

# IRF730/731/732/733 IRFP330/331/332/333

## N-CHANNEL POWER MOSFETS

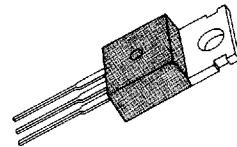
### FEATURES

- 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

### PRODUCT SUMMARY

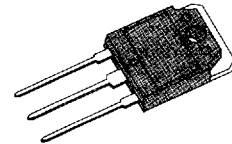
Part Number	$V_{DS}$	$R_{DS(on)}$	$I_D$
IRF730/IRFP330	400V	1.0 $\Omega$	5.5A
IRF731/IRFP331	350V	1.0 $\Omega$	5.5A
IRF732/IRFP332	400V	1.5 $\Omega$	4.5A
IRF733/IRFP333	350V	1.5 $\Omega$	4.5A

TO-220



IRF730/731/732/733

TO-3P



IRFP330/331/332/333

### MAXIMUM RATINGS

Characteristics	Symbol	IRF730 IRFP330	IRF731 IRFP331	IRF732 IRFP332	IRF733 IRFP333	Unit
Drain-Source Voltage (1)	$V_{DSS}$	400	350	400	350	Vdc
Drain-Gate Voltage ( $R_{GS}=1.0M\Omega$ )(1)	$V_{DGR}$	400	350	400	350	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$				Vdc
Continuous Drain Current $T_C=25^\circ C$	$I_D$	5.5	5.5	4.5	4.5	Adc
Continuous Drain Current $T_C=100^\circ C$	$I_D$	3.5	3.5	3.0	3.0	Adc
Drain Current—Pulsed (3)	$I_{DM}$	32	32	18	18	Adc
Gate Current—Pulsed	$I_{GM}$	$\pm 1.5$				Adc
Single Pulsed Avalanche Energy (4)	$E_{AS}$	290				mJ
Avalanche Current	$I_{AS}$	5.5				A
Total Power Dissipation @ $T_C=25^\circ C$ Derate above $25^\circ C$	$P_D$	75 0.6				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)  $L=17$  mH,  $V_{d0}=50V$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ C$

**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 IRF730/IRFP330 IRF732/IRFP332	400	—	—	V	$V_{GS}=0V$ $I_D=250\mu A$
	IRF731/IRFP331 IRF733/IRFP333	350	—	—	V	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS}=V_{GS}$ , $I_D=250\mu A$
$I_{GSS}$	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	$\mu A$	$V_{DS}=\text{Max. Rating}$ , $V_{GS}=0V$
		—	—	1000	$\mu A$	$V_{DS}=\text{Max. Rating}\times 0.8$ , $V_{GS}=0V$ , $T_C=125^\circ\text{C}$
$I_{D(on)}$	On-State Drain-Source Current (2) IRF730/IRFP330 IRF731/IRFP331	5.5	—	—	A	$V_{DS}\geq 8.2V$ , $V_{GS}=10V$
	IRF732/IRFP332 IRF733/IRFP333	4.5	—	—	A	
$R_{DS(on)}$	Static Drain-Source On-State Resistance (2) IRF730/IRFP330 IRF731/IRFP331	—	0.8	1.0	$\Omega$	$V_{GS}=10V$ , $I_D=3.0A$
	IRF732/IRFP332 IRF733/IRFP333	—	1.0	1.5	$\Omega$	
$g_{fs}$	Forward Transconductance (2)	2.9	4.4	—	$\text{V}$	$V_{DS}\geq 50V$ , $I_D=3.0A$
$C_{iss}$	Input Capacitance	—	780	—	pF	$V_{GS}=0V$ , $V_{DS}=25V$ , $f=1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	99	—	pF	
$C_{rss}$	Reverse Transfer Capacitance	—	43	—	pF	
$t_{d(on)}$	Turn-On Delay Time	—	11	17	ns	$V_{DD}=0.5BV_{DSS}$ , $I_D=5.5A$ , $Z_O=12\Omega$ (MOSFET switching times are essentially independent of operating temperature)
$t_r$	Rise Time	—	19	29	ns	
$t_{d(off)}$	Turn-Off Delay Time	—	37	56	ns	
$t_f$	Fall Time	—	16	24	ns	
$Q_g$	Total Gate Charge (Gate-Source Plus Gate-Drain)	—	18	30	nC	$V_{GS}=10V$ , $I_D=5.5A$ , $V_{DS}=0.8$ Max. Rating (Gate charge is essentially independent of operating temperature.)
$Q_{gs}$	Gate-Source Charge	—	40	—	nC	
$Q_{gd}$	Gate-Drain ("Miller") Charge	—	14	—	nC	



**THERMAL RESISTANCE**


Symbol	Characteristic		IRF730-3	IRFP330-3	Unit	
$R_{thJC}$	Junction-to-Case	MAX	1.67	1.67	K/W	
$R_{thCS}$	Case-to-Sink	TYP	0.50	0.24	K/W	Mounting surface flat, smooth, and greased
$R_{thJA}$	Junction-to-Ambient	MAX	80	40	K/W	Free Air Operation

Notes: (1)  $T_J=25^\circ\text{C}$  to  $150^\circ\text{C}$

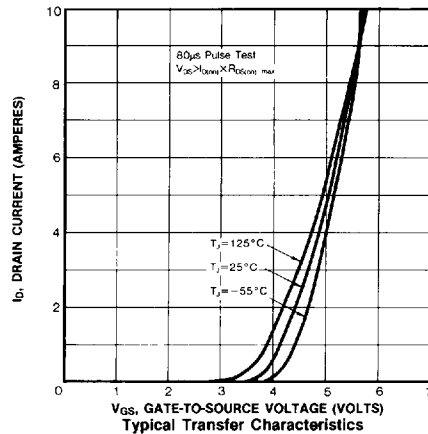
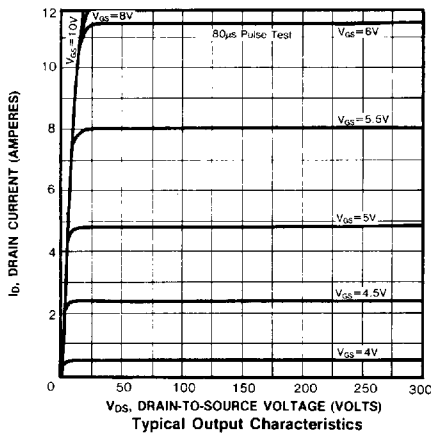
(2) Pulse test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$

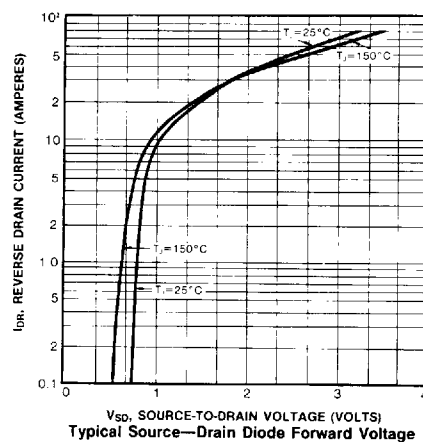
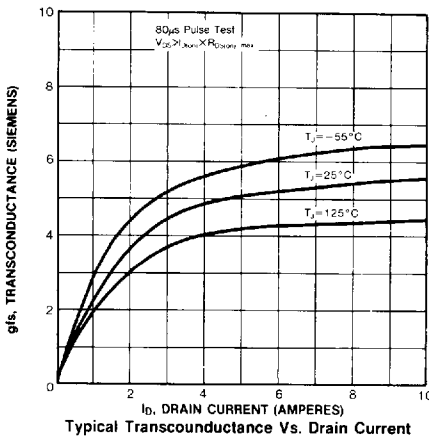
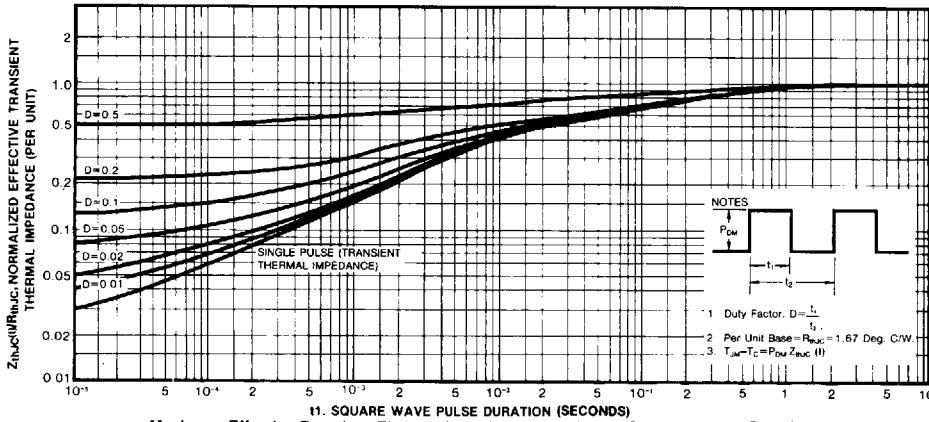
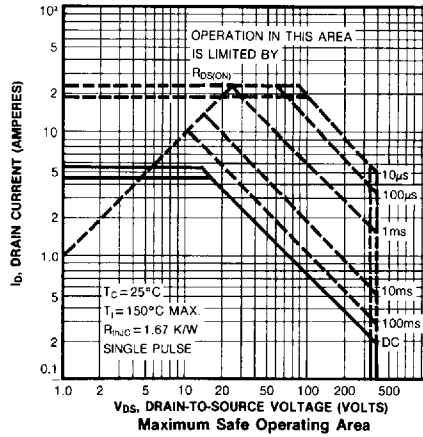
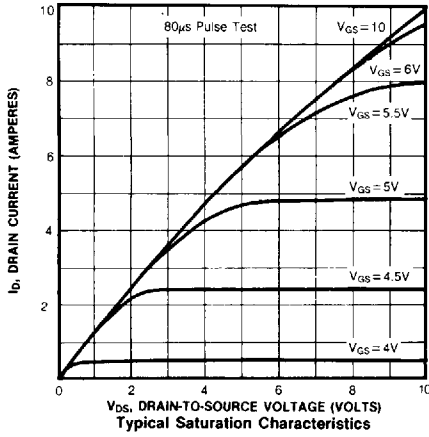
(3) Repetitive rating: Pulse width limited by max. junction temperature

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode) IRF730/IRFP330 IRF731/IRFP331	—	—	5.5	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
	IRF732/IRFP332 IRF733/IRFP333	—	—	4.5	A	
I <sub>SM</sub>	Pulse Source Current(Body Diode)(3) IRF730/IRFP330/IRFP330 IRF731/IRFP331/IRFP331	—	—	22	A	
	IRF732/IRFP332 IRF733/IRFP333	—	—	18	A	
V <sub>SD</sub>	Diode Forward Voltage (2) IRF730/IRFP330 IRF731/IRFP331	—	—	1.8	V	T <sub>C</sub> =25°C, I <sub>S</sub> =5.5A, V <sub>GS</sub> =0V
	IRF732/IRFP332 IRF733/IRFP333	—	—	1.6	V	T <sub>C</sub> =25°C, I <sub>S</sub> =4.5A, V <sub>GS</sub> =0V
t <sub>rr</sub>	Reverse Recovery Time	—	310	660	ns	T <sub>J</sub> =25°C, I <sub>F</sub> =5.5A, dI <sub>F</sub> /dt=100A/μS

**Notes:** (1) T<sub>J</sub>=25°C to 150°C (2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%  
 (3) Repetitive rating: Pulse with limited by max. junction temperature





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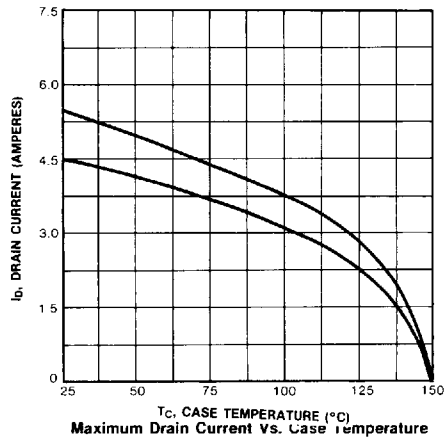
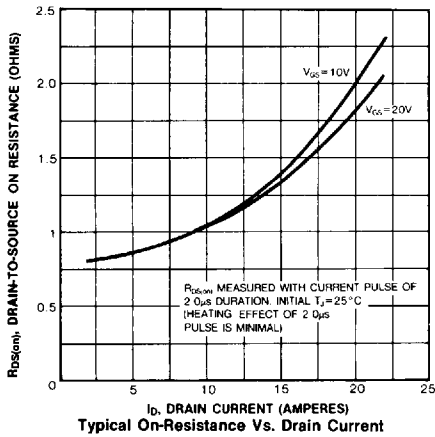
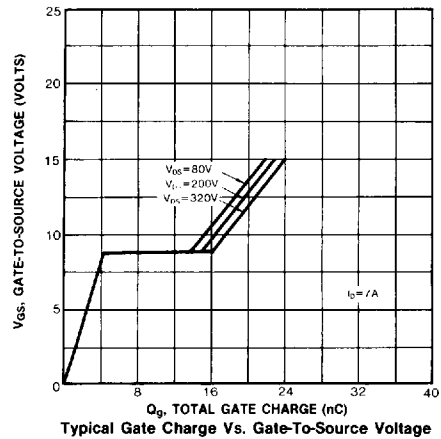
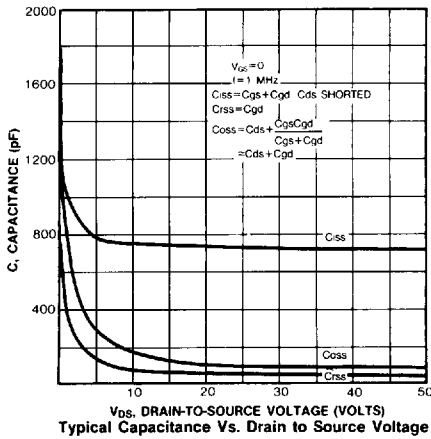
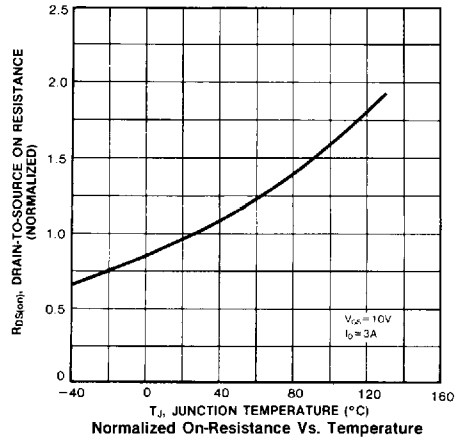
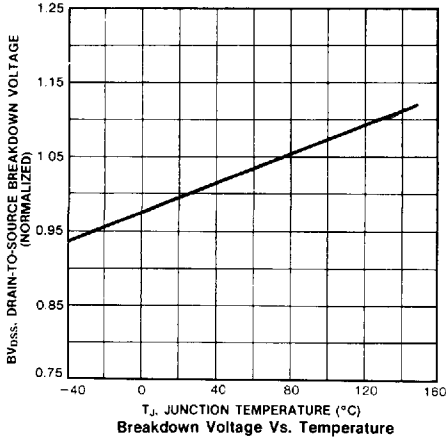
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# N-CHANNEL POWER MOSFETS

SAMSUNG ELECTRONICS INC

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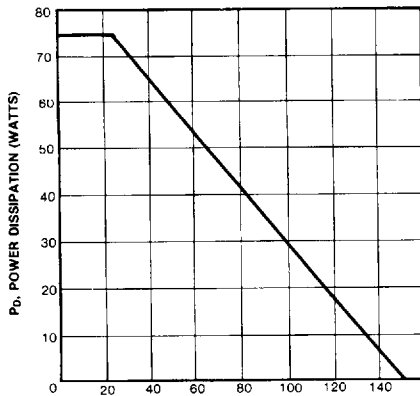
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**T<sub>c</sub> CASE TEMPERATURE (°C)**  
**Power Vs. Temperature Derating Curve**

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