

ESD5Z5.0C-Q1

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Surface Mount Bi-Directional TVS For ESD Protection Diode 5.0V

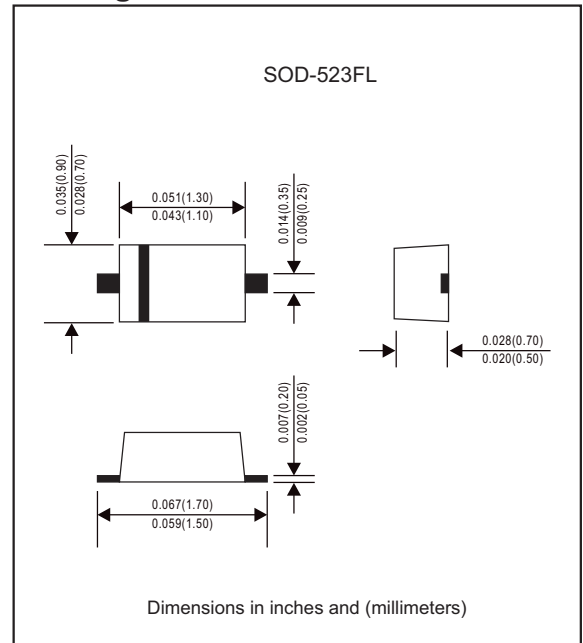
Features

- Stand-off voltage: 5.0V
- Small body outline dimensions
- Low body height
- Peak power up to 174 watts@8x20μs pulse
- ESD rating of class 3 per human body mode
- Low leakage current
- Response time is typically <1ns
- Provide transient protection:
IEC 61000-4-2 (ESD) level 4, ±15kV (air), ±8kV (contact)
IEC 61000-4-4 (EFT) 40A (5/50ns)
IEC 61000-4-5 (Surge) 9.4A (8/20μs)
- Lead free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates Halogen-free part, ex.ESD5Z5.0C-Q1-H

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOD-523FL
- Terminals : Solder plated, solderable per
MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.002 gram

Package outline



Applications

- Cellular phones
- Portable devices
- Digital cameras
- Power supplies

Maximum ratings (at $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Conditions	Symbol	Value	Unit
ESD Voltage	Per human body model	ESD	16	kV
Electrostatic discharge	IEC61000-4-2 air discharge IEC61000-4-2 contact discharge	ESD	±15 ±8	kV
Electrostatic discharge	IEC61000-4-4	EFT	40	A
Total power dissipation	on FR-5 board, @ $T_A = 25^\circ\text{C}$	P_D	150	mW
Thermal resistance	Junction to ambient	$R_{\theta JA}$	833	$^\circ\text{C/W}$
Lead solder temperature -maximum		T_L	260(10s)	$^\circ\text{C}$
Maximum junction temperature		T_J	+150	$^\circ\text{C}$
Storage temperature range		T_{STG}	-55 to +150	$^\circ\text{C}$
Operating temperature range		T_{OP}	-40 to +125	$^\circ\text{C}$

Electrical characteristics (at $T_A=25^\circ\text{C}$ unless otherwise noted)

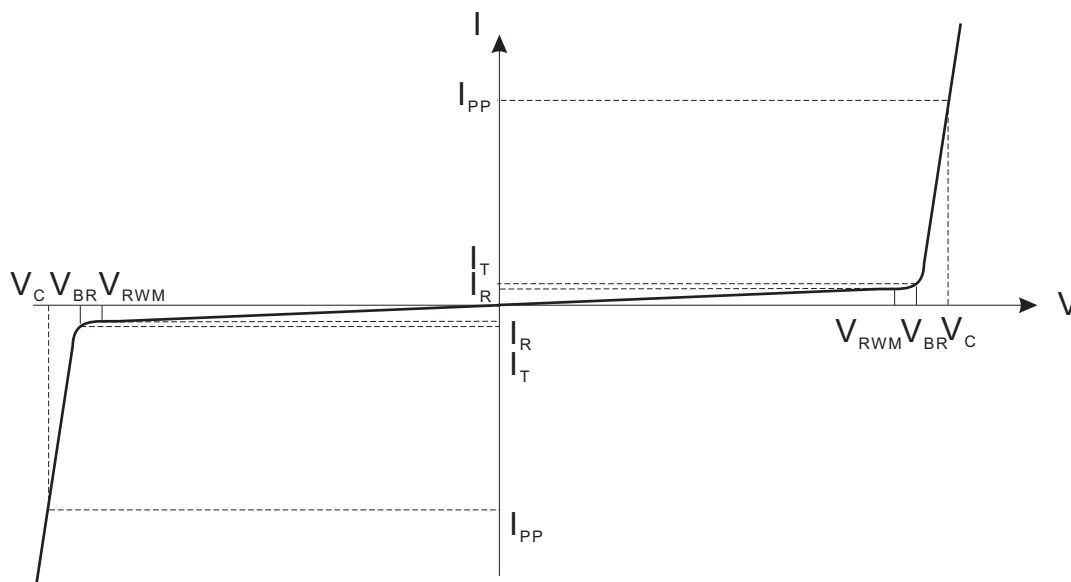
Part No.	V_{RWM} (V)	$I_R(\mu\text{A})$ @ V_{RWM}	$V_{BR}(V)$ @ I_T (Note 2)		I_T (mA)	$V_C(V)$ (Note 1) @ $I_{PP}=5.0\text{A}$	I_{PP} (Note 1) (A)	$V_C(V)$ (Note 1) @ Max I_{PP}	P_{PK} (W) (Note 1) Max	$C_J(pF)$ $V_R=0V$ and $f=1\text{MHz}$ Typ.
	Max	Max	Min.	Max		Max	Max	Max		
ESD5Z5.0C-Q1	5.0	1.0	5.6	7.8	1.0	11.6	9.4	18.6	174	25

Notes 1. Surge current waveform per Fig.1

2. V_{BR} is measured with a pulse test current I_T at an ambient temperature of 25°C .

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Typical characteristics (at $T_A=25^\circ\text{C}$ unless otherwise noted)



Bi-Directional TVS

V_C : Clamping Voltage @ I_{PP}
 I_{PP} : Maximum Reverse Peak Pulse Current
 V_{RWM} : Maximum Working Peak Reverse voltage
 I_R : Maximum Reverse Leakage Current @ V_{RWM}
 V_{BR} : Breakdown voltage @ I_T
 I_T : Test Current
 C_J : Capacitance @ $V_R = 0\text{V}$ and $f = 1\text{MHz}$

Rating and characteristic curves (ESD5Z5.0C-Q1)

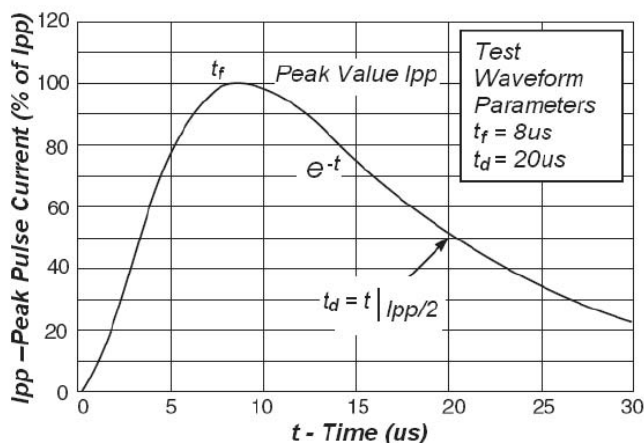


Fig1. Pulse Waveform

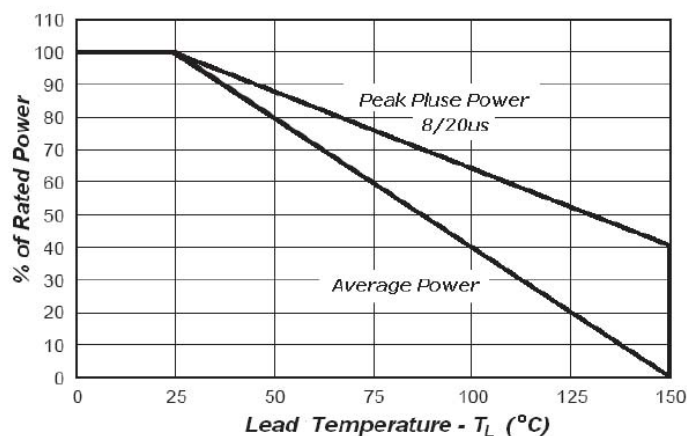


Fig2. Power Derating

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Application Note

Electrostatic discharge (ESD) is a major cause of failure in electronic system. Transient Voltage Suppressors (TVS) are an ideal choice for ESD protection. They are capable of clamping the incoming transient to a low enough level such that damage to the protected semiconductor is prevented. Surface mount TVS offers the best choice for minimal lead inductance. They serve as parallel protection elements, connected between the signal lines to ground. As the transient rise above the operating voltage of the device, the TVS becomes a low impedance path diverting the transient current to ground. The ESD5Z is the ideal board level protection of ESD sensitive semiconductor components.

The tiny SOD-523FL package allows design flexibility in the design of high density boards where the space is at a premium. This enables to shorten the routing and contributes to hardening against ESD.

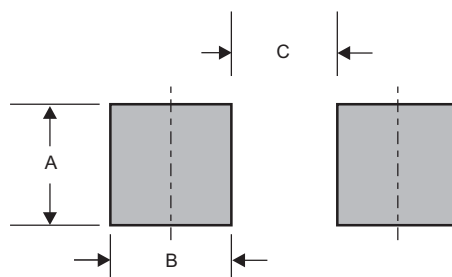
Pinning information

Pin	Symbol
Bi-Directional	

Marking

Type number	Marking code
ESD5Z5.0C-Q1	5C

Suggested solder pad layout

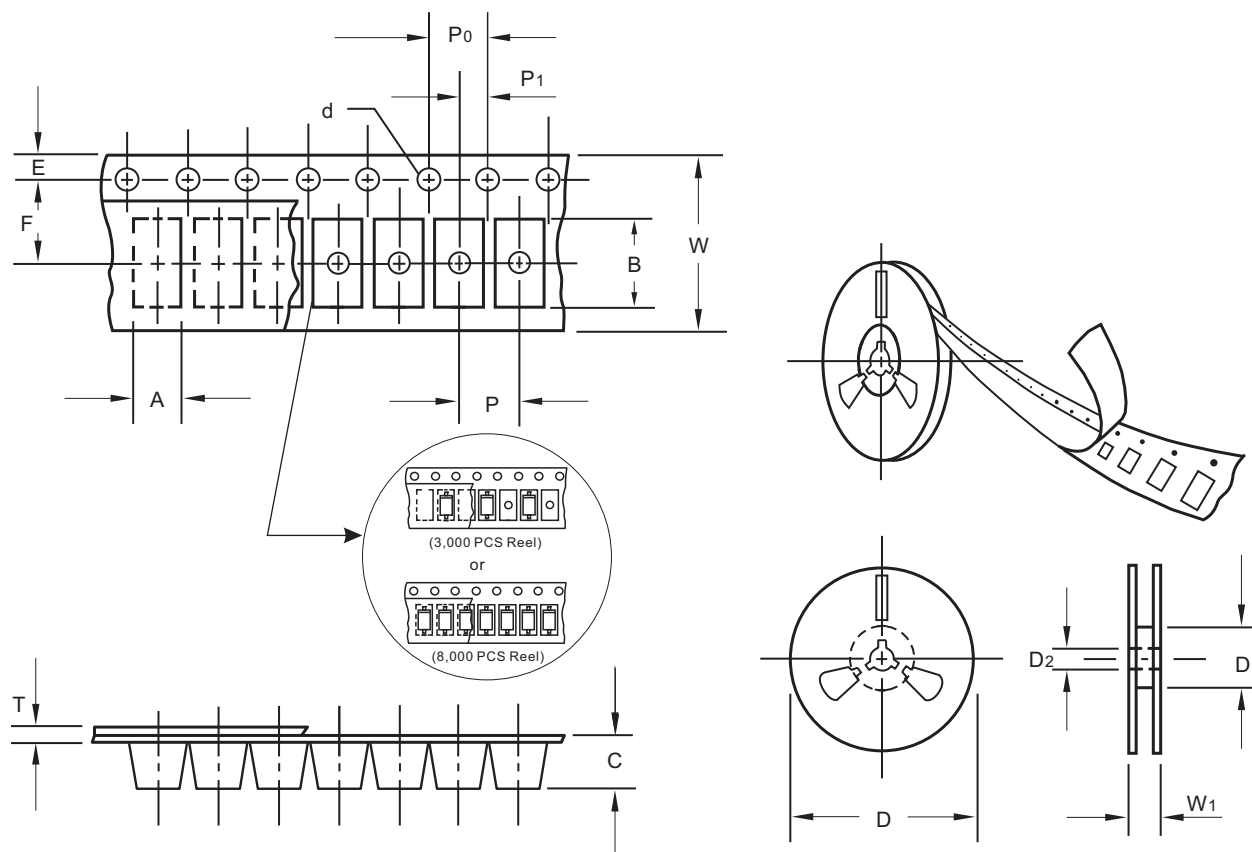


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SOD-523FL	0.032 (0.80)	0.024 (0.60)	0.044 (1.10)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOD-523FL
Carrier width	A	0.1	0.90
Carrier length	B	0.1	1.94
Carrier depth	C	0.1	0.76
Sprocket hole	d	0.1	1.50
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	50.00
Feed hole diameter	D2	0.2	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	2.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	9.50

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

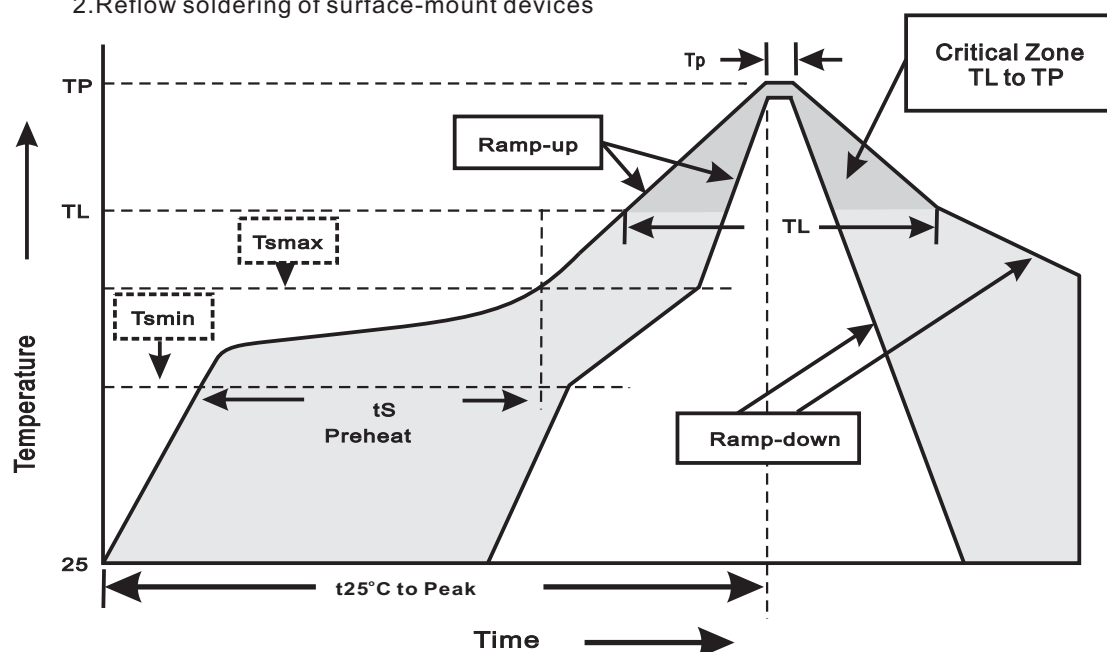
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Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA. (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOD-523FL	7"	3,000	2.0	30,000	183*123*183	178	382*257*387	240,000	8
		8,000	2.0	80,000	183*123*183	178	382*257*387	640,000	10

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T _L to T _P)	<3°C/sec
Preheat -Temperature Min(T _{smmin}) -Temperature Max(T _{smmax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smmax} to T _L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T _L) -Time(t _L)	217°C 60~260sec
Peak Temperature(T _P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t _P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

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High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125°C+168hrs@85°C /85%RH+3xIR@260°C+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. High Temperature Reverse Bias	$V_{BR}=V_{BR\ Nom}*80\%$ ($T_j=150^{\circ}C$)Test Duration:1000hrs	JESD22-A108
3. High Temperature Storage Life	$T_a=125^{\circ}C$ Test Duration: 1000hrs	JESD22 A-103
4. Temperature Cycle	$-55^{\circ}C$ (15min) to $150^{\circ}C$ (15min)Test Cycles: 1000cycles	JESD22 A-104
5. Autoclave	$P=2atm$ $T_a=121^{\circ}C$ RH=100% Test Duration:96hrs	JESD22 A-102
6. Solderability	$245\pm5^{\circ}C$ for 5sec	J-STD-002
7. Moisture Resistance	$T_a=85^{\circ}C$ /85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
8. Resistance To Solder Heat	$260\pm5^{\circ}C$ for 10sec	JESD22 B-106
9. High Temperature High Humidity Reverse Bias	$T_a=85^{\circ}C$, 85%RH, with device reverse biased at 80% of rated breakdown voltage up to a maximum of 100V or limit of chamber Test Duration:1000hrs	JESD22-A101