

PI49FCT32802/PI49FCT32803

1:5/1:7 3.3V CMOS Clock Drivers

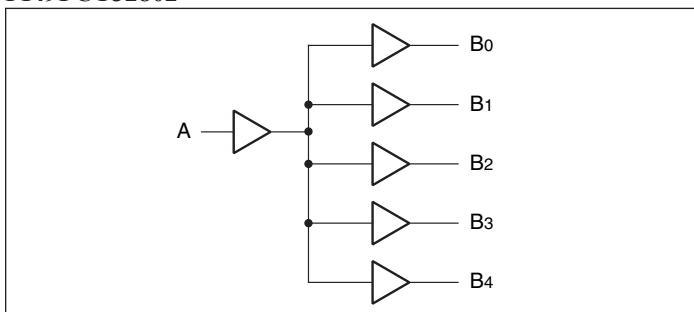
Description

The PI49FCT3280x is a 3.3V very low-skew clock buffer from a single low-capacitance input that produces five outputs on PI49FCT32802 and seven outputs on PI49FCT32803. Excellent output signals to power and ground ratio minimize power and ground noise, and also improves output performance.

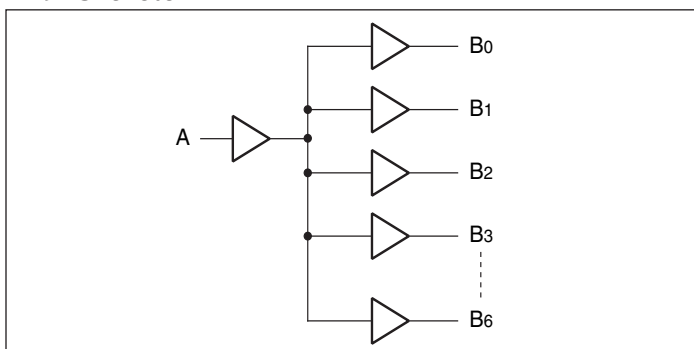
The PI49FCT3280x integrates series damping resistors on all outputs.

Block Diagram

PI49FCT32802



PI49FCT32803



Features

- Low Skew: <200ps
- Fast Switching Frequency: 133MHz (Maximum)
- Fast Output Rise/Fall Time: <1.5ns
- Low Propagation Delay: <2.5ns
- Low Input Capacitance: <6.0pF
- 5V Tolerant Input
- Rail-to-Rail CMOS Outputs
- Industrial Temperature: -40°C to +85°C
- 3.3V ±10% Operation
- Packaging (Pb-free & Green available):
 - 16-Pin, 150-mil Wide, QSOP (Q)
 - 16-Pin, 173-mil Wide, TSSOP (L)
- 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-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative.

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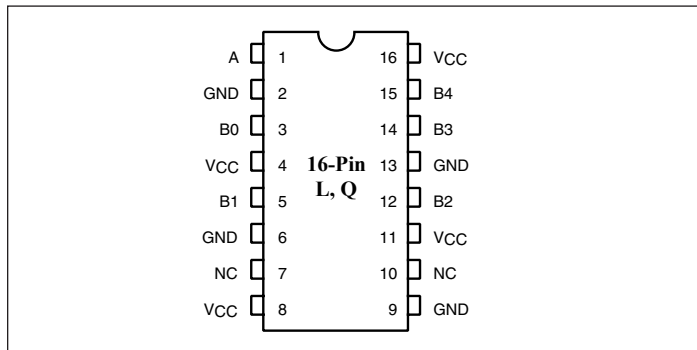
Notes:

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.

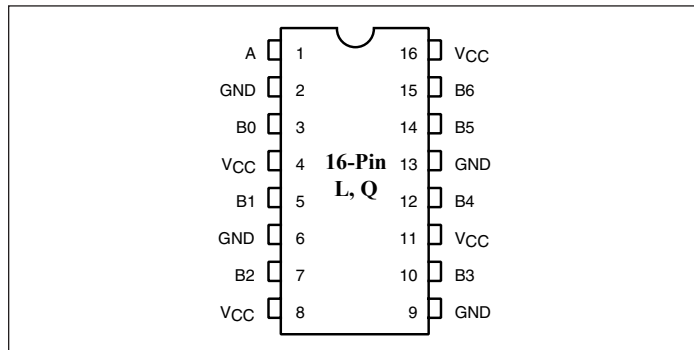
PI49FCT32802/PI49FCT32803

Pin Configuration

PI49FCT32802



PI49FCT32803



Pin Description

Pin Number		Pin Name	Description
PI49FCT32802	PI49FCT32803		
1	1	A	Input
3	3	B0	Outputs
5	5	B1	Outputs
12	7	B2	Outputs
14	10	B3	Outputs
15	12	B4	Outputs
—	14	B5	Outputs
—	15	B6	Outputs
2, 6, 9, 13	2, 6, 9, 13	GND	Ground
4, 8, 11, 16	4, 8, 11, 16	VCC	Power
7, 10	—	NC	Not Connected

Maximum Ratings

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

Storage Temperature	-55°C to +150°C
Supply Voltage to Ground Potential.....	-0.5V to +5.5V
DC Input Voltage	-0.5V to +5.5V
DC Output Current.....	120mA
Power Dissipation	0.5W
Latch Up.....	200mA
ESD Protection (Input)	2000V Min. (HBM)
Junction Temperature.....	125°C Max.

Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

DC Electrical Characteristics

Over the Operating Range

Symbol	Description	Test Conditions ⁽¹⁾		Min.	Typ.	Max.	Units
V _{OH}	Output HIGH Voltage	V _{CC} = 3V, V _{IN} = V _{IH} or V _{IL}	I _{OH} = -8mA	2.4	3		V
V _{OL}	Output LOW Voltage	V _{CC} = 3V, V _{IN} = V _{IH} or V _{IL}	I _{OL} = 12mA		0.4	0.5	
V _{IH}	Input HIGH Voltage	Guaranteed Logic HIGH Level (Input Pins)		2		5.5	
V _{IL}	Input LOW Voltage	Guaranteed Logic LOW Level (Input Pins)		-0.5		0.8	
I _{IH}	Input HIGH Current	V _{CC} = 3.6V	V _{IN} = 3.6V			1	μA
I _{IL}	Input LOW Current	V _{CC} = 3.6V	V _{IN} = 0V			-1	
V _{IK}	Clamp Diode Voltage	V _{CC} = Min., I _{IN} = -18mA			-0.7	-1.2	V
I _{OH}	Output HIGH Current	V _{CC} = 3.3V, V _{IN} = V _{IH} or V _{IL} , V _{OUT} = 1.5V ⁽⁵⁾		-25	-45	-80	mA
I _{OL}	Output LOW Current	V _{CC} = 3.3V, V _{IN} = V _{IH} or V _{IL} , V _{OUT} = 1.5V ⁽⁵⁾		25	45	90	
I _{OS}	Short Circuit Current ⁽⁵⁾	V _{CC} = Max., V _{OUT} = GND ⁽⁵⁾		-50	-100	-180	
V _H	Input Hysteresis				150		mV
R _S	Series Resistor				22		Ω

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V_{CC} = 3.3V, +25°C ambient and maximum loading.
- V_{OH} = V_{CC} - 0.6V at rated current.
- This parameter is determined by device characterization but is not production tested.
- Not more than one output should be shorted at one time. Duration of the test should not exceed one second.

Power Supply Characteristics

Parameters	Description	Test Conditions ⁽¹⁾		Min.	Typ ⁽²⁾	Max.	Units
I _{CC}	Quiescent Power Supply Current	V _{CC} = Max.	V _{IN} = GND or V _{CC}		0.1	30	μA

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Parameters	Description	Test Conditions ⁽¹⁾		Min.	Typ ⁽²⁾	Max.	Units
ΔI_{CC}	Supply Current per Inputs @ TTL HIGH	$V_{CC} = \text{Max.}$	$V_{IN} = V_{CC} - 0.6V^{(3)}$		47	300	μA
I_{CCD}	Supply Current per Input per MHz ⁽⁴⁾	$V_{CC} = \text{Max.},$ Outputs Open Per Output Toggling 50% Duty Cycle	$V_{IN} = V_{CC}$				mA/
			$V_{IN} = \text{GND}$		0.08	0.16	MHz

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at $V_{CC} = 3.3V$, $+25^{\circ}C$ ambient.
- Per TTL driven input ($V_{IN} = V_{CC} - 0.6V$); all other inputs at V_{CC} or GND.
- This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.
- Values for these conditions are examples of the I_C formula. These limits are guaranteed but not tested.

Capacitance

 $T_A = 25^{\circ}C$, $f = 1\text{MHz}$

Parameters ⁽¹⁾	Description	Test Conditions	Typ	Max.	Units
C_{IN}	Input Capacitance	$V_{IN} = 0V$	3.0	4	pF
C_{OUT}	Output Capacitance	$V_{OUT} = 0V$		6	

Notes:

- This parameter is determined by device characterization but is not production tested.

Maximum Switching Characteristics

Over operating range

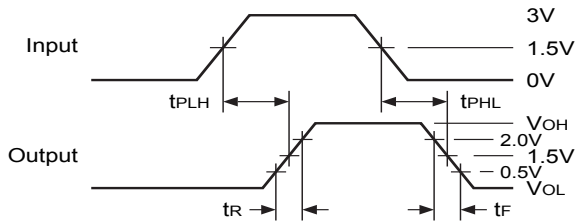
Symbol	Description	Condition	Max.	Units
t_{PLH} t_{PHL}	Propagation Delay A to Bn ⁽³⁾	$CL = 15\text{pF}$	2.5	ns
$t_{R/tF}$	Rise/Fall Time ⁽²⁾	0.8V–2.0V	1.5	
$t_{SK(p)}$	Pulse Skew (Same Package) ^(1,2)	$CL = 15\text{pF}$	0.35	
$t_{SK(o)}$	Output Skew (Same Package) ^(1,2)		0.2	
$t_{SK(t)}$	Output Skew (Different Package) (1,2)		0.55	
F_{IN}	Input Frequency ^(1,2)		133	MHz

Notes:

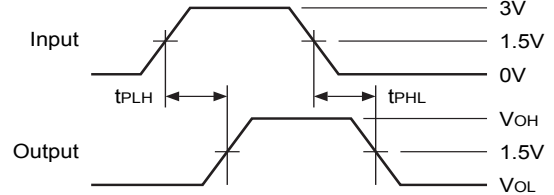
- Other loading condition is described on page 4, “Test Circuits for All Outputs.”
- These parameters are guaranteed by design.
- Minimum propagation delay of 1.5ns is guaranteed by design.

Switching Waveforms

Propagation Delay

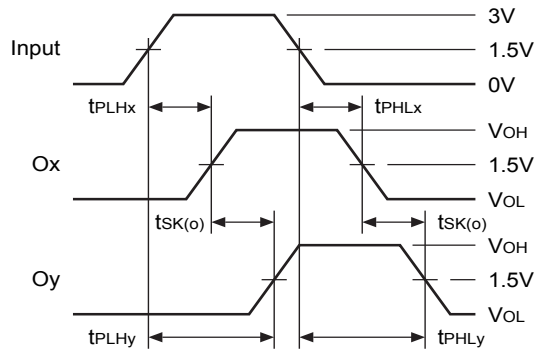


Pulse Skew – $t_{SK(p)}$



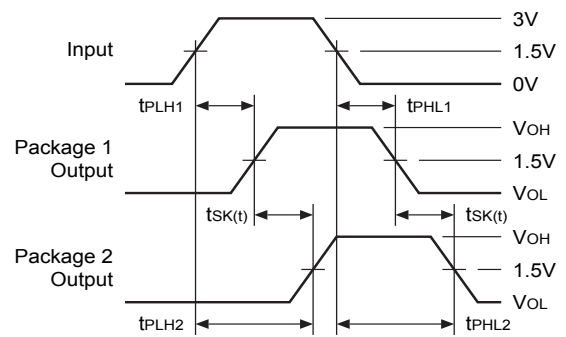
$$t_{SK(p)} = |t_{PHL} - t_{PLH}|$$

Output Skew – $t_{SK(o)}$



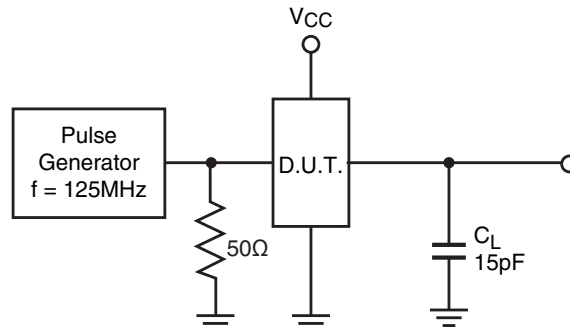
$$t_{SK(o)} = |t_{PLHy} - t_{PLHx}| \text{ or } |t_{PHLy} - t_{PHLx}|$$

Package Skew – $t_{SK(t)}$



$$t_{SK(t)} = |t_{PLH2} - t_{PLH1}| \text{ or } |t_{PHL2} - t_{PHL1}|$$

Tests Circuits for All Outputs



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Part Marking

PI49FCT32802

Q Package

PI49FCT
32802QE
○ YWXX

YW: 2 Letter Datecode per MA1251
1st X: Assembly Code
2nd X: Fab Code

L Package

PI49FCT
32802LE
○ YYWWXX

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

PI49FCT32803

Q Package

PI49FCT
32803QE
○ YYWWXX

YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code
Date Code per MA-1251

L Package

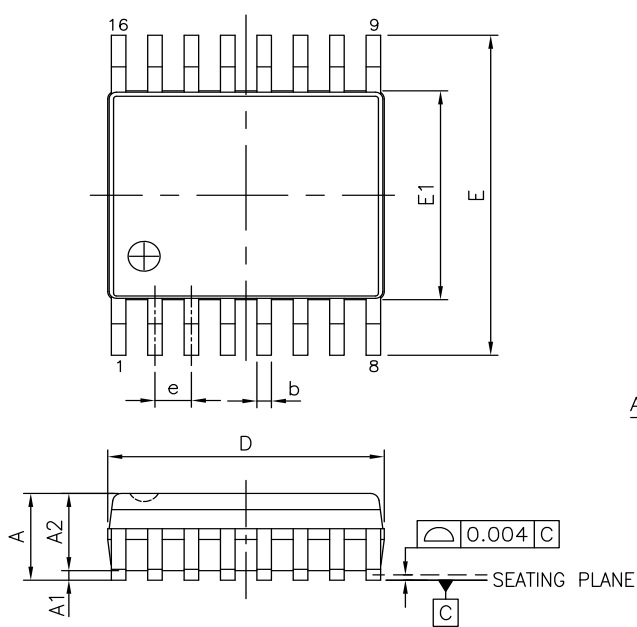
PI49FCT
32803LE
○ YYWWXX

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

PI49FCT32802/PI49FCT32803

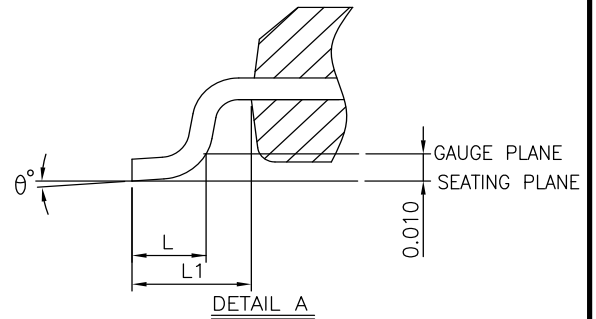
Packaging Mechanical

16-QSOP (Q)



SYMBOLS	MIN.	NOM.	MAX.
A	—	—	0.069
A1	0.004	—	0.0098
A2	0.049	—	—
b	0.008	—	0.012
c	0.004	—	0.010
D	0.189	0.193	0.197
E1	0.150	0.154	0.158
E	0.228	0.236	0.244
L	0.016	—	0.050
L1	0.041 REF.		
e	0.025 BSC.		
θ°	0	—	8

UNIT : INCH



NOTES:
1. ALL DIMENSIONS IN INCH. ANGLES IN DEGREES.
2. JEDEC MO-137E.
3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.



DATE: 04/08/16

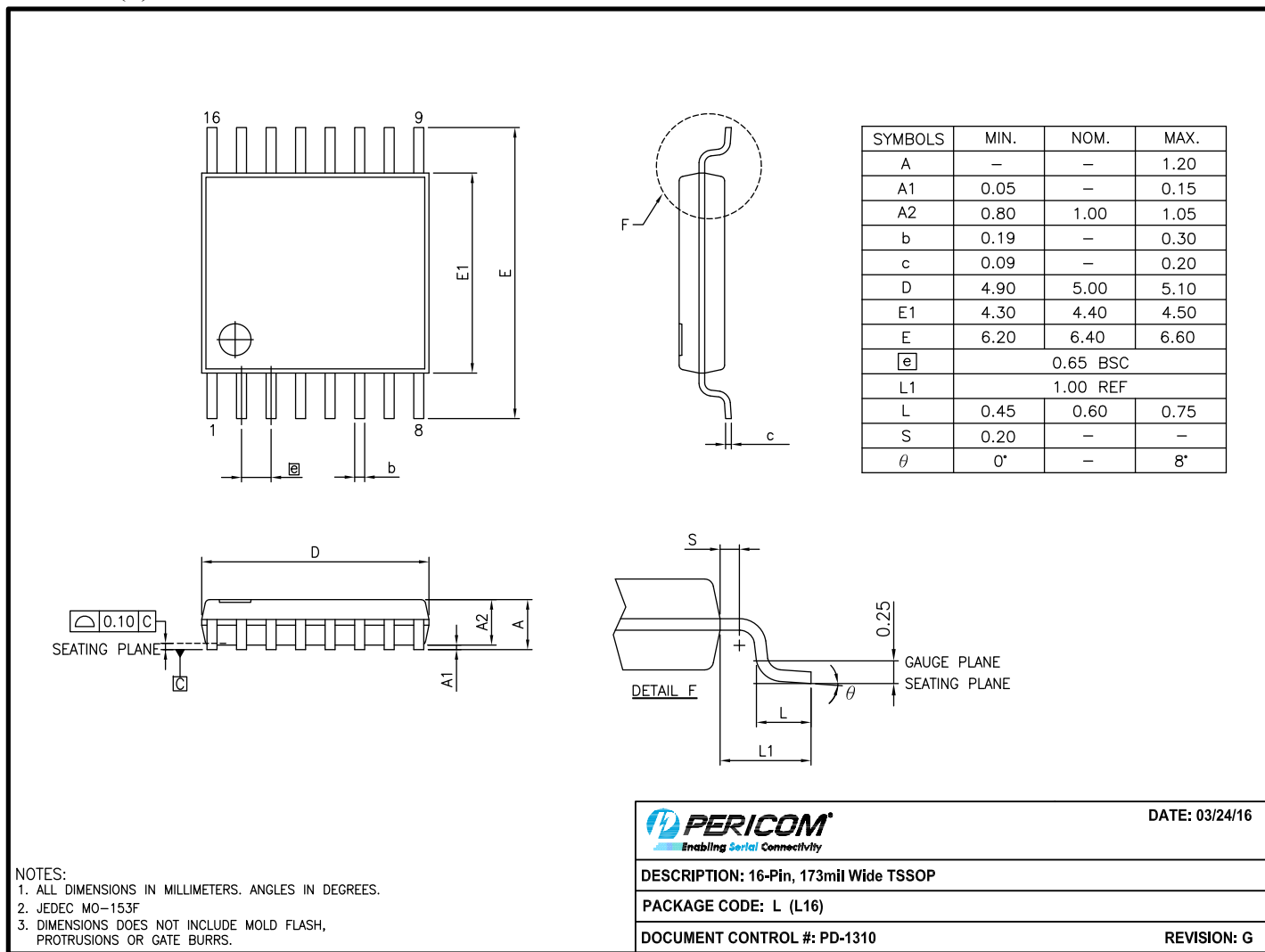
DESCRIPTION: 16-Pin, 150mil Wide QSOP

PACKAGE CODE: Q (Q16)

DOCUMENT CONTROL #: PD-1201

REVISION: H

16-0056

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16-TSSOP (L)


16-0061

For latest package info.

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

Orderable Part Number	Package Code	Package Description
PI49FCT32802QEX	Q	16-Pin, 150mil Wide (QSOP)
PI49FCT32803QEX	Q	16-Pin, 150mil Wide (QSOP)
PI49FCT32802LEX	L	16-Pin, 173mil Wide (TSSOP)
PI49FCT32803LEX	L	16-Pin, 173mil Wide (TSSOP)

Notes:

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- 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.
- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- E = Pb-free and Green
- X suffix = Tape/Reel

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