

2.5V/3.3V, High Bandwidth, Hot Insertion, 4-Bit, 2-Port Bus Switch with Individual Enables

Description

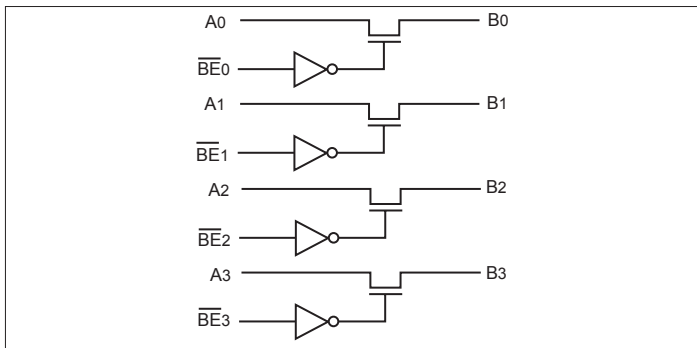
The PI3C3125 and PI3C3126 are 2.5 volt or 3.3 volt, 4-bit bus switches designed with four individual 5Ω bus switches with fast individual enables in an industry standard 74XX125/126 pinout. When enabled via the associated Bus Enable pin, the “A” pin is directly connected to the “B” pin for that particular gate. The bus switch introduces no additional propagation delay or additional ground bounce noise.

The PI3C3125 device has active LOW enables, and the PI3C3126 has active HIGH enables. It is very useful in switching signals that have high bandwidth (>400MHz).

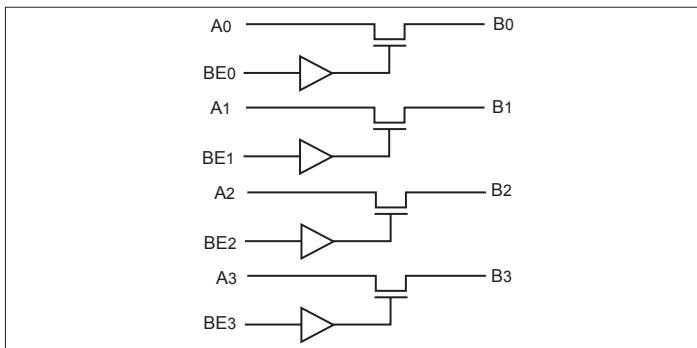
Application(s)

- High Bandwidth Data Switching
- Hot Docking

PI3C3125 Block Diagram



PI3C3126 Block Diagram



Features

- Near-Zero Propagation Delay
- 5Ω Switches Connect Inputs to Outputs
- High Bandwidth (>400MHz)
- Rail-to-Rail, or 2.5V or 3.3V Switching
- 5V I/O Tolerant
- 2.5V Supply Voltage Operation
- Permits Hot Insertion
- Packaging (Pb-free & Green available):
 - 14-pin 150-mil wide plastic SOIC (W)
 - 14-pin 170-mil wide plastic TSSOP (L)
 - 16-pin 150-mil wide plastic QSOP (Q)
- 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-Q100/101/104/200, 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/>

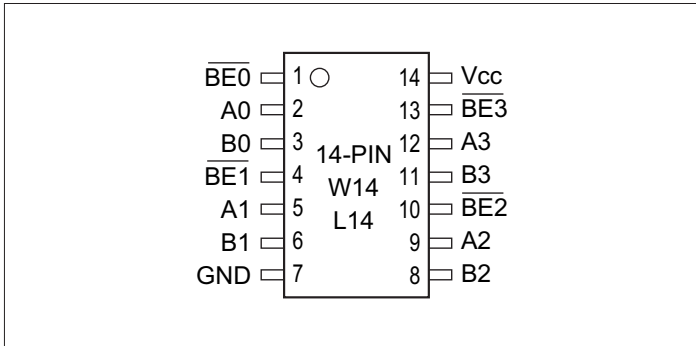
Notes:

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.

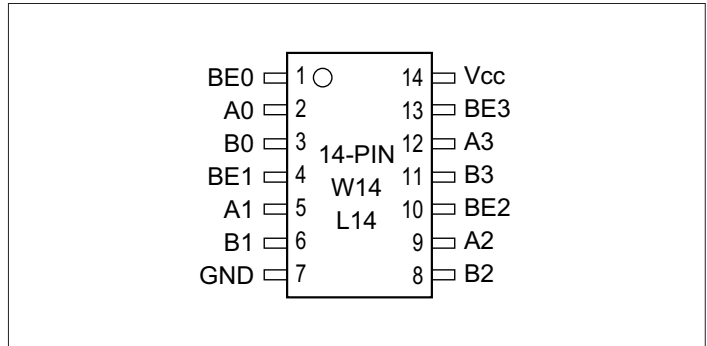
PI3C3125/PI3C3126

Pin Configuration

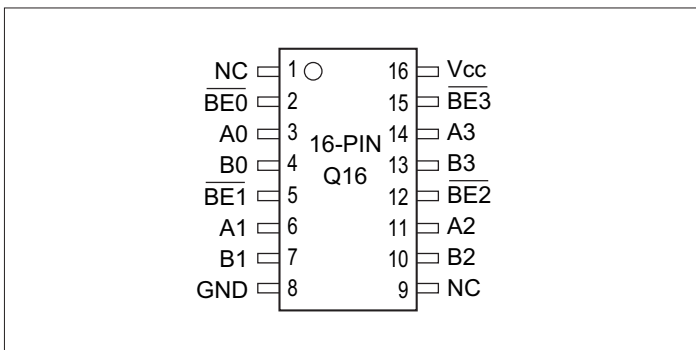
PI3C3125 14-Pin



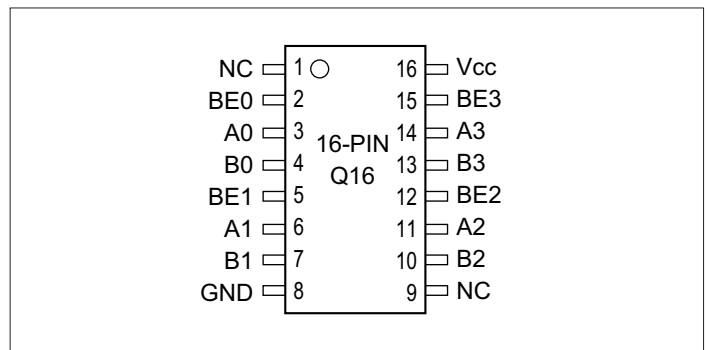
PI3C3126 14-Pin



PI3C3125 16-Pin



PI3C3126 16-Pin



Pin Description

Pin Name	Description
\overline{BE}_n	Switch Enable (PI3C3125)
BE_n	Switch Enable (PI3C3126)
A3 - A0	Bus A
B3 - B0	Bus B
V _{CC}	Power
GND	Ground

Table 1. Truth Table

PI3C3125 \overline{BE}_n	PI3C3126 BE_n	A _n	B _n	V _{CC}	Function
X*	X	Hi-Z	Hi-Z	GND	Disconnect
H	L	Hi-Z	Hi-Z	V _{CC}	Disconnect
L	H	B _n	A _n	V _{CC}	A _n = B _n

Note:

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
Junction Temperature	125°C

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	μA
I _{OZH} ⁽³⁾	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		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.
 - Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
 - 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 = 1MHz

Parameters ⁽¹⁾	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	
C _{ON}	A/B Capacitance, Switch On	V _{IN} = 0V	10.0	

- Notes:**
- This parameter is determined by device characterization but is not production tested.

Power Supply Characteristics

Parameters	Description	Test Conditions		Min.	Typ. ⁽²⁾	Max.	Units
I_{CC}	Quiescent Power Supply Current	$V_{CC} = \text{Max}$	$V_{IN} = \text{GND or } V_{CC}$		260	500	μA
ΔI_{CC}	Supply Current per Input HIGH	$V_{CC} = \text{Max}$	$V_{IN} = 3.0\text{V}^{(3)}$			750	

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at $V_{CC} = 3.3\text{V}$, $+25^\circ\text{C}$ 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	Conditions	PI3C3125/PI3C3126		Units
			Com.		
			Min.	Max.	
t_{PLH} t_{PHL}	Propagation Delay ^(1,2) A to B, B to A	$C_L = 50\text{pF}$ $R_L = 500\Omega$		0.25	ns
t_{PZH} t_{PZL}	Bus Enable Time	$C_L = 50\text{pF}$ $R_L = 500\Omega$	1.5	6.5	
t_{PHZ} t_{PLZ}	Bus Disable Time	$R = 500\Omega$	1.5	5.5	

Notes:

- 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	Conditions	PI3C3125/PI3C3126		Units
			Com.		
			Min.	Max.	
t_{PLH} t_{PHL}	Propagation Delay ^(1,2) A to B, B to A	$C_L = 50\text{pF}$ $R_L = 500\Omega$		0.25	ns
t_{PZH} t_{PZL}	Bus Enable Time	$C_L = 50\text{pF}$ $R_L = 500\Omega$	1.5	9.8	
t_{PHZ} t_{PLZ}	Bus Disable Time	$R = 500\Omega$	1.5	8.3	

Notes:

- 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.

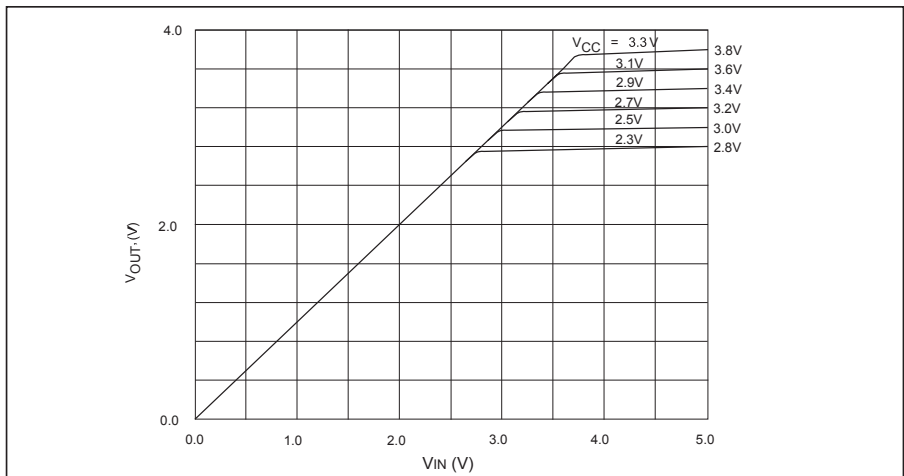


Figure 1. Switch Output Voltage vs. Input Voltage over Various Supply Voltage

PI3C3125/PI3C3126

Part Marking

PI3C3125

L Package

PI3C
3125LE
YYWWX̄
○

YYWW: Date Code (Year & Workweek)
1st X: Assembly Site Code (Variable)
2nd X: Wafer Fab Site Code (Variable)
Bar above fab code means Cu wire
Bar above 'l' means Fab3 of MGN

W Package

PI3C
3125WE
YYWWḠ
○

YYWW: Date Code (Year & Workweek)
1st G: Assembly Site Code
2nd G: Wafer Fab Site Code
Bar above 'G' means Cu wire
Bar above 'l' means Fab3 of MGN

Q Package

PI3C
3125QE
YWXX̄
○

Y: Year
W: Workweek
1st X: Assembly Site Code
2nd X: Fab Site Code
Bar above fab code means Cu wire
Bar above 'l' means Fab3 of MGN

PI3C3126

L Package

PI3C
3126LE
YYWWX̄
○

YYWW: Date Code (Year & Workweek)
1st X: Assembly Site Code (Variable)
2nd X: Wafer Fab Site Code (Variable)
Bar above fab code means Cu wire
Bar above 'l' means Fab3 of MGN

Q Package

PI3C
3126QE
YWXX̄
○

Y: Year
W: Workweek
1st X: Assembly Site Code
2nd X: Fab Site Code
Bar above fab code means Cu wire
Bar above 'l' means Fab3 of MGN

PI3C3125/PI3C3126

Packaging Mechanical

14-SOIC (W)

SYMBOLS	MIN.	NOM.	MAX.
A	—	—	1.75
A1	0.10	—	0.25
A2	1.25	—	—
b	0.31	—	0.51
c	0.10	—	0.25
D	8.55	8.65	8.75
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
e	1.27 BSC		
L	0.40	—	1.27
L1	1.04 REF		
h	0.25	—	0.50
θ°	0	—	8

NOTES:
 1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
 2. JEDEC MS-012
 3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

DATE: 05/15/23

DESCRIPTION: 14-Pin, 150mil Wide SOIC

PACKAGE CODE: W (W14)

DOCUMENT CONTROL #: PD-1002 **REVISION: G**

PI3C3125/PI3C3126

14-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	4.90	5.00	5.10
E1	4.30	4.40	4.50
E	6.20	6.40	6.60
e	0.65 BSC		
L1	1.00 REF		
L	0.45	0.60	0.75
S	0.20	—	—
θ	0°	—	8°

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

PERICOM
Enabling Serial Connectivity

DATE: 03/24/16

DESCRIPTION: 14-Pin, 173mil Wide TSSOP

PACKAGE CODE: L (L14)

DOCUMENT CONTROL #: PD-1309

REVISION: E

16-0060

PI3C3125/PI3C3126

16-QSOP (Q)

SYMBOLS	MIN.	NOM.	MAX.
A	—	—	0.069
A1	0.004	—	0.0098
A2	0.049	—	—
b	0.008	—	0.012
c	0.004	—	0.010
D	0.189	0.193	0.197
E1	0.150	0.154	0.158
E	0.228	0.236	0.244
L	0.016	—	0.050
L1	0.041 REF.		
e	0.025 BSC.		
θ°	0	—	8

UNIT : INCH

NOTES:
 1. ALL DIMENSIONS IN INCH. ANGLES IN DEGREES.
 2. JEDEC MO-137E
 3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

PERICOM
Enabling Serial Connectivity

DATE: 04/08/16

DESCRIPTION: 16-Pin, 150mil Wide QSOP

PACKAGE CODE: Q (Q16)

DOCUMENT CONTROL #: PD-1201

REVISION: H

16-0056

For latest package info.

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

Ordering Information

Orderable Part Number	Package Code	Package Description
PI3C3125LEX	L	14-pin, 173mil Wide (TSSOP)
PI3C3125WEX	W	14-pin, 150mil Wide (SOIC); Not Recommended for New Design
PI3C3125QEX	Q	16-pin, 150mil Wide (QSOP)
PI3C3126LEX	L	14-pin, 173mil Wide (TSSOP)
PI3C3126QEX	Q	16-pin, 150mil Wide (QSOP)

Notes:

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
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- 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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