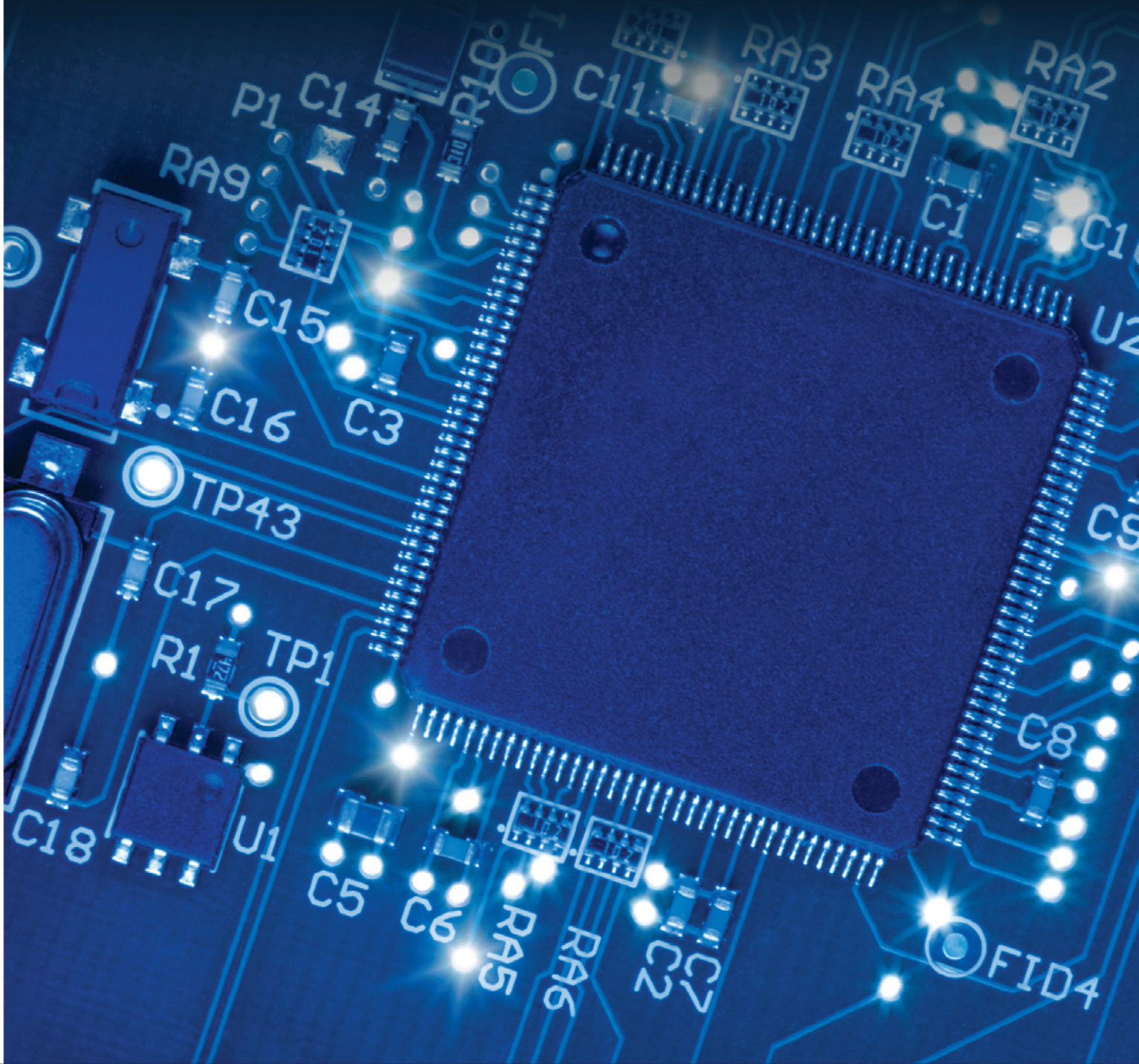




# Master Components Selector Guide



# ON Semiconductor Master Components Selector Guide

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AC–DC Controllers and Regulators; Amplifiers and Comparators; Analog Switches; Bipolar Transistors; Clock and Data Distribution; Clock Generation; Custom; DC–DC Controllers, Converters, and Regulators; Digital Potentiometers; Diodes and Rectifiers; Drivers; DSP Systems; EMI/RFI Filters; IGBTs and FETs; Interfaces; Memory; Standard Logic; Thermal Management; Thyristors; Voltage and Current Management

SG388/D  
Rev. 12, June–2011



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# Table of Contents

	Page		Page
<b>AC–DC Controllers and Regulators</b> . . .	<b>5</b>	<b>Clock Generation</b> . . . . .	<b>81</b>
Off–Line Controllers . . . . .	8	Crystal Oscillators . . . . .	84
Off–Line Regulators . . . . .	11	Phase/Frequency Detectors . . . . .	85
Power Factor Controllers . . . . .	10	PLL Clock Generators . . . . .	85
Secondary Side Controllers . . . . .	10	Spread Spectrum EMI Reduction Clocks . . . . .	86
<b>Amplifiers and Comparators</b> . . . . .	<b>13</b>	VCOs . . . . .	88
Audio Amplifiers . . . . .	16	Zero Delay Buffers . . . . .	89
Compandors . . . . .	16	<b>Custom</b> . . . . .	<b>91</b>
Comparators . . . . .	16	Digital ASICs . . . . .	94
Operational Amplifiers . . . . .	17	Custom Foundry Services . . . . .	94
Video Amplifiers . . . . .	19	<b>DC–DC Controllers, Converters, and</b>	
<b>Analog Switches</b> . . . . .	<b>21</b>	<b>Regulators</b> . . . . .	<b>95</b>
Audio Switches . . . . .	24	Battery Charge Controllers . . . . .	98
Data Switches . . . . .	24	Charge Pumps . . . . .	98
Signal Switches . . . . .	25	DC–DC Controllers . . . . .	98
<b>Bipolar Transistors</b> . . . . .	<b>27</b>	DC–DC Converters . . . . .	100
Bipolar Power Transistors . . . . .	30	Linear Voltage Regulators . . . . .	103
Discrete Transistors . . . . .	31	Single Linear Voltage Regulators . . . . .	103
Darlington Transistors . . . . .	46	Dual Linear Voltage Regulators . . . . .	110
Audio . . . . .	38	PoE Controllers . . . . .	111
Electronic Lamp Ballasts . . . . .	39	<b>Digital Potentiometers</b> . . . . .	<b>113</b>
Small–Signal Bipolar Transistors . . . . .	40	Digitally Programmable Potentiometers . . . . .	116
General–Purpose Transistors . . . . .	40	<b>Diodes and Rectifiers</b> . . . . .	<b>119</b>
General–Purpose Multiple Transistors . . . . .	45	Tuning and Switching Diodes . . . . .	122
Low Noise and Good $h_{FE}$ Linearity . . . . .	46	Abrupt Junction Tuning Diodes . . . . .	122
Darlington Transistors . . . . .	46	Hyper–Abrupt Junction Tuning Diodes . . . . .	122
High Current Transistors . . . . .	47	Schottky Diodes . . . . .	123
High Voltage Transistors . . . . .	49	Pin Switching Diodes . . . . .	125
RF Transistors . . . . .	50	General Purpose Signal & Switching Diodes . . . . .	126
Switching Transistors . . . . .	50	Zener Diodes – Regulation in Axial Leads . . . . .	128
Multiple Switching Transistors . . . . .	51	Zener Diodes – Regulation in Surface Mount . . . . .	130
Digital Transistors (Bias Resistor Transistors) . . . . .	52	Dual Zeners – Duals in Surface Mount . . . . .	136
Dual Digital Transistors . . . . .		TVS Diodes – In Axial Leads . . . . .	139
(Bias Resistor Transistors) . . . . .	54	TVS Diodes – In Surface Mount . . . . .	142
Combinational Digital Transistors . . . . .		ESD Protection Diodes . . . . .	155
(Bias Resistor Transistors) . . . . .	55	TVS/ESD Protection . . . . .	175
Complex Digital Transistors . . . . .	57	Application Specific Rectifiers . . . . .	187
Low Saturation Voltage Transistors . . . . .	58	Low $V_F$ Schottky . . . . .	187
Load Switch Transistors . . . . .	59	Low Leakage Schottky . . . . .	188
<b>Clock and Data Distribution</b> . . . . .	<b>61</b>	High Voltage Schottky . . . . .	188
Arithmetic Functions . . . . .	64	MEGAHERTZ™ . . . . .	188
Drivers and Fanout Buffers . . . . .	65	UltraSoft Rectifiers . . . . .	188
Flip–Flops, Latches and Registers . . . . .	65	Energy Rated Rectifiers . . . . .	188
Logic Gates . . . . .	74	SCHOTTKY Rectifiers . . . . .	189
Multiplexers and Crosspoint Switches . . . . .	75	Surface Mount Schottky . . . . .	189
Serial/Parallel Converters . . . . .	77	Axial Lead Schottky . . . . .	192
Skew Management . . . . .	78	TO–220 Type Schottky . . . . .	193
Translators . . . . .	78	TO–218 Types and TO–247 Schottky . . . . .	195
		UltraSoft Rectifiers . . . . .	195

	Page
<b>Diodes and Rectifiers (cont.)</b>	
Ultrafast Rectifiers	196
Surface Mount Ultrafast	196
Axial Lead Ultrafast	197
TO–220 Type Ultrafast	198
TO–218 Types and TO–247 Ultrafast	198
Fast Recovery Rectifiers/General Purpose Rectifiers	199
<b>Drivers</b>	<b>201</b>
Display/LED Drivers	204
Load/Relay Drivers	
Load Drivers	207
Relay Drivers	207
MOSFET/IGBT Drivers	208
Motor Drivers	208
<b>DSP Systems</b>	<b>211</b>
Audio DSP Systems	214
<b>EMI/RFI Filters</b>	<b>215</b>
Audio Filters	218
Data Filters	218
<b>IGBTs and FETs</b>	<b>221</b>
IGBTs	224
JFETs	224
MOSFETs	224
Protected MOSFETs	236
<b>Interfaces</b>	<b>237</b>
Data Transmitters and Transceivers	240
HART and MAU	240
LIN and CAN Transceivers	240
I/O Expanders	241
Modulators/Demodulators	241
PLC Modems	241
Sensor Interfaces	241
SMART and SIM Card Interfaces	242

	Page
<b>Memory</b>	<b>243</b>
NVRAM	246
Parallel EEPROM	249
Serial EEPROM	246
SRAM	249
<b>Standard Logic</b>	<b>251</b>
Arithmetic Functions	254
Buffers	255
Flip–Flops	260
Latches and Registers	261
Logic Gates	263
Multiplexers	271
Multivibrators	273
Transceivers	273
Translators	274
<b>Thermal Management</b>	<b>277</b>
Fan Controllers	280
Temperature Sensors	281
<b>Thyristors</b>	<b>283</b>
Programmable Unijunction Transistors (PUTs)	286
SIDACs	286
Silicon Controlled Rectifiers (SCRs)	286
Thyristor Surge Protection Devices (TSPDs)	287
TRIACs	288
<b>Voltage and Current Management</b>	<b>291</b>
Current Protection	294
Voltage Protection	294
Voltage References	294
Voltage Supervisors	295
<b>Index</b>	<b>297</b>

NOTE: The **Tape & Reel Specification** information has been moved to its own publication. Please see ON Semiconductor brochure, BRD8011/D, for information on Tape & Reel.

# AC-DC Controllers and Regulators

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# AC–DC Controllers and Regulators

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## Table of Contents

	Page
Off-Line Controllers .....	8
Off-Line Regulators .....	11
Power Factor Controllers .....	10
Secondary Side Controllers .....	10



## ON Semiconductor Selector Guide – AC–DC Controllers and Regulators

### OFF-LINE CONTROLLERS

Device	Topology	Control Mode	f <sub>sw</sub> Typ (kHz)	Stand-by Mode	UVLO (V)	Short-Circuit Protection	Latch	Soft Start	V <sub>CC</sub> Max (V)	Drive Cap. (mA)	Package
CS5124	Flyback	Current Mode	400	No	Yes	No	No	Yes	75	200	SOIC–8
MC33060A	Flyback	Voltage Mode	200	No	Yes	No	No	Yes	42	200	PDIP–14; SOIC–14
MC33067	Flyback	Voltage Mode	1000	No	Yes	Yes	No	Yes	20	200 / 200	PDIP–16; SOIC–16W
MC33364	Flyback	Current Mode		Yes	Yes	No	No	No	16	220 / 600	SOIC–16; SOIC–8
MC44603A	Flyback	Current/Voltage Mode	Up to 250	Yes	9 V	Yes	Yes	Yes	18	750 / 750	SOIC–16W
NCL30000	Flyback		Up to 300						20	500 / 800	SOIC–8
NCL30001	Flyback	Current Mode	Up to 150						20	1000 / 1000	SOIC–16
NCP1200	Flyback	Current Mode	40; 60; 100	Yes	No	Yes	No	No	16	250 / 250	PDIP–8; SOIC–8
NCP1203	Flyback	Current Mode	40; 60; 100	Yes	Yes	Yes	No	No	16	250	PDIP–8; SOIC–8
NCP1207A	Flyback	Current Mode	Up to 1000	Yes	yes	Yes	Yes	Yes	16	500 / 500	PDIP–8; SOIC–8
NCP1207B	Flyback	Current Mode	Up to 1000	Yes	Yes	Yes	Yes	Yes	18	500 / 500	SOIC–8
NCP1216	Flyback	Current Mode	65; 100; 133	Yes	No	Yes	No	No	16	500	PDIP–8; SOIC–8
NCP1216A	Flyback	Current Mode	65; 100; 133	Yes	No	Yes	No	Yes	16	500	PDIP–8; SOIC–8
NCP1217	Flyback	Current Mode	65; 100; 133	Yes	Yes	Yes	Yes	No	16	500	PDIP–8; SOIC–8
NCP1217A	Flyback	Current Mode	65; 100; 133	Yes	Yes	Yes	Yes	Yes	16	500	PDIP–8; SOIC–8
NCP1218	Flyback	Current Mode	65	Yes	9.4 V	Yes	Yes	Yes	20	500 / 800	SOIC–8
NCP1219	Flyback	Current Mode	65; 100	Yes	9.4 V	Yes	Yes	Yes	20	500 / 800	SOIC–8
NCP1230	Flyback	Current Mode	65; 100; 133	Yes	Yes	Yes	Yes	Yes	18	500 / 800	PDIP–8; SOIC–8
NCP1234	Flyback	Current Mode	65		9.5	Yes	Yes	Yes	28	500 / 500	SOIC–8
NCP1236	Flyback	Current Mode	65			Yes	Yes	Yes	28	500 / 500	SOIC–8
NCP1237	Flyback	Current Mode	65			Yes	Yes	Yes	28	1000 / 1000	SOIC–8
NCP1238	Flyback	Current Mode	65			Yes	Yes	Yes	28	1000 / 1000	SOIC–8
NCP1250	Flyback	Current Mode	65	Yes	8.8 V	Yes	Yes	Yes	28	300 / 500	TSOP–6
NCP1251	Flyback	Current Mode	65	Yes	8.8	Yes	Yes	Yes	28	300 / 500	TSOP–6
NCP1271	Flyback	Current Mode	65; 100	Yes	Yes	Yes	Yes	Yes	20	500 / 800	PDIP–8; SOIC–8
NCP1288	Flyback	Current Mode	65		10 V	Yes	Yes	Yes	28	1000 / 1000	SOIC–8
NCP1308	Flyback	Current Mode	Variable	Yes	Yes	Yes	Yes	Yes	16	500 / 500	SOIC–8
NCP1337	Flyback	Current Mode	Variable	Yes	Yes	Yes	Yes	Yes	20	500 / 500	PDIP–8; SOIC–8
NCP1338	Flyback	Current Mode	Variable	Yes	Yes	Yes	Yes	Yes	20	500 / 500	SOIC–8
NCP1351	Flyback	Current Mode	Variable	No	Yes	Yes	Yes	No	28	400 / 400	PDIP–8; SOIC–8
NCP1377	Flyback	Current Mode	Variable	Yes	Yes	No	Yes	Yes	16	500 / 500	PDIP–8; SOIC–8
NCP1379	Flyback	Current Mode	Variable	Yes	9	Yes	Yes	Yes	28	500 / 800	SOIC–8
NCP1380	Flyback	Current Mode	Variable	Yes	9	Yes	No; Yes	Yes	28	500 / 800	SOIC–8

OFF-LINE CONTROLLERS (continued)

Device	Topology	Control Mode	f <sub>sw</sub> Typ (kHz)	Stand-by Mode	UVLO (V)	Short-Circuit Protection	Latch	Soft Start	V <sub>CC</sub> Max (V)	Drive Cap. (mA)	Package
NCP1381	Flyback	Current Mode	Variable	Yes	Yes	Yes	Yes	Yes	20	500 / 800	SOIC-14
NCP1382	Flyback	Current Mode	Variable	Yes	Yes	Yes	Yes	Yes	20	500 / 800	SOIC-14
NCP1562	Flyback	Voltage Mode	Up to 500	No	Yes	Yes	Yes	Yes	20	2500 / 2500	SOIC-16; TSSOP-16
NCV3843B	Flyback	Current Mode	52	No	Yes	Yes	No	Yes	30	200 / 200	SOIC-14; SOIC-8
UC2842B	Flyback	Current Mode	52	No	Yes	Yes	No	No	30	200 / 200	PDIP-8; SOIC-14; SOIC-8
UC2843B	Flyback	Current Mode	52	No	Yes	Yes	No	No	30	200 / 200	PDIP-8; SOIC-14; SOIC-8
UC2844B	Flyback	Current Mode	52	No	Yes	Yes	No	No	30	200 / 200	PDIP-8; SOIC-14; SOIC-8
UC2845B	Flyback	Current Mode	52	No	Yes	Yes	No	No	30	200 / 200	PDIP-8; SOIC-14; SOIC-8
UC3842B	Flyback	Current Mode	52	No	Yes	Yes	No	No; Yes	30	200 / 200	PDIP-8; SOIC-14; SOIC-8
UC3843B	Flyback	Current Mode	52	No	Yes	Yes	No	No; Yes	30	200 / 200	PDIP-8; SOIC-14; SOIC-8
NCP1252	Flyback; Forward	Current Mode	Up to 500	Yes	9 to 10 V (typ)	Yes	Yes	Yes	28	500 / 800	SOIC-8
NCP1294	Flyback; Forward; Half-Bridge; Step-Down; Step-Up										SOIC-16; TSSOP-16
CS51221	Forward	Voltage Mode	Up to 1000	No	Yes	No	Yes	Yes	15	1000	SOIC-16
NCP1392	Half-Bridge	Current Mode	250	No	9 V	No	No	Yes	16	500 / 1000	SOIC-8
NCP1393	Half-Bridge	Current Mode	250	No	9 V	No	No	Yes	16	500 / 1000	SOIC-8
NCP1910	Half-Bridge	Current Mode	Up to 500	Yes	9/10.4	Yes	Yes	Yes	20	500 / 1000	SOIC-24
MC33025	Push-Pull	Current / Voltage Mode	1000	No	Yes	Yes	No	Yes	30	200 / 200	SOIC-16W
NCP1395	Push-Pull	Voltage Mode	1000	Yes	Yes	Yes	Yes	Yes	20	180 / 180	PDIP-16; SOIC-16
NCP1396	Push-Pull	Voltage Mode	Up to 500	Yes	Yes	Yes	Yes	Yes	20	500 / 1000	SOIC-16
MC34060A		Voltage Mode	200	No	Yes	No	No		42	200	PDIP-14; SOIC-14
NCP1397					9.5 / 10.5	Yes	Yes	Yes	20	500 / 1000	SOIC-16
UC3844B		Current Mode	52	No	Yes	Yes	No	No; Yes	25	200 / 200	PDIP-8; SOIC-14; SOIC-8
UC3845B		Current Mode	52	No	Yes	Yes	No	No; Yes	25	200 / 200	PDIP-8; SOIC-14; SOIC-8

## ON Semiconductor Selector Guide – AC–DC Controllers and Regulators

### POWER FACTOR CONTROLLERS

Device	PFC Mode	Frequency Operation	Control Mode	Topology	f <sub>sw</sub> Typ (kHz)	V <sub>CC</sub> Max (V)	Drive Cap. (mA)	UVLO	Latch	UVP	Inhibition	Package
NCL30001	CCM	Fixed	Current Mode	Flyback	Up to 150	20	1000 / 1000					SOIC–16
NCP1650	CCM	Fixed	Current Mode	Step–Up	25 – 250	20	1500 / 1500	10 – 10.5	Yes	No	Yes	SOIC–16
NCP1653	CCM	Fixed	Current Mode	Step–Up	67; 100	18	1000 / 1000	8.7 – 13.25	Yes	Fixed	Yes	PDIP–8; SOIC–8
NCP1654	CCM	Fixed	Current Mode	Step–Up	65000; 133000; 200000	20	1500 / 1500	10.5 – 13.75	No	Yes	Yes	SOIC–8
NCP1910	CCM	Variable	Current Mode	Half–Bridge	Up to 500	20	500 / 1000	9/10.4	Yes	Yes	Yes	SOIC–24
NCP1652	CCM; DCM	Fixed	Current Mode	Step–Down	100; 100000	20	1	9.3 – 11.3	Yes	Yes		SOIC–16; SOIC–20W
MC33260	CRM	Variable	Voltage Mode	Step–Up	Variable	16	500 / 500	8.5 – 11	Yes	Fixed	Yes	PDIP–8; SOIC–8
MC33262	CRM	Variable	Current Mode	Step–Up	Variable	30	500 / 500	8 – 13	Yes	No	Yes	PDIP–8; SOIC–8
MC33368	CRM	Variable	Current Mode	Step–Up	Variable	16	1000 / 1000	8.5 – 13	Yes	No	Yes	SOIC–16
NCL30000	CRM	Variable		Flyback	Up to 300	20	500 / 800			Yes	Yes	SOIC–8
NCP1607	CRM	Variable	Voltage Mode	Step–Up	Variable	20	500 / 800	9.5 – 12 V	Yes	Yes	Yes	SOIC–8
NCP1608	CRM	Variable	Voltage Mode	Step–Up	Variable	20	500 / 800	9.5–12	No	Yes	No	SOIC–8
NCP1631	CRM	Variable	Voltage Mode	Step–Up		20	500 / 500	9.5 – 12 V	Yes	Yes		SOIC–16
NCP1601	CRM; DCM	Fixed; Variable	Voltage Mode	Step–Up	Up to 400	18	500 / 800	9 – 10.5; 9 – 13.75	Yes	Fixed		PDIP–8; SOIC–8
NCP1605	DCM	Fixed	Voltage Mode	Step–Up	Up to 250	20	500 / 800	9 – 15	Yes	Fixed; Yes	Yes	SOIC–16
MC34262			Current Mode	Boost		30	500 / 500	Yes	Fixed	No	Yes	PDIP–8; SOIC–8

### SECONDARY SIDE CONTROLLERS

Device	Description	V <sub>CC</sub> Max (V)	V <sub>ref</sub> Typ (V)	I <sub>CC</sub> Max (A)	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
NCP4303	Universal Synchronous Rectification Driver	30					SOIC–8
NCP4330	Secondary Side Synchronous Controller	20	2.5	0.02	–40	125	SOIC–8

OFF-LINE REGULATORS

Device	Control Mode	f <sub>sw</sub> Typ (kHz)	f <sub>Jitter</sub> Typ (%)	Stand-by Mode	R <sub>DS(ON)</sub> Typ (Ω)	V <sub>(BR)DSS</sub> Max (V)	I <sub>peak</sub> (mA)	HV Start-up Min (V)	DSS (mA)	UVLO	Short Circuit Protection	Over Power Comp.	Brown-out	Latch	Package Type
NCP1010	Current Mode	65; 100; 130	Yes	Yes	25	700	100	Yes	8.5	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
NCP1011	Current Mode	65; 100; 130	Yes	Yes	25	700	250	Yes	8.5	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
NCP1012	Current Mode	65; 100; 130; 133	Yes	Yes	11	700	250	Yes	8	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
NCP1013	Current Mode	65; 100; 130; 133	Yes	Yes	11	700	350	Yes	8	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
NCP1014	Current Mode	65; 100	Yes	Yes	11	700	450	Yes	8	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
NCP1015	Current Mode	65; 100	Yes	Yes	11	700	450	Yes	8	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
NCP1027	Current Mode	65; 100	Yes	Yes	5.6	700	800	Yes	N/A	Yes	Yes	Yes	Yes	Yes	PDIP-8
NCP1028	Current Mode	65; 100	Yes	Yes	5.6	700	800	Yes	N/A	Yes	Yes	Yes	Yes	No	PDIP-8
NCP1050	Gated Oscillator	44; 100; 136	Yes	Yes	30	700	100	Yes	6.3	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
NCP1051	Gated Oscillator	44; 100; 136	Yes	Yes	30	700	200	Yes	6.3	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
NCP1052	Gated Oscillator	44; 100; 136	Yes	Yes	30	700	300	Yes	6.3	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
NCP1053	Gated Oscillator	44; 100; 136	Yes	Yes	15	700	400	Yes	6.3	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
NCP1054	Gated Oscillator	44; 100; 136	Yes	Yes	15	700	530	Yes	6.3	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
NCP1055	Gated Oscillator	45.5; 100; 140	Yes	Yes	15	700	680	Yes	6.3	Yes	Yes	No	No	Yes	PDIP-8; SOT-223-4 / TO-261-4
MC33363A	Voltage Mode	285	No	No	14	700	400	Yes	No	Yes	No	No	No	No	SOIC-16W
MC33363B	Voltage Mode	285	No	No	14	700	400	Yes	No	Yes	No	No	No	No	SOIC-16W
NCP1030	Voltage Mode	300	No	No	4.1	200	515	Yes	12.5	Yes	No	No	No	Yes	Micro8
NCP1031	Voltage Mode	Up to 1000	No	No	2.1	200	1050	Yes	16	Yes	No	No	No	Yes	DFN-8; SOIC-8



# Amplifiers and Comparators

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# Amplifiers and Comparators

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## Table of Contents

	Page
Audio Amplifiers .....	16
Compandors .....	16
Comparators .....	16
Operational Amplifiers .....	17
Video Amplifiers .....	19



**AUDIO AMPLIFIERS**

Device	Class	Output Power Typ (W)	Output Type	Efficiency Typ (%)	t <sub>on</sub> Typ (ms)	THD + N Typ (%)	I <sub>Q</sub> Typ (mA)	I <sub>SD</sub> Typ (nA)	Package
NCP2809	AB	0.135	–	63	285		1.5	10	Micro10; UDFN-10
NCP2811	AB	0.11	–		1	0.01	6	10	Flip-Chip-12; TSSOP-14; WQFN-12
NCP2890	AB	–	BTL	63	285	0.02	1.5	10	Flip-Chip-9; Micro8
NCP2892	AB	1.3	BTL	63	90	0.01	1.5	10	Flip-Chip-9
NCP2892B	AB	1.3	BTL	63	90	0.01	1.5	10	Flip-Chip-9
NCP2990	AB	1.3	BTL	63	70	0.01	1.7	10	Flip-Chip-9
NCP2991	AB	1.35	BTL	64	30	0.015	1.8	20	Flip-Chip-9
NCP4894	AB	–	Differential	64	140	0.01	1.9	20	DFN-10; Flip-Chip-9; Micro10
NCS2211	AB	1.5	BTL	63	0.001	0.2	20	1000	DFN-8; SOIC-8
NCP2704	D	1.4	Differential	87	1	0.1	3.6	100	Flip-Chip-20
NCP2820	D	2.12; 2.19	Differential	87; 90	0.001; 1; 9	0.05	2.2	300	DFN-8; Flip-Chip-9
NCP2823	D	1.5; 3	BTL	90; 92	7.4	0.08	1.8; 2.6	10	Flip-Chip-9
NCP2824	D	1.2	BTL	86	7.4	0.06	2.2	10	Flip-Chip-9
NCS8353	D	–	BTL	83	450	0.03	33	0.1	QFN-32
NLMD5820	D	–	Differential	87	0	0.05	2.2	300	UDFN-16

**COMPANDORS**

Device	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>CC</sub> Max (mA)	THD Typ (%)	e <sub>n</sub> Typ (μV)	V <sub>ref</sub> (V)	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
NE570	2	6	24	4.3	0.3	20	1.8	0	70	SOIC-16W
SA571	2	6	18	4.3	0.5	20	1.8	-40	85	PDIP-16; SOIC-16W
SA572	2	6	22	6.3	0.05	6	2.5	-40	85	PDIP-16; SOIC-16W; TSSOP-16
SA575	2	3	7	4.2	0.12	6	2.5	-40	85	PDIP-20; SOIC-20W; TSSOP-20

**COMPARATORS**

Device	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>O</sub> Typ (mA)	I <sub>CC</sub> Typ (mA)	t <sub>res</sub> Typ (ns)	V <sub>IO</sub> Max (mV)	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
LM211	1	5	36	8	2.4	200	3	-25	85	SOIC-8
LM311	1	5	36	8	2.4	200	7.5	0	70	PDIP-8; SOIC-8
LMV331	1	-40	5	84	0.06	800	9	2.7	85	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NCS2200	1	0.85	6	70	0.01	1100	5	-40	105	DFN-6; SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NCS2200A	1	0.85	6	60	0.01	1100	5	-40	105	UDFN-6
NCS2202	1	0.85	6	70	0.01	1100	5	-40	105	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
LM2903	2	2	36	16	0.7	1500	7	-40	105	Micro8; PDIP-8; SOIC-8
LM2903V	2	2	36	16	0.7	1500	7	-40	125	PDIP-8; SOIC-8

**COMPARATORS** (continued)

Device	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>O</sub> Typ (mA)	I <sub>CC</sub> Typ (mA)	t <sub>res</sub> Typ (ns)	V <sub>IO</sub> Max (mV)	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
LM293	2	2	36	16	0.7	1300	5	-25	85	Micro8; SOIC-8
LM393	2	2	36	16	0.7	1300	5	0	70	Micro8; PDIP-8; SOIC-8
LMV393	2	2.7	5.5	84	0.1	800	9	-40	85	Micro8; SOIC-8; UDFN-8
MC10E1651	2	-	-	50	-	-	-	0	85	PLLCC-20
MC10E1652	2	-	-	50	-	-	-	0	85	PLLCC-20
NCS2220	2	0.85	6	60	0.075	500	5	-40	105	UDFN-8
NCV2903	2	2	36	16	0.7	1500	7	-40	125	Micro8; SOIC-8
NE521	2	-7	7	-100	27	9.6	7.5	0	70	PDIP-14; SOIC-14
LM239	4	3	36	16	1	1300	5	-25	85	PDIP-14; SOIC-14; TSSOP-14
LM2901	4	3	36	16	1	1300	7	-40	105; 125	PDIP-14; SOIC-14; TSSOP-14
LM339	4	3	36	16	1	1300	5	0	70	PDIP-14; SOIC-14; TSSOP-14
LMV339	4	2.7	5	84	0.17	800	9	-40	85	SOIC-14; TSSOP-14
MC3302	4	3	30	16	1	1300	20	-40	85	PDIP-14; SOIC-14; TSSOP-14
NCV2901	4	3	36	16	1	1300	7	-40	125; 150	SOIC-14; TSSOP-14

**OPERATIONAL AMPLIFIERS**

Device	Channels	Rail to Rail	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>O</sub> Min (mA)	I <sub>O</sub> Typ (mA)	I <sub>D</sub> Typ (mA)	GBW Typ (MHz)	SR Typ (V/μs)	V <sub>IO</sub> Max (mV)	Package Type
LM201A	1	No	3	22	-	-	1.8	1	0.5	2	PDIP-8; SOIC-8
LM301A	1	No	3	18	-	-	1.2	1	0.5	7.5	PDIP-8; SOIC-8
LMV301	1	Yes	1.8	5.5	10	60	0.2	1	1	9	SC-88A-5 / SC-70-5 / SOT-323-5
LMV321	1	Yes	2.5	5.5	10	160	0.25	1	1	9	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
LMV821	1	Yes	2.5	5.5	12	26	0.3	5	2	3.5	SC-88A-5 / SC-70-5 / SOT-323-5
LMV931	1	Yes	1.8	5	68	80	0.21	1.5	0.48	6	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
LMV981	1	Yes	1.8	5	58	80	0.21	1.5	0.48	6	ULLGA-8
MC33071	1	No	3	44	10	30	1.9	4.5	10	5	PDIP-8; SOIC-8
MC33171	1	No	3	44	3	5	0.22	1.8	2.1	4.5	PDIP-8; SOIC-8
MC33201	1	Yes	1.8	12	50	80	0.9	2.2	1	6	PDIP-8; SOIC-8
MC34071	1	No	3	44	10	30	1.9	4.5	10	5	PDIP-8; SOIC-8
MC34071A	1	No	3	44	10	30	1.9	4.5	10	3	PDIP-8; SOIC-8
NCS2001	1	Yes	0.9	7	40	76	0.82	1.4	1.6	6	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NCS2002	1	Yes	0.9	7	65	86	0.002	1	1.2	6	TSOP-6
NCS7101	1	Yes	1.8	10	50	72	1.13	1	1.2	7	TSOP-5 / SOT23-5
NCV2002	1	Yes	0.9	7	-	86	0.002	1	1.2	6	TSOP-6

## ON Semiconductor Selector Guide – Amplifiers and Comparators

### OPERATIONAL AMPLIFIERS (continued)

Device	Channels	Rail to Rail	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>O</sub> Min (mA)	I <sub>O</sub> Typ (mA)	I <sub>D</sub> Typ (mA)	GBW Typ (MHz)	SR Typ (V/μs)	V <sub>IO</sub> Max (mV)	Package Type
NE5230	1	Yes	1.8	15	4	6	0.11	0.25	0.09	3	PDIP-8; SOIC-8
NE5534	1	No	3	20		38	6.5; 8	10	13	2; 4	PDIP-8; SOIC-8
TLV271	1	Yes	2.7	16	5	13	0.56	3	2.6	5	TSOP-5 / SOT23-5
LM258	2	No	3	32	20	40	1.5	1	0.6	5	Micro8; PDIP-8; SOIC-8
LM2904	2	No	3	32	20	40	1.5	1	0.6	7	Micro8; PDIP-8; SOIC-8
LM2904V	2	-	3	32	20	40	1.5	1	0.6	7	Micro8; PDIP-8; SOIC-8
LM358	2	No	3	32	20	40	1.5	1	0.6	3; 7	Micro8; PDIP-8; SOIC-8
LM392	2	No	3	30	20	40	60	1	0.1	5	SOIC-8
LM833	2	No	5	18	-	29	4	15	7	5	PDIP-8; SOIC-8
LMV358	2	Yes	2.5	5.5	10	160	0.44	1	1	9	Micro8; SOIC-8; UDFN-8
LMV982	2	Yes	1.8	5	58	80	0.42	1.5	0.48	7.5	UQFN-10
MC33072	2	No	3	44	10	30	3.8	4.5	10	3; 5	PDIP-8; SOIC-8
MC33077	2	No	2.5	18	10	26	3.5	37	11	1	PDIP-8; SOIC-8
MC33078	2	No	5	18	15	29	4.1	16	7	2	PDIP-8; SOIC-8
MC33172	2	No	3	44	-	5	0.44	1.8	2.1	4.5	PDIP-8; SOIC-8
MC33178	2	No	4	36	50	80	0.9	5	2	3	Micro8; PDIP-8; SOIC-8
MC33202	2	Yes	1.8	12	50	80	1.8	2	1	8	Micro8; PDIP-8; SOIC-8
MC33272A	2	No	3	36	25	37	4.3	24	10	1; 2.5	PDIP-8; SOIC-8
MC34072	2	No	3	44	10	30	3.8	4.5	10	5	PDIP-8; SOIC-8
MC34072A	2	No	3	44	10	30	3.8	4.5	10	3; 5	PDIP-8; SOIC-8; WQFN-10
NCS5650	2	Yes	6; +3,-3	12; +6,-6	-	1500	20	60; 80	80	10	QFN-20
NCV2904	2	No	3	32	20	40	1.5	1	0.6	7	Micro8; SOIC-8
NCV33072	2	No	3	44	10	30	3.8	4.5	10	5	SOIC-8
NCV33202	2	Yes	1.8	12	50	80	1.8	2	1	8	SOIC-8
NE5517	2	No	-	-	-	-	-	-	50	-	PDIP-16; SOIC-16
NE5532	2	No	3	20	10	38	8	10	9	2; 4	PDIP-8; SOIC-16W; SOIC-8
TCA0372	2	No	5	40		1000	5	1.4	1.4	15	PDIP-16; PDIP-8; SOEIAJ-16; SOIC-16W
LM224	4	No	3	32	20	40	1.4	1	0.6	5	PDIP-14; SOIC-14; TSSOP-14
LM2902	4	No	3	32	20	40	1.4	1	0.6	7	PDIP-14; SOIC-14; TSSOP-14
LM2902V	4	No	3	32	20	40	1.4	1	0.6	7	SOIC-14; TSSOP-14
LM324	4	No	3	32	20	40	1.4	1	0.6	7	PDIP-14; SOIC-14; TSSOP-14
LM324A	4	No	3	32	20	40	1.4	1	0.6	3	PDIP-14; SOIC-14; TSSOP-14
LMV324	4	Yes	2.5	5.5	10	160	0.83	1	1	9	SOIC-14; TSSOP-14

**OPERATIONAL AMPLIFIERS** (continued)

Device	Channels	Rail to Rail	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>O</sub> Min (mA)	I <sub>O</sub> Typ (mA)	I <sub>D</sub> Typ (mA)	GBW Typ (MHz)	SR Typ (V/μs)	V <sub>IO</sub> Max (mV)	Package Type
LMV824	4	Yes	2.5	5.5	12	26	1.3	5	2	3.5	SOIC-14; TSSOP-14
MC3303	4	No	3	36	10	30	2.8	1	0.6	8	PDIP-14; SOIC-14
MC33074	4	No	3	44	10	30	7.6	4.5	10	3; 5	PDIP-14; SOIC-14; TSSOP-14
MC33079	4	No	5	18	15	29	8.4	16	7	2	PDIP-14; SOIC-14
MC33174	4	No	3	44	3	5	0.88	1.8	2.1	4.5	PDIP-14; SOIC-14; TSSOP-14
MC33179	4	No	4	36	50	80	1.7	5	2	3	PDIP-14; SOIC-14; TSSOP-14
MC33204	4	Yes	1.8	12	50	80	3.6	2.2	1	10	PDIP-14; SOIC-14; TSSOP-14
MC33274A	4	No	3	36	25	37	8.6	24	10	1	PDIP-14; SOIC-14; TSSOP-14
MC3403	4	No	3	36	10	20	2.8	1	0.6	10	PDIP-14; SOIC-14
MC34074	4	No	3	44	10	30	7.6	4.5	10	3; 5	PDIP-14; SOIC-14
MC34074A	4	No	3	44	10	30	7.6	4.5	10	3	PDIP-14; SOIC-14
NCV2902	4	No	3	32	20	40	1.4	1	0.6	7	SOIC-14; TSSOP-14
NCV33204	4	Yes	1.8	12	50	80	3.6	2	1	10	SOIC-14; TSSOP-14
NCV33274A	4	No	3	36	25	37	8.6	24	10	1	SOIC-14; TSSOP-14

**VIDEO AMPLIFIERS**

Device	Channels	GBW Typ (MHz)	V <sub>CC</sub> Max (V)	I <sub>D</sub> Typ (mA)	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
NCS2561	1	8	3.3	0.0015	-40	125	SC-88-6 / SC-70-6 / SOT-363-6
NE592	1	40; 90	8	18	0	70	PDIP-14; PDIP-8; SOIC-14; SOIC-8
NCS2553	3	8	5.5	23	-40	85	SOIC-8
NCS2563	3	30	5.5	-	-40	85	SOIC-8
NCS2554	4	8	5.5	40	-40	85	TSSOP-14
NCS2564	4	8; 34	5.3	40	-40	85	TSSOP-14
NCS2566	6	8; 34	5.3	65	-40	85	TSSOP-20



# Analog Switches

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# Analog Switches

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## Table of Contents

	<b>Page</b>
Audio Switches .....	24
Data Switches .....	24
Signal Switches .....	25



## ON Semiconductor Selector Guide – Analog Switches

### AUDIO SWITCHES

Device	Number of Elements	Channels	$r_{on}$ Max ( $\Omega$ )	$I_{ikg}$ Max ( $\mu A$ )	$V_{CC}$ Min (V)	$V_{CC}$ Max (V)	Package
NLAS4157	1	1	1	1	1.65	5.5	SC-88-6 / SC-70-6 / SOT-363-6
NLAS5123	1	1	1	1	1.65	5.5	UDFN-6; WDFN-6
NS5B1G385	1	1	7	1	2	5.5	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NLAS3699	2	4	0.5	1	1.65	3.6	QFN-16
NLAS3699B	2	4	0.75	1	1.65	4.5	QFN-16
NLAS3799B	2	4	0.4	1	1.65	4.5	QFN-16; UQFN-16
NLAS4684	2	2	0.5	1	1.8	5.5	DFN-10; Flip-Chip-10; Micro10
NLAS5157	2	2	0.5	1	1.65	4.3	UDFN-6
NLAS5213	2	2	1.3	1	1.65	4.5	UDFN-8; US8
NLAS5223	2	2	0.5	1	1.65	3.6	WQFN-10
NLAS52231	2	2	0.5	1	1.65	4.5	UQFN-10
NLAS5223B	2	2	0.5	1	1.65	4.5	UQFN-10; WQFN-10
NLAS4783	3	3	1.2	1	1.65	3.6	QFN-16
NLAS4783B	3	3	1.2	1	1.65	4.5	QFN-16
NLAS3799	4	2	0.5	1	1.65	3.6	QFN-16
NLMD5820	4	2	0.5	2	1.65	4.2	UDFN-16
NS5S1153	4	2	4.6	0.08	2.7	5	UQFN-10
NLAS3899	-	-	4	1	1.65	4.3	QFN-16

### DATA SWITCHES

Device	Number of Elements	Channels	$r_{on}$ Max ( $\Omega$ )	$I_{ikg}$ Max ( $\mu A$ )	$V_{CC}$ Min (V)	$V_{CC}$ Max (V)	Package
NS5B1G384	1	1	7	1	2	-	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NS5B1G385	1	1	7	1	2	5.5	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NCN9252	2	6	6	1	1.65	4.5	UQFN-12
NLAS4717	2	2	4.5	1	1.8	5.5	Flip-Chip-10; Micro10
NLAS4717EP	2	2	4.5	1	1.8	5.5	Flip-Chip-10; WQFN-10
NLAS7213	2	2	9	1	1.65	4.5	UQFN-8
NLAS7222A	2	4	9	1	3	3.6	UQFN-10; WQFN-10
NLAS7222B	2	4	8	1	1.65	4.5	UQFN-10
NLAS7222C	2	4	8	1	1.65	4.5	UQFN-10
NLAS7242	2	2	7.5	1	1.65	4.5	UQFN-10

**DATA SWITCHES** (continued)

Device	Number of Elements	Channels	r <sub>on</sub> Max (Ω)	I <sub>ikg</sub> Max (μA)	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	Package
NLAS8252MUTAG	2	6	6	1	1.65	4.5	UQFN-12
NS5S1153	4	2	4.6	0.08	2.7	5	UQFN-10
NCN1154	6	3	–	0.08	2.7	5	UQFN-12
NS3L500	11	11	7	600	3	3.6	WQFN-56
NCN7200	14	7	16	0.1	3	3.6	WQFN-42
NCN2612	30	6	13	500	3	3.6	WQFN-56
NLAS3899	–	–	4	1	1.65	4.3	QFN-16

**SIGNAL SWITCHES**

Device	Number of Elements	Channels	r <sub>on</sub> Max (Ω)	I <sub>ikg</sub> Max (μA)	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	Package
MC14051B	1	8	500	0.1	3	18	PDIP-16; SOIC-16; TSSOP-16
MC14067B	1	16	500	0.1	3	18	SOIC-24
MC74HC4051A	1	8	190	0.2	2	12	PDIP-16; SOIC-16; SOIC-16W; TSSOP-16
MC74HC4851A	1	8	550	0.1	2	6	PDIP-16; SOIC-16; SOIC-16W; TSSOP-16
MC74LVX8051	1	8	30	0.2	2	6	SOIC-16; TSSOP-16
MC74LVXT8051	1	8	30	0.1	2	6	SOIC-16; TSSOP-16
MC74VHC1G66	1	1	45	0.1	2	5.5	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1GT66	1	1	45	0.1	2	5.5	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC4051	1	8	160	0.1	2	6	SOIC-16; TSSOP-16
NLAS4051	1	8	37	0.1	2.5	5.5	SOIC-16; TSSOP-16
NLAS4501	1	1	30	0.1	2	5.5	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NLAS4599	1	2	30	0.1	2	5.5	SC-88-6 / SC-70-6 / SOT-363-6; TSOP-6
NLAS5123	1	1	1	1	1.65	5.5	UDFN-6; WDFN-6
NLASB3157	1	1	7	1	1.65	5.5	SC-88-6 / SC-70-6 / SOT-363-6; WDFN-6
NLAST4051	1	8	37	0.1	2.5	5.5	TSSOP-16
NLAST4501	1	1	30	0.1	2	5.5	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NLAST4599	1	2	30	0.1	2	5.5	SC-88-6 / SC-70-6 / SOT-363-6; TSOP-6
NS5B1G385	1	1	7	1	2	5.5	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC14052B	2	4	500	0.1	3	18	PDIP-16; SOIC-16; TSSOP-16
MC74HC4052A	2	4	190	0.1	2	12	PDIP-16; SOIC-16; SOIC-16W; TSSOP-16

## ON Semiconductor Selector Guide – Analog Switches

### SIGNAL SWITCHES (continued)

Device	Number of Elements	Channels	$r_{on}$ Max ( $\Omega$ )	$I_{ikg}$ Max ( $\mu A$ )	$V_{CC}$ Min (V)	$V_{CC}$ Max (V)	Package
MC74HC4852A	2	4	2,550	0.1	2	6	PDIP-16; SOIC-16; TSSOP-16
NLAS2066	2	2	11	0.1	1.65	5.5	US8
NLAS3158	2	2	6	1	1.65	5.5	DFN-12
NLAS323	2	1	30	0.1	2	5.5	US8
NLAS324	2	2	30	0.1	2	5.5	US8
NLAS325	2	2	30	0.2	2	5.5	US8
NLAS44599	2	2	30	0.2	2	5.5	QFN-16; TSSOP-16
NLAS4717EP	2	2	4.5	1	1.8	5.5	Flip-Chip-10; WQFN-10
NLAS5223	2	2	0.5	1	1.65	3.6	WQFN-10
NLAS9431	2	2	30	0.2	2	5.5	QFN-16
NLAST44599	2	2	30	0.2	2	5.5	QFN-16; TSSOP-16
NLAST9431	2	2	30	0.2	2	5.5	QFN-16
MC14053B	3	2	500	0.1	3	18	PDIP-16; SOIC-16; TSSOP-16
MC74HC4053A	3	2	190	0.1	2	12	PDIP-16; SOIC-16; SOIC-16W; TSSOP-16
MC74LVX8053	3	2	30	0.1	2	6	SOIC-16; TSSOP-16
MC74LVXT8053	3	2	30	0.1	2	6	SOIC-16; TSSOP-16
NLAS4053	3	2	37	0.1	2.5	5.5	SOIC-16; TSSOP-16
MC14016B	4	1	660	0.1	3	18	PDIP-14; SOIC-14
MC14066B	4	1	500	0.1	3	18	PDIP-14; SOIC-14; TSSOP-14
MC14551B	4	2	500	0.1	3	18	PDIP-16; SOIC-16
MC74HC4066A	4	1	120	0.1	2	12	PDIP-14; SOIC-14; TSSOP-14
MC74HC4316A	4	1	160	0.1	2	6	PDIP-16; SOIC-16
MC74LVX4066	4	1	25	0.1	2	6	SOIC-14; TSSOP-14
MC74LVXT4066	4	4	25	0.1	2	5.5	SOIC-14; TSSOP-14
MC74VHC4066	4	1	120	0.1	2	12	SOIC-14; TSSOP-14
NLAS3799	4	2	0.5	1	1.65	3.6	QFN-16
NL7WB66	20	2	11	0.1	1.65	5.5	US8
NLAS1053	-	-	28	1	2	5.5	US8
NLAS3899	-	-	4	1	1.65	4.3	QFN-16

# Bipolar Transistors

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# Bipolar Transistors

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## Table of Contents



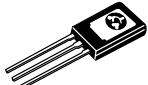
	Page
Bipolar Power Transistors .....	30
Discrete Transistors .....	31
Darlington Transistors .....	36
Audio .....	38
Electronic Lamp Ballasts .....	39
Small-Signal Bipolar Transistors .....	40
General-Purpose Transistors .....	40
General-Purpose Multiple Transistors .....	45
Low Noise and Good $h_{FE}$ Linearity .....	46
Darlington Transistors .....	46
High Current Transistors .....	47
High Voltage Transistors .....	49
RF Transistors .....	50
Switching Transistors .....	50
Multiple Switching Transistors .....	51
Digital Transistors (Bias Resistor Transistors) .....	52
Dual Digital Transistors	
(Bias Resistor Transistors) .....	54
Combinational Digital Transistors	
(Bias Resistor Transistors) .....	55
Complex Digital Transistors .....	57
Low Saturation Voltage Transistors .....	58
Load Switch Transistors .....	59

## BIPOLAR TRANSISTORS SELECTOR GUIDE

## SELECTION BY PACKAGE

Package	$I_C$ Range (Amps)	$V_{CE}$ Range (Volts)	$P_D$ (Watts)
 SOT-223	0.5–3.0	30–300	2.75–3.0
 DPAK	0.5–10	25–450	12.5–25
 D <sup>2</sup> PAK	6.0–10	80–350	50–75
 DPAK	0.5–10	25–450	12.5–25
 TO-225AA	0.3–5.0	25–500	12.5–50
 TO-220AB	0.5–15	32–400	30–150
 Isolated TO-220	1.0–10	60–450	28–45
 TO-218	10–25	60–350	80–150
 TO-247	8.0–30	150–250	100–200
 TO-3P	15–20	150–260	150–200
 TO-264	15–20	250–350	200–250
 TO-264 5-Lead	15	260	200
 TO-3 (TO-204AA) 40 Mil Pins	4.0–30	40–250	115–250
 TO-3 (TO-204AE) 60 Mil Pins	40–60	60–250	150–300

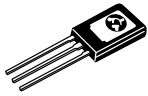
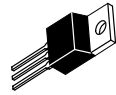
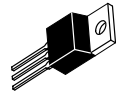
**DISCRETE TRANSISTORS**

I <sub>C</sub> Cont Amps Max	V <sub>CEO(sus)</sub> Volts Min	Device Type		h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	f <sub>T</sub> MHz Min	P <sub>D</sub> (Case) Watts @ 25°C	Package
		NPN	PNP					
0.5	300		MMJT350T1	30/240	0.05	30	2.75	 <b>SOT-223</b>
2.0	100	NSS1C201MZ4	NSS1C200MZ4	120/360	0.5	100	2.0	
3.0	40		NJT4030P	200/400	1.0	160 typ	2.0	
		NJT4031N		200/400	1.0	215	2.0	
	40	NSS40301MZ4	NSS40300MZ4	200/500	1.0	150 typ	2.0	
6.0	60	NSS60601MZ4	NSS60600MZ4	120/360	1.0	100	2.0	
0.5	300	MJD340T4	MJD350T4	30/240	0.05	30	15	 <b>DPAK</b>
1.0	250	MJD47T4		30/150	0.3	10	15	
	350		MJD5731T4	10 min	1.0	10	15	
	400	MJD50T4		30/150	0.3	10	15	
2.0	50	NJD2873T4		40 min	2.0	65	12.5	
	50		NJD1718	70/240	0.5	80 typ	15	
3.0	40	MJD31T4	MJD32T4	10 min	1.0	3.0	15	
	100	MJD31CT4	MJD32CT4	10 min	1.0	3.0	15	
4.0	45	MJD148T4		50 min	2.0	3.0	20	
	100	MJD243T4	MJD253T4	40/180	0.2	40	12.5	
5.0	25	MJD200T4	MJD210T4	45/180	2.0	65	12.5	
6.0	100	MJD41CT4	MJD42CT4	15/75	3.0	3.0	20	
8.0	80	MJD44H11T4	MJD45H11T4	40 min	4.0	50 typ	20	
10	60	MJD3055T4	MJD2955T4	20/100	4.0	2.0	20	
6.0	100	MJB41CT4	MJB42CT4	15/75	3.0	3.0	65	
8.0	80	MJB44H11T4	MJB45H11T4	40/100	4.0	40	50	
0.3	350	MJE3439		40/160	0.02	15	15	 <b>TO-225AA</b>
0.5	200	MJE344		30/300	0.05	15	20.8	
	250	2N5655		30/250	0.1	10	20	
	300	MJE340	MJE350	30/240	0.05	30	20.8	
	350	2N5657		30/250	0.1	10	20	
BD159			30/240	0.05	30	20		
1.0	40	2N4921	2N4918	20/100	0.5	3.0	30	
	60	2N4922	2N4919	20/100	0.5	3.0	30	
	80	2N4923	2N4920	20/100	0.5	3.0	30	
1.5	45	BD135	BD136	40/250	0.15	50	12.5	
	60	BD137	BD138	40/250	0.15	50	12.5	
	80	BD139	BD140	40/250	0.15	50	12.5	
2.0	45		BD234	25 min	1.0	3.0	25	
	80	BD237		25 min	1.0	3.0	25	
3.0	40	MJE180	MJE170	50/250	0.1	50	12.5	
	60	MJE181	MJE171	50/250	0.1	50	12.5	
	80	BD179	BD180	40/250	0.15	3.0	25	
		MJE182	MJE172	50/250	0.1	50	12.5	

†Style 3.



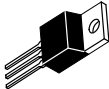
**DISCRETE TRANSISTORS** (continued)

I <sub>C</sub> Cont Amps Max	V <sub>CEO(sus)</sub> Volts Min	Device Type		h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	f <sub>T</sub> MHz Min	P <sub>D</sub> (Case) Watts @ 25°C	Package
		NPN	PNP					
4.0	32	BD435	BD436	50 min	2.0	3.0	36	 <b>TO-225AA</b>
			MJE371	40 min	1.0	3.0	40	
	40	2N5190		25 min	1.5	2.0	40	
		BD437	BD438	40 min	2.0	3.0	36	
	60	BD439	BD440	25 min	2.0	3.0	36	
		BD787	BD788	20 min	2.0	50	15	
		2N5191	2N5194	25/100	1.5	2.0	40	
	80	2N5192	2N5195	25/100	1.5	2.0	40	
BD441		BD442	15 min	2.0	3.0	36		
100	MJE243	MJE253	40/120	0.2	40	15		
5.0	25	MJE200	MJE210	45/180	2.0	65	15	
1.0	60	TIP29A		15/75	1.0	3.0	30	 <b>TO-220AB</b>
	80	TIP29B		15/75	1.0	3.0	30	
	100	TIP29C	TIP30C	15/75	1.0	3.0	30	
	250	TIP47		30/150	0.3	10	40	
	300	TIP48	MJE5730	30/150	0.3	10	40	
	350		MJE5731	30/150	0.3	10	40	
	375		MJE5731A	30/150	0.3	10	40	
	400	TIP50		30/150	0.3	10	40	
2.0	450/1000	BUX85		30	0.1	4.0	50	 <b>TO-220AB</b>
		MJE18002		14/34	0.2	12 typ	40	
3.0	40	TIP31	TIP32	25 min	1.0	3.0	40	
		TIP31A	TIP32A	25 min	1.0	3.0	40	
	80		BD242B	25 min	1.0	3.0	40	
		TIP31B	TIP32B	25 min	1.0	3.0	40	
	100	BD241C	BD242C	25 min	1.0	3.0	40	
		TIP31C	TIP32C	25 min	1.0	3.0	40	
4.0	80		D45C12	40/120	0.2	40 typ	30	
		350	MJE15034	MJE15035	10 min	2.0	30	
	400/700	MJE13005		6/30	3.0	4.0	60	
	500/800	BUH50		10 typ	2.0	4.0	50	
5.0	400/700	BUL45		14/34	0.3	12 typ	75	
		BUL45D2*		22 min	0.8	13 typ	75	
	450/1000	MJE18004		14/34	0.3	13	75	

NOTE: When two voltages are given, the format is V<sub>CEO(sus)</sub>/V<sub>CES</sub>.


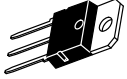
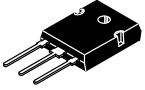
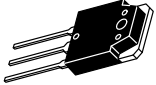



\*D2 suffix indicates transistor with built-in C-E freewheeling diode and antisaturation network.

**DISCRETE TRANSISTORS** (continued)

I <sub>C</sub> Cont Amps Max	V <sub>CEO(sus)</sub> Volts Min	Device Type		h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	f <sub>T</sub> MHz Min	P <sub>D</sub> (Case) Watts @ 25°C	Package
		NPN	PNP					
6.0	40		TIP42	15/75	3.0	3.0	65	 <b>TO-220AB</b>
		TIP41A	TIP42A	15/75	3.0	3.0	65	
	80	TIP41B	TIP42B	15/75	3.0	3.0	65	
			BD244B	15 min	3.0	3.0	65	
	100	BD243C	BD244C	15 min	3.0	3.0	65	
		TIP41C	TIP42C	15/75	3.0	3.0	65	
7.0	30	2N6288	2N6111	30/150	3.0	4.0	40	
	50		2N6109	30/150	2.5	4.0	40	
	70	2N6292	2N6107	30/150	2.0	4.0	40	
	200	BU406		30 min	1.5	10	60	
8.0	120	MJE15028	MJE15029	20 min	4.0	30	50	
	150	MJE15030	MJE15031	20 min	4.0	30	50	
	250	MJE15032	MJE15033	10 min	2.0	30	50	
	300		MJE5850	15 min	2.0	30 typ	80	
	350		MJE5851	15 min	2.0	30 typ	80	
	400		MJE5852	15 min	2.0	30 typ	80	
		MJE13007		5/30	5.0	14 typ	80	
450/1000	MJE18008		16/34	1.0	13 typ	125		
10	60	D44H8	D45H8	40 min	4.0	3.0	50	
		MJE3055T	MJE2955T	20/70	4.0	3.0	75	
	80	BD809	BD810	15 min	4.0	1.5	90	
		D44H11	D45H11	40 min	4.0	50 typ	50	
	400/700	BUH100		6.0 min	10	23 typ	100	
12	90	BUV26		12 min	12	30 typ	85	
	120	BUV27		12 min	8.0	30 typ	70	
	400/700	MJE13009		6/30	8.0	4.0	100	
15	60	2N6487	2N6490	20/150	5.0	5.0	75	
	80	2N6488	2N6491	20/150	5.0	5.0	75	
		D44VH10	D45VH10	20 min	4.0	50 typ	83	
	400/700	BUH150		4.0 min	20	23 typ	150	



NOTE: When two voltages are given, the format is V<sub>CEO(sus)</sub>/V<sub>CES</sub>.

**DISCRETE TRANSISTORS** (continued)


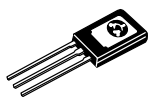
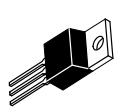
I <sub>C</sub> Cont Amps Max	V <sub>CE0(sus)</sub> Volts Min	Device Type		h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	f <sub>T</sub> MHz Min	P <sub>D</sub> (Case) Watts @ 25°C	Package
		NPN	PNP					
1.0	250	MJF47		30/150	0.3	10	28	 <b>Isolated TO-220</b>
3.0	100	MJF31C	MJF32C	10 min	1.0	3.0	28	
5.0	450/1000	MJF18004		14/34	0.3	13 typ	35	
8.0	150	MJF15030	MJF15031	40 min	3.0	30	35	
	450/1000	MJF18008		16/34	1.0	13 typ	45	
10	60	MJF3055	MJF2955	20/100	4.0	2.0	40	
	80	MJF44H11	MJF45H11	40/100	4.0	40	35	
10	100	TIP33C		20/100	3.0	3.0	80	 <b>TO-218</b>
15	60	TIP3055	TIP2955	5 min	10	2.5	80	
16	160	MJE4343		15 min	8.0	1.0	125	
25	60	TIP35A	TIP36A	15/75	15	3.0	125	
	100	TIP35C	TIP36C	15/75	15	3.0	125	
15	260	MJW3281A	MJW1302A	75/150	4.0	30	200	 <b>TO-247</b>
16	250	MJW21194	MJW21193	20/60	8.0	4.0	200	
		MJW21196	MJW21195	20/60	8.0	4.0	200	
30	450/1000	MJW18020		14/35	3.0	13 typ	250	
15	260	NJW0281	NJW0302	75/150	3.0	30	150	 <b>TO-3P</b>
	260	NJW3281	NJW1302	75/150	4.0	30	200	
16	250	NJW21194	NJW21193	20/60	8.0	4.0	200	
15	260	MJL3281A	MJL1302A	75/150	4.0	30	200	 <b>TO-264</b>
	350	MJL4281A	MJL4302A	80/250	5.0	35	230	
16	250	MJL21194	MJL21193	25/75	8.0	4.0	200	
		MJL21196	MJL21195	25/75	8.0	4.0	200	
15	260	NJL0281D	NJL0302D	75/150	3.0	30	180	 <b>TO-264 (5-Lead)</b>
	260	NJL3281D	NJL1302D	75/150	4.0	30	200	
	350	NJL4281D	NJL4302D	75/150	5.0	30	250	
16	250	NJL21194D	NJL21193D	25/75	8.0	4.0	200	
10	140	2N3442		20/70	4.0	3.0	117	 <b>TO-3 (TO-204AA)</b>
15	60	2N3055	MJ2955	20/70	4.0	2.5	115	
		2N3055A		20/70	4.0	0.8	115	
	120	MJ15015	MJ15016	20/70	4.0	1.0	180	
	140	MJ15001		25/150	4.0	2.0	200	

NOTE: When two voltages are given, the format is V<sub>CE0(sus)</sub>/V<sub>CES</sub>.

**DISCRETE TRANSISTORS** (continued)

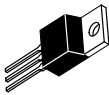
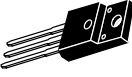
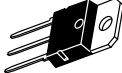


I <sub>C</sub> Cont Amps Max	V <sub>CEO(sus)</sub> Volts Min	Device Type		h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	f <sub>T</sub> MHz Min	P <sub>D</sub> (Case) Watts @ 25°C	Package
		NPN	PNP					
16	140	2N3773		15/60	8.0	4.0	150	 <b>TO-3 (TO-204AA)</b>
	200	MJ15022	MJ15023	15/60	8.0	5.0	250	
	250	MJ15024	MJ15025	15/60	8.0	5.0	250	
		MJ21194	MJ21193	25/75	8.0	4.0	250	
		MJ21196	MJ21195	25/75	8.0	4.0	250	
20	60	2N3772		15/60	10	2.0	150	
	90	2N5038		20/100	12	60	140	
	140	MJ15003	MJ15004	25/150	5.0	2.0	250	
25	60	2N5885	2N5883	20/100	10	4.0	200	
	80	2N5886	2N5884	20/100	10	4.0	200	
	100	2N6338		30/120	10	40	200	
	150	2N6341		30/120	10	40	200	
30	40	2N3771		15/60	15	2.0	150	
	60	2N5302		15/60	15	2.0	200	
	100	MJ802	MJ4502	25/100	7.5	2.0	200	
40	200	BUV21		10 min	25	8.0	150	 <b>TO-3 (TO-204AE)</b>
	250	BUV22		10 min	20	8.0	250	
50	80	2N5686	2N5684	15/60	25	2.0	300	
60	80	MJ14002		15/100	50	3.0	300	

**DARLINGTON TRANSISTORS**

I <sub>C</sub> Cont Amps Max	V <sub>CEO(sus)</sub> Volts Min	Device Type		h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	f <sub>T</sub> MHz Min	P <sub>D</sub> (Case) Watts @ 25°C	Package	
		NPN	PNP						
2.0	100	MJD112T4	MJD117T4	1000 min	2.0	25	20	 <b>D<sup>2</sup>PAK</b>	
4.0	80	MJD6039T4		1k/2k	2.0	25	20		
	350	NJD35N04		2000 min	2.0	90	45		
8.0	100	MJD122T4	MJD127T4	1k/2k	4.0	4	20		
	120		MJD128T4	1k/2k	4.0	4	20		
	400	MJB5742		200 min	4.0		80		
10	80	MJD44E3T4		1k min	5.0		20		
	350	BUB323Z		500/3400	5.0	2.0	75		
2.0	100	MJE270†	MJE271†	1.5k min	0.12	6.0	15		 <b>TO-225AA</b>
4.0	40		2N6034	25 min	1.5	2.0	40		
	45	BD675	BD676	750	1.5	3.0	40		
		BD675A	BD676A	750	2.0	3.0	40		
	60	BD677	BD678	750 min	1.5		40		
		BD677A	BD678A	750 min	2.0		40		
		MJE800	MJE700	750 min	1.5	1.0	40		
		2N6038	2N6035	750/18k	2.0	25	40		
80	BD679	BD680	750 min	1.5		40			
	BD679A	BD680A	750 min	2.0		40			
	MJE802	MJE702	750 min	1.5	1.0	40			
	MJE803	MJE703	750 min	2.0	1.0	40			
	2N6039	2N6036	750/18k	2.0	25	40			
100	BD681	BD682	750 min	1.5		40			
2.0	60	TIP110	TIP115	500 min	2.0	25	50		
	80	TIP111	TIP116	500 min	2.0	25	50		
	100	TIP112	TIP117	500 min	2.0	25	50		
5.0	60	TIP120	TIP125	1k min	3.0	4.0	65		
	80	TIP121	TIP126	1k min	3.0	4.0	65		
	100	TIP122	TIP127	1k min	3.0	4.0	75		
8.0	60	2N6043	2N6040	1k/10k	4.0	4.0	75		
		TIP100		1k/20k	3.0	4.0	80		
	80	BDX53B	BDX54B	750 min	3.0	4.0	60		
			TIP106	1k/20k	3.0	4.0	80		
		TIP131		1k/15k	4.0		70		
	100	TIP132		1k/15k	4.0		70		
		2N6045	2N6042	1k/10k	3.0	4.0	75		
		BDX53C	BDX54C	750 min	3.0				
		TIP102	TIP107	1k/20k	3.0	4.0	80		
	400	MJE5742		200 min	4.0		80		
 <b>TO-220AB</b>									

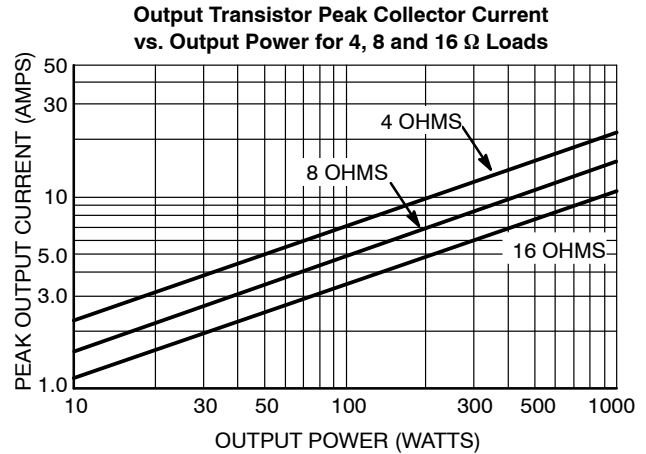
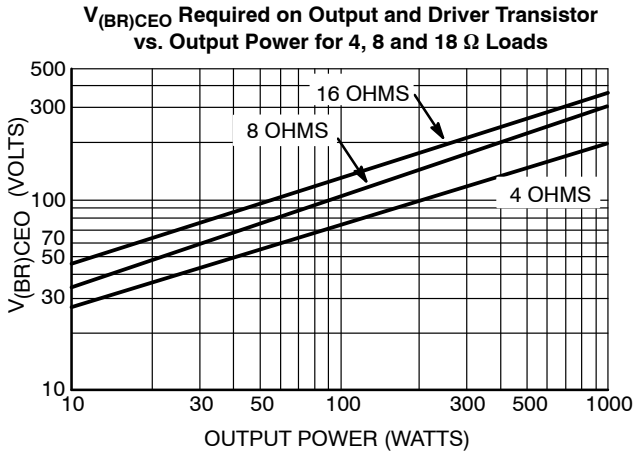
NOTE: When two voltages are given, the format is V<sub>CEO(sus)</sub>/V<sub>CES</sub>.  
 †Style 3.

**DARLINGTON TRANSISTORS** (continued)

I <sub>C</sub> Cont Amps Max	V <sub>CEO(sus)</sub> Volts Min	Device Type		h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	f <sub>T</sub> MHz Min	P <sub>D</sub> (Case) Watts @ 25°C	Package
		NPN	PNP					
10	60	2N6387	2N6667	1k/20k	5.0	20	65	 <b>TO-220AB</b>
	80	BDX33B	BDX34B	750 min	3.0	3.0	70	
		2N6388		1k/20k	5.0	20	65	
	100	BDX33C	BDX34C	750 min	3.0	3.0	70	
15	80		BDW46	1k min	5.0	4.0	85	
	100	BDW42	BDW47	1k min	5.0	4.0	85	
5.0	100	MJF122	MJF127	2000 min	3.0	4.0	28	 <b>Isolated TO-220</b>
10	100	MJF6388		3k/20k	3.0	20	40	
10	60	TIP140		500 min	10	4.0	125	 <b>TO-218</b>
		TIP141		500 min	10	4.0	125	
	100	BDV65B	BDV64B	1k min	5.0		125	
		TIP142	TIP147	500 min	10	4.0	125	
	350	BU323Z		500/3400	5.0		150	
15	150		MJH11017	400/15k	10	3.0	150	
	200	MJH11020	MJH11019	400/15k	10	3.0	150	
	250	MJH11022	MJH11021	400/15k	10	3.0	150	
20	100	MJH6284	MJH6287	750/18k	10	4.0	125	
12	100		2N6052	750/18k	6.0	4.0	150	 <b>TO-3 (TO-204AA)</b>
15	250	MJ11022	MJ11021	100 min	15	3.0	175	
20	80		2N6286	750/18k	10	4.0	160	
	100	2N6284	2N6287	750/18k	10	4.0	160	
30	60	MJ11012		1k min	20	4.0	200	
	120	MJ11016	MJ11015	1k min	20	4.0	200	
	250	MJ11022	MJ11021	400/15k	10	3.0	200	
50	60	MJ11028		400 min	50		300	 <b>TO-3 (TO-204AE)</b>
	120	MJ11032	MJ11033	400 min	50		300	

# Audio

## GENERAL DESIGN CURVES FOR POWER AUDIO OUTPUT STAGES



Another important parameter that must be considered before selecting the output transistors is the safe-operating area these devices must withstand. For a complete discussion see Application Note AN485.

## RECOMMENDED POWER TRANSISTORS FOR AUDIO/SERVO LOADS


RMS Power Output	NPN	PNP	Package	$P_D$ Watts @ 25°C	$V_{CEO}$	$I_C$ Max	$h_{FE}$		$f_T$ MHz Typ
							Min/Max	@ $I_C$ Amps	
To 25 W	MJE15030	MJE15031	TO-220	50	150	8.0	20 min	4.0	30
	MJE15032	MJE15033	TO-220	50	250	8.0	50 min	1.0	30
25 to 50 W	MJE15034	MJE15035	TO-220	50	350	4.0	50 min	1.0	30
50 to 100 W	MJ15003	MJ15004	TO-3	150	140	20	25/150	5.0	3.0
	MJ15015	MJ15016	TO-3	180	120	15	20/70	4.0	3.0
Over 100 W	NJW0281	NJW0302	TO-3P	150	260	15	75/150	3.0	30
	NJL0281D	NJL0302D	TO-264 (5-Lead)	180	260	15	75/150	3.0	30
	MJL21194	MJL21193	TO-264	200	250	16	25/75	8.0	4.0
	MJL21196	MJL21195	TO-264	200	250	16	25/75	8.0	4.0
	MJW21194	MJW21193	TO-247	200	250	16	20/60	8.0	4.0
	NJW21194	NJW21193	TO-3P	200	250	16	20/60	8.0	4.0
	MJW21196	MJW21195	TO-247	200	250	16	25/60	8.0	4.0
	MJL3281A	MJL1302A	TO-264	200	260	15	75/150	5.0	30

**RECOMMENDED POWER TRANSISTORS FOR AUDIO/SERVO LOADS** (continued)

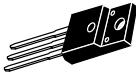
RMS Power Output	NPN	PNP	Package	P <sub>D</sub> Watts @ 25°C	V <sub>CEO</sub>	I <sub>C</sub> Max	h <sub>FE</sub>		f <sub>T</sub> MHz Typ
							Min/Max	@ I <sub>C</sub> Amps	
Over 100 W	MJW3281A	MJW1302A	TO-247	200	260	15	75/150	5.0	30
	NJW3281	NJW1302	TO-3P	200	260	15	75/150	5.0	30
	MJL4281A	MJL4302A	TO-264	200	350	15	80/200	5.0	35
	NJL3281D	NJL1302D	TO-264 (5-Lead)	200	260	15	75/150	7.0	30
	NJL4281D	NJL4302D	TO-264 (5-Lead)	250	350	15	75/150	5.0	30
	MJ15024	MJ15025	TO-3	250	250	16	15/60	8.0	4.0
	MJ21194	MJ21193	TO-3	250	250	16	25/75	8.0	4.0

The Power Transistors shown are provided for reference only and show device capability. The final choice of the Power Transistors used is left to the circuit designer and depends upon the particular safe-operating area required and the mounting and heat sinking configuration used.

**Bipolar Power Transistors for Electronic Lamp Ballasts**

I <sub>C</sub> Cont Amps Max	V <sub>CEO(sus)</sub> Volts Min	V <sub>CES</sub> Volts Min	Device Type	I <sub>C</sub> Operating Amps	h <sub>FE</sub> min @ I <sub>C</sub> Operating V <sub>CE</sub> = 1.0 V	Inductive Switching @ I <sub>C</sub> Operating t <sub>si</sub> /t <sub>fi</sub> Max (μs)	P <sub>D</sub> (Case) Watts @ 25°C	Package
2.0	450	1000	MJE18002	1.0	6.0	2.75/0.175	50	 TO-220AB
4.0	500	800	BUH50	2.0	8.0 typ	2.75/0.15	50	
5.0	400	700	BUL45	2.0	7.0	3.8/0.17	75	
		700	BUL45D2*	2.0	10	2.25/0.015	75	
	450	1000	MJE18004	2.0	6.0	2.5/0.175	75	
8.0	450	1000	MJE18008	4.5	6.0	3.2/0.15	125	
10	400	700	BUH100	5.0	10 typ	3.5/0.15	100	
15	400	700	BUH150	10	8.0 typ	2.75/0.175	150	

**Isolated TO-220**

I <sub>C</sub> Cont Amps Max	V <sub>CEO(sus)</sub> Volts Min	V <sub>CES</sub> Volts Min	Device Type	I <sub>C</sub> Operating Amps	h <sub>FE</sub> min @ I <sub>C</sub> Operating V <sub>CE</sub> = 1.0 V	Inductive Switching @ I <sub>C</sub> Operating t <sub>si</sub> /t <sub>fi</sub> Max (μs)	P <sub>D</sub> (Case) Watts @ 25°C	Package
5.0	450	1000	MJF18004	2.0	6.0	2.5/0.175	35	 Isolated TO-220
8.0	450	1000	MJF18008	4.5	6.0	3.2/0.15	45	

BUH-Series are specified for Halogen applications.



\*D2 suffix indicates transistor with built-in C-E freewheeling diode and antisaturation network.

†Style 3.

The isolated TO-220 is UL RECOGNIZED for its isolation feature and has been evaluated to 3500 volts RMS. Actual isolation rating depends on specific mounting position and maintaining required strike and creepage distances.




**BIPOLAR TRANSISTORS**  
**GENERAL-PURPOSE TRANSISTORS**

NPN	PNP	V <sub>(BR)CEO</sub>	I <sub>C</sub> mA Max	h <sub>FE</sub>		f <sub>T</sub> MHz Min	NF dB Max	Package	
				Min	Max				
<b>MPS8099</b>	–	80	500	100	300	150	–	 <b>TO-226AA, TO-92</b> Case 29-11	
<b>MPSA06</b>	<b>MPSA56</b>	80	500	100	–	100	–		
BC639	–	80	1000	40	160	60	0.5		
BC639-16	–	80	1000	100	250	60	0.5		
–	BC490	80	1000	60	400	150 typ	–		
–	BC640-016	80	500	100	250	–	–		
BC546B	BC556B	65	100	180	450	150	10		
MPSA05	MPSA55	60	500	100	–	100	–		
–	<b>MPS2907A</b>	60	600	100	300	200	–		
<b>MPS651</b>	<b>MPS751</b>	60	2000	75	–	75	0.5		
BC637	–	60	500	40	160	–	0.5		
–	<b>2N5087</b>	50	50	250	800	40	2.0		
–	BC307B	45	100	200	460	150	10		
BC337	–	45	800	100	630	210 (Typ)	–		
BC337-25	BC327-25	45	800	160	400	260 (Typ)	–		
BC337-40	BC327-40	45	800	250	630	260 (Typ)	–		
BC550C	BC560C	45	100	380	800	250 (Typ)	2.5		
BC547B	BC557B	45	100	180	450	150	10		
BC547C	BC557C	45	100	400	800	150	10		
<b>MPS2222A</b>	–	40	600	100	300	300	–		
PN2222A	–	40	600	100	300	300	4		
<b>2N4401</b>	<b>2N4403</b>	40	600	100	300	200	–		
–	MPS4250	40	50	250	800	–	2.0		
–	MPS750	40	2000	40	–	75	–		
–	<b>MPS6652</b>	40	1000	50	–	100	–		
<b>2N3904</b>	<b>2N3906</b>	40	200	100	300	250	5.0		
BC548C	–	30	100	420	800	300	10		
BC548B	BC558B	30	100	180	460	150	10		
BC549C	–	30	100	420	800	–	–		
MPS2222	–	30	600	100	300	250	–		
2N5088	–	30	50	350	–	50	3.0		
2N5089	–	25	50	450	–	50	2.0		
2N4124	–	25	200	120	360	300	–		
MPS4124	–	25	200	120	360	170	5.0		
MPS5172	–	25	100	100	500	–	–		
–	BC369	20	1000	60	–	65	0.5		
<b>MPSW06</b>	<b>MPSW56</b>	80	500	80	–	50	–		 <b>TO-226AE (1-WATT)</b> <b>TO-92</b> Case 29-10
MPSW05	MPSW55	60	500	60	–	50	250		
<b>MPSW01A</b>	<b>MPSW51A</b>	40	1000	50	–	50	–		
MPSW01	MPSW51	30	1000	50	–	50	–		
MPS6726	–	30	1000	50	250	–	–		

Devices listed in **bold italic** are ON Semiconductor preferred devices.

## BIPOLAR TRANSISTORS



## GENERAL-PURPOSE TRANSISTORS (continued)

NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	NF dB Max	Package
				Min	Max			
MMBT5550L	–	140	600	60	250	–	–	 TO-236AB, SOT-23 Case 318-08
–	BSS63L	100	100	30	–	50	–0.25	
BSS64L	–	80	100	20	–	60	0.15	
<b>MMBTA06L</b>	<b>MMBTA56L</b>	80	500	100	–	100	–	
MMBT8099L	–	80	500	100	300	150	–	
<b>BC846AL</b>	–	65	100	110	220	100	10	
<b>BC846BL</b>	–	65	100	200	450	100	10	
–	<b>BC856AL</b>	65	100	125	250	100	10	
–	<b>BC856BL</b>	65	100	220	475	100	10	
–	<b>MMBT2907AL</b>	60	600	100	300	200	–	
MMBT2484L	–	60	50	250	–	–	3.0	
MMBTA05L	–	60	500	100	–	100	–	
–	MMBTA55L	60	500	100	–	50	–	
MMBT6428L	–	50	200	250	–	100	3.0 (Typ)	
–	<b>MMBT5087L</b>	50	50	250	–	40	2.0	
MMBT6429L	–	45	200	500	–	100	3.0 (Typ)	
BC817-16L	BC807-16L	45	500	100	250	100	–	
BC817-25L	BC807-25L	45	500	160	400	100	–	
BC817-40L	BC807-40L	45	500	250	600	100	–	
<b>BC847AL</b>	–	45	100	110	220	100	10	
<b>BC847BL</b>	–	45	100	200	450	100	10	
<b>BC847CL</b>	–	45	100	420	800	100	10	
<b>BC850BL</b>	–	45	100	200	450	100	4.0	
<b>BC850CL</b>	–	45	100	420	800	100	4.0	
–	<b>BC857AL</b>	45	100	125	250	100	10	
–	<b>BC857BL</b>	45	100	220	475	100	10	
–	<b>BC857CL</b>	45	100	420	800	100	10	
–	BCW68GL	45	800	120	400	100	10	
–	BCW70L	45	100	215	500	–	10	
BCW72L	–	45	100	200	450	300	10	
–	BCX17L	45	500	100	600	–	–	
BCX19L	–	45	500	100	600	–	–	
<b>MMBT2222AL</b>	–	40	600	100	300	300	4.0	
<b>MMBT3904L</b>	–	40	200	100	300	200	5.0	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

**BIPOLAR TRANSISTORS**




**GENERAL-PURPOSE TRANSISTORS** (continued)

NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	NF dB Max	Package
				Min	Max			
-	<b>MMBT3906L</b>	40	200	100	300	250	4.0	 TO-236AB, SOT-23 Case 318-08
<b>MMBT4401L</b>	-	40	600	100	300	250	-	
-	<b>MMBT4403L</b>	40	600	100	300	200	-	
MMBT3416L	-	40	100	75	225	-	-	
-	MMBTA70L	40	100	40	400	125	-	
-	BCW30L	32	100	215	500	-	10	
BCW32L	-	32	100	200	450	-	10	
BCW65AL	-	32	800	100	250	100	10	
BCW65CL	-	32	100	250	630	100	10	
<b>BC848AL</b>	-	30	100	110	220	100	10	
<b>BC848BL</b>	-	30	100	200	450	100	10	
<b>BC848CL</b>	-	30	100	420	800	100	10	
<b>BC849BL</b>	-	30	100	200	450	100	4.0	
<b>BC849CL</b>	-	30	100	420	800	100	4.0	
MMBT489L	-	30	1000	300	900	100	-	
-	MMBT589L	30	1000	100	300	100	-	
-	<b>BC858AL</b>	30	100	125	250	100	10	
-	<b>BC858BL</b>	30	100	220	475	100	10	
-	<b>BC858CL</b>	30	100	420	800	100	10	
<b>MMBT5088L</b>	-	30	50	300	900	5	3.0	
MMBT2222L	-	30	600	100	300	250	4.0	
MMBT6521L	-	25	100	300	600	-	-	
<b>MMBT5089L</b>	-	25	50	400	1200	50	2.0	
<b>MMBT4124L</b>	-	25	200	120	360	300	5.0	
BC818-40L	-	25	500	250	600	100	-	
-	MMBT4126L	25	200	120	300	250	4.0	
-	BC808-25L	25	500	160	400	100	-	
BCW33L	-	20	100	420	800	-	10	
<b>MSD601-R</b>	-	50	100	210	340	-	-	 SC-59 Case 318D-04
<b>MSD602-R</b>	-	50	500	120	240	-	-	
<b>MSC2712G</b>	-	50	100	200	400	-	-	
-	<b>MSA1162G</b>	50	100	200	400	-	-	
-	<b>MSA1162Y</b>	50	100	120	240	-	-	
-	<b>MSB709-R</b>	45	100	210	340	-	-	
MSD1328-R	-	20	500	200	350	-	-	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

## BIPOLAR TRANSISTORS







## GENERAL-PURPOSE TRANSISTORS (continued)

NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	NF dB Max	Package
				Min	Max			
<i>MMBTA06W</i>	<i>MMBTA56W</i>	80	500	100	–	100	–	 SC-70, SOT-323 Case 419-04
<i>BC846BW</i>	–	65	100	200	450	100	10	
–	<i>BC856BW</i>	65	100	220	475	100	10	
–	<i>MMBT2907AW</i>	60	600	100	–	200	–	
<i>MSD1819A-R</i>	–	50	100	210	340	–	–	
<i>BC847AW</i>	–	45	100	110	220	100	10	
<i>BC847BW</i>	–	45	100	200	450	100	10	
<i>BC847CW</i>	–	45	100	420	800	100	4.0	
–	<i>BC857BW</i>	45	100	220	475	100	10	
–	<i>BC857CW</i>	45	100	420	800	100	10	
–	<i>MSB1218A-R</i>	45	100	210	340	–	–	
MMBT4401W	–	40	600	100	300	250	–	
–	MMBT4403W	40	600	100	300	200	–	
<i>MMBT2222AW</i>	–	40	600	100	300	300	4.0	
<i>MMBT3904W</i>	–	40	200	100	300	300	5.0	
–	<i>MMBT3906W</i>	40	200	100	300	250	4.0	
<i>BC848BW</i>	–	30	100	200	450	100	10	
<i>BC848CW</i>	–	30	100	420	800	100	4.0	
–	<i>BC858AW</i>	30	100	110	220	100	10	
–	<i>BC858BW</i>	30	100	200	450	100	10	
<i>2SC4617</i>	–	50	100	120	560	180 (Typ)	–	 SOT-416, SC-75, SC-90 Case 463-01
–	<i>2SA1774</i>	50	100	120	560	140 (Typ)	–	
<i>BC847BT</i>	–	45	100	200	450	100	10	
<i>BC847CT</i>	–	45	100	420	800	100	4.0	
–	<i>BC857BT</i>	45	100	220	475	100	10	
<i>MMBT3904T</i>	–	40	200	100	300	300	5.0	
–	<i>MMBT3906T</i>	40	200	100	300	250	4.0	
<i>MMBT2222AT</i>	–	40	600	100	300	300	4.0	
MMBT5551M3	–	160	60	80	250	–	–	 SOT-723 Case 631AA-01
BC846BM3	–	65	100	200	450	100	10	
–	MMBT2907AM3	60	600	100	300	200	–	
2SC5658M3	–	50	100	120	560	180 (Typ)	–	
2SC5658RM3	–	50	100	215	375	180 (Typ)	–	
–	2SA2029M3	50	100	120	560	140 (Typ)	–	
–	NS2029M3	50	100	120	560	100	–	
–	BC856BM3	45	100	220	475	100	10	
BC847BM3	–	45	100	200	450	100	10	
–	MMBT4403M3	40	600	100	300	200	–	
MMBT4401M3	–	40	600	100	300	250	–	
MMBT2222AM3	–	40	600	100	300	300	4	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

**BIPOLAR TRANSISTORS**






**GENERAL-PURPOSE TRANSISTORS** (continued)

NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	NF dB Max	Package
				Min	Max			
NST846BF3	–	65	100	200	450	100	10	 SOT-1123 Case 524AA
–	NST856BF3	65	100	200	475	100	10	
NST847BF3	–	45	100	200	450	100	10	
–	NST857BF3	45	100	200	475	100	10	
NST3904F3	–	40	200	100	300	200	5	
–	NST3906F3	40	200	100	300	250	4	
NST848BF3	–	30	100	200	450	100	10	 SOT-223 Case 318E-04
<b><i>BCP56</i></b>	<b><i>BCP53</i></b>	80	1000	40	250	50 (Typ)	–	
<b><i>BCP56-10</i></b>	<b><i>BCP53-10</i></b>	80	1000	63	160	50 (Typ)	–	
<b><i>BCP56-16</i></b>	<b><i>BCP53-16</i></b>	80	1000	100	250	50 (Typ)	–	
–	<b><i>PZT2907A</i></b>	60	600	100	300	200	–	
<b><i>PZT651</i></b>	<b><i>PZT751</i></b>	60	2000	75	–	75	–	
<b><i>PZT2222A</i></b>	–	40	600	100	300	300	–	
PZT3904	–	40	200	100	300	300	5.0	
<b><i>BCP68</i></b>	<b><i>BCP69</i></b>	25	1000	85	375	60 (Typ)	–	 SOT-223 Case 318E-04
–	MMBT2131	30	700	150	–	–	–	 SC-74 Case 318F-05
–	MBT35200M	35	2000	100	400	100	–	 TSOP-6 SINGLE Case 318G-02
NST489AM	–	30	2000	300	900	200	–	
–	NSL12AW	12	2000	100	300	100	–	 SC-88, SOT-363 Case 419B-02

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.

## BIPOLAR TRANSISTORS



## GENERAL-PURPOSE MULTIPLE TRANSISTORS

Device	Type	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	NF dB Max	Package	
				Min	Max				
<i>BC846BDW1</i>	Dual NPN	65	100	200	450	100	10	 SC-88, SOT-363 Case 419B-02	
<i>BC856BDW1</i>	Dual PNP	65	100	220	475	100	10		
<i>BC846BPDW1</i>	Dual Complementary	65	100	200	475	100	10		
<i>BC847BDW1</i>	Dual NPN	45	100	200	290	100	10		
<i>BC847CDW1</i>	Dual NPN	45	100	420	520	100	4.0		
<i>BC857BDW1</i>	Dual PNP	45	100	220	290	100	10		
<i>BC857CDW1</i>	Dual PNP	45	100	420	520	100	10		
<i>BC847BPDW1</i>	Dual Complementary	45	100	200	475	100	10		
<i>MBT3904DW1</i>	Dual NPN	40	200	100	300	300	5.0		
<i>MBT3906DW1</i>	Dual PNP	40	200	100	300	250	4.0		
<i>MBT3946DW1</i>	Dual Complementary	40	200	100	300	250	5.0/4.0		
<i>MBT2222ADW1</i>	Dual NPN	40	600	100	300	300	4.0		
MBT6429DW1	Dual NPN	45	200	500	1250	100	-		
NST45011MW6	Dual Matched NPN	45	100	200	500	100	10		
UMZ1N	Dual Complementary	50	200	200	400	114 (Typ)	-		
<i>BC848CDW1</i>	Dual NPN	30	100	420	250	100	4.0	 SOT-563 Case 463A-01	
<i>BC848CPDW1</i>	Dual Complementary	30	100	420	520	100	4.0/10		
<i>BC847CDXV6</i>	NPN	45	100	420	520	100	-		
EMT1DXV6	Dual PNP	60	100	120	560	140 (Typ)	-		
EMX1DXV6	Dual NPN	50	100	120	560	180 (Typ)	-		
EMX2DXV6	Dual NPN	50	100	120	560	180 (Typ)	-		
EMZ1DXV6	Complementary	60	100	120	560	140 (Typ)	-		
<i>BC847BPDXV6</i>	Complementary	45	100	200	290	100	-		
<i>NST3904DXV6</i>	Dual NPN	40	200	100	300	300	-		
<i>NST3906DXV6</i>	Dual PNP	40	200	100	300	250	-		
<i>NST3946DXV6</i>	Complementary	40	200	100	300	250	-		
<i>NST30010MXV6</i>	Matched Dual PNP	30	100	420	520	100	-		
<i>BC858CDXV6</i>	Dual PNP	30	100	420	520	100	-		
NST3904DP6	Dual NPN	40	200	100	300	200	5		 SOT-963 Case 527AA
NST3906DP6	Dual PNP	40	200	100	300	250	4		
NST3946DP6	Dual Complementary	40	200	100	300	200	5		
NST847BDP6	Dual NPN	45	100	200	450	100	10		
NST847BPDP6	Dual Complementary	45	100	200	450	100	10		
NST857BDP6	Dual PNP	45	100	200	475	100	10		
NST45010MW6	Matched Dual PNP	45	100	220	475	100	10		
HN1B01FDW1	Complementary	50	200	200	400	-	-	 SC-74 Case 318F-05	
<i>NSS40301MD</i>	Matched Dual NPN	40	3000	200	500	150	-	 8 1 SOIC-8 Case 751 STYLE 16	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

## BIPOLAR TRANSISTORS





### LOW NOISE AND GOOD $h_{FE}$ LINEARITY

NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	NF dB Max	Package
				Min	Max			
–	<b>2N5087</b>	50	50	250	800	40	2.0	 TO-226AA, TO-92 Case 29-11 (Note 1)
MPSA18	–	45	200	500	1500	100	1.5	
BC550C	–	45	100	380	800	250 (Typ)	2.5	
2N5088	–	30	50	350	–	50	3.0	
2N5089	–	25	50	450	–	50	2.0	
MMBT2484L	–	60	50	250	–	–	3.0	 TO-236AB, SOT-23 Case 318-08
MMBT6428L	–	50	200	250	–	100	3.0 (Typ)	
–	<b>MMBT5087L</b>	50	50	250	–	40	2.0	
MMBT6429L	–	45	200	500	–	100	3.0 (Typ)	
<b>MMBT5088L</b>	–	30	50	300	900	5	3.0	
<b>MMBT5089L</b>	–	25	50	400	–	50	2.0	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

1.  $N_F$ : Noise Figure at  $R_S = 2.0\text{ k}\Omega$ ,  $I_C = 200\text{ }\mu\text{A}$ ,  $V_{CE} = 5.0\text{ Volts}$ .  $f = 30\text{ Hz to }15\text{ kHz}$ .



### DARLINGTON TRANSISTORS

NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	NF dB Max	Package
				Min	Max			
<b>MPSW45A</b>	–	50	1000	25K	150K	100	1.5	 TO-226AE (1-WATT) TO-92 Case 29-10
MPSW45	–	40	1000	25K	150K	100	1.5	
<b>MPSA29</b>	–	100	500	10K	–	125	1.5	 TO-226AA, TO-92 Case 29-11
BC373	–	80	1000	10K	160K	100	1.1	
MPSA27	–	60	500	10K	–	–	1.5	
2N6427	–	40	500	20K	200K	–	1.5	
2N6426	–	40	500	30K	300K	125	1.5	
<b>MPSA14</b>	–	30	500	20K	–	125	1.5	
MPSA13	–	30	500	10K	–	125	1.5	
BC517	–	30	1000	30K	–	200 (Typ)	1.0	
MMBT6427L	–	40	500	20000	200000	–	10	 TO-236AB, SOT-23 Case 318-08
<b>MMBTA14L</b>	<b>MMBTA64L</b>	30	300	20K	–	125	–	
MMBTA13L	–	30	300	10000	–	125	–	
–	MMBTA63L	30	500	10000	–	125	–	
<b>BSP52</b>	–	80	1000	2000	–	–	–	 SOT-223 Case 318E-04

Devices listed in **bold italic** are ON Semiconductor preferred devices.

**BIPOLAR TRANSISTORS**

**HIGH CURRENT TRANSISTORS ( $\geq 500$  mA)**





NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	NF dB Max	Package	
				Min	Max				
BC639	-	80	500	40	160	60	0.5	 <p>TO-226AA, TO-92 Case 29-11</p>	
BC639-16	-	80	1000	100	250	60	0.5		
-	BC490	80	1000	60	400	150 typ	-		
<b>MPS8099</b>	-	80	500	100	300	150	-		
<b>MPSA06</b>	<b>MPSA56</b>	80	500	100	-	100	-		
<b>MPS651</b>	<b>MPS751</b>	60	2000	75	-	75	0.5		
BC637		60	500	40	160	-	0.5		
MPSA05	MPSA55	60	500	100	-	100	-		
-	<b>MPS2907A</b>	60	600	100	300	200	-		
BC337	-	45	800	100	630	210 (Typ)	-		
BC337-25	BC327-25	45	800	160	400	260 (Typ)	-		
BC337-40	BC327-40	45	800	250	630	260 (Typ)	-		
MPS650	MPS750	40	2000	40	-	75	-		
<b>MPS2222A</b>	-	40	600	100	300	300	-		
<b>2N4401</b>	<b>2N4403</b>	40	600	100	300	200	-		
P2N2222A	-	40	600	100	300	300	-		
PN2222A	-	40	600	100	300	300	-		
	<b>MPS6652</b>	40	1000	50	-	100	-		
MPS2222	-	30	600	100	300	250	-		
-	BC369	20	1000	60	-	65	0.5		
<b>MPSW06</b>	<b>MPSW56</b>	80	500	80	-	50	-		 <p>TO-226AE (1-WATT) TO-92 Case 29-10</p>
MPSW05	-	60	500	60	-	50	250		
-	2SA1020	50	2000	70	240	100	-		
<b>MPSW01A</b>	<b>MPSW51A</b>	40	1000	50	-	50	-		
MPSW01	MPSW51	30	1000	50	-	50	-		
MPS6726	-	30	1000	50	250	-	-		

Devices listed in **bold italic** are ON Semiconductor preferred devices.



**BIPOLAR TRANSISTORS**







**HIGH CURRENT TRANSISTORS** ( $\geq 500$  mA) (continued)

NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	NF dB Max	Package
				Min	Max			
MMBT5550L	–	140	600	60	250	–	–	 <b>TO-236AB, SOT-23</b> Case 318-08
<b>MMBTA06L</b>	<b>MMBTA56L</b>	80	500	100	–	100	–	
MMBT8099L	–	80	500	100	300	150	–	
–	<b>MMBT2907AL</b>	60	600	100	300	200	–	
MMBTA05L	–	60	500	100	–	100	–	
–	MMBTA55L	60	500	100	–	50	–	
–	BCW68GL	45	800	120	400	100	10	
BCW66GL	–	45	800	160	400	100	10	
–	BCX17L	45	500	100	600	–	–	
BCX19L	–	45	500	100	600	–	–	
<b>MMBT2222AL</b>	–	40	600	100	300	300	4.0	
<b>MMBT4401L</b>	–	40	600	100	300	250	–	
–	<b>MMBT4403L</b>	40	600	100	300	200	–	
BCW65AL	–	32	800	100	250	100	10	
MMBT2222L	–	30	600	100	300	250	4.0	
<b>BCP56</b>	<b>BCP53</b>	80	1000	40	250	50 (Typ)	–	 <b>SOT-223</b> Case 318E-04
<b>BCP56-10</b>	<b>BCP53-10</b>	80	1000	63	160	50 (Typ)	–	
<b>BCP56-16</b>	<b>BCP53-16</b>	80	1000	100	250	50 (Typ)	–	
–	<b>PZT2907A</b>	60	600	100	300	200	–	
<b>PZT651</b>	<b>PZT751</b>	60	2000	75	–	75	–	
<b>PZT2222A</b>	–	40	600	100	300	300	–	
<b>BCP68</b>	<b>BCP69</b>	25	1000	85	375	60 (Typ)	–	
<b>MMBT2222AT</b>	–	40	600	100	300	300	4.0	 <b>SOT-416, SC-75, SC-90</b> Case 463-01
–	<b>MMBT2907AW</b>	60	600	100	–	200	–	 <b>SC-70, SOT-323</b> Case 419-04
<b>MMBT2222AW</b>	–	40	600	100	300	300	4.0	
–	MSB92ASW	300	500	120	200	50	–	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

## BIPOLAR TRANSISTORS




## HIGH VOLTAGE TRANSISTORS (&gt; 100 V)

NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	NF dB Max	Package
				Min	Max			
<i>MPSW42</i>	–	300	500	40	–	50	0.5	 TO-226AE (1-WATT) TO-92 Case 29-10
–	<i>MPSW92</i>	300	500	25	–	50	0.5	
<i>2N5551</i>	–	160	600	80	250	100	8.0	
–	<i>2N5401</i>	150	600	60	240	100	8.0	
MPSA44	–	400	300	50	200	–	–	 TO-226AA, TO-92 Case 29-11
–	BF493S	350	500	40	–	50	–	
–	<i>2N6520</i>	350	500	30	200	40	–	
<i>MPSA42</i>	–	300	500	40	–	50	0.5	
–	<i>MPSA92</i>	300	500	40	–	50	0.5	
BF422	BF423	250	500	50	–	60	–	
2N5550	–	140	600	60	250	100	10	
<i>MMBT6517L</i>	–	350	100	15	–	40	–	 TO-236AB, SOT-23 Case 318-08
–	<i>MMBT6520L</i>	350	500	15	–	40	–	
<i>MMBTA42L</i>	–	300	50	40	–	50	–	
–	<i>MMBTA92L</i>	300	50	25	–	50	–	
<i>MMBT5551L</i>	–	160	600	80	250	–	–	
–	<i>MMBT5401L</i>	150	500	50	–	100	8.0	
MMBT5550L	–	140	600	60	250	–	–	
<i>BSP19A</i>	–	350	100	40	–	70	–	 SOT-223 Case 318E-04
<i>PZTA42</i>	<i>PZTA92</i>	300	500	40	–	50	–	
–	PZTA96S	450	500	50	150	–	–	
–	<i>BSP16</i>	300	100	30	120	15	–	
<i>BF720</i>	<i>BF721</i>	250	100	50	–	60	–	
–	MSB92	300	50	25	–	–	–	 SC-59 CASE 318D-04
<i>MSD42W</i>	–	300	150	40	–	–	–	 SC-70, SOT-323 Case 419-04
MSD42SW	–	300	150	25	200	–	–	
–	<i>MSB92W</i>	300	500	25	–	50	–	
–	<i>MSB92AW</i>	300	500	120	200	50	–	
–	MSB92ASW	300	500	120	200	50	–	

Devices listed in **bold italic** are ON Semiconductor preferred devices.



## BIPOLAR TRANSISTORS

### RF TRANSISTORS

NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	Cap pF Max	Package
				Min	Max			
<b><i>MPSH10</i></b>	–	25	–	60	–	650	$C_{RB} = 0.65$	 TO-226AA, TO-92 Case 29-11
<b><i>MMBTH10L</i></b>	–	25	–	60	–	650	$C_{CB} = 0.7$	 TO-236AB, SOT-23 Case 318-08
<b><i>MMBTH10-4L</i></b>	–	25	–	120	240	800	$C_{CB} = 0.7$	
MMBT918L	–	15	50	20	–	600	$C_{OBO} = 1.7$	
BSV52L	–	12	100	40	120	400	–	
MMBTH10M3	–	25	–	60	–	650	$C_{CB} = 0.7$	 SOT-723 Case 631AA-01

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.



### SWITCHING TRANSISTORS

NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	$T_{off}$ ns Max	Package
				Min	Max			
–	<b><i>MPS2907A</i></b>	60	600	100	300	200	110	 TO-226AA, TO-92 Case 29-11
<b><i>2N4401</i></b>	<b><i>2N4403</i></b>	40	600	100	300	200	–	
<b><i>2N3904</i></b>	<b><i>2N3906</i></b>	40	200	100	300	250	300	
P2N2222A	–	40	600	100	300	300	285	
<b><i>MPS2222A</i></b>	–	40	600	100	300	300	285	
–	<b><i>MMBT2907AL</i></b>	60	600	100	300	200	100	 TO-236AB, SOT-23 Case 318-08
<b><i>MMBT2222AL</i></b>	–	40	600	100	300	300	285	
<b><i>MMBT3904L</i></b>	–	40	200	100	300	300	250	
–	<b><i>MMBT3906L</i></b>	40	200	100	300	250	300	
<b><i>MMBT4401L</i></b>	–	40	600	100	300	250	255	
–	<b><i>MMBT4403L</i></b>	40	600	100	300	200	255	
<b><i>MMBT2369L</i></b>	–	15	200	40	120	–	18	
<b><i>MMBT2369AL</i></b>	–	15	200	40	120	–	18	

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.



## BIPOLAR TRANSISTORS

### SWITCHING TRANSISTORS

NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	$T_{off}$ ns Max	Package
				Min	Max			
–	<b>MMBT2907AW</b>	60	600	100	300	200	100	 SC-70, SOT-323 Case 419-04
<b>MMBT3904W</b>	–	40	200	100	300	300	250	
–	<b>MMBT3906W</b>	40	200	100	300	250	300	
<b>MMBT2222AW</b>	–	40	600	100	300	300	285	
<b>MMBT4401W</b>	–	40	600	100	300	250	255	
–	<b>MMBT4403W</b>	40	600	100	300	200	255	
<b>MMBT3904T</b>	–	40	200	100	300	300	250	 SOT-416, SC-75, SC-90 Case 463-01
–	<b>MMBT3906T</b>	40	200	100	300	250	300	
<b>MMBT2222AT</b>	–	40	600	100	300	300	285	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

### MULTIPLE SWITCHING TRANSISTORS

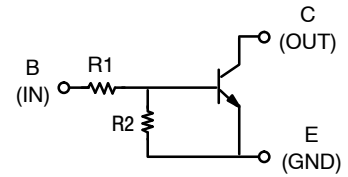
Device	Type	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$		$f_T$ MHz Min	$T_{off}$ ns Max	Package
				Min	Max			
<b>MBT3904DW1</b>	Dual NPN	40	200	100	300	300	250	 SC-88, SOT-363 Case 419B-02
<b>MBT3906DW1</b>	Dual PNP	40	200	100	300	250	300	
<b>MBT3946DW1</b>	Dual Complementary	40	200	100	300	250	250/300	
<b>MBT2222ADW1</b>	Dual NPN	40	600	100	300	300	285	
HN1B01FDW1	Dual Complementary	50	200	200	400	–	–	 SC-74 Case 318F-05




Devices listed in **bold italic** are ON Semiconductor preferred devices.

## BIPOLAR TRANSISTORS

### DIGITAL TRANSISTORS (BIAS RESISTOR TRANSISTORS)

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.



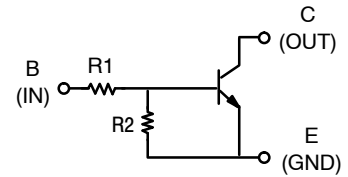
NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$ Min	$R_1$ $\Omega$	$R_2$ $\Omega$	Package
<i>MUN2211</i>	<i>MUN2111</i>	50	100	35	10K	10K	 SC-59 Case 318D-04
<i>MUN2212</i>	<i>MUN2112</i>	50	100	60	22K	22K	
<i>MUN2213</i>	<i>MUN2113</i>	50	100	80	47K	47K	
<i>MUN2214</i>	<i>MUN2114</i>	50	100	80	10K	47K	
<i>MUN2215</i>		50	100	160	10K	$\infty$	
<i>MUN2216</i>		50	100	160	4.7K	$\infty$	
<i>MUN2230</i>		50	100	3.0	1.0K	1.0K	
<i>MUN2232</i>		50	100	15	4.7K	4.7K	
<i>MUN2233</i>		50	100	80	4.7K	47K	
<i>MUN2234</i>		50	100	80	22K	47K	
<i>MUN2237</i>		50	100	80	47K	22K	
<i>MUN2240</i>	-	50	100	160	47K	$\infty$	
<i>MMUN2211L</i>	<i>MMUN2111L</i>	50	100	35	10K	10K	 TO-236AB, SOT-23 Case 318-08
<i>MMUN2212L</i>	<i>MMUN2112L</i>	50	100	60	22K	22K	
<i>MMUN2213L</i>	<i>MMUN2113L</i>	50	100	80	47K	47K	
<i>MMUN2214L</i>	<i>MMUN2114L</i>	50	100	80	10K	47K	
<i>MMUN2215L</i>	<i>MMUN2115L</i>	50	100	160	10K	$\infty$	
<i>MMUN2216L</i>	<i>MMUN2116L</i>	50	100	160	4.7K	$\infty$	
<i>MMUN2231L</i>		50	100	8.0	2.2K	2.2K	
<i>MMUN2232L</i>	<i>MMUN2132L</i>	50	100	15	4.7K	4.7K	
<i>MMUN2233L</i>	<i>MMUN2133L</i>	50	100	80	4.7K	47K	
<i>MMUN2234L</i>	<i>MMUN2134L</i>	50	100	80	22K	47K	
<i>MMUN2238L</i>	-	50	100	160	2.2K	$\infty$	
<i>MUN5211</i>	<i>MUN5111</i>	50	100	35	10K	10K	 SC-70, SOT-323 Case 419-04
<i>MUN5212</i>	<i>MUN5112</i>	50	100	60	22K	22K	
<i>MUN5213</i>	<i>MUN5113</i>	50	100	80	47K	47K	
<i>MUN5214</i>	<i>MUN5114</i>	50	100	80	10K	47K	
<i>MUN5215</i>		50	100	160	10K	$\infty$	
<i>MUN5230</i>		50	100	3.0	1.0K	1.0K	
	<i>MUN5131</i>	50	100	8.0	2.2K	2.2K	
<i>MUN5232</i>	<i>MUN5132</i>	50	100	15	4.7K	4.7K	
<i>MUN5233</i>	<i>MUN5133</i>	50	100	80	4.7K	47K	
<i>MUN5235</i>	<i>MUN5135</i>	50	100	80	2.2K	47K	


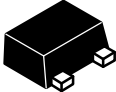
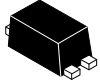
Devices listed in **bold italic** are ON Semiconductor preferred devices.

## BIPOLAR TRANSISTORS

### DIGITAL TRANSISTORS (BIAS RESISTOR TRANSISTORS) (continued)

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.



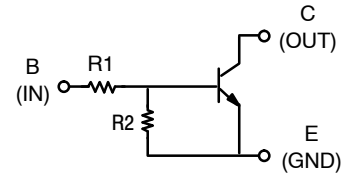
NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$ Min	R1 $\Omega$	R2 $\Omega$	Package
<i>DTC114EE</i>	<i>DTA114EE</i>	50	100	35	10k	10k	 SOT-416, SC-75, SC-90 Case 463-01
<i>DTC124EE</i>		50	100	60	22k	22k	
<i>DTC144EE</i>	<i>DTA144EE</i>	50	100	80	47k	47k	
<i>DTC114YE</i>	<i>DTA114YE</i>	50	100	80	10k	47k	
<i>DTC114TE</i>	<i>DTA114TE</i>	50	100	160	10k	$\infty$	
<i>DTC143EE</i>	<i>DTA143EE</i>	50	100	15	4.7k	4.7k	
<i>DTC143ZE</i>	<i>DTA143ZE</i>	50	100	80	4.7k	4.7k	
<i>DTC124XE</i>	–	50	100	80	22k	47k	
<i>DTC123JE</i>		50	100	80	2.2k	47k	
<i>DTC115EE</i>	<i>DTA115EE</i>	50	100	80	100k	100k	
<i>DTC114EM3</i>	<i>DTA114EM3</i>	50	100	35	10k	10k	 SOT-723 Case 631AA-01
<i>DTC124EM3</i>	<i>DTA124EM3</i>	50	100	60	22k	22k	
<i>DTC144EM3</i>	<i>DTA144EM3</i>	50	100	80	47k	47k	
<i>DTC114YM3</i>	<i>DTA114YM3</i>	50	100	80	10k	47k	
<i>DTC114TM3</i>	<i>DTA114TM3</i>	50	100	160	10k	$\infty$	
<i>DTC143TM3</i>	<i>DTA143TM3</i>	50	100	160	4.7k	$\infty$	
<i>DTC123EM3</i>	<i>DTA123EM3</i>	50	100	8.0	2.2k	2.2k	
<i>DTC143EM3</i>	<i>DTA143EM3</i>	50	100	15	4.7k	4.7k	
<i>DTC143ZM3</i>	<i>DTA143ZM3</i>	50	100	80	4.7k	4.7k	
<i>DTC124XM3</i>	<i>DTA124XM3</i>	50	100	80	22k	47k	
<i>DTC123JM3</i>		50	100	80	2.2k	47k	
<i>DTC115EM3</i>	<i>DTA115EM3</i>	50	100	80	100k	100k	
<i>DTC144WM3</i>	<i>DTA144WM3</i>	50	100	80	47k	22k	
<i>DTC144TM3</i>	<i>DTA144TM3</i>	50	100	160	47k	$\infty$	
<i>NSBC143EF3</i>	<i>NSBA143EF3</i>	50	100	15	4.7k	4.7k	 SOT-1123 Case 524AA
<i>NSBC114EF</i>	<i>NSBA114EF3</i>	50	100	35	10k	10k	
<i>NSBC124EF3</i>	<i>NSBA124EF3</i>	50	100	60	22k	22k	
<i>NSBC144EF3</i>	<i>NSBA144EF3</i>	50	100	80	47k	47k	
<i>NSBC123JF3</i>	<i>NSBA123JF3</i>	50	100	80	2.2k	47k	
<i>NSBC143ZF3</i>	<i>NSBA143ZF3</i>	50	100	80	4.7k	47k	
<i>NSBC144WF3</i>	<i>NSBA144WF3</i>	50	100	80	47k	22k	
<i>NSBC123TF3</i>	<i>NSBA123TF3</i>	50	100	160	2.2k	$\infty$	
<i>NSBC114TF3</i>	<i>NSBA114TF3</i>	50	100	160	10k	$\infty$	
<i>NSBC115TF3</i>	<i>NSBA115TF3</i>	50	100	160	100k	$\infty$	




Devices listed in **bold italic** are ON Semiconductor preferred devices.

## BIPOLAR TRANSISTORS

### DUAL DIGITAL TRANSISTORS (BIAS RESISTOR TRANSISTORS)

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.

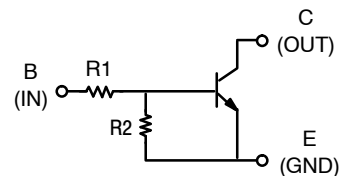




NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$ Min	$R_1$ $\Omega$	$R_2$ $\Omega$	Package
<i>MUN5211DW1</i>	<i>MUN5111DW1</i>	50	100	35	10k	10k	 SC-88, SOT-363 Duals Case 419B-02
<i>MUN5212DW1</i>		50	100	60	22k	22k	
<i>MUN5213DW1</i>	<i>MUN5113DW1</i>	50	100	80	47k	47k	
<i>MUN5214DW1</i>	<i>MUN5114DW1</i>	50	100	80	10k	47k	
<i>MUN5215DW1</i>	<i>MUN5115DW1</i>	50	100	160	10k	$\infty$	
<i>MUN5216DW1</i>	<i>MUN5116DW1</i>	50	100	160	4.7k	$\infty$	
<i>MUN5230DW1</i>		50	100	3.0	1.0k	1.0k	
<i>MUN5232DW1</i>		50	100	15	4.7k	4.7k	
<i>MUN5233DW1</i>	<i>MUN5133DW1</i>	50	100	80	4.7k	47k	
<i>MUN5235DW1</i>	<i>MUN5135DW1</i>	50	100	80	2.2k	47k	
<i>MUN5237DW1</i>		50	100	80	47k	22k	
NSBC114EDXV6	NSBA114EDXV6	50	100	35	10k	10k	 SOT-563 Duals Case 463A-01
NSBC124EDXV6		50	100	60	22k	22k	
NSBC144EDXV6	NSBA144EDXV6	50	100	80	47k	47k	
<b>NSBC114YDXV6</b>	NSBA114YDXV6	50	100	80	10k	10k	
<b>NSBC114TDXV6</b>		50	100	160	10k	–	
NSBC143ZDXV6		50	100	80	4.7k	4.7k	
	<b>NSBA123JDXV6</b>	50	100	80	2.2k	47k	
NSBC115EDXV6	NSBA115EDXV6	50	100	80	100k	100k	 SOT-963 Case 527AA
NSBC143EDP6	NSBA143EDP6	50	100	15	4.7k	4.7k	
NSBC114EDP6	NSBA114EDP6	50	100	35	10k	10k	
NSBC124EDP6	NSBA124EDP6	50	100	60	22k	22k	
NSBC114YDP6	NSBA114YDP6	50	100	80	10k	47k	
NSBC123JDP6	NSBA123JDP6	50	100	80	2.2k	47k	
NSBC143ZDP6	NSBA143ZDP6	50	100	80	4.7k	47k	
NSBC144EDP6	NSBA144EDP6	50	100	80	47k	47k	
NSBC144WDP6	NSBA144WDP6	50	100	80	47k	22k	
NSBC114TDP6	NSBA114TDP6	50	100	160	10k	$\infty$	
NSBC115TDP6	NSBA115TDP6	50	100	160	100k	$\infty$	
NSBC123TDP6	NSBA123TDP6	50	100	160	2.2k	$\infty$	

## BIPOLAR TRANSISTORS

### DUAL DIGITAL TRANSISTORS (BIAS RESISTOR TRANSISTORS)

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.



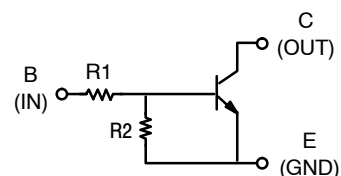
NPN	PNP	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$ Min	$R_1$ $\Omega$	$R_2$ $\Omega$	Package
NSBC114YF3	NSBA114YF3	45	100	80	10k	47k	 SOT-1123 Case 524AA
IMH20TR1	–	15	600	100	2.2k	–	 SC-74 Case 318F-05



Devices listed in **bold italic** are ON Semiconductor preferred devices.

## BIPOLAR TRANSISTORS

### COMBINATIONAL DIGITAL TRANSISTORS (BIAS RESISTOR TRANSISTORS)

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.



Device	Type	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$ Min	Q1	Q2	Package
<b>MUN5311DW1</b>	Dual Complementary	50	100	35	MUN5211	MUN5111	 SC-88, SOT-363 Case 419B-02
<b>MUN5312DW1</b>		50	100	60	MUN5212	MUN5112	
<b>MUN5313DW1</b>		50	100	80	MUN5213	MUN5113	
<b>MUN5314DW1</b>		50	100	80	MUN5214	MUN5114	
<b>MUN5315DW1</b>		50	100	160	MUN5215	MUN5115	
<b>MUN5316DW1</b>		50	100	160	MUN5216	MUN5116	
<b>MUN5330DW1</b>		50	100	3.0	MUN5230	MUN5130	
<b>MUN5332DW1</b>		50	100	15	4.7k/4.7k	4.7k/4.7k	
<b>MUN5333DW1</b>		50	100	80	MUN5233	MUN5133	
<b>MUN5334DW1</b>		50	100	80	22k/47k	22k/47k	
<b>MUN5335DW1</b>		50	100	80	MUN5235	MUN5135	
<b>NSB4904DW1</b>		50	100	80	22k/47k	22k/47k	
<b>UMC3N</b>	Dual Common Base Collector	50	100	35	4.7k/10k	47k/47k	 SC-88A, SOT-353 SC70-5 Case 419A-02
<b>UMC5N</b>		50	100	20	47k/ $\infty$	47k/ $\infty$	
<b>NSB1706DMW5</b>	Dual Common Emitter	50	100	80	4.7k/47k	4.7k/47k	

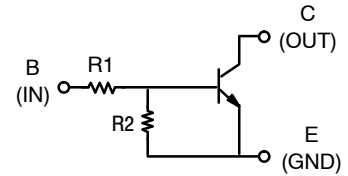
Devices listed in **bold italic** are ON Semiconductor preferred devices.





## BIPOLAR TRANSISTORS

### COMBINATIONAL DIGITAL TRANSISTORS (BIAS RESISTOR TRANSISTORS)

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.



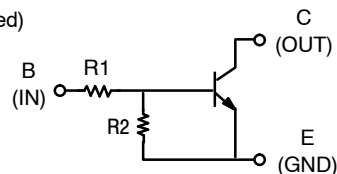
Device	Type	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$ Min	Q1	Q2	Package	
EMC2DXV5	Dual Common Base Collector	50	100	60	22k/22k	22k/22k	 <b>SOT-553</b> Case 463B-01	
EMC3DXV5		50	100	35	10k/10k	10k/10k		
EMC4DXV5		50	100	80	10k/47k	4.7k/47k		
EMC5DXV5		50	100	35	4.7k/10k	4.7k/47k		
EMG2DXV5	Dual Common Base, Common Emitter	50	100	80	4.7k/47k	4.7k/47k		
NSTB1002DXV5	Dual Common Base Collector	40	100	100	47k/47k	47k/47k		
NSTB1005DXV5		50	100	80	47k/47k	47k/47k		
EMD4DXV6	Dual Complementary	50	100	80	10k/47k	47k/47k		 <b>SOT-563</b> Case 463A-01
EMD5DXV6		50	100	20	4.7k/10k	47k/47k		
NSBC114EPDXV6		50	100	35	10k/10k	10k/10k		
NSBC114YPDXV6		50	100	80	10k/47k	10k/47k		
NSBC123JPDXV6		50	100	80	2.2k/47k	2.2k/47k		
NSBC124EPDXV6		50	100	60	22k/22k	22k/22k		
NSBC143TPDXV6		50	100	160	4.7k/∞	4.7k/∞		
NSBC143ZPDXV6		50	100	80	4.7k/47k	4.7k/47k		
NSBC144EPDXV6		50	100	80	47k/47k	47k/47k		
NSB1011XV6	Dual NPN	50	100	–	2.2k/47k	10k/10k		


Devices listed in **bold italic** are ON Semiconductor preferred devices.

## BIPOLAR TRANSISTORS

### COMBINATIONAL DIGITAL TRANSISTORS (BIAS RESISTOR TRANSISTORS) (continued)

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.

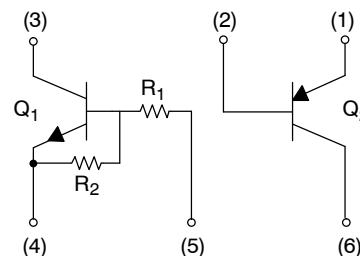



Device	Type	$V_{(BR)CEO}$	$I_C$ mA Max	$h_{FE}$ Min	Q1	Q2	Package
<i>NSBC114EPD6</i>	Dual Complementary	50	100	35	10k/10k	10k/10k	 SOT-963 Case
<i>NSBC114YPDP6</i>		50	100	80	10k/47k	10k/47k	
<i>NSBC123JPDP6</i>		50	100	80	2.2k/47k	2.2k/47k	
<i>NSBC143ZPDP6</i>		50	100	80	4.7k/47k	4.7k/47k	
<i>NSBC144EPDP6</i>		50	100	80	47k/47k	47k/47k	
<i>NSBC115TPDP6</i>		50	100	160	100k/∞	100k/∞	

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.

### COMPLEX DIGITAL TRANSISTORS

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.



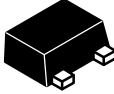






Device	Switching Transistor				Digital Transistor			Package
	$V_{(BR)CEO}$ V	$I_C$ (mA) Max	$h_{FE}$		$h_{FE}$ Min	R1 $\Omega$	R2 $\Omega$	
			Min	Max				
<i>EMF5XV6</i>	12	500	270	680	80	47K	47K	 SOT-563 Case 463A-01
<i>EMF18XV6</i>	60	100	120	560	80	47K	47K	

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.

## BIPOLAR TRANSISTORS






### LOW SATURATION VOLTAGE TRANSISTORS

NPN	PNP	$V_{(BR)CEO}$	$I_C$ DC A Max	$I_C$ Peak A Max	$h_{FE}$ @ 1.0 A		$f_t$ MHz Min	$V_{CE(sat)}$ @ 1.0 A Max	Package
					Min	Max			
NSS1C201L	-	100	2	3	120	360	100	0.09	 <p>TO-236AB, SOT-23 Case 318-08 STYLE 6</p>
-	NSS1C200L	100	2	3	120	360	120	0.115	
NSS60201L	-	60	2	4	200	500	150	0.070	
-	NSS60200L	60	2	4	200	500	150	0.095	
NSS40201L	-	40	2	4	200	500	150	0.060	
-	NSS40200L	40	2	4	200	500	150	0.090	
NSS30101L	-	30	1	2	100	500	100	0.200	
-	NSS30100L	30	1	2	100	500	100	0.300	
NSS20201L	-	20	2	4	200	500	150	0.050	
-	NSS20200L	20	2	4	200	500	150	0.080	
NSS12201L	-	12	2	4	200	500	150	0.055	
-	NSS12200L	12	2	4	200	500	150	0.080	
NSS20101J	-	20	1	2	200	500	350	0.22	 <p>SC-89 Case 463A-01</p>
-	NSS12100M3	12	1	3	120			0.41	 <p>SOT-723 Case 631AA-01</p>
NSS30071MR6	-	30	0.7	2	150	500	100	0.250	 <p>SC-74 Case 318F-05 STYLE 2</p>
-	NSS30070MR6	30	0.7	2	150	500	100	0.250	
-	NSS35200MR6	35	2	5	100	400	100	0.150	 <p>TSOP-6 Single Case 318G-02 STYLE 6</p>
NSS30201MR6	-	30	2	5	200	900	100	0.150	
NSS20201MR6	-	20	2	5	200	900	100	0.150	
-	NSS20300MR6	20	3	5	100	400	100	0.150	
NSS40601CF8	-	40	6	6	225	500	100	0.065	 <p>ChipFET™ Case 1206A-03 STYLE 4</p>
-	NSS40600CF8	40	6	6	220	500	100	0.065	
-	NSS35200CF8	35	2	7	100	400	100	0.150	
NSS20601CF8	-	20	6	6	250	500	100	0.050	
NSS12601CF8	-	12	6	6	250	500	100	0.050	
NSS40501UW3	-	40	5	6	250	500	100	0.045	 <p>WDFN3 Case 506AU-01</p>
-	NSS40500UW3	40	5	6	250	500	100	0.080	
NSS20501UW3	-	20	5	6	250	500	100	0.045	
-	NSS20500UW3	20	5	7	250	500	100	0.090	
NSS12501UW3	-	12	5	6	250	500	100	0.045	
-	NSS12500UW3	12	5	6	250	500	100	0.070	
-	NSS12100UW3	12	1	2	200	400	200	0.44	

Devices listed in **bold italic** are ON Semiconductor preferred devices.


**BIPOLAR TRANSISTORS**

**LOW SATURATION VOLTAGE TRANSISTORS** (continued)


NPN	PNP	$V_{(BR)CEO}$	$I_C$ DC A Max	$I_C$ Peak A Max	$h_{FE}$ @ 1.0 A		$f_t$ MHz Min	$V_{CE(sat)}$ @ 1.0 A Max	Package
					Min	Max			
-	NSS40200UW6	40	2	4	150	500	100	0.120	 WDFN6 Case 506AS-01
-	NSS12200W	12	2	3	100	300	100	0.290	 SC-88, SOT-363 Case 419B-02 STYLE 20
-	NSS12100XV6	12	1	2	200	500	150	0.280	 SOT-563 Case 463A-01
NJD2873	-	50	2	3	120	360	65	0.300	 DPAK Case 369C-01
NSS1C201MZ4	-	100	2	3	120	360	100	0.100	 SOT-223 Case 318E-04
-	NSS1C200MZ4	100	2	3	120	360	120	0.125	
NSS40301MZ4	-	40	3	5	200	500	150	0.045	
-	NSS40300MZ4	40	3	5	200	500	150	0.050	
NSS60601MZ4	-	60	6	12	120	360	100	0.060	
-	NSS60600MZ4	60	6	12	120	360	100	0.065	
-	NSB9435	30	3	5	125	500	110	0.210	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

**LOW SATURATION VOLTAGE MULTIPLE TRANSISTORS**

Device	Type	$V_{(BR)CEO}$	$I_C$ DC	$I_C$ Peak	$h_{FE}$		$f_t$	$V_{CE(sat)}$	Package
					Min	Max			
NSS40301MD	Matched Dual NPN	40	3	6	200		100	0.05	 8 1 SOIC-8 Case 751
NSS40300DD	Dual PNP	40	3	6	220		100	0.095	
NSS40300MD	Matched Dual PNP	40	3	6	220		100	0.095	
NSS40302PD	Dual Complementary	40	3	6	200		100	0.06	

**LOAD SWITCH TRANSISTORS** (Low Saturation Voltage Transistors with BRT Driver)

NPN	PNP	$V_{(BR)CEO}$	$I_C$ DC A Max	$I_C$ Peak A Max	$h_{FE}$ @ 1.0 A		$f_t$ MHz Min	$V_{CE(sat)}$ @ 0.1 A Max	Package
					Min	Max			
-	EMF5XV6	50	0.1	0.5	270	680	-	0.250	 SOT-563 Case 463A-01
-	EMF18XV6	50	0.1	0.5	120	560	-	0.400	

Devices listed in **bold italic** are ON Semiconductor preferred devices.



## **Clock and Data Distribution**

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# Clock and Data Distribution

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## Table of Contents

	<b>Page</b>
Arithmetic Functions .....	64
Drivers and Fanout Buffers .....	65
Flip-Flops, Latches and Registers .....	65
Logic Gates .....	74
Multiplexers and Crosspoint Switches .....	75
Serial/Parallel Converters .....	77
Skew Management .....	78
Translators .....	78



## ON Semiconductor Selector Guide – Clock and Data Distribution

### ARITHMETIC FUNCTIONS

Device	Type	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Max</sub> Typ (MHz)	t <sub>pd</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Package
MC10H180	Adder / Subtractor	ECL	ECL	-5.2		1.8	2100	PDIP-16; PLLC-20
MC100E016	Counter	ECL	ECL	5	900	0.775	700	PLCC-28
MC100E136	Counter	ECL	ECL	5	650	1.15	600	PLCC-28
MC100E137	Counter	ECL	ECL	5	2200	2.9	600	PLCC-28
MC100EP016A	Counter	CML; ECL	ECL	3.3	1400	0.55	320	LQFP-32; QFN-32
MC10E016	Counter	ECL	ECL	5	900	0.775	800	PLCC-28
MC10E136	Counter	ECL	ECL	5	650	1.15	600	PLCC-28
MC10E137	Counter	ECL	ECL	5	2200	2.9	600	PLCC-28
MC10EP016	Counter	CML; ECL	ECL	3.3; 5	900	0.5	220	LQFP-32
MC10H016	Counter	ECL	ECL	-5.2	200	1.8	21	PDIP-16; PLLC-20
MC10H136	Counter	ECL	ECL	-5.2	250	1.5	2400	PDIP-16; PLLC-20
MC100EL32	Divider	ECL	ECL	5	3000	0.51	350	DFN-8; SOIC-8; TSSOP-8
MC100EL33	Divider	ECL	ECL	5	4200	0.65	350	SOIC-8; TSSOP-8
MC100EL34	Divider	ECL	ECL	5	1100	1	52.5	SOIC-16
MC100EL38	Divider	ECL	ECL	5	1200	0.9	550	SOIC-20W
MC100EL39	Divider	ECL	ECL	5	1200	0.9	550	SOIC-20W
MC100EP139	Divider	CML; ECL	ECL	3.3; 5	1000	0.75	275	QFN-20; SOIC-20W; TSSOP-20
MC100EP32	Divider	CML; ECL	ECL	3.3; 5	4000	0.35	170	DFN-8; SOIC-8; TSSOP-8
MC100EP33	Divider	CML; ECL	ECL	3.3; 5	4000	0.32	180	DFN-8; SOIC-8; TSSOP-8
MC100LVEL32	Divider	ECL; LVDS	ECL	3.3	2600	0.51	320	DFN-8; SOIC-8; TSSOP-8
MC100LVEL33	Divider	ECL; LVDS	ECL	3.3	4000	0.63	320	DFN-8; SOIC-8; TSSOP-8
MC100LVEL34	Divider	ECL; LVDS	ECL	3.3	1500	0.7	400	SOIC-16; TSSOP-16
MC100LVEL37	Divider	ECL; LVDS	ECL	3.3	1000	0.7	550	SOIC-20W
MC100LVEL38	Divider	ECL; HSTL	ECL	3.3	1000	0.9	550	SOIC-20W
MC100LVEL39	Divider	ECL; LVDS	ECL	3.3	1000	0.9	550	SOIC-20W
MC100LVEP34	Divider	CML; ECL; LVDS	ECL	2.5; 3.3	2800	0.7	250	SOIC-16; TSSOP-16
MC10EL32	Divider	ECL	ECL	5	3000	0.51	350	SOIC-8; TSSOP-8
MC10EL33	Divider	ECL	ECL	5	4000	0.65	350	SOIC-8; TSSOP-8
MC10EL34	Divider	ECL	ECL	5	1100	1	52.5	SOIC-16
MC10EP139	Divider	CML; ECL	ECL	3.3; 5	1000	0.75	275	SOIC-20W; TSSOP-20
MC10EP32	Divider	CML; ECL	ECL	3.3; 5	400; 4000	0.35	17; 170	DFN-8; SOIC-8; TSSOP-8
MC10EP33	Divider	CML; ECL	ECL	3.3; 5	4000	0.32	180	DFN-8; SOIC-8; TSSOP-8

**ARITHMETIC FUNCTIONS** (continued)

Device	Type	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Max</sub> Typ (MHz)	t <sub>pd</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Package
NB4L339	Divider	CML; ECL; LVDS	ECL	2.5; 3.3	700	1.3	250	QFN-32
NB6L239	Divider	CML; CMOS; ECL; LVDS	ECL	2.5; 3.3	3000	0.47	120	QFN-16
NB6N239S	Divider	CML; CMOS; ECL; LVDS	LVDS	3.3	3000	0.665	190	QFN-16
NB7L32M	Divider	CML; ECL; LVDS	CML	2.5; 3.3	14000	0.155	45	QFN-16
NB7N017M	Divider	CML; CMOS; ECL; LVDS	CML	3.3	3500	0.5	65	QFN-52
NB7V32M	Divider	CML; ECL; LVDS	CML	1.8; 2.5	10000	0.2	60	QFN-16
NB7V33M	Divider	CML; ECL; LVDS	CML	1.8; 2.5	11000	0.26	60	QFN-16
MC10E166	Magnitude Comparator	ECL	ECL	5	1100	0.85	800	PLCC-28
MC12026A	Prescaler	ECL	ECL	5	1100			SOIC-8
MC12080	Prescaler	ECL	ECL	5	1100			SOIC-8
MC12093	Prescaler	ECL	ECL	3.3	1100			DFN-8; SOIC-8
MC12095	Prescaler	ECL	ECL	3.3	3000			DFN-8; SOIC-8

**DRIVERS AND FANOUT BUFFERS**

Device	Type	Channels	Input / Output Ratio	Input Level	Output Level	V <sub>CC</sub> Typ (V)	T <sub>Jitter</sub> RMS Typ (ps)	t <sub>skew(o-o)</sub> Max (ps)	t <sub>pd</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	f <sub>max</sub> Clock Typ (MHz)	f <sub>max</sub> Data Typ (Mbps)	Package
MC100EL11	Buffer	1	1:2	ECL	ECL	5	0.2	5	0.265	350	2000		SOIC-8; TSSOP-8
MC100EP11	Buffer	1	1:2	CML; ECL	ECL	3.3; 5	0.2	20	0.22	180	3000		DFN-8; SOIC-8; TSSOP-8
MC100LVEL11	Buffer	1	1:2	ECL; LVDS	ECL	3.3	0.2	20	0.33	180	1000		DFN-8; SOIC-8; TSSOP-8
MC100LVEP11	Buffer	1	1:2	CML; ECL; LVDS	ECL	2.5; 3.3	0.2	20	0.24	180	3000		DFN-8; SOIC-8; TSSOP-8
MC10EL11	Buffer	1	1:2	ECL	ECL	5	0.2	5	0.265	350	2000		SOIC-8; TSSOP-8
MC10EP11	Buffer	1	1:2	ECL	ECL	3.3; 5	0.2	20	0.22	180	3000		SOIC-8; TSSOP-8
MC10LVEP11	Buffer	1	1:2	CML; ECL; LVDS	ECL	2.5; 3.3	0.2	20	0.24	180	3000		SOIC-8; TSSOP-8
NB4N11M	Buffer	1	1:2	CML; CMOS; ECL; LVDS; TTL	CML	3.3	1	25	600	300	2500	2500	TSSOP-8
NB6L11	Buffer	1	1:2	CML; CMOS; ECL; LVDS; TTL	ECL	2.5; 3.3	0.2	15	0.15	120	6000	6000	SOIC-8; TSSOP-8

## ON Semiconductor Selector Guide – Clock and Data Distribution

### DRIVERS AND FANOUT BUFFERS (continued)

Device	Type	Channels	Input / Output Ratio	Input Level	Output Level	V <sub>CC</sub> Typ (V)	T <sub>Jitter</sub> RMS Typ (ps)	t <sub>skew(o-o)</sub> Max (ps)	t <sub>pd</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	f <sub>maxClock</sub> Typ (MHz)	f <sub>maxData</sub> Typ (Mbps)	Package
NB6L11M	Buffer	1	1:2	CML; CMOS; ECL; LVDS; TTL	CML	2.5; 3.3	0.15	15	200	120	4000		QFN-16
NB6L11S	Buffer	1	1:2	CML; CMOS; ECL; LVDS; TTL	LVDS	2.5	0.5	25	0.38	170	2000	2500	QFN-16
NB6L611	Buffer	1	1:2	CML; CMOS; ECL; LVDS; TTL	ECL	2.5; 3.3	0.2	15	0.2	200	4000		QFN-16
NB6N11S	Buffer	1	1:2	CML; CMOS; ECL; LVDS; TTL	LVDS	3.3	0.5	30	470	120	2000	2500	QFN-16
NB7L11M	Buffer	1	1:2	CML; CMOS; ECL; LVDS; TTL	CML	2.5; 3.3	0.2	15	0.11	60	8000	12000	QFN-16
NBSG11	Buffer	1	1:2	CML; CMOS; ECL; LVDS; TTL	ECL	2.5; 3.3	0.5	15	0.125	30	12000	12000	QFN-16
MC100EL15	Buffer	1	1:4	ECL	ECL	5	0.2	50	0.57	575	1000		SOIC-16
MC10EL15	Buffer	1	1:4	ECL	ECL	5	0.2	50	0.57	575	1000		SOIC-16
NB3L553	Buffer	1	1:4	CMOS	CMOS	2.5; 3.3; 5		50	4	1000	200		DFN-8; SOIC-8
NB3N2304NZ	Buffer	1	1:4	CMOS	CMOS	3.3		100	3.5	1500	140		DFN-8; TSSOP-8
NB3N551	Buffer	1	1:4	CMOS	CMOS	3.3; 5	2	160	3	1000	180		DFN-8; SOIC-8
NB6HQ14M	Buffer	1	1:4	CML; ECL; LVDS	CML	2.5	0.2	3	0.22	30	5000	6500	QFN-16
NB6L14	Buffer	1	1:4	CML; CMOS; ECL; LVDS; TTL	ECL	2.5; 3.3	0.2	20	350	225	3000	2500	QFN-16
NB6L14M	Buffer	1	1:4	CML; CMOS; ECL; LVDS; TTL	CML	2.5; 3.3	0.2	20	350	150	3000	2500	QFN-16
NB6L14S	Buffer	1	1:4	CML; CMOS; ECL; HCSSL; HSTL; LVDS; TTL	LVDS	2.5	0.5	20	0.45	225	2000	2500	QFN-16
NB6N14S	Buffer	1	1:4	CML; CMOS; ECL; LVDS; TTL	LVDS	3.3	0.5	20	0.38	190	2000	2500	QFN-16
NB7HQ14M	Buffer	1	1:4	CML; ECL; LVDS	CML	2.5	0.2	15	0.17	45	7000	10000	QFN-16
NB7L14	Buffer	1	1:4	CML; CMOS; ECL; LVDS; TTL	ECL	2.5; 3.3	0.5	15	165	60	7000	10700	QFN-16
NB7L14M	Buffer	1	1:4	CML; CMOS; ECL; LVDS; TTL	CML	2.5; 3.3	0.5	15	0.11	60	8000	12000	QFN-16
NB7VQ14M	Buffer	1	1:4	CML; ECL; LVDS	CML	1.8; 3.3	0.2	15	0.175	45	8000	14000	QFN-16
NBSG14	Buffer	1	1:4	CML; CMOS; ECL; LVDS; TTL	ECL	2.5; 3.3	0.5	15	0.125	55	12000	12000	QFN-16
MC100EL14	Buffer	1	1:5	ECL	ECL	5	0.2	50	0.68	500	1000		SOIC-20W

**DRIVERS AND FANOUT BUFFERS** (continued)

Device	Type	Channels	Input / Output Ratio	Input Level	Output Level	V <sub>CC</sub> Typ (V)	T <sub>Jitter</sub> RMS Typ (ps)	t <sub>skew(o-o)</sub> Max (ps)	t <sub>pd</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	f <sub>maxClock</sub> Typ (MHz)	f <sub>maxData</sub> Typ (Mbps)	Package
MC100EP14	Buffer	1	1:5	CML; ECL; HSTL; LVDS	ECL	3.3; 5	0.2	45	0.375	270	2000		TSSOP-20
MC100LVEL14	Buffer	1	1:5	ECL; LVDS	ECL	3.3	0.2	50	0.68	500	1000		SOIC-20W
MC100LVEP14	Buffer	1	1:5	CML; ECL; HSTL; LVDS	ECL	2.5; 3.3	0.2	25	0.4	250	2000		TSSOP-20
P2P2305NZ	Buffer	1	1:5	CMOS	CMOS	3.3		250	4	2000	133.33		SOIC-8
MC100E211	Buffer	1	1:6	ECL	ECL	5	0.2	75	0.94	400	700		PLCC-28
MC10E211	Buffer	1	1:6	ECL	ECL	5	0.2	75	0.94	400	700		PLCC-28
MC100H643	Buffer	1	1:8	ECL	TTL	5		500		1200	80		PLCC-28
MC100H646	Buffer	1	1:8	ECL	TTL	5		350		1500	80		PLCC-28
MC10H643	Buffer	1	1:8	ECL	TTL	5		500	5.36	1200	80		PLCC-28
MC10H646	Buffer	1	1:8	ECL	TTL	5		350	5.36	1500	80		PLCC-28
NB7L1008M	Buffer	1	1:8	CML; ECL; LVDS	CML	2.5; 3.3	0.2	25	0.16	70	6000	10700	QFN-32
MC100E111	Buffer	1	1:9	ECL	ECL	5	0.2	50	0.53	600	800		PLCC-28
MC100EP809	Buffer	1	1:9	CML; ECL; HSTL; LVDS	HSTL	3.3	1.4	15	0.85	600	750		LQFP-32; QFN-32
MC100LVE111	Buffer	1	1:9	ECL	ECL	3.3	0.2	20	0.53	600	1500		PLCC-28
MC10E111	Buffer	1	1:9	ECL	ECL	5	0.2	50	0.53	600	800		PLCC-28
MC10H641	Buffer	1	1:9	ECL	ECL	5		350	5.36	1700	65		PLCC-28
MC10H645	Buffer	1	1:9	TTL	TTL	5		650	5.36	2500			PLCC-28
PCS2P2309NZ	Buffer	1	1:9	CMOS	CMOS	3.3		250	4	2000			SOIC-16
MC100LVEP111	Buffer	1	1:10	CML; ECL; HSTL; LVDS	ECL	2.5; 3.3	0.2	25	0.5	200	3000		LQFP-32; QFN-32
NB4N111K	Buffer	1	1:10	CML; ECL; LVDS	HCSL	3.3	1	100	0.1	700	400		QFN-32
NB7L111M	Buffer	1	1:10	CML; CMOS; ECL; LVDS; TTL	CML	2.5; 3.3	0.2	20	0.28	75	5500	6125	QFN-52
NB100LVEP222	Buffer	1	1:15	CML; ECL; LVDS	ECL	2.5; 3.3	0.2	20	0.875	160	1000		LQFP-52; QFN-52
NB100LVEP221	Buffer	1	1:20	CML; ECL; HSTL; LVDS	ECL	2.5; 3.3	1	20	0.54	300	1000		LQFP-52; QFN-52
NB4N121K	Buffer	1	1:21	CML; CMOS; ECL; LVDS; TTL	HCSL	3.3	1	50	0.8	340	200		QFN-52
NB100EP223	Buffer	1	1:22	CML; ECL; HSTL; LVDS	HSTL	3.3	0.2	25	1	700	500		QFP-64 / LQFP-64
NB100LVEP224	Buffer	1	1:24	CML; ECL; LVDS	ECL	2.5; 3.3	5	40	0.75	300	1000		QFP-64 / LQFP-64

## ON Semiconductor Selector Guide – Clock and Data Distribution

### DRIVERS AND FANOUT BUFFERS (continued)

Device	Type	Channels	Input / Output Ratio	Input Level	Output Level	V <sub>CC</sub> Typ (V)	T <sub>Jitter</sub> RMS Typ (ps)	t <sub>skew(o-o)</sub> Max (ps)	t <sub>pd</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	f <sub>maxClock</sub> Typ (MHz)	f <sub>maxData</sub> Typ (Mbps)	Package
MC10H640	Buffer	1	2:6	ECL	TTL	5		500	5.4	2500	135		PLCC-28
MC100E310	Buffer	1	2:8	ECL	ECL	5	0.2	50	0.65	600	900		PLCC-28
MC100H642	Buffer	1	2:8	ECL	TTL	5		500	5.25	2500	100		PLCC-28
MC100LVE310	Buffer	1	2:8	ECL	ECL	3.3	1.5	50	0.65	600	1000		PLCC-28
NB3H83905C	Buffer	1		Crystal	CMOS	1.8; 3.3	0.14	80	-	800	40		SOIC-16; TSSOP-16
MC100LVE210	Buffer	1	1:4; 1:5	ECL	ECL	3.3	0.2	75	0.6	600	700		PLCC-28
MC100EL13	Buffer	2	1:3	ECL	ECL	5	0.2	50	0.5	500	1000		SOIC-20W
MC100LVEL13	Buffer	2	1:3	ECL; LVDS	ECL	3.3	0.2	50	0.5	500	1000		SOIC-20W
MC100EP210S	Buffer	2	1:5	CML; ECL; LVDS	LVDS	3.3	0.2	20	0.55	225	1000		LQFP-32; QFN-32
MC100LVEP210	Buffer	2	1:5	CML; ECL; HSTL; LVDS	ECL	2.5; 3.3	0.2	20	0.35	270	3000		LQFP-32; QFN-32
MC100LVE222	Buffer	2	1:15	ECL	ECL	3.3	0.2	50	1.18	600	1500		QFP-52 / LQFP-52
MC100E210	Buffer	2	1:4; 1:5	ECL	ECL	5	0.2	75	0.6	600	700		PLCC-28
MC10EL89	Coaxial Cable Driver	1	1:2	ECL	2X ECL	5		20	0.35	455	1500		SOIC-8; TSSOP-8
MC10EP89	Coaxial Cable Driver	1	1:2	CML; ECL	2X ECL	3.3; 5	0.5	20	0.31	350	2000		DFN-8; SOIC-8; TSSOP-8
MC10SX1189	Fibre Channel Coaxial Cable Driver	1	1:2	ECL	2X ECL	5			0.425	250	2500		SOIC-16
MC10SX1190	Fibre Channel Coaxial Cable Driver	1	1:2	ECL	2X ECL	3.3; 5			0.425	250	2500	2500	TSSOP-20
MC10SX1130	LED Driver	1	1:1	ECL	ECL	5			1.4	1260	300		SOIC-16
NB7L585	Multiplexer	1	2:6	CML; ECL; LVDS	ECL	2.5; 3.3	0.2	20	0.175	85			QFN-32
NB7L585R	Multiplexer	1	2:6	CML; ECL; LVDS	RSECL	2.5	0.2	20	0.160-0.200	70			QFN-32
NB7VQ572M	Multiplexer	1	4:2	CML; ECL; LVDS	CML	1.8; 3.3	0.2	15	175	65	7000	11000	QFN-32
NB7VPQ16M	PreEmphasizer & Equalizer	1	1:1	CML; ECL; LVDS	CML	1.8; 2.5	0.1		0.2	50	8000	12500	QFN-16
MC100EL12	Signal Driver	1	1:1	ECL	ECL	5			0.29	550	1000		SOIC-8; TSSOP-8

DRIVERS AND FANOUT BUFFERS (continued)

Device	Type	Channels	Input / Output Ratio	Input Level	Output Level	V <sub>CC</sub> Typ (V)	T <sub>Jitter</sub> RMS Typ (ps)	t <sub>skew(o-o)</sub> Max (ps)	t <sub>pd</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	f <sub>maxClock</sub> Typ (MHz)	f <sub>maxData</sub> Typ (Mbps)	Package
MC100EL16	Signal Driver	1	1:1	ECL	ECL	5	0.2		0.25	350	1000		SOIC-8; TSSOP-8
MC100EP16	Signal Driver	1	1:1	CML; ECL	ECL	3.3; 5	0.2		0.22	180	4000		DFN-8; SOIC-8; TSSOP-8
MC100EP16F	Signal Driver	1	1:1	CML; ECL	RSECL	3.3; 5	0.2		0.3	100	4000		SOIC-8; TSSOP-8
MC100EP16T	Signal Driver	1	1:1	CML; ECL	ECL	3.3; 5	0.2		0.22	180	3000		DFN-8; SOIC-8; TSSOP-8
MC100EP16VA	Signal Driver	1	1:1	CML; ECL	ECL	3.3; 5	0.2		0.27	180	3000		DFN-8; SOIC-8; TSSOP-8
MC100EP16VS	Signal Driver	1	1:1	ECL	ECL	3.3; 5	0.2		0.22	180	4000		SOIC-8; TSSOP-8
MC100EP16VT	Signal Driver	1	1:1	ECL	ECL	3.3; 5	0.2		0.3	180	4000		DFN-8; SOIC-8; TSSOP-8
MC100LVEL16	Signal Driver	1	1:1	ECL; LVDS	ECL	3.3	0.2		0.3	320	1000		DFN-8; SOIC-8; TSSOP-8
MC100LVEP16	Signal Driver	1	1:1	CML; ECL; LVDS	ECL	2.5; 3.3	0.2		0.24	180	4000		DFN-8; SOIC-8; TSSOP-8
MC10EL16	Signal Driver	1	1:1	ECL	ECL	5	0.2		0.25	350	1750		SOIC-8; TSSOP-8
MC10EP16	Signal Driver	1	1:1	CML; ECL	ECL	3.3; 5	0.2		0.22	180	4000		DFN-8; SOIC-8; TSSOP-8
MC10EP16T	Signal Driver	1	1:1	CML; ECL	ECL	3.3; 5	0.2		0.22	180	3000		DFN-8; SOIC-8; TSSOP-8
MC10EP16VA	Signal Driver	1	1:1	CML; ECL	ECL	3.3; 5	0.2		0.27	180	3000		DFN-8; SOIC-8; TSSOP-8
MC10LVEP16	Signal Driver	1	1:1	CML; ECL; LVDS	ECL	2.5; 3.3	0.2		0.24	180	4000		SOIC-8; TSSOP-8
NB4L16M	Signal Driver	1	1:1	CML; CMOS; ECL; LVDS; TTL	CML	2.5; 3.3	0.2		0.265	90	3500	5000	QFN-16
NB4N316M	Signal Driver	1	1:1	CML; CMOS; ECL; HSTL; LVDS; TTL	CML	3.3	1	20	0.55	300	2000	2500	TSSOP-8
NB6L16	Signal Driver	1	1:1	CML; CMOS; ECL; LVDS; TTL	ECL	2.5; 3.3	0.2		0.13	120	6000	6000	SOIC-8; TSSOP-8
NB7L216	Signal Driver	1	1:1	CML; CMOS; ECL; LVDS; TTL	ECL	2.5; 3.3	0.1		0.18	45	8500	12000	QFN-16
NBSG16	Signal Driver	1	1:1	CML; CMOS; ECL; LVDS; TTL	RSECL	2.5; 3.3	0.3		0.12	65	12000	12000	QFN-16
NBSG16M	Signal Driver	1	1:1	CML; CMOS; ECL; LVDS; TTL	CML	2.5; 3.3	0.2		0.12	53	10000	10000	QFN-16

## ON Semiconductor Selector Guide – Clock and Data Distribution

### DRIVERS AND FANOUT BUFFERS (continued)

Device	Type	Channels	Input / Output Ratio	Input Level	Output Level	V <sub>CC</sub> Typ (V)	T <sub>Jitter</sub> RMS Typ (ps)	t <sub>skew(o-o)</sub> Max (ps)	t <sub>pd</sub> Typ (ns)	t <sub>r</sub> & t <sub>f</sub> Max (ps)	f <sub>maxClock</sub> Typ (MHz)	f <sub>maxData</sub> Typ (Mbps)	Package
NBSG16VS	Signal Driver	1	1:1	CML; CMOS; ECL; LVDS; TTL	RSECL	2.5; 3.3	0.8	no spec	0.125	55	12000	12000	QFN-16
MC100EP16VB	Signal Driver	1	1:2	CML; ECL	ECL	3.3; 5	0.2		0.3	240	3000		SOIC-8; TSSOP-8
MC100EP16VC	Signal Driver	1	1:2	ECL	ECL	3.3; 5	0.2		0.38	240	3000		DFN-8; SOIC-8; TSSOP-8
MC100LVEL12	Signal Driver	1	1:2	ECL	ECL	3.3			0.445	550	1000		DFN-8; SOIC-8; TSSOP-8
MC10EL12	Signal Driver	1	1:2	ECL	ECL	5			0.29	550			SOIC-8; TSSOP-8
NB7VQ1006M	Signal Driver	1	1:6	CML; ECL; LVDS	CML	1.8; 2.5	0.2	1	0.225	65	7500	10000	QFN-24
NB4N527S	Signal Driver	2	1:1	CML; CMOS; ECL; HSTL; LVDS	LVDS	3.3	1	50	0.275	300	1500	2500	QFN-16
NB4N855S	Signal Driver	2	1:1	CML; CMOS; ECL; HSTL; LVDS; SSTL; TTL	LVDS	3.3	1	25	0.47	140	1500	2500	Micro10
NB4N1158	Signal Driver	2	2:1	ECL; TTL	ECL	3.3	10		0.375	150		1500	TSSOP-28
MC10H116	Signal Driver	3	1:1	ECL; HSTL	ECL	-5.2			1	1600			PDIP-16; PLLC-20; SOIC-16
MC10H123	Signal Driver	3	4:1	ECL	ECL	-5.2			1.5	1700			PDIP-16; PLLC-20
MC100E112	Signal Driver	4	1:1	ECL	ECL	5		40	0.4	700	700		PLCC-28
MC100EL17	Signal Driver	4	1:1	ECL; LVDS	ECL	5	0.2		0.425	550	1000		SOIC-20W
MC100EP17	Signal Driver	4	1:1	CML; ECL	ECL	3.3; 5	0.2		0.22	230	3000		QFN-20; SOIC-20W; TSSOP-20
MC100H680	Signal Driver	4	1:1	ECL	TTL	5			3.2	3400			PLCC-28
MC100LVEL17	Signal Driver	4	1:1	ECL; LVDS	ECL	3.3	0.2		0.425	550	1750		SOIC-20W
MC10EP17	Signal Driver	4	1:1	CML; ECL	ECL	3.3; 5	0.2		0.22	230	3000		QFN-20; SOIC-20W; TSSOP-20
MC10H115	Signal Driver	4	1:1	ECL	ECL	-5.2			1	1500			PDIP-16; PLLC-20

**DRIVERS AND FANOUT BUFFERS** (continued)

Device	Type	Channels	Input / Output Ratio	Input Level	Output Level	V <sub>CC</sub> Typ (V)	T <sub>Jitter</sub> RMS Typ (ps)	t <sub>skew(o-o)</sub> Max (ps)	t <sub>pd</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	f <sub>maxClock</sub> Typ (MHz)	f <sub>maxData</sub> Typ (Mbps)	Package
NB100LVEP17	Signal Driver	4	1:1	CML; ECL; LVDS	ECL	2.5; 3.3; 5	0.5		0.25	240	2500	2500	QFN-24; TSSOP-20
MC10E112	Signal Driver	4	1:2	ECL	ECL	5		40	0.4	700	700		PLCC-28
MC100E116	Signal Driver	5	1:1	ECL	ECL	5	0.2		0.3	575	800		PLCC-28
MC10E116	Signal Driver	5	1:1	ECL	ECL	5	0.2		0.3	575	800		PLCC-28
MC10E416	Signal Driver	5	1:1	ECL	ECL	5	0.2		0.35	350	2000		PLCC-28
MC100EP116	Signal Driver	6	1:1	ECL	ECL	3.3; 5	0.2		0.26	240	3000		LQFP-32; QFN-32
MC10EP116	Signal Driver	6	1:1	CML; ECL	ECL	3.3; 5	0.2		0.26	240	3000		LQFP-32
MC10E122	Signal Driver	9	1:1	ECL	ECL	5		75	0.35	800	800		PLCC-28

**FLIP-FLOPS, LATCHES AND REGISTERS**

Device	Type	Bits	Input Level	Output Level	V <sub>CC</sub> Typ (V)	t <sub>Jitter</sub> Typ (ps)	t <sub>pd</sub> Typ (ns)	t <sub>su</sub> Min (ns)	t <sub>h</sub> Min (ns)	t <sub>rec</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	f <sub>Toggle</sub> Typ (MHz)	Package
MC100EL31	D-Type	1	ECL	ECL	5	1	0.475	0.15	0.25	0.4	350	2800	SOIC-8; TSSOP-8
MC100EL51	D-Type	1	ECL	ECL	5	1	0.475	0.15	0.25	0.4	350	2800	SOIC-8; TSSOP-8
MC100EL52	D-Type	1	ECL	ECL	5	1	0.365	0.125	0.15		350	2800	SOIC-8; TSSOP-8
MC100EP31	D-Type	1	CML; ECL	ECL	3.3; 5	0.2	0.34	0.1	0.15	0.225	200	3000	DFN-8; SOIC-8; TSSOP-8
MC100EP51	D-Type	1	CML; ECL	ECL	3.3; 5	0.2	0.37	0.1	0.1	0.15	180	3000	DFN-8; SOIC-8; TSSOP-8
MC100EP52	D-Type	1	CML; ECL	ECL	3.3; 5	0.2	0.33	0.05	0		180	4000	DFN-8; SOIC-8; TSSOP-8
MC100LVEL31	D-Type	1	ECL	ECL	3.3	1	0.475	0.15	0.25	0.4	320	2900	SOIC-8; TSSOP-8
MC100LVEL51	D-Type	1	ECL	ECL	3.3	1	0.475	0.15	0.25	0.35	320	2800	DFN-8; SOIC-8; TSSOP-8
MC10EL31	D-Type	1	ECL	ECL	5	1	0.475	0.15	0.25	0.4	350	2800	SOIC-8; TSSOP-8
MC10EL51	D-Type	1	ECL	ECL	5	1	0.475	0.15	0.25	0.4	350	2800	SOIC-8; TSSOP-8



## ON Semiconductor Selector Guide – Clock and Data Distribution

### FLIP-FLOPS, LATCHES AND REGISTERS (continued)

Device	Type	Bits	Input Level	Output Level	V <sub>CC</sub> Typ (V)	t <sub>Jitter</sub> Typ (ps)	t <sub>pd</sub> Typ (ns)	t <sub>su</sub> Min (ns)	t <sub>h</sub> Min (ns)	t <sub>rec</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	f <sub>Toggle</sub> Typ (MHz)	Package
MC10EL52	D-Type	1	ECL	ECL	5	1	0.365	0.125	0.15		350	2800	SOIC-8; TSSOP-8
MC10EP31	D-Type	1	CML; ECL	ECL	3.3; 5	0.2	0.34	0.1	0.15	0.225	200	3000	DFN-8; SOIC-8; TSSOP-8
MC10EP51	D-Type	1	CML; ECL	ECL	3.3; 5	0.2	0.375	0.1	0.1	0.15	180	3000	DFN-8; SOIC-8; TSSOP-8
MC10EP52	D-Type	1	CML; ECL	ECL	3.3; 5	1	0.33	0.05	0		180	4000	DFN-8; SOIC-8; TSSOP-8
NB4L52	D-Type	1	CML; CMOS; ECL; LVDS	ECL	2.5; 3.3; 5	1	0.33	0.1	0.05	0.4	200	4000	QFN-16
NBSG53A	D-Type	1	CML; CMOS; ECL; LVDS	ECL	2.5; 3.3	0.5	0.215	0.03	0.025	0.009	60	10000	QFN-16
MC100EL29	D-Type	2	ECL; LVDS	ECL	5	1	0.58	0	0.1	0.1	550	1100	SOIC-20W
MC100EP29	D-Type	2	CML; ECL	ECL	3.3; 5	0.2	0.42	0.1	0.1	0.15	300	3000	QFN-20; TSSOP-20
MC100LVEL29	D-Type	2	ECL; LVDS	ECL	3.3	1	0.58	0	0.1	0.1	550	1100	SOIC-20W
MC10EP29	D-Type	2	CML; ECL	ECL	3.3; 5	0.2	0.42	0.1	0.1	0.15	300	3000	QFN-20; TSSOP-20
MC10H131	D-Type	2	ECL	ECL	-5.2		1	0.7	0.8		2000	250	PDIP-16; PLLC-20
MC100E431	D-Type	3	ECL	ECL	5	1	0.6	0.2	0.2	0.4	650	1100	PLCC-28
MC100EL30	D-Type	3	ECL	ECL	5	1	0.45	0.15	0.2	0.4	550	1200	SOIC-20W
MC100LVEL30	D-Type	3	ECL	ECL	3.3	1	0.45	0.15	0.2	0.4	550	1200	SOIC-20W
MC10E431	D-Type	3	CML; ECL	ECL	5	1	0.6	0.2	0.2	0.4	650	1100	PLCC-28
MC100E131	D-Type	4	ECL	ECL	5	1	0.5	0.15	0.175	0.4	480	1100	PLCC-28
MC100EP131	D-Type	4	CML; ECL	ECL	3.3; 5	0.2	0.46	0.12	0.12	0.29	290	3000	LQFP-32; QFN-32
MC10E131	D-Type	4	ECL	ECL	5	1	0.5	0.15	0.175	0.4	480	1100	PLCC-28
MC10EP131	D-Type	4	CML; ECL	ECL	3.3; 5	0.2	0.46	0.12	0.12	0.29	290	3000	LQFP-32; QFN-32
MC10H176	D-Type	6	ECL	ECL	-5.2		1.7	1.5	0.9		1900	250	PDIP-16; PLLC-20
NB7V52M	D-Type		CML; ECL; LVDS	CML	1.8; 2.5	0.2	0.2	0.04	0.05		35	10000	QFN-16

FLIP-FLOPS, LATCHES AND REGISTERS (continued)

Device	Type	Bits	Input Level	Output Level	V <sub>CC</sub> Typ (V)	t <sub>Jitter</sub> Typ (ps)	t <sub>pd</sub> Typ (ns)	t <sub>su</sub> Min (ns)	t <sub>h</sub> Min (ns)	t <sub>rec</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	f <sub>Toggle</sub> Typ (MHz)	Package
MC100EL35	JK-Type	1	ECL	ECL	5	1	0.252; 0.525	0.15	0.25	0.4	350	2200	DFN-8; SOIC-8; TSSOP-8
MC100EP35	JK-Type	1	CML; ECL	ECL	3.3; 5	0.2	0.41	0.15	0.15	0.15	180	3000	DFN-8; SOIC-8; TSSOP-8
MC10EL35	JK-Type	1	ECL	ECL	5	1	0.525	0.15	0.25	0.4	350	2200	SOIC-8; TSSOP-8
MC10EP35	JK-Type	1	CML; ECL	ECL	3.3; 5	0.2	0.41	0.15	0.15	0.15	180	3000	SOIC-8; TSSOP-8
MC10H135	JK-Type	2	ECL	ECL	-5.2		1.5	1.5	1		2200	250	PDIP-16; PLLC-20
MC100E150	Latch	6	ECL	ECL	5	1	0.8	0.2	0.2	0.75	450	1000	PLCC-28
MC10E150	Latch	6	ECL	ECL	-5.2	1	0.8	0.2	0.2	0.75	450	900	PLCC-28
MC100E175	Latch	9	ECL	ECL	5	1	0.6	0.275	0.175	0.85	800	1000	PLCC-28
MC10E175	Latch	9	ECL	ECL	-5.2	1	0.6	0.275	0.175	0.85	800	1100	PLCC-28
MC100E452	Register	5	ECL	ECL	5	1	0.6	0.175	0.225	0.75	650		PLCC-28
MC10E452	Register	5	ECL	ECL	5	1	0.6	0.175	0.225	0.75	650		PLCC-28
MC100E151	Register	6	ECL	ECL	5	1	0.65	0.15	0.35	0.75	450	1100	PLCC-28
MC100E451	Register	6	ECL	ECL	5	1	0.65	0.15	0.35	0.75	800		PLCC-28
MC100EP451	Register	6	CML; ECL	ECL	3.3; 5	0.2	0.45	0.08	0.08	0.25	260	3000	LQFP-32; QFN-32
MC10E151	Register	6	ECL	ECL	5	1	0.65	0.15	0.35	0.75	450	1100	PLCC-28
MC10E451	Register	6	ECL	ECL	5	1	0.65	0.15	0.35	0.75	800		PLCC-28
MC10EP451	Register	6	CML; ECL	ECL	3.3; 5	0.2	0.45	0.08	0.08	0.25	260	3000	LQFP-32; QFN-32
MC100E143	Register	9	ECL	ECL	5	1	0.8	0.05	0.3	0.9	800		PLCC-28
MC10E143	Register	9	ECL	ECL	5	1	0.8	0.05	0.3	0.9	800		PLCC-28
MC10H141	Shift Register	4	ECL	ECL	-5.2		1.5	1.5	1		2400	250	PDIP-16; PLLC-20
MC100E241	Shift Register	8	ECL	ECL	5	1	0.75	0.175	0.2	0.9	800		PLCC-28
MC10E141	Shift Register	8	ECL	ECL	5	1	0.75	0.175	0.2	0.9	800	700	PLCC-28
MC100EP142	Shift Register	9	CML; ECL	ECL	3.3; 5	1	0.675	0.05	0.1	0.8	275	2800	LQFP-32; QFN-32

## ON Semiconductor Selector Guide – Clock and Data Distribution

### FLIP-FLOPS, LATCHES AND REGISTERS (continued)

Device	Type	Bits	Input Level	Output Level	V <sub>CC</sub> Typ (V)	t <sub>Jitter</sub> Typ (ps)	t <sub>pd</sub> Typ (ns)	t <sub>su</sub> Min (ns)	t <sub>h</sub> Min (ns)	t <sub>rec</sub> Typ (ns)	t <sub>r</sub> & t <sub>f</sub> Max (ps)	f <sub>Toggle</sub> Typ (MHz)	Package
MC10E142	Shift Register	9	ECL	ECL	5	1	0.8	0.05	0.3	0.9	800		PLCC-28
MC10EP142	Shift Register	9	CML; ECL	ECL	3.3; 5	1	0.675	0.05	0.1	0.8	275	2800	LQFP-32; QFN-32

### LOGIC GATES

Device	Type	Channels	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Toggle</sub> Max (MHz)	t <sub>pd</sub> Typ (ns)	t <sub>Jitter</sub> Typ (ps)	t <sub>r</sub> & t <sub>f</sub> Max (ps)	Package
MC10H104	AND	4	ECL	ECL	-5.2		1		1700	PDIP-16; PLLC-20
MC100E104	AND/NAND	5	ECL	ECL	5	2000	0.385	1	700	PLCC-28
MC100E404	AND/NAND	4	ECL	ECL	5	2000	0.475	1	400	PLCC-28
MC100EL04	AND/NAND	1	ECL	ECL	5	2000	0.24	1	350	SOIC-8; TSSOP-8
MC100EL05	AND/NAND	1	ECL	ECL	5	2000	0.275	1	350	SOIC-8; TSSOP-8
MC100EP05	AND/NAND	1	CML; ECL	ECL	3.3; 5	3000	0.22	0.2	180	DFN-8; SOIC-8; TSSOP-8
MC100EP105	AND/NAND	1	CML; ECL	ECL	3.3; 5	3000	0.22	0.2	180	LQFP-32; QFN-32
MC100LVEL05	AND/NAND	1	ECL; LVDS	ECL	3.3	2000	0.34	1	320	SOIC-8; TSSOP-8
MC100LVEP05	AND/NAND	1	CML; ECL; LVDS	ECL	2.5; 3.3	3000	0.22	0.2	200	DFN-8; SOIC-8; TSSOP-8
MC10E104	AND/NAND	5	ECL	ECL	5	700	0.385	1	700	PLCC-28
MC10E404	AND/NAND	4	ECL	ECL	5	700	0.475	1	400	PLCC-28
MC10EL04	AND/NAND	1	ECL	ECL	5	2000	0.24	1	350	SOIC-8; TSSOP-8
MC10EL05	AND/NAND	1	ECL	ECL	5	2000	0.275	1	350	SOIC-8; TSSOP-8
MC10EP05	AND/NAND	1	CML; ECL	ECL	3.3; 5	3000	0.22	0.2	180	SOIC-8; TSSOP-8
MC10EP105	AND/NAND	1	CML; ECL	ECL	3.3; 5	3000	0.22	0.2	180	LQFP-32; QFN-32
MC10H102	NOR	4	ECL	ECL	-5.2		1		1600	PDIP-16; PLLC-20
MC10H103	OR	4	ECL	ECL	-5.2		1		1800	PDIP-16; PLLC-20
MC100E101	OR/NOR	4	ECL	ECL	5	2000	0.35	1	575	PLCC-28
MC100EL01	OR/NOR	1	ECL	ECL	5	2000	0.23	1	235	SOIC-8; TSSOP-8
MC100EP01	OR/NOR	1	CML; ECL	ECL	3.3; 5	3000	0.27	0.2	180	DFN-8; SOIC-8; TSSOP-8
MC100EP101	OR/NOR	4	CML; ECL	ECL	3.3; 5	3000	0.3	0.2	220	LQFP-32; QFN-32
MC100LVEL01	OR/NOR	1	ECL	ECL	3.3	2000	0.37	1	320	SOIC-8; TSSOP-8
MC10E101	OR/NOR	4	ECL	ECL	5	700	0.35	1	575	PLCC-28
MC10EL01	OR/NOR	1	ECL	ECL	5	2000	0.23	1	235	SOIC-8; TSSOP-8
MC10EP01	OR/NOR	1	CML; ECL	ECL	3.3; 5	3000	0.27	0.2	180	DFN-8; SOIC-8; TSSOP-8

**LOGIC GATES** (continued)

Device	Type	Channels	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Toggle</sub> Max (MHz)	t <sub>pd</sub> Typ (ns)	t <sub>Jitter</sub> Typ (ps)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Package
MC10EP101	OR/NOR	4	CML; ECL	ECL	3.3; 5	3000	0.3	0.2	220	LQFP-32; QFN-32
MC10H101	OR/NOR	4	ECL	ECL	-5.2		1		2200	PDIP-16; PLLC-20
MC10H105	OR/NOR	3	ECL	ECL	-5.2		1		1600	PDIP-16; PLLC-20
NB7L86M	SmartGate	1	CML; CMOS; ECL; LVDS; TTL	CML	2.5; 3.3	8000	0.09	0.2	60	QFN-16
NBSG86A	SmartGate	1	CML; CMOS; ECL; LVDS; TTL	RSECL	2.5; 3.3	8000	0.165	0.5	65	QFN-16
MC100E107	XOR/XNOR	5	ECL	ECL	5	2000	0.41	1	700	PLCC-28
MC100EL07	XOR/XNOR	1	ECL	ECL	5	2000	0.26	1	225	DFN-8; TSSOP-8
MC100EP08	XOR/XNOR	1	CML; ECL	ECL	3.3; 5	3000	0.25	0.2	180	SOIC-8; TSSOP-8
MC10E107	XOR/XNOR	5	ECL	ECL	5	700	0.41	1	700	PLCC-28
MC10EL07	XOR/XNOR	1	ECL	ECL	5	2000	0.26	1	225	SOIC-8; TSSOP-8
MC10EP08	XOR/XNOR	1	CML; ECL	ECL	3.3; 5	3000	0.25	0.2	180	SOIC-8; TSSOP-8
MC10H107	XOR/XNOR	3	ECL	ECL	-5.2		1		1600	PDIP-16; PLLC-20

**MULTIPLEXERS AND CROSSPOINT SWITCHES**

Device	Input / Output Ratio	Channels	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Max</sub> Typ (MHz)	t <sub>Jitter</sub> Typ (ps)	t <sub>skew(OO)</sub> Max (ps)	t <sub>pd</sub> Typ (ns)	Package
MC100E158	2:1	5	ECL	ECL	5	1000	1	60	0.385	PLCC-28
MC100E457	2:1	3	CML; ECL	ECL	5	1000	1	40	0.475	PLCC-28
MC100EL56	2:1	2	ECL; LVDS	ECL	5	1000	1	80	0.58	SOIC-20W
MC100EL58	2:1	1	ECL	ECL	5	1500	1		0.23	DFN-8; SOIC-8; TSSOP-8
MC100EL59	2:1	3	ECL	ECL	5	1000	1	100	0.5	SOIC-20W
MC100EP56	2:1	2	CML; ECL	ECL	3.3; 5	3000	0.2	100	0.36	QFN-20; SOIC-20W; TSSOP-20
MC100EP58	2:1	1	CML; ECL	ECL	3.3; 5	3000	0.2		0.31	SOIC-8; TSSOP-8
MC100LEVEL56	2:1	2	ECL; LVDS	ECL	3.3	1000	3	80	0.44	SOIC-20W
MC100LEVEL58	2:1	1	ECL	ECL	3.3	1500	1		0.44	SOIC-8; TSSOP-8
MC100LEVEL59	2:1	3	ECL	ECL	3.3	1000	1	100	0.5	SOIC-20W
MC10E154	2:1	5	ECL	ECL	5	1100	1	50	0.5	PLCC-28
MC10E155	2:1	6	ECL	ECL	5	1100	1	75	0.5	PLCC-28
MC10E157	2:1	4	ECL	ECL	5	1100	1	70	0.38	PLCC-28
MC10E158	2:1	5	ECL	ECL	5	1100	1	60	0.385	PLCC-28
MC10E167	2:1	6	ECL	ECL	5	1400	1	75	0.65	PLCC-28

## ON Semiconductor Selector Guide – Clock and Data Distribution

### MULTIPLEXERS AND CROSSPOINT SWITCHES (continued)

Device	Input / Output Ratio	Channels	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Max</sub> Typ (MHz)	t <sub>Jitter</sub> Typ (ps)	t <sub>skew(OO)</sub> Max (ps)	t <sub>pd</sub> Typ (ns)	Package
MC10E457	2:1	3	CML; ECL	ECL	5	1000	1	40	0.475	PLCC-28
MC10EL58	2:1	1	ECL	ECL	5	1500	1		0.23	SOIC-8; TSSOP-8
MC10EP56	2:1	2	CML; ECL	ECL	3.3; 5	3000	0.2	100	0.475	QFN-20; TSSOP-20
MC10EP58	2:1	1	CML; ECL	ECL	3.3; 5	3000	0.2		0.31	SOIC-8; TSSOP-8
MC10H158	2:1	4	ECL	ECL	-5.2				1.5	PDIP-16; PLLC-20
NB100LVEP56	2:1	2	CML; ECL; LVDS	ECL	2.5; 3.3	2500	0.2	50	0.7	QFN-24; TSSOP-20
NB4L6254	2:1	2	CML; CMOS; ECL; LVDS	ECL	2.5	3000	0.3	50	485	LQFP-32; QFN-32
NB4L858M	2:1	4	CML; ECL	CML	2.5			12	350	LQFP-32
NB4N1158	2:1	2	ECL; TTL	ECL	3.3	1000	10		0.375	TSSOP-28
NB4N7132	2:1	1	CML; ECL; LVDS	ECL	3.3	750	25		0.375	TSSOP-28
NB4N840M	2:1	2	CML	CML	2.5	8000	0.2	20	0.12	QFN-32
NB7L72M	2:1	2	CML; ECL; LVDS	CML	2.5; 3.3	8500	0.2	10	150	QFN-16
NB7L86M	2:1	1	CML; CMOS; ECL; LVDS; TTL	CML	2.5; 3.3	8000	0.2		0.09	QFN-16
NB7V585M	2:1	1	CML; ECL; LVDS	CML	1.8; 2.5	7000	0.2	30	175	QFN-32
NB7V586M	2:1	1	CML; ECL; LVDS	CML	1.8	6000	0.2	30	0.175	QFN-32
NB7V58M	2:1	1	CML; ECL; LVDS	CML	1.8; 2.5; 3.3	8000	0.2	50	0.00018	QFN-16
NB7VQ58M	2:1	1	CML; ECL; LVDS	CML	1.8; 3.3	8000	0.2	0	0.18	QFN-16
NBSG72A	2:1	2	CML; CMOS; ECL; LVDS	ECL	2.5	7000		25		QFN-16
NBSG86A	2:1	1	CML; CMOS; ECL; LVDS; TTL	RSECL	2.5; 3.3	8000	0.5	20	0.165	QFN-16
NB4L7210	2:10	1	CML; CMOS; ECL; LVDS	ECL	3.3	1000	100	35	725	QFN-52
NB6L72	2:2	1	CML; CMOS; ECL; LVDS	ECL	2.5	3000	0.2	15	0.425	QFN-16
NB6L72M	2:2	1	CML; CMOS; ECL; LVDS	CML	2.5	3000	0.2	20	0.36	QFN-16
NB7V72M	2:2	2	LVDS	CML	1.8; 2.5	6000	0.5	30	150	QFN-16
NB7L585	2:6	1	CML; ECL; LVDS	ECL	2.5; 3.3	7000	0.2	20	0.175	QFN-32
NB7L585R	2:6	1	CML; ECL; LVDS	RSECL	2.5	7000	0.2	20	0.160-0.200	QFN-32
MC100E171	4:1	3	ECL	ECL	5	1000	1	60	0.48	PLCC-28
MC100EL57	4:1	1	ECL	ECL	5	1000	1	100	0.56	SOIC-16
MC100EP57	4:1	1	CML; ECL	ECL	3.3; 5	3000	0.2	200	0.475	QFN-20; TSSOP-20

**MULTIPLEXERS AND CROSSPOINT SWITCHES** (continued)

Device	Input / Output Ratio	Channels	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Max</sub> Typ (MHz)	t <sub>Jitter</sub> Typ (ps)	t <sub>skew(OO)</sub> Max (ps)	t <sub>pd</sub> Typ (ns)	Package
MC10E156	4:1	3	ECL	ECL	5	1100	1	50	0.6	PLCC-28
MC10E171	4:1	3	ECL	ECL	5	1400	1	60	0.48	PLCC-28
MC10EL57	4:1	1	ECL	ECL	5	1000	1	100	0.56	SOIC-16
MC10EP57	4:1	1	CML; ECL	ECL	3.3; 5	3000	0.2	200	0.475	QFN-20; TSSOP-20
NB6L572M	4:1	1	CML; ECL; LVDS	CML	2.5; 3.3	6000	0.2	15	200	QFN-32
NB6LQ572M	4:1	1	CML; ECL; LVDS	CML	2.5; 3.3	6000	0.2	15	0.2	QFN-32
NB7LQ572	4:1	1	CML; ECL; LVDS	CML	2.5; 3.3	7000	0.2	15	160	QFN-32
NB6LQ572	4:2	1	CML; ECL; LVDS	ECL	2.5; 3.3	6000	0.2	15	0.175	QFN-32
NB6VQ572M	4:2	1	CML; ECL; LVDS	CML	1.8; 2.5	5000	0.2	15	0.175	QFN-32
NB7L572	4:2	1	CML; ECL; LVDS	ECL	2.5; 3.3	7000	0.5	15	0.175	QFN-32
NB7VQ572M	4:2	1	CML; ECL; LVDS	CML	1.8; 3.3	7000	0.2	15	175	QFN-32
MC100E163	8:1	2	ECL	ECL	5	1000	1	40	0.55	PLCC-28
MC10E163	8:1	2	ECL	ECL	5	1100	1	40	0.55	PLCC-28
MC10H164	8:1	1	ECL	ECL	-5.2				1	PDIP-16; PLLC-20
MC100E164	16:1	1	ECL	ECL	5	1000	1	50	0.6	PLCC-28
MC100LVE164	16:1	1	ECL	ECL	3.3	1000	1	50	0.6	LQFP-32
MC10E164	16:1	1	ECL	ECL	5	1100	1	50	0.6	PLCC-28

**SERIAL/PARALLEL CONVERTERS**

Device	Type	Bits	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>dr</sub> Typ (Gb/sec)	t <sub>pd</sub> Typ (ns)	t <sub>su</sub> Min (ns)	t <sub>h</sub> Min (ns)	t <sub>Jitter</sub> Typ (ps)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Package
MC100E445	Serial/Parallel	4	ECL	ECL	5	2	1.8	-0.25	0.3	1	350	PLCC-28
MC100E446	Parallel/Serial	4	ECL	ECL	5	1.6	1.2	-0.45	0.65	1	350	PLCC-28
MC10E445	Serial/Parallel	4	ECL	ECL	5	2	1.8	-0.25	0.3	1	350	PLCC-28
MC10E446	Serial/Parallel	4	ECL	ECL	5	2	1.8	-0.25	0.3	1	350	PLCC-28
MC100EP445	Serial/Parallel	8	CML; ECL	ECL	3.3; 5	2.5	1.3	-0.4	0.6	0.2	300	LQFP-32; QFN-32
MC100EP446	Parallel/Serial	8	CML; ECL	ECL	3.3; 5	3.4	0.8	-0.45	-0.6	0.2	170	LQFP-32; QFN-32
MC10EP445	Serial/Parallel	8	CML; ECL	ECL	3.3; 5	2.5	1.3	-0.4	0.6	0.2	300	LQFP-32
MC10EP446	Parallel/Serial	8	CML; ECL	ECL	3.3; 5	3.4	0.8	-0.45	-0.6	0.2	170	LQFP-32; QFN-32

## ON Semiconductor Selector Guide – Clock and Data Distribution

### SKEW MANAGEMENT

Device	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Max</sub> Typ (MHz)	t <sub>d(prog)</sub> Min (ns)	t <sub>d(prog)</sub> Max (ns)	t <sub>d(step)</sub> Typ (ps)	t <sub>Jitter</sub> Typ (ps)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Package
MC100E195	ECL	ECL	5	1000	2.05	2.6	20	5	325	PLCC-28
MC100E196	ECL	ECL	5	1000	2.05	2.6	20	5	325	PLCC-28
MC100EP195	CML; ECL	ECL	3.3	1200	2.2	12.2	10	1	300	LQFP-32; QFN-32
MC100EP195B	CML; ECL; LVDS	ECL	3.3	1200	2.2	12	10	3	300	LQFP-32; QFN-32
MC100EP196	CML; ECL	ECL	3.3	1200	2.2	12.2	10	3	210	LQFP-32
MC100EP196B	CML; ECL; LVDS	ECL	3.3	1200	8.95	12.11	11	1.2	165	LQFP-32; QFN-32
MC10E195	ECL	ECL	3.3	1000	2.05	2.6	20	5	325	PLCC-28
MC10E196	ECL	ECL	3.3	1000	2.05	2.6	20	5	325	PLCC-28
MC10EP195	CML; ECL	ECL	3.3	1200	2.2	12.2	10	3	300	LQFP-32; QFN-32
NB6L295	CML; ECL; LVDS	ECL	2.5; 3.3	1500	6.2	6.2	11	3	150	QFN-24
NB6L295M	CML; CMOS; ECL; LVDS	CML	2.5; 3.3	1500	6.2	6.2	11	2.4	150	QFN-24

### TRANSLATORS

Device	Channels	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Max</sub> Typ (MHz)	t <sub>pd</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Package
MC100ELT20	1	TTL	ECL	5	100	1.2	1500	SOIC-8; TSSOP-8
MC100ELT21	1	ECL	TTL	5	100	3.5	750	SOIC-8; TSSOP-8
MC100ELT24	1	TTL	ECL	5	400	0.95	1250	DFN-8; SOIC-8; TSSOP-8
MC100ELT25	1	ECL	TTL	5	100	2.6	2300	DFN-8; SOIC-8; TSSOP-8
MC100EPT20	1	CMOS; TTL	ECL	3.3	1000	0.37	180	DFN-8; SOIC-8; TSSOP-8
MC100EPT21	1	CML; ECL; LVDS	TTL	3.3	350	1.4	500	DFN-8; SOIC-8; TSSOP-8
MC100EPT24	1	CMOS; TTL	ECL	3.3	1000	0.53	180	DFN-8; SOIC-8; TSSOP-8
MC100EPT25	1	ECL	TTL	3.3	275	1.1	1100	DFN-8; SOIC-8; TSSOP-8
MC100EPT26	1	ECL	TTL	3.3	275	1.5	900	DFN-8; SOIC-8; TSSOP-8
MC100LVELT20	1	CMOS; TTL	ECL	3.3	1000	0.37	180	SOIC-8
MC10ELT20	1	TTL	ECL	5	100	1.2	1500	SOIC-8; TSSOP-8
MC10ELT21	1	ECL	TTL	5	100	3.5	750	TSSOP-8

TRANSLATORS (continued)

Device	Channels	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Max</sub> Typ (MHz)	t <sub>pd</sub> Typ (ns)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Package
MC10ELT24	1	TTL	ECL	5	400	0.95	1250	SOIC-8; TSSOP-8
MC10ELT25	1	ECL	TTL	5	100	2.6	2300	SOIC-8; TSSOP-8
MC10EPT20	1	CMOS; TTL	ECL	3.3	1000	0.37	180	DFN-8; SOIC-8; TSSOP-8
MC10H600	1	TTL	ECL	5			1500	PLCC-28
MC10H601	1	ECL	TTL	5		3.45	1500; 3000	PLCC-28
MC10H602	1	TTL	ECL	5			1500	PLCC-28
MC100ELT22	2	TTL	ECL	5	100	1.2	1600	SOIC-8; TSSOP-8
MC100ELT23	2	ECL	TTL	5	100	3.5	1600	SOIC-8; TSSOP-8
MC100ELT28	2	ECL; TTL	ECL; TTL	5	100	1.2	1500	SOIC-8; TSSOP-8
MC100EPT22	2	CMOS; TTL	ECL	3.3	1100	0.42	220	DFN-8; SOIC-8; TSSOP-8
MC100EPT23	2	CML; ECL; LVDS	TTL	3.3	350	1.5	600	DFN-8; SOIC-8; TSSOP-8
MC100LVELT22	2	CMOS; TTL	ECL	3.3	2000	0.35	500	DFN-8; SOIC-8; TSSOP-8
MC100LVELT23	2	ECL	TTL	3.3	180	1.7	600	DFN-8; SOIC-8; TSSOP-8
MC10ELT22	2	TTL	ECL	5	100	1.2	1600	SOIC-8; TSSOP-8
MC10ELT28	2	ECL; TTL	ECL; TTL	5	100	1.2	1500	SOIC-8; TSSOP-8
NB100ELT23L	2	ECL	TTL	3.3	275	2.1	1300	SOIC-8; TSSOP-8
MC100EL90	3	ECL	ECL	5	650	0.5	500	SOIC-20W
MC100EL91	3	ECL	ECL	5	700	0.67	400	SOIC-20W
MC100EP90	3	ECL	ECL	3.3; 5	3000	0.26	180	TSSOP-20
MC100EP91	3	CML; CMOS; ECL; LVDS; TTL	ECL	3.3	2	0.55	150	QFN-24; SOIC-20W
MC100LVEL90	3	ECL	ECL	3.3	650	0.5	500	SOIC-20W
MC100LVEL91	3	ECL	ECL	3.3; 5	600	0.62	580	SOIC-20W
MC100LVEL92	3	ECL	ECL	3.3	600	0.61	580	SOIC-20W
MC10EP90	3	ECL	ECL	3.3; 5	3000	0.26	180	TSSOP-20
NB100LVEP91	3	CML; HSTL; LVDS	ECL	2.5; 3.3	2500	0.43	250	QFN-24; SOIC-20W
MC10H124	4	TTL	ECL	5	50	1.6	1600	PDIP-16; PLLC-20
MC10H125	4	ECL	TTL	5	50		1200	PDIP-16; PLLC-20
MC10H350	4	ECL	TTL	5	50	3.5	1600	PDIP-16; PLLC-20
MC10H351	4	TTL	ECL	5		1.3	2000	PDIP-16; PLLC-20
MC10H424	4	TTL	ECL	5		1.5	2000	PDIP-16; PLLC-20
MC10H604	6	TTL	ECL	5			2000	PLCC-28
MC100EPT622	10	CMOS; TTL	ECL	3.3	1500	0.45	250	LQFP-32; QFN-32





## Clock Generation

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# Clock Generation

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## Table of Contents

	<b>Page</b>
Crystal Oscillators .....	84
Phase/Frequency Detectors .....	85
PLL Clock Generators .....	85
Spread Spectrum EMI Reduction Clocks .....	86
VCOs .....	88
Zero Delay Buffers .....	89

# ON Semiconductor Selector Guide – Clock Management

## CRYSTAL OSCILLATORS

Device	Input Level	Output Level	V <sub>DD</sub> Typ (V)	f <sub>CLKOUT1</sub> Typ (MHz)	f <sub>CLKOUT2</sub> Typ (MHz)	∣I <sub>f</sub> (±PPM)	t <sub>Jitter</sub> (Φ) Typ (ps)	t <sub>R</sub> & t <sub>F</sub> Typ (ps)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Duty Cycle Min (%)	Duty Cycle Typ (%)	Duty Cycle Max (%)	Package
NBVSBA011	CMOS	ECL	2.5–3.3	122.88		50	0.5	245	400	45	50	55	CLCC–6
NBVSBA015	CMOS	ECL	2.5–3.3	200		50	0.5	245	400	45	50	55	CLCC–6
NBVSBA017	CMOS	ECL	2.5–3.3	156.25		50	0.5	245	400	45	50	55	CLCC–6
NBVSBA018	CMOS	ECL	2.5–3.3	155.52		50	0.5	250	400	45	50	55	CLCC–6
NBVSBA024	CMOS	ECL	2.5–3.3	622.08		50	0.5	245	400	45	50	55	CLCC–6
NBVSBA026	CMOS	LVDS	2.5–3.3	644.53		50	0.5	245	400	45	50	55	CLCC–6
NBVSPA015	CMOS	LVDS	3.3	200		50	0.5	245	400	45	50	55	CLCC–6
NBVSPA017	CMOS	LVDS	3.3	156.25		50	0.5	245	400	45	50	55	CLCC–6
NBVSPA018	CMOS	LVDS	3.3	155.52		50	0.5	245	400	45	50	55	CLCC–6
NBVSPA019	CMOS	LVDS	3.3	125		50	0.5	245	400	45	50	55	CLCC–6
NBVSPA024	CMOS	LVDS	3.3	160		50	0.5	245	400	45	50	55	CLCC–6
NBVSPA027	CMOS	LVDS	3.3	148.5		50	0.5	245	400	45	50	55	CLCC–6
NBVSPA042	CMOS	LVDS	3.3	74.25		50	0.5	245	400	45	50	55	CLCC–6
NBXDBA009	CMOS	ECL	3.3	75	150	50	0.4	250	400	48	50	52	CLCC–6
NBXDBA012	CMOS	ECL	3.3	106.25	212.5	50	0.4	250	400	48	50	52	CLCC–6
NBXDBA014	CMOS	ECL	3.3	62.5	125	50	0.4	380	620	48	50	52	CLCC–6
NBXDBA015	CMOS	ECL	3.3	200	206.9	50	0.4	250	400	48	50	52	CLCC–6
NBXDBA017	CMOS	ECL	3.3	156.25	312.5	50	0.4	250	400	48	50	52	CLCC–6
NBXDBA018	CMOS	ECL	3.3	155.52	311.04	50	0.4	250	400	48	50	52	CLCC–6
NBXDBA019	CMOS	ECL	3.3	125	250	50	0.4	250	400	48	50	52	CLCC–6
NBXDBB017	CMOS	ECL	3.3	156.25	312.5	20	0.4	250	400	48	50	52	CLCC–6
NBXDBB018	CMOS	ECL	3.3	155.52	311.04	20	0.4	250	400	48	50	52	CLCC–6
NBXDDA016	CMOS	ECL	3.3	133.33	137.93	50	0.4	160	300	48	50	52	CLCC–6
NBXDPA012	CMOS	LVDS	2.5–3.3	106.25	212.5	50	0.4	115	400	48	50	52	CLCC–6
NBXDPA017	CMOS	LVDS	2.5–3.3	156.25	312.5	50	0.4	115	400	48	50	52	CLCC–6
NBXDPA018	CMOS	LVDS	2.5–3.3	155.52	311.04	50	0.5	115	400	48	50	52	CLCC–6
NBXDPA019	CMOS	LVDS	2.5–3.3	125	250	50	0.5	115	400	48	50	52	CLCC–6
NBXHBA017	CMOS	ECL	3.3	156.25		50	0.4	250	400	48	50	52	CLCC–6
NBXHBA019	CMOS	ECL	3.3	125		50	0.4	250	400	48	50	52	CLCC–6
NBXSBA007	CMOS	ECL	3.3	240		50	0.4	250	400	48	50	52	CLCC–6
NBXSBA008	CMOS	ECL	3.3	161.1328		50	0.4	250	400	48	50	52	CLCC–6
NBXSBA010	CMOS	ECL	3.3	100		50	0.4	250	400	48	50	52	CLCC–6

**CRYSTAL OSCILLATORS** (continued)

Device	Input Level	Output Level	V <sub>DD</sub> Typ (V)	f <sub>CLKOUT1</sub> Typ (MHz)	f <sub>CLKOUT2</sub> Typ (MHz)	III <sub>r</sub> (±PPM)	t <sub>Jitter</sub> (Φ) Typ (ps)	t <sub>R</sub> & t <sub>F</sub> Typ (ps)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Duty Cycle Min (%)	Duty Cycle Typ (%)	Duty Cycle Max (%)	Package
NBXSBA017	CMOS	ECL	3.3	312.5		50	0.4	250	400	48	50	52	CLCC-6
NBXSBA019	CMOS	ECL	3.3	250		50	0.4	250	400	48	50	52	CLCC-6
NBXSBA020	CMOS	ECL	3.3	280		50	0.4	250	400	48	50	52	CLCC-6
NBXSBA021	CMOS	ECL	3.3	266.667		50	0.4	250	400	48	50	52	CLCC-6
NBXSBA022	CMOS	ECL	3.3	187.5		50	0.4	250	400	48	50	52	CLCC-6
NBXSBA023	CMOS	ECL	3.3	400		50	0.4	250	400	48	50	52	CLCC-6
NBXSBA024	CMOS	ECL	2.5-3.3	622.08		50	0.5	250	400	45	50	55	CLCC-6
NBXSBA025	CMOS	ECL	2.5-3.3	425		50	0.5	250	400	48	50	52	CLCC-6
NBXSBA030	CMOS	ECL	2.5-3.3	175		50	0.5	250	400	48	50	52	CLCC-6
NBXSBA031	CMOS	ECL	2.5-3.3	340		50	0.4	250	400	48	50	52	CLCC-6
NBXSBA045	CMOS	ECL	2.5-3.3	345		50	0.4	250	400	48	50	52	CLCC-6
NBXSBA046	CMOS	ECL	2.5-3.3	172.5		50	0.5	250	400	48	50	52	CLCC-6
NBXSPA008	CMOS	LVDS	2.5-3.3	161.1328		50	0.5	115	400	48	50	52	CLCC-6
NBXSPA022	CMOS	LVDS	2.5-3.3	187.5		50	0.4	115	400	48	50	52	CLCC-6

**PHASE/FREQUENCY DETECTORS**

Device	Input Level	Output Level	V <sub>CC</sub> Typ (V)	Transfer Gain Typ (mV/degree)	CMRR Max (V)	f <sub>Toggle</sub> Max (MHz)	t <sub>pd</sub> Typ (ns)	t <sub>Jitter</sub> Typ (ps)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Package
MC100EP140	CML; ECL	ECL	3.3	1.2073		2000	0.475	0.2	200	SOIC-8
MC100EP40	CML; ECL	ECL	3.3; 5	0.93	2	2000	0.55	0.2	150	TSSOP-20
MC100LVEL40	CML; ECL; LVDS	ECL	3.3; 5	2	1.2	250	1.35	0.2	475	SOIC-20W
MCH12140	ECL	ECL	5			800	0.44	0.2	350	SOIC-8
MCK12140	ECL	ECL	5			800	0.44	0.2	350	SOIC-8

**PLL CLOCK GENERATORS**

Device	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Max</sub> Min (MHz)	f <sub>Max</sub> Max (MHz)	t <sub>Jitter</sub> Typ (ps)	t <sub>R</sub> & t <sub>F</sub> Min (ps)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Package
ASM3P2854C	CMOS	CMOS	3.3			300			TSSOP-16
ASM3P2855D	CMOS	CMOS	3.3						TSSOP-16
FS6128-04	CMOS	CMOS; TTL	3.3	24	36	200	1700	1700	SOIC-8
FS6128-07	CMOS	CMOS; TTL	3.3	24	36	200	1700	1700	SOIC-8
FS6370	CMOS; TTL	TTL	3.3; 5	0.8	150	390	1800	2100	SOIC-16
FS6377	CMOS; TTL	TTL	3.3; 5	0.8	150	390	1800	2100	SOIC-16

## ON Semiconductor Selector Guide – Clock Management

### PLL CLOCK GENERATORS (continued)

Device	Input Level	Output Level	V <sub>CC</sub> Typ (V)	f <sub>Max</sub> Min (MHz)	f <sub>Max</sub> Max (MHz)	t <sub>Jitter</sub> Typ (ps)	t <sub>R</sub> & t <sub>F</sub> Min (ps)	t <sub>R</sub> & t <sub>F</sub> Max (ps)	Package
FS7140	CMOS	ECL; TTL	3.3	0	300	75	1000	1000	SOIC-16; SSOP-16
FS7145	CMOS	ECL; TTL	3.3	0	300	75	1000	1000	SOIC-16; SSOP-16
NB2779A	CMOS	CMOS	2.5; 3.3	13	30	200	700	1800	TSOP-6
NB3N3002	CMOS; TTL	HCSL	3.3	25	200	2	175	700	TSSOP-16
NB3N3011	ECL	ECL	3.3	96	120	0.29	275	600	TSSOP-8
NB3N3020	CML; CMOS; ECL	ECL; TTL	3.3	8	210	3	700 ps max ECL; 1500 ps LVTTTL	700	TSSOP-16
NB3N502	CMOS	CMOS	3.3	10	190	15	1000	1000	SOIC-8
NB3N508S	CMOS	LVDS	3.3		216	88 dBc/Hz @ 1 KHz	380	500	TSSOP-16
NB3N5573	Crystal	HCSL	3.3	25	200	1.5		700	TSSOP-16
NB4N441	CMOS	CMOS	3.3	12.5	425	3.5	175	425	QFN-24
NB4N507A	CMOS; TTL	ECL	3.3; 5	50	200	10	50	70	SOIC-16
NBC12429	CMOS	ECL	3.3; 5	25	400	20	175	425	LQFP-32; PLCC-28; QFN-32
NBC12430	CMOS	ECL	3.3; 5	50	800	20	175	425	LQFP-32; PLCC-28; QFN-32
NBC12439	CMOS	ECL	3.3; 5	50	800	20	175	425	LQFP-32; PLCC-28; QFN-32
P2084A	CMOS	CMOS	3.3			200			SOIC-8
PCS1P2192A	CMOS	CMOS	3.3	25	108	150	800	2500	SOIC-8
PCS1P2860A	CMOS	CMOS	3.3			300			TSSOP-16

### SPREAD SPECTRUM EMI REDUCTION CLOCKS

Device	V <sub>DD</sub> Typ (V)	f <sub>in</sub> Typ (MHz)	f <sub>out</sub> Typ (MHz)	Deviation Type	Features	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
ASM3P18S19B	3.3	20-40	20-40	-1.25% to -1.75%	Spread Deviation Selection	0	70	SOIC-8
ASM3P2107A	5	12-22	12-22	Down		0	70	SOIC-8
ASM3P2108A	5	25-45	25-45	-1.3		0	70	SOIC-8
ASM3P2111B	3.3	25	48; 66	-1.7		0	70	SOIC-8
ASM3P2180A	3.3	6-30	6-30	Selectable Down		0	70	SOIC-8
ASM3P2182A	3.3	25-210	25-210	±0.13 to ±1.24		0	70	SOIC-8
ASM3P2274A	2.5; 3.3	12-30	48-120	-1.5	PDB	0	70	TSOP-6

SPREAD SPECTRUM EMI REDUCTION CLOCKS (continued)

Device	V <sub>DD</sub> Typ (V)	f <sub>in</sub> Typ (MHz)	f <sub>out</sub> Typ (MHz)	Deviation Type	Features	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
ASM3P2474A	3.3	13–30	13–30; 26–60	–1.5		0	70	TSOP–6
ASM3P2579A	3.3	13	30	±1	SSON	–40	85	TSOP–6
ASM3P2590A	2.5; 3.3	60–120	60–120	±0.75 @85MHz	SSON/OFF	0	70	TSOP–6
ASM3P2598A	2.5; 3.3	60–120	60–120	±1.5	SSON	0	70	TSOP–6
ASM3P2669A	2.5; 3.3	6–12; 6–13	6–12; 6–13	±1	PDB	–40; 0	70; 85	TSOP–6
ASM3P2760A	2.5; 3.3	6–12; 6–13	6–12; 6–13	±0.65	PDB	0	70	TSOP–6
ASM3P2775A	3.3	13–30	13–30	±1.8	PDB	0	70	TSOP–6
ASM3P2779A	2.5; 3.3	13–30	13–30	±1	PDB	–40; 0	70; 85	TSOP–6
ASM3P2811A	3.3	10–40	10–40	–2.5 to –3.8; ±1.2 to ±1.9	ModOUT = 1x Input Clock	0	70	SOIC–8
ASM3P2812A	3.3	10–40	20–80	–2.5 to –3.8; ±1.2 to ±1.9	ModOUT = 2x Input Clock	0	70	SOIC–8; TSSOP–8
ASM3P2814A	3.3	10–40	40–160	–2.5 to –3.8; ±1.2 to ±1.9	ModOUT = 4x Input Clock	0	70	SOIC–8
ASM3P2853A	2.5	25	48; 50	±1		0	70	SOIC–8
ASM3P2863A	2.5; 3.3	6–12; 6–13	6–12; 6–13	±0.5	REFOUT	0	70	TSOP–6
ASM3P2872A	2.5; 3.3	13–30	13–30	–1.25	REFOUT	0	70	TSOP–6
ASM3P623S05B	3.3	20–50	20–50	±0.25; ±0.5		0	70	TSSOP–8
P1708C	3.3	50–110	50–110	Selectable Center Spread	SSON/OFF	0	70	SOIC–8; TSSOP–8
P1727A	3.3	20–40	20–40	Selectable ±0.625% to –3.50%		0	70	SOIC–8
P1817A	2.7–5.5	20–32	20–32	Center		–40	85	SOIC–8
P1817B	2.7–5.5	10–20	10–20	Center		–40	85	SOIC–8
P1819B	3.3	20–40	20–40	–1.25 & –1.75	PD with SSON/OFF	–40	85	SOIC–8
P1819G	3.3	20–40	20–40	±0.875 & –1.75	PD with SSON/OFF	–40	85	SOIC–8
P1P8160A	3.3	27	27; 100	Selectable Down Spread		–10	85	WDFN–10
P2042A	3.3	30–110	30–110	±0.23 to ±1.89	SSON/OFF	0	70	TSSOP–8
P2180A	3.3	20–40	20–40	–1.25%; –1.75%		0	70	SOIC–8
P2781A	3.3	3–78	3–78	±0.25 to ±5	External loop filter for deviation setting	0	70	SOIC–8
P2782A	3.3	3–78	6–156	±0.25 to ±5	External Loop Filter For Deviation Setting	0	70	SOIC–8
P2784	3.3	3–78	12–312	±0.25 to ±5	External Loop Filter For Deviation Setting	0	70	SOIC–8
P2811B	3.3	10–40	10–40	±0.625 to –3.5		0	70	SOIC–8
P2814B	3.3	10–40	40–160	±0.625 to –3.5		0	70	SOIC–8



## ON Semiconductor Selector Guide – Clock Management

### SPREAD SPECTRUM EMI REDUCTION CLOCKS (continued)

Device	V <sub>DD</sub> Typ (V)	f <sub>in</sub> Typ (MHz)	f <sub>out</sub> Typ (MHz)	Deviation Type	Features	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
P3I2005A	3.3; 5	10–30; 30–100	10–30; 30–100	Selectable center & Down		–40	85	SOIC–8
P3P25812A	3.3	4–32	8–64	–0.5 to –3.0; ±0.3 to ±1.4	ModOUT=2x Input Clock	0	70	SOIC–8
P3P25814	3.3	4–32	16–128	–0.5 to –3.0; ±0.3 to ±1.4	ModOUT=4x Input Clock	0	70	SOIC–8
P3P623S00BG	3.3	20–50	20–50	±0.25 & ±0.50		0	70	SOIC–8; TSSOP–16; TSSOP–8
P3P8220A	1.8; 2.5; 3.3	0–60	0–60	7.5nS	Supports Non-continuous Input Clock	0	70	WDFN–8
P3P85R01A	3.3	75–200	75–200	Analog Deviation		0	70	WDFN–8
P3PS550AH	2.3–3.6	18–36	18–36	±0.4 to ±2.5	High Drive, PDB	–20	85	WDFN–8
P3PS850BH	2.3–3.6	18–72	18–72	Analog	PDB	–20	85	WDFN–8
P3PSL450AH	1.8	15–60	15–60	Analog	PDB	–20	85	WDFN–8
P6P82PS01A	3.3	5	5	Analog	External or Internal MR selection	0	70	WDFN–8
PCS3P2537A	3.3	18–36	18–36	–0.25	SSON/OFF	0	70	WDFN–8
PCS3P25811A	3.3	4–32	4–32	–0.5 to –3.0; ±0.3 to ±1.4	ModOUT=1x Input Clock	0	70	SOIC–8
PCS3P6100A	2.5; 3.3	20–130; 30–130	20–130; 30–130	±0.75, ±1, ±1.25, ±1.5		–40	85	TSOT–23–6
PCS3P6200A	2.5; 3.3	25–120	25–120	±0.75, ±1, ±1.25, ±1.5		–40	85	TSOT–23–6
PCS3P7100A	2.5; 3.3	20–130; 30–130	20–130; 30–130	±0.75, ±1, ±1.25, ±1.5		–40	85	TSOT–23–6
PCS3P7303A	2.5; 3.3	10–70; 10–80	10–70; 10–80	Analog		0	70	TSSOP–8; WDFN–8
PCS3P8103A	3.3	16.667	66.66	–0.7; ±1.2	SSOFF	0	70	TSOT–23–6
PCS3P8504A	3.3	15–50	15–50	Analog	MR Selection	0	70	WDFN–8
PCS3PS550A	2.3–3.6	18–36	18–36	±0.4 to ±2.5	PDB	–20	85	WDFN–8

### VCOs

Device	Description	Input Level	Output Level	f <sub>Max</sub> Typ (MHz)	V <sub>CC</sub> Typ (V)	Duty Cycle (%)	Package
MC100EL1648	5.0 V ECL Voltage Controlled Oscillator	ECL	ECL	1100	5.5	50	DFN–8; SOIC–8; TSSOP–8
MC14046B	Phase Locked Loop	CMOS	CMOS		18		PDIP–16; SOIC–16W
MC74HC4046A	Phase Locked Loop	CMOS	CMOS		6		PDIP–16; SOIC–16; TSSOP–16

**ZERO DELAY BUFFERS**

Device	Input Level	Output Level	Outputs Per Channel	V <sub>DD</sub> Typ (V)	t <sub>skew(O-O)</sub> Max (ps)	F Max (MHz)	t <sub>Jitter</sub> Max (ps)	Package
NB2304A	CMOS	CMOS	4	3.3	200	133.3	100	SOIC-8
NB2305A	CMOS	CMOS	5	3.3	250	133.3	200	SOIC-8; TSSOP-8
NB2308A	CMOS	CMOS	8	3.3	200	133.3	100	SOIC-16; TSSOP-16
NB2309A	CMOS	CMOS	9	3.3	250	133.3	200	SOIC-16; TSSOP-16



**Custom**

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# Custom

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## Table of Contents

	<b>Page</b>
Digital ASICs .....	94
Custom Foundry Services .....	94

## ON Semiconductor Selector Guide – Custom Devices

### DIGITAL ASICs

Family	Core Voltage	I/O Voltage	I/O Types	System Performance	Special Features	FPGA Conversion Targets
SC5 (0.5 μm)	5 V	5 V; 3.3 V	PCI33, TTL, LVTTTL, LVC MOS	75 MHz	Long-Term 5 V Support, High Temp	Legacy FPGAs & PLDs
SC3 (0.35 μm)	3.3 V; 2.5 V	5 V; 3.3 V	PCI33/66, GTL, HSTL, SSTL, LVTTTL, LVC MOS, LVPECL	100 MHz	Freeprom, High Temp	Virtex-1® Spartan2®, APEX 20K®, Acex®, ProASIC Plus/500K®
ONC18 (0.18 μm)	1.8 V; 1.5 V	3.3 V; 2.5 V; 1.8 V	PCI33/66 HSTL, SSTL, LVTTTL, LVC MOS, LVPECL, LVDS, DCI	266 MHz	NVM, OTP, High Vt, High Temp	Virtex -E®, Virtex II®, Spartan -IIE®, APEX 20KE®, Stratix®, APEX II®, Cyclone®, Xcelerator® ProASIC3®
SP110 (0.11 μm)	1.2 V	3.3 V; 2.5 V; 1.8 V; 1.5 V; 1.2 V	PCI33/66, PCIX, HSTL, SSTL, LVTTTL, LVC MOS, LVPECL, LVDS, DCI, CML	450 MHz	OTP, Dual-Source Capability, Future Mil Temp	Virtex-4®, Spartan-3/6®, APEX-II®, Stratix -II®, Cyclone II/III/IV®, Arria®, IGLOO®
SP65* (65 nm)	0.9 V	3.3 V; 2.5 V; 1.8 V; 1.5 V	PCI33/66, PCIX, HSTL, SSTL, LVTTTL, LVC MOS, LVPECL, LVDS, DCI, CML	600 MHz	Extensive IP Portfolio	Virtex-6®, Virtex-7®, Artix-7®, Kintex-7®, Stratix III/IV®, Arria II®

### CUSTOM FOUNDRY SERVICES

Process Name	Min Drawn Poly (μ)	No. Metal Layers	Wafer Size (in)	Max Oper Voltage	Metal 1 Pitch	NVM	Linear Cap	N-Ch DMOS	P-Ch DMOS	Bi-polars	Trans Char	Other Devices
ONC18G/R	0.18	4-6	8	3.3	0.46	Y	MIM	-	-	-	Salicide	Resistors
ONC25	0.25	2-5	8	5	0.64	Y	MIM	-	-	Y	Salicide	Misc.
ONBCD25	0.25	2-5	8	40	0.64	Y	MIM	Y	-	Y	Salicide	Misc.
C3/D3	0.35	3-5	8	5	1.1	Y	PIP	-	-	-	Salicide	Resistors
I3T25	0.35	3-5	8	18	1	Y	MIM	Y	Y	Y	Salicide	Resistors
I3T50	0.35	3-5	6	40	1	Y	MIM	Y	Y	Y	Salicide	Misc.
I3T80	0.35	3-5	6	80	1	Y	MIM	Y	Y	Y	Salicide	Misc.
C5	0.6	2,3	8	20	1.5	Y	PIP	Y	Y	-	Poly	Misc.
I2T30 (E)	0.7	2,3	6	30	2.8	-	PIP	Y	Y	Y	Poly	-
I2T100	0.7	2,3	6	100	2.8	-	PIP	Y	Y	Y	Poly	Misc.

# **DC-DC Controllers, Converters, and Regulators**

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# DC–DC Controllers, Converters, and Regulators

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## Table of Contents

	Page
Battery Charge Controllers .....	98
Charge Pumps .....	98
DC–DC Controllers .....	98
DC–DC Converters .....	100
Linear Voltage Regulators .....	103
Single Linear Voltage Regulators .....	103
Dual Linear Voltage Regulators .....	110
PoE Controllers .....	111

## ON Semiconductor Selector Guide – DC–DC Controllers, Converters, and Regulators

### BATTERY CHARGE CONTROLLER

Device	Description	Type	Number of Cells Charged	V <sub>CC</sub> Min (V)	I <sub>D</sub> Max (μA)	Features	Package
NCP1835B	300 mA One-Cell Lithium-ion/Polymer Battery Charger	Li-Ion/Polymer	1	2.8	3	CCCV Charger (30–300 mA)	DFN–10

### CHARGE PUMPS

Device	V <sub>in</sub> Typ (V)	V <sub>out</sub> Typ (V)	I <sub>out</sub> Typ (mA)	I <sub>CC</sub> Max (μA)	f <sub>osc</sub> Typ (kHz)	Shutdown Pin	Package
CAT3200	2.7 to 4.5	5; 2.7 to 6 (adj)	100	–	2000	Yes	MSOP–8; TSOT–23–6
CAT3200HU2	2.2 to 4.5	2.7 to 6 (adj)	100	–	–	Yes	UDFN–8
CAT660	3.0 to 5.5	–	100	–	80	No	PDIP–8; SOIC–8
CAT661	3.0 to 5.5	–	100	–	135	No	PDIP–8; SOIC–8
MAX1720	1.15 to 5.5	–V <sub>in</sub> or 2 V <sub>in</sub>	90	90	12	Yes	TSOP–6
NCP1729	1.15 to 5.5	–V <sub>in</sub> or 2 V <sub>in</sub>	50	20	35	Yes	TSOP–6

### DC–DC CONTROLLERS

Device	Topology	Phases	Control Mode	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	f <sub>sw</sub> Typ (kHz)	t <sub>res</sub> Typ (ns)	Package
CS51022A	Buck	1	Current Mode	8.2	20	Up to 1000		SOIC–16; TSSOP–16
NCP5386	Buck	1/2	Current/Voltage Mode	4.75	7	100 – 1000		QFN–32
SG3525A	Flyback; Forward; Half–Bridge; Push–Pull; Step–Down; Step–Up	1	Voltage Mode	8	35	400		PDIP–16; SOIC–16W
TL494	Flyback; Forward; Half–Bridge; Push–Pull; Step–Down; Step–Up	1	Voltage Mode	7	40	Up to 200		PDIP–16; SOIC–16
CS5124	Flyback; Forward; Step–Down	1	Current Mode	7.6	75	400		SOIC–8
NCP1080	Multimode	1	Current Mode	0	57	250	37	TSSOP–20
NCL30100	Step–Down		Hysteretic	6.35		Up to 700		TSOP–6
NCP1034	Step–Down	1	Voltage Mode	8	100	Up to 500		SOIC–16
NCP3011	Step–Down	1	Voltage Mode	4.7	28	400		TSSOP–14
NCP3012	Step–Down	1	Voltage Mode	4.7	28	Up to 200		TSSOP–14
NCP3020	Step–Down	1	Voltage Mode	4.7	28	300; 600		SOIC–8
NCP3030	Step–Down	1	Voltage Mode	4.7	28	1200; 2400		SOIC–8
NCP5212	Step–Down	1	Current/Voltage Mode	4.5	27	300		QFN–16
NCP5212T	Step–Down	1	Current/Voltage Mode	4.5	27	300		QFN–16
NCP5217	Step–Down	1	Current/Voltage Mode	4.5	27	300		QFN–14

DC–DC CONTROLLERS (continued)

Device	Topology	Phases	Control Mode	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	f <sub>sw</sub> Typ (kHz)	t <sub>res</sub> Typ (ns)	Package
NCP5222	Step-Down	2	Current/Voltage Mode	4.5	27	300		QFN–28
NCP5393A	Step-Down	2/3/4	Current/Voltage Mode	4.75	5.25	100 – 1000		QFN–48
NCP5393B	Step-Down	2/3/4	Current/Voltage Mode	4.75	5.25	100 – 1000		QFN–48
ADP3193A								LFCSP–32
ADP3198		2/3/4	Current/Voltage Mode	6	14.5	100 – 1000		LFCSP–40
ADP3207C								LFCSP–40
ADP3208D								LFCSP–48
ADP3209C								LFCSP–32
ADP3210								QFN–40
ADP3211								QFN–32
ADP3212								QFN–48
ADP3212A								QFN–48
ADP3290		2/3/4	Current/Voltage Mode	6	14.5	100 – 1000		LFCSP–40
ADP3293		2/3	Current/Voltage Mode	6	14.5	100 – 1000		LFCSP–40
ADP4000		4/5/6	Current/Voltage Mode	4.7	5.75	250 – 9000		LFCSP–48
ADP4100		4/5/6	Current/Voltage Mode	4.7	5.75	250 – 9000		LFCSP–48
CS51021A		1	Current Mode	8.2	20	Up to 1000		SOIC–16
CS51031		1	Hysteretic	4.5	16	200		SOIC–8
NCP1282		1	Voltage Mode	8	20	Up to 500		SOIC–16
NCP1294								SOIC–16; TSSOP–16
NCP1575		1	V2	9	20	200 – 400	200	SOIC–8
NCP1579								SOIC–8
NCP1581								SOIC–14
NCP1587		1	Voltage Mode	4.5	13.2	250 – 300		SOIC–8
NCP1587A		1	Voltage Mode	4.5	13.2	180 – 220		SOIC–8
NCP1587EDR2G								SOIC–8
NCP1589A								DFN–10
NCP1589D								DFN–10
NCP1589L								DFN–10
NCP4200								QFN–40

## ON Semiconductor Selector Guide – DC–DC Controllers, Converters, and Regulators

### DC–DC CONTROLLERS (continued)

Device	Topology	Phases	Control Mode	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	f <sub>sw</sub> Typ (kHz)	t <sub>res</sub> Typ (ns)	Package
NCP4208								QFN–48
NCP5210		1	Voltage Mode	4.5	13.2	250		DFN–20
NCP5378								QFN–32
NCP5380								QFN–32
NCP5387		2/3/4	Current/Voltage Mode	4.75	5.25	100 – 1000	120	QFN–40
NCP5388		2/3/4	Current/Voltage Mode	10.8	13.2	100 – 1000	20	QFN–40
NCP5391		2/3	Current/Voltage Mode	10.8	13.2	100 – 1000	20	QFN–32
NCP5392		2/3/4	Current/Voltage Mode	4.75	5.25	100 – 1000	10	QFN–40
NCP5392P		2/3/4	Current/Voltage Mode	4.75	5.25	100 – 1000	10	QFN–40
NCP5392Q		2/3/4	Current/Voltage Mode	4.75	5.25	100 – 1000	10	QFN–40
NCP5392T		2/3/4	Current/Voltage Mode	4.75	5.25	100 – 1000	10	QFN–40
NCP5395								QFN–48
NCP5395T								QFN–48
NCP5422A		1	V2	10.8	13.2	Up to 600	150	SOIC–16
NCP5425		1	V2	4.75	13.2	750	200	TSSOP–20
NCV494		1	Voltage Mode	7	40	200		SOIC–16
NCV8851B								TSSOP–20
TL594		1	Voltage Mode	6	42	Up to 300		PDIP–16; SOIC–16; TSSOP–16

### DC–DC CONVERTERS

Device	Topology	Control Mode	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	V <sub>O</sub> Typ (V)	I <sub>O</sub> Typ (A)	f <sub>sw</sub> Typ (kHz)	Package
CS51411	Step–Down	V2	4.5	40		1.5	260	DFN–18; SOIC–8
CS51412	Step–Down	V2	4.5	40		1.5	260	DFN–18; SOIC–8
CS51413	Step–Down	V2	4.5	40		1.5	520	DFN–18; SOIC–8
CS51414	Step–Down	V2	4.5	40		1.5	520	SOIC–8
LM2574	Step–Down	Voltage Mode	7	40	1.23 to 37	0.5		PDIP–8; SOIC–16W
LM2575	Step–Down	Voltage Mode	7	40	1.23 to 37	1		D2PAK–5; TO–220–5
LM2576	Step–Down	Voltage Mode	7	40	1.23 to 37	3		D2PAK–5; TO–220–5
LM2594	Step–Down	Voltage Mode	4.5	40		0.5	150	PDIP–8; SOIC–8

DC–DC CONVERTERS (continued)

Device	Topology	Control Mode	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	V <sub>O</sub> Typ (V)	I <sub>O</sub> Typ (A)	f <sub>sw</sub> Typ (kHz)	Package
LM2595	Step–Down	Voltage Mode	4.5	40		1	150	D2PAK–5; TO–220–5
LM2596	Step–Down	Voltage Mode	4.5	40		3	150	D2PAK–5; TO–220–5
MC33167	Step–Down	Voltage Mode	7.5	40	5.0 to 40	5	72	D2PAK–5; TO–220–5
MC34167	Step–Down	Voltage Mode	7.5	40	5.0 to 40	5	72	D2PAK–5; TO–220–5
NCP1031	Step–Down	Voltage Mode		200		1	Up to 1000	DFN–8; SOIC–8
NCP1521B	Step–Down	Current Mode	2.7	5.5	0.9 to 3.3	0.6	1500	TSOP–5 / SOT23–5
NCP1522B	Step–Down	Voltage Mode	2.7	5.5	0.9 to 3.3	0.6	3000	TSOP–5 / SOT23–5; UDFN–6
NCP1523	Step–Down	Voltage Mode	2.7	5.5	0.9 to 2.3	0.6	3000	Flip–Chip–8
NCP1523B	Step–Down	Voltage Mode	2.7	5.5	0.9 to 3.3	0.6	3000	Flip–Chip–8
NCP1529	Step–Down	Current Mode	2.7	5.5	0.9 to 3.9	1	1700	TSOP–5 / SOT23–5; UDFN–6
NCP1532	Step–Down	Current Mode	2.7	5.5	0.9 to 3.3	1.6	2250	UDFN–10
NCP1546	Step–Down	V2	4	40		1.5	Up to 200	DFN–18; SOIC–8
NCP1547	Step–Down	V2	4	40	1.5 to 24	1.5	Up to 700	DFN–18; SOIC–8
NCP1595	Step–Down	Current Mode	4	5.5	0.8 to 4.95	1.5	Up to 1200	DFN–6
NCP1597	Step–Down	Voltage Mode	4	5.5		2	1000	DFN–6
NCP1597B	Step–Down	Voltage Mode	4	5.5		2	1000	QFN–10
NCP1599	Step–Down	Voltage Mode	3	5.5		3	1000	DFN–6
NCP3101	Step–Down	Voltage Mode	2.7	18		6	275	QFN–40
NCP3102	Step–Down	Voltage Mode	2.7	18		10	275	QFN–40
NCP3120	Step–Down		4.5	15			Up to 1000	QFN–32
NCP3121	Step–Down		4.5	15			Up to 1000	QFN–32
NCP3122	Step–Down		4.5	15		2	Up to 2200	QFN–32
NCP3123	Step–Down		4.5	15		3	Up to 2200	QFN–32
NCP3125	Step–Down	Voltage Mode	4.5	13.2		4	350	SOIC–8
NCP3126	Step–Down	Voltage Mode	4.5	13.2		3	350	SOIC–8
NCP3127	Step–Down	Voltage Mode	4.5	13.2		2	350	SOIC–8
NCP3155	Step–Down	Voltage Mode	4.7	24		3	500; 1000	SOIC–8
NCP5252	Step–Down		4.5	13.2		2		QFN–16
NCV2575	Step–Down	Current/Voltage Mode	4.75	40	5; 12	1	52	D2PAK–5
NCV51411	Step–Down	V2	4.5	40		1.5	260	DFN–18; SOIC–16W; SOIC–8
NCV8842	Step–Down	V2	4	40		1.5	Up to 200	DFN–18; SOIC–16W; SOIC–8
NCV8843	Step–Down	V2	4	40		1.5	Up to 700	DFN–18; SOIC–16W; SOIC–8
NCV8855	Step–Down	Voltage Mode	9	18			Up to 200	QFN–40

## ON Semiconductor Selector Guide – DC–DC Controllers, Converters, and Regulators

### DC–DC CONVERTERS (continued)

Device	Topology	Control Mode	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	V <sub>O</sub> Typ (V)	I <sub>O</sub> Typ (A)	f <sub>sw</sub> Typ (kHz)	Package
NCV8881	Step–Down	Voltage Mode	5	40		1.5	275	SOIC–16W
MC33063A	Step–Down; Step–Up; Step–Up/Step–Down	Hysteretic	3	40	1.25 to 40	1.5	100	DFN–8; PDIP–8; SOIC–8
MC34063A	Step–Down; Step–Up; Step–Up/Step–Down	Voltage Mode	3	40	1.25 to 40	1.5	100	PDIP–8; SOIC–8
NCP3063	Step–Down; Step–Up; Step–Up/Step–Down	Hysteretic	3	40		1.5	150	DFN–8; PDIP–8; SOIC–8
NCP3064	Step–Down; Step–Up; Step–Up/Step–Down	Hysteretic	3	40		1.5	150	DFN–8; PDIP–8; SOIC–8
NCP3065	Step–Down; Step–Up; Step–Up/Step–Down	Hysteretic	3	40		1.5	250	DFN–8; PDIP–8; SOIC–8
NCP3066	Step–Down; Step–Up; Step–Up/Step–Down	Hysteretic	3	40		1.5	250 Up to 300	DFN–8; PDIP–8; SOIC–8
NCP3163	Step–Down; Step–Up; Step–Up/Step–Down	Hysteretic	2.5	40		3	Up to 300	DFN–18; SOIC–16W
NCV3063	Step–Down; Step–Up; Step–Up/Step–Down	Hysteretic	3	40		1.5	Up to 200	DFN–8; PDIP–8; SOIC–8
NCV3064	Step–Down; Step–Up; Step–Up/Step–Down		3	40		1.5	Up to 300	DFN–8; PDIP–8; SOIC–8
NCV3163	Step–Down; Step–Up; Step–Up/Step–Down	Hysteretic	2.5	40		3	Up to 300	DFN–18; SOIC–16W
NCV33063AV	Step–Down; Step–Up; Step–Up/Step–Down	Hysteretic	3	40	1.25 to 40	1.5	100	PDIP–8; SOIC–8
CS5171	Step–Up	Current Mode	2.7	30		1.5	Up to 500	SOIC–8
CS5172	Step–Up	Current Mode	2.7	30		1.5	Up to 500	SOIC–8
CS5173	Step–Up	Current Mode	2.7	30		1.5	Up to 1000	SOIC–8
CS5174	Step–Up	Current Mode	2.7	30		1.5	Up to 1000	SOIC–8
NCP1400A	Step–Up		0.8	5.5	1.9; 2.2; 2.5; 2.7; 3; 3.3; 3.8; 4.5; 5	Up to 0.1	180	TSOP–5 / SOT23–5
NCP1402	Step–Up		0.8	5.5	1.9; 2.7; 3; 3.3; 4; 5	Up to 0.2	Up to 200	TSOP–5 / SOT23–5
NCP1403	Step–Up		1.2	5.5	Up to 15	0.05		TSOP–5 / SOT23–5
NCP1406	Step–Up		1.4	5.5	Up to 25	0.025	Up to 1000	TSOP–5 / SOT23–5
NCP1410	Step–Up		1	5.5	1.5 to 5.5	0.25	600	Micro8
NCP1421	Step–Up		1	5.5	1.5 to 5.0	0.6	Up to 1200	Micro8
NCP1422	Step–Up			5.5	1.5	0.8	Up to 1200	DFN–10
NCP1423	Step–Up			6	1.8 to 3.3	0.4	Up to 600	Micro10
NCP1450A	Step–Up		0.6	5.5	1.9; 2.7; 3; 3.3; 5	1		TSOP–5 / SOT23–5
NCP5005	Step–Up	Current Mode			22	0.05	1200	TSOP–5 / SOT23–5
NCP5006	Step–Up	Current Mode			22	0.05	1200	TSOP–5 / SOT23–5
NCP5007	Step–Up	Current Mode			22	0.05	1200	TSOP–5 / SOT23–5
NCV5171	Step–Up	Current Mode	2.7	30		1.5		SOIC–8
MC33163	Step–Up/Step–Down	Voltage Mode	2.5	40	1.25 to 40	3.4		PDIP–16; SOIC–16W
MC33166	Step–Up/Step–Down	Voltage Mode	7.5	40	1.5 to 40	3		D2PAK–5; TO–220–5

DC–DC CONVERTERS (continued)

Device	Topology	Control Mode	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	V <sub>O</sub> Typ (V)	I <sub>O</sub> Typ (A)	f <sub>sw</sub> Typ (kHz)	Package
NCV33163	Step-Up/Step-Down	Voltage Mode	2.5	40	1.25 to 40	3.4		PDIP-16; SOIC-16W
NCP1030		Voltage Mode		200		0.5	300	Micro8
NCP1596A								DFN-6
NCP5208		Voltage Mode	1.7	5.5	0.9 / 1.25	1.5		SOIC-8
NCV5173								SOIC-8

LINEAR VOLTAGE REGULATORS

SINGLE LINEAR VOLTAGE REGULATORS

Device	Polarity	I <sub>O</sub> Typ (A)	V <sub>O</sub> (V)	V <sub>I</sub> Max (V)	V <sub>DO</sub> Typ (V)	I <sub>q</sub> Typ (mA)	PSRR (dB)	Noise (μVrms)	Package
NCP102	Positive	0.005	9.75	13					TSOP-6
NCP51460	Positive	0.02	3.3	30	0.9	0.14	70	18	SOT-23-3
NCP4640	Positive	0.05	2; 3; 3.3; 8; 12		0.2	0.009	30	80	SOT-89-5
NCP508	Positive	0.05	1.5; 1.8; 2.5; 2.8; 3; 3.3	13	0.155	0.3	70	39	SC-88A-5 / SC-70-5 / SOT-323-5; WDFN-6
NCV8184	Positive	0.07	Tracking	26	0.35	0.05	60		DDPAK-4; SOIC-8
MC33761	Positive	0.08	2.5; 2.8; 2.9; 3; 5	12	0.16				TSOP-5 / SOT23-5
MC78LC	Positive	0.08	1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.3; 4; 5	12	1				SOT-89-3; TSOP-5 / SOT23-5
NCP502	Positive	0.08	1.5; 1.8; 2.5; 2.7; 2.8; 2.9; 3; 3.1; 3.3; 3.4; 3.5; 3.6; 3.7; 5	12	0.6; 0.85; 1; 1.3; 1.5	0.04	55	180	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NCP512	Positive	0.08	1.3; 1.5; 1.8; 2.2; 2.5; 2.7; 2.8; 3; 3.1; 3.3; 5	6	0.12; 0.16; 0.17; 0.18; 0.2; 0.22; 0.24; 0.35; 0.52	0.04	50	180	SC-88A-5 / SC-70-5 / SOT-323-5
NCP553	Positive	0.08	1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.3; 5	12	0.7				SC-82AB-4
NCP562	Positive	0.08	1.5; 1.8; 2.1; 2.5; 2.7; 2.8; 3; 3.3; 3.5; 5	6	0.14; 0.19; 0.2; 0.23; 0.25; 0.4; 0.55				SC-82AB-4
NCP563	Positive	0.08	1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.3; 5	6	0.14; 0.19; 0.2; 0.23; 0.25; 0.4; 0.55				SC-82AB-4
NCV553	Positive	0.08	1.5; 5	12	0.7	0.0028		90	SC-82AB-4
CS8101	Positive	0.1	5	60	0.4	0.07	75		SOIC-20W; SOIC-8
CS8151	Positive	0.1	5	60	0.4	0.4	75		SOIC-14
LM2931	Positive	0.1	5; Adjustable	40	0.16				D2PAK-3; D2PAK-5; DPAK-4; SOIC-8; TO-220-3; TO-220-5; TO-92
LM317L	Positive	0.1	Adjustable	40	1.9				SOIC-8; TO-92
LP2950	Positive	0.1	3; 3.3; 5	30	0.35				DDPAK-4; TO-92
LP2951	Positive	0.1	Adjustable	30	0.35				Micro8; PDIP-8; SOIC-8
MC33160	Positive	0.1	5	40	2				PDIP-16; SOIC-16W



# ON Semiconductor Selector Guide – DC–DC Controllers, Converters, and Regulators

## LINEAR VOLTAGE REGULATORS

### SINGLE LINEAR VOLTAGE REGULATORS (continued)

Device	Polarity	I <sub>O</sub> Typ (A)	V <sub>O</sub> (V)	V <sub>I</sub> Max (V)	V <sub>DO</sub> Typ (V)	I <sub>q</sub> Typ (mA)	PSRR (dB)	Noise (μVrms)	Package
MC78L05A	Positive	0.1	5	30	1.7				SOIC–8; TO–92
MC78L08A	Positive	0.1	8	30	1.7				SOIC–8; TO–92
MC78L09A	Positive	0.1	9	30	1.7				SOIC–8; TO–92
MC78L12A	Positive	0.1	12	35	1.7				SOIC–8; TO–92
MC78L15A	Positive	0.1	15	35	1.7				SOIC–8; TO–92
MC78L18A	Positive	0.1	18	35	1.7				TO–92
MC78L24A	Positive	0.1	24	40	1.7				TO–92
MC79L05	Negative	0.1	–5	–30; –5	1.7				SOIC–8; TO–92
MC79L12	Negative	0.1	–12	–35	1.7				SOIC–8; TO–92
MC79L15	Negative	0.1	–15	–35	1.7				SOIC–8; TO–92
MC79L18	Negative	0.1	–18	–35	1.7				TO–92
MC79L24	Negative	0.1	–24	–40	1.7				TO–92
NCP612	Positive	0.1	1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.1; 3.3; 3.7; 5	6	0.16; 0.18; 0.2; 0.21; 0.23; 0.25; 0.27; 0.42; 0.53	0.04		100	SC–88A–5 / SC–70–5 / SOT–323–5
NCP662	Positive	0.1	1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.3; 5	6	0.17; 0.23; 0.25; 0.28; 0.3; 0.5; 0.68				SC–82AB–4
NCP663	Positive	0.1	1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.3; 5	6	0.17; 0.23; 0.25; 0.28; 0.3; 0.5; 0.68				SC–82AB–4
NCV2931	Positive	0.1	5; Adjustable	40	0.16		90		D2PAK–3; DPAK–4; SOIC–8; SOT–223–4 / TO–261–4; TO–92
NCV2951	Positive	0.1	Adjustable	30	0.35	0.093		56	SOIC–8
NCV4264	Positive	0.1	3.3; 5	45	0.275	0.1	67		SOIC–8; SOT–223–4 / TO–261–4
NCV4264–2	Positive	0.1	3.3; 5	45	0.27	0.033	67		SOT–223–4 / TO–261–4
NCV4949A	Positive	0.1	5	28	0.3	0.15			SOIC–20W; SOIC–8
NCV612	Positive	0.1	1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.1; 3.3; 3.7; 5	6	0.16; 0.18; 0.2; 0.21; 0.23; 0.25; 0.27; 0.42; 0.53	0.04		100	SC–88A–5 / SC–70–5 / SOT–323–5
NCV662	Positive	0.1	1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.3; 5	6	0.17; 0.23; 0.28; 0.3; 0.5; 0.68	0.0025		100	SC–82AB–4
NCV663	Positive	0.1	1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.3; 5	6	0.17; 0.23; 0.25; 0.28; 0.3; 0.5; 0.68	0.0025		100	SC–82AB–4
NCV78L05A	Positive	0.1	5	30	1.7				SOIC–8; TO–92
NCV78L08	Positive	0.1	8	30	1.7				SOIC–8
NCV78L12A	Positive	0.1	12	35	1.7				SOIC–8; TO–92
MC78FC30	Positive	0.12	3	10	0.5				SOT–89–3
MC78FC33	Positive	0.12	3.3	10	0.5				SOT–89–3
MC78FC40	Positive	0.12	4	10	0.5				SOT–89–3

**LINEAR VOLTAGE REGULATORS**

**SINGLE LINEAR VOLTAGE REGULATORS** (continued)

Device	Polarity	I <sub>o</sub> Typ (A)	V <sub>O</sub> (V)	V <sub>I</sub> Max (V)	V <sub>DO</sub> Typ (V)	I <sub>q</sub> Typ (mA)	PSRR (dB)	Noise (μVrms)	Package
MC78FC50	Positive	0.12	5	10	0.5				SOT–89–3
CAT6217	Positive	0.15	1.5; 1.8; 2.5; 2.8; 2.85; 3.3	5.5	0.09	0.08	64	45	TSOP–23–5
MC78PC18	Positive	0.15	1.8	9	0.6				SOT–23–5
MC78PC25	Positive	0.15	2.5	9	0.24				SOT–23–5
MC78PC28	Positive	0.15	2.8	9	0.2				SOT–23–5
MC78PC30	Positive	0.15	3	9	0.2				SOT–23–5
MC78PC33	Positive	0.15	3.3	9	0.2				SOT–23–5
MC78PC50	Positive	0.15	5	9	0.17				SOT–23–5
NCP3985	Positive	0.15	1.8; 2.5; 2.75; 2.8; 3; 3.3	5.5	0.1; 0.105; 0.7	0.07	70	20	TSOP–5 / SOT23–5
NCP4587	Positive	0.15	1.2; 1.8; 2.8; 3; 3.3	6	0.12; 0.19; 0.24	0.055	70	115	XDFN–6
NCP4620	Positive	0.15	1.2; 1.5; 1.8; 2.5; 3; 3.3; 5	12	0.4	0.023	70	90	SC–88A–5 / SC–70–5 / SOT–323–5; SOT–23–5
NCP4641	Positive	0.15	3; 5; 8	35	0.2	0.009	27	112	SOT–89–5
NCP4680	Positive	0.15	0.8; 0.9; 1; 1.2; 1.5; 1.8; 2.5; 2.8; 3; 3.3	1.4	0.25	0.05	75	60	SC–88–6 / SC–70–6 / SOT–363–6; SC–88A–5 / SC–70–5 / SOT–323–5; XDFN–4
NCP4681	Positive	0.15	1.5; 2.5; 2.8; 2.9; 3.3; 3.5	6	0.28	0.001	25	100	SC–88A–5 / SC–70–5 / SOT–323–5; XDFN–4
NCP4682	Positive	0.15	1.2; 1.5; 1.8; 2; 2.5; 2.8; 3; 3.3	1.7	0.24	0.001	30	70	SC–82AB–4; UDFN–4
NCP500	Positive	0.15	1.8; 1.85; 2.5; 2.6; 2.7; 2.8; 3; 3.3; 5	6	0.12; 0.15; 0.165; 0.17; 0.18; 0.19; 0.27				DFN–6; TSOP–5 / SOT23–5
NCP511	Positive	0.15	1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.3; 5	6	0.075; 0.09; 0.1; 0.11; 0.16; 0.245				TSOP–5 / SOT23–5
NCP551	Positive	0.15	1.5; 1.8; 2.5; 2.7; 2.8; 2.9; 3; 3.1; 3.2; 3.3; 5	12	0.04; 0.13				TSOP–5 / SOT23–5
NCP561	Positive	0.15	1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.3; 5	6	0.12; 0.13; 0.14; 0.15; 0.24; 0.33				TSOP–5 / SOT23–5
NCP571	Positive	0.15	0.8; 0.9; 1; 1.2	12	0.35; 0.55; 0.65; 0.73	0.004			DFN–6; TSOP–5 / SOT23–5
NCP582	Positive	0.15	1.5; 1.8; 2.5; 2.8; 2.9; 3; 3.3	6.5	0.22; 0.28; 0.32; 0.38				SC–82AB–4; SOT–563–6
NCP583	Positive	0.15	1.5; 1.8; 2.5; 2.6; 2.8; 2.9; 3; 3.1; 3.3	6.5	0.25; 0.35; 0.5; 0.6				SC–82AB–4; SOT–563–6
NCP600	Positive	0.15	1.3; 1.5; 1.8; 2.5; 2.8; 3; 3.3; 3.5; 5; Adjustable	6	0.075; 0.085; 0.125; 0.175				DFN–6; TSOP–5 / SOT23–5
NCP623	Positive	0.15	2.5; 2.8; 3; 3.3; 4; 5	12	0.18				DFN–6
NCP698	Positive	0.15	1.3; 1.5; 1.8; 2.5; 2.8; 3; 3.3; 3.5; 5	6	0.28; 0.36; 0.37; 0.42; 0.52; 0.7; 0.87; 1.03	0.0025		100	SC–82AB–4

# ON Semiconductor Selector Guide – DC–DC Controllers, Converters, and Regulators

## LINEAR VOLTAGE REGULATORS

### SINGLE LINEAR VOLTAGE REGULATORS (continued)

Device	Polarity	I <sub>o</sub> Typ (A)	V <sub>O</sub> (V)	V <sub>I</sub> Max (V)	V <sub>DO</sub> Typ (V)	I <sub>q</sub> Typ (mA)	PSRR (dB)	Noise (μVrms)	Package
NCP699	Positive	0.15	1.3; 1.4; 1.5; 1.8; 2.5; 2.8; 2.9; 3; 3.1; 3.3; 3.4; 4.5; 5	6	0.24; 0.3; 0.32; 0.33; 0.34; 0.35; 0.36; 0.4; 0.57; 0.64; 0.75; 0.8	0.09			TSOP-5 / SOT23-5
NCV4269A	Positive	0.15	5	45	0.25	0.19			SOIC-14; SOIC-20W; SOIC-8
NCV4279A	Positive	0.15	5	45	0.25	0.19			SOIC-14; SOIC-8
NCV4299	Positive	0.15	3.3; 5	45	0.22	0.086	66		SOIC-14; SOIC-8
NCV551	Positive	0.15	1.4; 1.5; 1.8; 2.5; 2.7; 2.8; 3; 3.1; 3.2; 3.3; 5	12	0.04; 0.13; 0.17	0.004			TSOP-5 / SOT23-5
NCV8501	Positive	0.15	2.5; 3.3; 5; 8; 10; Adjustable	45	0.4	0.05; 0.09; 0.1	55		SOIC-16W; SOIC-8
NCV8502	Positive	0.15	2.5; 3.3; 5; 8; 10; Adjustable	45	0.4	0.05; 0.09; 0.1			SOIC-16W; SOIC-8
NCV8560	Positive	0.15	1.3; 1.5; 1.8; 2.5; 2.8; 3; 3.3; 3.5; 5; Adjustable	6	0.075; 0.1; 0.125; 0.15; 0.175				DFN-6; TSOP-5 / SOT23-5
NCV8660	Positive	0.15	5	40	0.3	0.025	60		SOIC-8
NCV8660B	Positive	0.15	3.3; 5	40	0.3	0.025	60		SOIC-8
NCV8664	Positive	0.15	3.3; 5	45	0.315	0.021	67		DPAK-4; SOIC-8; SOT-223-4 / TO-261-4
NCV8665	Positive	0.15	5	45	0.25	0.03			D2PAK-5; SOIC-8
NCV8667	Positive	0.15	5	40	0.225	0.028	60		SOIC-14; SOIC-8
NCV8669	Positive	0.15	5	40	0.225	0.042	60		SOIC-14
NCP4586	Positive	0.15	1.2; 1.4; 1.5; 1.8; 2.5; 2.8; 3; 3.3; 5	6.5	0.32; 0.51; 0.54; 0.67	0.038	80	30	SC-82AB-4; SOT-23-5; UDFN-4
CS8182	Positive	0.2	Tracking	26	0.35	0.075	60		D2PAK-5; DPAK-4; SOIC-8
NCP4588	Positive	0.2	1; 1.5; 2.5	5.3	0.27	0.0095	70	80	SC-88A-5 / SC-70-5 / SOT-323-5; XDFN-6
NCP584	Positive	0.2	0.9; 1.2; 1.5; 1.8; 2.5; 2.6; 2.8; 3; 3.1; 3.3	6	0.1; 0.2; 0.3; 0.4				SOT-23-5
NCP700	Positive	0.2	1.8; 2.5; 2.75; 2.8; 3; 3.3	5.5	0.13; 0.14; 0.15; 0.17; 0.7	0.07	80	15	DFN-6
NCP700B	Positive	0.2	1.8; 2.8; 3; 3.3	6		0.07	82	10	TSOP-5 / SOT23-5; WDFN-6
NCV8570	Positive	0.2	1.8; 2.5; 2.75; 2.8; 3; 3.3	5.5	0.13; 0.14; 0.15; 0.17; 0.7	0.07	80	15	DFN-6; TSOP-5 / SOT23-5
NCV8508B	Positive	0.25	3.3; 5	45	0.45	0.1			D2PAK-7; SOIC-8
NCV8518A	Positive	0.25	5	45	0.425	0.1			SOIC-16W; SOIC-8
NCV8518B	Positive	0.25	5	45		0.1			SOIC-16W; SOIC-8
CAT6218	Positive	0.3	1.8; 2.4; 2.5; 2.7; 2.85; 3; 3.2; 3.3	5.5	0.18	0.08	64	45	TSOT-23-5
MC33275	Positive	0.3	2.5; 3; 3.3; 5	13	0.26				DFN-8; DPAK-4; SOIC-8; SOT-223-4 / TO-261-4
MC33375	Positive	0.3	1.8; 2.5; 3; 3.3; 5	12	0.26				SOIC-8; SOT-223-4 / TO-261-4

**LINEAR VOLTAGE REGULATORS**

**SINGLE LINEAR VOLTAGE REGULATORS** (continued)

Device	Polarity	I <sub>o</sub> Typ (A)	V <sub>O</sub> (V)	V <sub>I</sub> Max (V)	V <sub>DO</sub> Typ (V)	I <sub>q</sub> Typ (mA)	PSRR (dB)	Noise (μVrms)	Package
NCP2860	Positive	0.3	2.77; Adjustable	6	0.15; 0.155		60 69	60	Micro8
NCP4589	Positive	0.3	1.2; 1.8; 2.5; 2.8; 3; 3.3	5.3	0.23	0.055	70	90	SC-88A-5 / SC-70-5 / SOT-323-5; XDFN-6
NCP4625	Positive	0.3	1.2; 1.8; 2.8; 3; 3.3; 5	10	0.2	0.023	70	85	SOT-23-5
NCP4626	Positive	0.3	3; 3.3; 4.5; 5	18	0.75	0.006	70	0	SOT-23-5; XDFN6 1.6x1.6, 0.5P
NCP4683	Positive	0.3	1.2; 1.8; 1.85; 2.8; 2.85; 3.3	1.4	0.25	0.05	65	65	SC-88A-5 / SC-70-5 / SOT-323-5; UDFN-4
NCP585	Positive	0.3	0.9; 1; 1.2; 1.25; 1.5; 1.8; 2.5; 2.8; 3; 3.3	6	0.31; 0.4; 0.48; 0.55				SOT-23-5
NCP603	Positive	0.3	1.3; 1.5; 1.8; 2.5; 2.8; 3; 3.3; 3.5; 5; Adjustable	6.5	0.157; 0.187; 0.245; 0.35; 0.375				TSOP-5 / SOT23-5
NCV33275	Positive	0.3	3.3; 5	13	0.26				SOT-223-4 / TO-261-4
NCV33375	Positive	0.3	1.8; 2.5	13	0.26	1.5			SOIC-8; SOT-223-4 / TO-261-4
NCV8674	Positive	0.35	5; 12	45	0.3	0.027; 0.031	67		D2PAK-3
NCV8675	Positive	0.35	3.3; 5	45	0.31	0.034	70		D2PAK-5; DPAK-4
NCV8772	Positive	0.35	5	45	0.44	0.024	60		D2PAK-5; D2PAK-7
NCP4671	Positive	0.4	0.6; 0.9; 1; 1.2; 1.3; 1.5	6	0.18	0.028; 0.28	80	70	SOT-23-5; XDFN-6
NCV4274	Positive	0.4	2.5; 3.3; 5	45	0.25	0.14; 0.145; 0.19	60		D2PAK-3; DPAK-4; SOT-223-4 / TO-261-4
NCV4276	Positive	0.4	1.8; 2.5; 3.3; 5; Adjustable	45	0.25	0.13	60		D2PAK-5; DPAK-4
NCV4276B	Positive	0.4	5; Adjustable	45	0.25	0.13	70		D2PAK-5; DPAK-4
NCV8503	Positive	0.4	2.5; 3.3; 5; Adjustable	45	0.4	0.2			SOIC-16W
NCV8504	Positive	0.4	2.5; 3.3; 5; Adjustable	45	0.4	0.1			SOIC-16W
NCV8505	Positive	0.4	2.5; 3.3; 5; Adjustable	45	0.4	0.2			D2PAK-7
NCV8506	Positive	0.4	2.5; 3.3; 5; Adjustable	45	0.4	0.1			D2PAK-7
NCV4275A	Positive	0.45	3.3; 5	45	0.25	0.15	60		D2PAK-5; DPAK-4
CAT6219	Positive	0.5	1.25; 1.8; 2.5; 2.8; 2.85; 3; 3.3; Adjustable	5.5	0.3	0.085	64	45	TDFN-6; TSOT-23-5; WDFN-6
LM317M	Positive	0.5	Adjustable	40	2.1				DPAK-4; SOT-223-4 / TO-261-4; TO-220-3
MC78M05	Positive	0.5	5	35	2				DPAK-4; TO-220-3
MC78M05A	Positive	0.5	5	35	2				DPAK-4; TO-220-3
MC78M06	Positive	0.5	6	35	2				DPAK-4; TO-220-3
MC78M08	Positive	0.5	8	35	2				DPAK-4; TO-220-3
MC78M09	Positive	0.5	9	35	2				DPAK-4; TO-220-3
MC78M12	Positive	0.5	12	35	2				DPAK-4; TO-220-3

# ON Semiconductor Selector Guide – DC–DC Controllers, Converters, and Regulators

## LINEAR VOLTAGE REGULATORS

### SINGLE LINEAR VOLTAGE REGULATORS (continued)

Device	Polarity	I <sub>O</sub> Typ (A)	V <sub>O</sub> (V)	V <sub>I</sub> Max (V)	V <sub>DO</sub> Typ (V)	I <sub>q</sub> Typ (mA)	PSRR (dB)	Noise (μVrms)	Package
MC78M12A	Positive	0.5	12	35	2				DPAK–4; TO–220–3
MC78M15	Positive	0.5	15	35	2				DPAK–4; TO–220–3
MC78M15A	Positive	0.5	15	35	2				DPAK–4; TO–220–3
MC78M18	Positive	0.5	18	35	2				DPAK–4; TO–220–3
MC78M20	Positive	0.5	20	40	2				TO–220–3
MC78M24	Positive	0.5	24	40	2				TO–220–3
MC79M05	Negative	0.5	–5	–35	1.1				DPAK–4; TO–220–3
MC79M08	Negative	0.5	–8	–35	1.1				DPAK–4; TO–220–3
MC79M12	Negative	0.5	–12	–35	1.1				DPAK–4; TO–220–3
MC79M15	Negative	0.5	–15	–35	1.1				DPAK–4; TO–220–3
NCP3334	Positive	0.5	Adjustable	12	0.34				SOIC–8
NCP3335A	Positive	0.5	1.5; 1.8; 2.5; 2.8; 2.85; 3; 3.3; 5; Adjustable	12	0.34; 1.13; 1.43				DFN–10; Micro8
NCP3337	Positive	0.5	1.8; 2.5; 3.3; 5	12		0.22	40	33; 35; 46; 58	DFN–10
NCP4629	Positive	0.5	5; 6; 12	24	0.135	0.07	60		DPAK–5
NCP5500	Positive	0.5	1.5; 3.3; 5; Adjustable	18	0.23; 1				DPAK–4; SOIC–8
NCP5501	Positive	0.5	1.5; 3.3; 5	18	0.3; 1				DPAK–4
NCP605	Positive	0.5	1.5; 1.8; 2.5; 2.8; 3; 3.3; 5; Adjustable	6	0.15; 0.17; 0.18; 0.19; 0.2; 0.25; 0.29; 0.45	0.145	62	50	DFN–6
NCV5500	Positive	0.5	1.5; 3.3; 5; Adjustable	18	0.3				DPAK–4; SOIC–8
NCV5501	Positive	0.5	1.5; 3.3; 5	18	0.3				DPAK–4
NCV8141	Positive	0.5	5	60	1.25		75		D2PAK–7
NCV8535	Positive	0.5	1.5; 1.8; 1.9; 2.5; 2.8; 2.85; 3; 3.3; 3.5; 5; Adjustable	12	0.34; 1.13; 1.43	0.19			DFN–10
NCV8605	Positive	0.5	1.5; 1.8; 2.5; 2.8; 3; 3.3; 5; Adjustable	6	0.15; 0.17; 0.18; 0.19; 0.2; 0.25; 0.29; 0.45	0.145	62	50	DFN–6
CS8126	Positive	0.75	5	60	0.35	2	75		D2PAK–7
MC33269	Positive	0.8	3.3; 5; 12; Adjustable	20	1.1				DPAK–4; SOIC–8; SOT–223–4 / TO–261–4; TO–220–3
MC34268	Positive	0.8	2.85	15	1.1				SOIC–8
NCV33269	Positive	0.8	3.3; 5; 12; Adjustable	20	1.1				DPAK–4; SOIC–8
MC7805	Positive	1	5	35	2	3.2	68	10	D2PAK–3; DPAK–4; TO–220–3
MC7806	Positive	1	6	35	2				D <sup>2</sup> PAK–3 TO–220–3
MC7806A	Positive	1	6	35	2				TO–220–3

**LINEAR VOLTAGE REGULATORS**

**SINGLE LINEAR VOLTAGE REGULATORS** (continued)

Device	Polarity	I <sub>O</sub> Typ (A)	V <sub>O</sub> (V)	V <sub>I</sub> Max (V)	V <sub>DO</sub> Typ (V)	I <sub>q</sub> Typ (mA)	PSRR (dB)	Noise (μVrms)	Package
MC7808	Positive	1	8	35	2				D2PAK–3; DPAK–4; TO–220–3
MC7808A	Positive	1	8	35	2				D2PAK–3; TO–220–3
MC7809	Positive	1	9	35	2				D2PAK–3; TO–220–3
MC7809A	Positive	1	9	35	2				TO–220–3
MC7812	Positive	1	12	35	2				D2PAK–3; DPAK–4; TO–220–3
MC7812A	Positive	1	12	35	2				D2PAK–3; TO–220–3
MC7815	Positive	1	15	35	2				D2PAK–3; DPAK–4; TO–220–3
MC7815A	Positive	1	15	35	2				D2PAK–3; TO–220–3
MC7818	Positive	1	18	35	2				D2PAK–3; TO–220–3
MC7818A	Positive	1	18	35	2				TO–220–3
MC7824	Positive	1	24	40	2				D2PAK–3; TO–220–3
MC7824A	Positive	1	24	40	2				TO–220–3
MC7905	Negative	1	–5	–35	1.3				D2PAK–3; TO–220–3
MC7905.2	Negative	1	–5.2	–35	1.3				TO–220–3
MC7905A	Negative	1	–5	–35	1.3				D2PAK–3; TO–220–3
MC7906	Negative	1	–6	–35	1.3				D2PAK–3; TO–220–3
MC7908	Negative	1	–8	–35	1.3				D2PAK–3; TO–220–3
MC7908A	Negative	1	–8	–35	1.3				TO–220–3
MC7912	Negative	1	–12; 1.3	–35	1.3				D2PAK–3; TO–220–3
MC7915	Negative	1	–15	–35	1.3				D2PAK–3; TO–220–3
MC7918	Negative	1	–18	–35	1.3				TO–220–3
MC7924	Negative	1	–24	–40	1.3				D2PAK–3; TO–220–3
NCP1117	Positive	1	1.5; 1.8; 1.9; 2; 2.5; 2.85; 3.3; 5; 12; Adjustable	20	1.2				DPAK–4; SOT–223–4 / TO–261–4
NCP1117LP		1	1.5; 2.5; 3.3; 5	18	1.3	0.55	60		SOT–223–4 / TO–261–4
NCP5661	Positive	1	1.2; 1.5; 1.8; 2.5; 2.8; 3; 3.3; Adjustable	9	1				DFN–6; DPAK–4
NCP690	Positive	1	1.25; 1.5; 1.8; 2.5; 3.3; 5	6	0.12; 0.18; 0.19; 0.24; 0.29; 0.45	0.145	62	50	DFN–6
NCP691	Positive	1	1.25; 1.5; 1.8; 2.5; 5	6	0.12; 0.19; 0.24; 0.29	0.145	62	50	DFN–6
NCP692	Positive	1	1.25; 1.5; 1.8; 2.5; 3.3; 5	6	0.12; 0.18; 0.19; 0.24; 0.29; 0.45	0.145	62	50	DFN–6
NCP693	Positive	1	0.8; 1; 1.2; 2.5; 3.3	7	0.45; 0.7; 0.9; 1; 1.1	0.065	70	45	UDFN–6
NCP694	Positive	1	0.8; 1; 1.2; 2.5; 3.3; Adjustable	6	0.18; 0.32; 0.56; 0.72	0.06	70	30	SON–6 / HSON–6; SOT–89–5

# ON Semiconductor Selector Guide – DC–DC Controllers, Converters, and Regulators

## LINEAR VOLTAGE REGULATORS

### SINGLE LINEAR VOLTAGE REGULATORS (continued)

Device	Polarity	I <sub>o</sub> Typ (A)	V <sub>O</sub> (V)	V <sub>I</sub> Max (V)	V <sub>DO</sub> Typ (V)	I <sub>q</sub> Typ (mA)	PSRR (dB)	Noise (μVrms)	Package
NCP7800	Positive	1	5; 8; 12; 15	35	2	3	70; 71; 72; 75	34; 54.4; 81.6; 102	TO–220–3
NCV1117	Positive	1	1.5; 1.8; 2; 2.5; 3.3; 5; 12; Adjustable	20	1.07	4.2			DPAK–4; SOT–223–4 / TO–261–4
NCV7805	Positive	1	5	35	2				D2PAK–3; DPAK–4; TO–220–3
NCV7808	Positive	1	8	35	2				D2PAK–3; DPAK–4; TO–220–3
NCV7812	Positive	1	12	35	2				D2PAK–3; TO–220–3
LM317	Positive	1.5	Adjustable	40	2.25				D2PAK–3; TO–220–3
LM337	Negative	1.5	Adjustable	–40	2.5; 2.7				D2PAK–3; TO–220–3
NCP565	Positive	1.5	1.2; 1.5; 2.8; 3; 3.3; Adjustable	9	0.9				D2PAK–3; D2PAK–5; DFN–6; SOT–223–4 / TO–261–4
NCP566	Positive	1.5	1.2; 1.8; 2.5	9	0.9				SOT–223–4 / TO–261–4
NCV317	Positive	1.5	Adjustable	40	2.25				D2PAK–3; TO–220–3
NCV565	Positive	1.5	1.2; Adjustable	9	0.9				D2PAK–3; D2PAK–5; SOT–223–4 / TO–261–4
NCP5662	Positive	2	1.2; 1.5; 1.8; 2.5; 2.8; 3; 3.3; Adjustable	9	1				D2PAK–5; DFN–8
NCP5663	Positive	3	1.5; 1.8; Adjustable	9	1				D2PAK–5
NCP5667	Positive	3	5	9	1	2.4		105	D2PAK–3
NCP59300	Positive	3			0.3	60			D2PAK–5
NCP630	Positive	3	3.47; Adjustable	12	1.25				D2PAK–5

### MULTIPLE OUTPUT LOW DROPOUT LINEAR VOLTAGE REGULATORS (continued)

Device	Polarity	I <sub>o</sub> Typ (A)	V <sub>O</sub> (V)	V <sub>I</sub> Max (V)	V <sub>DO</sub> Typ (V)	I <sub>q</sub> Typ (mA)	PSRR (dB)	Package
MC33762	Positive	0.08	2.5, 2.5; 2.8, 2.8; 3.0, 3.0	7; 12	0.16			Micro8
NCP4672	Positive	0.08	1.8, 3.5	18	0.15			SOIC–8
CS8363	Positive	0.1	3.3	12.5	0.4	0.145	70	D2PAK–7
NCV8509	Positive	0.1	1.8, 3.3; 2.5, 5.0	50	0.6	0.125		SOIC–16W
CS8183	Positive	0.2	Tracking	45	0.4; 1.2	0.075	60	SOIC–20W
CS8361	Positive	0.25	5	60	0.4	0.14	70	D2PAK–7; SOIC–16W
NCP5504	Positive	0.25	3.3, Adj.	18	0.25			DPAK–4
NCV5504	Positive	0.25	3.3, 1.25	18	0.25			DPAK–4
CAT6221	Positive	0.3	1.5, 3.3; 1.8, 2.8; 1.8, 3.0; 1.8, 3.3; 2.5, 3.0; 2.7, 3.3; 3.0, 3.0	5.5	0.2	0.16	64	TSOT–23–6
NCP590	Positive	0.3	1.2, 1.5; 1.2, 1.8; 1.5, 2.4; 1.8, 2.8; 2.8, 2.8; 3.3, 3.3	6	0.165			DFN–8

**LINEAR VOLTAGE REGULATORS**

**MULTIPLE OUTPUT LOW DROPOUT LINEAR VOLTAGE REGULATORS** (continued)

Device	Polarity	I <sub>o</sub> Typ (A)	V <sub>O</sub> (V)	V <sub>I</sub> Max (V)	V <sub>DO</sub> Typ (V)	I <sub>q</sub> Typ (mA)	PSRR (dB)	Package
CM3202-00	Positive	2	2.5	3.6	2.5	7	40	WDFN-8
CM3202-02	Positive	2	2.5	3.6	2.5	7	40	WDFN-8

**PoE CONTROLLERS**

Device	Description	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	Package
NCP1080	Integrated 13 W PoE–PD & DC–DC Converter Controller (IEEE 802.3af)	0	57	TSSOP–20
NCP1081	Integrated 40 W High Power PoE–PD & DC–DC Converter Controller (IEEE 802.3at Draft 3.0)	0	57	TSSOP–20
NCP1082	Integrated 13 W PoE–PD & DC–DC Converter Controller with Auxiliary Supply Support (IEEE 802.3af)	0	57	TSSOP–20
NCP1083	Integrated 40 W High Power PoE–PD & DC–DC Converter Controller with Auxiliary Supply Support (IEEE 802.3at Draft 3.0)	0	57	TSSOP–20
NCP1090	Integrated IEEE 802.3af PoE–PD Interface Controller	36	57	SOIC–8; TSSOP–8
NCP1091	Integrated IEEE 802.3af PoE–PD Interface Controller w/ Programmable UVLO	36	57	SOIC–8; TSSOP–8
NCP1092	Integrated IEEE 802.3af PoE–PD Interface Controller w/ Vaux Support	–	–	SOIC–8; TSSOP–8
NCP1093	IEEE802.3at PoE–PD Interface Controller	–	–	DFN–10
NCP1094	IEEE802.3at PoE–PD Interface Controller	–	–	DFN–10





# Digital Potentiometers

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# Digital Potentiometers

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## Table of Contents

	Page
Digitally Programmable Potentiometers .....	116

## ON Semiconductor Selector Guide – Digital Potentiometers

### DIGITALLY PROGRAMMABLE POTENTIOMETERS

Device	# of Pots	# of Taps	Type	Control Interface	Resistance Typ (k $\Omega$ )	V <sub>H</sub> Max (V)	Wiper Position Memory	V <sub>DD</sub> Max (V)	Package
CAT5110	1	32	Potentiometer	Up/Down	10; 50; 100	VCC	No	5.5	SC-88-6 / SC-70-6; SOT-23-6
CAT5111	1	100	Potentiometer	Up/Down	10; 50; 100	VCC	Yes	6	MSOP-8; PDIP-8; SOIC-8; TSSOP-8
CAT5112	1	32	Potentiometer	Up/Down	10; 50; 100	VCC	Yes	6	MSOP-8; PDIP-8; SOIC-8; TSSOP-8
CAT5113	1	100	Potentiometer	Up/Down	1; 10; 50; 100	VCC	Yes	6	MSOP-8; PDIP-8; SOIC-8; TSSOP-8
CAT5114	1	32	Potentiometer	Up/Down	10; 50; 100	VCC	Yes	6	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT5115	1	32	Potentiometer	Up/Down	10; 50; 100	VCC	No	6	MSOP-8; PDIP-8; SOIC-8; TSSOP-8
CAT5116	1	100	Potentiometer	Up/Down	32	VCC	Yes	5.5	MSOP-8; PDIP-8; SOIC-8; TSSOP-8
CAT5118	1	32	Rheostat	Up/Down	10; 50; 100	VCC	No	5.5	SC-88A-5 / SC-70-5; SOT-23-8
CAT5119	1	32	Rheostat	Up/Down	10; 50; 100	VCC	No	5.5	SC-88-6 / SC-70-6; SOT-23-6
CAT5120	1	16	Potentiometer	Up/Down	10; 50	VCC	No	5.5	SC-88-6 / SC-70-6; SOT-23-6
CAT5121	1	16	Rheostat	Up/Down	10; 50	VCC	No	5.5	SC-88-6 / SC-70-6; SOT-23-6
CAT5122	1	16	Rheostat	Up/Down	10; 50	VCC	No	5.5	SC-88-6 / SC-70-6; SC-88A-5 / SC-70-5; SOT-23-8
CAT5123	1	32	Rheostat	Up/Down	10	VCC	No	5.5	SOT-23-8
CAT5124	1	32	Rheostat	Up/Down	50	VCC	No	5.5	SOT-23-6
CAT5125	1	32	Rheostat	Up/Down	10	VCC	No	5.5	SOT-23-6
CAT5126	1	32	Potentiometer	Up/Down	10; 50; 100	VCC	OTP	5.5	MSOP-8; TDFN-8
CAT5128	1	32	Potentiometer	Up/Down	10; 50	VCC	No	5.5	SOT-23-8
CAT5129	1	32	Rheostat	Up/Down	10	VCC	Yes	5.5	TSOT-23-6

**DIGITALLY PROGRAMMABLE POTENTIOMETERS** (continued)

Device	# of Pots	# of Taps	Type	Control Interface	Resistance Typ (k $\Omega$ )	V <sub>H</sub> Max (V)	Wiper Position Memory	V <sub>DD</sub> Max (V)	Package
CAT5132	1	128	Potentiometer	I2C	10; 50; 100	16	Yes	5.5	MSOP-10
CAT5133	1	128	Potentiometer	Up/Down	10	16	Yes	5.5	MSOP-10
CAT5140	1	256	Potentiometer	I2C	50	VCC	Yes	5.5	MSOP-8
CAT5171	1	256	Potentiometer	I2C	50	VCC	No	5.5	SOT-23-8
CAT5221	2	64	Potentiometer	I2C	2.5; 10; 50; 100	VCC	Yes	6	SOIC-20W; TSSOP-20
CAT5261	2	256	Potentiometer	SPI	50; 100	VCC	Yes	6	SOIC-24W; TSSOP-24
CAT5269	2	256	Potentiometer	I2C	50; 100	VCC	Yes	6	SOIC-24W; TSSOP-24
CAT5271	2	256	Potentiometer	I2C	50; 100	VCC	No	6.5	MSOP-10
CAT5273	2	256	Potentiometer	I2C	50	VCC	No	6.5	MSOP-10
CAT5411	2	64	Potentiometer	SPI	2.5; 10; 50; 100	VCC	Yes	6	SOIC-24W; TSSOP-24
CAT5419	2; 4	64	Potentiometer	I2C	2.5; 10; 50; 100	VCC	Yes	6	SOIC-24W; TSSOP-24
CAT5241	4	64	Potentiometer	I2C	2.5; 10; 50; 100	VCC	Yes	6	SOIC-20W; TSSOP-20
CAT5251	4	256	Potentiometer	SPI	50; 100	VCC	Yes	6	SOIC-24W; TSSOP-24
CAT5259	4	256	Potentiometer	I2C	50; 100	VCC	Yes	6	SOIC-24W; TSSOP-24
CAT5401	4	64	Potentiometer	SPI	2.5; 10; 50; 100	VCC	Yes	6	SOIC-24W; TSSOP-24
CAT5409	4	64	Potentiometer	I2C	2.5; 10; 50; 100	VCC	Yes	6	SOIC-24W; TSSOP-24
CAT5172	-	-	-	-	-	-	-	-	SOT-23-8



## Diodes and Rectifiers

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# Diodes



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## Table of Contents

	Page
Tuning and Switching Diodes	
Abrupt Junction Tuning Diodes .....	122
Hyper–Abrupt Junction Tuning Diodes .....	122
Schottky Diodes .....	123
Pin Switching Diodes .....	125
General Purpose Signal & Switching Diodes .....	126
Zener Diodes – Regulation in Axial Leads .....	128
Zener Diodes – Regulation in Surface Mount .....	130
Dual Zeners – Surface Mount .....	136
TVS Diodes – In Axial Leads .....	139
TVS Diodes – In Surface Mount .....	142
ESD Protection Diodes .....	155
TVS/ESD Protection .....	175
Application Specific Rectifiers .....	187
Low $V_F$ Schottky .....	187
Low Leakage Schottky .....	188
High Voltage Schottky .....	188
MEGAHERTZ™ .....	188
UltraSoft Rectifiers .....	188
Energy Rated Rectifiers .....	188
SCHOTTKY Rectifiers .....	189
Surface Mount Schottky .....	189
Axial Lead Schottky .....	192
TO–220 Type Schottky .....	193
TO–218 Types and TO–247 Schottky .....	195
UltraSoft Rectifiers .....	195
Ultrafast Rectifiers .....	196
Surface Mount Ultrafast .....	196
Axial Lead Ultrafast .....	197
TO–220 Type Ultrafast .....	198
TO–218 Types and TO–247 Ultrafast .....	198
Fast Recovery Rectifiers/General Purpose Rectifiers .....	199


## TUNING AND SWITCHING DIODES

### ABRUPT JUNCTION TUNING DIODES

Device	V <sub>R</sub> Volts	C <sub>T</sub> @ V <sub>R</sub> = 4.0 V, 1.0 MHz			Cap Ratio Min	Q @ 4.0 V 50 MHz Typ	Package
		pF Min	pF Nominal	pF Max			
MV2105	30	13.5	15	16.5	2.5	400	 TO-226AC, TO-92 2-Lead Case 182-06
<b>MMBV2105L</b>	30	13.5	15	16.5	2.5	400	 TO-236AB, SOT-23 Case 318-08
<b>MMBV3102L</b>	30	20	–	25	4.5	200	

Devices listed in **bold italic** are ON Semiconductor preferred devices.





### HYPER-ABRUPT JUNCTION TUNING DIODES

Device	V <sub>R</sub> Volts	C <sub>T</sub> (f = 1.0 MHz)			Cap Ratio			Q 3.0 V Min	Type	Package
		pF Min	pF Max	Volts	Min	Max	Volts			
<b>MMBV105GL</b>	30	1.5	2.8	25	4.0	6.5	3.0/25	200	Single	 TO-236AB, SOT-23 Case 318-08
<b>MMBV609L</b>	20	26	32	3.0	1.8	2.4	3/8	250	Dual Common Cathode	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

TUNING AND SWITCHING DIODES (continued)







SCHOTTKY DIODES

Device	V <sub>R</sub> Volts	C <sub>T</sub> @ V		V <sub>F</sub> Volts Max	I <sub>R</sub> @ V		Type	Package
		pF Max	Volts		nA Max	Volts		
<i>MBD301</i>	30	1.5	15	0.6	200	25	Single	 TO-226AC, TO-92 2-Lead Case 182-06
<i>MMSD701</i>	70	1.0	20	1.0	200	35	Single	 SOD-123 Case 425-04
<i>BAT54</i>	30	10	1.0	0.4	2000	25	Single	
<i>MMSD301</i>	30	1.5	15	0.6	200	25	Single	
<i>MMDL770</i>	70	1.0	20	1.0	200	35	Single	 SOD-323 Case 477-02
<i>BAT54H</i>	30	10	1.0	0.4	2000	25	Single	
<i>MMDL301</i>	30	1.5	15	0.6	200	25	Single	
NSR0240H	40	–	–	0.71	550	10	Single	
NSR0340H	40	–	–	0.59	1000	10	Single	
NSR1020MW2	20	29	5	0.44	40000	10	Single	
NSRLV20MW2	20	29	5	0.27	50000	10	Single	
<i>RB751V40</i>	30	2.5	1.0	0.37	500	30	Single	
<i>MMDL101</i>	7.0	1.0	0	0.6	250	3.0	Single	
<i>NSR0320MW2</i>	20	29	5.0	0.27	50000	15	Single	
<i>BAS70L</i>	70	2.0	0	0.75	100	50	Single	 TO-236AB, SOT-23 Case 318-08
<i>BAS70-04L</i>	70	2.0	0	0.75	100	50	Dual Series	
<i>MMBD701L</i>	70	1.0	20	1.0	200	35	Single	
<i>BAS40L</i>	40	5.0	1.0	0.5	1000	25	Single	
<i>BAS40-04L</i>	40	5.0	1.0	0.5	1000	25	Dual Series	
<i>BAS40-06L</i>	40	5.0	1.0	0.5	1000	25	Dual Common Anode	
BAT54CL	30	10	1.0	0.4	2000	25	Dual Common Cathode	
<i>BAT54L</i>	30	10	1.0	0.4	2000	25	Single	
<i>BAT54AL</i>	30	10	1.0	0.4	2000	25	Dual Common Anode	
<i>BAT54SL</i>	30	10	1.0	0.4	2000	25	Dual Series	
<i>MMBD301L</i>	30	1.5	15	0.6	200	25	Single	
MMBD452L	30	1.5	15	0.6	200	25	Dual Series	
<i>MMBD101L</i>	7.0	1.0	0	0.6	250	3.0	Single	
<i>MMBD352L</i>	7.0	1.0	0	0.6	250	3.0	Dual Series	
<i>MMBD353L</i>	7.0	1.0	0	0.6	250	3.0	Dual Series	
<i>MMBD354L</i>	7.0	1.0	0	0.6	250	3.0	Dual Common Cathode	
<i>MMBD355L</i>	7.0	1.0	0	0.6	250	3.0	Dual Common Anode	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

**TUNING AND SWITCHING DIODES** (continued)







**SCHOTTKY DIODES** (continued)

Device	V <sub>R</sub> Volts	C <sub>T</sub> @ V		V <sub>F</sub> Volts Max	I <sub>R</sub> @ V		Type	Package
		pF Max	Volts		nA Max	Volts		
<b>MMBD770</b>	70	1.0	20	1.0	200	35	Single	 <b>SC-70, SOT-323</b> Case 419-04
BAT54AW	30	10	1.0	0.4	2000	25	Dual Common Anode	
BAT54CW	30	10	1.0	0.4	2000	25	Dual Common Cathode	
<b>BAT54W</b>	30	10	1.0	0.4	2000	25	Single	
<b>BAT54SW</b>	30	10	1.0	0.4	2000	25	Dual Series	
<b>MMBD330</b>	30	1.5	15	0.6	200	25	Single	
<b>MMBD717L</b>	20	2.5	1.0	0.37	1000	10	Dual Common Anode	
<b>MMBD352W</b>	7.0	1.0	0	0.6	250	3.0	Dual Series	
BAT54CT	30	10	1.0	0.4	2000	25	Dual Common Cathode	 <b>SOT-416, SC-75, SC-90</b> Case 463-01
<b>MBD770DW</b>	70	1.0	0	0.5	200	35	Dual Isolated	 <b>SC-88, SOT-363</b> Case 419B-02
<b>MBD54DW</b>	30	1.0	0	0.32	2000	25	Dual Isolated	
<b>MBD330DW</b>	30	1.5	0	0.4	200	25	Dual Isolated	
NSR0320XV6	23	35	5.0	0.27	50000	15	Single	 <b>SOT-563</b> Case 463A-01
BAT54CXV3	30	10	1.0	0.4	2000	25	Dual Common Cathode	 <b>SC-89</b> Case 463C-03
NSR0240V2	40	–	–	0.39	2000	25	Single	 <b>SOD-523</b> Case 502-01
NSR0340V2	40	–	–	0.35	3000	25	Single	
RB751S40	40	2.5	1.0	0.37	500	30	Single	
BAT54XV2	30	10	1.0	0.4	2000	25	Single	
NSRLL30XV2	30	–	–	0.60	1000	10	Single	
RB520S30	30	–	–	0.5	1000	10	Single	
RB521S30	30	–	–	0.6	30000	10	Single	
NSR0520V2	20	–	–	0.32	30000	10	Single	



Devices listed in **bold italic** are ON Semiconductor preferred devices.

**TUNING AND SWITCHING DIODES** (continued)

**SCHOTTKY DIODES** (continued)

Device	V <sub>R</sub> Volts	C <sub>T</sub> @ V		V <sub>F</sub> Max Volts	I <sub>R</sub> @ V		Type	Package
		pF Max	Volts		nA Max	Volts		
NSR0230M2	30	–	–	0.325	10000	10	Single	 SOD-723 Case 509AA
NSR30CM3	30	10	1.0	0.8	2.0	25	Dual Common Cathode	 SOT-723 Case 631AA-01
MMBD301M3	30	1.5	15	0.6	200	25	Single	
BAT54M3	30	10	1	0.4	2000	25	Single	
NSR0130P2	30	–	–	0.385	350	10	Single	 SOD-923 Case 514AA-01
NSR0140P2	30	2.5	1.0	0.350	500	30	Single	
NSR0170P2	70	–	–	0.64	90	50	Single	
NSR0240P2	40	–	–	0.5	5000	40	Single	
NSR0340P2	40	–	–	0.56	5000	10	Single	
NSR0530P2	30	–	–	0.46	10000	10	Single	
NSR0620P2	20	–	–	0.52	10000	10	Single	
NSR0230P2	30	–	–	0.325	10000	10	Single	
NSR20F30NX	30	–	–	0.480	20000	10	Single	
NSR20F20NX	20	–	–	0.490	30000	10	Single	
NSR10F40NX	40	–	–	0.490	10000	10	Single	 DSN2 (0502) Case 152AD-01
NSR10F30NX	30	–	–	0.480	20000	10	Single	
NSR10F20NX	20	–	–	0.460	20000	10	Single	
NSR05F40NX	40	–	–	0.44	15000	10	Single	 DSN2 (0402) Case 152AC-01
NSR05F30NX	30	–	–	0.430	15000	10	Single	
NSR05F20NX	20	–	–	0.430	15000	10	Single	
NSR02L30NX	30	–	–	0.4	200	10	Single	 DSN2 (0201) Case 152AA-01
NSR02F30NX	30	–	–	0.37	7000	10	Single	
NSR01L30NX	30	–	–	0.4	200	10	Single	
NSR01F30NX	30	–	–	0.37	700	10	Single	



**PIN SWITCHING DIODES**

Device	V <sub>R</sub> Volts Min	C <sub>T</sub> @ V		Resistance Ω Max	I <sub>R</sub> μA Max	Type	Package
		pF Max	Volts				
MMBV3700L	200	1.0	20	1.0	0.1	Single	 TO-236AB, SOT-23 Case 318-08
<b>MMBV3401L</b>	35	1.0	20	0.7	0.1	Single	
<b>MMVL3401</b>	35	1.0	20	0.7	0.1	Single	 SOD-323 Case 477-02

Devices listed in **bold italic** are ON Semiconductor preferred devices.

**TUNING AND SWITCHING DIODES** (continued)

**GENERAL PURPOSE SIGNAL AND SWITCHING DIODES**

Device	V <sub>R</sub> Min Volts	I <sub>R</sub> Max μA	V <sub>F</sub>		C <sub>T</sub> Max pF	t <sub>rr</sub> Max ns	Type	Package
			Min Volts	Max Volts				
BAV23CL	250	0.1	–	1.25	5	150	Dual Common Cathode	 <p>TO-236AB, SOT-23 Case 318-08</p>
<b>BAS21L</b>	250	0.1	–	1.0	5.0	50	Single	
<b>BAS21SL</b>	250	0.1	–	1.0	5.0	50	Dual Series	
<b>MMBD914L</b>	100	5.0	–	1.0	4.0	4.0	Single	
<b>BAS16L</b>	75	1.0	–	1.0	2.0	6.0	Single	
<b>MMBD6050L</b>	70	0.1	0.85	1.1	2.5	4.0	Single	
<b>BAL99L</b>	70	2.5	–	1.0	1.5	6.0	Single	
<b>BAS116L</b>	75	0.005	–	0.9	2.0	3000	Single	
<b>MMBD7000L</b>	100	1.0	0.75	1.1	1.5	4.0	Dual Series	
MMBD2836L	75	0.1	–	1.0	4.0	4.0	Dual Common Anode	
MMBD2838L	75	0.1	–	1.0	4.0	4.0	Dual Common Cathode	
<b>BAV70L</b>	70	5.0	–	1.0	1.5	6.0	Dual Common Cathode	
<b>BAV99L</b>	70	2.5	–	1.0	1.5	4.0	Dual Series	
<b>BAW56L</b>	70	2.5	–	1.0	2.0	6.0	Dual Common Anode	
MMBD6100L	70	0.1	0.85	1.1	2.5	4.0	Dual Common Cathode	
BAV74L	50	0.1	–	1.0	2.0	4.0	Dual Common Cathode	
MMBD2835L	35	0.1	–	1.0	4.0	4.0	Dual Common Anode	
MMBD2837L	35	0.1	–	1.0	4.0	4.0	Dual Common Cathode	
<b>BAV199L</b>	70	0.005	–	0.9	2.0	3000	Dual Series	
<b>BAS20L</b>	200	0.1	–	1.0	5.0	50	Single	
<b>BAS19L</b>	120	0.1	–	1.0	5.0	50	Single	
<b>M1MA151K</b>	40	0.1	–	1.2	2.0	3.0	Single	 <p>SC-59 Case 318D-04</p>
<b>M1MA152K</b>	80	0.1	–	1.2	2.0	3.0	Single	
<b>M1MA151WA</b>	40	0.1	–	1.2	15	10	Dual Common Anode	
<b>M1MA151WK</b>	40	0.1	–	1.2	2.0	3.0	Dual Common Cathode	
<b>M1MA152WA</b>	80	0.1	–	1.2	15	10	Dual Common Anode	
<b>M1MA152WK</b>	80	0.1	–	1.2	2.0	3.0	Dual Common Cathode	
<b>BAS16W</b>	75	1.0	–	1.25	2.0	6.0	Single	 <p>SC-70, SOT-323 Case 419-04</p>
<b>M1MA141K</b>	40	0.1	–	1.2	2.0	3.0	Single	
<b>M1MA142WK</b>	80	0.1	–	1.2	2.0	3.0	Dual Common Cathode	
<b>M1MA142WA</b>	80	0.1	–	1.2	15	10	Dual Common Anode	
<b>BAW56W</b>	70	2.5	–	1.0	2.0	6.0	Dual Common Anode	
<b>BAV70W</b>	70	5.0	–	1.0	1.5	6.0	Dual Common Cathode	
<b>BAV99W</b>	70	2.5	–	1.0	1.5	6.0	Dual Series	
<b>BAV99RW</b>	70	2.5	–	1.0	1.5	6.0	Dual Series	
<b>M1MA141WA</b>	40	0.1	–	1.2	15	10	Dual Common Anode	
<b>MMSD914</b>	100	5.0	–	1.0	4.0	4.0	Single	 <p>SOD-123 Case 425-04</p>
<b>MMSD103</b>	250	100	–	1.0	5.0	50	Single	
<b>MMSD4148</b>	100	5.0	–	1.0	4.0	4.0	Single	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

**TUNING AND SWITCHING DIODES** (continued)**GENERAL PURPOSE SIGNAL AND SWITCHING DIODES**

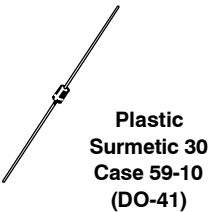
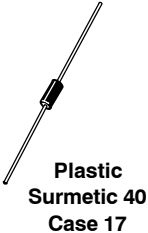
Device	V <sub>R</sub> Min Volts	I <sub>R</sub> Max μA	V <sub>F</sub>		C <sub>T</sub> Max pF	t <sub>rr</sub> Max ns	Type	Package
			Min Volts	Max Volts				
BAS16H	75	1.0	–	1.0	2.0	6.0	Single	 <b>SOD-323</b> <b>Case 477-02</b>
BAS20H	200	0.1			5.0	50	Single	
BAS21AH	250	0.04	–	1.0	5.0	50	Single	
BAS21H	250	0.1	–	1.0	5.0	50	Single	
MMDL914	100	5.0	–	1.0	4.0	4.0	Single	
MMDL6050	70	0.1	0.85	1.1	2.5	4.0	Single	
BAS16T	75	1.0	–	1.0	2.0	6.0	Single	 <b>SOT-416, SC-75,</b> <b>SC-90</b> <b>Case 463-01</b>
DA121T	80	1.0			2.0	6.0	Single	
DAP222	80	0.1	–	1.2	3.5	4.0	Dual Common Anode	
BAW56T	70	2.5	–	1.0	2.0	6.0	Dual Common Anode	
DAN222	80	0.1	–	1.2	3.5	4.0	Dual Common Cathode	
BAV70T	70	5.0	–	1.0	1.5	6.0	Dual Common Cathode	
HN2D02FUTW1	85	0.1	–	1.2	2.0	3.0	Triple Isolated	 <b>SC-88</b> <b>Case 419B-02</b>
BAS21DW5	250	0.1	–	1.0	5.0	50	Dual Isolated	 <b>SC-88A</b> <b>Case 419A-02</b>
1SS400	100	0.1	–	1.2	3.0	4.0	Single	 <b>SOD-523</b> <b>Case 502-01</b>
BAS16XV2	75	1.0	–	1.0	2.0	6.0	Single	
NSD914XV2	100	–	–	1.0	4.0	4.0	Single	
NSDEMP11XV6	70	0.01	–	1.2	3.5	4.0	Two Dual Common Anode	 <b>SOT-563</b> <b>Case 463A-01</b>
BAS16DXV6	75	0.001	–	1.25	2.0	6.0	Dual Isolated	
BAV70M3	75	2.5	–	1.25	1.5	6	Dual Common Cathode	 <b>SOT-723</b> <b>Case 631AA-01</b>
BAW56M3	75	2.5	–	1.25	2	6	Dual Common ANode	
DAN222M3	80	0.1	–	1.2	3.5	4.0	Dual Common Cathode	
DAP222M3	80	0.1	–	1.2	3.5	4.0	Dual Common Anode	
BAS21M3	250	0.1	–	1.25	5	50	Single	
NSD16F3	75	1	–	1.25	2	6	Single	
NSD914F3	100	5	–	1	4	4	Single	 <b>SOT-1123</b> <b>Case 631AA-01</b>

Devices listed in **bold italic** are ON Semiconductor preferred devices.



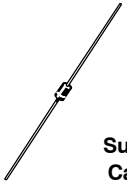

## ZENER DIODES – REGULATION IN AXIAL LEADS

Axial Leaded – 3, 5 W

Nominal Zener Breakdown Voltage	3 Watt Cathode = Polarity Band	5 Watt Cathode = Polarity Band
Volts	 <p>Plastic Surmetic 30 Case 59-10 (DO-41)</p>	 <p>Plastic Surmetic 40 Case 17</p>
3.3	1N5913B	1N5333B
3.6		1N5334B
3.9		1N5335B
4.3		1N5336B
4.7	1N5917B	1N5337B
5.1		1N5338B
5.6	1N5919B	1N5339B
6.0		1N5340B
6.2	1N5920B	1N5341B
6.8	1N5921B	1N5342B
7.5		1N5343B
8.2	1N5923B	1N5344B
8.7		1N5345B
9.1	1N5924B	1N5346B
10	1N5925B	1N5347B
11		1N5348B
12	1N5927B	1N5349B
13		1N5350B
14		1N5351B
15	1N5929B	1N5352B
16		1N5353B
17		1N5354B
18	1N5931B	1N5355B
19		1N5356B
20	1N5932B	1N5357B
22		1N5358B
24	1N5934B	1N5359B

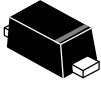





**ZENER DIODES – REGULATION IN AXIAL LEADS** (continued)

Axial Leaded – 3, 5 W

Nominal Zener Breakdown Voltage	3 Watt Cathode = Polarity Band	5 Watt Cathode = Polarity Band
Volts	 <p>Plastic Surmetic 30 Case 59-10 (DO-41)</p>	 <p>Plastic Surmetic 40 Case 17</p>
25		1N5360B
27	1N5935B	1N5361B
28		1N5362B
30		1N5363B
33	1N5937B	1N5364B
36	1N5938B	1N5365B
39		1N5366B
43	1N5940B	1N5367B
47	1N5941B	1N5368B
51	1N5942B	1N5369B
56		1N5370B
60		1N5371B
62		1N5372B
68		1N5373B
75	1N5946B	1N5374B
82		1N5375B
87		
91	1N5948B	1N5377B
100		1N5378B
110		
120		1N5380B
130		1N5381B
140		
150	1N5953B	1N5383B
160		1N5384B
170		
180	1N5955B	1N5386B
190		1N5387
200	1N5956B	1N5388B

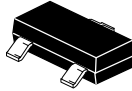
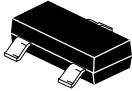
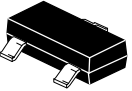
## ZENER DIODES – REGULATION IN SURFACE MOUNT

Surface Mount Packages – 200 mW

Nominal Zener Breakdown Voltage	Standard Tolerance SOD-923	Tight Tolerance SOD-923	Standard Tolerance SOD-523	Tight Tolerance SOD-523	Standard Tolerance SOD-323	Tight Tolerance SOD-323
Volts	 Case 514AB	 Case 514AB	 Case 502	 Case 502	 Case 477 Style 1	 Case 477 Style 1
2.4	NZ9F2V4	NZ9F2V4S	MM5Z2V4	MM5Z2V4S	MM3Z2V4	
2.7	NZ9F2V7	NZ9F2V7S	MM5Z2V7		MM3Z2V7	
3.0	NZ9F3V0	NZ9F3V0S	MM5Z3V0		MM3Z3V0	
3.3	NZ9F3V3	NZ9F3V3S	MM5Z3V3		MM3Z3V3	MM3Z3V3S
3.6	NZ9F3V6	NZ9F3V6S	MM5Z3V6		MM3Z3V6	
3.9	NZ9F3V9	NZ9F3V9S			MM3Z3V9	MM3Z3V9S
4.3	NZ9F4V3	NZ9F4V3S			MM3Z4V3	MM3Z4V3S
4.7	NZ9F4V7	NZ9F4V7S	MM5Z4V7	MM5Z4V7S	MM3Z4V7	MM3Z4V7S
5.1	NZ9F5V1	NZ9F5V1S	MM5Z5V1	MM5Z5V1S	MM3Z5V1	MM3Z5V1S
5.6	NZ9F5V6	NZ9F5V6S	MM5Z5V6	MM5Z5V6S	MM3Z5V6	MM3Z5V6S
6.2	NZ9F6V2	NZ9F6V2S	MM5Z6V2	MM5Z6V2S	MM3Z6V2	MM3Z6V2S
6.8	NZ9F6V8	NZ9F6V8S	MM5Z6V8	MM5Z6V8S	MM3Z6V8	MM3Z6V8S
7.5	NZ9F7V5	NZ9F7V5S	MM5Z7V5		MM3Z7V5	MM3Z7V5S
8.2	NZ9F8V2	NZ9F8V2S	MM5Z8V2	MM5Z8V2S	MM3Z8V2	MM3Z8V2S
9.1	NZ9F9V1	NZ9F9V1S	MM5Z9V1	MM5Z9V1S	MM3Z9V1	MM3Z9V1S
10	NZ9F10V	NZ9F10VS	MM5Z10V		MM3Z10V	MM3Z10VS
11	NZ9F11V	NZ9F11VS			MM3Z11V	
12	NZ9F12V	NZ9F12VS	MM5Z12V		MM3Z12V	MM3Z12VS
13	NZ9F13V	NZ9F13VS			MM3Z13V	
15	NZ9F15V	NZ9F15VS	MM5Z15V		MM3Z15V	MM3Z15VS
16	NZ9F16V	NZ9F16VS	MM5Z16V		MM3Z16V	MM3Z16VS
18	NZ9F18V	NS9F18VS	MM5Z18V		MM3Z18V	MM3Z18VS
20	NZ9F20V		MM5Z20V		MM3Z20V	
22	NZ9F22V				MM3Z22V	MM3Z22VS
24	NZ9F24V		MM5Z24V		MM3Z24V	
27			MM5Z27V		MM3Z27V	MM3Z27VS
30			MM5Z30V			
36			MM5Z36V		MM3Z36V	MM3Z33VS
39					MM3Z39V	
43					MM3Z43V	

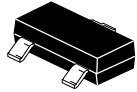
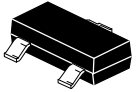
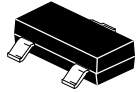
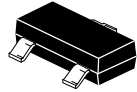
**ZENER DIODES – REGULATION IN SURFACE MOUNT** (continued)

Surface Mount Packages – 225 mW

Nominal Zener Breakdown Voltage	Standard Tolerance SOT-23	Tight Tolerance SOT-23	Standard Tolerance SOT-23	Energy Rated SOT-23
Volts	 Case 318	 Case 318	 Case 318	 Case 318
2.4	BZX84C2V4L		MMBZ5221BL	
2.5			MMBZ5222BL	
2.7	BZX84C2V7L		MMBZ5223BL	
3.0	BZX84C3V0L		MMBZ5225BL	
3.3	BZX84C3V3L		MMBZ5226BL	
3.6	BZX84C3V6L		MMBZ5227BL	
3.9	BZX84C3V9L		MMBZ5228BL	
4.3	BZX84C4V3L		MMBZ5229BL	
4.7	BZX84C4V7L		MMBZ5230BL	
5.1	BZX84C5V1L	BZX84B5V1L	MMBZ5231BL	MMBZ5231EL
5.6	BZX84C5V6L	BZX84B5V6L	MMBZ5232BL	MMBZ5232EL
6.0			MMBZ5233BL	
6.2	BZX84C6V2L	BZX84B6V2L	MMBZ5234BL	MMBZ5234EL
6.8	BZX84C6V8L	BZX84B6V8L	MMBZ5235BL	
7.5	BZX84C7V5L	BZX84B7V5L	MMBZ5236BL	
8.2	BZX84C8V2L	BZX84B8V2L	MMBZ5237BL	MMBZ5237EL
8.7			MMBZ5238BL	
9.1	BZX84C9V1L	BZX84B9V1L	MMBZ5239BL	MMBZ5239EL
10	BZX84C10L		MMBZ5240BL	MMBZ5240EL
11	BZX84C11L		MMBZ5241BL	
12	BZX84C12L	BZX84B12L	MMBZ5242BL	MMBZ5242EL
13	BZX84C13L		MMBZ5243BL	MMBZ5243EL
14			MMBZ5244BL	
15	BZX84C15L	BZX84B15L	MMBZ5245BL	MMBZ5245EL
16	BZX84C16L	BZX84B16L	MMBZ5246BL	MMBZ5246EL
17			MMBZ5247BL	
18	BZX84C18L	BZX84B18L	MMBZ5248BL	MMBZ5248EL
19			MMBZ5249BL	
20	BZX84C20L		MMBZ5250BL	MMBZ5250EL
22	BZX84C22L	BZX84B22L	MMBZ5251BL	
24	BZX84C24L	BZX84B24L	MMBZ5252BL	MMBZ5252EL
25			MMBZ5253BL	MMBZ5253EL
27	BZX84C27L		MMBZ5254BL	
28			MMBZ5255BL	
30	BZX84C30L		MMBZ5256BL	
33	BZX84C33L		MMBZ5257BL	MMBZ5257EL
36	BZX84C36L		MMBZ5258BL	
39	BZX84C39L		MMBZ5259BL	





**ZENER DIODES – REGULATION IN SURFACE MOUNT** (continued)

Surface Mount Packages – 225 mW

Nominal Zener Breakdown Voltage	Standard Tolerance SOT-23	Tight Tolerance SOT-23	Standard Tolerance SOT-23	Energy Rated SOT-23
Volts	 Case 318	 Case 318	 Case 318	 Case 318
43	BZX84C43L		MMBZ5260BL	
47	BZX84C47L		MMBZ5261BL	MMBZ5261EL
51	BZX84C51L			
56	BZX84C56L		MMBZ5263BL	
60			MMBZ5264BL	
62	BZX84C62L			
68	BZX84C68L			
75	BZX84C75L			
82			MMBZ5268BL	
91			MMBZ5270BL	

**ZENER DIODES – REGULATION IN SURFACE MOUNT** (continued)

Surface Mount Packages – 500 mW

Nominal Zener Breakdown Voltage	Standard Tolerance SOD-123	Standard Tolerance SOD-123	Standard Tolerance SOD-123	Energy Rated SOD-123
Volts	 Case 425	 Case 425	 Case 425	 Case 425
1.8		MMSZ4678		
2.0		MMSZ4679		
2.2		MMSZ4680		
2.4	MMSZ2V4	MMSZ4681	MMSZ5221B	MMSZ5221E
2.5			MMSZ5222B	
2.7	MMSZ2V7	MMSZ4682	MMSZ5223B	MMSZ5223E
3.0	MMSZ3V0	MMSZ4683	MMSZ5225B	
3.3	MMSZ3V3	MMSZ4684	MMSZ5226B	MMSZ5226E
3.6	MMSZ3V6	MMSZ4685	MMSZ5227B	
3.9	MMSZ3V9	MMSZ4686	MMSZ5228B	
4.3	MMSZ4V3	MMSZ4687	MMSZ5229B	
4.7	MMSZ4V7	MMSZ4688	MMSZ5230B	
5.1	MMSZ5V1	MMSZ4689	MMSZ5231B	
5.6	MMSZ5V6	MMSZ4690	MMSZ5232B	
6.0			MMSZ5233B	
6.2	MMSZ6V2	MMSZ4691	MMSZ5234B	
6.8	MMSZ6V8	MMSZ4692	MMSZ5235B	MMSZ5235E
7.5	MMSZ7V5	MMSZ4693	MMSZ5236B	
8.2	MMSZ8V2	MMSZ4694	MMSZ5237B	MMSZ5237E
8.7			MMSZ5238B	
9.1	MMSZ9V1	MMSZ4696	MMSZ5239B	
10	MMSZ10	MMSZ4697	MMSZ5240B	MMSZ5240E
11	MMSZ11	MMSZ4698	MMSZ5241B	
12	MMSZ12	MMSZ4699	MMSZ5242B	MMSZ5242E
13	MMSZ13	MMSZ4700	MMSZ5243B	
14		MMSZ4701	MMSZ5244B	MMSZ5244E
15	MMSZ15	MMSZ4702	MMSZ5245B	MMSZ5245E
16	MMSZ16	MMSZ4703	MMSZ5246B	MMSZ5246E
17		MMSZ4704	MMSZ5247B	
18	MMSZ18	MMSZ4705	MMSZ5248B	MMSZ5248E
19		MMSZ4706	MMSZ5249B	
20	MMSZ20	MMSZ4707	MMSZ5250B	MMSZ5250E
22	MMSZ22	MMSZ4708	MMSZ5251B	MMSZ5251E
24	MMSZ24	MMSZ4709	MMSZ5252B	MMSZ5252E
25		MMSZ4710	MMSZ5253B	



**ZENER DIODES – REGULATION IN SURFACE MOUNT** (continued)

Surface Mount Packages – 500 mW (continued)

Nominal Zener Breakdown Voltage	Standard Tolerance SOD-123	Standard Tolerance SOD-123	Standard Tolerance SOD-123	Energy Rated SOD-123
Volts	 Case 425	 Case 425	 Case 425	 Case 425
27	MMSZ27	MMSZ4711	MMSZ5254B	MMSZ5254E
28	MMSZ30		MMSZ5255B	
30		MMSZ4713	MMSZ5256B	MMSZ5256E
33	MMSZ33	MMSZ4714	MMSZ5257B	MMSZ5257E
36	MMSZ36	MMSZ4715	MMSZ5258B	
39	MMSZ39		MMSZ5259B	MMSZ5259E
43	MMSZ43	MMSZ4717	MMSZ5260B	
47	MMSZ47		MMSZ5261B	
51	MMSZ51		MMSZ5262B	
56	MMSZ56		MMSZ5263B	
60			MMSZ5264B	
62			MMSZ5265B	
68			MMSZ5266B	
75			MMSZ5267B	
82			MMSZ5268B	
87				
91			MMSZ5270B	
100				
110			MMSZ5272B	

**ZENER DIODES – REGULATION IN SURFACE MOUNT** (continued)



Surface Mount Packages – 1.5, 3 W

Nominal Zener Breakdown Voltage	1.5 Watt	3 Watt
	SMA	SMB
Volts	 Plastic Case 403B Cathode = Notch	 Plastic Case 403A
3.3	1SMA5913B	1SMB5913B
3.6	1SMA5914B	1SMB5914B
3.9	1SMA5915B	1SMB5915B
4.3	1SMA5916B	1SMB5916B
4.7	1SMA5917B	1SMB5917B
5.1	1SMA5918B	1SMB5918B
5.6	1SMA5919B	1SMB5919B
6.2	1SMA5920B	1SMB5920B
6.8	1SMA5921B	1SMB5921B
7.5	1SMA5922B	1SMB5922B
8.2	1SMA5923B	1SMB5923B
9.1	1SMA5924B	1SMB5924B
10	1SMA5925B	1SMB5925B
11		1SMB5926B
12	1SMA5927B	1SMB5927B
13	1SMA5928B	1SMB5928B
15	1SMA5929B	1SMB5929B
16	1SMA5930B	1SMB5930B
18	1SMA5931B	1SMB5931B
20	1SMA5932B	1SMB5932B
22	1SMA5933B	1SMB5933B
24	1SMA5934B	1SMB5934B
27	1SMA5935B	1SMB5935B
30	1SMA5936B	1SMB5936B
33	1SMA5937B	1SMB5937B
36	1SMA5938B	1SMB5938B
39	1SMA5939B	1SMB5939B
43	1SMA5940B	1SMB5940B
47	1SMA5941B	1SMB5941B
51	1SMA5942B	1SMB5942B
56	1SMA5943B	1SMB5943B
62		1SMB5944B
68	1SMA5945B	1SMB5945B
75		1SMB5946B



## ZENER DIODES – REGULATION IN SURFACE MOUNT (continued)

Surface Mount Packages – 1.5, 3 W (continued)

Nominal Zener Breakdown Voltage	1.5 Watt SMA	3 Watt SMB
Volts	 Plastic Case 403B Cathode = Notch	 Plastic Case 403A
82		1SMB5947B
91		1SMB5948B
100		1SMB5949B
120		1SMB5951B
130		1SMB5952B
150		1SMB5953B
160		1SMB5954B
180		1SMB5955B
200		1SMB5956B

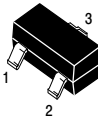
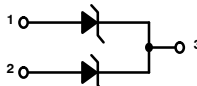
## DUAL ZENERS – DUALS IN SURFACE MOUNT

### MMBZ15VDLT1 – Common Cathode Series

SOT-23 Dual Common Cathode Zener; 40 W Peak Power (10 x 1000 μs)

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Bidirectional** (Circuit tied to Pins 1 and 2)

Device	Breakdown Voltage			Reverse Voltage Working Peak $V_{RWM}$ (V)	Reverse Leakage Current $I_R$ (nA)	Reverse Surge Current $I_{PP}$ (A)	Reverse Voltage @ $I_{PP}$ (Clamping Voltage) $V_C$ (V)	Temperature Coefficient of $V_{BR}$ (mV/°C)	
	$V_{BR}$ (Note 1) (V)								
	Min	Nom	Max						
 <p>CASE 318-08 TO-236AB LOW PROFILE SOT-23</p> 									
MMBZ15VDL	14.3	15	15.8	1.0	12.8	100	1.9	21.2	12
MMBZ27VCL	25.65	27	28.35	1.0	22	50	1.0	38	26

1.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

**DUAL ZENERS – SURFACE MOUNT (continued)**

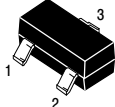
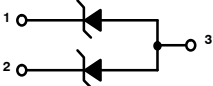
**MMBZ5V6ALT1 – Common Anode Series**

**SOT-23 Dual Common Anode Zener; 24 W Peak Power (10 x 1000 μs)**

**ELECTRICAL CHARACTERISTICS** (T<sub>A</sub> = 25°C unless otherwise noted)

**Unidirectional** (Circuit tied to Pins 1 and 3 or Pins 2 and 3)

(V<sub>F</sub> = 0.9 V Max @ I<sub>F</sub> = 10 mA)

Device	Breakdown Voltage			@ I <sub>T</sub> (mA)	Max Reverse Leakage Current		Max Zener Impedance (Note 3)			Max Reverse Surge Current I <sub>PP</sub> (A)	Max Reverse Voltage @ I <sub>PP</sub> (Clamping Voltage) V <sub>C</sub> (V)	Max Temp Coefficient of V <sub>BR</sub> (mV/°C)
	V <sub>BR</sub> (Note 2) (V)				I <sub>R</sub> @ V <sub>R</sub> (μA) (V)	Z <sub>ZT</sub> @ I <sub>ZT</sub> (Ω) (mA)	Z <sub>ZK</sub> @ I <sub>ZK</sub> (Ω) (mA)					
	Min	Nom	Max									
 <p style="text-align: center;"><b>CASE 318-08 STYLE 12 LOW PROFILE SOT-23 PLASTIC</b></p> 												
MMBZ5V6AL	5.32	5.6	5.88	20	5.0	3.0	11	1600	0.25	3.0	8.0	1.26
MMBZ6V2AL	5.89	6.2	6.51	1.0	0.5	3.0	-	-	-	2.76	8.7	2.80
MMBZ6V8AL	6.46	6.8	7.14	1.0	0.5	4.5	-	-	-	2.5	9.6	3.40
MMBZ9V1AL	8.65	9.1	9.56	1.0	0.3	6.0	-	-	-	1.7	14	7.50

2. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.

3. Z<sub>ZT</sub> and Z<sub>ZK</sub> are measured by dividing the AC voltage drop across the device by the AC current supplied. The specified limits are I<sub>Z(AC)</sub> = 0.1 I<sub>Z(DC)</sub>, with AC frequency = 1 kHz.

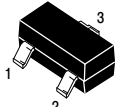
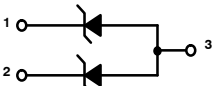
**MMBZ5V6ALT1 – Common Anode Series**

**SOT-23 Dual Common Anode Zener; 40 W Peak Power (10 x 1000 μs)**

**ELECTRICAL CHARACTERISTICS** (T<sub>A</sub> = 25°C unless otherwise noted)

**Unidirectional** (Circuit tied to Pins 1 and 3 or Pins 2 and 3)

(V<sub>F</sub> = 0.9 V Max @ I<sub>F</sub> = 10 mA)

Device	Breakdown Voltage			@ I <sub>T</sub> (mA)	Reverse Voltage Working Peak V <sub>RWM</sub> (V)	Max Reverse Leakage Current I <sub>R</sub> (nA)	Max Reverse Surge Current I <sub>PP</sub> (A)	Max Reverse Voltage @ I <sub>PP</sub> (Clamping Voltage) V <sub>C</sub> (V)	Maximum Temperature Coefficient of V <sub>BR</sub> (mV/°C)
	V <sub>BR</sub> (Note 4) (V)								
	Min	Nom	Max						
 <p style="text-align: center;"><b>CASE 318-08 STYLE 12 LOW PROFILE SOT-23 PLASTIC</b></p> 									
MMBZ12VAL	11.40	12	12.60	1.0	8.5	200	2.35	17	7.50
MMBZ15VAL	14.25	15	15.75	1.0	12.0	50	1.9	21	12.30
MMBZ18VAL	17.10	18	18.90	1.0	14.5	50	1.6	25	15.30
MMBZ20VAL	19.00	20	21.00	1.0	17.0	50	1.4	28	17.20
MMBZ27VAL	25.65	27	28.35	1.0	22.0	50	1.0	40	24.30
MMBZ33VAL	31.35	33	34.65	1.0	26.0	50	0.87	46	30.40

4. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.

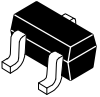
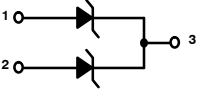
**DUAL ZENERS – SURFACE MOUNT (continued)**

**MMBZ27VCW – Common Cathode Series**

**SC-70 Dual Common Cathode Zener; 40 W Peak Power (10 x 1000 μs)**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Bidirectional** (Circuit tied to Pins 1 and 2)

Device	Breakdown Voltage				Reverse Voltage Working Peak $V_{RWM}$ (V)	Reverse Leakage Current $I_R$ (nA)	Reverse Surge Current $I_{PP}$ (A)	Reverse Voltage @ $I_{PP}$ (Clamping Voltage) $V_C$ (V)	Temperature Coefficient of $V_{BR}$ (mV/°C)
	$V_{BR}$ (Note 1) (V)			@ $I_T$ (mA)					
	Min	Nom	Max						
 <span style="margin-left: 100px;">CASE 419-04 SC-70</span> 									
MMBZ27VCL	25.65	27	28.35	1.0	22	50	1.0	38	26


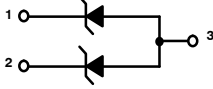
1.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of 25°C.

**MMBZ27VAW – Common Anode Series**

**SC-70 Dual Common Anode Zener; 40 W Peak Power (10 x 1000 μs)**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

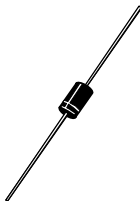
**Bidirectional** (Circuit Tied to Pins 1 and 2)

Device	Breakdown Voltage				Reverse Leakage Current $I_R$ @ $V_R$ (μA) (V)	Reverse Surge Current $I_{PP}$ (A)	Reverse Voltage @ $I_{PP}$ (Clamping Voltage) $V_C$ (V)	Temp Coefficient of $V_{BR}$ (mV/°C)	
	$V_{BR}$ (Note 2) (V)			@ $I_T$ (mA)					
	Min	Nom	Max						
 <span style="margin-left: 100px;">CASE 419-04 SC-70</span> 									
MMBZ27VAW	25.65	27	28.35	1.0	50	22	1.0	40	24.3

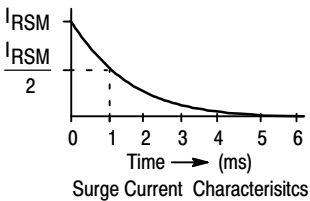
2.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of 25°C.

**TVS – IN AXIAL LEADS**

Peak Power Dissipation, 500 W @ 1 ms Surge (10 x 1000 μs) Case 59 (MiniMOSORB™)



**CASE 59 (MiniMOSORB™)**  
**PLASTIC**  
**Cathode = Polarity Band**



Surge Current Characteristics

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  $V_F = 3.5\text{ V Max}$ ,  $I_F = 35\text{ A Pulse}$

Working Peak Reverse Voltage $V_{RWM}$ (V) (Note 1)	Device	Breakdown Voltage			Maximum Reverse Leakage @ $V_{RWM}$ $I_R$ ( $\mu\text{A}$ )	Maximum Reverse Surge Current $I_{RSM}$ (A) (Note 3)	Maximum Reverse Voltage @ $I_{RSM}$ (Clamping Voltage) $V_{RSM}$ (V)
		$V_{BR}$ (V)		@ $I_T$ Pulse (mA)			
		Min (Note 2)	Max				
5	SA5.0A	6.4	7	10	600	54.3	9.2
6	SA6.0A	6.67	7.37	10	600	48.5	10.3
7	SA7.0A	7.78	8.6	10	150	41.7	12
10	SA10A	11.1	12.3	1	1	29.4	17
12	SA12A	13.3	14.7	1	1	25.1	19.9
13	SA13A	14.4	15.9	1	1	23.2	21.5
15	SA15A	16.7	18.5	1	1	20.6	24.4
16	SA16A	17.8	19.7	1	1	19.2	26
17	SA17A	18.9	20.9	1	1	18.1	27.6
18	SA18A	20	22.1	1	1	17.2	29.2
20	SA20A	22.2	24.5	1	1	15.4	32.4
24	SA24A	26.7	29.5	1	1	12.8	38.9
26	SA26A	28.9	31.9	1	1	11.9	42.1
28	SA28A	31.1	34.4	1	1	11	45.4
30	SA30A	33.3	36.8	1	1	10.3	48.4
33	SA33A	36.7	40.6	1	1	9.4	53.3
36	SA36A	40	44.2	1	1	8.6	58.1

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage ( $V_{RWM}$ ) which should be equal to or greater than the DC or continuous peak operating voltage level.
2.  $V_{BR}$  measured at pulse test current  $I_T$  at ambient temperature of  $25^\circ\text{C}$ .
3.  $10 \times 1000\ \mu\text{s}$  exponential decay surge waveform.

**TVS – IN AXIAL LEADS** (continued)

Peak Power Dissipation, 600 W @ 1 ms Surge (10 x 1000 μs) Case 17 – SURMETIC® 40 (continued)

**CASE 17  
PLASTIC  
Cathode = Polarity Band**

Surge Current Characteristics

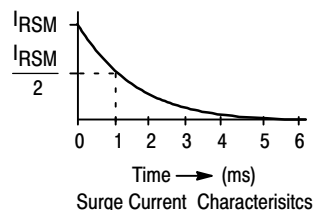
**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  $V_F = 3.5\text{ V Max}$ ,  $I_F = 50\text{ A Pulse}$  (except bidirectional devices).

Breakdown Voltage (Note 2)		Device	Working Peak Reverse Voltage $V_{RWM}$ (V) (Note 1)	Maximum Reverse Leakage @ $V_{RWM}$ $I_R$ ( $\mu\text{A}$ )	Maximum Reverse Surge Current $I_{RSM}$ (A) (Note 3)	Maximum Reverse Voltage @ $I_{RSM}$ (Clamping Voltage) $V_{RSM}$ (V)
$V_{BR}$ (V)	@ $I_T$ Pulse (mA)					
Nom						
6.8	10	P6KE6.8A	5.8	1000	57	10.5
7.5	10	P6KE7.5A	6.4	500	53	11.3
10	1	P6KE10A	8.55	10	41	14.5
12	1	P6KE12A	10.2	5	36	16.7
13	1	P6KE13A	11.1	5	33	18.2
15	1	P6KE15A	12.8	5	28	21.2
16	1	P6KE16A	13.6	5	27	22.5
18	1	P6KE18A	15.3	5	24	25.2
20	1	P6KE20A	17.1	5	22	27.7
22	1	P6KE22A	18.8	5	20	30.6
24	1	P6KE24A	20.5	5	18	33.2
27	1	P6KE27A	23.1	5	16	37.5
30	1	P6KE30A	25.6	5	14.4	41.4
33	1	P6KE33A	28.2	5	13.2	45.7
36	1	P6KE36A	30.8	5	12	49.9
39	1	P6KE39A	33.3	5	11.2	53.9
43	1	P6KE43A	36.8	5	10.1	59.3
47	1	P6KE47A	40.2	5	9.3	64.8
51	1	P6KE51A	43.6	5	8.6	70.1
56	1	P6KE56A	47.8	5	7.8	77
62	1	P6KE62A	53	5	7.1	85
68	1	P6KE68A	58.1	5	6.5	92
75	1	P6KE75A	64.1	5	5.8	103
82	1	P6KE82A	70.1	5	5.3	113
100	1	P6KE100A	85.5	5	4.4	137
150	1	P6KE150A	128	5	2.9	207
160	1	P6KE160A	136	5	2.7	219
180	1	P6KE180A	154	5	2.4	246
200	1	P6KE200A	171	5	2.2	274

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage ( $V_{RWM}$ ) which should be equal to or greater than the DC or continuous peak operating voltage level.
2.  $V_{BR}$  measured at pulse test current  $I_T$  at ambient temperature of  $25^\circ\text{C}$ .
3.  $10 \times 1000\ \mu\text{s}$  exponential decay surge waveform.

**TVS – IN AXIAL LEADS** (continued)

Peak Power Dissipation, 1500 W @ 1 ms Surge (10 x 1000 μs) Case 41A – MOSORB



**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  $V_F = 3.5\text{ V Max}$ ,  $I_F = 100\text{ A Pulse}$


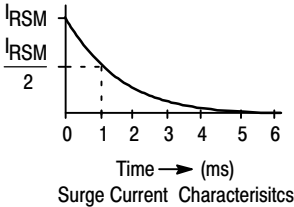
Breakdown Voltage (Note 2)		JEDEC Device	Device	Working Peak Reverse Voltage $V_{RWM}$ (V) (Note 1)	Maximum Reverse Leakage @ $V_{RWM}$ $I_R$ ( $\mu\text{A}$ )	Maximum Reverse Surge Current $I_{RSM}$ (A) (Note 3)	Maximum Reverse Voltage @ $I_{RSM}$ (Clamping Voltage) $V_{RSM}$ (V)
$V_{BR}$ V	@ $I_T$ Pulse (mA)						
Nom							
6.8	10	1N6267A	1.5KE6.8A	5.8	1000	143	10.5
7.5	10		1.5KE7.5A	6.4	500	132	11.3
8.2	10		1.5KE8.2A	7.02	200	124	12.1
10	1	1N6271A	1.5KE10A	8.55	10	103	14.5
11	1		1.5KE11A	9.4	5	96	15.6
12	1		1.5KE12A	10.2	5	90	16.7
13	1	1N6274A	1.5KE13A	11.1	5	82	18.2
15	1	1N6275A	1.5KE15A	12.8	5	71	21.2
16	1	1N6276A	1.5KE16A	13.6	5	67	22.5
18	1	1N6277A	1.5KE18A	15.3	5	59.5	25.2
20	1	1N6278A	1.5KE20A	17.1	5	54	27.7
22	1	1N6279A		18.8	5	49	30.6
24	1	1N6280A	1.5KE24A	20.5	5	45	33.2
27	1	1N6281A	1.5KE27A	23.1	5	40	37.5
30	1	1N6282A	1.5KE30A	25.6	5	36	41.4
33	1	1N6283A	1.5KE33A	28.2	5	33	45.7
36	1	1N6284A	1.5KE36A	30.8	5	30	49.9
39	1	1N6285A	1.5KE39A	33.3	5	28	53.9
43	1	1N6286A	1.5KE43A	36.8	5	25.3	59.3
47	1	1N6287A	1.5KE47A	40.2	5	23.2	64.8
51	1	1N6288A	1.5KE51A	43.6	5	21.4	70.1
56	1	1N6289A	1.5KE56A	47.8	5	19.5	77
62	1	1N6290A	1.5KE62A	53	5	17.7	85
68	1	1N6291A	1.5KE68A	58.1	5	16.3	92
75	1	1N6292A	1.5KE75A	64.1	5	14.6	103
82	1		1.5KE82A	70.1	5	13.3	113
91	1	1N6294A	1.5KE91A	77.8	5	12	125
100	1	1N6295A		85.5	5	11	137

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage ( $V_{RWM}$ ) which should be equal to or greater than the DC or continuous peak operating voltage level.
2.  $V_{BR}$  measured at pulse test current  $I_T$  at ambient temperature of  $25^\circ\text{C}$ .
3.  $10 \times 1000\ \mu\text{s}$  exponential decay surge waveform.

**TVS – IN SURFACE MOUNT**

**1PMT Series Unidirectional Overvoltage Transient Suppressors, 200 W Peak Power @ 1 ms Surge**  
**(10 x 1000 μs)**

**ELECTRICAL CHARACTERISTICS** ( $T_L = 30^\circ\text{C}$  unless otherwise noted) ( $V_F = 1.25\text{ V @ }200\text{ mA}$ )

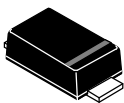
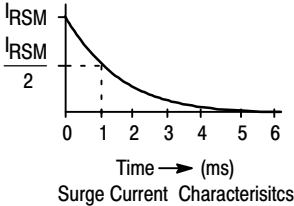
Device	Marking	$V_{RWM}$ (V)	$V_{BR}$ @ $I_T$ (V) (Note 2)			$I_T$	$I_R$ @ $V_{RWM}$	$V_C$ @ $I_{PP}$	$I_{PP}$ (A)
		(Note 1)	Min	Nom	Max	(mA)	(μA)	(V)	(Note 3)
 <p><b>POWERMITE®</b>  <b>CASE 457</b>  <b>PLASTIC</b></p>									
		1PMT5.0A	MKE	5.0	6.4	6.7	7.0	10	800
1PMT7.0A	MKM	7.0	7.78	8.2	8.6	10	500	12	14.6
1PMT12A	MLE	12	13.3	14	14.7	1.0	5.0	19.9	8.8
1PMT16A	MLP	16	17.8	18.75	19.7	1.0	5.0	26	7.0
1PMT22A	MLX	22	24.4	25.6	26.9	1.0	5.0	35.5	4.9
1PMT26A	MME	26	28.9	30.4	31.9	1.0	5.0	42.1	4.2
1PMT33A	MMM	33	36.7	38.7	40.6	1.0	5.0	53.3	3.3

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage ( $V_{RWM}$ ) which should be equal to or greater than the DC or continuous peak operating voltage level.
2.  $V_{BR}$  measured at pulse test current  $I_T$  at ambient temperature of  $25^\circ\text{C}$ .
3. 10 x 1000 μs exponential decay surge waveform.

TVS – IN SURFACE MOUNT (continued)

SMF Series Unidirectional Overvoltage Transient Suppressors, 200 W Peak Power @ 1 ms Surge  
(10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T<sub>L</sub> = 30°C unless otherwise noted) (V<sub>F</sub> = 1.25 V @ 200 mA)

Device	Marking	V <sub>RWM</sub> (V)	V <sub>BR</sub> @ I <sub>T</sub> (V) (Note 2)			I <sub>T</sub>	I <sub>R</sub> @ V <sub>RWM</sub>	V <sub>C</sub> @ I <sub>PP</sub>	I <sub>PP</sub> (A)
		(Note 1)	Min	Nom	Max	(mA)	(μA)	(V)	(Note 3)
		SOD-123FL CASE 498 PLASTIC							
SMF5.0A	KE	5.0	6.4	6.7	7.0	10	400	9.2	16.3
SMF6.0A	KG	6.0	6.67	7.02	7.37	10	400	10.3	14.6
SMF7.0A	KM	7.0	7.78	8.2	8.6	10	100	12	12.5
SMF7.5A	KP	7.5	8.33	8.77	9.21	1.0	50	12.9	11.6
SMF8.0A	KR	8.0	8.89	9.36	9.83	1.0	25	13.6	11
SMF9.0A	KV	9.0	10	10.55	11.1	1.0	5.0	15.4	9.7
SMF10A	KX	10	11.1	11.7	12.3	1.0	2.5	17	8.8
SMF11A	KZ	11	12.2	12.85	13.5	1.0	2.5	18.2	8.2
SMF12A	LE	12	13.3	14	14.7	1.0	2.5	19.9	7.5
SMF13A	LG	13	14.4	15.15	15.9	1.0	1.0	21.5	7.0
SMF14A	LK	14	15.6	16.4	17.2	1.0	1.0	23.2	6.5
SMF15A	LM	15	16.7	17.6	18.5	1.0	1.0	24.4	6.1
SMF18A	LT	18	20	21	22.1	1.0	1.0	29.2	5.1
SMF20A	LV	20	22.2	23.35	24.5	1.0	1.0	32.4	4.6
SMF22A	LX	22	24.4	25.6	26.9	1.0	1.0	35.5	4.2
SMF24A	LZ	24	26.7	28.1	29.5	1.0	1.0	38.9	3.9
SMF26A	ME	26	28.9	30.4	31.9	1.0	1.0	42.1	3.6
SMF28A	MG	28	31.1	32.8	34.4	1.0	1.0	45.4	3.3
SMF30A	MK	30	33.3	35.1	36.8	1.0	1.0	48.4	3.1
SMF33A	MM	33	36.7	38.7	40.6	1.0	1.0	53.3	2.8
SMF36A	MP	36	40	42.1	44.2	1.0	1.0	58.1	2.6


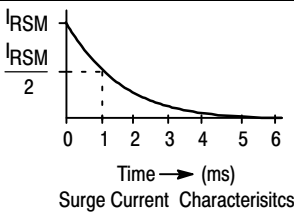
1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V<sub>RWM</sub>) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform. TVS – in Surface Mount (continued)



**TVS – IN SURFACE MOUNT** (continued)

**1SMA Series Unidirectional Overvoltage Transient Suppressors; 400 W Peak Power @ 1 ms Surge**  
(10 x 1000 μs)

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) ( $V_F = 3.5$  Volts @  $I_F = 40$  A for all types) (Note 4)


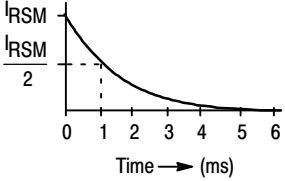
Device	Working Peak Reverse Voltage $V_{RWM}$ (V) (Note 1)	Breakdown Voltage		Maximum Reverse Voltage @ $I_{RSM}$ (Clamping Voltage) $V_C$ (V)	Maximum Reverse Surge Current $I_{PP}$ (A) (Note 3)	Maximum Reverse Leakage @ $V_{RWM}$ $I_R$ (μA)	Device Marking
		$V_{BR}$ (V) (Min) (Note 2)	$I_T$ mA				
 <p><b>SMA CASE 403B PLASTIC</b></p>  <p>Surge Current Characteristics</p>							
1SMA5.0A	5.0	6.4	10	9.2	43.5	400	QE
1SMA6.0A	6.0	6.67	10	10.3	38.8	400	QG
1SMA6.5A	6.5	7.22	10	11.2	35.7	250	QK
1SMA8.0A	8.0	8.89	1	13.6	29.4	25	QR
1SMA8.5A	8.5	9.44	1	14.4	27.8	5.0	QT
1SMA9.0A	9.0	10	1	15.4	26.0	2.5	QV
1SMA10A	10	11.1	1	17.0	23.5	2.5	QX
1SMA11A	11	12.2	1	18.2	22.0	2.5	QZ
1SMA12A	12	13.3	1	19.9	20.1	2.5	RE
1SMA13A	13	14.4	1	21.5	18.6	2.5	RG
1SMA15A	15	16.7	1	24.4	16.4	2.5	RM
1SMA16A	16	17.8	1	26.0	15.4	2.5	RP
1SMA17A	17	18.9	1	27.6	14.5	2.5	RR
1SMA18A	18	20	1	29.2	13.7	2.5	RT
1SMA20A	20	22.2	1	32.4	12.3	2.5	RV
1SMA22A	22	24.4	1	35.5	11.3	2.5	RX
1SMA24A	24	26.7	1	38.9	10.3	2.5	RZ
1SMA26A	26	28.9	1	42.1	9.5	2.5	SE
1SMA28A	28	31.1	1	45.4	8.8	2.5	SG
1SMA30A	30	33.3	1	48.4	8.3	2.5	SK
1SMA33A	33	36.7	1	53.3	7.5	2.5	SM
1SMA36A	36	40	1	58.1	6.9	2.5	SP
1SMA40A	40	44.4	1	64.5	6.2	2.5	SR
1SMA43A	43	47.8	1	69.4	5.8	2.5	ST
1SMA45A	45	50	1	72.2	5.5	2.5	SV
1SMA48A	48	53.3	1	77.4	5.2	2.5	SX
1SMA54A	54	60	1	87.1	4.6	2.5	TE
1SMA58A	58	64.4	1	93.6	4.8	2.5	TG
1SMA70A	70	77.8	1	113.0	3.5	2.5	TP

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage ( $V_{RWM}$ ) which should be equal to or greater than the DC or continuous peak operating voltage level.
2.  $V_{BR}$  measured at pulse test current  $I_T$  at ambient temperature of  $25^\circ\text{C}$ .
3. 10 x 1000 μs exponential decay surge waveform.
4. 1/2 sine wave (or equivalent square pulse, PW = 8.3 ms, duty cycle = 4 pulses per minute).

**TVS – IN SURFACE MOUNT** (continued)

**NSA5.0AT3G 400 W Peak Power Zener TVS**


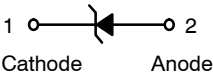
**ELECTRICAL CHARACTERISTICS**

Device	Device Marking	V <sub>RWM</sub> (Note 1) V	I <sub>R</sub> @ V <sub>RWM</sub> μA	Breakdown Voltage			V <sub>C</sub> @ I <sub>PP</sub> (Note 3)		C TYP (Note 4) pF	V <sub>F</sub> @ I <sub>F</sub> (Note 5)	
				V <sub>BR</sub> (V) (Note 2)			@ I <sub>T</sub>	V <sub>C</sub>		I <sub>PP</sub>	Max
				Min	Nom	Max	mA	V		A	V
 SMA CASE 403D PLASTIC		 Surge Current Characteristics									
NSA5.0AT3G	QA	5.0	400	6.4	6.7	7.0	10	9.2	43.5	2450	3.5

1. A transient suppressor is normally selected according to the working peak reverse voltage (V<sub>RWM</sub>), which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.
3. Surge current waveform per Figure 2 and derate per Figure 3.
4. Bias voltage = 0 V, F = 1.0 MHz, T<sub>J</sub> = 25°C.
5. 1/2 sine wave or equivalent, PW = 8.3 ms, non-repetitive, I<sub>F</sub> = 30 A

**NS6Axxx Series 600 W Peak Power Zener TVS, Unidirectional**


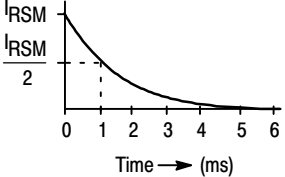
**ELECTRICAL CHARACTERISTICS**

Device	Device Marking	V <sub>RWM</sub> V	I <sub>R</sub> @ V <sub>RWM</sub> μA	Breakdown Voltage			V <sub>C</sub> @ I <sub>PP</sub>		C TYP (pF)	
				V <sub>BR</sub> (V)			@ I <sub>T</sub>	V <sub>C</sub>		I <sub>PP</sub>
				Min	Nom	Max	mA	V		A
 SMA CASE 403D PLASTIC		 Cathode      Anode								
NS6A5.0AT3G	6QE	5	800	6.4	6.7	7.0	10	9.2	65.2	2700
NS6A13AT3G	6LG	13	5	14.4	15.15	15.9	1.0	21.5	27.9	1160

**TVS – IN SURFACE MOUNT** (continued)

**1SMA Series Bidirectional Zener Overvoltage Transient Suppressors; 400 W Peak Power @ 1 ms Surge (10 x 1000 μs)**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)


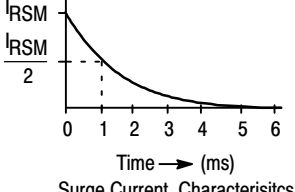
Device	Working Peak Reverse Voltage $V_{RWM}$ (V) (Note 1)	Breakdown Voltage		Maximum Reverse Voltage @ $I_{RSM}$ (Clamping Voltage) $V_C$ (V)	Maximum Reverse Surge Current $I_{PP}$ (A) (Note 3)	Maximum Reverse Leakage @ $V_{RWM}$ $I_R$ (μA)	Device Marking
		$V_{BR}$ (V) (Min) (Note 2)	$I_T$ mA				
 <p><b>SMA CASE 403B PLASTIC</b></p>  <p>Surge Current Characteristics</p>							
1SMA10CA	10	11.1	1	17.0	23.5	2.5	QXC
1SMA12CA	12	13.3	1	19.9	20.1'	2.5	REC
1SMA13CA	13	14.4	1	21.5	18.6	2.5	RGC
1SMA15CA	15	16.7	1	24.4	16.4	2.5	RMC
1SMA16CA	16	17.8	1	26.0	15.4	2.5	RPC
1SMA18CA	18	20	1	29.2	13.7	2.5	RTC
1SMA20CA	20	22.2	1	32.4	12.3	2.5	RVC
1SMA24CA	24	26.7	1	38.9	10.3	2.5	RZC
1SMA26CA	26	28.9	1	42.1	9.5	2.5	SEC
1SMA28CA	28	31.1	1	45.4	8.8	2.5	SGC
1SMA30CA	30	33.3	1	48.4	8.3	2.5	SKC
1SMA33CA	33	36.7	1	53.3	7.5	2.5	SMC
1SMA36CA	36	40	1	58.1	6.9	2.5	SPC
1SMA40CA	40	44.4	1	64.5	6.2	2.5	SRC
1SMA48CA	48	53.3	1	77.4	5.2	2.5	SXC
1SMA58CA	58	64.4	1	93.6	4.3	2.5	TGC
1SMA60CA	60	66.7	1	96.8	4.1	2.5	TKC
1SMA70CA	70	77.8	1	113.0	3.5	2.5	TPC
1SMA78CA	78	86.7	1	126.0	3.2	2.5	TSC

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage ( $V_{RWM}$ ) which should be equal to or greater than the DC or continuous peak operating voltage level.
2.  $V_{BR}$  measured at pulse test current  $I_T$  at ambient temperature of  $25^\circ\text{C}$ .
3.  $10 \times 1000 \mu\text{s}$  exponential decay surge waveform.

TVS – IN SURFACE MOUNT (continued)

1SMB Series Unidirectional Overvoltage Transient Suppressors; 600 W Peak Power @ 1 ms Surge  
(10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted) (V<sub>F</sub> = 3.5 V Max @ I<sub>F</sub> = 30 A) (Note 4)


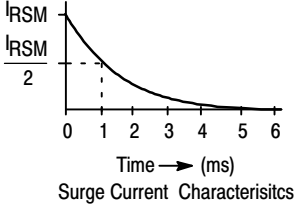
Device	Working Peak Reverse Voltage V <sub>RWM</sub> (Vo) (Note 1)	Breakdown Voltage		Maximum Clamping Voltage V <sub>C</sub> @ I <sub>pp</sub> (V)	Peak Pulse Current I <sub>pp</sub> (A) (Note 3)	Maximum Reverse Leakage @ V <sub>R</sub> I <sub>R</sub> (μA)	Device Marking
		V <sub>BR</sub> @ I <sub>T</sub> (V) (Min) (Note 2)	mA				
 <p><b>SMB CASE 403A PLASTIC</b></p>  <p>Surge Current Characteristics</p>							
1SMB5.0A	5.0	6.40	10	9.2	65.2	800	KE
1SMB6.0A	6.0	6.67	10	10.3	58.3	800	KG
1SMB6.5A	6.5	7.22	10	11.2	53.6	500	KK
1SMB7.0A	7.0	7.78	10	12.0	50.0	200	KM
1SMB7.5A	7.5	8.33	1.0	12.9	46.5	100	KP
1SMB8.0A	8.0	8.89	1.0	13.6	44.1	50	KR
1SMB8.5A	8.5	9.44	1.0	14.4	41.7	10	KT
1SMB9.0A	9.0	10.0	1.0	15.4	39.0	5.0	KV
1SMB10A	10	11.1	1.0	17.0	35.3	5.0	KX
1SMB11A	11	12.2	1.0	18.2	33.0	5.0	KZ
1SMB12A	12	13.3	1.0	19.9	30.2	5.0	LE
1SMB13A	13	14.4	1.0	21.5	27.9	5.0	LG
1SMB14A	14	15.6	1.0	23.2	25.8	5.0	LK
1SMB15A	15	16.7	1.0	24.4	24.0	5.0	LM
1SMB16A	16	17.8	1.0	26.0	23.1	5.0	LP
1SMB17A	17	18.9	1.0	27.6	21.7	5.0	LR
1SMB18A	18	20.0	1.0	29.2	20.5	5.0	LT
1SMB20A	20	22.2	1.0	32.4	18.5	5.0	LV
1SMB22A	22	24.4	1.0	<b>35.5</b>	16.9	5.0	LX
1SMB24A	24	26.7	1.0	38.9	15.4	5.0	LZ
1SMB26A	26	28.9	1.0	42.1	14.2	5.0	ME
1SMB28A	28	31.1	1.0	45.4	13.2	5.0	MG
1SMB30A	30	33.3	1.0	48.4	12.4	5.0	MK
1SMB33A	33	36.7	1.0	53.3	11.3	5.0	MM
1SMB36A	36	40.0	1.0	58.1	10.3	5.0	MP
1SMB40A	40	44.4	1.0	64.5	9.3	5.0	MR
1SMB43A	43	47.8	1.0	69.4	8.6	5.0	MT
1SMB45A	45	50.0	1.0	72.7	8.3	5.0	MV
1SMB48A	48	53.3	1.0	77.4	7.7	5.0	MX
1SMB51A	51	56.7	1.0	82.4	7.3	5.0	MZ
1SMB54A	54	60.0	1.0	87.1	6.9	5.0	NE
1SMB58A	58	64.4	1.0	93.6	6.4	5.0	NG
1SMB60A	60	66.7	1.0	96.8	6.2	5.0	NK
1SMB64A	64	71.1	1.0	103	5.8	5.0	NM
1SMB70A	70	77.8	1.0	113	5.3	5.0	NP
1SMB75A	75	83.3	1.0	121	4.9	5.0	NR
1SMB85A	85	94.4	1.0	137	4.4	5.0	NV
1SMB90A	90	100	1.0	146	4.1	5.0	NX
1SMB100A	100	111	1.0	162	3.7	5.0	NZ

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V<sub>RWM</sub>) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.
4. 1/2 sine wave (or equivalent square pulse, PW = 8.3 ms, duty cycle = 4 pulses per minute).

**TVS – IN SURFACE MOUNT** (continued)

**1SMB Series Unidirectional Overvoltage Transient Suppressors; 600 W Peak Power @ 1 ms Surge**  
**(10 x 1000 μs)** (continued)

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) ( $V_F = 3.5\text{ V Max @ } I_F = 30\text{ A}$ ) (Note 4)


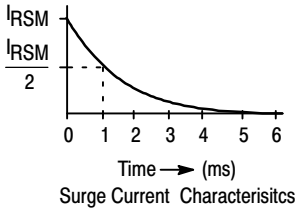
Device	Working Peak Reverse Voltage $V_{RWM}$ (V) (Note 1)	Breakdown Voltage		Maximum Clamping Voltage $V_C @ I_{pp}$ (V)	Peak Pulse Current $I_{pp}$ (A) (Note 3)	Maximum Reverse Leakage @ $V_R$ $I_R$ (μA)	Device Marking
		$V_{BR} @ I_T$ (V) (Min) (Note 2)	mA				
 <p><b>SMB CASE 403A PLASTIC</b></p>  <p>Surge Current Characteristics</p>							
1SMB110A	110	122	1.0	177	3.4	5.0	PE
1SMB120A	120	133	1.0	193	3.1	5.0	PG
1SMB130A	130	144	1.0	209	2.9	5.0	PK
1SMB150A	150	167	1.0	243	2.5	5.0	PM
1SMB160A	160	178	1.0	259	2.3	5.0	PP
1SMB170A	170	189	1.0	275	2.2	5.0	PR

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage ( $V_{RWM}$ ) which should be equal to or greater than the DC or continuous peak operating voltage level.
2.  $V_{BR}$  measured at pulse test current  $I_T$  at ambient temperature of  $25^\circ\text{C}$ .
3.  $10 \times 1000\ \mu\text{s}$  exponential decay surge waveform.
4. 1/2 sine wave (or equivalent square pulse,  $PW = 8.3\text{ ms}$ , duty cycle = 4 pulses per minute).

TVS – IN SURFACE MOUNT (continued)

1SMB Series Bidirectional Overvoltage Transient Suppressors; 600 W Peak Power @ 1 ms Surge  
(10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted).


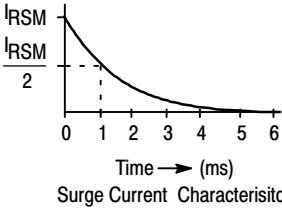
Device	Working Peak Reverse Voltage V <sub>RWM</sub> (V) (Note 1)	Breakdown Voltage		Maximum Clamping Voltage V <sub>C</sub> @ I <sub>pp</sub> (V)	Peak Pulse Current I <sub>pp</sub> (A) (Note 3)	Maximum Reverse Leakage @ V <sub>R</sub> I <sub>R</sub> (μA)	Device Marking
		V <sub>BR</sub> @ I <sub>T</sub> (V) (Min) (Note 2)	(mA)				
 <p><b>SMB CASE 403A PLASTIC</b></p>  <p>Surge Current Characteristics</p>							
1SMB10CA	10	11.1	1.0	17.0	35.3	5.0	KXC
1SMB11CA	11	12.2	1.0	18.2	33.0	5.0	KZC
1SMB12CA	12	13.3	1.0	19.9	30.2	5.0	LEC
1SMB13CA	13	14.4	1.0	21.5	27.9	5.0	LGC
1SMB14CA	14	15.6	1.0	23.2	25.8	5.0	LKC
1SMB15CA	15	16.7	1.0	24.4	24.0	5.0	LMC
1SMB16CA	16	17.8	1.0	26.0	23.1	5.0	LPC
1SMB17CA	17	18.9	1.0	27.6	21.7	5.0	LRC
1SMB18CA	18	20.0	1.0	29.2	20.5	5.0	LTC
1SMB20CA	20	22.2	1.0	32.4	18.5	5.0	LVC
1SMB22CA	22	24.4	1.0	35.5	16.9	5.0	LXC
1SMB24CA	24	26.7	1.0	38.9	15.4	5.0	LZC
1SMB26CA	26	28.9	1.0	42.1	14.2	5.0	MEC
1SMB28CA	28	31.1	1.0	45.4	13.2	5.0	MGC
1SMB30CA	30	33.3	1.0	48.4	12.4	5.0	MKC
1SMB33CA	33	36.7	1.0	53.3	11.3	5.0	MMC
1SMB36CA	36	40.0	1.0	58.1	10.3	5.0	MPC
1SMB40CA	40	44.4	1.0	64.5	9.3	5.0	MRC
1SMB43CA	43	47.8	1.0	69.4	8.6	5.0	MTC
1SMB45CA	45	50.0	1.0	72.7	8.3	5.0	MVC
1SMB48CA	48	53.3	1.0	77.4	7.7	5.0	MXC
1SMB51CA	51	56.7	1.0	82.4	7.3	5.0	MZC
1SMB54CA	54	60.0	1.0	87.1	6.9	5.0	NEC
1SMB58CA	58	64.4	1.0	93.6	6.4	5.0	NGC
1SMB60CA	60	66.7	1.0	96.8	6.2	5.0	NKC
1SMB64CA	64	71.1	1.0	103	5.8	5.0	NMC
1SMB75CA	75	83.3	1.0	121	4.9	5.0	NRC

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V<sub>RWM</sub>) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.

TVS – IN SURFACE MOUNT (continued)

P6SMB Series Unidirectional Overvoltage Transient Suppressors; 600 W Peak Power @ 1 ms Surge  
(10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted) (V<sub>F</sub> = 3.5 V Max, I<sub>F</sub> = 50 A for all types) (Note 4)


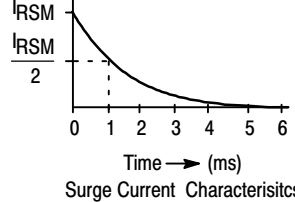
Device	Breakdown Voltage				Working Peak Reverse Voltage V <sub>RWM</sub> (V) (Note 1)	Maximum Reverse Leakage @ V <sub>RWM</sub> I <sub>R</sub> (μA)	Maximum Reverse Surge Current I <sub>PP</sub> (A) (Note 3)	Maximum Reverse Voltage @ I <sub>PP</sub> (Clamping Voltage) V <sub>C</sub> (V)	Temperature Coefficient of V <sub>BR</sub> %/°C	Device Marking
	V <sub>BR</sub> @ I <sub>T</sub> (V) (Note 2)									
	Min	Nom	Max	(mA)						
 <b>SMB CASE 403A PLASTIC</b>										
 <p>Surge Current Characteristics</p>										
P6SMB6.8A	6.45	6.8	7.14	10	5.8	1000	57	10.5	0.057	6V8A
P6SMB7.5A	7.13	7.5	7.88	10	6.4	500	53	11.3	0.061	7V5A
P6SMB8.2A	7.79	8.2	8.61	10	7.02	200	50	12.1	0.065	8V2A
P6SMB9.1A	8.65	9.1	9.55	1	7.78	50	45	13.4	0.068	9V1A
P6SMB10A	9.5	10	10.5	1	8.55	10	41	14.5	0.073	10A
P6SMB12A	11.4	12	12.6	1	10.2	5	36	16.7	0.078	12A
P6SMB13A	12.4	13	13.7	1	11.1	5	33	18.2	0.081	13A
P6SMB15A	14.3	15	15.8	1	12.8	5	28	21.2	0.084	15A
P6SMB16A	15.2	16	16.8	1	13.6	5	27	22.5	0.086	16A
P6SMB18A	17.1	18	18.9	1	15.3	5	24	25.2	0.088	18A
P6SMB20A	19	20	21	1	17.1	5	22	27.7	0.09	20A
P6SMB22A	20.9	22	23.1	1	18.8	5	20	30.6	0.092	22A
P6SMB24A	22.8	24	25.2	1	20.5	5	18	33.2	0.094	24A
P6SMB27A	25.7	27	28.4	1	23.1	5	16	37.5	0.096	27A
P6SMB30A	28.5	30	31.5	1	25.6	5	14.4	41.4	0.097	30A
P6SMB33A	31.4	33	34.7	1	28.2	5	13.2	45.7	0.098	33A
P6SMB36A	34.2	36	37.8	1	30.8	5	12	49.9	0.099	36A
P6SMB39A	37.1	39	41	1	33.3	5	11.2	53.9	0.1	39A
P6SMB43A	40.9	43	45.2	1	36.8	5	10.1	59.3	0.101	43A
P6SMB47A	44.7	47	49.4	1	40.2	5	9.3	64.8	0.101	47A
P6SMB51A	48.5	51	53.6	1	43.6	5	8.6	70.1	0.102	51A
P6SMB56A	53.2	56	58.8	1	47.8	5	7.8	77	0.103	56A
P6SMB62A	58.9	62	65.1	1	53	5	7.1	85	0.104	62A
P6SMB68A	64.6	68	71.4	1	58.1	5	6.5	92	0.104	68A
P6SMB75A	71.3	75	78.8	1	64.1	5	5.8	103	0.105	75A
P6SMB82A	77.9	82	86.1	1	70.1	5	5.3	113	0.105	82A
P6SMB91A	86.5	91	95.5	1	77.8	5	4.8	125	0.106	91A
P6SMB100A	95	100	105	1	85.5	5	4.4	137	0.106	100A
P6SMB120A	114	120	126	1	102	5	3.6	165	0.107	120A
P6SMB130A	124	130	137	1	111	5	3.3	179	0.107	130A
P6SMB150A	143	150	158	1	128	5	2.9	207	0.108	150A
P6SMB160A	152	160	168	1	136	5	2.7	219	0.108	160A
P6SMB180A	171	180	189	1	154	5	2.4	246	0.108	180A
P6SMB200A	190	200	210	1	171	5	2.2	274	0.108	200A

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V<sub>RWM</sub>) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.
4. 1/2 sine wave (or equivalent square pulse, PW = 8.3 ms, duty cycle = 4 pulses per minute).

TVS – IN SURFACE MOUNT (continued)

P6SMB Series Bidirectional Overvoltage Transient Suppressors; 600 W Peak Power @ 1 ms Surge  
(10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Device	Breakdown Voltage				Working Peak Reverse Voltage V <sub>RWM</sub> Volts (Note 1)	Maximum Reverse Leakage I <sub>R</sub> @ V <sub>RWM</sub> μA	Maximum Reverse Surge Current I <sub>PP</sub> Amps (Note 3)	Maximum Reverse Voltage @ I <sub>PP</sub> (Clamping Voltage) V <sub>C</sub> Volts	Temperature Coefficient of V <sub>BR</sub> %/°C	Device Marking
	V <sub>BR</sub> @ I <sub>T</sub> Volts (Note 2)									
	Min	Nom	Max	mA						
 <p><b>SMB CASE 403A PLASTIC</b></p>  <p>Surge Current Characteristics</p>										
P6SMB11CA P6SMB12CA	10.5 11.4	11 12	11.6 12.6	1 1	9.4 10.2	5 5	38 36	15.6 16.7	0.075 0.078	11C 12C
P6SMB15CA P6SMB16CA P6SMB18CA P6SMB20CA	14.3 15.2 17.1 19	15 16 18 20	15.8 16.8 18.9 21	1 1 1 1	12.8 13.6 15.3 17.1	5 5 5 5	28 27 24 22	21.2 22.5 25.2 27.7	0.084 0.086 0.088 0.09	15C 16C 18C 20C
P6SMB22CA P6SMB24CA P6SMB27CA P6SMB30CA	20.9 22.8 25.7 28.5	22 24 27 30	23.1 25.2 28.4 31.5	1 1 1 1	18.8 20.5 23.1 25.6	5 5 5 5	20 18 16 14.4	30.6 33.2 37.5 41.4	0.092 0.094 0.096 0.097	22C 24C 27C 30C
P6SMB33CA P6SMB36CA P6SMB39CA P6SMB43CA	31.4 34.2 37.1 40.9	33 36 39 43	34.7 37.8 41 45.2	1 1 1 1	28.2 30.8 33.3 36.8	5 5 5 5	13.2 12 11.2 10.1	45.7 49.9 53.9 59.3	0.098 0.099 0.1 0.101	33C 36C 39C 43C
P6SMB47CA P6SMB51CA P6SMB56CA P6SMB62CA	44.7 48.5 53.2 58.9	47 51 56 62	49.4 53.6 58.8 65.1	1 1 1 1	40.2 43.6 47.8 53	5 5 5 5	9.3 8.6 7.8 7.1	64.8 70.1 77 85	0.101 0.102 0.103 0.104	47C 51C 56C 62C
P6SMB68CA P6SMB82CA	64.6 77.9	68 82	71.4 86.1	1 1	58.1 70.1	5 5	6.5 5.3	92 113	0.104 0.105	68C 82C


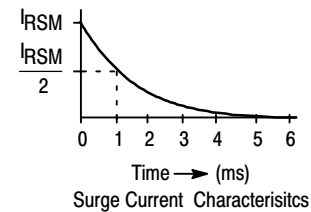
1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V<sub>RWM</sub>) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.



**TVS – IN SURFACE MOUNT** (continued)

**SMBJ12AON Series Bidirectional Overvoltage Transient Suppressors; 600 W Peak Power @ 1 ms Surge (10 x 1000 μs)**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)


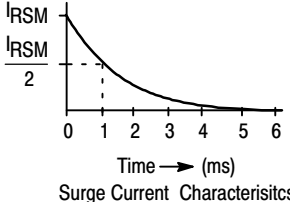
Device	Breakdown Voltage				Working Peak Reverse Voltage $V_{RWM}$ Volts (Note 1)	Maximum Reverse Leakage @ $V_{RWM}$ $I_R$ μA	Maximum Reverse Surge Current $I_{PP}$ Amps (Note 3)	Maximum Reverse Voltage @ $I_{PP}$ (Clamping Voltage) $V_C$ Volts
	$V_{BR}$ @ $I_T$ Volts (Note 2)							
	Min	Nom	Max	mA				
 <p><b>SMB CASE 403A PLASTIC</b></p>					 <p>Surge Current Characteristics</p>			
SMBJ12AON	13.2	13.75	14.3	1	12	5	17.5	15.6

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage ( $V_{RWM}$ ) which should be equal to or greater than the DC or continuous peak operating voltage level.
2.  $V_{BR}$  measured at pulse test current  $I_T$  at ambient temperature of  $25^\circ\text{C}$ .
3. 10 x 1000 μs exponential decay surge waveform.

TVS – IN SURFACE MOUNT (continued)

1SMC Series Unidirectional Overvoltage Transient Suppressors; 1500 W Peak Power @ 1 ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted) (V<sub>F</sub> = 3.5 V Max @ I<sub>F</sub> = 100 A) (Note 4)


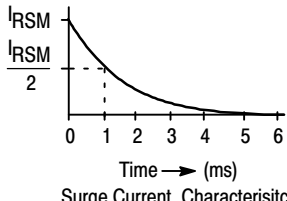
Device	Working Peak Reverse Voltage V <sub>R</sub> Volts (Note 1)	Breakdown Voltage		Maximum Clamping Voltage V <sub>C</sub> @ I <sub>pp</sub> Volts	Peak Pulse Current I <sub>pp</sub> Amps (Note 3)	Maximum Reverse Leakage @ V <sub>R</sub> I <sub>R</sub> μA	Device Marking
		V <sub>BR</sub> @ I <sub>T</sub>					
		Volts (Min) (Note 2)	mA				
 <p><b>SMC CASE 403B PLASTIC</b></p>  <p>Surge Current Characteristics</p>							
1SMC5.0A	5.0	6.40	10	9.2	163.0	1000	GDE
1SMC6.0A	6.0	6.67	10	10.3	145.6	1000	GDG
1SMC6.5A	6.5	7.22	10	11.2	133.9	500	GDK
1SMC7.0A	7.0	7.78	10	12.0	125.0	200	GDM
1SMC7.5A	7.5	8.33	1.0	12.9	116.3	100	GDP
1SMC8.0A	8.0	8.89	1.0	13.6	110.3	50	GDR
1SMC9.0A	9.0	10.0	1.0	15.4	97.4	10	GDV
1SMC10A	10	11.1	1.0	17.0	88.2	5.0	GDY
1SMC12A	12	13.3	1.0	19.9	75.3	5.0	GEE
1SMC13A	13	14.4	1.0	21.5	69.7	5.0	GEG
1SMC14A	14	15.6	1.0	23.2	64.7	5.0	GEK
1SMC15A	15	16.7	1.0	24.4	61.5	5.0	GEM
1SMC16A	16	17.8	1.0	26.0	57.7	5.0	GEP
1SMC17A	17	18.9	1.0	27.6	53.3	5.0	GER
1SMC18A	18	20.0	1.0	29.2	51.4	5.0	GET
1SMC20A	20	22.2	1.0	32.4	46.3	5.0	GEV
1SMC22A	22	24.4	1.0	35.5	42.2	5.0	GEX
1SMC24A	24	26.7	1.0	38.9	38.6	5.0	GEZ
1SMC26A	26	28.9	1.0	42.1	35.6	5.0	GFE
1SMC28A	28	31.1	1.0	45.4	33.0	5.0	GFG
1SMC30A	30	33.3	1.0	48.4	31.0	5.0	GFK
1SMC33A	33	36.7	1.0	53.3	28.1	5.0	GFM
1SMC36A	36	40.0	1.0	58.1	25.8	5.0	GFP
1SMC40A	40	44.4	1.0	64.5	23.2	5.0	GFR
1SMC43A	43	47.8	1.0	69.4	21.6	5.0	GFT
1SMC48A	48	53.3	1.0	77.4	19.4	5.0	GFX
1SMC51A	51	56.7	1.0	82.4	18.2	5.0	GFZ
1SMC54A	54	60.0	1.0	87.1	17.2	5.0	GGE
1SMC58A	58	64.4	1.0	93.6	16.0	5.0	GGG
1SMC60A	60	66.7	1.0	96.8	15.5	5.0	GGK
1SMC64A	64	71.1	1.0	103	14.6	5.0	GGM
1SMC70A	70	77.8	1.0	113	13.3	5.0	GGP
1SMC75A	75	83.3	1.0	121	12.4	5.0	GGR
1SMC78A	78	86.7	1.0	126	11.4	5.0	GGT

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V<sub>RWM</sub>) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.
4. 1/2 sine wave (or equivalent square pulse, PW = 8.3 ms, duty cycle = 4 pulses per minute).

TVS – IN SURFACE MOUNT (continued)

1.5 SMC Series Unidirectional Overvoltage Transient Suppressors; 1500 W Peak Power @ 1 ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted) (V<sub>F</sub> = 3.5 V Max, I<sub>F</sub> = 100 A for all types) (Note 4)

Device	Breakdown Voltage				Working Peak Reverse Voltage V <sub>RWM</sub> Volts (Note 1)	Maximum Reverse Leakage I <sub>R</sub> @ V <sub>RWM</sub> μA	Maximum Reverse Surge Current I <sub>PP</sub> Amps (Note 3)	Maximum Reverse Voltage @ I <sub>PP</sub> (Clamping Voltage) V <sub>C</sub> Volts	Temperature Coefficient of V <sub>BR</sub> %/°C	Device Marking
	V <sub>BR</sub> @ I <sub>T</sub> Volts (Note 2)									
	Min	Nom	Max	mA						
 <p style="text-align: center;"><b>SMC CASE 403 PLASTIC</b></p>  <p style="text-align: center;">Surge Current Characteristics</p>										
1.5SMC6.8A 1.5SMC7.5A	6.45 7.13	6.8 7.5	7.14 7.88	10 10	5.8 6.4	1000 500	143 132	10.5 11.3	0.057 0.061	6V8A 7V5A
1.5SMC10A 1.5SMC12A 1.5SMC13A	9.5 11.4 12.4	10 12 13	10.5 12.6 13.7	1 1 1	8.55 10.2 11.1	10 5 5	103 90 82	14.5 16.7 18.2	0.073 0.078 0.081	10A 12A 13A
1.5SMC15A 1.5SMC16A 1.5SMC18A 1.5SMC20A	14.3 15.2 17.1 19	15 16 18 20	15.8 16.8 18.9 21	1 1 1 1	12.8 13.6 15.3 17.1	5 5 5 5	71 67 59.5 54	21.2 22.5 25.2 27.7	0.084 0.086 0.088 0.09	15A 16A 18A 20A
1.5SMC22A 1.5SMC24A 1.5SMC27A 1.5SMC30A	20.9 22.8 25.7 28.5	22 24 27 30	23.1 25.2 28.4 31.5	1 1 1 1	18.8 20.5 23.1 25.6	5 5 5 5	49 45 40 36	30.6 33.2 37.5 41.4	0.092 0.094 0.096 0.097	22A 24A 27A 30A
1.5SMC33A 1.5SMC36A 1.5SMC39A 1.5SMC43A	31.4 34.2 37.1 40.9	33 36 39 43	34.7 37.8 41 45.2	1 1 1 1	28.2 30.8 33.3 36.8	5 5 5 5	33 30 28 25.3	45.7 49.9 53.9 59.3	0.098 0.099 0.1 0.101	33A 36A 39A 43A
1.5SMC47A 1.5SMC51A 1.5SMC56A 1.5SMC62A	44.7 48.5 53.2 58.9	47 51 56 62	49.4 53.6 58.8 65.1	1 1 1 1	40.2 43.6 47.8 53	5 5 5 5	23.2 21.4 19.5 17.7	64.8 70.1 77 85	0.101 0.102 0.103 0.104	47A 51A 56A 62A
1.5SMC68A 1.5SMC75A 1.5SMC82A 1.5SMC91A	64.6 71.3 77.9 86.5	68 75 82 91	71.4 78.8 86.1 95.5	1 1 1 1	58.1 64.1 70.1 77.8	5 5 5 5	16.3 14.6 13.3 12	92 103 113 125	0.104 0.105 0.105 0.106	68A 75A 82A 91A



1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V<sub>RWM</sub>) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.
4. 1/2 sine wave (or equivalent square pulse, PW = 8.3 ms, duty cycle = 4 pulses per minute).

### TVS/ESD PROTECTION – One Line

#### ESD11N5 – One Line Low Cap

Single Line TVS/ESD in 0201 DSN; Meets IEC61000–4–2, Level 4

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
**BIDIRECTIONAL**



Device	Breakdown Voltage			Reverse Voltage Working Peak $V_{RWM}$ (V)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	$V_C$ (V) @ $I_{PP} = 1\text{ A}$	Typical Capacitance (pF) Pin 1 to 2 @ 0 V
	$V_{BR}$ (Note 5) (V)		@ $I_T$ (mA)				
	Min						
 <b>CASE 152AA DSN2</b> 							
ESD11N5.0ST5G	5.8	1.0		5.0	1.0	12.0	0.6

5.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

#### ESD11B5 – One Line

Single Line TVS/ESD in 0201 DSN; Meets IEC61000–4–2, Level 4

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
**BIDIRECTIONAL**



Device	Breakdown Voltage			Reverse Voltage Working Peak $V_{RWM}$ (V)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	$V_C$ (V) @ $I_{PP} = 1\text{ A}$	Typical Capacitance (pF) Pin 1 to 2 @ 0 V
	$V_{BR}$ (Note 6) (V)		@ $I_T$ (mA)				
	Min						
 <b>CASE 152AA DSN2</b> 							
ESD11B5.0ST5G	5.8	1.0		5.0	1.0	10.0	12.0

6.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

#### SD05 Series

Single Line TVS/ESD in SOD–323; 350 W Peak Power (8 x 20  $\mu\text{s}$ ); Meets IEC61000–4–2, Level 4

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
**Unidirectional**

Device	Breakdown Voltage				Reverse Voltage Working Peak $V_{RWM}$ (Volts)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	Max Reverse Surge Current $I_{PP}$ (A)	Max Reverse Voltage @ $I_{PP}$ (Clamping Voltage) $V_C$ (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	$V_{BR}$ (Note 7) (V)			@ $I_T$ (mA)					
	Min	Nom	Max						
 <b>CASE 477 STYLE 1 SOD–323</b> 									
SD05	6.2	6.75	7.3	1.0	5.0	10	24	14.5	350
SD12	13.3	14.5	15.75	1.0	12	1.0	15	25	150

7.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .



TVS/ESD PROTECTION – One Line (continued)

SD12C

Single Line TVS/ESD in SOD–323; 350 W Peak Power (8 x 20 μs); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Bidirectional

Device	Breakdown Voltage				Reverse Voltage Working Peak V <sub>RWM</sub> (Volts)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Max Reverse Surge Current I <sub>PP</sub> (A)	Max Reverse Voltage @ I <sub>PP</sub> (Clamping Voltage) V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	V <sub>BR</sub> (Note 8) (V)			@ I <sub>T</sub> (mA)					
	Min	Nom	Max						
 <p>CASE 477 STYLE 1 SOD–323</p> 									
SD12C	13.3	–	–	1.0	12	1.0	15	24	64



8. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.

ESD5Z Series

Single Line TVS/ESD in SOD–523; 200 W Peak Power (8 x 20 μs); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Unidirectional

Device	Breakdown Voltage				Reverse Voltage Working Peak V <sub>RWM</sub> (Volts)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Max Reverse Surge Current I <sub>PP</sub> (A)	Max Reverse Voltage @ I <sub>PP</sub> (Clamping Voltage) V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	V <sub>BR</sub> (Note 9) (V)			@ I <sub>T</sub> (mA)					
	Min	Nom	Max						
 <p>CASE 502 SOD–523</p> 									
ESD5Z2.5	4.0	–	–	1.0	2.5	6.0	11	10.9	145
ESD5Z3.3	5.0	–	–	1.0	3.3	0.05	11.2	14.1	105
ESD5Z5.0	6.2	–	–	1.0	5.0	0.05	9.4	18.6	80
ESD5Z6.0	6.8	–	–	1.0	6.0	0.01	8.8	20.5	70
ESD5Z7.0	7.5	–	–	1.0	7.0	0.01	8.8	22.7	65
ESD5Z12	14.1	–	–	1.0	12	0.01	9.6	25	55



9. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.

TVS/ESD PROTECTION – One Line (continued)

ESD5B

Single Line TVS/ESD in SOD–523; Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)  
Bidirectional



Device	Breakdown Voltage			Reverse Voltage Working Peak V <sub>RWM</sub> (V)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Max Reverse Surge Current I <sub>PP</sub> (A)	Max Reverse Voltage @ I <sub>PP</sub> (Clamping Voltage) V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	V <sub>BR</sub> (V) @ I <sub>T</sub> (Note 10)		@ I <sub>T</sub> (mA)					
	Min	Max						
 <b>CASE 502 SOD–523</b> 								
ESD5B5.0S	5.8	–	1.0	5.0	1.0	–	–	32

10. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.

ESD9X Series

Single Line TVS/ESD in SOD–923; 100 W Peak Power (8 x 20 μs); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)  
Unidirectional



Device	Breakdown Voltage		Reverse Voltage Working Peak V <sub>RWM</sub> (V)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Max Reverse Surge Current I <sub>PP</sub> (A)	Max Reverse Voltage @ I <sub>PP</sub> (Clamping Voltage) V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts	
	V <sub>BR</sub> (V) @ I <sub>T</sub> (Note 11)							@ I <sub>T</sub> (mA)
	Min	Max						
 <b>CASE 514AA SOD–923</b> 								
ESD9X3.3S	5.0	1.0	3.3	2.5	9.8	10.4	80	
ESD9X5.0S	6.2	1.0	5.0	1.0	8.7	12.3	65	
ESD9X12S	13.5	1.0	12	1.0	5.9	23.7	30	

11. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.

ESD9B Series

Single Line TVS/ESD in SOD–923; Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)  
Bidirectional

Device	Breakdown Voltage			Reverse Voltage Working Peak V <sub>RWM</sub> (V)	Max Reverse Leakage Current I <sub>R</sub> (μA)	V <sub>C</sub> (V) @ I <sub>PP</sub> = 1 A	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	V <sub>BR</sub> (V) @ I <sub>T</sub> (Note 11)		@ I <sub>T</sub> (mA)				
	Min	Max					
 <b>CASE 514AB SOD–923</b> 							
ESD9B3.3	5.0	7.0	1.0	3.3	1.0	10.5	15
ESD9B5.0	5.8	7.8	1.0	5.0	1.0	12.5	15



12. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.

TVS/ESD PROTECTION – One Line (continued)

ESD9C Series

Single Line TVS/ESD in SOD–923; Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
Unidirectional

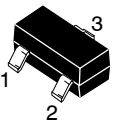
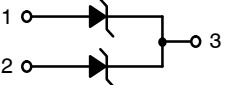
Device	Breakdown Voltage		Reverse Voltage Working Peak $V_{RWM}$ (V)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	$V_{BR}$ (V) @ $I_T$ (Note 11)	@ $I_T$ (mA)			
	Min				
 <b>CASE 514AB SOD–923</b> 					
ESD9C3.3	5.0	1.0	3.3	1.0	12.8
ESD9C5.0	11.0	1.0	5.0	0.5	6.0

13.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

NUP1105L – LIN Bus Protector

Single Line TVS/ESD in SOT–23; 350 W Peak Power (8 x 20  $\mu\text{s}$ ); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
Bidirectional

Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ $I_{PP}$ (Clamping Voltage)	Peak Power Rating (8x20 $\mu\text{sec}$ ) (Note 14)
	$V_{BR}$ (V)		@ $I_T$	$I_R$	$V_{RWM}$						
	Min	Nom	Max	(mA)	( $\mu\text{A}$ )	(V)	Typ	Max	$I_{PP}$ (A)	$V_C$ (V)	
 <b>CASE 318 STYLE 27 SOT–23</b> 											
NUP1105L	25.7	–	28.4	1.0	0.1	24	–	30	8.0	44	350

14. Surge waveform 8 x 20  $\mu\text{sec}$ .

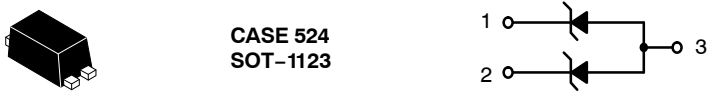
## TVS/ESD PROTECTION – Two Line

### ESD11A3.3 Series – Two Line

Dual Line TVS/ESD in SOT-1123; Meets IEC61000-4-2, Level 4

ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Unidirectional

Device	Breakdown Voltage		Reverse Voltage Working Peak $V_{RWM}$ (V)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	$V_C$ (V) @ $I_{PP} = 1\text{ A}$	Typical Capacitance (pF) Pin 1 to 2 @ 0 V
	$V_{BR}$ (Note 15) (V)					
	Min	@ $I_T$ (mA)				
						
ESD11A3.3DT5G	5.2	1.0	3.3	1.0	7.8	25.0
ESD11A5.0DT5G	6.2	1.0	5.0	0.1	9.5	20.0

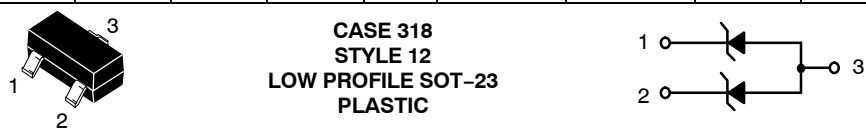
15.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

### SM05 – Common Anode Series

Two Line TVS/ESD in SOT-23; 300 W Peak Power (8 x 20  $\mu\text{s}$ ); Meets IEC61000-4-2, Level 4

ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Unidirectional

Device	Breakdown Voltage				Reverse Voltage Working Peak $V_{RWM}$ (Volts)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	Max Reverse Surge Current $I_{PP}$ (A)	Max Reverse Voltage @ $I_{PP}$ (Clamping Voltage) $V_C$ (V)	Typical Capacitance (pF) Pin 1 to 3 @ 0 Volts
	$V_{BR}$ (Note 16) (V)			@ $I_T$ (mA)					
	Min	Nom	Max						
									
SM05	6.2	6.75	7.3	1.0	5.0	10	17	9.8	225
SM12	13.3	14.5	15.75	1.0	12	1.0	12	19	95

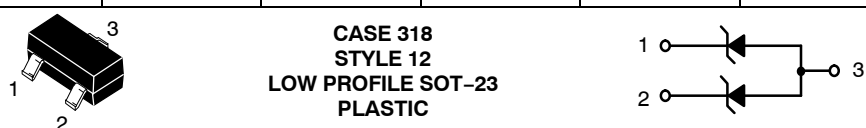
16.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

### MA3075WAL

Two Line TVS/ESD in SOT-23; Meets IEC61000-4-2, Level 4

ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Unidirectional

Device	Breakdown Voltage				@ $I_T$ (mA)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ @ 5 V)	Maximum Temperature Coefficient of $V_{BR}$ ( $\text{mV}/^\circ\text{C}$ )
	$V_{BR}$ (Note 17) (V)			Max			
	Min	Nom	Max				
							
MA3075WAL	7.2	7.5	7.9		5.0	1.0	5.3

17.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .




TVS/ESD PROTECTION – Two Line (continued)

NUP2105L – CAN Bus Protector

Two Line TVS/ESD in SOT–23; 350 W Peak Power (8 x 20 μs); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)  
Bidirectional

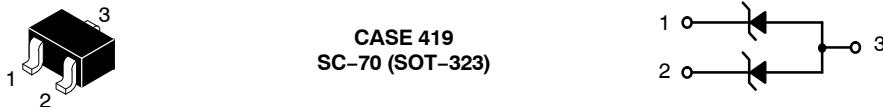
Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current I <sub>PP</sub> (A)	Max Reverse Voltage @ I <sub>PP</sub> (Clamping Voltage) V <sub>C</sub> (V)	Peak Power Rating (8x20 μsec) (Note 18) Watts
	V <sub>BR</sub> (V)		@ I <sub>T</sub>	I <sub>R</sub>	V <sub>RWM</sub>	Typ	Max				
	Min	Nom	Max	(mA)	(μA)			(V)			
 <p>CASE 318 SOT-23</p>											
NUP2105L	26.2	–	32	1.0	0.1	24	30	–	8.0	44	350

18. Surge waveform 8 x 20 μsec.

DF3A6.8FU

Two Line TVS/ESD in SC–70; 150 W Peak Power (8 x 20 μs); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)  
Unidirectional

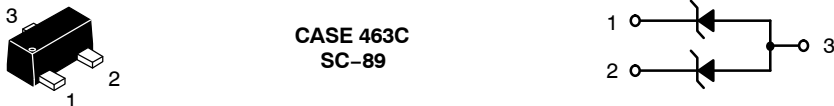
Device	Breakdown Voltage				@ I <sub>T</sub> (mA)	Max Reverse Leakage Current		Max Reverse Surge Current I <sub>PP</sub> (A)	Max Reverse Voltage @ I <sub>PP</sub> (Clamping Voltage) V <sub>C</sub> (V)
	V <sub>BR</sub> (Note 19) (V)			I <sub>R</sub> @ V <sub>R</sub> (μA)		V <sub>R</sub> (V)			
	Min	Nom	Max						
 <p>CASE 419 SC-70 (SOT-323)</p>									
DF3A6.8FU	6.4	6.8	7.2	5.0	0.5	5.0	2.0	9.6	

19. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.

NZL5V6AXV Series

Two Line ESD Protection in SC–89; Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)  
Unidirectional

Device	Breakdown Voltage				@ I <sub>T</sub> (mA)	Max Reverse Leakage Current	
	V <sub>BR</sub> (Note 20) (V)			I <sub>R</sub> @ V <sub>R</sub> (μA)		V <sub>R</sub> (V)	
	Min	Nom	Max				
 <p>CASE 463C SC-89</p>							
NZL5V6AXV3	5.32	5.6	5.88	5.0	5.0	3.0	
NZL6V8AXV3	6.46	6.8	7.14	5.0	1.0	4.5	
NZL7V5AXV3	7.12	7.5	7.88	5.0	1.0	5.0	

20. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.

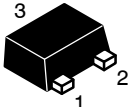
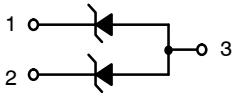
**TVS/ESD PROTECTION – Two Line** (continued)

**μESD3.3D Series**

Two Line ESD Protection in SOT-723; Meets IEC61000-4-2, Level 4

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Unidirectional**

Device	Breakdown Voltage				Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ ) @ $V_{RWM}$
	$V_{BR}$ (Note 21) (V)			@ $I_T$ (mA)	
	Min	Nom	Max		
 CASE 631AA STYLE 4 SOT-723 					
μESD3.3D	5.0	–	–	1.0	1.0
μESD5.0D	6.2	–	–	1.0	0.1
μESD6.0D	7.0	–	–	1.0	0.1

21.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

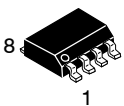
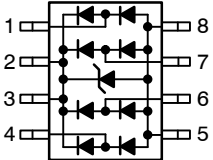
**TVS/ESD PROTECTION – Four Line**

**NUP4000DR2G – Four Line**

Four Line TVS/ESD in SO-8; Meets IEC61000-4-C, Level 4

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Bidirectional**

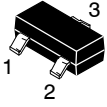
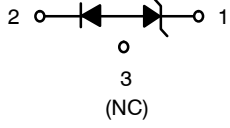
Device	Breakdown Voltage		Reverse Voltage Working Peak $V_{RWM}$ (V)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	$V_C$ (V) @ $I_{PP} = 1\text{ A}$	$V_C$ (V) @ $I_{PP} = 5\text{ A}$	Typical Capacitance (pF) Pin 1 to 2 @ 0 V
	$V_{BR}$ (Note 22) (V)	@ $I_T$ (mA)					
	Min						
 CASE 751 SO-8 							
NUP4000DR2G	16.7	1.0	15.0	1.0	24.0	30.0	75.0

22.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

## LOW CAPACITANCE TVS/ESD PROTECTION – One Line

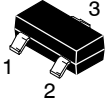
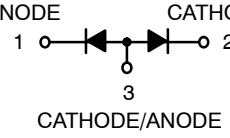
### SL05 Series

Single Line Low Cap TVS/ESD in SOT-23; 300 W Peak Power (8 x 20  $\mu$ s); Meets IEC61000-4-2, Level 4

Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ $I_{PP}$ (Clamping Voltage)	Peak Power Rating (8x20 $\mu$ sec)
	$V_{BR}$ (V)		@ $I_T$	$I_R$	$V_{RWM}$						
	Min	Nom	Max	(mA)	( $\mu$ A)	(V)	Typ	Max	$I_{PP}$ (A)	$V_C$ (V)	Watts
 <p>CASE 318 STYLE 26 SOT-23</p> 											
SL05	6.0	-	8.0	1.0	20	5.0	3.5	5.0	17	11	300
SL12	13.3	-	15.0	1.0	1.0	12	3.5	5.0	12	24	300
SL15	16.7	-	18.5	1.0	1.0	15	3.5	5.0	10	30	300
SL24	26.7	-	29	1.0	1.0	24	3.5	5.0	5.0	55	300

### NUP1301ML


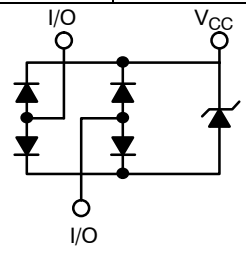
Single Line Low Capacitance TVS/ESD in SOT-23; Meets IEC61000-4-2, Level 4

Device	Breakdown Voltage		Forward Voltage		Capacitance* (pF) @ 0 V, 1.0 MHz	
	$V_{BR}$ (V)	@ $I_{br}$	$V_f$ (V)	$I_f$	Typ	Max
	Min	$\mu$ A	Max	mA		
 <p>CASE 318 SOT-23</p> 						
<b>USB 2.0</b>						
NUP1301ML3	70	100	0.855	10	-	0.9

\* $C_j$  = Between I/O pin and ground.

### NUP2114UC


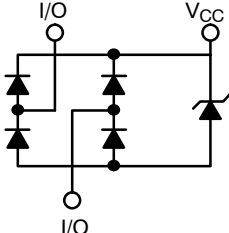
NUP2114UC: Low Capacitance TVS/ESD Protection

Device	$V_{RWM}$ (V)	Breakdown Voltage	$I_R$ (mA) @ $V_{RWM} = 5$ V	C (pF)		Clamping Voltage $V_C$ @ $I_{PP} = 1$ A (V)
	Max	Min	Max	Typ	Max	Max
 <p>CASE 318G TSSOP-6</p> 						
NUP2114UC	5.0	6.0	1.0	0.8	1.0	12

**LOW CAPACITANCE TVS/ESD PROTECTION – One Line** (continued)

**NUP2114UP**

**NUP2114UP: Low Capacitance TVS/ESD Protection**



Device	$V_{RWM}$ (V)	Breakdown Voltage	$I_R$ (mA) @ $V_{RWM} = 5$ V	C (pF)		Clamping Voltage $V_C$ @ $I_{PP} = 1$ A (V)
	Max	Min	Max	Typ	Max	Max
	CASE 463B SOT-553					
			NUP2114UP	5.0	6.0	1.0

**ESD9L Series**

**Single Line Unidirectional TVS/ESD in SOD-923; Meets IEC61000-4-2, Level 4**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Unidirectional**

Device	Breakdown Voltage		Reverse Voltage Working Peak $V_{RWM}$ (V)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	$V_{BR}$ (V) @ $I_T$ (Note 11)	@ $I_T$ (mA)			
	Min				
	CASE 514AB SOD-923				
ESD9L3.3S	4.8	1.0	3.3	1.0	0.5
ESD9L5.0S	4.4	1.0	5.0	1.0	0.5



23.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

**ESD9R Series**

**Single Line Low Leakage Unidirectional TVS/ESD in SOD-923; Meets IEC61000-4-2, Level 4**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Unidirectional**

Device	Breakdown Voltage		Reverse Voltage Working Peak $V_{RWM}$ (V)	Max Reverse Leakage Current $I_R$ (nA)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	$V_{BR}$ (V) @ $I_T$ (Note 11)	@ $I_T$ (mA)			
	Min				
	CASE 514AB SOD-923				
ESD9R3.3S	4.8	1.0	3.3	1	0.5

24.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .



**LOW CAPACITANCE TVS/ESD PROTECTION – One Line** (continued)

**ESD9M Series**

Single Line Unidirectional TVS/ESD in SOD-923; Meets IEC61000-4-2, Level 4

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

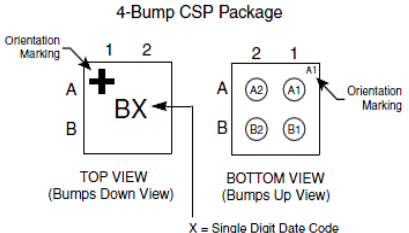
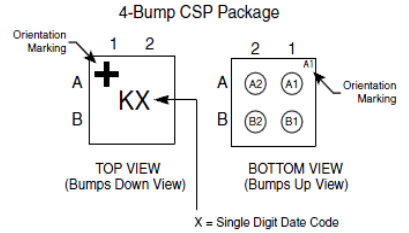
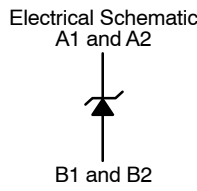
**Unidirectional**

Device	Breakdown Voltage		Reverse Voltage Working Peak $V_{RWM}$ (V)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	Max Capacitance (pF) Pin 1 to 2 @ 0 V
	$V_{BR}$ (V) @ $I_T$ (Note 11)	@ $I_T$ (mA)			
	Min				
	CASE 514AB SOD-923				
ESD9M5.0S	5.8	1.0	5.0	1.0	2.5

25.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

**CM6110, CM6116 – Single Line TVS/ESD in CSP**


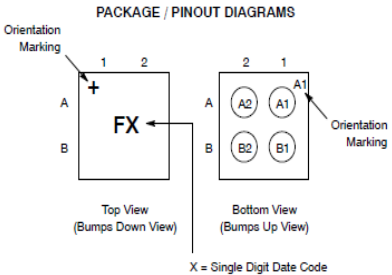
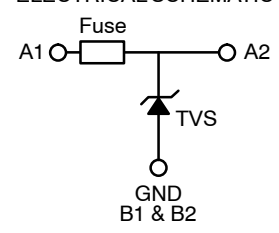
**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Device	Breakdown Voltage		Clamping Voltage (Max) $V_{CL}$ (V)	Max $I_R$ ( $\mu\text{A}$ )	C @ 0 V Typ (pF)
	$V_{BR}$ (V) @ $I_T$	$I_T$			
	Min	mA			
 <p>CM6110</p>	 <p>CM6116</p>	 <p>Electrical Schematic A1 and A2 B1 and B2</p>			
CM6110	10	15	13	0.8	310
CM6116	16	15	20	0.5	190

**LOW CAPACITANCE TVS/ESD PROTECTION – One Line (continued)**

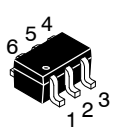
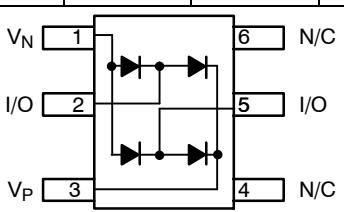
**CM6136 – Single Line TVS/ESD with Fuse in CSP**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Device	Breakdown Voltage		Clamping Voltage (Max) $V_{CL}$ (V)	Fusing Time @ 5 A (ms)	Max $I_R$ ( $\mu\text{A}$ )	C @ 0 V Typ (pF)
	$V_{BR}$ (V) @ $I_T$					
	Min	$I_T$ mA				
 <p><b>WLCSP4 CP SUFFIX CASE 567CA</b></p>	<p>PACKAGE / PINOUT DIAGRAMS</p>  <p>Orientation Marking</p> <p>Top View (Bumps Down View)</p> <p>Bottom View (Bumps Up View)</p> <p>X = Single Digit Date Code</p>		<p>ELECTRICAL SCHEMATIC</p>  <p>Fuse</p> <p>A1</p> <p>A2</p> <p>TVS</p> <p>GND B1 &amp; B2</p>			
CM6136	15.5	20	19.5	100	0.1	190

**TVS PROTECTION – Low Capacitance Surface Mount for USB 2.0 and 1.1**

ESD Protection Meeting IEC 61000-4-2, 4-4, 4-5

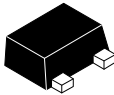
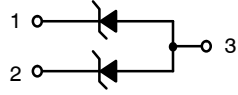
Device	Breakdown Voltage			Max Reverse Leakage Current			Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ $I_{PP}$ (Clamping Voltage)	Peak Power Rating (8x20 $\mu\text{sec}$ )			
	$V_{BR}$ (V)		@ $I_T$	$I_R$	$V_{RWM}$									
	Min	Nom	Max	(mA)	( $\mu\text{A}$ )	(V)	Typ	Max	$I_{PP}$ (A)	$V_C$ (V)	Watts			
 <p><b>CASE 419B SC-88</b></p>	 <p><math>V_N</math> 1</p> <p>I/O 2</p> <p><math>V_P</math> 3</p> <p>6 N/C</p> <p>5 I/O</p> <p>4 N/C</p>			<p><b>USB 2.0</b></p>										
NUP2301MW6	70	-	-	-	0.1	2.5	0.8	1.5	-	-	-			

## LOW CAPACITANCE TVS/ESD PROTECTION – Two Line

### ESD7L Series – Common Anode Series

Two Line TVS/ESD in SOT-723; Meets IEC61000-4-2, Level 4

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
Unidirectional


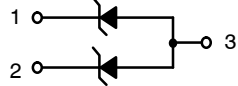
Device	Breakdown Voltage		Reverse Voltage Working Peak $V_{RWM}$ (V)	$V_C$ (V) @ $I_{PP} = 1$ A	Typical Capacitance (pF) Pin 1 to 2 @ 0 V
	$V_{BR}$ (Note 16) (V)	@ $I_T$ (mA)			
 <p>CASE 631AA SOT-723</p> 	Min				
ESD7L5.0	5.4	1.0	5.0	8.4	0.25

26.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

### ESD11L – Common Anode Series

Two Line TVS/ESD in SOT-1123; Meets IEC61000-4-2, Level 4

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
Unidirectional

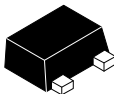
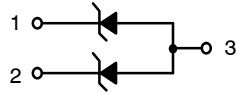
Device	Breakdown Voltage		Reverse Voltage Working Peak $V_{RWM}$ (Vo)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	Typical Capacitance (pF) Pin 1 to 2 @ 0 V
	$V_{BR}$ (Note 16) (V)	@ $I_T$ (mA)			
 <p>CASE 524AA SOT-1123</p> 	Min				
ESD11L5.0	5.4	1.0	5.0	1.0	0.25

27.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

### ESD7M Series – Common Anode Series

Two Line TVS/ESD in SOT-723; Meets IEC61000-4-2, Level 4

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
Unidirectional

Device	Breakdown Voltage		Reverse Voltage Working Peak $V_{RWM}$ (Volts)	Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	$V_C$ (V) @ $I_{PP} = 1$ A	Max Capacitance (pF) Pin 1 to 3 @ 0 V
	$V_{BR}$ (Note 16) (V)	@ $I_T$ (mA)				
 <p>CASE 631AA SOT-723</p> 	Min					
ESD7M5.0	5.4	1.0	5.0	1.0	8.4	2.4

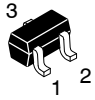
28.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

**LOW CAPACITANCE TVS/ESD PROTECTION – Two Line** (continued)

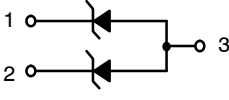
**ESDR0502B – Two Line TVS/ESD in SC-75**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
**Unidirectional**

Device	Breakdown Voltage		$V_{RWM}$ (V)	Max $I_R$ ( $\mu\text{A}$ )	C Typ (pF)
	$V_{BR}$ (V) @ $I_T$	$I_T$			
	Min	mA			
ESDR0502B	5.8	1.0	5	1	0.25



CASE 463  
SC-75  
STYLE 4

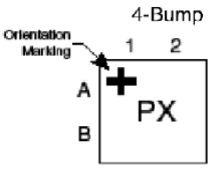


**CM6100 – Two Line TVS/ESD in CSP**

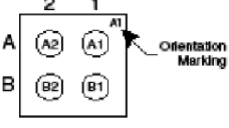
**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Device	Breakdown Voltage		$V_{RWM}$ (V)	Max $I_R$ ( $\mu\text{A}$ )	$C_{IN}$ Max (pF)
	$V_{BR}$ (V) @ $I_T$	$I_T$			
	Min	mA			
CM6100	6	8	5.5	0.3	1.5

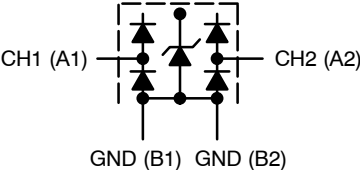
4-Bump CSP Package



TOP VIEW  
(Bumps Down View)




BOTTOM VIEW  
(Bumps Up View)



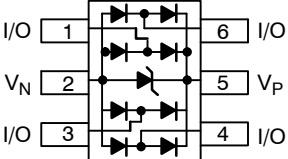
**NUP4114H**

**NUP4114H – Low Capacitance TVS/ESD Protection; Meets IEC6100-4-2, Level 4**

Device	Max Reverse Voltage $V_{RWM}$ (V)	Breakdown Voltage				Max Reverse Leakage Current $I_R$ ( $\mu\text{A}$ )	Max Clamping Voltage @ $I_{PP} = 1\text{ A}$ $V_C$ (V)	Typical Capacitance (pF) @ 0 V
		$V_{BR}$ (V)			@ $I_T$ (mA)			
		Min	Nom	Max				
NUP4114H	5.0	6.0	7.5		1.0	12.1	0.8	



CASE 318G  
TSOP-6  
STYLE 12

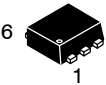
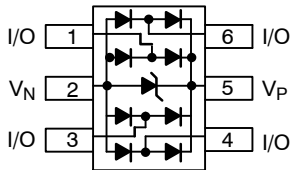




**LOW CAPACITANCE TVS/ESD PROTECTION – Two Line** (continued)

**NUP4114UP**


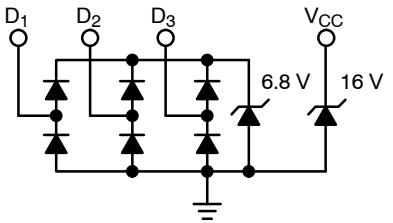
NUP4114UP – Low Capacitance TVS/ESD Protection; Meets IEC6100–4–2, Level 4

Device	Max Reverse Voltage $V_{RWM}$ (V)	Breakdown Voltage				Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Clamping Voltage @ $I_{PP}$ = 1 A $V_C$ (V)	Typical Capacitance (pF) @ 0 V
		$V_{BR}$ (V)			@ $I_T$ (mA)			
		Min	Nom	Max				
		CASE 463A SOT-563						
NUP4114UP	5.0	6.0			1.0	11.2	0.4	

**LOW CAPACITANCE TVS/ESD PROTECTION – Three Line**


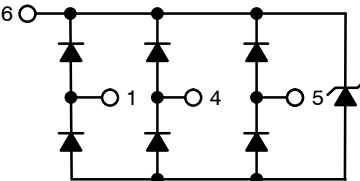
**NUP3115UP**

NUP3115UP – Low Capacitance TVS/ESD Protection; Meets IEC6100–4–2, Level 4

Device	Max Reverse Voltage $V_{RWM}$ (V)	Breakdown Voltage				Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Typ Clamping Voltage @ $I_{PP}$ = 1 A $V_C$ (V)	Typical Capacitance (pF) @ 0 V
		$V_{BR}$ (V)			@ $I_T$ (mA)			
		Min	Nom	Max				
		CASE 517AP UDFN6 1.6x1.6						
NUP3115UP	5.5	6.4	6.8	8.0	1.0	9.4	0.8	

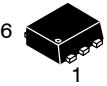
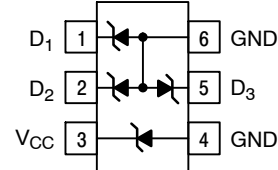
**ESDR0502N**

ESDR0502N – Ultra-Low Capacitance TVS/ESD Protection; Meets IEC61000–4–2, Level 4

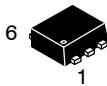
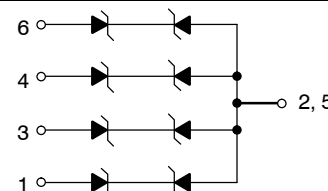
Device	Max Reverse Voltage $V_{RWM}$ (V)	Breakdown Voltage				Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Clamping Voltage @ $I_{PP}$ = 1 A $V_C$ (V)	Typical Capacitance (pF) @ 0 V
		$V_{BR}$ (V)			@ $I_T$ (mA)			
		Min	Nom	Max				
		CASE 517AA UDFN6						
ESDR0502N	5.5	6.0			1.0		0.3	

## LOW CAPACITANCE TVS/ESD PROTECTION – Four Line

### Four Line Low Cap TVS/ESD Protection in SOT-563; Meets IEC61000-4-2, Level 4

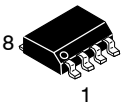
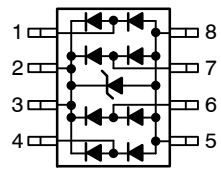
Device	Breakdown Voltage (D <sub>1</sub> , D <sub>2</sub> , and D <sub>3</sub> )				Breakdown Voltage (V <sub>CC</sub> )				Working Peak Reverse Voltage (D <sub>1</sub> , D <sub>2</sub> , and D <sub>3</sub> )	Max Reverse Leakage Current (D <sub>1</sub> , D <sub>2</sub> , and D <sub>3</sub> )		Max Reverse Leakage Current (V <sub>CC</sub> )		Capacitance (pF) @ 3.0 V, 1.0 MHz		Peak Power Rating (8x20 μsec) (D <sub>1</sub> , D <sub>2</sub> , and D <sub>3</sub> )	Peak Power Rating (8x20 μsec) (V <sub>CC</sub> )
	V <sub>BR</sub> (V)		@ I <sub>T</sub> (mA)	V <sub>BR</sub> (V)	@ I <sub>T</sub> (mA)		V <sub>RWM</sub> (V)	I <sub>R</sub> (μA)	V <sub>RWM</sub> (V)	I <sub>R</sub> (μA)	V <sub>R</sub> (V)	Typ	Max	Watts	(mW)		
	Min	Nom			Max	Min										Nom	Max
 <p style="text-align: center;"><b>CASE 463A SOT-563</b></p> 																	
NUP4060AXV6	6.2	6.8	7.2	1.0	15.3	16	17.1	5.0	5.0	0.5	3.0	0.05	11	7.0	10	20	200

### Four Line Low Cap Bidirectional TVS/ESD Protection in SOT-563; Meets IEC61000-4-2, Level 4

Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I <sub>pp</sub> (Clamping Voltage)	Peak Power Rating (8x20 μsec)
	V <sub>BR</sub> (V)		@ I <sub>T</sub> (mA)	nA	V <sub>RWM</sub> (V)	Typ	Max	I <sub>pp</sub> (A)	V <sub>C</sub> (V)	Watts	
	Min	Nom									Max
 <p style="text-align: center;"><b>CASE 463A SOT-563</b></p> 											
NUP4102XV6	13.6	-	17.8	1.0	100	12	13	15	3.0	25	75

\*C<sub>j</sub> = Between I/O pin and ground.

### Four Line Low Cap TVS/ESD Protection; Meets IEC61000-4-2, Level 4

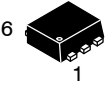
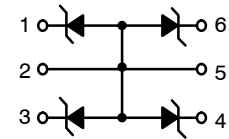
Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I <sub>pp</sub> (Clamping Voltage)	Peak Power Rating (8x20 μsec)
	V <sub>BR</sub> (V)		@ I <sub>T</sub> (mA)	I <sub>R</sub> (μA)	V <sub>RWM</sub> (V)	Typ	Max	I <sub>pp</sub> (A)	V <sub>C</sub> (V)	Watts	
	Min	Nom									Max
 <p style="text-align: center;"><b>CASE 751 SO-8</b></p> 											
<b>USB 2.0</b>											
NUP4201DR2	6.0	-	-	1.0	10	5.0	5.0	10	10	12	500
SRDA05-4R2	6.0	-	-	1.0	10	5.0	10	15	10	12	500

\*C<sub>j</sub> = Between I/O pin and ground.

**LOW CAPACITANCE TVS/ESD PROTECTION – Four Line** (continued)


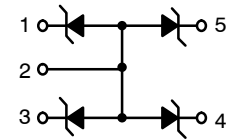
**NUP4112P**

**NUP4112P – Quad Low Capacitance TVS/ESD Protection; Meets IEC6100–4–2, Level 4**

Device	Max Reverse Voltage $V_{RWM}$ (V)	Breakdown Voltage			$V_{BR}$ (V) @ $I_T$ (mA)	Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Clamping Voltage @ $I_{PP}$ = 1 A $V_C$ (V)	Typical Capacitance (pF) @ 0 V
		$V_{BR}$ (V)						
		Min	Nom	Max				
		CASE 463A SOT–563						
NUP4012P	4.0	5.2	5.5		1.0	1.0	9.5	0.7


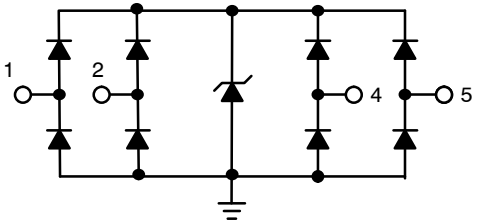
**NUP4016**

**NUP4016 – Quad Ultra–Low Capacitance TVS/ESD Protection; Meets IEC6100–4–2, Level 4, 15 kV Contact Discharge**

Device	Max Reverse Voltage $V_{RWM}$ (V)	Breakdown Voltage			$V_{BR}$ (V) @ $I_T$ (mA)	Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Clamping Voltage @ $I_{PP}$ = 1 A $V_C$ (V)	Typical Capacitance (pF) @ 0 V
		$V_{BR}$ (V)						
		Min	Nom	Max				
		CASE 527AE SOT–953						
NUP4016	5.0	6.0			1.0	1.0		0.5

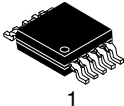
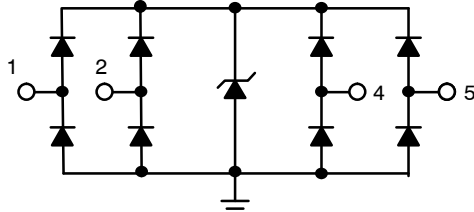
**ESDR0524P**

**ESDR0524P – Quad Low Capacitance TVS/ESD Protection; Meets IEC6100–4–2, Level 4**


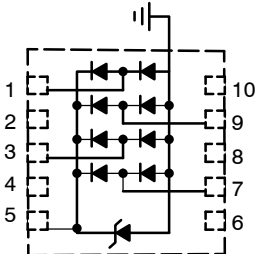
Device	Max Reverse Voltage $V_{RWM}$ (V)	Breakdown Voltage			$V_{BR}$ (V) @ $I_T$ (mA)	Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Clamping Voltage @ $I_{PP}$ = 1 A $V_C$ (V)	Typical Capacitance (pF) @ 0 V
		$V_{BR}$ (V)						
		Min	Nom	Max				
		CASE 517BB UDFN10						
ESDR0524P	5.0	6.0			1.0	1.0		0.5

**LOW CAPACITANCE TVS/ESD PROTECTION – Four Line** (continued)


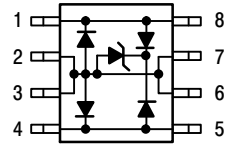
**ESDR0544M – Quad Low Cap TVS/ESD Protection; Meets IEC61000–4–2, Level 4**

Device	Max Reverse Working Voltage $V_{RWM}$ (V)	Breakdown Voltage		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Clamping Voltage @ $I_{PP} = 1$ A $V_C$ (V)	Typical Capacitance (pF) @ 0 V
		$V_{BR}$ (V) Min	@ $I_T$ (mA)			
 <p>Micro-10 DM SUFFIX CASE 846B</p> 						
ESDR0544M	5.0	6.0	1	1.0		0.5

**ESD1014 – Quad Low Cap TVS/ESD Protection; Meets IEC61000–4–2, Level 4**

Device	Max Reverse Working Voltage $V_{RWM}$ (V)	Breakdown Voltage		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Clamping Voltage @ $I_{PP} = 1$ A $V_C$ (V)	Typical Capacitance @ 0 V (pF)
		$V_{BR}$ (V) Min	@ $I_T$ (mA)			
 <p>UDFN10 CASE 517AN</p> 						
ESD1014	3.3	5.0	1	5	7.5	3.8

**LC03–6R2 – TVS for High-Speed Data Interfaces; Meets IEC61000–4–2, Level 4**

Device	Max Reverse Working Voltage $V_{RWM}$ (V)	Breakdown Voltage		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Clamping Voltage @ $I_{PP} = 50$ A $V_C$ (V)	Typical Capacitance @ 0 V (pF)
		$V_{BR}$ (V) Min	@ $I_T$ (mA)			
 <p>SOIC-8 CASE 751 PLASTIC</p> 						
LC03–6R2	5	6.8	1	20	15	16

**LOW CAPACITANCE TVS/ESD PROTECTION – Four Line** (continued)

**CM1641 – TVS Dual Voltage ESD Protection Array; Meets IEC61000-4-2, Level 4**



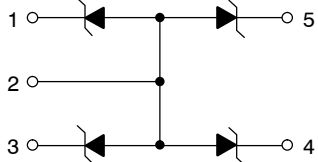
Device	Max Reverse Working Voltage $V_{RWM}$ (V)	Breakdown Voltage		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Typ Clamping Voltage @ $I_{PP} = 1$ A $V_{CL}$ (V)	Typical Capacitance @ 2.5 V (pF)
		$V_{BR}$ (V) Min	@ $I_T$ (mA)			
CM1641	6	6.8	10	1	9.64	53

**MMQA SERIES – Quad Common Anode TVS/ESD Protection; Meets HBM 16 kV**


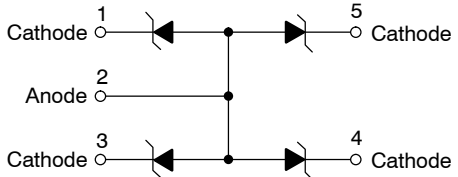
Device	Breakdown Voltage		Max Reverse Leakage Current		Max Reverse Surge Current $I_{RSM}$ (A)	Max Clamping Voltage $V_{RSM}$ @ $I_{RSM}$ (V)	Max Capacitance @ 0 V (pF)
	$V_{BR}$ (V) Min	@ $I_T$ (mA)	$I_R$ (nA)	$V_R$ (V)			
<b>PIN ASSIGNMENT</b>							
		<b>SC-74 PLASTIC CASE 318F</b>					
MMQA5V6T1, T3	5.32	1.0	2000	3.0	3.0	8.0	–
MMQA6V2T1, T3	5.89	1.0	700	4.0	2.66	9.0	–
MMQA6V8T1, T3	6.46	1.0	500	4.3	2.45	9.8	250
MMQA12VT1, T3	11.4	1.0	75	9.1	1.39	17.3	–
MMQA13VT1	12.4	1.0	75	9.8	1.29	18.6	–
MMQA15VT1, T3	14.3	1.0	75	11	1.1	21.7	–
MMQA18VT1, T3	17.1	1.0	75	14	0.923	26	–
MMQA20VT1, T3	19	1.0	75	15	0.84	28.6	–
MMQA21VT1, T3	20	1.0	75	16	0.792	30.3	–
MMQA22VT1, T3	20.9	1.0	75	17	0.758	31.7	–
MMQA24VT1, T3	22.8	1.0	75	18	0.694	34.6	–
MMQA27VT1, T3	25.7	1.0	75	21	0.615	39	–
MMQ33VT1, T3	31.4	1.0	75	25	0.504	46.6	–

**LOW CAPACITANCE TVS/ESD PROTECTION – Four Line** (continued)


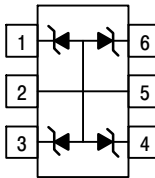
**NZQA SERIES – Quad Common Anode TVS/ESD Protection; Meets IEC61000–4–2, Level 4**

Device	Breakdown Voltage		Max Leakage Current		Max Reverse Peak Pulse Current $I_{PP}$ (A)	Max Clamping Voltage $V_C$ @ $I_{PP}$ (V)	Typ Capacitance @ 0 V (pF)
	$V_{BR}$ (V) Min	@ $I_T$ (mA)	$I_{RM}$ ( $\mu$ A)	$V_{RM}$ (V)			
 <b>SOT-553 CASE 463B PLASTIC</b> 							
							
NZQA5V6XV5T1G	5.32	1.0	1.0	3.0	10	10.5	90
NZQA6V2XV5T1G	5.89	1.0	0.5	4.0	9.0	11.5	80
NZQA6V8XV5T1G	6.46	1.0	0.1	4.3	8.0	12.5	70

**SMF05T1 – Quad TVS/ESD Protection; Meets IEC61000–4–2, Level 4**


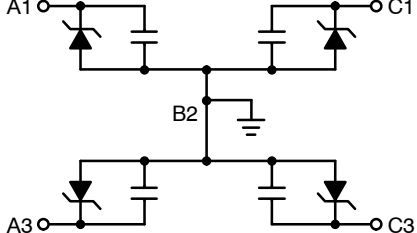
Device	Max Reverse Working Voltage $V_{RWM}$ (V)	Breakdown Voltage		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Clamping Voltage @ $I_{PP} = 1$ A $V_C$ (V)	Max Capacitance @ 0 V (pF)
		$V_{BR}$ (V) Min	@ $I_T$ (mA)			
 <b>SC-88A/SOT-323 CASE 419A STYLE 5</b>						
						
SMF05T1	5	6	1.0	5	9.5	90

**SMS05T1 SERIES – Quad Common Anode TVS/ESD Protection, 350 W Peak Power; Meets IEC61000–4–2, Level 4**

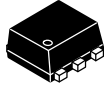
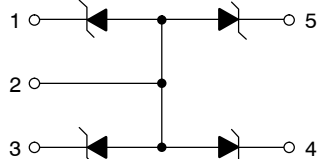
Device	Breakdown Voltage		Max Leakage Current		Reverse Surge Current $I_{RSM}$ (A)	Max Clamping Voltage $V_C$ @ $I_{RSM}$ (V)	Max Capacitance @ 0 V (pF)
	$V_{BR}$ (V) Min	@ $I_T$ (mA)	$I_R$ ( $\mu$ A)	$V_R$ (V)			
 <b>SC-74 CASE 318F STYLE 1</b> 							
SMS05T1	6	1.0	20	5	5.0	9.8	400
SMS12T1	13.3	1.0	1.0	12	5.0	19	150
SMS15T1	16.7	1.0	1.0	15	5.0	24	125
SMS24T1	26.7	1.0	1.0	24	5.0	40	75

**LOW CAPACITANCE TVS/ESD PROTECTION – Four Line** (continued)


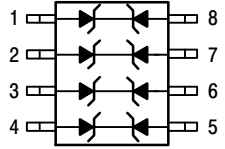
**NUP4103FC – Unidirectional, Quad TVS/ESD Protection; Meets IEC61000–4–2, Level 4**

Device	Max Reverse Working Voltage $V_{RWM}$ (V)	Breakdown Voltage		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Typical Capacitance (pF) @ 2.5 V
		$V_{BR}$ (V) Min	@ $I_T$ (mA)		
 <b>5-PIN FLIP-CHIP CSP PLASTIC CASE 766AB</b>					
					
NUP4103FC	5.5	6.0	1.0	0.1	30

**NUP45V6, NUP46V8 – Quad Common Anode TVS/ESD Protection; Meets HBM 8 kV**

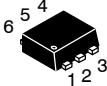

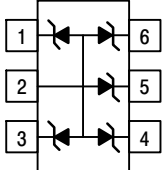
Device	Breakdown Voltage		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Clamping Voltage @ $I_{PP} = 1$ A $V_C$ (V)	Typical Capacitance (pF) @ 0 V
	$V_{BR}$ (V) Min	@ $I_T$ (mA)			
 <b>SOT-953 CASE 526AE</b>					
					
NUP45V6P5	5.3	1	1.0	10.5	13
NUP46V8P5	6.47	1	1.0	–	12

**SMDA Series – Bidirectional, Quad TVS Protection, 300 W Peak Power; Meets IEC61000–4–2, Level 4**

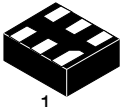

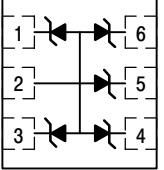
Device	Max Reverse Working Voltage $V_{RWM}$ (V)	Breakdown Voltage		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Clamping Voltage @ $I_{PP} = 1$ A $V_C$ (V)	Max Junction Capacitance @ 0 V (pF)
		$V_{BR}$ (V) Min	@ $I_T$ (mA)			
 <b>SO-8 CASE 751</b>						
						
SMDA05C	5	6	1.0	20	9.8	350
SMDA12C	12	13.3	1.0	1.0	19	120
SMDA15C	15	16.7	1.0	1.0	24	75
SMDA24C	24	26.7	1.0	1.0	43	50

### TVS/ESD PROTECTION – 5 Lines

NUP5120X6, – TVS/ESD Protection; Meets IEC61000–4–2, Level 4

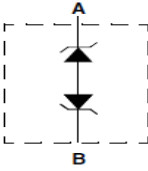
Device	Breakdown Voltage		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Reverse Working Voltage $V_{RWM}$ (V)	Typical Capacitance (pF) @ 0 V
	$V_{BR}$ (V) Min	@ $I_T$ (mA)			
	SOT-563 CASE 463A STYLE 6				
NUP5120X6	6.2	1	0.5	5	54

NUP5150MU – TVS/ESD Protection; Meets IEC61000–4–2, Level 4

Device	Breakdown Voltage		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Max Reverse Working Voltage $V_{RWM}$ (V)	Typical Capacitance (pF) @ 0 V
	$V_{BR}$ (V) Min	@ $I_T$ (mA)			
	UDFN6 CASE 517AA				
NUP5150MU	6.2	1	0.5	5	54

### TVS/ESD PROTECTION, COMMON ANODE – One Line

CM1242 – Single Line TVS/ESD; Meets IEC61000–4–2, Level 4,  
19 kV contact discharge for CM1242–07CP  
30 kV contact discharge for CM1242–33CP

Device	Number of lines	Typ Breakdown Voltage @ 10 mA (V)	Max Channel Leakage Current $I_{Leak}$ ( $\mu$ A)	Small Signal Clamping Voltage (+ve Clamp) @ $I_{pp} = 10$ mA $V_C$ (V)	Small Signal Clamping Voltage (-ve Clamp) @ $I_{pp} = 10$ mA $V_C$ (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
							
CM1242–07CP	1	7.6	0.5	9.0	-9.0	5.8	CSP
CM1242–33CP	1	7.6	0.5	8.6	-8.6	55	CSP



### TVS/ESD PROTECTION, COMMON ANODE – Two to Five Lines

**CM1218 – Common Anode Series; Meets IEC61000–4–2, Level 4, 15 kV contact discharge**

Device	Number of lines	Min Reverse Stand-off Voltage @ 1 mA (V)	Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Small Signal Clamping Voltage (+ve Clamp) @ $I_{PP} = 10$ mA $V_C$ (V)	Small Signal Clamping Voltage (-ve Clamp) @ $I_{PP} = 10$ mA $V_C$ (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
<b>CM1218–03</b>							
<b>CM1218–F4</b>							
CM1218–03SR	3	6.1	1.0	6.8	-0.8	7	SOT143
CM1218–F4SE	4	6.1	1.0	6.8	-0.8	7	SOT–563
CM1218–H4SE	4	6.1	1.0	6.8	-0.8	7	SOT–563

**CM1219 – Common Anode Series; Meets IEC61000–4–2, Level 4, 8 kV contact discharge**

Device	Number of lines	Min Reverse Stand-off Voltage @ 1 mA (V)	Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Small Signal Clamping Voltage (+ve Clamp) @ $I_{PP} = 10$ mA $V_C$ (V)	Small Signal Clamping Voltage (-ve Clamp) @ $I_{PP} = 10$ mA $V_C$ (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
<b>CM1219–02</b>							
<b>CM1219–03</b>							
<b>CM1219–04</b>							
<b>CM1219–05</b>							
CM1219–02SO	2	6.1	1.0	6.8	-0.8	4	SOT23–3
CM1219–02S7	2	6.1	1.0	6.8	-0.8	4	SC70–3
CM1219–03SR	3	6.1	1.0	6.8	-0.8	4	SOT143
CM1219–04SO	4	6.1	1.0	6.8	-0.8	4	SOT23–5
CM1219–04SE	4	6.1	1.0	6.8	-0.8	4	SOT–553
CM1219–04S7	4	6.1	1.0	6.8	-0.8	4	SC70–5
CM1219–05SO	5	6.1	1.0	6.8	-0.8	4	SOT23–6
CM1219–05S7	5	6.1	1.0	6.8	-0.8	4	SC70–6

### TVS/ESD PROTECTION, COMMON ANODE – Four or Eight Lines

CM1204 – Common Anode Series; Meets IEC61000-4-2, Level 4,  
 15 kV contact discharge for CM1204  
 30 kV contact discharge for CM1244

Device	Breakdown Voltage			@I <sub>T</sub> (mA)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Signal Clamping Voltage (+ve Clamp) @ I <sub>pp</sub> = 10 mA V <sub>C</sub> (V)	Signal Clamping Voltage (-ve Clamp) @ I <sub>pp</sub> = 10 mA V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V
	V <sub>BR</sub> (V)							
	Min	Nom	Max					
CM1204-03CP		6.0		0.01	0.1	6.8	-0.8	27

CM1205 – Common Anode Series; Meets IEC61000-4-2, Level 4, 25 kV contact discharge

Device	Breakdown Voltage			@I <sub>T</sub> (mA)	Reverse Voltage V <sub>RWM</sub> (V)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Max Reverse Voltage @ I <sub>pp</sub> (Clamping Voltage) V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	V <sub>BR</sub> (V)							
	Min	Nom	Max					
CM1205	5.6	6.8	8	10	6	0.1	12	39

CM1248 – Common Anode Series; Meets IEC61000-4-2, Level 4, 15 kV contact discharge

Device	Number of lines	Min Diode Stand-off Voltage @ 10 μA (V)	Max Leakage Current I <sub>R</sub> (μA)	Small Signal Clamping Voltage (+ve Clamp) @ I <sub>pp</sub> = 10 mA V <sub>C</sub> (V)	Small Signal Clamping Voltage (-ve Clamp) @ I <sub>pp</sub> = 10 mA V <sub>C</sub> (V)	Typical Channel Capacitance (pF) @ 0 V	Package Type
CM1248-04QG	4	5.5	0.75	6.8	-0.89	10	superDFN
CM1248-04S9	4	5.5	0.75	6.8	-0.89	10	SOT-953
CM1248-08DE	8	5.5	0.75	6.8	-0.89	10	uDFN

**TVS/ESD PROTECTION, COMMON ANODE – Four or Eight Lines** (continued)

**CM1249 – Common Anode Series; Meets IEC61000-4-2, Level 4, 8 kV contact discharge**

Device	Number of lines	Max Leakage Current $I_R$ ( $\mu A$ )	Small Signal Clamping Voltage (+ve Clamp) @ $I_{PP} = 5\text{ mA}$ $V_C$ (V)	Small Signal Clamping Voltage (-ve Clamp) @ $I_{PP} = 5\text{ mA}$ $V_C$ (V)	Typical Channel Capacitance (pF) @ 0 V	Package Type
<b>CM1249-04</b> 						
CM1249-04S9	4	0.75	8.5 (max)	-0.4	5	SOT-953

**CM1250 – Common Anode Series; Meets IEC61000-4-2, Level 4, 8 kV contact discharge**

Device	Number of lines	Max Leakage Current $I_R$ ( $\mu A$ )	Small Signal Clamping Voltage (+ve Clamp) @ $I_{PP} = 5\text{ mA}$ $V_C$ (V)	Small Signal Clamping Voltage (-ve Clamp) @ $I_{PP} = 5\text{ mA}$ $V_C$ (V)	Typical Channel Capacitance (pF) @ 0 V	Package Type
CM1250-04QG	4	0.1	8.5 (max)	-0.4 (max)	5	superDFN

**PicoGuard®: LOW CAPACITANCE TVS/ESD PROTECTION – One to Four Lines**

CM1282 – Low Capacitance Single Line TVS/ESD Protection; Meets IEC61000-4-2, Level 4, 8 kV contact discharge

Device	Breakdown Voltage			Max Reverse Leakage Current $I_{LEAK}$ ( $\mu$ A)	Typical Clamping Voltage @ $I_{PP} = 1$ A $V_{CL}$ (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	
	$V_{BR}$ (V)						
	Min	Nom	Max				
CM1282-01D1	7.5	9.0	11.0	10	1.0	11	0.5

**CM1214A series – AC Signal ESD Protection; Meets IEC61000-4-2, Level 4**

Device	Number of lines	Operating Supply Voltage (V)		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Channel Clamping Voltage @ $I_{PP} = 1$ A $V_C$ (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
		Nom	Max				
CM1214A-01SO	1	7		1.0	11.3	0.6	SOT23
CM1214A-02MR	2	7		1.0	11.3	0.6	MSOP

**CM1213A series – Including Vp and Vn Connections; Meets IEC61000-4-2, Level 4, 8 kV contact discharge**

Device	Number of lines	Operating Supply Voltage (V)		Max Operating Current ( $\mu$ A)	Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Channel Clamping Voltage (+ve Transient) @ $I_{PP} = 1$ A $V_C$ (V)	Channel Clamping Voltage (-ve Transient) @ $I_{PP} = 1$ A $V_C$ (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
		Nom	Max						
CM1213A-01SO	1	3.3	5.5	8.0	1.0	10	-1.7	0.85	SOT23-3
CM1213A-02SR	2	3.3	5.5	8.0	1.0	10	-1.7	0.85	SOT143-4
CM1213A-02SO	2	3.3	5.5	8.0	1.0	10	-1.7	0.85	SOT23-5
CM1213A-04SO	4	3.3	5.5	8.0	1.0	10	-1.7	0.85	SOT23-6
CM1213A-04S7	4	3.3	5.5	8.0	1.0	10	-1.7	0.85	SC70-6
CM1213A-04MR	4	3.3	5.5	8.0	1.0	10	-1.7	0.85	MSOP-10

**PicoGuard®: LOW CAPACITANCE TVS/ESD PROTECTION – One to Four Lines**

(continued)

**CM1215 series – Including Vp and Vn Connections; Meets IEC61000-4-2, Level 4, 15 kV contact discharge**

Device	Number of lines	Operating Supply Voltage (V)		Max Operating Current (μA)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Channel Clamping Voltage (+ve Transient) @ I <sub>PP</sub> = 1 A V <sub>C</sub> (V)	Channel Clamping Voltage (-ve Transient) @ I <sub>PP</sub> = 1 A V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
		Nom	Max						
CM1215-01SO	1	3.3	5.5	8	1.0	V <sub>P</sub> +1.5	V <sub>N</sub> -1.5	1.6	SOT23-3
CM1215-02SR	2	3.3	5.5	8	1.0	V <sub>P</sub> +1.5	V <sub>N</sub> -1.5	1.6	SOT143
CM1215-02SO	2	3.3	5.5	8	1.0	V <sub>P</sub> +1.5	V <sub>N</sub> -1.5	1.6	SOT23-5
CM1215-04SO	4	3.3	5.5	8	1.0	V <sub>P</sub> +1.5	V <sub>N</sub> -1.5	1.6	SOT23-6

**CM1224 series – Including Vp and Vn Connections; Meets IEC61000-4-2, Level 4, 8 kV contact discharge**

Device	Number of lines	Operating Supply Voltage (V)		Max Operating Current (μA)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Channel Clamping Voltage (+ve Transient) @ I <sub>PP</sub> = 1 A V <sub>C</sub> (V)	Channel Clamping Voltage (-ve Transient) @ I <sub>PP</sub> = 1 A V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
		Nom	Max						
CM1224-02SR	2	3.3	5.5	8	1.0	10.0	-1.8	0.7	SOT143-4
CM1224-04SO	4	3.3	5.5	8	1.0	10.0	-1.8	0.7	SOT23-6
CM1224-04MR	4	3.3	5.5	8	1.0	10.0	-1.8	0.7	MSOP-10

**CM1293A series – Including Vp and Vn Connections; Meets IEC61000-4-2, Level 4, 8 kV contact discharge**

Device	Number of lines	Operating Supply Voltage (V)		Max Operating Current (μA)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Channel Clamping Voltage (+ve Transient) @ I <sub>PP</sub> = 1 A V <sub>C</sub> (V)	Channel Clamping Voltage (-ve Transient) @ I <sub>PP</sub> = 1 A V <sub>C</sub> (V)	Max Capacitance (pF) @ 0 V	Package Type
		Nom	Max						
CM1293A-02SR	2	3.3	5.5	8	1.0	9.9	-1.6	2.0	SOT143-4
CM1293A-02SO	4	3.3	5.5	8	1.0	9.9	-1.6	2.0	SOT23-5
CM1293A-04SO	2	3.3	5.5	8	1.0	9.9	-1.6	2.0	SOT23-6
CM1293A-04MR	4	3.3	5.5	8	1.0	9.9	-1.6	2.0	MSOP-10

**PicoGuard®: LOW CAPACITANCE TVS/ESD PROTECTION – One to Four Lines**

(continued)

**CM1225 series – Including Vn Connection; Meets IEC61000-4-2, Level 4, 8 kV contact discharge**

Device	Number of lines	Operating Supply Voltage		Max Reverse Leakage Current $I_R$ ( $\mu$ A)	Channel Clamping Voltage (+ve Transient) @ $I_{PP} = 1$ A $V_C$ (V)	Channel Clamping Voltage (-ve Transient) @ $I_{PP} = 1$ A $V_C$ (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
		(V)						
		Nom	Max					
<p style="text-align: center;"><b>CM1224-04DE</b></p>								
CM1225-04DE	4		5.5	1.0	10.0	-4.5	0.8	uUDFN-10

**CM1241 – Dual-Voltage ESD Protection Including Vp and Vn Connections; Meets IEC61000-4-2, Level 4, 8 kV contact discharge**

Device	Number of lines	Max Reverse Leakage Current LV diode $I_R$ ( $\mu$ A)	Small Signal Clamping Voltage (+ve Clamp) @ $I_{PP} = 1$ A $V_C$ (V)	Small Signal Clamping Voltage (-ve Clamp) @ $I_{PP} = 1$ A $V_C$ (V)	Typical Capacitance HV diode @ 3 V (pF)	Typical Capacitance LV diode @ 3 V (pF)	Package Type
<p style="text-align: center;">Note: Pins 5 and 6 to 8 are connected to a common substrate.</p>							
CM1241-04D4	3	0.1	9.64	-1.75	53	1.2	TDFN-8

**PicoGuard®: LOW CAPACITANCE TVS/ESD PROTECTION – Two, Four, Six or Eight Lines**

**CM1216 series – Including Vp and Vn Connections; Meets IEC61000-4-2, Level 4, 15 kV contact discharge**

Device	Number of lines	Operating Supply Voltage		Max Operating Current (μA)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Channel Clamping Voltage (+ve Transient) @ I <sub>PP</sub> = 1 A V <sub>C</sub> (V)	Channel Clamping Voltage (-ve Transient) @ I <sub>PP</sub> = 1 A V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
		(V)							
		Nom	Max						
<p style="text-align: center;"><b>CM1216-06MR</b> <b>CM1216-06SM</b></p> <p style="text-align: center;"><b>CM1216-08MR</b></p>									
CM1216-06SM	6	3.3	5.5	8	1.0	9.0	-1.5	1.6	SOIC
CM1216-06MR	6	3.3	5.5	8	1.0	9.0	-1.5	1.6	MSOP
CM1216-08MR	8	3.3	5.5	8	1.0	9.0	-1.5	1.6	MSOP

**CM1223 series – Including Vp and Vn with Backdrive Protection; Meets IEC61000-4-2, Level 4, 8 kV contact discharge**

Device	Number of lines	Operating Supply Voltage		Max Operating Current (μA)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Channel Clamping Voltage (+ve Transient) @ I <sub>PP</sub> = 1 A V <sub>C</sub> (V)	Channel Clamping Voltage (-ve Transient) @ I <sub>PP</sub> = 1 A V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
		(V)							
		Nom	Max						
<p style="text-align: center;"><b>CM1223-02SO</b> <b>CM1223-02SR</b></p> <p style="text-align: center;"><b>CM1223-04SO</b> <b>CM1223-04MR</b></p> <p style="text-align: center;"><b>CM1223-08MR</b></p>									
CM1223-02SO	2	3.3	5.5	8.0	1.0	8.8	-1.4	1.0	SOT23-5
CM1223-02SR	2	3.3	5.5	8.0	1.0	8.8	-1.4	1.0	SOT143-4
CM1223-04SO	4	3.3	5.5	8.0	1.0	8.8	-1.4	1.0	SOT23-6
CM1223-04MR	4	3.3	5.5	8.0	1.0	8.8	-1.4	1.0	MSOP-10
CM1223-08MR	8	3.3	5.5	8.0	1.0	8.8	-1.4	1.0	MSOP-10

**PicoGuard®: LOW CAPACITANCE TVS/ESD PROTECTION – Two, Four, Six or Eight Lines**

**CM1230 series – Including Vp and Vn Connections; Meets IEC61000-4-2, Level 4, 8 kV contact discharge**

Device	Number of lines	Operating Supply Voltage		Max Operating Current (μA)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Channel Clamping Voltage (+ve Transient) @ I <sub>pp</sub> = 1 A V <sub>C</sub> (V)	Channel Clamping Voltage (-ve Transient) @ I <sub>pp</sub> = 1 A V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
		(V)							
		Nom	Max						
CM1230-02CP	2	3.3	5.5	8.0	1.0	9.8	-1.8	0.8	CSP-4
CM1230-04CP	4	3.3	5.5	8.0	1.0	9.8	-1.8	0.8	CSP-6
CM1230-08CP	8	3.3	5.5	8.0	1.0	9.8	-1.8	0.8	CSP-10

**CM1263 series – Including Vp and Vn Connections; Meets IEC61000-4-2, Level 4, 15 kV contact discharge**

Device	Number of lines	Operating Supply Voltage		Max Operating Current (μA)	Max Reverse Leakage Current I <sub>R</sub> (μA)	Channel Clamping Voltage (+ve Transient) @ I <sub>pp</sub> = 1 A V <sub>C</sub> (V)	Channel Clamping Voltage (-ve Transient) @ I <sub>pp</sub> = 1 A V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
		(V)							
		Nom	Max						
CM1263-02SE	2	3.3	5.5	8	1.0	9.96	-1.6	0.85	SOT553
CM1263	6	3.3	5.5	8	1.0	9.96	-1.6	0.88	uDFN-12



**PicoGuard-XP®: LOW CAPACITANCE TVS/ESD CLAMP PROTECTION – Two Lines**  
**CM1231 series – ESD Clamp Protection Array; Meets IEC61000-4-2, Level 4, 12 kV contact discharge**

Device	Number of lines	Operating Supply Voltage		Max Operating Current (μA)	Typical Series Resistance (Ω)	Channel Clamping Voltage (+ve Transient) @ I <sub>pp</sub> = 1 A V <sub>C</sub> (V)	Channel Clamping Voltage (-ve Transient) @ I <sub>pp</sub> = 1 A V <sub>C</sub> (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 V	Package Type
		(V)							
		Nom	Max						
CM1231-02SO	2	5	5.5	1.0	1	9.0	-1.4	1.5	SOT23-6

**PicoGuard-XS®: LOW CAPACITANCE TVS/ESD CLAMP PROTECTION – Four Pairs of Differential lines**

**CM123x series – ESD Clamp Protection Array; Meets IEC61000-4-2, Level 4, 8 kV contact discharge for CM1233, CM1234, CM1235, CM1236 20 kV contact discharge for CM1238**

Device	Number of Pairs of Differential lines	Operating Supply Voltage		Channel Leakage Current (μA)	Individual Channel Single-ended Impedance (Ω)	Differential Channels Pair Impedance (Ω)	Channel Clamping Voltage (+ve Transient) @ I <sub>pp</sub> = 1 A V <sub>C</sub> (V)	Channel Clamping Voltage (-ve Transient) @ I <sub>pp</sub> = 1 A V <sub>C</sub> (V)	TDFN-16 Package Size (mm x mm)
		(V)							
		Min	Max						
CM1233-08DE	4	-0.5	5.5	1	50	100	10.0	-1.8	4.0 x 6.0
CM1234-08DE	4	-0.5	5.5	1	50	100	9	-1.5	4.0 x 6.0
CM1235-08DE	4	-0.5	5.5	1	50	100	9.2	-1.6	1.7 x 4.0
CM1236-08DE	4	-0.5	5.5	1	50	100	9.2	-1.6	4.0 x 6.0
CM1238-08DE	4	-0.5	5.5	1	50	100	10.0	-1.9	1.6 x 4.0

**20 kV contact discharge for CM1238, ESD4238**

ESD4238	4	-0.5	5.5	1	50	100	10.0	-1.9	1.6 x 4.0
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**MediaGuard®: HDMI PORT PROTECTION AND INTERFACE DEVICES**

CM20xx series – HDMI Port Source and Sink

Protection and Interface Devices; Meets IEC61000–4–2, Level 4, 8 kV contact discharge

Device	HDMI (Source or Sink ?)	# of pairs of Data Channel	# of pairs of Clock Channel	DDC Active Pull-up	CEC Slew Rate control	Backdrive Protection	Level Shifters	Package Type
CM2020–00TR	Source	3	1	No	No	Yes	Yes	38–TSSOP
CM2020–01TR	Source	3	1	No	No	Yes	Yes	38–TSSOP
CM2030–A0TR	Source	3	1	Yes	Yes	Yes	Yes	38–TSSOP
CM2031–A0TR	Sink	3	1	Yes	Yes	Yes	Yes	38–TSSOP

### VGA PORT PROTECTION AND INTERFACE DEVICES

**CM2006 – VGA and DVI-I Port Companion Circuit for TVs and Monitors; Meets IEC61000–4–2, Level 4, 8 kV contact discharge**

Device	VGA	# of Video Lines	# of Sync Lines	DDC Data & CLK	CEC Slew Rate control	Backdrive Protection	Level Shifters	Package Type
<b>Electrical Schematic</b>								
CM2006–02QR	Monitors & TVs	3	2	Yes	No	Yes	Yes	16–QSOP

**CM2009 – VGA and DVI-I Port Companion Circuit for PCs, Graphics Cards and Set Top Boxes; Meets IEC61000–4–2, Level 4, 8 kV contact discharge**

Device	VGA	# of Video Lines	# of Sync Lines	DDC Data & CLK	Backdrive Protection	Level Shifters	R <sub>OUT</sub>	Package Type
<b>Electrical Schematic</b>								
CM2009–00QR	PCs, Graphics Cards & Set Top Boxes	3	2	Yes	Yes	Yes	65 Ω	16–QSOP
CM2009–02QR	PCs, Graphics Cards & Set Top Boxes	3	2	Yes	Yes	Yes	15 Ω	16–QSOP

## APPLICATION SPECIFIC RECTIFIERS

Table 1. LOW  $V_F$  SCHOTTKY RECTIFIERS

Device	$I_O$ (A)	$V_{RRM}$ (V)	Max $V_F$ @ Rated $I_O$ and $T_C = 25^\circ\text{C}$ (V)	Max $I_R$ @ Rated $V_{RRM}$ and $T_C = 25^\circ\text{C}$ (mA) <sup>(1)</sup>	Package
MBRD835L	8.0	35	0.51	1.4	DPAK
MBRD1035CTL	10	35	0.47	2.0	DPAK
MBRD5H100	5.0	100	0.71	0.0035	DPAK
MBRB2515L	25	15	0.45	15	D <sup>2</sup> PAK
MBRB3030CTL	30	30	0.44	2.0	D <sup>2</sup> PAK
MBRB2535CTL	25	35	0.47	10	D <sup>2</sup> PAK
MBRB30H60CT	30	60	0.62	0.3	D <sup>2</sup> PAK
MBRB8H100	8	100	0.71	0.0045	D <sup>2</sup> PAK
MBRB20H100CT	20	100	0.77	0.0045	D <sup>2</sup> PAK
MBRB41H100CT	40	100	0.8	0.01	D <sup>2</sup> PAK
MBRB60H100CT	60	100	0.84	0.01	D <sup>2</sup> PAK
MBRB30H30CT-1G	30	30	0.48	0.8	I <sup>2</sup> PAK
MBRB3045CT-1G	30	45	0.62	0.2	I <sup>2</sup> PAK
MBRB30H60CT-1G	30	60	0.62	0.3	I <sup>2</sup> PAK
MBRB41H100CT-1G	40	100	0.80	0.01	I <sup>2</sup> PAK
MBRM110L	1.0	10	0.365	0.5	POWERMITE®
MBRA210L	2.0	10	0.35	0.7	SMA
MBRA320	3.0	20	0.50	2.0	SMA
MBRS130L	1.0	30	0.395	1.0	SMB
MBRS230L	2.0	30	0.50	1.0	SMB
MBRS2H100	2.0	100	0.79	0.008	SMB
MBRS410L	4.0	10	0.33	5.0	SMC
MBR0520L	0.5	20	0.385	0.25	SOD-123
MBR120LSF	1.0	20	0.45	0.4	SOD-123 Flat Lead
MBR120VLSF	1.0	20	0.34	0.6	SOD-123 Flat Lead
MBR130LSF	1.0	30	0.38	1.0	SOD-123 Flat Lead
MBR30H30CT	30	30	0.48	0.8	TO-220AB
MBR2535CT	30	35	0.62	0.2	TO-220AB
MBR30L45CT	30	45	0.5	0.65	TO-220AB
MBR3045ST	30	45	0.62	0.2	TO-220AB
MBR40L45CT	40	45	0.5	1.2	TO-220AB
MBR60L45CT	60	45	0.55	1.2	TO-220AB
MBR30H60CT	30	60	0.62	0.3	TO-220AB
MBR20H100CTG	20	100	0.77	0.0045	TO-220AB
MBR10H100CTG	10	100	0.73	0.0035	TO-220AB
MBR20L45CT	20	45	0.5	0.5	TO-220AB
MBR30H100CTG	30	100	0.80	0.0045	TO-220AB
MBR41H100CTG	40	100	0.80	0.01	TO-220AB
MBR60H100CTG	60	100	0.84	0.01	TO-220AB
MBR20H150CT	20	150	0.68 @ 125°C	0.05	TO-220AB
MBR2515L	25	15	0.45	15	TO-220AC
MBR2030CTL	20	30	0.52	5.0	TO-220AC
MBR2535CTL	25	35	0.47	5.0	TO-220AC
MBRF2045CT	20	45	0.84 @ 20A	0.1	TO220FP
MBRF30L45CT	30	45	0.5	0.65	TO220FP
MBRF30H60CTG	30	60	0.62	0.3	TO-220FP
MBRF20H100CT	20	100	0.77	0.0045	TO220FP
MBRF30H100CT	30	100	0.8	0.0045	TO220FP
MBRF20H150CT	20	150	0.68 @ 125°C	0.05	TO220FP
MBRF30H150CT	30	150	0.73 @ 125°C	0.06	TO220FP
MBRF20L45CT	20	45	0.5	0.5	TO220FP
MBRF2545CT	25	45	0.7	0.2	TO220FP
MBR4015LWT	40	15	0.42	5.0	TO-247
MBR60L45WT	60	45	0.55	1.2	TO-247
MBR40H100WTG	40	100	0.80	0.01	TO-247

1. Refers to maximum leakage current per leg on "CT" and "WT" suffix devices.

APPLICATION SPECIFIC RECTIFIERS (continued)

Table 2. LOW LEAKAGE SCHOTTKY RECTIFIERS

Device	I <sub>O</sub> (A)	V <sub>RRM</sub> (V)	Max V <sub>F</sub> @ Rated I <sub>O</sub> and T <sub>C</sub> = 25°C (V)	Max I <sub>R</sub> @ Rated V <sub>RRM</sub> and T <sub>C</sub> = 25°C (mA)	Package
MBR120ESF	1.0	20	0.53	0.01	SOD-123 FLAT LEAD
MBRM110E	1.0	10	0.53	0.001	POWERMITE®
MBRM120E	1.0	20	0.53	0.01	POWERMITE®
MBRA210E	2.0	10	0.5	0.05	SMA
MBRA120E	1.0	20	0.53	0.01	SMA
MBRS410E	4.0	10	0.5	0.15	SMC

Table 3. HIGH VOLTAGE SCHOTTKY RECTIFIERS

Device	I <sub>O</sub> (A)	V <sub>RRM</sub> (V)	Max V <sub>F</sub> @ Rated I <sub>O</sub> and T <sub>C</sub> = 25°C (V)	Max I <sub>R</sub> @ Rated V <sub>RRM</sub> and T <sub>C</sub> = 25°C (mA) <sup>(2)</sup>	Package
MBRS3200	3.0	200	0.84	1.0	SMB
MBRS3201	3.0	200	0.84	1.0	SMC
MBRS4201	4.0	200	0.86	1.0	SMC
MBRB20200CT	20	200	0.9	1.0	D <sup>2</sup> PAK
MBR20200CT	20	200	0.9	1.0	TO-220AB
MBR40250T	40	250	0.97	0.03	TO-220AB
MBR40250	40	250	0.97	0.03	TO-220AC
MBRF20200CT	20	200	0.9	1.0	TO-200FP
MBRF40250T	40	250	0.97	0.03	TO-220FP

2. Refers to maximum leakage current per leg on “CT” and “WT” suffix devices.

Table 4. MEGAHERTZ™ RECTIFIERS

Device	I <sub>O</sub> (A)	V <sub>RRM</sub> (V)	Max V <sub>F</sub> @ Rated I <sub>F</sub> and T <sub>C</sub> = 25°C (V)	Max I <sub>R</sub> @ Rated V <sub>RRM</sub> and T <sub>C</sub> = 25°C (mA) <sup>(3)</sup>	t <sub>rr</sub> (ns)	Package
MURHS160	1.0	600	2.4	0.02	35	SMB
MURHD560	5.0	600	2.7	0.01	30	DPAK
MURHB840CT	8.0	400	2.2	0.01	28	D <sup>2</sup> PAK
MURHB860CT	8.0	600	2.8	0.01	35	D <sup>2</sup> PAK
MURH840CT	8.0	400	2.2	0.01	28	TO-220AB
MURH860CT	8.0	600	2.8	0.01	35	TO-220AB
MURHF860CT	8.0	600	2.8	0.01	35	TO-220FP

3. Refers to maximum leakage current per leg on “CT” suffix devices.

Table 5. ULTRASOFT RECTIFIERS (For High Speed Rectification)

Device	I <sub>O</sub> (A)	V <sub>RRM</sub> (V)	Max V <sub>F</sub> @ I <sub>O</sub> and T <sub>C</sub> = 25°C (V)	Max t <sub>rr</sub> (ns)	T <sub>J</sub> Max (°C)	Package
MSRD620CT	6.0	200	1.15	55	175	DPAK
MSR860	8.0	600	1.7	120	150	TO-220AC
MSR1560	15	600	1.8	45	150	TO-220AC
MSRF860	8	600	1.7	120	150	TO-220FP
MSRF1560	15	600	1.8	45	150	TO-220FP

Table 6. ENERGY RATED RECTIFIERS

Device	I <sub>O</sub> (A)	V <sub>RRM</sub> (V)	Max V <sub>F</sub> @ I <sub>O</sub> Rated and T <sub>C</sub> = 25°C (V)	Max I <sub>R</sub> @ Rated V <sub>RRM</sub> and T <sub>C</sub> = 25°C (μA)	Avalanche Energy (mJ)	Package
MUR180E	1.0	800	1.75	10	10	Case 59-10
MUR1100E	1.0	1000	1.75	10	10	Case 59-10
MUR480E	4.0	800	1.85	25	20	Case 267-05
MUR4100E	4.0	1000	1.85	25	20	Case 267-05
MURS480E	4.0	800	1.85	25	20	SMC
MUR880E	8.0	800	1.8	25	20	TO-220AC
MUR8100E	8.0	1000	1.8	25	20	TO-220AC





APPLICATION SPECIFIC RECTIFIERS (continued)

Table 7. LVFR TRENCH BASED SCHOTTKY RECTIFIERS

Device	I <sub>O</sub> (A)	V <sub>RRM</sub> (V)	Max V <sub>F</sub> @ I <sub>O</sub> Rated and T <sub>C</sub> = 25°C (V)	Max I <sub>R</sub> @ Rated V <sub>RRM</sub> and T <sub>C</sub> = 25°C (μA)	Package
NTST301005G	30	100	0.95	1.0	TO-220AB

SCHOTTKY RECTIFIERS


Table 8. SURFACE MOUNT SCHOTTKY RECTIFIERS

V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max V <sub>F</sub> @ I <sub>O</sub> T <sub>C</sub> = 25°C (V)	I <sub>FSM</sub> (A)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> <sup>(4)</sup> T <sub>J</sub> = 25°C (mA)	Max I <sub>R</sub> <sup>(4)</sup> (mA)	Package	
20	0.5	T <sub>L</sub> = 90°C	MBR0520L	0.385	5.5	125	0.250	8.0 @ 100°C	CASE 425-04 (SOD-123) Cathode = Band 	
30	0.5	T <sub>L</sub> = 100°C	MBR0530	0.430	5.5	125	0.130	4.0 @ 100°C		
30	2.0	T <sub>L</sub> = 105°C	MBR230LSF	0.43	40	125	1.0	25 @ 100°C		
30	1.0	T <sub>L</sub> = 65°C	MBR130	0.51	5.5	125	0.06	4.0 @ 125°C		
40	0.5	T <sub>L</sub> = 115°C	MBR0540	0.51	5.5	150	0.020	13 @ 100°C	CASE 498-01 (SOD-123FL) 	
100	1.0	T <sub>L</sub> = 162°C	MBR1H100SF	0.76	50	175	0.04	0.5 @ 125°C		
100	2.0	T <sub>L</sub> = 146°C	MBR2H100SF	0.84	50	175	0.04	0.5 @ 125°C		
20	1.0	T <sub>L</sub> = 140°C	MBR120ESF	0.53	40	150	0.01	1.6 @ 100°C		
20	1.0	T <sub>L</sub> = 115°C	MBR120LSF	0.45	50	125	0.4	25 @ 85°C		
20	1.0	T <sub>L</sub> = 119°C	MBR120VLSF	0.34	45	125	0.6	15 @ 85°C		
30	1.0	T <sub>L</sub> = 117°C	MBR130LSF	0.38	40	125	1.0	25 @ 100°C		
40	1.0	T <sub>L</sub> = 112°C	MBR140SF	0.55	30	125	0.5	25 @ 85°C		
10	1.0	T <sub>C</sub> = 115°C	MBRM110E	0.53	50	150	0.001	0.5 @ 100°C		CASE 457-04 (POWERMITE®) 
10	1.0	T <sub>C</sub> = 115°C	MBRM110L	0.365	50	125	0.5	60 @ 100°C		
20	1.0	T <sub>C</sub> = 130°C	MBRM120E	0.53	50	150	0.01	1.6 @ 100°C		
20	1.0	T <sub>C</sub> = 115°C	MBRM120L	0.45	50	125	0.4	25 @ 85°C		
30	1.0	T <sub>C</sub> = 135°C	MBRM130L	0.38	50	125	0.41	11 @ 85°C		
40	1.0	T <sub>C</sub> = 110°C	MBRM140	0.55	50	125	0.5	25 @ 85°C		
100	1.0	T <sub>L</sub> = 168°C	MBRM1H100	0.76	50	175	0.02	1.0 @ 125°C		
100	2.0	T <sub>L</sub> = 160°C	MBRM2H100	0.84	50	175	0.02	1.0 @ 125°C		
10	2.0	T <sub>C</sub> = 125°C	MBRA210E	0.5	100	150	0.05	0.5 @ 100°C	CASE 403D-02 (SMA) Cathode = Notch or Polarity Band 	
10	2.0	T <sub>L</sub> = 110°C	MBRA210L	0.35	160	125	0.70	60 @ 100°C		
20	1.0	T <sub>L</sub> = 125°C	MBRA120E	0.53	40	150	0.01	1.6 @ 100°C		
20	3.0	T <sub>L</sub> = 100°C	MBRA320	0.50	80	125	2.0	20 @ 100°C		
30	1.0	T <sub>C</sub> = 105°C	MBRA130L	0.41	25	125	1.0	25 @ 100°C		
40	1.0	T <sub>C</sub> = 95°C	MBRA140	0.55	30	125	0.5	10 @ 100°C		
40	3.0	T <sub>L</sub> = 100°C	MBRA340	0.45	100	150	0.3	15 @ 100°C		
60	1.0	T <sub>C</sub> = 105°C	MBRA160	0.51	60	150	0.2	12 @ 125°C		
100	1.0	T <sub>L</sub> = 167°C	MBRA1H100	0.76	50	175	0.04	0.5 @ 125°C		
100	2.0	T <sub>L</sub> = 150°C	MBRA2H100	0.79	130	175	0.008	1.5 @ 125°C		

4. At V<sub>RRM</sub>

SCHOTTKY RECTIFIERS (continued)

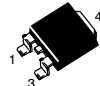
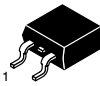
Table 7. SURFACE MOUNT SCHOTTKY RECTIFIERS (continued)

V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max V <sub>F</sub> @ I <sub>O</sub> Rated T <sub>C</sub> = 25°C (V)	I <sub>FSM</sub> (A)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> <sup>(5)</sup> T <sub>J</sub> = 25°C (mA)	Max I <sub>R</sub> (mA)	Package
20	1.0	T <sub>L</sub> = 115°C	<b>MBRS120</b>	0.6	40	125	1.0	10 @ 100°C	<b>CASE 403A-03</b> (SMB) Cathode = Notch or Polarity Band 
30	1.0	T <sub>L</sub> = 120°C	<b>MBRS130L</b>	0.395	40	125	1.0	10 @ 100°C	
30	1.0	T <sub>L</sub> = 115°C	<b>MBRS130</b>	0.6	40	125	1.0	10 @ 100°C	
30	2.0	T <sub>C</sub> = 110°C	<b>MBRS230L</b>	0.5	40	125	1.0	75 @ 125°C	
40	1.0	T <sub>L</sub> = 115°C	<b>MBRS140</b>	0.6	40	125	1.0	10 @ 100°C	
40	1.5	T <sub>C</sub> = 100°C	<b>MBRS1540</b>	0.46	40	125	0.8	5.7 @ 100°C	
40	2.0	T <sub>C</sub> = 100°C	<b>MBRS240L</b>	0.43	25	125	2.0	60 @ 100°C	
40	2.0	T <sub>C</sub> = 103°C	<b>MBRS2040L</b>	0.43	70	125	0.80	20 @ 100°C	
60	2.0	T <sub>L</sub> = 95°C	<b>MBRS260</b>	0.63	60	125	0.2	12 @ 125°C	
90	1.0	T <sub>L</sub> = 163°C	<b>MBRS190</b>	0.75	50	175	0.5	5.0 @ 100°C	
100	1.0	T <sub>L</sub> = 163°C	<b>MBRS1100</b>	0.75	50	175	0.5	5.0 @ 100°C	
100	2.0	T <sub>L</sub> = 150°C	<b>MBRS2H100</b>	0.79	130	175	0.008	1.5 @ 125°C	
200	3.0	T <sub>L</sub> = 120°C	<b>MBRS3200</b>	0.84	100	150	1.0	5.0 @ 100°C	
10	4.0	T <sub>L</sub> = 130°C	<b>MBRS410E</b>	0.50	250	150	0.15	4.0 @ 100°C	
10	4.0	T <sub>L</sub> = 110°C	<b>MBRS410L</b>	0.33	150	125	5.0	200 @ 100°C	
20	3.0	T <sub>L</sub> = 110°C	<b>MBRS320</b>	0.50	80	150	2.0	20 @ 100°C	
30	3.0	T <sub>L</sub> = 110°C	<b>MBRS330</b>	0.50	80	150	2.0	20 @ 100°C	
40	3.0	T <sub>L</sub> = 110°C	<b>MBRS340</b>	0.5	80	150	2.0	20 @ 100°C	
40	5.0	T <sub>C</sub> = 105°C	<b>MBRS540</b>	0.5	190	150	0.3	15 @ 100°C	
60	3.0	T <sub>L</sub> = 137°C	<b>MBRS360</b>	0.74	125	175	0.15	10 @ 100°C	
100	3.0	T <sub>L</sub> = 100°C	<b>MBRS3100</b>	0.79	130	175	0.05	5.0 @ 125°C	
200	3.0	T <sub>C</sub> = 70°C	<b>MBRS3201</b>	0.84	100	150	1.0	5.0 @ 150°C	
200	4.0	T <sub>L</sub> = 70°C	<b>MBRS4201</b>	0.86	100	150	1.0	5.0 @ 150°C	

5. At V<sub>RRM</sub>

SCHOTTKY RECTIFIERS (continued)

Table 7. SURFACE MOUNT SCHOTTKY RECTIFIERS (continued)



V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max V <sub>F</sub> @ I <sub>O</sub> Rated T <sub>C</sub> = 25°C (V)	I <sub>FSM</sub> (A)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> <sup>(6)</sup> T <sub>J</sub> = 25°C (mA)	Max I <sub>R</sub> <sup>(6)</sup> (mA)	Package	
20	3.0	T <sub>C</sub> = 125°C	<i>MBRD320</i>	0.60	75	175	0.2	20 @ 125°C	<p><b>CASE 369A-13 (DPAK)</b></p>  <p>1 3 4</p> <p>1 3 4</p> <p>“CT” Suffix</p> <p>1 3 4</p> <p>Non-“CT” Suffix</p> <p>3 4</p> <p>MBRD5H100 ONLY</p>	
20	6.0	T <sub>C</sub> = 130°C	<i>MBRD620CT</i>	0.70	75	175	0.1	15 @ 125°C		
30	3.0	T <sub>C</sub> = 125°C	<i>MBRD330</i>	0.60	75	175	0.2	20 @ 125°C		
30	6.0	T <sub>C</sub> = 130°C	<i>MBRD630CT</i>	0.70	75	175	0.1	15 @ 125°C		
35	8.0	T <sub>C</sub> = 88°C	<i>MBRD835L</i>	0.51	75	150	1.4	35 @ 100°C		
35	10	T <sub>C</sub> = 115°C	<i>MBRD1035CTL</i>	0.47	50	150	2.0	60 @ 100°C		
40	3.0	T <sub>C</sub> = 125°C	<i>MBRD340</i>	0.60	75	175	0.2	20 @ 125°C		
40	6.0	T <sub>C</sub> = 130°C	<i>MBRD640CT</i>	0.70	75	175	0.1	15 @ 125°C		
45	10	T <sub>C</sub> = 135°C	<i>MBRD1045</i>	0.84	70	175	0.1	15 @ 125°C		
50	3.0	T <sub>C</sub> = 125°C	<i>MBRD350</i>	0.60	75	175	0.2	20 @ 125°C		
50	6.0	T <sub>C</sub> = 130°C	<i>MBRD650CT</i>	0.70	75	175	0.1	15 @ 125°C		
60	3.0	T <sub>C</sub> = 125°C	<i>MBRD360</i>	0.60	75	175	0.2	20 @ 125°C		
60	6.0	T <sub>C</sub> = 130°C	<i>MBRD660CT</i>	0.70	75	175	0.1	15 @ 125°C		
100	5.0	T <sub>C</sub> = 171°C	<i>MBRD5H100</i>	0.71	105	175	0.0035	4.5 @ 125°C		
15	25	T <sub>C</sub> = 90°C	<i>MBRB2515L</i>	0.45	150	100	15	200 @ 70°C		<p><b>CASE 418B-04 (D<sup>2</sup>PAK)</b></p>  <p>1 3 4</p> <p>1 3 4</p> <p>“CT” Suffix</p> <p>1 3 4</p> <p>Non-“CT” Suffix</p>
30	30	T <sub>C</sub> = 134°C	<i>MBRB3030CT</i>	0.54	200	175	0.6	145 @ 150°C		
30	30	T <sub>C</sub> = 115°C	<i>MBRB3030CTL</i>	0.44	300	125	2.0	195 @ 125°C		
30	40	T <sub>C</sub> = 115°C	<i>MBRB4030</i>	0.55	300	175	0.35	150 @ 125°C		
35	25	T <sub>C</sub> = 110°C	<i>MBRB2535CTL</i>	0.47	150	125	10	500 @ 125°C		
45	30	T <sub>C</sub> = 164°C	<i>MBRB2545CT</i>	0.62	150	175	0.2	25 @ 125°C		
45	10	T <sub>C</sub> = 135°C	<i>MBRB1045</i>	0.84	150	175	0.1	15 @ 125°C		
45	15	T <sub>C</sub> = 167°C	<i>MBRB1545CT</i>	0.84	150	175	0.1	15 @ 125°C		
45	16	T <sub>C</sub> = 163°C	<i>MBRB1645</i>	0.63	150	175	0.2	40 @ 125°C		
60	30	T <sub>C</sub> = 159°C	<i>MBRB30H60CT</i>	0.62	260	175	0.3	45 @ 125°C		
60	20	T <sub>C</sub> = 110°C	<i>MBRB2060CT</i>	0.95	150	175	0.15	35 @ 125°C		
100	8	T <sub>C</sub> = 146°C	<i>MBRB8H100</i>	0.71	250	175	0.0045	5.3 @ 125°C		
100	20	T <sub>C</sub> = 162°C	<i>MBRB20H100CT</i>	0.77	250	175	0.0045	6.0 @ 125°C		
100	40	T <sub>C</sub> = 150°C	<i>MBRB41H100CT</i>	0.8	350	175	0.01	10 @ 125°C		
100	60	T <sub>C</sub> = 155°C	<i>MBRB60H100CT</i>	0.84	350	175	0.01	10 @ 125°C		
100	20	T <sub>C</sub> = 110°C	<i>MBRB20100CT</i>	0.85	150	175	0.1	6.0 @ 125°C		
200	20	T <sub>C</sub> = 134°C	<i>MBRB20200CT</i>	0.9	150	150	1.0	50 @ 125°C		

6. At V<sub>RRM</sub>; refers to maximum leakage current per leg on “CT” suffix devices.



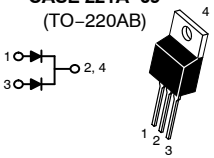
**SCHOTTKY RECTIFIERS (continued)**

**Table 9. AXIAL LEAD SCHOTTKY RECTIFIERS**

$V_{RRM}$ (V)	$I_O$ (A)	$I_O$ Rating Condition	Device	Max $V_F$ @ $I_O$ Rated $T_C = 25^\circ\text{C}$ (V)	$I_{FSM}$ (A)	$T_J$ Max ( $^\circ\text{C}$ )	Max $I_R$ @ $V_{RRM}$ $T_A = 25^\circ\text{C}$ (mA)	Max $I_R$ @ $V_{RRM}$ $T_A = 100^\circ\text{C}$ (mA)	Package
20	1.0	$T_A = 55^\circ\text{C}$ $R_{\theta JA} = 80^\circ\text{C/W}$	<b>1N5817</b>	0.45	25	125	1.0	10	<p><b>CASE 59-10 (DO-41) Plastic</b></p>  <p>Cathode = Polarity Band</p>
30	1.0	$T_A = 55^\circ\text{C}$ $R_{\theta JA} = 80^\circ\text{C/W}$	<b>1N5818</b>	0.55	25	125	1.0	10	
40	1.0	$T_A = 55^\circ\text{C}$ $R_{\theta JA} = 80^\circ\text{C/W}$	<b>1N5819</b>	0.60	25	125	1.0	10	
50	1.0	$T_A = 55^\circ\text{C}$ $R_{\theta JA} = 80^\circ\text{C/W}$	<b>MBR150</b>	0.75	25	150	0.5	5.0	
60	1.0	$T_A = 55^\circ\text{C}$ $R_{\theta JA} = 80^\circ\text{C/W}$	<b>MBR160</b>	0.75	25	150	0.5	5.0	
100	1.0	$T_A = 120^\circ\text{C}$ $R_{\theta JA} = 50^\circ\text{C/W}$	<b>MBR1100</b>	0.79	50	175	0.5	5.0	
20	3.0	$T_A = 76^\circ\text{C}$ $R_{\theta JA} = 28^\circ\text{C/W}$	<b>1N5820</b>	0.475	80	125	2.0	20	<p><b>CASE 267-05 (DO-201AD) Plastic</b></p>  <p>Cathode = Polarity Band</p>
30	3.0	$T_A = 71^\circ\text{C}$ $R_{\theta JA} = 28^\circ\text{C/W}$	<b>1N5821</b>	0.50	80	125	2.0	20	
40	3.0	$T_A = 61^\circ\text{C}$ $R_{\theta JA} = 28^\circ\text{C/W}$	<b>1N5822</b>	0.525	80	125	2.0	20	
40	3.0	$T_A = 65^\circ\text{C}$ $R_{\theta JA} = 28^\circ\text{C/W}$	<b>MBR340</b>	0.60	80	175	0.6	20	
50	3.0	$T_A = 65^\circ\text{C}$ $R_{\theta JA} = 28^\circ\text{C/W}$	<b>MBR350</b>	0.74	80	150	0.6	20	
60	3.0	$T_A = 65^\circ\text{C}$ $R_{\theta JA} = 28^\circ\text{C/W}$	<b>MBR360</b>	0.74	80	150	0.6	20	
100	3.0	$T_A = 100^\circ\text{C}$ $R_{\theta JA} = 28^\circ\text{C/W}$	<b>MBR3100</b>	0.79	150	175	0.6	20	

SCHOTTKY RECTIFIERS (continued)

Table 10. TO-220 AND I<sup>2</sup>PAK THRU-HOLE SCHOTTKY RECTIFIERS

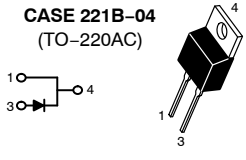

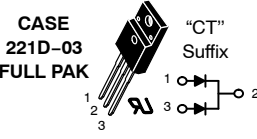





V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max V <sub>F</sub> @ I <sub>O</sub> Rated T <sub>C</sub> = 25°C (V)	I <sub>FSM</sub> (A)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> <sup>(7)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 25°C (mA)	Max I <sub>R</sub> <sup>(7)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 125°C (mA)	Package
15	40	T <sub>C</sub> = 140°C	MBR4015CTL	0.43	150	150	10	600 @ 125°C	<p>CASE 221A-09 (TO-220AB)</p> 
30	20	T <sub>C</sub> = 167°C	MBR2030CTL	0.52	150	175	5.0	75 @ 125°C	
30	30	T <sub>C</sub> = 138°C	MBR30H30CT	0.48	260	150	0.8	130 @ 125°C	
35	15	T <sub>C</sub> = 163°C	MBR1535CT	0.57 @ 125°C	150	175	0.1	15 @ 125°C	
35	25	T <sub>C</sub> = 142°C	MBR2535CTL	0.47	150	150	5.0	500 @ 125°C	
35	30	T <sub>C</sub> = 160°C	MBR2535CT	0.62	150	175	0.2	25 @ 125°C	
45	15	T <sub>C</sub> = 163°C	MBR1545CT	0.57 @ 125°C	150	175	0.1	15 @ 125°C	
45	20	T <sub>C</sub> = 141°C	MBR20L45CT	0.5	180	150	0.5	170 @ 125°C	
45	20	T <sub>C</sub> = 165°C	MBR2045CT	0.57 @ 125°C	150	175	0.1	15 @ 125°C	
45	25	T <sub>C</sub> = 160°C	MBR2545CT	0.62	150	175	0.2	25 @ 125°C	
45	30	T <sub>C</sub> = 137°C	MBR30L45CT	0.5	190	150	0.65	250 @ 125°C	
45	30	T <sub>C</sub> = 130°C	MBR3045ST	0.62	150	175	0.2	40 @ 125°C	
45	40	T <sub>C</sub> = 145°C	MBR40L45CT	0.5	200	175	1.2	275 @ 125°C	
45	60	T <sub>C</sub> = 145°C	MBR60L45CT	0.55	200	175	1.2	275 @ 125°C	
60	10	T <sub>C</sub> = 140°C	MBR10L60CT	0.66	200	150	0.22	60 @ 125°C	
60	20	T <sub>C</sub> = 123°C	MBR20L60CT	0.73	240	150	0.38	96 @ 125°C	
60	20	T <sub>C</sub> = 133°C	MBR2060CT	0.85	150	175	0.1	20 @ 125°C	
60	30	T <sub>C</sub> = 159°C	MBR30H60CT	0.62	260	175	0.3	45 @ 125°C	
60	30	T <sub>C</sub> = 133°C	MBR30L60CT	0.81	240	150	0.35	110 @ 125°C	
60	40	T <sub>C</sub> = 130°C	MBR40L60CT	0.81	240	150	0.55	175 @ 125°C	
80	20	T <sub>C</sub> = 137°C	MBR20L80CT	0.85	175	150	0.5	50 @ 125°C	
80	20	T <sub>C</sub> = 133°C	MBR2080CT	0.85	150	175	0.1	6.0 @ 125°C	
80	30	T <sub>C</sub> = 130°C	MBR30H80CT	0.88	240	150	0.25	35 @ 125°C	
90	20	T <sub>C</sub> = 133°C	MBR2090CT	0.85	150	175	0.1	6.0 @ 125°C	
100	16	T <sub>C</sub> = 166°C	MBR16100CT	0.74	150	175	0.1	5.0 @ 125°C	
100	10	T <sub>C</sub> = 168°C	MBR10H100CT	0.75	180	175	0.0035	4.5 @ 125°C	
100	20	T <sub>C</sub> = 162°C	MBR20H100CT	0.77	250	175	0.0045	6.0 @ 125°C	
100	20	T <sub>C</sub> = 133°C	MBR20100CT	0.85	150	175	0.1	6.0 @ 125°C	
100	30	T <sub>C</sub> = 156°C	MBR30H100CT	0.80	250	175	0.0045	6.0 @ 125°C	
100	40	T <sub>C</sub> = 150°C	MBR41H100CT	0.80	350	175	0.01	10 @ 125°C	
100	60	T <sub>C</sub> = 155°C	MBR60H100CT	0.84	350	175	0.01	10 @ 125°C	
150	20	T <sub>C</sub> = 134°C	MBR20H150CT	0.68 @ 125°C	180	150	0.05	30 @ 125°C	
150	30	T <sub>C</sub> = 124°C	MBR30H150CT	1.11	200	150	0.06	50 @ 125°C	
200	20	T <sub>C</sub> = 161°C	MBR20200CT	0.90	150	175	1.0	50 @ 125°C	
250	40	T <sub>C</sub> = 82°C	MBR40250T	0.86	150	150	0.03	30 @ 125°C	

7. Refers to maximum leakage current per leg on "CT" suffix devices.


Ⓝ Indicates UL Recognized – File #E69369

SCHOTTKY RECTIFIERS (continued)

Table 10. TO-220 AND I<sup>2</sup>PAK THRU-HOLE SCHOTTKY RECTIFIERS

V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max V <sub>F</sub> @ I <sub>O</sub> Rated T <sub>C</sub> = 25°C (V)	I <sub>FSM</sub> (A)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> <sup>(7)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 25°C (mA)	Max I <sub>R</sub> <sup>(7)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 125°C (mA)	Package
15	25	T <sub>C</sub> = 91°C	<i>MBR2515L</i>	0.45	150	100	15	200 @ 70°C	<p>CASE 221B-04 (TO-220AC)</p> 
35	7.5	T <sub>C</sub> = 164°C	<i>MBR735</i>	0.84	150	175	0.1	15 @ 125°C	
35	10	T <sub>C</sub> = 135°C	<i>MBR1035</i>	0.84	150	175	0.1	15 @ 125°C	
35	16	T <sub>C</sub> = 163°C	<i>MBR1635</i>	0.63	150	175	0.2	40 @ 125°C	
45	7.5	T <sub>C</sub> = 164°C	<i>MBR745</i>	0.84	150	175	0.1	15 @ 125°C	
45	10	T <sub>C</sub> = 135°C	<i>MBR1045</i>	0.84	150	175	0.1	15 @ 125°C	
45	16	T <sub>C</sub> = 163°C	<i>MBR1645</i>	0.63	150	175	0.2	40 @ 125°C	
60	10	T <sub>C</sub> = 133°C	<i>MBR1060</i>	0.80	150	175	0.1	15 @ 125°C	
80	10	T <sub>C</sub> = 133°C	<i>MBR1080</i>	0.80	150	175	0.1	6.0 @ 125°C	
90	10	T <sub>C</sub> = 133°C	<i>MBR1090</i>	0.80	150	175	0.1	6.0 @ 125°C	
100	10	T <sub>C</sub> = 133°C	<i>MBR10100</i>	0.80	150	175	0.1	6.0 @ 125°C	
250	40	T <sub>C</sub> = 82°C	<i>MBR40250</i>	0.86	150	150	0.03	30 @ 125°C	
30	30	T <sub>C</sub> = 138°C	<i>MBRB30H30CT-1</i>	0.48	260	150	0.8	45 @ 125°C	<p>CASE 418D-01 I<sup>2</sup>PAK (TO-262)</p> 
45	30	T <sub>C</sub> = 130°C	<i>MBRB3045CT-1</i>	0.48	150	175	0.2	40 @ 125°C	
60	30	T <sub>C</sub> = 159°C	<i>MBRB30H60CT-1</i>	0.62	260	175	0.3	45 @ 125°C	
80	30	T <sub>C</sub> = 130°C	<i>MBRB30H80CT-1</i>	0.88	240	150	0.25	35 @ 125°C	
100	40	T <sub>C</sub> = 150°C	<i>MBRB41H100CT-1</i>	0.80	350	175	0.01	10 @ 125°C	
45	20	T <sub>C</sub> = 141°C	<i>MBRF20L45CT</i>	0.5	180	150	0.5	170 @ 125°C	<p>CASE 221D-03 FULL PAK</p>  <p>"CT" Suffix</p>
45	20	T <sub>C</sub> = 165°C	<i>MBRF2045CT</i>	0.84 @ 20 A	150	175	0.1	15 @ 125°C	
45	25	T <sub>C</sub> = 125°C	 <i>MBRF2545CT</i>	0.70	150	175	0.2	40 @ 125°C	
45	30	T <sub>C</sub> = 137°C	<i>MBRF30L45CT</i>	0.5	190	150	0.65	250 @ 125°C	
60	10	T <sub>C</sub> = 140°C	<i>MBRF10L60CT</i>	0.66	200	150	0.22	60 @ 125°C	
60	20	T <sub>C</sub> = 123°C	<i>MBRF20L60CT</i>	0.73	240	150	0.38	96 @ 125°C	
60	20	T <sub>C</sub> = 133°C	 <i>MBRF2060CT</i>	0.85	150	175	0.15	150 @ 125°C	
60	30	T <sub>C</sub> = 133°C	<i>MBRF30L60CT</i>	0.81	240	150	0.35	110 @ 125°C	
60	30	T <sub>C</sub> = 159°C	<i>MBRF30H60CT</i>	0.62	260	175	0.3	45 @ 125°C	
80	20	T <sub>C</sub> = 137°C	<i>MBRF20L80CT</i>	0.85	175	150	0.5	50 @ 125°C	
100	20	T <sub>C</sub> = 162°C	<i>MBRF20H100CT</i>	0.77	250	175	0.0045	6.0 @ 125°C	
100	20	T <sub>C</sub> = 133°C	 <i>MBRF20100CT</i>	0.85	150	175	0.15	150 @ 125°C	
100	30	T <sub>C</sub> = 156°C	<i>MBRF30H100CT</i>	0.8	250	175	0.0045	6.0 @ 125°C	
150	10	T <sub>C</sub> = 142°C	<i>MBRF10H150CT</i>	0.69 @ 125°C	150	150	0.045	20 @ 125°C	
150	20	T <sub>C</sub> = 134°C	<i>MBRF20H150CT</i>	0.68 @ 125°C	180	150	0.05	30 @ 125°C	
150	30	T <sub>C</sub> = 124°C	<i>MBRF30H150CT</i>	0.73 @ 125°C	200	150	0.06	50 @ 125°C	
200	20	T <sub>C</sub> = 125°C	 <i>MBRF20200CT</i>	0.90	150	150	1.0	50 @ 125°C	
250	40	T <sub>C</sub> = 46°C	 <i>MBRF40250T</i>	0.86	150	150	0.03	30 @ 125°C	

7. Refers to maximum leakage current per leg on "CT" suffix devices.

 Indicates UL Recognized – File #E69369

**SCHOTTKY RECTIFIERS (continued)**

**Table 11. TO-218 AND TO-247 SCHOTTKY RECTIFIERS**

V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max V <sub>F</sub> @ I <sub>O</sub> Rated T <sub>C</sub> = 25°C (V)	I <sub>FSM</sub> (A)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> <sup>(8)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 25°C (mA)	Max I <sub>R</sub> <sup>(8)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 100°C (mA)	Package
45	30	T <sub>C</sub> = 105°C	<i>MBR3045PT</i>	0.76 @ 60 A	200	175	1.0	100 @ 125°C	<b>CASE 340D-02</b> (TO-218AC) 
45	40	T <sub>C</sub> = 125°C	<i>MBR4045PT</i>	0.70	400	175	1.0	50 @ 125°C	
45	60	T <sub>C</sub> = 125°C	<i>MBR6045PT</i>	0.62	500	175	1.0	50 @ 125°C	
15	40	T <sub>C</sub> = 120°C	<i>MBR4015LWT</i>	0.42	120	150	5.0	150 @ 100°C	<b>CASE 340L-02</b> (TO-247) 
30	70	T <sub>C</sub> = 100°C	<i>MBR7030WT</i>	0.55	500	175	5.0	250 @ 100°C	
45	30	T <sub>C</sub> = 105°C	<i>MBR3045WT</i>	0.76 @ 60 A	200	175	1.0	100 @ 125°C	
45	40	T <sub>C</sub> = 125°C	<i>MBR4045WT</i>	0.70	400	175	1.0	530 @ 100°C	
45	60	T <sub>C</sub> = 125°C	<i>MBR6045WT</i>	0.62	500	175	1.0	50 @ 100°C	
45	60	T <sub>C</sub> = 165°C	<i>MBR60L45WT</i>	0.55	200	175	1.2	275 @ 125°C	
100	40	T <sub>C</sub> = 148°C	<i>MBR40H100WT</i>	0.80	200	175	0.01	10 @ 125°C	

8. Refers to maximum leakage current per leg on "CT" suffix devices.

**ULTRASOFT RECTIFIERS**


**Table 12. ULTRASOFT RECTIFIERS (For High Speed Rectification)**

V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max V <sub>F</sub> @ I <sub>O</sub> T <sub>C</sub> = 25°C (V)	t <sub>rr</sub> (ns)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> <sup>(9)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 25°C (μA)	Max I <sub>R</sub> <sup>(9)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 150°C (μA)	Package
200	6.0	T <sub>C</sub> = 137°C	<i>MSRD620CT</i>	1.15	55	175	5.0	200	<b>CASE 369A-13</b> (DPAK) 
200	6.0	T <sub>C</sub> = 162°C	<i>MSRD620CTR</i>	1.3	75	175	1.0	200	<b>CASE 369A-13</b> (DPAK) 
600	8.0	T <sub>C</sub> = 125°C	<i>MSR860</i>	1.7	120	150	10	1000	<b>CASE 221B-04</b> (TO-220AC) 
600	15	T <sub>C</sub> = 125°C	<i>MSR1560</i>	1.8	45	150	15	5000	
600	8	T <sub>C</sub> = 125°C	<i>MSRF860</i>	1.7	120	150	10	1000	<b>CASE 221D-03</b> <b>FULL PAK</b> 
600	15	T <sub>C</sub> = 125°C	<i>MSRF1560</i>	1.8	45	150	15	5000	

9. Refers to maximum leakage current per leg on "CT" suffix devices.

ULTRAFAST RECTIFIERS



Table 13. SURFACE MOUNT ULTRAFAST RECTIFIERS

V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max t <sub>rr</sub> (ns)	Max V <sub>F</sub> @ I <sub>O</sub> Rated T <sub>C</sub> = 25°C (V)	I <sub>FSM</sub> (A)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> <sup>(10)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 25°C (μA)	Max I <sub>R</sub> <sup>(10)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 150°C (μA)	Package
50	1.0	T <sub>L</sub> = 155°C	<i>MURA105</i>	30	0.875	50	175	2.0	50	CASE 403D-02 SMA  Cathode = Polarity Band
50	2.0	T <sub>L</sub> = 135°C	<i>MURA205</i>	30	0.94	50	175	2.0	50	
100	1.0	T <sub>L</sub> = 155°C	<i>MURA110</i>	30	0.875	50	175	2.0	50	
100	2.0	T <sub>L</sub> = 135°C	<i>MURA210</i>	30	0.94	50	175	2.0	50	
150	1.0	T <sub>L</sub> = 155°C	<i>MURA115</i>	35	0.875	40	175	2.0	50	
150	2.0	T <sub>L</sub> = 135°C	<i>MURA215</i>	35	0.95	40	175	2.0	50	
200	1.0	T <sub>L</sub> = 155°C	<i>MURA120</i>	35	0.875	40	175	2.0	50	
200	2.0	T <sub>L</sub> = 135°C	<i>MURA220</i>	35	0.95	40	175	2.0	50	
300	1.0	T <sub>L</sub> = 150°C	<i>MURA130</i>	65	1.1	35	175	5.0	150	
300	2.0	T <sub>L</sub> = 125°C	<i>MURA230</i>	65	1.3	35	175	5.0	150	
400	1.0	T <sub>L</sub> = 150°C	<i>MURA140</i>	65	1.1	35	175	5.0	150	
400	2.0	T <sub>L</sub> = 125°C	<i>MURA240</i>	65	1.3	35	175	5.0	150	
600	1.0	T <sub>L</sub> = 145°C	<i>MURA160</i>	75	1.25	30	175	5.0	150	
600	2.0	T <sub>L</sub> = 110°C	<i>MURA260</i>	75	1.45	30	175	5.0	150	
50	1.0	T <sub>L</sub> = 155°C	<i>MURS105</i>	35	0.875	40	175	2.0	50	
50	2.0	T <sub>L</sub> = 125°C	<i>MURS205</i>	30	0.94	50	175	2.0	50	
100	1.0	T <sub>L</sub> = 155°C	<i>MURS110</i>	35	0.875	40	175	2.0	50	
100	2.0	T <sub>L</sub> = 125°C	<i>MURS210</i>	30	0.94	50	175	2.0	50	
150	1.0	T <sub>L</sub> = 155°C	<i>MURS115</i>	35	0.875	40	175	2.0	50	
200	1.0	T <sub>L</sub> = 155°C	<i>MURS120</i>	35	0.875	40	175	2.0	50	
200	2.0	T <sub>L</sub> = 145°C	<i>MURS220</i>	35	0.95	40	175	2.0	50	
300	2.0	T <sub>L</sub> = 125°C	<i>MURS230</i>	65	1.3	35	175	5.0	150	
400	1.0	T <sub>L</sub> = 150°C	<i>MURS140</i>	75	1.25	35	175	5.0	150	
400	2.0	T <sub>L</sub> = 125°C	<i>MURS240</i>	65	1.3	35	175	5.0	150	
600	1.0	T <sub>L</sub> = 145°C	<i>MURHS160</i>	35	2.4	15	175	20	200 @ 125°C	
600	1.0	T <sub>L</sub> = 150°C	<i>MURS160</i>	75	1.25	35	175	5.0	150	
600	2.0	T <sub>L</sub> = 125°C	<i>MURS260</i>	75	1.45	35	175	5.0	150	
600	3.0	T <sub>L</sub> = 105°C	<i>MURS360B</i>	75	1.25	100	175	3.0	150	
200	3.0	T <sub>L</sub> = 140°C	<i>MURS320</i>	35	0.875	75	175	5.0	150	
400	3.0	T <sub>L</sub> = 130°C	<i>MURS340</i>	75	1.25	75	175	10	250	
600	3.0	T <sub>L</sub> = 130°C	<i>MURS360</i>	75	1.25	75	175	10	250	
800	4.0	T <sub>L</sub> = 110°C	<i>MURS480E</i>	100	1.85	70	175	25	900	
200	3.0	T <sub>C</sub> = 158°C	<i>MURD320</i>	35	0.95	75	175	5.0	500 @ 125°C	
200	6.0	T <sub>C</sub> = 140°C	<i>MURD620CT</i>	35	1.0	50	175	5.0	250 @ 125°C	
300	3.0	T <sub>C</sub> = 160°C	<i>MURD330</i>	50	1.15	75	175	5.0	500	
300	5.0	T <sub>C</sub> = 165°C	<i>MURD530</i>	45	1.05	75	175	5.0	100 @ 125°C	
520	5.0	T <sub>C</sub> = 160°C	<i>MURD550PF</i>	95	1.15	75	175	5.0	400	
600	5.0	T <sub>C</sub> = 159°C	<i>MURHD560</i>	30	2.7	50	175	10	70 @ 125°C	
200	16	T <sub>C</sub> = 150°C	<i>MURB1620CT</i>	35	0.975	100	175	5.0	250	
200	16	T <sub>C</sub> = 150°C	<i>MURB1620CTR</i>	35	0.975	100	175	5.0	250	
400	8.0	T <sub>C</sub> = 120°C	<i>MURHB840CT</i>	28	2.2	100	175	10	500	
600	8.0	T <sub>C</sub> = 120°C	<i>MURHB860CT</i>	35	2.8	100	175	10	500	
600	16	T <sub>C</sub> = 150°C	<i>MURB1660CT</i>	60	1.5	100	175	10	500	

10. Refers to maximum leakage current per leg on "CT" suffix devices.

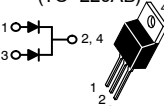
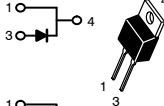
ULTRAFAST RECTIFIERS (continued)

Table 14. AXIAL LEAD ULTRAFAST RECTIFIERS

V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max t <sub>rr</sub> (ns)	Max V <sub>F</sub> @ I <sub>O</sub> Rated T <sub>C</sub> = 25°C (V)	I <sub>FSM</sub> (A)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> @ V <sub>RRM</sub> T <sub>A</sub> = 25°C (μA)	Max I <sub>R</sub> @ V <sub>RRM</sub> T <sub>A</sub> = 150°C (μA)	Package
50	1.0	T <sub>A</sub> = 130°C	<b>MUR105</b>	35	0.875	35	175	2.0	50	 <p><b>CASE 59-10</b> (DO-41) Plastic Cathode = Polarity Band</p>
100	1.0	T <sub>A</sub> = 130°C	<b>MUR110</b>	35	0.875	35	175	2.0	50	
100	2.0	T <sub>A</sub> = 100°C	<b>MUR210</b>	30	0.94	35	175	2.0	50	
150	1.0	T <sub>A</sub> = 130°C	<b>MUR115</b>	35	0.875	35	175	2.0	50	
200	1.0	T <sub>A</sub> = 130°C	<b>MUR120</b>	35	0.875	35	175	2.0	50	
200	2.0	T <sub>A</sub> = 90°C	<b>MUR220</b>	35	0.95	35	175	2.0	50	
300	1.0	T <sub>A</sub> = 120°C	<b>MUR130</b>	75	1.25	35	175	5.0	150	
400	1.0	T <sub>A</sub> = 120°C	<b>MUR140</b>	75	1.25	35	175	5.0	150	
400	2.0	T <sub>A</sub> = 85°C	<b>MUR240</b>	65	1.3	35	175	5.0	150	
600	1.0	T <sub>A</sub> = 120°C	<b>MUR160</b>	100	1.25	35	175	5.0	150	
600	2.0	T <sub>A</sub> = 60°C	<b>MUR260</b>	75	1.35	35	175	5.0	150	
800	1.0	T <sub>A</sub> = 95°C	<b>MUR180E</b>	100	1.75	35	175	10	600 @ 100°C	
1000	1.0	T <sub>A</sub> = 95°C	<b>MUR1100E</b>	100	1.75	35	175	10	600 @ 100°C	
1000	2.0	T <sub>A</sub> = 35°C	<b>MUR2100E</b>	100	2.2	35	175	10	600 @ 100°C	
50	4.0	T <sub>A</sub> = 80°C	<b>MUR405</b>	35	0.89	125	175	5.0	150	 <p><b>CASE 267-05</b> (DO-201AD) Plastic Cathode = Polarity Band</p>
100	4.0	T <sub>A</sub> = 80°C	<b>MUR410</b>	35	0.89	125	175	5.0	150	
150	4.0	T <sub>A</sub> = 80°C	<b>MUR415</b>	35	0.89	125	175	5.0	150	
200	4.0	T <sub>A</sub> = 80°C	<b>MUR420</b>	35	0.89	125	175	5.0	150	
400	4.0	T <sub>A</sub> = 40°C	<b>MUR440</b>	75	1.28	110	175	10	250	
520	5.0	T <sub>A</sub> = 65°C	<b>MUR550APF</b>	95	1.15	85	175	5.0	500	
600	4.0	T <sub>A</sub> = 40°C	<b>MUR460</b>	75	1.28	110	175	10	400	
800	4.0	T <sub>A</sub> = 35°C	<b>MUR480E</b>	100	1.85	70	175	25	900	
1000	4.0	T <sub>A</sub> = 35°C	<b>MUR4100E</b>	100	1.85	70	175	25	900	

ULTRAFAST RECTIFIERS (continued)

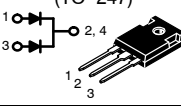
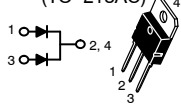
Table 15. TO-220 ULTRAFAST AND MEGAHERTZ™ RECTIFIERS

V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max t <sub>rr</sub> (ns)	Max V <sub>F</sub> @ I <sub>O</sub> Rated T <sub>C</sub> = 25°C (V)	I <sub>FSM</sub> (A)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> <sup>(11)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 25°C (μA)	Max I <sub>R</sub> <sup>(11)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 150°C (μA)	Package
100	16	T <sub>C</sub> = 150°C	MUR1610CT	35	0.975	100	175	5.0	250	<b>CASE 221A-09</b> (TO-220AB) 
150	16	T <sub>C</sub> = 150°C	MUR1615CT	35	0.975	100	175	5.0	250	
200	6.0	T <sub>C</sub> = 130°C	MUR620CT	35	0.975	75	175	5.0	250	
200	16	T <sub>C</sub> = 150°C	MUR1620CT	35	0.975	100	175	5.0	250	
200	16	T <sub>C</sub> = 160°C	MUR1620CTR	85	1.2	100	175	5.0	500	
400	8.0	T <sub>C</sub> = 155°C	MURH840CT	28	2.2	100	175	10	500	
400	16	T <sub>C</sub> = 150°C	MUR1640CT	60	1.30	100	175	10	500	
600	8.0	T <sub>C</sub> = 120°C	MURH860CT	35	2.8	100	175	10	500	
600	16	T <sub>C</sub> = 150°C	MUR1660CT	60	1.5	100	175	10	500	
50	8.0	T <sub>C</sub> = 150°C	MUR805	35	0.975	100	175	5.0	250	
100	8.0	T <sub>C</sub> = 150°C	MUR810	35	0.975	100	175	5.0	250	<b>CASE 221B-04</b> (TO-220AC) 
100	15	T <sub>C</sub> = 150°C	MUR1510	35	1.05	200	175	10	500	
150	8.0	T <sub>C</sub> = 150°C	MUR815	35	0.975	100	175	5.0	250	
150	15	T <sub>C</sub> = 150°C	MUR1515	35	1.05	200	175	10	500	
200	8.0	T <sub>C</sub> = 150°C	MUR820	35	0.975	100	175	5.0	250	
200	15	T <sub>C</sub> = 150°C	MUR1520	35	1.05	200	175	10	500	
200	20	T <sub>C</sub> = 125°C	MUR2020R	95	1.10	250	175	50	1000	
400	8.0	T <sub>C</sub> = 150°C	MUR840	60	1.30	100	175	10	500	
400	15	T <sub>C</sub> = 150°C	MUR1540	60	1.25	150	175	10	500	
520	5.0	T <sub>C</sub> = 160°C	MUR550PF	95	1.15	100	175	5.0	400	
600	8.0	T <sub>C</sub> = 150°C	MUR860	60	1.50	100	175	10	500	
600	15	T <sub>C</sub> = 145°C	MUR1560	60	1.50	150	175	10	1000	
800	8.0	T <sub>C</sub> = 150°C	MUR880E	100	1.80	100	175	25	500 @ 100°C	
1000	8.0	T <sub>C</sub> = 150°C	MUR8100E	100	1.80	100	175	25	500 @ 100°C	
200	16	T <sub>C</sub> = 150°C	Ⓢ MURF1620CT	35	0.975	100	150	5.0	250	
520	5.0	T <sub>C</sub> = 160	MURF550PF	95	1.15	100	175	5.0	400	
600	8.0	T <sub>C</sub> = 150	MURF860	60	1.5	100	175	10	500	
600	8.0	T <sub>C</sub> = 120°C	Ⓢ MURHF860CT	35	2.8	100	150	10	500	
600	15	T <sub>C</sub> = 145	MURF1560	60	45	150	175	10	1000	
600	16	T <sub>C</sub> = 150°C	Ⓢ MURF1660CT	60	1.5	100	150	10	500	

Ⓢ Indicates UL Recognized – File #E69369

11. Refers to maximum leakage current per leg on “CT” and “CTR” suffix devices.




Table 16. TO-218 AND TO-247 ULTRAFAST RECTIFIERS

V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max t <sub>rr</sub> (ns)	Max V <sub>F</sub> @ I <sub>O</sub> Rated T <sub>C</sub> = 25°C (V)	I <sub>FSM</sub> (A)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> <sup>(12)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 25°C (μA)	Max I <sub>R</sub> <sup>(12)</sup> @ V <sub>RRM</sub> T <sub>A</sub> = 150°C (mA)	Package
200	30	T <sub>C</sub> = 145°C	MUR3020WT	35	1.05	200	175	10	0.5	<b>CASE 340L-02</b> (TO-247) 
600	30	T <sub>C</sub> = 145°C	MUR3060WT	60	1.70	150	175	10	1.0	
200	30	T <sub>C</sub> = 150°C	MUR3020PT	35	1.05	200	175	10	0.5	<b>CASE 340D-02</b> (TO-218AC) 
400	30	T <sub>C</sub> = 150°C	MUR3040PT	60	1.25	200	175	10	0.5	
600	30	T <sub>C</sub> = 145°C	MUR3060PT	60	1.50	200	175	10	1.0	

12. Refers to maximum leakage current per leg on “WT” and “PT” suffix devices.

**FAST RECOVERY RECTIFIERS/GENERAL PURPOSE RECTIFIERS**

**Table 17. FAST RECOVERY RECTIFIERS/GENERAL PURPOSE RECTIFIERS**

V <sub>RRM</sub> (V)	I <sub>O</sub> (A)	I <sub>O</sub> Rating Condition	Device	Max V <sub>F</sub> @ I <sub>O</sub> Rated T <sub>J</sub> = 25°C (V)	Max t <sub>rr</sub> (ns)	I <sub>FSM</sub> (A)	T <sub>J</sub> Max (°C)	Max I <sub>R</sub> V <sub>RRM</sub> T <sub>J</sub> = 25°C (μA)	Max I <sub>R</sub> V <sub>RRM</sub> T <sub>A</sub> = 100°C (μA)	Package
300	1.0	T <sub>L</sub> = 150°C	<b>MRA4003</b>	1.1	–	30	175	10	50	<b>CASE 403D-02 SMA</b>  Cathode = Notch
400	1.0	T <sub>L</sub> = 150°C	<b>MRA4004</b>	1.1	–	30	175	10	50	
600	1.0	T <sub>L</sub> = 150°C	<b>MRA4005</b>	1.1	–	30	175	10	50	
800	1.0	T <sub>L</sub> = 150°C	<b>MRA4006</b>	1.1	–	30	175	10	50	
1000	1.0	T <sub>L</sub> = 150°C	<b>MRA4007</b>	1.1	–	30	175	10	50	
400	1.5	T <sub>L</sub> = 118°C	<b>MRS1504</b>	1.04	–	50	150	1.0	340	<b>CASE 403A-03 SMB</b> 
50	1.0	T <sub>A</sub> = 75°C	<b>1N4001RL</b>	1.1	–	30	175	10	50	<b>CASE 59-10<sup>(13)</sup> (DO-41) Plastic</b>  Cathode = Polarity Band
100	1.0	T <sub>A</sub> = 75°C	<b>1N4002RL</b>	1.1	–	30	175	10	50	
200	1.0	T <sub>A</sub> = 75°C	<b>1N4003RL</b>	1.1	–	30	175	10	50	
400	1.0	T <sub>A</sub> = 75°C	<b>1N4004RL</b>	1.1	–	30	175	10	50	
600	1.0	T <sub>A</sub> = 75°C	<b>1N4005RL</b>	1.1	–	30	175	10	50	
800	1.0	T <sub>A</sub> = 75°C	<b>1N4006RL</b>	1.1	–	30	175	10	50	
1000	1.0	T <sub>A</sub> = 75°C	<b>1N4007RL</b>	1.1	–	30	175	10	50	
50	1.0	T <sub>A</sub> = 75°C	<b>1N4933RL</b>	1.2	200	30	150	5.0	100	
100	1.0	T <sub>A</sub> = 75°C	<b>1N4934RL</b>	1.2	200	30	150	5.0	100	
200	1.0	T <sub>A</sub> = 75°C	<b>1N4935RL</b>	1.2	200	30	150	5.0	100	
400	1.0	T <sub>A</sub> = 75°C	<b>1N4936RL</b>	1.2	200	30	150	5.0	100	
600	1.0	T <sub>A</sub> = 75°C	<b>1N4937RL</b>	1.2	200	30	150	5.0	100	
50	3.0	T <sub>L</sub> = 105°C	<b>1N5400RL</b>	1.0	–	200	150	10	50	
100	3.0	T <sub>L</sub> = 105°C	<b>1N5401RL</b>	1.0	–	200	150	10	50	
100	3.0	T <sub>A</sub> = 80°C	<b>MR851</b>	1.25	200	100	125	10	150 @ 80°C	
200	3.0	T <sub>L</sub> = 105°C	<b>1N5402RL</b>	1.0	–	200	150	10	50	
400	3.0	T <sub>L</sub> = 105°C	<b>1N5404RL</b>	1.0	–	200	150	10	50	
600	3.0	T <sub>L</sub> = 105°C	<b>1N5406RL</b>	1.0	–	200	150	10	50	
800	3.0	T <sub>L</sub> = 105°C	<b>1N5407RL</b>	1.0	–	200	150	10	50	
1000	3.0	T <sub>L</sub> = 105°C	<b>1N5408RL</b>	1.0	–	200	150	10	50	
200	3.0	T <sub>A</sub> = 80°C	<b>MR852RL</b>	1.25	200	100	125	–	200 @ 80°C	
400	3.0	T <sub>A</sub> = 80°C	<b>MR854RL</b>	1.25	200	100	125	–	250 @ 80°C	
600	3.0	T <sub>A</sub> = 80°C	<b>MR856RL</b>	1.25	200	100	125	–	300 @ 80°C	

13. Package Size: 0.120" max diameter by 0.260" length.





## Drivers

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# Drivers

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## Table of Contents

	<b>Page</b>
Display/LED Drivers .....	204
Load/Relay	
Load Drivers .....	207
Relay Drivers .....	207
MOSFET/IGBT Drivers .....	208
Motor Drivers .....	208

# ON Semiconductor Selector Guide – Drivers

## DISPLAY/LED DRIVERS

Device	Topology	V <sub>I</sub> Min (V)	V <sub>I</sub> Max (V)	V <sub>O</sub> Max (V)	I <sub>O</sub> Max (mA)	f <sub>sw</sub> Typ (kHz)	LEDs in Series, Max #	LEDs in Parallel, Max #	Package
CAT3224	Charge Pump	2.5	5.5	–	4000	800	1	2	TQFN-16
CAT3604A	Charge Pump	3	5.5	6	30	1000	1	4	TQFN-16
CAT3604V	Charge Pump	2.5	5.5	–	120	1000	–	4	TQFN-16
CAT3606	Charge Pump	3	5.5	–	180	1000	–	6	TQFN-16
CAT3612	Charge Pump	3	5.5	–	300	1000	–	2	TDFN-12
CAT3614	Charge Pump	3	5.5	–	124	1000	–	4	TDFN-12
CAT3616	Charge Pump	3	5.5	–	186	1000	–	6	TQFN-16
CAT3626	Charge Pump	3	5.5	–	192	1000	–	6	TQFN-16
CAT3636	Charge Pump	2.5	5.5	–	192	1000	–	6	TQFN-16
CAT3637	Charge Pump	2.5	5.5	–	180	1000	–	6	TQFN-16
CAT3643	Charge Pump	2.5	5.5	–	90	1000	–	3	TDFN-12; TQFN-16
CAT3644	Charge Pump	2.5	5.5	–	100	1000	–	4	TQFN-16
CAT3647	Charge Pump	2.5	5.5	–	100	1000	–	3	TQFN-16
CAT3648	Charge Pump	2.5	5.5	–	100	1000	–	4	TQFN-16
CAT3661	Charge Pump	2	5.5	6	6	100	1	–	TQFN-16
NCP5602	Charge Pump	2.7	5.5	5.5	60	1000	–	2	LLGA-12
NCP5603	Charge Pump	2.7	5.5	5.5	350	650	1	10	DFN-10
NCP5604	Charge Pump	2.7	5.5	–	120	1000	1	3; 4	QFN-16
NCP5612	Charge Pump	–	5.5	5.5	60	1000	–	2	LLGA-12
NCP5623B	Charge Pump	2.7	5.5	5.5	80	1000	–	3	LLGA-12
NCP5623C	Charge Pump	–	–	–	90	1000	–	3	LLGA-12
NCL30000	Flyback	–	–	–	–	Up to 300	72	–	SOIC-8
NCL30001	Flyback	–	–	–	–	Up to 150	–	–	SOIC-16
NCP1351	Flyback	–	–	–	–	Variable	–	–	PDIP-8; SOIC-8
CAT310	Linear	3	5.5	40	500	–	–	10	SOIC-20W
CAT4002A	Linear	–	5.5	6	40	–	1	2	SC-88-6 / SC-70-6; TSOT-23-6
CAT4004	Linear	2.4	5.5	–	100	–	4	–	TDFN-8
CAT4004A	Linear	–	5.5	6	40	–	1	4	UDFN-8
CAT4008	Linear	3	5.5	–	800	–	8	–	SOIC-16; SOIC-16W; TSSOP-16
CAT4016	Linear	3	5.5	–	1600	–	16	–	QSOP-24; SOIC-24W; TSSOP-24; WQFN-24

DISPLAY/LED DRIVERS (continued)

Device	Topology	V <sub>I</sub> Min (V)	V <sub>I</sub> Max (V)	V <sub>O</sub> Max (V)	I <sub>O</sub> Max (mA)	f <sub>sw</sub> Typ (kHz)	LEDs in Series, Max #	LEDs in Parallel, Max #	Package
CAT4026	Linear	4.5	5.5	–	–	–	80	6	SOIC–28W
CAT4101	Linear	3	5.5	–	1000	–	8	–	TO–263–5
CAT4103	Linear	3	5.5	–	525	–	8	3	SOIC–16
CAT4104	Linear	3	5.5	–	700	–	8	4	SOIC–8; TDFN–8
CAT4109	Linear	3	25	–	525	–	7	3	SOIC–16
NLSF595	Linear	1.8	7	5.5	8	–	1	8	QFN–16; TSSOP–16
NSI45015W	Linear	–	45	–	15	–	80	–	SOD–123–2
NSI45020	Linear	–	45	–	20	–	80	–	SOD–123–2
NSI45020A	Linear	–	45	–	20	–	80	–	SOD–123–2
NSI45020J	Linear	–	45	–	40	–	80	–	SOT–223–4 / TO–261–4
NSI45025	Linear	–	45	–	25	–	80	–	SOD–123–2
NSI45025A	Linear	–	45	–	25	–	80	–	SOD–123–2
NSI45025AZ	Linear	–	45	–	25	–	80	–	SOT–223–4 / TO–261–4
NSI45025Z	Linear	–	45	–	25	–	80	–	SOT–223–4 / TO–261–4
NSI45030	Linear	–	45	–	30	–	80	–	SOD–123–2
NSI45030A	Linear	–	45	–	30	–	80	–	SOD–123–2
NSI45030AZ	Linear	–	45	–	30	–	80	–	SOT–223–4 / TO–261–4
NSI45030Z	Linear	–	45	–	30	–	80	–	SOT–223–4 / TO–261–4
NSI45035J	Linear	–	45	–	70	–	80	–	SOT–223–4 / TO–261–4
NSI45060DD	Linear	–	45	–	60–100	–	80	–	DPAK–4
NSI45090DD	Linear	–	45	–	90–160	–	80	–	DPAK–4
NSI50010YT1G	Linear	–	50	–	10	–	80	–	SOD–123–2
NUD4001	Linear	3.6	30	28	500	–	8	–	SOIC–8
NUD4011	Linear	3.6	–	200	70	–	100	–	SOIC–8
NCP3063	Step–Down; Step–Up; Step–Up/Step–Down	3	40	–	1500	150	10	–	DFN–8; PDIP–8; SOIC–8
NCP3065	Step–Down; Step–Up; Step–Up/Step–Down	3	40	–	1500	250	8	–	DFN–8; PDIP–8; SOIC–8
NCP3066	Step–Down; Step–Up; Step–Up/Step–Down	3	40	–	1500	250; Up to 300	8	–	DFN–8; PDIP–8; SOIC–8
CAT4201	Step–Down Buck	7	36	–	350	–	7	–	TSOT–23–5

## ON Semiconductor Selector Guide – Drivers

### DISPLAY/LED DRIVERS (continued)

Device	Topology	V <sub>I</sub> Min (V)	V <sub>I</sub> Max (V)	V <sub>O</sub> Max (V)	I <sub>O</sub> Max (mA)	f <sub>sw</sub> Typ (kHz)	LEDs in Series, Max #	LEDs in Parallel, Max #	Package
NCL30100	Step-Down Buck	–	–	–	1200	Up to 700	–	–	TSOP-6
NCP5005	Step-Up	2.7	20	22	50	1200	5	–	TSOP-5 / SOT23-5
NCP5006	Step-Up	2.7	20	22	–	1200	5	–	TSOP-5 / SOT23-5
NCP5007	Step-Up	2.7	20	22	50	1200	5	–	TSOP-5 / SOT23-5
CAT32	Step-Up Boost	–	5.5	20	25	1200	4	–	TSOT-23-6
CAT37	Step-Up Boost	2	5.5	20	25	1000	–	–	TSOT-23-5
CAT4106	Step-Up Boost	3	5.5	40	175	1000	10	4	TQFN-16; TSSOP-16
CAT4134	Step-Up Boost	2.8	5.5	16	500	1000	3	2	TDFN-12
CAT4137	Step-Up Boost	2.2	5.5	24	30	1000	5	–	TSOT-23-5
CAT4139	Step-Up Boost	2.2	5.5	24	350	1000	5	–	TSOT-23-5
CAT4237	Step-Up Boost	2.8	5.5	30	100	1000	8	–	TSOT-23-5
CAT4238	Step-Up Boost	2	5.5	38	100	1000	10	–	TSOT-23-5
CAT4240	Step-Up Boost	2	5.5	38	350	1000	10	–	TSOT-23-5
NCP5030	Step-Up/Step-Down	2.7	5.5	5.5	1200	700	1	–	WDFN-12
CAT3649	–	2.4	5.5	–	25	1000	–	6	TQFN-16
CAT4002B	–	–	5.5	6	50	–	1	2	SC-88-6 / SC-70-6; TSOT-23-6
CAT4003B	–	–	5.5	6	75	–	1	3	SC-88-6 / SC-70-6; TSOT-23-6
CAT4004B	–	–	5.5	6	50	–	1	4	UDFN-8
NCP5050	–	2.7	5.5	20	1200	1700	5	–	WDFN-10
NCP5623T	–	–	–	–	–	–	–	–	TSSOP-14
NCP5680	–	–	–	–	500	1000	–	–	UQFN-24
NCV7680	–	–	–	–	–	–	–	–	SOIC-16W
NSI45060JD	–	–	45	–	100	–	80	–	DPAK-4
NSI45090JD	–	–	45	–	160	–	80	–	DPAK-4

**LOAD/RELAY DRIVERS**

**LOAD DRIVERS**

Device	Number of Drivers	V <sub>CC</sub> Max (V)	V <sub>(BR)GSS</sub> Max (V)	V <sub>(BR)DSS</sub> Max (V)	I <sub>D</sub> Max (A)	r <sub>DS(on)</sub> Max (Ω)	T <sub>j</sub> Max (°C)	Package
AMIS-39100	8	16	6.3	35	0.35	1	175	SOIC-28W
AMIS-39101	8	28	6.3	35	0.85	3	175	SOIC-28W
MC1413	7	50	30	50	0.5	4.6	150	PDIP-16; SOIC-16
NCV1413	7	50	30	50	0.5	4.6	150	SOIC-16
NCV33152	2	18	-	-	-	-	-	SOIC-8
NCV7513	6	5.25	-	-	-	2500	150	LQFP-32
NCV7513B	6	5.25	-	-	-	2500	-	LQFP-32
NCV7517	6	5.25	-	-	-	500	150	LQFP-32
NCV7517B	6	5.25	-	-	-	500	-	LQFP-32
NCV7608	8	5.5	-	-	0.35	2.8	150	SOIC-28W
NCV7702B	4	16	-	-	-	-	150	SOIC-24
NCV7703	6	40	-	40	1.8	-	150	SOIC-14
NCV7703B	3	5.25	-	40	-	1.7	150	SOIC-14
NCV7708B	12	5.25	-	40	0.5	1.8	150	SOIC-28W
NUS2401	-	-	-	-	-	-	-	SC-74-6 / SC59-ML-6
UAA2016	1	-10	6.5	10	0.15	7.7	85	PDIP-8; SOIC-8
ULN2003	7	50	-	-	-	4.6	150	SOIC-16

**RELAY DRIVERS**

Device	Number of Drivers	V <sub>CC</sub> Max (V)	V <sub>(BR)GSS</sub> Max (V)	V <sub>(BR)DSS</sub> Max (V)	I <sub>D</sub> Max (A)	r <sub>DS(on)</sub> Max (Ω)	T <sub>j</sub> Max (°C)	Package
MDC3105	1; 2	6	6	6.6	0.4	0.64	150	SC-74-6 / SC59-ML-6; SOT-23-3
NUD3105	1; 2	6	6	6	0.5	0.9	150	SC-74-6 / SC59-ML-6; SOT-23-3
NUD3112	1; 2	14	6	14	0.5	0.9	150	SC-74-6 / SC59-ML-6; SOT-23-3
NUD3124	1; 2	28	12	28	0.15	0.8	150	SC-74-6 / SC59-ML-6; SOT-23-3
NUD3160	1; 2	60	12	60	0.15	1.8	150	SC-74-6 / SC59-ML-6; SOT-23-3



## ON Semiconductor Selector Guide – Drivers

### MOSFET/IGBT DRIVERS

Device	Type	Number of Drivers	V <sub>CC</sub> Max (V)	Drive Source/Sink Typ (mA)	Rise Time (ns)	Fall Time (ns)	t <sub>p</sub> Max (ns)	Package
ADP3110A	MOSFET	2	13.2	1000 / 1000	40	20	65	DFN-8; SOIC-8
ADP3120A	MOSFET	2	13.2	1500 / 1500	20	16	70	DFN-8; SOIC-8
ADP3121	-	2	13.2	-	20	20	45	LFCSP-8; SOIC-8
ADP3419	MOSFET	2	6	1000 / 1000	14	11	70	Micro10
ADP3611	-	-	-	-	-	-	-	DFN-8; Micro10
MC33151	MOSFET	2	18	1500 / 1500	14	16	100	PDIP-8; SOIC-8
MC33152	MOSFET	2	18	1500 / 1500	14	15	120	PDIP-8; SOIC-8
MC33153	IGBT	1	20	1000 / 2000	17	17	300	PDIP-8; SOIC-8
NCP1392	-	2	16	500 / 1000	40	20	500	SOIC-8
NCP1393	-	2	16	500 / 1000	40	20	500	SOIC-8
NCP3420	-	2	13.2	-	16	11	45	SOIC-8
NCP5104	MOSFET or IGBT	2	20	250 / 500	85	35	170	PDIP-8; SOIC-8
NCP5106	MOSFET or IGBT	2	23	250 / 500	85	35	170	PDIP-8; SOIC-8
NCP5111	MOSFET or IGBT	2	23	250 / 500	85	35	170	PDIP-8; SOIC-8
NCP5181	MOSFET	2	20	1400 / 2200	20; 40	20; 40	170	PDIP-8; SOIC-8
NCP5304	MOSFET or IGBT	2	23	250 / 500	85	35	170	PDIP-8; SOIC-8
NCP5351	MOSFET	2	6.3	1400 / 2200	10	14	80	DFN-10; SOIC-8
NCP5359	MOSFET	2	15	1500 / 1500	16	11	35	DFN-10; SOIC-8
NCP5359A	-	2	13.2	1500 / 1500	16	15	30	DFN-8; SOIC-8
NCP5901	-	-	-	-	-	-	-	DFN-8; SOIC-8
NCP5901B	-	-	-	-	-	-	-	DFN-8; SOIC-8
NCP5911	-	-	-	-	-	-	-	DFN-8
NCV33152	MOSFET	2	18	1500 / 1500	15	36	120	SOIC-8
NCV7513	MOSFET	6	5.25	1	1400	1400	1000	LQFP-32
NCV7513B	MOSFET or IGBT	6	5.25	-	-	-	-	LQFP-32
NCV7517	MOSFET	6	5.25	100 / 100	277	277	1000	LQFP-32
NCV7517B	MOSFET or IGBT	6	5.25	-	-	-	-	LQFP-32

### MOTOR DRIVERS

Device	Type	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	P <sub>D</sub> Max (W)	I <sub>O</sub> Max (A)	Package
AMIS-30512	Stepper	6	40	0.32	0.8	SOIC-24
AMIS-30521	Stepper	6	40	1.28	1.6	NQFP-32

**MOTOR DRIVERS** (continued)

Device	Type	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	P <sub>D</sub> Max (W)	I <sub>O</sub> Max (A)	Package
AMIS-30522	Stepper	6	40	1.28	1.6	NQFP-32
AMIS-30523	-	-	40	-	1.2	QFN-52
AMIS-30532	Stepper	6	30	2.27	3.2	NQFP-32
AMIS-30542	Stepper	-	-	-	3.2	NQFP-32
AMIS-30621	Stepper	-	-	-	-	NQFP-32; SOIC-20W
AMIS-30622	Stepper	6	40	0.32	0.8	NQFP-32; SOIC-20W
AMIS-30623	Stepper	6	40	0.13; 0.32	0.8	NQFP-32; SOIC-20W
AMIS-30624	Stepper	6	40	0.32	0.8	NQFP-32; SOIC-20W
AMIS-39100	-	-	16	-	-	SOIC-28W
CS3351	Regulator	-	27	-	-	SOIC-14
CS3361	Regulator	-	27	-	-	SOIC-14
CS8190	-	8.5	15	-	0.01	PDIP-16; SOIC-20W
MC33033	Brushless DC	10	30	0.619	0.1	SOIC-20W
MC33035	Brushless DC	10	30	0.65	0.1	SOIC-24
MC33039	Brushless DC	5.5	9	0.65	0.02	SOIC-8
NCV33033	Brushless DC	10	30	0.619	0.1	SOIC-20W
NCV33035	Brushless DC	10	30	0.65	0.1	SOIC-24
NCV33039	Brushless DC	5.5	9	0.65	0.02	SOIC-8
NCV33152	MOSFET	6.5	18	-	1.5	SOIC-8
NCV70521	Stepper	6	40	0.104	1.5	NQFP-32
NCV70522	Stepper	-	-	-	-	NQFP-32
NCV7513	MOSFET	4.75	5.25	-	-	LQFP-32
NCV7513B	MOSFET or IGBT	4.75	5.25	-	0.00525	LQFP-32
NCV7517	MOSFET	4.75	5.25	-	-	LQFP-32
NCV7517B	MOSFET or IGBT	4.75	5.25	-	0.026	LQFP-32
NCV7702B	-	7	16	-	0.001	SOIC-24
NCV7703	Drivers	-	40	-	-	SOIC-14
NCV7703B	Brush DC	3	5.25	-	3	SOIC-14
NCV7708B	-	-	5.25	-	-	SOIC-28W
NCV7729	Brush DC	3	5.5	-	9.6	PSOP-20
TDA1085C	Triac Control	15	16	1	0.2	PDIP-16



## DSP Systems

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# DSP Systems

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## Table of Contents

	<b>Page</b>
Audio DSP Systems .....	214

**AUDIO DSP SYSTEMS**

Device	DSP Core (bits)	Coprocessor Type	MIPS	Dynamic Range (dB)	RAM (kB)	I <sub>standby</sub> Typ (μA)	Audio Inputs	Audio Outputs	Package
BELASIGNA R261	16	WOLA	60	88		40	2	2	WLCSP-26; WLCSP-30
BELASIGNA 200	16	WOLA	40	83	42	250	2	2	NQFP-52; WLCSP-40
BELASIGNA 250	16	WOLA	60	88	42	50	2	2	LFBGA-57; LFBGA-64; WLCSP-48
BELASIGNA 300	24	HEAR	240	110	110	40	4	1	DFN-44; WLCSP-35

## **EMI/RFI Filters**

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# EMI/RFI Filters

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## Table of Contents

	<b>Page</b>
Audio Filters .....	218
Data Filters .....	218

## ON Semiconductor Selector Guide – EMI/RFI Filters

### AUDIO FILTERS

Device	Description	R Typ ( $\Omega$ )	C Typ (pF)	I <sub>R</sub> Max ( $\mu$ A)	V <sub>(BR)</sub> Typ (V)	V <sub>RWM</sub> Max (V)	Package
CM1411	2-Channel Headset/Speaker EMI Filter with ESD Protection	10	200	–	6.8	–	WLCSP-5
CM1412	2-Channel Headset Microphone EMI Filter with ESD Protection	68	94	–	6.8	–	WLCSP-5
CM1481	2-Channel EMI Filter with ESD Protection for Headset Speaker Applications	10	100	1	7	–	WDFN-8
CM1483	Praetorian® L-C EMI Filter with ESD Protection for Headset Speaker Applications	–	–	–	–	–	WDFN-8
CSPEMI201A	2-Channel Headset Speaker CSP EMI Filters with ESD Protection	10	200	–	6.8	–	WLCSP-5
CSPEMI202A	2-Channel Headset Microphone CSP EMI Filters with ESD Protection	68	94	–	6.8	–	WLCSP-5
CSPEMI205	3-Channel Single Mic / Stereo Speaker CSP EMI Filters with ESD Protection	10	200	–	6.8	–	WLCSP-8
NUF2114MN	2-Line Audio EMI Filter with ESD Protection	8.4	60	0.1	15.7	12	DFN-8
NUF2116	2-Line Audio EMI Filter with ESD Protection	64	50	0.1	15.7	12	DFN-8
NUF2441	Integrated Passive Filter with ESD Protection	0.28	250	0.1	15	12	Flip-Chip-6
NUF2450MU	2-Line EMI Filter with ESD Protection in UDFN8 Package	1.3	240	0.1	7	5	UDFN-8
NUF4220	4-Line Audio EMI Filter with ESD Protection	0.85	205	0.1	7	5	DFN-8

### DATA FILTERS

Device	Description	R Typ ( $\Omega$ )	C Typ (pF)	I <sub>R</sub> Max ( $\mu$ A)	V <sub>(BR)</sub> Typ (V)	V <sub>RWM</sub> Max (V)	Package
CM1402	SIM Card EMI Filter Array with ESD Protection	100	20	–	6.8	–	WLCSP-10
CM1406	4- and 8-Channel EMI Filter Arrays with ESD Protection	200	30	–	6.8	–	WDFN-16; WDFN-8
CM1409	6- and 8-Channel LCD and Camera EMI Filters with ESD Protection	100	30	–	6.8	–	WDFN-12; WDFN-16
CM1411	2-Channel Headset/Speaker EMI Filter with ESD Protection	10	200	–	6.8	–	WLCSP-5
CM1412	2-Channel Headset Microphone EMI Filter with ESD Protection	68	94	–	6.8	–	WLCSP-5
CM1425	4-Channel EMI Filter Array with ESD Protection	100	40	–	6.8	–	WLCSP-9
CM1430-08DE	LCD and Camera EMI Filter Array with ESD Protection	100	17	1	6.8	3.3	WDFN-16
CM1431-08DE	LCD and Camera EMI Filter Array with ESD Protection	100	30	1	6.8	–	WDFN-16
CM1436-04DE	4-Channel LCD and Camera EMI Filter Array with ESD Protection	200	30	–	6.8	–	WDFN-8
CM1436-08DE	8-Channel LCD and Camera EMI Filter Array with ESD Protection	200	30	–	6.8	–	WDFN-16
CM1442	6- and 8-Channel LCD and Camera EMI Filter Arrays with ESD Protection	100	30	–	6.8	–	WLCSP-15
CM1442-06LP	6-Channel LCD and Camera EMI Filter Array with ESD Protection	100	30	–	6.8	–	WLCSP-15
CM1443-04	4-Channel EMI Filter Array with ESD Protection	100	17	–	6.8	–	WLCSP-10
CM1443-08	8-Channel EMI Filter with ESD Protection	100	17	–	6.8	–	WLCSP-20
CM1451	6- and 8-Channel LCD & Camera EMI Filter Arrays with ESD Protection	3	28.5	–	6.8	–	WLCSP-15; WLCSP-20
CM1453-06CP	Praetorian 6-Channel LCD Camera EMI Filter Array with ESD Protection	2	19	–	6.8	–	WLCSP-15
CM1453-08CP	Praetorian 8-Channel LCD Camera EMI Filter Array with ESD Protection	2	19	–	6.8	–	WLCSP-20

DATA FILTERS (continued)

Device	Description	R Typ ( $\Omega$ )	C Typ (pF)	I <sub>R</sub> Max ( $\mu$ A)	V <sub>(BR)</sub> Typ (V)	V <sub>RWM</sub> Max (V)	Package
CM1457	Praetorian III L-C EMI Filter Array with ESD Protection, 4-, 6- and 8-Channel	45	12.5	–	6.8	–	WLCSP-10; WLCSP-15; WLCSP-20
CM1461	Praetorian L-C LCD and Camera EMI Filter Arrays with ESD Protection, 6- and 8-Channel	2.3	20	–	6.8	–	WDFN-12; WDFN-16
CM1492-06DE	Praetorian L-C LCD and Camera EMI Filter Array with ESD Protection	–	–	–	–	–	WDFN-12
CM1624	Praetorian III EMI Filter Device with ESD Protection for T-Flash/MicroSD Interfaces	40	12	–	6.8	–	UDFN-16
CM1631	4-, 6- and 8-Channel LCD and Camera EMI Filter Arrays with ESD Protection	100	30	–	6.8	–	UDFN-16; UDFN-8
CM1636	4- and 8-Channel EMI Filter Arrays with ESD Protection	200	30	–	6.8	–	UDFN-16; UDFN-8
CM1693	Praetorian III L-C 4-, 6- and 8-Channel EMI Filter Arrays with ESD Protection	–	22	–	6.8	–	UDFN-12; UDFN-16; UDFN-8
CM6300	ASIP SIM Interface	100/47	16.7	–	6.8	–	WLCSP-8
CSPEMI201A	2-Channel Headset Speaker CSP EMI Filters with ESD Protection	10	200	–	6.8	–	WLCSP-5
CSPEMI202A	2-Channel Headset Microphone CSP EMI Filters with ESD Protection	68	94	–	6.8	–	WLCSP-5
CSPEMI205	3-Channel Single Mic / Stereo Speaker CSP EMI Filters with ESD Protection	10	200	–	6.8	–	WLCSP-8
CSPEMI306A	6-Channel EMI Filter with ESD Protection	100	30	0.1	6.8	–	WLCSP-15
CSPEMI307A	4-Channel EMI Filter with ESD Protection	100	30	0.1	6.8	–	WLCSP-15
CSPEMI400	SIM Card CSP EMI Filter + ESD Protection	100	20	0.3	6.8	–	WLCSP-10
EMI7204MU	4-Channel EMI Filter with ESD	10	24.2	1	6.8	5	UDFN-8
EMI7206MU	6-Channel EMI Filter with ESD Protection	10	24.2	1	6.8	5	UDFN-12
EMI7208MU	8-Channel EMI Filter with ESD Protection	10	24.2	1	6.8	5	UDFN-16
EMI2121	Common Mode Filter for USB 2.0	8	0.8	1	–	5	UDFN-8
EMI4182	Common Mode Filter	8	0.9	1	6.8	5	WDFN-10
EMI4183	Common Mode Filter	8	0.9	1	6.8	5	WDFN-16
NUF2042XV6	USB Upstream Terminator with ESD Protection	22	42	0.01	6.8	5.25	SOT-563-6
NUF2101	USB 1.1 DownStream EMI Filter with ESD Protection	30	55	0.1	7	5.25	TSOP-6
NUF2221	USB Upstream Terminator with ESD Protection	22	42	0.1	6.8	5.25	SC-88-6 / SC-70-6 / SOT-363-6
NUF2222	2-Line USB 1.1 Upstream EMI Filter	33	36	0.1	7.6	5.6	Flip-Chip-8
NUF2230	2-Line EMI Filter with ESD Protection	100	16	1	7	5	SOT-563-6
NUF3102	Low Capacitance 3-Line EMI Filter	100	13	1	7	5	UDFN-8
NUF4000	4-Channel EMI Filter, 100 Ohms, 15 pF	100	15	0.1	7	5	UDFN-8
NUF4001MU	Low Capacitance 4-Line EMI Filter with ESD Protection in UDFN8 Package	100	13	0.1	7	5	UDFN-8
NUF4010	4-Channel EMI Filter, 100 ohms, 7 pF	100	7	0.1	7	5	UDFN-8
NUF4107FC	4-Channel EMI Pi-Filter Array with Full USB Filter	22	60	0.1	6.8	3.3	Flip-Chip-17
NUF4211	Low Capacitance 4-Line EMI Filter with ESD Protection	100	8.5	0.1	7	5	DFN-8
NUF4310	4-Channel EMI Filter with Integrated ESD Protection	100	18	0.1	7	5	WDFN-8

## ON Semiconductor Selector Guide – EMI/RFI Filters

### DATA FILTERS (continued)

Device	Description	R Typ ( $\Omega$ )	C Typ (pF)	I <sub>R</sub> Max ( $\mu$ A)	V <sub>(BR)</sub> Typ (V)	V <sub>RWM</sub> Max (V)	Package
NUF4401MN	4-Line EMI Filter with ESD Protection DFN 2.0 x 2.0 mm Package	200	15	0.1	7	5	DFN-8
NUF4402MN	Low Capacitance 4-Line EMI Filter with ESD Protection in DFN8 1.6 x 1.6 mm Package	100	12	0.1	7	5	DFN-8
NUF4403MN	4-Line EMI Filter with ESD Protection	100	17	0.1	7	5	DFN-8
NUF6001MU	6-Line EMI Filter with ESD Protection in $\hat{A}$ DFN Package	100	17	0.1	7	5	UDFN-12
NUF6005	6-Channel EMI Filter, 100 ohm, 10 pF	100	10	0.1	7	5	UDFN-12
NUF6010	6-Channel EMI Filter, 100ohm, 7 pF uDFN12	100	7	0.1	6.8	5	UDFN-12
NUF6105	6-Channel EMI Pi-Filter Array with ESD Protection	100	27	0.1	7	5	Flip-Chip CSP-15
NUF6106	6-Channel EMI Filter Low capacitance for High speed	100	21	0.1	7	3.3	Flip-Chip CSP-15
NUF6107	4-Channel Data Line EMI Filter	100	30	0.1	6.8	5	DFN-12
NUF6400	6-Line EMI Filter	100	50	0.1	7	5	DFN-12
NUF6401MN	6-Line EMI Filter with ESD Protection DFN 1.35 x 3.0 mm Package	100	17	1	7	5	DFN-12
NUF6402	4-Line EMI Filter with ESD Protection DFN 1.35 x 3.0 mm Package	100	17	1	7	5	DFN-12
NUF6406	Low Capacitance 6-Line EMI Filter with ESD Protection	100	13	1	7	5	DFN-12
NUF6410	6-Channel EMI Filter Low CAP Filter	100	7	0.1	6.8	5	DFN-12
NUF8001MU	Low Capacitance 8-Line EMI Filter with ESD Protection in UDFN Package	100	12	0.1	7	5	UDFN-16
NUF8010	8-Channel EMI Filter – Low Capacitance	100	7	0.1	7	5	UDFN-16
NUF8152	8-Channel LC EMI Filter in UDFN	28	20	0.1	7	5	UDFN-16
NUF8401	Low Capacitance 8-Line EMI Filter with ESD Protection, 1.6 x 4.0 mm DFN Package	100	12	0.1	7	5	DFN-16
NUF8402	8-Line EMI Filter with ESD Protection 1.6 x 4.0 mm DFN Package	100	17	0.1	7	5	DFN-16
NUF8410	Low Capacitance 8-Line EMI Filter with ESD Protection	100	8.5	0.1	7	5	DFN-16
NUF8600	8-Line EMI Filter with ESD	50	17	0.1	7	5	DFN-16
NUF8610	8-Line EMI Filter with ESD	50	8.5	0.1	7	5	DFN-16
NUF9001	10-Line EMI Filter	200	45	0.1	7	5	Flip-Chip CSP-25
NUF9002	Low Capacitance 10-Line EMI Filter with ESD Protection	100	28	0.5	7	5	Flip-Chip CSP-25
NZF220DFT1	EMI Filter with ESD Protection	100	22	1	7	3	SC-88A-5 / SC-70-5 / SOT-323-5
NZF220TT1	EMI Filter with ESD Protection	100	22	1	7	3	SC-75-3 / SOT-416-3
PACUSB-D1	USB Downstream Port Terminator	33	47	0.1	–	5.5	SC-88A-5 / SC-70-5
PACUSB-U3	Upstream USB Port Terminator	22	47	0.1	–	5.5	SC-88-6 / SC-70-6
PACVGA105	PActive VGA Port Companion Circuit	–	–	10	–	5.5	QSOP-16
STF202	EMI Filter with ESD Protection	22	68	1	7	5.25	TSOP-6

## **IGBTs and FETs**

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# IGBTs and FETs

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## Table of Contents

	<b>Page</b>
IGBTs .....	224
JFETs .....	224
MOSFETs .....	224
Protected MOSFETs .....	236



## ON Semiconductor Selector Guide – IGBTs and FETs

### IGBTs

Device	Channel Polarity	V <sub>(BR)CES</sub> Typ (V)	V <sub>CE(sat)</sub> Typ (V)	I <sub>C</sub> Max (A)	E <sub>AS</sub> Typ (μJ)	t <sub>sc</sub> Min (ms)	P <sub>D</sub> Max (W)	Package
NGB18N40CLB	N-Channel	100	1.8	18	400000	0.0015		D2PAK-3
NGB8206A	N-Channel	350	1.3	20	250000		150	D2PAK-3
NGB8206N	N-Channel	350	1.3	20	250000		150	D2PAK-3
NGD8205N	N-Channel	350	1.3	20	250000		125	DPAK-4
NGB8207AN	N-Channel	365	1.75	20	500000		165	D2PAK-3
NGB8207N	N-Channel	365	1.5	20	500000		165	D2PAK-3
NGB8202A	N-Channel	400	1.3	20	250000		150	D2PAK-3
NGB8202N	N-Channel	400	1.3	20	250000		150	D2PAK-3
NGB8204N	N-Channel	400	1.8	18	400000	5	115	D2PAK-3
NGD18N40CLB	N-Channel	400	1.8	18	400000	0.04	115	DPAK-4
NGD8201A	N-Channel	400	1.3	20	250000		125	DPAK-4
NGD8201N	N-Channel	400	1.3	20	250000		125	DPAK-4
NGB15N41CLT4	N-Channel	410	1.9	15	250000		107	D2PAK-3
NGD15N41CLT4	N-Channel	410	1.9	15	250000	250	107	DPAK-4
NGP15N41CL	N-Channel	410	1.9	15	250000		107	TO-220-3

### JFETs

Device	Channel Polarity	V <sub>(BR)GSS</sub> Min (V)	I <sub>DSS</sub> Min (μA)	I <sub>DSS</sub> Max (μA)	C <sub>iss</sub> Max (pF)	C <sub>rss</sub> Max (pF)	Package
J310	N Channel	25	24000	60000	5	5.5	TO-92
MMBFJ309L	N Channel	25	12000	30000	5	2.5	SOT-23-3
MMBFJ310L	N Channel	25	24000	60000	5	2.5	SOT-23-3
MMBFU310L	N Channel	25	24000	60000	5	2.5	SOT-23-3
MMBF4391L	N Channel	30	50	150000	14	3.5	SOT-23-3
MMBF4392L	N Channel	30	25	75000	14	3.5	SOT-23-3
MMBF4393L	N Channel	30	5000	30000	14	3.5	SOT-23-3
MPF4393	N Channel	30	5000	30000	10	3.5	TO-92
J112	N Channel	35	5000		28	5	TO-92
MMBFJ175L	P Channel	30	70	60000	11	5.5	SOT-23-3
MMBFJ177L	P Channel	30	1500	20000	11	5.5	SOT-23-3

### MOSFETs

Device	Channel Polarity	Configuration	V <sub>(BR)DSS</sub> Min (V)	V <sub>GS</sub> Max (V)	r <sub>DS(on)</sub> Max (mΩ)	Q <sub>g</sub> Typ (nC)	I <sub>D</sub> Max (A)	P <sub>D</sub> Max (W)	Package
NTGD3149C	Complementary	Dual	20	8	60	4	3.5	1.1	TSOP-6
NTHC5513	Complementary	Dual	20	12	80	2.6	3.9	2.1	ChipFET-8

## MOSFETs (continued)

Device	Channel Polarity	Configuration	$V_{(BR)DSS}$ Min (V)	$V_{GS}$ Max (V)	$r_{DS(on)}$ Max (m $\Omega$ )	$Q_g$ Typ (nC)	$I_D$ Max (A)	$P_D$ Max (W)	Package
NTHD3100C	Complementary	Dual	20	12	80	2.3	3.9	3.1	ChipFET-8
NTHD3102C	Complementary	Dual	20	8	45	5.8	5.5	2.1	ChipFET-8
NTJD4105C	Complementary	Dual	20	12	220	1.3	0.775	0.55	SC-88-6 / SC-70-6 / SOT-363-6
NTLJD3119C	Complementary	Dual	20	8	65	3.7	4.6	2.3	WDFN-6
NTUD3127C	Complementary	Dual	20	8	3000		0.2	0.2	SOT-963
NTUD3169CZ	Complementary	Dual	20	8	1500		0.28	0.2	SOT-963
NTZD3155C	Complementary	Dual	20	6	400	1.5	0.54	0.25	SOT-563-6
NTGD4167C	Complementary	Dual	30	12	90	3.7	2.6	0.9	TSOP-6
NTJD4158C	Complementary	Dual	30	20	260	0.9	0.88	0.27	SC-88-6 / SC-70-6 / SOT-363-6
NTGD3148N	N Channel	Dual	20	12	70	3.8	3.5	1.1	TSOP-6
NTHD4508N	N Channel	Dual	20	12	75	2.6	4.1	2.1	ChipFET-8
NTJD4401N	N Channel	Dual	20	12	375	1.3	0.63	0.27	SC-88-6 / SC-70-6 / SOT-363-6
NTLGD3502N	N Channel	Dual	20	20	60	2.9	5.8	1.74	DFN-6
NTMD6N02	N Channel	Dual	20	12	35	12	6.5	2	SOIC-8
NTUD3128N	N Channel	Dual	20	8	3000		0.2	0.2	SOT-963
NTUD3170NZ	N Channel	Dual	20	8	1500		0.28	0.2	SOT-963
NTZD3154N	N Channel	Dual	20	6	550	1.5	0.54	0.28	SOT-563-6
NT4N03	N Channel	Dual	30	20	60	8	4	2	SOIC-8
NTHD4502N	N Channel	Dual	30	20	85	1.9	3.9	2.1	ChipFET-8
NTJD4001N	N Channel	Dual	30	20	1500	0.9	0.25	0.272	SC-88-6 / SC-70-6 / SOT-363-6
NTLJD4116N	N Channel	Dual	30	8	70	5.4	4.6	2.3	WDFN-6
NTMD4820N	N Channel	Dual	30	20	20	7.7	6.4	1.28	SOIC-8
NTMD4840N	N Channel	Dual	30	20	24	5.2	5.5	1.14	SOIC-8
NTMD6N03	N Channel	Dual	30	20	32	19	6	2	SOIC-8
NTMD5836NL	N Channel	Dual	40	20	11+25	36+16	9.0 / 5.7	1.5	SOIC-8
MMDF1N05E	N Channel	Dual	50	20	300	12.5	2	2	SOIC-8
NTJD5121N	N Channel	Dual	60	20	1600	0.7	0.295	0.25	SC-88-6 / SC-70-6 / SOT-363-6
NTZD5110N	N Channel	Dual	60	20	1600	0.7	0.31	0.28	SOT-563-6
NTLJF4156N	N Channel	FETKY $\square$	30	8	70	5.4	4	2.08	WDFN-6

# ON Semiconductor Selector Guide – IGBTs and FETs

## MOSFETs (continued)

Device	Channel Polarity	Configuration	$V_{(BR)DSS}$ Min (V)	$V_{GS}$ Max (V)	$r_{DS(on)}$ Max (m $\Omega$ )	$Q_g$ Typ (nC)	$I_D$ Max (A)	$P_D$ Max (W)	Package
NTLUF4189NZ	N Channel	FETKY $\square$	30	8	200	1.4	1.5	0.8	UDFN-6
NTMD4884NF	N Channel	FETKY $\square$	30	20	70	2.8	5.7	0.77	SOIC-8
NTMFS4897N	N Channel	FETKY $\square$	30	20	2	39.6	171	125	SO-8FL / DFN-5
NTMFS4898N	N Channel	FETKY $\square$	30	20	3	25.6	117	74	SO-8FL / DFN-5
NTMFS4899N	N Channel	FETKY $\square$	30	20	5	12.2	75	7.18	SO-8FL / DFN-5
NTMS4873NF	N Channel	FETKY $\square$	30	20	12	10.3	11.7	2.45	SOIC-8
MGSF1N02L	N Channel	Single	20	20	90		0.75	0.4	SOT-23-3
MGSF2N02EL	N Channel	Single	20	8	85	3.5	2.8	1.25	SOT-23-3
MMBF0201NL	N Channel	Single	20	20	1000	1.4	0.3	0.225	SOT-23-3
MMBF2201N	N Channel	Single	20	20	1000		0.3	0.15	SC-70-3 / SOT-323-3
NTA4001N	N Channel	Single	20	10	1500		0.238	0.3	SC-75-3 / SOT-416-3
NTA4153N	N Channel	Single	20	6	230	1.82	0.915	0.3	SC-75-3 / SOT-416-3
NTE4153N	N Channel	Single	20	6	230	1.82	0.915	0.3	SC-89-3
NTGS3130N	N Channel	Single	20	8	24	13.2	5.6	1.4	TSOP-6
NTGS3446	N Channel	Single	20	12	45	8	5.1	2	TSOP-6
NTHS5404	N Channel	Single	20	12	30	12	7.2	2.5	ChipFET-8
NTJS3157N	N Channel	Single	20	8	60	6.9	4	1	SC-88-6 / SC-70-6 / SOT-363-6
NTK3043N	N Channel	Single	20	10	3400		0.285	0.44	SOT-723-3
NTK3134N	N Channel	Single	20	6	350		0.89	0.55	SOT-723-3
NTR4501	N Channel	Single	20	12	80	2.4	3.2	1.25	SOT-23-3
NTD110N02R	N Channel	Single	24	20	4.6	23.6	110	92.5	DPAK-4
NTD14N03R	N Channel	Single	25	20	95	1.8	14	20.8	DPAK-4
NTD40N03R	N Channel	Single	25	20	16.5	5.78	45	50	DPAK-4
NTD4855N	N Channel	Single	25	20	4.3	24.4	98	2.24	DPAK-4
NTD4856N	N Channel	Single	25	20	4.7	17.9	89	2.14	DPAK-4
NTD4857N	N Channel	Single	25	20	5.7	16	78	2.1	DPAK-4
NTD4858N	N Channel	Single	25	20	6.2	12.8	73	2	DPAK-4; IPAK-3
NTD4860N	N Channel	Single	25	20	7.5	10.8	12.6	2	DPAK-4; IPAK-3
NTD4863N	N Channel	Single	25	20	10.2	8.8	49	1.95	DPAK-4; IPAK-3
NTD4865N	N Channel	Single	25	20	10.9	6.4	10.2	1.92	DPAK-4
NTD70N03R	N Channel	Single	25	20	8	13.2	72	62.5	DPAK-4

## MOSFETs (continued)

Device	Channel Polarity	Configuration	$V_{(BR)DSS}$ Min (V)	$V_{GS}$ Max (V)	$r_{DS(on)}$ Max (m $\Omega$ )	$Q_g$ Typ (nC)	$I_D$ Max (A)	$P_D$ Max (W)	Package
NTJS4405N	N Channel	Single	25	8	350	0.75	1.2	0.63	SC-88-6 / SC-70-6 / SOT-363-6
NTS4409NT1G	N Channel	Single	25	8	350	1.2	0.75	0.33	SC-70-3 / SOT-323-3
NTMS4503N	N Channel	Single	28	20	7	23	14	2.5	SOIC-8
NTD4965N	N Channel	Single	30	20	4.7	17.5	64	38.5	DPAK-4; IPA-3; IPA-4
NTD4969N	N Channel	Single	30	20	9	18	40	26.3	DPAK-4; IPA-3; IPA-4
NTD4970N	N Channel	Single	30	20	11	8.2	38	22	DPAK-4; IPA-3; IPA-4
NTMFS4825NFE	N Channel	Single	30	20	2	40.2	171	2.74	SO-8FL / DFN-5
NTMFS4826NE	N Channel	Single	30	20	5.9	13.5	66	2.16	SO-8FL / DFN-5
NTMFS4923NE	N Channel	Single	30	20	3.3	22	91	2.63	SO-8FL / DFN-5
NTMFS4925N	N Channel	Single	30	20	6	11.3	80.5	66.14	SO-8FL / DFN-5
NTMFS4926N	N Channel	Single	30	20	7	9	74.6	66.14	SO-8FL / DFN-5
NTMFS4927N	N Channel	Single	30	20	9	8.3	65.8	66.14	SO-8FL / DFN-5
NTMFS4933N	N Channel	Single	30	20	1.2	66	166	104	SO-8FL / DFN-5
NTMFS4934N	N Channel	Single	30	20	2	34	147	2.72	SO-8FL / DFN-5
NTMS4916N	N Channel	Single	30	20	9	14	11.4	1.98	SOIC-8
NTMS4917N	N Channel	Single	30	20	11	10.8	10.2	1.95	SOIC-8
NTTFS4928N	N Channel	Single	30	20	8	8.3	41	22.7	u8FL / WDFN-8
NTTFS4929N	N Channel	Single	30	20	11	8.8	34	22.3	u8FL / WDFN-8
NTTFS4930N	N Channel	Single	30	20	23	4.6	23	20.2	u8FL / WDFN-8
NVMFS4841N	N Channel	Single	30	20	7	11.5	89	112	SO-8FL / DFN-5
NVTFS4823N	N Channel	Single	30	20	10.5	6	30	21	u8FL / WDFN-8
MGSF1N03L	N Channel	Single	30	20	100		1.6	0.42	SOT-23-3
NTA7002N	N Channel	Single	30	10	7000		0.154	0.3	SC-75-3 / SOT-416-3
NTD20N03L27	N Channel	Single	30	20	27	13.8	20	74	DPAK-4
NTD4302	N Channel	Single	30	20	10	55	18.5	5	DPAK-4
NTD4804N	N Channel	Single	30	20	4	30	117	93.75	DPAK-4; IPA-3; IPA-4
NTD4805N	N Channel	Single	30	20	5	20.5	88	66	DPAK-4; IPA-4
NTD4806N	N Channel	Single	30	20	6	15	76	60	DPAK-4; IPA-3
NTD4808N	N Channel	Single	30	20	8	11.3	63	54.6	DPAK-4; IPA-4
NTD4809N	N Channel	Single	30	20	9	11	58	52	DPAK-4; IPA-3

# ON Semiconductor Selector Guide – IGBTs and FETs

## MOSFETs (continued)

Device	Channel Polarity	Configuration	$V_{(BR)DSS}$ Min (V)	$V_{GS}$ Max (V)	$r_{DS(on)}$ Max (m $\Omega$ )	$Q_g$ Typ (nC)	$I_D$ Max (A)	$P_D$ Max (W)	Package
NTD4809NH	N Channel	Single	30	20	9	12.5	58	52	DPAK-4; IPAК-3
NTD4810N	N Channel	Single	30	20	10	9.2	54	50	DPAK-4
NTD4813N	N Channel	Single	30	20	13	6.9	40	35.3	IPAК-3
NTD4813NH	N Channel	Single	30	20	13	7.1	40	35.3	DPAK-4
NTD4815N	N Channel	Single	30	20	15	6	35	32.6	DPAK-4; IPAК-3
NTD4904N	N Channel	Single	30	20	3.7	41	79	52	DPAK-4; IPAК-3; IPAК-4
NTD4906N	N Channel	Single	30	20	5.5	11	54	37.5	DPAK-4; IPAК-3; IPAК-4
NTD4909N	N Channel	Single	30	20	8	7.6	41	29.4	DPAK-4; IPAК-3; IPAК-4
NTD4910N	N Channel	Single	30	20	9	6.8	37	27.3	DPAK-4; IPAК-3; IPAК-4
NTD4913N	N Channel	Single	30	20	10.5	6.2	32	24	DPAK-4
NTD4960N	N Channel	Single	30	20	8	11	55	35.7	DPAK-4; IPAК-3; IPAК-4
NTD4963N	N Channel	Single	30	20	9.6	9	44	35.7	DPAK-4; IPAК-3; IPAК-4
NTGS4141N	N Channel	Single	30	20	25	12	7	2	TSOP-6
NTHS4166N	N Channel	Single	30	20	24	11	8.2	0.71	ChipFET-8
NTJS4160NT1G	N Channel	Single	30	20	60	2.75	3.2	0.95	SC-88-6 / SC-70-6 / SOT-363-6
NTLJS4114N	N Channel	Single	30	12	35	8.5	7.8	3.3	WDFN-6
NTMFS4119N	N Channel	Single	30	20	3.5	36.8	30	6.1	SO-8FL / DFN-5
NTMFS4821N	N Channel	Single	30	16	6.95	10.7	58.5	38.5	SO-8FL / DFN-5
NTMFS4823N	N Channel	Single	30	16	10.5	6	30	32.5	SO-8FL / DFN-5
NTMFS4833N	N Channel	Single	30	20	2	39	191	125	SO-8FL / DFN-5
NTMFS4834N	N Channel	Single	30	20	3	32	130	86.2	SO-8FL / DFN-5
NTMFS4835N	N Channel	Single	30	20	3.5	22	104	62.5	SO-8FL / DFN-5
NTMFS4836N	N Channel	Single	30	20	4	20	90	55.6	SO-8FL / DFN-5
NTMFS4837NH	N Channel	Single	30	20	5	15.9	75	48	SO-8FL / DFN-5
NTMFS4839NH	N Channel	Single	30	20	5.5	12.9	64	42.4	SO-8FL / DFN-5
NTMFS4841N	N Channel	Single	30	20	7	11.5	57	41.7	SO-8FL / DFN-5
NTMFS4841NH	N Channel	Single	30	20	7	11.3	59	41.7	SO-8FL / DFN-5
NTMFS4845	N Channel	Single	30	16	2.9	25.6	115	62.5	SO-8FL / DFN-5
NTMFS4846	N Channel	Single	30	16	3.4	21.8	100	55.5	SO-8FL / DFN-5
NTMFS4847N	N Channel	Single	30	16	4.1	19.2	85	48.1	SO-8FL / DFN-5

## MOSFETs (continued)

Device	Channel Polarity	Configuration	$V_{(BR)DSS}$ Min (V)	$V_{GS}$ Max (V)	$r_{DS(on)}$ Max (m $\Omega$ )	$Q_g$ Typ (nC)	$I_D$ Max (A)	$P_D$ Max (W)	Package
NTMFS4851	N Channel	Single	30	16	5.9	13.5	66	41.7	SO-8FL / DFN-5
NTMFS4852N	N Channel	Single	30	20	2.1	34.3	155	86.2	SO-8FL / DFN-5
NTMFS4921N	N Channel	Single	30	20	6.95	10.7	58.5	5.6	SO-8FL / DFN-5
NTMFS4935N	N Channel	Single	30	20	3.2	22	93	48	SO-8FL / DFN-5
NTMFS4936N	N Channel	Single	30	20	4	19	79	43	SO-8FL / DFN-5
NTMFS4937N	N Channel	Single	30	20	4.5	15.9	70	43	SO-8FL / DFN-5
NTMFS4939N	N Channel	Single	30	20	5.5	9.3	53	30	SO-8FL / DFN-5
NTMFS4941N	N Channel	Single	30	20	6.2	11.3	47	25.5	SO-8FL / DFN-5
NTMFS4943N	N Channel	Single	30	20	7.2	9.2	41	22.3	SO-8FL / DFN-5
NTMS4800N	N Channel	Single	30	20	27	7.7	6.4	1.29	SOIC-8
NTMS4801N	N Channel	Single	30	20	12.5	12.2	9.9	1.41	SOIC-8
NTMS4802N	N Channel	Single	30	20	5.5	36	15	1.66	SOIC-8
NTMS4807N	N Channel	Single	30	20	6.1	24	12.2	0.86	SOIC-8
NTMS4816N	N Channel	Single	30	20	10	9.2	9	1.37	SOIC-8
NTMS4920N	N Channel	Single	30	20	4.3	26.3	17	2.12	SOIC-8
NTMS4935N	N Channel	Single	30	20	5.1	23.3	16	2.1	SOIC-8
NTMS4937N	N Channel	Single	30	20	6.5	17.4	13.6	2	SOIC-8
NTMS4939N	N Channel	Single	30	20	8.4	12.4	12.5	2	SOIC-8
NTMS7N03R2	N Channel	Single	30	20	23	26	7	2.5	SOIC-8
NTR4003N	N Channel	Single	30	20	1500	1.15	0.56	0.83	SOT-23-3
NTR4170N	N Channel	Single	30	12	55	4.34	4	1.25	SOT-23-3
NTR4503N	N Channel	Single	30	20	140	3.6	2.5	0.73	SOT-23-3
NTS4001N	N Channel	Single	30	20	1500	0.9	0.27	0.33	SC-70-3 / SOT-323-3
NTTFS4800N	N Channel	Single	30	20	20	7.7	32	2.04	u8FL / WDFN-8
NTTFS4821N	N Channel	Single	30	20	10.8	10.5	57	2.1	u8FL / WDFN-8
NTTFS4823N	N Channel	Single	30	20	17.5	6.5	50	2.1	u8FL / WDFN-8
NTTFS4824N	N Channel	Single	30	20	7.5	12.6	69	2.2	u8FL / WDFN-8
NTTFS4840N	N Channel	Single	30	20	24	5.2	26	2.04	u8FL / WDFN-8
NTTFS4932N	N Channel	Single	30	20	4	20	79	2.2	u8FL / WDFN-8
NTTFS4937N	N Channel	Single	30	20	4.5	15.7	75	4.6	u8FL / WDFN-8
NTTFS4939N	N Channel	Single	30	20	5.5	12.4	56	4.48	u8FL / WDFN-8
NTTFS4941N	N Channel	Single	30	20	6.2	10.1	46	4.42	u8FL / WDFN-8
NTMFS5834NL	N Channel	Single	40	20	9.3	24	74	89	SO-8FL / DFN-5

## ON Semiconductor Selector Guide – IGBTs and FETs

### MOSFETs (continued)

Device	Channel Polarity	Configuration	$V_{(BR)DSS}$ Min (V)	$V_{GS}$ Max (V)	$r_{DS(on)}$ Max (m $\Omega$ )	$Q_g$ Typ (nC)	$I_D$ Max (A)	$P_D$ Max (W)	Package
NTMS5835NL	N Channel	Single	40	20	10	40	9.2	1.5	SOIC-8
NTMS5838NL	N Channel	Single	40	20	25	17	5.8	1.5	SOIC-8
NVD5890N	N Channel	Single	40	20	3.7	75	123	107	DPAK-4
NVTFS5811NL	N Channel	Single	40	20	6.7	17	40	21	u8FL / WDFN-8
NTB5404N	N Channel	Single	40	20	4.5	125	136	167	D2PAK-3
NTB5405N	N Channel	Single	40	20	5.8	88	116	150	D2PAK-3
NTD5406N	N Channel	Single	40	20	10	45	70	100	DPAK-4
NTD5407N	N Channel	Single	40	20	26	20	38	75	DPAK-4
NTD5802N	N Channel	Single	40	20	4.4	75	101	93.75	DPAK-4
NTD5803N	N Channel	Single	40	20	7.2	51	75	83	DPAK-4
NTD5804N	N Channel	Single	40	20	8.5	45	69	71	DPAK-4
NTD5805N	N Channel	Single	40	20	9.5	33	51	47	DPAK-4
NTD5806N	N Channel	Single	40	2.5	19	17	33	39	DPAK-4
NTD5807N	N Channel	Single	40	20	31	12.6	23	33	DPAK-4
NTTFS5811NL	N Channel	Single	40	20	6.4	18	17	2.7	u8FL / WDFN-8
NVD5803N	N Channel	Single	40	20	5.7	51	85	83	DPAK-4
BSS138L	N Channel	Single	50	20	3500		0.2	0.225	SOT-23-3
NTMFS5844NL	N Channel	Single	60	20	12	30	60	89	SO-8FL / DFN-5
NVD5862N	N Channel	Single	60	20	5.7	82	98	115	DPAK-4
NVD5863NL	N Channel	Single	60	20	8.2	66	73	96	DPAK-4
NVD5865NL	N Channel	Single	60	20	16	29	38	49	DPAK-4
NVD5867NL	N Channel	Single	60	20	39	15	22	43	DPAK-4
NVTFS5820NL	N Channel	Single	60	20	11.5	28	29	21	u8FL / WDFN-8
NVTFS5826NL	N Channel	Single	60	20	24	16	20	22	u8FL / WDFN-8
2N7000	N Channel	Single	60	20	5000		0.2	0.35	TO-92
2N7002E	N Channel	Single	60	20	2500	0.81	0.31	0.42	SOT-23-3
2N7002K	N Channel	Single	60	20	1600	0.7	0.38	0.42	SOT-23-3
2N7002L	N Channel	Single	60	20	7500		0.115	0.3	SOT-23-3
2N7002W	N Channel	Single	60	20	1600	0.7	0.34	0.33	SC-70-3 / SOT-323-3
BS170	N Channel	Single	60	20	5000		0.5	0.35	TO-92
MMBF170L	N Channel	Single	60	20	5000		0.5	0.225	SOT-23-3
MMFT960	N Channel	Single	60	30	1700	3.2	0.3	0.8	SOT-223-4 / TO-261-4
NTB30N06L	N Channel	Single	60	15	46	16	30	88.2	D2PAK-3

## MOSFETs (continued)

Device	Channel Polarity	Configuration	$V_{(BR)DSS}$ Min (V)	$V_{GS}$ Max (V)	$r_{DS(on)}$ Max (m $\Omega$ )	$Q_g$ Typ (nC)	$I_D$ Max (A)	$P_D$ Max (W)	Package
NTB45N06	N Channel	Single	60	20	26	33	45	125	D2PAK-3
NTB45N06L	N Channel	Single	60	15	28	23	45	125	D2PAK-3
NTB5411N	N Channel	Single	60	20	10	92	80	166	D2PAK-3
NTB5426N	N Channel	Single	60	20	6	150	130	215	D2PAK-3
NTB60N06	N Channel	Single	60	20	14	62	60	136.4	D2PAK-3
NTB60N06L	N Channel	Single	60	15	16	43.2	60	136.4	D2PAK-3
NTB75N06	N Channel	Single	60	20	9.5	92	75	214	D2PAK-3
NTD18N06	N Channel	Single	60	20	60	15.3	18	55	DPAK-4
NTD18N06L	N Channel	Single	60	15	65	11	18	55	DPAK-4
NTD20N06	N Channel	Single	60	20	46	21.2	20	60	DPAK-4
NTD20N06L	N Channel	Single	60	15	48	16.6	20	60	DPAK-4
NTD24N06	N Channel	Single	60	20	42	24	24	62.5	DPAK-4
NTD24N06L	N Channel	Single	60	15	45	16	24	62.5	DPAK-4
NTD3055-094	N Channel	Single	60	20	94	10.9	12	48	DPAK-4; IPAk-4
NTD3055-150	N Channel	Single	60	20	150	7.1	9	28.8	DPAK-4
NTD3055L104	N Channel	Single	60	15	104	7.4	12	48	DPAK-4; IPAk-4
NTD3055L170	N Channel	Single	60	15	170	4.7	9	28.8	DPAK-4
NTD32N06L	N Channel	Single	60	20	28	23	32	93.75	DPAK-4
NTD5413N	N Channel	Single	60	20	26	35	30	68	DPAK-4
NTD5414N	N Channel	Single	60	20	37	25	24	55	DPAK-4
NTD5862N	N Channel	Single	60	20	5.7	82	90	96	DPAK-4; IPAk-4
NTD5865N	N Channel	Single	60	20	18	20.3	34	44	DPAK-4; IPAk-4
NTD5865NL	N Channel	Single	60	20	16	20.3	34	44	DPAK-4; IPAk-4
NTD5867NL	N Channel	Single	60	20	39	10	19	30	DPAK-4; IPAk-4
NTF3055-100	N Channel	Single	60	20	100	10.6	3	2.1	SOT-223-4 / TO-261-4
NTF3055L108	N Channel	Single	60	15	120	7.6	3	2.1	SOT-223-4 / TO-261-4
NTF3055L175	N Channel	Single	60	15	175	5.1	2	2.1	SOT-223-4 / TO-261-4
NTTFS5820NL	N Channel	Single	60	20	11.5	15	37	2.7	u8FL / WDFN-8
NTTFS5826NL	N Channel	Single	60	20	25		8.2	3.1	u8FL / WDFN-8
VN2222LL	N Channel	Single	60	20	7500		0.15	0.4	TO-92
BSS123L	N Channel	Single	100	20	6000		0.17	0.225	SOT-23-3
NTB6410AN	N Channel	Single	100	20	13	120	76	188	D2PAK-3



## ON Semiconductor Selector Guide – IGBTs and FETs

### MOSFETs (continued)

Device	Channel Polarity	Configuration	$V_{(BR)DSS}$ Min (V)	$V_{GS}$ Max (V)	$r_{DS(on)}$ Max (m $\Omega$ )	$Q_g$ Typ (nC)	$I_D$ Max (A)	$P_D$ Max (W)	Package
NTB6411AN	N Channel	Single	100	20	14	100	72	188	D2PAK-3
NTB6412AN	N Channel	Single	100	20	18.2	73	58	187	D2PAK-3
NTB6413AN	N Channel	Single	100	20	28	51	42	136	D2PAK-3
NTD12N10	N Channel	Single	100	20	165	14	12	56.6	DPAK-4; IPAK-4
NTD6414AN	N Channel	Single	100	20	37.6	40	32	75	DPAK-4; IPAK-4
NTD6415AN	N Channel	Single	100	20	55	29	23	63	DPAK-4; IPAK-4
NTD6415ANL	N Channel	Single	100	20	56	35	23	83	DPAK-4
NTD6416AN	N Channel	Single	100	20	81	20	17	54	DPAK-4; IPAK-4
NTD6416ANL	N Channel	Single	100	20	74	25	19	71	DPAK-4; IPAK-4
NTP6410AN	N Channel	Single	100	20	13	120	76	188	TO-220-3
NTP6411AN	N Channel	Single	100	20	14	100	77	217	TO-220-3
NTP6412AN	N Channel	Single	100	20	18.2	73	58	167	TO-220-3
NTP6413AN	N Channel	Single	100	20	28	51	42	136	TO-220-3
MTD6N15	N Channel	Single	150	20	300	15	6	20	DPAK-4
MTP20N15E	N Channel	Single	150	20	130	39.1	20	112	TO-220-3
NTB35N15	N Channel	Single	150	20	50	70	37	178	D2PAK-3
BS107A	N Channel	Single	200	20	6000		0.25	0.35	TO-92
BS108	N Channel	Single	200	20	10000		0.25	0.35	TO-92
MTD6N20E	N Channel	Single	200	20	700	13.7	6	50	DPAK-4
MTW32N20E	N Channel	Single	200	20	75	85	32	180	TO-247-3
NTB30N20	N Channel	Single	200	30	81	75	30	214	D2PAK-3
NDD03N50Z	N Channel	Single	500	30	3300	10	2.6	58	DPAK-4; IPAK-4
NDD04N50Z	N Channel	Single	500	30	2700	12	3.4	61	DPAK-4; IPAK-4
NDD05N50Z	N Channel	Single	500	30	1500	18.5	4.7	83	DPAK-4; IPAK-4
NDF05N50Z	N Channel	Single	500	30	1500	18.5	5	28	TO-220 FULLPAK-3
NDF08N50Z	N Channel	Single	500	30	850	31	7.5	31	TO-220 FULLPAK-3
NDF11N50Z	N Channel	Single	500	30	520	46	10.5	36	TO-220 FULLPAK-3
NDD02N60Z	N Channel	Single	600	30	4800	10.1	2.2	57	DPAK-4; IPAK-4
NDD03N60Z	N Channel	Single	600	30	3600	12	2.6	61	DPAK-4; IPAK-4
NDD04N60Z	N Channel	Single	600	30	2000	19	4	28	DPAK-4; IPAK-4
NDF02N60Z	N Channel	Single	600	30	4800	10.1	2.4	23	TO-220 FULLPAK-3

## MOSFETs (continued)

Device	Channel Polarity	Configuration	$V_{(BR)DSS}$ Min (V)	$V_{GS}$ Max (V)	$r_{DS(on)}$ Max (m $\Omega$ )	$Q_g$ Typ (nC)	$I_D$ Max (A)	$P_D$ Max (W)	Package
NDF03N60Z	N Channel	Single	600	30	3600	12	3	24	TO-220 FULLPAK-3
NDF04N60Z	N Channel	Single	600	30	2000	19	4	28	TO-220 FULLPAK-3
NDF06N60Z	N Channel	Single	600	30	1200	31	6	31	TO-220 FULLPAK-3
NDF08N60Z	N Channel	Single	600	30	950	39	7.5	35	TO-220 FULLPAK-3
NDF10N60Z	N Channel	Single	600	30	750	47	10	36	TO-220 FULLPAK-3
NDF04N62Z	N Channel	Single	620	30	2000	19	4.1	83	TO-220 FULLPAK-3
NDF06N62Z	N Channel	Single	620	30	1200	32	3.8	31	TO-220 FULLPAK-3
NDF10N62Z	N Channel	Single	620	30	750	47	5.7	36	TO-220 FULLPAK-3
NTGD1100L	P Channel	Dual	8	8	55		3.3	0.83	SC-74-6 / SC59-ML-6
NTJD1155L	P Channel	Dual	8	8	175		1.3	0.4	SC-88-6 / SC-70-6 / SOT-363-6
NTHD4102P	P Channel	Dual	20	8	80	7.6	4.1	2.1	ChipFET-8
NTJD4152P	P Channel	Dual	20	12	215	2.2	0.88	0.272	SC-88-6 / SC-70-6 / SOT-363-6
NTLJD3115P	P Channel	Dual	20	8	100	5.5	3.3	1.47	WDFN-6
NTLUD3A260P	P Channel	Dual	20	8	200	4.2	1.7	0.8	UDFN-6
NTMD6P02	P Channel	Dual	20	12	33	20	7.8	2	SOIC-8
NTUD3171PZ	P Channel	Dual	20	8	5000		0.2	0.2	SOT-963
NTZD3152P	P Channel	Dual	20	6	900	1.7	0.43	0.28	SOT-563-6
NUS5530MN	P Channel	Dual	20	12	60	9.7	3.9	2.5	DFN-8
NTGD4161P	P Channel	Dual	30	20	160	5.6	2.3	1.3	TSOP-6
NTMD3P03	P Channel	Dual	30	20	85	16	3.05	2	SOIC-8
NTHD3101F	P Channel	FETKY $\square$	20	8	80	7.4	4.4	2.1	ChipFET-8
NTHD3133PF	P Channel	FETKY $\square$	20	8	80	7.4	4.4	1.1	ChipFET-8
NTHD4P02	P Channel	FETKY $\square$	20	12	155	3	3	2.1	ChipFET-8
NTLGF3402P	P Channel	FETKY $\square$	20	12	140	3.8	3.9	3	DFN-6
NTLJF3117P	P Channel	FETKY $\square$	20	8	100	5.5	4.1	2.3	WDFN-6
NTTD4401F	P Channel	FETKY $\square$	20	10	90	10	3.3	1.42	Micro8
NTMD4184PF	P Channel	FETKY $\square$	30	20	165	2.8	2.3	1.6	SOIC-8

## ON Semiconductor Selector Guide – IGBTs and FETs

### MOSFETs (continued)

Device	Channel Polarity	Configuration	$V_{(BR)DSS}$ Min (V)	$V_{GS}$ Max (V)	$r_{DS(on)}$ Max (m $\Omega$ )	$Q_g$ Typ (nC)	$I_D$ Max (A)	$P_D$ Max (W)	Package
NTR2101P	P Channel	Single	8	8	52	12	3.7	0.96	SOT–23–3
NTS2101P	P Channel	Single	8	8	100	6.4	1.4	0.29	SC–70–3 / SOT–323–3
NTGS3433	P Channel	Single	12	8	75	7	3.3	2	TSOP–6
NTJS3151P	P Channel	Single	12	12	60	8.6	3.3	0.625	SC–88–6 / SC–70–6 / SOT–363–6
NTLJS2103P	P Channel	Single	12	8	40	12.8	7.7	1.9	WDFN–6
NUS5531	P Channel	Single	12	8	40	13	5.7	0.418	DFN–8
MMSF3P02HD	P Channel	Single	20	20	75	33	5.6	2.5	SOIC–8
NTA4151P	P Channel	Single	20	6	360	2.1	0.76	0.301	SC–75–3 / SOT–416–3
NTE4151P	P Channel	Single	20	6	360	2.1	0.76	0.313	SC–89–3
NTF6P02	P Channel	Single	20	8	50	15	10	8.3	SOT–223–4 / TO–261–4
NTGS3441	P Channel	Single	20	8	90	6.2	2.35	1	TSOP–6
NTGS3441P	P Channel	Single	20	12	110	3.25	3.16	1.6	TSOP–6
NTGS3443	P Channel	Single	20	12	65	7.5	2	2	TSOP–6
NTHS4101P	P Channel	Single	20	8	34	25	6.7	2.5	ChipFET–8
NTHS5441T1	P Channel	Single	20	12	60	9.7	5.3	2.5	ChipFET–8
NTHS5443	P Channel	Single	20	12	65	7.5	4.9	2.5	ChipFET–8
NTJS4151P	P Channel	Single	20	12	60	10	4.2	1	SC–88–6 / SC–70–6 / SOT–363–6
NTK3139P	P Channel	Single	20	6	480		0.78	0.55	SOT–723–3
NTLJS3113P	P Channel	Single	20	8	40	13	7.7	3.3	WDFN–6
NTLUS3A40P	P Channel	Single	20	8	29	29	6.4	0.7	UDFN–6
NTLUS3A90P	P Channel	Single	20	8	62	12.3	4	0.6	UDFN–6
NTMS10P02	P Channel	Single	20	12	14	48	10	2.5	SOIC–8
NTMS5P02	P Channel	Single	20	10	33	20	5.4	7.05	SOIC–8
NTNUS3171PZ	P Channel	Single	20	8	3500		0.14	0.125	SOT–1123–3
NTR0202PL	P Channel	Single	20	20	800	2.18	0.4	0.225	SOT–23–3
NTR1P02	P Channel	Single	20	20	180	2.5	1	0.4	SOT–23–3
NTR1P02LT1	P Channel	Single	20	12	220	5.5	1.3	0.4	SOT–23–3
NTR4101	P Channel	Single	20	8	85	7.5	3.2	0.73	SOT–23–3
NTS4101P	P Channel	Single	20	8	120	6.4	1.37	0.329	SC–70–3 / SOT–323–3
NTZS3151P	P Channel	Single	20	8	150	5.6	0.95	0.21	SOT–563–6

## MOSFETs (continued)

Device	Channel Polarity	Configuration	$V_{(BR)DSS}$ Min (V)	$V_{GS}$ Max (V)	$r_{DS(on)}$ Max (m $\Omega$ )	$Q_g$ Typ (nC)	$I_D$ Max (A)	$P_D$ Max (W)	Package
MTB50P03HDL	P Channel	Single	30	15	25	74	50	125	D2PAK-3
MTP50P03HDL	P Channel	Single	30	15	25	74	50	125	TO-220-3
NTD25P03L	P Channel	Single	30	15	72	15	25	75	DPAK-4
NTF5P03T3	P Channel	Single	30	20	100	15	5	3.13	SOT-223-4 / TO-261-4
NTGS3455	P Channel	Single	30	20	100	9	3.5	2	TSOP-6
NTGS4111P	P Channel	Single	30	20	60	15.25	4.7	1.25	TSOP-6
NTMS4177P	P Channel	Single	30	20	19	29	11.4	2.5	SOIC-8
NTR4171P	P Channel	Single	30	12	75	7.4	3.5	1.25	SOT-23-3
NTR4502P	P Channel	Single	30	20	200	6	1.95	1.25	SOT-23-3
NTS4173P	P Channel	Single	30	12	150	4.8	1.3	0.35	SC-70-3 / SOT-323-3
BSS84L	P Channel	Single	50	20	10000		0.13	0.225	SOT-23-3
NVTF5116PL	P Channel	Single	60	20	52	25	14	21	u8FL / WDFN-8
MTB30P06V	P Channel	Single	60	15	80	54	30	125	D2PAK-3
MTD5P06V	P Channel	Single	60	15	450	12	5	40	DPAK-4
NTB25P06	P Channel	Single	60	15	82	33	27.5	120	D2PAK-3
NTB5605P	P Channel	Single	60	20	140	13	18.5	88	D2PAK-3
NTD20P06L	P Channel	Single	60	20	150	15	15.5	65	DPAK-4
NTD2955	P Channel	Single	60	20	180	15	12	55	DPAK-4; IPAK-4
NTF2955	P Channel	Single	60	20	170	14.3	2.6	1	SOT-223-4 / TO-261-4
NTGS5120P	P Channel	Single	60	20	111	18.1	2.9	1.4	TSOP-6
NTP2955	P Channel	Single	60	20	196	14	12	2.4	TO-220-3
NTTFS5116PL	P Channel	Single	60	20	52		5.4	2.7	u8FL / WDFN-8
MTB2P50E	P Channel	Single	500	20	6000	19	2	2.5	D2PAK-3
MTP2P50E	P Channel	Single	500	20	6000	19	2	75	TO-220-3
NUS3116MT	P Channel & Dual PNP	Dual	12	8	40	13	6.2	2.2	DFN-8

**PROTECTED MOSFETS**

Device	Channel Polarity	$V_{(BR)DSS}$ Min (V)	$I_D$ Typ (A)	$r_{DS(on)}$ Max (m $\Omega$ )	$P_D$ Max (W)	Package
NCV8401	N Channel	42	33	23	1.56	DPAK-4
NCV8402	N Channel	42	2	165	8.9	SOT-223-4 / TO-261-4
NCV8402D	N Channel	42	2	165	1.62	SOIC-8
NCV8403	N Channel	42	15	53	1.9	DPAK-4; SOT-223-4 / TO-261-4
NCV8405	N Channel	42	6	100	1.7	SOT-223-4 / TO-261-4
NCV8440	N Channel	52	2.6	95	1.69	SOT-223-4 / TO-261-4
NID9N05CL	N Channel	52	9	181	28.8	DPAK-4
NIF9N05CL	N Channel	52	2.6	125	1.69	SOT-223-4 / TO-261-4
MLD1N06CL	N Channel	60		750	40	DPAK-4
NIMD6001	N Channel	60	3	130		SOIC-8
MLD2N06CL	N Channel	62		400	40	DPAK-4
NCV8406	N Channel	65	7	210	1.31	DPAK-4; SOT-223-4 / TO-261-4
NID6002N	N Channel	65	6.5	210	2.5	DPAK-4
NDD04N60Z	N Channel	600	4	2000	28	DPAK-4; IPAK-4
NDF04N60Z	N Channel	600		2000	28	TO-220 FULLPAK-3
NDF06N60Z	N Channel	600		1200	31	TO-220 FULLPAK-3
NDF10N60Z	N Channel	600		750	36	TO-220 FULLPAK-3
NCV8450	High Side Switch	45	0.8	1000	1.7	SOT-223-4 / TO-261-4
NUD4700						POWERMITE-2

# Interfaces

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# Interfaces

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## Table of Contents

	<b>Page</b>
Data Transmitters and Transceivers .....	240
HART and MAU .....	240
LIN and CAN Transceivers .....	240
I/O Expanders .....	241
Modulators/Demodulators .....	241
PLC Modems .....	241
Sensor Interfaces .....	241
SMART and SIM Card Interfaces .....	242



**DATA TRANSMITTERS AND TRANSCEIVERS**

**HART AND MAU**

Device	Description	Data Transmission Standard	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>PLH</sub> Max (μs)	I <sub>O</sub> Max (μA)	I <sub>H</sub> Max (mA)	Package
A5191HRT	Industrial HART–Protocol Modem	HART	3	5.5	0.02	670	0.0005	LQFP–32; PLCC–28; QFN–32
AMIS–49200	Fieldbus Physical Layer Medium Access Unit (MAU)	MAU	4.75	6.2	4.7	30000	0.001	LQFP–44; NQFP–44

**LIN AND CAN TRANSCEIVERS**

AMIS–30660	CAN High Speed Transceiver	CAN	4.75	5.25	1	45000	8	SOIC–8
AMIS–30663	CAN High Speed Transceiver	CAN	4.75	5.25	1	45000	8	SOIC–8
AMIS–41682	Fault Tolerant CAN Transceiver, 5.0 V Version	CAN	4.75	5.25	8	45000	6.3	SOIC–14
AMIS–41683	Fault Tolerant CAN Transceiver, 3.3V Version	CAN	4.75	5.25	8	45000	6.3	SOIC–14
AMIS–42665	High Speed Low Power CAN Transceiver	CAN	4.75	5.25	1	45000	8	SOIC 14; SOIC–8
AMIS–42670	High Speed CAN Transceiver for Long Networks	CAN	4.75	5.25	1	45000	8	SOIC–8
AMIS–42671	High Speed CAN Transceiver for Long Networks	CAN	4.75	5.25	1	45000	8	SOIC–8
AMIS–42673	High Speed CAN Transceiver for Long Networks	CAN	4.75	5.25	1	45000	8	SOIC–8
AMIS–42675	High Speed Low Power CAN Transceiver	CAN	4.75	5.25	1	45000	8	SOIC–8
AMIS–42700	Dual High Speed CAN Transceiver	CAN	–0.3	7	–	–	–	SOIC–20W
AMIS–42770	Dual High Speed CAN Transceiver for Long Networks	CAN	4.75	5.25	1	45000	19.5	SOIC–20W
NCV7341	High Speed, Low Power CAN Transceiver	CAN	4.75	5.25	–	–	–	SOIC–14
NCV7356	Single Wire CAN Transceiver	CAN	–0.3	18	6.3	350000	0.05	SOIC–14; SOIC–8
AMIS–30600	LIN Transceiver	LIN	7.3	18	50	40000	0.7	SOIC–8
NCV7321	Stand Alone LIN Transceiver	LIN	5	27	–	–	–	SOIC–8
NCV7420	LIN Transceiver with Voltage Regulator	LIN	–	–	–	–	–	SOIC–14

**I/O EXPANDERS**

Device	I/O	Cascadable	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	Interrupt Output	I/O Pullups	LED Blink/PWM	I <sub>O</sub> Min (mA)	Package Type
CAT9532	16	8 Slave ID Addresses	2.3	5.5	No	No	Yes	25	SOIC-24W; TQFN-24; TSSOP-24
CAT9552	16	8 Slave ID Addresses	2.3	5.5	No	No	Yes	25	SOIC-24W; TQFN-24; TSSOP-24
CAT9555	16	8 Slave ID Addresses	2.3	5.5	Yes	Yes	No	10	SOIC-24W; TQFN-24; TSSOP-24
PCA9535E	16	–	1.65	5.5	Yes	–	–	25	QFN-24; SOIC-24; TSSOP-24
CAT9534	8	8 Slave ID Addresses	2.3	5.5	Yes	No	No	10	SOIC-16; TQFN-16; TSSOP-16
CAT9554	8	8 Slave ID Addresses	2.3	5.5	Yes	Yes	No	10	SOIC-16; TQFN-16; TSSOP-16
CAT9554A	8	8 Slave ID Addresses	2.3	5.5	Yes	Yes	No	10	SOIC-16; TQFN-16; TSSOP-16
JLC1562B	8	–	4.2	6	No	No	–	–	PDIP-16; SOEIAJ-16
PCA9655E	–	–	–	–	–	–	–	–	QFN-24; SOIC-24; TSSOP-24

**MODULATORS/DEMULATORS**

Device	z <sub>is</sub> Typ (kΩ)	z <sub>os</sub> Typ (kΩ)	V <sub>CFT</sub> Typ (μV)	V <sub>CS</sub> Typ (mV)	A <sub>VS</sub> Typ (V)	B Typ (MHz)	I <sub>B</sub> Typ (μA)	ACM Typ (dB)	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
MC1496	200	40	20	65	3.5	300	12	85	0	70	PDIP-14; SOIC-14
MC1496B	200	40	20	65	3.5	300	12	85	-40	125	PDIP-14; SOIC-14

**PLC MODEMS**

Device	Modulation Type	Transmission Rate	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
AMIS-30585	S-FSK	Half Duplex up to 1440 b/s	-25	70	PLCC-28
AMIS-49587	S-FSK	Half Duplex up to 2880 b/s	-40	80	PLCC-28; QFN-52

**SENSOR INTERFACES**

Device	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>T</sub> Max (mA)	V <sub>I</sub> Typ (V)	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
NCV1124	2	4.5	5.5	5	250	-40	125	SOIC-8

**SMART AND SIM CARD INTERFACES**

Device	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>T</sub> Typ (mA)	I <sub>I(standby)</sub> Max (μA)	f <sub>Clock</sub> Max (MHz)	Package
NCN4555	1.8	5.5	0.03	4	5	QFN-16
NCN4557	1.8	5.5	0.03	3	5	QFN-16
NCN6001	2.7	6	0.5	60	40	TSSOP-20
NCN6004A	1.8	5.5	–	50	–	QFP-48 / TQFP-48
NCN6804	2.7	5.5	0.1	100	40	QFN-32
NCN8024	4.5	5.5	–	1000	18	SOIC-28W; TSSOP-28

# Memory

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# Memory

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## Table of Contents

	<b>Page</b>
NVRAM .....	246
Parallel EEPROM .....	249
Serial EEPROM .....	246
SRAM .....	249

## ON Semiconductor Selector Guide – Memory

### NVRAM

Device	Density	Organization	t <sub>ACC</sub> Max (ns)	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>standby</sub> Max (μA)	I <sub>act</sub> Max (mA)	T Min (°C)	T Max (°C)	Package
CAT22C10	256 b	64 x 4	200	4.5	5.5	30	40	-40	85	SOIC-16W
CAT24C44	256 b	16 x 16	375	4.5	5.5	30	3	-40	85	PDIP-8; SOIC-8

### PARALLEL EEPROM

Device	Type	Density	Organization	t <sub>ACC</sub> Max ns	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>act</sub> Max (mA)	T Min (°C)	T Max (°C)	Package
CAT28C16A	Parallel	16 kb	2k x 8	120	4.5	5.5	35	-40	85	PDIP-24W; PLCC-32; SOIC-24W
CAT28C17A	Parallel	16 kb	2k x 8	200	4.5	5.5	35	-40	85	SOIC-28W
CAT28C256	Parallel	256 kb	32k x 8	120	4.5	5.5	30	-40	85	PLCC-32
CAT28C64B	Parallel	64 kb	8k x 8	120	4.5	5.5	30	-40	85	PLCC-32; SOIC-28W
CAT28C65B	Parallel	64 kb	8k x 8	120	4.5	5.5	30	-40	85	PLCC-32; SOIC-28W
CAT28LV256	Parallel	256 kb	32k x 8	200	3; 3.6	3.6	15	-40	85	PLCC-32
CAT28LV64	Parallel	64 kb	8k x 8	150	3	3.6	8	-40	85	PLCC-32; SOIC-28W
CAT28LV65	Parallel	64 kb	8k x 8	150	3	3.6	8	-40	85	PLCC-32

### SERIAL EEPROM

Device	Type	Density	Organization	Data Transmission Standard	f <sub>cycle</sub> Max (kHz)	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>standby</sub> Max (mA)	I <sub>act</sub> Max (mA)	T Min (°C)	T Max (°C)	Package
CAT1021	Serial	2 kb	256 x 8	I <sup>2</sup> C	400	2.7	5.5	60	3	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT1022	Serial	2 kb	256 x 8	I <sup>2</sup> C	400	2.7	5.5	60	3	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT1023	Serial	2 kb	256 x 8	I <sup>2</sup> C	400	2.7	5.5	60	3	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT1024	Serial	2 kb	256 x 8	I <sup>2</sup> C	400	2.7	5.5	40	3	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT1025	Serial	2 kb	256 x 8	I <sup>2</sup> C	400	2.7	5.5	40	3	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT1026	Serial	2 kb	256 x 8	I <sup>2</sup> C	400	2.7	5.5	50	3	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT1027	Serial	2 kb	256 x 8	I <sup>2</sup> C	400	2.7	5.5	60	3	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT1161	Serial	16 kb	2k x 8	I <sup>2</sup> C	400	2.7	6	50	3	-40	85	PDIP-8; SOIC-8
CAT1162	Serial	16 kb	2k x 8	I <sup>2</sup> C	400	2.7	6	50	3	-40	85	PDIP-8; SOIC-8
CAT1163	Serial	16 kb	2k x 8	I <sup>2</sup> C	400	2.7	6	50	3	-40	85	PDIP-8; SOIC-8

SERIAL EEPROM (continued)

Device	Type	Density	Organization	Data Transmission Standard	f <sub>cycle</sub> Max (kHz)	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>standby</sub> Max (mA)	I <sub>act</sub> Max (mA)	T Min (°C)	T Max (°C)	Package
CAT13001	Serial	1 kb	Split	MicroWire	2000	2.5	5.5	25	3	-40	85	SOIC-8
CAT1320	Serial	32 kb	4k x 8	I2C	400	3	5.5	40	3	-40	85	PDIP-8; SOIC-8; TSSOP-8
CAT1321	Serial	32 kb	4k x 8	I2C	400	3	5.5	40	3	-40	85	PDIP-8
CAT14002	Serial	2 kb	256 x 8	I2C	400	2.5	5.5	22	1	-40	85	SOIC-8
CAT14004	Serial	4 kb	512 x 8	I2C	400	2.5	5.5	22	1	-40	85	SOIC-8
CAT14008	Serial	8 kb	1k x 8	I2C	400	2.5	5.5	22	1	-40	85	SOIC-8
CAT14016	Serial	16 kb	2k x 8	I2C	400	2.5	5.5	22	1	-40	85	SOIC-8
CAT15002	Serial	2 kb	256 x 8	SPI	10000	2.5	5.5	25	2	-40	85	SOIC-8
CAT15004	Serial	4 kb	512 x 8	SPI	10000	2.5	5.5	25	2	-40	85	SOIC-8
CAT15008	Serial	8 kb	1k x 8	SPI	10000	2.5	5.5	25	2	-40	85	SOIC-8
CAT15016	Serial	16 kb	2k x 8	SPI	10000	2.5	5.5	25	2	-40	85	SOIC-8
CAT1640	Serial	64 kb	8k x 8	I2C	400	3	5.5	40	3	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT1641	Serial	64 kb	8k x 8	I2C	400	3	5.5	40	3	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT24AA01	Serial	1 kb	128 x 8	I2C	400	1.7	5.5	1	1	-40	85	SOIC-8; TSOT-23-5
CAT24AA02	Serial	2 kb	256 x 8	I2C	400	1.7	5.5	1	1	-40	85	SOIC-8; TSOT-23-5
CAT24AA04	Serial	4 kb	512 x 8	I2C	1000	1.7	5.5	1	1	-40	85	SOIC-8; TSOT-23-5
CAT24AA08	Serial	8 kb	1k x 8	I2C	1000	1.7	5.5	1	1	-40	85	SOIC-8; TSOT-23-5
CAT24AA16	Serial	16 kb	2k x 8	I2C	10000	1.7	5.5	1	1	-40	85	SOIC-8; TSOT-23-5
CAT24C01	Serial	1 kb	128 x 8	I2C	400	1.7	5.5	1	1	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSOT-23-5; TSSOP-8
CAT24C02	Serial	2 kb	256 x 8	I2C	400	1.7	5.5	1; 2	1	-40	85; 125	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSOT-23-5; TSSOP-8
CAT24C03	Serial	2 kb	256 x 8	I2C	400	1.8	5.5	1	1	-40	85	PDIP-8; SOIC-8; TDFN-8; TSOT-23-5; TSSOP-8
CAT24C04	Serial	4 kb	512 x 8	I2C	400	1.7	5.5	1	1	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSOT-23-5; TSSOP-8
CAT24C05	Serial	4 kb	512 x 8	I2C	400	1.8	5.5	1	1	-40	85	PDIP-8; SOIC-8; TDFN-8; TSOT-23-5; TSSOP-8
CAT24C08	Serial	8 kb	1k x 8	I2C	400	1.7	5.5	1	1	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSOT-23-5; TSSOP-8
CAT24C128	Serial	128 kb	16k x 8	I2C	400	1.8	5.5	1	1	-40	85; 125	MSOP-8; PDIP-8; SOIC-8; TSSOP-8; UDFN-8
CAT24C16	Serial	16 kb	2k x 8	I2C	400	1.7	5.5	1	1	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSOT-23-5; TSSOP-8
CAT24C164	Serial	16 kb	2k x 8	I2C	400	1.8	5.5	1	1	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8



## ON Semiconductor Selector Guide – Memory

### SERIAL EEPROM (continued)

Device	Type	Density	Organization	Data Transmission Standard	f <sub>cycle</sub> Max (kHz)	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>standby</sub> Max (mA)	I <sub>act</sub> Max (mA)	T Min (°C)	T Max (°C)	Package
CAT24C208	Serial	8 kb	1k x 8	I2C	400	2.5	5.5	50	1	-40	85	SOIC-8
CAT24C21	Serial	1 kb	128 x 8	I2C	400	2.5	5.5	1	1	-40	85	MSOP-8; PDIP-8; SOIC-8
CAT24C256	Serial	256 kb	32k x 8	I2C	400	1.8	5.5	1	1	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT24C32	Serial	32 kb	4k x 8	I2C	400	1.7	5.5	1	1	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8; UDFN-8
CAT24C64	Serial	64 kb	8k x 8	I2C	400	1.7	5.5	1	1	-40	85; 125	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSSOP-8; UDFN-8
CAT25010	Serial	1 kb	128 x 8	SPI	10000	1.8	5.5	2	2	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT25020	Serial	2 kb	256 x 8	SPI	10000	1.8	5.5	2	2	-40	85	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT25040	Serial	4 kb	512 x 8	SPI	10000	1.8	5.5	2	2	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT25080	Serial	8 kb	1k x 8	SPI	10000	1.8	5.5	2	2	-40	85; 125	PDIP-8; SOIC-8; TDFN-8; TSSOP-8; UDFN-8
CAT25128	Serial	128 kb	16k x 8	SPI	10000	1.8	5.5	2	2	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT25160	Serial	16 kb	2k x 8	SPI	10000	1.8	5.5	2	2	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8; UDFN-8
CAT25256	Serial	256 kb	32k x 8	SPI	10000	1.8	5.5	2	2	-40	85; 125	PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT25320	Serial	32 kb	4k x 8	SPI	10000	1.8	5.5	2	2	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8; UDFN-8
CAT25640	Serial	64 kb	8k x 8	SPI	10000	1.8	5.5	2	2	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8; UDFN-8
CAT34C02	Serial	2 kb	256 x 8	I2C	400	1.7	5.5	1	1	-40	85	TDFN-8; TSSOP-8; UDFN-8
CAT34TS02	Serial	2 kb	256 x 8	I2C	400	3.3	3.6	5	0.5	-40	125	TDFN-8
CAT64LC40	Serial	4 kb	256 x 16	SPI	-	2.5	6	3	3	-40	85	PDIP-8; SOIC-8; TSSOP-8
CAT93C46	Serial	1 kb	128 x 8; Split	MicroWire	2000	1.8	5.5	2	3	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT93C46R	Serial	1 kb	128 x 8	MicroWire	2000	1.8	5.5	2	3	-40	85	PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT93C56	Serial	2 kb	256 x 8	MicroWire	2000	1.8	5.5	4	1	-40	85; 125	PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT93C57	Serial	2 kb	256 x 8	MicroWire	2000	1.8	5.5	4	1	-40	85	PDIP-8; SOIC-8; TSSOP-8
CAT93C66	Serial	4 kb	512 x 8; Split	MicroWire	2000	1.8	5.5	2; 4	1; 3	-40	85; 125	PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT93C76	Serial	8 kb	1k x 8	MicroWire	-	1.8	5.5	10	3	-40	85	PDIP-8; SOIC-8; TSSOP-8
CAT93C86	Serial	16 kb	2k x 8	MicroWire	-	1.8	5.5	10	3	-40	85	PDIP-8; SOIC-8

## SRAM

Device	Type	Density	Organization (bits)	f <sub>cycle</sub> Max (MHz)	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	I <sub>standby</sub> Typ (μA)	I <sub>act</sub> Max (μA)	Package
N25S818HA	Serial	256 kb	32k x 8	16	1.7	1.95	0.2	–	SOIC-8; TSSOP-8
N25S830HA	Serial	256 kb	32k x 8	20	2.7	3.6	1	–	SOIC-8; TSSOP-8
N64S818HA	Serial	64 kb	8k x 8	16	1.7	1.95	1	4	SOIC-8; TSSOP-8
N64S830HA	Serial	64 kb	8k x 8	20	2.7	3.6	1	4	SOIC-8; TSSOP-8



## Standard Logic

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# Standard Logic

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## Table of Contents

	<b>Page</b>
Arithmetic Functions .....	254
Buffers .....	255
Flip-Flops .....	260
Latches and Registers .....	261
Logic Gates .....	263
Multiplexers .....	271
Multivibrators .....	273
Transceivers .....	273
Translators .....	274

## ON Semiconductor Selector Guide – Standard Logic Devices

### ARITHMETIC FUNCTIONS

Device	Type	Description	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	P <sub>D</sub> Max (W)	I <sub>O</sub> Max (mA)	Package Type
MC14008B	Adder	4–Bit Full Adder	3	18	320	0.5	2.25	PDIP–16; SOIC–16
NLX1G99	Arithmetic Logic Unit	1.65 V to 5.5 V Logic MiniGate™ with 24 mA Drive	1.65	5.5	6.7	0.000055	32	ULLGA–8
NL7SZ57	Arithmetic Logic Unit	Flexible Choice Logic (9 Configurable Functions)	1.65	5.5	2.5	0.2	32	SC–88–6 / SC–70–6 / SOT–363–6
NL7SZ97	Arithmetic Logic Unit	Flexible Choice Logic (9 Configurable Functions)	1.65	5.5	2.5	0.2	32	SC–88–6 / SC–70–6 / SOT–363–6
NL7SZ58	Arithmetic Logic Unit	Flexible Choice Logic (9 Configurable Functions), Inverting	1.65	5.5	2.5	0.2	32	SC–88–6 / SC–70–6 / SOT–363–6
NL7SZ98	Arithmetic Logic Unit	Flexible Choice Logic (9 Configurable Functions), Inverting	1.65	5.5	2.5	0.2	32	SC–88–6 / SC–70–6 / SOT–363–6
MC14490	Bounce Eliminator	Hex Bounce Eliminator	3	18	320	0.5	9	SOIC–16W
MC14040B	Counter	12–Bit Binary Counter	3	18	1440	0.5	2.25	PDIP–16; SOIC–16; TSSOP–16
MC74AC4040	Counter	12–Stage Binary Ripple Counter	2	6	8	0.75	24	PDIP–16; SOIC–16
MC14020B	Counter	14–Bit Binary Counter	3	18	1725	0.5	2.25	PDIP–16; SOIC–16
MC14060B	Counter	14–Stage Binary Counter/Oscillator	3	18	1300	0.5	2.25	PDIP–16; SOIC–16; TSSOP–16
MC74HC4060A	Counter	14–Stage Binary Ripple Counter with Oscillator	2	6	250	0.75	5.2	PDIP–16; SOIC–16; TSSOP–16
MC14553B	Counter	3–Digit BCD Counter	3	18	1000	0.5	2.25	PDIP–16
MC14024B	Counter	7–Stage Ripple Counter	3	18	750	0.5	2.25	PDIP–14; SOIC–14
MC14516B	Counter	Binary Up/Down Counter	3	18	260	0.5	2.25	PDIP–16; SOIC–16
MC14029B	Counter	Binary/Decade Up/Down Counter	3	18	200	0.5	2.25	PDIP–16; SOIC–16
MC14017B	Counter	Decade Counter/Divider	3	18	460	0.5	2.25	PDIP–16; SOIC–16
MC74HC393A	Counter	Dual 4–Stage Binary Ripple Counter	2	6	52	0.75	5.2	PDIP–14; SOIC–14; TSSOP–14
MC74HC390A	Counter	Dual 4–Stage Binary Ripple Counter with ÷2 and ÷5 Sections	2	6	58	0.75	5.2	PDIP–16; SOIC–16; TSSOP–16
MC14518B	Counter	Dual BCD Up Counter	3	18	230	0.5	2.25	PDIP–16; SOIC–16W
MC14520B	Counter	Dual BCD Up Counter	3	18	230	0.5	2.25	PDIP–16; SOIC–16W
MC74HC4020A	Counter	Monolithic WFR, Binary Counter	2	6	31	0.75	5.2	PDIP–16; SOIC–16; TSSOP–16
MC74HC4040A	Counter	Monolithic WFR, Binary Counter	2	6	31	0.75	5.2	PDIP–16; SOIC–16; TSSOP–16
MC14022B	Counter	Octal Counter	3	18	460	0.5	2.25	PDIP–16; SOIC–16
MC14018B	Counter	Preset Divide By N Counter	3	18	240	0.5	2.25	PDIP–16; SOIC–16
MC14526B	Counter	Presettable 4–Bit Down Counters	3	18	450	0.5	2.25	PDIP–16; SOIC–16W
MC74HC161A	Counter	Presettable Counter	2	6	16		5.2	SOIC–16; TSSOP–16
MC74HC163A	Counter	Presettable Counter	2	6	22		5.2	SOIC–16; TSSOP–16

**ARITHMETIC FUNCTIONS** (continued)

Device	Type	Description	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	P <sub>D</sub> Max (W)	I <sub>O</sub> Max (mA)	Package Type
MC14569B	Counter	Programmable Divide-By-N Dual 4-Bit Binary/BCD Down Counter	3	18	500	0.5	2.25	PDIP-16; SOIC-16W
MC74AC161	Counter	Synchronous Presettable Binary Counter	2	6	9.5	0.35	24	PDIP-16; SOIC-16
MC74AC163	Counter	Synchronous Presettable Binary Counter	2	6	9.5	0.35	24	PDIP-16; SOIC-16
MC74ACT161	Counter	Synchronous Presettable Binary Counter	4.5	5.5	10.5	0.35	24	PDIP-16; SOIC-16
MC74ACT163	Counter	Synchronous Presettable Binary Counter	4.5	5.5	11	0.35	24	PDIP-16; SOIC-16
MC14521B	Divider	24-Stage Frequency Divider	3	18	4500	0.5	2.25	PDIP-16; SOIC-16
MC14585B	Magnitude Comparator	4-Bit Magnitude Comparator	3	18	360	0.5	2.25	PDIP-16; SOIC-16
MC14536B	Timer	Programmable Timer	3	18	6000	0.5	2.25	PDIP-16; SOIC-16W
MC14541B	Timer	Programmable Timer Oscillator	3	18	10000	0.5	8	PDIP-14; SOIC-14; TSSOP-14
MC1455	Timer	Timer Circuit	4.5	16				PDIP-8; SOIC-8
MC1455B	Timer	Timer Circuit	4.5	16				PDIP-8; SOIC-8
NCV1455	Timer	Timer Circuit	4.5	16				SOIC-8
NLX1G57		1.65 to 5.5 V Flexible Logic MiniGate™ with 24 mA Output Drive	1.65	5.5	5.1		24	ULLGA-6
MC14007UB		Dual Comparator Pair Plus Inverter	3	18	75	0.5	2.5	PDIP-14; SOIC-14
NLX1G97		Flexible Choice Logic (9 Configurable Functions)	1.65	5.5	6.3		24	ULLGA-6
NLX1G58		Flexible Choice Logic (9 Configurable Functions), Inverting	1.65	5.5	5.1		24	ULLGA-6
MC74HC160A		IC COUNTER 4-BIT SYNC						SOIC-16; TSSOP-16

**BUFFERS**

Device	Description	Channels	Output	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
74VHCX245	8-Bit 3-State Bi-directional Transceiver, Low Voltage	1	3-State	2	6	15	6	QFN-20
MC14511B	BCD-to-7-Segment Latch/Decoder/Driver	1	3-State	3	18	580	25	PDIP-16; SOIC-16; SOIC-16W
MC14513B	BCD-to-7-Segment Latch/Decoder/Driver	1	3-State	3	18	580	25	PDIP-18
MC14543B	BCD-to-7-Segment Latch/Decoder/Driver for Liquid Crystals	1	3-State	3	18	660	10	PDIP-16; SOIC-16
MC74LCX1624	Low Voltage 16-Bit CMOS Buffer	1	3-State	2	3.6	4.5	24	TSSOP-48
NLX1G125	Non-Inverting Buffer, 3-State	1	Single	1.65	5.5	2.7	32	Flip-Chip-5
NL17SZ16	Single Buffer	1	3-State	1.65	5.5	4.5	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5



## ON Semiconductor Selector Guide – Standard Logic Devices

### BUFFERS (continued)

Device	Description	Channels	Output	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74VHC1G05	Single Inverter, Open Drain	1		2	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL17SZ06	Single Inverter, Open Drain	1		1.65	5.5	3	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5
MC74VHC1G50	Single Non-Inverting Buffer	1	CMOS	2	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL17SV16	Single Non-Inverting Buffer	1		0.9	4.6	3.3	50	SOT-553-5
NLU1G07	Single Non-Inverting Buffer with Open Drain Output	1	Open Drain	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
NL17SZ17	Single Non-Inverting Buffer with Schmitt Trigger Output	1	3-State	1.65	5.5	4.9	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5
NLU1GT50	Single Non-Inverting Buffer with TTL-Compatible Inputs	1	CMOS	1.65	5.5	6.7	8	UDFN-6; ULLGA-6
MC74VHC1G126	Single Non-Inverting Buffer, 3-State	1	3-State	2	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1GT125	Single Non-Inverting Buffer, 3-State	1	3-State	3	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL17SZ125	Single Non-Inverting Buffer, 3-State	1	3-State	1.65	5.5	5	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5; TSOP-5 / SOT23-5
NL17SZ126	Single Non-Inverting Buffer, 3-State	1	3-State	1.65	5.5	5	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5
NLU1GT125	Single Non-Inverting Buffer, 3-State	1	3-State	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
MC74VHC1G125	Single Non-Inverting Buffer, 3-State	1	3-State	2	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1G07	Single Non-Inverting Buffer, Open Drain	1	Open Drain	2	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL17SZ07	Single Non-Inverting Buffer, Open Drain	1	Open Drain	1.65	5.5	3.5	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5
MC74VHC1GT126	Single Non-Inverting Buffer, TTL Level	1	3-State	3	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1GT50	Single Non-Inverting Buffer, TTL Level	1	CMOS	1.65	5.5	7.7	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NLU1GT126	Single Non-Inverting Buffer, TTL-Level	1	3-State	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
NL27WZ16	Dual Buffer	2		1.65	5.5	3.8	32	SC-88-6 / SC-70-6 / SOT-363-6; TSOP-6
NLU2G16	Dual Buffer	2	CMOS	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
NLX2G16	Dual Buffer	2	CMOS	1.65	5.5	1.8	24	ULLGA-6
NLX2G07	Dual Buffer with Open Drain Output	2	Open Drain	1.65	5.5	3.5	32	ULLGA-6
NLU2G17	Dual Buffer with Schmitt Trigger Output	2	CMOS	1.65	5.5	8.6	8	UDFN-6; ULLGA-6

**BUFFERS** (continued)

Device	Description	Channels	Output	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
NLX2G17	Dual Buffer with Schmitt Trigger Output	2	CMOS	1.65	5.5	3.1	24	ULLGA-6
NL27WZ126	Dual Buffer, 3-State High Enable	2	3-State	1.65	5.5	5.7	24	US8
NL27WZ125	Dual Buffer, 3-State Low Enable	2	3-State	1.65	5.5	5.7	32	US8
NL27WZ07	Dual Buffer, Open Drain	2	Open Drain	1.65	1.65; 5.5	3.5	32	SC-88-6 / SC-70-6 / SOT-363-6; TSOP-6
NLX2G06	Dual Inverter with Open Drain Output	2		1.65	5.5	3	32	ULLGA-6
NL27WZ06	Dual Inverter, Open Drain	2	CMOS	1.65	5.5	3	32	SC-88-6 / SC-70-6 / SOT-363-6; TSOP-6
NLU2G07	Dual Non-Inverting Buffer with Open Drain Output	2	CMOS	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
NL27WZ17	Dual Non-Inverting Buffer with Schmitt Trigger Input	2		1.65	5.5	5.9	32	SC-88-6 / SC-70-6 / SOT-363-6
NL27WZ07DFT2GH	High Performance Dual Buffer, Open Drain	2	Open Drain	1.65	5.5	3.5	32	SC-88-6 / SC-70-6 / SOT-363-6
NL37WZ16	Triple Buffer	3		1.65	5.5	3.8	32	US8
NLX3G16	Triple Buffer	3		1.65	5.5	1.8	24	ULLGA-8
NL37WZ07	Triple Buffer, Open Drain	3	Open Drain	1.65	5.5	3.5	32	US8
NL37WZ06	Triple Inverter, Open Drain	3	CMOS	1.65	5.5	3	32	US8
NLU3G16	Triple Non-Inverting Buffer	3	CMOS	1.65	5.5	5.5	8	UDFN-8; ULLGA-8
NL37WZ17	Triple Non-Inverting Buffer with Schmitt Trigger Inputs	3		1.65	5.5	4.9	32	US8
NLX3G17	Triple Non-Inverting Buffer with Schmitt Trigger Output	3	CMOS	1.65	5.5	2.7	24	ULLGA-8
NLU3G17	Triple Non-Inverting Buffer with Schmitt Trigger Output	3	CMOS	1.65	5.5	8.6	8	UDFN-8; ULLGA-8
MC74LCX125	Low Voltage Quad Non-Inverting Buffer, 3-State	4	3-State	2	3.6	6	24	SOIC-14; TSSOP-14
MC74VHCT257A	Quad 2-Channel Multiplexer (Mux) with 3-State Outputs	4	3-State	4.5	5.5	7.9	8	SOIC-16; TSSOP-16
MC74LVX257	Quad 2-Channel Multiplexer with 3-State Outputs	4	3-State	2	3.6	12	4	SOIC-16; TSSOP-16
MC74VHC257	Quad 2-Channel Multiplexer with 3-State Outputs	4	3-State	2	5.5	7.9	8	SOIC-16; TSSOP-16
MC74AC125	Quad Buffer with 3-State Outputs	4	3-State	2	6	7	24	PDIP-14; SOIC-14; TSSOP-14
MC74ACT125	Quad Buffer with 3-State Outputs	4	3-State	4.5	5.5	9	24	PDIP-14; SOIC-14; TSSOP-14
NLSF3T125	Quad Bus Buffer with 3-state Control Inputs	4	3-State	2	5.5	5.5	25	QFN-16
NLSF3T126	Quad Bus Buffer with 3-state Control Inputs	4	3-State	2	5.5	7.5	25	QFN-16

## ON Semiconductor Selector Guide – Standard Logic Devices

### BUFFERS (continued)

Device	Description	Channels	Output	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74LVX125	Quad Bus Buffer, 3-State	4	3-State	2	3.6	9.7	4	SOIC-14; TSSOP-14
MC74VHC125	Quad Bus Buffer, 3-State	4	3-State	2	5.5	7.5	8	SOIC-14; TSSOP-14
MC74VHC126	Quad Bus Buffer, 3-State	4	3-State	2	5.5	7.5	8	SOIC-14; TSSOP-14
MC74VHCT125A	Quad Bus Buffer, 3-State, TTL Level	4	3-State	4.5	5.5	7.5	8	SOIC-14; TSSOP-14
MC74VHCT126A	Quad Bus Buffer, 3-State, TTL Level	4	3-State	4.5	5.5	7.5	8	SOIC-14; TSSOP-14
MC74HCT125A	Quad Non-inverting Buffer with LSTTL Compatible Inputs, 3-State	4	3-State	2	6	18	6	SOIC-14; TSSOP-14
MC74HC125A	Quad Non-inverting Buffer, 3-State	4	3-State	2	6	24	6	PDIP-14; SOIC-14; TSSOP-14
MC74HC126A	Quad Non-inverting Buffer, 3-State	4	3-State	2	6	24	6	PDIP-14; SOIC-14; TSSOP-14
MC74HC365A	Hex 3-State Non-inverting Buffer with Common Enables	6	3-State	2	6	20	7.8	SOIC-16; TSSOP-16
MC14050B	Hex Buffer	6		3	18	80	16	PDIP-16; SOIC-16; TSSOP-16
MC74LVX50	Hex Buffer	6	3-State	2	3.6	9.7	4	SOIC-14; TSSOP-14
MC74VHC50	Hex Buffer	6	3-State	2	5.5	7.5	8	SOIC-14; TSSOP-14
MC14049B	Hex Inverter	6		3	18	80	16	PDIP-16; SOIC-16
MC14049UB	Hex Inverter	6		3	18	65	16	PDIP-16; SOIC-16; TSSOP-16
MC74AC05	Hex Inverter Open-Drain	6		2	6	6	24	PDIP-14; SOIC-14
MC74HC05A	Hex Inverter with Open Drain Outputs	6		2	6	15	5.2	SOIC-14; TSSOP-14
MC74ACT05	Hex Inverter with Open-Drain Outputs	6		4.5	5.5	8.5	24	PDIP-14; SOIC-14; TSSOP-14
MC14503B	Hex Non-inverting Buffer, 3-State	6	3-State	3	18	80	6.2	PDIP-16; SOIC-16
MC74LCX07	Low Voltage CMOS Hex Buffer with Open Drain Outputs and 5V-Tolerant Inputs	6	Open Drain	2	5.5	3	24	SOIC-14; TSSOP-14
MC74LCX06	Low Voltage CMOS Hex Inverter with Open Drain Outputs and 5V-Tolerant I/Os	6		2	3.6	3.7	24	SOIC-14; TSSOP-14
MC74VHCT50A	Non-inverting Buffer / CMOS Logic Level Shifter with LSTTL-Compatible Inputs	6	3-State	4.5	5.5	7.7	8	SOIC-14; TSSOP-14
MC74LCX540	Low Voltage CMOS Octal Buffer Flow Through Pinout	8	3-State	2	3.6	6.5	24	SOIC-20W; TSSOP-20
MC74LCX541	Low Voltage CMOS Octal Buffer Flow Through Pinout	8	3-State	2	3.6	6.5	24	SOIC-20W; TSSOP-20
MC74LCX244	Low Voltage Non-inverting Octal Buffer, 3-State	8	3-State	2	3.6	6.5	24	QFN-20; SOIC-20W; TSSOP-20
MC74LCX240	Low Voltage Octal Inverting Buffer, 3-State	8	3-State	2	3.6	6.5	24	SOIC-20W; TSSOP-20
MC74VHCT541A	Non-inverting Octal Bus Buffer/Line Driver/Line Receiver, TTL Level, 3-State	8	3-State	4.5	5.5	7.9	8	SOIC-20W; TSSOP-20
MC74HC540A	Octal 3-State Inverting Buffer/Line Driver/Line Receiver	8	3-State	2	6	25	6	PDIP-20; SOIC-20W; TSSOP-20

**BUFFERS** (continued)

Device	Description	Channels	Output	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74HC244A	Octal 3-State Non-Inverting Buffer/Line Driver/Line Receiver	8	3-State	2	6	22	6	PDIP-20; SOIC-20W; TSSOP-20
MC74HC541A	Octal 3-State Non-inverting Buffer/Line Driver/Line Receiver	8	3-State	2	6	25	6	PDIP-20; SOIC-20W; TSSOP-20
MC74HCT241A	Octal 3-State Noninverting Buffer/Line Driver/Line Receiver with LSTTL-Compatible Inputs	8		4.5	5.5	23	6	SOIC-20W; TSSOP-20
MC74HCT244A	Octal 3-State Non-Inverting Buffer/Line Driver/Line Receiver, TTL Level	8	3-State	4.5	5.5	26	6	PDIP-20; SOIC-20W; TSSOP-20
MC74HCT541A	Octal 3-State Non-inverting Buffer/Line Driver/Line Receiver, TTL Level	8	3-State	4.5	5.5	30	6	PDIP-20; SOIC-20W; TSSOP-20
MC74AC540	Octal Buffer/Line Driver with 3-State Outputs	8	3-State	2	6	6	24	PDIP-20; SOIC-20W
MC74AC541	Octal Buffer/Line Driver with 3-State Outputs	8	3-State	2	6	6	24	PDIP-20; SOIC-20W; TSSOP-20
MC74ACT540	Octal Buffer/Line Driver with 3-State Outputs	8	3-State	4.5	5.5	8	24	PDIP-20; SOIC-20W; TSSOP-20
MC74ACT541	Octal Buffer/Line Driver with 3-State Outputs	8	3-State	4.5	5.5	7.5	24	PDIP-20; SOIC-20W; TSSOP-20
MC74AC240	Octal Buffer/Line Driver, 3-State	8	3-State	2	6	6.5	24	PDIP-20; SOIC-20W; TSSOP-20
MC74AC244	Octal Buffer/Line Driver, 3-State	8	3-State	2	6	7	24	PDIP-20; SOIC-20W; TSSOP-20
MC74ACT240	Octal Buffer/Line Driver, 3-State	8	3-State	4.5	5.5	8.5	24	PDIP-20; SOIC-20W; TSSOP-20
MC74ACT241	Octal Buffer/Line Driver, 3-State	8	3-State	4.5	5.5	9	24	SOIC-20W; TSSOP-20
MC74ACT244	Octal Buffer/Line Driver, 3-State	8	3-State	4.5	5.5	9	24	PDIP-20; SOIC-20W; TSSOP-20
MC74LVX541	Octal Bus Buffer	8	3-State	2	3.6	7	4	SOIC-20W; TSSOP-20
MC74VHC540	Octal Bus Buffer	8	3-State	2	5.5	7	8	SOIC-20W; TSSOP-20
MC74VHC541	Octal Bus Buffer	8	3-State	2	5.5	7	8	SOIC-20W; TSSOP-20
MC74VHCT244A	Octal Bus Buffer/Line Driver	8	3-State	4.5	5.5	8.4	8	SOIC-20W; TSSOP-20
MC74VHCT240A	Octal Inverting Buffer/Line Driver, 3-State Output	8	3-State	4.5	5.5	8.8	8	SOIC-20W; TSSOP-20
MC74HC240A	Octal Inverting Buffer/Line Driver/Line Receiver, 3-State	8	3-State	2	6	22	6	PDIP-20; SOIC-20W; TSSOP-20
MC74LVX240	Octal Inverting Bus Buffer, 3-State	8	3-State	2	3.6	9.7	4	SOIC-20W; TSSOP-20
MC74VHC240	Octal Inverting Bus Buffer/Line Driver, 3-State Output	8	3-State	2	5.5	7.5	8	SOIC-20W; TSSOP-20
MC74LVX244	Octal Non-inverting Bus Buffer, 3-State	8	3-State	2	3.6	10.6	4	SOIC-20W; TSSOP-20
MC74VHC244	Octal Non-inverting Bus Buffer, 3-State	8	3-State	2	5.5	7.5	8	SOIC-20W; TSSOP-20
MC74LCX16240	Low Voltage 16-Bit CMOS Buffer	16	3-State	2	3.6	4.5	24	TSSOP-48

## ON Semiconductor Selector Guide – Standard Logic Devices

### BUFFERS (continued)

Device	Description	Channels	Output	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74HC367A	Hex 3-State NonInverting Buffer with Separate 2-Bit and 4-Bit Sections							SOIC-16; TSSOP-16
MC74HCT366A	Hex buffer/line driver, 3-state, inverting, TTL							SOIC-16; TSSOP-16

### FLIP-FLOPS

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC14013B	Dual D Flip-Flop	D-Type	2	3	18	150	2.25	PDIP-14; SOIC-14; TSSOP-14
MC74LVX74	Dual D Flip-Flop	D-Type	2	2	3.6	13.6	4	SOIC-14; TSSOP-14
MC74AC74	Dual D Flip-Flop Positive Edge Trigger	D-Type	2	2	6	9.5	24	PDIP-14; SOIC-14; TSSOP-14
MC74HC74A	Dual D Flip-Flop with Set and Reset	D-Type	2	2	6	20	4	PDIP-14; SOIC-14; TSSOP-14
MC74HCT74A	Dual D Flip-Flop with Set and Reset	D-Type	2	4.5	5.5	24	4	PDIP-14; SOIC-14
MC74VHC74	Dual D Flip-Flop with Set and Reset	D-Type	2	2	5.5	9.3	8	SOIC-14; TSSOP-14
MC74VHCT74A	Dual D Flip-Flop with Set and Reset	D-Type	2	4.5	5.5	8.8	8	SOIC-14; TSSOP-14
MC74ACT74	Dual D-Type Positive Edge-Triggered Flip-Flop	D-Type	2	4.5	5.5	10	24	PDIP-14; SOIC-14; TSSOP-14
MC74HC174A	Hex D Flip-Flop with Clock	D-Type	6	2	6	22	4	PDIP-16; SOIC-16; TSSOP-16
NLSF1174	Hex D Flip-Flop with Common Clock and Reset	D-Type	6	2	6	19	25	QFN-16
MC14174B	Hex D-Type Flip-Flop	D-Type	6	3	18	160	2.25	PDIP-16; SOIC-16
MC74LCX16374	Low Voltage CMOS 16-Bit D Flip-Flop	D-Type	16	2	3.6	6.2	24	TSSOP-48
MC74LCX74	Low Voltage CMOS Dual D Flip-Flop	D-Type	2	2	3.6	7	24	SOIC-14; TSSOP-14
MC74LCX374	Low Voltage CMOS Octal D Flip-Flop	D-Type	8	2	3.6	8.5	24	SOIC-20W; TSSOP-20
MC74LCX574	Low Voltage CMOS Octal D Flip-Flop Flow Through Pinout	D-Type	8	2	3.6	8.5	3.6; 24	SOIC-20W; TSSOP-20
MC74HC574A	Octal 3-State Non-inverting D Flip-Flop	D-Type	8	2	6	32	6	PDIP-20; SOIC-20W; TSSOP-20
MC74HCT374A	Octal 3-State Non-inverting D Flip-Flop	D-Type	8	4.5	5.5	31	6	PDIP-20; SOIC-20W; TSSOP-20
MC74HCT574A	Octal 3-State Non-inverting D Flip-Flop	D-Type	8	4.5; 5.5	5.5	30	6	PDIP-20; SOIC-20W; TSSOP-20
MC74AC273	Octal D Flip-Flop	D-Type	8	2	6	10	24	PDIP-20; SOIC-20W; TSSOP-20
MC74ACT273	Octal D Flip-Flop	D-Type	8	4.5	5.5	11	24	PDIP-20; SOIC-20W; TSSOP-20
MC74HC273A	Octal D Flip-Flop	D-Type	8	2	6	29	6	PDIP-20; SOIC-20W; TSSOP-20
MC74HC374A	Octal D Flip-Flop	D-Type	8	2	6	25	6	PDIP-20; SOIC-20W; TSSOP-20
MC74HCT273A	Octal D Flip-Flop	D-Type	8	4.5	5.5	25	6	PDIP-20; SOIC-20W; TSSOP-20
MC74AC374	Octal D Flip-Flop with 3-State Outputs	D-Type	8	2	6	9.5	24	PDIP-20; SOIC-20W; TSSOP-20

**FLIP-FLOPS** (continued)

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74AC574	Octal D Flip-Flop with 3-State Outputs	D-Type	8	2	6	9.5	24	PDIP-20; SOIC-20W; TSSOP-20
MC74ACT374	Octal D Flip-Flop with 3-State Outputs	D-Type	8	4.5	5.5	10	24	PDIP-20; SOIC-20W; TSSOP-20
MC74ACT574	Octal D Flip-Flop with 3-State Outputs	D-Type	8	4.5	5.5	11	24	PDIP-20; SOIC-20W; TSSOP-20
MC74LVX374	Octal D Flip-Flop with 3-State Outputs	D-Type	8	2	3.6	14.1	4	SOIC-20W; TSSOP-20
MC74LVX574	Octal D Flip-Flop with 3-State Outputs	D-Type	8	2	3.6	16.7	4	SOIC-20W; TSSOP-20
MC74VHC374	Octal D Flip-Flop with 3-State Outputs	D-Type	8	2	5.5	10.1	8	SOIC-20W; TSSOP-20
MC74VHC574	Octal D Flip-Flop with 3-State Outputs	D-Type	8	2	5.5	10.6	8	SOIC-20W; TSSOP-20
MC74VHCT374A	Octal D Flip-Flop with 3-State Outputs	D-Type	8	4.5	5.5	10.4	8	SOIC-20W; TSSOP-20
MC74VHCT574A	Octal D Flip-Flop with 3-State Outputs	D-Type	8	4.5	5.5	10.4	8	SOIC-20W; TSSOP-20
MC74AC377	Octal D Flip-Flop with Clock Enable	D-Type	8	2	6	10	24	PDIP-20; SOIC-20W; TSSOP-20
MC74ACT377	Octal D Flip-Flop with Clock Enable	D-Type	8	4.5	5.5	10	24	PDIP-20; SOIC-20W
MC74HC175A	Quad D Flip-Flop with Common Clock and Reset	D-Type	4	2	6	26	4	PDIP-16; SOIC-16; TSSOP-16
MC14175B	Quad D-Type Flip-Flop	D-Type	4	3	18	160	2.25	PDIP-16; SOIC-16
NL17SZ74	Single D Flip-Flop	D-Type	1	1.65	5	5	24	US8
MC14027B	Dual J-K Flip-Flop	JK-Type	2	3	18	150	2.25	PDIP-16; SOIC-16
MC74HC73A	Dual J-K Flip-Flop with Reset	JK-Type	2	2	6	21	5.2	SOIC-14; TSSOP-14
MC74HC112A	Dual J-K Flip-Flop with Set and Reset	JK-Type	2	2	6	21	5.2	SOIC-16; TSSOP-16
NLX1G74	Single D Flip-Flop							UQFN-8

**LATCHES AND REGISTERS**

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74HC259A	8-Bit Addressable Latch 1-of-8 Decoder	Coder/Decoder	8	2	6	100	5.2	SOIC-16; TSSOP-16
MC74HC377A	IC FLIP/FLOP OCTAL D-TYPE with Common Clock and Enable	D-Type	8					SOIC-20W; TSSOP-20
MC14099B	8-Bit Addressable Latch	Latch	1	3	18	150	2.25	PDIP-16; SOIC-16W
MC74AC259	8-Bit Addressable Latch	Latch	8	2	6	10	24	PDIP-16; SOIC-16
MC74ACT259	8-Bit Addressable Latch	Latch	8	4.5	5.5	11	24	PDIP-16; SOIC-16
MC74LVX259	8-Bit Addressable Latch/1-of-8 Decoder CMOS Logic Level Shifter	Latch	1	2	3.6	12	4	SOIC-16; TSSOP-16
MC74VHC259	8-Bit Addressable Latch/1-of-8 Decoder CMOS Logic Level Shifter	Latch	1	2	5.5	10	8	SOIC-16; TSSOP-16

## ON Semiconductor Selector Guide – Standard Logic Devices

### LATCHES AND REGISTERS (continued)

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74VHCT259A	8-Bit Addressable Latch/1-of-8 Decoder CMOS Logic Level Shifter	Latch	1	4.5	5.5	10	8	SOIC-16; TSSOP-16
MC14598B	9-Bit Bus-Compatible Latches	Latch	8	3	18	250	6	PDIP-18
MC74LCX16373	Low Voltage CMOS 16-Bit Transparent Latch	Latch	16	2	3.6	5.4	24	TSSOP-48
MC74LCX373	Low Voltage CMOS Octal Transparent Latch	Latch	8	2	3.6	8	24	SOIC-20W; TSSOP-20
MC74LCX573	Low Voltage CMOS Octal Transparent Latch Flow Through Pinout	Latch	8	2	3.6	8	24	SOIC-20W; TSSOP-20
MC74HC373A	Octal 3-State Non-Inverting Transparent Latch	Latch	8	2	6	25	6	PDIP-20; SOIC-20W; TSSOP-20
MC74HC573A	Octal 3-State Non-Inverting Transparent Latch	Latch	8	2	6	30	6	PDIP-20; SOIC-20W; TSSOP-20
MC74HCT573A	Octal 3-State Transparent Latch/Transceiver	Latch	8	4.5	5.5	30	6	PDIP-20; SOIC-20W; TSSOP-20
MC74AC573	Octal Buffer/Line Driver with 3-State Outputs	Latch	8	2	6	10	24	PDIP-20; SOIC-20W; TSSOP-20
MC74ACT573	Octal Buffer/Line Driver with 3-State Outputs	Latch	8	4.5	5.5	10.5	24	PDIP-20; SOIC-20W; TSSOP-20
MC74LVX573	Octal D Latch 3-State Outputs	Latch	8	2	3.6	12.8	4	SOIC-20W; TSSOP-20
MC74VHCT573A	Octal D Latch with 3-State Output	Latch	8	4.5	5.5	9.5	8	SOIC-20W; TSSOP-20
MC74ACT564	Octal D Latch with 3-State Outputs	Latch	8	4.5	5.5	10.5	24	PDIP-20; SOIC-20W
MC74VHC373	Octal D-Type Latch with 3-State Output	Latch	8	2	5.5	9.2	8	SOIC-20W; TSSOP-20
MC74HCT373A	Octal Latch	Latch	8	4.5	5.5	28	6	PDIP-20; SOIC-20W; TSSOP-20
MC74VHC573	Octal Non-Inverting D Latch, 3-State Output	Latch	8	2	5.5	8.8	8	SOIC-20W; TSSOP-20
MC74LVX373	Octal Transparent Latch 3-State	Latch	8	2	3.6	12.8	4	SOIC-20W; TSSOP-20
MC74VHCT373A	Octal Transparent Latch 3-State	Latch	8	4.5	5.5	9.5	8	SOIC-20W; TSSOP-20
MC74AC373	Octal Transparent Latch with 3-State Outputs	Latch	8	2	6	9.5	24	PDIP-20; SOIC-20W; TSSOP-20
MC74ACT373	Octal Transparent Latch with 3-State Outputs	Latch	8	4.5	5.5	10	24	PDIP-20; SOIC-20W; TSSOP-20
MC14043B	Quad R-S Latches	Latch	4	3	18	175	2.25	PDIP-16; SOIC-16
MC14044B	Quad R-S Latches	Latch	4	3	18	175	2.25	PDIP-16; SOIC-16
MC14042B	Quad Transparent Latch	Latch	4	3	18	180	2.25	PDIP-16; SOIC-16
MC14076B	4-Bit D Register with Three-State Outputs	Register	4	3	18	250	2.25	PDIP-16; SOIC-16
MC14557B	1- to 64-Bit Variable Length Shift Register	Shift Register	1	3	18	260	2.25	PDIP-16; SOIC-16W

LATCHES AND REGISTERS (continued)

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74HC165A	8-Bit Serial or Parallel-Input/Serial Output Shift Register	Shift Register	1	2	6	30	4	PDIP-16; SOIC-16; TSSOP-16
MC74HC164A	8-Bit Serial-Input/Parallel-Output Shift Register	Shift Register	1	2	6	32	4	PDIP-14; SOIC-14; TSSOP-14
MC74HC589A	8-Bit Shift Register	Shift Register	1	2	6	40	6	PDIP-16; SOIC-16; TSSOP-16
MC74VHC595	8-Bit Shift Register w/Output Storage Register (3-State)	Shift Register	1	2	5.5	10	8	SOIC-16; TSSOP-16
MC14014B	8-Bit Static Shift Register	Shift Register	1	3	18	340	2.25	PDIP-16; SOIC-16
MC14021B	8-Bit Static Shift Register	Shift Register	1	3	18	340	2.25	PDIP-16; SOIC-16
MC14094B	8-Bit Storage/Shift Register with Three-State Outputs	Shift Register	1	3	18	250	2.25	PDIP-16; SOIC-16; TSSOP-16
MC14015B	Dual 4-Bit Static Shift Register	Shift Register	2	3	18	250	2.25	PDIP-16; SOIC-16
MC14517B	Dual 64-Bit Static Shift Register	Shift Register	2	3	18	300	2.25	PDIP-16; SOIC-16W
MC74HC595A	Shift Register 3-State	Shift Register	1	2	6	28	6	PDIP-16; SOIC-16; TSSOP-16
MC14549B	Successive Approximation Register	Shift Register	1	3	18	420	2.25	PDIP-16; SOIC-16W
MC74HC597A	8-Bit Serial or Parallel-Input/Serial-Output Shift Register with Input Latch							SOIC-16; TSSOP-16
MC74HC4094A	8-Bit Shift and Store Register							SOIC-16; TSSOP-16

LOGIC GATES

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
NL27WZ08	Dual 2-Input AND Gate	AND	2	1.65	5.5	3.7	32	US8
MC14082B	Dual 4-Input AND Gate	AND	2	3	18	130	2.25	PDIP-14; SOIC-14
MC74LCX08	Low Voltage Quad 2-Input AND Gate	AND	4	2	3.6	5.5	24	SOIC-14; TSSOP-14
MC14081B	Quad 2-Input AND Gate	AND	4	3	18	130	2.25	PDIP-14; SOIC-14; TSSOP-14
MC74AC08	Quad 2-Input AND Gate	AND	4	2	6	7.5	24	PDIP-14; SOIC-14; TSSOP-14
MC74ACT08	Quad 2-Input AND Gate	AND	4	4.5	5.5	9	24	PDIP-14; SOIC-14; TSSOP-14
MC74HC08A	Quad 2-Input AND Gate	AND	4	2	6	15	4	PDIP-14; SOIC-14; TSSOP-14
MC74LVX08	Quad 2-Input AND Gate	AND	4	2	3.6	10.6	4	SOIC-14; TSSOP-14
MC74VHC08	Quad 2-Input AND Gate	AND	4	2	5.5	7.9	8	SOIC-14; TSSOP-14



## ON Semiconductor Selector Guide – Standard Logic Devices

### LOGIC GATES (continued)

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74VHCT08A	Quad 2-Input AND Gate	AND	4	4.5	5.5	7.9	8	SOIC-14; TSSOP-14
NLSF308	Quad 2-Input AND Gate	AND	4	2	5.5	7.9	8	QFN-16
MC74HC1G08	Single 2-Input AND Gate	AND	1	2	6	20	2	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1G08	Single 2-Input AND Gate	AND	1	2	5.5	7.9	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL17SZ08	Single 2-Input AND Gate	AND	1	1.65	5.5	4.5	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5
MC74VHC1G09	Single 2-Input AND Gate, Open Drain	AND	1	2	5.5	7.9	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1GT08	Single 2-Input AND Gate, TTL Level	AND	1	3	5.5	7.9	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC14073B	Triple 3-Input AND Gate	AND	3	3	18	130	2.25	PDIP-14; SOIC-14
MC74AC11	Triple 3-Input AND Gate	AND	3	2	6	8	24	PDIP-14; SOIC-14
MC74ACT11	Triple 3-Input AND Gate	AND	3	4.5	5.5	9.5	24	PDIP-14; SOIC-14
NL17SV08XV5T2	2-Input AND Gate, Ultra-Low Voltage	AND/NAND	1	0.9	3.6	1	24	SOT-553-5
MC74HC30A	8-Input NAND Gate	AND/NAND	1	2	6	30	5.2	SOIC-14; TSSOP-14
MC74HCT08A	Quad 2-Input AND Gate with LSTTL Compatible Inputs	AND/NAND	4	2	6	15	4	SOIC-14; TSSOP-14
MC74HCT132A	Quad 2-Input NAND Gate with Schmitt Trigger Inputs with LSTTL Compatible Inputs	AND/NAND	4	2	6	25	4	SOIC-14; TSSOP-14
NLU1G08	Single 2-Input AND Gate	AND/NAND	1	1.65	5.5	5.9	8	UDFN-6; ULLGA-6
NL17SV00	Single 2-Input NAND Gate	AND/NAND	1	0.9	3.6	2.3	50	SOT-553-5
NLU1G00	Single 2-Input NAND Gate	AND/NAND	1	1.65	5.5	3.5	8	ULLGA-6
MC74HC11A	Triple 3-Input AND Gate	AND/NAND	3	2		16	5.2	SOIC-14; TSSOP-14
MC74HC10A	Triple 3-Input NAND Gate	AND/NAND	3	2	6	16	5.2	SOIC-14; TSSOP-14
NL27WZ04	Dual Inverter	Inverter	2	1.65	5.5	3.6	32	SC-88-6 / SC-70-6 / SOT-363-6; TSOP-6
NLX2G04	Dual Inverter	Inverter	2	1.65	5.5	1.8	24	ULLGA-6
NLU2G06	Dual Inverter with Open Drain Output	Inverter	2	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
NL27WZ14	Dual Inverter with Schmitt Trigger Input	Inverter	2	1.65	5.5	4.9	32	SC-88-6 / SC-70-6 / SOT-363-6; TSOP-6
NLU2G14	Dual Inverter with Schmitt Trigger Input	Inverter	2	1.65	5.5	8.6	8	UDFN-6; ULLGA-6
NLX2G14	Dual Inverter with Schmitt Trigger Input	Inverter	2	1.65	5.5	4.9	32	ULLGA-6
MC74VHC1GT04	Single Inverter, TTL Level	Inverter	1	3	5.5	7.7	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5

LOGIC GATES (continued)

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74HC1G04	Single Inverter	Inverter	1	2	6	20	2	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1G04	Single Inverter	Inverter	1	2	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL17SZ04	Single Inverter	Inverter	1	1.65	5.5	4.3	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5
NLU1G04	Single Inverter	Inverter	1	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
NL17SZ14	Single Inverter with Schmitt Trigger Input	Inverter	1	1.65	5.5	5.9	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5
MC74VHC1GT14	Single Inverter with TTL Level Input, Schmitt Trigger Input	Inverter	1	3	5.5	10.6	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74HC1G14	Single Inverter, Schmitt Trigger Input	Inverter	1	2	6	20	2	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1G14	Single Inverter, Schmitt Trigger Input	Inverter	1	2	5.5	10.6	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NLU1GT04	Single Inverter, TTL-Level	Inverter	1	1.65	5.5	6.7	8	UDFN-6; ULLGA-6
MC74HC1GU04	Single Unbuffered Inverter	Inverter	1	2	6	20	2	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL37WZ04	Triple Inverter	Inverter	3	1.65	5.5	3.6	32	US8
NL37WZ14	Triple Inverter with Schmitt Trigger Input	Inverter	3	1.65	5.5	4.9	32	US8
NLX3G14	Triple Inverter with Schmitt Trigger Input	Inverter	3	1.65	5.5	3.3	24	ULLGA-8
NL27WZU04	Unbuffered Dual Inverter	Inverter	2	1.65	5.5	5.6	32	SC-88-6 / SC-70-6 / SOT-363-6; TSOP-6
NLU2GU04	Unbuffered Dual Inverter	Inverter	2	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
NLX2GU04	Unbuffered Dual Inverter	Inverter	2	1.65	5.5	2.7	16	ULLGA-6
MC74VHC1GU04	Unbuffered Single Inverter	Inverter	1	2	5.5	7	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NLU1GU04	Unbuffered Single Inverter	Inverter	1	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
NL17SZU04	Unbuffered Single Inverter	Inverter	1	1.65	5.5	5	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5
NL27WZ00	Dual 2-Input NAND Gate	NAND	2	1.65	5.5	3.6	32	US8
MC74AC20	Dual 4-Input NAND Gate	NAND	2	2	6	7	24	PDIP-14; SOIC-14
MC74ACT20	Dual 4-Input NAND Gate	NAND	2	4.5	5.5	9	24	PDIP-14; SOIC-14
MC14012B	Dual 4-Input NAND Gates	NAND	2	3	18	130	2.25	PDIP-14; SOIC-14
MC74LCX00	Low Voltage CMOS Quad 2-Input NAND Gate	NAND	4	2	3.6	5.2	24	SOIC-14; TSSOP-14
MC14011B	Quad 2-Input NAND Gate	NAND	4	3	18	100	2.25	PDIP-14; SOIC-14; TSSOP-14

## ON Semiconductor Selector Guide – Standard Logic Devices

### LOGIC GATES (continued)

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC14011UB	Quad 2-Input NAND Gate	NAND	4	3	18	100	2.25	PDIP-14; SOIC-14
MC74AC00	Quad 2-Input NAND Gate	NAND	4	2	6	8	24	PDIP-14; SOIC-14; TSSOP-14
MC74ACT00	Quad 2-Input NAND Gate	NAND	4	4.5	5.5	9	24	PDIP-14; SOIC-14; TSSOP-14
MC74HC00A	Quad 2-Input NAND Gate	NAND	4	2	6	15	4	PDIP-14; SOIC-14; TSSOP-14
MC74LVX00	Quad 2-Input NAND Gate	NAND	4	2	3.6	9.7	4	SOIC-14; TSSOP-14
MC74VHC00	Quad 2-Input NAND Gate	NAND	4	2	5.5	7.5	8	SOIC-14; TSSOP-14
MC74VHC00A	Quad 2-Input NAND Gate	NAND	4	3	5.5	7.9	8	SOIC-14; TSSOP-14
MC74HC03A	Quad 2-Input NAND Gate with Open Drain Outputs	NAND	4	2	6	24	4	PDIP-14; SOIC-14; TSSOP-14
MC14093B	Quad 2-Input NAND Gate with Schmitt Trigger Input	NAND	4	3	18	100	2.25	PDIP-14; SOIC-14; TSSOP-14
MC74AC132	Quad 2-Input NAND Gate with Schmitt Trigger Input	NAND	4	2	6	9	24	PDIP-14; SOIC-14
MC74ACT132	Quad 2-Input NAND Gate with Schmitt Trigger Input	NAND	4	4.5	5.5	11.5	24	PDIP-14; SOIC-14
MC74HC132A	Quad 2-Input NAND Gate with Schmitt Trigger Input	NAND	4	2	6	25	4	PDIP-14; SOIC-14; TSSOP-14
MC74LVX132	Quad 2-Input NAND Gate with Schmitt Trigger Input	NAND	4	2	3.6	15.4	4	SOIC-14; TSSOP-14
MC74VHC132	Quad 2-Input NAND Gate with Schmitt Trigger Input	NAND	4	2	5.5	9.7	8	SOIC-14; TSSOP-14
MC74VHCT132A	Quad 2-Input NAND Gate with Schmitt Trigger Input	NAND	4	4.5	5.5	9.7	8	SOIC-16; TSSOP-14
MC74HC1G00	Single 2-Input NAND Gate	NAND	1	2	6	20	2	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1G00	Single 2-Input NAND Gate	NAND	1	2	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL17SZ00	Single 2-Input NAND Gate	NAND	1	1.65	5.5	4.3	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5
MC74VHC1GT00	Single 2-Input NAND Gate TTL level	NAND	1	3	5.5	7.9	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1G132	Single 2-Input NAND Gate with Schmitt Trigger Input	NAND	1	2	5.5	9.7	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1G01	Single 2-Input NAND Gate, Open Drain	NAND	1	2	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1G135	Single 2-Input NAND Gate, Schmitt Trigger, Open Drain	NAND	1	2	5.5	9.7	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC14023B	Triple 3-Input NAND Gate	NAND	3	3	18	130	2.25	PDIP-14; SOIC-14
MC74AC10	Triple 3-Input NAND Gate	NAND	3	2	6	7	24	PDIP-14; SOIC-14

LOGIC GATES (continued)

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74ACT10	Triple 3-Input NAND Gate	NAND	3	4.5	5.5	9	24	PDIP-14; SOIC-14; TSSOP-14
NL27WZ02	Dual 2-Input NOR Gate	NOR	2	1.65	5.5	3.7	32	US8
MC74LCX02	Low Voltage CMOS Quad 2-Input NOR Gate	NOR	4	2	3.6	5.2	24	SOIC-14; TSSOP-14
MC14001B	Quad 2-Input NOR Gate	NOR	4	3	18	100	2.25	PDIP-14; SOIC-14; TSSOP-14
MC14001UB	Quad 2-Input NOR Gate	NOR	4	3	18	100	2.25	PDIP-14; SOIC-14
MC74AC02	Quad 2-Input NOR Gate	NOR	4	2	6	6.5	24	PDIP-14; SOIC-14; TSSOP-14
MC74ACT02	Quad 2-Input NOR Gate	NOR	4	4.5	5.5	9.5	24	PDIP-14; SOIC-14; TSSOP-14
MC74HC02A	Quad 2-Input NOR Gate	NOR	4	2	6	15	4	PDIP-14; SOIC-14; TSSOP-14
MC74LVX02	Quad 2-Input NOR Gate	NOR	4	2	3.6	10.1	4	SOIC-14; TSSOP-14
MC74VHC02	Quad 2-Input NOR Gate	NOR	4	2	5.5	7.5	8	SOIC-14; TSSOP-14
MC74VHCT02A	Quad 2-Input NOR Gate	NOR	4	4.5	5.5	7.5	8	SOIC-14; TSSOP-14
NLSF302	Quad 2-Input NOR Gate	NOR	4	2	5.5	7.5	8	QFN-16
MC74HC1G02	Single 2-Input NOR Gate	NOR	1	2	6	20	2	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1G02	Single 2-Input NOR Gate	NOR	1	2	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL17SZ02	Single 2-Input NOR Gate	NOR	1	1.65	5.5	4.3	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5
MC74VHC1GT02	Single 2-Input NOR Gate TTL Level	NOR	1	3	5.5	7.7	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1G03	Single 2-Input NOR Gate, Open Drain	NOR	1	2	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC14025B	Triple 3-Input NOR Gate	NOR	3	3	18	130	2.25	PDIP-14; SOIC-14
MC74VHC32	2-1 Quad OR Gate	OR	4	2	5.5	7.5	8	SOIC-14; TSSOP-14
NL27WZ32	Dual 2-Input OR Gate	OR	2	1.65	5.5	3.7	32	US8
MC74LCX32	Low Voltage Quad 2-Input OR Gate with 5V-Tolerant Inputs	OR	4	2	3.6	5.5	24	SOIC-14; TSSOP-14
MC14071B	Quad 2-Input OR Gate	OR	4	3	18	130	2.25	PDIP-14; SOIC-14; TSSOP-14
MC74AC32	Quad 2-Input OR Gate	OR	4	2	6	7.5	24	PDIP-14; SOIC-14; TSSOP-14
MC74LVX32	Quad 2-Input OR Gate	OR	4	2	3.6	10.1	4	SOIC-14; TSSOP-14
MC74VHCT32A	Quad 2-Input OR Gate / CMOS Logic Level Shifter with LSTTL-Compatible Inputs	OR	4	2	5.5	7.5	8	SOIC-14; TSSOP-14
MC74ACT32	Quad 2-Input OR Gate with TTL	OR	4	4.5	5.5	9	24	PDIP-14; SOIC-14; TSSOP-14
MC74HC32A	Quad OR Gate	OR	4	2	6	15	4	PDIP-14; SOIC-14; TSSOP-14

## ON Semiconductor Selector Guide – Standard Logic Devices

### LOGIC GATES (continued)

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74HC1G32	Single 2-Input OR Gate	OR	1	2	6	20	2	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
MC74VHC1G32	Single 2-Input OR Gate	OR	1	2	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL17SZ32	Single 2-Input OR Gate	OR	1	1.65	5.5	4.5	24	SC-88A-5 / SC-70-5 / SOT-323-5; SOT-553-5
MC74VHC1GT32	Single 2-Input OR Gate, TTL Level	OR	1	3	5.5	7.5	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL17SV02	Single 2-Input NOR Gate, Ultra-Low Voltage	OR/NOR	1	0.9	3.6	3.3	50	SOT-553-5
MC74HCT86A	Quad 2-Input Exclusive OR Gate with LSTTL Compatible Inputs	OR/NOR	4	2	6	17	4	SOIC-14; TSSOP-14
MC74HCT32A	Quad 2-Input OR Gate with LSTTL Compatible Inputs	OR/NOR	4	2	6	15	4	SOIC-14; TSSOP-14
NLU1G32	Single 2-Input OR Gate	OR/NOR	1	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
NL17SV32	Single 2-Input OR Gate	OR/NOR	1	0.9	3.6	3.3	50	SOT-553-5
NLU1GT32	Single 2-Input OR Gate, TTL-Level	OR/NOR	1	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
NL17SV04	Single Inverter, Ultra-Low Voltage	OR-AND/OR-AND INV	1	0.09	3.6	2.3	50	SOT-553-5
NLU2G04	Dual Inverter	OR-AND/OR-AND INV	2	1.65	5.5	5.5	8	UDFN-6; ULLGA-6
NL7SZ57	Flexible Choice Logic (9 Configurable Functions)	OR-AND/OR-AND INV	3	1.65	5.5	2.5	32	SC-88-6 / SC-70-6 / SOT-363-6
NLU1GT14	Single Inverter with LSTTL-Compatible Input and Schmitt Trigger Input	OR-AND/OR-AND INV	1	1.65	5.5	8.6	8	UDFN-6; ULLGA-6
NLU1G14	Single Inverter with Schmitt Trigger Input	OR-AND/OR-AND INV	1	1.65	5.5	8.6	8	UDFN-6; ULLGA-6
NLU3G14	Triple Inverter with Schmitt Trigger Input	OR-AND/OR-AND INV	3	1.65	5.5	8.6	8	UDFN-8; ULLGA-8
NLX1G57	1.65 to 5.5 V Flexible Logic MiniGate with 24 mA Output Drive	SmartGate	1	1.65	5.5	5.1	24	ULLGA-6
NLX1G99	1.65 V to 5.5 V Logic MiniGate with 24 mA Drive	SmartGate	1	1.65	5.5	6.7	32	ULLGA-8
NLX1G97	Flexible Choice Logic (9 Configurable Functions)	SmartGate	1	1.65	5.5	6.3	24	ULLGA-6
NL7SZ58	Flexible Choice Logic (9 Configurable Functions), Inverting	SmartGate	3	1.65	5.5	2.5	32	SC-88-6 / SC-70-6 / SOT-363-6
NLX1G58	Flexible Choice Logic (9 Configurable Functions), Inverting	SmartGate	1	1.65	5.5	5.1	24	ULLGA-6
NLX1G98	Flexible Choice Logic (9 Configurable Functions), Inverting	SmartGate	1	1.65	5.5	5.1	24	ULLGA-6

LOGIC GATES (continued)

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC14077B	Quad Exclusive NOR Gate	XNOR	4	3	18	150	2.25	PDIP-14; SOIC-14
NL27WZ86	Dual 2-Input Exclusive OR Gate	XOR	2	1.65	5.5	4.2	32	US8
MC74LCX86	Low Voltage CMOS Quad 2-Input XOR Gate	XOR	4	2	3.6	6.5	24	SOIC-14; TSSOP-14
MC74AC86	Quad 2-Input Exclusive OR Gate	XOR	4	2	6	8.5	24	PDIP-14; SOIC-14; TSSOP-14
MC74HC86A	Quad 2-Input Exclusive OR Gate	XOR	4	2	6	20	4	PDIP-14; SOIC-14; TSSOP-14
MC74ACT86	Quad 2-Input Exclusive-OR Gate	XOR	4	4.5	5.5	9.5	24	PDIP-14; SOIC-14; TSSOP-14
MC74LVX86	Quad 2-Input XOR Gate	XOR	4	2	3.6	12.8	4	SOIC-14; TSSOP-14
MC74VHC86	Quad 2-Input XOR Gate	XOR	4	2	5.5	8.8	8	SOIC-14; TSSOP-14
MC74VHCT86A	Quad 2-Input XOR Gate / CMOS Logic Level Shifter with LSTTL-Compatible Inputs	XOR	4	2	5.5	8.8	8	SOIC-14; TSSOP-14
MC14070B	Quad XOR Gate	XOR	4	3	18	150	2.25	PDIP-14; SOIC-14
MC74VHC1G86	Single 2-Input Exclusive OR Gate	XOR	1	2	5.5	8.8	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NL17SZ86	Single 2-Input Exclusive OR Gate	XOR	1	1.65	5.5	4.2	24	SC-88A-5 / SC-70-5 / SOT-323-5
MC74VHC1GT86	Single 2-Input Exclusive OR Gate, TTL Level	XOR	1	3	5.5	8.8	8	SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5
NLU1G86	Single 2-Input Exclusive OR Gate	XOR/XNOR	1	1.65	5.5	6.8	8	UDFN-6; ULLGA-6
NLU1GT86	Single 2-Input Exclusive OR Gate, TTL-Level	XOR/XNOR	1	1.65	5.5	6.8	8	UDFN-6; ULLGA-6
NLX1G11	3-Input AND Gate							ULLGA-6
NLX1G10	3-Input NAND Gate							ULLGA-6
NLX1G332	3-Input OR Gate							ULLGA-6
MC74HCT259A	8-BIT ADDRESSABLE LATCH							SOIC-16; TSSOP-16
NLX2G08	Dual 2-Input AND Gate							UQFN-8
NLX2G86	Dual 2-Input Exclusive OR Gate							UQFN-8
NLX2G00	Dual 2-Input NAND Gate							ULLGA-8
NLX2G02	Dual 2-Input NOR Gate							ULLGA-8
MC74HC20A	Dual 4-Input NAND Gate							SOIC-14; TSSOP-14
MC74HCT366A	Hex buffer/line driver, 3-state, inverting, TTL							SOIC-16; TSSOP-16
MC14572UB	Hex Gate		6	3	18	100	2.25	PDIP-16; SOIC-16
MC14069UB	Hex Inverter		6	3	18	100	2.25	PDIP-14; SOIC-14; TSSOP-14
MC74AC04	Hex Inverter		6	2	6	7	24	PDIP-14; SOIC-14; TSSOP-14

## ON Semiconductor Selector Guide – Standard Logic Devices

### LOGIC GATES (continued)

Device	Description	Type	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74ACT04	Hex Inverter		6	4.5	5.5	8.5	24	PDIP-14; SOIC-14; TSSOP-14
MC74HC04A	Hex Inverter		6	2	6	15	4	PDIP-14; SOIC-14; TSSOP-14
MC74LVX04	Hex Inverter		6	2	3.6	9.7	4	SOIC-14; TSSOP-14
MC74LVXU04	Hex Inverter		6	2	3.6	9.7	4	SOIC-14; TSSOP-14
MC74VHC04	Hex Inverter		6	2	5.5	7.5	8	SOIC-14; TSSOP-14
MC74VHCT04A	Hex Inverter with LSTTL-Compatible Inputs		6	4.5	5.5	7.7	8	SOIC-14; TSSOP-14
MC74HCT04A	Hex Inverter with LSTTL-Compliant Input		6	4.5	5.5	17	4	PDIP-14; SOIC-14; TSSOP-14
MC14106B	Hex Inverter with Schmitt Trigger Input		6	3	18	100	2.25	PDIP-14; SOIC-14; TSSOP-14
MC74AC14	Hex Inverter with Schmitt Trigger Input		6	2	6	10	24	PDIP-14; SOIC-14; TSSOP-14
MC74ACT14	Hex Inverter with Schmitt Trigger Input		6	4.5	5.5	11.5	24	PDIP-14; SOIC-14; TSSOP-14
MC74HC14A	Hex Inverter with Schmitt Trigger Input		6	2	6	15	4	PDIP-14; SOIC-14; TSSOP-14
MC74HCT14A	Hex Inverter with Schmitt Trigger Input		6	4.5	5.5	32	4	PDIP-14; SOIC-14; TSSOP-14
MC74LVX14	Hex Inverter with Schmitt Trigger Input		6	2	3.6	14.1	4	SOIC-14; TSSOP-14
MC74VHC14	Hex Inverter with Schmitt Trigger Input		6	2	5.5	10.6	8	SOIC-14; TSSOP-14
MC74VHCT14A	Hex Inverter with Schmitt Trigger Input		6	4.5	5.5	9.6	8	SOIC-14; TSSOP-14
MC14584B	Hex Inverter with Schmitt-Trigger Input		6	3	18	100	2.25	PDIP-14; SOIC-14; TSSOP-14
MC74HC160A	IC COUNTER 4-BIT SYNC							SOIC-16; TSSOP-16
MC74LCX04	Low Voltage CMOS Hex Inverter		6	2	3.6	5.2	24	SOIC-14; TSSOP-14
MC74LCX14	Low Voltage CMOS Hex Inverter with 5.0 V-Tolerant Input and Schmitt Trigger Input		6	2	3.6	6.5	24	SOIC-14; TSSOP-14
MC74LCXU04	Low Voltage CMOS Unbuffered Hex Inverter		6	2	3.6	3.6	16	SOIC-14; TSSOP-14
MC74HCT4066A	Quad Analog Switch/Multiplexer/Demultiplexer/with LSTTL Compatible Inputs							SOIC-14; TSSOP-14
NLX1G74	Single D Flip-Flop							UQFN-8
MC74HCU04A	Unbuffered Hex Inverter		6	2	6	14	4	PDIP-14; SOIC-14; TSSOP-14
MC74VHCU04	Unbuffered Hex Inverter		6	2	5.5	7	8	SOIC-14; TSSOP-14

MULIPLEXERS

Device	Description	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74AC138	1-of-8 Decoder/Demultiplexer	1	2	6	9.5	24	PDIP-16; SOIC-16; TSSOP-16
MC74ACT138	1-of-8 Decoder/Demultiplexer	1	4.5	5.5	10.5	24	PDIP-16; SOIC-16; TSSOP-16
MC74HC138A	1-of-8 Decoder/Demultiplexer	1	2	6	19	5.2	PDIP-16; SOIC-16; TSSOP-16
MC74HC238A	1-of-8 Decoder/Demultiplexer	1	2	6	19	5.2	SOIC-16; TSSOP-16
MC74HCT138A	1-of-8 Decoder/Demultiplexer with LSTTL Compatible Inputs	1	4.5	5.5	27	4	PDIP-16; SOIC-16; TSSOP-16
MC74LVX138	3-to-8 Line Decoder	1	2	3.6	12.3	4	SOIC-16; TSSOP-16
MC74VHC138	3-to-8 Line Decoder	1	2	5.5	10.1	8	SOIC-16; TSSOP-16
MC74VHCT138A	3-to-8 Line Decoder	1	3	5.5	11.4	8	SOIC-16; TSSOP-16
MC14514B	4-Bit Transparent Latch/4-to-16 Line Decoder	1	3	18	450	2.25	SOIC-24
MC14515B	4-Bit Transparent Latch/4-to-16 Line Decoder	1	3	18	450	2.25	SOIC-24
MC14532B	8-Bit Priority Encoder	1	3	18	220	2.25	PDIP-16; SOIC-16
MC14512B	8-Channel Data Selector	1	3	18	250	2.25	PDIP-16; SOIC-16
MC74VHC4052	Analog Multiplexer/ Demultiplexer	1	2	6	49	8	SOIC-16; TSSOP-16
MC74VHC4053	Analog Multiplexer/ Demultiplexer	1	2	6	49	8	SOIC-16; TSSOP-16
MC74LVX4051	Analog Multiplexer/Demultiplexer (Mux/Demux)	1	2.5	6	23	4	SOIC-16; TSSOP-16
MC74LVXT4051	Analog Multiplexer/Demultiplexer (Mux/Demux)	1	2.5	6	23	4	SOIC-16; TSSOP-16
MC14028B	BCD-to-Decimal Decoder	1	3	18	260	2.25	PDIP-16; SOIC-16
MC74LCX138	Low Voltage CMOS 3-to-8 Decoder/Demultiplexer	1	2	3.6	6	24	SOIC-16; TSSOP-16
NL7SZ18	1:2 Digital Demultiplexer Non-Inverting, 3-State	2	1.65	5.5	4	32	SC-88-6 / SC-70-6 / SOT-363-6; UDFN-6
NL7SZ19	1:2 Digital Multiplexer / Demultiplexer	2	1.65	5.5	4	50	SC-88-6 / SC-70-6 / SOT-363-6; UDFN-6
MC74LVX4052	Analog Multiplexer/Demultiplexer (Mux/Demux)	2	2.5	6	23	4	SOIC-16; TSSOP-16
MC74LVXT4052	Analog Multiplexer/Demultiplexer (Mux/Demux)	2	2.5	6	23	4	SOIC-16; TSSOP-16
NLAS4053	Analog Multiplexers/Demultiplexers	2	2.5	5.5	40	50	SOIC-16; TSSOP-16
MC74HC139A	Dual 1-of-4 Decoder / Demultiplexer	2	2	6	23	4	PDIP-16; SOIC-16; TSSOP-16
MC74AC139	Dual 1-of-4 Decoder/Demultiplexer	2	2	6	8.5	24	PDIP-16; SOIC-16; TSSOP-16
MC74ACT139	Dual 1-of-4 Decoder/Demultiplexer	2	4.5	5.5	9.5	24	PDIP-16; SOIC-16; TSSOP-16



## ON Semiconductor Selector Guide – Standard Logic Devices

### MULIPLEXERS (continued)

Device	Description	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74LVX139	Dual 2-to-4 Decoder/ Demultiplexer	2	2	3.6	13	4	SOIC-16; TSSOP-16
MC74VHC139	Dual 2-to-4 Decoder/Demultiplexer	2	2	5.5	9.2	8	SOIC-16; TSSOP-16
MC74VHCT139A	Dual 2-to-4 Decoder/Demultiplexer	2	4.5	5.5	9.2	8	SOIC-16; TSSOP-16
MC74ACT153	Dual 4-Input Multiplexer	2	4.5	5.5	11.5	24	SOIC-16
MC74AC253	Dual 4-Input Multiplexer with 3-State Outputs	2	2	6	11.5	24	SOIC-16
MC74ACT253	Dual 4-Input Multiplexer with 3-State Outputs	2	4.5	5.5	13	24	SOIC-16
MC14555B	Dual Binary to 1-of-4 Decoder/Demultiplexer	2	3	18	190	2.25	PDIP-16; SOIC-16
MC14556B	Dual Binary to 1-of-4 Decoder/Demultiplexer	2	3	18	190	2.25	PDIP-16; SOIC-16
MC74LCX139	Dual Low Voltage CMOS 2-of-4 Decoder/Demultiplexer	2	2	3.6	6.2	24	SOIC-16; TSSOP-16
MC74LCX157	Low Voltage CMOS Quad 2-Input Multiplexer	2	2	3.6	5.8	24	SOIC-16; TSSOP-16
MC74LVX4053	Analog Multiplexer / Demultiplexer	3	2.5	6	23	4	SOIC-16; TSSOP-16
MC74LVXT4053	Analog Multiplexer/Demultiplexer (Mux/Demux)	3	2.5	6	23	4	SOIC-16; TSSOP-16
MC74VHC157	2-Input Data Selector/Multiplexer (Mux)	4	2	5.5	8.4	8	SOIC-16; TSSOP-16
MC74HCT4051A	Analog Multiplexers / Demultiplexers with LSTTL Compatible Inputs	4	2	12	45	25	SOIC-16; TSSOP-16
MC74HCT4851A	Analog Multiplexers/Demultiplexers with Injection Current Effect Control with LSTTL Compatible Inputs	4	2	6	40		SOIC-16; SOIC-16W; TSSOP-16
MC74HC157A	Data Selector/Multiplexer (Mux), 2-Input Q	4	2	6	21	6	PDIP-16; SOIC-16; TSSOP-16
MC74LCX257	Low Voltage CMOS Quad 2-Input Multiplexer	4	2	3.6	6	24	SOIC-16; TSSOP-16
MC74LCX158	Low Voltage Quad 2-Input Multiplexer	4	2	3.6	6.5	24	SOIC-16; TSSOP-16
MC74LCX258	Low Voltage Quad 2-Input Multiplexer with 5V-Tolerant Inputs and Outputs (3-State, Inverting)	4	2	3.6	6.5	24	SOIC-16; TSSOP-16
74FST3257	Quad 2:1 Multiplexer/Demultiplexer (Mux/Demux) Bus Switch	4	4	5.5	0.25		QFN-16; SOIC-16; TSSOP-16
MC74VHCT157A	Quad 2-Channel Multiplexer	4	4.5	5.5	8.4	8	TSSOP-16
MC74LVX157	Quad 2-Channel Multiplexer (Mux)	4	2	3.6	11.4	4	SOIC-16; TSSOP-16
MC74AC157	Quad 2-Input Multiplexer	4	2	6	9	24	PDIP-16; SOIC-16; TSSOP-16
MC74ACT157	Quad 2-Input Multiplexer	4	4.5	5.5	9.5	24	PDIP-16; SOIC-16; TSSOP-16
MC74AC257	Quad 2-Input Multiplexer 3-State Output	4	2	6	7.5	24	PDIP-16; SOIC-16

**MULIPLEXERS** (continued)

Device	Description	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74ACT257	Quad 2-Input Multiplexer with 3-State Output	4	4.5	5.5	10.5	24	PDIP-16; SOIC-16
MC74VHC4316	Quad Analog Multiplexer/Demultiplexer (Mux/Demux)	4	2	6	8		SOIC-16; TSSOP-16
MC74HCT4852A	Analog Multiplexers/Demultiplexers with Injection, TTL	8	4.5	5.5	40	0.0001	SOIC-16; TSSOP-16
7SB384	1 Bit Bus Switch						SC-88A-5 / SC-70-5 / SOT-323-5; TSOP-5 / SOT23-5; UDFN-6; ULLGA-6
MC74HC251A	8-Channel Multiplexer (3-state)						SOIC-16; TSSOP-16
MC74HC153A	Dual 4-Input Data Selector/Multiplexer High-Performance Silicon-Gate CMOS						SOIC-16; TSSOP-16
MC74HC151A	IC Multiplexer 8-Channel						SOIC-16; TSSOP-16
MC74HC4067A	Quad Analog Switch/Multiplexer/Demultiplexer						SOIC-24; TSSOP-24
MC74HCT4066A	Quad Analog Switch/Multiplexer/Demultiplexer/with LSTTL Compatible Inputs						SOIC-14; TSSOP-14

**MULTIVIBRATORS**

Device	Description	Channels	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC14528B	Dual Monostable Multivibrator	2	3	18	240	2.25	PDIP-16; SOIC-16
MC14538B	Dual Precision Monostable Multivibrator	2	3	18	300	2.25	PDIP-16; SOIC-16; SOIC-16W; TSSOP-16
MC74HC4538A	Dual Precision Monostable Multivibrator	2	3	6	35	4	PDIP-16; SOIC-16; TSSOP-16

**TRANSCEIVERS**

Device	Description	Channels	Output	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
74VHCX245	8-Bit 3-State Bi-directional Transceiver, Low Voltage	1	3-State	2	6	15	6	QFN-20
MC74LXC245	Low Voltage CMOS Octal Transceiver	1	CMOS	2	3.6	7	24	QFN-20; SOIC-20W; TSSOP-20
MC74ACT640	Octal 3-State Inverting Bus Transceiver	1	3-State	4.5	5.5	8	24	PDIP-20; SOIC-20W
MC74HCT245A	Octal 3-State Non-Inverting Bus Transceiver	1	3-State	4.5	5.5	22	6	PDIP-20; SOIC-20W; TSSOP-20
MC74HC245A	Octal 3-State Non-Inverting Bus/Transceiver	1	3-State	2	6	15	6	PDIP-20; SOIC-20W; TSSOP-20
MC74AC245	Octal Bidirectional Transceiver with 3-State Inputs/Outputs	1	3-State	2	2; 6	6.5	24	PDIP-20; SOIC-20W; TSSOP-20

## ON Semiconductor Selector Guide – Standard Logic Devices

### TRANSCEIVERS (continued)

Device	Description	Channels	Output	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
MC74ACT245	Octal Bidirectional Transceiver with 3-State Inputs/Outputs	1	3-State	4.5	5.5	8	24	PDIP-20; SOIC-20W; TSSOP-20
MC74LVX245	Octal Bus Transceiver	1	CMOS	2	3.6	10.1	4	SOIC-20W; TSSOP-20
MC74VHC245	Octal Bus Transceiver	1	CMOS	2	5.5	7.5	8	SOIC-20W; TSSOP-20
MC74VHCT245A	Octal Bus Transceiver	1	CMOS	4.5	5.5	8.7	8	SOIC-20W; TSSOP-20
MC74LVXC3245	Configurable Dual Supply Octal Transceiver	8	3-State	2.3	3.6	9	24	SOIC-24; TSSOP-24
MC74LVX4245	Dual Supply Octal Translating Transceiver	8	3-State	2.7	3.6	10	24	SOIC-24; TSSOP-24
MC74LCX16245	Low Voltage CMOS 16-Bit Transceiver	8	3-State	2	3.6	5.2	24	TSSOP-48
MC74AC646	Octal Bus Transceiver Register with 3-State Outputs (Non-inverting)	8	3-State	2	6	12	24	SOIC-24
MC74AC652	Octal Bus Transceiver Register with 3-State Outputs (Non-inverting)	8	3-State	2	6	12	24	SOIC-24
MC74ACT646	Octal Bus Transceiver/Register with 3-State Outputs (Non-inverting)	8	3-State	4.5	5.5	14.5	24	PDIP-24; SOIC-24
MC74ACT652	Octal Bus Transceiver/Register with 3-State Outputs (Non-inverting)	8	3-State	4.5	5.5	14.5	24	PDIP-24; SOIC-24
74VCTXH16245	Low Voltage 1.8/2.5/3.3 V 16-Bit Transceiver	16	3-State	1.65	3.6	2.5	24	TSSOP-48

### TRANSLATORS

Device	Description	Channels	Input Level	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
NLSX5011	1 Bit 100 Mbps Configurable Dual-Supply Level Translator	1	CMOS	0.9				UDFN-6; ULLGA-6
NLSV1T240	1-Bit Dual-Supply Inverting Level Translator	1	CMOS	0.9	4.5	3.3	50	UDFN-6
NLSV1T244	1-Bit Dual-Supply Non-Inverting Level Translator	1	CMOS	0.9	4.5	3.3	50	UDFN-6
NLSV1T34	1-Bit Dual-Supply Non-Inverting Level Translator	1	CMOS	0.9	4.5	3.3	50	SC-88A-5 / SC-70-5 / SOT-323-5; UDFN-6; ULLGA-6
MC14504B	Hex Level Shifter	1	CMOS; TTL	3	18	340	2.25	PDIP-16; SOIC-16; TSSOP-16
NLSX5012	2 Bit 140 Mbps Enhanced Dual-Supply Auto Sense Level Translators	2	CMOS	0.9	4.5			Micro8; SOIC-8; UDFN-8
NLSX3012	2-Bit 100 Mbps Configurable Dual-Supply Level Translator	2	CMOS	1.3	5.5	7.2	0.02	Micro8; SOIC-8; UDFN-8
NLSX3373	2-Bit 20 Mb/s Dual-Supply Level Translator	2	CMOS	1.2	5.5	30	40	UDFN-8
NLSX4373	2-Bit 20 Mb/s Dual-Supply Level Translator	2		1.5	5.5	20		Micro8; SOIC-8; UDFN-8

TRANSLATORS (continued)

Device	Description	Channels	Input Level	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	t <sub>pd</sub> Max (ns)	I <sub>O</sub> Max (mA)	Package
NLSV2T240	2-Bit Dual-Supply Inverting Level Translator	2	CMOS	0.9	4.5	3.3	50	UDFN-8
NLSV2T244	2-Bit Dual-Supply Non-Inverting Level Translator	2	CMOS	0.9	4.5	3.3	50	Micro8; SOIC-8; UDFN-8
NLSX3014	4-Bit 100 Mbps Configurable Dual-Supply Level Translator	4	CMOS	0.9	4.5	6.5	0.02	UQFN-12
NLSX4014	4-Bit 100 Mbps Configurable Dual-Supply Level Translator	4	CMOS	1.3	4.5	17		SOIC-14; TSSOP-14; UQFN-12
NLSX5014	4-Bit 100Mb/s Configurable Dual-Supply Level Translator	4	CMOS	0.9	4.5			SOIC-14; TSSOP-14; UQFN-12
NLSX3378	4-Bit 20 Mbps Dual-Supply Level Translator	4	CMOS	1.2	4.5	15	40	Flip-Chip-12
NLSX4378	4-Bit 20 Mbps Dual-Supply Level Translator	4	CMOS	1.65	5.5	20		Flip-Chip-12
NLSV4T3234	4-Bit Dual Supply Bus Buffer Translator w/ 26 Ohm Output Series Resistor	4	CMOS	0.9	4.5	5.6	50	Flip-Chip CSP-11
NLSV4T240E	4-Bit Dual-Supply Inverting Level Translator	4	CMOS	0.9	4.5	2.5	24	SOIC-14; TSSOP-14; UQFN-12
NLSV4T240	4-Bit Dual-Supply Inverting Level Translator	4	CMOS	0.9	4.5	3.3	50	UQFN-12
NLSV4T244E	4-Bit Dual-Supply Non-Inverting Level Translator	4	CMOS	0.9	4.5	2.5	24	SOIC-14; TSSOP-14; UQFN-12
NLSV4T244	4-Bit Dual-Supply Non-Inverting Level Translator	4		0.9	4.5	3.3	50	SOIC-14; TSSOP-14; UQFN-12
NLSV22T244MUTAG	Dual 2-Bit Dual-Supply Non-Inverting Level Translator	4		1.65	3.6	3.3	50	UQFN-12
NLSX3018	8-Bit 100 Mb/s Configurable Dual-Supply Level Translator	8		0.9	5.5	6.5	20	SOIC-20W; TSSOP-20; UDFN-20
NLSX3013	8-Bit 100 Mbps Configurable Dual-Supply Level Translator	8	CMOS	1.3	4.5	6; 6.5	0.02	Flip-Chip-20
NLSV8T240MUTAG	8-Bit Dual-Supply Inverting Level Translator	8	CMOS	0.9	4.5	3.3	50	UDFN-20
NLSV8T244	8-Bit Dual-Supply Non-Inverting Level Translator	8	CMOS	0.9	4.5	3.3	50	SOIC-20W; TSSOP-20; UDFN-20
MC74LVX4245	Dual Supply Octal Translating Transceiver	8	TTL	2.7	3.6	10	24	SOIC-24; TSSOP-24
7WBD3125	2-Bit Translating Bus Switch							UDFN-8; ULLGA-8; UQFN-8; US8
PCA9306	Dual Bidirectional I2C Bus and SMBus Voltage Level Translator							TSSOP-8; UQFN-8; US8



# Thermal Management

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# Thermal Management

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## Table of Contents

	<b>Page</b>
Fan Controllers .....	280
Temperature Sensors .....	281



**FAN CONTROLLERS**

Device	Data Transmission Standard	I <sub>CC</sub> Max (mA)	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	T Min (°C)	T Max (°C)	Package
ADM1024	SMBus	3.5	2.8	5.5	0	100	TSSOP-24
ADM1026	SMBus	4	3	5.5	0	100	LQFP-48
ADM1029	SMBus	3	3	5.5	0	100	QSOP-24
ADM1030	SMBus	3	3	5.5	0	100	QSOP-16
ADM1031	SMBus	3	3	5.5	0	100	QSOP-16
ADM1033	SMBus	3	3	5.5	-40	125	QSOP-16
ADM1034	SMBus	3	3	3.6	-40	125	QSOP-16
ADT7460	SMBus	3	3	5.5	-40	120	QSOP-16
ADT7462	SMBus	4	3	5.5	-40	125	LFCSP-32
ADT7463	SMBus	3	3	5.5	-40	120	QSOP-24
ADT7467	SMBus	3	3	5.5	-40	120	QSOP-16
ADT7473	SMBus	3	3	3.6	-40	125	QSOP-16
ADT7475	SMBus	3	3	3.6	-40	125	QSOP-16
ADT7476	SMBus	3	3	3.6	-40	125	QSOP-24
ADT7476A	SMBus	3	3	3.6	-40	125	QSOP-24
ADT7490	SMBus	5	3	3.6	-40	125	QSOP-24

## TEMPERATURE SENSORS

Device	Sensor Type	Data Transmission Standard	I <sub>CC</sub> Max (mA)	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	T Min (°C)	T Max (°C)	Temperature Error (°C)	Package
ADM1021A	Local & Remote	SMBus	0.2	3	5.5	-55	125	±3	QSOP-16
ADM1023	Local & Remote	SMBus	0.2	3	5.5	0	120	±1	QSOP-16
ADM1032	Local & Remote	SMBus	0.215	3	5.5	0	120	±1	Micro8; SOIC-8
ADT7461	Local & Remote	SMBus	0.215	3	5.5	-40	125	±1	Micro8; SOIC-8
ADT7461A	Local & Remote	SMBus	0.35	3	3.6	-40	125	±1	Micro8
ADT7481	Local & Remote	SMBus	0.35	3	3.6	-40	125	±1	Micro10
ADT7482	Local & Remote	SMBus	0.35	3	3.6	-40	125	±1	Micro10
ADT7483A	Local & Remote	SMBus	0.35	3	3.6	-40	125	±1	QSOP-16
ADT7484A	Local & Remote	SST	5	3	3.6	-40	125	±1	Micro8; SOIC-8
ADT7485A		SST	5	3	3.6	-40	125	±1	Micro10
ADT7486A	Local & Remote	SST	5	3	3.6	-40	125	±1	Micro10
ADT7488A	-	SST	5	3	3.6	-40	125	±1	Micro10
CAT6095	-	-	-	3	3.6	-40	125	±3	TDFN-8
NCT1008	Local & Remote	I2C; SMBus	0.35	2.8	3.6	-40	125	±1	DFN-8; WDFN-8
NCT210	-	SMBus	-	3	5.5	-65	125	-	QSOP-16
NCT214	-	-	-					-	WDFN-10
NCT75	-	-	-	3	5.5	-55	125	-	DFN-8; Micro8; SOIC-8
NVT210	-	-	-	-	-	-	-	-	Micro8



# Thyristors

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# Thyristors

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## Table of Contents

	<b>Page</b>
Programmable Unijunction Transistors (PUTs) . . . . .	286
SIDACs . . . . .	286
Silicon Controlled Rectifiers (SCRs) . . . . .	286
Thyristor Surge Protection (TSPDs) . . . . .	287
TRIACs . . . . .	288

**PROGRAMMABLE UNIJUNCTION TRANSISTORS (PUTs)**

Device	I <sub>GAO</sub> Max (μA)	I <sub>p</sub> Max (μA)	V <sub>T</sub> Min (V)	V <sub>T</sub> Max (V)	I <sub>V</sub> Max (±A)	Package
2N6027	0.01	2	0.2	1.6	50	TO-92
2N6028	0.01	0.15	0.2	0.6	25	TO-92

**SIDACs**

Device	I <sub>T(RMS)</sub> Max (A)	V <sub>(BO)</sub> Min (V)	V <sub>(BO)</sub> Max (V)	Package
MKP1Vx	0.9	110; 120; 150; 220	130; 140; 170; 250	Axial Lead-2
MKP3Vx	1	110; 220	130; 250	Axial Lead-2
MKP9V160	0.9	150	170	Axial Lead-2

**SILICON CONTROLLED RECTIFIERS (SCRs)**

Device	I <sub>T(RMS)</sub> Max (A)	V <sub>DRM</sub> Min (V)	I <sub>TSM</sub> Max (A)	I <sub>GT</sub> Max (mA)	V <sub>GT</sub> Max (V)	Package
2N506x	0.8	30; 60; 100; 200	10	0.2	0.8	TO-92
2N639x	12	50; 100; 400; 800	100	30	1.5	TO-220-3
2N640x	16	50; 100; 200; 400; 600; 800	160	30	1.5	TO-220-3
2N650x	25	50; 100; 400; 600; 800	300	30	1.5	TO-220-3
C106	4	200; 400; 600	20	0.2	0.8	TO-225-3
C122F1	8	50; 200	90	25	1.5	TO-220-3
MCR08x	0.8	200; 600	8	0.2	0.8	SOT-223-4 / TO-261-4
MCR100-x	0.8	100; 200; 400; 600	10	0.2	0.8	TO-92
MCR106-x	4	400; 600	25	0.2	1	TO-225-3
MCR12x	12	400; 600; 800	100	20	1	TO-220-3
MCR12DCx	12	600; 800	100	20	1	DPAK-4
MCR12DSx	12	600; 800	100	0.2	1	DPAK-4; IPAK-4
MCR12Lx	12	400; 600; 800	100	8	0.8	TO-220-3
MCR16N	16	800	160	20	1	TO-220-3
MCR218-x	8	50; 200; 400	100	25	1.5	TO-220-3
MCR22-x	1.5	50; 400; 600	15	0.2	0.8	TO-92
MCR25x	25	400; 600; 800	300	30	1	TO-220-3
MCR310-010	10	800	100	0.2	1.5	TO-220-3
MCR68-2	12	50	100	30	1.5	TO-220-3
MCR69-x	25	50; 100	300	30	1.5	TO-220-3
MCR70xA	4	100; 400; 600	25	0.075	0.8	DPAK-4; IPAK-4
MCR71x	4	400; 600	25	0.075	0.8	DPAK-4
MCR72-x	8	100; 400; 600	100	0.2	1.5	TO-220-3

## SILICON CONTROLLED RECTIFIERS (SCRs)

Device	$I_{T(RMS)}$ Max (A)	$V_{DRM}$ Min (V)	$I_{TSM}$ Max (A)	$I_{GT}$ Max (mA)	$V_{GT}$ Max (V)	Package
MCR8DCx	8	600; 800	80	15	1	DPAK-4
MCR8DSx	8	600; 800	90	0.2	1	DPAK-4
MCR8N	8	800	80	15	1	TO-220-3
MCR8Sx	8	400; 600; 800	80	0.2	1	TO-220-3
NYC008	0.8	600	10	0.0002	0.8	TO-92
NYC0102B	0.25	200	7	0.2	0.8	SOT-23-3
NYC222	1.5	50; 400; 600	15	0.2	0.8	SOT-223-4 / TO-261-4

## THYRISTOR SURGE PROTECTION DEVICES (TSPDs)

Device	$V_{DM}$ Max (V)	$V_{DRM}$ Max (V)	$V_{(BO)}$ Max (V)	$I_D$ Max ( $\mu$ A)	$I_{DRM}$ Max ( $\mu$ A)	$I_H$ Min (mA)	$I_{PPS}$ Max (A)	$di/dt$ Max (A/ $\mu$ s)	$C_0$ Typ (pF)	Package
MMT05A230	170	–	265	5	–	150	50	100	22	SMA-2
MMT05A260	200	–	320	5	–	150	50	100	22	SMA-2
MMT05A310	270	–	365	5	–	150	50	100	22	SMA-2
MMT05B230	170	–	265	5	–	150	50	150	22	SMB-2
MMT05B260	200	–	320	5	–	150	50	150	22	SMB-2
MMT05B310	270	–	365	5	–	150	50	150	22	SMB-2
MMT05B350	300	–	400	5	–	150	50	300	14	SMB-2
MMT08B064T3	58	–	77	5	–	150	80	150	67	SMB-2
MMT08B260	200	–	320	5	–	150	80	300	25	SMB-2
MMT08B310T3	270	–	365	5	–	150	80	150	23	SMB-2
MMT08B350	300	–	400	5	–	150	80	300	20	SMB-2
MMT10B230	170	–	265	5	–	150	100	100	65	SMB-2
MMT10B260	200	–	320	5	–	150	100	100	65	SMB-2
MMT10B310	270	–	365	5	–	150	100	100	65	SMB-2
MMT10B350	300	–	400	5	–	150	100	100	40	SMB-2
NP SERIES	–	58; 65; 75; 90; 120; 140; 170; 180; 190; 220; 275; 320	77; 88; 98; 130; 160; 180; 220; 240; 260; 300; 350; 400	5	–	150	50; 80; 100	500	40; 60; 70; 100; 125; 180; 210	SMB-2
NP0080TA SERIES	–	–	20; 30	–	–	50	50	–	11; 13	TSOP-5 / SOT-23-5
NP2600SX1	–	220	300	5	5	270	80; 100	500	60; 80	SMB-2
NPMC SERIES	–	58; 65; 75; 90; 120; 140; 170; 180; 190; 220; 275; 320	77; 88; 98; 130; 160; 180; 220; 240; 260; 300; 350; 400	2	5	150	100	500	29	SMB-2
NPMC-A SERIES	–	58; 65; 75; 90; 120; 140; 170; 180; 190; 220; 275	77; 88; 98; 130; 160; 180; 220; 240; 260; 300; 350	2	5	150	50	500	18	SMB-2
NPMC-B SERIES	–	58; 65; 75; 90; 120; 140; 170; 180; 190; 220; 275; 320	77; 88; 98; 130; 160; 180; 220; 240; 260; 300; 350; 400	2	5	150	80	500	21	SMB-2
NTVB058NSx-L	–	58	77	–	–	–	–	–	–	SMB-2



THYRISTOR SURGE PROTECTION DEVICES (TSPDs)

Device	V <sub>DM</sub> Max (V)	V <sub>DRM</sub> Max (V)	V <sub>(BO)</sub> Max (V)	I <sub>D</sub> Max (μA)	I <sub>DRM</sub> Max (μA)	I <sub>H</sub> Min (mA)	I <sub>PPS</sub> Max (A)	di/dt Max (A/μs)	C <sub>O</sub> Typ (pF)	Package
NTVB065NSx-L	-	65	88	-	-	-	-	-	-	SMB-2
NTVB090NSx-L	-	90	130	-	-	-	-	-	-	SMB-2
NTVB170Sx-L	-	170	265	-	-	-	-	-	-	SMB-2
NTVB170NSx-L	-	170	220	-	-	-	-	-	-	SMB-2
NTVB180Sx-L	-	170	240	-	-	-	-	-	-	SMB-2
NTVB200Sx-L	-	200	320	-	-	-	-	-	-	SMB-2
NTVB220NSx-L	-	220	300	-	-	-	-	-	-	SMB-2
NTVB270Sx-L	-	270	365	-	-	-	-	-	-	SMB-2
NTVB275NSx-L	-	275	350	-	-	-	-	-	-	SMB-2
NTVB300Sx	-	300	400	-	-	-	-	-	-	SMB-2

TRIACs

Device	I <sub>T(RMS)</sub> Max (A)	V <sub>DRM</sub> Min (V)	I <sub>TSM</sub> Max (A)	I <sub>GT</sub> Max (mA)	Package
BTA12-x00C4	12	600; 800	120	25-25-25-50	TO-220-3
2N607xA	4	200; 400; 600	30	5-5-5-10	TO-225-3
2N607xB	4	200; 400; 600	30	3-3-3-5	TO-225-3
2N6344	8	600	100	50-75-50-75	TO-220-3
2N6344A	12	600	100	50	TO-220-3
2N634xA	12	600; 800	100	50-75-50-75	TO-220-3
BTA08-x00CW3	8	600; 800	90	35-35-35	TO-220-3
BTA08-x00BW3	8	600; 800	90	50-50-50	TO-220-3
BTA12-x00CW3	12	600; 800	105	35-35-35	TO-220-3
BTA12-x00BW3	12	600; 800	105	50-50-50	TO-220-3
BTA16-x00SW3	16	600; 800	170	10-10-10	TO-220-3
BTA16-x00CW3	16	600; 800	170	35-35-35	TO-220-3
BTA16-x00BW3	16	600; 800	170	50-50-50	TO-220-3
BTA25-x00CW3	25	600; 800	250	35-35-35	TO-220-3
BTA25H-x00CW3	25	600; 800	250	35-35-35	TO-220-3
BTA30-x00CW3	30	600; 800	400	35-35-35	TO-220-3
BTA30H-x00CW3	30	600; 800	400	35-35-35	TO-220-3
BTB08-x00CW3	8	600; 800	90	35-35-35	TO-220-3
BTB08-x00BW3	8	600; 800	90	50-50-50	TO-220-3
BTB12-x00CW3	12	600; 800	120	35-35-35	TO-220-3
BTB12-x00BW3	12	600; 800	120	50-50-50	TO-220-3
BTB12-x00TW3	12	600	126	5-5-5	TO-220-3
BTB16-x00CW3	16	600; 800	170	35-35-35	TO-220-3
BTB16-x00BW3	16	600; 800	170	50-50-50	TO-220-3

## TRIACs

Device	$I_{T(RMS)}$ Max (A)	$V_{DRM}$ Min (V)	$I_{TSM}$ Max (A)	$I_{GT}$ Max (mA)	Package
MAC08B	0.8	200	8	10-10-10-10	SOT-223-4 / TO-261-4
MAC12HCx	12	400; 600; 800	100	50-50-50	TO-220-3
MAC12x	12	400; 600; 800	100	35-35-35	TO-220-3
MAC12Sx	12	600; 800	90	5-5-5	TO-220-3
MAC15-x	15	600; 800	150	50-50-50	TO-220-3
MAC15Ax	15	400; 600; 800	150	50-50-50-75	TO-220-3
MAC15x	15	600; 800	150	35-35-35	TO-220-3
MAC15Sx	15	400; 600; 800	120	5-5-5	TO-220-3
MAC16Cx	16	600; 800	150	35-35-35	TO-220-3
MAC16HCx	16	400; 600; 800	150	50-50-50	TO-220-3
MAC16x	16	400; 600; 800	150	50-50-50	TO-220-3
MAC210Ax	10	600; 800	100	50-50-50-75	TO-220-3
MAC212Ax	12	600; 800	100	50-50-50-75	TO-220-3
MAC228Ax	8	200; 400; 600; 800	80	5-5-5-10	TO-220-3
MAC4DCx	4	600; 800	40	35-35-35	DPAK-4 IPAK-4
MAC4DHM	4	600	40	5-5-5-10	DPAK-4 IPAK-4
MAC4DLM	4	600	40	3-3-3-5	DPAK-4 IPAK-4
MAC4DSx	4	600; 800	40	10-10-10	DPAK-4 IPAK-4
MAC8x	8	400; 600; 800	80	35-35-35	TO-220-3
MAC8Sx	8	400; 600; 800	70	5-5-5	TO-220-3
MAC97Ax	0.6	200; 400; 600	8	5-5-5-7	TO-92
MAC997Ax	0.8	400; 600	8	5-5-5-7	TO-92
MAC997Bx	0.8	400; 600	8	3-3-3-5	TO-92
MAC9x	8	400; 600; 800	80	50-50-50	TO-220-3
T2322B	2.5	200	25	10-10-10-10	TO-225-3
T2500D	6	400	60	25-60-25-60	TO-220-3
T2800D	8	400	100	25-60-25-60	TO-220-3
Z01XXMA	1	600	8	3-3-3-5; 5-5-5-7; 10-10-10-10	TO-92
Z01XXMN	1	600	8	3-3-3-5; 5-5-5-7; 10-10-10-10	SOT-223-4 / TO-261-4



# **Voltage and Current Management**

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# Voltage and Current Management

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## Table of Contents

	Page
Current Protection .....	294
Voltage Protection .....	294
Voltage References .....	294
Voltage Supervisors .....	295

## ON Semiconductor Selector Guide – Voltage and Current Management

### CURRENT PROTECTION

Device	Type	V <sub>I</sub> Max (V)	r <sub>DS(on)</sub> Max (mΩ)	T <sub>SD</sub> Typ (°C)	T <sub>hyst</sub> Typ (°C)	Package
NCP380	–	7	100; 80	140	–	TSOP-5 / SOT23-5; TSOP-6; UDFN-6
NCP382	–	–	–	–	–	SOIC-8
NIS1050	–	30	90	–	–	DFN-6
NIS5112	Auto-Retry; Latch Off	18	35	135	40	SOIC-8
NIS5132	Auto-Retry; Latch Off	18	55	175	45	DFN-10
NIS5135	Auto-Retry; Latch Off	–	82	175	45	DFN-10

### VOLTAGE PROTECTION

Device	V <sub>CC</sub> Min (V)	V <sub>CC</sub> Max (V)	P <sub>(AV)</sub> Max (W)	V <sub>IT+</sub> Typ (V)	V <sub>IT</sub> Typ (V)	I <sub>DDH</sub> Max (μA)	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
CMPWR101	–	–	–	–	–	–	–	–	SOIC-8
CMPWR150	–	–	–	–	–	–	–	–	SOIC-8
CMPWR330	–	–	–	–	–	–	–	–	SOIC-8
NCP347	1.2	28	0.44	5.63	2.95	250	–40	85	WDFN-10
NCP348	1.2	28	0.48	6.02; 6.4	3.25	250	–40	85	LLGA-10; WDFN-10
NCP349	1.2	28	–	5.68; 6.02; 6.4; 6.85	2.95; 3.25	0.25	–40	85	DFN-6
NCP360	1.2	20	0.3	–	3	–	–40	85	TSOP-5 / SOT23-5; UDFN-6
NCP361	1.2	20	0.3	5.675	3	–	25	85	TSOP-5 / SOT23-5; UDFN-6
NCP362	1.2	20	–	5.675	3	35	–40	85	UDFN-10
NCP367	–	–	–	–	–	–	–	–	DFN8 2.0x2.2, 0.5P
NCP370	–28	28	2.5	6.6	2.7	280	–40	85	LLGA-12
NCP3712ASN	–	–	–	–	–	–	–	–	SC-74-6 / SC59-ML-6
NCP372	–30	30	0.45	6.3	2.7	260	–40	85	LLGA-12

### VOLTAGE REFERENCES

Device	Type	V <sub>(BR)</sub> Typ (V)	Tolerance (%)	I <sub>Q</sub> Typ (mA)	I <sub>R</sub> Min (mA)	V <sub>F</sub> Max (V)	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
CAT102	Adjustable	0.6	1	0.09	0.1	18	–40	85	TSOT-23-5
CAT8900	Fixed	1.024; 1.2; 1.25; 1.8; 2.048; 2.5; 2.6; 3; 3.3	0.04; 0.05; 0.08; 0.1; 0.12; 0.2; 0.24; 0.4	0.45	0.1	6.5	–40	85	SOT-23-3
LM285	Fixed	1.235; 2.5	1; 1.5	–	0.01	–	–40	85	SOIC-8; TO-92
LM385	Fixed	1.235; 2.5	2; 3	–	0.015	–	0	70	SOIC-8; TO-92
LM385B	Fixed	1.235; 2.5	1; 1.5	–	0.015	–	0	70	SOIC-8; TO-92
NCP100	Adjustable	0.696	1.7	0.07	0.1	7	–40	85	TO-92; TSOP-5 / SOT23-5
NCP4300A	Fixed	2.6	1	–	0.08	36	0	105	SOIC-8
NCP51460	–	3.3	1	0.14	20	30	0	100	SOT-23-3

**VOLTAGE REFERENCES** (continued)

Device	Type	V <sub>(BR)</sub> Typ (V)	Tolerance (%)	I <sub>Q</sub> Typ (mA)	I <sub>R</sub> Min (mA)	V <sub>F</sub> Max (V)	T <sub>A</sub> Min (°C)	T <sub>A</sub> Max (°C)	Package
NCS1002	–	–	0.4	0.4	–	–	–	–	SOIC–8
NCV1009	Fixed	2.5	0.2	–	0.4	–	–40	125	SOIC–8
TL431	Adjustable	2.495	2.2	–	1	36	–40; 0	70; 85	Micro8; PDIP–8; SOIC–8; TO–92
TL431A	Adjustable	2.495	1	0.5	1	36	–40; 0	70; 85	Micro8; PDIP–8; SOIC–8; TO–92
TL431B	Adjustable	2.495	0.4	–	1	36	–40; 0	70; 85; 125	Micro8; PDIP–8; SOIC–8; TO–92
TLV431A	Adjustable	1.24	1	–	0.055; 0.08	16; 18	–40	85	SOT–23–3; TO–92; TSOP–5 / SOT23–5
TLV431B	Adjustable	1.24	0.5	–	0.000055	16	–40	85	SOT–23–3; TO–92; TSOP–5 / SOT23–5

**VOLTAGE SUPERVISORS**

Device	Voltages Monitored	V <sub>CC</sub> Max (V)	V <sub>(TO)</sub> Typ (V)	I <sub>Q</sub> Typ (μA)	Reset Active State	Reset Timer	Manual Reset	Watchdog Timer	Package
CAT1232LP	1	5.5	4.38; 4.63	35	High; Low	Yes	Yes	Yes	MSOP–8; PDIP–8; SOIC–16W; SOIC–8
CAT1832	1	5.5	2.55; 2.88	20	High; Low	Yes	No	Yes	MSOP–8; PDIP–8; SOIC–8
CAT705	2	5.5	4.63	6	Low	Yes	Yes	Yes	MSOP–8; SOIC–8
CAT706	2	3.6; 5.5	2.63; 2.93; 3.08; 4.38	6	Low	Yes	Yes	No	MSOP–8; SOIC–8
CAT803	1	5.5	2.32; 2.63; 2.93; 3.08; 4; 4.38; 4.63	6; 8	Low	Yes	No	No	SC–70–3; SOT–23–3
CAT808	1	5.5	2.7; 3.2	5	Low	No	No	No	TSOT–23–5
CAT809	1	5.5	1.6; 2.32; 2.63; 2.93; 3.08; 4; 4.38; 4.55; 4.63	6; 8	Low	Yes	No	No	SC–70–3; SOT–23–3
CAT810	1	2.5; 5.5; 5.6	2.32; 2.63; 2.93; 3.08; 4; 4.38; 4.63	6	High	Yes	No	No	SC–70–3; SOT–23–3
CAT811	1	5.5	2.32; 2.63; 2.93; 3.08; 4; 4.38; 4.63	6; 8	Low	Yes	No	No	SOT–123–4
CAT812	1	5.5	2.32; 2.63; 2.93; 3.08; 4; 4.38; 4.63	6; 8	High	Yes	No	No	SOT–123–4
CAT813	2	5.5	2.32; 4.63	6	High	Yes	Yes	Yes	MSOP–8; SOIC–8
CAT823	1	3.3; 5.5	2.19; 2.32; 2.63; 2.93; 3.08; 4.38; 4.63	6	Low	Yes	Yes	Yes	SC–88A–5 / SC–70–5; TSOT–23–5
CAT824	1	5.5	2.19; 2.32; 2.63; 2.93; 3.08; 4.38; 4.63	6	High; Low	Yes	No	Yes	SC–88A–5 / SC–70–5; TSOT–23–5
CAT825	1	3.3; 5.5	2.19; 2.32; 2.63; 2.93; 3.08; 4.38; 4.63	3; 6	High; Low	Yes	Yes	No	SC–88A–5 / SC–70–5; TSOT–23–5
CAT853	1	5.5	2.93; 3.08; 4.38	6	Low	Yes	No	No	SOT–23–3
CAT859	1	5.5	2.93; 3.08; 4.38	6	Low	Yes	No	No	SOT–23–3
CAT863	1	5.5	2.93; 3.08; 4.38	6	Low	Yes	No	No	SOT–23–3
CAT869	1	5.5	2.93; 3.08; 4.38	6	Low	Yes	No	No	SOT–23–3
CAT8710	4	5.5	0.62	3	Low	Yes	No		TSOT–23–6
CAT8801	1	5.5	1.67; 2.19; 2.32; 2.63; 2.925; 3.075; 4.38; 4.625	0.2	Low	Yes	No	No	SC–70–3; SOT–23–3
CAT8836	1	5.5	1.7; 2.25; 2.64; 2.79; 2.93	–	Low	Yes	Yes	No	TSOT–23–5
CAT884	4	5.5	0.635	3	Low	Yes	Yes		SOIC–8
CAT885	5	5.5	1.68; 2.33; 2.87; 2.95; 3.08; 4.63	2	Low	Yes	Yes	No	MSOP–8
MAX708	2	5.5	2.63; 2.93; 3.08; 4.38	12	High; Low	No	Yes	No	Micro8; SOIC–8



## ON Semiconductor Selector Guide – Voltage and Current Management

### VOLTAGE SUPERVISORS (continued)

Device	Voltages Monitored	V <sub>CC</sub> Max (V)	V <sub>(TO)</sub> Typ (V)	I <sub>Q</sub> Typ (μA)	Reset Active State	Reset Timer	Manual Reset	Watchdog Timer	Package
MAX803	1	5.5	1.2; 2.63; 2.93; 3.08; 4.63	0.5	Low	Yes	No	No	SC-70-3 / SOT-323-3
MAX809	1	5.5	1.2; 1.6; 2.32; 2.63; 2.93; 3.08; 4; 4.38; 4.55; 4.63; 4.9	0.5	Low	Yes	No	No	SC-70-3 / SOT-323-3; SOT-23-3
MAX810	1	5.5	1.2; 2.63; 2.93; 3.08; 4.38; 4.63	0.5	High	Yes	No	No	SC-70-3 / SOT-323-3; SOT-23-3
MC33064	1	6.5	4.61	390	Low	No	No	No	Micro8; SOIC-8; TO-92; TSOP-5 / SOT23-5
MC33161	2	40	1.27	–	–	No	No	No	Micro8; PDIP-8; SOIC-8
MC33164	1	10	2.71; 4.33	24; 32	Low	No	No	No	Micro8; SOIC-8; TO-92
MC34064	1	6.5	4.61	390	Low	No	No	No	Micro8; SOIC-8; TO-92; TSOP-5 / SOT23-5
MC34164	1	10	2.71; 4.33	24; 32	Low	No	No	No	Micro8; SOIC-8; TO-92; TSOP-5 / SOT23-5
NCP300	1	10	0.9; 1.8; 1.85; 2; 2.7; 2.8; 3; 3.3; 3.4; 4.4; 4.5; 4.6; 4.7	0.5	High; Low	No	No	No	TSOP-5 / SOT23-5
NCP301	1	10	0.9; 1; 1.1; 1.2; 1.6; 1.8; 2; 2.2; 2.5; 2.6; 2.7; 2.8; 3; 3.1; 3.2; 3.3; 3.4; 3.6; 3.9; 4; 4.2; 4.5; 4.6; 4.7	0.5	High; Low	No	No	No	TSOP-5 / SOT23-5
NCP302	1	10	0.9; 1.5; 1.8; 2; 2.7; 3; 3.3; 3.8; 4; 4.3; 4.5; 4.7	0.5	High; Low	No	No	No	TSOP-5 / SOT23-5
NCP303	1	10	0.9; 1; 1.1; 1.3; 1.4; 1.5; 1.6; 1.8; 2; 2.2; 2.3; 2.4; 2.5; 2.6; 2.7; 2.8; 2.9; 3; 3.1; 3.2; 3.3; 3.4; 3.6; 3.8; 4; 4.2; 4.4; 4.5; 4.6; 4.8; 4.9	0.5	Low	No	No	No	TSOP-5 / SOT23-5
NCP304	1	10	0.9; 1.8; 2; 2.2; 2.3; 2.5; 2.7; 2.9; 3; 3.3; 3.7; 3.8; 4; 4.2; 4.3; 4.5; 4.6; 4.7	1	High; Low	No	No	No	SC-82AB-4
NCP304A	–	10	4.3	1	Low	–	–	–	SC-82AB-4
NCP305	1	10	0.9; 1.1; 1.5; 1.6; 1.7; 1.8; 2; 2.2; 2.3; 2.4; 2.5; 2.6; 2.7; 2.8; 2.9; 3; 3.1; 3.2; 3.3; 3.4; 3.5; 3.6; 3.7; 4; 4.4; 4.5; 4.7; 4.9	1	Low	No	No	No	SC-82AB-4
NCP348	–	28	5	170	–	–	–	–	LLGA-10; WDFN-10
NCP349	–	28	–	70	–	–	–	–	DFN-6
NCP360	–	20	5.675; 6.25; 7.07; 7.2	24	–	–	–	–	TSOP-5 / SOT23-5; UDFN-6
NCP361	–	20	5.675	24	–	–	–	–	TSOP-5 / SOT23-5; UDFN-6
NCP4208	–	–	–	–	–	–	–	–	QFN-48
NCP803	1	5.5	1.2; 1.6; 2.32; 2.63; 2.93; 3.08; 4; 4.38; 4.63	0.5	Low	Yes	No	No	SOT-23-3
NCV300	1	10	2; 2.7; 2.8; 3; 3.6	0.5	Low	No	No	No	TSOP-5 / SOT23-5
NCV301	1	10	1.2; 1.6; 2; 2.2; 2.5; 2.7; 2.8; 3.3; 4; 4.2; 4.5	0.5	High; Low	No	No	No	TSOP-5 / SOT23-5
NCV302	1	10	3	0.5	Low	No	No	No	TSOP-5 / SOT23-5
NCV303	1	10	1; 1.5; 1.7; 2.3; 2.9; 3; 4.2; 4.4; 4.5; 4.7; 4.9	0.5	Low	No	No	No	TSOP-5 / SOT23-5
NCV33064	1	6.5	4.61	390	Low	No	No	No	Micro8; SOIC-8; TO-92
NCV33161	2	40	1.27	–	–	No	No	No	SOIC-8
NCV33164	1	10	2.71; 4.33	24; 32	–	No	No	No	SOIC-8
NCV809	1	5.5	4.63	0.5	Low	Yes	No	No	SOT-23-3

## Alphanumeric Parts Index

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# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
1.5KE10A	141	1N4002	199	1N5374B	129
1.5KE11A	141	1N4003	199	1N5375B	129
1.5KE12A	141	1N4004	199	1N5377B	129
1.5KE13A	141	1N4005	199	1N5378B	129
1.5KE15A	141	1N4006	199	1N5380B	129
1.5KE16A	141	1N4007	199	1N5381B	129
1.5KE18A	141	1N4933	199	1N5383B	129
1.5KE20A	141	1N4934	199	1N5384B	129
1.5KE24A	141	1N4935	199	1N5386B	129
1.5KE27A	141	1N4936	199	1N5387	129
1.5KE30A	141	1N4937	199	1N5388B	129
1.5KE33A	141	1N5333B	128	1N5400	199
1.5KE36A	141	1N5334B	128	1N5401	199
1.5KE39A	141	1N5335B	128	1N5402	199
1.5KE43A	141	1N5336B	128	1N5404	199
1.5KE47A	141	1N5337B	128	1N5406	199
1.5KE51A	141	1N5338B	128	1N5407	199
1.5KE56A	141	1N5339B	128	1N5408	199
1.5KE6.8A	141	1N5340B	128	1N5817	192
1.5KE62A	141	1N5341B	128	1N5818	192
1.5KE68A	141	1N5342B	128	1N5819	192
1.5KE7.5A	141	1N5343B	128	1N5820	192
1.5KE75A	141	1N5344B	128	1N5821	192
1.5KE8.2A	141	1N5345B	128	1N5822	192
1.5KE82A	141	1N5346B	128	1N5913B	128
1.5KE91A	141	1N5347B	128	1N5917B	128
1.5SMC10A	154	1N5348B	128	1N5919B	128
1.5SMC12A	154	1N5349B	128	1N5920B	128
1.5SMC13A	154	1N5350B	128	1N5921B	128
1.5SMC15A	154	1N5351B	128	1N5923B	128
1.5SMC16A	154	1N5352B	128	1N5924B	128
1.5SMC18A	154	1N5353B	128	1N5925B	128
1.5SMC20A	154	1N5354B	128	1N5927B	128
1.5SMC22A	154	1N5355B	128	1N5929B	128
1.5SMC24A	154	1N5356B	128	1N5931B	128
1.5SMC27A	154	1N5357B	128	1N5932B	128
1.5SMC30A	154	1N5358B	128	1N5934B	128
1.5SMC33A	154	1N5359B	128	1N5935B	129
1.5SMC36A	154	1N5360B	129	1N5937B	129
1.5SMC39A	154	1N5361B	129	1N5938B	129
1.5SMC43A	154	1N5362B	129	1N5940B	129
1.5SMC47A	154	1N5363B	129	1N5941B	129
1.5SMC51A	154	1N5364B	129	1N5942B	129
1.5SMC56A	154	1N5365B	129	1N5946B	129
1.5SMC6.8A	154	1N5366B	129	1N5948B	129
1.5SMC62A	154	1N5367B	129	1N5953B	129
1.5SMC68A	154	1N5368B	129	1N5955B	129
1.5SMC7.5A	154	1N5369B	129	1N5956B	129
1.5SMC75A	154	1N5370B	129	1N6267A	141
1.5SMC82A	154	1N5371B	129	1N6271A	141
1.5SMC91A	154	1N5372B	129	1N6274A	141
1N4001	199	1N5373B	129	1N6275A	141

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
1N6276A	141	1SMA33CA	146	1SMA9.0A	144
1N6277A	141	1SMA36A	144	1SMB100A	147
1N6278A	141	1SMA36CA	146	1SMB10A	147
1N6279A	141	1SMA40A	144	1SMB10CA	149
1N6280A	141	1SMA40CA	146	1SMB110A	148
1N6281A	141	1SMA43A	144	1SMB11A	147
1N6282A	141	1SMA45A	144	1SMB11CA	149
1N6283A	141	1SMA48A	144	1SMB120A	148
1N6284A	141	1SMA48CA	146	1SMB12A	147
1N6285A	141	1SMA5.0A	144	1SMB12CA	149
1N6286A	141	1SMA54A	144	1SMB130A	148
1N6287A	141	1SMA58A	144	1SMB13A	147
1N6288A	141	1SMA58CA	146	1SMB13CA	149
1N6289A	141	1SMA5913B	135	1SMB14A	147
1N6290A	141	1SMA5914B	135	1SMB14CA	149
1N6291A	141	1SMA5915B	135	1SMB150A	148
1N6292A	141	1SMA5916B	135	1SMB15A	147
1N6294A	141	1SMA5917B	135	1SMB15CA	149
1N6295A	141	1SMA5918B	135	1SMB160A	148
1PMT12A	142	1SMA5919B	135	1SMB16A	147
1PMT16A	142	1SMA5920B	135	1SMB16CA	149
1PMT22A	142	1SMA5921B	135	1SMB170A	148
1PMT26A	142	1SMA5922B	135	1SMB17A	147
1PMT33A	142	1SMA5923B	135	1SMB17CA	149
1PMT5.0A	142	1SMA5924B	135	1SMB18A	147
1PMT7.0A	142	1SMA5925B	135	1SMB18CA	149
1SMA10A	144	1SMA5927B	135	1SMB20A	147
1SMA10CA	146	1SMA5928B	135	1SMB20CA	149
1SMA11A	144	1SMA5929B	135	1SMB22A	147
1SMA12A	144	1SMA5930B	135	1SMB22CA	149
1SMA12CA	146	1SMA5931B	135	1SMB24A	147
1SMA13A	144	1SMA5932B	135	1SMB24CA	149
1SMA13CA	146	1SMA5933B	135	1SMB26A	147
1SMA15A	144	1SMA5934B	135	1SMB26CA	149
1SMA15CA	146	1SMA5935B	135	1SMB28A	147
1SMA16A	144	1SMA5936B	135	1SMB28CA	149
1SMA16CA	146	1SMA5937B	135	1SMB30A	147
1SMA17A	144	1SMA5938B	135	1SMB30CA	149
1SMA18A	144	1SMA5939B	135	1SMB33A	147
1SMA18CA	146	1SMA5940B	135	1SMB33CA	149
1SMA20A	144	1SMA5941B	135	1SMB36A	147
1SMA20CA	146	1SMA5942B	135	1SMB36CA	149
1SMA22A	144	1SMA5943B	135	1SMB40A	147
1SMA24A	144	1SMA5945B	135	1SMB40CA	149
1SMA24CA	146	1SMA6.0A	144	1SMB43A	147
1SMA26A	144	1SMA6.5A	144	1SMB43CA	149
1SMA26CA	146	1SMA60CA	146	1SMB45A	147
1SMA28A	144	1SMA70A	144	1SMB45CA	149
1SMA28CA	146	1SMA70CA	146	1SMB48A	147
1SMA30A	144	1SMA78CA	146	1SMB48CA	149
1SMA30CA	146	1SMA8.0A	144	1SMB5.0A	147
1SMA33A	144	1SMA8.5A	144	1SMB51A	147

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
1SMB51CA	149	1SMB64A	147	2N3773	35
1SMB54A	147	1SMB64CA	149	2N3904	40, 50
1SMB54CA	149	1SMB7.0A	147	2N3906	40, 50
1SMB58A	147	1SMB7.5A	147	2N4124	40
1SMB58CA	149	1SMB70A	147	2N4401	40, 47, 50
1SMB5913B	135	1SMB75A	147	2N4403	40, 47, 50
1SMB5914B	135	1SMB75CA	149	2N4918	31
1SMB5915B	135	1SMB8.0A	147	2N4919	31
1SMB5916B	135	1SMB8.5A	147	2N4920	31
1SMB5917B	135	1SMB85A	147	2N4921	31
1SMB5918B	135	1SMB9.0A	147	2N4922	31
1SMB5919B	135	1SMB90A	147	2N4923	31
1SMB5920B	135	1SMC10A	153	2N5038	35
1SMB5921B	135	1SMC12A	153	2N506x	286
1SMB5922B	135	1SMC13A	153	2N5087	40, 46
1SMB5923B	135	1SMC14A	153	2N5088	40, 46
1SMB5924B	135	1SMC15A	153	2N5089	40, 46
1SMB5925B	135	1SMC16A	153	2N5190	32
1SMB5926B	135	1SMC17A	153	2N5191	32
1SMB5927B	135	1SMC18A	153	2N5192	32
1SMB5928B	135	1SMC20A	153	2N5194	32
1SMB5929B	135	1SMC22A	153	2N5195	32
1SMB5930B	135	1SMC24A	153	2N5302	35
1SMB5931B	135	1SMC26A	153	2N5401	49
1SMB5932B	135	1SMC28A	153	2N5550	49
1SMB5933B	135	1SMC30A	153	2N5551	49
1SMB5934B	135	1SMC33A	153	2N5655	31
1SMB5935B	135	1SMC36A	153	2N5657	31
1SMB5936B	135	1SMC40A	153	2N5684	35
1SMB5937B	135	1SMC43A	153	2N5686	35
1SMB5938B	135	1SMC48A	153	2N5883	35
1SMB5939B	135	1SMC5.0A	153	2N5884	35
1SMB5940B	135	1SMC51A	153	2N5885	35
1SMB5941B	135	1SMC54A	153	2N5886	35
1SMB5942B	135	1SMC58A	153	2N6027	286
1SMB5943B	135	1SMC6.0A	153	2N6028	286
1SMB5944B	135	1SMC6.5A	153	2N6034	36
1SMB5945B	135	1SMC60A	153	2N6035	36
1SMB5946B	135	1SMC64A	153	2N6036	36
1SMB5947B	136	1SMC7.0A	153	2N6038	36
1SMB5948B	136	1SMC7.5A	153	2N6039	36
1SMB5949B	136	1SMC70A	153	2N6040	36
1SMB5951B	136	1SMC75A	153	2N6042	36
1SMB5952B	136	1SMC78A	153	2N6043	36
1SMB5953B	136	1SMC8.0A	153	2N6045	36
1SMB5954B	136	1SMC9.0A	153	2N6052	37
1SMB5955B	136	1SS400T1	127	2N607xA	288
1SMB5956B	136	2N3055	34	2N607xB	288
1SMB6.0A	147	2N3055A	34	2N6107	33
1SMB6.5A	147	2N3442	34	2N6109	33
1SMB60A	147	2N3771	35	2N6111	33
1SMB60CA	149	2N3772	35	2N6284	37

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
2N6286	37	ADP3193A	99	AMIS-42670	240
2N6287	37	ADP3198	99	AMIS-42671	240
2N6288	33	ADP3207C	99	AMIS-42673	240
2N6292	33	ADP3208D	99	AMIS-42675	240
2N6338	35	ADP3209C	99	AMIS-42700	240
2N6341	35	ADP3210	99	AMIS-42770	240
2N6344	288	ADP3211	99	AMIS-49200	240
2N6344A	288	ADP3212	99	AMIS-49587	241
2N634xA	288	ADP3212A	99	ASM3P18S19B	86
2N6387	37	ADP3290	99	ASM3P2107A	86
2N6388	37	ADP3293	99	ASM3P2108A	86
2N639x	286	ADP3419	208	ASM3P2111B	86
2N640x	286	ADP3611	208	ASM3P2180A	86
2N6426	46	ADP4000	99	ASM3P2182A	86
2N6427	46	ADP4100	99	ASM3P2274A	86
2N6487	33	ADT7460	280	ASM3P2474A	87
2N6488	33	ADT7461	281	ASM3P2579A	87
2N6490	33	ADT7461A	281	ASM3P2590A	87
2N6491	33	ADT7462	280	ASM3P2598A	87
2N650x	286	ADT7463	280	ASM3P2669A	87
2N6520	49	ADT7467	280	ASM3P2760A	87
2N6667	37	ADT7473	280	ASM3P2775A	87
2N7000	230	ADT7475	280	ASM3P2779A	87
2N7002E	230	ADT7476	280	ASM3P2811A	87
2N7002K	230	ADT7476A	280	ASM3P2812A	87
2N7002L	230	ADT7481	281	ASM3P2814A	87
2N7002W	230	ADT7482	281	ASM3P2853A	87
2SA1020	47	ADT7483A	281	ASM3P2854C	85
2SA1774	43	ADT7484A	281	ASM3P2855D	85
2SA2029BM3T5G	43	ADT7485A	281	ASM3P2863A	87
2SC4617	43	ADT7486A	281	ASM3P2872A	87
2SC5658BM3T5G	43	ADT7488A	281	ASM3P623S05B	87
2SC5658RM3	43	ADT7490	280	BAL99LT1	126
74FST3257	272	AMIS-30512	208	BAS116LT1	126
74VCXH16245	274	AMIS-30521	208	BAS16DXV6T1	127
74VCXH245	255, 273	AMIS-30522	209	BAS16HT1	127
7SB384	273	AMIS-30523	209	BAS16LT1	126
7WBD3125	275	AMIS-30532	209	BAS16TT1	127
A5191HRT	240	AMIS-30542	209	BAS16WT1	126
ADM1021A	281	AMIS-30585	241	BAS16XV2T1	127
ADM1023	281	AMIS-30600	240	BAS19LT1	126
ADM1024	280	AMIS-30621	209	BAS20HT1	127
ADM1026	280	AMIS-30622	209	BAS20LT1	126
ADM1029	280	AMIS-30623	209	BAS21AH	127
ADM1030	280	AMIS-30624	209	BAS21DW5T1	127
ADM1031	280	AMIS-30660	240	BAS21HT1	127
ADM1032	281	AMIS-30663	240	BAS21LT1	126
ADM1033	280	AMIS-39100	207, 209	BAS21M3	127
ADM1034	280	AMIS-39101	207	BAS21SL	126
ADP3110A	208	AMIS-41682	240	BAS40-04LT1	123
ADP3120A	208	AMIS-41683	240	BAS40-06LT1	123
ADP3121	208	AMIS-42665	240	BAS40LT1	123

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
BAS70-04LT1	123	BC637	40, 47	BC857BWT1	43
BAS70LT1	123	BC639	40, 47	BC857CDW1T1	45
BAT54ALT1	123	BC639-16	40, 47	BC857CLT1	41
BAT54AWT1	124	BC640-016	40	BC857CWT1	43
BAT54CLT1	123	BC807-16L	41	BC858ALT1	42
BAT54CTT1	124	BC807-25L	41	BC858AWT1	43
BAT54CWT1	124	BC807-40L	41	BC858BLT1	42
BAT54CXV3T1	124	BC808-25L	42	BC858BWT1	43
BAT54HT1	123	BC817-16LT1	41	BC858CDXV6T1	45
BAT54LT1	123	BC817-25LT1	41	BC858CLT1	42
BAT54M3	125	BC817-40LT1	41	BCP53-10	44, 48
BAT54SLT1	123	BC818-40L	42	BCP53-16	44, 48
BAT54SWT1	124	BC846ALT1	41	BCP53T1	44, 48
BAT54T1	123	BC846BDW1T1	45	BCP56-10	44, 48
BAT54WT1	124	BC846BLT1	41	BCP56-16	44, 48
BAT54XV2T1	124	BC846BM3T5G	43	BCP56T1	44, 48
BAV199LT1	126	BC846BPDW1T1	45	BCP68T1	44, 48
BAV23CL	126	BC846BWT1	43	BCP69T1	44, 48
BAV70LT1	126	BC847ALT1	41	BCW30LT1	42
BAV70M3	127	BC847AWT1	43	BCW32LT1	42
BAV70TT1	127	BC847BDW1T1	45	BCW33LT1	42
BAV70WT1	126	BC847BLT1	41	BCW65ALT1	42, 48
BAV74LT1	126	BC847BM3T5G	43	BCW65CLT1	42
BAV99LT1	126	BC847BPDW1T1	45	BCW66GLT1	48
BAV99RWT1	126	BC847BPDXV6T1	45	BCW68GLT1	41, 48
BAV99WT1	126	BC847BTT1	43	BCW70LT1	41
BAW56LT1	126	BC847BWT1	43	BCW72LT1	41
BAW56M3	127	BC847CDW1T1	45	BCX17LT1	41, 48
BAW56TT1	127	BC847CDXV6T1	45	BCX19LT1	41, 48
BAW56WT1	126	BC847CLT1	41	BD135	31
BC307B	40	BC847CTT1	43	BD136	31
BC327-25	40, 47	BC847CWT1	43	BD137	31
BC327-40	40, 47	BC848ALT1	42	BD138	31
BC337	40, 47	BC848BLT1	42	BD139	31
BC337-25	40, 47	BC848BWT1	43	BD140	31
BC337-40	40, 47	BC848CDW1T1	45	BD159	31
BC369	40, 47	BC848CLT1	42	BD179	31
BC373	46	BC848CPDW1T1	45	BD180	31
BC490	40, 47	BC848CWT1	43	BD234	31
BC517	46	BC849BLT1	42	BD237	31
BC546B	40	BC849CLT1	42	BD241C	32
BC547B	40	BC850BLT1	41	BD242B	32
BC547C	40	BC850CLT1	41	BD242C	32
BC548B	40	BC856ALT1	41	BD243C	33
BC548C	40	BC856BDW1T1	45	BD244B	33
BC549C	40	BC856BLT1	41	BD244C	33
BC550C	40, 46	BC856BM3T5G	43	BD435	32
BC556B	40	BC856BWT1	43	BD436	32
BC557B	40	BC857ALT1	41	BD437	32
BC557C	40	BC857BDW1T1	45	BD438	32
BC558B	40	BC857BLT1	41	BD439	32
BC560C	40	BC857BTT1	43	BD440	32

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
BD441	32	BSS84L	235	BZX84C16L	131
BD442	32	BSV52LT1	50	BZX84C18L	131
BD675	36	BTA08-x00BW3	288	BZX84C20L	131
BD675A	36	BTA08-x00CW3	288	BZX84C22L	131
BD676	36	BTA12-x00C4	288	BZX84C24L	131
BD676A	36	BTA12-x00BW3	288	BZX84C27L	131
BD677	36	BTA12-x00CW3	288	BZX84C2V4L	131
BD677A	36	BTA16-x00BW3	288	BZX84C2V7L	131
BD678	36	BTA16-x00CW3	288	BZX84C30L	131
BD678A	36	BTA16-x00SW3	288	BZX84C33L	131
BD679	36	BTA25-x00CW3	288	BZX84C36L	131
BD679A	36	BTA25H-x00CW3	288	BZX84C39L	131
BD680	36	BTA30-x00CW3	288	BZX84C3V0L	131
BD680A	36	BTA30H-x00CW3	288	BZX84C3V3L	131
BD681	36	BTB08-x00BW3	288	BZX84C3V6L	131
BD682	36	BTB08-x00CW3	288	BZX84C3V9L	131
BD787	32	BTB12-x00BW3	288	BZX84C43L	132
BD788	32	BTB12-x00CW3	288	BZX84C47L	132
BD809	33	BTB12-x00TW3	288	BZX84C4V3L	131
BD810	33	BTB16-x00BW3	288	BZX84C4V7L	131
BDV64B	37	BTB16-x00CW3	288	BZX84C51L	132
BDV65B	37	BU323Z	37	BZX84C56L	132
BDW42	37	BU406	33	BZX84C5V1L	131
BDW46	37	BUB323Z	36	BZX84C5V6L	131
BDW47	37	BUH100	33, 39	BZX84C62L	132
BDX33B	37	BUH150	33, 39	BZX84C68L	132
BDX33C	37	BUH50	32, 39	BZX84C6V2L	131
BDX34B	37	BUL45	32, 39	BZX84C6V8L	131
BDX34C	37	BUL45D2	32, 39	BZX84C75L	132
BDX53B	36	BUV21	35	BZX84C7V5L	131
BDX53C	36	BUV22	35	BZX84C8V2L	131
BDX54B	36	BUV26	33	BZX84C9V1L	131
BDX54C	36	BUV27	33	C106	286
BELASIGNA 200	214	BUX85	32	C122F1	286
BELASIGNA 250	214	BZ84B15L	131	C3/D3	94
BELASIGNA 300	214	BZX84B12L	131	C5	94
BELASIGNA R261	214	BZX84B16L	131	CAT102	294
BF422	49	BZX84B18L	131	CAT1021	246
BF423	49	BZX84B22L	131	CAT1022	246
BF493S	49	BZX84B24L	131	CAT1023	246
BF720T1	49	BZX84B5V1L	131	CAT1024	246
BF721T1	49	BZX84B5V6L	131	CAT1025	246
BS107A	232	BZX84B6V2L	131	CAT1026	246
BS108	232	BZX84B6V8L	131	CAT1027	246
BS170	230	BZX84B7V5L	131	CAT1161	246
BSP16T1	49	BZX84B8V2L	131	CAT1162	246
BSP19AT1	49	BZX84B9V1L	131	CAT1163	246
BSP52T1	46	BZX84C10L	131	CAT1232LP	295
BSS123L	231	BZX84C11L	131	CAT13001	247
BSS138L	230	BZX84C12L	131	CAT1320	247
BSS63LT1	41	BZX84C13L	131	CAT1321	247
BSS64LT1	41	BZX84C15L	131	CAT14002	247



# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
CAT14004	247	CAT3224	204	CAT5123	116
CAT14008	247	CAT34C02	248	CAT5124	116
CAT14016	247	CAT34TS02	248	CAT5125	116
CAT15002	247	CAT3604A	204	CAT5126	116
CAT15004	247	CAT3604V	204	CAT5128	116
CAT15008	247	CAT3606	204	CAT5129	116
CAT15016	247	CAT3612	204	CAT5132	117
CAT1640	247	CAT3614	204	CAT5133	117
CAT1641	247	CAT3616	204	CAT5140	117
CAT1832	295	CAT3626	204	CAT5171	117
CAT22C10	246	CAT3636	204	CAT5172	117
CAT24AA01	247	CAT3637	204	CAT5221	117
CAT24AA02	247	CAT3643	204	CAT5241	117
CAT24AA04	247	CAT3644	204	CAT5251	117
CAT24AA08	247	CAT3647	204	CAT5259	117
CAT24AA16	247	CAT3648	204	CAT5261	117
CAT24C01	247	CAT3649	206	CAT5269	117
CAT24C02	247	CAT3661	204	CAT5271	117
CAT24C03	247	CAT37	206	CAT5273	117
CAT24C04	247	CAT4002A	204	CAT5401	117
CAT24C05	247	CAT4002B	206	CAT5409	117
CAT24C08	247	CAT4003B	206	CAT5411	117
CAT24C128	247	CAT4004	204	CAT5419	117
CAT24C16	247	CAT4004A	204	CAT6095	281
CAT24C164	247	CAT4004B	206	CAT6217	105
CAT24C208	248	CAT4008	204	CAT6218	106
CAT24C21	248	CAT4016	204	CAT6219	107
CAT24C256	248	CAT4026	205	CAT6221	110
CAT24C32	248	CAT4101	205	CAT64LC40	248
CAT24C44	246	CAT4103	205	CAT660	98
CAT24C64	248	CAT4104	205	CAT661	98
CAT25010	248	CAT4106	206	CAT705	295
CAT25020	248	CAT4109	205	CAT706	295
CAT25040	248	CAT4134	206	CAT803	295
CAT25080	248	CAT4137	206	CAT808	295
CAT25128	248	CAT4139	206	CAT809	295
CAT25160	248	CAT4201	205	CAT810	295
CAT25256	248	CAT4237	206	CAT811	295
CAT25320	248	CAT4238	206	CAT812	295
CAT25640	248	CAT4240	206	CAT813	295
CAT28C16A	246	CAT5110	116	CAT823	295
CAT28C17A	246	CAT5111	116	CAT824	295
CAT28C256	246	CAT5112	116	CAT825	295
CAT28C64B	246	CAT5113	116	CAT853	295
CAT28C65B	246	CAT5114	116	CAT859	295
CAT28LV256	246	CAT5115	116	CAT863	295
CAT28LV64	246	CAT5116	116	CAT869	295
CAT28LV65	246	CAT5118	116	CAT8710	295
CAT310	204	CAT5119	116	CAT8801	295
CAT32	206	CAT5120	116	CAT8836	295
CAT3200	98	CAT5121	116	CAT884	295
CAT3200HU2	98	CAT5122	116	CAT885	295

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
CAT8900	294	CM1230-04CP	183	CM2009-02QR	186
CAT93C46	248	CM1230-08CP	183	CM2020-00TR	185
CAT93C46R	248	CM1231-02SO	184	CM2020-01TR	185
CAT93C56	248	CM1233-08DE	184	CM2030-A0TR	185
CAT93C57	248	CM1234-08DE	184	CM2031-A0TR	185
CAT93C66	248	CM1235-08DE	184	CM3202-00	111
CAT93C76	248	CM1236-08DE	184	CM3202-02	111
CAT93C86	248	CM1238-08DE	184	CM6100	167
CAT9532	241	CM1241-04D4	181	CM6110	164
CAT9534	241	CM1242-07CP	175	CM6116	164
CAT9552	241	CM1242-33CP	175	CM6136	165
CAT9554	241	CM1248-04QG	177	CM6300	219
CAT9554A	241	CM1248-04S9	177	CMPWR101	294
CAT9555	241	CM1248-08DE	177	CMPWR150	294
CM1204-03CP	177	CM1249-04S9	178	CMPWR330	294
CM1205	177	CM1250-04QG	178	CS3351	209
CM1213A-01SO	179	CM1263	183	CS3361	209
CM1213A-02SO	179	CM1263-02SE	183	CS51021A	99
CM1213A-02SR	179	CM1282-01D1	179	CS51022A	98
CM1213A-04MR	179	CM1293A-02SO	180	CS51031	99
CM1213A-04S7	179	CM1293A-02SR	180	CS51221	9
CM1213A-04SO	179	CM1293A-04MR	180	CS5124	8, 98
CM1214A-01SO	179	CM1293A-04SO	180	CS51411	100
CM1214A-02MR	179	CM1402	218	CS51412	100
CM1215-01SO	180	CM1406	218	CS51413	100
CM1215-02SO	180	CM1409	218	CS51414	100
CM1215-02SR	180	CM1411	218	CS5171	102
CM1215-04SO	180	CM1412	218	CS5172	102
CM1216-06MR	182	CM1425	218	CS5173	102
CM1216-06SM	182	CM1430-08DE	218	CS5174	102
CM1216-08MR	182	CM1431-08DE	218	CS8101	103
CM1218-03SR	176	CM1436-04DE	218	CS8126	108
CM1218-F4SE	176	CM1436-08DE	218	CS8151	103
CM1218-H4SE	176	CM1442	218	CS8182	106
CM1219-02S7	176	CM1442-06LP	218	CS8183	110
CM1219-02SO	176	CM1443-04	218	CS8190	209
CM1219-03SR	176	CM1443-08	218	CS8361	110
CM1219-04S7	176	CM1451	218	CS8363	110
CM1219-04SE	176	CM1453-06CP	218	CSPEMI201A	218, 219
CM1219-04SO	176	CM1453-08CP	218	CSPEMI202A	218, 219
CM1219-05S7	176	CM1457	219	CSPEMI205	218, 219
CM1219-05SO	176	CM1461	219	CSPEMI306A	219
CM1223-02SO	182	CM1481	218	CSPEMI307A	219
CM1223-02SR	182	CM1483	218	CSPEMI400	219
CM1223-04MR	182	CM1492-06DE	219	D44H11	33
CM1223-04SO	182	CM1624	219	D44H8	33
CM1223-08MR	182	CM1631	219	D44VH10	33
CM1224-02SR	180	CM1636	219	D45C12	32
CM1224-04MR	180	CM1641	172	D45H11	33
CM1224-04SO	180	CM1693	219	D45H8	33
CM1225-04DE	181	CM2006-02QR	186	D45VH10	33
CM1230-02CP	183	CM2009-00QR	186	DA121TT1	127

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
DAN222	127	EMC5DXV5T5	56	HN1B01FDW1	45
DAN222M3T5G	127	EMD4DXV6T1	56	HN1B01FDW1T1	51
DAP222	127	EMF18XV6	59	HN2D02FUTW1T1	127
DAP222M3T5G	127	EMF18XV6T5	57	I2T100	94
DF3A6.8FU	160	EMF5XV6	59	I2T30 (E)	94
DTA114EET1	53	EMF5XV6T5	57	I3T25	94
DTA114EM3T5G	53	EMG2DXV5T5	56	I3T50	94
DTA114TET1	53	EMI4182	219	I3T80	94
DTA114TM3T5G	53	EMI4183	219	IMH20TR1	55
DTA114YET1	53	EMI7204MU	219	J112	224
DTA114YM3T5G	53	EMI7206MU	219	J310	224
DTA115EET1	53	EMI7208MU	219	JLC1562B	241
DTA115EM3T5G	53	EMT1DXV6	45	LC03-6R2	171
DTA123EM3T5G	53	EMX1DXV6T1	45	LM201A	17
DTA124EM3T5G	53	EMX2DXV6T1	45	LM211	16
DTA124XM3T5G	53	EMZ1DXV6T1	45	LM224	18
DTA143EE	53	ESD1014	171	LM239	17
DTA143EM3T5G	53	ESD11A3.3DT5G	159	LM2574	100
DTA143TM3T5G	53	ESD11A5.0DT5G	159	LM2575	100
DTA143ZET1	53	ESD11B5.0ST5G	155	LM2576	100
DTA143ZM3T5G	53	ESD11L5.0	166	LM258	18
DTA144EET1	53	ESD11N5.0ST5G	155	LM2594	100
DTA144EM3T5G	53	ESD4238	184	LM2595	101
DTA144TM3	53	ESD5B5.0S	157	LM2596	101
DTA144WM3T5G	53	ESD5Z12	156	LM285	294
DTC114EET1	53	ESD5Z2.5	156	LM2901	17
DTC114EM3T5G	53	ESD5Z3.3	156	LM2902	18
DTC114TET1	53	ESD5Z5.0	156	LM2902V	18
DTC114TM3T5G	53	ESD5Z6.0	156	LM2903	16
DTC114YET1	53	ESD5Z7.0	156	LM2903V	16
DTC114YM3T5G	53	ESD7L5.0	166	LM2904	18
DTC115EET1	53	ESD7M5.0	166	LM2904V	18
DTC115EM3T5G	53	ESD9B3.3	157	LM293	17
DTC123EM3T5G	53	ESD9B5.0	157	LM2931	103
DTC123JET1	53	ESD9C3.3	158	LM301A	17
DTC123JM3T5G	53	ESD9C5.0	158	LM311	16
DTC124EET1	53	ESD9L3.3S	163	LM317	110
DTC124EM3T5G	53	ESD9L5.0S	163	LM317L	103
DTC124XET1	53	ESD9R3.3S	163	LM317M	107
DTC124XM3T5G	53	ESD9X12S	157	LM324	18
DTC143EET1	53	ESD9X3.3S	157	LM324A	18
DTC143EM3T5G	53	ESD9X5.0S	157	LM337	110
DTC143TM3T5G	53	ESDR0502B	167	LM339	17
DTC143ZET1	53	ESDR0502N	168	LM358	18
DTC143ZM3T5G	53	ESDR0524P	170	LM385	294
DTC144EET1	53	ESDR0544M	171	LM385B	294
DTC144EM3T5G	53	FS6128-04	85	LM392	18
DTC144TM3T5G	53	FS6128-07	85	LM393	17
DTC144WM3T5G	53	FS6370	85	LM833	18
EMC2DXV5	56	FS6377	85	LMV301	17
EMC3DXV5T5	56	FS7140	86	LMV321	17
EMC4DXV5T5	56	FS7145	86	LMV324	18

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
LMV331	16	MBD54DWT1	124	MBR30H100CTG	187
LMV339	17	MBD770DWT1	124	MBR30H150CT	193
LMV358	18	MBR0520L	187, 189	MBR30H30CT	187, 193
LMV393	17	MBR0530	189	MBR30H60CT	187, 193
LMV821	17	MBR0540	189	MBR30H80CT	193
LMV824	19	MBR10100	194	MBR30L45CT	187, 193
LMV931	17	MBR1035	194	MBR30L60CT	193
LMV981	17	MBR1045	194	MBR3100	192
LMV982	18	MBR1060	194	MBR340	192
LP2950	103	MBR1080	194	MBR350	192
LP2951	103	MBR1090	194	MBR360	192
M1MA141KT1	126	MBR10H100CT	193	MBR4015CTL	193
M1MA141WAT1	126	MBR10H100CTG	187	MBR4015LWT	195
M1MA142WAT1	126	MBR10L60CT	193	MBR4015WT	187
M1MA142WKT1	126	MBR1100	192	MBR40250	188, 194
M1MA151KT1	126	MBR120ESF	188, 189	MBR40250T	188, 193
M1MA151WAT1	126	MBR120LSF	187, 189	MBR4045PT	195
M1MA151WKT1	126	MBR120VLSF	187, 189	MBR4045WT	195
M1MA152KT1	126	MBR130	189	MBR40H100WT	195
M1MA152WAT1	126	MBR130LSF	187, 189	MBR40H100WTG	187
M1MA152WKT1	126	MBR140SF	189	MBR40L45CT	187, 193
MA3075WAL	159	MBR150	192	MBR40L60CT	193
MAC08B	289	MBR1535CT	193	MBR41H100CT	193
MAC12Hcx	289	MBR1545CT	193	MBR41H100CTG	187
MAC12Sx	289	MBR160	192	MBR6045PT	195
MAC12x	289	MBR16100CT	193	MBR6045WT	195
MAC15-x	289	MBR1635	194	MBR60H100CT	193
MAC15Ax	289	MBR1645	194	MBR60H100CTG	187
MAC15Sx	289	MBR1H100SF	189	MBR60L45CT	187, 193
MAC15x	289	MBR20100CT	193	MBR60L45WT	187, 195
MAC16Cx	289	MBR20200CT	188, 193	MBR7030WT	195
MAC16Hcx	289	MBR2030CTL	187, 193	MBR735	194
MAC16x	289	MBR2045CT	193	MBR745	194
MAC210Ax	289	MBR2060CT	193	MBRA120E	188, 189
MAC212Ax	289	MBR2080CT	193	MBRA130L	189
MAC228Ax	289	MBR2090CT	193	MBRA140	189
MAC4Dcx	289	MBR20H100CT	193	MBRA160	189
MAC4DHM	289	MBR20H100CTG	187	MBRA1H100	189
MAC4DLM	289	MBR20H150CT	187	MBRA210E	188, 189
MAC8Sx	289	MBR20L45CT	187, 193	MBRA210L	187, 189
MAC8x	289	MBR20L60CT	193	MBRA2H100	189
MAC97Ax	289	MBR20L80CT	193	MBRA320	187, 189
MAC997Ax	289	MBR230LSF	189	MBRA340	189
MAC997Bx	289	MBR2515L	187, 194	MBRB1045	191
MAC9x	289	MBR2535CT	187, 193	MBRB1545CT	191
MAX1720	98	MBR2535CTL	187, 193	MBRB1645	191
MAX708	295	MBR2545CT	193	MBRB20100CT	191
MAX803	296	MBR2H100SF	189	MBRB20200CT	188, 191
MAX809	296	MBR3045PT	195	MBRB2060CT	191
MAX810	296	MBR3045ST	187, 193	MBRB20H100CT	187, 191
MBD301	123	MBR3045WT	195	MBRB2515L	187, 191
MBD330DWT1	124	MBR30H100CT	193	MBRB2535CTL	187, 191

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MBRB2545CT	191	MBRM120E	188, 189	MC100E175	73
MBRB3030CT	191	MBRM120L	189	MC100E195	78
MBRB3030CTL	187, 191	MBRM130L	189	MC100E196	78
MBRB3045CT-1	194	MBRM140	189	MC100E210	68
MBRB3045CT-1G	187	MBRM1H100	189	MC100E211	67
MBRB30H30CT-1	194	MBRM2H100	189	MC100E241	73
MBRB30H30CT-1G	187	MBRS1100	190	MC100E310	68
MBRB30H60CT	187, 191	MBRS120	190	MC100E404	74
MBRB30H60CT-1	194	MBRS130	190	MC100E431	72
MBRB30H60CT-1G	187	MBRS130L	187, 190	MC100E445	77
MBRB30H80CT-1	194	MBRS140	190	MC100E446	77
MBRB4030	191	MBRS1540	190	MC100E451	73
MBRB41H100CT	187, 191	MBRS190	190	MC100E452	73
MBRB41H100CT-1	194	MBRS2040L	190	MC100E457	75
MBRB41H100CT-1G	187	MBRS230L	187, 190	MC100EL01	74
MBRB60H100CT	187, 191	MBRS240L	190	MC100EL04	74
MBRB8H100	187, 191	MBRS260	190	MC100EL05	74
MBRD1035CTL	187, 191	MBRS2H100	187, 190	MC100EL07	75
MBRD1045	191	MBRS3100	190	MC100EL11	65
MBRD320	191	MBRS320	190	MC100EL12	68
MBRD330	191	MBRS3200	188, 190	MC100EL13	68
MBRD340	191	MBRS3201	188, 190	MC100EL14	66
MBRD350	191	MBRS330	190	MC100EL15	66
MBRD360	191	MBRS340	190	MC100EL16	69
MBRD5H100	187, 191	MBRS360	190	MC100EL1648	88
MBRD620CT	191	MBRS410E	188, 190	MC100EL17	70
MBRD630CT	191	MBRS410L	187, 190	MC100EL29	72
MBRD640CT	191	MBRS4201	188, 190	MC100EL30	72
MBRD650CT	191	MBRS540	190	MC100EL31	71
MBRD660CT	191	MBT2222ADW1T1	45, 51	MC100EL32	64
MBRD835L	187, 191	MBT35200M	44	MC100EL33	64
MBRF10H150CT	194	MBT3904DW1T1	45, 51	MC100EL34	64
MBRF10L60CT	194	MBT3906DW1T1	45, 51	MC100EL35	73
MBRF20100CT	194	MBT3946DW1T1	45, 51	MC100EL38	64
MBRF20200CT	188, 194	MBT6429DW1T1	45	MC100EL39	64
MBRF2045CT	187, 194	MC100E016	64	MC100EL51	71
MBRF2060CT	194	MC100E101	74	MC100EL52	71
MBRF20H100CT	187, 194	MC100E104	74	MC100EL56	75
MBRF20H150CT	187, 194	MC100E107	75	MC100EL57	76
MBRF20L45CT	187, 194	MC100E111	67	MC100EL58	75
MBRF20L60CT	194	MC100E112	70	MC100EL59	75
MBRF20L80CT	194	MC100E116	71	MC100EL90	79
MBRF2545CT	187, 194	MC100E131	72	MC100EL91	79
MBRF30H100CT	187, 194	MC100E136	64	MC100ELT20	78
MBRF30H150CT	187, 194	MC100E137	64	MC100ELT21	78
MBRF30H60CT	194	MC100E143	73	MC100ELT22	79
MBRF30H60CTG	187	MC100E150	73	MC100ELT23	79
MBRF30L45CT	187, 194	MC100E151	73	MC100ELT24	78
MBRF30L60CT	194	MC100E158	75	MC100ELT25	78
MBRF40250T	188, 194	MC100E163	77	MC100ELT28	79
MBRM110E	188, 189	MC100E164	77	MC100EP01	74
MBRM110L	187, 189	MC100E171	76	MC100EP016A	64

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MC100EP05	74	MC100H646	67	MC10E137	64
MC100EP08	75	MC100H680	70	MC10E141	73
MC100EP101	74	MC100LVE111	67	MC10E142	74
MC100EP105	74	MC100LVE164	77	MC10E150	73
MC100EP11	65	MC100LVE210	68	MC10E151	73
MC100EP116	71	MC100LVE222	68	MC10E154	75
MC100EP131	72	MC100LVE310	68	MC10E155	75
MC100EP139	64	MC100LVEL01	74	MC10E156	77
MC100EP14	67	MC100LVEL05	74	MC10E157	75
MC100EP140	85	MC100LVEL11	65	MC10E158	75
MC100EP142	73	MC100LVEL12	70	MC10E163	77
MC100EP16	69	MC100LVEL13	68	MC10E164	77
MC100EP16F	69	MC100LVEL14	67	MC10E1651	17
MC100EP16T	69	MC100LVEL16	69	MC10E1652	17
MC100EP16VA	69	MC100LVEL17	70	MC10E166	65
MC100EP16VB	70	MC100LVEL29	72	MC10E167	75
MC100EP16VC	70	MC100LVEL30	72	MC10E171	77
MC100EP16VS	69	MC100LVEL31	71	MC10E175	73
MC100EP16VT	69	MC100LVEL32	64	MC10E195	78
MC100EP17	70	MC100LVEL33	64	MC10E196	78
MC100EP195	78	MC100LVEL34	64	MC10E211	67
MC100EP195B	78	MC100LVEL37	64	MC10E404	74
MC100EP196	78	MC100LVEL38	64	MC10E416	71
MC100EP196B	78	MC100LVEL39	64	MC10E431	72
MC100EP210S	68	MC100LVEL40	85	MC10E445	77
MC100EP29	72	MC100LVEL51	71	MC10E446	77
MC100EP31	71	MC100LVEL56	75	MC10E451	73
MC100EP32	64	MC100LVEL58	75	MC10E452	73
MC100EP33	64	MC100LVEL59	75	MC10E457	76
MC100EP35	73	MC100LVEL90	79	MC10EL01	74
MC100EP40	85	MC100LVEL91	79	MC10EL04	74
MC100EP445	77	MC100LVEL92	79	MC10EL05	74
MC100EP446	77	MC100LVELT20	78	MC10EL07	75
MC100EP451	73	MC100LVELT22	79	MC10EL11	65
MC100EP51	71	MC100LVELT23	79	MC10EL12	70
MC100EP52	71	MC100LVEP05	74	MC10EL15	66
MC100EP56	75	MC100LVEP11	65	MC10EL16	69
MC100EP57	76	MC100LVEP111	67	MC10EL31	71
MC100EP58	75	MC100LVEP14	67	MC10EL32	64
MC100EP809	67	MC100LVEP16	69	MC10EL33	64
MC100EP90	79	MC100LVEP210	68	MC10EL34	64
MC100EP91	79	MC100LVEP34	64	MC10EL35	73
MC100EPT20	78	MC10E016	64	MC10EL51	71
MC100EPT21	78	MC10E101	74	MC10EL52	72
MC100EPT22	79	MC10E104	74	MC10EL57	77
MC100EPT23	79	MC10E107	75	MC10EL58	76
MC100EPT24	78	MC10E111	67	MC10EL89	68
MC100EPT25	78	MC10E112	71	MC10ELT20	78
MC100EPT26	78	MC10E116	71	MC10ELT21	78
MC100EPT622	79	MC10E122	71	MC10ELT22	79
MC100H642	68	MC10E131	72	MC10ELT24	79
MC100H643	67	MC10E136	64	MC10ELT25	79

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MC10ELT28	79	MC10H180	64	MC14051B	25
MC10EP01	74	MC10H350	79	MC14052B	25
MC10EP016	64	MC10H351	79	MC14053B	26
MC10EP05	74	MC10H424	79	MC14060B	254
MC10EP08	75	MC10H600	79	MC14066B	26
MC10EP101	75	MC10H601	79	MC14067B	25
MC10EP105	74	MC10H602	79	MC14069UB	269
MC10EP11	65	MC10H604	79	MC14070B	269
MC10EP116	71	MC10H640	68	MC14071B	267
MC10EP131	72	MC10H641	67	MC14073B	264
MC10EP139	64	MC10H643	67	MC14076B	262
MC10EP142	74	MC10H645	67	MC14077B	269
MC10EP16	69	MC10H646	67	MC14081B	263
MC10EP16T	69	MC10LVEP11	65	MC14082B	263
MC10EP16VA	69	MC10LVEP16	69	MC14093B	266
MC10EP17	70	MC10SX1130	68	MC14094B	263
MC10EP195	78	MC10SX1189	68	MC14099B	261
MC10EP29	72	MC10SX1190	68	MC14106B	270
MC10EP31	72	MC12026A	65	MC1413	207
MC10EP32	64	MC12080	65	MC14174B	260
MC10EP33	64	MC12093	65	MC14175B	261
MC10EP35	73	MC12095	65	MC14490	254
MC10EP445	77	MC14001B	267	MC14503B	258
MC10EP446	77	MC14001UB	267	MC14504B	274
MC10EP451	73	MC14007UB	255	MC14511B	255
MC10EP51	72	MC14008B	254	MC14512B	271
MC10EP52	72	MC14011B	265	MC14513B	255
MC10EP56	76	MC14011UB	266	MC14514B	271
MC10EP57	77	MC14012B	265	MC14515B	271
MC10EP58	76	MC14013B	260	MC14516B	254
MC10EP89	68	MC14014B	263	MC14517B	263
MC10EP90	79	MC14015B	263	MC14518B	254
MC10EPT20	79	MC14016B	26	MC14520B	254
MC10H016	64	MC14017B	254	MC14521B	255
MC10H101	75	MC14018B	254	MC14526B	254
MC10H102	74	MC14020B	254	MC14528B	273
MC10H103	74	MC14021B	263	MC14532B	271
MC10H104	74	MC14022B	254	MC14536B	255
MC10H105	75	MC14023B	266	MC14538B	273
MC10H107	75	MC14024B	254	MC14541B	255
MC10H115	70	MC14025B	267	MC14543B	255
MC10H116	70	MC14027B	261	MC14549B	263
MC10H123	70	MC14028B	271	MC1455	255
MC10H124	79	MC14029B	254	MC14551B	26
MC10H125	79	MC14040B	254	MC14553B	254
MC10H131	72	MC14042B	262	MC14555B	272
MC10H135	73	MC14043B	262	MC14556B	272
MC10H136	64	MC14044B	262	MC14557B	262
MC10H141	73	MC14046B	88	MC1455B	255
MC10H158	76	MC14049B	258	MC14569B	255
MC10H164	77	MC14049UB	258	MC14572UB	269
MC10H176	72	MC14050B	258	MC14584B	270

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MC14585B	255	MC34064	296	MC74ACT10	267
MC14598B	262	MC34071	17	MC74ACT11	264
MC1496B	241	MC34071A	17	MC74ACT125	257
MC3302	17	MC34072	18	MC74ACT132	266
MC33025	9	MC34072A	18	MC74ACT138	271
MC3303	19	MC34074	19	MC74ACT139	271
MC33033	209	MC34074A	19	MC74ACT14	270
MC33035	209	MC34164	296	MC74ACT153	272
MC33039	209	MC34167	101	MC74ACT157	272
MC33060A	8	MC34262	10	MC74ACT161	255
MC33063A	102	MC34268	108	MC74ACT163	255
MC33064	296	MC44603A	8	MC74ACT20	265
MC33067	8	MC74AC00	266	MC74ACT240	259
MC33071	17	MC74AC02	267	MC74ACT241	259
MC33072	18	MC74AC04	269	MC74ACT244	259
MC33074	19	MC74AC05	258	MC74ACT245	274
MC33077	18	MC74AC08	263	MC74ACT253	272
MC33078	18	MC74AC10	266	MC74ACT257	273
MC33079	19	MC74AC11	264	MC74ACT259	261
MC33151	208	MC74AC125	257	MC74ACT273	260
MC33152	208	MC74AC132	266	MC74ACT32	267
MC33153	208	MC74AC138	271	MC74ACT373	262
MC33160	103	MC74AC139	271	MC74ACT374	261
MC33161	296	MC74AC14	270	MC74ACT377	261
MC33163	102	MC74AC157	272	MC74ACT540	259
MC33164	296	MC74AC161	255	MC74ACT541	259
MC33166	102	MC74AC163	255	MC74ACT564	262
MC33167	101	MC74AC20	265	MC74ACT573	262
MC33171	17	MC74AC240	259	MC74ACT574	261
MC33172	18	MC74AC244	259	MC74ACT640	273
MC33174	19	MC74AC245	273	MC74ACT646	274
MC33178	18	MC74AC253	272	MC74ACT652	274
MC33179	19	MC74AC257	272	MC74ACT74	260
MC33201	17	MC74AC259	261	MC74ACT86	269
MC33202	18	MC74AC273	260	MC74HC00A	266
MC33204	19	MC74AC32	267	MC74HC02A	267
MC33260	10	MC74AC373	262	MC74HC03A	266
MC33262	10	MC74AC374	260	MC74HC04A	270
MC33269	108	MC74AC377	261	MC74HC05A	258
MC33272A	18	MC74AC4040	254	MC74HC08A	263
MC33274A	19	MC74AC540	259	MC74HC10A	264
MC33275	106	MC74AC573	262	MC74HC112A	261
MC33363A	11	MC74AC574	261	MC74HC11A	264
MC33363B	11	MC74AC646	274	MC74HC125A	258
MC33364	8	MC74AC652	274	MC74HC126A	258
MC33368	10	MC74AC74	260	MC74HC132A	266
MC33375	106	MC74AC86	269	MC74HC138A	271
MC33761	103	MC74ACT00	266	MC74HC139A	271
MC33762	110	MC74ACT02	267	MC74HC14A	270
MC3403	19	MC74ACT04	270	MC74HC151A	273
MC34060A	9	MC74ACT05	258	MC74HC153A	273
MC34063A	102	MC74ACT08	263	MC74HC157A	272



# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MC74HC160A	255, 270	MC74HC73A	261	MC74LCX374	260
MC74HC161A	254	MC74HC74A	260	MC74LCX540	258
MC74HC163A	254	MC74HC86A	269	MC74LCX541	258
MC74HC164A	263	MC74HCT04A	270	MC74LCX573	262
MC74HC165A	263	MC74HCT08A	264	MC74LCX574	260
MC74HC174A	260	MC74HCT125A	258	MC74LCX74	260
MC74HC175A	261	MC74HCT132A	264	MC74LCX86	269
MC74HC1G00	266	MC74HCT138A	271	MC74LCXU04	270
MC74HC1G02	267	MC74HCT14A	270	MC74LVX00	266
MC74HC1G04	265	MC74HCT241A	259	MC74LVX02	267
MC74HC1G08	264	MC74HCT244A	259	MC74LVX04	270
MC74HC1G14	265	MC74HCT245A	273	MC74LVX08	263
MC74HC1G32	268	MC74HCT259A	269	MC74LVX125	258
MC74HC1GU04	265	MC74HCT273A	260	MC74LVX132	266
MC74HC20A	269	MC74HCT32A	268	MC74LVX138	271
MC74HC238A	271	MC74HCT366A	260, 269	MC74LVX139	272
MC74HC240A	259	MC74HCT373A	262	MC74LVX14	270
MC74HC244A	259	MC74HCT374A	260	MC74LVX157	272
MC74HC245A	273	MC74HCT4051A	272	MC74LVX240	259
MC74HC251A	273	MC74HCT4066A	270, 273	MC74LVX244	259
MC74HC259A	261	MC74HCT4851A	272	MC74LVX245	274
MC74HC273A	260	MC74HCT4852A	273	MC74LVX257	257
MC74HC30A	264	MC74HCT541A	259	MC74LVX259	261
MC74HC32A	267	MC74HCT573A	262	MC74LVX32	267
MC74HC365A	258	MC74HCT574A	260	MC74LVX373	262
MC74HC367A	260	MC74HCT74A	260	MC74LVX374	261
MC74HC373A	262	MC74HCT86A	268	MC74LVX4051	271
MC74HC374A	260	MC74HCU04A	270	MC74LVX4052	271
MC74HC377A	261	MC74LCX00	265	MC74LVX4053	272
MC74HC390A	254	MC74LCX02	267	MC74LVX4066	26
MC74HC393A	254	MC74LCX04	270	MC74LVX4245	274, 275
MC74HC4020A	254	MC74LCX06	258	MC74LVX50	258
MC74HC4040A	254	MC74LCX07	258	MC74LVX541	259
MC74HC4046A	88	MC74LCX08	263	MC74LVX573	262
MC74HC4051A	25	MC74LCX125	257	MC74LVX574	261
MC74HC4052A	25	MC74LCX138	271	MC74LVX74	260
MC74HC4053A	26	MC74LCX139	272	MC74LVX8051	25
MC74HC4060A	254	MC74LCX14	270	MC74LVX8053	26
MC74HC4066A	26	MC74LCX157	272	MC74LVX86	269
MC74HC4067A	273	MC74LCX158	272	MC74LVXC3245	274
MC74HC4094A	263	MC74LCX1624	255	MC74LVXT4051	271
MC74HC4316A	26	MC74LCX16240	259	MC74LVXT4052	271
MC74HC4538A	273	MC74LCX16245	274	MC74LVXT4053	272
MC74HC4851A	25	MC74LCX16373	262	MC74LVXT4066	26
MC74HC4852A	26	MC74LCX16374	260	MC74LVXT8051	25
MC74HC540A	258	MC74LCX240	258	MC74LVXT8053	26
MC74HC541A	259	MC74LCX244	258	MC74LVXU04	270
MC74HC573A	262	MC74LCX245	273	MC74VHC00	266
MC74HC574A	260	MC74LCX257	272	MC74VHC02	267
MC74HC589A	263	MC74LCX258	272	MC74VHC04	270
MC74HC595A	263	MC74LCX32	267	MC74VHC08	263
MC74HC597A	263	MC74LCX373	262	MC74VHC125	258

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MC74VHC126	258	MC74VHC573	262	MC78L12A	104
MC74VHC132	266	MC74VHC574	261	MC78L15A	104
MC74VHC138	271	MC74VHC595	263	MC78L18A	104
MC74VHC139	272	MC74VHC74	260	MC78L24A	104
MC74VHC14	270	MC74VHC86	269	MC78LC	103
MC74VHC157	272	MC74VHCT00A	266	MC78M05	107
MC74VHC1G00	266	MC74VHCT02A	267	MC78M05A	107
MC74VHC1G01	266	MC74VHCT04A	270	MC78M06	107
MC74VHC1G02	267	MC74VHCT08A	264	MC78M08	107
MC74VHC1G03	267	MC74VHCT125A	258	MC78M09	107
MC74VHC1G04	265	MC74VHCT126A	258	MC78M12	107
MC74VHC1G05	256	MC74VHCT132A	266	MC78M12A	108
MC74VHC1G07	256	MC74VHCT138A	271	MC78M15	108
MC74VHC1G08	264	MC74VHCT139A	272	MC78M15A	108
MC74VHC1G09	264	MC74VHCT14A	270	MC78M18	108
MC74VHC1G125	256	MC74VHCT157A	272	MC78M20	108
MC74VHC1G126	256	MC74VHCT240A	259	MC78M24	108
MC74VHC1G132	266	MC74VHCT244A	259	MC78PC18	105
MC74VHC1G135	266	MC74VHCT245A	274	MC78PC25	105
MC74VHC1G14	265	MC74VHCT257A	257	MC78PC28	105
MC74VHC1G32	268	MC74VHCT259A	262	MC78PC30	105
MC74VHC1G50	256	MC74VHCT32A	267	MC78PC33	105
MC74VHC1G66	25	MC74VHCT373A	262	MC78PC50	105
MC74VHC1G86	269	MC74VHCT50A	258	MC7905	109
MC74VHC1GT00	266	MC74VHCT541A	258	MC7905.2	109
MC74VHC1GT02	267	MC74VHCT573A	262	MC7905A	109
MC74VHC1GT04	264	MC74VHCT574A	261	MC7906	109
MC74VHC1GT08	264	MC74VHCT74A	260	MC7908	109
MC74VHC1GT125	256	MC74VHCT86A	269	MC7908A	109
MC74VHC1GT126	256	MC74VHCU04	270	MC7912	109
MC74VHC1GT14	265	MC7805	108	MC7915	109
MC74VHC1GT32	268	MC7806	108	MC7918	109
MC74VHC1GT50	256	MC7806A	108	MC7924	109
MC74VHC1GT66	25	MC7808	109	MC79L05	104
MC74VHC1GT86	269	MC7808A	109	MC79L12	104
MC74VHC1GU04	265	MC7809	109	MC79L15	104
MC74VHC240	259	MC7809A	109	MC79L18	104
MC74VHC244	259	MC7812	109	MC79L24	104
MC74VHC245	274	MC7812A	109	MC79M05	108
MC74VHC257	257	MC7815	109	MC79M08	108
MC74VHC259	261	MC7815A	109	MC79M12	108
MC74VHC32	267	MC7818	109	MC79M15	108
MC74VHC373	262	MC7818A	109	MCH12140	85
MC74VHC374	261	MC7824	109	MCK12140	85
MC74VHC4051	25	MC7824A	109	MCR08x	286
MC74VHC4052	271	MC78FC30	104	MCR100-x	286
MC74VHC4053	271	MC78FC33	104	MCR106-x	286
MC74VHC4066	26	MC78FC40	104	MCR12Dcx	286
MC74VHC4316	273	MC78FC50	105	MCR12Dsx	286
MC74VHC50	258	MC78L05A	104	MCR12Lx	286
MC74VHC540	259	MC78L08A	104	MCR12x	286
MC74VHC541	259	MC78L09A	104	MCR16N	286

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MCR218-x	286	MJD210T4	31	MJE371	32
MCR22-x	286	MJD243T4	31	MJE4343	34
MCR25x	286	MJD253T4	31	MJE5730	32
MCR310-010	286	MJD2955T4	31	MJE5731	32
MCR68-2	286	MJD3055T4	31	MJE5731A	32
MCR69-x	286	MJD31CT4	31	MJE5742	36
MCR70xA	286	MJD31T4	31	MJE5850	33
MCR71x	286	MJD32CT4	31	MJE5851	33
MCR72-x	286	MJD32T4	31	MJE5852	33
MCR8Dcx	287	MJD340T4	31	MJE700	36
MCR8Dsx	287	MJD350T4	31	MJE702	36
MCR8N	287	MJD41CT4	31	MJE703	36
MCR8Sx	287	MJD42CT4	31	MJE800	36
MDC3105	207	MJD44E3T4	36	MJE802	36
MGSF1N02L	226	MJD44H11T4	31	MJE803	36
MGSF1N03L	227	MJD45H11T4	31	MJF122	37
MGSF2N02EL	226	MJD47T4	31	MJF127	37
MJ11012	37	MJD50T4	31	MJF15030	34
MJ11015	37	MJD5731T4	31	MJF15031	34
MJ11016	37	MJD6039T4	36	MJF18004	34, 39
MJ11021	37	MJE13005	32	MJF18008	34, 39
MJ11022	37	MJE13007	33	MJF2955	34
MJ11028	37	MJE13009	33	MJF3055	34
MJ11032	37	MJE15028	33	MJF31C	34
MJ11033	37	MJE15029	33	MJF32C	34
MJ14002	35	MJE15030	33, 38	MJF44H11	34
MJ15001	34	MJE15031	33, 38	MJF45H11	34
MJ15003	35, 38	MJE15032	33, 38	MJF47	34
MJ15004	35, 38	MJE15033	33, 38	MJF6388	37
MJ15015	34, 38	MJE15034	32, 38	MJH11017	37
MJ15016	34, 38	MJE15035	32, 38	MJH11019	37
MJ15022	35	MJE170	31	MJH11020	37
MJ15023	35	MJE171	31	MJH11021	37
MJ15024	35, 39	MJE172	31	MJH11022	37
MJ15025	35, 39	MJE180	31	MJH6284	37
MJ21193	35, 39	MJE18002	32, 39	MJH6287	37
MJ21194	35, 39	MJE18004	32, 39	MJL1302A	34, 38
MJ21195	35	MJE18008	33, 39	MJL21193	34, 38
MJ21196	35	MJE181	31	MJL21194	34, 38
MJ2955	34	MJE182	31	MJL21195	34, 38
MJ4502	35	MJE200	32	MJL21196	34, 38
MJ802	35	MJE210	32	MJL3281A	34, 38
MJB41CT4	31	MJE243	32	MJL4281A	34, 39
MJB42CT4	31	MJE253	32	MJL4302A	34, 39
MJB44H11T4	31	MJE270	36	MJW0281A	38
MJB45H11T4	31	MJE271	36	MJW0302A	38
MJD112T4	36	MJE2955T	33	MJW1302A	34, 39
MJD117T4	36	MJE3055T	33	MJW18020	34
MJD122T4	36	MJE340	31	MJW21193	34, 38
MJD127T4	36	MJE3439	31	MJW21194	34, 38
MJD148T4	31	MJE344	31	MJW21195	34, 38
MJD200T4	31	MJE350	31	MJW21196	34, 38

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MJW3281A	34, 39	MM3Z9V1	130	MMBD770T1	124
MKP1Vx	286	MM3Z9V1S	130	MMBD914LT1	126
MKP3Vx	286	MM5Z10V	130	MMBF0201NL	226
MKP9V160	286	MM5Z12V	130	MMBF170L	230
MLD1N06CL	236	MM5Z15V	130	MMBF2201N	226
MLD2N06CL	236	MM5Z16V	130	MMBF4391L	224
MM3Z10V	130	MM5Z18V	130	MMBF4392L	224
MM3Z10VS	130	MM5Z20V	130	MMBF4393L	224
MM3Z11V	130	MM5Z24V	130	MMBFJ175L	224
MM3Z12V	130	MM5Z27V	130	MMBFJ177L	224
MM3Z12VS	130	MM5Z2V4	130	MMBFJ309L	224
MM3Z13V	130	MM5Z2V4S	130	MMBFJ310L	224
MM3Z15V	130	MM5Z2V7	130	MMBFU310L	224
MM3Z15V5	130	MM5Z30V	130	MMBT2131	44
MM3Z16V	130	MM5Z36V	130	MMBT2222ALT1	41, 48, 50
MM3Z16VS	130	MM5Z3V0	130	MMBT2222AM3	43
MM3Z18V	130	MM5Z3V3	130	MMBT2222ATT1	43, 48, 51
MM3Z18VS	130	MM5Z3V6	130	MMBT2222AWT1	43, 48, 51
MM3Z20V	130	MM5Z4V7	130	MMBT2222LT1	42, 48
MM3Z22V	130	MM5Z4V7S	130	MMBT2369ALT1	50
MM3Z22VS	130	MM5Z5V1	130	MMBT2369LT1	50
MM3Z24V	130	MM5Z5V1S	130	MMBT2484LT1	41, 46
MM3Z27V	130	MM5Z5V6	130	MMBT2907ALT1	41, 48, 50
MM3Z27VS	130	MM5Z5V6S	130	MMBT2907AM3T5G	43
MM3Z2V4	130	MM5Z6V2	130	MMBT2907AWT1	43, 48, 51
MM3Z2V7	130	MM5Z6V2S	130	MMBT3416L	42
MM3Z33VS	130	MM5Z6V8	130	MMBT3904LT1	41, 50
MM3Z36V	130	MM5Z6V8S	130	MMBT3904TT1	43, 51
MM3Z39V	130	MM5Z7V5	130	MMBT3904WT1	43, 51
MM3Z3V0	130	MM5Z8V2	130	MMBT3906LT1	42, 50
MM3Z3V3	130	MM5Z8V2S	130	MMBT3906TT1	43, 51
MM3Z3V3S	130	MM5Z9V1	130	MMBT3906WT1	43, 51
MM3Z3V6	130	MM5Z9V1S	130	MMBT4124LT1	42
MM3Z3V9	130	MMBD101LT1	123	MMBT4126LT1	42
MM3Z3V9S	130	MMBD2835LT1	126	MMBT4401LT1	42, 48, 50
MM3Z43V	130	MMBD2836LT1	126	MMBT4401M3	43
MM3Z4V3	130	MMBD2837LT1	126	MMBT4401WT1	43, 51
MM3Z4V3S	130	MMBD2838LT1	126	MMBT4403LT1	42, 48, 50
MM3Z4V7	130	MMBD301LT1	123	MMBT4403M3	43
MM3Z4V7S	130	MMBD301M3	125	MMBT4403WT1	43, 51
MM3Z5V1	130	MMBD330T1	124	MMBT489L	42
MM3Z5V1S	130	MMBD352LT1	123	MMBT5087LT1	41, 46
MM3Z5V6	130	MMBD352WT1	124	MMBT5088LT1	42, 46
MM3Z5V6S	130	MMBD353LT1	123	MMBT5089LT1	42, 46
MM3Z6V2	130	MMBD354LT1	123	MMBT5401LT1	49
MM3Z6V2S	130	MMBD355LT1	123	MMBT5550L	41
MM3Z6V8	130	MMBD452LT1	123	MMBT5550LT1	48, 49
MM3Z6V8S	130	MMBD6050LT1	126	MMBT5551LT1	49
MM3Z7V5	130	MMBD6100LT1	126	MMBT5551M3	43
MM3Z7V5S	130	MMBD7000LT1	126	MMBT589L	42
MM3Z8V2	130	MMBD701LT1	123	MMBT6427LT1	46
MM3Z8V2S	130	MMBD717LT1	124	MMBT6428LT1	41, 46

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MMBT6429LT1	41, 46	MMBZ5234EL	131	MMDL770T1	123
MMBT6517LT1	49	MMBZ5235BL	131	MMDL914T1	127
MMBT6520LT1	49	MMBZ5236BL	131	MMFT960	230
MMBT6521L	42	MMBZ5237BL	131	MMJT350T1	31
MMBT8099LT1	41, 48	MMBZ5237EL	131	MMQ33VT1	172
MMBT918LT1	50	MMBZ5238BL	131	MMQ33VT3	172
MMBTA05LT1	41, 48	MMBZ5239BL	131	MMQA12VT1	172
MMBTA06LT1	41, 48	MMBZ5239EL	131	MMQA12VT3	172
MMBTA06WT1	43	MMBZ5240BL	131	MMQA13VT1	172
MMBTA13LT1	46	MMBZ5240EL	131	MMQA13VT3	172
MMBTA14LT1	46	MMBZ5241BL	131	MMQA15VT1	172
MMBTA42LT1	49	MMBZ5242BL	131	MMQA15VT3	172
MMBTA55LT1	41, 48	MMBZ5242EL	131	MMQA18VT1	172
MMBTA56LT1	41, 48	MMBZ5243BL	131	MMQA18VT3	172
MMBTA56WT1	43	MMBZ5243EL	131	MMQA20VT1	172
MMBTA63LT1	46	MMBZ5244BL	131	MMQA20VT3	172
MMBTA64LT1	46	MMBZ5245BL	131	MMQA21VT1	172
MMBTA70LT1	42	MMBZ5245EL	131	MMQA21VT3	172
MMBTA92LT1	49	MMBZ5246BL	131	MMQA22VT1	172
MMBTH10-4L	50	MMBZ5246EL	131	MMQA22VT3	172
MMBTH10LT1	50	MMBZ5247BL	131	MMQA24VT1	172
MMBTH10M3	50	MMBZ5248BL	131	MMQA24VT3	172
MMBV105GLT1	122	MMBZ5248EL	131	MMQA27VT1	172
MMBV2105LT1	122	MMBZ5249BL	131	MMQA27VT3	172
MMBV3102LT1	122	MMBZ5250BL	131	MMQA5V6T1	172
MMBV3401LT1	125	MMBZ5251BL	131	MMQA5V6T3	172
MMBV3700LT1	125	MMBZ5252BL	131	MMQA6V2T1	172
MMBV609LT1	122	MMBZ5252EL	131	MMQA6V2T3	172
MMBZ12VAL	137	MMBZ5253BL	131	MMQA6V8T1	172
MMBZ15VAL	137	MMBZ5253EL	131	MMQA6V8T3	172
MMBZ15VDL	136	MMBZ5254BL	131	MMSD103T1	126
MMBZ18VAL	137	MMBZ5255BL	131	MMSD301T1	123
MMBZ20VAL	137	MMBZ5256BL	131	MMSD4148T1	126
MMBZ27VAL	137	MMBZ5257BL	131	MMSD701T1	123
MMBZ27VAW	138	MMBZ5257EL	131	MMSD914T1	126
MMBZ27VCL	136, 138	MMBZ5258BL	131	MMSF3P02HD	234
MMBZ33VAL	137	MMBZ5259BL	131	MMSZ10	133
MMBZ5221BL	131	MMBZ5260BL	132	MMSZ11	133
MMBZ5222BL	131	MMBZ5261BL	132	MMSZ12	133
MMBZ5223BL	131	MMBZ5261EL	132	MMSZ13	133
MMBZ5225BL	131	MMBZ5263BL	132	MMSZ15	133
MMBZ5226BL	131	MMBZ5264BL	132	MMSZ16	133
MMBZ5227BL	131	MMBZ5268BL	132	MMSZ18	133
MMBZ5228BL	131	MMBZ5270BL	132	MMSZ20	133
MMBZ5229BL	131	MMBZ5V6AL	137	MMSZ22	133
MMBZ5230BL	131	MMBZ6V2AL	137	MMSZ24	133
MMBZ5231BL	131	MMBZ6V8AL	137	MMSZ27	134
MMBZ5231EL	131	MMBZ9V1AL	137	MMSZ2V4	133
MMBZ5232BL	131	MMDF1N05E	225	MMSZ2V7	133
MMBZ5232EL	131	MMDL101T1	123	MMSZ30	134
MMBZ5233BL	131	MMDL301T1	123	MMSZ33	134
MMBZ5234BL	131	MMDL6050T1	127	MMSZ36	134

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MMSZ39	134	MMSZ5225B	133	MMSZ5261B	134
MMSZ3V0	133	MMSZ5226B	133	MMSZ5262B	134
MMSZ3V3	133	MMSZ5226E	133	MMSZ5263B	134
MMSZ3V6	133	MMSZ5227B	133	MMSZ5264B	134
MMSZ3V9	133	MMSZ5228B	133	MMSZ5265B	134
MMSZ43	134	MMSZ5229B	133	MMSZ5266B	134
MMSZ4678	133	MMSZ5230B	133	MMSZ5267B	134
MMSZ4679	133	MMSZ5231B	133	MMSZ5268B	134
MMSZ4680	133	MMSZ5232B	133	MMSZ5270B	134
MMSZ4681	133	MMSZ5233B	133	MMSZ5272B	134
MMSZ4682	133	MMSZ5234B	133	MMSZ56	134
MMSZ4683	133	MMSZ5235B	133	MMSZ5V1	133
MMSZ4684	133	MMSZ5235E	133	MMSZ5V6	133
MMSZ4685	133	MMSZ5236B	133	MMSZ6V2	133
MMSZ4686	133	MMSZ5237B	133	MMSZ6V8	133
MMSZ4687	133	MMSZ5237E	133	MMSZ7V5	133
MMSZ4688	133	MMSZ5238B	133	MMSZ8V2	133
MMSZ4689	133	MMSZ5239B	133	MMSZ9V1	133
MMSZ4690	133	MMSZ5240B	133	MMT05A230	287
MMSZ4691	133	MMSZ5240E	133	MMT05A260	287
MMSZ4692	133	MMSZ5241B	133	MMT05A310	287
MMSZ4693	133	MMSZ5242B	133	MMT05B230	287
MMSZ4694	133	MMSZ5242E	133	MMT05B260	287
MMSZ4696	133	MMSZ5243B	133	MMT05B310	287
MMSZ4697	133	MMSZ5244B	133	MMT05B350	287
MMSZ4698	133	MMSZ5244E	133	MMT08B064T3	287
MMSZ4699	133	MMSZ5245B	133	MMT08B260	287
MMSZ47	134	MMSZ5245E	133	MMT08B310T3	287
MMSZ4700	133	MMSZ5246B	133	MMT08B350	287
MMSZ4701	133	MMSZ5246E	133	MMT10B230	287
MMSZ4702	133	MMSZ5247B	133	MMT10B260	287
MMSZ4703	133	MMSZ5248B	133	MMT10B310	287
MMSZ4704	133	MMSZ5248E	133	MMT10B350	287
MMSZ4705	133	MMSZ5249B	133	MMUN2111LT1	52
MMSZ4706	133	MMSZ5250B	133	MMUN2112LT1	52
MMSZ4707	133	MMSZ5250E	133	MMUN2113LT1	52
MMSZ4708	133	MMSZ5251B	133	MMUN2114LT1	52
MMSZ4709	133	MMSZ5251E	133	MMUN2115LT1	52
MMSZ4710	133	MMSZ5252B	133	MMUN2116LT1	52
MMSZ4711	134	MMSZ5252E	133	MMUN2132LT1	52
MMSZ4713	134	MMSZ5253B	133	MMUN2133LT1	52
MMSZ4714	134	MMSZ5254B	134	MMUN2134L	52
MMSZ4715	134	MMSZ5254E	134	MMUN2211LT1	52
MMSZ4717	134	MMSZ5255B	134	MMUN2212LT1	52
MMSZ4V3	133	MMSZ5256B	134	MMUN2213LT1	52
MMSZ4V7	133	MMSZ5256E	134	MMUN2214LT1	52
MMSZ51	134	MMSZ5257B	134	MMUN2215LT1	52
MMSZ5221B	133	MMSZ5257E	134	MMUN2216LT1	52
MMSZ5221E	133	MMSZ5258B	134	MMUN2231LT1	52
MMSZ5222B	133	MMSZ5259B	134	MMUN2232LT1	52
MMSZ5223B	133	MMSZ5259E	134	MMUN2233LT1	52
MMSZ5223E	133	MMSZ5260B	134	MMUN2234LT1	52

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MMUN2238LT1	52	MSA1162YT1	42	MUN5115DW1T1	54
MMVL3401T1	125	MSB1218A-RT1	43	MUN5116DW1T1	54
MPF4393	224	MSB709-RT1	42	MUN5131T1	52
MPS2222	40, 47	MSB92ASW	48, 49	MUN5132T1	52
MPS2222A	40, 47, 50	MSB92AWT1	49	MUN5133DW1T1	54
MPS2907A	40, 47, 50	MSB92WT1	49	MUN5133T1	52
MPS4124	40	MSC2712GT1	42	MUN5135DW1T1	54
MPS4250	40	MSD1328-RT1	42	MUN5135T1	52
MPS5172	40	MSD1819A-RT1	43	MUN5211DW1T1	54
MPS650	47	MSD42SW	49	MUN5211T1	52
MPS651	40, 47	MSD42WT1	49	MUN5212DW1T1	54
MPS6652	40, 47	MSD601-RT1	42	MUN5212T1	52
MPS6726	40, 47	MSD602-RT1	42	MUN5213DW1T1	54
MPS750	40, 47	MSR1560	188, 195	MUN5213T1	52
MPS751	40, 47	MSR860	188, 195	MUN5214DW1T1	54
MPS8099	40, 47	MSRD620CT	188, 195	MUN5214T1	52
MPSA05	40, 47	MSRD620CTR	195	MUN5215DW1T1	54
MPSA06	40, 47	MSRF1560	188, 195	MUN5215T1	52
MPSA13	46	MSRF860	188, 195	MUN5216DW1T1	54
MPSA14	46	MTB2P50E	235	MUN5230DW1T1	54
MPSA18	46	MTB30P06V	235	MUN5230T1	52
MPSA27	46	MTB50P03HDL	235	MUN5232DW1T1	54
MPSA29	46	MTD5P06V	235	MUN5232T1	52
MPSA42	49	MTD6N15	232	MUN5233DW1T1	54
MPSA44	49	MTD6N20E	232	MUN5233T1	52
MPSA55	40, 47	MTP20N15E	232	MUN5235DW1T1	54
MPSA56	40, 47	MTP2P50E	235	MUN5235T1	52
MPSA92	49	MTP50P03HDL	235	MUN5237DW1	54
MPSH10	50	MTW32N20E	232	MUN5311DW1T1	55
MPSW01	40, 47	MUN2111T1	52	MUN5312DW1T1	55
MPSW01A	40, 47	MUN2112T1	52	MUN5313DW1T1	55
MPSW05	40, 47	MUN2113T1	52	MUN5314DW1T1	55
MPSW06	40, 47	MUN2114T1	52	MUN5315DW1T1	55
MPSW42	49	MUN2211T1	52	MUN5316DW1T1	55
MPSW45	46	MUN2212T1	52	MUN5330DW1T1	55
MPSW45A	46	MUN2213T1	52	MUN5332DW1	55
MPSW51	40, 47	MUN2214T1	52	MUN5333DW1T1	55
MPSW51A	40, 47	MUN2215T1	52	MUN5334DW1	55
MPSW55	40	MUN2216T1	52	MUN5335DW1T1	55
MPSW56	40, 47	MUN2230T1	52	MUR105	197
MPSW92	49	MUN2232T1	52	MUR110	197
MR851	199	MUN2233T1	52	MUR1100E	188, 197
MR852	199	MUN2234T1	52	MUR115	197
MR854	199	MUN2237T1	52	MUR120	197
MR856	199	MUN2240T1	52	MUR130	197
MRA4003	199	MUN5111DW1T1	54	MUR140	197
MRA4004	199	MUN5111T1	52	MUR1510	198
MRA4005	199	MUN5112T1	52	MUR1515	198
MRA4006	199	MUN5113DW1T1	54	MUR1520	198
MRA4007	199	MUN5113T1	52	MUR1540	198
MRS1504	199	MUN5114DW1T1	54	MUR1560	198
MSA1162GT1	42	MUN5114T1	52	MUR160	197

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MUR1610CT	198	MURB1620CTR	196	NB2779A	86
MUR1615CT	198	MURB1660CT	196	NB3H83905C	68
MUR1620CT	198	MURD320	196	NB3L553	66
MUR1620CTR	198	MURD330	196	NB3N2304NZ	66
MUR1640CT	198	MURD550PF	196	NB3N3002	86
MUR1660CT	198	MURD620CT	196	NB3N3011	86
MUR180E	188, 197	MURF1560	198	NB3N3020	86
MUR2020R	198	MURF1620CT	198	NB3N502	86
MUR210	197	MURF1660CT	198	NB3N508S	86
MUR2100E	197	MURF550PF	198	NB3N551	66
MUR220	197	MURF860	198	NB3N5573	86
MUR240	197	MURH840CT	188, 198	NB4L16M	69
MUR260	197	MURH860CT	188, 198	NB4L339	65
MUR3020PT	198	MURHB840CT	188, 196	NB4L52	72
MUR3020WT	198	MURHB860CT	188, 196	NB4L6254	76
MUR3040PT	198	MURHD560	188, 196	NB4L7210	76
MUR3060PT	198	MURHF860CT	188, 198	NB4L858M	76
MUR3060WT	198	MURHS160	196	NB4N111K	67
MUR405	197	MURS105	196	NB4N1158	70, 76
MUR410	197	MURS110	196	NB4N11M	65
MUR4100E	188, 197	MURS115	196	NB4N121K	67
MUR415	197	MURS120	196	NB4N316M	69
MUR420	197	MURS140	196	NB4N441	86
MUR440	197	MURS160	196	NB4N507A	86
MUR460	197	MURS205	196	NB4N527S	70
MUR480E	188, 197	MURS210	196	NB4N7132	76
MUR550APF	197	MURS220	196	NB4N840M	76
MUR550PF	198	MURS230	196	NB4N855S	70
MUR620CT	198	MURS240	196	NB6HQ14M	66
MUR805	198	MURS260	196	NB6L11	65
MUR810	198	MURS320	196	NB6L11M	66
MUR8100E	188, 198	MURS340	196	NB6L11S	66
MUR815	198	MURS360	196	NB6L14	66
MUR820	198	MURS360B	196	NB6L14M	66
MUR840	198	MURS480E	188, 196	NB6L14S	66
MUR860	198	MV2105	122	NB6L16	69
MUR880E	188, 198	N25S818HA	249	NB6L239	65
MURA105	196	N25S830HA	249	NB6L295	78
MURA110	196	N64S818HA	249	NB6L295M	78
MURA115	196	N64S830HA	249	NB6L572M	77
MURA120	196	NB100ELT23L	79	NB6L611	66
MURA130	196	NB100EP223	67	NB6L72	76
MURA140	196	NB100LVEP17	71	NB6L72M	76
MURA160	196	NB100LVEP221	67	NB6LQ572	77
MURA205	196	NB100LVEP222	67	NB6LQ572M	77
MURA210	196	NB100LVEP224	67	NB6N11S	66
MURA215	196	NB100LVEP56	76	NB6N14S	66
MURA220	196	NB100LVEP91	79	NB6N239S	65
MURA230	196	NB2304A	89	NB6VQ572M	77
MURA240	196	NB2305A	89	NB7HQ14M	66
MURA260	196	NB2308A	89	NB7L1008M	67
MURB1620CT	196	NB2309A	89	NB7L111M	67



# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NB7L11M	66	NBXDBA017	84	NCP1031	11, 101
NB7L14	66	NBXDBA018	84	NCP1034	98
NB7L14M	66	NBXDBA019	84	NCP1050	11
NB7L216	69	NBXDBB017	84	NCP1051	11
NB7L32M	65	NBXDBB018	84	NCP1052	11
NB7L572	77	NBXDDA016	84	NCP1053	11
NB7L585	68, 76	NBXDPA012	84	NCP1054	11
NB7L585R	68, 76	NBXDPA017	84	NCP1055	11
NB7L72M	76	NBXDPA018	84	NCP1080	98, 111
NB7L86M	75, 76	NBXDPA019	84	NCP1081	111
NB7LQ572	77	NBXHBA017	84	NCP1082	111
NB7N017M	65	NBXHBA019	84	NCP1083	111
NB7V32M	65	NBXSBA007	84	NCP1090	111
NB7V33M	65	NBXSBA010	84	NCP1091	111
NB7V52M	72	NBXSBA017	85	NCP1092	111
NB7V585M	76	NBXSBA019	85	NCP1093	111
NB7V586M	76	NBXSBA020	85	NCP1094	111
NB7V58M	76	NBXSBA021	85	NCP1117	109
NB7V72M	76	NBXSBA022	85	NCP1117LP	109
NB7VPQ16M	68	NBXSBA023	85	NCP1200	8
NB7VQ1006M	70	NBXSBA024	85	NCP1203	8
NB7VQ14M	66	NBXSBA025	85	NCP1207A	8
NB7VQ572M	68	NBXSBA030	85	NCP1207B	8
NB7VQ58M	76	NBXSBA031	85	NCP1216	8
NBC12429	86	NBXSBA045	85	NCP1216A	8
NBC12430	86	NBXSBA046	85	NCP1217	8
NBC12439	86	NBXSFA008	85	NCP1217A	8
NBSG11	66	NBXSFA022	85	NCP1218	8
NBSG14	66	NCL30000	8, 10, 204	NCP1219	8
NBSG16	69	NCL30001	8, 10, 204	NCP1230	8
NBSG16M	69	NCL30100	98, 206	NCP1234	8
NBSG16VS	70	NCN1154	25	NCP1236	8
NBSG53A	72	NCN2612	25	NCP1237	8
NBSG72A	76	NCN4555	242	NCP1238	8
NBSG86A	75, 76	NCN4557	242	NCP1250	8
NBVSBA011	84	NCN6001	242	NCP1251	8
NBVSBA015	84	NCN6004A	242	NCP1252	9
NBVSBA017	84	NCN6804	242	NCP1271	8
NBVSBA018	84	NCN7200	25	NCP1282	99
NBVSBA024	84	NCN8024	242	NCP1288	8
NBVSBA026	84	NCN9252	24	NCP1294	9, 99
NBVSPA015	84	NCP100	294	NCP1308	8
NBVSPA017	84	NCP1010	11	NCP1337	8
NBVSPA018	84	NCP1011	11	NCP1338	8
NBVSPA019	84	NCP1012	11	NCP1351	8, 204
NBVSPA024	84	NCP1013	11	NCP1377	8
NBVSPA027	84	NCP1014	11	NCP1379	8
NBVSPA042	84	NCP1015	11	NCP1380	8
NBXDBA009	84	NCP102	103	NCP1381	9
NBXDBA012	84	NCP1027	11	NCP1382	9
NBXDBA014	84	NCP1028	11	NCP1392	9, 208
NBXDBA015	84	NCP1030	11, 103	NCP1393	9, 208

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NCP1395	9	NCP2824	16	NCP4300A	294
NCP1396	9	NCP2860	107	NCP4303	10
NCP1397	9	NCP2890	16	NCP4330	10
NCP1400A	102	NCP2892	16	NCP4586	106
NCP1402	102	NCP2892B	16	NCP4587	105
NCP1403	102	NCP2990	16	NCP4588	106
NCP1406	102	NCP2991	16	NCP4589	107
NCP1410	102	NCP300	296	NCP4620	105
NCP1421	102	NCP301	296	NCP4625	107
NCP1422	102	NCP3011	98	NCP4626	107
NCP1423	102	NCP3012	98	NCP4629	108
NCP1450A	102	NCP302	296	NCP4640	103
NCP1521B	101	NCP3020	98	NCP4641	105
NCP1522B	101	NCP303	296	NCP4671	107
NCP1523	101	NCP3030	98	NCP4672	110
NCP1523B	101	NCP304	296	NCP4680	105
NCP1529	101	NCP304A	296	NCP4681	105
NCP1532	101	NCP305	296	NCP4682	105
NCP1546	101	NCP3063	102, 205	NCP4683	107
NCP1547	101	NCP3064	102	NCP4894	16
NCP1562	9	NCP3065	102, 205	NCP500	105
NCP1575	99	NCP3066	102, 205	NCP5005	102, 206
NCP1579	99	NCP3101	101	NCP5006	102, 206
NCP1581	99	NCP3102	101	NCP5007	102, 206
NCP1587	99	NCP3120	101	NCP502	103
NCP1587A	99	NCP3121	101	NCP5030	206
NCP1587EDR2G	99	NCP3122	101	NCP5050	206
NCP1589A	99	NCP3123	101	NCP508	103
NCP1589D	99	NCP3125	101	NCP5104	208
NCP1589L	99	NCP3126	101	NCP5106	208
NCP1595	101	NCP3127	101	NCP511	105
NCP1596A	103	NCP3155	101	NCP5111	208
NCP1597	101	NCP3163	102	NCP512	103
NCP1597B	101	NCP3334	108	NCP51460	103, 294
NCP1599	101	NCP3335A	108	NCP5181	208
NCP1601	10	NCP3337	108	NCP5208	103
NCP1605	10	NCP3420	208	NCP5210	100
NCP1607	10	NCP347	294	NCP5212	98
NCP1608	10	NCP348	294, 296	NCP5212T	98
NCP1631	10	NCP349	294, 296	NCP5217	98
NCP1650	10	NCP360	294, 296	NCP5222	99
NCP1652	10	NCP361	294, 296	NCP5252	101
NCP1653	10	NCP362	294	NCP5304	208
NCP1654	10	NCP367	294	NCP5351	208
NCP1729	98	NCP370	294	NCP5359	208
NCP1835B	98	NCP3712ASN	294	NCP5359A	208
NCP1910	9, 10	NCP372	294	NCP5378	100
NCP2704	16	NCP380	294	NCP5380	100
NCP2809	16	NCP382	294	NCP5386	98
NCP2811	16	NCP3985	105	NCP5387	100
NCP2820	16	NCP4200	99	NCP5388	100
NCP2823	16	NCP4208	100, 296	NCP5391	100

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NCP5392	100	NCP692	109	NCV33161	296
NCP5392P	100	NCP693	109	NCV33163	103
NCP5392Q	100	NCP694	109	NCV33164	296
NCP5392T	100	NCP698	105	NCV33202	18
NCP5393A	99	NCP699	106	NCV33204	19
NCP5393B	99	NCP700	106	NCV33269	108
NCP5395	100	NCP700B	106	NCV33274A	19
NCP5395T	100	NCP7800	110	NCV33275	107
NCP5422A	100	NCP803	296	NCV33375	107
NCP5425	100	NCS1002	295	NCV3843B	9
NCP5500	108	NCS2001	17	NCV4264	104
NCP5501	108	NCS2002	17	NCV4264-2	104
NCP5504	110	NCS2200	16	NCV4269A	106
NCP551	105	NCS2200A	16	NCV4274	107
NCP553	103	NCS2202	16	NCV4275A	107
NCP5602	204	NCS2211	16	NCV4276	107
NCP5603	204	NCS2220	17	NCV4276B	107
NCP5604	204	NCS5650	18	NCV4279A	106
NCP561	105	NCS7101	17	NCV4299	106
NCP5612	204	NCS8353	16	NCV494	100
NCP562	103	NCT1008	281	NCV4949A	104
NCP5623B	204	NCT210	281	NCV51411	101
NCP5623C	204	NCT214	281	NCV5171	102
NCP5623T	206	NCT75	281	NCV5173	103
NCP563	103	NCV1009	295	NCV5500	108
NCP565	110	NCV1117	110	NCV5501	108
NCP566	110	NCV1124	241	NCV5504	110
NCP5661	109	NCV1413	207	NCV551	106
NCP5662	110	NCV1455	255	NCV553	103
NCP5663	110	NCV2002	17	NCV565	110
NCP5667	110	NCV2575	101	NCV612	104
NCP5680	206	NCV2901	17	NCV662	104
NCP571	105	NCV2902	19	NCV663	104
NCP582	105	NCV2903	17	NCV70521	209
NCP583	105	NCV2904	18	NCV70522	209
NCP584	106	NCV2931	104	NCV7321	240
NCP585	107	NCV2951	104	NCV7341	240
NCP590	110	NCV300	296	NCV7356	240
NCP5901	208	NCV301	296	NCV7420	240
NCP5901B	208	NCV302	296	NCV7513	207, 208, 209
NCP5911	208	NCV303	296	NCV7513B	207, 208, 209
NCP59300	110	NCV3063	102	NCV7517	207, 208, 209
NCP600	105	NCV3064	102	NCV7517B	207, 208, 209
NCP603	107	NCV3163	102	NCV7608	207
NCP605	108	NCV317	110	NCV7680	206
NCP612	104	NCV33033	209	NCV7702B	207, 209
NCP623	105	NCV33035	209	NCV7703	207, 209
NCP630	110	NCV33039	209	NCV7703B	207, 209
NCP662	104	NCV33063AV	102	NCV7708B	207, 209
NCP663	104	NCV33064	296	NCV7729	209
NCP690	109	NCV33072	18	NCV7805	110
NCP691	109	NCV33152	207, 208, 209	NCV7808	110

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NCV7812	110	NDF04N62Z	233	NJW0281	34
NCV78L05A	104	NDF05N50Z	232	NJW0302	34
NCV78L08	104	NDF06N60Z	233, 236	NJW1302	34, 39
NCV78L12A	104	NDF06N62Z	233	NJW21193	34, 38
NCV809	296	NDF08N50Z	232	NJW21194	34, 38
NCV8141	108	NDF08N60Z	233	NJW3281	34, 39
NCV8184	103	NDF10N60Z	233, 236	NL17SV02	268
NCV8401	236	NDF10N62Z	233	NL17SV04	268
NCV8402	236	NDF11N50Z	232	NL17SV08XV5T2	264
NCV8402D	236	NE521	17	NL17SV16	256
NCV8403	236	NE5230	18	NL17SV32	268
NCV8405	236	NE5517	18	NL17SZ00	266
NCV8406	236	NE5532	18	NL17SZ02	267
NCV8440	236	NE5534	18	NL17SZ04	265
NCV8450	236	NE570	16	NL17SZ06	256
NCV8501	106	NGB15N41CLT4	224	NL17SZ07	256
NCV8502	106	NGB18N40CLB	224	NL17SZ08	264
NCV8503	107	NGB8202A	224	NL17SZ125	256
NCV8504	107	NGB8202N	224	NL17SZ126	256
NCV8505	107	NGB8204N	224	NL17SZ14	265
NCV8506	107	NGB8206A	224	NL17SZ16	255
NCV8508B	106	NGB8206N	224	NL17SZ17	256
NCV8509	110	NGB8207AN	224	NL17SZ32	268
NCV8518A	106	NGB8207N	224	NL17SZ74	261
NCV8518B	106	NGD15N41CLT4	224	NL17SZ86	269
NCV8535	108	NGD18N40CLB	224	NL17SZU04	265
NCV8560	106	NGD8201A	224	NL27WZ00	265
NCV8570	106	NGD8201N	224	NL27WZ02	267
NCV8605	108	NGD8205N	224	NL27WZ04	264
NCV8660	106	NGP15N41CL	224	NL27WZ06	257
NCV8660B	106	NID6002N	236	NL27WZ07	257
NCV8664	106	NID9N05CL	236	NL27WZ07DFT2GH	257
NCV8665	106	NIF9N05CL	236	NL27WZ08	263
NCV8667	106	NIMD6001	236	NL27WZ125	257
NCV8669	106	NIS1050	294	NL27WZ126	257
NCV8674	107	NIS5112	294	NL27WZ14	264
NCV8675	107	NIS5132	294	NL27WZ16	256
NCV8772	107	NIS5135	294	NL27WZ17	257
NCV8842	101	NJD1718	31	NL27WZ32	267
NCV8843	101	NJD2873	59	NL27WZ86	269
NCV8851B	100	NJD2873T4	31	NL27WZU04	265
NCV8855	101	NJD35N04	36	NL37WZ04	265
NCV8881	102	NJL0281D	34, 38	NL37WZ06	257
NDD02N60Z	232	NJL0302D	34, 38	NL37WZ07	257
NDD03N50Z	232	NJL1302D	34, 39	NL37WZ14	265
NDD03N60Z	232	NJL21193D	34	NL37WZ16	257
NDD04N50Z	232	NJL21194D	34	NL37WZ17	257
NDD04N60Z	232, 236	NJL3281D	34, 39	NL7SZ18	271
NDD05N50Z	232	NJL4281D	34, 39	NL7SZ19	271
NDF02N60Z	232	NJL4302D	34, 39	NL7SZ57	254, 268
NDF03N60Z	233	NJT4030P	31	NL7SZ58	254, 268
NDF04N60Z	233, 236	NJT4031N	31	NL7SZ97	254

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NL7SZ98	254	NLSV1T34	274	NLX1G57	255, 268
NL7WB66	26	NLSV22T244MUTAG	275	NLX1G58	255, 268
NLAS1053	26	NLSV2T240	275	NLX1G74	261, 270
NLAS2066	26	NLSV2T244	275	NLX1G97	255, 268
NLAS3158	26	NLSV4T240	275	NLX1G98	268
NLAS323	26	NLSV4T240E	275	NLX1G99	254, 268
NLAS324	26	NLSV4T244	275	NLX2G00	269
NLAS325	26	NLSV4T244E	275	NLX2G02	269
NLAS3699	24	NLSV4T3234	275	NLX2G04	264
NLAS3699B	24	NLSV8T240MUTAG	275	NLX2G06	257
NLAS3799	24, 26	NLSV8T244	275	NLX2G07	256
NLAS3799B	24	NLSX3012	274	NLX2G08	269
NLAS3899	24, 25, 26	NLSX3013	275	NLX2G14	264
NLAS4051	25	NLSX3014	275	NLX2G16	256
NLAS4053	26, 271	NLSX3018	275	NLX2G17	257
NLAS4157	24	NLSX3373	274	NLX2G86	269
NLAS44599	26	NLSX3378	275	NLX2GU04	265
NLAS4501	25	NLSX4014	275	NLX3G14	265
NLAS4599	25	NLSX4373	274	NLX3G16	257
NLAS4684	24	NLSX4378	275	NLX3G17	257
NLAS4717	24	NLSX5011	274	NP SERIES	287
NLAS4717EP	24, 26	NLSX5012	274	NP0080TA SERIES	287
NLAS4783	24	NLSX5014	275	NP2600SX1	287
NLAS4783B	24	NLU1G00	264	NPMC SERIES	287
NLAS5123	24, 25	NLU1G04	265	NPMC-A SERIES	287
NLAS5157	24	NLU1G07	256	NPMC-B SERIES	287
NLAS5213	24	NLU1G08	264	NS2029M3	43
NLAS5223	24, 26	NLU1G14	268	NS3L500	25
NLAS52231	24	NLU1G32	268	NS5B1G384	24
NLAS5223B	24	NLU1G86	269	NS5B1G385	24, 25
NLAS7213	24	NLU1GT04	265	NS5S1153	24, 25
NLAS7222A	24	NLU1GT125	256	NS6A13AT3G	145
NLAS7222B	24	NLU1GT126	256	NS6A5.0AT3G	145
NLAS7222C	24	NLU1GT14	268	NS9F18VS	130
NLAS7242	24	NLU1GT32	268	NSA5.0AT3G	145
NLAS8252MUTAG	25	NLU1GT50	256	NSB1011XV6T1	56
NLAS9431	26	NLU1GT86	269	NSB1706DMW5T1	55
NLASB3157	25	NLU1GU04	265	NSB4904DW1	55
NLAST4051	25	NLU2G04	268	NSB9435	59
NLAST44599	26	NLU2G06	264	NSBA114EDP6	54
NLAST4501	25	NLU2G07	257	NSBA114EDXV6T1	54
NLAST4599	25	NLU2G14	264	NSBA114EF3	53
NLAST9431	26	NLU2G16	256	NSBA114TDP6	54
NLMD5820	16, 24	NLU2G17	256	NSBA114TF3	53
NLSF1174	260	NLU2GU04	265	NSBA114YDP6	54
NLSF302	267	NLU3G14	268	NSBA114YDXV6T1	54
NLSF308	264	NLU3G16	257	NSBA114YF3	55
NLSF3T125	257	NLU3G17	257	NSBA115EDXV6T1	54
NLSF3T126	257	NLX1G10	269	NSBA115TDP6	54
NLSF595	205	NLX1G11	269	NSBA115TF3	53
NLSV1T240	274	NLX1G125	255	NSBA1223TDP6	54
NLSV1T244	274	NLX1G332	269	NSBA123JDP6	54

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NSBA123JDXV6T1	54	NSBC144EPDP6	57	NSR10F40NX	125
NSBA123JF3	53	NSBC144EPDXV6	56	NSR20F20NX	125
NSBA123TF3	53	NSBC144WDP6	54	NSR20F30NX	125
NSBA124EDP6	54	NSBC144WF3	53	NSR30CM3T5G	125
NSBA124EF3	53	NSD16F3	127	NSRLL30XV2	124
NSBA143EDP6	54	NSD914F3	127	NSRLV20MW2	123
NSBA143EF3	53	NSD914XV2T1	127	NSS12100M3	58
NSBA143ZDP6	54	NSDEMP11XV6T1	127	NSS12100UW3	58
NSBA143ZF3	53	NSI45015W	205	NSS12100XV6	59
NSBA144EDP6	54	NSI45020	205	NSS12200L	58
NSBA144EDXV6T1	54	NSI45020A	205	NSS12200W	59
NSBA144EF3	53	NSI45020J	205	NSS12201L	58
NSBA144WDP6	54	NSI45025	205	NSS12500UW3	58
NSBA144WF3	53	NSI45025A	205	NSS12501UW3	58
NSBC114EDP6	54	NSI45025AZ	205	NSS12601CF8	58
NSBC114EDXV6T1	54	NSI45025Z	205	NSS1C200L	58
NSBC114EF	53	NSI45030	205	NSS1C200MZ4	31, 59
NSBC114EPD6	57	NSI45030A	205	NSS1C201L	58
NSBC114EPDXV6	56	NSI45030AZ	205	NSS1C201MZ4	31, 59
NSBC114TDP6	54	NSI45030Z	205	NSS20101J	58
NSBC114TDXV6T1	54	NSI45035J	205	NSS20200L	58
NSBC114TF3	53	NSI45060DD	205	NSS20201L	58
NSBC114YDP6	54	NSI45060JD	206	NSS20201MR6	58
NSBC114YDXV6T1	54	NSI45090DD	205	NSS20300MR6	58
NSBC114YF3	55	NSI45090JD	206	NSS20500UW3	58
NSBC114YPDP6	57	NSI50010YT1G	205	NSS20501UW3	58
NSBC114YPDXXV6	56	NSL12AW	44	NSS20601CF8	58
NSBC115EDXV6T1	54	NSR0130P2	125	NSS30070MR6	58
NSBC115TDP6	54	NSR0140P2	125	NSS30071MR6	58
NSBC115TF3	53	NSR01F30NX	125	NSS30100L	58
NSBC115TPDP6	57	NSR01L30NX	125	NSS30101L	58
NSBC123JDP6	54	NSR0230M2	125	NSS30201MR6	58
NSBC123JF3	53	NSR0230P2	125	NSS35200CF8	58
NSBC123JPDP6	57	NSR0240H	123	NSS35200MR6	58
NSBC123JPDXV6	56	NSR0240P2	125	NSS40200L	58
NSBC123TDP6	54	NSR0240V2	124	NSS40200UW6	59
NSBC123TF3	53	NSR02F30NX	125	NSS40201L	58
NSBC124EDP6	54	NSR02L30NX	125	NSS40300MZ4	31
NSBC124EDXV6T1	54	NSR0320MW2T1	123	NSS40300MZ4T1G	59
NSBC124EF3	53	NSR0320XV6T1	124	NSS40301MD	45, 59
NSBC124EPDXV6	56	NSR0340H	123	NSS40301MZ4	31
NSBC143EDP6	54	NSR0340P2	125	NSS40301MZ4T1G	59
NSBC143EF3	53	NSR0340V2	124	NSS40500UW3	58
NSBC143TPDXV6	56	NSR0520V2	124	NSS40501UW3	58
NSBC143ZDP6	54	NSR0530P2	125	NSS40600CF8	58
NSBC143ZDXV6T1	54	NSR05F20NX	125	NSS40601CF8	58
NSBC143ZF3	53	NSR05F30NX	125	NSS60200L	58
NSBC143ZPDP6	57	NSR05F40NX	125	NSS60201L	58
NSBC143ZPDXV6	56	NSR0620P2	125	NSS60600MZ4	31, 59
NSBC144EDP6	54	NSR1020MW2	123	NSS60601MZ4	31, 59
NSBC144EDXV6T1	54	NSR10F20NX	125	NST30010MXV6	45
NSBC144EF3	53	NSR10F30NX	125	NST3904DP6	45

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NST3904DXV6T1	45	NTD24N06	231	NTD6415ANL	232
NST3904F3	44	NTD24N06L	231	NTD6416AN	232
NST3906DP6	45	NTD25P03L	235	NTD6416ANL	232
NST3906DXV6T1	45	NTD2955	235	NTD70N03R	226
NST3906F3	44	NTD3055-094	231	NTE4151P	234
NST3946DP6	45	NTD3055-150	231	NTE4153N	226
NST3946DXV6T1	45	NTD3055L104	231	NTF2955	235
NST45010MW6	45	NTD3055L170	231	NTF3055-100	231
NST45011MW6	45	NTD32N06L	231	NTF3055L108	231
NST489AM	44	NTD40N03R	226	NTF3055L175	231
NST846BF3	44	NTD4302	227	NTF5P03T3	235
NST847BDP6	45	NTD4804N	227	NTF6P02	234
NST847BF3	44	NTD4805N	227	NTGD1100L	233
NST847BPDP6	45	NTD4806N	227	NTGD3148N	225
NST848BF3	44	NTD4808N	227	NTGD3149C	224
NST856BF3	44	NTD4809N	227	NTGD4161P	233
NST857BDP6	45	NTD4809NH	228	NTGD4167C	225
NST857BF3	44	NTD4810N	228	NTGS3130N	226
NSTB1002DXV5	56	NTD4813N	228	NTGS3433	234
NSTB1005DXV5	56	NTD4813NH	228	NTGS3441	234
NT4N03	225	NTD4815N	228	NTGS3441P	234
NTA4001N	226	NTD4855N	226	NTGS3443	234
NTA4151P	234	NTD4856N	226	NTGS3446	226
NTA4153N	226	NTD4857N	226	NTGS3455	235
NTA7002N	227	NTD4860N	226	NTGS4111P	235
NTB25P06	235	NTD4863N	226	NTGS4141N	228
NTB30N06L	230	NTD4865N	226	NTGS5120P	235
NTB30N20	232	NTD4904N	228	NTHC5513	224
NTB35N15	232	NTD4906N	228	NTHD3100C	225
NTB45N06	231	NTD4909N	228	NTHD3101F	233
NTB45N06L	231	NTD4910N	228	NTHD3102C	225
NTB5404N	230	NTD4913N	228	NTHD3133PF	233
NTB5405N	230	NTD4960N	228	NTHD4102P	233
NTB5411N	231	NTD4965N	227	NTHD4502N	225
NTB5426N	231	NTD4969N	227	NTHD4P02	233
NTB5605P	235	NTD4970N	227	NTHS4101P	234
NTB60N06	231	NTD5406N	230	NTHS4166N	228
NTB60N06L	231	NTD5407N	230	NTHS5404	226
NTB6410AN	231	NTD5413N	231	NTHS5441T1	234
NTB6411AN	232	NTD5414N	231	NTHS5443	234
NTB6412AN	232	NTD5802N	230	NTJD1155L	233
NTB6413AN	232	NTD5803N	230	NTJD4001N	225
NTB75N06	231	NTD5804N	230	NTJD4105C	225
NTD110N02R	226	NTD5805N	230	NTJD4152P	233
NTD12N10	232	NTD5806N	230	NTJD4158C	225
NTD14N03R	226	NTD5807N	230	NTJD4401N	225
NTD18N06	231	NTD5862N	231	NTJD5121N	225
NTD18N06L	231	NTD5865N	231	NTJS3151P	234
NTD20N03L27	227	NTD5865NL	231	NTJS3157N	226
NTD20N06	231	NTD5867NL	231	NTJS4151P	234
NTD20N06L	231	NTD6414AN	232	NTJS4160NT1G	228
NTD20P06L	235	NTD6415AN	232	NTJS4405N	227

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NTK3043N	226	NTMFS4933N	227	NTTD4401F	233
NTK3134N	226	NTMFS4934N	227	NTTFS4800N	229
NTK3139P	234	NTMFS4935N	229	NTTFS4821N	229
NTLGD3502N	225	NTMFS4936N	229	NTTFS4823N	229
NTLGF3402P	233	NTMFS4937N	229	NTTFS4824N	229
NTLJD3115P	233	NTMFS4939N	229	NTTFS4840N	229
NTLJD3119C	225	NTMFS4941N	229	NTTFS4928N	227
NTLJD4116N	225	NTMFS4943N	229	NTTFS4929N	227
NTLJF3117P	233	NTMFS5834NL	229	NTTFS4930N	227
NTLJF4156N	225	NTMFS5844NL	230	NTTFS4932N	229
NTLJS2103P	234	NTMS10P02	234	NTTFS4937N	229
NTLJS3113P	234	NTMS4177P	235	NTTFS4939N	229
NTLJS4114N	228	NTMS4503N	227	NTTFS4941N	229
NTLUD3A260P	233	NTMS4800N	229	NTTFS5116PL	235
NTLUF4189NZ	226	NTMS4801N	229	NTTFS5811NL	230
NTLUS3A40P	234	NTMS4802N	229	NTTFS5820NL	231
NTLUS3A90P	234	NTMS4807N	229	NTTFS5826NL	231
NTMD3P03	233	NTMS4816N	229	NTUD3127C	225
NTMD4184PF	233	NTMS4873NF	226	NTUD3128N	225
NTMD4820N	225	NTMS4916N	227	NTUD3169CZ	225
NTMD4840N	225	NTMS4917N	227	NTUD3170NZ	225
NTMD4884NF	226	NTMS4920N	229	NTUD3171PZ	233
NTMD5836NL	225	NTMS4935N	229	NTVB058NSx-L	287
NTMD6N02	225	NTMS4937N	229	NTVB065NSx-L	288
NTMD6N03	225	NTMS4939N	229	NTVB090NSx-L	288
NTMD6P02	233	NTMS5835NL	230	NTVB170NSx-L	288
NTMFS4119N	228	NTMS5838NL	230	NTVB170Sx-L	288
NTMFS4821N	228	NTMS5P02	234	NTVB180Sx-L	288
NTMFS4823N	228	NTMS7N03R2	229	NTVB200Sx-L	288
NTMFS4825NFE	227	NTNUS3171PZ	234	NTVB220NSx-L	288
NTMFS4826NE	227	NTP2955	235	NTVB270Sx-L	288
NTMFS4833N	228	NTP6410AN	232	NTVB275NSx-L	288
NTMFS4834N	228	NTP6411AN	232	NTVB300Sx	288
NTMFS4835N	228	NTP6412AN	232	NTZD3152P	233
NTMFS4836N	228	NTP6413AN	232	NTZD3154N	225
NTMFS4837NH	228	NTR0202PL	234	NTZD3155C	225
NTMFS4839NH	228	NTR1P02	234	NTZD5110N	225
NTMFS4841N	228	NTR1P02LT1	234	NTZS3151P	234
NTMFS4841NH	228	NTR2101P	234	NUD3105	207
NTMFS4845	228	NTR4003N	229	NUD3112	207
NTMFS4846	228	NTR4101	234	NUD3124	207
NTMFS4847N	228	NTR4170N	229	NUD3160	207
NTMFS4851	229	NTR4171P	235	NUD4001	205
NTMFS4852N	229	NTR4501	226	NUD4011	205
NTMFS4897N	226	NTR4502P	235	NUD4700	236
NTMFS4898N	226	NTR4503N	229	NUF2042XV6	219
NTMFS4899N	226	NTS2101P	234	NUF2101	219
NTMFS4921N	229	NTS4001N	229	NUF2114MN	218
NTMFS4923NE	227	NTS4101P	234	NUF2116	218
NTMFS4925N	227	NTS4173P	235	NUF2221	219
NTMFS4926N	227	NTS4409NT1G	227	NUF2222	219
NTMFS4927N	227	NTST301005G	189	NUF2230	219



# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NUF2441	218	NUP5150MU	175	NZ9F4V7S	130
NUF2450MU	218	NUS2401	207	NZ9F5V1	130
NUF3102	219	NUS3116MT	235	NZ9F5V1S	130
NUF4000	219	NUS5530MN	233	NZ9F5V6	130
NUF4001MU	219	NUS5531	234	NZ9F5V6S	130
NUF4010	219	NVD5803N	230	NZ9F6V2	130
NUF4107FC	219	NVD5862N	230	NZ9F6V2S	130
NUF4211	219	NVD5863NL	230	NZ9F6V8	130
NUF4220	218	NVD5865NL	230	NZ9F6V8S	130
NUF4310	219	NVD5867NL	230	NZ9F7V5	130
NUF4401MN	220	NVD5890N	230	NZ9F7V5S	130
NUF4402MN	220	NVMFS4841N	227	NZ9F8V2	130
NUF4403MN	220	NVT210	281	NZ9F8V2S	130
NUF6001MU	220	NVTFS4823N	227	NZ9F9V1	130
NUF6005	220	NVTFS5116PL	235	NZ9F9V1S	130
NUF6010	220	NVTFS5811NL	230	NZF220DFT1	220
NUF6105	220	NVTFS5820NL	230	NZF220TT1	220
NUF6106	220	NVTFS5826NL	230	NZL5V6AXV3	160
NUF6107	220	NYC008	287	NZL6V8AXV3	160
NUF6400	220	NYC0102B	287	NZL7V5AXV3	160
NUF6401MN	220	NYC222	287	NZQA5V6XV5T1G	173
NUF6402	220	NZ9F10V	130	NZQA6V2XV5T1G	173
NUF6406	220	NZ9F10VS	130	NZQA6V8XV5T1G	173
NUF6410	220	NZ9F11V	130	ONBCD25	94
NUF8001MU	220	NZ9F11VS	130	ONC18G/R	94
NUF8010	220	NZ9F12V	130	ONC25	94
NUF8152	220	NZ9F12VS	130	P1708C	87
NUF8401	220	NZ9F13V	130	P1727A	87
NUF8402	220	NZ9F13VS	130	P1817A	87
NUF8410	220	NZ9F15V	130	P1817B	87
NUF8600	220	NZ9F15VS	130	P1819B	87
NUF8610	220	NZ9F16V	130	P1819G	87
NUF9001	220	NZ9F16VS	130	P1P8160A	87
NUF9002	220	NZ9F18V	130	P2042A	87
NUP1105L	158	NZ9F20V	130	P2084A	86
NUP1301ML3	162	NZ9F22V	130	P2180A	87
NUP2105L	160	NZ9F24V	130	P2781A	87
NUP2114UC	162	NZ9F2V4	130	P2782A	87
NUP2114UP	163	NZ9F2V7	130	P2784	87
NUP2301MW6	165	NZ9F2V7S	130	P2811B	87
NUP3115UP	168	NZ9F2Y4S	130	P2814B	87
NUP4000DR2G	161	NZ9F3V0	130	P2N2222A	47, 50
NUP4012P	170	NZ9F3V0S	130	P2P2305NZ	67
NUP4060AXV6	169	NZ9F3V3	130	P3I2005A	88
NUP4102XV6	169	NZ9F3V6	130	P3P25812A	88
NUP4103FC	174	NZ9F3V6S	130	P3P25814	88
NUP4114H	167	NZ9F3V9	130	P3P623S00BG	88
NUP4114UP	168	NZ9F3V9S	130	P3P8220A	88
NUP4201DR2	169	NZ9F3Y3S	130	P3P85R01A	88
NUP45V6P5	174	NZ9F4V3	130	P3PS550AH	88
NUP46V8P5	174	NZ9F4V3S	130	P3PS850BH	88
NUP5120X6	175	NZ9F4V7	130	P3PSL450AH	88

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
P6KE100A	140	P6SMB24A	150	PZT2907AT1	44, 48
P6KE10A	140	P6SMB24CA	151	PZT3904	44
P6KE12A	140	P6SMB27A	150	PZT651T1	44, 48
P6KE13A	140	P6SMB27CA	151	PZT751T1	44, 48
P6KE150A	140	P6SMB30A	150	PZTA42T1	49
P6KE15A	140	P6SMB30CA	151	PZTA92T1	49
P6KE160A	140	P6SMB33A	150	PZTA96S	49
P6KE16A	140	P6SMB33CA	151	RB520S30T1	124
P6KE180A	140	P6SMB36A	150	RB521S30T1	124
P6KE18A	140	P6SMB36CA	151	RB751S40T1	124
P6KE200A	140	P6SMB39A	150	RB751V40T1	123
P6KE20A	140	P6SMB39CA	151	SA10A	139
P6KE22A	140	P6SMB43A	150	SA12A	139
P6KE24A	140	P6SMB43CA	151	SA13A	139
P6KE27A	140	P6SMB47A	150	SA15A	139
P6KE30A	140	P6SMB47CA	151	SA16A	139
P6KE33A	140	P6SMB51A	150	SA17A	139
P6KE36A	140	P6SMB51CA	151	SA18A	139
P6KE39A	140	P6SMB56A	150	SA20A	139
P6KE43A	140	P6SMB56CA	151	SA24A	139
P6KE47A	140	P6SMB6.8A	150	SA26A	139
P6KE51A	140	P6SMB62A	150	SA28A	139
P6KE56A	140	P6SMB62CA	151	SA30A	139
P6KE6.8A	140	P6SMB68A	150	SA33A	139
P6KE62A	140	P6SMB68CA	151	SA36A	139
P6KE68A	140	P6SMB7.5A	150	SA5.0A	139
P6KE7.5A	140	P6SMB75A	150	SA571	16
P6KE75A	140	P6SMB8.2A	150	SA572	16
P6KE82A	140	P6SMB82A	150	SA575	16
P6P82PS01A	88	P6SMB82CA	151	SA6.0A	139
P6SMB100A	150	P6SMB9.1A	150	SA7.0A	139
P6SMB10A	150	P6SMB91A	150	SD05	155
P6SMB11CA	151	PACUSB-D1	220	SD12	155
P6SMB120A	150	PACUSB-U3	220	SD12C	156
P6SMB12A	150	PACVGA105	220	SG3525A	98
P6SMB12CA	151	PCA9306	275	SL05	162
P6SMB130A	150	PCA9535E	241	SL12	162
P6SMB13A	150	PCA9655E	241	SL15	162
P6SMB150A	150	PCS1P2192A	86	SL24	162
P6SMB15A	150	PCS1P2860A	86	SM05	159
P6SMB15CA	151	PCS2P2309NZ	67	SM12	159
P6SMB160A	150	PCS3P2537A	88	SMBJ12AON	152
P6SMB16A	150	PCS3P25811A	88	SMDA05C	174
P6SMB16CA	151	PCS3P6100A	88	SMDA12C	174
P6SMB180A	150	PCS3P6200A	88	SMDA15C	174
P6SMB18A	150	PCS3P7100A	88	SMDA24C	174
P6SMB18CA	151	PCS3P7303A	88	SMF05T1	173
P6SMB200A	150	PCS3P8103A	88	SMF10A	143
P6SMB20A	150	PCS3P8504A	88	SMF11A	143
P6SMB20CA	151	PCS3PS550A	88	SMF12A	143
P6SMB22A	150	PN2222A	40, 47	SMF13A	143
P6SMB22CA	151	PZT2222AT1	44, 48	SMF14A	143

# Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
SMF15A	143	TIP116	36	TIP41B	33
SMF18A	143	TIP117	36	TIP41C	33
SMF20A	143	TIP120	36	TIP42	33
SMF22A	143	TIP121	36	TIP42A	33
SMF24A	143	TIP122	36	TIP42B	33
SMF26A	143	TIP125	36	TIP42C	33
SMF28A	143	TIP126	36	TIP47	32
SMF30A	143	TIP127	36	TIP48	32
SMF33A	143	TIP131	36	TIP50	32
SMF36A	143	TIP132	36	TL431	295
SMF5.0A	143	TIP140	37	TL431A	295
SMF6.0A	143	TIP141	37	TL431B	295
SMF7.0A	143	TIP142	37	TL494	98
SMF7.5A	143	TIP147	37	TL594	100
SMF8.0A	143	TIP2955	34	TLV271	18
SMF9.0A	143	TIP29A	32	TLV431A	295
SMS05T1	173	TIP29B	32	TLV431B	295
SMS12T1	173	TIP29C	32	UAA2016	207
SMS15T1	173	TIP3055	34	UC2842B	9
SMS24T1	173	TIP30C	32	UC2843B	9
STF202	220	TIP31	32	UC2844B	9
T2322B	289	TIP31A	32	UC2845B	9
T2500D	289	TIP31B	32	UC3842B	9
T2800D	289	TIP31C	32	UC3843B	9
TCA0372	18	TIP32	32	UC3844B	9
TDA1085C	209	TIP32A	32	UC3845B	9
TIP100	36	TIP32B	32	uESD3.3D	161
TIP102	36	TIP32C	32	ULN2003	207
TIP106	36	TIP33C	34	UMC3NT1	55
TIP107	36	TIP35A	34	UMC5NT1	55
TIP110	36	TIP35C	34	UMZ1NT1	45
TIP111	36	TIP36A	34	VN2222LL	231
TIP112	36	TIP36C	34	Z01XXMA	289
TIP115	36	TIP41A	33	Z01XXMN	289

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