

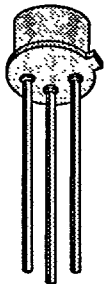
N-Channel Enhancement Mode Transistors

T-39-07

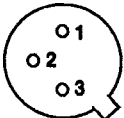
PRODUCT SUMMARY

PART NUMBER	$V_{(BR)DSS}$ (V)	$r_{DS(ON)}$ (Ω)	I_D (A)
IRFF310	400	3.6	1.35
IRFF311	350	3.6	1.35
IRFF312	400	5.0	1.15
IRFF313	350	5.0	1.15

TO-205AF



BOTTOM VIEW



1 DRAIN
2 GATE
3 SOURCE

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS		SYMBOL	IRFF				UNITS
			310	311	312	313	
Drain-Source Voltage		V _{DS}	400	350	400	350	V
Gate-Source Voltage		V _{GS}	± 20	± 20	± 20	± 20	
Continuous Drain Current	T _C = 25°C	I _D	1.35	1.35	1.15	1.15	A
	T _C = 100°C		0.86	0.86	0.73	0.73	
Pulsed Drain Current ¹		I _{DM}	5.5	5.5	4.5	4.5	
Avalanche Current (See Figure 9)		I _A	1.35	1.35	1.15	1.15	
Power Dissipation	T _C = 25°C	P _D	15	15	15	15	W
	T _C = 100°C		6	6	6	6	
Operating Junction & Storage Temperature Range		T _J , T _{stg}	-55 to 150				°C
Lead Temperature (1/16" from case for 10 sec.)		T _L	300				

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Case	R_{thJC}		8.33	K/W
Junction-to-Ambient	R_{thJA}		175	

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

IRFF310/311/312/313

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

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PARAMETER		SYMBOL	TEST CONDITIONS	TYP	LIMITS		UNIT
					MIN	MAX	
STATIC							
Drain-Source Breakdown Voltage	IRFF310, 312 IRFF311, 313	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$		400 350		V
Gate Threshold Voltage		$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		2.0	4.0	
Gate-Body Leakage		I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current		I_{DSS}	$V_{DS} = V_{(BR)DSS}, V_{GS} = 0\text{ V}$			250	μA
			$V_{DS} = 0.8 \times V_{(BR)DSS}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			1000	
On-State Drain Current ¹	IRFF310, 311 IRFF312, 313	$I_{D(ON)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$		1.35 1.15		A
Drain-Source On-State Resistance ¹	IRFF310, 311 IRFF312, 313	$r_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 0.8\text{ A}$	3.3 3.6		3.6 5.0	Ω
	IRFF310, 311 IRFF312, 313		$V_{GS} = 10\text{ V}, I_D = 0.8\text{ A}$ $T_J = 125^\circ\text{C}$	6.6 7.2		7.20 10.0	
Forward Transconductance ¹		g_{fs}	$V_{DS} = 15\text{ V}, I_D = 0.8\text{ A}$	0.6	0.5		S
DYNAMIC							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	175				pF
Output Capacitance	C_{oss}		40				
Reverse Transfer Capacitance	C_{rss}		9				
Total Gate Charge ²	Q_g	$V_{DS} = 0.5 \times V_{(BR)DSS}, V_{GS} = 10\text{ V}, I_D = 1.35\text{ A}$	5.8	3.0	10.0		nC
Gate-Source Charge ²	Q_{gs}		1.0	0.4	1.5		
Gate-Drain Charge ²	Q_{gd}		3.0	1.5	5		
Turn-On Delay Time ²	$t_{d(on)}$	$V_{DD} = 100\text{ V}, R_L = 125\text{ }\Omega$ $I_D \simeq 0.8\text{ A}, V_{GEN} = 10\text{ V}, R_G = 25\text{ }\Omega$	7		10		ns
Rise Time ²	t_r		14		25		
Turn-Off Delay Time ²	$t_{d(off)}$		25		30		
Fall Time ²	t_f		14		15		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_c = 25^\circ\text{C}$)							
Continuous Current	IRFF310, 311 IRFF312, 313	I_S			1.35 1.15		A
Pulsed Current ³	IRFF310, 311 IRFF312, 313	I_{SM}			5.5 4.5		
Forward Voltage ¹	IRFF310, 311 IRFF312, 313	V_{SD}	$I_F = I_S, V_{GS} = 0\text{ V}$			1.6 1.5	V
Reverse Recovery Time		t_{rr}	$I_F = I_S, dI_F/dt = 100\text{ A}/\mu\text{s}$	200			ns
Reverse Recovery Charge		Q_{rr}		1.2			μC

¹Pulse test: Pulse Width $\leq 300\text{ }\mu\text{sec}$, Duty Cycle $\leq 2\%$.²Independent of operating temperature.³Pulse width limited by maximum junction temperature (refer to transient thermal impedance data, Figure 11).



IRFF310/311/312/313

TYPICAL CHARACTERISTICS (25°C Unless Otherwise Specified)

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Figure 12. Output Characteristics

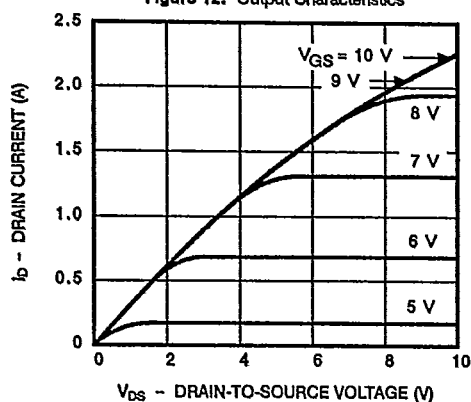


Figure 13. Transfer Characteristics

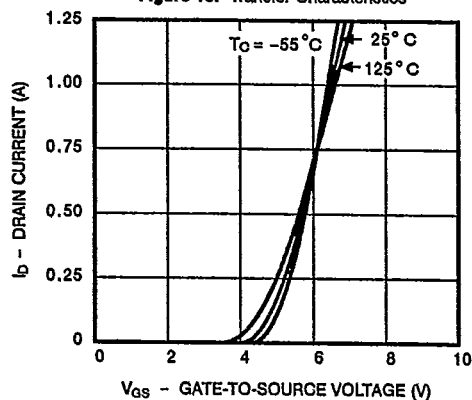


Figure 14. Transconductance

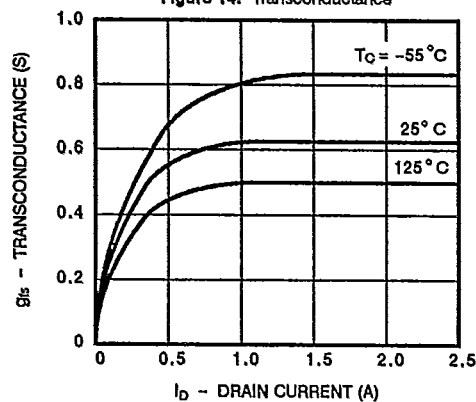


Figure 15. On-Resistance

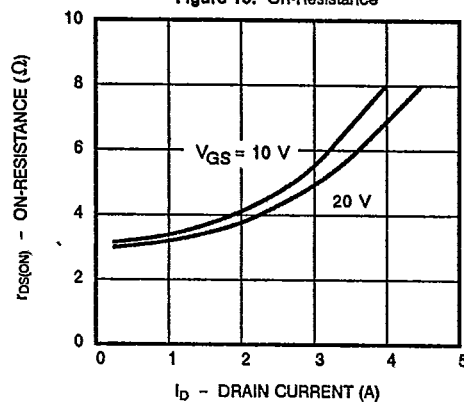


Figure 16. Capacitance

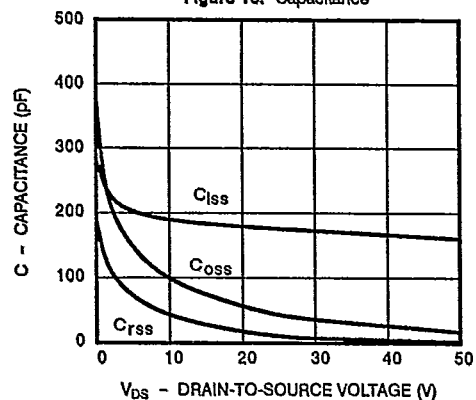
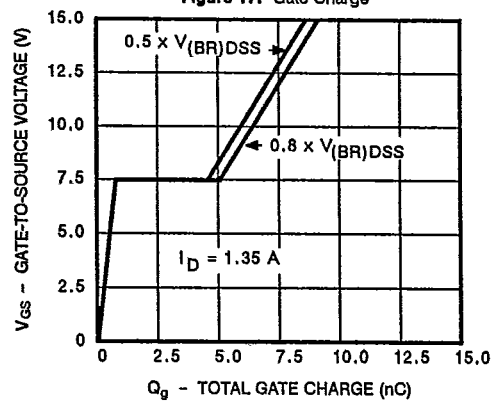
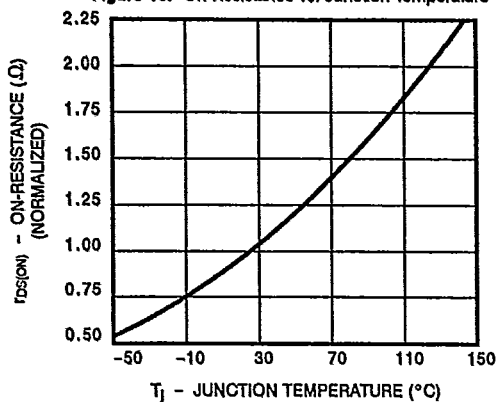
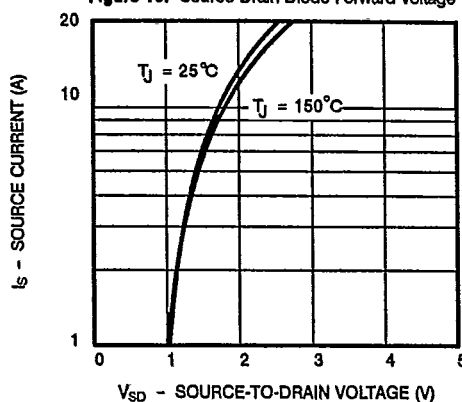
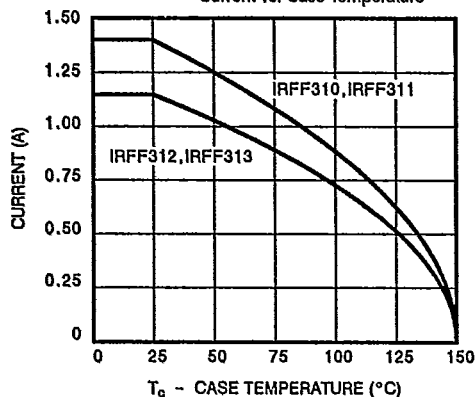
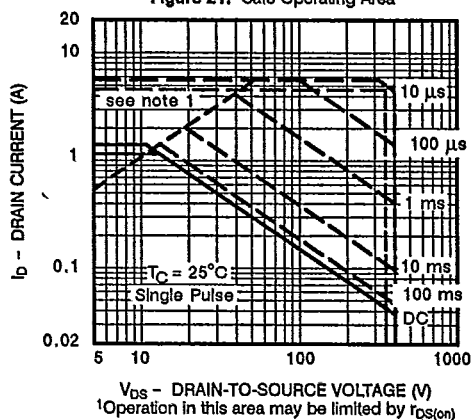


Figure 17. Gate Charge



IRFF310/311/312/313**TYPICAL CHARACTERISTICS (Cont'd)****T-39-07****Figure 18. On-Resistance vs. Junction Temperature****Figure 19. Source-Drain Diode Forward Voltage****THERMAL RATINGS****Figure 20. Maximum Avalanche and Drain Current vs. Case Temperature****Figure 21. Safe Operating Area****Figure 22. Normalized Effective Transient Thermal Impedance, Junction-to-Case**