

High-Voltage General-Purpose Diode

MMBD1401A, MMBD1403A, MMBD1404A, MMBD1405A

Description

Sourced from process 2V.

ABSOLUTE MAXIMUM RATINGS

(T_A = 25°C unless otherwise noted) (Notes 1, 2)

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	°C
Operating Junction Temperature	T _J	150	°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.

- These ratings are based on a maximum junction temperature of 150°C.
- These are steady-state limits. onsemi should be consulted on applications involving pulsed or low-duty-cycle operations.

THERMAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted) (Note 3)

Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	350	mW
Derate Above 25°C		2.8	mW/°C
Thermal Resistance, Junction-to-Ambient	R _{θJA}	357	°C/W

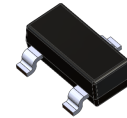
- Device is mounted on glass epoxy PCB 1.6 inch × 1.6 inch × 0.06 inch, mounting pad for the collector lead minimum 0.93 in².

ELECTRICAL CHARACTERISTICS

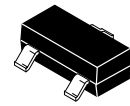
(T_A = 25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Max	Unit
Breakdown Voltage	B _V	I _R = 100 μA	250	–	V
Reverse Current	I _R	V _R = 120 V	–	40	nA
		V _R = 175 V	–	100	nA
Forward Voltage	V _F	I _F = 10 mA	–	800	mV
		I _F = 50 mA	760	920	mV
		I _F = 200 mA	–	1.1	V
		I _F = 300 mA	–	1.25	V
Diode Capacitance	C _O	V _R = 0, f = 1.0 MHz	–	2.0	pF
Reverse Recovery Time	t _{rr}	I _F = I _R = 30 mA, I _{RR} = 3.0 mA, R _L = 100 Ω	–	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.

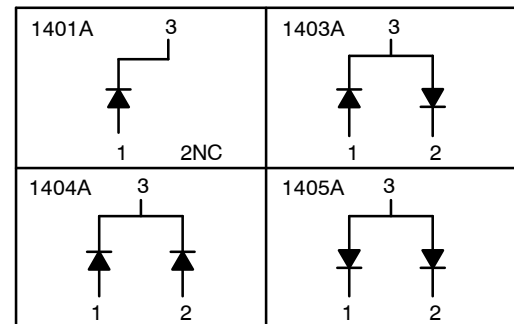


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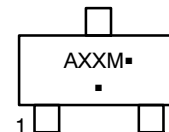


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CONNECTION DIAGRAMS



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†
MMBD1401A	SOT-23 (Pb-Free)	3000 / Tape & Reel
MMBD1403A	SOT-23 (Pb-Free)	3000 / Tape & Reel
MMBD1404A	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.

TYPICAL CHARACTERISTICS

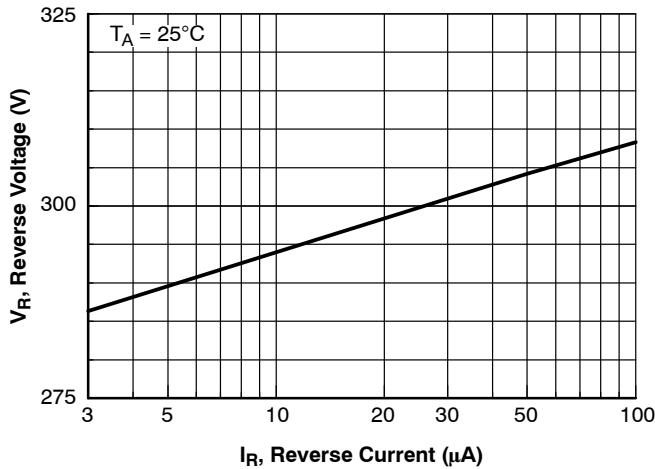


Figure 1. Reverse Voltage vs. Reverse Current
 $B_V - 1.0$ to $100 \mu A$

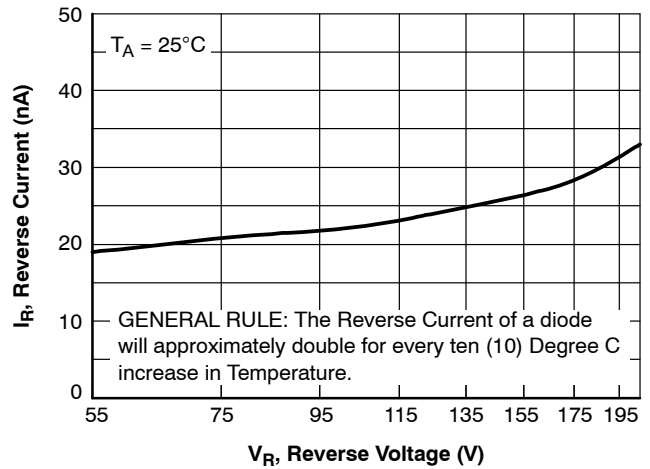


Figure 2. Reverse Current vs. Reverse Voltage
 $I_R - 55$ to $205 V$

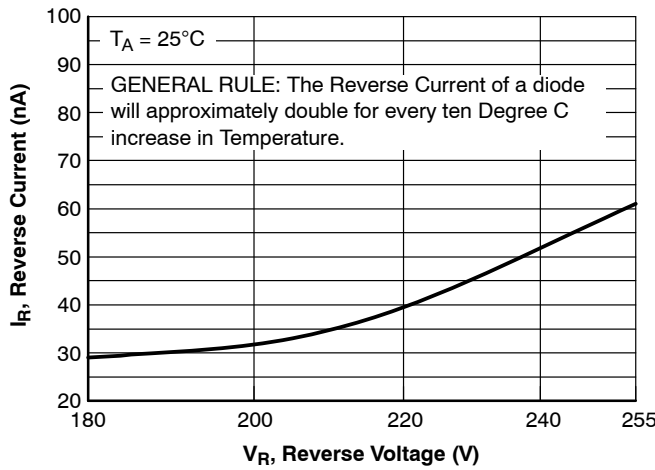


Figure 3. Reverse Current vs. Reverse Voltage
 $I_R - 180$ to $255 V$

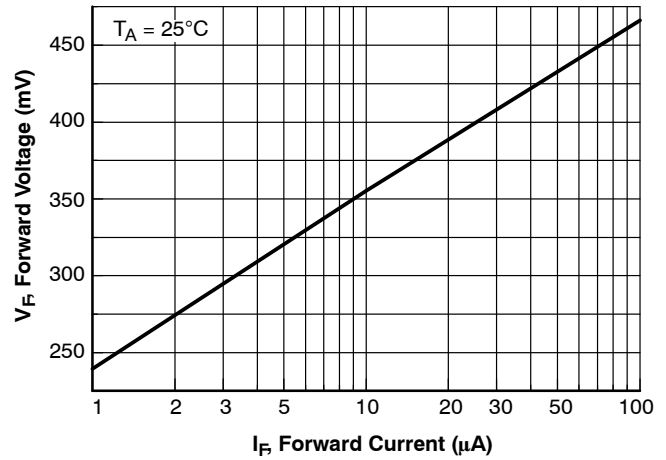


Figure 4. Forward Voltage vs. Forward Current
 $V_F - 1.0$ to $100 \mu A$

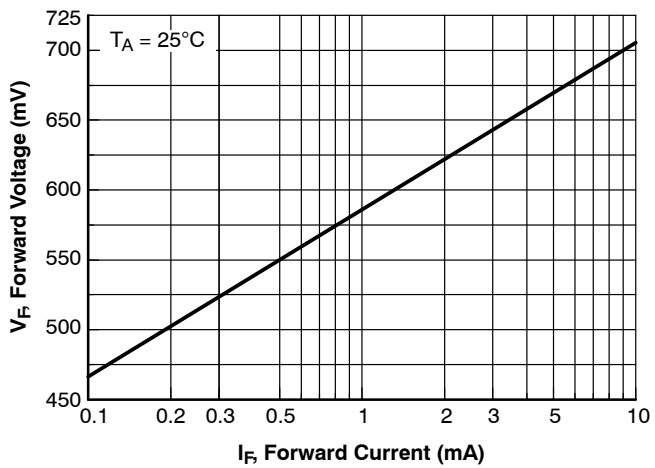


Figure 5. Forward Voltage vs. Forward Current
 $V_F - 0.1$ to $10 mA$

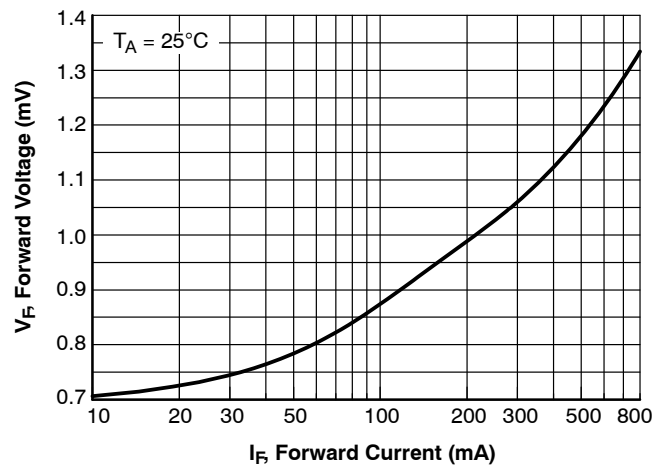


Figure 6. Forward Voltage vs. Forward Current
 $V_F - 10$ to $800 mA$

TYPICAL CHARACTERISTICS (Continued)

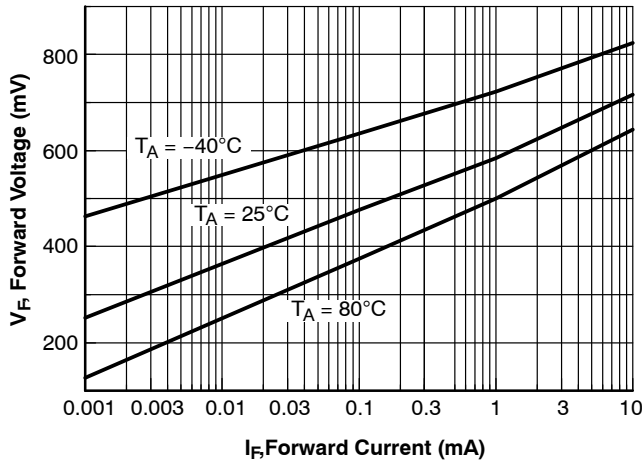


Figure 7. Forward Voltage vs. Ambient Temperature, $V_F - 1.0 \mu\text{A} - 10 \text{ mA} (-40 \text{ to } +80^\circ\text{C})$

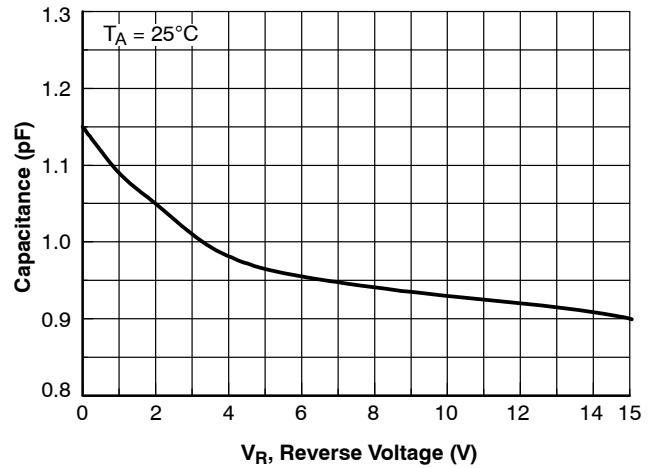


Figure 8. Capacitance vs. Reverse Voltage

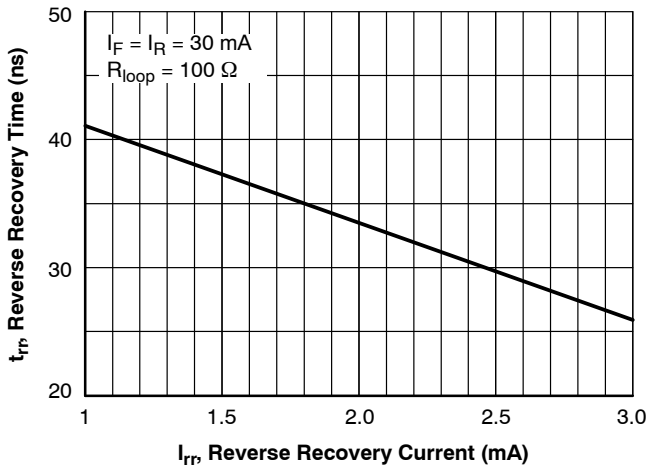


Figure 9. Reverse Recovery Time vs. Reverse Recovery Current (I_{rr})

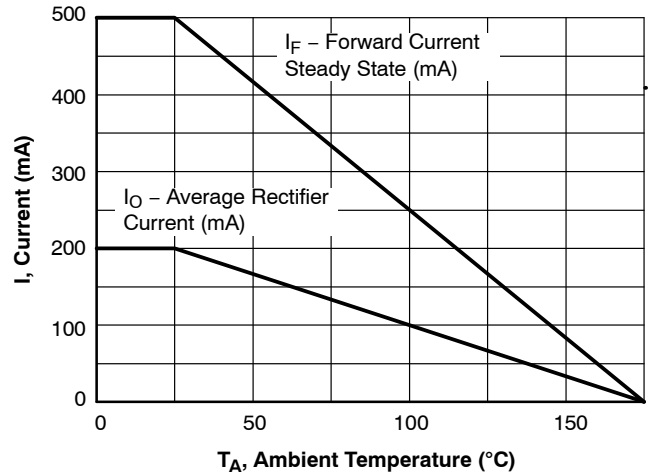


Figure 10. Average Rectified Current (I_O) and Forward Current (I_F) vs. Ambient Temperature (T_A)

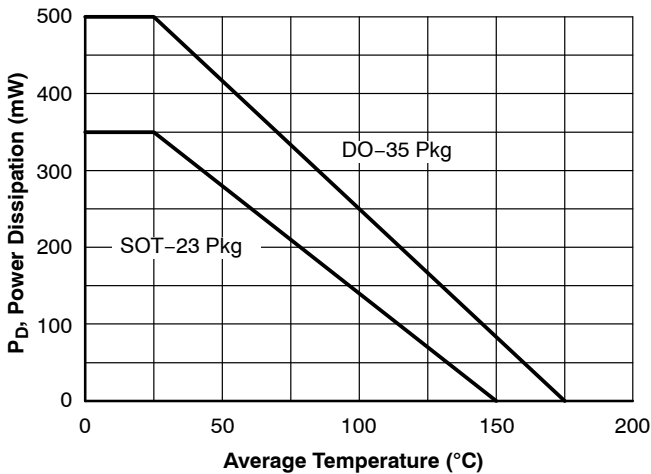
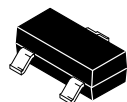


Figure 11. Power Derating Curve

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



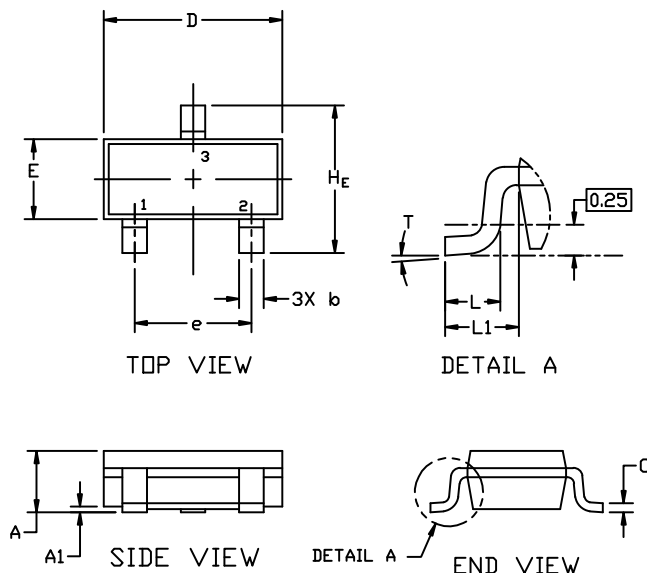
SCALE 4:1

SOT-23 (TO-236)

CASE 318

ISSUE AT

DATE 01 MAR 2023

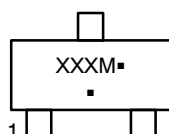


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. CONTROLLING DIMENSION: 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.

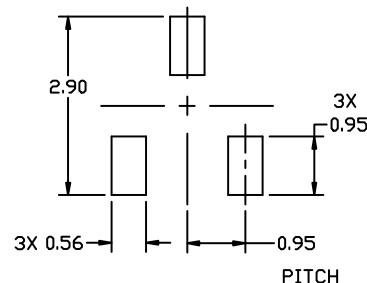
DIM	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
H _E	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	---	10°	0°	---	10°

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 ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

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MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS



SOT-23 (TO-236) CASE 318 ISSUE AT

DATE 01 MAR 2023

STYLE 1 THRU 5: CANCELLED	STYLE 6: PIN 1. BASE 2. EMITTER 3. COLLECTOR	STYLE 7: PIN 1. EMITTER 2. BASE 3. COLLECTOR	STYLE 8: PIN 1. ANODE 2. NO CONNECTION 3. CATHODE		
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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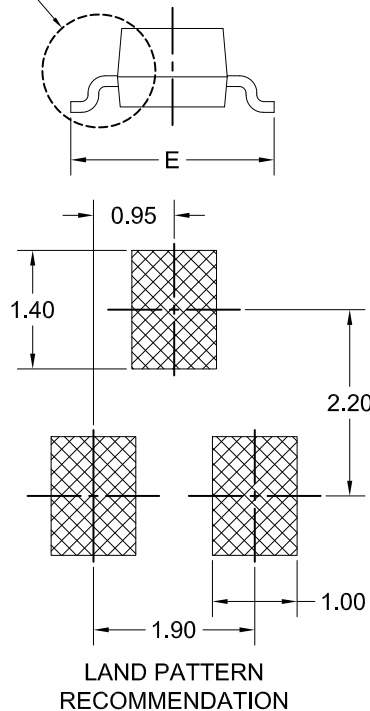
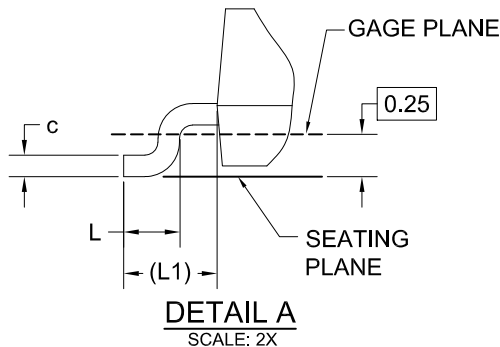
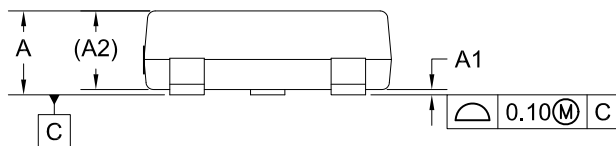
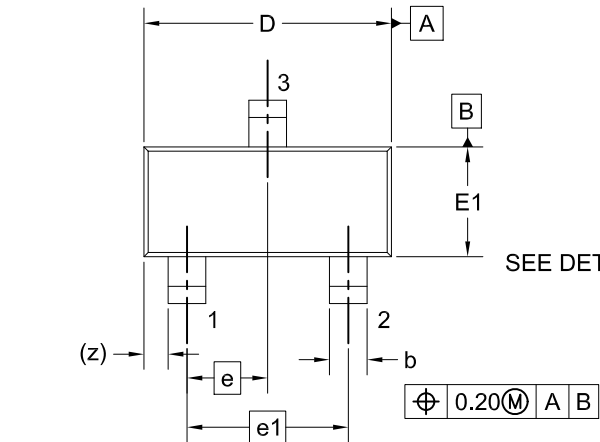


SOT-23 CASE 318BM ISSUE A

DATE 01 SEP 2021

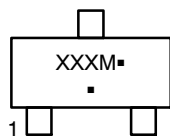
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- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M - 2009.



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		

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, SOLDERM/D.

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