

N-Channel Enhancement-Mode MOS Transistors

Product Summary

Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max (Ω)	$V_{GS(th)}$ (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

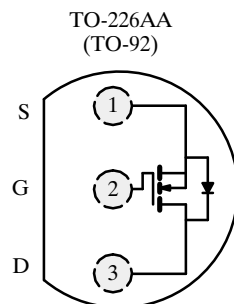
- Low On-Resistance: 0.85 Ω
- Low Threshold: 1.4 V
- Low Input Capacitance: 38 pF
- Fast Switching Speed: 9 ns
- Low Input and Output Leakage

Benefits

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

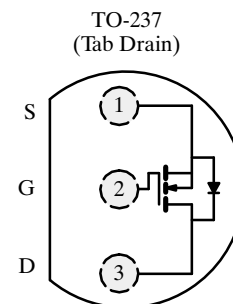
Applications

- 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}	± 20	± 20	± 30	± 30	V
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_A = 25^\circ\text{C}$	0.64	0.64	0.64	A
		$T_A = 100^\circ\text{C}$	0.38	0.38	0.38	
Pulsed Drain Current ^a	I_{DM}	1.5	1.5	3	3	A
Power Dissipation	P_D	$T_A = 25^\circ\text{C}$	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	$^\circ\text{C}/\text{W}$
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.

Specifications^a

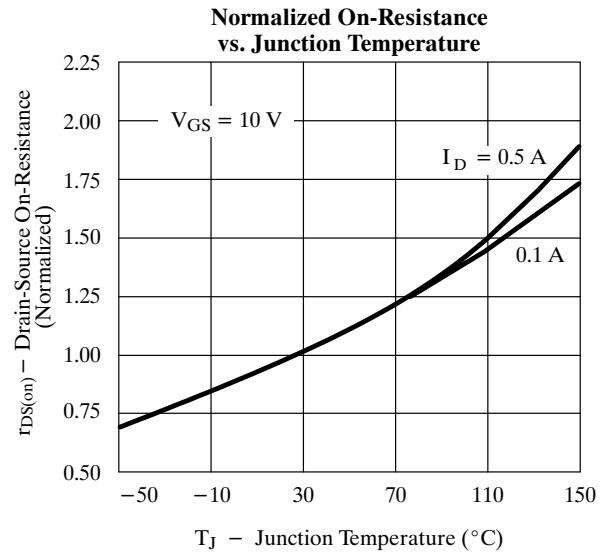
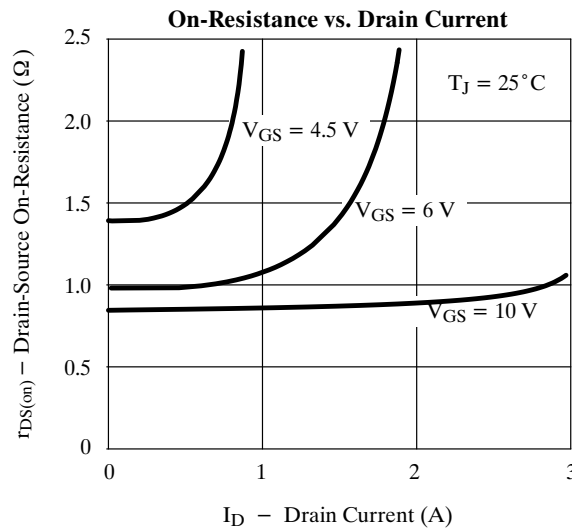
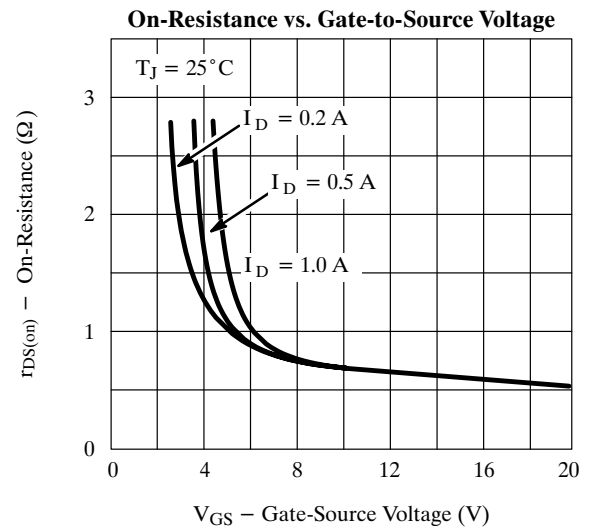
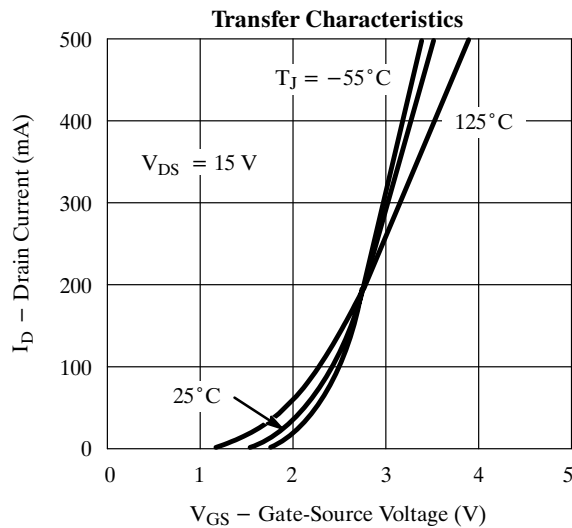
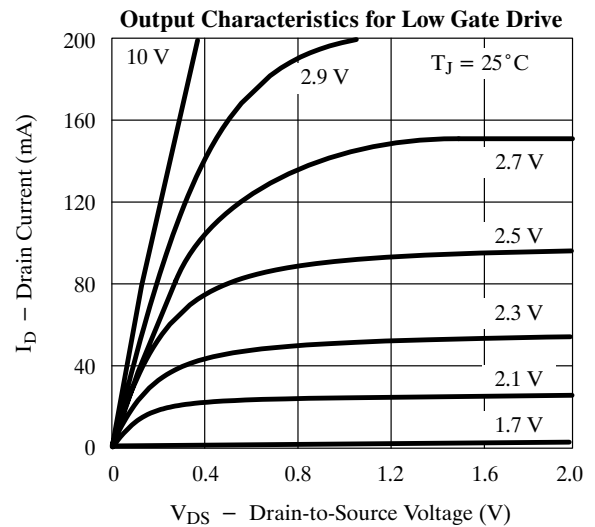
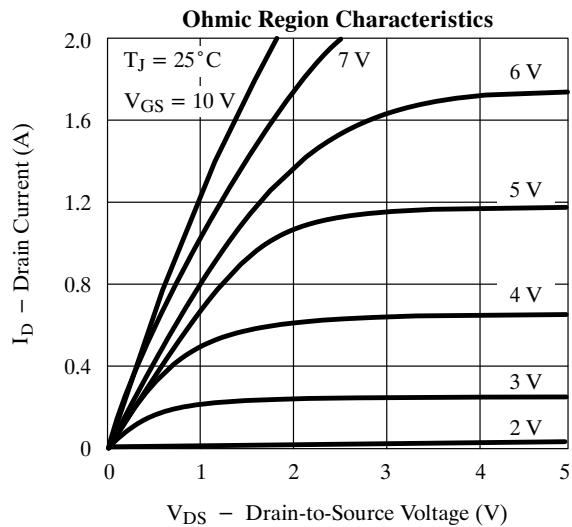
Parameter	Symbol	Test Conditions	Typ ^b	Limits				Unit
				TN0201L TN0401L		VN0300L VN0300M		
				Min	Max	Min	Max	
Static								
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$ $I_D = 10\text{ }\mu\text{A}$	TN0201L	55	20			V
			TN0401L	55	40			
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 0.25\text{ mA}$		0.5	2			V
		$V_{DS} = V_{GS}, I_D = 1\text{ mA}$				0.8	2.5	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 10			nA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 30\text{ V}$					± 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	μA
			$V_{DS} = 0.8 \times V_{(BR)DSS}, V_{GS} = 0\text{ V}$			1		
			$T_J = 125^\circ\text{C}$			100		
On-State Drain Current ^c	$I_{D(on)}$	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}$	0.9	0.25			A	
		$V_{DS} = 10\text{ V}, V_{GS} = 10\text{ V}$	3.5	1		1		
Drain-Source On-Resistance ^c	$r_{DS(on)}$	$V_{GS} = 3.5\text{ V}, I_D = 0.05\text{ A}$	1.8		4		Ω	
		$V_{GS} = 5\text{ V}, I_D = 0.3\text{ A}$	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 ^c	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 0.5\text{ A}$	500	200		200	mS	
Dynamic								
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	
Switching^d								
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)

