

## N-Channel 20-, 30-, 40-V (D-S) MOSFETs

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
VN0300LS	30	1.2 @ $V_{GS} = 10$ V	0.8 to 2.5	0.67

### FEATURES

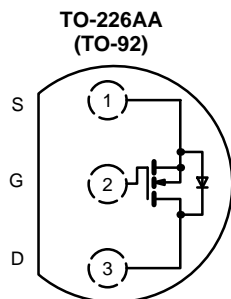
- Low On-Resistance: 0.85  $\Omega$
- Low Threshold: 1.4 V
- Low Input Capacitance: 38 pF
- Fast Switching Speed: 9 ns
- Low Input and Output Leakage

### 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

Device Marking  
Front View

**TN0201L**

"S" TN  
0201L  
xxyy

**TN0401L**

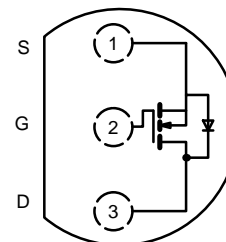
"S" TN  
0401L  
xxyy

**VN0300L**

"S" VN  
0300L  
xxyy

"S" = Siliconix Logo  
xxyy = Date Code

**TO-92S  
(Copper Lead Frame)**



Top View

VN0300LS

Device Marking  
Front View

**VN0300LS**

"S" VN  
0300LS  
xxyy

"S" = Siliconix Logo  
xxyy = Date Code

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	TN0201L	TN0401L	VN0300L	VN0300LS	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	0.43	
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	0.4	
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	156	156	156	156	$^\circ\text{C/W}$
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.

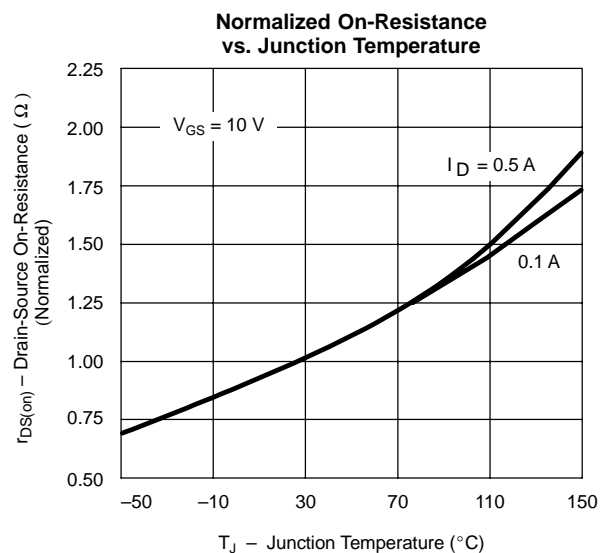
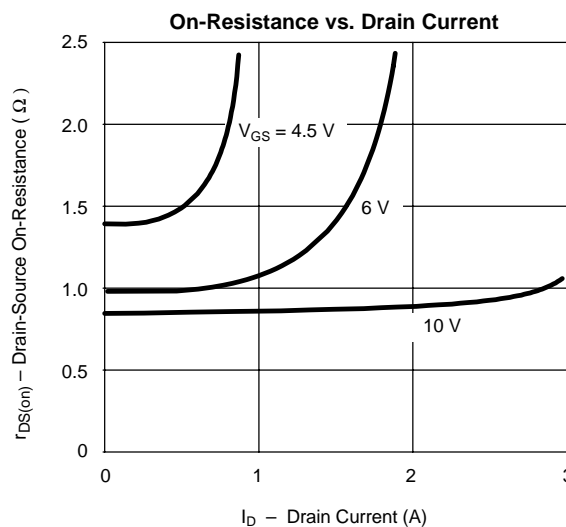
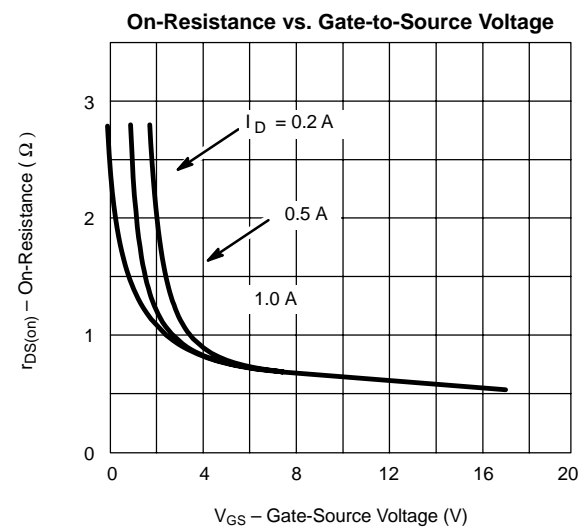
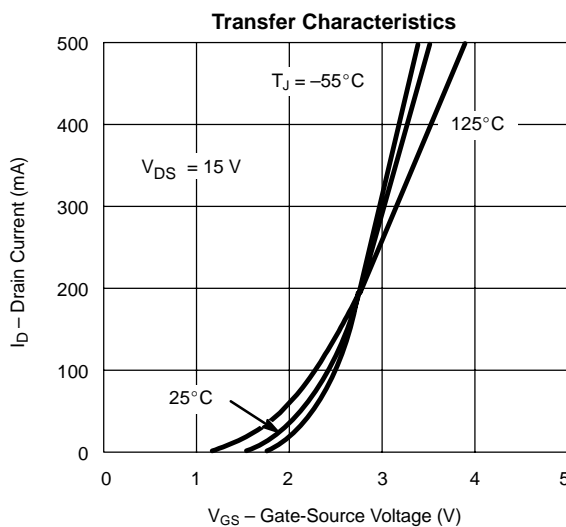
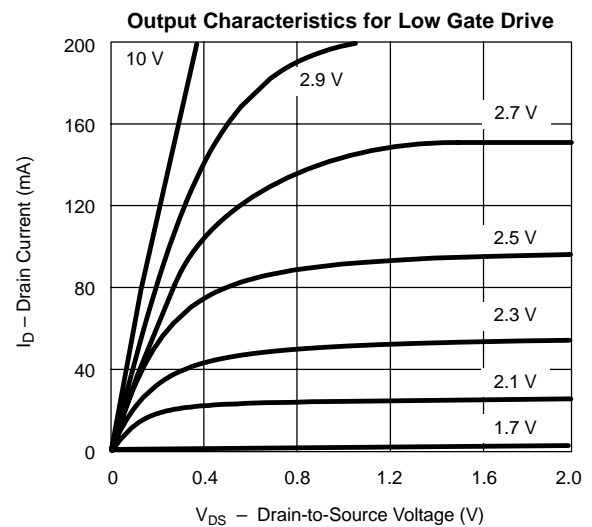
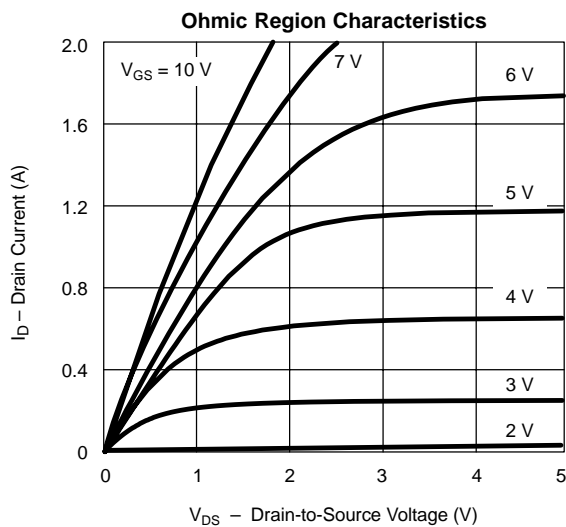


SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)									
Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits				Unit	
				TN0201L TN0401L		VN0300L VN0300LS			
				Min	Max	Min	Max		
<b>Static</b>									
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V I <sub>D</sub> = 10 μA	TN0201L	55	20				V
			TN0401L	55	40			30	
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 0.25 mA	1.4	0.5	2				
		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1 mA	1.5			0.8	2.5		
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±10				
		V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±30 V					±100	nA	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V	T <sub>J</sub> = 125°C					10	μA
							500		
		V <sub>DS</sub> = 0.8 x V <sub>(BR)DSS</sub> , V <sub>GS</sub> = 0 V			1				
			T <sub>J</sub> = 125°C			100			
On-State Drain Current <sup>b</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V	0.9	0.25				A	
		V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 10 V	3.5	1		1			
Drain-Source On-Resistance <sup>b</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 3.5 V, I <sub>D</sub> = 0.05 A	1.8		4			Ω	
		V <sub>GS</sub> = 5 V, I <sub>D</sub> = 0.3 A	1.2				3.3		
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.25 A	1.4		2				
		T <sub>J</sub> = 125°C	2.6		4				
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 1 A	0.85		1.2		1.2		
		T <sub>J</sub> = 125°C	1.6				2.4		
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.5 A	500	200		200		mS	
<b>Dynamic</b>									
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz	38		60		100	pF	
Output Capacitance	C <sub>oss</sub>		33		50		95		
Reverse Transfer Capacitance	C <sub>rss</sub>		8		15		25		
<b>Switching<sup>c</sup></b>									
Turn-On Time	t <sub>ON</sub>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 14 Ω I <sub>D</sub> ≅ 1 A, V <sub>GEN</sub> = 10 V R <sub>G</sub> = 25 Ω	10		30		30	ns	
Turn-Off Time	t <sub>OFF</sub>		13		30		30		

Notes

- a. For DESIGN AID ONLY, not subject to production testing..
- b. Pulse test: PW ≤ 300 μs duty cycle ≤ 2%.
- c. Switching time is essentially independent of operating temperature.

VNDQ03

**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**


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