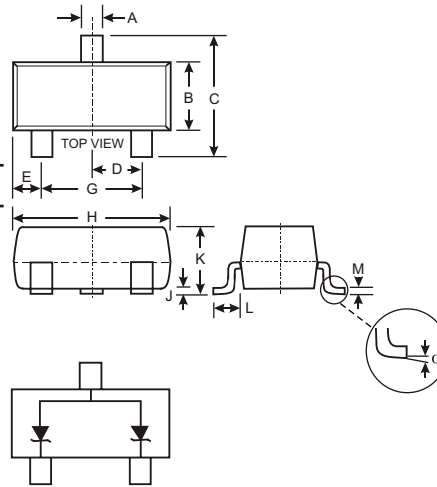


### Features

- Dual TVS in Common Anode Configuration
- 24W/40W Peak Power Dissipation Rating @ 1.0ms (Unidirectional)
- 225 mW Power Dissipation
- Ideally Suited for Automatic Insertion
- Low Leakage

### Mechanical Data

- Case: SOT-23, Molded Plastic
- Case material - UL Flammability Rating Classification 94V-0
- Moisture sensitivity: Level 1 per J-STD-020A
- Terminals: Solderable per MIL-STD-202, Method 208
- Polarity: See Diagram
- Marking: Marking Code & Date Code, See Page 2
- Marking Code: See Table Below and Page 2
- Weight: 0.008 grams (Approx.)
- Ordering Information: See Page 2
- ESD Rating Exceeding 16kV per the Human Body Model (Note 4)



SOT-23		
Dim	Min	Max
A	0.37	0.51
B	1.20	1.40
C	2.30	2.50
D	0.89	1.03
E	0.45	0.60
G	1.78	2.05
H	2.80	3.00
J	0.013	0.10
K	0.903	1.10
L	0.45	0.61
M	0.085	0.180
$\alpha$	0°	8°
All Dimensions in mm		

### Maximum Ratings @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 1)	P <sub>d</sub>	225	mW
Peak Power Dissipation (Note 2) MMBZ5V6AL - MMBZ10VAL	P <sub>pk</sub>	24	W
Peak Power Dissipation (Note 2) MMBZ15VAL - MMBZ33VAL	P <sub>pk</sub>	40	W
Thermal Resistance, Junction to Ambient Air (Note 1)	R <sub>θJA</sub>	556	°C/W
Operating and Storage Temperature Range	T <sub>j</sub> , T <sub>STG</sub>	-65 to +150	°C

### Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

#### 24 Watt (V<sub>F</sub> = 0.9V max @ I<sub>F</sub> = 10mA)

Type Number	Marking Code	V <sub>RWM</sub> Volts	I <sub>R</sub> @ V <sub>RWM</sub> μA	Breakdown Voltage			@ I <sub>T</sub> mA	V <sub>C</sub> @ I <sub>PP</sub> (Note 2)		Typical Temperature Coefficient T <sub>c</sub> (mV/°C)
				V <sub>BR</sub> (Note 3) (V)				V <sub>C</sub> V	I <sub>PP</sub> A	
				Min	Nom	Max				
MMBZ5V6AL	K9A	3	5.0	5.32	5.6	5.88	20	8.0	3.0	1.8

#### 24 Watt (V<sub>F</sub> = 1.1V max @ I<sub>F</sub> = 200mA)

Type Number	Marking Code	V <sub>RWM</sub> Volts	I <sub>R</sub> @ V <sub>RWM</sub> μA	Breakdown Voltage			@ I <sub>T</sub> mA	V <sub>C</sub> @ I <sub>PP</sub> (Note 2)		Typical Temperature Coefficient T <sub>c</sub> (%/°C)
				V <sub>BR</sub> (Note 3) (V)				V <sub>C</sub> V	I <sub>PP</sub> A	
				Min	Nom	Max				
MMBZ6V8AL	K9C	4.5	0.5	6.46	6.8	7.14	1.0	9.6	2.5	+0.045
MMBZ9V1AL	K9D	6.0	0.3	8.65	9.1	9.56	1.0	14	1.7	+0.065
MMBZ10VAL	K9E	6.5	0.3	9.50	10	10.5	1.0	14.2	1.7	+0.065

- Note:
1. Device mounted on FR-5 PCB 1.0 x 0.75 x 0.062 inch pad layout as shown on Diodes Inc. suggested pad layout AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>. 200mW per element must not be exceeded.
  2. Non-repetitive current pulse per Figure 2 and derate above T<sub>A</sub> = 25°C per Figure 1.
  3. Short duration pulse test used to minimize self-heating effect.
  4. MMBZ5V6AL and MMBZ15VAL exceed 16kV ESD rating, all other voltages exceed 8kV ESD rating.

40 Watt ( $V_F = 1.1V \text{ max @ } I_F = 200mA$ )

Type Number	Marking Code	$V_{RWM}$ Volts	$I_R @ V_{RWM}$ nA	Breakdown Voltage			$@ I_T$ mA	$V_C @ I_{PP}$ (Note 2)		Typical Temperature Coefficient $T_c$ (%/°C)
				$V_{BR}$ (Note 3) (V)				$V_C$ V	$I_{PP}$ A	
				Min	Nom	Max				
MMBZ15VAL	K9K	12	50	14.25	15	15.75	1.0	21	1.9	+0.080
MMBZ18VAL	K9L	14.5	50	17.10	18	18.90	1.0	25	1.6	+0.090
MMBZ20VAL	K9N	17	50	19.00	20	21.00	1.0	28	1.4	+0.090
MMBZ27VAL	K9Q	22	50	25.65	27	28.35	1.0	40	1.0	+0.090
MMBZ33VAL	K9T	26	50	31.35	33	34.65	1.0	46	0.87	+0.090

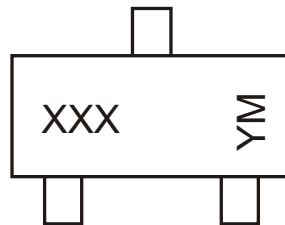
## Ordering Information (Note 5)

Device	Packaging	Shipping
(Type number)-7*	SOT-23	3000/Tape & Reel

\* Example: 5.6V type = MMBZ5V6AL-7.

Notes: 5. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## Marking Information



XXX = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: N = 2002  
 M = Month ex: 9 = September

### Date Code Key

Year	2001	2002	2003	2004	2005	2006	2007	2008
Code	M	N	P	R	S	T	U	V

Month	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

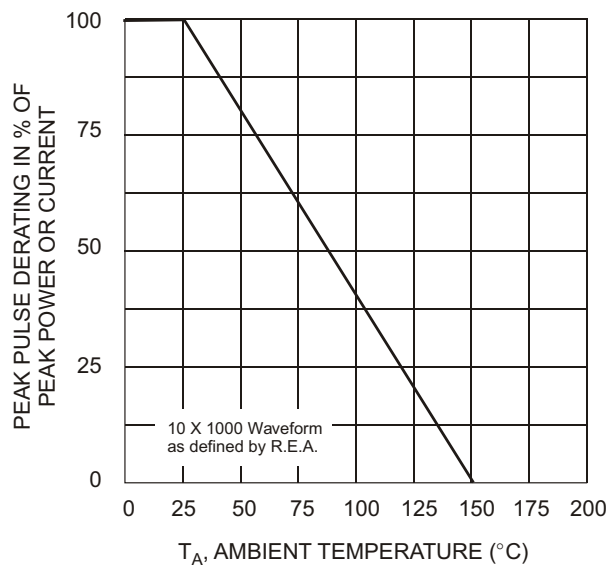


Fig. 1 Pulse Derating Curve

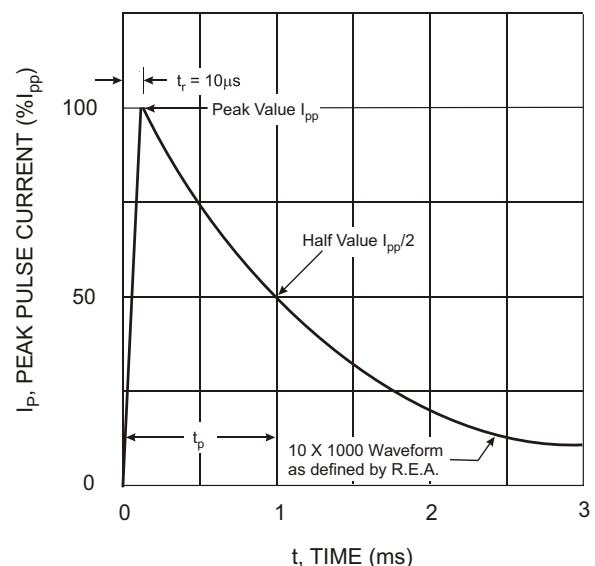


Fig. 2 Pulse Waveform

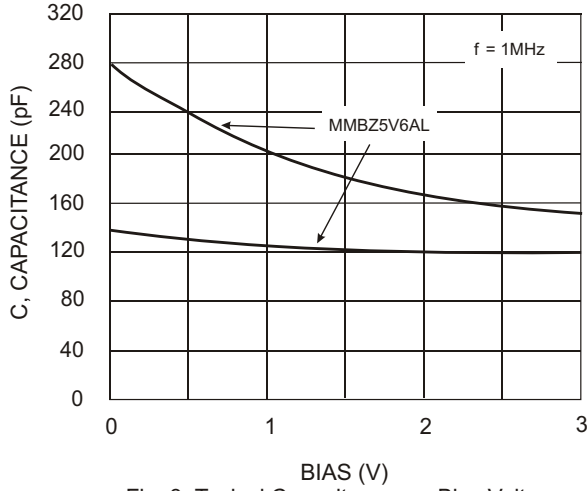


Fig. 3 Typical Capacitance vs. Bias Voltage  
(Lower curve is Bidirectional mode,  
Upper curve is Unidirectional mode)

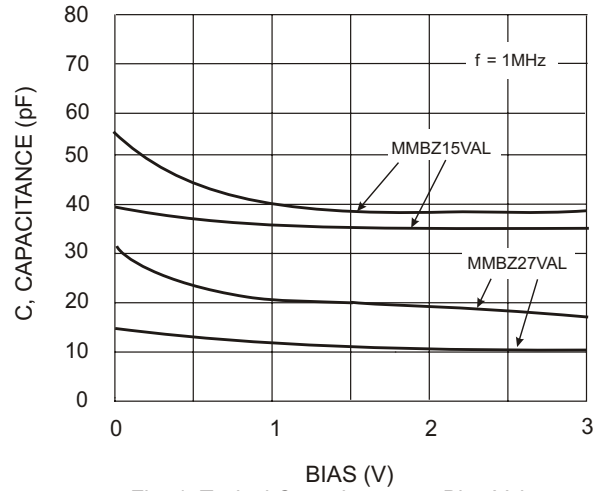


Fig. 4 Typical Capacitance vs. Bias Voltage  
(Lower curve is Bidirectional mode,  
Upper curve is Unidirectional mode)

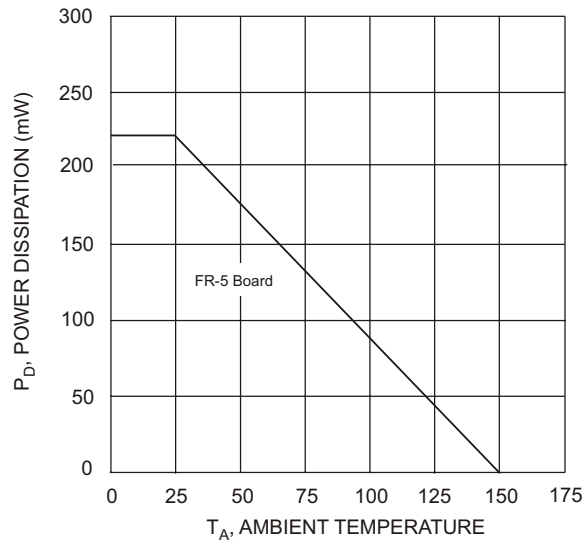


Fig. 5 Steady State Power Derating Curve

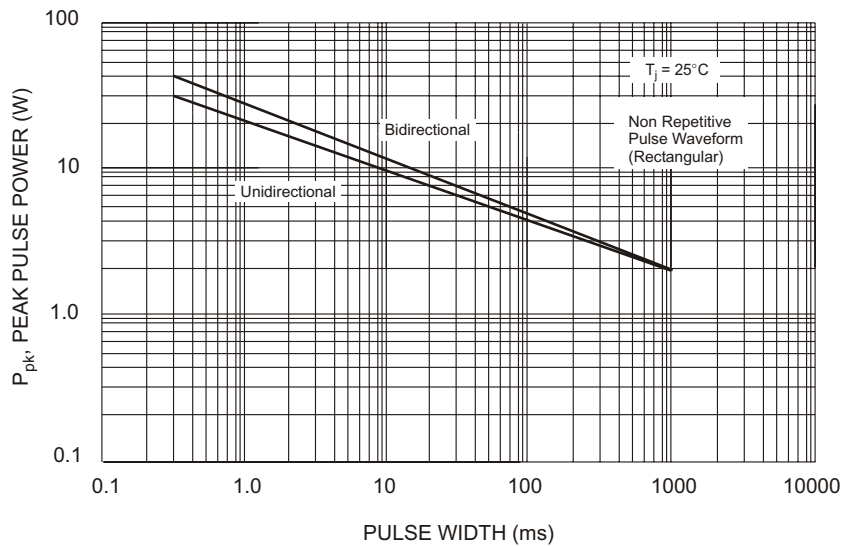
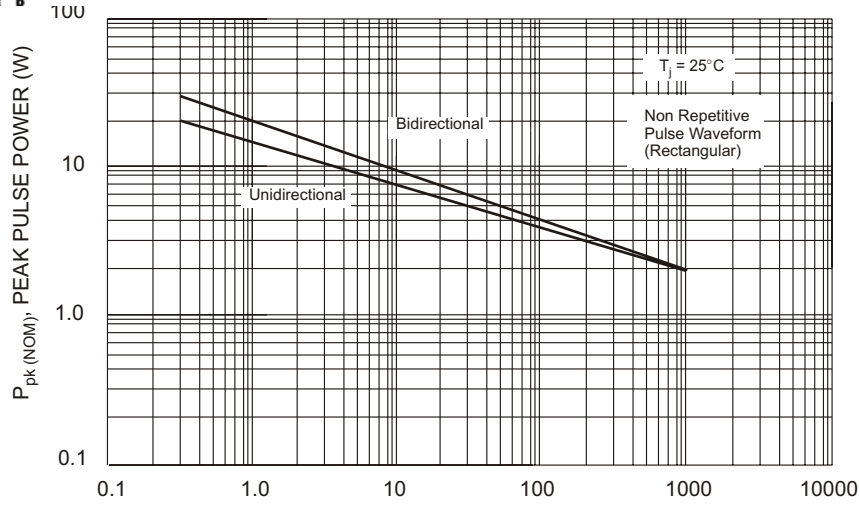


Fig. 6 Pulse Rating Curve,  
 $P_{pk}$  (W) vs. Pulse Width (ms)

Power is defined as  $P_{pk} = V_C \times I_{pp}$



PULSE WIDTH (ms)  
Fig. 7 Pulse Rating Curve,  
 $P_{pk(NOM)}$  (W) vs. Pulse Width (ms)

Power is defined as  $P_{pk(NOM)} = V_{Z(NOM)} \times I_{pp}$   
where  $V_{Z(NOM)}$  is the nominal Zener voltage  
measured at the low test current used  
for voltage classification