



**THE DATASHEET OF  
PI3B3251QE**



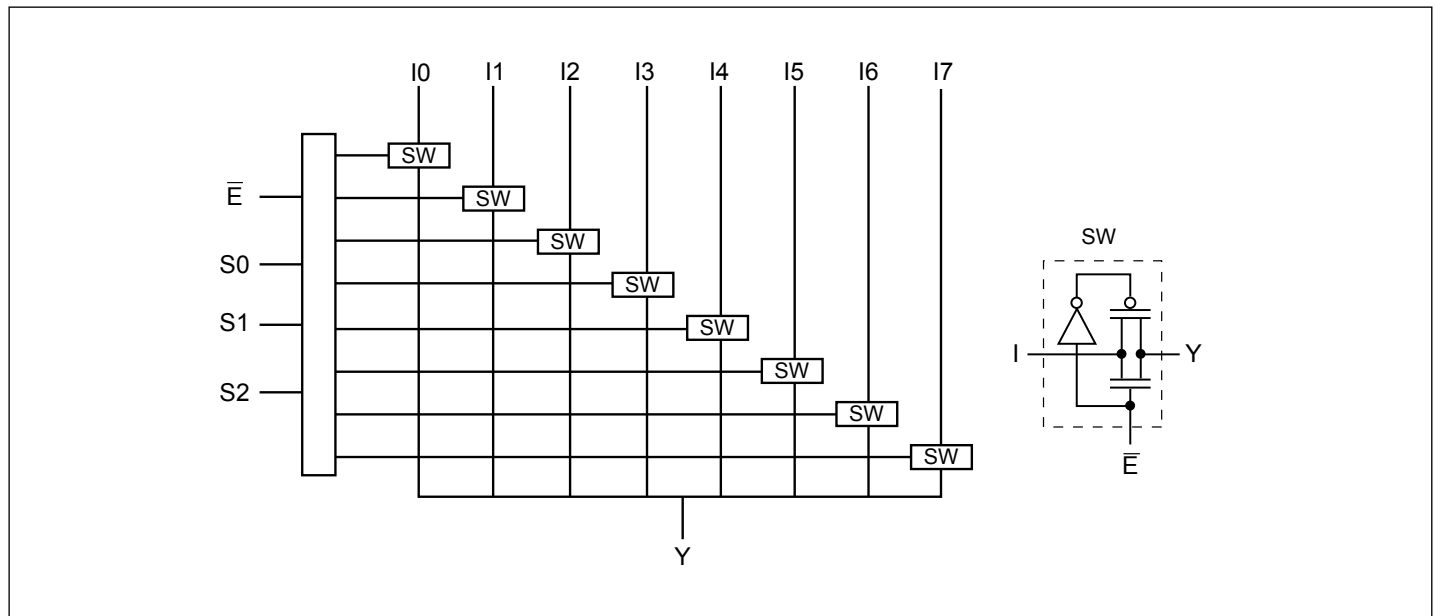
## Features

- Near-Zero propagation delay
- 5Ω switches connect inputs to outputs
- Ultra Low Quiescent Power (0.1μA typical)
  - Ideally suited for notebook applications
- Pin compatible with 74 series 251 logic devices
- 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):
  - 16-pin 173-mil Wide (TSSOP)

## Description

Diodes' PI3B3251 is a 3.3V Dual 8:1 Multiplexer/Demultiplexer with three-state outputs that is pinout compatible with the PI74FCT251T, 74F251, and 74ALS/AS/LS 251. Inputs can be connected to outputs with low On-Resistance (5Ω) with no additional ground bounce noise or propagation delay.

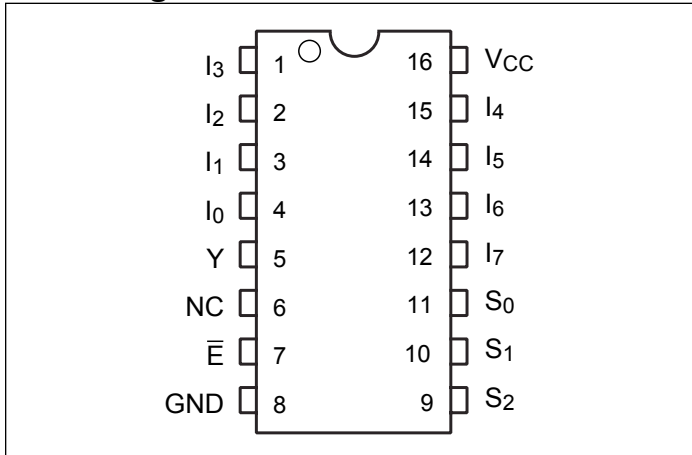
## Block Diagram



### 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.

## Pin Configuration



## Pin Description

Pin#	Pin Name	Description
4, 3, 2, 1, 15, 14, 13, 12	I <sub>0-7</sub>	Data Inputs
11, 10, 9	S <sub>0-2</sub>	Select Inputs
7	$\bar{E}$	Enable
5	Y	Data Outputs
8	GND	Ground
16	V <sub>CC</sub>	Power
6	NC	No Connect

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

$\bar{E}$	Select			Y	Function
	S <sub>2</sub>	S <sub>1</sub>	S <sub>0</sub>		
H	X	X	X	Hi-Z	Disable
L	L	L	L	I <sub>0</sub>	S <sub>2-0</sub> = 0
L	L	L	H	I <sub>1</sub>	S <sub>2-0</sub> = 1
L	L	H	L	I <sub>2</sub>	S <sub>2-0</sub> = 2
L	L	H	H	I <sub>3</sub>	S <sub>2-0</sub> = 3
L	H	L	L	I <sub>4</sub>	S <sub>2-0</sub> = 4
L	H	L	H	I <sub>5</sub>	S <sub>2-0</sub> = 5
L	H	H	L	I <sub>6</sub>	S <sub>2-0</sub> = 6
L	H	H	H	I <sub>7</sub>	S <sub>2-0</sub> = 7

**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 .....	-0.5V to +4.6V
DC Input Voltage .....	-0.5V to +4.6V
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> = 3.3V ±10%)

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 ≤ V <sub>CC</sub>			±1	
V <sub>IK</sub>	Clamp Diode Voltage	V <sub>CC</sub> = Min., I <sub>IN</sub> = -18mA			-1.2	V
R <sub>ON</sub>	Switch On-Resistance <sup>(3)</sup>	V <sub>CC</sub> = Min., V <sub>IN</sub> = 0.0V, I <sub>ON</sub> = 48mA or 64mA		5	8	Ω
		V <sub>CC</sub> = Min., V <sub>IN</sub> = 2.4V, I <sub>ON</sub> = 15mA		10	17	

**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> = 3.3V, T<sub>A</sub> = 25°C ambient and maximum loading.
- 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	3.0	pF
C <sub>I(OFF)</sub>	I <sub>0</sub> - I <sub>7</sub> Capacitance, Switch Off		8.0	
C <sub>Y(OFF)</sub>	Y Capacitance, Switch Off		64.0	
C <sub>I(ON)</sub>	I <sub>0</sub> - I <sub>7</sub> Capacitance, Switch On		72.0	

**Note:**

- 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	μA
ΔI <sub>CC</sub>	Supply Current per Input @ TTL HIGH	V <sub>CC</sub> = Max.	V <sub>IN</sub> = 3.0V <sup>(3)</sup>			750	

**Notes:**

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at V<sub>CC</sub> = 3.3V, +25°C ambient.
3. Per TTL driven input (control input only); I and Y pins do not contribute to I<sub>CC</sub>.

## Switching Characteristics over Operating Range

Parameters	Description	Conditions	Com.		Units
			Min.	Max.	
t <sub>PD</sub>	Propagation Delay <sup>(1,2)</sup> , In to Y	C <sub>L</sub> = 50pF R <sub>L</sub> = 500Ω		0.25	ns
t <sub>SY</sub>	Bus Enable Time, S <sub>n</sub> to Y		1	4.5	
t <sub>PZH</sub> t <sub>PZL</sub>	Bus Enable Time, $\bar{E}$ to Y		1	3.5	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Bus Disable Time, $\bar{E}$ to Y		1	5.5	

**Notes:**

1. This parameter is guaranteed but not tested on Propagation Delays.
2. 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.

## Applications Information

### Logic Inputs

The logic control inputs 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-to-Rail<sup>®</sup> minimizes power consumption.

### Power-Supply Sequencing and Hot-Plug Information

Proper power-supply sequencing is recommended for all CMOS devices. Always apply V<sub>CC</sub> and GND before applying signals to input/output or control pins.

*Rail-to-Rail is a registered trademark of Nippon Motorola, Ltd.*

## Part Marking

PI3B
3251LE
● YYWWGG

YYWW: Date Code (Year & Workweek)

1st G: Assembly Site Code

2nd G: Wafer Fab Site Code

PI3B3251

**Packaging Mechanical: 16-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	—	—
$\theta$	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.

16-0061

		DATE: 03/24/16
DESCRIPTION: 16-Pin, 173mil Wide TSSOP		
PACKAGE CODE: L (L16)		
DOCUMENT CONTROL #: PD-1310	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	Package Code	Package Description
PI3B3251LEX	L	16-pin, 173-mil Wide (TSSOP)

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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.
4. E = Pb-free and Green
5. X suffix = Tape/Reel

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