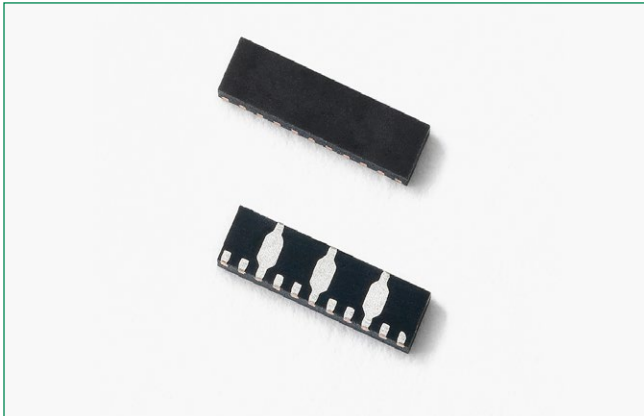


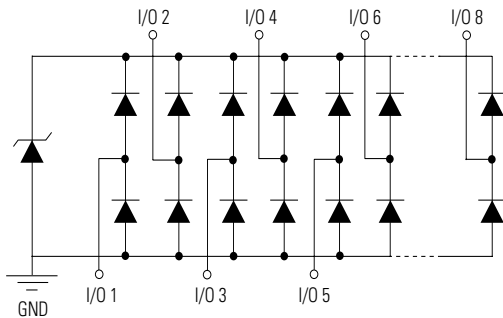
## SP8008 Series Diode Array



### Description

The SP8008 integrates eight channels of ultra low capacitance common mode protection for electronic equipment exposed to electrostatic discharges (ESD). This robust component can effectively protect against ESD events exceeding the IEC 61000-4-2 contact ESD level of  $\pm 8$  kV without any performance degradation. The extremely low off-state capacitance of this component makes it ideal for protecting high speed signal pins such as V-by-One, Embedded DisplayPort, HDMI 1.0 through 2.1 and USB 2.0/3.0/3.1.

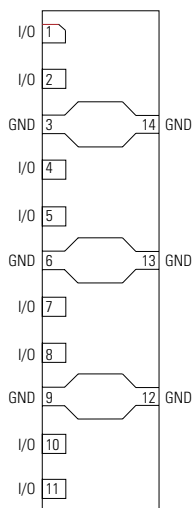
### Pinout



### Features

- ESD, IEC 61000-4-2, +30kV/-23kV contact, +30kV/-23kV air
- EFT, IEC 61000-4-4, 40A ( $t_p=5/50$ ns)
- Lightning, IEC 61000-4-5 2<sup>nd</sup> edition, 4A ( $t_p=8/20$  $\mu$ s)
- Low capacitance of 0.3pF @0V, 3GHz (TYP) per I/O
- 5634 N Menard Ave,
- Low leakage current of 0.5 $\mu$ A (MAX) at 5V
- Small form factor  $\mu$ DFN packages (JEDEC MO-229) saves board space and supports straight-through routing of the data lines.
- Halogen free, Lead free and RoHS compliant
- UL Recognized compound meeting flammability rating V-0
- AEC-Q101 qualified

### Functional Block Diagram



### Applications

- LCD/PDP TVs
- LCD/LED Monitors
- Notebook Computers
- Ultrabooks
- Automotive Displays
- Flat Panel Displays
- Digital Signage
- HD Cameras/Projectors
- USB and HDMI interfaces

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 ( $t_p=8/20\mu s$ )	4.0	A
$T_{OP}$	Operating Temperature	-40 to 125	°C
$T_{STOR}$	Storage Temperature	-55 to 150	°C

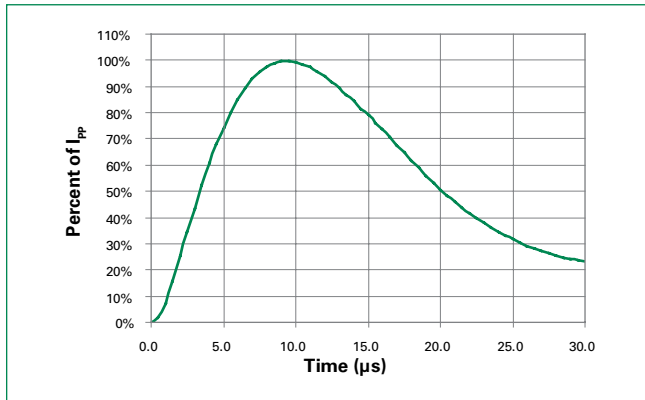
**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

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

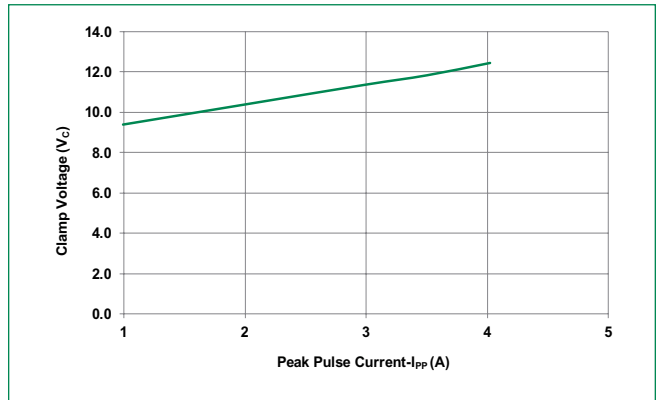
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R \leq 1\mu A$			5	V
Breakdown Voltage	$V_{BR}$	$I_R = 1mA$	6			V
Reverse Leakage Current	$I_{LEAK}$	$V_R = 5V, I/O$ to GND			0.5	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP} = 1A, t_p = 8/20\mu A, Fwd$		9.39		V
		$I_{PP} = 2A, t_p = 8/20\mu A, Fwd$		10.38		V
		$I_{PP} = 4A, t_p = 8/20\mu A, Fwd$		12.45		V
Dynamic Resistance <sup>1</sup>	$R_{DYN}$	TLP, $t_p = 100ns, I/O$ to GND		0.4		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact)			+30 / -23	kV
		IEC 61000-4-2 (Air)			+30 / -23	kV
Diode Capacitance <sup>1</sup>	$C_{I/O-GND}$	Reverse Bias=0V, f=3 GHz		0.3		pF

**Note: 1.** Parameter is guaranteed by design and/or component characterization.

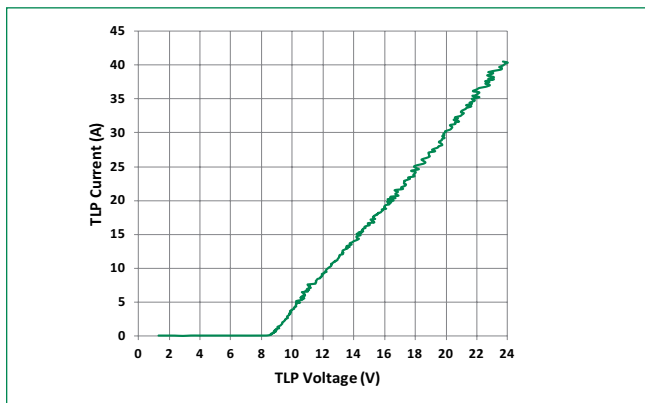
**8/20 $\mu s$  Pulse Waveform**



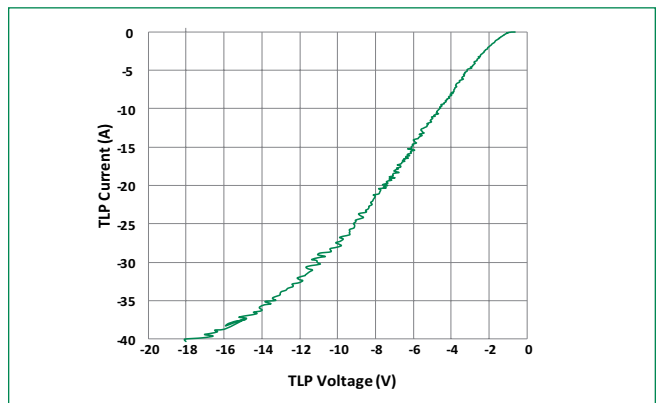
**Clamping Voltage vs.  $I_{PP}$**



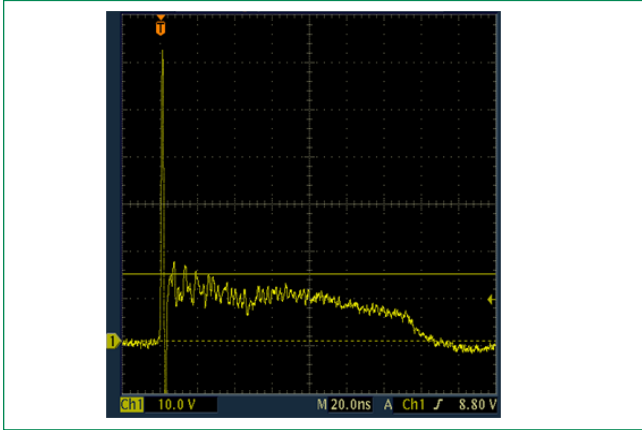
**Positive Transmission Line Pulsing (TLP) Plot**



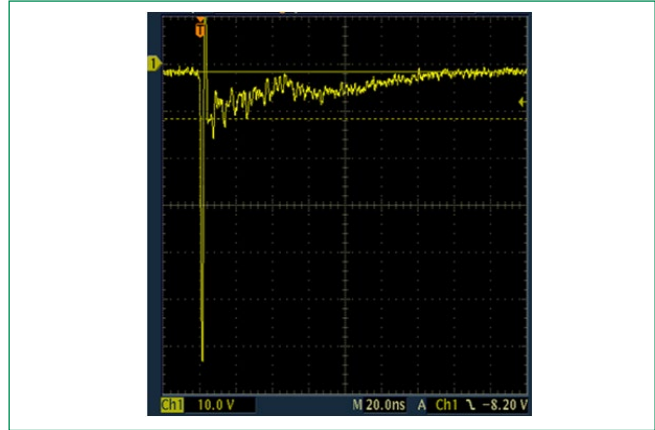
**Negative Transmission Line Pulsing (TLP) Plot**



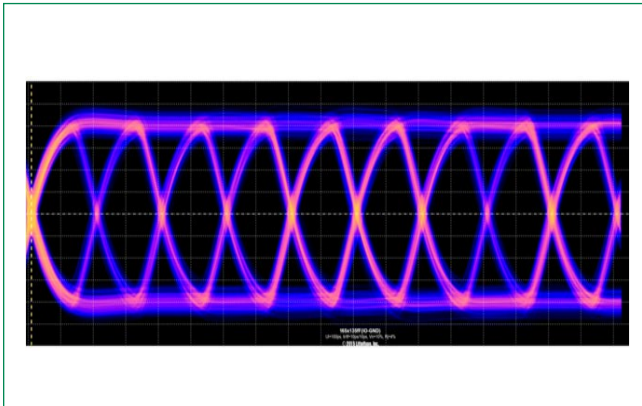
**IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage**



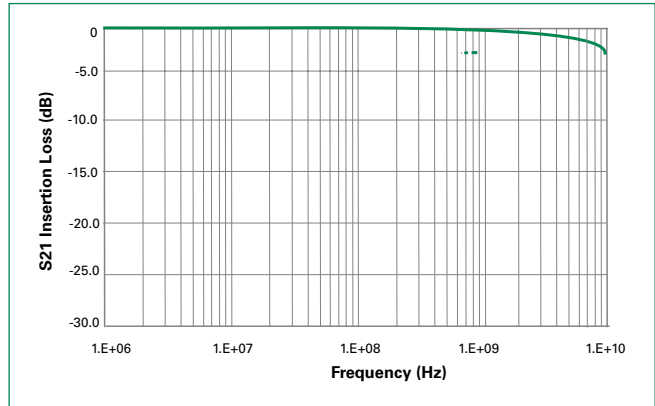
**IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage**



**Eye diagram 5Gbps, 2.5 GHz w/SP8008-08UTG**

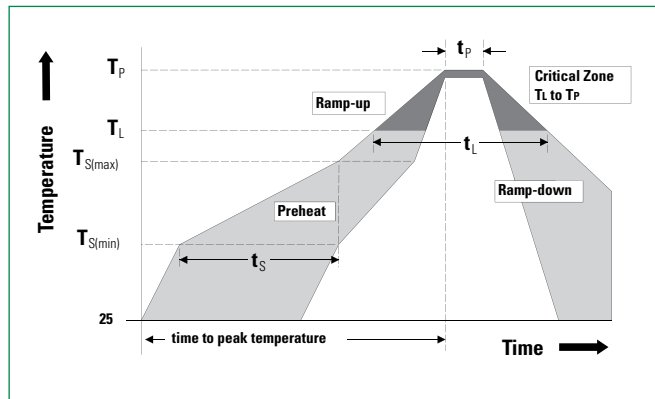


**Insertion Loss Diagram**



**Soldering Parameters**

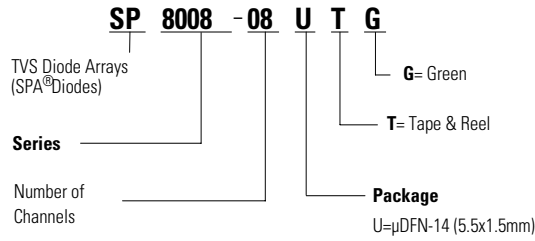
<b>Reflow Condition</b>		Pb – Free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_p$ )	60 – 180 secs
<b>Average ramp up rate (Liquidus) Temp (<math>T_L</math>) to peak</b>		3°C/second max
<b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		3°C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Temperature ( $t_r$ )	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



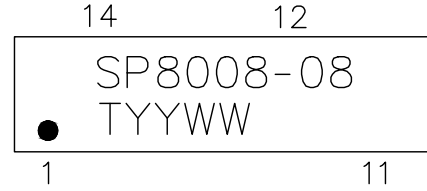
**Product Characteristics**

<b>Lead Plating</b>	Pre-Plated Frame
<b>Lead Material</b>	Copper Alloy
<b>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**

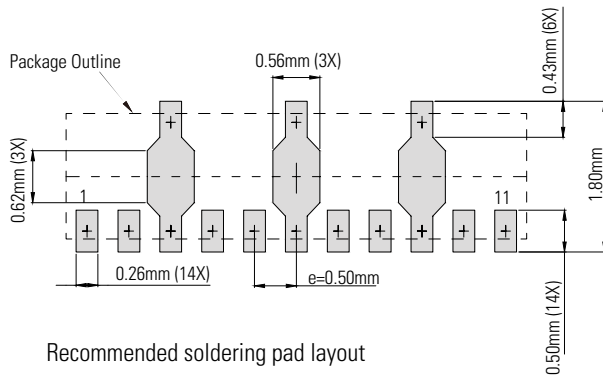
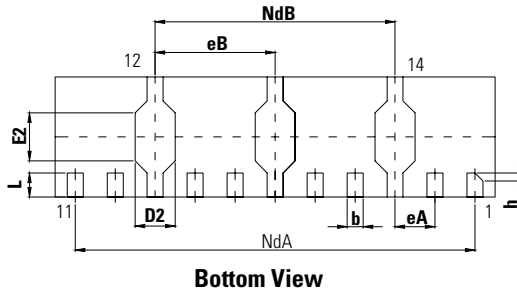
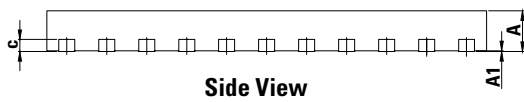
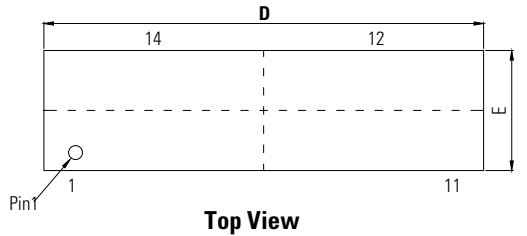


SP8008-08 = Part Number  
T = Assembly Code  
YY = Yearly code  
WW = Weekly code

**Ordering Information**

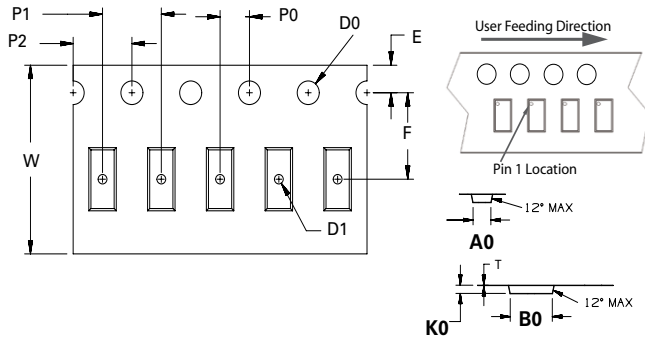
Part Number	Package	Min. Order Qty.
SP8008-08UTG	μDFN-14	3000

**Package Dimensions**



μDFN-14(5.5x1.5x0.5mm)						
JEDEC MO-229						
Symbol	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
b	0.15	0.20	0.25	0.006	0.008	0.010
c	0.10	0.15	0.20	0.004	0.006	0.008
D	5.45	5.50	5.55	0.215	0.217	0.219
D2	0.45	0.50	0.55	0.018	0.020	0.022
NdA	5.00 BSC			0.197 BSC		
eA	0.50 BSC			0.020 BSC		
eB	1.50 BSC			0.059 BSC		
NdB	3.00 BSC			0.118 BSC		
E	1.45	1.50	1.55	0.057	0.059	0.061
E2	0.55	0.60	0.65	0.022	0.024	0.026
L	0.20	0.30	0.40	0.008	0.012	0.016
h	0.05	0.10	0.15	0.002	0.004	0.006

**Embossed Carrier Tape & Reel Specification – μDFN-14**



Symbol	Millimeters
<b>A0</b>	1.75 +/- 0.10
<b>B0</b>	5.75 +/- 0.10
<b>D0</b>	1.50 + 0.10 /-0
<b>D1</b>	Ø 1.0 min
<b>E</b>	1.75 +/- 0.10
<b>F</b>	5.50 +/- 0.05
<b>K0</b>	0.70 +/- 0.10
<b>P0</b>	2.00 +/- 0.05
<b>P1</b>	4.00 +/- 0.10
<b>P2</b>	4.00 +/- 0.10
<b>T</b>	0.30 +/- 0.05
<b>W</b>	12.00 + 0.30 /- 0.10

