DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

# MBR3020CT-MBR3045CT

## 30 A SCHOTTKY RECTIFIERS

**FEATURES**

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

**MAXIMUM RATINGS**

| Rating | Symbol | MBR3020CT | MBR3035CT | MBR3045CT | Unit |
|---|---|---|---|---|---|
| **Peak repetitive reverse voltage**<br>**Working peak reverse voltage**<br>**DC blocking voltage** | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | 20 | 35 | 45 | V |
| **Average rectified forward current** (Rated $V_R$) | $I_{F(AV)}$ | 30 @ $T_C$ = 105°C | | | A |
| **Peak repetitive forward current** (Rated $V_R$, square wave, 20 kHz) | $I_{FRM}$ | 30 | | | A |
| **Peak repetitive reverse surge current** (2.0µs, 1.0 kHz) | $I_{RRM}$ | 2 | | | A |
| **Non-repetitive peak surge current**<br>(surge applied at rated load conditions, halfwave, single phase, 60Hz) | $I_{FSM}$ | 400 | | | A |
| **Operating junction temperature range** | $T_J$ | -65 to +150 | | | °C |
| **Storage junction temperature range** | $T_{stg}$ | -65 to +175 | | | °C |
| **Peak surge junction temperature** (forward current applied) | $T_{J(pk)}$ | 175 | | | °C |
| **Voltage rate of change** (Rated $V_R$) | dv/dt | 1000 | | | V/µs |
| **Maximum thermal resistance**<br>Junction to case | $R_{\Theta JC}$ | 1.4 | | | °C/W |

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise specified)

| Parameter | Symbol | MBR3020CT | MBR3035CT | MBR3045CT | Unit |
|---|---|---|---|---|---|
| **Maximum instantaneous forward voltage** (1)<br>($I_F$ = 20A, $T_C$ = 125°C)<br>($I_F$ = 30A, $T_C$ = 125°C)<br>($I_F$ = 30A, $T_C$ = 25°C) | $V_F$ | 0.6<br>0.72<br>0.76 | | | V |
| **Maximum instantaneous reverse current** (1)<br>(Rated dc voltage, $T_C$ = 125°C)<br>(Rated dc voltage, $T_C$ = 25°C) | $I_R$ | 60<br>1.0 | | | mA |
| **Capacitance** | $C_t$ | 2000 | | | pF |

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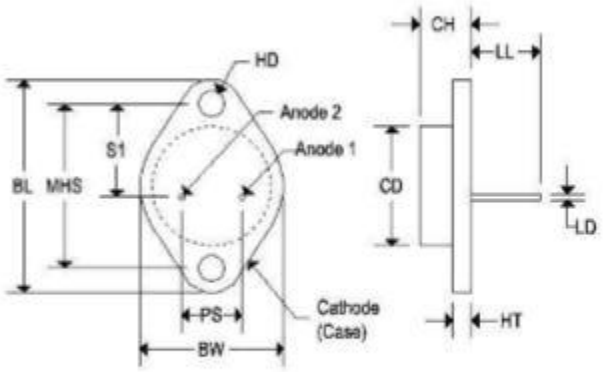
**MECHANICAL CHARACTERISTICS**

| | |
|---|---|
| **Case** | TO-3 Dual |
| **Marking** | Alpha-numeric |
| **Pin out** | See below |




| | TO-3 Dual | | | |
|---|---|---|---|---|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| CD | - | 0.875 | - | 22.220 |
| CH | 0.250 | 0.380 | 6.860 | 9.650 |
| HT | - | 0.135 | - | 3.430 |
| BW | - | 1.050 | - | 26.670 |
| HD | 0.131 | 0.188 | 3.330 | 4.780 |
| LD | 0.038 | 0.043 | 0.970 | 1.090 |
| LL | 0.312 | 0.500 | 7.920 | 12.700 |
| BL | 1.550 REF | | 39.370 REF | |
| MHS | 1.177 | 1.197 | 29.900 | 30.400 |
| PS | 0.420 | 0.440 | 10.670 | 11.180 |
| S1 | 0.655 | 0.675 | 16.640 | 17.150 |

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**FIGURE 1 — TYPICAL FORWARD VOLTAGE**

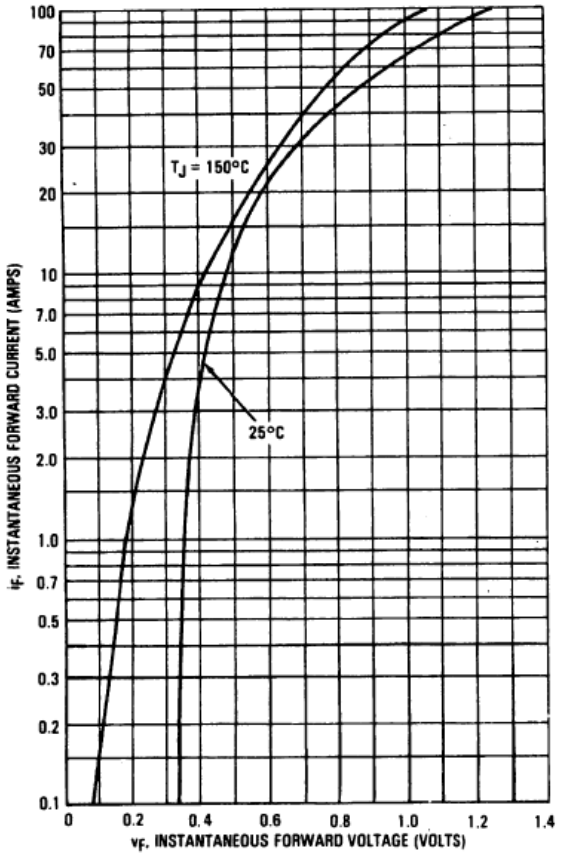


**FIGURE 2 — TYPICAL REVERSE CURRENT**

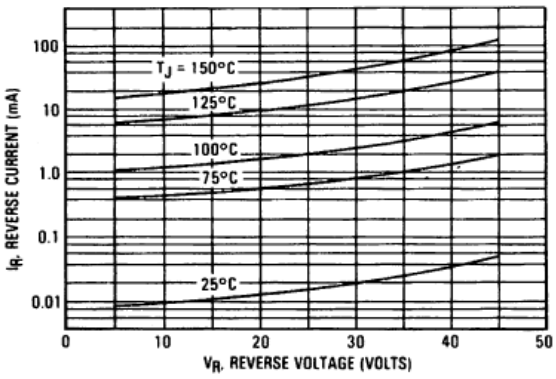


**FIGURE 3 — MAXIMUM SURGE CAPABILITY**

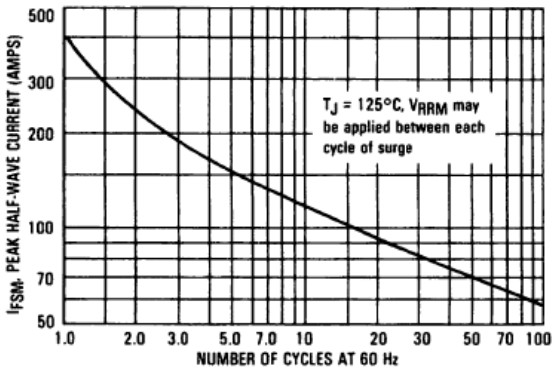


**FIGURE 4 — CURRENT DERATING**

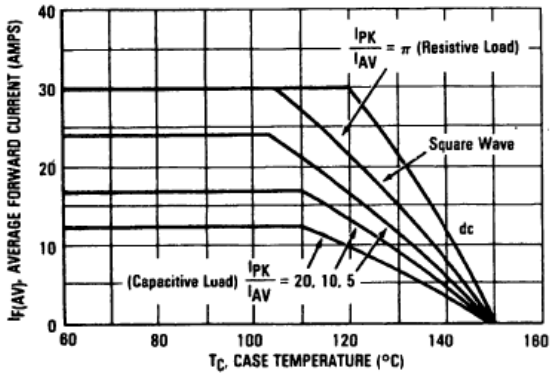


**FIGURE 5 — FORWARD POWER DISSIPATION**

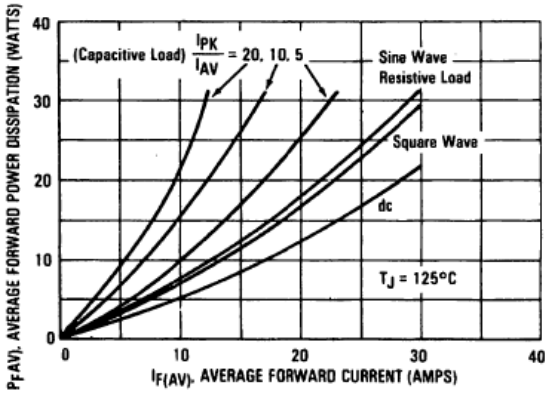

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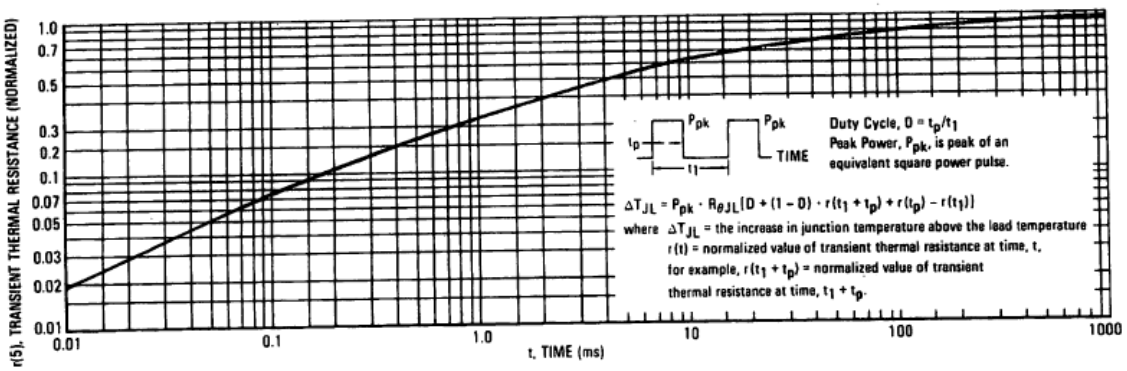
**FIGURE 6 — THERMAL RESPONSE PER DIODE LEG**




### 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 efficieny 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**

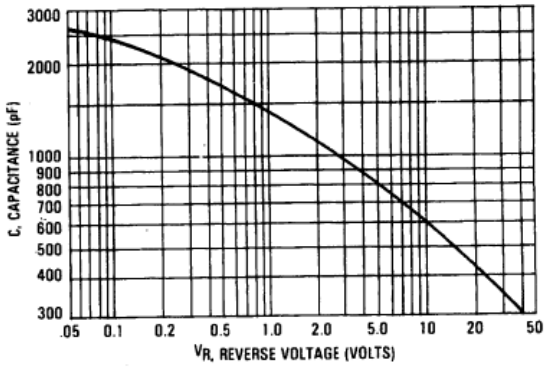



**FIGURE 8 — TEST CIRCUIT FOR REPETITIVE REVERSE CURRENT**