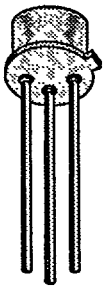
Siliconix incorporated

IRFF430/431/432/433

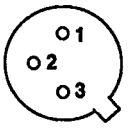
N-Channel Enhancement Mode Transistors

T-39-09

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)
IRFF430	500	1.5	2.75
IRFF431	450	1.5	2.75
IRFF432	500	2.0	2.25
IRFF433	450	2.0	2.25

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

PARAMETERS/TEST CONDITIONS		SYMBOL	IRFF 430	431	432	433	UNITS
Drain-Source Voltage		V_{DS}	500	450	500	450	V
Gate-Source Voltage		V_{GS}	±20	±20	±20	±20	
Continuous Drain Current	T_C = 25°C	I_D	2.75	2.75	2.25	2.25	A
	T_C = 100°C		2.0	2.0	1.7	1.7	
Pulsed Drain Current[1]		I_{DM}	11	11	9	9	
Avalanche Current (See Figure 9)		I_A	2.75	2.75	2.25	2.25	
Power Dissipation	T_C = 25°C	P_D	25	25	25	25	W
	T_C = 100°C		10	10	10	10	
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				

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THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Case	R_{thJC}		5.0	K/W
Junction-to-Ambient	R_{thJA}		175	

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

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

PARAMETER		SYMBOL	TEST CONDITIONS	TYP	LIMITS MIN	LIMITS MAX	UNIT
STATIC							
Drain-Source Breakdown Voltage	IRFF430, 432 IRFF431, 433	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA		500 450		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]	IRFF430, 431 IRFF432, 433	$I_{D(ON)}$	V_{DS} = 5 V, V_{GS} = 10 V		2.75 2.25		A
Drain-Source On-State Resistance[1]	IRFF430, 431 IRFF432, 433	$r_{DS(ON)}$	V_{GS} = 10 V, I_D = 1.5 A	1.2 1.5		1.5 2.0	Ω
	IRFF430, 431 IRFF432, 433		V_{GS} = 10 V, I_D = 1.5 A T_J = 125°C	2.5 3.3		3.3 4.4	
Forward Transconductance[1]		g_{fs}	V_{DS} = 15 V, I_D = 1.5 A	2.8	1.5		S
DYNAMIC							
Input Capacitance		C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	750			pF
Output Capacitance		C_{oss}		120			
Reverse Transfer Capacitance		C_{rss}		50			
Total Gate Charge[2]		Q_g	V_{DS} = 0.5 x $V_{(BR)DSS}$, V_{GS} = 10 V, I_D = 2.75 A	20	15	34	nC
Gate-Source Charge[2]		Q_{gs}		3.6	1.8	4.7	
Gate-Drain Charge[2]		Q_{gd}		9	7.6	17	
Turn-On Delay Time[2]		$t_{d(on)}$	V_{DD} = 225 V, R_L = 150 Ω I_D ≅ 1.5 A, V_{GEN} = 10 V, R_G = 7.5 Ω	11		30	ns
Rise Time[2]		t_r		12		30	
Turn-Off Delay Time[2]		$t_{d(off)}$		45		55	
Fall Time[2]		t_f		22		30	
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25°C)							
Continuous Current	IRFF430, 431 IRFF432, 433	I_S				2.75 2.25	A
Pulsed Current[3]	IRFF430, 431 IRFF432, 433	I_{SM}				11.0 9.0	
Forward Voltage[1]	IRFF430, 431 IRFF432, 433	V_{SD}	I_F = I_S, V_{GS} = 0 V			1.4 1.3	V
Reverse Recovery Time		t_{rr}	I_F = I_S, dI_F/dt = 100 A/µs	260			ns
Reverse Recovery Charge		Q_{rr}		1.5			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).

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TYPICAL CHARACTERISTICS (25°C Unless Otherwise Specified)

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Figure 1. Output Characteristics

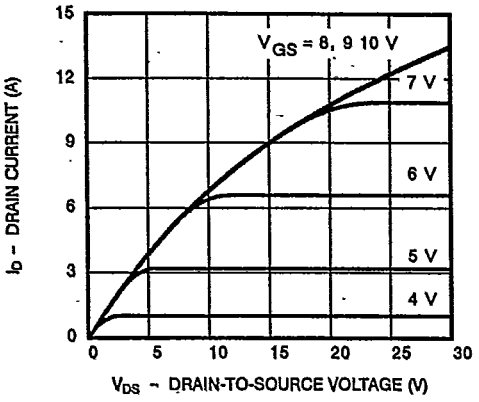


Figure 2. Transfer Characteristics

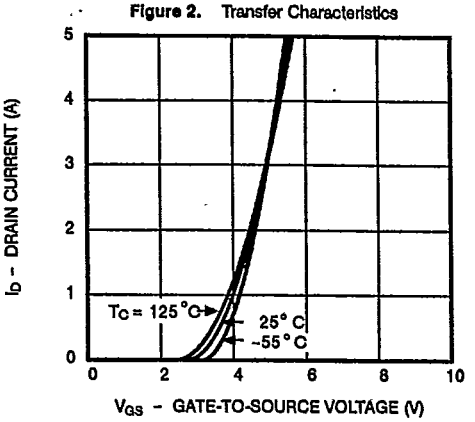


Figure 3. Transconductance

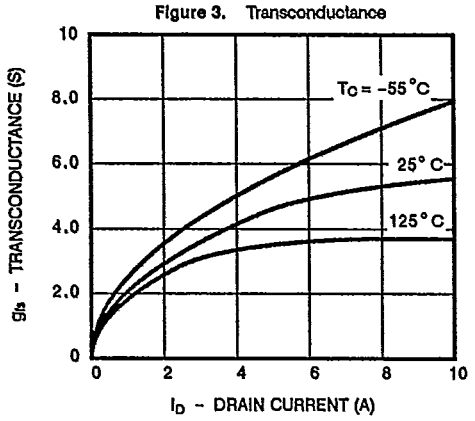


Figure 4. On-Resistance

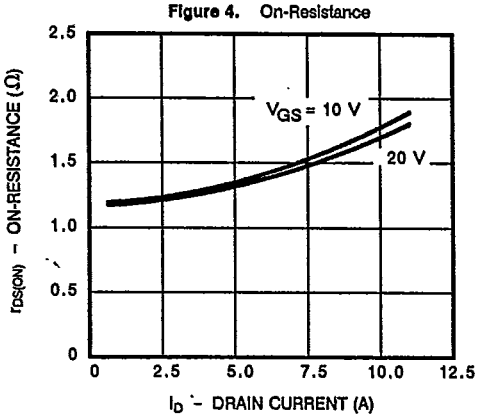


Figure 5. Capacitance

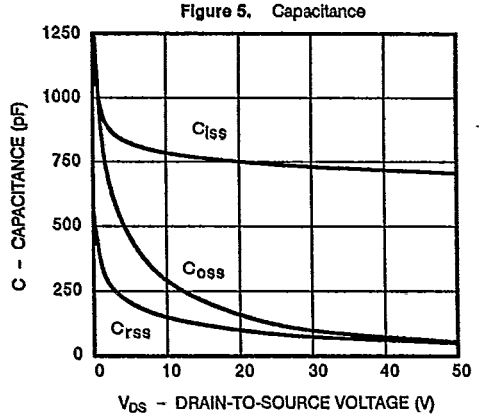
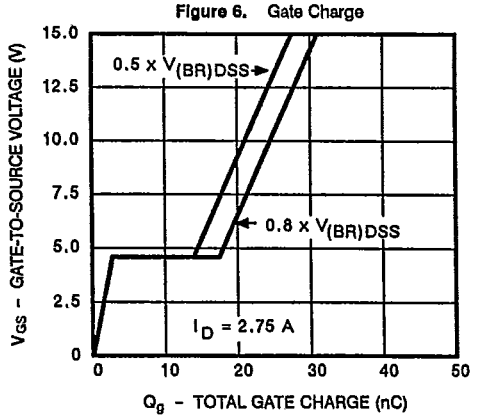


Figure 6. Gate Charge



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TYPICAL CHARACTERISTICS (Cont'd)

Figure 7. On-Resistance vs. Junction Temperature

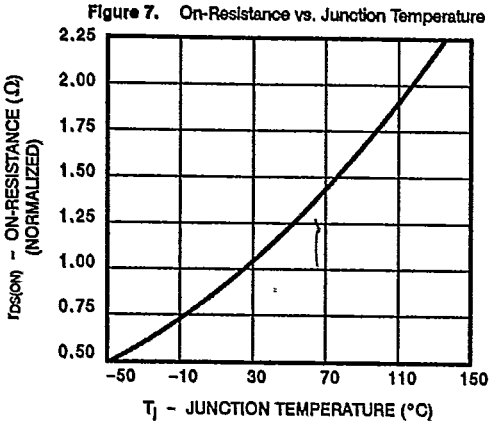
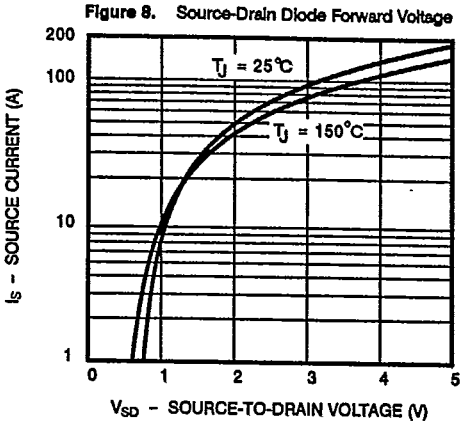


Figure 8. Source-Drain Diode Forward Voltage



THERMAL RATINGS

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

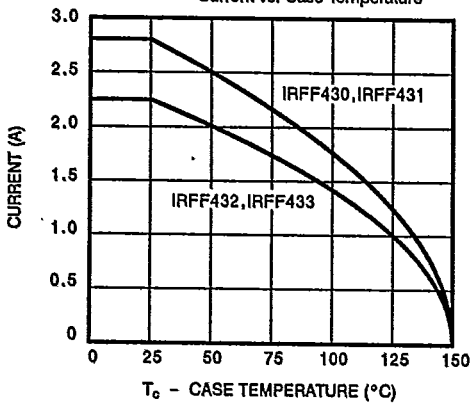
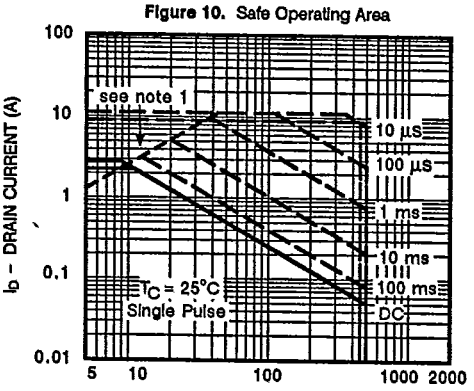


Figure 10. Safe Operating Area



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

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