

Description

These dual monolithic silicon zener diodes are designed for applications requiring transient overvoltage protection capability. Unidirectional double ESD protection diode in a common cathode 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

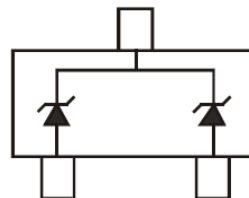
- Dual TVS in Common Anode Configuration
- 24W/40W Peak Power Dissipation Rating @ 1.0ms (Unidirectional)
- 225mW Power Dissipation
- Ideally Suited for Automated Insertion
- Low Leakage
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- The MMBZ6V8CLAQ - MMBZ33VCLAQ 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

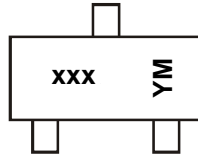
Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
(Type Number)-7	SOT23	3000	Tape & Reel
MMBZ27VCLAQ-13	SOT23	10,000	Tape & Reel

* Example: 6.8V type = MMBZ6V8CLAQ-7

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 - 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.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - 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: 4 = April)

Date Code Key

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Code	L	M	N	P	R	S	T	U	V	W	X	Y

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: MMBZ6V8CLAQ - MMBZ10VCLAQ (Note 6)	P _{PK}	24	W
Peak Power Dissipation: MMBZ15VCLAQ - MMBZ33VCLAQ (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 _{θJA}	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)
MMBZ6V8CLAQ	LVG	4.5	0.5	6.46	6.8	7.14	1.0	9.6	2.5	+0.045
MMBZ9V1CLAQ	LVH	6.0	0.3	8.65	9.1	9.56	1.0	14	1.7	+0.065
MMBZ10VCLAQ	LVI	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)
MMBZ15VCLAQ	LVJ	12	50	14.25	15	15.75	1.0	21	1.9	+0.080
MMBZ18VCLAQ	LVK	14.5	50	17.10	18	18.90	1.0	25	1.6	+0.090
MMBZ20VCLAQ	LVL	17	50	19.00	20	21.00	1.0	28	1.4	+0.090
MMBZ27VCLAQ	LVP	22	50	25.65	27	28.35	1.0	40	1.0	+0.090
MMBZ33VCLAQ	LVQ	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 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.

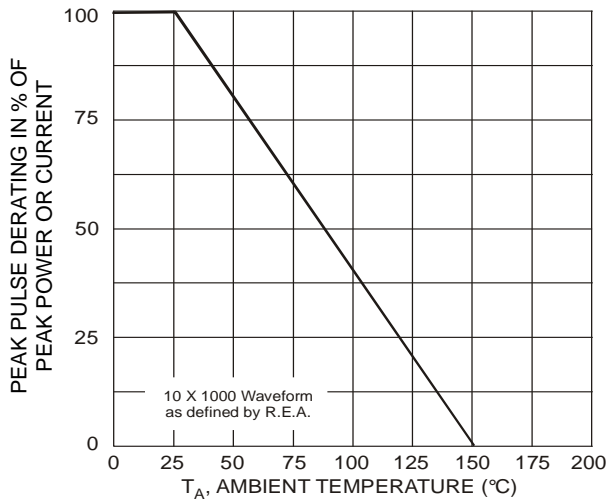


Figure 1. Pulse Derating Curve

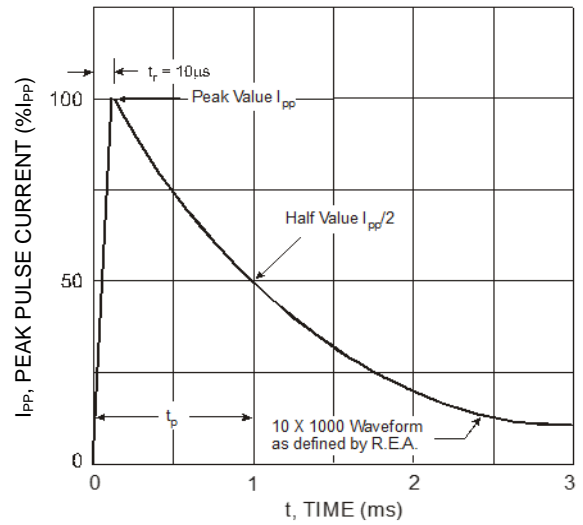


Figure 2. Pulse Waveform

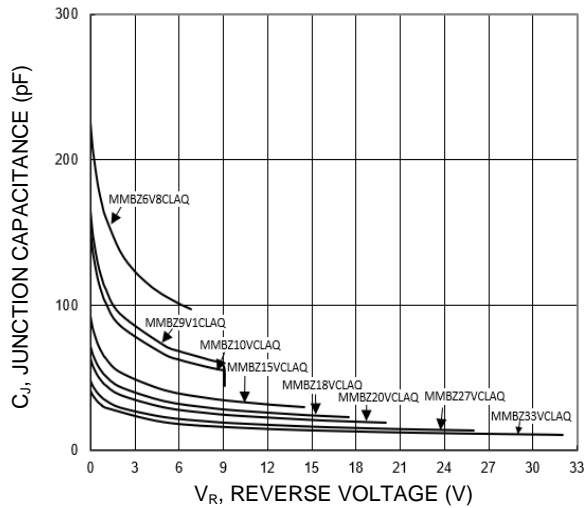


Figure 3. Typical Junction Capacitance

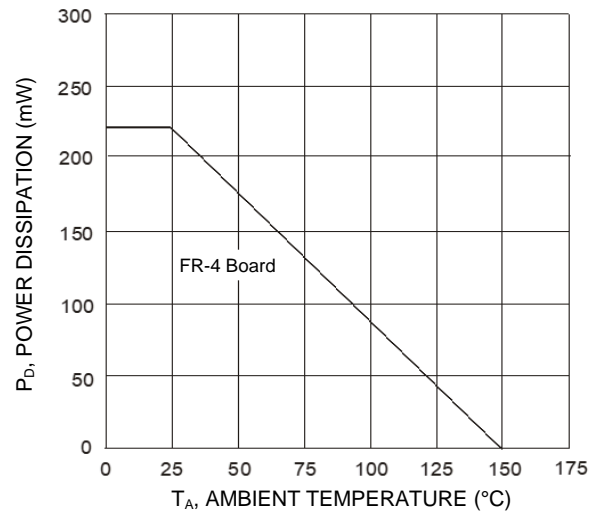


Figure 4. Steady-State Power Derating Curve

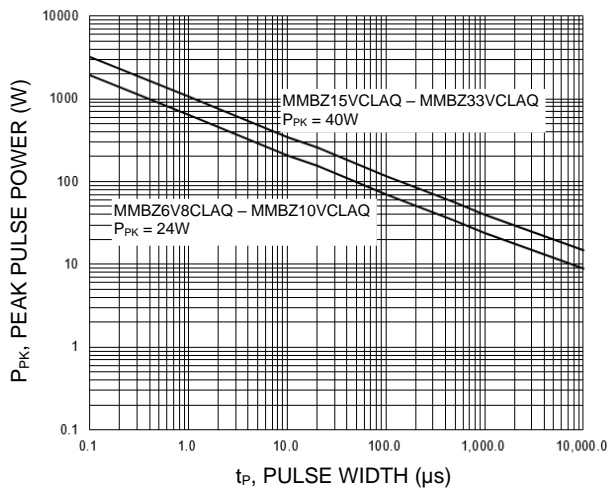


Figure 5. Pulse Rating Curve
P_{PK} vs. Pulse Width

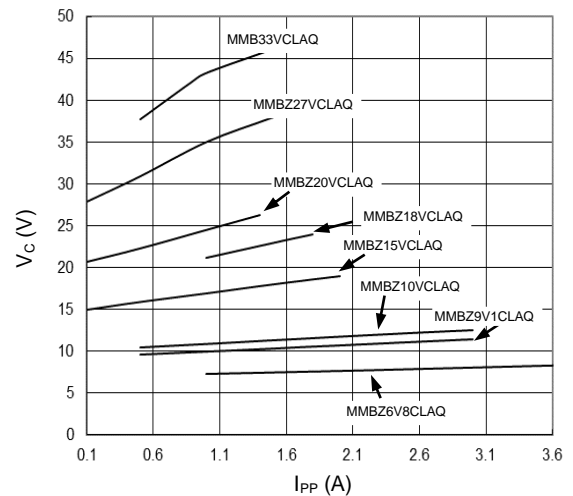
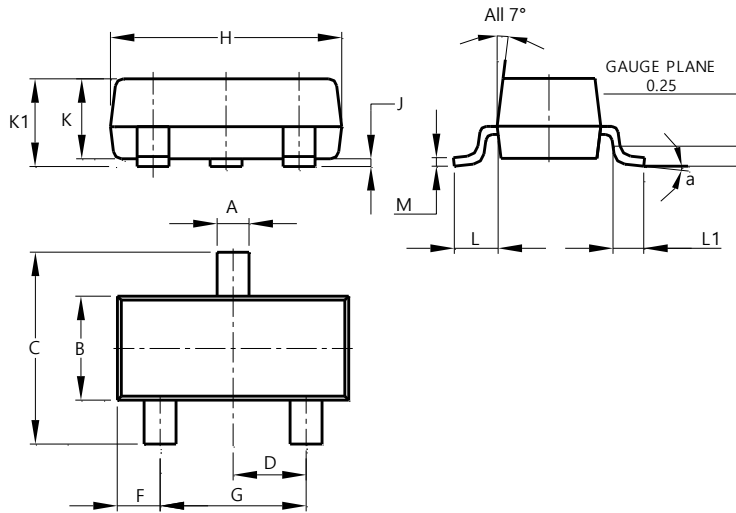


Figure 6. Typical Peak Clamping Voltage
V_C vs. Peak Pulse Current I_{PP}

Package Outline Dimensions

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

SOT23

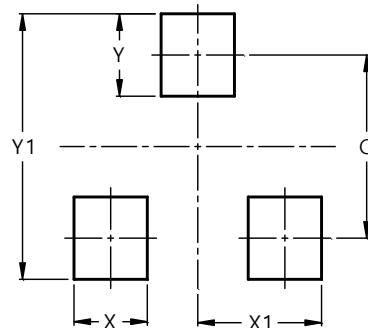


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

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

IMPORTANT NOTICE

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).
2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.
3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.
4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.
5. Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (<https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/>) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.
6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.
7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.
8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.
9. This Notice may be periodically updated with the most recent version available at <https://www.diodes.com/about/company/terms-and-conditions/important-notice>

The Diodes logo is a registered trademark of Diodes Incorporated in the United States and other countries.
All other trademarks are the property of their respective owners.
© 2024 Diodes Incorporated. All Rights Reserved.

www.diodes.com