

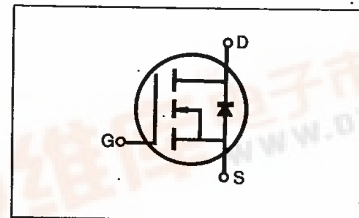
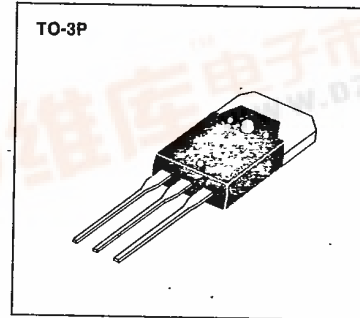
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IRFP450/451/452/453

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



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_{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}	± 20				Vdc
Continuous Drain Current $T_C=25^\circ C$	I_D	13	13	12	12	A dc
Continuous Drain Current $T_C=100^\circ C$	I_D	8.0	8.0	7.0	7.0	A dc
Drain Current—Pulsed (3)	I_{DM}	52	52	48	48	A dc
Gate Current—Pulsed	I_{GM}	± 1.5				A dc
Total Power Dissipation @ $T_C=25^\circ C$	P_D	150				Watts
Derate above $25^\circ C$		1.2				$W/^\circ C$
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°C unless otherwise specified)

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Drain-Source Breakdown Voltage	BV _{DSS}	IRFP450 IRFP452	500	—	—	V	V _{GS} =0V
		IRFP451 IRFP453	450	—	—	V	I _D =250μA
Gate Threshold Voltage	V _{GS(th)}	ALL	2.0	—	4.0	V	V _{DS} =V _{GS} , I _D =250μA
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} =Max. Rating, V _{GS} =0V
			—	—	1000	μA	V _{DS} =Max. Rating×0.8, V _{GS} =0V, T _C =125°C
On-State Drain-Source Current (2)	I _{D(on)}	IRFP450 IRFP451	13	—	—	A	V _{DS} >I _{D(on)} ×R _{DS(on)} max., V _{GS} =10V
		IRFP452 IRFP453	12	—	—	A	
Static Drain-Source On-State Resistance (2)	R _{DS(on)}	IRFP450 IRFP451	—	0.38	0.4	Ω	V _{GS} =10V, I _D =7.0A
		IRFP452 IRFP453	—	0.4	0.5	Ω	
Forward Transconductance (2)	g _{fs}	ALL	6.0	10.8	—	S	V _{DS} >I _{D(on)} ×R _{DS(on)} max., I _D =7.0A
Input Capacitance	C _{ISS}	ALL	—	2850	3000	pF	V _{GS} =0V, V _{DS} =25V, f=1.0MHz
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 =4.7Ω (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°C to 150°C

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

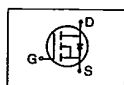
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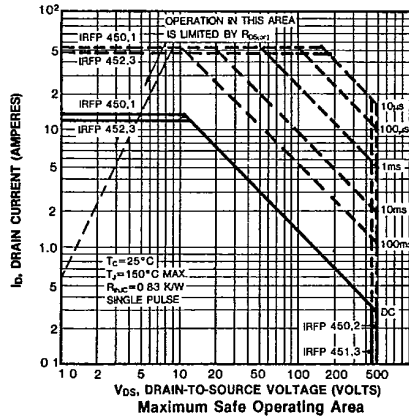
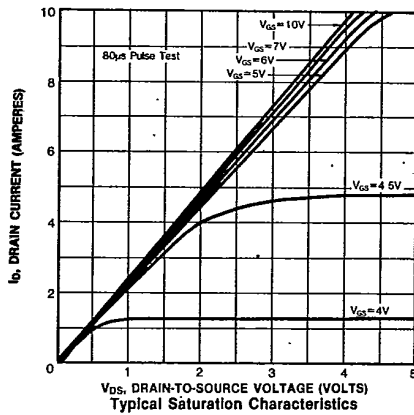
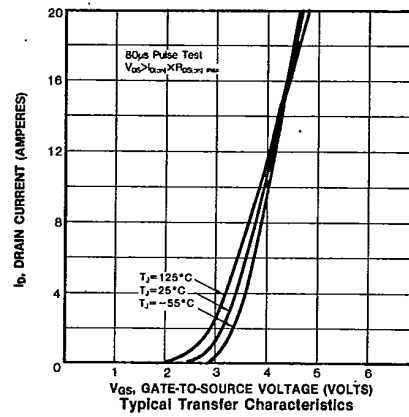
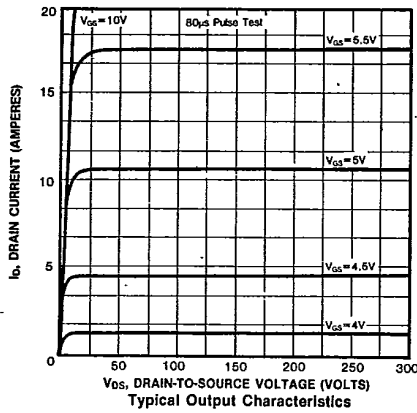
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SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

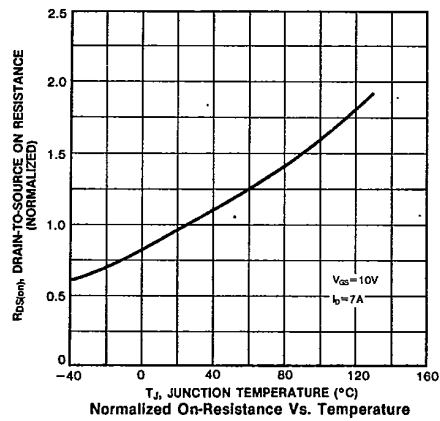
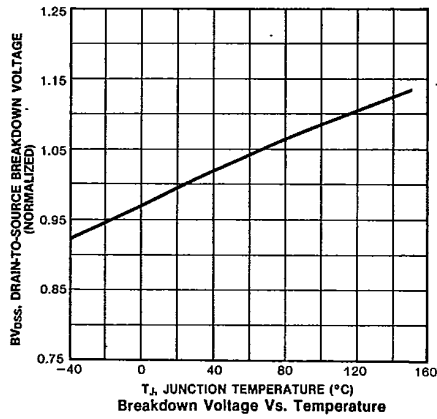
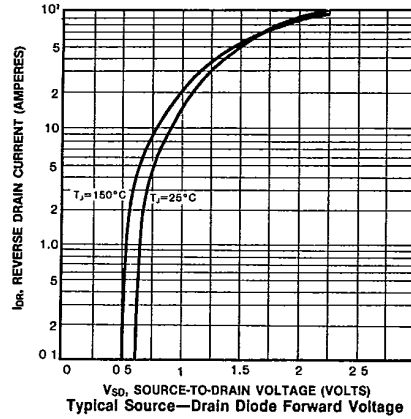
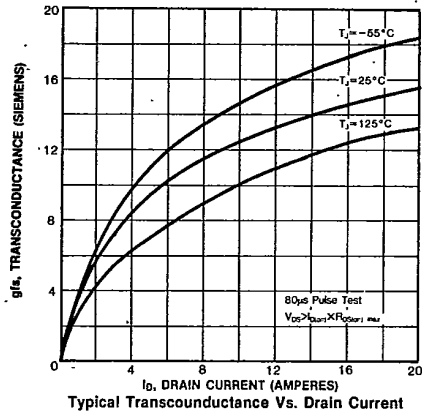
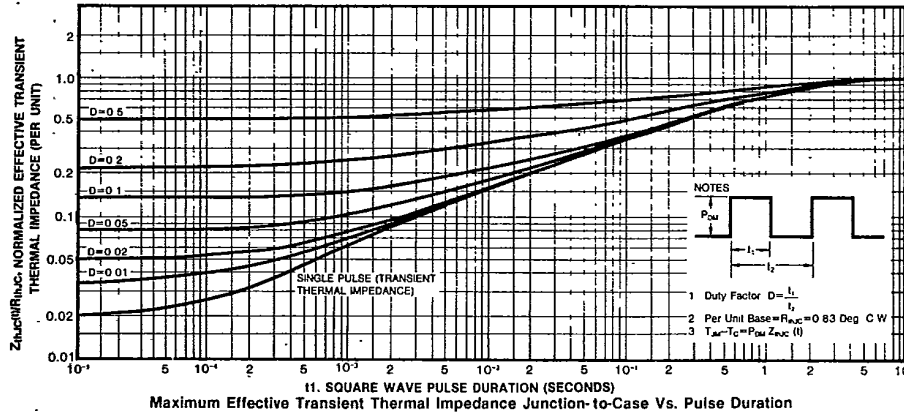
Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Continuous Source Current (Body Diode)	I_S	IRFP450	—	—	13	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
		IRFP451	—	—	12	A	
		IRFP452 IRFP453	—	—	12	A	
Pulse Source Current (Body Diode) (3)	I_{SM}	IRFP450	—	—	52	A	
		IRFP451	—	—	48	A	
		IRFP452 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	—	—	1.3	V	$T_C=25^\circ\text{C}$, $I_S=12\text{A}$, $V_{GS}=0\text{V}$
		IRFP452 IRFP453	—	—	1.3	V	$T_C=25^\circ\text{C}$, $I_S=12\text{A}$, $V_{GS}=0\text{V}$
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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