# MBRS2040LT3G, NRVBS2040LT3G

# Surface Mount Schottky Power Rectifier

## SMB Power Surface Mount Package

. . . employing 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
- ESD Ratings:
  - Human Body Model = 3B (> 16000 V)
  - Machine Model = C (> 400 V)
- NRVB Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable*
- These are Pb−Free Devices

### Mechanical Characteristics

- Case: Molded Epoxy
- Epoxy Meets UL94, VO at 1/8″
- Weight: 95 mg (approximately)
- Maximum Temperature of 260°C / 10 Seconds for Soldering
- Cathode Polarity Band
- Available in 12 mm Tape, 2500 Units per 13 inch Reel, Add “T3” Suffix to Part Number
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Marking: BKJL

**ON Semiconductor®**

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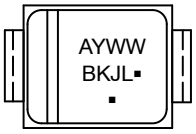
**SCHOTTKY BARRIER RECTIFIER 2.0 AMPERES 40 VOLTS**

**SMB**
**CASE 403A**

### MARKING DIAGRAM




| | |
|---|---|
| BKJL | = Specific Device Code |
| A | = Assembly Location** |
| Y | = Year |
| WW | = Work Week |
| ▪ | = Pb−Free Package |

(Note: Microdot may be in either location)

**The Assembly Location code (A) is front side optional. In cases where the Assembly Location is stamped in the package bottom (molding ejecter pin), the front side assembly code may be blank.

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| MBRS2040LT3G | SMB (Pb−Free) | 2,500 / Tape & Reel |
| NRVBS2040LT3G* | SMB (Pb−Free) | 2,500 / 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.

## 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 $V_R$, $T_C$ = 103°C) | $I_O$ | 2.0 | A |
| Peak Repetitive Forward Current<br>(At Rated $V_R$, Square Wave, 20 kHz, $T_C$ = 104°C) | $I_{FRM}$ | 4.0 | A |
| Non−Repetitive Peak Surge Current<br>(Surge Applied at Rated Load Conditions Halfwave, Single Phase, 60 Hz) | $I_{FSM}$ | 70 | A |
| Storage Temperature | $T_{stg}$, $T_C$ | −55 to +150 | °C |
| Operating Junction Temperature | $T_J$ | −55 to +125 | °C |
| Voltage Rate of Change<br>(Rated $V_R$, $T_J$ = 25°C) | dv/dt | 10,000 | V/μs |

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.

## THERMAL CHARACTERISTICS

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance — Junction−to−Lead (Note 1)<br>Thermal Resistance — Junction−to−Ambient (Note 2) | $R_{\theta JL}$<br>$R_{\theta JA}$ | 22.5<br>78 | °C/W |

1. Minimum pad size (0.108 X 0.085 inch) for each lead on FR4 board.
2. 1 inch square pad size (1 x 0.5 inch for each lead) on FR4 board.

## ELECTRICAL CHARACTERISTICS

| Characteristic | Symbol | Value | | Unit |
|---|---|---|---|---|
| Maximum Instantaneous Forward Voltage (Note 3)<br>see Figure 2 | $V_F$ | **$T_J$ = 25°C** | **$T_J$ = 125°C** | Volts |
| ($I_F$ = 2.0 A)<br>($I_F$ = 4.0 A) | | 0.43<br>0.50 | 0.34<br>0.45 | |
| Maximum Instantaneous Reverse Current (Note 3)<br>see Figure 4 | $I_R$ | **$T_J$ = 25°C** | **$T_J$ = 100°C** | mA |
| ($V_R$ = 40 V)<br>($V_R$ = 20 V) | | 0.8<br>0.1 | 20<br>6.0 | |

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.

3. Pulse Test: Pulse Width ≤ 250 μs, Duty Cycle ≤ 2.0%.

## TYPICAL CHARACTERISTICS

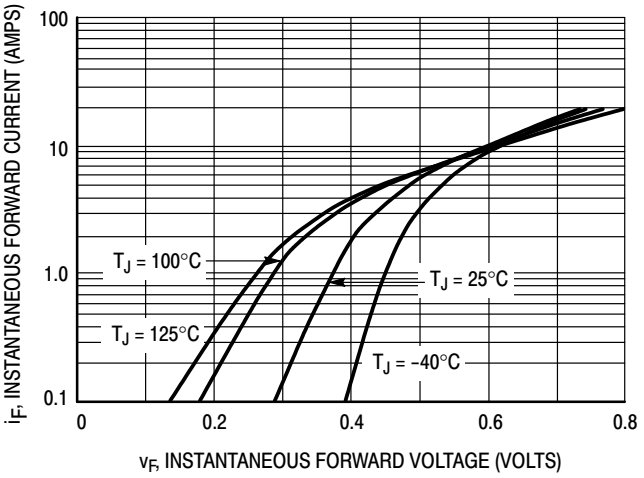



**Figure 1. Typical Forward Voltage**

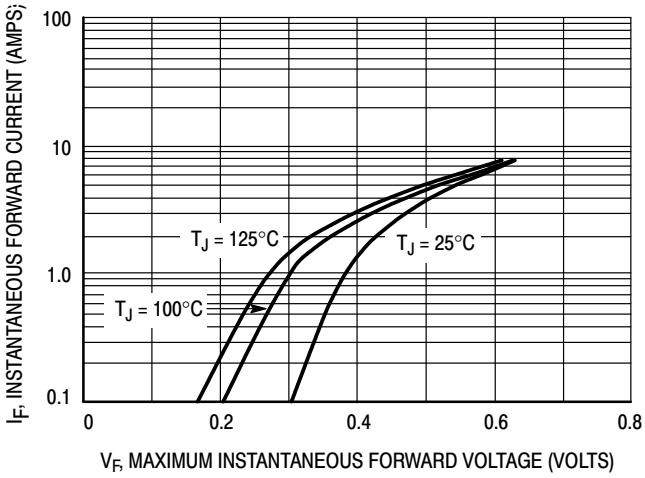



**Figure 2. Maximum Forward Voltage**

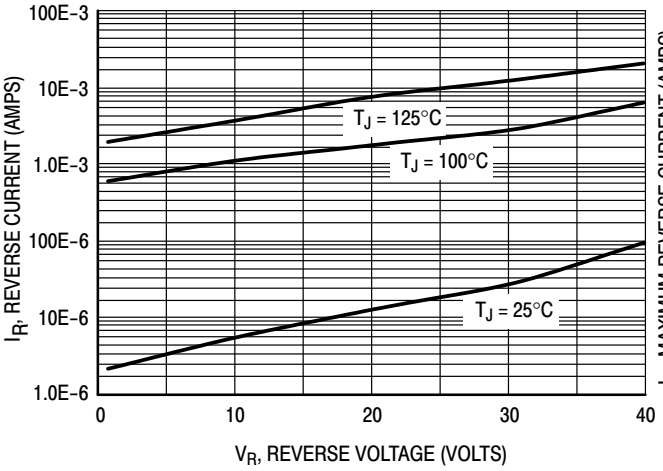
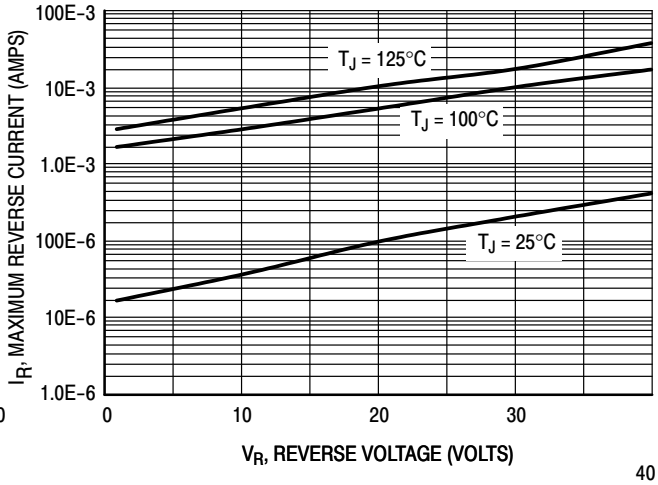



**Figure 3. Typical Reverse Current**




40

**Figure 4. Maximum Reverse Current**

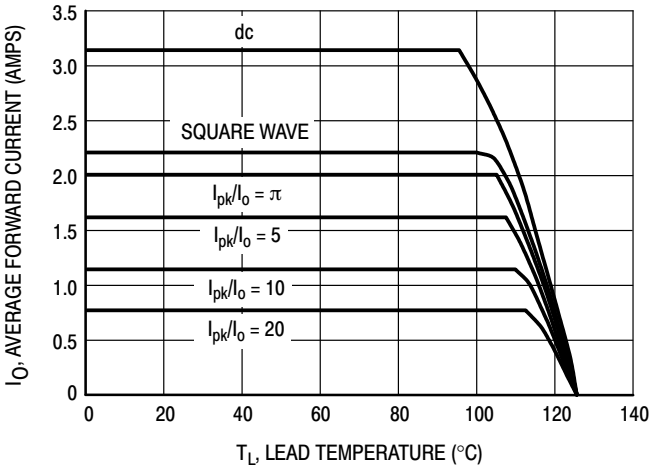



**Figure 5. Current Derating**

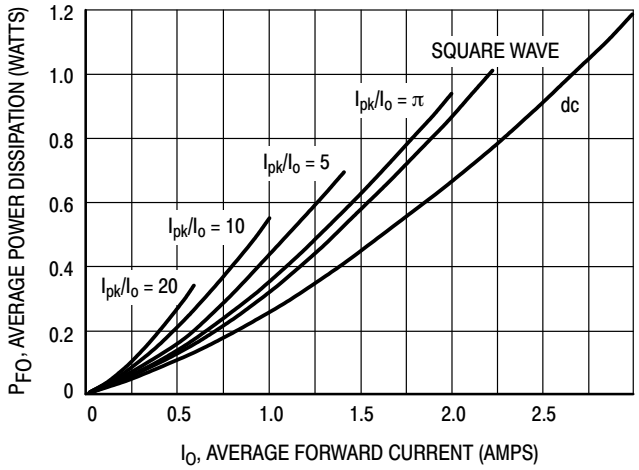



**Figure 6. Forward Power Dissipation**

3.0

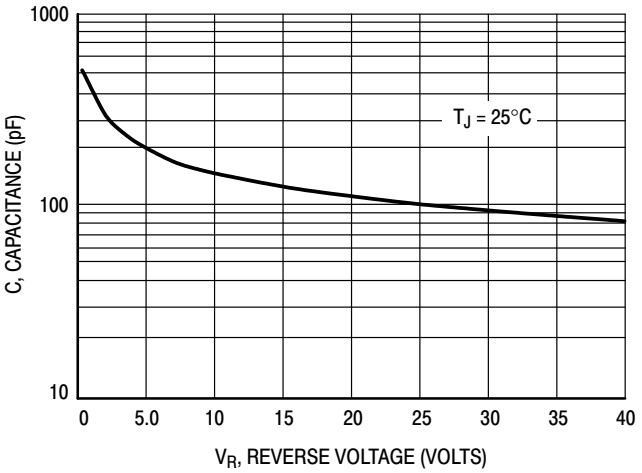



**Figure 7. Capacitance**

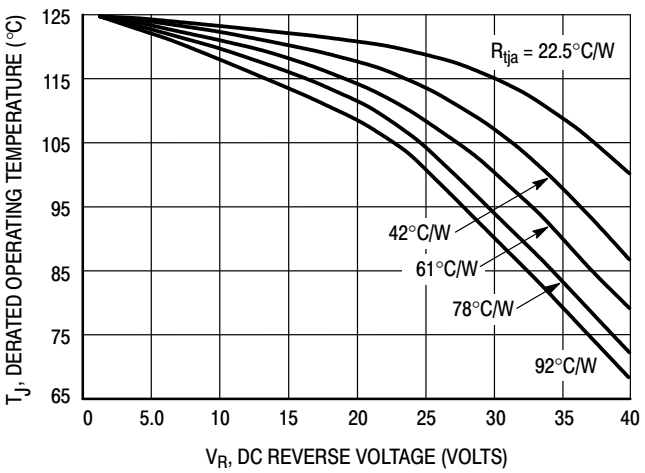



**Figure 8. Typical Operating Temperature Derating***

* 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: $T_J = T_{Jmax} - r(t)(Pf + Pr)$ where

r(t) = thermal impedance under given conditions,
Pf = forward power dissipation, and
Pr = reverse power dissipation

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

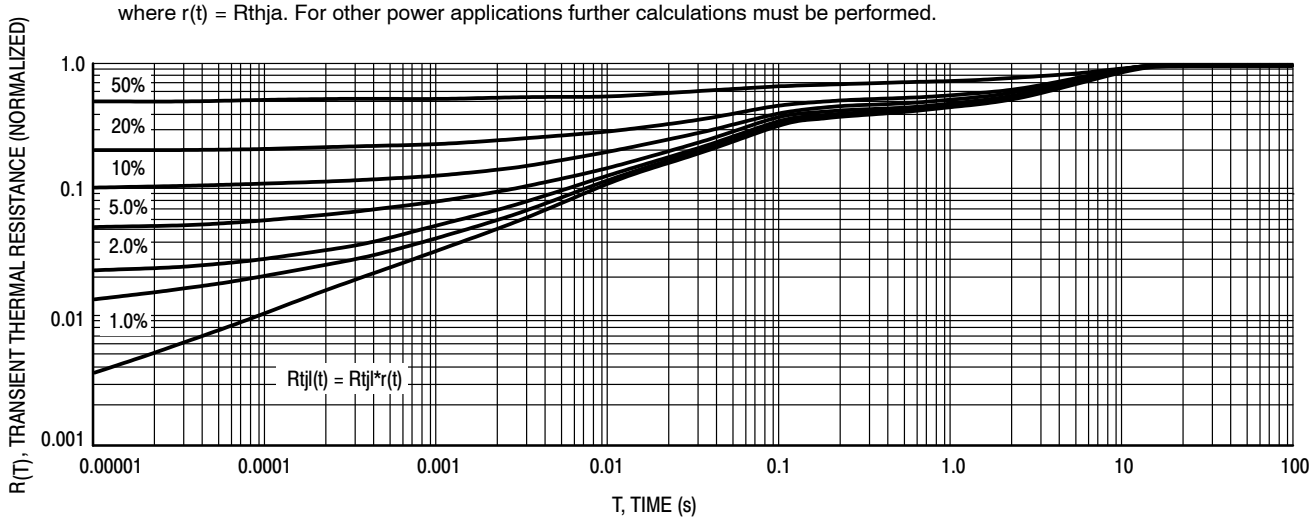



**Figure 9. Thermal Response Junction to Lead**

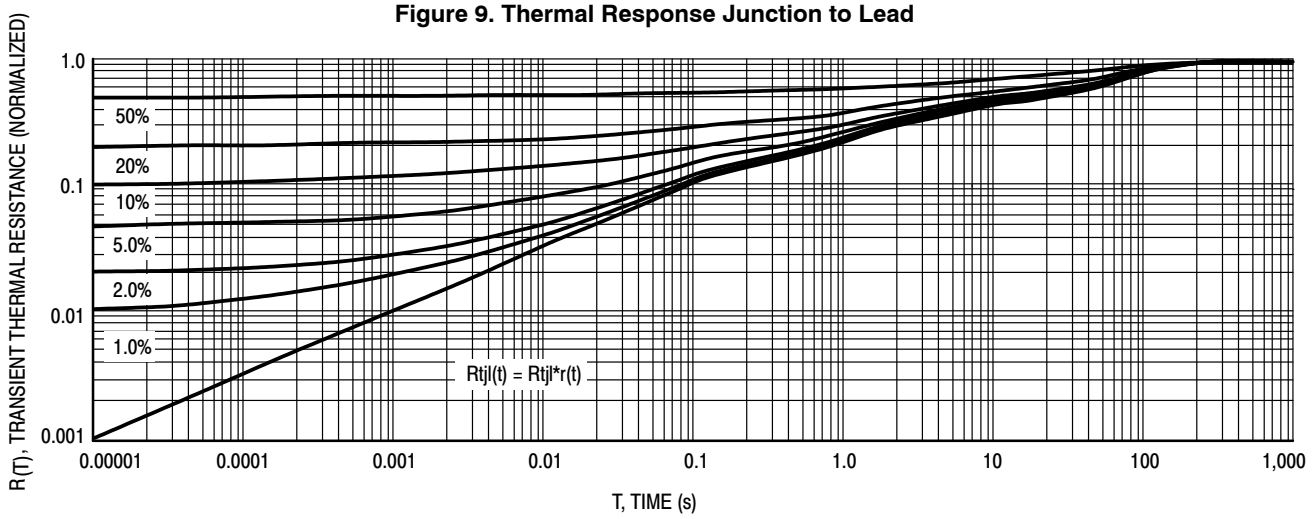
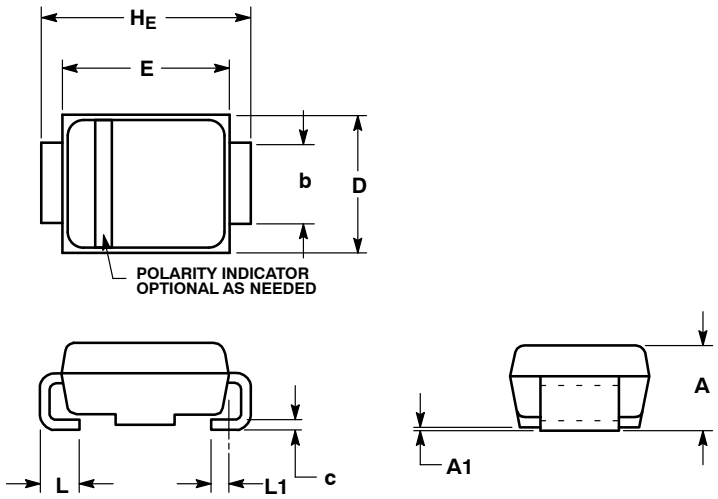



**Figure 10. Thermal Response Junction to Ambient**

## PACKAGE DIMENSIONS

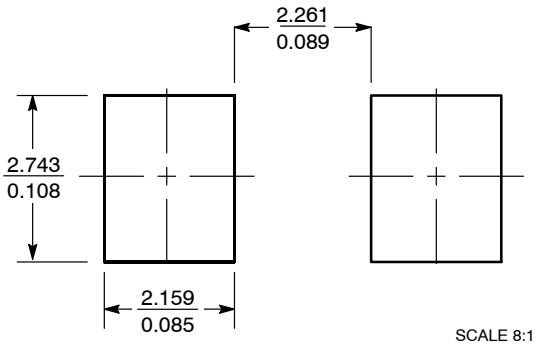
**SMB**
CASE 403A−03
ISSUE J




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

| | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| DIM | 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 |
| $H_E$ | 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 | | |

## SOLDERING FOOTPRINT*




SCALE 8:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

*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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