

PD-20541 rev. E 10/99

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} @ $t_p=5\mu s$ sine	6000	A
V_F @ 40 Apk, $T_J=125^\circ C$ (per leg)	0.32	V
T_J range	-55 to 150	$^\circ C$

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 °C junction temperature. Typical applications are in parallel switching power supplies, converters, reverse battery protection, and redundant power subsystems.

- 150 °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
		
D61-8	D61-8-SM	D61-8-SL

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 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)	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 μs 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_t Forward Slope Resistance	2.3	m Ω	
C_T Max. Junction Capacitance (Per Leg)	6500	pF	$V_R = 5V_{DC}$, (test signal range 100Khz to 1Mhz) 25°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/ μs	

(1) Pulse Width < 300 μs , 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	Min. 40(35) Max. 58(50)	Kg-cm (lbf-in)	

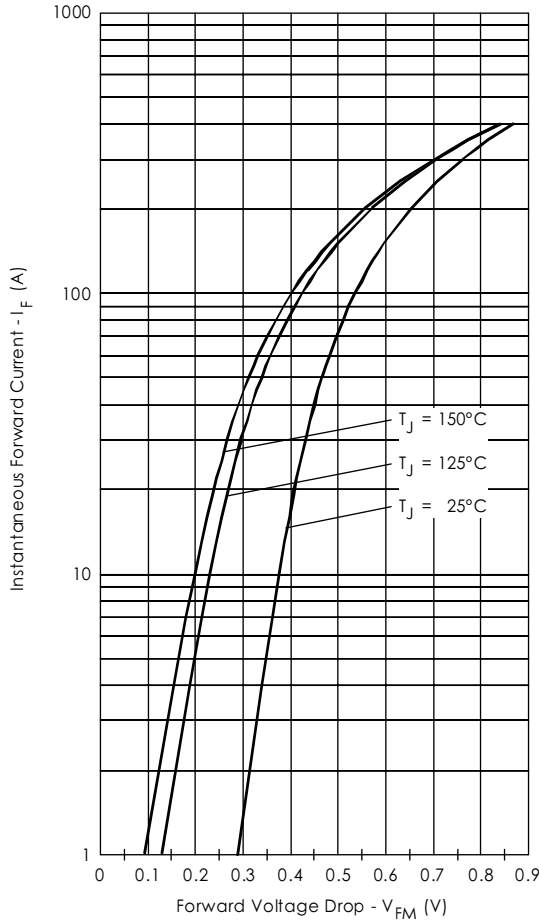


Fig. 1 - Max. Forward Voltage Drop Characteristics (PerLeg)

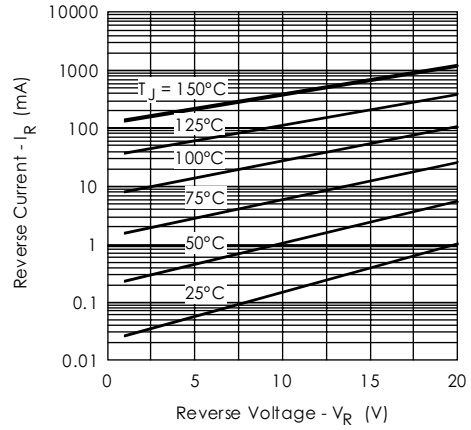


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (PerLeg)

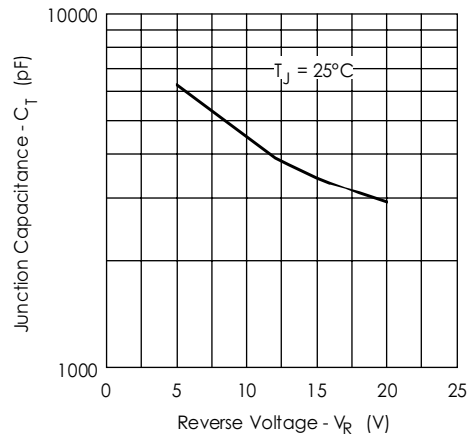


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (PerLeg)

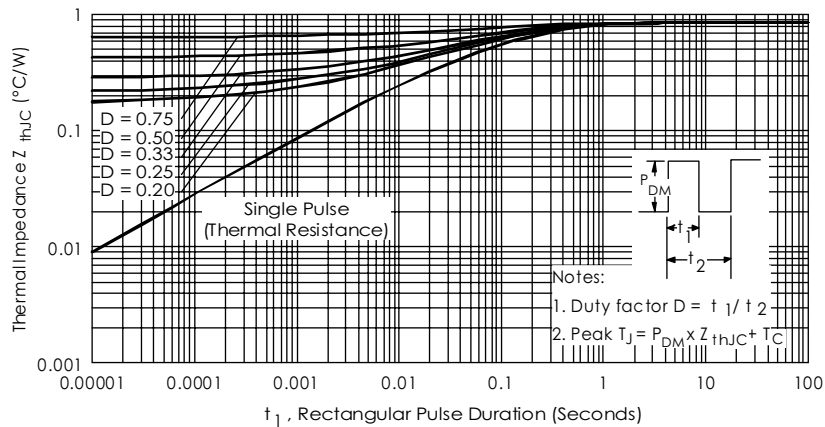


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (PerLeg)

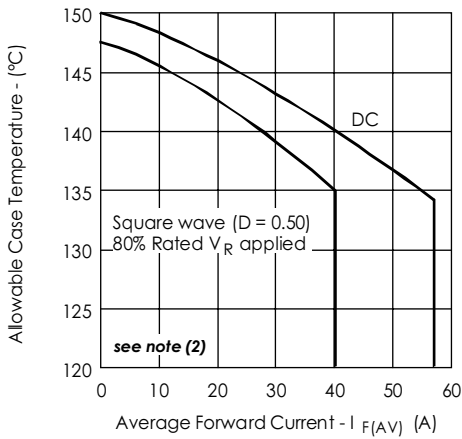


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

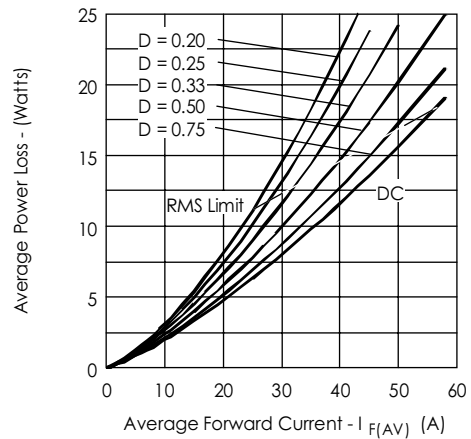


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

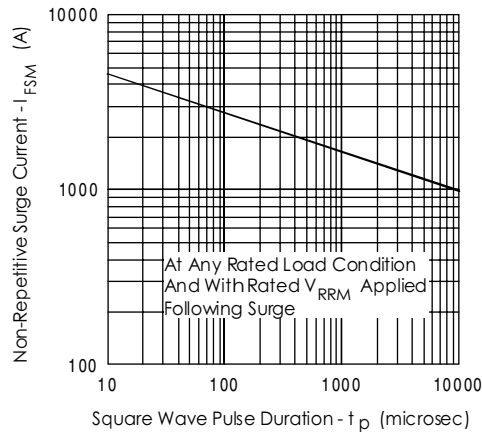


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

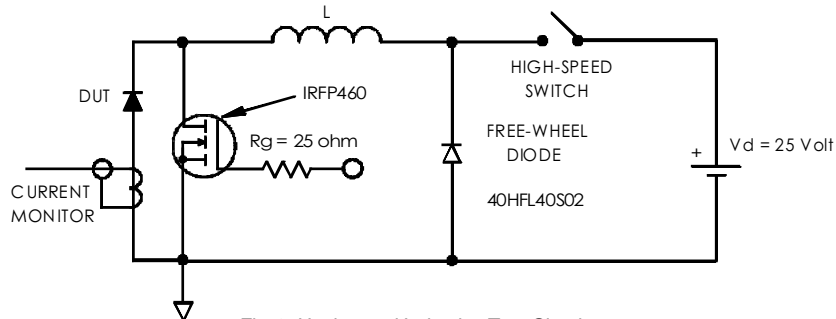
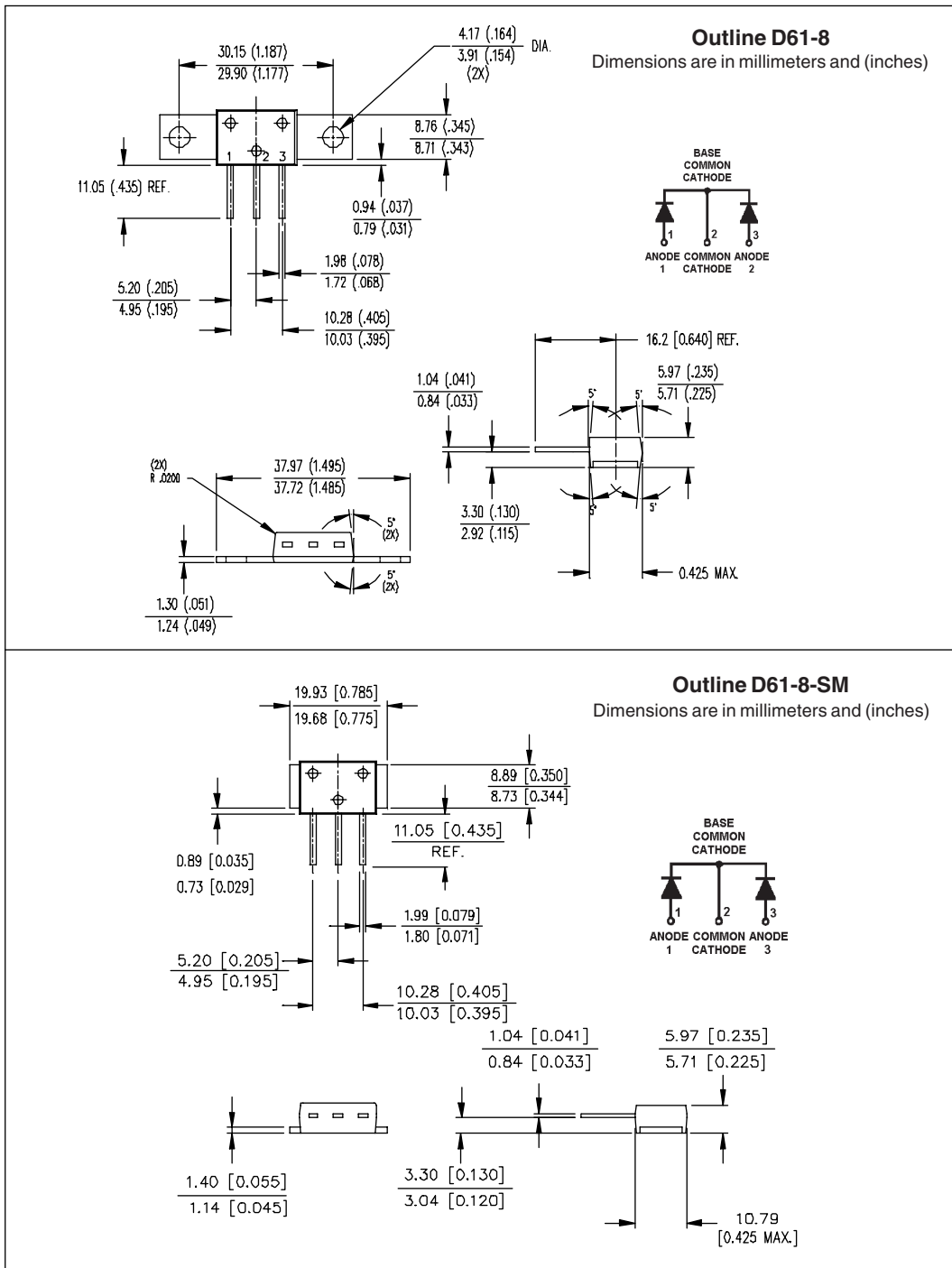


Fig. 8 - Unclamped Inductive Test Circuit

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

Outline Table



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