

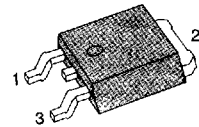
FEATURES

- 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

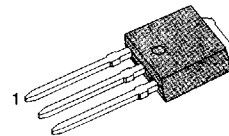
Part Number	V _{DS}	R _{DS(on)}	I _D
IRFR310/U310	400V	3.6 Ω	1.7A
IRFR311/U311	350V	3.6 Ω	1.7A

D-PAK



1.Gate 2.Drain 3.Source
IRFR310/311

I-PAK



1.Gate 2.Drain 3.Source
IRFU310/311

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	IRFR310/U310	IRFR311/U311	Unit
Drain-Source Voltage (1)	V _{DS}	400	350	V _{dc}
Drain-Gate Voltage (R _{GS} =1.0M Ω)	V _{DGR}	400	350	V _{dc}
Gate-Source Voltage	V _{GS}	± 20		V _{dc}
Continuous Drain Current T _C =25 °C	I _D	1.7		A _{dc}
Continuous Drain Current T _C =100 °C	I _D	1.2		A _{dc}
Drain Current - Pulsed (3)	I _{DM}	6.8		A _{dc}
Single Pulsed Avalanche Energy (4)	E _{AS}	120		mJ
Avalanche Current	I _{AS}	1.7		A
Total Power Dissipation at T _C =25 °C	P _D	25		Watts
Derate above 25 °C		0.2		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°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

(4) L=53mH, V_{dd}=50V, R_G=25 Ω , Starting T_J=25°C

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

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
	Drain-Source Breakdown Voltage					
	IRFR310/U310	400	-	-	V	V _{GS} =0V, I _D =250μA
	IRFR311/U311	350	-	-	V	
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
				1000	μA	V _{DS} =0.8 Max. Rating, V _{GS} =0V, T _C =125°C
R _{DS(on)}	Static Drain-Source On Resistance(2)	-	-	3.6	Ω	V _{GS} =10V, I _D =0.9A
g _{fs}	Forward Transconductance (2)	0.5	1.0	-	Ω	V _{DS} ≥50V, I _D =0.9A
C _{iss}	Input Capacitance	-	180	-	pF	V _{GS} =0V, V _{DS} =25V, f=1.0MHz
C _{oss}	Output Capacitance	-	40	-	pF	
C _{rss}	Reverse Transfer Capacitance	-	14	-	pF	
t _{d(on)}	Turn-On Delay Time	-	7.9	12	ns	V _{DD} =0.5 BV _{DSS} , I _D =1.7A, Z _Θ =24 Ω (MOSFET switching times are essentially independent of operating temperature)
t _r	Rise Time	-	9.9	15	ns	
t _{d(off)}	Turn-Off Delay Time	-	21	32	ns	
t _f	Fall Time	-	11	17	ns	
Q _g	Total Gate Charge	-	-	14	nC	V _{GS} =10V, I _D =1.7A, V _{DS} =0.8 Max. Rating (Gate charge is essentially independent of operating temperature)
Q _{gs}	Gate-Source Charge	-	2.0	-	nC	
Q _{gd}	Gate-Drain ("Miller") Charge	-	5.8	-	nC	

THERMAL RESISTANCE

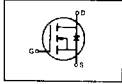
Symbol	Characteristics		All	Units	Remark
R _{thJC}	Junction-to-Case	MAX	5.0	K/W	
R _{thCS}	Case-to-Sink	TYP	1.7	K/W	Mounting surface flat, smooth and greased
R _{thJA}	Junction-to-Ambient	MAX	110	K/W	Free Air Operation

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

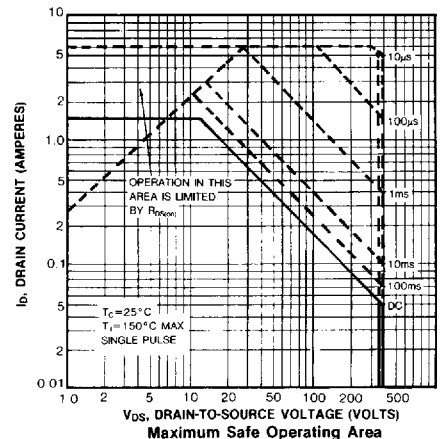
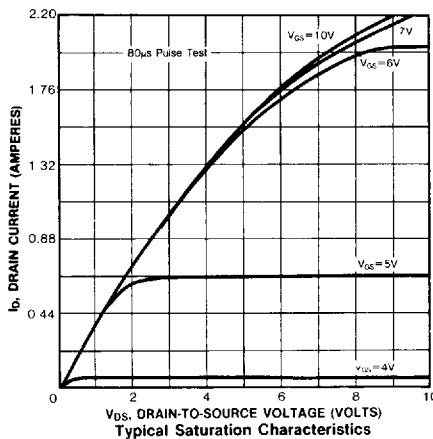
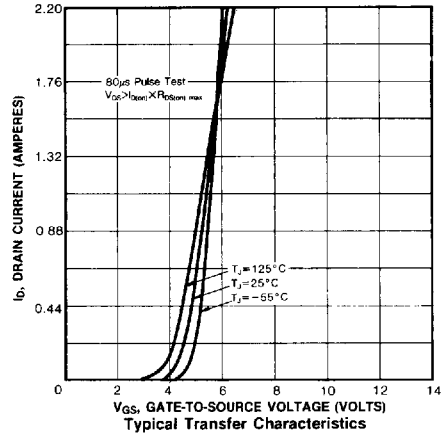
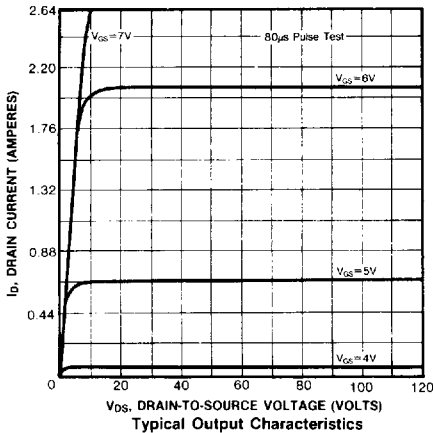
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

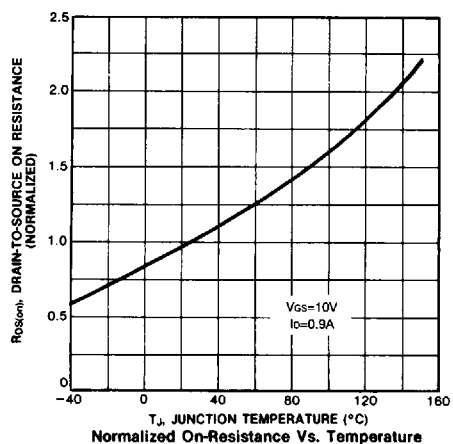
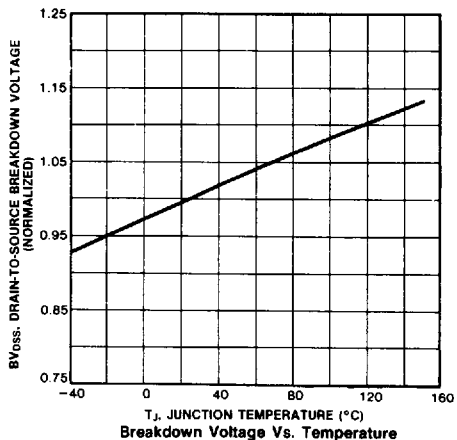
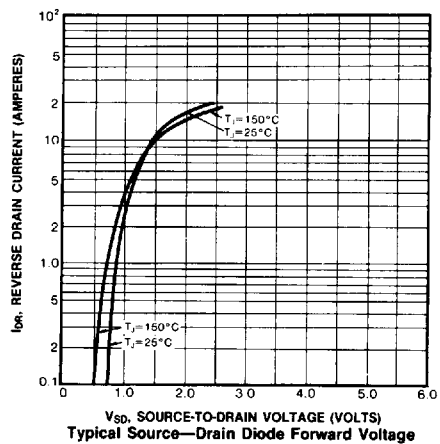
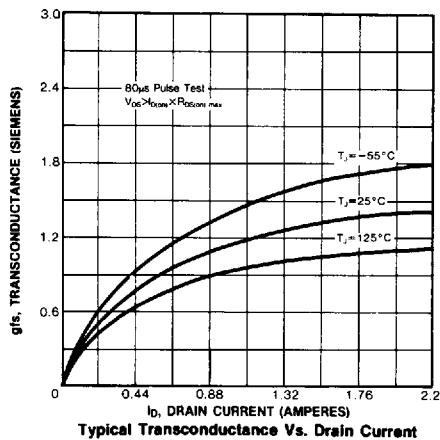
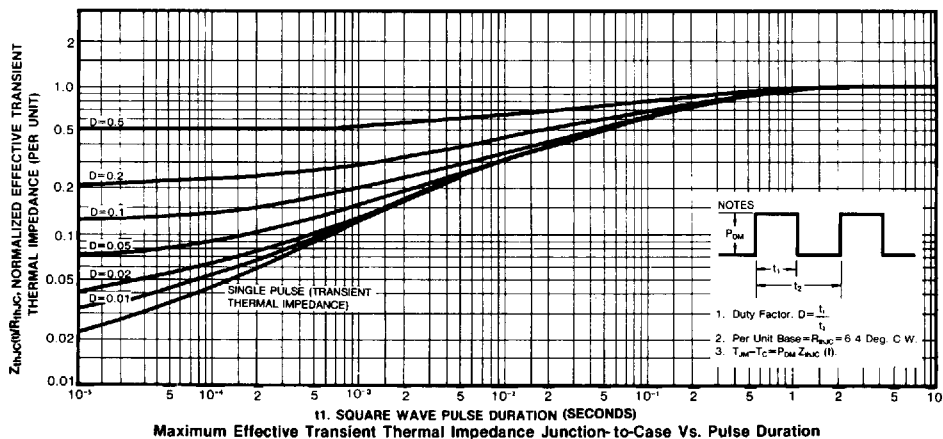
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	-	-	1.7	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
I_{SM}	Pulse Source Current (Body Diode) (3)	-	-	6.8	A	
V_{SD}	Diode Forward Voltage (2)	-	-	1.6	V	$T_J=25^\circ\text{C}$, $I_S=1.7\text{A}$, V_{GS} /
t_{rr}	Reverse Recovery Time	-	240	520	ns	$T_J=25^\circ\text{C}$, $I_F=1.7\text{A}$, $dI_F/dt=100\text{A}/\mu\text{S}$

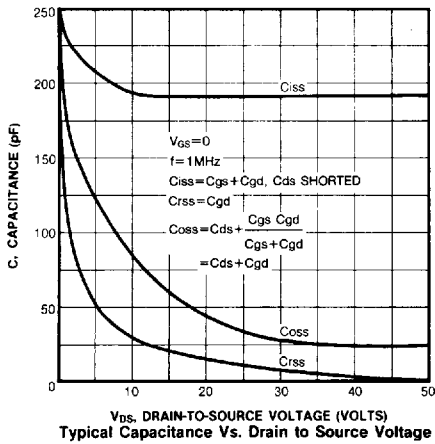
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(2) Pulse test : Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

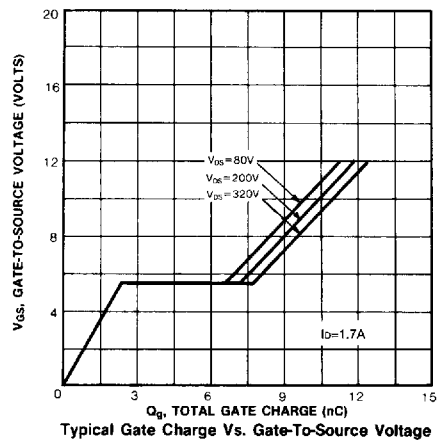
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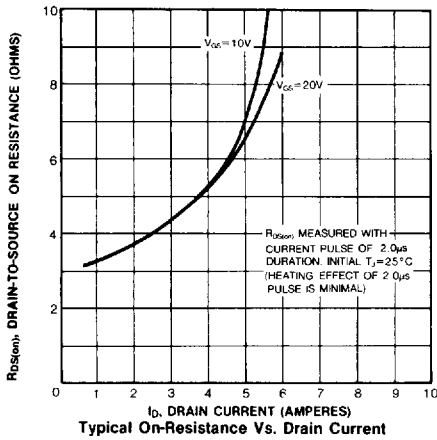




Typical Capacitance Vs. Drain to Source Voltage



Typical Gate Charge Vs. Gate-To-Source Voltage



Typical On-Resistance Vs. Drain Current

