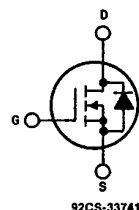
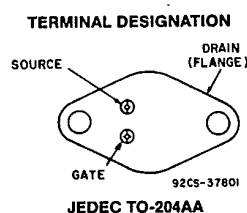


IRF130, IRF131, IRF132, IRF133

File Number 1566

Power MOS Field-Effect Transistors**N-Channel Enhancement-Mode
Power Field-Effect Transistors**12A and 14A, 60V-100V
 $r_{DS(on)} = 0.18 \Omega$ and 0.25Ω **Features:**

- SOA is power-dissipation limited
- Nanosecond switching speeds
- Linear transfer characteristics
- High input impedance
- Majority carrier device

N-CHANNEL ENHANCEMENT MODE**TERMINAL DIAGRAM**

The IRF130, IRF131, IRF132 and IRF133 are n-channel enhancement-mode silicon-gate power field-effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors requiring high speed and low gate-drive power. These types can be operated directly from integrated circuits.

The IRF-types are supplied in the JEDEC TO-204AA steel package.

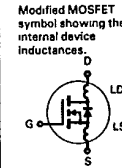
Absolute Maximum Ratings

Parameter	IRF130	IRF131	IRF132	IRF133	Units
V_{DS} Drain - Source Voltage ①	100	60	100	60	V
V_{DGS} 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	14	14	12	12	A
$I_D @ T_C = 100^\circ\text{C}$ Continuous Drain Current	9.0	9.0	8.0	8.0	A
I_{DM} Pulsed Drain Current ③	56	56	48	48	A
V_{GS} Gate - Source Voltage	± 20				V
$P_D @ T_C = 25^\circ\text{C}$ Max. Power Dissipation	75 (See Fig. 14)				W
Linear Derating Factor	0.6 (See Fig. 14)				W/ $^\circ\text{C}$
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				$^\circ\text{C}$
T_{stg} Lead Temperature	300 (0.083 in. (1.6mm) from case for 10s)				$^\circ\text{C}$

IRF130, IRF131, IRF132, IRF133

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

Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DS} Drain-Source Breakdown Voltage	IRF130 IRF132 IRF131 IRF133	100 60	—	—	V	$V_{GS} = 0V$ $I_D = 250\mu A$
$V_{GS(th)}$ Gate Threshold Voltage	ALL	2.0	—	4.0	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$
I_{GSS} Gate-Source Leakage Forward	ALL	—	—	100	nA	$V_{GS} = 20V$
I_{GSS} Gate-Source Leakage Reverse	ALL	—	—	-100	nA	$V_{GS} = -20V$
I_{DSS} Zero Gate Voltage Drain Current	ALL	—	—	250	μA	$V_{DS} = \text{Max. Rating}$, $V_{GS} = 0V$
		—	—	1000	μA	$V_{DS} = \text{Max. Rating} \times 0.8$, $V_{GS} = 0V$, $T_C = 125^\circ\text{C}$
$I_{D(on)}$ On-State Drain Current ①	IRF130 IRF131	14	—	—	A	$V_{DS} > I_{D(on)} \times R_{DS(on) \text{ max.}}$, $V_{GS} = 10V$
	IRF132 IRF133	12	—	—	A	
$R_{DS(on)}$ Static Drain-Source On-State Resistance ②	IRF130 IRF131	—	0.14	0.18	Ω	$V_{GS} = 10V$, $I_D = 8.0A$
	IRF132 IRF133	—	0.20	0.25	Ω	
g_{fs} Forward Transconductance ②	ALL	4.0	5.5	—	S (D)	$V_{DS} > I_{D(on)} \times R_{DS(on) \text{ max.}}$, $I_D = 8.0A$
C_{iss} Input Capacitance	ALL	—	600	800	pF	$V_{GS} = 0V$, $V_{DS} = 25V$, $f = 1.0\text{ MHz}$
C_{oss} Output Capacitance	ALL	—	300	500	pF	See Fig. 10
C_{rss} Reverse Transfer Capacitance	ALL	—	100	150	pF	
$t_{d(on)}$ Turn-On Delay Time	ALL	—	—	30	ns	$V_{DD} = 36V$, $I_D = 8.0A$, $Z_\theta = 160$
t_r Rise Time	ALL	—	—	75	ns	See Fig. 17
$t_{d(off)}$ Turn-Off Delay Time	ALL	—	—	40	ns	(MOSFET switching times are essentially independent of operating temperature.)
t_f Fall Time	ALL	—	—	45	ns	
Q_g Total Gate Charge (Gate-Source Plus Gate-Drain)	ALL	—	18	30	nC	$V_{GS} = 10V$, $I_D = 18A$, $V_{DS} = 0.8 \text{ Max. Rating}$. See Fig. 18 for test circuit. (Gate charge is essentially independent of operating temperature.)
Q_{gs} Gate-Source Charge	ALL	—	9.0	—	nC	
Q_{gd} Gate-Drain ("Miller") Charge	ALL	—	9.0	—	nC	
L_D Internal Drain Inductance	ALL	—	5.0	—	nH	Measured between the contact screw on header that is closer to source and gate pins and center of die.
L_S Internal Source Inductance	ALL	—	12.5	—	nH	Measured from the source pin, 6 mm (0.25 in.) from header and source bonding pad.



Thermal Resistance

$R_{\theta JC}$ Junction-to-Case	ALL	—	—	1.67	$^\circ\text{C/W}$	
$R_{\theta CS}$ Case-to-Sink	ALL	—	0.1	—	$^\circ\text{C/W}$	Mounting surface flat, smooth, and greased.
$R_{\theta JA}$ Junction-to-Ambient	ALL	—	—	30	$^\circ\text{C/W}$	Free Air Operation

Source-Drain Diode Ratings and Characteristics

I_S Continuous Source Current (Body Diode)	IRF130 IRF131 IRF132 IRF133	—	—	14 12	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier.
I_{SM} Pulse Source Current (Body Diode) ③	IRF130 IRF131 IRF132 IRF133	—	—	56 48	A	
V_{SD} Diode Forward Voltage ②	IRF130 IRF131 IRF132 IRF133	—	—	2.5 2.3	V	$T_C = 25^\circ\text{C}$, $I_S = 14A$, $V_{GS} = 0V$
		—	—	—	V	$T_C = 25^\circ\text{C}$, $I_S = 12A$, $V_{GS} = 0V$
t_{rr} Reverse Recovery Time	ALL	—	360	—	ns	$T_J = 150^\circ\text{C}$, $I_F = 14A$, $dI_F/dt = 100A/\mu s$
Q_{RR} Reverse Recovered Charge	ALL	—	2.1	—	μC	$T_J = 150^\circ\text{C}$, $I_F = 14A$, $dI_F/dt = 100A/\mu s$
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 $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

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

IRF130, IRF131, IRF132, IRF133

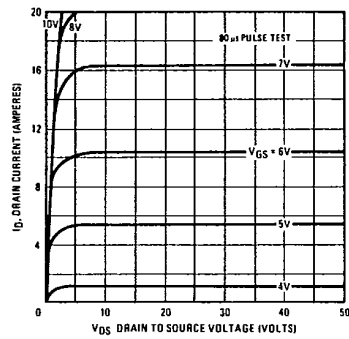


Fig. 1 - Typical Output Characteristics

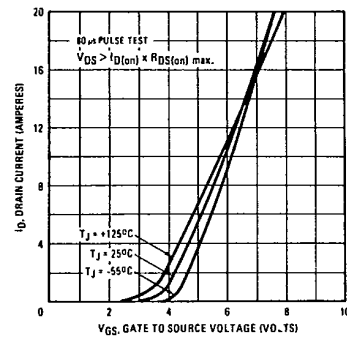


Fig. 2 - Typical Transfer Characteristics

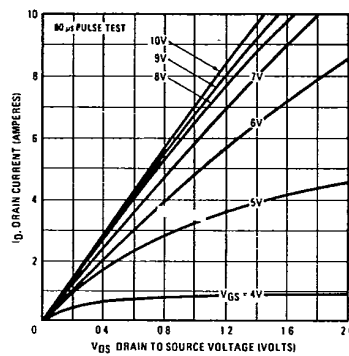


Fig. 3 - Typical Saturation Characteristics

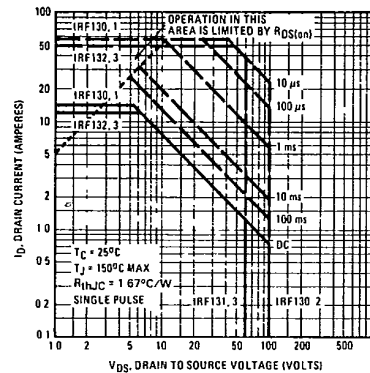


Fig. 4 - Maximum Safe Operating Area

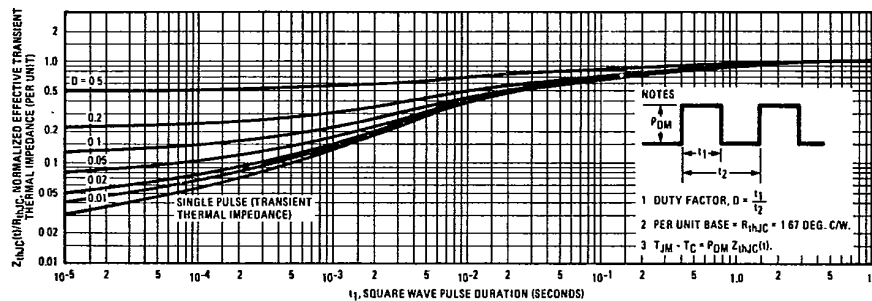


Fig. 5 - Maximum Effective Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration

IRF130, IRF131, IRF132, IRF133

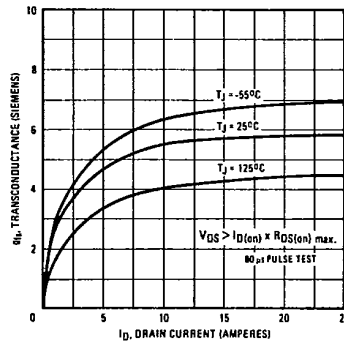


Fig. 6 - Typical Transconductance Vs. Drain Current

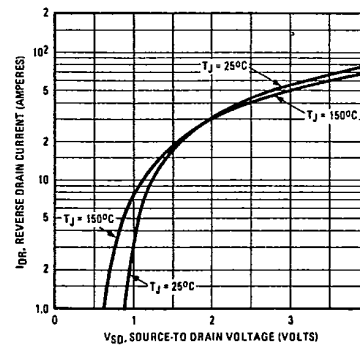


Fig. 7 - Typical Source-Drain Diode Forward Voltage

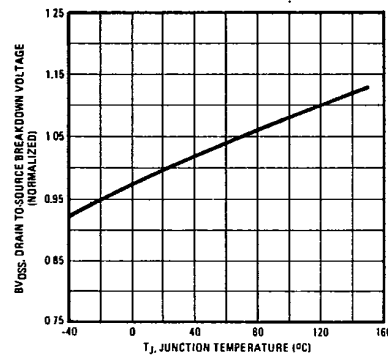


Fig. 8 - Breakdown Voltage Vs. Temperature

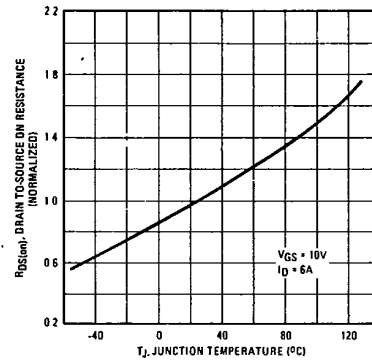


Fig. 9 - Normalized On-Resistance Vs. Temperature

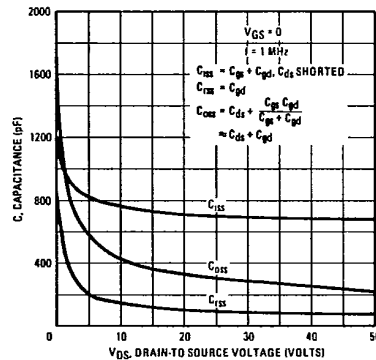


Fig. 10 - Typical Capacitance Vs. Drain-to-Source Voltage

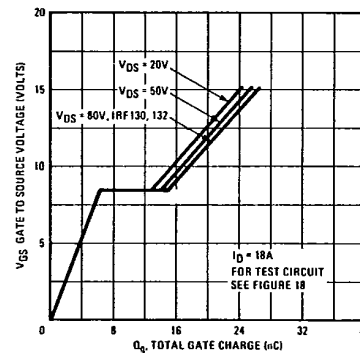


Fig. 11 - Typical Gate Charge Vs. Gate-to-Source Voltage

