

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

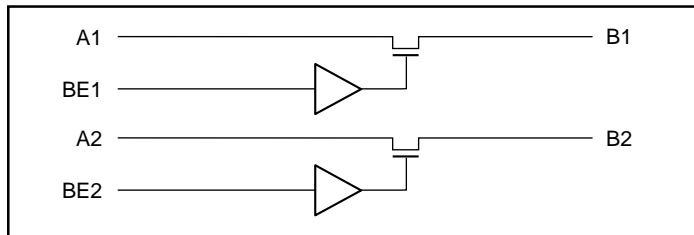
Product Features

- Near zero propagation delay
- 5 Ohm 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
- Packages available:
 - 8-pin 173-mil wide plastic TSSOP (L)
 - 8-pin 118-mil wide plastic MSOP (U)

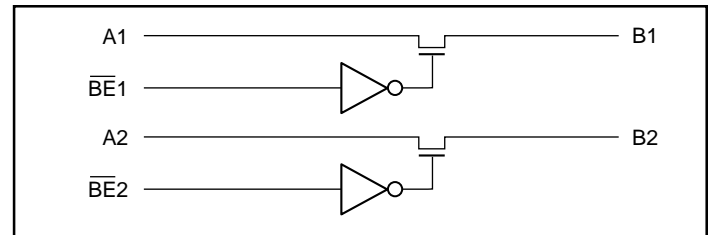
Applications

- High Bandwidth Data Switching
- Hot Docking

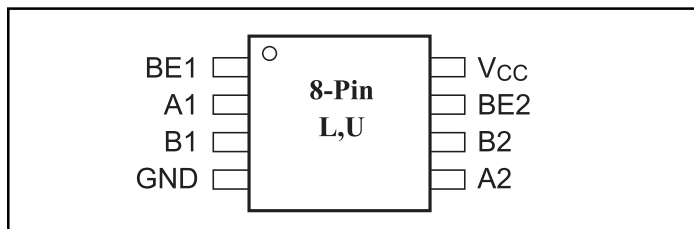
PI3C3305 Logic Block Diagram



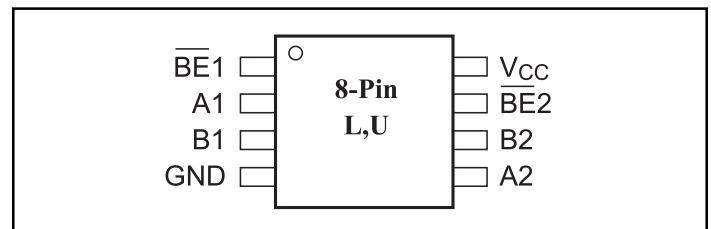
PI3C3306 Logic Block Diagram



PI3C3305 Pin Configuration



PI3C3306 Pin Configuration



Product 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 |

Truth Table⁽¹⁾

| PI3C3305 BE _n | PI3C3306 BE _n | A _n | B _n | V _{CC} | Function |
|-----------------------------|-----------------------------|----------------|----------------|-----------------|------------|
| X | X* | Hi-Z | Hi-Z | GND | Disconnect |
| L | H | Hi-Z | Hi-Z | V _{CC} | Disconnect |
| H | L | B _n | A _n | V _{CC} | Connect |

Notes:

1. 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 (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.

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 ⁽⁴⁾ | V _{CC} = Min., V _{IN} = 0.0V, I _{ON} = 48mA or 60mA V _{CC} = Min., V _{IN} = 2.4V, I _{ON} = 15mA | | 5 8 | 7 15 | Ohm |

Capacitance (T_A = 25°C, f = 1 MHz)

| Parameters ⁽⁵⁾ | Description | Test Conditions | Typ. | Units |
|---------------------------|-----------------------------|----------------------|------|-------|
| C _{IN} | Input Capacitance | V _{IN} = 0V | 3.5 | pF |
| C _{OFF} | A/B Capacitance, Switch Off | V _{IN} = 0V | 5.0 | pF |
| C _{ON} | A/B Capacitance, Switch On | V _{IN} = 0V | 10.0 | pF |

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} = 3.3V, T_A = 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.
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.
5. 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:

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

Switching Characteristics over 3.3V Operating Range

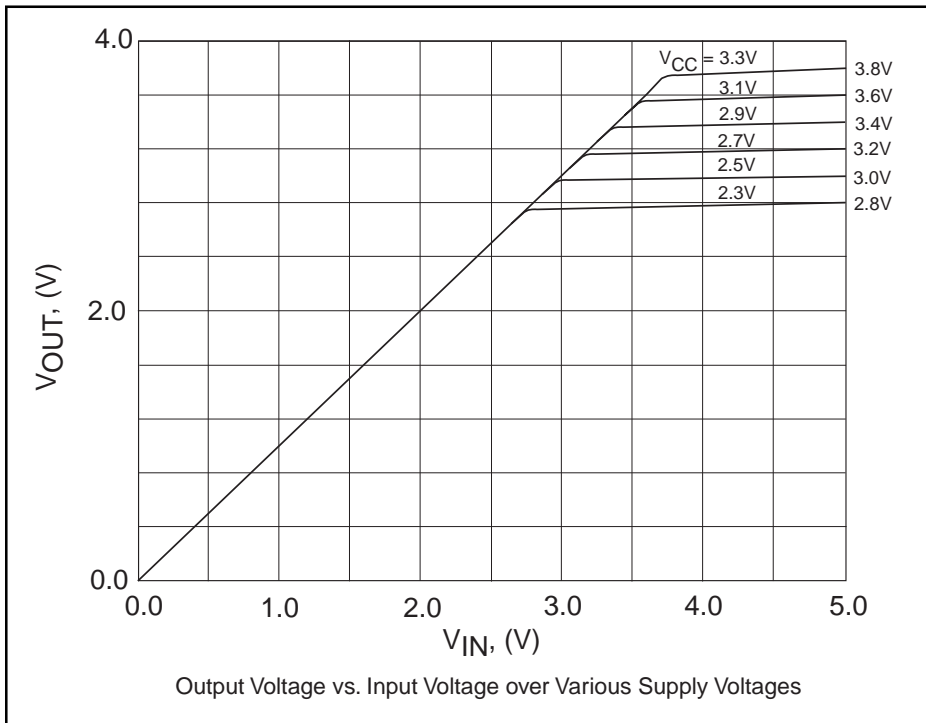
| Parameters | Description | Conditions ⁽¹⁾ | PI3C3305/PI3C3305 | | Units |
|--------------------------------------|--|--|-------------------|------|-------|
| | | | Com. | | |
| | | | Min. | Max. | |
| t _{PLH} t _{PHL} | Propagation Delay ^(2,3) A to B, B to A | C _L = 50 pF, R _L = 500Ω | | 0.25 | ns |
| t _{PZH} t _{PZL} | Bus Enable Time | C _L = 50 pF, R _L = 500Ω | 1.5 | 6.5 | |
| t _{PHZ} t _{PLZ} | Bus Disable Time | R = 500Ω | 1.5 | 5.5 | |

Switching Characteristics over 2.5V Operating Range

| Parameters | Description | Conditions ⁽¹⁾ | PI3C3305/PI3C3306 | | Units |
|--------------------------------------|--|--|-------------------|------|-------|
| | | | Com. | | |
| | | | Min. | Max. | |
| t _{PLH} t _{PHL} | Propagation Delay ^(2,3) A to B, B to A | C _L = 50 pF, R _L = 500Ω | | 0.25 | ns |
| t _{PZH} t _{PZL} | Bus Enable Time | C _L = 50 pF, R _L = 500Ω | 1.5 | 9.8 | |
| t _{PHZ} t _{PLZ} | 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

Ordering Information

| Part | Pin-Package | Width |
|-----------|-------------|---------|
| PI3C3305L | 8-TSSOP (L) | 173-mil |
| PI3C3305U | 8-MSOP (U) | 118-mil |
| PI3C3306L | 8-TSSOP (L) | 173-mil |
| PI3C3306U | 8-MSOP (U) | 118-mil |

Application Information

Logic Inputs

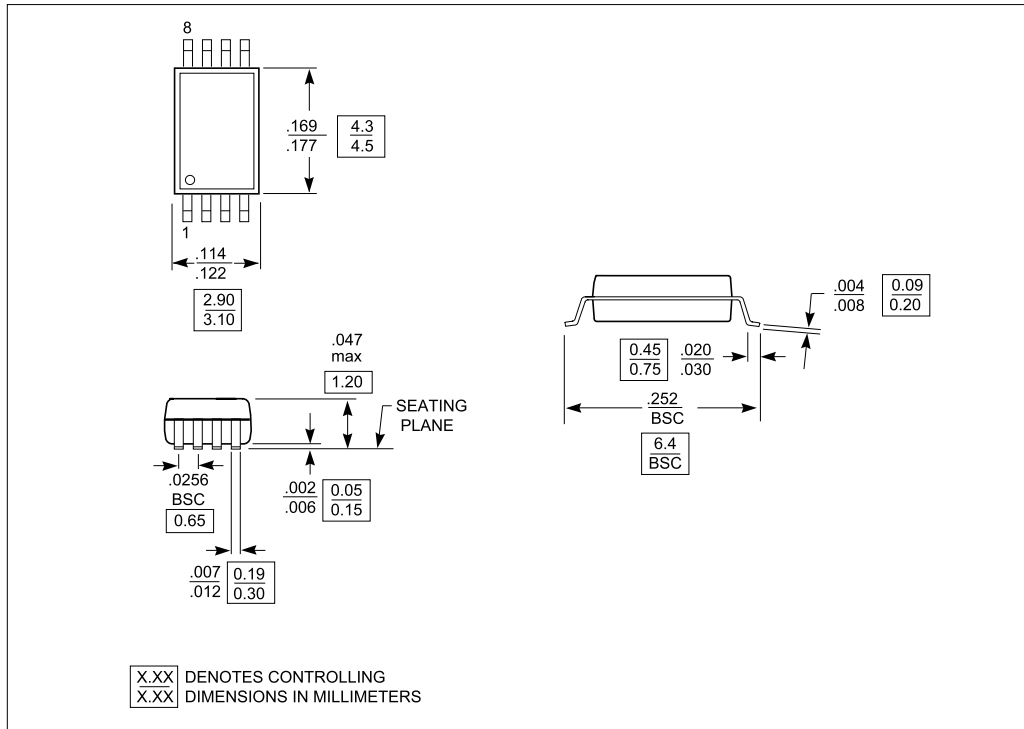
The logic control input can be driven up to +3.6V regardless of the supply voltage. For example, given a +3.3V supply, IN may be driven LOW to 0V and HIGH to 3.6V. Driving IN Rail-to-Rail minimizes power consumption.

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

8-Pin TSSOP (L) Package



8-Pin MSOP (U) Package

