

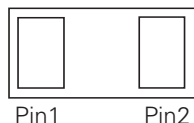
## SP1014 Series 6pF 12kV Bidirectional Discrete TVS



### Description

The SP1014 includes back-to-back Zener diodes which provides protection for electronic equipment that may experience destructive electrostatic discharges (ESD). It measures 0.52 x 0.27mm permitting use of the standard 0201 footprints, but offering a 30% reduction in occupied board space. The SP1014 can safely absorb repetitive ESD strikes above the maximum level specified in the IEC61000-4-2 international standard (Level 4, ±8kV contact discharge) without performance degradation, and the back-to-back configuration provides symmetrical standoff voltage which makes the component appropriate for use when AC signals are present on the data or signal line.

### Pinout



Note: Drawing not to scale

### Features

- ESD, IEC61000-4-2, ±12kV contact, ±15kV air
- EFT, IEC61000-4-4, 40A (5/50ns)
- Lightning, IEC61000-4-5, 2A ( $t_p=8/20\mu s$ )
- Low capacitance of 6pF (@  $V_R=0V$ )
- Low leakage current of 5nA at 1.5V

### Functional Block Diagram



### Applications

- Mobile Phones
- Smart Phones
- Tablets
- Wearable Technology
- Portable Medical
- Digital Cameras
- MP3/PMP
- Portable Navigation Devices
- Point of Sale Terminals

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 ( $t_p=8/20\mu s$ ) | 2.0 <sup>1</sup> | A     |
| $T_{OP}$   | Operating Temperature            | -40 to 125       | °C    |
| $T_{STOR}$ | Storage Temperature              | -55 to 150       | °C    |

Notes:

1. 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                   | -55 to 150 | °C    |
| Maximum Junction Temperature                | 150        | °C    |
| Maximum Lead Temperature (Soldering 20-40s) | 260        | °C    |

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

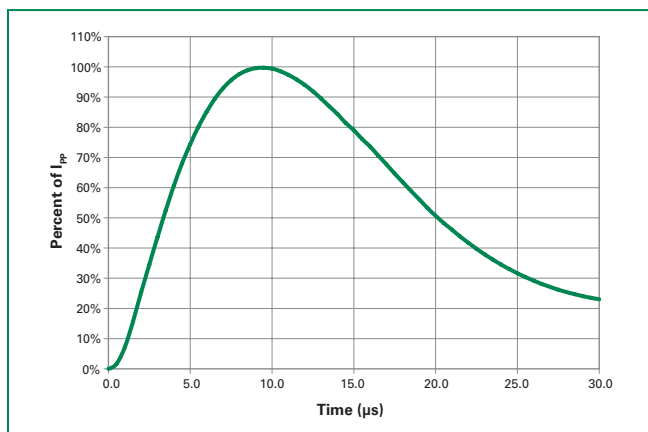
| Parameter                          | Symbol     | Test Conditions                           | Min      | Typ | Max | Units    |
|------------------------------------|------------|-------------------------------------------|----------|-----|-----|----------|
| Reverse Standoff Voltage           | $V_{RWM}$  | $I_R \leq 1\mu A$ with 1 pin to GND       |          |     | 5.0 | V        |
| Reverse Breakdown Voltage          | $V_{BR}$   | $I_R=1mA$ with 1 pin at GND               | 7.0      |     |     | V        |
| Leakage Current                    | $I_{LEAK}$ | $V_R=1.5V$ with 1 pin at GND <sup>1</sup> |          |     | 5   | nA       |
|                                    |            | $V_R=3.3V$ with 1 pin at GND <sup>1</sup> |          |     | 10  | nA       |
|                                    |            | $V_R=5V$ with 1 pin at GND <sup>1</sup>   |          |     | 100 | nA       |
| Clamp Voltage <sup>1</sup>         | $V_C$      | $I_{PP}=1A$ , $t_p=8/20\mu s$ , Fwd       |          | 10  |     | V        |
|                                    |            | $I_{PP}=2A$ , $t_p=8/20\mu s$ , Fwd       |          | 11  |     | V        |
| Dynamic Resistance <sup>2</sup>    | $R_{DYN}$  | TLP $t_p=100ns$ , 1 Pin to GND            |          | 0.5 |     | $\Omega$ |
| ESD Withstand Voltage <sup>1</sup> | $V_{ESD}$  | IEC61000-4-2 (Contact Discharge)          | $\pm 12$ |     |     | kV       |
|                                    |            | IEC61000-4-2 (Air Discharge)              | $\pm 15$ |     |     | kV       |
| Diode Capacitance <sup>1</sup>     | $C_D$      | Reverse Bias=0V, $f=1MHz$                 |          | 6   | 7   | pF       |

Note:

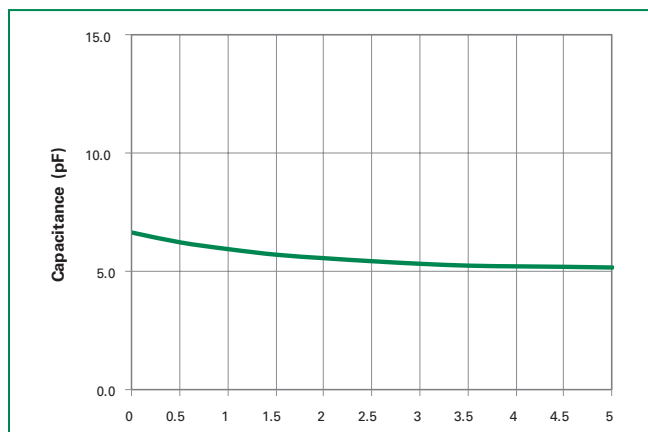
1 Parameter is guaranteed by design and/or device characterization.

2 Transmission Line Pulse (TLP) test setting : Std.TDR(50 $\Omega$ ),  $t_p=100ns$ ,  $tr=0.2ns$  ITLP and VTLP averaging window: start  $t_1=70ns$  to end  $t_2=80ns$

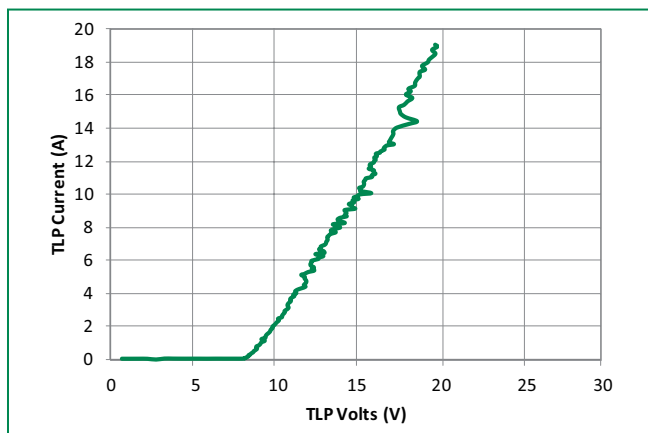
### Pulse Waveform



### Capacitance vs. Reverse Bias (1 Pin to GND)

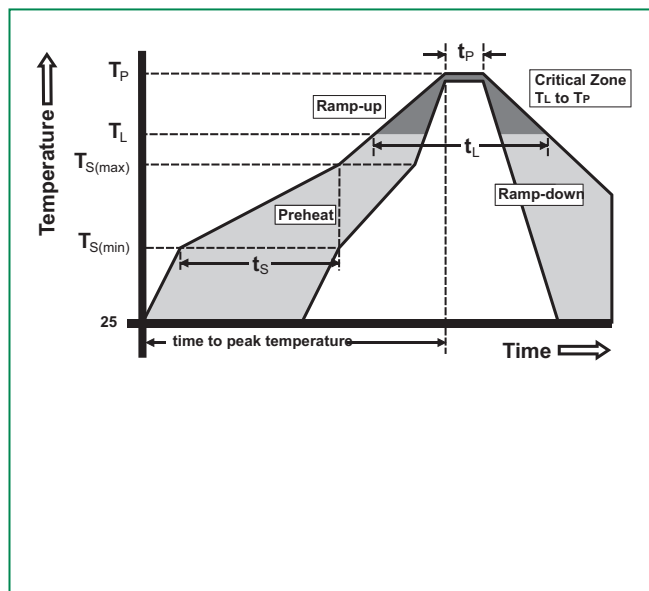


### Transmission Line Pulsing (TLP) Plot (1 Pin to GND)

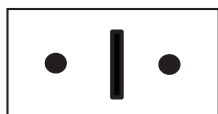


### Soldering Parameters

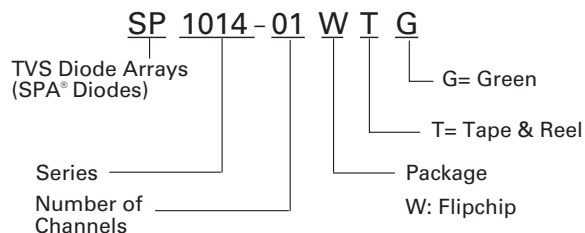
|                                                        |                                    |                         |
|--------------------------------------------------------|------------------------------------|-------------------------|
| Reflow Condition                                       |                                    | 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 <sup>+0/-5</sup> °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                   |



### Part Marking System



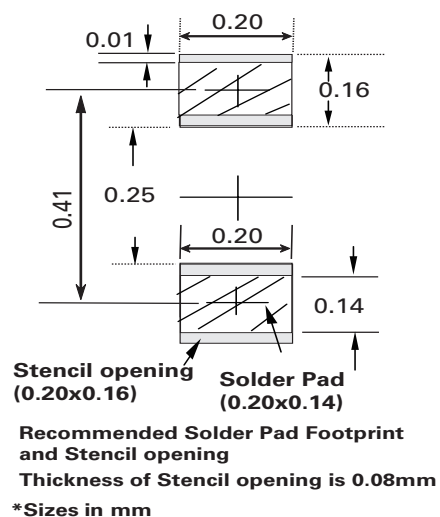
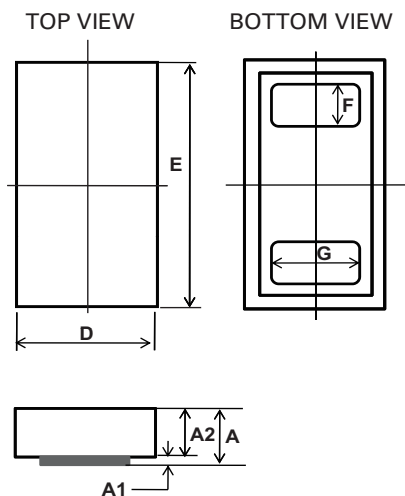
### Part Numbering System



### Ordering Information

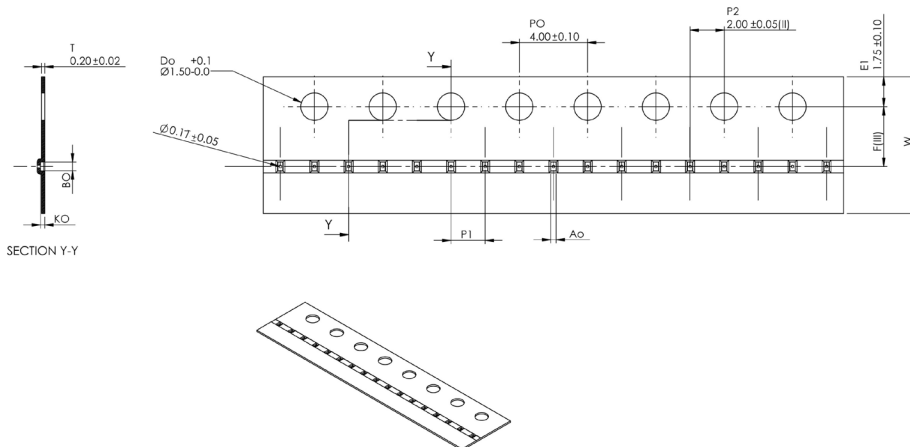
| Part Number  | Package  | Marking | Min. Order Qty. |
|--------------|----------|---------|-----------------|
| SP1014-01WTG | Flipchip | •   •   | 15000           |

### Package Dimensions – Flipchip



| Symbol    | Flipchip    |       |       |        |        |        |
|-----------|-------------|-------|-------|--------|--------|--------|
|           | Millimeters |       |       | Inches |        |        |
|           | Min         | Typ   | Max   | Min    | Typ    | Max    |
| <b>A</b>  | 0.183       | 0.211 | 0.239 | 0.0072 | 0.0083 | 0.0094 |
| <b>A1</b> | 0.008       | 0.011 | 0.014 | 0.0003 | 0.0004 | 0.0006 |
| <b>A2</b> | 0.175       | 0.200 | 0.225 | 0.0069 | 0.0079 | 0.0089 |
| <b>D</b>  | 0.280       | 0.290 | 0.300 | 0.0110 | 0.0114 | 0.0118 |
| <b>E</b>  | 0.530       | 0.540 | 0.550 | 0.0209 | 0.0213 | 0.0217 |
| <b>F</b>  | -           | 0.100 | -     | -      | 0.0039 | -      |
| <b>G</b>  | -           | 0.200 | -     | -      | 0.0079 | -      |

### Embossed Carrier Tape & Reel Specification – Flipchip



| Symbol    | Millimeters   |
|-----------|---------------|
| <b>A0</b> | 0.34+/-0.03   |
| <b>B0</b> | 0.60+/-0.03   |
| <b>K0</b> | 0.25 + 0.03   |
| <b>F</b>  | 3.50 +/- 0.05 |
| <b>P1</b> | 2.00+/-0.10   |
| <b>W</b>  | 8.00+/-0.10   |

## Данный компонент на территории Российской Федерации

**Вы можете приобрести в компании MosChip.**

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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