Small Signal Diodes

MMBD1401, MMBD1403, MMBD1404, MMBD1405

ABSOLUTE MAXIMUM RATINGS

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

Rating	Symbol	Value	Unit
Maximum Repetitive Reverse Voltage	V_{RRM}	200	V
Average Rectified Forward Current	$I_{F(AV)}$	200	mA
Non−Repetitive Peak Forward Surge Current Pulse Width = 1.0 second Pulse Width = 1.0 microsecond	I_{FSM}	 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.

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°C unless otherwise noted)

Characteristic	Symbol	Value	Unit
Power Dissipation	P_D	350	mW
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	357	°C/W

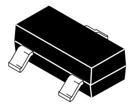
ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Max	Unit
Breakdown Voltage	B_V	I_R = 100 μA	200	−	V
Forward Voltage	V_F	I_F = 10 mA	−	800	mV
		I_F = 50 mA	760	920	mV
		I_F = 200 mA	−	1.0	V
		I_F = 300 mA	−	1.1	V
Reverse Current	I_R	V_R = 120 V	−	40	nA
		V_R = 175 V	−	100	nA
Total Capacitance	C_T	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

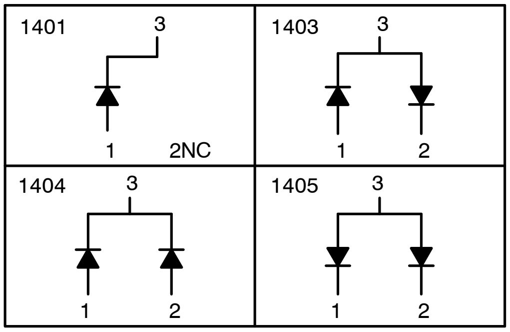
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

**SOT−23
CASE 318BM**

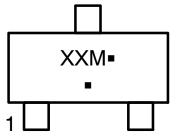


**SOT−23
CASE 318−08**

CONNECTION DIAGRAMS



MARKING DIAGRAM



XX = 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†
MMBD1401	SOT−23 (Pb−Free)	3000 / Tape & Reel
MMBD1403	SOT−23 (Pb−Free)	3000 / Tape & Reel
MMBD1404	SOT−23 (Pb−Free)	3000 / Tape & Reel
MMBD1405	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

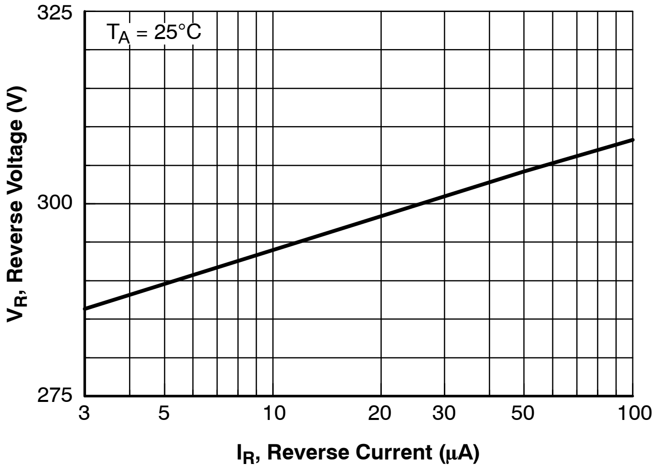
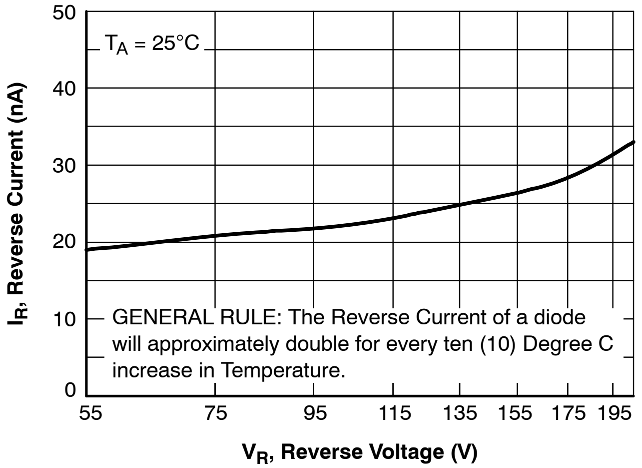
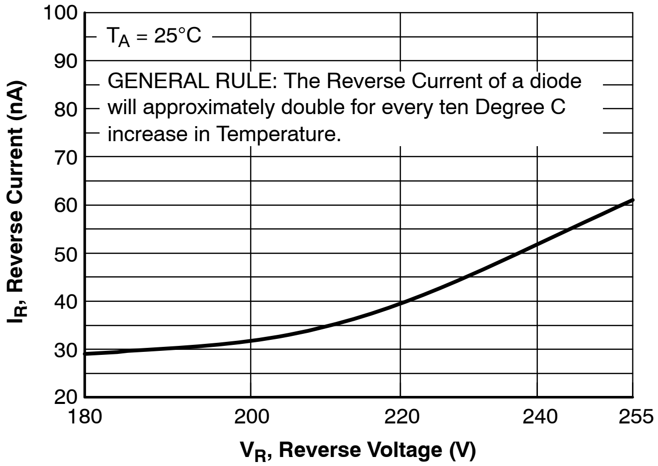


Figure 1. Reverse Voltage vs. Reverse Current
B_V – 1.0 to 100 μA



GENERAL RULE: The Reverse Current of a diode will approximately double for every ten (10) Degree C increase in Temperature.

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



GENERAL RULE: The Reverse Current of a diode will approximately double for every ten Degree C increase in Temperature.

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

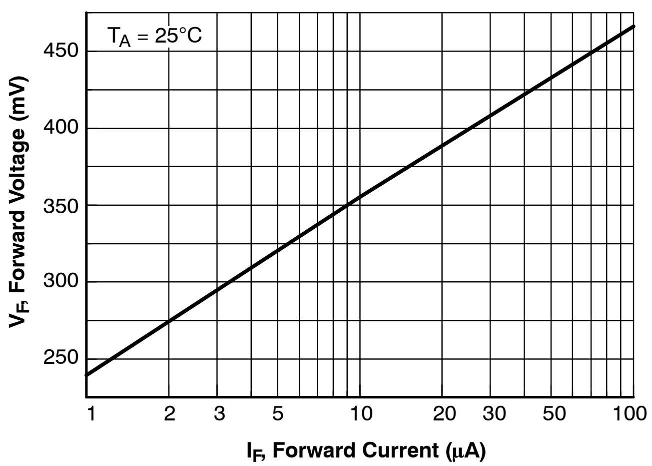


Figure 4. Forward Voltage vs. Forward Current
V_F – 1.0 to 100 μA

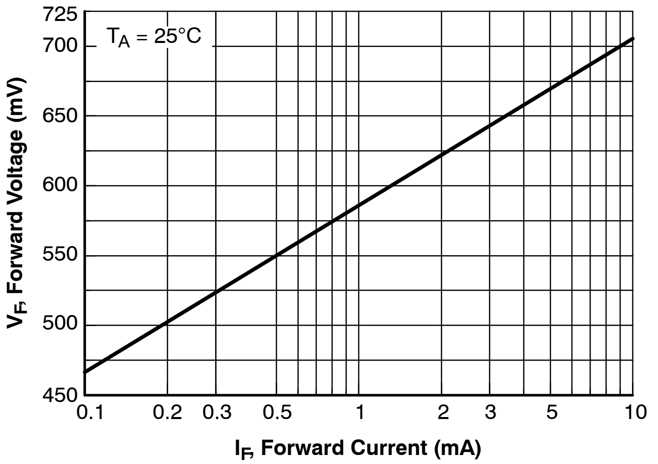


Figure 5. Forward Voltage vs. Forward Current
V_F – 0.1 to 10 mA

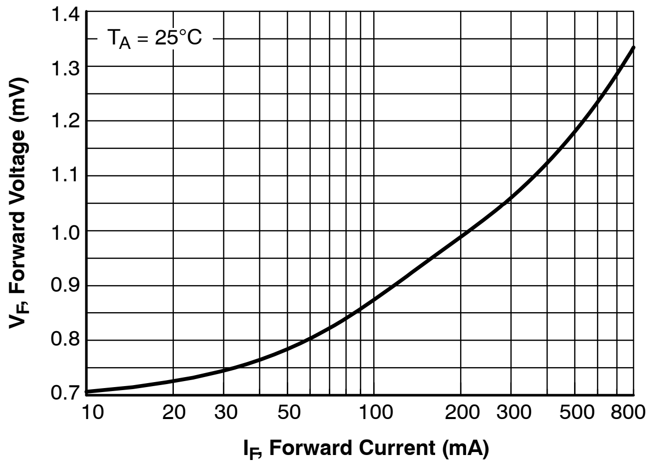


Figure 6. Forward Voltage vs. Forward Current
V_F – 10 to 800 mA

TYPICAL CHARACTERISTICS (Continued)

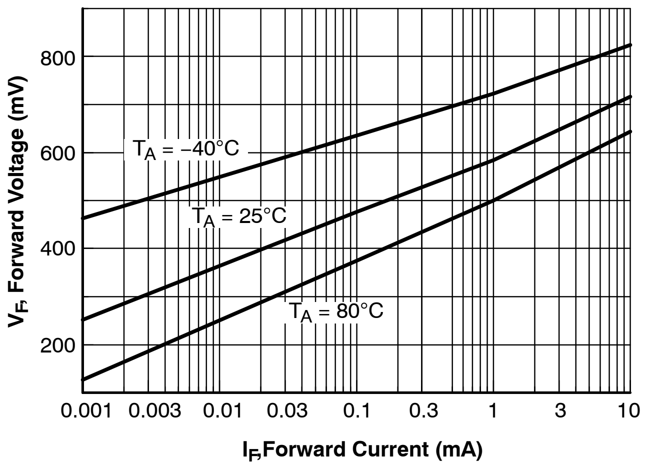


Figure 7. Forward Voltage vs. Ambient Temperature, V_F – 1.0 μA – 10 mA (−40 to +80°C)

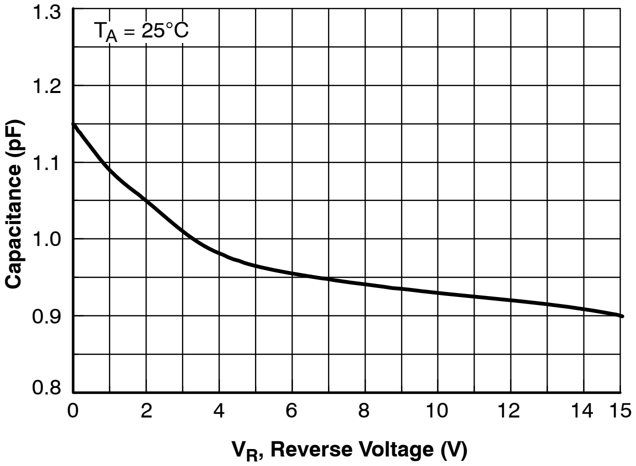


Figure 8. Capacitance vs. Reverse Voltage

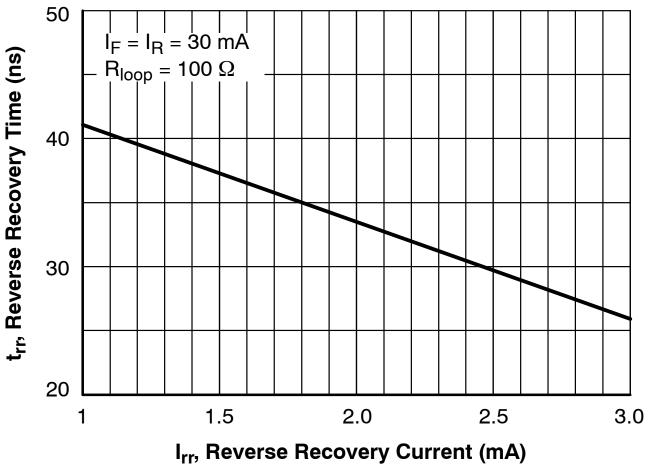


Figure 9. Reverse Recovery Time vs. Reverse Recovery Current (I_{rr})

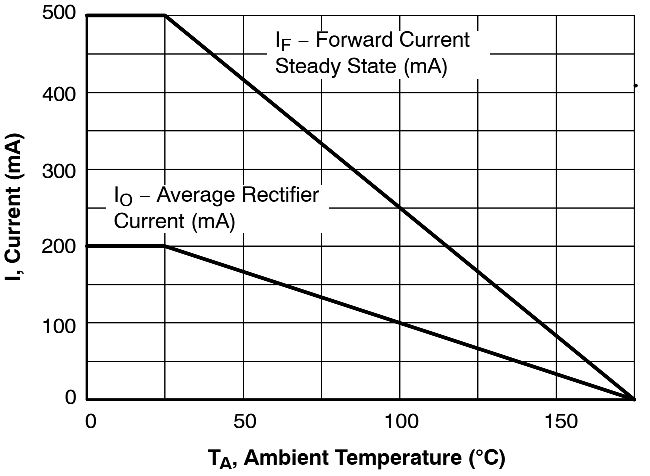


Figure 10. Average Rectified Current (I_O) and Forward Current (I_F) vs. Ambient Temperature (T_A)

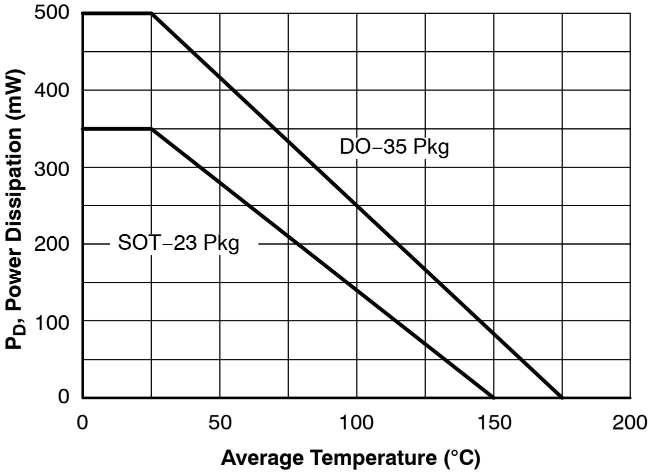
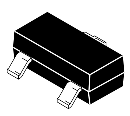


Figure 11. Power Derating Curve

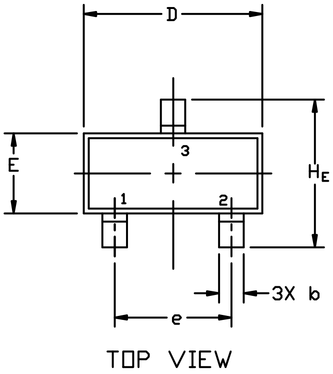


SCALE 4:1

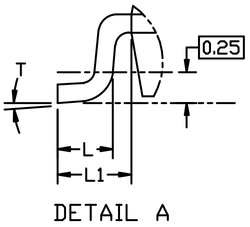
SOT−23 (TO−236)

CASE 318
ISSUE AT

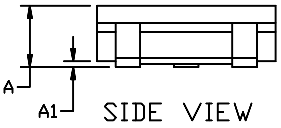
DATE 01 MAR 2023



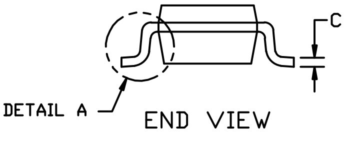
TOP VIEW



DETAIL A



SIDE VIEW



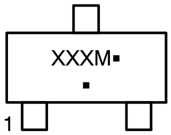
END VIEW

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.

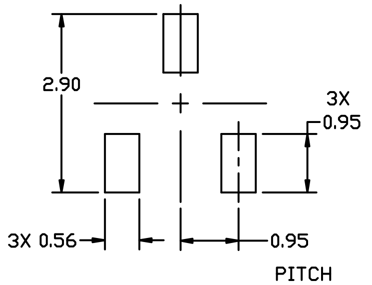
	MILLIMETERS			INCHES		
DIM	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
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

SOT−23 (TO−236)
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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

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

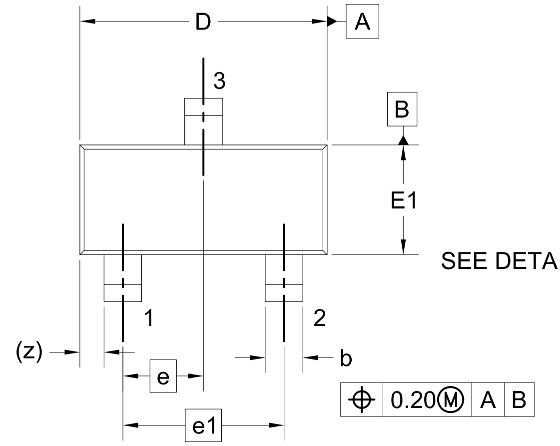
SOT−23
CASE 318BM
ISSUE A

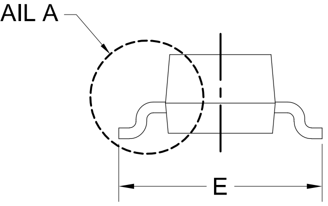
DATE 01 SEP 2021

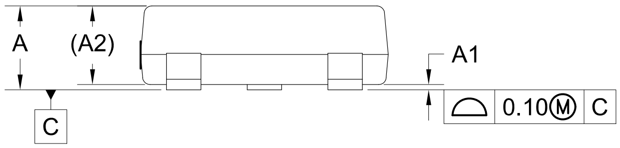
NOTES: UNLESS OTHERWISE SPECIFIED

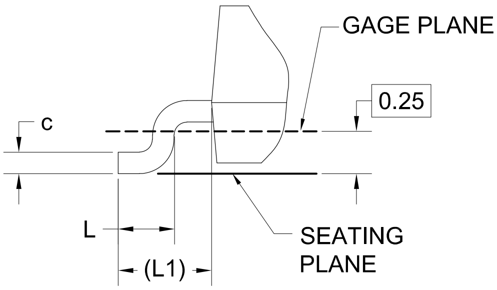
A) REFERENCE JEDEC REGISTRATION TO-236, VARIATION AB, ISSUE H.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M - 2009.

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		

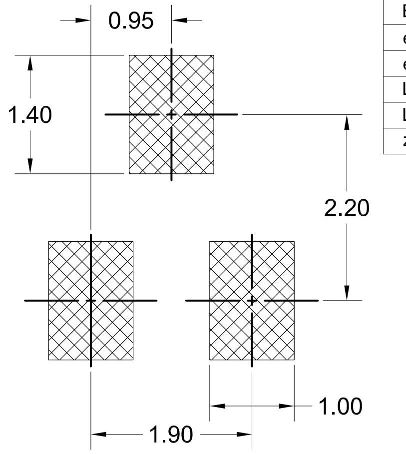








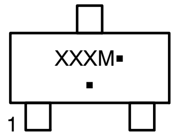
DETAIL A
SCALE: 2X



LAND PATTERN RECOMMENDATION

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

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.

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