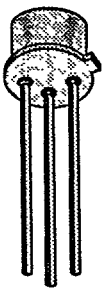
Siliconix incorporated

IRFF9120/9121/9122/9123

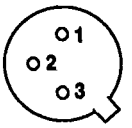
P-Channel Enhancement Mode Transistors

T-39-19

TO-205AF



BOTTOM VIEW



1 DRAIN
2 GATE
3 SOURCE

PRODUCT SUMMARY

PART NUMBER	$V_{(BR)DSS}$ (V)	$r_{DS(ON)}$ (Ω)	I_D (A)
IRFF9120	-100	0.6	-4.0
IRFF9121	-60	0.6	-4.0
IRFF9122	-100	0.8	-3.5
IRFF9123	-60	0.8	-3.5

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C Unless Otherwise Noted)[1]

PARAMETERS/TEST CONDITIONS		SYMBOL	IRFF 9120	9121	9122	9123	UNITS
Drain-Source Voltage		V_{DS}	100	60	100	60	V
Gate-Source Voltage		V_{GS}	±20	±20	±20	±20	
Continuous Drain Current	T_C = 25°C	I_D	4.0	4.0	3.5	3.5	A
	T_C = 100°C		2.5	2.5	2.2	2.2	
Pulsed Drain Current[2]		I_{DM}	16	16	14	14	
Avalanche Current (See Figure 9)		I_A	4.0	4.0	3.5	3.5	
Power Dissipation	T_C = 25°C	P_D	20	20	20	20	W
	T_C = 100°C		8	8	8	8	
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				

4

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Case	R_{thJC}		6.25	K/W
Junction-to-Ambient	R_{thJA}		175	

[1]Negative signs for current and voltage ratings have been omitted for the sake of clarity.
[2]Pulse width limited by maximum junction temperature (refer to transient thermal impedance data, Figure 11).

IRFF9120/9121/9122/9123

Siliconix incorporated

ELECTRICAL CHARACTERISTICS (T_J = 25°C Unless Otherwise Noted)

P-Channel Device – Negative Signs Have Been Omitted for Clarity

T-39-19

PARAMETER		SYMBOL	TEST CONDITIONS	TYP	LIMITS MIN	LIMITS MAX	UNIT
STATIC							
Drain-Source Breakdown Voltage	IRFF9120, 9122 IRFF9121, 9123	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA		100 60		V
Gate Threshold Voltage		$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		2.0	4.0	
Gate-Body Leakage		I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS} = $V_{(BR)DSS}$, V_{GS} = 0 V			250	µA
			V_{DS} = 0.8 x $V_{(BR)DSS}$, V_{GS} = 0 V, T_J = 125°C			1000	
On-State Drain Current[1]	IRFF9120, 9121 IRFF9122, 9123	$I_{D(ON)}$	V_{DS} = 5 V, V_{GS} = 10 V		4.0 3.5		A
Drain-Source On-State Resistance[1]	IRFF9120, 9121 IRFF9122, 9123	$r_{DS(ON)}$	V_{GS} = 10 V, I_D = 2 A	0.50 0.60		0.60 0.80	Ω
	IRFF9120, 9121 IRFF9122, 9123		V_{GS} = 10 V, I_D = 2 A T_J = 125°C	0.80 1.00		1.0 1.3	
Forward Transconductance[1]		g_{fs}	V_{DS} = 15 V, I_D = 2 A	1.4	1.25		S
DYNAMIC							
Input Capacitance		C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	350			pF
Output Capacitance		C_{oss}		205			
Reverse Transfer Capacitance		C_{rss}		80			
Total Gate Charge[2]		Q_g	V_{DS} = 0.5 x $V_{(BR)DSS}$, V_{GS} = 10 V, I_D = 4 A	11	5.0	22	nC
Gate-Source Charge[2]		Q_{gs}		2.0	1.0	3.5	
Gate-Drain Charge[2]		Q_{gd}		5.5	3.0	8	
Turn-On Delay Time[2]		$t_{d(on)}$	V_{DD} = 40 V, R_L = 20 Ω I_D ≃ 2 A, V_{GEN} = 10 V, R_G = 25 Ω	9		50	ns
Rise Time[2]		t_r		25		100	
Turn-Off Delay Time[2]		$t_{d(off)}$		39		100	
Fall Time[2]		t_f		30		100	
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25°C)							
Continuous Current	IRFF9120, 9121 IRFF9122, 9123	I_S				4.0 3.5	A
Pulsed Current[3]	IRFF9120, 9121 IRFF9122, 9123	I_{SM}				16 14	
Forward Voltage[1]	IRFF9120, 9121 IRFF9122, 9123	V_{SD}	I_F = I_S, V_{GS} = 0 V			6.3 6.0	V
Reverse Recovery Time		t_{rr}	I_F = I_S, dI_F/dt = 100 A/µs	80			ns
Reverse Recovery Charge		Q_{rr}		0.26			µC

[1]Pulse test: Pulse Width ≤ 300 µsec, Duty Cycle ≤ 2%.
[2]Independent of operating temperature.
[3]Pulse width limited by maximum junction temperature (refer to transient thermal impedance data, Figure 11).

TYPICAL CHARACTERISTICS (25°C Unless Otherwise Specified)

T-39-19

Figure 1. Output Characteristics

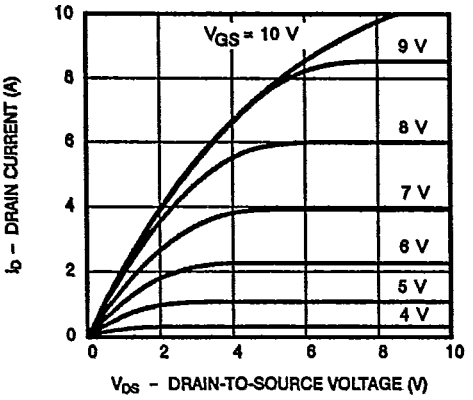


Figure 2. Transfer Characteristics

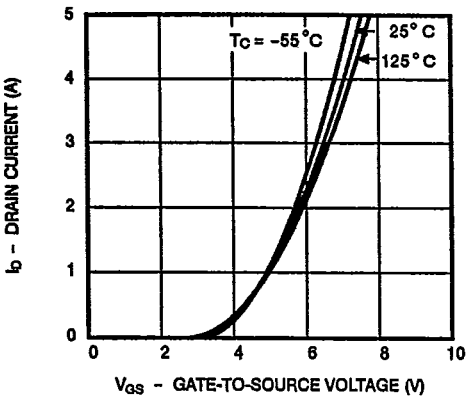


Figure 3. Transconductance

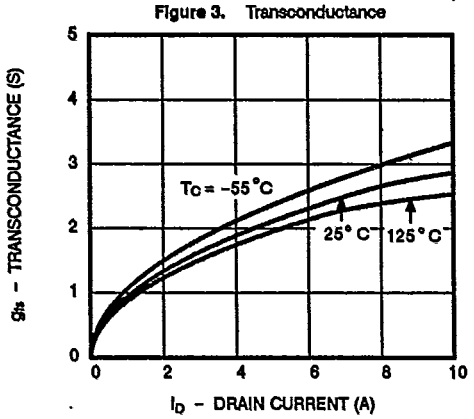


Figure 4. On-Resistance

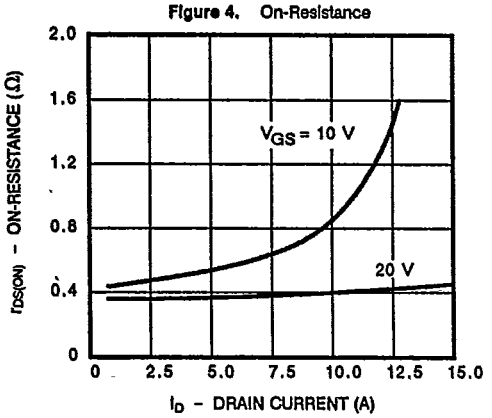


Figure 5. Capacitance

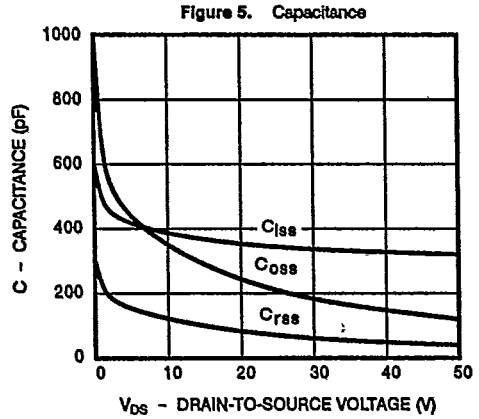
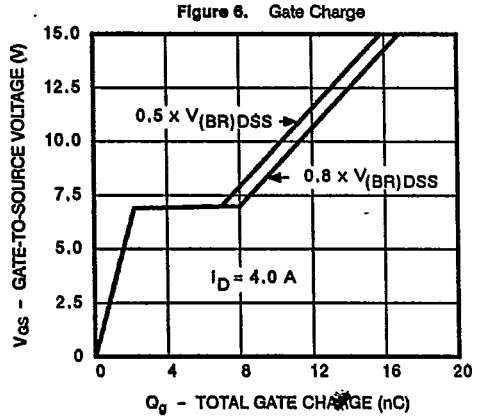


Figure 6. Gate Charge



4

IRFF9120/9121/9122/9123

Siliconix incorporated

T-39-19

TYPICAL CHARACTERISTICS (Cont'd)

Figure 7. On-Resistance vs. Junction Temperature

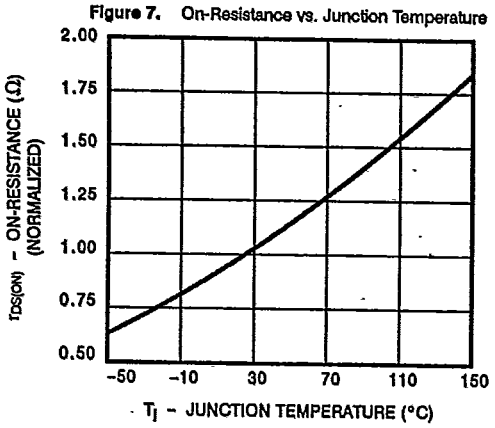
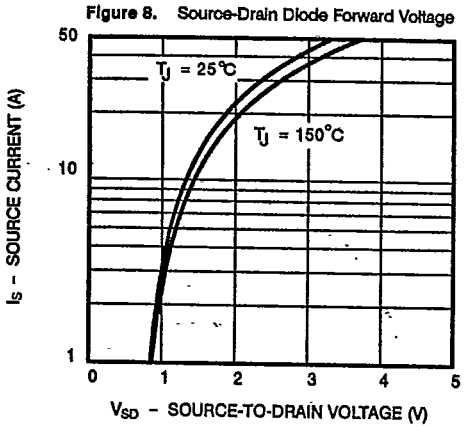


Figure 8. Source-Drain Diode Forward Voltage



THERMAL RATINGS

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

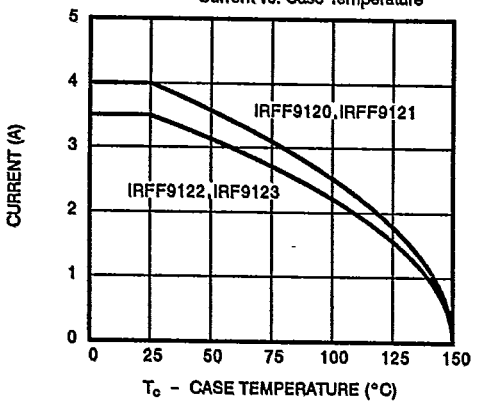
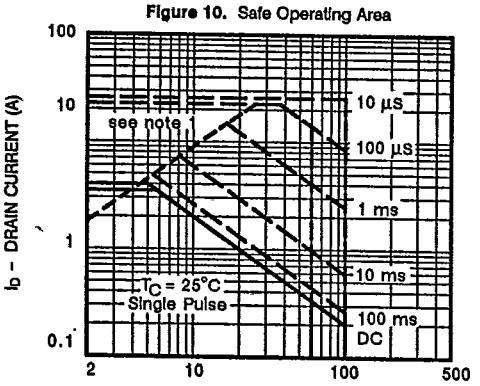


Figure 10. Safe Operating Area



[1]Operation in this area may be limited by $r_{DS(on)}$

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