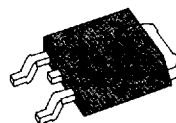
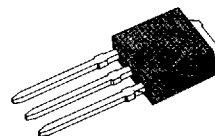


IRFR020/22/24/25
IRFU020/22/24/25**N-CHANNEL**
POWER MOSFETS**FEATURES**

- 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
IRFR020/U020	50V	0.10 Ω	15A
IRFR022/U022	50V	0.12 Ω	14A
IRFR024/U024	60V	0.10 Ω	15A
IRFR025/U025	60V	0.12 Ω	14A

D-PACKIRFR020/012
IRFR024/025**I-PACK**IRFU020/012
IRFU024/025**ABSOLUTE MAXIMUM RATINGS**

Characteristic	Symbol	IRFR020 IRFU020	IRFR022 IRFU022	IRFR024 IRFU024	IRFR025 IRFU025	Unit
Drain-Source Voltage (1)	V _{DSS}	50		60		V _{dc}
Drain-Gate Voltage (R _{GS} =1.0MΩ)(1)	V _{DGR}	50		60		V _{dc}
Gate-Source Voltage	V _{GS}	±20				V _{dc}
Continuous Drain Current T _C =25°C	I _D	15	14	15	14	A _{dc}
Continuous Drain Current T _C =100°C	I _D	9.6	8.7	9.6	8.7	A _{dc}
Drain Current—Pulsed (3)	I _{DM}	60	56	60	56	A _{dc}
Gate Current—Pulsed	I _{GM}	±1.5				A _{dc}
Single Pulsed Avalanche Energy (4)	E _{AS}	9.5				mJ
Avalanche Current	I _{AS}	15				A
Total Power Dissipation at T _C =25°C Derate above 25°C	P _D	42 0.33				Watts 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) $T_J=25^\circ C$ 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) $L=100\mu H$, $V_{dd}=25V$, $R_G=25\Omega$, Starting $T_J=25^\circ C$

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N-CHANNEL
POWER MOSFETS
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 IRFR024/025, IRFU024/025 IRFR020/022, IRFU020/022	60	—	—	V	$V_{GS}=0V$, $I_D=250\mu A$
		50	—	—	V	
$V_{GS(th)}$	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	$V_{DS}=\text{Max. Rating}$, $V_{GS}=0V$ $V_{DS}=0.8 \text{ Max Rating}$, $V_{GS}=0V$, $T_J=125^\circ\text{C}$
		—	—	1000		
$I_{D(on)}$	On-State Drain-Source Current (2) IRFR020/024, IRFU020/024 IRFR022/025, IRFU022/025	15	—	—	A	$V_{DS}\geq 1.8V$, $V_{GS}=10V$
		14	—	—		
		—	—	—		
$R_{DS(on)}$	Static Drain-Source IRFR020/024, IRFU020/024 IRFR022/025, IRFU022/025	—	0.08	0.10	Ω	$V_{GS}=10V$, $I_D=8.7A$
		—	—	0.12	Ω	
g_{fs}	Forward Transconductance (2)	3.6	—	—	Ω	$V_{DS}\geq 50V$, $I_D=8.7A$
C_{iss}	Input Capacitance	—	635	—	pF	$V_{GS}=0V$
C_{oss}	Output Capacitance	—	218	—	pF	$V_{DS}=25V$
C_{rss}	Reverse Transfer Capacitance	—	105	—	pF	$f=1.0\text{MHz}$
$t_{d(on)}$	Turn-On Delay Time	—	7.3	—	ns	$V_{DD}=0.5 BV_{DSS}$, $I_D=15A$, $Z_\theta=18\Omega$ (MOSFET switching times are essentially independent of operating temperature)
t_r	Rise Time	—	17.8	—	ns	
$t_{d(off)}$	Turn-Off Delay Time	—	20.4	—	ns	
t_f	Fall Time	—	14.5	—	ns	
Q_g	Total Gate Charge (Gate-Source Plus Gate-Drain)	—	38.5	—	nC	$V_{GS}=10V$, $I_D=15A$, $V_{DS}=0.8\text{Max. Rating}$ (Gate charge is essentially independent of operating temperature.)
Q_{gs}	Gate-Source Charge	—	8.75	—	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	—	17.8	—	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

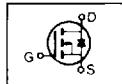
Notes: (1) $T_J=25^\circ\text{C}$ to 150°C

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

(3) Repetitive rating: Pulse width limited by max. junction temperature

IRFR020/22/24/25
IRFU020/22/24/25
P-CHANNEL
POWER MOSFETS
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

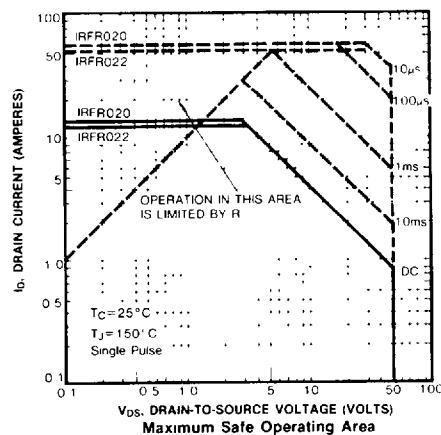
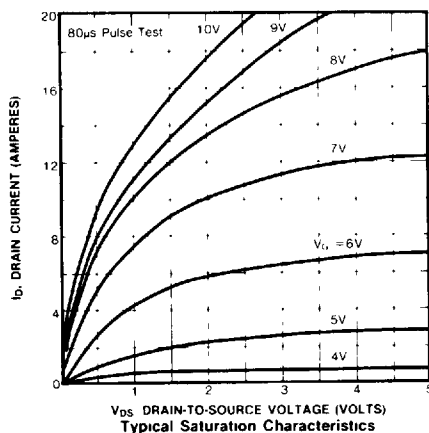
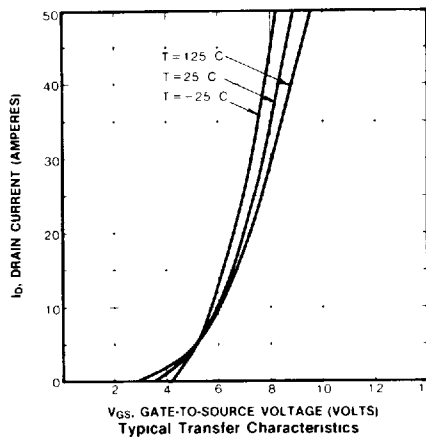
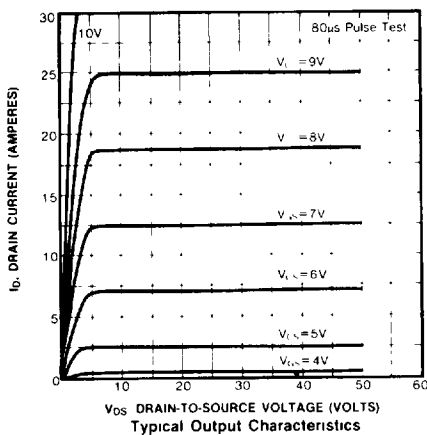
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	15	A	Modified MOSFET integral reverse P-N junction rectifier
I_{SM}	Pulse Source Current (3)	—	—	60	A	
V_{SD}	Diode Forward Voltage	—	—	1.4	V	$T_C = 25^\circ\text{C}$, $I_S = 15\text{A}$, $V_{GS} = 0\text{V}$
t_{rr}	Reverse Recovery Time	—	—	310	ns	$T_J = 25^\circ\text{C}$, $I_F = 15\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{S}$

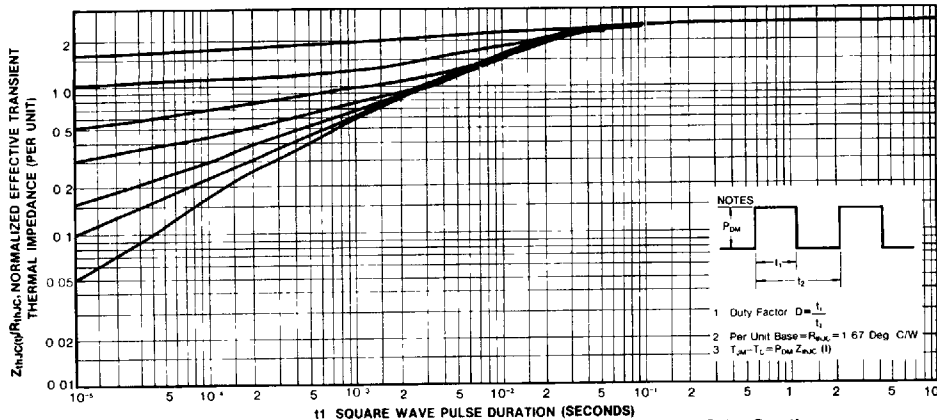


Notes: (1) $T_J = 25^\circ\text{C}$ to 150°C

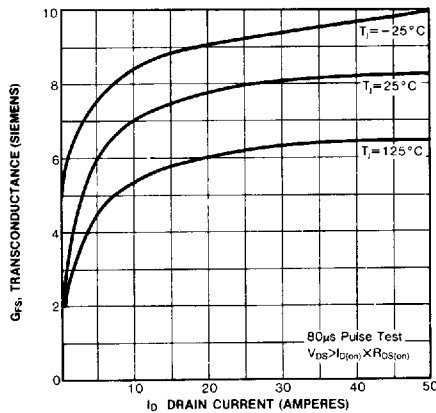
(2) Pulse test Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

(3) Repetitive rating Pulse with limited by max junction temperature

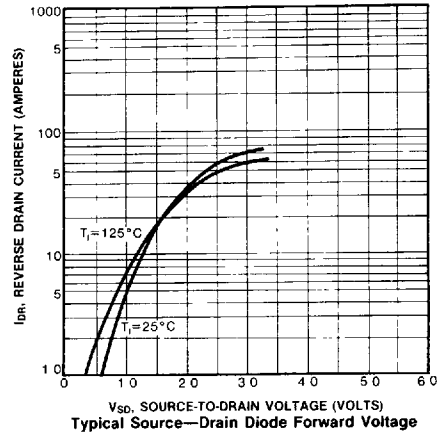


IRFR020/22/24/25
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N-CHANNEL
POWER MOSFETS


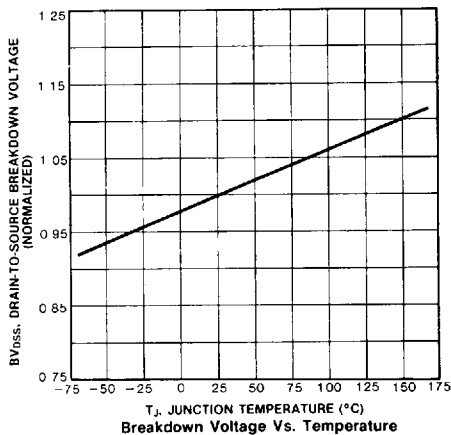
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



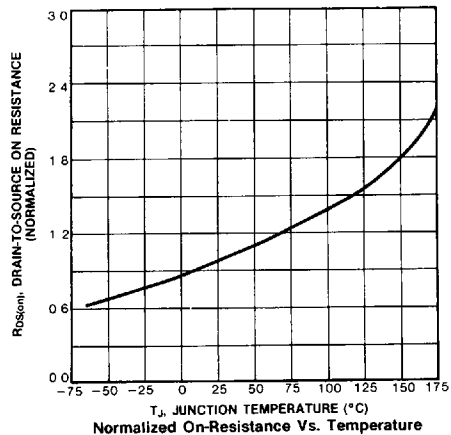
Typical Transconductance Vs. Drain Current



Typical Source-Drain Diode Forward Voltage



Breakdown Voltage Vs. Temperature



Normalized On-Resistance Vs. Temperature

IRFR020/22/24/25

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