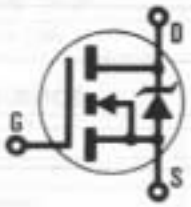
INTERNATIONAL RECTIFIER IOR

REPETITIVE AVALANCHE AND dv/dt RATED*

LOWER ON STATE RESISTANCE, 175°C OPERATING TEMPERATURE

HEXFET® TRANSISTORS



N-CHANNEL

IRF120
IRF121
IRF122
IRF123

100 Volt, 0.27 Ohm HEXFET
TO-204AA (TO-3) Hermetic Package

The HEXFET® technology is the key to International Rectifier's advanced line of power MOSFET transistors. The efficient geometry and unique processing of this latest "State of the Art" design achieves: very low on-state resistance combined with high transconductance; superior reverse energy and diode recovery dv/dt capability.

The HEXFET transistors also feature all of the well established advantages of MOSFETs such as voltage control, very fast switching, ease of paralleling and temperature stability of the electrical parameters.

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

Product Summary

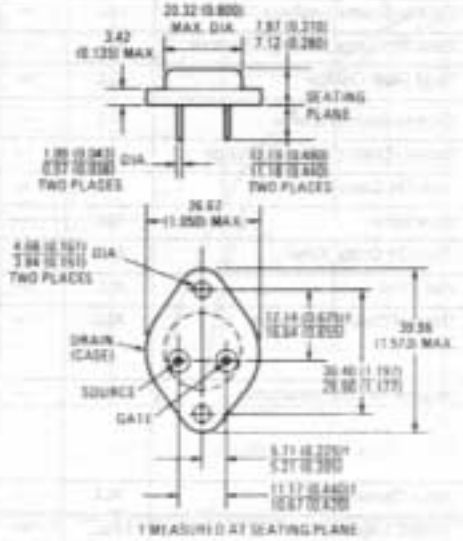
Part Number	BV_{DSS}	$R_{DS(on)}$	I_D
IRF120	100V	0.27Ω	9.2A
IRF121	80V	0.27Ω	9.2A
IRF122	100V	0.36Ω	8.0A
IRF123	80V	0.36Ω	8.0A

FEATURES:

- Repetitive Avalanche Ratings
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Ease of Paralleling

TO-3

CASE STYLE AND DIMENSIONS



Conforms to JEDEC Outline TO-204AA (Modified TO-3)
Dimensions in Millimeters and (Inches)

*This data sheet applies to product with batch codes that begin with a digit, ie. 2A3B

Absolute Maximum Ratings

Parameter		IRF120, IRF121	IRF122, IRF123	Units
I_D @ T_C = 25°C	Continuous Drain Current	9.2	8.0	A
I_D @ T_C = 100°C	Continuous Drain Current	6.5	5.8	A
I_{DM}	Pulsed Drain Current ①	37	32	A
P_D @ T_C = 25°C	Max. Power Dissipation	60		W
	Linear Derating Factor	0.40		W/K ⑤
V_{GS}	Gate-to-Source Voltage	±20		V
E_{AS}	Single Pulse Avalanche Energy ④	36 (See Fig. 14)		mJ
I_{AR}	Avalanche Current ① (Repetitive or Non-Repetitive)	9.2 (See E_{AR})		A
E_{AR}	Repetitive Avalanche Energy ①	6.0 (See I_{AR})		mJ
dv/dt	Peak Diode recovery dv/dt ③	5.5 (See Fig. 17)		V/ns
T_J T_{STG}	Operating Junction Storage Temperature Range	−55 to 175		°C
	Lead Temperature	300 (0.063 in. (1.6mm) from case for 10s)		°C

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

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	IRF120 IRF122	100	—	—	V	V_{GS} = 0V, I_D = 250µA
		IRF121 IRF123	80				
$R_{DS(on)}$	Static Drain-to-Source On-State Resistance ②	IRF120 IRF121	—	0.25	0.27	Ω	V_{GS} = 10V, I_D = 5.6A
		IRF122 IRF123	—	0.27	0.36		
$I_{D(on)}$	On-State Drain Current ②	IRF120 IRF121	9.2	—	—	A	V_{DS} > $I_{D(on)}$ × $R_{DS(on)}$ Max. V_{GS} = 10V
		IRF122 IRF123	8.0				
$V_{GS(th)}$	Gate Threshold Voltage	ALL	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250uA
g_{fs}	Forward Transconductance ②	ALL	2.7	4.1	—	S(℧)	V_{DS} ≥ 50V, I_{DS} = 5.6A,
I_{DSS}	Zero Gate Voltage Drain Current	ALL	—	—	250	µA	V_{DS} = Max. Rating, V_{GS} = 0V
			—	—	1000		V_{DS} = 0.8 × Max. Rating V_{GS} = 0V, T_J = 150°C
I_{GSS}	Gate-to-Source Leakage Forward	ALL	—	—	100	nA	V_{GS} = 20V
I_{GSS}	Gate-to-Source Leakage Reverse	ALL	—	—	−100	nA	V_{GS} = −20V
Q_g	Total Gate Charge	ALL	—	9.7	15	nC	V_{GS} = 10V, I_D = 5.6A V_{DS} = 0.8 × Max. Rating. See Fig. 16 (Independent of operating temperature)
Q_{gs}	Gate-to-Source Charge	ALL	—	2.2	3.3	nC	
Q_{gd}	Gate-to-Drain ("Miller") Charge		—	2.3	3.4	nC	
$t_{d(on)}$	Turn-On Delay Time	ALL	—	8.8	13	ns	V_{DD} = 50V, I_D = 9.2A, R_G = 18Ω R_D = 5.1Ω See Fig. 15 (Independent of operating temperature)
t_r	Rise Time	ALL	—	30	45	ns	
$t_{d(off)}$	Turn-Off Delay Time	ALL	—	19	29	ns	
t_f	Fall Time	ALL	—	20	30	ns	
L_D	Internal Drain Inductance	ALL	—	5.0	—	nH	Measured from the drain lead, 6mm (0.25 in.) from package to center of die.
L_S	Internal Source Inductance	ALL	—	13	—	nH	Measured from the source lead, 6mm (0.25 in.) from package to source bonding pad.
C_{iss}	Input Capacitance	ALL	—	350	—	pF	V_{GS} = 0V, V_{DS} = 25V f = 1.0 MHz See Fig. 10
C_{oss}	Output Capacitance	ALL	—	130	—	pF	
C_{rss}	Reverse Transfer Capacitance	ALL	—	36	—	pF	

Modified MOSFET symbol showing the internal inductances.

Source-Drain Diode Ratings and Characteristics

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	ALL	—	—	9.2	A	Modified MOSFET symbol showing the integral Reverse p-n junction rectifier.
I_{SM}	Pulsed Source Current (Body Diode) ①	ALL	—	—	37	A	
V_{SD}	Diode Forward Voltage ④	ALL	—	—	2.5	V	T_J = 25°C, I_S = 9.2A, V_{GS} = 0V
t_{rr}	Reverse Recovery Time	ALL	55	110	240	ns	T_J = 25°C, I_F = 9.2A, di/dt = 100 A/μs
Q_{RR}	Reverse Recovery Charge	ALL	0.25	0.53	1.10	μC	
t_{on}	Forward Turn-On Time	ALL	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by L_S + L_D.				

Thermal Resistance

R_{thJC}	Junction-to-Case	ALL	—	—	2.5	K/W⑤	
R_{thCS}	Case-to-Sink	ALL	—	0.12	—	K/W⑤	Mounting surface flat, smooth, and greased
R_{thJA}	Junction-to-Ambient	ALL	—	—	30	K/W⑤	Typical socket mount

① Repetitive Rating; Pulse width limited by maximum junction temperature (see figure 5) Refer. to current HEXFET reliability report

② @ V_{DD} = 50V, Starting T_J = 25°C, L = 640 μH, R_G = 25Ω, Peak I_L = 9.2A

③ I_{SD} ≤ 9.2A, di/dt ≤ 110 A/μs, V_{DD} ≤ BV_{DSS}, T_J ≤ 150°C Suggested R_G = 18Ω

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

⑤ K/W = °C/W W/K = W/°C

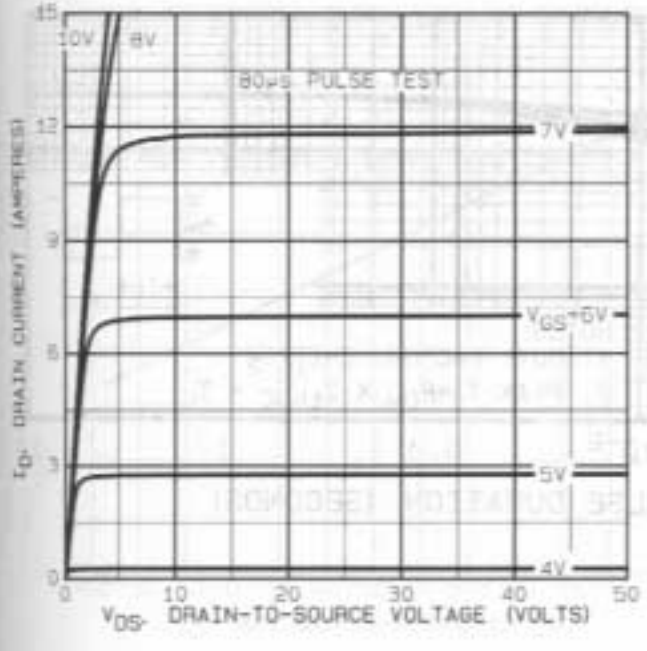


Fig. 1 — Typical Output Characteristics

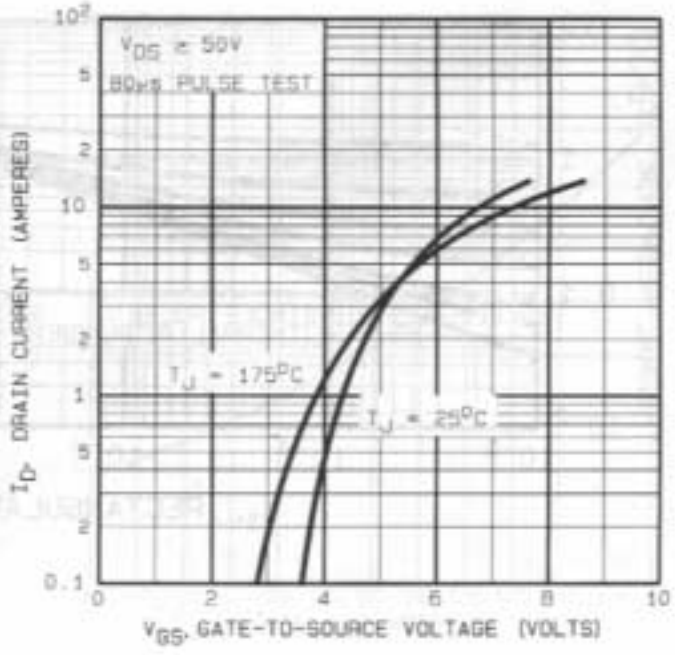


Fig. 2 — Typical Transfer Characteristics

TO-3