MMBZ5V6ALAQ - MMBZ33VALAQ

24W AND 40W PEAK POWER DUAL SURFACE-MOUNT TVS

Description

These dual monolithic silicon Zener diodes are designed for applications requiring transient overvoltage protection capability. Unidirectional double ESD protection diode in a common anode configuration, the device is designed for ESD and transient overvoltage protection of up to two signal lines.

Applications

- Automotive electronic control units
- Portable electronics
- Audio and video equipment

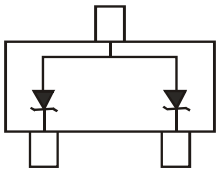
Features

- Dual TVS in Common Anode Configuration
- 24W/40W Peak Power Dissipation Rating @ 1.0ms (Unidirectional)
- 225mW Power Dissipation
- Ideally Suited for Automated Insertion
- Low Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The MMBZ5V6ALAQ - MMBZ33VALAQ are suitable for automotive applications requiring specific change control; these parts are AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.** **https://www.diodes.com/quality/product-definitions/**

Mechanical Data

- Package: SOT23
- Package Material: Molded Plastic "Green" Molding Compound. UL Flammability Classification 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Solderable per MIL-STD-202, Method 208 Lead Free Plating (Matte Tin Finish Annealed over Alloy 42 Leadframe) (e3)
- Polarity: See Diagram
- ESD Rating Exceeding 8kV per the Human Body Model
- Weight: 0.008 grams (Approximate)

Top View



Device Schematic

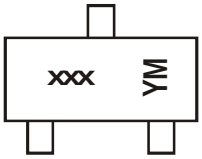
Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
(Type Number)-7	SOT23	3000	Tape & Reel
MMBZ27VALAQ-13	SOT23	10,000	Tape & Reel

* Example: 6.8V type = MMBZ6V8ALAQ-7

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



xxx = Product Type Marking Code
See *Electrical Characteristics* Table, Page 2
YM = Date Code Marking
Y = Year (ex: L = 2024)
M = Month (ex: 2 = February)

Date Code Key

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Code	K	L	M	N	P	R	S	T	U	V	W	X

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

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Peak Power Dissipation: MMBZ5V6ALAQ - MMBZ10VALAQ (Note 6)	P_{PK}	24	W
Peak Power Dissipation: MMBZ15VALAQ - MMBZ33VALAQ (Note 6)	P_{PK}	40	W

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	225	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	$R_{\theta JA}$	500	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

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

Type Number	Marking Code	V_{RWM}	Max Reverse Current, I_R @ V_{RWM} (Note 7)	Breakdown Voltage				Max Clamping Voltage, V_C @ I_{PP} (Note 6)		Typical Temperature Coefficient of Reverse Voltage
				V_{BR} (Note 7) (V)			@ I_T	V_C	I_{PP}	
		V	µA	Min	Typ	Max	mA	V	A	T_C (%/°C)
MMBZ5V6ALAQ	L9A	3.0	5.0	5.32	5.6	5.88	20	8.0	3.0	1.8
MMBZ6V2ALAQ	L9B	3.0	1.0	5.89	6.2	6.51	1.0	8.7	2.76	+0.04
MMBZ6V8ALAQ	L9C	4.5	0.5	6.46	6.8	7.14	1.0	9.6	2.5	+0.045
MMBZ9V1ALAQ	L9D	6.0	0.3	8.65	9.1	9.56	1.0	14	1.7	+0.065
MMBZ10VALAQ	L9E	6.5	0.3	9.5	10	10.5	1.0	14.2	1.7	+0.065

40Watt (V_F = 0.9V max @ I_F = 10mA)

Type Number	Marking Code	V_{RWM}	Max Reverse Current, I_R @ V_{RWM} (Note 7)	Breakdown Voltage				Max Clamping Voltage, V_C @ I_{PP} (Note 6)		Typical Temperature Coefficient of Reverse Voltage
				V_{BR} (Note 7) (V)			@ I_T	V_C	I_{PP}	
		V	nA	Min	Typ	Max	mA	V	A	T_C (%/°C)
MMBZ15VALAQ	L9K	12	50	14.25	15	15.75	1.0	21	1.9	+0.080
MMBZ18VALAQ	L9L	14.5	50	17.10	18	18.90	1.0	25	1.6	+0.090
MMBZ20VALAQ	L9N	17	50	19.00	20	21.00	1.0	28	1.4	+0.090
MMBZ27VALAQ	L9Q	22	50	25.65	27	28.35	1.0	40	1.0	+0.090
MMBZ33VALAQ	L9T	26	50	31.35	33	34.65	1.0	46	0.87	+0.090

Notes: 5. Device mounted on FR-4 PCB pad layout (2oz copper) as shown on Diodes Incorporated's website at http://www.diodes.com/package-outlines.html.
6. Non-repetitive current pulse per Figure 2 and derate above T_A = +25°C per Figure 2.
7. Short duration pulse test used to minimize self-heating effect.

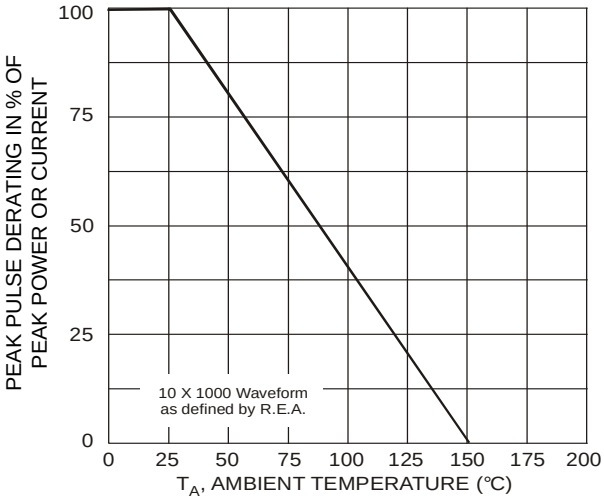


Figure 1. Pulse Derating Curve

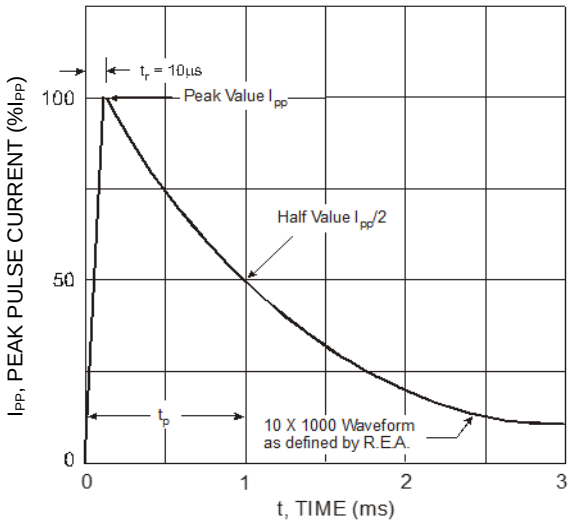


Figure 2. Pulse Waveform

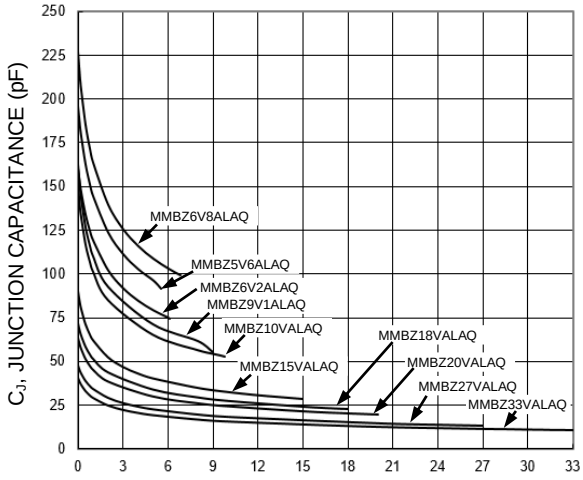


Figure 3. Typical Junction Capacitance

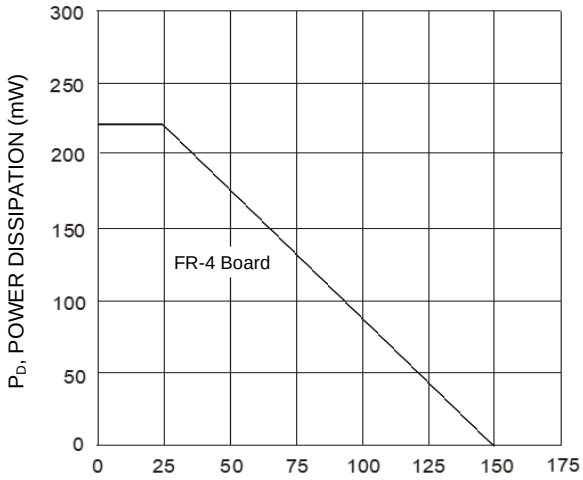


Figure 4. Steady-State Power Derating Curve

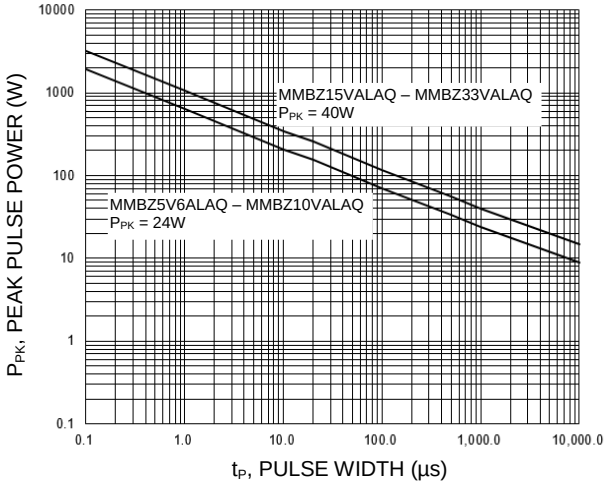


Figure 5. Pulse Rating Curve
P_{PK} vs. Pulse Width

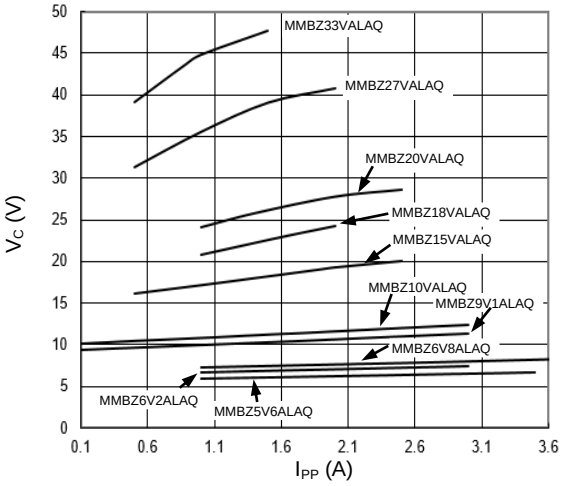
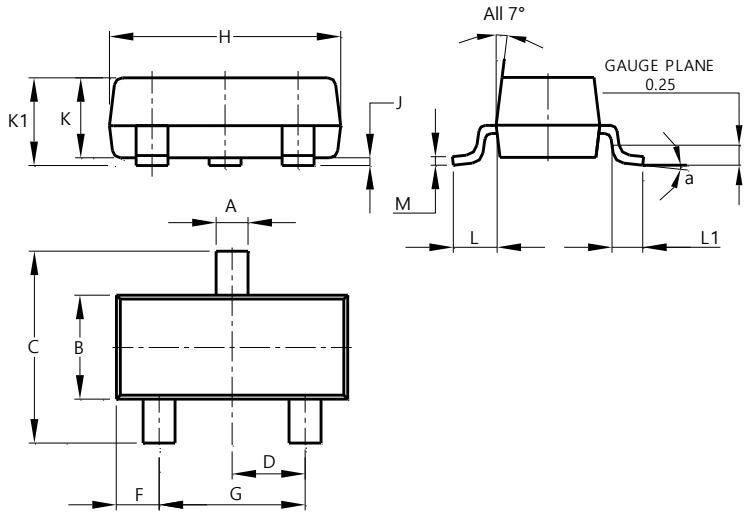


Figure 6. Typical Peak Clamping Voltage
V_C vs. Peak Pulse Current I_{PP}

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT23

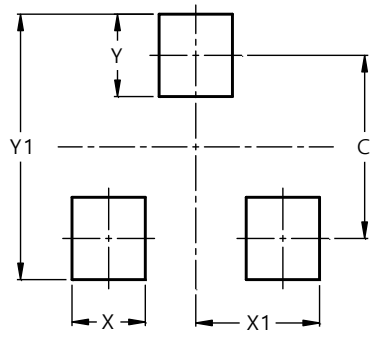


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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