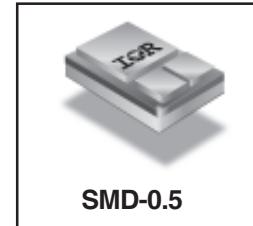


**LOGIC LEVEL
HEXFET® POWER MOSFET
SURFACE MOUNT (SMD-0.5)**

**IRL5NJ7404
20V, P-CHANNEL**

Product Summary

Part Number	BVDSS	Rds(on)	Id
IRL5NJ7404	-20V	0.04Ω	-11A



Fifth Generation HEXFET® power MOSFETs from International Rectifier utilize advanced processing techniques to achieve the lowest possible on-resistance per silicon unit area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET power MOSFETs are well known for, provides the designer with an extremely efficient device for use in a wide variety of applications.

These devices are well-suited for applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high-energy pulse circuits.

Features:

- Logic Level Gate Drive
- Low RDS(on)
- Avalanche Energy Ratings
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Ease of Paralleling
- Hermetically Sealed
- Surface Mount
- Light Weight

Absolute Maximum Ratings

	Parameter		Units
ID @ VGS = -10V, TC = 25°C	Continuous Drain Current	-11	A
ID @ VGS = -10V, TC = 100°C	Continuous Drain Current	-7.0	
IDM	Pulsed Drain Current ①	-44	W
	Max. Power Dissipation	50	
PD @ TC = 25°C	Linear Derating Factor	0.4	W/°C
	Gate-to-Source Voltage	±12	V
EAS	Single Pulse Avalanche Energy ②	157	mJ
IAR	Avalanche Current ①	-11	A
EAR	Repetitive Avalanche Energy ①	5.0	mJ
dv/dt	Peak Diode Recovery dv/dt ③	0.7	V/ns
TJ TSTG	Operating Junction Storage Temperature Range	-55 to 150	°C
	Package Mounting Surface Temperature	300 (for 5 s)	
	Weight	1.0 (Typical)	g

For footnotes refer to the last page

IRL5NJ7404

International
Rectifier

Electrical Characteristics @ $T_j = 25^\circ\text{C}$ (Unless Otherwise Specified)

	Parameter	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	-20	—	—	V	$\text{V}_{\text{GS}} = 0\text{V}, \text{I}_D = -250\mu\text{A}$
$\Delta \text{BV}_{\text{DSS}}/\Delta T_j$	Temperature Coefficient of Breakdown Voltage	—	0.14	—	V/ $^\circ\text{C}$	Reference to 25°C , $\text{I}_D = -1.0\text{mA}$
$\text{R}_{\text{DS(on)}}$	Static Drain-to-Source On-State Resistance	—	—	0.04	Ω	$\text{V}_{\text{GS}} = -4.5\text{V}, \text{I}_D = -11\text{A}$ ④
		—	—	0.07		$\text{V}_{\text{GS}} = -2.7\text{V}, \text{I}_D = -7.0\text{A}$
$\text{V}_{\text{GS(th)}}$	Gate Threshold Voltage	-0.7	—	—	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}, \text{I}_D = -250\mu\text{A}$
g_{fs}	Forward Transconductance	9.0	—	—	S	$\text{V}_{\text{DS}} = -15\text{V}, \text{I}_{\text{DS}} = -3.2\text{A}$ ④
I_{DSS}	Zero Gate Voltage Drain Current	—	—	-1.0	μA	$\text{V}_{\text{DS}} = -16\text{V}, \text{V}_{\text{GS}} = 0\text{V}$
		—	—	-25		$\text{V}_{\text{DS}} = -16\text{V}, \text{V}_{\text{GS}} = 0\text{V}, \text{T}_j = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Leakage Forward	—	—	-100	nA	$\text{V}_{\text{GS}} = -12\text{V}$
I_{GSS}	Gate-to-Source Leakage Reverse	—	—	100		$\text{V}_{\text{GS}} = 12\text{V}$
Q_g	Total Gate Charge	—	—	50	nC	$\text{V}_{\text{GS}} = -4.5\text{V}, \text{I}_D = -3.2\text{A}$
Q_{gs}	Gate-to-Source Charge	—	—	5.5		$\text{V}_{\text{DS}} = -16\text{V}$
Q_{gd}	Gate-to-Drain ('Miller') Charge	—	—	21		
$t_{\text{d(on)}}$	Turn-On Delay Time	—	—	25	ns	$\text{V}_{\text{DD}} = -10\text{V}, \text{I}_D = -3.2\text{A}, \text{V}_{\text{GS}} = -4.5\text{V}, \text{R}_G = 6.0\Omega$
t_r	Rise Time	—	—	150		
$t_{\text{d(off)}}$	Turn-Off Delay Time	—	—	72		
t_f	Fall Time	—	—	90		
$L_S + L_D$	Total Inductance	—	4.0	—	nH	Measured from the center of drain pad to center of source pad
C_{iss}	Input Capacitance	—	1450	—	pF	$\text{V}_{\text{GS}} = 0\text{V}, \text{V}_{\text{DS}} = -15\text{V}$ $f = 1.0\text{MHz}$
C_{oss}	Output Capacitance	—	830	—		
C_{rss}	Reverse Transfer Capacitance	—	430	—		

Source-Drain Diode Ratings and Characteristics

	Parameter	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	.11	A	
I_{SM}	Pulse Source Current (Body Diode) ①	—	—	-44		
V_{SD}	Diode Forward Voltage	—	—	-1.0	V	$T_j = 25^\circ\text{C}, I_S = -3.2\text{A}, \text{V}_{\text{GS}} = 0\text{V}$ ④
t_{rr}	Reverse Recovery Time	—	—	80	ns	$T_j = 25^\circ\text{C}, I_F = -3.2\text{A}, dI/dt \leq 100\text{A}/\mu\text{s}$
Q_{RR}	Reverse Recovery Charge	—	—	100	nC	$\text{V}_{\text{DD}} \leq -20\text{V}$ ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by $L_S + L_D$.				

Thermal Resistance

	Parameter	Min	Typ	Max	Units	Test Conditions
R_{thJC}	Junction-to-Case	—	—	2.5	$^\circ\text{C/W}$	

Note: Corresponding Spice and Saber models are available on International Rectifier Website.

For footnotes refer to the last page

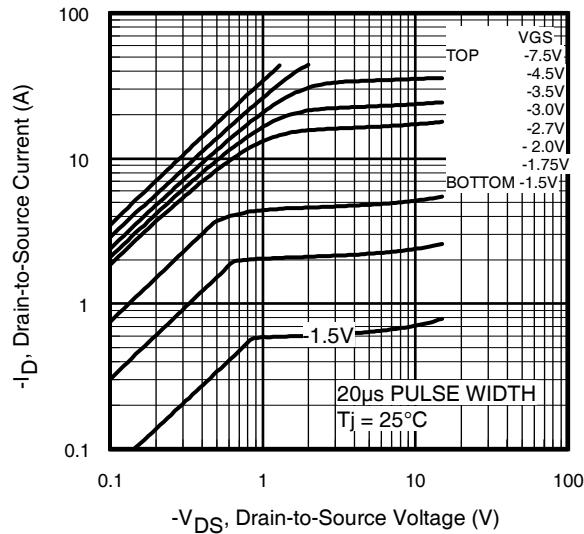


Fig 1. Typical Output Characteristics

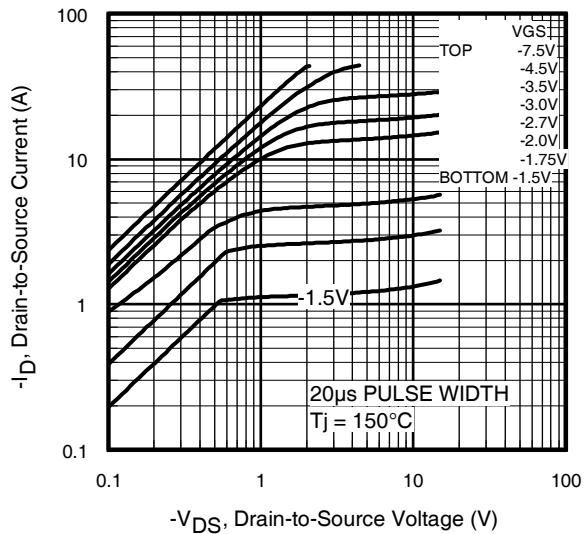


Fig 2. Typical Output Characteristics

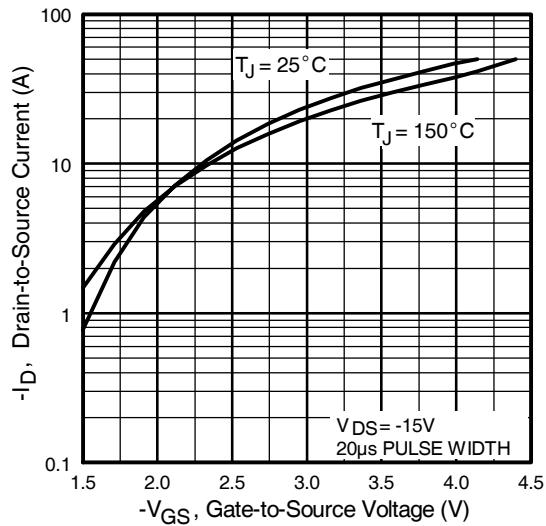


Fig 3. Typical Transfer Characteristics

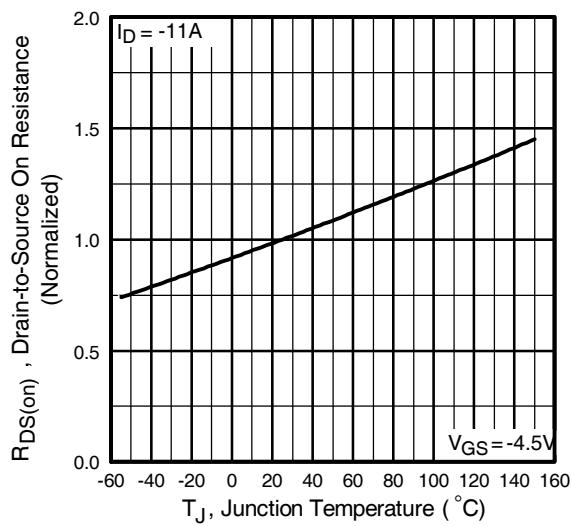


Fig 4. Normalized On-Resistance
Vs. Temperature

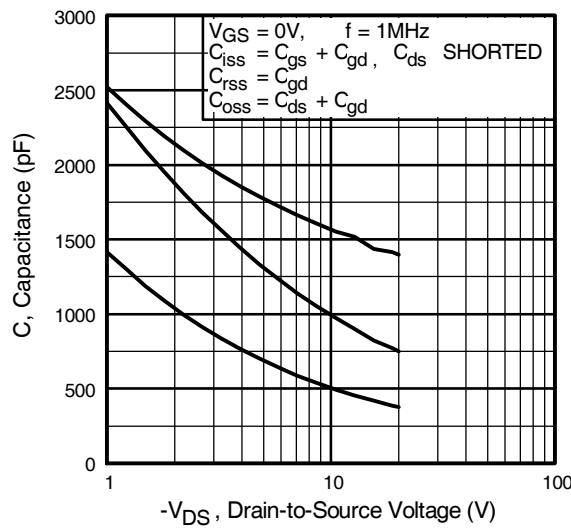


Fig 5. Typical Capacitance Vs.
Drain-to-Source Voltage

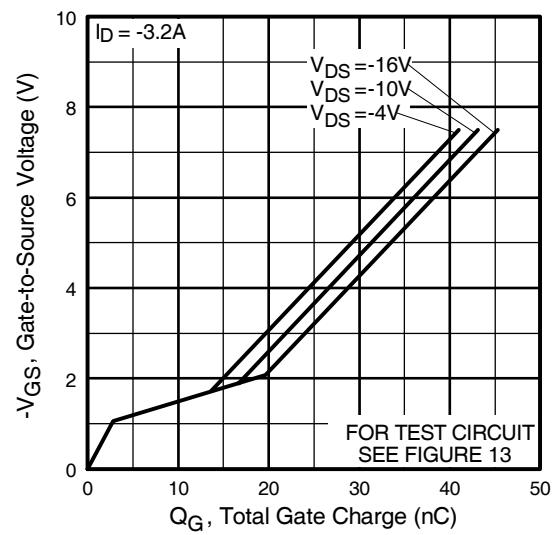


Fig 6. Typical Gate Charge Vs.
Gate-to-Source Voltage

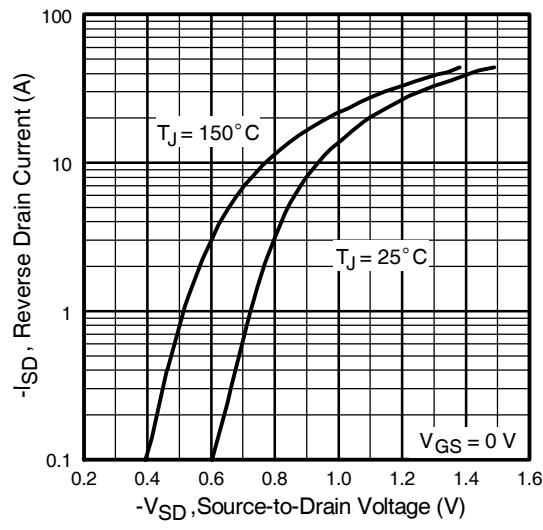


Fig 7. Typical Source-Drain Diode
Forward Voltage

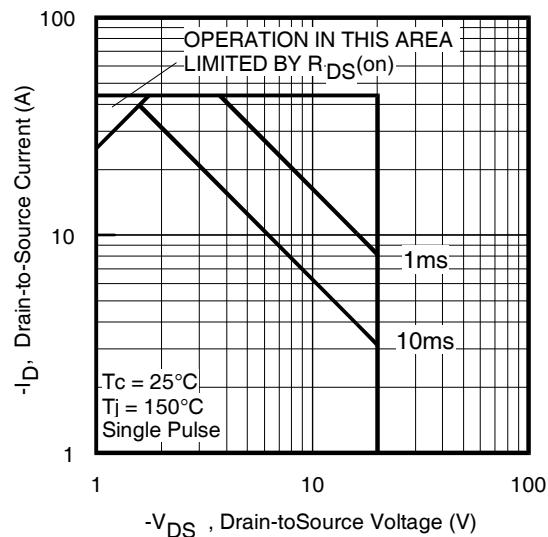


Fig 8. Maximum Safe Operating Area

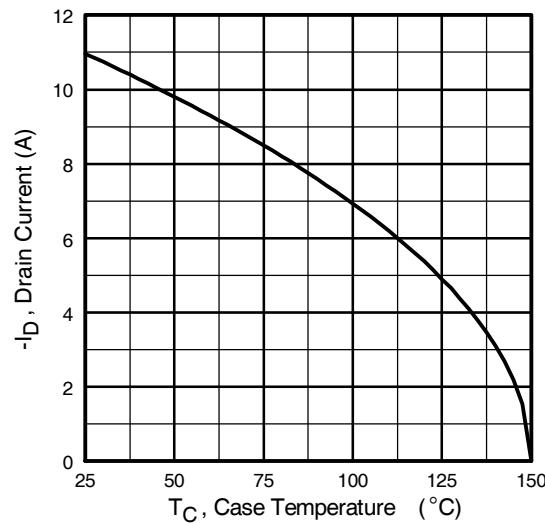


Fig 9. Maximum Drain Current Vs.
Case Temperature

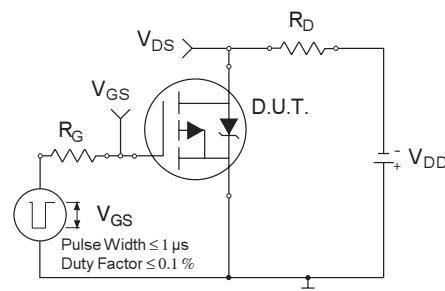


Fig 10a. Switching Time Test Circuit

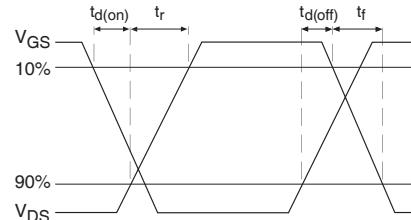


Fig 10b. Switching Time Waveforms

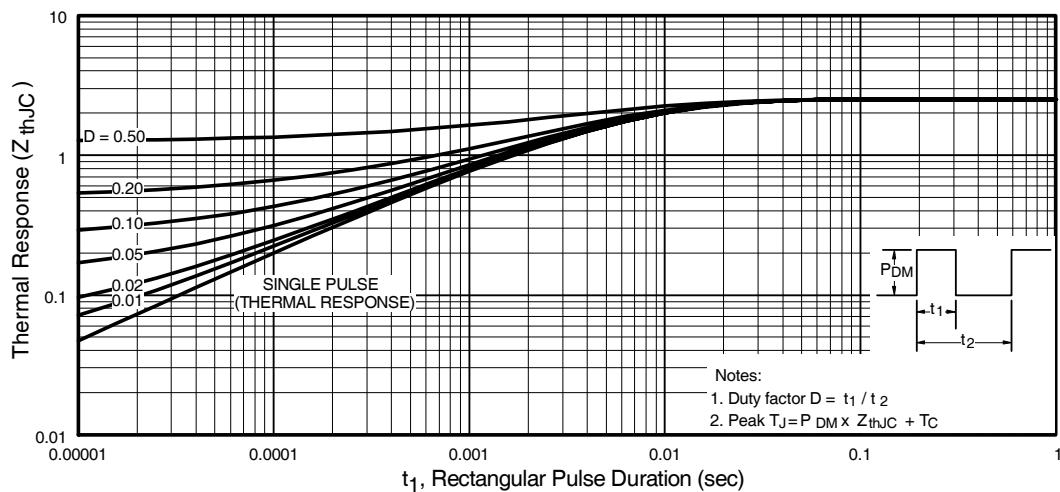
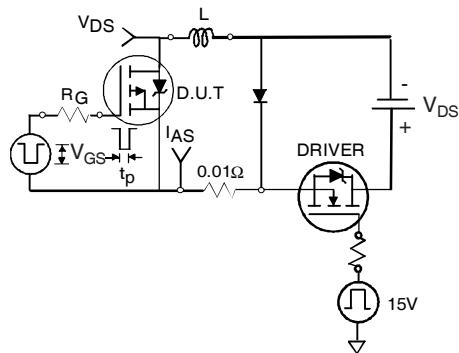
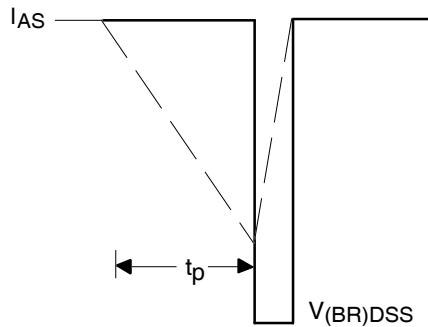
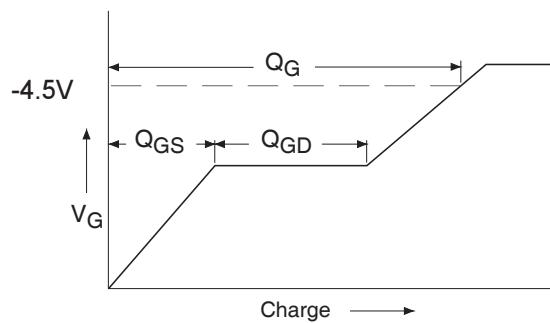
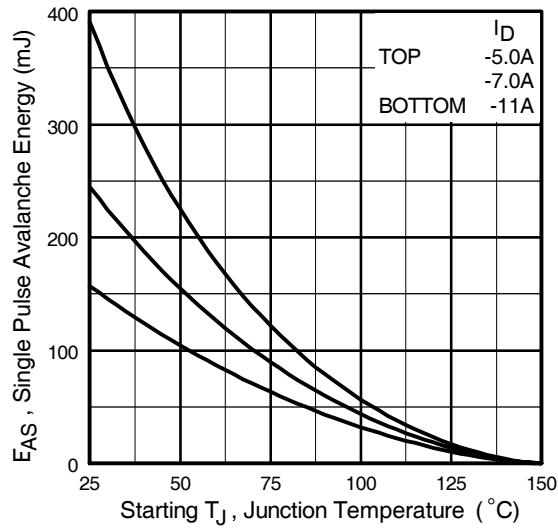
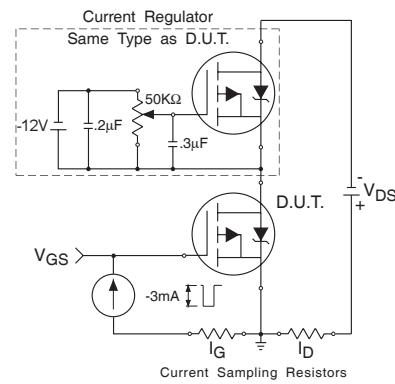


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

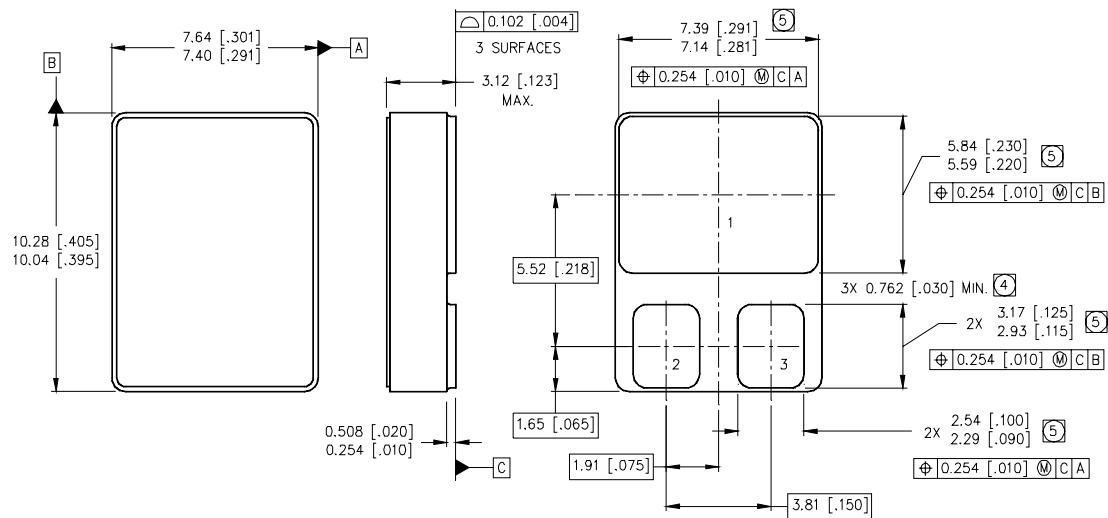
**Fig 12a.** Unclamped Inductive Test Circuit**Fig 12b.** Unclamped Inductive Waveforms**Fig 13a.** Basic Gate Charge Waveform**Fig 12c.** Maximum Avalanche Energy Vs. Drain Current**Fig 13b.** Gate Charge Test Circuit

Footnotes:

- ① Repetitive Rating; Pulse width limited by maximum junction temperature.
- ② V_{DD} = -15 V, Starting T_J = 25°C, L = 2.6mH Peak I_{AS} = -11A, V_{GS} = -10V, R_G = 25Ω

- ③ I_{SD} ≤ -11A, di/dt ≤ -84 A/μs, V_{DD} ≤ -20V, T_J ≤ 150°C
- ④ Pulse width ≤ 300 μs; Duty Cycle ≤ 2%

Case Outline and Dimensions — SMD-0.5



NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
- (4) DIMENSION INCLUDES METALLIZATION FLASH.
 (5) DIMENSION DOES NOT INCLUDE METALLIZATION FLASH.

PAD ASSIGNMENTS

- 1 = DRAIN
- 2 = GATE
- 3 = SOURCE

International
IR Rectifier

IRWORLD HEADQUARTERS: 101 N. Sepulveda Blvd., El Segundo, California 90245, USA Tel: (310) 252-7105
IRLEOMINSTER: 205 Crawford St., Leominster, Massachusetts 01453, USA Tel: (978) 534-5776
 TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information.
Data and specifications subject to change without notice. 03/2013