24W AND 40W PEAK POWER DUAL SURFACE MOUNT TVS

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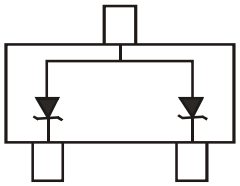
Features

- Dual TVS in Common Anode Configuration
- 24W/40W Peak Power Dissipation Rating @ 1.0ms (Unidirectional)
- 225 mW Power Dissipation
- Ideally Suited for Automated Insertion
- Low Leakage
- **Lead, Halogen and Antimony Free, RoHS Compliant "Green" Device (Notes 5 and 6)**

Mechanical Data

- Case: SOT-23
- Case Material: Molded Plastic. UL Flammability Classification 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Solderable per MIL-STD-202, Method 208
- Polarity: See Diagram
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- ESD Rating Exceeding 16kV per the Human Body Model (Note 4)
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.008 grams (approximate)

Top View



Device Schematic

Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic			Symbol	Value	Unit
Peak Power Dissipation	MMBZ5V6AL - MMBZ10VAL	(Note 2)	P_{pk}	24	W
Peak Power Dissipation	MMBZ15VAL - MMBZ33VAL	(Note 2)	P_{pk}	40	W

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 1)	P_D	225	mW
Thermal Resistance, Junction to Ambient Air	(Note 1)	$R_{\theta JA}$	556	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	–65 to +150	°C

Electrical Characteristics @T_A = 25°C unless otherwise specified

24 Watt (V_F = 0.9V max @ I_F = 10mA)

Type Number	Marking Code	V_{RWM}	I_R @ V_{RWM}	Breakdown Voltage				V_C @ I_{PP} (Note 2)		Typical Temperature Coefficient
				V_{BR} (Note 3) (V)			@ I_T	V_C	I_{PP}	
		Volts	µA	Min	Nom	Max	mA	V	A	Tc (mV/°C)
MMBZ5V6AL	K9A	3	5.0	5.32	5.6	5.88	20	8.0	3.0	1.8

24 Watt (V_F = 1.1V max @ I_F = 200mA)

Type Number	Marking Code	V_{RWM}	I_R @ V_{RWM}	Breakdown Voltage				V_C @ I_{PP} (Note 2)		Typical Temperature Coefficient
				V_{BR} (Note 3) (V)			@ I_T	V_C	I_{PP}	
		Volts	µA	Min	Nom	Max	mA	V	A	Tc (%/°C)
MMBZ6V2AL	K9B	3.0	0.5	5.89	6.2	6.51	1.0	8.7	2.76	+0.04
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

Notes:
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_A = 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.
5. No purposefully added lead. Halogen and Antimony Free.
6. Product manufactured with Data Code V9 (week 33, 2008) and newer are built with Green Molding Compound. Product manufactured prior to Date Code V9 are built with Non-Green Molding Compound and may contain Halogens or Sb_2O_3 Fire Retardants.

Electrical Characteristics (Continued) @T_A = 25°C unless otherwise specified

40 Watt (V_F = 1.1V max @ I_F = 200mA)

Type Number	Marking Code	V_{RWM}	I_R @ V_{RWM}	Breakdown Voltage				V_C @ I_{PP} (Note 2)		Typical Temperature Coefficient
				V_{BR} (Note 3) (V)			@ I_T	V_C	I_{PP}	
		Volts	nA	Min	Nom	Max	mA	V	A	Tc (%/°C)
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

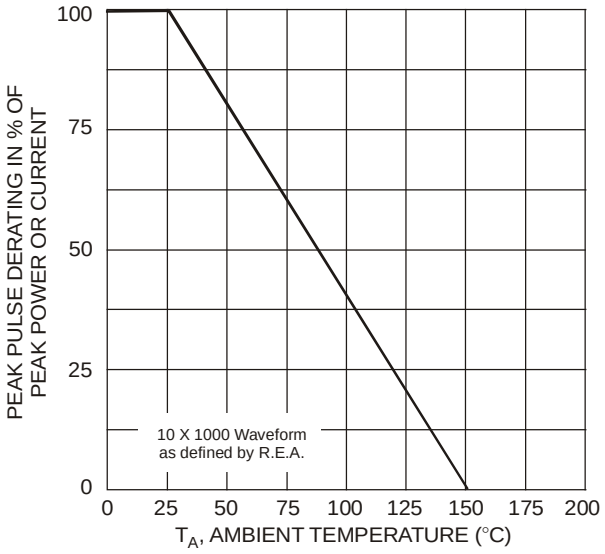


Fig. 1 Pulse Derating Curve

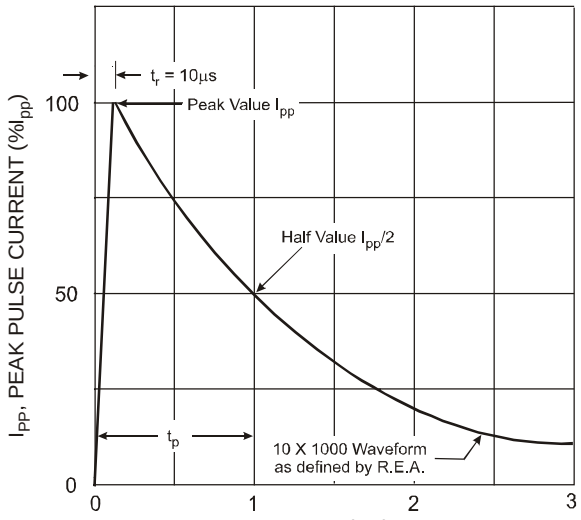


Fig. 2 Pulse Waveform

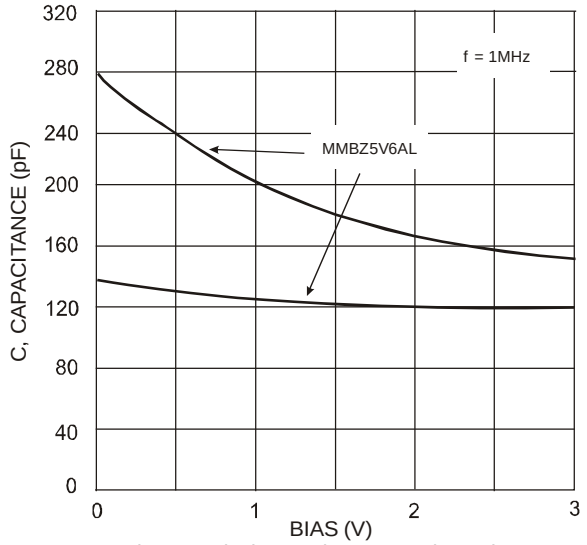


Fig. 3 Typical Capacitance vs. Bias Voltage
(Lower curve is Bidirectional mode,
Upper curve is Unidirectional mode)

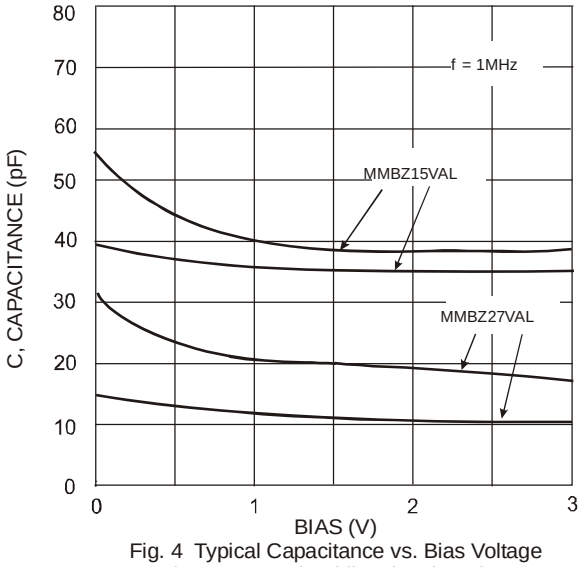


Fig. 4 Typical Capacitance vs. Bias Voltage
(Lower curve is Bidirectional mode,
Upper curve is Unidirectional mode)

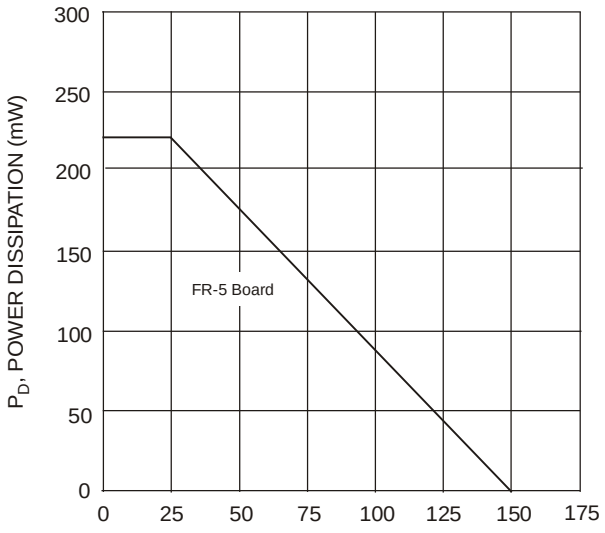


Fig. 5 Steady State Power Derating Curve

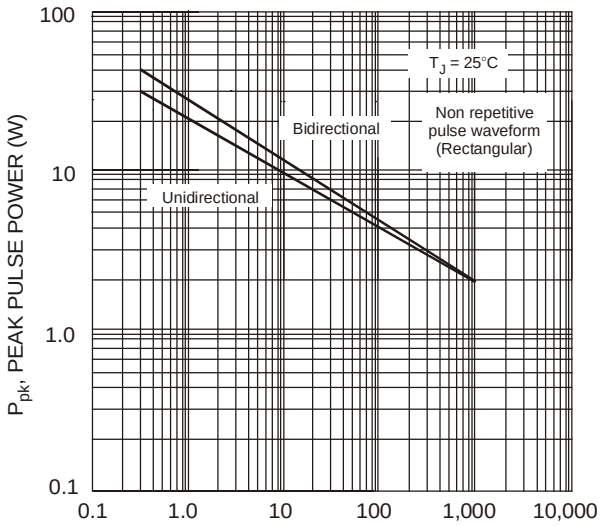


Fig. 6 Pulse Rating Curve,
P_{pk} (W) vs. Pulse Width (ms)

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

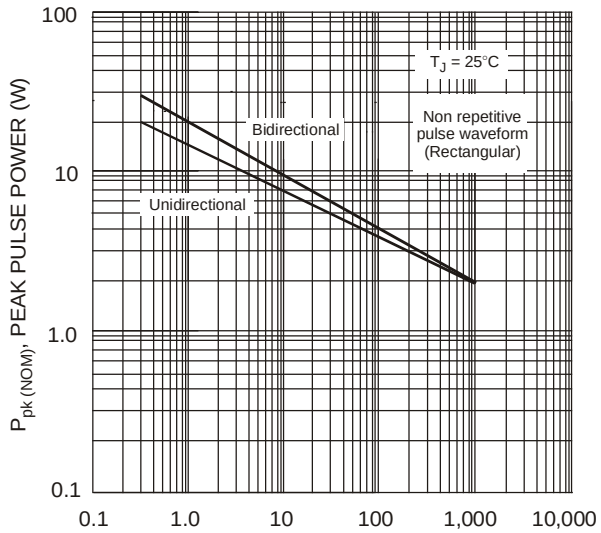


Fig. 7 Pulse Rating Curve,
$P_{pk\ (NOM)}$ (W) vs. Pulse Width (ms)

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

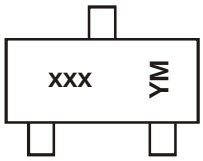
Ordering Information (Note 7)

Part Number	Case	Packaging
(Type Number)-7*-F	SOT-23	3000/Tape & Reel

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

Notes: 7. For packaging details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

Marking Information



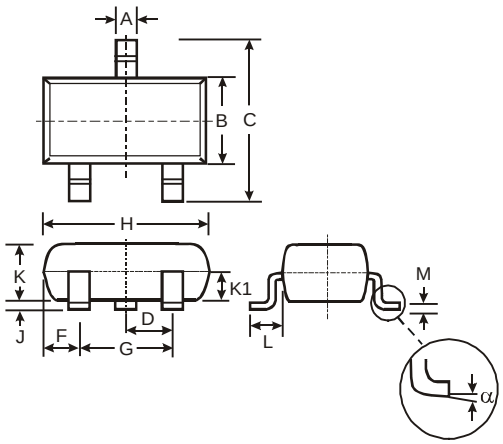
xxx = Product type marking code,
See Electrical Characteristics Table, Pages 1 & 2
YM = Date Code Marking
Y = Year (ex: T = 2006)
M = Month (ex: 9 = September)

Date Code Key

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Code	T	U	V	W	X	Y	Z	A	B	C

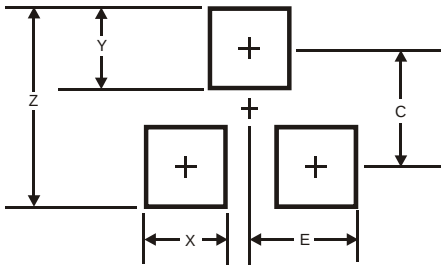
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Package Outline Dimensions



SOT-23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35