

# MBR1635, MBR1645, MBRB1645, NRVBB1645

## Switch-mode Power Rectifiers

### 16 A, 35 and 45 V

These state-of-the-art devices use the Schottky Barrier principle with a platinum barrier metal.

#### Features

- Guard-ring for Stress Protection
- Low Forward Voltage
- 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
- These Devices are Pb-Free and are RoHS Compliant

#### Mechanical Characteristics:

- Case: Epoxy, Molded
- Weight: 1.9 Grams for TO-220  
1.7 Grams for D<sup>2</sup>PAK
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes:  
260°C Max. for 10 Seconds

#### MAXIMUM RATINGS

| Rating  | Symbol      | Value       | Unit             |
|---|-------------|-------------|------------------|
| Peak Repetitive Reverse Voltage   | $V_{RRM}$   |             | V                |
| Working Peak Reverse Voltage  | $V_{RWM}$   |             |                  |
| DC Blocking Voltage   | $V_R$       | 35          |                  |
|   | MBR1635     | 45          |                  |
|   | MBR1645     | 45          |                  |
|   | MBRB1645    | 45          |                  |
| Average Rectified Forward Current Delay<br>(Rated $V_R$ , $T_C = 163^\circ\text{C}$ ) Total Device                          | $I_{F(AV)}$ | 16          | A                |
| Peak Repetitive Forward Current, Per Leg<br>(Rated $V_R$ , Square Wave,<br>20 kHz, $T_C = 157^\circ\text{C}$ ) Total Device | $I_{FRM}$   | 32          | A                |
| Non-Repetitive Peak Surge Current<br>(Surge Applied at Rated Load Conditions<br>Halfwave, Single Phase, 60 Hz)              | $I_{FSM}$   | 150         | A                |
| Peak Repetitive Reverse Surge Current<br>(2.0 $\mu\text{s}$ , 1.0 kHz)  | $I_{RRM}$   | 1.0         | A                |
| Storage Temperature Range   | $T_{stg}$   | -65 to +175 | °C               |
| Operating Junction Temperature (Note 1)   | $T_J$       | -65 to +175 | °C               |
| Voltage Rate of Change (Rated $V_R$ )   | $dv/dt$     | 10,000      | V/ $\mu\text{s}$ |

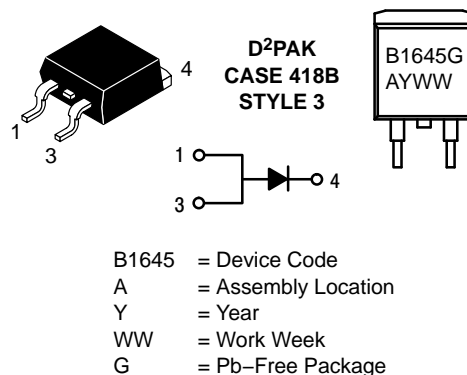
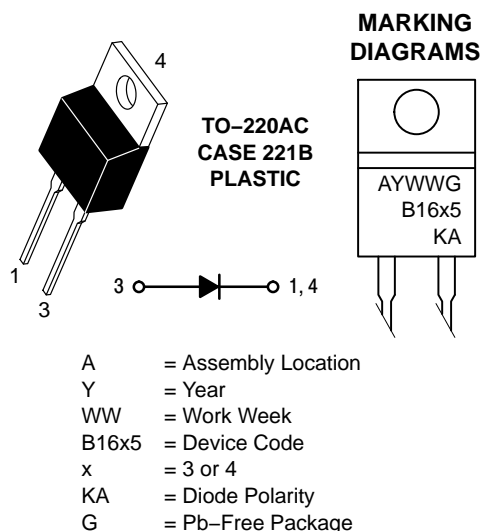
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. The heat generated must be less than the thermal conductivity from Junction-to-Ambient:  $dP_D/dT_J < 1/R_{\theta JA}$ .



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#### ORDERING INFORMATION

| Device       | Package                         | Shipping         |
|--------------|---------------------------------|------------------|
| MBR1635G     | TO-220<br>(Pb-Free)             | 50 Units / Rail  |
| MBR1645G     | TO-220<br>(Pb-Free)             | 50 Units / Rail  |
| MBRB1645T4G  | D <sup>2</sup> PAK<br>(Pb-Free) | 800 Units / Rail |
| NRVBB1645T4G | D <sup>2</sup> PAK<br>(Pb-Free) | 800 Units / Rail |

## MBR1635, MBR1645, MBRB1645, NRVBB1645

### THERMAL CHARACTERISTICS

| Characteristic                               | Symbol          | Value | Unit                 |
|--|-----------------|-------|----------------------|
| Maximum Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 1.5   | $^{\circ}\text{C/W}$ |

### ELECTRICAL CHARACTERISTICS

| Characteristic  | Symbol | Value        | Unit |
|---|--------|--------------|------|
| Maximum Instantaneous Forward Voltage (Note 2)<br>( $i_F = 16$ Amps, $T_C = 125^{\circ}\text{C}$ )<br>( $i_F = 16$ Amps, $T_C = 25^{\circ}\text{C}$ ) | $V_F$  | 0.57<br>0.63 | V    |
| Maximum Instantaneous Reverse Current (Note 2)<br>(Rated dc Voltage, $T_C = 125^{\circ}\text{C}$ )<br>(Rated dc Voltage, $T_C = 25^{\circ}\text{C}$ ) | $i_R$  | 40<br>0.2    | mA   |

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

# MBR1635, MBR1645, MBRB1645, NRVBB1645

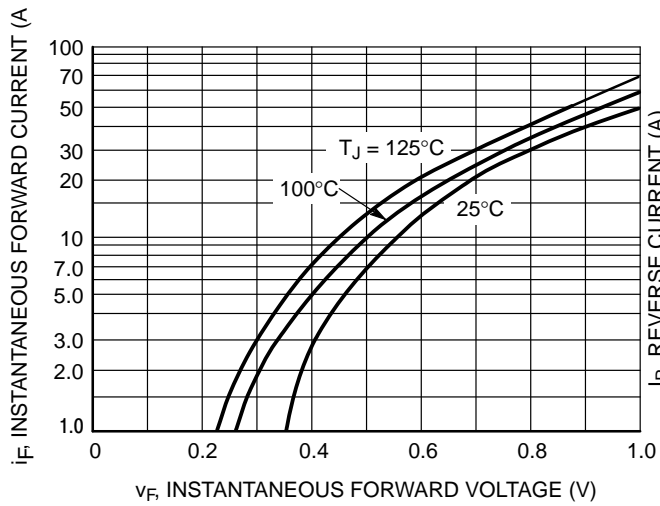


Figure 1. Typical Forward Voltage

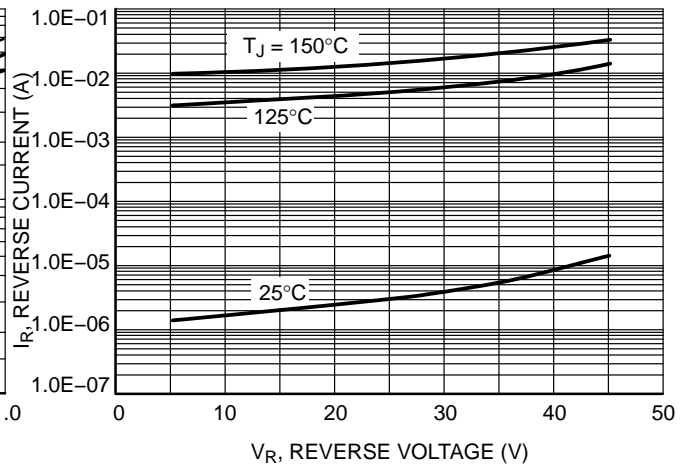


Figure 2. Typical Reverse Current

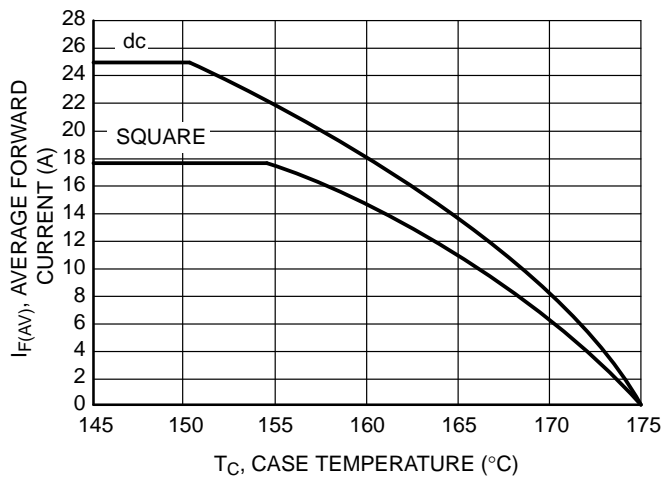


Figure 3. Current Derating, Case, Per Leg

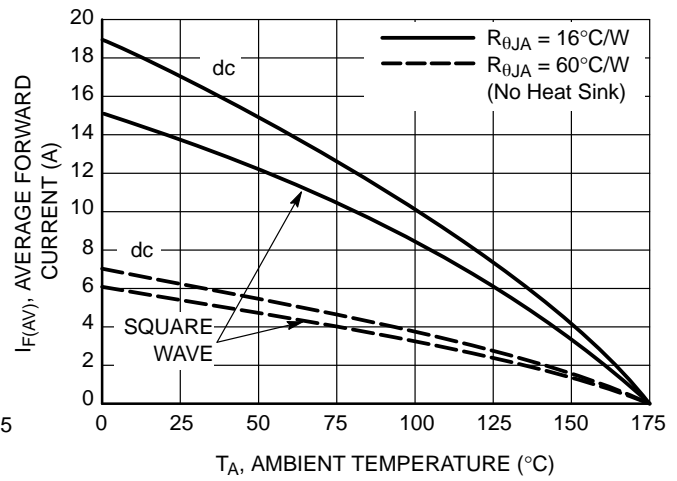


Figure 4. Current Derating, Ambient

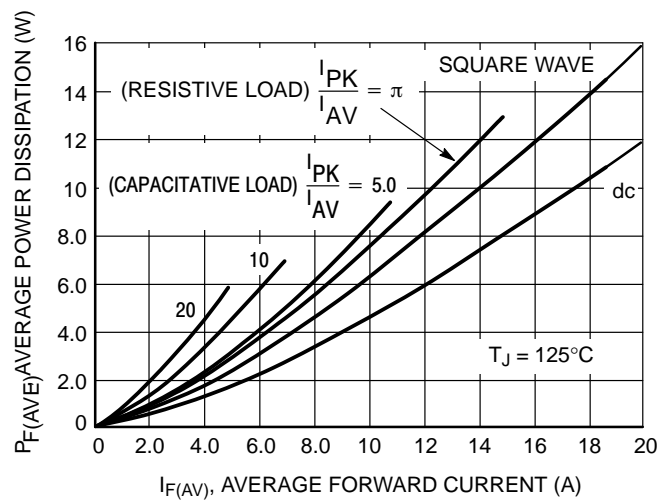


Figure 5. Forward Power Dissipation

# MECHANICAL CASE OUTLINE

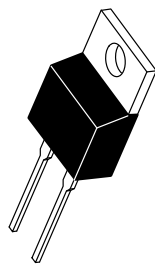
## PACKAGE DIMENSIONS

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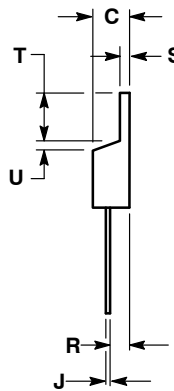
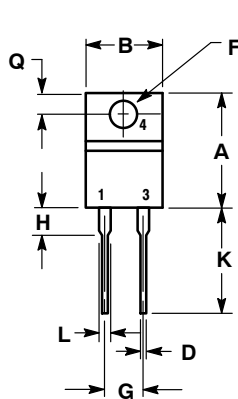


### TO-220, 2-LEAD CASE 221B-04 ISSUE F

DATE 12 APR 2013



SCALE 1:1



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.595  | 0.620 | 15.11       | 15.75 |
| B   | 0.380  | 0.405 | 9.65        | 10.29 |
| C   | 0.160  | 0.190 | 4.06        | 4.82  |
| D   | 0.025  | 0.039 | 0.64        | 1.00  |
| F   | 0.142  | 0.161 | 3.61        | 4.09  |
| G   | 0.190  | 0.210 | 4.83        | 5.33  |
| H   | 0.110  | 0.130 | 2.79        | 3.30  |
| J   | 0.014  | 0.025 | 0.36        | 0.64  |
| K   | 0.500  | 0.562 | 12.70       | 14.27 |
| L   | 0.045  | 0.060 | 1.14        | 1.52  |
| Q   | 0.100  | 0.120 | 2.54        | 3.04  |
| R   | 0.080  | 0.110 | 2.04        | 2.79  |
| S   | 0.045  | 0.055 | 1.14        | 1.39  |
| T   | 0.235  | 0.255 | 5.97        | 6.48  |
| U   | 0.000  | 0.050 | 0.000       | 1.27  |

STYLE 1:  
PIN 1. CATHODE  
2. N/A  
3. ANODE  
4. CATHODE

STYLE 2:  
PIN 1. ANODE  
2. N/A  
3. CATHODE  
4. ANODE

DOCUMENT NUMBER: 98ASB42149B

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DESCRIPTION: TO-220, 2-LEAD

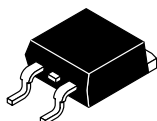
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# MECHANICAL CASE OUTLINE

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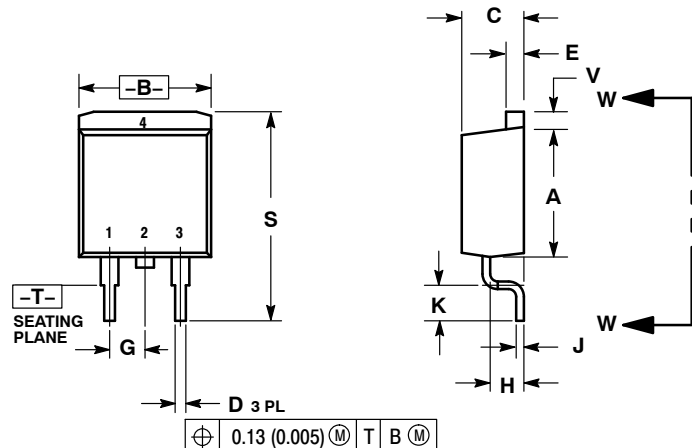
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**D<sup>2</sup>PAK 3**  
CASE 418B-04  
ISSUE L

DATE 17 FEB 2015

SCALE 1:1

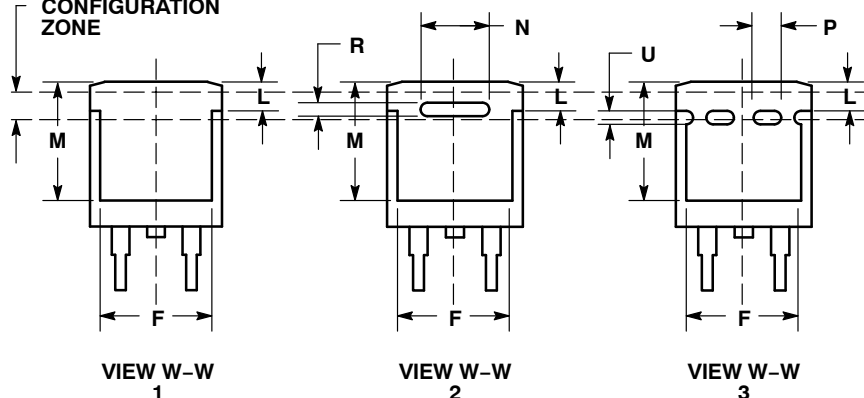


### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 418B-01 THRU 418B-03 OBSOLETE, NEW STANDARD 418B-04.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.340  | 0.380 | 8.64        | 9.65  |
| B   | 0.380  | 0.405 | 9.65        | 10.29 |
| C   | 0.160  | 0.190 | 4.06        | 4.83  |
| D   | 0.020  | 0.035 | 0.51        | 0.89  |
| E   | 0.045  | 0.055 | 1.14        | 1.40  |
| F   | 0.310  | 0.350 | 7.87        | 8.89  |
| G   | 0.100  | BSC   | 2.54        | BSC   |
| H   | 0.080  | 0.110 | 2.03        | 2.79  |
| J   | 0.018  | 0.025 | 0.46        | 0.64  |
| K   | 0.090  | 0.110 | 2.29        | 2.79  |
| L   | 0.052  | 0.072 | 1.32        | 1.83  |
| M   | 0.280  | 0.320 | 7.11        | 8.13  |
| N   | 0.197  | REF   | 5.00        | REF   |
| P   | 0.079  | REF   | 2.00        | REF   |
| R   | 0.039  | REF   | 0.99        | REF   |
| S   | 0.575  | 0.625 | 14.60       | 15.88 |
| V   | 0.045  | 0.055 | 1.14        | 1.40  |

### VARIABLE CONFIGURATION ZONE



#### STYLE 1:

- PIN 1. BASE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

#### STYLE 2:

- PIN 1. GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN

#### STYLE 3:

- PIN 1. ANODE  
2. CATHODE  
3. ANODE  
4. CATHODE

#### STYLE 4:

- PIN 1. GATE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

#### STYLE 5:

- PIN 1. CATHODE  
2. ANODE  
3. CATHODE  
4. ANODE

#### STYLE 6:

- PIN 1. NO CONNECT  
2. CATHODE  
3. ANODE  
4. CATHODE

## MARKING INFORMATION AND FOOTPRINT ON PAGE 2

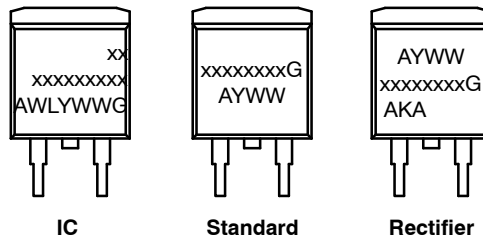
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CASE 418B-04  
ISSUE L

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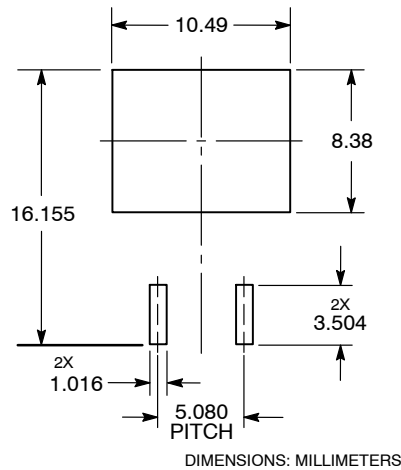
**GENERIC  
MARKING DIAGRAM\***



xx        = Specific Device Code  
A        = Assembly Location  
WL      = Wafer Lot  
Y        = Year  
WW      = Work Week  
G        = Pb-Free Package  
AKA     = Polarity Indicator


\*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.

**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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