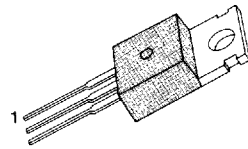


## FEATURES

- 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-220



1. Gate 2. Drain 3. Source

## PRODUCT SUMMARY

Part Number	V <sub>DS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
IRF720	400V	1.8Ω	3.3A
IRF721	350V	1.8Ω	3.3A

## ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	IRF720	IRF721	Unit
Drain-Source Voltage (1)	V <sub>DSS</sub>	400	350	V <sub>dc</sub>
Drain-Gate Voltage (R <sub>GS</sub> =1.0MΩ)(1)	V <sub>DGR</sub>	400	350	V <sub>dc</sub>
Gate-Source Voltage	V <sub>GS</sub>	± 20		V <sub>dc</sub>
Continuous Drain Current T <sub>C</sub> =25 °C	I <sub>D</sub>	3.3		A <sub>dc</sub>
Continuous Drain Current T <sub>C</sub> =100 °C	I <sub>D</sub>	2.1		A <sub>dc</sub>
Drain Current - Pulsed (3)	I <sub>DM</sub>	13		A <sub>dc</sub>
Gate Current - Pulsed	I <sub>GM</sub>	± 1.5		A <sub>dc</sub>
Single Pulsed Avalanche Energy (4)	E <sub>AS</sub>	190		mJ
Avalanche Current	I <sub>AS</sub>	3.3		A
Total Power Dissipation @ T <sub>C</sub> =25 °C	P <sub>D</sub>	50		Watts
Derate above 25 °C		0.40		W/°C
Operating and Storage	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150		°C
Junction Temperature Range				
Maximum Lead Temp. for Soldering	T <sub>L</sub>	300		°C
Purposes, 1/8" from case for 5 seconds				

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

(4) L=31mH, V<sub>dd</sub>=50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C

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

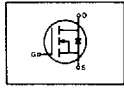
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage					
	IRF720	400	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
	IRF721	350	-	-	V	
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	-	4.0	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
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> =0.8 Max. Rating, V <sub>GS</sub> =0V, Tc=125°C
R <sub>DS(on)</sub>	Static Drain-Source On Resistance(2)	-	1.4	1.8	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> =1.7A
g <sub>fs</sub>	Forward Transconductance (2)	1.0	2.2	-	∩	V <sub>DS</sub> ≥50V, I <sub>D</sub> =1.7A
C <sub>iss</sub>	Input Capacitance	-	400	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz
C <sub>oss</sub>	Output Capacitance	-	59.3	-	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance	-	27	-	pF	
t <sub>d(on)</sub>	Turn-On Delay Time	-	10	15	ns	V <sub>DD</sub> =0.5 BV <sub>DSS</sub> , I <sub>D</sub> =3.3A, Z <sub>θ</sub> =18Ω (MOSFET switching times are essentially independent of operating temperature)
t <sub>r</sub>	Rise Time	-	14	20	ns	
t <sub>d(off)</sub>	Turn-Off Delay Time	-	30	45	ns	
t <sub>f</sub>	Fall Time	-	13	20	ns	
Q <sub>g</sub>	Total Gate Charge (Gate-Source Plus Gate-Drain)	-	-	25	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =3.3A, V <sub>DS</sub> =0.8 Max. Rating (Gate charge is essentially independent of operating temperature)
Q <sub>gs</sub>	Gate-Source Charge	-	3.0	-	nC	
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	-	11	-	nC	

**THERMAL RESISTANCE**

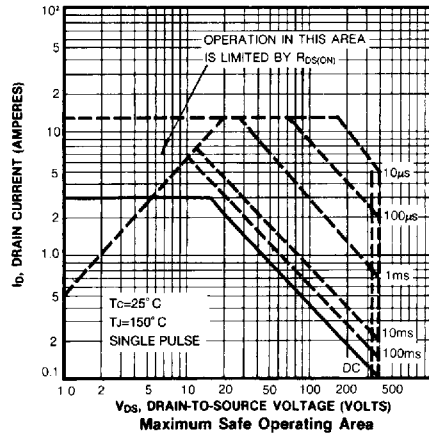
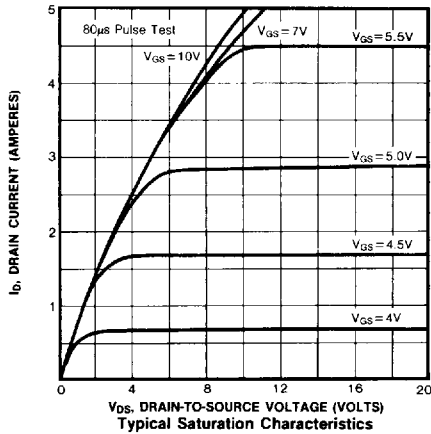
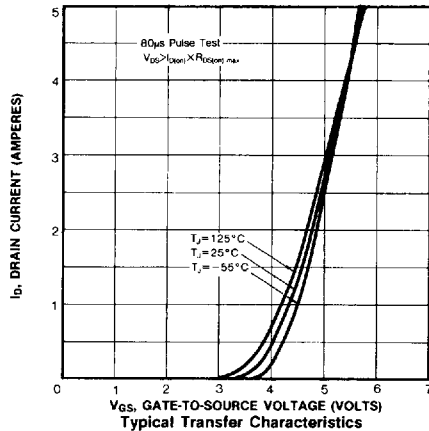
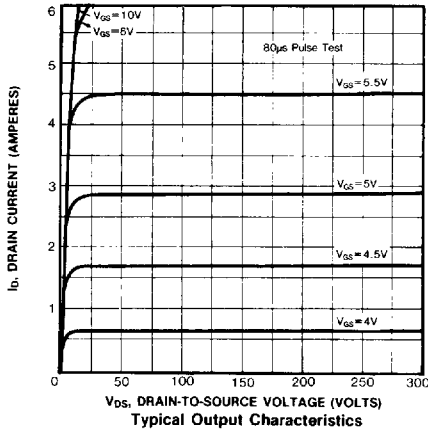
Symbol	Characteristics		All	Units	Remark
R <sub>thJC</sub>	Junction-to-Case	MAX	2.5	K/W	
R <sub>thCS</sub>	Case-to-Sink	TYP	0.5	K/W	Mounting surface flat, smooth, and greased
R <sub>thJA</sub>	Junction-to-Ambient	MAX	62.5	K/W	Free Air Operation

- 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

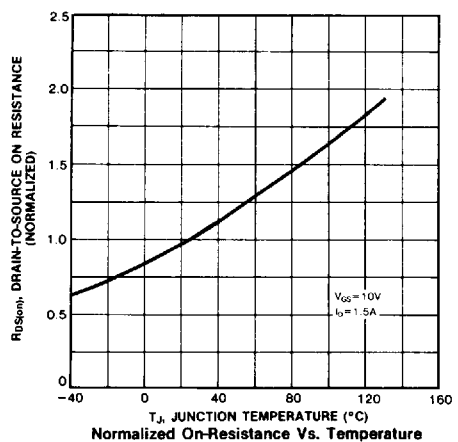
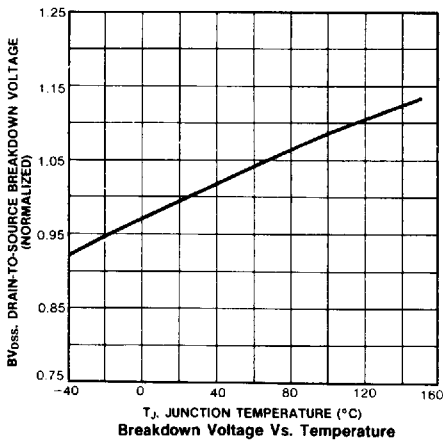
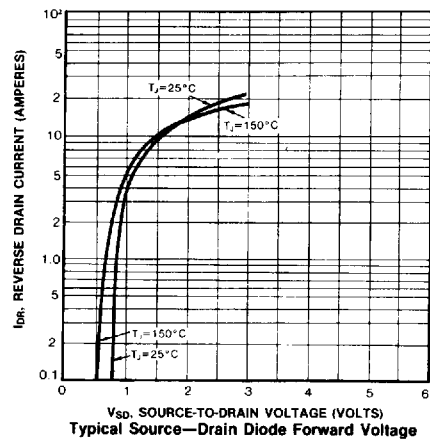
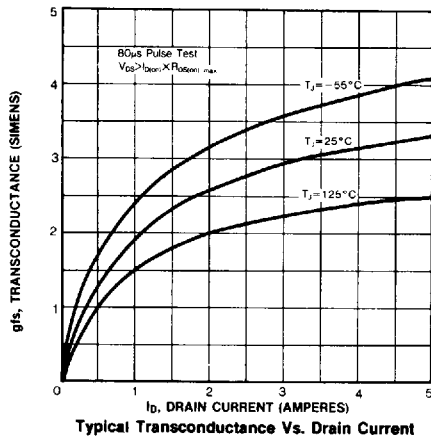
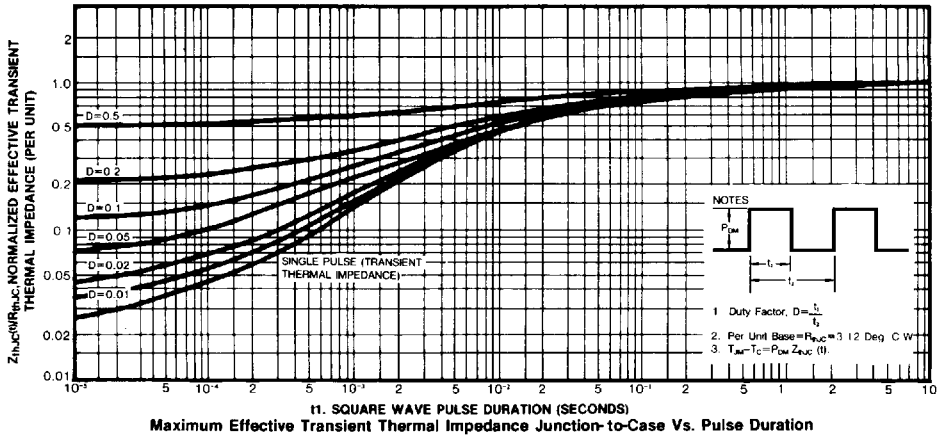
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

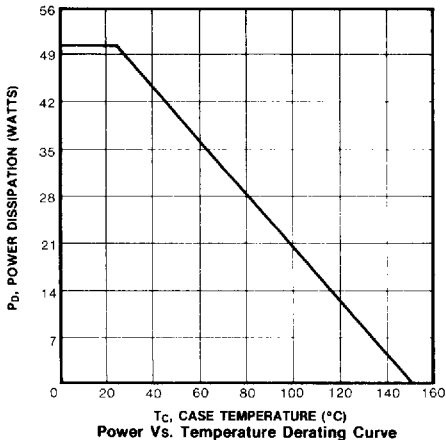
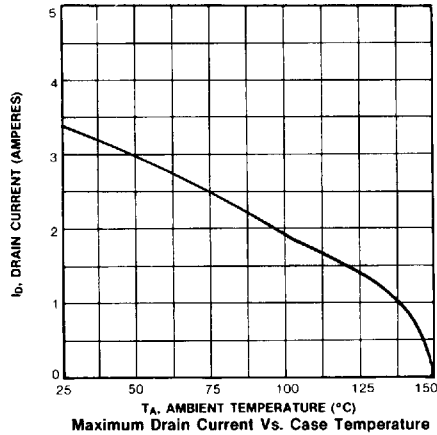
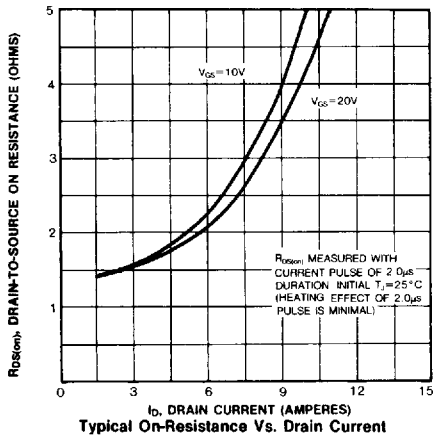
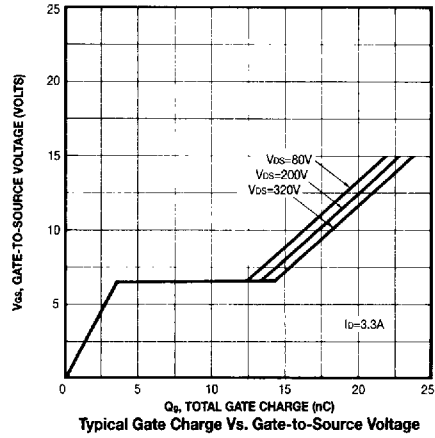
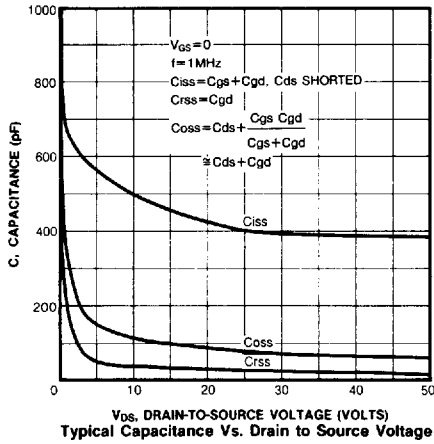
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	-	-	3.3	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
$I_{SM}$	Pulse Source Current (Body Diode) (3)	-	-	13	A	
$V_{SD}$	Diode Forward Voltage (2)	-	-	1.8	V	$T_J=25^\circ\text{C}$ , $I_S=3.3\text{A}$ , $V_{GS}=0\text{V}$
$t_{rr}$	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  $150^\circ\text{C}$   
 (2) Pulse test : Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$   
 (3) Repetitive rating : Pulse width limited by max. junction temperature



4





4