

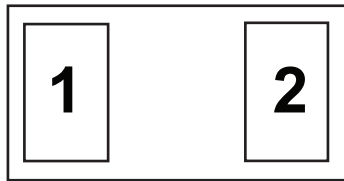
**HF** **RoHS** **Pb** **GREEN** **SP1005 Lead-Free/Green Series**



**Description**

The SP1005 includes back-to-back Zener diodes fabricated in a proprietary silicon avalanche technology to provide protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust diodes 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. The back-to-back configuration provides symmetrical ESD protection for data lines when AC signals are present.

**Pinout**



Note: Drawing not to scale.

**Features**

- ESD, IEC61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC61000-4-4, 40A (5/50ns)
- Lightning, IEC61000-4-5, 10A ( $t_p=8/20\mu s$ )
- Low capacitance of 30pF (@  $V_R=0V$ )
- Low leakage current of 0.1µA at 5V
- Industries smallest ESD footprint available (0201)

**Functional Block Diagram**



**Applications**

- Mobile phones
- Smart phones
- Camcorders
- PDA
- Digital cameras
- MP3/PMP
- Portable navigation devices
- Portable medical
- Point of sale terminals

Lead-Free/Green SP1005

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 ( $t_p=8/20\mu s$ )	10.0	A
$T_{OP}$	Operating Temperature	-40 to 85	°C
$T_{STOR}$	Storage Temperature	-65 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

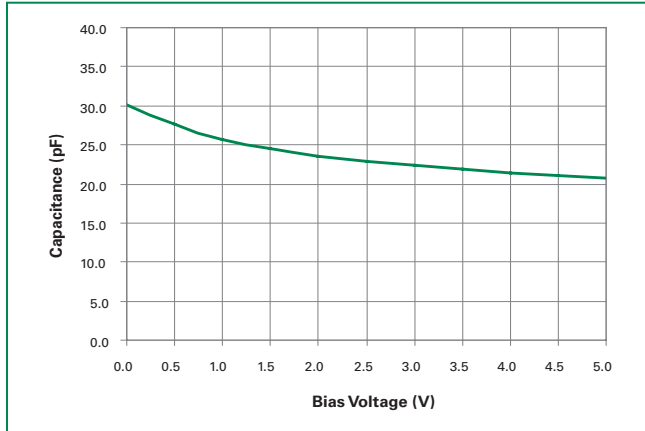
### Electrical Characteristics ( $T_{OP}=25^\circ C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$				6.0	V
Voltage Drop	$V_D$	$I_R=1mA$		8.5	9.5	V
Leakage Current	$I_{LEAK}$	$V_R=5V$ with 1 pin at GND		0.1	0.5	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A, t_p=8/20\mu s, Fwd$		9.3		V
		$I_{PP}=2A, t_p=8/20\mu s, Fwd$		10.0		V
		$I_{PP}=10A, t_p=8/20\mu s, Fwd$		15.6		V
Dynamic Resistance	$R_{DYN}$	$(V_{C2} - V_{C1}) / (I_{PP2} - I_{PP1})$		0.7		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC61000-4-2 (Contact Discharge)	$\pm 30$			kV
		IEC61000-4-2 (Air Discharge)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_D$	Reverse Bias=0V		30		pF
		Reverse Bias=2.5V		23		pF

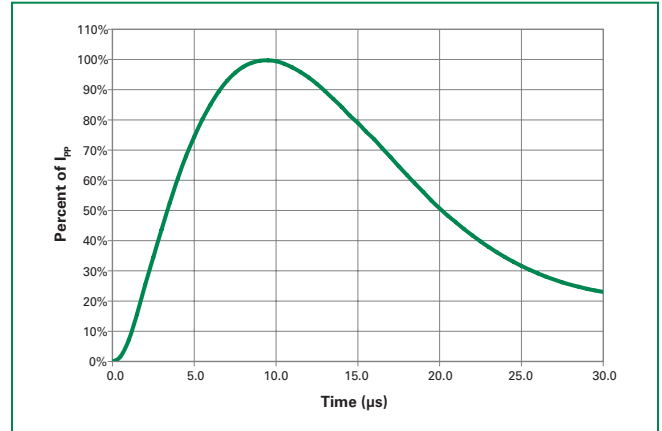
NOTES:

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

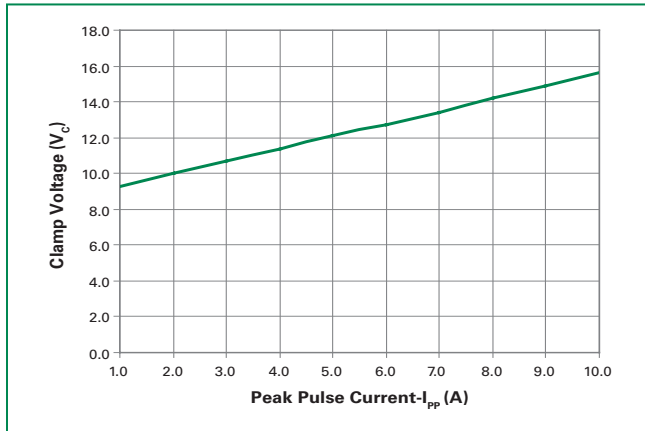
**Capacitance vs. Reverse Bias**



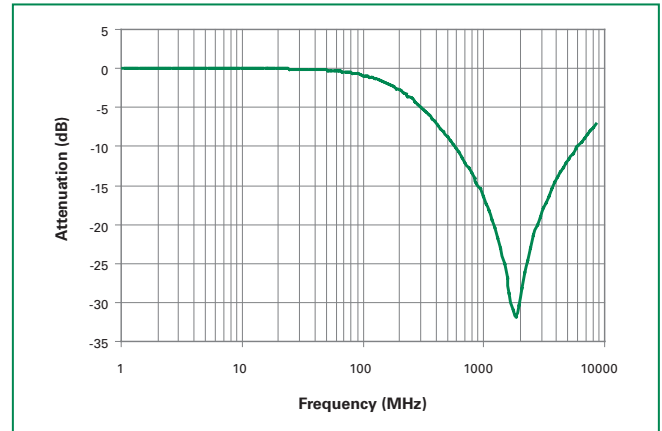
**Pulse Waveform**



**Clamping Voltage vs.  $I_{pp}$**

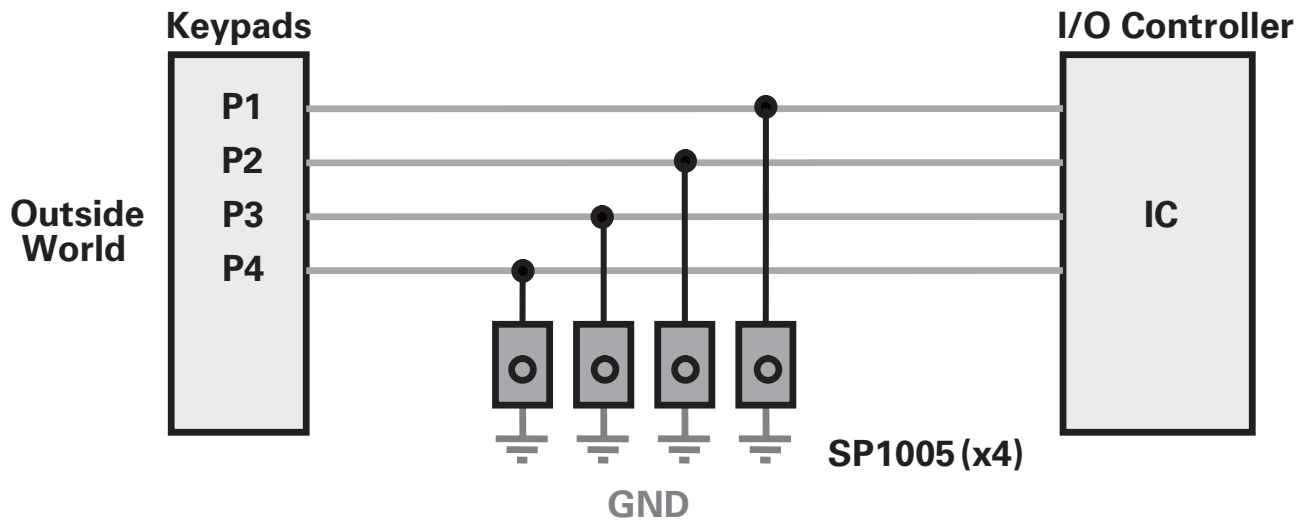


**Insertion Loss (S21) I/O to GND**



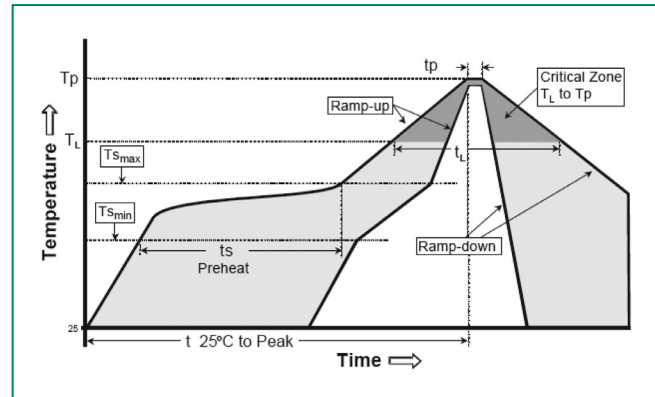
Lead-Free/Green SP1005

Application Example

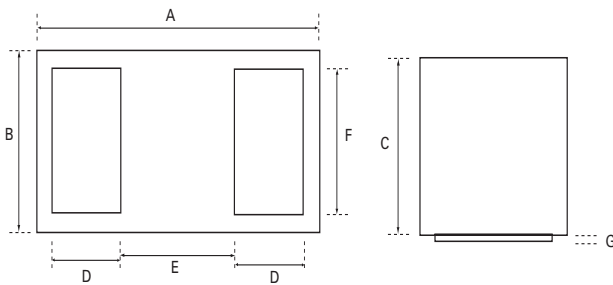


Soldering Parameters

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 <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

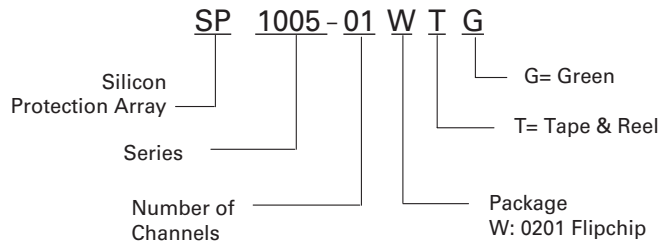


**Package Dimensions - 0201 Flipchip**



Symbol	0201 Flipchip					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	0.595	0.620	0.645	0.0234	0.0244	0.0254
B	0.295	0.320	0.345	0.0116	0.0126	0.0136
C	0.245	0.275	0.305	0.0096	0.0108	0.0120
D	0.145	0.150	0.155	0.0057	0.0059	0.0061
E	0.245	0.250	0.255	0.0096	0.0098	0.0100
F	0.245	0.250	0.255	0.0096	0.0098	0.0100
G	0.005	0.010	0.015	0.0002	0.0004	0.0006

**Part Numbering System**



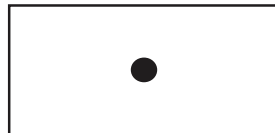
**Product Characteristics**

<b>Lead Plating</b>	Sn
<b>Lead Material</b>	Copper
<b>Lead Coplanarity</b>	6 um (max)
<b>Substitute Material</b>	Silicon
<b>Body Material</b>	Silicon

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**

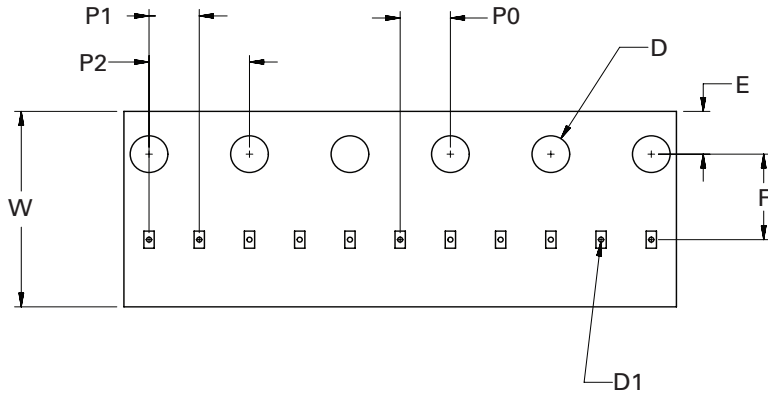


**Ordering Information**

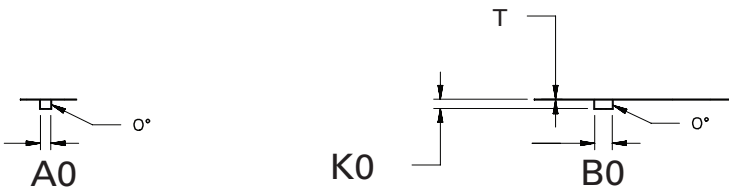
Part Number	Package	Marking	Min. Order Qty.
SP1005-01WTG	0201 Flipchip	•	10000

Lead-Free/Green SP1005

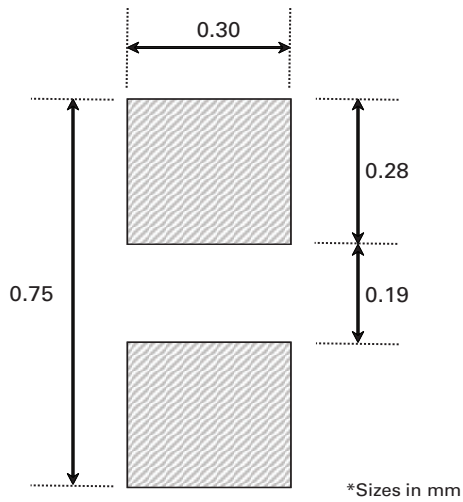
**Embossed Carrier Tape & Reel Specification – 0201 Flipchip**



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



**Recommended Solder Pad Footprint**



\*Sizes in mm