

IRFR220/222  
 IRFU220/222

捷多邦, 专业PCB打样  
**N-CHANNEL  
 POWER MOSFETS**

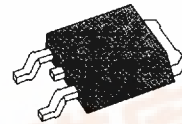
### FEATURES

- 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

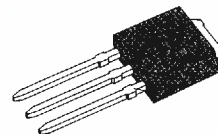
Part Number	$V_{DS}$	$R_{DS(on)}$	$I_D$
IRFR220/U220	200V	0.80 $\Omega$	4.6A
IRFR222/U222	200V	1.2 $\Omega$	3.8A

D-PACK



IRFR220/222

I-PACK



IRFU220/222

### MAXIMUM RATINGS

Characteristic	Symbol	IRFR220/U220	IRFR222/U222	Unit
Drain-Source Voltage (1)	$V_{DS}$	200		Vdc
Drain-Gate Voltage ( $R_{GS}=1.0M\Omega$ )(1)	$V_{DGR}$	200		Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$		Vdc
Continuous Drain Current $T_C=25^\circ C$	$I_D$	4.6	3.8	Adc
Continuous Drain Current $T_C=100^\circ C$	$I_D$	2.9	2.4	Adc
Drain Current—Pulsed (3)	$I_{DM}$	18	15	Adc
Gate Current—Pulsed	$I_{GM}$	$\pm 1.5$		Adc
Single Pulsed Avalanche Energy (4)	$E_{AS}$	50		mJ
Avalanche Current	$I_{AS}$	4.6		A
Total Power Dissipation @ $T_C=25^\circ C$ Derate above $25^\circ C$	$P_D$	42 0.33		Watts W/ $^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to 150		$^\circ C$
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	$T_L$	300		$^\circ C$

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  $T_J=25^\circ C$

**IRF-H220/222**  
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**ELECTRICAL CHARACTERISTICS** ( $T_C=25^\circ\text{C}$  unless otherwise specified)

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$BV_{DSS}$	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	$\mu A$	$V_{DS}=\text{Max. Rating}$ , $V_{GS}=0V$
		—	—	1000	$\mu A$	$V_{DS}=\text{Max. Rating}\times 0.8$ , $V_{GS}=0V$ , $T_C=125^\circ\text{C}$
$I_{D(on)}$	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	$\Omega$	$V_{GS}=10V$ , $I_D=2.4A$
	IRFR222/U222	—	—	1.2	$\Omega$	
$g_{fs}$	Forward Transconductance (2)	1.7	2.6	—	$\Omega$	$V_{DS}\geq 50V$ , $I_D=2.4A$
$C_{iss}$	Input Capacitance	—	400	—	pF	$V_{GS}=0V$ , $V_{DS}=25V$ , $f=1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	82	—	pF	
$C_{rss}$	Reverse Transfer Capacitance	—	32	—	pF	
$t_{d(on)}$	Turn-On Delay Time	—	8.8	13	ns	$V_{DD}=0.5BV_{DSS}$ , $I_D=5.1A$ , $Z_O=18\Omega$ (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	$V_{GS}=10V$ , $I_D=5.1A$ , $V_{DS}=0.8$ 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  $150^\circ\text{C}$ 
(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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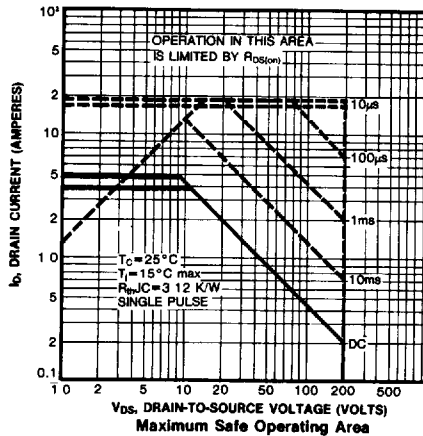
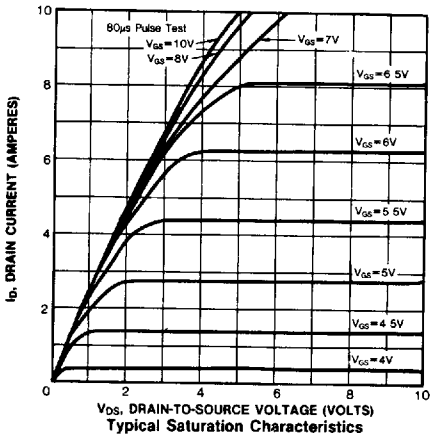
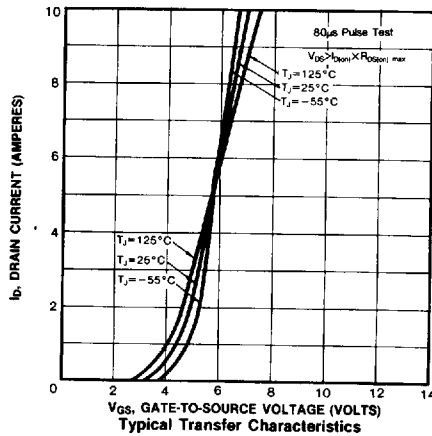
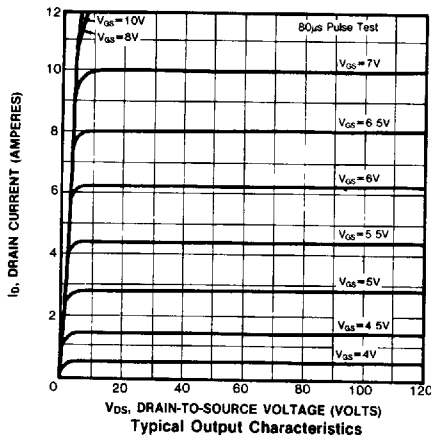
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**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

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	$T_J=150^\circ\text{C}$ , $I_F=5\text{A}$ , $di_F/dt=100\text{A}/\mu\text{S}$

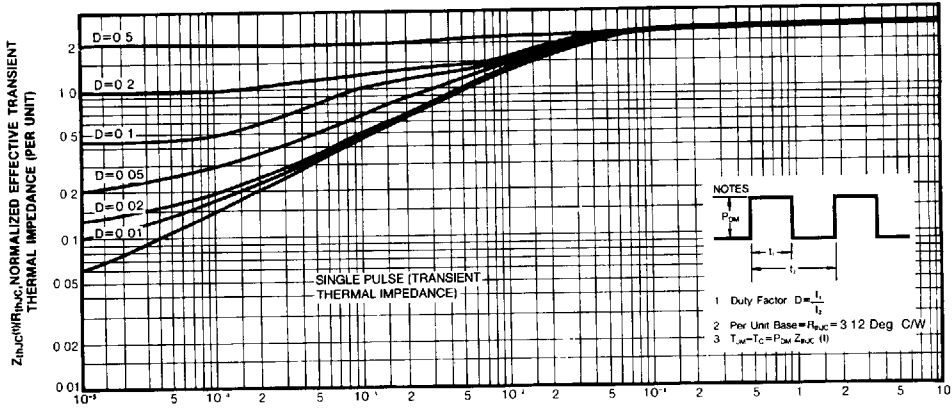
**Notes:** (1)  $T_J=25^\circ\text{C}$  to  $150^\circ\text{C}$  (2) Pulse test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$   
(3) Repetitive rating: Pulse with limited by max. junction temperature

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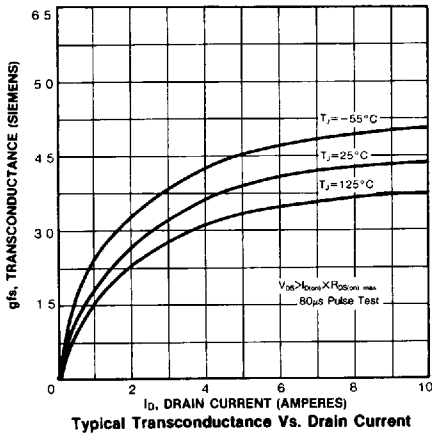


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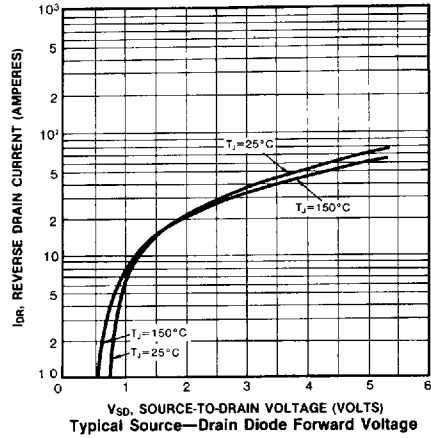
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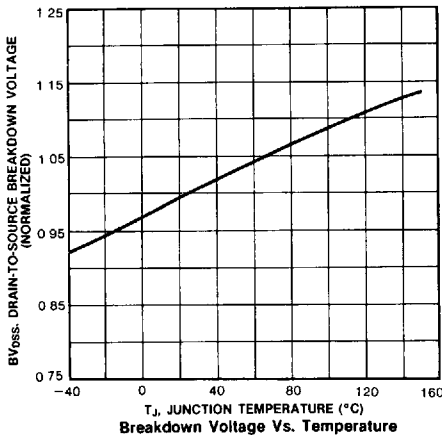
11. SQUARE WAVE PULSE DURATION (SECONDS)  
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



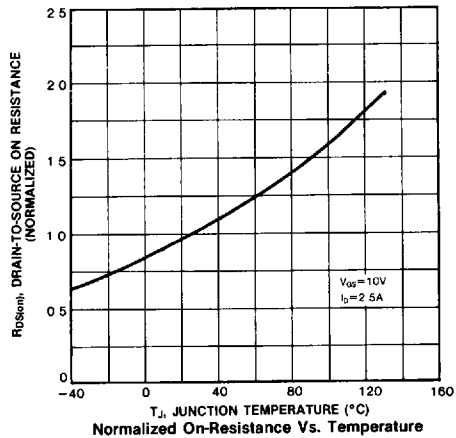
Typical Transconductance Vs. Drain Current



Typical Source-Drain Diode Forward Voltage



Breakdown Voltage Vs. Temperature



Normalized On-Resistance Vs. Temperature



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