

# MBRS140LT3

## Surface Mount Schottky Power Rectifier

### SMB Power Surface Mount Package

This device employs the Schottky Barrier principle in a metal-to-silicon power rectifier. Features epitaxial construction with oxide passivation and metal overlay contact. Ideally suited for low voltage, high frequency switching power supplies; free wheeling diodes and polarity protection diodes.

#### Features

- Compact Package with J-Bend Leads Ideal for Automated Handling
- Highly Stable Oxide Passivated Junction
- Guardring for Over-Voltage Protection
- Low Forward Voltage Drop
- Pb-Free Package is Available

#### Mechanical Characteristics:

- Case: Molded Epoxy
- Epoxy Meets UL 94 V-0 @ 0.125 in
- Weight: 95 mg (Approximately)
- Cathode Polarity Band
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C Max. for 10 Seconds
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable

#### MAXIMUM RATINGS

| Rating                                                                                                         | Symbol                          | Value       | Unit             |
|----------------------------------------------------------------------------------------------------------------|---------------------------------|-------------|------------------|
| Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage                         | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | 40          | V                |
| Average Rectified Forward Current<br>(At Rated $V_R$ , $T_C = 110^\circ\text{C}$ )                             | $I_O$                           | 1.0         | A                |
| Peak Repetitive Forward Current (At Rated $V_R$ , Square Wave, 100 kHz, $T_C = 110^\circ\text{C}$ )            | $I_{FRM}$                       | 2.0         | A                |
| Non-Repetitive Peak Surge Current<br>(Surge Applied at Rated Load Conditions<br>Halfwave, Single Phase, 60 Hz) | $I_{FSM}$                       | 40          | A                |
| Storage / Operating Case Temperature                                                                           | $T_{stg}, T_C$                  | -55 to +150 | $^\circ\text{C}$ |
| Operating Junction Temperature                                                                                 | $T_J$                           | -55 to +125 | $^\circ\text{C}$ |
| Voltage Rate of Change<br>(Rated $V_R$ , $T_J = 25^\circ\text{C}$ )                                            | $dv/dt$                         | 10,000      | V/ $\mu\text{s}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



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### SCHOTTKY BARRIER RECTIFIER 1.0 AMPERE – 40 VOLTS



SMB  
CASE 403A  
PLASTIC

#### MARKING DIAGRAM



B14L = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

| Device      | Package          | Shipping <sup>†</sup> |
|-------------|------------------|-----------------------|
| MBRS140LT3  | SMB              | 2500/Tape & Reel      |
| MBRS140LT3G | SMB<br>(Pb-Free) | 2500/Tape & Reel      |

<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.

## MBRS140LT3

### THERMAL CHARACTERISTICS

| Characteristic                                   | Symbol          | Max | Unit                 |
|--------------------------------------------------|-----------------|-----|----------------------|
| Thermal Resistance, Junction-to-Lead (Note 1)    | $R_{\theta JL}$ | 24  | $^{\circ}\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 80  | $^{\circ}\text{C/W}$ |

1. Mounted with minimum recommended pad size, PC Board FR4.
2. 1 inch square pad size (1 x 0.5 inch for each lead) on FR4 board.

### ELECTRICAL CHARACTERISTICS

| Characteristic                                                                                                         | Symbol | $T_J = 25^{\circ}\text{C}$                | $T_J = 125^{\circ}\text{C}$              | Unit |
|------------------------------------------------------------------------------------------------------------------------|--------|-------------------------------------------|------------------------------------------|------|
| Maximum Instantaneous Forward Voltage (Note 3)<br>see Figure 2<br>( $I_F = 1.0\text{ A}$ )<br>( $I_F = 2.0\text{ A}$ ) | $V_F$  | 0.5<br>0.6                                | 0.425<br>0.58                            | V    |
| Maximum Instantaneous Reverse Current (Note 3)<br>see Figure 4<br>( $V_R = 40\text{ V}$ )<br>( $V_R = 20\text{ V}$ )   | $I_R$  | $T_J = 25^{\circ}\text{C}$<br>0.4<br>0.02 | $T_J = 100^{\circ}\text{C}$<br>10<br>5.0 | mA   |

3. Pulse Test: Pulse Width  $\leq 250\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

# MBRS140LT3

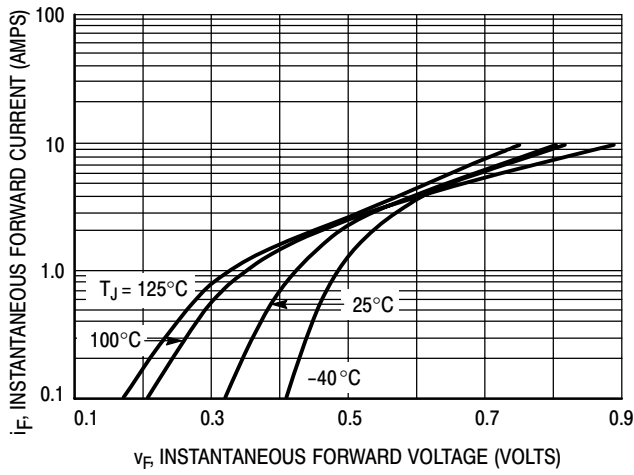


Figure 1. Typical Forward Voltage

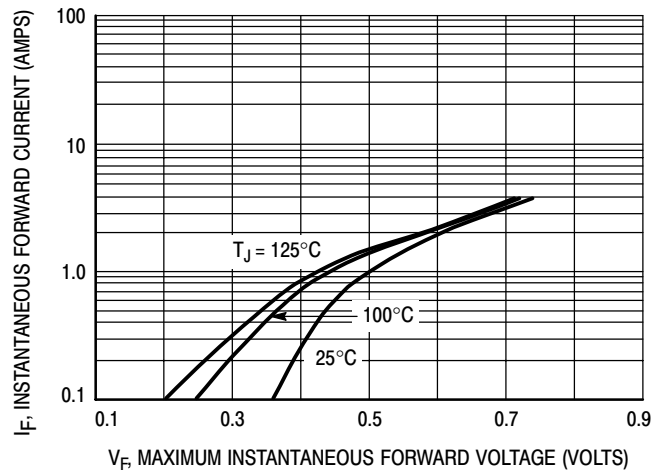


Figure 2. Maximum Forward Voltage

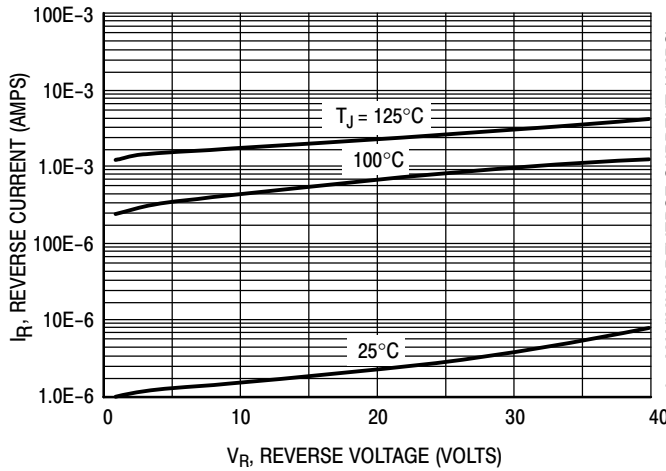


Figure 3. Typical Reverse Current

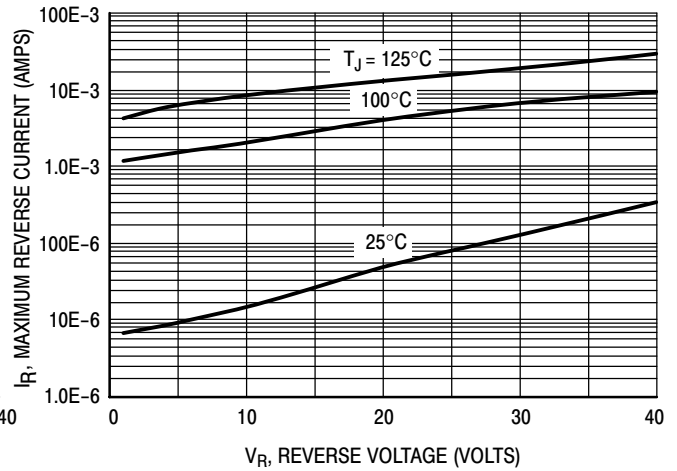


Figure 4. Maximum Reverse Current

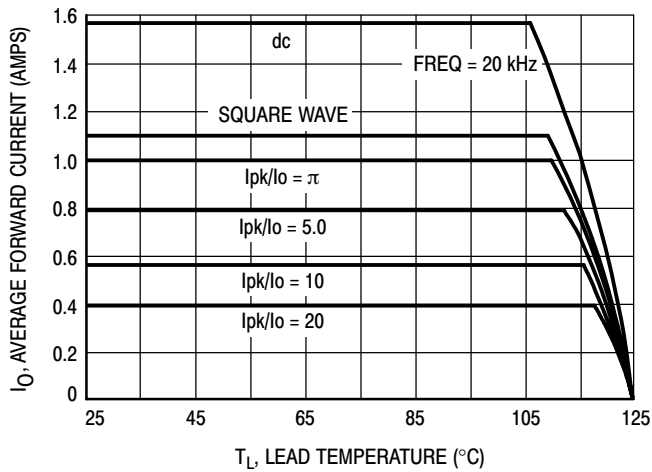


Figure 5. Current Derating

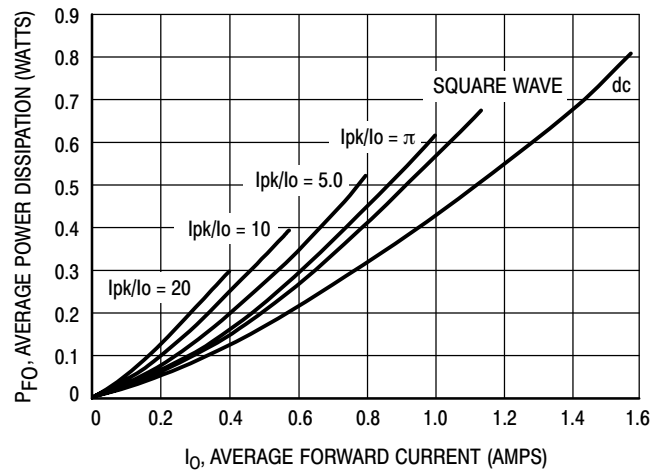


Figure 6. Forward Power Dissipation

# MBRS140LT3

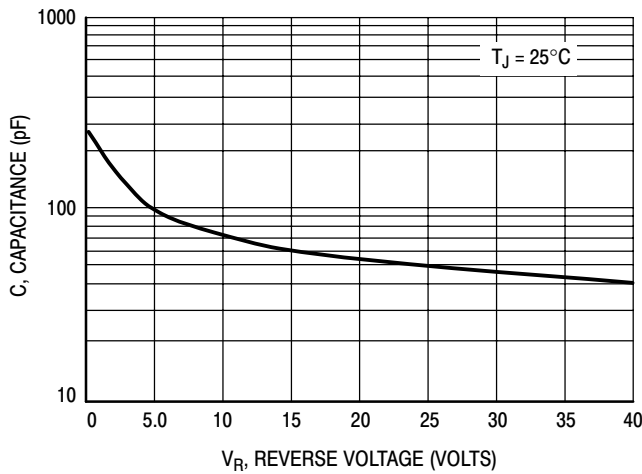


Figure 7. Capacitance

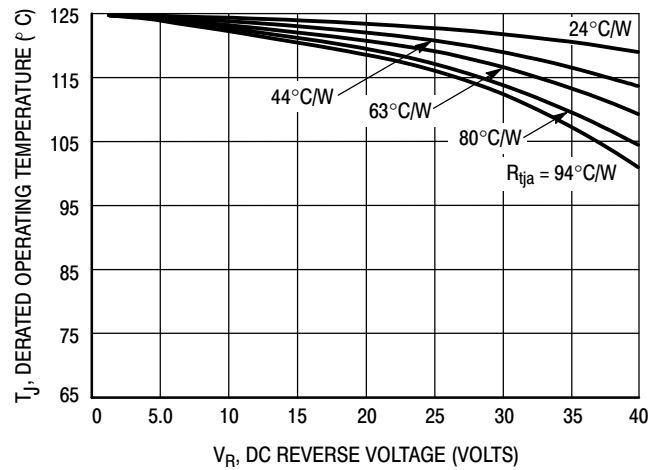


Figure 8. Typical Operating Temperature Derating\*

\* Reverse power dissipation and the possibility of thermal runaway must be considered when operating this device under any reverse voltage conditions. Calculations of  $T_J$  therefore must include forward and reverse power effects. The allowable operating  $T_J$  may be calculated from the equation:

$$T_J = T_{Jmax} - r(t)(P_f + P_r) \text{ where}$$

$r(t)$  = thermal impedance under given conditions,  
 $P_f$  = forward power dissipation, and  
 $P_r$  = reverse power dissipation

This graph displays the derated allowable  $T_J$  due to reverse bias under DC conditions only and is calculated as  $T_J = T_{Jmax} - r(t)P_r$ , where  $r(t) = R_{\theta JA}$ . For other power applications further calculations must be performed.

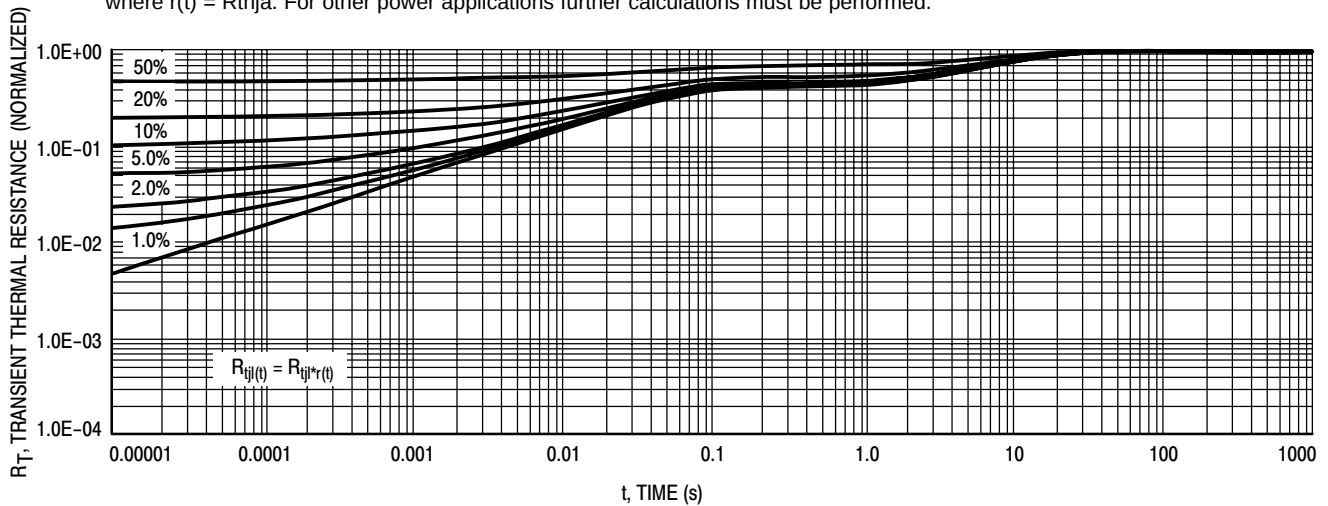


Figure 9. Thermal Response, Junction-to-Lead

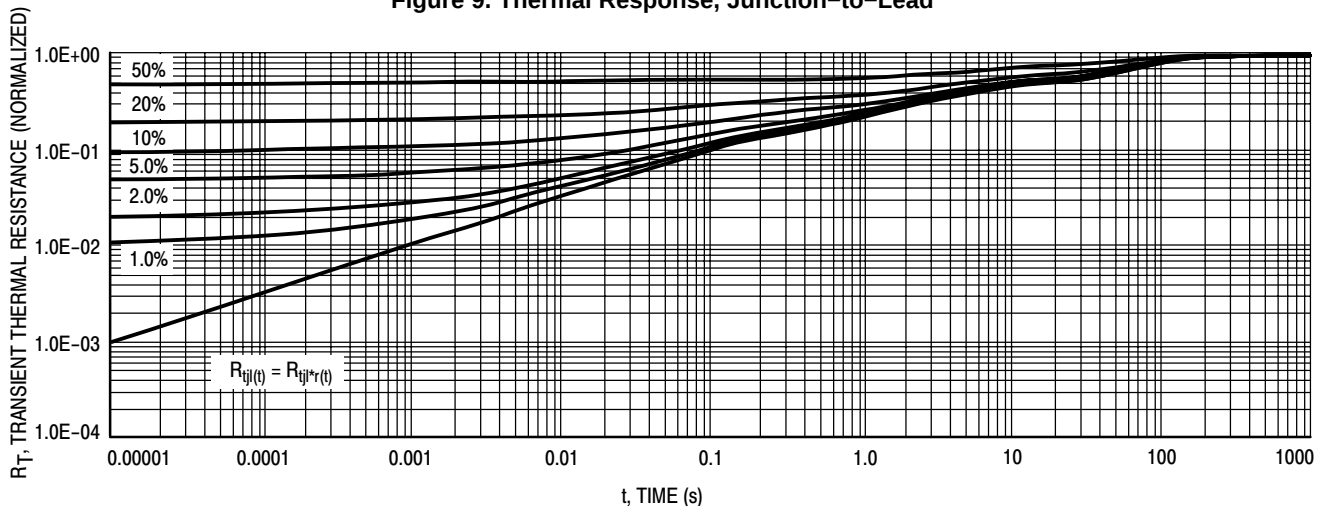


Figure 10. Thermal Response, Junction-to-Ambient



SCALE 1:1

Polarity Band



SCALE 1:1

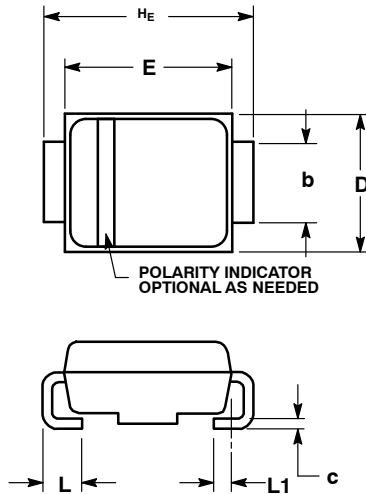
Non-Polarity Band

### SMB

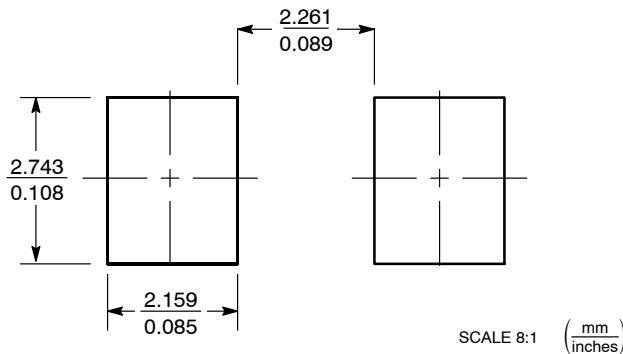
#### CASE 403A-03

#### ISSUE J

DATE 19 JUL 2012



SOLDERING FOOTPRINT\*



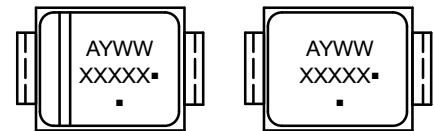
\*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION b SHALL BE MEASURED WITHIN DIMENSION L1.

| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| A   | 1.95        | 2.30 | 2.47 | 0.077     | 0.091 | 0.097 |
| A1  | 0.05        | 0.10 | 0.20 | 0.002     | 0.004 | 0.008 |
| b   | 1.96        | 2.03 | 2.20 | 0.077     | 0.080 | 0.087 |
| c   | 0.15        | 0.23 | 0.31 | 0.006     | 0.009 | 0.012 |
| D   | 3.30        | 3.56 | 3.95 | 0.130     | 0.140 | 0.156 |
| E   | 4.06        | 4.32 | 4.60 | 0.160     | 0.170 | 0.181 |
| HE  | 5.21        | 5.44 | 5.60 | 0.205     | 0.214 | 0.220 |
| L   | 0.76        | 1.02 | 1.60 | 0.030     | 0.040 | 0.063 |
| L1  | 0.51 REF    |      |      | 0.020 REF |       |       |

### GENERIC MARKING DIAGRAM\*



Polarity Band

Non-Polarity Band

XXXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*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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| DESCRIPTION:     | SMB         | PAGE 1 OF 1                                                                                                                                                                      |

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