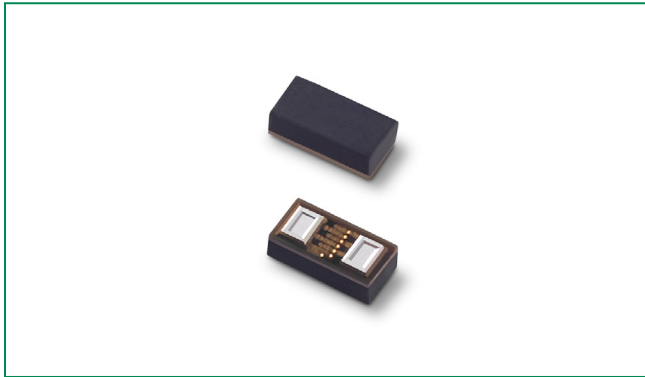


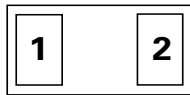
# SP1027 6.5pF 14kV Bidirectional Discrete TVS



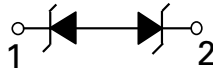
## Description

The SP1027 back-to-back diodes are fabricated in a proprietary silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment. The SP1027 TVS 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. The back-to-back configuration provides symmetrical ESD protection for data and I/O lines. The WLCSP package is encapsulated in epoxy.

## Pinout



## Functional Block Diagram



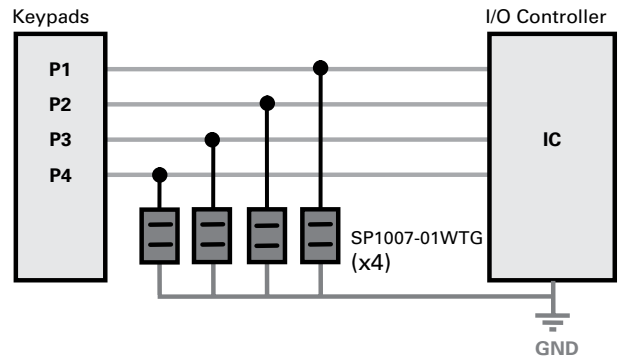
## Features

- ESD, IEC 61000-4-2, ±14kV contact, ±25kV air (TYP @  $V_R=0V$ )
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 2A (8/20 as defined in IEC 61000-4-5 2<sup>nd</sup> edition)
- Low capacitance of 6.5pF
- Low leakage current of 0.02µA (TYP) at 5V
- Space efficient 0201
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level (MSL -1)

## Applications

- Mobile Phones
- Smart Phones
- Camcorders
- Portable Medical
- Digital Cameras
- MP3/PMP
- Portable Navigation Components
- Tablets
- Point of Sale Terminals

## Application Example



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	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.

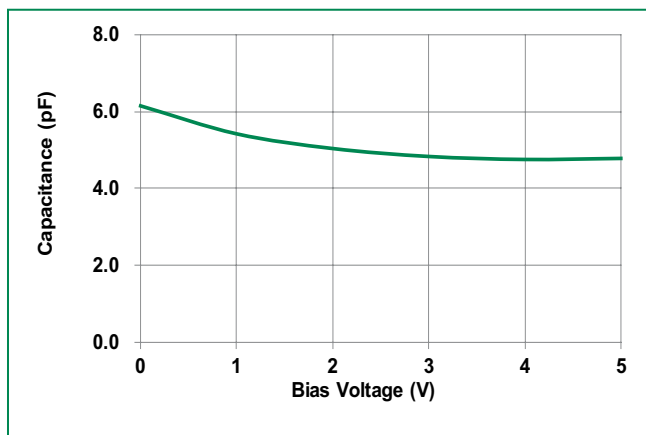
### Electrical Characteristics ( $T_{OP}=25^\circ C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R \leq 1\mu A$			6.0	V
Breakdown Voltage	$V_{BR}$	$I_R = 1mA$		7.9		V
Leakage Current	$I_{LEAK}$	$V_R = 5V$		0.02	0.5	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s, Fwd$		10.5		V
		$I_{PP} = 2A, t_p = 8/20\mu s, Fwd$		11.6		V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p = 100ns, I/O$ to GND		0.33		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)		$\pm 14$		kV
		IEC 61000-4-2 (Air Discharge)		$\pm 14$		kV
Diode Capacitance <sup>1</sup>	$C_D$	Reverse Bias=0V		6.5		pF

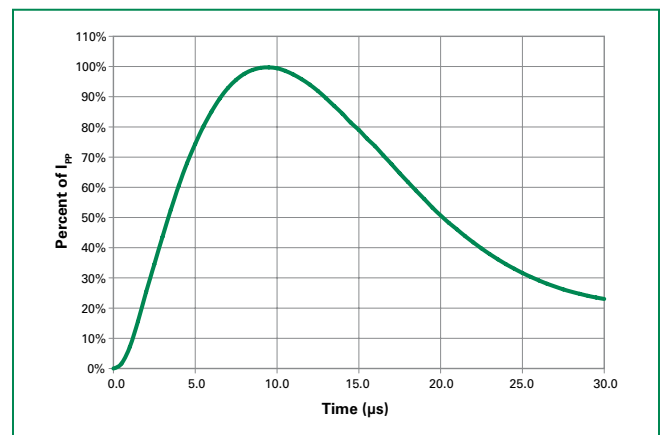
Note:

- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window  $t_1=70ns$  to  $t_2=90ns$

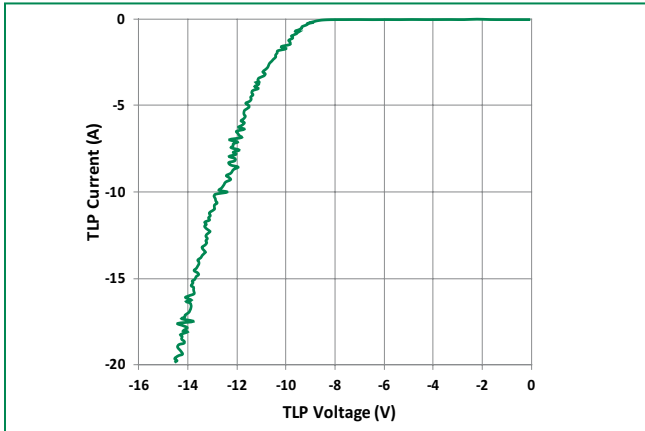
### Capacitance vs. Reverse Bias



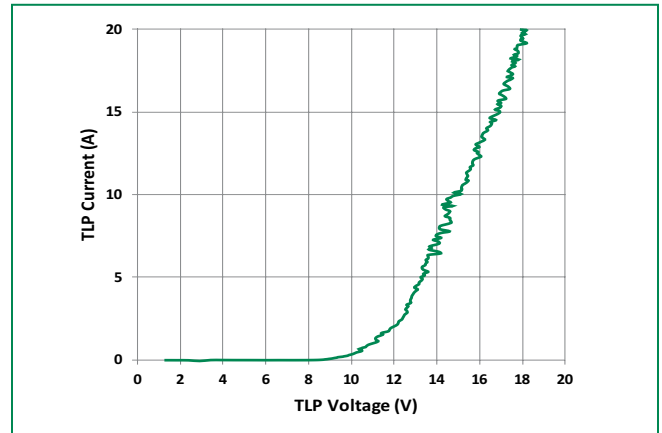
### 8/20 $\mu s$ Pulse Waveform



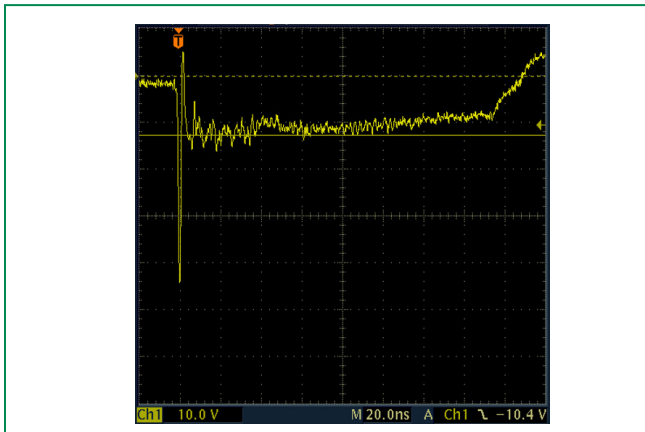
**Negative Transmission Line Pulsing (TLP) Plot**



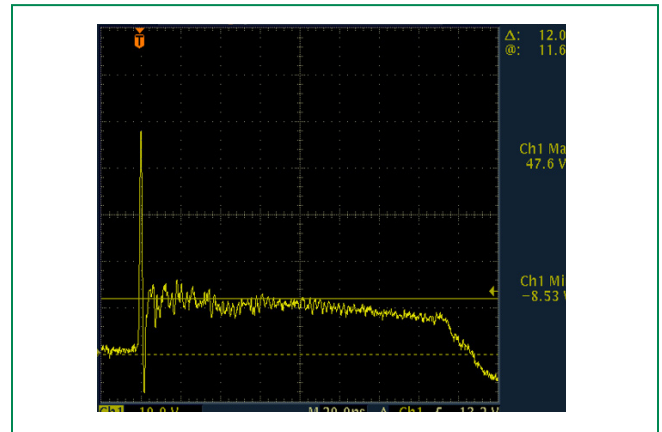
**Positive Transmission Line Pulsing (TLP) Plot**



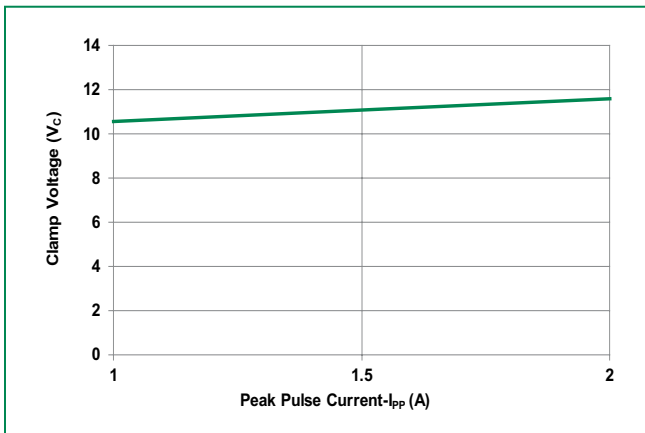
**IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage**



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

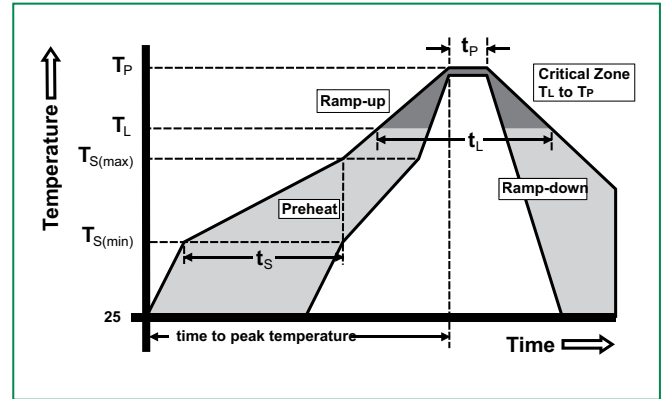


**Clamping voltage vs.  $I_{pp}$  for 8/20μS waveshape**



**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



**Product Characteristics**

<b>Lead Plating</b>	Tin
<b>Substrate material</b>	Silicon
<b>Body Material</b>	Molded Compound
<b>Flammability</b>	UL Recognized compound meeting flammability rating V-0

- Notes :
1. All dimensions are in millimeters
  2. Dimensions include solder plating.
  3. Dimensions are exclusive of mold flash & metal burr.

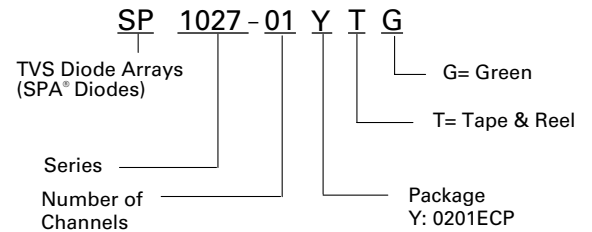
**Ordering Information**

Part Number	Package	Min. Order Qty.
SP1027-01YTG	0201 ECP	10000

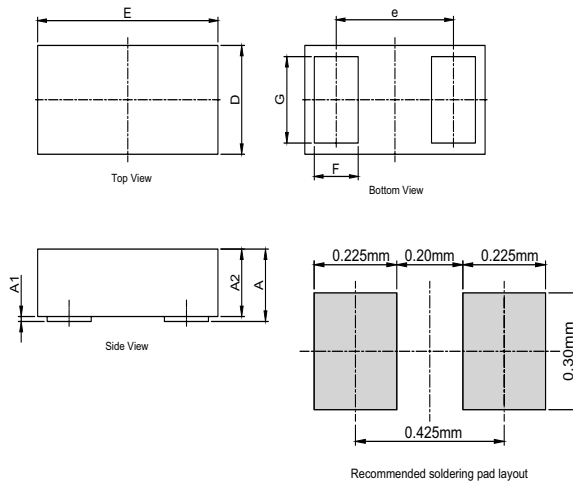
**Part Marking System**



**Part Numbering System**

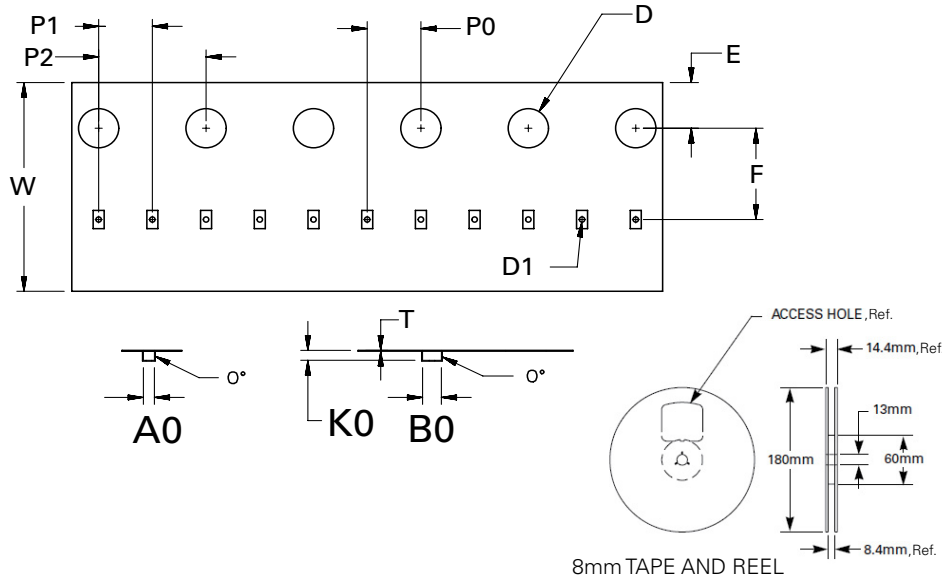


**Package Dimensions — 0201 ECP**



Symbol	0201 ECP					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
<b>A</b>	0.175	0.200	0.225	0.0069	0.0079	0.0089
<b>A1</b>	0.008	0.011	0.014	0.0003	0.0004	0.0006
<b>A2</b>	0.167	0.189	0.211	0.0066	0.0074	0.0083
<b>e</b>	0.360 BSC			0.0142 BSC		
<b>D</b>	0.270	0.300	0.330	0.0106	0.0118	0.0130
<b>E</b>	0.570	0.600	0.630	0.0224	0.0236	0.0248
<b>F</b>	0.130	0.140	0.150	0.0051	0.0055	0.0059
<b>G</b>	0.190	0.200	0.210	0.0075	0.0079	0.0083

**Embossed Carrier Tape & Reel Specification — 0201 ECP**



Symbol	Millimeters
<b>A0</b>	0.41 +/-0.03
<b>B0</b>	0.70 +/-0.03
<b>D</b>	ø 1.50 + 0.10
<b>D1</b>	ø 0.20 +/- 0.05
<b>E</b>	1.75 +/-0.10
<b>F</b>	3.50 +/-0.05
<b>K0</b>	0.38 +/-0.03
<b>P0</b>	2.00 +/-0.05
<b>P1</b>	2.00 +/-0.05
<b>P2</b>	4.00 +/-0.10
<b>W</b>	8.00 + 0.30 -0.10
<b>T</b>	0.23 +/-0.02

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