

# D44VH10 (NPN), D45VH10 (PNP)

## Complementary Silicon Power Transistors

These complementary silicon power transistors are designed for high-speed switching applications, such as switching regulators and high frequency inverters. The devices are also well-suited for drivers for high power switching circuits.

### Features

- Fast Switching –  
 $t_f = 90$  ns (Max)
- Key Parameters Specified @ 100°C
- Low Collector-Emitter Saturation Voltage –  
 $V_{CE(sat)} = 1.0$  V (Max) @ 8.0 A
- Complementary Pairs Simplify Circuit Designs
- Pb-Free Packages are Available\*

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	80	Vdc
Collector-Emitter Voltage	$V_{CEV}$	100	Vdc
Emitter Base Voltage	$V_{EB}$	7.0	Vdc
Collector Current –Continuous –Peak (Note 1)	$I_C$ $I_{CM}$	15 20	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	$P_D$	83 0.67	W W/°C
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to 150	°C

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.5	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	°C/W
Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	$T_L$	275	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Pulse Width  $\leq 6.0$  ms, Duty Cycle  $\leq 50\%$ .

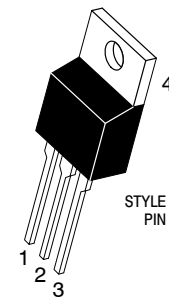
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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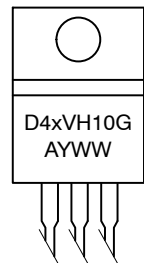
## 15 A COMPLEMENTARY SILICON POWER TRANSISTORS 80 V, 83 W



STYLE 1:  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

CASE 221A-09  
TO-220AB

### MARKING DIAGRAM



x = 4 or 5  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

### ORDERING INFORMATION

Device	Package	Shipping
D44VH10	TO-220	50 Units/Rail
D44VH10G	TO-220 (Pb-Free)	50 Units/Rail
D45VH10	TO-220	50 Units/Rail
D45VH10G	TO-220 (Pb-Free)	50 Units/Rail

## D44VH10 (NPN), D45VH10 (PNP)

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

Characteristic	Symbol	Min	Typ	Max	Unit
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#### OFF CHARACTERISTICS

Collector-Emitter Sustaining Voltage (Note 2) ( $I_C = 25 \text{ mAdc}$ , $I_B = 0$ )	$V_{CEO(sus)}$	80	-	-	Vdc
Collector-Emitter Cutoff Current ( $V_{CE} = \text{Rated } V_{CEV}$ , $V_{BE(off)} = 4.0 \text{ Vdc}$ ) ( $V_{CE} = \text{Rated } V_{CEV}$ , $V_{BE(off)} = 4.0 \text{ Vdc}$ , $T_C = 100^\circ\text{C}$ )	$I_{CEV}$	-	-	10 100	$\mu\text{Adc}$
Emitter Base Cutoff Current ( $V_{EB} = 7.0 \text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	-	-	10	$\mu\text{Adc}$

#### ON CHARACTERISTICS (Note 2)

DC Current Gain ( $I_C = 2.0 \text{ Adc}$ , $V_{CE} = 1.0 \text{ Vdc}$ ) ( $I_C = 4.0 \text{ Adc}$ , $V_{CE} = 1.0 \text{ Vdc}$ )	$h_{FE}$	35 20	-	-	-
Collector-Emitter Saturation Voltage ( $I_C = 8.0 \text{ Adc}$ , $I_B = 0.4 \text{ Adc}$ ) ( $I_C = 8.0 \text{ Adc}$ , $I_B = 0.8 \text{ Adc}$ ) ( $I_C = 15 \text{ Adc}$ , $I_B = 3.0 \text{ Adc}$ , $T_C = 100^\circ\text{C}$ )	$V_{CE(sat)}$	-	-	0.4 1.0 0.8 1.5	Vdc
Base-Emitter Saturation Voltage ( $I_C = 8.0 \text{ Adc}$ , $I_B = 0.4 \text{ Adc}$ ) ( $I_C = 8.0 \text{ Adc}$ , $I_B = 0.8 \text{ Adc}$ ) ( $I_C = 8.0 \text{ Adc}$ , $I_B = 0.4 \text{ Adc}$ , $T_C = 100^\circ\text{C}$ ) ( $I_C = 8.0 \text{ Adc}$ , $I_B = 0.8 \text{ Adc}$ , $T_C = 100^\circ\text{C}$ )	$V_{BE(sat)}$	-	-	1.2 1.0 1.1 1.5	Vdc

#### DYNAMIC CHARACTERISTICS

Current Gain Bandwidth Product ( $I_C = 0.1 \text{ Adc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 20 \text{ MHz}$ )	$f_T$	-	50	-	MHz
Output Capacitance ( $V_{CB} = 10 \text{ Vdc}$ , $I_C = 0$ , $f_{test} = 1.0 \text{ MHz}$ )	$C_{ob}$	-	120 275	-	pF

#### SWITCHING CHARACTERISTICS

Delay Time	$(V_{CC} = 20 \text{ Vdc}$ , $I_C = 8.0 \text{ Adc}$ , $I_{B1} = I_{B2} = 0.8 \text{ Adc}$ )	$t_d$	-	-	50	ns
Rise Time		$t_r$	-	-	250	
Storage Time		$t_s$	-	-	700	
Fall Time		$t_f$	-	-	90	

2. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

# D44VH10 (NPN), D45VH10 (PNP)

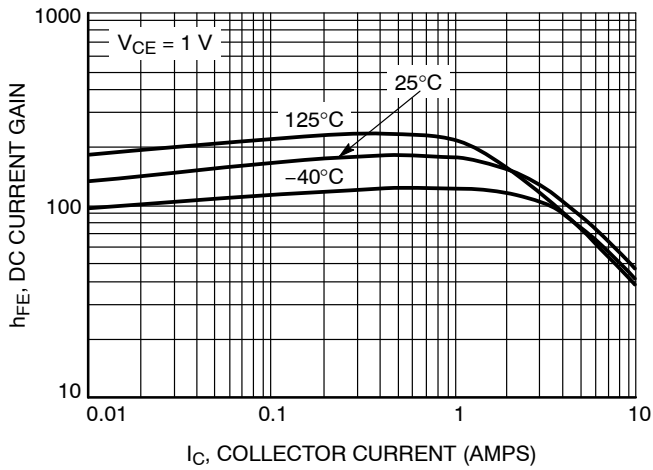


Figure 1. D44VH10 DC Current Gain

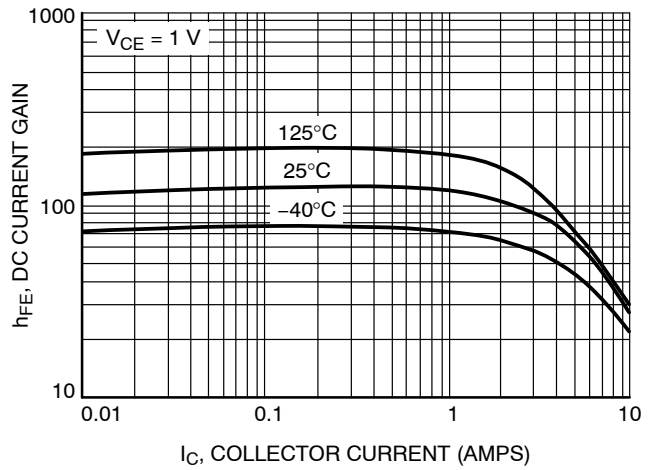


Figure 2. D45VH10 DC Current Gain

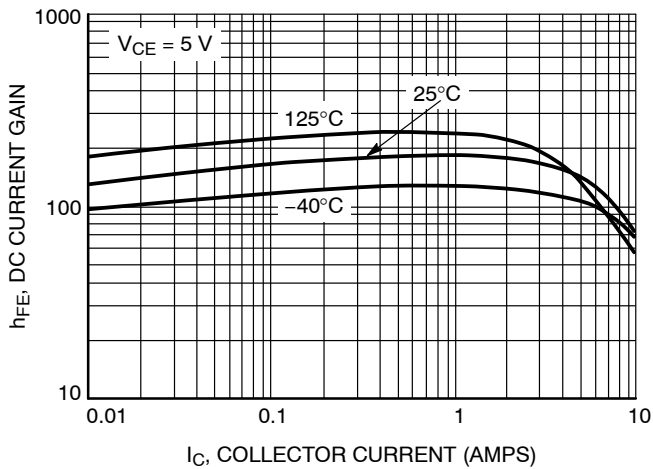


Figure 3. D44VH10 DC Current Gain

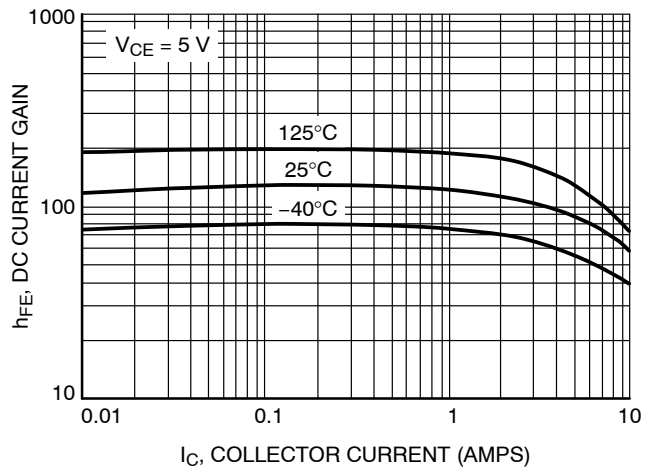


Figure 4. D45VH10 DC Current Gain

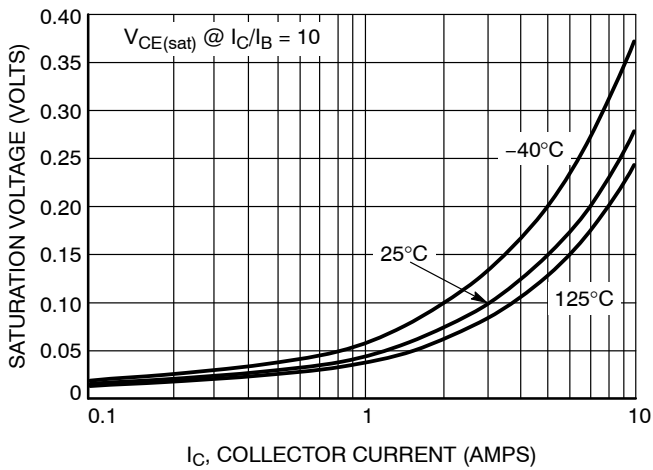


Figure 5. D44VH10 ON-Voltage

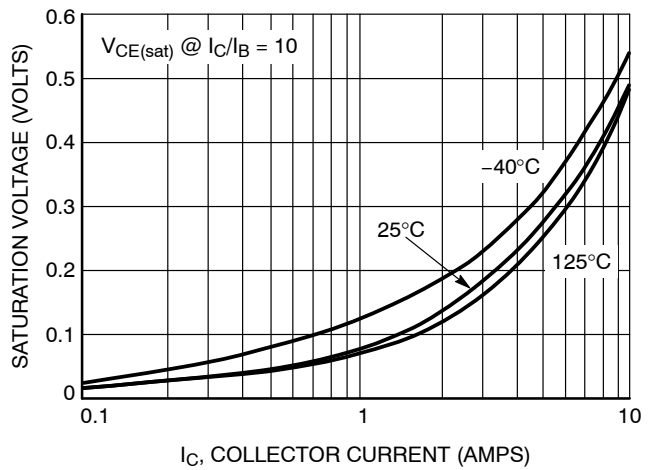
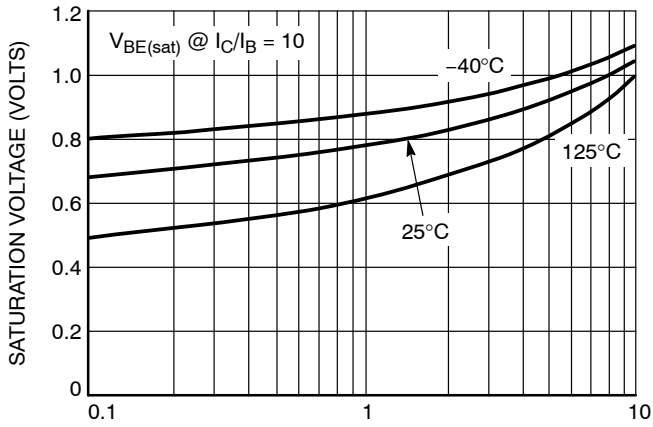


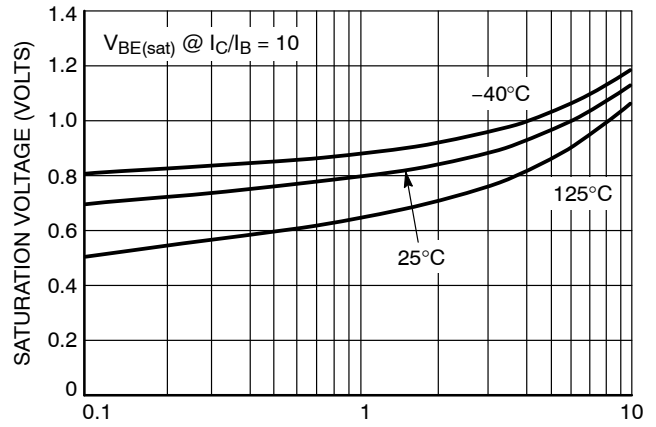
Figure 6. D45VH10 ON-Voltage

# D44VH10 (NPN), D45VH10 (PNP)



IC, COLLECTOR CURRENT (AMPS)

Figure 7. D44VH10 ON-Voltage



IC, COLLECTOR CURRENT (AMPS)

Figure 8. D45VH10 ON-Voltage

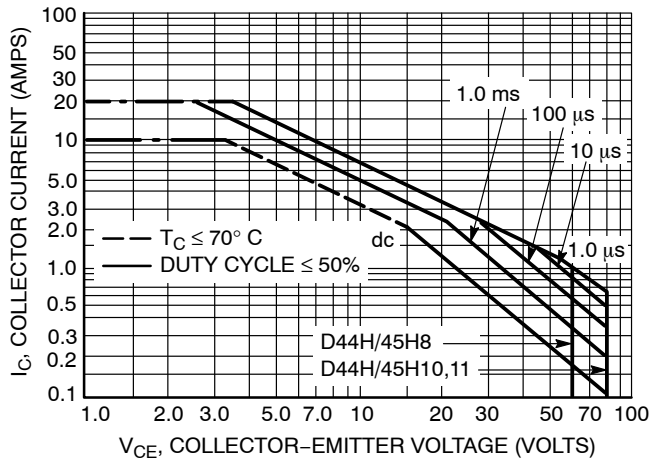


Figure 9. Maximum Rated Forward Bias Safe Operating Area

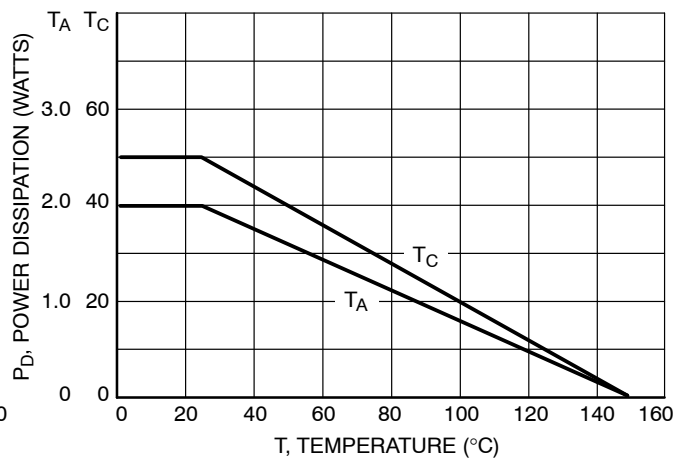


Figure 10. Power Derating

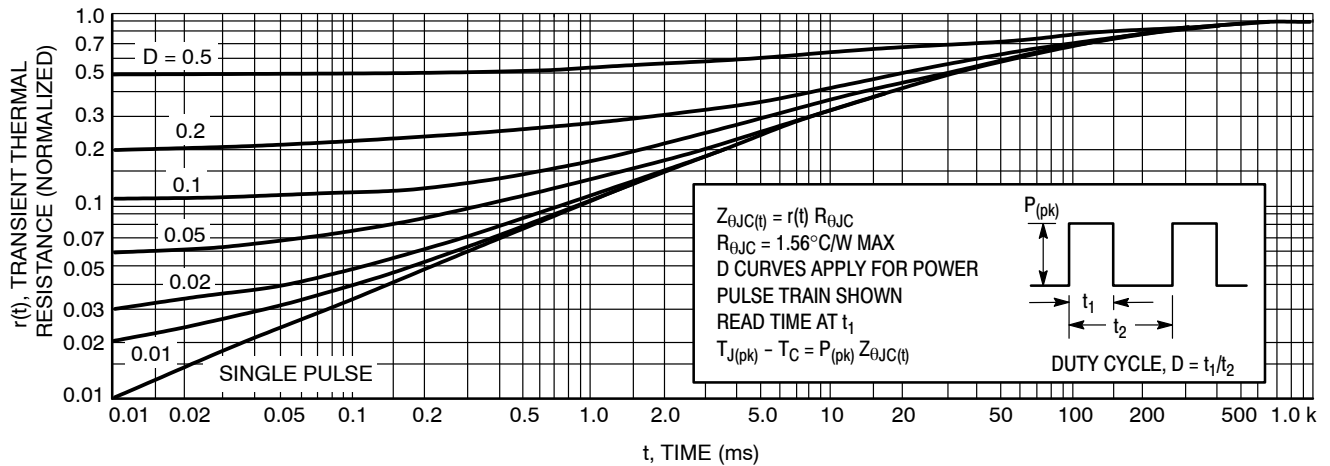
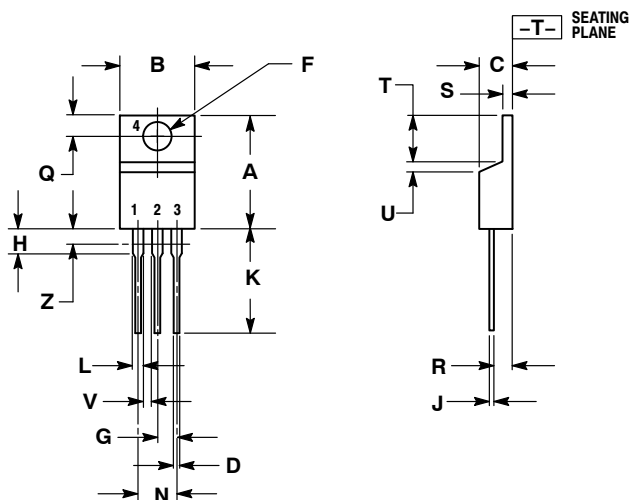


Figure 11. Thermal Response

# D44VH10 (NPN), D45VH10 (PNP)

## PACKAGE DIMENSIONS

### TO-220 CASE 221A-09 ISSUE AG



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.036	0.64	0.91
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.025	0.36	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

- STYLE 1:  
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