

### N-Channel Enhancement-Mode MOS Transistors

#### Product Summary

Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max ( $\Omega$ )	$V_{GS(th)}$ (V)	$I_D$ (A)
TN0201L	20	1.2 @ $V_{GS} = 10$ V	0.5 to 2	0.64
TN0401L	40	1.2 @ $V_{GS} = 10$ V	0.5 to 2	0.64
VN0300L	30	1.2 @ $V_{GS} = 10$ V	0.8 to 2.5	0.64
VN0300M	30	1.2 @ $V_{GS} = 10$ V	0.8 to 2.5	0.67

#### Features

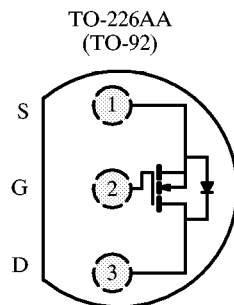
- Low On-Resistance: 0.85  $\Omega$
- Low Threshold: 1.4 V
- Low Input Capacitance: 38 pF
- Fast Switching Speed: 9 ns
- Low Input and Output Leakage

#### Benefits

- Low Offset Voltage
- Low-Voltage Operation
- Easily Driven Without Buffer
- High-Speed Circuits
- Low Error Voltage

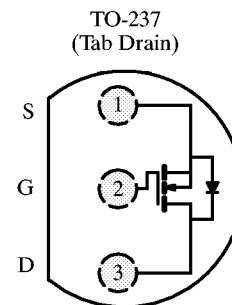
#### Applications

- Direct Logic-Level Interface: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays



Top View

TN0201L  
TN0401L  
VN0300L



Top View

VN0300M

#### Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Parameter	Symbol	TN0201L	TN0401L	VN0300L	VN0300M	Unit
Drain-Source Voltage	$V_{DS}$	20	40	30	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	$\pm 30$	$\pm 30$	
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ )	$T_A = 25^\circ\text{C}$	$I_D$	0.64	0.64	0.64	A
	$T_A = 100^\circ\text{C}$		0.38	0.38	0.38	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	1.5	1.5	3	3	
Power Dissipation	$T_A = 25^\circ\text{C}$	$P_D$	0.8	0.8	0.8	W
	$T_A = 100^\circ\text{C}$		0.32	0.32	0.32	
Maximum Junction-to-Ambient	$R_{thJA}$	156	156	156	125	$^\circ\text{C/W}$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150				$^\circ\text{C}$

Notes

a. Pulse width limited by maximum junction temperature.

## TN0201L/0401L, VN0300L/M

### Specifications<sup>a</sup>

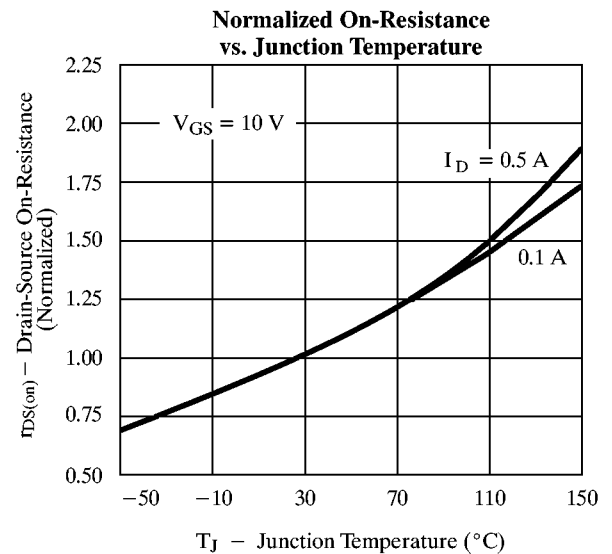
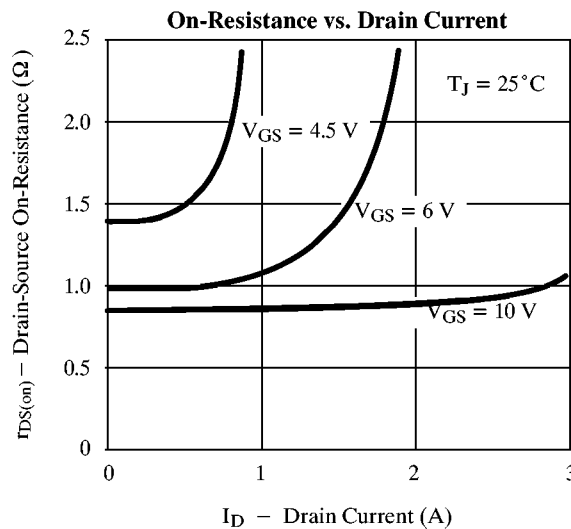
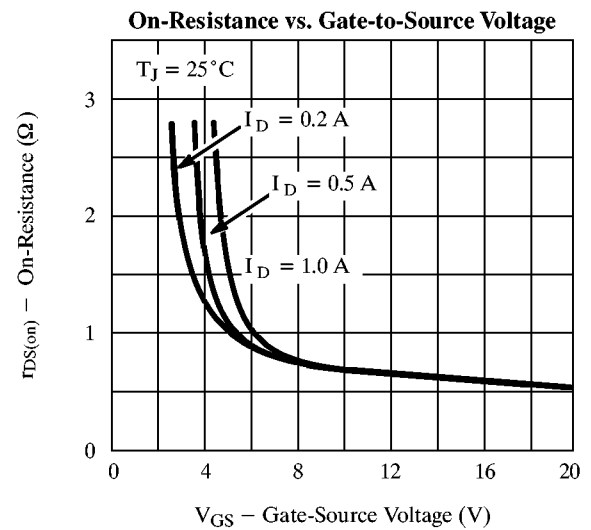
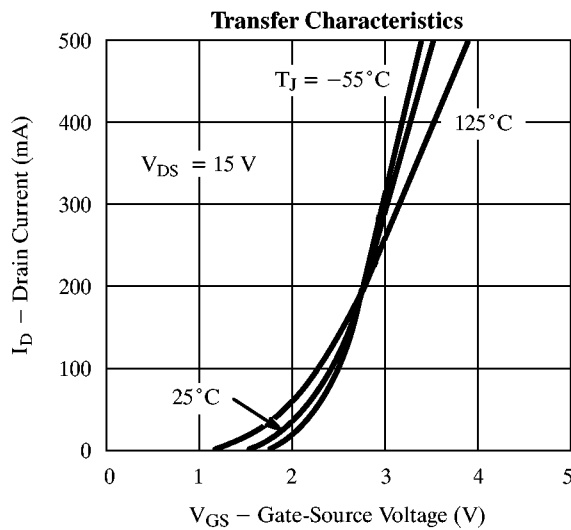
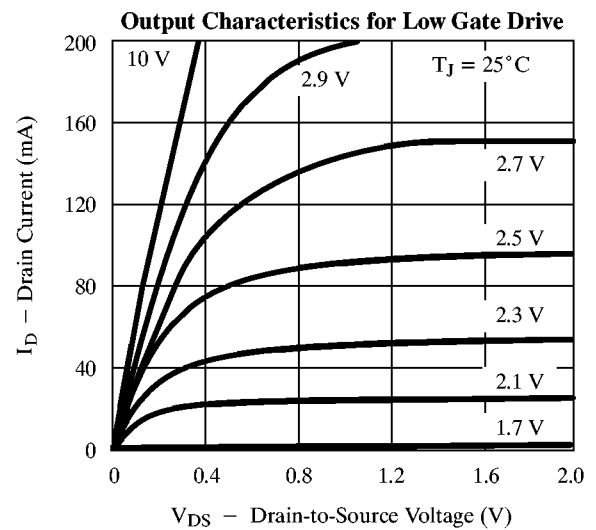
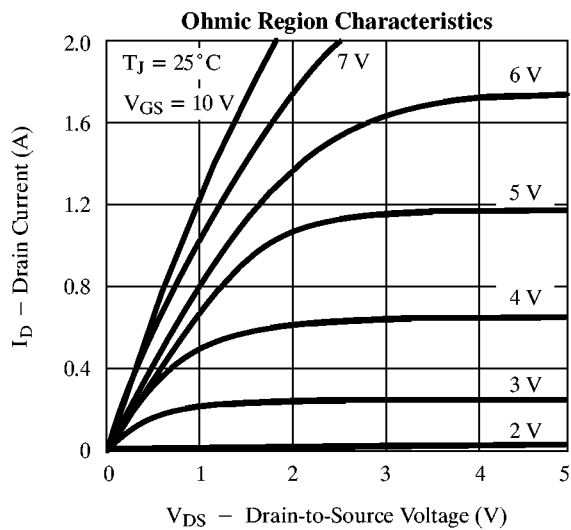
Parameter	Symbol	Test Conditions	Typ <sup>b</sup>	Limits				Unit
				TN0201L TN0401L		VN0300L VN0300M		
				Min	Max	Min	Max	
<b>Static</b>								
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$ $I_D = 10\text{ }\mu\text{A}$	TN0201L	55	20			V
			TN0401L	55	40			
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 0.25\text{ mA}$		0.5	2			V
		$V_{DS} = V_{GS}, I_D = 1\text{ mA}$				0.8	2.5	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 10$			nA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 30\text{ V}$					$\pm 100$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	$T_J = 125^\circ\text{C}$				10	$\mu\text{A}$
			$V_{DS} = 0.8 \times V_{(BR)DSS}, V_{GS} = 0\text{ V}$			1		
			$T_J = 125^\circ\text{C}$			100		
On-State Drain Current <sup>c</sup>	$I_{D(on)}$	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}$	0.9	0.25			A	
		$V_{DS} = 10\text{ V}, V_{GS} = 10\text{ V}$	3.5	1		1		
Drain-Source On-Resistance <sup>c</sup>	$r_{DS(on)}$	$V_{GS} = 3.5\text{ V}, I_D = 0.05\text{ A}$	1.8		4		$\Omega$	
		$V_{GS} = 5\text{ V}, I_D = 0.3\text{ A}$	1.2			3.3		
		$V_{GS} = 4.5\text{ V}, I_D = 0.25\text{ A}$	1.4		2			
		$T_J = 125^\circ\text{C}$	2.6		4			
		$V_{GS} = 10\text{ V}, I_D = 1\text{ A}$	0.85		1.2	1.2		
		$T_J = 125^\circ\text{C}$	1.6			2.4		
Forward Transconductance <sup>c</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}, I_D = 0.5\text{ A}$	500	200		200	mS	
<b>Dynamic</b>								
Input Capacitance	$C_{iss}$	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	38		60		100	pF
Output Capacitance	$C_{oss}$		33		50		95	
Reverse Transfer Capacitance	$C_{rss}$		8		15		25	
<b>Switching<sup>d</sup></b>								
Turn-On Time	$t_{ON}$	$V_{DD} = 15\text{ V}, R_L = 14\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}$ $R_G = 25\text{ }\Omega$	10		30		30	ns
Turn-Off Time	$t_{OFF}$		13		30		30	

Notes

- $T_A = 25^\circ\text{C}$  unless otherwise noted.
- For DESIGN AID ONLY, not subject to production testing.
- Pulse test:  $PW \leq 300\text{ }\mu\text{s}$  duty cycle  $\leq 2\%$ .
- Switching time is essentially independent of operating temperature.

VNDQ03

## Typical Characteristics (25°C Unless Otherwise Noted)



## TN0201L/0401L, VN0300L/M

### Typical Characteristics (25°C Unless Otherwise Noted) (Cont'd)

