PI49FCT32805

3.3V, 2 x 1:5 CMOS Clock Driver

Features

- Low output skew: <270ps
- Switching frequency of 133 MHz
- Fast output rise/fall time <1.5ns
- Low propagation delay <3.0ns
- Low input capacitance <6.0pF
- Balanced CMOS outputs
- Industrial Temperature: –40°C to +85°C
- 3.3V ±10% operation
- 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/
- Packaging: (Pb-free & Green Available)
  - 20-pin 300-mil wide QSOP (Q)

Description

Diodes' PI49FCT32805 is a fast speed, low skew, fast slew rate, and low propagation delay for most computing and communication applications.

The devices are non-inverting drivers. The outputs are configured into 2 groups of 1-in, 5-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.

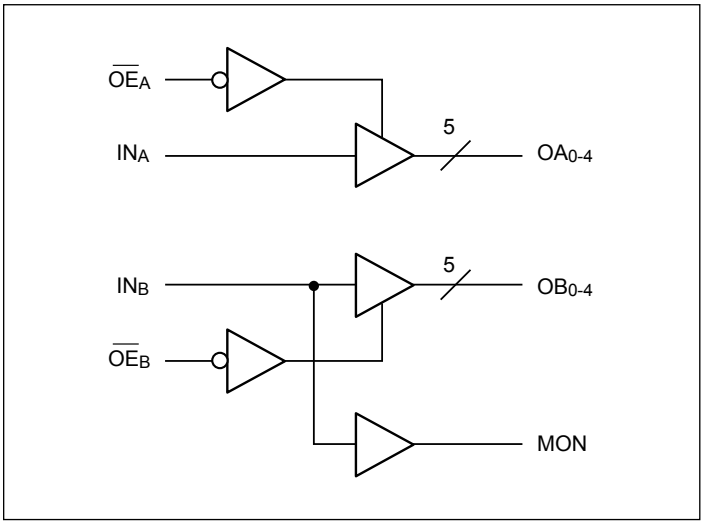
The PI49FCT32805 has built-in series damping resistors on all outputs.

Truth Table

Inputs		Outputs	
$\overline{OE}_A$, $\overline{OE}_B$	IN_A, IN_B	$_OA_N$, $_OB_N$	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

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.

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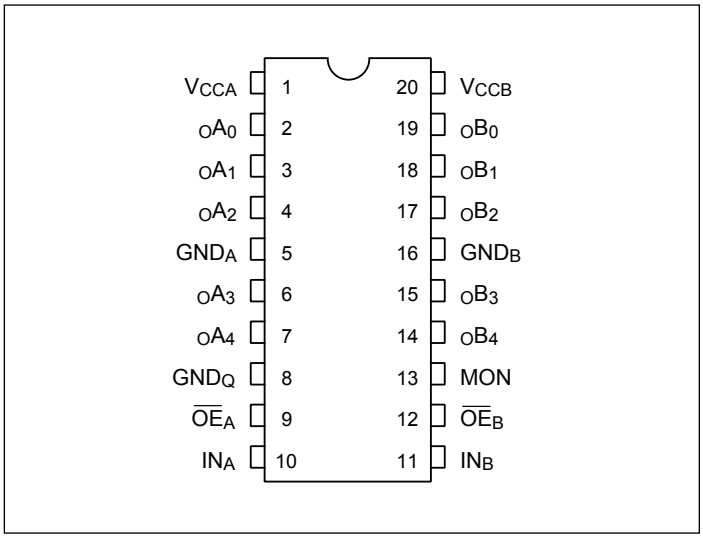
Pin Configuration



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
MON	Monitor Output
GND	Ground
V_{CC}	Power

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Maximum Ratings

Storage Temperature	–55°C to +150°C
Supply Voltage to Ground Potential (Inputs & V_{CC} Only)	–0.5V to +4.6V
Supply Voltage to Ground Potential (Outputs & I/O Only)	–0.5V to +4.6V
DC Input Voltage	–0.5V to +4.6V
DC Output Current	120 mA
Power Dissipation	0.5W
Junction Temperature	125°C max
Latch up	200mA
ESD Protection (Input)	2000V min (HBM)

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_A = –40°C to +85°C, V_{CC} = 3.3V ± 10%)

Symbol	Parameter	Test Condition(1)		Min.	Typ.	Max.	Units
V_{OH}	Output High Voltage V_{CC} = 3.0V, V_{IN} = V_{IL} or V_{IH}	I_{OH} = -8mA		2.4(2)	3.0		V
V_{OL}	Output Low Voltage V_{CC} = 3.0V, V_{IN} = V_{IL} or V_{IH}	I_{OL} = +12mA			0.4	0.5	
V_{IH}	Input High Voltage			2.0		V_{CC}-0.2	
V_{IL}	Input Low Voltage			-0.5		0.8	
I_{IH}	Input High Current	V_{CC} = Max., V_{IN} = V_{CC}				1	µA
I_{IL}	Input Low Current	V_{CC} = Max., V_{IN} = GND				-1	
I_{OZH}	High Impedance Output Current	V_{CC} = Max., All outputs Disabled	V_{OUT} = V_{CC}			1	
I_{OZL}	High Impedance Output Current	V_{CC} = Max., All outputs Disabled	V_{OUT} = GND			-1	
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = -18mA			-0.9	-1.2	V
I_{OH}	Output HIGH Current(3)	V_{OUT} = 1.5V, V_{IN} =V_{IL} or V_{IH}, V_{CC} = 3.3V		-25	-55	-80	mA
I_{OL}	Output LOW Current(3)	V_{OUT} = 1.5V, V_{IN} = V_{IL} or V_{IH}, V_{CC} = 3.3V		25	45	90	
I_{OS}	Short Circuit Current(4)	V_{CC} = Max., V_{OUT} = GND		-50	-100	-180	
R_S	Internal Series Resistor				20		Ω

Notes:
1. For Max or Min conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. V_{OH} = V_{CC} – 0.6V at rated current.
3. This parameter is guaranteed by device characterization.
4. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.

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Power Supply Characteristics

Parameters	Description	Test Conditions[1]	Condition	Min.	Typ	Max.	Units
I_{CC}	Quiescent Power Supply Current	V_{CC} = Max	V_{IN} = GND or V_{CC}		0.1	30	µA
ΔI_{CC}	Supply Current per Inputs @ TTL HIGH	V_{CC} = Max	V_{IN} = V_{CC} – 0.6V[2]		110	300	
I_{CCD}	Supply Current per Output per MHz[3]	V_{CC} = Max, Outputs Open $\overline{OE}_A$ or $\overline{OE}_B$ = GND 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND		0.09 Per Output Toggling	0.16	mA/ MHz
I_C		V_{CC} = Max, Outputs Open f_O = 10 MHz 50% Duty Cycle $\overline{OE}_A$ or $\overline{OE}_B$ = GND Mon. Outputs Toggling	V_{IN} = V_{CC} V_{IN} = GND		1.3	9.0[4]	mA
			V_{IN} = V_{CC} – 0.6V V_{IN} = GND		1.3	10.0[4]	
		V_{CC} = Max, Outputs Open f_O = 2.5 MHz 50% Duty Cycle $\overline{OE}_A$ or $\overline{OE}_B$ = GND Eleven Outputs Toggling	V_{IN} = V_{CC} V_{IN} = GND		4.4	6.0[4]	
			V_{IN} = V_{CC} – 0.6V V_{IN} = GND		4.4	7.0[4]	

Notes:

1. For Max or Min conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Per TTL driven input (V_{IN} = V_{CC} – 0.6V); all other inputs at V_{CC} or GND.
3. This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.
4. Values for these conditions are examples of the I_C formula. These limits are guaranteed but not tested.

Switching Characteristics

Symbol	Description	Condition	Max.	Units
t_{PLH} t_{PHL}	Propagation Delay A to B_N[1]	15pF	3.0	ns
t_R/t_F	Rise/Fall Time[2] 0.5V - 2.0V	15pF	1.5	
$t_{SK(P)}$	Pulse Skew[2]	Same Output	0.35	
$t_{SK(O)}$	Output Skew [2]	Same Package, Same Bank	0.27	
$t_{SK(I)}$	Package Skew[2]	Same Package, Same Bank	0.55	
t_{ZL}, t_{ZH} t_{LZ}, t_{HZ}	Enable/Disable Time	15pF 500Ω	5.2	
F_{MAX}	Input Frequency	15pF	133	MHz

Notes:

1. Minimum propagation delay of 1.5ns is guaranteed but not tested.
2. These parameters are guaranteed by design

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Capacitance (T_A = 25°C, f = 1 MHz)

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

Note:
1. This parameter is determined by device characterization.

Switch Position

Test	Switch
Disable Low Enable Low	6V
Disable High Enable High	GND
All Other Inputs	Open

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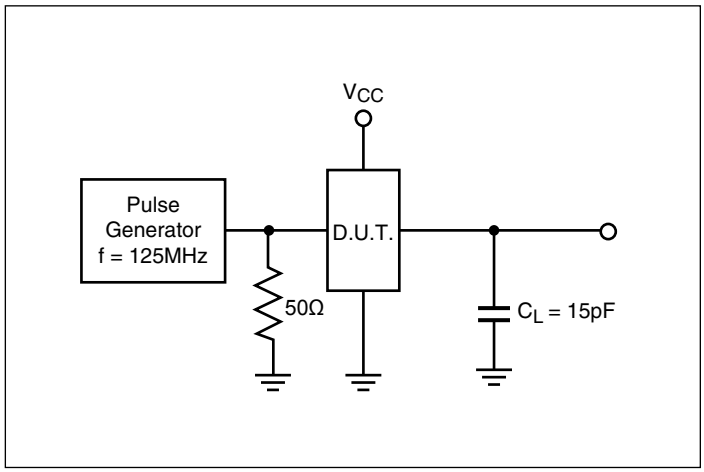
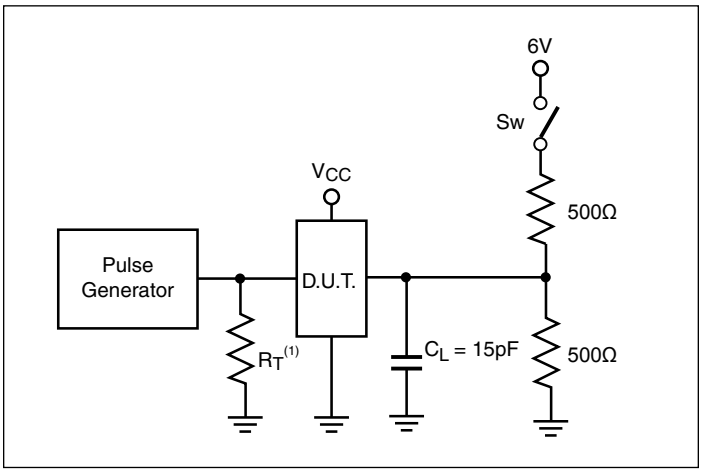
Tests Circuits for F_{IN} >100 MHz



Enable/Disable Time Test Set-Up



Note:
1. R_T = Termination resistance should be equal to Z_{OUT} of the Pulse Generator.

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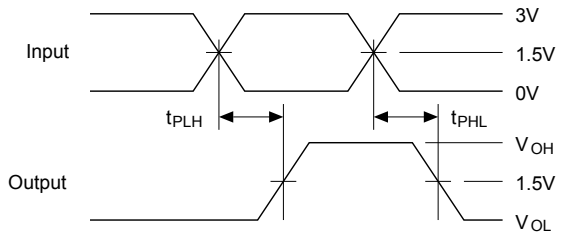
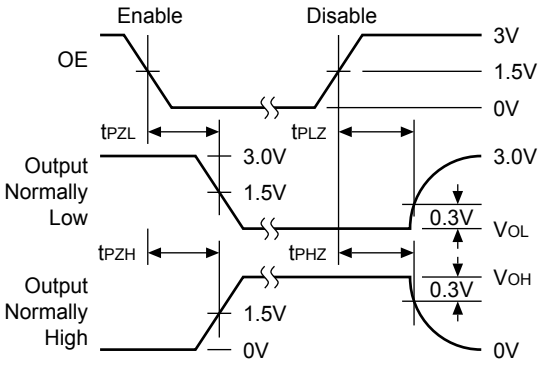
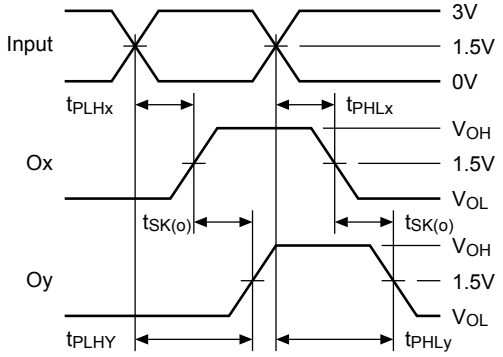
Switching Waveforms



Propagation Delay

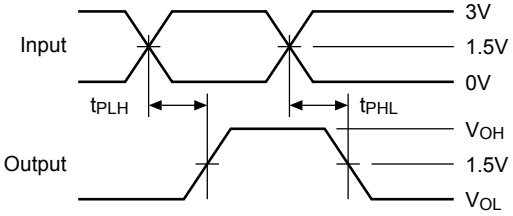


Enable and Disable Times



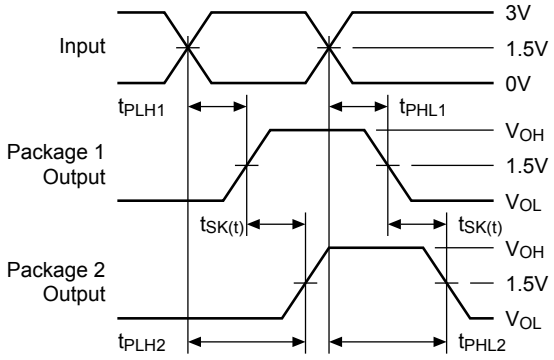
$t_{SK(o)} = | t_{PLHy} - t_{PLHx} |$ or $| t_{PHLy} - t_{PHLx} |$

Output Skew – $t_{sk(o)}$



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

Pulse Skew – $t_{sk(p)}$



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

Package Skew – $t_{sk(t)}$

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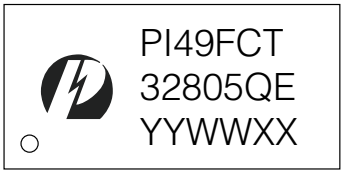
Part Marking



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

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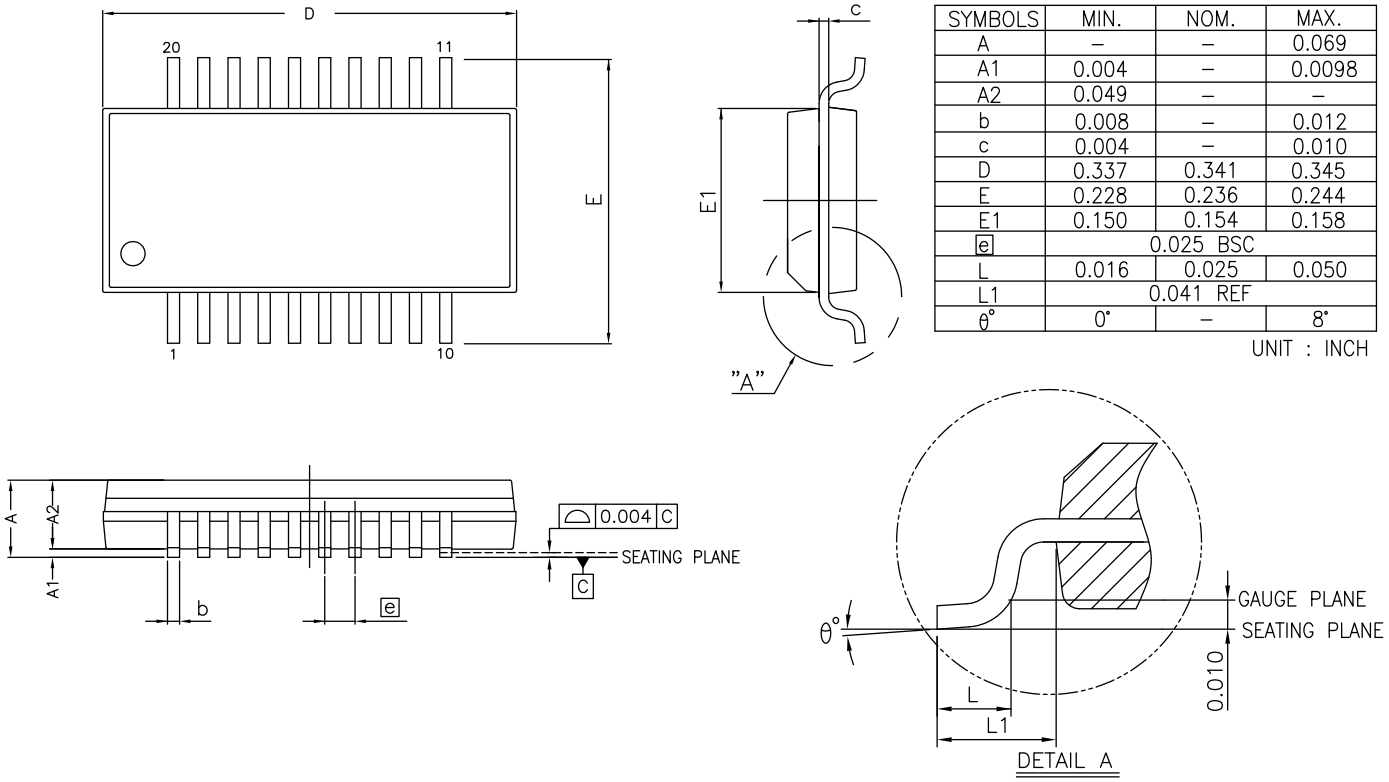
Packaging Mechanical: 20-QSOP (Q)



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.

PERICOM Enabling Serial Connectivity

DATE: 03/24/16

DESCRIPTION: 20-Pin, 150mil Wide QSOP

PACKAGE CODE: Q (Q20)

DOCUMENT CONTROL #: PD-1202 REVISION: I

16-0057

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
PI49FCT32805QEX	Q	20-pin 150mil 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.
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4. E = Pb-free and Green
5. X suffix = Tape/Reel

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