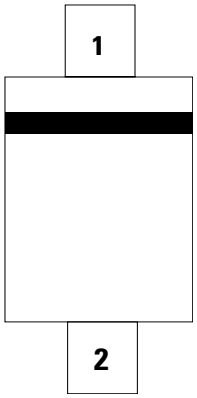
SP4020 Series 2.5pF, 30A Discrete TVS Diode



Description

The SP4020 components integrate low capacitance steering diodes with one or two avalanche breakdown diodes for unidirectional or bidirectional protection, respectively, to protect against ESD and lightning induced surge events. These devices can safely absorb up to 30A per IEC 61000-4-5, 2nd Edition (tp=8/20µs) without performance degradation and a minimum ±30kV ESD per IEC 61000-4-2 International Standard. The low loading capacitance and high surge capability make it ideal for protecting telecommunication ports such as Ethernet and other high speed data interfaces.

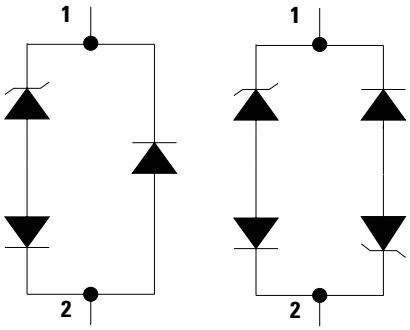
Pinout



Features

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 30A (8/20 as defined in IEC 61000-4-5 2nd edition)
- Low capacitance of 2.5pF (@ V_R=0V)
- Low leakage current of 0.1µA at 3.3V
- Unidirectional and Bidirectional configuration
- Small SOD323 package fits 0805 footprints
- Moisture Sensitivity Level (MSL-1)
- AEC-Q101 Qualified
- Halogen-Free, Lead-Free and RoHS-Compliant

Functional Block Diagram



Unidirectional
SP4020-01FTG

Bidirectional
SP4020-01FTG-C

Applications

- 10/100/1000 Ethernet
- T1/E1/T3/E3
- USB 1.1/2.0
- USB 3.0/3.1
- Power Ports
- Computers and Peripherals
- Instrumentation
- Medical Equipment

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=8/20µs)	30	A
P_{Pk}	Peak Pulse Power (t_p=8/20µs)	750	W
T_{OP}	Operating Temperature	-40 to 125	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

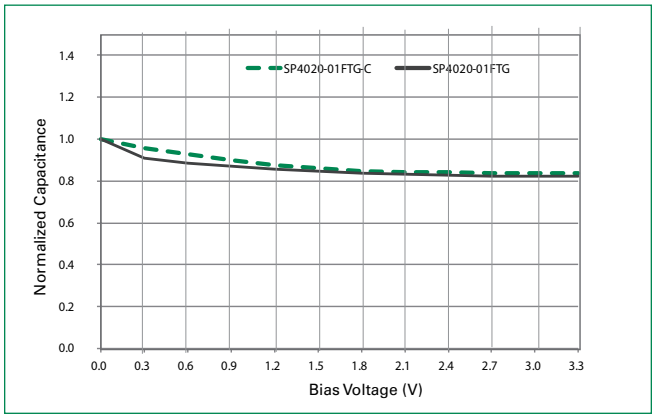
CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Characteristics (T_{OP}=25°C)

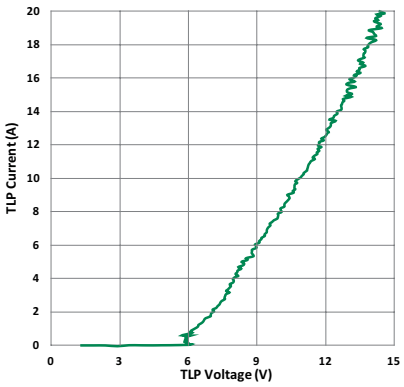
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Breakdown Voltage	V_{BR}	I_R=2uA	3.5			V
Reverse Standoff Voltage	V_{RWM}	I_R=1µA			3.3	V
Reverse Leakage Current	I_{LEAK}	V_R=3.3V		0.1	0.5	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd		6.6		V
		I_{PP}=10A, t_p=8/20µs, Fwd		14.2		V
		I_{PP}=24A, t_P=8/20µs, Fwd		21.8		V
Dynamic Resistance[2]	R_{DYN}	TLP, t_P =100ns, I/O to GND		0.40		Ω
ESD Withstand Voltage[1]	V_{ESD}	IEC 61000-4-2 (Contact Discharge)	±30			kV
		IEC 61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance[1]	C_D	Reverse Bias=0V, f=1MHz		2.5		pF

Note:
1. Parameter is guaranteed by design and/or component characterization.
2. Transmission Line Pulse (TLP) with 100ns width and 200ps rise time.

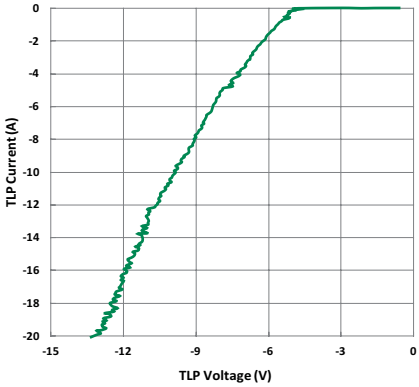
Normalized Capacitance vs. Bias Voltage



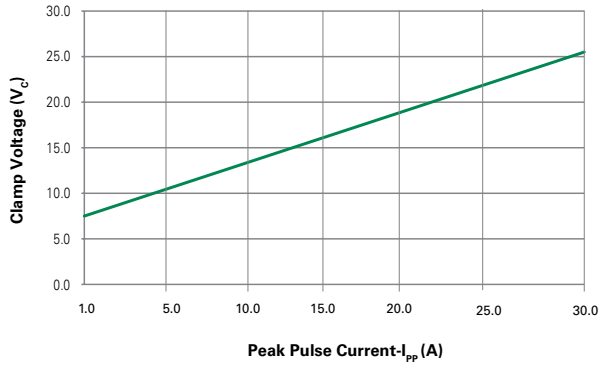
Positive Transmission Line Pulsing (TLP) Plot



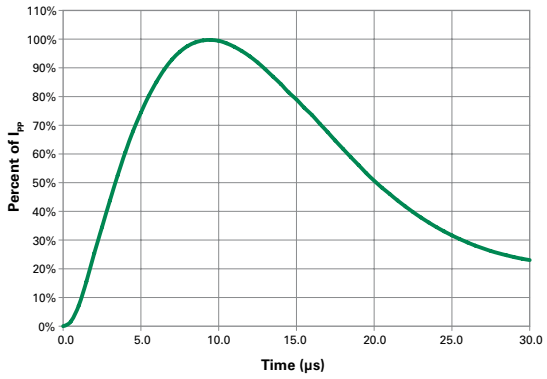
Negative Transmission Line Pulsing (TLP) Plot



Clamping Voltage vs. I_{PP}



8/20 Pulse Waveform

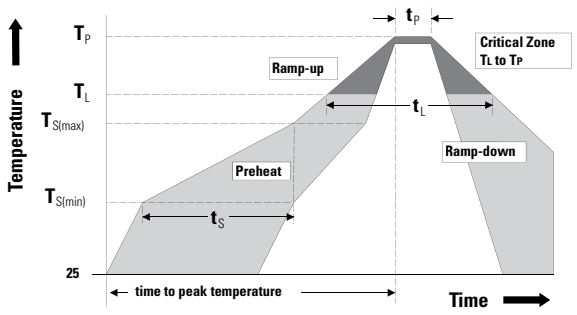


Soldering Parameters

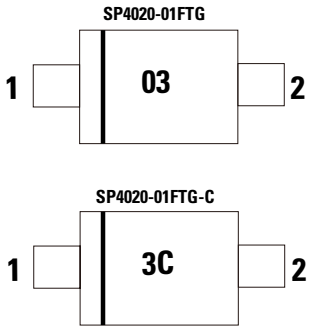
Reflow Condition		Pb – Free assembly
Pre Heat	**- Temperature Min ($T_{s(min)}$)**	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus) Temp (T_L) to peak		3°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	**- Temperature (T_L) (Liquidus)**	217°C
	- Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °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

Product Characteristics

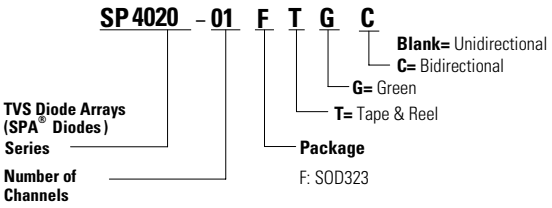
Lead Plating	Matte Tin
Lead Material	Alloy 42
Lead Coplanarity	0.0004 inches (0.102mm)
Substrate Material	Silicon
Body Material	Molded Compound
Flammability	UL Recognized compound meeting flammability rating V-0



Part Marking System



Part Numbering System



Ordering Information

Part Number	Package	Min. Order Qty.
SP4020-01FTG	SOD323	3000
SP4020-01FTG-C	SOD323	3000