

TVS Diode – TPSMF Series

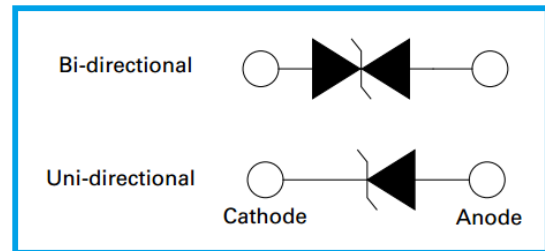
Features

- Plastic package, excellent insulation strength.
- Glass passivated chip junction in SOD-123 package.
- Automotive grade AEC-Q101 qualified.
- Excellent voltage clamping capability.
- Low Zener impedance.
- 200W peak pulse power capability on 10/1000 μ s waveform.
- Typical leakage current less than 1 μ A above 13 V.
- Very fast response time, typically less than 1.0 ps from 0 volt to V_{BR} minimum.
- High temperature soldering guaranteed: 265 °C/10 sec.
- MSL: JEDEC-J-STD-020, Level 1



Applications

- I/O interface, V_{CC} bus
- Telecom / Automotive
- Industrial and consumer electronic applications.
- Relay and electromagnetic valve surge absorption.



Mechanical and Physical Data

- Case: JEDEC SMF molded plastic.
- Axial leaded, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denoted cathode except bidirectional.

Maximum Ratings and Thermal Characteristics

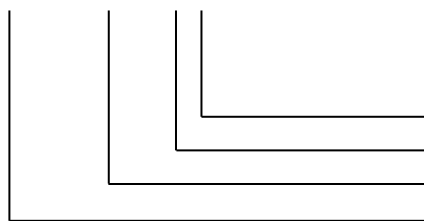
Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation on 10/1000 μ s waveform (Note 1, Fig.1).	P_{PPM}	Min 200	W
Peak Pulse Current of 10/1000 μ s waveform (Note 1, Fig.3).	I_{PPM}	See Table	A
Peak Forward Surge Current, 8.3 ms Single Half Sine Wave Superimposed on Rated Load (Note 2, Fig.6).	I_{FSM}	20	A
Operating Junction and Storage Temperature Range.	T_J, T_{STG}	-55~150	°C

Note:

1. Non-repetitive current pulse, per Fig.3 and derated above $T_A = 25$ °C per Fig.2.
2. 8.3ms single half sine wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum.

Part Number Code

TPSMF □□□ C A



V_{BR} Voltage tolerance (A: 5%; Blank: 10%)

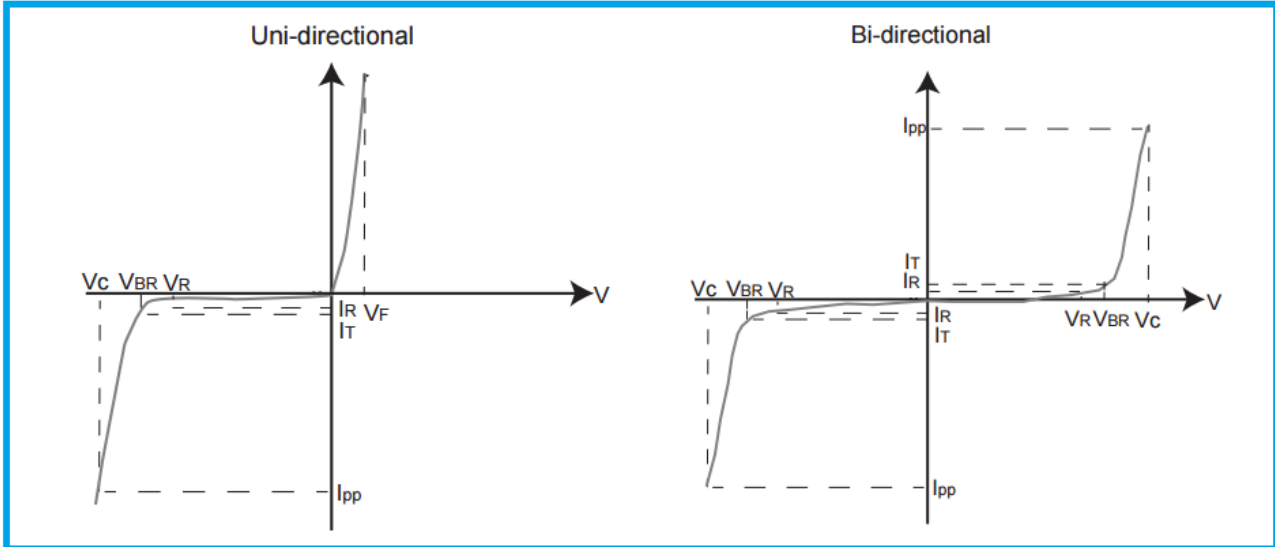
C: Bi-directional; Blank: Uni-directional

Reverse Stand-Off Voltage or Typical Breakdown Voltage

Automotive TPSMF Series (200W)

TVS Diode – TPSMF Series

I-V Curve Characteristics



I_{PPM} Peak Pulse Power Dissipation – Maximum power dissipation

V_R Stand-off Voltage – Maximum voltage that can be applied to the TVS without operation

V_{BR} Breakdown Voltage – Maximum voltage that flows through the TVS at a specified test current (I_T)

V_C Clamping Voltage – Peak voltage measured across the TVS at a specified I_{PPM} (Peak Impulse Current)

I_R Reverse Leakage Current – Current measured at V_R

V_F Forward Voltage Drop for Uni-directional

Electrical Characteristics

Part Number		Marking		Reverse Stand Off Voltage V_R (V)	Breakdown Voltage V_{BR} (V) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C (V) @ I_{PP}	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R (μ A) @ V_R
Uni	Bi	Uni	Bi		Min.	Max.				
TPSMF5.0A	TPSMF5.0CA	FET	KET	5.0	6.40	7.00	10	9.2	21.74	400
TPSMF6.0A	TPSMF6.0CA	FGT	KGT	6.0	6.67	7.37	10	10.3	19.42	400
TPSMF6.5A	TPSMF6.5CA	FKT	KKT	6.5	7.22	7.98	10	11.2	17.86	250
TPSMF7.0A	TPSMF7.0CA	FMT	KMT	7.0	7.78	8.60	10	12.0	16.67	100
TPSMF7.5A	TPSMF7.5CA	FPT	KPT	7.5	8.33	9.21	1	12.9	15.50	50
TPSMF8.0A	TPSMF8.0CA	FRT	KRT	8.0	8.89	9.83	1	13.6	14.71	25
TPSMF8.5A	TPSMF8.5CA	FTT	KTT	8.5	9.44	10.40	1	14.4	13.89	10
TPSMF9.0A	TPSMF9.0CA	FVT	KVT	9.0	10.00	11.10	1	15.4	12.99	5.0
TPSMF10A	TPSMF10CA	FXT	KXT	10	11.10	12.30	1	17.0	11.76	2.5
TPSMF11A	TPSMF11CA	FZT	KZT	11	12.20	13.50	1	18.2	10.99	2.5
TPSMF12A	TPSMF12CA	HET	LET	12	13.30	14.70	1	19.9	10.05	2.5
TPSMF13A	TPSMF13CA	HGT	LGT	13	14.40	15.90	1	21.5	9.30	1
TPSMF14A	TPSMF14CA	HKT	LKT	14	15.60	17.20	1	23.2	8.62	1
TPSMF15A	TPSMF15CA	HMT	LMT	15	16.70	18.50	1	24.4	8.20	1
TPSMF16A	TPSMF16CA	HPT	LPT	16	17.80	19.70	1	26.0	7.69	1
TPSMF17A	TPSMF17CA	HRT	LRT	17	18.90	20.90	1	27.6	7.25	1
TPSMF18A	TPSMF18CA	HTT	LTT	18	20.00	22.10	1	29.2	6.85	1

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Part Number		Marking		Reverse Stand Off Voltage V_R (V)	Breakdown Voltage V_{BR} (V) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C (V) @ I_{PP}	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R (μ A) @ V_R
Uni	Bi	Uni	Bi		Min.	Max.				
TPSMF19A	TPSMF19CA	HBT	LBT	19	21.10	23.30	1	30.6	6.54	1
TPSMF20A	TPSMF20CA	HVT	LVT	20	22.20	24.50	1	32.4	6.17	1
TPSMF22A	TPSMF22CA	HXT	LXT	22	24.40	26.90	1	35.5	5.63	1
TPSMF24A	TPSMF24CA	HZT	LZT	24	26.70	29.50	1	38.9	5.14	1
TPSMF26A	TPSMF26CA	JET	MET	26	28.90	31.90	1	42.1	4.75	1
TPSMF28A	TPSMF28CA	JGT	MGT	28	31.10	34.40	1	45.4	4.41	1
TPSMF30A	TPSMF30CA	JKT	MKT	30	33.30	36.80	1	48.4	4.13	1
TPSMF33A	TPSMF33CA	JMT	MMT	33	36.70	40.60	1	53.3	3.75	1
TPSMF36A	TPSMF36CA	JPT	MPT	36	40.00	44.20	1	58.1	3.44	1
TPSMF40A	TPSMF40CA	JRT	MRT	40	44.40	49.10	1	64.5	3.10	1
TPSMF43A	TPSMF43CA	JTT	MTT	43	47.80	52.80	1	69.4	2.88	1
TPSMF45A	TPSMF45CA	JVT	MVT	45	50.00	55.30	1	72.7	2.75	1
TPSMF48A	TPSMF48CA	JXT	MXT	48	53.30	58.90	1	77.4	2.58	1
TPSMF51A	TPSMF51CA	JZT	MZT	51	56.70	62.70	1	82.4	2.43	1
TPSMF54A	TPSMF54CA	XET	NET	54	60.00	66.30	1	87.1	2.30	1
TPSMF58A	TPSMF58CA	XGT	NGT	58	64.40	71.20	1	93.6	2.14	1
TPSMF60A	TPSMF60CA	XKT	NKT	60	66.70	73.70	1	96.8	2.07	1
TPSMF64A	TPSMF64CA	XMT	NMT	64	71.10	78.60	1	103.0	1.94	1
TPSMF70A	TPSMF70CA	XPT	NPT	70	77.80	86.00	1	113.0	1.77	1
TPSMF75A	TPSMF75CA	XRT	NRT	75	83.30	92.10	1	121.0	1.65	1
TPSMF78A	TPSMF78CA	XTT	NTT	78	86.70	95.80	1	126.0	1.59	1
TPSMF80A	TPSMF80CA	XBT	NBT	80	88.80	97.60	1	129.0	1.55	1
TPSMF85A	TPSMF85CA	XVT	NVT	85	94.40	104.0	1	137.0	1.46	1
TPSMF90A	TPSMF90CA	XXT	NXT	90	100.0	111.0	1	146.0	1.37	1
TPSMF100A	TPSMF100CA	XZT	NZT	100	111.0	123.0	1	162.0	1.23	1
TPSMF110A	TPSMF110CA	TET	PET	110	122.0	135.0	1	177.0	1.13	1
TPSMF120A	TPSMF120CA	TGT	PGT	120	133.0	147.0	1	193.0	1.04	1
TPSMF130A	TPSMF130CA	TKT	PKT	130	144.0	159.0	1	209.0	0.96	1
TPSMF140A	TPSMF140CA	TBT	PBT	140	155.0	171.0	1	224.0	0.89	1
TPSMF150A	TPSMF150CA	TMT	PMT	150	167.0	185.0	1	243.0	0.82	1
TPSMF160A	TPSMF160CA	TPT	PPT	160	178.0	197.0	1	259.0	0.77	1
TPSMF170A	TPSMF170CA	TRT	PRT	170	189.0	209.0	1	275.0	0.73	1
TPSMF180A	TPSMF180CA	TTT	PTT	180	200.0	220.0	1	292.0	0.68	1
TPSMF190A	TPSMF190CA	TVT	PVT	190	211.0	232.0	1	308.0	0.65	1
TPSMF200A	TPSMF200CA	TXT	PXT	200	224.0	247.0	1	324.0	0.62	1
TPSMF220A	TPSMF220CA	TZT	PZT	220	246.0	272.0	1	356.0	0.56	1

Note:

1. For bi-directional type having V_R of 10 volts and less, the I_R limit is double.

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Ratings and Characteristic Curves

Fig 1 - Peak Pulse Power Rating Curve

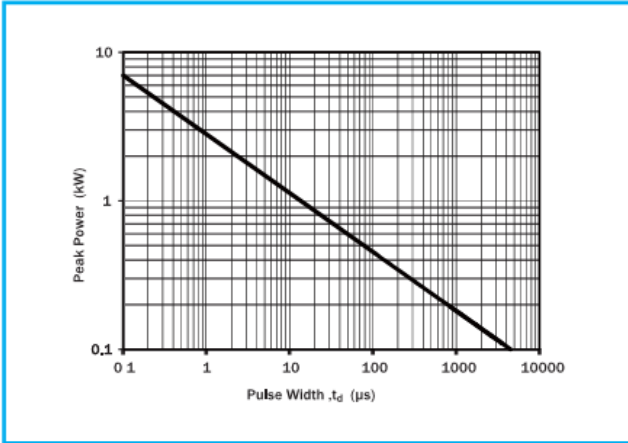


Fig 2 - Pulse Derating Curve

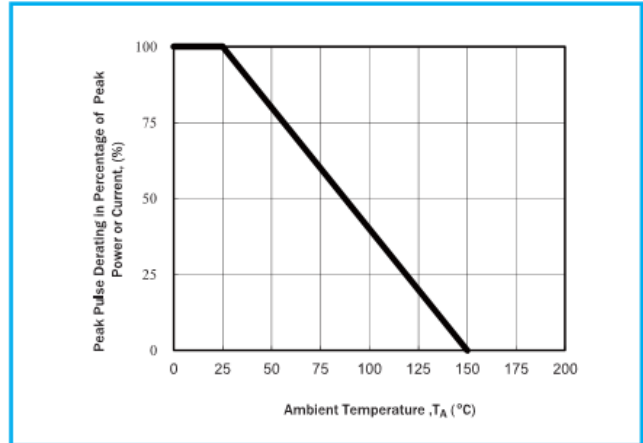


Fig 3 - Pulse Waveform

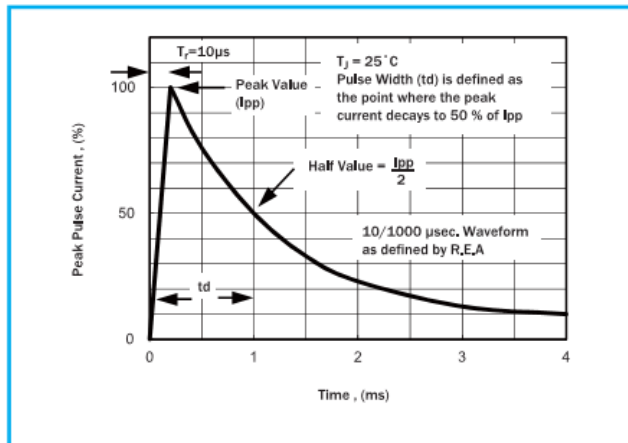


Fig 4 - Typical Junction Capacitance Uni-directional

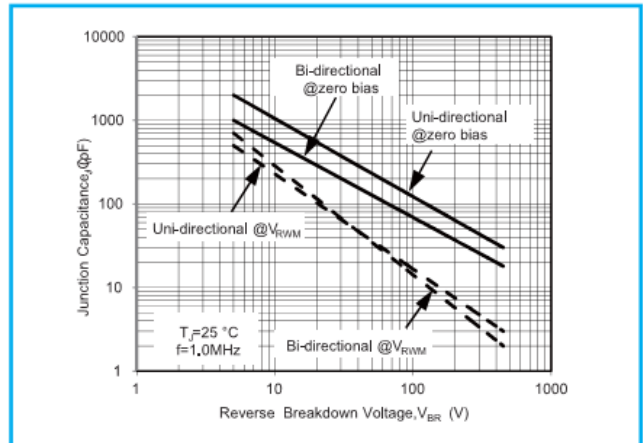


Fig 5 - Steady State Power Dissipation Derating Curve

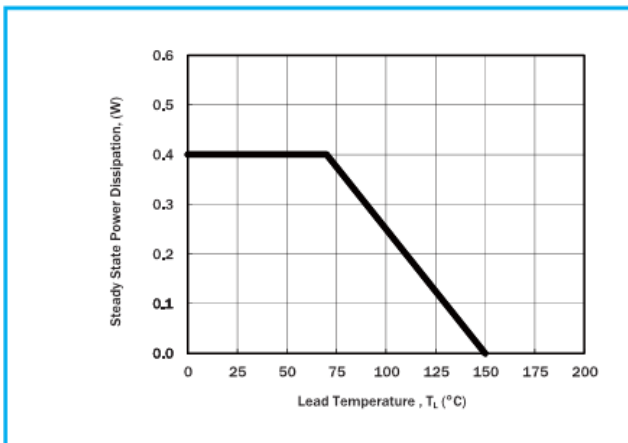
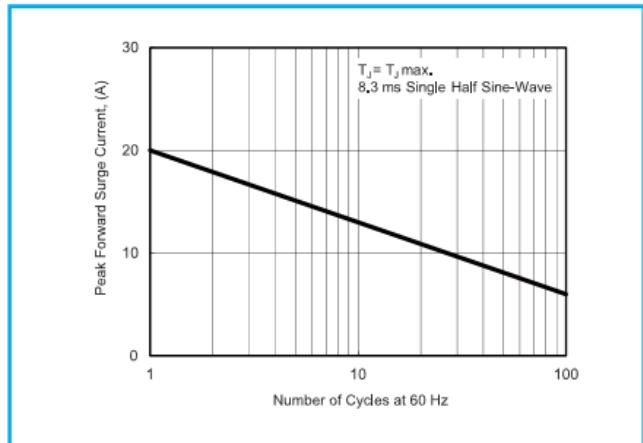
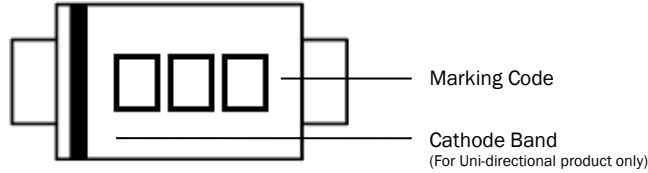


Fig 6 - Maximum Non-Repetitive Forward Surge Current (Uni-directional Only)

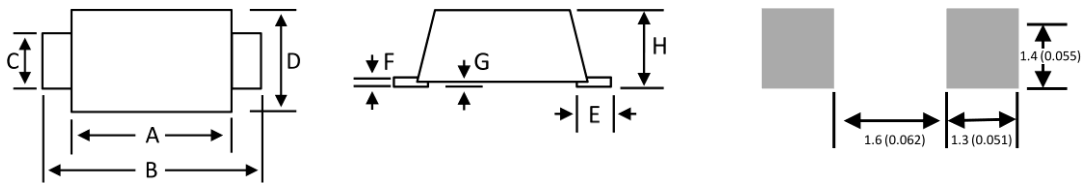


TVS Diode – TPSMF Series

Marking Definitions



Physical Dimensions



Dimension	Millimeters		Inches	
	Min	Max	Min	Max
A	2.50	2.90	0.0984	0.1142
B	3.40	3.90	0.1339	0.1535
C	0.70	1.20	0.0275	0.0472
D	1.50	2.00	0.0591	0.0787
E	0.35	0.90	0.0138	0.0354
F	0.05	0.26	0.0020	0.0102
G	-	0.10	-	0.0039
H	0.95	1.30	0.0374	0.0512

Lead Free Reflow Soldering Recommendations

Preheat	
- Temperature Min (T_{s_min})	150°C
- Temperature Max (T_{s_max})	200°C
- Time (T_{s_min} to T_{s_max})	60-180 seconds
- Average Ramp-Up Rate	1~3°C/second
Peak Temperature	260°C max.
Time within 5°C of actual Peak Temperature (t_p)	40 seconds max.
Ramp-Down Rate	6 °C /second max.



Note: If the soldering temperatures exceed the recommended profile, devices may not meet the performance requirements.

TVS Diode – TPSMF Series

Packaging Information

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
TPSMF Series	SOD-123	3000	Tape & Reel – 8mm tape/7" reel	EIA STD RS-481

Tape and Reel Specifications

