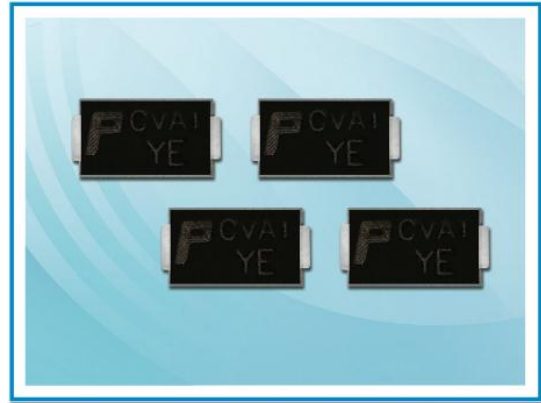


## TVS Diode – SMAJ Series

### Features

- Plastic package, excellent insulation strength.
- Glass passivated chip junction in SMA package.
- Excellent voltage clamping capability.
- Low Zener impedance.
- 400W peak pulse power capability on 10/1000 $\mu$ s waveform.
- Typical leakage current less than 1 $\mu$ A above 13V.
- Very fast response time, typically less than 1.0ps from 0 volt to  $V_{BR}$  minimum.
- High temperature soldering guaranteed: 265 $^{\circ}$ C/10 sec.
- MSL: JEDEC-J-STD-020, Level 1

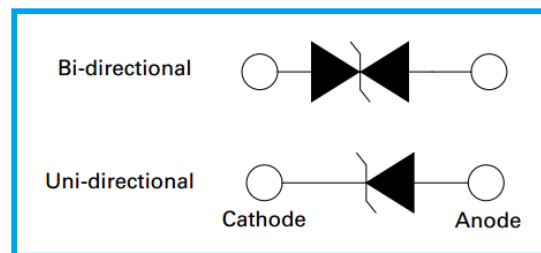


### Applications

- I/O interface,  $V_{CC}$  bus
- Telecom
- Industrial and consumer electronic applications.
- Relay and electromagnetic valve surge absorption.

### Agency Approval

- UL file no.: E474915



### Mechanical and Physical Data

- Case: JEDEC SMA molded plastic.
- Surface mount device, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denoted cathode except bidirectional.

### Maximum Ratings and Thermal Characteristics

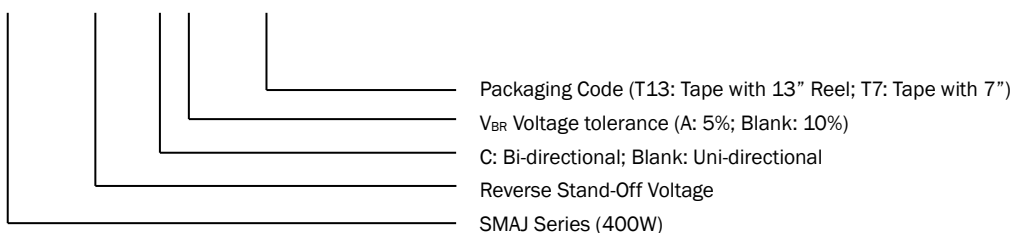
Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation on 10/1000 $\mu$ s waveform (Note 1, Fig.1).	$P_{PPM}$	Min 400	Watt
Peak Pulse Current of 10/1000 $\mu$ s waveform (Note 1, Fig.3).	$I_{PPM}$	See Table	Amp
Steady State Power Dissipation at $T_L = 75^{\circ}$ C, Lead lengths 0.375", (9.5mm) (Fig.5).	$P_{M(AV)}$	3.3	Watt
Peak Forward Surge Current, 8.3 ms Single Half Sine Wave Superimposed on Rated Load (Note 2, Fig.6).	$I_{FSM}$	40	Amp
Operating Junction and Storage Temperature Range.	$T_J, T_{STG}$	-55~150	$^{\circ}$ C

Note:

1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A = 25^{\circ}$ C per Fig.2.
2. 8.3ms single half sine wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum.

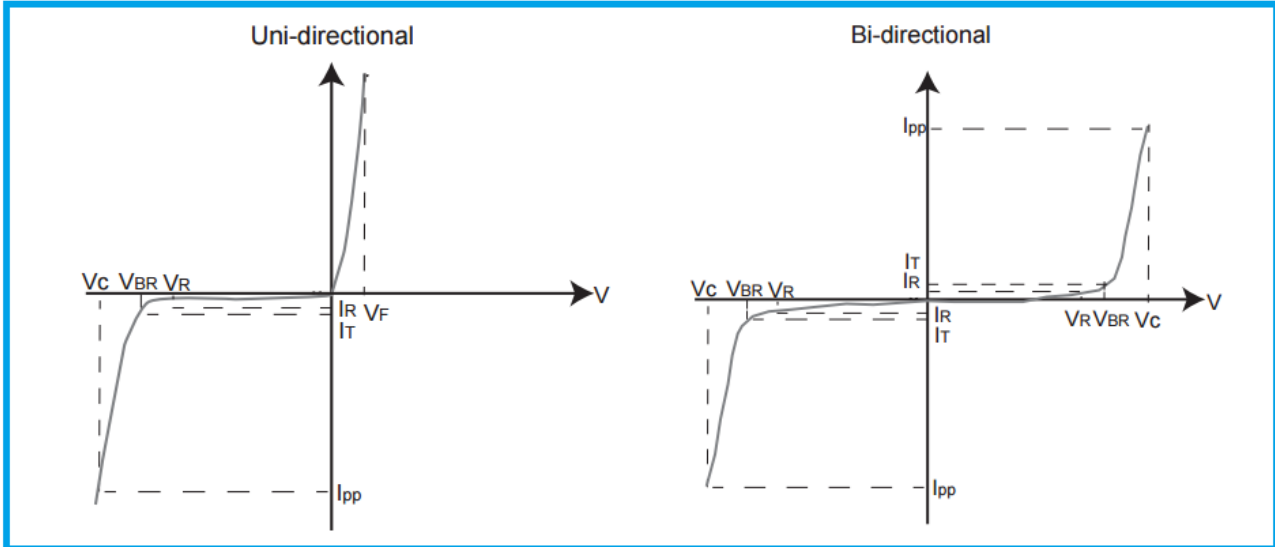
### Part Number Code

SMAJ □□□ CA - □□□



## TVS Diode – SMAJ Series

### I-V Curve Characteristics



$I_{PPM}$  Peak Pulse Power Dissipation – Maximum 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

### Electrical Characteristics

Part Number		Marking		Reverse Stand Off Voltage $V_R$ (V)	Breakdown Voltage $V_{BR}$ (V) @ $I_T$		Test Current $I_T$ (mA)	Maximum Clamping Voltage $V_C$ (V) @ $I_{PP}$	Maximum Peak Pulse Current $I_{PP}$ (A)	Maximum Reverse Leakage $I_R$ ( $\mu$ A) @ $V_R$
Uni	Bi	Uni	Bi		Min.	Max.				
SMAJ5.0A	SMAJ5.0CA	AE	WE	5.0	6.40	7.00	10	9.2	43.5	800
SMAJ6.0A	SMAJ6.0CA	AG	WG	6.0	6.67	7.37	10	10.3	38.8	800
SMAJ6.5A	SMAJ6.5CA	AK	WK	6.5	7.22	7.98	10	11.2	35.7	500
SMAJ7.0A	SMAJ7.0CA	AM	WM	7.0	7.78	8.60	10	12.0	33.3	200
SMAJ7.5A	SMAJ7.5CA	AP	WP	7.5	8.33	9.21	1	12.9	31.0	100
SMAJ8.0A	SMAJ8.0CA	AR	WR	8.0	8.89	9.83	1	13.6	29.4	50
SMAJ8.5A	SMAJ8.5CA	AT	WT	8.5	9.44	10.4	1	14.4	27.8	20
SMAJ9.0A	SMAJ9.0CA	AV	WV	9.0	10.0	11.1	1	15.4	26.0	10
SMAJ10A	SMAJ10CA	AX	WX	10.0	11.1	12.3	1	17.0	23.5	5
SMAJ11A	SMAJ11CA	AZ	WZ	11.0	12.2	13.5	1	18.2	22.0	1
SMAJ12A	SMAJ12CA	BE	XE	12.0	13.3	14.7	1	19.9	20.1	1
SMAJ13A	SMAJ13CA	BG	XG	13.0	14.4	15.9	1	21.5	18.6	1
SMAJ14A	SMAJ14CA	BK	XK	14.0	15.6	17.2	1	23.2	17.2	1
SMAJ15A	SMAJ15CA	BM	XM	15.0	16.7	18.5	1	24.4	16.4	1
SMAJ16A	SMAJ16CA	BP	XP	16.0	17.8	19.7	1	26.0	15.4	1
SMAJ17A	SMAJ17CA	BR	XR	17.0	18.9	20.9	1	27.6	14.5	1
SMAJ18A	SMAJ18CA	BT	XT	18.0	20.0	22.1	1	29.2	13.7	1

## TVS Diode – SMAJ Series

Part Number		Marking		Reverse Stand Off Voltage $V_R$ (V)	Breakdown Voltage $V_{BR}$ (V) @ $I_T$		Test Current $I_T$ (mA)	Maximum Clamping Voltage $V_C$ (V) @ $I_{PP}$	Maximum Peak Pulse Current $I_{PP}$ (A)	Maximum Reverse Leakage $I_R$ ( $\mu$ A) @ $V_R$
Uni	Bi	Uni	Bi		Min.	Max.				
SMAJ20A	SMAJ20CA	BV	XV	20.0	22.2	24.5	1	32.4	12.3	1
SMAJ22A	SMAJ22CA	BX	XX	22.0	24.4	26.9	1	35.5	11.3	1
SMAJ24A	SMAJ24CA	BZ	XZ	24.0	26.7	29.5	1	38.9	10.3	1
SMAJ26A	SMAJ26CA	CE	YE	26.0	28.9	31.9	1	42.1	9.5	1
SMAJ28A	SMAJ28CA	CG	YG	28.0	31.1	34.4	1	45.4	8.8	1
SMAJ30A	SMAJ30CA	CK	YK	30.0	33.3	36.8	1	48.4	8.3	1
SMAJ33A	SMAJ33CA	CM	YM	33.0	36.7	40.6	1	53.3	7.5	1
SMAJ36A	SMAJ36CA	CP	YP	36.0	40.0	44.2	1	58.1	6.9	1
SMAJ40A	SMAJ40CA	CR	YR	40.0	44.4	49.1	1	64.5	6.2	1
SMAJ43A	SMAJ43CA	CT	YT	43.0	47.8	52.8	1	69.4	5.8	1
SMAJ45A	SMAJ45CA	CV	YV	45.0	50.0	55.3	1	72.7	5.5	1
SMAJ48A	SMAJ48CA	CX	YX	48.0	53.3	58.9	1	77.4	5.2	1
SMAJ51A	SMAJ51CA	CZ	YZ	51.0	56.7	62.7	1	82.4	4.9	1
SMAJ54A	SMAJ54CA	RE	ZE	54.0	60.0	66.3	1	87.1	4.6	1
SMAJ58A	SMAJ58CA	RG	ZG	58.0	64.4	71.2	1	93.6	4.3	1
SMAJ60A	SMAJ60CA	RK	ZK	60.0	66.7	73.7	1	96.8	4.1	1
SMAJ64A	SMAJ64CA	RM	ZM	64.0	71.1	78.6	1	103.0	3.9	1
SMAJ70A	SMAJ70CA	RP	ZP	70.0	77.8	86.0	1	113.0	3.5	1
SMAJ75A	SMAJ75CA	RR	ZR	75.0	83.3	92.1	1	121.0	3.3	1
SMAJ78A	SMAJ78CA	RT	ZT	78.0	86.7	95.8	1	126.0	3.2	1
SMAJ85A	SMAJ85CA	RV	ZV	85.0	94.4	104.0	1	137.0	2.9	1
SMAJ90A	SMAJ90CA	RX	ZX	90.0	100.0	111.0	1	146.0	2.7	1
SMAJ100A	SMAJ100CA	RZ	ZZ	100.0	111.0	123.0	1	162.0	2.5	1
SMAJ110A	SMAJ110CA	SE	VE	110.0	122.0	135.0	1	177.0	2.3	1
SMAJ120A	SMAJ120CA	SG	VG	120.0	133.0	147.0	1	193.0	2.1	1
SMAJ130A	SMAJ130CA	SK	VK	130.0	144.0	159.0	1	209.0	1.9	1
SMAJ150A	SMAJ150CA	SM	VM	150.0	167.0	185.0	1	243.0	1.6	1
SMAJ160A	SMAJ160CA	SP	VP	160.0	178.0	197.0	1	259.0	1.5	1
SMAJ170A	SMAJ170CA	SR	VR	170.0	189.0	209.0	1	275.0	1.5	1
SMAJ180A	SMAJ180CA	ST	VT	180.0	201.0	222.0	1	292.0	1.4	1
SMAJ190A	SMAJ190CA	SU	YU	190.0	209.0	243.0	1	308.0	1.3	1
SMAJ200A	SMAJ200CA	SV	VV	200.0	224.0	247.0	1	324.0	1.2	1
SMAJ220A	SMAJ220CA	SX	VX	220.0	246.0	272.0	1	356.0	1.1	1
SMAJ250A	SMAJ250CA	SZ	VZ	250.0	279.0	309.0	1	405.0	1.0	1
SMAJ300A	SMAJ300CA	TE	UE	300.0	335.0	371.0	1	486.0	0.8	1
SMAJ350A	SMAJ350CA	TG	UG	350.0	391.0	432.0	1	567.0	0.7	1
SMAJ400A	SMAJ400CA	TK	UK	400.0	447.0	494.0	1	648.0	0.6	1
SMAJ440A	SMAJ440CA	TM	UM	440.0	492.0	543.0	1	713.0	0.6	1

Note:

1. For bi-directional type having  $V_R$  of 10 volts and less, the  $I_R$  limit is double.

## TVS Diode – SMAJ Series

### Ratings and Characteristic Curves

Fig 1 - Peak Pulse Power Rating Curve

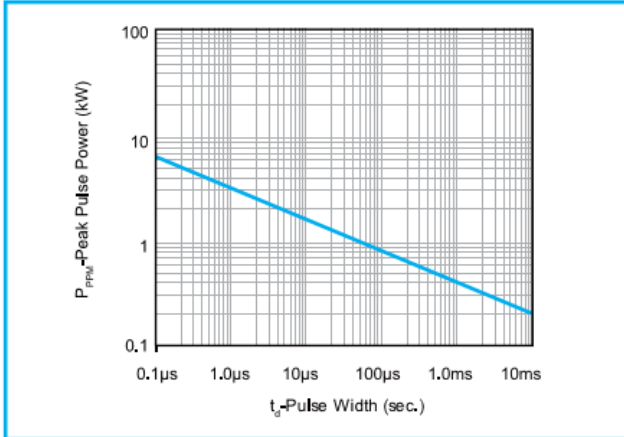


Fig 2 - Pulse Derating Curve

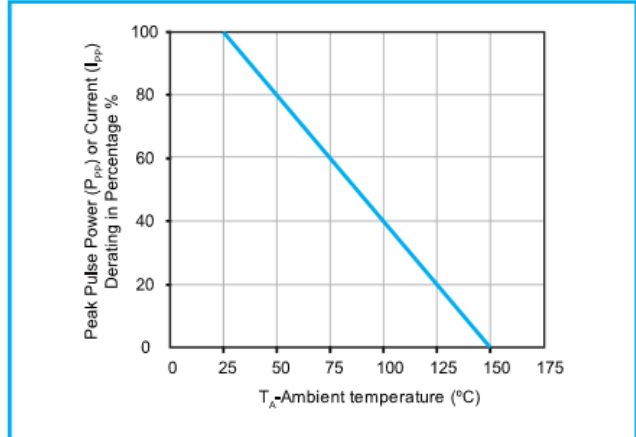


Fig 3 - Pulse Waveform

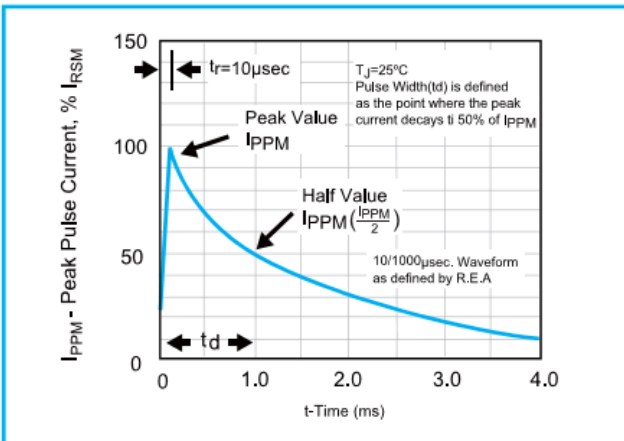


Fig 4 - Typical Junction Capacitance Uni-directional

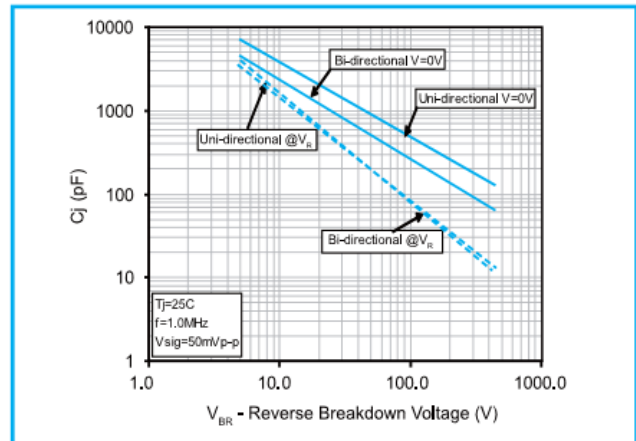


Fig 5 - Steady State Power Dissipation Derating Curve

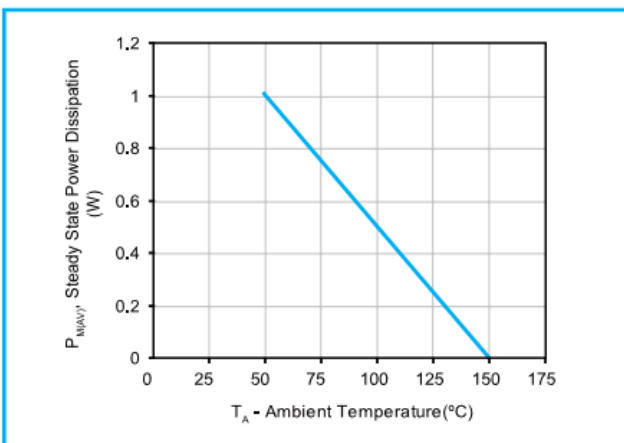
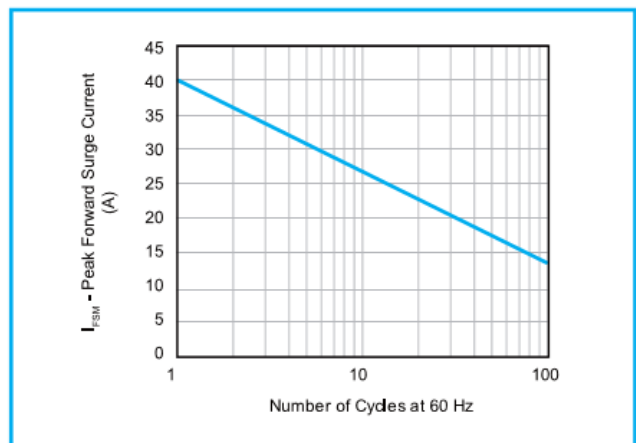
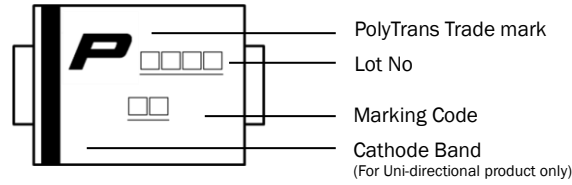


Fig 6 - Maximum Non-Repetitive Forward Surge Current (Uni-directional Only)

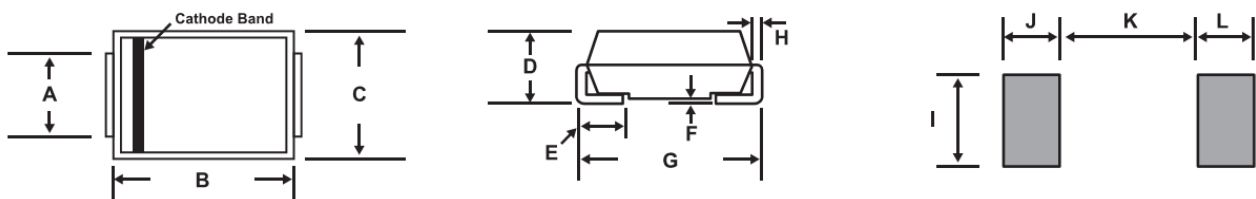


## TVS Diode – SMAJ Series

### Marking Definitions



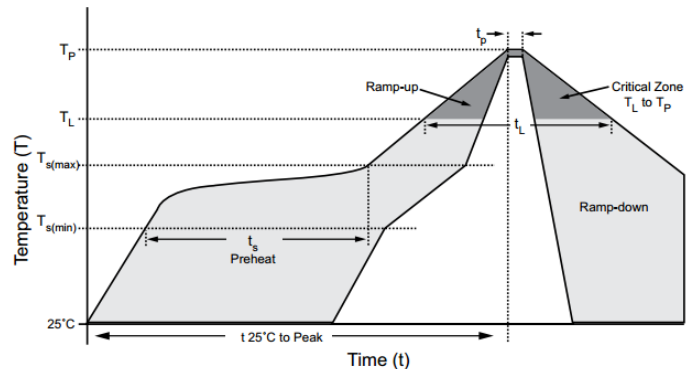
### Physical Dimensions



Dimension	Millimeters		Inches	
	Min	Max	Min	Max
A	1.25	1.65	0.049	0.065
B	3.99	4.60	0.157	0.177
C	2.50	2.90	0.100	0.110
D	1.98	2.29	0.078	0.090
E	0.78	1.52	0.030	0.060
F	-	0.203	-	0.008
G	4.93	5.28	0.194	0.208
H	0.152	0.305	0.006	0.012
I	1.80	-	0.070	-
J	2.10	-	0.082	-
K	-	2.30	-	0.090
L	2.10	-	0.082	-

### Lead Free Reflow Soldering Recommendations

Preheat	
- Temperature Min ( $T_{s\_min}$ )	150°C
- Temperature Max ( $T_{s\_max}$ )	200°C
- Time ( $T_{s\_min}$ to $T_{s\_max}$ )	60-180 seconds
- Average Ramp-Up Rate	1~3°C/second
Peak Temperature	260°C max.
Time within 5°C of actual Peak Temperature ( $t_p$ )	40 seconds max.
Ramp-Down Rate	6 °C /second max.



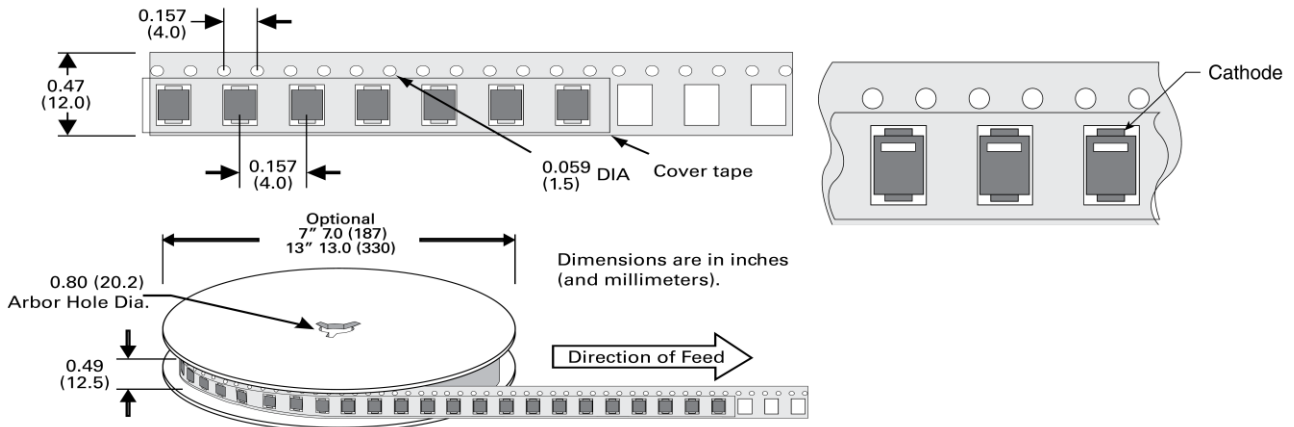
**Note:** If the soldering temperatures exceed the recommended profile, devices may not meet the performance requirements.

## TVS Diode – SMAJ Series

### Packaging Information

Part Number	Packaging Code	Component Package	Quantity	Packaging Option	Packaging Specification
SMAJ Series	T13	DO-214AC	5000	Tape & Reel - 12mm tape/13" reel	EIA STD RS-481
SMAJ Series	T7	DO-214AC	2000	Tape & Reel - 12mm tape/7" reel	EIA STD RS-481

### Tape and Reel Specifications



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