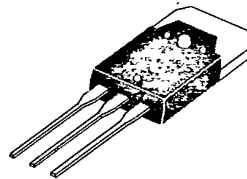


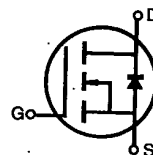
IRFP450/451/452/453**N-CHANNEL
POWER MOSFETS****FEATURES**

- Low $R_{DS(on)}$ at high voltage
- Improved inductive ruggedness
- Excellent high voltage stability
- Fast switching times
- Rugged polysilicon gate cell structure
- Low input capacitance
- Extended safe operating area
- Improved high temperature reliability
- TO-3P package

TO-3P

**PRODUCT SUMMARY**

Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRFP250	500V	0.4 Ω	13A
IRFP251	450V	0.4 Ω	13A
IRFP252	500V	0.5 Ω	12A
IRFP253	450V	0.5 Ω	12A

**MAXIMUM RATINGS**

Characteristic	Symbol	IRFP450	IRFP451	IRFP452	IRFP453	Unit
Drain-Source Voltage (1)	V_{DSS}	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	13	13	12	12	Adc
Continuous Drain Current $T_C=100^\circ C$	I_D	8.0	8.0	7.0	7.0	Adc
Drain Current—Pulsed (3)	I_{DM}	52	52	48	48	Adc
Gate Current—Pulsed	I_{GM}	± 1.5				Adc
Total Power Dissipation @ $T_C=25^\circ C$ Derate above $25^\circ C$	P_D	150 1.2				Watts 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 width limited by max. junction temperature

IRFP450/451/452/453**N-CHANNEL
POWER MOSFETS****ELECTRICAL CHARACTERISTICS** ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Drain-Source Breakdown Voltage	BV_{DSS}	IRFP450	500	—	—	V	$V_{GS} = 0V$
		IRFP452	—	—	—	—	—
		IRFP451	450	—	—	V	$I_D = 250\mu A$
		IRFP453	—	—	—	—	—
Gate Threshold Voltage	$V_{GS(th)}$	ALL	2.0	—	4.0	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$
Gate-Source Leakage Forward	I_{GSS}	ALL	—	—	100	nA	$V_{GS} = 20V$
Gate-Source Leakage Reverse	I_{GSS}	ALL	—	—	-100	nA	$V_{GS} = -20V$
Zero Gate Voltage Drain Current	I_{DSS}	ALL	—	—	250	μA	$V_{DS} = \text{Max. Rating}$, $V_{GS} = 0V$
			—	—	1000	μA	$V_{DS} = \text{Max. Rating} \times 0.8$, $V_{GS} = 0V$, $T_C = 125^\circ\text{C}$
On-State Drain-Source Current (2)	$I_{D(on)}$	IRFP450	13	—	—	A	$V_{DS} > I_{D(on)} \times R_{DS(on)}$ max., $V_{GS} = 10V$
		IRFP451	—	—	—	—	
		IRFP452 IRFP453	12	—	—	A	
Static Drain-Source On-State Resistance (2)	$R_{DS(on)}$	IRFP450	—	0.38	0.4	Ω	$V_{GS} = 10V$, $I_D = 7.0A$
		IRFP451	—	—	—	—	
		IRFP452	—	0.4	0.5	Ω	
		IRFP453	—	—	—	—	
Forward Transconductance (2)	g_{fs}	ALL	6.0	10.8	—	S	$V_{DS} > I_{D(on)} \times R_{DS(on)}$ max., $I_D = 7.0A$
Input Capacitance	C_{iss}	ALL	—	2850	3000	pF	$V_{GS} = 0V$, $V_{DS} = 25V$, $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	ALL	—	350	600	pF	
Reverse Transfer Capacitance	C_{rss}	ALL	—	150	200	pF	
Turn-On Delay Time	$t_{d(on)}$	ALL	—	—	35	ns	$V_{DD} = 0.5BV_{DSS}$, $I_D = 7.0A$, $Z_O = 4.7\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
Rise Time	t_r	ALL	—	—	50	ns	
Turn-Off Delay Time	$t_{d(off)}$	ALL	—	—	150	ns	
Fall Time	t_f	ALL	—	—	70	ns	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q_g	ALL	—	77	120	nC	$V_{GS} = 10V$, $I_D = 16A$, $V_{DS} = 0.8$ Max. Rating (Gate charge is essentially independent of operating temperature.)
Gate-Source Charge	Q_{gs}	ALL	—	11	—	nC	
Gate-Drain ("Miller") Charge	Q_{gd}	ALL	—	66	—	nC	

THERMAL RESISTANCE

Junction-to-Case	R_{thJC}	ALL	—	—	0.83	K/W	
Case-to-Sink	R_{thCS}	ALL	—	0.1	—	K/W	Mounting surface flat, smooth, and greased
Junction-to-Ambient	R_{thJA}	ALL	—	—	80	K/W	Free Air Operation

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

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



IRFP450/451/452/453

N-CHANNEL
POWER MOSFETS

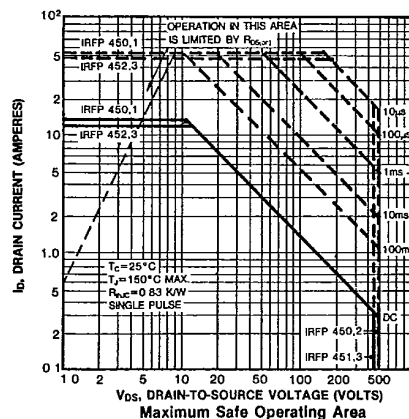
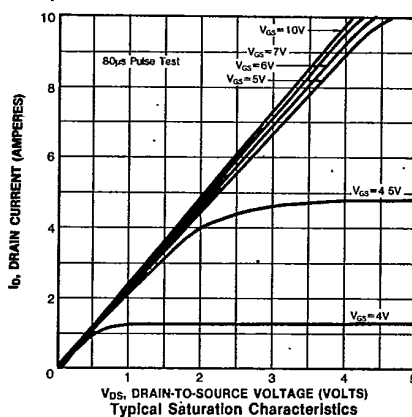
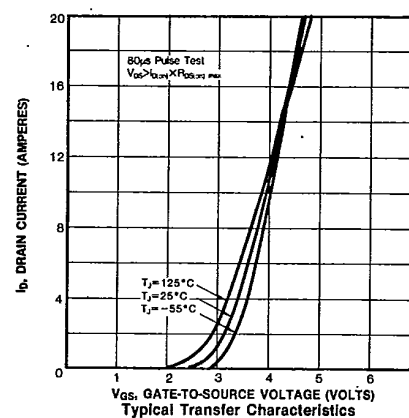
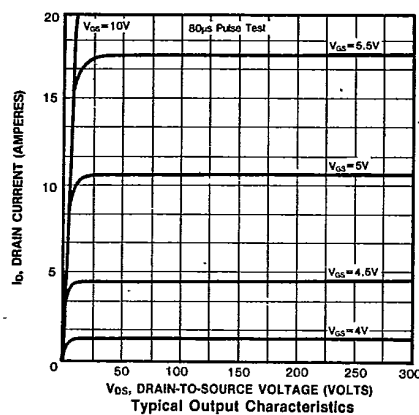
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SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

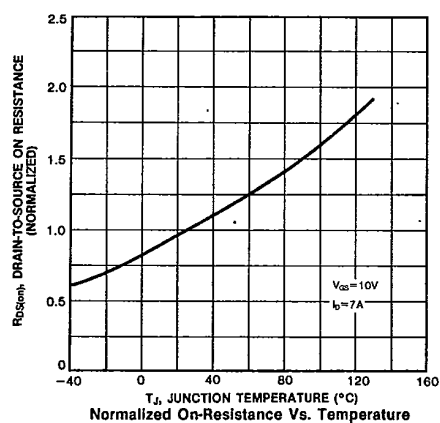
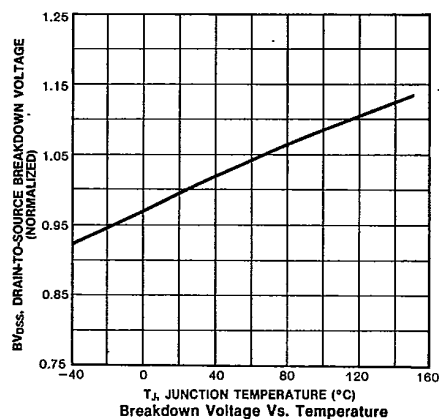
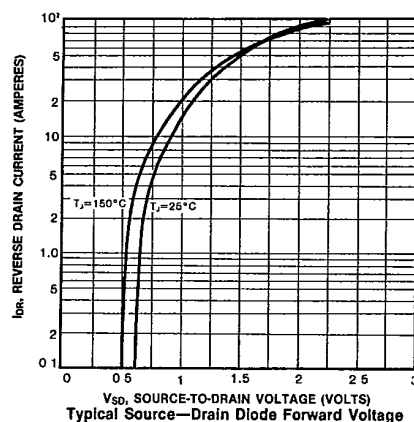
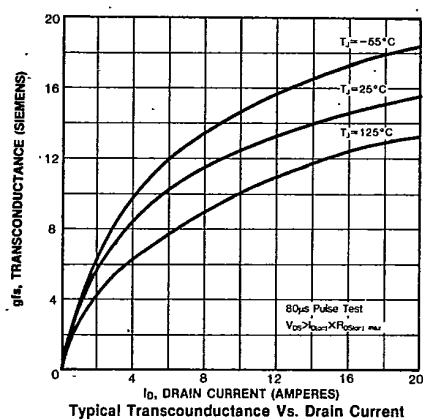
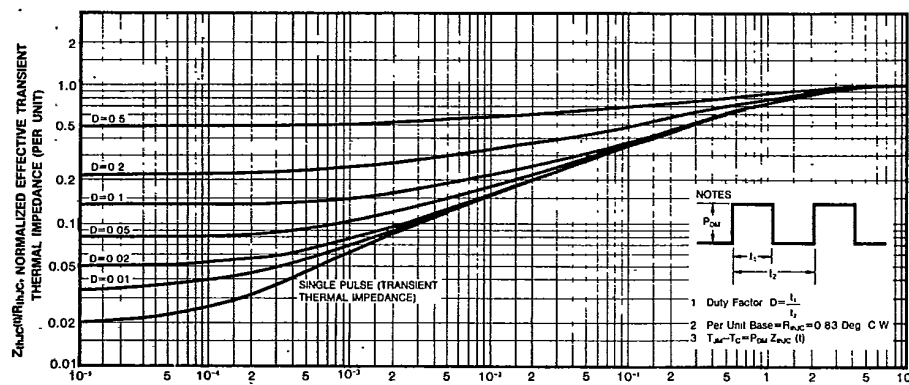
Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Continuous Source Current (Body Diode)	I_S	IRFP450	—	—	13	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier
		IRFP451	—	—	13	A	
		IRFP452	—	—	12	A	
		IRFP453	—	—	12	A	
Pulse Source Current (Body Diode) (3)	I_{SM}	IRFP450	—	—	52	A	
		IRFP451	—	—	52	A	
		IRFP452	—	—	48	A	
		IRFP453	—	—	48	A	
Diode Forward Voltage (2)	V_{SD}	IRFP450	—	—	1.4	V	$T_C=25^\circ\text{C}$, $I_S=13\text{A}$, $V_{GS}=0\text{V}$
		IRFP451	—	—	1.4	V	
		IRFP452	—	—	1.3	V	$T_C=25^\circ\text{C}$, $I_S=12\text{A}$, $V_{GS}=0\text{V}$
		IRFP453	—	—	1.3	V	
Reverse Recovery Time	t_{rr}	ALL	—	1300	—	ns	$T_J=150^\circ\text{C}$, $I_F=13\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$

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

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



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