

## N-Channel Enhancement-Mode MOSFET Transistors

### Zener Gate Protected Product Summary

Part Number	V <sub>(BR)DSS</sub> Min (V)	r <sub>DS(on)</sub> Max (Ω)	V <sub>GS(th)</sub> (V)	I <sub>D</sub> (A)
VN0610L	60	5 @ V <sub>GS</sub> = 10 V	0.8 to 2.5	0.27
VN10KE		5 @ V <sub>GS</sub> = 10 V	0.8 to 2.5	0.17
VN10KM		5 @ V <sub>GS</sub> = 10 V	0.8 to 2.5	0.31
VN10KT		5 @ V <sub>GS</sub> = 10 V	0.8 to 2.5	0.31
VN2222L		7.5 @ V <sub>GS</sub> = 10 V	0.6 to 2.5	0.23

### Features

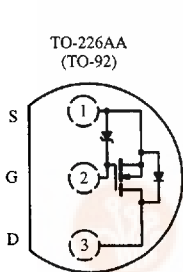
- Zener Diode Input Protected
- Low On-Resistance: 3 Ω
- Ultralow Threshold: 1.2 V
- Low Input Capacitance: 38 pF
- Low Input and Output Leakage

### Benefits

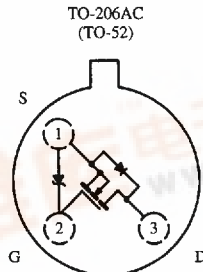
- Extra ESD Protection
- Low Offset Voltage
- Low-Voltage Operation
- High-Speed, Easily Driven
- Low Error Voltage

### Applications

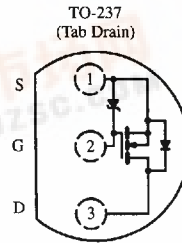
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays
- Inductive Load Drivers



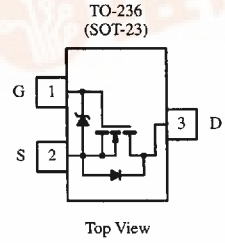
Top View  
VN0610L  
VN2222L



Top View  
VN10KE



Top View  
VN10KM



Top View  
VN10KT (K1)\*  
\*Marking Code for TO-236

### Absolute Maximum Ratings (T<sub>A</sub> = 25°C Unless Otherwise Noted)

Parameter	Symbol	VN2222L VN0610L	VN10KE	VN10KM VN10KT	Unit
Drain-Source Voltage	V <sub>DS</sub>	60	60	60	V
Gate-Source Voltage	V <sub>GS</sub>	15/-0.3	15/-0.3	15/-0.3	V
Continuous Drain Current (T <sub>J</sub> = 150°C)	I <sub>D</sub>	T <sub>A</sub> = 25°C	0.27	0.31	A
		T <sub>A</sub> = 100°C	0.17	0.20	
Pulsed Drain Current <sup>a</sup>	I <sub>DM</sub>	1	1	1	A
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> = 25°C	0.8	1	W
		T <sub>A</sub> = 100°C	0.32	0.4	
Maximum Junction-to-Ambient	R <sub>thJA</sub>	156	400	125	°C/W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150			°C

<sup>a</sup> Pulse width limited by maximum junction temperature.

Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70213.

# VN0610L, VN10KE/M/T, VN2222L



## Specifications<sup>a</sup>

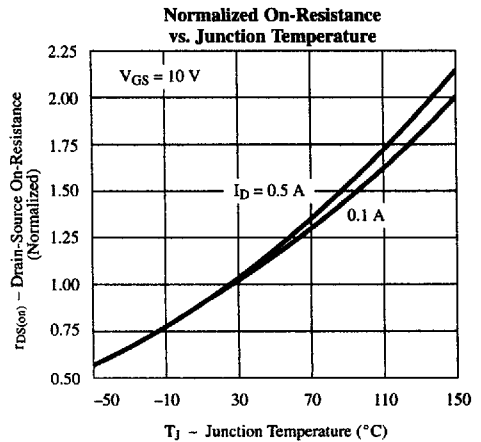
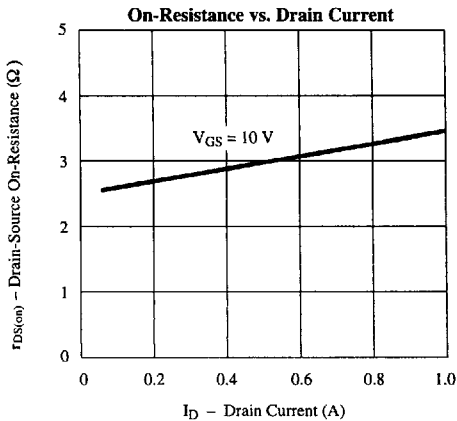
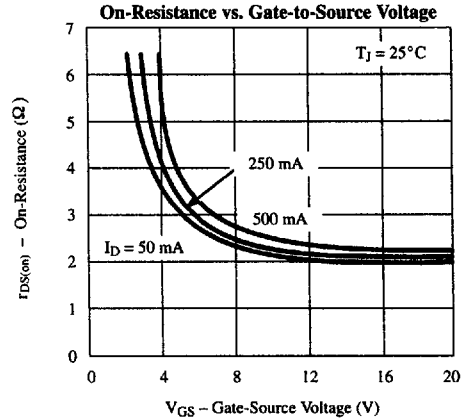
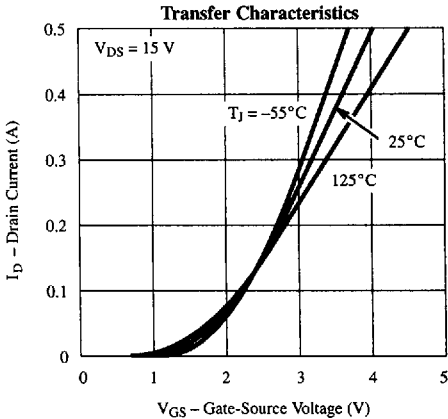
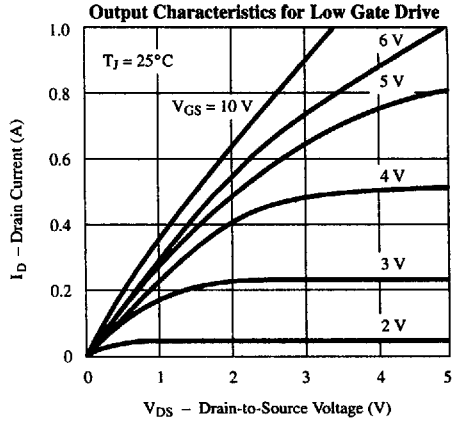
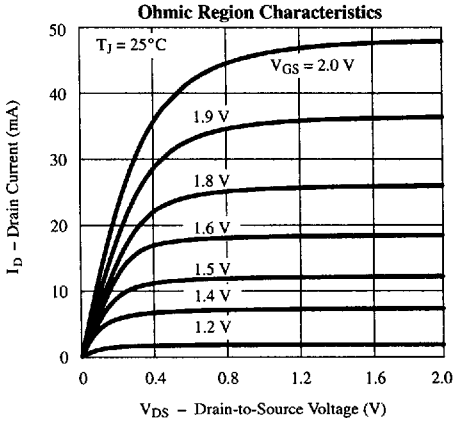
Parameter	Symbol	Test Conditions	Typ <sup>b</sup>	Limits				Unit	
				VN0610L VN10KE VN10KM VN10KT		VN2222L			
				Min	Max	Min	Max		
<b>Static</b>									
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$	120	60		60		V	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1\text{ mA}$	1.2	0.8	2.5	0.6	2.5		
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = 15\text{ V}$	1		100		100	nA	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}$			10		10	$\mu\text{A}$	
			$T_J = 125^\circ\text{C}$		500		500		
On-State Drain Current <sup>c</sup>	$I_{D(on)}$	$V_{DS} = 10\text{ V}, V_{GS} = 10\text{ V}$	1	0.75		0.75		A	
Drain-Source On-Resistance <sup>c</sup>	$r_{DS(on)}$	$V_{GS} = 5\text{ V}, I_D = 0.2\text{ A}$	4		7.5		7.5	$\Omega$	
			$V_{GS} = 10\text{ V}, I_D = 0.5\text{ A}$	3		5			7.5
			$T_J = 125^\circ\text{C}$	5.6		9			13.5
Forward Transconductance <sup>c</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}, I_D = 0.5\text{ A}$	300	100		100		mS	
Common Source Output Conductance <sup>c</sup>	$g_{os}$	$V_{DS} = 7.5\text{ V}, I_D = 0.05\text{ A}$	0.2						
<b>Dynamic</b>									
Input Capacitance	$C_{iss}$	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	38		60		60	$\text{pF}$	
Output Capacitance	$C_{oss}$		16		25		25		
Reverse Transfer Capacitance	$C_{rss}$		2		5		5		
<b>Switching<sup>d</sup></b>									
Turn-On Time	$t_{ON}$	$V_{DD} = 15\text{ V}, R_L = 23\ \Omega$ $I_D = 0.6\text{ A}, V_{GEN} = 10\text{ V}$ $R_G = 25\ \Omega$	7		10		10	ns	
Turn-Off Time	$t_{OFF}$		9		10		10		

**Notes**

- a.  $T_A = 25^\circ\text{C}$  unless otherwise noted.
- b. For DESIGN AID ONLY, not subject to production testing.
- c. Pulse test:  $PW \leq 300\ \mu\text{s}$  duty cycle  $\leq 2\%$ .
- d. Switching time is essentially independent of operating temperature.

VNDP06

**Typical Characteristics (25°C Unless Otherwise Noted)**



## Typical Characteristics (25°C Unless Otherwise Noted) (Cont'd)

