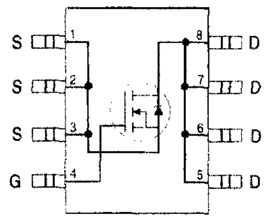
International
IOR Rectifier

PD - 9.1613A

IRF7413A

HEXFET® Power MOSFET

- Generation V Technology
- Ultra Low On-Resistance
- N-Channel Mosfet
- Surface Mount
- Available in Tape and Reel
- Dynamic dv/dt Rating
- Fast Switching



Top View

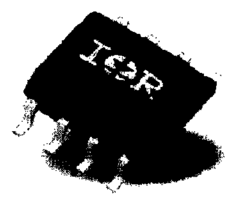
V_{DSS} = 30V

$R_{DS(on)}$ = 0.0135Ω

Description

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

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infrared, or wave soldering techniques. Power dissipation of greater than 0.8W is possible in a typical PCB mount application.


SO-8

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	12	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	8.4	
I_{DM}	Pulsed Drain Current ①	58	
P_D @T_A = 25°C	Power Dissipation	2.5	W
	Linear Derating Factor	0.02	mW/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	260	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

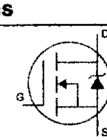
Thermal Resistance Ratings

	Parameter	Typ.	Max.	Units
$R_{θJA}$	Maximum Junction-to-Ambient ⑥	—	50	°C/W

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	30	—	—	V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.034	—	V/°C	Reference to 25°C, I_D = 1mA ⑤
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.0135	Ω	V_{GS} = 10V, I_D = 6.6A ④
		—	—	0.020		V_{GS} = 4.5V, I_D = 3.3A ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	—	V	V_{DS} = V_{GS}, I_D = 250μA
g_{fs}	Forward Transconductance	10	—	—	S	V_{DS} = 10V, I_D = 3.7A ⑤
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	μA	V_{DS} = 24V, V_{GS} = 0V
		—	—	25		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	-100	nA	V_{GS} = -20V
	Gate-to-Source Reverse Leakage	—	—	100		V_{GS} = 20V
Q_g	Total Gate Charge	—	52	79	nC	I_D = 7.3A
Q_{gs}	Gate-to-Source Charge	—	6.1	9.2		V_{DS} = 24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	16	23		V_{GS} = 10 V, see figure 6 and 9 ④⑤
$t_{d(on)}$	Turn-On Delay Time	—	8.6	—	ns	V_{DD} = 15V
t_r	Rise Time	—	50	—		I_D = 7.3A
$t_{d(off)}$	Turn-Off Delay Time	—	52	—		R_G = 6.2Ω
t_f	Fall Time	—	46	—		R_D = 2.0Ω, see figure 10 ④⑤
C_{iss}	Input Capacitance	—	1800	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	680	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	240	—		f = 1.0MHz, see figure 5⑤

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	3.1	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	58		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	T_J = 25°C, I_S = 6.6A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	—	74	110	ns	T_J = 25°C, I_F = 7.3A
Q_{rr}	Reverse RecoveryCharge	—	200	300	nC	di/dt = 100A/μs ③⑤

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (see figure 11)

② Starting T_J = 25°C, L =9.8mH R_G = 25Ω, I_{AS} =7.3A. (see figure 12)

③ $I_{SD} \le$ 7.3A, di/dt ≤ 100A/μs, $V_{DD} \le V_{(BR)DSS}$, $T_J \le$ 150°C

④ Pulse width ≤ 300μs; duty cycle ≤ 2%.

⑤ Use IRF7413 data and test conditions

⑥ Surface mounted on FR-4 board, t ≤ 10sec.

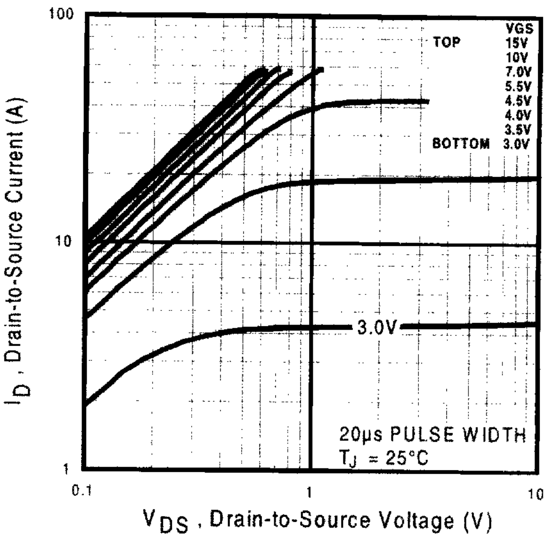


Fig 1. Typical Output Characteristics

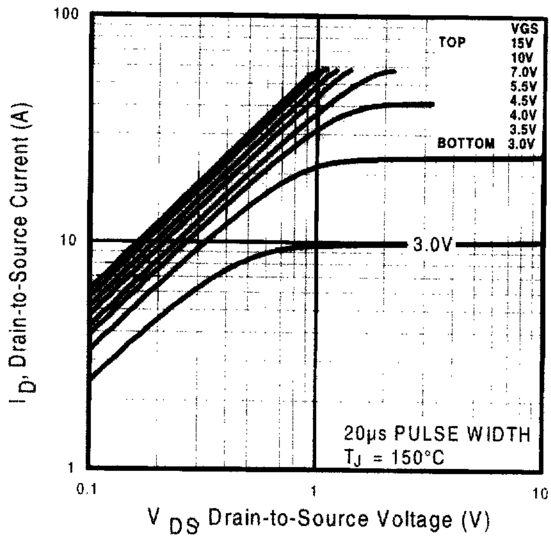


Fig 2. Typical Output Characteristics

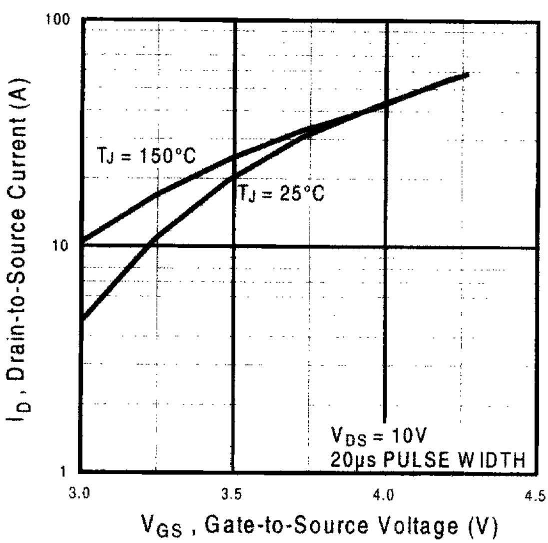


Fig 3. Typical Transfer Characteristics

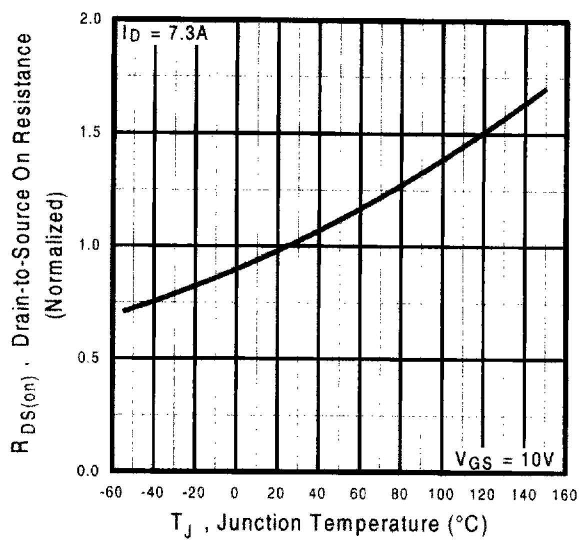


Fig 4. Normalized On-Resistance Vs. Temperature

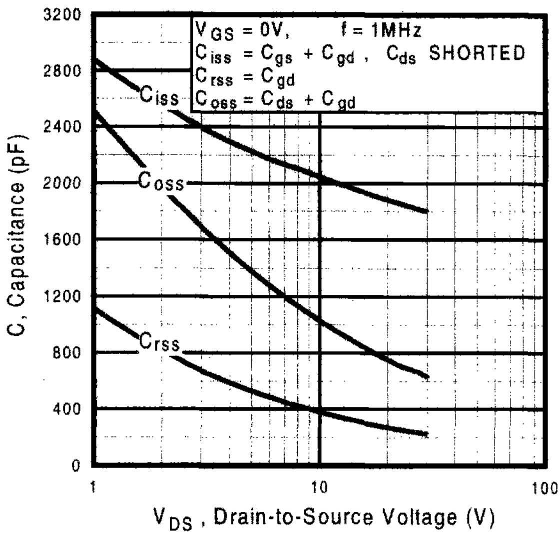


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

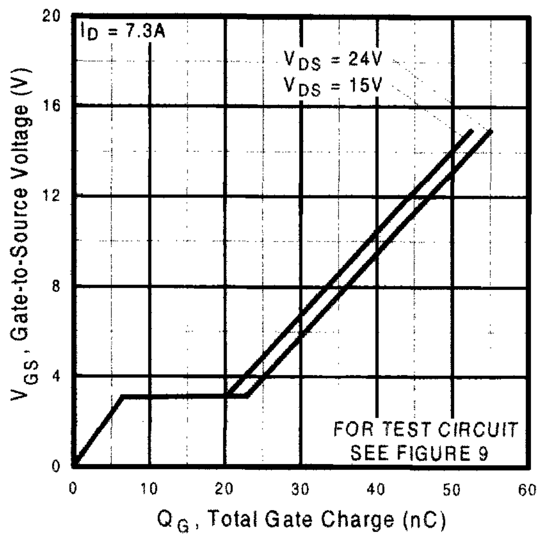


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

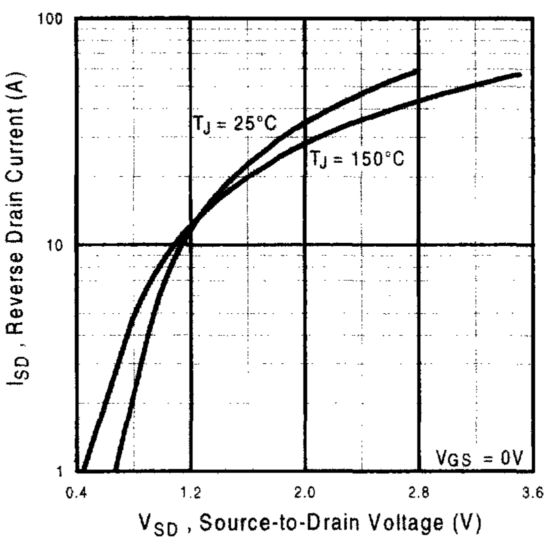


Fig 7. Typical Source-Drain Diode Forward Voltage

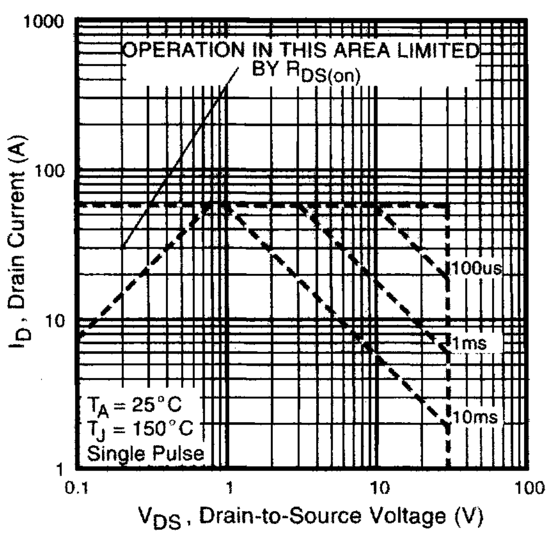


Fig 8. Maximum Safe Operating Area

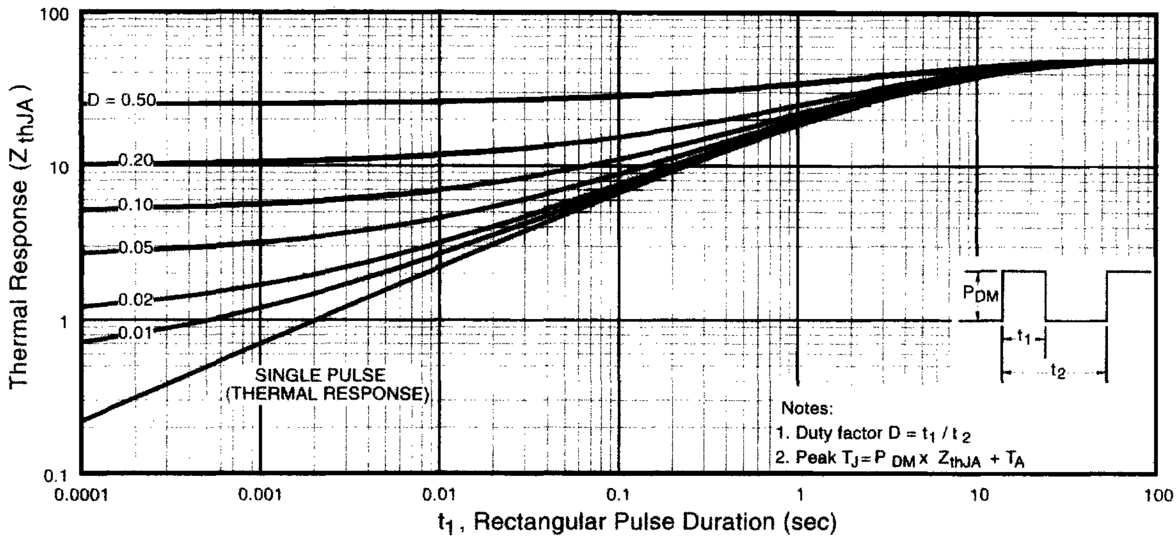


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

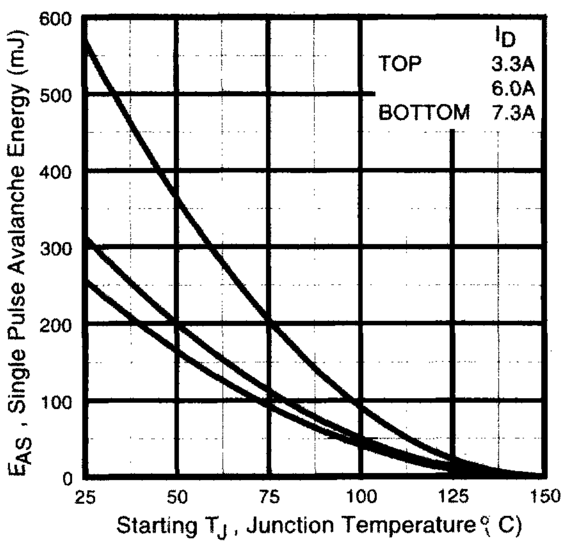


Fig 12c. Maximum Avalanche Energy
Vs. Drain Current

Mechanical drawings, Appendix A
Part marking information, Appendix B
Test Circuit diagrams, Appendix C