

Bulletin PD-20554 rev. B 07/01

International
IR Rectifier

12CTQ...
12CTQ...S
12CTQ... -1

SCHOTTKY RECTIFIER

12 Amp

$$I_{F(AV)} = 12\text{Amp}$$
$$V_R = 35 \text{ to } 45\text{V}$$

Major Ratings and Characteristics

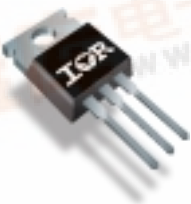
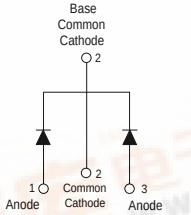
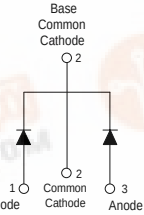
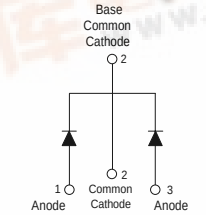
Characteristics	12CTQ	Units
$I_{F(AV)}$ Rectangular waveform	12	A
V_{RRM} range	35 to 45	V
I_{FSM} @ $t_p = 5 \mu\text{s}$ sine	690	A
V_F @ 6Apk , $T_J = 125^\circ\text{C}$ (per leg)	0.53	V
T_J range	-55 to 175	$^\circ\text{C}$

Description/ Features

The 12CTQ 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, free-wheeling diodes, and reverse battery protection.

- 175°C T_J operation
- Center tap TO-220 package
- Low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability

Case Styles

12CTQ...	12CTQ... S	12CTQ... -1
  TO-220	  D ² PAK	  TO-262



12CTQ... Series

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Voltage Ratings

Part number	12CTQ035	12CTQ040	12CTQ045
V_R Max. DC Reverse Voltage (V)	35	40	45
V_{RWM} Max. Working Peak Reverse Voltage (V)			

Absolute Maximum Ratings

Parameters	12CTQ	Units	Conditions
$I_{F(AV)}$ Max. Average Forward (Per Leg) Current * See Fig. 5 (Per Device)	6 12	A	50% duty cycle @ $T_C = 160^\circ\text{C}$, rectangular wave form
I_{FSM} Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg) * See Fig. 7	690 140	A	5 μs Sine or 3 μs Rect. pulse 10ms Sine or 6ms Rect. pulse Following any rated load condition and with rated V_{RWM} applied
E_{AS} Non-Repetitive Avalanche Energy (Per Leg)	8	mJ	$T_J = 25^\circ\text{C}$, $I_{AS} = 1.20$ Amps, $L = 11.10$ mH
I_{AR} Repetitive Avalanche Current (Per Leg)	1.20	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	12CTQ	Units	Conditions
V_{FM} Max. Forward Voltage Drop (Per Leg) * See Fig. 1 (1)	0.60 0.73 0.53 0.64	V	@ 6A @ 12A @ 6A @ 12A $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$
I_{RM} Max. Reverse Leakage Current (Per Leg) * See Fig. 2 (1)	0.8 7.0	mA	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ $V_R = \text{rated } V_R$
$V_{F(TO)}$ Threshold Voltage	0.35	V	$T_J = T_J \text{ max.}$
r_t Forward Slope Resistance	18.23	m Ω	
C_T Max. Junction Capacitance (Per Leg)	400	pF	$V_R = 5V_{DC}$, (test signal range 100Khz to 1Mhz) 25°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)	10,000	V/ μs	

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

Thermal-Mechanical Specifications

Parameters	12CTQ	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 Junction to Case (Per Leg)	3.50	$^\circ\text{C/W}$	DC operation * See Fig. 4
R_{thJC} Max. Thermal Resistance Junction to Case (Per Package)	1.75	$^\circ\text{C/W}$	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) Max. 12 (10)	Kg-cm (lbf-in)	

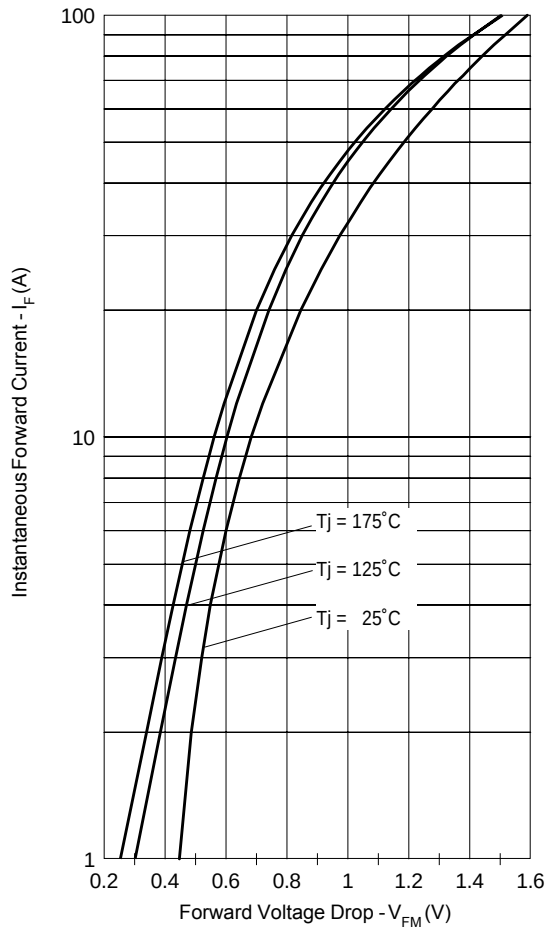


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

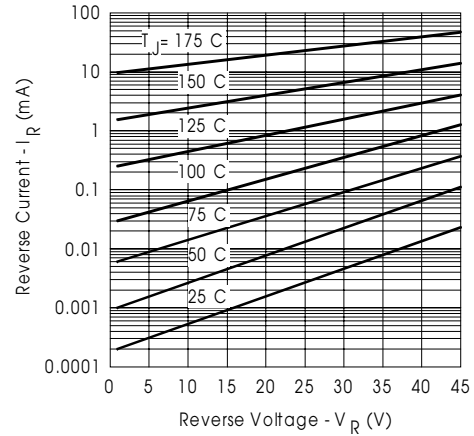


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

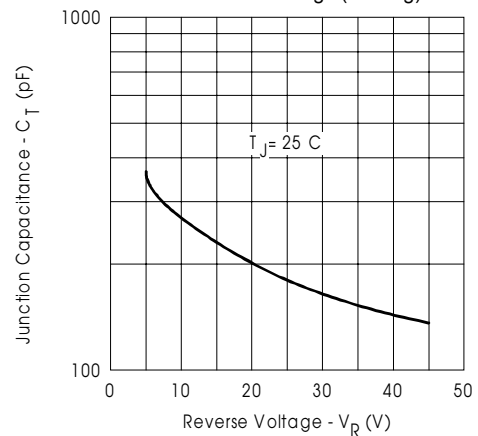


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

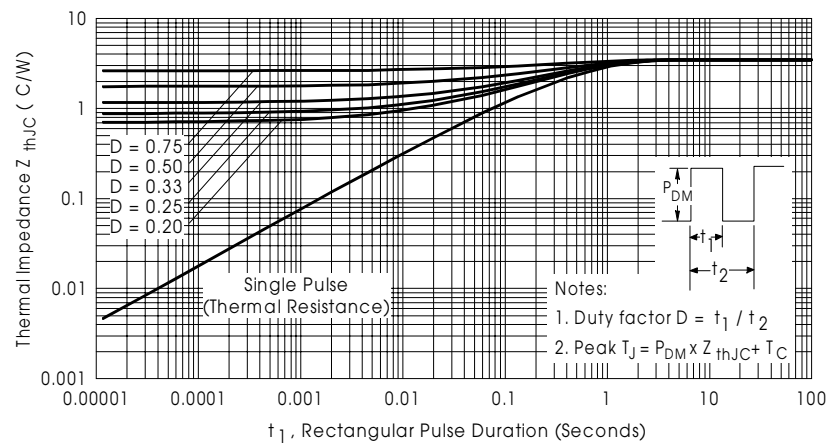


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

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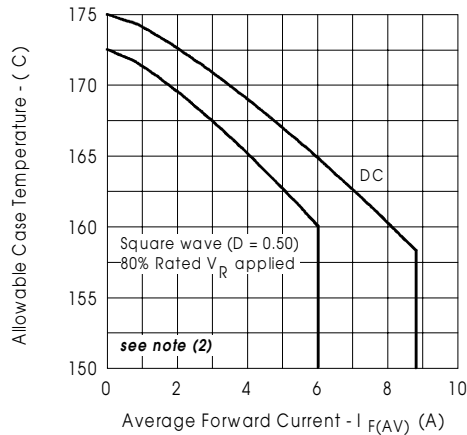


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

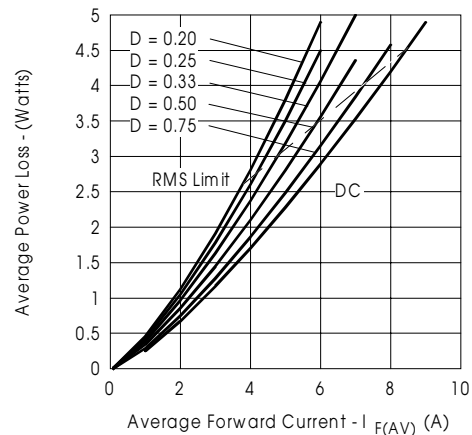


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

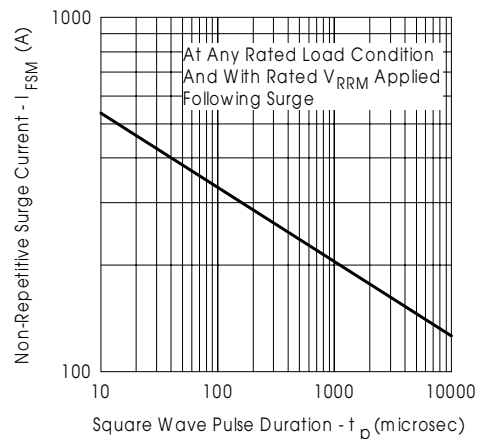


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

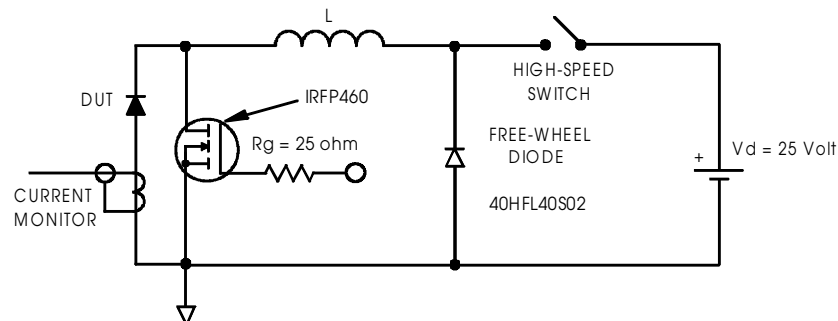
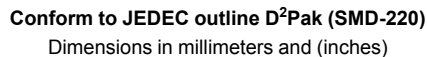


Fig. 8 - Unclamped Inductive Test Circuit

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

Outline Table

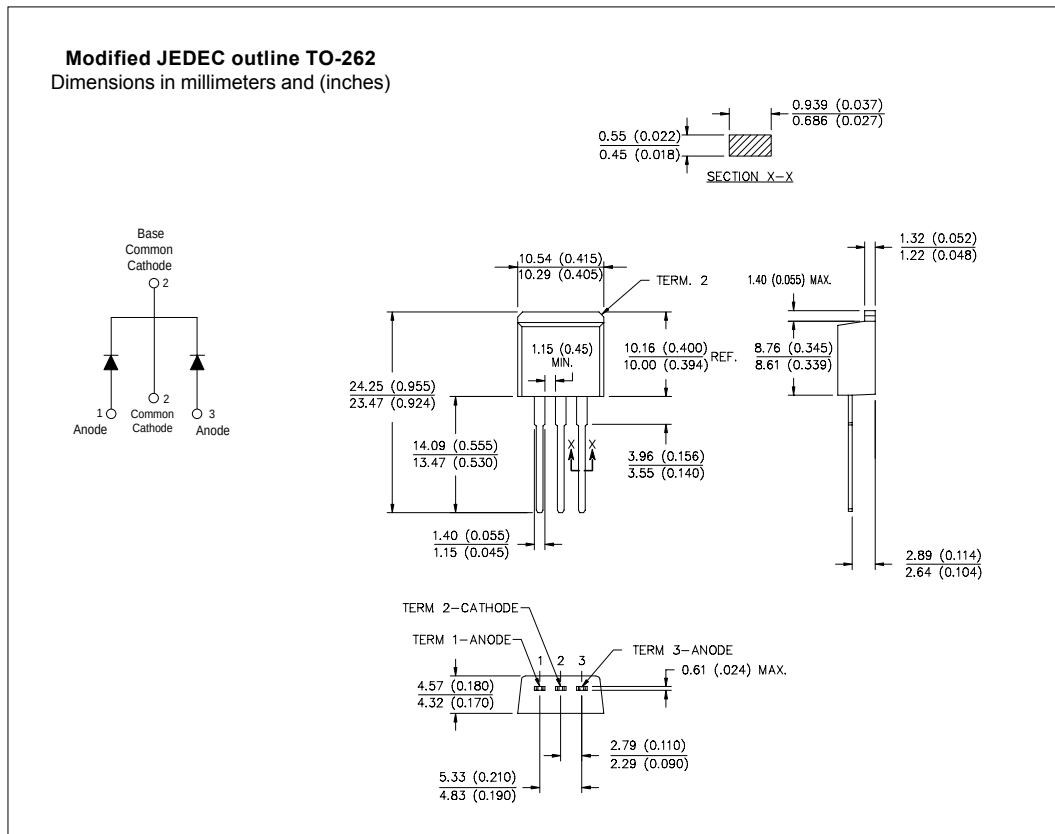


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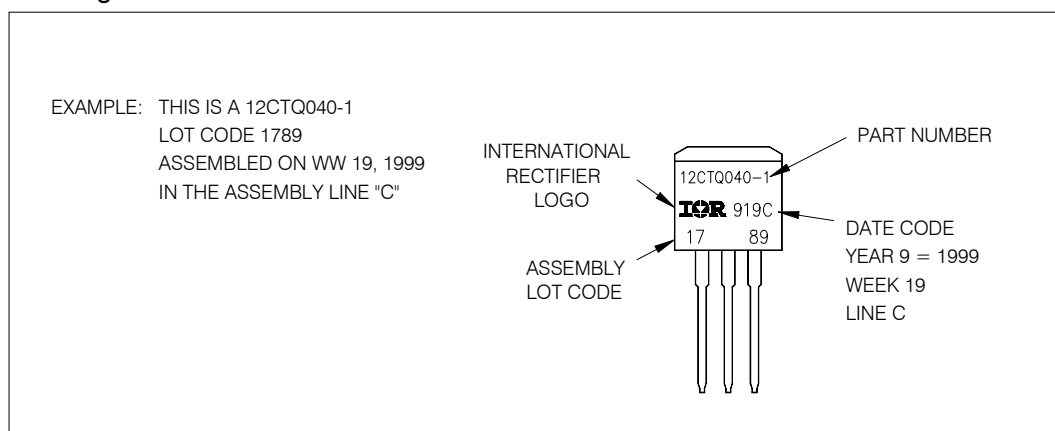
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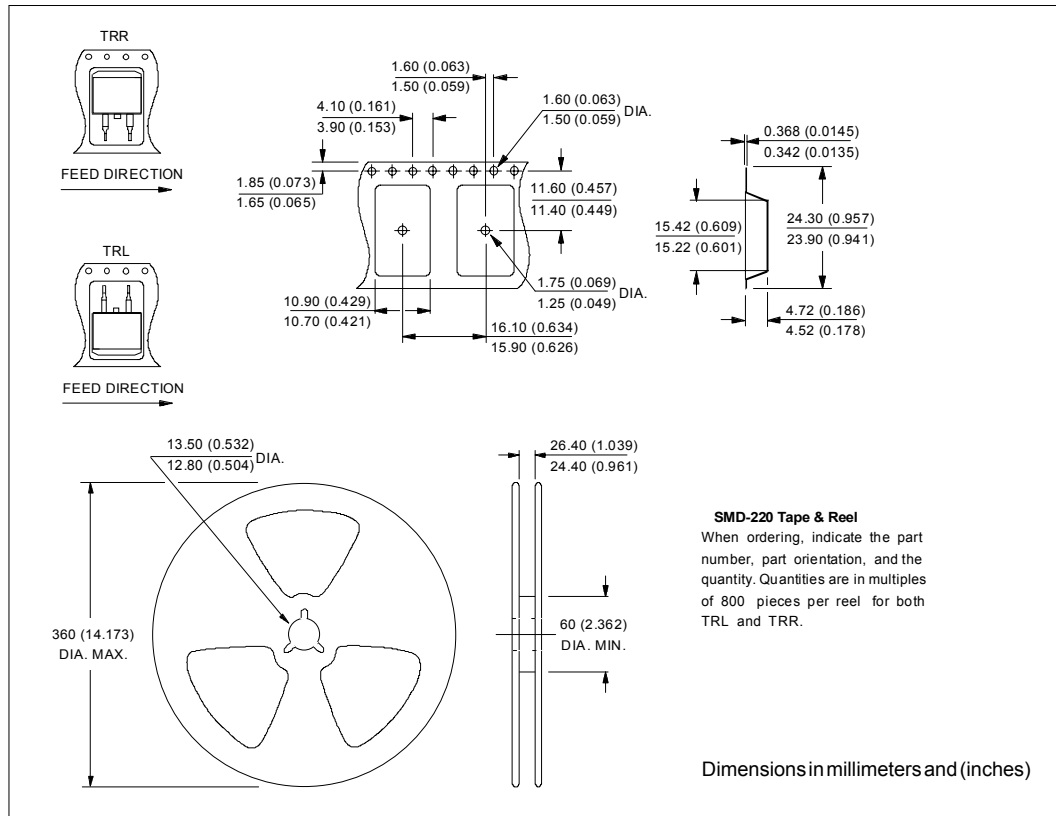
Outline Table



Marking Information



Tape & Reel Information



Ordering Information Table

Device Code					
12	C	T	Q	045	-1
①	②	③	④	⑤	⑥
1	-	Essential Part Number			
2	-	Common Cathode			
3	-	T = TO-220			
4	-	Q = Schottky Q Series			
5	-	Voltage Rating			
6	-	S = D ² Pak			
	-	-1 = TO-262			
					035 = 35V 040 = 40V 045 = 45V

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

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Visit us at www.irf.com for sales contact information. 07/01