

2N7004 T-39-05

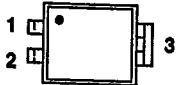
N-Channel Enhancement Mode Transistor

4-PIN DIP
(Similar to TO-250)

TOP VIEW

PRODUCT SUMMARY

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



1 GATE
2 SOURCE
3 DRAIN

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ 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	$T_A = 25^\circ\text{C}$	I_D	1.0	A
	$T_A = 100^\circ\text{C}$		0.63	
Pulsed Drain Current ¹		I_{DM}	8.0	
Power Dissipation	$T_A = 25^\circ\text{C}$	P_D	1.0	W
	$T_A = 100^\circ\text{C}$		0.40	
Operating Junction & Storage Temperature Range		T_J, T_{stg}	-55 to 150	$^\circ\text{C}$
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

¹Pulse width limited by maximum junction temperature.

2N7004

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

T-39-05

PARAMETER	SYMBOL	TEST CONDITIONS	TYP	LIMITS		UNIT
				MIN	MAX	
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$		100		V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1000\text{ }\mu\text{A}$		2.0	4.0	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 500	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	$I_{D(ON)}$	$V_{DS} = 2\text{ V}, V_{GS} = 10\text{ V}$		1.0		A
Drain-Source On-State Resistance ¹	$r_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 0.8\text{ A}$	0.5		0.60	Ω
		$V_{GS} = 10\text{ V}, I_D = 0.8\text{ A}, T_J = 125^\circ\text{C}$	0.9		1.1	
Forward Transconductance ¹	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 0.8\text{ A}$	0.9	0.8		S
DYNAMIC						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	170		250	pF
Output Capacitance	C_{oss}		75		100	
Reverse Transfer Capacitance	C_{rss}		23		40	
Total Gate Charge ²	Q_g	$V_{DS} = 0.5 \times V_{(BR)DSS}, V_{GS} = 10\text{ V}, I_D = 1\text{ A}$	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	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 62\text{ }\Omega$ $I_D \simeq 0.8\text{ A}, V_{GEN} = 10\text{ V}, R_G = 25\text{ }\Omega$	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 ($T_A = 25^\circ\text{C}$)						
Continuous Current	I_S				1.0	A
Pulsed Current ³	I_{SM}				8.0	
Forward Voltage ¹	V_{SD}	$I_F = I_S, V_{GS} = 0\text{ V}$			2.5	V
Reverse Recovery Time	t_{rr}	$I_F = I_S, dI_F/dt = 100\text{ A}/\mu\text{s}$	65			ns
Reverse Recovery Charge	Q_{rr}		0.12			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.

**2N7004**

TYPICAL CHARACTERISTICS (25°C Unless Otherwise Specified)

T-39.05

Figure 1. Output Characteristics

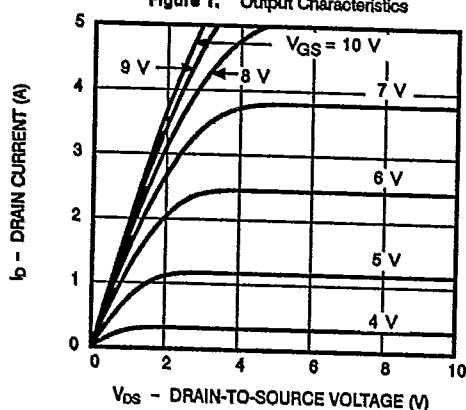


Figure 2. Transfer Characteristics

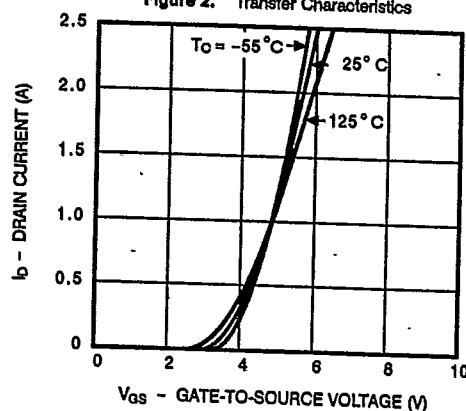


Figure 3. Transconductance

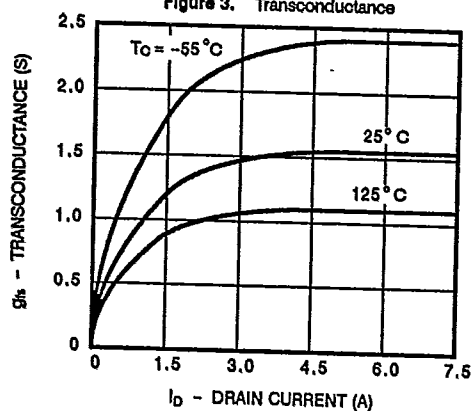


Figure 4. On-Resistance

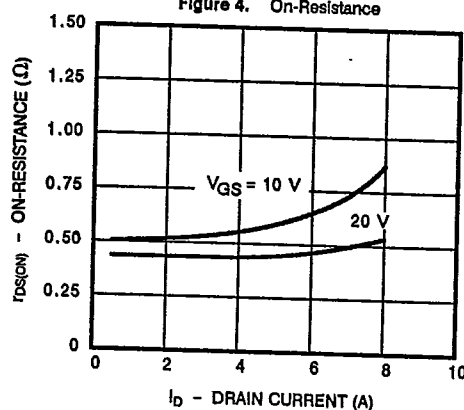


Figure 5. Capacitance

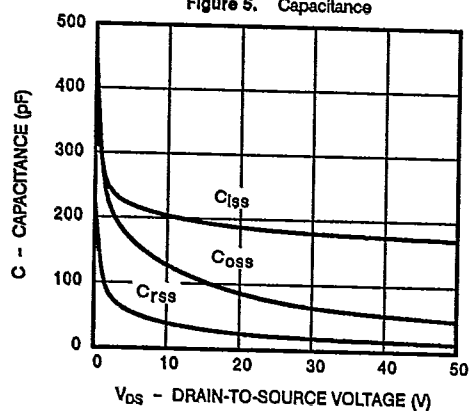
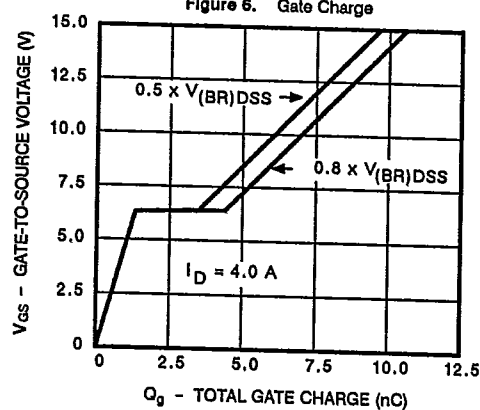
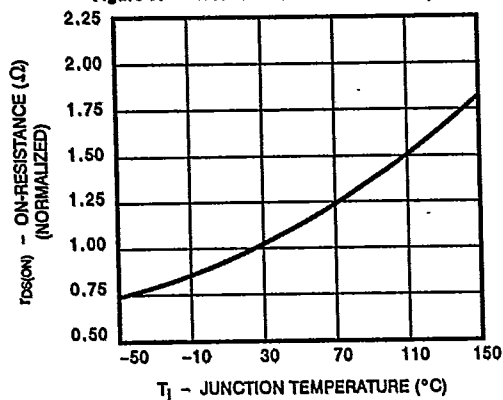
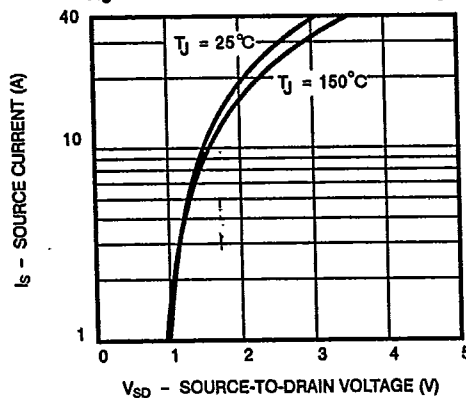
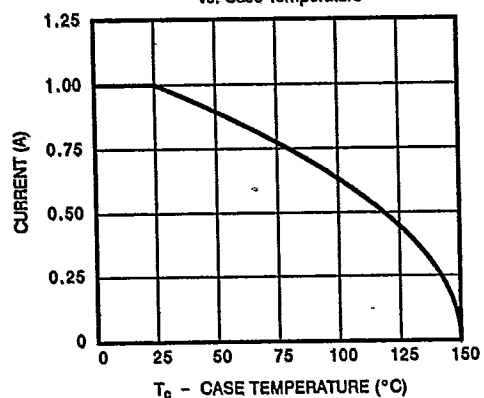


Figure 6. Gate Charge



2N7004**TYPICAL CHARACTERISTICS (Cont'd)****T-39-05****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**