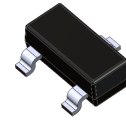
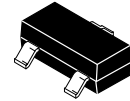


High-Voltage General-Purpose Diode

MMBD1401A, MMBD1403A, MMBD1404A, MMBD1405A



SOT-23
CASE 318BM



SOT-23
CASE 318-08

Description

Sourced from process 2V.

ABSOLUTE MAXIMUM RATINGS

($T_A = 25^\circ\text{C}$ 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 | $i_{f(\text{surge})}$ | | A |
| Pulse Width = 1.0 second | | 1.0 | |
| Pulse Width = 1.0 microsecond | | 2.0 | |
| 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.

1. These ratings are based on a maximum junction temperature of 150°C .
2. 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 3)

| 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 | $^\circ\text{C}/\text{W}$ |

3. 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.

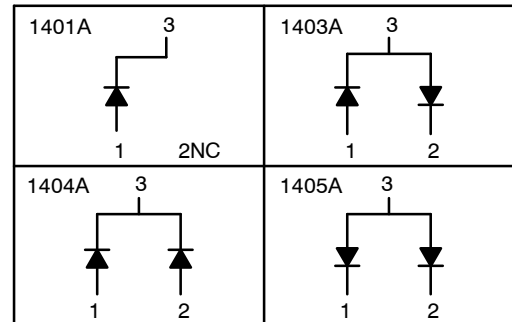
ELECTRICAL CHARACTERISTICS

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

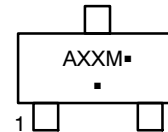
| Parameter | Symbol | Condition | Min | Max | Unit |
|-----------------------|----------|--|-----|------|------|
| Breakdown Voltage | B_V | $I_R = 100 \mu\text{A}$ | 250 | - | V |
| Reverse Current | I_R | $V_R = 120 \text{ V}$ | - | 40 | nA |
| | | $V_R = 175 \text{ V}$ | - | 100 | nA |
| Forward 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.

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

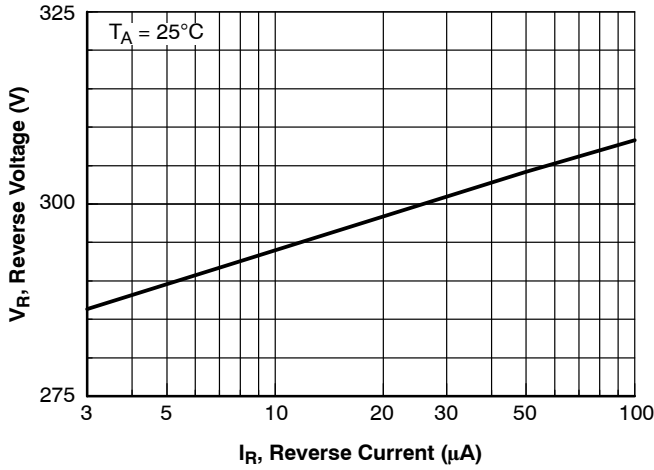


Figure 1. Reverse Voltage vs. Reverse Current
 $B_V - 1.0$ to $100 \mu A$

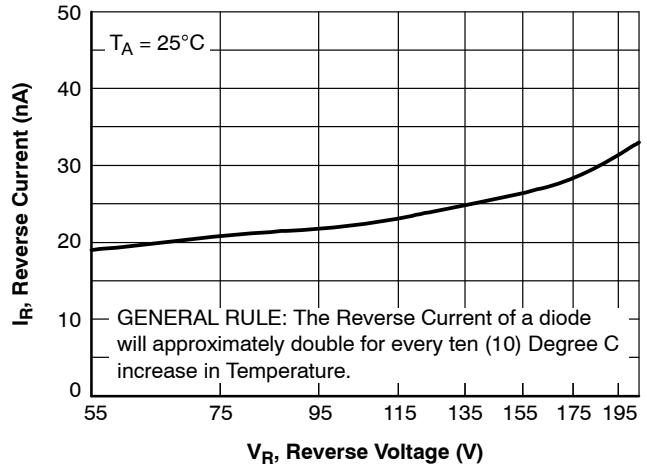


Figure 2. Reverse Current vs. Reverse Voltage
 $I_R - 55$ to $205 V$

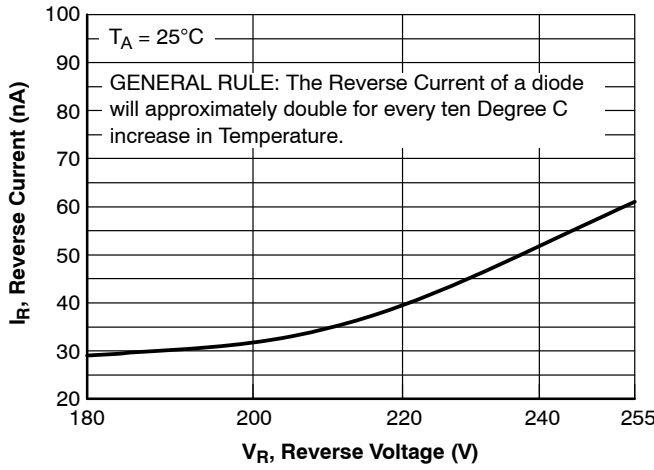


Figure 3. Reverse Current vs. Reverse Voltage
 $I_R - 180$ to $255 V$

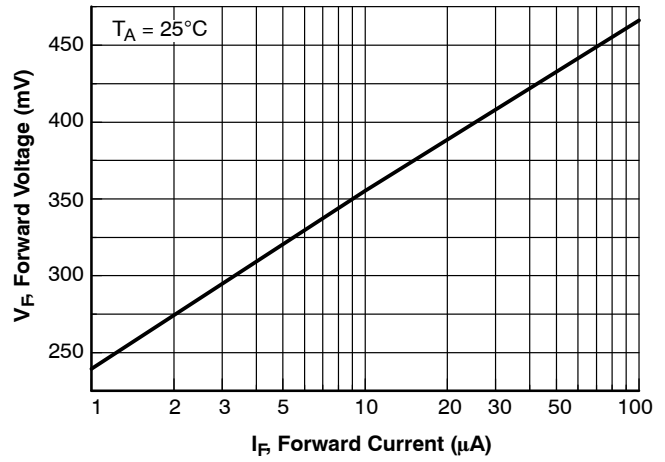


Figure 4. Forward Voltage vs. Forward Current
 $V_F - 1.0$ to $100 \mu A$

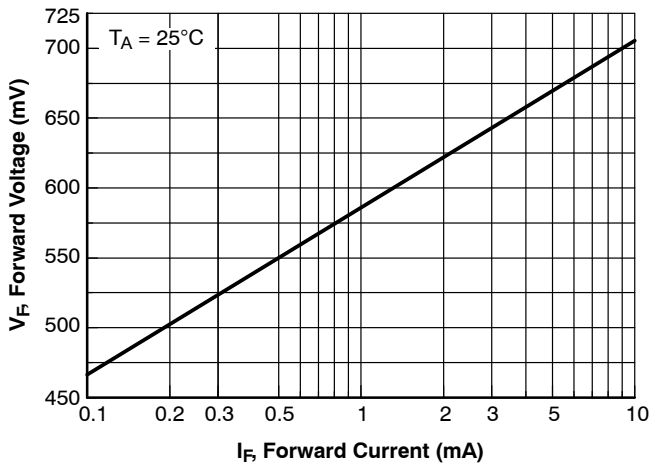


Figure 5. Forward Voltage vs. Forward Current
 $V_F - 0.1$ to $10 mA$

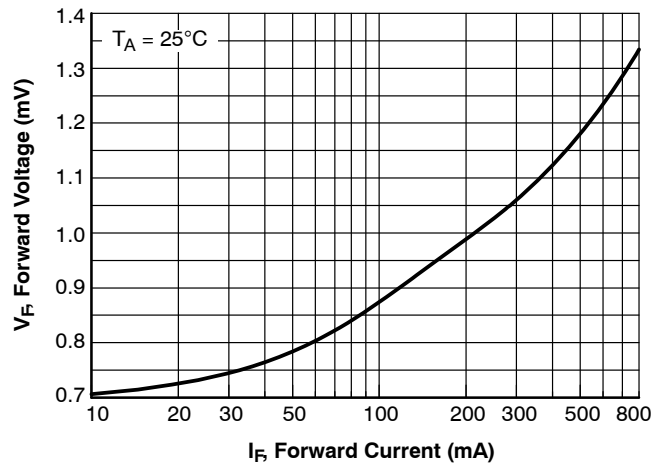


Figure 6. Forward Voltage vs. Forward Current
 $V_F - 10$ to $800 mA$

TYPICAL CHARACTERISTICS (Continued)

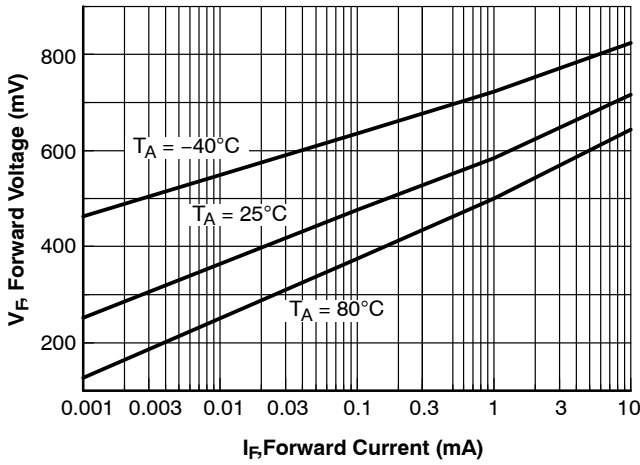


Figure 7. Forward Voltage vs. Ambient Temperature, $V_F - 1.0 \mu A - 10 mA (-40 \text{ to } +80^\circ C)$

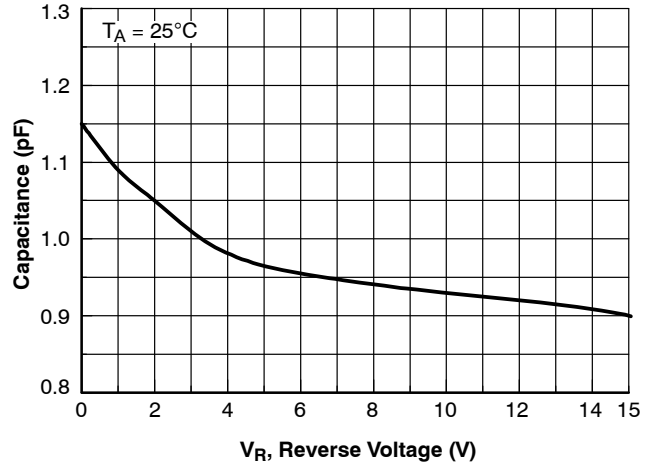


Figure 8. Capacitance vs. Reverse Voltage

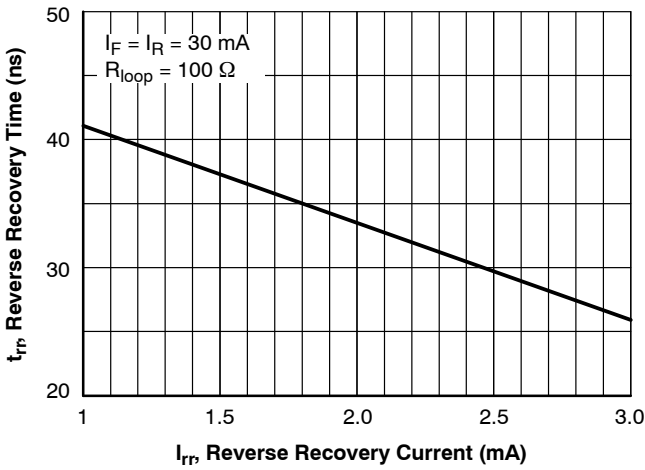


Figure 9. Reverse Recovery Time vs. Reverse Recovery Current (I_{rr})

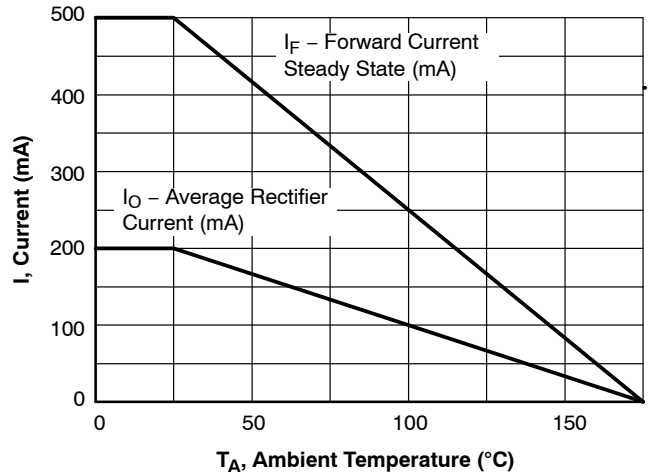


Figure 10. Average Rectified Current (I_O) and Forward Current (I_F) vs. Ambient Temperature (T_A)

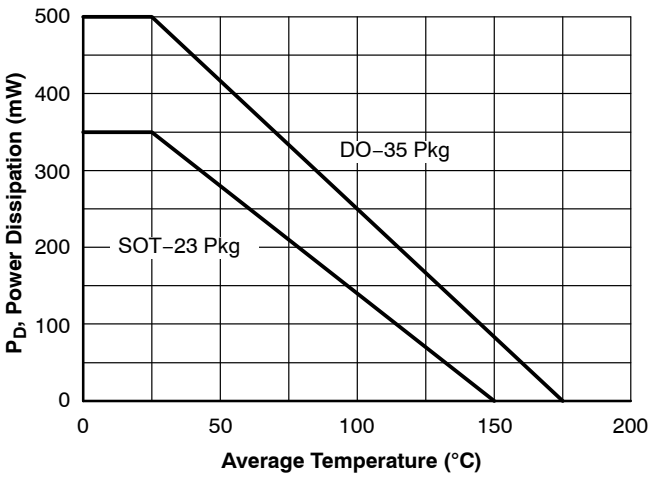
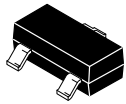


Figure 11. Power Derating Curve

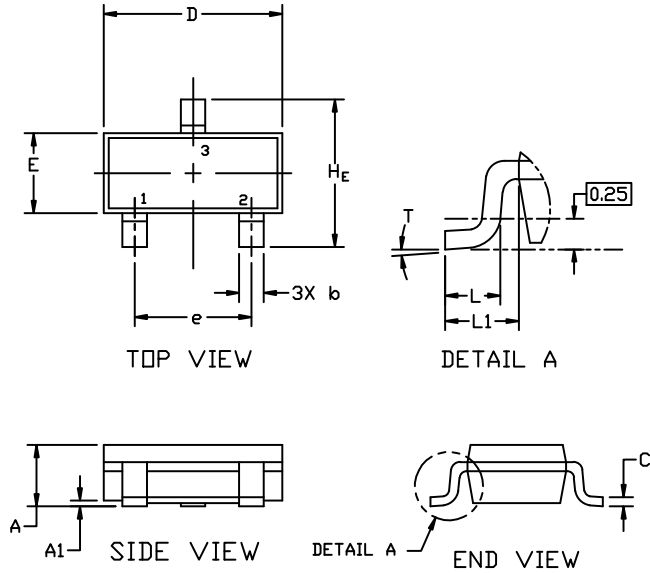
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



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

DATE 01 MAR 2023

SCALE 4:1



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.

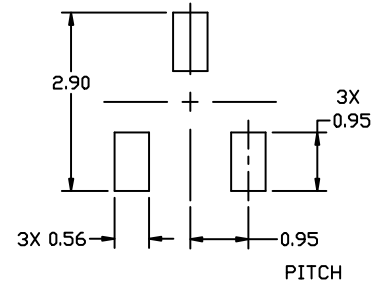
| DIM | MILLIMETERS | | | INCHES | | |
|----------------|-------------|------|------|--------|-------|-------|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.89 | 1.00 | 1.11 | 0.035 | 0.039 | 0.044 |
| A1 | 0.01 | 0.06 | 0.10 | 0.000 | 0.002 | 0.004 |
| b | 0.37 | 0.44 | 0.50 | 0.015 | 0.017 | 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

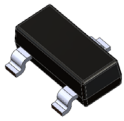
STYLE 27:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

STYLE 28:
PIN 1. ANODE
2. ANODE
3. ANODE

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MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

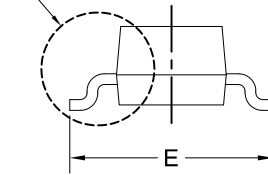
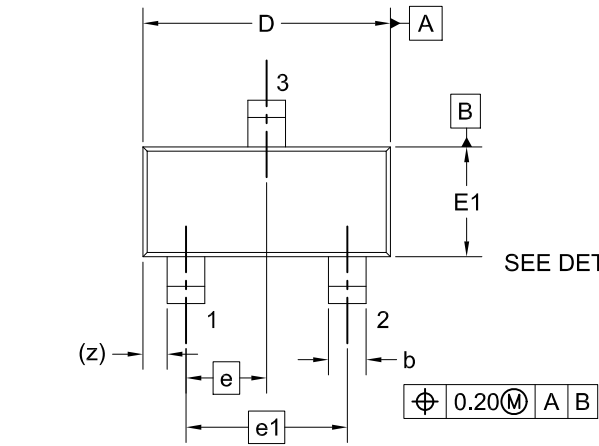


SOT-23
CASE 318BM
ISSUE A

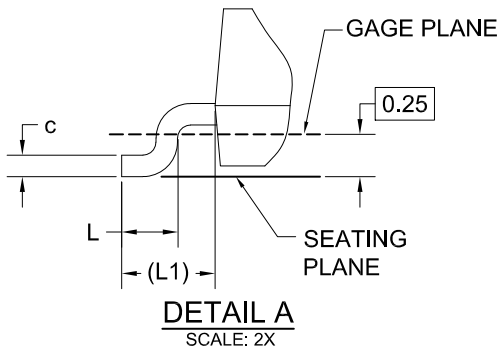
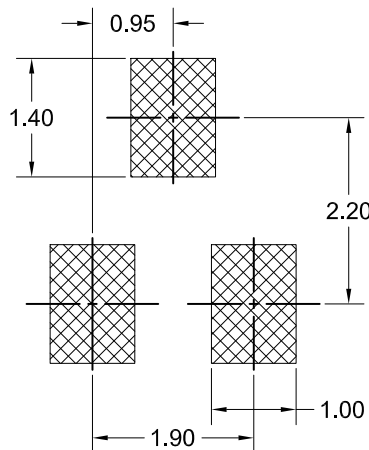
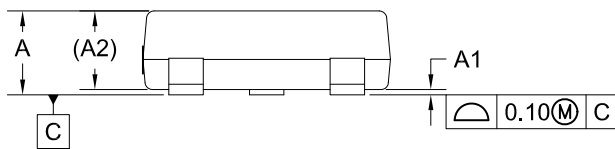
DATE 01 SEP 2021

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.

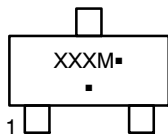


| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | --- | --- | 1.20 |
| A1 | 0.00 | 0.05 | 0.10 |
| A2 | 0.93 REF | | |
| b | 0.37 | 0.44 | 0.60 |
| c | 0.08 | 0.15 | 0.23 |
| D | 2.72 | 2.92 | 3.12 |
| E | 2.10 | 2.40 | 2.70 |
| E1 | 1.15 | 1.30 | 1.50 |
| e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



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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