

3.3V, 4-Bit, 2-Port *Nanoswitch*[™]
w/Individual Enables

Features

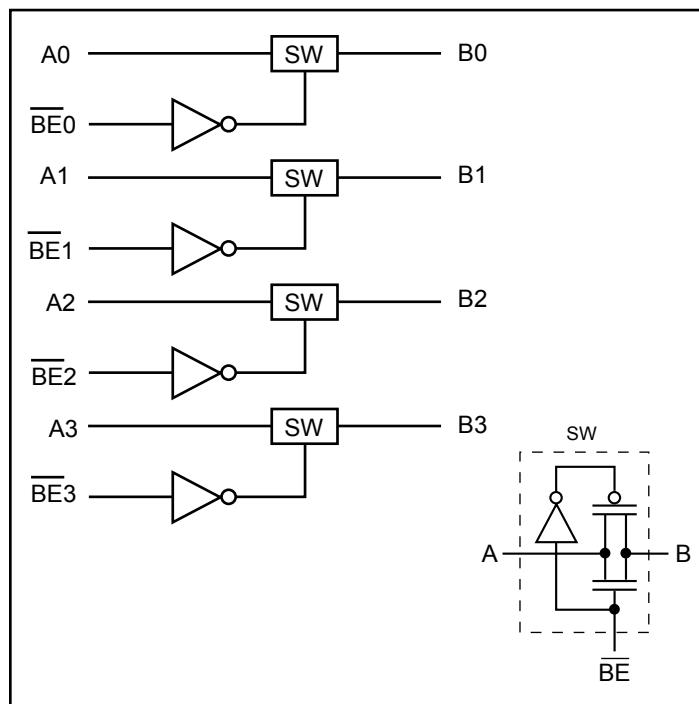
- Near-Zero propagation delay
- 5Ω switches connect inputs to outputs
- Fast Switching Speed -4ns Max.
- Ultra Low Quiescent Power (0.1μA Typical)
– Ideally suited for notebook applications
- Packaging (Pb-free & Green available):
– 14-pin 150-mil wide plastic SOIC (W)
– 14-pin 170-mil wide plastic TSSOP (L)
– 16-pin 150-mil wide plastic QSOP (Q)

Description

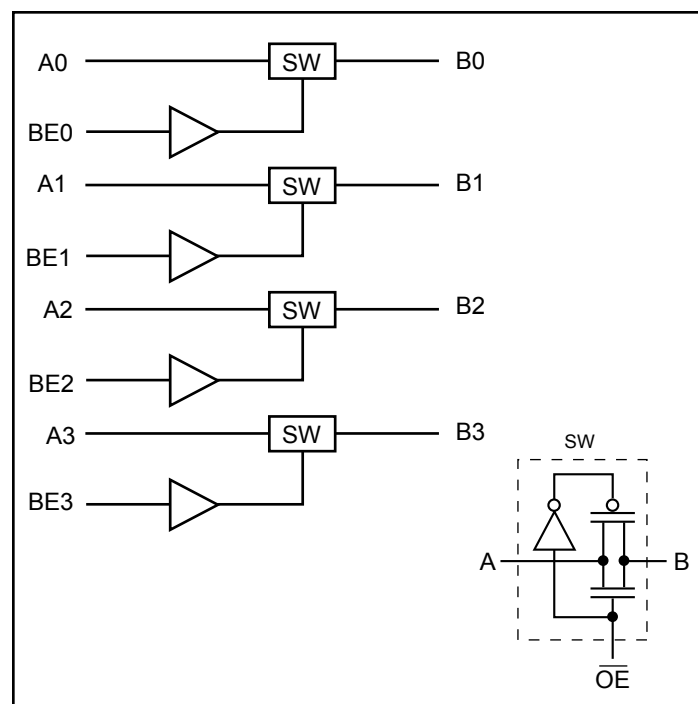
Pericom Semiconductor’s PI3B3125 and PI3B3126 are 3.3 Volt, 4-bit bus switches designed with four individual 5Ω bus switches with fast individual enables in an industry standard 74XX125/126 pinout. When enabled via the associated Bus Enable (BE) pin, the “A” pin is directly connected to the “B” pin for that particular gate. The bus switch introduces no additional propagation delay or additional ground bounce noise.

The PI3B3125 device has active LOW enables, and the PI3B3126 has active HIGH enables.

PI3B3125 Block Diagram



PI3B3126 Block Diagram



Maximum Ratings

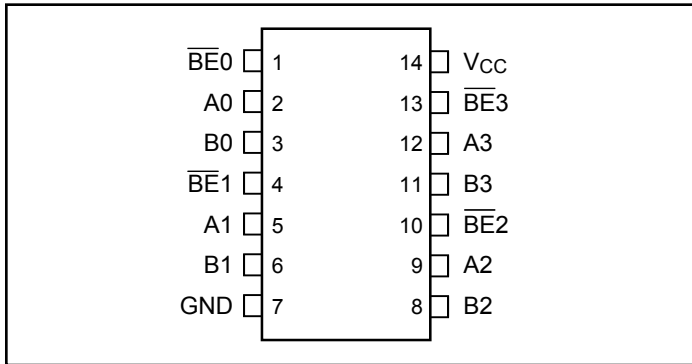
(Above which the useful life may be impaired. For user guidelines, not tested.)

| | |
|--|-----------------|
| Storage Temperature | -65°C to +150°C |
| Ambient Temperature with Power Applied | -40°C to +85°C |
| Supply Voltage to Ground Potential..... | -0.5V to +4.6V |
| DC Input Voltage | -0.5V to +4.6V |
| DC Output Current..... | 120mA |
| Power Dissipation..... | 0.5W |

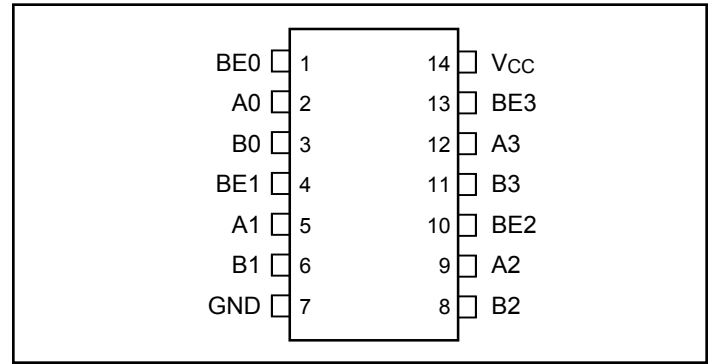
Note:

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.

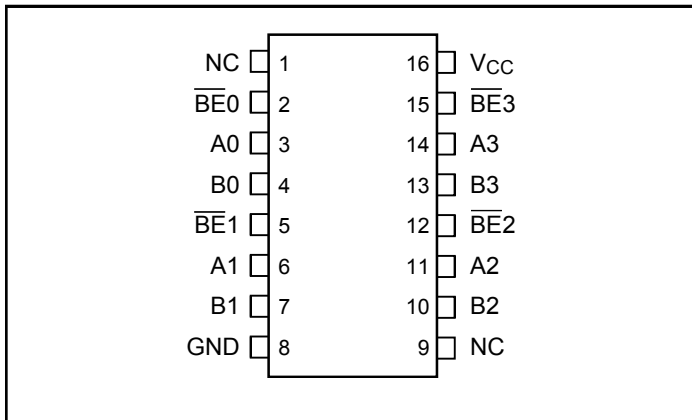
PI3B3125 14-Pin Configuration



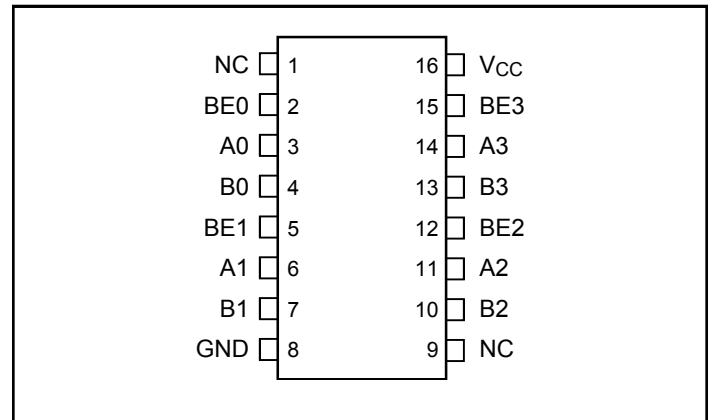
PI3B3126 14-Pin Configuration



PI3B3125 16-Pin Configuration



PI3B3126 16-Pin Configuration



Pin Description

| Pin Name | Description |
|--------------------------------|--------------------------|
| \overline{BE}_N | Switch Enable (PI3B3125) |
| BE_N | Switch Enable (PI3B3126) |
| A ₃ -A ₀ | Bus A |
| B ₃ -B ₀ | Bus B |
| V _{CC} | Power |
| GND | Ground |

Truth Table⁽¹⁾

| PI3B3125 \overline{BE}_N | PI3B3126 BE_N | A _N | B _N | V _{CC} | Function |
|-------------------------------|--------------------|----------------|----------------|-----------------|------------|
| X ⁽²⁾ | 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 |

Notes:

- 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 the 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_{OFF} | Off Current | $V_{CC} = 0, V_{OUT} = 3 \text{ to } 3.6\text{V}$ | | | 10 | |
| V_{IK} | Clamp Diode Voltage | $V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$ | | | -1.2 | V |
| R_{ON} | Switch On-Resistance ⁽³⁾ | $V_{CC} = \text{Min.}, V_{IN} = 0.0\text{V}, I_{ON} = 48\text{mA or } 60\text{mA}$ | | 5 | 8 | Ω |
| | | $V_{CC} = \text{Min.}, V_{IN} = 2.4\text{V}, I_{ON} = 15\text{mA}$ | | 10 | 17 | |

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

| Parameters ⁽⁴⁾ | Description | Test Conditions | Typ. | Units |
|---------------------------|-----------------------------|----------------------|------|-------|
| C_{IN} | Input Capacitance | $V_{IN} = 0\text{V}$ | 3.5 | pF |
| C_{OFF} | A/B Capacitance, Switch Off | | 8 | |

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at $V_{CC} = 3.3\text{V}$, $T_A = 25^\circ\text{C}$ ambient and maximum loading.
- 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.
- 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 | $V_{CC} = \text{Max.}$ | $V_{IN} = \text{GND or } V_{CC}$ | | 0.1 | 3 | μA |
| ΔI_{CC} | Supply Current per Input HIGH | $V_{CC} = \text{Max.}$ | $V_{IN} = 3.0\text{V}^{(3)}$ | | | 750 | |

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 driven input (control inputs only); A and B pins do not contribute to I_{CC} .

PI3B3125 Switching Characteristics over Operating Range

| Parameters | Description | Conditions ⁽¹⁾ | PI3B3125 | | Units |
|--------------------------------------|--|--|----------|------|-------|
| | | | Com. | | |
| | | | Min. | Max. | |
| t _{PLH} t _{PHL} | Propagation Delay ^(2,3) Ax to Bx, Bx to Ax | C _L = 50pF R _L = 500Ω | | 0.25 | ns |
| t _{PZH} t _{PZL} | Bus Enable Time | C _L = 50pF, R _L = 500Ω, | 1.0 | 3.0 | |
| t _{PHZ} t _{PLZ} | Bus Disable Time | R _L = 500Ω | 1.0 | 4.0 | |

PI3B3126 Switching Characteristics over Operating Range

| Parameters | Description | Conditions ⁽¹⁾ | PI3B3126 | | Units |
|--------------------------------------|--|--|----------|------|-------|
| | | | Com. | | |
| | | | Min. | Max. | |
| t _{PLH} t _{PHL} | Propagation Delay ^(2,3) Ax to Bx, Bx to Ax | C _L = 50pF R _L = 500Ω | | 0.25 | ns |
| t _{PZH} t _{PZL} | Bus Enable Time | C _L = 50pF, R _L = 500Ω, | 1.0 | 2.5 | |
| t _{PHZ} t _{PLZ} | Bus Disable Time | R _L = 500Ω | 1.0 | 4.0 | |

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.

Applications Information
Logic Inputs

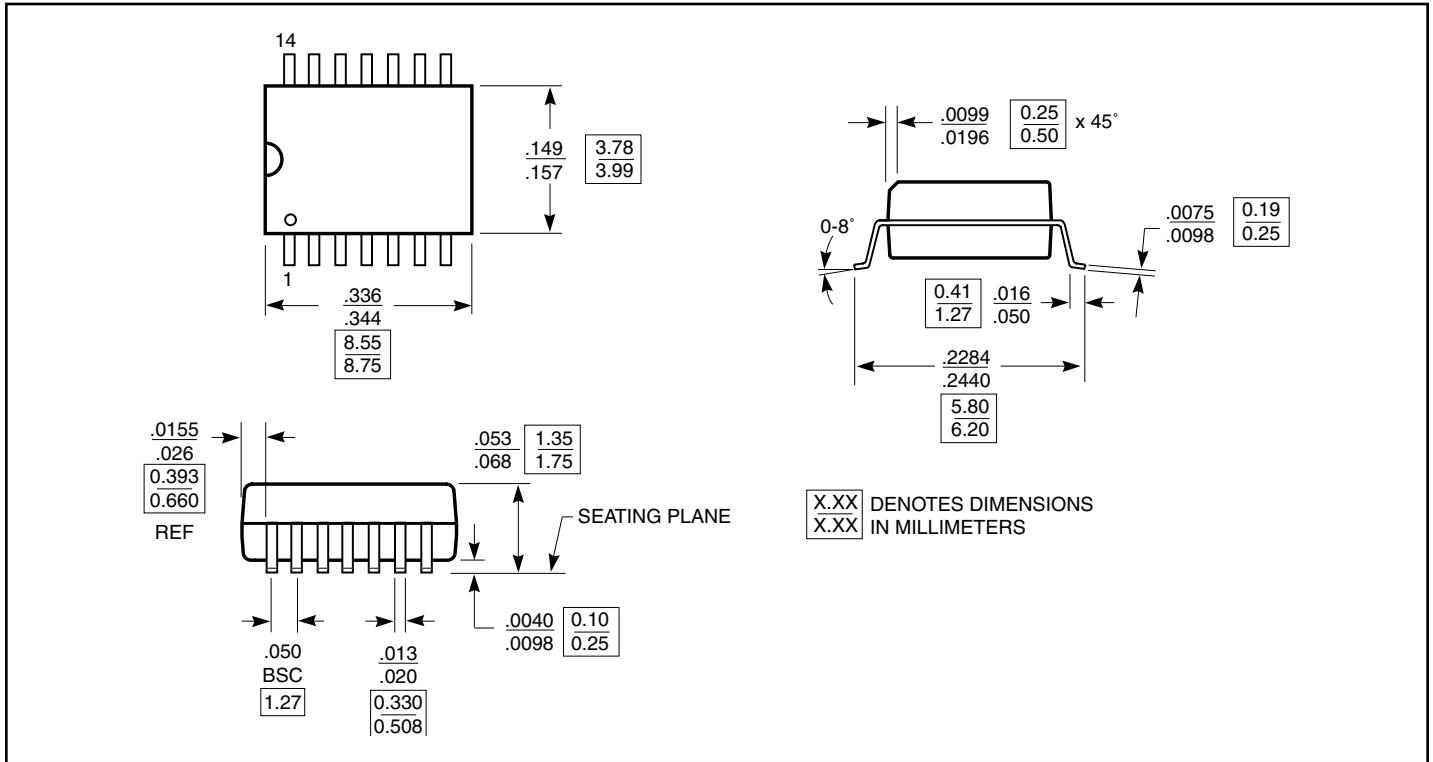
The logic control inputs can be driven up to +3.6V regardless of the supply voltage. For example, given a + 3.3V supply, IN may be driven low to 0V and high to 3.6V. Driving IN Rail-to-Rail® minimizes power consumption.

Power-Supply Sequencing and Hot-Plug Information

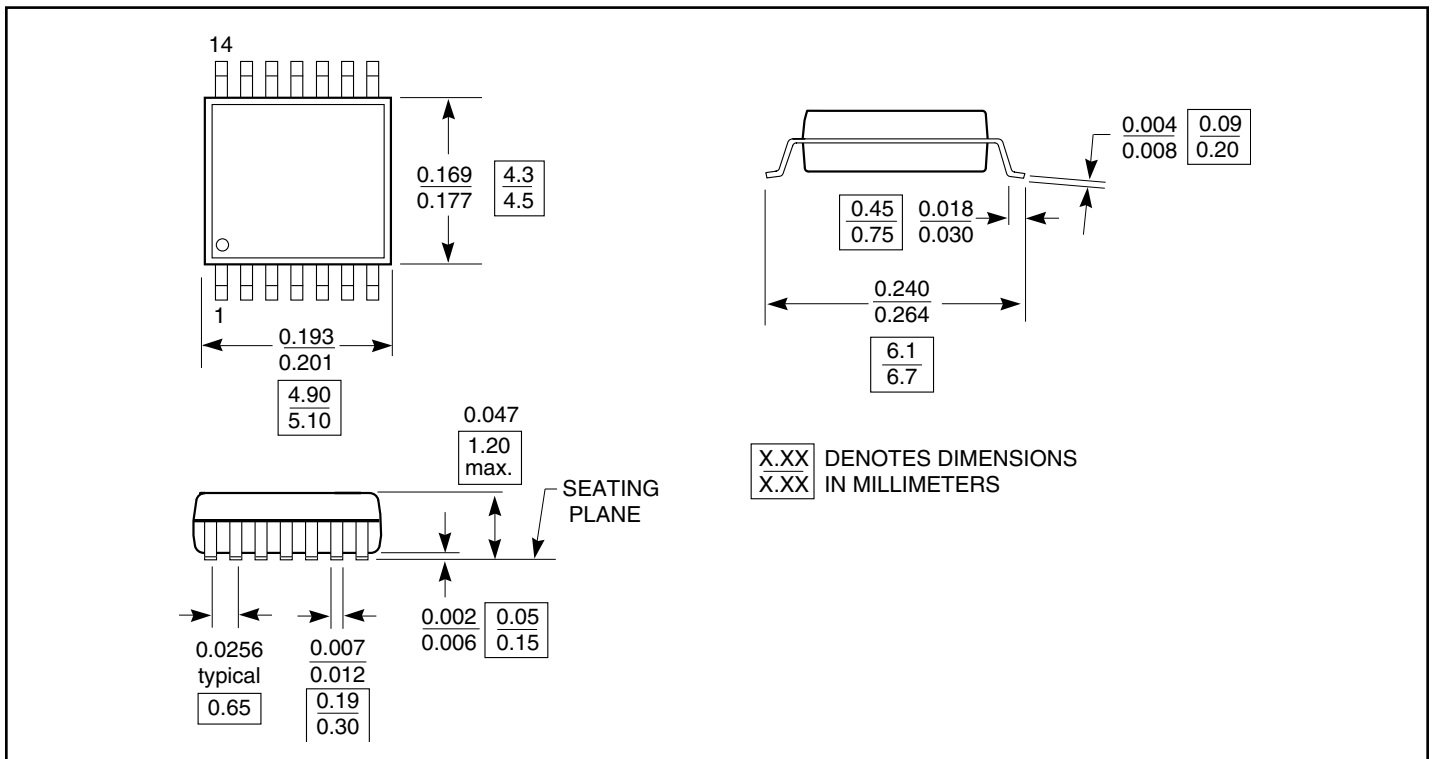
Proper power-supply sequencing is recommended for all CMOS devices. Always apply V_{CC} and GND before applying signals to input/output or control pins.

Rail-to-Rail is a registered trademark of Nippon Motorola, Ltd.

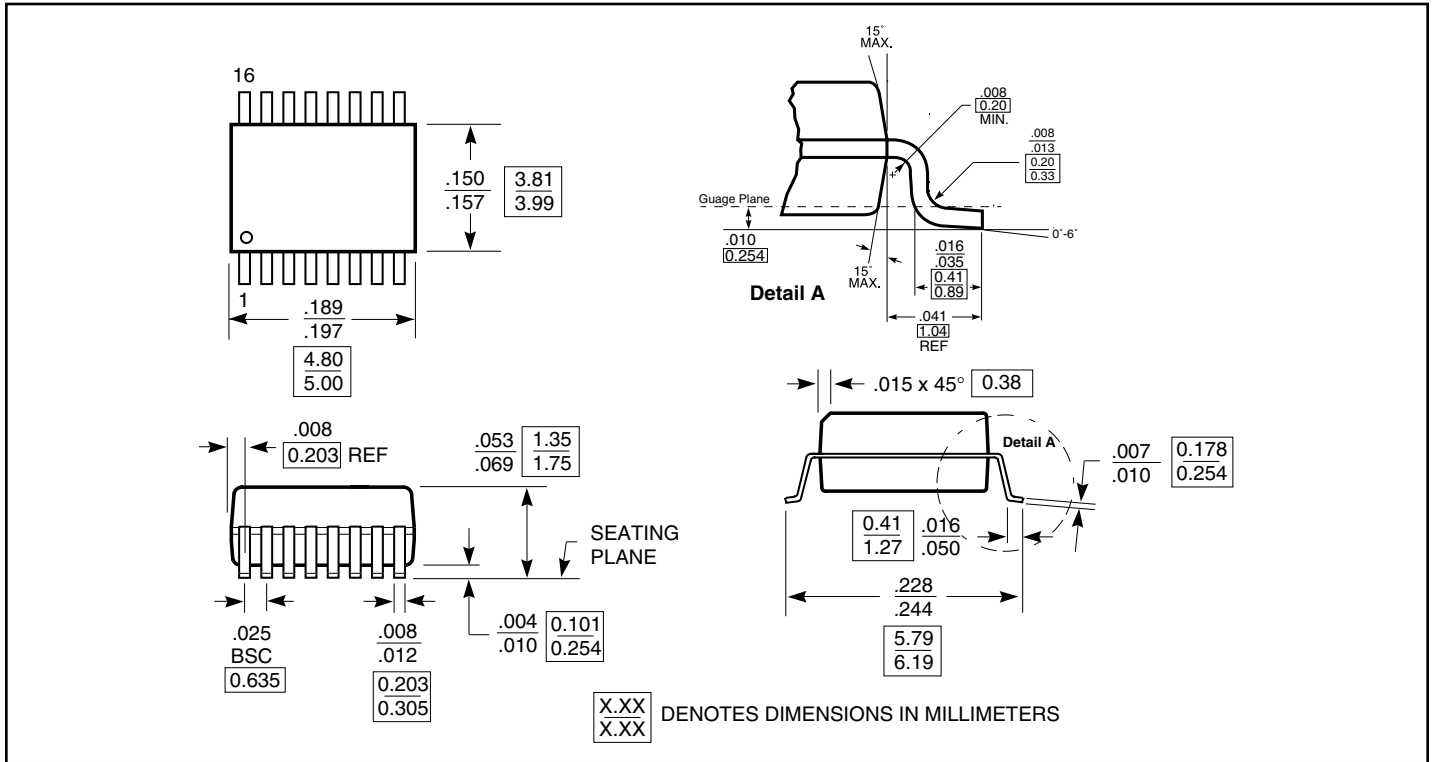
Packaging Mechanical: 14-pin SOIC (W)



Packaging Mechanical: 14-pin TSSOP (L)



Packaging Mechanical: 16-pin QSOP (Q)



Ordering Information

| Ordering Code | Package Code | Package Description |
|---------------|--------------|-------------------------------|
| PI3B3125L | L | 14-Pin TSSOP |
| PI3B3125LE | L | Pb-free & Green, 14-Pin TSSOP |
| PI3B3125W | W | 14-pin SOIC |
| PI3B3125WE | W | Pb-free & Green, 14-pin SOIC |
| PI3B3125Q | Q | 16-pin QSOP |
| PI3B3125QE | Q | Pb-free & Green, 16-pin QSOP |
| PI3B3126L | L | 14-Pin TSSOP |
| PI3B3126LE | L | Pb-free & Green, 14-Pin TSSOP |
| PI3B3126W | W | 14-pin SOIC |
| PI3B3126WE | W | Pb-free & Green, 14-pin SOIC |
| PI3B3126Q | Q | 16-pin QSOP |
| PI3B3126QE | Q | Pb-free & Green, 16-pin QSOP |

Notes:

1. Thermal Characteristics can be found on the web at www.pericom.com/packaging/