

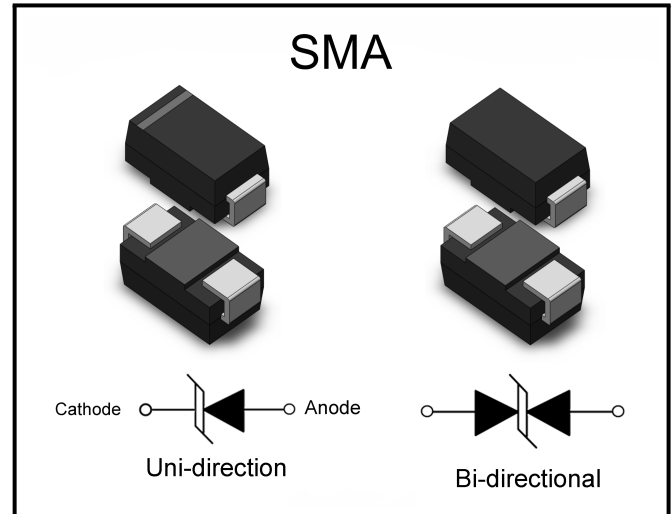
SMAJ / HSMAJ Series

Transient
Voltage Suppressor

Features

- Excellent clamping capability
- Low leakage current
- Low capacitance
- High surge capability
- Glass passivated chip
- Epoxy resin package
- Built-in strain relief
- Will not fatigue
- RoHS Compliant
- “H” Prefix is for Automotive applications, AEC-Q101 qualified

Package



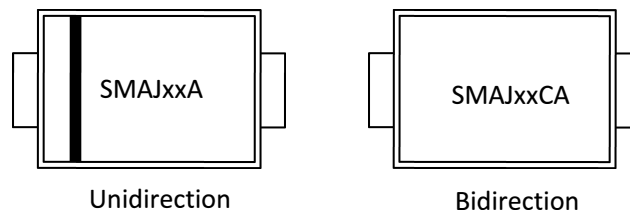
Mechanical Characteristics

- Package: SMA plastic package
- Lead Finish: Matte Tin
- Case Material: Epoxy Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020

Applications

- Telecom
- Computer
- Industrial electronic
- Consumer electronic
- Automotive electronic

Making Code



Summary of Packing Options

Package	Packing Description	Packing Quantity	Industry Standard
SMA	Tape/Reel, 13" reel	5000	EIA-481-1
	Tape/Reel, 7" reel	2000	EIA-481-1

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Specifications are subject to change without notice.

Please refer to <http://www.born-tw.com> for current information.

Revision: 2022-Jan-1-A

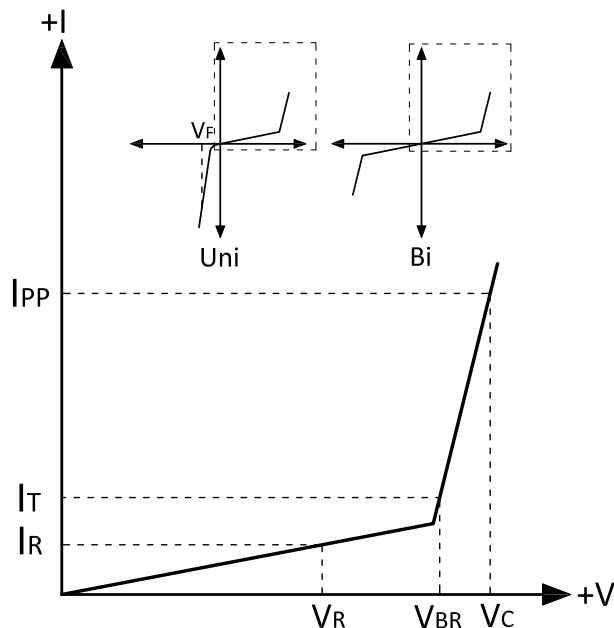


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Electrical Parameters

Parameter	Definition
C_J	Junction Capacitance - typical capacitance measured with 0V or V_R bias
I_{PP}	Peak Pulse Current - maximum rated peak impulse current
V_C	Clamping Voltage - Peak voltage measured across the suppressor at a specified I_{PPM}
V_{BR}	Breakdown Voltage - Maximum voltage that flows though the TVS at a specified test current (I_T)
I_R	Leakage Current - maximum peak off-state current measured at V_R
V_R	Peak Off-state Voltage - maximum voltage that can be applied while maintaining off state



Absolute Maximum Ratings ($T_A=+25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Value	Units
Peak Pulse Power Dissipation (Note1,2)	P_{PPM}	400	W
Steady State Power Dissipation (Note3)	P_D	3.3	W
Peak Forward Surge Current (Note4)	I_{FSM}	40	A
Maximum Instantaneous Forward Voltage at 50A (Note5)	V_{FM}	3.5/6.5	V
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	30	$^{\circ}\text{C/W}$
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	120	$^{\circ}\text{C/W}$
Operating Temperature Range	T_J	-55 to 150	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-55 to 150	$^{\circ}\text{C}$

Notes:

- (1) Non-repetitive current pulse , 10/1000us Waveform.
- (2) Mounted on copper pad area of 5×5mm to each terminal.
- (3) Infinite HeatSink at $T_A=50^{\circ}\text{C}$
- (4) Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 perminute maximum.
- (5) For UnidirectionalOnly, $V_{FW}<3.5\text{V}$ for $V_{BR}\leq 200\text{V}$ and $V_{FM}<6.5\text{V}$ for $V_{BR}\geq 201\text{V}$.



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Electrical Characteristics ($T_A=+25^{\circ}\text{C}$, unless otherwise noted)

Part Number	Part Number	Reverse Stand-Off Voltage	Breakdown Voltage $V_{BR}@I_T$		Test Current I_T	Maximum Clamping Voltage $V_C @ I_{pp}$	Maximum Peak Pulse Current I_{pp}	Maximum Reverse Leakage $I_R @ V_R$
(Uni)	(Bi)	(V)	Min.(V)	Max.(V)	(mA)	(V)	(A)	(μA)
SMAJ5.0A HSMAJ5.0A	SMAJ5.0CA HSMAJ5.0CA	5	6.4	7	10	9.2	43.5	800
SMAJ6.0A HSMAJ6.0A	SMAJ6.0CA HSMAJ6.0CA	6	6.67	7.37	10	10.3	38.8	800
SMAJ6.5A HSMAJ6.5A	SMAJ6.5CA HSMAJ6.5CA	6.5	7.22	7.98	10	11.2	35.7	500
SMAJ6.8A HSMAJ6.8A	SMAJ6.8CA HSMAJ6.8CA	5.8	6.45	7.14	10	10.5	39.0	500
SMAJ7.0A HSMAJ7.0A	SMAJ7.0CA HSMAJ7.0CA	7	7.78	8.6	10	12	33.3	200
SMAJ7.5A HSMAJ7.5A	SMAJ7.5CA HSMAJ7.5CA	7.5	8.33	9.21	1	12.9	31	100
SMAJ8.0A HSMAJ8.0A	SMAJ8.0CA HSMAJ8.0CA	8	8.89	9.83	1	13.6	29.4	50
SMAJ8.5A HSMAJ8.5A	SMAJ8.5CA HSMAJ8.5CA	8.5	9.44	10.4	1	14.4	27.8	20
SMAJ9.0A HSMAJ9.0A	SMAJ9.0CA HSMAJ9.0CA	9	10	11.1	1	15.4	26	10
SMAJ10A HSMAJ10A	SMAJ10CA HSMAJ10CA	10	11.1	12.3	1	17	23.5	5
SMAJ11A HSMAJ11A	SMAJ11CA HSMAJ11CA	11	12.2	13.5	1	18.2	22	1
SMAJ12A HSMAJ12A	SMAJ12CA HSMAJ12CA	12	13.3	14.7	1	19.9	20.1	1
SMAJ13A HSMAJ13A	SMAJ13CA HSMAJ13CA	13	14.4	15.9	1	21.5	18.6	1
SMAJ14A HSMAJ14A	SMAJ14CA HSMAJ14CA	14	15.6	17.2	1	23.2	17.2	1
SMAJ15A HSMAJ15A	SMAJ15CA HSMAJ15CA	15	16.7	18.5	1	24.4	16.4	1



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Part Number	Part Number	Reverse Stand-Off Voltage	Breakdown Voltage $V_{BR}@I_T$		Test Current I_T	Maximum Clamping Voltage $V_C @ I_{pp}$	Maximum Peak Pulse Current I_{pp}	Maximum Reverse Leakage $I_R @ V_R$
(Uni)	(Bi)	(V)	Min.(V)	Max.(V)	(mA)	(V)	(A)	(μA)
SMAJ16A HSMAJ16A	SMAJ16CA HSMAJ16CA	16	17.8	19.7	1	26	15.4	1
SMAJ17A HSMAJ17A	SMAJ17CA HSMAJ17CA	17	18.9	20.9	1	27.6	14.5	1
SMAJ18A HSMAJ18A	SMAJ18CA HSMAJ18CA	18	20	22.1	1	29.2	13.7	1
SMAJ20A HSMAJ20A	SMAJ20CA HSMAJ20CA	20	22.2	24.5	1	32.4	12.3	1
SMAJ22A HSMAJ22A	SMAJ22CA HSMAJ22CA	22	24.4	26.9	1	35.5	11.3	1
SMAJ24A HSMAJ24A	SMAJ24CA HSMAJ24CA	24	26.7	29.5	1	38.9	10.3	1
SMAJ26A HSMAJ26A	SMAJ26CA HSMAJ26CA	26	28.9	31.9	1	42.1	9.5	1
SMAJ28A HSMAJ28A	SMAJ28CA HSMAJ28CA	28	31.1	34.4	1	45.4	8.8	1
SMAJ30A HSMAJ30A	SMAJ30CA HSMAJ30CA	30	33.3	36.8	1	48.4	8.3	1
SMAJ33A HSMAJ33A	SMAJ33CA HSMAJ33CA	33	36.7	40.6	1	53.3	7.5	1
SMAJ36A HSMAJ36A	SMAJ36CA HSMAJ36CA	36	40	44.2	1	58.1	6.9	1
SMAJ40A HSMAJ40A	SMAJ40CA HSMAJ40CA	40	44.4	49.1	1	64.5	6.2	1
SMAJ43A HSMAJ43A	SMAJ43CA HSMAJ43CA	43	47.8	52.8	1	69.4	5.8	1
SMAJ45A HSMAJ45A	SMAJ45CA HSMAJ45CA	45	50	55.3	1	72.7	5.5	1
SMAJ48A HSMAJ48A	SMAJ48CA HSMAJ48CA	48	53.3	58.9	1	77.4	5.2	1



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Electrical Characteristics (T_A=+25°C, unless otherwise noted)

Part Number	Part Number	Reverse Stand-Off Voltage	Breakdown Voltage V _{BR} @I _T		Test Current I _T	Maximum Clamping Voltage V _C @ I _{pp}	Maximum Peak Pulse Current I _{pp}	Maximum Reverse Leakage I _R @ V _R
(Uni)	(Bi)	(V)	Min.(V)	Max.(V)	(mA)	(V)	(A)	(uA)
SMAJ51A HSMAJ51A	SMAJ51CA HSMAJ51CA	51	56.7	62.7	1	82.4	4.9	1
SMAJ54A HSMAJ54A	SMAJ54CA HSMAJ54CA	54	60	66.3	1	87.1	4.6	1
SMAJ58A HSMAJ58A	SMAJ58CA HSMAJ58CA	58	64.4	71.2	1	93.6	4.3	1
SMAJ60A HSMAJ60A	SMAJ60CA HSMAJ60CA	60	66.7	73.7	1	96.8	4.1	1
SMAJ64A HSMAJ64A	SMAJ64CA HSMAJ64CA	64	71.1	78.6	1	103	3.9	1
SMAJ70A HSMAJ70A	SMAJ70CA HSMAJ70CA	70	77.8	86	1	113	3.5	1
SMAJ75A HSMAJ75A	SMAJ75CA HSMAJ75CA	75	83.3	92.1	1	121	3.3	1
SMAJ78A HSMAJ78A	SMAJ78CA HSMAJ78CA	78	86.7	95.8	1	126	3.2	1
SMAJ85A HSMAJ85A	SMAJ85CA HSMAJ85CA	85	94.4	104	1	137	2.9	1
SMAJ90A HSMAJ90A	SMAJ90CA HSMAJ90CA	90	100	111	1	146	2.7	1
SMAJ100A HSMAJ100A	SMAJ100CA HSMAJ100CA	100	111	123	1	162	2.5	1
SMAJ110A HSMAJ110A	SMAJ110CA HSMAJ110CA	110	122	135	1	177	2.3	1
SMAJ120A HSMAJ120A	SMAJ120CA HSMAJ120CA	120	133	147	1	193	2.1	1
SMAJ130A HSMAJ130A	SMAJ130CA HSMAJ130CA	130	144	159	1	209	1.9	1
SMAJ150A HSMAJ150A	SMAJ150CA HSMAJ150CA	150	167	185	1	243	1.6	1



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Part Number	Part Number	Reverse Stand-Off Voltage	Breakdown Voltage $V_{BR}@I_T$		Test Current I_T	Maximum Clamping Voltage $V_C @ I_{pp}$	Maximum Peak Pulse Current I_{pp}	Maximum Reverse Leakage $I_R @ V_R$
(Uni)	(Bi)	(V)	Min.(V)	Max.(V)	(mA)	(V)	(A)	(μA)
SMAJ160A HSMAJ160A	SMAJ160CA HSMAJ160CA	160	178	197	1	259	1.5	1
SMAJ170A HSMAJ170A	SMAJ170CA HSMAJ170CA	170	189	209	1	275	1.5	1
SMAJ180A HSMAJ180A	SMAJ180CA HSMAJ180CA	180	201	222	1	292	1.4	1
SMAJ200A HSMAJ200A	SMAJ200CA HSMAJ200CA	200	224	247	1	324	1.2	1
SMAJ220A HSMAJ220A	SMAJ220CA HSMAJ220CA	220	246	272	1	356	1.1	1
SMAJ250A HSMAJ250A	SMAJ250CA HSMAJ250CA	250	279	309	1	405	1	1
SMAJ300A HSMAJ300A	SMAJ300CA HSMAJ300CA	300	335	371	1	486	0.8	1
SMAJ350A HSMAJ350A	SMAJ350CA HSMAJ350CA	350	391	432	1	567	0.7	1
SMAJ400A HSMAJ400A	SMAJ400CA HSMAJ400CA	400	447	494	1	648	0.6	1
SMAJ440A HSMAJ440A	SMAJ440CA HSMAJ440CA	440	492	543	1	713	0.6	1



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Ratings and Characteristic Curves ($T_A = +25^\circ\text{C}$, unless otherwise noted)

Figure 1: Peak Pulse Power Rating

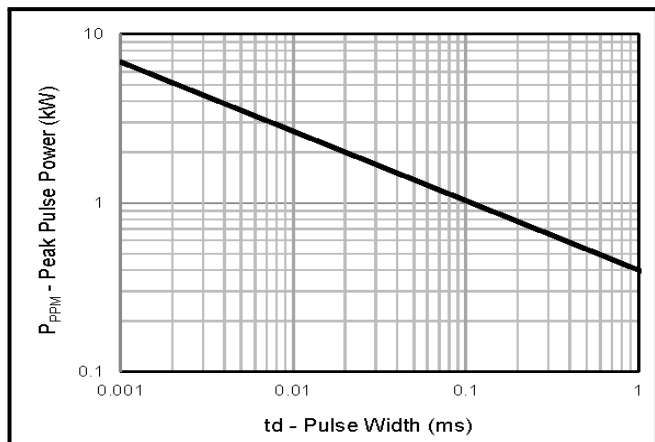


Figure 2: Pulse Derating Curve

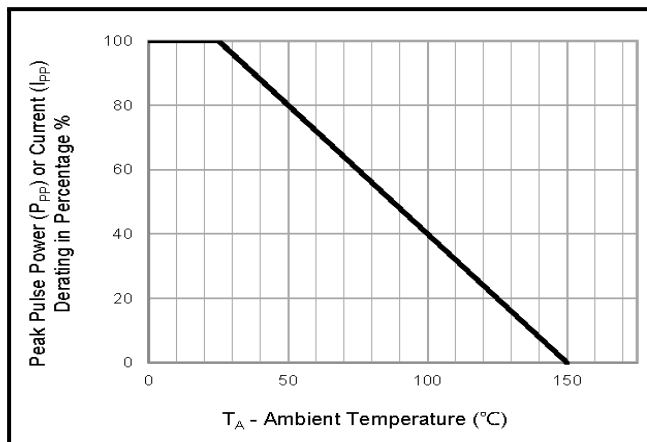


Figure 3: Pulse Waveform

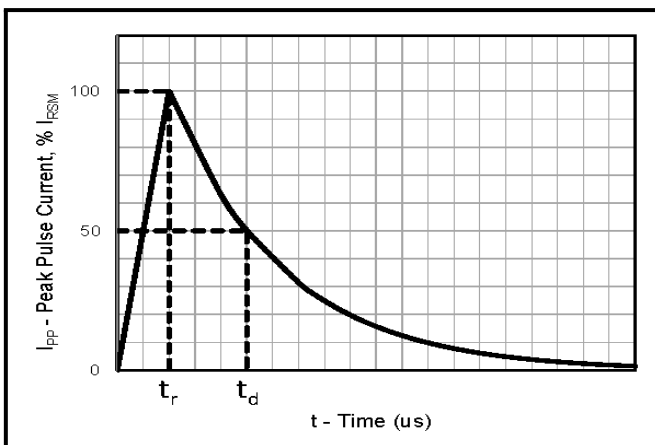


Figure 4 : Typical Junction Capacitance

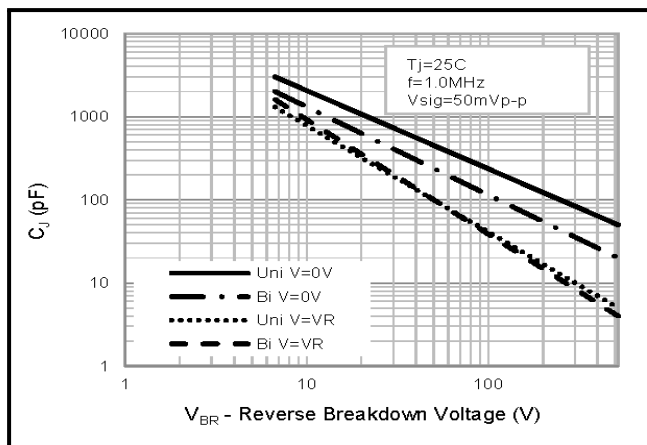


Figure 5: Steady State Power Dissipation Derating

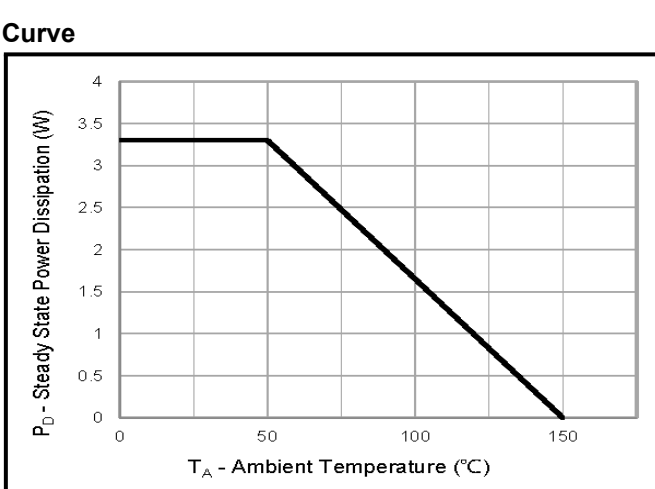
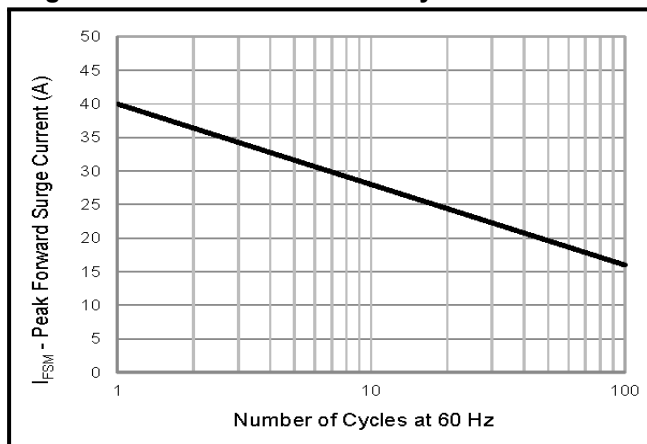
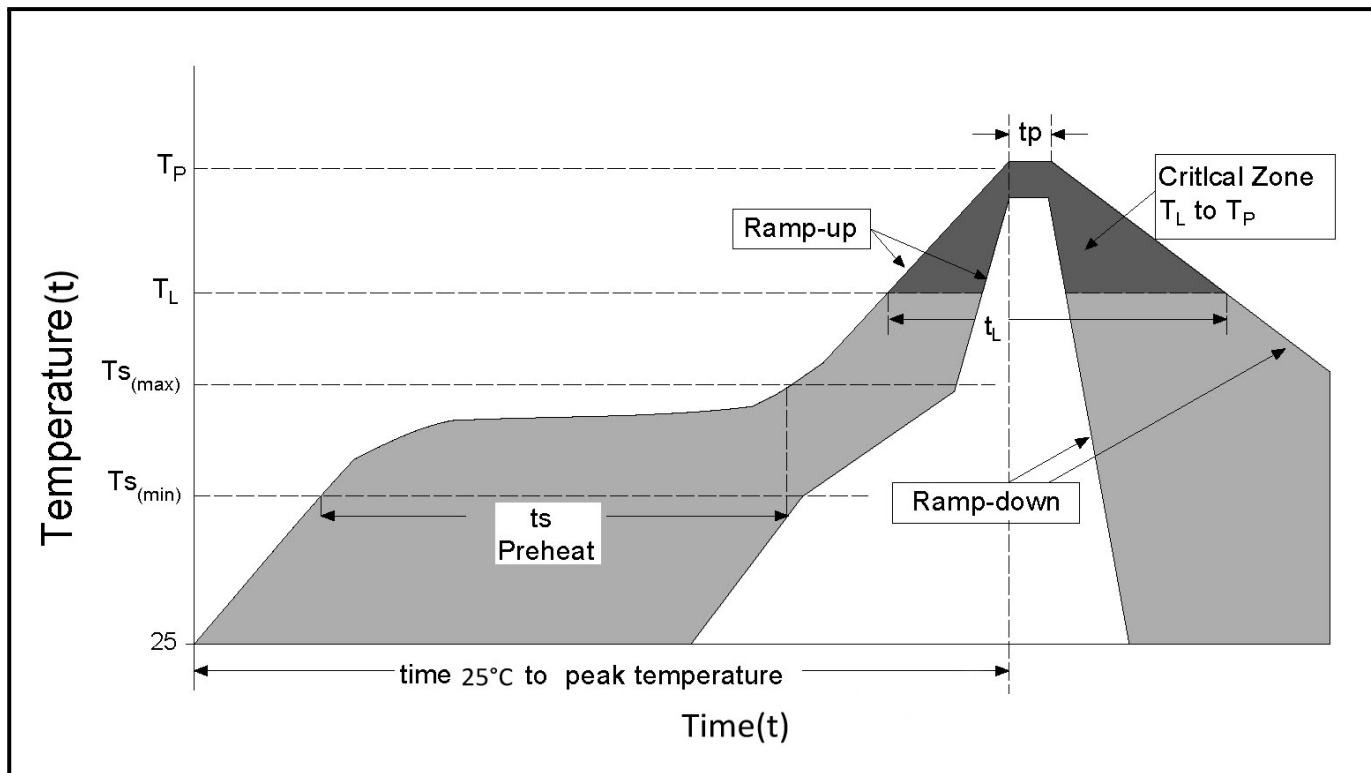


Figure 6 : Maximum Non-Repetitive Peak Forward

Surge Current Uni-Directional Only



Soldering Parameters



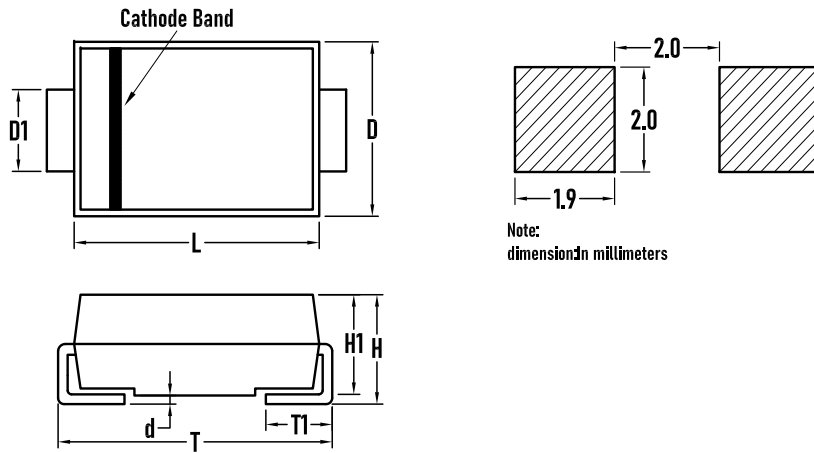
Reflow Condition		Lead-free assembly
Pre Heat	- Temperature Min ($T_{S(min)}$)	150°C
	- Temperature Max ($T_{S(max)}$)	200°C
	- Time (min to max) (t_s)	60 - 180 secs
Average ramp up rate (Liquidus Temp (T_L) to peak)		3°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T_L) (Liquidus)	217°C
	- Time (t_L)	60 -150 secs
Peak Temperature (T_P)		260 ^{+0/-5} °C
Time within 5°C of actual peak Temperature (t_p)		20 - 40 secs
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (t)		8 minutes Max.
Do not exceed		260°C



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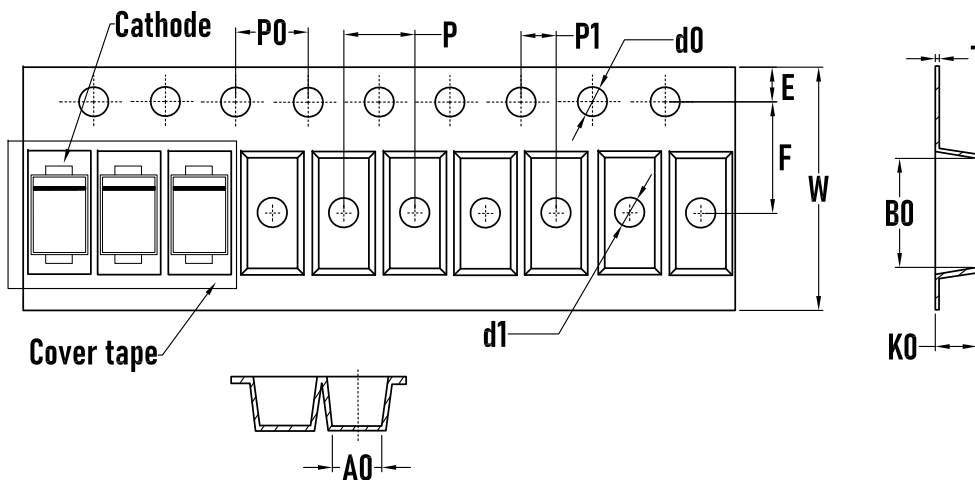
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Outline Drawing - SMA



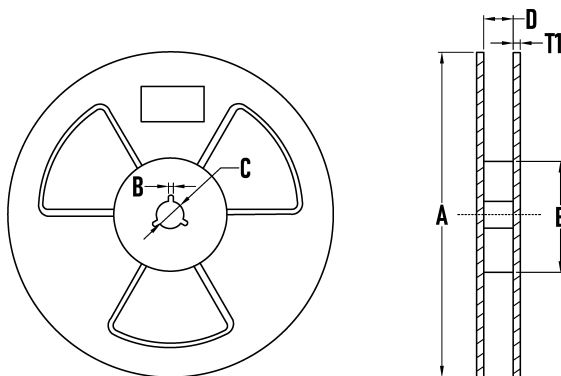
SYMBOL	MILLIMETER		Inches	
	MIN	MAX	MIN	MAX
D	2.5	2.9	0.098	0.114
D1	1.2	1.8	0.047	0.071
T	4.8	5.3	0.189	0.209
T1	0.8	1.5	0.031	0.059
d	—	0.2	—	0.008
H1	1.8	2.2	0.071	0.087
H	1.9	2.5	0.075	0.098
L	3.9	4.6	0.154	0.181

Packaging Tape - SMA



SYMBOL	MILLIMETER
A0	2.70
B0	5.10±0.1
d0	1.50±0.1
d1	1.50±0.1
E	1.75±0.1
F	5.50±0.1
K0	2.40±0.1
P	4.00±0.1
P0	4.00±0.1
P1	2.00±0.1
W	12.00±0.1
T	0.2±0.02

Packaging Reel



SYMBOL	MILLIMETER
A	323±2
B	3.0±0.2
C	15.0±0.5
D	13±2
E	73±2
T1	2.2±0.2
Quantity	5000PCS

