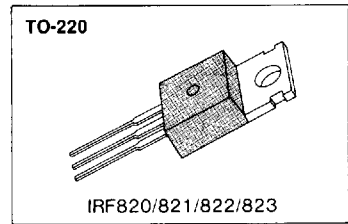


## FEATURES

- 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	$V_{DS}$	$R_{DS(on)}$	$I_D$
IRF820	500V	$3.0\Omega$	2.5A
IRF821	450V	$3.0\Omega$	2.5A
IRF822	500V	$4.0\Omega$	2.2A
IRF823	450V	$4.0\Omega$	2.2A

## MAXIMUM RATINGS

Characteristics	Symbol	IRF820 IRF420	IRF821 IRF421	IRF822 IRF422	IRF823 IRF423	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	$V_{GS}$	$\pm 20$				Vdc
Continuous Drain Current $T_C=25^\circ C$	$I_D$	2.5	2.5	2.2	2.2	Adc
Continuous Drain Current $T_C=100^\circ C$	$I_D$	1.6	1.6	1.4	1.4	Adc
Drain Current—Pulsed (3)	$I_{DM}$	8.0	8.0	7.0	7.0	Adc
Gate Current—Pulsed	$I_{GM}$	$\pm 1.5$				Adc
Single Pulsed Avalanche Energy (4)	$E_{AS}$	210				mJ
Avalanche Current	$I_{AS}$	2.5				A
Total Power Dissipation @ $T_C=25^\circ C$ Derate above $25^\circ C$	$P_D$	50 0.4				Watts W/ $^\circ C$
Operating and Storage Junction to Case	$T_J, T_{stg}$	-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)  $L=60 mH$ ,  $V_{dd}=50V$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ C$

# IRF820/821/822/823

## N-CHANNEL POWER MOSFETS

### ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C unless otherwise specified)

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage IRF820 IRF822	500	—	—	V	V <sub>GS</sub> =0V I <sub>D</sub> =250μA
	IRF821 IRF823	450	—	—	V	
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	—	4.0	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
I <sub>GSS</sub>	Gate-Source Leakage Forward	—	—	100	nA	V <sub>GS</sub> =20V
I <sub>GSS</sub>	Gate-Source Leakage Reverse	—	—	-100	nA	V <sub>GS</sub> =-20V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	—	—	250	μA	V <sub>DS</sub> =Max. Rating, V <sub>GS</sub> =0V
		—	—	1000	μA	V <sub>DS</sub> =Max. Rating×0.8, V <sub>GS</sub> =0V, T <sub>C</sub> =125°C
I <sub>D(on)</sub>	On-State Drain-Source Current (2) IRF820 IRF821	2.5	—	—	A	V <sub>DS</sub> ≥10V, V <sub>GS</sub> =10V
	IRF822 IRF823	2.0	—	—	A	
R <sub>DS(on)</sub>	Static Drain-Source On-State Resistance (2) IRF820 IRF821	—	2.5	3.0	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> =1.4A
	IRF822 IRF823	—	3.0	4.0	Ω	
g <sub>fs</sub>	Forward Transconductance (2)	1.5	2.3	—	Ω	V <sub>DS</sub> ≥10V, I <sub>D</sub> =1.4A
C <sub>iss</sub>	Input Capacitance	—	390	—	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz
C <sub>oss</sub>	Output Capacitance	—	52	—	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance	—	22	—	pF	
t <sub>d(on)</sub>	Turn-On Delay Time	—	10	15	ns	V <sub>DD</sub> =0.5BV <sub>DSS</sub> , I <sub>D</sub> =2.5A, Z <sub>O</sub> =18Ω (MOSFET switching times are essentially independent of operating temperature)
t <sub>r</sub>	Rise Time	—	12	18	ns	
t <sub>d(off)</sub>	Turn-Off Delay Time	—	28	42	ns	
t <sub>f</sub>	Fall Time	—	12	18	ns	
Q <sub>g</sub>	Total Gate Charge (Gate-Source Plus Gate-Drain)	—	13	19	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =2.5A, V <sub>DS</sub> =0.8 Max. Rating (Gate charge is essentially independent of operating temperature.)
Q <sub>gs</sub>	Gate-Source Charge	—	2.2	3.3	nC	
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	—	6.8	10	nC	

### THERMAL RESISTANCE

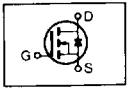
Symbol	Characteristic		IRF820-3	Unit	
R <sub>thJC</sub>	Junction-to-Case	MAX	2.5	K/W	
R <sub>thCS</sub>	Case-to-Sink	TYP	0.5	K/W	Mounting surface flat, smooth, and greased
R <sub>thJA</sub>	Junction-to-Ambient	MAX	80	K/W	Free Air Operation

Notes: (1) T<sub>J</sub>=25°C to 150°C

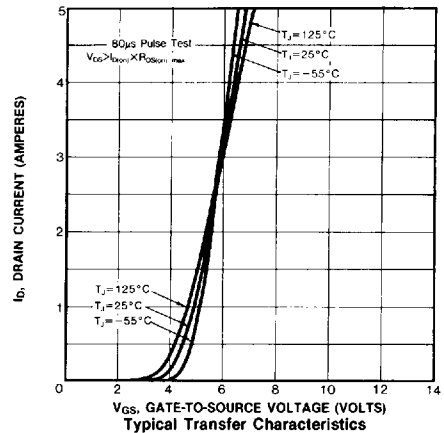
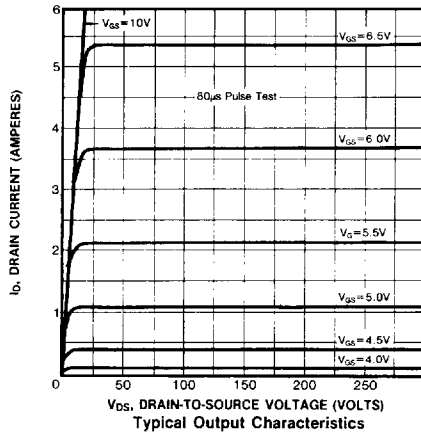
(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%

(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) IRF820 IRF821	—	—	2.5	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
	IRF822 IRF823	—	—	2.2	A	
$I_{SM}$	Pulse Source Current(Body Diode)(3) IRF820 IRF821	—	—	8.0	A	
	IRF822 IRF823	—	—	7.0	A	
$V_{SD}$	Diode Forward Voltage (2) IRF820 IRF821	—	—	1.6	V	$T_C=25^\circ\text{C}$ , $I_S=2.5\text{A}$ , $V_{GS}=0\text{V}$
	IRF822 IRF823	—	—	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	$T_J=25^\circ\text{C}$ , $I_F=2.5\text{A}$ , $dI_F/dt=100\text{A}/\mu\text{S}$

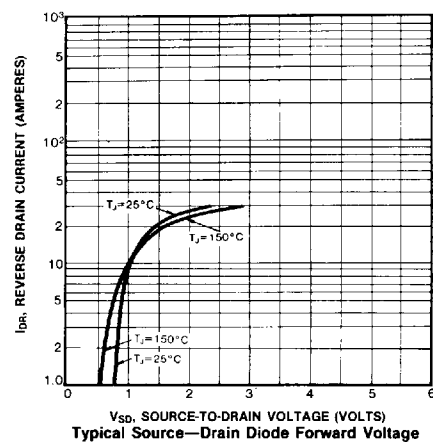
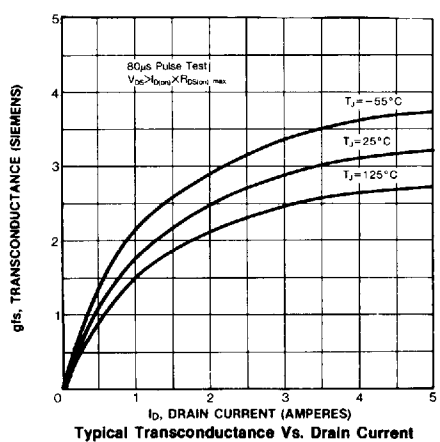
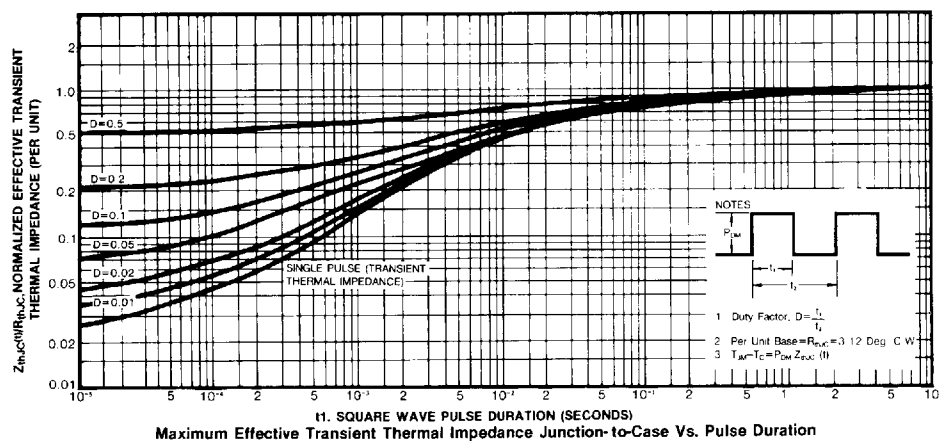
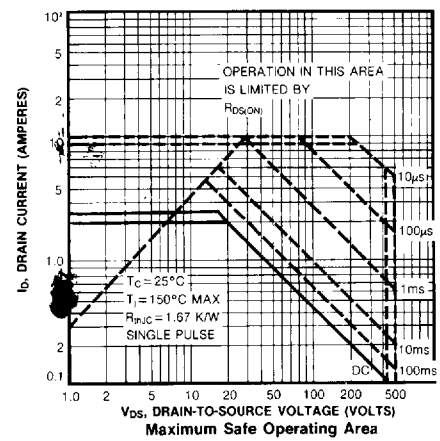
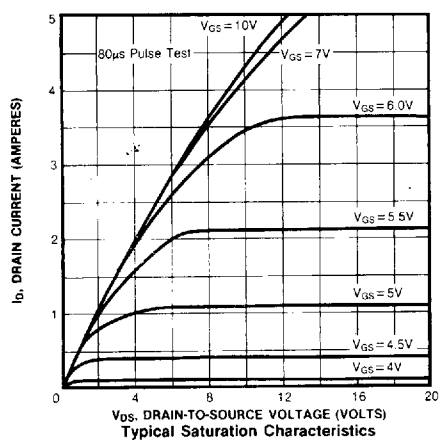
Notes: (1)  $T_J=25^\circ\text{C}$  to  $150^\circ\text{C}$  (2) Pulse test: Pulse width $\leq 300\mu\text{s}$ , Duty Cycle $\leq 2\%$   
(3) Repetitive rating: Pulse with limited by max. junction temperature



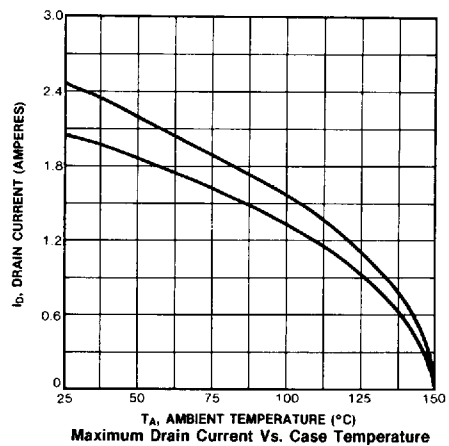
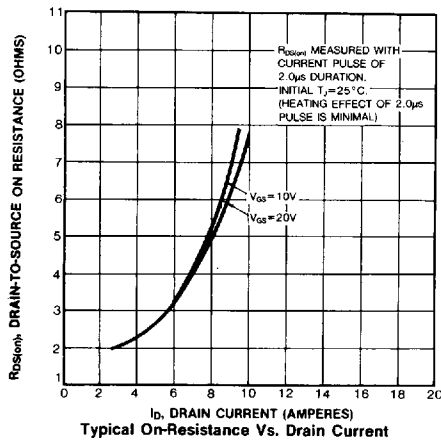
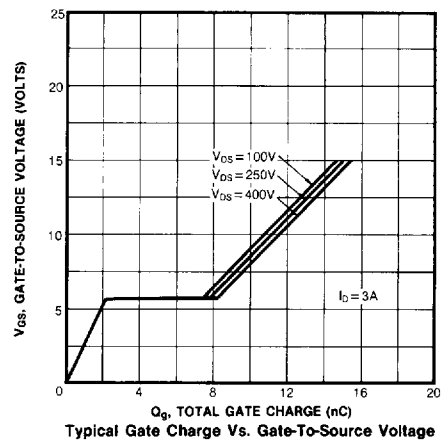
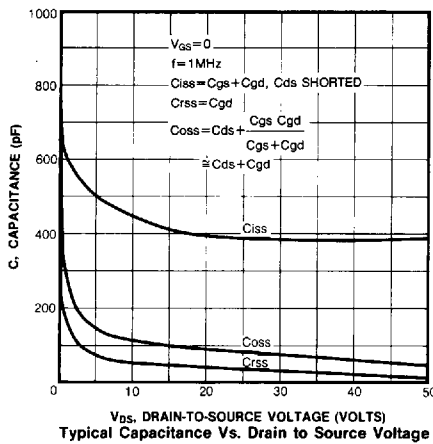
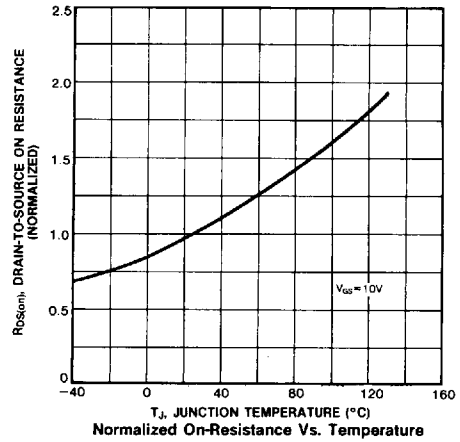
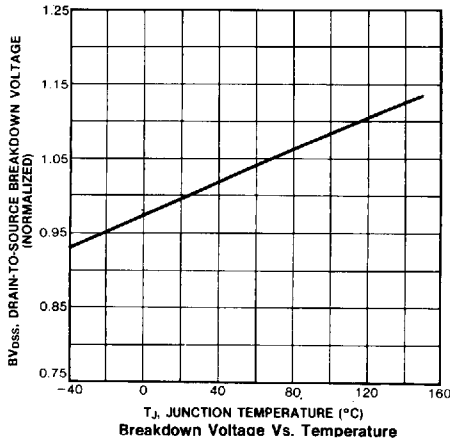
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# IRF820/821/822/823

# N-CHANNEL POWER MOSFETS



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**IRF820/821/822/823****N-CHANNEL  
POWER MOSFETS**