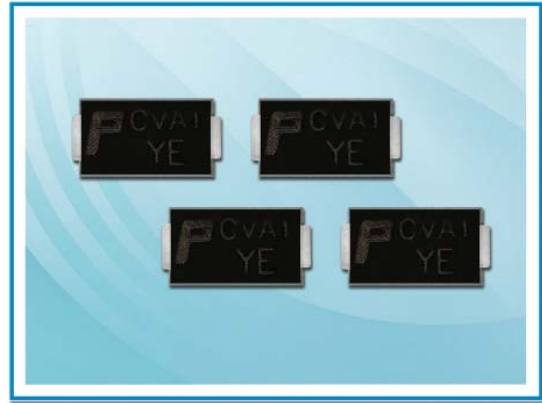


## TVS Diode – AP6SMB Series

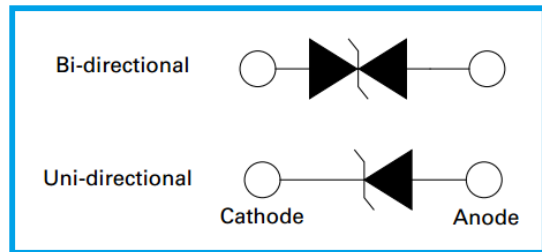
### Features

- Plastic package, excellent insulation strength.
- Glass passivated chip junction in SMB package.
- Excellent voltage clamping capability.
- Automotive grade AEC-Q101 qualified.
- Low Zener impedance.
- 600W 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°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.



### Mechanical and Physical Data

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

### Maximum Ratings and Thermal Characteristics

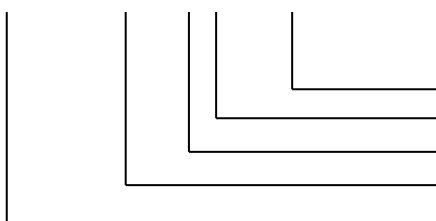
Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation on 10/1000 $\mu$ s waveform	$P_{PP}$	600	Watt
Peak Pulse Current of 10/1000 $\mu$ s waveform	$I_{PP}$	See Table	Amp
Steady State Power Dissipation at $T_L = 75^\circ\text{C}$	$P_D$	5.0	Watt
Peak Forward Surge Current, 8.3 ms Single Half Sine Wave unidirectional only	$I_{FSM}$	100	Amp
Maximum instantaneous forward voltage at 25 A for unidirectional only <sup>(3)</sup>	$V_F$	3.5/5.0	V
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~150	$^\circ\text{C}$

Note:

1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A = 25^\circ\text{C}$  per Fig.1.
2. 8.3ms single half sine wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum.
3.  $V_F < 3.5\text{V}$  for devices of  $V_{BR} < 200\text{V}$  and  $V_F < 5.0\text{V}$  for devices of  $V_{BR} > 201\text{V}$

### Part Number Code

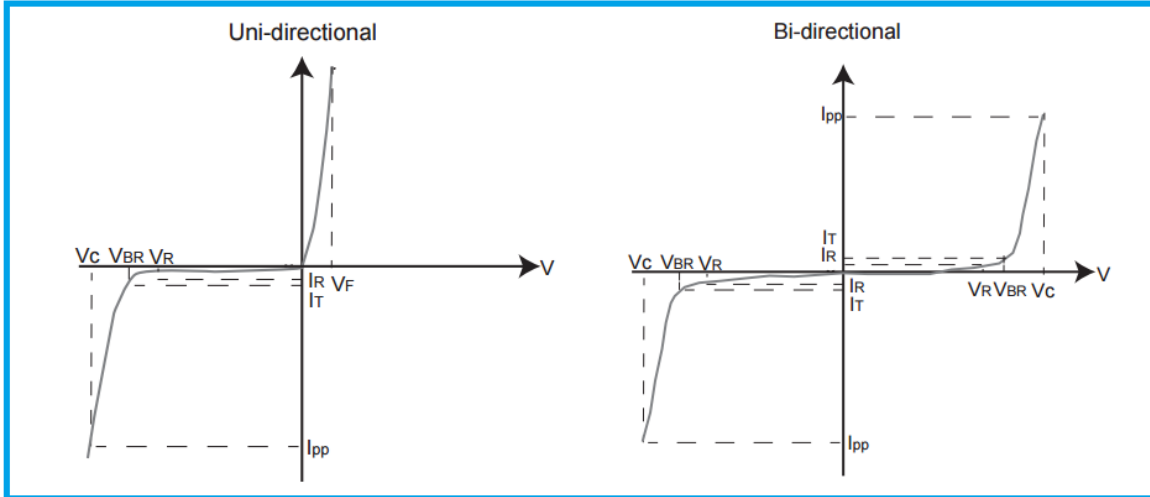
AP6SMB □□□ C A - □□□



- Packaging Code (T13: Tape with 13" Reel; T7: Tape with 7")
- $V_{BR}$  Voltage tolerance (A: 5%; Blank: 10%)
- C: Bi-directional; Blank: Uni-directional
- Typical Breakdown Voltage
- AP6SMB Series (600W)

## TVS Diode – AP6SMB Series

### I-V Curve Characteristics



$P_{PPM}$  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) @ $I_{PPM}$	Maximum Peak Pulse Current $I_{PPM}$ (A)	Maximum Reverse Leakage $I_R$ ( $\mu$ A) @ $V_R$
Uni	Bi	Uni	Bi		Min.	Max.				
AP6SMB13A	AP6SMB13CA	13AA	13CA	11.1	12.35	13.65	1	18.2	32.97	1
AP6SMB15A	AP6SMB15CA	15AA	15CA	12.8	14.25	15.75	1	21.2	28.30	1
AP6SMB16A	AP6SMB16CA	16AA	16CA	13.6	15.20	16.80	1	22.5	26.67	1
AP6SMB18A	AP6SMB18CA	18AA	18CA	15.3	17.10	18.90	1	25.5	23.81	1
AP6SMB20A	AP6SMB20CA	20AA	20CA	17.1	19.00	21.00	1	27.7	21.66	1
AP6SMB22A	AP6SMB22CA	22AA	22CA	18.8	20.90	23.10	1	30.6	19.61	1
AP6SMB24A	AP6SMB24CA	24AA	24CA	20.5	22.80	25.20	1	33.2	18.07	1
AP6SMB27A	AP6SMB27CA	27AA	27CA	23.1	25.65	28.35	1	37.5	16.00	1
AP6SMB30A	AP6SMB30CA	30AA	30CA	25.6	28.50	31.50	1	41.4	14.49	1
AP6SMB33A	AP6SMB33CA	33AA	33CA	28.2	31.35	34.65	1	45.7	13.13	1
AP6SMB36A	AP6SMB36CA	36AA	36CA	30.8	34.20	37.80	1	49.9	12.02	1
AP6SMB39A	AP6SMB39CA	39AA	39CA	33.3	37.05	40.95	1	53.9	11.13	1
AP6SMB43A	AP6SMB43CA	43AA	43CA	36.8	40.85	45.15	1	59.3	10.12	1
AP6SMB47A	AP6SMB47CA	47AA	47CA	40.2	44.65	49.35	1	64.8	9.26	1
AP6SMB51A	AP6SMB51CA	51AA	51CA	43.6	48.45	53.55	1	70.1	8.56	1
AP6SMB56A	AP6SMB56CA	56AA	56CA	47.8	53.20	58.80	1	77.0	7.79	1
AP6SMB62A	AP6SMB62CA	62AA	62CA	53.0	58.90	65.10	1	85.0	7.06	1
AP6SMB68A	AP6SMB68CA	68AA	68CA	58.1	64.60	71.40	1	92.0	6.52	1

## TVS Diode – AP6SMB 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.				
AP6SMB75A	AP6SMB75CA	75AA	75CA	64.1	71.25	78.75	1	103.0	5.83	1
AP6SMB82A	AP6SMB82CA	82AA	82CA	70.1	77.90	86.10	1	113.0	5.31	1
AP6SMB91A	AP6SMB91CA	91AA	91CA	77.8	86.45	95.55	1	125.0	4.80	1
AP6SMB100A	AP6SMB100CA	100AA	100CA	85.5	95.00	105.00	1	137.0	4.38	1
AP6SMB110A	AP6SMB110CA	110AA	110CA	94.0	104.50	115.50	1	152.0	3.95	1
AP6SMB120A	AP6SMB120CA	120AA	120CA	102.0	114.00	126.00	1	165.0	3.64	1
AP6SMB130A	AP6SMB130CA	130AA	130CA	111.0	123.50	136.50	1	179.0	3.35	1
AP6SMB150A	AP6SMB150CA	150AA	150CA	128.0	142.50	157.50	1	207.0	2.90	1
AP6SMB160A	AP6SMB160CA	160AA	160CA	136.0	152.00	168.00	1	219.0	2.74	1
AP6SMB170A	AP6SMB170CA	170AA	170CA	145.0	161.50	178.50	1	234.0	2.56	1
AP6SMB180A	AP6SMB180CA	180AA	180CA	154.0	171.00	189.00	1	246.0	2.44	1
AP6SMB200A	AP6SMB200CA	200AA	200CA	171.0	190.00	210.00	1	274.0	2.19	1
AP6SMB220A	AP6SMB220CA	220AA	220CA	185.0	209.00	231.00	1	328.0	1.83	1
AP6SMB250A	AP6SMB250CA	250AA	250CA	214.0	237.50	262.50	1	344.0	1.74	1
AP6SMB300A	AP6SMB300CA	300AA	300CA	256.0	285.00	315.00	1	414.0	1.45	1
AP6SMB350A	AP6SMB350CA	350AA	350CA	299.3	332.50	367.50	1	482.0	1.24	1
AP6SMB380A	AP6SMB380CA	380AA	380CA	324.9	361.00	399.00	1	524.4	1.14	1
AP6SMB400A	AP6SMB400CA	400AA	400CA	342.0	380.00	420.00	1	548.0	1.09	1

Note:

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

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## TVS Diode – AP6SMB Series

### Ratings and Characteristic Curves

Fig 1 - Peak Pulse Power Rating Curve

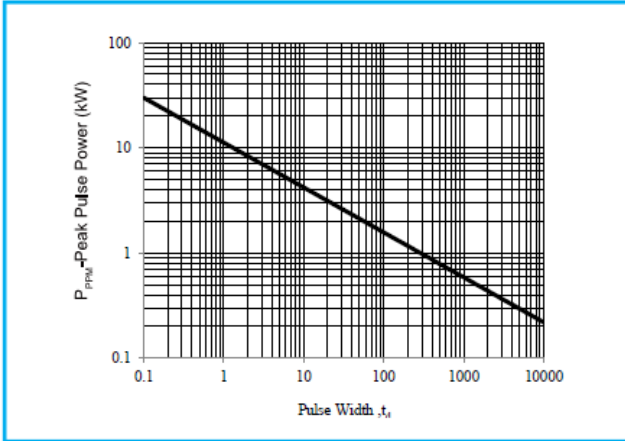


Fig 2 - Pulse Derating Curve

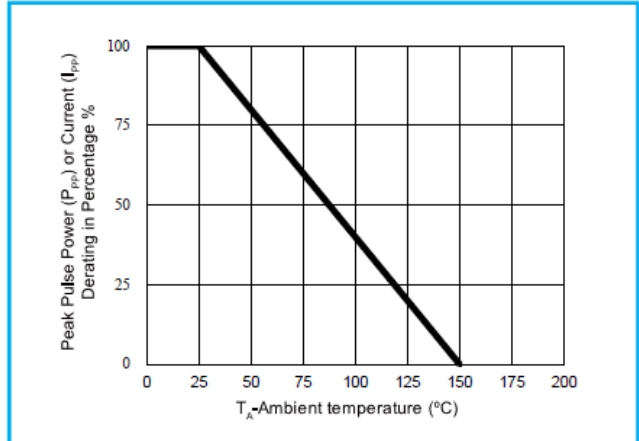


Fig 3 - Pulse Waveform

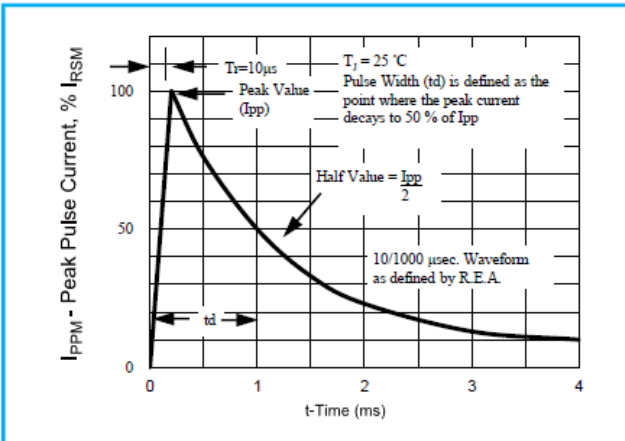


Fig 4 - Typical Junction Capacitance Uni-directional

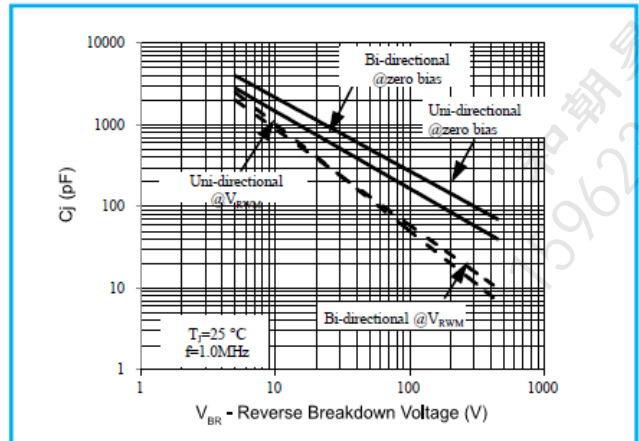


Fig 5 - Steady State Power Dissipation Derating Curve

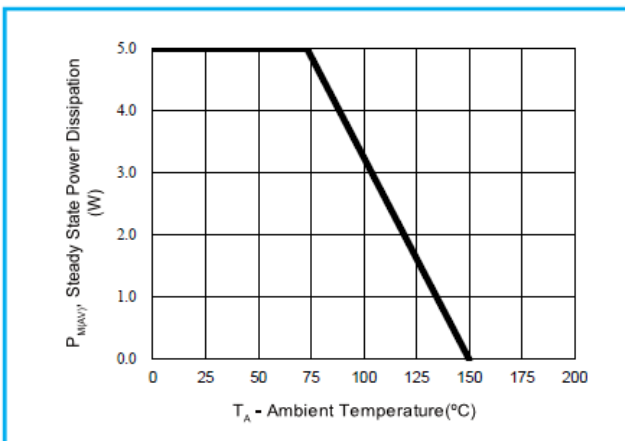
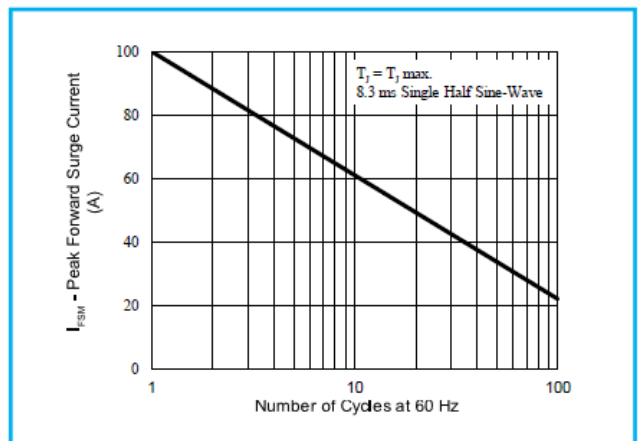
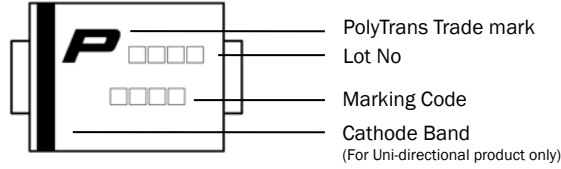


Fig 6 - Maximum Non-Repetitive Forward Surge Current (Uni-directional Only)

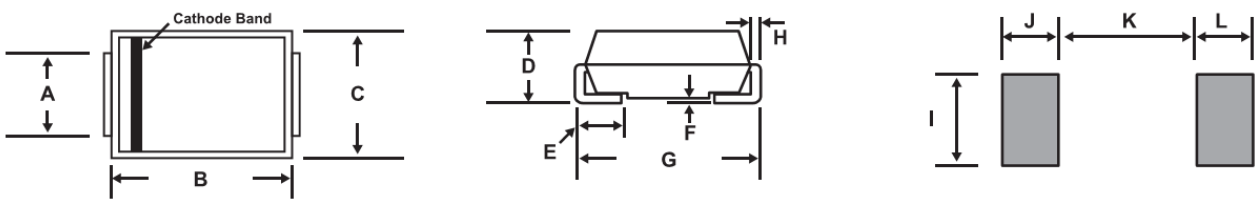


## TVS Diode – AP6SMB Series

### Marking Definitions



### Physical Dimensions

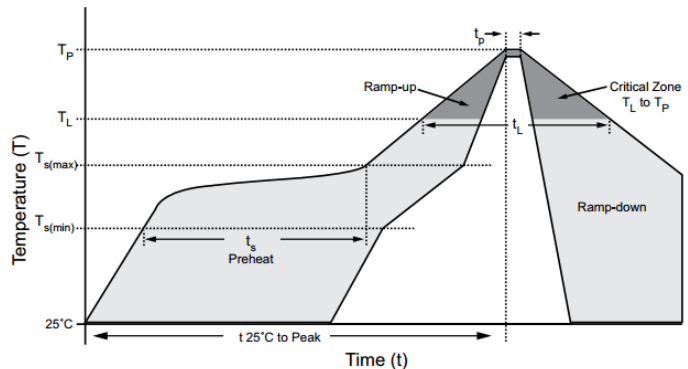


Dimension	Millimeters		Inches	
	Min	Max	Min	Max
A	1.96	2.20	0.077	0.087
B	4.35	4.85	0.171	0.191
C	3.30	3.94	0.130	0.155
D	2.13	2.44	0.084	0.096
E	0.75	1.52	0.030	0.060
F	0.02	0.20	0.001	0.008
G	5.10	5.50	0.201	0.216
H	0.15	0.30	0.006	0.012
I	2.26	-	0.089	-
J	2.16	-	0.085	-
K	-	2.74	-	0.107
L	2.16	-	0.085	-

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### 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.



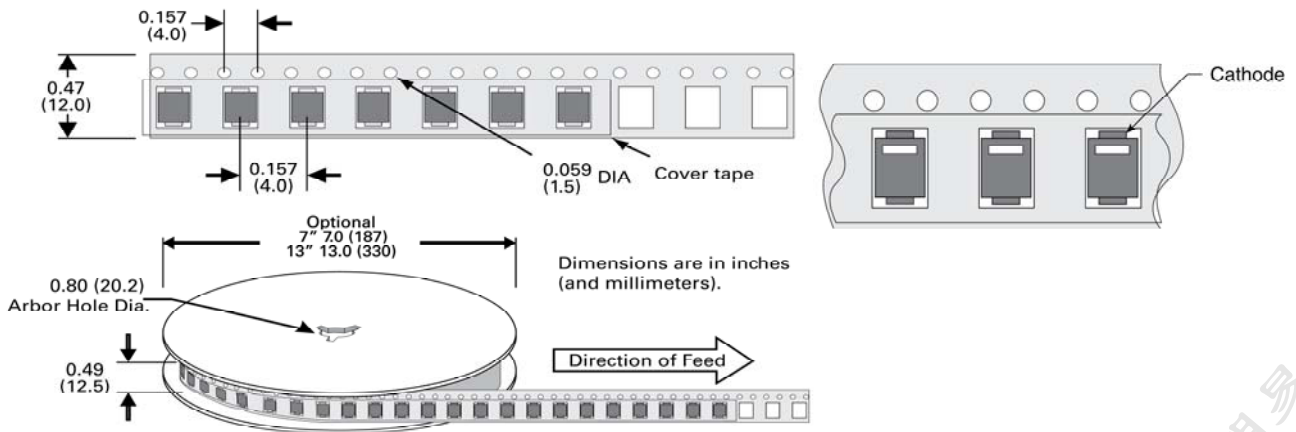
**Note:** If the soldering temperatures exceed the recommended profile, devices may not meet the performance requirements.

## TVS Diode – AP6SMB Series

### Packaging Information

Part Number	Packaging Code	Component Package	Quantity	Packaging Option	Packaging Specification
AP6SMB Series	T13	DO-214AA	3000	Tape & Reel - 12mm tape/13" reel	EIA STD RS-481
AP6SMB Series	T7	DO-214AA	500	Tape & Reel - 12mm tape/7" reel	EIA STD RS-481

### Tape and Reel Specifications



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