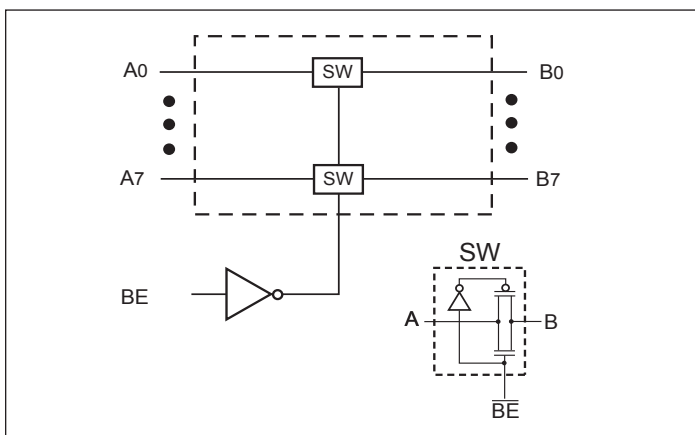


Description

The DIODES PI3B3245 is a 3.3V 8-bit, 2-port bus switch designed with a low On-Resistance (5Ω) allowing inputs to be connected directly to outputs. The bus switch creates no additional propagational delay or additional ground bounce noise. The switches are turned ON by the Bus Enable ($\overline{BE}$) input signal.

Block Diagram



Features

- Near-Zero Propagation Delay
- 5Ω Switches Connect Inputs to Outputs
- Fast Switching Speed: 4.5ns (Maximum)
- Ultra-Low Quiescent Power ($0.2\mu A$ Typical)
 - Ideally suited for Notebook Applications
- TTL-compatible Control of Inputs Levels
- ESD Protection (2kV Human Body Model and 200V Machine Model)
- 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](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>
- Packaging (Pb-free & Green):
 - 20-pin, QSOP (Q)
 - 20-pin, TSSOP (L)
 - 20-pin, W-QFN (ZH)

Truth Table

Function	$\overline{BE}$	A0-7
Disconnect	H	Hi-Z
Connect	L	B0-7

Note:

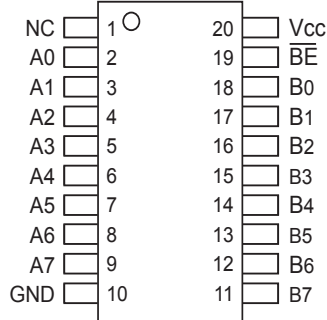
H = High Voltage Level, L = Low Voltage Level, Hi-Z = High Impedance

Notes:

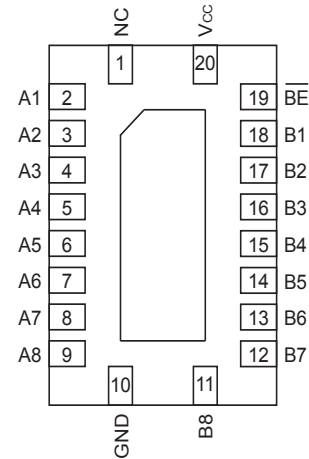
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin Configuration

QSOP, TSSOP Package



W-QFN Package



Pin Description

Pin#	Pin Name		Description
	QSOP/TSSOP	W-QFN	
19	$\overline{BE}$	$\overline{BE}$	Bus Enable Input (Active LOW)
2, 3, 4, 5, 6, 7, 8, 9	A0-7	A1-8	Bus A Input/ Output
18, 17, 16, 15, 14, 13, 12, 11	B0-7	B1-8	Bus B Input/ Output
10	GND	GND	Ground ⁽¹⁾
20	V _{CC}	V _{CC}	Power
1	NC	NC	Not Connected

Note:

1. UQFN20 package die supply ground is connected to both GND pin and exposed center pad. GND pin must be connected to supply ground for proper device operation. For enhanced thermal, electrical, and board level performance, the exposed pad needs to be soldered to the board using a corresponding thermal pad on the board and for proper heat conduction through the board, thermal vias need to be incorporated in the PCB in the thermal pad region.

Absolute Maximum Ratings

(Above which 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	2.0			V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW Level	-0.5		0.8	V
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	μA
I_{OZH}	High Impedance Output Current	$0 \leq A_N, B_N \leq V_{CC}$			± 1	μA
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 64mA		5	8	Ω
		$V_{CC} = \text{Min.}, V_{IN} = 2.4\text{V}, I_{ON} = 15\text{mA}$		10	17	

Notes:

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

$T_A = 25^{\circ}\text{C}$, $f = 1 \text{ MHz}$

Parameters ⁽¹⁾	Description	Test Conditions	Typ.	Units
C_{IN}	Input Capacitance	$V_{IN} = 0\text{V}$	3.0	pF
C_{OFF}	A/B Capacitance, Switch Off	$V_{IN} = 0\text{V}$	8.0	pF
C_{ON}	A/B Capacitance, Switch On	$V_{IN} = 0\text{V}$	16.0	pF

Notes:

- 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	$V_{CC} = \text{Max.}$	$V_{IN} = \text{GND or } V_{CC}$		0.1	3.0	μA
ΔI_{CC}	Supply Current per Input HIGH	$V_{CC} = \text{Max.}$	$V_{IN} = 3.0\text{V}^{(3)}$			750	μA

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 TTL driven input (control input only); A and B pins do not contribute to I_{CC} .

Switching Characteristics over Operating Range

Parameters	Description	Test Conditions	Com.		Units
			Min.	Max.	
t_{PLH} t_{PHL}	Propagation Delay ^(1,2) Ax to Bx, Bx to Ax	CL = 50 pF RL = 500 Ω		0.25	ns
t_{PZH} t_{PZL}	Bus Enable Time $\overline{\text{BE}}$ to Ax or Bx		1.0	4.0	
t_{PHZ} t_{PLZ}	Bus Disable Time $\overline{\text{BE}}$ to Ax or Bx		1.0	4.5	

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 0.25 ns for 50 pF 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, A_N may be driven low to 0V and high to 3.6V. Driving B_N Rail-to-Rail® minimizes power consumption.

Power-Supply Sequencing and Hot-Plug Information

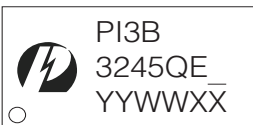
Proper power-supply sequencing is recommended for all CMOS devices. Always apply V_{CC} and GND before applying signals to input/output or control pins.

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

PI3B3245

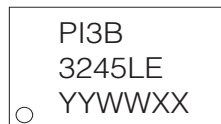
Part Marking

Q Package



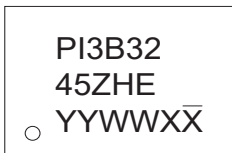
YY: Year
WW: Workweek
1st X: Assembly Site Code
2nd X: Fab Site Code
Bar above fab code means Cu wire
Without bar above fab code means Au wire

L Package



YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

ZH Package

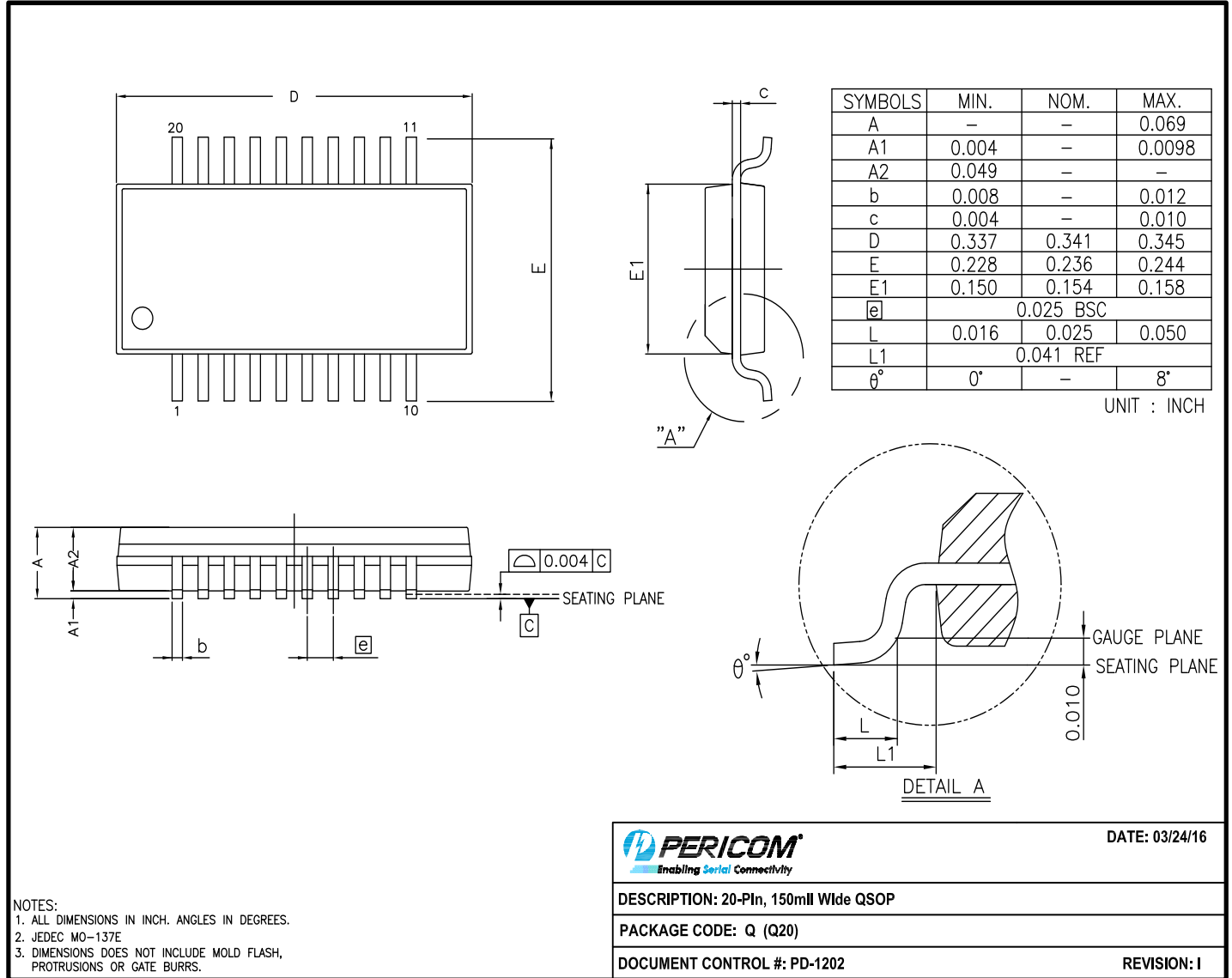


YY: Date Code (Year)
WW: Date Code (Workweek)
1st X: Assembly Code
2nd X: Fab Code
Bar above 2nd "X" means Cu wire

PI3B3245

Packaging Mechanical

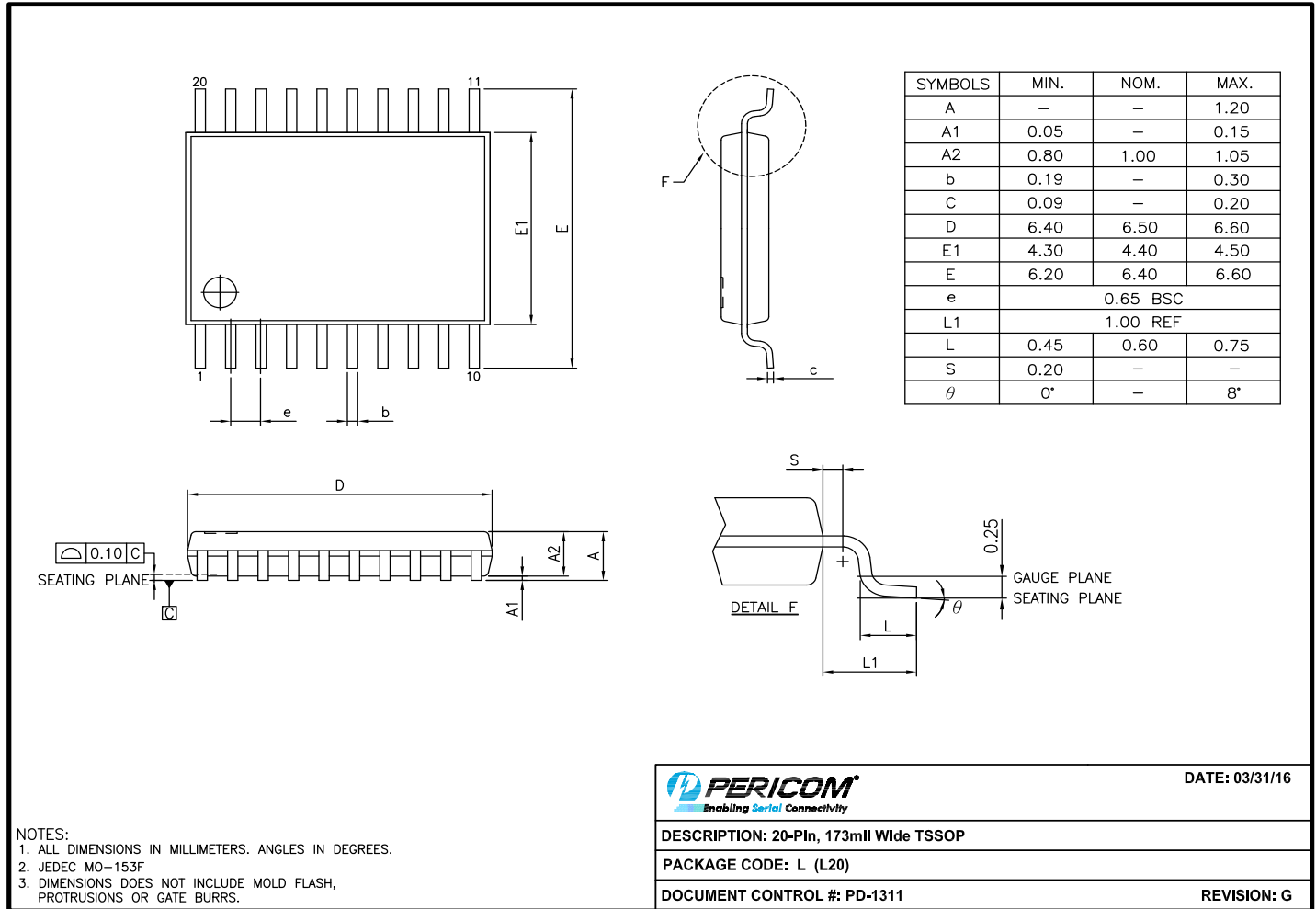
20-QSOP (Q)



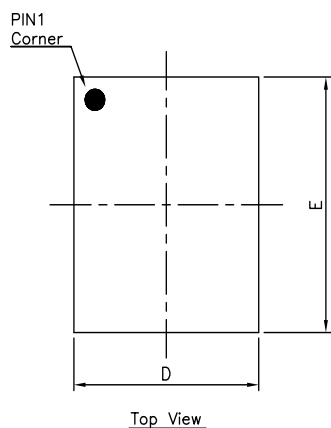
16-0057

PI3B3245

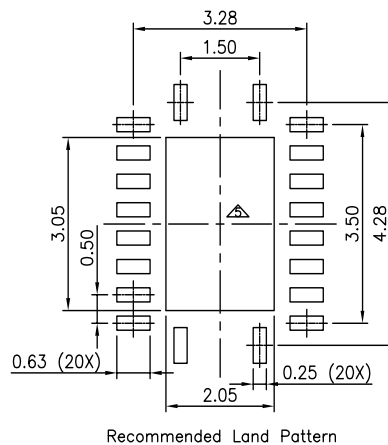
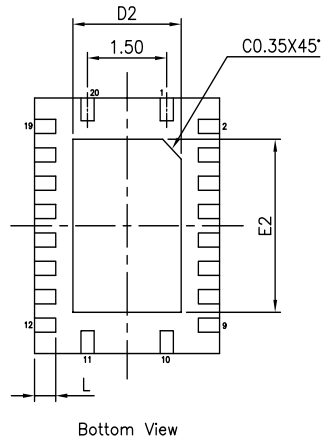
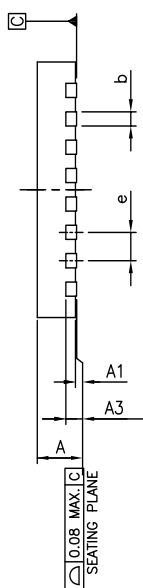
20-TSSOP (L)



16-0074

PI3B3245
20-W-QFN (ZH)


SYMBOLS	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3	0.20 REF.		
b	0.18	0.25	0.30
D	3.40	3.50	3.60
E	4.40	4.50	4.60
e	0.50 BSC		
L	0.30	0.40	0.50
D2	1.95	2.05	2.15
E2	2.95	3.05	3.15


NOTE :

1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
2. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
3. REFER JEDEC MO-241.
4. RECOMMENDED LAND PATTERN IS FOR REFERENCE ONLY.
5. THERMAL PAD SOLDERING AREA (MESH STENCIL DESIGN IS RECOMMENDED)

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	Description
PI3B3245QEX	Q	20-pin, 150mil Wide (QSOP)
PI3B3245LEX	L	20-pin, 173mil Wide (TSSOP)
PI3B3245ZHEX	ZH	20-pin, W-QFN3545-20

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

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