

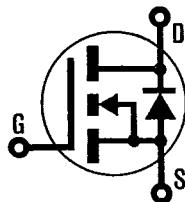
INTERNATIONAL RECTIFIER

T-39-11

INTERNATIONAL RECTIFIER **IR**

HEXFET® TRANSISTORS IRFJ130

**N-CHANNEL
POWER MOSFETs**



**IRFJ131
IRFJ132
IRFJ133**

100 Volt, 0.18 Ohm HEXFET

The HEXFET® technology is the key to International Rectifier's advanced line of power MOSFET transistors. The efficient geometry and unique processing of the HEXFET design achieve very low on-state resistance combined with high transconductance and great device ruggedness.

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.

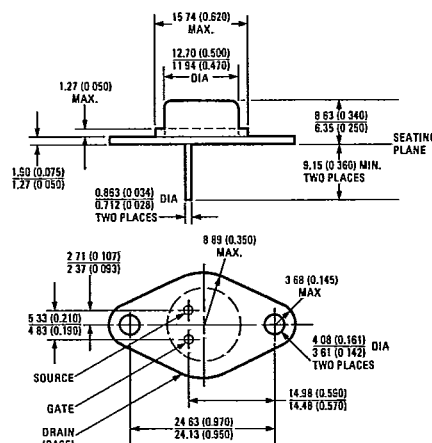
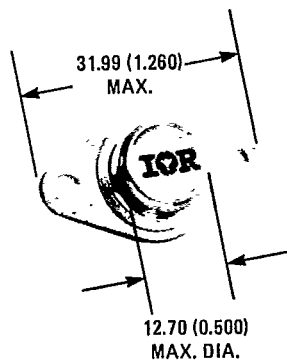
Features:

- Fast Switching
- Low Drive Current
- Ease of Paralleling
- No Second Breakdown
- Excellent Temperature Stability

Product Summary

Part Number	V _{DS}	R _{DS(on)}	I _D
IRFJ130	100V	0.18Ω	10A
IRFJ131	60V	0.18Ω	10A
IRFJ132	100V	0.25Ω	10A
IRFJ133	60V	0.25Ω	10A

CASE STYLE AND DIMENSIONS



Conforms to JEDEC Case Style TO-213AA (TO-66)
Dimensions in Millimeters and (Inches)

IRFJ130, IRFJ131, IRFJ132, IRFJ133 Devices

Absolute Maximum Ratings

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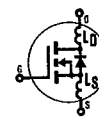
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Parameter	IRFJ130	IRFJ131	IRFJ132	IRFJ133	Units
V_{DS} Drain - Source Voltage ①	100	60	100	60	V
V_{DGR} Drain - Gate Voltage ($R_{GS} = 20\text{ k}\Omega$) ①	100	60	100	60	V
$I_D @ T_C = 25^\circ\text{C}$ Continuous Drain Current *	10	10	10	10	A
$I_D @ T_C = 100^\circ\text{C}$ Continuous Drain Current	7.5	7.5	6.0	6.0	A
I_{DM} Pulsed Drain Current ③	40	40	40	40	A
V_{GS} Gate - Source Voltage	± 20				V
$P_D @ T_C = 25^\circ\text{C}$ Max. Power Dissipation	50 (See Fig. 14)				W
Linear Derating Factor	0.40 (See Fig. 14)				W/K ④
I_{LM} Inductive Current, Clamped	(See Fig. 15 and 16) $L = 100\mu\text{H}$				A
T_J Operating Junction and Storage Temperature Range	-55 to 150				$^\circ\text{C}$
Lead Temperature	300 (0.063 in. (1.6mm) from case for 10s)				$^\circ\text{C}$

Electrical Characteristics @ $T_C = 25^\circ\text{C}$ (Unless Otherwise Specified)

Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS} Drain - Source Breakdown Voltage	IRFJ130	100	—	—	V	$V_{GS} = 0\text{V}$
	IRFJ132	—	—	—	V	$I_D = 250\mu\text{A}$
	IRFJ131	60	—	—	V	
$V_{GS(th)}$ Gate Threshold Voltage	ALL	2.0	—	4.0	V	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$
I_{GSS} Gate - Source Leakage Forward	ALL	—	—	100	nA	$V_{GS} = 20\text{V}$
I_{GSS} Gate - Source Leakage Reverse	ALL	—	—	~100	nA	$V_{GS} = -20\text{V}$
I_{DSS} Zero Gate Voltage Drain Current	ALL	—	—	250	μA	$V_{DS} = \text{Max. Rating}$, $V_{GS} = 0\text{V}$
		—	—	1000	μA	$V_{DS} = \text{Max. Rating} \times 0.8$, $V_{GS} = 0\text{V}$, $T_C = 125^\circ\text{C}$
$I_{D(on)}$ On-State Drain Current ②	IRFJ130	10	—	—	A	$V_{DS} > I_{D(on)} \times R_{DS(on)max.}$, $V_{GS} = 10\text{V}$
	IRFJ131	—	—	—	A	
	IRFJ132	10	—	—	A	
$R_{DS(on)}$ Static Drain-Source On-State Resistance ②	IRFJ130	—	0.14	0.18	Ω	$V_{GS} = 10\text{V}$, $I_D = 6.0\text{A}$
	IRFJ131	—	—	—	Ω	
	IRFJ132	—	0.20	0.25	Ω	
g_{fs} Forward Transconductance ②	ALL	4.0	5.5	—	S (U)	$V_{DS} > I_{D(on)} \times R_{DS(on)max.}$, $I_D = 6.0\text{A}$
C_{iss} Input Capacitance	ALL	—	600	800	pF	$V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1.0\text{ MHz}$ See Fig. 10
C_{oss} Output Capacitance	ALL	—	300	500	pF	
C_{rss} Reverse Transfer Capacitance	ALL	—	100	150	pF	
$t_{d(on)}$ Turn-On Delay Time	ALL	—	—	30	ns	$V_{DD} \approx 36\text{V}$, $I_D = 6.0\text{A}$, $Z_\theta = 15^\circ\text{C/W}$ See Fig. 17 (MOSFET switching times are essentially independent of operating temperature.)
t_r Rise Time	ALL	—	—	75	ns	
$t_{d(off)}$ Turn-Off Delay Time	ALL	—	—	40	ns	
t_f Fall Time	ALL	—	—	45	ns	
Q_g Total Gate Charge (Gate-Source Plus Gate-Drain)	ALL	—	18	30	nC	
Q_{gs} Gate-Source Charge	ALL	—	9.0	—	nC	Measured between the contact screw on header that is closer to source and gate pins and center of die.
Q_{gd} Gate-Drain ("Miller") Charge	ALL	—	9.0	—	nC	
L_D Internal Drain Inductance	ALL	—	5.0	—	nH	
L_S Internal Source Inductance	ALL	—	12.5	—	nH	

Modified MOSFET symbol showing the internal device inductances.



Thermal Resistance

R_{thJC} Junction-to-Case	ALL	—	—	2.5	K/W ④	
R_{thCS} Case-to-Sink	ALL	—	0.2	—	K/W ④	Mounting surface flat, smooth, and greased.
R_{thJA} Junction-to-Ambient	ALL	—	—	50	K/W ④	Typical socket mount

* I_D Limited by pin dimension

IRFJ130, IRFJ131, IRFJ132, IRFJ133 Devices

Source-Drain Diode Ratings and Characteristics

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I_S	Continuous Source Current (Body Diode)	IRFJ130 IRFJ131	—	—	10	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier.
		IRFJ132 IRFJ133	—	—	10	A	
I_{SM}	Pulse Source Current (Body Diode) ③	IRFJ130 IRFJ131	—	—	40	A	
		IRFJ132 IRFJ133	—	—	40	A	
V_{SD}	Diode Forward Voltage ②	IRFJ130 IRFJ131	—	—	2.5	V	$T_C = 25^\circ\text{C}$, $I_S = 10\text{A}$, $V_{GS} = 0\text{V}$
		IRFJ132 IRFJ133	—	—	2.3	V	$T_C = 25^\circ\text{C}$, $I_S = 10\text{A}$, $V_{GS} = 0\text{V}$
t_{rr}	Reverse Recovery Time	ALL	—	360	—	ns	$T_J = 150^\circ\text{C}$, $I_F = 10\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{s}$
Q_{RR}	Reverse Recovered Charge	ALL	—	2.1	—	μC	$T_J = 150^\circ\text{C}$, $I_F = 10\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{s}$
t_{on}	Forward Turn-on Time	ALL	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by $L_S + L_D$.				

① $T_J = 25^\circ\text{C}$ to 150°C . ② Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

③ Repetitive Rating: Pulse width limited by max. junction temperature. See Transient Thermal Impedance Curve (Fig. 5).

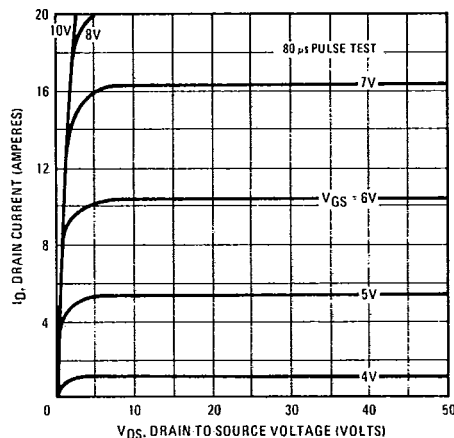
④ $\text{K/W} = ^\circ\text{C/W}$
 $\text{W/K} = \text{W}/^\circ\text{C}$ 

Fig. 1 - Typical Output Characteristics

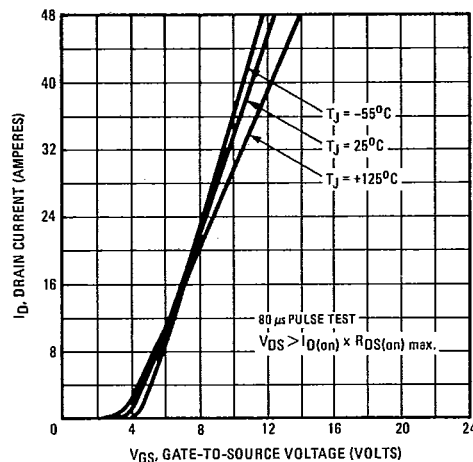


Fig. 2 - Typical Transfer Characteristics

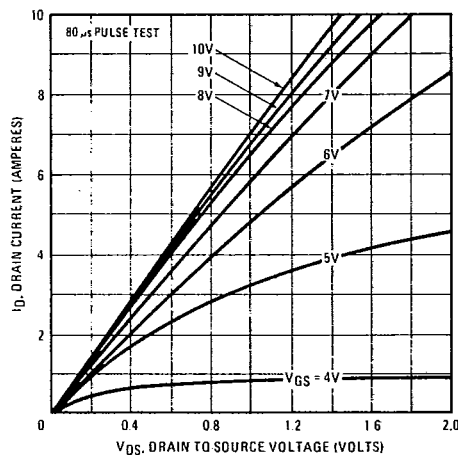


Fig. 3 - Typical Saturation Characteristics

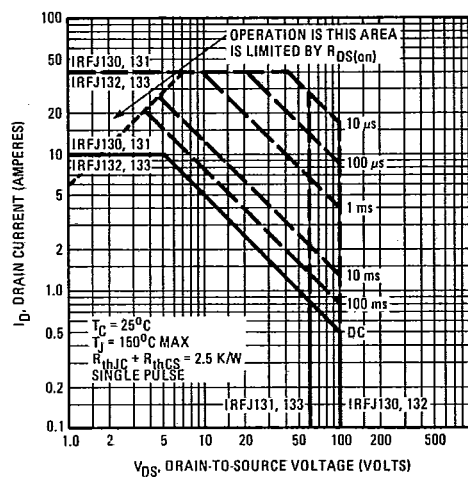


Fig. 4 - Maximum Safe Operating Area

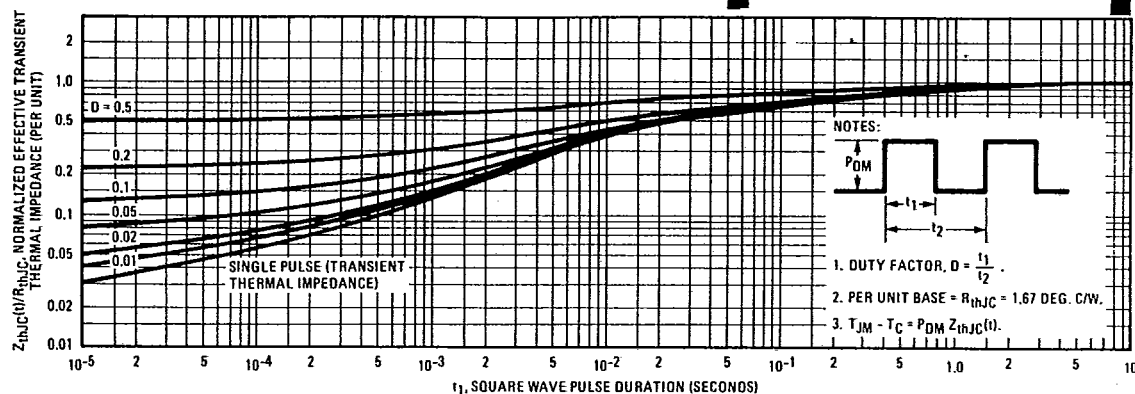


Fig. 5 — Maximum Effective Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration

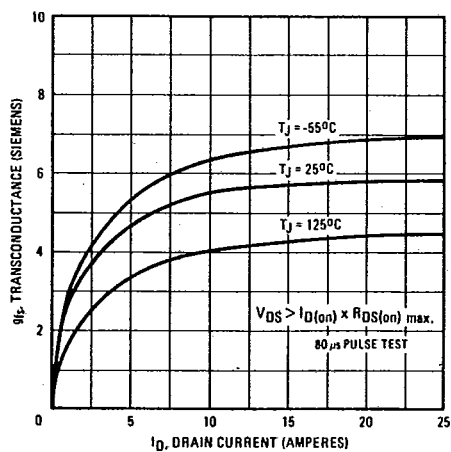


Fig. 6 — Typical Transconductance Vs. Drain Current

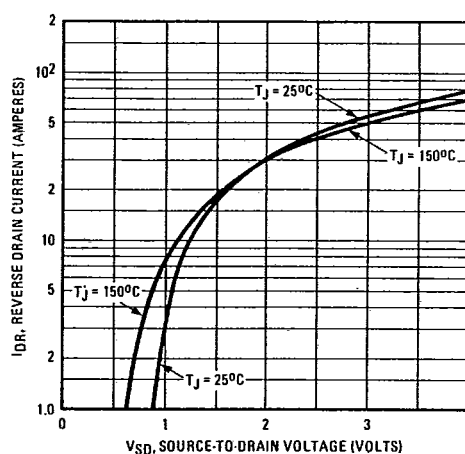


Fig. 7 — Typical Source-Drain Diode Forward Voltage

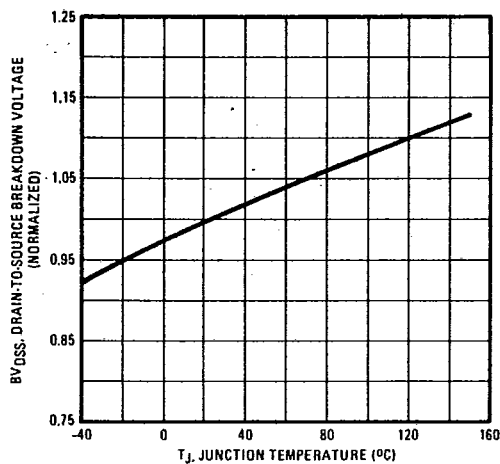


Fig. 8 — Breakdown Voltage Vs. Temperature

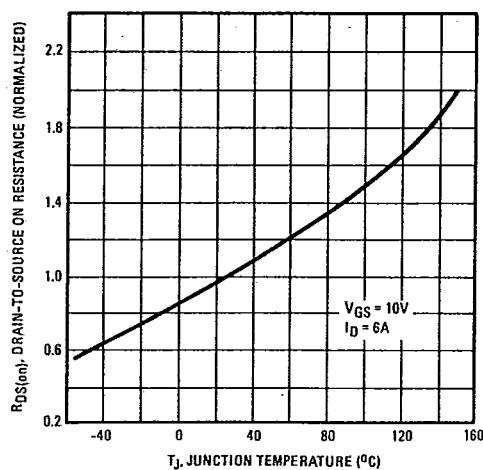


Fig. 9 — Normalized On-Resistance Vs. Temperature

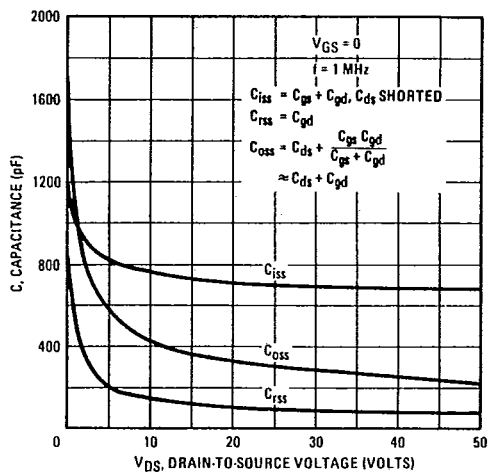


Fig. 10 - Typical Capacitance Vs. Drain-to-Source Voltage

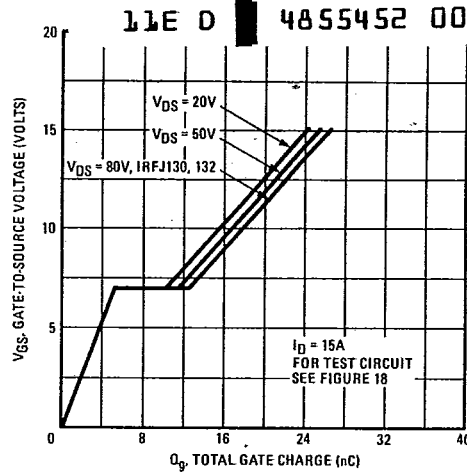


Fig. 11 - Typical Gate Charge Vs. Gate-to-Source Voltage

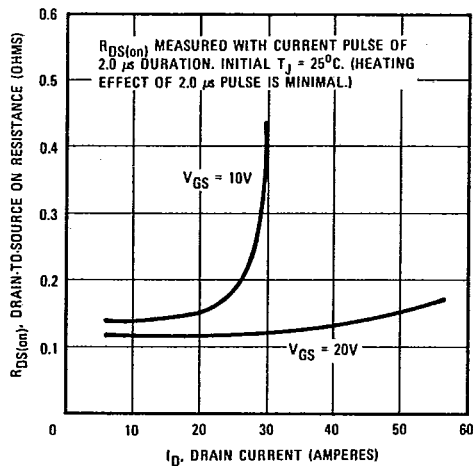


Fig. 12 - Typical On-Resistance Vs. Drain Current

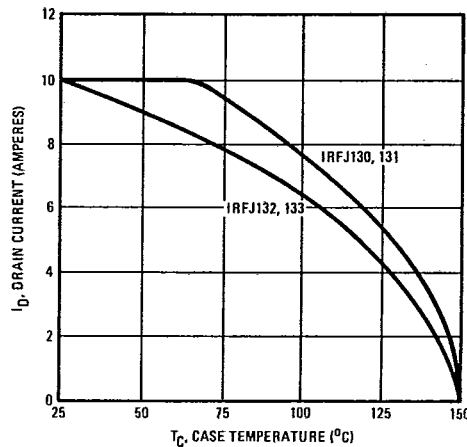


Fig. 13 - Maximum Drain Current Vs. Case Temperature

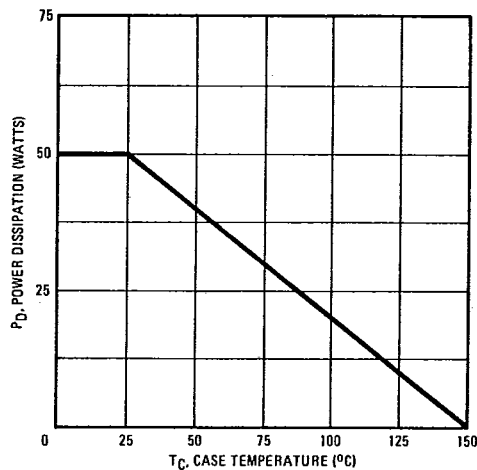


Fig. 14 - Power Vs. Temperature Derating Curve

G-525

T0-66

