

2.5V/3.3V, High Bandwidth, Hot Insertion, 4-Bit, 2-Port Bus Switch with Individual Enables

Features

- Near-Zero propagation delay
- 5-ohm switches connect inputs to outputs
- High Bandwidth (>400MHz)
- Rail-to-Rail, or 2.5V or 3.3V Switching
- 5V I/O Tolerant
- 2.5V Supply Voltage Operation
- Permits Hot Insertion
- Packaging (Pb-free & Green available):
 - 14-pin 150-mil wide plastic SOIC (W)
 - 14-pin 170-mil wide plastic TSSOP (L)
 - 16-pin 150-mil wide plastic QSOP (Q)

Description

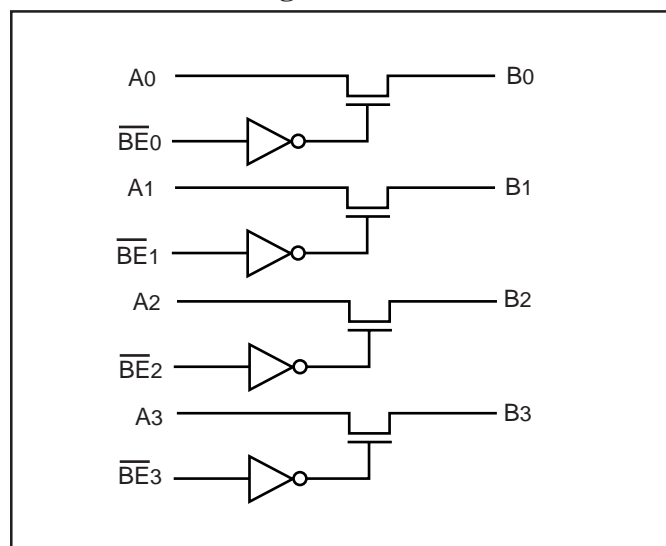
Pericom Semiconductor's PI3C3125A and PI3C3126A are 2.5 volt or 3.3 volt, 4-bit bus switches designed with four individual 5-ohm bus switches with fast individual enables in an industry standard 74XX125/126 pinout. When enabled via the associated Bus Enable (\overline{BE}) pin, the "A" pin is directly connected to the "B" pin for that particular gate. The bus switch introduces no additional propagation delay or additional ground bounce noise.

The PI3C3125 device has active LOW enables, and the PI3C3126A has active HIGH enables. It is very useful in switching signals that have high bandwidth (>400 MHz).

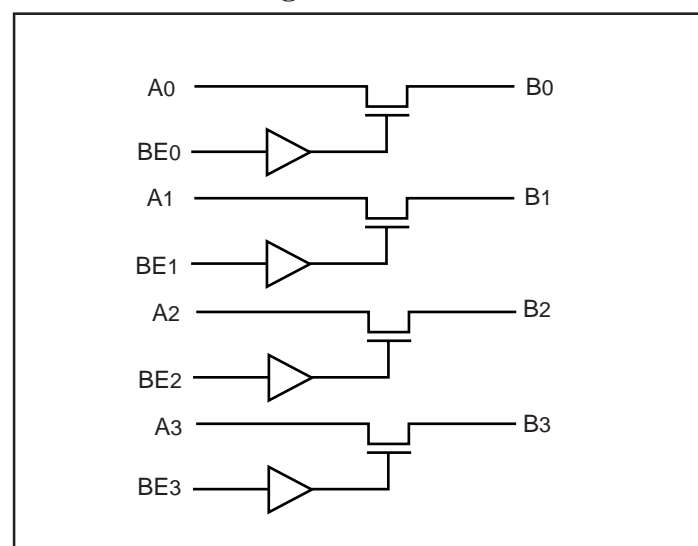
Applications

- High Bandwidth Data Switching
- Hot Docking

PI3C3125 Block Diagram



PI3C3126 Block Diagram



Maximum Ratings

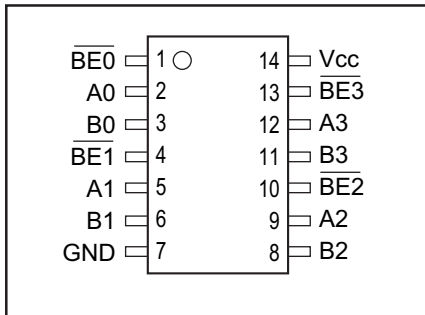
(Above which the useful life may be impaired. For user guidelines, not tested.)

| | |
|--|-----------------|
| Storage Temperature | -65°C to +150°C |
| Ambient Temperature with Power Applied | -40°C to +85°C |
| Supply Voltage to Ground Potential (Inputs & V _{CC} Only) | -0.5V to +4.6V |
| Supply Voltage to Ground Potential (Outputs & D/O Only) | -0.5V to +4.6V |
| DC Input Voltage | -0.5V to +5.5V |
| DC Output Current | 120mA |
| Power Dissipation | 0.5W |

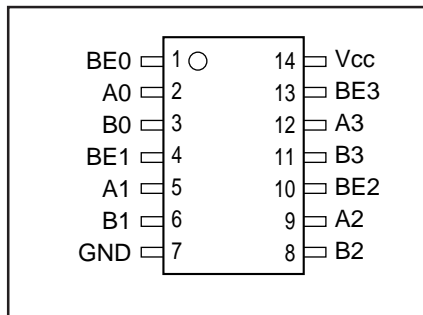
Note:

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.

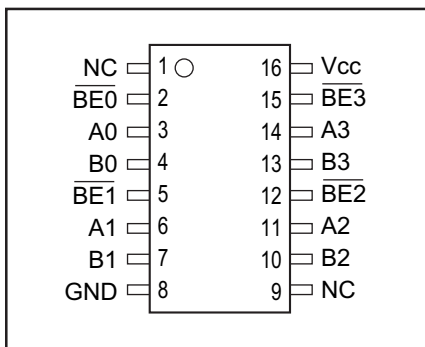
PI3C3125 14-Pin Configuration



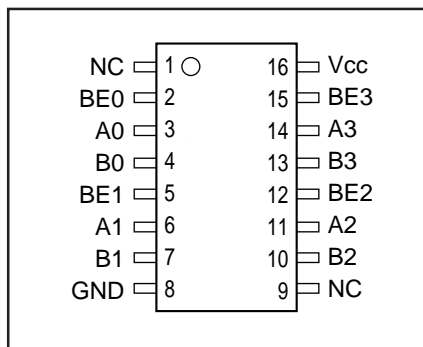
PI3C3126 14-Pin Configuration



PI3C3125 16-Pin Configuration



PI3C3126 16-Pin Configuration



Pin Description

| Pin Name | Description |
|------------------|--------------------------|
| \overline{BEn} | Switch Enable (PI3C3125) |
| BEn | Switch Enable (PI3C3126) |
| A3-A0 | Bus A |
| B3-B0 | Bus B |
| V _{CC} | Power |
| GND | Ground |

Truth Table⁽¹⁾

| PI3C3125 \overline{BEn} | PI3C3126 BEn | A _n | B _n | V _{CC} | Function |
|------------------------------|-----------------|----------------|----------------|-----------------|------------|
| X* | X | Hi-Z | Hi-Z | GND | Disconnect |
| H | L | Hi-Z | Hi-Z | V _{CC} | Disconnect |
| L | H | B _n | A _n | V _{CC} | Connect |

Note:

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

* A pull-up resistor should be provided for power-up protection.

DC Electrical Characteristics (Over Operating Range, $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{CC} = 3.3\text{V} \pm 10\%$)

| Parameters | Description | Test Conditions ⁽¹⁾ | Min. | Typ. ⁽²⁾ | Max. | Units |
|-----------------|-------------------------------------|---|------|---------------------|---------|---------------|
| V_{IH} | Input HIGH Voltage | Guaranteed Logic HIGH Level | 2.0 | | | V |
| V_{IL} | Input LOW Voltage | Guaranteed Logic LOW Level -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 | |
| $I_{OZH}^{(3)}$ | High Impedance Output Current | $0 \leq A, B \leq V_{CC}$ | | | ± 1 | |
| V_{IK} | Clamp Diode Voltage | $V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$ | | -0.73 | -1.2 | V |
| R_{ON} | Switch On Resistance ⁽⁴⁾ | $V_{CC} = \text{Min.}, V_{IN} = 0.0\text{V}, I_{ON} = 48\text{mA}$ or 60mA $V_{CC} = \text{Min.}, V_{IN} = 2.4\text{V}, I_{ON} = 15\text{mA}$ | | 5 8 | 7 15 | Ω |

Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at $V_{CC} = 3.3\text{V}$, $T_A = 25^{\circ}\text{C}$ 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.
4. Measured by the voltage drop between A and B pin at indicated current through the switch. ON resistance is determined by the lower of the voltages on the two (A,B) pins.

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

| Parameters ⁽¹⁾ | Description | Test Conditions | Typ. | Units |
|---------------------------|-----------------------------|----------------------|------|-------|
| C_{IN} | Input Capacitance | $V_{IN} = 0\text{V}$ | 3.5 | pF |
| C_{OFF} | A/B Capacitance, Switch Off | $V_{IN} = 0\text{V}$ | 5.0 | |
| C_{ON} | A/B Capacitance, Switch On | $V_{IN} = 0\text{V}$ | 10.0 | |

Notes:

1. This parameter is determined by device characterization but is not production tested.

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} | | 260 | 500 | μA |
| ΔI_{CC} | Supply Current per Input HIGH | $V_{CC} = \text{Max.}$ | $V_{IN} = 3.0\text{V}^{(3)}$ | | | 750 | |

Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at $V_{CC} = 3.3\text{V}$, $+25^{\circ}\text{C}$ ambient.
3. Per driven input (control input only); A and B pins do not contribute to ΔI_{CC} .

PI3C3125/PI3C3126 Switching Characteristics over 3.3V Operating Range

| Parameters | Description | Conditions | PI3C3125/PI3C3126 | | Units |
|--------------|--|---|-------------------|------|-------|
| | | | Com. | | |
| | | | Min. | Max. | |
| tPLH tPHL | Propagation Delay ^(1,2) A to B, B to A | C _L = 50 pF R _L = 500Ω | | 0.25 | ns |
| tPZH tPZL | Bus Enable Time | C _L = 50 pF R _L = 500Ω | 1.5 | 6.5 | |
| tPHZ tPLZ | Bus Disable Time | R = 500Ω | 1.5 | 5.5 | |

Notes:

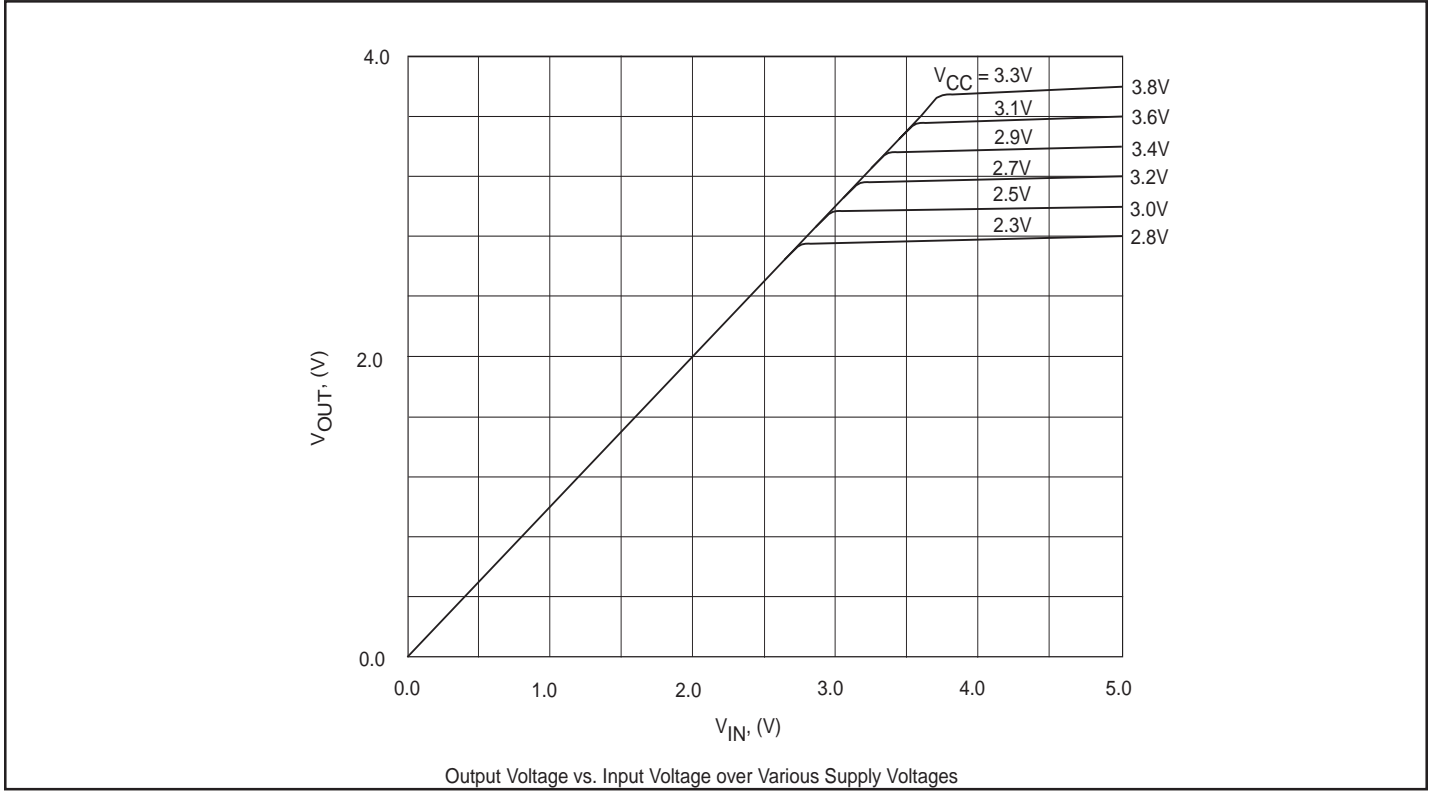
1. This parameter is guaranteed but not tested on Propagation Delays.
2. The bus switch contributes no propagational delay other than the RC delay of the ON resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25ns for 50pF load. Since this time constant is much smaller than the rise/fall times of typical driving signals, it adds very little propagational delay to the system. Propagational delay of the bus switch when used in a system is determined by the driving circuit on the driving side of the switch and its interaction with the load on the driven side.

PI3C3125/PI3C3126 Switching Characteristics over 2.5V Operating Range

| Parameters | Description | Conditions ⁽¹⁾ | PI3C3125/PI3C3126 | | Units |
|--------------|--|---|-------------------|------|-------|
| | | | Com. | | |
| | | | Min. | Max. | |
| tPLH tPHL | Propagation Delay ^(2,3) A to B, B to A | C _L = 50 pF R _L = 500Ω | | 0.25 | ns |
| tPZH tPZL | Bus Enable Time | C _L = 50 pF R _L = 500Ω | 1.5 | 9.8 | |
| tPHZ tPLZ | Bus Disable Time | R = 500Ω | 1.5 | 8.3 | |

Notes:

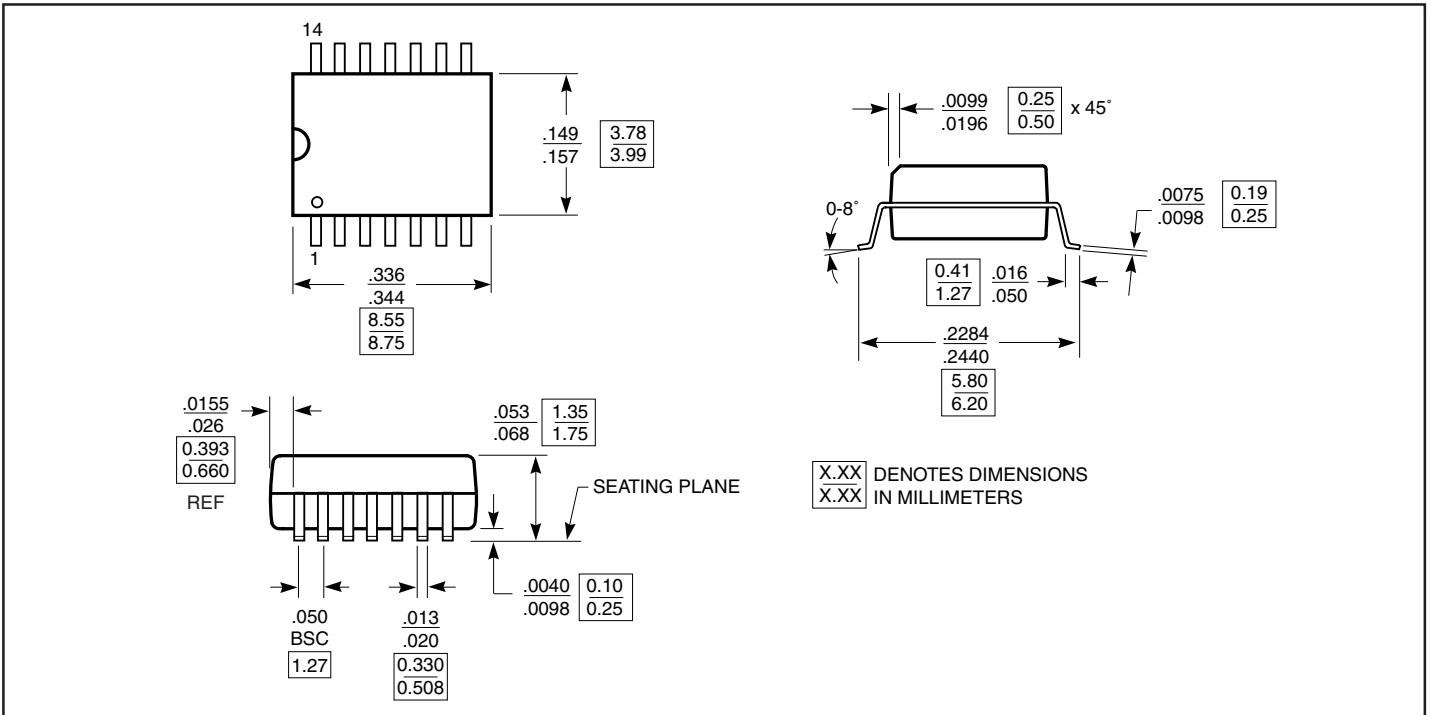
1. See test circuit and waveforms.
2. This parameter is guaranteed but not tested on Propagation Delays.
3. The bus switch contributes no propagational delay other than the RC delay of the ON resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25ns for 50pF load. Since this time constant is much smaller than the rise/fall times of typical driving signals, it adds very little propagational delay to the system. Propagational delay of the bus switch when used in a system is determined by the driving circuit on the driving side of the switch and its interaction with the load on the driven side.



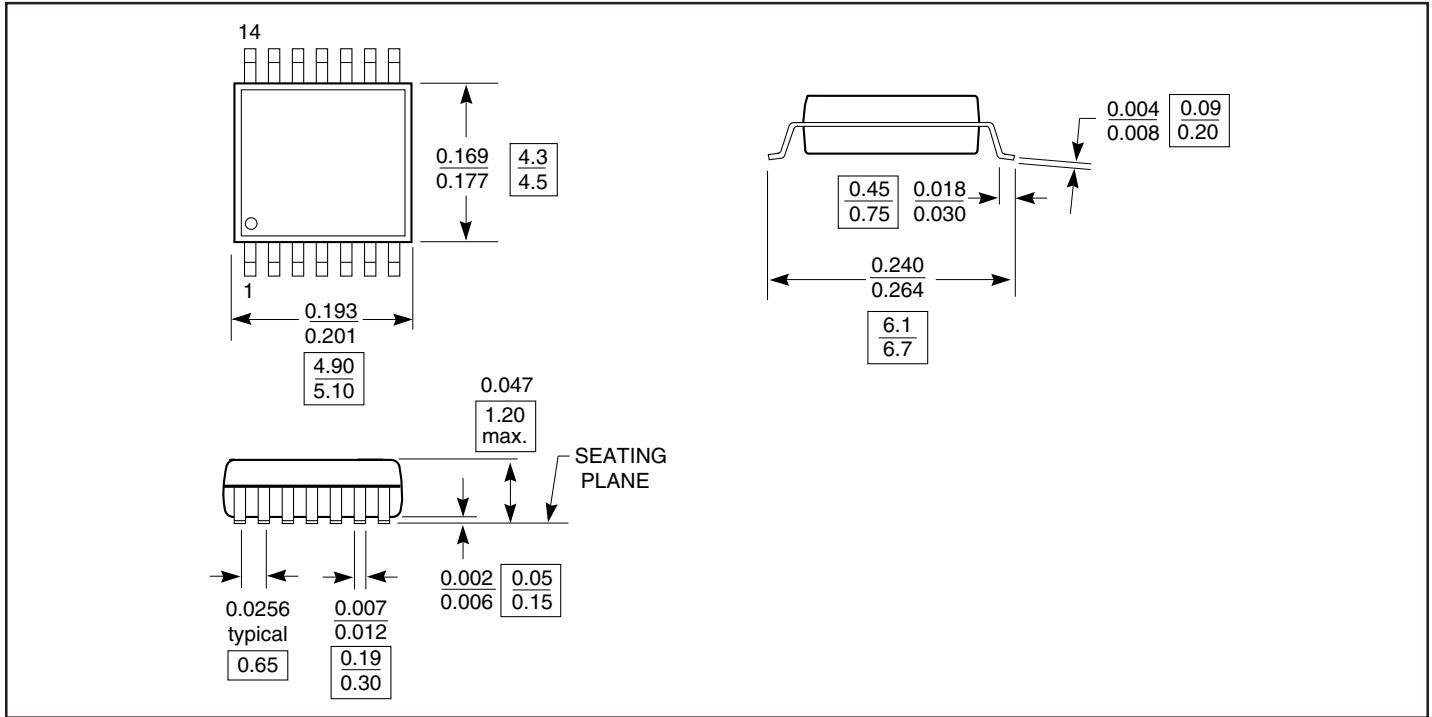
Output Voltage vs. Input Voltage over Various Supply Voltages

Output Voltage vs. Input Voltage over Various Supply Voltages

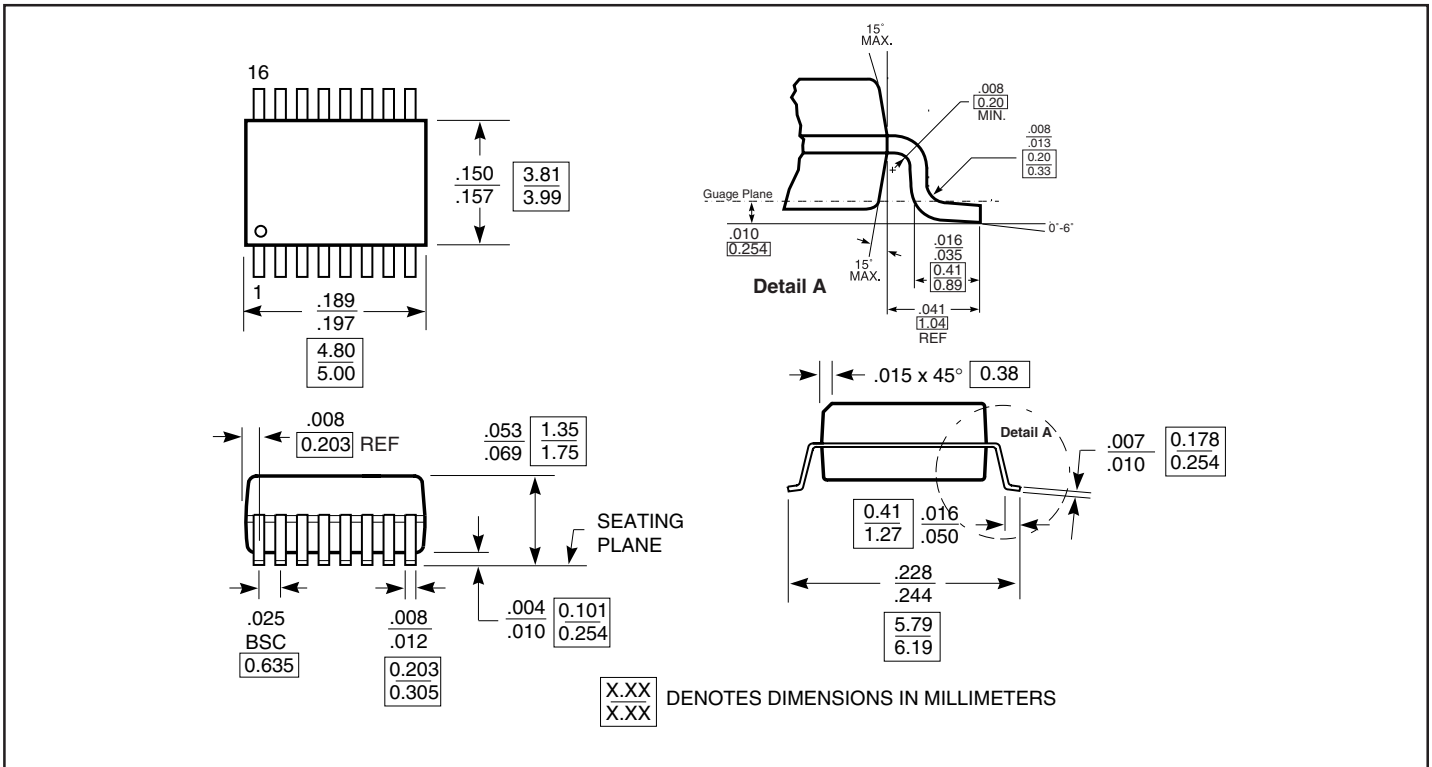
Packaging Mechanical: 14-pin 150-mil wide plastic SOIC (W)



Packaging Mechanical: 14-pin 173-mil wide plastic TSSOP (L)



Packaging Mechanical: 16-pin 150-mil wide plastic QSOP (Q)





Ordering Information

| Ordering Code | Package Code | Package Type |
|---------------|--------------|-------------------------------|
| PI3C3125L | L | 14-pin TSSOP |
| PI3C3125LE | L | Pb-free & Green, 14-pin TSSOP |
| PI3C3125W | W | 14-pin SOIC |
| PI3C3125WE | W | Pb-free & Green, 14-pin SOIC |
| PI3C3125Q | Q | 16-pin QSOP |
| PI3C3126L | L | 14-pin TSSOP |
| PI3C3126LE | L | Pb-free & Green, 14-pin TSSOP |
| PI3C3126W | W | 14-pin SOIC |
| PI3C3126WE | W | Pb-free & Green, 14-pin SOIC |
| PI3C3126Q | Q | 16-pin QSOP |
| PI3C3126QE | Q | Pb-free & Green, 16-pin QSOP |

Notes:

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