

$I_{F(AV)} = 30\text{Amp}$   
 $V_R = 50 - 60\text{V}$

**Major Ratings and Characteristics**


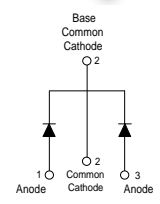

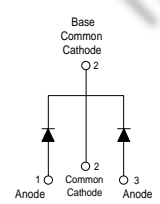
Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform	30	A
$V_{RRM}$	50 - 60	V
$I_{FSM}$ @ tp = 5 $\mu\text{s}$ sine	1000	A
$V_F$ @ 15 Apk, $T_J = 125^\circ\text{C}$ (per leg)	0.56	V
$T_J$ range	-55 to 150	$^\circ\text{C}$

**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**

<p>30CTQ...SPbF</p>   <p><b>D<sup>2</sup>PAK</b></p>	<p>30CTQ...-1PbF</p>   <p><b>TO-262</b></p>
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## Voltage Ratings

Parameters	30CTQ050SPbF 30CTQ050-1PbF	30CTQ060SPbF 30CTQ060-1PbF
$V_R$ Max. DC Reverse Voltage (V)	50	60
$V_{RWM}$ Max. Working Peak Reverse Voltage (V)		

## Absolute Maximum Ratings

Parameters	Values	Units	Conditions
$I_{F(AV)}$ Max. Average Forward Current (Per Leg) * See Fig. 5 (Per Device)	15	A	50% duty cycle @ $T_C = 105^\circ\text{C}$ , rectangular wave form
	30		
$I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg) * See Fig. 7	1000	A	5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse
	260		10ms Sine or 6ms Rect. pulse
$E_{AS}$ Non-Repetitive Avalanche Energy (Per Leg)	13	mJ	$T_J = 25^\circ\text{C}$ , $I_{AS} = 1.50$ Amps, $L = 11.5$ mH
$I_{AR}$ Repetitive Avalanche Current (Per Leg)	1.50	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	Values	Units	Conditions
$V_{FM}$ Max. Forward Voltage Drop (Per Leg) * See Fig. 1 (1)	0.62	V	@ 15A
	0.82	V	@ 30A
	0.56	V	@ 15A
	0.71	V	@ 30A
$I_{RM}$ Max. Reverse Leakage Current (Per Leg) * See Fig. 2 (1)	0.80	mA	$T_J = 25^\circ\text{C}$
	45	mA	$T_J = 125^\circ\text{C}$
$V_{F(TO)}$ Threshold Voltage	0.39	V	$T_J = T_J$ max.
$r_t$ Forward Slope Resistance	8.47	m $\Omega$	
$C_T$ Max. Junction Capacitance (Per Leg)	720	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	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)	3.25	$^\circ\text{C/W}$	DC operation
$R_{thJC}$ Max. Thermal Resistance Junction to Case (Per Package)	1.63	$^\circ\text{C/W}$	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	30CTQ...S	Case style D <sup>2</sup> Pak	
	30CTQ...-1	Case style TO-262	

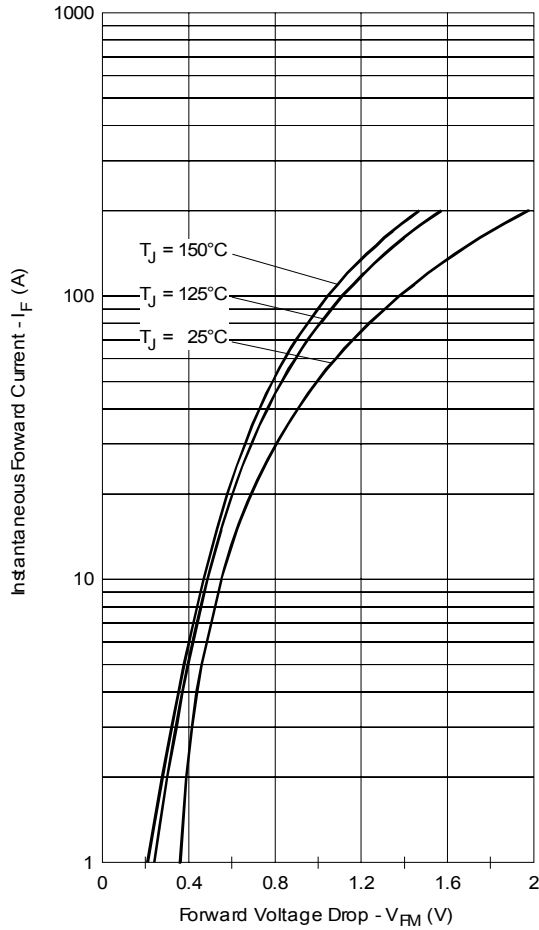


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

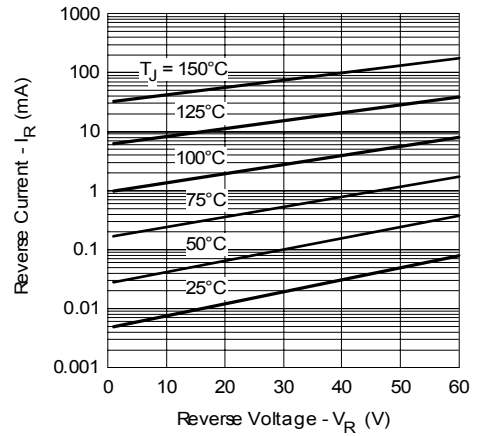


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

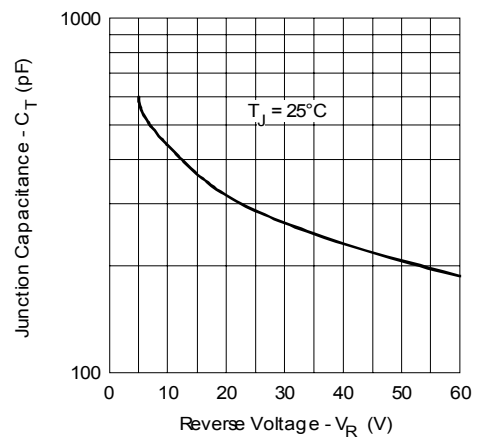


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

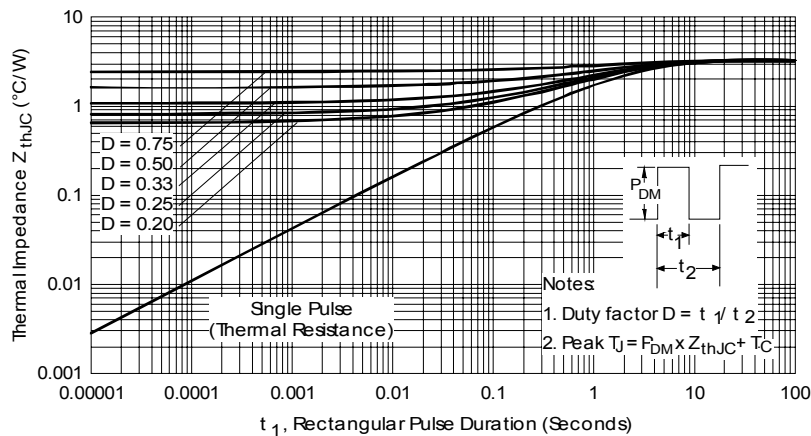


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

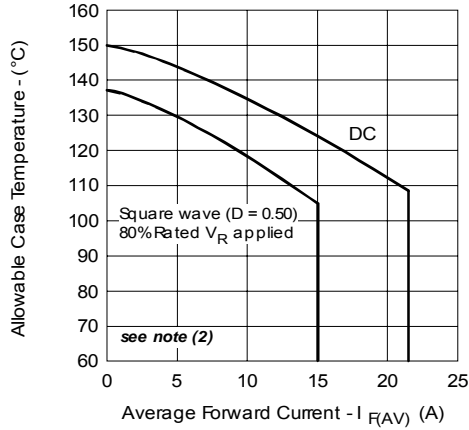


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

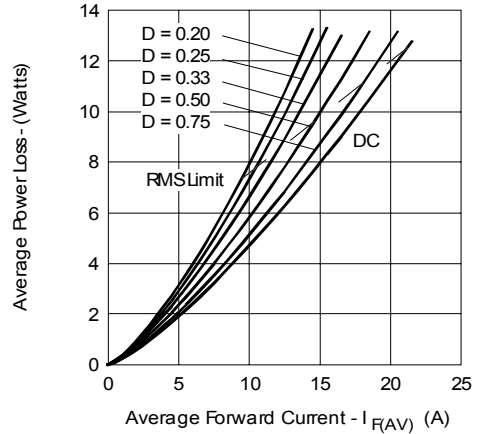


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

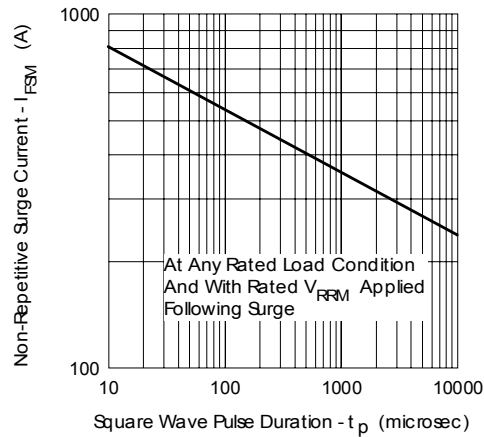


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

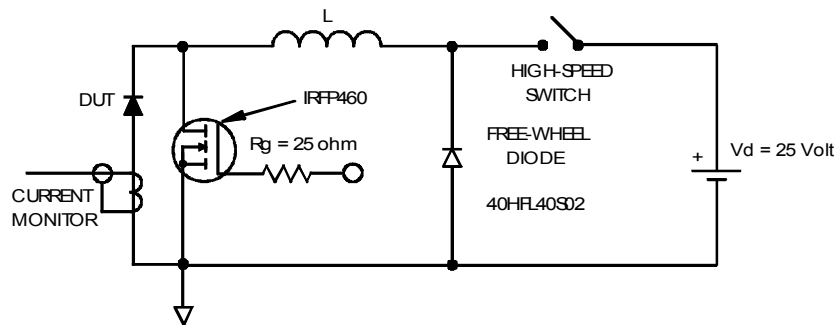


Fig. 8 - Unclamped Inductive Test Circuit

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

Outlines Table

NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994  
 2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]  
 3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.  
 4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.  
 5. CONTROLLING DIMENSIONS: INCH.

SYMBOL	DIMENSIONS				NOTES	
	MILLIMETERS		INCHES			
	MIN.	MAX.	MIN.	MAX.		
A	4.06	4.83	.160	.190	4	
A1	0.00	0.254	.000	.010		
b	0.51	0.99	.020	.039		
b1	0.51	0.89	.020	.035		
b2	1.14	1.78	.045	.070		
c	0.38	0.74	.015	.029		
c1	0.38	0.58	.015	.023		4
c2	1.14	1.65	.045	.065		
D	8.51	9.65	.335	.380		3
D1	6.86	-	.270	-		
E	9.65	10.67	.380	.420	3	
E1	6.22	-	.245	-		
e	2.54 BSC		.100 BSC		HEXFET 1.- GATE 2, 4.- DRAIN 3.- SOURCE	
H	14.61	15.88	.575	.625		
L	1.78	2.79	.070	.110		
L1	-	1.65	-	.065		
L2	1.27	1.78	.050	.070	IGBTs, CoPACK 1.- GATE 2, 4.- COLLECTOR 3.- EMITTER	
L3	0.25 BSC		.010 BSC			
L4	4.78	5.28	.188	.208		
m	17.78	-	.700	-	DIODES 1.- ANODE * 2, 4.- CATHODE 3.- ANODE	
m1	8.89	-	.350	-		
n	11.43	-	.450	-	* PART DEPENDENT.	
o	2.08	-	.082	-		
p	3.81	-	.150	-		
R	0.51	0.71	.020	.028		
θ	90°	93°	90°	93°		

LEAD ASSIGNMENTS

HEXFET  
 1.- GATE  
 2, 4.- DRAIN  
 3.- SOURCE

IGBTs, CoPACK  
 1.- GATE  
 2, 4.- COLLECTOR  
 3.- EMITTER

DIODES  
 1.- ANODE \*  
 2, 4.- CATHODE  
 3.- ANODE

\* PART DEPENDENT.

**Conform to JEDEC outline D<sup>2</sup>Pak (SMD-220)**  
 Dimensions in millimeters and (inches)

NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994  
 2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]  
 3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.  
 4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.  
 5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.  
 6. CONTROLLING DIMENSIONS: INCH.  
 7.- OUTLINE CONFORM TO JEDEC TO-262 EXCEPT A1(max.), b(min.), AND D1(min.) WHERE DIMENSIONS DERIVED THE ACTUAL PACKAGE OUTLINE.

SYMBOL	DIMENSIONS				NOTES	
	MILLIMETERS		INCHES			
	MIN.	MAX.	MIN.	MAX.		
A	4.06	4.83	.160	.190	5	
A1	2.03	3.02	.080	.119		
b	0.51	0.99	.020	.039		
b1	0.51	0.89	.020	.035		
b2	1.14	1.78	.045	.070		
b3	1.14	1.73	.045	.068		
c	0.38	0.74	.015	.029		
c1	0.38	0.58	.015	.023		5
c2	1.14	1.65	.045	.065		
D	8.38	9.65	.330	.380		3
D1	6.86	-	.270	-		
E	9.65	10.67	.380	.420	3,4	
E1	6.22	-	.245	-		
e	2.54 BSC		.100 BSC		HEXFET 1.- GATE 2.- DRAIN 3.- SOURCE 4.- DRAIN	
L	13.46	14.10	.530	.555		
L1	-	1.65	-	.065		
L2	3.56	3.71	.140	.146		

LEAD ASSIGNMENTS

HEXFET  
 1.- GATE  
 2.- DRAIN  
 3.- SOURCE  
 4.- DRAIN

IGBTs, CoPACK  
 1.- GATE  
 2.- COLLECTOR  
 3.- EMITTER  
 4.- COLLECTOR

**Modified JEDEC outline TO-262**  
 Dimensions in millimeters and (inches)

Part Marking Information

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

EXAMPLE: THIS IS A 30CTQ060S  
 LOT CODE 8024  
 ASSEMBLED ON WW 02, 2000

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

INTERNATIONAL RECTIFIER LOGO

ASSEMBLY LOT CODE

PART NUMBER

DATE CODE  
 YEAR 0 = 2000  
 WEEK 02  
 P = LEAD-FREE

**TO-262**

EXAMPLE: THIS IS A 430CTQ060-1  
 LOT CODE 1789  
 ASSEMBLED ON WW 19, 1999

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

INTERNATIONAL RECTIFIER LOGO

ASSEMBLY LOT CODE

PART NUMBER

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

Tape & Reel Information

SECTION Y-Y

NOTES:

- 1.0 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±.02
- 2.0 CAMBER NOT TO EXCEED 1mm in 100mm
- 3.0 MATERIAL: CONDUCTIVE BLACK STYRENIC ALLOY
- 4.0 K<sub>0</sub> 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<sup>6</sup> 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

A <sub>0</sub>	10.50	+/- 0.1
B <sub>0</sub>	15.80	+/- 0.1
B <sub>2</sub>	10.25	+/- 0.1
K <sub>0</sub>	4.90	+/- 0.1
F	11.50	+/- 0.1
P <sub>1</sub>	16.00	+/- 0.1
W	24.00	+/- 0.3

Dimensions in millimeters and (inches)

Ordering Information Table

Device Code		30	C	T	Q	060	S	TRL	PbF
		①	②	③	④	⑤	⑥	⑦	⑧
<b>1</b>	-	Current Rating (30A)							
<b>2</b>	-	Circuit Configuration							
		C = Common Cathode							
<b>3</b>	-	T = TO-220							
<b>4</b>	-	Schottky "Q" Series							
<b>5</b>	-	Voltage Ratings							
<b>6</b>	-	<ul style="list-style-type: none"> <li>• S = D<sup>2</sup>Pak</li> <li>• -1= TO-262</li> </ul>							
<b>7</b>	-	<ul style="list-style-type: none"> <li>• none = Tube (50 pieces)</li> <li>• TRL = Tape &amp; Reel (Left Oriented - for D<sup>2</sup>Pak only)</li> <li>• TRR = Tape &amp; Reel (Right Oriented - for D<sup>2</sup>Pak only)</li> </ul>							
<b>8</b>	-	<ul style="list-style-type: none"> <li>• none = Standard Production</li> <li>• PbF = Lead-Free</li> </ul>							

050 = 50V  
 060 = 60V

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.