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High-Voltage General-Purpose Diode

MMBD1401A, MMBD1403A, MMBD1404A, MMBD1405A

Description

Sourced from process 2V.

ABSOLUTE MAXIMUM RATINGS

($T_A = 25^\circ\text{C}$ unless otherwise noted) (Notes 2, 3)

Rating	Symbol	Value	Unit
Working Inverse Voltage	W_{IV}	175	V
Average Rectified Current	I_O	200	mA
DC Forward Current	I_F	600	mA
Recurrent Peak Forward Current	i_f	700	mA
Non-Repetitive Peak Forward Surge Current Pulse Width = 1.0 second Pulse Width = 1.0 microsecond	$i_{f(surge)}$	1.0 2.0	A
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ\text{C}$
Operating Junction Temperature	T_J	150	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

2. These ratings are based on a maximum junction temperature of 150°C .

3. These are steady-state limits. onsemi should be consulted on applications involving pulsed or low-duty-cycle operations.

THERMAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$ unless otherwise noted) (Note 4)

Characteristic	Symbol	Value	Unit
Power Dissipation	P_D	350	mW
Derate Above 25°C		2.8	mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	357	$^\circ\text{C/W}$

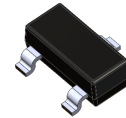
4. Device is mounted on glass epoxy PCB 1.6 inch \times 1.6 inch \times 0.06 inch, mounting pad for the collector lead minimum 0.93 in².

ELECTRICAL CHARACTERISTICS

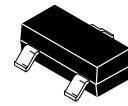
($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Max	Unit
Breakdown Voltage	B_V	$I_R = 100 \mu\text{A}$	250	–	V
Reverse Current	I_R	$V_R = 120 \text{ V}$	–	40	nA
		$V_R = 175 \text{ V}$	–	100	nA
Forward Voltage	V_F	$I_F = 10 \text{ mA}$	–	800	mV
		$I_F = 50 \text{ mA}$	760	920	mV
		$I_F = 200 \text{ mA}$	–	1.1	V
		$I_F = 300 \text{ mA}$	–	1.25	V
Diode Capacitance	C_O	$V_R = 0, f = 1.0 \text{ MHz}$	–	2.0	pF
Reverse Recovery Time	t_{rr}	$I_F = I_R = 30 \text{ mA},$ $I_{RR} = 3.0 \text{ mA},$ $R_L = 100 \Omega$	–	50	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

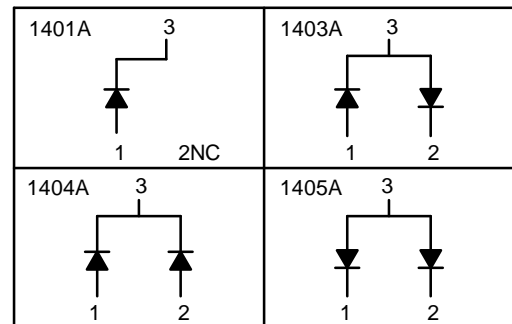


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CASE 318BM

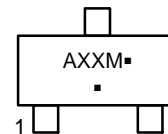


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CONNECTION DIAGRAMS



MARKING DIAGRAM



AXX = Specific Device Code

XX = 29/32/33/34

M = Date Code

▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping [†]
MMBD1404A	SOT-23 (Pb-Free)	3000 / Tape & Reel

DISCONTINUED (Note 1)

MMBD1401A	SOT-23 (Pb-Free)	3000 / Tape & Reel
MMBD1403A	SOT-23 (Pb-Free)	3000 / Tape & Reel
MMBD1405A	SOT-23 (Pb-Free)	3000 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

1. **DISCONTINUED:** These devices are not recommended for new design. Please contact your onsemi representative for information. The most current information on these devices may be available on www.onsemi.com.

TYPICAL CHARACTERISTICS

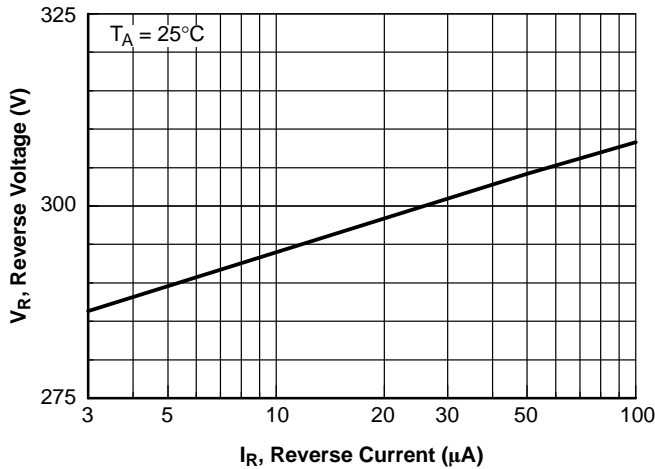


Figure 1. Reverse Voltage vs. Reverse Current
 $B_V - 1.0$ to $100 \mu\text{A}$

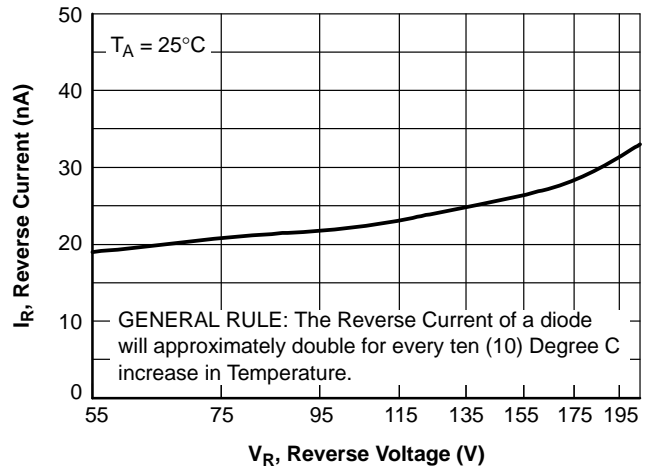


Figure 2. Reverse Current vs. Reverse Voltage
 $I_R - 55$ to 205 V

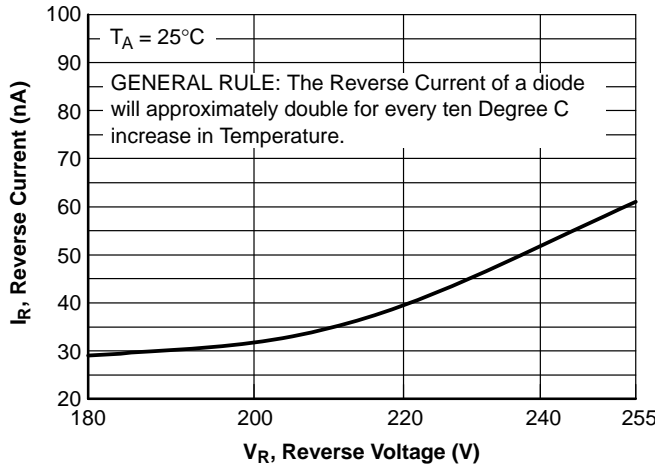


Figure 3. Reverse Current vs. Reverse Voltage
 $I_R - 180$ to 255 V

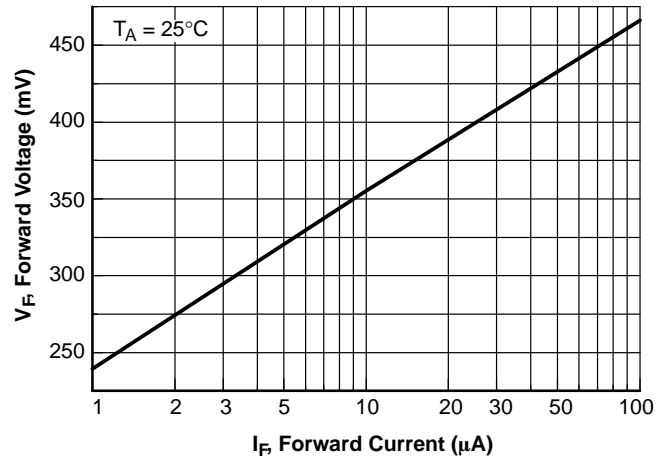


Figure 4. Forward Voltage vs. Forward Current
 $V_F - 1.0$ to $100 \mu\text{A}$

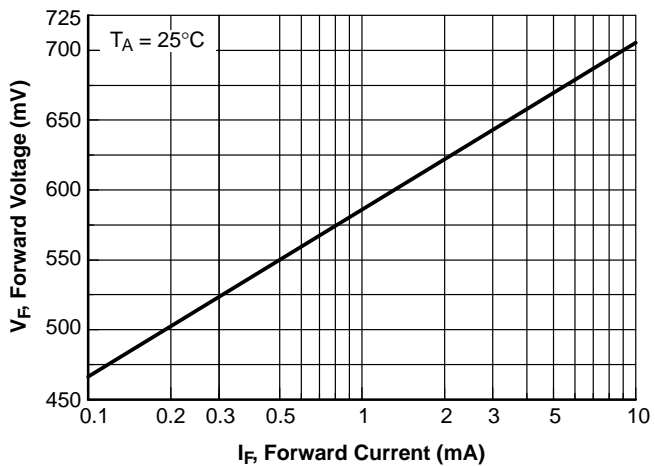


Figure 5. Forward Voltage vs. Forward Current
 $V_F - 0.1$ to 10 mA

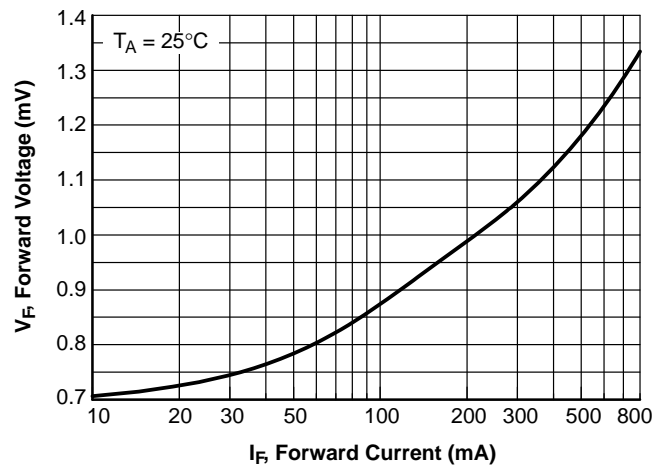


Figure 6. Forward Voltage vs. Forward Current
 $V_F - 10$ to 800 mA

TYPICAL CHARACTERISTICS (Continued)

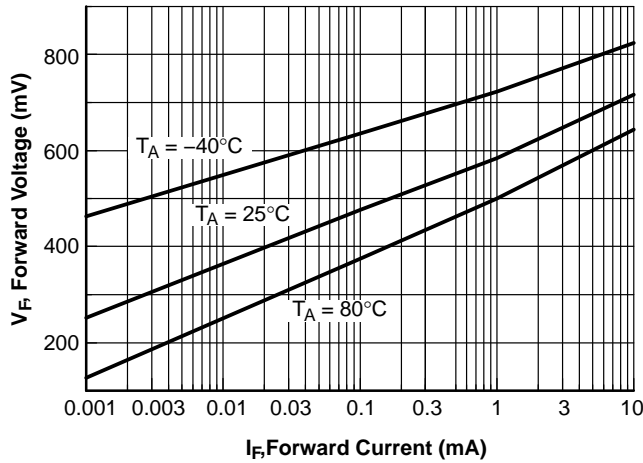


Figure 7. Forward Voltage vs. Ambient Temperature, $V_F - 1.0 \mu\text{A} - 10 \text{ mA} (-40 \text{ to } +80^\circ\text{C})$

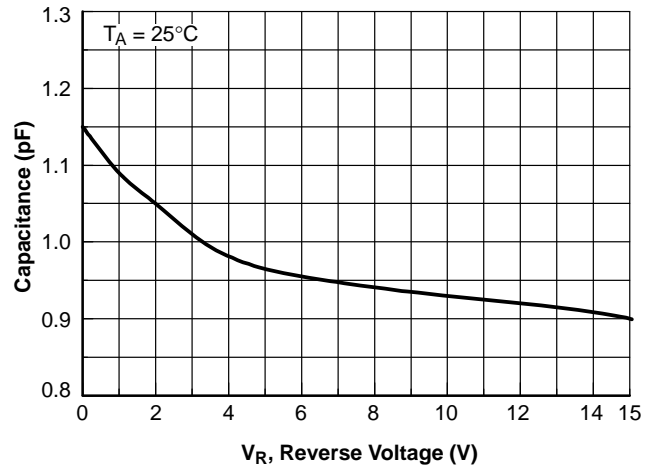


Figure 8. Capacitance vs. Reverse Voltage

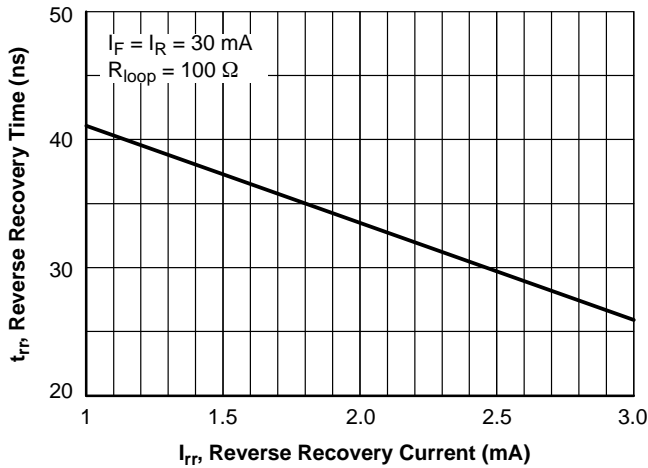


Figure 9. Reverse Recovery Time vs. Reverse Recovery Current (I_{rr})

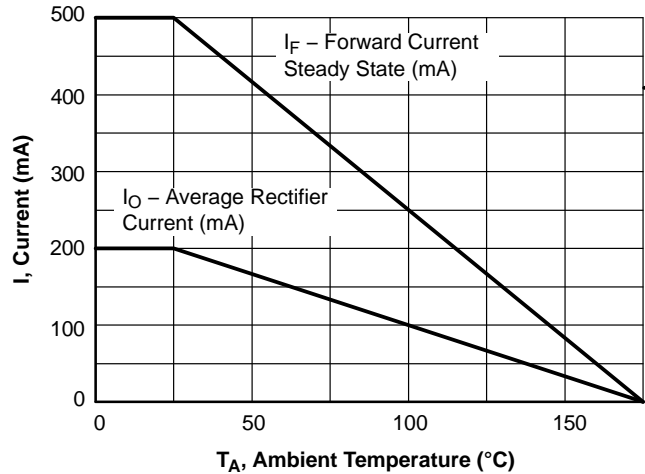


Figure 10. Average Rectified Current (I_O) and Forward Current (I_F) vs. Ambient Temperature (T_A)

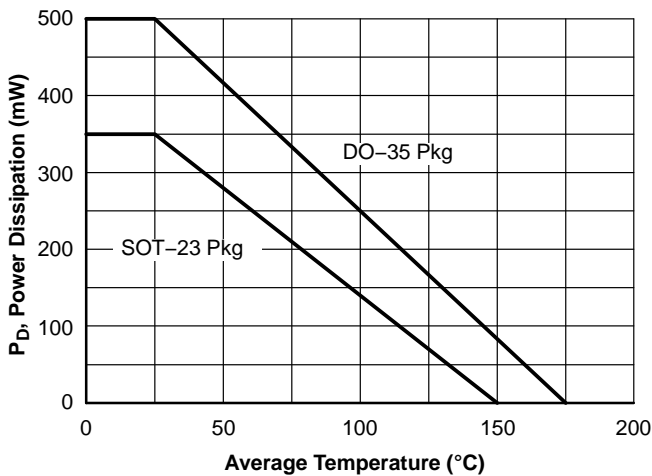


Figure 11. Power Derating Curve



SCALE 4:1

SOT-23 (TO-236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

DATE 14 AUG 2024

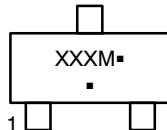


MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.89	1.00	1.11
A1	0.01	0.06	0.10
b	0.37	0.44	0.50
c	0.08	0.14	0.20
D	2.80	2.90	3.04
E	1.20	1.30	1.40
e	1.78	1.90	2.04
L	0.30	0.43	0.55
L1	0.35	0.54	0.69
HE	2.10	2.40	2.64
T	0°	---	10°

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

GENERIC
MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.



RECOMMENDED
MOUNTING FOOTPRINT

* For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

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ISSUE AU

DATE 14 AUG 2024

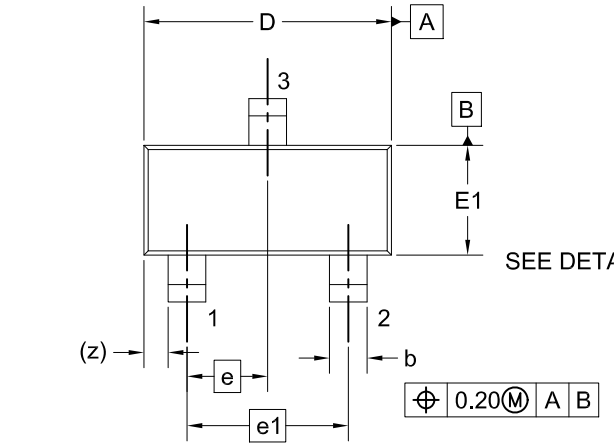
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STYLE 9: PIN 1. ANODE 2. ANODE 3. CATHODE	STYLE 10: PIN 1. DRAIN 2. SOURCE 3. GATE	STYLE 11: PIN 1. ANODE 2. CATHODE 3. CATHODE-ANODE	STYLE 12: PIN 1. CATHODE 2. CATHODE 3. ANODE	STYLE 13: PIN 1. SOURCE 2. DRAIN 3. GATE	STYLE 14: PIN 1. CATHODE 2. GATE 3. ANODE
STYLE 15: PIN 1. GATE 2. CATHODE 3. ANODE	STYLE 16: PIN 1. ANODE 2. CATHODE 3. CATHODE	STYLE 17: PIN 1. NO CONNECTION 2. ANODE 3. CATHODE	STYLE 18: PIN 1. NO CONNECTION 2. CATHODE 3. ANODE	STYLE 19: PIN 1. CATHODE 2. ANODE 3. CATHODE-ANODE	STYLE 20: PIN 1. CATHODE 2. ANODE 3. GATE
STYLE 21: PIN 1. GATE 2. SOURCE 3. DRAIN	STYLE 22: PIN 1. RETURN 2. OUTPUT 3. INPUT	STYLE 23: PIN 1. ANODE 2. ANODE 3. CATHODE	STYLE 24: PIN 1. GATE 2. DRAIN 3. SOURCE	STYLE 25: PIN 1. ANODE 2. CATHODE 3. GATE	STYLE 26: PIN 1. CATHODE 2. ANODE 3. NO CONNECTION
STYLE 27: PIN 1. CATHODE 2. CATHODE 3. CATHODE	STYLE 28: PIN 1. ANODE 2. ANODE 3. ANODE				

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CASE 318BM
ISSUE A

DATE 01 SEP 2021

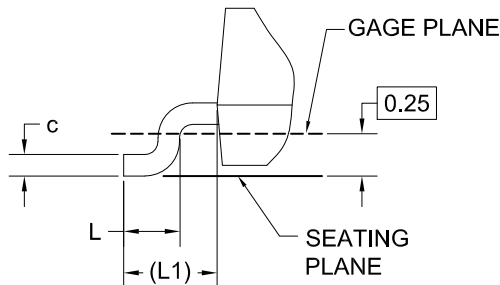
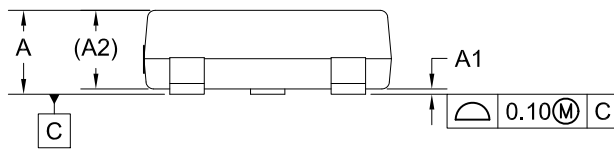
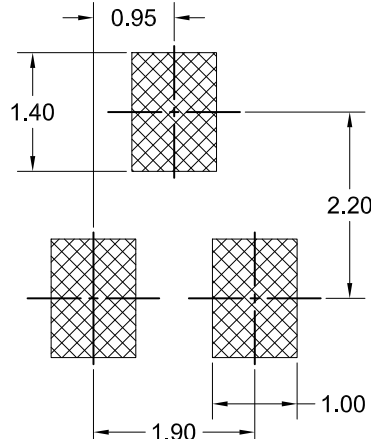
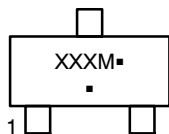


SEE DETAIL A

NOTES: UNLESS OTHERWISE SPECIFIED

- A) REFERENCE JEDEC REGISTRATION TO-236, VARIATION AB, ISSUE H.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M - 2009.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	---	---	1.20
A1	0.00	0.05	0.10
A2	0.93 REF		
b	0.37	0.44	0.60
c	0.08	0.15	0.23
D	2.72	2.92	3.12
E	2.10	2.40	2.70
E1	1.15	1.30	1.50
e	0.95 BSC		
e1	1.90 BSC		
L	0.20	---	---
L1	0.55 REF		
z	0.29 REF		


DETAIL A
SCALE: 2X

LAND PATTERN
RECOMMENDATION
GENERIC
MARKING DIAGRAM*


XXX = Specific Device Code
M = Date Code
▪ = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

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