



**PI5C3309**

**3:1 Mux/DeMux Bus Switch**

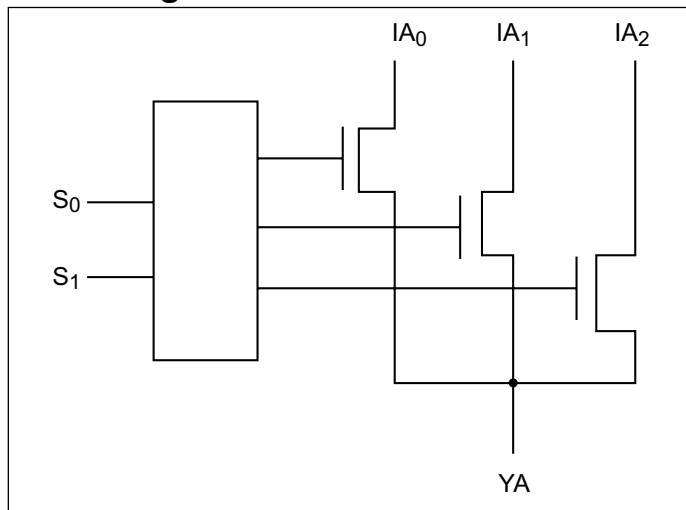
**Features**

- Near-Zero propagation delay
- 5-ohm switches connect inputs to outputs
- Direct bus connection when switches are ON
- Ultra Low Quiescent Power (0.2µA typical)- Ideally suited for notebook applications
- Packaging (Pb-free & Green available):
  - 8 pin 118-mil wide plastic MSOP (U)

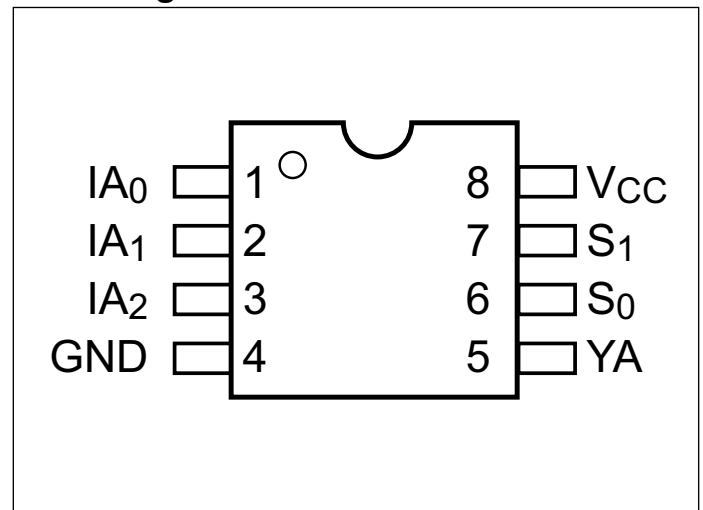
**Description**

Diodes' PI5C3309 is a 3:1 Multiplexer/Demultiplexer with 3-State outputs. Inputs can be connected to outputs with low On-Resistance (5-ohm) with no additional ground bounce noise or propagation delay.

**Block Diagram**



**Pin Configuration**



**Truth Table (1)**

Select			
S1	S0	YA	Function
L	L	IA0	S1-0 = 0
L	H	IA1	S1-0 = 1
H	L	IA2	S1-0 = 2
H	H	Hi-Z	S1-0 = 3

**Pin Description**

Pin Name	Description
IAn	Data Inputs
S0-1	Select Inputs
YA	Data Output
GND	Ground
VCC	Power

**Note:**

1. H = High Voltage Level  
L = Low Voltage Level

## 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 <sub>CC</sub> 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 Operating Range, T<sub>A</sub> = -40°C to +85°C, V<sub>CC</sub> = 5V ±5%)

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>OZH</sub>	High Impedance Output Current	0 ≤ I <sub>N</sub> , Y <sub>N</sub> ≤ V <sub>CC</sub>			±1	
V <sub>IK</sub>	Clamp Diode Voltage	V <sub>CC</sub> = Min, I <sub>IN</sub> = -18mA	-0.7		1.2	V
I <sub>OS</sub>	Short Circuit current	I(Y)=0V, Y(I)=V <sub>CC</sub>			100	mA
V <sub>H</sub>	Input Hysteresis at Control Pins			150		mV
R <sub>ON</sub>	Switch on Resistance <sup>(4)</sup>	V <sub>CC</sub> = Min., V <sub>IN</sub> = 0.0V, I <sub>ON</sub> = 48mA		5	7	Ω
		V <sub>CC</sub> = Min., V <sub>IN</sub> = 2.4V, I <sub>ON</sub> = 15mA		10	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.
- 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 I and Y pin at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the two (I, Y) 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>	I <sub>A</sub> Capacitance, Switch Off		4	
C <sub>ON</sub>	I <sub>A</sub> Capacitance, Switch On		16	

### 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 <sub>CC</sub>	Quiescent Power Supply Current	V <sub>CC</sub> = Max.	V <sub>IN</sub> = GND or V <sub>CC</sub>		0.1	3.0	μA
ΔI <sub>CC</sub>	Supply Current per Input @ TTL HIGH		V <sub>IN</sub> = 3.4V <sup>(3)</sup>			2.5	mA
I <sub>CCD</sub>	Supply Current per Input per MHz <sup>(4)</sup>	V <sub>CC</sub> = Max., I and Y pins open 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<sub>CC</sub> = 5.0V, +25°C ambient.
- Per TTL driven input (V<sub>IN</sub> = 3.4V, control inputs only); I and Y 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 I and Y inputs generate no significant AC or DC currents as they transition. The parameter is not tested, but is guaranteed by design.

### Switching Characteristics over Operating Range

Parameters	Description	Conditions	PI5C3309		Units
			Com		
			Min.	Max.	
t <sub>IY</sub>	Propagation Delay <sup>(1,2)</sup> I <sub>N</sub> to Y <sub>N</sub>			0.25	ns
t <sub>SY</sub>	Bus Select Time S <sub>N</sub> to Y <sub>N</sub>	C <sub>L</sub> = 50pF R <sub>L</sub> = 500Ω	0.5	6.6	
t <sub>PZH</sub> t <sub>PZL</sub>	Bus Enable Time S <sub>N</sub> to Y <sub>N</sub>		0.5	6.0	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Bus Disable Time S <sub>N</sub> to Y <sub>N</sub>		0.5	6.0	

**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.

### Part Marking

U Package



Y: Date Code (Year)

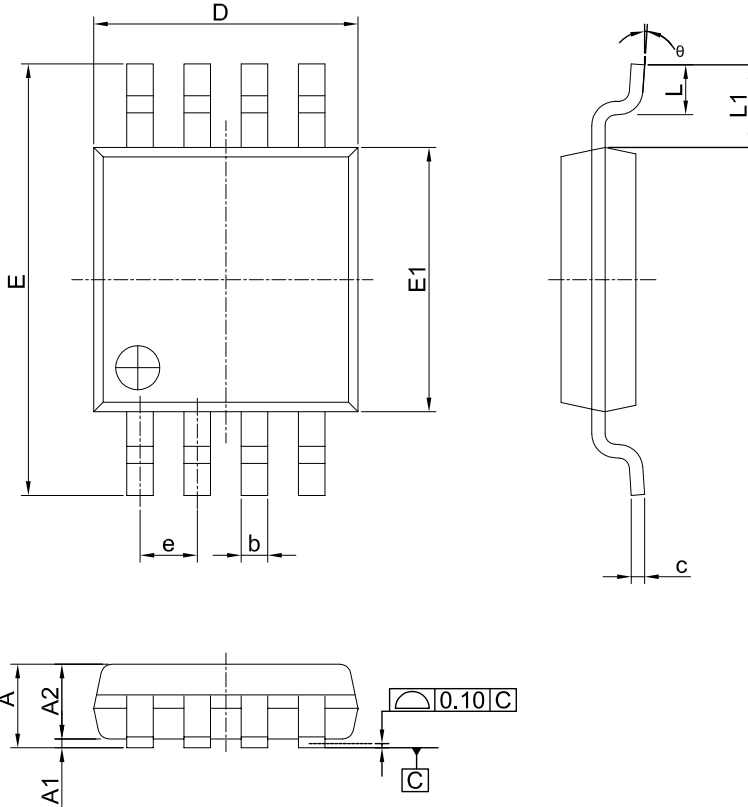
W: Date Code (Workweek)

1st X: Assembly Site Code

2nd X: Wafer Fab Site Code

PI5C3309

**Packaging Mechanical: 8-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	2.80	3.20
E	4.65	5.15
E1	2.80	3.20
e	0.65 BSC	
L	0.40	0.80
L1	0.95 REF	
θ	0°	8°

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

16-0242

		DATE: 11/03/16
DESCRIPTION: 8-Pin, Mini Small Outline Package, MSOP		
PACKAGE CODE: U (U8)		
DOCUMENT CONTROL #: PD-1261	REVISION: G	

For latest package info.

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

**Ordering Information**

Ordering Code	Packaging Code	Package Description
PI5C3309UEX	U	8-pin, Mini Small Outline Package (MSOP)

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/](http://www.diodes.com/design/support/packaging/)
- E = Pb-free and Green
- X suffix = Tape/Reel

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