

### N-Channel Enhancement-Mode MOS Transistors

#### Zener Gate Protected

#### Product Summary

Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max ( $\Omega$ )	$V_{GS(th)}$ (V)	$I_D$ (A)
VN0610L	60	5 @ $V_{GS} = 10$ V	0.8 to 2.5	0.27
VN10KE		5 @ $V_{GS} = 10$ V	0.8 to 2.5	0.17
VN10KM		5 @ $V_{GS} = 10$ V	0.8 to 2.5	0.31
VN2222L		7.5 @ $V_{GS} = 10$ V	0.6 to 2.5	0.23

#### Features

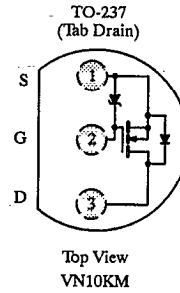
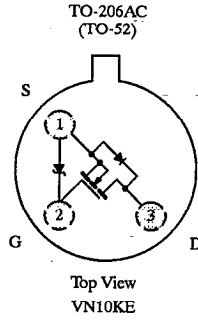
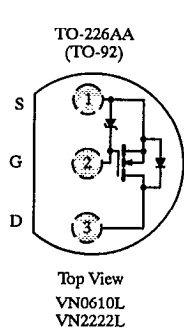
- Zener Diode Input Protected
- Low On-Resistance: 3  $\Omega$
- Ultralow Threshold: 1.2 V
- Low Input Capacitance: 38 pF
- Low Input and Output Leakage

#### 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



#### Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Parameter	Symbol	VN0610L	VN10KE	VN10KM	VN2222L	Unit	
Drain-Source Voltage	$V_{DS}$	60	60	60	60	V	
Gate-Source Voltage	$V_{GS}$	15/-0.3	15/-0.3	15/-0.3	15/-0.3	V	
Continuous Drain Current ( $T_f = 150^\circ\text{C}$ )	$I_D$	$T_A = 25^\circ\text{C}$	0.27	0.17	0.31	0.23	A
		$T_A = 100^\circ\text{C}$	0.17	0.11	0.20	0.14	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	1	1	1	1	A	
Power Dissipation	$P_D$	$T_A = 25^\circ\text{C}$	0.8	0.3	1	0.8	W
		$T_A = 100^\circ\text{C}$	0.32	0.12	0.4	0.32	
Maximum Junction-to-Ambient	$R_{thJA}$	156	400	125	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.

## VN0610L, VN10KE/KM, VN2222L

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### Specifications<sup>a</sup>

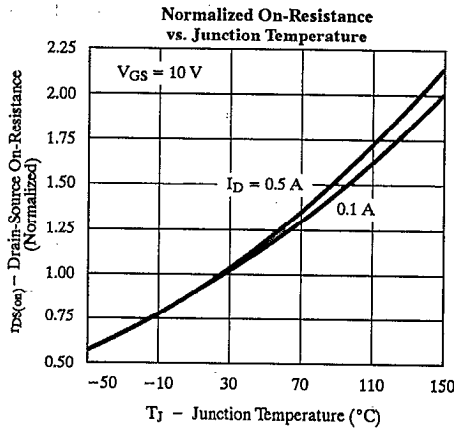
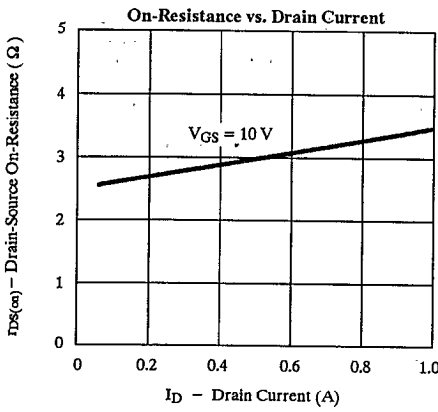
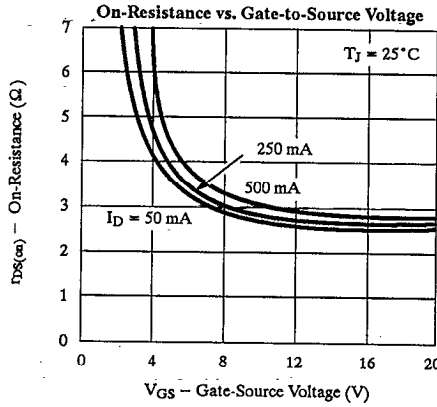
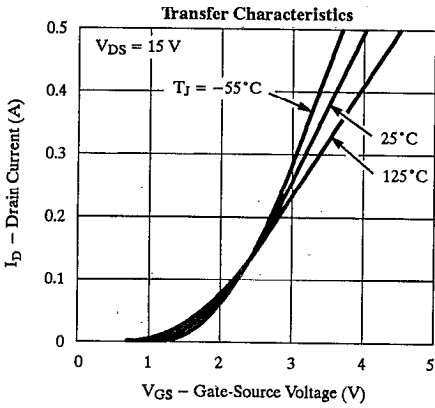
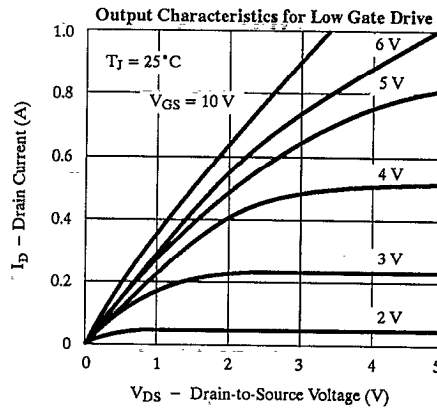
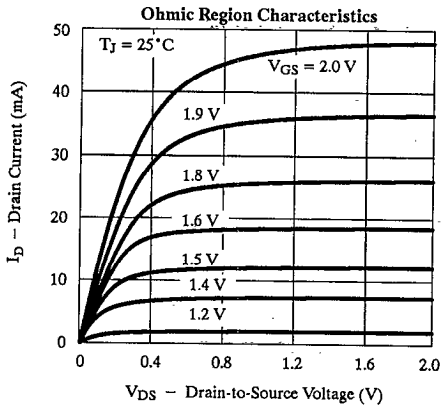
Parameter	Symbol	Test Conditions	Typ <sup>b</sup>	Limits				Unit
				VN0610L VN10KE VN10KM		VN2222L		
				Min	Max	Min	Max	
<b>Static</b>								
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$	120	60		60		V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1\ \text{mA}$	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	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

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

VNDP06

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



## VN0610L, VN10KE/KM, VN2222L

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

