International
IOR Rectifier

IRFN250
JANTX2N7225U
HEXFET® POWER MOSFET JANTXV2N7225U
[REF:MIL-PRF-19500/592]

N - CHANNEL

200 Volt, 0.100Ω MOSFET

HEXFET® power MOSFET technology is the key to InternationalRectifier's advanced line of power MOSFET transistors. The efficient geometry achieves very low on-state resistance combined with high transconductance.

HEXFET® power MOSFET transistors also feature all of the well-established advantages of MOSFETs, such as voltage control, very fast switching, ease of paralleling and electrical parameter temperature stability. They are well-suited for applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high-energy pulse circuits.

The Surface Mount Device (SMD-1) package represents another step in the continual evolution of surface mount technology. The SMD-1 will give designers the extra flexibility they need to increase circuit board density. International Rectifier has engineered the SMD-1package to meet the specific needs of the power market by increasing the size of the bottom source pads, thereby enhancing the thermal and electrical performance.

Product Summary

Part Number	BV_{DSS}	$R_{DS(on)}$	I_D
IRFN250	200V	0.100Ω	27.4A

Features:

- 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_D @ V_{GS} = 10V, T_C = 25°C	Continuous Drain Current	27.4	A
I_D @ V_{GS} = 10V, T_C = 100°C	Continuous Drain Current	17	
I_{DM}	Pulsed Drain Current ①	110	
P_D @ T_C = 25°C	Max. Power Dissipation	150	W
	Linear Derating Factor	1.2	W/°C
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy ②	500	mJ
I_{AR}	Avalanche Current ①	27.4	A
E_{AR}	Repetitive Avalanche Energy ①	15.0	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J T_{STG}	Operating Junction Storage Temperature Range	-55 to 150	°C
	Package Mounting Surface Temperature	300 (for 5 seconds)	
	Weight	2.6 (typical)	g

Electrical Characteristics @ Tj = 25°C (Unless Otherwise Specified)

	Parameter	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	200	—	—	V	V_{GS} = 0V, I_D = 1.0mA
$\Delta BV_{DSS}/\Delta T_J$	Temperature Coefficient of Breakdown Voltage	—	0.29	—	V/°C	Reference to 25°C, I_D = 1.0mA
$R_{DS(on)}$	Static Drain-to-Source On-State Resistance	—	—	0.100	Ω	V_{GS} = 10V, I_D = 17A ④
		—	—	0.105		V_{GS} = 10V, I_D = 27.4A
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}$, I_D = 250µA
g_{fs}	Forward Transconductance	9.0	—	—	S (℧)	V_{DS} > 15V, I_{DS} = 17A ④
I_{DSS}	Zero Gate Voltage Drain Current	—	—	25	µA	V_{DS}= 0.8 x Max Rating, V_{GS}=0V
		—	—	250		V_{DS} = 0.8 x Max Rating V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Leakage Forward	—	—	100	nA	V_{GS} = 20V
I_{GSS}	Gate-to-Source Leakage Reverse	—	—	-100		V_{GS} = -20V
Q_g	Total Gate Charge	—	—	115	nC	V_{GS} =10V, I_D = 27.4A V_{DS} = Max Rating x 0.5
Q_{gs}	Gate-to-Source Charge	—	—	22		
Q_{gd}	Gate-to-Drain ('Miller') Charge	—	—	60		
$t_{d(on)}$	Turn-On Delay Time	—	—	35	ns	V_{DD} = 50V, I_D = 27.4A, R_G = 2.35Ω, V_{GS} =10V
t_r	Rise Time	—	—	190		
$t_{d(off)}$	Turn-Off Delay Time	—	—	170		
t_f	Fall Time	—	—	130		
$L_S + L_D$	Total Inductance	—	4.0	—	nH	Measured from the center of drain pad to center of source pad
C_{iss}	Input Capacitance	—	3500	—	pF	V_{GS} = 0V, V_{DS} = 25V f = 1.0MHz
C_{oss}	Output Capacitance	—	700	—		
C_{rss}	Reverse Transfer Capacitance	—	110	—		

Source-Drain Diode Ratings and Characteristics

	Parameter	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	27.4	A	
I_{SM}	Pulse Source Current (Body Diode) ①	—	—	110		
V_{SD}	Diode Forward Voltage	—	—	1.9	V	T_j = 25°C, I_S = 27.4A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	—	950	ns	T_j = 25°C, I_F = 27.4A, di/dt ≥ 100A/µs
Q_{RR}	Reverse Recovery Charge	—	—	9.0	µC	V_{DD} ≤ 30V 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	—	—	0.83	°C/W	
$R_{thJ-PCB}$	Junction-to-PC board	—	3.0	—		Soldered to a copper-clad PC board

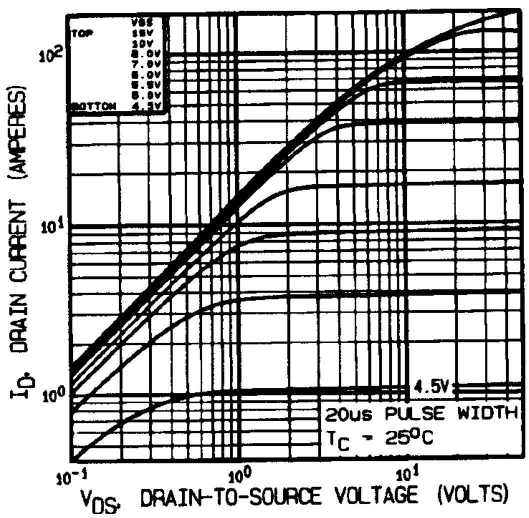


Fig 1. Typical Output Characteristics

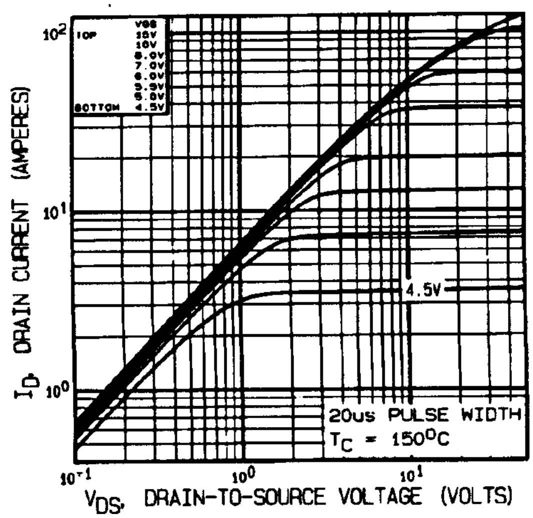


Fig 2. Typical Output Characteristics

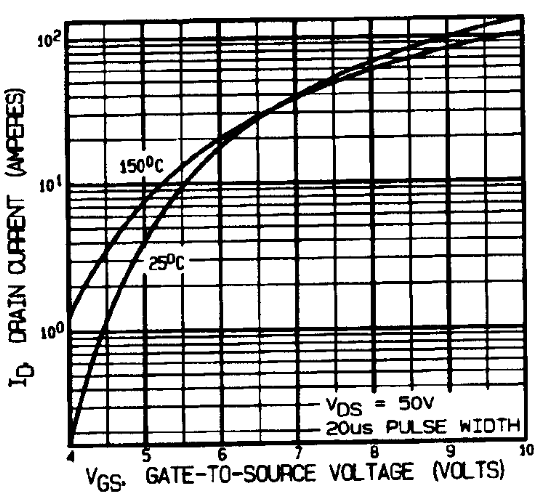


Fig 3. Typical Transfer Characteristics

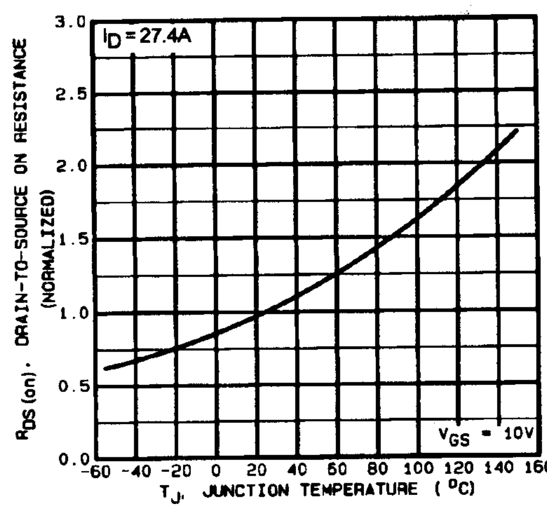


Fig 4. Normalized On-Resistance Vs. Temperature

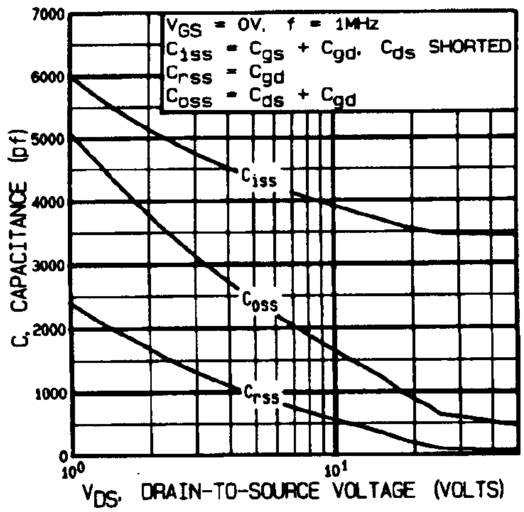


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

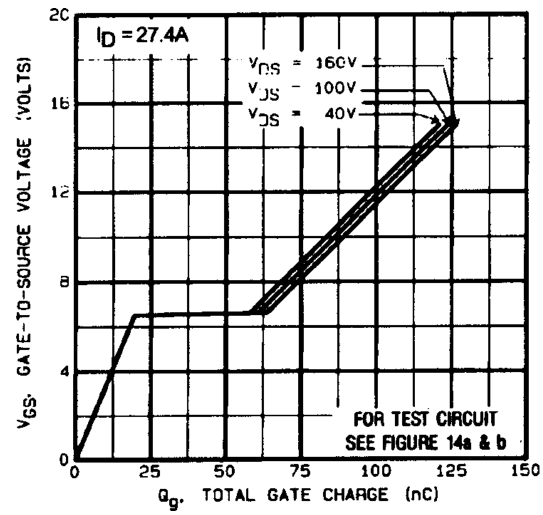


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

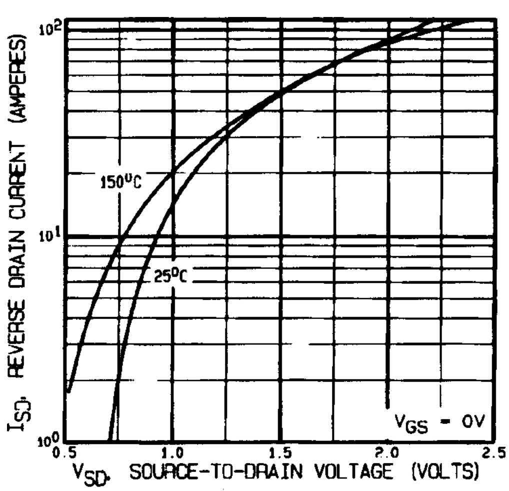


Fig 7. Typical Source-Drain Diode Forward Voltage

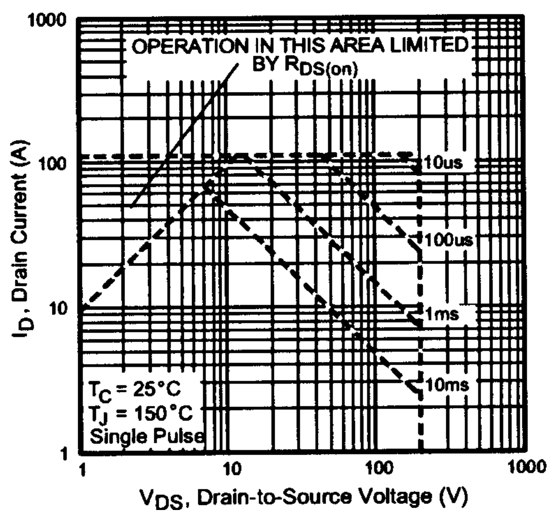


Fig 8. Maximum Safe Operating Area

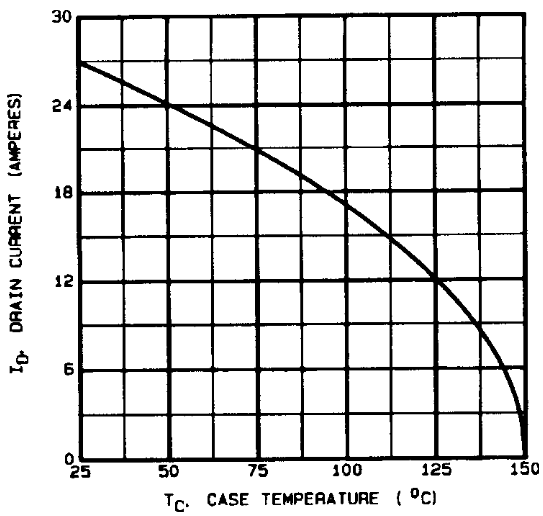


Fig 9. Maximum Drain Current Vs. Case Temperature

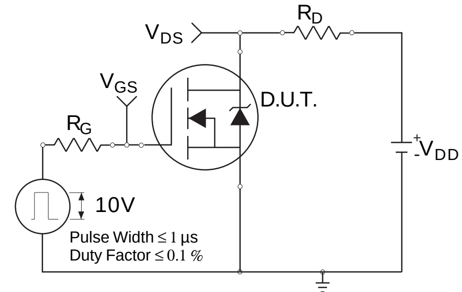


Fig 10a. Switching Time Test Circuit

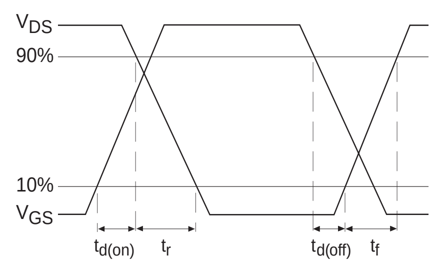


Fig 10b. Switching Time Waveforms

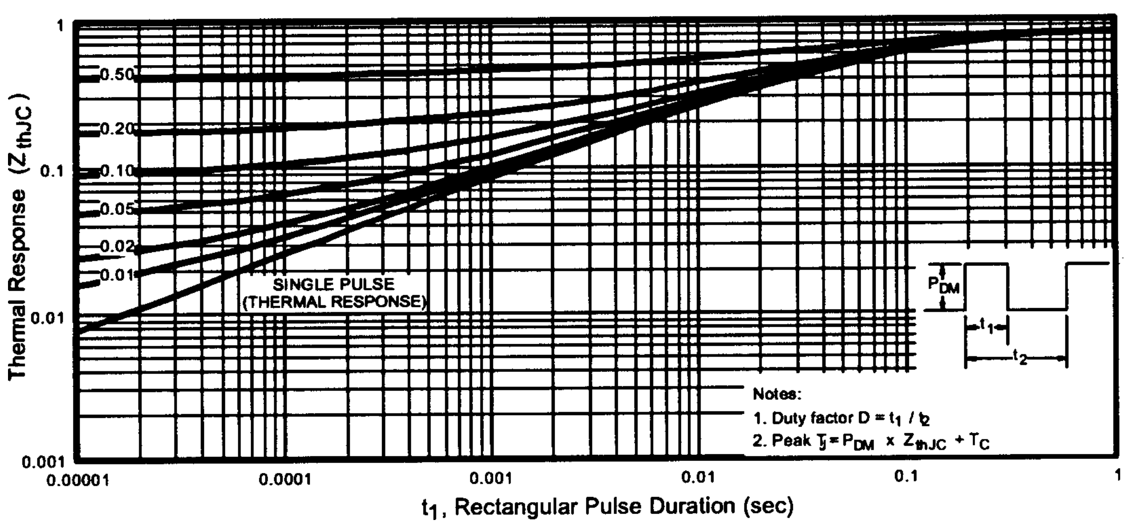


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

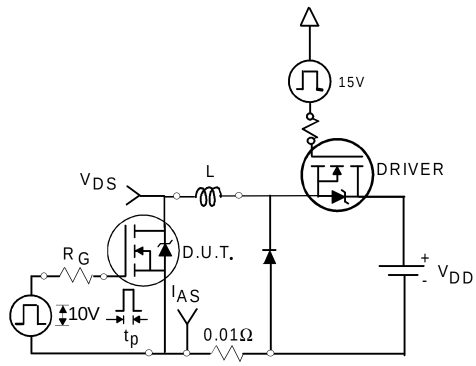


Fig 12a. Unclamped Inductive Test Circuit

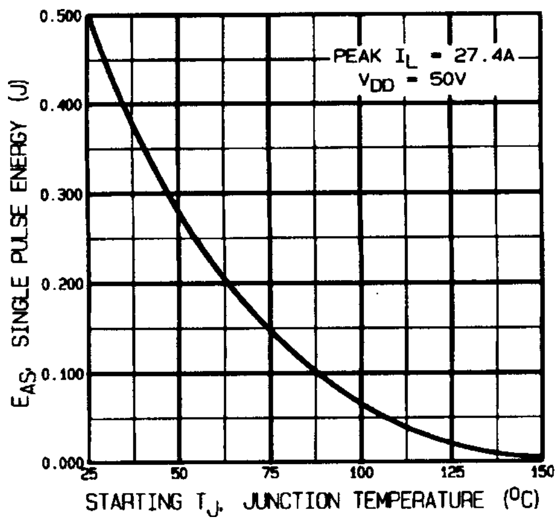


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

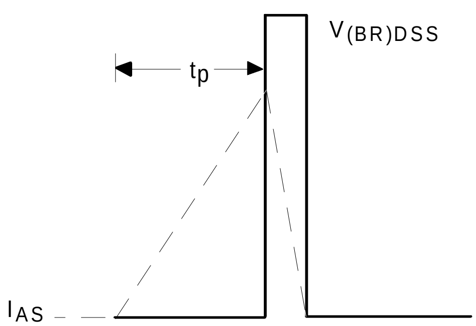


Fig 12b. Unclamped Inductive Waveforms

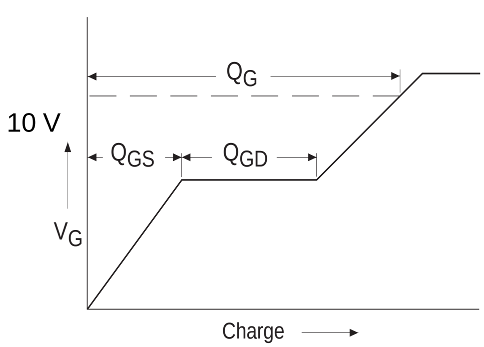


Fig 13a. Basic Gate Charge Waveform

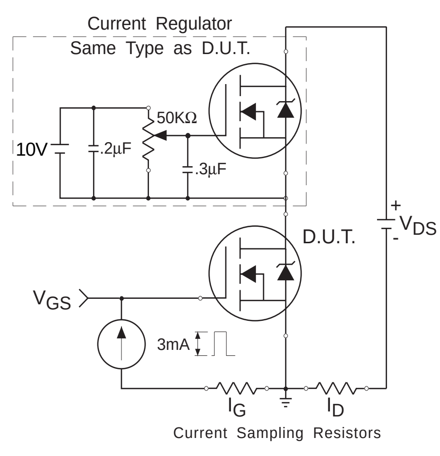


Fig 13b. Gate Charge Test Circuit

Notes:

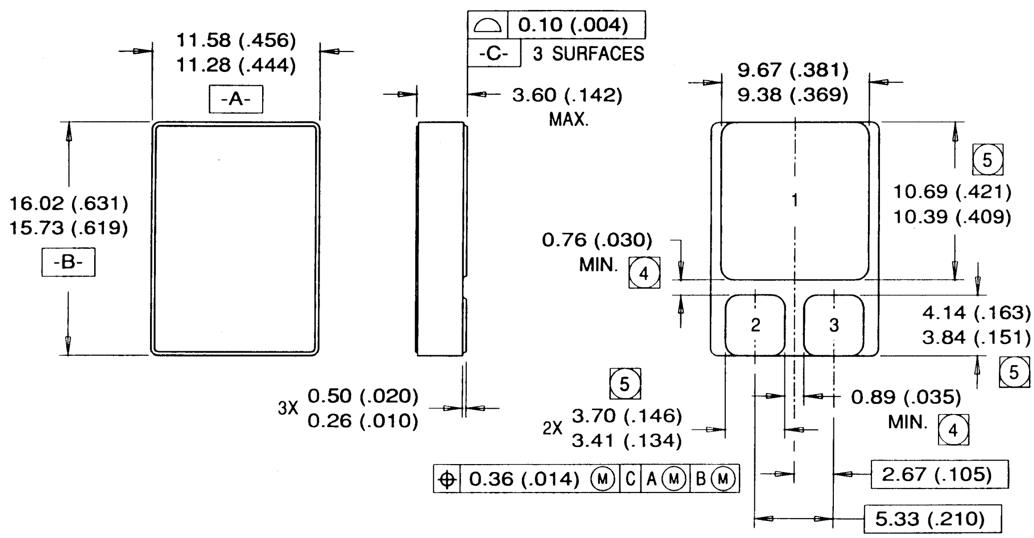
① Repetitive Rating; Pulse width limited by maximum junction temperature.

② V_{DD} = 25 V, Starting T_J = 25°C, Peak I_L =27.4A, V_{GS} =10 V, 25 ≤ R_G ≤ 200Ω

③ I_{SD} ≤ 27.4A, di/dt ≤ 190 A/µs, V_{DD} ≤ 200V, T_J ≤ 150°C

④ Pulse width ≤ 300 µs; Duty Cycle ≤ 2%

Case Outline and Dimensions — SMD-1



NOTES:

1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982
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 IOR Rectifier

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Data and specifications subject to change without notice. *12/99*