

**PI49FCT3805D**

**3.3V, 2 x 1:5 CMOS Clock Driver**

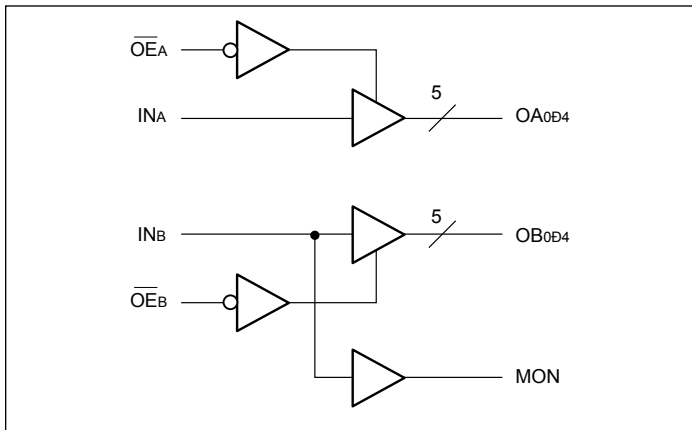
**Features**

- Low output skew: <200ps
- Switching frequency up to 166 MHz
- Fast output rise/fall time: <1.0ns
- Low propagation delay: <2.5ns
- Low input capacitance: <6.0pF
- Balanced CMOS outputs
- Industrial Temperature: -40°C to +85°C
- 3.3V ±10% operation, 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](mailto:contact@diodes.com) or your local Diodes representative.  
<https://www.diodes.com/quality/product-definitions/>
- Packaging (Pb-free & Green available):
  - ◆ 20-pin, 150-mil wide QSOP (Q)
  - ◆ 20-pin, 209-mil wide SSOP (H)

**Description**

Diodes' PI49FCT3805D is composed of non-inverting drivers. The outputs are configured into 2 groups of one-in, five-out with independent output enable. Group B has an extra MON output. Excellent output signals to power and ground ratio minimize power and ground noise and also improves output performance.

**Block Diagram**



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

Inputs		Outputs	
$\overline{OE}_X$	$IN_X$	$OA_X$	MON
L	L	L	L
L	H	H	H
H	L	Z	L
H	H	Z	H

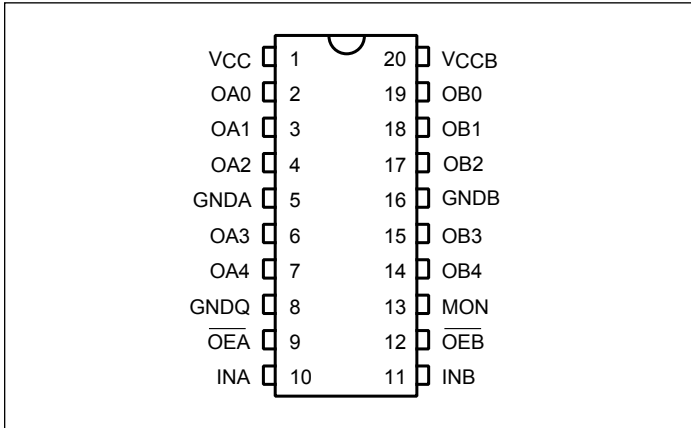
**Note:**

1. H = High Voltage Level, L = Low Voltage Level, Z = High Impedance

**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 Description

Pin Name	Description
$\overline{OE}_X$	Hi-Z State Output Enable Inputs (Active Low)
$IN_X$	Clock Inputs
$OA_N, OB_N$	Clock Outputs
MON	Monitor Output
GND	Ground
VCC	Power

### 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
Input Voltage to GND Potential (Inputs & V <sub>CC</sub> Only) .....	-0.5V to 5.5V
Output Voltage to GND Potential (Outputs & I/O Only)...	-0.5V to +V <sub>CC</sub> +0.5V
V <sub>CC</sub> Input Voltage .....	-0.5V to +4.6V

**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 (T<sub>A</sub> = -40°C to +85°C, V<sub>CC</sub> = 3.3V ± 0.3V)

Symbol	Parameters	Test Conditions <sup>(1)</sup>	Min.	Typ.	Max.	Units
V <sub>OH</sub>	Output High Voltage V <sub>CC</sub> = Min., V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub>	I <sub>OH</sub> = -0.1mA I <sub>OH</sub> = -8mA I <sub>OH</sub> = -12mA	V <sub>CC</sub> -0.2 2.4 <sup>(3)</sup> 2.4 <sup>(3)</sup>	- 3.0 3.0		V
V <sub>OL</sub>	Output Low Voltage V <sub>CC</sub> = Min., V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub>	I <sub>OH</sub> = 0.1mA I <sub>OH</sub> = 8mA I <sub>OH</sub> = 12mA		- 0.2 0.3	0.2 0.4 0.4	
V <sub>IH</sub>	Input High Voltage	Low Logic	2.0		5.5	
V <sub>IL</sub>	Input Low Voltage	High Logic	-0.5		0.8	
I <sub>IH</sub>	Input High Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = 5.5V			1	μA
I <sub>IL</sub>	Input Low Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = GND			-1	
I <sub>OZH</sub> I <sub>OZL</sub>	High Impedance output current	V <sub>CC</sub> = Max., all outputs disabled			1 -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 <sup>(4, 5)</sup>	V <sub>OUT</sub> = 1.5V, V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , V <sub>CC</sub> = 3.3V	-40	-74	-100	mA
I <sub>ODL</sub>	Output Low Current <sup>(4, 5)</sup>	V <sub>OUT</sub> = 1.5V, V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , V <sub>CC</sub> = 3.3V	50	90	130	
I <sub>OS</sub>	Short Circuit Current <sup>(4, 5)</sup>	V <sub>CC</sub> = Max., V <sub>OUT</sub> = GND	-60	-100	-120	

**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.

### Capacitance (T<sub>A</sub> = 25°C, f = 1 MHz)

Parameters <sup>(1)</sup>	Description	Test Conditions	Typ	Max.	Units
C <sub>IN</sub>	Input Capacitance	V <sub>IN</sub> = 0V	3.0	4	pF
C <sub>OUT</sub>	Output Capacitance	V <sub>OUT</sub> = 0V	—	6	

**Note:**

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

### Power Supply Characteristics

Parameters	Description	Test Conditions <sup>(1)</sup>		Min.	Typ. <sup>(2)</sup>	Max.	Units
$I_{CC}$	Quiescent Power Supply Current	$V_{CC} = \text{Max.}$	$V_{IN} = \text{GND or } V_{DD}$		0.1	30	$\mu\text{A}$
$I_{DD}$	Dynamic Supply Current per Output	$V_{CC} = 3.6\text{V},$ $C_L = 15\text{pF},$ All Outputs Toggling			80	120	
$I_C$	Total Power Supply Current	$V_{CC} = 3.6\text{V},$ $C_L = 15\text{pF},$ All Outputs Toggling, $f_i = 133\text{ MHz}$	$V_{IN} = V_{CC} \text{ or GND}$		100	135	mA/ MHz
			$V_{IN} = V_{CC} - 0.6\text{V or GND}$		100	135	
		$V_{CC} = 3.6\text{V},$ $C_L = 15\text{pF},$ All Outputs Toggling, $f_i = 166\text{ MHz}$	$V_{IN} = V_{CC} \text{ or GND}$		120	160	
			$V_{IN} = V_{CC} - 0.6\text{V or GND}$		120	160	
$\Delta I_{CC}$	Supply Current per inputs @ TTL High	$V_{CC} = \text{Max.}$	$V_{IN} = V_{CC} - 0.6\text{V}^{(3)}$		45	300	$\mu\text{A}$

**Notes:**

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

### Switching Characteristics over Operating Range

Parameters	Description	Test Conditions <sup>(1)</sup>	3805D	Units
			Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay I <sub>NN</sub> to O <sub>N</sub>	C <sub>L</sub> = 15pF, 133 MHz (3805D)	3.0	ns
t <sub>R</sub> /t <sub>F</sub>	CLKn Rist/Fall Time 0.8V ~ 2.0V		1.5	ns
t <sub>SK(o)</sub> <sup>(3)</sup>	Pulse Skew		270	ps
t <sub>SK(p)</sub> <sup>(3)</sup>	Output Skew		270	
t <sub>SK(t)</sub> <sup>(3)</sup>	Package Skew		550	
t <sub>ZL</sub> , t <sub>ZH</sub> , t <sub>LZ</sub> , t <sub>HZ</sub>	Enable/Disable Time		5.2	ns
F <sub>MAX</sub>	Input Frequency		133	MHz

**Note:**

1. These parameters are guaranteed by design
2. Series Resistor loading = 33Ω (See Test Circuit)

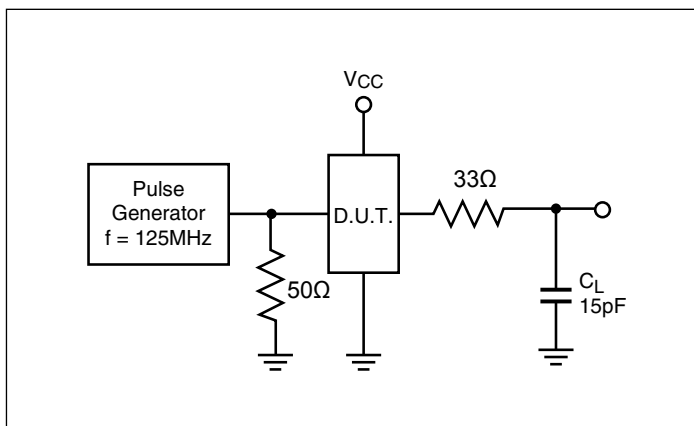
### Switch Position

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

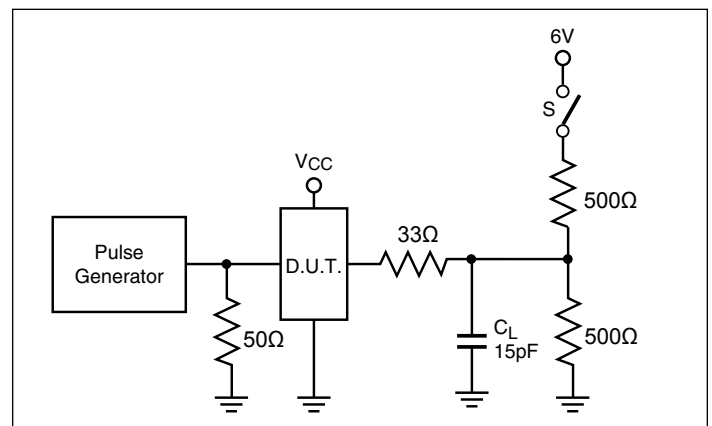
**Definitions:**

1. C<sub>L</sub> = Load capacitance: includes jig and probe capacitance.
2. R<sub>T</sub> = Termination resistance: should be equal to Z<sub>OUT</sub> of the Pulse Generator.

### Tests Circuit

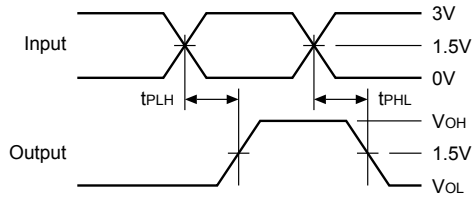


### Enable/Disable Time Test Set-Up

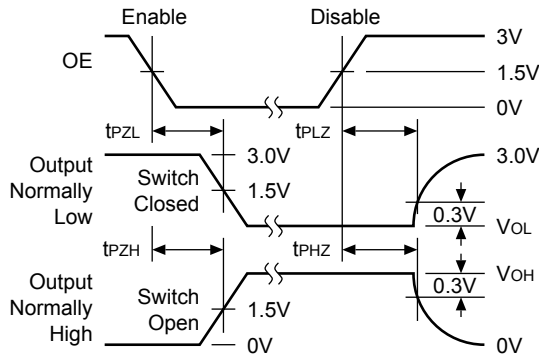


**Switching Waveforms**

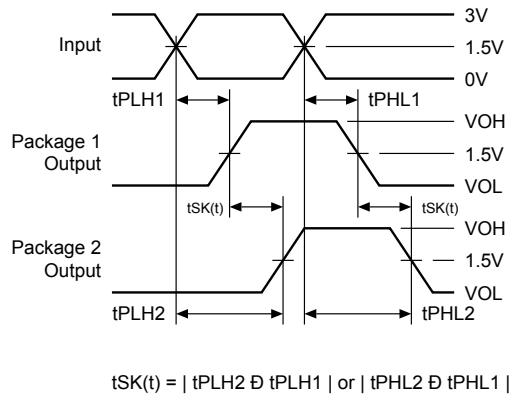
**Propagation Delay**



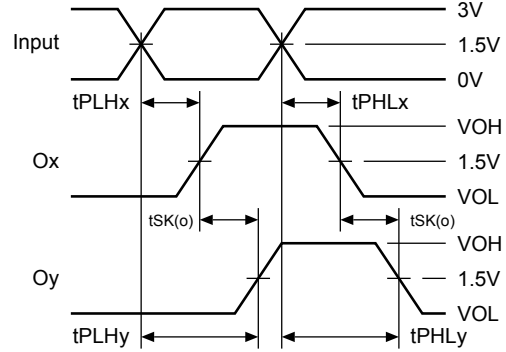
**Enable and Disable Times**



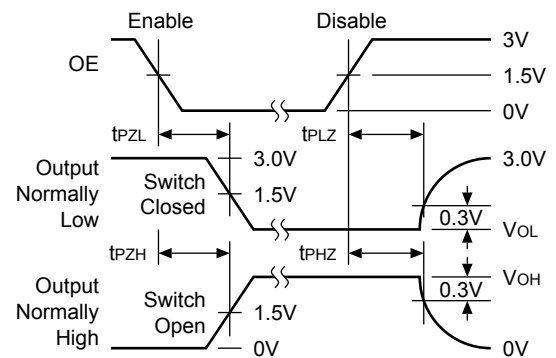
**Package Skew – t<sub>sk(t)</sub>**



**Output Skew – t<sub>sk(o)</sub>**



**Pulse Skew – t<sub>sk(p)</sub>**



**PI49FCT3805D**

### Part Marking

#### H Package



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

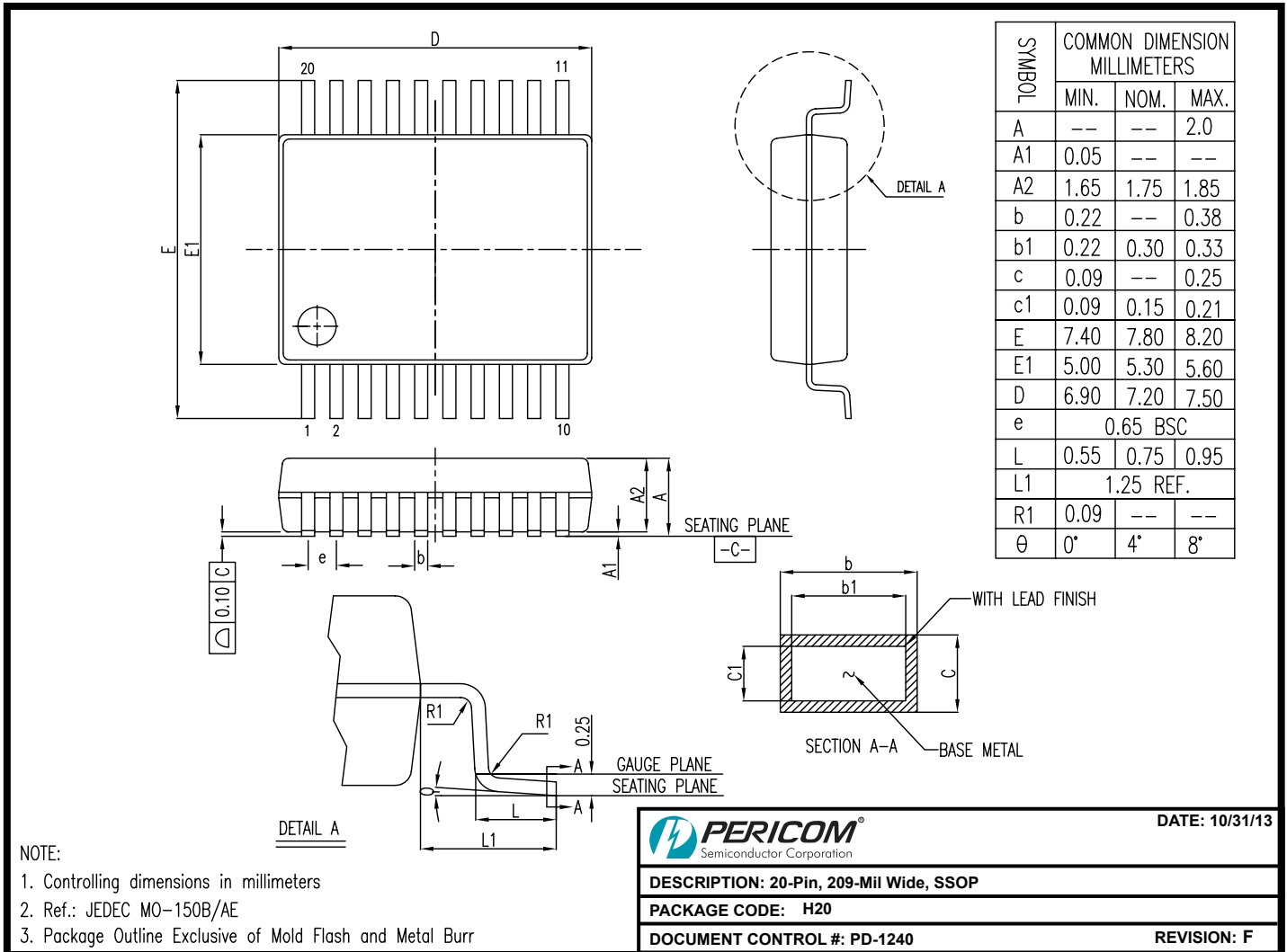
#### Q Package



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

**PI49FCT3805D**

**Packaging Mechanical: 20-SSOP (H)**



13-0214



**PI49FCT3805D**

**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

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

		DATE: 03/24/16
DESCRIPTION: 20-Pin, 150mil Wide QSOP		
PACKAGE CODE: Q (Q20)		
DOCUMENT CONTROL #: PD-1202	REVISION: I	

**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
PI49FCT3805DHEX	H	20-pin, 209-mil Wide (SSOP)
PI49FCT3805DQEX	Q	20-pin, 150-mil Wide (QSOP)

**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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