



## N-Channel 350- and 400-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)
VN3515L	350	15 @ $V_{GS} = 4.5$ V	0.6 to 1.8	0.15
VN4012L	400	12 @ $V_{GS} = 4.5$ V	0.6 to 1.8	0.16

### FEATURES

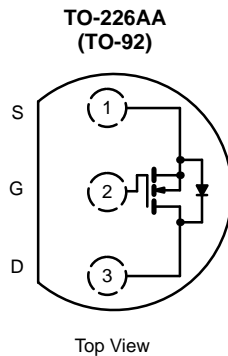
- Low On-Resistance: 8.7  $\Omega$
- Secondary Breakdown Free: 420 V
- Low Power/Voltage Driven
- Low Input and Output Leakage
- Excellent Thermal Stability

### BENEFITS

- Low Offset Voltage
- Full-Voltage Operation
- Easily Driven Without Buffer
- Low Error Voltage
- No High-Temperature "Run-Away"

### APPLICATIONS

- High-Voltage Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Transistors, etc.
- Telephone Mute Switches, Ringer Circuits
- Power Supply, Converters
- Motor Control



Device Marking  
Front View

VN3515L

"S" VN  
3515L  
xxyy

VN3515L

"S" VN  
4012L  
xxyy

"S" = Siliconix Logo  
xxyy = Date Code

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter	Symbol	VN3515L	VN4012L	Unit
Drain-Source Voltage	$V_{DS}$	350	400	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ )	$T_A = 25^\circ\text{C}$	0.15	0.16	A
	$T_A = 100^\circ\text{C}$	0.09	0.1	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	0.6	0.65	
Power Dissipation	$T_A = 25^\circ\text{C}$	0.8	0.8	W
	$T_A = 100^\circ\text{C}$	0.32	0.32	
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	156		$^\circ\text{C}/\text{W}$
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.

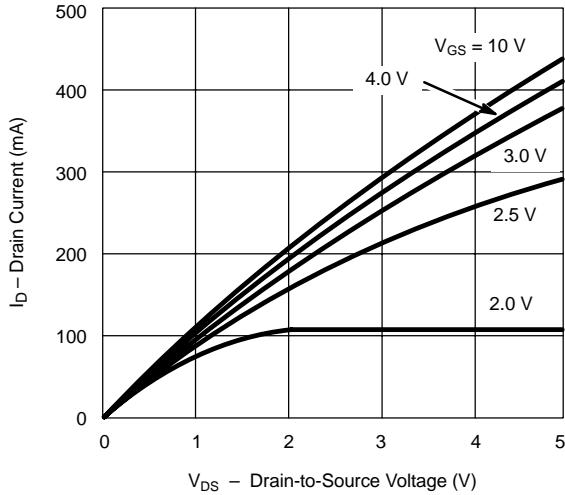
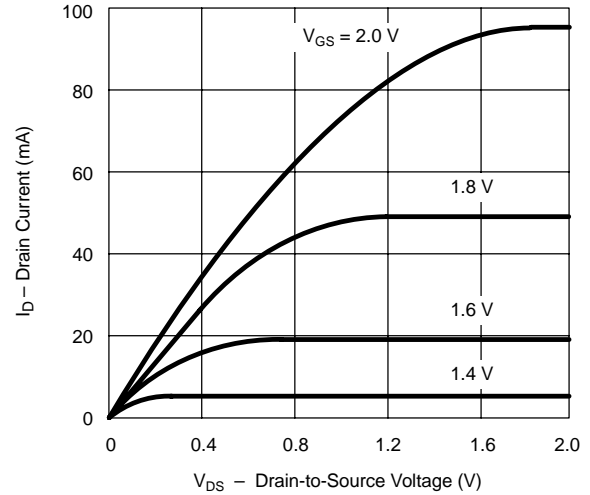
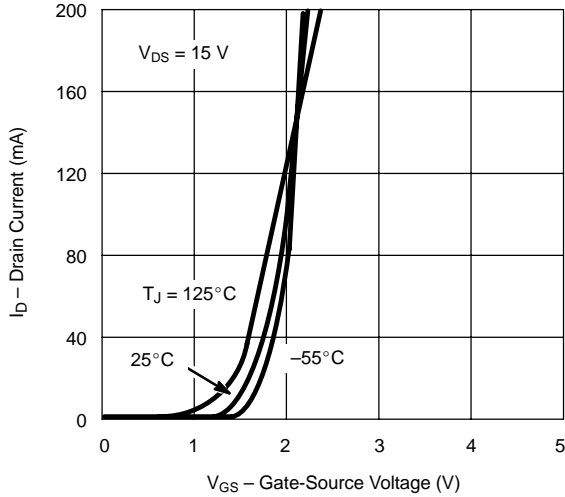
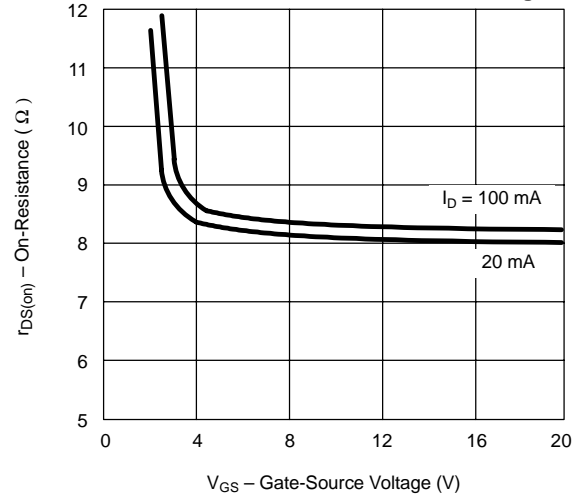
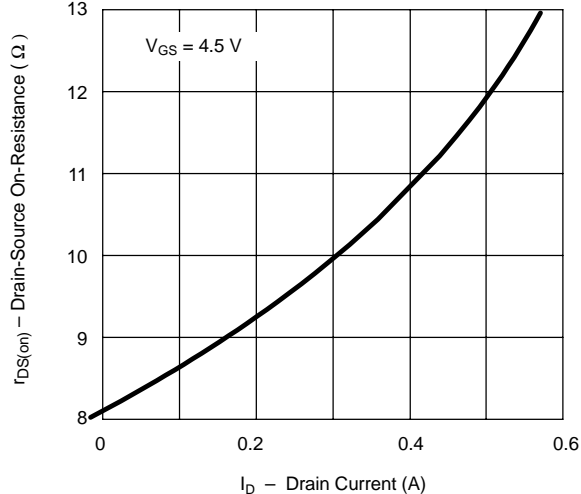
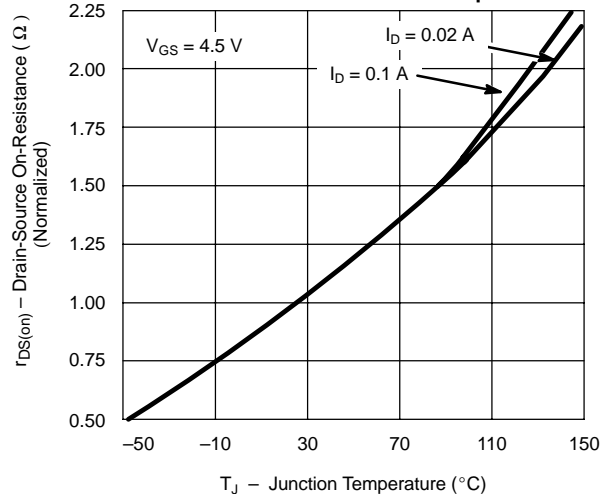
**SPECIFICATIONS (T<sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)**

Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits				Unit
				VN3515L		VN4012L		
				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> = 100 μA	420	350		400		V
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1 mA	1.3	0.6	1.8	0.6	1.8	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V	±1		±10		±10	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 0.8 × V <sub>(BR)DSS</sub> , V <sub>GS</sub> = 0 V			1		1	μA
			T <sub>J</sub> = 125 °C		100		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	800	150		150		mA
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	8.7					Ω
			V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.1 A	8.7		15	12	
			T <sub>J</sub> = 125 °C	15.5		35	30	
			V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.15 A	8.7				
		T <sub>J</sub> = 125 °C	15.5					
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 0.1 A	350	125		125		mS
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 0.1 A, V <sub>GS</sub> = 0 V	0.8					V
<b>Dynamic</b>								
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1 MHz	85		110		110	pF
Output Capacitance	C <sub>oss</sub>		20		30		30	
Reverse Transfer Capacitance	C <sub>rss</sub>		5		10		10	
<b>Switching<sup>c</sup></b>								
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 25 V, R <sub>L</sub> = 250 Ω I <sub>D</sub> ≅ 0.1 A, V <sub>GEN</sub> = 10 V R <sub>G</sub> = 25 Ω	2.5		20		20	ns
	t <sub>r</sub>		2		20		20	
Turn-Off Time	t <sub>d(off)</sub>		27		65		65	
	t <sub>f</sub>		9		65		65	

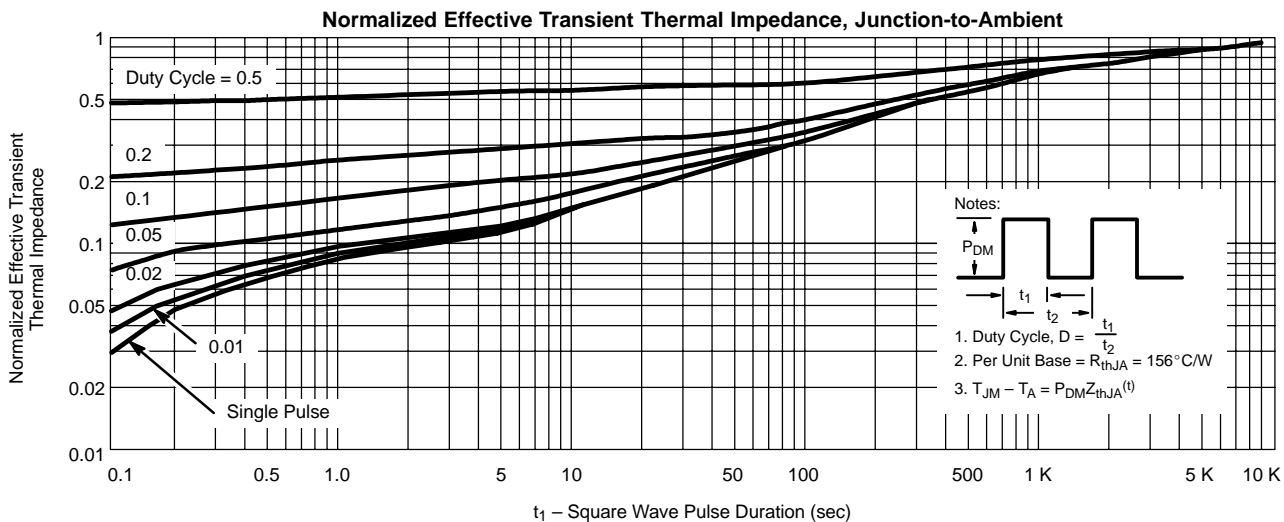
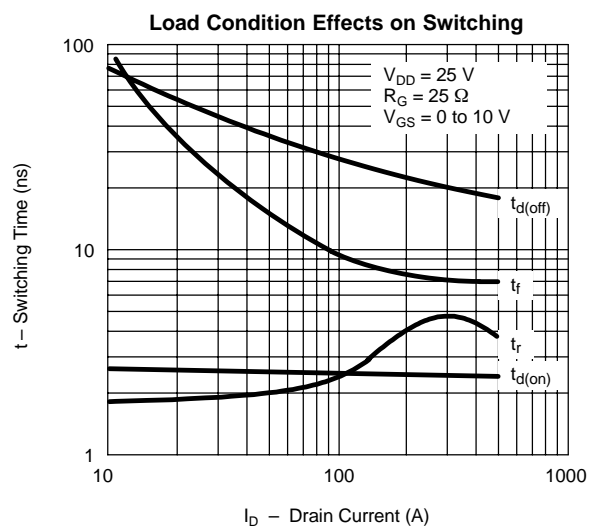
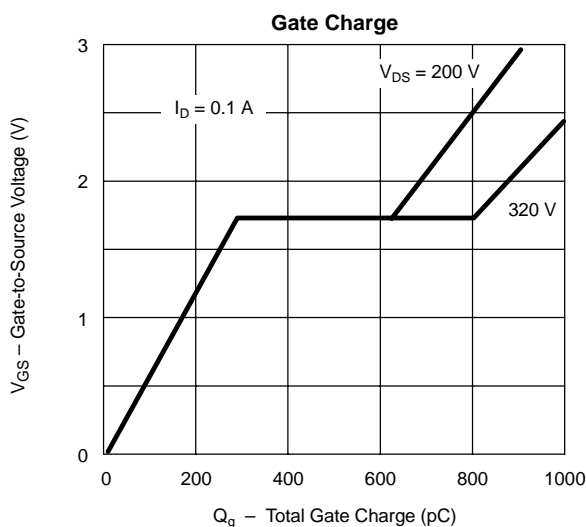
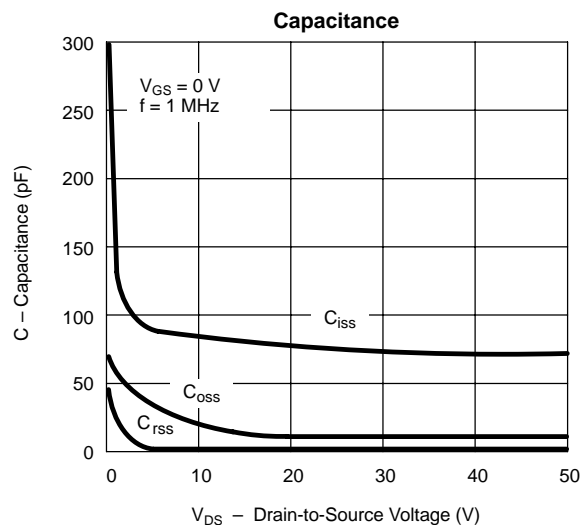
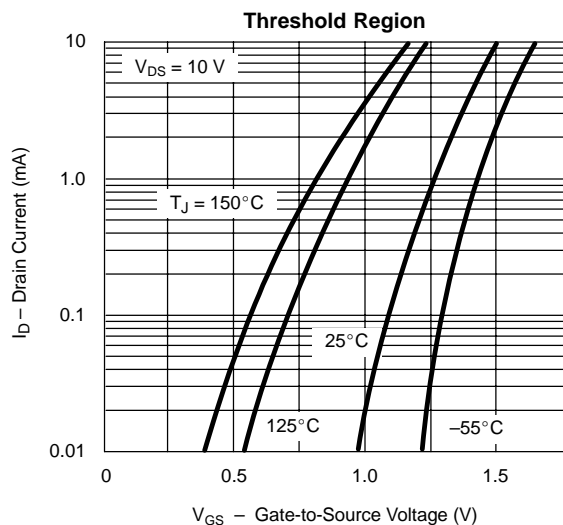
## Notes

- 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.

VNDV40

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

**Output Characteristics for Low Gate Drive**

**Transfer Characteristics**

**On-Resistance vs. Gate-to-Source Voltage**

**On-Resistance vs. Drain Current**

**On-Resistance vs. Junction Temperature**


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





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