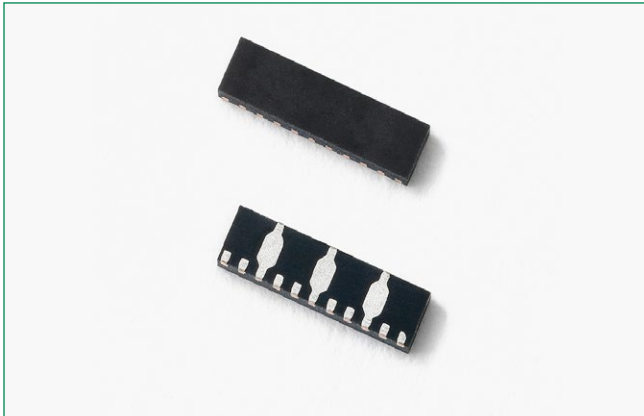


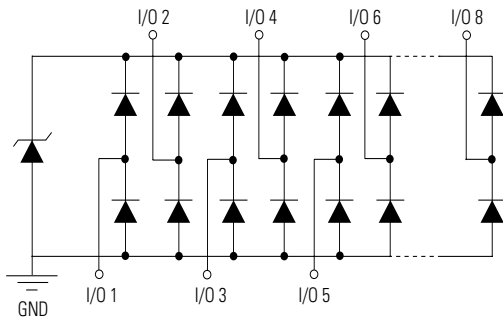
SP8008 Series Diode Array



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 ± 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.

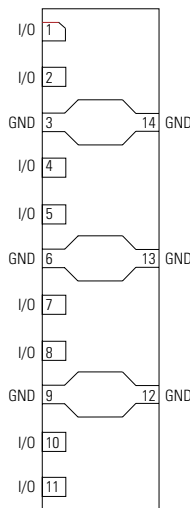
Pinout



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 2nd edition, 4A ($t_p=8/20$ μs)
- 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

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 |

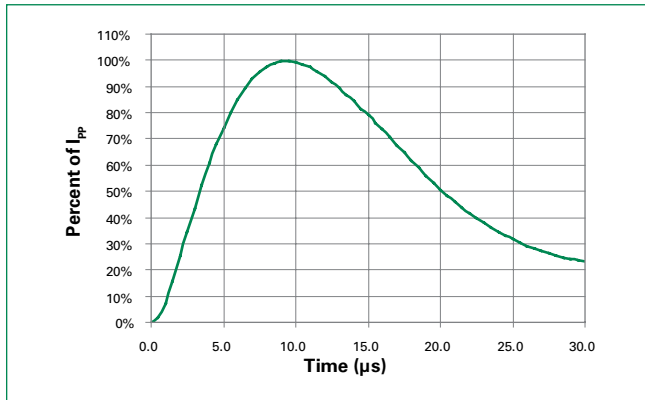
CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

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

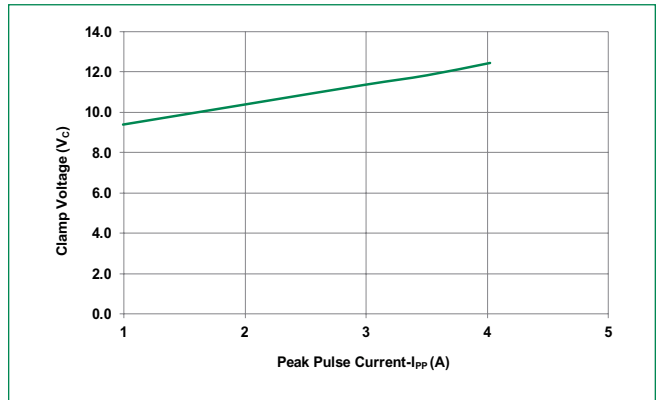
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|------------------------------------|---------------|---|-----|-------|-----------|----------|
| Reverse Standoff Voltage | V_{RWM} | $I_R \leq 1\mu A$ | | | 5 | V |
| Breakdown Voltage | V_{BR} | $I_R = 1mA$ | 6 | | | V |
| Reverse Leakage Current | I_{LEAK} | $V_R = 5V$, I/O to GND | | | 0.5 | μA |
| Clamp Voltage ¹ | 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 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.

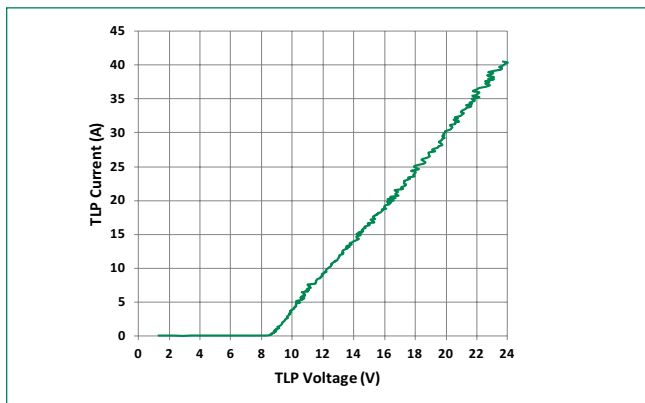
8/20 μs Pulse Waveform



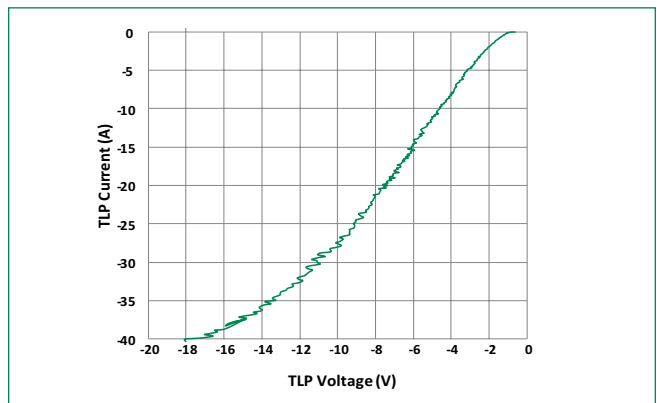
Clamping Voltage vs. I_{PP}



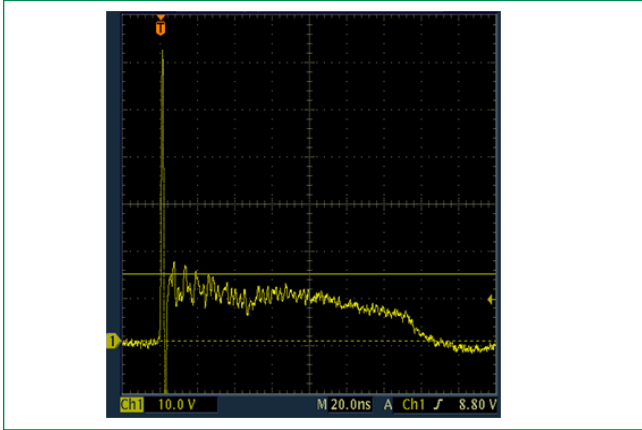
Positive Transmission Line Pulsing (TLP) Plot



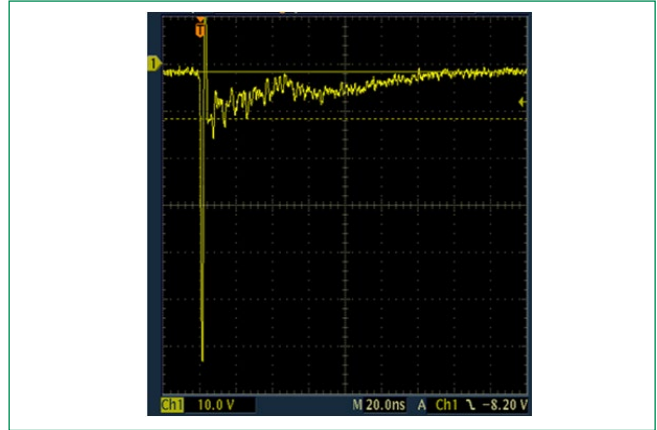
Negative Transmission Line Pulsing (TLP) Plot



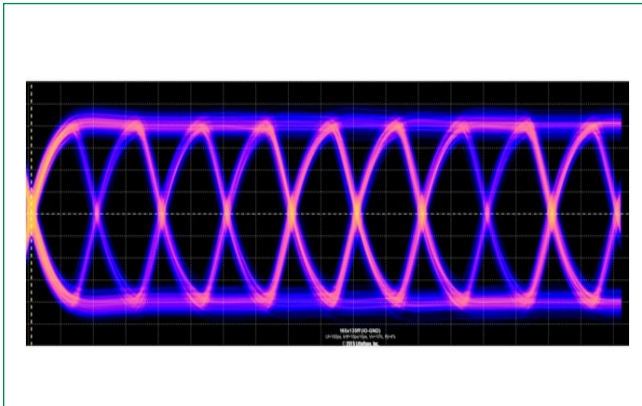
IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage



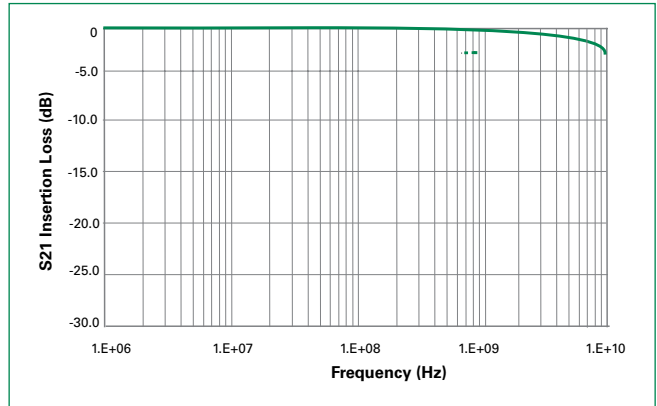
IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage



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

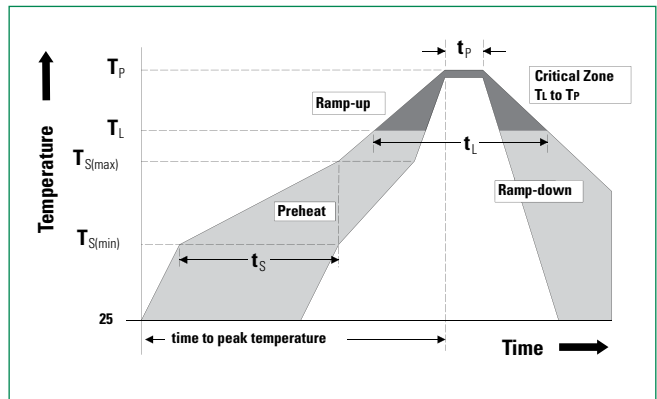


Insertion Loss Diagram



Soldering Parameters

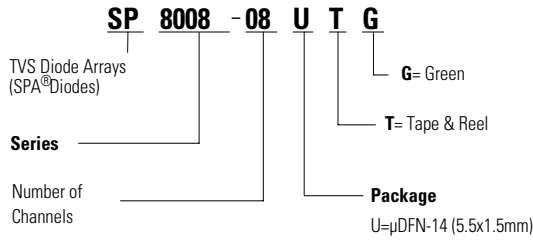
| | | |
|--|------------------------------------|-------------------------|
| Reflow Condition | | Pb – Free assembly |
| Pre Heat | - Temperature Min ($T_{s(min)}$) | 150°C |
| | - Temperature Max ($T_{s(max)}$) | 200°C |
| | - Time (min to max) (t_s) | 60 – 180 secs |
| Average ramp up rate (Liquidus) 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_r) | 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 |



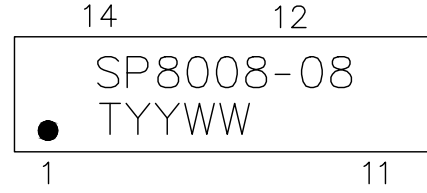
Product Characteristics

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

Part Numbering System



Part Marking System

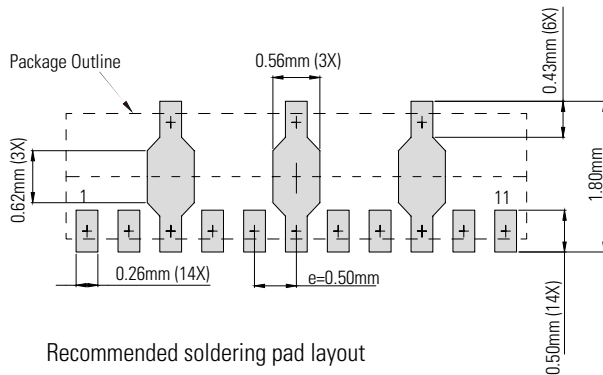
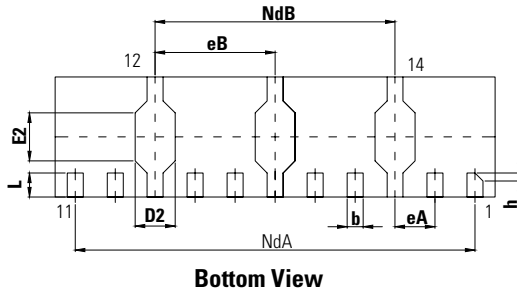
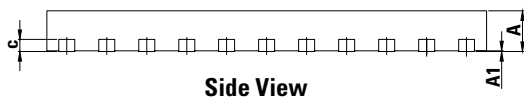
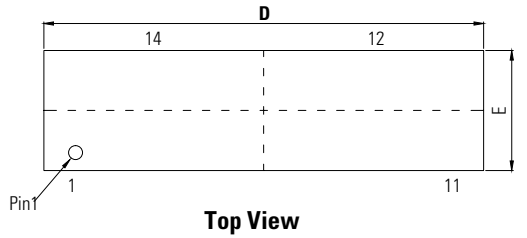


SP8008-08 = Part Number
T = Assembly Code
YY = Yearly code
WW = Weekly code

Ordering Information

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

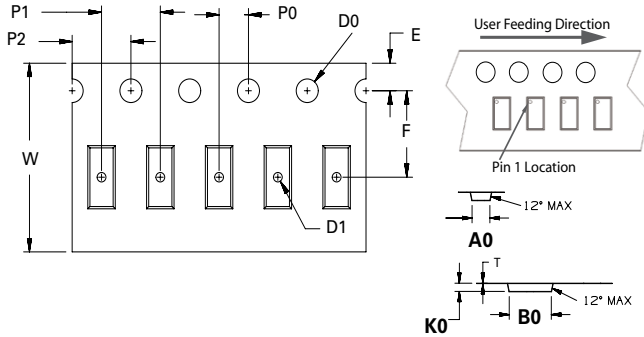
Package Dimensions



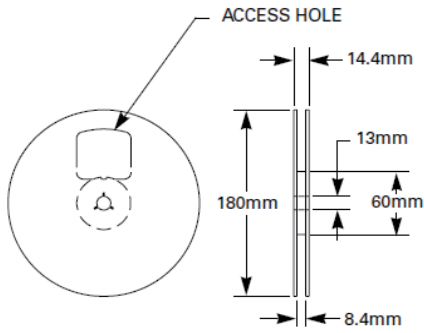
Recommended soldering pad layout

| 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 |
|-----------|----------------------|
| 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 |



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Revised: 09/23/19

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