

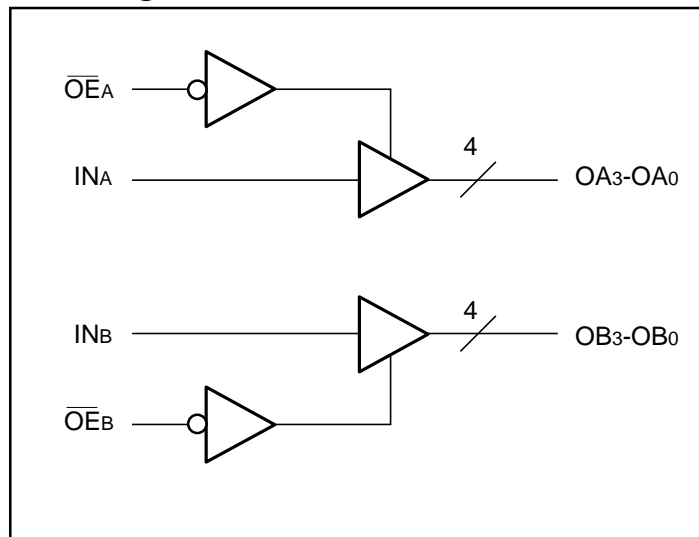
#### Features

- 3.3V version of PI49FCT804T
- Low output skew: 0.7ns
- Clock busing with Hi-Z state control
- TTL input and output levels, reducing problematic “ground bounce”
- Extremely low static power (1mW, typical)
- Hysteresis on all inputs
- ESD protection exceeds 2000V
- Industrial Operation: -40°C to 85°C
- Packaging (Pb-free & Green available):
  - 16-pin 300-mil wide plastic SOIC (S)

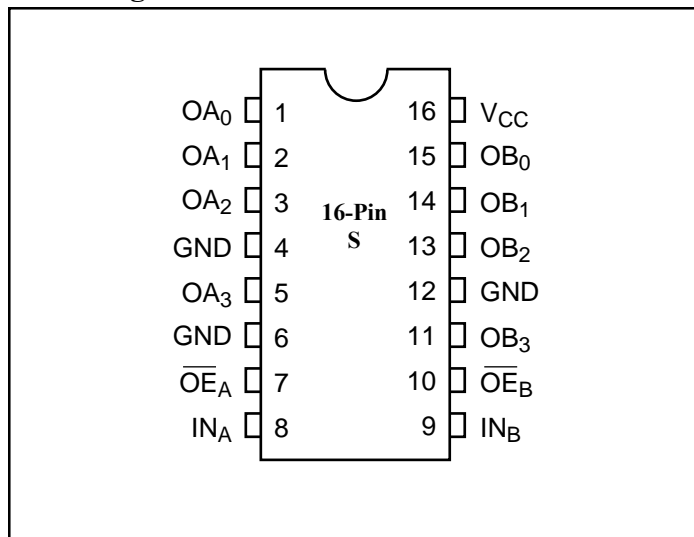
#### Description

Pericom Semiconductor’s PI49FCT3804 is a non-inverting clock driver designed with two independent groups of buffers. These buffers have Hi-Z state Output Enable inputs (active LOW) with a 1-in, 4-out configuration per group. Each clock driver consists of two banks of drivers, driving four outputs each from a standard TTL compatible CMOS input.

#### Block Diagram



#### Pin Configuration



**Pin Description**

Pin Name	Description
$\overline{OE}_A, \overline{OE}_B$	Hi-Z State Output Enable Inputs (Active LOW)
$IN_A, IN_B$	Clock Inputs
$OA_N, OB_N$	Clock Outputs
GND	Ground
$V_{CC}$	Power

**Truth Table<sup>(1)</sup>**

Inputs		Outputs
$\overline{OE}_A, \overline{OE}_B$	$IN_A, IN_B$	$OA_N, OB_N$
L	L	L
L	H	H
H	L	Z
H	H	Z

**Notes:**

H = High Voltage Level

L = Low Voltage Level

Z = High Impedance

**Capacitance** ( $T_A = 25^\circ\text{C}, f = 1\text{ MHz}$ )

Parameters <sup>(1)</sup>	Description	Test Conditions	Typ.	Max.	Units
$C_{IN}$	Input Capacitance	$V_{IN} = 0V$	6	10	pF
$C_{OUT}$	Output Capacitance	$V_{OUT} = 0V$	8	12	pF

**Note:**

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

### Maximum Ratings

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

Storage Temperature .....	-65°C to +150°C
Ambient Temperature with Power Applied .....	-40°C to +85°C
Supply Voltage to Ground Potential .....	-0.5V to +7.0V
DC Input Voltage .....	-0.5V to +7.0V
DC Output Current .....	120mA
Power Dissipation .....	0.5W

**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

Ambient Temperature =	-40°C to +85°C
V <sub>CC</sub> =	3.3V ± 0.3V

### DC Electrical Characteristics (Over the Operating Range)

Parameters	Description	Test Conditions <sup>(1)</sup>		Min.	Typ <sup>(2)</sup>	Max.	Units
V <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> = Min., V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -0.1mA I <sub>OH</sub> = -8mA	V <sub>CC</sub> - 0.2 2.4 <sup>(3)</sup>	— 3.0	—	V
V <sub>OL</sub>	Output LOW Voltage	V <sub>CC</sub> = Min., V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 0.1mA I <sub>OL</sub> = 16mA I <sub>OL</sub> = 24mA	—	— 0.2 0.3	0.2 0.4 0.5	V
V <sub>IH</sub>	Input HIGH Voltage	Guaranteed Logic HIGH Level		2.0	—	5.5	V
V <sub>IL</sub>	Input LOW Voltage	Guaranteed Logic LOW Level		-0.5	—	0.8	V
I <sub>IH</sub>	Input HIGH Current	V <sub>CC</sub> = Max.	V <sub>IN</sub> = V <sub>CC</sub> (Input Pins)	—	—	1	μA
I <sub>IL</sub>	Input LOW Current	V <sub>CC</sub> = Max.	V <sub>IN</sub> = GND (Input & I/O Pins)	—	—	-1	μA
I <sub>OZH</sub>	High Impedance	V <sub>CC</sub> = Max.	V <sub>OUT</sub> = V <sub>CC</sub>	—	—	1	μA
I <sub>OZL</sub>	Output Current	(Hi-Z State Output Pins)	V <sub>OUT</sub> = GND	—	—	-1	
V <sub>IK</sub>	Clamp Diode Voltage	V <sub>CC</sub> = Min., I <sub>IN</sub> = -18mA		—	-0.7	-1.2	V
I <sub>ODH</sub>	Output HIGH Current	V <sub>CC</sub> = 3.3V, V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , V <sub>OUT</sub> = 1.5V <sup>(4)</sup>		-35	-60	-110	mA
I <sub>ODL</sub>	Output LOW Current	V <sub>CC</sub> = 3.3V, V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , V <sub>OUT</sub> = 1.5V <sup>(4)</sup>		50	90	200	mA
I <sub>OS</sub>	Short Circuit Current <sup>(5)</sup>	V <sub>CC</sub> = Max., V <sub>OUT</sub> = GND <sup>(5)</sup>		-60	-135	-240	mA
V <sub>H</sub>	Input Hysteresis			—	150	—	mV

**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<sub>CC</sub> = 3.3V, +25°C ambient and maximum loading.
3. V<sub>OH</sub> = V<sub>CC</sub> - 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 <sup>(1)</sup>		Min.	Typ <sup>(2)</sup>	Max.	Units
I <sub>CC</sub>	Quiescent Power Supply Current	V <sub>CC</sub> =Max.	V <sub>IN</sub> =GND or V <sub>CC</sub>	—	3	30	μA
ΔI <sub>CC</sub>	Supply Current per Inputs @ TTL HIGH	V <sub>CC</sub> =Max.	V <sub>IN</sub> =V <sub>CC</sub> -0.6V <sup>(3)</sup>	—	2.0	300	μA
I <sub>CCD</sub>	Supply Current per Input per MHz <sup>(4)</sup>	V <sub>CC</sub> =Max., Outputs Open $\overline{OE}_A$ or $\overline{OE}_B$ =GND Per Output Toggling 50% Duty Cycle	V <sub>IN</sub> =V <sub>CC</sub> V <sub>IN</sub> =GND	—	0.08	0.16	mA/ MHz
I <sub>C</sub>	Total Power Supply Current <sup>(6)</sup>	V <sub>CC</sub> =Max., Outputs Open f <sub>O</sub> =10 MHz 50% Duty Cycle $\overline{OE}_A$ or $\overline{OE}_B$ =GND Mon. Output Toggling	V <sub>IN</sub> =V <sub>CC</sub> V <sub>IN</sub> =GND	—	3.3	9.0 <sup>(5)</sup>	mA
			V <sub>IN</sub> =V <sub>CC</sub> -0.6V V <sub>IN</sub> =GND	—	3.3	10.0 <sup>(5)</sup>	
		V <sub>CC</sub> =Max., Outputs Open f <sub>O</sub> =2.5 MHz 50% Duty Cycle $\overline{OE}_A$ or $\overline{OE}_B$ =GND Eleven Outputs Toggling	V <sub>IN</sub> =V <sub>CC</sub> V <sub>IN</sub> =GND	—	1.8	6.0 <sup>(5)</sup>	
			V <sub>IN</sub> =V <sub>CC</sub> -0.6V V <sub>IN</sub> =GND	—	1.8	7.0 <sup>(5)</sup>	

**Notes:**

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at V<sub>CC</sub> = 3.3V, +25°C ambient.
- Per TTL driven input (V<sub>IN</sub> = V<sub>CC</sub> - 0.6V); all other inputs at V<sub>CC</sub> 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<sub>C</sub> formula. These limits are guaranteed but not tested.
- $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$   
 $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_O N_O)$   
 I<sub>CC</sub> = Quiescent Current  
 ΔI<sub>CC</sub> = Power Supply Current for a TTL High Input (V<sub>IN</sub> = V<sub>CC</sub> - 0.6V)  
 D<sub>H</sub> = Duty Cycle for TTL Inputs High  
 N<sub>T</sub> = Number of TTL Inputs at D<sub>H</sub>  
 I<sub>CCD</sub> = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)  
 f<sub>O</sub> = Output Frequency  
 N<sub>O</sub> = Number of Outputs at f<sub>O</sub>  
 All currents are in milliamps and all frequencies are in megahertz.

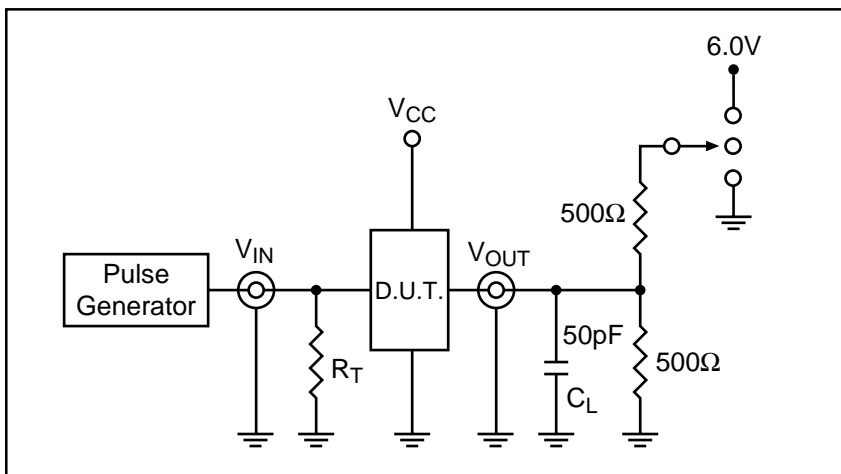
### Switching Characteristics over Operating Range

Parameters	Description	Conditions <sup>(1)</sup>	3804		3804A		Units
			Com.		Com.		
			Min.	Max.	Min.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay I <sub>NA</sub> to O <sub>AN</sub> , I <sub>NB</sub> to O <sub>BN</sub>	C <sub>L</sub> = 50pF R <sub>L</sub> = 500Ω	1.5	6.5	1.5	5.8	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time O <sub>EA</sub> to O <sub>AN</sub> , O <sub>EB</sub> to O <sub>BN</sub>		1.5	8.0	1.5	8.0	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time O <sub>EA</sub> to O <sub>AN</sub> , O <sub>EB</sub> to O <sub>BN</sub>		1.5	7.0	1.5	7.0	ns
t <sub>skew(o)</sub> <sup>(3)</sup>	Skew between two outputs of same package (same transition)		—	0.8	—	0.7	ns
t <sub>skew(p)</sub> <sup>(3)</sup>	Skew between opposite transitions (t <sub>PHL</sub> -t <sub>PLH</sub> ) of the same output		—	1.0	—	0.8	ns
t <sub>skew(t)</sub> <sup>(3)</sup>	Skew between two outputs of different package at same temperature (same transition)		—	1.6	—	1.4	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).

### Tests Circuits For All Outputs<sup>(1)</sup>



### Switch Position

Test	Switch
Disable LOW Enable LOW	6V
Disable HIGH Enable HIGH	GND
All Other Inputs	Open

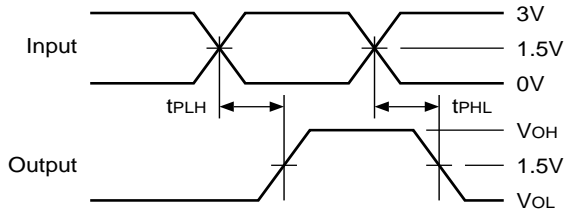
**DEFINITIONS:**

C<sub>L</sub> = Load capacitance: includes jig and probe capacitance.

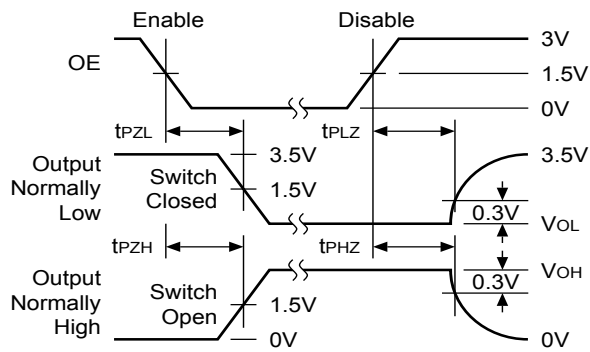
R<sub>T</sub> = Termination resistance: should be equal to Z<sub>OUT</sub> of the Pulse Generator.

### Switching Waveforms

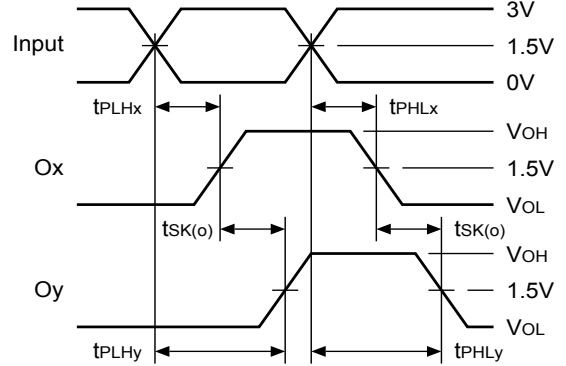
#### Propagation Delay



#### Enable and Disable Times

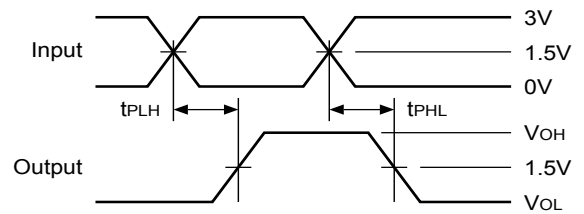


#### Output Skew – t<sub>SK(o)</sub>



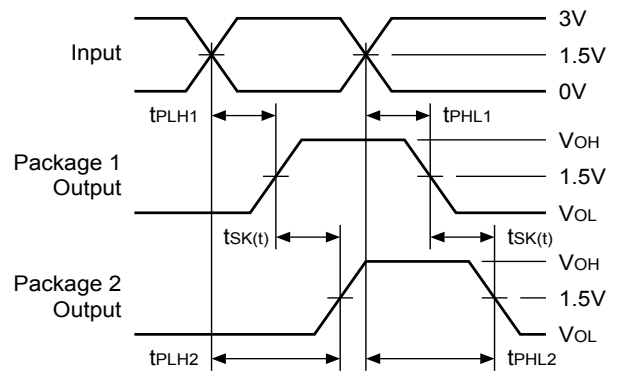
$$t_{SK(o)} = |t_{PLHy} - t_{PLHx}| \text{ or } |t_{PHLy} - t_{PHLx}|$$

#### Pulse Skew – t<sub>SK(p)</sub>



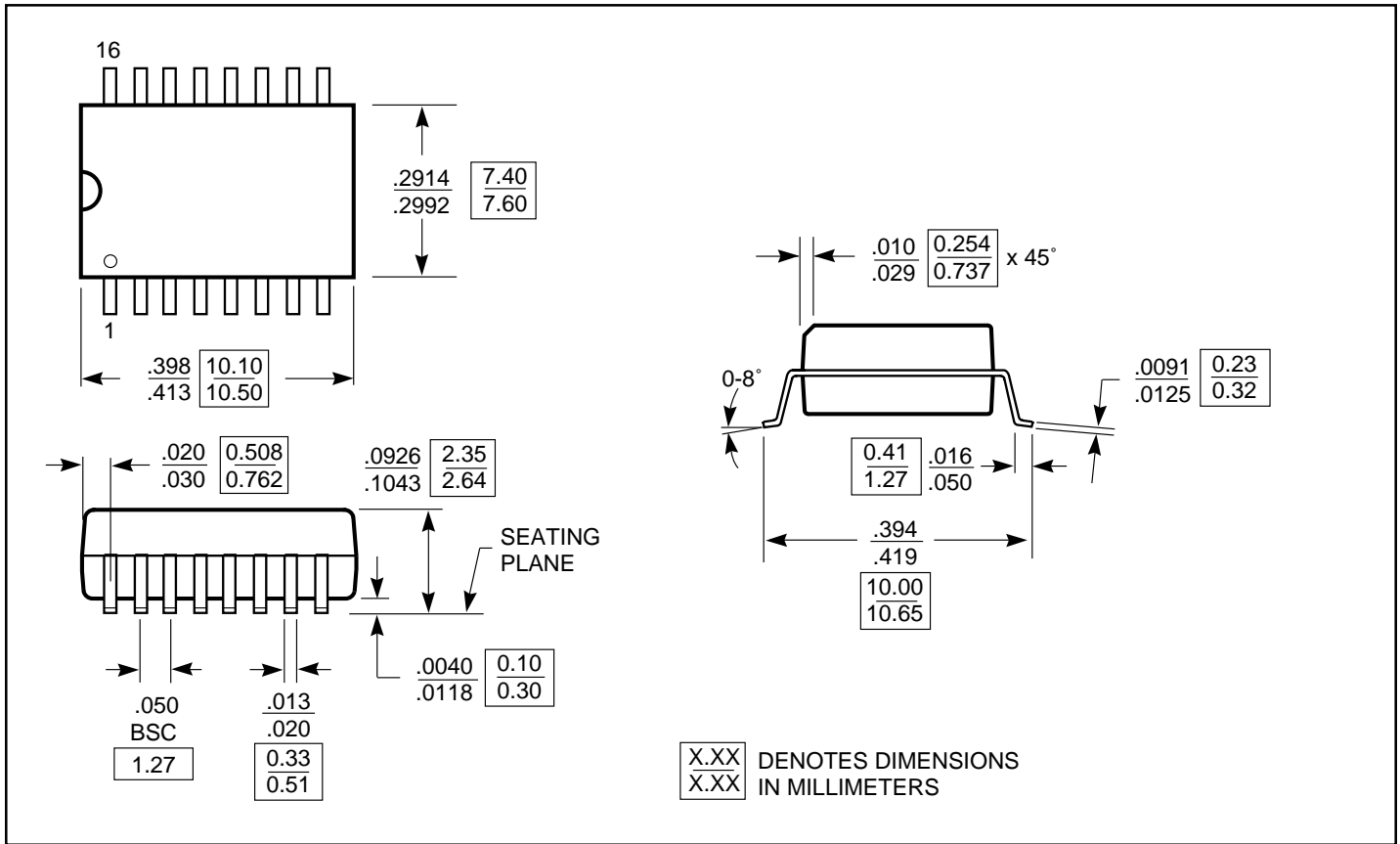
$$t_{SK(p)} = |t_{PHL} - t_{PLH}|$$

#### Package Skew – t<sub>SK(t)</sub>



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

**Packaging Mechanical: 16-pin 300-mil SOIC (S)**



**Ordering Information**

Ordering Code	Package Code	Speed Grade	Package Type
PI49FCT3804S	S	Blank	16-pin 300-mil SOIC
PI49FCT3804SE	S	Blank	Pb-free & Green, 16-pin 300-mil SOIC
PI49FCT3804AS	S	A	16-pin 300-mil SOIC
PI49FCT3804ASE	S	A	Pb-free & Green, 16-pin 300-mil SOIC

**Notes:**

1. Thermal characteristics can be found on the company web site at [www.pericom.com/packaging/](http://www.pericom.com/packaging/)