

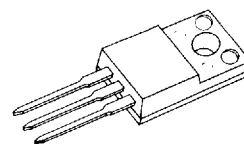
IRFS820/821/822/823

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

TO-220F



IRFS820/821/822/823

PRODUCT SUMMARY

Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRFS820	500V	3Ω	2.0A
IRFS821	450V	3Ω	2.0A
IRFS822	500V	4Ω	1.5A
IRFS823	450V	4Ω	1.5A

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	IRFS820	IRFS821	IRFS822	IRFS823	Unit
Drain-Source Voltage (1)	V_{DS}	500	450	500	450	Vdc
Drain-Gate Voltage ($R_{GS}=1.0M\Omega$)(1)	V_{DGR}	500	450	500	450	Vdc
Gate-Source Voltage	V_{GS}	± 20				Vdc
Continuous Drain Current $T_C=25^\circ C$	I_D	2.0	2.0	1.5	1.5	Adc
Continuous Drain Current $T_C=100^\circ C$	I_D	1.2	1.2	0.9	0.9	Adc
Drain Current—Pulsed (3)	I_{DM}	13	13	11	11	Adc
Gate Current—Pulsed	I_{GM}	± 1.5				Adc
Single Pulsed Avalanche Energy (4)	E_{AS}	134				mJ
Avalanche Current	I_{AS}	2				A
Total Power Dissipation at $T_C=25^\circ C$	P_D	30				Watts
Derate above $25^\circ C$		0.24				$W/^\circ C$
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) $L=60mH$, $V_{dd}=50V$, $R_G=25\Omega$, Starting $T_J=25^\circ C$

IRFS820/821/822/823

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POWER MOSFETSELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise specified)

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV _{DSS}	Drain-Source Breakdown Voltage	500	—	—	V	V _{GS} =0V, I _D =250μA
	IRFS820/822	450	—	—		
	IRFS821/823					
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		V _{DS} =0.8Max. Rating, T _C =125°C
I _{D(on)}	On-State Drain-Source Current (2)					V _{DS} ≥10V, V _{GS} =10V
	IRFS820/821	2.5	—	—	A	
	IRFS822/823	2.0	—	—		
R _{DS(on)}	Static Drain-Source On-State Resistance (2)					V _{GS} =10V, I _D =1.4A
	IRFS820/821	—	2.5	3.0	Ω	
	IRFS822/823	—	3.0	4.0		
g _{fs}	Forward Transconductance (2)	1.5	2.3	—	∩	V _{DS} ≥50V, I _D =1.4A
C _{ISS}	Input Capacitance	—	390	—	pF	V _{GS} =0V
C _{OSS}	Output Capacitance	—	52	—	pF	V _{DS} =25V
C _{RSS}	Reverse Transfer Capacitance	—	22	—	pF	f=1.0MHz
t _{d(on)}	Turn-On Delay Time	—	10	15	ns	V _{DD} =0.5 BV _{DSS} , I _D =2.5A, Z _O =18Ω (MOSFET switching times are essentially independent of operating temperature)
t _r	Rise Time	—	12	18	ns	
t _{d(off)}	Turn-Off Delay Time	—	28	42	ns	
t _f	Fall Time	—	12	18	ns	
Q _g	Total Gate Charge (Gate-Source Pulse Gate-Drain)	—	13	19	nC	
Q _{gs}	Gate-Source Charge	—	2.2	3.3	nC	V _{GS} =10V, I _D =2.5A, V _{DS} =0.8Max. Rating (Gate charge is essentially independent of operating temperature.)
Q _{gd}	Gate-Drain ("Miller") Charge	—	6.8	10	nC	

4

THERMAL RESISTANCE

R _{thJC}	Junction-to-Case	MAX	4.16	K/W	
R _{thCS}	Case-to-Sink	TYP	0.5	K/W	Mounting surface flat smooth, and greased
R _{thJA}	Junction-to-Ambient	MAX	80	K/W	Free Air Operation

Notes: (1) T_J=25°C to 150°C

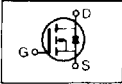
(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%

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

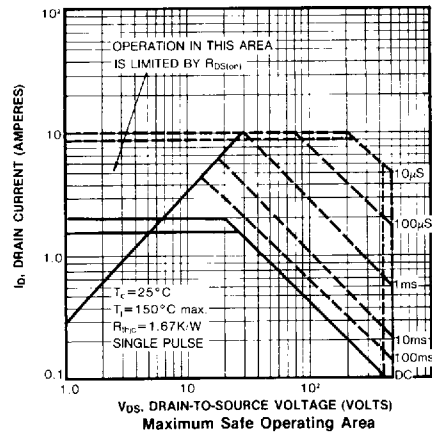
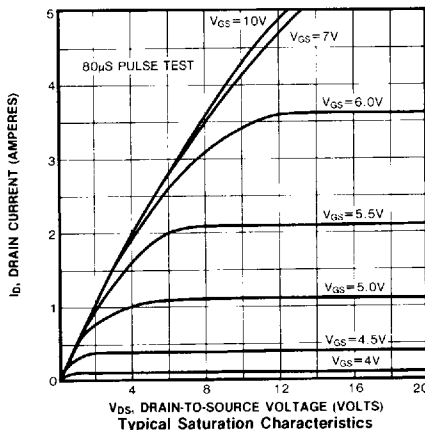
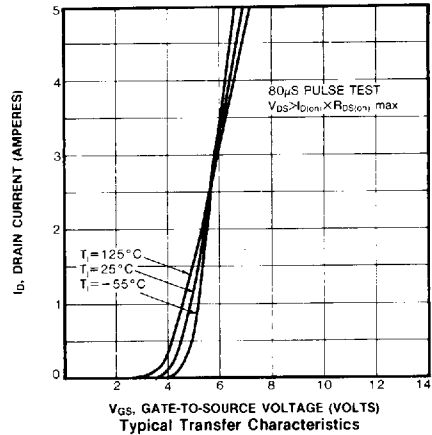
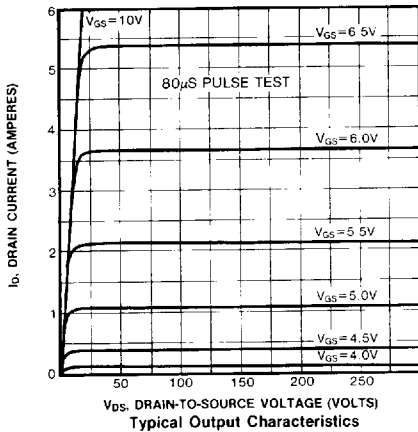
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SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

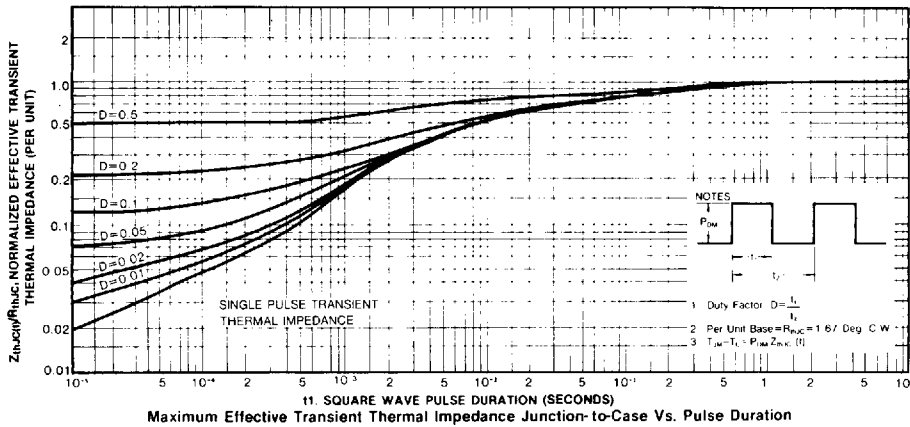
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_s	Continuous Source Current (Body Diode)					Modified MOSFET integral reverse P-N junction rectifier 
	IRFS820/821	—	—	2.5	A	
	IRFS822/823	—	—	2.2	A	
I_{SM}	Pulse Source Current (3)					
	IRFS820/821	—	—	8	A	
	IRFS822/823	—	—	7	A	
V_{SD}	Diode Forward Voltage (2)					$T_C=25^\circ\text{C}$, $I_S=2.5\text{A}$, $V_{GS}=0\text{V}$
	IRFS820/821	—	—	1.6	V	
	IRFS822/823	—	—	1.5	V	$T_C=25^\circ\text{C}$, $I_S=2.2\text{A}$, $V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	—	270	540	ns	$T_J=25^\circ\text{C}$, $I_F=2.5\text{A}$, $dl/dt=100\text{A}/\mu\text{S}$

- 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

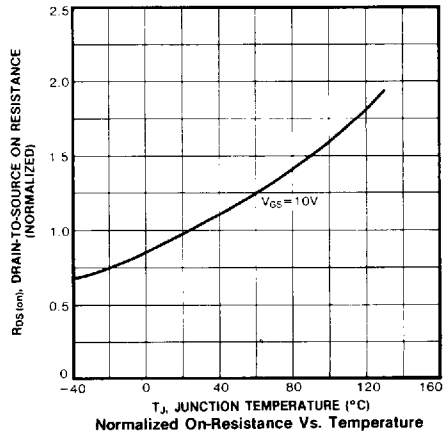
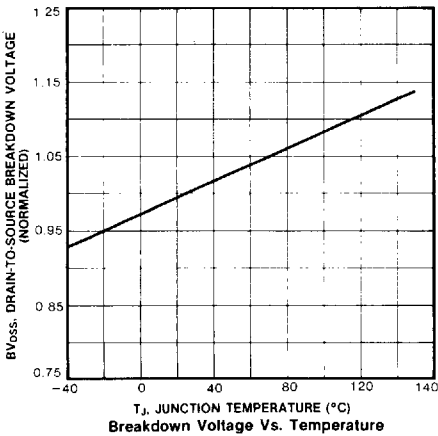
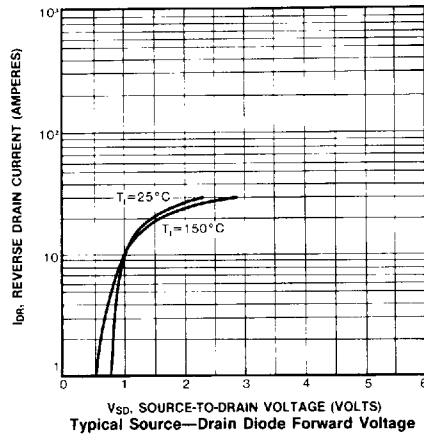
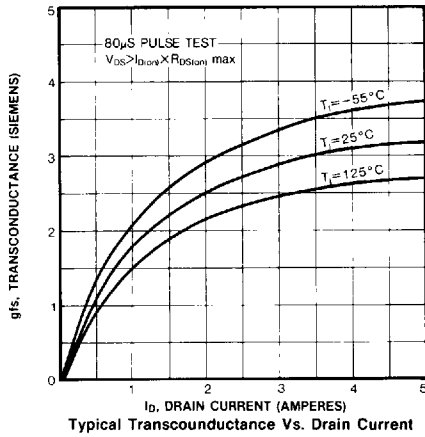


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Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



4

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