

PI3B3125/PI3B3126
3.3V, 4-Bit, 2-Port Nanoswitchw/Individual Enables
Features

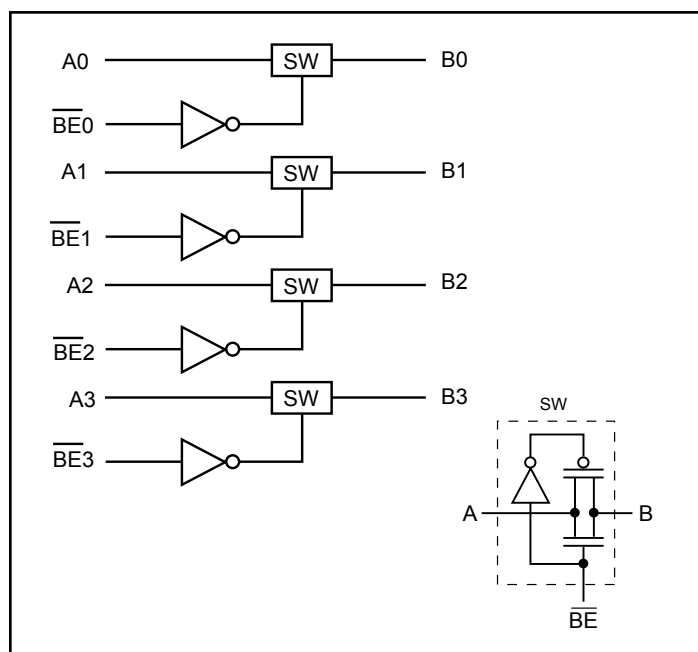
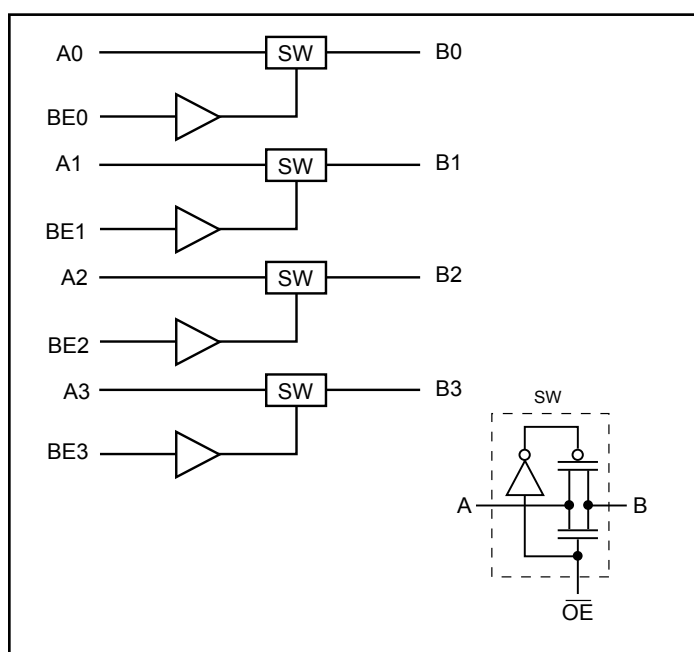
- Near zero propagation delay
- 5 Ohm switches connect inputs to outputs
- Fast Switching Speed - 4ns max.
- Ultra Low Quiescent Power (0.1µA Typical)
 - Ideally suited for notebook applications
- Packages available:
 - 14-pin, SOIC (W)
 - 14-pin, TSSOP (L)
 - 14-pin, TQFN (ZDB)
 - 16-pin, QSOP (Q)

Description

Diodes' PI3B series of logic circuits are produced using the Company's advanced sub micron CMOS technology, achieving industry leading speed grades.

The PI3B3125 and PI3B3126 are 3.3 Volt, 4-bit bus switches designed with four individual 5 Ohm bus switches with fast individual enables in an industry standard 74XX125/126 pinout. When enabled via the associated Bus Enable (BE) pin, the "A" pin is directly connected to the "B" pin for that particular gate. The bus switch introduces no additional propagation delay or additional ground bounce noise.

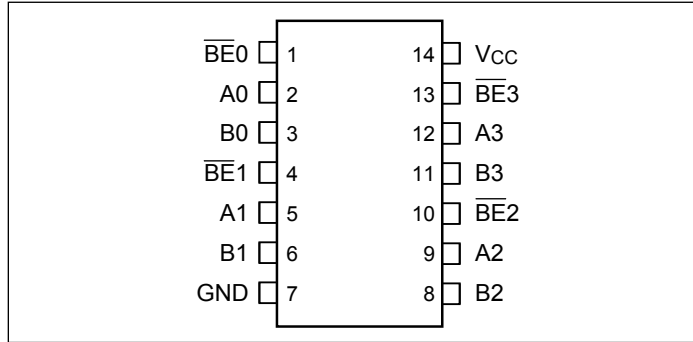
The PI3B3125 device has active LOW enables, and the PI3B3126 has active HIGH enables.

PI3B3125 Logic Block Diagram

PI3B3126 Logic Block Diagram


PI3B3125/PI3B3126

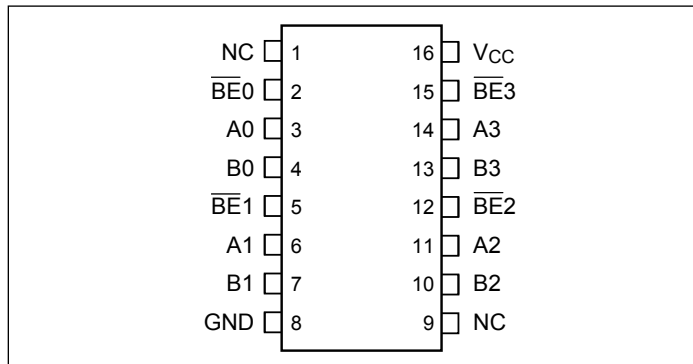
PI3B3125

14-Pin Product Configuration (SOIC, TSSOP)



PI3B3125

16-Pin Product Configuration (QSOP)



Pin Description

Pin Name	Description
$\overline{\text{BEn}}$	Switch Enable (PI3B3125)
BEn	Switch Enable (PI3B3126)
A3-A0	Bus A
B3-B0	Bus B
V_{CC}	Power
GND	Ground

Truth Table⁽¹⁾

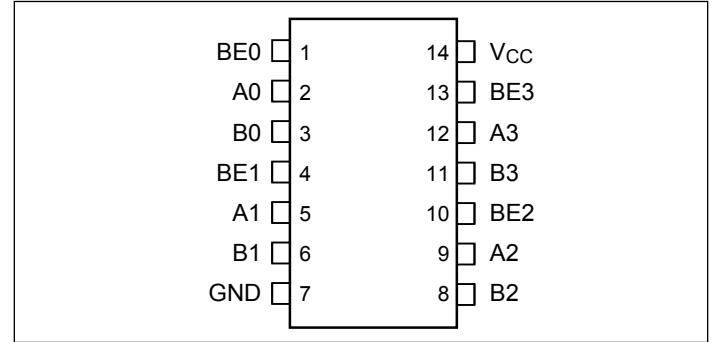
PI3B3125 $\overline{\text{BEn}}$	PI3B3126 BEn	An	Bn	V_{CC}	Function
X ⁽²⁾	X	Hi-Z	Hi-Z	GND	Disconnect
H	L	Hi-Z	Hi-Z	V_{CC}	Disconnect
L	H	Bn	An	V_{CC}	Connect

Notes:

- H = High Voltage Level, L = Low Voltage Level
HI-Z = High Impedance, X = Don't Care
- A pull-up resistor should be provided for power-up protection.

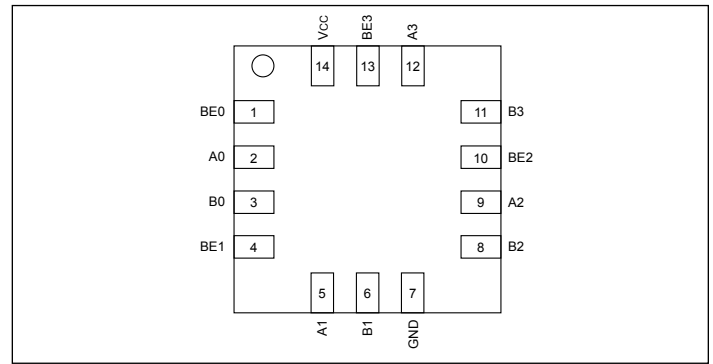
PI3B3126

14-Pin Product Configuration (SOIC, TSSOP)



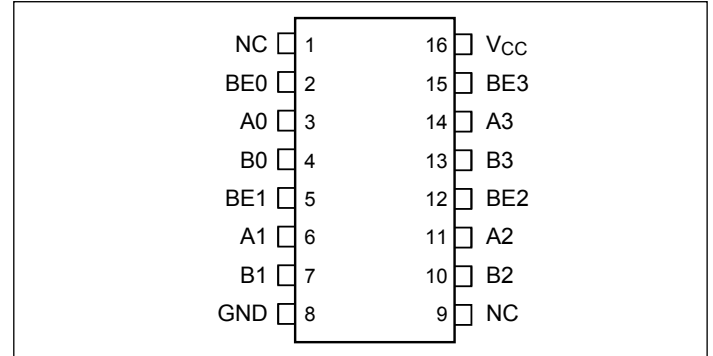
PI3B3126

14-Pin Product Configuration (TQFN)



PI3B3126

16-Pin Product Configuration (QSOP)



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

Parameter	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	mA
I_{IL}	Input LOW Current	$V_{CC} = \text{Max.}, V_{IN} = \text{GND}$			± 1	mA
I_{OFF}	Off Current	$V_{CC} = 0, V_{OUT} = 3 \text{ to } 3.6\text{V}$			10	mA
V_{IK}	Clamp Diode Voltage	$V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$			-1.2	V
R_{ON}	Switch On Resistance ⁽³⁾	$V_{CC} = \text{Min.}, V_{IN} = 0.0\text{V}, I_{ON} = 48\text{mA or } 60\text{mA}$		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

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

Parameter ⁽¹⁾	Description	Test Conditions	Min.	Typ.	Max.	Units
C_{IN}	Input Capacitance	$V_{IN} = 0\text{V}$		3.5		pF
C_{OFF}	A/B Capacitance, Switch Off	$V_{IN} = 0\text{V}$		8		pF

Note:

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

Power Supply Characteristics

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

PI3B3125 Switching Characteristics over Operating Range

Parameter	Description	Conditions ⁽¹⁾	PI3B3125		Units
			Com.		
			Min.	Max.	
t _{PLH} t _{PHL}	Propagation Delay ^(2,3) Ax to Bx, Bx to Ax	C _L = 50pF R _L = 500Ω		0.25	ns
t _{PZH} t _{PZL}	Bus Enable Time	C _L = 50pF R _L = 500Ω	1.0	3.0	ns
t _{PHZ} t _{PLZ}	Bus Disable Time	R _L = 500Ω	1.0	4.0	ns

PI3B3126 Switching Characteristics over Operating Range

Parameter	Description	Conditions ⁽¹⁾	PI3B3126		Units
			Com.		
			Min.	Max.	
t _{PLH} t _{PHL}	Propagation Delay ^(2,3) Ax to Bx, Bx to Ax	C _L = 50pF R _L = 500Ω		0.25	ns
t _{PZH} t _{PZL}	Bus Enable Time	C _L = 50pF R _L = 500Ω	1.0	2.5	ns
t _{PHZ} t _{PLZ}	Bus Disable Time	R _L = 500Ω	1.0	4.0	ns

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.

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

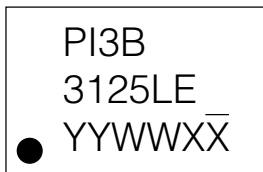
Proper power-supply sequencing is recommended for all CMOS devices. Always apply V_{CC} and GND before applying signals to input/output or control pins.

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

PI3B3125/PI3B3126

PI3B3125 Part Marking

L Package



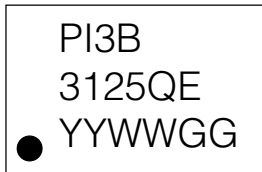
YY: Year

WW: Workweek

1st X: Assembly Site Code

2nd X: Fab Site Code

Q Package



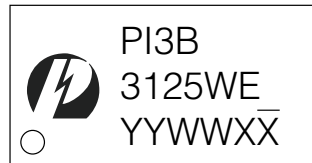
YY: Year

WW: Workweek

1st G: Assembly Site Code

2nd G: Wafer Fab Site Code

W Package



YY: Year

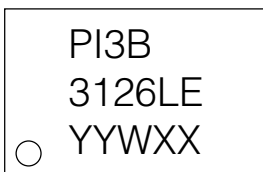
WW: Workweek

1st X: Assembly Site Code

2nd X: Wafer Fab Site Code

PI3B3126 Part Marking

L Package



1st Y: Die Rev

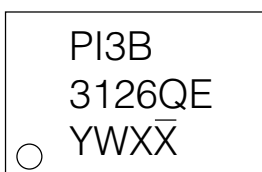
2nd Y: Year

W: Workweek

1st X: Assembly Code

2nd X: Fab Code

Q Package



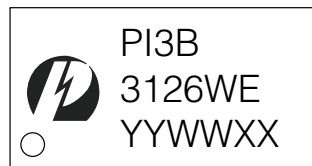
Y: Year

W: Workweek

1st X: Assembly Site Code

2nd X: Fab Site Code

W Package



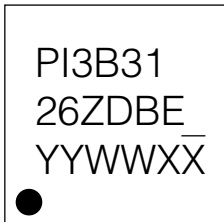
YY: Year

WW: Workweek

1st X: Assembly Site Code

2nd X: Wafer Fab Site Code

ZDB Package



YY: Year

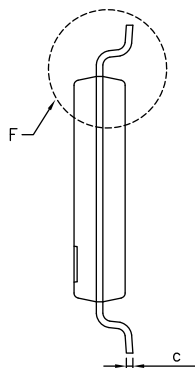
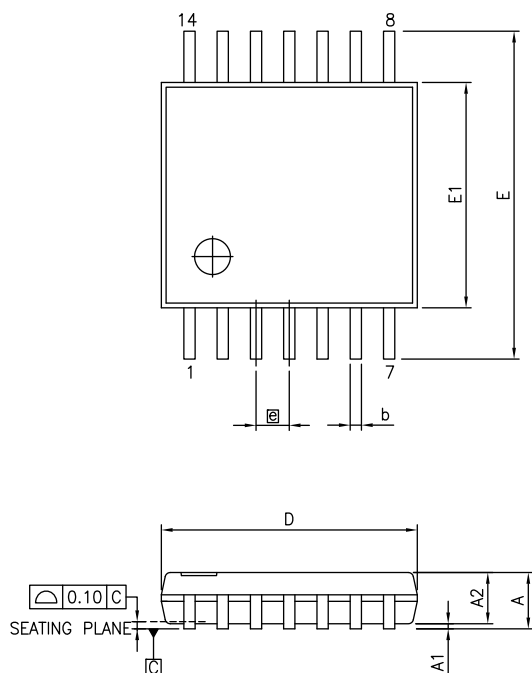
WW: Workweek

1st X: Assembly Site Code

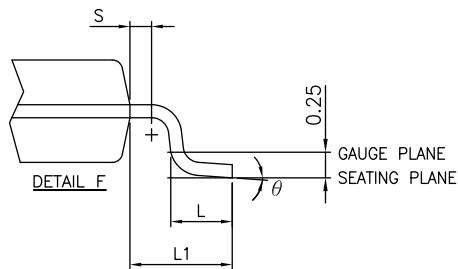
2nd X: Fab Site Code

PI3B3125/PI3B3126

Packaging Mechanical: 14-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	—	—
θ	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.



DATE: 03/24/16

DESCRIPTION: 14-Pin, 173mil Wide TSSOP

PACKAGE CODE: L (L14)

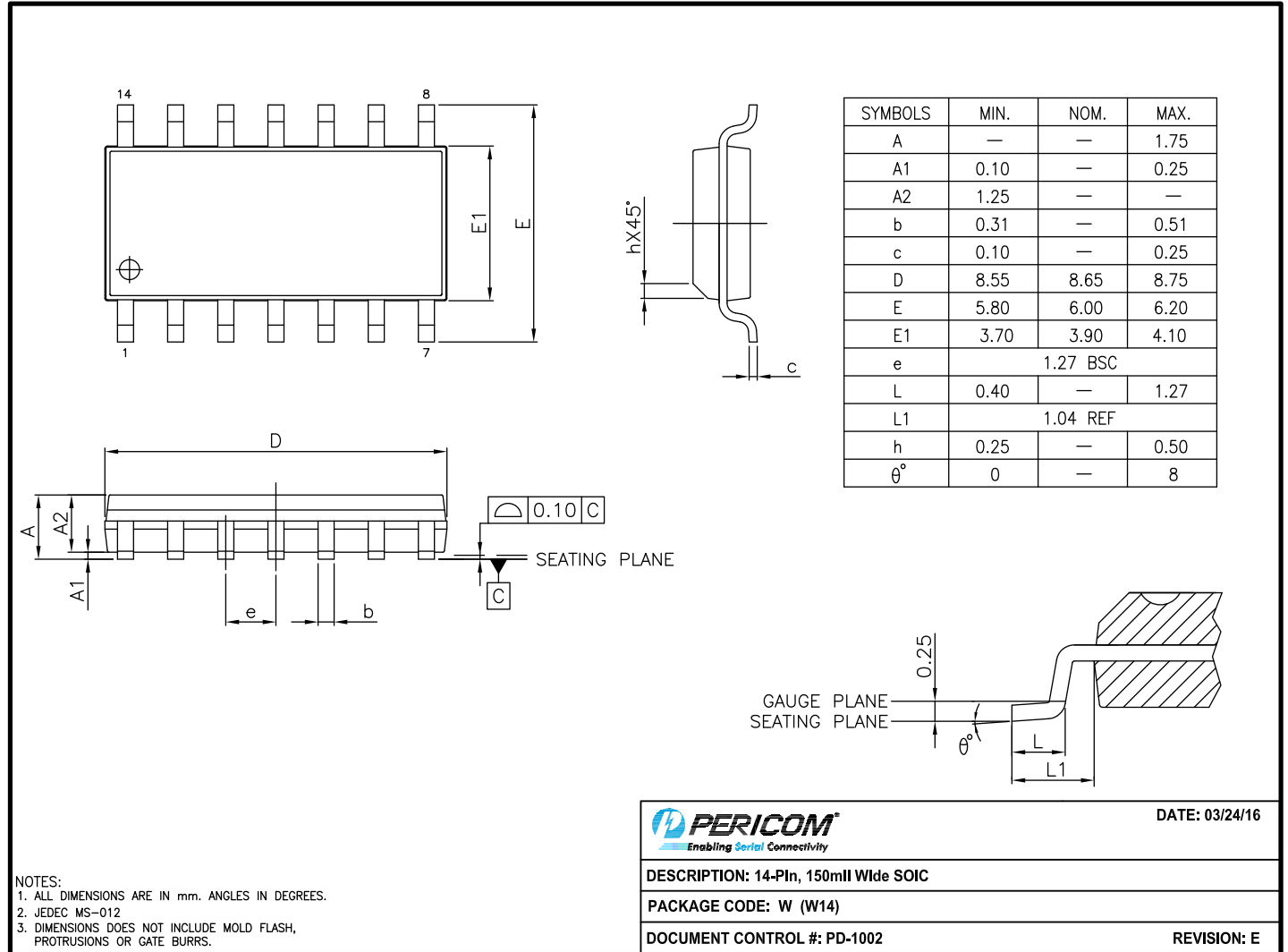
DOCUMENT CONTROL #: PD-1309

REVISION: E

16-0060

PI3B3125/PI3B3126

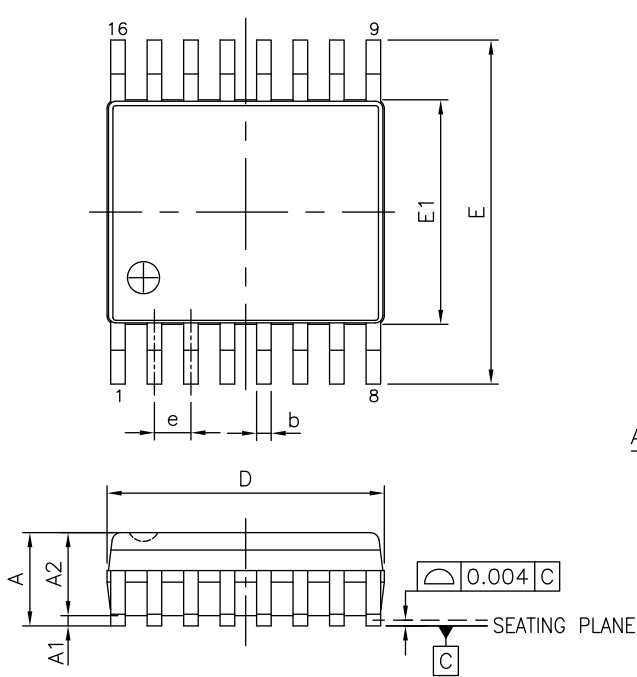
Packaging Mechanical: 14-SOIC (W)



16-0055

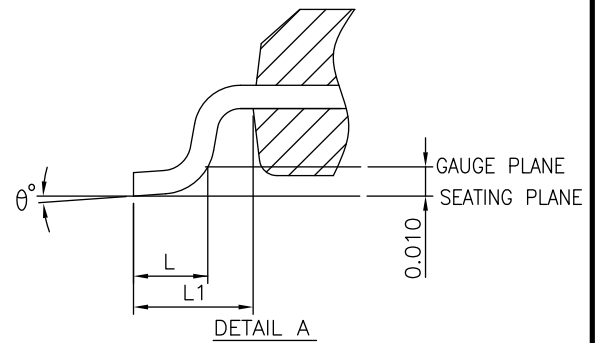
PI3B3125/PI3B3126

Packaging Mechanical: 16-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	0.189	0.193	0.197
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: 04/08/16

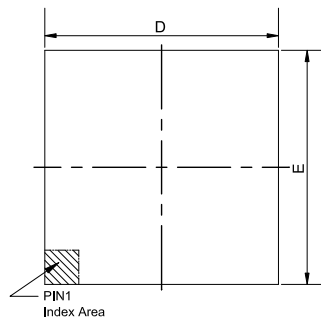
DESCRIPTION: 16-Pin, 150mil Wide QSOP

PACKAGE CODE: Q (Q16)

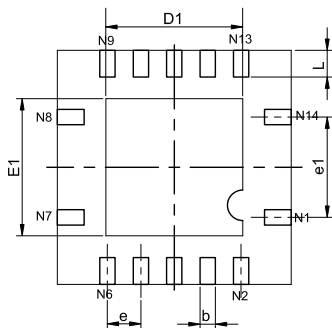
DOCUMENT CONTROL #: PD-1201

REVISION: H

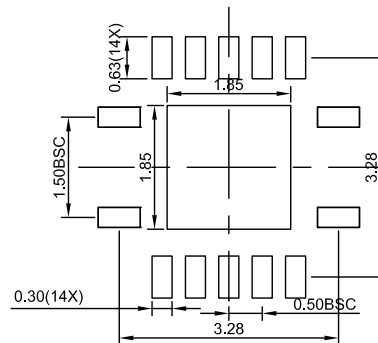
16-0056

PI3B3125/PI3B3126
Packaging Mechanical: 14-TQFN (ZDB)


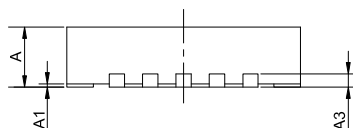
TOP VIEW



BOTTOM VIEW



RECOMMENDED LAND PATTERN(unit:mm)



SIDE VIEW

PKG. DIMENSIONS(MM)			
SYMBOL	Min	NOM	Max
A	0.75	0.80	0.85
A1	0.00	0.02	0.05
A3	0.15 REF		
D	3.45	3.50	3.55
E	3.45	3.50	3.55
D1	1.90	2.00	2.10
E1	1.90	2.00	2.10
b	0.20	0.25	0.30
e	0.50 BSC		
e1	1.50 BSC		
L	0.35	0.40	0.45

Note:

1. Comply with JEDEC MO-220K, except 'A', 'A3', 'D1' and 'E1'.



DATE: 02/15/17

DESCRIPTION: 14-Pin, TQFN, 3.5x3.5
PACKAGE CODE: ZDB (ZDB14)
DOCUMENT CONTROL #: PD-2222
REVISION: --

17-0029

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
PI3B3125LEX	L	14-Pin, 173mil Wide (TSSOP)
PI3B3125WEX	W	14-Pin, 150mil Wide (SOIC)
PI3B3125QEX	Q	16-Pin, 150mil Wide(QSOP)
PI3B3126LEX	L	14-Pin, 173mil Wide (TSSOP)
PI3B3126WEX	W	14-Pin, 150mil Wide (SOIC)
PI3B3126QEX	Q	16-Pin, 150mil Wide(QSOP)
PI3B3126ZDBEX	ZDB	16-Pin, 3.5x3.5 (TQFN)

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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