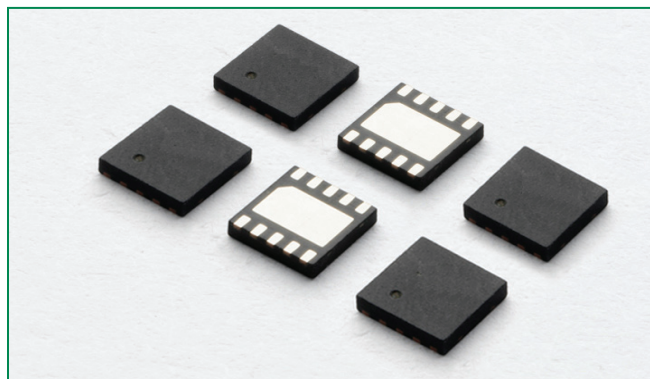
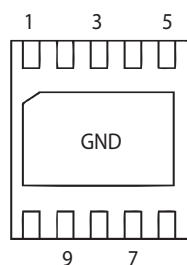


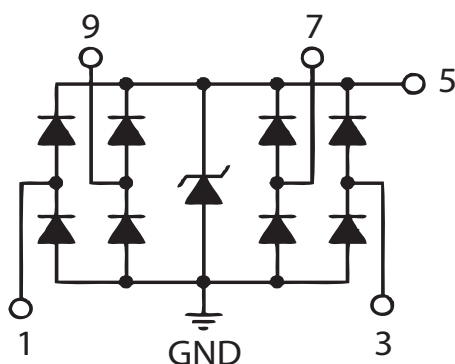
### SP2504N Series 2.5V 20A Diode Array



#### Pinout



#### 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.

#### Description

The SP2504N integrates 4 channels of low capacitance diodes with an additional zener diode to protect sensitive I/O pins against lightning induced surge events and ESD. This robust device can safely absorb up to 20A per IEC61000-4-5 ( $t_p=8/20\mu s$ ) without performance degradation and a minimum  $\pm 30kV$  ESD per IEC61000-4-2 international standard. The low loading capacitance makes the SP2504N ideal for protecting high-speed signal pins.

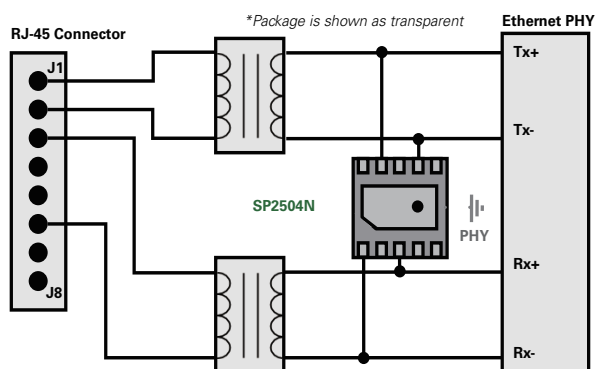
#### Features

- ESD, IEC61000-4-2,  $\pm 30kV$  contact,  $\pm 30kV$  air
- EFT, IEC61000-4-4, 40A ( $t_p=5/50ns$ )
- Lightning, IEC61000-4-5, 20A ( $t_p=8/20\mu s$ )
- Low capacitance of 3.5pF (TYP) per I/O
- Low leakage current of  $1\mu A$  (MAX) at 2.5V

#### Applications

- 10/100/1000 Ethernet Interfaces
- Customer Premise Equipment (CPE)
- VoIP Phones
- Set Top Boxes
- PBX Systems

#### Application Example



SP2504N

### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Current ( $t_p=8/20\mu s$ )	20.0	A
$P_{PK}$	Peak Pulse Power ( $t_p=8/20\mu s$ )	300	W
$T_{OP}$	Operating Temperature	-40 to 85	°C
$T_{STOR}$	Storage Temperature	-50 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.

### Thermal Information

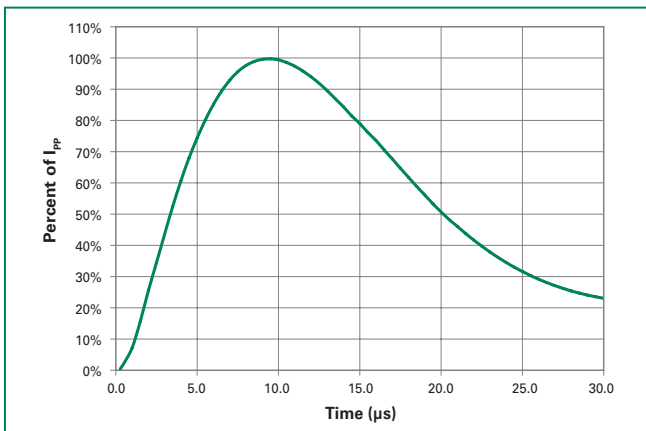
Parameter	Rating	Units
Storage Temperature Range	-65 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

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

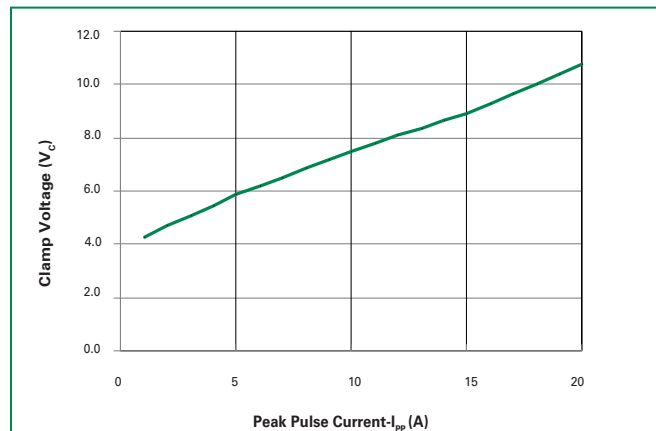
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$				2.5	V
Snap Back Voltage	$V_{SB}$	$I_{SB}=50mA$	2.0			V
Reverse Leakage Current	$I_{LEAK}$	$V_R=2.5V$ , I/O to GND		0.5	1.0	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A$ , $t_p=8/20\mu s$ , Fwd			5.0	V
		$I_{PP}=5A$ , $t_p=8/20\mu s$ , Fwd			6.3	V
		$I_{PP}=10A$ , $t_p=8/20\mu s$ , Fwd			8.0	V
		$I_{PP}=20A$ , $t_p=8/20\mu s$ , Fwd			11.5	V
Dynamic Resistance	$R_{DYN}$	$(V_{C2}-V_{C1})/(I_{PP2}-I_{PP1})$		0.35		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC61000-4-2 (Contact)	$\pm 30$			kV
		IEC61000-4-2 (Air)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_{I/O-GND}$	Reverse Bias=0V		3.5	5.0	pF
Diode Capacitance <sup>1</sup>	$C_{I/O-I/O}$	Reverse Bias=0V		2.0		pF

Note: <sup>1</sup> Parameter is guaranteed by design and/or device characterization.

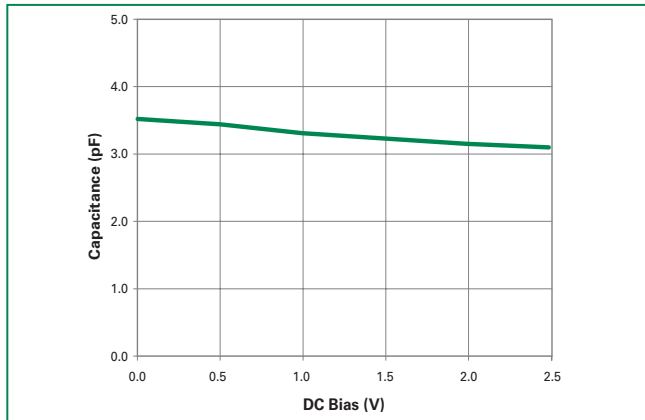
### Pulse Waveform



### Clamping Voltage vs. $I_{PP}$



### Capacitance vs. Bias

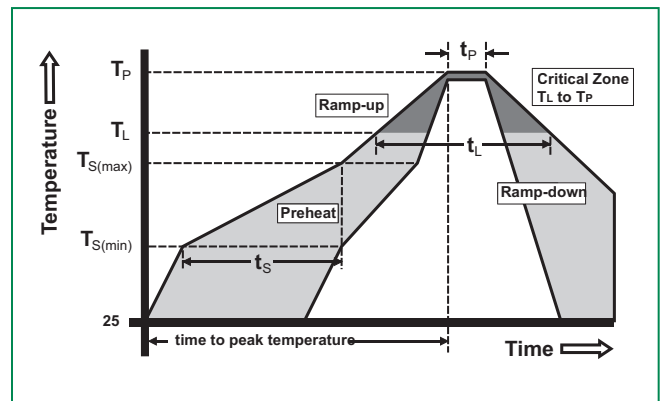


### Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SP2504NUTG	μDFN-10	TH4	3000

### Soldering Parameters

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



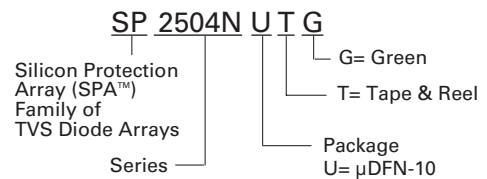
### Product Characteristics

Lead Plating	Pre-Plated Frame
Lead Material	Copper Alloy
Lead Coplanarity	0.0004 inches (0.102mm)
Substitute Material	Silicon
Body Material	Molded Epoxy
Flammability	UL 94 V-0

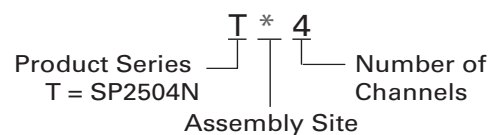
Notes :

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.

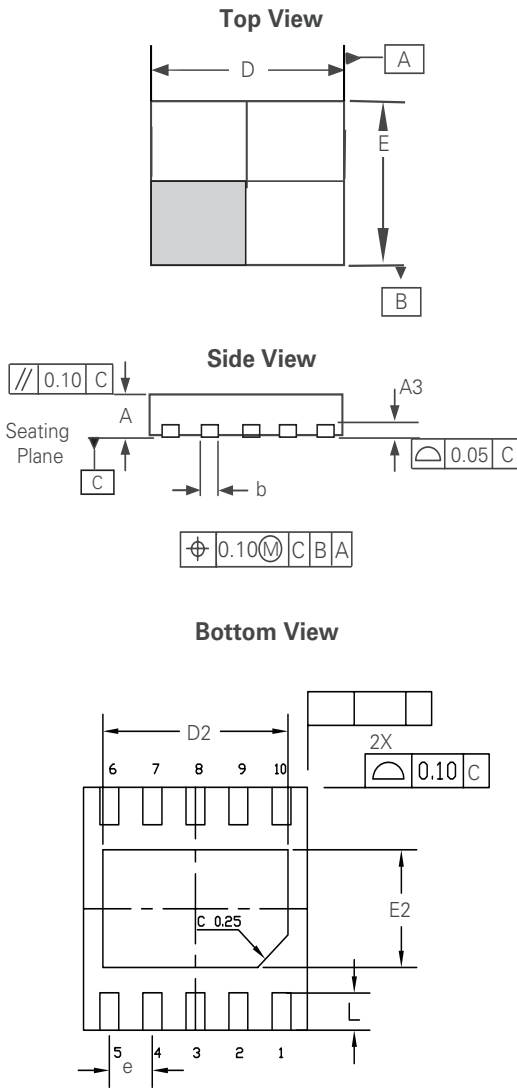
### Part Numbering System



### Part Marking System

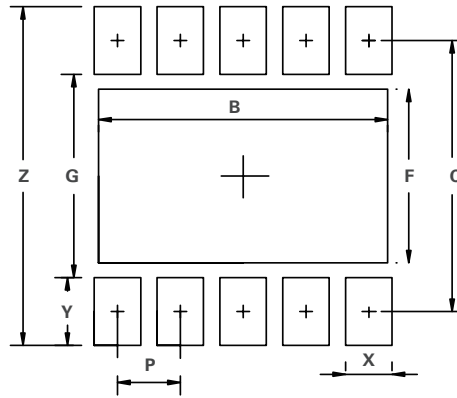


**Package Dimensions —  $\mu$ DFN-10**



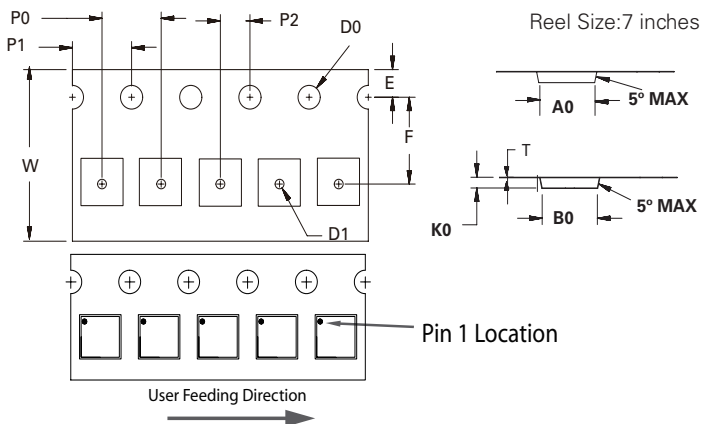
Package	$\mu$ DFN-10 (2.6x2.6mm)					
JEDEC	MO-229					
Symbol	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
<b>A</b>	0.45	0.50	0.55	0.018	0.020	0.022
<b>A3</b>	0.130 Ref			0.005 Ref		
<b>b</b>	0.17	0.22	0.27	0.006	0.008	0.010
<b>D</b>	2.50	2.60	2.70	0.097	0.101	0.105
<b>D2</b>	2.10	2.15	2.20	0.081	0.083	0.085
<b>E</b>	2.50	2.60	2.70	0.097	0.101	0.105
<b>E2</b>	1.21	1.26	1.31	0.046	0.049	0.051
<b>e</b>	0.50 BSC			0.020 BSC		
<b>L</b>	0.35	0.40	0.45	0.014	0.016	0.018

**Recommended Solder Pads  $\mu$ DFN-10L 2.6x2.6mm**



Dimension		
Symbol	Millimeters	Inches
<b>B</b>	2.30	0.091
<b>C</b>	2.20	0.087
<b>F</b>	1.41	0.056
<b>G</b>	1.65	0.065
<b>P</b>	0.50	0.020
<b>X</b>	0.37	0.015
<b>Y</b>	0.55	0.022
<b>Z</b>	2.75	0.108

**Embossed Carrier Tape & Reel Specification —  $\mu$ DFN-10 (2.6x2.6mm)**



Symbol	Millimeters
<b>A0</b>	2.82 +/- 0.05
<b>B0</b>	2.82 +/- 0.05
<b>D0</b>	$\varnothing 1.50 + 0.10$
<b>D1</b>	$\varnothing 0.50 + 0.05$
<b>E</b>	1.75 +/- 0.10
<b>F</b>	3.50 +/- 0.05
<b>K0</b>	0.76 +/- 0.05
<b>P0</b>	4.00 +/- 0.10
<b>P1</b>	4.00 +/- 0.10
<b>P2</b>	2.00 +/- 0.05
<b>T</b>	0.25 +/- 0.02
<b>W</b>	8.00 + 0.30 /- 0.10