

## 3.3V, Synchronous 16-Bit to 32-Bit FET Mux/Demux *NanoSwitch™*

### Product Features

- Near-Zero propagation delay.
- 5-ohm Switches Connect Between Two Ports
- Packages Available :
  - 56-pin 240mil Wide Thin Plastic TSSOP(A)
  - 56-pin 300mil Wide Plastic SSOP(V)

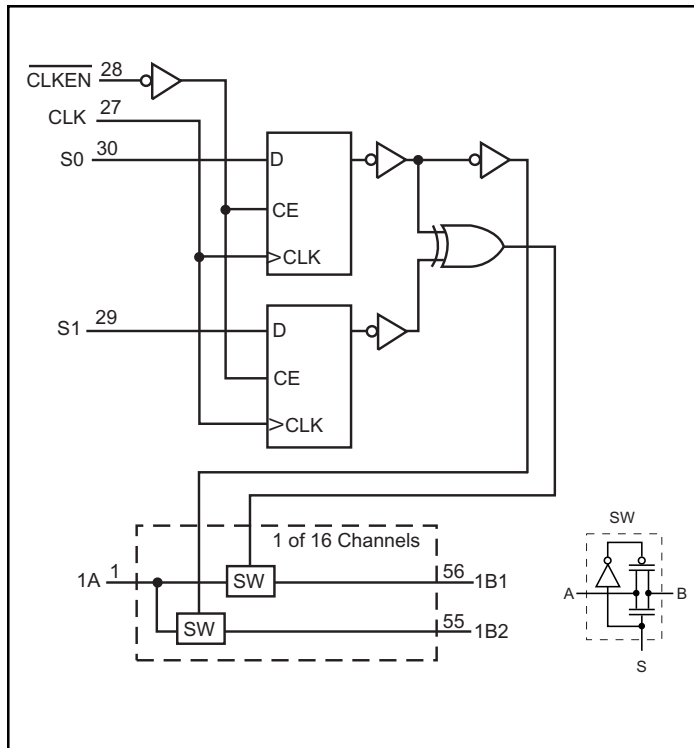
### Product Description

Pericom Semiconductor's PI3B series of logic circuits are produced using the company's advanced submicron CMOS technology.

The PI3B16232 is a 3.3 volt, 16-bit to 32-bit synchronous switch.

Two select inputs (S0 and S1) control the data flow. A clock (CLK) and a clock enable (CLKEN) synchronize the device operation. When  $\overline{\text{CLKEN}}$  is high, the bus switch remains in the last clocked function.

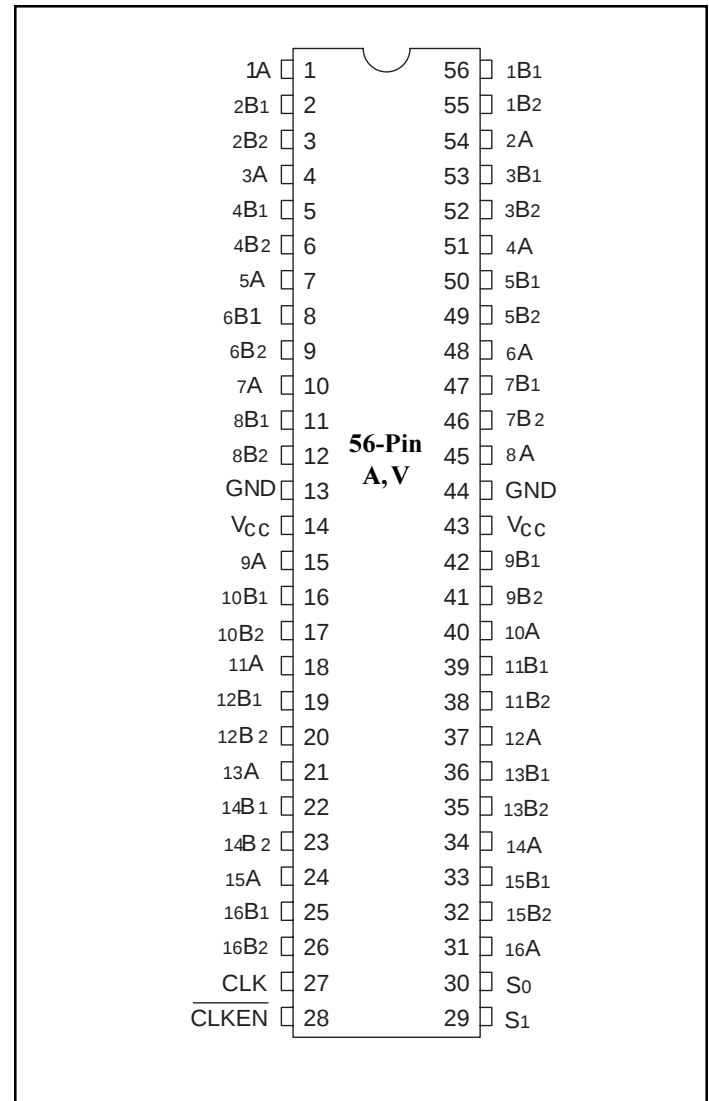
### Logic Block Diagram



### Truth Table

| S1 | S0 | CLK | $\overline{\text{CLKEN}}$ | Function          |
|----|----|-----|---------------------------|-------------------|
| X  | X  | X   | H                         | Last State        |
| L  | L  | ↑   | L                         | Disconnect        |
| L  | H  | ↑   | L                         | A = B1 and A = B2 |
| H  | L  | ↑   | L                         | A = B1            |
| H  | H  | ↑   | L                         | A = B2            |

### Product Pin Configuration



**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 Range .....                   | −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.

**DC Electrical Characteristics** (Over the Operating Range,  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{CC} = 3.0\text{V}$  to  $3.6\text{V}$ )

| Parameters | Description                         | Test Conditions <sup>(1)</sup>                                                      | Min. | Typ <sup>(1)</sup> | Max. | Units |
|------------|-------------------------------------|-------------------------------------------------------------------------------------|------|--------------------|------|-------|
| $V_{IH}$   | Input HIGH Voltage                  | Guaranteed Logic HIGH Level                                                         | 2.0  | —                  | —    | V     |
| $V_{IL}$   | Input LOW Voltage                   | Guaranteed Logic LOW Level                                                          | −0.5 | —                  | 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   |       |
| $I_{OZH}$  | High Impedance Output Current       | $0 \leq A, B \leq V_{CC}$                                                           | —    | —                  | ±1   |       |
| $V_{IK}$   | Clamp Diode Voltage                 | $V_{CC} = \text{Min.}, V_{IN} = -18\text{mA}$                                       | —    | −0.7               | −1.2 | V     |
| $R_{ON}$   | Switch ON Resistance <sup>(3)</sup> | $V_{CC} = \text{Min.}, I_{IN} = 0.0\text{V}, I_{ON} = 48\text{mA}$ or $64\text{mA}$ | —    | 5                  | 8    | Ω     |
|            |                                     | $V_{CC} = \text{Min.}, V_{IN} = 2.4\text{V}, I_{ON} = 15\text{mA}$                  |      | 10                 | 15   |       |

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

| Parameters <sup>(4)</sup> | Description                | Test Conditions      | Typ. | Units |
|---------------------------|----------------------------|----------------------|------|-------|
| $C_{IN}$                  | Input Capacitance          | $V_{IN} = 0\text{V}$ | 3.0  | pF    |
| $C_{ON}$                  | A/B Capacitance, Switch On |                      | 25.0 |       |

**Notes:**

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at  $V_{CC} = 3.3\text{V}$ ,  $T_A = 25^\circ\text{C}$  ambient and maximum loading.
3. 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.
4. 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 <sub>CC</sub>  | Quiescent Power Supply Current                  | V <sub>CC</sub> = Max.                                                                          | V <sub>IN</sub> = GND or V <sub>CC</sub> |      |                    | 10   | μA         |
| ΔI <sub>CC</sub> | Supply Current per Input @ TTL HIGH             | V <sub>CC</sub> = Max.                                                                          | V <sub>IN</sub> = 3.0V <sup>(3)</sup>    |      |                    | 750  |            |
| I <sub>CCD</sub> | Supply Current per Input per MHz <sup>(4)</sup> | V <sub>CC</sub> = Max., A & B Pins Open<br>BE = GND<br>Control Input Toggling<br>50% Duty Cycle |                                          |      |                    | 0.25 | mA/<br>MHz |

#### Notes:

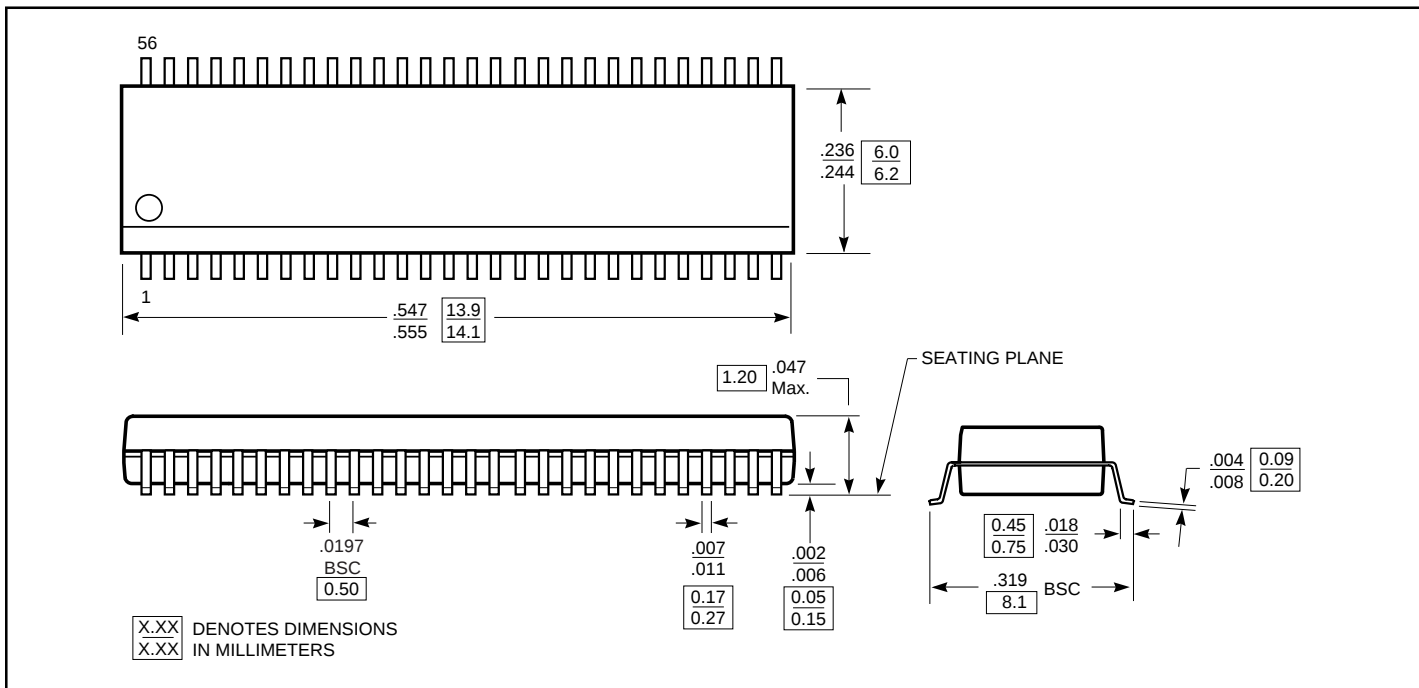
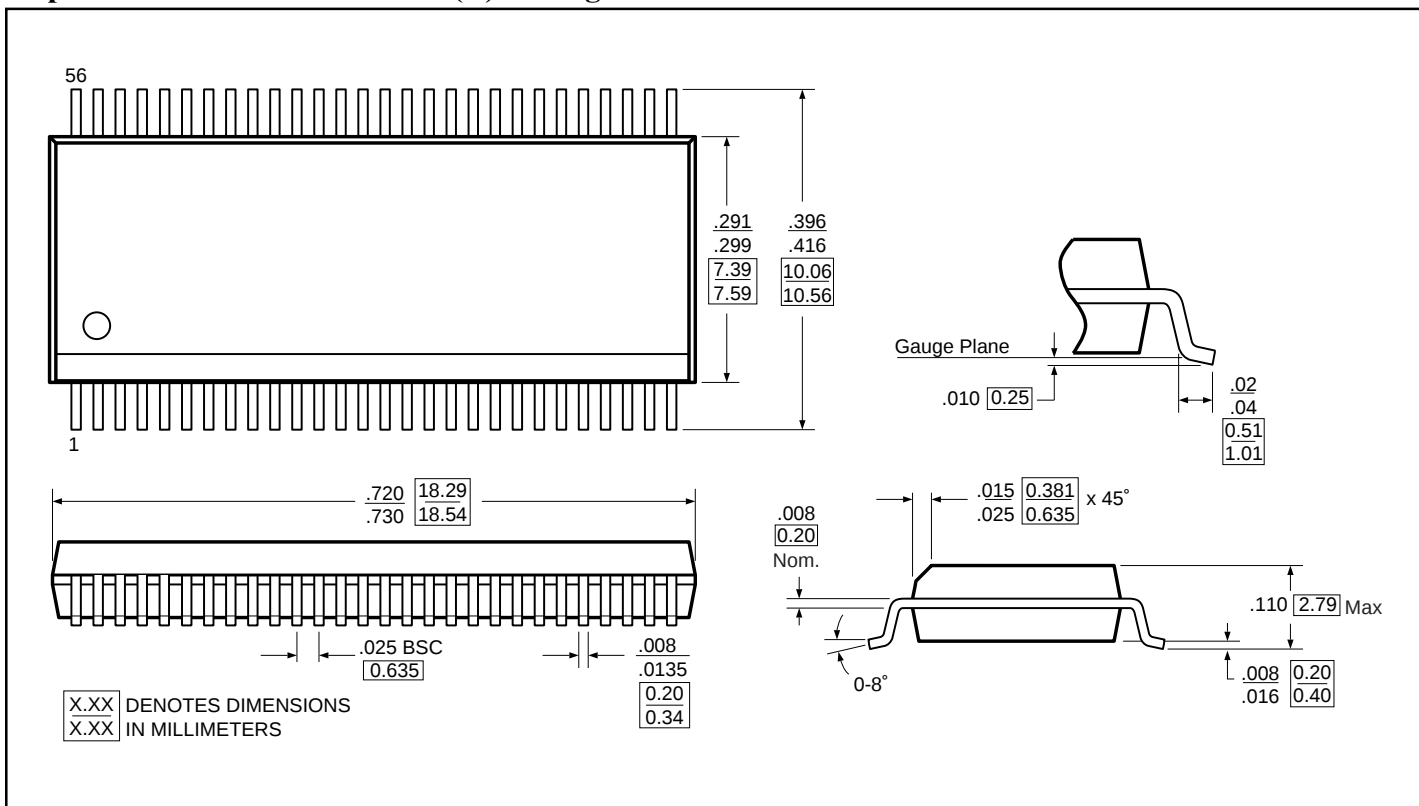
- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for applicable device.
- Typical values are at V<sub>CC</sub> = 3.3V, +25°C ambient.
- Per TTL driven input (control inputs only); A and B pins do not contribute to I<sub>CC</sub>.
- This current applies to the control inputs only and represent the current required to switch internal capacitance at the specified frequency. The A and B inputs generate no significant AC or DC currents as they transition. This parameter is not tested, but is guaranteed by design.

### Switching Characteristics over Operating Range

| Parameter                         | Description       | Test Conditions <sup>(1)</sup> | V <sub>CC</sub> = 3.0 to 3.6V |      | Units |
|-----------------------------------|-------------------|--------------------------------|-------------------------------|------|-------|
|                                   |                   |                                | Min.                          | Max. |       |
| f <sub>CLK</sub>                  | Clock Frequency   |                                | 0                             | 150  | MHz   |
| t <sub>w</sub>                    | Pulse Duration    | CLK high or low                | 3.3                           |      | ns    |
| t <sub>s</sub>                    | Setup Time        | S0, S1 before CLK↑             | 1.9                           |      |       |
|                                   |                   | CLKEN before CLK↑              | 1.9                           |      |       |
| t <sub>h</sub>                    | Hold Time         | S0, S1 after CLK↑              | 1                             |      |       |
|                                   |                   | CLKEN after CLK↑               | 1.8                           |      |       |
| t <sub>en</sub>                   | Enable Time       | CLK to B1, B2                  | 1                             | 5    |       |
| t <sub>dis</sub>                  | Disable Time      | CLK to B1, B2                  | 1                             | 6    |       |
| tpd <sub>1</sub> <sup>(2,3)</sup> | Propagation Delay | A to B                         |                               | 0.25 |       |
| tpd <sub>2</sub>                  | Propagation Delay | CLK to A                       | 1                             | 4.5  |       |

#### Notes:

- See Test Circuits and Waveforms.
- This parameter is guaranteed by design but not tested.
- The bus switch contributes no propagational delay other than the RC delay of ON resistance of the switch and the load capacitance.

**56-pin 240mil Wide Thin Plastic TSSOP (A) Package**

**56-pin 300mil Wide Plastic SSOP (V) Package**


## 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<sub>CC</sub> and GND before applying signals to input/output or control pins.

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

## Ordering Information

| Part       | Pin | Package | Width   | Temperature   |
|------------|-----|---------|---------|---------------|
| PI3B16222A | 56  | TSSOP   | 240-mil | -40°C to 85°C |
| PI3B16222V |     | SSOP    | 300-mil |               |