

$$I_{F(AV)} = 40\text{Amp}$$
$$V_R = 150\text{V}$$

Major Ratings and Characteristics

| Characteristics                               | Values     | Units      |
|-----------------------------------------------|------------|------------|
| $I_{F(AV)}$ Rectangular waveform              | 40         | A          |
| $V_{RRM}$                                     | 150        | V          |
| $I_{FSM}$ @ $t_p = 5 \mu s$ sine              | 150        | A          |
| $V_F$ @ 20 Apk, $T_J = 125^\circ C$ (per leg) | 0.71       | V          |
| $T_J$                                         | -55 to 175 | $^\circ C$ |

Description/ Features

The 40CTQ...PbF 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 175° C junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

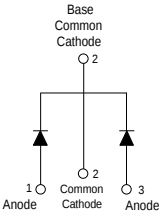
- 175° C  $T_J$  operation
- Center tap TO-220 package
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Very low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead-Free ("PbF" suffix)

Case Styles

40CTQ150PbF



TO-220



## Voltage Ratings

| Part number                                     | 40CTQ150PbF |
|-------------------------------------------------|-------------|
| $V_R$ Max. DC Reverse Voltage (V)               | 150         |
| $V_{RWM}$ Max. Working Peak Reverse Voltage (V) |             |

## Absolute Maximum Ratings

| Parameters                                                                           | 40CTQ.. | Units | Conditions                                                                                                                                                 |
|--------------------------------------------------------------------------------------|---------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $I_{F(AV)}$ Max. Average Forward (Per Leg)<br>Current * See Fig. 5 (Per Device)      | 20      | A     | 50% duty cycle @ $T_C = 140^\circ\text{C}$ , rectangular wave form                                                                                         |
|                                                                                      | 40      |       |                                                                                                                                                            |
| $I_{FSM}$ Max. Peak One Cycle Non-Repetitive<br>Surge Current (Per Leg) * See Fig. 7 | 1500    | A     | 5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse<br>10ms Sine or 6ms Rect. pulse<br>Following any rated load condition and with rated $V_{RRM}$ applied |
|                                                                                      | 250     |       |                                                                                                                                                            |
| $E_{AS}$ Non-Repetitive Avalanche Energy (Per Leg)                                   | 1.0     | mJ    | $T_J = 25^\circ\text{C}$ , $I_{AS} = 1.5\text{ Amps}$ , $L = 0.9\text{ mH}$                                                                                |
| $I_{AR}$ Repetitive Avalanche Current (Per Leg)                                      | 1.5     | A     | Current decaying linearly to zero in 1 $\mu\text{sec}$<br>Frequency limited by $T_J$ max. $V_A = 1.5 \times V_R$ typical                                   |

## Electrical Specifications

| Parameters                                                       | 40CTQ.. | Units            | Conditions                                                            |
|------------------------------------------------------------------|---------|------------------|-----------------------------------------------------------------------|
| $V_{FM}$ Max. Forward Voltage Drop (Per Leg) * See Fig. 1 (1)    | 0.93    | V                | @ 20A<br>$T_J = 25^\circ\text{C}$                                     |
|                                                                  | 1.16    | V                | @ 40A                                                                 |
|                                                                  | 0.71    | V                | @ 20A<br>$T_J = 125^\circ\text{C}$                                    |
|                                                                  | 0.85    | V                | @ 40A                                                                 |
| $I_{RM}$ Max. Reverse Leakage Current (Per Leg) * See Fig. 2 (1) | 50      | $\mu\text{A}$    | $T_J = 25^\circ\text{C}$<br>$V_R = \text{rated } V_R$                 |
|                                                                  | 15      | mA               | $T_J = 125^\circ\text{C}$                                             |
| $C_T$ Max. Junction Capacitance (Per Leg)                        | 450     | pF               | $V_R = 5V_{DC}$ (test signal range 100Khz to 1Mhz) $25^\circ\text{C}$ |
| $L_S$ Typical Series Inductance (Per Leg)                        | 8.0     | nH               | Measured lead to lead 5mm from package body                           |
| $dv/dt$ Max. Voltage Rate of Change (Rated $V_R$ )               | 10000   | V/ $\mu\text{s}$ |                                                                       |

(1) Pulse Width < 300 $\mu\text{s}$ , Duty Cycle <2%

## Thermal-Mechanical Specifications

| Parameters                                                         | 40CTQ..      | Units              | Conditions                           |
|--------------------------------------------------------------------|--------------|--------------------|--------------------------------------|
| $T_J$ Max. Junction Temperature Range                              | -55 to 175   | $^\circ\text{C}$   |                                      |
| $T_{stg}$ Max. Storage Temperature Range                           | -55 to 175   | $^\circ\text{C}$   |                                      |
| $R_{thJC}$ Max. Thermal Resistance Per Leg<br>Junction to Case     | 1.5          | $^\circ\text{C/W}$ | DC operation * See Fig. 4            |
| $R_{thJC}$ Max. Thermal Resistance Per Package<br>Junction to Case | 0.75         | $^\circ\text{C/W}$ | DC operation                         |
| $R_{thCS}$ Typical Thermal Resistance,<br>Case to Heatsink         | 0.5          | $^\circ\text{C/W}$ | Mounting surface, smooth and greased |
| wt Approximate Weight                                              | 2 (0.07)     | g (oz.)            |                                      |
| T Mounting Torque                                                  | Min. 6 (5)   | Kg-cm<br>(lbf-in)  | Non-lubricated threads               |
|                                                                    | Max. 12 (10) |                    |                                      |
| Marking Device                                                     | 40CTQ150     |                    |                                      |

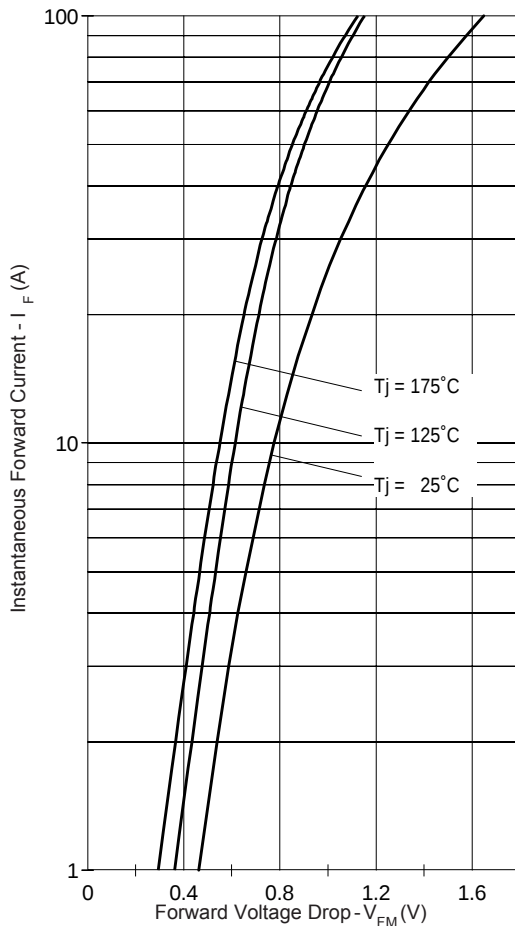


Fig. 1 - Maximum Forward Voltage Drop Characteristics

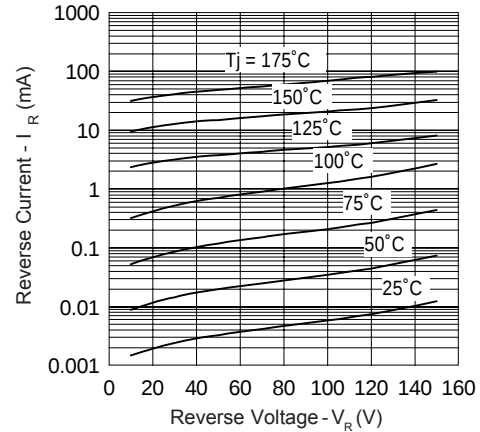


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

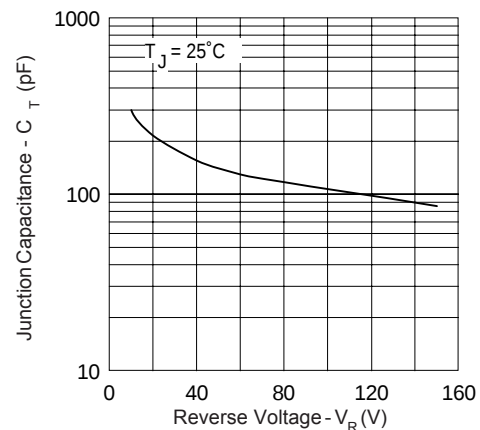


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

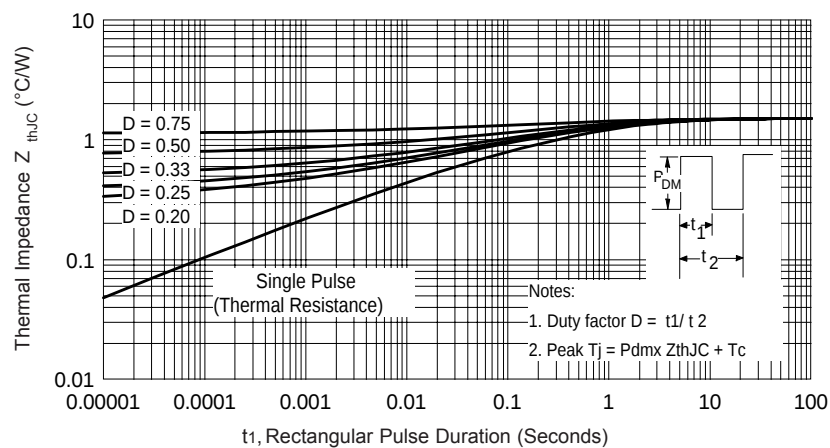
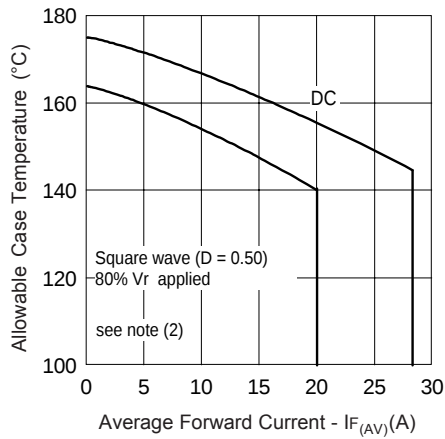
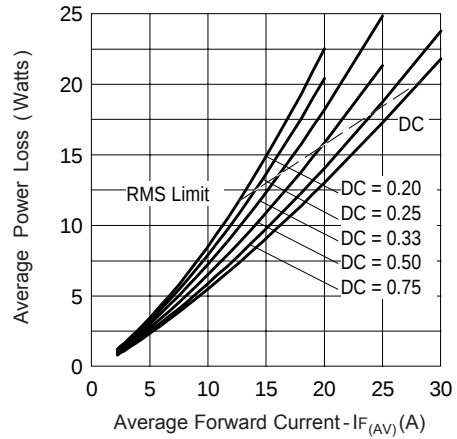


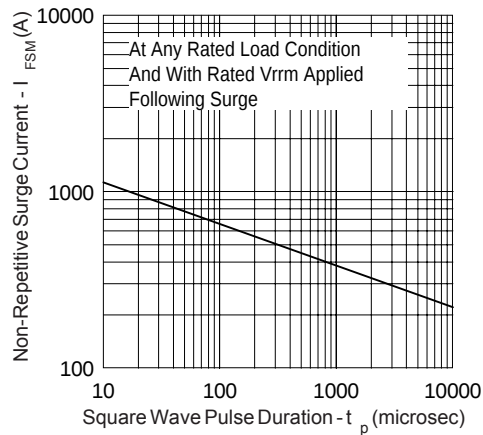
Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics



**Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current**



**Fig. 6 - Forward Power Loss Characteristics**



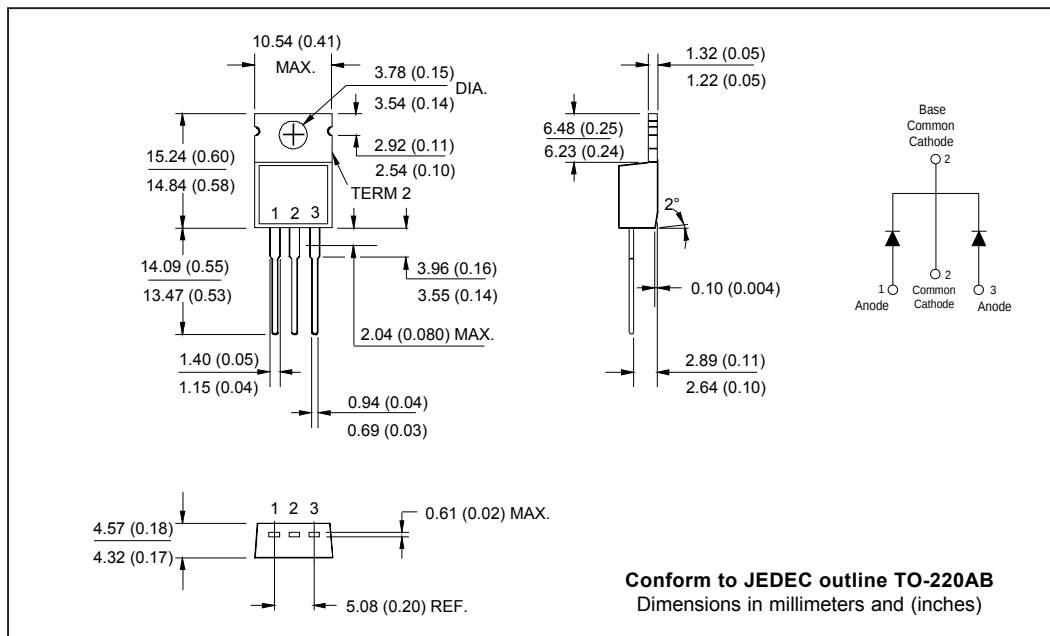
**Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)**

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

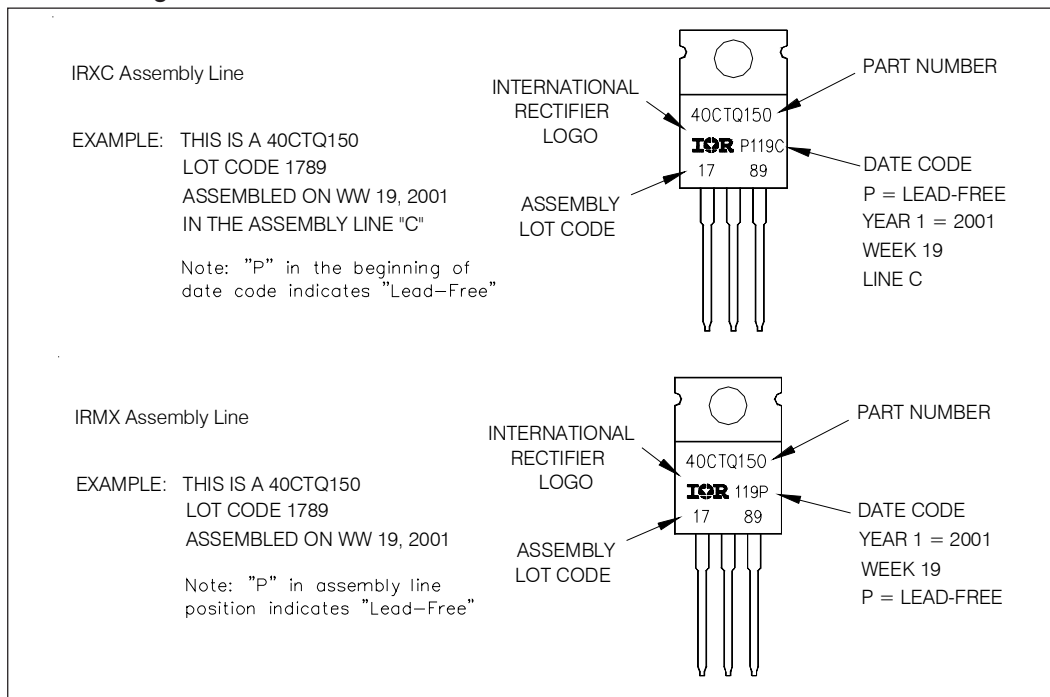
$Pd$  = Forward Power Loss =  $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);

$Pd_{REV}$  = Inverse Power Loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R @ V_R = 80\% V_R$  applied

## Outline Table



## Part Marking Information



## Ordering Information Table

## Device Code

|    |   |   |   |     |     |
|----|---|---|---|-----|-----|
| 40 | C | T | Q | 150 | PbF |
| 1  | 2 | 3 | 4 | 5   | 6   |

|          |   |                                                                                                           |
|----------|---|-----------------------------------------------------------------------------------------------------------|
| <b>1</b> | - | Current Rating (40 = 40A)                                                                                 |
| <b>2</b> | - | Circuit Configuration                                                                                     |
|          |   | C = Common Cathode                                                                                        |
| <b>3</b> | - | Package                                                                                                   |
|          |   | T = TO-220                                                                                                |
| <b>4</b> | - | Schottky "Q" Series                                                                                       |
| <b>5</b> | - | Voltage Rating (150 = 150V)                                                                               |
| <b>6</b> | - | <ul style="list-style-type: none"> <li>• none = Standard Production</li> <li>• PbF = Lead-Free</li> </ul> |

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.

International  
**IR** Rectifier

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