

## 1-To-1 Differential-to-LVCMOS/LVTTL Translator

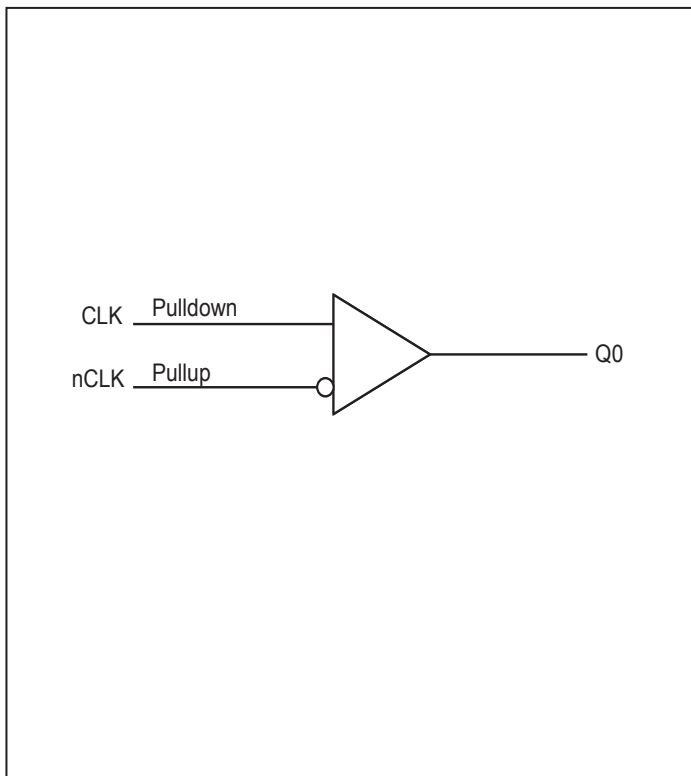
### Features

- One LVCMOS/LVTTL output
- Differential CLK/nCLK input pair
- CLK/nCLK pair can accept the following differential input levels: LVPECL, LVDS, LVHSTL, SSTL, HCSL
- Output frequency: 360MHz
- Part-to-part skew: 500ps (maximum)
- Additive phase jitter, RMS: 0.09ps (typical), 3.3V output
- Full 3.3V and 2.5V operating supply
- -40°C to 85°C ambient operating temperature

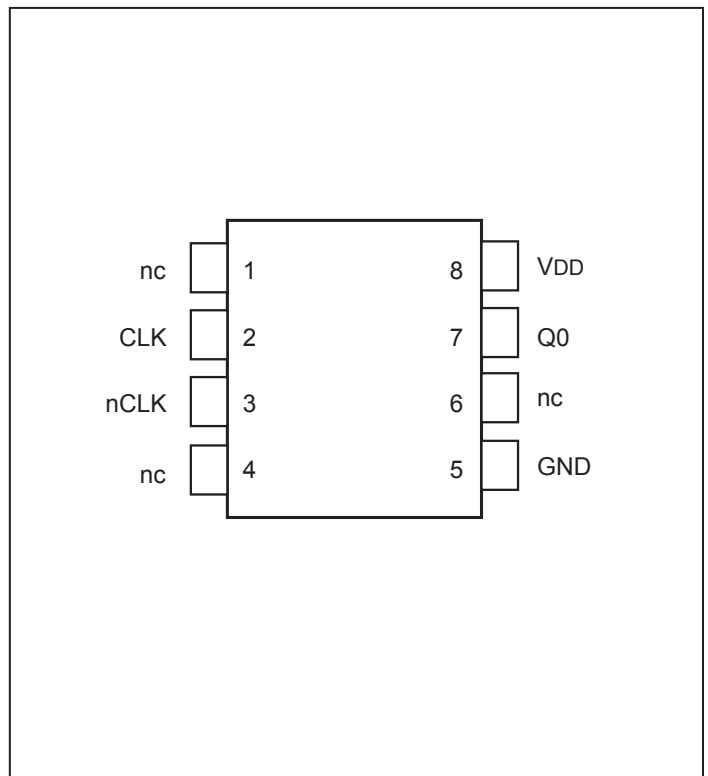
### Description

The PI6C49X0201 is a 1-to-1 Differential-to-LVCMOS/LVTTL Translator High Performance Buffer. The differential input is highly flexible and can accept LVPECL, LVDS, LVHSTL, SSTL, and HCSL. The small 8-lead SOIC footprint makes this device ideal for use in applications with limited board space.

### Block Diagram



### Pin Assignment



**Pin Descriptions**

Pin#	Pin Name	Pin Type		Pin Description
1, 4, 6	nc	Unused		No connect.
2	CLK	Input	Pulldown	Non-inverting differential clock input.
3	nCLK	Input	Pullup	Inverting differential clock input.
5	GND	Power		Power supply ground.
7	Q0	Output		Single-ended clock output. LVCMOS/LVTTL interface levels.
8	VDD	Power		Positive supply pin.

Note: *Pullup* and *Pulldown* refer to internal input resistors.

**Pin Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typical	Max.	Units
$C_{IN}$	Input Capacitance			4		pF
$R_{PULLUP}$	Input Pullup Resistor			51		k $\Omega$
$R_{PULLDOWN}$	Input Pulldown Resistor			51		k $\Omega$
$C_{PD}$	Power Dissipation Capacitance	VDD = 3.6V		23		pF
$R_{OUT}$	Output Impedance		5	7	13	$\Omega$

### Maximum Ratings

(Above which useful life may be impaired. For user guidelines, not tested.)

Supply Voltage, VDD	4.6V
Inputs, $V_I$	-0.5V to VDD+0.5V
Output, $V_O$	-0.5V to VDD+0.5V
Package Thermal Impedance, $\theta_{JA}$	103°C/W (0 lfpm)
Storage Temperature, $T_{STG}$	-65°C to 150°C
ESD Protection (Input)	2000V min (HBM)

Note:

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These ratings are stress specifications only. Functional operation of product at these conditions or any conditions beyond those listed in the DC Characteristics or AC Characteristics

is not implied. Exposure to absolute maximum rating conditions for extended periods may affect product reliability.

### DC Electrical Characteristics

**Power Supply DC Characteristics**, VDD = 3.3V ± 0.3V or 2.5V ± 5%,  $T_A$  = -40°C to 85°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
VDD	Positive Supply Voltage		3.0	3.3	3.6	V
			2.375	2.5	2.625	V
IDD	Power Supply Current	25MHz, unloaded			25	mA
		250MHz, unloaded			35	mA

**LVCMOS / LVTTL DC Characteristics**, VDD = 3.3V ± 0.3V or 2.5V ± 5%,  $T_A$  = -40°C to 85°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$V_{OH}$	Output High Voltage; NOTE 1	VDD = 3.6V	2.6		3.6	V
		VDD = 2.625V	1.8		2.625	V
$V_{OL}$	Output Low Voltage; NOTE 1	VDD = 3.6V or 2.625V			0.5	V

NOTE 1: Outputs terminated with 50Ω to VDD/2.

**Differential DC Characteristics**, VDD = 3.3V ± 0.3V or 2.5V ± 5%,  $T_A$  = -40°C to 85°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$I_{IH}$	Input High Current	nCLK $V_{IN} = VDD = 3.6V$ or 2.625V			5	μA
		CLK $V_{IN} = VDD = 3.6V$ or 2.625V			150	μA
$I_{IL}$	Input Low Current	nCLK $V_{IN} = 0V$ , VDD = 3.6V or 2.625V	-150			μA
		CLK $V_{IN} = 0V$ , VDD = 3.6V or 2.625V	-5			μA
$V_{PP}$	Peak-to-Peak Input Voltage		0.15		1.3	V
$V_{CRM}$	Common Mode Input Voltage; NOTE 1, 2		GND + 0.5		VDD - 0.85	V

NOTE 1: For single ended applications, the maximum input voltage for CLK, nCLK is VDD + 0.3V.

NOTE 2: Common mode voltage is defined as  $(V_{IH} + V_{IL})/2$ .

### AC Electrical Characteristics

#### AC Characteristics, $V_{DD} = 3.3V \pm 0.3V$ , $T_A = -40^\circ C$ to $85^\circ C$

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$f_{MAX}$	Output Frequency		4		360	MHz
$t_{PD}$	Propagation Delay, NOTE 1	$f \leq 350\text{MHz}$	1.6	1.8	2.0	ns
$tsk(pp)$	Part-to-Part Skew; NOTE 2, 3				500	ps
$t_{jit}$	Buffer Additive Phase Jitter, RMS	156.25MHz, Integration Range (12kHz – 20MHz)		0.09		ps
		125MHz, Integration Range (12kHz – 20MHz)		0.15		
$t_R/t_F$	Output Rise/Fall Time	0.8V to 2V	80	250	350	ps
odc	Output Duty Cycle	$f \leq 166\text{MHz}$	45	50	55	%
		$166\text{MHz} < f \leq 350\text{MHz}$	40	50	60	%

NOTE: Electrical parameters are guaranteed over the specified ambient operating temperature range. The device will meet specifications after thermal equilibrium has been reached under these conditions.

All parameters measured at  $f_{MAX}$  unless noted otherwise.

NOTE 1: Measured from the differential input crossing point to the output at  $V_{DD}/2$ .

NOTE 2: Defined as skew between outputs on different devices operating at the same supply voltage and with equal load conditions.

Using the same type of inputs on each device, the outputs are measured at  $V_{DD}/2$ .

#### AC Characteristics, $V_{DD} = 2.5V \pm 5\%$ , $T_A = -40^\circ C$ to $85^\circ C$

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$f_{MAX}$	Output Frequency		4		360	MHz
$t_{PD}$	Propagation Delay, NOTE 1	$f \leq 350\text{MHz}$	1.9	2.2	2.5	ns
$tsk(pp)$	Part-to-Part Skew; NOTE 2				500	ps
$t_{jit}$	Buffer Additive Phase Jitter, RMS	156.25MHz, Integration Range (12kHz – 20MHz)		0.04		ps
		125MHz, Integration Range (12kHz – 20MHz)		0.14		
$t_R/t_F$	Output Rise/Fall Time	20% to 80%	180		350	ps
odc	Output Duty Cycle	$f \leq 250\text{MHz}$	45	50	55	%
		$250\text{MHz} < f \leq 350\text{MHz}$	40	50	60	%

NOTE: Electrical parameters are guaranteed over the specified ambient operating temperature range. The device will meet specifications after thermal equilibrium has been reached under these conditions.

All parameters measured at  $f_{MAX}$  unless noted otherwise.

NOTE 1: Measured from the differential input crossing point to the output at  $V_{DD}/2$ .

NOTE 2: Defined as skew between outputs on different devices operating at the same supply voltage and with equal load conditions.

Using the same type of inputs on each device, the outputs are measured at  $V_{DD}/2$ .

**Application Information**

*Wiring the differential input to accept single ended levels*

Figure 1 shows how the differential input can be wired to accept single ended levels. The reference voltage  $V_{REF} = VDD/2$  is generated by the bias resistors R1, R2 and C1. This bias circuit should be located as close as possible to the input pin. The ratio of R1 and R2 might need to be adjusted to position the  $V_{REF}$  in the center of the input voltage swing. For example, if the input clock swing is only 2.5V and  $VDD = 3.3V$ ,  $V_{REF}$  should be 1.25V and  $R1/R2 = 0.609$ .

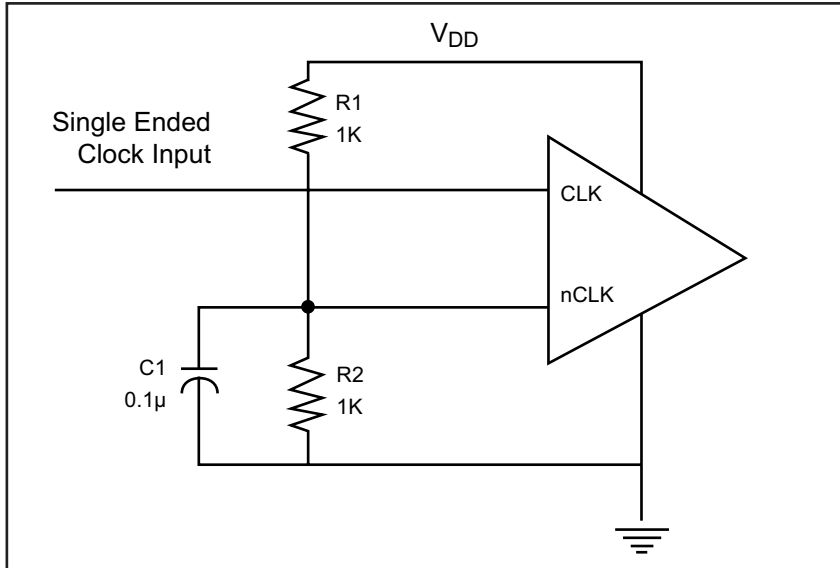


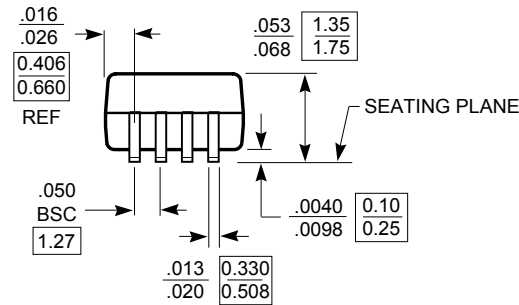
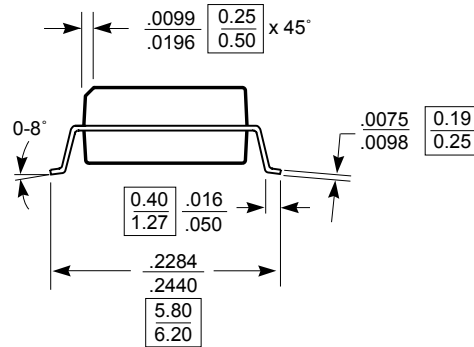
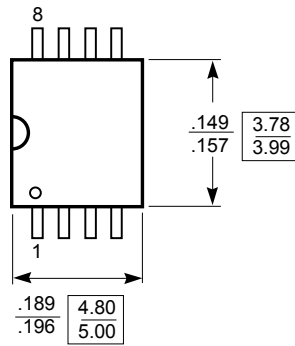
Figure 1. Single-ended input to Differential input device

**Thermal Information**

Symbol	Description	Condition	
$\Theta_{JA}$	Junction-to-ambient thermal resistance	Still air	157 °C/W
$\Theta_{JC}$	Junction-to-case thermal resistance		42 °C/W

DOCUMENT CONTROL NO.  
PD - 1001

REVISION: F  
DATE: 03/09/05



X.XX DENOTES DIMENSIONS  
X.XX IN MILLIMETERS

Notes:  
1) Controlling dimensions in millimeters.  
2) Ref: JEDEC MS-012D/AA



Pericom Semiconductor Corporation  
3545 N. 1st Street, San Jose, CA 95134  
1-800-435-2335 • www.pericom.com

DESCRIPTION: 8-Pin, 150-Mil Wide, SOIC

PACKAGE CODE: W

**Note:**

- For latest package info, please check: <http://www.pericom.com/products/packaging/mechanicals.php>

**Ordering Information<sup>(1-3)</sup>**

Ordering Code	Package Code	Package Description
PI6C49X0201 WIE	W	8-pin, Pb-free & Green, SOIC

**Notes:**

- Thermal characteristics can be found on the company web site at [www.pericom.com/packaging/](http://www.pericom.com/packaging/)
- E = Pb-free and Green
- Adding an X suffix = Tape/Reel