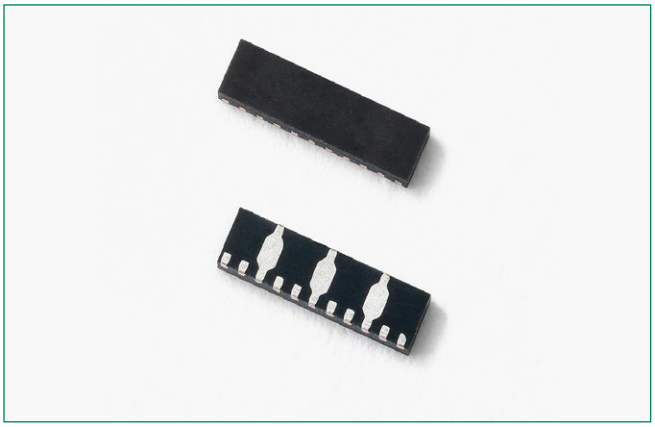
SP8008 Series Diode Array

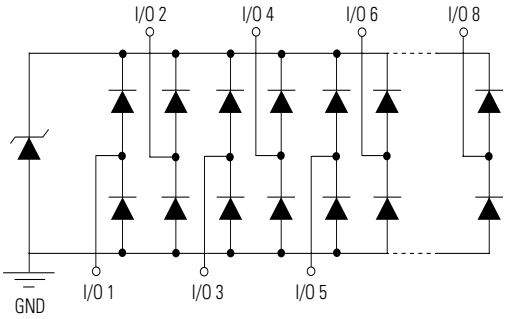
AUTOMOTIVE GRADE HF RoHS Pb GREEN



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 ±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.

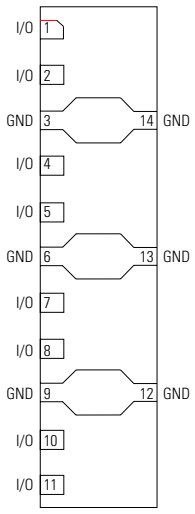
Pinout



Features

- ESD, IEC 61000-4-2, +30kV/-23kV contact, +30kV/-23kV air
- EFT, IEC 61000-4-4, 40A (t_P=5/50ns)
- Lightning, IEC 61000-4-5 2nd edition, 4A (t_P=8/20µs)
- Low capacitance of 0.3pF @0V, 3GHz (TYP) per I/O
- 5634 N Menard Ave,
- Low leakage current of 0.5µA (MAX) at 5V
- Small form factor µDFN 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

Revised: 09/23/19

TVS Diode Array (SPA® Diodes)

General Purpose ESD Protection - SP8008 Series

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20μs)	4.0	A
T_{OP}	Operating Temperature	-40 to 125	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

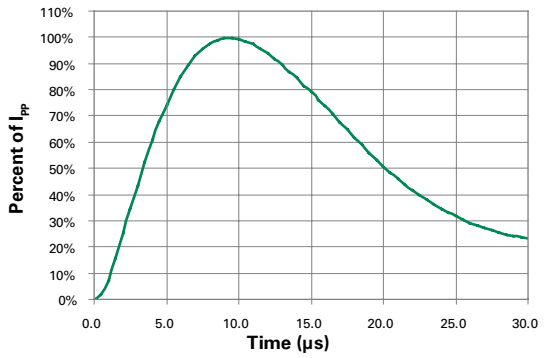
CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Characteristics (T_{OP}=25°C)

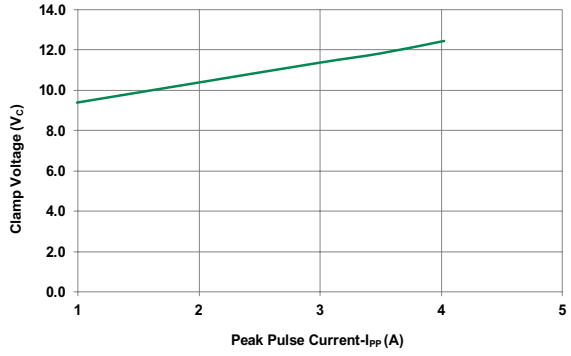
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R≤1μA			5	V
Breakdown Voltage	V_{BR}	I_R=1mA	6			V
Reverse Leakage Current	I_{LEAK}	V_R=5V, I/O to GND			0.5	μA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20μA, Fwd		9.39		V
		I_{PP}=2A, t_p=8/20μA, Fwd		10.38		V
		I_{PP}=4A,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

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

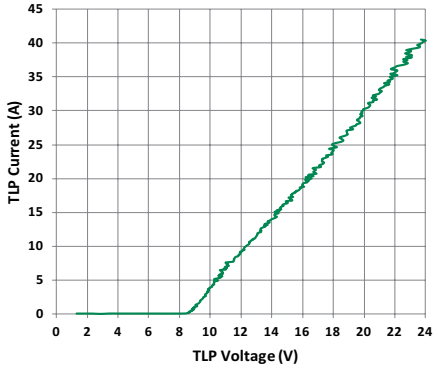
8/20μs Pulse Waveform



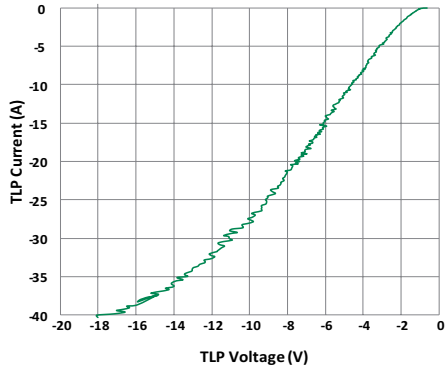
Clamping Voltage vs. I_{PP}



Positive Transmission Line Pulsing (TLP) Plot



Negative Transmission Line Pulsing (TLP) Plot

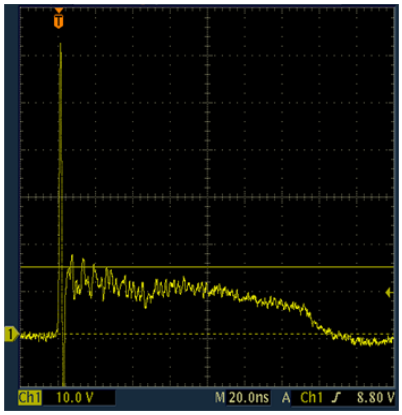


Revised: 09/23/19

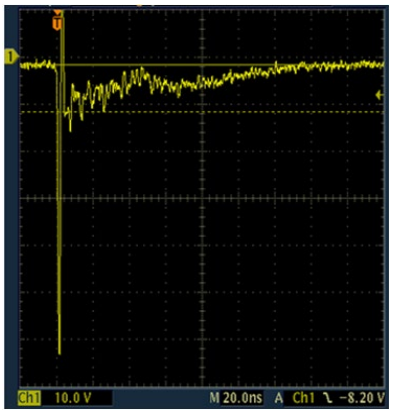
TVS Diode Array (SPA®Diodes)

General Purpose ESD Protection - SP8008 Series

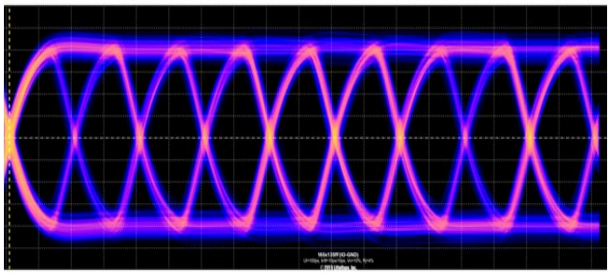
IEC 61000–4–2 +8 kV Contact ESD Clamping Voltage



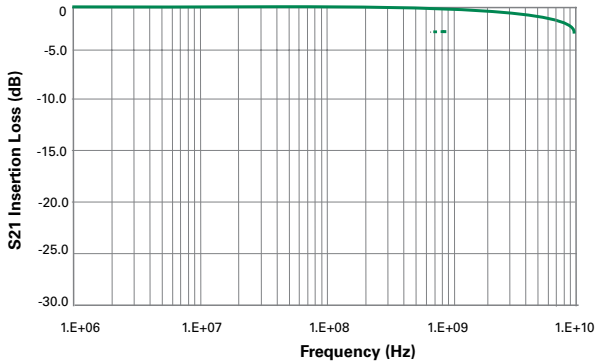
IEC 61000–4–2 -8 kV Contact ESD Clamping Voltage



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

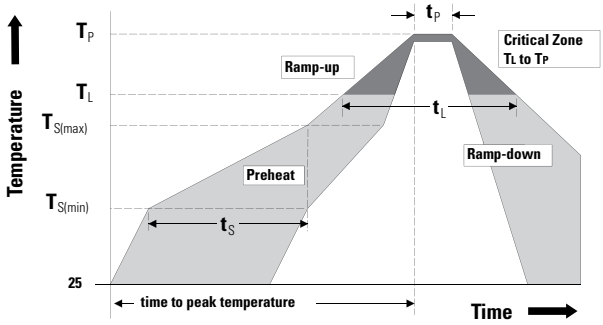


Insertion Loss Diagram



Soldering Parameters

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)		$260^{+0/-5}$ °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

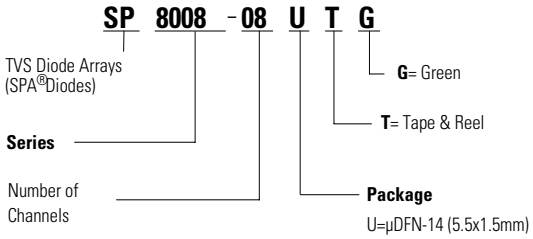
Lead Plating	Pre-Plated Frame
Lead Material	Copper Alloy
Substrate Material	Silicon
Body Material	Molded Compound
Flammability	UL Recognized compound meeting flammabilit y rating V-0.

Revised: 09/23/19

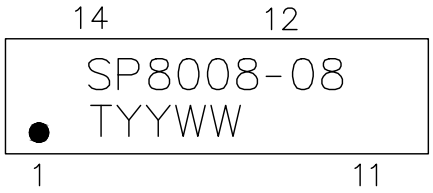
TVS Diode Array (SPA®Diodes)

General Purpose ESD Protection - SP8008 Series

Part Numbering System



Part Marking System

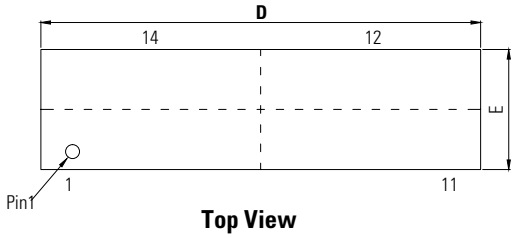


SP8008-08 = Part Number
T = Assembly Code
YY = Yearly code
WW = Weekly code

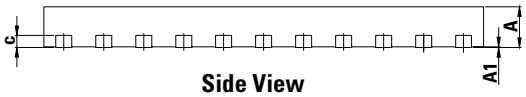
Ordering Information

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

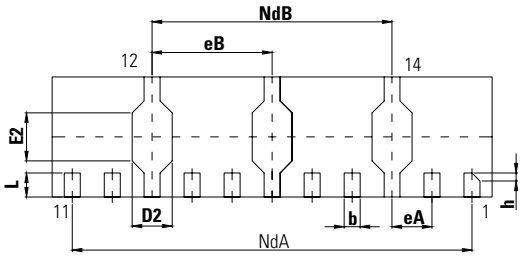
Package Dimensions



Top View

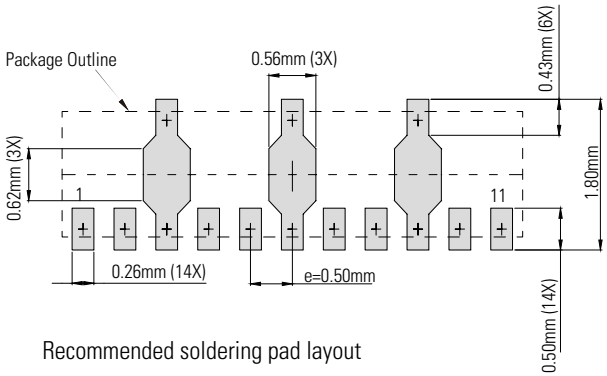


Side View



Bottom View

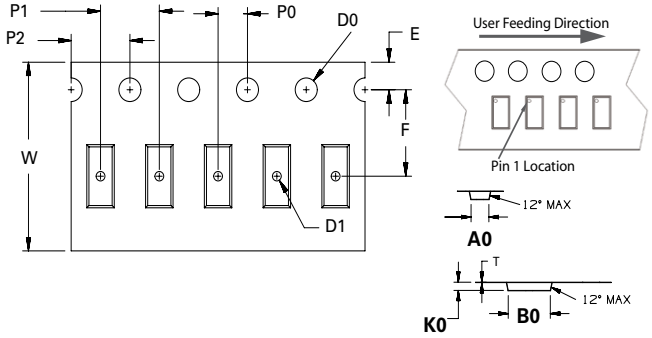
µDFN-14(5.5x1.5x0.5mm) JEDEC MO-229						
Symbol	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
b	0.15	0.20	0.25	0.006	0.008	0.010
c	0.10	0.15	0.20	0.004	0.006	0.008
D	5.45	5.50	5.55	0.215	0.217	0.219
D2	0.45	0.50	0.55	0.018	0.020	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



Recommended soldering pad layout

Revised: 09/23/19

Embossed Carrier Tape & Reel Specification — µDFN-14



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