Siliconix incorporated

2N7004

T-39-05

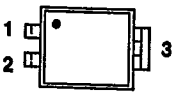
N-Channel Enhancement Mode Transistor

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(ON)}$ (Ω)	I_D (A)
100	0.60	1.0

4-PIN DIP
(Similar to TO-250)

TOP VIEW



1 GATE
2 SOURCE
3 DRAIN

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

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS	UNITS
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current	T_A = 25°C	I_D	1.0	A
	T_A = 100°C		0.63	
Pulsed Drain Current[1]		I_{DM}	8.0	
Power Dissipation	T_A = 25°C	P_D	1.0	W
	T_A = 100°C		0.40	
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-Ambient	R_{thJA}		120	K/W

[1]Pulse width limited by maximum junction temperature.

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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	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA		100		V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1000 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]	$I_{D(ON)}$	V_{DS} = 2 V, V_{GS} = 10 V		1.0		A
Drain-Source On-State Resistance[1]	$r_{DS(ON)}$	V_{GS} = 10 V, I_D = 0.8 A	0.5		0.60	Ω
		V_{GS} = 10 V, I_D = 0.8 A, T_J = 125°C	0.9		1.1	
Forward Transconductance[1]	g_{fs}	V_{DS} = 15 V, I_D = 0.8 A	0.9	0.8		S
DYNAMIC						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	170		250	pF
Output Capacitance	C_{oss}		75		100	
Reverse Transfer Capacitance	C_{rss}		23		40	
Total Gate Charge[2]	Q_g	V_{DS} = 0.5 x $V_{(BR)DSS}$, V_{GS} = 10 V, I_D = 1 A	6		7.0	nC
Gate-Source Charge[2]	Q_{gs}		1.2			
Gate-Drain Charge[2]	Q_{gd}		2.5			
Turn-On Delay Time[2]	$t_{d(on)}$	V_{DD} = 50 V, R_L = 62 Ω, I_D ≅ 0.8 A, V_{GEN} = 10 V, R_G = 25 Ω	7		20	ns
Rise Time[2]	t_r		18		25	
Turn-Off Delay Time[2]	$t_{d(off)}$		24		25	
Fall Time[2]	t_f		11		20	
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_A = 25°C)						
Continuous Current	I_S				1.0	A
Pulsed Current[3]	I_{SM}				8.0	
Forward Voltage[1]	V_{SD}	I_F = I_S, V_{GS} = 0 V			2.5	V
Reverse Recovery Time	t_{rr}	I_F = I_S, dI_F/dt = 100 A/µs	65			ns
Reverse Recovery Charge	Q_{rr}		0.12			µC

[1]Pulse test: Pulse Width ≤ 300 µsec, Duty Cycle ≤ 2%.
[2]Independent of operating temperature.
[3]Pulse width limited by maximum junction temperature.

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TYPICAL CHARACTERISTICS (25°C Unless Otherwise Specified)

Figure 1. Output Characteristics

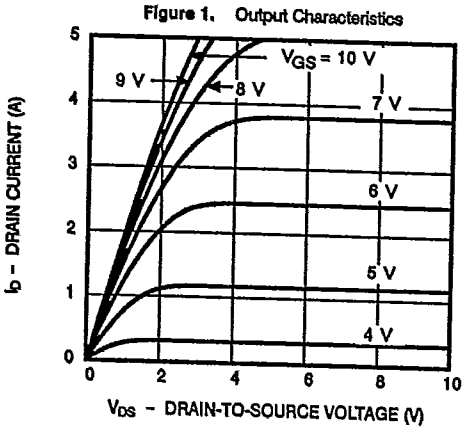


Figure 2. Transfer Characteristics

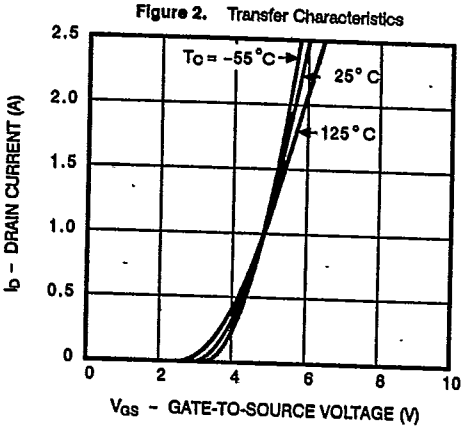


Figure 3. Transconductance

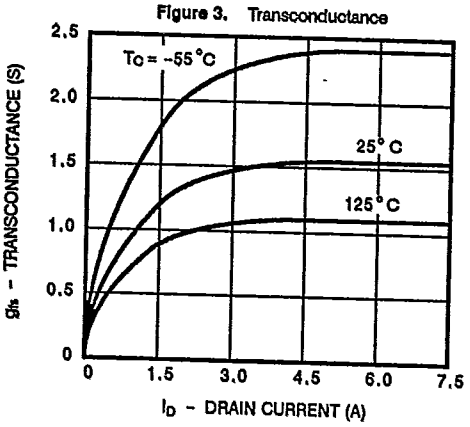


Figure 4. On-Resistance

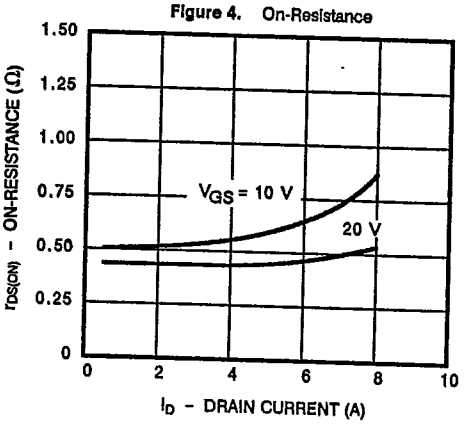


Figure 5. Capacitance

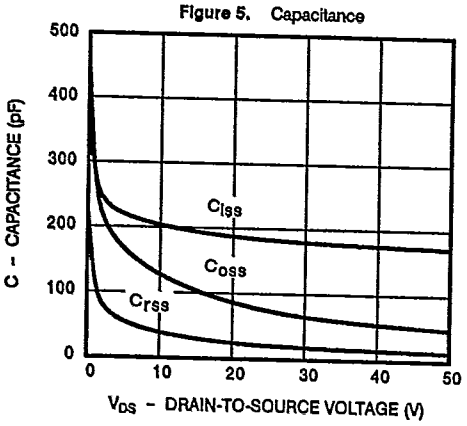
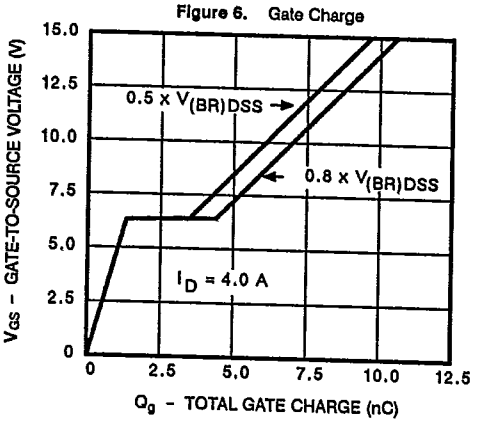


Figure 6. Gate Charge



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TYPICAL CHARACTERISTICS (Cont'd)

Figure 7. On-Resistance vs. Junction Temperature

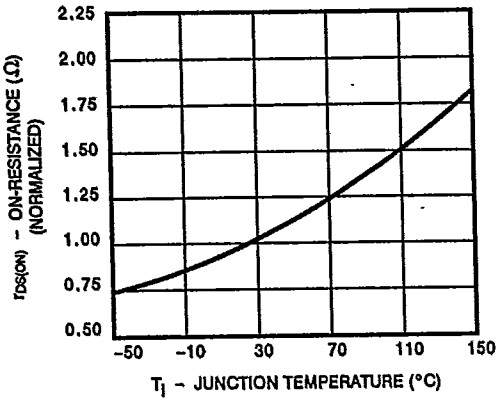
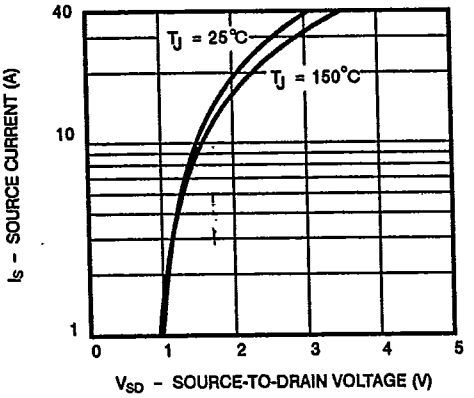


Figure 8. Source-Drain Diode Forward Voltage



THERMAL RATINGS

Figure 9. Maximum Drain Current vs. Case Temperature

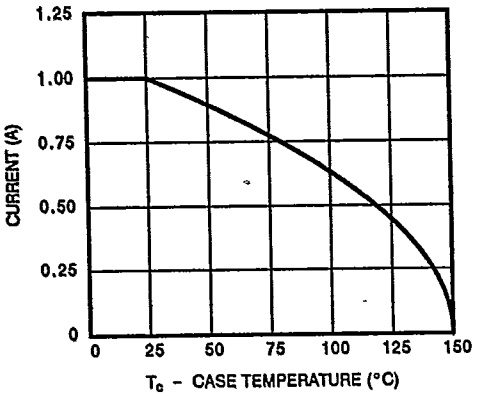
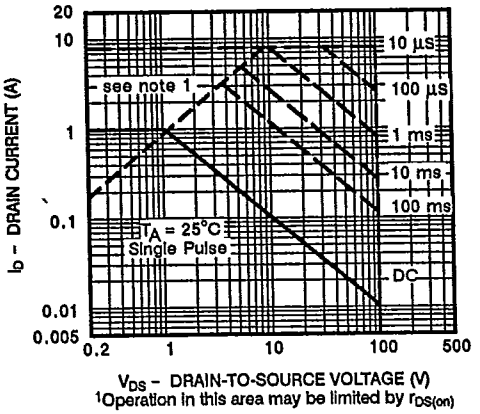


Figure 10. Safe Operating Area



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