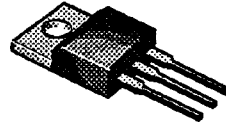


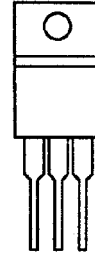
### PRODUCT SUMMARY

PART NUMBER	$V_{(BR)DSS}$ (V)	$r_{DS(ON)}$ ( $\Omega$ )	$I_D$ (A)
IRF9530	-100	0.30	-12
IRF9531	-60	0.30	-12
IRF9532	-100	0.40	-10
IRF9533	-60	0.40	-10

TO-220AB



TOP VIEW



- 1 GATE
- 2 DRAIN (Connected to TAB)
- 3 SOURCE

1 2 3

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ Unless Otherwise Noted)<sup>1</sup>

PARAMETERS/TEST CONDITIONS	SYMBOL	IRF				UNITS	
		9530	9531	9532	9533		
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	$\pm 20$	$\pm 20$	V	
Continuous Drain Current	$I_D$	$T_C = 25^\circ\text{C}$	12	12	10	10	A
		$T_C = 100^\circ\text{C}$	7.5	7.5	6.5	6.5	
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	48	48	40	40		
Avalanche Current (See Figure 9)	$I_{AR}$	12	12	12	12		
Repetitive Avalanche Energy <sup>3</sup>	$E_{AR}$	7.2	7.2	7.2	7.2	mJ	
Power Dissipation	$P_D$	$T_C = 25^\circ\text{C}$	75	75	75	75	W
		$T_C = 100^\circ\text{C}$	30	30	30	30	
Operating Junction & Storage Temperature Range	$T_J, T_{stg}$	-55 to 150				$^\circ\text{C}$	
Lead Temperature ( $1/16"$ from case for 10 sec.)	$T_L$	300					

### THERMAL RESISTANCE RATINGS<sup>1</sup>

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Case	$R_{thJC}$		1.67	K/W
Junction-to-Ambient	$R_{thJA}$		80	
Case-to-Sink	$R_{thCS}$	1.0		

<sup>1</sup>Negative signs for current and voltage ratings have been omitted for the sake of clarity.

<sup>2</sup>Pulse width limited by maximum junction temperature (refer to transient thermal impedance data, Figure 11).

<sup>3</sup>Duty cycle  $\leq 1\%$ .

# IRF9530/9531/9532/9533



## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ Unless Otherwise Noted) P-Channel Device - Negative Signs Have Been Omitted for Clarity

PARAMETER	SYMBOL	TEST CONDITIONS	TYP	LIMITS		UNIT	
				MIN	MAX		
<b>STATIC</b>							
Drain-Source Breakdown Voltage	IRF9530, 9532 IRF9531, 9533	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$		100 60	V	
Gate Threshold Voltage		$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$		2.0	4.0	
Gate-Body Leakage		$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 500$	
Zero Gate Voltage Drain Current		$I_{DSS}$	$V_{DS} = V_{(BR)DSS}, V_{GS} = 0\text{ V}$			250	
			$V_{DS} = 0.8 \times V_{(BR)DSS}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			1000	
On-State Drain Current <sup>1</sup>	IRF9530, 9531 IRF9532, 9533	$I_{D(ON)}$	$V_{DS} = 10\text{ V}, V_{GS} = 10\text{ V}$		12 10	A	
Drain-Source On-State Resistance <sup>1</sup>	IRF9530, 9531 IRF9532, 9533	$r_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 6.5\text{ A}$	0.25 0.30		0.30 0.40	
	IRF9530, 9531 IRF9532, 9533		$V_{GS} = 10\text{ V}, I_D = 6.5\text{ A}$ $T_J = 125^\circ\text{C}$	0.40 0.48		0.48 0.64	
Forward Transconductance <sup>1</sup>		$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 6.5\text{ A}$	3.2	2.0	S	
<b>DYNAMIC</b>							
Input Capacitance		$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	625		700	
Output Capacitance		$C_{oss}$			280		450
Reverse Transfer Capacitance		$C_{rss}$			105		200
Total Gate Charge <sup>2</sup>		$Q_g$	$V_{DS} = 0.8 \times V_{(BR)DSS}, V_{GS} = 10\text{ V}, I_D = 15\text{ A}$	26		45	
Gate-Source Charge <sup>2</sup>		$Q_{gs}$			3.4		
Gate-Drain Charge <sup>2</sup>		$Q_{gd}$			13.5		
Turn-On Delay Time <sup>2</sup>		$t_{d(on)}$	$V_{DD} = 40\text{ V}, R_L = 6\ \Omega$ $I_D \simeq 6.5\text{ A}, V_{GEN} = 10\text{ V}, R_G = 25\ \Omega$	9		60	
Rise Time <sup>2</sup>		$t_r$			50		140
Turn-Off Delay Time <sup>2</sup>		$t_{d(off)}$			60		140
Fall Time <sup>2</sup>		$t_f$			40		140
<b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (<math>T_C = 25^\circ\text{C}</math>)</b>							
Continuous Current	IRF9530, 9531 IRF9532, 9533	$I_S$				12 10	
Pulsed Current <sup>3</sup>	IRF9530, 9531 IRF9532, 9533	$I_{SM}$				48 40	
Forward Voltage <sup>1</sup>	IRF9530, 9531 IRF9532, 9533	$V_{SD}$	$I_F = I_S, V_{GS} = 0\text{ V}$			6.3 6.0	
Reverse Recovery Time		$t_{rr}$	$I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$	110		ns	
Reverse Recovery Charge		$Q_{rr}$			0.4		$\mu\text{C}$

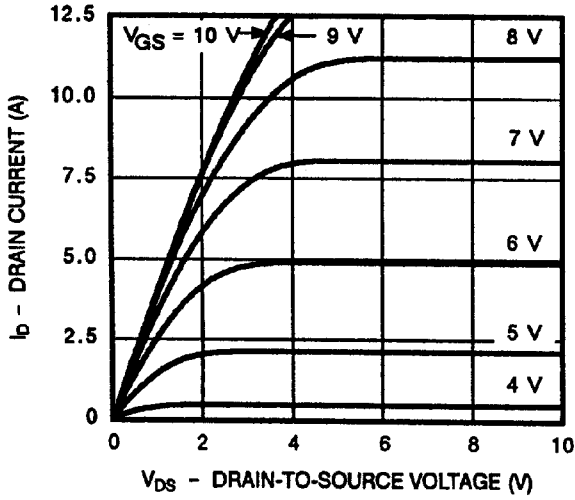
<sup>1</sup>Pulse test: Pulse Width  $\leq 300\ \mu\text{sec}$ , Duty Cycle  $\leq 2\%$ .

<sup>2</sup>Independent of operating temperature.

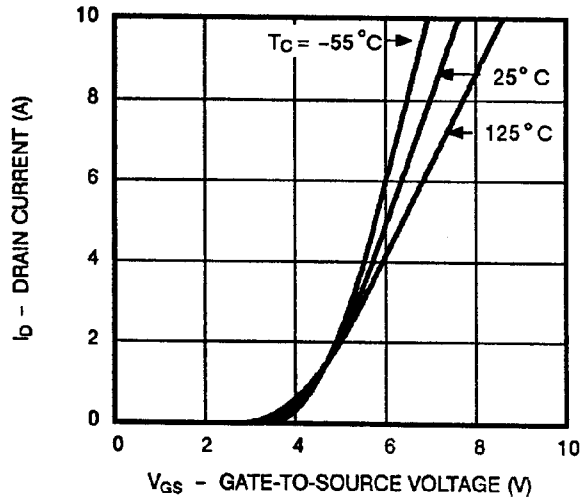
<sup>3</sup>Pulse width limited by maximum junction temperature (refer to transient thermal impedance data, Figure 11).

**TYPICAL CHARACTERISTICS (25°C Unless Otherwise Specified)**

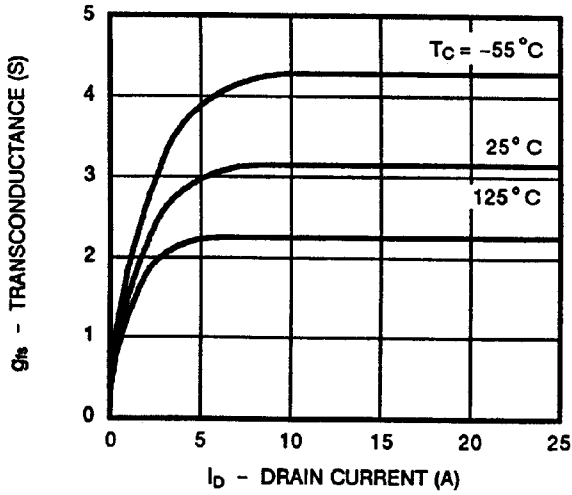
**Figure 1. Output Characteristics**



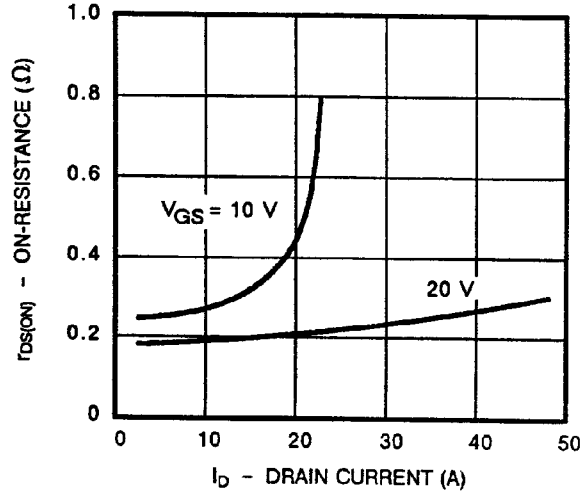
**Figure 2. Transfer Characteristics**



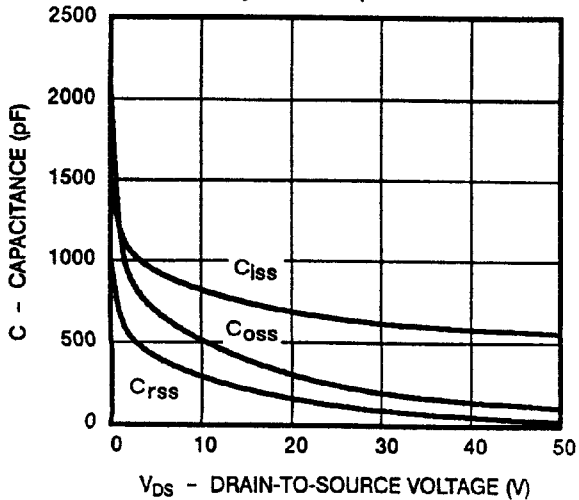
**Figure 3. Transconductance**



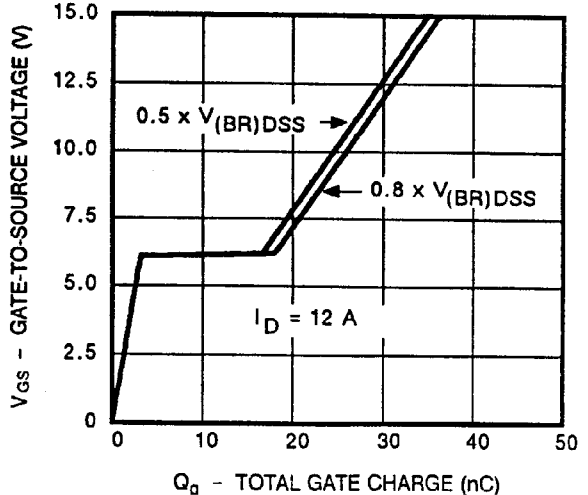
**Figure 4. On-Resistance**



**Figure 5. Capacitance**



**Figure 6. Gate Charge**



## TYPICAL CHARACTERISTICS (Cont'd)

Figure 7. On-Resistance vs. Junction Temperature

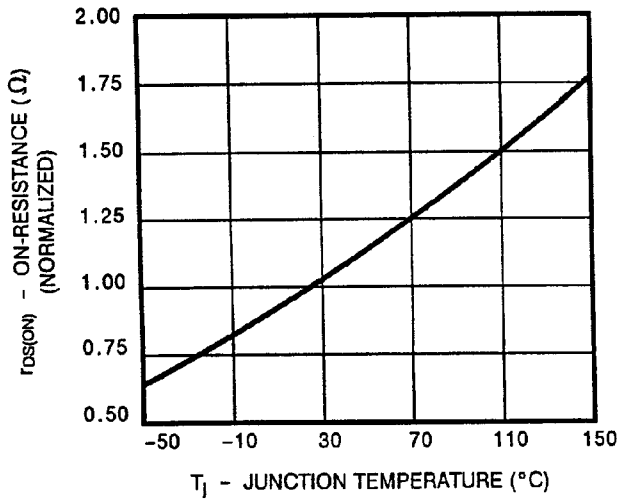
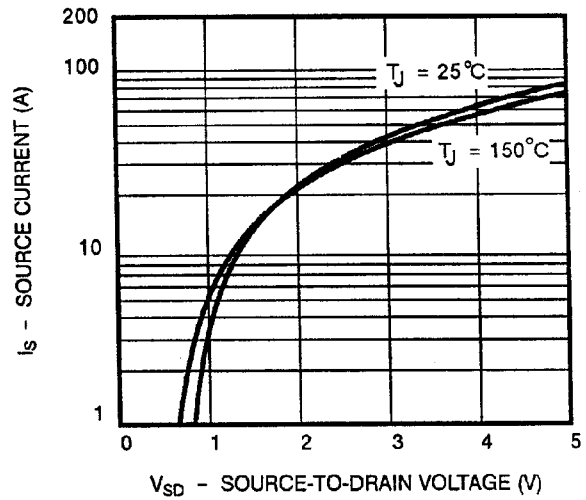


Figure 8. Source-Drain Diode Forward Voltage



## THERMAL RATINGS

Figure 9. Maximum Avalanche and Drain Current vs. Case Temperature

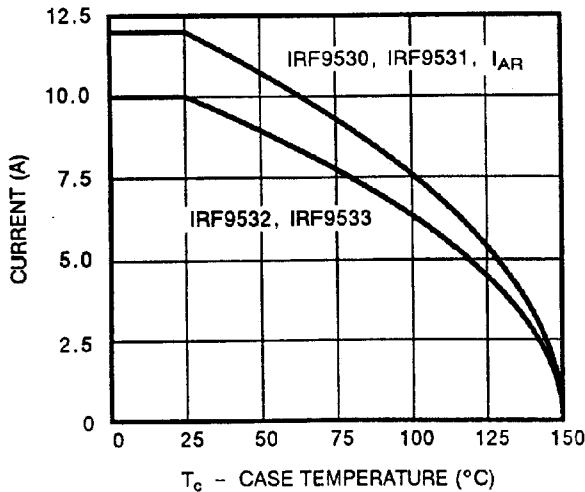


Figure 10. Safe Operating Area

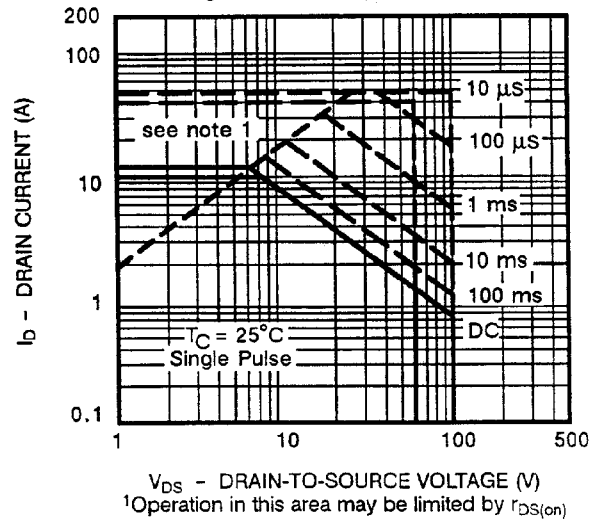


Figure 11. Normalized Effective Transient Thermal Impedance, Junction-to-Case

