

ESD3Z SERIES

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ESD3Z SERIES

Surface Mount Uni-Directional TVS For ESD Protection Diode 3.3V-36V

Features

- This series is designed for average power 350W approximated ESD protection, different V_{RWM} , different peak pulse power available
- Protects one I/O or power line
- Low clamping voltage
- Working voltages: 3.3V, 5.0V, 12V, 15V, 24V, 36V
- Low leakage current
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen-free part, ex. ESD3Z3.3-H

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) (8/20 μs)

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
- Polarity : Indicated by cathode band
- 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
ESD voltage	Per IEC 61000-4-2(Air) Per IEC 61000-4-2(Contact)	V_{ESD}	± 15 ± 8	kV
Lead solder temperature-maximum	10 second duration	TL	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.)	$V_{BR}(\text{V})$ @ I_T (Note 3) (Min.)	I_T (mA)	$V_C(\text{V})$ @ $I_{PP}=1.0\text{A}$ (Note 2) (Max.)	I_{PP} (A) (Note 2) (Max.)	$V_C(\text{V})$ @ I_{PP} (Note 2) (Max.)	P_{PK} (W) (Note 1) (Max.)	C_J (pF) (Note 4) (Max.)
ESD3Z3.3	3.3	40	4.0	1.0	7.5	20.0	10.5	210	450
ESD3Z5.0	5.0	10	6.0	1.0	9.8	17.0	18.0	306	300
ESD3Z12	12	1	13.3	1.0	19.0	11.0	32.0	352	130
ESD3Z15	15	1	16.7	1.0	24.0	10.0	38.0	380	120
ESD3Z24	24	1	26.7	1.0	43.0	7.0	52.0	364	80
ESD3Z36	36	1	40.0	1.0	60.0	5.0	75.0	375	30

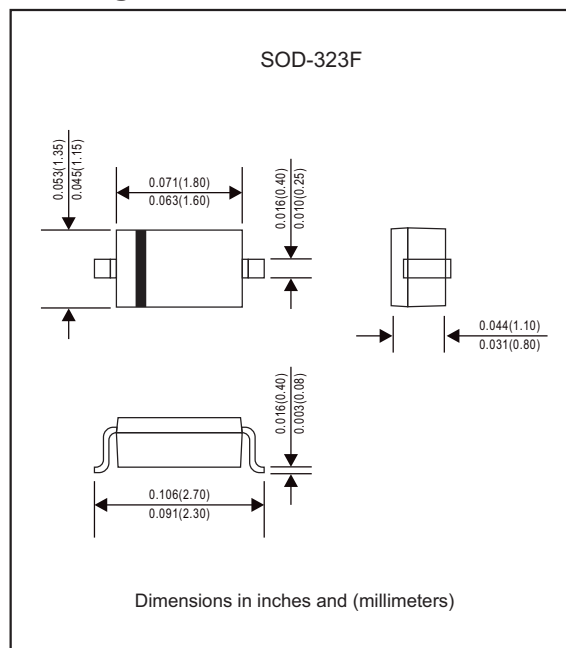
Notes 1. Surge current waveform per Fig.1

2. Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC61000-4-5

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

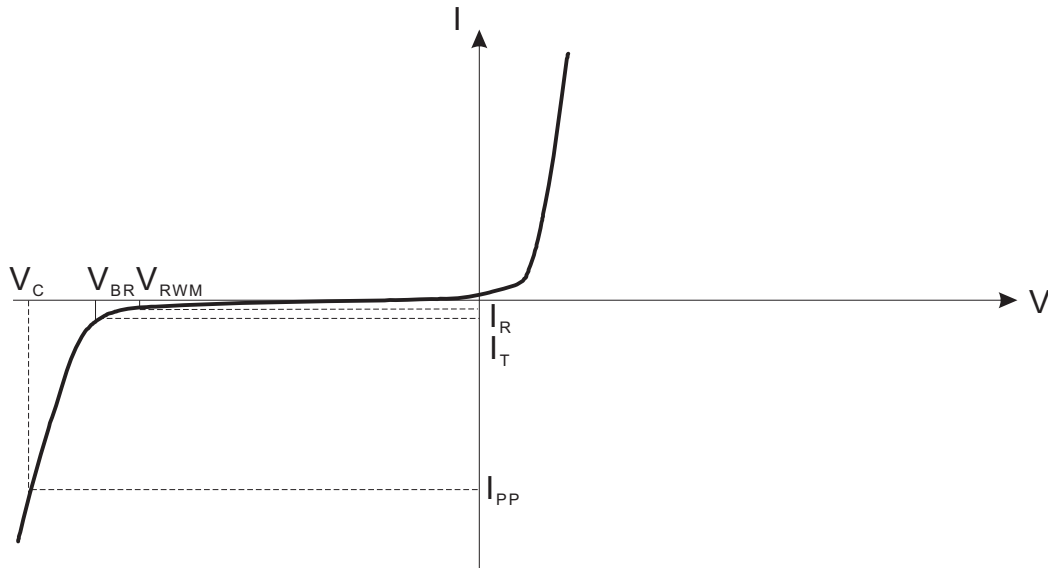
4. $V_R=0\text{V}$, $f=1\text{MHz}$

Package outline



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



Uni-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 $f = 1\text{MHz}$

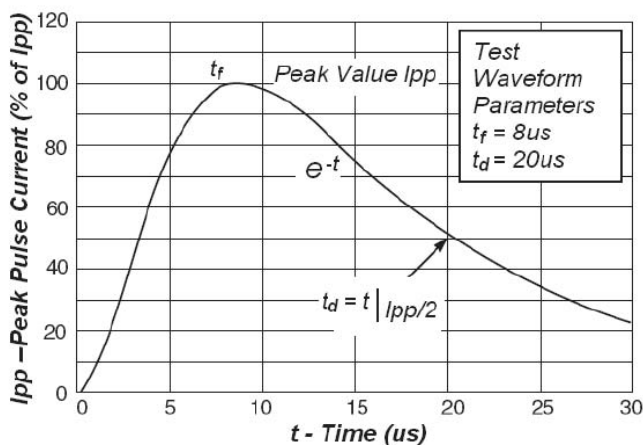


Fig1. Pulse Waveform

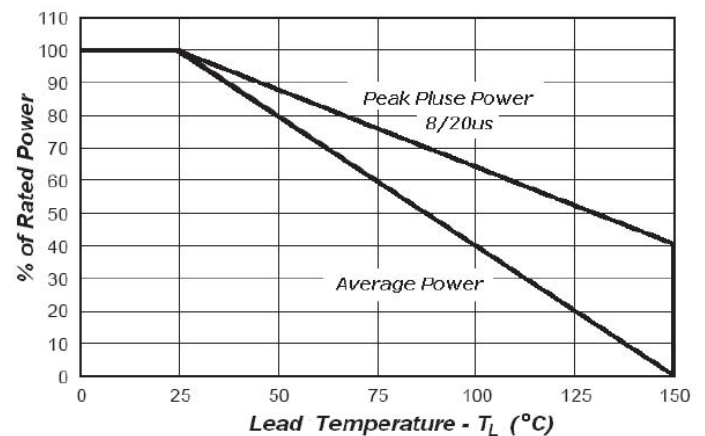
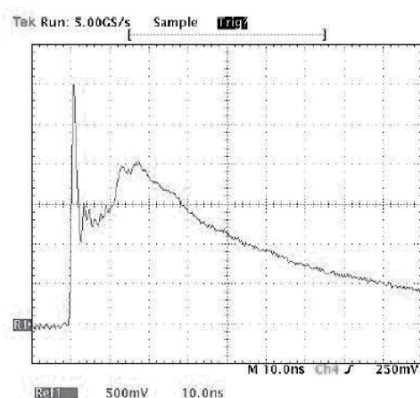


Fig2. Power Derating

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ESD Pulse Waveform (Per IEC 61000-4-2)



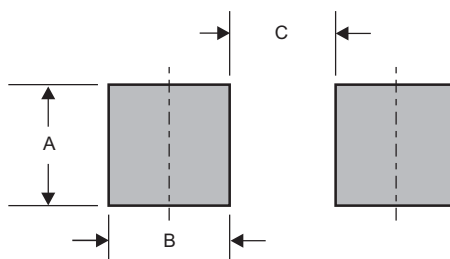
Pinning information

Pin	Simplified outline	Symbol
Uni-Directional Pin1 cathode Pin2 anode		

Marking

Type number	Marking code
ESD3Z3.3	03W,03
ESD3Z5.0	05W,05
ESD3Z12	12W,1B
ESD3Z15	15W,15
ESD3Z24	24W,24
ESD3Z36	36W,36

Suggested solder pad layout

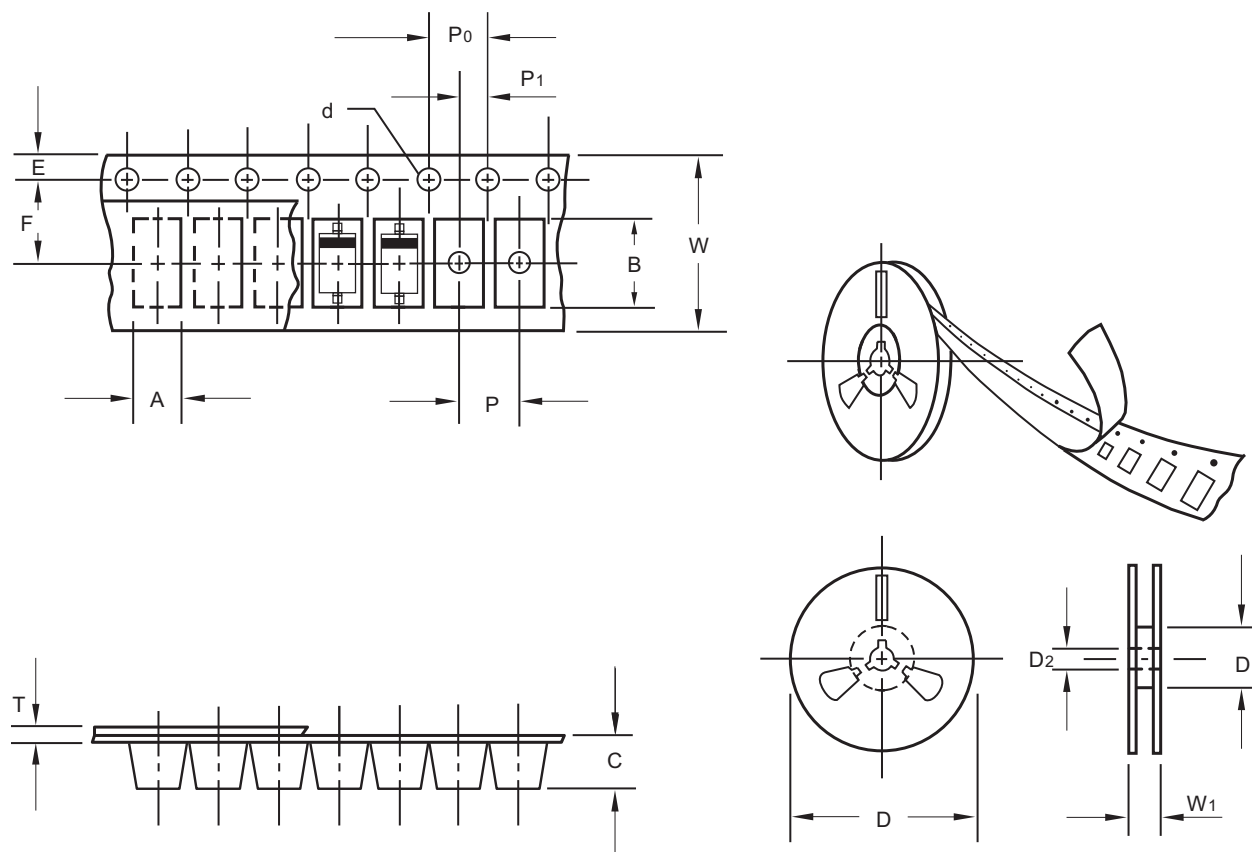


Dimensions in inches and (millimeters)

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.

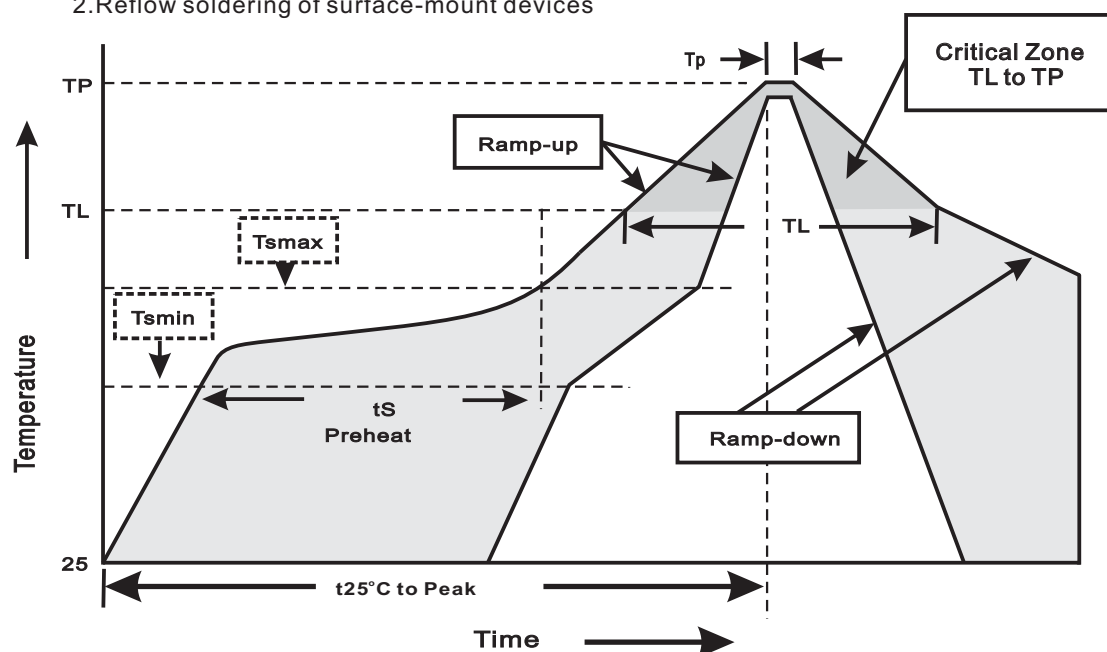
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Reel packing

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°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. Solder Resistance	at $260\pm 5^{\circ}\text{C}$ for $10\pm 2\text{sec.}$	MIL-STD-750D METHOD-2031
2. Solderability	at $245\pm 5^{\circ}\text{C}$ for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	$V_{\text{BR}}=V_{\text{BR Min}}*80\%$ at $T_{\text{J}}=150^{\circ}\text{C}$ for 168 hrs.	MIL-STD-750D METHOD-1038
4. Pressure Cooker	$15P_{\text{SIG}}$ at $T_{\text{A}}=121^{\circ}\text{C}$ for 4 hrs.	JESD22-A102
5. Temperature Cycling	-55°C to $+125^{\circ}\text{C}$ dwelled for 30 min. and transferred for 5min. total 10 cycles.	MIL-STD-750D METHOD-1051
6. Humidity	at $T_{\text{A}}=85^{\circ}\text{C}$, RH=85% for 1000hrs.	MIL-STD-750D METHOD-1021
7. High Temperature Storage Life	at 175°C for 1000 hrs.	MIL-STD-750D METHOD-1031