

## Features

- 400W peak pulse power capability at 10/1000 $\mu$ 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 $^{\circ}$ C
- High reliability application and automotive grade AEC-Q101 qualified

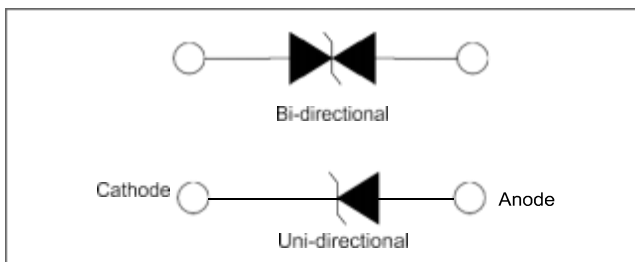
**RoHS**  
Compliant



## 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, Consumer electronic and Automotive applications.

## Function Diagram



### Maximum Ratings and Thermal Characteristics (T<sub>A</sub> = 25 $^{\circ}$ C unless otherwise noted)


Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at T <sub>A</sub> = 25 $^{\circ}$ C by 10/1000 $\mu$ s Waveform (Fig.2)	P PPM	400	W
Power Dissipation on Infinite Heat Sink at T <sub>L</sub> = 50 $^{\circ}$ C	PD	3.3	W
Peak Forward Surge Current, 8.3 ms Single Half Sine Wave (Note 1)	I FSM	60	A
Maximum Instantaneous Forward Voltage at 5.0 A for Unidirectional Only (Note 2)	V F	3.5/5	V
Operating Temperature Range	T J	-55 to 150	$^{\circ}$ C
Storage Temperature Range	T STG	-55 to 150	$^{\circ}$ C

AGENCY	AGENCY FILE NUMBER
	Pending

#### Notes:

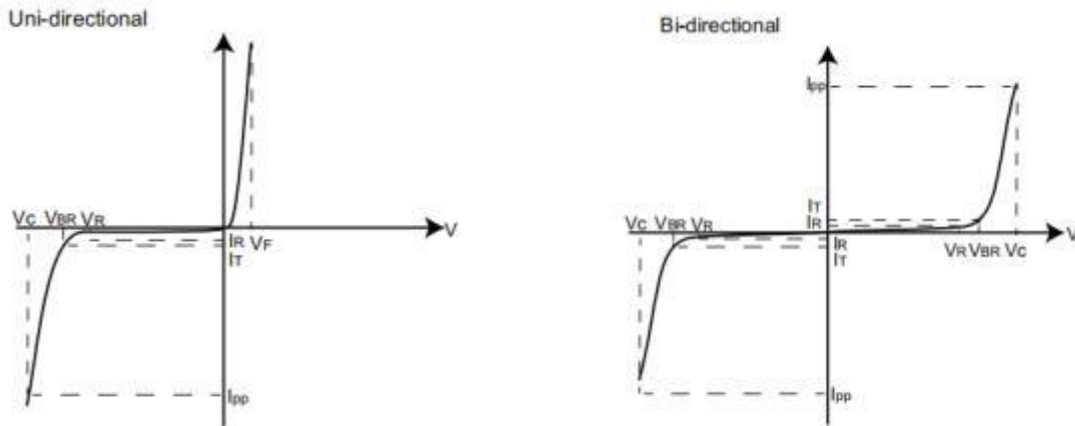
1. Measured on 8.3 ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle= 4 per minute maximum.
2. V F < 3.5V for single die parts and V F < 5V for stacked- die parts.

**Characteristics (T = 25 oC 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 $V_C @ I_{DD}$ (V)	Maximum Peak Pulse Current $I_{pp}$ (A)	Maximum Reverse Leakage $I_R @ V_R$ ( $\mu$ A)	Agency Approval 
		UNI	BI		MIN	MAX					
\	TPSMAJ5.0CA	\	AA005	5.0	6.40	7.00	10	9.2	43.5	400	
TPSMAJ5.0A	\	AA005	\	5.0	6.40	7.00	10	9.2	43.5	100	
\	TPSMAJ6.0CA	\	AA006	6.0	6.67	7.37	10	10.3	38.8	400	
TPSMAJ6.0A	\	AA006	\	6.0	6.67	7.37	10	10.3	38.8	100	
\	TPSMAJ6.5CA	\	AA06F	6.5	7.22	7.98	10	11.2	35.7	100	
TPSMAJ6.5A	\	AA06F	\	6.5	7.22	7.98	10	11.2	35.7	80	
TPSMAJ7.0A	TPSMAJ7.0CA	AA007	AA007	7.0	7.78	8.60	10	12.0	33.3	60	
TPSMAJ7.5A	TPSMAJ7.5CA	AA07F	AA07F	7.5	8.33	9.21	1	12.9	31.0	50	
TPSMAJ8.0A	TPSMAJ8.0CA	AA008	AA008	8.0	8.89	9.83	1	13.6	29.4	30	
TPSMAJ8.5A	TPSMAJ8.5CA	AA08F	AA08F	8.5	9.44	10.40	1	14.4	27.8	20	
TPSMAJ9.0A	TPSMAJ9.0CA	AA009	AA009	9.0	10.00	11.10	1	15.4	26.0	10	
TPSMAJ10A	TPSMAJ10CA	AA010	AA010	10.0	11.10	12.30	1	17.0	23.5	5	
TPSMAJ11A	TPSMAJ11CA	AA011	AA011	11.0	12.20	13.50	1	18.2	22.0	1	
TPSMAJ12A	TPSMAJ12CA	AA012	AA012	12.0	13.30	14.70	1	19.9	20.1	1	
TPSMAJ13A	TPSMAJ13CA	AA013	AA013	13.0	14.40	15.90	1	21.5	18.6	1	
TPSMAJ14A	TPSMAJ14CA	AA014	AA014	14.0	15.60	17.20	1	23.2	17.3	1	
TPSMAJ15A	TPSMAJ15CA	AA015	AA015	15.0	16.70	18.50	1	24.4	16.4	1	
TPSMAJ16A	TPSMAJ16CA	AA016	AA016	16.0	17.80	19.70	1	26.0	15.4	1	
TPSMAJ17A	TPSMAJ17CA	AA017	AA017	17.0	18.90	20.90	1	27.6	14.5	1	
TPSMAJ18A	TPSMAJ18CA	AA018	AA018	18.0	20.00	22.10	1	29.2	13.7	1	
TPSMAJ20A	TPSMAJ20CA	AA020	AA020	20.0	22.20	24.50	1	32.4	12.4	1	
TPSMAJ22A	TPSMAJ22CA	AA022	AA022	22.0	24.40	26.90	1	35.5	11.3	1	
TPSMAJ24A	TPSMAJ24CA	AA024	AA024	24.0	26.70	29.50	1	38.9	10.3	1	
TPSMAJ26A	TPSMAJ26CA	AA026	AA026	26.0	28.90	31.90	1	42.1	9.5	1	
TPSMAJ28A	TPSMAJ28CA	AA028	AA028	28.0	31.10	34.40	1	45.4	8.8	1	
TPSMAJ30A	TPSMAJ30CA	AA030	AA030	30.0	33.30	36.80	1	48.4	8.3	1	
TPSMAJ33A	TPSMAJ33CA	AA033	AA033	33.0	36.70	40.60	1	53.3	7.5	1	
TPSMAJ36A	TPSMAJ36CA	AA036	AA036	36.0	40.00	44.20	1	58.1	6.9	1	
TPSMAJ40A	TPSMAJ40CA	AA040	AA040	40.0	44.40	49.10	1	64.5	6.2	1	
TPSMAJ43A	TPSMAJ43CA	AA043	AA043	43.0	47.80	52.80	1	69.4	5.8	1	
TPSMAJ45A	TPSMAJ45CA	AA045	AA045	45.0	50.00	55.30	1	72.7	5.5	1	
TPSMAJ48A	TPSMAJ48CA	AA048	AA048	48.0	53.30	58.90	1	77.4	5.2	1	
TPSMAJ51A	TPSMAJ51CA	AA051	AA051	51.0	56.70	62.70	1	82.4	4.9	1	
TPSMAJ54A	TPSMAJ54CA	AA054	AA054	54.0	60.00	66.30	1	87.1	4.6	1	
TPSMAJ58A	TPSMAJ58CA	AA058	AA058	58.0	64.40	71.20	1	93.6	4.3	1	
TPSMAJ60A	TPSMAJ60CA	AA060	AA060	60.0	66.70	73.70	1	96.8	4.1	1	
TPSMAJ64A	TPSMAJ64CA	AA064	AA064	64.0	71.10	78.60	1	103.0	3.9	1	
TPSMAJ70A	TPSMAJ70CA	AA070	AA070	70.0	77.80	86.00	1	113.0	3.6	1	



## 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 oC unless otherwise noted)

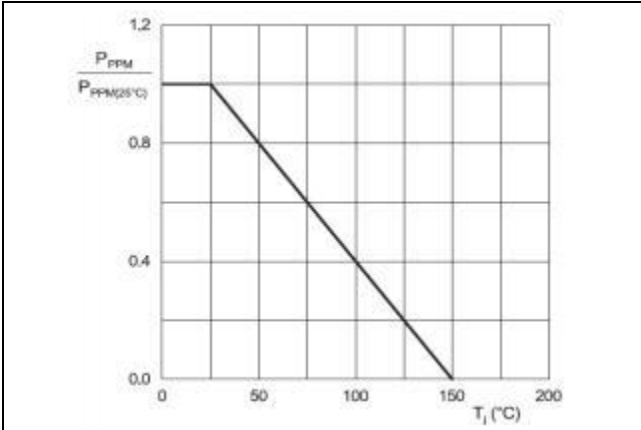


Figure 1 . Peak pulse power derating curve

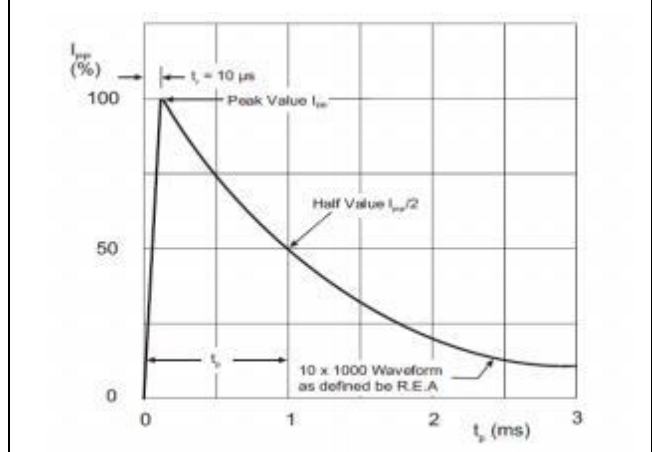


Figure2 . Pulse waveform

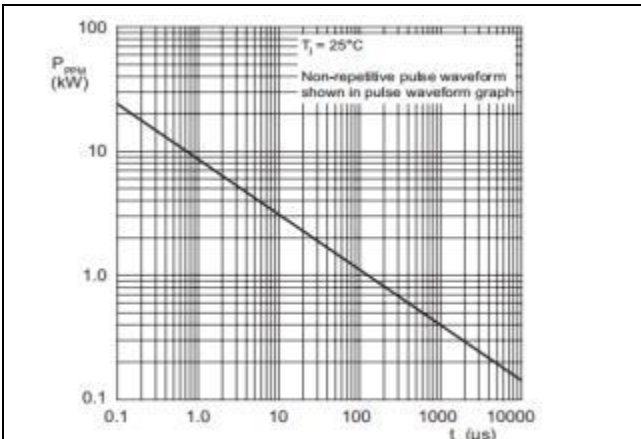


Figure3 . Peak pulse power rating curve

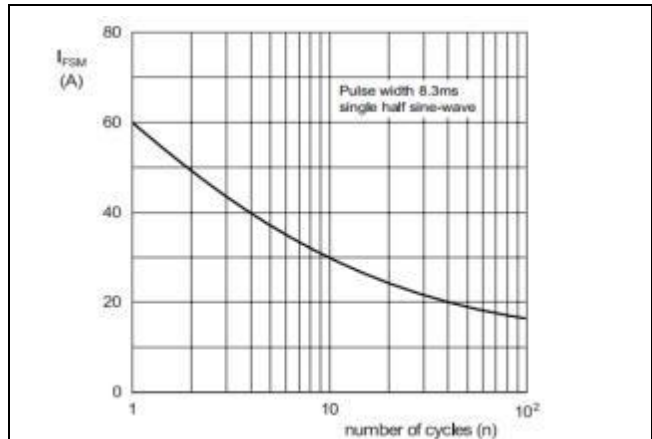
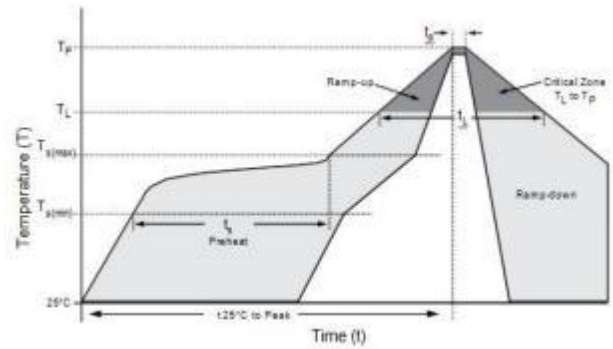


Figure4 . Maximum non- repetitive surge current

### Soldering Parameters

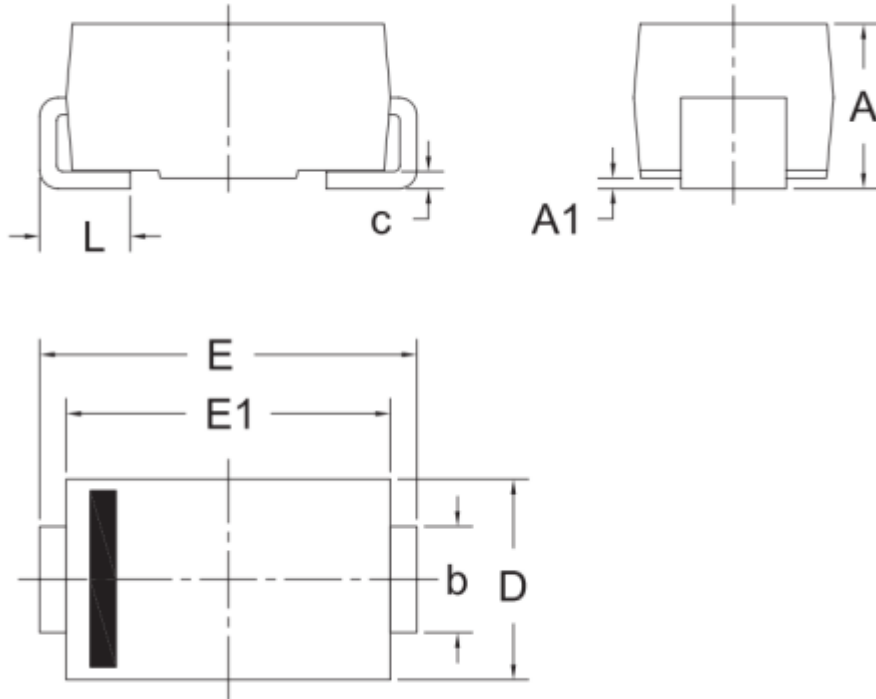
Reflow Condition		Lead- free assembly
Pre Heat	- Temperature Min (Ts(min))	150°C
	- Temperature Max (Ts(max))	200°C
	- Time (min to max) (ts)	60 – 180 secs
Average ramp up rate (Liquidus Temp (TA) to peak)		3 ° C/ second max
TS(max) to TA - Ramp - up Rate		3 ° C/ second max
Reflow	- Temperature (TA) (Liquidus)	217°C
	- Time (min to max) (ts)	60 – 150 seconds
Peak Temperature ( T P)		260+0/-5 °C
Time within 5 °C of actual peak		
Temperature ( tp)		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

### Soldering profile





Dimensions

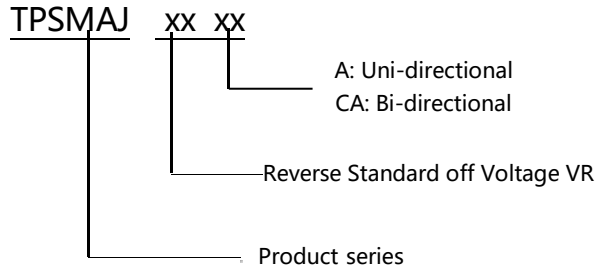


UNIT	A	A1	b	c	D	E	E1	L	
mm	Max	2.45	0.20	1.65	0.25	2.85	5.25	4.55	1.55
	Min	1.95	0.10	1.35	0.15	2.55	4.75	4.25	0.85

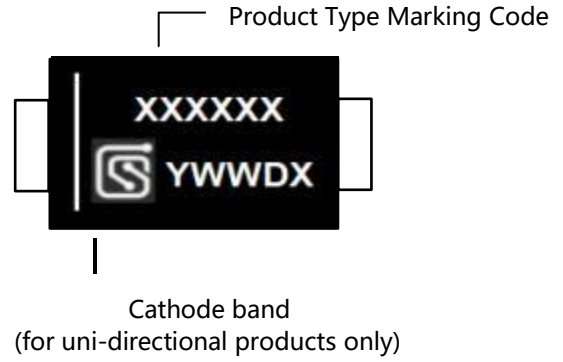
Remark: Dimensions D and E1 do not include mold flash & gate remain.



### Part Numbering



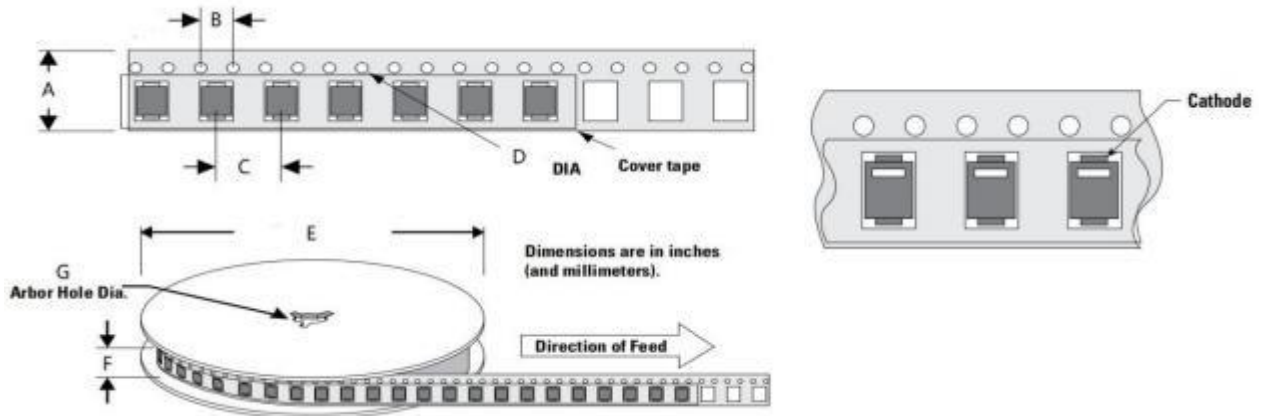
### Part Marking



### Packing

Part number	Package name	Small packing quantity	Packing method
TPSMAJXXXX	DO-214AC	5000	Tape&Reel

### Tape and Reel Specification



Symbol	Millimeter
A	12.00±0.10
B	4.00±0.10
C	4.00±0.10
D	1.55±0.05
E	330.20± 2.00
F	15.70±2.00
G	13.30±0.30

### Revision history of Specification

Version	Change Items	Effective Date
1.0	Initial Release	20-July-2020



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