

# VN10/0605/0610/2222 Series

## N-Channel Enhancement-Mode MOSFET Transistors

VN10LE      VN0605T      VN2222LL  
 VN10LM      VN0610LL      VN2222LM

### 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> Min (A)
VN10LE	60	5 @ V <sub>GS</sub> = 10 V	0.8 to 2.5	0.38
VN10LM		5 @ V <sub>GS</sub> = 10 V	0.8 to 2.5	0.32
VN0605T		5 @ V <sub>GS</sub> = 10 V	0.8 to 3.0	0.18
VN0610LL		5 @ V <sub>GS</sub> = 10 V	0.8 to 2.5	0.28
VN2222LL		7.5 @ V <sub>GS</sub> = 5 V	0.6 to 2.5	0.23
VN2222LM		7.5 @ V <sub>GS</sub> = 5 V	0.6 to 2.5	0.26

### Features

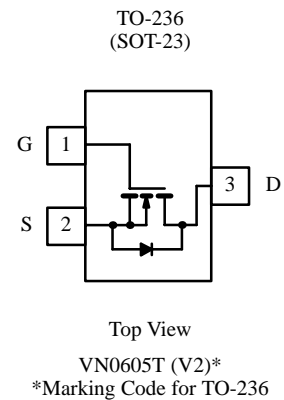
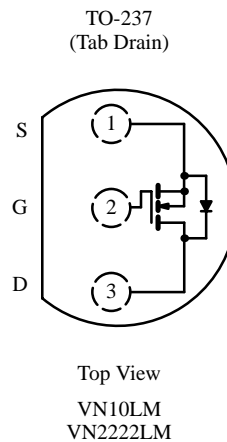
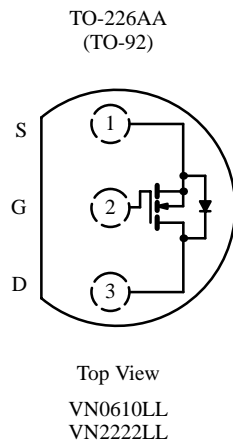
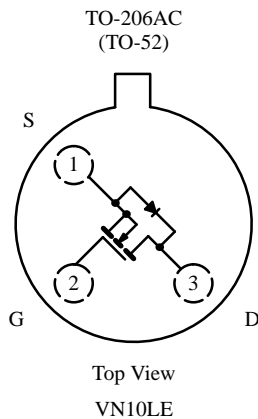
- Low On-Resistance: 2.5 Ω
- Low Threshold: <2.1 V
- Low Input Capacitance: 22 pF
- Fast Switching Speed: 7 ns
- Low Input and Output Leakage

### Benefits

- Low Offset Voltage
- Low-Voltage Operation
- Easily Driven Without Buffering
- High-Speed Circuits
- Low Error Voltage

### Applications

- Direct Logic-Level Interface: TTL/CMOS
- Solid State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems



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

Parameter	Symbol	VN10LE <sup>b</sup>	VN10LM	VN0605T	VN0610LL	VN2222LL	VN2222LM	Unit	
Drain-Source Voltage	$V_{DS}$	60	60	60	60	60	60	V	
Gate-Source Voltage—Non-Repetitive <sup>c</sup>	$V_{GSM}$		$\pm 30$	$\pm 30$	$\pm 30$	$\pm 30$	$\pm 30$		
Gate-Source Voltage—Continuous	$V_{GS}$	$\pm 20$	$\pm 20$	$\pm 20$	$\pm 20$	$\pm 20$	$\pm 20$		
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ )	$T_A = 25^\circ\text{C}$	$I_D$	0.38	0.32	0.18	0.28	0.23	0.26	A
	$T_A = 100^\circ\text{C}$		0.24	0.2	0.11	0.17	0.14	0.16	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	1.0	1.4	0.72	1.3	1.0	1.0		
Power Dissipation	$T_A = 25^\circ\text{C}$	$P_D$	1.5	1.0	0.36	0.8	0.8	1.0	W
	$T_A = 100^\circ\text{C}$		0.6	0.4	0.14	0.32	0.32	0.4	
Maximum Junction-to-Ambient	$R_{thJA}$	400	125	350	156	156	125	$^\circ\text{C}/\text{W}$	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150						$^\circ\text{C}$	

### Notes

- Pulse width limited by maximum junction temperature.
- Reference case for all temperature testing.
- $t_p \leq 50 \mu\text{s}$ .

## Specifications<sup>a</sup>

Parameter	Symbol	Test Conditions	Typ <sup>b</sup>	Limits						Unit	
				VN10LE VN10LM VN0610LL		VN0605T		VN2222LL VN2222LM			
				Min	Max	Min	Max	Min	Max		
<b>Static</b>											
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0 \text{ V}, I_D = 100 \mu\text{A}$	70	60					60		V
		$V_{GS} = 0 \text{ V}, I_D = 10 \mu\text{A}$	70				60				
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1 \text{ mA}$	2.1	0.8	2.5	0.8	3.0	0.6	2.5		
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$				$\pm 100^e$		$\pm 100$		$\pm 100$	nA
		$T_J = 125^\circ\text{C}$						$\pm 500$			
Zero Gate-Voltage Drain Current	$I_{DSS}$	$V_{DS} = 50 \text{ V}, V_{GS} = 0 \text{ V}$				10		1.0			$\mu\text{A}$
		$T_J = 125^\circ\text{C}$				500		500			
		$V_{DS} = 48 \text{ V}, V_{GS} = 0 \text{ V}$								10	
		$T_J = 125^\circ\text{C}$							500		
On-State Drain Current <sup>c</sup>	$I_{D(on)}$	$V_{DS} = 10 \text{ V}, V_{GS} = 10 \text{ V}$	1000	750		500		750		mA	
Drain-Source On-Resistance <sup>c</sup>	$r_{DS(on)}$	$V_{GS} = 4.5 \text{ V}, I_D = 50 \text{ mA}$	4.5				7.5				$\Omega$
		$V_{GS} = 5 \text{ V}, I_D = 0.2 \text{ A}$	4.5		7.5				7.5		
		$V_{GS} = 10 \text{ V}, I_D = 0.5 \text{ A}$	2.4		5		5		7.5		
		$T_J = 125^\circ\text{C}$	4.4		9		10		13.5		
Forward Transconductance <sup>c</sup>	$g_{fs}$	$V_{DS} = 10 \text{ V}, I_D = 0.5 \text{ A}$	230	100				100		mS	
		$V_{DS} = 10 \text{ V}, I_D = 0.2 \text{ A}$	180			80					
Common Source Output Conductance <sup>c</sup>	$g_{os}$	$V_{DS} = 5 \text{ V}, I_D = 50 \text{ mA}$	500							$\mu\text{s}$	

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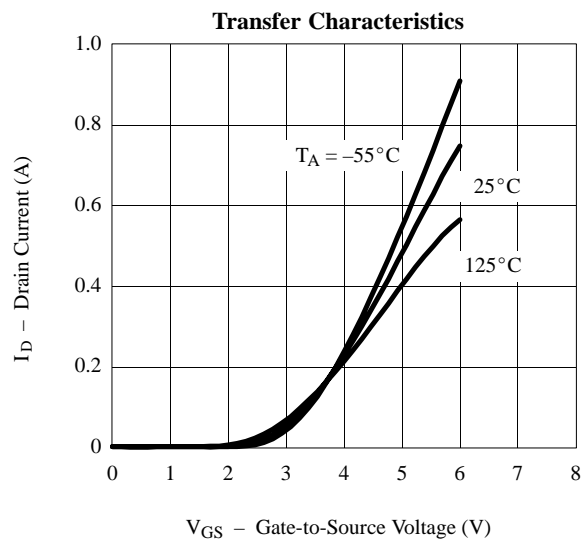
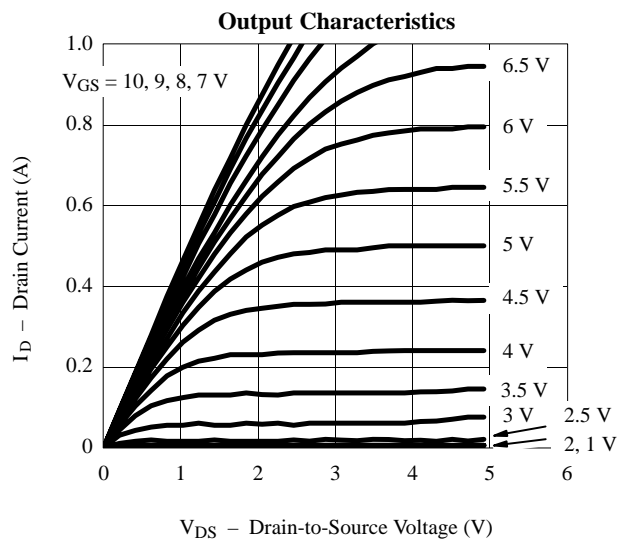
Parameter	Symbol	Test Conditions	Typ <sup>b</sup>	Limits						Unit
				VN10LE VN10LM VN0610LL		VN0605T		VN2222LL VN2222LM		
				Min	Max	Min	Max	Min	Max	
<b>Dynamic</b>										
Input Capacitance	$C_{iss}$	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$	22		60		60		60	pF
Output Capacitance	$C_{oss}$		11		25		25		25	
Reverse Transfer Capacitance	$C_{rss}$		2		5		5		5	
<b>Switching<sup>d</sup></b>										
Turn-On Time	$t_{ON}$	$V_{DD} = 15\text{ V}, R_L = 23\ \Omega$ $I_D \cong 0.6\text{ A}$ $V_{GEN} = 10\text{ V}, R_G = 25\ \Omega$	7		10				10	ns
Turn-Off Time	$t_{OFF}$		7		10				10	
Turn-On Time	$t_{ON}$	$V_{DD} = 30\text{ V}, R_L = 150\ \Omega$ $I_D \cong 0.2\text{ A}$ $V_{GEN} = 10\text{ V}, R_G = 25\ \Omega$	7				20			
Turn-Off Time	$t_{OFF}$		11				20			

### Notes

- $T_A = 25^\circ\text{C}$  unless otherwise noted.
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- Pulse test:  $PW \leq 300\ \mu\text{s}$  duty cycle  $\leq 3\%$ .
- Switching time is essentially independent of operating temperature.
- VN10LE only.

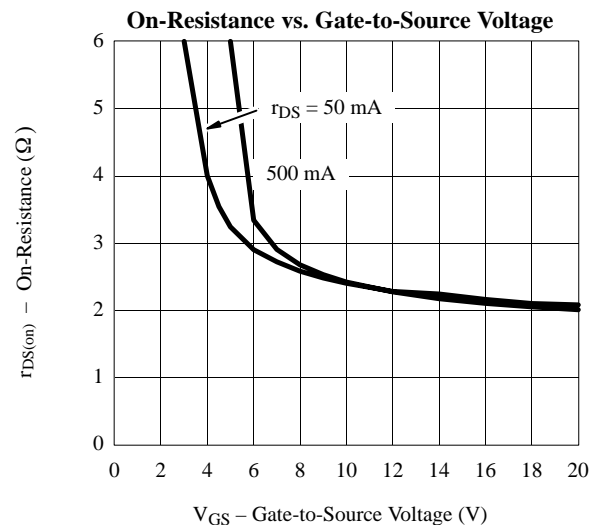
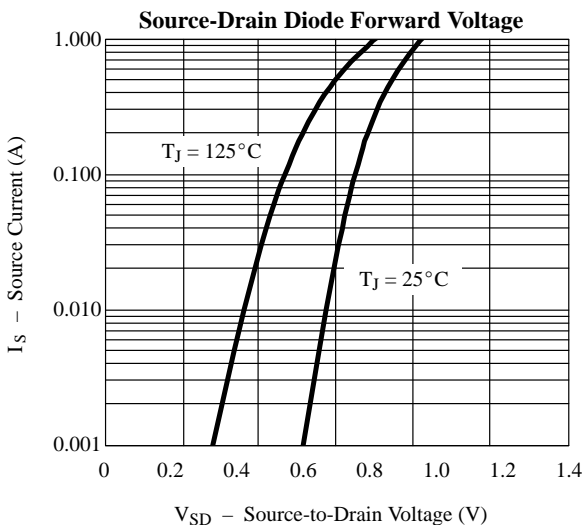
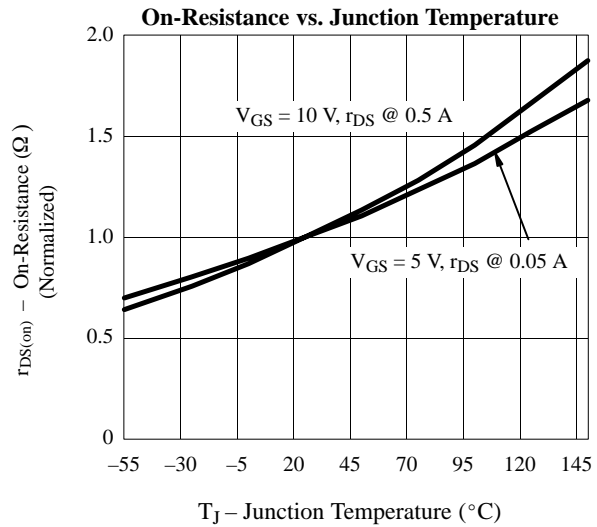
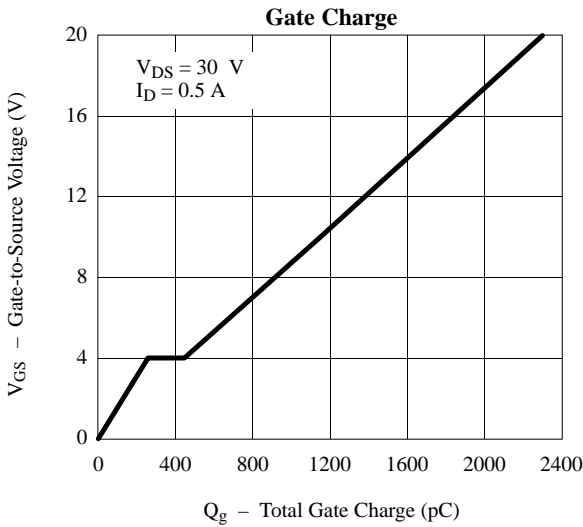
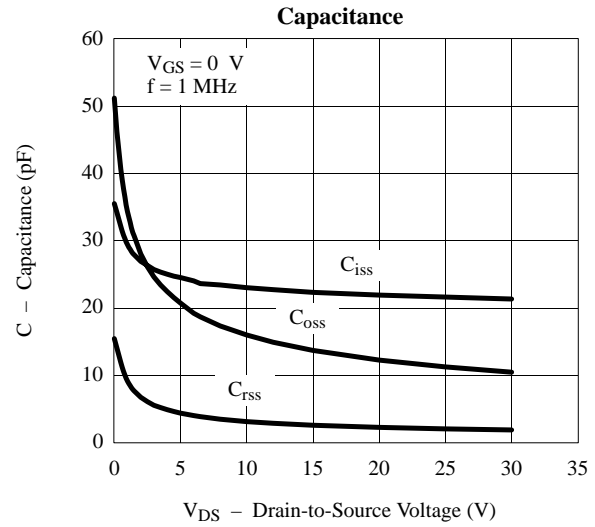
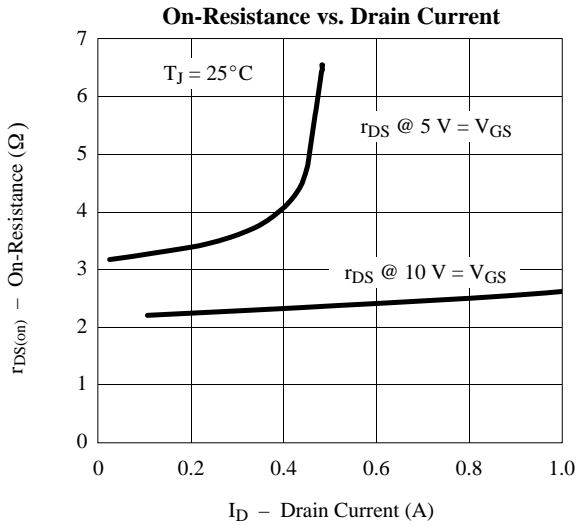
VNBF06

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



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