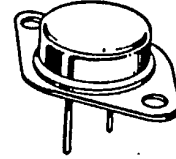


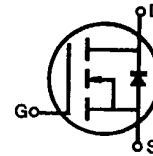
IRF220/221/222/223**N-CHANNEL
POWER MOSFETS****FEATURES**

- 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)

TO-3

**PRODUCT SUMMARY**

Part Number	V _{DS}	R _{DS(on)}	I _D
IRF220	200V	0.80Ω	5.0A
IRF221	150V	0.80Ω	5.0A
IRF222	200V	1.2Ω	4.0A
IRF223	150V	1.2Ω	4.0A

**MAXIMUM RATINGS**

Characteristic	Symbol	IRF220	IRF221	IRF222	IRF223	Unit
Drain-Source Voltage (1)	V _{DSS}	200	150	200	150	V _{dc}
Drain-Gate Voltage (R _{GS} =1.0MΩ) (1)	V _{DGR}	200	150	200	150	V _{dc}
Gate-Source Voltage	V _{GS}	±20				V _{dc}
Continuous Drain Current T _C =25°C	I _D	5.0	5.0	4.0	4.0	A _{dc}
Continuous Drain Current T _C =100°C	I _D	3.0	3.0	2.0	2.0	A _{dc}
Drain Current—Pulsed (3)	I _{DM}	20	20	16	16	A _{dc}
Gate Current—Pulsed	I _{GM}	±1.5				A _{dc}
Total Power Dissipation @ T _C =25°C Derate above 25°C	P _D	40 0.32				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

- 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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N-CHANNEL
POWER MOSFETSELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise specified)

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Drain-Source Breakdown Voltage	BV _{DSS}	IRF220 IRF222	200	—	—	V	V _{GS} =0V
		IRF221 IRF223	150	—	—	V	I _D =250μA
Gate Threshold Voltage	V _{GS(th)}	ALL	2.0	—	4.0	V	V _{DS} =V _{GS} , I _D =250μA
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} =Max. Rating, V _{GS} =0V
			—	—	1000	μA	V _{DS} =Max. Rating×0.8, V _{GS} =0V, T _C =125°C
On-State Drain-Source Current (2)	I _{D(on)}	IRF220 IRF221	5.0	—	—	A	V _{DS} >I _{D(on)} ×R _{DS(on) max.} , V _{GS} =10V
		IRF222 IRF223	4.0	—	—	A	
Static Drain-Source On-State Resistance (2)	R _{DS(on)}	IRF220 IRF221	—	0.4	0.8	Ω	V _{GS} =10V, I _D =2.5A
		IRF222 IRF223	—	0.8	1.2	Ω	
Forward Transconductance (2)	g _{fs}	ALL	1.3	2.8	—	Ω	V _{DS} >I _{D(on)} ×R _{DS(on) max.} , I _D =2.5A
Input Capacitance	C _{iss}	ALL	—	450	600	pF	V _{GS} =0V, V _{DS} =25V, f=1.0MHz
Output Capacitance	C _{oss}	ALL	—	150	300	pF	
Reverse Transfer Capacitance	C _{rss}	ALL	—	50	80	pF	
Turn-On Delay Time	t _{d(on)}	ALL	—	—	40	ns	
Rise Time	t _r	ALL	—	—	60	ns	V _{DD} =0.5BV _{DSS} , I _D =2.5A, Z _O =50Ω (MOSFET switching times are essentially independent of operating temperature.)
Turn-Off Delay Time	t _{d(off)}	ALL	—	—	100	ns	
Fall Time	t _f	ALL	—	—	60	ns	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q _g	ALL	—	12.5	15	nC	V _{GS} =10V, I _D =6.0A, V _{DS} =0.8 Max. Rating (Gate charge is essentially independent of operating temperature.)
Gate-Source Charge	Q _{gs}	ALL	—	4.0	—	nC	
Gate-Drain ("Miller") Charge	Q _{gd}	ALL	—	8.5	—	nC	

THERMAL RESISTANCE

Junction-to-Case	R _{thJC}	ALL	—	—	3.12	K/W	
Case-to-Sink	R _{thCS}	ALL	—	0.1	—	K/W	Mounting surface flat, smooth, and greased
Junction-to-Ambient	R _{thJA}	ALL	—	—	30	K/W	Free Air Operation

Notes: (1) T_J=25°C to 150°C

(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%

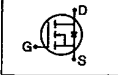
(3) Repetitive rating: Pulse width limited by max. junction temperature



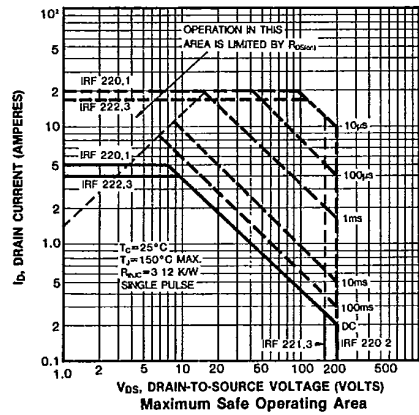
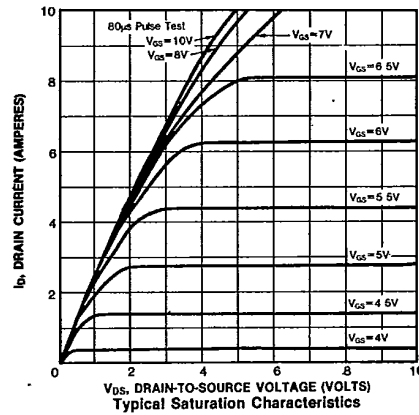
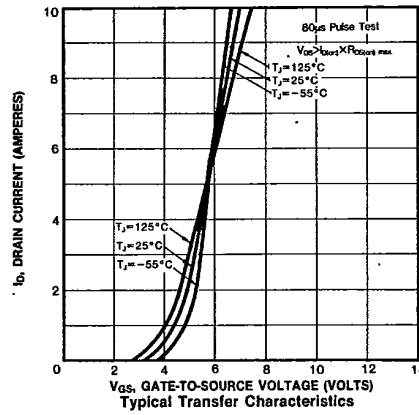
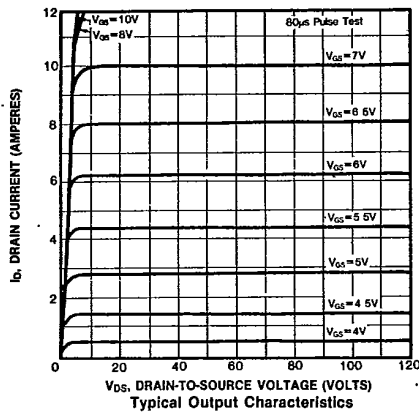
**N-CHANNEL
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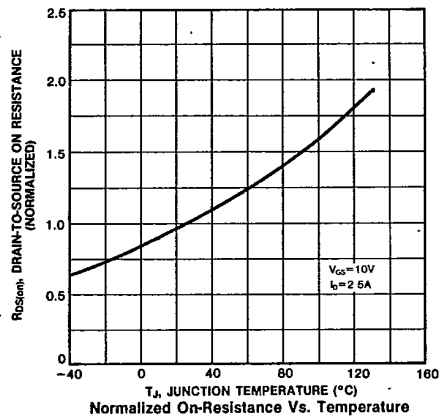
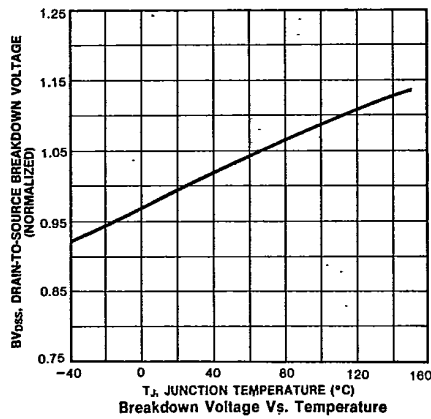
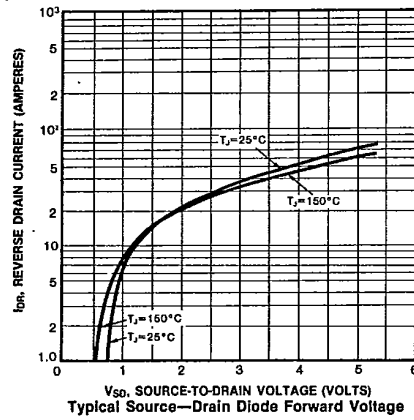
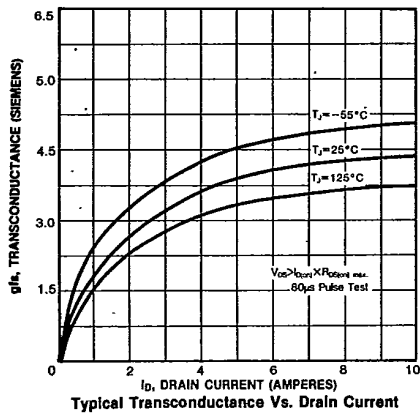
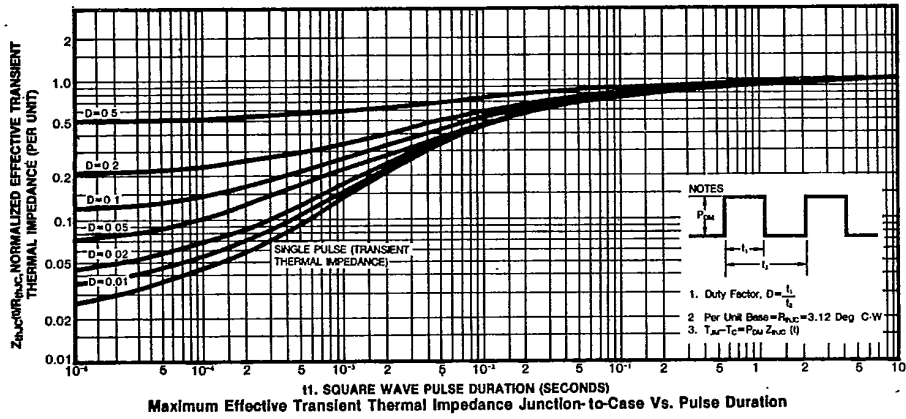
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SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Continuous Source Current (Body Diode)	I_S	IRF220 IRF221	—	—	5.0	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
		IRF222 IRF223	—	—	4.0	A	
Pulse Source Current (Body Diode) (3)	I_{SM}	IRF220 IRF221	—	—	20	A	
		IRF222 IRF223	—	—	16	A	
Diode Forward Voltage (2)	V_{SD}	IRF220 IRF221	—	—	2.0	V	$T_C=25^\circ\text{C}$, $I_S=5.0\text{A}$, $V_{GS}=0\text{V}$
		IRF222 IRF223	—	—	1.8	V	$T_C=25^\circ\text{C}$, $I_S=4.0\text{A}$, $V_{GS}=0\text{V}$
Reverse Recovery Time	t_{rr}	ALL	—	350	—	ns	$T_J=150^\circ\text{C}$, $I_F=5.0\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$

Notes: (1) $T_J=25^\circ\text{C}$ to 150°C (2) Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
 (3) Repetitive rating: Pulse width limited by max. junction temperature





IRF220/221/222/223

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