

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

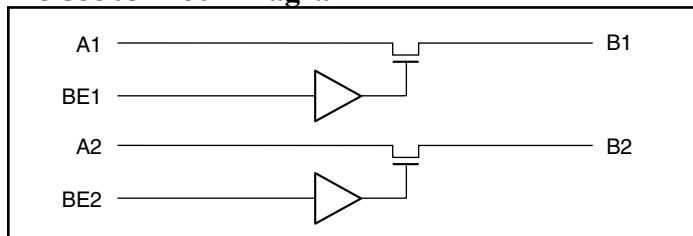
Features

- Near-Zero propagation delay
- 5Ω switches connect inputs to outputs
- High Bandwidth (>400 MHz)
- Rail-to-Rail, 3.3V or 2.5V Switching
- 5V I/O Tolerant
- 2.5V Supply Voltage Operation
- Permits Hot Insertion
- Packaging (Pb-free & Green):
 - 8-pin 173-mil wide plastic TSSOP
 - 8-pin 118-mil wide plastic MSOP

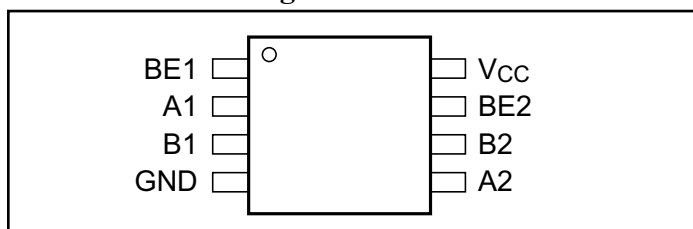
Applications

- High Bandwidth Data Switching
- Hot Docking

PI3C3305 Block Diagram



PI3C3305 Pin Configuration



Pin Description

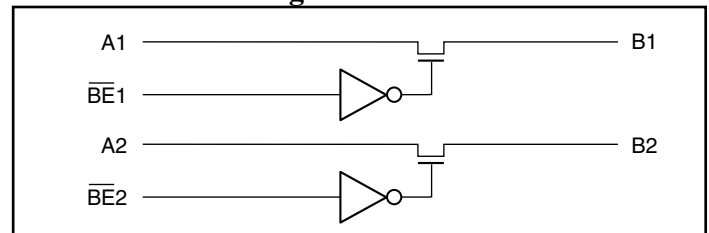
| Pin Name | Description |
|--------------------------|--------------------------|
| BE _n | Switch Enable (PI3C3305) |
| $\overline{\text{BE}}_n$ | Switch Enable (PI3C3306) |
| A2-A1 | Bus A |
| B2-B1 | Bus B |
| V _{CC} | Power |
| GND | Ground |

Description

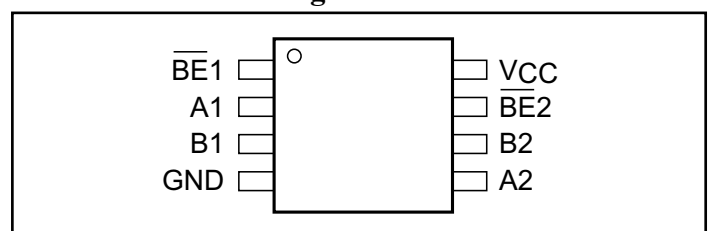
Pericom Semiconductor's PI3C3305 and PI3C3306 are 2.5 volt or 3.3 volt, 2-bit bus switches designed with fast individual enables. When enabled via the associated Bus Enable (BE) pin, the "A" pin is directly connected to the "B" pin for that particular gate. The bus switch introduces no additional propagation delay or additional ground bounce noise.

The PI3C3306 device has active LOW enables, and the PI3C3305 has active HIGH enables. It is very useful in switching signals that have high bandwidth (>400 MHz).

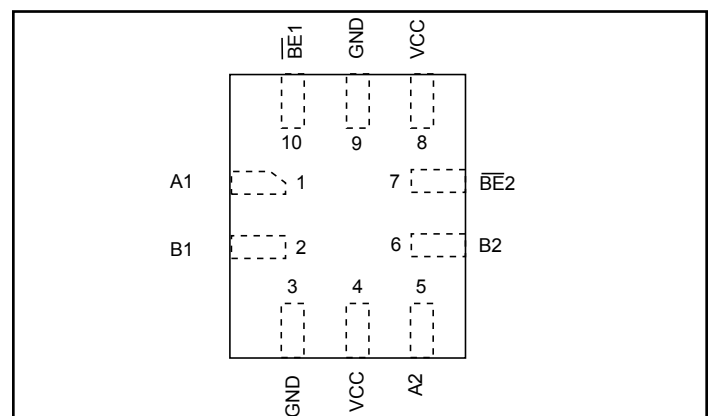
PI3C3306 Block Diagram



PI3C3306 8-Pin Configuration



PI3C3306 10-Contact Configuration





Truth Table⁽¹⁾

| PI3C3306 $\overline{\text{BEn}}$ | PI3C3305 BEn | An | Bn | V _{CC} | Function |
|-------------------------------------|--------------------------|------|------|-----------------|------------|
| X | X ⁽²⁾ | Hi-Z | Hi-Z | GND | Disconnect |
| H | L | Hi-Z | Hi-Z | V _{CC} | Disconnect |
| L | H | Bn | An | 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.

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 +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.

DC Electrical Characteristics (Over Operating Range, T_A = -40°C to +85°C, V_{CC} = 3.3V ±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} = Max., V _{IN} = V _{CC} | | | ±1 | µA |
| I _{IL} | Input LOW Current | V _{CC} = Max., V _{IN} = GND | | | ±1 | |
| I _{OZH} | High Impedance Output Current | 0 ≤ A, B ≤ V _{CC} | | | ±1 | |
| V _{IK} | Clamp Diode Voltage | V _{CC} = Min., I _{IN} = -18mA | | -0.73 | -1.2 | V |
| R _{ON} | Switch On Resistance ⁽³⁾ | V _{CC} = Min., V _{IN} = 0.0V, I _{ON} = 48mA or 60mA | | 5 | 7 | Ω |
| | | V _{CC} = Min., V _{IN} = 2.4V, I _{ON} = 15mA | | 8 | 15 | |

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V_{CC} = 3.3V, T_A = 25°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.

Capacitance (T_A = 25°C, f = 1 MHz)

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

Notes:

- 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} = Max. | V _{IN} = GND or V _{CC} | | 260 | 500 | μA |
| ΔI _{CC} | Supply Current per Input HIGH | V _{CC} = Max. | V _{IN} = 3.0V ⁽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} = 3.3V, +25°C ambient.
- Per driven input (control input only); A and B pins do not contribute to ΔI_{CC}.

Switching Characteristics over 3.3V Operating Range

| Parameters | Description | Test Conditions ⁽¹⁾ | 3305/3306 | | Units |
|--------------------------------------|--|--|-----------|------|-------|
| | | | Com | | |
| | | | Min. | Max. | |
| t _{PLH} t _{PHL} | Propagation Delay ^(2, 3) A to B, B to A | C _L = 50pF R _L = 500Ω | | 0.25 | ns |
| t _{PZH} t _{PZL} | Bus Enable Time | C _L = 50pF R _L = 500Ω | 1.5 | 6.5 | |
| t _{PHZ} t _{PLZ} | Bus Disable Time | R = 500Ω | 1.5 | 5.5 | |

Notes:

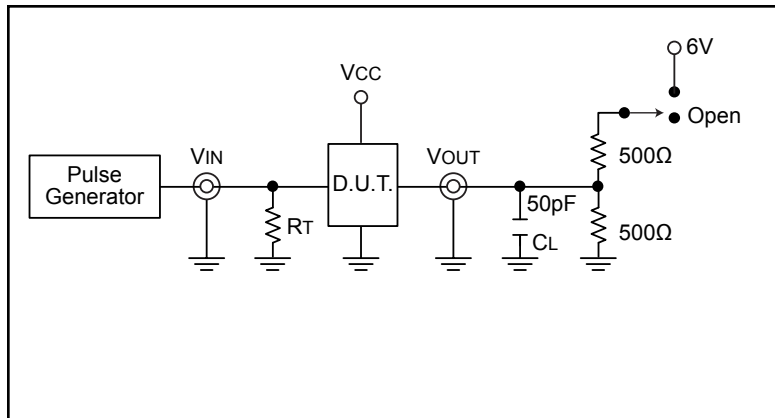
- See test circuit and waveforms.
- This parameter is guaranteed but not tested on Propagation Delays.
- The bus switch contributes no propagational delay other than the RC delay of the On-Resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25ns 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.

Switching Characteristics over 2.5V Operating Range

| Parameters | Description | Test Conditions ⁽¹⁾ | 3305/3306 | | Units |
|--------------------------------------|--|--|-----------|------|-------|
| | | | Com | | |
| | | | Min. | Max. | |
| t _{PLH} t _{PHL} | Propagation Delay ^(2, 3) A to B, B to A | C _L = 50pF R _L = 500Ω | | 0.25 | ns |
| t _{PZH} t _{PZL} | Bus Enable Time | C _L = 50pF R _L = 500Ω | 1.5 | 9.8 | |
| t _{PHZ} t _{PLZ} | Bus Disable Time | R = 500Ω | 1.5 | 8.3 | |

Notes:

- See test circuit and waveforms.
- This parameter is guaranteed but not tested on Propagation Delays.
- 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.

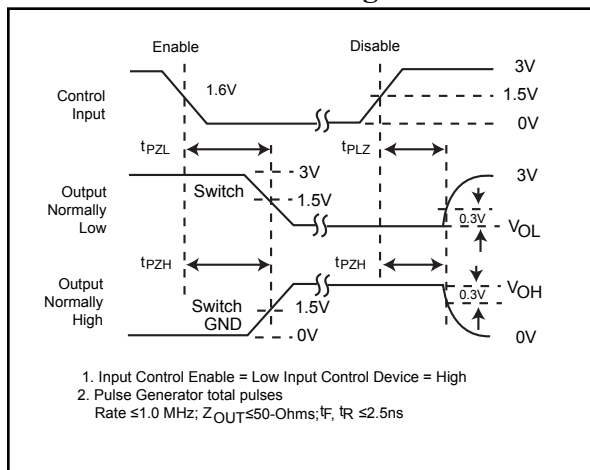
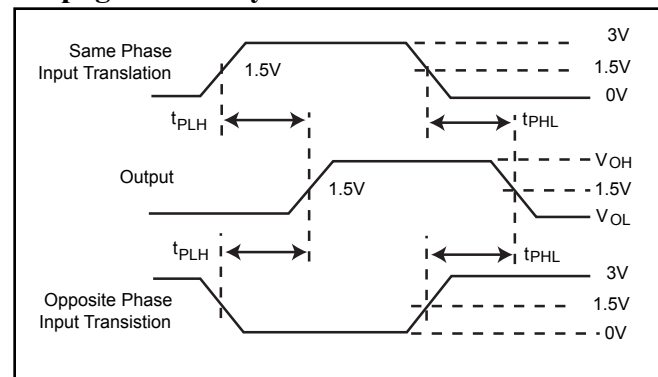
Test Circuits

Switch Position

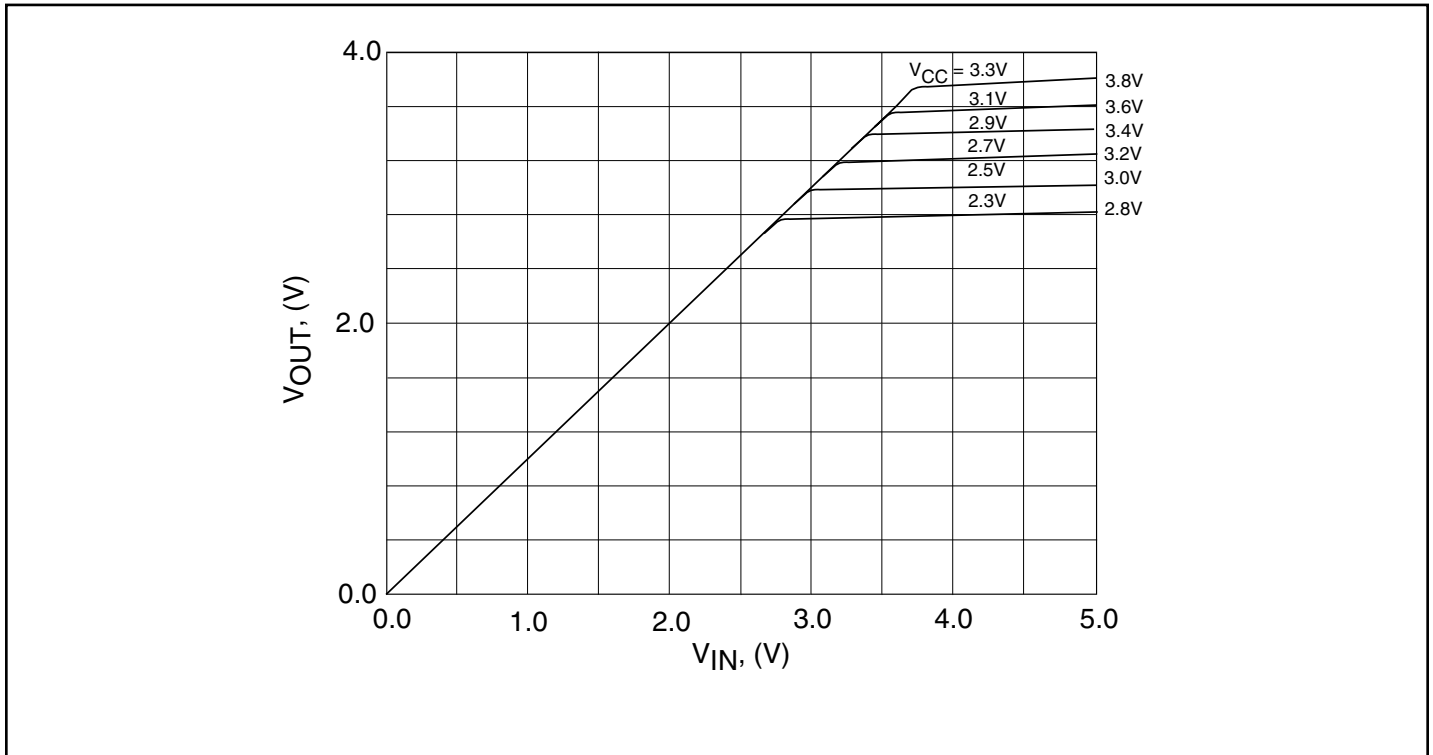
| Test | Switch |
|--------------|--------|
| Disable LOW | 6V |
| Enable LOW | 6V |
| Disable HIGH | GND |
| Enable HIGH | GND |
| tPD | Open |

Definitions:

C_L = Load capacitance (includes jig and probe capacitance)

R_T = Termination resistance (should be equal to Z_{OUT} of the pulse generator)

Enable and Disable Timing

Propagation Delay




Output Voltage vs. Input Voltage over Various Supply Voltages

Application Information

Logic Inputs

The logic control input 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-toRail[®] minimizes power consumption.

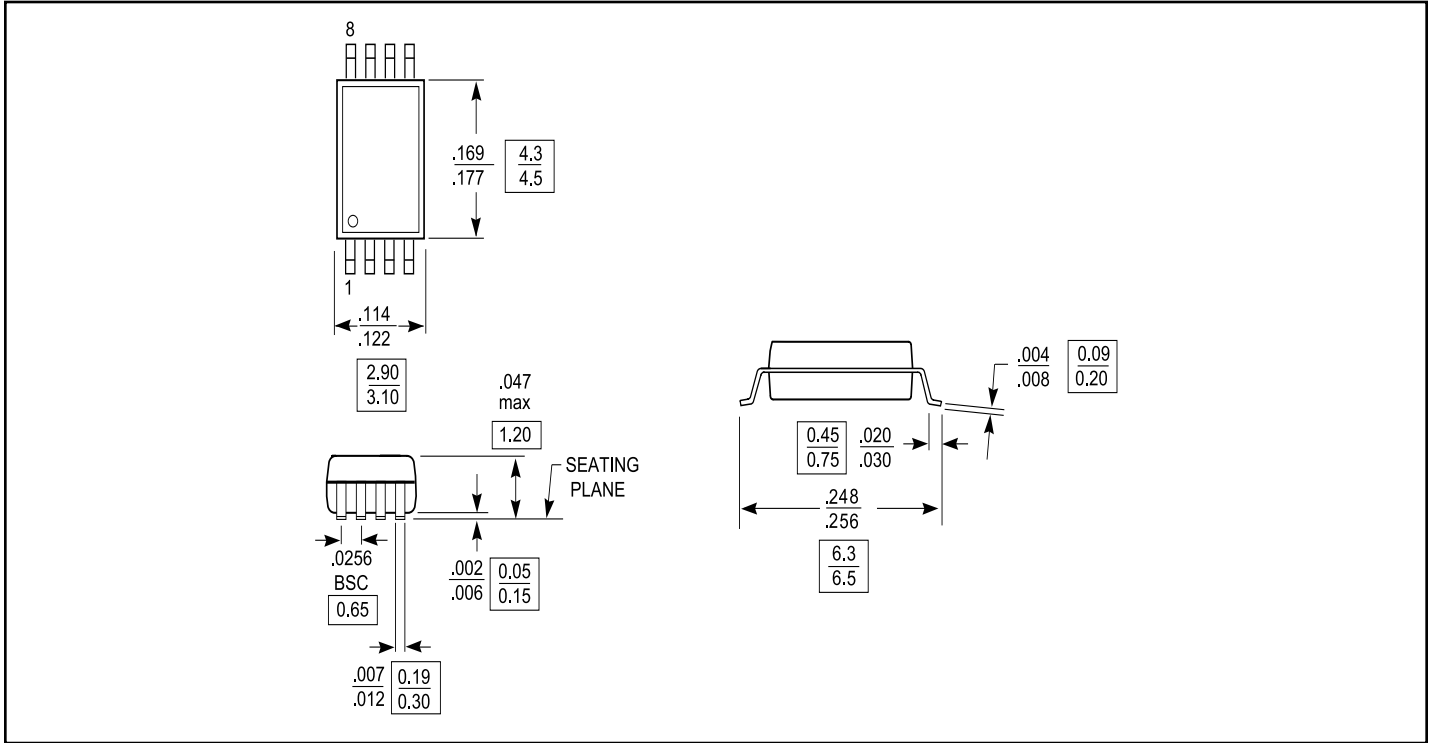
Power-Supply Sequencing

Proper power-supply sequencing is advised for all CMOS devices. It is recommended to always apply V_{CC} before applying signals to the input/output or control pins.

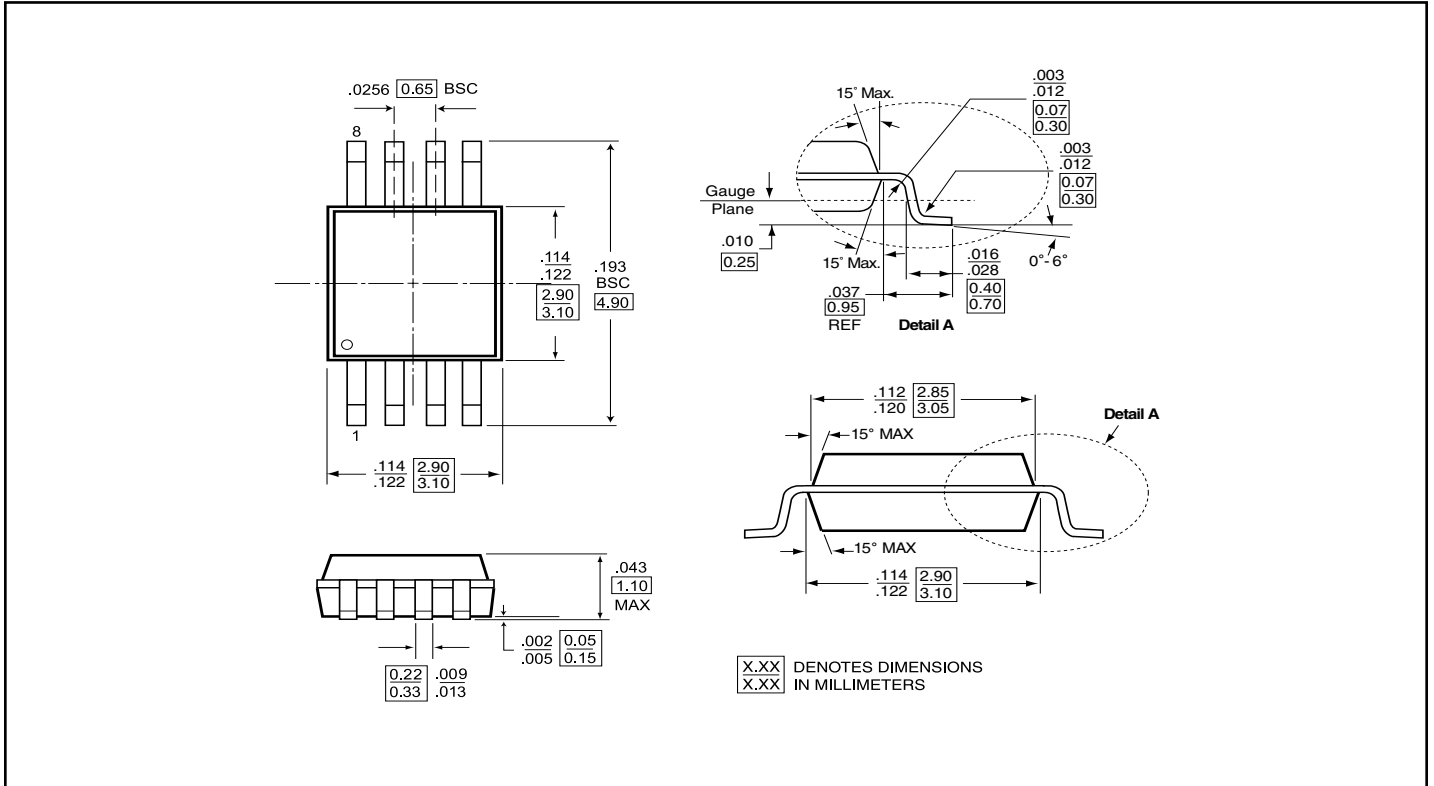
Rail-to-Rail is a registered trademark of Nippon Motorola, Ltd.



Packaging Mechanical: 8-Pin TSSOP (L)



Packaging Mechanical: 8-Pin MSOP (U)

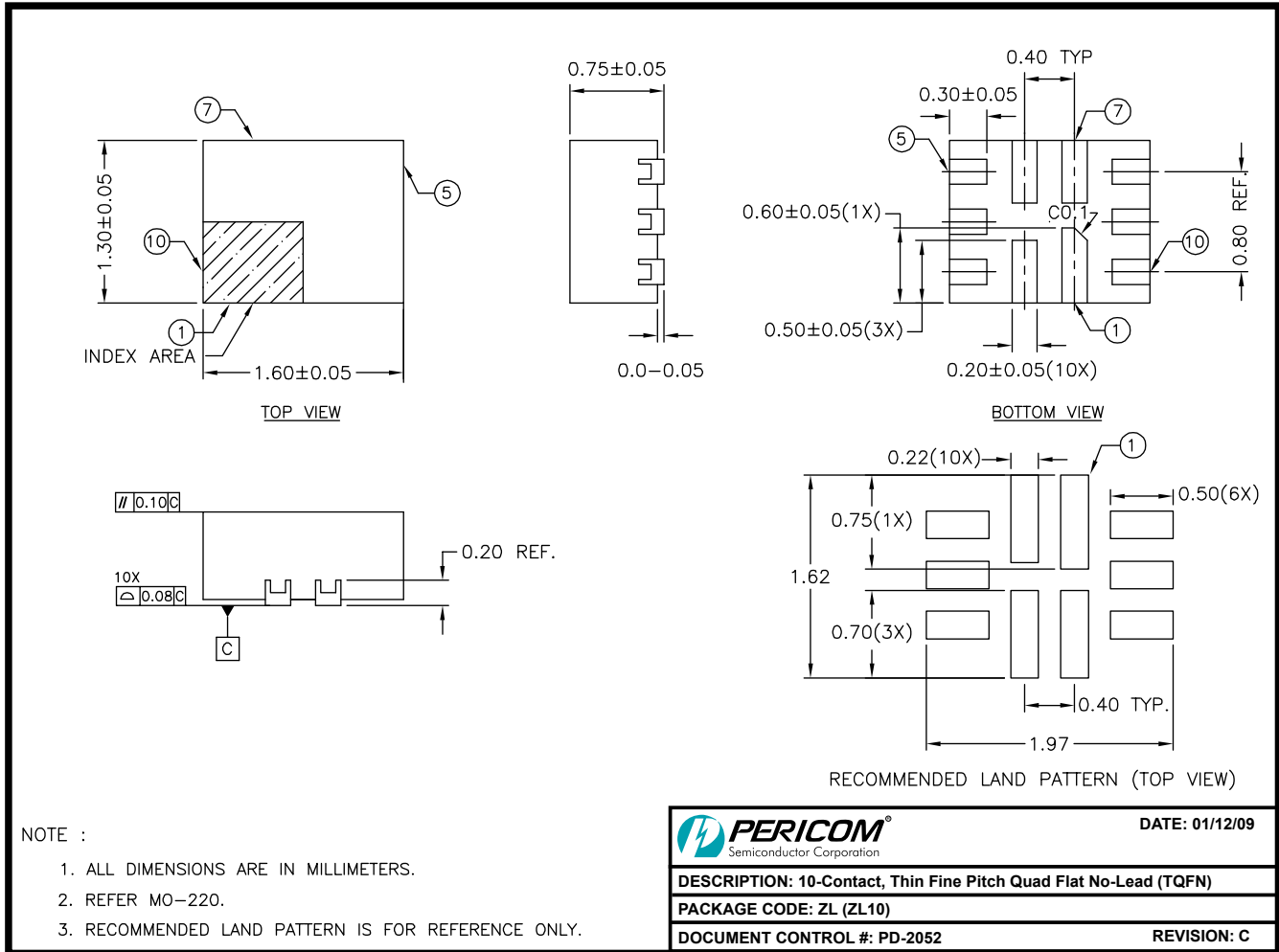


PI3C3305/PI3C3306

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



Packaging Mechanical: 8-Pin MSOP (ZL)



09-0031

Ordering Information

| Ordering Code | Package Code | Description |
|---------------|--------------|--|
| PI3C3305LE | L | Pb-free & Green, 8-pin 173-mil wide plastic TSSOP |
| PI3C3305UEX | U | Pb-free & Green, 8-pin 118-mil wide plastic MSOP Tape/Reel |
| PI3C3306LE | L | Pb-free & Green, 8-pin 173-mil wide plastic TSSOP |
| PI3C3306UEX | U | Pb-free & Green, 8-pin 118-mil wide plastic MSOP Tape/Reel |

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