

# VN222LLG

## Small Signal MOSFET 150 mA, 60 Volts

N-Channel TO-92

### Features

- This is a Pb-Free Device\*

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	60	Vdc
Drain-Gate Voltage ( $R_{GS} = 1.0 \text{ M}\Omega$ )	$V_{DGR}$	60	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$	Vdc
- Continuous	$V_{GSM}$	$\pm 40$	Vpk
- Non-repetitive ( $t_p \leq 50 \mu\text{s}$ )			
Drain Current	$I_D$	150	mAdc
- Continuous	$I_{DM}$	1000	
- Pulsed			
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	400	mW
Derate above $25^\circ\text{C}$		3.2	mW/ $^\circ\text{C}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### THERMAL CHARACTERISTICS

Characteristic	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	$^\circ\text{C}$

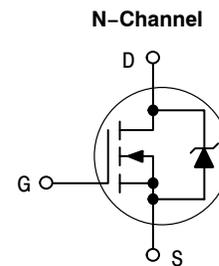
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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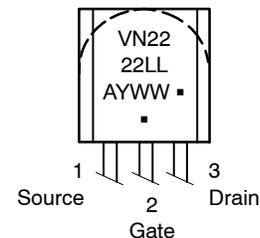
<http://onsemi.com>

150 mA, 60 V  
 $R_{DS(on)} = 7.5 \Omega$



TO-92  
CASE 29  
STYLE 22

### MARKING DIAGRAM & PIN ASSIGNMENT



A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

# VN2222LLG

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

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 100 μA <sub>dc</sub> )	V <sub>(BR)DSS</sub>	60	-	V <sub>dc</sub>
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 48 V <sub>dc</sub> , V <sub>GS</sub> = 0) (V <sub>DS</sub> = 48 V <sub>dc</sub> , V <sub>GS</sub> = 0, T <sub>J</sub> = 125°C)	I <sub>DSS</sub>	-	10 500	μA <sub>dc</sub>
Gate-Body Leakage Current, Forward (V <sub>GSF</sub> = 30 V <sub>dc</sub> , V <sub>DS</sub> = 0)	I <sub>GSSF</sub>	-	-100	nA <sub>dc</sub>

### ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1.0 mA <sub>dc</sub> )	V <sub>GS(th)</sub>	0.6	2.5	V <sub>dc</sub>
Static Drain-Source On-Resistance (V <sub>GS</sub> = 10 V <sub>dc</sub> , I <sub>D</sub> = 0.5 A <sub>dc</sub> ) (V <sub>GS</sub> = 10 V <sub>dc</sub> , I <sub>D</sub> = 0.5 V <sub>dc</sub> , T <sub>C</sub> = 125°C)	r <sub>DS(on)</sub>	-	7.5 13.5	Ω
Drain-Source On-Voltage (V <sub>GS</sub> = 5.0 V <sub>dc</sub> , I <sub>D</sub> = 200 mA <sub>dc</sub> ) (V <sub>GS</sub> = 10 V <sub>dc</sub> , I <sub>D</sub> = 500 mA <sub>dc</sub> )	V <sub>DS(on)</sub>	-	1.5 3.75	V <sub>dc</sub>
On-State Drain Current (V <sub>GS</sub> = 10 V <sub>dc</sub> , V <sub>DS</sub> ≥ 2.0 V <sub>DS(on)</sub> )	I <sub>D(on)</sub>	750	-	mA
Forward Transconductance (V <sub>DS</sub> = 10 V <sub>dc</sub> , I <sub>D</sub> = 500 mA <sub>dc</sub> )	g <sub>fs</sub>	100	-	μmhos

### DYNAMIC CHARACTERISTICS

Input Capacitance	(V <sub>DS</sub> = 25 V <sub>dc</sub> , 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 (Note 1)

Turn-On Delay Time	(V <sub>DD</sub> = 15 V <sub>dc</sub> , 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 μs, Duty Cycle ≤ 2.0%.

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
VN2222LLG	TO-92 (Pb-Free)	1000 Unit / Box

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# VN2222LLG

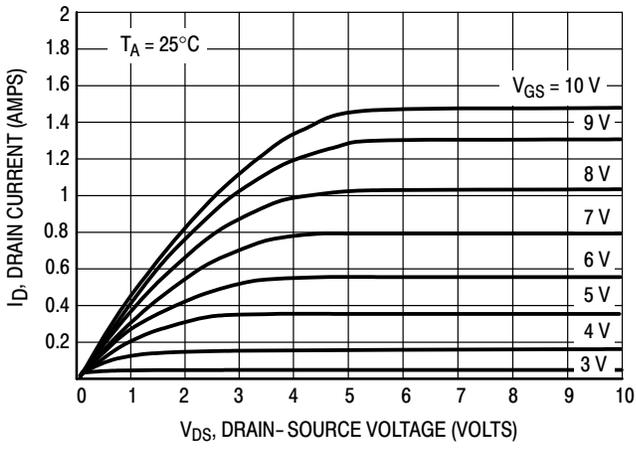


Figure 1. Ohmic Region

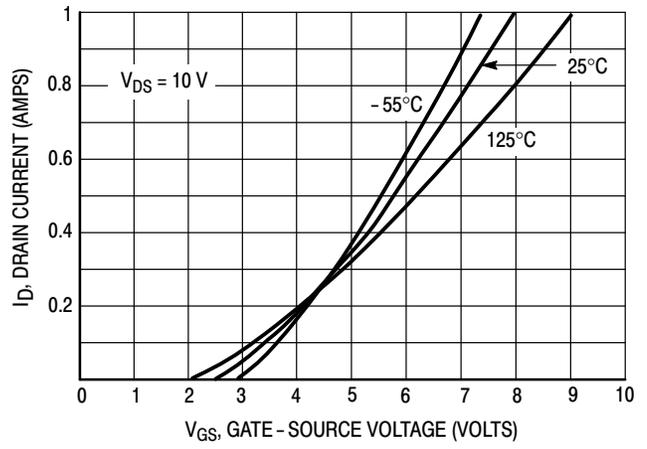


Figure 2. Transfer Characteristics

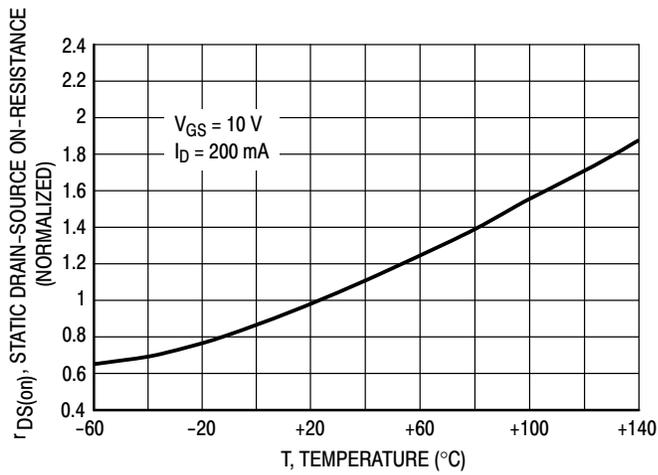


Figure 3. Temperature versus Static Drain-Source On-Resistance

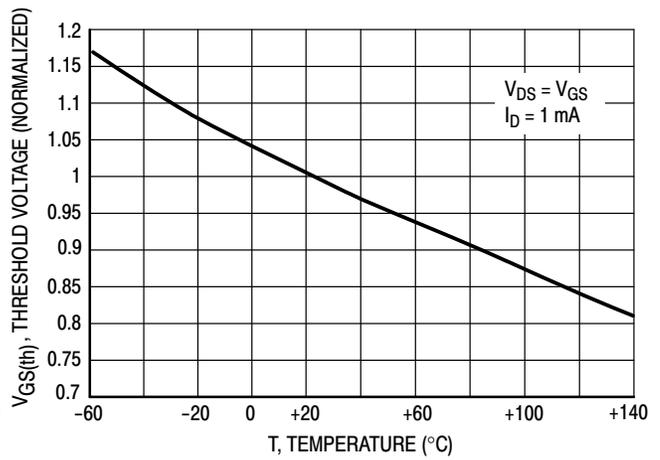
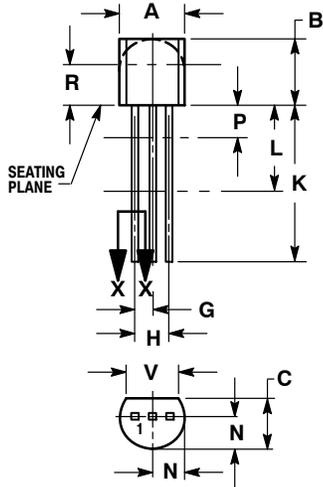


Figure 4. Temperature versus Gate Threshold Voltage

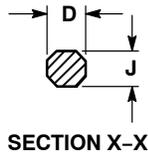
# VN2222LLG

## PACKAGE DIMENSIONS

TO-92  
CASE 29-11  
ISSUE AM



STRAIGHT LEAD  
BULK PACK

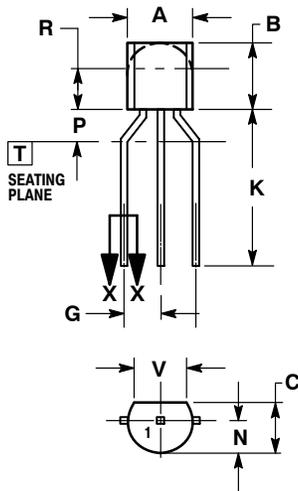


SECTION X-X

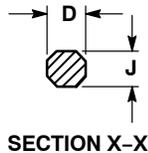
NOTES:

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	---



BENT LEAD  
TAPE & REEL  
AMMO PACK



SECTION X-X

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	MILLIMETERS	
	MIN	MAX
A	4.45	5.20
B	4.32	5.33
C	3.18	4.19
D	0.40	0.54
G	2.40	2.80
J	0.39	0.50
K	12.70	---
N	2.04	2.66
P	1.50	4.00
R	2.93	---
V	3.43	---

STYLE 22:

1. SOURCE
2. GATE
3. DRAIN

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