A Product Line of
Diodes Incorporated

PI6C49CB01J

Industrial Grade 1-to-1 Differential-to-LVCMOS/LVTTL Translator

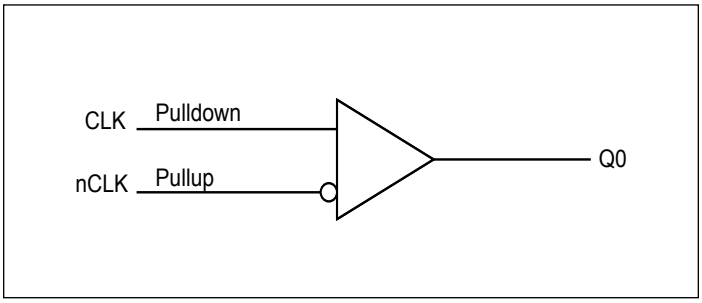
Features

- 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
- Additive phase jitter, RMS: 0.09ps (typical), 3.3V output
- Full 3.3V and 2.5V operating supply
- -40°C to 105°C ambient operating temperature
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/
- Packaging (Pb-free & Green):
  - Small 8-pin SOIC(W) package saves board space

Description

The PI6C49CB01J is a industrial grade 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.

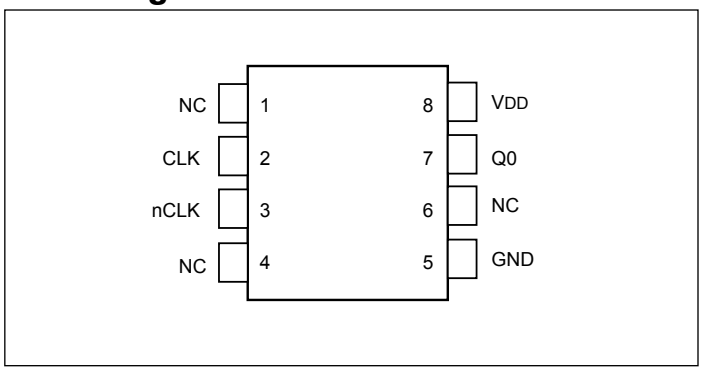
Block Diagram



Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin Configuration



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.	Typ.	Max.	Units
C_{IN}	Input Capacitance			4		pF
R_{PULLUP}	Input Pullup Resistor			51		kΩ
$R_{PULLDOWN}$	Input Pulldown Resistor			51		kΩ
C_{PD}	Power Dissipation Capacitance	VDD = 3.6V		23		pF
R_{OUT}	Output Impedance		5	7	13	Ω

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
Storage Temperature, T_{STG} .....-65°C to 150°C
ESD Protection (Input) ..... 2000V min (HBM)
Junction Temperature .....125°C (Max)

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.

Recommended Operation Conditions

Parameter	Min.	Typ.	Max.	Units
Ambient Operating Temperature	-40		105	°C
Power Supply Voltage (measured in respect to GND)	2.375		3.465	V

DC Electrical Characteristics

Power Supply DC Characteristics, VDD = 3.3V ± 0.3V or 2.5V ± 5%, T_A = -40°C to 105°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 105°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{OH}	Output High Voltage(1)	VDD = 3.6V	2.6		3.6	V
		VDD = 2.625V	1.8		2.625	V
V_{OL}	Output Low Voltage(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 105°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(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.
2. Common mode voltage is defined as (V_{IH} + V_{IL})/2.

AC Electrical Characteristics

AC Characteristics, VDD = 3.3V ± 0.3V, T_A = -40°C to 105°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
f_{MAX}	Output Frequency		4		360	MHz
t_{PD}	Propagation Delay(1)	$f \leq 350$MHz	1.6	1.8	2.0	ns
tsk(pp)	Part-to-Part Skew(2)(3)				500	ps
tjit	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	$f \leq 166$MHz	45	50	55	%
		166MHz < $f \leq 350$MHz	40	50	60	%

Note:
1. 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.
2. Measured from the differential input crossing point to the output at VDD/2.
3. 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 VDD/2.

AC Characteristics, VDD = 2.5V ± 5%, T_A = -40°C to 105°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
f_{MAX}	Output Frequency		4		360	MHz
t_{PD}	Propagation Delay(1)	$f \leq 350$MHz	1.9	2.2	2.5	ns
tsk(pp)	Part-to-Part Skew(2)(3)				500	ps
tjit	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	$f \leq 250$MHz	45	50	55	%
		250MHz < $f \leq 350$MHz	40	50	60	%

Note:
1. 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.
2. Measured from the differential input crossing point to the output at VDD/2.
3. 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 VDD/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 postion 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.

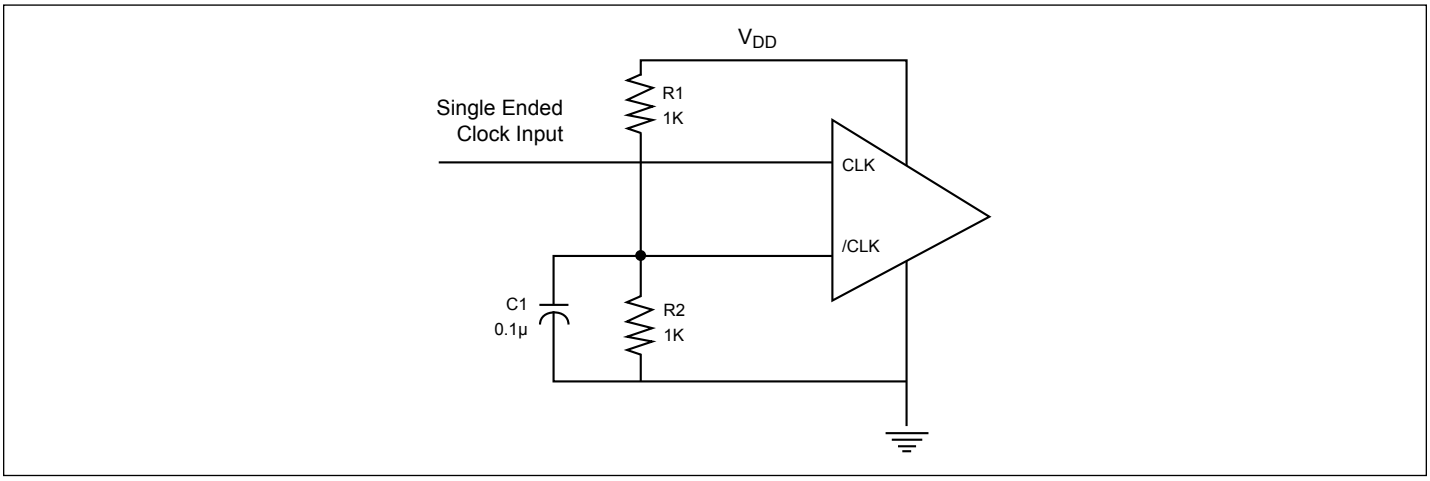


Figure 1. Single-ended Input to Differential Input Device

Thermal Information

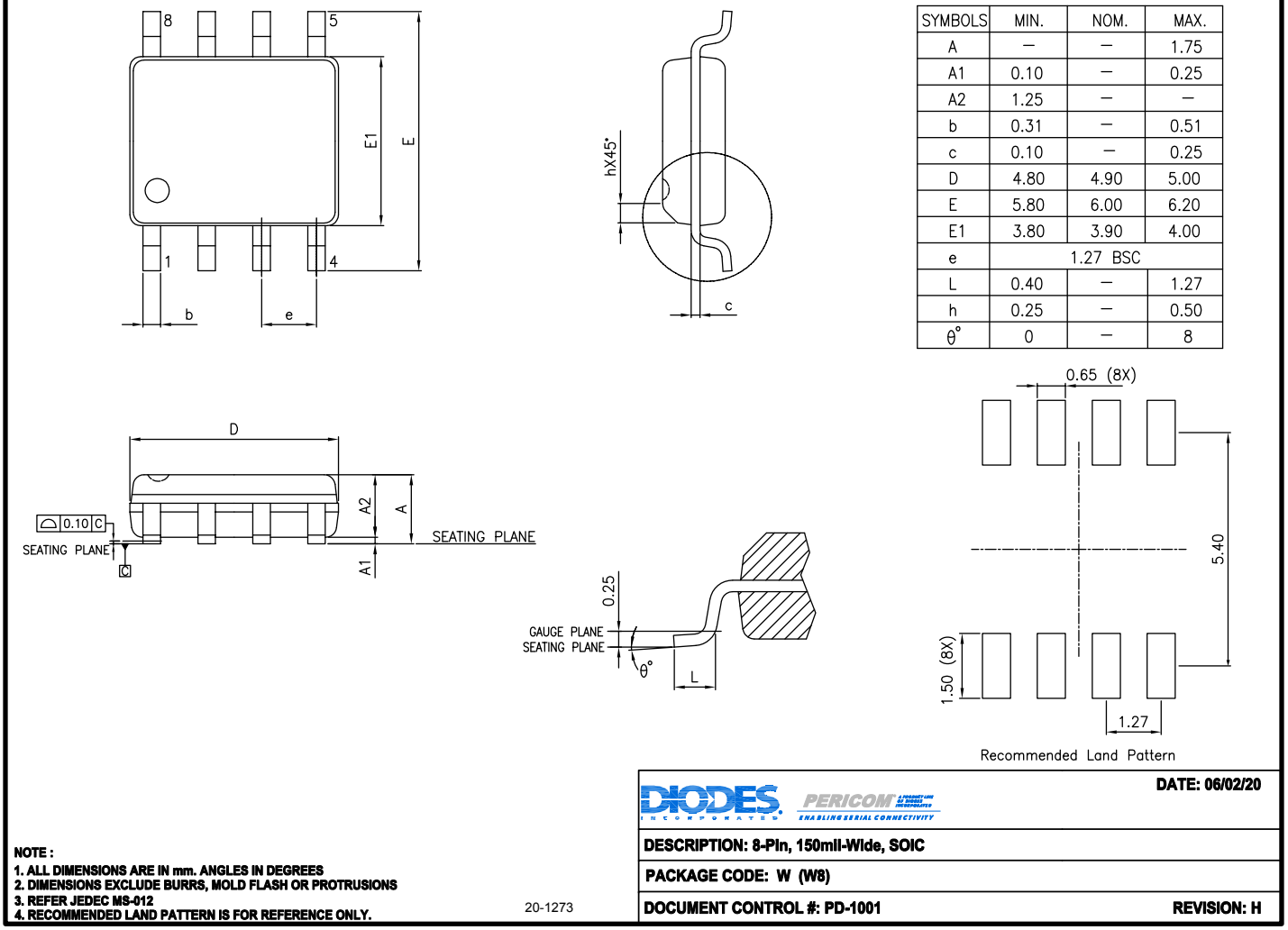
Symbol	Description	Condition	
Θ_{JA}	Junction-to-ambient thermal resistance	Still air	157 °C/W
Θ_{JC}	Junction-to-case thermal resistance		42 °C/W

Part Marking

PI6C49CB
01JWE
YYWWXX

YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

Packaging Mechanical: 8-SOIC (W)



SYMBOLS	MIN.	NOM.	MAX.
A	–	–	1.75
A1	0.10	–	0.25
A2	1.25	–	–
b	0.31	–	0.51
c	0.10	–	0.25
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e		1.27 BSC	
L	0.40	–	1.27
h	0.25	–	0.50
θ°	0	–	8

NOTE :
1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES
2. DIMENSIONS EXCLUDE BURRS, MOLD FLASH OR PROTRUSIONS
3. REFER JEDEC MS-012
4. RECOMMENDED LAND PATTERN IS FOR REFERENCE ONLY.

20-1273

DATE: 06/02/20

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

PACKAGE CODE: W (W8)

DOCUMENT CONTROL #: PD-1001 REVISION: H

For latest package info.

please check: http://www.diodes.com/design/support/packaging/pericom-packaging/packaging-mechanicals-and-thermal-characteristics/

Ordering Information

Ordering Code	Package Code	Package Description
PI6C49CB01JWEX	W	8-pin, 150mil-Wide (SOIC)

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. J = Industrial Grade
5. E = Pb-free and Green
6. X suffix = Tape/Reel

IMPORTANT NOTICE

1. DIODES INCORPORATED AND ITS SUBSIDIARIES ("DIODES") MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes products. Diodes products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of the Diodes products for their intended applications, (c) ensuring their applications, which incorporate Diodes products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.

3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.

4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.

5. Diodes products are provided subject to Diodes' Standard Terms and Conditions of Sale (https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

6. Diodes products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.

7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.

8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

www.diodes.com