

SP4203 0.5 pF, 10A bidirectional discrete TVS diodes



**Description**

The SP4203 integrates low capacitance diodes to provide electronic equipment protection from destructive electrostatic discharges (ESDs). These robust TVSs can withstand repetitive contact or air ESD discharge events at  $\pm 30$  kV levels without suffering any performance degradation. This exceeds the ESD contact and air discharge test requirements of IEC 61000-4-2. Additionally, the TVS can withstand an 8/20 surge current event as defined in IEC 61000-4-5 2<sup>nd</sup> edition up to 10A and still provide low voltage clamping levels.

**Pinout**



**Features**

- ESD, IEC 61000-4-2,  $\pm 30$ kV contact,  $\pm 30$ kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 10A (8/20 as defined in IEC 61000-4-5 2<sup>nd</sup> edition)
- Low capacitance of 0.5pF (@  $V_R=0V$ )
- Low leakage current
- Small SOD323 package fits 0805 footprints
- AEC-Q101 qualified
- Halogen free, lead free and RoHS compliant
- Moisture Sensitivity Level (MSL -1)

**Functional Block Diagram**



**Applications**

- xDSL Interfaces
- RS-232
- RS-485
- Power Ports
- Security Equipment
- Instrumentation
- Medical Equipment
- Computers and Peripherals

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	A
$T_{OP}$	Operating Temperature	-40 to 125	°C
$T_{STOR}$	Storage Temperature	-55 to 150	°C

Notes:

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

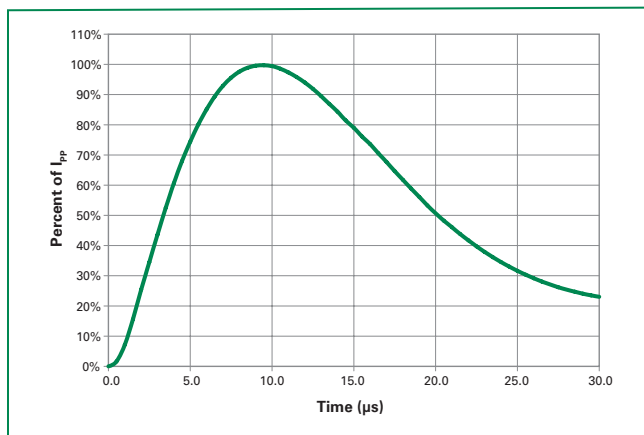
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R=1\mu A$			3.3	V
Breakdown Voltage	$V_{BR}$	$I_R=1mA$	5.5	6.6		V
Reverse Leakage Current	$I_{LEAK}$	$V_R=3.3V$			0.1	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A, t_p=8/20\mu s$		7.5	10	V
		$I_{PP}=10A, t_p=8/20\mu s$		16.5	20	V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p=100ns, I/O$ to $I/O$		0.54		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)	$\pm 30$			kV
		IEC 61000-4-2 (Air Discharge)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_{I/O-I/O}$	Reverse Bias=0V, $f=1MHz$		0.5	0.9	pF

Notes:

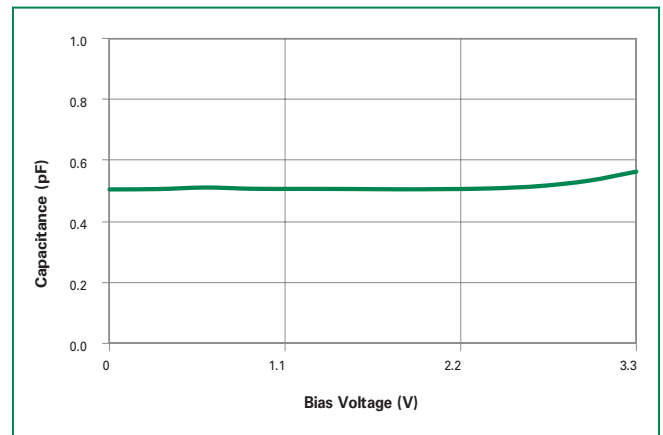
1.Parameter is guaranteed by design and/or component characterization.

2.Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window  $t1=70ns$  to  $t2=90ns$

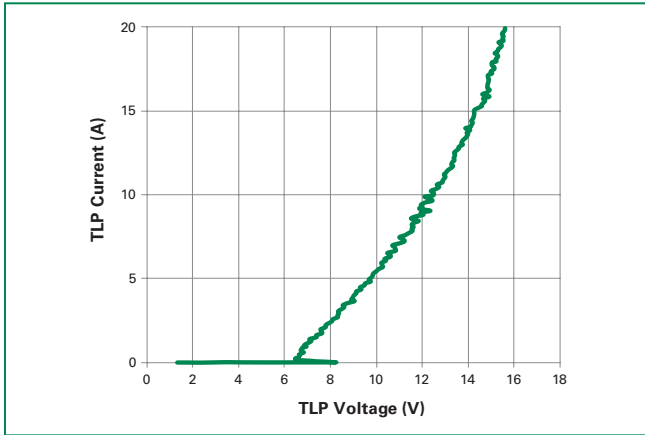
### 8/20 $\mu s$ Pulse Waveform



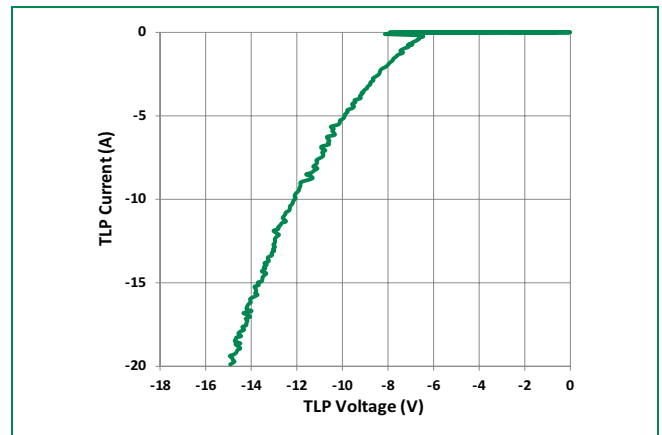
### Capacitance vs. Reverse Bias



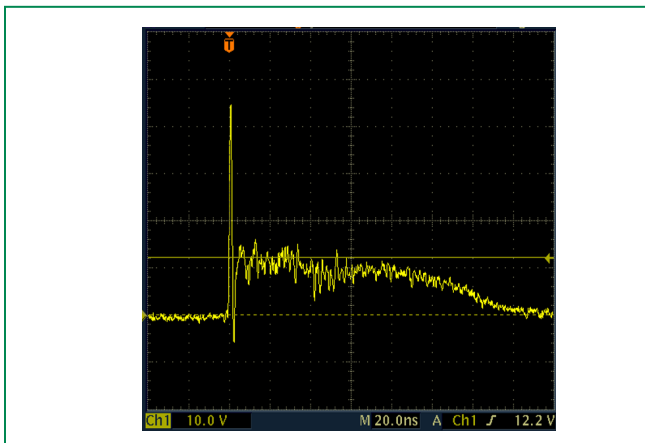
**Positive Transmission Line Pulsing (TLP) Plot**



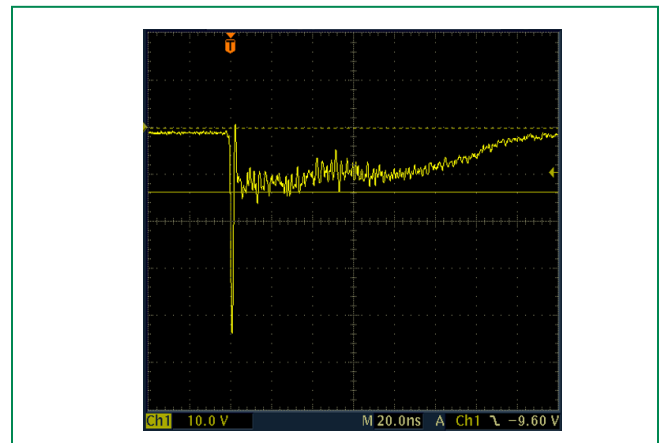
**Negative Transmission Line Pulsing (TLP) Plot**



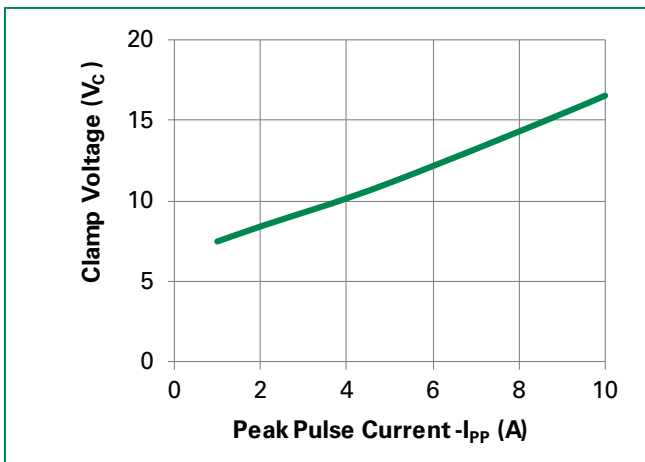
**IEC 61000-4-2 +8kV Contact ESD Clamping Voltage**



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

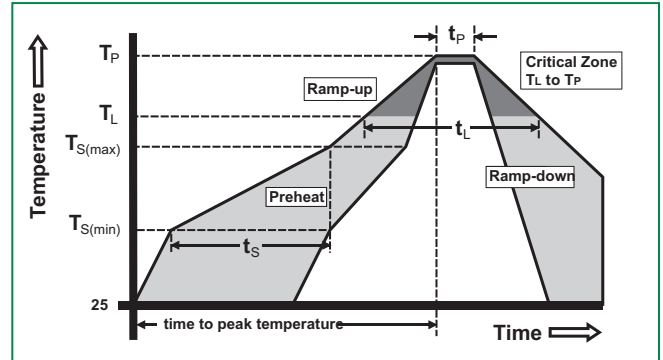


**Clamping voltage vs.  $I_{pp}$  for 8/20 $\mu$ s waveshape**



### Soldering Parameters

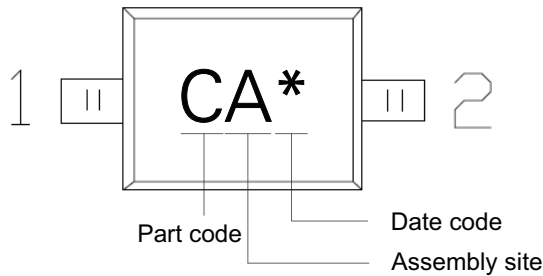
Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus) Temp ( $T_L$ ) to peak		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	- 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



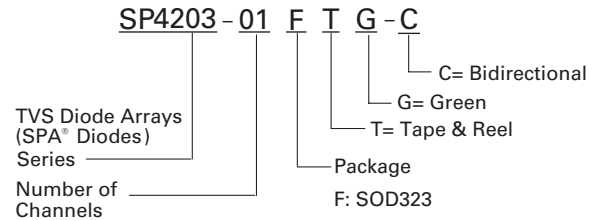
### Product Characteristics

<b>Lead Plating</b>	Matte Tin
<b>Lead Material</b>	Alloy 42
<b>Lead Coplanarity</b>	0.004 inches(0.102mm)
<b>Substrate Material</b>	Silicon
<b>Body Material</b>	Molded Compound
<b>Flammability</b>	UL Recognized compound meeting flammability rating V-0

### Part Marking System



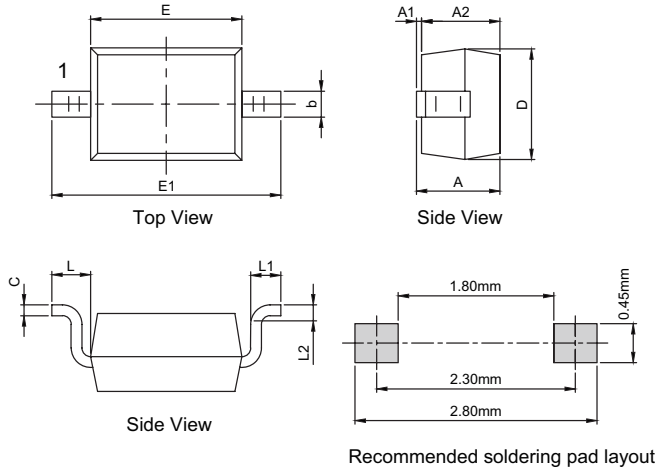
### Part Numbering System



### Ordering Information

Part Number	Package	Min. Order Qty.
SP4203-01FTG-C	SOD323	3000

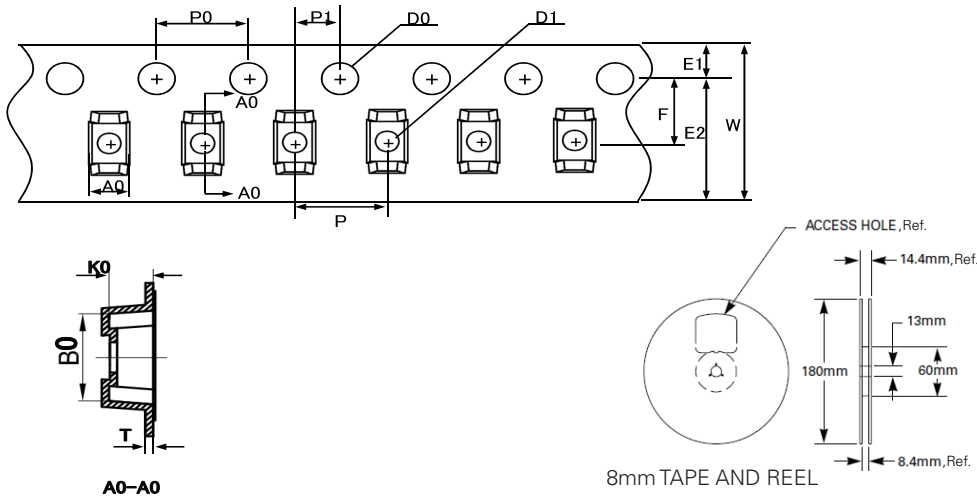
**Package Dimensions -SOD323**



Drawing#: F03-A

Symbol	SOD323			
	Millimeters		Inches	
	Min	Max	Min	Max
<b>A</b>	-	1.00	-	0.039
<b>A1</b>	0.00	0.10	0.000	0.004
<b>A2</b>	0.80	0.90	0.031	0.035
<b>b</b>	0.25	0.35	0.010	0.014
<b>c</b>	0.08	0.15	0.003	0.006
<b>D</b>	1.20	1.40	0.047	0.055
<b>E</b>	1.60	1.90	0.063	0.075
<b>E1</b>	2.50	2.70	0.098	0.106
<b>L</b>	0.475 REF		0.019 REF	
<b>L1</b>	0.25	0.40	0.010	0.016
<b>L2</b>	0.20 BSC		0.008 BSC	

**Embossed Carrier Tape & Reel Specification – SOD323**



Symbol	Millimeters
<b>A0</b>	1.46+/-0.10
<b>B0</b>	2.90+/-0.10
<b>W</b>	8.0+0.3/-0.10
<b>D0</b>	1.50+0.10
<b>D1</b>	0.45min/1.15max
<b>E1</b>	1.75+/-0.10
<b>E2</b>	-
<b>F</b>	3.50+/-0.10
<b>P0</b>	4.00+/-0.10
<b>P</b>	4.00+/-0.10
<b>P1</b>	2.00+/-0.05
<b>K0</b>	1.25+/-0.10
<b>T</b>	0.254+/-0.02

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