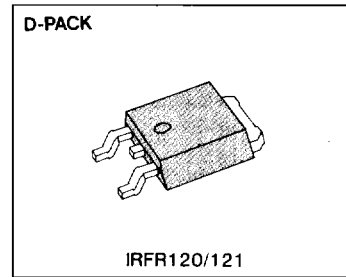


FEATURES

- 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
IRFR120	100V	0.27Ω	8.4A
IRFR121	80V	0.27Ω	8.4A

MAXIMUM RATINGS

Characteristic	Symbol	IRFR120	IRFR121	Unit
Drain-Source Voltage (1)	V_{DSS}	100	80	Vdc
Drain-Gate Voltage ($R_{GS}=1.0M\Omega$)(1)	V_{DGR}	100	80	Vdc
Gate-Source Voltage	V_{GS}	± 20		Vdc
Continuous Drain Current $T_C=25^\circ C$	I_D	8.4		Adc
Continuous Drain Current $T_C=100^\circ C$	I_D	5.9		Adc
Drain Current—Pulsed (3)	I_{DM}	34		Adc
Gate Current—Pulsed	I_{GM}	± 1.5		Adc
Single Pulsed Avalanche Energy (4)	E_{AS}	30		mJ
Avalanche Current	I_{AS}	8.4		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) $L=0.64mH$, $V_{dd}=25V$, $R_G=25\Omega$, Starting $T_J=25^\circ C$

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

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV _{DSS}	Drain-Source Breakdown Voltage IRFR120	100	—	—	V	V _{GS} =0V
	IRFR121	80	—	—	V	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	—	—	250	μA	V _{DS} =Max. Rating V _{GS} =0V
	Drain Current	—	—	1000	μA	V _{DS} =Max. Rating×0.8, V _{GS} =0V, T _C =125°C
I _{D(on)}	On-State Drain-Source Current (2)	8.4	—	—	A	V _{DS} >I _{D(on)} ×R _{DS(on)max} V _{GS} =10V
R _{DS(on)}	Static Drain-Source On-State Resistance (2)	—	0.214	0.27	Ω	V _{GS} =10V, I _D =5.7A
g _{fs}	Forward Transconductance (2)	2.8	3.3	—	Ω	V _{DS} ≥50V, I _D =5.9A
C _{iss}	Input Capacitance	—	416	—	pF	
C _{oss}	Output Capacitance	—	111	—	pF	V _{GS} =0V, V _{DS} =25V, f=1.0MHz
C _{rss}	Reverse Transfer Capacitance	—	43	—	pF	
t _{d(on)}	Turn-On Delay Time	—	8.8	13	ns	V _{DD} =0.5BV _{DSS} , I _D =9.2A, Z _θ =18Ω (MOSFET switching times are essentially independent of operating temperature)
t _r	Rise Time	—	30	45	ns	
t _{d(off)}	Turn-Off Delay Time	—	19	29	ns	
t _f	Fall Time	—	20	30	ns	
Q _g	Total Gate Charge (Gate-Source Plus Gate-Drain)	—	9.7	15	nC	
Q _{gs}	Gate-Source Charge	—	2.2	3.3	nC	V _{GS} =10V, I _D =9.2A, V _{DS} =0.8 Max. Rating (Gate charge is essentially independent of operating temperature.)
Q _{gd}	Gate-Drain ("Miller") Charge	—	2.3	3.4	nC	

THERMAL RESISTANCE

Symbol	Characteristic		IRFR120/121	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

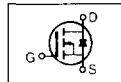
Notes: (1) T_J=25°C to 150°C

(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%

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

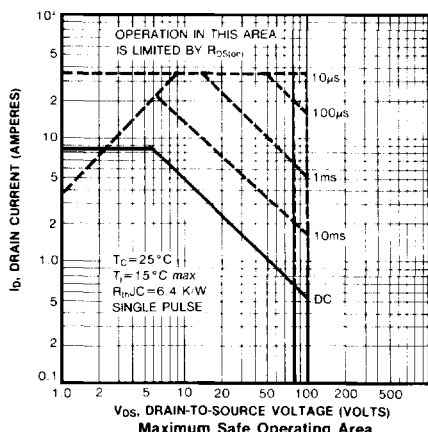
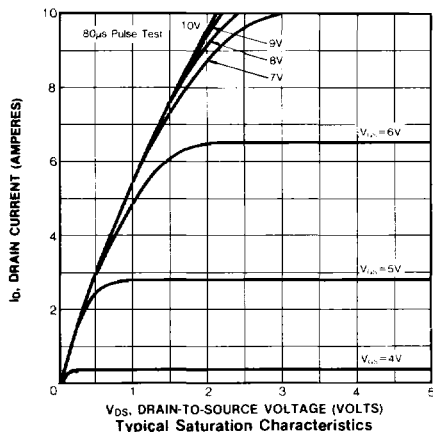
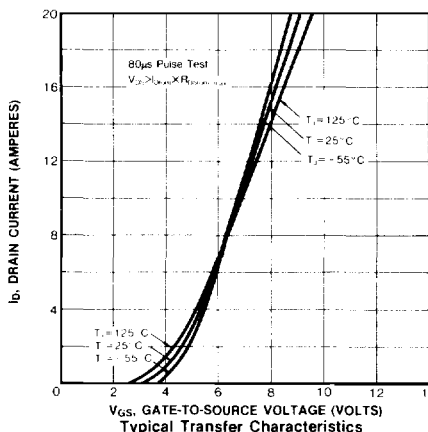
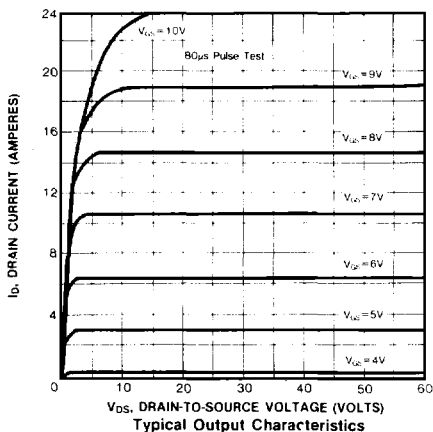
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

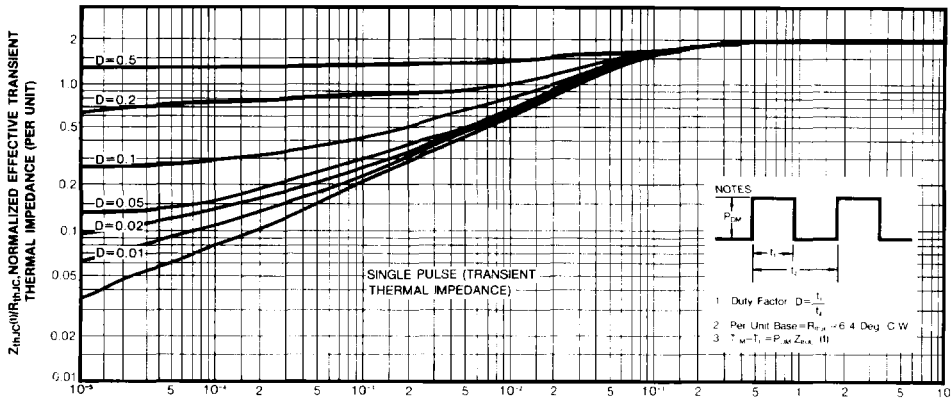
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	8.4	A	Modified MOSFET showing the integral reverse P-N junction rectifier
I_{SM}	Pulse Source Current(Body Diode)(3)	—	—	34	A	
V_{SD}	Diode Forward Voltage (2)	—	—	2.5	V	$T_C=25^\circ\text{C}$, $I_S=8.4\text{A}$, $V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	—	110	240	ns	$T_J=150^\circ\text{C}$, $I_F=9.2\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$



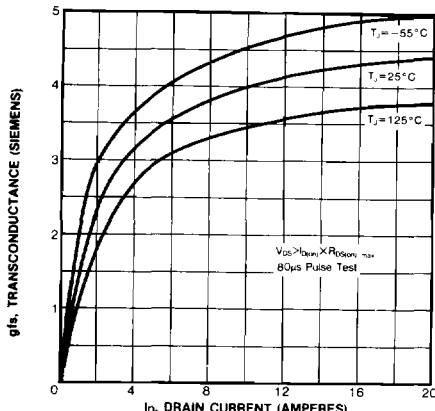
Notes: (1) $T_J=25^\circ\text{C}$ to 150°C (2) Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
 (3) Repetitive rating: Pulse with limited by max. junction temperature

2

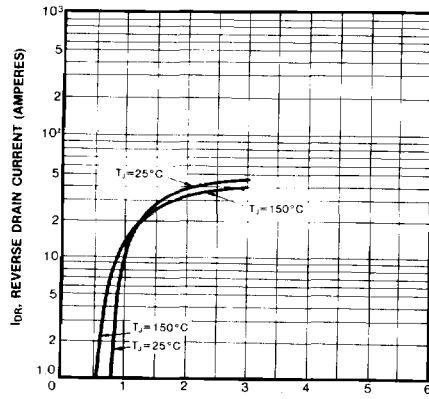




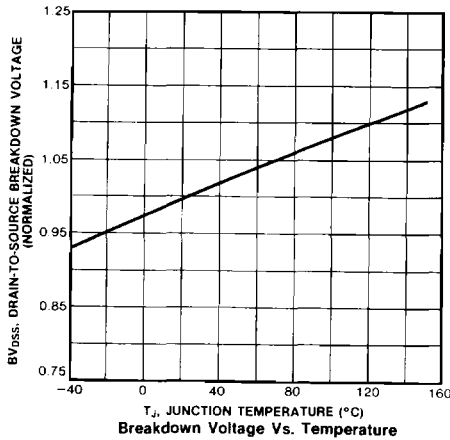
11. SQUARE WAVE PULSE DURATION (SECONDS)
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



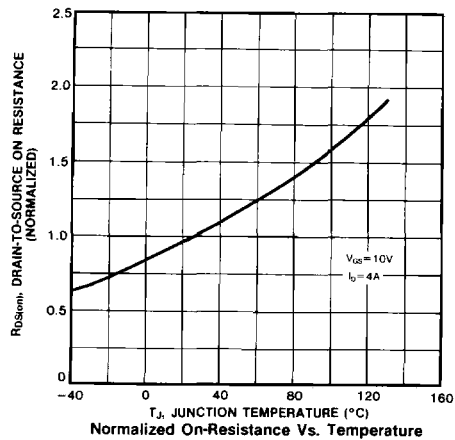
Typical Transconductance Vs. Drain Current



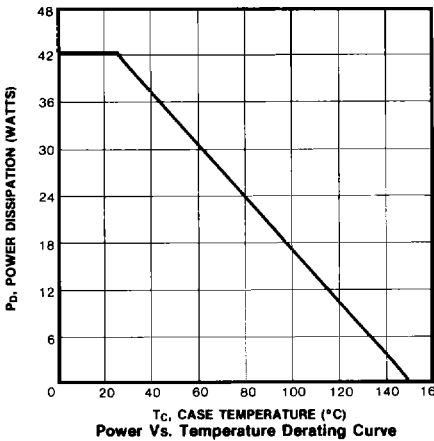
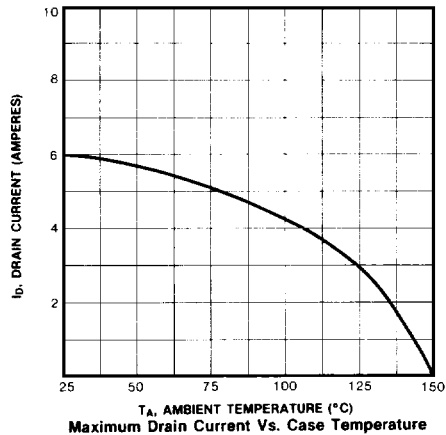
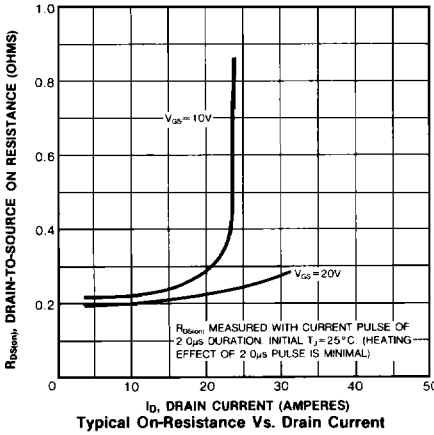
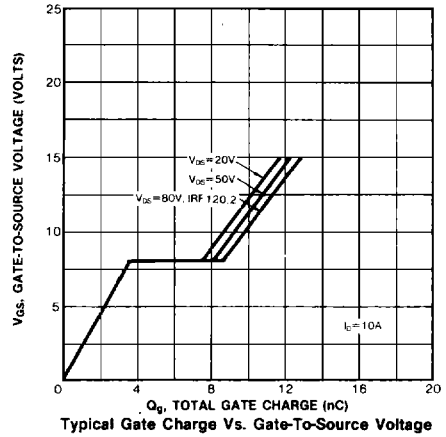
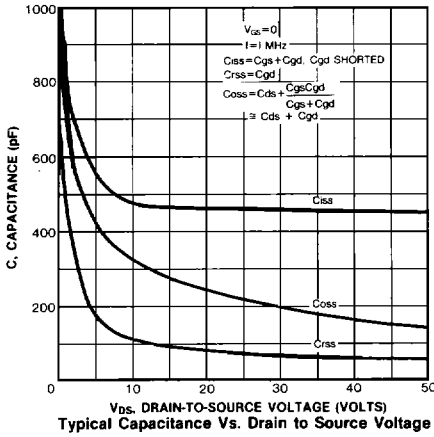
Typical Source-Drain Diode Forward Voltage



Breakdown Voltage Vs. Temperature



Normalized On-Resistance Vs. Temperature



2