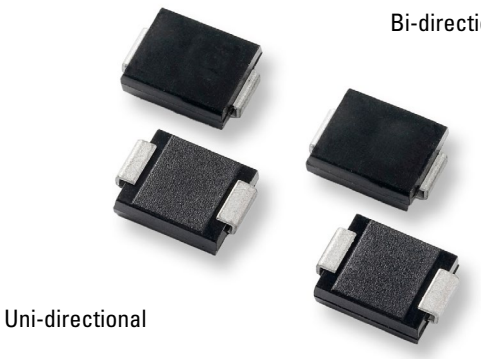
TPSMD Series
Surface Mount – 3000W

AUTOMOTIVE GRADE HF RoHS



Web Resources

Download ECAD models, order samples, and find technical recources at www.littelfuse.com

Agency Approvals

Agency	Agency File Number
	E230531

Maximum Ratings and Thermal Characteristics
(T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at T_A=25°C by 10/1000µs Waveform (Fig.2) (Note 1), (Note 2)	P_{PPM}	3000	W
Power Dissipation on Infinite Heat Sink at T_A=50°C	$P_{M(AV)}$	6.5	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	I_{FSM}	300	A
Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only	V_F	3.5	V
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-65 to 150	°C
Typical Thermal Resistance Junction to Lead	R_{uJL}	15	°C/W
Typical Thermal Resistance Junction to Ambient	R_{uJA}	75	°C/W

Notes:
1. Non-repetitive current pulse , per Fig. 4 and derated above T_A = 25°C per Fig. 3.
2. Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0mm) to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.

Description

The TPSMD series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

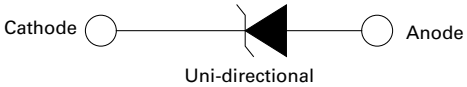
Features & Benefits

- Hi reliability application and automotive grade AEC-Q101 qualified
- SMT for minimal boad footprint
- Low profile package
- 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
- IEC-61000-4-2 ESD 30kV(Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Built-in strain relief
- V_{BR}@T_J= V_{BR}@25°C x (1+αT x (T_J - 25)) (αT:Temperature Coefficient)
- Glass passivated chip junction
- 3000W peak pulse power capability at 10/1000µs waveform, repetition rate (duty cycles):0.01%
- Fast response time: typically less than 1.0ps from 0V to V_{BR} min
- Excellent clamping capability
- Low incremental surge resistance
- Typical I_R ≤ 2µA for V_R > 10V
- High temperature soldering guaranteed: 260°C/10 seconds at terminals
- UL Recognized compound meeting flammability rating V-0.
- Meet MSL level1, per J-STD-020, high temperature soldering guaranteed.
- Matte tin lead–free plated
- 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-STD-609A.01)
- Support active clamping (please see app. note "Littelfuse Using High Voltage TVS Diodes in IGBT active Clamp Applications" for futher details)

Applications

TVS Components are ideal for the protection of I/O Interfaces, V_{CC} bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

Functional Diagram



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Electrical Characteristics

Part Number (Uni)	Part Number (Bi)	Marking		Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C @ I_{PP} (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R @ V_R (µA)	Agency Approval
		UNI	BI		MIN	MAX					
TPSMD10A	TPSMD10CA	PDXA	DDXA	10.0	11.10	12.30	1	17.0	176.5	5	X
TPSMD11A	TPSMD11CA	PDZA	DDZA	11.0	12.20	13.50	1	18.2	164.8	2	X
TPSMD12A	TPSMD12CA	PEEA	DEEA	12.0	13.30	14.70	1	19.9	150.8	2	X
TPSMD13A	TPSMD13CA	PEGA	DEGA	13.0	14.40	15.90	1	21.5	139.5	2	X
TPSMD14A	TPSMD14CA	PEKA	DEKA	14.0	15.60	17.20	1	23.2	129.3	2	X
TPSMD15A	TPSMD15CA	PEMA	DEMA	15.0	16.70	18.50	1	24.4	123.0	2	X
TPSMD16A	TPSMD16CA	PEPA	DEPA	16.0	17.80	19.70	1	26.0	115.4	2	X
TPSMD17A	TPSMD17CA	PERA	DERA	17.0	18.90	20.90	1	27.6	108.7	2	X
TPSMD18A	TPSMD18CA	PETA	DETA	18.0	20.00	22.10	1	29.2	102.7	2	X
TPSMD20A	TPSMD20CA	PEVA	DEVA	20.0	22.20	24.50	1	32.4	92.6	2	X
TPSMD22A	TPSMD22CA	PEXA	DEXA	22.0	24.40	26.90	1	35.5	84.5	2	X
TPSMD24A	TPSMD24CA	PEZA	DEZA	24.0	26.70	29.50	1	38.9	77.1	2	X
TPSMD26A	TPSMD26CA	PFEA	DFEA	26.0	28.90	31.90	1	42.1	71.3	2	X
TPSMD28A	TPSMD28CA	PFGA	DFGA	28.0	31.10	34.40	1	45.4	66.1	2	X
TPSMD30A	TPSMD30CA	PFKA	DFKA	30.0	33.30	36.80	1	48.4	62.0	2	X
TPSMD33A	TPSMD33CA	PFMA	DFMA	33.0	36.70	40.60	1	53.3	56.3	2	X
TPSMD36A	TPSMD36CA	PFPA	DFPA	36.0	40.00	44.20	1	58.1	51.6	2	X
TPSMD40A	TPSMD40CA	PFRA	DFRA	40.0	44.40	49.10	1	64.5	46.5	2	X
TPSMD43A	TPSMD43CA	PFTA	DFTA	43.0	47.80	52.80	1	69.4	43.2	2	X
TPSMD45A	TPSMD45CA	PFVA	DFVA	45.0	50.00	55.30	1	72.7	41.3	2	X
TPSMD48A	TPSMD48CA	PFXA	DFXA	48.0	53.30	58.90	1	77.4	38.8	2	X
TPSMD51A	TPSMD51CA	PFZA	DFZA	51.0	56.70	62.70	1	82.4	36.4	2	X
TPSMD54A	TPSMD54CA	RGEA	DGEA	54.0	60.00	66.30	1	87.1	34.4	2	X
TPSMD58A	TPSMD58CA	PGGA	DGGA	58.0	64.40	71.20	1	93.6	32.1	2	X
TPSMD60A	TPSMD60CA	PGKA	DGKA	60.0	66.70	73.70	1	96.8	31.0	2	X
TPSMD64A	TPSMD64CA	PGMA	DGMA	64.0	71.10	78.60	1	103.0	29.1	2	X
TPSMD70A	TPSMD70CA	PGPA	DGPA	70.0	77.80	86.00	1	113.0	26.5	2	X
TPSMD75A	TPSMD75CA	PGRA	DGRA	75.0	83.30	92.10	1	121.0	24.8	2	X
TPSMD78A	TPSMD78CA	PGTA	DGTA	78.0	86.70	95.80	1	126.0	23.8	2	X
TPSMD85A	TPSMD85CA	PGVA	DGVA	85.0	94.40	104.00	1	137.0	21.9	2	X
-	TPSMD400CA-A	-	PGCA	400.0	447.00	494.00	1	658.0	4.7	2	X

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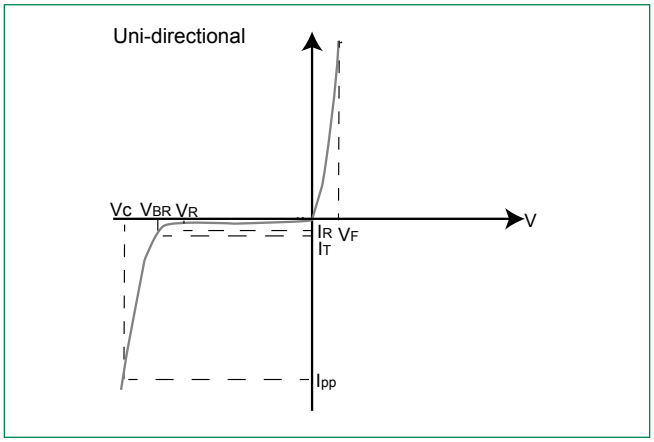
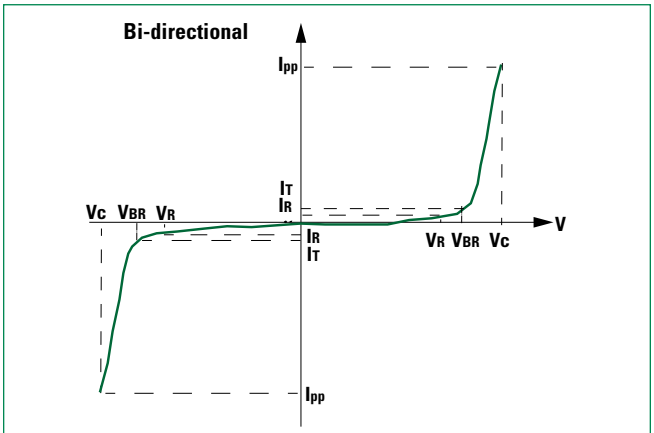
I-V Curve Characteristics





P_{PPM} Peak Pulse Power Dissipation – Max 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 though the TVS at a specified test current (I_T)
V_C Clamping Voltage -- Peak voltage measured across the suppressor at a specified Ippm (peak impulse current)
I_R Reverse Leakage Current -- Current measured at V_R
V_F Forward Voltage Drop for Uni-directional

Ratings and Characteristic Curves (T_A=25°C unless otherwise noted)

Figure 1 - TVS Transients Clamping Waveform

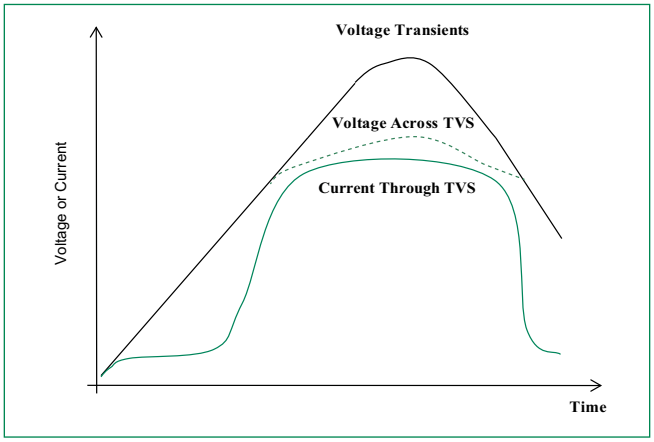
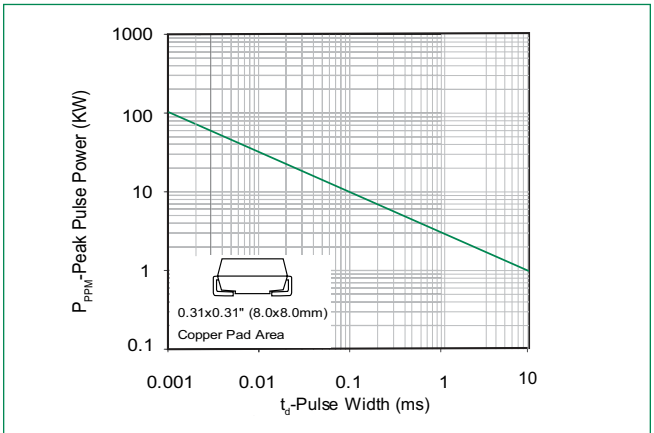


Figure 2 - Peak Pulse Power Rating



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Ratings and Characteristic Curves (T_A=25°C unless otherwise noted) (Continued)

Figure 3 - Peak Pulse Power or Current Derating Curve vs Initial Junction Temperature

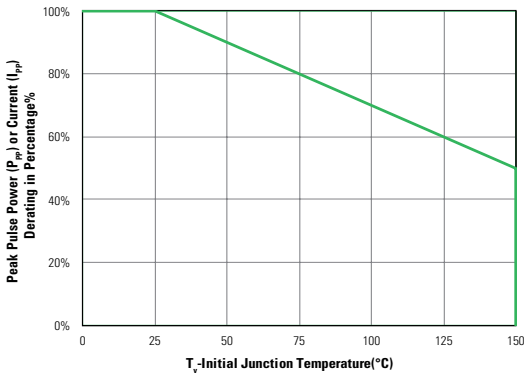


Figure 4 - Pulse Waveform

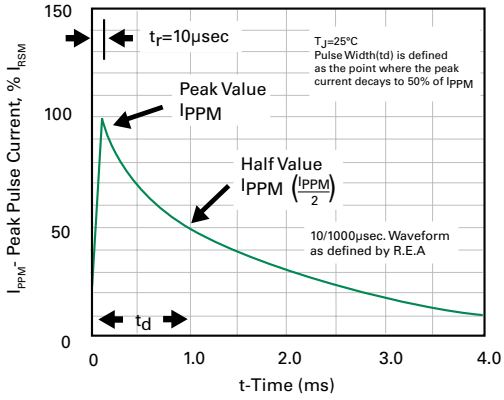


Figure 5 - Typical Junction Capacitance

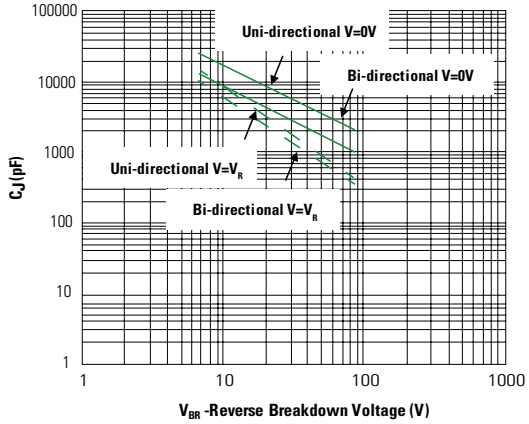


Figure 6 - Steady State Power Derating Curve

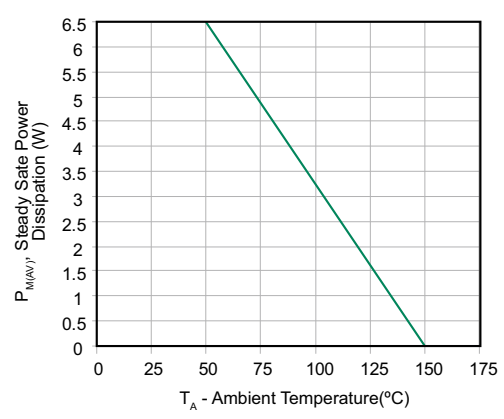
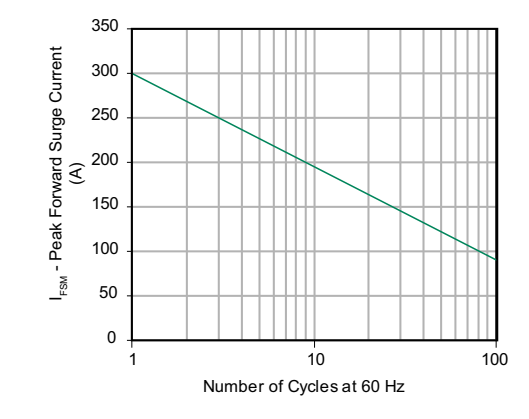


Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional only



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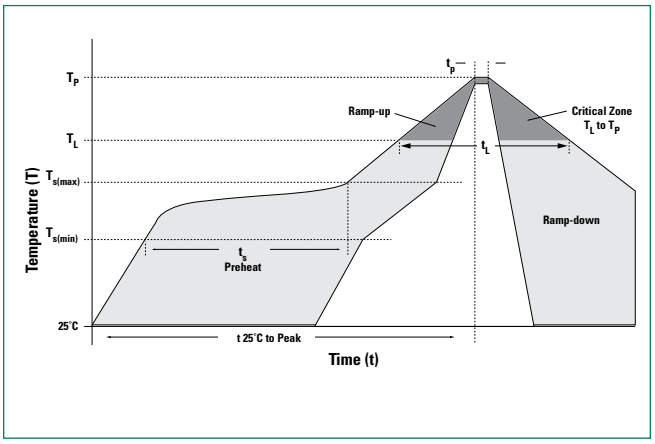
Soldering Parameters

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 secs
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

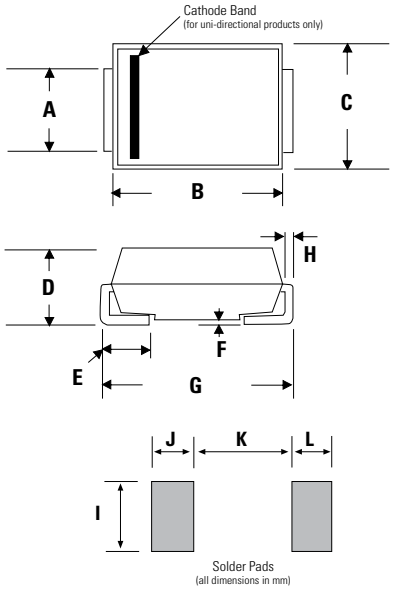
Weight	0.007 ounce, 0.21 grams
Case	JEDEC DO214AB. Molded plastic body over glass passivated junction
Polarity	Color band denotes positive end (cathode) except Bidirectional.
Terminal	Matte Tin-plated leads, Solderable per JESD22-B102

Environmental Specifications

High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Temperature Cycling	JESD22-A104
MSL	JEDEC-J-STD-020, Level 1
H3TRB	JESD22-A101
RSH	JESD22-B106

Dimensions

DO-214AB (SMC J-Bend)



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.126	2.900	3.200
B	0.260	0.280	6.600	7.110
C	0.220	0.245	5.590	6.220
D	0.079	0.103	2.060	2.620
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.305	0.320	7.750	8.130
H	0.006	0.012	0.152	0.305
I	0.129	-	3.300	-
J	0.094	-	2.400	-
K	-	0.165		4.200
L	0.094	-	2.400	-

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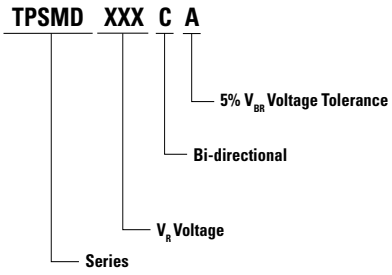
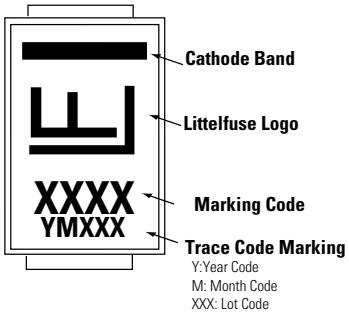
Part Numbering System



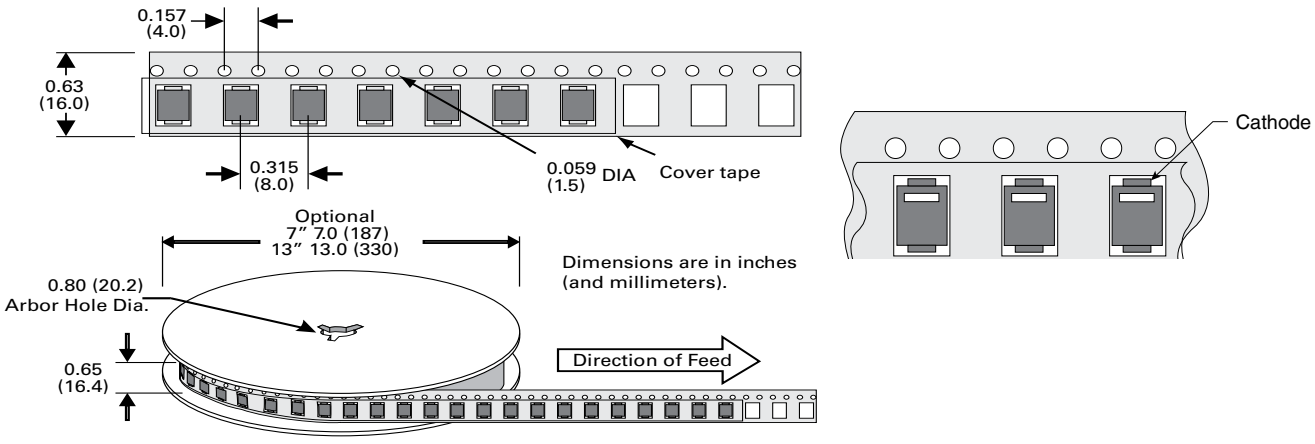
Part Marking System



Packaging Options

Part number	Component Package	Quantity	Packaging Option	Packaging Specification
TPSMDxxxX	DO-214AB	3000	Tape & Reel - 16mm tape/13" reel	EIA STD RS-481
TPSMDxxxX-T7	DO-214AB	500	Tape & Reel – 16mm tape /7" reel	EIA STD RS-481

Tape and Reel Specification



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