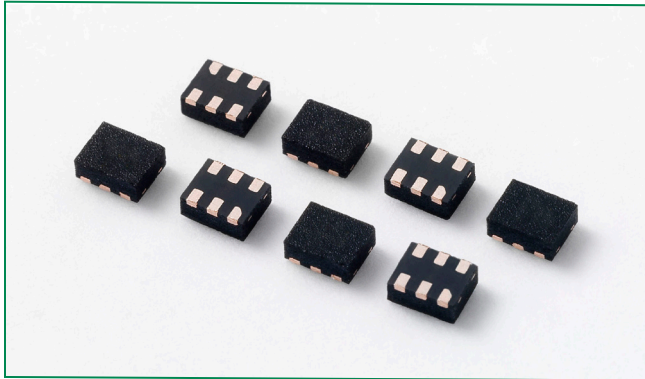


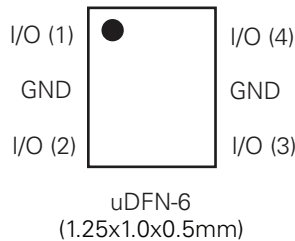
HF **RoHS** **Pb** **GREEN** **SP1010 Lead-Free/Green Series**



Description

Zener diodes fabricated in a proprietary silicon avalanche technology protect each I/O pin to provide a high level of protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust diodes can safely absorb repetitive ESD strikes at the maximum level specified in the IEC 61000-4-2 international standard (Level 4, ±8kV contact discharge) without performance degradation. Their very low loading capacitance also makes them ideal for protection high-speed signal pins.

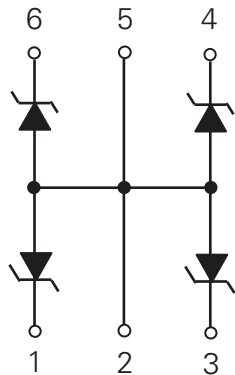
Pinout



Features

- ESD, IEC61000-4-2, ±8kV contact, ±15kV air
- Lightning, IEC61000-4-5, 1A ($t_p=8/20\mu s$)
- Low capacitance of 3.5pF (TYP) per I/O
- Low leakage current of 1µA (MAX) at 5V
- Tiny uDFN package (1.25mm x 1.0mm x 0.5mm)
- EFT protection IEC61000-4-4, 40A (5/50ns)

Functional Block Diagram



Applications

- Notebook
- Netbook
- Ultra mobile PC
- Mobile phone
- Portable navigation device
- Portable medical device
- MP3/PMP
- Digital camera

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 Pulse Current ($t_p=8/20\mu s$) | 1.0 | A |
| T_{OP} | Operating Temperature | -40 to 85 | °C |
| T_{STOR} | Storage Temperature | -60 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 10s) | 260 | °C |

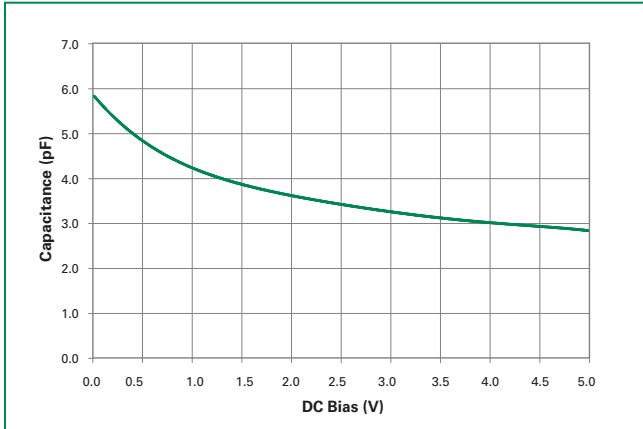
Electrical Characteristics ($T_{OP}=25^\circ C$)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|------------------------------------|------------|----------------------------------|----------|-----|-----|---------|
| Reverse Voltage Drop | V_R | $I_R = 1\text{mA}$ | 6.0 | 7.5 | 8.0 | V |
| Reverse Standoff Voltage | V_{RWM} | $I_R \leq 1\mu A$ | | | 6 | V |
| Reverse Leakage Current | I_{LEAK} | $V_R = 5V$ | | 0.1 | 1 | μA |
| ESD Withstand Voltage ¹ | V_{ESD} | IEC61000-4-2 (Contact Discharge) | ± 8 | | | kV |
| | | IEC61000-4-2 (Air Discharge) | ± 15 | | | kV |
| Diode Capacitance ¹ | C_D | Reverse Bias = 0V | | 6 | 7 | pF |
| | | Reverse Bias = 2.5V | | 3.5 | | pF |

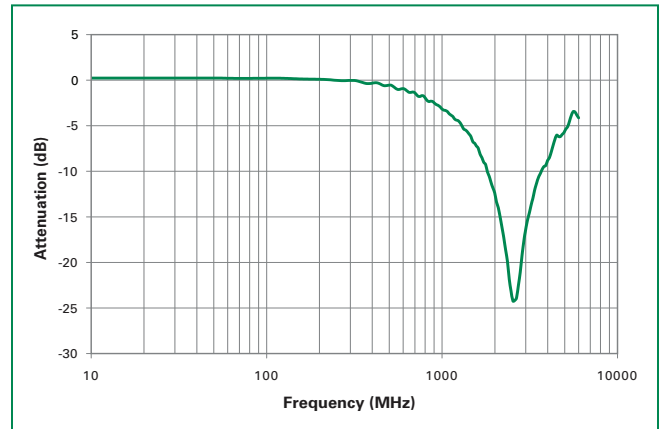
Notes:

1. Parameter is guaranteed by design and/or device characterization.

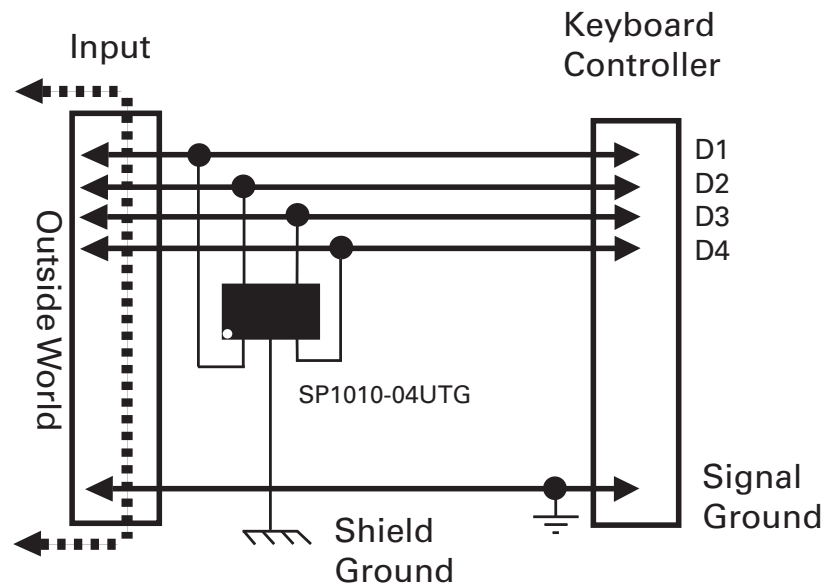
Capacitance vs. Reverse Bias



Insertion Loss (S21) I/O to GND



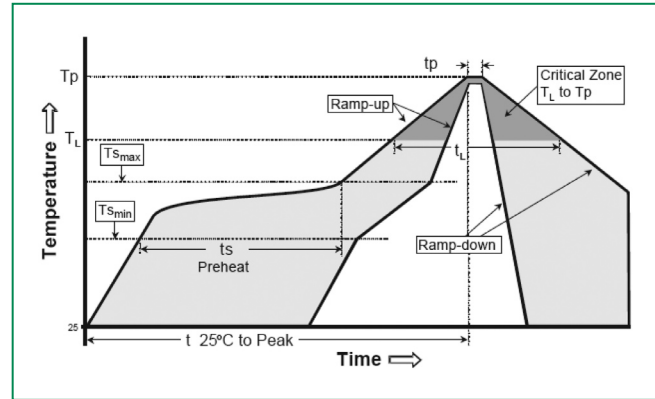
Application Example



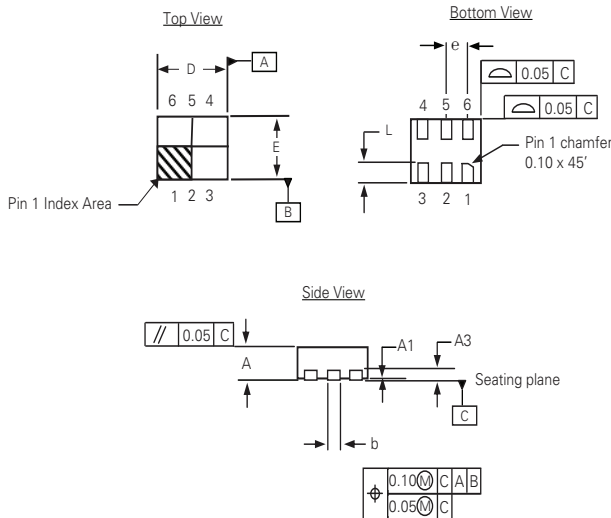
Lead-Free/Green SP1010

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) | | 250 ^{+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 |

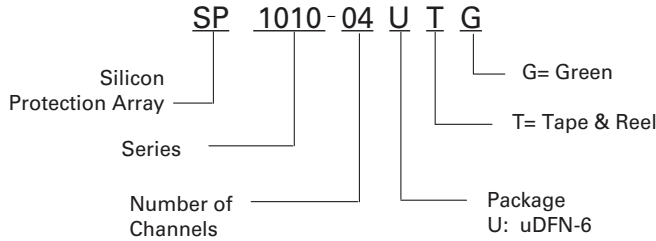


Package Dimensions - uDFN-6 (1.25x1.0x0.5mm)



| uDFN-6 (1.25x1.0x0.5mm) | | | | |
|-------------------------|-------------|------|-----------|-------|
| Symbol | Millimeters | | Inches | |
| | Min | Max | Min | Max |
| A | 0.45 | 0.55 | 0.018 | 0.022 |
| A1 | 0.00 | 0.05 | 0.000 | 0.002 |
| A3 | 0.127 REF | | 0.005 REF | |
| b | 0.15 | 0.25 | 0.006 | 0.010 |
| D | 1.20 | 1.30 | 0.047 | 0.051 |
| D2 | - | - | - | - |
| E | 0.95 | 1.05 | 0.037 | 0.041 |
| E2 | - | - | - | - |
| e | 0.4 REF | | 0.016 REF | |
| L | 0.25 | 0.35 | 0.010 | 0.014 |

Part Numbering System



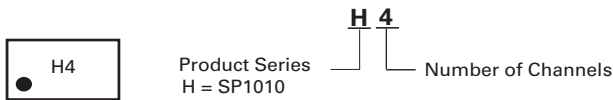
Product Characteristics

| | |
|----------------------------|-------------------------|
| Lead Plating | Pre-Plated Frame |
| Lead Material | Copper Alloy |
| Lead Coplanarity | 0.0004 inches (0.102mm) |
| Substitute Material | Silicon |
| Body Material | Molded Epoxy |
| Flammability | UL94-V-0 |

Notes :

1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. All specifications comply to JEDEC SPEC MO-223 Issue A
5. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
6. Package surface matte finish VDI 11-13.

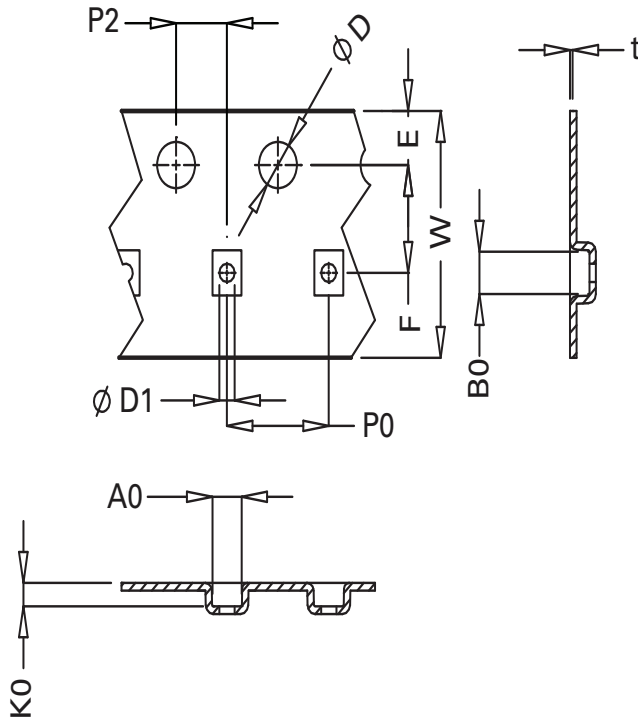
Part Marking System



Ordering Information

| Part Number | Package | Marking | Min. Order Qty. |
|--------------|-------------------------|---------|-----------------|
| SP1010-04UTG | uDFN-6 (1.25x1.0x0.5mm) | H4 | 3000 |

Embossed Carrier Tape & Reel Specification – uDFN-6 (1.25x1.0x0.5mm)



| Symbol | Millimeters | | Inches | |
|-------------|---------------|------|---------------|------|
| | Min | Max | Min | Max |
| E | 1.65 | 1.85 | 0.06 | 0.07 |
| F | 3.45 | 3.55 | 0.14 | 0.14 |
| D1 | 0.50 | 0.65 | 0.02 | 0.03 |
| D | 1.50 MIN | | 0.06 MIN | |
| P0 | 3.90 | 4.10 | 0.15 | 0.16 |
| 10P0 | 40.0 +/- 0.20 | | 1.57 +/- 0.01 | |
| W | 7.90 | 8.30 | 0.31 | 0.33 |
| P2 | 1.95 | 2.05 | 0.08 | 0.08 |
| A0 | 1.09 | 1.19 | 0.04 | 0.05 |
| B0 | 1.42 | 1.52 | 0.06 | 0.06 |
| K0 | 0.71 | 0.81 | 0.03 | 0.03 |
| t | 0.25 TYP | | 0.01 TYP | |

Lead-Free/Green SP1010

SPA™ Silicon Protection Array Products
3.5pF Unidirectional TVS Array for ESD Protection

