

# Switch-mode Power Rectifier

60 V, 20 A

**MBR20L60CTG**  
**MBRF20L60CTG**

## Features and Benefits

- Low Power Loss/High Efficiency
- High Surge Capacity
- 20 A Total (10 A Per Diode Leg)
- Guard-Ring for Stress Protection
- These Devices are Pb-Free and are RoHS Compliant\*

## Applications

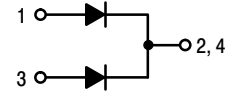
- Power Supply – Output Rectification
- Power Management
- Instrumentation

## Mechanical Characteristics:

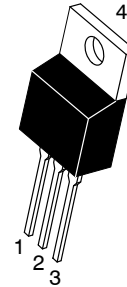
- Case: Epoxy, Molded
- Epoxy Meets UL 94 V-0 @ 0.125 in
- Weight: 1.9 Grams (Approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes: 260°C Max. for 10 Seconds
- Shipped 50 Units Per Plastic Tube

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

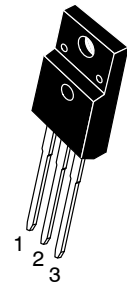
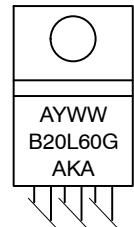
**SCHOTTKY BARRIER  
RECTIFIER  
20 AMPERES  
60 VOLTS**



## MARKING DIAGRAM



**TO-220  
CASE 221A  
STYLE 6**



**TO-220 FULLPAK™  
CASE 221D**



A = Assembly Location  
Y = Year  
WW = Work Week  
B20L60 = Device Code  
G = Pb-Free Package  
AKA = Polarity Designator

## ORDERING INFORMATION

| Device       | Package               | Shipping        |
|--------------|-----------------------|-----------------|
| MBR20L60CTG  | TO-220<br>(Pb-Free)   | 50 Units / Rail |
| MBRF20L60CTG | TO-220FP<br>(Pb-Free) | 50 Units / Rail |

# MBR20L60CTG MBRF20L60CTG

## MAXIMUM RATINGS (Per Diode Leg)

| Rating                                                                                                                                                                | Symbol                          | Value           | Unit             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-----------------|------------------|
| Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage                                                                                | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | 60              | V                |
| Average Rectified Forward Current<br>MBR20L60CT (Rated $V_R$ ) $T_C = 138^\circ\text{C}$ Per Diode<br>MBRF20L60CT (Rated $V_R$ ) $T_C = 123^\circ\text{C}$ Per Device | $I_{F(AV)}$                     | 10<br>20        | A                |
| Nonrepetitive Peak Surge Current<br>(Surge applied at rated load conditions halfwave, single phase, 60 Hz)                                                            | $I_{FSM}$                       | 240             | A                |
| Operating Junction Temperature (Note 1)                                                                                                                               | $T_J$                           | -55 to +150     | $^\circ\text{C}$ |
| Storage Temperature                                                                                                                                                   | $T_{stg}$                       | -65 to +175     | $^\circ\text{C}$ |
| ESD Ratings:<br>Machine Model = C<br>Human Body Model = 3B                                                                                                            |                                 | > 400<br>> 8000 | V                |
| Maximum Repetitive Peak Avalanche Voltage<br>( $t_p < 1 \mu\text{s}$ , $T_J < 150^\circ\text{C}$ , $I_{AR} < 51 \text{ A}$ )                                          | $V_{ARM}$                       | 85              | V                |
| Maximum Single-Pulse Peak Avalanche Voltage<br>( $t_p < 1 \mu\text{s}$ , $T_J < 150^\circ\text{C}$ , $I_{AR} < 51 \text{ A}$ )                                        | $V_{ASM}$                       | 85              | 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<br>MBR20L60CTG<br>- Junction-to-Case<br>- Junction-to-Ambient | $R_{\theta JC}$<br>$R_{\theta JA}$ | 2.3<br>70 | $^\circ\text{C/W}$ |
| MBRF20L60CTG<br>- Junction-to-Case<br>- Junction-to-Ambient                              | $R_{\theta JC}$<br>$R_{\theta JA}$ | 5.2<br>75 |                    |

## ELECTRICAL CHARACTERISTICS (Per Diode Leg)

| Characteristic                                                                                                                                                                                                                                                               | Symbol | Typ                          | Max                          | Unit                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------------------------|------------------------------|---------------------|
| Maximum Instantaneous Forward Voltage (Note 2)<br>( $I_F = 10 \text{ A}$ , $T_C = 25^\circ\text{C}$ )<br>( $I_F = 10 \text{ A}$ , $T_C = 125^\circ\text{C}$ )<br>( $I_F = 20 \text{ A}$ , $T_C = 25^\circ\text{C}$ )<br>( $I_F = 20 \text{ A}$ , $T_C = 125^\circ\text{C}$ ) | $V_F$  | 0.53<br>0.49<br>0.68<br>0.64 | 0.57<br>0.54<br>0.73<br>0.69 | V                   |
| Maximum Instantaneous Reverse Current (Note 2)<br>(Rated DC Voltage, $T_C = 25^\circ\text{C}$ )<br>(Rated DC Voltage, $T_C = 125^\circ\text{C}$ )                                                                                                                            | $I_R$  | 118<br>52                    | 380<br>96                    | $\mu\text{A}$<br>mA |

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.

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

# MBR20L60CTG MBRF20L60CTG

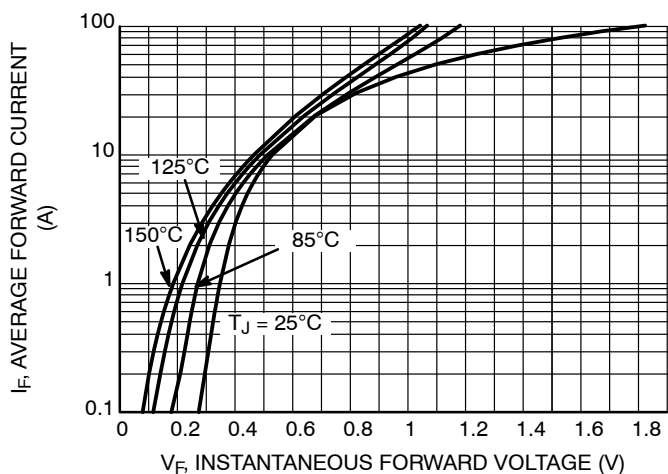


Figure 1. Typical Forward Voltage

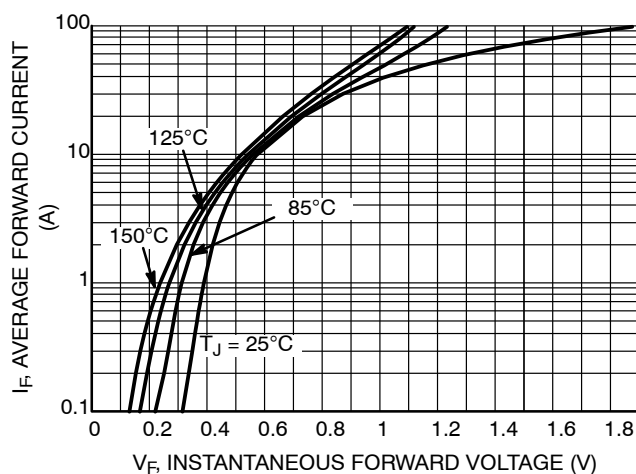


Figure 2. Maximum Forward Voltage

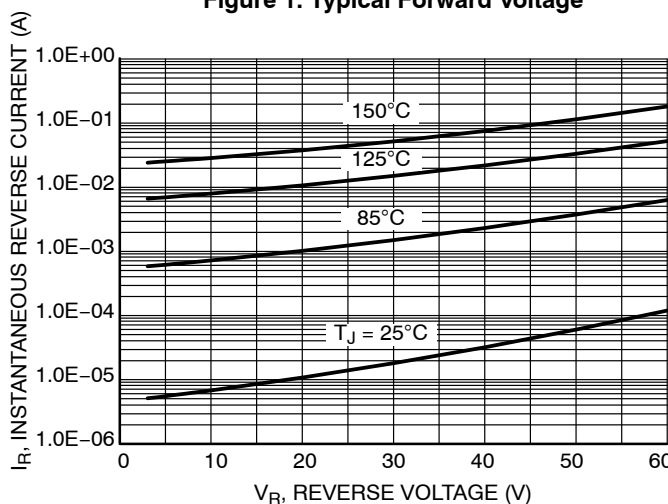


Figure 3. Typical Reverse Current

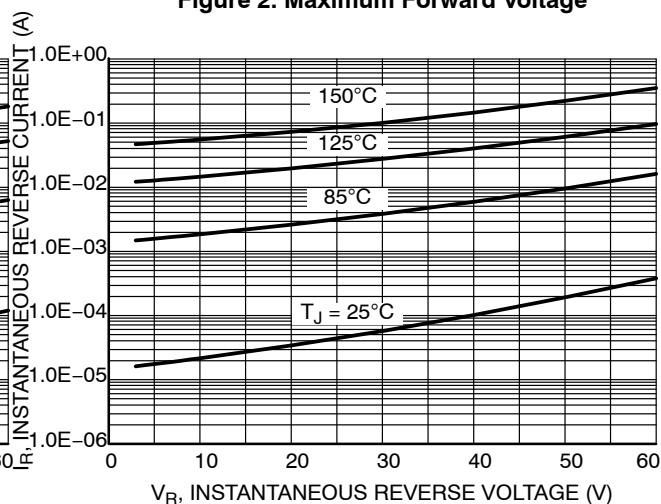


Figure 4. Maximum Reverse Current

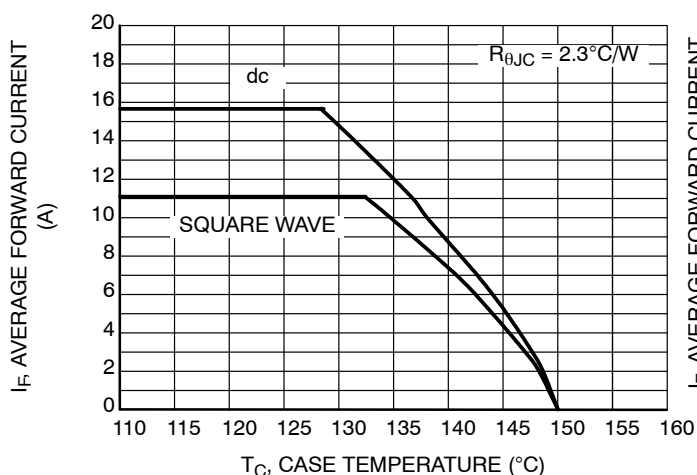


Figure 5. Current Derating, Case per Leg  
MBR20L60CT

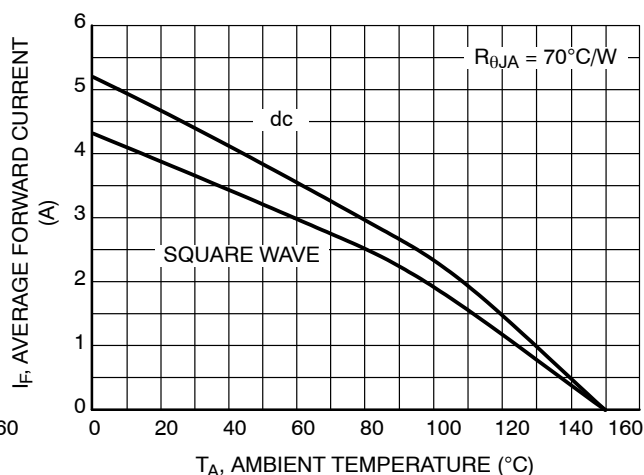
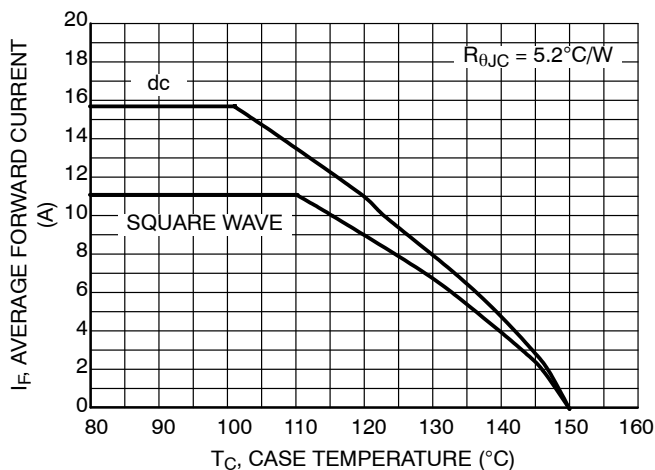
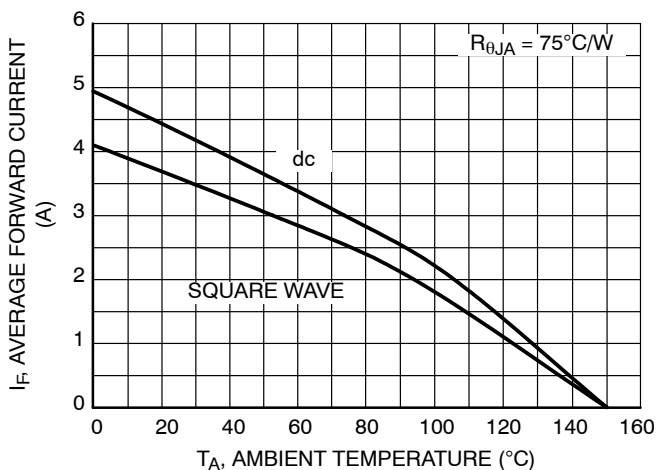


Figure 6. Current Derating, Ambient per Leg  
MBR20L60CT

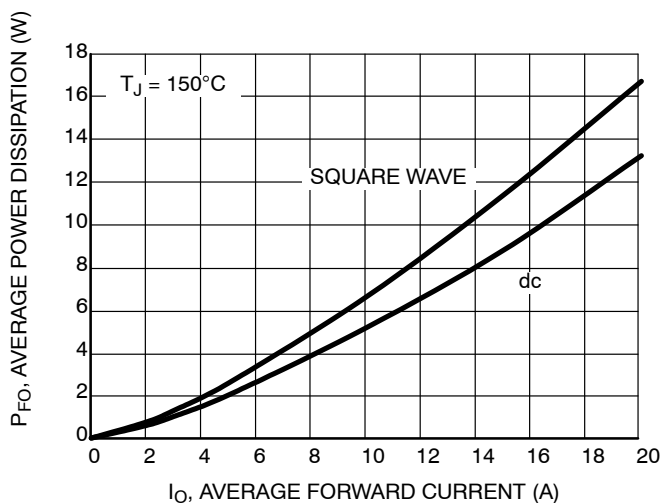
# MBR20L60CTG MBRF20L60CTG



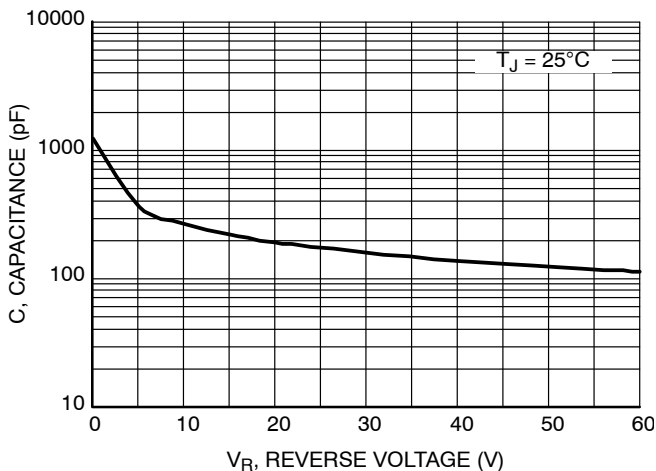
**Figure 7. Current Derating, Case per Leg  
MBRF20L60CT**



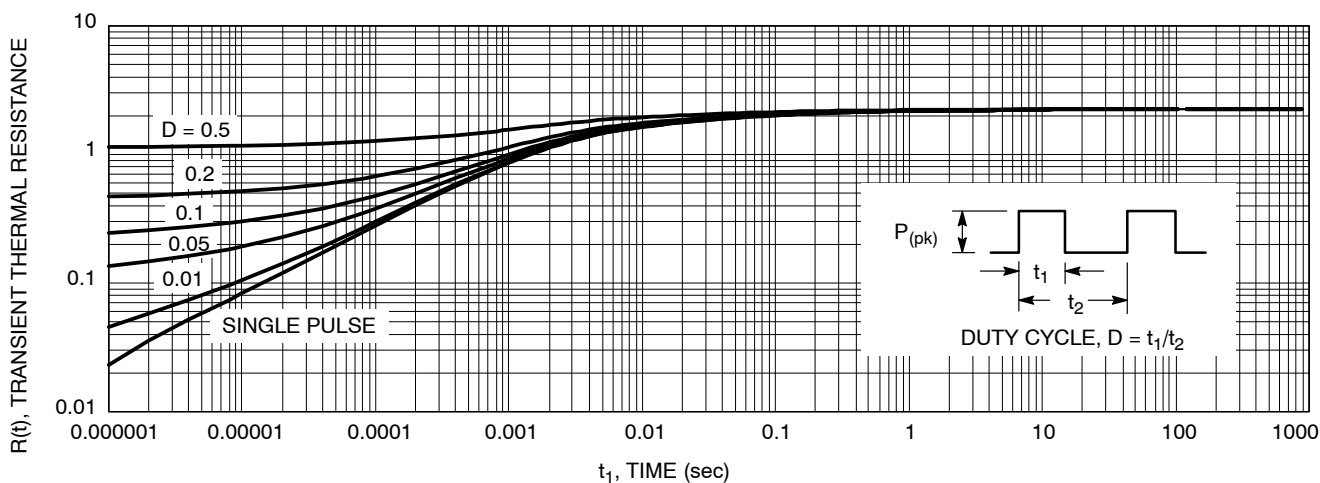
**Figure 8. Current Derating, Ambient per Leg  
MBRF20L60CT**



**Figure 9. Forward Power Dissipation**



**Figure 10. Capacitance**



**Figure 11. Thermal Response Junction-to-Case, per Leg for MBR20L60CT**

## MBR20L60CTG MBRF20L60CTG

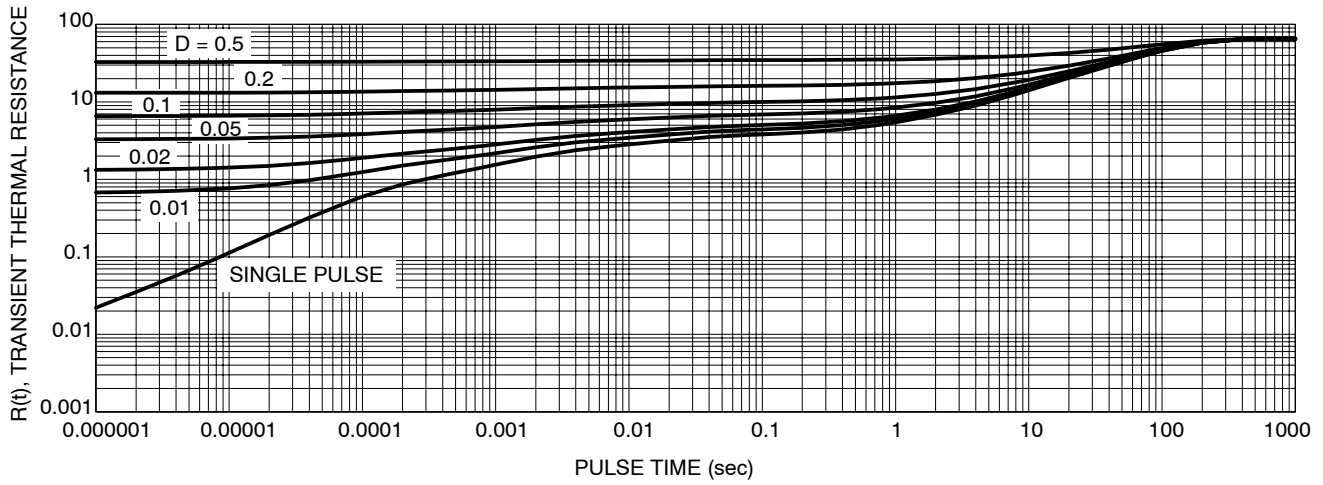


Figure 12. Thermal Response Junction-to-Ambient, per Leg for MBR20L60CT

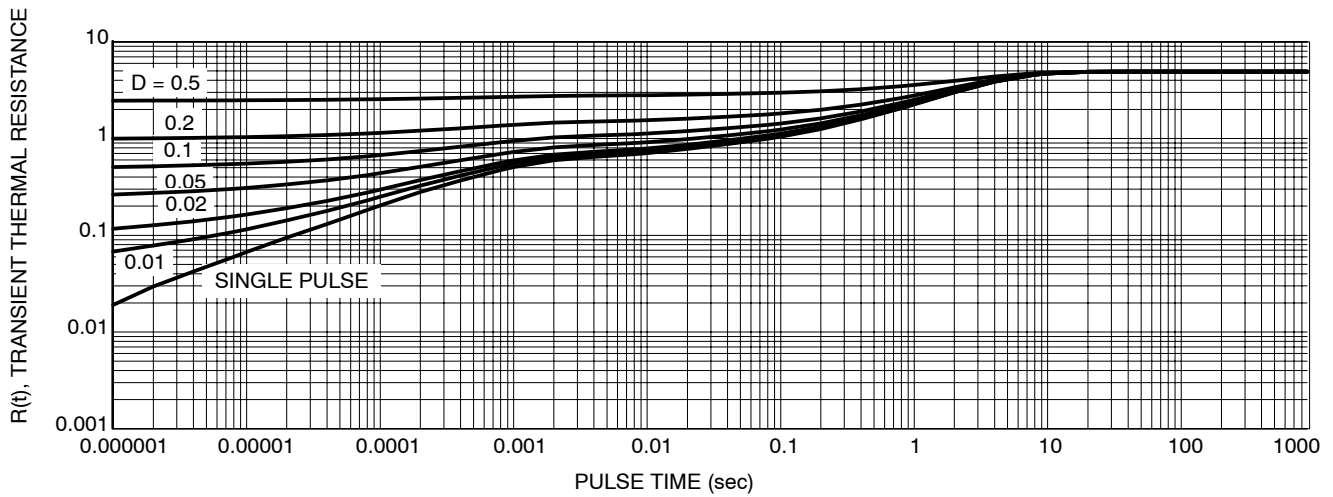


Figure 13. Thermal Response Junction-to-Case, per Leg for MBRF20L60CT

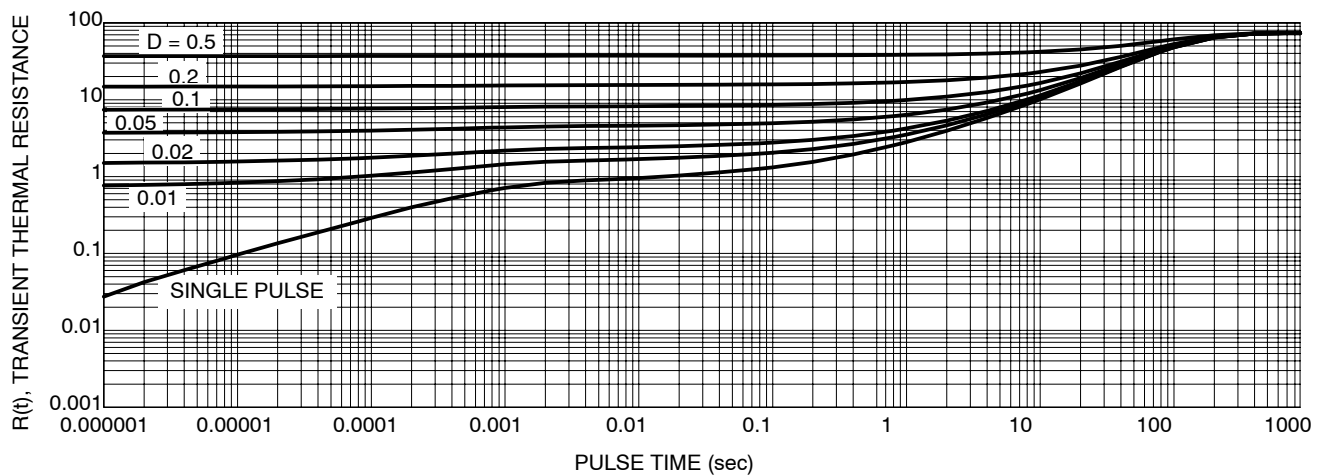
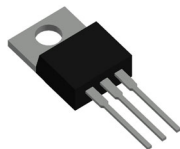


Figure 14. Thermal Response Junction-to-Ambient, per Leg for MBRF20L60CT

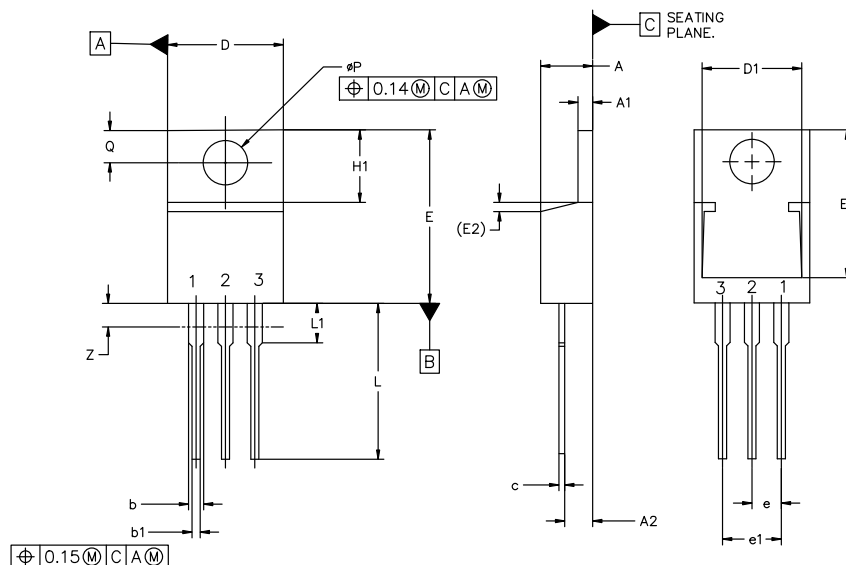


TO-220-3 10.10x15.12x4.45, 2.54P

CASE 221A

ISSUE AL

DATE 05 FEB 2025



| MILLIMETERS |          |       |       |
|-------------|----------|-------|-------|
| DIM         | MIN      | NOM   | MAX   |
| A           | 4.07     | 4.45  | 4.83  |
| A1          | 1.15     | 1.28  | 1.41  |
| A2          | 2.04     | 2.42  | 2.79  |
| b           | 1.15     | 1.34  | 1.52  |
| b1          | 0.64     | 0.80  | 0.96  |
| c           | 0.36     | 0.49  | 0.61  |
| D           | 9.66     | 10.10 | 10.53 |
| D1          | 8.43     | 8.63  | 8.83  |
| E           | 14.48    | 15.12 | 15.75 |
| E1          | 12.58    | 12.78 | 12.98 |
| E2          | 1.27 REF |       |       |

| MILLIMETERS |       |       |       |
|-------------|-------|-------|-------|
| DIM         | MIN   | NOM   | MAX   |
| e           | 2.42  | 2.54  | 2.66  |
| e1          | 4.83  | 5.08  | 5.33  |
| H1          | 5.97  | 6.22  | 6.47  |
| L           | 12.70 | 13.49 | 14.27 |
| L1          | 2.80  | 3.45  | 4.10  |
| Q           | 2.54  | 2.79  | 3.04  |
| øP          | 3.60  | 3.85  | 4.09  |
| Z           | ---   | ---   | 3.48  |

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

STYLE 1:  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

STYLE 2:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR  
4. EMITTER

STYLE 3:  
PIN 1. CATHODE  
2. ANODE  
3. GATE  
4. ANODE

STYLE 4:  
PIN 1. MAIN TERMINAL 1  
2. MAIN TERMINAL 2  
3. GATE  
4. MAIN TERMINAL 2

STYLE 5:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN

STYLE 6:  
PIN 1. ANODE  
2. CATHODE  
3. ANODE  
4. CATHODE

STYLE 7:  
PIN 1. CATHODE  
2. ANODE  
3. CATHODE  
4. ANODE

STYLE 8:  
PIN 1. CATHODE  
2. ANODE  
3. EXTERNAL TRIP/DELAY  
4. ANODE

STYLE 9:  
PIN 1. GATE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

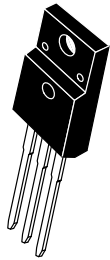
STYLE 10:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN  
4. SOURCE

STYLE 11:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE  
4. SOURCE

STYLE 12:  
PIN 1. MAIN TERMINAL 1  
2. MAIN TERMINAL 2  
3. GATE  
4. NOT CONNECTED

|                  |                                  |                                                                                                                                                                                  |
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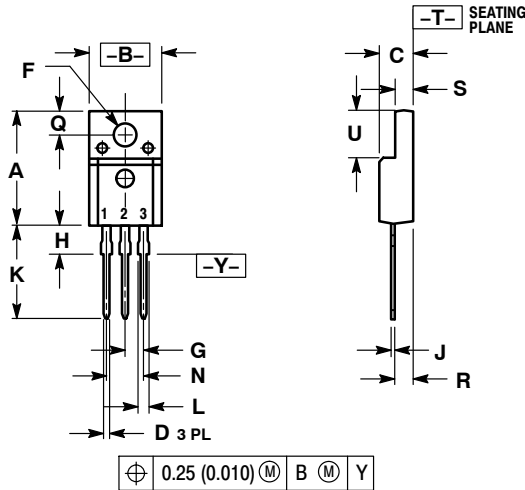
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SCALE 1:1

TO-220 FULLPAK  
CASE 221D-03  
ISSUE K

DATE 27 FEB 2009



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH
  3. 221D-01 THRU 221D-02 OBSOLETE, NEW STANDARD 221D-03.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.617     | 0.635 | 15.67       | 16.12 |
| B   | 0.392     | 0.419 | 9.96        | 10.63 |
| C   | 0.177     | 0.193 | 4.50        | 4.90  |
| D   | 0.024     | 0.039 | 0.60        | 1.00  |
| F   | 0.116     | 0.129 | 2.95        | 3.28  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.118     | 0.135 | 3.00        | 3.43  |
| J   | 0.018     | 0.025 | 0.45        | 0.63  |
| K   | 0.503     | 0.541 | 12.78       | 13.73 |
| L   | 0.048     | 0.058 | 1.23        | 1.47  |
| N   | 0.200 BSC |       | 5.08 BSC    |       |
| Q   | 0.122     | 0.138 | 3.10        | 3.50  |
| R   | 0.099     | 0.117 | 2.51        | 2.96  |
| S   | 0.092     | 0.113 | 2.34        | 2.87  |
| U   | 0.239     | 0.271 | 6.06        | 6.88  |

MARKING  
DIAGRAMS

- STYLE 1:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE
- STYLE 2:  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER
- STYLE 3:  
PIN 1. ANODE  
2. CATHODE  
3. ANODE
- STYLE 4:  
PIN 1. CATHODE  
2. ANODE  
3. CATHODE
- STYLE 5:  
PIN 1. CATHODE  
2. ANODE  
3. GATE
- STYLE 6:  
PIN 1. MT 1  
2. MT 2  
3. GATE



Bipolar



Rectifier

xxxxxx = Specific Device Code  
G = Pb-Free Package  
A = Assembly Location  
Y = Year  
WW = Work Week

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

|                  |                |                                                                                                                                                                                     |
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