

International  
**IR** Rectifier

175BGQ045  
 175BGQ045J

SCHOTTKY RECTIFIER

175 Amp

#### Major Ratings and Characteristics

Characteristics	175BGQ045	Units
$I_{F(AV)}$ Rectangular waveform	175	A
@ $T_C$	107	°C
$I_{DC}$ Maximum	248	A
$V_{RRM}$	45	V
$I_{FSM}$ @ $t_p=5\mu s$ sine	8700	A
$V_F$ @175Apk typical	0.61	V
@ $T_J$	150	°C
$T_J$ range	-55 to 150	°C

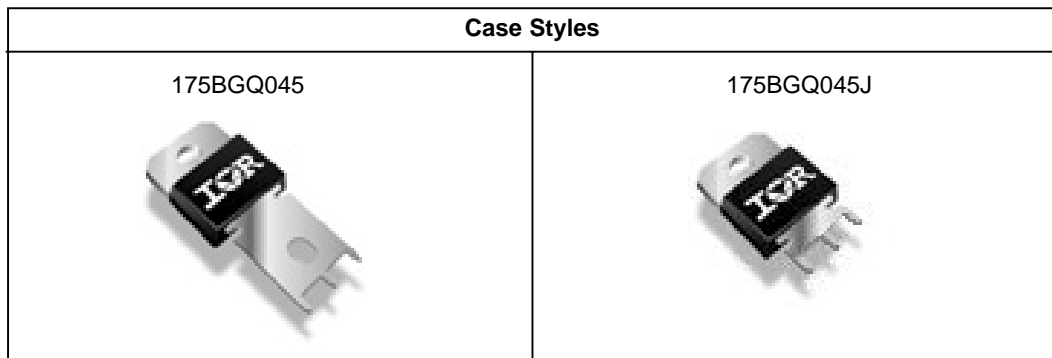
#### Description/ Features

The 175BGQ045 Schottky rectifier has been optimized for ultra low forward voltage drop specifically for low voltage output in high current AC/DC power supplies.

The proprietary barrier technology allows for reliable operation up to 150°C junction temperature. Typical applications are in switching power supplies, converters, reverse battery protection, and redundant power subsystems.

- 150°C  $T_J$  operation
- High Frequency Operation
- Ultra low forward voltage drop
- Continuous High Current operation
- Guard ring for enhanced ruggedness and long term reliability
- **PowIRtab™ package**

#### Case Styles



175BGQ045, 175BGQ045J

Bulletin PD-20710 rev. D 12/02

Voltage Ratings

Part number	175BGQ045
V <sub>R</sub> Max. DC Reverse Voltage (V)	45
V <sub>RWM</sub> Max. Working Peak Reverse Voltage (V)	

Absolute Maximum Ratings

Parameters	175BGQ	Units	Conditions
I <sub>F(AV)</sub> Max. Average Forward Current	175	A	50% duty cycle @ T <sub>C</sub> = 107°C, rectangular wave form
I <sub>F(RMS)</sub> RMS Forward Current	248	A	T <sub>C</sub> = 104°C
I <sub>FSM</sub> Max. Peak One Cycle Non-Repetitive Surge Current	8700	A	5µs Sine or 3µs Rect. pulse
	1550		10ms Sine or 6ms Rect. pulse
E <sub>AS</sub> Non-Repetitive Avalanche Energy	40	mJ	T <sub>J</sub> = 25°C, I <sub>AS</sub> = 6 Amps, L = 2.0 mH
I <sub>AR</sub> Repetitive Avalanche Current	6	A	Current decaying linearly to zero in 1µsec Frequency limited by T <sub>J</sub> max. V <sub>A</sub> = 1.5 x V <sub>R</sub> typical

Electrical Specifications

Parameters	175BGQ		Units	Conditions	
	Typ.	Max.			
V <sub>FM</sub> Forward Voltage Drop (1) (2)	0.53	0.56	V	@ 100A	T <sub>J</sub> = 25°C
	0.64	0.69	V	@ 175A	
	0.48	0.52	V	@ 100A	T <sub>J</sub> = 150°C
	0.61	0.64	V	@ 175A	
I <sub>RM</sub> Reverse Leakage Current (1)	0.6	2	mA	T <sub>J</sub> = 25°C	V <sub>R</sub> = rated V <sub>R</sub>
	360	640	mA	T <sub>J</sub> = 125°C	
	1200	2000	mA	T <sub>J</sub> = 150°C	V <sub>R</sub> = 45V
V <sub>F(TO)</sub> Threshold Voltage	0.352		V	T <sub>J</sub> = T <sub>J</sub> max.	
r <sub>t</sub> Forward Slope Resistance	1.5		mΩ		
C <sub>T</sub> Max. Junction Capacitance	5600		pF	V <sub>R</sub> = 5V <sub>DC</sub> , (test signal range 100Khz to 1Mhz) 25°C	
L <sub>S</sub> Typical Series Inductance	3.5		nH	Measured from tab to mounting plane	
dv/dt Max. Voltage Rate of Change (Rated V <sub>R</sub> )	10000		V/µs		

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

(2) V<sub>FM</sub> = V<sub>F(TO)</sub> + r<sub>t</sub> x I<sub>F</sub>

Thermal-Mechanical Specifications

Parameters	175BGQ	Units	Conditions
T <sub>J</sub> Max. Junction Temperature Range	-55 to 150	°C	
T <sub>stg</sub> Max. Storage Temperature Range	-55 to 150	°C	
R <sub>thJC</sub> Max. Thermal Resistance Junction to Case	0.25	°C/W	DC operation
R <sub>thCS</sub> Typical Thermal Resistance, Case to Heatsink	0.20	°C/W	Mounting surface, smooth and greased
wt Approximate Weight	5(0.18)	g(oz.)	
T Mounting Torque	Min.	1.2(10)	N*m (lbf-in)
	Max.	2.4(20)	
Case Style	PowIRtab™		

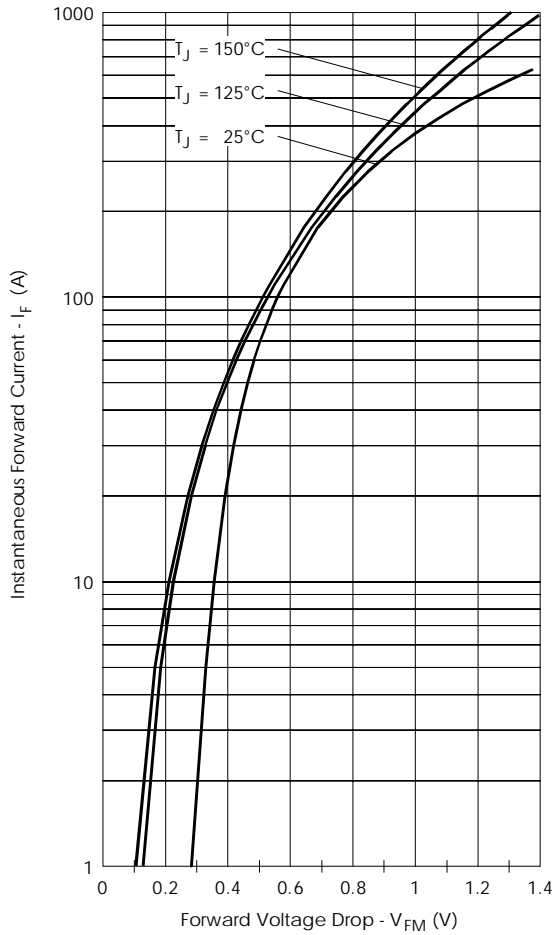


Fig. 1 - Maximum Forward Voltage Drop Characteristics

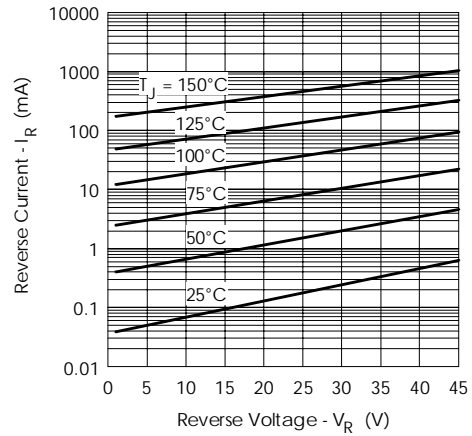


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

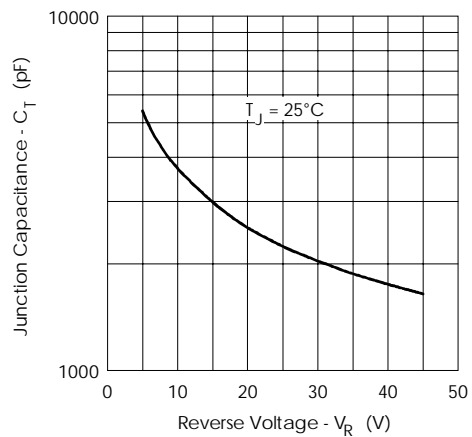


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

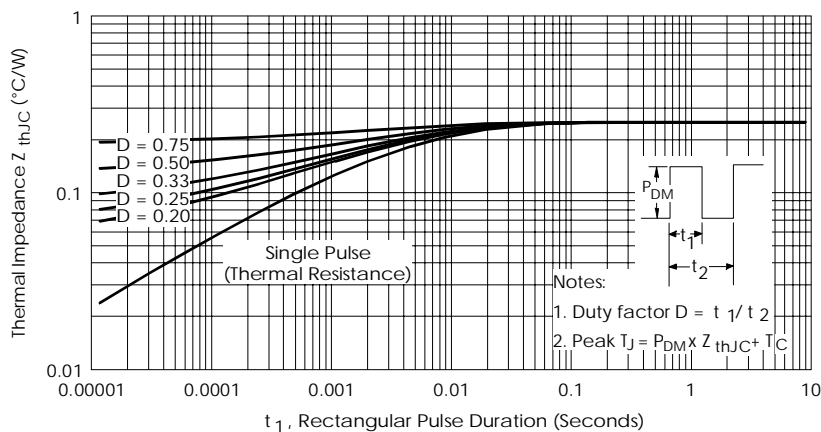


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

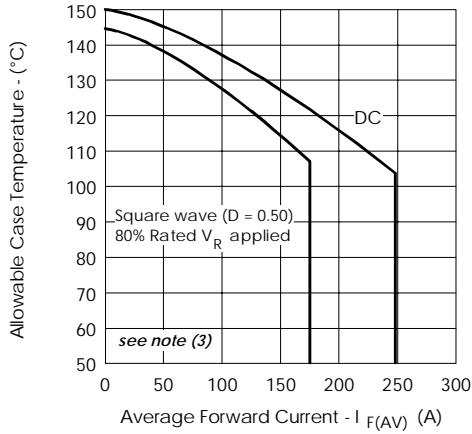


Fig.5- Maximum Allowable Case Temperature Vs. Average Forward Current

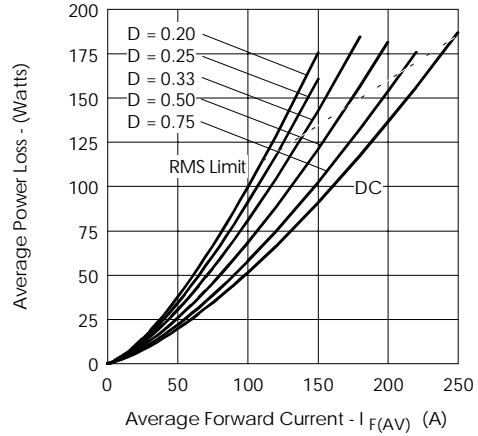


Fig.6- Forward Power Loss Characteristics

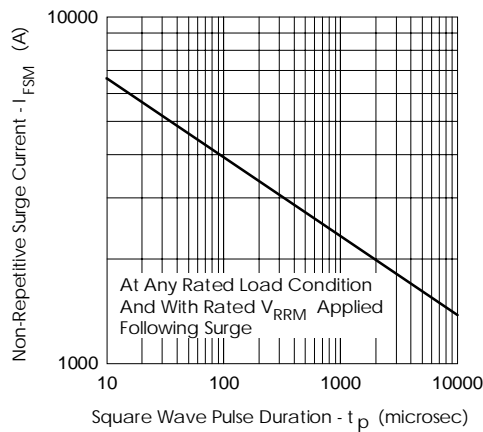


Fig.7- Maximum Non-Repetitive Surge Current

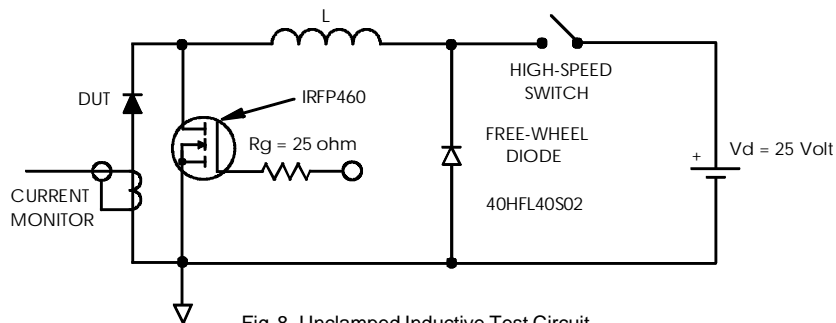


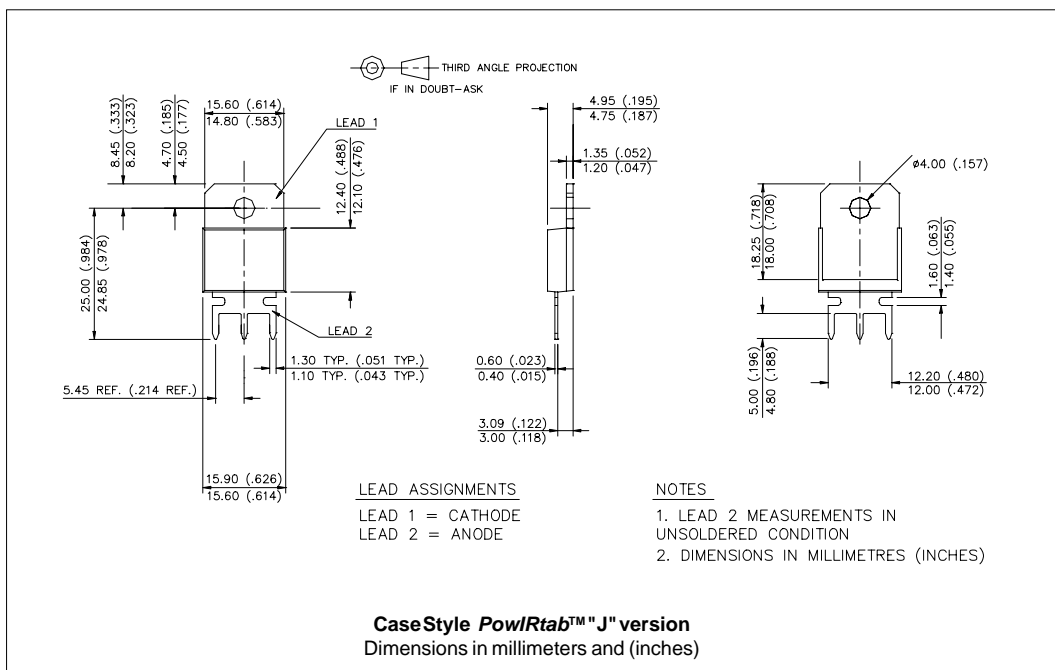
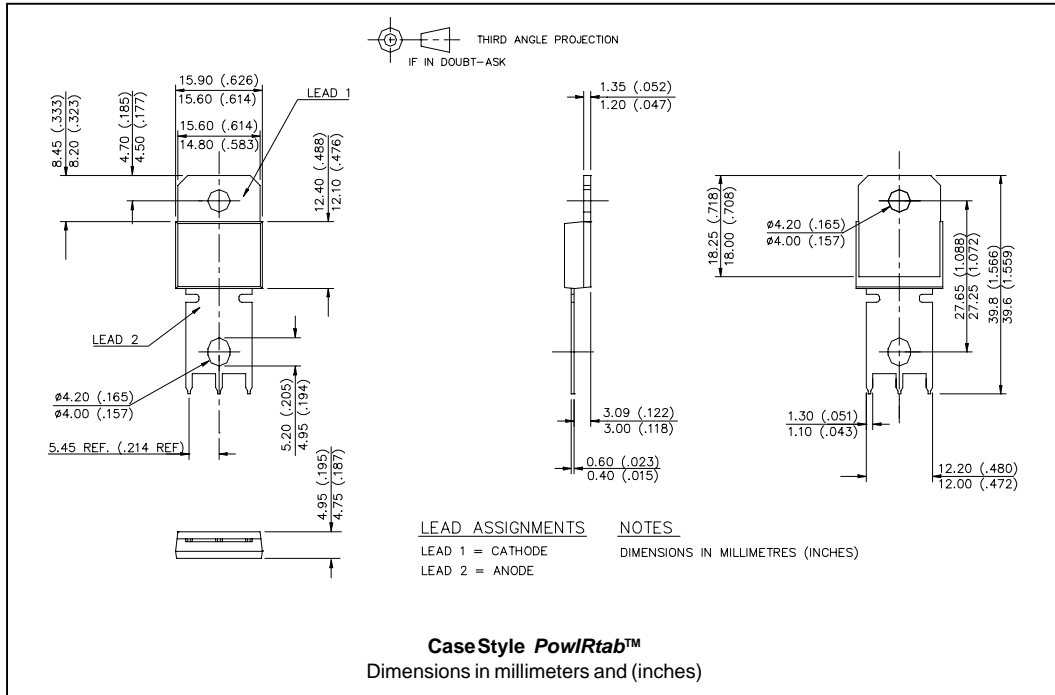
Fig.8- Unclamped Inductive Test Circuit

(3) Formula used:  $T_c = T_j - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;

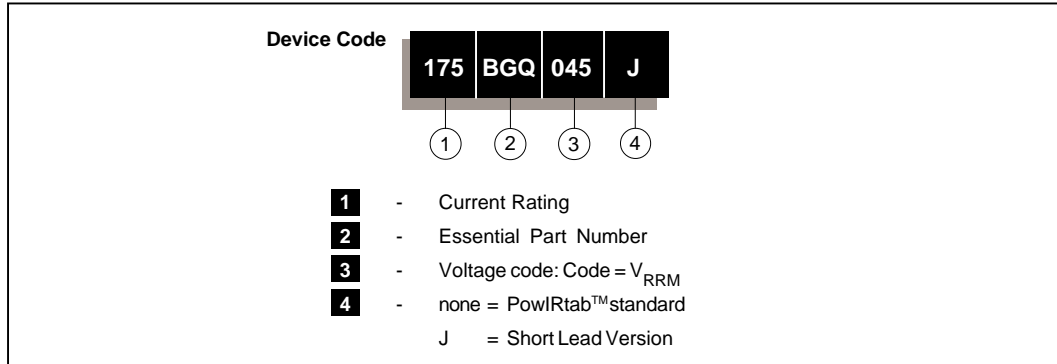
$P_d = \text{Forward Power Loss} = I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);

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

Outline Table



Ordering Information Table



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*****
This model has been developed by
Wizard SPICE MODEL GENERATOR (1999)
(International Rectifier Corporation)
contains Proprietary Information
*****

SPICE Model Diode is composed by a
simple diode plus paralld VCG2T
*****

.SUBCKT 175bgq45 ANOCAT
D1 ANO 1 DMOD (0.24359)
*Define diode model
.MODEL DMOD D (IS=1.83192228095708E-04A,N=1.05013272757567,BV=45V,
+IBV=0.318718355472911A,RS=0.0003020516,CJO=5.36650017916966E-08,
+VJ=0.773797902206145,XTI=2,EG=0.707245556720411)
*****
*Implementation of VCG2T
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL TRES RES (R=1,TC1=5.6216088199529)
GP1 ANO CAT VALUE=(-ABS (I(VX)))*(EXP(((((-2.339145E-03/
5.621609)*(V(2,CAT)*1E6)/(I(VX)+1E-6)-1))+1)*5.687601E-02*ABS(V(ANO,CAT)))-1))
*****
.ENDS175bgq45

Thermal Model Subcircuit
.SUBCKT 175bgq45T 5 1
CTHERM1 5 4 1.71E+3
CTHERM2 4 3 3.63E+2
CTHERM3 3 2 3.23E+4
CTHERM4 2 1 3.12E+5

RTHERM1 5 4 3.24E-2
RTHERM2 4 3 1.52E-1
RTHERM3 3 2 4.08E-2
RTHERM4 2 1 1.81E-4
.ENDS 175bgq45T
    
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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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