

IRFP350/351/352/353

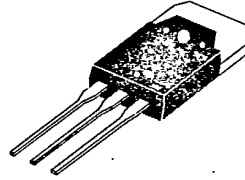
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POWER MOSFETS

98 DE 7964142 0005204 8

FEATURES

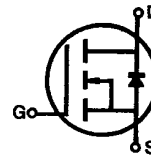
- Low $R_{DS(on)}$
- Improved inductive ruggedness
- Fast switching times
- Rugged polysilicon gate cell structure
- Low input capacitance
- Extended safe operating area
- Improved high temperature reliability
- TO-3P package

TO-3P



PRODUCT SUMMARY

Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRFP250	400V	0.3 Ω	15A
IRFP251	350V	0.3 Ω	15A
IRFP252	400V	0.4 Ω	13A
IRFP253	350V	0.4 Ω	13A



MAXIMUM RATINGS

Characteristic	Symbol	IRFP350	IRFP351	IRFP352	IRFP353	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}	± 20				Vdc
Continuous Drain Current $T_C=25^\circ C$	I_D	15	15	13	13	Adc
Continuous Drain Current $T_C=100^\circ C$	I_D	9.0	9.0	8.0	8.0	Adc
Drain Current—Pulsed (3)	I_{DM}	60	60	52	52	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

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ELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise specified)

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Drain-Source Breakdown Voltage	BV _{DSS}	IRFP350 IRFP352	400	—	—	V	V _{GS} =0V
		IRFP351 IRFP353	350	—	—	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)}	IRFP350 IRFP351	15	—	—	A	V _{DS} >I _{D(on)} ×R _{DS(on)} max., V _{GS} =10V
		IRFP352 IRFP353	13	—	—	A	
Static Drain-Source On-State Resistance (2)	R _{DS(on)}	IRFP350 IRFP351	—	0.25	0.3	Ω	V _{GS} =10V, I _D =8.0A
		IRFP352 IRFP353	—	0.3	0.4	Ω	
Forward Transconductance (2)	g _{fs}	ALL	8.0	11	—	S	V _{DS} >I _{D(on)} ×R _{DS(on)} max., I _D =8.0A
Input Capacitance	C _{iss}	ALL	—	2630	3000	pF	V _{GS} =0V, V _{DS} =25V, f=1.0MHz
Output Capacitance	C _{oss}	ALL	—	390	600	pF	
Reverse Transfer Capacitance	C _{rss}	ALL	—	130	200	pF	
Turn-On Delay Time	t _{d(on)}	ALL	—	—	35	ns	V _{DD} =0.5BV _{DSS} , I _D =8.0A, Z ₀ =4.7 Ω (MOSFET switching times are essentially independent of operating temperature.)
Rise Time	t _r	ALL	—	—	65	ns	
Turn-Off Delay Time	t _{d(off)}	ALL	—	—	150	ns	
Fall Time	t _f	ALL	—	—	75	ns	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q _g	ALL	—	73	120	nC	V _{GS} =10V, I _D =18A, V _{DS} =0.8 Max. Rating (Gate charge is essentially independent of operating temperature. See Fig. 8 page 21)
Gate-Source Charge	Q _{gs}	ALL	—	14	—	nC	
Gate-Drain ("Miller") Charge	Q _{gd}	ALL	—	59	—	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%

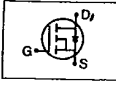
(3) Repetitive rating: Pulse width limited by max. junction temperature

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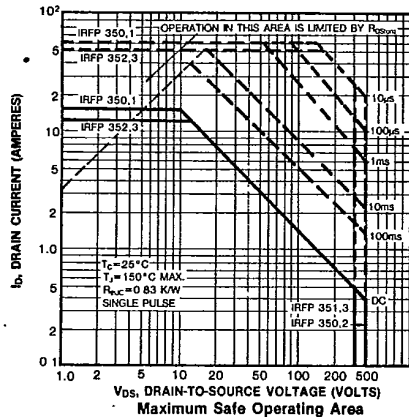
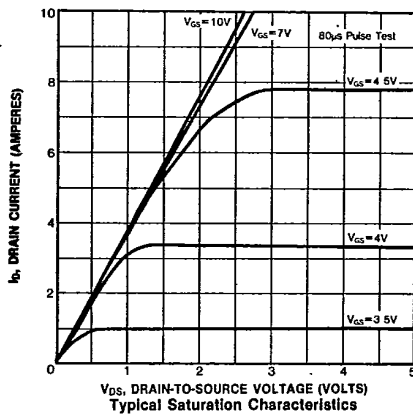
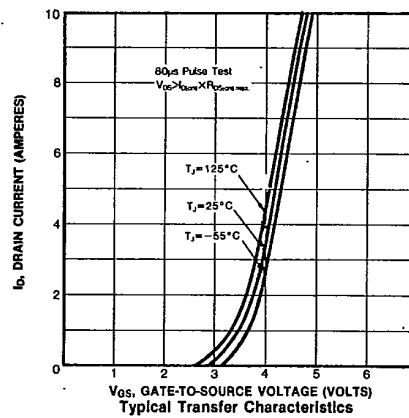
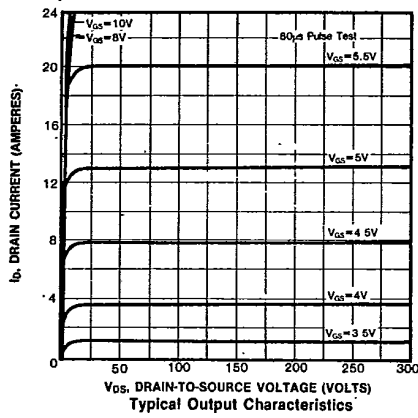
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SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Continuous Source Current (Body Diode)	I_S	IRFP350	—	—	15	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
		IRFP351	—	—	13	A	
Pulse Source Current (Body Diode) (3)	I_{SM}	IRFP350	—	—	60	A	
		IRFP351	—	—	52	A	
		IRFP353	—	—	—	A	
Diode Forward Voltage (2)	V_{SD}	IRFP350	—	—	1.6	V	$T_C=25^\circ\text{C}$, $I_S=15\text{A}$, $V_{GS}=0\text{V}$
		IRFP351	—	—	1.5	V	$T_C=25^\circ\text{C}$, $I_S=13\text{A}$, $V_{GS}=0\text{V}$
Reverse Recovery Time	t_{rr}	ALL	—	1000	—	ns	$T_J=150^\circ\text{C}$, $I_F=15\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$

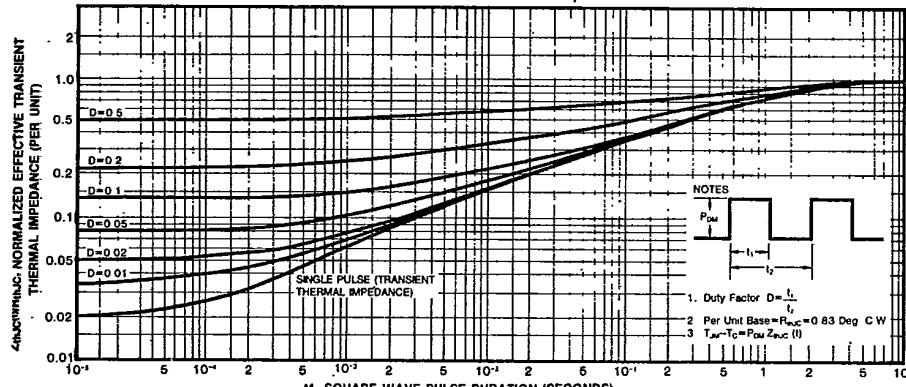
Notes: (1) $T_J=25^\circ\text{C}$ to 150°C (2) Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
 (3) Repetitive rating: Pulse width limited by max. junction temperature



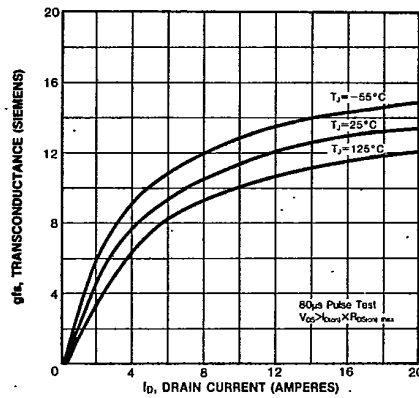
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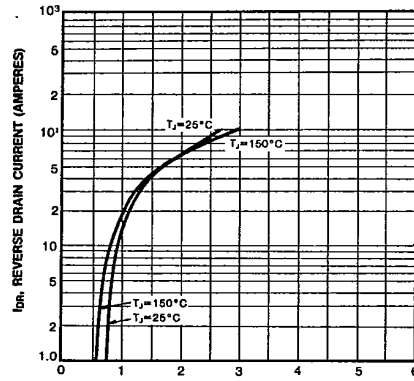
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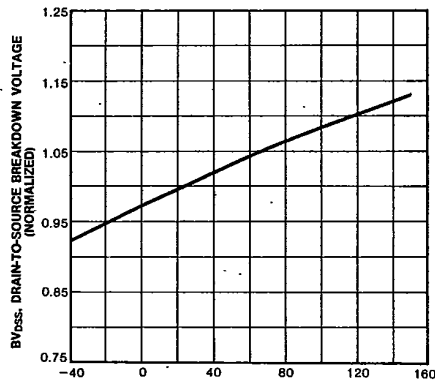
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



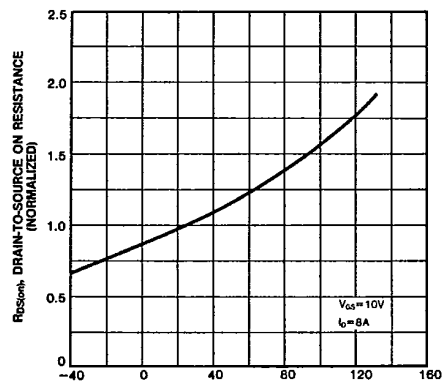
Typical Transconductance Vs. Drain Current



Typical Source-Drain Diode Forward Voltage



Breakdown Voltage Vs. Temperature



Normalized On-Resistance Vs. Temperature

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