

# Diode – Small Signal

## MMBD1501A, MMBD1503A, MMBD1504A, MMBD1505A

### ABSOLUTE MAXIMUM RATINGS

(Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.) (Notes 1, 2)

| Symbol      | Parameter                                 | Value                           | Unit             |
|-------------|-------------------------------------------|---------------------------------|------------------|
| $V_{RRM}$   | Maximum Repetitive Reverse Voltage        | 200                             | V                |
| $I_{F(AV)}$ | Average Rectified Forward Current         | 200                             | mA               |
| $I_{FSM}$   | Non-Repetitive Peak Forward Surge Current | Pulse Width = 1.0 s             | 1.0              |
|             |                                           | Pulse Width = 1.0 $\mu\text{s}$ | 2.0              |
| $T_{STG}$   | Storage Temperature Range                 | -55 to +150                     | $^\circ\text{C}$ |
| $T_J$       | Operating Junction Temperature            | -55 to +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.

- These ratings are based on a maximum junction temperature of  $150^\circ\text{C}$ .
- These are steady-state limits. onsemi should be consulted on applications involving pulsed or low-duty-cycle operations.

### THERMAL CHARACTERISTICS

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

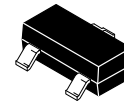
| Symbol          | Parameter                               | Value | Unit                      |
|-----------------|-----------------------------------------|-------|---------------------------|
| $P_D$           | Power Dissipation                       | 350   | mW                        |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 357   | $^\circ\text{C}/\text{W}$ |

### ELECTRICAL CHARACTERISTICS

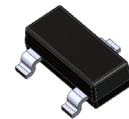
(Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.)

| Symbol | Parameter         | Conditions                                           | Min  | Max  | Unit          |
|--------|-------------------|------------------------------------------------------|------|------|---------------|
| $V_R$  | Breakdown Voltage | $I_R = 5.0 \mu\text{A}$                              | 200  | –    | V             |
| $V_F$  | Forward Voltage   | $I_F = 1.0 \text{ mA}$                               | 620  | 720  | mV            |
|        |                   | $I_F = 10 \text{ mA}$                                | 720  | 830  | mV            |
|        |                   | $I_F = 50 \text{ mA}$                                | 800  | 890  | mV            |
|        |                   | $I_F = 100 \text{ mA}$                               | 830  | 930  | mV            |
|        |                   | $I_F = 200 \text{ mA}$                               | 0.87 | 1.10 | V             |
|        |                   | $I_F = 300 \text{ mA}$                               | 0.90 | 1.15 | V             |
| $I_R$  | Reverse Current   | $V_R = 125 \text{ V}$                                | –    | 1.0  | nA            |
|        |                   | $V_R = 125 \text{ V}$ ,<br>$T_A = 150^\circ\text{C}$ | –    | 3.0  | $\mu\text{A}$ |
|        |                   | $V_R = 180 \text{ V}$                                | –    | 10.0 | nA            |
|        |                   | $V_R = 180 \text{ V}$ ,<br>$T_A = 150^\circ\text{C}$ | –    | 5.0  | $\mu\text{A}$ |
| $C_T$  | Total Capacitance | $V_R = 0$ ,<br>$f = 1.0 \text{ MHz}$                 | –    | 4.0  | pF            |

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.

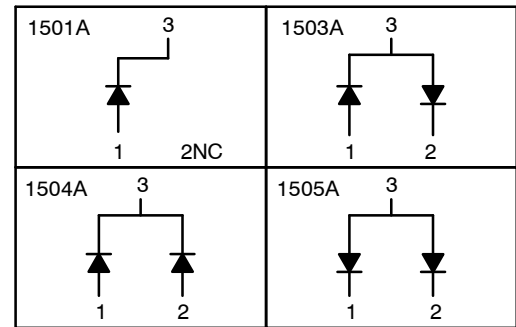


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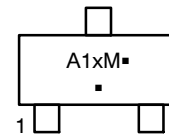


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### CONNECTION DIAGRAMS



### MARKING DIAGRAM



A1x = Specific Device Code  
 x = 1, 3, 4, 5  
 M = Date Code  
 ■ = Pb-Free Package

### ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

TYPICAL CHARACTERISTICS

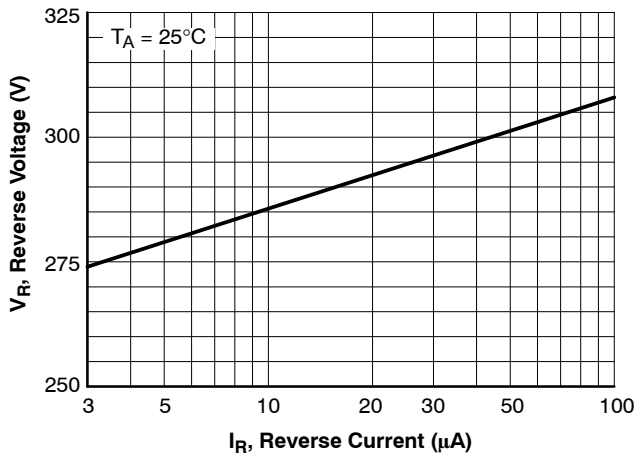


Figure 1. Reverse Voltage vs. Reverse Current  
 $I_R - 3.0$  to  $100 \mu\text{A}$

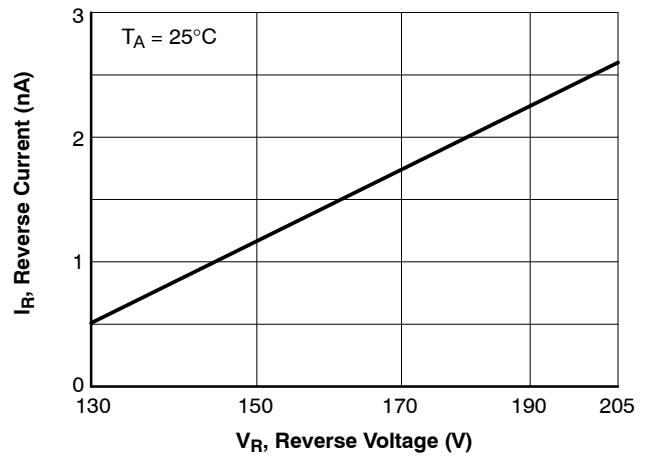


Figure 2. Reverse Current vs. Reverse Voltage  
 $V_R - 130$  to  $205 \text{ V}$

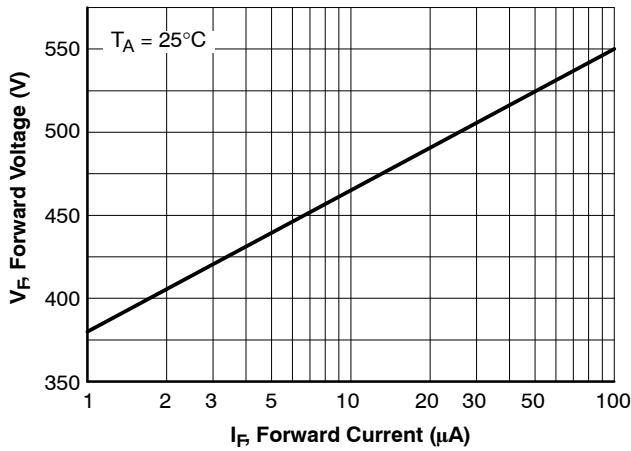


Figure 3. Forward Voltage vs. Forward Current  
 $I_F - 1$  to  $100 \mu\text{A}$

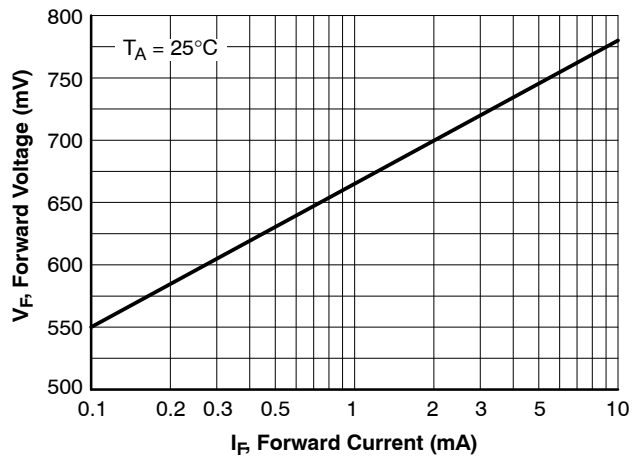


Figure 4. Forward Voltage vs. Forward Current  
 $I_F - 0.1$  to  $10 \text{ mA}$

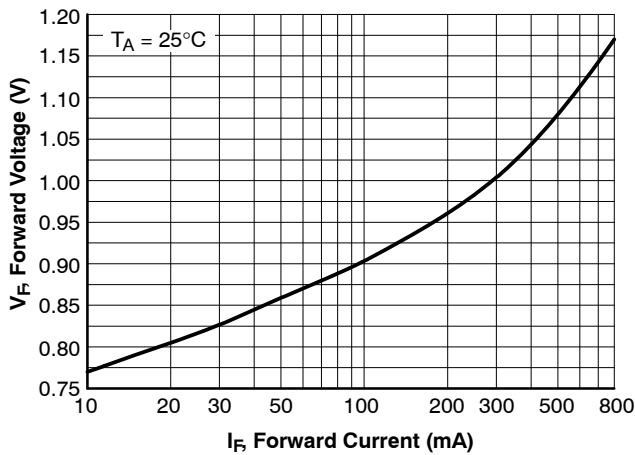


Figure 5. Forward Voltage vs. Forward Current  
 $I_F - 10$  to  $800 \text{ mA}$

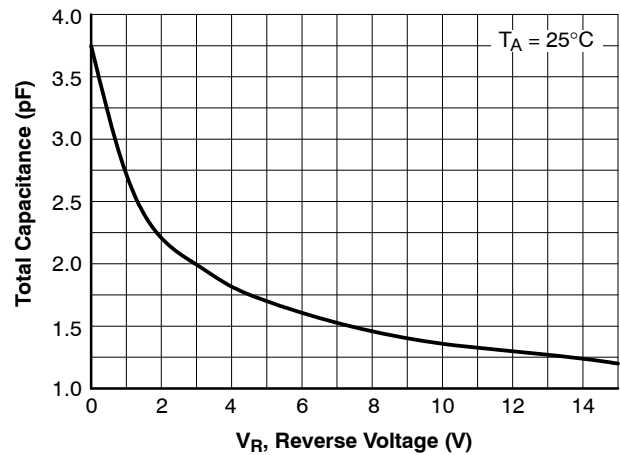
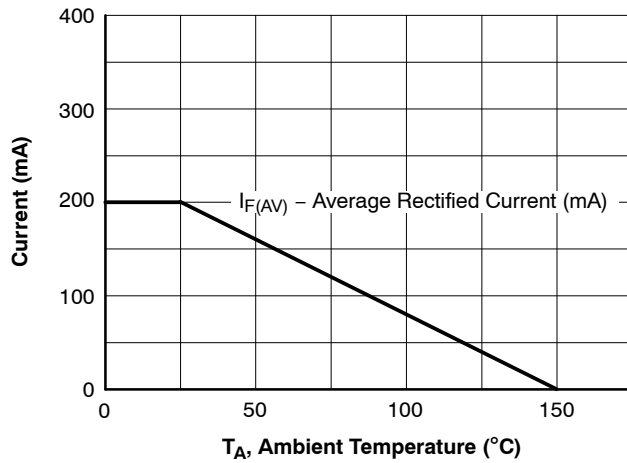


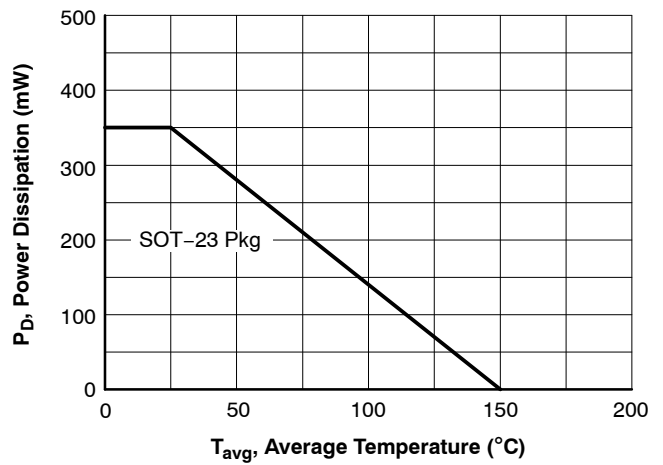
Figure 6. Total Capacitance vs. Reverse Voltage  
 $V_R - 0$  to  $15 \text{ V}$

# MMBD1501A, MMBD1503A, MMBD1504A, MMBD1505A

## TYPICAL CHARACTERISTICS (Continued)



**Figure 7. Average Rectified Current ( $I_{F(AV)}$ ) vs. Ambient Temperature ( $T_A$ )**



**Figure 8. Power Derating Curve**

## ORDERING INFORMATION

| Part Number       | Specific Device Marking | Package Type                 | Shipping <sup>†</sup>      |
|-------------------|-------------------------|------------------------------|----------------------------|
| MMBD1501A         | A11                     | SOT-23 (TO-236)<br>(Pb-Free) | 3,000 / Tape & Reel (7")   |
| MMBD1503A         | A13                     |                              |                            |
| MMBD1504A         | A14                     |                              |                            |
| MMBD1505A         | A15                     |                              |                            |
| NSVMMBD1504ALT1G* | A16                     | SOT-23<br>(Pb-Free)          | 10,000 / Tape & Reel (13") |
| MMBD1503A_D87Z    | A13                     |                              |                            |
| NSVMMBD1501ALT3G* | A11                     | SOT-23 (TO-236)<br>(Pb-Free) | 10,000 / Tape & Reel (13") |

<sup>†</sup>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](#).

\*NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.



SCALE 4:1

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

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| 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, SOLDERM/D.

STYLES ON PAGE 2

|                  |                                      |                                                                                                                                                                                     |
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**ISSUE AU**

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|                                                         |                                                       |                                                             |                                                             |                                                             |                                                             |
|---------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|
| STYLE 1 THRU 5:<br>CANCELLED                            | STYLE 6:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 7:<br>PIN 1. EMITTER<br>2. BASE<br>3. COLLECTOR       | STYLE 8:<br>PIN 1. ANODE<br>2. NO CONNECTION<br>3. CATHODE  |                                                             |                                                             |
| STYLE 9:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE      | STYLE 10:<br>PIN 1. DRAIN<br>2. SOURCE<br>3. GATE     | STYLE 11:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE-ANODE | STYLE 12:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE       | STYLE 13:<br>PIN 1. SOURCE<br>2. DRAIN<br>3. GATE           | STYLE 14:<br>PIN 1. CATHODE<br>2. GATE<br>3. ANODE          |
| STYLE 15:<br>PIN 1. GATE<br>2. CATHODE<br>3. ANODE      | STYLE 16:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE | STYLE 17:<br>PIN 1. NO CONNECTION<br>2. ANODE<br>3. CATHODE | STYLE 18:<br>PIN 1. NO CONNECTION<br>2. CATHODE<br>3. ANODE | STYLE 19:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE-ANODE | STYLE 20:<br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE          |
| STYLE 21:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN       | STYLE 22:<br>PIN 1. RETURN<br>2. OUTPUT<br>3. INPUT   | STYLE 23:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE         | STYLE 24:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE           | STYLE 25:<br>PIN 1. ANODE<br>2. CATHODE<br>3. GATE          | STYLE 26:<br>PIN 1. CATHODE<br>2. ANODE<br>3. NO CONNECTION |
| STYLE 27:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. CATHODE | STYLE 28:<br>PIN 1. ANODE<br>2. ANODE<br>3. ANODE     |                                                             |                                                             |                                                             |                                                             |

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