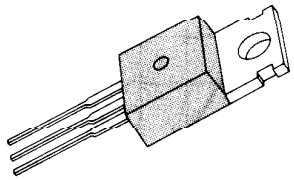
IRF9620/9621/9622/9623
IRFP9220/9221/9222/9223
IRF9220/9221/9222/9223

P-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



IRF9620/9621/9622/9623

PRODUCT SUMMARY

Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRF9620/IRFP9220/ IRF9220	−200V	1.5Ω	−3.5A
IRF9621/IRFP9221/ IRF9221	−150V	1.5Ω	−3.5A
IRF9622/IRFP9222/ IRF9222	−200V	2.4Ω	−3.0A
IRF9623/IRFP9223/ IRF9223	−150V	2.4Ω	−3.0A

MAXIMUM RATINGS

Characteristic	Symbol	IRF9620 IRFP9220 IRF9220	IRF9621 IRFP9221 IRF9221	IRF9622 IRFP9222 IRF9222	IRF9623 IRFP9223 IRF9223	Unit
Drain-Source Voltage (1)	V_{DSS}	−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	−3.5	−3.5	−3.0	−3.0	Adc
Continuous Drain Current T_C=100°C	I_D	−2.0	−2.0	−1.5	−1.5	Adc
Drain Current—Pulsed (3)	I_{DM}	−14	−14	−12	−12	Adc
Gate Current—Pulsed	I_{GM}	±1.5				Adc
Single Pulsed Avalanche Energy (4)	E_{AS}	270				mJ
Avalanche Current	I_{AS}	−3.5				A
Total Power Dissipation @ T_C=25°C Derate above 25°C	P_D	40 0.32				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=35mH, V_{dd}=−50V, R_G=25Ω, Starting T_J=25°C

ELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise specified)

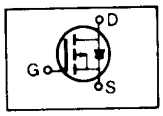
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage IRF9620/IRFP9220/IRF9220 IRF9622/IRFP9222/IRF9222	-200	—	—	V	V_{GS}=0V I_D=−250μA
	IRF9621/IRFP9221/IRF9221 IRF9623/IRFP9223/IRF9223	-150	—	—	V	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS}=V_{GS}, 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) IRF9620/IRFP9220/IRF9220 IRF9621/IRFP9221/IRF9221	-3.5	—	—	A	V_{DS}≤−8.4V, V_{GS}=−10V
	IRF9622/IRFP9222/IRF9222 IRF9623/IRFP9223/IRF9223	-3.0	—	—	A	
$R_{DS(on)}$	Static Drain-Source On-State Resistance (2) IRF9620/IRFP9220/IRF9220 IRF9621/IRFP9221/IRF9221	—	—	1.5	Ω	V_{GS}=−10V, I_D=−1.5A
	IRF9622/IRFP9222/IRF9222 IRF9623/IRFP9223/IRF9223	—	—	2.4	Ω	
g_{fs}	Forward Transconductance (2)	1.0	—	—	℧	V_{DS}≤−50V, I_D=−1.5A
C_{iss}	Input Capacitance	—	405	—	pF	V_{GS}=0V, V_{DS}=−25V, f=1.0MHz
C_{oss}	Output Capacitance	—	85.5	—	pF	
C_{rss}	Reverse Transfer Capacitance	—	27	—	pF	
$t_{d(on)}$	Turn-On Delay Time	—	—	40	ns	V_{DD}=0.5BV_{DSS}, I_D=−1.5A, Z_O=50Ω (MOSFET switching times are essentially independent of operating temperature)
t_r	Rise Time	—	—	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	—	—	50	ns	
t_f	Fall Time	—	—	40	ns	
Q_g	Total Gate Charge (Gate-Source Plus Gate-Drain)	—	—	22	nC	V_{GS}=−15V, I_D=−4.0A, V_{DS}=0.8 Max. Rating (Gate charge is essentially independent of operating temperature.)
Q_{gs}	Gate-Source Charge	—	—	9	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	—	—	13	nC	

THERMAL RESISTANCE

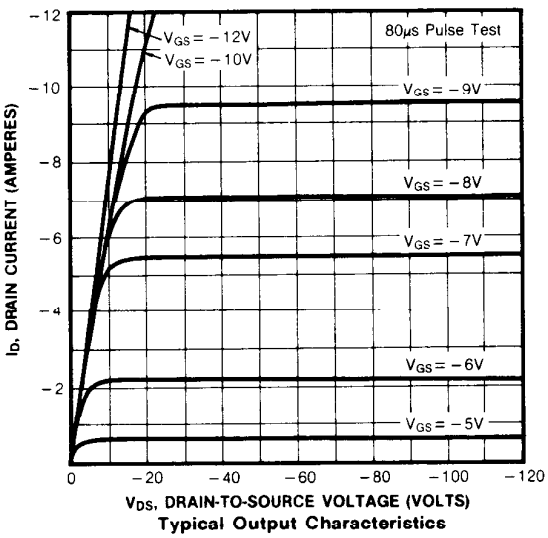
Symbol	Characteristic		IRF9620-3	IRFP9620-3	IRF9620-3	Unit	
R_{thJC}	Junction-to-Case	MAX	3.12	3.12	3.12	K/W	
R_{thCS}	Case-to-Sink	TYP	1.0	0.24	0.1	K/W	Mounting surface flat, smooth, and greased
R_{thJA}	Junction-to-Ambient	MAX	80	40	30	K/W	Free Air Operation

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

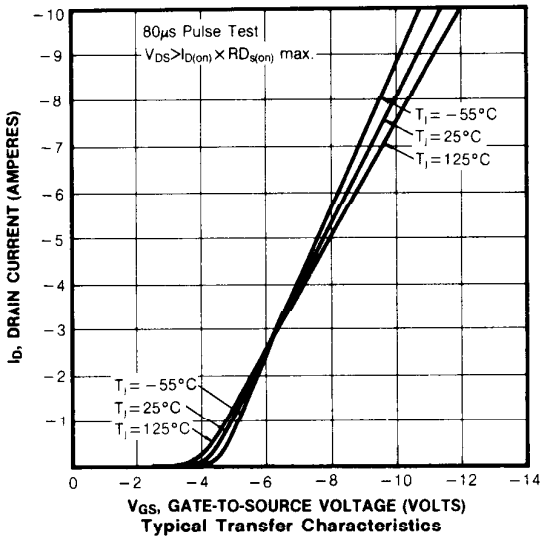
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode) IRF9620/IRFP9220/IRF9220 IRF9621/IRFP9221/IRF9221	—	—	−3.5	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
	IRF9622/IRFP9222/IRF9222 IRF9623/IRFP9223/IRF9223	—	—	−3.0	A	
I_{SM}	Pulse Source Current(Body Diode)(3) IRF9620/IRFP9220/IRF9220 IRF9621/IRFP9221/IRF9221	—	—	−14	A	
	IRF9622/IRFP9222/IRF9222 IRF9623/IRFP9223/IRF9223	—	—	−12	A	
V_{SD}	Diode Forward Voltage (2) IRF9620/IRFP9220/IRF9220 IRF9621/IRFP9221/IRF9221	—	—	−7.0	V	T_C=25°C, I_S=−3.5A, V_{GS}=0V
	IRF9622/IRFP9222/IRF9222 IRF9623/IRFP9223/IRF9223	—	—	−6.0	V	T_C=25°C, I_S=−3.0A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	300	—	ns	T_j=150°C, I_F=−3.5A, dI_F/dt=100A/μS

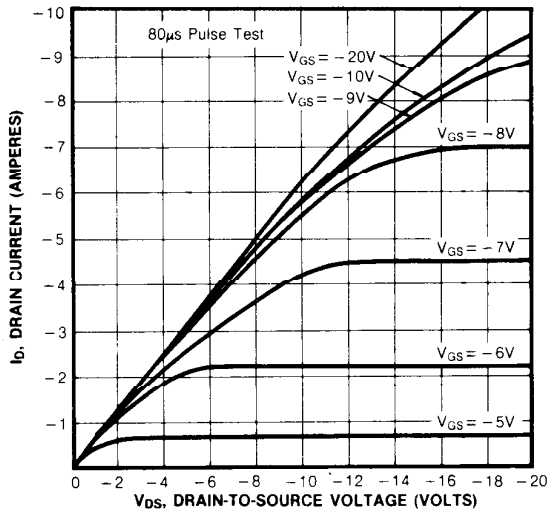
Notes: (1) T_J=25°C to 150°C (2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating: Pulse with limited by max. junction temperature



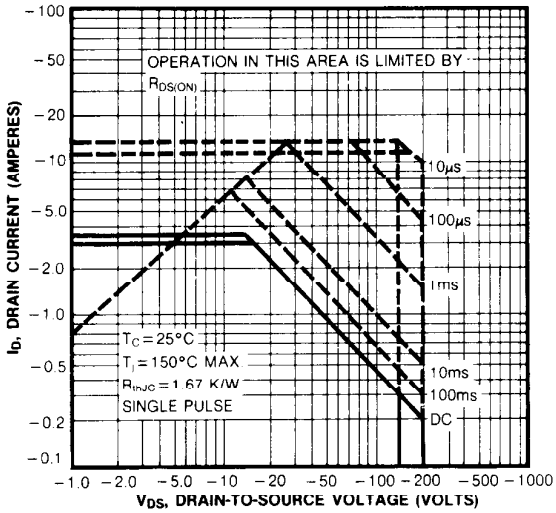
Typical Output Characteristics



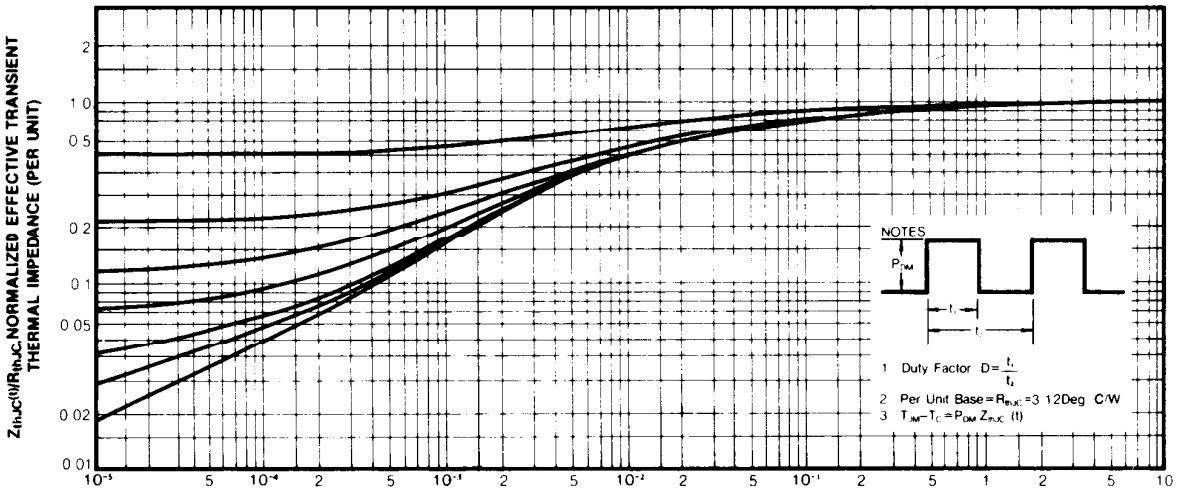
Typical Transfer Characteristics



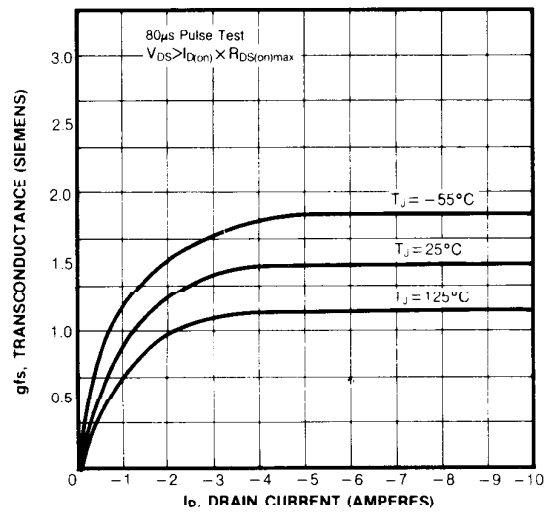
Typical Saturation Characteristics



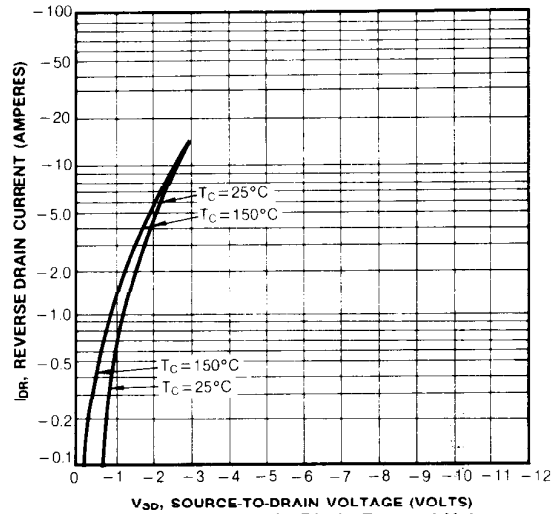
Maximum Safe Operating Area



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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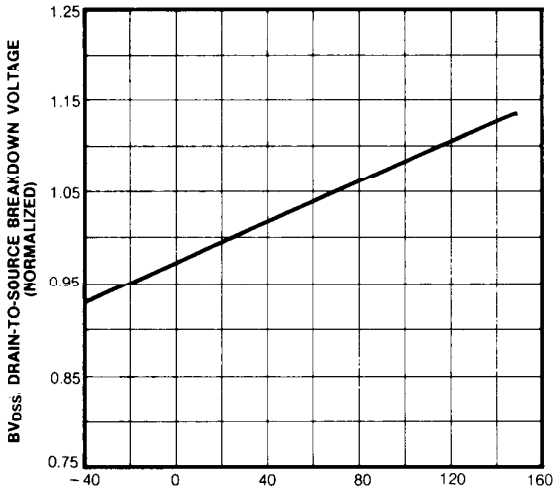
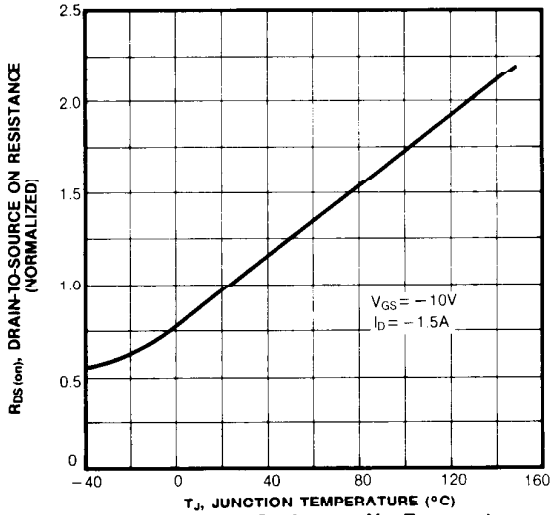
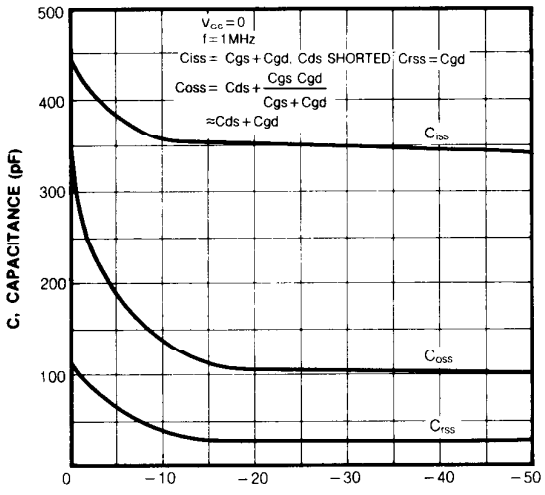


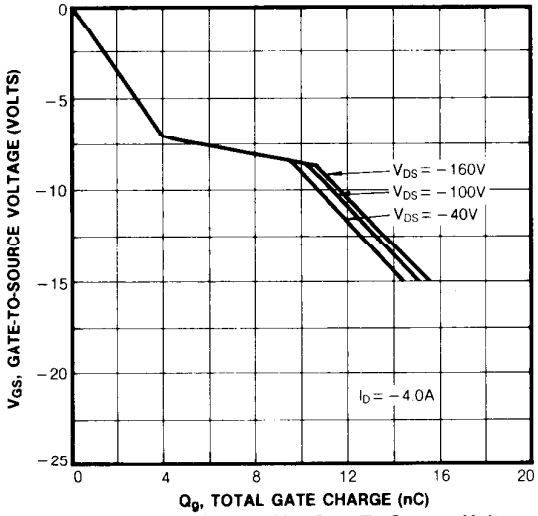
Breakdown Voltage Vs. Temperature



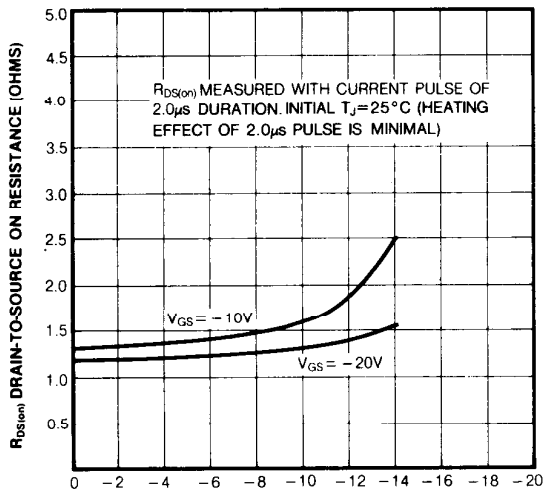
Normalized On-Resistance Vs. Temperature



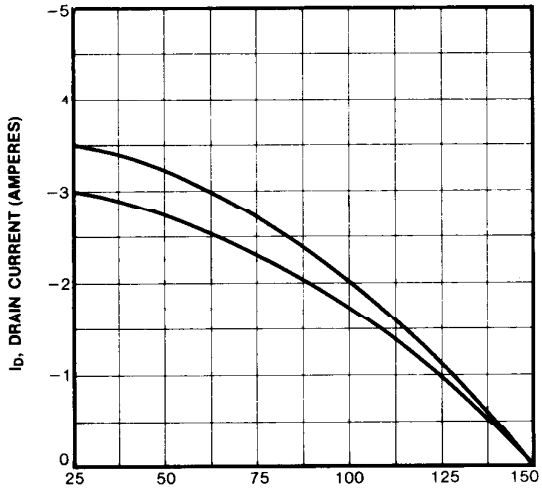
Typical Capacitance Vs. Drain to Source Voltage



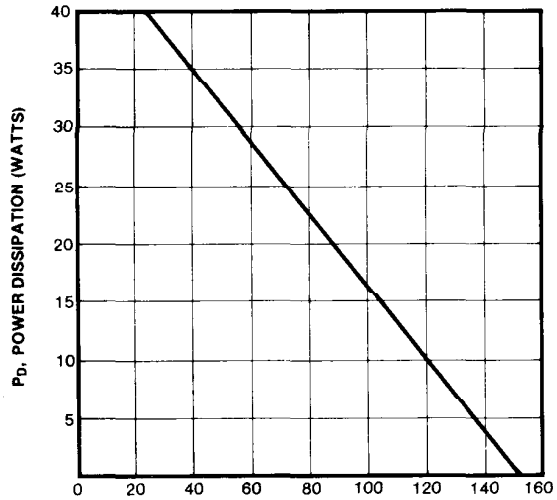
Typical Gate Charge Vs. Gate-To-Source Voltage



Typical On-Resistance Vs. Drain Current



Maximum Drain Current Vs. Case Temperature



Power Vs. Temperature Derating Curve