

PI3B3125/PI3B3126

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

Description

The 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 5Ω bus switches with fast individual enables in an industry standard 74XX125/126 pinout. When enabled via the associated Bus Enable (\overline{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.

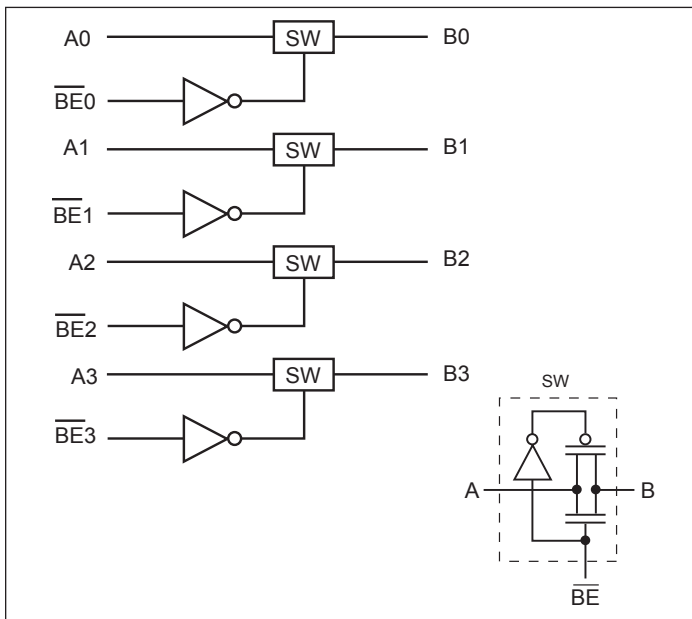
The PI3B3125 device has active LOW enables, and the PI3B3126 has active HIGH enables.

Features

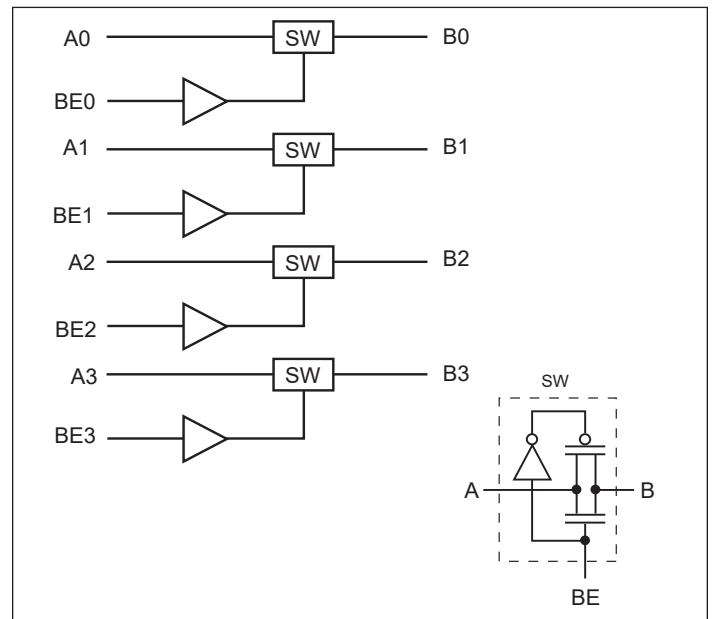
- Near zero propagation delay
- 5 Ohm switches connect inputs to outputs
- Fast Switching Speed - 4ns max.
- Ultra Low Quiescent Power (0.1μA Typical)
 - Ideally suited for notebook applications
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 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 available):
 - 14-pin, SOIC (W), PI3B3125 only
 - 14-pin, TSSOP (L)
 - 16-pin, QSOP (Q)

Logic Block Diagram

PI3B3125



PI3B3126

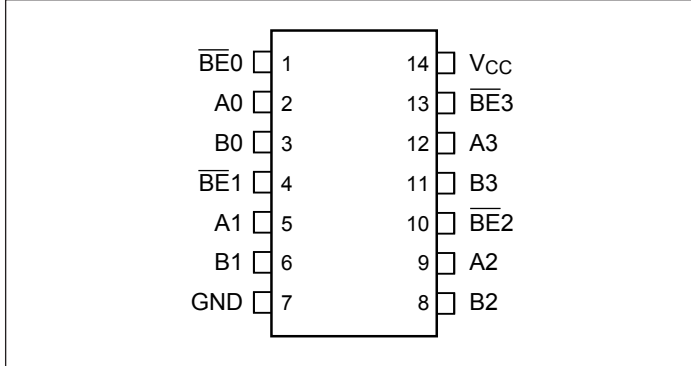


Notes:

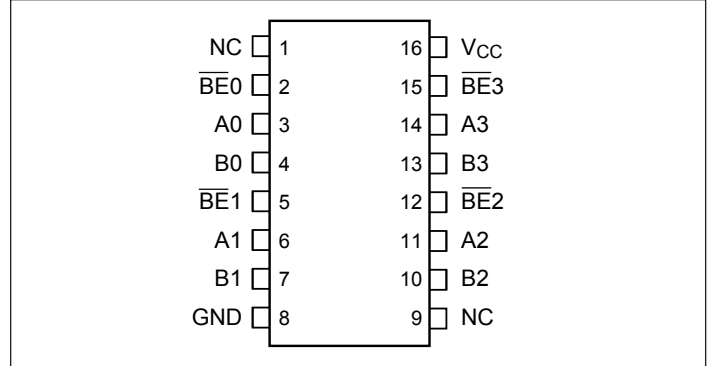
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and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

Pin Configuration

PI3B3125

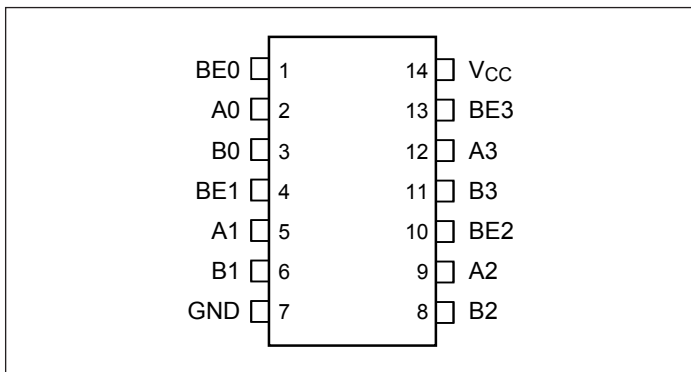


14-Pin, SOIC and TSSOP

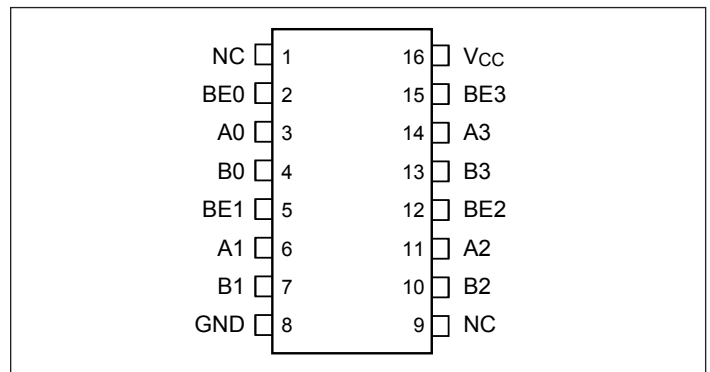


16-Pin, QSOP

PI3B3126



14-Pin, TSSOP



16-Pin, QSOP

Pin Description

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

Truth Table⁽¹⁾

| PI3B3125 $\overline{\text{BE}}_n$ | PI3B3126 BE_n | A_n | B_n | V_{CC} | Function |
|--------------------------------------|---------------------------|-------|-------|----------|------------|
| X ⁽²⁾ | X | Hi-Z | Hi-Z | GND | Disconnect |
| H | L | Hi-Z | Hi-Z | V_{CC} | Disconnect |
| L | H | B_n | A_n | 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.

Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

| | |
|---|-----------------|
| Storage Temperature..... | -65°C to +150°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 |
| Junction Temperature (Tj)..... | Max. 125°C |

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°C to +85°C, V_{CC} = 3.3V ±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} = Max., V _{IN} = V _{CC} | | | ±1 | µA |
| I _{IL} | Input LOW Current | V _{CC} = Max., V _{IN} = GND | | | ±1 | µA |
| I _{OFF} | Off Current | V _{CC} = 0, V _{OUT} = 3 to 3.6V | | | 10 | µA |
| V _{IK} | Clamp Diode Voltage | V _{CC} = Min., I _{IN} = -18mA | | | -1.2 | V |
| R _{ON} | Switch On Resistance ⁽³⁾ | V _{CC} = Min., V _{IN} = 0.0V, I _{ON} = 48mA or 60mA | | 5 | 8 | Ω |
| | | V _{CC} = Min., V _{IN} = 2.4V, I _{ON} = 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_{CC} = 3.3V, T_A = 25°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°C, f = 1 MHz

| Parameter ⁽¹⁾ | Description | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------------|-----------------------------|----------------------|------|------|------|-------|
| C _{IN} | Input Capacitance | V _{IN} = 0V | | 3.5 | | pF |
| C _{OFF} | A/B Capacitance, Switch Off | V _{IN} = 0V | | 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} .

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 | $C_L = 50\text{pF}$ $R_L = 500\Omega$ | | 0.25 | ns |
| t_{PZH} t_{PZL} | Bus Enable Time | $C_L = 50\text{pF}$ $R_L = 500\Omega$ | 1.0 | 3.0 | ns |
| t_{PHZ} t_{PLZ} | Bus Disable Time | $R_L = 500\Omega$ | 1.0 | 4.0 | ns |

| Parameter | Description | Conditions ⁽¹⁾ | PI3B3126 | | Units |
|------------------------|---|--|----------|------|-------|
| | | | Com. | | |
| | | | Min. | Max. | |
| t_{PLH} t_{PHL} | Propagation Delay ^(2,3) Ax to Bx, Bx to Ax | $C_L = 50\text{pF}$ $R_L = 500\Omega$ | | 0.25 | ns |
| t_{PZH} t_{PZL} | Bus Enable Time | $C_L = 50\text{pF}$ $R_L = 500\Omega$ | 1.0 | 2.5 | ns |
| t_{PHZ} t_{PLZ} | Bus Disable Time | $R_L = 500\Omega$ | 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.

Part Marking

PI3B3125

| L Package | Q Package | W Package |
|---|---|---|
| | | |
| YY: Year WW: Workweek 1st X: Assembly Site Code 2nd X: Fab Site Code | YY: Year WW: Workweek 1st G: Assembly Site Code 2nd G: Wafer Fab Site Code | YY: Year WW: Workweek 1st X: Assembly Site Code 2nd X: Wafer Fab Site Code |

PI3B3126

| L Package | Q Package |
|---|---|
| | |
| 1st Y: Die Rev 2nd Y: Year W: Workweek 1st X: Assembly Code 2nd X: Fab Code | Y: Year W: Workweek 1st X: Assembly Site Code 2nd X: Fab Site Code |

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

14-SOIC (W)

| SYMBOLS | MIN. | NOM. | MAX. |
|----------------|----------|------|------|
| A | — | — | 1.75 |
| A1 | 0.10 | — | 0.25 |
| A2 | 1.25 | — | — |
| b | 0.31 | — | 0.51 |
| c | 0.10 | — | 0.25 |
| D | 8.55 | 8.65 | 8.75 |
| E | 5.80 | 6.00 | 6.20 |
| E1 | 3.70 | 3.90 | 4.10 |
| e | 1.27 BSC | | |
| L | 0.40 | — | 1.27 |
| L1 | 1.04 REF | | |
| h | 0.25 | — | 0.50 |
| θ° | 0 | — | 8 |

NOTES:
 1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
 2. JEDEC MS-012
 3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

PERICOM
Enabling Serial Connectivity

DATE: 03/24/16

DESCRIPTION: 14-Pin, 150mil Wide SOIC

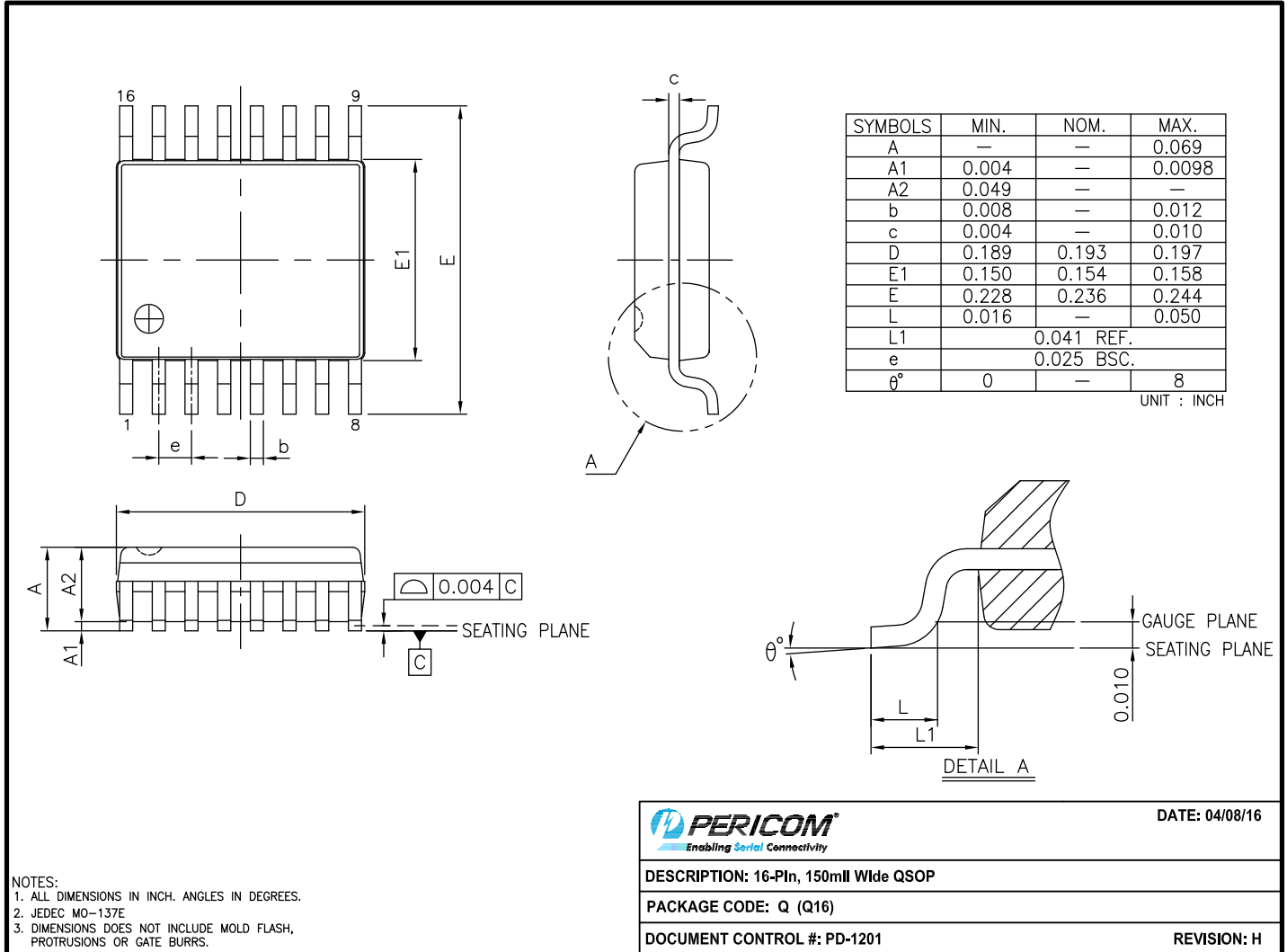
PACKAGE CODE: W (W14)

DOCUMENT CONTROL #: PD-1002

REVISION: E

16-0055

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 | 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) |
| PI3B3126QEX | Q | 16-Pin, 150mil Wide(QSOP) |

Notes:

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
- 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.
- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- E = Pb-free and Green
- X suffix = Tape/Reel

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