

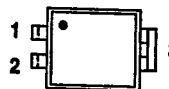
# 2N7005

T-39-05

N-Channel Enhancement Mode Transistor

4-PIN DIP  
(Similar to TO-250)

TOP VIEW



1 GATE  
2 SOURCE  
3 DRAIN

## PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(ON)}$ ( $\Omega$ )	$I_D$ (A)
200	1.5	0.60

## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS	SYMBOL	LIMITS	UNITS
Drain-Source Voltage	$V_{DS}$	200	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current	$I_D$	$T_A = 25^\circ\text{C}$	A
		$T_A = 100^\circ\text{C}$	
Pulsed Drain Current <sup>1</sup>	$I_{DM}$	2.5	
Power Dissipation	$P_D$	$T_A = 25^\circ\text{C}$	W
		$T_A = 100^\circ\text{C}$	
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	$R_{\theta JA}$		120	K/W

<sup>1</sup>Pulse width limited by maximum junction temperature.

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**ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C Unless Otherwise Noted)**

PARAMETER	SYMBOL	TEST CONDITIONS	TYP	LIMITS		UNIT
				MIN	MAX	
<b>STATIC</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA		200		V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1000 μA		2.0	4.0	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±500	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = V <sub>(BR)DSS</sub> , V <sub>GS</sub> = 0 V			250	μA
		V <sub>DS</sub> = 0.8 × V <sub>(BR)DSS</sub> , V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125°C			1000	
On-State Drain Current <sup>1</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 2 V, V <sub>GS</sub> = 10 V		0.6		A
Drain-Source On-State Resistance <sup>1</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.3 A	1.0		1.5	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.3 A, T <sub>J</sub> = 125°C	1.8		2.7	
Forward Transconductance <sup>1</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 0.3 A	0.7	0.5		S
<b>DYNAMIC</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz	175		240	pF
Output Capacitance	C <sub>oss</sub>		65		80	
Reverse Transfer Capacitance	C <sub>rss</sub>		20		40	
Total Gate Charge <sup>2</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 0.5 × V <sub>(BR)DSS</sub> , V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.6 A	7.5		10	nC
Gate-Source Charge <sup>2</sup>	Q <sub>gs</sub>		1.6			
Gate-Drain Charge <sup>2</sup>	Q <sub>gd</sub>		5			
Turn-On Delay Time <sup>2</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 100 V, R <sub>L</sub> = 300 Ω I <sub>D</sub> ≈ 0.3 A, V <sub>GS</sub> = 10 V, R <sub>G</sub> = 25 Ω	7		20	ns
Rise Time <sup>2</sup>	t <sub>r</sub>		18		30	
Turn-Off Delay Time <sup>2</sup>	t <sub>d(off)</sub>		35		45	
Fall Time <sup>2</sup>	t <sub>f</sub>		20		30	
<b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T<sub>A</sub> = 25°C)</b>						
Continuous Current	I <sub>S</sub>				0.60	A
Pulsed Current <sup>3</sup>	I <sub>SM</sub>				2.5	
Forward Voltage <sup>1</sup>	V <sub>SD</sub>	I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0 V			2.0	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = I <sub>S</sub> , dI <sub>F</sub> /dt = 100 A/μs	65			ns
Reverse Recovery Charge	Q <sub>rr</sub>		0.12			μC

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



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TYPICAL CHARACTERISTICS (25°C Unless Otherwise Specified)

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Figure 1. Output Characteristics

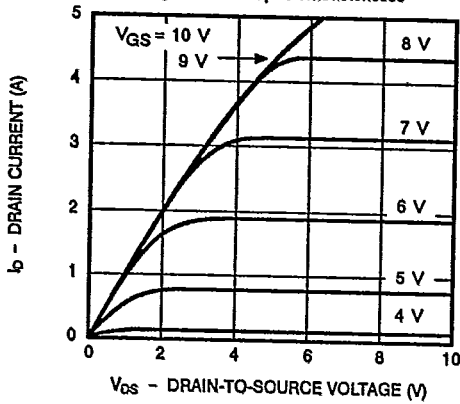


Figure 2. Transfer Characteristics

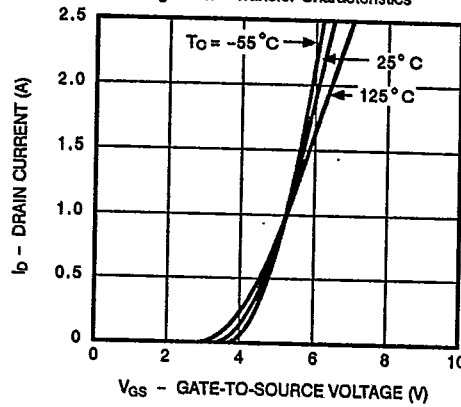


Figure 3. Transconductance

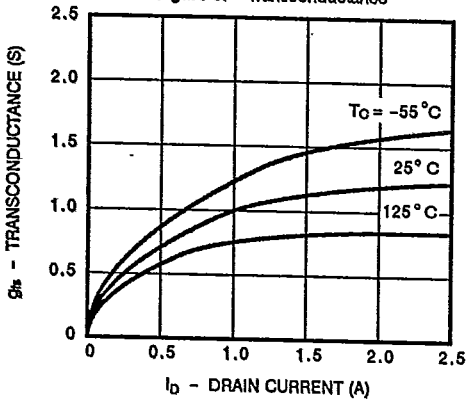
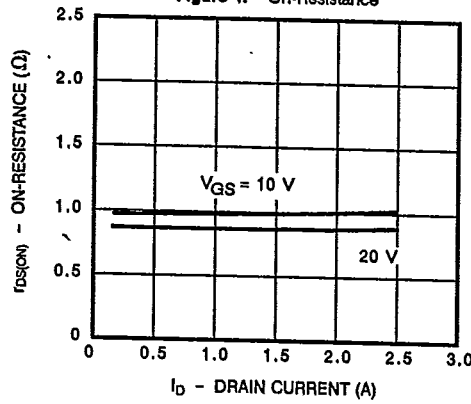


Figure 4. On-Resistance



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Figure 5. Capacitance

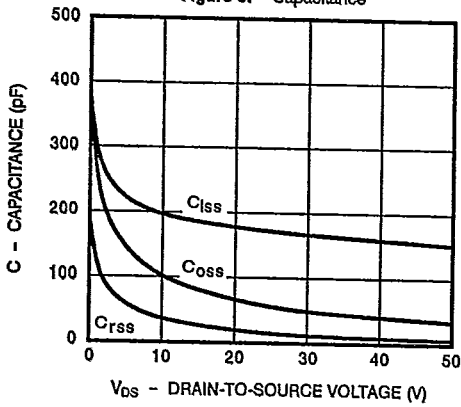
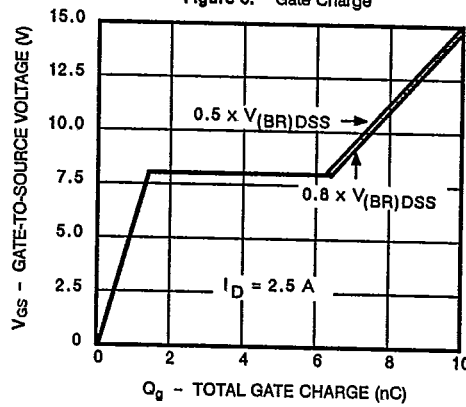


Figure 6. Gate Charge



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TYPICAL CHARACTERISTICS (Cont'd)

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Figure 7. On-Resistance vs. Junction Temperature

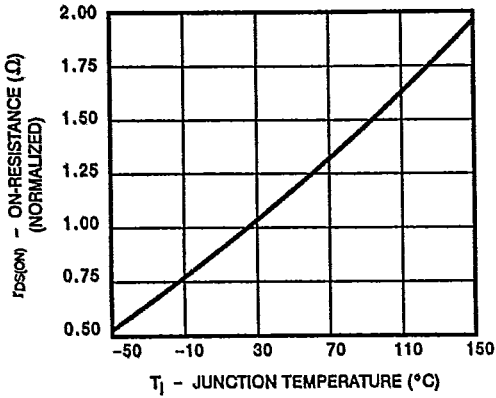
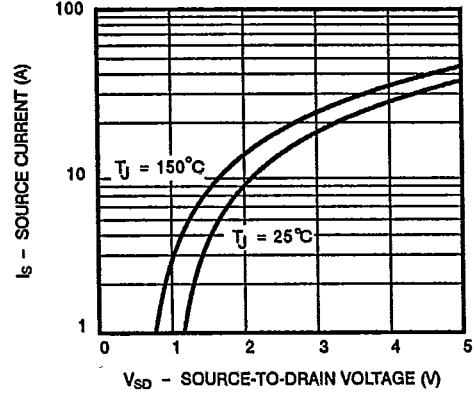


Figure 8. Source-Drain Diode Forward Voltage



THERMAL RATINGS

Figure 9. Maximum Drain Current vs. Case Temperature

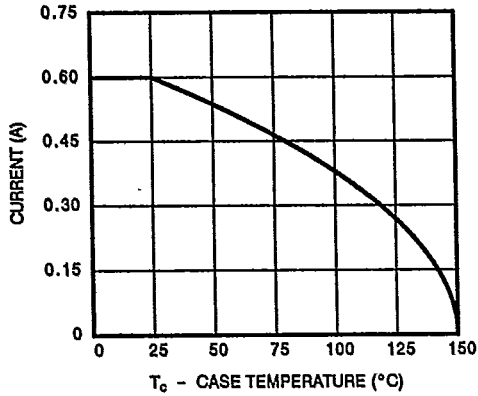


Figure 10. Safe Operating Area

