

# MBR440MFS, NRVB440MFS

## SWITCHMODE Power Rectifiers

These state-of-the-art devices have the following features:

### Features

- Low Power Loss / High Efficiency
- New Package Provides Capability of Inspection and Probe After Board Mounting
- Guardring for Stress Protection
- Low Forward Voltage Drop
- 175°C Operating Junction Temperature
- NRVB Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- WF Suffix for Products with Wettable Flanks
- These are Pb-Free and Halide-Free Devices

### Mechanical Characteristics:

- Case: Epoxy, Molded
- Epoxy Meets Flammability Rating UL 94-0 @ 0.125 in.
- Lead Finish: 100% Matte Sn (Tin)
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C Max. for 10 Seconds
- Device Meets MSL 1 Requirements

### Applications

- Ideally Suited for use as an Output Rectifier in High Frequency (up to 2 MHz) Automotive and Non-Automotive Applications
- Output Rectification in Compact Portable Consumer Applications
- Freewheeling Diode used with Inductive Loads

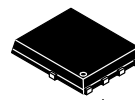


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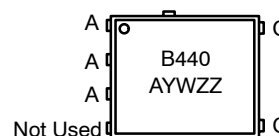
## SCHOTTKY BARRIER RECTIFIERS 4 AMPERES 40 VOLTS

1,2,3  5,6



**SO-8 FLAT LEAD  
CASE 488AA  
STYLE 2**

### MARKING DIAGRAM



B440 = Specific Device Code  
A = Assembly Location  
Y = Year  
W = Work Week  
ZZ = Lot Traceability

### ORDERING INFORMATION

| Device          | Package              | Shipping†             |
|-----------------|----------------------|-----------------------|
| MBR440MFST1G    | SO-8 FL<br>(Pb-Free) | 1500 /<br>Tape & Reel |
| MBR440MFST3G    | SO-8 FL<br>(Pb-Free) | 5000 /<br>Tape & Reel |
| NRVB440MFST1G   | SO-8 FL<br>(Pb-Free) | 1500 /<br>Tape & Reel |
| NRVB440MFST3G   | SO-8 FL<br>(Pb-Free) | 5000 /<br>Tape & Reel |
| NRVB440MFSWFT1G | SO-8 FL<br>(Pb-Free) | 1500 /<br>Tape & Reel |
| NRVB440MFSWFT3G | SO-8 FL<br>(Pb-Free) | 5000 /<br>Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# MBR440MFS, NRVB440MFS

## 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>(Rated $V_R$ , $T_C = 165^\circ\text{C}$ )                             | $I_{F(AV)}$                     | 4.0         | A                |
| Peak Repetitive Forward Current,<br>(Rated $V_R$ , Square Wave, 20 kHz, $T_C = 165^\circ\text{C}$ )         | $I_{FRM}$                       | 8.0         | A                |
| Non-Repetitive Peak Surge Current<br>(Surge Applied at Rated Load Conditions Halfwave, Single Phase, 60 Hz) | $I_{FSM}$                       | 40          | A                |
| Storage Temperature Range                                                                                   | $T_{stg}$                       | -65 to +175 | $^\circ\text{C}$ |
| Operating Junction Temperature                                                                              | $T_J$                           | -55 to +175 | $^\circ\text{C}$ |
| Unclamped Inductive Switching Energy (10 mH Inductor, Non-repetitive)                                       | $E_{AS}$                        | 10          | mJ               |
| ESD Rating (Human Body Model)                                                                               |                                 | 3B          |                  |
| ESD Rating (Machine Model)                                                                                  |                                 | M4          |                  |

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.

## THERMAL CHARACTERISTICS

| Characteristic                                                                                                            | Symbol          | Typ | Max | Unit               |
|---------------------------------------------------------------------------------------------------------------------------|-----------------|-----|-----|--------------------|
| Thermal Resistance, Junction-to-Case, Steady State<br>(Assumes 600 mm <sup>2</sup> 1 oz. copper bond pad, on a FR4 board) | $R_{\theta JC}$ | –   | 2.4 | $^\circ\text{C/W}$ |

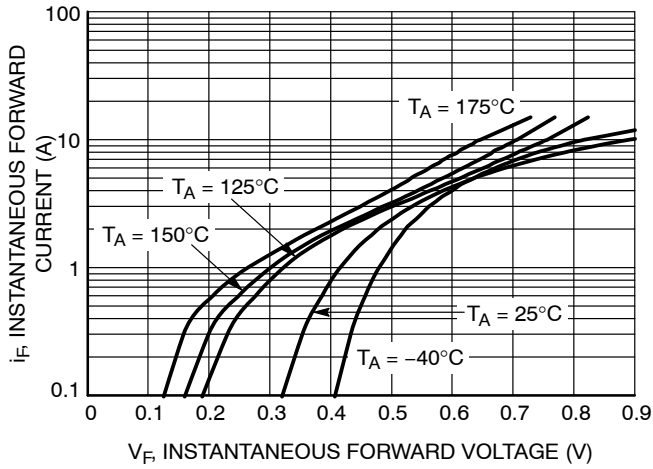
## ELECTRICAL CHARACTERISTICS

|                                                                                                                                           |       |              |              |    |
|-------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------|--------------|----|
| Instantaneous Forward Voltage (Note 1)<br>( $i_F = 4$ Amps, $T_J = 125^\circ\text{C}$ )<br>( $i_F = 4$ Amps, $T_J = 25^\circ\text{C}$ )   | $V_F$ | 0.58<br>0.59 | 0.63<br>0.65 | V  |
| Instantaneous Reverse Current (Note 1)<br>(Rated dc Voltage, $T_J = 125^\circ\text{C}$ )<br>(Rated dc Voltage, $T_J = 25^\circ\text{C}$ ) | $i_R$ | 10<br>0.070  | 15<br>0.8    | mA |

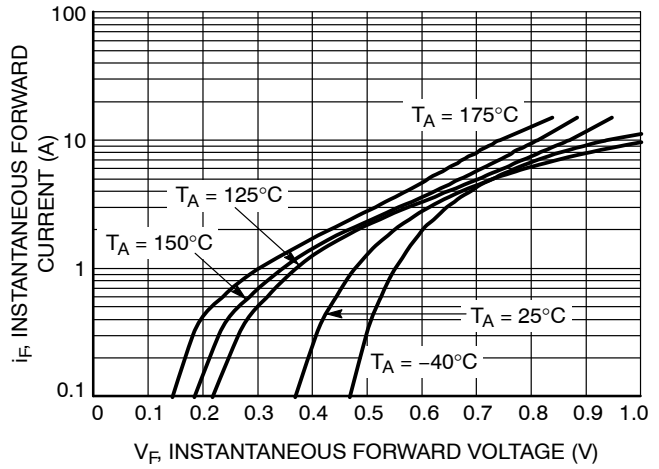
1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

# MBR440MFS, NRVB440MFS

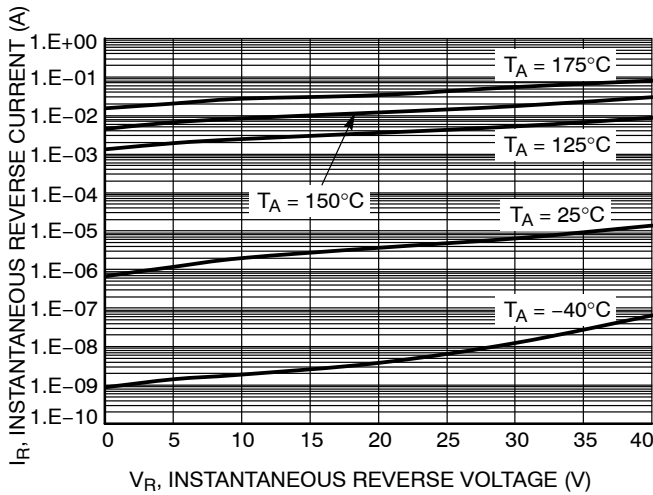
## TYPICAL CHARACTERISTICS



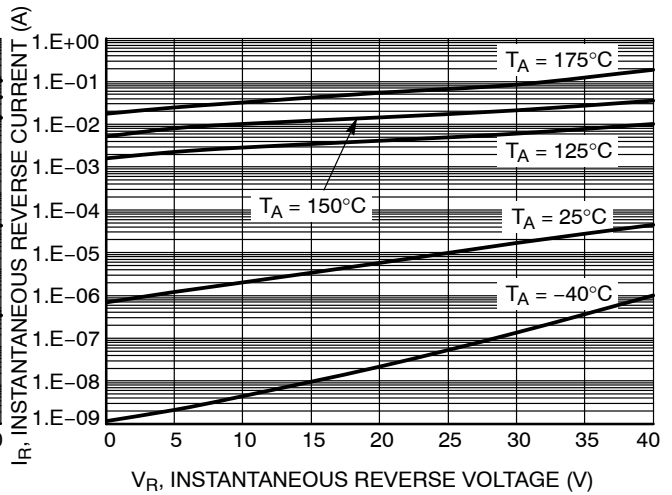
**Figure 1. Typical Instantaneous Forward Characteristics**



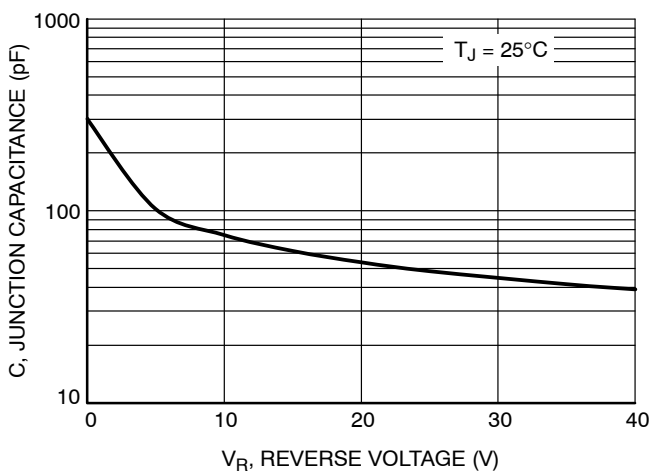
**Figure 2. Maximum Instantaneous Forward Characteristics**



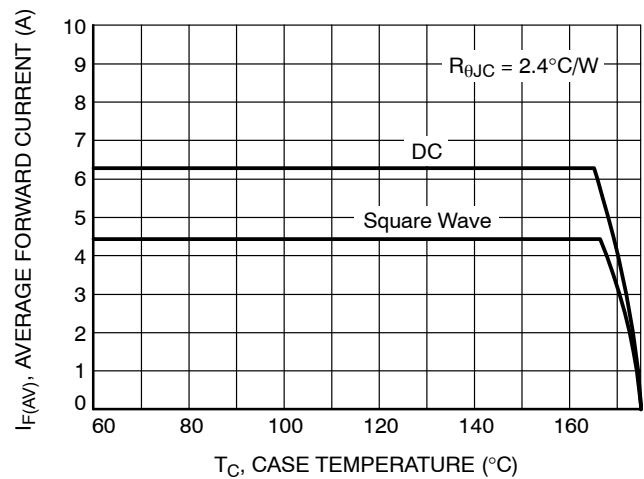
**Figure 3. Typical Reverse Characteristics**



**Figure 4. Maximum Reverse Characteristics**



**Figure 5. Typical Junction Capacitance**



**Figure 6. Current Derating TO-220AB**

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## TYPICAL CHARACTERISTICS

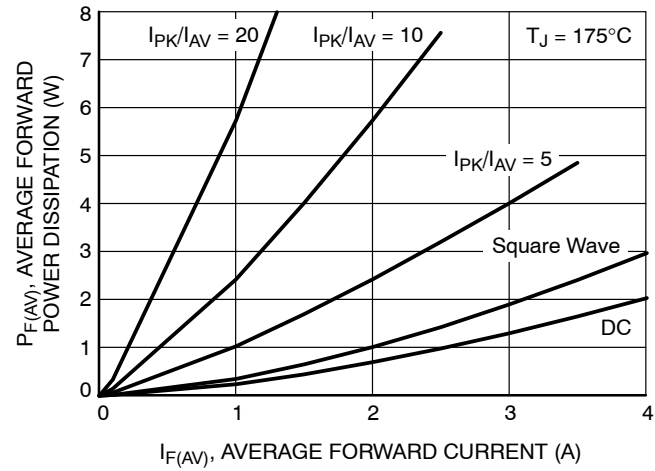


Figure 7. Forward Power Dissipation

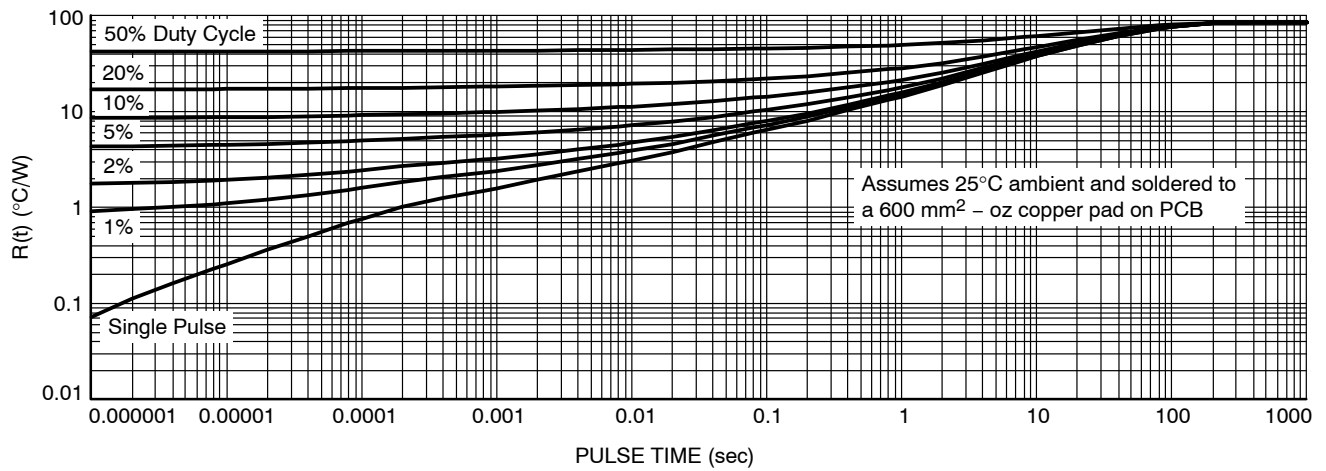


Figure 8. Thermal Characteristics

# MBR440MFS, NRVB440MFS

## PACKAGE DIMENSIONS

DFN5 5x6, 1.27P  
(SO-8FL)  
CASE 488AA  
ISSUE G

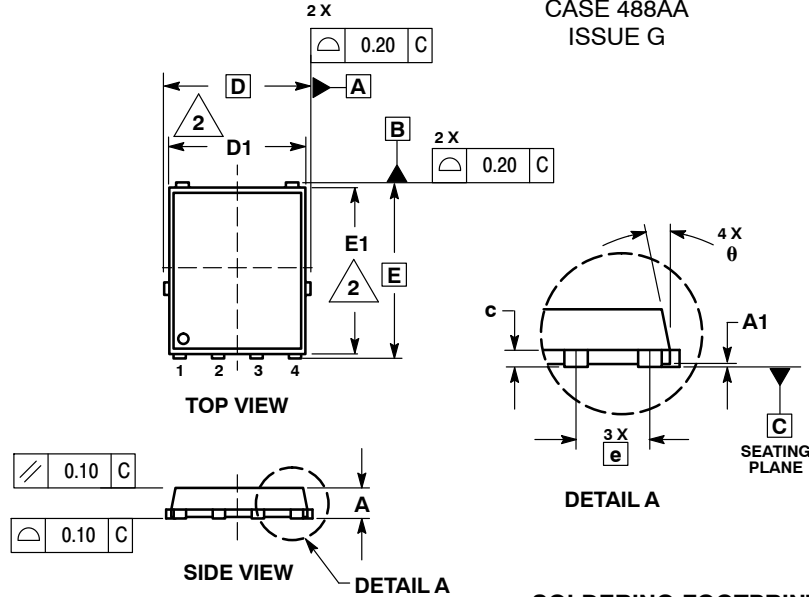
### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

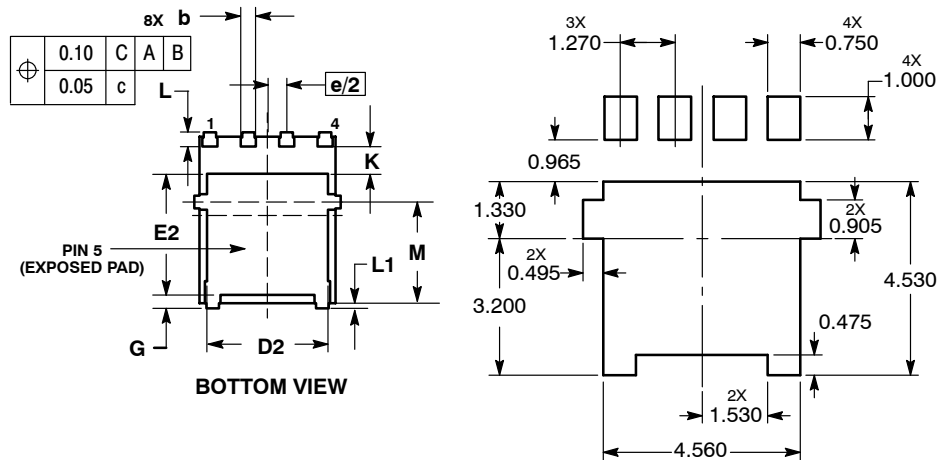
| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN         | NOM  | MAX  |
| A   | 0.90        | 1.00 | 1.10 |
| A1  | 0.00        | ---- | 0.05 |
| b   | 0.33        | 0.41 | 0.51 |
| c   | 0.23        | 0.28 | 0.33 |
| D   | 5.15 BSC    |      |      |
| D1  | 4.50        | 4.90 | 5.10 |
| D2  | 3.50        | ---- | 4.22 |
| E   | 6.15 BSC    |      |      |
| E1  | 5.50        | 5.80 | 6.10 |
| E2  | 3.45        | ---- | 4.30 |
| e   | 1.27 BSC    |      |      |
| G   | 0.51        | 0.61 | 0.71 |
| K   | 1.20        | 1.35 | 1.50 |
| L   | 0.51        | 0.61 | 0.71 |
| L1  | 0.05        | 0.17 | 0.20 |
| M   | 3.00        | 3.40 | 3.80 |
| θ   | 0°          | ---- | 12°  |

### STYLE 2:

- PIN 1. ANODE
- ANODE
- ANODE
- NO CONNECT
- CATHODE



### SOLDERING 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.

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MBR440MFS/D

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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

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moschip.ru\_4

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