

IRFR320/322

IRFU320/322

N-CHANNEL

POWER MOSFET

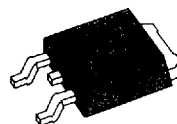
FEATURE

- Lower $R_{DS(on)}$
- Improved inductive ruggedness
- Fast switching time
- Rugged polysilicon gate cell structure
- Lower input capacitance
- Extended safe operating area
- Improved high temperature reliability

PRODUCT SUMMARY

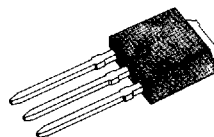
Part Number	V_{DS}	$R_{DS(on)}$	$I_{D(on)}$
IRFR320/U320	400V	1.8 Ω	2.7A
IRFR322/U322	400V	2.5 Ω	2.3A

D-PACK



IRFR320/322

I-PACK



IRFU320/322

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	IRFR320/U320	IRFR322/U322	Units
Drain-Source Voltage (1)	V_{DS}	400		Vdc
Drain-Gate Voltage ($R_{GS}=1.0M\Omega$) (1)	V_{DGR}	400		Vdc
Gate-Source Voltage	V_{GS}	± 20		Vdc
Continuous Drain Current $T_C=25^\circ C$	I_D	2.7	2.3	Adc
Continuous Drain Current $T_C=100^\circ C$	I_D	1.8	1.5	Adc
Drain Current — Pulsed (3)	I_{DM}	11.0	9.0	Adc
Gate Current — Pulsed	I_{GM}	± 1.5		Adc
Single Pulsed Avalanche Energy (4)	E_{AS}	16		mJ
Avalanche Current	I_{AS}	2.7		A
Total Power Dissipation at $T_C=25^\circ C$ 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 width 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 CHARACTERISTIC ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Characteristic	Min	Typ	Max	Units	Test Condition
BV_{DSS}	Drain-Source Breakdown Voltage	400	—	—	V	$V_{GS} = 0V$ $I_D = 250\mu A$
$V_{GS(th)}$	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	$V_{DS} = \text{Max. Rating}$, $V_{GS} = 0V$
$I_{D(on)}$	On-State Drain Source Current (2) IRFR320/U320	2.7	—	—	A	$V_{DS} > I_{D(on)} \times R_{DS(on)}$ max. $V_{GS} = 10V$
	IRFU322/U322	2.3	—	—		
$R_{DS(on)}$	Static Drain-Source On-State Resistance IRFR320/U320	—	—	1.8	Ω	$V_{GS} = 10V$, $I_D = 1.4A$
	IRFR322/U322	—	—	2.5		
g_{fs}	Forward Transconductance (2)	1.0	2.0	—	S	$V_{DS} > R_{DS} \times I_{D(on)}$, $I_D = 1.4A$
C_{iss}	Input Capacitance	—	400	—	pF	$V_{GS} = 0V$, $V_{DS} = 25V$, $f = 10\text{MHz}$
C_{oss}	Output Capacitance	—	59	—	pF	
C_{rss}	Reverse Transfer Capacitance	—	27	—	pF	
$t_{d(on)}$	Turn-On Delay Time	—	10	15	ns	$V_{DD} = 0.5 BV_{DSS}$, $I_D = 2.7A$, $Z_\theta = 180$ (MOSFET switching times are essentially independent of operating temperature)
t_r	Rise Time	—	14	20	ns	
$t_{d(off)}$	Turn-Off Delay Time	—	30	45	ns	
t_f	Fall Time	—	13	20	ns	
Q_g	Total Gate Charge (Gate-Source Pulse Gate-Drain)	—	12	15	nC	$V_{GS} = 10V$, $I_D = 2.7A$, $V_{DS} = 0.8 \text{ Max. Rating}$ (Gate charge is essentially independent of operating temperature)
Q_{gs}	Gate-Source Charge	—	2.8	—	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	—	9.7	—	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) $T_J = 25^\circ$ to 150°

(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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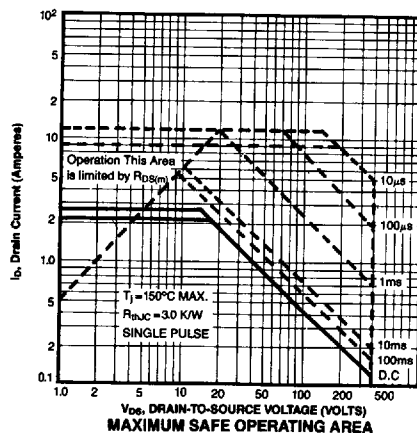
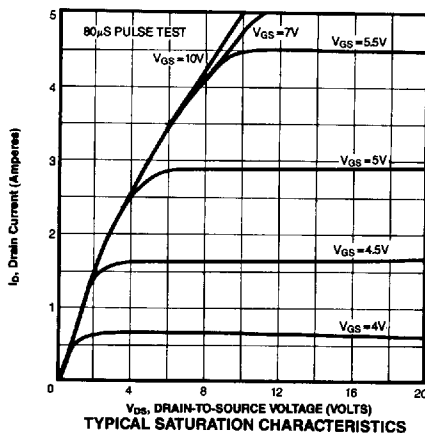
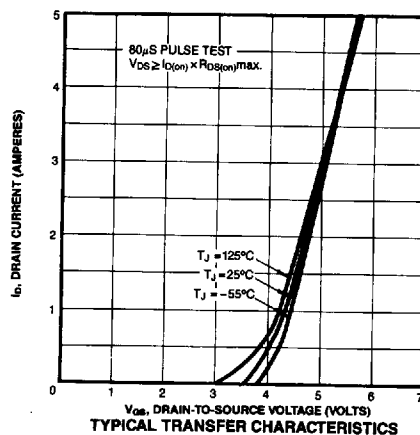
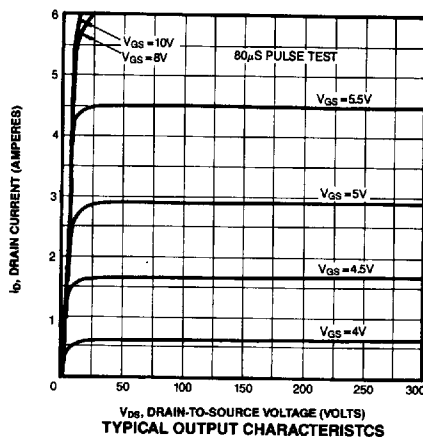
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

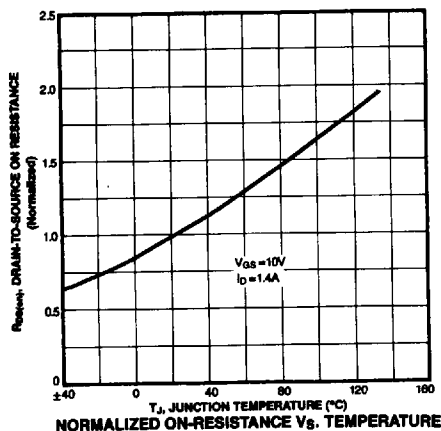
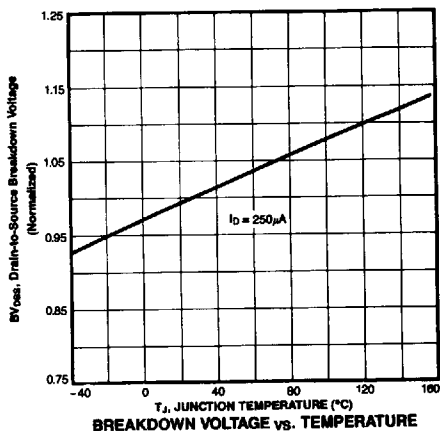
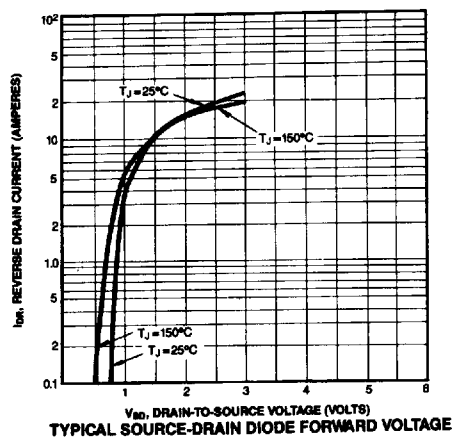
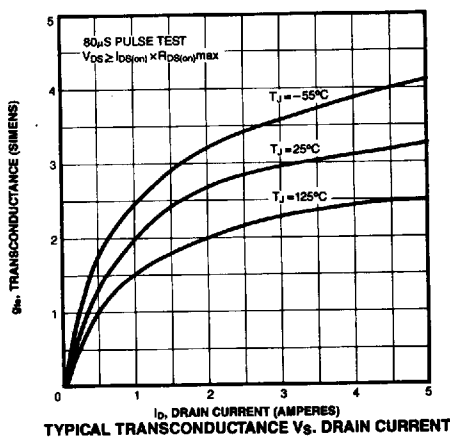
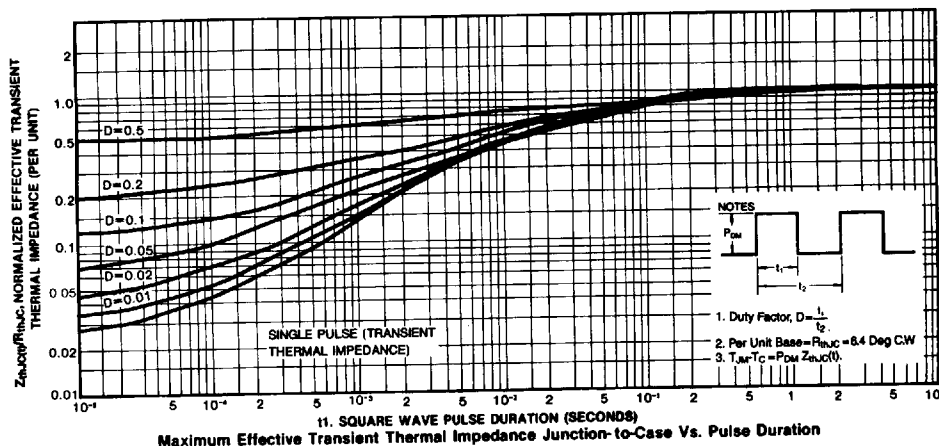
Symbol	Characteristic	Min	Typ	Max	Units	Test Condition
I_s	Continuous Source Current (Body Diode)	—	—	2.7	A	Modified MOSFET integral reverse
I_{SM}	Pulse-Source Current (3)	—	—	11	A	P-N junction rectifier
V_{DS}	Diode Forward Voltage (2)	—	—	1.8	V	$T_c = 25^\circ\text{C}$, $I_s = 2.7\text{A}$, $V_{GS} = 0\text{V}$
t_{rr}	Reverse Recovery time	—	270	—	ns	$T_j = 25^\circ\text{C}$, $I_F = 2.7\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{s}$

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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