

**Features**

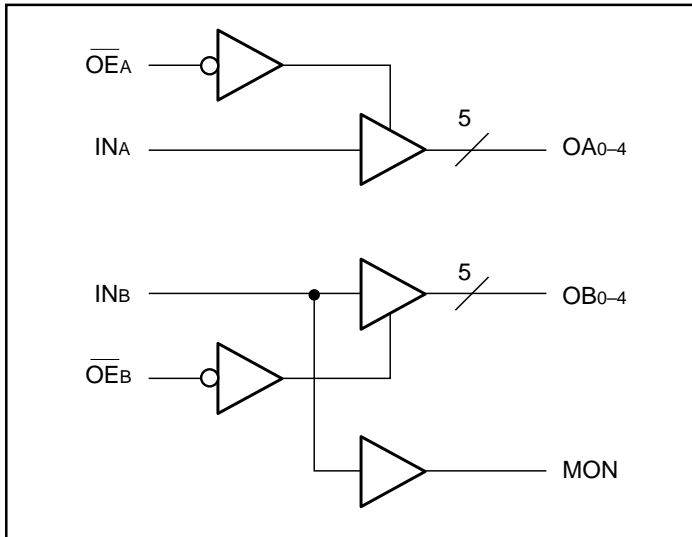
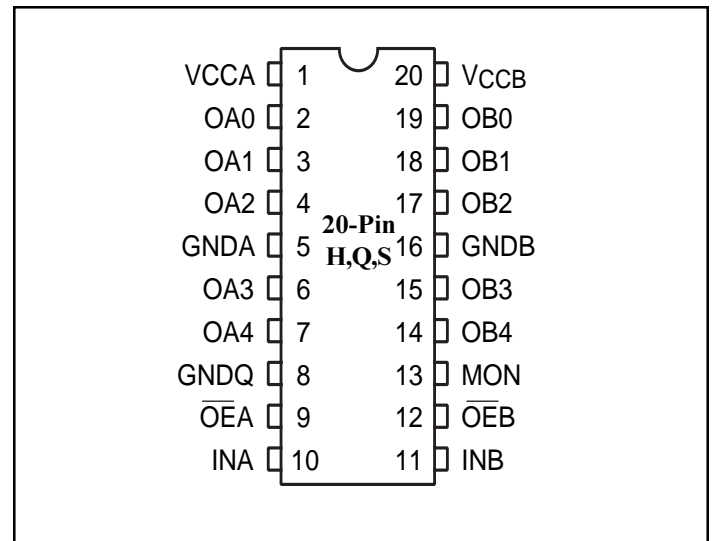
- Low output skew: <math>\lt; 270\text{ps}</math>
- Switching frequency of 133 MHz
- Fast output rise/fall time <math>\lt; 1.5\text{ns}</math>
- Low propagation delay <math>\lt; 3.0\text{ns}</math>
- Low input capacitance <math>\lt; 6.0\text{pF}</math>
- Balanced CMOS outputs
- Industrial Temperature: <math>-40^\circ\text{C}</math> to <math>+85^\circ\text{C}</math>
- 3.3V  $\pm 10\%$  operation
- Packages available:
  - 20-pin 300-mil wide SOIC (S)
  - 20-pin 150-mil wide QSOP (Q)
  - 20-pin 209-mil wide SSOP (H)

**Description**

Pericom Semiconductor's PI49FCT series of logic circuits are produced using the Company's advanced submicron CMOS technology to achieve fast speed, low skew, fast slew rate, and low propagation delay for most computing and communication applications.

The PI49FCT32805 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.

PI49FCT32805 integrate series damping resistors on all outputs.

**PI49FCT32805 Logic Block Diagram**

**PI49FCT32805 Product Pin Configuration**

**Product Pin Description**

Pin Name	Description
$\overline{\text{OE}}_A, \overline{\text{OE}}_B$	Hi-Z State Output Enable Inputs (Active LOW)
$\text{IN}_A, \text{IN}_B$	Clock Inputs
$\text{OAN}, \text{OBN}$	Clock Outputs
MON	Monitor Output
GND	Ground
Vcc	Power

**PI49FCT32805 Truth Table<sup>(1)</sup>**

Inputs		Outputs	
$\overline{\text{OE}}_A, \overline{\text{OE}}_B$	$\text{IN}_A, \text{IN}_B$	$\text{OAN}, \text{OBN}$	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

**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	$V_{IN} = 0V$	3.0	4	pF
$C_{OUT}$	Output Capacitance	$V_{OUT} = 0V$		6	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 .....	$-65^\circ\text{C}$ to $+150^\circ\text{C}$
Ambient Temperature with Power Applied .....	$-40^\circ\text{C}$ to $+85^\circ\text{C}$
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

**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 =  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{CC} = 3.3V \pm 0.3V$ 
**DC Electrical Characteristics** (Over the Operating Range)

Symbol	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
$V_{OH}$	Output high voltage $V_{CC} = 3.0V$ $V_{IN} = V_{IL}$ or $V_{IH}$	$I_{OH} = -8mA$	2.4 <sup>(3)</sup>	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	LOW logic	2.0	–	$V_{CC} - 0.2$	
$V_{IL}$	Input low voltage	HIGH logic	$-0.5$	–	0.8	
$I_{IH}$	Input high current	$V_{CC} = \text{max.}, V_{IN} = V_{CC}$	–	–	1	$\mu A$
$I_{IL}$	Input low current	$V_{CC} = \text{max.}, V_{IN} = GND$	–	–	$-1$	
$I_{OZH}$ $I_{OZL}$	High impedance output current	$V_{CC} = \text{max.}$ , all outputs disabled	– –	– –	1 $-1$	
$V_{IK}$	Clamp diode voltage	$V_{CC} = \text{min.}, I_{IN} = -18mA$	–	$-0.9$	$-1.2$	V
$I_{OH}$	Output HIGH <sup>(4)</sup> current	$V_{OUT} = 1.5V, V_{IN} = V_{IL}$ or $V_{IH}$ $V_{CC} = 3.3V$	$-25$	$-55$	$-80$	mA
$I_{OL}$	Output LOW <sup>(4)</sup> current	$V_{OUT} = 1.5V, V_{IN} = V_{IL}$ or $V_{IH}$ $V_{CC} = 3.3V$	25	45	90	
$I_{OS}$	Short circuit <sup>(5)</sup> current	$V_{CC} = \text{max.}$ $V_{OUT} = GND$	$-50$	$-100$	$-180$	
$R_S$	Internal series resistor			22		Ohm

**Notes:**

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at  $V_{CC} = 3.3V$ ,  $+25^\circ\text{C}$  ambient and maximum loading.
- $V_{OH} = V_{CC} - 0.6V$  at rated current.
- This parameter is determined by device characterization but is not production tested.
- 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
$I_{CC}$	Quiescent Power Supply Current	$V_{CC} = \text{Max.}$	$V_{IN} = \text{GND or } V_{CC}$	—	0.1	30	$\mu\text{A}$
$\Delta I_{CC}$	Supply Current per Inputs @ TTL HIGH	$V_{CC} = \text{Max.}$	$V_{IN} = V_{CC} - 0.6\text{V}^{(3)}$	—	110	300	$\mu\text{A}$
$I_{CCD}$	Supply Current per Input per MHz <sup>(4)</sup>	$V_{CC} = \text{Max.}$ , Outputs Open $\overline{OE}_A$ or $\overline{OE}_B = \text{GND}$ Per Output Toggling 50% Duty Cycle	$V_{IN} = V_{CC}$ $V_{IN} = \text{GND}$	—	0.09	0.16	mA/ MHz
$I_C$		$V_{CC} = \text{Max.}$ , Outputs Open $f_O = 10 \text{ MHz}$ 50% Duty Cycle $\overline{OE}_A$ or $\overline{OE}_B = \text{GND}$ Mon. Outputs Toggling	$V_{IN} = V_{CC}$ $V_{IN} = \text{GND}$	—	1.3	9.0 <sup>(5)</sup>	mA
			$V_{IN} = V_{CC} - 0.6\text{V}$ $V_{IN} = \text{GND}$	—	1.3	10.0 <sup>(5)</sup>	
		$V_{CC} = \text{Max.}$ , Outputs Open $f_O = 2.5 \text{ MHz}$ 50% Duty Cycle $\overline{OE}_A$ or $\overline{OE}_B = \text{GND}$ Eleven Outputs Toggling	$V_{IN} = V_{CC}$ $V_{IN} = \text{GND}$	—	4.4	6.0 <sup>(5)</sup>	
			$V_{IN} = V_{CC} - 0.6\text{V}$ $V_{IN} = \text{GND}$	—	4.4	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  $V_{CC} = 3.3\text{V}$ ,  $+25^\circ\text{C}$  ambient.
- Per TTL driven input ( $V_{IN} = V_{CC} - 0.6\text{V}$ ); all other inputs at  $V_{CC}$  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  $I_C$  formula. These limits are guaranteed but not tested.
- $I_C = I_{\text{QUIESCENT}} + I_{\text{INPUTS}} + I_{\text{DYNAMIC}}$   
 $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_O N_O)$   
 $I_{CC}$  = Quiescent Current  
 $\Delta I_{CC}$  = Power Supply Current for a TTL High Input ( $V_{IN} = V_{CC} - 0.6\text{V}$ )  
 $D_H$  = Duty Cycle for TTL Inputs High  
 $N_T$  = Number of TTL Inputs at  $D_H$   
 $I_{CCD}$  = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)  
 $f_O$  = Output Frequency  
 $N_O$  = Number of Outputs at  $f_O$   
 All currents are in milliamps and all frequencies are in megahertz.

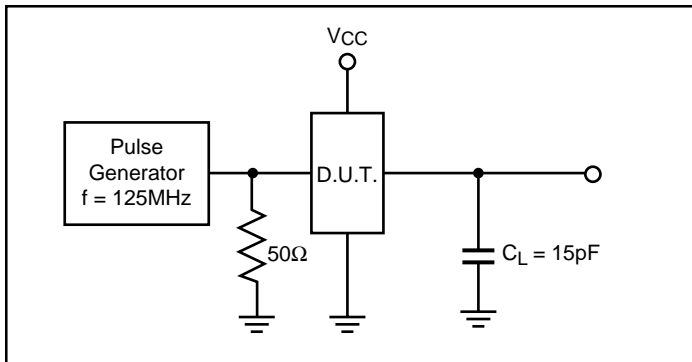
### Switching Characteristics over Operating Range

Symbol	Description	Condition	Max. <sup>(2)</sup>	Units
$t_{PLH}$ $t_{PHL}$	Propagation Delay A to Bn <sup>(3)</sup>	15pF	3.0	ns
$t_R/t_F$	Rise/Fall Time <sup>(2)</sup> 0.5V - 2.0V	15pF	1.5	
$t_{SK(p)}$	Pulse Skew <sup>(2)</sup>	Same Output	0.35	
$t_{SK(o)}$	Output Skew <sup>(2)</sup>	Same Package, Same Bank	0.27	
$t_{SK(i)}$	Package Skew <sup>(2)</sup>	Same Device, Same Bank	0.55	
$t_{ZL}, t_{ZH},$ $t_{LZ}, t_{HZ}$	Enable/Disable Time	15pF	5.2	
$F_{MAX}$	Input Frequency	15pF	133	MHz

**Note:**

1. Lumped load,  $C_L = 15pF$
2. These parameters are guaranteed by design
3. Minimum propagation delay of 1.5ns is guaranteed but not tested.

### Tests Circuits for $F_{IN} > 100 MHz^{(2)}$



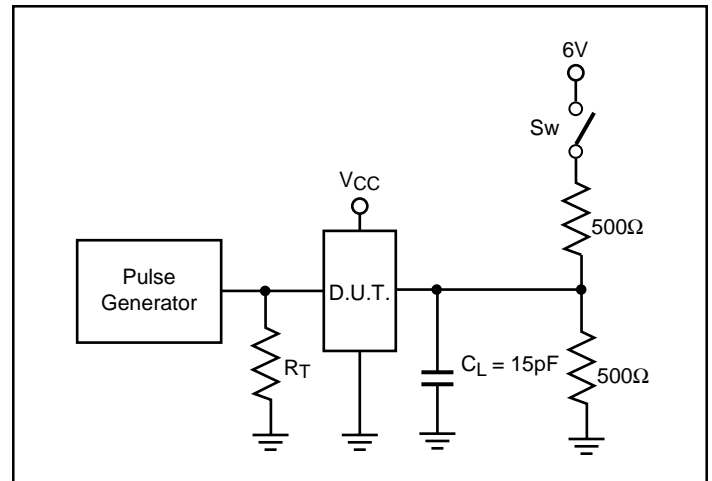
### Switch Position

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

**Definitions:**

**CL** = Load capacitance: includes jig and probe capacitance.  
**RT** = Termination resistance: should be equal to  $Z_{OUT}$  of the Pulse Generator.

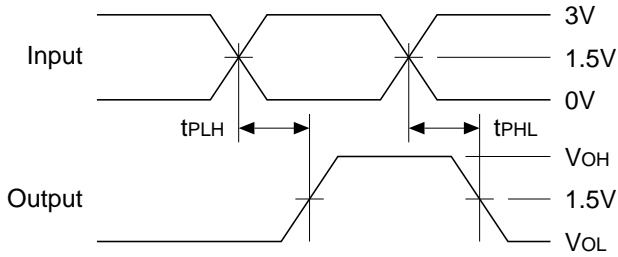
### Enable/Disable Time Test Set-Up



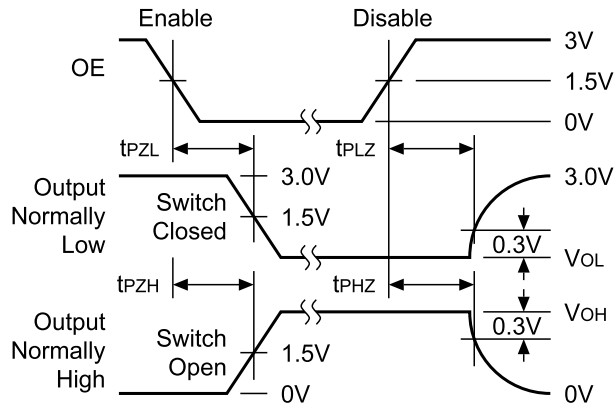
**R<sub>T</sub>** = Termination resistance, should be equal to  $Z_{OUT}$  of the pulse generators.

## SWITCHING WAVEFORMS

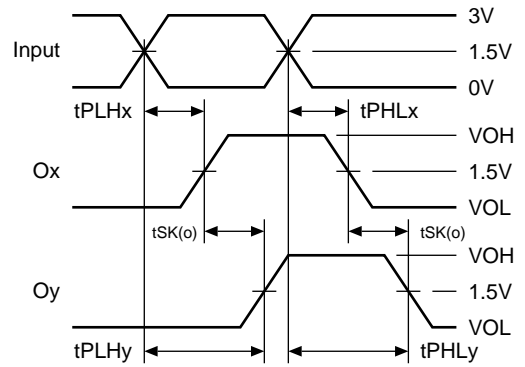
### Propagation Delay



### Enable and Disable Times

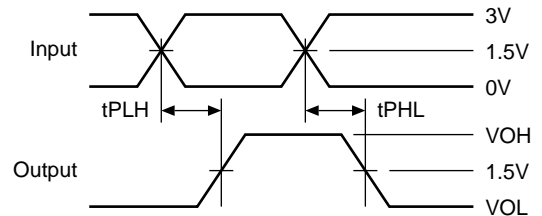


### Output Skew – t<sub>SK(o)</sub>



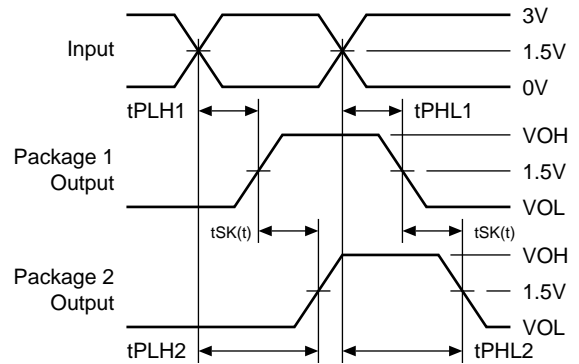
$$t_{SK(o)} = |t_{PLHy} - t_{PLHx}| \text{ or } |t_{PHLy} - t_{PHLx}|$$

### Pulse Skew – t<sub>SK(p)</sub>

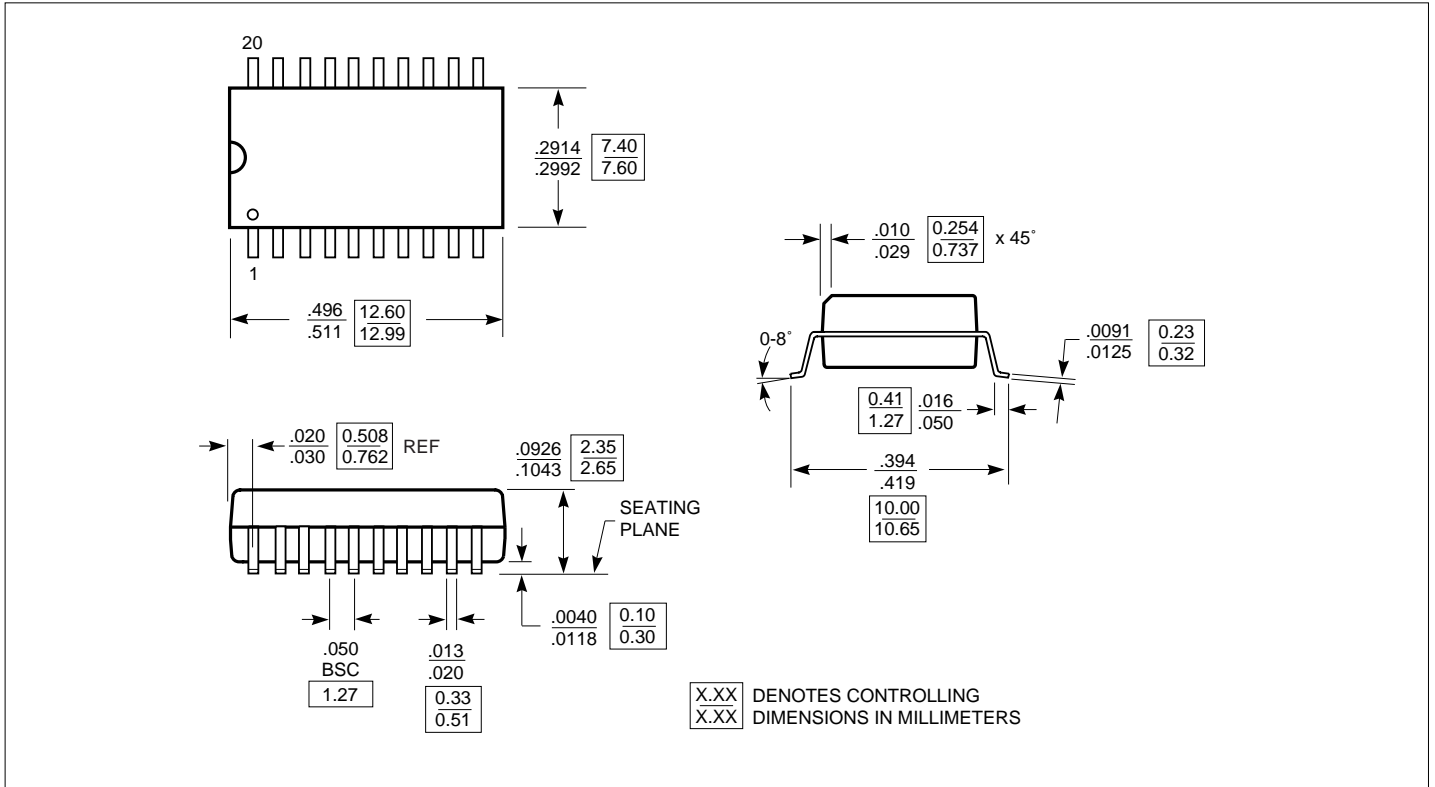
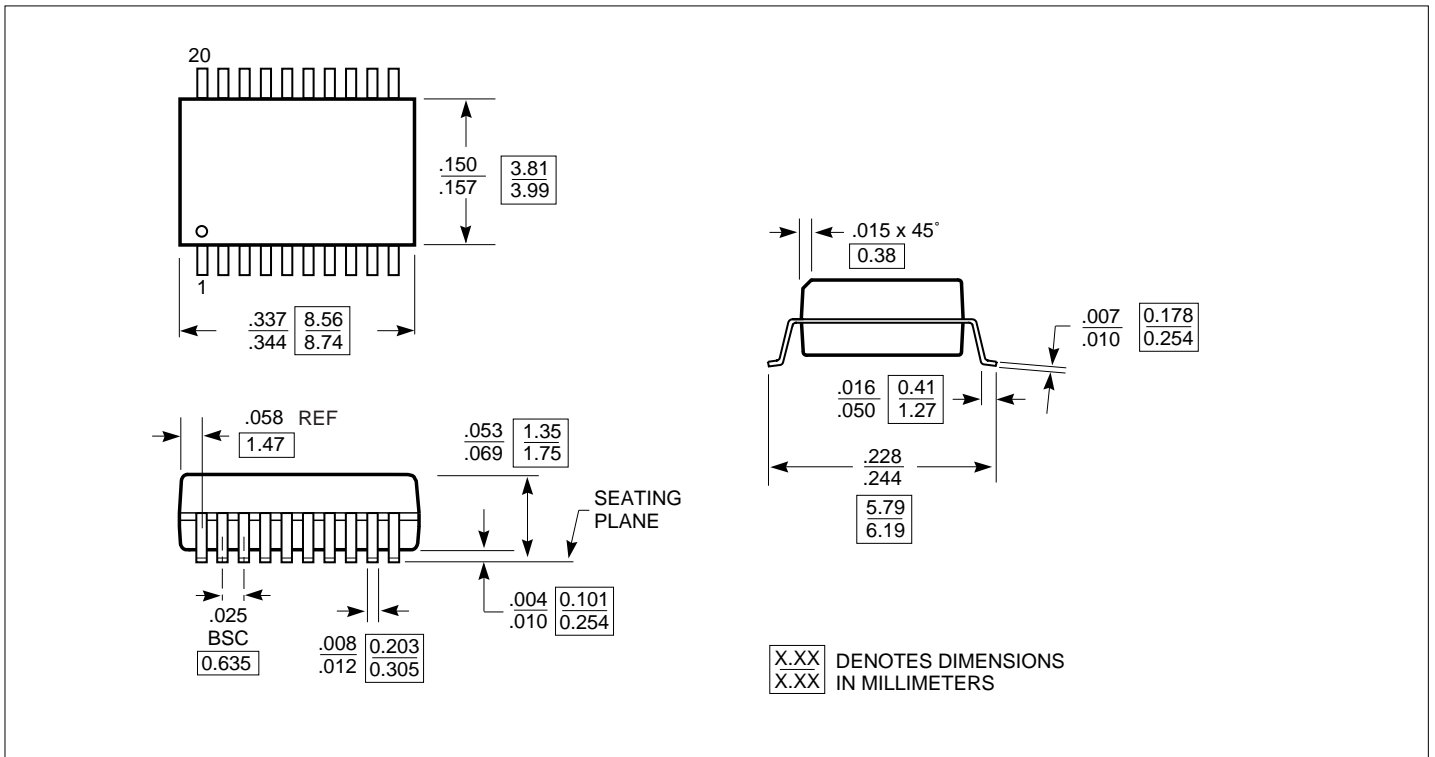


$$t_{SK(p)} = |t_{PHL} - t_{PLH}|$$

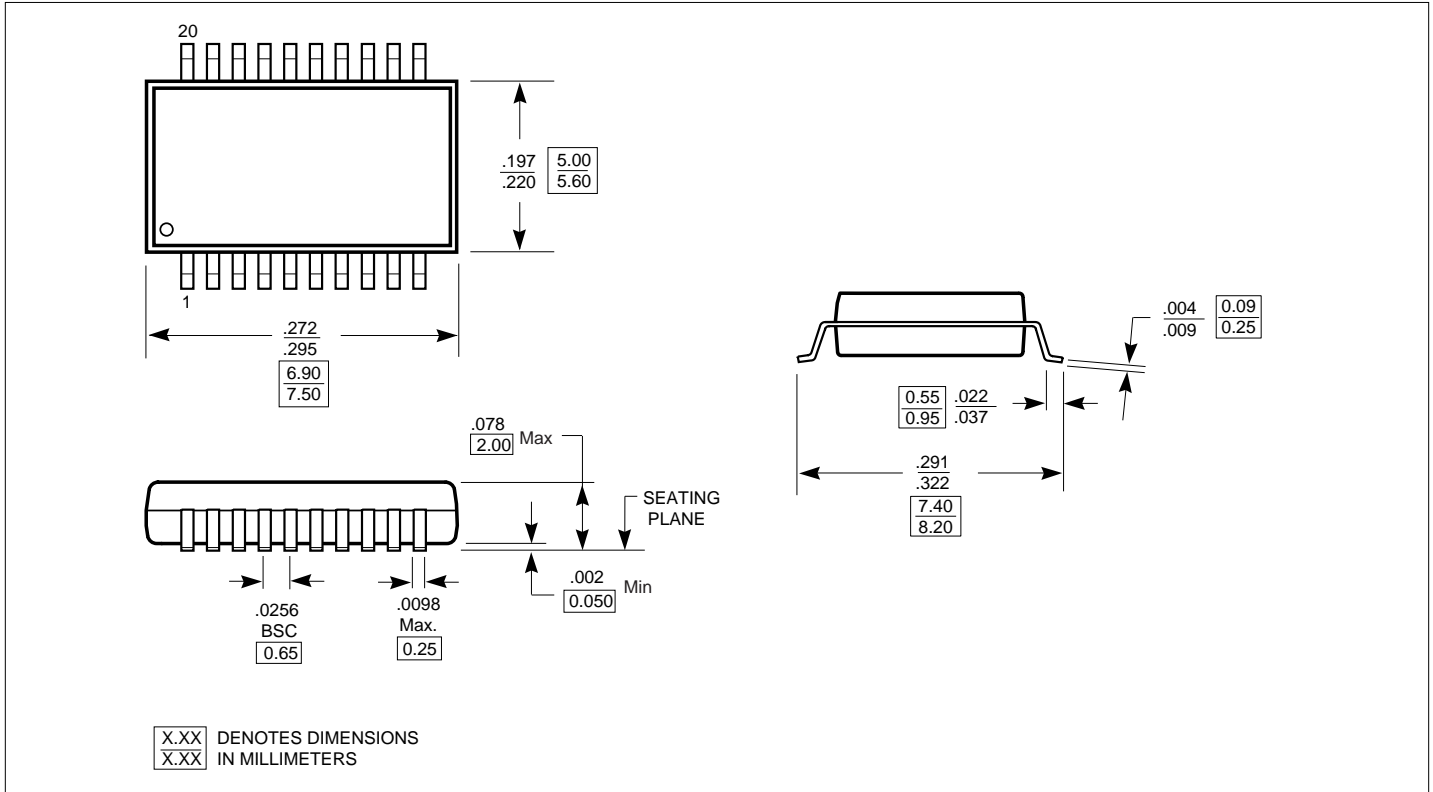
### Package Skew – t<sub>SK(t)</sub>



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

**20-Pin SOIC Package Drawing (S)**

**20-Pin QSOP Package Drawing (Q)**


### 20-Pin SSOP Package Drawing (H)



### Ordering Information

Ordering Code	Part Marking	Package Type	Rating
PI49FCT32805H	PI49FCT32805H	20-pin 209 mil SSOP	Industrial
PI49FCT32805Q	PI49FCT32805Q	20-pin 150 mil QSOP	Industrial
PI49FCT32805S	PI49FCT32805S	20-pin 300 mil SOIC	Industrial