



A product Line of
Diodes Incorporated



PI3B3257A

3.3V, Quad 2:1 Mux/DeMux NanoSwitch™

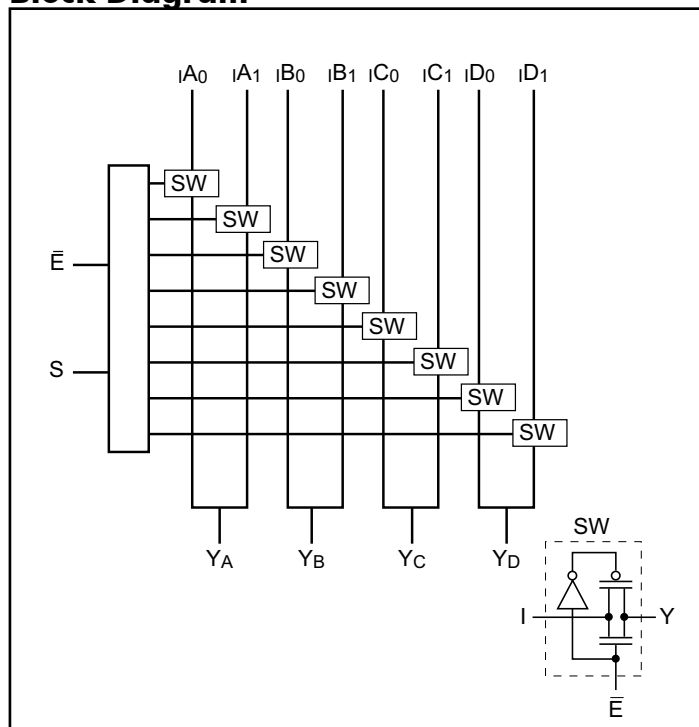
Features

- Near-Zero propagation delay
- 5Ω switches connect inputs to outputs
- Fast Switching Speed: 4.8ns max.
- Ultra-Low Quiescent Power: 0.1μA typical
 - Ideally suited for notebook applications
- Pin compatible with 74 series 257 logic devices
- Packaging (Pb-free & Green):
 - 16-pin 150 mil wide plastic QSOP (Q)

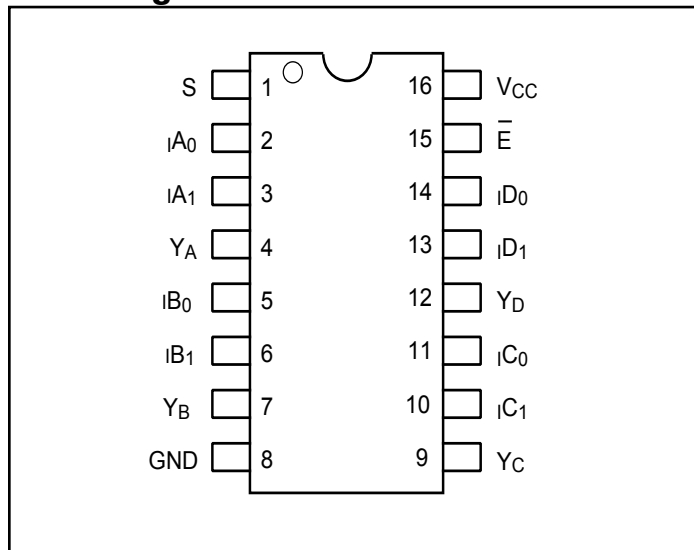
Description

The PI3B3257A is a 3.3 Volt, Quad 2:1 multiplexer/demultiplexer with three-state outputs that is pinout and function compatible with the PI74FCT257T, 74F257, and 74ALS/AS/LS257. Inputs can be connected to outputs with low On-Resistance (5Ω) with no additional ground bounce noise or propagation delay.

Block Diagram



Pin Configuration



Pin Description

Pin Name	Description
IA _N -ID _N	Data Inputs
S	Select Inputs
E̅	Enable
Y _A -Y _D	Data Outputs
GND	Ground
V _{CC}	Power
NC	No Connect

Truth Table⁽¹⁾

E	S	Y _A	Y _B	Y _C	Y _D	Function
H	X	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Disable
L	L	IA ₀	IB ₀	IC ₀	ID ₀	S = 0
L	H	IA ₁	IB ₁	IC ₁	ID ₁	S = 1

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, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = 3.3\text{V} \pm 10\%$)

Parameters	Description	Test Conditions ⁽¹⁾	Min.	Typ. ⁽²⁾	Max.	Units
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH Level	2			V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW Level	-0.5		0.8	
I_{IH}	Input HIGH Current	$V_{CC} = \text{Max.}, V_{IN} = V_{CC}$			± 1	μA
I_{IL}	Input LOW Current	$V_{CC} = \text{Max.}, V_{IN} = \text{GND}$			± 1	
I_{OZH}	High Impedance Output Current	$0 \leq I_n, Y_n \leq V_{CC}$			± 1	
V_{IK}	Clamp Diode Voltage	$V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$			-1.2	V
R_{ON}	Switch On-Resistance ⁽³⁾	$V_{CC} = \text{Min.}, V_{IN} = 0.0\text{V}, I_{on} = 48\text{mA or } 64\text{mA}$		5	7	Ω
		$V_{CC} = \text{Min.}, V_{IN} = 2.4\text{V}, I_{ON} = 15\text{mA}$		8	17	

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at $V_{CC} = 3.3\text{V}$, $T_A = 25^\circ\text{C}$ 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 ($T_A = 25^\circ\text{C}$, $f = 1\text{ MHz}$)

Parameters ⁽¹⁾	Description	Test Conditions	Typ.	Units
C_{IN}	Input Capacitance	$V_{IN} = 0\text{V}$	2	pF
C_{OFFYN}	Y_N Capacitance, Switch OFF		7.5	
C_{OFFIN}	I_N Capacitance, Switch OFF		4.0	
C_{ON}	I_N/Y_N Capacitance, Switch ON		11	

Notes:

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

PI3B3257A

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}		0.1	3.0	μA
ΔI _{CC}	Supply Current per Input @ TTL HIGH ^(3, 4)	V _{CC} = Max.	V _{IN} = 3.0			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 TTL driven input (control inputs only); I and Y 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 I and Y 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

Parameters	Description	Conditions	Com.		Units
			Min.	Max.	
t _{IY}	Propagation Delay In to Yn ^(1,2)	C _L = 50pF R _L = 500Ω		0.25	ns
t _{SY}	Bus Select Time, S _n to Y _n		1	4.5	
t _{PZH} t _{PZL}	Bus Enable Time, E to Y _n		1	4.5	
t _{PHZ} t _{PLZ}	Bus Disable Time, E to Y _n		1	4.8	

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 switch's time constant 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® minimizes power consumption.

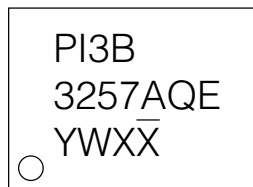
Power-Supply Sequencing and Hot-Plug Information

Proper power-supply sequencing is recommended for all CMOS devices. Always apply V_{CC} and GND before applying signals to input/output or control pins.

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

Part Marking

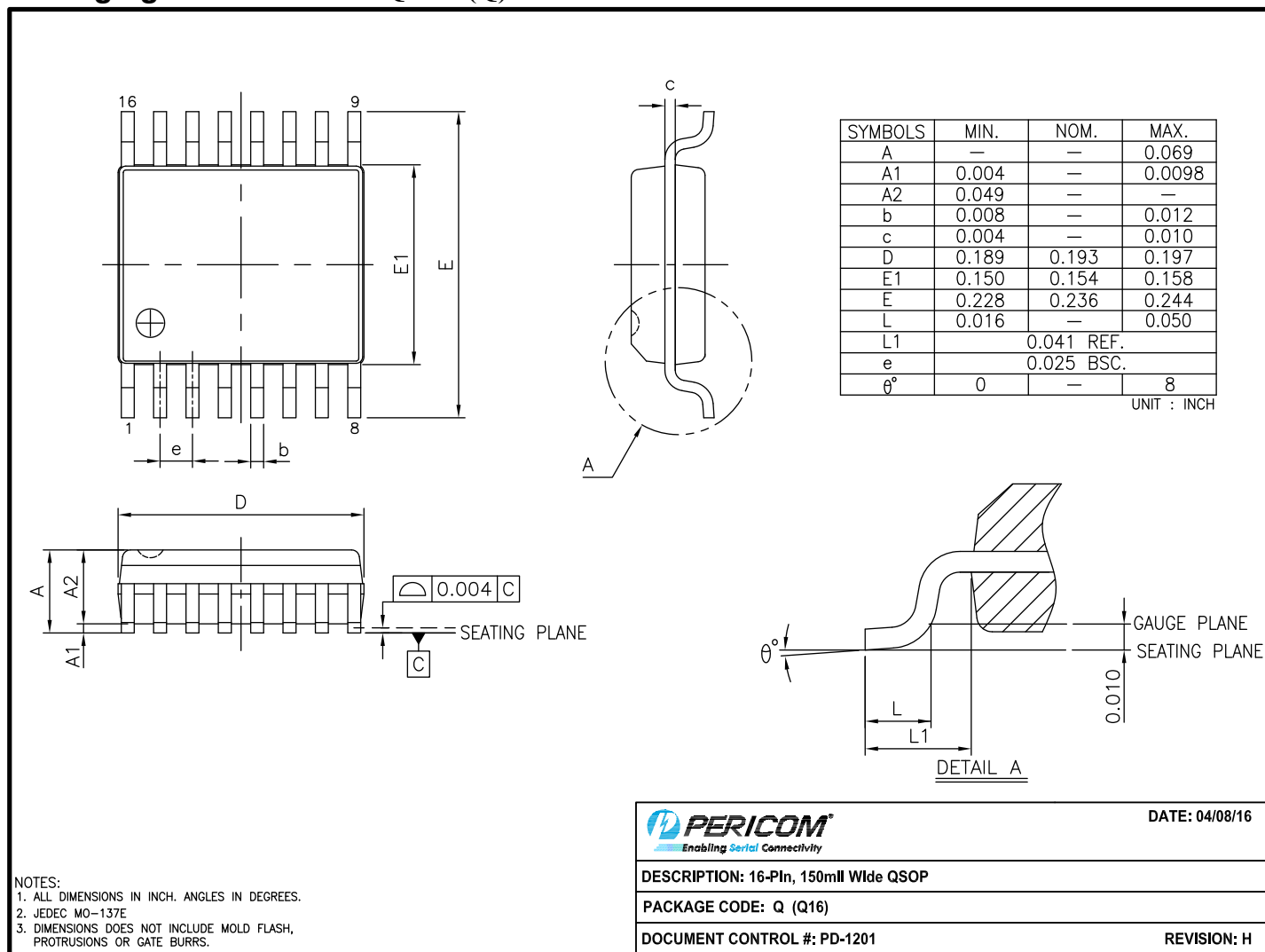
Q Package



YW: 2 Letter Date Code

1st X: Assembly Code

2nd X: Fab Code

PI3B3257A
Packaging Mechanical: 16-QSOP (Q)


16-0056

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
PI3B3257AQEX	Q	16-pin, 150mil Wide (QSOP)

Notes:

1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
2. 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/
3. E = Pb-free and Green
4. X suffix = Tape/Reel

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