

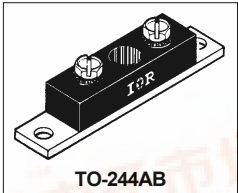
Bulletin PD-20723 rev.B 07/01

International
IR Rectifier

409CNQ... SERIES

SCHOTTKY RECTIFIER

400 Amp



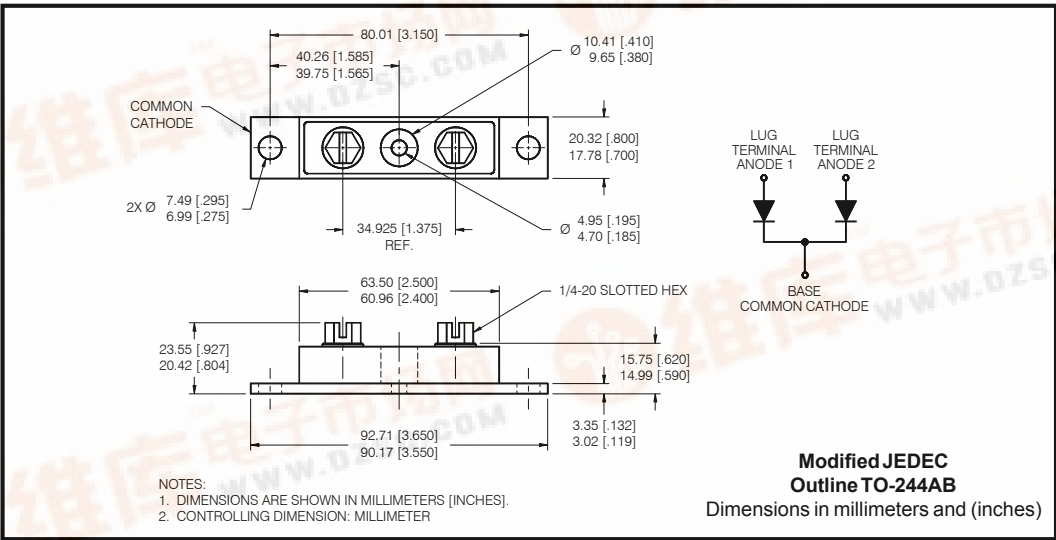
Major Ratings and Characteristics

Characteristics	409CNQ...	Units
$I_{F(AV)}$ Rectangular waveform	400	A
V_{RRM} range	135 to 150	V
I_{FSM} @tp=5 μ s sine	20000	A
V_F @200Apk, $T_J=125^\circ\text{C}$ (per leg)	0.72	V
T_J range	-55to175	$^\circ\text{C}$

Description/Features

The 409CNQ center tap Schottky rectifier module series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 $^\circ\text{C}$ junction temperature. Typical applications are in high current switching power supplies, plating power supplies, UPS systems, converters, free-wheeling diodes, welding, and reverse battery protection.

- 175 $^\circ\text{C}$ T_J operation
- Center tap module
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability



409CNQ... Series

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Voltage Ratings

Part number	409CNQ135	409CNQ150
V_R Max. DC Reverse Voltage (V)	135	150
V_{RWM} Max. Working Peak Reverse Voltage (V)		

Absolute Maximum Ratings

Parameters	409CNQ	Units	Conditions
$I_{F(AV)}$ Max. Average Forward Current (Per Leg) * See Fig. 5 (Per device)	200 400	A	50% duty cycle @ $T_C = 125^\circ\text{C}$, rectangular wave form
I_{FSM} Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg) * See Fig. 7	20000 2300	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)	15	mJ	$T_J = 25^\circ\text{C}$, $I_{AS} = 1\text{ Amps}$, $L = 30\text{ mH}$
I_{AR} Repetitive Avalanche Current (Per Leg)	1	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	409CNQ	Units	Conditions
V_{FM} Max. Forward Voltage Drop (Per Leg) * See Fig. 1 (1)	1.03	V	@ 200A $T_J = 25^\circ\text{C}$
	1.21	V	@ 400A
	0.72	V	@ 200A $T_J = 125^\circ\text{C}$
	0.83	V	@ 400A
I_{RM} Max. Reverse Leakage Current (Per Leg) * See Fig. 2 (1)	6	mA	$T_J = 25^\circ\text{C}$ $V_R = \text{rated } V_R$
	85	mA	$T_J = 125^\circ\text{C}$
C_T Max. Junction Capacitance (Per Leg)	6000	pF	$V_R = 5V_{DC}$, (test signal range 100Khz to 1Mhz) 25°C
L_S Typical Series Inductance (Per Leg)	5.0	nH	From top of terminal hole to mounting plane
dv/dt Max. Voltage Rate of Change (Rated V_R)	10000	V/ μs	

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

Thermal-Mechanical Specifications

Parameters	409CNQ	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)	0.20	$^\circ\text{C/W}$	DC operation * See Fig. 4
R_{thJC} Max. Thermal Resistance Junction to Case (Per Package)	0.10	$^\circ\text{C/W}$	DC operation
R_{thCS} Typical Thermal Resistance, Case to Heatsink	0.10	$^\circ\text{C/W}$	Mounting surface, smooth and greased
wt Approximate Weight	79(2.80)	g(oz.)	
T Mounting Torque	Base Min.	24(20)	Kg-cm (lbf-in)
	Base Max.	35(30)	
	Center Hole Typ.	13.5(12)	
	Terminal Torque Min.	35(30)	
	Max.	46(40)	
Case Style	TO - 244AB		Modified JEDEC

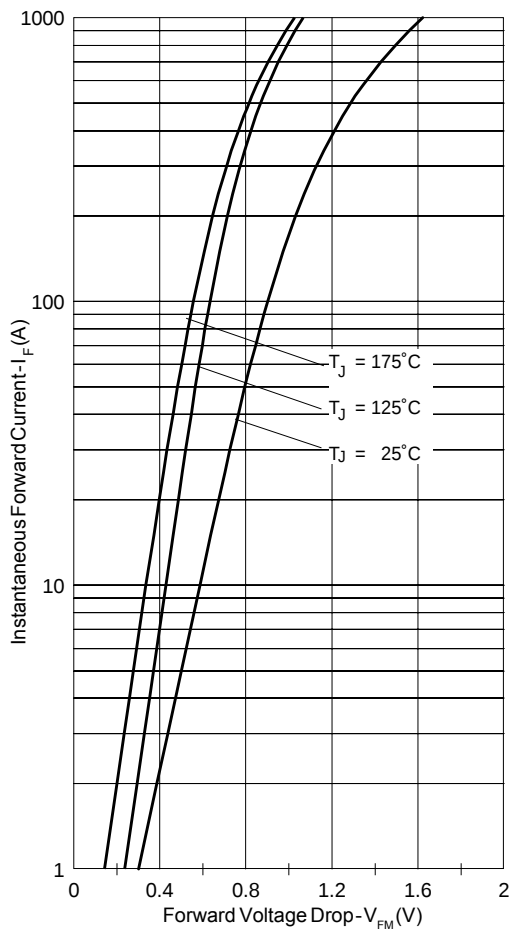


Fig. 1 - Max. Forward Voltage Drop Characteristics

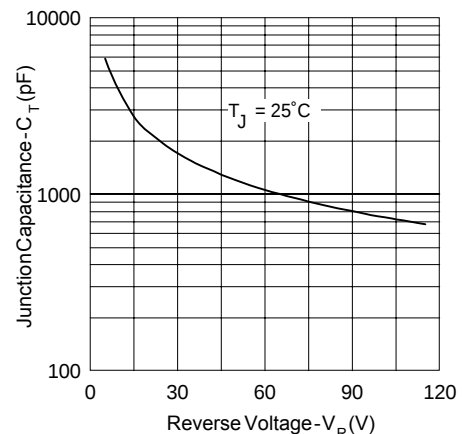
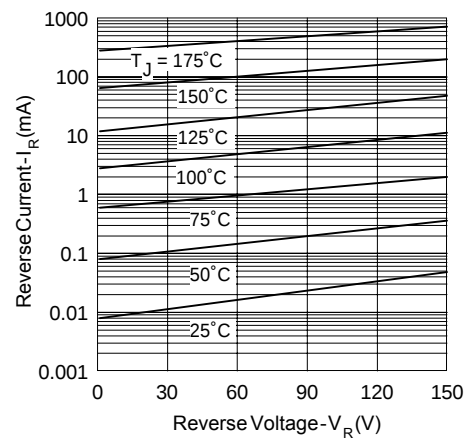


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

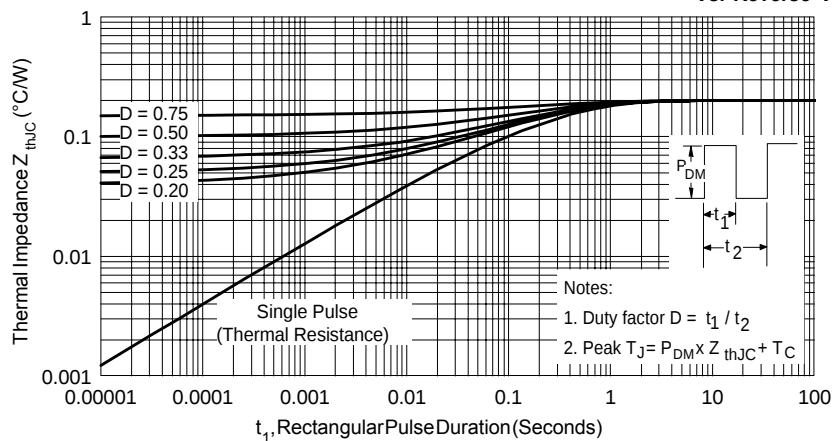


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

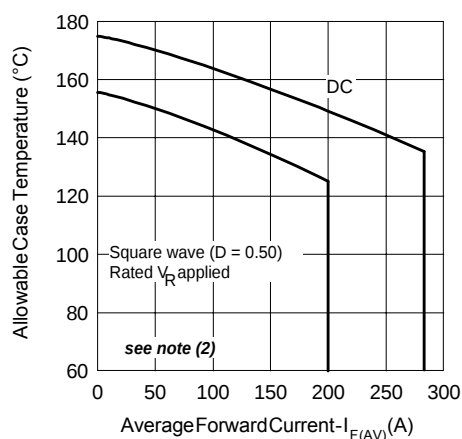


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

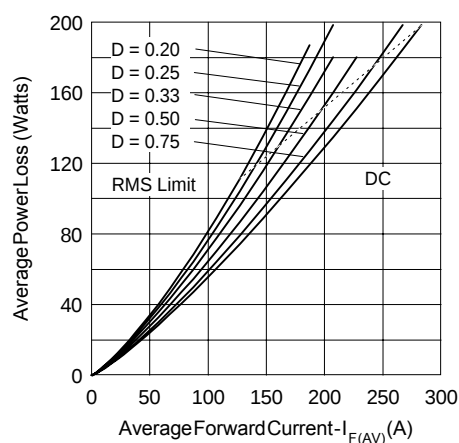


Fig. 6 - Forward Power Loss Characteristics

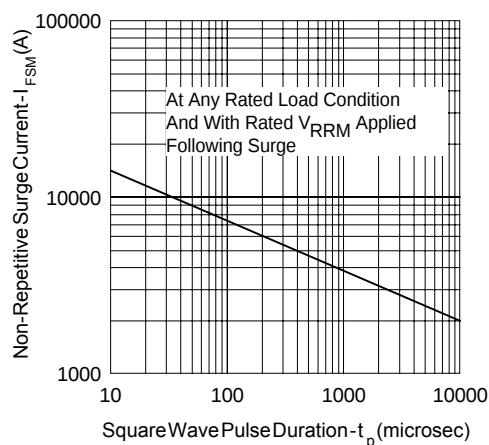


Fig. 7 - Max. Non-Repetitive Surge Current

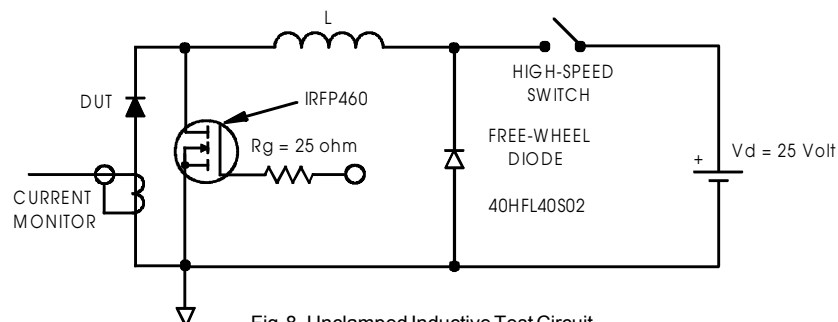


Fig. 8 - Unclamped Inductive Test Circuit

(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 = $V_{R1} \times I_R (1 - D)$; $I_R @ V_{R1}$ = rated V_R

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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