MOTOROLA
SEMICONDUCTORS
P.O. BOX 20912 • PHOENIX, ARIZONA 85036

MBR3520
MBR3535
MBR3545, H, H1

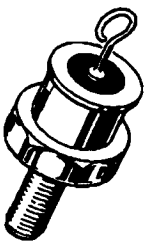
SWITCHMODE POWER RECTIFIERS

. . . using a platinum barrier metal in a large area metal-to-silicon power diode. State-of-the-art geometry features epitaxial construction with oxide passivation and metal overlap contact. Ideally suited for use as rectifiers in low-voltage, high-frequency inverters, free-wheeling diodes, and polarity-protection diodes.

- Guardring for dv/dt Stress Protection
- Guaranteed Reverse Surge Current/Avalanche
- 150°C Operating Junction Temperature

SCHOTTKY BARRIER RECTIFIERS

35 AMPERES
20 to 45 VOLTS



CASE 245
DO-4

MAXIMUM RATINGS

Rating	Symbol	MBR3520	MBR3535	MBR3545, H, H1*	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	20	35	45	Volts
Peak Repetitive Forward Current (Rated V_R, Square Wave, 20 kHz)	I_{FRM}	← 70 →			Amps
Average Rectified Forward Current (Rated V_R)	$I_{F(AV)}$	← 70 →			Amps
Peak Repetitive Reverse Surge Current (2.0 μs, 1.0 kHz) See Figure 8	I_{RRM}	← 2.0 →			Amps
Nonrepetitive Peak Surge Current (Surge applied at rated load conditions halfwave, single phase, 60 Hz)	I_{FSM}	← 600 →			Amps
Operating Junction Temperature	T_J	← -65 to + 150 →			°C
Storage Temperature	T_{stg}	← -65 to +175 →			°C
Voltage Rate of Change (Rated V_R)	dv/dt	← 1000 →			V/μs

THERMAL CHARACTERISTICS

Characteristic	Symbol	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.3	1.5	°C/W

ELECTRICAL CHARACTERISTICS PER DIODE

Characteristic	Symbol	Typ	Max	Unit
Instantaneous Forward Voltage (1) (i_F = 35 Amp, T_C = 125°C) (i_F = 35 Amp, T_C = 25°C) (i_F = 70 Amp, T_C = 125°C)	v_F	 0.49 0.55 0.60	 0.55 0.63 0.69	Volts
Instantaneous Reverse Current (1) (Rated Voltage, T_C = 125°C) (Rated Voltage, T_C = 25°C)	i_R	 60 0.1	 100 0.3	mA
Capacitance (V_R = 1.0 Vdc, 100 kHz > f > 1.0 MHz, T_C = 25°C)	C_t	3000	3700	pF

*H and H1 devices include extra testing. See Figure 10.
(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle ≈ 2.0%

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FIGURE 1 —MAXIMUM FORWARD VOLTAGE

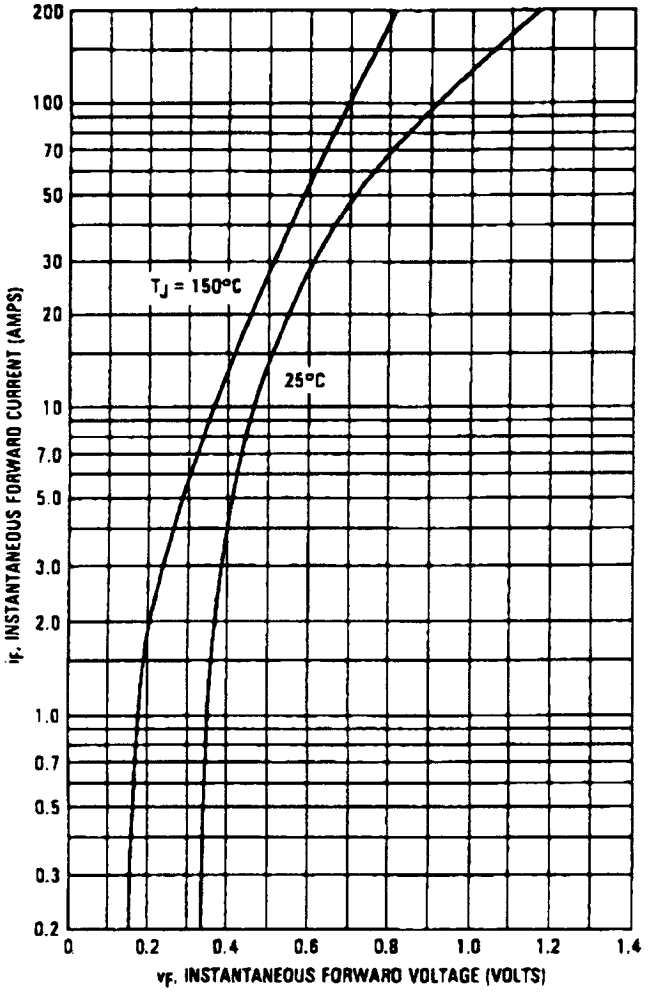


FIGURE 2 — MAXIMUM REVERSE CURRENT

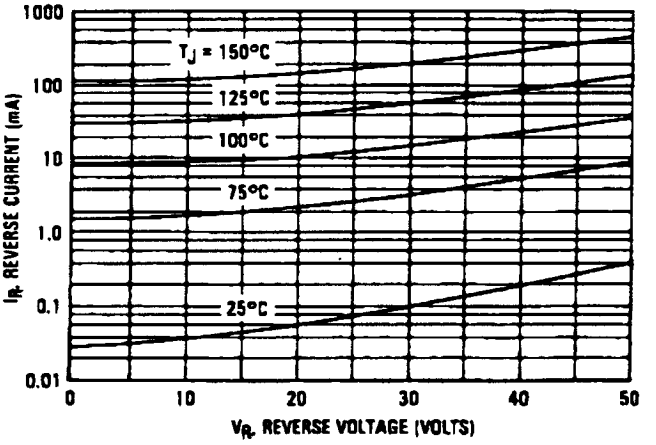


FIGURE 3 — MAXIMUM SURGE CAPABILITY

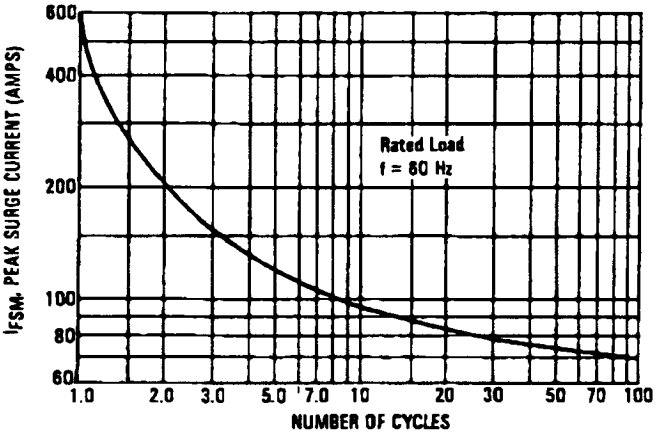


FIGURE 4 — CURRENT DERATING

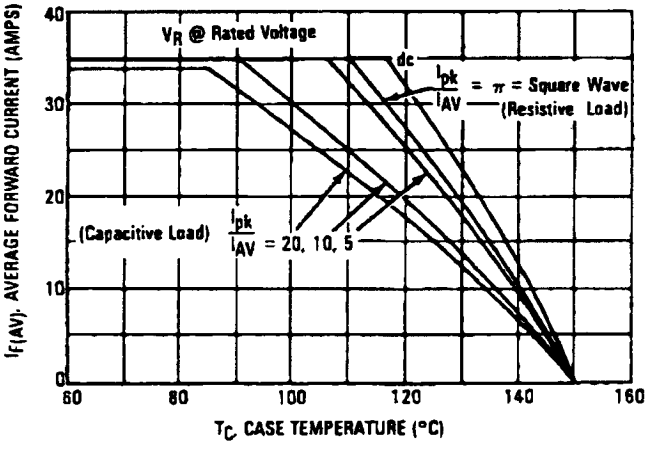


FIGURE 5 — POWER DISSIPATION

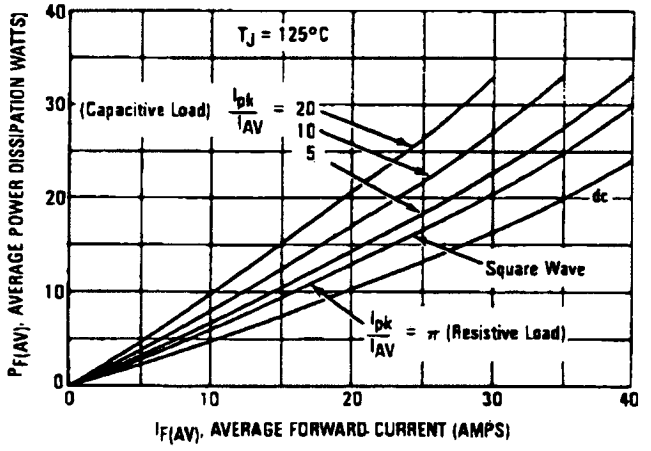
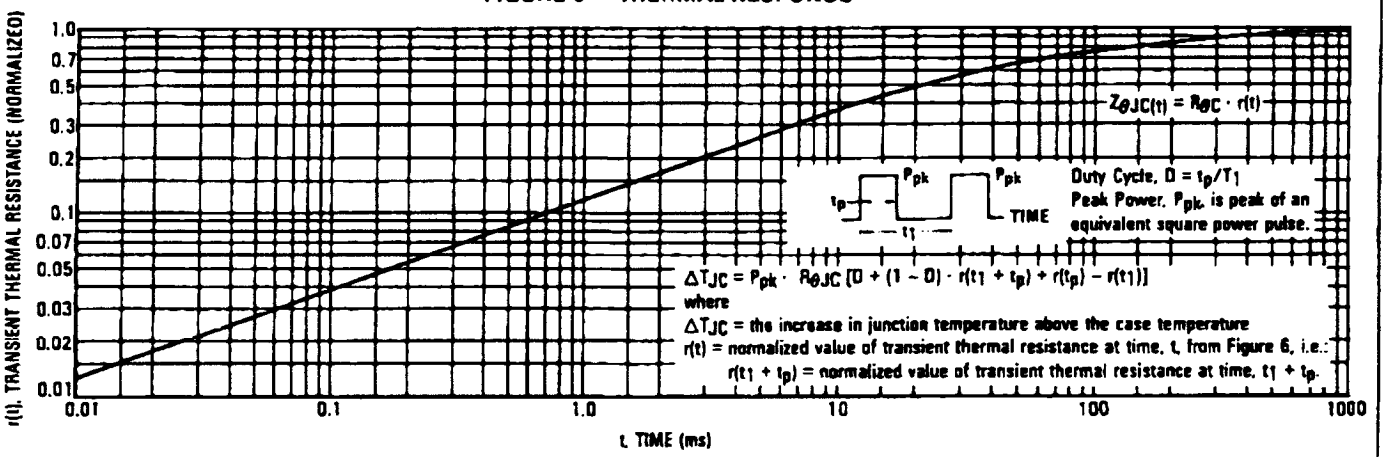


FIGURE 6 — THERMAL RESPONSE



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 7.)

Rectification efficiency measurements show that operation will be satisfactory up to several megahertz. For example, relative waveform rectification efficiency is approximately 70 per cent 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 7 — CAPACITANCE

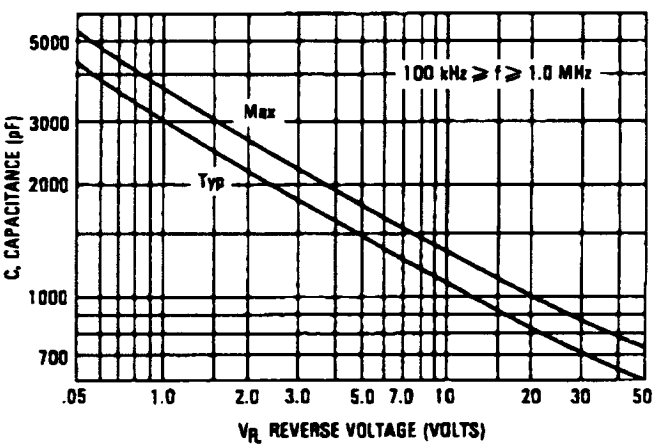
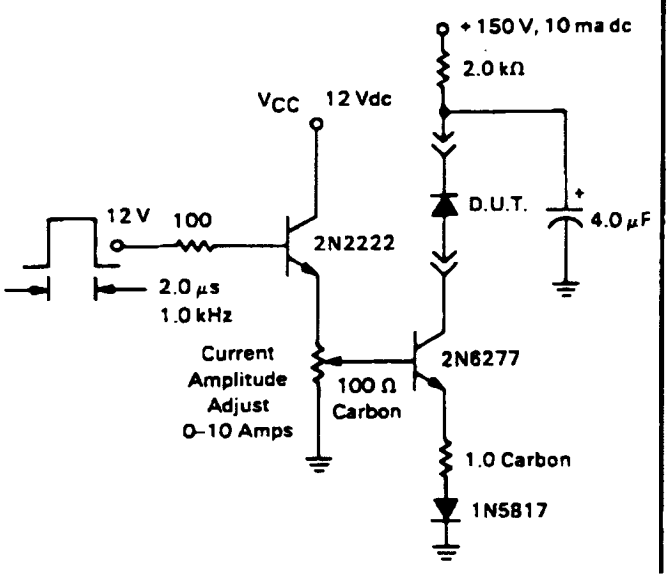
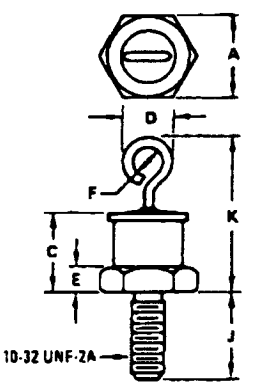


FIGURE 8 — TEST CIRCUIT FOR dv/dt AND REVERSE SURGE CURRENT





DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	10.77	11.10	0.424	0.437
C	–	10.29	–	0.405
D	–	6.35	–	0.250
E	1.91	4.45	0.075	0.175
F	1.52	–	0.060	–
J	10.72	11.51	0.422	0.453
K	–	20.32	–	0.800

MECHANICAL CHARACTERISTICS

CASE: Welded, hermetically sealed

FINISH: All external surfaces corrosion resistant and terminal lead is readily solderable.

POLARITY: Cathode-to-Case

MOUNTING POSITION: Any

STUD TORQUE: 25 in.-lb Max

SOLDER HEAT: The excellent heat transfer property of the heavy duty copper anode terminal which transmits heat away from the die requires that caution be used when attaching wires. Motorola suggests a heat sink be clamped between the eyelet and the body during any soldering operation.

CASE 245
(DO-4)
Polarity: Cathode to Case

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