

# VN0610LL

## FET Transistor N-Channel — Enhancement



ON Semiconductor®

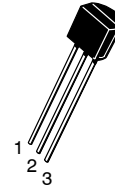
<http://onsemi.com>

### MAXIMUM RATINGS

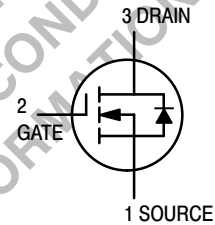
Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	60	Vdc
Drain-Gate Voltage ( $R_{GS} = 1\text{ M}\Omega$ )	$V_{DGR}$	60	Vdc
Gate-Source Voltage - Continuous - Non-repetitive ( $t_p \leq 50\ \mu\text{s}$ )	$V_{GS}$ $V_{GSM}$	$\pm 20$ $\pm 40$	Vdc Vpk
Drain Current Continuous Pulsed	$I_D$ $I_{DM}$	190 1000	mAdc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	400 3.2	mW mW/ $^\circ\text{C}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	312.5	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes, 1/16" from case for 10 seconds	$T_L$	300	$^\circ\text{C}$



CASE 29-11, STYLE 22  
TO-92 (TO-226AA)



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## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 100 μA)	V <sub>(BR)DSS</sub>	60	—	Vdc
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 48 Vdc, V <sub>GS</sub> = 0) (V <sub>DS</sub> = 48 Vdc, V <sub>GS</sub> = 0, T <sub>J</sub> = 125°C)	I <sub>DSS</sub>	—	10 500	μAdc
Gate-Body Leakage Current, Forward (V <sub>GSF</sub> = 30 V, V <sub>DS</sub> = 0)	I <sub>GSSF</sub>	—	-100	nAdc

## ON CHARACTERISTICS<sup>(1)</sup>

Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1.0 mA)	V <sub>GS(th)</sub>	0.8	2.5	Vdc
Static Drain-Source On-Resistance (V <sub>GS</sub> = 10 V, I <sub>D</sub> = 500 mA) (V <sub>GS</sub> = 10 V, I <sub>D</sub> = 500 mA, T <sub>C</sub> = 125°C)	r <sub>DS(on)</sub>	—	5.0 9.0	Ω
Drain-Source On-Voltage (V <sub>GS</sub> = 5.0 V, I <sub>D</sub> = 200 mA) (V <sub>GS</sub> = 10 V, I <sub>D</sub> = 500 mA)	V <sub>DS(on)</sub>	—	1.5 2.5	Vdc
On-State Drain Current (V <sub>GS</sub> = 10 V, V <sub>DS</sub> ≥ 2.0 V <sub>DS(on)</sub> )	I <sub>D(on)</sub>	750	—	mAdc
Forward Transconductance (V <sub>DS</sub> ≥ 2.0 V <sub>DS(on)</sub> , I <sub>D</sub> = 500 mA)	g <sub>fs</sub>	100	—	μmhos

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

## DYNAMIC CHARACTERISTICS

Input Capacitance	(V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0, f = 1.0 MHz)	C <sub>iss</sub>	—	60	pF
Output Capacitance		C <sub>oss</sub>	—	25	
Reverse Transfer Capacitance		C <sub>rss</sub>	—	5.0	

## SWITCHING CHARACTERISTICS<sup>(1)</sup>

Turn-On Delay Time	(V <sub>DD</sub> = 15 Vdc, I <sub>D</sub> = 600 mA, R <sub>gen</sub> = 25 Ω, R <sub>L</sub> = 23 Ω)	t <sub>on</sub>	—	10	ns
Turn-Off Delay Time		t <sub>off</sub>	—	10	

1. Pulse Test: Pulse Width ≤ 300 ms, Duty Cycle ≤ 10%.

RESISTIVE SWITCHING

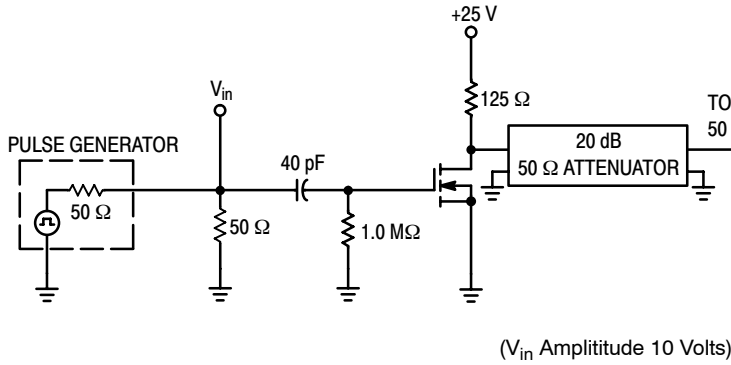


Figure 1. Switching Test Circuit

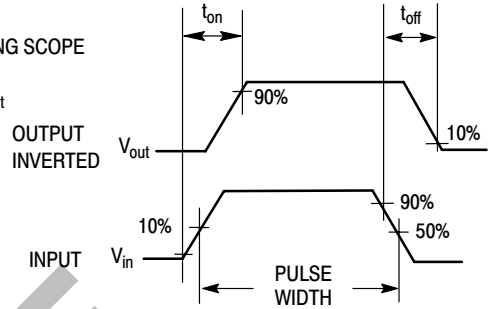


Figure 2. Switching Waveforms

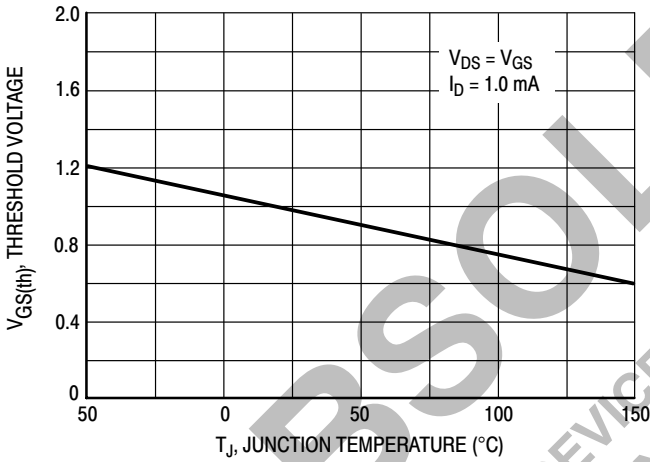


Figure 3.  $V_{GS(th)}$  Normalized versus Temperature

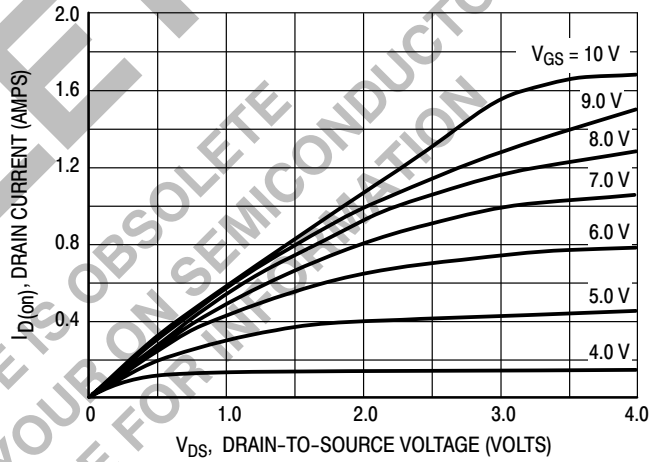


Figure 4. On-Region Characteristics

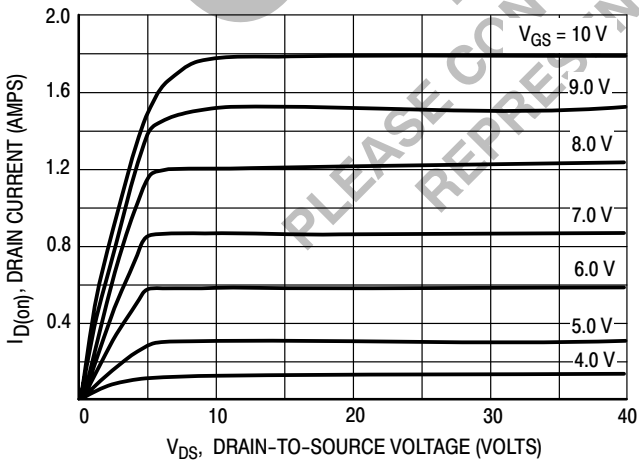


Figure 5. Output Characteristics

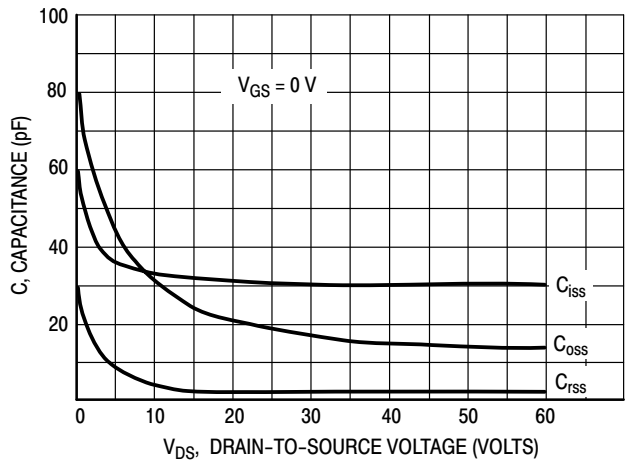
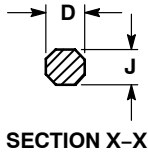
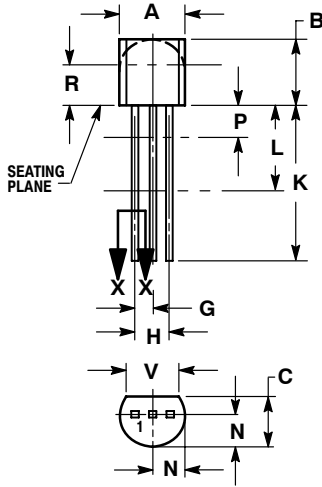


Figure 6. Capacitance versus Drain-To-Source Voltage

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## PACKAGE DIMENSIONS

### TO-92 (TO-226AA) CASE 29-11 ISSUE AL



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---

- STYLE 22:  
PIN 1: SOURCE  
2: GATE  
3: DRAIN

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