

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

**IRL5NJ7413  
 30V, N-CHANNEL**

**Product Summary**

Part Number	BV <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
IRL5NJ7413	30V	0.014Ω	22A*



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:**

- Low R<sub>DS(on)</sub>
- Avalanche Energy Ratings
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Ease of Paralleling
- Hermetically Sealed
- Surface Mount
- Light Weight

**Absolute Maximum Ratings**

	Parameter		Units
I <sub>D</sub> @ V <sub>GS</sub> = 10V, T <sub>C</sub> = 25°C	Continuous Drain Current	22*	A
I <sub>D</sub> @ V <sub>GS</sub> = 10V, T <sub>C</sub> = 100°C	Continuous Drain Current	22*	
I <sub>DM</sub>	Pulsed Drain Current ①	88	
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Max. Power Dissipation	75	W
	Linear Derating Factor	0.60	W/°C
V <sub>GS</sub>	Gate-to-Source Voltage	±16	V
EAS	Single Pulse Avalanche Energy ②	190	mJ
I <sub>AR</sub>	Avalanche Current ①	22	A
EAR	Repetitive Avalanche Energy ①	7.5	mJ
dv/dt	Peak Diode Recovery dv/dt ③	1.0	V/ns
T <sub>J</sub>	Operating Junction	-55 to 150	°C
T <sub>STG</sub>	Storage Temperature Range		
	Package Mounting Surface Temperature	300 (for 5 s)	
	Weight	1.0	g

\* Current is limited by package  
 For footnotes refer to the last page

**Electrical Characteristics @ T<sub>j</sub> = 25°C (Unless Otherwise Specified)**

	Parameter	Min	Typ	Max	Units	Test Conditions
BVDSS	Drain-to-Source Breakdown Voltage	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔBVDSS/ΔT <sub>J</sub>	Temperature Coefficient of Breakdown Voltage	—	0.027	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1.0mA
RDS(on)	Static Drain-to-Source On-State Resistance	—	—	0.014	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 22A ④
		—	—	0.020		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 22A
VGS(th)	Gate Threshold Voltage	1.0	—	3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
gfs	Forward Transconductance	30	—	—	S (r)	V <sub>DS</sub> = 10V, I <sub>DS</sub> = 22A ④
IDSS	Zero Gate Voltage Drain Current	—	—	25	μA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V
		—	—	250		V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
IGSS	Gate-to-Source Leakage Forward	—	—	100	nA	V <sub>GS</sub> = 16V
IGSS	Gate-to-Source Leakage Reverse	—	—	-100		V <sub>GS</sub> = -16V
Qg	Total Gate Charge	—	—	70	nC	V <sub>GS</sub> = 10V, I <sub>D</sub> = 22A
Qgs	Gate-to-Source Charge	—	—	20		V <sub>DS</sub> = 24V
Qgd	Gate-to-Drain ('Miller') Charge	—	—	23		
td(on)	Turn-On Delay Time	—	—	20	ns	V <sub>DD</sub> = 15V, I <sub>D</sub> = 22A, V <sub>GS</sub> = 10V, R <sub>G</sub> = 6.2Ω
tr	Rise Time	—	—	80		
td(off)	Turn-Off Delay Time	—	—	80		
tf	Fall Time	—	—	80		
LS + LD	Total Inductance	—	4.0	—	nH	Measured from the center of drain pad to center of source pad
Ciss	Input Capacitance	—	1640	—	pF	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 25V f = 1.0MHz
Coss	Output Capacitance	—	660	—		
Crss	Reverse Transfer Capacitance	—	80	—		

**Source-Drain Diode Ratings and Characteristics**

	Parameter	Min	Typ	Max	Units	Test Conditions
IS	Continuous Source Current (Body Diode)	—	—	22*	A	
ISM	Pulse Source Current (Body Diode) ①	—	—	88		
VSD	Diode Forward Voltage	—	—	1.0	V	T <sub>j</sub> = 25°C, I <sub>S</sub> = 22A, V <sub>GS</sub> = 0V ④
trr	Reverse Recovery Time	—	—	120	nS	T <sub>j</sub> = 25°C, I <sub>F</sub> = 22A, di/dt ≤ 100A/μs
QRR	Reverse Recovery Charge	—	—	300	nC	V <sub>DD</sub> ≤ 25V ④
ton	Forward Turn-On Time	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by LS + LD.				

\* Current is limited by package

**Thermal Resistance**

	Parameter	Min	Typ	Max	Units	Test Conditions
RthJC	Junction-to-Case	—	—	1.67	°C/W	

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

For footnotes refer to the last page

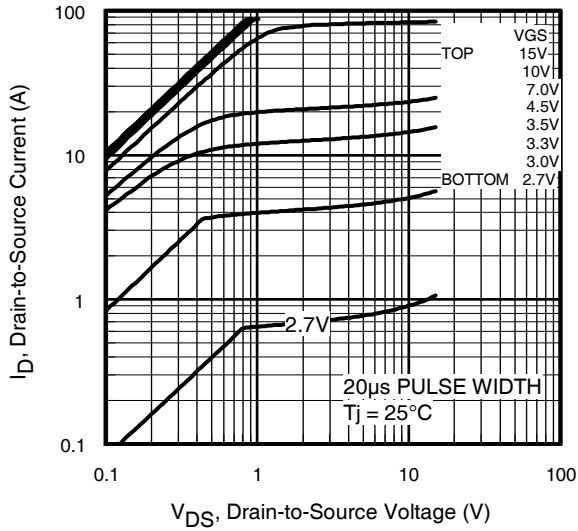


Fig 1. Typical Output Characteristics

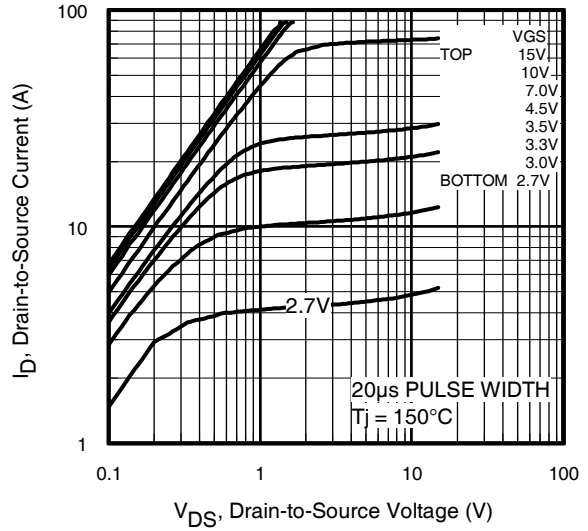


Fig 2. Typical Output Characteristics

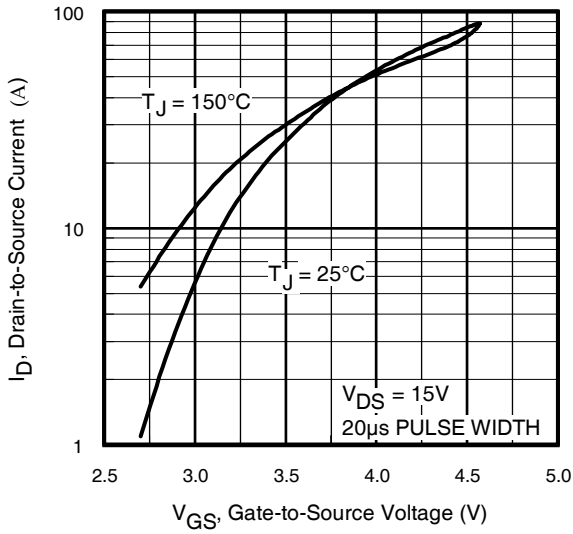


Fig 3. Typical Transfer Characteristics

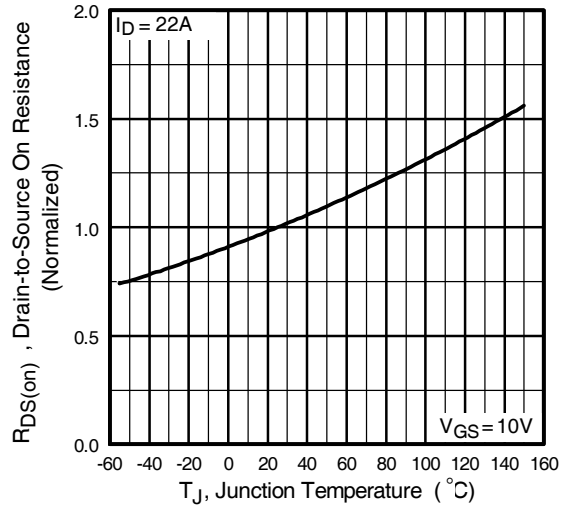
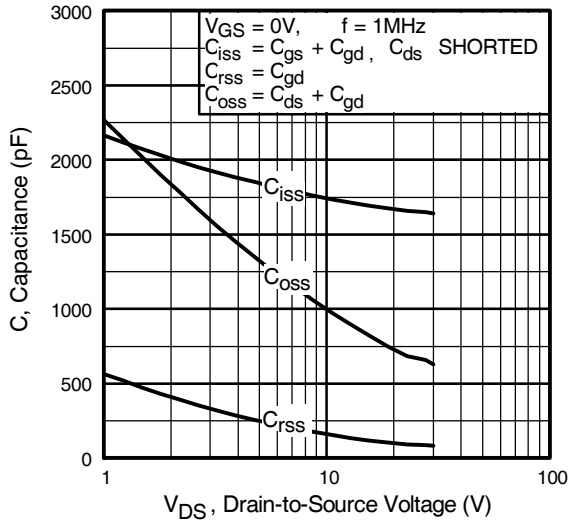
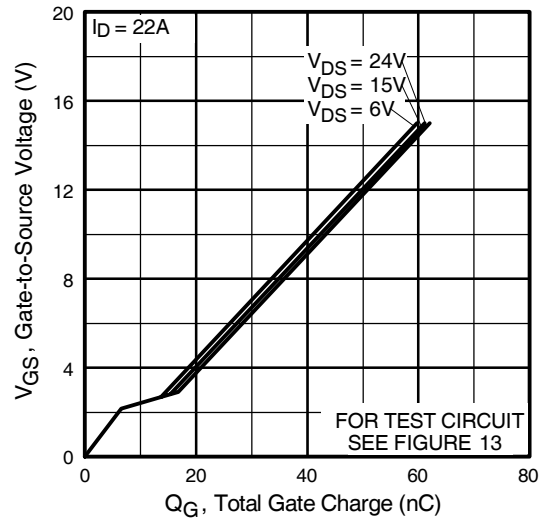


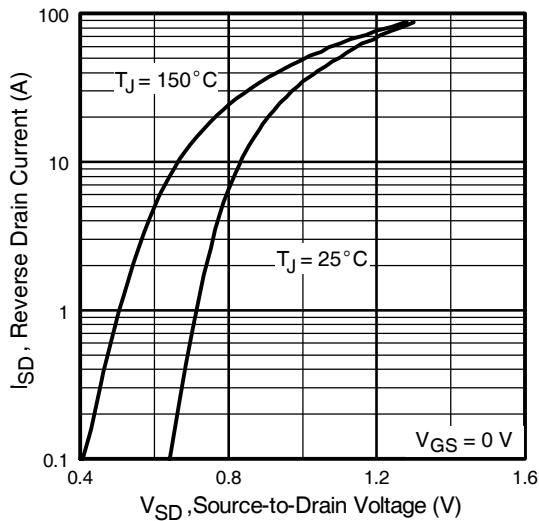
Fig 4. Normalized On-Resistance Vs. Temperature



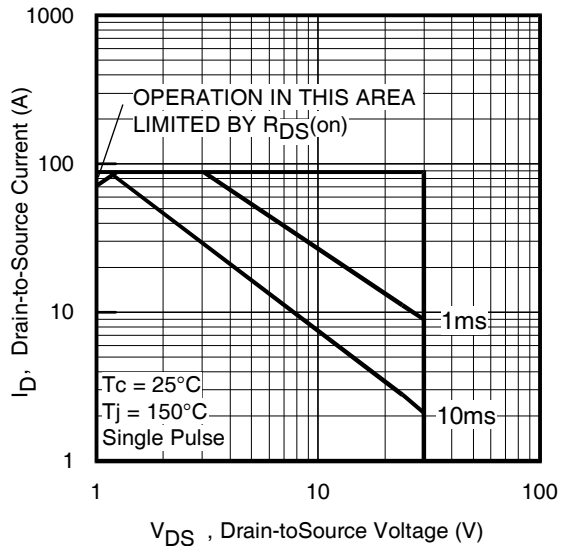
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



**Fig 7.** Typical Source-Drain Diode Forward Voltage



**Fig 8.** Maximum Safe Operating Area

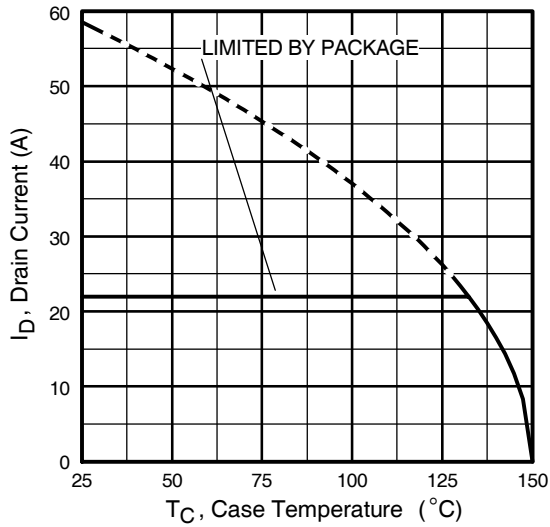


Fig 9. Maximum Drain Current Vs. Case Temperature

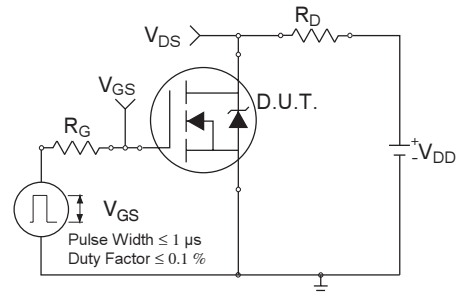


Fig 10a. Switching Time Test Circuit

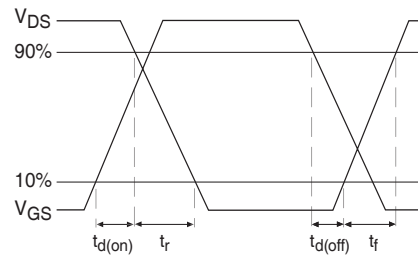


Fig 10b. Switching Time Waveforms

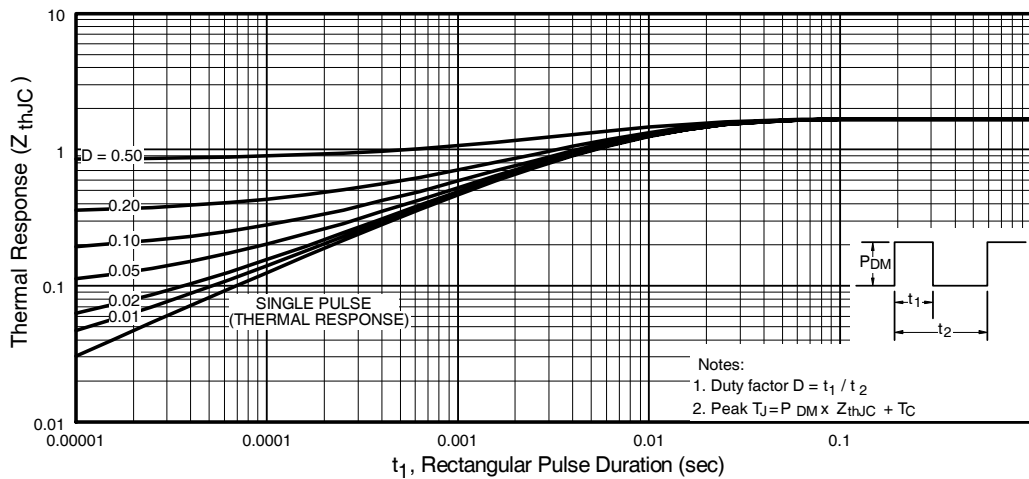
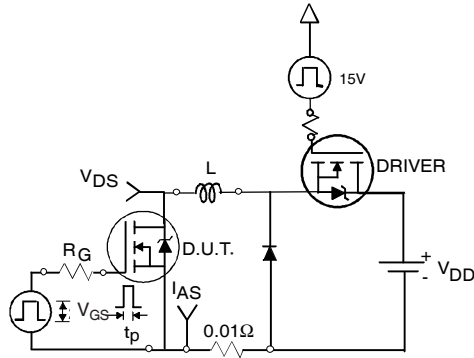
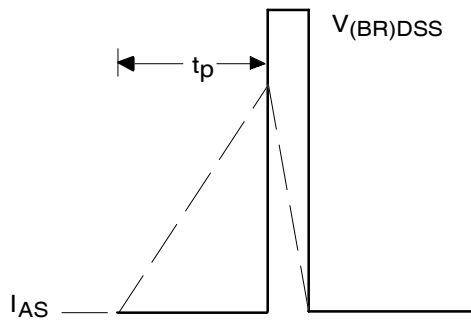


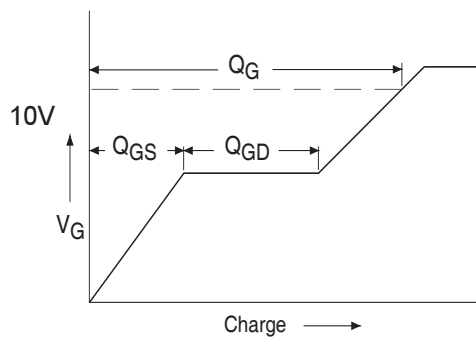
Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case



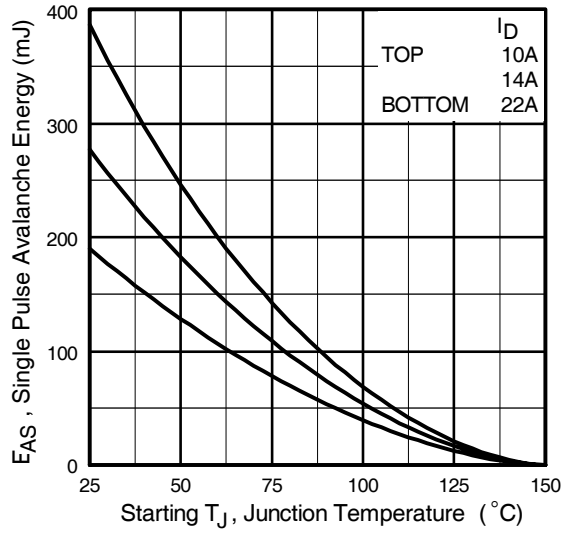
**Fig 12a.** Unclamped Inductive Test Circuit



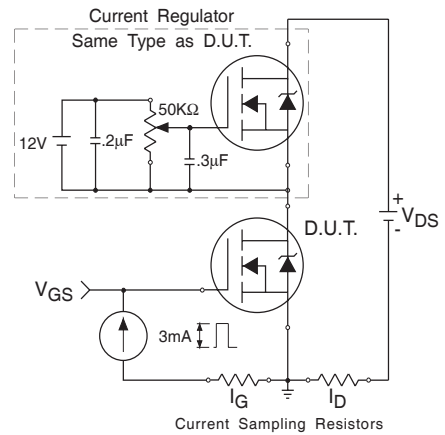
**Fig 12b.** Unclamped Inductive Waveforms



**Fig 13a.** Basic Gate Charge Waveform



**Fig 12c.** Maximum Avalanche Energy Vs. Drain Current

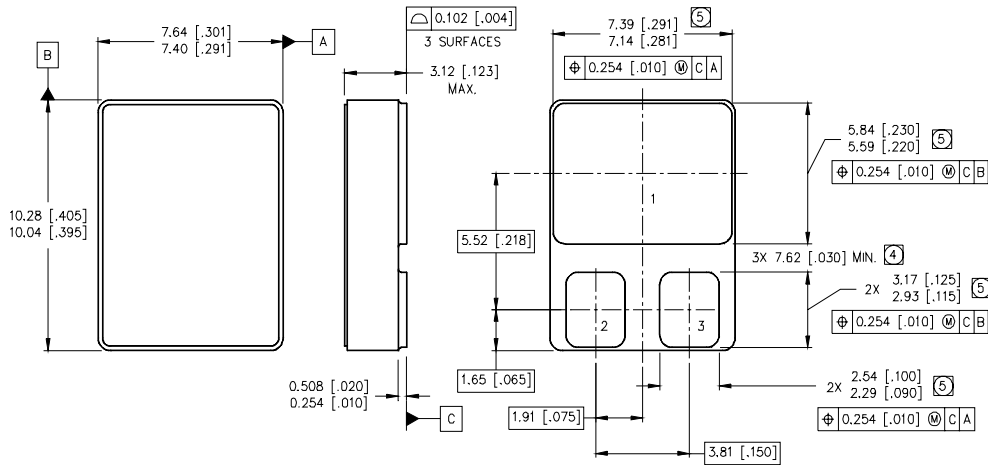


**Fig 13b.** Gate Charge Test Circuit

**Footnotes:**

- ① Repetitive Rating; Pulse width limited by maximum junction temperature.
- ②  $V_{DD} = 25\text{ V}$ , Starting  $T_J = 25^\circ\text{C}$ ,  $L=0.8\text{mH}$   
 Peak  $I_{AS} = 22\text{A}$ ,  $V_{GS} = 10\text{ V}$ ,  $R_G = 25\Omega$
- ③  $I_{SD} \leq 22\text{A}$ ,  $di/dt \leq 140\text{ A}/\mu\text{s}$ ,  
 $V_{DD} \leq 30\text{V}$ ,  $T_J \leq 150^\circ\text{C}$
- ④ Pulse width  $\leq 300\ \mu\text{s}$ ; Duty Cycle  $\leq 2\%$

**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