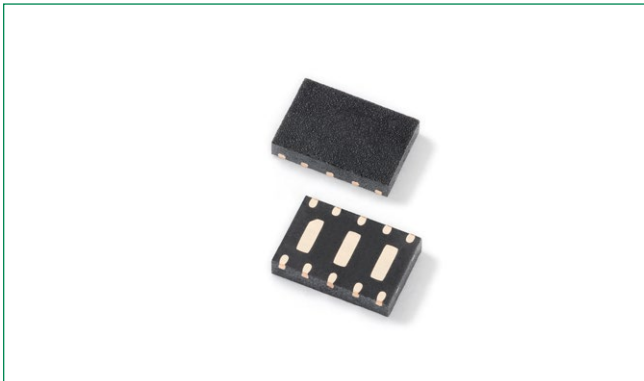


# SP3374NUTG 3.3V 40A Diode Array

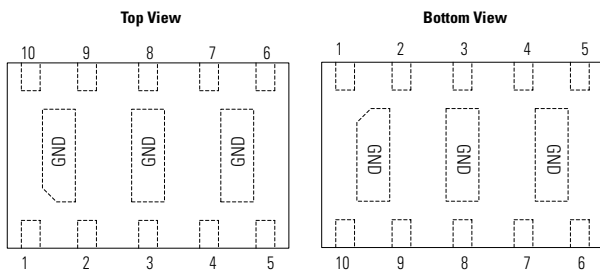


## Description

The SP3374NUTG is a low-capacitance, TVS Diode Array designed to provide protection against ESD (electrostatic discharge), CDE (cable discharge events), EFT (electrical fast transients), and lightning induced surges for high-speed, differential data lines. It's packaged in a  $\mu$ DFN package (3.0 x 2.0mm) and each device can protect up to 4 channels or 2 differential pairs, up to 40A (IEC 61000-4-5 2<sup>nd</sup> edition,) and up to 30kV ESD (IEC 61000-4-2). The "flow-through" design minimizes signal distortion, reduces voltage overshoot, and provides a simplified PCB design.

The SP3374NUTG with its low capacitance and low clamping voltage makes it ideal for high-speed data interfaces such as 1GbE applications found in notebooks, switches, etc.

## Pinout

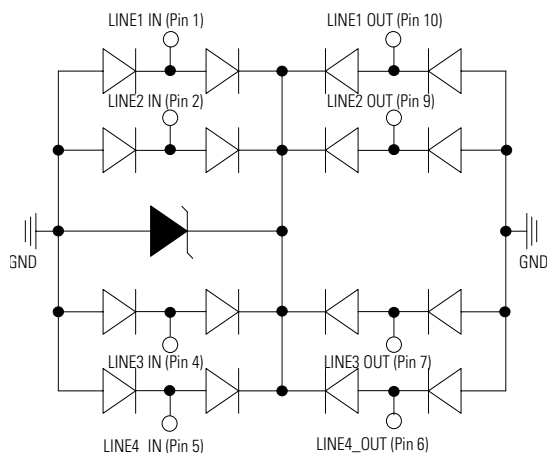


**NOTE:** PIN3, PIN8 are same potential with GND

## Features

- ESD, IEC 61000-4-2,  $\pm 30$ kV contact,  $\pm 30$ kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 40A (8/20 $\mu$ s as defined in IEC 61000-4-5 2nd Edition)
- Low capacitance of 3.5pF@0V (TYP) per I/O
- Low leakage current of 0.1 $\mu$ A (TYP) at 3.3V
- $\mu$ DFN-10 package is optimized for high-speed data line routing
- Provides protection for two differential data pairs (4 channels) up to 40A
- Low operating and clamping voltage
- AEC-Q101 qualified
- Halogen free, Lead free and RoHS compliant

## Functional Block Diagram



Life Support Note:

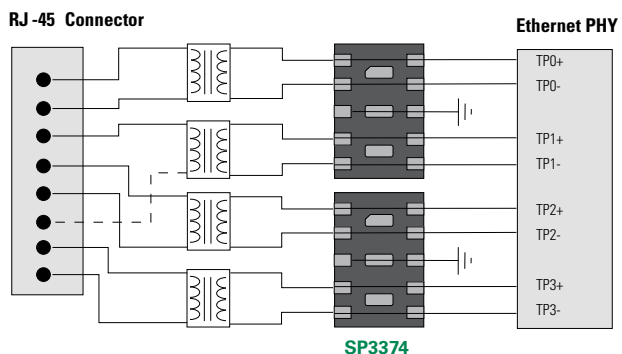
### Not Intended for Use in Life Support or Life Saving Applications

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

## Applications

- 10/100/1000 Ethernet
- WAN/LAN Equipment
- Desktops, Servers and Notebooks
- LVDS Interfaces
- Integrated Magnetics
- Smart TV

## Application Example



### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Current ( $t_p=8/20\mu s$ )	40	A
$P_{PK}$	Peak Pulse Power ( $t_p=8/20\mu s$ )	1000	W
$T_{OP}$	Operating Temperature	-40 to 125	°C
$T_{STOR}$	Storage Temperature	-55 to 150	°C

**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

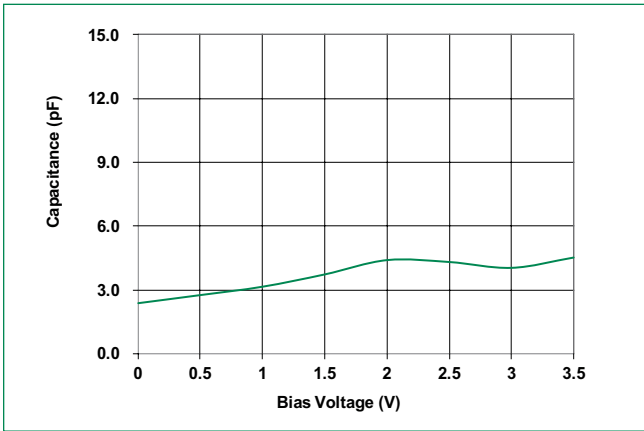
### Electrical Characteristics ( $T_{OP}=25^\circ C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R \leq 1\mu A$			3.3	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 3.3V, T = 25^\circ C$		0.1	0.5	$\mu A$
Snap Back Voltage	$V_{SB}$	$I_{SB} = 50mA$	2.8			V
Clamp Voltage	$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s$ Any I/O to Ground			5.5	V
		$I_{PP} = 10A, t_p = 8/20\mu s$ Any I/O to Ground			10.5	
		$I_{PP} = 25A, t_p = 8/20\mu s$ Any I/O to Ground			18.0	
		$I_{PP} = 40A, t_p = 8/20\mu s$ Line-to-Line <sup>1</sup> , two I/O Pins connected together on each line			25.0	
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p = 100ns$ , Any I/O to Ground		0.15		$\Omega$
ESD Withstand Voltage	$V_{ESD}$	IEC 61000-4-2 (Contact)	$\pm 30$			kV
		IEC 61000-4-2 (Air)	$\pm 30$			kV
Diode Capacitance	$C_{I/O \text{ to GND}}$	Between I/O Pins and Ground $V_R = 0V, f = 1MHz$		3.5	5.0	pF
	$C_{I/O \text{ to I/O}}$	Between I/O Pins $V_R = 0V, f = 1MHz$		1.7		pF

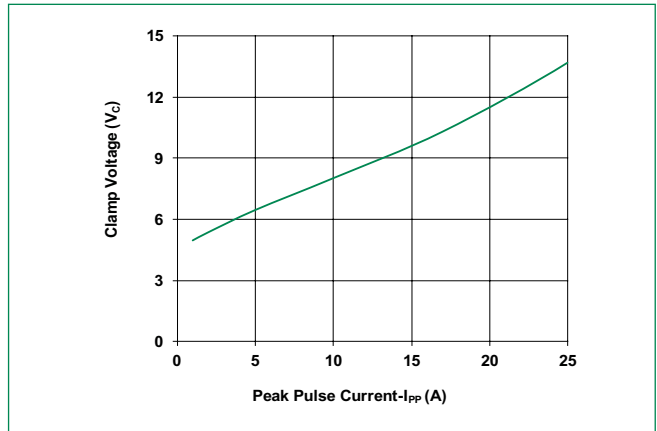
**Notes:**

- Rating with 2 pins connected together per suggested diagram ( For example, pin1 is connected to pin 10, pin 2 is connected to Pin 9, Pin 4 is connected to pin 7 and pin 5 is connected to pin 6)
- Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window  $t_1=70ns$  to  $t_2= 90ns$

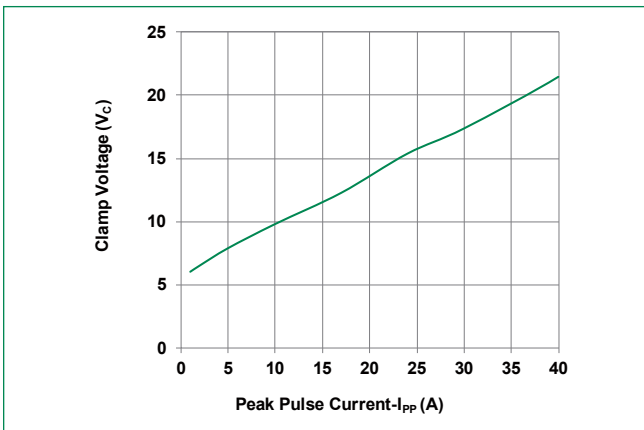
**Capacitance vs. Reverse Bias**



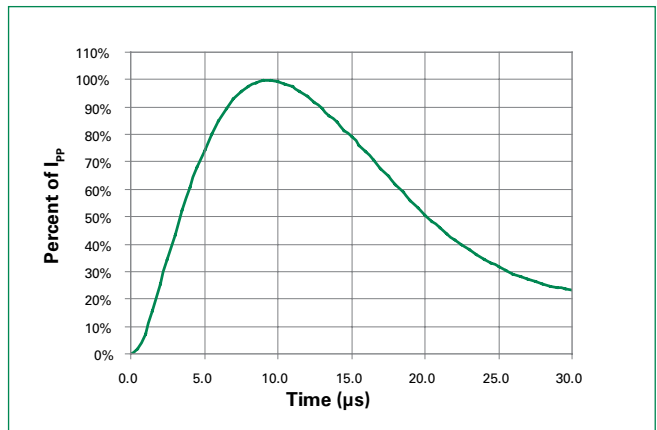
**Clamping Voltage vs. I<sub>pp</sub> (I/O to GND)**



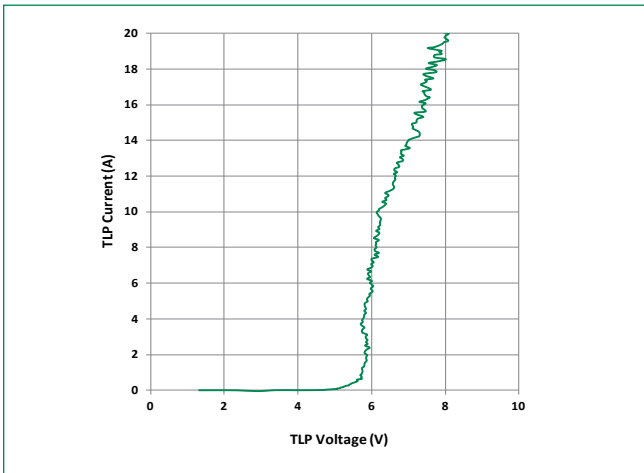
**Clamping Voltage vs. I<sub>pp</sub> (Line-to-Line)**



**8/20μS Pulse Waveform**

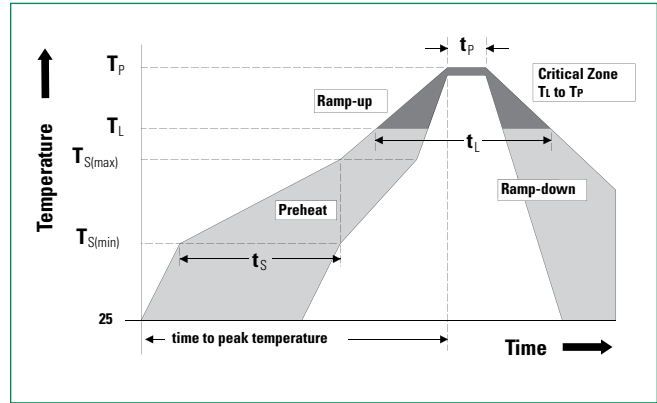


**Transmission Line Pulsing(TLP) Plot**



**Soldering Parameters**

<b>Reflow Condition</b>		Pb – Free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
<b>Average ramp up rate (Liquidus) Temp (<math>T_L</math>) to peak</b>		3°C/second max
<b><math>T_{S(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		3°C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Temperature ( $t_L$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °C
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>		20 – 40 seconds
<b>Ramp-down Rate</b>		6°C/second max
<b>Time 25°C to peak Temperature (<math>T_p</math>)</b>		8 minutes Max.
<b>Do not exceed</b>		260°C



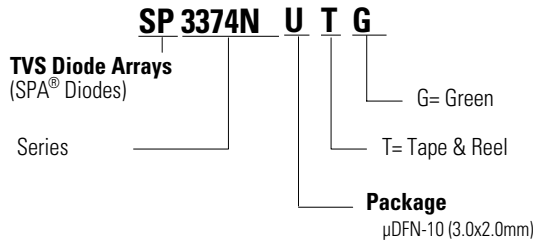
**Ordering Information**

Part Number	Package	Min. Order Qty.
SP3374NUTG	μDFN-10 (3.0x2.0mm)	3000

**Product Characteristics**

<b>Lead Plating</b>	Pre-Plated Frame
<b>Lead Material</b>	Copper Alloy
<b>Substrate material</b>	Silicon
<b>Body Material</b>	Molded Compound
<b>Flammability</b>	UL Recognized compound meeting flammability rating V-0

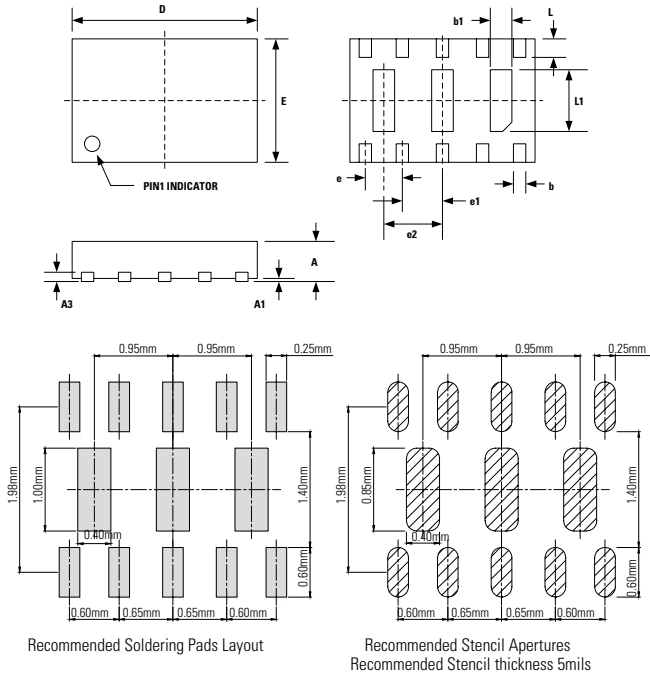
**Part Numbering System**



**Part Marking System**



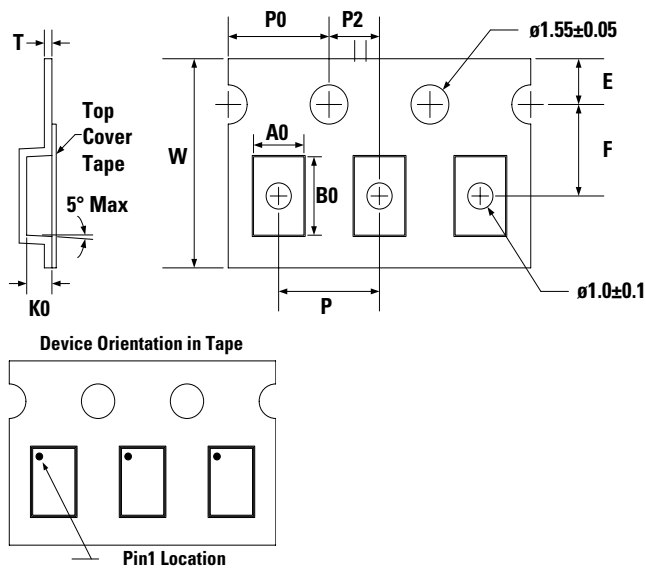
**Package Dimensions —  $\mu$ DFN-10 (3.0x2.0mm)**



Package	$\mu$ DFN-10 (3.0x2.0mm)					
JEDEC	MO-229					
Symbol	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
<b>A</b>	0.50	0.60	0.65	0.020	0.024	0.026
<b>A1</b>	0.00	0.03	0.05	0.000	0.001	0.002
<b>A3</b>	0.15 Ref			0.006 Ref		
<b>b</b>	0.15	0.20	0.25	0.006	0.008	0.010
<b>b1</b>	0.25	0.35	0.45	0.010	0.014	0.018
<b>D</b>	2.90	3.00	3.10	0.114	0.118	0.122
<b>E</b>	1.90	2.00	2.10	0.075	0.079	0.083
<b>e</b>	0.60 BSC			0.024 BSC		
<b>e1</b>	0.65 BSC			0.026 BSC		
<b>e2</b>	0.95 BSC			0.037		
<b>L</b>	0.25	0.30	0.35	0.010	0.012	0.014
<b>L1</b>	0.95	1.00	1.05	0.037	0.039	0.041

- Notes:**
1. All dimensions are in millimeters
  2. Dimensions include solder plating.
  3. Dimensions are exclusive of mold flash & metal burr.
  4. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
  5. Package surface matte finish VDI 11-13.

**Tape & Reel Specification —  $\mu$ DFN-10 (3.0x2.0mm)**



Package	$\mu$ DFN-10 (3.0x2.0mm)
Symbol	Millimeters
<b>A0</b>	2.30 +/- 0.10
<b>B0</b>	3.20 +/- 0.10
<b>E</b>	1.75 +/- 0.10
<b>F</b>	3.50 +/- 0.05
<b>K0</b>	1.0 +/- 0.10
<b>P</b>	4.00 +/- 0.10
<b>P0</b>	4.00 +/- 0.10
<b>P2</b>	2.00 +/- 0.10
<b>T</b>	0.3 +/- 0.05
<b>W</b>	8.00 +0.30/- 0.10