Bulletin I27289 12/06

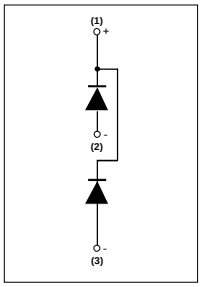
International
IOR Rectifier

IRKCS409/150P

SCHOTTKY RECTIFIER 400 Amp

Description/ Features

The IRKCS409.. Schottky rectifier Common Cathode has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °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 °C T_J operation
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- UL pending
- TOTALLY LEAD-FREE, RoHS Compliant

Mechanical Description

The Generation V of Add-A-pak module combine the excellent thermal performance obtained by the usage of Direct Bonded Copper substrate with superior mechanical ruggedness, thanks to the insertion of a solid Copper baseplate at the bottom side of the device.
The Cu baseplate allow an easier mounting on the majority of heatsink with increased tolerance of surface roughness and improve thermal spread.

The Generation V of AAP module is manufactured without hard mold, eliminating in this way any possible direct stress on the leads.
The electrical terminals are secured against axial pull-out: they are fixed to the module housing via a click-stop feature already tested and proved as reliable on other IR modules.

Major Ratings and Characteristics

Characteristics		Values	Units
$I_{F(AV)}$	Rectangular waveform	400	A
V_{RRM}		150	V
I_{FSM}	@ tp = 5 µs sine	20000	A
V_F	@ 200Apk, T_J=125°C	0.79	V
T_J	range	- 55 to 175	°C

Outline TO-240AA

Voltage Ratings

	Parameters	IRKCS409/150P
V_R	Max. DC Reverse Voltage (V)	150
V_{RWM}	Max. Working Peak Reverse Voltage (V)	

Absolute Maximum Ratings

	Parameters		Values	Units	Conditions	
$I_{F(AV)}$	Max. Average Forward Current	Per Module	400	A	50% duty cycle @ T_C = 94 °C, rectangular wave form	
		Per Leg	200			
I_{FSM}	Max. Peak One Cycle Non-Repetitive Surge Current		20000	A	5µs Sine or 3µs Rect. pulse	Following any rated load condition and with rated V_{RRM} applied
			2300		10ms Sine or 6ms Rect. pulse	
E_{AS}	Non-Repetitive Avalanche Energy		15	mJ	T_J = 25 °C, I_{AS} = 1.8 Amps, L = 10mH	
I_{AR}	Repetitive Avalanche Current		1	A	Current decaying linearly to zero in 1 µsec Frequency limited by T_J max. V_A = 1.5 x V_R typical	

Electrical Specifications

	Parameters	Values	Units	Conditions	
V_{FM}	Max. Forward Voltage Drop (1)	0.98	V	@ 200A	T_J = 25 °C
		1.23	V	@ 400A	
		0.79	V	@ 200A	T_J = 125 °C
		1.03	V	@ 400A	
I_{RM}	Max. Reverse Leakage Current (1)	6	mA	T_J = 25 °C	V_R = rated V_R
		85	mA	T_J = 125 °C	
C_T	Max. Junction Capacitance	6000	pF	V_R = 5V_{DC} (test signal range 100Khz to 1Mhz) 25°C	
L_S	Typical Series Inductance	5.0	nH	From top of terminal hole to mounting plane	
dv/dt	Max. Voltage Rate of Change	10000	V/ µs	(Rated V_R)	
V_{INS}	RMS isolation voltage (1 sec)	3500	V	50 Hz, circuit to base, all terminals shorted	

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

Thermal-Mechanical Specifications

	Parameters		Values	Units	Conditions
T_J	Max. Junction Temperature Range		-55 to 175	°C	
T_{stg}	Max. Storage Temperature Range		-55 to 175	°C	
R_{thJC}	Max. Thermal Resistance, Junction to Case (Per Leg)		0.36	°C/W	DC operation
R_{thCS}	Max. Thermal Resistance, case to Heatsink		0.1	°C/W	Mounting Surface, smooth and greased
wt	Approximate Weight		110 (4)	gr (oz)	
T	Mounting Torque ± 10%	to heatsink	5	Nm	
		busbar	4		
	Case Style		TO - 240AA		JEDEC

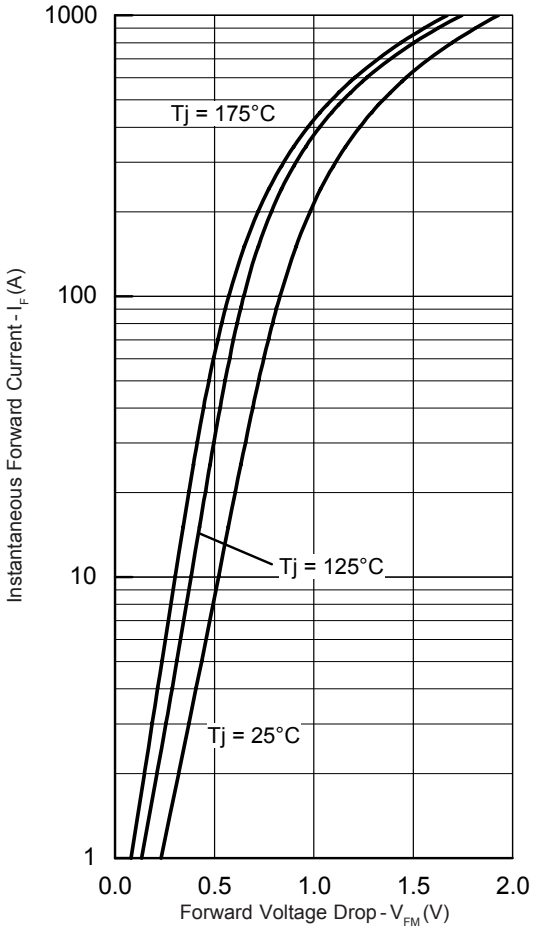


Fig. 1 - Max. Forward Voltage Drop Characteristics

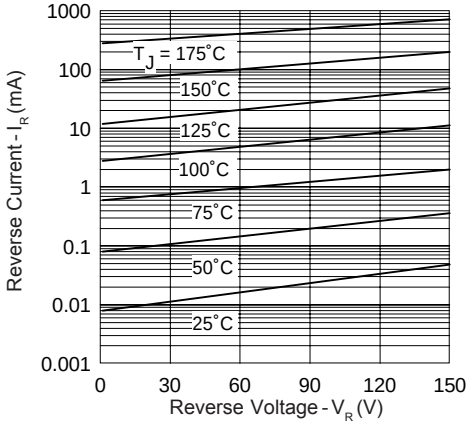


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

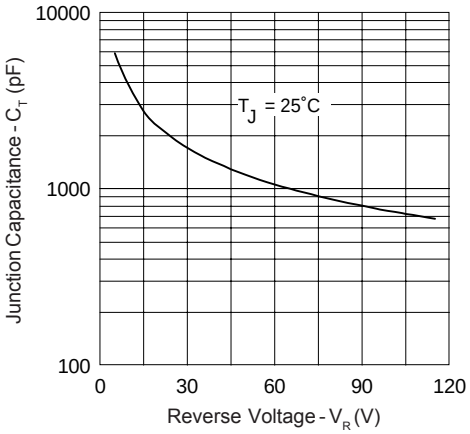


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

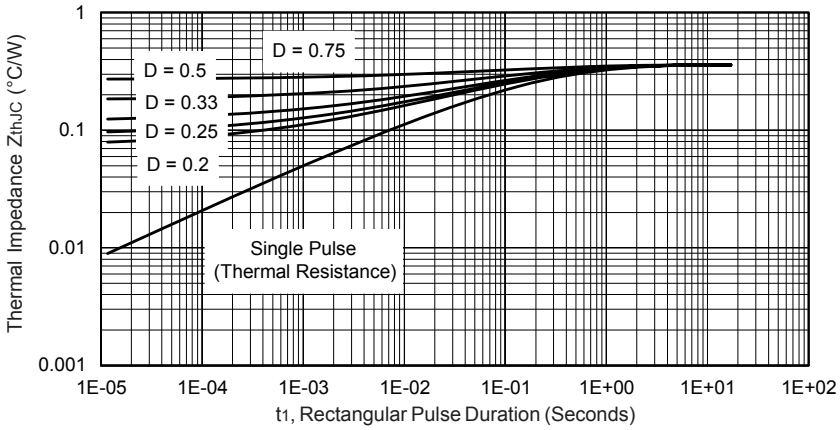


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

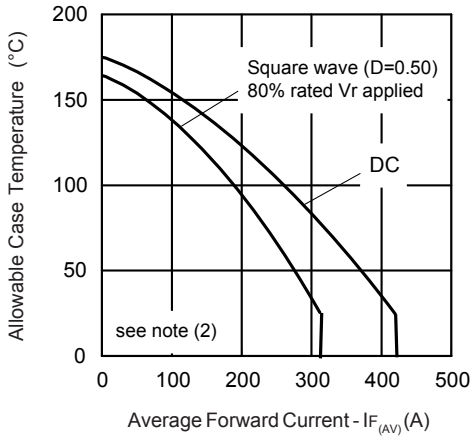


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

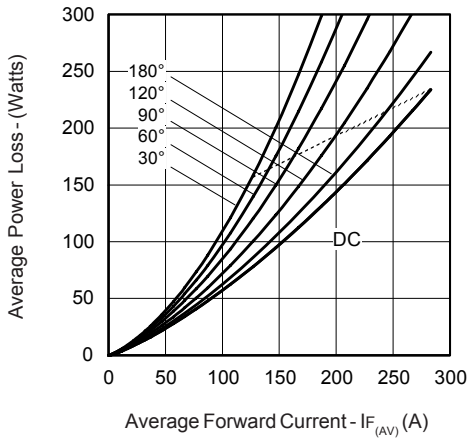


Fig. 6 - Forward Power Loss Characteristics

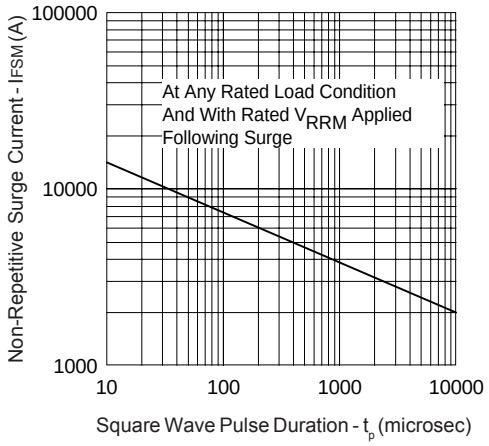


Fig. 7 - Max. Non-Repetitive Surge Current

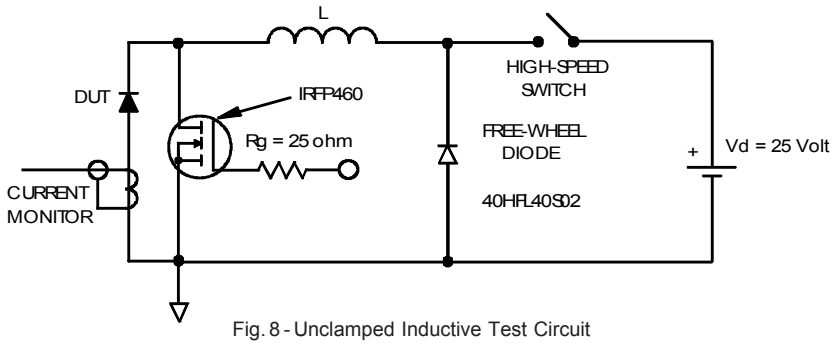
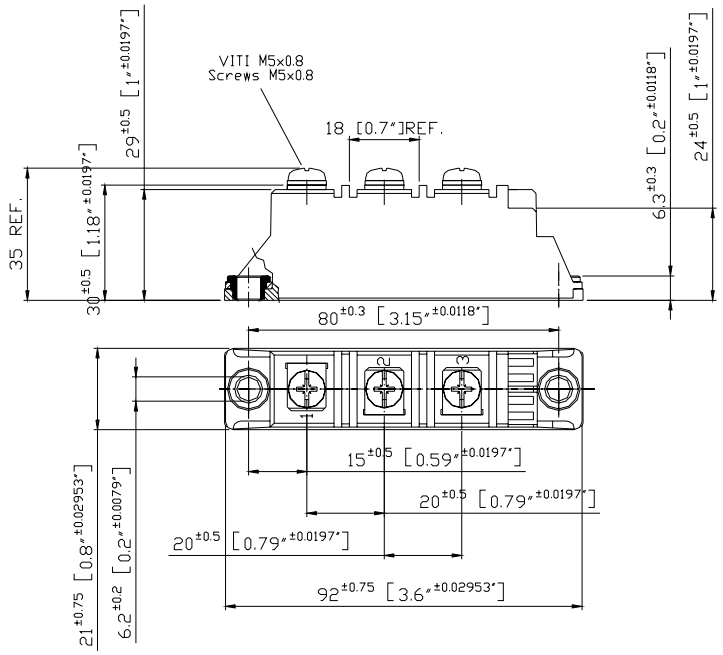


Fig. 8 - Unclamped Inductive Test Circuit

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

Outline Table



Dimensions are in millimeters and [inches]

Ordering Information Table

Device Code

IR	KC	S	40	9	/	150	P
1	2	3	4	5		6	7

- **1** - International Rectifier
- **2** - Circuit Configuration
  KD = Add-A-Pak - 2 diodes/common cathode
- **3** - S = Schottky Diode
- **4** - Average Rating (x10)
- **5** - Product Silicon Identification
- **6** - Voltage Rating (150 = 150V)
- **7** - Lead-Free

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.

International
IOR Rectifier

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