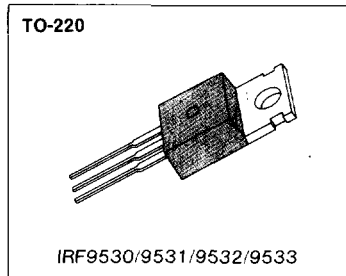


## FEATURES

- 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	$V_{DS}$	$R_{DS(on)}$	$I_D$
IRF9530	-100V	0.30 $\Omega$	-12A
IRF9531	-60V	0.30 $\Omega$	-12A
IRF9532	-100V	0.40 $\Omega$	-10A
IRF9533	-60V	0.40 $\Omega$	-10A

## MAXIMUM RATINGS

Characteristic	Symbol	IRF9530	IRF9531	IRF9532	IRF9533	Unit
Drain-Source Voltage (1)	$V_{DSS}$	-100	-60	-100	-60	Vdc
Drain-Gate Voltage ( $R_{GS}=1.0M\Omega$ )(1)	$V_{DGR}$	-100	-60	-100	-60	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$				Vdc
Continuous Drain Current $T_C=25^\circ C$	$I_D$	-12	-12	-10	-10	Adc
Continuous Drain Current $T_C=100^\circ C$	$I_D$	-7.5	-7.5	-6.5	-6.5	Adc
Drain Current—Pulsed (3)	$I_{DM}$	-48	-48	-40	-40	Adc
Gate Current—Pulsed	$I_{GM}$	$\pm 1.5$				Adc
Total Power Dissipation @ $T_C=25^\circ C$ Derate above $25^\circ C$	$P_D$	75 0.6				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 with limited by max. junction temperature

## 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 IRF9530/IRF9532	-100	—	—	V	V <sub>GS</sub> =0V I <sub>D</sub> =-250μA
	IRF9531/IRF9533	-60	—	—	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> =Max. Rating×0.8, V <sub>GS</sub> =0V, T <sub>C</sub> =125°C
I <sub>D(on)</sub>	On-State Drain-Source Current (2) IRF9530/IRF9531	-12	—	—	V	V <sub>DS</sub> <I <sub>D(on)</sub> ×R <sub>DS(on)max</sub> , V <sub>GS</sub> =-10V
	IRF9532/IRF9533	-10	—	—	A	
R <sub>DS(on)</sub>	Static Drain-Source On-State Resistance (2)	—	—	0.3	Ω	V <sub>GS</sub> =-10V, I <sub>D</sub> =-6.5A
	IRF9532/IRF9533	—	—	0.4	Ω	
g <sub>fs</sub>	Forward Transconductance (2)	2.0	—	—	∅	V <sub>DS</sub> ≤-50V, I <sub>D</sub> =-6.5A
C <sub>iss</sub>	Input Capacitance	—	835	—	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =-25V, f=1.0MHz
C <sub>oss</sub>	Output Capacitance	—	357	—	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance	—	94	—	pF	
t <sub>d(on)</sub>	Turn-On Delay Time	—	—	60	ns	V <sub>DD</sub> =0.5BV <sub>DSS</sub> , I <sub>D</sub> =-6.5A, Z <sub>O</sub> =50Ω (MOSFET switching times are essentially independent of operating temperature)
t <sub>r</sub>	Rise Time	—	—	140	ns	
t <sub>d(off)</sub>	Turn-Off Delay Time	—	—	140	ns	
t <sub>f</sub>	Fall Time	—	—	140	ns	
Q <sub>g</sub>	Total Gate Charge (Gate-Source Plus Gate-Drain)	—	—	45	nC	V <sub>GS</sub> =-15V, I <sub>D</sub> =-15A, V <sub>DS</sub> =0.8 Max. Rating (Gate charge is essentially independent of operating temperature.)
Q <sub>gs</sub>	Gate-Source Charge	—	—	20	nC	
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	—	—	25	nC	

## THERMAL RESISTANCE

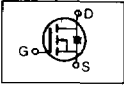
Symbol	Characteristic		IRF9530-3	Unit	
R <sub>thJC</sub>	Junction-to-Case	MAX	1.67	K/W	
R <sub>thCS</sub>	Case-to-Sink	TYP	1.0	K/W	Mounting surface flat, smooth, and greased
R <sub>thJA</sub>	Junction-to-Ambient	MAX	80	K/W	Free Air Operation

Notes: (1) T<sub>J</sub>=25°C to 150°C

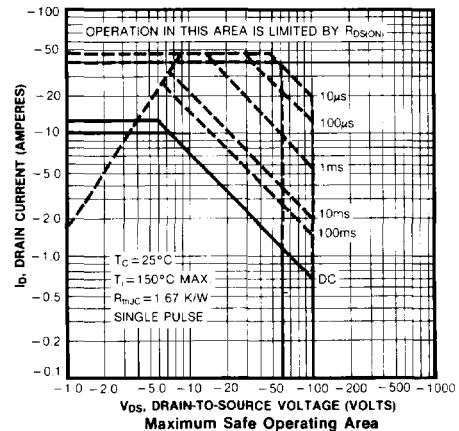
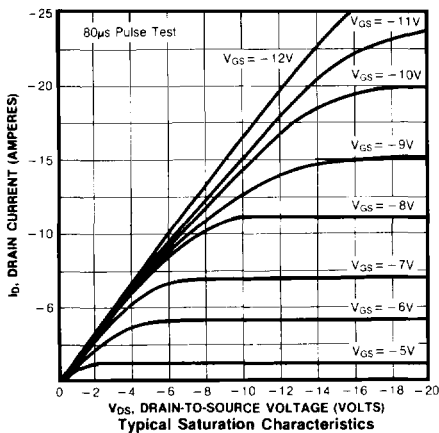
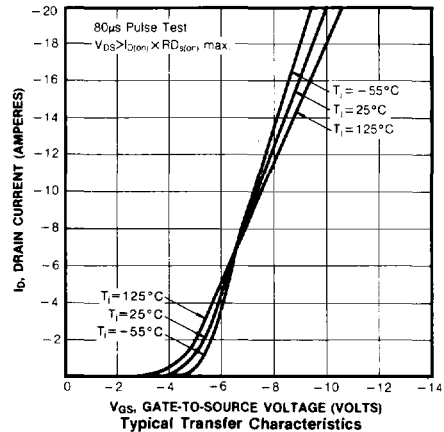
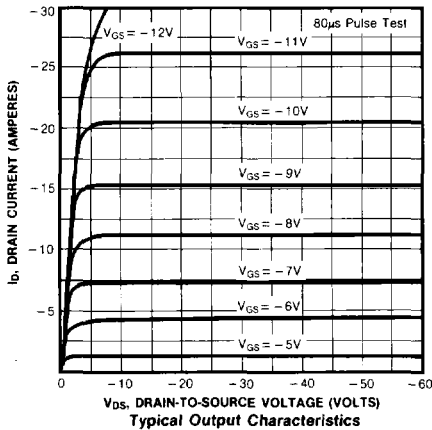
(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%

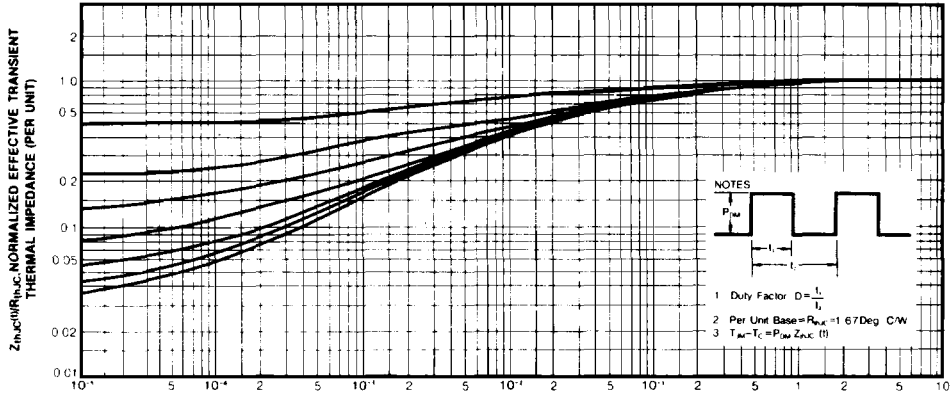
(3) Repetitive rating: Pulse width limited by max. junction temperature

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

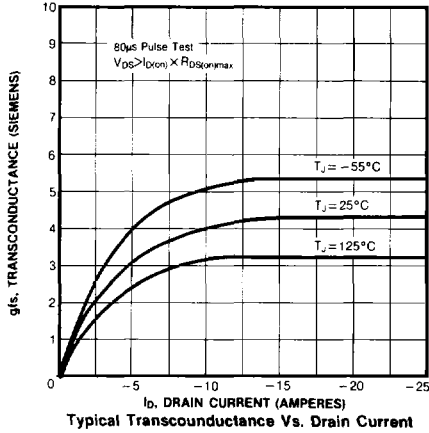
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode) IRF9530/IRF9531	—	—	-12	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
	IRF9532/IRF9533	—	—	-10	A	
$I_{SM}$	Pulse Source Current (Body Diode) (3) IRF9530/IRF9531	—	—	-48	A	
	IRF9532/IRF9533	—	—	-40	A	
$V_{SD}$	Diode Forward Voltage (2) IRF9530/IRF9531	—	—	-6.3	A	$T_C = 25^\circ\text{C}$ , $I_S = -12\text{A}$ , $V_{GS} = 0\text{V}$
	IRF9532/IRF9533	—	—	-6.0	A	$T_C = 25^\circ\text{C}$ , $I_S = -10\text{A}$ , $V_{GS} = 0\text{V}$
$t_{rr}$	Reverse Recovery Time	—	300	—	ns	$T_J = 150^\circ\text{C}$ , $I_F = -6.0\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{S}$

**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 with limited by max junction temperature

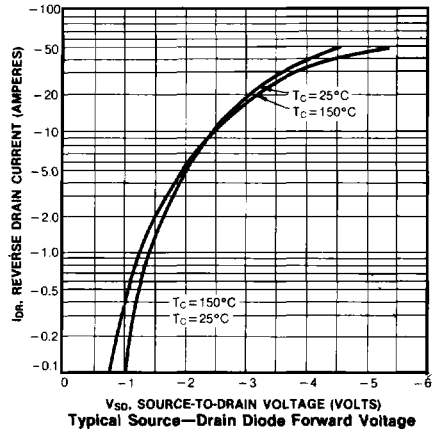




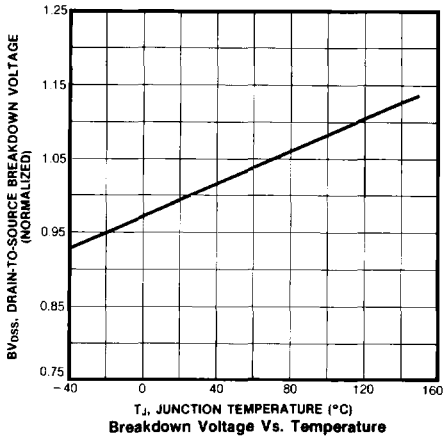
11. SQUARE WAVE PULSE DURATION (SECONDS)  
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration  
For IRF9530-3



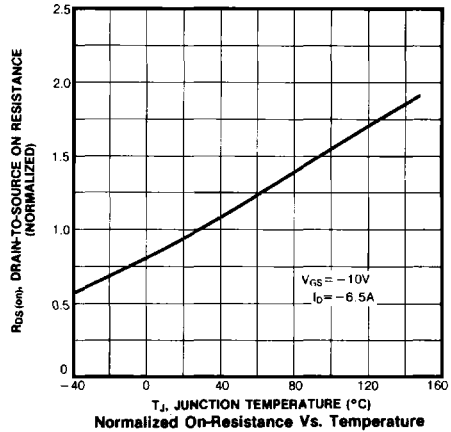
Typical Transconductance Vs. Drain Current



Typical Source-Drain Diode Forward Voltage



Breakdown Voltage Vs. Temperature



Normalized On-Resistance Vs. Temperature

2

