

Switch-mode Power Rectifier

60 V, 30 A

**MBRB30H60CT-1G,
 MBRB30H60CTT4G,
 NRVBB30H60CTT4G,**

Features and Benefits

- Low Forward Voltage
- Low Power Loss/High Efficiency
- High Surge Capacity
- 175°C Operating Junction Temperature
- 30 A Total (15 A Per Diode Leg)
- Guard-Ring for Stress Protection
- AEC-Q101 Qualified and PPAP Capable
- NRVBB Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These are Pb-Free and Halide Free Devices*

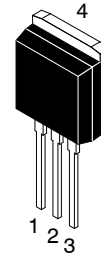
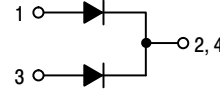
Applications

- Power Supply – Output Rectification
- Power Management
- Instrumentation

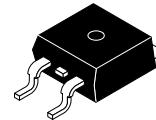
Mechanical Characteristics:

- Case: Epoxy, Molded
- Epoxy Meets UL 94 V-0 @ 0.125 in
- Weight (Approximately): 1.5 Grams (I²PAK)
 1.7 Grams (D²PAK)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes:
 260°C Max. for 10 Seconds

SCHOTTKY BARRIER RECTIFIERS 30 AMPERES, 60 VOLTS



I²PAK (TO-262)
 CASE 418D-01
 PLASTIC
 STYLE 3



D²PAK 3
 CASE 418B-04

ORDERING AND MARKING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

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

MBRB30H60CT-1G, MBRB30H60CTT4G, NRVB30H60CTT4G,

MAXIMUM RATINGS (Per Diode Leg)

| Rating | Symbol | Value | Unit |
|--|---------------------------------|-----------------|------------------|
| Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage | V_{RRM} V_{RWM} V_R | 60 | V |
| Average Rectified Forward Current (Rated V_R , $T_C = 159^\circ\text{C}$) | $I_{F(AV)}$ | 15 | A |
| Peak Repetitive Forward Current (Rated V_R , Square Wave, 20 kHz) | I_{FRM} | 30 | A |
| Nonrepetitive Peak Surge Current (Surge applied at rated load conditions halfwave, single phase, 60 Hz) | I_{FSM} | 260 | A |
| Operating Junction Temperature (Note 1) | T_J | -55 to +175 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55 to +175 | $^\circ\text{C}$ |
| Voltage Rate of Change (Rated V_R) | dv/dt | 10,000 | V/ μs |
| Controlled Avalanche Energy (see test conditions in Figures 11 and 12) | W_{AVAIL} | 350 | mJ |
| ESD Ratings: Machine Model = C Human Body Model = 3B | | > 400 > 8000 | V |

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: $dP_D/dT_J < 1/R_{\theta JA}$.

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------|---------------------------|
| Maximum Thermal Resistance (MBRB30H60CT-1G) Junction-to-Case | $R_{\theta JC}$ | 2.0 | $^\circ\text{C}/\text{W}$ |
| Junction-to-Ambient (MBRB30H60CTT4G and NRVB30H60CTT4G) | $R_{\theta JA}$ | 70 | |
| Junction-to-Case | $R_{\theta JC}$ | 1.6 | |

ELECTRICAL CHARACTERISTICS (Per Diode Leg)

| Characteristic | Symbol | Value | Unit |
|--|--------|------------------------------|------|
| Maximum Instantaneous Forward Voltage (Note 2) ($I_F = 15\text{ A}$, $T_C = 25^\circ\text{C}$) ($I_F = 15\text{ A}$, $T_C = 125^\circ\text{C}$) ($I_F = 30\text{ A}$, $T_C = 25^\circ\text{C}$) ($I_F = 30\text{ A}$, $T_C = 125^\circ\text{C}$) | v_F | 0.62 0.56 0.78 0.71 | V |
| Maximum Instantaneous Reverse Current (Note 2) (Rated DC Voltage, $T_C = 25^\circ\text{C}$) (Rated DC Voltage, $T_C = 125^\circ\text{C}$) | i_R | 0.3 45 | mA |

2. Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.

MBRB30H60CT-1G, MBRB30H60CTT4G, NRVB30H60CTT4G,

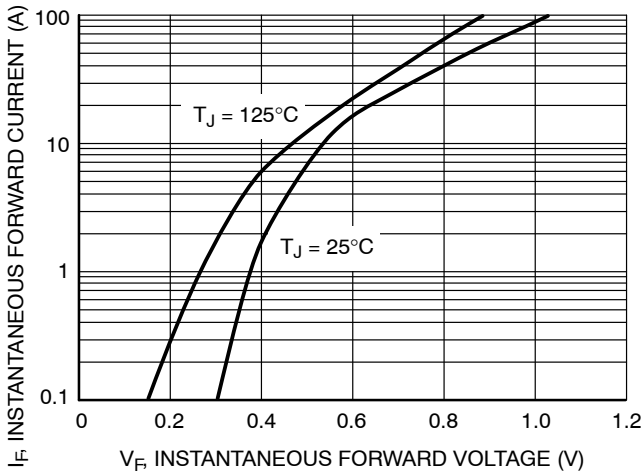


Figure 1. Typical Forward Voltage

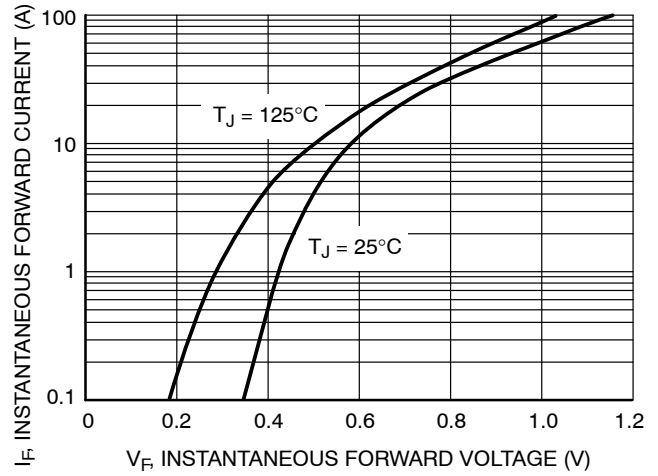


Figure 2. Maximum Forward Voltage

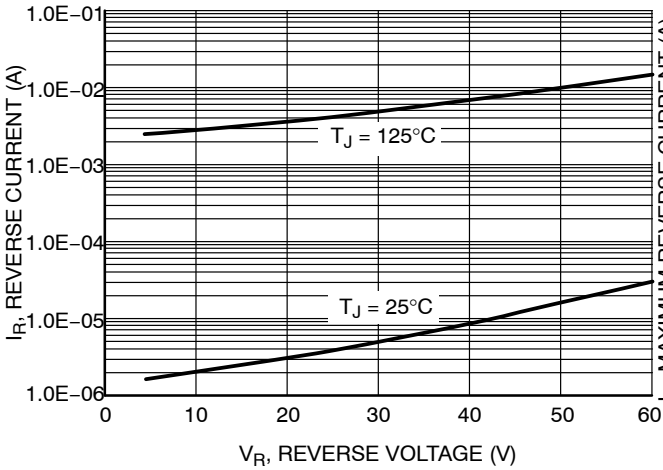


Figure 3. Typical Reverse Current

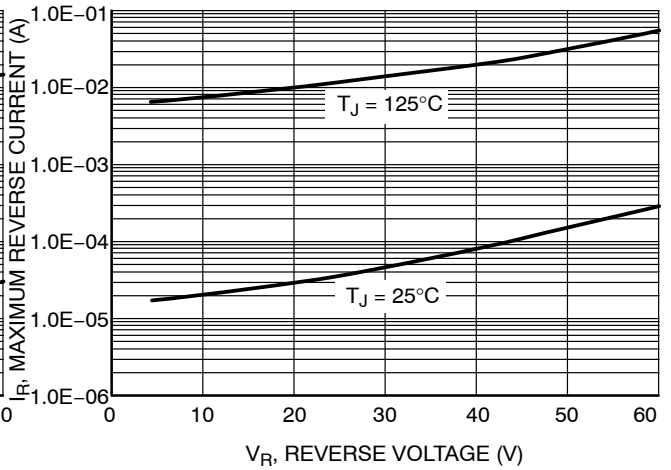
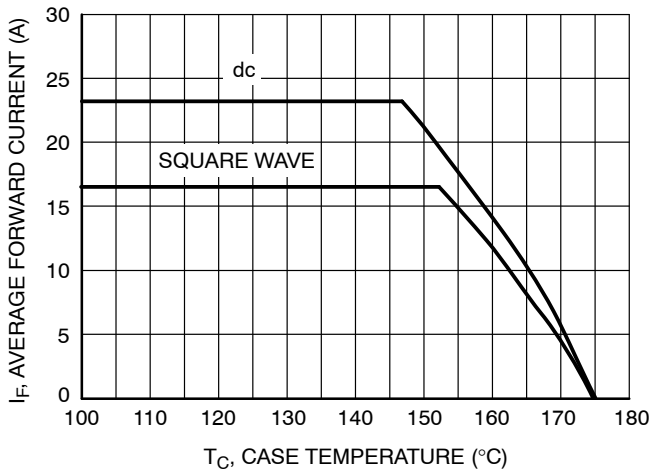


Figure 4. Maximum Reverse Current



**Figure 5. Current Derating for
MBRB30H60CT-1G, MBR30H60CTG,
MBRB30H60CTT4G and NRVB30H60CTT4G**

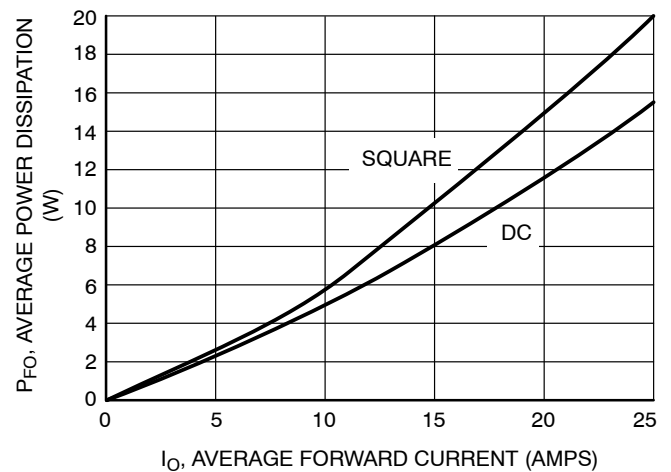


Figure 6. Forward Power Dissipation

MBRB30H60CT-1G, MBRB30H60CTT4G, NRVBB30H60CTT4G,

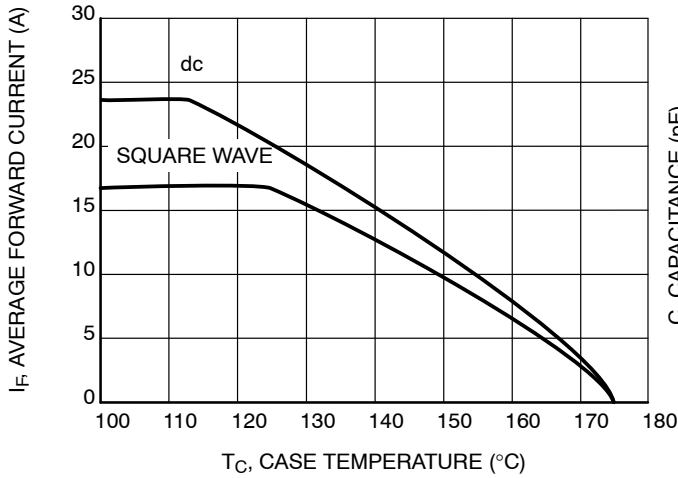


Figure 8. Current Derating for MBRF30H60CTG and MBRJ30H60CTG

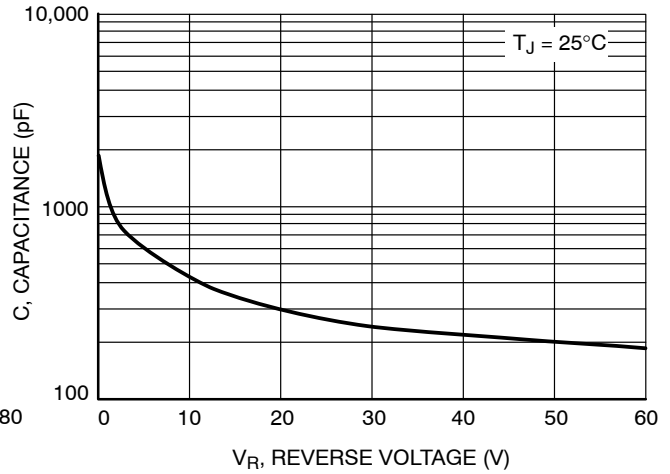


Figure 7. Capacitance

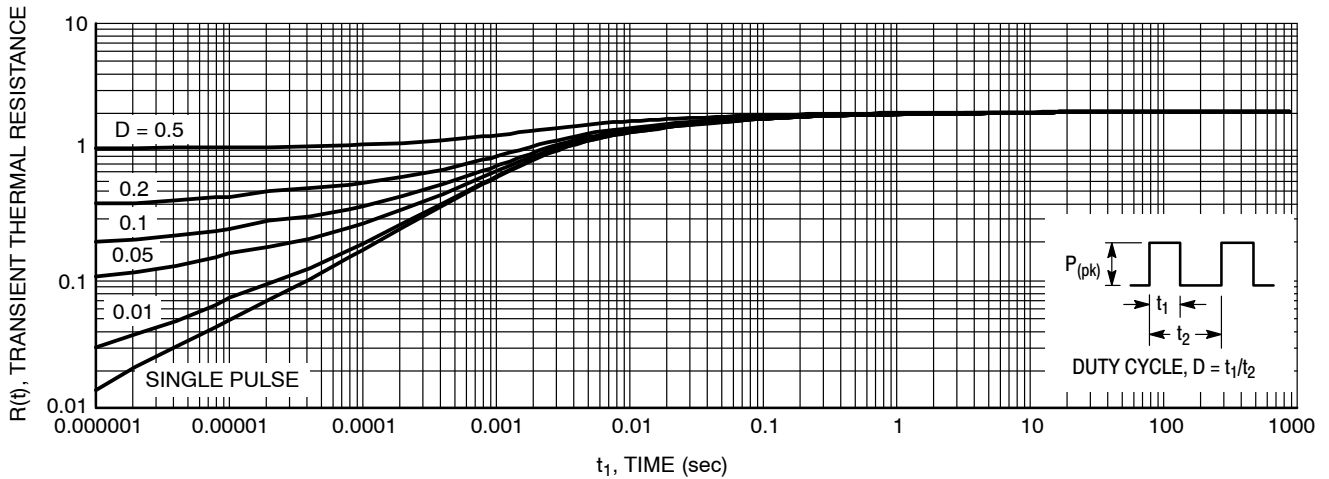


Figure 9. Thermal Response Junction-to-Case for MBRB30H60CT-1G, MBR30H60CTG, MBRB30H60CTT4G and NRVBB30H60CTT4G

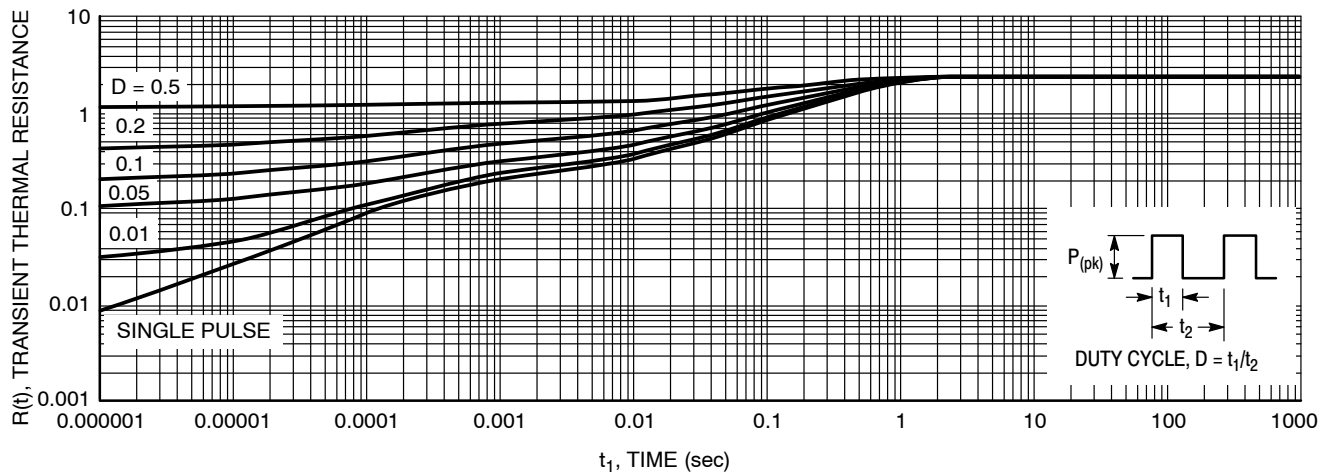


Figure 10. Thermal Response Junction-to-Case for MBRF30H60CTG and MBRJ30H60CTG

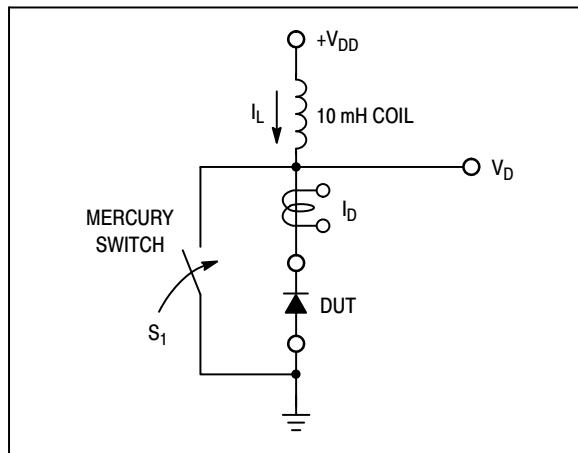


Figure 11. Test Circuit

The unclamped inductive switching circuit shown in Figure 11 was used to demonstrate the controlled avalanche capability of this device. A mercury switch was used instead of an electronic switch to simulate a noisy environment when the switch was being opened.

When S_1 is closed at t_0 the current in the inductor I_L ramps up linearly; and energy is stored in the coil. At t_1 the switch is opened and the voltage across the diode under test begins to rise rapidly, due to di/dt effects, when this induced voltage reaches the breakdown voltage of the diode, it is clamped at BV_{DUT} and the diode begins to conduct the full load current which now starts to decay linearly through the diode, and goes to zero at t_2 .

By solving the loop equation at the point in time when S_1 is opened; and calculating the energy that is transferred to the diode it can be shown that the total energy transferred is equal to the energy stored in the inductor plus a finite amount of energy from the V_{DD} power supply while the diode is in breakdown (from t_1 to t_2) minus any losses due to finite component resistances. Assuming the component resistive

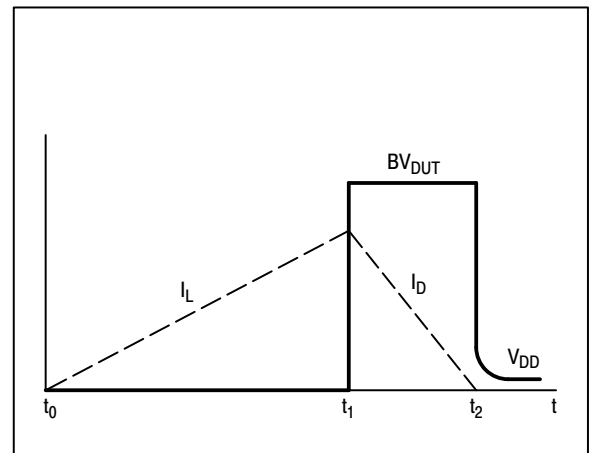


Figure 12. Current-Voltage Waveforms

elements are small Equation (1) approximates the total energy transferred to the diode. It can be seen from this equation that if the V_{DD} voltage is low compared to the breakdown voltage of the device, the amount of energy contributed by the supply during breakdown is small and the total energy can be assumed to be nearly equal to the energy stored in the coil during the time when S_1 was closed, Equation (2).

EQUATION (1):

$$W_{AVAL} \approx \frac{1}{2} L I_{LPK}^2 \left(\frac{BV_{DUT}}{BV_{DUT} - V_{DD}} \right)$$

EQUATION (2):

$$W_{AVAL} \approx \frac{1}{2} L I_{LPK}^2$$

MBRB30H60CT-1G, MBRB30H60CTT4G, NRVBB30H60CTT4G,

MARKING DIAGRAMS



I²PAK (TO-262)



D²PAK

B30H60 = Device Code
 A = Assembly Location
 Y = Year
 WW = Work Week
 G = Pb-Free Package
 AKA = Polarity Designator

ORDERING INFORMATION

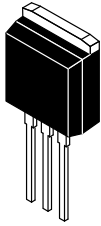
| Device | Package | Shipping [†] |
|-----------------|---------------------------------|-----------------------|
| MBRB30H60CT-1G | TO-262 (Pb-Free) | 50 Units / Tube |
| MBRB30H60CTT4G | D ² PAK (Pb-Free) | 800 / Tape & Reel |
| NRVBB30H60CTT4G | D ² PAK (Pb-Free) | 800 / Tape & Reel |

[†]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](#).

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

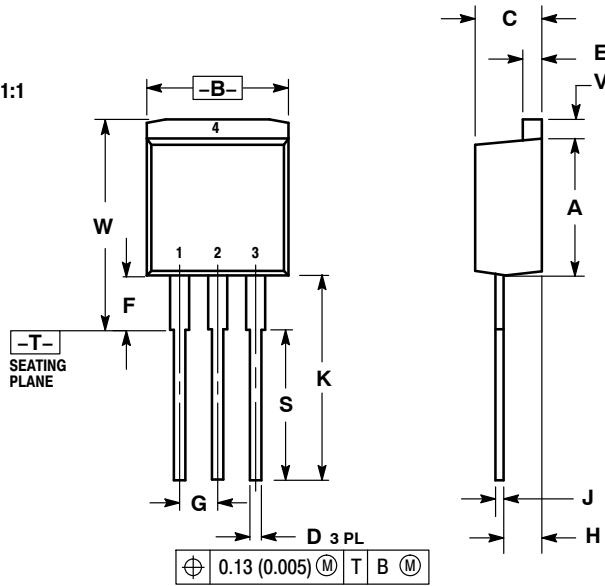
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SCALE 1:1

I²PAK (TO-262)
CASE 418D-01
ISSUE D

DATE 16 OCT 2007



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

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.335 | 0.380 | 8.51 | 9.65 |
| B | 0.380 | 0.406 | 9.65 | 10.31 |
| C | 0.160 | 0.185 | 4.06 | 4.70 |
| D | 0.026 | 0.035 | 0.66 | 0.89 |
| E | 0.045 | 0.055 | 1.14 | 1.40 |
| F | 0.122 REF | | 3.10 REF | |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.094 | 0.110 | 2.39 | 2.79 |
| J | 0.013 | 0.025 | 0.33 | 0.64 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| S | 0.390 REF | | 9.90 REF | |
| V | 0.045 | 0.070 | 1.14 | 1.78 |
| W | 0.522 | 0.551 | 13.25 | 14.00 |

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

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MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

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D²PAK 3
CASE 418B-04
ISSUE L

DATE 17 FEB 2015

SCALE 1:1

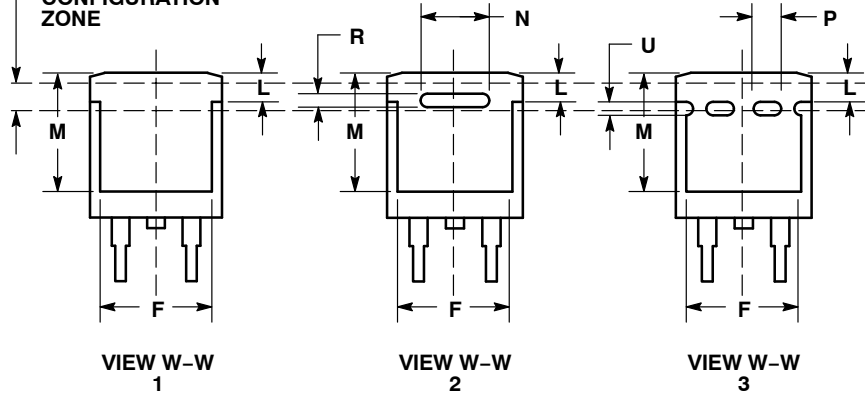


NOTES:

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 |
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MARKING INFORMATION AND FOOTPRINT ON PAGE 2

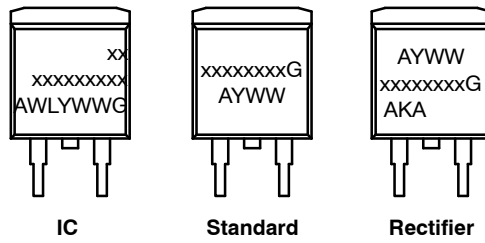
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CASE 418B-04
ISSUE L

DATE 17 FEB 2015

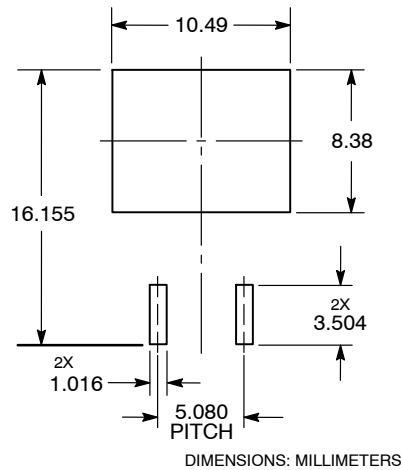
**GENERIC
MARKING DIAGRAM***



- 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.

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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