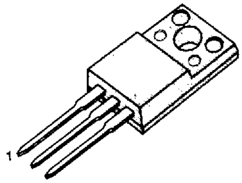
IRFS9530/9531

P-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

TO-220F



1.Gate 2.Drain 3.Source

PRODUCT SUMMARY

Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRFS9530	-100V	0.30Ω	-8.0A
IRFS9531	-60V	0.30Ω	-8.0A

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	IRFS9530	IRFS9531	Unit
Drain-Source Voltage (1)	V_{DSS}	-100	-60	Vdc
Drain-Gate Voltage (R_{GS}=1.0MΩ)(1)	V_{DGR}	-100	-60	Vdc
Gate-Source Voltage	V_{GS}	±20		Vdc
Continuous Drain Current T_C=25 °C	I_D	-8.0		Adc
Continuous Drain Current T_C=100 °C	I_D	-5.6		Adc
Drain Current - Pulsed (3)	I_{DM}	-48		Adc
Gate Current - Pulsed	I_{GM}	±1.5		Adc
Single Pulsed Avalanche Energy (4)	E_{AS}	240		mJ
Avalanche Current	I_{AS}	-8.0		A
Total Power Dissipation at T_C=25 °C Derate above 25 °C	P_D	35 0.28		Watts W/ °C
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-55 to +150		°C
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T_L	300		°C

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
(4) L=8.5mH, V_{dd}=-25V, R_G=25Ω, Starting T_J=25°C

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

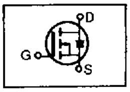
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage					
	IRFS9530	-100	-	-	V	V_{GS}=0V, I_D=-250μA
	IRFS9531	-80	-	-	V	
$V_{GS(th)}$	Gate Threshold Voltage	-2.0	-	-4.0	V	V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	Gate-Source Leakage Forward	-	-	-100	nA	V_{GS}=-20V
I_{GSS}	Gate-Source Leakage Reverse	-	-	100	nA	V_{GS}=20V
I_{DSS}	Zero Gate Voltage Drain Current	-	-	-250	μA	V_{DS}=-Max. Rating, V_{GS}=0V
		-	-	-1000	μA	V_{DS}=-0.8 Max. Rating, V_{GS}=0V, T_C=125°C
$R_{DS(on)}$	Static Drain-Source On Resistance(2)	-	-	0.3	Ω	V_{GS}=-10V, I_D=-6.0A
g_{fs}	Forward Transconductance (2)	2.0	-	-	℧	V_{DS}≤-10V, I_D=-6.0A
C_{iss}	Input Capacitance	-	670	-	pF	V_{GS}=0V, V_{DS}=-25V, f=1.0MHz
C_{oss}	Output Capacitance	-	357	-	pF	
C_{rss}	Reverse Transfer Capacitance	-	94	-	pF	
$t_{d(on)}$	Turn-On Delay Time	-	20	60	ns	V_{DD}=-50V, I_D=-12.0A, Z_O=24Ω (MOSFET switching times are essentially independent of operating temperature)
t_r	Rise Time	-	40	140	ns	
$t_{d(off)}$	Turn-Off Delay Time	-	100	140	ns	
t_f	Fall Time	-	65	140	ns	
Q_g	Total Gate Charge (Gate-Source Plus Gate-Drain)	-	-	58	nC	V_{GS}=-10V, I_D=-12.0A, V_{DS}=-0.8 Max. Rating (Gate charge is essentially independent of operating temperature)
Q_{gs}	Gate-Source Charge	-	12.6	-	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	-	16.6	-	nC	

THERMAL RESISTANCE

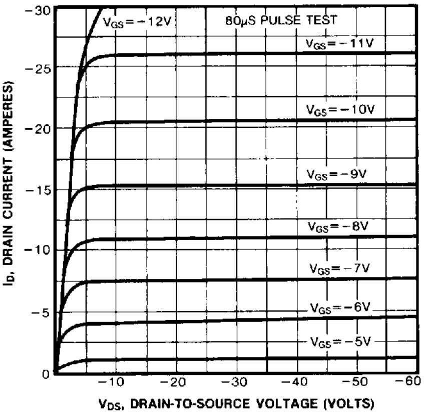
Symbol	Characteristics		All	Units	Remark
R_{thJC}	Junction-to-Case	MAX	3.57	K/W	
R_{thCS}	Case-to-Sink	TYP	0.5	K/W	Mounting surface flat, smooth, and greased
R_{thJA}	Junction-to-Ambient	MAX	62.5	K/W	Free Air Operation

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

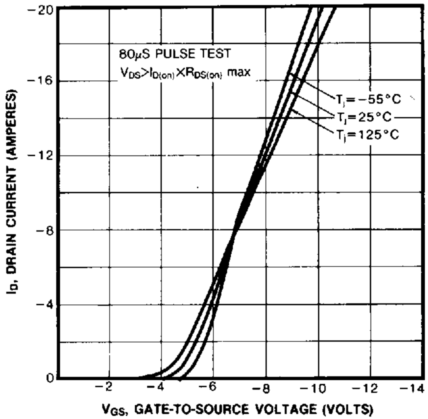
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	-	-	-12	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
I_{SM}	Pulse Source Current (Body Diode) (3)	-	-	-48	A	
V_{SD}	Diode Forward Voltage (2)	-	-	-6.3	V	T_J=25°C, I_S=-12A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	-	300	-	ns	T_J=25°C, I_F=-12A, dI_F/dt=100A/μS

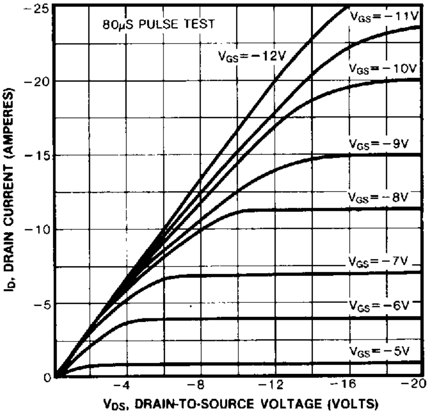
Notes : (1) T_J=25°C to 150°C
(2) Pulse test : Pulse width ≤300μs, Duty Cycle ≤2%
(3) Repetitive rating : Pulse width limited by max. junction temperature



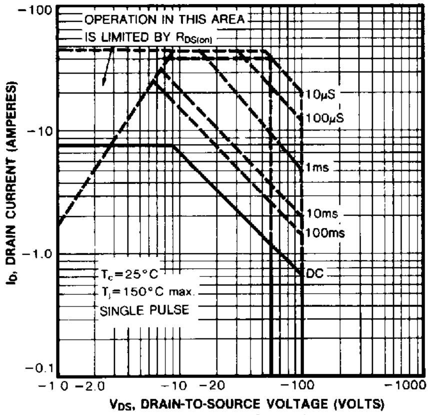
Typical Output Characteristics



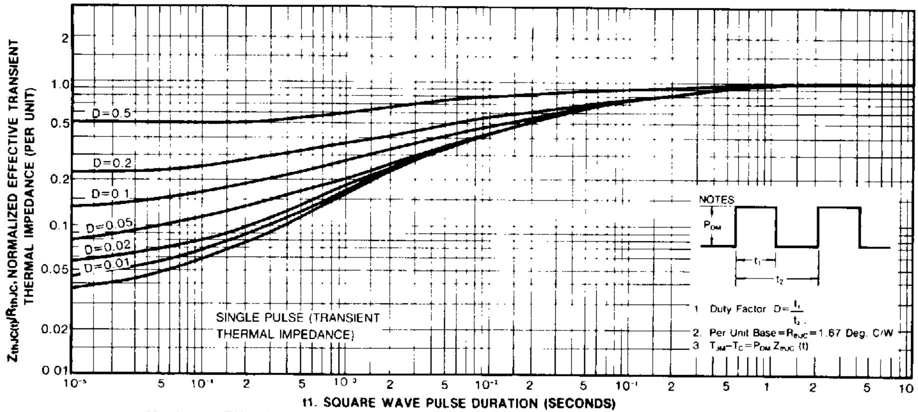
Typical Transfer Characteristics



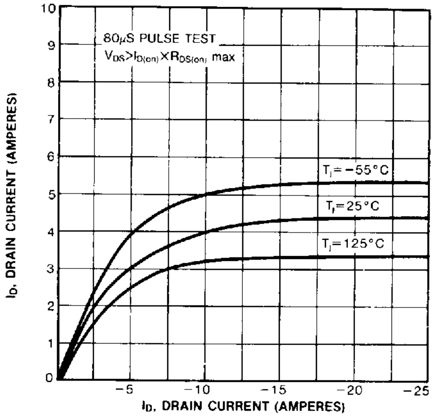
Typical Saturation Characteristics



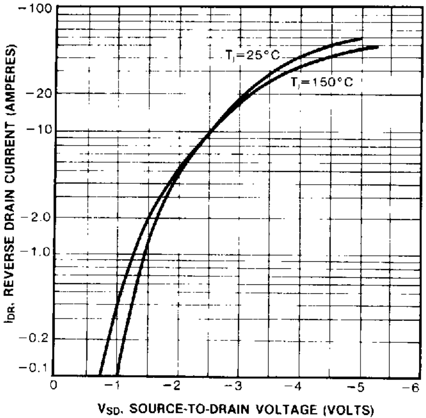
Maximum Safe Operating Area



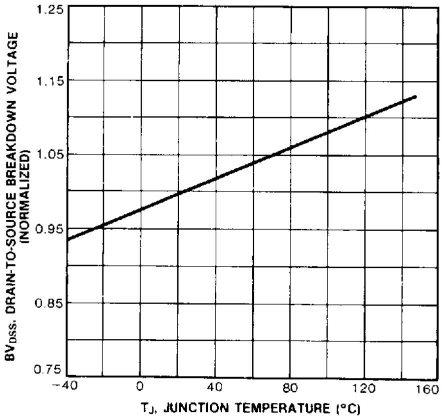
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



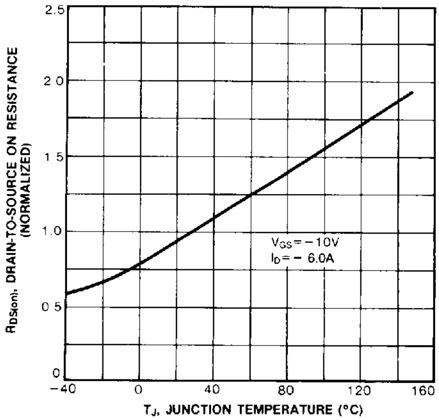
Typical Transcounductance Vs. Drain Current



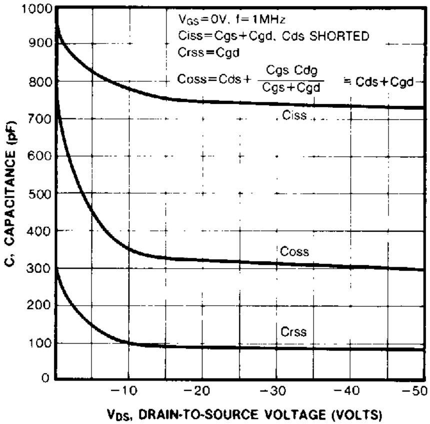
Typical Source—Drain Diode Forward Voltage



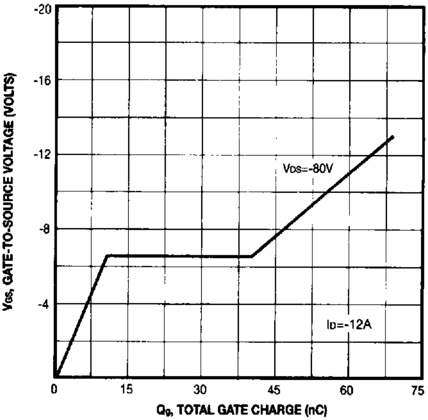
Breakdown Voltage Vs. Temperature



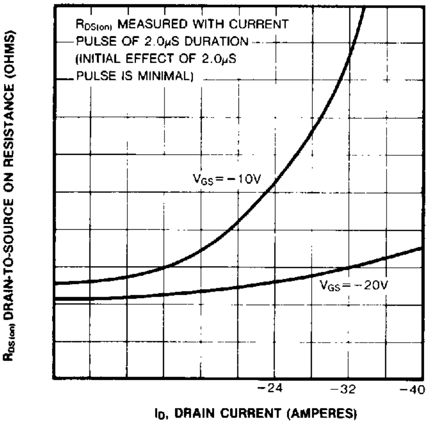
Normalized On-Resistance Vs. Temperature



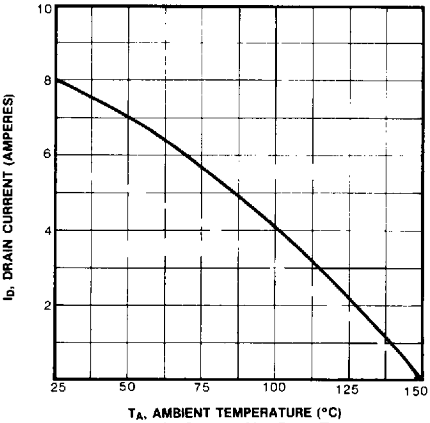
Typical Capacitance Vs. Drain to Source Voltage



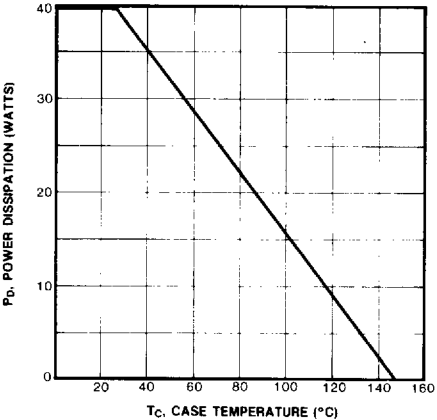
Typical Gate Charge Vs. Gate-to-Source Voltage



Typical On-Resistance Vs. Drain Current



Maximum Drain Current Vs. Case Temperature



Power Vs. Temperature Derating Curve