

# International IRF Rectifier

## 40CTQ150SPbF 40CTQ150-1PbF

SCHOTTKY RECTIFIER

40 Amp

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

### Major Ratings and Characteristics

Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform	40	A
$V_{RRM}$	150	V
$I_{FSM}$ @tp = 5 $\mu$ s sine	1500	A
$V_F$ @20 Apk, $T_J=125^\circ\text{C}$ (per leg)	0.71	V
$T_J$	-55 to 175	$^\circ\text{C}$

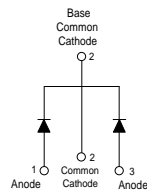
### Description/ Features

The 40CTQ.. 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 $^\circ\text{C}$  junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- 175 $^\circ\text{C}$   $T_J$  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)

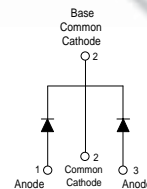
### Case Styles

40CTQ150SPbF



D<sup>2</sup>PAK

40CTQ150-1PbF



TO-262

## Voltage Ratings

Parameters	40CTQ150SPbF, 40CTQ150-1PbF
$V_R$ 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 Current * See Fig. 5 (Per Leg) (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 Surge Current (Per Leg) * See Fig. 7	1500	A	5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse 10ms Sine or 6ms Rect. pulse Following any rated load condition and with rated $V_{RRM}$ applied
	250		
$E_{AS}$ Non-Repetitive Avalanche Energy (Per Leg)	1.0	mJ	$T_J = 25^\circ\text{C}$ , $I_{AS} = 1.5$ Amps, $L = 0.9$ mH
$I_{AR}$ Repetitive Avalanche Current (Per Leg)	1.5	A	Current decaying linearly to zero in 1 $\mu\text{sec}$ 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 $T_J = 25^\circ\text{C}$
	1.16	V	@ 40A
	0.71	V	@ 20A $T_J = 125^\circ\text{C}$
	0.85	V	@ 40A
$I_{RM}$ Max. Reverse Leakage Current (Per Leg) * See Fig. 2 (1)	50	$\mu\text{A}$	$T_J = 25^\circ\text{C}$
	15	mA	$T_J = 125^\circ\text{C}$ $V_R = \text{rated } V_R$
$C_T$ 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	10000	V/ $\mu\text{s}$	(Rated $V_R$ )

(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 Junction to Case	1.5	$^\circ\text{C}/\text{W}$	DC operation * See Fig. 4
$R_{thJC}$ Max. Thermal Resistance Per Package Junction to Case	0.75	$^\circ\text{C}/\text{W}$	DC operation
$R_{thCS}$ Typical Thermal Resistance, Case to Heatsink	0.5	$^\circ\text{C}/\text{W}$	Mounting surface, smooth and greased
wt Approximate Weight	2 (0.07)	g (oz.)	
T Mounting Torque	Min. 6 (5)	Kg-cm (lbf-in)	Non-lubricated threads
	Max. 12 (10)		
Marking Device	40CTQ150S	Case style D <sup>2</sup> Pak	
	40CTQ150-1	Case style TO-262	

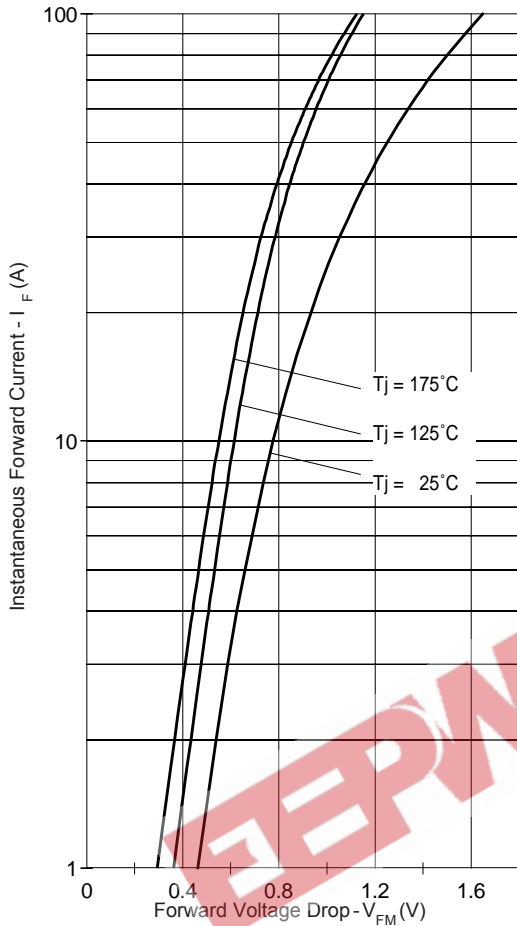


Fig. 1 - Maximum Forward Voltage Drop Characteristics

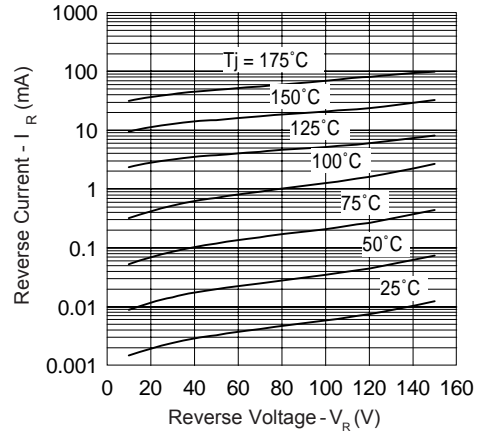


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

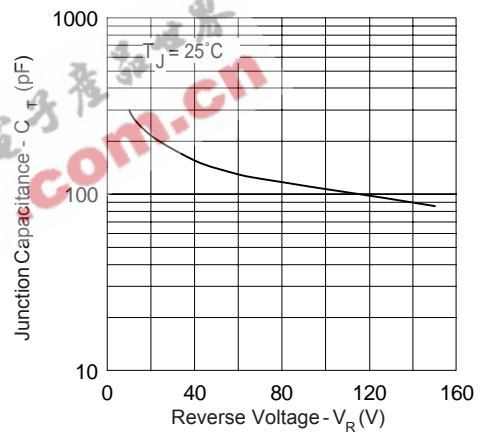


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

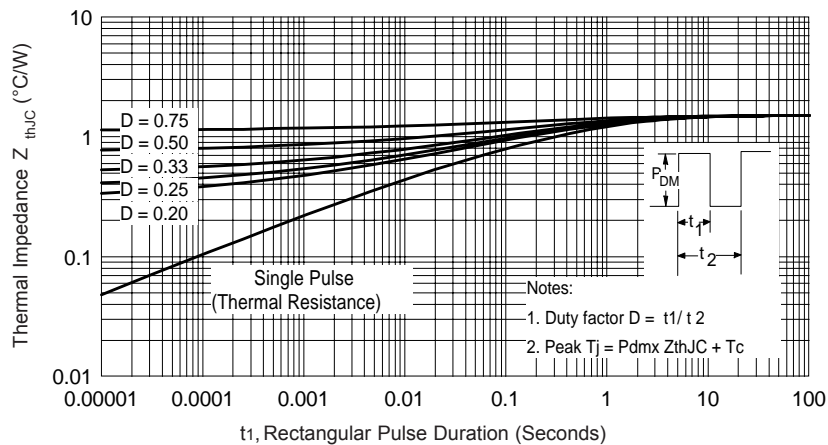


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics

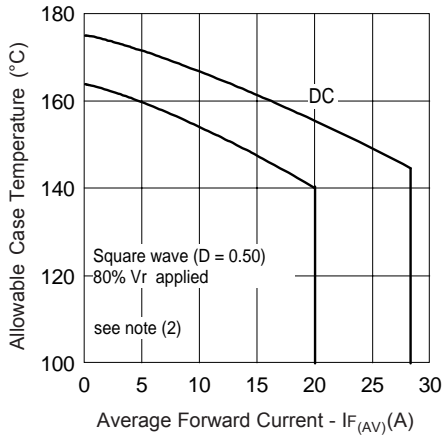


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

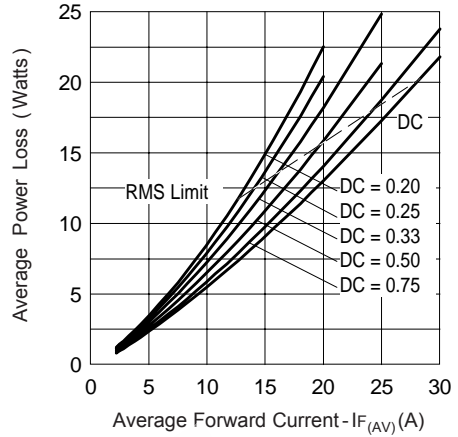


Fig. 6 - Forward Power Loss Characteristics

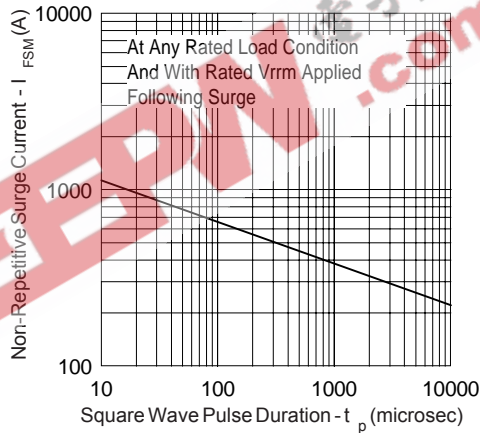
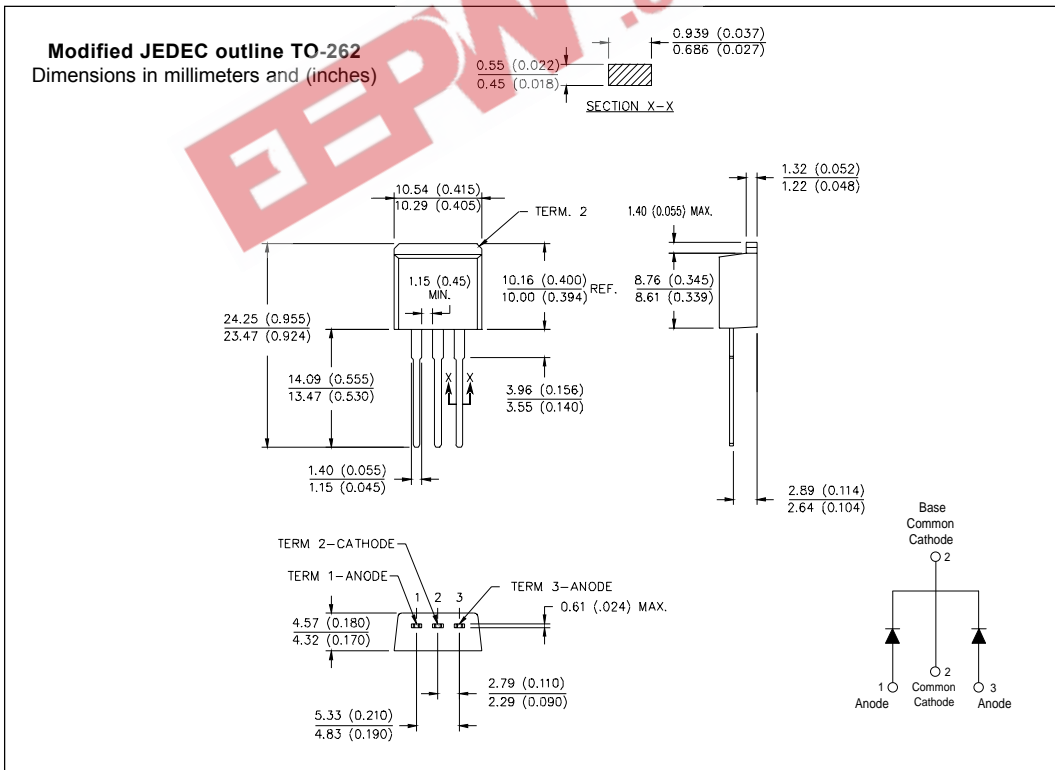
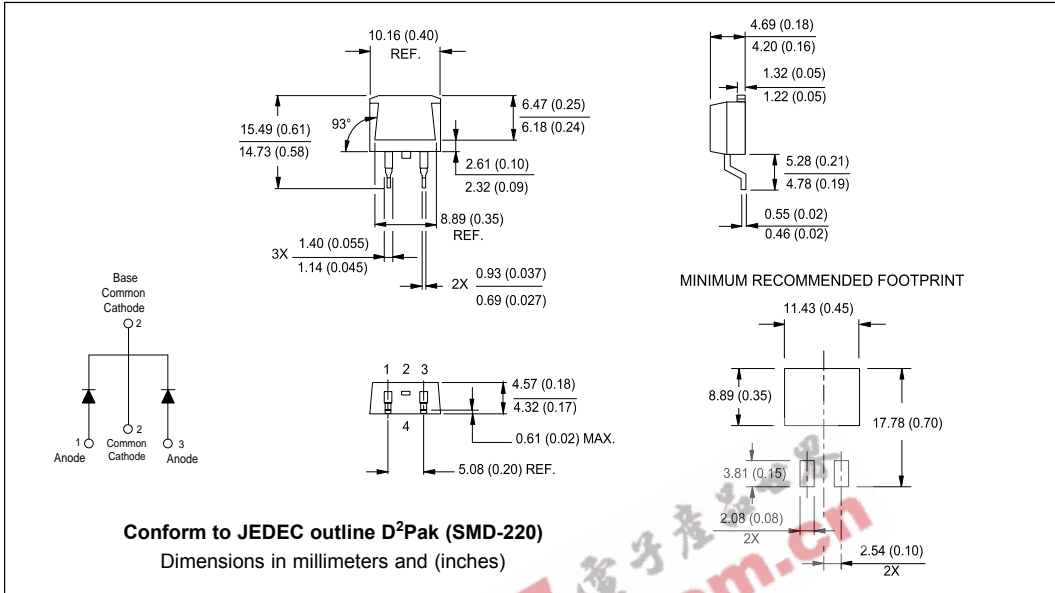


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

- (2) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;  
 $P_d = \text{Forward Power Loss} = I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);  
 $P_{d_{REV}} = \text{Inverse Power Loss} = V_{R1} \times I_R (1 - D)$ ;  $I_R @ V_R = 80\% V_R$  applied

Outline Table



Part Marking Information

**D<sup>2</sup>PAK**

EXAMPLE: THIS IS A 40CTQ150S  
LOT CODE 8024  
ASSEMBLED ON WW 02, 2000

Note: "P" in assembly line position indicates "Lead-Free"

INTERNATIONAL RECTIFIER LOGO  
PART NUMBER  
DATE CODE  
YEAR 0 = 2000  
WEEK 02  
P = LEAD-FREE  
ASSEMBLY LOT CODE

**TO-262**

EXAMPLE: THIS IS A 40CTQ150-1  
LOT CODE 1789  
ASSEMBLED ON WW 19, 2002

Note: "P" in assembly line position indicates "Lead-Free"

INTERNATIONAL RECTIFIER LOGO  
PART NUMBER  
DATE CODE  
YEAR 2 = 2002  
WEEK 19  
P = LEAD-FREE  
ASSEMBLY LOT CODE

Tape & Reel Information

**TRR**  
FEED DIRECTION

**TRL**  
FEED DIRECTION

Dimensions in millimeters and (inches):

- 1.60 (0.063)
- 1.50 (0.059)
- 1.60 (0.063) DIA.
- 1.50 (0.059) DIA.
- 4.10 (0.161)
- 3.90 (0.153)
- 1.85 (0.073)
- 1.65 (0.065)
- 11.60 (0.457)
- 11.40 (0.449)
- 0.368 (0.0145)
- 0.342 (0.0135)
- 15.42 (0.609)
- 15.22 (0.601)
- 24.30 (0.957)
- 23.90 (0.941)
- 1.75 (0.069) DIA.
- 1.25 (0.049) DIA.
- 4.72 (0.186)
- 4.52 (0.178)
- 10.90 (0.429)
- 10.70 (0.421)
- 16.10 (0.634)
- 15.90 (0.626)
- 13.50 (0.532) DIA.
- 12.80 (0.504) DIA.
- 360 (14.173) DIA. MAX.
- 26.40 (1.039)
- 24.40 (0.961)
- 60 (2.362) DIA. MIN.

**SMD-220 Tape & Reel**  
When ordering, indicate the part number, part orientation, and the quantity. Quantities are in multiples of 800 pieces per reel for both TRL and TRR.

Dimensions in millimeters and (inches)

Ordering Information Table

Device Code																	
	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;"><b>40</b></td> <td style="padding: 5px;"><b>C</b></td> <td style="padding: 5px;"><b>T</b></td> <td style="padding: 5px;"><b>Q</b></td> <td style="padding: 5px;"><b>150</b></td> <td style="padding: 5px;"><b>S</b></td> <td style="padding: 5px;"><b>TRL</b></td> <td style="padding: 5px;"><b>PbF</b></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> <td style="text-align: center;">⑦</td> <td style="text-align: center;">⑧</td> </tr> </table>	<b>40</b>	<b>C</b>	<b>T</b>	<b>Q</b>	<b>150</b>	<b>S</b>	<b>TRL</b>	<b>PbF</b>	①	②	③	④	⑤	⑥	⑦	⑧
<b>40</b>	<b>C</b>	<b>T</b>	<b>Q</b>	<b>150</b>	<b>S</b>	<b>TRL</b>	<b>PbF</b>										
①	②	③	④	⑤	⑥	⑦	⑧										
<b>1</b>	- Current Rating (40A)																
<b>2</b>	- Circuit Configuration C = Common Cathode																
<b>3</b>	- T = TO-220																
<b>4</b>	- Schottky "Q" Series																
<b>5</b>	- Voltage Rating (150 = 150V)																
<b>6</b>	- • S = D <sup>2</sup> Pak • -1= TO-262																
<b>7</b>	- • none = Tube (50 pieces) • TRL = Tape & Reel (Left Oriented - for D <sup>2</sup> Pak only) • TRR = Tape & Reel (Right Oriented - for D <sup>2</sup> Pak only)																
<b>8</b>	- • none = Standard Production • PbF = Lead-Free																

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.