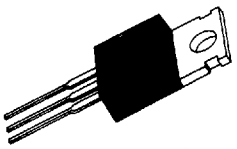
IRF530/531/532/533
IRFP130/131/132/133

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

TO-220



IRF530/531/532/533

TO-3P

IRFP130/131/132/133

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

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}=1.0MΩ)(1)	V_{DGR}	100	80	100	80	Vdc
Gate-Source Voltage	V_{GS}	±20				Vdc
Continuous Drain Current T_C=25°C	I_D	14	14	12	12	Adc
Continuous Drain Current T_C=100°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°C Derate above 25°C	P_D	77 0.62				Watts W/°C
Operating and Storage Junction to Case	T_J, Tstg	−55 to 150				°C
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T_L	300				°C

Notes: (1) T_J=25°C to 150°C
(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating: Pulse with limited by max. junction temperature
(4) L=0.53 mH, V_{dd}=25V, R_G=25Ω, Starting T_j=25°C

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N-CHANNEL POWER MOSFETS

ELECTRICAL CHARACTERISTICS (T_C=25°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=250μA
	IRF531/IRFP131 IRF533/IRFP133	80	—	—	V	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS}=V_{GS}, I_D=250μA
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}=Max. Rating, V_{GS}=0V
		—	—	1000	μA	V_{DS}=Max. Rating×0 8, V_{GS}=0V, T_C=125°C
$I_{D(on)}$	On-State Drain-Source Current (2) IRF530/IRFP130 IRF531/IRFP131	14	—	—	A	V_{DS}≥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_{DS}≥50V, I_D=8.3A
C_{iss}	Input Capacitance	—	640	—	pF	V_{GS}=0V, V_{DS}=25V, f=1.0MHz
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_O=12Ω (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 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°C to 150°C
(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating: Pulse width limited by max. junction temperature

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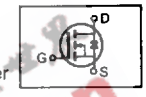
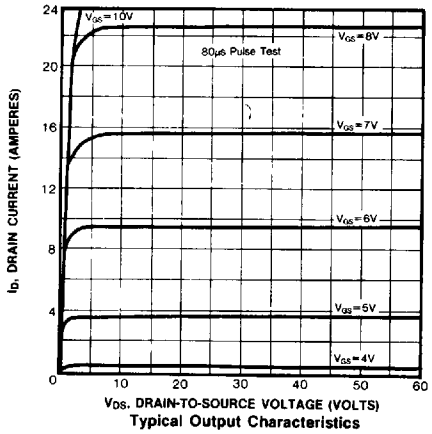
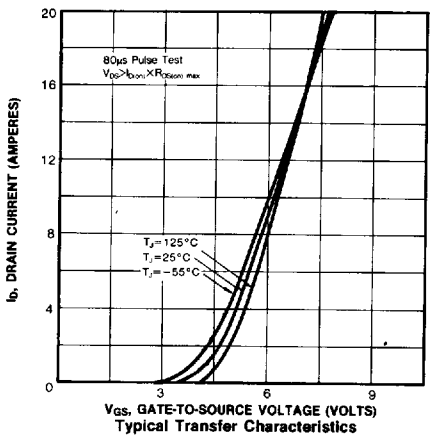
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode) IRF530/IRFP130 IRF531/IRFP131	—	—	14	A	
	IRF532/IRFP132 IRF533/IRFP133	—	—	12	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
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°C, I_S=14A, V_{GS}=0V
	IRF532/IRFP132 IRF533/IRFP133	—	—	2.3	V	T_C=25°C, I_S=12A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	120	250	ns	T_J=25°C, I_F=14A, dI_F/dt=100A/μS

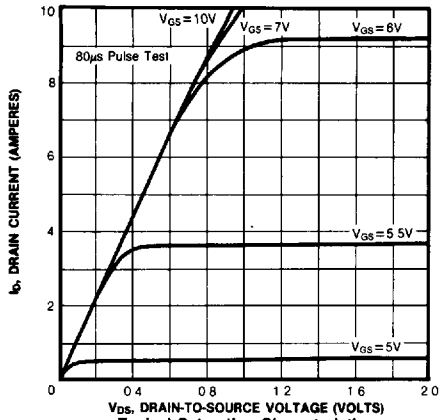
Notes: (1) T_J=25°C to 150°C (2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating: Pulse with limited by max junction temperature



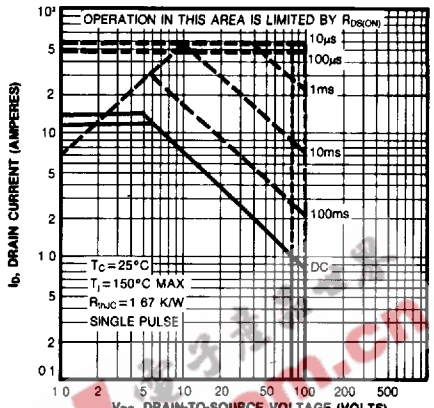
Typical Output Characteristics



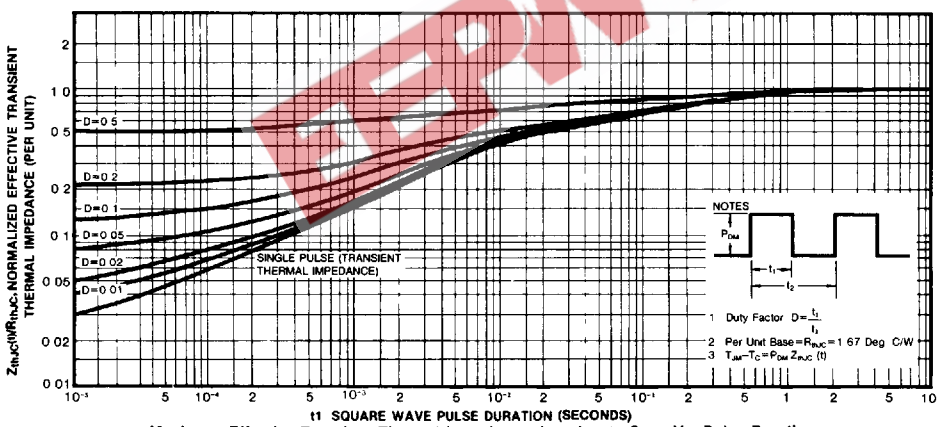
Typical Transfer Characteristics



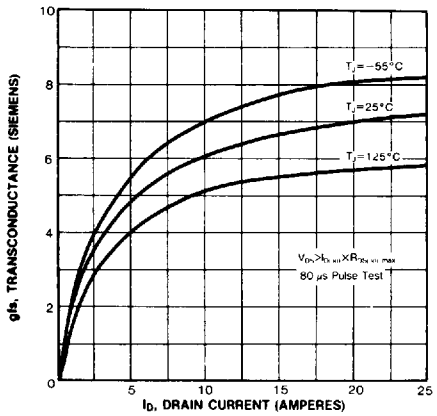
Typical Saturation Characteristics



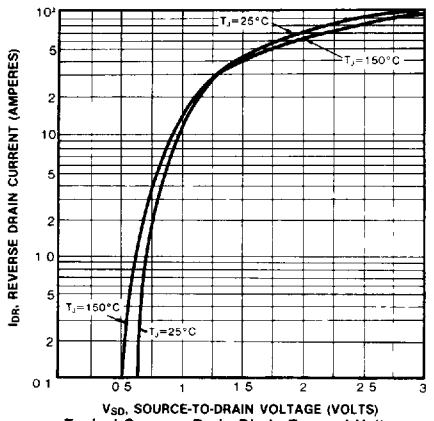
Maximum Safe Operating Area



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



Typical Transcounductance Vs. Drain Current



Typical Source—Drain Diode Forward Voltage

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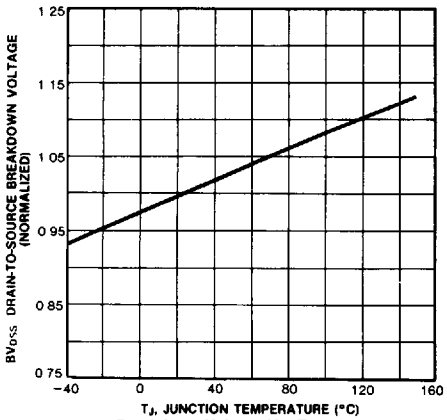
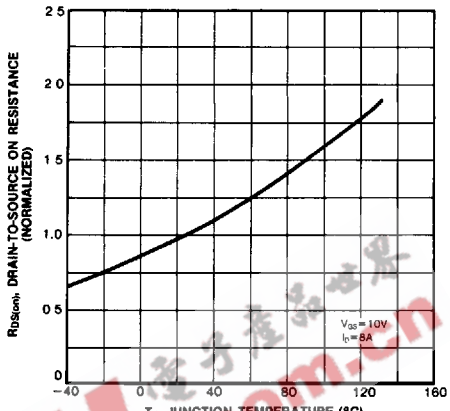
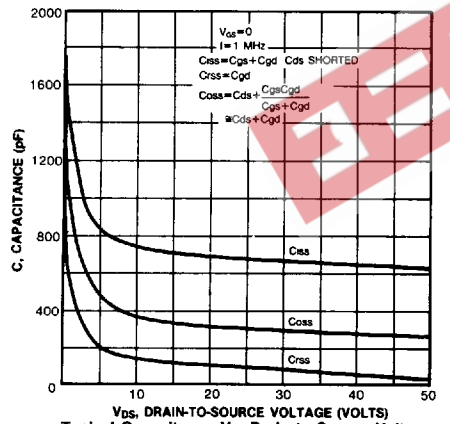


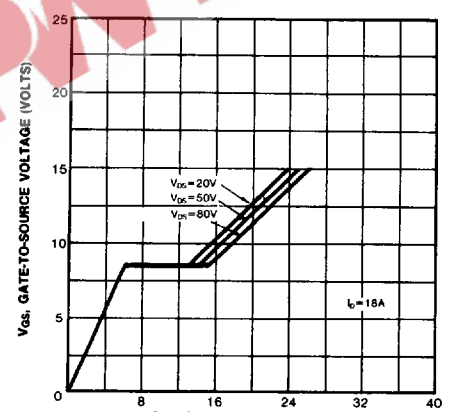
Breakdown Voltage Vs. Temperature



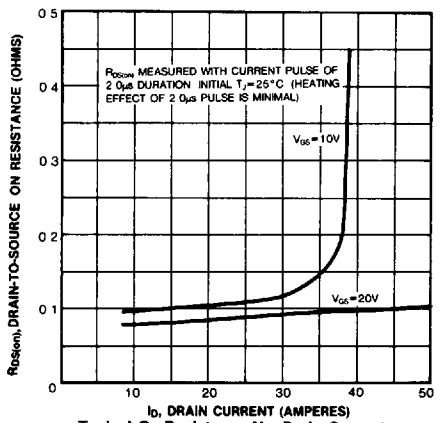
Normalized On-Resistance Vs. Temperature



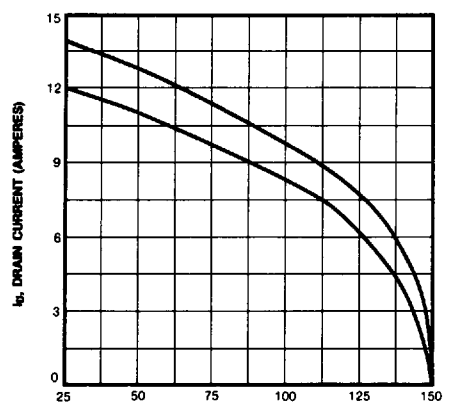
Typical Capacitance Vs. Drain to Source Voltage



Typical Gate Charge Vs. Gate-To-Source Voltage



Typical On-Resistance Vs. Drain Current



Maximum Drain Current Vs. Case Temperature

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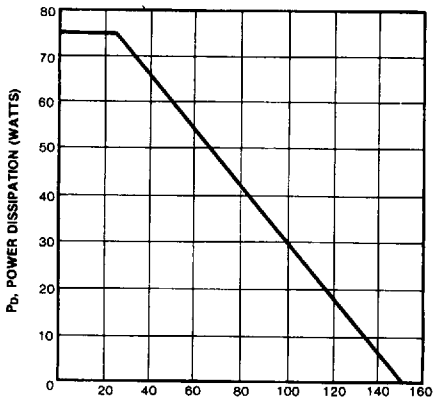

Power Vs. Temperature Derating Curve