

# Switch Mode Power Rectifiers

16 A, 35 and 45 V

## MBR1635, MBR1645, MBRB1645, NRVBB1645

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:

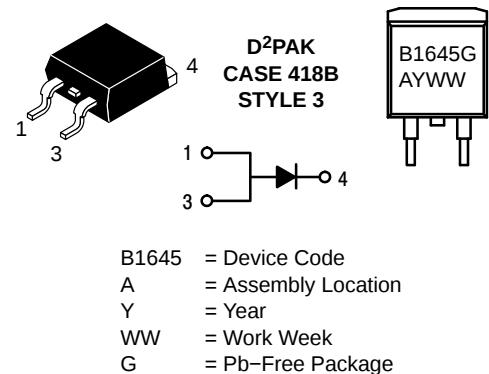
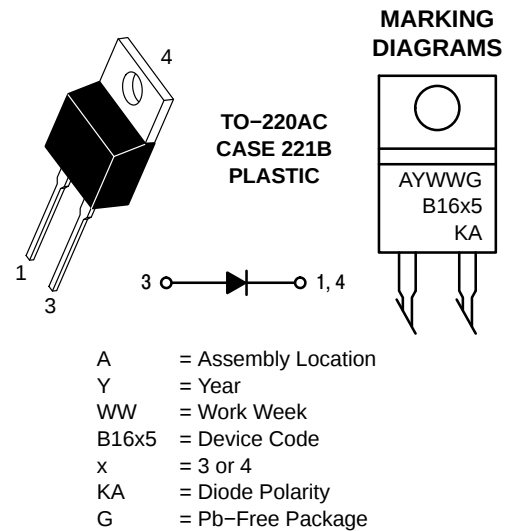
- Case: Epoxy, Molded
- Weight: 1.9 Grams for TO-220  
1.7 Grams for D<sup>2</sup>PAK
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes: 260°C Max. for 10 Seconds

### 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          |                  |
|                                                                                                                          |             | 45          |                  |
|                                                                                                                          |             | 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, 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 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 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.

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



### ORDERING INFORMATION

| Device   | Package             | Shipping        |
|----------|---------------------|-----------------|
| MBR1645G | TO-220<br>(Pb-Free) | 50 Units / Rail |

### DISCONTINUED (Note 1)

|              |                                 |                  |
|--------------|---------------------------------|------------------|
| MBR1635G     | 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 |

1. **DISCONTINUED:** These devices are not recommended for new design. Please contact your onsemi representative for information. The most current information on these devices may be available on [www.onsemi.com](http://www.onsemi.com).

## 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

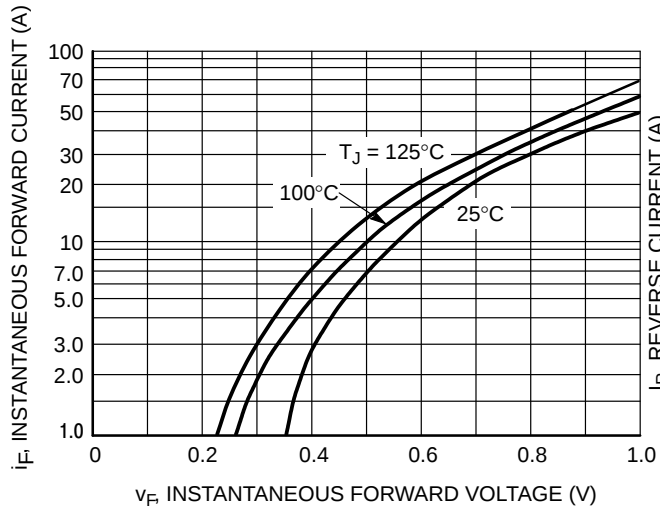


Figure 1. Typical Forward Voltage

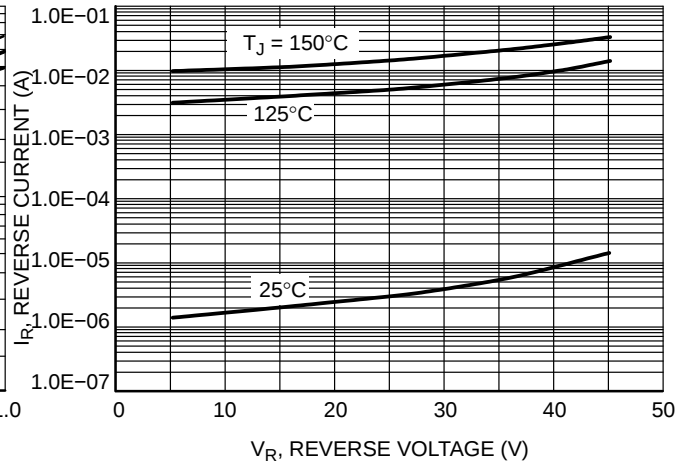


Figure 2. Typical Reverse Current

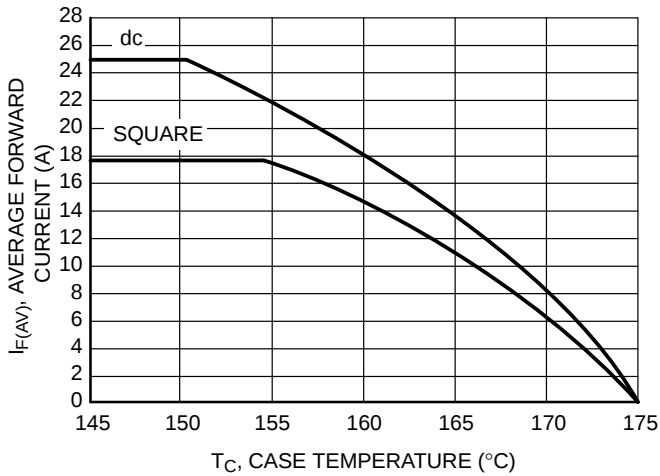


Figure 3. Current Derating, Case, Per Leg

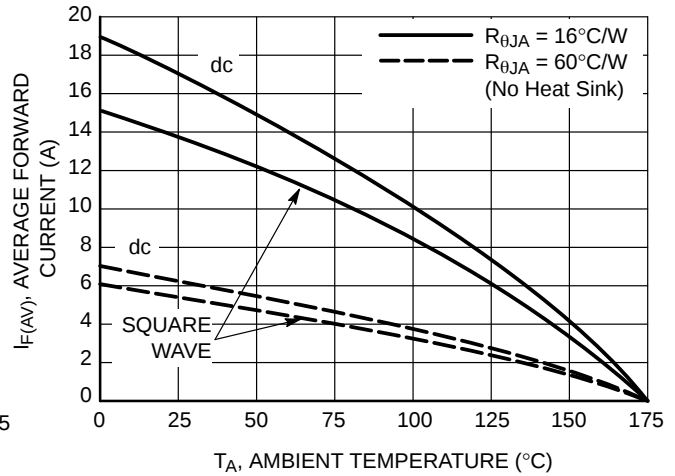


Figure 4. Current Derating, Ambient

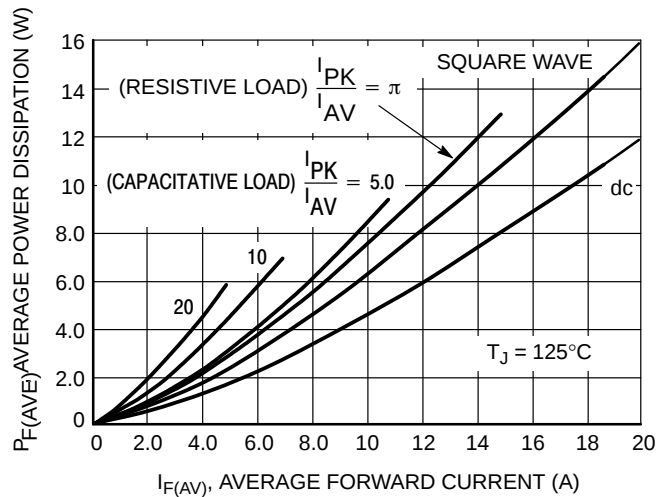
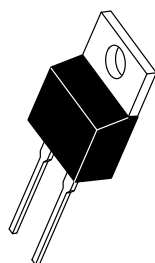
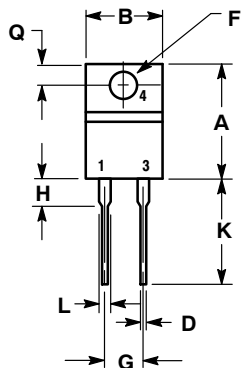


Figure 5. Forward Power Dissipation



SCALE 1:1



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

DATE 12 APR 2013

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

PAGE 1 OF 1

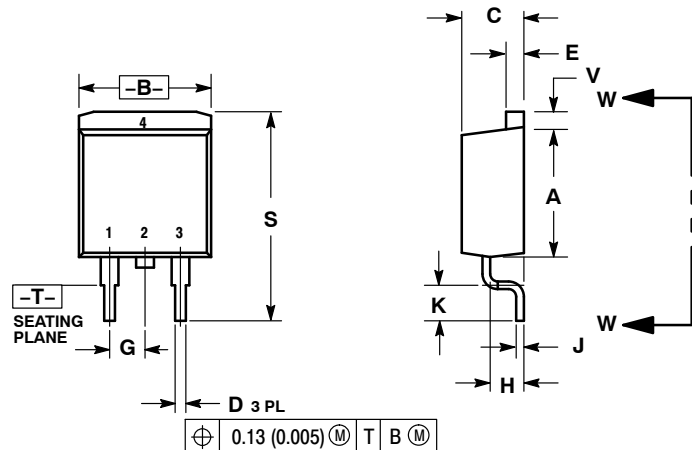
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D<sup>2</sup>PAK 3  
CASE 418B-04  
ISSUE L

DATE 17 FEB 2015

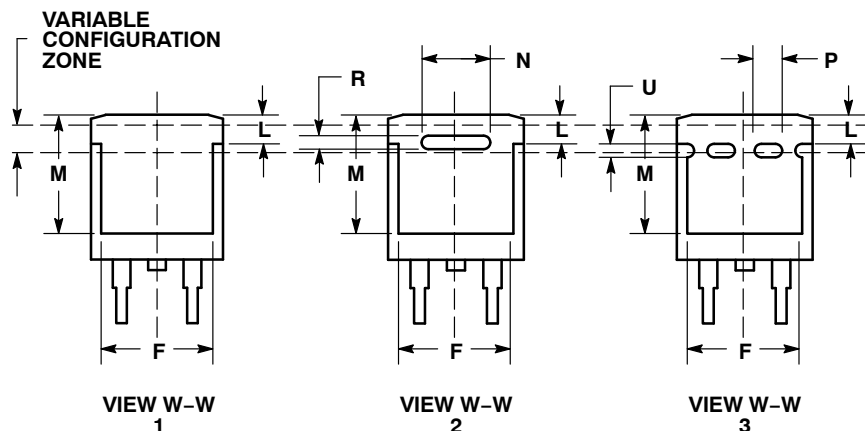
SCALE 1:1



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  |



|                                                                       |                                                              |                                                                  |                                                                       |                                                                  |                                                                       |
|-----------------------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------|
| STYLE 1:<br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR | STYLE 2:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE<br>4. DRAIN | STYLE 3:<br>PIN 1. ANODE<br>2. CATHODE<br>3. ANODE<br>4. CATHODE | STYLE 4:<br>PIN 1. GATE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR | STYLE 5:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE<br>4. ANODE | STYLE 6:<br>PIN 1. NO CONNECT<br>2. CATHODE<br>3. ANODE<br>4. CATHODE |
|-----------------------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------|

MARKING INFORMATION AND FOOTPRINT ON PAGE 2

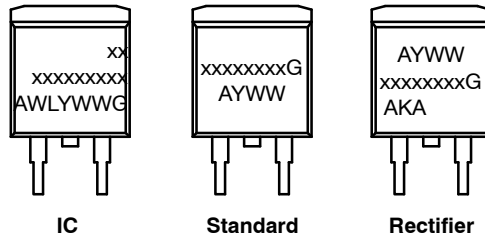
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**D<sup>2</sup>PAK 3**  
CASE 418B-04  
ISSUE L

DATE 17 FEB 2015

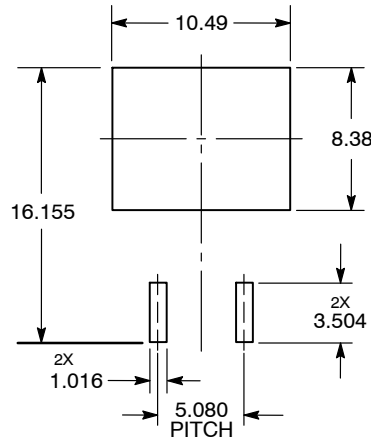
**GENERIC  
MARKING DIAGRAM\***



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. Some products may not follow the Generic Marking.

**SOLDERING FOOTPRINT\***



DIMENSIONS: MILLIMETERS

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

|                         |                           |                                                                                                                                                                                     |
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