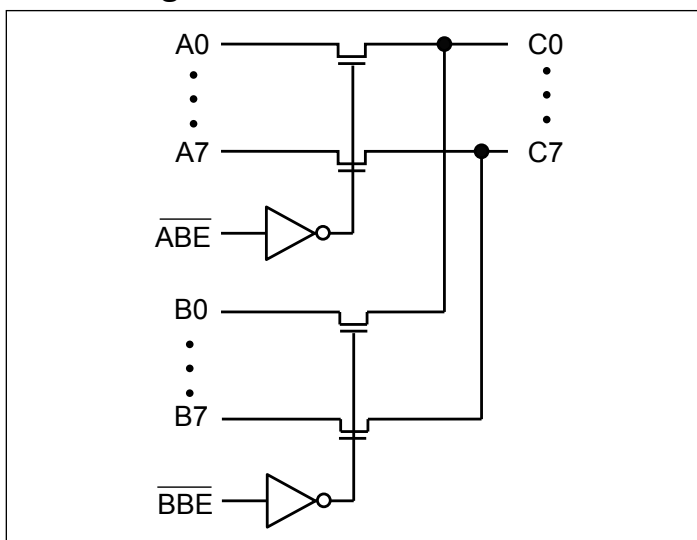


16-to-8 Multiplexer/Demultiplexer Bus Switch

Features

- Near-Zero propagation delay
- Low noise, 25Ω version (PI5C32390)
- 5Ω switches connect inputs to outputs (PI5C3390)
- Direct bus connection when switches are ON
- Ultra-low quiescent power (0.2μA typical)
 - Ideally suited for notebook applications
- Packaging (Pb-free & Green):
 - 28-pin QSOP (Q)

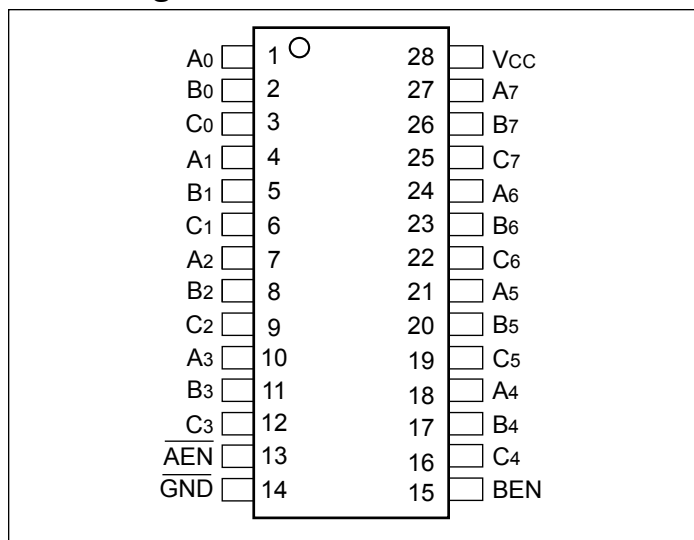
Block Diagram



Description

Diodes' PI5C3390 and PI5C32390 are 16-to-8 multiplexer/demultiplexer bus switches with a low On-Resistance allowing inputs to be connected directly to outputs. The two enable inputs connect each of eight I/O to the common I/O pin. This multiplexer function can be used to select and route logic signals to form crossbar switches, isolate bus capacitance, or provide a zero delay switch connection. The bus switch creates no additional ground bounce noise or additional propagation delay. The PI5C32390 is designed with an internal 25-ohm resistor reducing noise reflection in high-speed applications.

Pin Configuration



Truth Table⁽¹⁾

Function	\overline{AEN}	\overline{BEN}	A Sw	B Sw
Disconnect	H	H	Off	Off
A to C	L	H	On	Off
B to C	H	L	Off	On
A, B to C	L	L	On	On

Note: 1. H = High Voltage Level,
L = Low Voltage Level

Pin Description

Pin Name	I/O	Description
\overline{AEN} , \overline{BEN}	I	Bus Output Enable (Active LOW)
A0 - A7	I/O	Bus A
B0 - B7	I/O	Bus B
C0 - C7	I/O	Bus C

Absolute Maximum Ratings

Storage Temperature.....	-65°C to +150°C
Ambient Temperature with Power Applied	-40°C to +85°C
Supply Voltage to Ground Potential (Inputs&Vcc Only)	-0.5V to +7.0V
Supply Voltage to Ground Potential (Outputs&D/O Only).....	-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_A = -40°C to +85°C, V_{CC} = 5V±5%)

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	V	
I _{IH}	Input HIGH Current	V _{CC} = Max., V _{IN} = V _{CC}	-1		1	μA	
I _{IL}	Input LOW Current	V _{CC} = Max., V _{IN} = GND	-1		1	μA	
I _{OZ}	High Impedance Output Current	0 ≤ A, B ≤ V _{CC}	-1		1	μA	
V _{IK}	Clamp Diode Voltage	V _{CC} = Min., I _{IN} = -18mA		-0.7	-1.2	V	
I _{OS}	Short Circuit Current ⁽³⁾	A (B) = 0V, B (A) = V _{CC}	100			mA	
V _H	Input Hysteresis at Control Pins			150		mV	
R _{ON}	Switch On Resistance ⁽⁴⁾	V _{CC} = Min., V _{IN} = 0.0V, I _{ON} = 48 mA	PI5C3390 PI5C32390	20	5 28	7 40	Ω
		V _{CC} = Min., V _{IN} = 2.4V, I _{ON} = 15 mA	PI5C3390 PI5C32390	20	10 35	15 48	

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} = 5.0V, 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.

Capacitance (T_A = 25°C, f = 1 MHz)

Parameters ⁽¹⁾	Description	Test Conditions	Typ.	Max.	Units
C _{IN}	Input Capacitance	V _{IN} = 0V		6	pF
C _{OFF}	A/B Capacitance, Switch Off			6	pF
C _{ON}	A/B Capacitance, Switch On			16	pF

Notes:

1. 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}		0.2	30	μA
ΔI _{CC}	Supply Current @ TTL HIGH	V _{CC} = Max., V _{IN} = 3.4V ⁽³⁾			3.5	mA
I _{CCD}	Supply Current per Input per MHz ⁽⁴⁾	V _{CC} = Max. A and B Pins Open $\overline{\text{BE}}$ = GND Control Input Toggling 50% Duty Cycle			0.25	mA/ MHz

Notes:

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

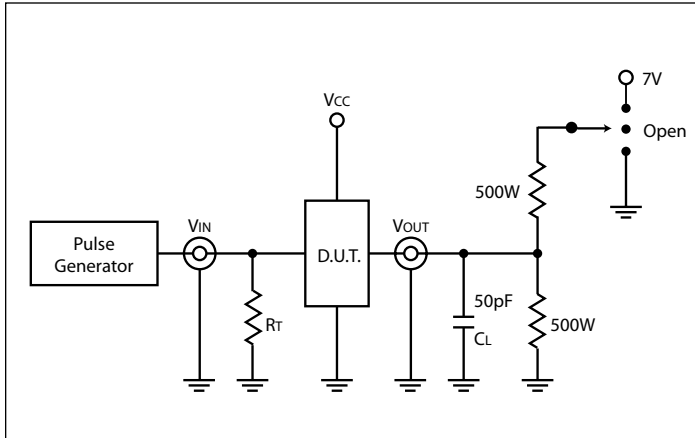
PI5C3390						
Parameters	Description	Test Conditions	Min.	Typ.	Max.	Units
t _{PLH} t _{PHL}	Propagation Delay ^(2,3) A, B to/from C			0.25		ns
t _{PZH} t _{PZL}	Bus Enable Time AEN/ $\overline{\text{BEN}}$ to A, B, C	C _L = 50 pF R _L = 500Ω	1.5		6.5	
t _{PHZ} t _{PLZ}	Bus Disable Time AEN/ $\overline{\text{BEN}}$ to A, B, C		1.5		5.5	

PI5C32390						
Parameters	Description	Test Conditions	Min.	Typ.	Max.	Units
t _{PLH} t _{PHL}	Propagation Delay ^(2,3) A, B to/from C			1.25		ns
t _{PZH} t _{PZL}	Bus Enable Time AEN/ $\overline{\text{BEN}}$ to A, B, C	C _L = 50 pF R _L = 500Ω	1.5		6.5	
t _{PHZ} t _{PLZ}	Bus Disable Time AEN/ $\overline{\text{BEN}}$ to A, B, C		1.5		5.5	

Notes:

- See test circuit and waveforms.
- 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.

Test Circuit



Switch Position

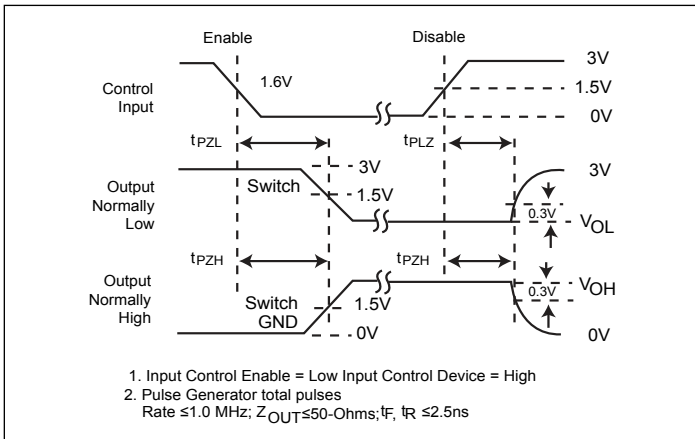
Test	Switch
Disable LOW	Closed
Enable LOW	Closed
t_{PD}	Open

Definitions:

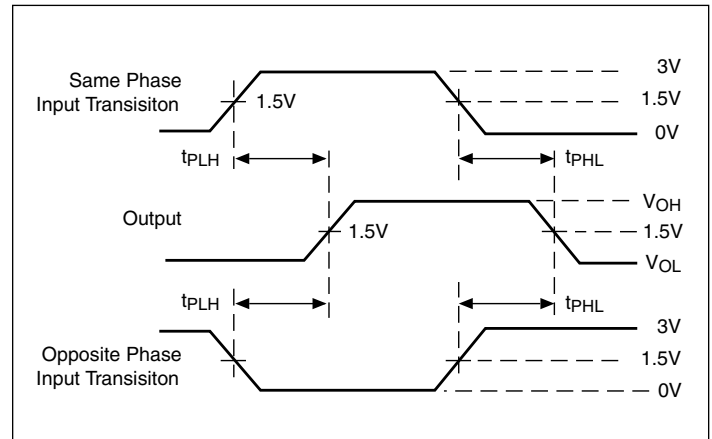
C_L = Load capacitance (includes jig and probe capacitance)

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

Enable and Disable Timing Diagram



Propagation Delay Diagram

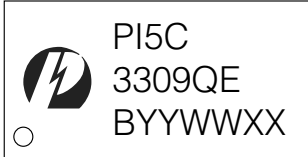


PI5C3390/PI5C32390

Part Marking

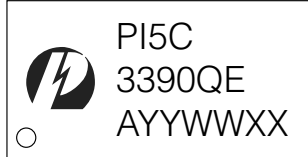
PI5C3309

Q Package



B: Fab Port Code/Cost Down Code
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

Q Package-2017



A: Fab Port Code / Cost Down Code
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

PI5C32309

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

Packaging Mechanical: 24-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	0.386	0.390	0.394
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.

		DATE: 03/30/16
DESCRIPTION: 28-Pin, 150mil Wide QSOP		
PACKAGE CODE: Q (Q28)		
DOCUMENT CONTROL #: PD-1204		REVISION: G

16-0058

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
PI5C3390QEX	Q	28-pin 150mil wide (QSOP)
PI5C32390QEX	Q	28-pin 150mil wide (QSOP)

Notes:

- EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
- See <http://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free. Thermal characteristics can be found on the company web site at www.diodes.com/design/support/packaging/
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- X suffix = Tape/Reel

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