

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

## N-CHANNEL POWER MOSFETS

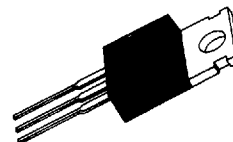
### FEATURES

- 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

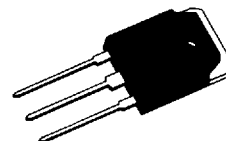
Part Number	$V_{DS}$	$R_{DS(on)}$	$I_D$
IRF530/IRFP130	100V	$0.16\Omega$	14A
IRF531/IRFP131	80V	$0.16\Omega$	14A
IRF532/IRFP132	100V	$0.23\Omega$	12A
IRF533/IRFP133	80V	$0.23\Omega$	12A

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	$V_{GS}$	$\pm 20$				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	$I_{GM}$	$\pm 1.5$				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  $T_J=25^\circ C$

**IRF530/531/532/533**  
**IRFP130/131/132/133**
**N-CHANNEL**  
**POWER MOSFETS**
**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	$\mu A$	$V_{DS}=\text{Max. Rating}$ , $V_{GS}=0V$
		—	—	1000	$\mu A$	$V_{DS}=\text{Max. Rating} \times 0.8$ , $V_{GS}=0V$ , $T_C=125^\circ\text{C}$
$I_{D(on)}$	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	$\Omega$	$V_{GS}=10V$ , $I_D=8.3A$
	IRF532/IRFP132 IRF533/IRFP133	—	0.16	0.23	$\Omega$	
$g_{fs}$	Forward Transconductance (2)	5.1	7.6	—	$\text{V}$	$V_{DS} \geq 50V$ , $I_D=8.3A$
$C_{iss}$	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**

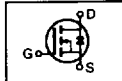
Symbol	Characteristic		IRF530-3	IRFP130-3	Unit	
$R_{thJC}$	Junction-to-Case	MAX	1.62	1.62	K/W	
$R_{thCS}$	Case-to-Sink	TYP	0.5	0.24	K/W	Mounting surface flat, smooth, and greased
$R_{thJA}$	Junction-to-Ambient	MAX	80	40	K/W	Free Air Operation

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

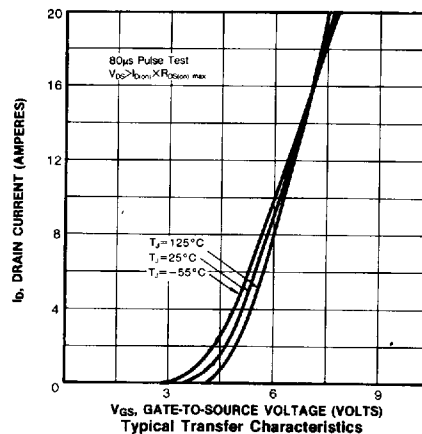
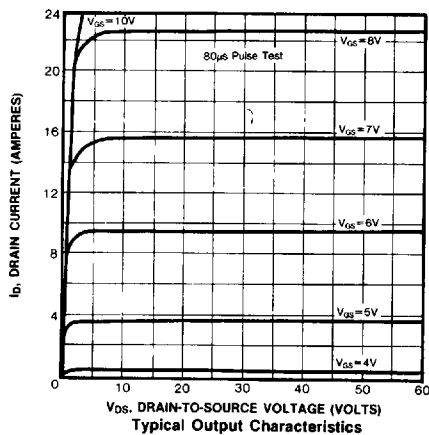
(2) Pulse test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

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

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**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

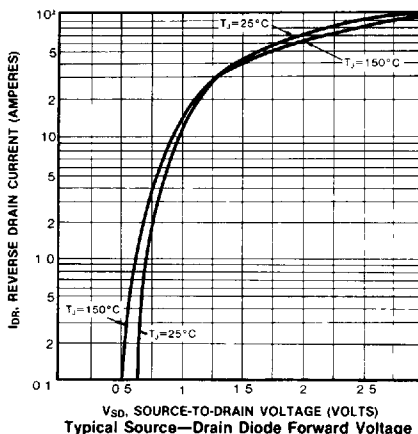
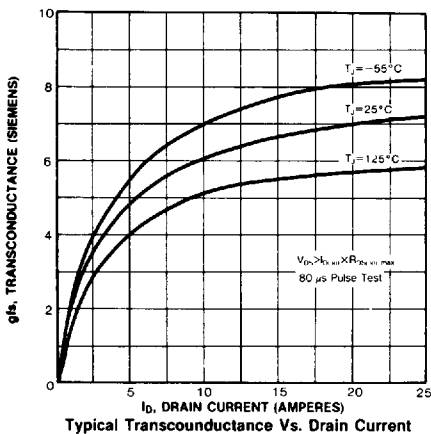
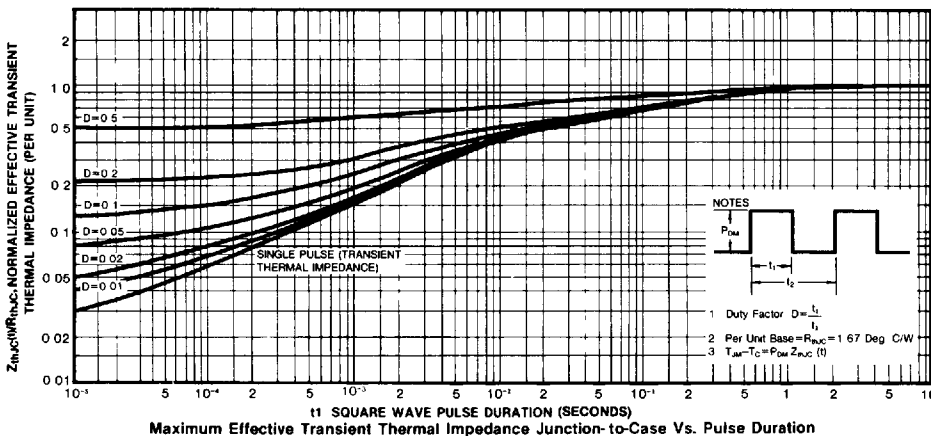
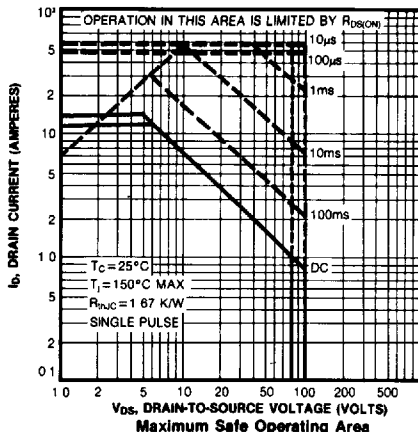
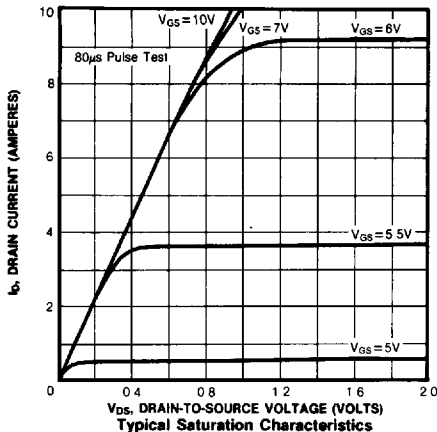
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode) IRF530/IRFP130 IRF531/IRFP131	—	—	14	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
	IRF532/IRFP132 IRF533/IRFP133	—	—	12	A	
$I_{SM}$	Pulse Source Current(Body Diode)(3) 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  $150^\circ\text{C}$  (2) Pulse test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$   
 (3) Repetitive rating: Pulse with limited by max junction temperature



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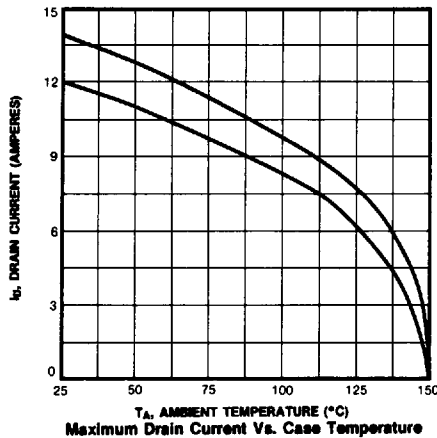
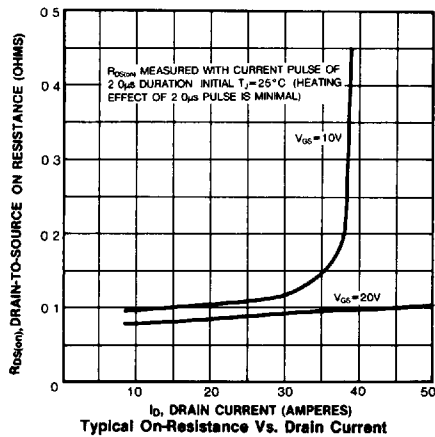
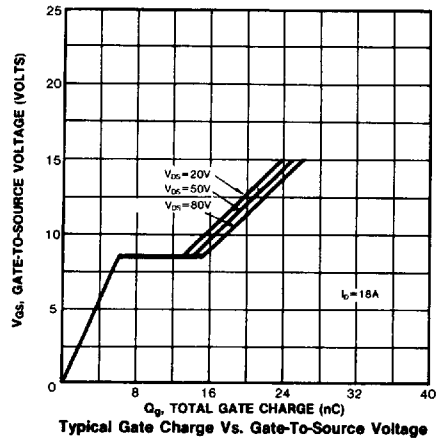
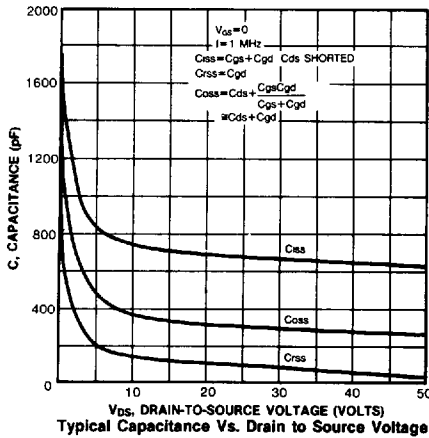
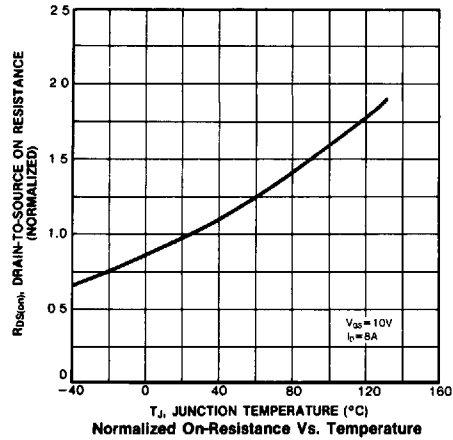
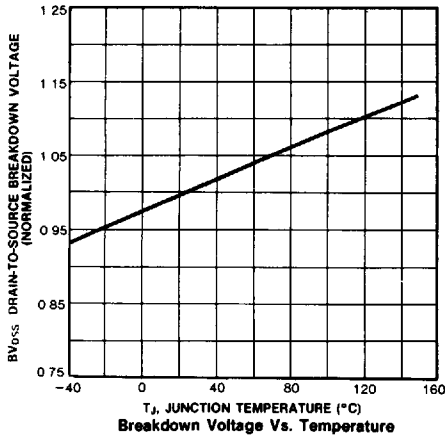
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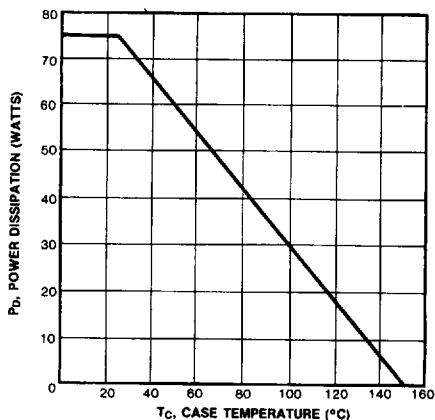
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Power Vs. Temperature Derating Curve

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