

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:
 - 8-pin 173-mil wide plastic TSSOP
 - 8-pin 118-mil wide plastic MSOP

Applications

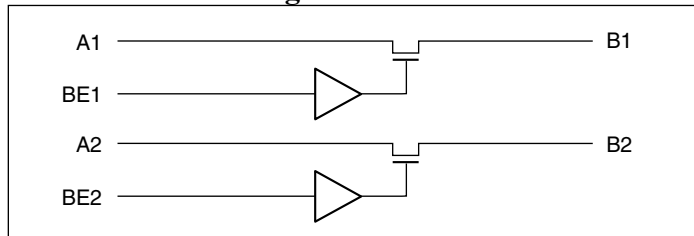
- High Bandwidth Data Switching
- Hot Docking

Description

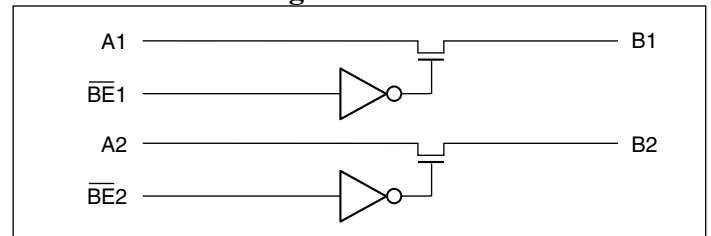
PI3C3305 and PI3C3306 are 2.5 volt or 3.3 volt, 2-bit bus switches designed with fast individual enables. When enabled via the associated Bus Enable (BE) pin, the “A” pin is directly connected to the “B” pin for that particular gate. The bus switch introduces no additional propagation delay or additional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

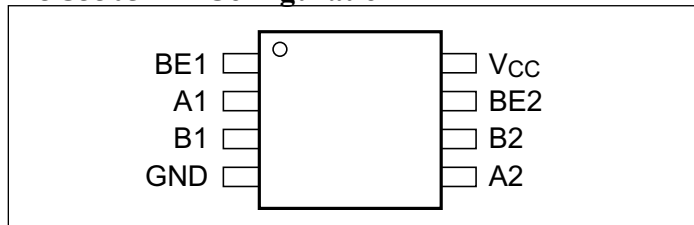
PI3C3305 Block Diagram



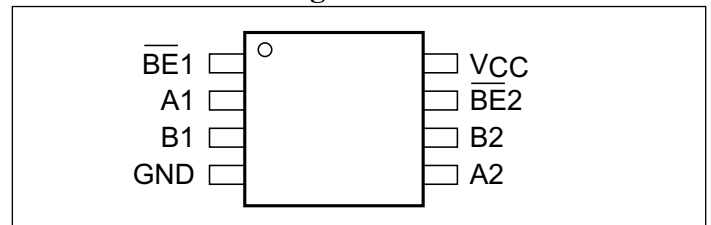
PI3C3306 Block Diagram



PI3C3305 Pin Configuration



PI3C3306 8-Pin Configuration



Truth Table⁽¹⁾

PI3C3306 BE _n	PI3C3305 BE _n	A _n	B _n	V _{CC}	Function
X	X ⁽²⁾	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:

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.

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

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}.

PI3C3305/PI3C3306

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:

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.

Switching Characteristics over 2.5V Operating Range

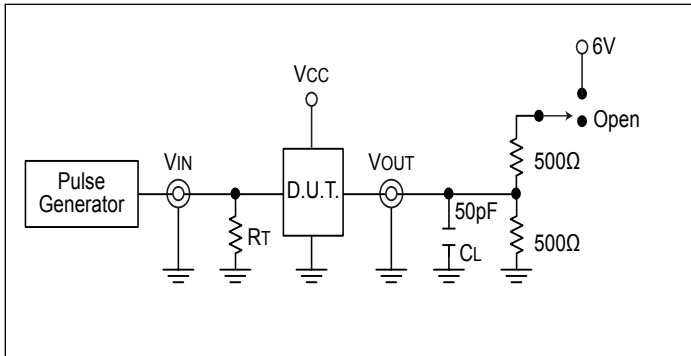
Parameters	Description	Test Conditions ⁽¹⁾	3305/3306		Units
			Com		
			Min.	Max.	
t _{PLH} t _{PHL}	Propagation Delay ^(2, 3) A to B, B to A	C _L = 50pF R _L = 500Ω		0.25	ns
t _{PZH} t _{PZL}	Bus Enable Time	C _L = 50pF R _L = 500Ω	1.5	9.8	
t _{PHZ} t _{PLZ}	Bus Disable Time	R = 500Ω	1.5	8.3	

Notes:

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.

PI3C3305/PI3C3306

Test Circuits



Switch Position

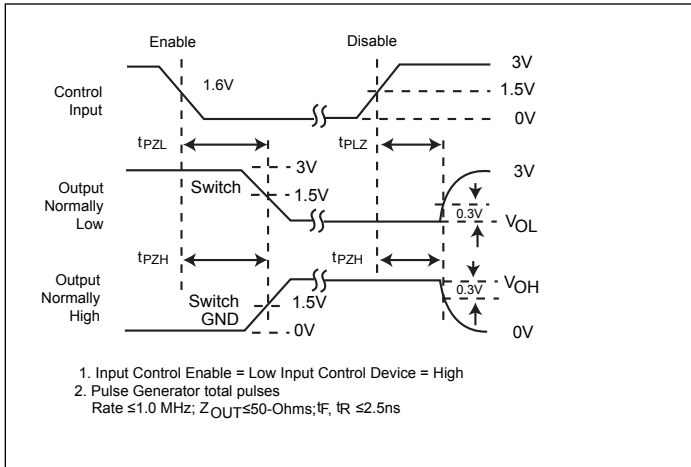
Test	Switch
Disable LOW	6V
Enable LOW	6V
Disable HIGH	GND
Enable HIGH	GND
tPD	Open

Definitions:

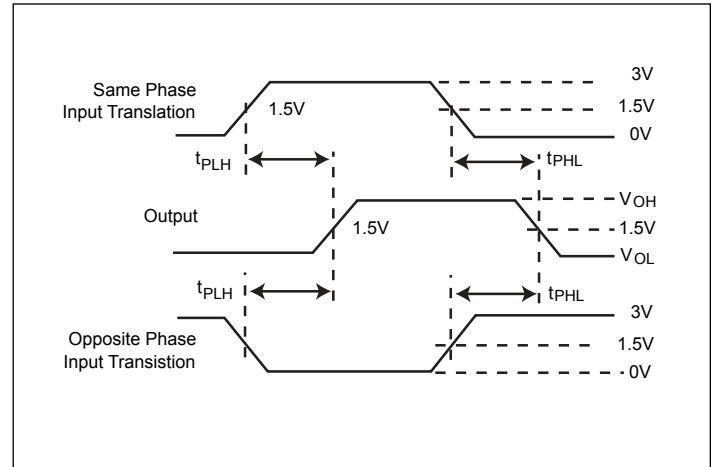
C_L = Load capacitance (includes jig and probe capacitance)

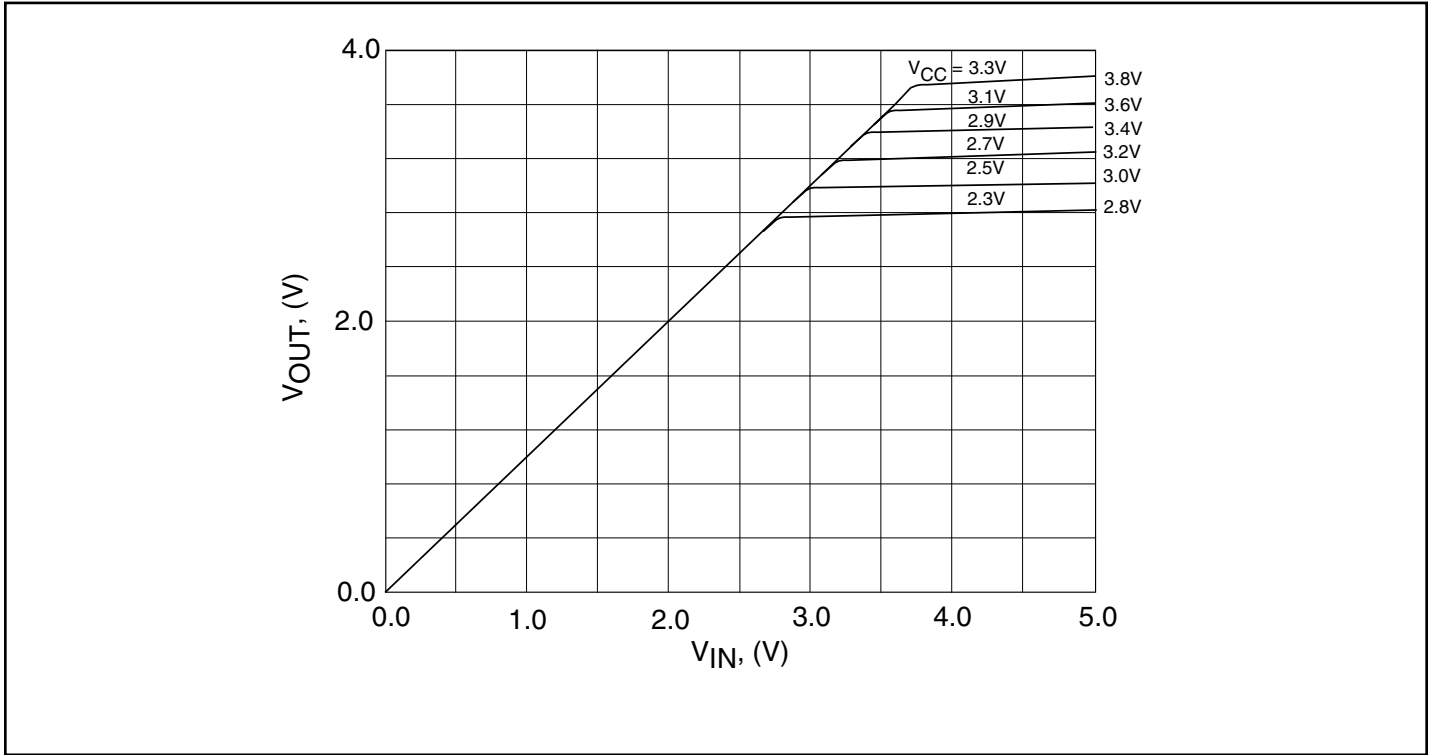
R_T = Termination resistance (should be equal to Z_{OUT} of the pulse generator)

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.

PI3C3305/PI3C3306

Packaging Mechanical: 8-Pin 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.

PERICOM DATE: 03/24/16
enabling Serial Connectivity

DESCRIPTION: 8-Pin, 173mil Wide TSSOP

PACKAGE CODE: L (L8)

DOCUMENT CONTROL #: PD-1308 **REVISION: G**

16-0062

PI3C3305/PI3C3306

Packaging Mechanical: 8-Pin MSOP (U)

PKG. DIMENSIONS(MM)		
SYMBOL	Min.	Max.
A	-	1.10
A1	0.00	0.15
A2	0.75	0.95
b	0.22	0.38
c	0.08	0.23
D	2.90	3.10
E	2.90	3.10
E1	4.65	5.15
e	0.65 BSC	
L	0.40	0.80
θ	0°	8°

NOTE:
 1. ALL DIMENSIONS ARE IN MILLIMETERS.
 2. REFER JEDEC MO-187E/AA
 3. PACKAGE OUTLINE DIMENSIONS DO NOT INCLUDE MOLD FLASH AND METAL BURR.

		DATE: 10/20/14
DESCRIPTION: 8-Pin, Mini Small Outline Package, MSOP		
PACKAGE CODE: U (U8)		
DOCUMENT CONTROL #: PD-1261	REVISION: E	

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	Description
PI3C3305LEX	L	8-pin 173-mil wide (TSSOP)
PI3C3305UEX	U	8-pin, Mini Small Outline Package (MSOP)
PI3C3306LEX	L	8-pin 173-mil wide (TSSOP)
PI3C3306UEX	U	8-pin, Mini Small Outline Package (MSOP)

Notes:

- Thermal characteristics can be found on the company web site at www.diodes.com/design/support/packaging/
- E = Pb-free and Green
- X suffix = Tape/Reel

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and definitive format released by Diodes Incorporated.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

- A. Life support devices or systems are devices or systems which:
1. are intended to implant into the body, or
 2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.
- B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2016, Diodes Incorporated
www.diodes.com