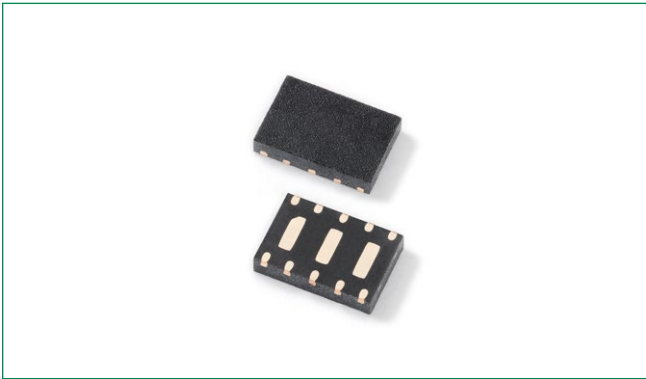


# SP2574NUTG 2.5V 40A Diode Array

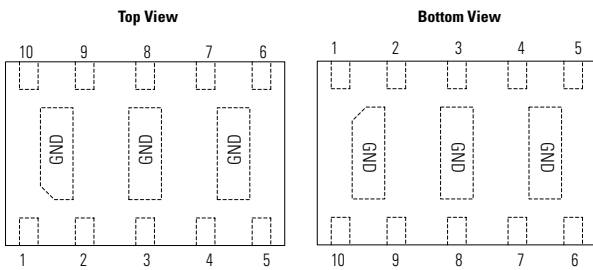


## Description

The SP2574NUTG 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 component can protect up to 4 channels or 2 differential pairs, up to 40A (IEC 61000-4-5) 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 SP2574NUTG 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

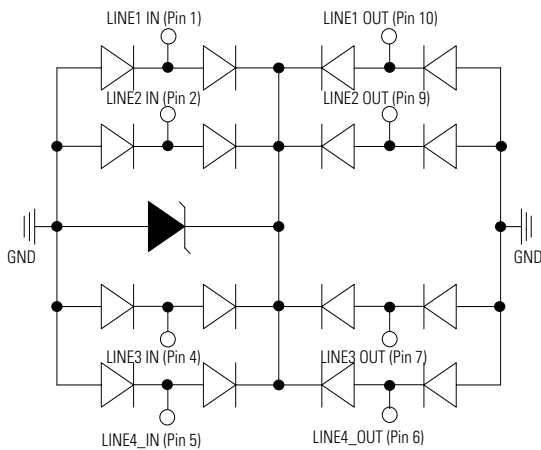


**NOTE:** PIN3, PIN8 are same potential with GND

## 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 3.8pF@0V (TYP) per I/O
- Low leakage current of 0.1 $\mu$ A (TYP) at 2.5V
- $\mu$ 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

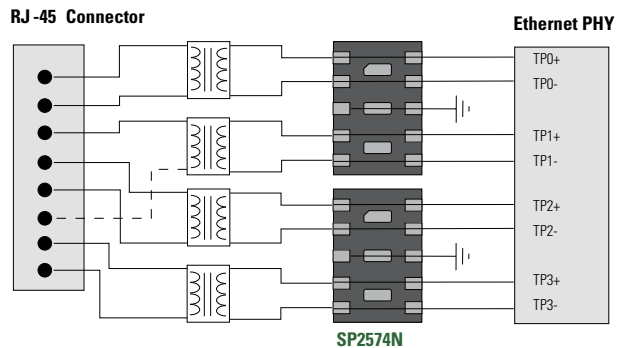
## Functional Block Diagram



## Applications

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

## Application Example



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.

**Absolute Maximum Ratings**

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Current ( $t_p=8/20\mu s$ )	40 <sup>1</sup>	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

**Notes:**1. 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)

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

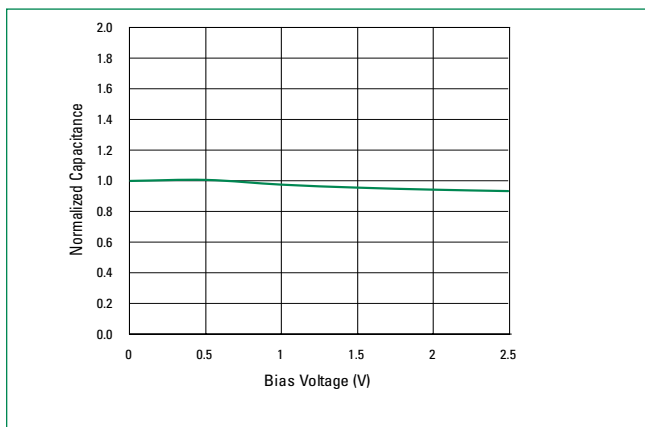
**Electrical Characteristics ( $T_{OP}=25^\circ C$ )**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R \leq 1\mu A$			2.5	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 2.5V, T = 25^\circ C$		0.1	0.5	$\mu A$
Breakdown Voltage	$V_{BR}$	$I_{t1} = 1\mu A$	3.0	3.7	4.5	V
Snap Back Voltage	$V_{SB}$	$I_H = 1mA$	3.0			V
Clamp Voltage	$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s$ Any I/O to Ground			4.5	V
		$I_{PP} = 10A, t_p = 8/20\mu s$ Any I/O to Ground			7.5	
		$I_{PP} = 25A, t_p = 8/20\mu s$ Any I/O to Ground			12.0	
		$I_{PP} = 40A, t_p = 8/20\mu s$ Line-to-Line <sup>1</sup> , two I/O Pins connected together on each line			20.0	
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p=100ns$ , Any I/O to Ground		0.13		$\Omega$
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 $V_R = 0V, f = 1MHz$		3.8	5.0	pF
	$C_{I/O \text{ to I/O}}$	Between I/O Pins $V_R = 0V, f = 1MHz$		1.7		pF

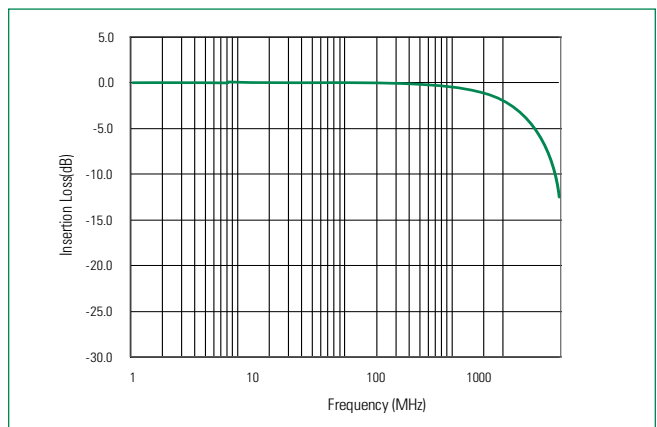
**Notes:**

- 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  $t1=70ns$  to  $t2=90ns$

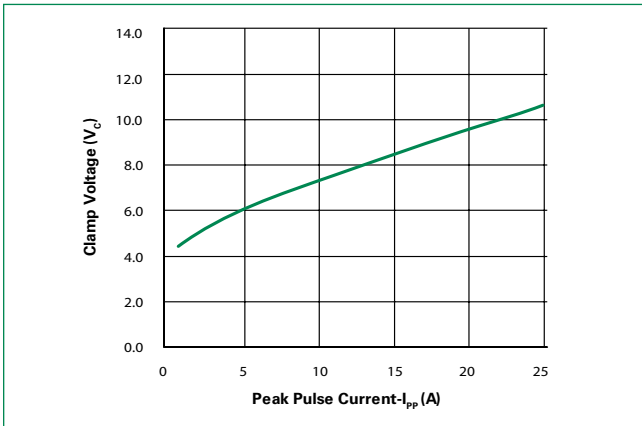
**Normalized Capacitance vs. Voltage**



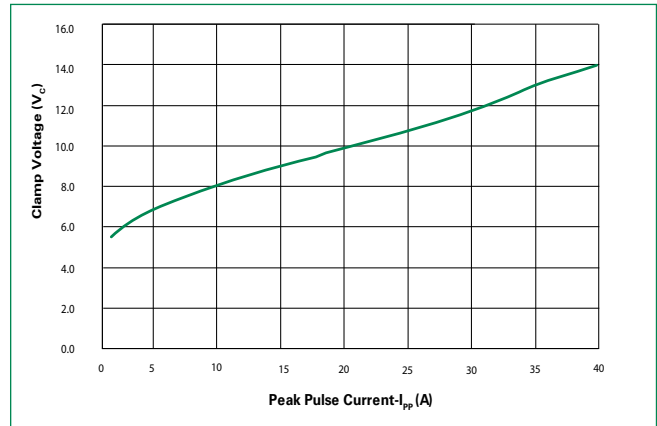
**Insertion Loss (S21)**



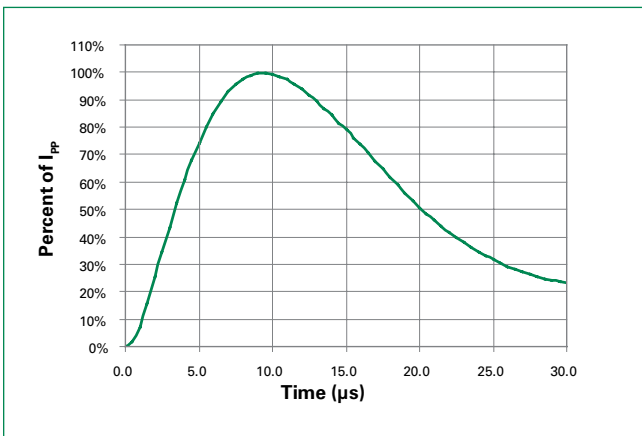
**Clamping Voltage vs.  $I_{pp}$  (I/O to GND)**



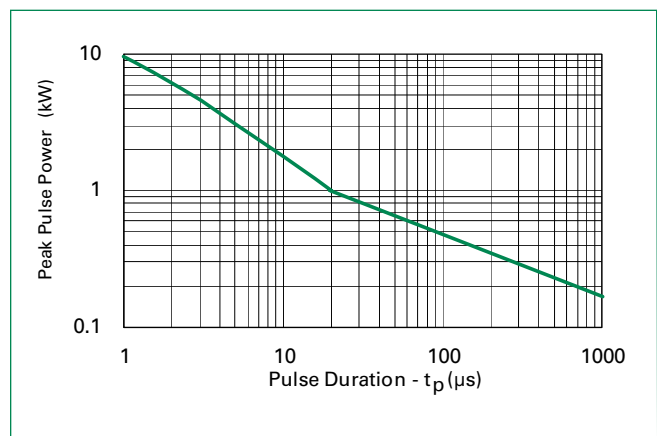
**Clamping Voltage vs.  $I_{pp}$  (Line-to-Line, Two I/O Pins Connected Together)**



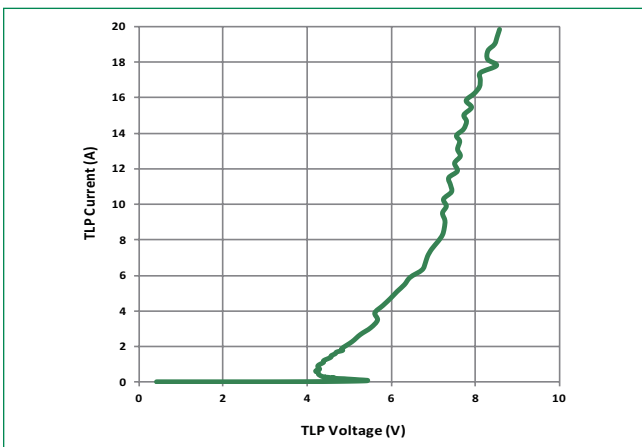
**8/20 $\mu$ s Pulse Waveform**



**Non-Repetitive Peak Pulse Power vs. Pulse Time**

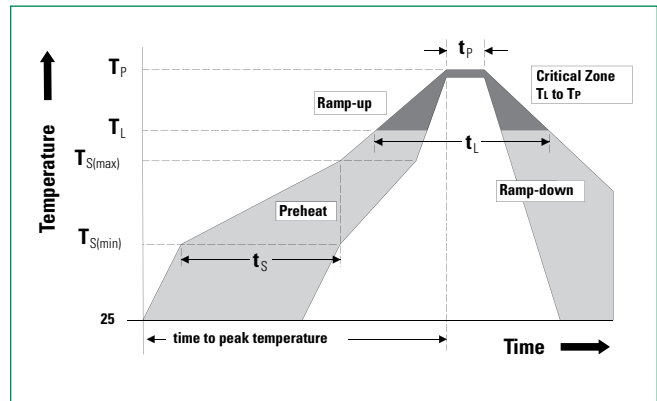


**Transmission Line Pulse (TLP)**



### 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



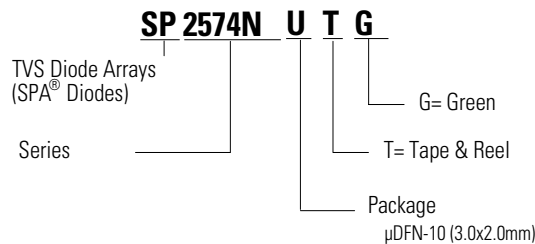
### Product Characteristics

<b>Lead Plating</b>	Pre-Plated Frame
<b>Lead Material</b>	Copper Alloy
<b>Lead Coplanarity</b>	0.004 inches(0.102mm)
<b>Substrate material</b>	Silicon
<b>Body Material</b>	Molded Compound
<b>Flammability</b>	UL Recognized compound meeting flammability rating V-0

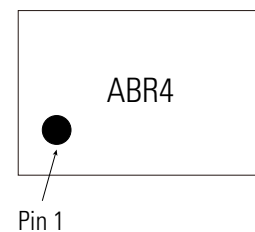
### Ordering Information

Part Number	Package	Min. Order Qty.
SP2574NUTG	μDFN-10 (3.0x2.0mm)	3000

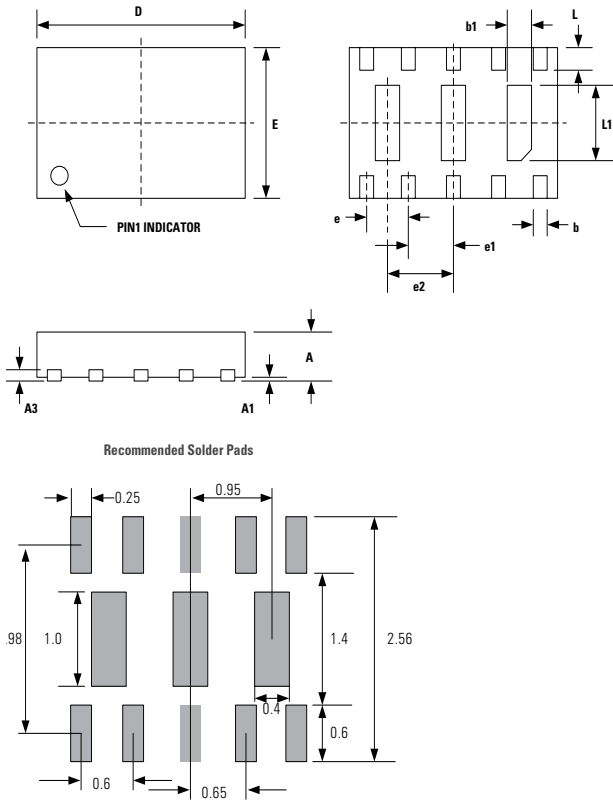
### Part Numbering System



### Part Marking System



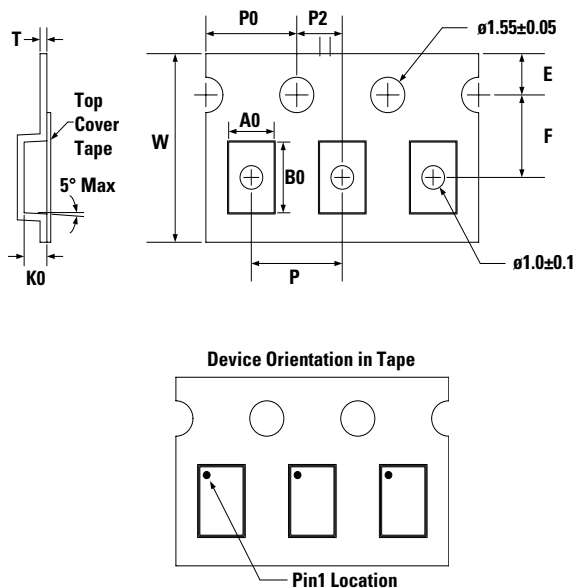
**Package Dimensions —  $\mu$ DFN-10 (3.0x2.0mm)**



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

**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

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