

IRF530/531/532/533 IRFP130/131/132/133

N-CHANNEL POWER MOSFETS

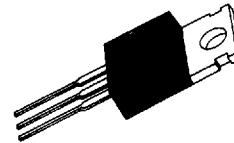
FEATURES

- Lower $R_{DS(on)}$
- Improved inductive ruggedness
- Fast switching times
- Rugged polysilicon gate cell structure
- Lower input capacitance
- Extended safe operating area
- Improved high temperature reliability

PRODUCT SUMMARY

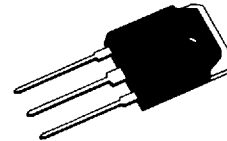
Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRF530/IRFP130	100V	0.16Ω	14A
IRF531/IRFP131	80V	0.16Ω	14A
IRF532/IRFP132	100V	0.23Ω	12A
IRF533/IRFP133	80V	0.23Ω	12A

TO-220



IRF530/531/532/533

TO-3P



IRFP130/131/132/133

MAXIMUM RATINGS

Characteristics	Symbol	IRF530 IRFP130	IRF531 IRFP131	IRF532 IRFP132	IRF533 IRFP133	Unit
Drain-Source Voltage (1)	V_{DSS}	100	80	100	80	Vdc
Drain-Gate Voltage ($R_{GS}=1.0M\Omega$)(1)	V_{DGR}	100	80	100	80	Vdc
Gate-Source Voltage	V_{GS}	± 20				Vdc
Continuous Drain Current $T_C=25^\circ C$	I_D	14	14	12	12	Adc
Continuous Drain Current $T_C=100^\circ C$	I_D	10	10	8.3	8.3	Adc
Drain Current—Pulsed (3)	I_{DM}	56	56	48	48	Adc
Gate Current—Pulsed	I_{GM}	± 1.5				Adc
Single Pulsed Avalanche Energy(4)	E_{AS}	69				mJ
Avalanche Current	I_{AS}	14				A
Total Power Dissipation @ $T_C=25^\circ C$ Derate above $25^\circ C$	P_D	77 0.62				Watts W/ $^\circ C$
Operating and Storage Junction to Case	T_J, T_{stg}	-55 to 150				$^\circ C$
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T_L	300				$^\circ C$

Notes: (1) $T_J=25^\circ C$ to $150^\circ C$

(2) Pulse test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

(3) Repetitive rating: Pulse with limited by max. junction temperature

(4) $L=0.53$ mH, $V_{dd}=25V$, $R_G=25\Omega$, Starting $T_J=25^\circ C$

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ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage IRF530/IRFP130 IRF532/IRFP132	100	—	—	V	$V_{GS}=0V$ $I_D=250\mu A$
	IRF531/IRFP131 IRF533/IRFP133	80	—	—	V	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS}=V_{GS}$, $I_D=250\mu A$
I_{GSS}	Gate-Source Leakage Forward	—	—	100	nA	$V_{GS}=20V$
I_{GSS}	Gate-Source Leakage Reverse	—	—	-100	nA	$V_{GS}=-20V$
I_{DSS}	Zero Gate Voltage Drain Current	—	—	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-Source Current (2) IRF530/IRFP130 IRF531/IRFP131	14	—	—	A	$V_{DS} \geq 3.2V$, $V_{GS}=10V$
	IRF532/IRFP132 IRF533/IRFP133	12	—	—	A	
$R_{DS(on)}$	Static Drain-Source On-State Resistance (2) IRF530/IRFP130 IRF531/IRFP131	—	0.10	0.16	Ω	$V_{GS}=10V$, $I_D=8.3A$
	IRF532/IRFP132 IRF533/IRFP133	—	0.16	0.23	Ω	
g_{fs}	Forward Transconductance (2)	5.1	7.6	—	V	$V_{DS} \geq 50V$, $I_D=8.3A$
C_{iss}	Input Capacitance	—	640	—	pF	$V_{GS}=0V$, $V_{DS}=25V$, $f=1.0\text{MHz}$
C_{oss}	Output Capacitance	—	240	—	pF	
C_{rss}	Reverse Transfer Capacitance	—	72	—	pF	
$t_{d(on)}$	Turn-On Delay Time	—	10	15	ns	$V_{DD}=0.5BV_{DSS}$, $I_D=8.3A$, $Z_\theta=12\Omega$ (MOSFET switching times are essentially independent of operating temperature)
t_r	Rise Time	—	34	51	ns	
$t_{d(off)}$	Turn-Off Delay Time	—	23	35	ns	
t_f	Fall Time	—	24	36	ns	
Q_g	Total Gate Charge (Gate-Source Plus Gate-Drain)	—	17	26	nC	$V_{GS}=10V$, $I_D=14A$, $V_{DS}=0.8 \text{ Max. Rating}$ (Gate charge is essentially independent of operating temperature.)
Q_{gs}	Gate-Source Charge	—	3.7	5.5	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	—	7	11	nC	

THERMAL RESISTANCE

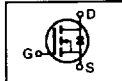
Symbol	Characteristic		IRF530-3	IRFP130-3	Unit	
R_{thJC}	Junction-to-Case	MAX	1.62	1.62	K/W	
R_{thCS}	Case-to-Sink	TYP	0.5	0.24	K/W	Mounting surface flat, smooth, and greased
R_{thJA}	Junction-to-Ambient	MAX	80	40	K/W	Free Air Operation

Notes: (1) $T_J=25^\circ\text{C}$ to 150°C

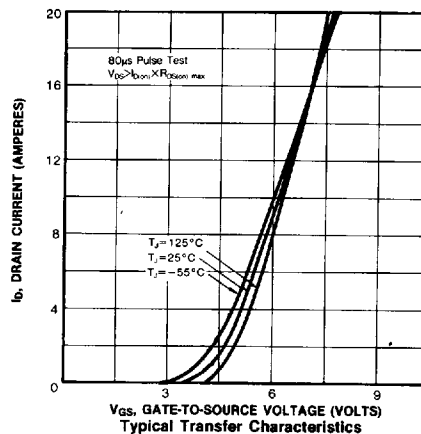
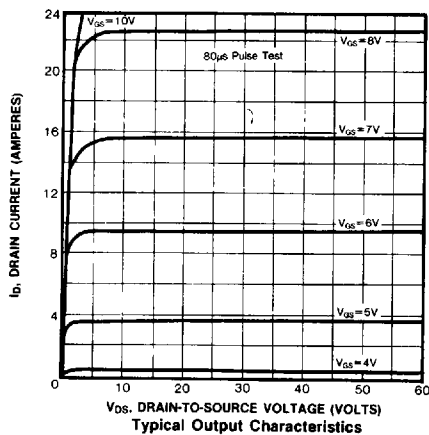
(2) Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

(3) Repetitive rating: Pulse width limited by max. junction temperature

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SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

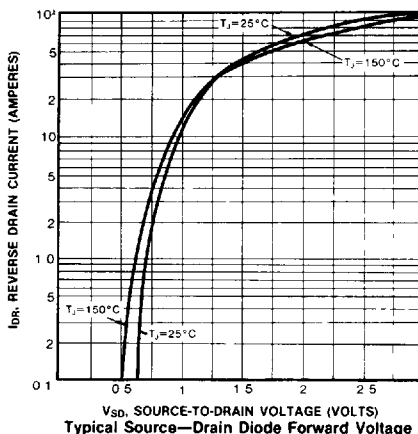
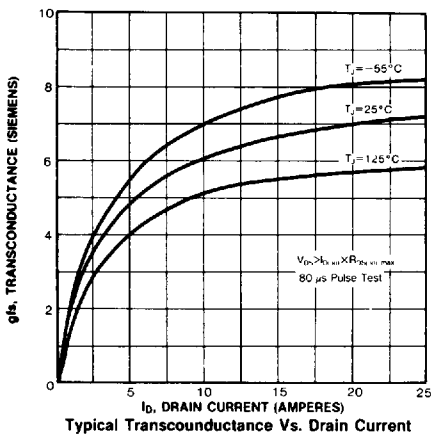
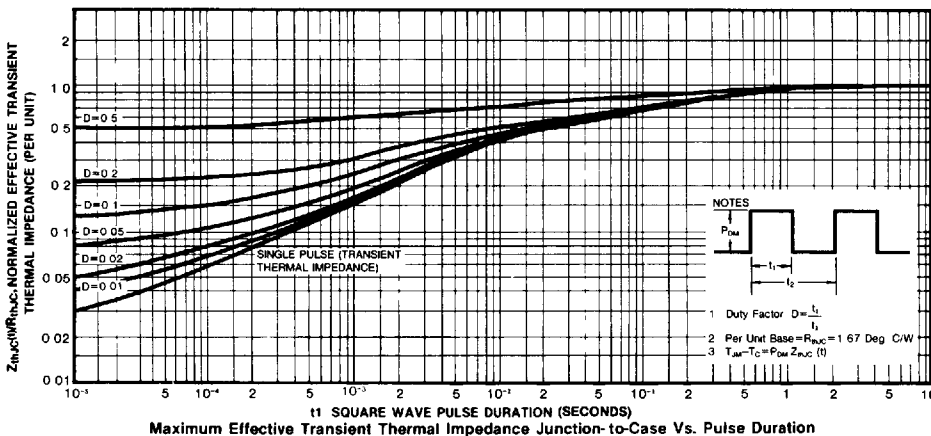
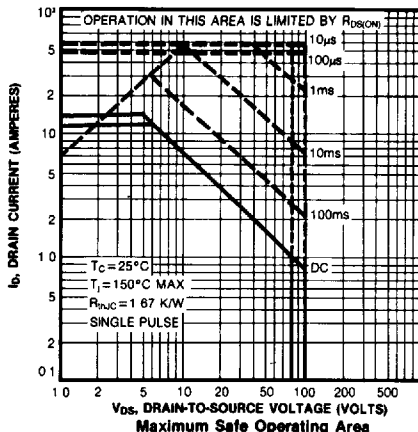
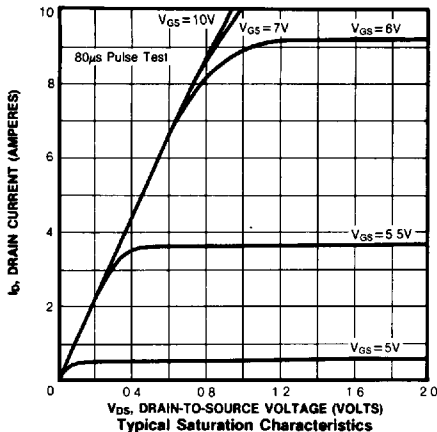
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode) IRF530/IRFP130 IRF531/IRFP131	—	—	14	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
	IRF532/IRFP132 IRF533/IRFP133	—	—	12	A	
I_{SM}	Pulse Source Current(Body Diode)(3) IRF530/IRFP130 IRF531/IRFP131	—	—	56	A	
	IRF532/IRFP132 IRF533/IRFP133	—	—	48	A	
V_{SD}	Diode Forward Voltage (2) IRF530/IRFP130 IRF531/IRFP131	—	—	2.5	V	$T_C=25^\circ\text{C}$, $I_S=14\text{A}$, $V_{GS}=0\text{V}$
	IRF532/IRFP132 IRF533/IRFP133	—	—	2.3	V	$T_C=25^\circ\text{C}$, $I_S=12\text{A}$, $V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	—	120	250	ns	$T_J=25^\circ\text{C}$, $I_F=14\text{A}$, $dI_F/dt=100\text{A}/\mu\text{S}$

Notes: (1) $T_J=25^\circ\text{C}$ to 150°C (2) Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
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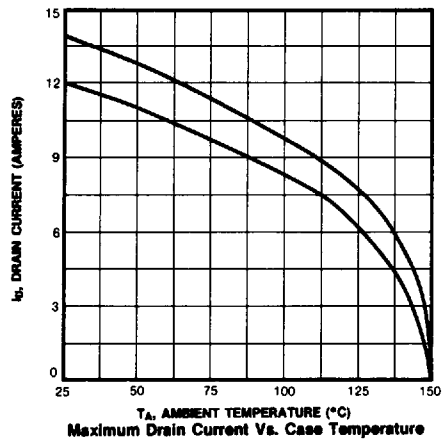
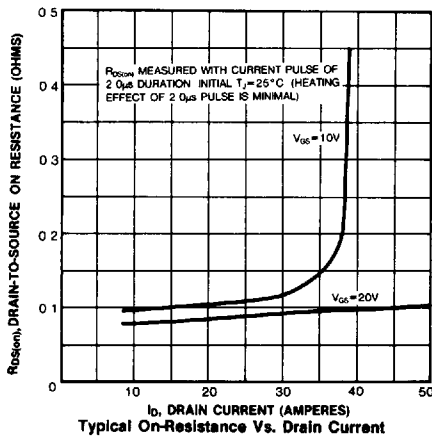
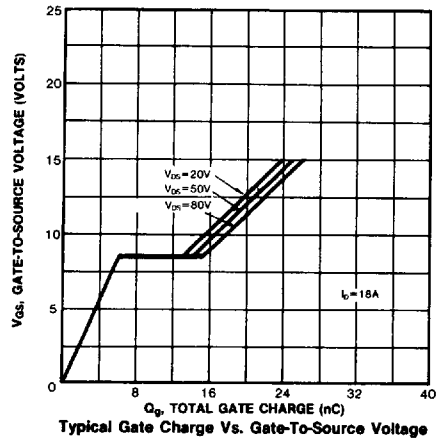
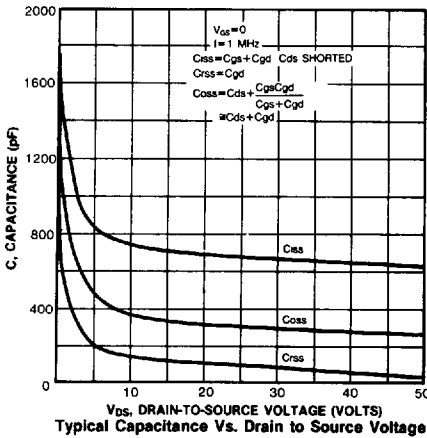
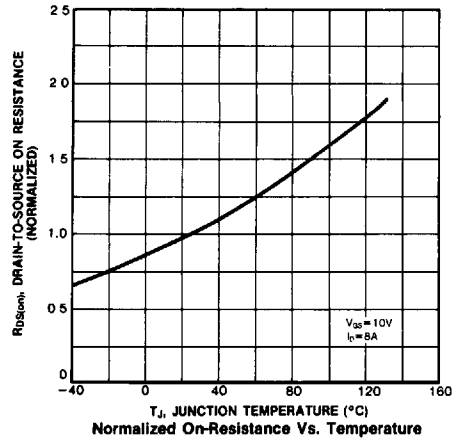
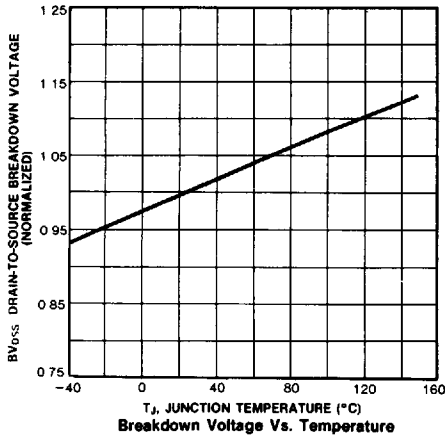
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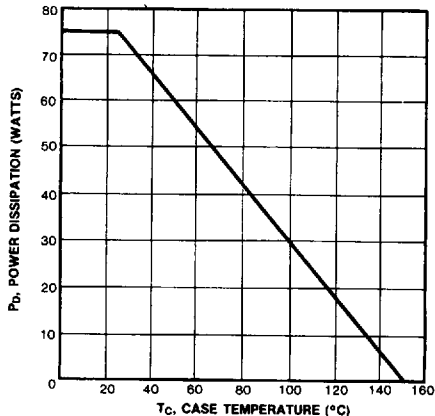
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Power Vs. Temperature Derating Curve

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