A product Line of
Diodes Incorporated

PI49FCT3802/PI49FCT3803

1:5/1:7 Clock Buffer for Networking Applications

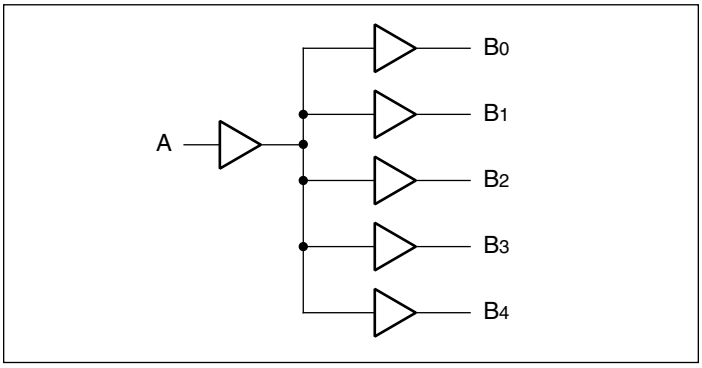
Features

- High Frequency >156 MHz
- High-Speed, Low-Noise, Non-Inverting Buffer
  - PI49FCT3802 is 1:5 Buffer
  - PI49FCT3803 is 1:7 Buffer
- Low-Skew (<250ps) Between Any Two Output Clocks
- Low Duty Cycle Distortion <250ps
- Low-Propagation Delay <2.5ns
- 5V Tolerant Input
- Multiple V_{DD}, GND Pins for Noise Reduction
- 3.3V Supply Voltage
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Packaging (Pb-free & Green available):
  - 16-pin TSSOP (L)

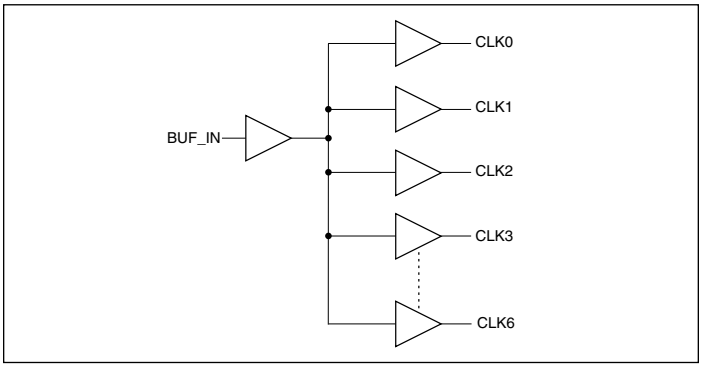
Description

The PI49FCT380x is a 3.3V compatible, high-speed, low-noise, non-inverting clock buffer. The key goal in designing the PI6C380x is to target networking applications that require low-skew, low-jitter, and high-frequency clock distribution. Providing output-to-output skew as low as 250ps, the PI49FCT380x is an ideal clock distribution device for synchronous systems. Designing synchronous networking systems requires a tight level of skew from a large number of outputs.

Block Diagram (PI49FCT3802)

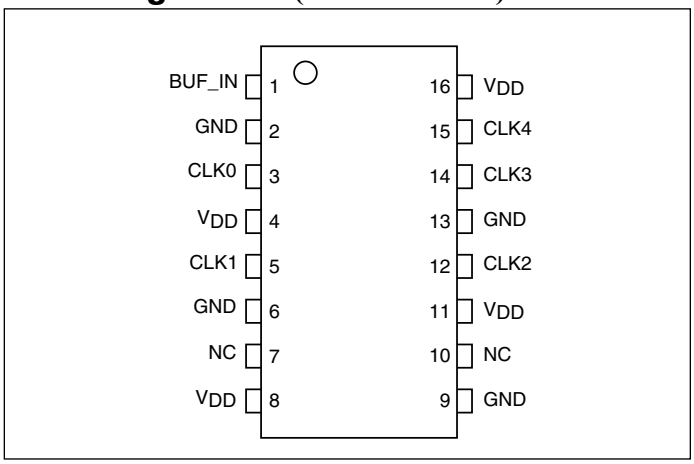


Block Diagram (PI49FCT3803)

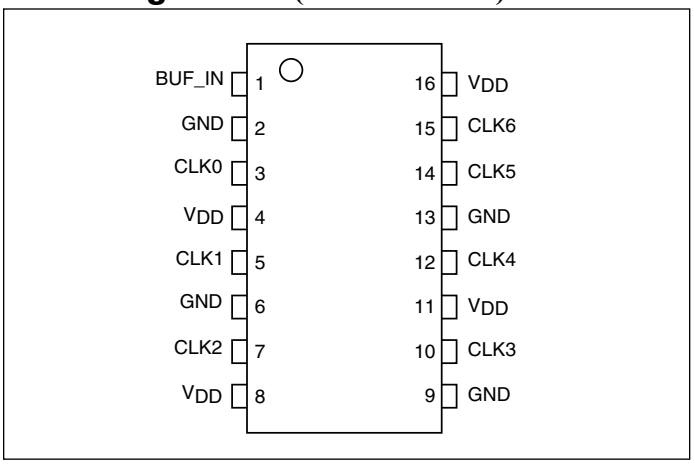


Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- 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 (PI49FCT3802)



Pin Configuration (PI49FCT3803)



Pin Description

Pin#		Pin Name	Type
FCT3802	FCT3803		
1	1	BUF_IN	Input
3	3	CLK0	Output
5	5	CLK1	Output
12	7	CLK2	Output
14	10	CLK3	Output
15	12	CLK4	Output
–	14	CLK5	Output
–	15	CLK6	Output
2, 6, 9, 13	2, 6, 9, 13	GND	GND
4, 8, 11, 16	4, 8, 11, 16	V_{DD}	Power
7, 10	–	NC	NC

Maximum Ratings

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

Storage Temperature	–65°C to +150°C
Junction Temperature	125°C
V_{DD} Voltage	–0.5V to 5.5V
Output Voltage	–0.5V to 5.5V
Input Voltage	–0.5V to 5.5V
DC Output Current	–60mA to +60mA
Power Dissipation	500mW

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.

Operating Range

V_{DD} Voltage	3.3V ± 0.3V
Commercial Temperature	0°C to +70°C
Industrial Temperature	–40°C to +85°C
Input Frequency	DC to 156 MHz
Capacitive Loading	10pF to 50pF

DC Electrical Characteristics (Over the Operating Range)

Parameters	Description	Test Conditions[1]		Min.	Typ.[2]	Max.	Units
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH Level (Input Pins)		2.0	—	5.5	V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW Level (Input Pins)		-0.5	—	0.8	
I_{IH}	Input HIGH Current	V_{DD} = Max.	V_{IN} = V_{DD}	—	—	1	µA
I_{IL}	Input LOW Current	V_{DD} = Max.	V_{IN} = GND	—	—	-1	
V_{IK}	Clamp Diode Voltage	V_{DD} = Min., I_{IN} = –18mA		—	-0.7	-1.2	V
V_{OH}	Output HIGH Voltage	V_{CC} = Min., V_{IN} = V_{IH} or V_{IL}	I_{OH} = –0.1mA	V_{DD}-0.2	—	—	
			I_{OH} = –12mA	2.4[3]	3.0	—	
V_{OL}	Output LOW Voltage	V_{CC} = Min., V_{IN} = V_{IH} or V_{IL}	I_{OH} = 0.1mA	—	—	0.2	
			I_{OH} = 12mA	—	0.3	0.5	
I_{OH}	Output HIGH Current	V_{DD} = 3.0V, V_{IN} = V_{IH} OR V_{IL}, V_{OUT} = 1.5V[4]		-45	-75	-180	mA
I_{OL}	Output LOW Current	V_{DD} = 3.0V, V_{IN} = V_{IH} OR V_{IL}, V_{OUT} = 1.5V[4]		50	92	200	

Notes:
1. For maximum or minimum conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{DD} = 3.3V, +25°C ambient and maximum loading.
3. V_{OH} = V_{DD}– 0.6V at rated current.
4. This parameter is determined by device characterization but is not production tested.
5. 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		Min.	Typ.(2)	Max.	Units
I_{DDQ}	Quiescent Power Supply Current	V_{DD} = Max.	V_{IN} = GND or V_{DD}	—	0.1	30	µA
ΔI_{DD}	Supply Current per Inputs @ TTL High	V_{DD} = Max.	V_{IN} = V_{DD} -0.6V(3)	—	47	300	µA
I_{DD}	Dynamic Supply Current	V_{DD} = 3.6V, No load	50MHz	—	43	—	mA
			67MHz	—	56	—	
			80MHz	—	66	—	
			100MHz	—	81	—	
			125MHz	—	97	—	
			156MHz	—	121	—	

Notes: 1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at V_{DD} = 3.3V, +25°C ambient.
3. Per TTL driven input (V_{IN} = V_{DD} – 0.6V); all other inputs at V_{DD} or GND.

Capacitance (T_A = 25°C, f = 1 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	

Note: 1. This parameter is determined by device characterization but is not production tested.

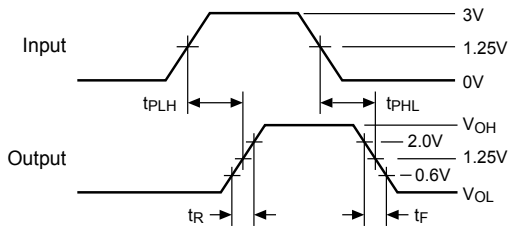
Switching Characteristics (V_{DD} = 3.3V ± 0.3V, T_A = 85°C)

Parameters	Description	Test Conditions	Min.	Typ.	Max.	Units
t_R/t_F	CLKn Rise/Fall Time 0.8V ~ 2.0V	C_L = 15pF, 125MHz	—	0.7	1.0	ns
t_{PLH} t_{PHL}	Propagation Delay BUF_IN to CLKn		1.0	2.2	2.5	
$t_{sk(o)}$(3)	Skew between two outputs of the same package (same transition)		—	110	250	ps
$t_{sk(p)}$(3)	Skew between opposite transitions (t_{PHL} - t_{PLH}) of the same output		—	200	250	
$t_{sk(t)}$(3)	Skew between two outputs of different packages(4)		—	—	0.55	ns

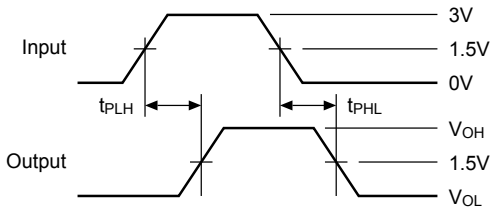
Notes: 1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested on propagation delays.
3. Skew measured at worse cast temperature (max. temp).
4. Identical conditions: loading, transitions, supply voltage, temperature, package type, and speed grade.

Switching Waveforms

Propagation Delay

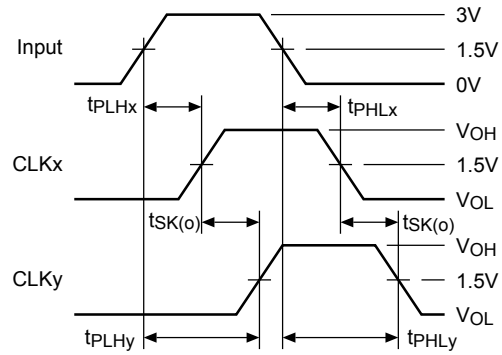


Pulse Skew – $t_{SK(P)}$



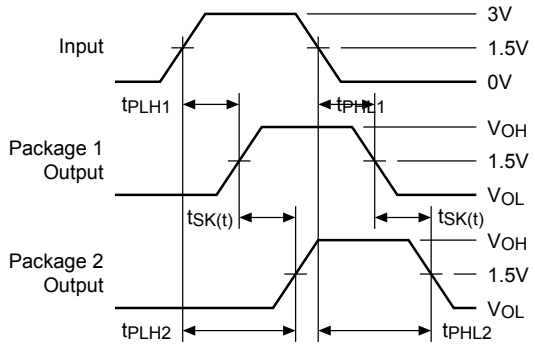
$t_{SK(p)} = | t_{PHL} - t_{PLH} |$

Output Skew – $t_{SK(O)}$



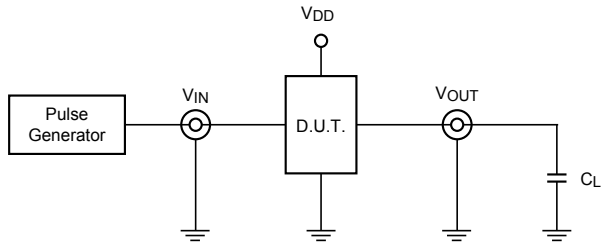
$t_{SK(o)} = t_{PLHy} - t_{PLHx}$ or $t_{PHLy} - t_{PHLx}$

Package Skew – $t_{SK(T)}$



$t_{SK(t)} = t_{PLH2} - t_{PLH1}$ or $t_{PHL2} - t_{PHL}$

Test Circuits for All Outputs



Definitions:

C_L = Load capacitance: includes jig and probe capacitance.
R_T = Termination resistance, should be equal to Zout of the Pulse Generator.

Part Marking

PI49FCT3802

PI49FCT
3802LE_
YYWWXX

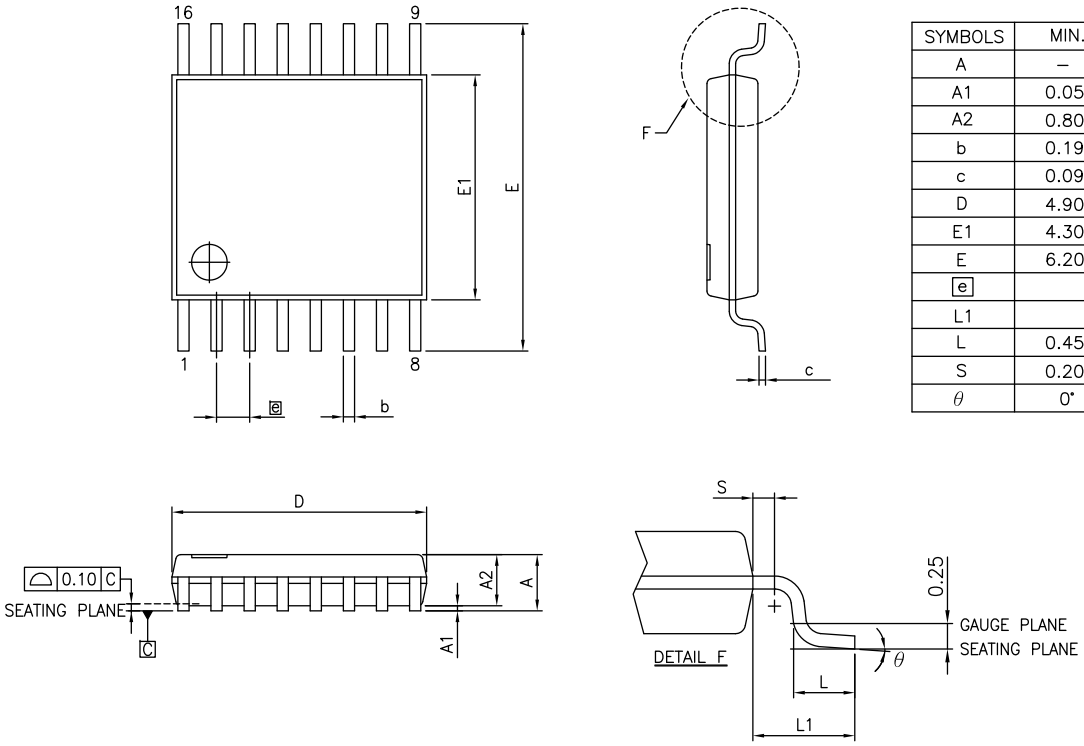
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

PI49FCT3803

PI49FCT
3803LE_
YYWWXX

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

Packaging Mechanical: 16-TSSOP (L)



SYMBOLS	MIN.	NOM.	MAX.
A	–	–	1.20
A1	0.05	–	0.15
A2	0.80	1.00	1.05
b	0.19	–	0.30
c	0.09	–	0.20
D	4.90	5.00	5.10
E1	4.30	4.40	4.50
E	6.20	6.40	6.60
e	0.65 BSC		
L1	1.00 REF		
L	0.45	0.60	0.75
S	0.20	–	–
θ	0°	–	8°

NOTES:
1. ALL DIMENSIONS IN MILLIMETERS. ANGLES IN DEGREES.
2. JEDEC MO–153F
3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

PERICOM Enabling Serial Connectivity — DATE: 03/24/16

DESCRIPTION: 16-Pin, 173mil Wide TSSOP

PACKAGE CODE: L (L16)

DOCUMENT CONTROL #: PD-1310 — REVISION: G

16-0061

For latest package information:

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

Ordering Information

Ordering Number	Package Code	Package Description
PI49FCT3802LEX	L	16-Pin, 173mil Wide (TSSOP)
PI49FCT3803LEX	L	16-Pin, 173mil Wide (TSSOP)

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. E = Pb-free and Green
5. X suffix = Tape/Reel

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

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