A Product Line of
Diodes Incorporated

/ PERICOM®

DIODES
INCORPORATED

Pb Lead-free Green

PI49FCT3807D

## 1-10 Clock Buffer for Networking Applications

Features

➔ Maximum Frequency up to 156 MHz

➔ High-speed, low-noise, non-inverting 1-10 buffer

➔ Low-skew (<250ps) between any two output clocks

➔ Low duty cycle distortion <250ps

➔ Low propagation delay <2.5ns

➔ Multiple VDD, GND pins for noise reduction

➔ 3.3V supply voltage with 5V input tolerant

➔ 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/

➔ Packages (Pb-free & Green Available):
  ‣ 20-pin 209-mil wide SSOP (H)
  ‣ 20-pin 150-mil wide QSOP (Q)

Description

The PI49FCT3807D is a 3.3V high-speed, low-noise 1-10 non-inverting clock buffer. The key goal in designing the PI49FCT3807D 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 PI49FCT3807D 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.
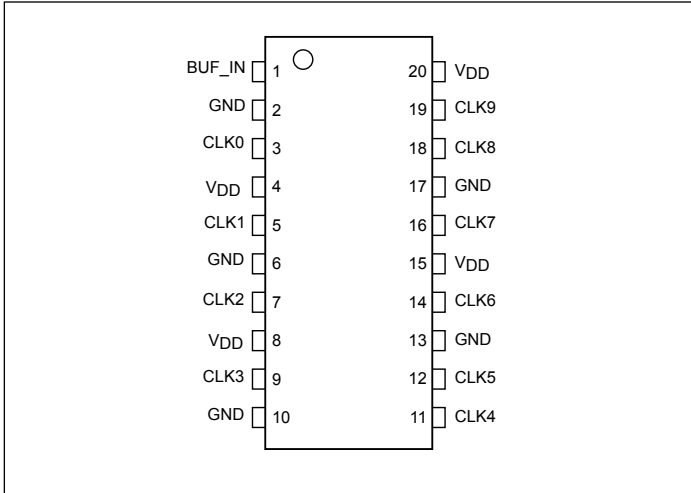
Block Diagram
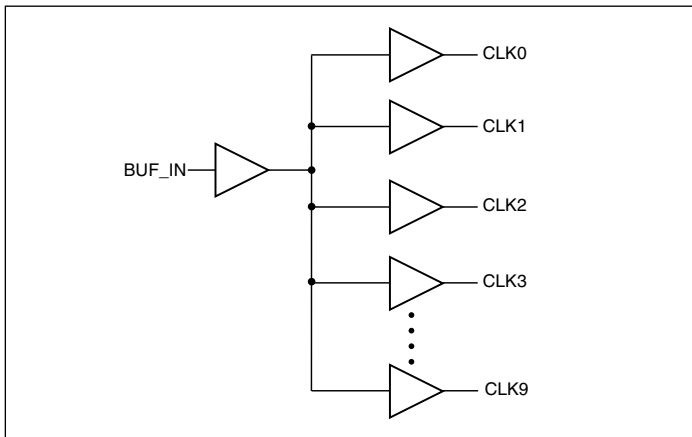
Notes:

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

```
        BUF_IN  ┤1  ○      20├  VDD
          GND   ┤2         19├  CLK9
          CLK0  ┤3         18├  CLK8
          VDD   ┤4         17├  GND
          CLK1  ┤5         16├  CLK7
          GND   ┤6         15├  VDD
          CLK2  ┤7         14├  CLK6
          VDD   ┤8         13├  GND
          CLK3  ┤9         12├  CLK5
          GND   ┤10        11├  CLK4
```

Pin Description

Pin Name	Description
BUF_IN	Input
CLK [0:9]	Outputs
GND	Ground
V_{DD}	Power

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

Storage Temperature	–65°C to +150°C
V_{DD} Voltage	–0.5V to +4.6V
Output Voltage	–0.5V to V_{DD}+0.5V
Input Voltage	–0.5V to +5.5V
Junction Temperature	Max. 125°C

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
Industrial Temperature	–40°C to +105°C
Input Frequency	DC to 156 MHz

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} = 5.5V			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_{OH}	Output High Voltage	V_{DD} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OH} = 0.1mA	V_{DD}-0.2			V
			I_{OH} = -12mA	2.4[3]	3.0		
V_{OL}	Output LOW Voltage	V_{DD} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OL} = 0.1mA			0.2	
			I_{OL} = 12mA		0.3	0.5	
I_{ODH}	Output HIGH Current	V_{DD} = 3.3V, V_{IN} = V_{IH} or V_{IL}, V_{OUT} = 1.5V[4, 5]		-45	-75	-180	mA
I_{ODL}	Output LOW Current	V_{DD} = 3.3V, V_{IN} = V_{IH} or V_{IL}, V_{OUT} = 1.5V[4, 5]		50	80	200	

Notes:
1.   For Max. or Min. 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[1]		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	
I_D	Dynamic Supply Current	V_{DD} = 3.6V, No Load	50 MHz		43	55	mA
			67 MHz		56	70	
			80 MHz		66	85	
			100 MHz		81	105	
			125 MHz		97	125	
			156 MHz		121	155	

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.
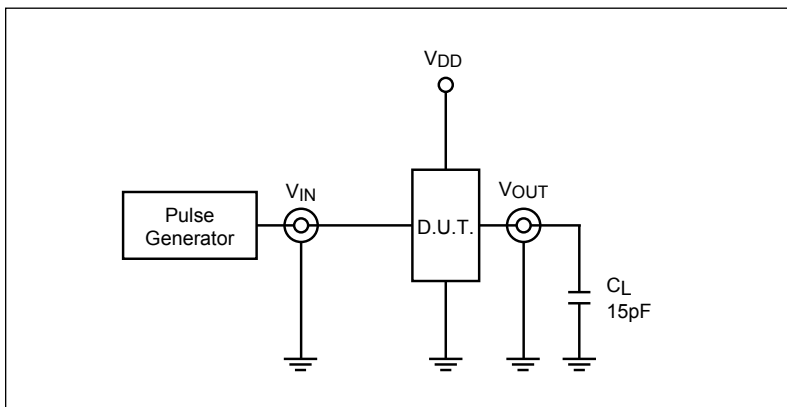3. Per TTL driven input ($V_{IN} = V_{DD}$ – 0.6V); all other inputs at V_{DD} or GND.

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.

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.

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

Parameters	Description	Test Conditions[1]	Min.	Typ	Max.	Units
t_R/t_F	CLKn Rise/Fall Time 0.8V ~ 2.0V			0.8	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)	C_L = 15pF, 125 MHz		110	250	
$t_{SK(p)}$[3]	Skew between opposite transitions (t_{PHL}-t_{PLH}) of the same output			200	250	ps
$t_{SK(o)}$[3]	Skew between two outputs of different package[4]				550	

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.

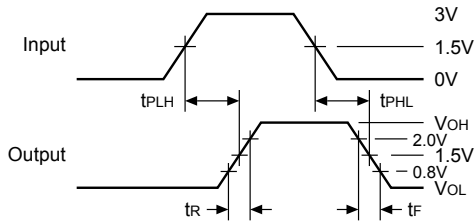## Switching Characteristics (V_{DD} = 3.3V ± 0.3V, T_A = 105°C)

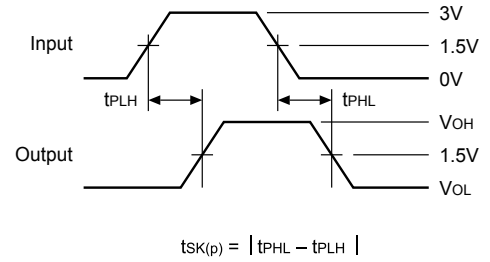| Parameters	Description	Test Conditions[1]	Min.	Typ	Max.	Units
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$t_{SK(o)}$[3]	Skew between two outputs of the same package (same transition)	C_L = 15pF, 125 MHz		110	250	
$t_{SK(p)}$[3]	Skew between opposite transitions (t_{PHL}-t_{PLH}) of the same output			200	250	ps
$t_{SK(o)}$[3]	Skew between two outputs of different package[4]				550	

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

Input — 3V / 1.5V / 0V

t_{PLH} t_{PHL}

Output — V_{OH} / 2.0V / 1.5V / 0.8V / V_{OL}

t_R t_F

Pulse Skew – $t_{SK(P)}$

Input — 3V / 1.5V / 0V

t_{PLH} t_{PHL}

Output — V_{OH} / 1.5V / V_{OL}

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

Output Skew – $t_{SK(O)}$

Input — 3V / 1.5V / 0V

t_{PLHx} t_{PHLx}

CLKx — V_{OH} / 1.5V / V_{OL}

$t_{SK(o)}$ $t_{SK(o)}$

CLKy — V_{OH} / 1.5V / V_{OL}

t_{PLHy} t_{PHLy}

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

Package Skew – $t_{SK(T)}$

Input — 3V / 1.5V / 0V

t_{PLH1} t_{PHL1}

Package 1 Output — V_{OH} / 1.5V / V_{OL}

$t_{SK(t)}$ $t_{SK(t)}$

Package 2 Output — V_{OH} / 1.5V / V_{OL}

t_{PLH2} t_{PHL2}

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

A Product Line of
Diodes Incorporated

Part Marking

Q Package

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PI49FCT
3807DQE‾
BYYWWXX‾
○
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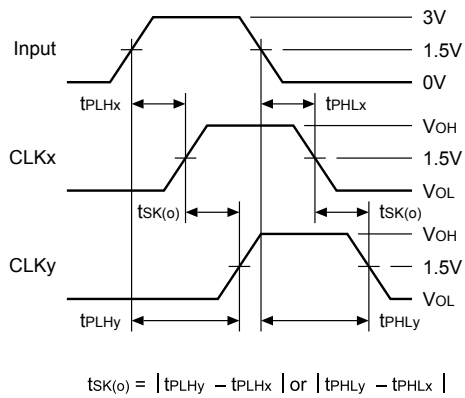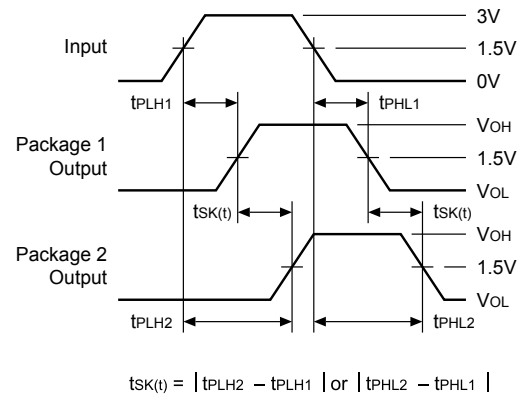
B: Fab 2 Code
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

H Package

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PI49FCT
3807DHE‾
YYWWXX‾
○
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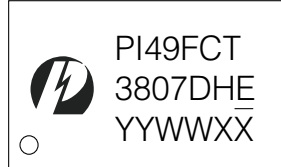
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

Packaging Mechanical: 20-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	0.337	0.341	0.345
E	0.228	0.236	0.244
E1	0.150	0.154	0.158
e	0.025 BSC		
L	0.016	0.025	0.050
L1	0.041 REF		
θ°	0°	–	8°

UNIT : INCH

DETAIL A
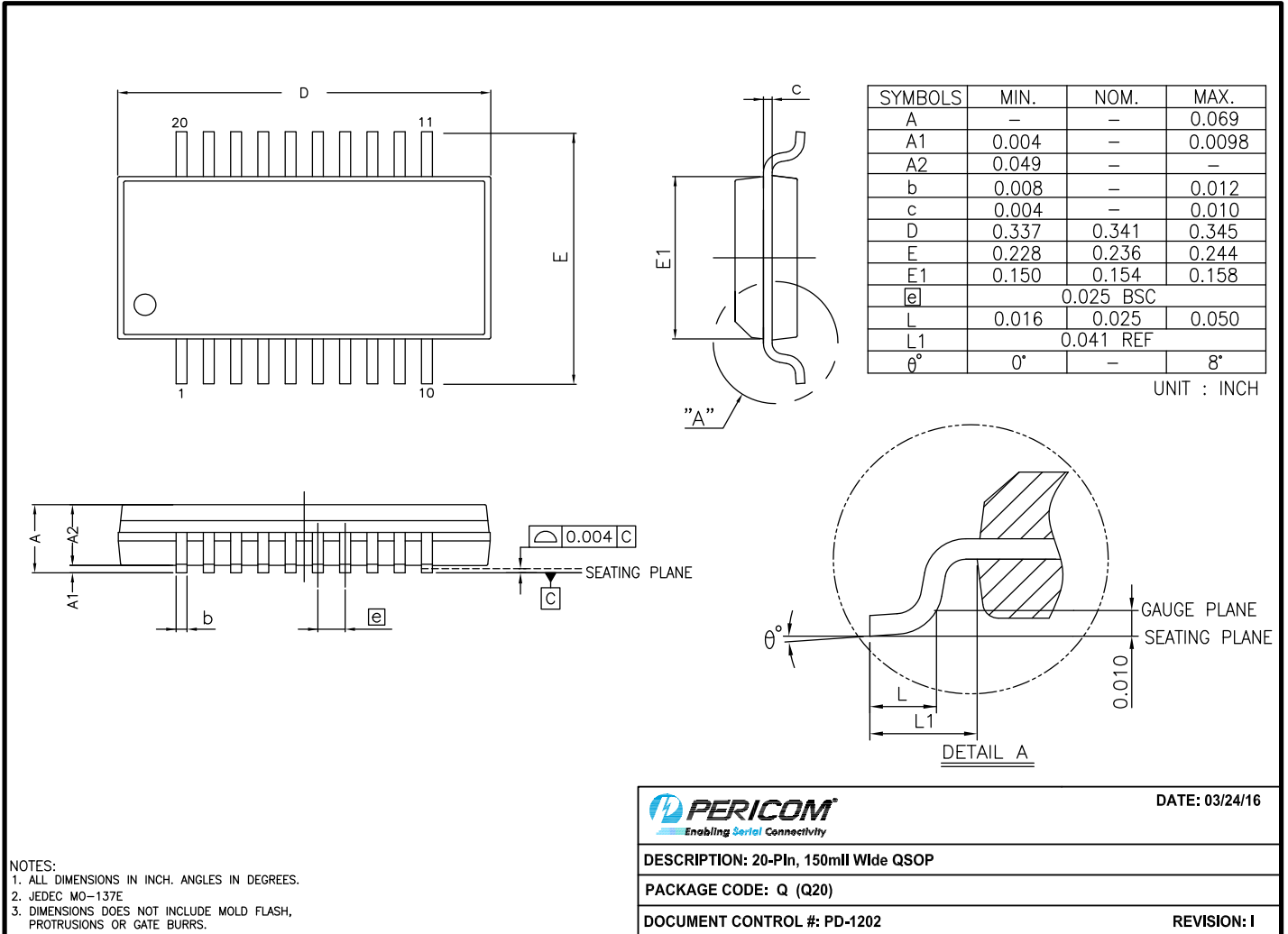
DATE: 03/24/16

PERICOM
Enabling Serial Connectivity

DESCRIPTION: 20-Pin, 150mil Wide QSOP

PACKAGE CODE: Q (Q20)

DOCUMENT CONTROL #: PD-1202   **REVISION: I**

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

16-0057

Packaging Mechanical: 20-SSOP (H)

SYMBOL	COMMON DIMENSION MILLIMETERS		
	MIN.	NOM.	MAX.
A	--	--	2.0
A1	0.05	--	--
A2	1.65	1.75	1.85
b	0.22	--	0.38
b1	0.22	0.30	0.33
c	0.09	--	0.25
c1	0.09	0.15	0.21
E	7.40	7.80	8.20
E1	5.00	5.30	5.60
D	6.90	7.20	7.50
e	0.65 BSC		
L	0.55	0.75	0.95
L1	1.25 REF.		
R1	0.09	--	--
θ	0°	4°	8°

NOTE:
1. Controlling dimensions in millimeters
2. Ref.: JEDEC MO−150B/AE
3. Package Outline Exclusive of Mold Flash and Metal Burr

DATE: 10/31/13

Semiconductor Corporation

DESCRIPTION: **20-Pin, 209-Mil Wide, SSOP**

PACKAGE CODE: **H20**

DOCUMENT CONTROL #: PD-1240   REVISION: F

13-0214

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
PI49FCT3807DQEX	Q	20-pin, 150-mil wide (QSOP)
PI49FCT3807DHEX	H	20-pin, 209-mil wide (SSOP)

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