

ESD3Z3.3C-Q1 Thru ESD3Z24C-Q1

List

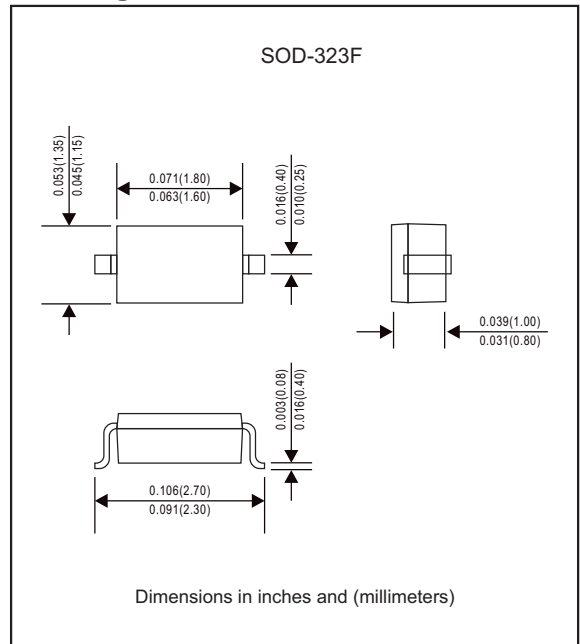
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ESD3Z3.3C-Q1 Thru ESD3Z24C-Q1

Surface Mount Bi-Directional TVS
For ESD Protection Diode - 3.3V - 24V

Features

- This series is designed for average power 350W approximated ESD protection, different VRWM, different peak pulse power available.
- Protects one I/O or power line.
- Low clamping voltage.
- Working voltages: 3.3V, 5.0V, 12V, 15V, 24V.
- Low leakage current.
- Lead-free parts meet environmental standards of MIL-STD-19500 /228
- Qualified to AEC-Q101 standards for high reliability.
- Suffix "-H" indicates Halogen-free part, ex.ESD3Z3.3C-Q1-H.

Package outline**IEC compatibility**

- IEC61000-4-2 (ESD) $\pm 15\text{kV}$ (air), $\pm 8\text{kV}$ (contact)
- IEC61000-4-4 (EFT) 40A (5/50ns)
- IEC61000-4-5 (Lightning) 24A (8/20us)

Applications

- Cell Phone Handsets and Accessories
- Microprocessor based equipment
- Personal Digital Assistants (PDA's)
- Notebooks, Desktops, and Servers
- Portable Instrumentation
- Peripherals
- Pagers

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOD-323F
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.005 gram

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

PARAMETER	CONDITIONS	SYMBOL	VALUE	UNIT
Lead solder temperature-maximum	10 second duration	T_L	260	$^\circ\text{C}$
Operating junction temperature range		T_J	-55 to +150	$^\circ\text{C}$
Storage temperature range		T_{STG}	-55 to +150	$^\circ\text{C}$

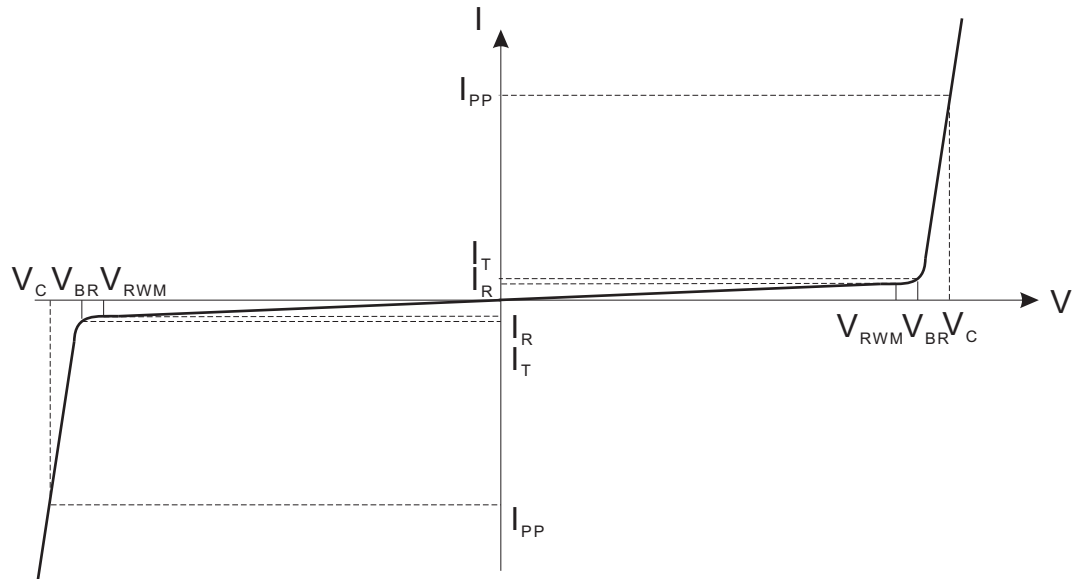
Electrical characteristics (at $T_A=25^\circ\text{C}$ unless otherwise noted)

Part No.	V_{RWM} (V) (Max.)	$I_R(\mu\text{A})$ @ V_{RWM} (Max.)	$V_{BR}(V)$ @ I_T (Note 2) (Min.)	I_T (mA)	$V_C(V)$ @ $I_{PP}=1.0\text{A}$ (Max.)	I_{PP} (A) (Max.)	$V_C(V)$ @ I_{PP} (Max.)	P_{PK} (W) (Note 1) (Max.)	C_J (pF) (Max.)
ESD3Z3.3C-Q1	3.3	40	4.0	1.0	7.5	20.0	10.5	210	450
ESD3Z5.0C-Q1	5.0	10	6.0	1.0	9.8	17.0	18.0	306	200
ESD3Z12C-Q1	12	1	13.3	1.0	19.0	11.0	32.0	352	75
ESD3Z15C-Q1	15	1	16.7	1.0	24.0	10.0	38.0	380	68
ESD3Z24C-Q1	24	1	26.7	1.0	43.0	7.0	52.0	364	50

Note 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 : Max. capacitance @ $V_R = 0\text{V}$ and $f = 1\text{MHz}$

Rating and characteristic curves (ESD3Z3.3C-Q1 Thru ESD3Z24C-Q1)

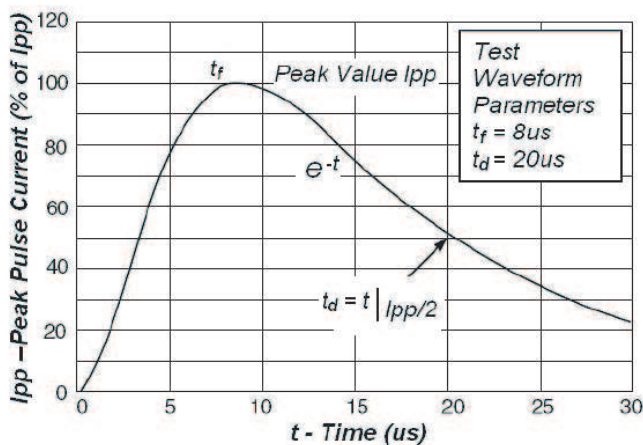


Fig1. Pulse Waveform

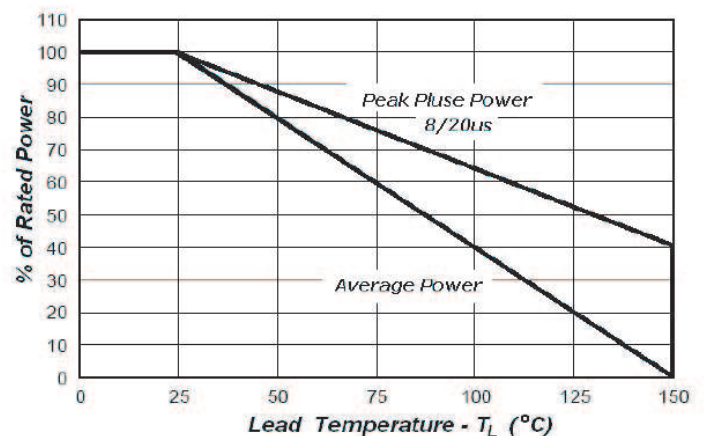
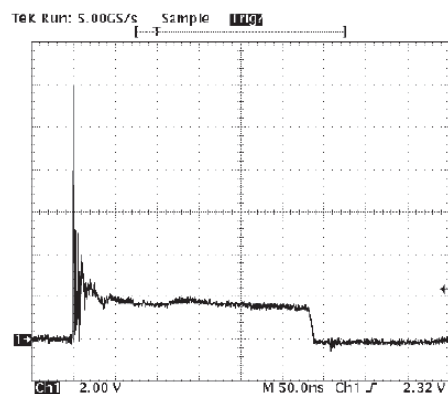


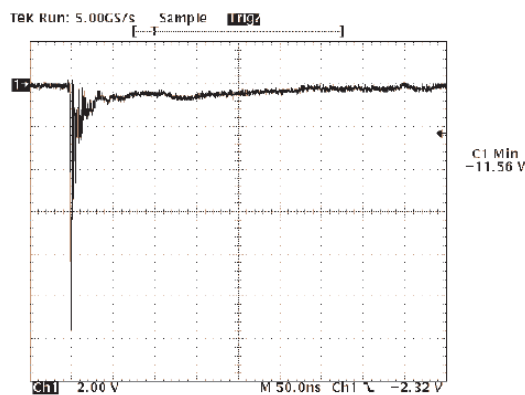
Fig2. Power Derating

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ESD Clamping
(8kV Contact per IEC 61000-4-2)



ESD Clamping
(-8kV Contact per IEC 61000-4-2)



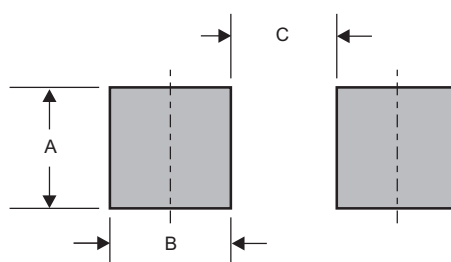
Pinning information

Pin	Simplified outline	Symbol
Bi-Directional		

Marking

Type number	Marking code
ESD3Z3.3C-Q1	2A,03B
ESD3Z5.0C-Q1	2B,05B
ESD3Z12C-Q1	2D,12B
ESD3Z15C-Q1	2J,15B
ESD3Z24C-Q1	2H,24B

Suggested solder pad layout

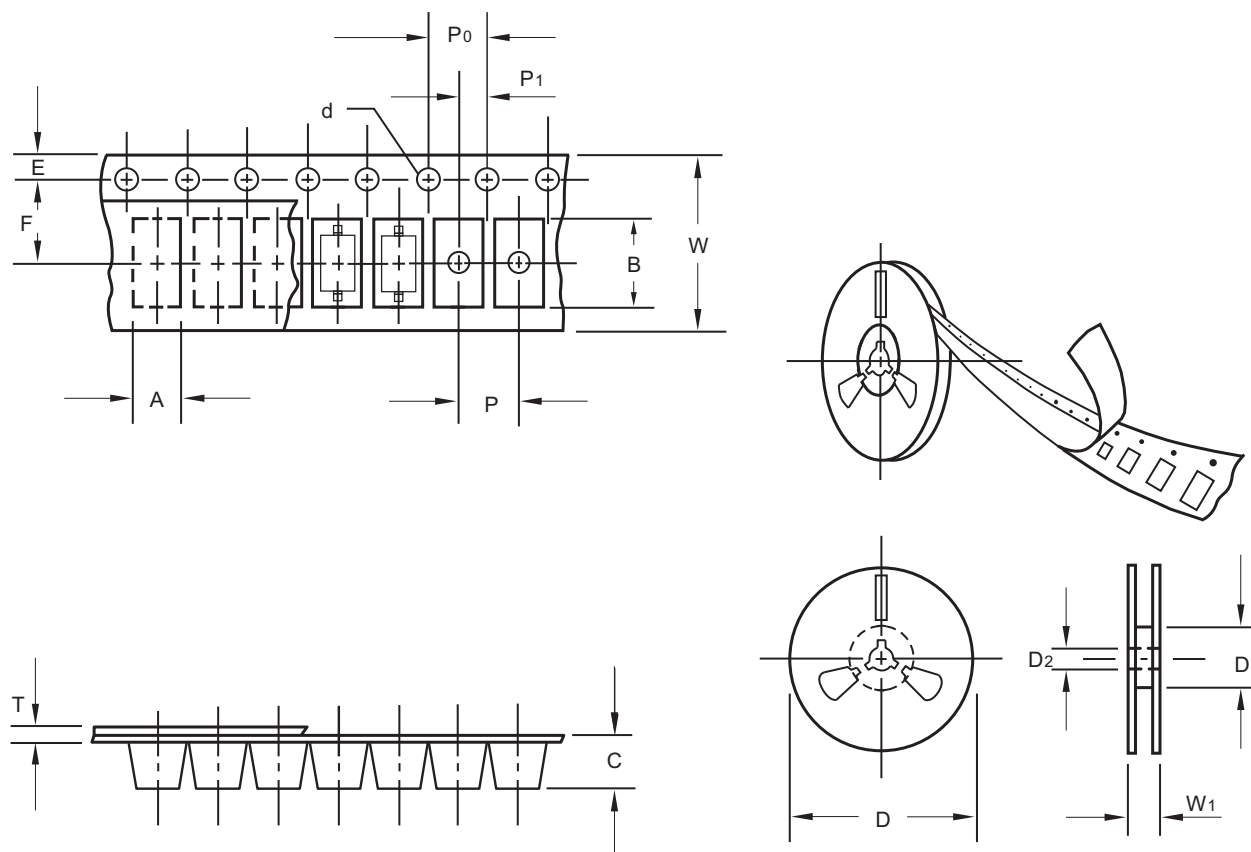


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SOD-323F	0.033 (0.83)	0.025 (0.63)	0.063 (1.60)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOD-323F
Carrier width	A	0.1	1.46
Carrier length	B	0.1	2.95
Carrier depth	C	0.1	1.25
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	62.00
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
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	11.40

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

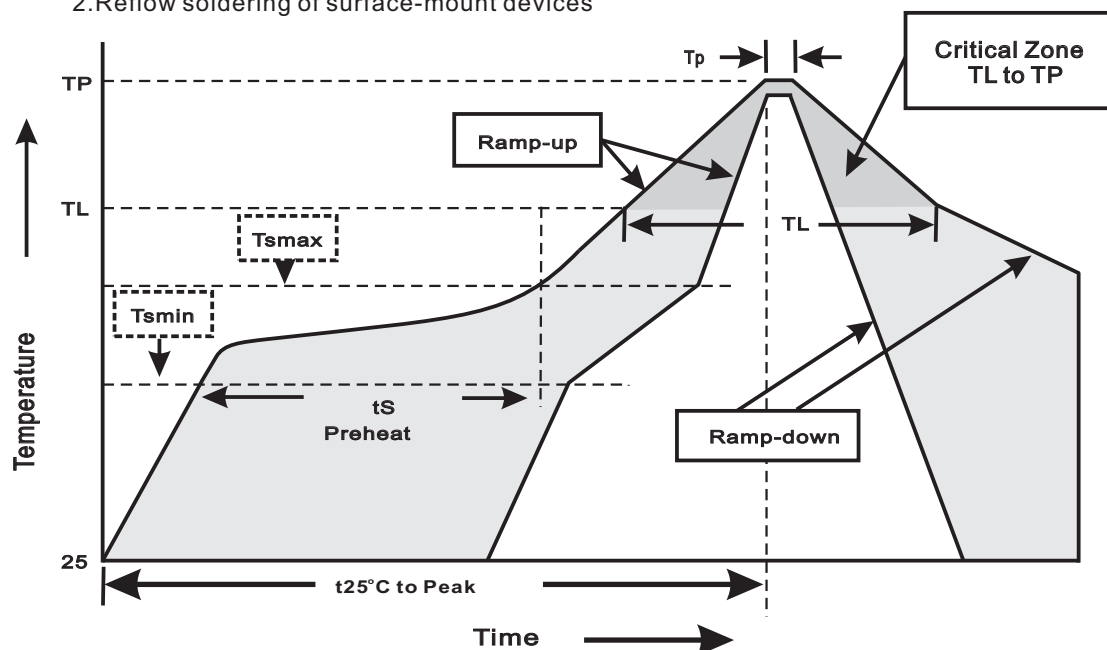
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Reel packing

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-323F	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	8.0

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)	$<3^{\circ}\text{C}/\text{sec}$
Preheat -Temperature Min(T_{smin}) -Temperature Max(T_{smax}) -Time(min to max)(t_s)	150°C 200°C 60~120sec
T_{smax} to T_L -Ramp-upRate	$<3^{\circ}\text{C}/\text{sec}$
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	$<6^{\circ}\text{C}/\text{sec}$
Time 25°C to Peak Temperature	$<6\text{minutes}$

ESD3Z3.3C-Q1 Thru ESD3Z24C-Q1**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