

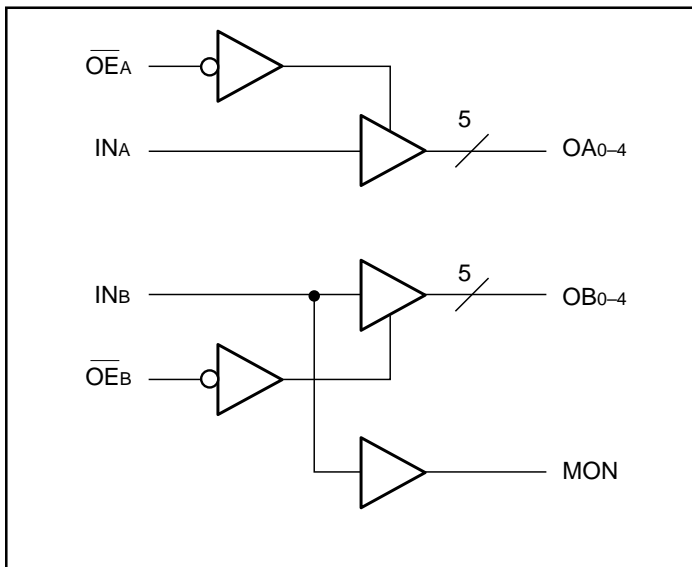
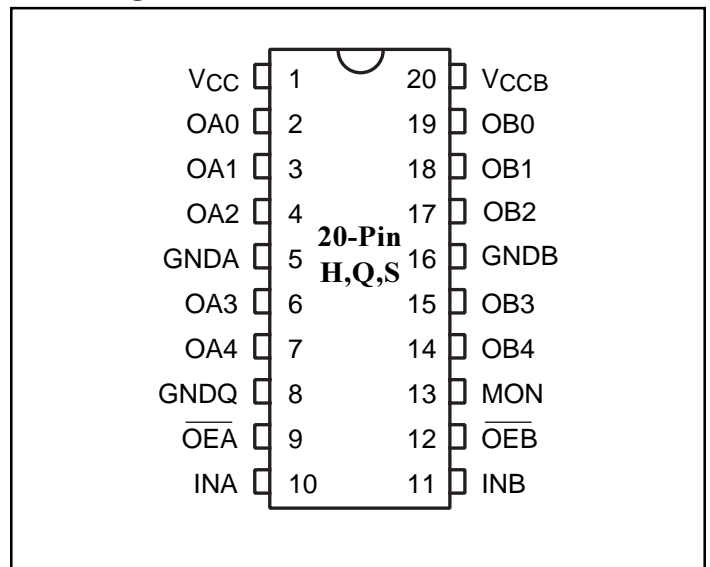
Features

- 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
- 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 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.

Logic Block Diagram

Pin Configuration

Product Pin Description

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

Truth Table⁽¹⁾

| Inputs | | Outputs | |
|------------------------------------|----------|----------|-----|
| $\overline{OE}_A, \overline{OE}_B$ | INA, INB | OAN, 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 | Description | Test Conditions | Typ | Max. | Units |
|------------|--------------------|-----------------------|-----|------|-------|
| C_{IN} | Input Capacitance | $V_{IN} = 0\text{V}$ | 3.0 | 4 | pF |
| C_{OUT} | Output Capacitance | $V_{OUT} = 0\text{V}$ | | 6 | |

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 $+150^\circ\text{C}$ |
| Ambient Temperature with Power Applied | -40°C to $+85^\circ\text{C}$ |
| Supply Voltage to Ground Potential (Inputs & V_{CC} Only) | -0.5V to $+7.0\text{V}$ |
| Supply Voltage to Ground Potential (Outputs & I/O Only) .. | -0.5V to $+V_{CC} + 0.5\text{V}$ |
| DC Input Voltage | -0.5V to $+4.6\text{V}$ |
| DC Output Current | 120 mA |
| Power Dissipation | 0.5 W |

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 $+85^\circ\text{C}$, $V_{CC} = 3.3\text{V} \pm 0.3\text{V}$ |
|-----------------------------------------------------------------------------------------------------------|

DC Electrical Characteristics (Over the Operating Range)

| Symbol | Description | Test Conditions ⁽¹⁾ | Min. | Typ. ⁽²⁾ | Max. | Units |
|------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------|---------------------|-------------------|---------------|
| V_{OH} | Output high voltage $V_{CC} = \text{Min.}$ $V_{IN} = V_{IL}$ or V_{IH} | $I_{OH} = -0.1\text{mA}$ $I_{OH} = -8\text{mA}$ $I_{OH} = -12\text{mA}$ | $V_{CC} - 0.2$ 2.4 ⁽³⁾ 2.4 ⁽³⁾ | – 3.0 3.0 | – – – | V |
| V_{OL} | Output low voltage $V_{CC} = \text{Min.}$ $V_{IN} = V_{IL}$ or V_{IH} | $I_{OH} = 0.1\text{mA}$ $I_{OH} = 8\text{mA}$ $I_{OH} = 12\text{mA}$ | – – – | – 0.2 0.3 | 0.2 0.4 0.4 | |
| V_{IH} | Input high voltage | LOW logic | 2.0 | – | 5.5 | |
| 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 | μA |
| I_{IL} | Input low current | $V_{CC} = \text{Max.}$, $V_{IN} = \text{GND}$ | – | – | -1 | |
| I_{OZH} I_{OZL} | High impedance output current | $V_{CC} = \text{Max.}$, all outputs disabled | – – | – – | 1 -1 | |
| V_{IK} | Clamp diode voltage | $V_{CC} = \text{Min.}$, $I_{IN} = -18\text{mA}$ | – | -0.7 | -1.2 | V |
| I_{OH} | Output HIGH ⁽⁴⁾ current | $V_{OUT} = 1.5\text{V}$, $V_{IN} = V_{IL}$ or V_{IH} , $V_{CC} = 0\text{V}$ | -45 | -74 | -180 | mA |
| I_{OL} | Output LOW ⁽⁴⁾ current | $V_{OUT} = 1.5\text{V}$, $V_{IN} = V_{IL}$ or V_{IH} , $V_{CC} = 0\text{V}$ | 50 | 90 | 200 | |
| I_{OS} | Short circuit ⁽⁵⁾ current | $V_{CC} = \text{Max.}$ | -60 | -135 | -240 | |

Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at $V_{CC} = 3.3\text{V}$, $+25^\circ\text{C}$ ambient and maximum loading.
3. $V_{OH} = V_{CC} - 0.6\text{V}$ 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_{CC} | Quiescent Power Supply Current | $V_{CC} = \text{Max.}$ | $V_{IN} = \text{GND or } V_{CC}$ | — | 0.1 | 30 | μA |
| ΔI_{CC} | Supply Current per Inputs @ TTL HIGH | $V_{CC} = \text{Max.}$ | $V_{IN} = V_{CC} - 0.6\text{V}^{(3)}$ | — | 110 | 300 | μA |
| I_{CCD} | Supply Current per Input per MHz ⁽⁴⁾ | $V_{CC} = \text{Max.},$ Outputs Open $\overline{OE}_A \text{ or } \overline{OE}_B = \text{GND}$ 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 $\overline{OE}_A \text{ or } \overline{OE}_B = \text{GND}$ Mon. Outputs Toggling | $V_{IN} = V_{CC}$ $V_{IN} = \text{GND}$ | — | 1.3 | 9.0 ⁽⁵⁾ | mA |
| | | | $V_{IN} = V_{CC} - 0.6\text{V}$ $V_{IN} = \text{GND}$ | — | 1.3 | 10.0 ⁽⁵⁾ | |
| | | $V_{CC} = \text{Max.},$ Outputs Open $f_O = 2.5 \text{ MHz}$ 50% Duty Cycle $\overline{OE}_A \text{ or } \overline{OE}_B = \text{GND}$ Eleven Outputs Toggling | $V_{IN} = V_{CC}$ $V_{IN} = \text{GND}$ | — | 4.4 | 6.0 ⁽⁵⁾ | |
| | | | $V_{IN} = V_{CC} - 0.6\text{V}$ $V_{IN} = \text{GND}$ | — | 4.4 | 7.0 ⁽⁵⁾ | |

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
 ΔI_{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. ⁽²⁾ | Units |
|---------------------------------------|------------------------------------------------|--------------------------------------------|---------------------|-------|
| t_{PLH} t_{PHL} | Propagation Delay A to Bn | Reference Voltage = 1.5V | 3.0 | ns |
| t_{R}/t_{F} | Rise/Fall Time 0.4V to 2.4V 2.4V to 0.4V | $C_L = 15\text{pF}$ $C_L = 15\text{pF}$ | 1.5 | |
| $t_{SK(p)}$ | Pulse Skew | Reference 1.5V | 0.27 | |
| $t_{SK(o)}$ | Output Skew | Reference 1.5V | 0.27 | |
| $t_{SK(t)}$ | Package Skew | Reference 1.5V | 0.55 | |
| $t_{ZL}, t_{ZH},$ t_{LZ}, t_{HZ} | Enable/Disable Time | | 5.2 | |
| F_{MAX} | Input Frequency | | 133 | |

Note:

1. Lumped load, $C_L = 15\text{pF}$
2. These parameters are guaranteed by design
3. Series Resistor loading = 33ohms (See Test Circuit)

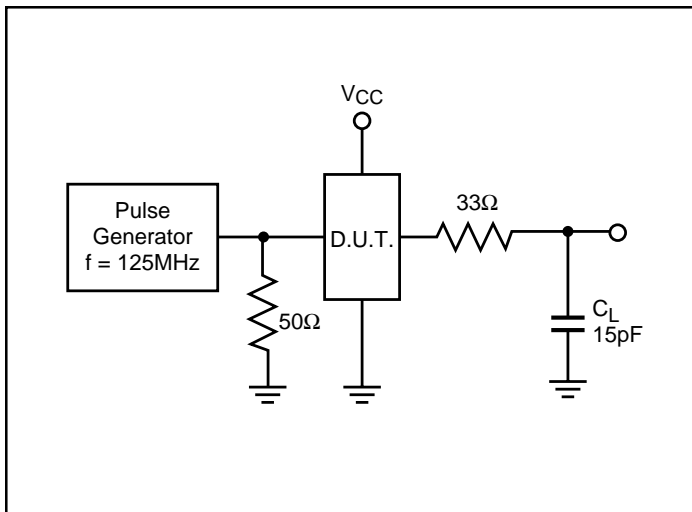
Switch Position

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

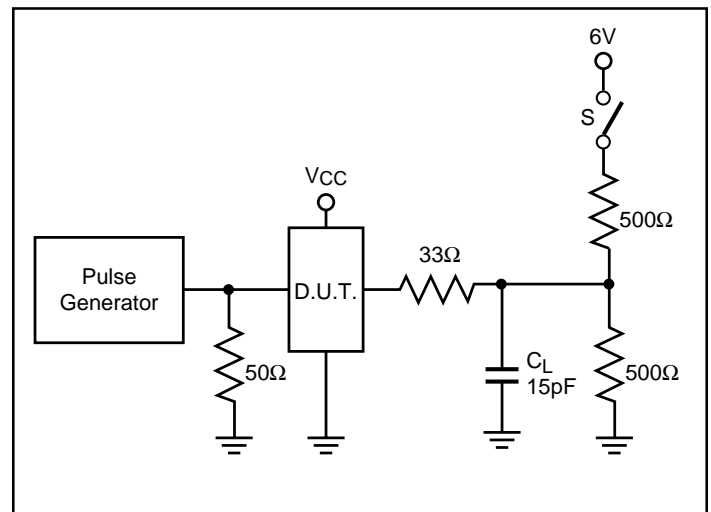
Definitions:

C_L = Load capacitance: includes jig and probe capacitance.
 R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.

Tests Circuit for 133 MHz

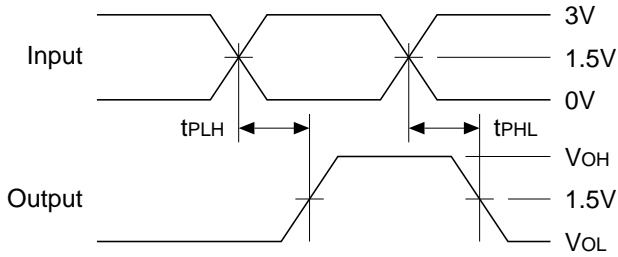


Enable/Disable Time Test Set-Up

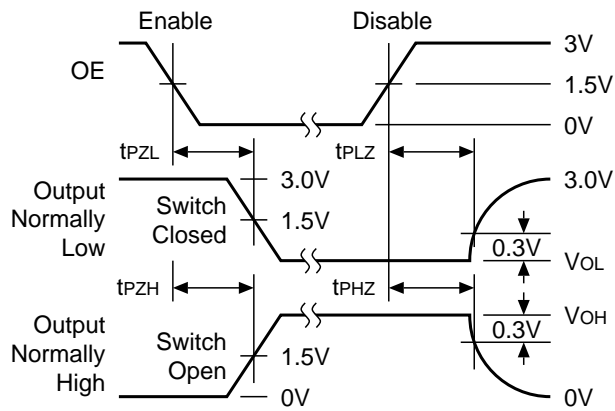


Switching Waveforms

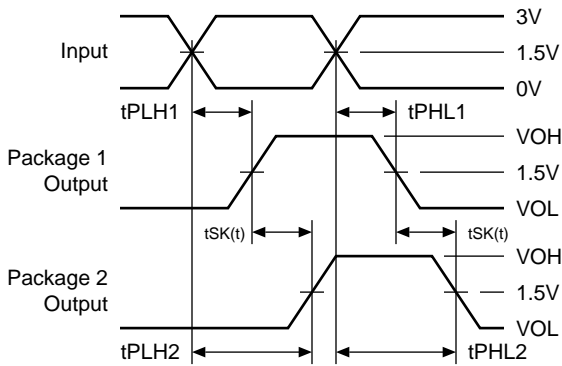
Propagation Delay



Enable and Disable Times

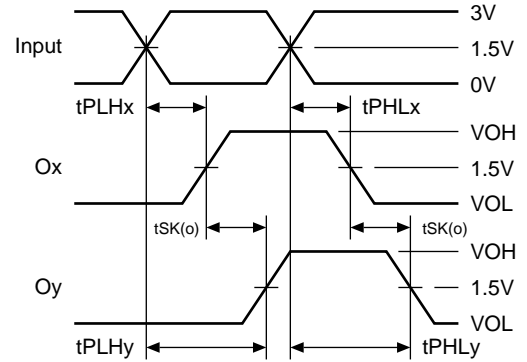


Package Skew – t_{SK(t)}



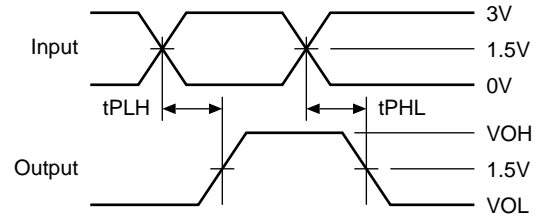
$$t_{SK(t)} = |t_{PLH2} - t_{PLH1}| \text{ or } |t_{PHL2} - t_{PHL1}|$$

Output Skew – t_{SK(o)}



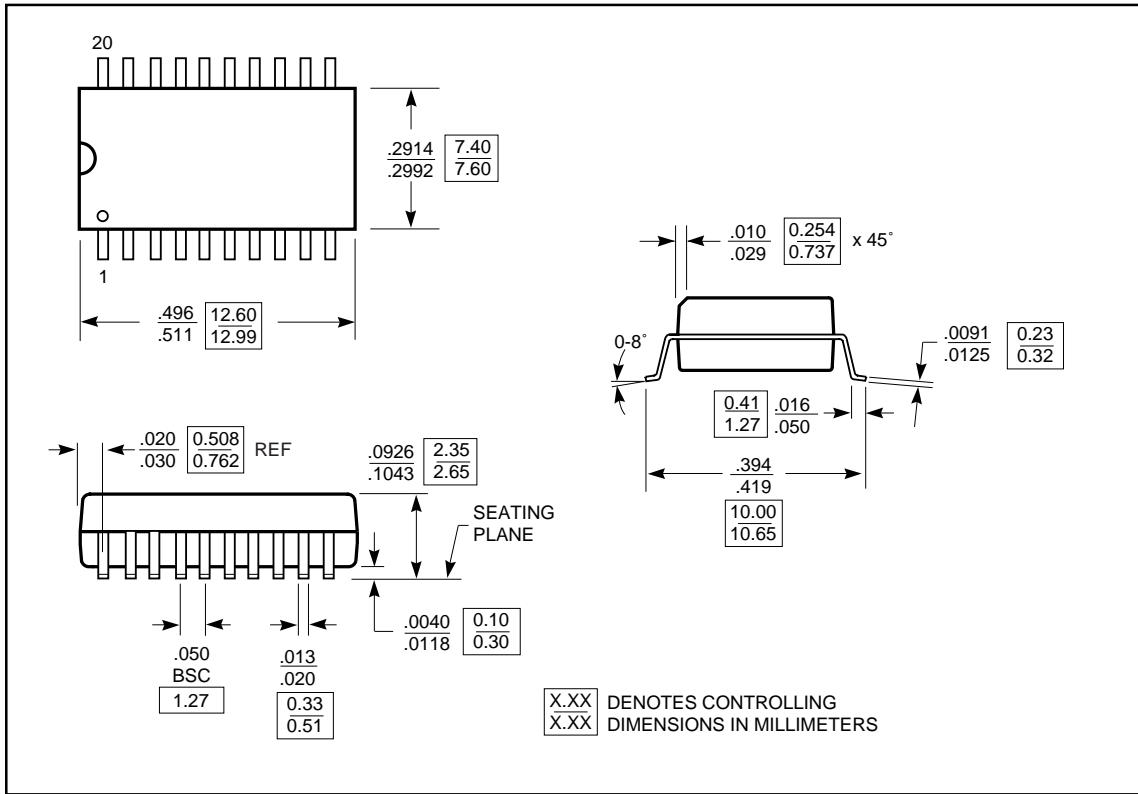
$$t_{SK(o)} = |t_{PLHy} - t_{PLHx}| \text{ or } |t_{PHLy} - t_{PHLx}|$$

Pulse Skew – t_{SK(p)}

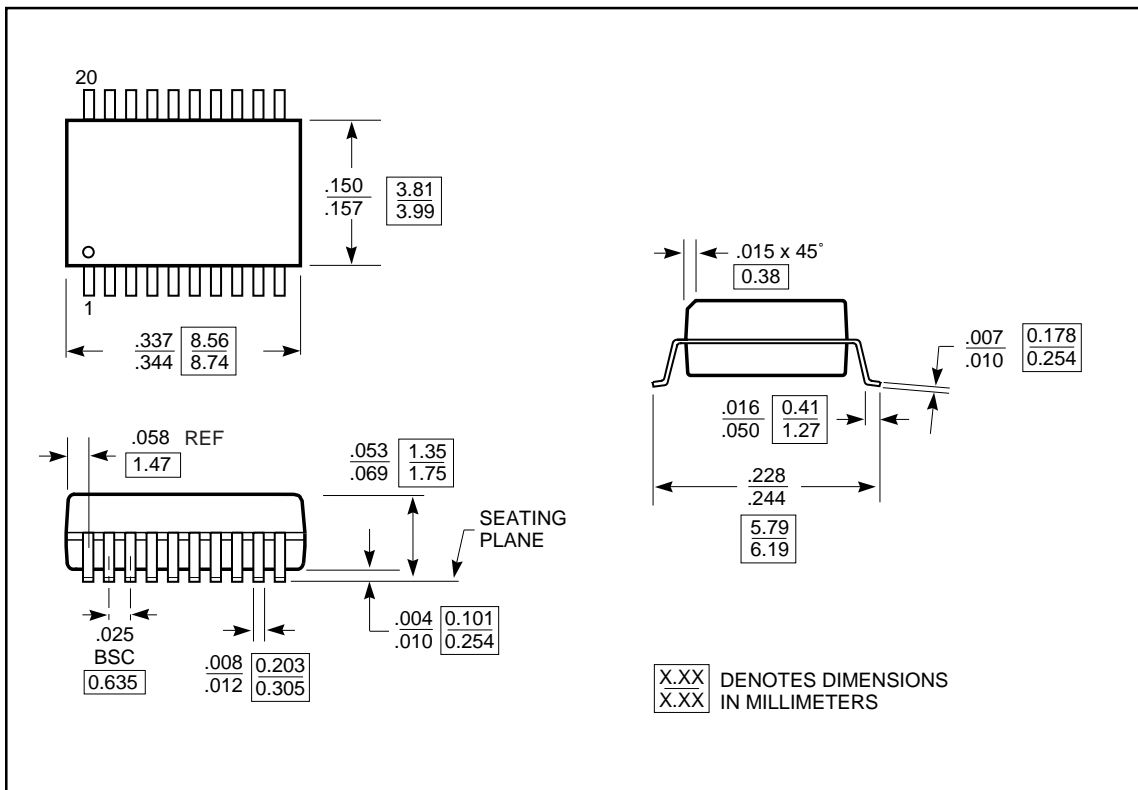


$$t_{SK(p)} = |t_{PHL} - t_{PLH}|$$

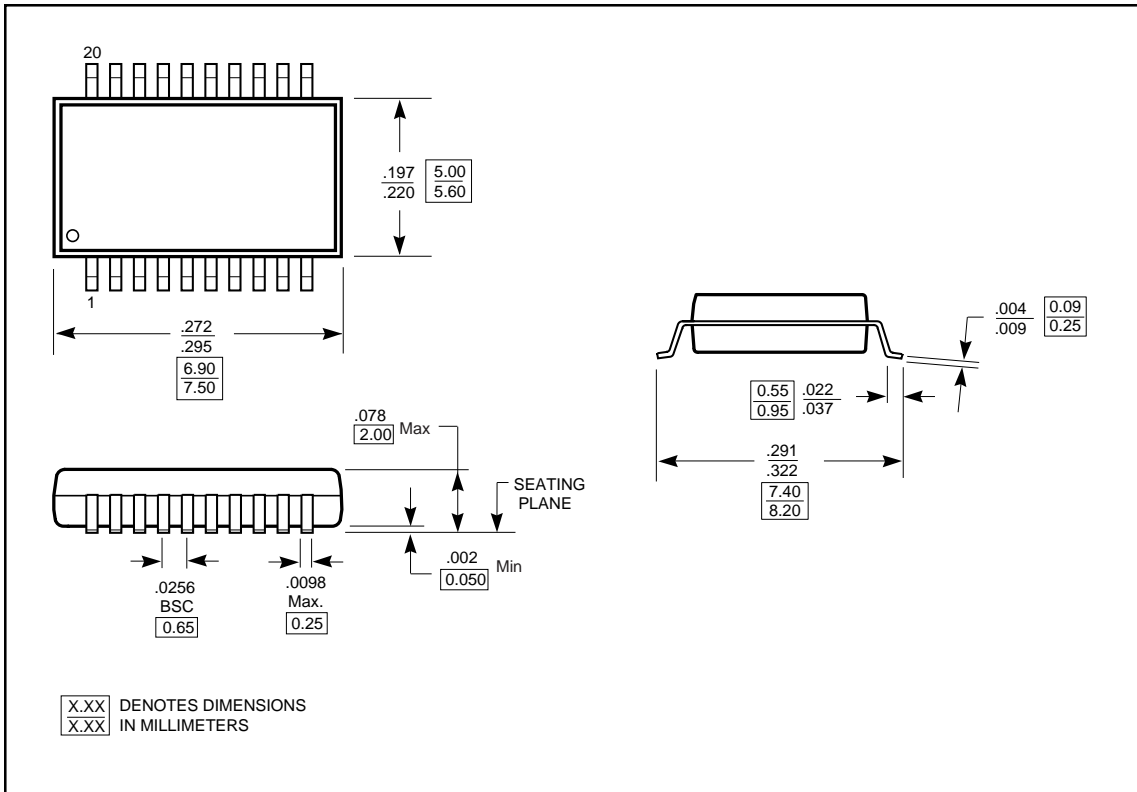
20-Pin 300-mil wide SOIC (S)



20-Pin 150-mil wide QSOP (Q)



20-Pin 209-mil wide SSOP (H)



Ordering Information

| Ordering Code | Part Marking | Package Type | Rating |
|---------------|---------------|---------------------|------------|
| PI49FCT3805DH | PI49FCT3805HD | 20-pin 209 mil SSOP | Industrial |
| PI49FCT3805DQ | PI49FCT3805QD | 20-pin 150 mil QSOP | |
| PI49FCT3805DS | PI49FCT3805SD | 20-pin 300 mil SSIC | |