A product Line of
Diodes Incorporated

PI6C49CB01Q

Automotive AEC-Q100 Qualified 1-to-1 Differential-to-LVCMOS/LVTTL Translator

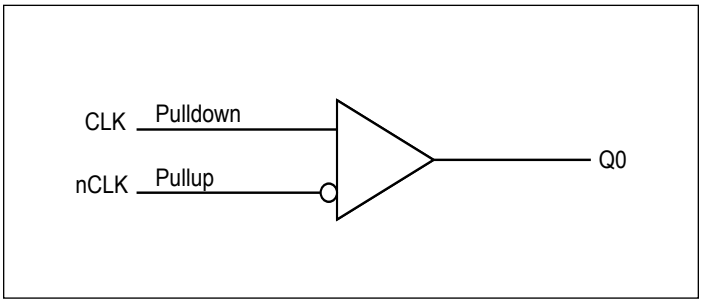
Features

- 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 105°C ambient operating temperature
- AEC-Q100 Qualified
- Automotive Grade 2 temperature range (-40 to 105 °C)
- Automotive Grade 3 temperature range (-40 to 85 °C)
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- The PI6C49CB01Q is suitable for automotive applications requiring specific change control and is AEC-Q100 qualified, has a grade 2, -40 to 105 °C temperature rating and grade 3, -40 to 85 °C temperature rating, is PPAP capable, and is manufactured in IATF16949:2016 certified facilities.
- Package: 8-Pin, SOIC (W)

Description

The PI6C49CB01Q 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.

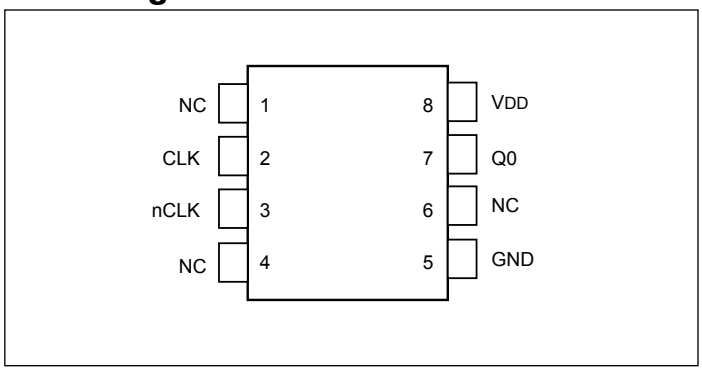
Block Diagram



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
Package Thermal Impedance, θ_{JA} .....103°C/W (0 lfpm)
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 (Automotive Grade 2)	-40		105	°C
Ambient Operating Temperature (Automotive Grade 3)	-40		85	°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.

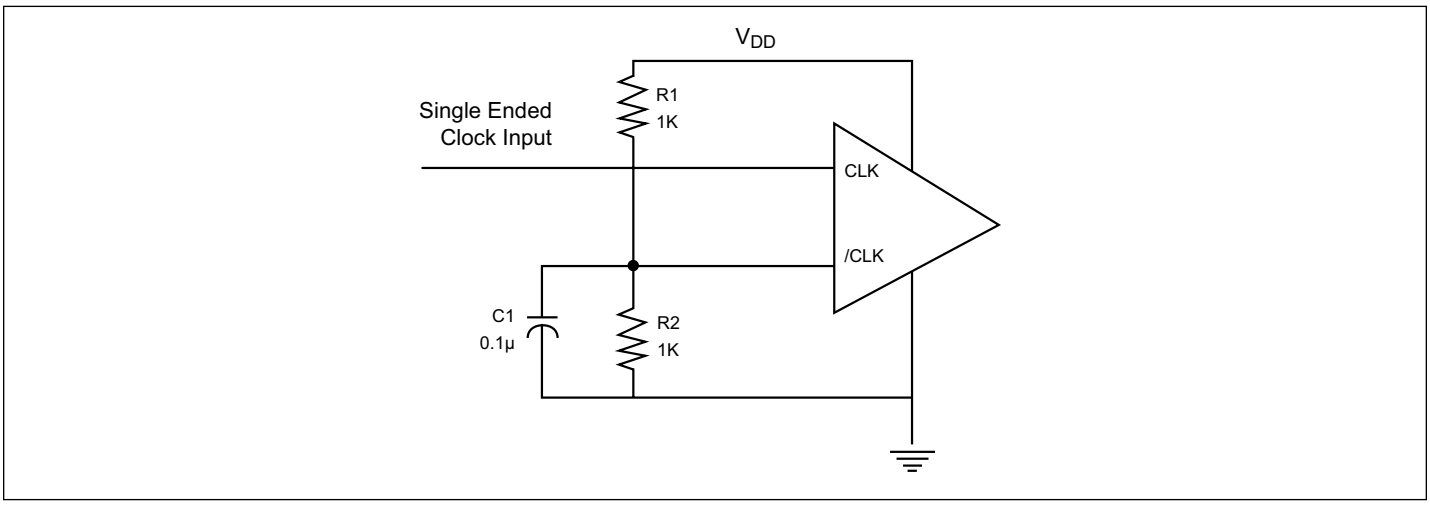


Figure 1. Single-ended Input to Differential Input Device

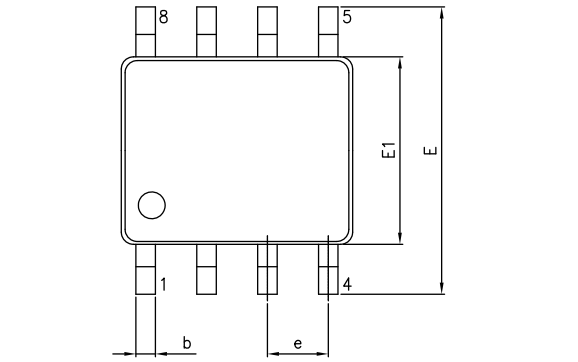
Thermal Information

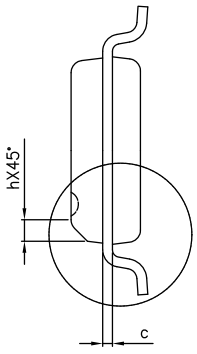
Symbol	Description	Condition	
Θ_{JA}	Junction-to-ambient thermal resistance	Still air	157 °C/W
Θ_{JC}	Junction-to-case thermal resistance		42 °C/W

Part Marking

Top mark not available at this time. To obtain advance information regarding the top mark, please contact your local sales representative.

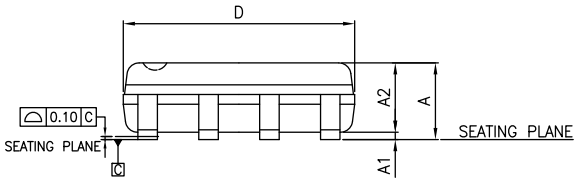
Packaging Mechanical: 8-SOIC (W)

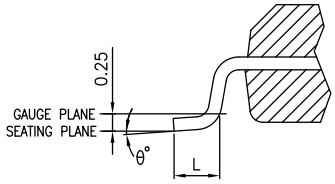




SYMBOLS	MIN.	NOM.	MAX.
A	–	–	1.75
A1	0.10	–	0.25
A2	1.25	–	–
b	0.31	–	0.51
c	0.10	–	0.25
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e		1.27 BSC	
L	0.40	–	1.27
h	0.25	–	0.50
θ°	0	–	8

UNIT : mm





NOTE :
1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES
2. DIMENSIONS EXCLUDE BURRS, MOLD FLASH OR PROTRUSIONS
3. REFER JEDEC MS-012

PERICOM Enabling Serial Connectivity — DATE: 02/21/14

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

PACKAGE CODE: W (W8)

DOCUMENT CONTROL #: PD-1001 — REVISION: G

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	Operating Temperature	Package Description
PI6C49CB01Q2WEX	W	-40 to 105°C	8-pin, 150mil-Wide (SOIC)
PI6C49CB01Q3WEX	W	-40 to 85°C	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. Q = Automotive Compliant
5. 2 and 3 = AEC-Q100 Grade Level
6. E = Pb-free and Green
7. X suffix = Tape/Reel