

## Features

### Common Features

- PI74FCT16245T and PI74FCT162245T are high-speed, low-power devices with high-current drive
- $V_{CC} = 5V \pm 10\%$
- Hysteresis on all inputs
- Packaging (Pb-free & Green available):
  - 48-pin 240-mil wide plastic TSSOP (A)
  - 48-pin 300-mil wide plastic SSOP (V)

### PI74FCT16245T 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  $V_{CC} = 5V$ ,  $T_A = 25^\circ C$

### PI74FCT162245T Features

- Balanced output drivers:  $\pm 24mA$
- Reduced system switching noise
- Typical  $V_{OLP}$  (Output Ground Bounce)
  - < 0.6V at  $V_{CC} = 5V$ ,  $T_A = 25^\circ C$

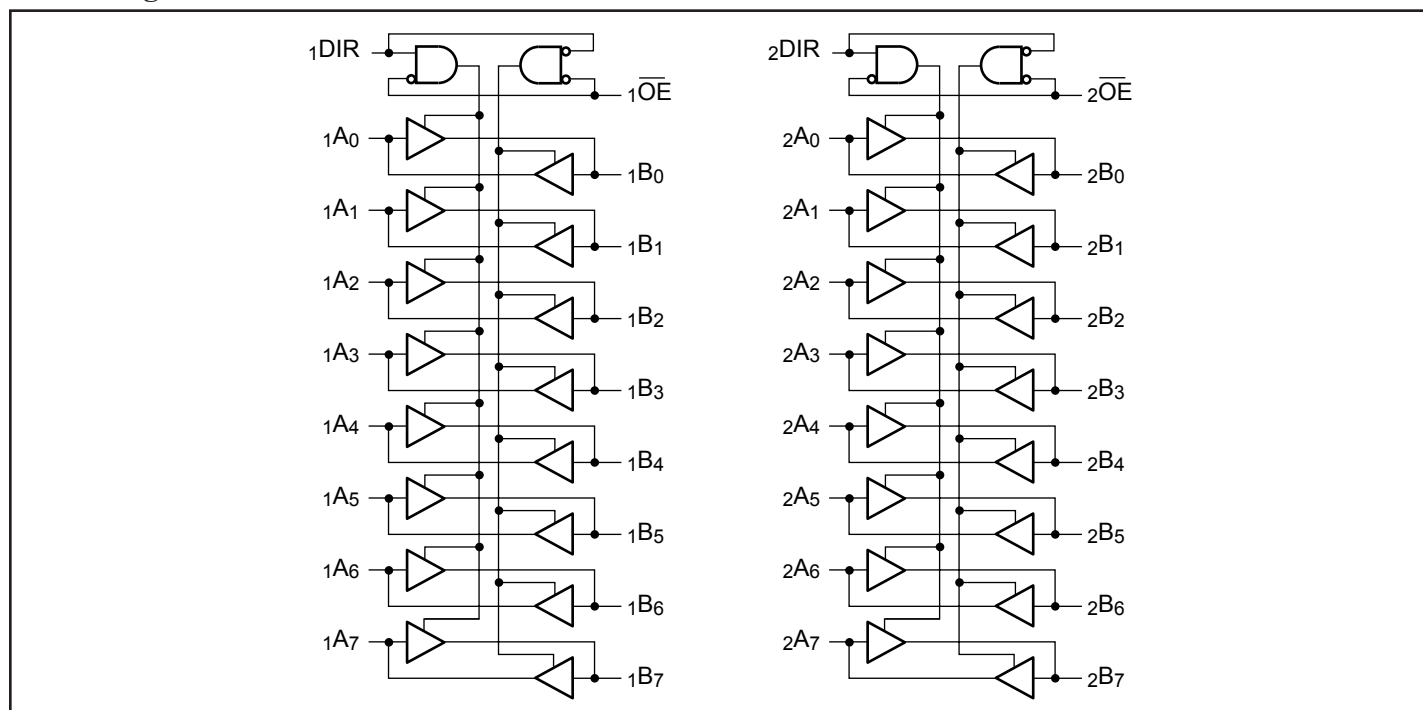
## Description

Pericom Semiconductor's PI74FCT16245T and PI74FCT162245T are 16-bit bidirectional transceivers designed for asynchronous two-way communication between data buses. The direction control input pin (xDIR) determines the direction of data flow through the bidirectional transceiver. The Direction and Output Enable controls are designed to operate these devices as either two independent 8-bit transceivers or one 16-bit transceiver. The output enable ( $\overline{OE}$ ) input, when HIGH, disables both A and B ports by placing them in Hi-Z condition.

The PI74FCT16245T output buffers are designed with a power off disable allowing “live insertion” of boards when used as backplane drivers.

The PI74FCT162245T 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



## 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 & V <sub>CC</sub> 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.

## Pin Configuration

|                 |    |    |                 |
|-----------------|----|----|-----------------|
| 1DIR            | 1  | 48 | 1OE             |
| 1B0             | 2  | 47 | 1A0             |
| 1B1             | 3  | 46 | 1A1             |
| GND             | 4  | 45 | GND             |
| 1B2             | 5  | 44 | 1A2             |
| 1B3             | 6  | 43 | 1A3             |
| V <sub>CC</sub> | 7  | 42 | V <sub>CC</sub> |
| 1B4             | 8  | 41 | 1A4             |
| 1B5             | 9  | 40 | 1A5             |
| GND             | 10 | 39 | GND             |
| 1B6             | 11 | 38 | 1A6             |
| 1B7             | 12 | 37 | 1A7             |
| 2B0             | 13 | 36 | 2A0             |
| 2B1             | 14 | 35 | 2A1             |
| GND             | 15 | 34 | GND             |
| 2B2             | 16 | 33 | 2A2             |
| 2B3             | 17 | 32 | 2A3             |
| V <sub>CC</sub> | 18 | 31 | V <sub>CC</sub> |
| 2B4             | 19 | 30 | 2A4             |
| 2B5             | 20 | 29 | 2A5             |
| GND             | 21 | 28 | GND             |
| 2B6             | 22 | 27 | 2A6             |
| 2B7             | 23 | 26 | 2A7             |
| 2DIR            | 24 | 25 | 2OE             |

## Truth Table

| Inputs <sup>(1)</sup> |      | Outputs <sup>(1)</sup> |
|-----------------------|------|------------------------|
| xOE                   | xDIR |                        |
| L                     | L    | Bus B Data to Bus A    |
| L                     | H    | Bus A Data to Bus B    |
| H                     | X    | High Z State           |

### Note:

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

## Pin Description

| Pin Name        | Description                        |
|-----------------|------------------------------------|
| xOE             | 3-State Enable Inputs (Active LOW) |
| xDIR            | Direction Control Input            |
| xA <sub>X</sub> | Side A Inputs or 3-State Outputs   |
| xB <sub>X</sub> | Side B Inputs or 3-State Outputs   |
| GND             | Ground                             |
| V <sub>CC</sub> | Power                              |

**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  |               |
| $I_{IH}$   | Input HIGH Current    | Standard Input, $V_{CC} = \text{Max.}$                          | $V_{IN} = V_{CC}$       |      |                     | 1    | $\mu\text{A}$ |
|            |                       | Standard I/O, $V_{CC} = \text{Max.}$                            | $V_{IN} = V_{CC}$       |      |                     | 1    |               |
| $I_{IL}$   | Input LOW Current     | Standard Input, $V_{CC} = \text{Min.}$                          | $V_{IN} = \text{GND}$   |      |                     | -1   |               |
|            |                       | Standard I/O, $V_{CC} = \text{Min.}$                            | $V_{IN} = \text{GND}$   |      |                     | -1   |               |
| $I_{OZH}$  | High Impedance        | $V_{CC} = \text{Max.}$                                          | $V_{OUT} = 2.7\text{V}$ |      |                     | 1    |               |
| $I_{OZL}$  | Output Current        | $V_{CC} = \text{Max.}$                                          | $V_{OUT} = 0.5\text{V}$ |      |                     | -1   |               |
| $V_{IK}$   | 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                | -300 | mA            |
| $I_O$      | Output Drive Current  | $V_{CC} = \text{Max.}$ <sup>(3)</sup> , $V_{OUT} = 2.5\text{V}$ |                         | -50  |                     | -180 |               |
| $V_H$      | 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.

**PI74FCT16245T Output Drive Characteristics** (Over the Operating Range)

| Parameters | Description         | Test Conditions <sup>(1)</sup>                                |                           | Min. | Typ. <sup>(2)</sup> | Max.      | Units         |
|------------|---------------------|---------------------------------------------------------------|---------------------------|------|---------------------|-----------|---------------|
| $V_{OH}$   | Output HIGH Voltage | $V_{CC} = \text{Min.}$ , $V_{IN} = V_{IH}$ or $V_{IL}$        | $I_{OH} = -3.0\text{mA}$  | 2.5  | 3.5                 |           | V             |
|            |                     |                                                               | $I_{OH} = -15.0\text{mA}$ | 2.4  | 3.5                 |           |               |
|            |                     |                                                               | $I_{OH} = -32.0\text{mA}$ |      |                     |           |               |
| $V_{OL}$   | Output LOW Voltage  | $V_{CC} = \text{Min.}$ , $V_{IN} = V_{IH}$ or $V_{IL}$        | $I_{OL} = 64\text{mA}$    |      | 0.2                 | 0.55      |               |
| $I_{OFF}$  | Power Down Disable  | $V_{CC} = 0\text{V}$ , $V_{IN}$ or $V_{OUT} \leq 4.5\text{V}$ |                           | —    | —                   | $\pm 100$ | $\mu\text{A}$ |

**PI74FCT162245T Output Drive Characteristics** (Over the Operating Range)

| Parameters | Description         | Test Conditions <sup>(1)</sup>                                                                |                           | Min. | Typ. <sup>(2)</sup> | Max. | Units |
|------------|---------------------|-----------------------------------------------------------------------------------------------|---------------------------|------|---------------------|------|-------|
| $V_{OH}$   | Output HIGH Voltage | $V_{CC} = \text{Min.}$ , $V_{IN} = V_{IH}$ or $V_{IL}$                                        | $I_{OH} = -24.0\text{mA}$ | 2.4  | 3.3                 |      | V     |
| $V_{OL}$   | Output LOW Voltage  | $V_{CC} = \text{Min.}$ , $V_{IN} = V_{IH}$ or $V_{IL}$                                        | $I_{OL} = 24\text{mA}$    |      | 0.3                 | 0.55 |       |
| $I_{ODL}$  | Output LOW Current  | $V_{CC} = 5\text{V}$ , $V_{IN} = V_{IH}$ or $V_{IL}$ , $V_{OUT} = 1.5\text{V}$ <sup>(3)</sup> |                           | 60   | 115                 | 160  | mA    |
| $I_{ODH}$  | Output HIGH Current | $V_{CC} = 5\text{V}$ , $V_{IN} = V_{IH}$ or $V_{IL}$ , $V_{OUT} = 1.5\text{V}$ <sup>(3)</sup> |                           | -60  | -115                | -150 |       |

**Capacitance** ( $T_A = 25^\circ\text{C}$ ,  $f = 1\text{ MHz}$ )

| Parameters <sup>(4)</sup> | Description        | Test Conditions | Typ. | Max. | Units |
|---------------------------|--------------------|-----------------|------|------|-------|
| $C_{IN}$                  | Input Capacitance  | $V_{IN} = 0V$   | 4.5  | 6    | pF    |
| $C_{OUT}$                 | Output Capacitance | $V_{OUT} = 0V$  | 5.5  | 8    |       |

**Notes:**

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at  $V_{CC} = 5.0V$ ,  $+25^\circ\text{C}$  ambient and maximum loading.
- Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
- 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                  | $V_{CC} = \text{Max.}$                                                                                                                          | $V_{IN} = \text{GND or } V_{CC}$            |      | 0.1                 | 500                 | $\mu\text{A}$            |
| $\Delta I_{CC}$ | Supply Current per Input @ TTL HIGH             | $V_{CC} = \text{Max.}$                                                                                                                          | $V_{IN} = 3.4V^{(3)}$                       |      | 0.5                 | 1.5                 | mA                       |
| $I_{CCD}$       | Supply Current per Input per MHz <sup>(4)</sup> | $V_{CC} = \text{Max.},$<br>Outputs Open<br>$\overline{xOE} = xDIR = \text{GND}$<br>One Bit Toggling<br>50% Duty Cycle                           | $V_{IN} = V_{CC},$<br>$V_{IN} = \text{GND}$ |      | 60                  | 100                 | $\mu\text{A}/\text{MHz}$ |
| $I_C$           | Total Power Supply Current <sup>(6)</sup>       | $V_{CC} = \text{Max.},$<br>Outputs Open<br>$f_i = 10\text{ MHz}$<br>50% Duty Cycle<br>$\overline{xOE} = xDIR = \text{GND}$<br>One Bit Toggling  | $V_{IN} = V_{CC},$<br>$V_{IN} = \text{GND}$ |      | 0.7                 | 2.5 <sup>(5)</sup>  | mA                       |
|                 |                                                 |                                                                                                                                                 | $V_{IN} = 3.4V$                             |      | 0.9                 | 3.3 <sup>(5)</sup>  |                          |
|                 |                                                 | $V_{CC} = \text{Max.},$<br>Outputs Open<br>$f_i = 2.5\text{ MHz}$<br>50% Duty Cycle<br>$\overline{xOE} = xDIR = \text{GND}$<br>16 Bits Toggling | $V_{IN} = V_{CC},$<br>$V_{IN} = \text{GND}$ |      | 2.5                 | 5.5 <sup>(5)</sup>  |                          |
|                 |                                                 |                                                                                                                                                 | $V_{IN} = 3.4V$                             |      | 6.5                 | 17.5 <sup>(5)</sup> |                          |

**Notes:**

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at  $V_{CC} = 5.0V$ ,  $+25^\circ\text{C}$  ambient.
- Per TTL driven input ( $V_{IN} = 3.4V$ ); 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  $I_{CC}$  formula. These limits are guaranteed but not tested.
- $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$   
 $I_C = I_{CC} + \Delta I_{CC} D_{HNT} + I_{CCD} (f_{CP}/2 + f_i N_i)$   
 $I_{CC}$  = Quiescent Current  
 $\Delta I_{CC}$  = Power Supply Current for a TTL High Input ( $V_{IN} = 3.4V$ )  
 $D_H$  = 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)  
 $f_{CP}$  = Clock Frequency for Register Devices (Zero for Non-Register Devices)  
 $f_i$  = Input Frequency  
 $N_i$  = Number of Inputs at  $f_i$   
All currents are in milliamps and all frequencies are in megahertz.

**PI74FCT16245T Switching Characteristics over Operating Range**

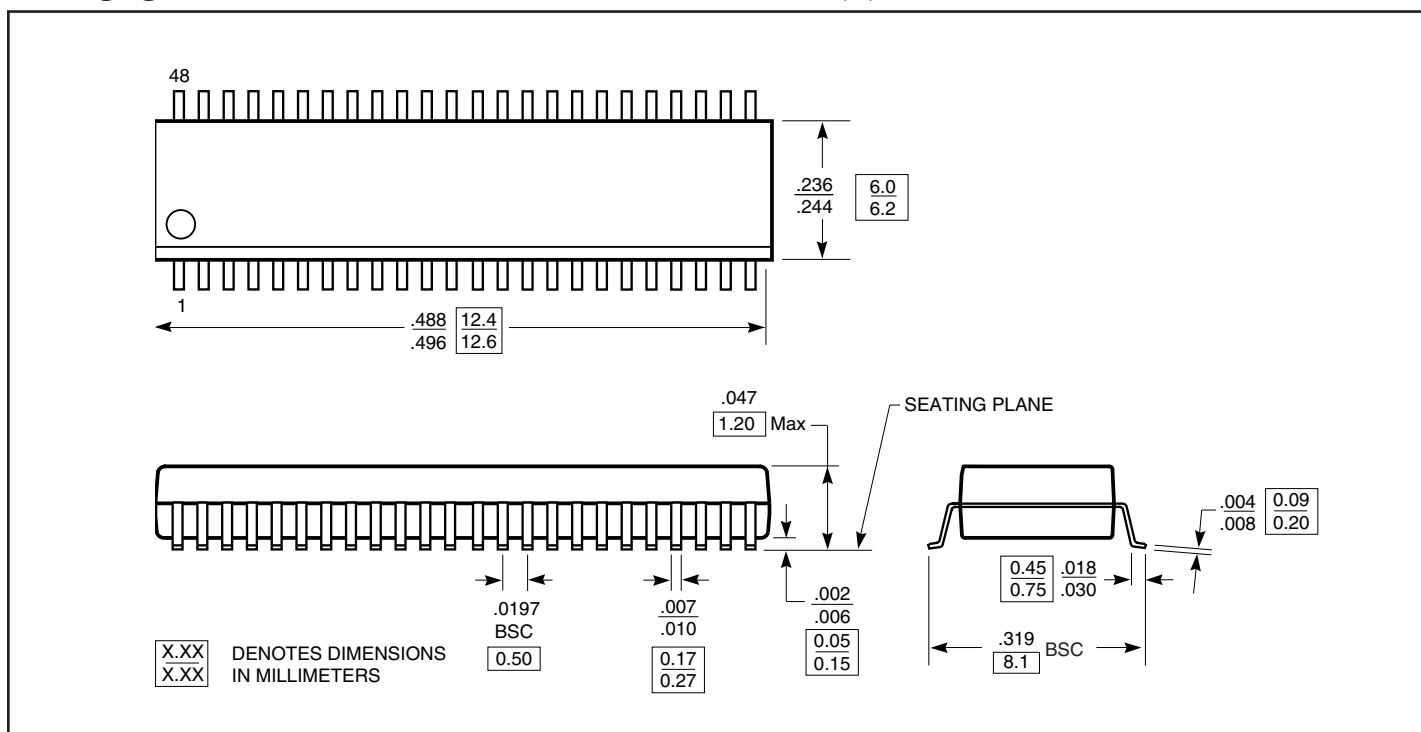
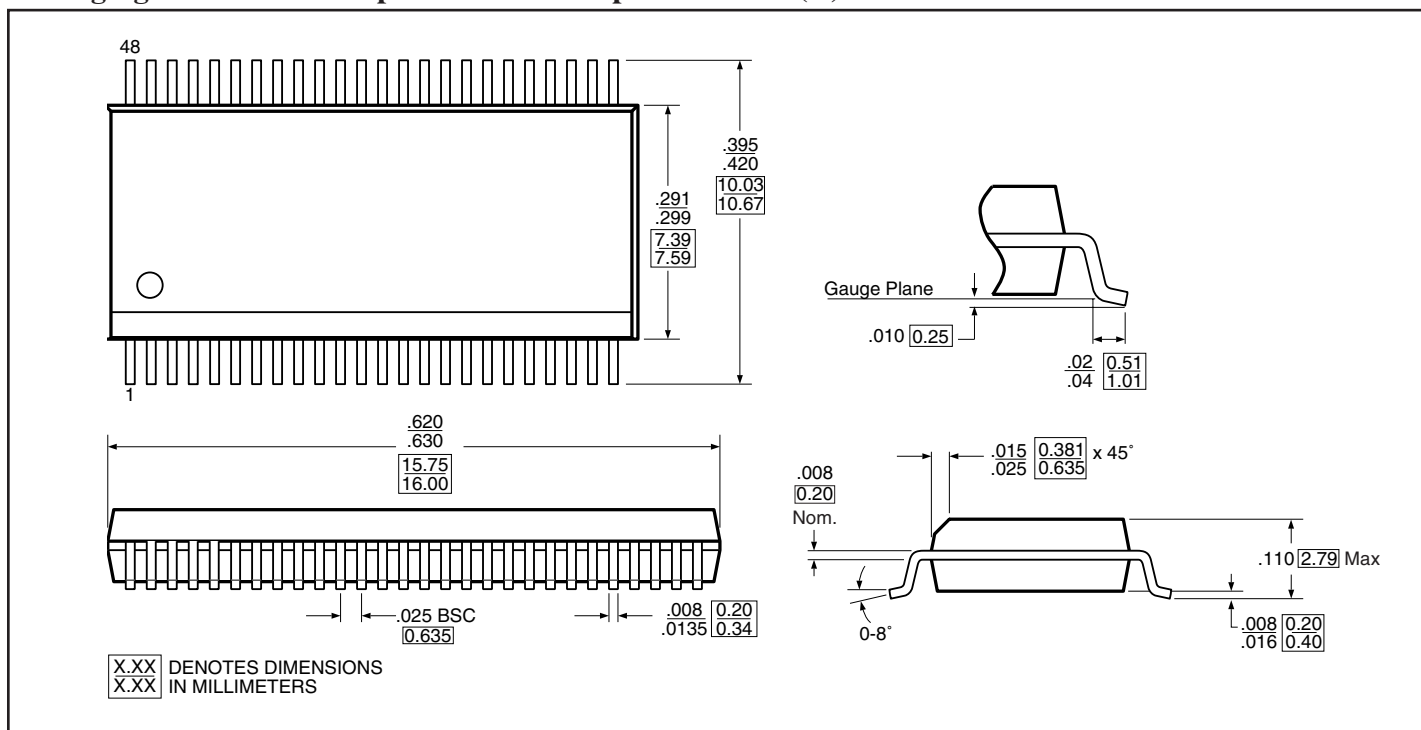
| Parameters                           | Description                                          | Conditions <sup>(1)</sup>                      | 16245T |      | 16245AT |      | 16245CT |      | Units |
|--------------------------------------|------------------------------------------------------|------------------------------------------------|--------|------|---------|------|---------|------|-------|
|                                      |                                                      |                                                | Com.   |      | Com.    |      | Com.    |      |       |
|                                      |                                                      |                                                | Min.   | Max. | Min.    | Max. | Min.    | Max. |       |
| t <sub>PHL</sub><br>t <sub>PHL</sub> | Propagation Delay <sup>(2)</sup><br>A TO B, B TO A   | C <sub>L</sub> = 50pF<br>R <sub>L</sub> = 500Ω | 1.5    | 7.0  | 1.5     | 4.6  | 1.5     | 4.1  | ns    |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Output Enable Time<br>xOE to A OR B                  |                                                | 1.5    | 9.5  | 1.5     | 6.2  | 1.5     | 5.8  | ns    |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Output Disable Time <sup>(3)</sup><br>xOE to A OR B  |                                                | 1.5    | 7.5  | 1.5     | 5.0  | 1.5     | 4.8  | ns    |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Output Enable Time<br>xDIR to A OR B <sup>(3)</sup>  |                                                | 1.5    | 9.5  | 1.5     | 6.2  | 1.5     | 5.8  | ns    |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Output Disable Time<br>xDIR to A OR B <sup>(3)</sup> |                                                | 1.5    | 7.5  | 1.5     | 5.0  | 1.5     | 4.8  | ns    |
| T <sub>SK(0)</sub>                   | Output Skew <sup>(4)</sup>                           |                                                | —      | 0.5  | —       | 0.5  | —       | 0.5  | ns    |

**PI74FCT162245T Switching Characteristics over Operating Range**

| Parameters                           | Description                                          | Conditions <sup>(1)</sup>                      | 162245T |      | 162245AT |      | 162245CT |      | Units |
|--------------------------------------|------------------------------------------------------|------------------------------------------------|---------|------|----------|------|----------|------|-------|
|                                      |                                                      |                                                | Com.    |      | Com.     |      | Com.     |      |       |
|                                      |                                                      |                                                | Min.    | Max. | Min.     | Max. | Min.     | Max. |       |
| t <sub>PHL</sub><br>t <sub>PHL</sub> | Propagation Delay <sup>(2)</sup><br>A to B, B to A   | C <sub>L</sub> = 50pF<br>R <sub>L</sub> = 500Ω | 1.5     | 7.0  | 1.5      | 4.6  | 1.5      | 4.1  | ns    |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Output Enable Time<br>xOE to A or B                  |                                                | 1.5     | 9.5  | 1.5      | 6.2  | 1.5      | 5.8  | ns    |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Output Disable Time <sup>(3)</sup><br>xOE to A or B  |                                                | 1.5     | 7.5  | 1.5      | 5.0  | 1.5      | 4.8  | ns    |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Output Enable Time<br>xDIR to A or B <sup>(3)</sup>  |                                                | 1.5     | 9.5  | 1.5      | 6.2  | 1.5      | 5.8  | ns    |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Output Disable Time<br>xDIR to A or B <sup>(3)</sup> |                                                | 1.5     | 7.5  | 1.5      | 5.0  | 1.5      | 4.8  | ns    |
| tsk(o)                               | Output Skew <sup>(4)</sup>                           |                                                | —       | 0.5  | —        | 0.5  | —        | 0.5  | ns    |

**Notes:**

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

**Packaging Mechanical: 48-Pin, 240-mil wide Plastic TSSOP (A)**

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


**PI74FCT16245T Ordering Information**

| Ordering Code    | Package Code | Speed Grade | Package Description                                |
|------------------|--------------|-------------|----------------------------------------------------|
| PI74FCT16245TA   | A            | Blank       | 48-pin 240-mil wide plastic TSSOP                  |
| PI74FCT16245TAE  | A            | Blank       | Pb-free & Green, 48-pin 240-mil wide plastic TSSOP |
| PI74FCT16245TV   | V            | Blank       | 48-pin 300-mil wide plastic SSOP                   |
| PI74FCT16245TVE  | V            | Blank       | Pb-free & Green, 48-pin 300-mil wide plastic SSOP  |
| PI74FCT16245ATA  | A            | A           | 48-pin 240-mil wide plastic TSSOP                  |
| PI74FCT16245ATAE | A            | A           | Pb-free & Green, 48-pin 240-mil wide plastic TSSOP |
| PI74FCT16245ATV  | V            | A           | 48-pin 300-mil wide plastic SSOP                   |
| PI74FCT16245ATVE | V            | A           | Pb-free & Green, 48-pin 300-mil wide plastic SSOP  |
| PI74FCT16245CTA  | A            | C           | 48-pin 240-mil wide plastic TSSOP                  |
| PI74FCT16245CTAE | A            | C           | Pb-free & Green, 48-pin 240-mil wide plastic TSSOP |
| PI74FCT16245CTV  | V            | C           | 48-pin 300-mil wide plastic SSOP                   |
| PI74FCT16245CTVE | V            | C           | Pb-free & Green, 48-pin 300-mil wide plastic SSOP  |

**PI74FCT162245T Ordering Information**

| Ordering Code     | Package Code | Speed Grade | Package Description                                |
|-------------------|--------------|-------------|----------------------------------------------------|
| PI74FCT162245TA   | A            | Blank       | 48-pin 240-mil wide plastic TSSOP                  |
| PI74FCT162245TAE  | A            | Blank       | Pb-free & Green, 48-pin 240-mil wide plastic TSSOP |
| PI74FCT162245TV   | V            | Blank       | 48-pin 300-mil wide plastic SSOP                   |
| PI74FCT162245TVE  | V            | Blank       | Pb-free & Green, 48-pin 300-mil wide plastic SSOP  |
| PI74FCT162245ATA  | A            | A           | 48-pin 240-mil wide plastic TSSOP                  |
| PI74FCT162245ATAE | A            | A           | Pb-free & Green, 48-pin 240-mil wide plastic TSSOP |
| PI74FCT162245ATV  | V            | A           | 48-pin 300-mil wide plastic SSOP                   |
| PI74FCT162245ATVE | V            | A           | Pb-free & Green, 48-pin 300-mil wide plastic SSOP  |
| PI74FCT162245CTA  | A            | C           | 48-pin 240-mil wide plastic TSSOP                  |
| PI74FCT162245CTAE | A            | C           | Pb-free & Green, 48-pin 240-mil wide plastic TSSOP |
| PI74FCT162245CTV  | V            | C           | 48-pin 300-mil wide plastic SSOP                   |
| PI74FCT162245CTVE | V            | C           | Pb-free & Green, 48-pin 300-mil wide plastic SSOP  |

**Notes:**

1. Thermal characteristics can be found on the company web site at [www.pericom.com/packaging/](http://www.pericom.com/packaging/)