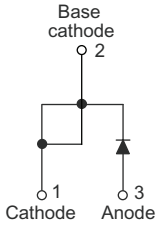
# Schottky Rectifier, 10 A

Available
RoHS*
COMPLIANT

## FEATURES

- 150°C $T_J$ operation
- High frequency operation
- Low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Compliant to RoHS
- Designed and qualified according to JEDEC-JESD47




TO-220AC

## DESCRIPTION

The MBR1045 Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 150°C junction temperature.

## APPLICATIONS

- Switching mode power supplies
- Converters
- Freewheeling diodes
- Reverse battery protection.

| PRODUCT SUMMARY | |
|---|---|
| Package | TO-220AC |
| $I_{F(AV)}$ | 10A |
| $V_R$ | 45V |
| $V_F$ at $I_F$ | 0.57V |
| $I_{RM}$ max. | 15mA at 125°C |
| $T_J$ max. | 150°C |
| Diode variation | Single die |
| $E_{AS}$ | 8 mJ |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|---|---|---|---|
| SYMBOL | CHARACTERISTICS | VALUE | UNIT |
| $I_{F(AV)}$ | Rectangular waveform | 10 | A |
| $I_{FRM}$ | $T_J$ = 135°C | 20 | A |
| $V_{RRM}$ | | 45 | V |
| $I_{FSM}$ | $t_p$ = 5 µs sine | 1060 | A |
| $V_F$ | 10 $A_{pk}$, $T_J$ = 125°C | 0.57 | V |
| $T_J$ | Range | -65 to 150 | °C |

| VOLTAGE RATINGS | | | |
|---|---|---|---|
| PARAMETER | SYMBOL | MBR1045 | UNIT |
| Maximum DC reverse voltage | $V_R$ | 45 | V |
| Maximum working peak reverse voltage | $V_{RWM}$ | | |

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUE | UNIT |
|---|---|---|---|---|---|
| Maximum average forward current | $I_{F(AV)}$ | $T_C$ = 131°C, rated $V_R$ | | 10 | A |
| Peak repetitive forward current | $I_{FRM}$ | Rated $V_R$ , square wave, 20 kHz, $T_C$ = 135°C | | 20 | A |
| Non-repetitive peak surge current | $I_{FSM}$ | 5 µs sine or 3 µs rect.pulse | Following any rated load condition and with rated $V_{RRM}$ applied | 1060 | A |
| | | Surge applied at rated load condition half wave single phase 60 Hz | | 150 | |
| Non-repetitive avalanche energy | $E_{AS}$ | $T_J$ = 25°C, $I_{AS}$ = 2A, L = 4mH | | 8 | mJ |
| Repetitive avalanche current | $I_{AR}$ | Current decaying linearly to zero in 1 µs<br>Frequency limited by $T_J$ maximum $V_A$ = 1.5 x $V_R$ typical | | 2 | A |

## ELECTRICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUE | UNIT |
|---|---|---|---|---|---|
| Maximum forward voltage drop | $V_{FM}$(1) | 20A | $T_J$ = 25°C | 0.84 | V |
| | | 10A | $T_J$ = 125°C | 0.57 | |
| | | 20A | | 0.72 | |
| Maximum instantaneous reverse current | $I_{RM}$(1) | $T_J$ = 25°C | Rated DC voltage | 0.1 | mA |
| | | $T_J$ = 125°C | | 15 | |
| Maximum junction capacitance | $C_T$ | $V_R$ = 5 $V_{DC}$ (test signal range 100 kHz to 1 MHZ) 25°C | | 600 | pF |
| Typical series inductance | $L_S$ | Measured from top of terminal to mounting plane | | 8 | nH |
| Maximum voltage rate of change | dV/dt | Rated $V_R$ | | 10000 | V/µs |
| Threshdd voltage | $V_{F(TO)}$ | $T_J$ = $T_J$ maximum | | 0.345 | V |
| Forward slope resistance | $r_t$ | | | 17.6 | mΩ |

**Note**
(1) Pulse width < 300 µs, duty cycle < 2%

## THERMAL - MECHANICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUE | UNIT |
|---|---|---|---|---|
| Maximum junction temperature range | $T_J$ | | -65 to 150 | °C |
| Maximum storage temperature range | $T_{stg}$ | | -65 to 175 | |
| Maximum thermal resistance, junction to case | $R_{thJC}$ | DC operation | 2 | °C/W |
| Typical thermal resistance, case to heatsink | $R_{thCS}$ | Mounting surface, smooth and greased | 0.5 | |
| Approximate weight | | | 2 | g |
| | | | 0.07 | oz. |
| Mounting torque minimum | | | 6 (5) | kgf · cm (lbf · in) |
| Mounting torque maximum | | | 12 (10) | |
| Marking device | | Case style TO-220AC | MBR1045 | |

## Ordering Information Table

**Device code**

| MBR | 10 | 45 |
|---|---|---|
| ① | ② | ③ |

1 - Schottky MBR series

2 - Current rating (10 = 10A)

3 - Voltage ratings — 45=45V

**Fig.1 Maximum forward voltage drop characteristics**

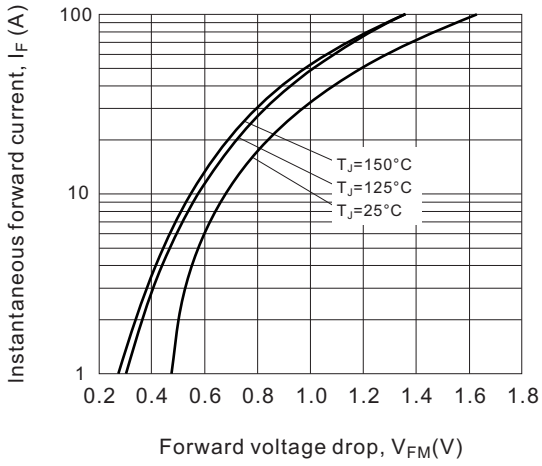



**Fig.2 Typical values of reverse current vs. reverse voltage**

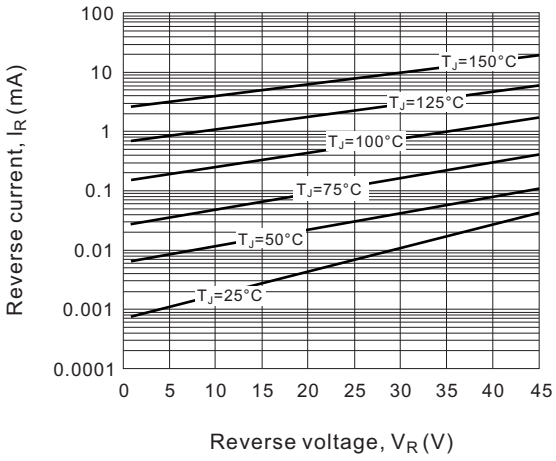



**Fig.3 Typical junction capacitance vs. reverse voltage**

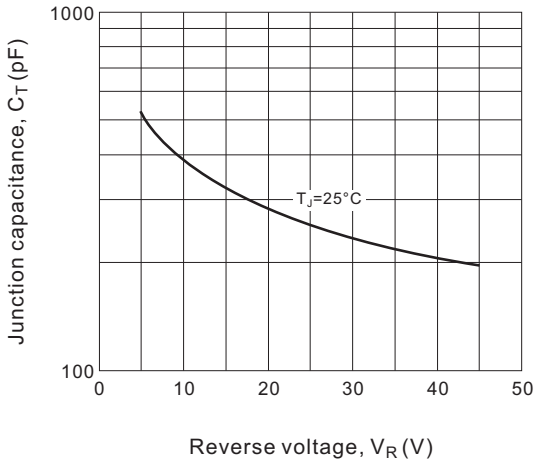



**Fig.4 Maximum allowable case temperature vs. average forward current**

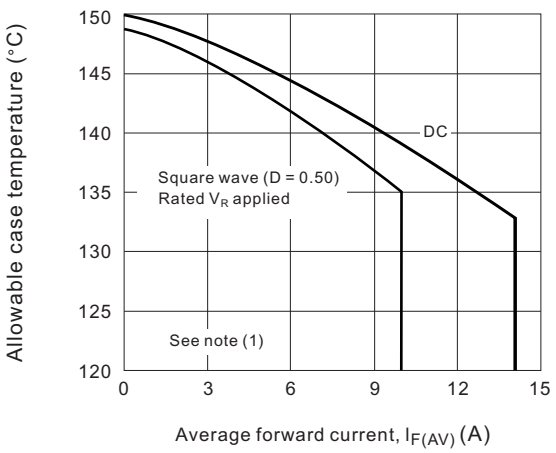


**Fig.5 Maximum thermal impedance $R_{th(j-c)}$ characteristics**

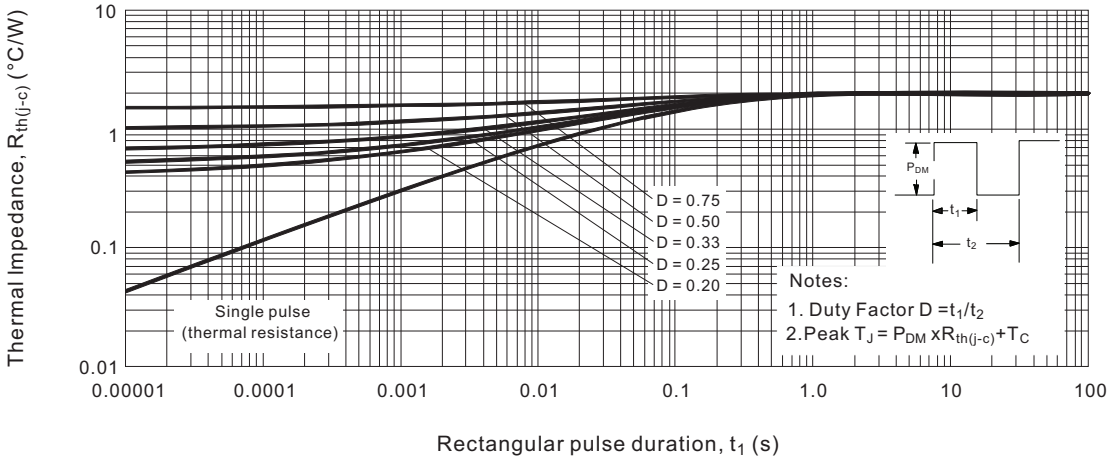



**Fig.6 Forward power loss characteristics**

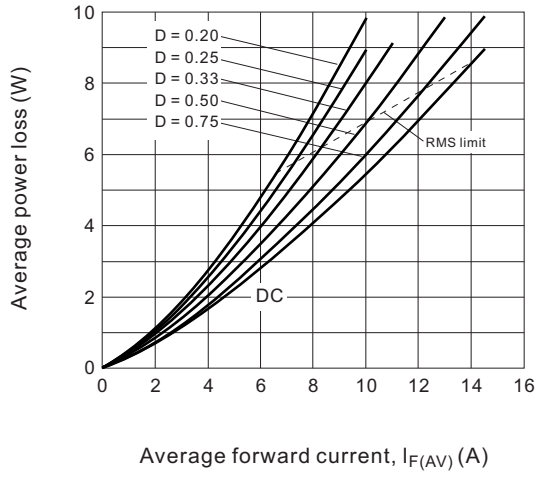
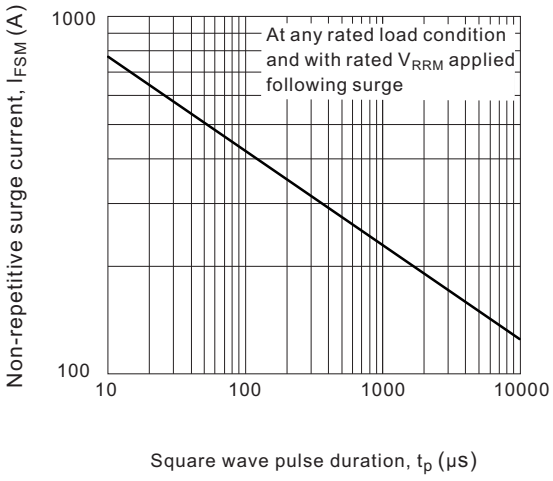



**Fig.7 Maximum non-repetitive surge current**




**Note**

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;

Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D)(see fig.6);

$Pd_{REV}$ = Inverse power loss = $V_{R1} \times I_R (1-D)$; $I_R$ at $V_{R1}$ = Rated $V_R$

## TO-220AC Package Outline