

# 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

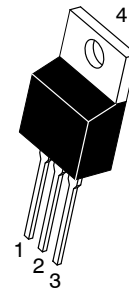
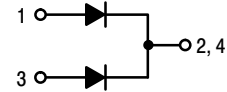
- Power Supply – Output Rectification
- Power Management
- Instrumentation

### 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

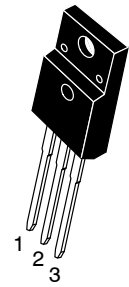
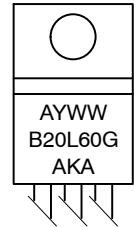
\*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## SCHOTTKY BARRIER RECTIFIER 20 AMPERES 60 VOLTS

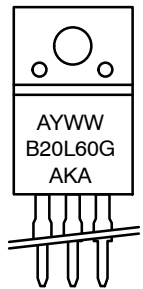


TO-220  
CASE 221A  
STYLE 6

### MARKING DIAGRAM



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 (Pb-Free)	50 Units / Rail
MBRF20L60CTG	TO-220FP (Pb-Free)	50 Units / Rail

## MBR20L60CTG MBRF20L60CTG

### 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 MBR20L60CT (Rated $V_R$ ) $T_C = 138^\circ\text{C}$ Per Diode MBRF20L60CT (Rated $V_R$ ) $T_C = 123^\circ\text{C}$ Per Device	$I_{F(AV)}$	10 20	A
Nonrepetitive Peak Surge Current (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: Machine Model = C Human Body Model = 3B		> 400 > 8000	V
Maximum Repetitive Peak Avalanche Voltage ( $t_p < 1 \mu\text{s}$ , $T_J < 150^\circ\text{C}$ , $I_{AR} < 51 \text{ A}$ )	$V_{ARM}$	85	V
Maximum Single-Pulse Peak Avalanche Voltage ( $t_p < 1 \mu\text{s}$ , $T_J < 150^\circ\text{C}$ , $I_{AR} < 51 \text{ A}$ )	$V_{ASM}$	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 MBR20L60CTG - Junction-to-Case - Junction-to-Ambient	$R_{\theta JC}$ $R_{\theta JA}$	2.3 70	$^\circ\text{C}/\text{W}$
MBRF20L60CTG - Junction-to-Case - Junction-to-Ambient	$R_{\theta JC}$ $R_{\theta JA}$	5.2 75	

### ELECTRICAL CHARACTERISTICS (Per Diode Leg)

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

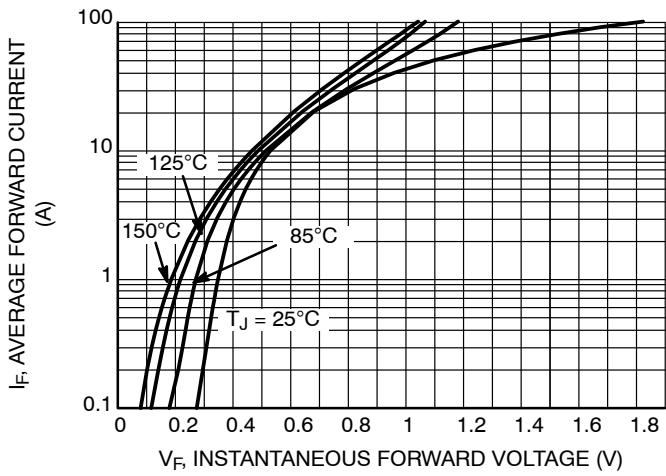


Figure 1. Typical Forward Voltage

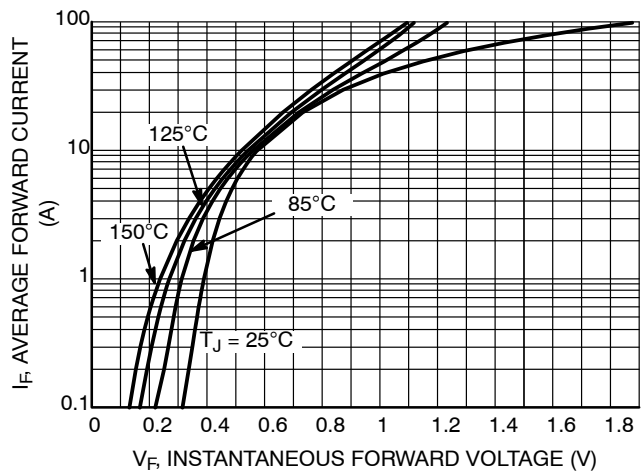


Figure 2. Maximum Forward Voltage

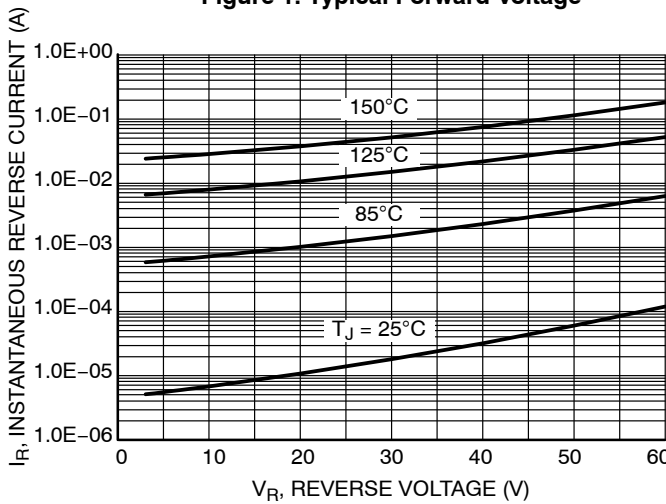


Figure 3. Typical Reverse Current

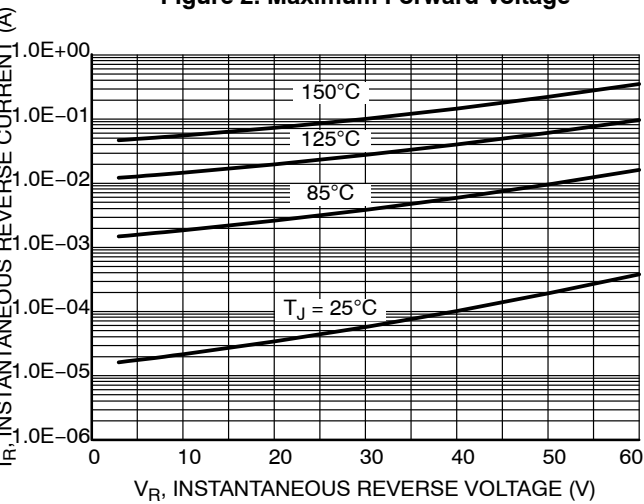


Figure 4. Maximum Reverse Current

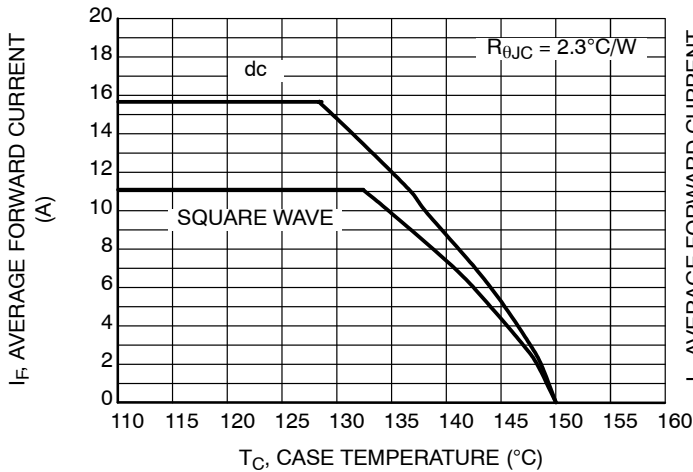


Figure 5. Current Derating, Case per Leg  
MBR20L60CT

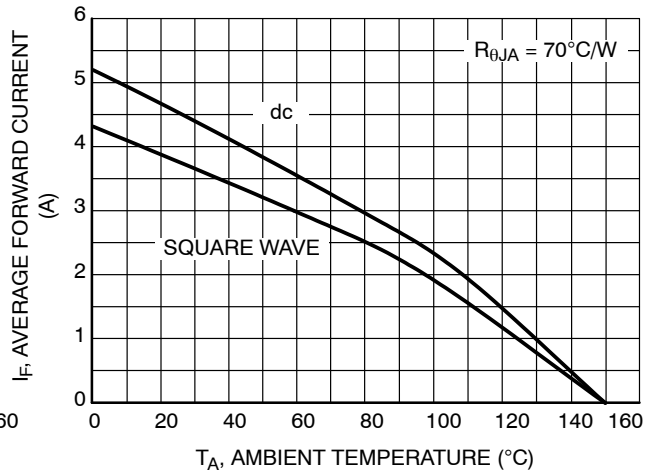
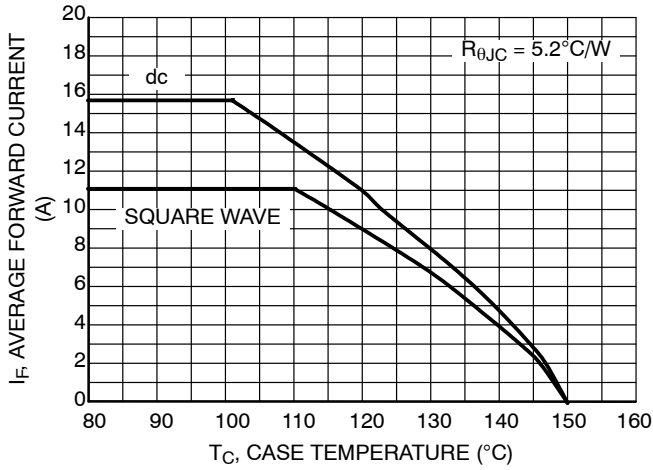
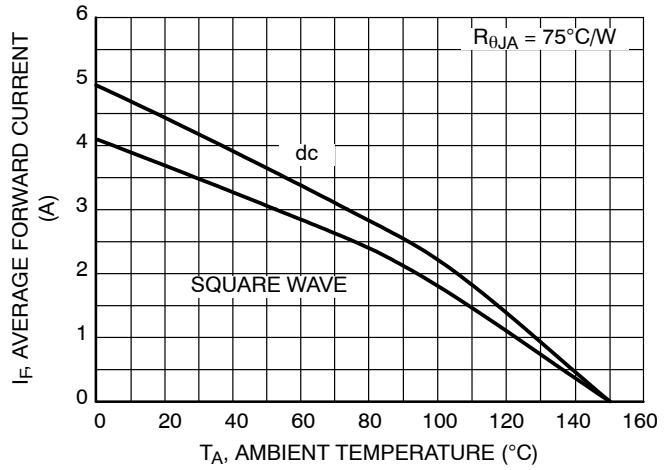


Figure 6. Current Derating, Ambient per Leg  
MBR20L60CT

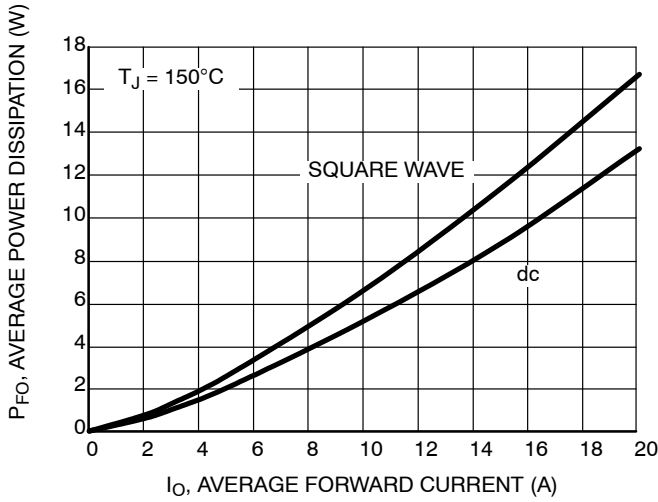
# MBR20L60CTG MBRF20L60CTG



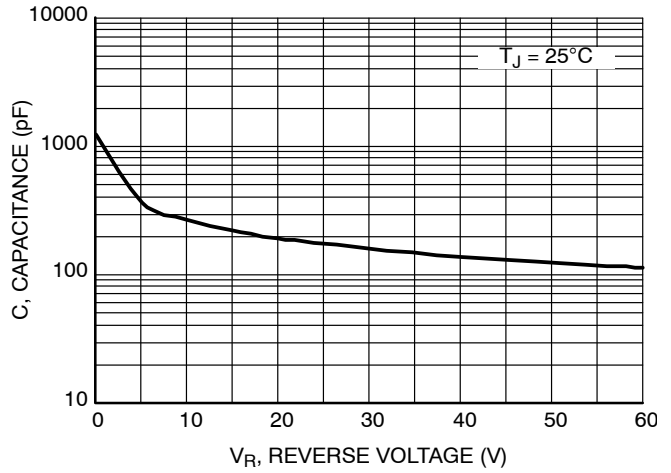
**Figure 7. Current Derating, Case per Leg  
MBRF20L60CT**



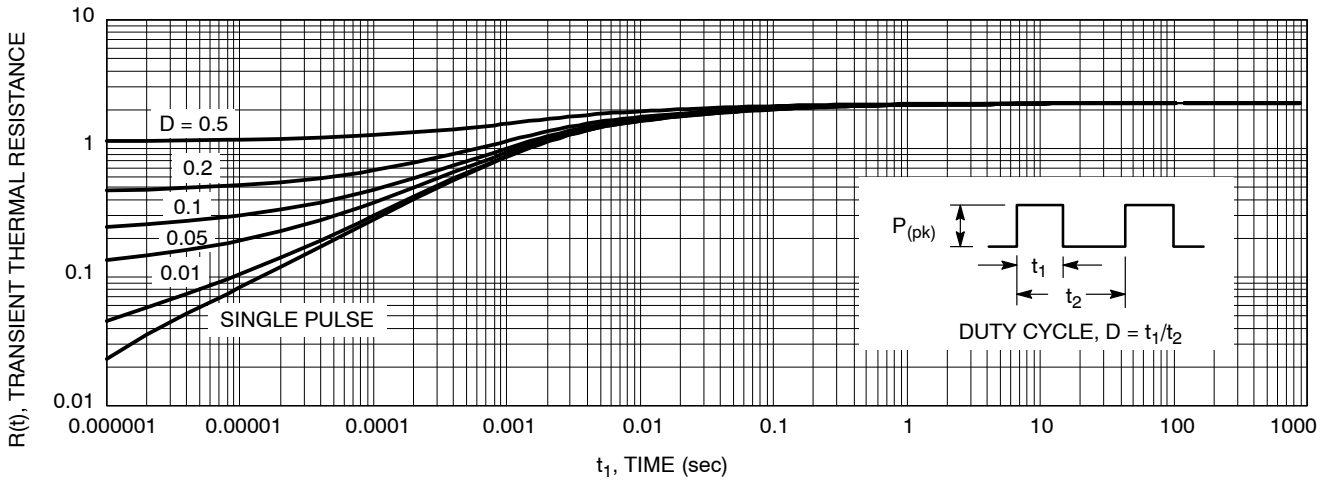
**Figure 8. Current Derating, Ambient per Leg  
MBRF20L60CT**



**Figure 9. Forward Power Dissipation**

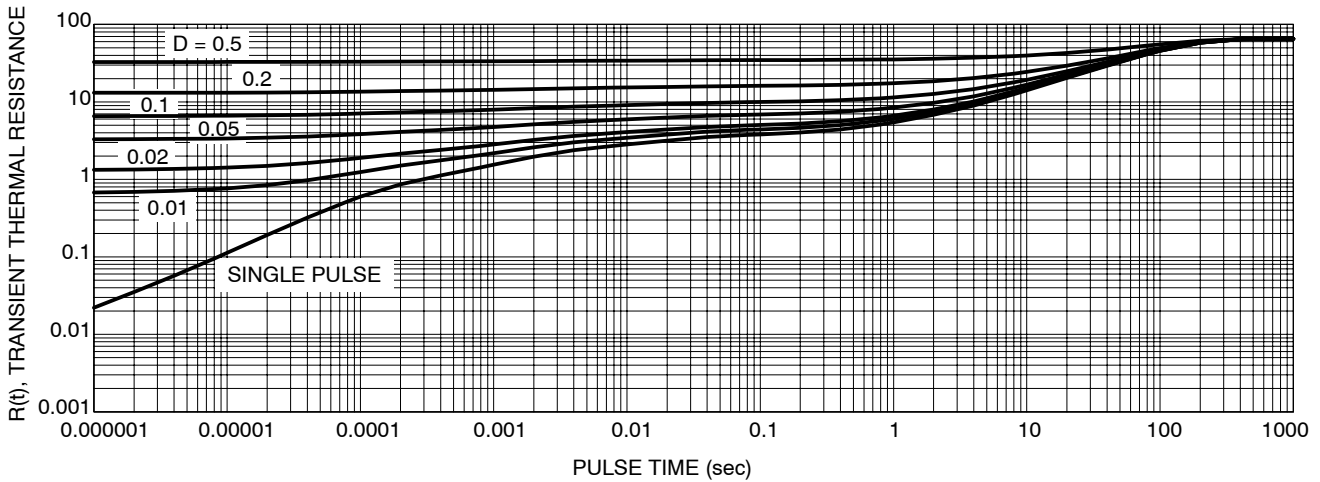


**Figure 10. Capacitance**

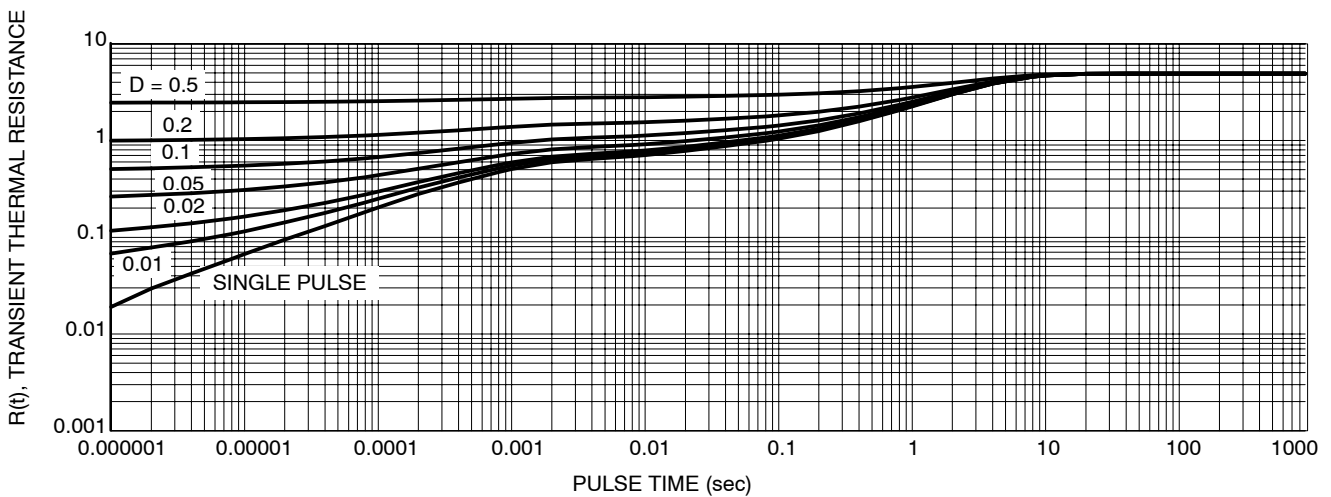


**Figure 11. Thermal Response Junction-to-Case, per Leg for MBR20L60CT**

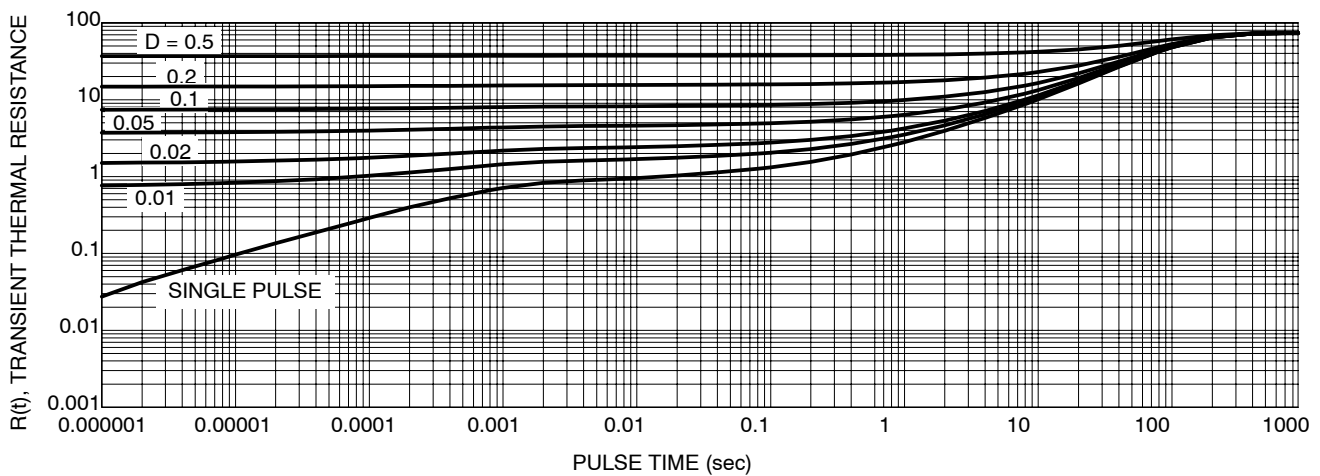
# MBR20L60CTG MBRF20L60CTG



**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**

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# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 1:1



## TO-220 CASE 221A ISSUE AK

DATE 13 JAN 2022

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
4. MAX WIDTH FOR F102 DEVICE = 1.35MM

DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.570	0.620	14.48	15.75
B	0.380	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.60	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.41
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

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

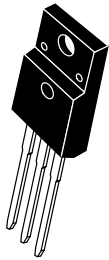
STYLE 11:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE  
4. SOURCE

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

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# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 1:1

## TO-220 FULLPAK CASE 221D-03 ISSUE K

DATE 27 FEB 2009



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

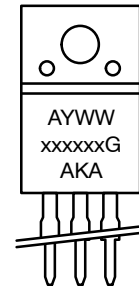
⊕ 0.25 (0.010) Ⓜ B Ⓜ Y

- |  |   |  |
|--|---|--|
| <p>STYLE 1:<br/>PIN 1. GATE<br/>2. DRAIN<br/>3. SOURCE</p>     | <p>STYLE 2:<br/>PIN 1. BASE<br/>2. COLLECTOR<br/>3. EMITTER</p> | <p>STYLE 3:<br/>PIN 1. ANODE<br/>2. CATHODE<br/>3. ANODE</p> |
| <p>STYLE 4:<br/>PIN 1. CATHODE<br/>2. ANODE<br/>3. CATHODE</p> | <p>STYLE 5:<br/>PIN 1. CATHODE<br/>2. ANODE<br/>3. GATE</p>     | <p>STYLE 6:<br/>PIN 1. MT 1<br/>2. MT 2<br/>3. GATE</p>      |

### MARKING DIAGRAMS



Bipolar



Rectifier

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

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