

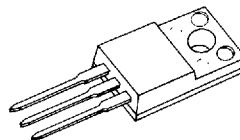
IRFS720/721/722/723

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



IRFS720/721/722/723

PRODUCT SUMMARY

Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRFS720	400V	$1.8\ \Omega$	2.5A
IRFS721	350V	$1.8\ \Omega$	2.5A
IRFS722	400V	$2.5\ \Omega$	2.0A
IRFS723	350V	$2.5\ \Omega$	2.0A

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ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	IRFS720	IRFS721	IRFS722	IRFS723	Unit
Drain-Source Voltage (1)	V_{DS}	400	350	400	350	Vdc
Drain-Gate Voltage ($R_{GS}=1.0M\Omega$)(1)	V_{DGR}	400	350	400	350	Vdc
Gate-Source Voltage	V_{GS}	± 20				Vdc
Continuous Drain Current $T_C=25^\circ C$	I_D	2.5	2.5	2.0	2.0	Adc
Continuous Drain Current $T_C=100^\circ C$	I_D	1.5	1.5	1.2	1.2	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}	109				mJ
Avalanche Current	I_{AS}	2.5				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) $L=31mH$, $V_{dd}=50V$, $R_G=25\Omega$, Starting $T_J=25^\circ C$

IRFS720/721/722/723**N-CHANNEL
POWER MOSFETS****ELECTRICAL CHARACTERISTICS** ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV _{DSS}	Drain-Source Breakdown Voltage	400	—	—	V	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$
	IRFS720/722 IRFS721/723	350	—	—		
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$
I _{GSS}	Gate-Source Leakage Forward	—	—	100	nA	$V_{GS}=20\text{V}$
I _{GSS}	Gate-Source Leakage Reverse	—	—	-100	nA	$V_{GS}=-20\text{V}$
I _{DSS}	Zero Gate Voltage Drain Current	—	—	250	μA	$V_{DS}=\text{Max. Rating}$, $V_{GS}=0\text{V}$
		—	—	1000		$V_{DS}=0.8\text{Max. Rating}$, $T_C=125^\circ\text{C}$
I _{D(on)}	On-State Drain-Source Current (2)	3.3	—	—	A	$V_{DS}\geq 8.2\text{A}$, $V_{GS}=10\text{V}$
		2.8	—	—		
R _{DS(on)}	Static Drain-Source On-State Resistance (2)	—	1.4	1.8	Ω	$V_{GS}=10\text{V}$, $I_D=1.8\text{A}$
		—	1.8	2.5		
g _{fs}	Forward Transconductance (2)	1.0	2.2	—	U	$V_{DS}\geq 50\text{V}$, $I_D=1.8\text{A}$
C _{iss}	Input Capacitance	—	400	—	pF	$V_{GS}=0\text{V}$
C _{oss}	Output Capacitance	—	59.3	—	pF	$V_{DS}=25\text{V}$
C _{rss}	Reverse Transfer Capacitance	—	27	—	pF	$f=1.0\text{MHz}$
t _{d(on)}	Turn-On Delay Time	—	10	15	ns	$V_{DD}=0.5\text{BV}_{DSS}$, $I_D=3.3\text{A}$, $Z_O=18\Omega$ (MOSFET switching times are essentially independent of operating temperature)
t _r	Rise Time	—	14	20	ns	
t _{d(off)}	Turn-Off Delay Time	—	30	45	ns	
t _f	Fall Time	—	13	20	ns	
Q _g	Total Gate Charge (Gate-Source Pulse Gate-Drain)	—	12.5	15	nC	$V_{GS}=10\text{V}$, $I_D=9.2\text{A}$, $V_{DS}=0.8\text{Max. Rating}$ (Gate charge is essentially independent of operating temperature.)
Q _{gs}	Gate-Source Charge	—	2.8	—	nC	
Q _{gd}	Gate-Drain ("Miller") Charge	—	9.7	—	nC	

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) $T_J=25^\circ\text{C}$ to 150°C (2) Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

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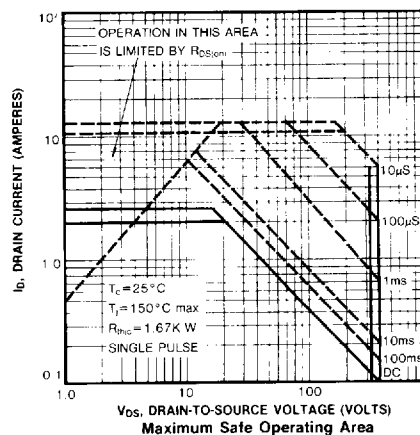
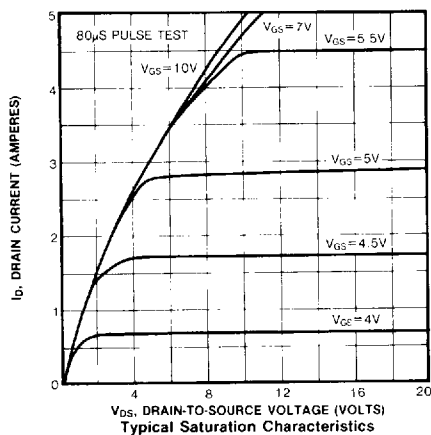
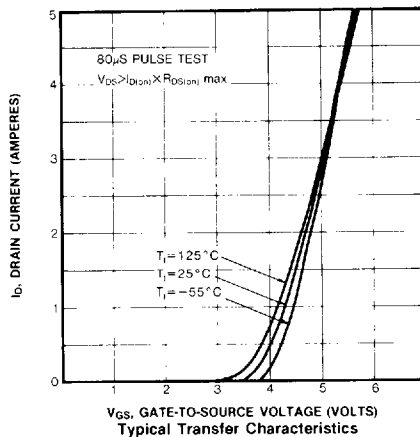
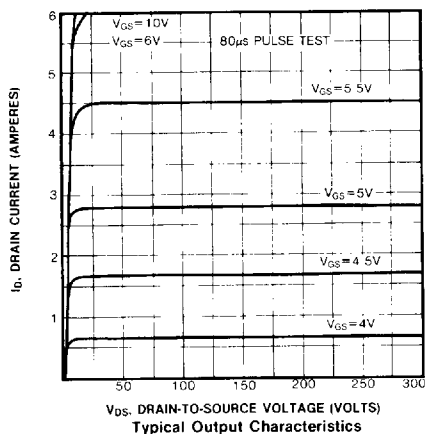
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SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

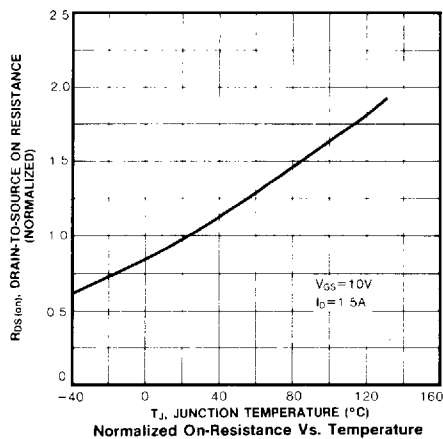
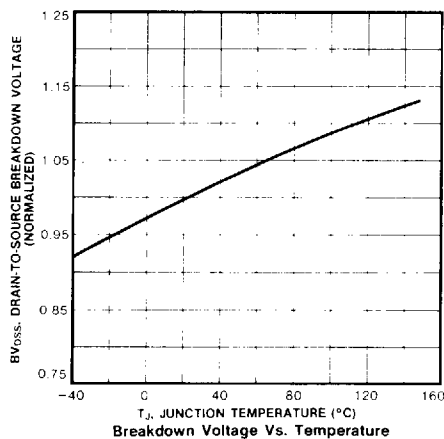
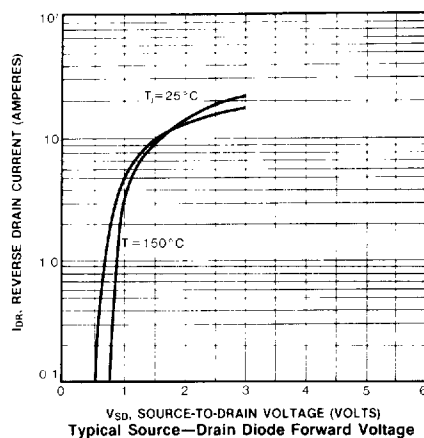
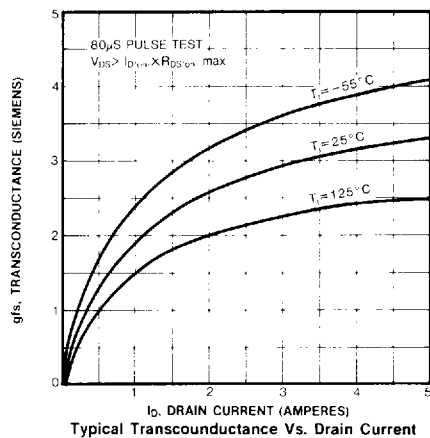
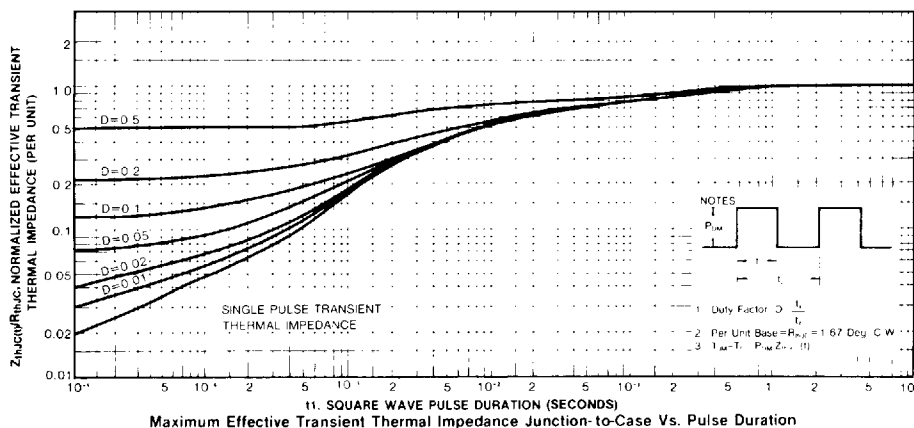
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)					Modified MOSFET integral reverse P-N junction rectifier
	IRFS720/721	—	—	3.3	A	
	IRFS722/723	—	—	2.8	A	
I_{SM}	Pulse Source Current (3)					
	IRFS720/721	—	—	13	A	
	IRFS722/723	—	—	11	A	
V_{SD}	Diode Forward Voltage (2)					$T_C = 25^\circ\text{C}$, $I_S = 3.3\text{A}$, $V_{GS} = 0\text{V}$ $T_C = 25^\circ\text{C}$, $I_S = 2.8\text{A}$, $V_{GS} = 0\text{V}$
	IRFS720/721	—	—	1.8	V	
	IRFS722/723	—	—	1.7	V	
t_{rr}	Reverse Recovery Time	—	270	—	ns	$T_J = 25^\circ\text{C}$, $I_F = 3.3\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{S}$

Notes: (1) $T_J = 25^\circ\text{C}$ to 150°C (2) Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

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