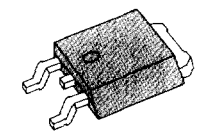
FEATURES

- 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

D-PACK



IRFR020/022
IRFR024/025

PRODUCT SUMMARY

Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRFR020	50V	0.10Ω	15A
IRFR022	50V	0.12Ω	14A
IRFR024	60V	0.10Ω	15A
IRFR025	60V	0.12Ω	14A

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	IRFR020/022		IRFR024/025		Unit
Drain-Source Voltage (1)	V_{DSS}	50		60		Vdc
Drain-Gate Voltage (R_{GS}=1.0MΩ)(1)	V_{DGR}	50		60		Vdc
Gate-Source Voltage	V_{GS}	±20				Vdc
Continuous Drain Current T_C=25°C	I_D	15	14	15	14	Adc
Continuous Drain Current T_C=100°C	I_D	9.6	8.7	9.6	8.7	Adc
Drain Current—Pulsed (3)	I_{DM}	60	56	60	56	Adc
Gate Current—Pulsed	I_{GM}	±1.5				Adc
Single Pulsed Avalance 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 0.20				Watts W/°C
Operating and Storage Junction Temperature Range	T_J, Tstg	−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 with limited by max. junction temperature
(4) L=100μH, V_{dd}=25V, R_G=25Ω, Starting T_j=25°C

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

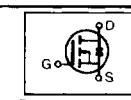
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage IRFR024/025 IRFR020/022	 60 50	 — —	 — —	 V V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	Gate-Source Leakage Forward	—	—	100	nA	V_{GS}=20V
I_{GSS}	Gate-Source Leakage Reverse	—	—	−100	nA	V_{GS}=−20V
I_{DSS}	Zero Gate Voltage Drain Current	—	—	250	μA	V_{DS}=Max. Rating V_{GS}=0V V_{DS}=0.7Max. Rating, V_{GS}=0V, T_j=125°C
$I_{D(on)}$	On-State Drain-Source Current (2) IRF020/024 IRF022/025	 15 14	 — —	 — —	 A	V_{DS}≥1.8V, V_{GS}=10V
$R_{DS(on)}$	Static Drain-Source IRFR020/024 IRFR022/025	 — —	 0.08 —	 0.10 0.12	 Ω Ω	V_{GS}=10V, I_D=8.7A
g_{fs}	Forward Transconductance (2)	3.6	—	—	℧	V_{DS}>10V, 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=1.0MHz
$t_{d(on)}$	Turn-On Delay Time	—	—	13	ns	V_{DD}=0.5 BV_{DSS}, I_D=15A, Z_O=18Ω (MOSFET switching times are essentially independent of operating temperature)
t_r	Rise Time	—	—	83	ns	
$t_{d(off)}$	Turn-Off Delay Time	—	—	24	ns	
t_f	Fall Time	—	—	39	ns	
Q_g	Total Gate Charge (Gate-Source Plus Gate-Drain)	—	—	38	nC	V_{GS}=10V, I_D=15A, V_{DS}=0.8Max. Rating (Gate charge is essentially independent of operating temperature.)
Q_{gs}	Gate-Source Charge	—	—	7.5	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	—	—	12	nC	

THERMAL RESISTANCE

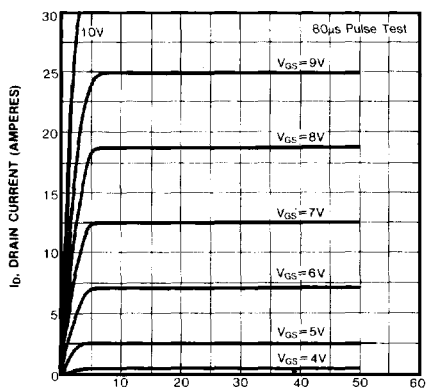
Symbol	Characteristic		IRFR020/22/24/25	Unit	
R_{thJC}	Junction-to-Case	MAX	3.0	K/W	
R_{thCS}	Case-to-Sink	TYP	1.7	K/W	Mounting surface flat, smooth, and greased
R_{thJA}	Junction-to-Ambient	MAX	110	K/W	Free Air Operation

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

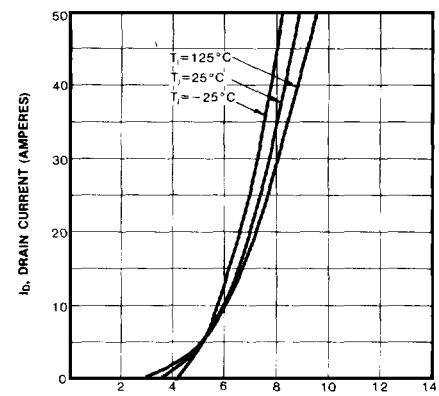
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

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_{DS}	Diode Forward Voltage	—	—	1.4	V	T_C=25°C, I_S=15A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	—	310	ns	T_j=25°C, I_F=15A, dI_F/dt=100A/μS

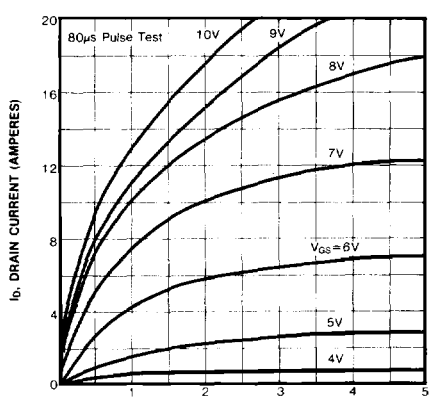
Notes: (1) T_J=25°C to 150°C
(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating: Pulse with limited by max. junction temperature



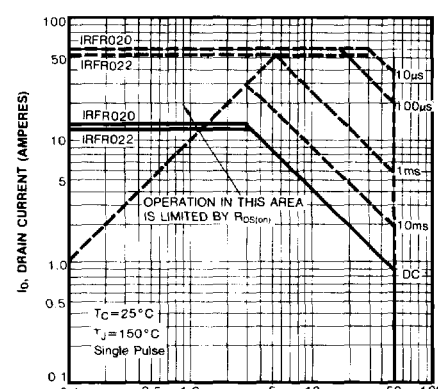
Typical Output Characteristics



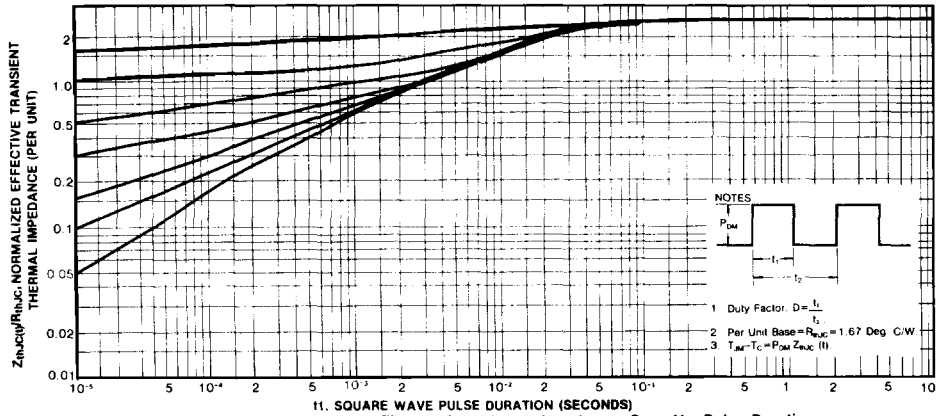
Typical Transfer Characteristics



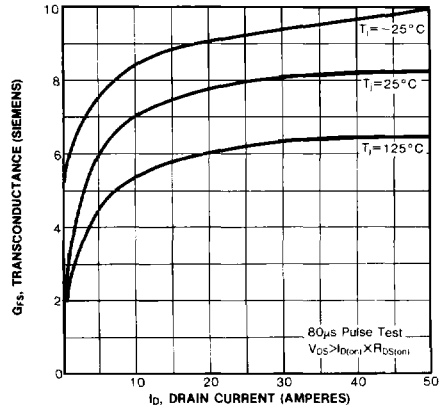
Typical Saturation Characteristics



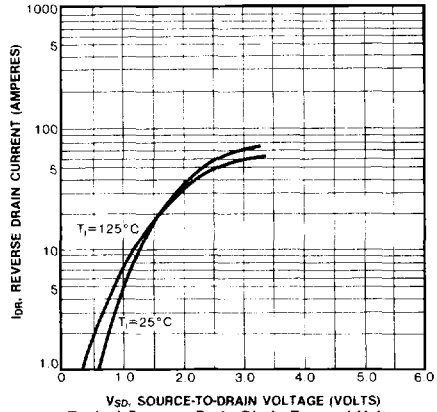
Maximum Safe Operating Area



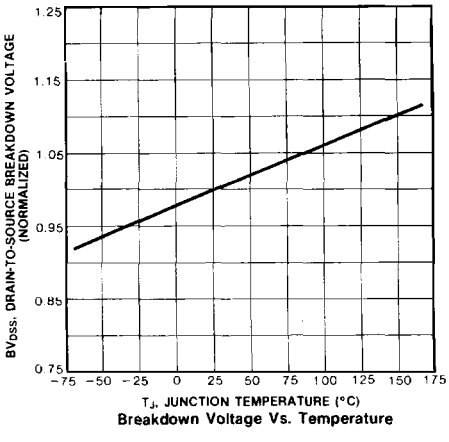
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



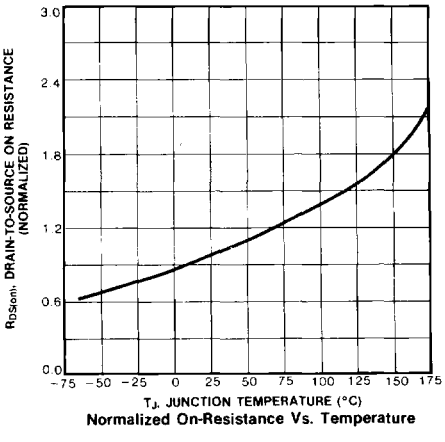
Typical Transcounductance Vs. Drain Current



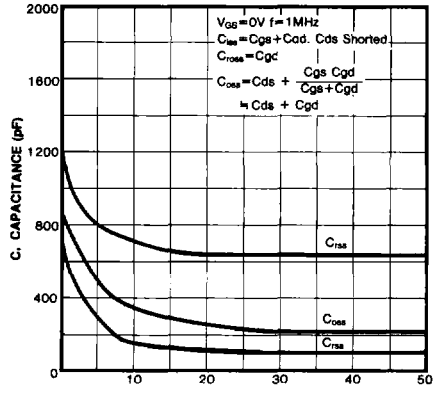
Typical Source—Drain Diode Forward Voltage



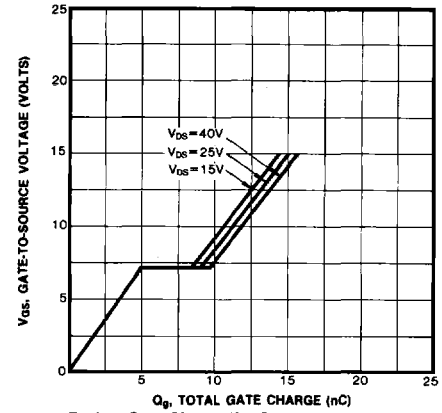
Breakdown Voltage Vs. Temperature



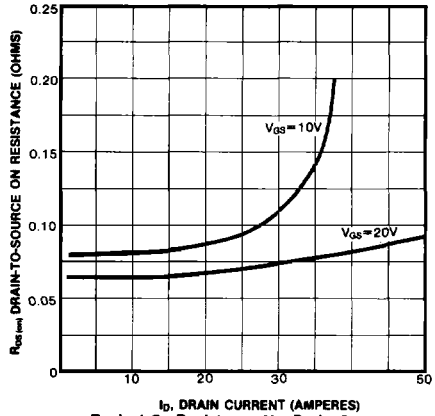
Normalized On-Resistance Vs. Temperature



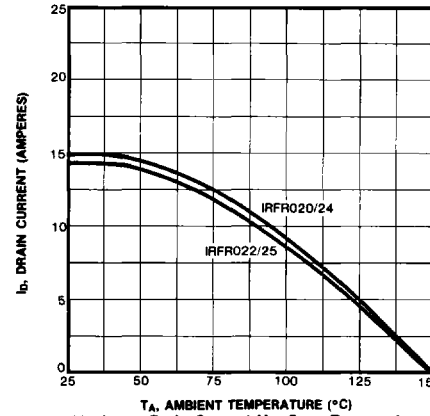
Typical Capacitance Vs. Drain to Source Voltage



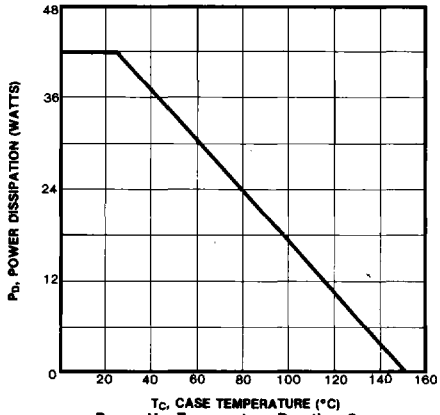
Typical Gate Charge Vs. Gate-To-Source Voltage



Typical On-Resistance Vs. Drain Current



Maximum Drain Current Vs. Case Temperature



Power Vs. Temperature Derating Curve