

## Fast CMOS 16-Bit Buffer/Line Drivers

### Features

#### Common Features

- High-speed, low-power devices with high-current drive  
 $V_{CC}=5V\pm 10\%$
- Hysteresis on all inputs
- Device models available upon request

#### PI74FCT16244T Features

- High output drive:  $I_{OH} = -32mA$ ;  $I_{OL} = 64mA$
- Power off disable outputs permit "live insertion"
- Typical  $V_{OLP}$  (Output Ground Bounce)  
 $< 1.0V$  at  $V_{CC} = 5V$ ,  $T_A = 25^\circ C$

#### PI74FCT162244T Features

- Balanced output drivers:  $\pm 24mA$
- Reduced system switching noise
- Typical  $V_{OLP}$  (Output Ground Bounce)  
 $< 0.6V$  at  $V_{CC} = 5V$ ,  $T_A = 25^\circ C$
- Packaging (Pb-free & Green available):
  - 48-pin 240-mil wide plastic TSSOP (A)
  - 48-pin 300-mil wide plastic SSOP (V)
  - 48-pin 173-mil wide plastic TVSOP (K)

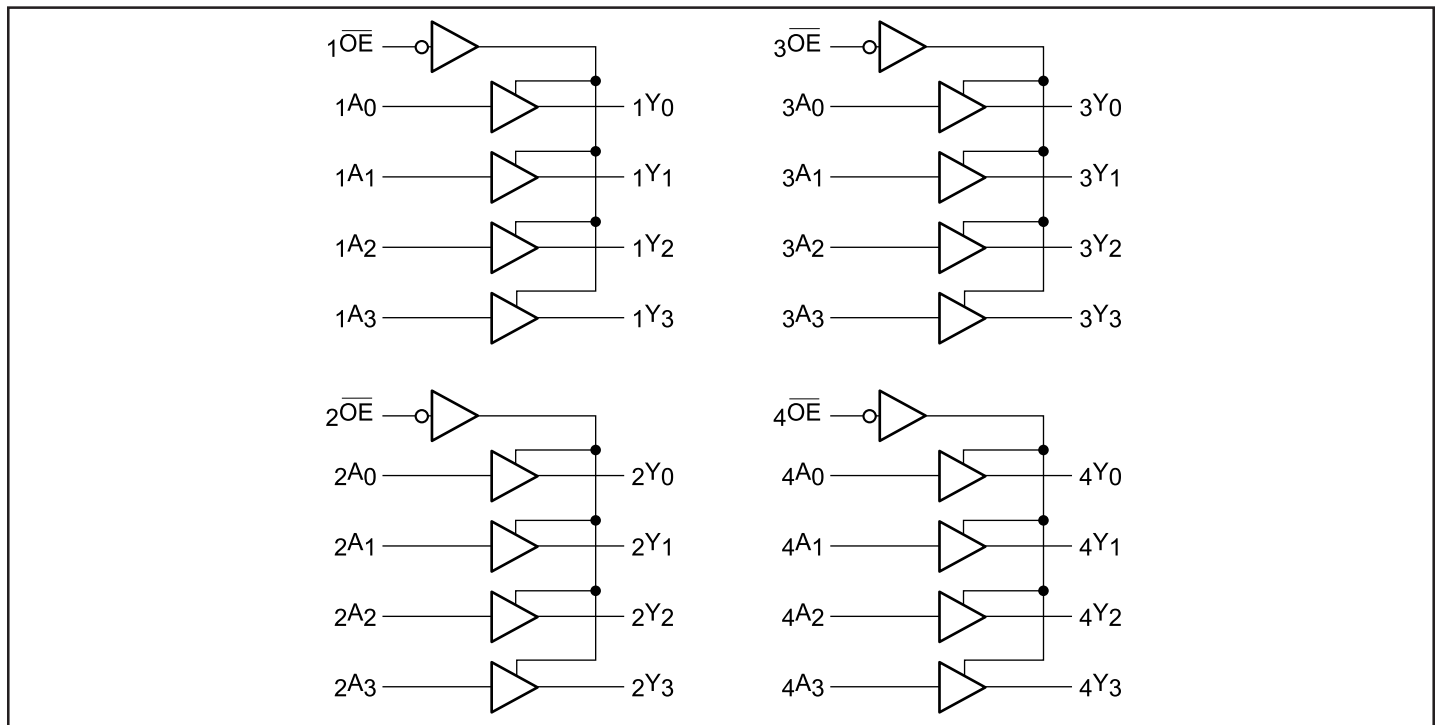
### Description

Pericom Semiconductor's PI74FCT16244T and PI74FCT162244T are non-inverting 16-bit buffer/line drivers designed for applications driving high capacitance loads and low impedance backplanes. These high-speed, low power devices offer bus/backplane interface capability and a flow-through organization for ease of board layout. These devices are designed with three-state controls to operate in a Quad-Nibble, Dual-Byte, or a single 16-bit word mode.

The PI74FCT16244T output buffers are designed with a Power-Off disable allowing "live insertion" of boards when used as backplane drivers.

The PI74FCT162244T has  $\pm 24mA$  balanced output drivers. It is designed with current limiting resistors at its outputs to control the output edge rate resulting in lower ground bounce and undershoot. This eliminates the need for external terminating resistors for most interface applications.

### Block Diagram



**Product Pin Description**

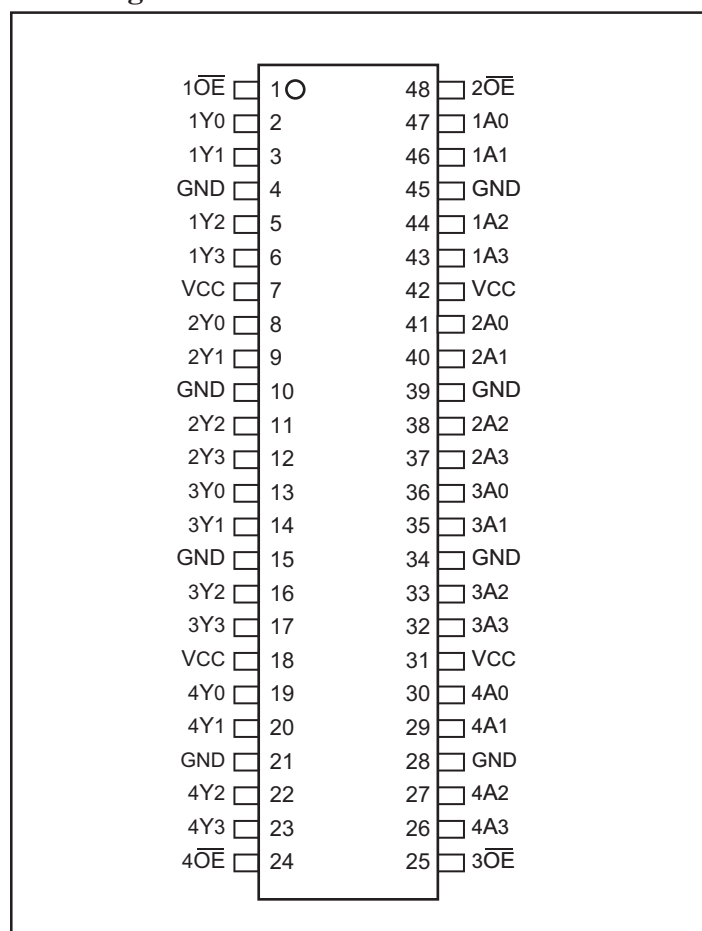
| Pin Name         | Description                               |
|------------------|---|
| $\overline{xOE}$ | 3-State Output Enable Inputs (Active LOW) |
| $xAx$            | Inputs <sup>(1)</sup>                     |
| $xYx$            | 3-State Outputs                           |
| GND              | Ground                                    |
| Vcc              | Power                                     |

**Truth Table**

| Inputs <sup>(1)</sup> |       | Outputs <sup>(1)</sup> |
|-----------------------|-------|------------------------|
| $\overline{xOE}$      | $xAx$ | $xYx$                  |
| L                     | L     | L                      |
| L                     | H     | H                      |
| H                     | X     | Z                      |

**Note:**

- H = High Voltage Level, X = Don't Care,  
L = Low Voltage Level, Z = High Impedance

**Pin Configuration**


### 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 (Inputs & Vcc Only) ... | -0.5V to +7.0V  |
| Supply Voltage to Ground Potential (Outputs & D/O Only)    | -0.5V to +7.0V  |
| DC Input Voltage .....                                     | -0.5V to +7.0V  |
| DC Output Current .....                                    | 120mA           |
| Power Dissipation .....                                    | 1.0W            |

#### 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 (Over the Operating Range, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ , $V_{CC} = 5.0\text{V} \pm 10\%$ )

| Parameters | Description           | Test Conditions <sup>(1)</sup>                                  |                         | Min. | Typ. <sup>(2)</sup> | Max. | Units         |
|------------|-----------------------|---|-------------------------|------|---------------------|------|---------------|
| $V_{IH}$   | Input HIGH Voltage    | Guaranteed Logic HIGH Level                                     |                         | 2.0  |                     |      | V             |
| $V_{IL}$   | Input LOW Voltage     | Guaranteed Logic LOW Level                                      |                         |      |                     | 0.8  | V             |
| $I_{IH}$   | Input HIGH Current    | Standard Input, $V_{CC} = \text{Max.}$                          | $V_{IN} = V_{CC}$       |      |                     | 1    | $\mu\text{A}$ |
| $I_{IH}$   | Input HIGH Current    | Standard I/O, $V_{CC} = \text{Max.}$                            | $V_{IN} = V_{CC}$       |      |                     | 1    | $\mu\text{A}$ |
| $I_{IL}$   | Input LOW Current     | Standard Input, $V_{CC} = \text{Min.}$                          | $V_{IN} = \text{GND}$   |      |                     | -1   | $\mu\text{A}$ |
| $I_{IL}$   | Input LOW Current     | Standard I/O, $V_{CC} = \text{Min.}$                            | $V_{IN} = \text{GND}$   |      |                     | -1   | $\mu\text{A}$ |
| $I_{OZH}$  | High Impedance        | $V_{CC} = \text{Max.}$  | $V_{OUT} = 2.7\text{V}$ |      |                     | 1    | $\mu\text{A}$ |
| $I_{OZL}$  | Output Current        | $V_{CC} = \text{Max.}$  | $V_{OUT} = 0.5\text{V}$ |      |                     | -1   | $\mu\text{A}$ |
| $V_{IK}$   | Clamp Diode Voltage   | $V_{CC} = \text{Min.}$ , $I_{IN} = -18\text{mA}$                |                         |      | -0.7                | -1.2 | V             |
| $I_{OS}$   | Short Circuit Current | $V_{CC} = \text{Max.}$ <sup>(3)</sup> , $V_{OUT} = \text{GND}$  |                         | -80  | -140                | -320 | mA            |
| $I_O$      | Output Drive Current  | $V_{CC} = \text{Max.}$ <sup>(3)</sup> , $V_{OUT} = 2.5\text{V}$ |                         | -50  |                     | -180 | mA            |
| $V_H$      | Input Hysteresis      |   |                         |      | 100                 |      | 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  $V_{CC} = 5.0\text{V}$ ,  $+25^\circ\text{C}$  ambient and maximum loading.
3. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.

**PI74FCT16244T Output Drive Characteristics (Over the Operating Range)**

| Parameters | Description         | Test Conditions <sup>(1)</sup> |               | Min. | Typ. <sup>(2)</sup> | Max. | Units |
|------------|---------------------|--------------------------------|---------------|------|---------------------|------|-------|
| VOH        | Output HIGH Voltage | VCC = Min., VIN = VIH or VIL   | IOH = -3.0mA  | 2.5  | 3.5                 |      | V     |
|            |                     |                                | IOH = -15.0mA | 2.4  | 3.5                 |      |       |
|            |                     |                                | IOH = -32.0mA | 2.0  | 3.0                 |      |       |
| VOL        | Output LOW Voltage  | VCC = Min., VIN = VIH or VIL   | IOL = 64mA    |      | 0.2                 | 0.55 | V     |
| IOFF       | Power Down Disable  | VCC = 0V, VIN or VOUT = -4.5V  |               |      |                     | ±100 | μA    |

**Notes:**

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at VCC = 5.0V, +25°C ambient and maximum loading.

**PI74FCT162244T Output Drive Characteristics (Over the Operating Range)**

| Parameters | Description         | Test Conditions <sup>(1)</sup>                         |               | Min. | Typ. <sup>(2)</sup> | Max. | Units |
|------------|---------------------|--|---------------|------|---------------------|------|-------|
| VOH        | Output HIGH Voltage | VCC = Min., VIN = VIH or VIL                           | IOH = -24.0mA | 2.4  | 3.3                 |      | V     |
| VOL        | Output LOW Voltage  | VCC = Min., VIN = VIH or VIL                           | IOL = 24mA    |      | 0.3                 | 0.55 | V     |
| IODL       | Output LOW Current  | VCC = 5V, VIN = VIH OR VIL, VOUT = 1.5V <sup>(3)</sup> |               | 60   | 115                 | 150  | mA    |
| IODH       | Output HIGH Current | VCC = 5V, VIN = VIH OR VIL, VOUT = 1.5V <sup>(3)</sup> |               | -60  | -115                | -160 | mA    |

**Notes:**

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at VCC = 5.0V, +25°C ambient and maximum loading.
3. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.

**Capacitance (TA = 25°C, f = 1 MHz)**

| Parameters <sup>(1)</sup> | Description        | Test Conditions | Typ | Max. | Units |
|---------------------------|--------------------|-----------------|-----|------|-------|
| CIN                       | Input Capacitance  | VIN = 0V        | 4.5 | 7.5  | pF    |
| COUT                      | Output Capacitance | VOUT = 0V       | 5.5 | 8    | pF    |

**Notes:**

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 <sub>CC</sub>  | Quiescent Power Supply Current                  | V <sub>CC</sub> = Max.   | V <sub>IN</sub> = GND or V <sub>CC</sub>                   |      | 0.1                | 500                 | μA         |
| ΔI <sub>CC</sub> | Supply Current per Input @ TTL HIGH             | V <sub>CC</sub> = Max.   | V <sub>IN</sub> = 3.4V <sup>(3)</sup>                      |      | 0.5                | 1.5                 | mA         |
| I <sub>CCD</sub> | Supply Current per Input per MHz <sup>(4)</sup> | V <sub>CC</sub> = Max.,<br>Outputs Open<br>x $\overline{OE}$ = GND<br>One Bit Toggling<br>50% Duty Cycle                             | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND |      | 60                 | 100                 | μA/<br>MHz |
| I <sub>C</sub>   | Total Power Supply Current <sup>(6)</sup>       | V <sub>CC</sub> = Max.,<br>Outputs Open<br>f <sub>i</sub> = 10 MHz<br>50% Duty Cycle<br>x $\overline{OE}$ = GND<br>One Bit Toggling  | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND |      | 0.6                | 1.5 <sup>(5)</sup>  | mA         |
|                  |   |  | V <sub>IN</sub> = 3.4V<br>V <sub>IN</sub> = GND            |      | 0.9                | 2.3 <sup>(5)</sup>  |            |
|                  |   | V <sub>CC</sub> = Max.,<br>Outputs Open<br>f <sub>i</sub> = 2.5 MHz<br>50% Duty Cycle<br>x $\overline{OE}$ = GND<br>16 Bits Toggling | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND |      | 2.4                | 4.5 <sup>(5)</sup>  |            |
|                  |   |  | V <sub>IN</sub> = 3.4V<br>V <sub>IN</sub> = GND            |      | 6.4                | 16.5 <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> = 5.0V, +25°C ambient.
- Per TTL driven input (V<sub>IN</sub> = 3.4V); 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>CC</sub> formula. These limits are guaranteed but not tested.

6. I<sub>C</sub> = I<sub>QUIESCENT</sub> + I<sub>INPUTS</sub> + I<sub>DYNAMIC</sub>

$$I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_i N_i)$$

I<sub>CC</sub> = Quiescent Current

ΔI<sub>CC</sub> = Power Supply Current for a TTL High Input (V<sub>IN</sub> = 3.4V)

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>CP</sub> = Clock Frequency for Register Devices (Zero for Non-Register Devices)

f<sub>i</sub> = Input Frequency

N<sub>i</sub> = Number of Inputs at f<sub>i</sub>

All currents are in milliamps and all frequencies are in megahertz.

**PI74FCT16244T Switching Characteristics over Operating Range**

| Parameters             | Description  | Conditions              | 16244T |     | 16244AT |     | 16244CT |     | 16244ET |     | Units |
|------------------------|--|-------------------------|--------|-----|---------|-----|---------|-----|---------|-----|-------|
|                        |  |                         | Com.   |     | Com.    |     | Com.    |     | Com.    |     |       |
|                        |  |                         | Min    | Max | Min     | Max | Min     | Max | Min     | Max |       |
| tPLH<br>tPHL           | Propagation Delay <sup>(1)</sup><br>xAX to xYX                                 | CL = 50 pF<br>RL = 500Ω | 1.5    | 6.5 | 1.5     | 4.8 | 1.5     | 4.1 | 1.5     | 3.2 | ns    |
| tpZH<br>tpZL           | Output Enable Time<br>xOE to xYX   |                         | 1.5    | 8.0 | 1.5     | 6.2 | 1.5     | 5.8 | 1.5     | 4.4 | ns    |
| tPHZ<br>tPLZ<br>tsk(o) | Output Disable Time <sup>(2)</sup><br>xOE to xYX<br>Output Skew <sup>(3)</sup> |                         | 1.5    | 7.0 | 1.5     | 5.6 | 1.5     | 5.2 | 1.5     | 4.3 | ns    |
|                        |  |                         |        | 0.5 |         | 0.5 |         | 0.5 |         | 0.5 | ns    |

**Notes:**

1. Minimum limits are guaranteed but not tested on Propagation Delays.
2. This parameter is guaranteed but not production tested.
3. Skew between any two outputs, of the same package, switching in the same direction. This parameter is guaranteed by design.

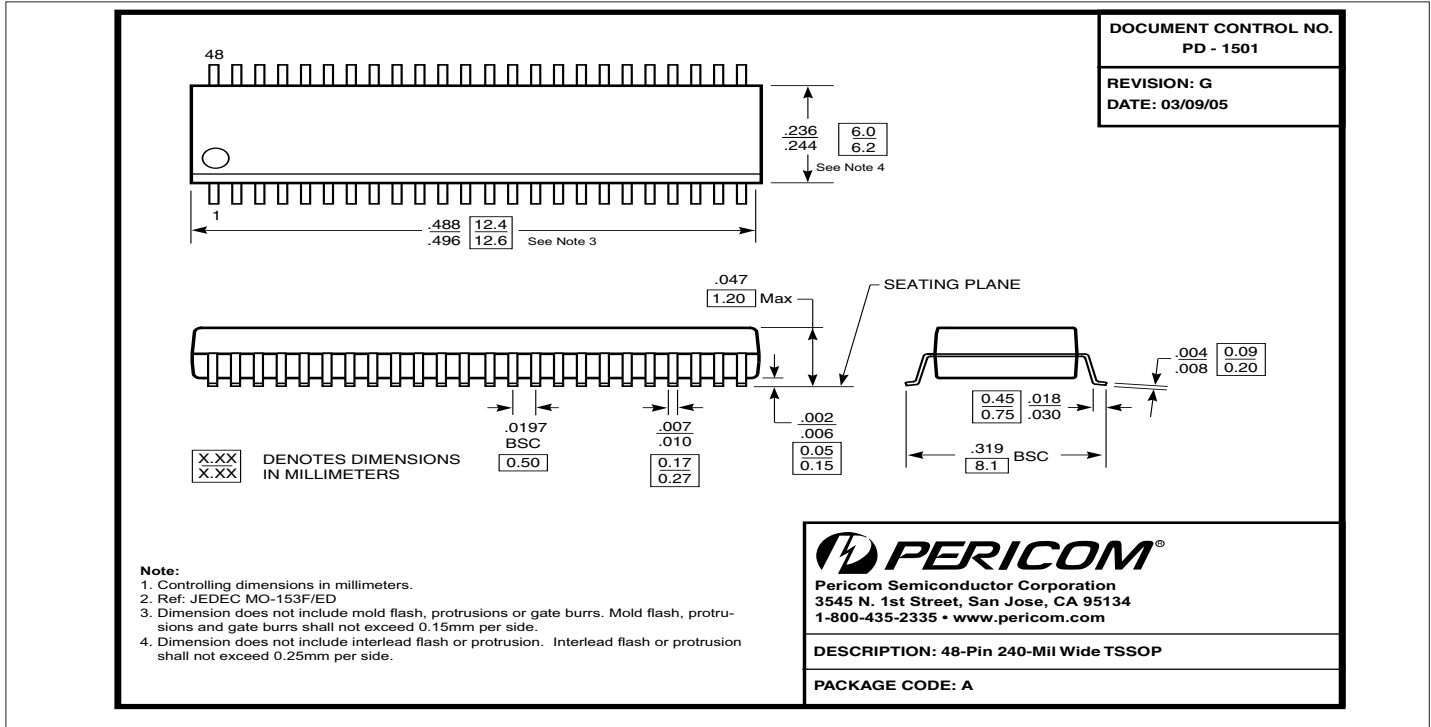
**PI74FCT162244T Switching Characteristics over Operating Range**

| Parameters             | Description  | Conditions              | 162244T |     | 162244AT |     | 162244CT |     | 162244ET |     | Units |
|------------------------|--|-------------------------|---------|-----|----------|-----|----------|-----|----------|-----|-------|
|                        |  |                         | Com.    |     | Com.     |     | Com.     |     | Com.     |     |       |
|                        |  |                         | Min     | Max | Min      | Max | Min      | Max | Min      | Max |       |
| tPLH<br>tPHL           | Propagation Delay <sup>(1)</sup><br>xAX to xYX                                 | CL = 50 pF<br>RL = 500Ω | 1.5     | 6.5 | 1.5      | 4.8 | 1.5      | 4.1 | 1.5      | 3.2 | ns    |
| tpZH<br>tpZL           | Output Enable Time<br>xOE to xYX   |                         | 1.5     | 8.0 | 1.5      | 6.2 | 1.5      | 5.8 | 1.5      | 4.4 | ns    |
| tPHZ<br>tPLZ<br>tsk(o) | Output Disable Time <sup>(2)</sup><br>xOE to xYX<br>Output Skew <sup>(3)</sup> |                         | 1.5     | 7.0 | 1.5      | 5.6 | 1.5      | 5.2 | 1.5      | 4.0 | ns    |
|                        |  |                         |         | 0.5 |          | 0.5 |          | 0.5 |          | 0.5 | ns    |

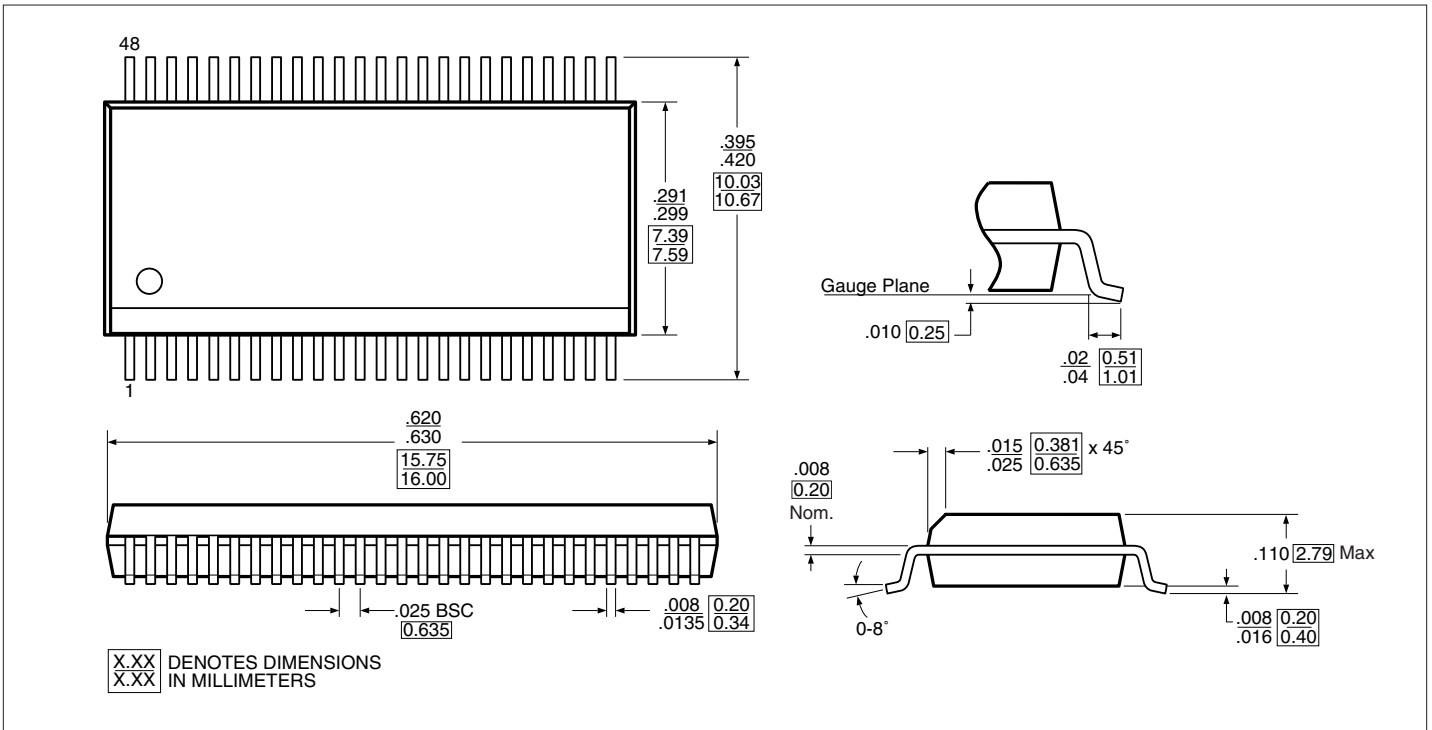
**Notes:**

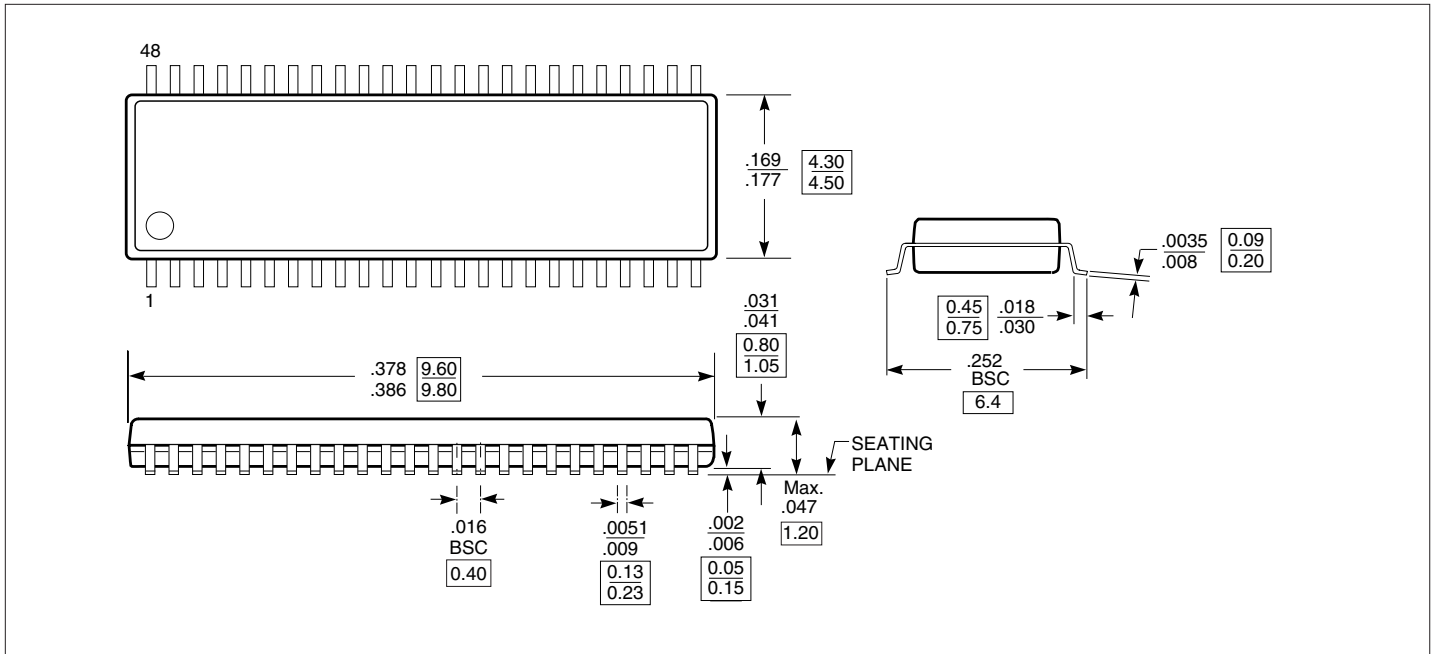
1. Minimum limits are guaranteed but not tested on Propagation Delays.
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**Packaging Mechanical: 48-Pin, 240 mil wide Plastic TSSOP (A)**



**Packaging Mechanical: 48-pin 300 mil wide plastic SSOP (V)**



**Packaging Mechanical: 48-pin 173-mil wide plastic TVSOP (K)**

**PI74FCT16244T Ordering Information**

| Ordering Code    | Package Code | Speed Grade | Package Type                               |
|------------------|--------------|-------------|--|
| PI74FCT16244TA   | A            | Blank       | 48-pin 240-mil wide TSSOP                  |
| PI74FCT16244TAE  | A            | Blank       | Pb-free & Green, 48-pin 240-mil wide TSSOP |
| PI74FCT16244TV   | V            | Blank       | 48-pin 300-mil wide SSOP                   |
| PI74FCT16244TVE  | V            | Blank       | Pb-free & Green, 48-pin 300-mil wide SSOP  |
| PI74FCT16244TK   | K            | Blank       | 48-pin 173-mil wide TVSOP                  |
| PI74FCT16244TKE  | K            | Blank       | Pb-free & Green, 48-pin 173-mil wide TVSOP |
| PI74FCT16244ATA  | A            | A           | 48-pin 240-mil wide TSSOP                  |
| PI74FCT16244ATAE | A            | A           | Pb-free & Green, 48-pin 240-mil wide TSSOP |
| PI74FCT16244ATV  | V            | A           | 48-pin 300-mil wide SSOP                   |
| PI74FCT16244ATVE | V            | A           | Pb-free & Green, 48-pin 300-mil wide SSOP  |
| PI74FCT16244CTA  | A            | C           | 48-pin 240-mil wide TSSOP                  |
| PI74FCT16244CTAE | A            | C           | Pb-free & Green, 48-pin 240-mil wide TSSOP |
| PI74FCT16244CTV  | V            | C           | 48-pin 300-mil wide SSOP                   |
| PI74FCT16244CTVE | V            | C           | Pb-free & Green, 48-pin 300-mil wide SSOP  |



**PI74FCT162244T Ordering Information**

| Ordering Code     | Package Code | Speed Grade | Package Type                               |
|-------------------|--------------|-------------|--|
| PI74FCT162244TA   | A            | Blank       | 48-pin 240-mil wide TSSOP                  |
| PI74FCT162244TAE  | A            | Blank       | Pb-free & Green, 48-pin 240-mil wide TSSOP |
| PI74FCT162244TV   | V            | Blank       | 48-pin 300-mil wide SSOP                   |
| PI74FCT162244TVE  | V            | Blank       | Pb-free & Green, 48-pin 300-mil wide SSOP  |
| PI74FCT162244ATA  | A            | A           | 48-pin 240-mil wide TSSOP                  |
| PI74FCT162244ATAE | A            | A           | Pb-free & Green, 48-pin 240-mil wide TSSOP |
| PI74FCT162244ATV  | V            | A           | 48-pin 300-mil wide SSOP                   |
| PI74FCT162244ATVE | V            | A           | Pb-free & Green, 48-pin 300-mil wide SSOP  |
| PI74FCT162244CTA  | A            | C           | 48-pin 240-mil wide TSSOP                  |
| PI74FCT162244CTV  | V            | C           | 48-pin 300-mil wide SSOP                   |
| PI74FCT162244CTK  | K            | C           | 48-pin 173-mil wide TVSOP                  |
| PI74FCT162244CTKE | K            | C           | Pb-free & Green, 48-pin 173-mil wide TVSOP |

**Notes:**

- Thermal characteristics can be found on the company web site at [www.pericom.com/packaging/](http://www.pericom.com/packaging/)
- E = Pb-free & Green
- Adding an X suffix = Tape/Reel

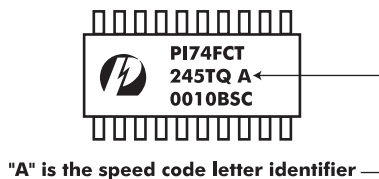
**Part Marking Information**

Pericom's standard product mark follows our standard part number ordering information, except for those products with a speed letter code. For marking purposes, the speed letter code mark is placed after the package code letter, rather than after the device number as it is ordered.

Although all products are marked immediately after assembly to assure material traceability, Pericom does not usually mark the speed code at that time. After electrical test screening and speed binning have been completed, we then perform an "add mark" operation which places the speed code letter at the end of the complete part number.

Please refer to the example shown below:

- Part Number as ordered: PI74FCT245ATQ
- Example of Part Number as marked:


**Notes:**

- 1) 8-pin DIP, 8-pin SOIC, 8-pin TSSOP, 14-pin SOIC, 16-pin QSOP, SC70, MSOP, and SOT23 packages are not marked with the Pericom logo due to space limitations on the package.