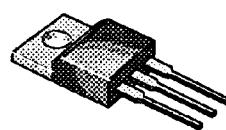


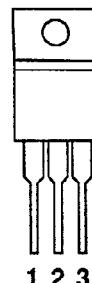
### PRODUCT SUMMARY

PART NUMBER	V <sub>(BR)DSS</sub> (V)	r <sub>DSS(ON)</sub> (Ω)	I <sub>D</sub> (A)
IRF540	100	0.085	27
IRF541	60	0.085	27
IRF542	100	0.11	24
IRF543	60	0.11	24

TO-220AB



TOP VIEW



1 GATE  
2 DRAIN (Connected to TAB)  
3 SOURCE

### ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25°C Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS	SYMBOL	IRF				UNITS
		540	541	542	543	
Gate-Source Voltage	V <sub>GS</sub>	±20	±20	±20	±20	V
Continuous Drain Current	T <sub>C</sub> = 25°C	I <sub>D</sub>	27	27	24	24
	T <sub>C</sub> = 100°C		17	17	15	15
Pulsed Drain Current <sup>1</sup>	I <sub>DM</sub>	108	108	96	96	A
Avalanche Current (See Figure 9)	I <sub>AR</sub>	27	27	27	27	
Repetitive Avalanche Energy <sup>2</sup>	E <sub>AR</sub>	36	36	36	36	mJ
Power Dissipation	T <sub>C</sub> = 25°C	P <sub>D</sub>	125	125	125	125
	T <sub>C</sub> = 100°C		50	50	50	50
Operating Junction & Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	−55 to 150				°C
Lead Temperature (1/16" from case for 10 sec.)	T <sub>L</sub>	300				

### THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Case	R <sub>thJC</sub>		1.0	K/W
Junction-to-Ambient	R <sub>thJA</sub>		80	
Case-to-Sink	R <sub>thCS</sub>	1.0		

<sup>1</sup>Pulse width limited by maximum junction temperature (refer to transient thermal impedance data, Figure 11).

<sup>2</sup>Duty cycle ≤ 1%.

# IRF540/541/542/543



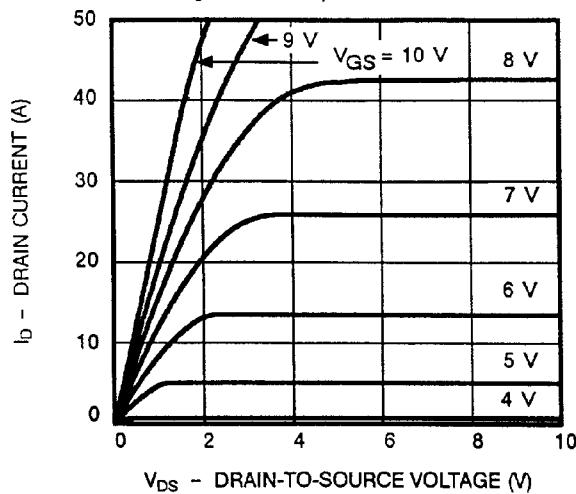
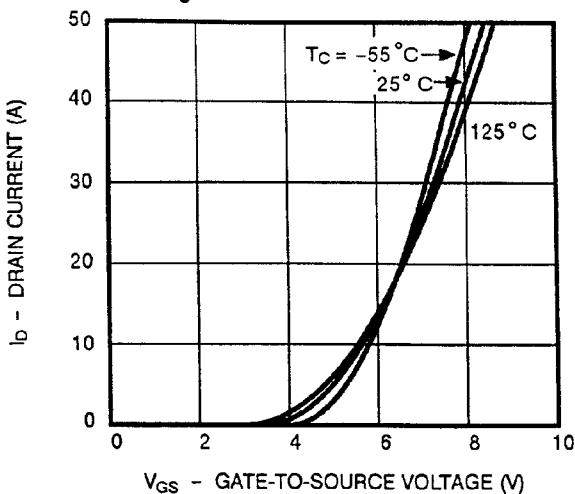
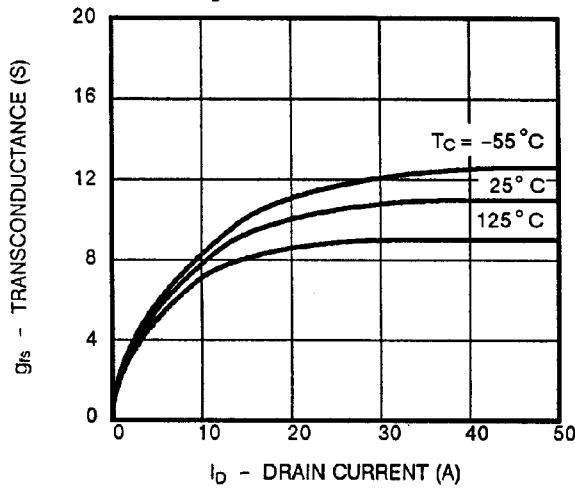
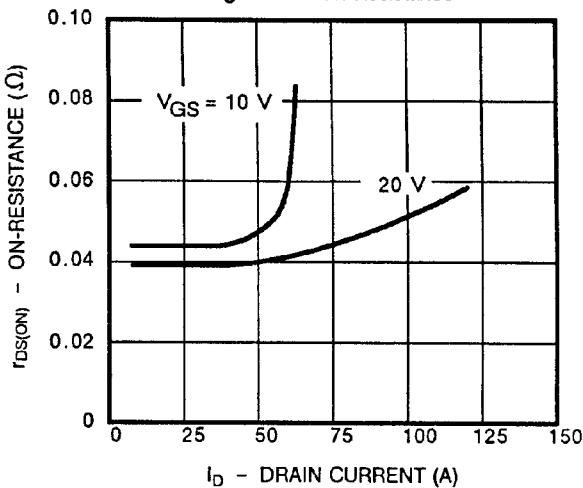
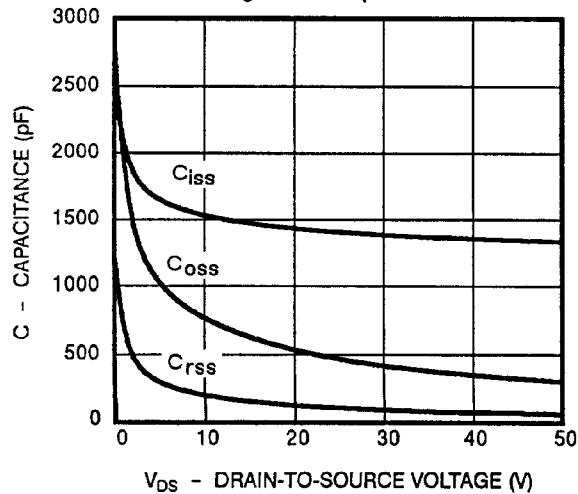
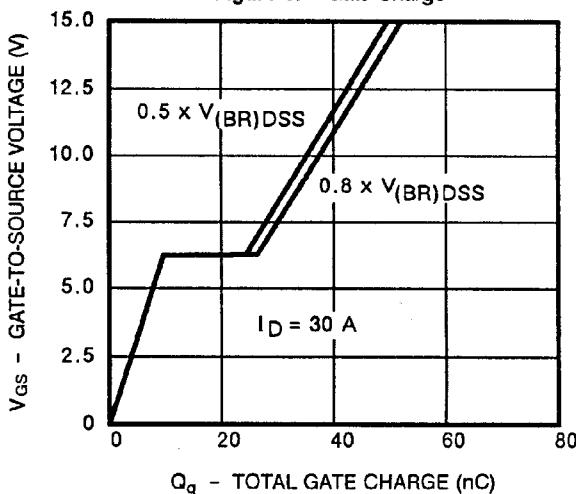
## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ Unless Otherwise Noted)

PARAMETER	SYMBOL	TEST CONDITIONS	TYP	LIMITS		UNIT
				MIN	MAX	
<b>STATIC</b>						
Drain-Source Breakdown Voltage	IRF540, 542 IRF541, 543	$V_{(\text{BR})\text{DSS}}$	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	100 60		V
Gate Threshold Voltage		$V_{GS(\text{th})}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	2.0	4.0	
Gate-Body Leakage		$I_{GSS}$	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$		$\pm 500$	nA
Zero Gate Voltage Drain Current		$I_{DSS}$	$V_{DS} = V_{(\text{BR})\text{DSS}}, V_{GS} = 0 \text{ V}$		250	$\mu\text{A}$
			$V_{DS} = 0.8 \times V_{(\text{BR})\text{DSS}}, V_{GS} = 0 \text{ V}, T_J = 125^\circ\text{C}$		1000	
On-State Drain Current <sup>1</sup>	IRF540, 541 IRF542, 543	$I_{D(\text{ON})}$	$V_{DS} = 10 \text{ V}, V_{GS} = 10 \text{ V}$	27 24		A
Drain-Source On-State Resistance <sup>1</sup>	IRF540, 541 IRF542, 543	$r_{DS(\text{ON})}$	$V_{GS} = 10 \text{ V}, I_D = 15 \text{ A}$	0.50 0.09		$\Omega$
	IRF540, 541 IRF542, 543		$V_{GS} = 10 \text{ V}, I_D = 15 \text{ A}, T_J = 125^\circ\text{C}$	0.10 0.15	0.15 0.19	
Forward Transconductance <sup>1</sup>	$g_{fs}$		$V_{DS} = 15 \text{ V}, I_D = 15 \text{ A}$	8	6.0	S
<b>DYNAMIC</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$	1500		1600	pF
Output Capacitance	$C_{oss}$		480		800	
Reverse Transfer Capacitance	$C_{rss}$		110		200	
Total Gate Charge <sup>2</sup>	$Q_g$	$V_{DS} = 0.5 \times V_{(\text{BR})\text{DSS}}, V_{GS} = 10 \text{ V}, I_D = 27 \text{ A}$	38		60	nC
Gate-Source Charge <sup>2</sup>	$Q_{gs}$		10			
Gate-Drain Charge <sup>2</sup>	$Q_{gd}$		17			
Turn-On Delay Time <sup>2</sup>	$t_{d(on)}$	$V_{DD} = 30 \text{ V}, R_L = 2 \Omega$ $I_D \approx 15 \text{ A}, V_{GEN} = 10 \text{ V}, R_G = 4.7 \Omega$	10		30	ns
Rise Time <sup>2</sup>	$t_r$		40		60	
Turn-Off Delay Time <sup>2</sup>	$t_{d(off)}$		30		80	
Fall Time <sup>2</sup>	$t_f$		12		30	
<b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (<math>T_C = 25^\circ\text{C}</math>)</b>						
Continuous Current	IRF540, 541 IRF542, 543	$I_S$			27 24	A
Pulsed Current <sup>3</sup>	IRF540, 541 IRF542, 543	$I_{SM}$			108 96	
Forward Voltage <sup>1</sup>	IRF540, 541 IRF542, 543	$V_{SD}$	$I_F = I_S, V_{GS} = 0 \text{ V}$		2.5 2.3	V
Reverse Recovery Time	$t_{rr}$	$I_F = I_S, dI_F/dt = 100 \text{ A}/\mu\text{s}$	150			ns
Reverse Recovery Charge	$Q_{rr}$		0.5			

<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


# IRF540/541/542/543

**Siliconix**  
incorporated

## TYPICAL CHARACTERISTICS (Cont'd)

Figure 7. On-Resistance vs. Junction Temperature

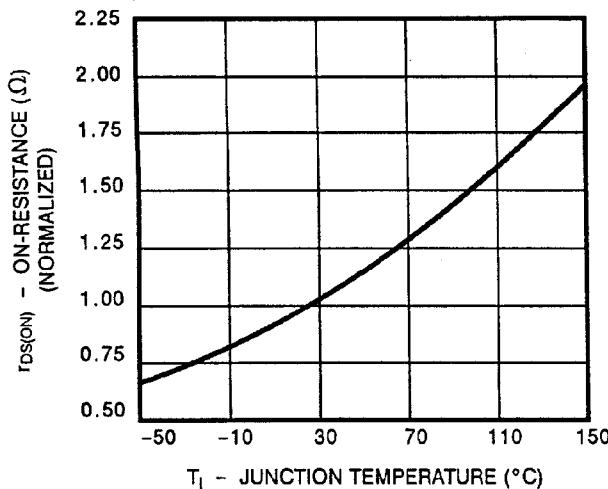
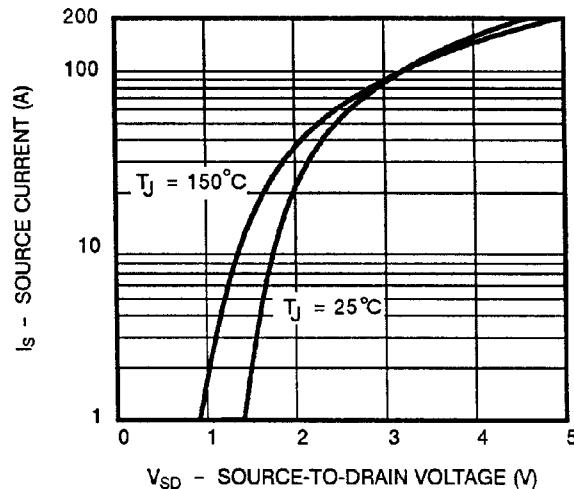


Figure 8. Source-Drain Diode Forward Voltage



## THERMAL RATINGS

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

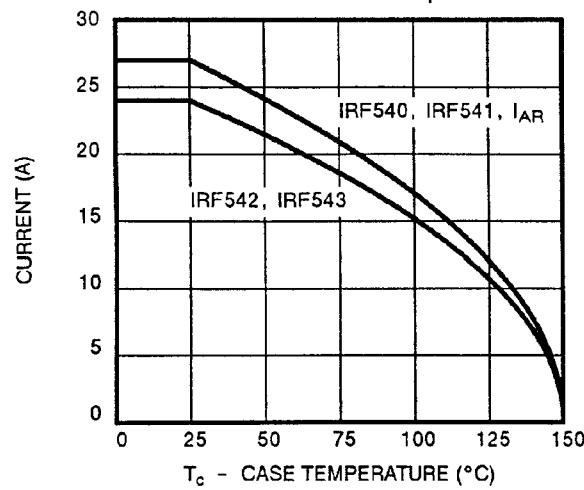


Figure 10. Safe Operating Area

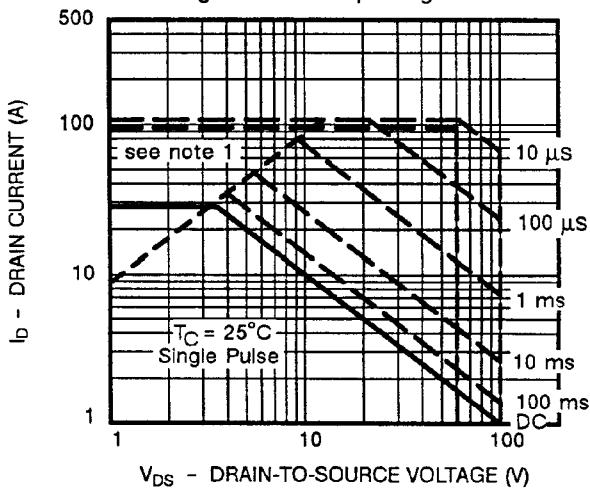


Figure 11. Normalized Effective Transient Thermal Impedance, Junction-to-Case

