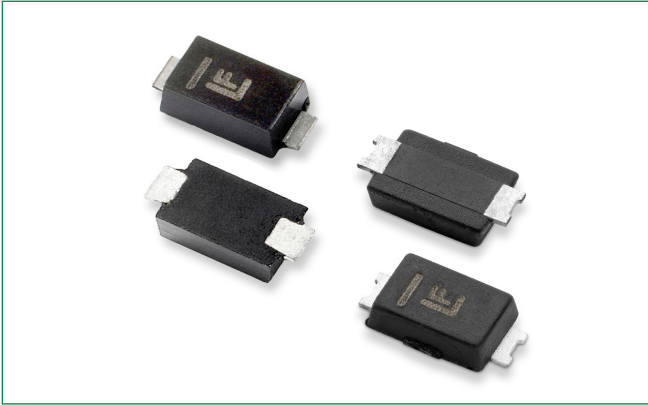


SMFA Asymmetric Series

Surface Mount TVS Diodes



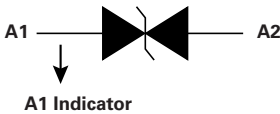
Maximum Ratings & Thermal Characteristics

Parameter	Symbol	Value	Unit
Power Dissipation on Infinite Heat Sink at $T_L = 50^\circ\text{C}$ (Note 1)	P_D	1	W
Thermal Resistance, Junction to Lead (Note3)	$R_{\theta JL}$	100	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	220	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Notes:

1. Mounted with recommended minimum pad size, DC board FR-4.

Functional Diagram



Description

The SMFA Asymmetric TVS Diode Series is designed specifically for SiC MOSFET gate protection for asymmetric voltages. It comes in SOD-123FL small and flat lead low-profile plastic package.

Features & Benefits

- SOD-123FL low-profile package: maximum height of 1.08 mm
- Low inductance, excellent clamping capability
- For surface-mounted applications to optimize board space
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c pass Class 1 and 2
- IEC 61000-4-2 ESD 30 kV(Air), 30 kV (Contact)
- Glass passivated chip junction
- Low dynamic resistance
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$ (αT : temperature coefficient, typical value is 0.1%)
- Recognized compound meeting flammability rating UL94 V-0
- Halogen-free and RoHS-compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD609A.01)

Applications

- AI/data center server power supplies
- High-efficiency power for EVI
- High-reliability power supplies for semiconductor/ industrial equipment

SMFA Asymmetric Series

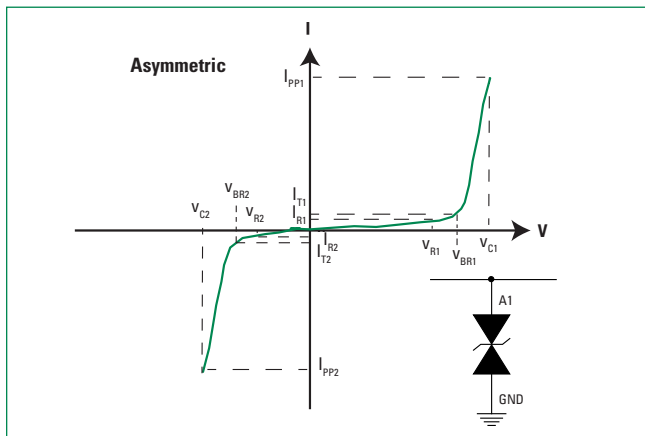
Surface Mount TVS Diodes

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

Part Number	Marking											
		Maximum Reverse Leakage $I_{R1} @ V_{R1}$ (μA)	Stand-off Voltage V_{R1} (V)	Breakdown Voltage V_{BR} (Volts) @ I_{T1}			Typical Clamping Voltage $V_{C1} @ I_{PP3}$ (V)	Typical Peak Pulse Current I_{PP3} (A)	Maximum Clamping Voltage $V_{C1} @ I_{PP1}$ (V)	Maximum Peak Pulse Current I_{PP1} (A)	Test Current I_{T1} (mA)	Junction Capacitance Typ@ 1 MHz, 0 V Bias (pF)
				Min.	Nom.	Max.						
SMFA1505CA	FM	1	15	16.7	17.6	18.5	18.57	2	24.05	16.63	1	565
SMFA1805CA	FT	1	18	20.0	21.1	22.1	24.47	2	28.73	13.92	1	515
SMFA1905CA	FU	1	19	21.1	22.2	23.3	25.55	2	30.29	13.21	1	485
SMFA2005CA	FV	1	20	22.2	23.4	24.5	26.40	2	31.85	12.56	1	440

Part Number	Marking											
		Maximum Reverse Leakage $I_{R2} @ V_{R2}$ (μA)	Stand-off Voltage V_{R2} (V)	Breakdown Voltage V_{BR} (Volts) @ I_{T2}			Typical Clamping Voltage $V_{C2} @ I_{PP4}$ (V)	Typical Peak Pulse Current I_{PP4} (A)	Maximum Clamping Voltage $V_{C2} @ I_{PP2}$ (V)	Maximum Peak Pulse Current I_{PP2} (A)	Test Current I_{T2} (mA)	Junction Capacitance Typ@ 1 MHz, 0 V Bias (pF)
				Min.	Nom.	Max.						
SMFA1505CA	FM	400	5.5	6.82	7.15	7.48	7.85	2	10.5	33.0	10	565
SMFA1805CA	FT	400	5.5	6.82	7.15	7.48	7.85	2	10.5	33.0	10	515
SMFA1905CA	FU	400	5.5	6.82	7.15	7.48	7.85	2	10.5	33.0	10	485
SMFA2005CA	FV	400	5.5	6.82	7.15	7.48	7.85	2	10.5	33.0	10	440

I-V Curve Characteristics



P_{PPM} Peak Pulse Power Dissipation ($I_{PP} \times V_C$) - Max power dissipation

V_{R1}/V_{R2} Stand-off Voltage - Maximum voltage that can be applied to the TVS without operation

V_{BR1}/V_{BR2} Breakdown Voltage - Maximum voltage that flows through the TVS at a specified test current (I_T)

V_{C1}/V_{C2} Clamping Voltage - Peak voltage measured across the TVS at a specified I_{PPM} (peak impulse current)

I_{R1}/I_{R2} Reverse Leakage Current - Current measured at V_R

SMFA Asymmetric Series

Surface Mount TVS Diodes

Figure 1. Pulse Rating Curve

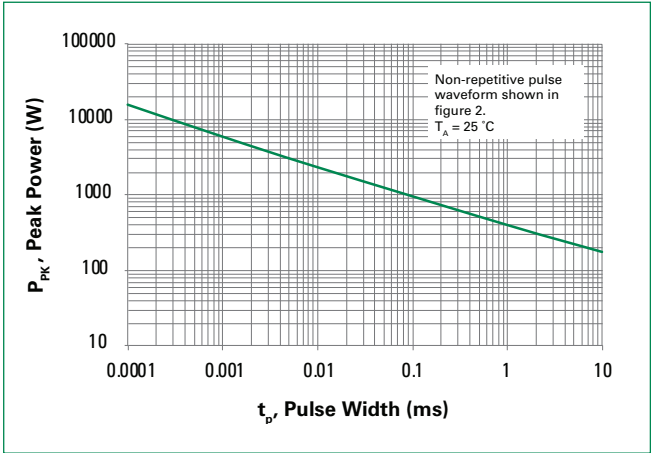


Figure 2. Surge Derating Curve

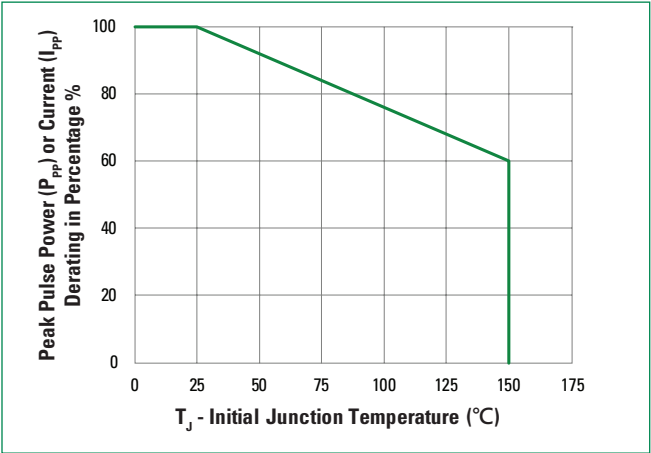


Figure 3. 10/1000 μs Pulse Waveform

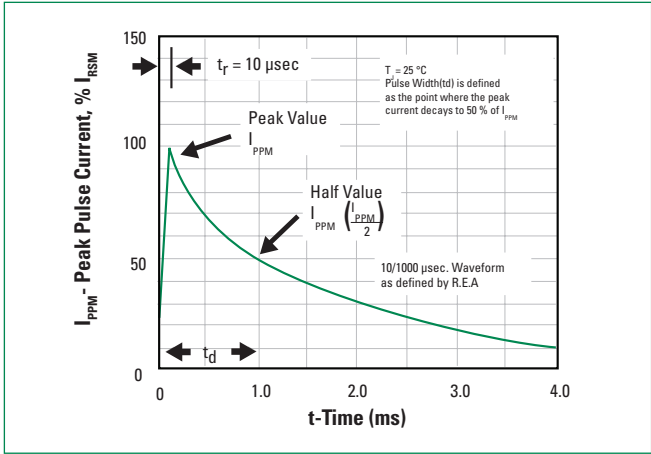
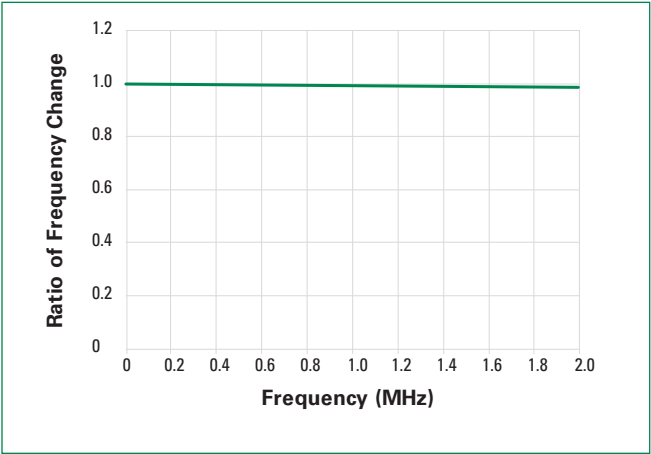


Figure 4. Normalized Typical Junction Capacitance vs. Frequency

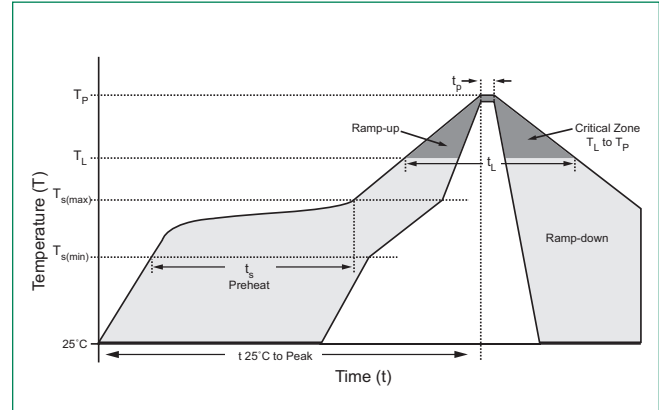


SMFA Asymmetric Series

Surface Mount TVS Diodes

Soldering Parameters

Reflow Condition		Lead-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 – 120 seconds
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
	- Time (min to max) (t_s)	60 – 150 seconds
Peak Temperature (T_p)		260 ^{+0/-5} °C
Time Within 5 °C of Actual Peak Temperature (t_p)		30 seconds max.
Ramp-down Rate		6 °C/second max.
Time 25 °C to Peak Temperature (T_p)		8 minutes max.
Do Not Exceed		260 °C



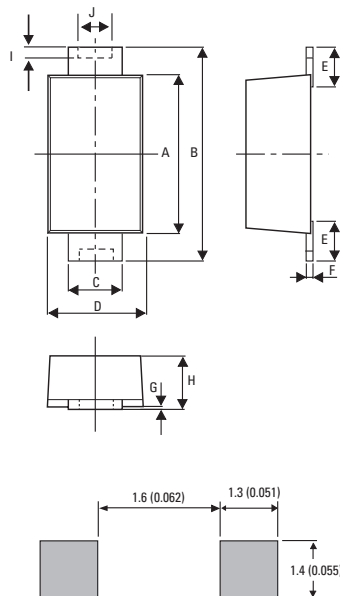
Physical Specifications

Weight	0.005 ounce, 0.0155 grams
Case	SOD-123FL plastic over glass passivated junction
Polarity	High voltage A1 side is denoted with a indicator
Terminal	Matte tin-plated leads, solderable per JESD22-B102

Environmental Specifications

High Temperature Storage Life (HTSL)	JESD22-A103
High Temperature Voltage Blocking (HTRB)	100 % DC reverse voltage rated 150 °C, 1008 hours JEDEC, JESD22-A-108
Temperature Cycling (TC)	-55 °C to +150 °C, 15 min. dwell, 1000 cycles. JEDEC, JESD22-A104
Moisture Sensitivity Level (MSL)	85 %RH, +85 °C, 168 hours, 3 reflow cycles (+260 °C Peak). JEDEC, JEDEC-J-STD-020, Level 1
Biased Temperature & Humidity (H3TRB)	80 % breakdown voltage (+85 °C) 85 %RH, 1008 hours JEDEC, JESD22-A-101
Resistance to Solder Heat (RSH)	+260 °C, 30 seconds JEDEC, JEDEC JESD22-A-111

Dimensions



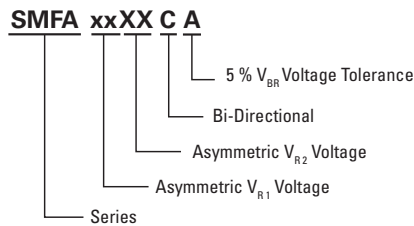
Mounting Pad Layout

Dimensions	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.70	3.10	0.106	0.122
B	3.50	3.90	0.138	0.154
C	0.85	1.05	0.033	0.041
D	1.70	2.00	0.067	0.079
E	0.43	0.83	0.017	0.033
F	0.10	0.25	0.004	0.010
G	0.00	0.10	0.000	0.004
H	0.90	1.08	0.035	0.043
I	0.00	0.20	0.000	0.008
J	0.40	0.60	0.016	0.024

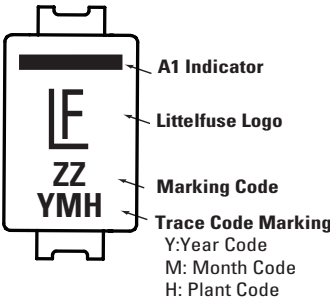
SMFA Asymmetric Series

Surface Mount TVS Diodes

Part Numbering System



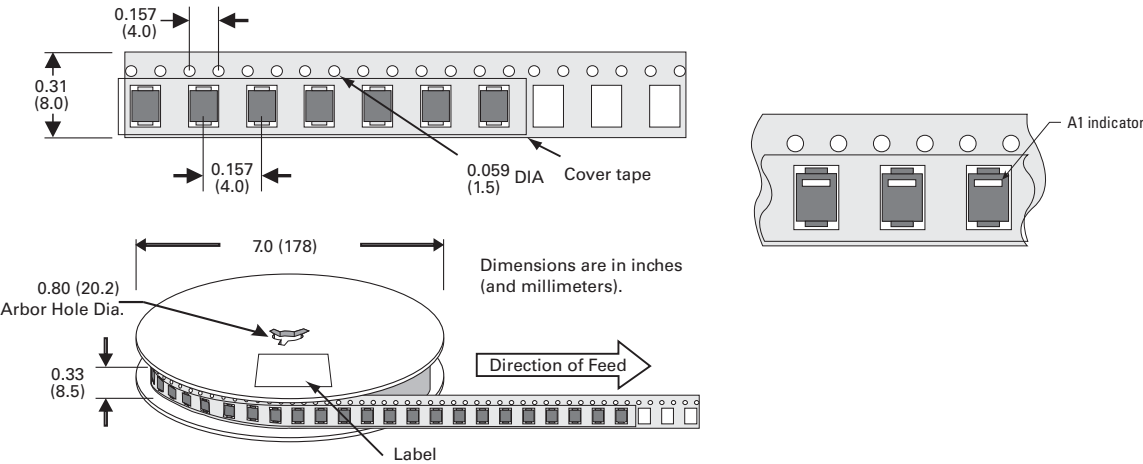
Part Marking System



Packaging

Device	Component Package	Quantity	Packaging Option	Packaging Specification
SMFAxxXXCA	SOD-123FL	3000	Tape & Reel - 8 mm tape/7" reel	EIA STD RS-481

Tape and Reel Specification



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