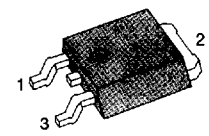
FEATURES

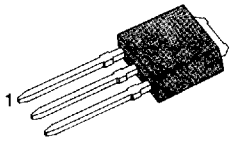
- **Lower $R_{DS(ON)}$**
- **Excellent voltage stability**
- **Fast switching speeds**
- **Rugged polysilicon gate cell structure**
- **Lower input capacitance**
- **Extended safe operating area**
- **Improved high temperature reliability**
- **D-PAK/I-PAK**

D-PAK



1.Gate 2.Drain 3.Source
IRLR220/221

I-PAK



1.Gate 2.Drain 3.Source
IRLU220/221

PRODUCT SUMMARY

Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRLR220/U220	200V	1.2Ω	4.0A
IRLR221/U221	150V	1.2Ω	4.0A

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	IRLR220/U220	IRLR221/U221	Unit
Drain-Source Voltage (1)	V_{DSS}	200	150	Vdc
Drain-Gate Voltage (R_{GS}=1MΩ)(1)	V_{DGR}	200	150	Vdc
Gate-Source Voltage	V_{GS}	±15		Adc
Continuous Drain Current T_C=25 °C	I_D	4.0		Adc
Continuous Drain Current T_C=100 °C	I_D	2.6		Adc
Drain Current - Pulsed (3)	I_{DM}	16		Adc
Total Power Dissipation @ T_C=25 °C	P_D	42		Watts
Derate Above 25 °C		0.33		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 junction temperature

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

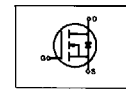
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage					
	IRLR220/U220	200	-	-	V	V_{GS}=0V, I_D=250μA
	IRLR221/U221	150	-	-	V	
$V_{GS(th)}$	Gate Threshold Voltage	1.0	-	2.0	V	V_{DS}=V_{GS}, I_D=1mA
I_{GSS}	Gate-Source Leakage Forward	-	-	100	nA	V_{GS}=15V
I_{GSS}	Gate-Source Leakage Reverse	-	-	-100	nA	V_{GS}=-15V
I_{DSS}	Zero Gate Voltage	-	-	250	μA	V_{DS}=Max. Rating, V_{GS}=0V
	Drain Current	-	-	1000	μA	V_{DS}=0.8 Max. Rating, V_{GS}=0V, T_C=125°C
$R_{DS(on)}$	Static Drain-Source On-Resistance(2)	-	-	1.2	Ω	V_{GS}=5.0V, I_D=2.0A
g_{fs}	Forward Transconductance (2)	3.0	-	-	Ʊ	V_{DS}≥25V, I_D=2.0A
C_{iss}	Input Capacitance	-	450	-	pF	V_{GS}=0V, V_{DS}=25V, f=1.0MHz
C_{oss}	Output Capacitance	-	140	-	pF	
C_{rss}	Reverse Transfer Capacitance	-	60	-	pF	
$t_{d(on)}$	Turn-On Delay Time	-	-	40	ns	V_{DD}=0.5 BV_{DSS}, I_D=4.0A, Z_O=24Ω
t_r	Rise Time	-	-	60	ns	(MOSFET switching times are essentially
$t_{d(off)}$	Turn-Off Delay Time	-	-	100	ns	independent of operating temperature)
t_f	Fall Time	-	-	15	ns	
Q_g	Total Gate Charge	-	-	2.0	nC	V_{GS}=5V, I_D=4.0A, V_{DS}=0.8 Max. Rating
	(Gate-Source Plus Gate-Drain)					(Gate charge is essentially independent of
Q_{gs}	Gate-Source Charge	-	8.5	-	nC	operating temperature)
Q_{gd}	Gate-Drain Charge	-	6.3	-	nC	

THERMAL RESISTANCE

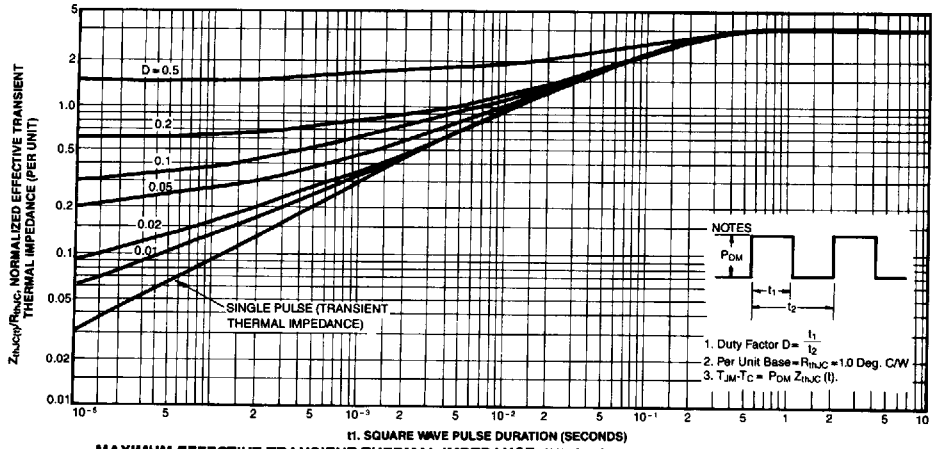
Symbol	Characteristics		All	Units	Remark
R_{thJC}	Junction-to-Case	MAX	3.0	K/W	
R_{thCS}	Case-to-Sink	TYP	1.7	K/W	Mounting surface flat, smooth and greased
R_{thJA}	Junction-to-Ambient	MAX	110	K/W	Free Air Operation

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

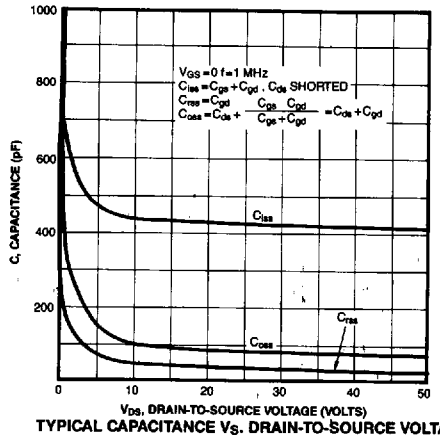
SOURCE-DRAIN DIODE RATING AND CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Units	Test Condition
I_S	Continuous Source Current (Body Diode)	—	—	4.0	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
I_{SM}	Pulse Source Current (Body Diode) (3)	—	—	16	A	
V_{SD}	Diode Forward Voltage (2)	—	—	1.8	V	T_J=25°C, I_S=4.0A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	400	—	ns	T_J=25°C, I_F=4.0A, dI_F/dt=100A/μS

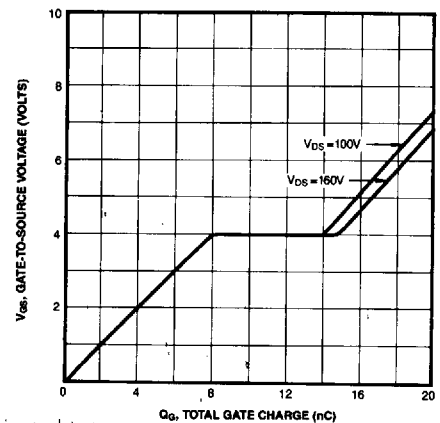
Notes: (1) T_J =25°C to 150°C
(2) Pulse test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
(3) Repetitive rating: Pulse width limited by max. junction temperature



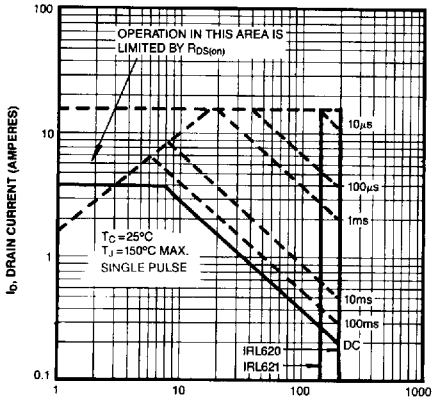
MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE JUNCTION-TO-CASE V_S. PULSE DURATION



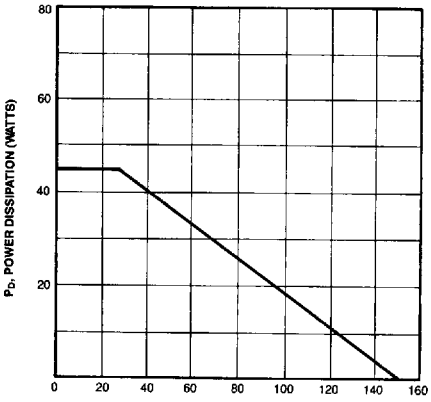
TYPICAL CAPACITANCE V_S. DRAIN-TO-SOURCE VOLTAGE



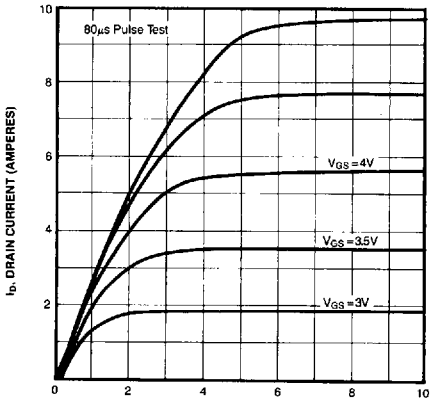
TYPICAL GATE CHARGE V_S. GATE-TO-SOURCE VOLTAGE



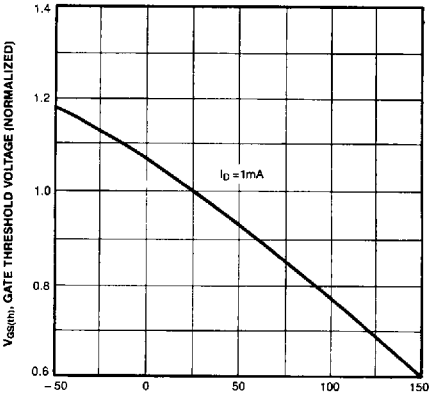
MAXIMUM SAFE OPERATING AREA



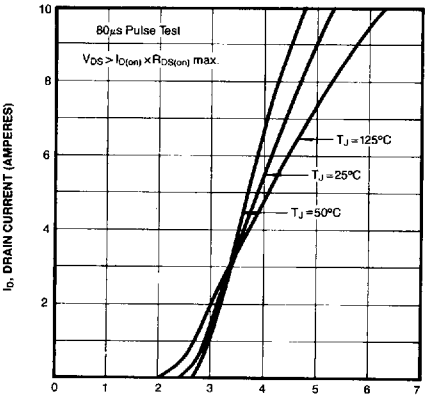
POWER V_S. TEMPERATURE DERATING CURVE



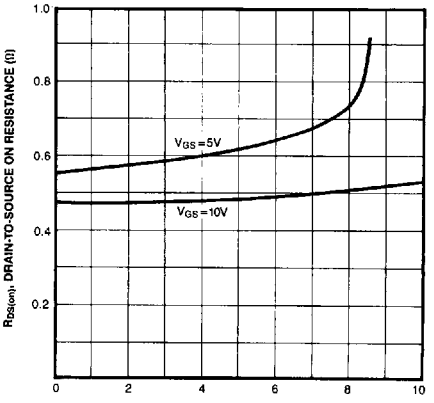
TYPICAL SATURATION CHARACTERISTICS



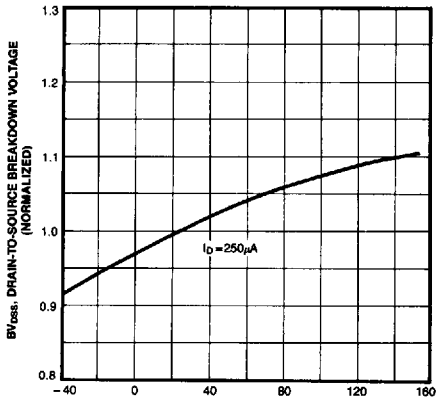
GATE-THRESHOLD VOLTAGE VARIATION WITH TEMPERATURE



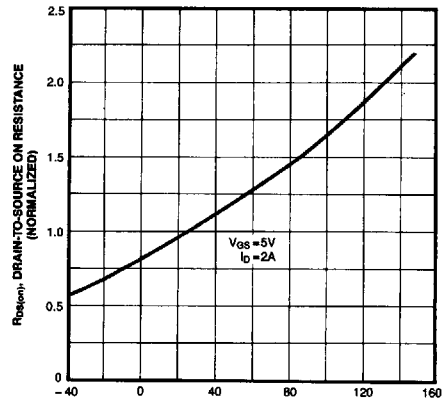
TYPICAL TRANSFER CHARACTERISTICS



TYPICAL ON-RESISTANCE V_S. DRAIN CURRENT



BREAKDOWN VOLTAGE VS. TEMPERATURE



NORMALIZED ON-RESISTANCE VS. TEMPERATURE