

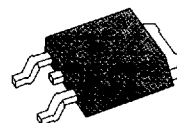
IRFR220/222
IRFU220/222
N-CHANNEL
POWER MOSFETS
FEATURES

- 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

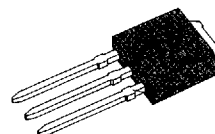
Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRFR220/U220	200V	0.80Ω	4.6A
IRFR222/U222	200V	1.2Ω	3.8A

D-PACK



IRFR220/222

I-PACK



IRFU220/222

MAXIMUM RATINGS

Characteristic	Symbol	IRFR220/U220	IRFR222/U222	Unit
Drain-Source Voltage (1)	V _{DSS}	200		V _{dc}
Drain-Gate Voltage (R _{GS} =1.0MΩ)(1)	V _{DGR}	200		V _{dc}
Gate-Source Voltage	V _{GS}	±20		V _{dc}
Continuous Drain Current T _C =25°C	I _D	4.6	3.8	A _{dc}
Continuous Drain Current T _C =100°C	I _D	2.9	2.4	A _{dc}
Drain Current—Pulsed (3)	I _{DM}	18	15	A _{dc}
Gate Current—Pulsed	I _{GM}	±1.5		A _{dc}
Single Pulsed Avalanche Energy (4)	E _{AS}	50		mJ
Avalanche Current	I _{AS}	4.6		A
Total Power Dissipation @ T _C =25°C	P _D	42		Watts
Derate above 25°C		0.33		
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) $T_J=25^\circ C$ 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) $L=4.5mH$, $V_{dd}=50V$, $R_G=25\Omega$, Starting $T_J=25^\circ C$

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

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV_{DS}	Drain-Source Breakdown Voltage	200	—	—		$V_{GS}=0V$ $I_D=250\mu A$
$V_{GS(th)}$	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	μA	$V_{DS}=\text{Max. Rating}$, $V_{GS}=0V$
		—	—	1000	μA	$V_{DS}=\text{Max. Rating} \times 0.8$, $V_{GS}=0V$, $T_C=125^\circ\text{C}$
$I_{D(on)}$	On-State Drain-Source Current (2) IRFR220/U220	4.6	—	—	A	$V_{DS}>I_{D(on)} \times R_{DS(on)max}$, $V_{GS}=10V$
	IRFR222/U222	3.8	—	—	A	
$R_{DS(on)}$	Static Drain-Source On-State Resistance (2) IRFR220/U220	—	—	0.8	Ω	$V_{GS}=10V$, $I_D=2.4A$
	IRFR222/U222	—	—	1.2	Ω	
g_{fs}	Forward Transconductance (2)	1.7	2.6	—	Ω	$V_{DS} \geq 50V$, $I_D=2.4A$
C_{iss}	Input Capacitance	—	400	—	pF	$V_{GS}=0V$, $V_{DS}=25V$, $f=1.0MHz$
C_{oss}	Output Capacitance	—	82	—	pF	
C_{rss}	Reverse Transfer Capacitance	—	32	—	pF	
$t_{d(on)}$	Turn-On Delay Time	—	8.8	13	ns	$V_{DD}=0.5BV_{DS}$, $I_D=5.1A$, $Z_O=18\Omega$ (MOSFET switching times are essentially independent of operating temperature)
t_r	Rise Time	—	27	41	ns	
$t_{d(off)}$	Turn-Off Delay Time	—	21	32	ns	
t_f	Fall Time	—	14	21	ns	
Q_g	Total Gate Charge (Gate-Source Plus Gate-Drain)	—	12	18	nC	$V_{GS}=10V$, $I_D=5.1A$, $V_{DS}=0.8 \text{ Max. Rating}$ (Gate charge is essentially independent of operating temperature.)
Q_{gs}	Gate-Source Charge	—	2.3	3.4	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	—	4.5	6.8	nC	

THERMAL RESISTANCE

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) $T_J=25^\circ\text{C}$ to 150°C

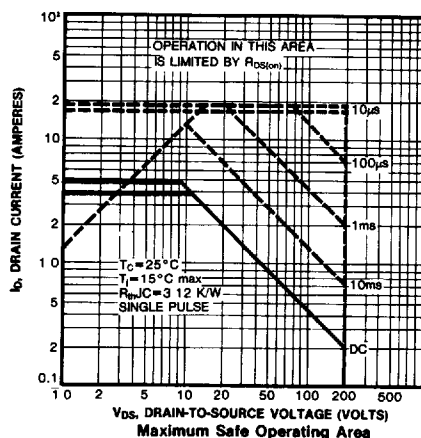
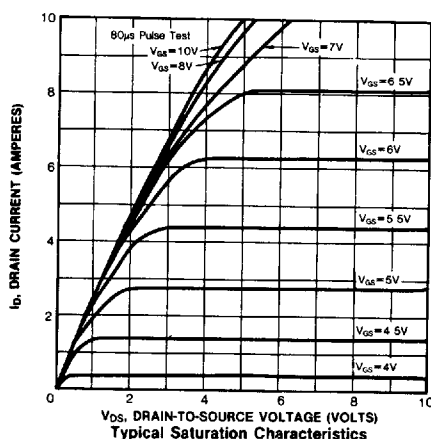
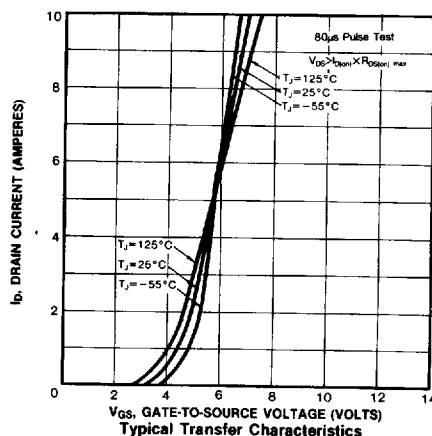
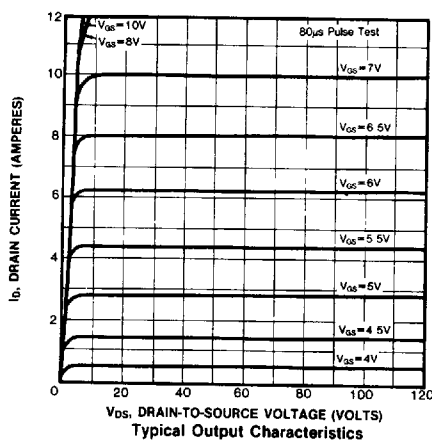
 (2) Pulse test. Pulse width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

(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)	—	—	4.6	A	Modified MOSFET showing the integral reverse P-N junction rectifier 
I_{SM}	Pulse Source Current (Body Diode) (3)	—	—	18	A	
V_{SD}	Diode Forward Voltage (2)	—	—	1.8	V	$T_C = 25^\circ\text{C}$, $I_S = 4.6\text{A}$, $V_{GS} = 0\text{V}$
t_{rr}	Reverse Recovery Time	—	170	400	ns	$T_J = 150^\circ\text{C}$, $I_F = 5\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{s}$

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 with limited by max. junction temperature

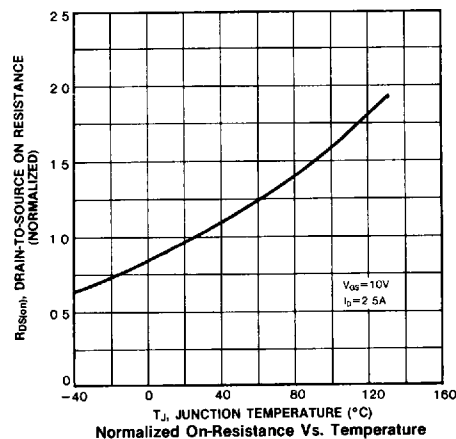
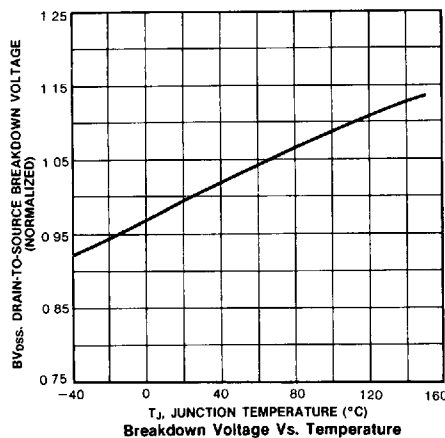
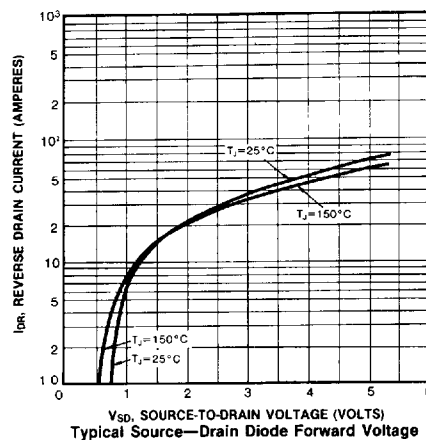
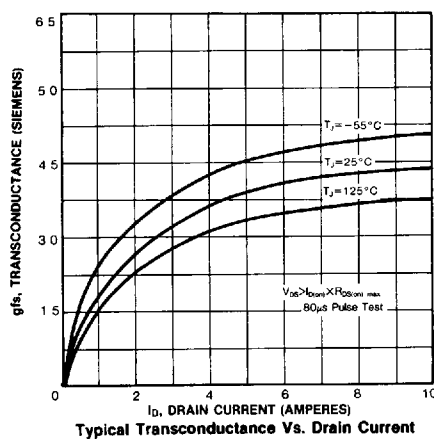
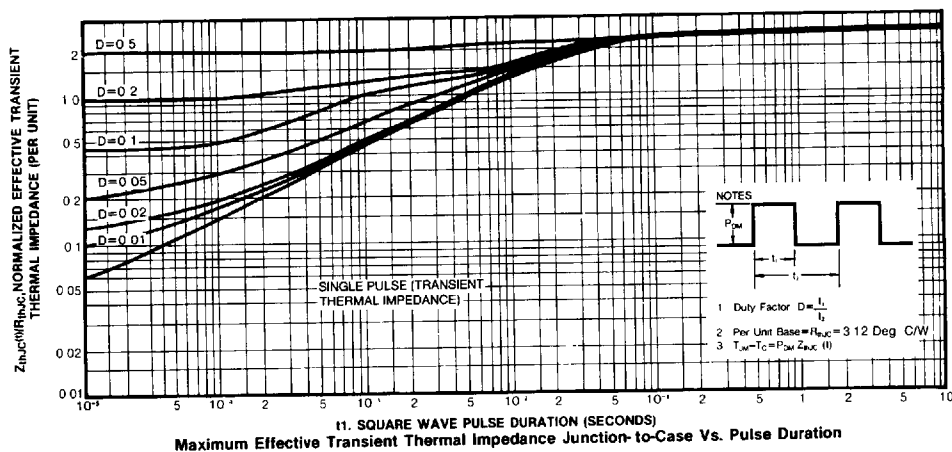


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