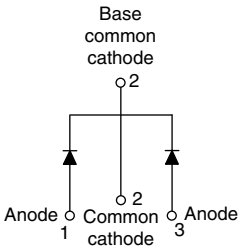
# Schottky Rectifier, 2 x 6 A

TO-220AB




## FEATURES

- 175 °C $T_J$ operation
- Center tap TO-220 package
- 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
- Lead (Pb)-free ("PbF" suffix)
- Designed and qualified for industrial level

Pb-free Available

RoHS* COMPLIANT

## DESCRIPTION

The 12CTQ...PbF center tap Schottky rectifier series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

| PRODUCT SUMMARY | |
|---|---|
| $I_{F(AV)}$ | 2 x 6 A |
| $V_R$ | 35 to 45 V |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|---|---|---|---|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| $I_{F(AV)}$ | Rectangular waveform | 12 | A |
| $V_{RRM}$ | Range | 35 to 45 | V |
| $I_{FSM}$ | $t_p$ = 5 µs sine | 690 | A |
| $V_F$ | 6 Apk, $T_J$ = 125 °C (per leg) | 0.53 | V |
| $T_J$ | Range | - 55 to 175 | °C |

| VOLTAGE RATINGS | | | | | |
|---|---|---|---|---|---|
| PARAMETER | SYMBOL | 12CTQ035PbF | 12CTQ040PbF | 12CTQ045PbF | UNITS |
| Maximum DC reverse voltage | $V_R$ | 35 | 40 | 45 | V |
| Maximum working peak reverse voltage | $V_{RWM}$ | | | | |

| ABSOLUTE MAXIMUM RATINGS | | | | | | |
|---|---|---|---|---|---|---|
| PARAMETER | | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum average forward current See fig. 5 | per leg | $I_{F(AV)}$ | 50 % duty cycle at $T_C$ = 160 °C, rectangular waveform | | 6 | A |
| | per device | | | | 12 | |
| Maximum peak one cycle non-repetitive surge current per leg See fig. 7 | | $I_{FSM}$ | 5 µs sine or 3 µs rect. pulse | Following any rated load condition and with rated $V_{RRM}$ applied | 690 | A |
| | | | 10 ms sine or 6 ms rect. pulse | | 140 | |
| Non-repetitive avalanche energy per leg | | $E_{AS}$ | $T_J$ = 25 °C, $I_{AS}$ = 1.20 A, L = 11.10 mH | | 8 | 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 x $V_R$ typical | | 1.20 | A |

* Pb containing terminations are not RoHS compliant, exemptions may apply

| ELECTRICAL SPECIFICATIONS | | | | | |
|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | | **VALUES** | **UNITS** |
| Maximum forward voltage drop per leg See fig. 1 | $V_{FM}$ (1) | 6 A | $T_J$ = 25 °C | 0.60 | V |
| | | 12 A | | 0.73 | |
| | | 6 A | $T_J$ = 125 °C | 0.53 | |
| | | 12 A | | 0.64 | |
| Maximum reverse leakage curent per leg See fig. 2 | $I_{RM}$ (1) | $T_J$ = 25 °C | $V_R$ = Rated $V_R$ | 0.8 | mA |
| | | $T_J$ = 125 °C | | 7.0 | |
| Threshold voltage | $V_{F(TO)}$ | $T_J$ = $T_J$ maximum | | 0.35 | V |
| Forward slope resistance | $r_t$ | | | 18.23 | mΩ |
| Maximum junction capacitance per leg | $C_T$ | $V_R$ = 5 $V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °C | | 400 | 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 | V/µs |

**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 175 | °C |
| Maximum thermal resistance, junction to case per leg | | $R_{thJC}$ | DC operation See fig. 4 | 3.50 | °C/W |
| Maximum thermal resistance, junction to case per package | | | DC operation | 1.75 | |
| 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 | 12CTQ035 | |
| | | | | 12CTQ040 | |
| | | | | 12CTQ045 | |

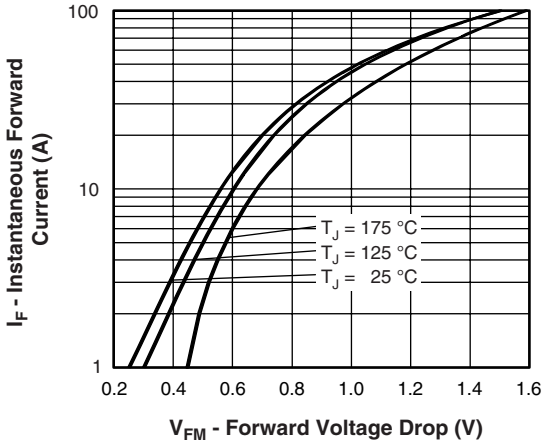



Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

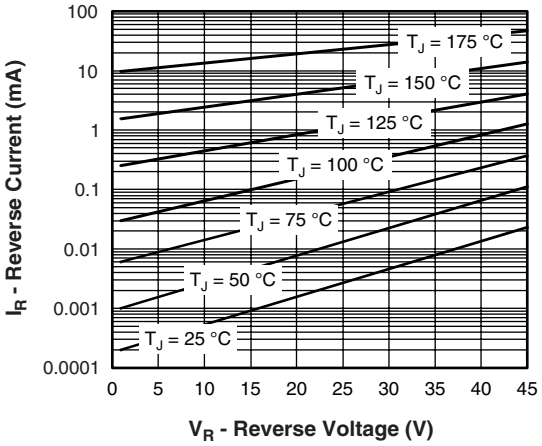



Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

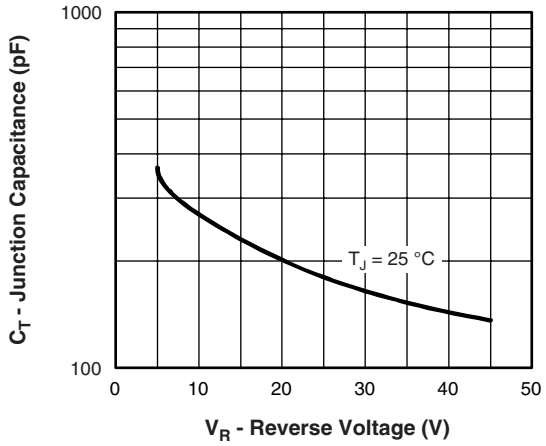



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

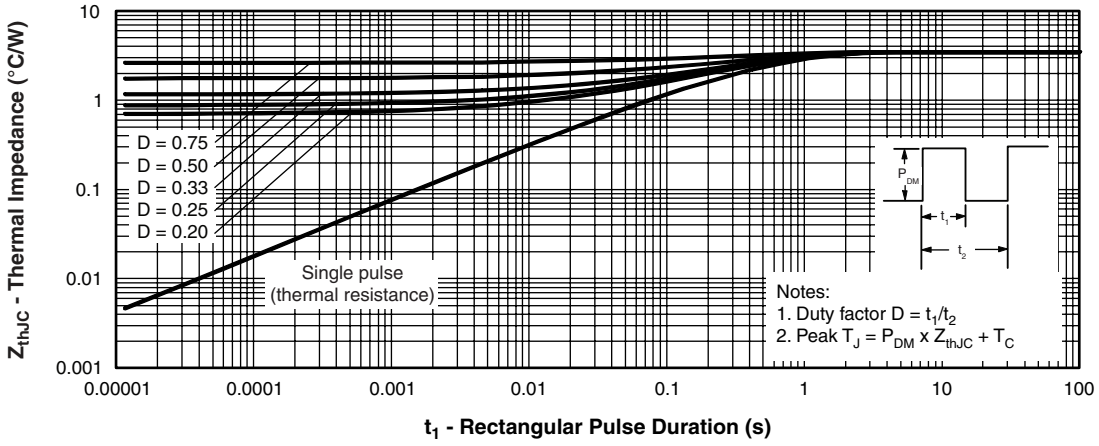



Fig. 4 - Maximum Thermal Impedance $Z_{thJC}$ Characteristics (Per Leg)

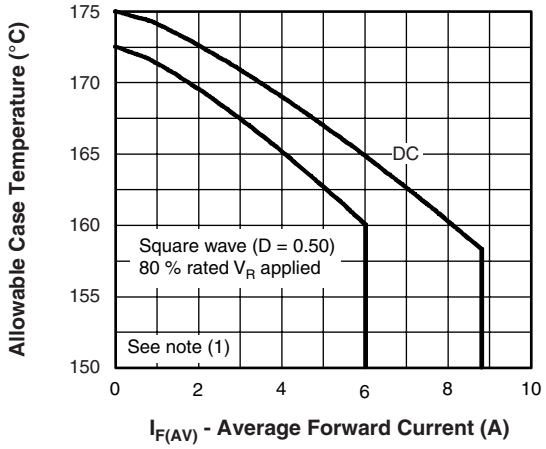



Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

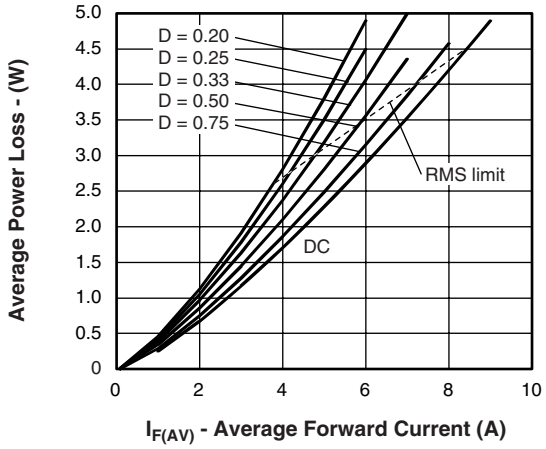



Fig. 6 - Forward Power Loss Characteristics (Per Leg)

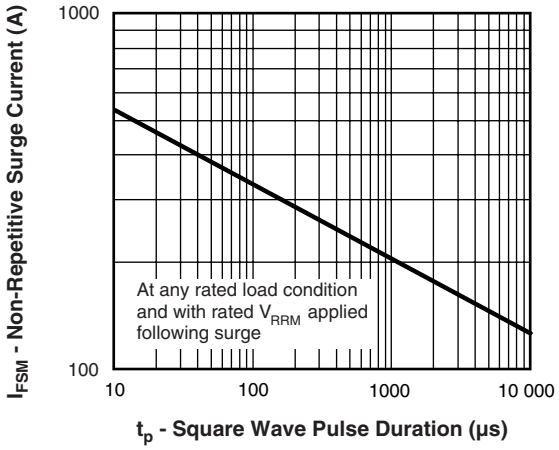



Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

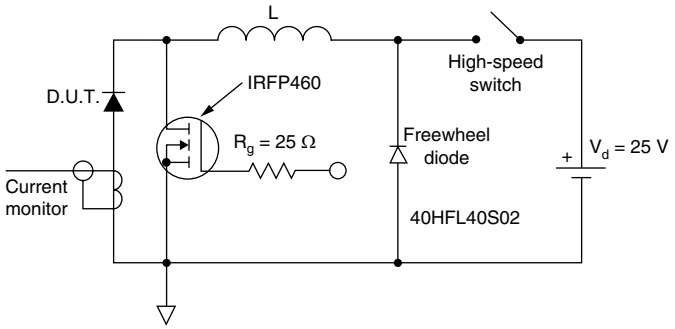


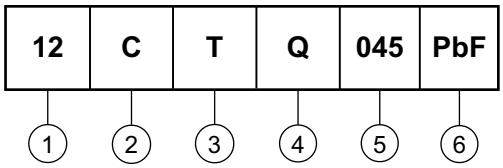

Fig. 8 - Unclamped Inductive Test Circuit

**Note**

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
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 $V_{R1}$ = 80 % rated $V_R$

## ORDERING INFORMATION TABLE

**Device code**




1 - Current rating (12 = 12 A)

2 - Circuit configuration:
C = Common cathode

3 - Package:
T = TO-220

4 - Schottky “Q” series

5 - Voltage ratings
035 = 35 V
040 = 40 V
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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