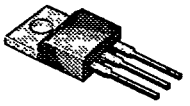
Siliconix incorporated

IRF630/631/632/633

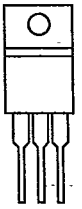
N-Channel Enhancement Mode Transistors

T-39-11

TO-220AB



TOP VIEW



1 GATE
2 DRAIN (Connected to TAB)
3 SOURCE

PRODUCT SUMMARY

PART NUMBER	$V_{(BR)DSS}$ (V)	$r_{DS(ON)}$ (Ω)	I_D (A)
IRF630	200	0.4	9.0
IRF631	150	0.4	9.0
IRF632	200	0.6	8.0
IRF633	150	0.6	8.0

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

PARAMETERS/TEST CONDITIONS		SYMBOL	IRF 630	IRF 631	IRF 632	IRF 633	UNITS
Gate-Source Voltage		V_{GS}	±20	±20	±20	±20	V
Continuous Drain Current	T_C = 25°C	I_D	9.0	9.0	8.0	8.0	A
	T_C = 100°C		6.0	6.0	5.0	5.0	
Pulsed Drain Current[1]		I_{DM}	36	36	32	32	
Avalanche Current (See Figure 9)		I_A	9.0	9.0	9.0	9.0	
Power Dissipation	T_C = 25°C	P_D	75	75	75	75	W
	T_C = 100°C		30	30	30	30	
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}		1.67	K/W
Junction-to-Ambient	R_{thJA}		80	
Case-to-Sink	R_{thCS}	1.0		

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

4

IRF630/631/632/633

Siliconix incorporated

T-39-11

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

PARAMETER		SYMBOL	TEST CONDITIONS	TYP	LIMITS MIN	LIMITS MAX	UNIT
STATIC							
Drain-Source Breakdown Voltage	IRF630, 632 IRF631, 633	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA		200 150		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			±500	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]	IRF630, 631 IRF632, 633	$I_{D(ON)}$	V_{DS} = 10 V, V_{GS} = 10 V		9.0 8.0		A
Drain-Source On-State Resistance[1]	IRF630, 631 IRF632, 633	$r_{DS(ON)}$	V_{GS} = 10 V, I_D = 5 A	0.25 0.40		0.40 0.60	Ω
	IRF630, 631 IRF632, 633		V_{GS} = 10 V, I_D = 5 A T_J = 125°C	0.45 0.75		0.80 1.20	
Forward Transconductance[1]		g_{fs}	V_{DS} = 15 V, I_D = 5 A	3.7	3.0		S
DYNAMIC							
Input Capacitance		C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	780		800	pF
Output Capacitance		C_{oss}		220		450	
Reverse Transfer Capacitance		C_{rss}		70		150	
Total Gate Charge[2]		Q_g	V_{DS} = 0.8 x $V_{(BR)DSS}$, V_{GS} = 10 V, I_D = 12 A	27		30	nC
Gate-Source Charge[2]		Q_{gs}		5			
Gate-Drain Charge[2]		Q_{gd}		17			
Turn-On Delay Time[2]		$t_{d(on)}$	V_{DD} = 90 V, R_L = 18 Ω I_D ≃ 5 A, V_{GEN} = 10 V, R_G = 7.5 Ω	8		30	ns
Rise Time[2]		t_r		42		50	
Turn-Off Delay Time[2]		$t_{d(off)}$		12		50	
Fall Time[2]		t_f		30		40	
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25°C)							
Continuous Current	IRF630, 631 IRF632, 633	I_S				9.0 8.0	A
Pulsed Current[3]	IRF630, 631 IRF632, 633	I_{SM}				36 32	
Forward Voltage[1]	IRF630, 631 IRF632, 633	V_{SD}	I_F = I_S, V_{GS} = 0 V			2.0 1.8	V
Reverse Recovery Time		t_{rr}	I_F = I_S, dI_F/dt = 100 A/µs	150			ns
Reverse Recovery Charge		Q_{rr}		0.8			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-39-11

Figure 1. Output Characteristics

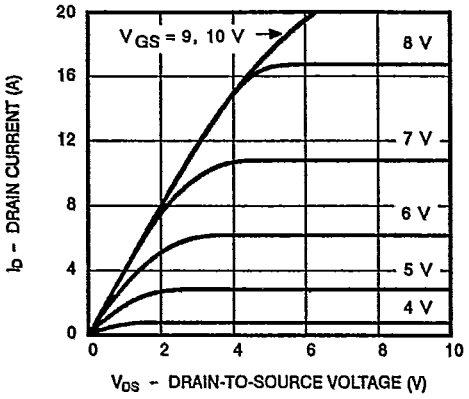


Figure 2. Transfer Characteristics

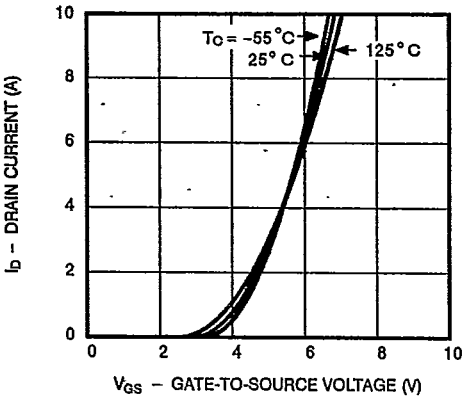


Figure 3. Transconductance

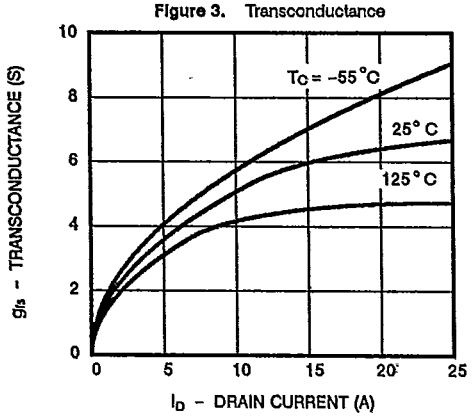


Figure 4. On-Resistance

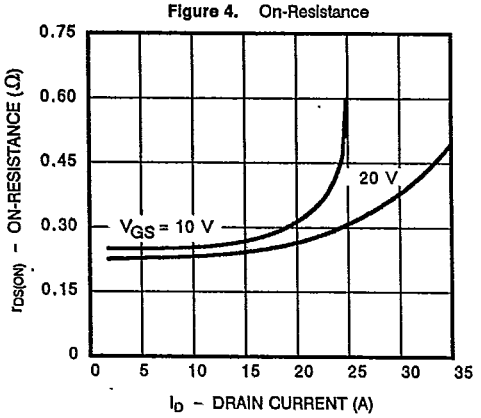


Figure 5. Capacitance

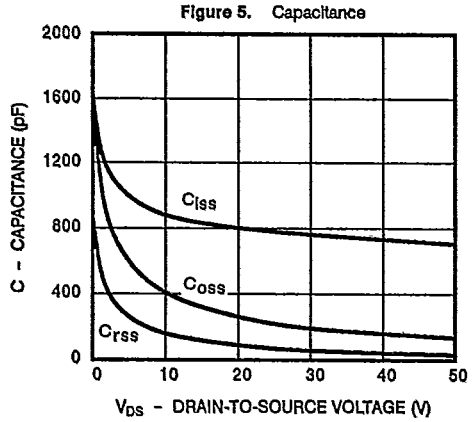
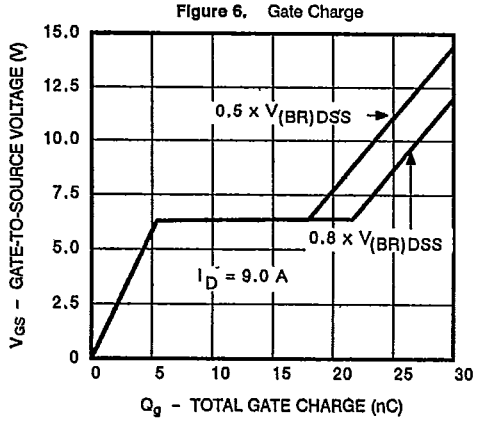


Figure 6. Gate Charge



4

TYPICAL CHARACTERISTICS (Cont'd)

Figure 7. On-Resistance vs. Junction Temperature

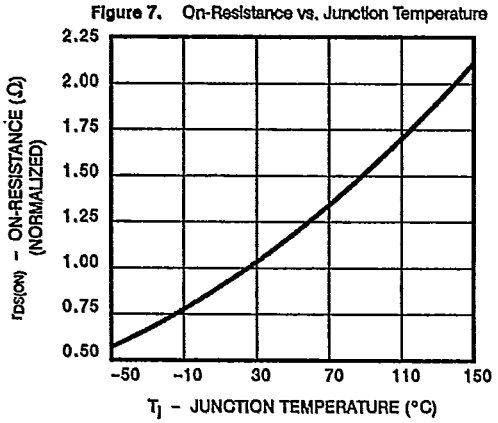
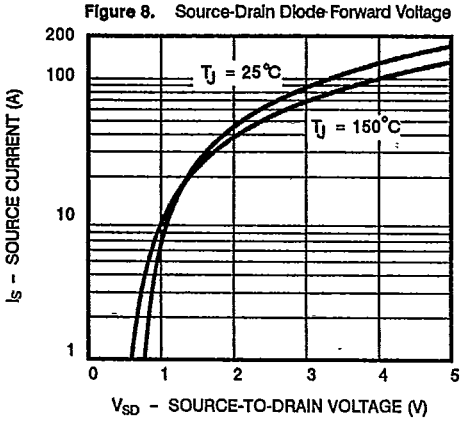


Figure 8. Source-Drain Diode Forward Voltage



THERMAL RATINGS

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

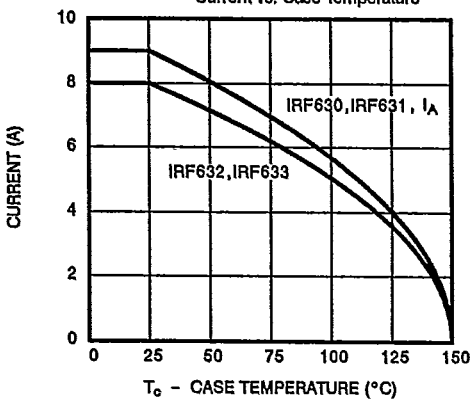
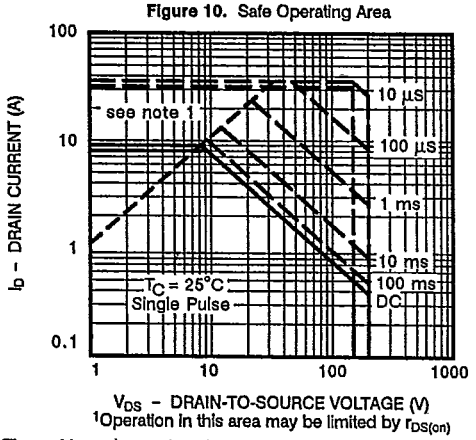


Figure 10. Safe Operating Area



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

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