MBR1035, MBR1045

MBR1045 is a Preferred Device

SWITCHMODE™ Power Rectifiers

. . . using the Schottky Barrier principle with a platinum barrier metal. These state–of–the–art devices have the following features:

- Guardring for Stress Protection
- Low Forward Voltage
- 150°C Operating Junction Temperature
- Epoxy Meets UL94, VO at 1/8″

Mechanical Characteristics:

- Case: Epoxy, Molded
- 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
- Marking: B1035, B1045

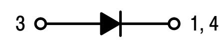
MAXIMUM RATINGS

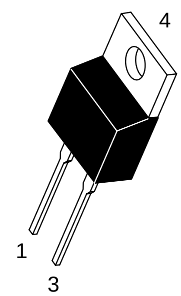
Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage MBR1035 MBR1045	V_{RRM} V_{RWM} V_R	 35 45	V
Average Rectified Forward Current (Rated V_R, T_C = 135°C)	$I_{F(AV)}$	10	A
Peak Repetitive Forward Current, (Rated V_R, Square Wave, 20 kHz, T_C = 135°C)	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 12.	I_{RRM}	1.0	A
Storage Temperature Range	T_{stg}	–65 to +175	°C
Operating Junction Temperature	T_J	–65 to +150	°C
Voltage Rate of Change (Rated V_R)	dv/dt	10,000	V/μs

ON Semiconductor™

http://onsemi.com

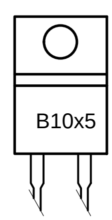
SCHOTTKY BARRIER RECTIFIERS 10 AMPERES 35 to 45 VOLTS





TO–220AC CASE 221B PLASTIC

MARKING DIAGRAM



B10x5 = Device Code
x = 3 or 4

ORDERING INFORMATION

Device	Package	Shipping
MBR1035	TO–220	50 Units/Rail
MBR1045	TO–220	50 Units/Rail

Preferred devices are recommended choices for future use and best overall value.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Maximum Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.0	°C/W

ELECTRICAL CHARACTERISTICS

Maximum Instantaneous Forward Voltage (Note 1.) (i_F = 10 Amps, TC = 125°C) (i_F = 20 Amps, T_C = 125°C) (i_F = 20 Amps, T_C = 25°C)	v_F	 0.57 0.72 0.84	Volts
Maximum Instantaneous Reverse Current (Note 1.) (Rated dc Voltage, T_C = 125°C) (Rated dc Voltage, T_C = 25°C)	i_R	 15 0.1	mA

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

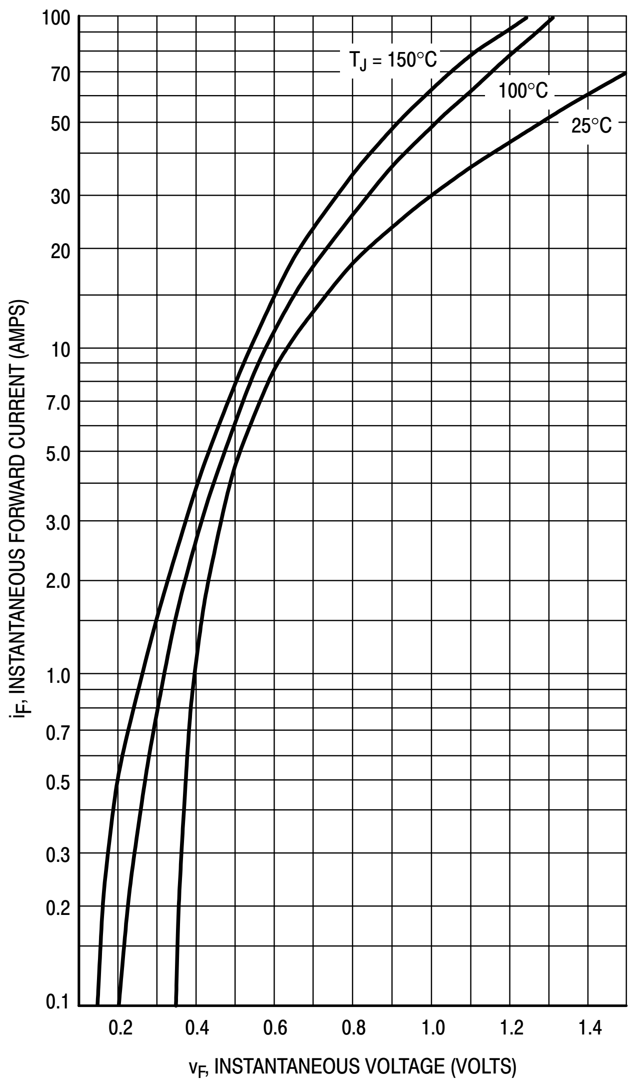


Figure 1. Maximum Forward Voltage

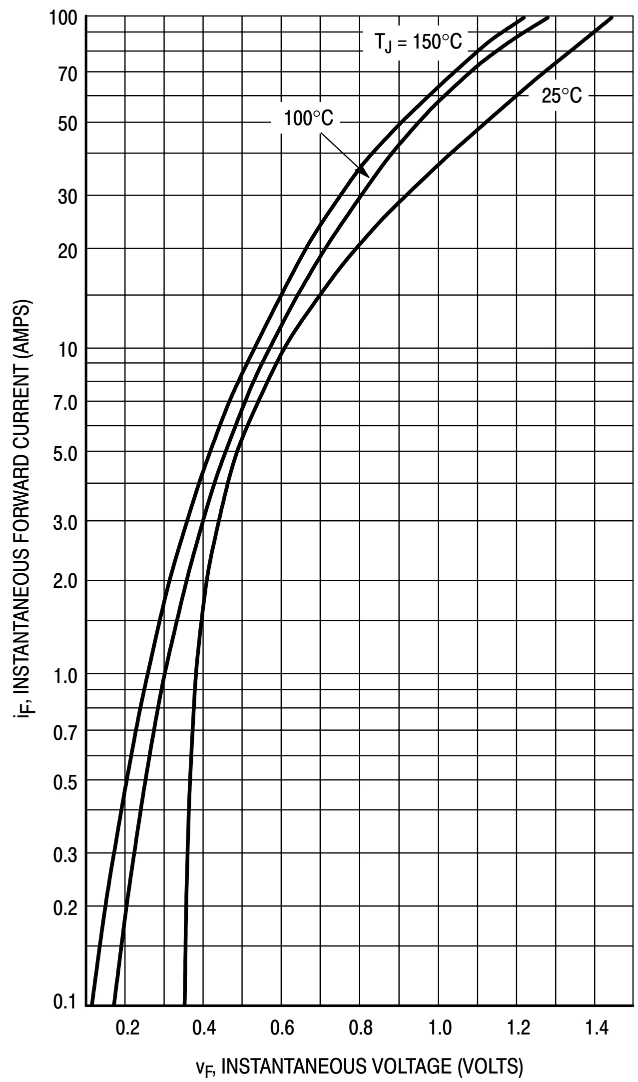


Figure 2. Typical Forward Voltage

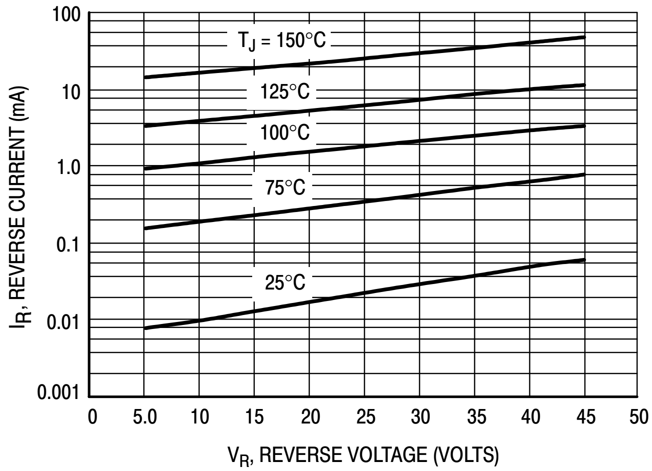


Figure 3. Maximum Reverse Current

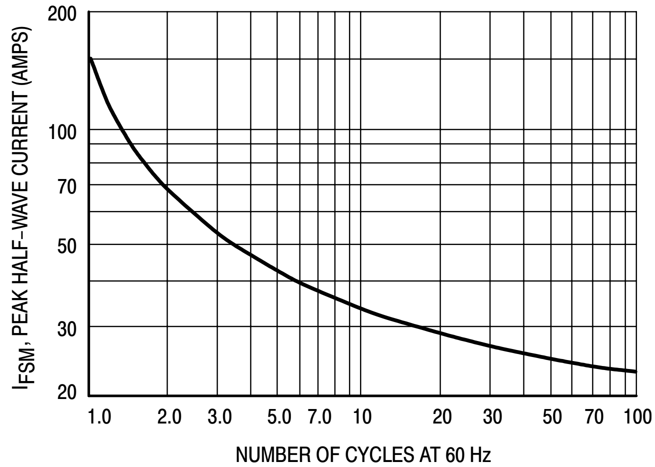


Figure 4. Maximum Surge Capability

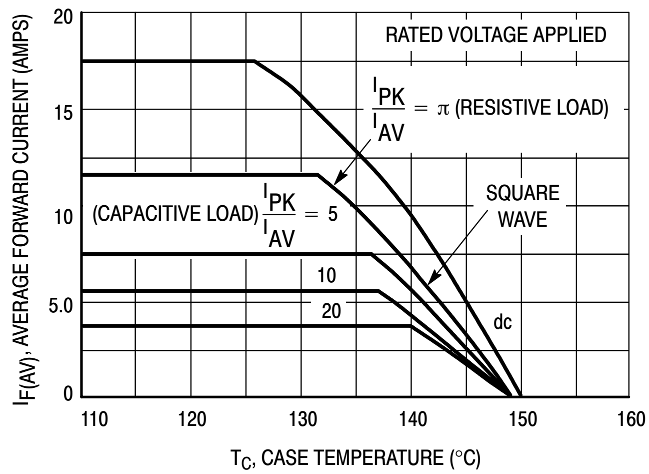


Figure 5. Current Derating, Infinite Heatsink

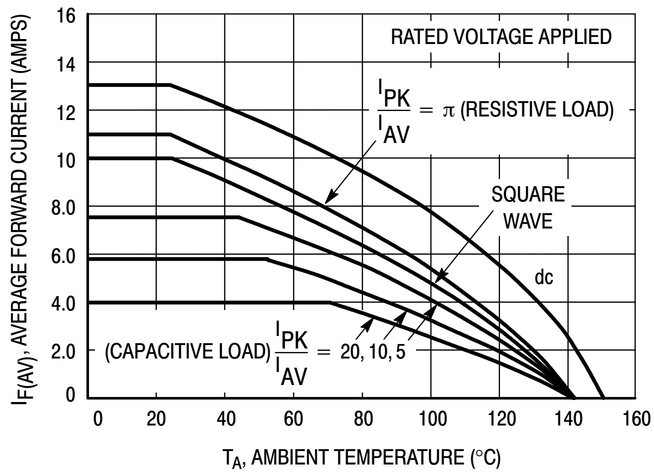


Figure 6. Current Derating, $R_{\theta JA}$ = 16°C/W

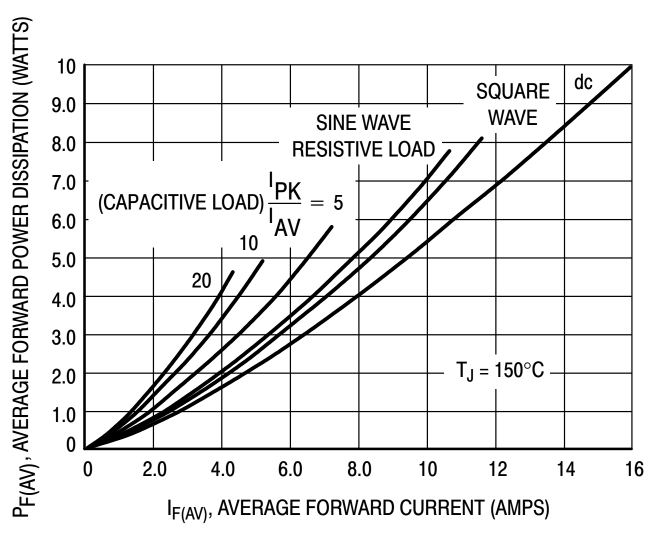


Figure 7. Forward Power Dissipation

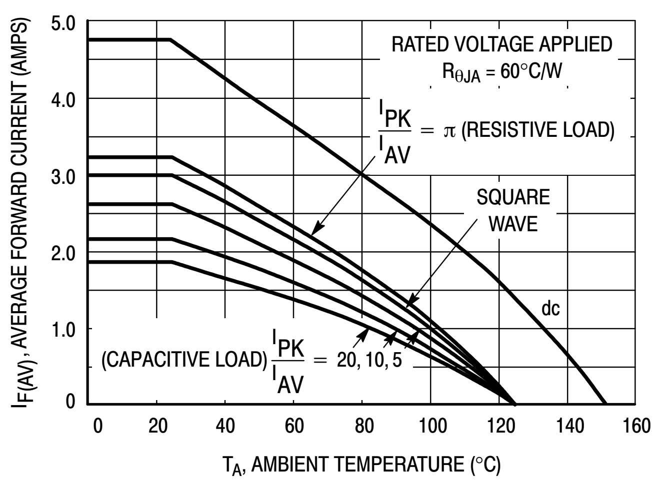


Figure 8. Current Derating, Free Air

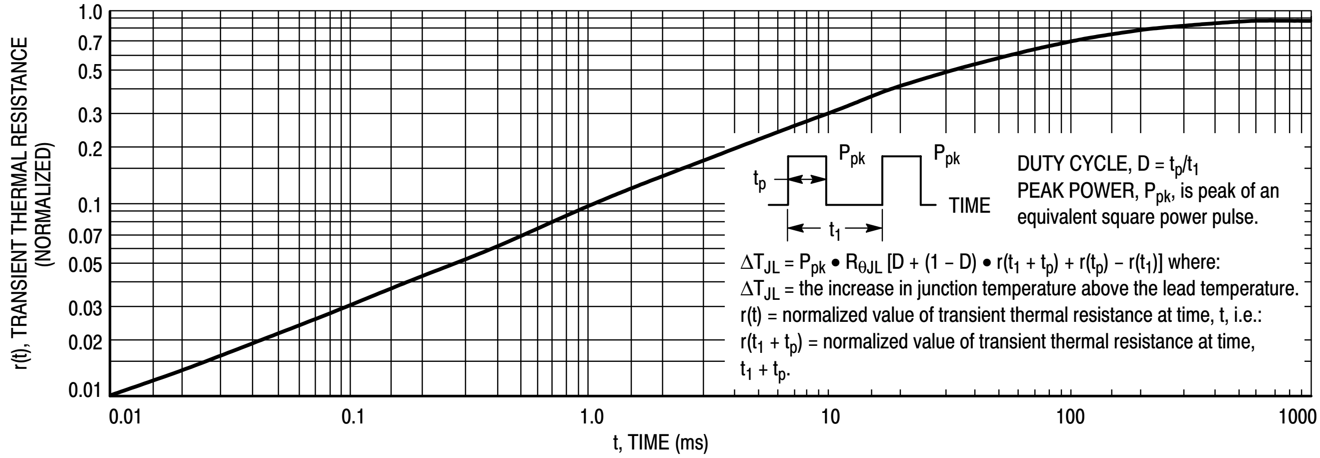


Figure 9. Thermal Response

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.

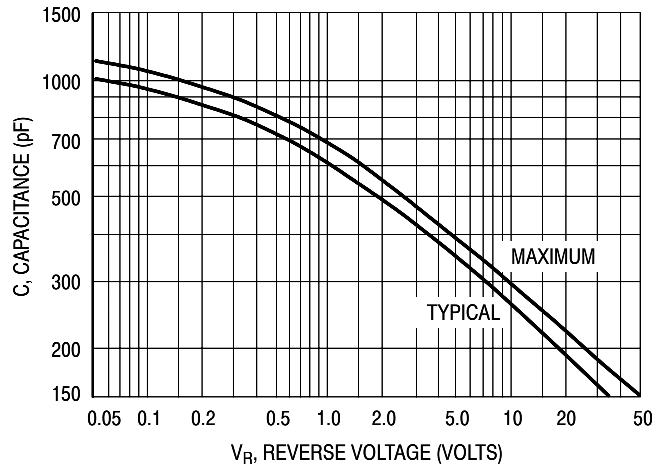


Figure 10. Capacitance

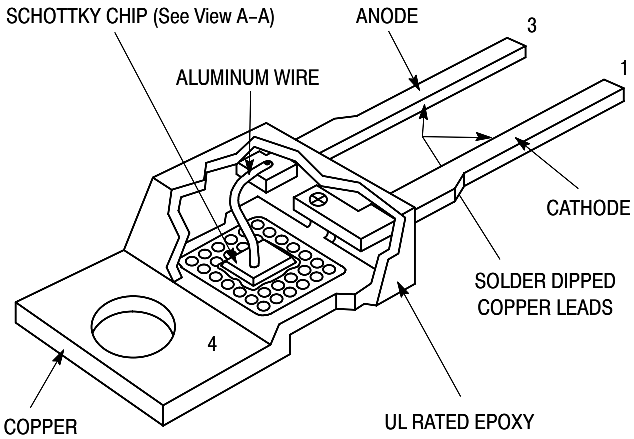
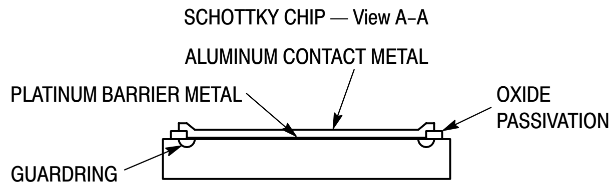


Figure 11. Schottky Rectifier



Motorola builds quality and reliability into its Schottky Rectifiers.

First is the chip, which has an interface metal between the barrier metal and aluminum–contact metal to eliminate any possible interaction between the two. The indicated guardring prevents dv/dt problems, so snubbers are not mandatory. The guardring also operates like a zener to absorb over–voltage transients.

Second is the package. The Schottky chip is bonded to the copper heat sink using a specially formulated solder. This gives the unit the capability of passing 10,000 operating thermal–fatigue cycles having a ΔT_J of 100°C. The epoxy molding compound is rated per UL 94, V0 @ 1/8″. Wire bonds are 100% tested in assembly as they are made.

Third is the electrical testing, which includes 100% dv/dt at 1600 V/μs and reverse avalanche as part of device characterization.

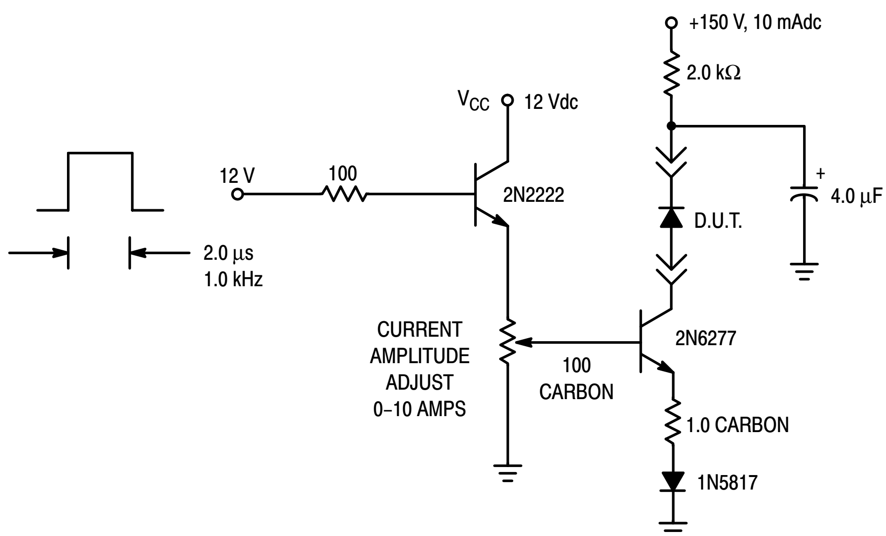
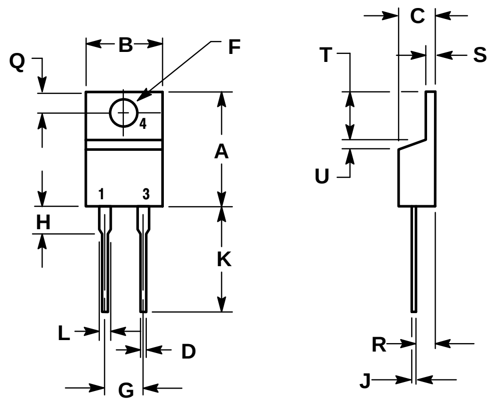


Figure 12. Test Circuit for dv/dt and Reverse Surge Current

PACKAGE DIMENSIONS

TO–220
PLASTIC
CASE 221B–04
ISSUE D



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.595	0.620	15.11	15.75
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.82
D	0.025	0.035	0.64	0.89
F	0.142	0.147	3.61	3.73
G	0.190	0.210	4.83	5.33
H	0.110	0.130	2.79	3.30
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.14	1.52
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.14	1.39
T	0.235	0.255	5.97	6.48
U	0.000	0.050	0.000	1.27

Notes

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