



**THE DATASHEET OF  
PI49FCT32802QE**



**PI49FCT32802/PI49FCT32803**

**1:5/1:7 3.3V CMOS Clock Drivers**

**Features**

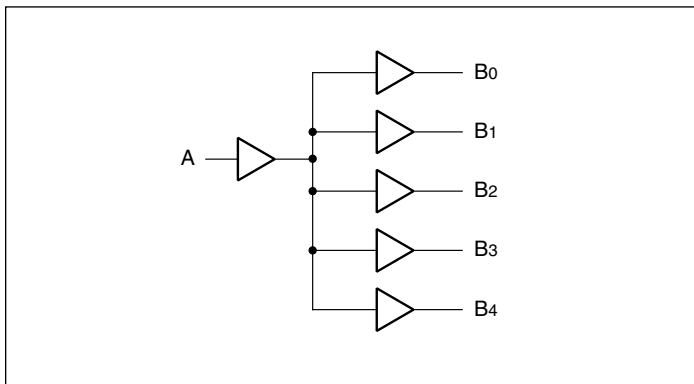
- Low skew: < 200ps
  - Fast switching frequency >133 MHz
  - Fast output rise/fall time < 1.5ns
  - Low propagation delay < 2.5ns
  - Low input capacitance < 6.0pF
  - 5V Tolerant input
  - Rail-to-Rail CMOS outputs
  - Industrial Temperature: -40°C to +85°C
  - 3.3V ±10% operation
  - Totally Lead-Free & 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](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative.
- <https://www.diodes.com/quality/product-definitions/>
- Packages (Pb-free & Green available):
    - 16-pin 150-mil wide QSOP (Q)
    - 16-pin 173-mil wide TSSOP (L)

**Description**

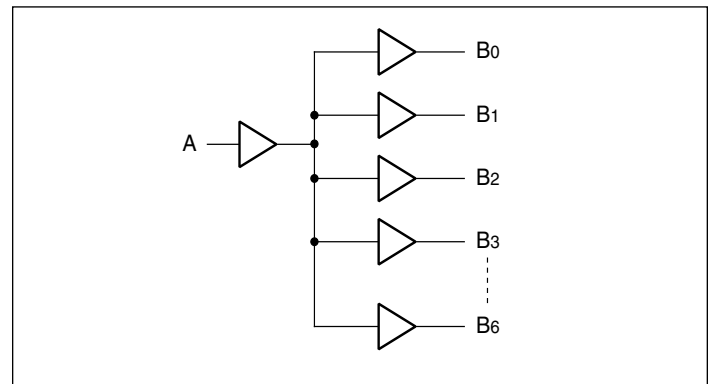
The PI49FCT3280x is a 3.3V very low-skew clock buffer from a single low-capacitance input that produces five outputs on PI49FCT32802 and seven outputs on PI49FCT32803. Excellent output signals to power and ground ratio minimize power and ground noise, and also improves output performance.

The PI49FCT3280x integrates series damping resistors on all outputs.

**Block Diagram (PI49FCT32802)**



**Block Diagram (PI49FCT32803)**

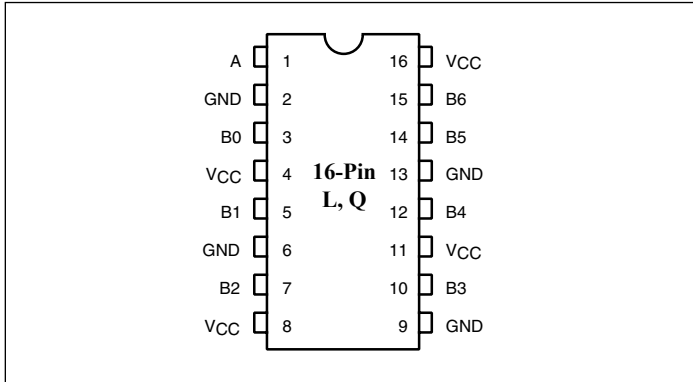


**Notes:**

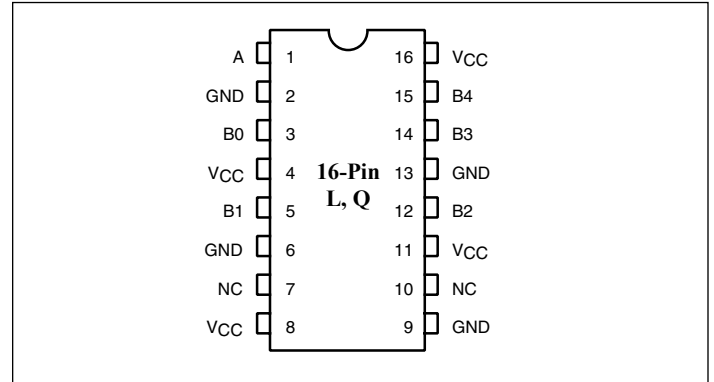
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated’s definitions of Halogen- and Antimony-free, “Green” and Lead-free.
3. Halogen- and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

**PI49FCT32802/PI49FCT32803**

**Pin Configuration (PI49FCT32802)**



**Pin Configuration (PI49FCT32803)**



**Pin Description**

Pin Name		Description
PI49FCT32802	PI49FCT32803	
A	A	Input
B0-B4	B0-B6	Outputs
GND	GND	Ground
VCC	VCC	Power

## Maximum Ratings

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

Storage Temperature .....	-55°C to +150°C
Supply Voltage to Ground Potential.....	-0.5V to +5.5V
DC Input Voltage .....	-0.5V to +5.5V
DC Output Current.....	120mA
Power Dissipation .....	0.5W
Latch up .....	200mA
ESD Protection (Input) .....	2000V min (HBM)
Junction Temperature .....	125°C Max

**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)

Symbol	Description	Test Conditions <sup>(1)</sup>	Min.	Typ.	Max.	Units	
V <sub>OH</sub>	Output HIGH voltage	V <sub>CC</sub> =3V, V <sub>IN</sub> =V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -8mA	2.4	3	-	V
V <sub>OL</sub>	Output LOW voltage	V <sub>CC</sub> =3V, V <sub>IN</sub> =V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 12mA	-	0.4	0.5	
V <sub>IH</sub>	Input HIGH voltage	Guaranteed Logic HIGH Level (Input Pins)		2	-	5.5	
V <sub>IL</sub>	Input LOW voltage	Guaranteed Logic LOW Level (Input Pins)		-0.5	-	0.8	
I <sub>IH</sub>	Input HIGH current	V <sub>CC</sub> = 3.6V	V <sub>IN</sub> = 3.6V	-	-	1	μA
I <sub>IL</sub>	Input LOW current	V <sub>CC</sub> = 3.6V	V <sub>IN</sub> = 0V	-	-	-1	
V <sub>IK</sub>	Clamp diode voltage	V <sub>CC</sub> = Min., I <sub>IN</sub> = -18mA		-	-0.7	-1.2	V
I <sub>OH</sub>	Output HIGH current	V <sub>CC</sub> = 3.3V, V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , V <sub>OUT</sub> = 1.5V <sup>(5)</sup>		-25	-45	-80	mA
I <sub>OL</sub>	Output LOW current	V <sub>CC</sub> = 3.3V, V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , V <sub>OUT</sub> = 1.5V <sup>(5)</sup>		25	45	90	
I <sub>OS</sub>	Short circuit current <sup>(5)</sup>	V <sub>CC</sub> = Max., V <sub>OUT</sub> = GND <sup>(5)</sup>		-50	-100	-180	
V <sub>H</sub>	Input Hysteresis			-	150	-	mV
R <sub>S</sub>	Series Resistor				22		Ω

**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, +25°C ambient and maximum loading.
- V<sub>OH</sub> = V<sub>CC</sub> - 0.6V at rated current.
- This parameter is determined by device characterization but is not production tested.
- Not more than one output should be shorted at one time. Duration of the test should not exceed one second.

**Power Supply Characteristics**

Parameters	Description	Test Conditions <sup>(1)</sup>		Min.	Typ <sup>(2)</sup>	Max.	Units
$I_{CC}$	Quiescent Power Supply Current	$V_{CC} = \text{Max.}$	$V_{IN} = \text{GND}$ or $V_{CC}$	—	0.1	30	$\mu\text{A}$
$\Delta I_{CC}$	Supply Current per Inputs @ TTL HIGH	$V_{CC} = \text{Max.}$	$V_{IN} = V_{CC} - 0.6\text{V}^{(3)}$	—	47	300	
$I_{CCD}$	Supply Current per Input per MHz <sup>(4)</sup>	$V_{CC} = \text{Max.},$ Outputs Open Per Output Toggling 50% Duty Cycle	$V_{IN} = V_{CC}$	—			mA/
			$V_{IN} = \text{GND}$		0.08	0.16	MHz

**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 ( $V_{IN} = V_{CC} - 0.6\text{V}$ ); all other inputs at  $V_{CC}$  or  $\text{GND}$ .
- This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.
- Values for these conditions are examples of the  $I_C$  formula. These limits are guaranteed but not tested.

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

Parameters <sup>(1)</sup>	Description	Test Conditions	Typ	Max.	Units
$C_{IN}$	Input Capacitance	$V_{IN} = 0\text{V}$	3.0	4	$\text{pF}$
$C_{OUT}$	Output Capacitance	$V_{OUT} = 0\text{V}$		6	

**Notes:**

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

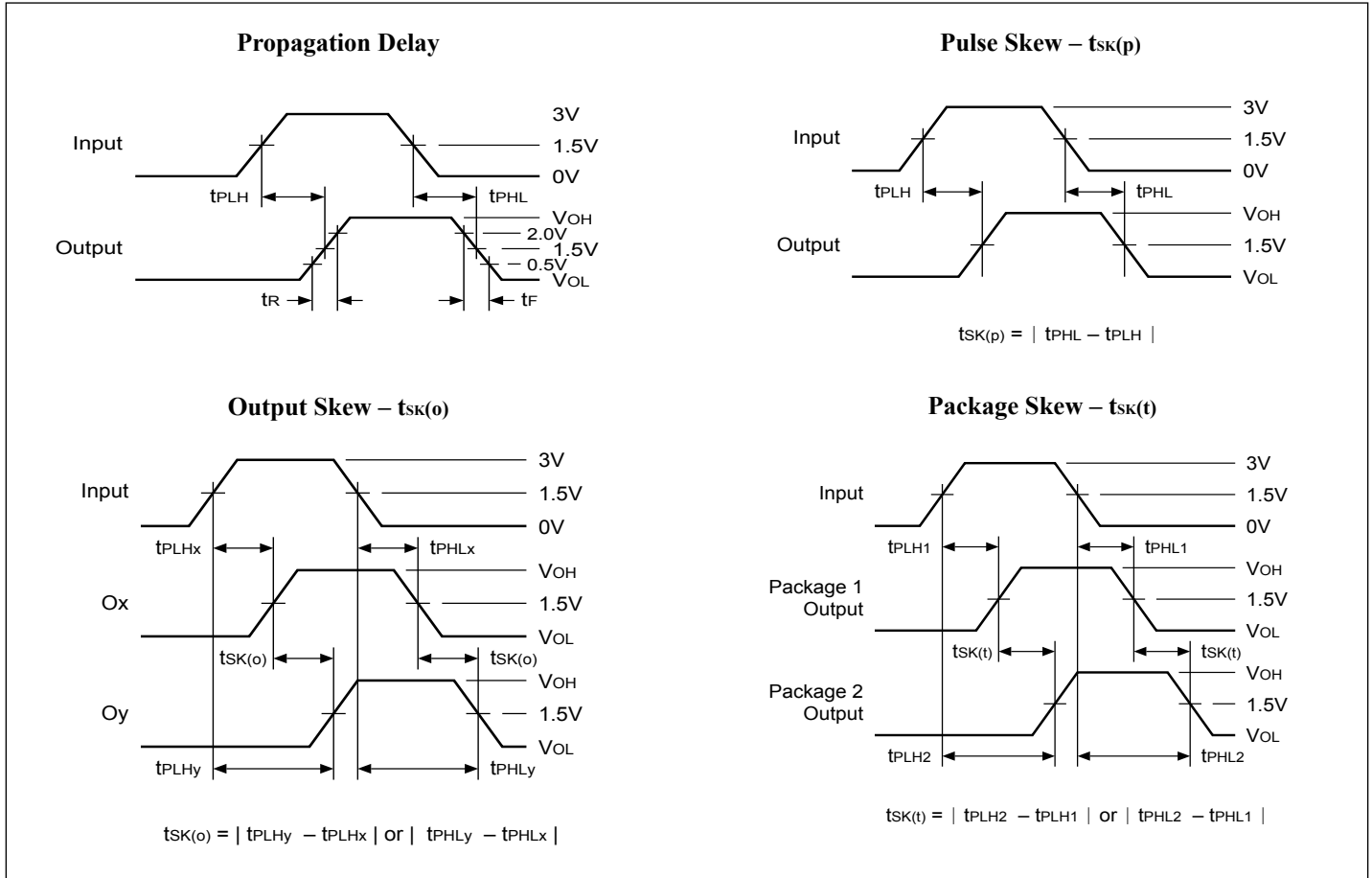
**Maximum Switching Characteristics** (Over operating range)

Symbol	Description	Condition	Max.	Units
$t_{PLH}$ $t_{PHL}$	Propagation Delay A to Bn <sup>(3)</sup>	$CL = 15\text{pF}$	2.5	$\text{ns}$
$t_{R/tF}$	Rise/Fall Time <sup>(2)</sup>	$0.8\text{V} - 2.0\text{V}$	1.5	
$t_{SK(p)}$	Pulse Skew (same pkg) <sup>(1,2)</sup>	$CL = 15\text{pF}$	0.35	
$t_{SK(o)}$	Output Skew (same pkg.) <sup>(1,2)</sup>		0.2	
$t_{SK(t)}$	Output Skew (different pkg.) <sup>(1,2)</sup>		0.55	
$F_{IN}$	Input Frequency <sup>(1,2)</sup>		133	MHz

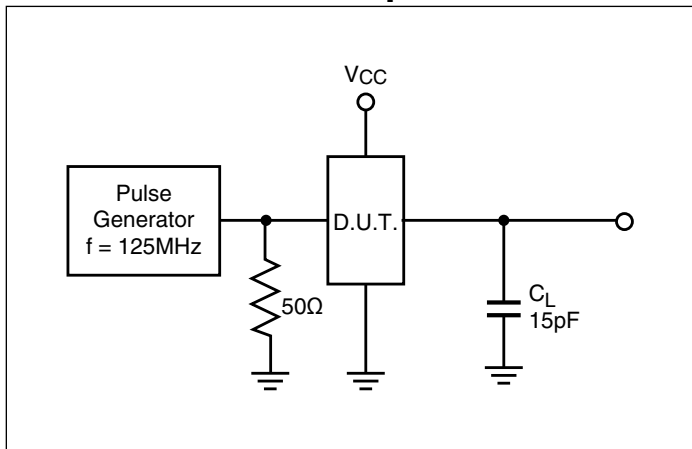
**Notes:**

- Other loading condition is described on page 4, "Test Circuits for All Outputs."
- These parameters are guaranteed by design.
- Minimum propagation delay of 1.5ns is guaranteed by design.

**Switching Waveforms**



**Tests Circuits for All Outputs**



**PI49FCT32802/PI49FCT32803**

**Part Marking**

**PI49FCT32802**

**Q Package**

PI49FCT  
32802QE  
○ YWXX

YW: 2 Letter Datecode per MA1251  
1st X: Assembly Code  
2nd X: Fab Code

**L Package**

PI49FCT  
32802LE  
○ YYWWXX

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

**PI49FCT32803**

**Q Package**

PI49FCT  
32803QE  
○ YYWWXX

YY: Year  
WW: Workweek  
1st X: Assembly Code  
2nd X: Fab Code  
Date Code per MA-1251

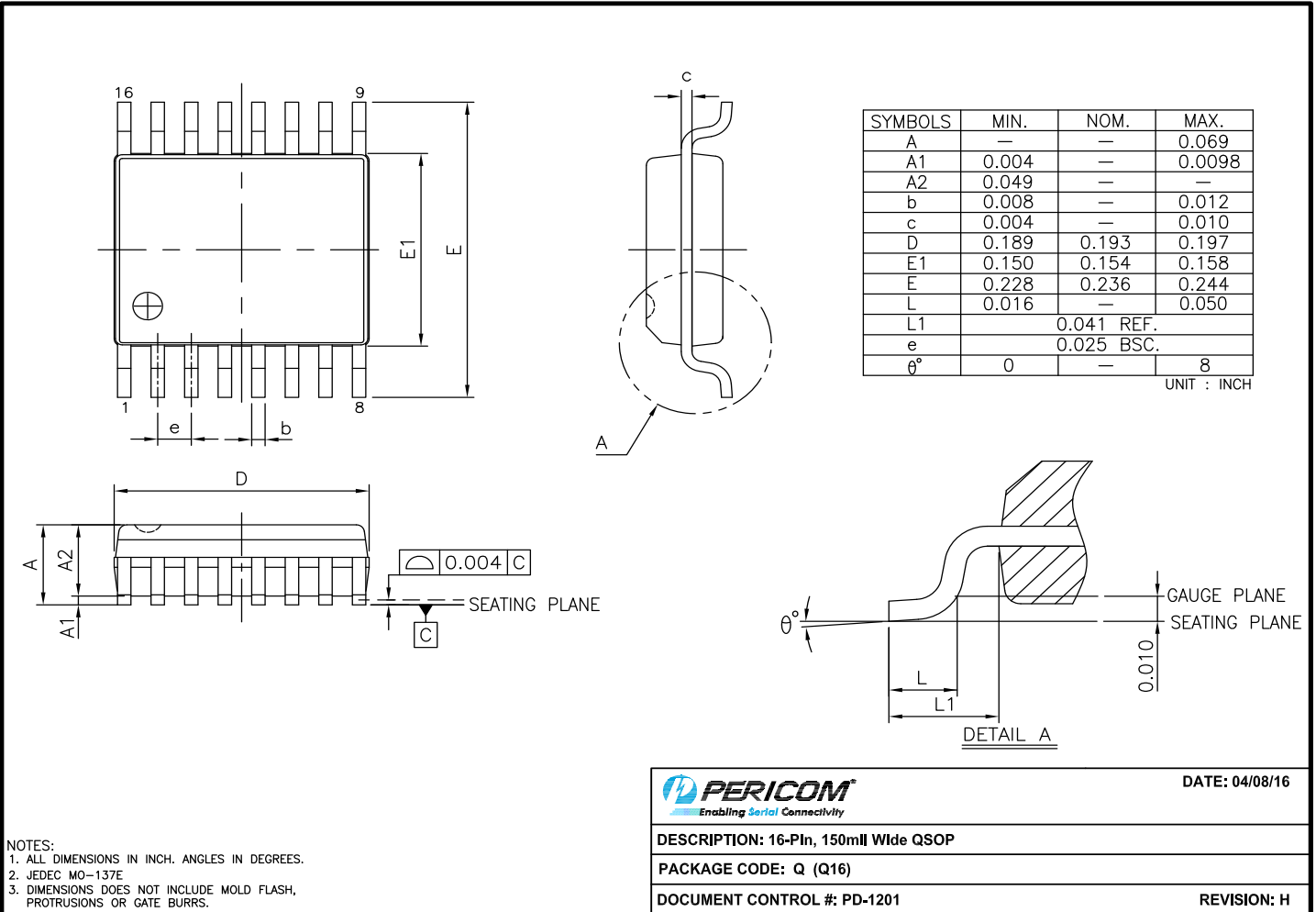
**L Package**

PI49FCT  
32803LE  
○ YYWWXX

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

**PI49FCT32802/PI49FCT32803**

**Packaging Mechanical: 16-QSOP (Q)**



16-0056

**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 Number	Package Code	Package Description
PI49FCT32802QEX	Q	16-Pin, 150mil Wide (QSOP)
PI49FCT32803QEX	Q	16-Pin, 150mil Wide (QSOP)
PI49FCT32802LEX	L	16-Pin, 173mil Wide (TSSOP)
PI49FCT32803LEX	L	16-Pin, 173mil Wide (TSSOP)

**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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