Transient Voltage Suppression Diodes: TPSMAJ Series

SMD Type 400 W

■ Features

1. Glass passivated chip
2. 400W peak pulse power capability with a 10/1000 μs waveform, repetitive rate (duty cycle): 0.01%
3. Excellent clamping capability
4. Very fast response time
5. Low clamping voltage
6. Low leakage current
7. Meets MSL level 1, per J-STD-020, LF maximum peak of 260°C
8. Halogen free and RoHS compliant
9. AEC Q101 qualified

■ Recommended Applications

1. I/O interface
2. VCC BUS
3. Low frequency signal transmission line

■ Mechanical Data

1. Case: DO-214AC (SMA), molded plastic
2. Epoxy：UL 94V-0 rate flame retardant
3. Terminals: Solderable per MIL-STD-750, method 2026
4. Polarity: Color band denotes cathode end
5. Mounting Position: Any

■ Part Number Code

T	P	S	M	A	J	5	.	0	C	A
1	2	3	4	5	6	7	8	9	10	11

THINKING Transient Voltage Suppression Diodes

Product Series	
SMAJ	THINKING Transient Voltage Suppression Diodes SMAJ Series

Reverse Stand off Voltage (V_{RWM})	
5.0	5V
70	70V
120	120V

Type Code	
A	Uni-directional, 5% V_{BR} Voltage Tolerance
CA	Bi-directional, 5% V_{BR} Voltage Tolerance

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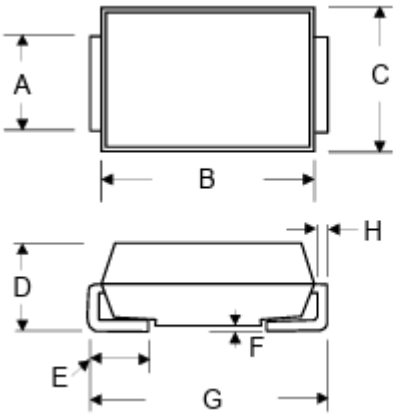
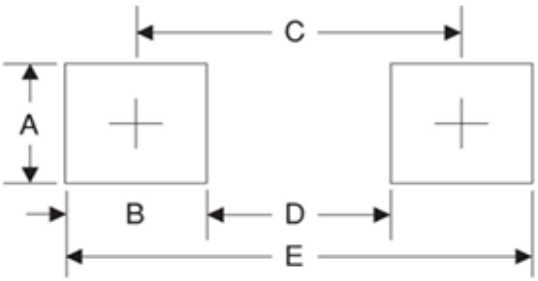
SMD Type 400 W

■ Structures and Dimensions



Symbol	Dimensions in millimeters	
	Min	Max
A	1.30	1.70
B	3.90	4.50
C	2.40	2.80
D	2.00	2.50
E	0.76	1.52
F	0.10	0.20
G	4.80	5.30
H	0.15	0.31



Symbol	Unit (mm)	Unit (inch)
A	1.68	0.066
B	1.52	0.060
C	3.90	0.154
D	2.41	0.095
E	5.45	0.215

■ Maximum Rating (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak pulse power dissipation at T_A=25 ℃ by 10/1000μs waveform (Note1、2)	P_{PPM}	400	W
Peak pulse current with 10/1000 μs waveform (Note 1)	I_{PPM}	See next table	A
Peak forward surge current, 8.3ms single half sine wave on rated load (Note 3)	I_{FSM}	40	A
Power dissipation on infinite heatsink at T_L=75℃	P_D	3.3	W
Typical thermal resistance junction to ambient	$R_{\theta JA}$	120	°C/W
Typical thermal resistance junction to lead	$R_{\theta JL}$	30	°C/W
Operating junction and storage temperature range	T_J, T_{STG}	-55~+150	ºC

Notes : (1) Non-repetitive current pulse, per Fig. 3 and derated above TA=25℃ per Fig. 2

(2) Mounted on 5.0 x 5.0mm copper pad 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

■ Electrical Characteristics (T_A=25℃ unless otherwise noted)

Part No. (Uni)	Part No. (Bi)	Reverse Stand off Voltage	Breakage Voltage VBR @ IT		Test Current	Maximum Clamping Voltage VC @ Ipp	Maximum Peak Pulse Current	Maximum Reverse Leakage IR @VRWM	Marking Code	
		VRWM (V)	Min(V)	Max(V)	IT(mA)	VC(V)	Ipp(A)	IR(μA)	Uni	Bi
TPSMAJ5.0A	TPSMAJ5.0CA	5.0	6.4	7.0	10	9.2	43.5	800	AE	WE
TPSMAJ6.0A	TPSMAJ6.0CA	6.0	6.7	7.4	10	10.3	38.8	800	AG	WG
TPSMAJ6.5A	TPSMAJ6.5CA	6.5	7.2	8.0	10	11.2	35.7	500	AK	WK
TPSMAJ7.0A	TPSMAJ7.0CA	7.0	7.8	8.6	10	12.0	33.3	200	AM	WM
TPSMAJ7.5A	TPSMAJ7.5CA	7.5	8.3	9.2	1	12.9	31.0	100	AP	WP
TPSMAJ8.0A	TPSMAJ8.0CA	8.0	8.9	9.8	1	13.6	29.4	50	AR	WR
TPSMAJ8.5A	TPSMAJ8.5CA	8.5	9.4	10.4	1	14.4	27.8	10	AT	WT
TPSMAJ9.0A	TPSMAJ9.0CA	9.0	10	11.0	1	15.4	26.0	5	AV	WV
TPSMAJ10A	TPSMAJ10CA	10.0	11.1	12.3	1	17	23.5	5	AX	WX
TPSMAJ11A	TPSMAJ11CA	11.0	12.2	13.5	1	18.2	22.0	1	AZ	WZ
TPSMAJ12A	TPSMAJ12CA	12.0	13.3	14.7	1	19.9	20.1	1	BE	XE
TPSMAJ13A	TPSMAJ13CA	13.0	14.4	15.9	1	21.5	18.6	1	BG	XG
TPSMAJ14A	TPSMAJ14CA	14.0	15.6	17.2	1	23.2	17.2	1	BK	XK
TPSMAJ15A	TPSMAJ15CA	15.0	16.7	18.5	1	24.4	16.4	1	BM	XM
TPSMAJ16A	TPSMAJ16CA	16.0	17.8	19.7	1	26	15.4	1	BP	XP
TPSMAJ17A	TPSMAJ17CA	17.0	18.9	20.9	1	27.6	14.5	1	BR	XR
TPSMAJ18A	TPSMAJ18CA	18.0	20	22.1	1	29.2	13.7	1	BT	XT
TPSMAJ19A	TPSMAJ19CA	19.0	21.1	23.3	1	30.8	13.0	1	BW	XW
TPSMAJ20A	TPSMAJ20CA	20.0	22.2	24.5	1	32.4	12.4	1	BV	XV
TPSMAJ22A	TPSMAJ22CA	22.0	24.4	26.9	1	35.5	11.3	1	BX	XX
TPSMAJ24A	TPSMAJ24CA	24.0	26.7	29.5	1	38.9	10.3	1	BZ	XZ
TPSMAJ26A	TPSMAJ26CA	26.0	28.9	31.9	1	42.1	9.5	1	CE	YE
TPSMAJ28A	TPSMAJ28CA	28.0	31.1	34.4	1	45.4	8.8	1	CG	YG
TPSMAJ30A	TPSMAJ30CA	30.0	33.3	36.8	1	48.4	8.3	1	CK	YK
TPSMAJ33A	TPSMAJ33CA	33.0	36.7	40.6	1	53.3	7.5	1	CM	YM
TPSMAJ36A	TPSMAJ36CA	36.0	40.0	44.2	1	58.1	6.9	1	CP	YP
TPSMAJ40A	TPSMAJ40CA	40.0	44.4	49.1	1	64.5	6.2	1	CR	YR
TPSMAJ43A	TPSMAJ43CA	43.0	47.8	52.8	1	69.4	5.8	1	CT	YT
TPSMAJ45A	TPSMAJ45CA	45.0	50.0	55.3	1	72.7	5.5	1	CV	YV
TPSMAJ48A	TPSMAJ48CA	48.0	53.3	58.9	1	77.4	5.2	1	CX	YX

■ Electrical Characteristics (T_A=25℃ unless otherwise noted)

Part No. (Uni)	Part No. (Bi)	Reverse Stand off Voltage	Breakage Voltage VBR @ IT		Test Current	Maximum Clamping Voltage VC @ Ipp	Maximum Peak Pulse Current	Maximum Reverse Leakage IR @VRWM	Marking Code	
		VRWM (V)	Min(V)	Max(V)	IT(mA)	VC(V)	Ipp(A)	IR(μA)	Uni	Bi
TPSMAJ51A	TPSMAJ51CA	51.0	56.7	62.7	1	82.4	4.9	1	CZ	YZ
TPSMAJ54A	TPSMAJ54CA	54.0	60.0	66.3	1	87.1	4.6	1	RE	ZE
TPSMAJ58A	TPSMAJ58CA	58.0	64.4	71.2	1	93.6	4.3	1	RG	ZG
TPSMAJ60A	TPSMAJ60CA	60.0	66.7	73.7	1	96.8	4.1	1	RK	ZK
TPSMAJ64A	TPSMAJ64CA	64.0	71.1	78.6	1	103.0	3.9	1	RM	ZM
TPSMAJ70A	TPSMAJ70CA	70.0	77.8	86.0	1	113.0	3.5	1	RP	ZP
TPSMAJ75A	TPSMAJ75CA	75.0	83.3	92.1	1	121.0	3.3	1	RR	ZR
TPSMAJ78A	TPSMAJ78CA	78.0	86.7	95.8	1	126.0	3.2	1	RT	ZT
TPSMAJ80A	TPSMAJ80CA	80.0	88.8	97.6	1	129.6	3.1	1	RW	ZW
TPSMAJ85A	TPSMAJ85CA	85.0	94.4	104.0	1	137.0	2.9	1	RV	ZV
TPSMAJ90A	TPSMAJ90CA	90.0	100	111	1	146.0	2.7	1	RX	ZX
TPSMAJ100A	TPSMAJ100CA	100.0	111	123	1	162.0	2.5	1	RZ	ZZ
TPSMAJ110A	TPSMAJ110CA	110.0	122	135	1	177.0	2.3	1	SE	VE
TPSMAJ120A	TPSMAJ120CA	120.0	133	147	1	193.0	2.1	1	SG	VG
TPSMAJ130A	TPSMAJ130CA	130.0	144	159	1	209.0	1.9	1	SK	VK
TPSMAJ140A	TPSMAJ140CA	140.0	155	171	1	227.0	1.8	1	SW	VW
TPSMAJ150A	TPSMAJ150CA	150.0	167	185	1	243.0	1.7	1	SM	VM
TPSMAJ160A	TPSMAJ160CA	160.0	178	197	1	259.0	1.6	1	SP	VP
TPSMAJ170A	TPSMAJ170CA	170.0	189	209	1	275.0	1.5	1	SR	VR
TPSMAJ180A	TPSMAJ180CA	180.0	200	220	1	291.0	1.4	1	ST	VT
TPSMAJ190A	TPSMAJ190CA	190.0	211	232	1	308.0	1.3	1	SU	VU
TPSMAJ200A	TPSMAJ200CA	200.0	224	247	1	324.0	1.2	1	SV	VV
TPSMAJ220A	TPSMAJ220CA	220.0	246	272	1	356.0	1.1	1	SX	VX
TPSMAJ250A	TPSMAJ250CA	250.0	279	309	1	405.0	1.0	1	SZ	VZ
TPSMAJ300A	TPSMAJ300CA	300.0	335	371	1	486.0	0.8	1	TE	UE
TPSMAJ350A	TPSMAJ350CA	350.0	391	432	1	567.0	0.7	1	TG	UG
TPSMAJ400A	TPSMAJ400CA	400.0	447	494	1	648.0	0.6	1	TK	UK
TPSMAJ440A	TPSMAJ440CA	440.0	492	543	1	713.0	0.6	1	TM	UM

■ Rate and Characteristic Curve (T_A=25℃ unless otherwise noted)

Fig.1 - Peak Pulse Power Rating Curve

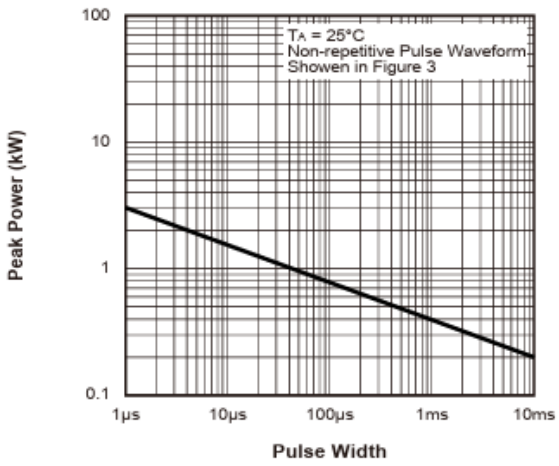


Fig.2 - Pulse Derating Curve

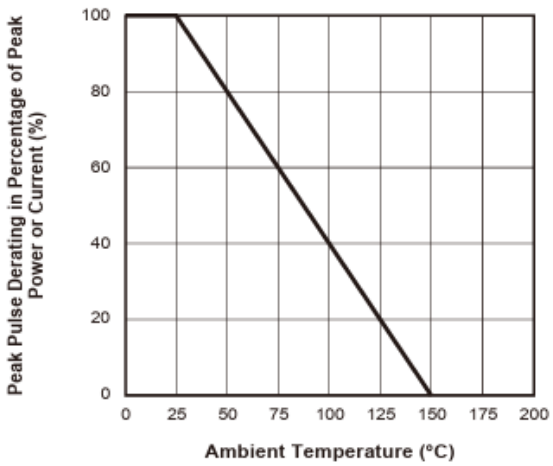


Fig.3 - Pulse Waveform

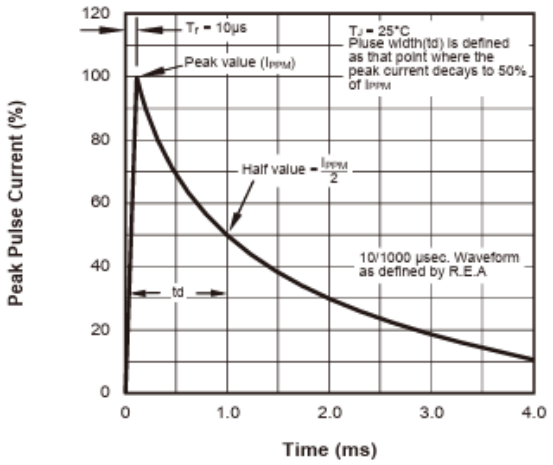
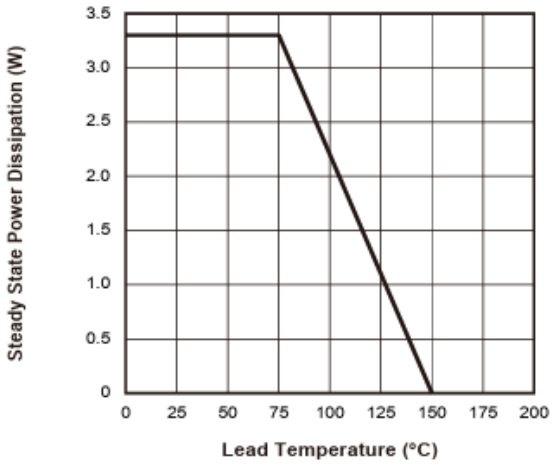
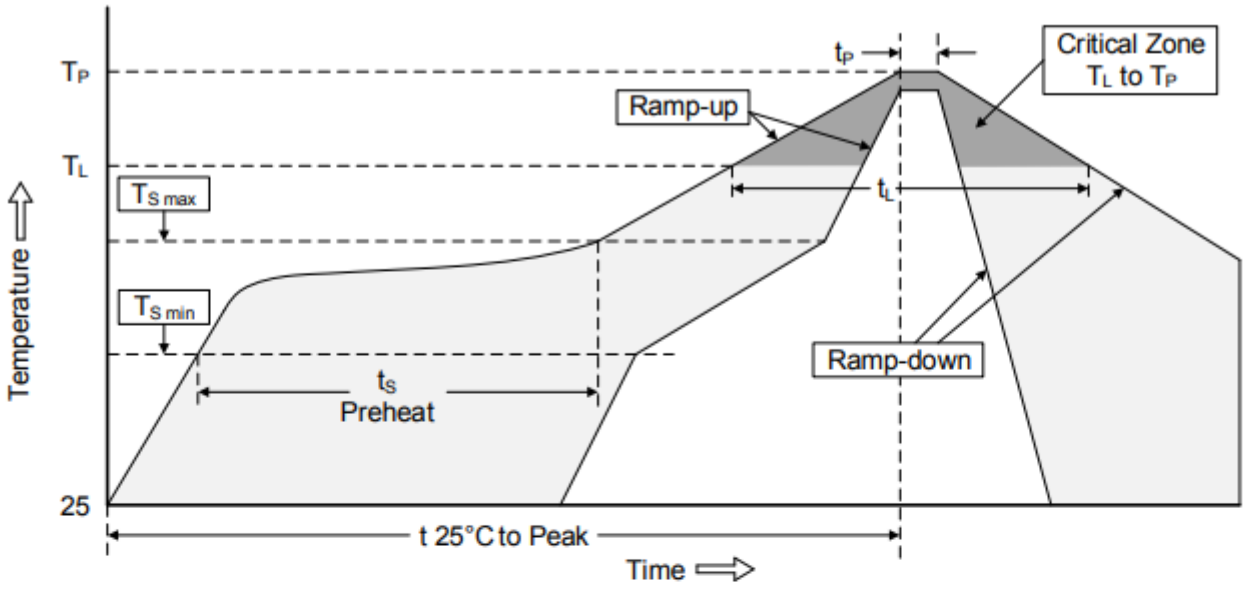


Fig.4 - Steady State Power Derating Curve



IR-reflow soldering profile

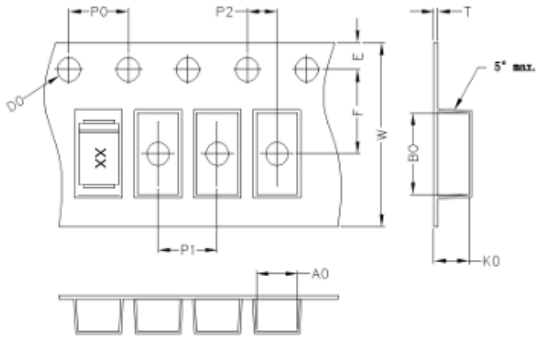
Reflow Soldering



Recommended Conditions

Profile Feature	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3°C/second max.
Preheat -Temperature Min ($T_{S\,min}$) -Temperature Max ($T_{S\,max}$) -Time (min to max) (t_S)	 150°C 200°C 60-180 seconds
$T_{S\,max}$ to T_L -Ramp-up Rate	 3°C/second max.
Time maintained above: -Temperature (T_L) -Time (t_L)	 217°C 60-150 seconds
Peak Temperature (T_P)	260°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	8 minutes max.

■ Packaging



A0	B0	K0	D0	E	F
2.80	5.30	2.36	1.55	1.75	5.50
P0	P1	P2	T	W	Tolerance
4.0	4.0	2.0	0.25	12	0.1

■ Quantity

Series Type	Packaging option	Base quantity	Packaging specification
TPSMAJ	Tape and reel	7500/reel	EIA STD RS-481

■ Warehouse Storage Conditions of product

● Storage Condition:

1. Storage Temperature: ≤25℃
2. Relative Humidity: 50%~80%RH
3. Keep away from corrosive atmosphere and sunlight.

● Period of Storage: 1 year.