

**PI5C3305**

**2-Bit Bus Switch with Individual Enables**

**Features**

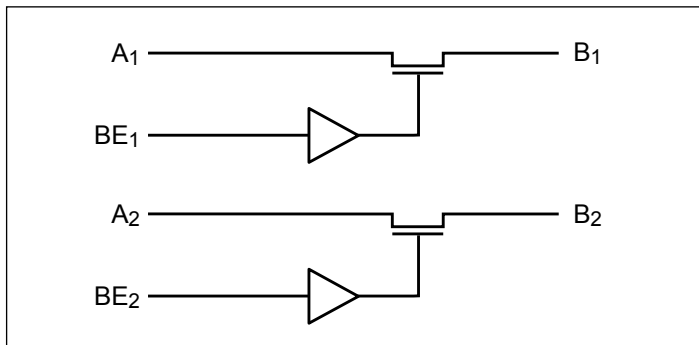
- Near-Zero propagation delay
- 5Ω switches connect inputs to outputs
- Direct bus connection when switches are ON
- Ultra Low Quiescent Power (0.2μA typical)
  - Ideally suited for notebook applications
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. “Green” Device (Note 3)
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative.  
<https://www.diodes.com/quality/product-definitions/>
- Packaging (Pb-free & Green available):
  - 8-pin, 173-mil wide plastic TSSOP (L)

**Description**

PI5C3305 is a 2-bit bus switch designed with two individual 5Ω switches 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 PI5C3305 device has active HIGH enables.

**Block Diagram**



**Truth Table<sup>(1)</sup>**

| BE <sub>n</sub>  | A <sub>n</sub> | B <sub>n</sub> | V <sub>CC</sub> | Function   |
|------------------|----------------|----------------|-----------------|------------|
| X <sup>(2)</sup> | Hi-Z           | Hi-Z           | GND             | Disconnect |
| L                | Hi-Z           | Hi-Z           | V <sub>CC</sub> | Disconnect |
| H                | B <sub>n</sub> | A <sub>n</sub> | V <sub>CC</sub> | Connect    |

**Notes:**

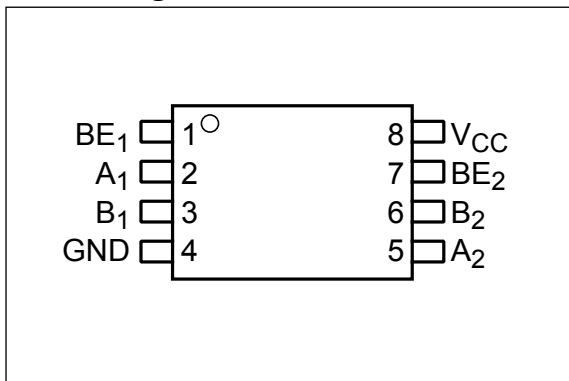
1. H = High Voltage Level, L = Low Voltage Level  
Hi-Z = High Impedance, X = Don't Care
2. A pull-up resistor should be provided for power-up protection.

**Notes:**

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

**PI5C3305**

**Pin Configuration**



**Pin Description**

| Pin Name                       | Description   |
|--------------------------------|---------------|
| BE <sub>n</sub>                | Switch Enable |
| A <sub>2</sub> -A <sub>1</sub> | Bus A         |
| B <sub>2</sub> -B <sub>1</sub> | Bus B         |
| V <sub>CC</sub>                | Power         |
| GND                            | Ground        |

### 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 +7.0V  |
| DC Input Voltage .....                       | -0.5V to +7.0V  |
| 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<sub>A</sub> = -40°C to +85°C, V<sub>CC</sub> = 4V to 5.5V)

| Parameters      | Description                         | Test Conditions <sup>(1)</sup>  | Min. | Typ <sup>(2)</sup> | Max. | Units |
|-----------------|-------------------------------------|---|------|--------------------|------|-------|
| V <sub>IH</sub> | Input HIGH Voltage                  | Guaranteed Logic HIGH Level   |      | 2.0                |      | V     |
| V <sub>IL</sub> | Input LOW Voltage                   | Guaranteed Logic LOW Level  |      | -0.5               | 0.8  |       |
| I <sub>IH</sub> | Input HIGH Current                  | V <sub>CC</sub> = Max., V <sub>IN</sub> = V <sub>CC</sub>                         |      |                    | ±1   | μA    |
| I <sub>IL</sub> | Input LOW Current                   | V <sub>CC</sub> = Max., V <sub>IN</sub> = GND                                     |      |                    | ±1   |       |
| I <sub>OZ</sub> | High Impedance Output Current       | 0 ≤ A, B ≤ V <sub>CC</sub>  |      |                    | ±1   |       |
| I <sub>ON</sub> | Low Impedance Output Current        | 0 ≤ A, B ≤ V <sub>CC</sub>  |      |                    | ±1   |       |
| V <sub>H</sub>  | Input Hysteresis at Control Pins    |   |      | 250                |      | mV    |
| R <sub>ON</sub> | Switch On-Resistance <sup>(3)</sup> | V <sub>CC</sub> = 4.5V, V <sub>IN</sub> = 0.0V,<br>I <sub>ON</sub> = 30mA or 64mA |      | 4                  | 7    | Ω     |
|                 |                                     | V <sub>CC</sub> = 4.5V, V <sub>IN</sub> = 2.4V,<br>I <sub>ON</sub> = -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<sub>CC</sub> = 5.0V, T<sub>A</sub> = 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<sub>A</sub> = 25°C, f = 1 MHz)

| Parameters <sup>(1)</sup> | Description                 | Test Conditions      | Typ. | Units |
|---------------------------|-----------------------------|----------------------|------|-------|
| C <sub>IN</sub>           | Input Capacitance           | V <sub>IN</sub> = 0V | 3    | pF    |
| C <sub>OFF</sub>          | A/B Capacitance, Switch Off |                      | 5    |       |
| C <sub>ON</sub>           | A/B Capacitance, Switch On  |                      | 10   |       |

**Notes:**

- 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         |
|-----------------|-------------------------------------|--------------------------------|------|---------------------|------|---------------|
| $I_{CC}$        | Quiescent Power Supply Current      | $V_{CC} = \text{Max.}$         |      | 0.1                 | 3.0  | $\mu\text{A}$ |
| $\Delta I_{CC}$ | Supply Current per Input @ TTL HIGH |                                |      |                     |      |               |

**Notes:**

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at  $V_{CC} = 5.0\text{V}$ ,  $+25^\circ\text{C}$  ambient.
3. Per TTL driven input ( $V_{IN} = 3.4\text{V}$ , control inputs only); A and B pins do not contribute to  $I_{CC}$ .

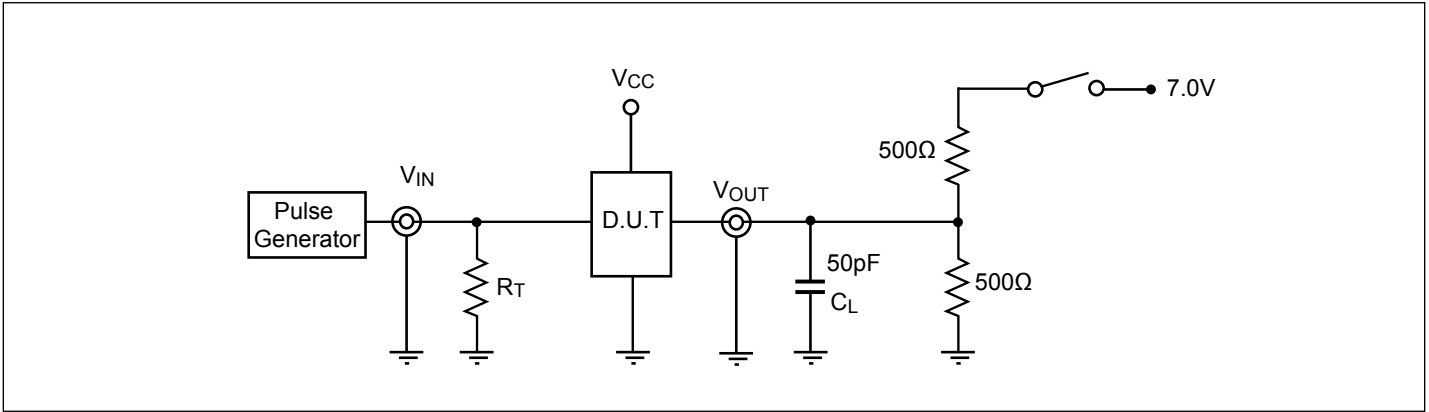
### Switching Characteristics Over Operating Range

| Parameters             | Description   | Test Conditions <sup>(1)</sup>           | $V_{CC} = 5\text{V} \pm 10\%$ |      | $V_{CC} = 4\text{V}$ |      | Units |
|------------------------|---|--|-------------------------------|------|----------------------|------|-------|
|                        |   |  | Min.                          | Max. | Min.                 | Max. |       |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay <sup>(2, 3)</sup><br>A to B, B to A | $C_L = 50\text{pF}$<br>$R_L = 500\Omega$ |                               | 0.25 |                      | 0.25 | ns    |
| $t_{PZH}$<br>$t_{PZL}$ | Bus Enable Time                                       |  | 1.0                           | 4.9  |                      | 5.5  |       |
| $t_{PHZ}$<br>$t_{PLZ}$ | Bus Disable Time                                      |  | 1.0                           | 4.2  |                      | 4.5  |       |

**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.

**Test Circuit**



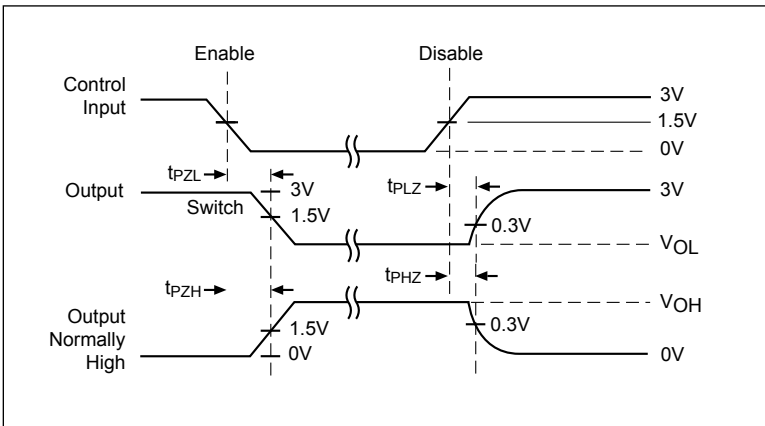
**Switch Positions<sup>(1)</sup>**

| Test                                    | Switch |
|---|--------|
| Open Drain<br>Disable LOW<br>Enable LOW | 7V     |
| All Other Inputs                        | Open   |

**Notes:**

- $C_L$  = Load Capacitance: includes jig and probe capacitance.  
 $R_T$  = Termination Resistance: should be equal to the  $Z_{OUT}$  of the Pulse Generator.

**Enable and Disable Timing**



**Notes:**

- Input Control Enable = Low; Input Control Disable = High
- Pulse Generator for All Pulses: Rate  $\leq$  1.0 MHz;  $Z_{OUT} \leq 50\Omega$ ;  $t_F, t_R \leq 2.5ns$

**Part Marking**

Top mark not available at this time. To obtain advance information regarding the top mark, please contact your local sales representative.

**PI5C3305**

**Packaging Mechanical: 8-TSSOP (L)**

| SYMBOLS | MIN.     | NOM. | MAX. |
|---------|----------|------|------|
| A       | —        | —    | 1.20 |
| A1      | 0.05     | —    | 0.15 |
| A2      | 0.80     | 1.00 | 1.05 |
| b       | 0.19     | —    | 0.30 |
| c       | 0.09     | —    | 0.20 |
| D       | 2.90     | 3.00 | 3.10 |
| E       | 6.20     | 6.40 | 6.60 |
| e       | 0.65 BSC |      |      |
| E1      | 4.30     | 4.40 | 4.50 |
| L       | 0.45     | 0.60 | 0.75 |
| L1      | 1.00 REF |      |      |
| S       | 0.20     | —    | —    |
| θ*      | 0        | —    | 8    |

UNIT : MM

**NOTES:**  
 1. ALL DIMENSIONS IN MILLIMETERS. ANGLES IN DEGREES.  
 2. JEDEC MO-153F/AA  
 3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

|                                       |                |
|---------------------------------------|----------------|
|                                       | DATE: 03/24/16 |
| DESCRIPTION: 8-Pin, 173mil Wide TSSOP |                |
| PACKAGE CODE: L (L8)                  |                |
| DOCUMENT CONTROL #: PD-1308           | REVISION: G    |

16-0062

**For latest package info.**

please check: <http://www.diodes.com/design/support/packaging/pericom-packaging/packaging-mechanicals-and-thermal-characteristics/>

**Ordering Information**

| Ordering Code | Package Code | Package Description        |
|---------------|--------------|----------------------------|
| PI5C3305LEX   | L            | 8-Pin, 173mil Wide (TSSOP) |

**Notes:**

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
- See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- E = Pb-free and Green
- X suffix = Tape/Reel

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