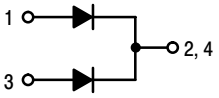
MBR2045CT

SWITCHMODE™ Power Rectifier

ON Semiconductor®
http://onsemi.com

SCHOTTKY BARRIER RECTIFIER 20 AMPERES, 45 VOLTS



Features and Benefits

- Low Forward Voltage
- Low Power Loss / High Efficiency
- High Surge Capacity
- 175°C Operating Junction Temperature
- 20 A Total (10 A Per Diode Leg)
- Pb−Free Package is Available*

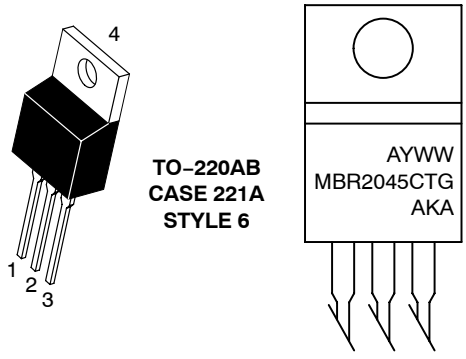
Applications

- 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
- ESD Rating: Human Body Model = 3B
  Machine Model = C

MARKING DIAGRAM



TO−220AB
CASE 221A
STYLE 6

A	= Assembly Location
Y	= Year
WW	= Work Week
MBR2045CT	= Device Code
G	= Pb−Free Package
AKA	= Diode Polarity

ORDERING INFORMATION

Device	Package	Shipping
MBR2045CT	TO−220	50 Units / Rail
MBR2045CTG	TO−220 (Pb−Free)	50 Units / Rail

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

MAXIMUM RATINGS

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 Per Device Per Diode (T_C = 165°C)	$I_{F(AV)}$	 20 10	A
Peak Repetitive Forward Current per Diode Leg (Square Wave, 20 kHz, T_C = 163°C)	I_{FRM}	20	A
Non−Repetitive Peak Surge Current (Surge Applied at Rated Load Conditions Halfwave, Single Phase, 60 Hz)	I_{FSM}	150	A
Peak Repetitive Reverse Surge Current (2.0 μs, 1.0 kHz) See Figure 11	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/μs

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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	Max	Unit
Maximum Thermal Resistance, Junction−to−Case (Min. Pad)	$R_{\theta JC}$	2.0	°C/W
Maximum Thermal Resistance, Junction−to−Ambient (Min. Pad)	$R_{\theta JA}$	60	

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Unit
Instantaneous Forward Voltage (Note 2) (i_F = 10 Amps, T_J = 125°C) (i_F = 20 Amps, T_J = 125°C) (i_F = 20 Amps, T_J = 25°C)	v_F	 − − −	 0.50 0.67 0.71	 0.57 0.72 0.84	V
Instantaneous Reverse Current (Note 2) (Rated dc Voltage, T_J = 125°C) (Rated dc Voltage, T_J = 25°C)	i_R	 − −	 10.4 0.02	 15 0.1	mA

2. Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤ 2.0%.

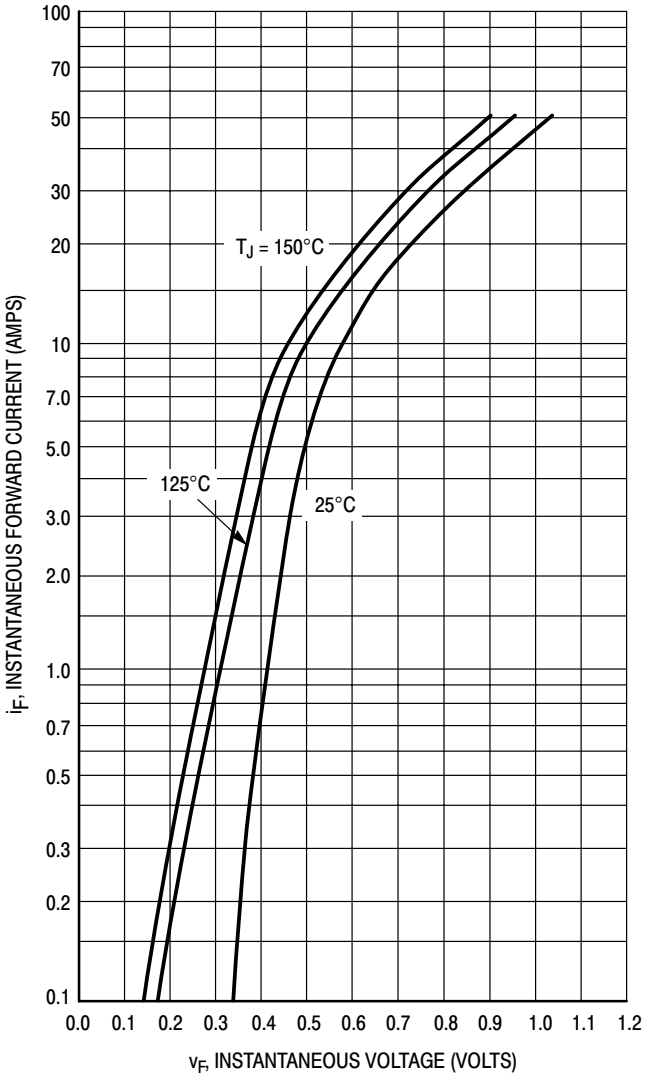


Figure 1. Typical Forward Voltage

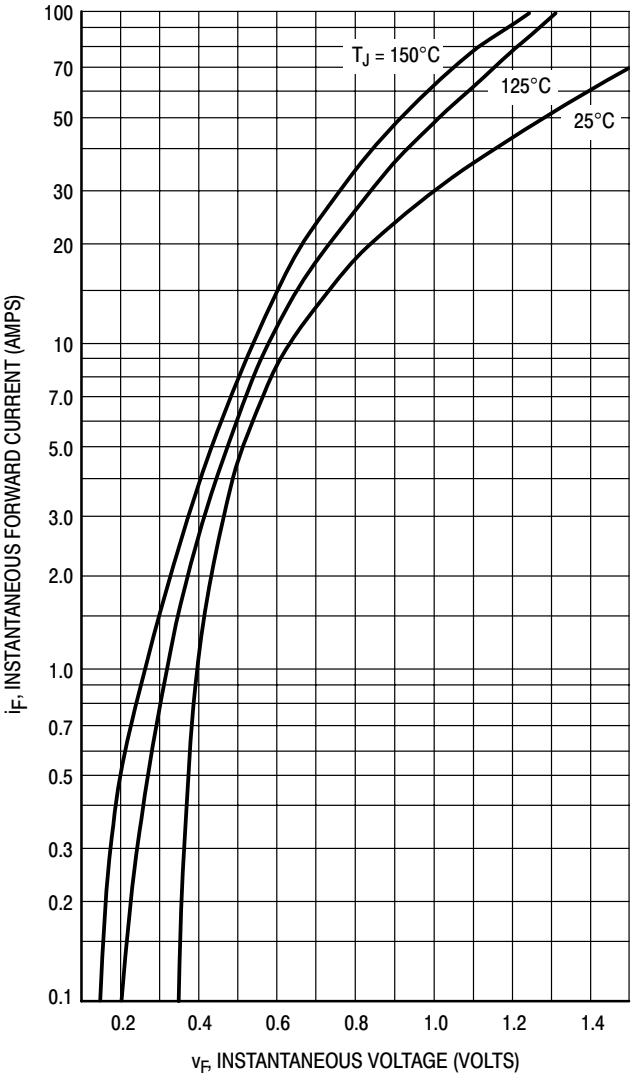


Figure 2. Maximum Forward Voltage

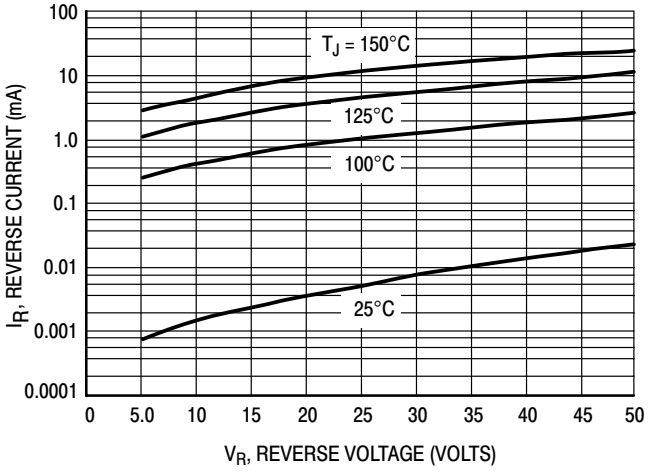


Figure 3. Typical Reverse Current

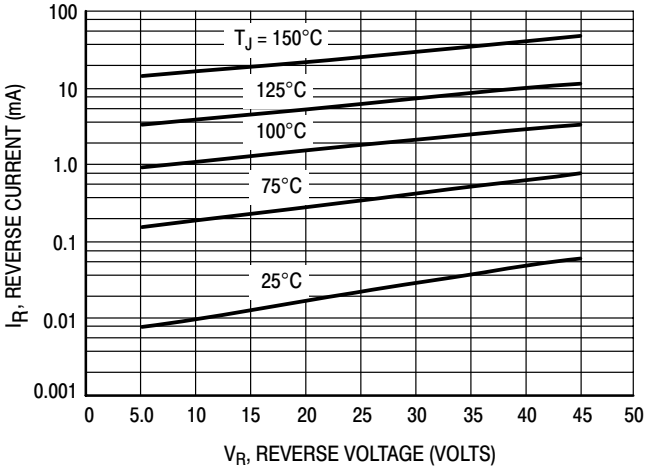


Figure 4. Maximum Reverse Current

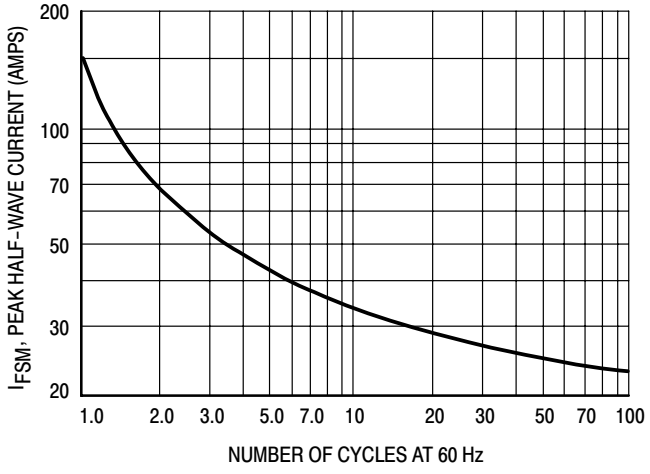


Figure 5. Maximum Surge Capability

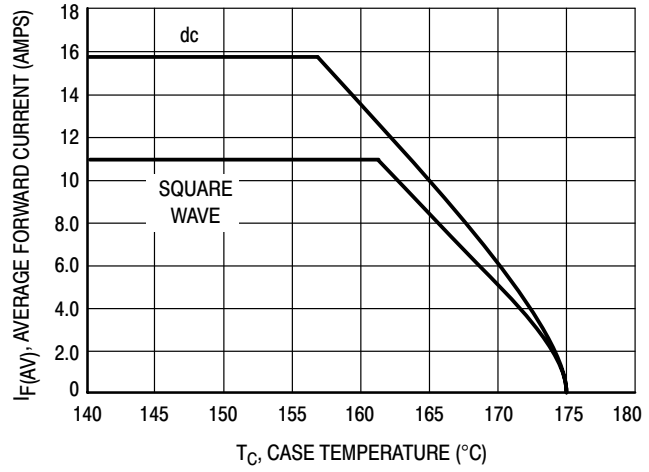


Figure 6. Current Derating, Case

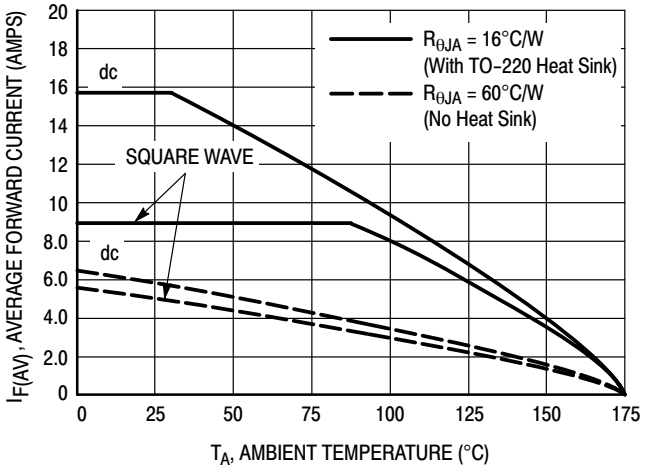


Figure 7. Current Derating, Ambient, Per Leg

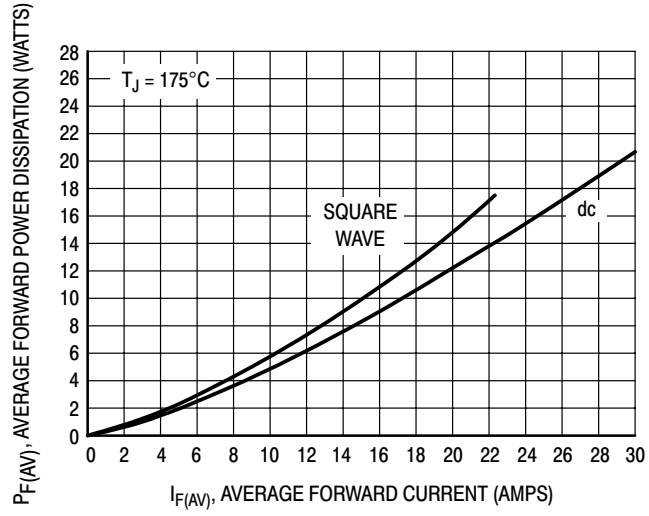


Figure 8. Forward Power Dissipation

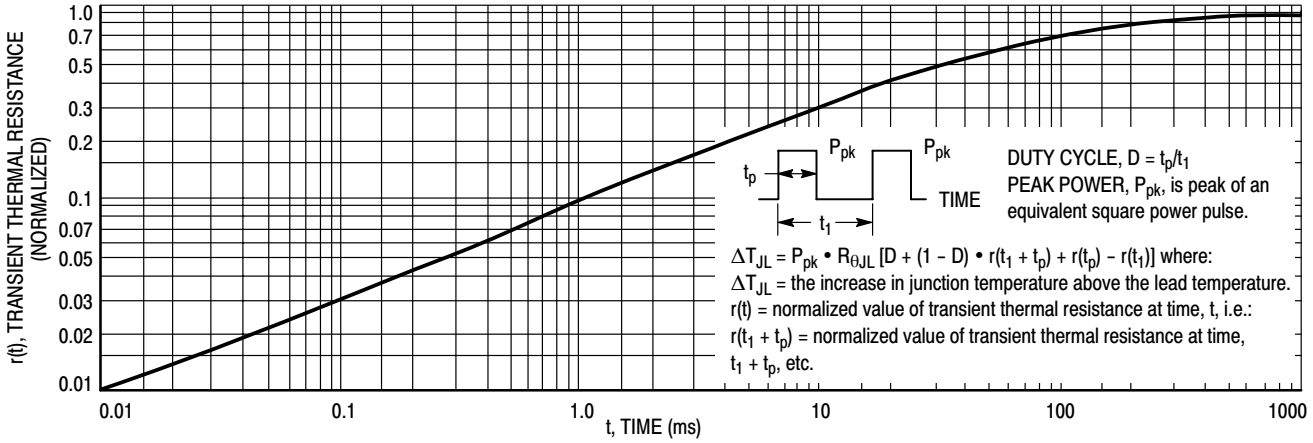


Figure 9. Thermal Response

HIGH FREQUENCY OPERATION

Since current flow in a Schottky rectifier is the result of majority carrier conduction, it is not subject to junction diode forward and reverse recovery transients due to minority carrier injection and stored charge. Satisfactory circuit analysis work may be performed by using a model consisting of an ideal diode in parallel with a variable capacitance. (See Figure 10.)

Rectification efficiency measurements show that operation will be satisfactory up to several megahertz. For example, relative waveform rectification efficiency is approximately 70 percent at 2.0 MHz, e.g., the ratio of dc power to RMS power in the load is 0.28 at this frequency, whereas perfect rectification would yield 0.406 for sine wave inputs. However, in contrast to ordinary junction diodes, the loss in waveform efficiency is not indicative of power loss; it is simply a result of reverse current flow through the diode capacitance, which lowers the dc output voltage.

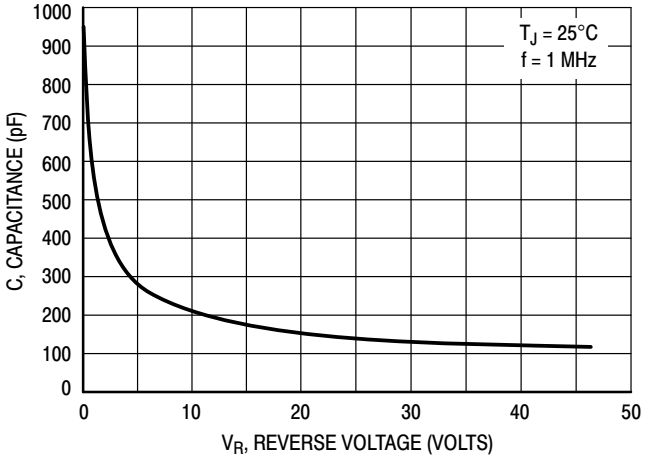


Figure 10. Typical Capacitance

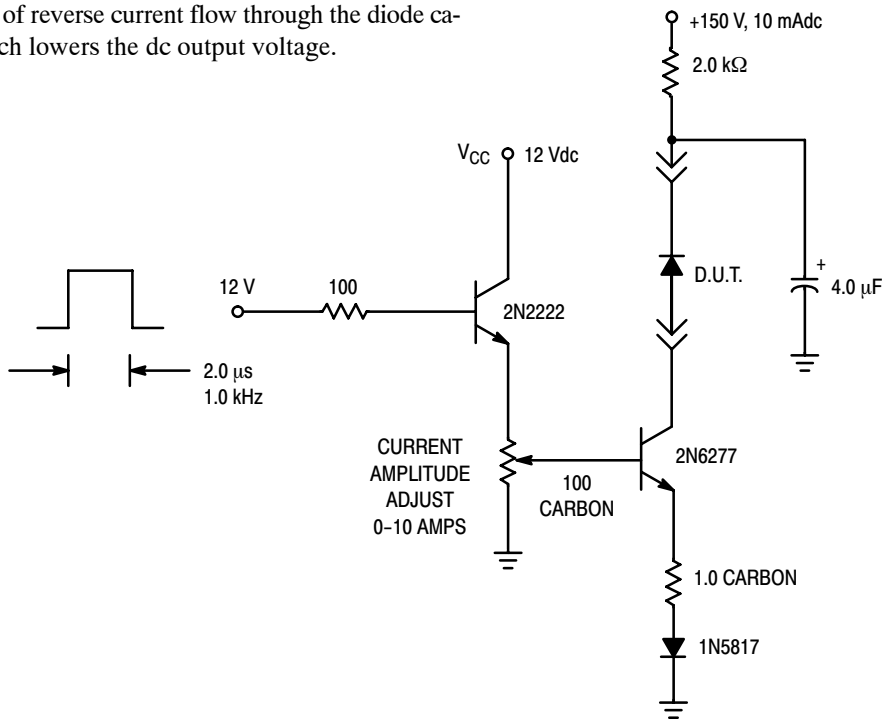
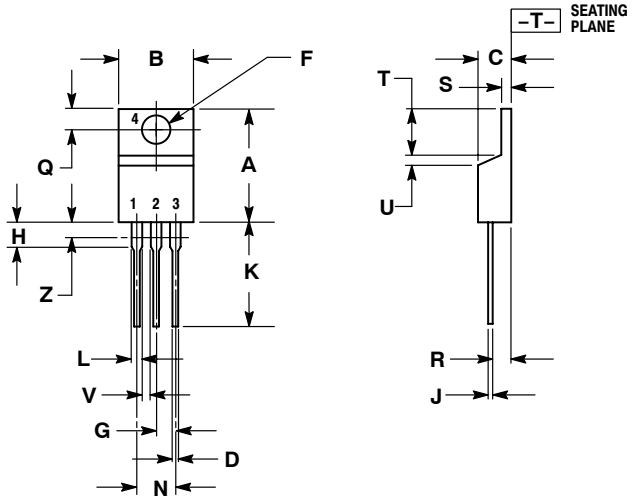


Figure 11. Test Circuit for dv/dt and Reverse Surge Current

PACKAGE DIMENSIONS

TO−220
CASE 221A−09
ISSUE AE



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.014	0.025	0.36	0.64
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	1.39
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 6:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

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PUBLICATION ORDERING INFORMATION

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