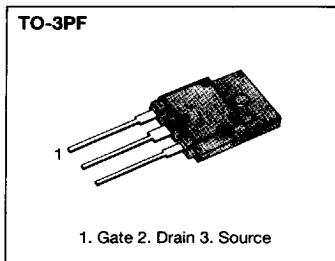


## FEATURES

- 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	$V_{DSS}$	$R_{DS(on)}$	$I_D$
IRFS250	200V	0.085 $\Omega$	20.7A
IRFS251	150V	0.085 $\Omega$	20.7A

## ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	IRFS250	IRFS251	Unit
Drain-Source Voltage (1)	$V_{DSS}$	200	150	Vdc
Drain-Gate Voltage ( $R_{GS}=1.0M\Omega$ )(1)	$V_{DGR}$	200	150	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$		Vdc
Continuous Drain Current $T_C=25^\circ C$	$I_D$	20.7		A
Continuous Drain Current $T_C=100^\circ C$	$I_D$	14.5		A
Drain Current - Pulsed (3)	$I_{DM}$	120		A
Gate Current - Pulsed	$I_{GM}$	$\pm 1.5$		A
Single Pulsed Avalanche Energy (4)	EAS	247		mJ
Avalanche Current	$I_{AS}$	20.7		A
Total Power Dissipation at $T_C=25^\circ C$ Derate Above $25^\circ C$	$P_D$	96		Watts
		0.77		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 junction temperature

(4)  $L=1.1mH$ ,  $V_{dd}=50V$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ C$

**ELECTRICAL CHARACTERISTICS** (T<sub>c</sub>=25°C unless otherwise specified)

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage					
	IRFS250	200	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
	IRFS251	150	-	-	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, T <sub>c</sub> =150°C
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance(2)	-	-	0.085	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> =15A
g <sub>fs</sub>	Forward Transconductance (2)	8.0	-	-	U	V <sub>DS</sub> ≥ 50V, I <sub>D</sub> =15A
C <sub>iss</sub>	Input Capacitance	-	2500	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz
C <sub>oss</sub>	Output Capacitance	-	533	-	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance	-	228	-	pF	
t <sub>d(on)</sub>	Turn-On Delay Time	-	-	35	ns	V <sub>DD</sub> =0.5 BV <sub>DSS</sub> , I <sub>D</sub> =30.0A, Z <sub>o</sub> =9.1Ω (MOSFET switching times are essentially independent of operating temperature)
t <sub>r</sub>	Rise Time	-	-	100	ns	
t <sub>d(off)</sub>	Turn-Off Delay Time	-	-	125	ns	
t <sub>f</sub>	Fall Time	-	-	100	ns	
Q <sub>g</sub>	Total Gate Charge (Gate-Source Plus Gate-Drain)	-	-	128	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =30.0A, V <sub>DS</sub> =0.8 Max. Rating (Gate charge is essentially independent of operating temperature)
Q <sub>gs</sub>	Gate-Source Charge	-	22.6	-	nC	
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	-	54.6	-	nC	

**THERMAL RESISTANCE**

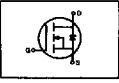
Symbol	Characteristics		All	Units	Remark
R <sub>thJC</sub>	Junction-to-Case	MAX	1.3	K/W	
R <sub>thCS</sub>	Case-to-Sink	TYP	0.24	K/W	Mounting surface flat
R <sub>thJA</sub>	Junction-to-Ambient	MAX	40	K/W	Free Air Operation

- 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 junction temperature

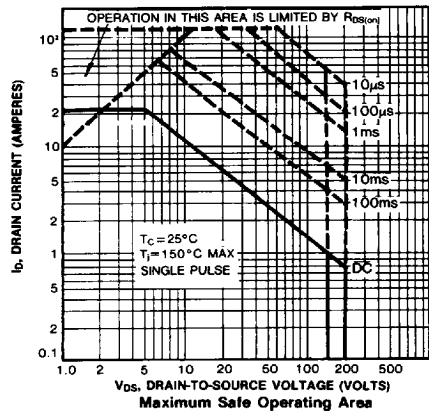
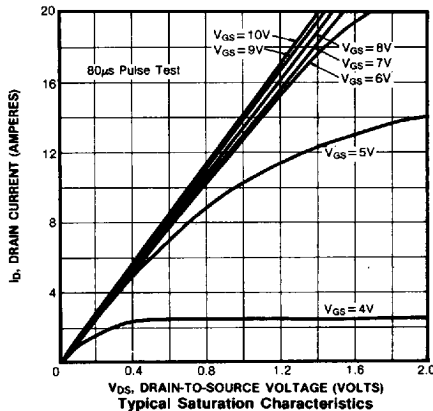
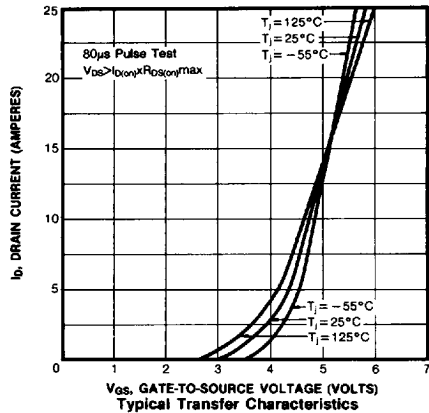
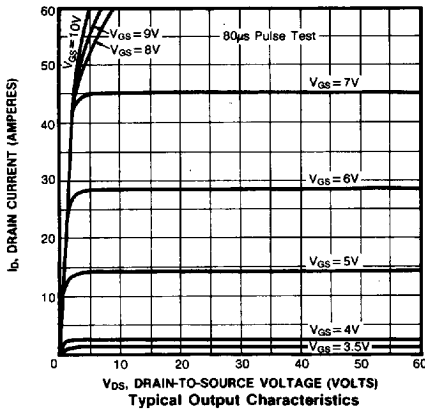


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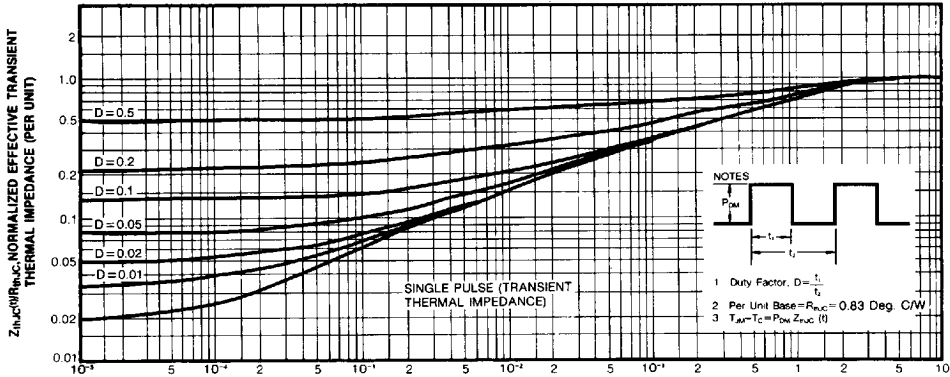
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	-	-	30	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
$I_{SM}$	Pulse Source Current (Body Diode) (3)	-	-	120	A	
$V_{SD}$	Diode Forward Voltage (2)	-	-	2.0	V	$T_J=25^\circ\text{C}$ , $I_S=30\text{A}$ , $V_{GS}=0\text{V}$
$t_{rr}$	Reverse Recovery Time	-	300	-	ns	$T_J=25^\circ\text{C}$ , $I_F=30\text{A}$ , $dI_F/dt=100\text{A}/\mu\text{S}$

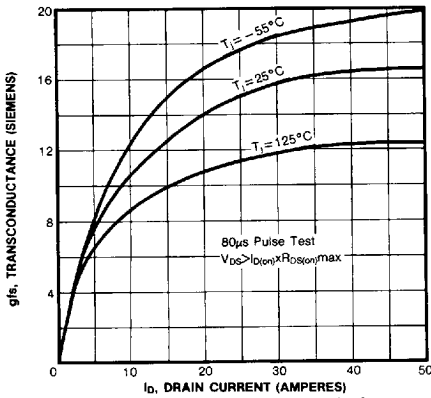
- Notes : (1)  $T_J=25^\circ\text{C}$  to  $150^\circ\text{C}$   
 (2) Pulse test : Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$   
 (3) Repetitive rating : Pulse width limited by junction temperature



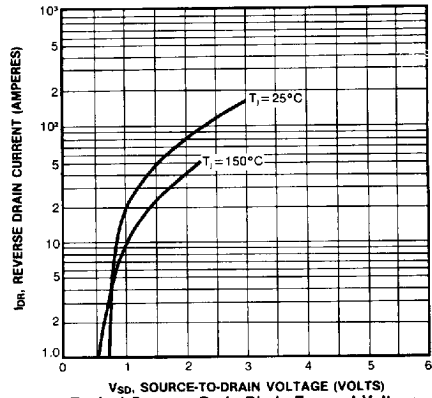
ELECTRONICS



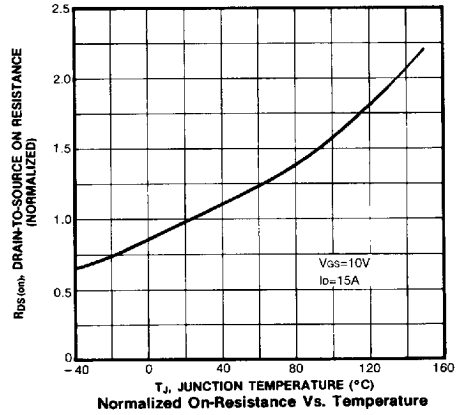
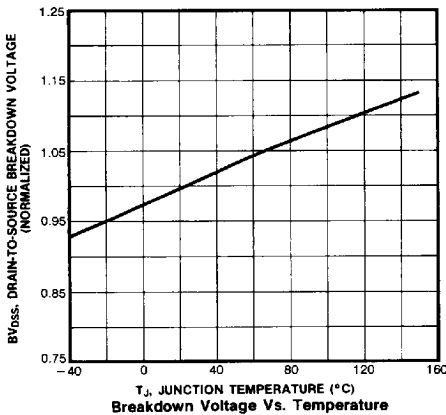
11. SQUARE WAVE PULSE DURATION (SECONDS)  
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



Typical Transconductance Vs. Drain Current

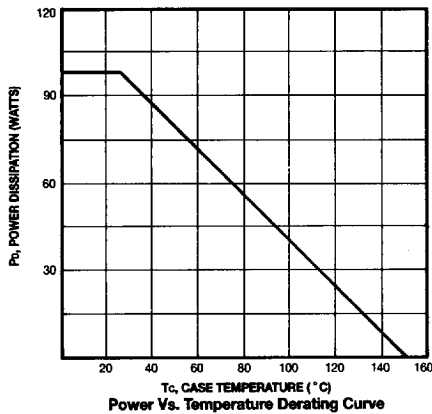
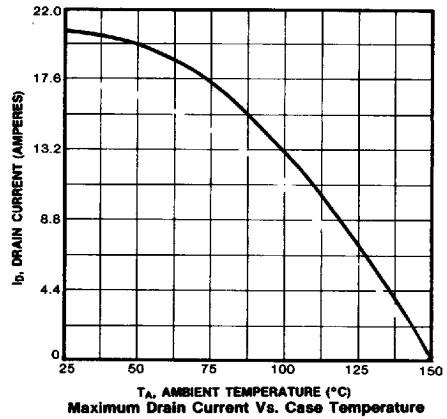
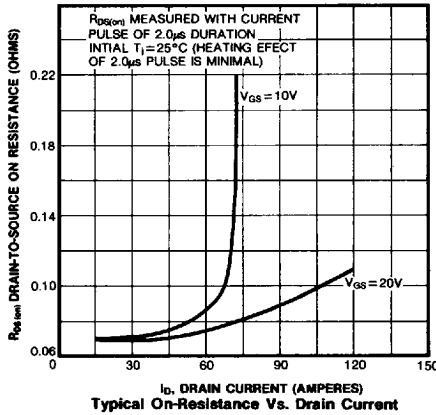
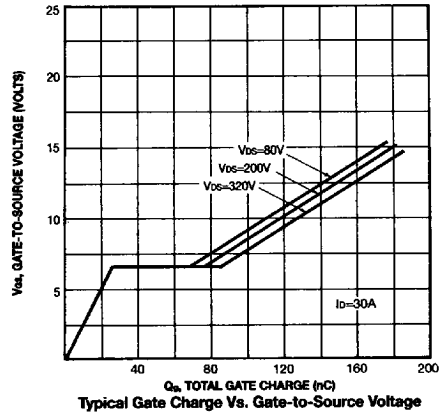
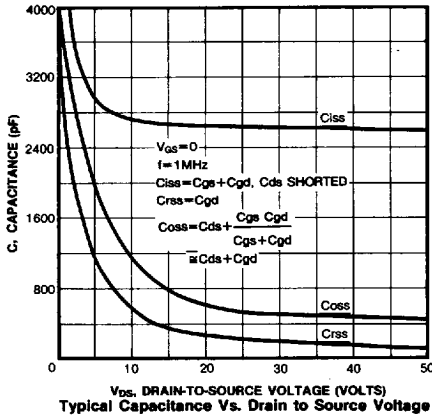


Typical Source-Drain Diode Forward Voltage



4





ELECTRONICS