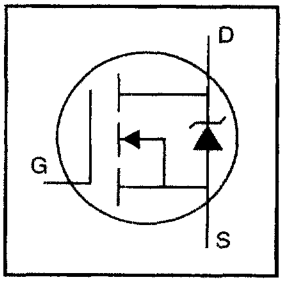
International
IOR Rectifier

PD - 9.1501A

IRFIZ24N

HEXFET® Power MOSFET

- Advanced Process Technology
- Isolated Package
- High Voltage Isolation = 2.5KVRMS ⑤
- Sink to Lead Creepage Dist. = 4.8mm
- Fully Avalanche Rated



V_{DSS} = 55V

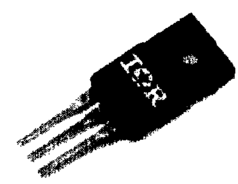
$R_{DS(on)}$ = 0.07Ω

I_D = 14A

Description

Fifth Generation HEXFETs 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 TO-220 Full-Pak eliminates the need for additional insulating hardware in commercial-industrial applications. The moulding compound used provides a high isolation capability and a low thermal resistance between the tab and external heatsink. This isolation is equivalent to using a 100 micron mica barrier with standard TO-220 product. The Full-Pak is mounted to a heatsink using a single clip or by a single screw fixing.



TO-220 Full-Pak

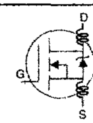
Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	14	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	10	
I_{DM}	Pulsed Drain Current ①⑥	68	
P_D @T_C = 25°C	Power Dissipation	29	W
	Linear Derating Factor	0.19	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②⑥	71	mJ
I_{AR}	Avalanche Current ①⑥	10	A
E_{AR}	Repetitive Avalanche Energy①	2.9	mJ
dv/dt	Peak Diode Recovery dv/dt ③⑥	5.0	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

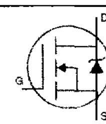
Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	5.2	°C/W
$R_{\theta JA}$	Junction-to-Ambient	—	65	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.052	—	V/°C	Reference to 25°C, I_D = 1mA ⑥
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.07	Ω	V_{GS} = 10V, I_D = 7.8A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
g_{fs}	Forward Transconductance	4.5	—	—	S	V_{DS} = 25V, I_D = 10A ⑥
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	µA	V_{DS} = 55V, V_{GS} = 0V
		—	—	250		V_{DS} = 44V, V_{GS} = 0V, T_J = 150°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	—	—	20	nC	I_D = 10A
Q_{gs}	Gate-to-Source Charge	—	—	5.3		V_{DS} = 44V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	7.6		V_{GS} = 10V, see figure 6 and 13 ④⑥
$t_{d(on)}$	Turn-On Delay Time	—	4.9	—	ns	V_{DD} = 28V
t_r	Rise Time	—	34	—		I_D = 10A
$t_{d(off)}$	Turn-Off Delay Time	—	19	—		R_G = 24Ω
t_f	Fall Time	—	27	—		R_D = 2.6Ω, see figure10 ④⑥
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) 
L_S	Internal Source Inductance	—	7.5	—		from package and center of die contact
C_{iss}	Input Capacitance	—	370	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	140	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	65	—		f = 1.0MHz, see figure 5 ⑥
C	Drain to Sink Capacitance	—	12	—		f = 1.0MHz

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	14	A	MOSFET symbol showing the 
I_{SM}	Pulsed Source Current (Body Diode) ①⑥	—	—	68		integral reverse p-n junction diode.
V_{SD}	Diode Forward Voltage	—	—	1.3	V	T_J = 25°C, I_S = 7.8A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	56	83	ns	T_J = 25°C, I_F = 10A
Q_{rr}	Reverse Recovery Charge	—	120	180	µC	di/dt = 100A/µs ④⑥
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

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

② V_{DD} = 25V, starting T_J = 25°C, L = 1.0mH, R_G = 25Ω, I_{AS} = 10A. (see figure 12)

③ $I_{SD} \leq$ 10A, di/dt ≤ 280A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 175°C

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

⑤ t = 60s, f = 60Hz

⑥ Uses IRFZ24N data and test conditions

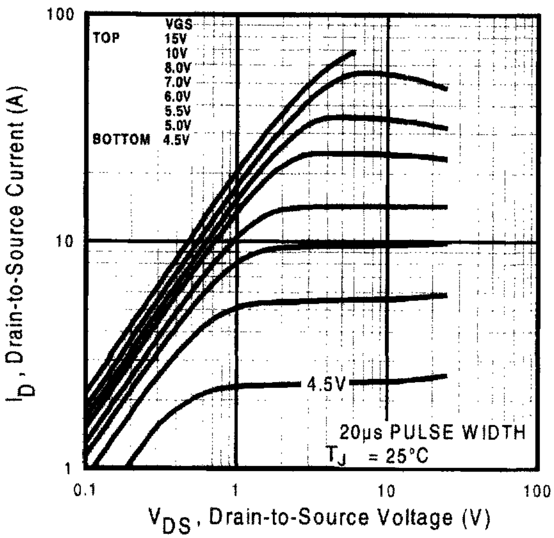


Fig 1. Typical Output Characteristics

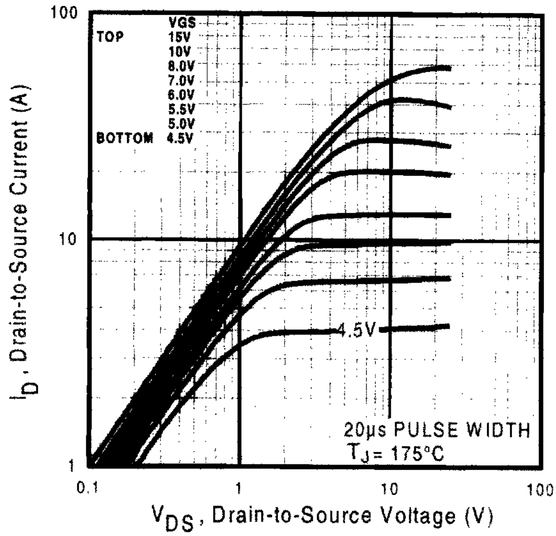


Fig 2. Typical Output Characteristics

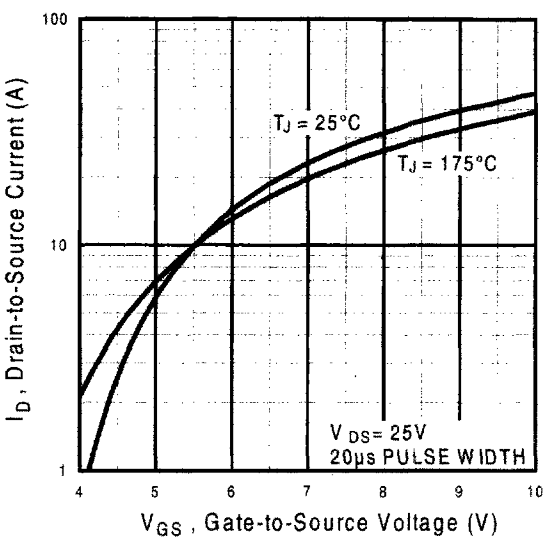


Fig 3. Typical Transfer Characteristics

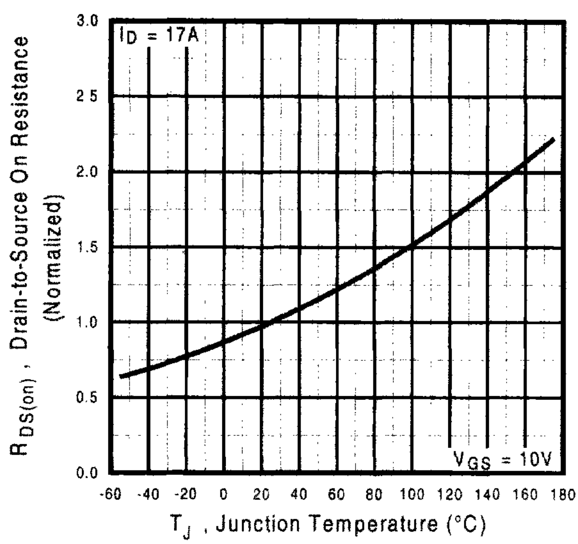


Fig 4. Normalized On-Resistance Vs. Temperature

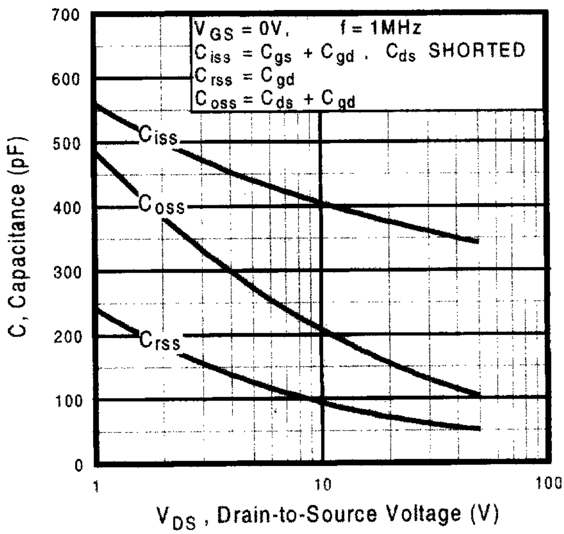


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

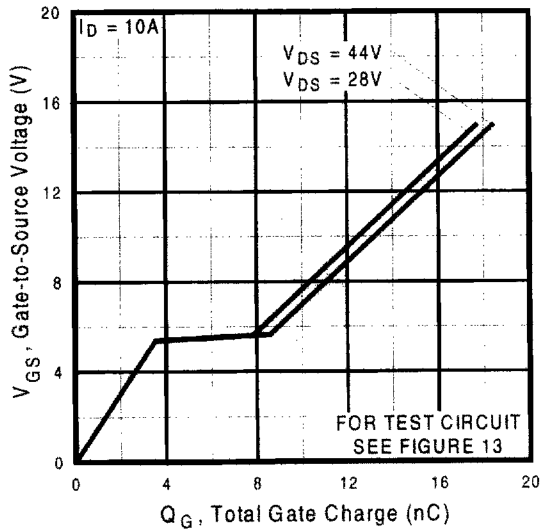


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

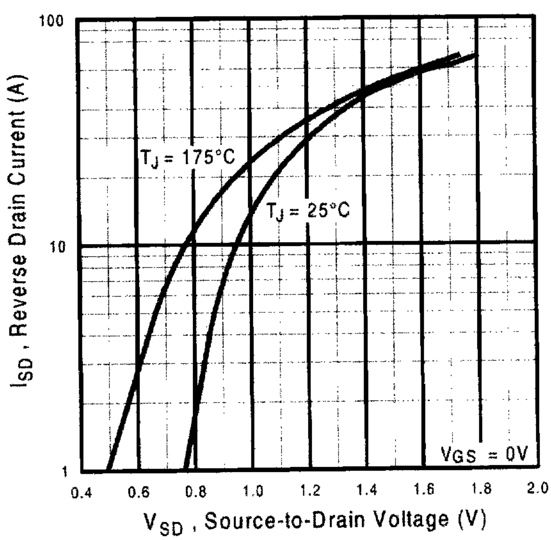


Fig 7. Typical Source-Drain Diode Forward Voltage

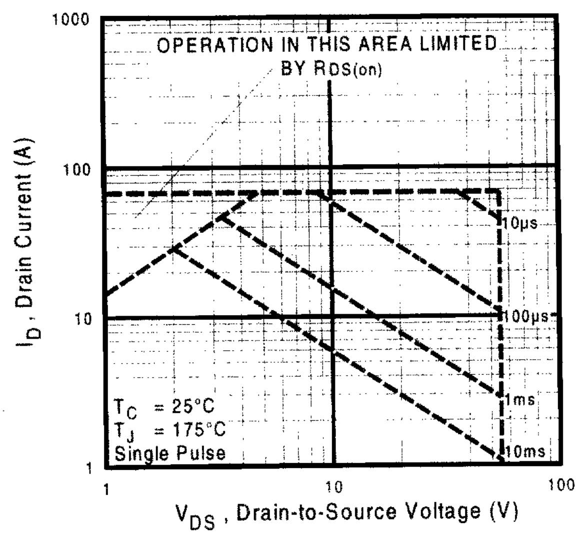


Fig 8. Maximum Safe Operating Area

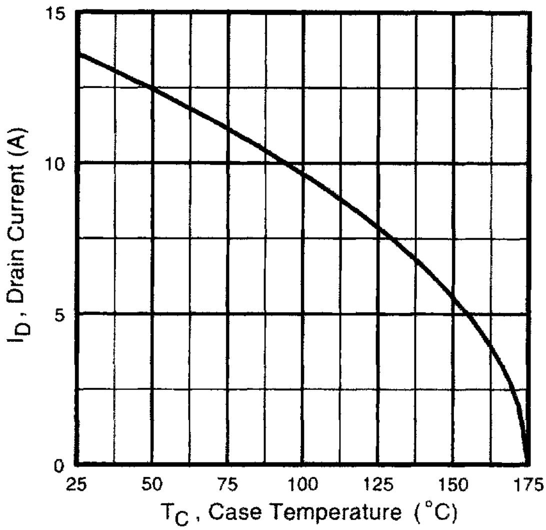


Fig 9. Maximum Drain Current Vs. Case Temperature

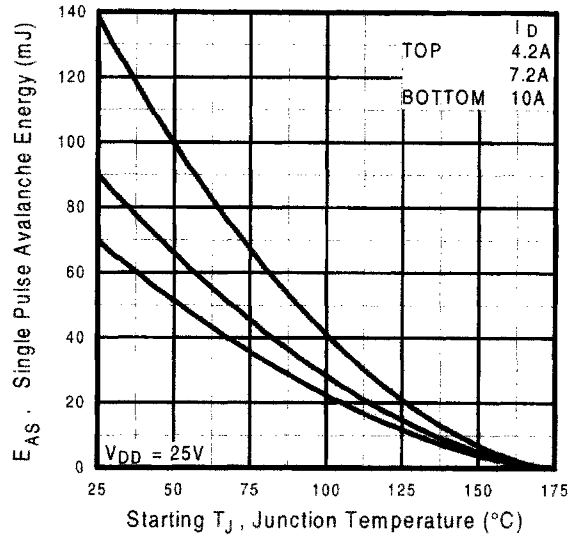


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

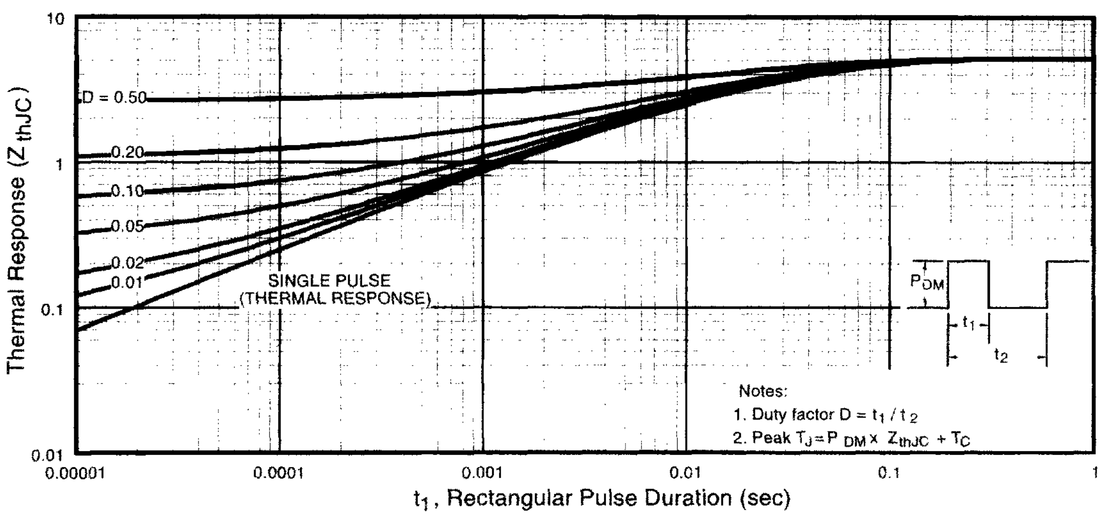


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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