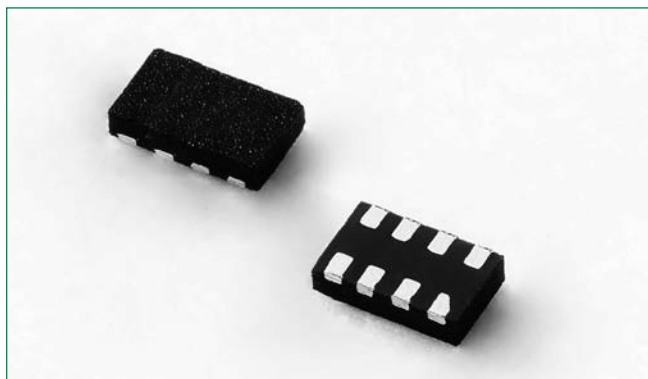
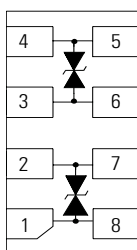


## SP3312T Series 3.3V 15A Diode Array



### Pinout



### Functional Block Diagram



### Description

The SP3312T integrates 4 channels (2 differential pair) of low capacitance diodes to protect sensitive I/O pins against lightning induced surge events and ESD. This robust component can safely absorb up to 15A per IEC 61000-4-5 ( $t_p=8/20\mu s$ ) without performance degradation and a minimum  $\pm 30kV$  ESD per IEC 61000-4-2 international standard. The low loading capacitance makes the SP3312T ideal for protecting high-speed signal pins.

### Features

- ESD, IEC 61000-4-2,  $\pm 30kV$  contact,  $\pm 30kV$  air
- EFT, IEC 61000-4-4, 40A ( $t_p=5/50ns$ )
- Lightning, IEC 61000-4-5 2nd edition, 15A ( $t_p=8/20\mu s$ )
- Low capacitance of 1.3pF (TYP) per I/O
- Low leakage current of  $0.01\mu A$  (TYP) at 3.3V
- Low variation in capacitance vs. bias voltage: 0.3pF Typical ( $V_R=0$  to 2.5V)
- AEC-Q101 qualified
- Moisture Sensitivity Level (MSL-1)

### Applications

- 10/100/1000 Ethernet
- Integrated magnetics/RJ45 connectors
- LAN/WAN Equipment
- Security Cameras
- Industrial Controls
- Notebook & Desktop Computers

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 ( $t_p=8/20\mu s$ )	15.0	A
$P_{PK}$	Peak Pulse Power ( $t_p=8/20\mu s$ )	250	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 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.

### Thermal Information

Parameter	Rating	Units
Storage Temperature Range	-55 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

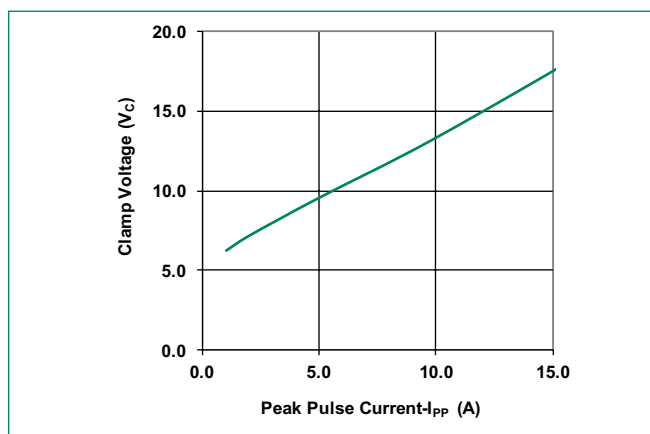
### Electrical Characteristics ( $T_{OP}=25^{\circ}C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$				3.3	V
Snap Back Voltage	$V_{SB}$	$I_{SB}=50mA$	2.8			V
Reverse Leakage Current	$I_{LEAK}$	$V_R=3.3V$ , I/O to GND		0.01	0.05	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A$ , $t_p=8/20\mu s$ , Fwd		6.0		V
		$I_{PP}=2A$ , $t_p=8/20\mu s$ , Fwd		7.0		V
		$I_{PP}=10A$ , $t_p=8/20\mu s$ , Fwd		13.0		V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p=100ns$ , I/O to GND		0.40		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact)	$\pm 30$			kV
		IEC 61000-4-2 (Air)	$\pm 30$			kV
Variation in Capacitance with Reverse Bias <sup>1</sup>		Pins 1, 8 to 2, 7 and pins 3, 6 to 4, 5 $V_R=0$ to 2.5V, $f=1MHz$		0.3	2.0	pF
Diode Capacitance <sup>1</sup>	$C_{I/O-GND}$	Reverse Bias=0V		1.3	4.0	pF

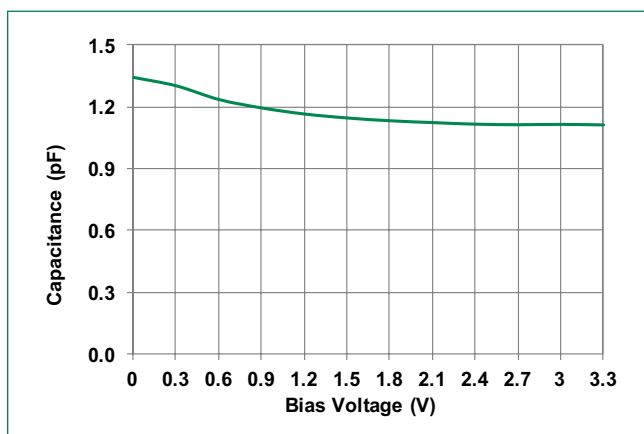
**Note:**

- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window  $t_1=70ns$  to  $t_2=90ns$

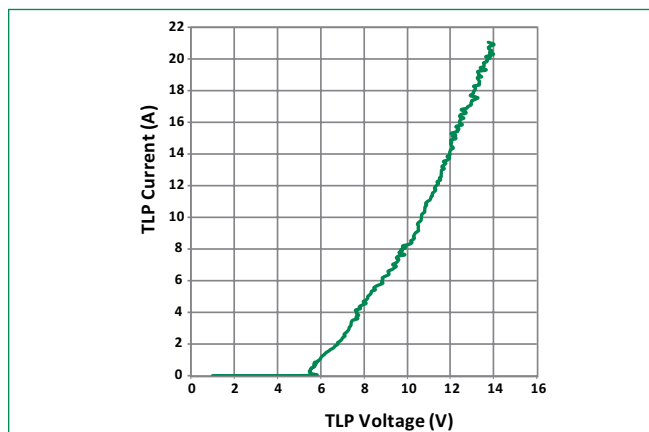
### Clamping Voltage vs $I_{PP}$



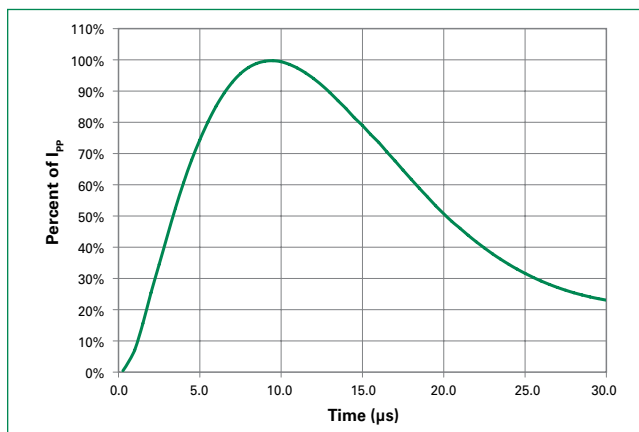
### Capacitance vs. Reverse Bias



### Transmission Line Pulsing (TLP) Plot

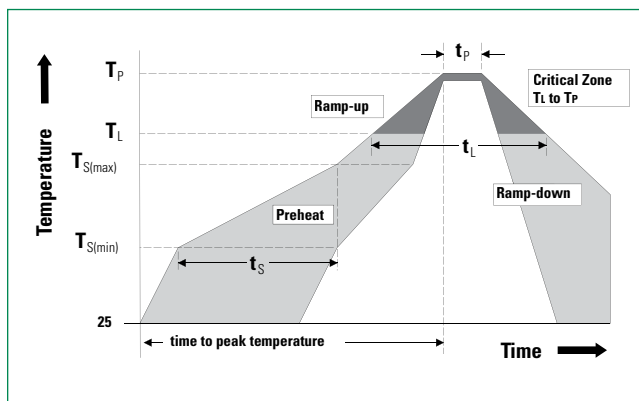


### 8/20μs Pulse Waveform



### 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

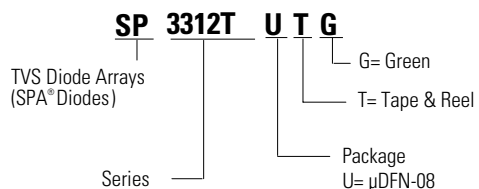
#### Notes :

1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.

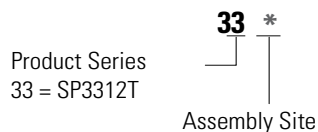
### Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SP3312TUTG	μDFN-08	33H	3000

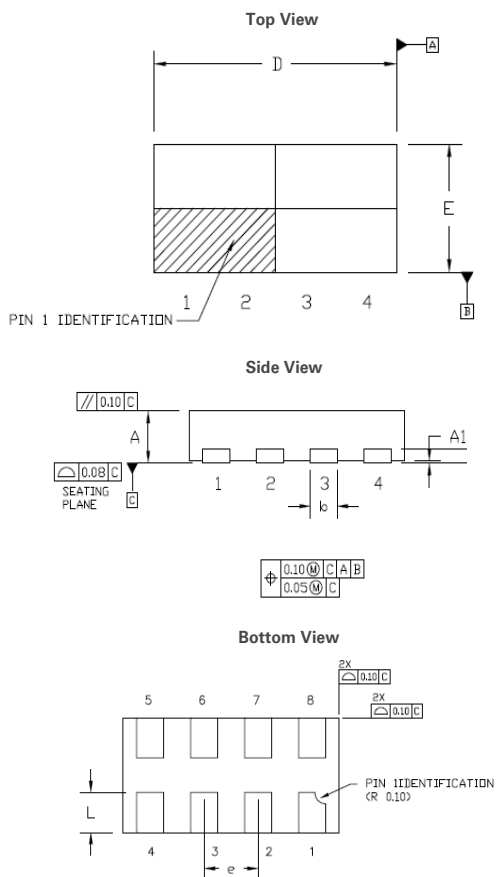
## Part Numbering System



## Part Marking System

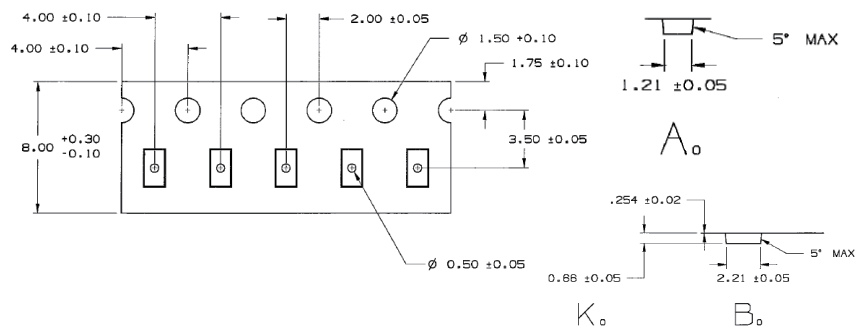


## Package Dimensions — $\mu$ DFN-08



Package	$\mu$ DFN-08 (2.0x1.0mm)			
JEDEC	MO-229			
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.45	0.55	0.018	0.022
A1	0	0.05	0	0.002
b	0.20	0.30	0.008	0.012
D	1.90	2.10	0.075	0.083
E	0.90	1.10	0.035	0.043
R	0.10 BSC		0.004 BSC	
e	0.50 BSC		0.020 BSC	
L	0.30	0.40	0.012	0.016

## Embossed Carrier Tape & Reel Specification — $\mu$ DFN-08



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