

# International IR Rectifier

## 89CNQ...A Series

SCHOTTKY RECTIFIER  
New GenIII D-61 Package

80 Amp

### Major Ratings and Characteristics

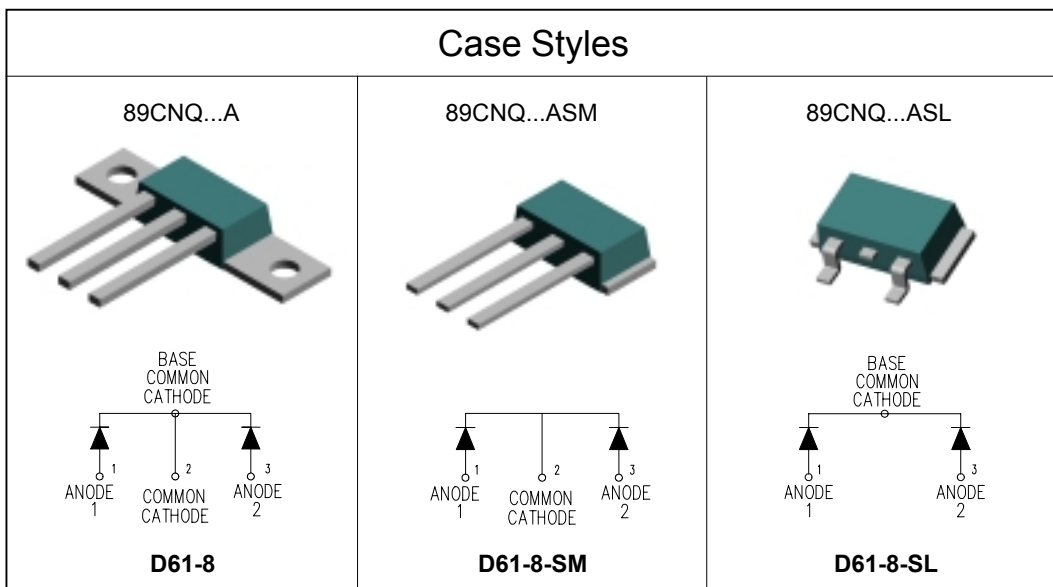
Characteristics	89CNQ...A	Units
$I_{F(AV)}$ Rectangular waveform	80	A
$V_{RRM}$	135 to 150	V
$I_{FSM}$ @tp=5 $\mu$ s sine	4300	A
$V_F$ @40 Apk, $T_J=125^\circ\text{C}$ (per leg)	0.69	V
$T_J$ range	-55 to 175	$^\circ\text{C}$

### Description/Features

The 89CNQ...A center tap Schottky rectifier module has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 175 $^\circ\text{C}$  junction temperature. Typical applications are in switching power supplies, converters, free wheeling diodes, 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

*New fully transfer-mold low profile, small footprint, high current package*



## Voltage Ratings

Part number	89CNQ135A	89CNQ150A
$V_R$ Max. DC Reverse Voltage (V)	135	150
$V_{RWM}$ Max. Working Peak Reverse Voltage (V)		

## Absolute Maximum Ratings

Parameters	89CNQ	Units	Conditions
$I_{F(AV)}$ Max. Av. Forward Current (Per Leg) See Fig. 5 (Per Device)	40	A	50% duty cycle @ $T_C = 130^\circ\text{C}$ , rectangular wave form (Rated $V_R$ )
	80		
$I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg) See Fig. 7	4300	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 $V_r$ applied
	500		
$E_{AS}$ Non-Repetitive Avalanche Energy (Per Leg)	9	mJ	$T_J = 25^\circ\text{C}$ , $I_{AS} = 1$ Amps, $L = 18$ mH
$I_{AR}$ Repetitive Avalanche Current (Per Leg)	1.0	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	89CNQ	Units	Conditions
$V_{FM}$ Max. Forward Voltage Drop (Per Leg) See Fig. 1 (1)	0.99	V	@ 40A $T_J = 25^\circ\text{C}$
	1.14	V	@ 80A
	0.69	V	@ 40A $T_J = 125^\circ\text{C}$
	0.78	V	@ 80A
$I_{RM}$ Typical Reverse Leakage Current (Per Leg) See Fig. 2 (1)	1.5	mA	$T_J = 25^\circ\text{C}$ $V_R = \text{rated } V_R$
	21	mA	$T_J = 125^\circ\text{C}$
$C_T$ Max. Junction Capacitance (Per Leg)	980	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 $V_R$ )	10000	V/ $\mu\text{s}$	

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

## Thermal-Mechanical Specifications

Parameters	89CNQ	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)	0.85	$^\circ\text{C}/\text{W}$	DC operation
$R_{thJC}$ Max. Thermal Resistance Junction to Case (Per Package)	0.42	$^\circ\text{C}/\text{W}$	DC operation
$R_{thCS}$ Typical Thermal Resistance, Case to Heatsink (D61-8 Only)	0.30	$^\circ\text{C}/\text{W}$	Mounting surface, smooth and greased Device flatness < 5 mils
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)	

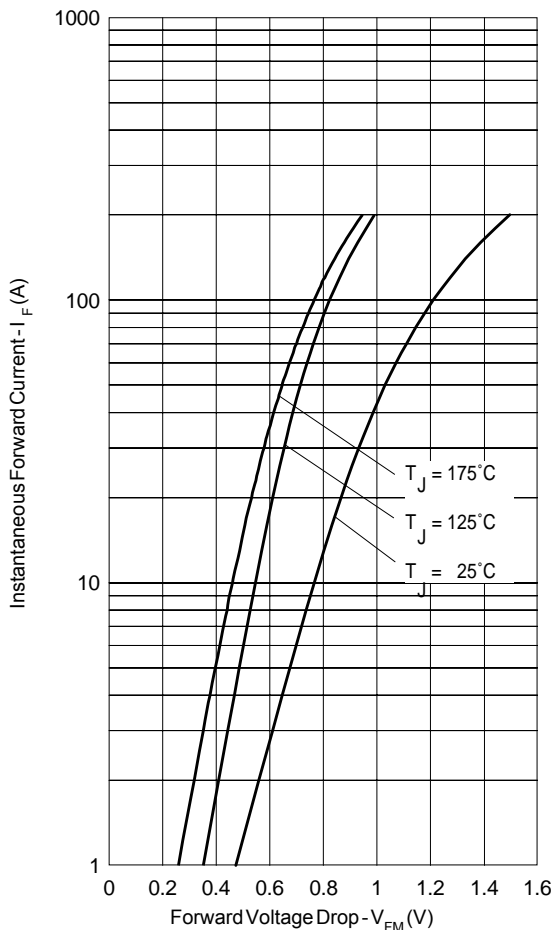


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

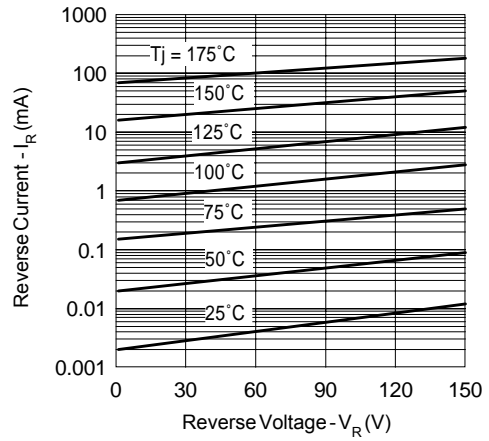


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

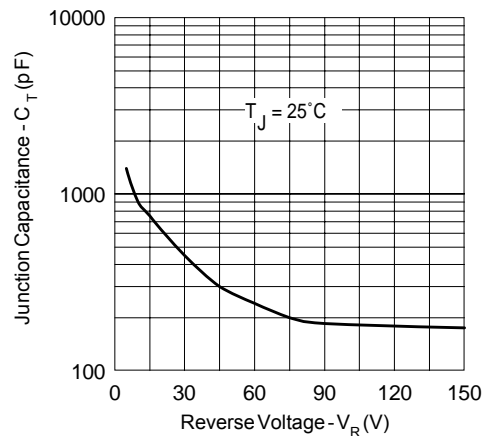


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

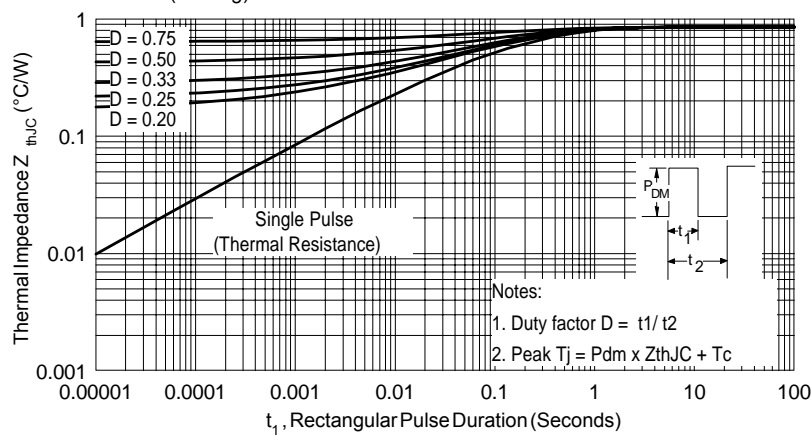


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

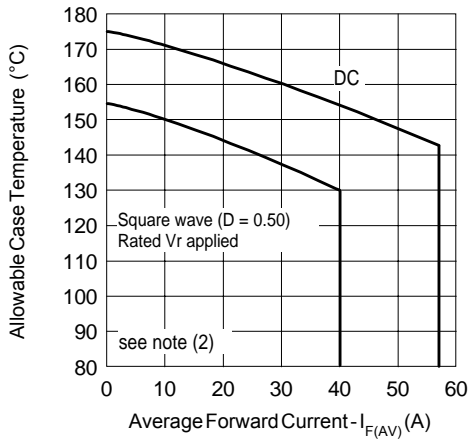


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

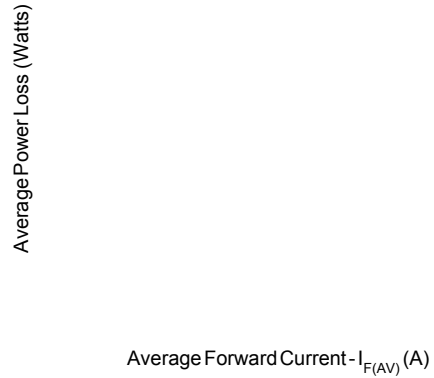


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

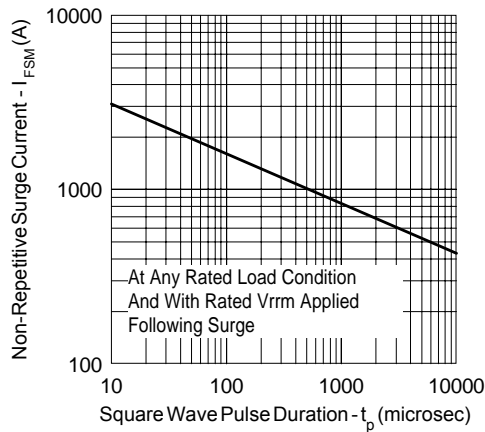


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

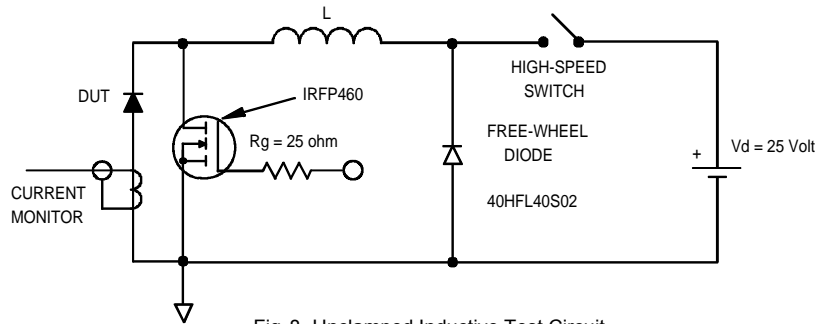
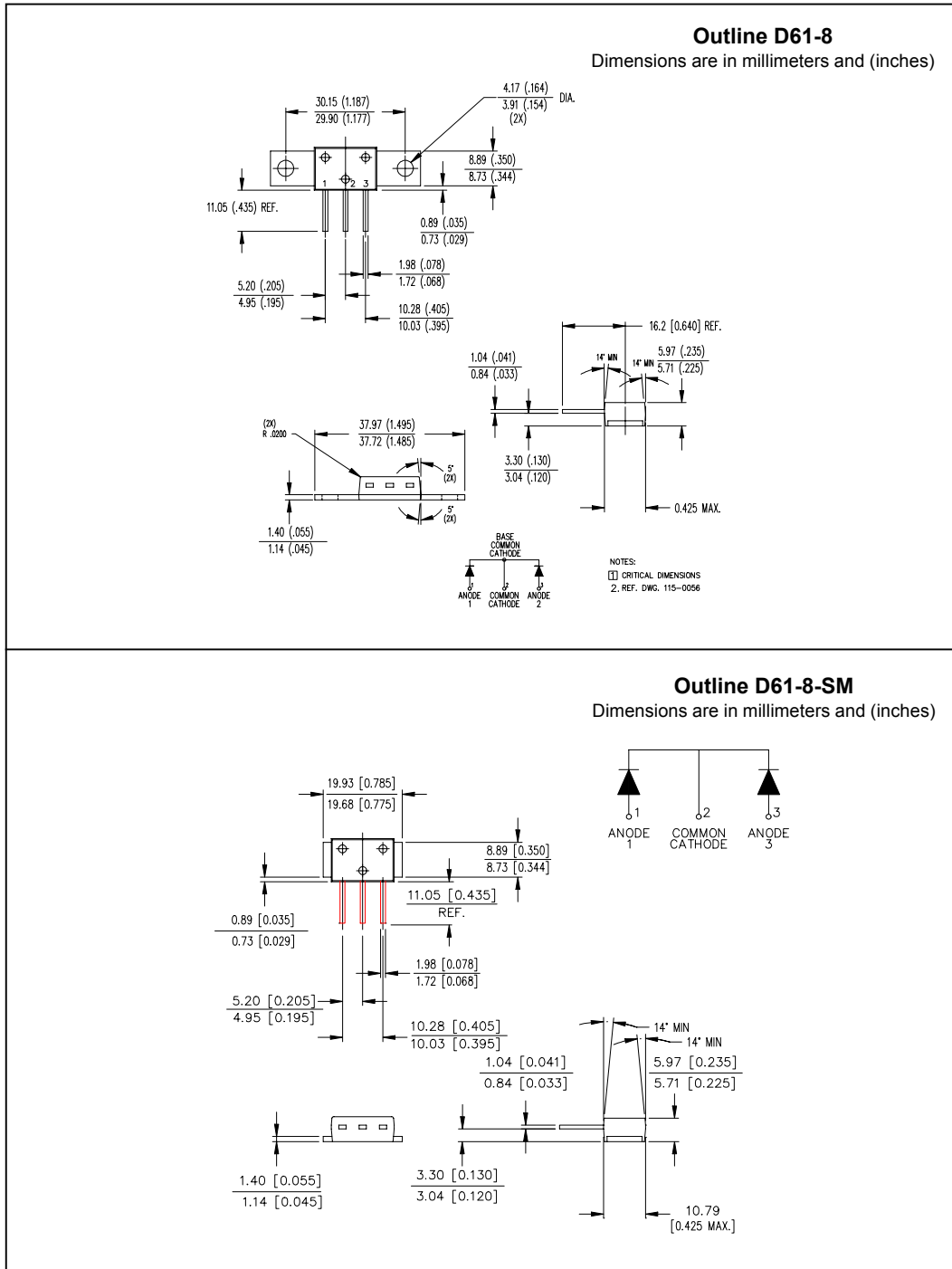


Fig. 8 - Unclamped Inductive Test Circuit

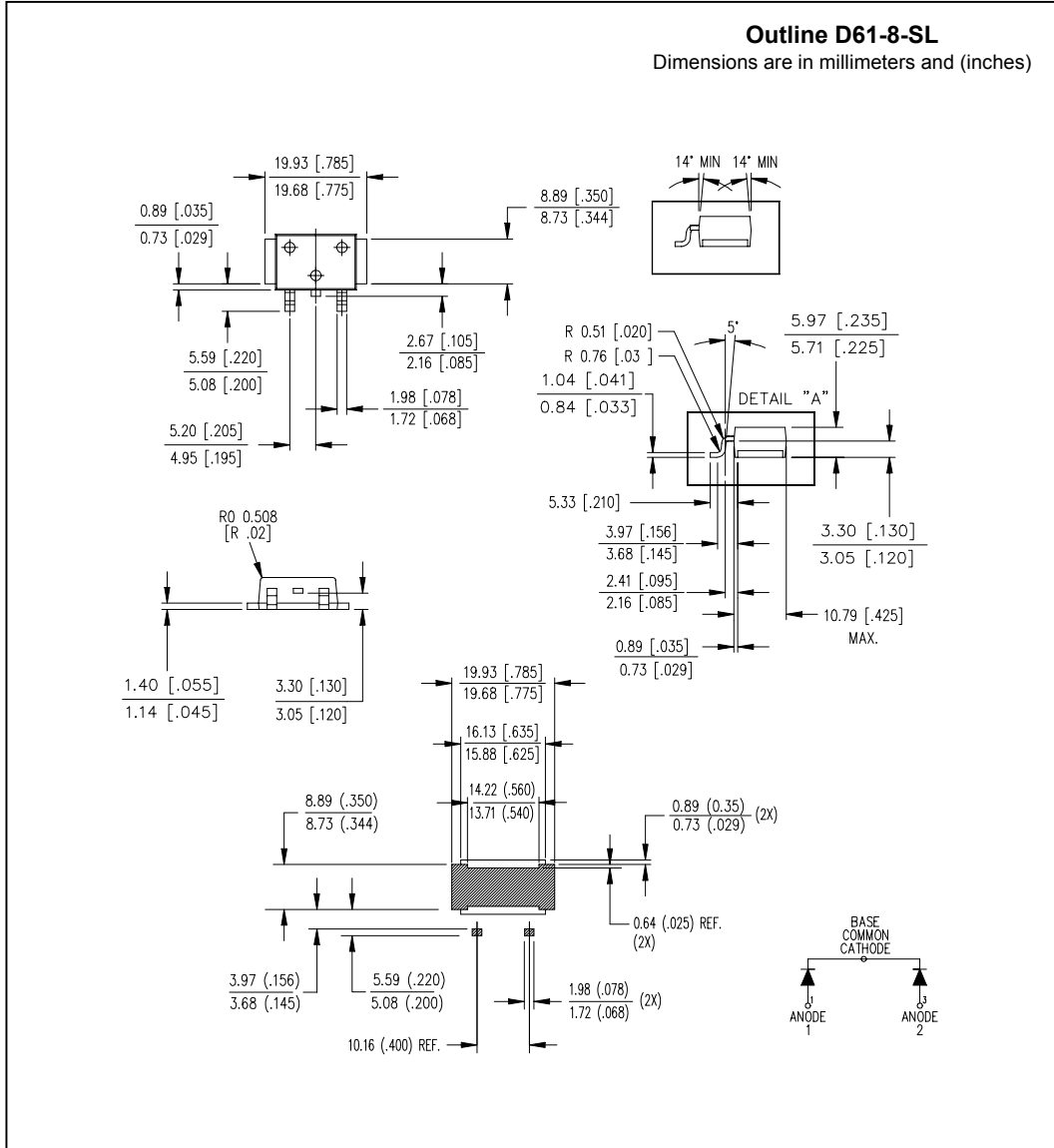
- (2) Formula used:  $T_c = T_j - (Pd + Pd_{REV}) \times R_{thJC}$ ;  
 $Pd = \text{Forward Power Loss} = I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);  
 $Pd_{REV} = \text{Inverse Power Loss} = V_{R1} \times I_R (1 - D)$ ;  $I_R @ V_{R1} = \text{Rated } V_R$

Outline Table



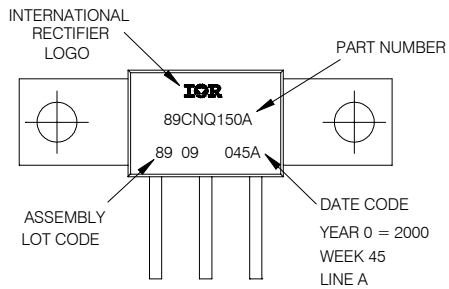
**Outline D61-8-SM**  
 Dimensions are in millimeters and (inches)

Outline Table



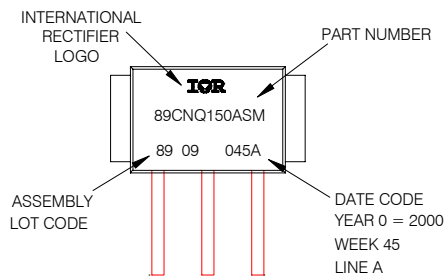
Part Marking Information

EXAMPLE: THIS IS A 89CNQ150A WITH  
 LOT CODE 89 09  
 ASSEMBLED ON WW 45, 2000  
 IN THE ASSEMBLY LINE "A"



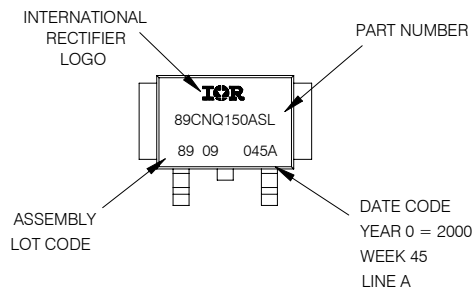
D61-8

EXAMPLE: THIS IS A 89CNQ150ASM WITH  
 LOT CODE 89 09  
 ASSEMBLED ON WW 45, 2000  
 IN THE ASSEMBLY LINE "A"



D61-8-SM

EXAMPLE: THIS IS A 89CNQ150ASL WITH  
 LOT CODE 89 09  
 ASSEMBLED ON WW 45, 2000  
 IN THE ASSEMBLY LINE "A"



D61-8-SL

89CNQ...A Series

Bulletin PD-20046 rev. C 07/02

International  
**IOR** Rectifier

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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.

International  
**IOR** Rectifier

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