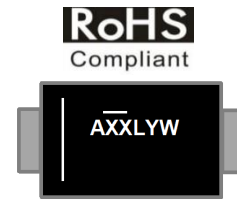


Features

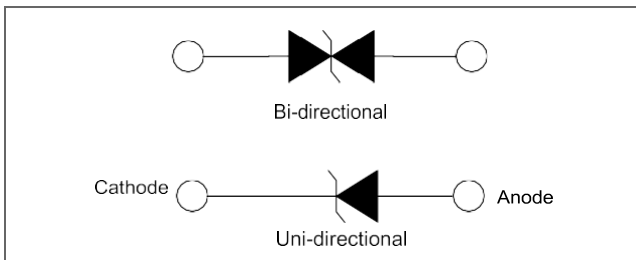
- 400W peak pulse power capability at 10/1000 μ s waveform, repetition rate (duty cycles):0.01%
- Excellent clamping capability
- Typical failure mode is a short circuit condition for current events exceeding component rating
- Plastic package is flammability rated V-0 per UL-94
- Meet MSL level1, per J-STD-020, lead-frame maximum peak of 260°C
- High reliability application and automotive grade AEC-Q101 qualified
- IEC 61000-4-2 ESD 30kV(Air), 30kV (Contact)



Applications


TVS devices are ideal for the transient voltage clamp protection of I/O Interfaces, DC power line bus and other circuits used in Telecom, Computer, Industrial and Automotive electronic applications.

Function Diagram



Maximum Ratings and Thermal Characteristics
 ($T_A=25^{\circ}\text{C}$ unless otherwise noted)


Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at $T_A=25^{\circ}\text{C}$ by 10/1000 μ s Waveform (Fig.2)	P_{PPM}	400	W
Power Dissipation on Infinite Heat Sink at $T_L=50^{\circ}\text{C}$	P_D	1	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 1)	I_{FSM}	30	A
Maximum Instantaneous Forward Voltage at 50A for Unidirectional Only	V_F	3.5	V
Operating Temperature Range	T_J	-55 to 150	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-55 to 150	$^{\circ}\text{C}$

AGENCY	AGENCY FILE NUMBER
	Pending

Notes:

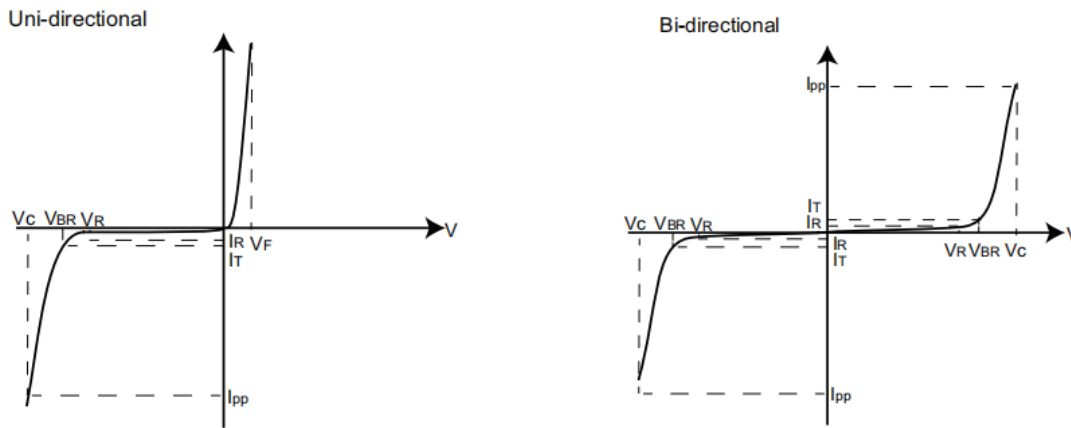
1. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.

Characteristics (T = 25°C unless otherwise noted)

Part Number (Uni)	Part Number (Bi)	Key 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					
TPSMF4L3.3A		3T		3.3	5.20	6.00	10	7.3	54.8	50	
	TPSMF4L3.3CA		3T	3.3	5.70	6.50	10	8.0	50.0	50	
TPSMF4L5.0A	TPSMF4L5.0CA	05	05	5.0	6.40	7.00	10	9.2	40.1	800	
TPSMF4L6.0A	TPSMF4L6.0CA	06	06	6.0	6.67	7.37	10	10.3	35.9	800	
TPSMF4L6.5A	TPSMF4L6.5CA	6F	6F	6.5	7.22	7.98	10	11.2	33.1	500	
TPSMF4L7.0A	TPSMF4L7.0CA	07	07	7.0	7.78	8.60	10	12.0	30.9	200	
TPSMF4L7.5A	TPSMF4L7.5CA	7F	7F	7.5	8.33	9.21	1	12.9	28.7	100	
TPSMF4L8.0A	TPSMF4L8.0CA	08	08	8.0	8.89	9.83	1	13.6	27.2	50	
TPSMF4L8.5A	TPSMF4L8.5CA	8F	8F	8.5	9.44	10.40	1	14.4	25.7	20	
TPSMF4L9.0A	TPSMF4L9.0CA	09	09	9.0	10.00	11.10	1	15.4	26.4	5	
TPSMF4L10A	TPSMF4L10CA	10	10	10.0	11.10	12.30	1	17.0	23.5	5	
TPSMF4L11A	TPSMF4L11CA	11	11	11.0	12.20	13.50	1	18.2	22.0	1	
TPSMF4L12A	TPSMF4L12CA	12	12	12.0	13.30	14.70	1	19.9	20.1	1	
TPSMF4L13A	TPSMF4L13CA	13	13	13.0	14.40	15.90	1	21.5	18.6	1	
TPSMF4L14A	TPSMF4L14CA	14	14	14.0	15.60	17.20	1	23.2	17.2	1	
TPSMF4L15A	TPSMF4L15CA	15	15	15.0	16.70	18.50	1	24.4	16.4	1	
TPSMF4L16A	TPSMF4L16CA	16	16	16.0	17.80	19.70	1	26.0	15.4	1	
TPSMF4L17A	TPSMF4L17CA	17	17	17.0	18.90	20.90	1	27.6	14.5	1	
TPSMF4L18A	TPSMF4L18CA	18	18	18.0	20.00	22.10	1	29.2	13.7	1	
TPSMF4L20A	TPSMF4L20CA	20	20	20.0	22.20	24.50	1	32.4	12.3	1	
TPSMF4L22A	TPSMF4L22CA	22	22	22.0	24.40	26.90	1	35.5	11.3	1	
TPSMF4L24A	TPSMF4L24CA	24	24	24.0	26.70	29.50	1	38.9	10.3	1	
TPSMF4L26A		26		26.0	28.90	31.90	1	42.1	9.5	1	
TPSMF4L28A		28		28.0	31.10	34.40	1	45.4	8.8	1	
TPSMF4L30A		30		30.0	33.30	36.80	1	48.4	8.3	1	
TPSMF4L33A		33		33.0	36.70	40.60	1	53.3	7.5	1	
TPSMF4L36A		36		36.0	40.00	44.20	1	58.1	6.9	1	
TPSMF4L40A		40		40.0	44.40	49.10	1	64.5	6.2	1	
TPSMF4L43A		43		43.0	47.80	52.80	1	69.4	5.8	1	
TPSMF4L45A		45		45.0	50.00	55.30	1	72.7	5.5	1	
TPSMF4L48A		48		48.0	53.30	58.90	1	77.4	5.2	1	
TPSMF4L51A		51		51.0	56.70	62.70	1	82.4	4.9	1	
TPSMF54A		54		54.0	60.00	66.30	1	87.1	4.6	1	
TPSMF4L58A		58		58.0	64.40	71.20	1	93.6	4.3	1	
TPSMF4L60A		60		60.0	66.70	73.70	1	96.8	4.1	1	
TPSMF4L64A		64		64.0	71.10	78.60	1	103.0	3.9	1	
TPSMF4L70A		70		70.0	77.80	86.00	1	113.0	3.5	1	
TPSMF4L75A		75		75.0	83.30	92.10	1	121.0	3.3	1	
TPSMF4L78A		78		78.0	86.70	95.80	1	126.0	3.2	1	
TPSM4LF85A		85		85.0	94.40	104.0	1	137.0	2.9	1	

* with -- on first two digit marking to show 400W
 TPSMF4L3.3A and TPSMF3.3CA is planar process

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 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



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

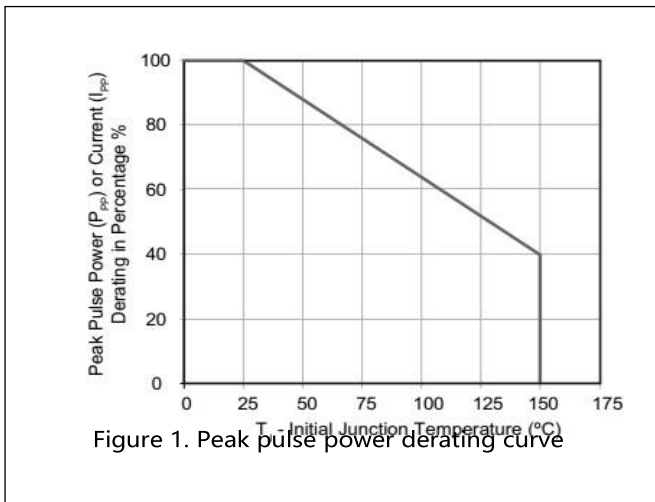


Figure 1. Peak pulse power derating curve

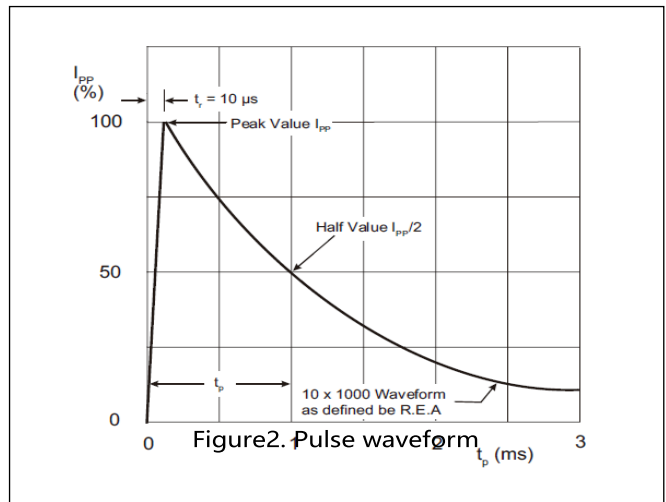


Figure 2. Pulse waveform

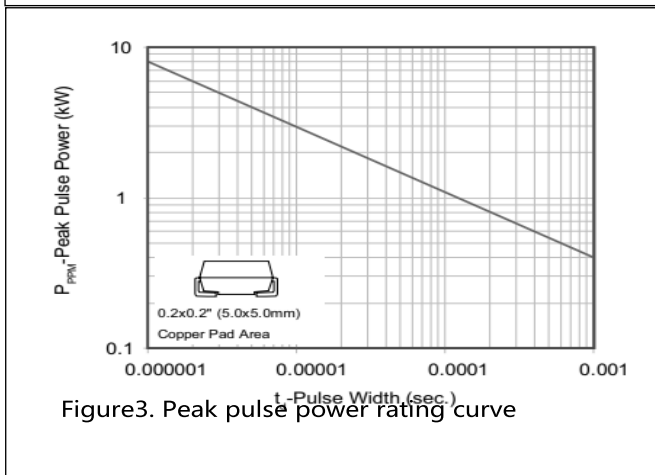


Figure 3. Peak pulse power rating curve

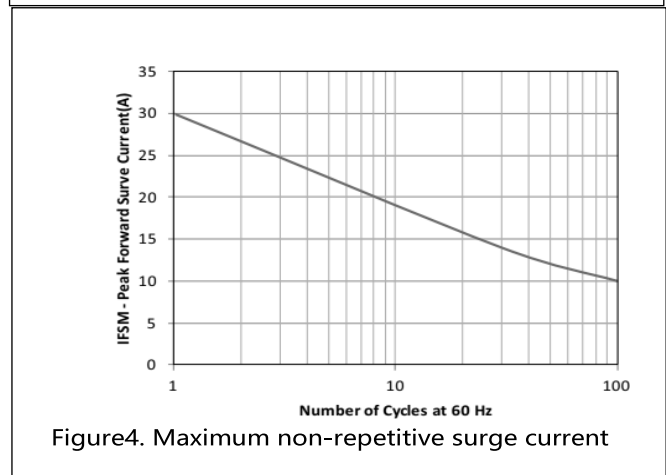


Figure 4. Maximum non-repetitive surge current

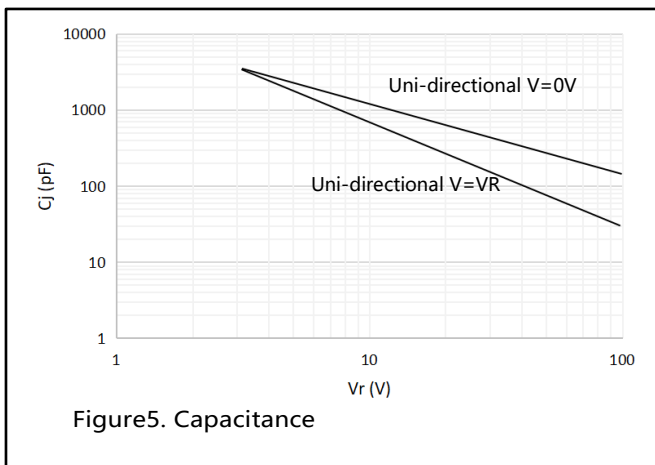
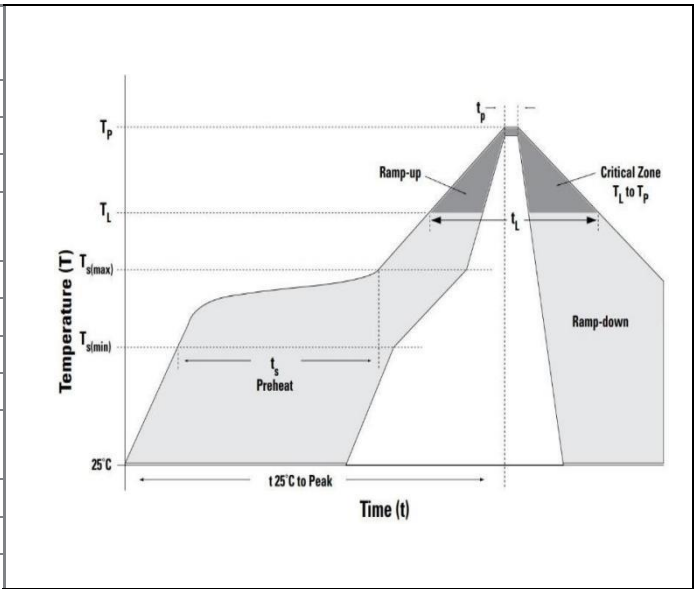


Figure 5. Capacitance

Soldering Parameters

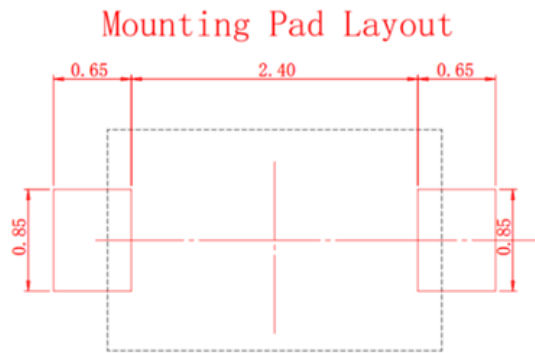
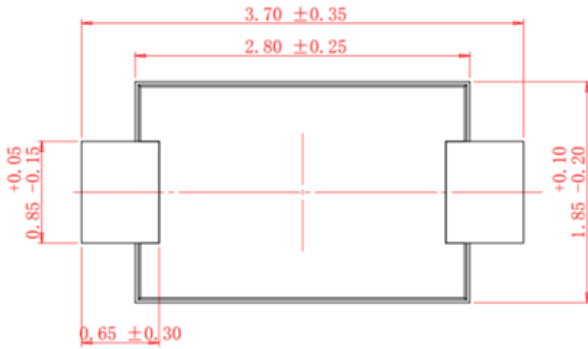
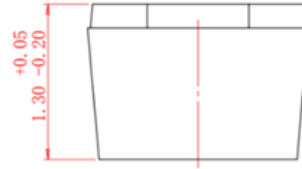
Soldering profile

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 – 180 secs
Average ramp up rate (Liquidus Temp (T_A) to peak)		3°C/second max
$T_{s(max)}$ to T_A - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T_A) (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)		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_p)		8 minutes Max.
Do not exceed		260°C

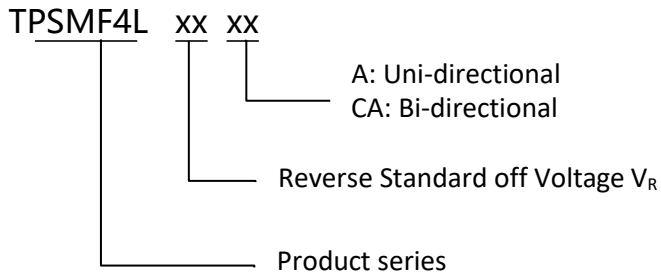




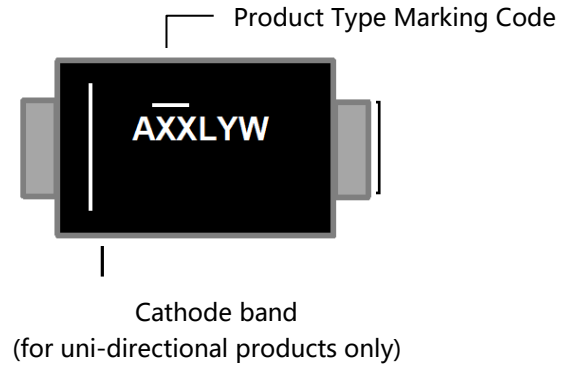
Dimensions



Part Numbering



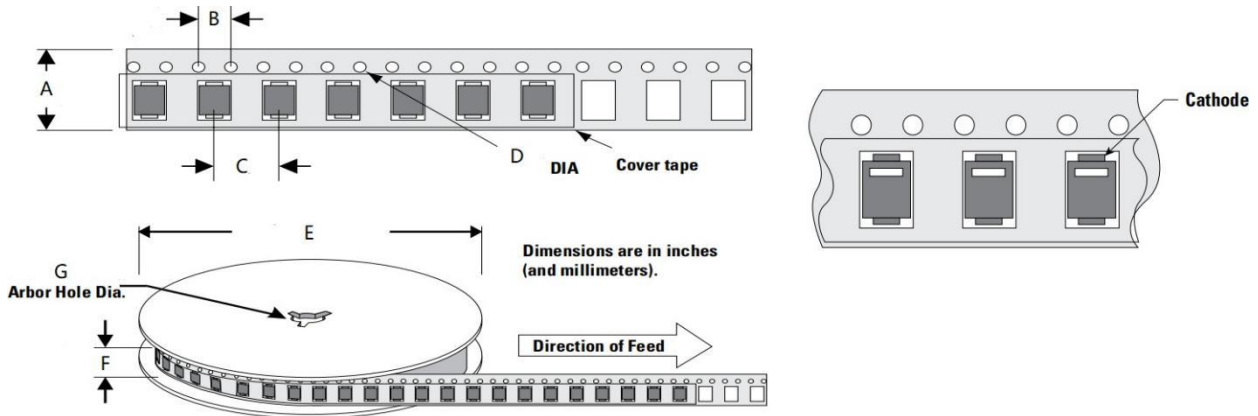
Part Marking



Packing

Part number	Package name	Small packing quantity	Packing method
TPSMF4LXXXX	SOD-123F	3000	Tape & Reel

Tape and Reel Specification



Symbol	Millimeter
A	8.00±0.10
B	4.00±0.10
C	4.00±0.10
D	1.55±0.05
E	177.80±2.00
F	11.50±1.00
G	13.30±0.30

Revision history of Specification

Version	Change Items	Effective Date
1.0	Initial Release	23-July-2021
1.1	Add TPSMF4L3.3A, TPSMF4L3.3CA	13-Jan-2022
1.2	Add IEC 61000-4-2 ESD 30kV (Air), 30kV (Contact), capacitance curve	16-Jan-2023
1.3	Update Package Sizes	4 -Jan- 2024

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[P6KE13CA](#) [P6KE43CA](#) [P6KE6.8CA](#) [P6KE8.2](#) [P6SMBJ20CA](#) [JANTX1N6072A](#) [SR2835ESKG](#) [SA90CA](#)