

# Switch-mode Power Rectifier

## 45 V, 20 A

### MBR20L45CTG, MBRF20L45CTG

#### Features and Benefits

- Low Forward Voltage
- Low Power Loss/High Efficiency
- High Surge Capacity
- 150°C Operating Junction Temperature
- 20 A Total (10 A Per Diode Leg)
- Guard-Ring for Stress Protection

#### Applications

- Power Supply – Output Rectification
- Power Management
- Instrumentation

#### Mechanical Characteristics:

- Case: Epoxy, Molded
- Epoxy Meets UL 94 V-0 @ 0.125 in
- Weight (Approximately): 1.9 Grams
- 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
- These Devices are Pb-Free and are RoHS Compliant\*

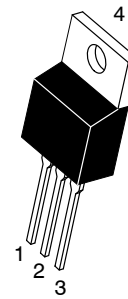
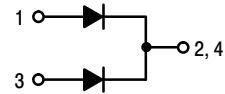
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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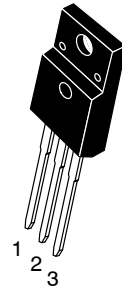
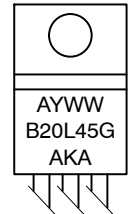
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### DUAL SCHOTTKY BARRIER RECTIFIERS 20 AMPERES, 45 VOLTS



TO-220  
CASE 221A  
STYLE 6

#### MARKING DIAGRAMS



TO-220 FULLPAK™  
CASE 221D



- B20L45 = Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- AKA = Polarity Designator
- G = Pb-Free Device

#### ORDERING INFORMATION

Device	Package	Shipping
MBR20L45CTG	TO-220 (Pb-Free)	50 Units/Rail
MBRF20L45CTG	TO-220FP (Pb-Free)	50 Units/Rail

# MBR20L45CTG, MBRF20L45CTG

## MAXIMUM RATINGS (Per Diode Leg)

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	$V_{RRM}$ $V_{RWM}$ $V_R$	45	V
Average Rectified Forward Current (Rated $V_R$ ) $T_C = 141^\circ\text{C}$	$I_{F(AV)}$	10	A
Peak Repetitive Forward Current (Rated $V_R$ , Square Wave, 20 kHz)	$I_{FRM}$	20	A
Nonrepetitive Peak Surge Current (Surge applied at rated load conditions halfwave, single phase, 60 Hz)	$I_{FSM}$	180	A
Operating Junction Temperature (Note 1)	$T_J$	-55 to +150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +175	$^\circ\text{C}$
Voltage Rate of Change (Rated $V_R$ )	dv/dt	10,000	V/ $\mu\text{s}$
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 (MBR20L45CTG)	$R_{\theta JC}$	1.9	$^\circ\text{C/W}$
	$R_{\theta JA}$	45	
(MBRF20L45CTG)	$R_{\theta JC}$	2.2	

## ELECTRICAL CHARACTERISTICS (Per Diode Leg)

Characteristic	Symbol	Value	Unit
Maximum Instantaneous Forward Voltage (Note 2) ( $I_F = 10\text{ A}$ , $T_C = 25^\circ\text{C}$ ) ( $I_F = 10\text{ A}$ , $T_C = 125^\circ\text{C}$ ) ( $I_F = 20\text{ A}$ , $T_C = 25^\circ\text{C}$ ) ( $I_F = 20\text{ A}$ , $T_C = 125^\circ\text{C}$ )	$V_F$	0.50 0.47 0.63 0.62	V
Maximum Instantaneous Reverse Current (Note 2) (Rated DC Voltage, $T_C = 25^\circ\text{C}$ ) (Rated DC Voltage, $T_C = 125^\circ\text{C}$ )	$i_R$	0.5 170	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  $\leq 2.0\%$ .

# MBR20L45CTG, MBRF20L45CTG

## TYPICAL CHARACTERISTICS

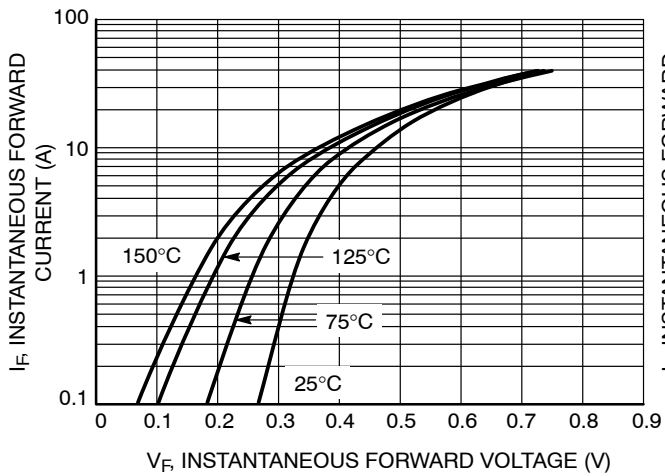


Figure 1. Typical Forward Voltage

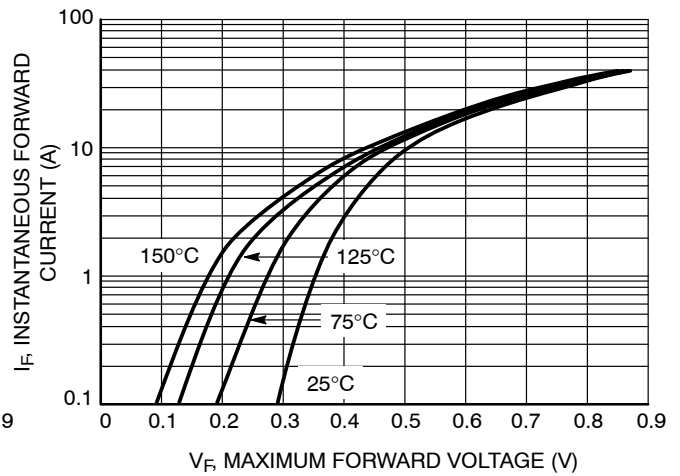


Figure 2. Maximum Forward Voltage

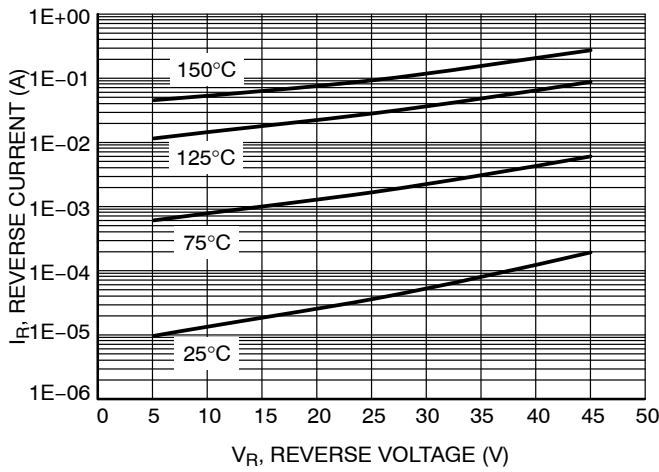


Figure 3. Typical Reverse Current

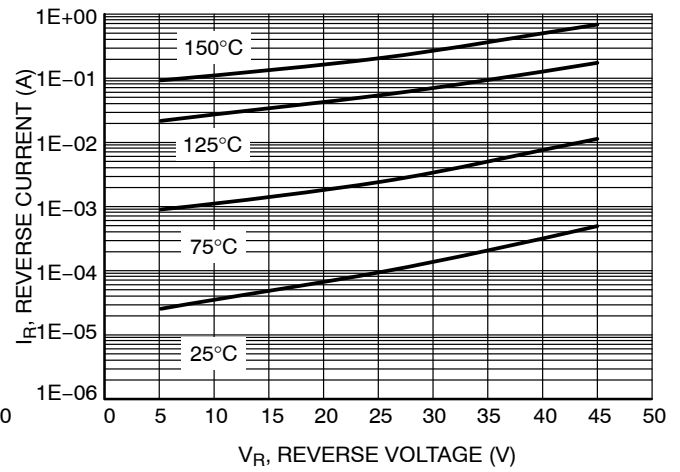


Figure 4. Maximum Reverse Current

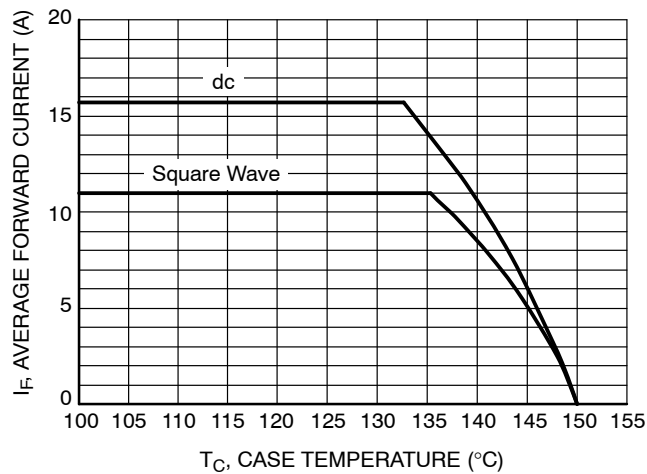


Figure 5. Current Derating

# MBR20L45CTG, MBRF20L45CTG

## TYPICAL CHARACTERISTICS

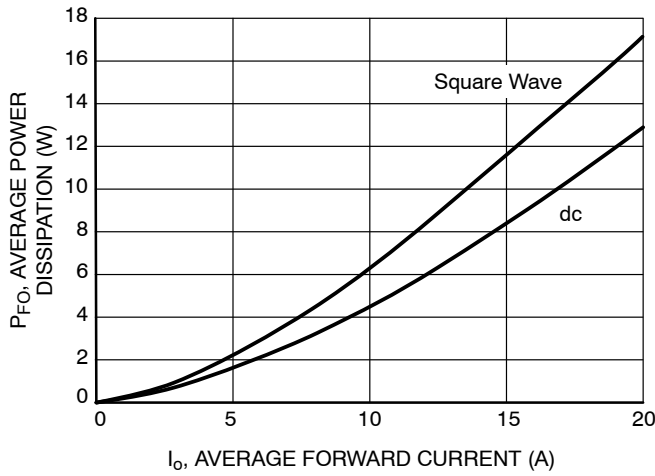


Figure 6. Forward Power Dissipation

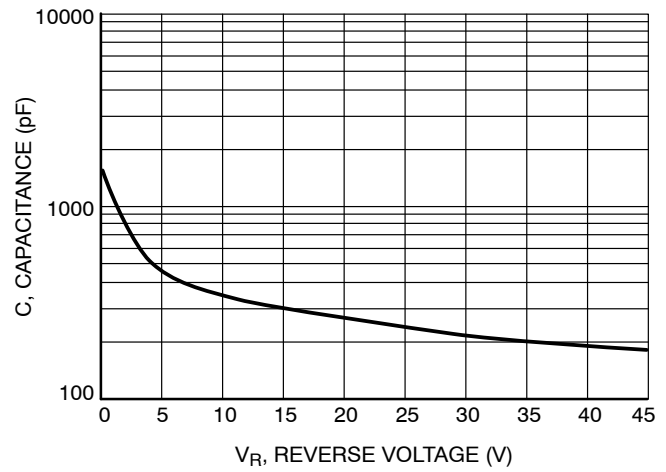


Figure 7. Typical Capacitance

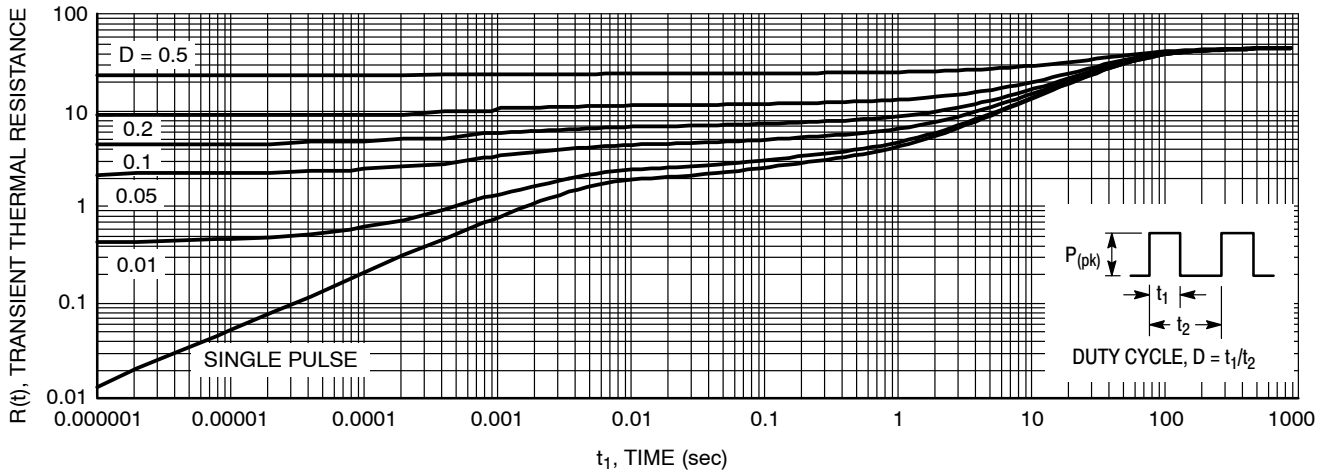


Figure 8. Thermal Response Junction-to-Ambient for MBR20L45CTG

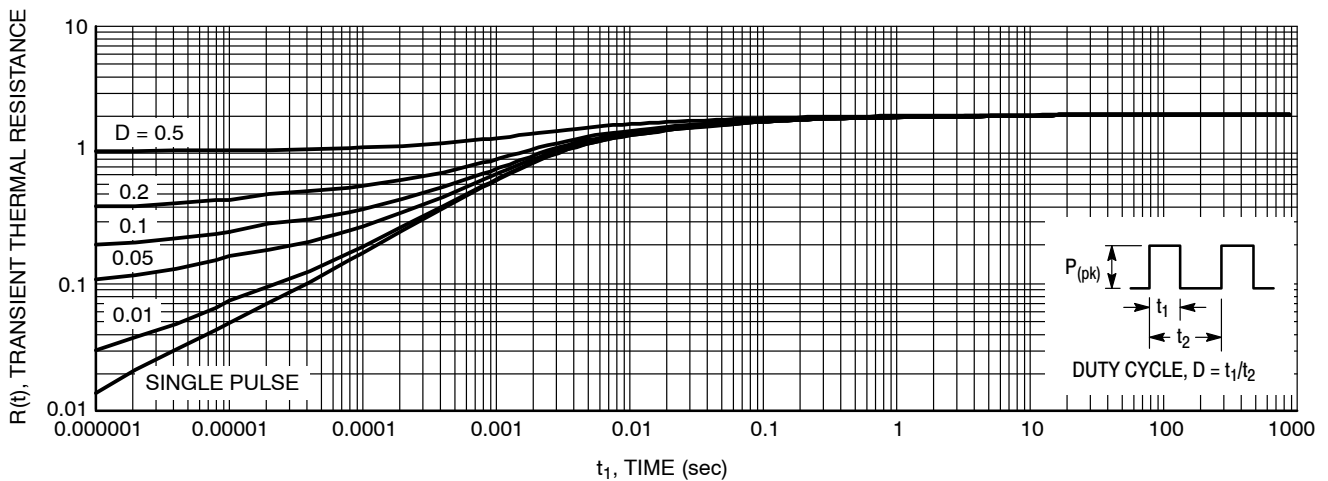


Figure 9. Thermal Response Junction-to-Case for MBR20L45CTG

# MBR20L45CTG, MBRF20L45CTG

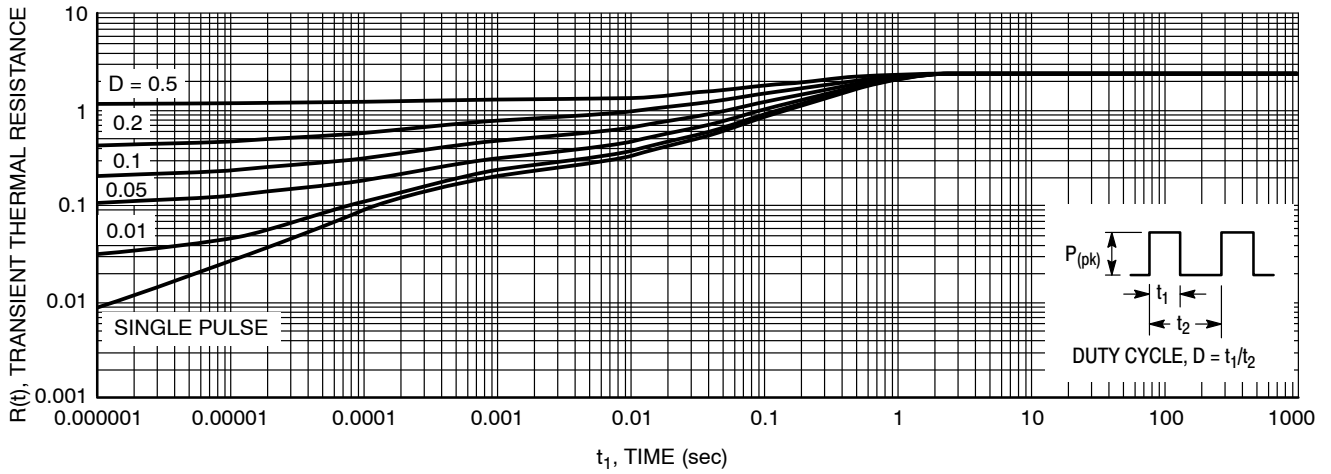


Figure 10. Thermal Response Junction-to-Case for MBRF20L45CTG

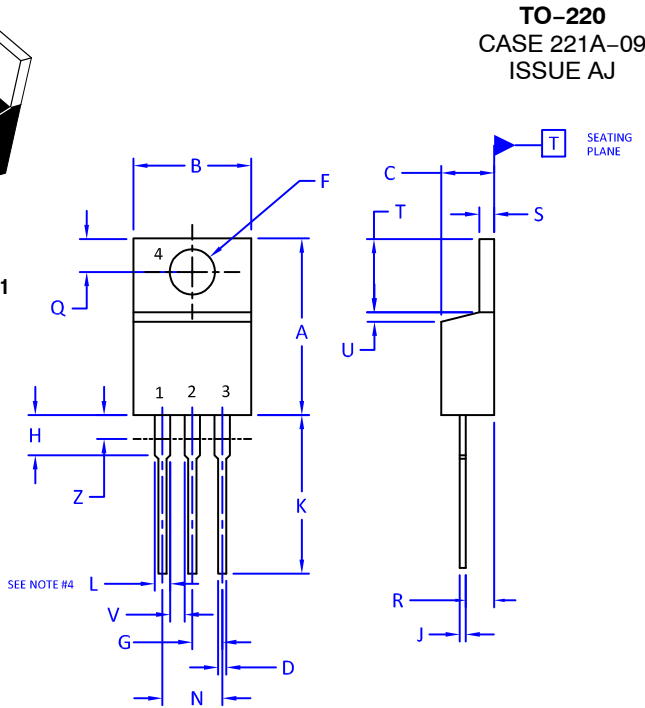
# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

ON Semiconductor®



SCALE 1:1



**TO-220**  
CASE 221A-09  
ISSUE AJ

DATE 05 NOV 2019

**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

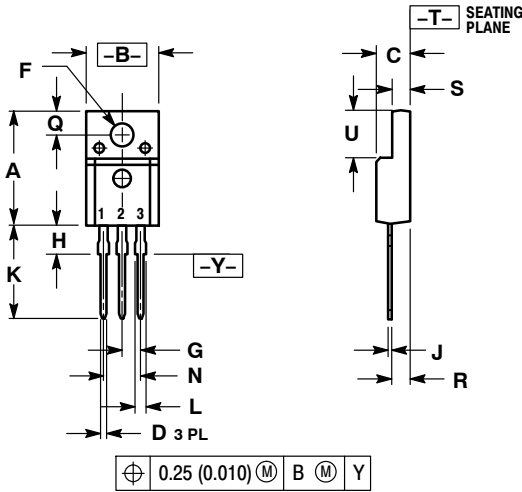
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SCALE 1:1

### 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.

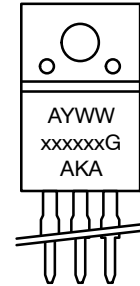
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.617	0.635	15.67	16.12
B	0.392	0.419	9.96	10.63
C	0.177	0.193	4.50	4.90
D	0.024	0.039	0.60	1.00
F	0.116	0.129	2.95	3.28
G	0.100 BSC		2.54 BSC	
H	0.118	0.135	3.00	3.43
J	0.018	0.025	0.45	0.63
K	0.503	0.541	12.78	13.73
L	0.048	0.058	1.23	1.47
N	0.200 BSC		5.08 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:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE     | STYLE 2:<br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER | STYLE 3:<br>PIN 1. ANODE<br>2. CATHODE<br>3. ANODE |
| STYLE 4:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE | STYLE 5:<br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE     | STYLE 6:<br>PIN 1. MT 1<br>2. MT 2<br>3. GATE      |



**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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