

New Jersey Semi-Conductor Products, Inc.

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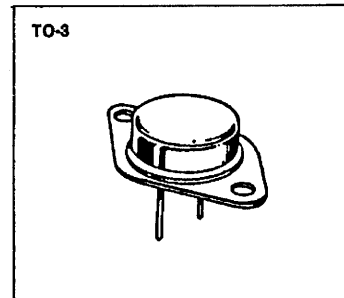
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IRF230/231/232/233

**N-CHANNEL
 POWER MOSFETS**

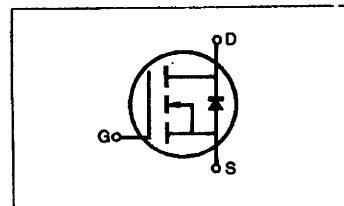
FEATURES

- Low $R_{DS(on)}$
- Improved inductive ruggedness
- Fast switching times
- Rugged polysilicon gate cell structure
- Low input capacitance
- Extended safe operating area
- Improved high temperature reliability
- TO-3 package (Standard)



PRODUCT SUMMARY

Part Number	V _{DS}	R _{DS(on)}	I _D
IRF230	200V	0.4Ω	9.0A
IRF231	150V	0.4Ω	9.0A
IRF232	200V	0.6Ω	8.0A
IRF233	150V	0.6Ω	8.0A



MAXIMUM RATINGS

Characteristic	Symbol	IRF230	IRF231	IRF232	IRF233	Unit
Drain-Source Voltage (1)	V _{DS}	200	150	200	150	Vdc
Drain-Gate Voltage (R _{GS} =1.0MΩ) (1)	V _{DGR}	200	150	200	150	Vdc
Gate-Source Voltage	V _{GS}	±20				Vdc
Continuous Drain Current T _C =25°C	I _D	9.0	9.0	8.0	8.0	Adc
Continuous Drain Current T _C =100°C	I _D	6.0	6.0	5.0	5.0	Adc
Drain Current—Pulsed (3)	I _{DM}	36	36	32	32	Adc
Gate Current—Pulsed	I _{GM}	±1.5				Adc
Total Power Dissipation @ T _C =25°C Derate above 25°C	P _D	75 0.6				Watts W/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-55 to 150				°C
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T _L	300				°C



Quality Semi-Conductors

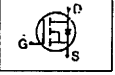
ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Drain-Source Breakdown Voltage	BV_{DSS}	IRF230	200	--	--	V	$V_{GS}=0V$ $I_D=250\mu A$
		IRF232					
		IRF231	150	--	--	V	
		IRF233					
Gate Threshold Voltage	$V_{GS(th)}$	ALL	2.0	--	4.0	V	$V_{DS}=V_{GS}$, $I_D=250\mu A$
Gate-Source Leakage Forward	I_{GSS}	ALL	--	--	100	nA	$V_{GS}=20V$
Gate-Source Leakage Reverse	I_{GSS}	ALL	--	--	-100	nA	$V_{GS}=-20V$
Zero Gate Voltage Drain Current	I_{DSS}	ALL	--	--	250	μA	$V_{DS}=\text{Max. Rating}$, $V_{GS}=0V$
			--	--	1000	μA	$V_{DS}=\text{Max. Rating}\times 0.8$, $V_{GS}=0V$, $T_C=125^\circ\text{C}$
On-State Drain-Source Current (2)	$I_{D(on)}$	IRF230	9.0	--	--	A	$V_{DS}>I_{D(on)}\times R_{DS(on)}$ max., $V_{GS}=10V$
		IRF231					
		IRF232 IRF233	8.0	--	--	A	
Static Drain-Source On-State Resistance (2)	$R_{DS(on)}$	IRF230	--	0.25	0.4	Ω	$V_{GS}=10V$, $I_D=5.0A$
		IRF231					
		IRF232	--	0.4	0.6	Ω	
		IRF233					
Forward Transconductance (2)	g_{fs}	ALL	3.0	4.6	--	S	$V_{DS}>I_{D(on)}\times R_{DS(on)}$ max., $I_D=5.0A$
Input Capacitance	C_{iss}	ALL	--	720	800	pF	$V_{GS}=0V$, $V_{DS}=25V$, $f=1.0\text{MHz}$
Output Capacitance	C_{oss}	ALL	--	250	450	pF	
Reverse Transfer Capacitance	C_{rse}	ALL	--	80	150	pF	
Turn-On Delay Time	$t_{d(on)}$	ALL	--	--	30	ns	
Rise Time	t_r	ALL	--	--	50	ns	$V_{DD}=0.5BV_{DSS}$, $I_D=5.0A$, $Z_0=15\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
Turn-Off Delay Time	$t_{d(off)}$	ALL	--	--	50	ns	
Fall Time	t_f	ALL	--	--	40	ns	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q_g	ALL	--	19	30	nC	$V_{GS}=10V$, $I_D=12A$, $V_{DS}=0.8$ Max. Rating (Gate charge is essentially independent of operating temperature.)
Gate-Source Charge	Q_{gs}	ALL	--	5.0	--	nC	
Gate-Drain ("Miller") Charge	Q_{gd}	ALL	--	14	--	nC	

THERMAL RESISTANCE

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

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Continuous Source Current (Body Diode)	I_S	IRF230	—	—	9.0	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
		IRF231	—	—	9.0	A	
		IRF232	—	—	8.0	A	
Pulse Source Current (Body Diode) (3)	I_{SM}	IRF230	—	—	36	A	
		IRF231	—	—	36	A	
		IRF232	—	—	32	A	
Diode Forward Voltage (2)	V_{SD}	IRF230	—	—	2.0	V	$T_C=25^\circ\text{C}$, $I_S=9.0\text{A}$, $V_{GS}=0\text{V}$
		IRF231	—	—	2.0	V	$T_C=25^\circ\text{C}$, $I_S=9.0\text{A}$, $V_{GS}=0\text{V}$
		IRF232	—	—	1.8	V	$T_C=25^\circ\text{C}$, $I_S=8.0\text{A}$, $V_{GS}=0\text{V}$
Reverse Recovery Time	t_{rr}	ALL	—	450	—	ns	$T_J=150^\circ\text{C}$, $I_F=9.0\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$