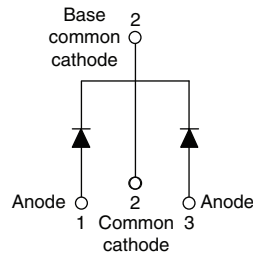


Schottky Rectifier, 2 x 20 A


TO-220AB


FEATURES

- 150 °C T_J operation
- Center tap configuration
- Very low forward voltage drop
- High frequency operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Designed and qualified for industrial level

DESCRIPTION

This center tap Schottky rectifier has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

PRODUCT SUMMARY

| | |
|-------------|----------|
| $I_{F(AV)}$ | 2 x 20 A |
| V_R | 45 V |

MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
|-------------|--|-------------|------------------|
| $I_{F(AV)}$ | Rectangular waveform | 40 | A |
| V_{RRM} | | 45 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 1240 | A |
| V_F | 20 Apk, $T_J = 125 \text{ }^\circ\text{C}$ (per leg) | 0.48 | V |
| T_J | Range | - 55 to 150 | $^\circ\text{C}$ |

VOLTAGE RATINGS

| PARAMETER | SYMBOL | 40CTQ045 | UNITS |
|--------------------------------------|-----------|----------|-------|
| Maximum DC reverse voltage | V_R | 45 | V |
| Maximum working peak reverse voltage | V_{RWM} | | |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|--|-------------|---|--------|-------|
| Maximum average forward current $\frac{\text{per leg}}{\text{per device}}$ See fig. 5 | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 116 \text{ }^\circ\text{C}$, rectangular waveform | 20 | A |
| | | | 40 | |
| Maximum peak one cycle non-repetitive surge current per leg See fig. 7 | I_{FSM} | 5 μs sine or 3 μs rect. pulse | 1240 | |
| | | 10 ms sine or 6 ms rect. pulse | 350 | |
| Non-repetitive avalanche energy per leg | E_{AS} | $T_J = 25 \text{ }^\circ\text{C}$, $I_{AS} = 3 \text{ A}$, $L = 4.4 \text{ mH}$ | 20 | mJ |
| Repetitive avalanche current per leg | I_{AR} | Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical | 3 | A |



| ELECTRICAL SPECIFICATIONS | | | | | |
|---|----------------|--|-----------------------------------|--------|------------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum forward voltage drop per leg See fig. 1 | $V_{FM}^{(1)}$ | 20 A | $T_J = 25\text{ }^\circ\text{C}$ | 0.53 | V |
| | | 40 A | | 0.68 | |
| | | 20 A | $T_J = 125\text{ }^\circ\text{C}$ | 0.48 | |
| | | 40 A | | 0.67 | |
| Maximum reverse leakage current per leg See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | 3 | mA |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 115 | |
| Threshold voltage | $V_{F(TO)}$ | $T_J = T_J \text{ maximum}$ | | 0.27 | V |
| Forward slope resistance | r_t | $T_J = T_J \text{ maximum}$ | | 8.72 | $\text{m}\Omega$ |
| Maximum junction capacitance per leg | C_T | $V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ | | 2800 | pF |
| Typical series inductance per leg | L_S | Measured lead to lead 5 mm from package body | | 8.0 | nH |
| Maximum voltage rate of change | dV/dt | Rated V_R | | 10 000 | $\text{V}/\mu\text{s}$ |

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

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | |
|--|----------------|--------------------------------------|--|-------------|---------------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum junction and storage temperature range | T_J, T_{Stg} | | | - 55 to 150 | $^\circ\text{C}$ |
| Maximum thermal resistance, junction to case per leg | R_{thJC} | DC operation | | 2.0 | $^\circ\text{C}/\text{W}$ |
| Maximum thermal resistance, junction to case per package | | | | 1.0 | |
| Typical thermal resistance, case to heatsink | R_{thCS} | Mounting surface, smooth and greased | | 0.50 | |
| Approximate weight | | | | 2 | g |
| | | | | 0.07 | oz. |
| Mounting torque | minimum | | | 6 (5) | kgf · cm (lbf · in) |
| | maximum | | | 12 (10) | |
| Marking device | | Case style TO-220AB | | 40CTQ045 | |

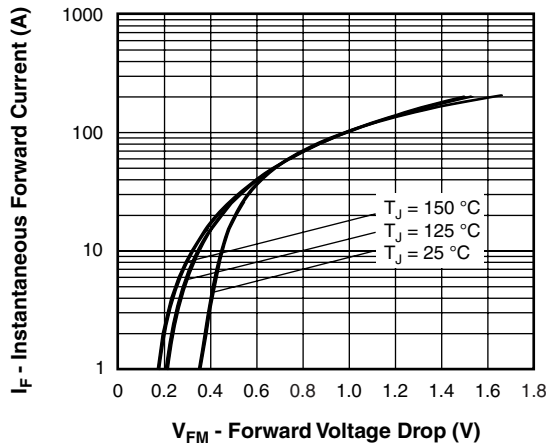


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

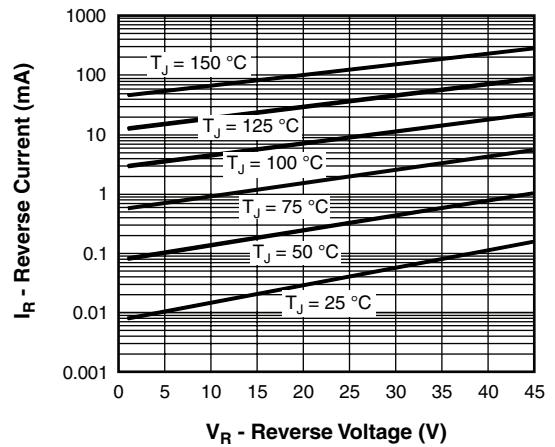


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

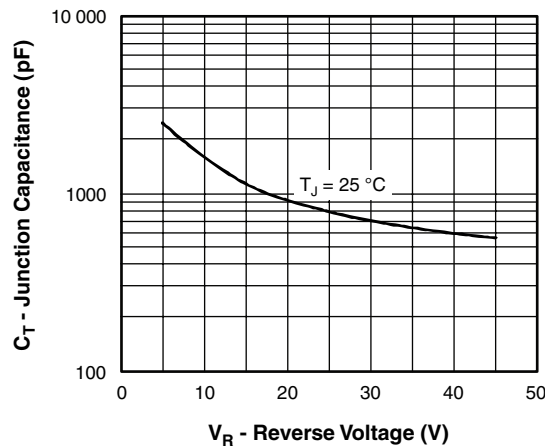


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

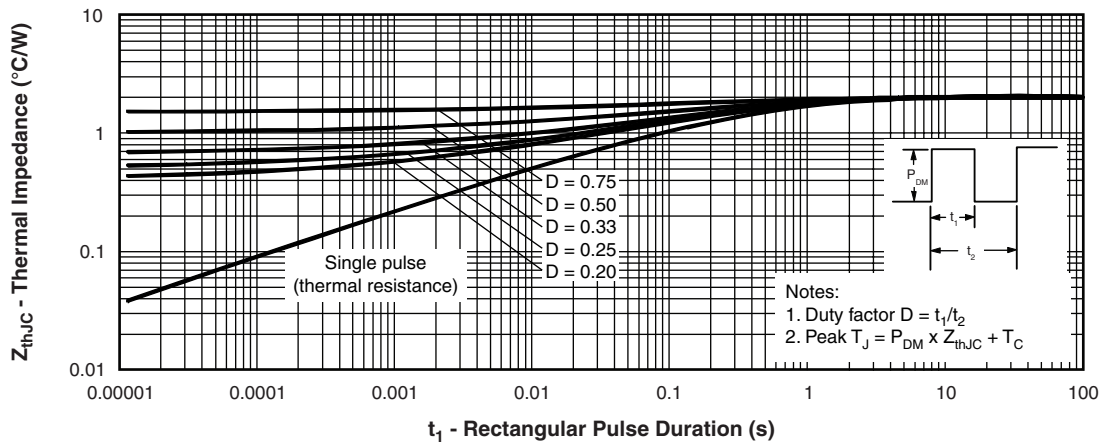


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

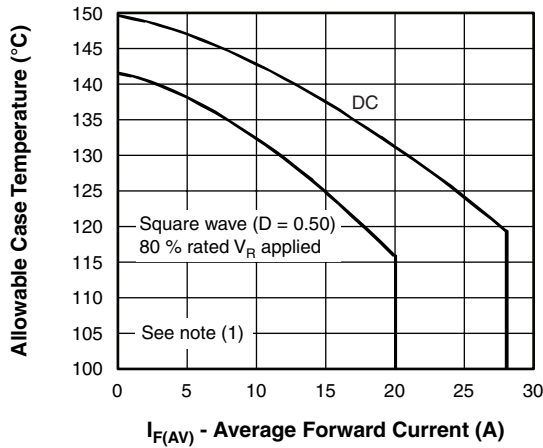


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

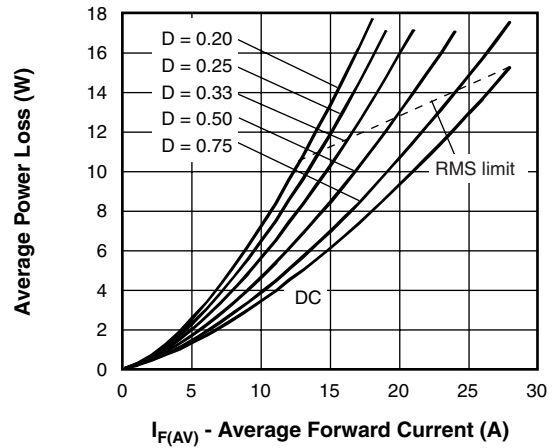


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

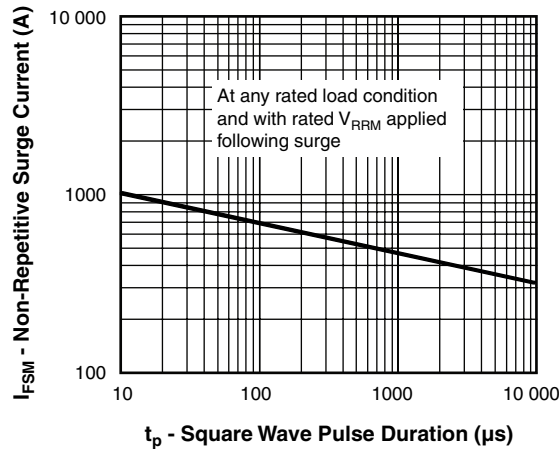


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

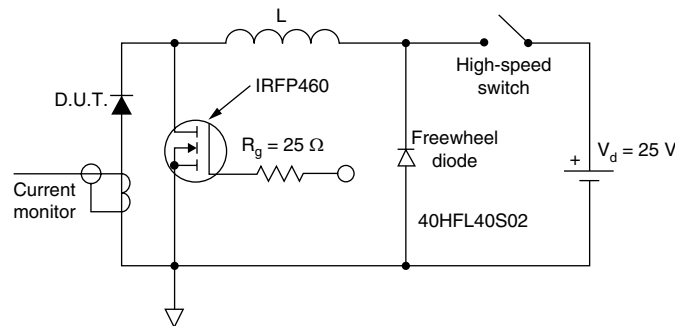


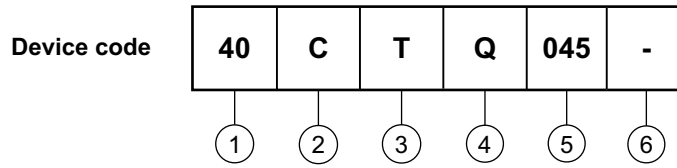
Fig. 8 - Unclamped Inductive Test Circuit

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$;
 $P_d = \text{Forward power loss} = I_{F(AV)} \times V_{FM} \text{ at } (I_{F(AV)}/D)$ (see fig. 6);
 $P_{d_{REV}} = \text{Inverse power loss} = V_{R1} \times I_R (1 - D)$; I_R at $V_{R1} = 10 \text{ V}$



ORDERING INFORMATION TABLE



- 1** - Current rating (40 = 40 A)
- 2** - Circuit configuration:
C = Common cathode
- 3** - Package:
T = TO-220
- 4** - Schottky "Q" series
- 5** - Voltage rating (045 = 45 V)
- 6** -
 - None = Standard production
 - PbF = Lead (Pb)-free

Tube standard pack quantity: 50 pieces

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|---|
| Dimensions | http://www.vishay.com/doc?95222 |
| Part marking information | http://www.vishay.com/doc?95225 |



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