

International  
**IR** Rectifier

87CNQ020  
 87CNQ020SM  
 87CNQ020SL

SCHOTTKY RECTIFIER

80 Amp

#### Major Ratings and Characteristics

Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform	80	A
$V_{RRM}$	20	V
$I_{FSM}$ @ tp=5 $\mu$ s sine	6000	A
$V_F$ @ 40Apk, $T_J=125^\circ\text{C}$ (perleg)	0.32	V
$T_J$ range	-55 to 150	$^\circ\text{C}$

#### Description/Features

The center tap Schottky rectifier module has been optimized for ultra low forward voltage drop specifically for 3.3V output power supplies. The proprietary barrier technology allows for reliable operation up to 150 $^\circ\text{C}$  junction temperature. Typical applications are in parallel switching power supplies, converters, reverse battery protection, and redundant power subsystems.

- 150 $^\circ\text{C}$   $T_J$  operation
- Center tap module
- Optimized for 3.3V application
- Ultra low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Low profile, small footprint, high current package

#### Case Styles

87CNQ020	87CNQ020SM	87CNQ020SL
		
<b>D61-8</b>	<b>D61-8-SM</b>	<b>D61-8-SL</b>

## 87CNQ020, 87CNQ020SM, 87CNQ020SL

PD-20541 rev. E 10/99

International  
IR Rectifier

## Voltage Ratings

Part number	87CNQ020 / .020SM / .020SL		
$V_R$ Max. DC Reverse Voltage (V)	@ 125° C	20	
$V_R$ Max. DC Reverse Voltage (V)	@ 150° C	10	

## Absolute Maximum Ratings

Parameters	87CNQ	Units	Conditions
$I_{F(AV)}$ Max. Average Forward Current (Per Device) (Per Leg)	80 40	A	50% duty cycle @ $T_C = 135^\circ\text{C}$ , rectangular waveform
$I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg)	6000 1100	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
$E_{AS}$ Non-Repetitive Avalanche Energy (Per Leg)	36	mJ	$T_J = 25^\circ\text{C}$ , $I_{AS} = 8$ Amps, $L = 1.12$ mH
$I_{AR}$ Repetitive Avalanche Current (Per Leg)	8	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	87CNQ	Units	Conditions
$V_{FM}$ Max. Forward Voltage Drop (Per Leg) (1)	0.45	V	@ 40A $T_J = 25^\circ\text{C}$
	0.51	V	@ 80A $T_J = 25^\circ\text{C}$
	0.32	V	@ 40A $T_J = 125^\circ\text{C}$
	0.39	V	@ 80A $T_J = 125^\circ\text{C}$
	0.29	V	@ 40A $T_J = 150^\circ\text{C}$
	0.37	V	@ 80A $T_J = 150^\circ\text{C}$
$I_{RM}$ Max. Reverse Leakage Current (Per Leg) (1)	5.5	mA	$T_J = 25^\circ\text{C}$ $V_R = \text{rated } V_R$
	550	mA	$T_J = 125^\circ\text{C}$ $V_R = \text{rated } V_R$
	90	mA	$T_J = 125^\circ\text{C}$ $V_R = 5\text{V}$
	70	mA	$T_J = 125^\circ\text{C}$ $V_R = 3.3\text{V}$
	480	mA	$T_J = 150^\circ\text{C}$ $V_R = 10\text{V}$
$V_{F(TO)}$ Threshold Voltage	0.191	V	$T_J = T_J \text{ max.}$
$r_f$ Forward Slope Resistance	2.3	m $\Omega$	
$C_T$ Max. Junction Capacitance (Per Leg)	6500	pF	$V_R = 5V_{DC}$ , (test signal range 100Khz to 1Mhz) $25^\circ\text{C}$
$L_S$ Typical Series Inductance (Per Leg)	5.5	nH	Measured lead to lead 5mm from package body
dv/dt Max. Voltage Rate of Change (Rated $V_R$ )	10,000	V/ $\mu\text{s}$	

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

## Thermal-Mechanical Specifications

Parameters	87CNQ	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)	0.85	$^\circ\text{C/W}$	DC operation
$R_{thJC}$ Max. Thermal Resistance Junction to Case (Per Package)	0.42	$^\circ\text{C/W}$	DC operation
$R_{thCS}$ Typical Thermal Resistance, Case to Heatsink (D61-8 Only)	0.30	$^\circ\text{C/W}$	Mounting surface, smooth and greased
wt Approximate Weight	7.8(0.28)	g(oz.)	
T Mounting Torque (D61-8 Only)	Min.	40(35)	Kg-cm (lbf-in)
	Max.	58(50)	

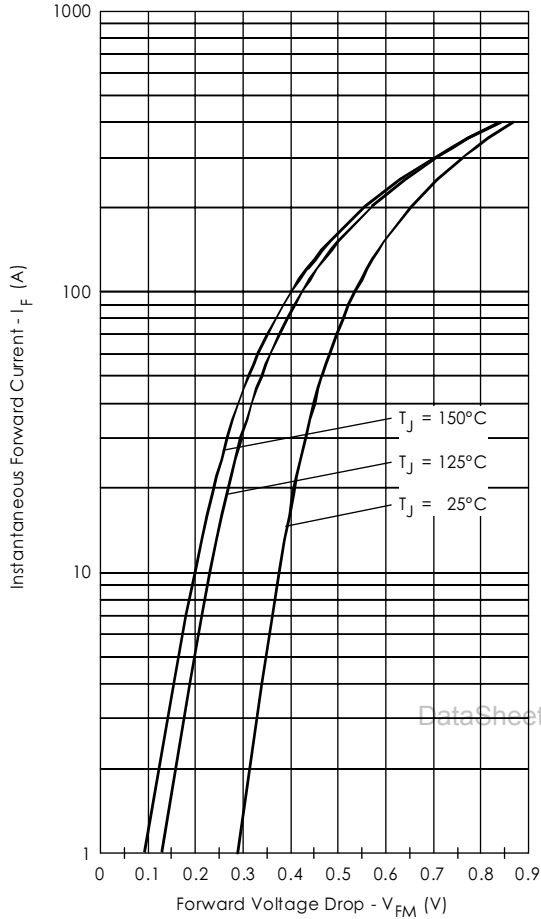


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

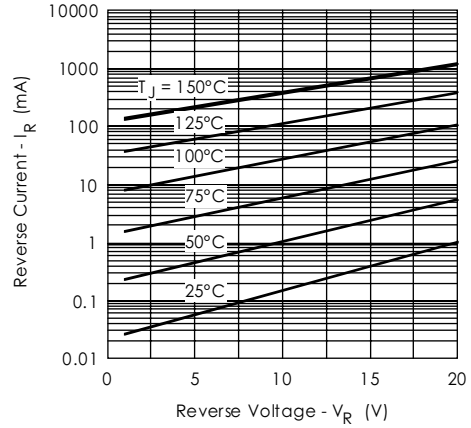


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

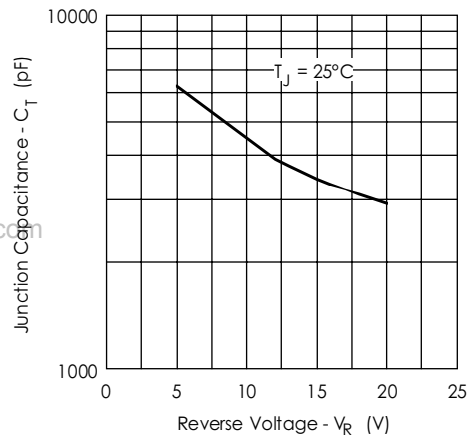


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

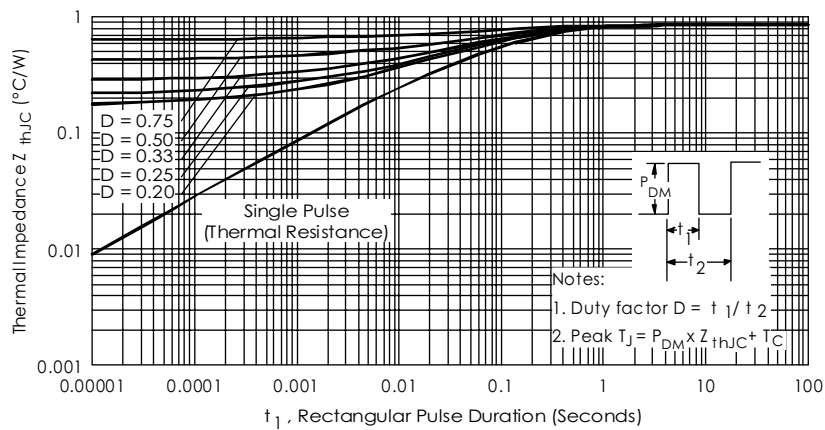


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

87CNQ020, 87CNQ020SM, 87CNQ020SL

PD-20541 rev. E 10/99

International  
IR Rectifier

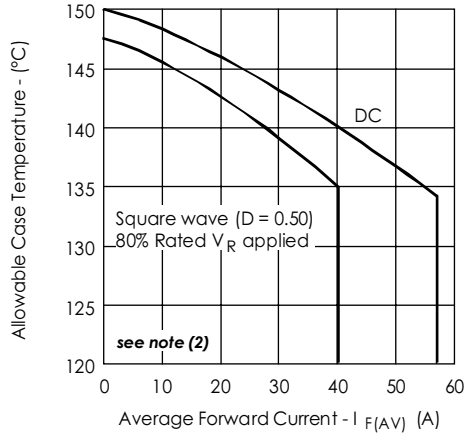


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (PerLeg)

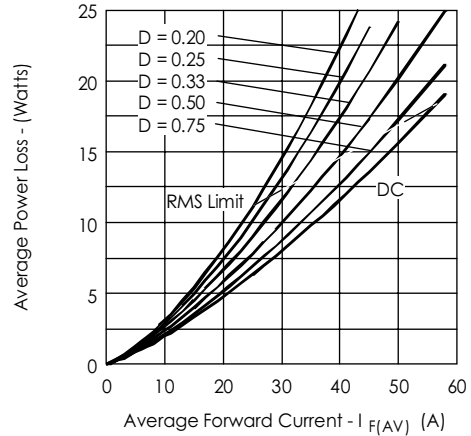


Fig. 6 - Forward Power Loss Characteristics (PerLeg)

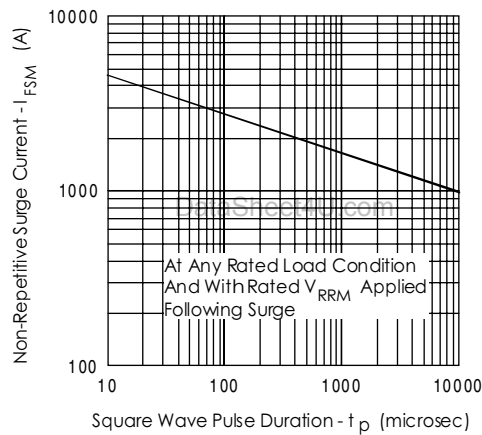


Fig. 7 - Max. Non-Repetitive Surge Current (PerLeg)

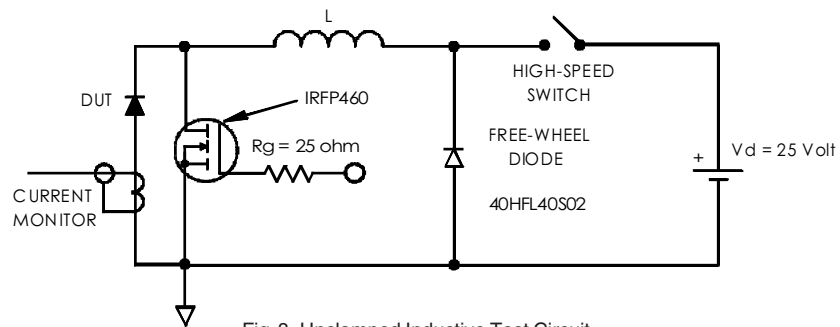
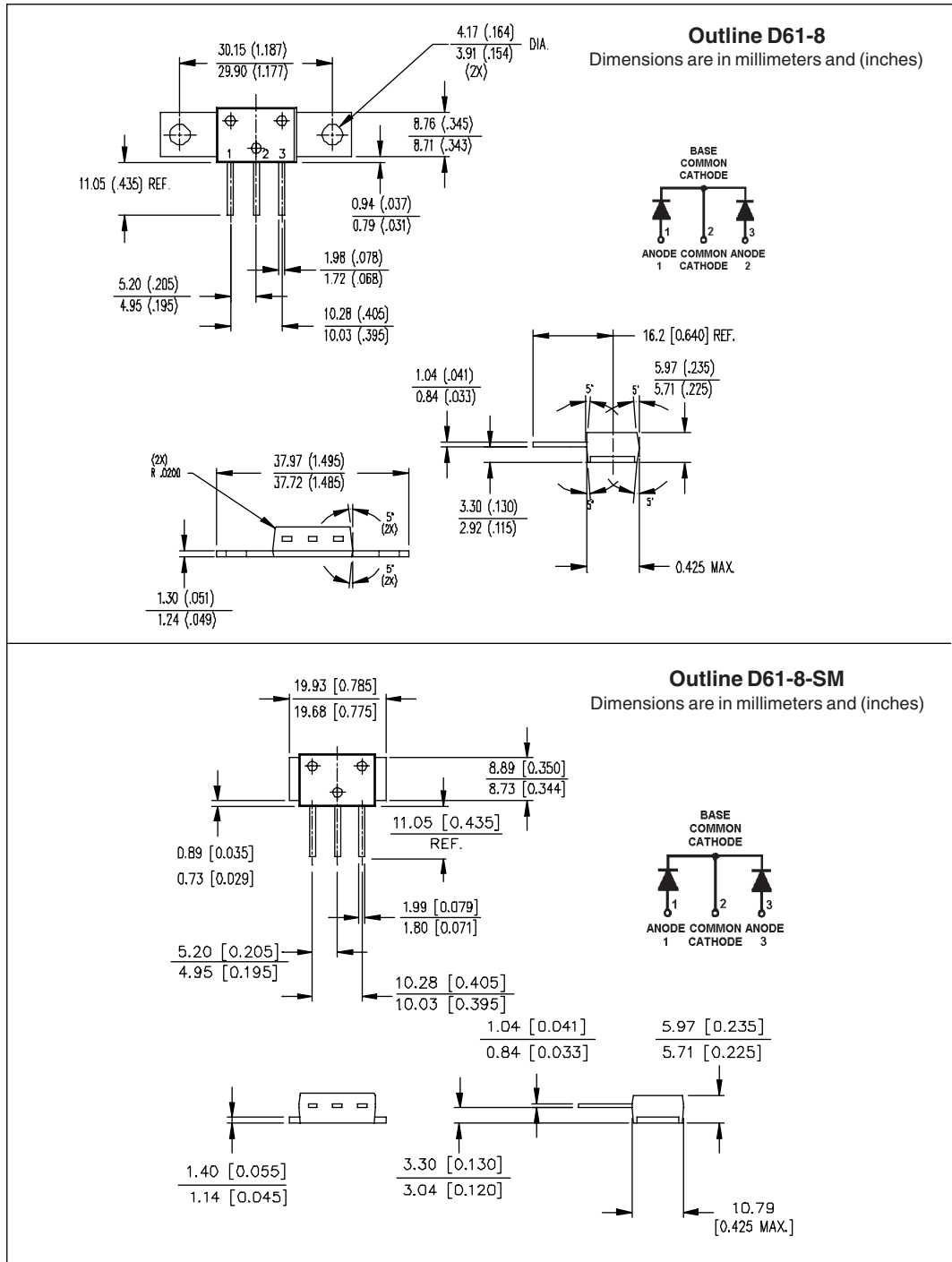


Fig. 8 - Unclamped Inductive Test Circuit

- (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);  
 $P_{d_{REV}} = \text{Inverse Power Loss} = V_{R1} \times I_R (1 - D); I_R @ V_{R1} = 80\% \text{ rated } V_R$

Outline Table

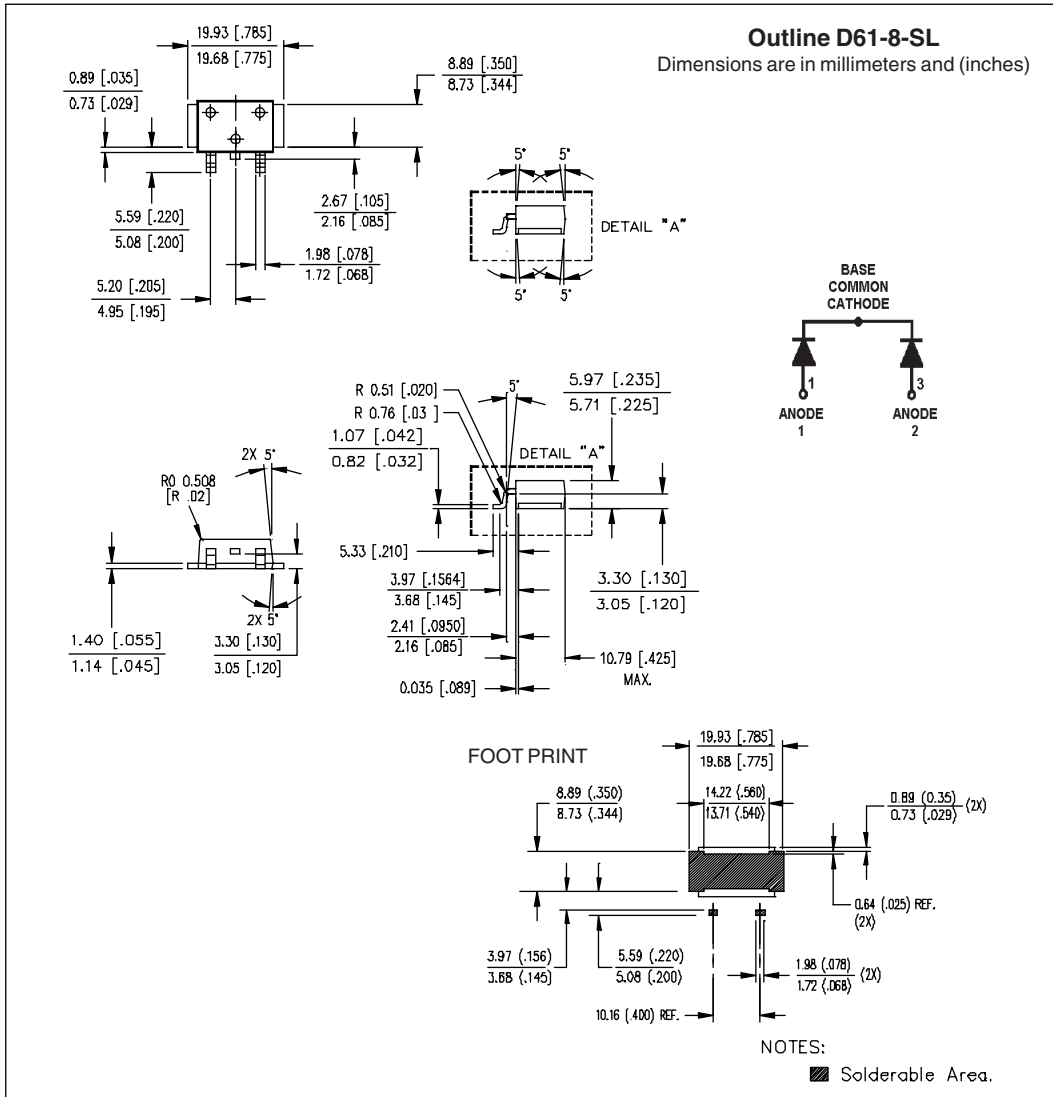


87CNQ020, 87CNQ020SM, 87CNQ020SL

PD-20541 rev. E 10/99

International  
IR Rectifier

Outline Table



International  
IR Rectifier

**WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245 U.S.A. Tel: (310) 322 3331. Fax: (310) 322 3332.  
**EUROPEAN HEADQUARTERS:** Hurst Green, Oxted, Surrey RH8 9BB, U.K. Tel: ++ 44 1883 732020. Fax: ++ 44 1883 733408.  
**IR CANADA:** 15 Lincoln Court, Brampton, Markham, Ontario L6T3Z2. Tel: (905) 453 2200. Fax: (905) 475 8801.  
**IR GERMANY:** Saalburgstrasse 157, 61350 Bad Homburg. Tel: ++ 49 6172 96590. Fax: ++ 49 6172 965933.  
**IR ITALY:** Via Liguria 49, 10071 Borgaro, Torino. Tel: ++ 39 11 4510111. Fax: ++ 39 11 4510220.  
**IR FAR EAST:** K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo, Japan 171. Tel: 81 3 3983 0086.  
**IR SOUTHEAST ASIA:** 1 Kim Seng Promenade, Great World City West Tower, 13-11, Singapore 237994. Tel: ++ 65 838 4630.  
**IR TAIWAN:** 16 Fl. Suite D.207, Sec. 2, Tun Haw South Road, Taipei, 10673, Taiwan. Tel: 886 2 2377 9936.

<http://www.irf.com>

Fax-On-Demand: +44 1883 733420

Data and specifications subject to change without notice.