

International IOR Rectifier

47CTQ020PbF

SCHOTTKY RECTIFIER

40 Amp

$$I_{F(AV)} = 40\text{Amp}$$

$$V_R = 20\text{V}$$

Major Ratings and Characteristics

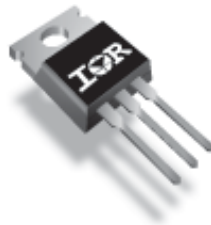
| Characteristics | Values | Units |
|---|------------|------------------|
| $I_{F(AV)}$ Rectangular waveform | 40 | A |
| V_{RRM} | 20 | V |
| I_{FSM} @ tp = 5 μ s sine | 1000 | A |
| V_F @ 20 Apk, $T_J = 125^\circ\text{C}$ | 0.34 | V |
| T_J | -55 to 150 | $^\circ\text{C}$ |

Description/ Features

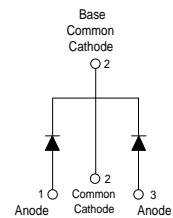
This center tap Schottky rectifier has been optimized for ultra low forward voltage drop specifically for 3.3V output power supplies. The proprietary barrier technology allows for reliable operation up to 150 $^\circ\text{C}$ junction temperature. Typical applications are in parallel switching power supplies, converters, reverse battery protection, and redundant power subsystems.

- 150 $^\circ\text{C}$ T_J operation
- Center tap configuration
- Optimized for 3.3V application
- Ultra low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Lead-Free ("PbF" suffix)

Case Styles



TO-220



47CTQ020PbF

Bulletin PD-20854 rev. A 02/07



Voltage Ratings

| Part number | 47CTQ020PbF | | |
|-----------------------------------|-------------|----|--|
| V_R Max. DC Reverse Voltage (V) | @ 125° C | 20 | |
| V_R Max. DC Reverse Voltage (V) | @ 150° C | 10 | |

Absolute Maximum Ratings

| Parameters | 47CTQ | Units | Conditions |
|--|-------------|-------|--|
| $I_{F(AV)}$ Max. Average Forward (Per Device) Current (Per Leg) | 40 20 | A | 50% duty cycle @ $T_C = 135^\circ\text{C}$, rectangular wave form |
| I_{FSM} Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg) | 1000 250 | A | 5 μs Sine or 3 μs Rect. pulse 10ms Sine or 6ms Rect. pulse Following any rated load condition and with rated V_{RRM} applied |
| E_{AS} Non-Repetitive Avalanche Energy (Per Leg) | 18 | mJ | $T_J = 25^\circ\text{C}$, $I_{AS} = 3$ Amps, $L = 3$ mH |
| I_{AR} Repetitive Avalanche Current (Per Leg) | 3 | A | Current decaying linearly to zero in 1 μsec Frequency limited by T_J max. $V_A = 1.5 \times V_R$ typical |

Electrical Specifications

| Parameters | 47CTQ | Units | Conditions |
|---|-------|------------------|---|
| V_{FM} Max. Forward Voltage Drop (Per Leg) (1) | 0.45 | V | @ 20A $T_J = 25^\circ\text{C}$ |
| | 0.51 | V | @ 40A $T_J = 25^\circ\text{C}$ |
| | 0.34 | V | @ 20A $T_J = 125^\circ\text{C}$ |
| | 0.44 | V | @ 40A $T_J = 125^\circ\text{C}$ |
| | 0.31 | V | @ 20A $T_J = 150^\circ\text{C}$ |
| I_{RM} Max. Reverse Leakage Current (Per Leg) (1) | 3 | mA | $T_J = 25^\circ\text{C}$ $V_R = \text{rated } V_R$ |
| | 310 | mA | $T_J = 125^\circ\text{C}$ $V_R = 5V$ |
| | 60 | mA | $T_J = 125^\circ\text{C}$ $V_R = 3.3V$ |
| | 45 | mA | $T_J = 125^\circ\text{C}$ $V_R = 3.3V$ |
| $V_{F(TO)}$ Threshold Voltage | 0.188 | V | $T_J = T_J \text{ max.}$ |
| r_t Forward Slope Resistance | 5.9 | m Ω | |
| C_T Max. Junction Capacitance (Per Leg) | 3000 | pF | $V_R = 5V_{DC}$ (test signal range 100Khz to 1Mhz) 25°C |
| L_S Typical Series Inductance (Per Leg) | 5.5 | nH | Measured lead to lead 5mm from package body |
| dv/dt Max. Voltage Rate of Change | 10000 | V/ μs | (Rated V_R) |

Thermal-Mechanical Specifications

(1) Pulse Width < 300 μs , Duty Cycle <2%

| Parameters | 47CTQ | Units | Conditions |
|---|------------|--------------------|--------------------------------------|
| T_J Max. Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ | |
| T_{stg} Max. Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ | |
| R_{thJC} Max. Thermal Resistance Junction to Case (Per Leg) | 1.5 | $^\circ\text{C/W}$ | DC operation |
| R_{thJC} Max. Thermal Resistance Junction to Case (Per Package) | 0.75 | $^\circ\text{C/W}$ | DC operation |
| R_{thCS} Typical Thermal Resistance, Case to Heatsink | 0.50 | $^\circ\text{C/W}$ | Mounting surface, smooth and greased |
| wt Approximate Weight | 2 (0.07) | g (oz.) | |
| T Mounting Torque | Min. | 6 (5) | Kg-cm (lbf-in) |
| | Max. | 12 (10) | |
| Marking Device | 47CTQ020 | | |

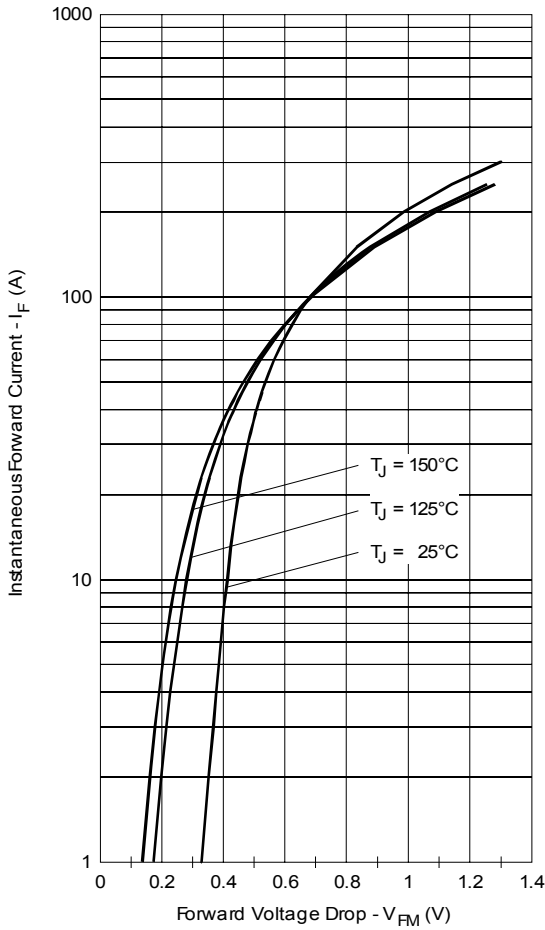


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

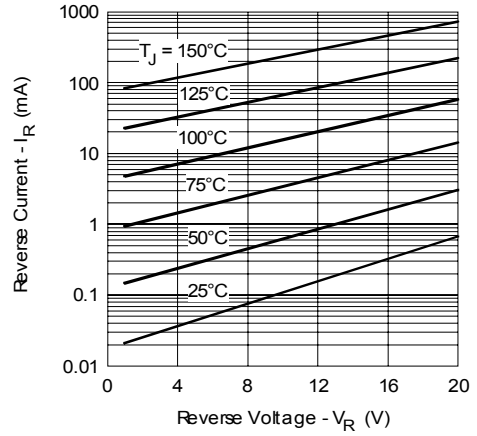


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

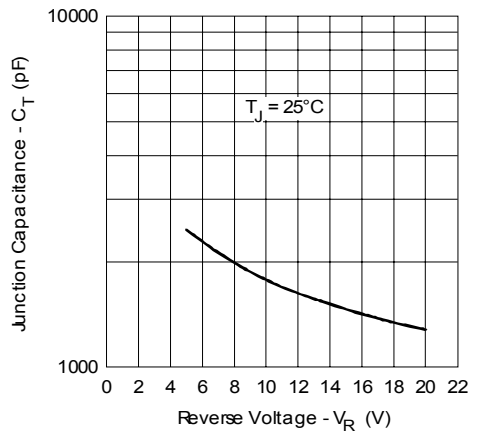


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

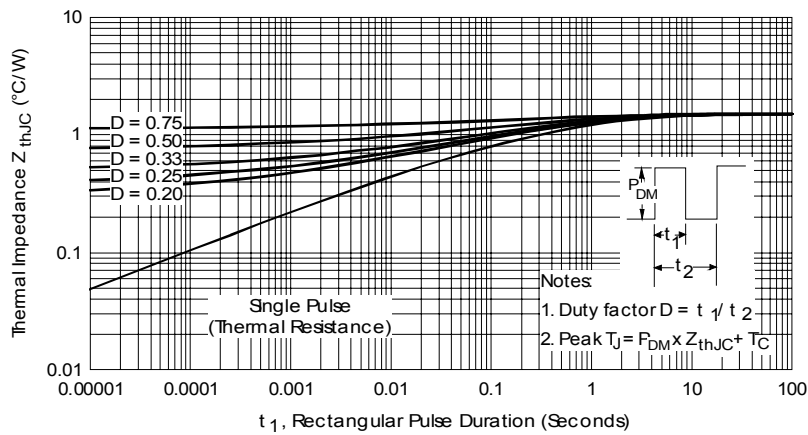


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

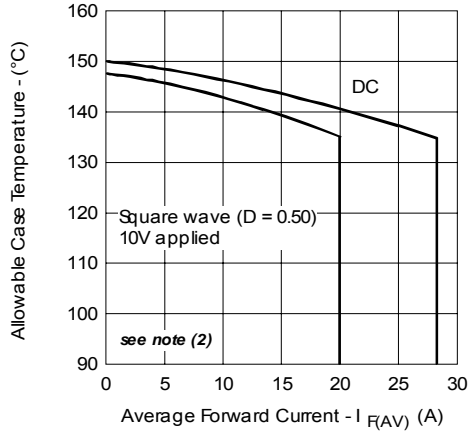


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

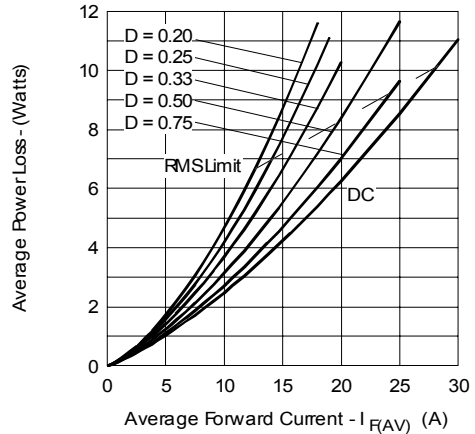


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

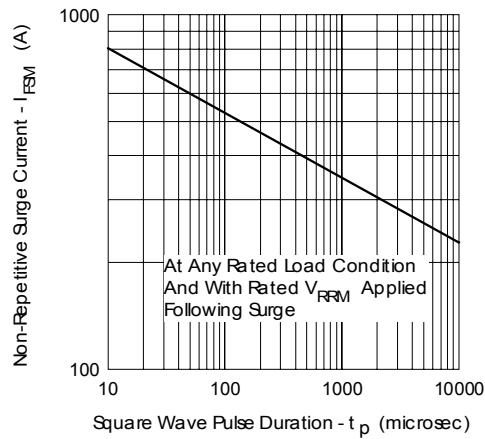


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

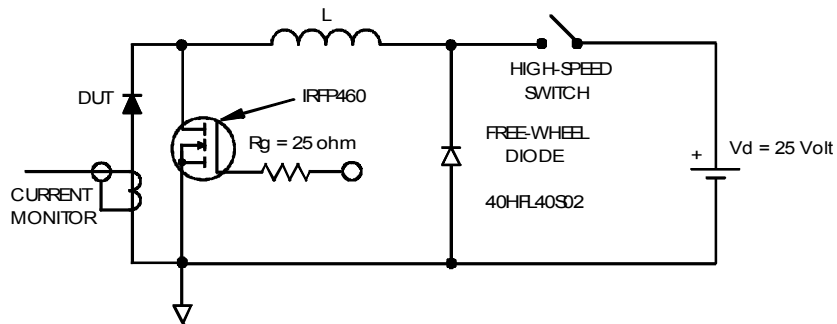
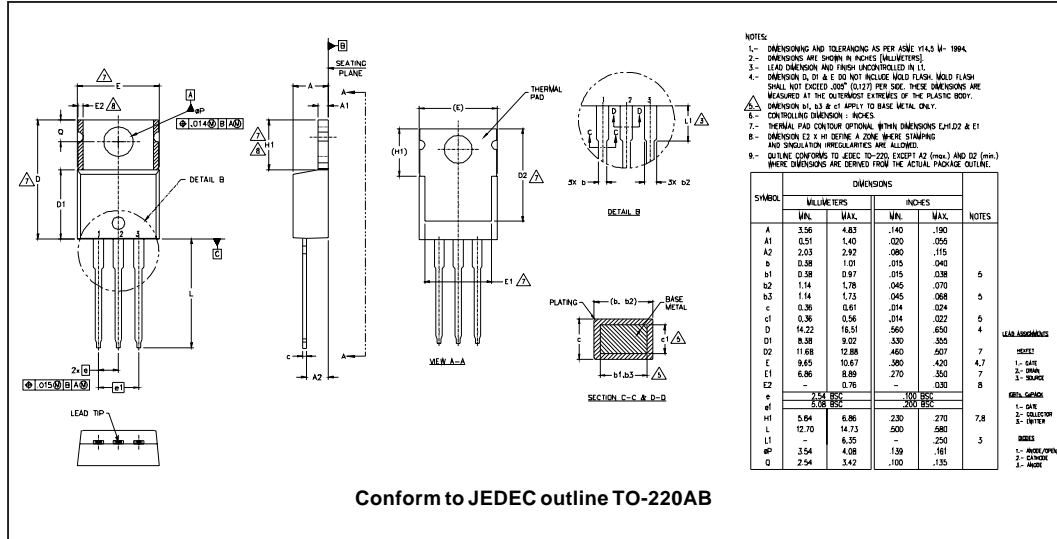


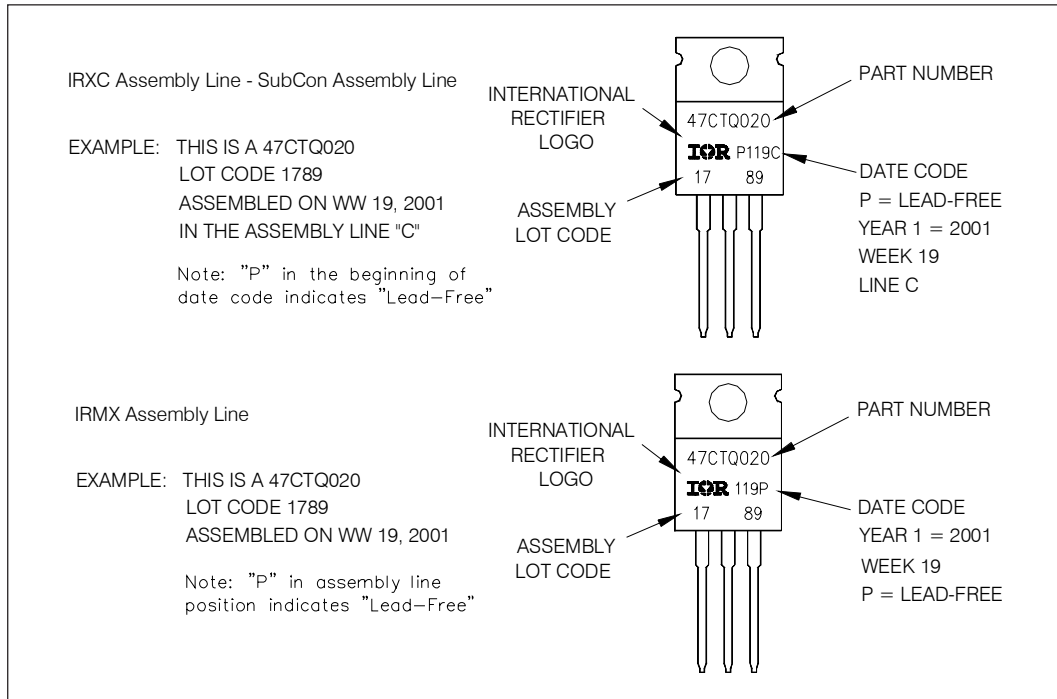
Fig. 8 - Unclamped Inductive Test Circuit

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

Outline Table



Part Marking Information



Ordering Information Table

| Device Code | | | | | | | | | | | | | |
|---|--|----|---|-----|-----|-----|-----|---|---|---|---|---|---|
| | <table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">47</td> <td style="padding: 5px;">C</td> <td style="padding: 5px;">T</td> <td style="padding: 5px;">Q</td> <td style="padding: 5px;">020</td> <td style="padding: 5px;">PbF</td> </tr> <tr> <td style="text-align: center;">①</td> <td style="text-align: center;">②</td> <td style="text-align: center;">③</td> <td style="text-align: center;">④</td> <td style="text-align: center;">⑤</td> <td style="text-align: center;">⑥</td> </tr> </table> | 47 | C | T | Q | 020 | PbF | ① | ② | ③ | ④ | ⑤ | ⑥ |
| 47 | C | T | Q | 020 | PbF | | | | | | | | |
| ① | ② | ③ | ④ | ⑤ | ⑥ | | | | | | | | |
| 1 | - Current Rating (40A) | | | | | | | | | | | | |
| 2 | - Circuit Configuration C = Common Cathode | | | | | | | | | | | | |
| 3 | - Package T = TO-220 | | | | | | | | | | | | |
| 4 | - Schottky "Q" Series | | | | | | | | | | | | |
| 5 | - Voltage Rating (020 = 20A) | | | | | | | | | | | | |
| 6 | - <ul style="list-style-type: none"> • none = Standard Production • PbF = Lead-Free | | | | | | | | | | | | |
| Tube Standard Pack Quantity : 50 pieces | | | | | | | | | | | | | |

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level and Lead-Free.
Qualification Standards can be found on IR's Web site.