

International **IR** Rectifier

42CTQ030SPbF
42CTQ030-1PbF

SCHOTTKY RECTIFIER

40 Amp

$$I_{F(AV)} = 40\text{Amp}$$
$$V_R = 30\text{V}$$

Major Ratings and Characteristics

Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform	40	A
V_{RRM}	30	V
I_{FSM} @ tp = 5 μ s sine	1100	A
V_F @ 20 Apk, $T_J = 125^\circ\text{C}$ (per leg)	0.38	V
T_J range	-55 to 150	$^\circ\text{C}$

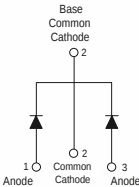
Description/ Features

This 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 150°C junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- 150°C T_J operation
- Center tap configuration
- Very 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
- Lead- Free ("PbF" suffix)

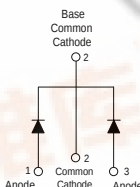
Case Styles

42CTQ030SPbF



D²PAK

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TO-262



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Voltage Ratings

Parameters	42CTQ030SPbF, 42CTQ030-1PbF
V_R Max. DC Reverse Voltage (V)	30
V_{RWM} Max. Working Peak Reverse Voltage (V)	

Absolute Maximum Ratings

Parameters	Values	Units	Conditions
$I_{F(AV)}$ Max. Average Forward (Per Leg) Current * See Fig. 5 (Per Device)	20 40	A	50% duty cycle @ $T_C = 121^\circ\text{C}$, rectangular wave form
I_{FSM} Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg) * See Fig. 7	1100 360	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)	13	mJ	$T_J = 25^\circ\text{C}$, $I_{AS} = 3$ Amps, $L = 2.90$ 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	Values	Units	Conditions
V_{FM} Max. Forward Voltage Drop (Per Leg) * See Fig. 1 (1)	0.48	V	@ 20A $T_J = 25^\circ\text{C}$
	0.57	V	@ 40A
	0.38	V	@ 20A $T_J = 125^\circ\text{C}$
	0.51	V	@ 40A
I_{RM} Max. Reverse Leakage Current (Per Leg) * See Fig. 2 (1)	3	mA	$T_J = 25^\circ\text{C}$
	183	mA	$T_J = 125^\circ\text{C}$ $V_R = \text{rated } V_R$
$V_{F(TO)}$ Threshold Voltage	0.22	V	$T_J = T_J \text{ max.}$
r_t Forward Slope Resistance	6.76	m Ω	
C_T Max. Junction Capacitance (Per Leg)	2840	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	10000	V/ μs	(Rated V_R)

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

Thermal-Mechanical Specifications

Parameters	Values	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)	2.0	$^\circ\text{C/W}$	DC operation
R_{thJC} Max. Thermal Resistance Junction to Case (Per Package)	1.0	$^\circ\text{C/W}$	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	42CTQ030S		Case style D ² Pak
	42CTQ030-1		Case style TO-262

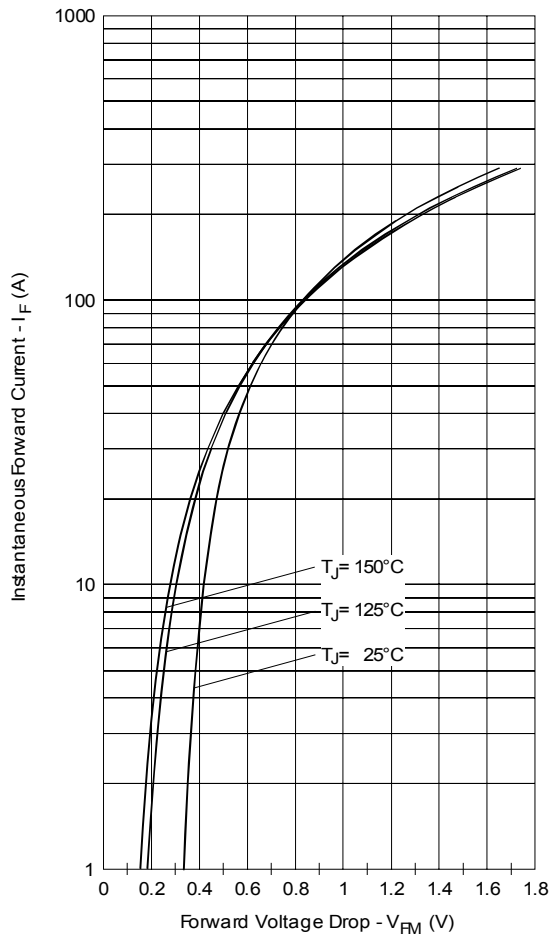


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

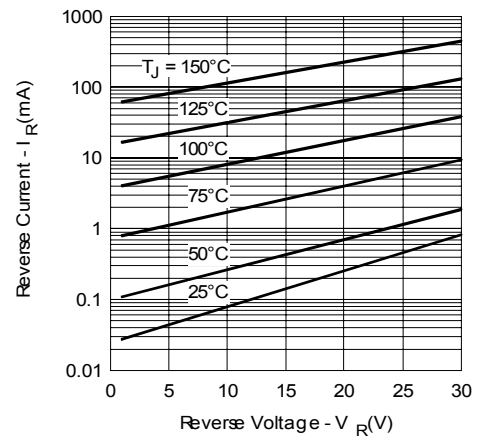


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

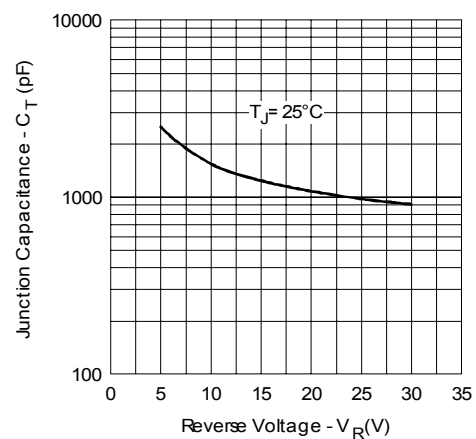


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

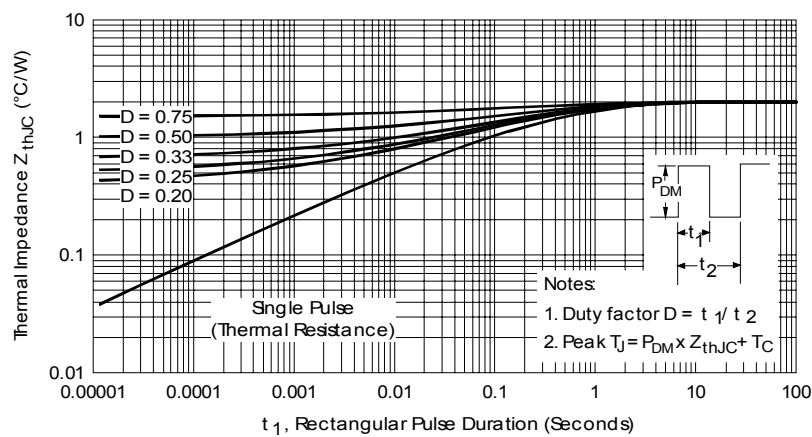


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

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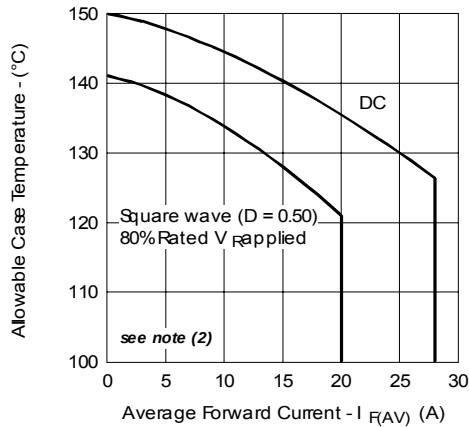


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

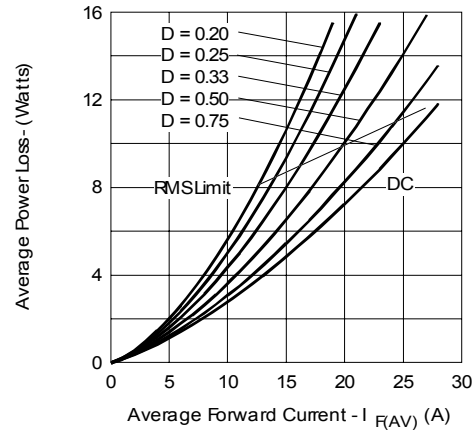


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

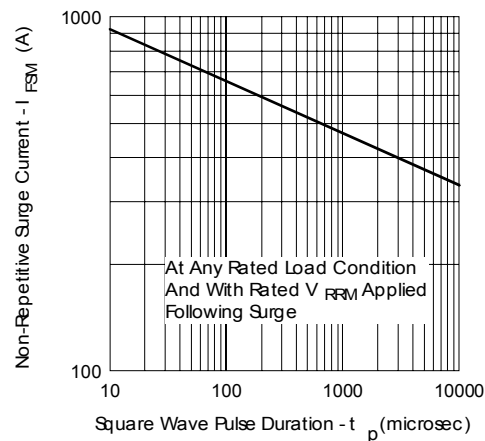


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

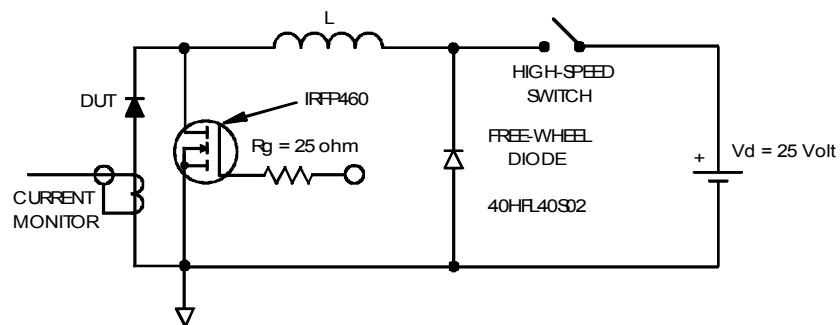


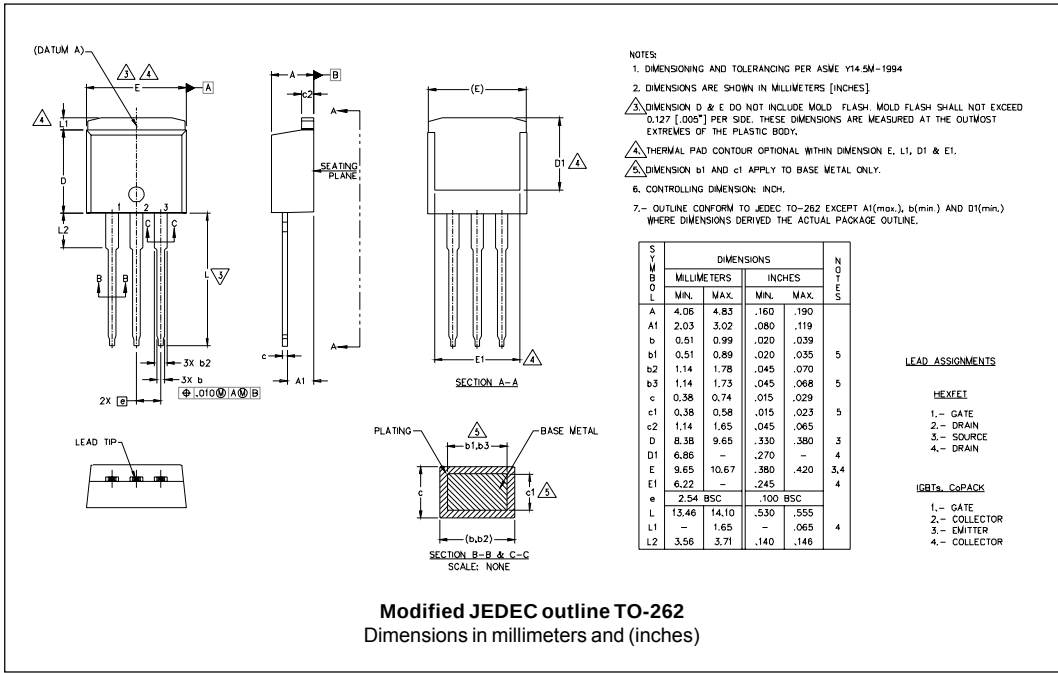
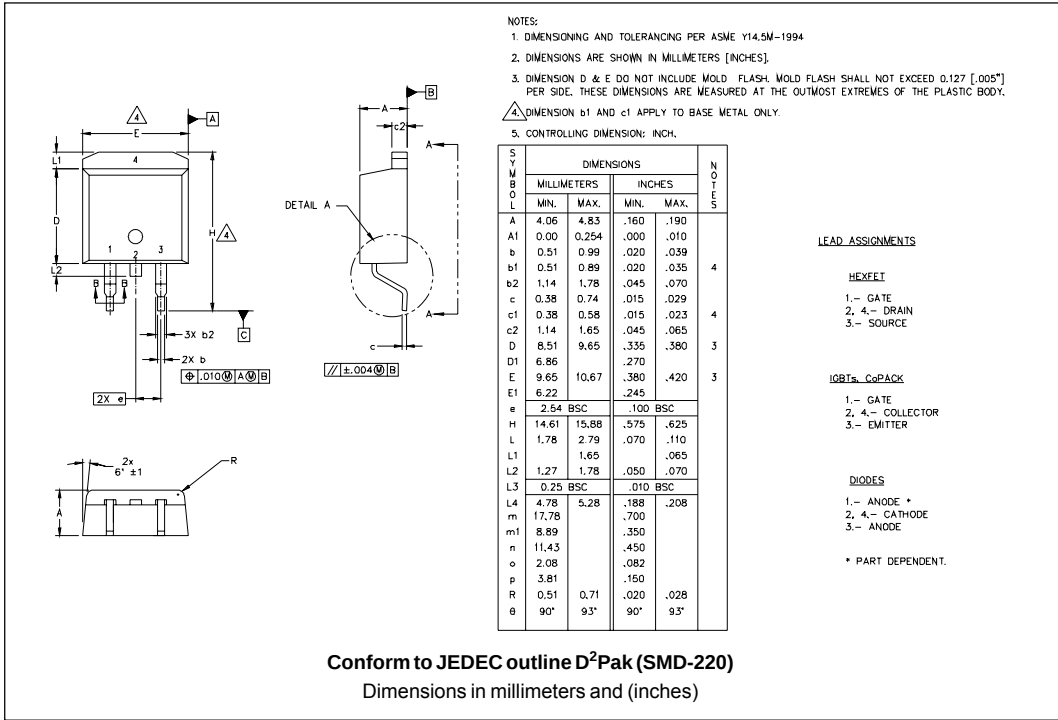
Fig. 8 - Unclamped Inductive Test Circuit

(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 = $V_{R1} \times I_{R1} (1 - D)$; $I_{R1} @ V_{R1} = 10V$

Outlines Table



42CTQ030SPbF, 42CTQ030-1PbF

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Part Marking Information

D²PAK

EXAMPLE: THIS IS A 42CTQ030S
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 42CTQ030-1
LOT CODE 1789
ASSEMBLED ON WW 19, 1999

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

INTERNATIONAL RECTIFIER LOGO

PART NUMBER

DATE CODE
YEAR 9 = 1999
WEEK 19
P = LEAD-FREE

ASSEMBLY LOT CODE

Tape & Reel Information

SECTION Y-Y

NOTES:

- 1.0 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ± 0.02
- 2.0 CAMBER NOT TO EXCEED 1mm in 100mm
- 3.0 MATERIAL: CONDUCTIVE BLACK STYRENE ALLOY
- 4.0 K₀ MEASURED FROM A PLANE ON THE INSIDE BOTTOM OF THE POCKET TO THE TOP SURFACE OF THE CARRIER
- 5.0 MEASURED FROM CENTRELINE OF SPROCKET HOLE TO CENTRELINE OF POCKET
- 6.0 VENDOR: (OPTIONAL)
- 7.0 MUST ALSO MEET REQUIREMENTS OF EIA STANDAR #EIA-481A TAPING OF SURFACE MOUNT COMPONENTS FOR AUTOMATIC PLACEMENT
- 8.0 SURFACE RESISTIVITY OF MOLDED MATL. MUST MEASURE LESS OR EQUAL TO 10^6 OHMS PER SQUARE. MEASURED IN ACCORDANCE TO PROCEDURE GIVEN IN ASTM D-257 & ASTM D-991
- 9.0 TOTAL LENGTH PER REEL MUST BE 45 METERS
- 10.0 © CRITICAL

Symbol	Value	Tolerance
A ₀	10.50	+/- 0.1
B ₀	15.80	+/- 0.1
B ₂	10.25	+/- 0.1
K ₀	4.90	+/- 0.1
F	11.50	+/- 0.1
P ₁	16.00	+/- 0.1
W	24.00	+/- 0.3

Dimensions in millimeters and (inches)

Ordering Information Table

Device Code							
42	C	T	Q	030	S	TRL	PbF
1	2	3	4	5	6	7	8
1	-	Current Rating (40A)					
2	-	Circuit Configuration					
		C = Common Cathode					
3	-	T = TO-220					
4	-	Schottky "Q" Series					
5	-	Voltage Rating (030 = 30V)					
6	-	• S = D ² Pak					
		• -1= TO-262					
7	-	• none = Tube (50 pieces)					
		• TRL = Tape & Reel (Left Oriented - for D ² Pak only)					
		• TRR = Tape & Reel (Right Oriented - for D ² Pak only)					
8	-	• 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.

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