

VN10/0605/0610/2222 Series

N-Channel Enhancement-Mode MOSFET Transistors

VN10LE VN0605T VN2222LL
VN10LM VN0610LL VN2222LM

Product Summary

Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max (Ω)	$V_{GS(th)}$ (V)	I_D Min (A)
VN10LE	60	5 @ $V_{GS} = 10$ V	0.8 to 2.5	0.38
VN10LM		5 @ $V_{GS} = 10$ V	0.8 to 2.5	0.32
VN0605T		5 @ $V_{GS} = 10$ V	0.8 to 3.0	0.18
VN0610LL		5 @ $V_{GS} = 10$ V	0.8 to 2.5	0.28
VN2222LL		7.5 @ $V_{GS} = 5$ V	0.6 to 2.5	0.23
VN2222LM		7.5 @ $V_{GS} = 5$ V	0.6 to 2.5	0.26

Features

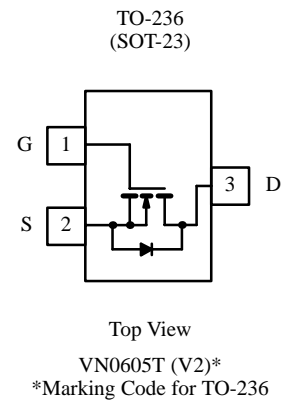
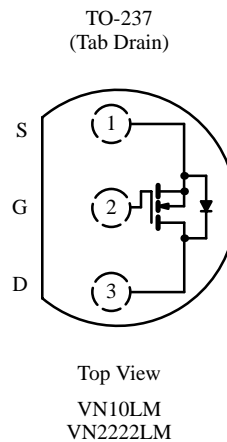
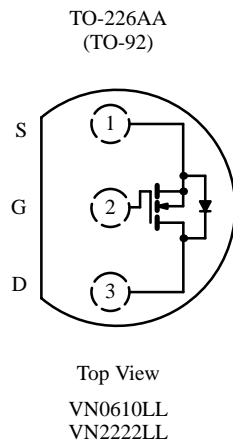
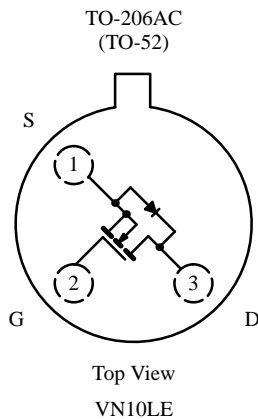
- Low On-Resistance: 2.5 Ω
- Low Threshold: <2.1 V
- Low Input Capacitance: 22 pF
- Fast Switching Speed: 7 ns
- Low Input and Output Leakage

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 ^b	VN10LM	VN0605T	VN0610LL	VN2222LL	VN2222LM	Unit	
Drain-Source Voltage	V_{DS}	60	60	60	60	60	60	V	
Gate-Source Voltage—Non-Repetitive ^c	V_{GSM}		± 30	± 30	± 30	± 30	± 30		
Gate-Source Voltage—Continuous	V_{GS}	± 20	± 20	± 20	± 20	± 20	± 20		
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_A = 25^\circ\text{C}$	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 ^a	I_{DM}	1.0	1.4	0.72	1.3	1.0	1.0		
Power Dissipation	P_D	$T_A = 25^\circ\text{C}$	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^a

Parameter	Symbol	Test Conditions	Typ ^b	Limits						Unit
				VN10LE VN10LM VN0610LL		VN0605T		VN2222LL VN2222LM		
				Min	Max	Min	Max	Min	Max	
Static										
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}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			$\pm 100^e$		± 100		± 100	nA
		$T_J = 125^\circ\text{C}$					± 500			
Zero Gate-Voltage Drain Current	I_{DSS}	$V_{DS} = 50 \text{ V}, V_{GS} = 0 \text{ V}$			10		1.0			μA
		$T_J = 125^\circ\text{C}$			500		500			
		$V_{DS} = 48 \text{ V}, V_{GS} = 0 \text{ V}$							10	
		$T_J = 125^\circ\text{C}$						500		
On-State Drain Current ^c	$I_{D(on)}$	$V_{DS} = 10 \text{ V}, V_{GS} = 10 \text{ V}$	1000	750		500		750		mA
Drain-Source On-Resistance ^c	$r_{DS(on)}$	$V_{GS} = 4.5 \text{ V}, I_D = 50 \text{ mA}$	4.5				7.5			Ω
		$V_{GS} = 5 \text{ V}, I_D = 0.2 \text{ A}$	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 ^c	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 ^c	g_{os}	$V_{DS} = 5 \text{ V}, I_D = 50 \text{ mA}$	500							μs

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Specifications^a

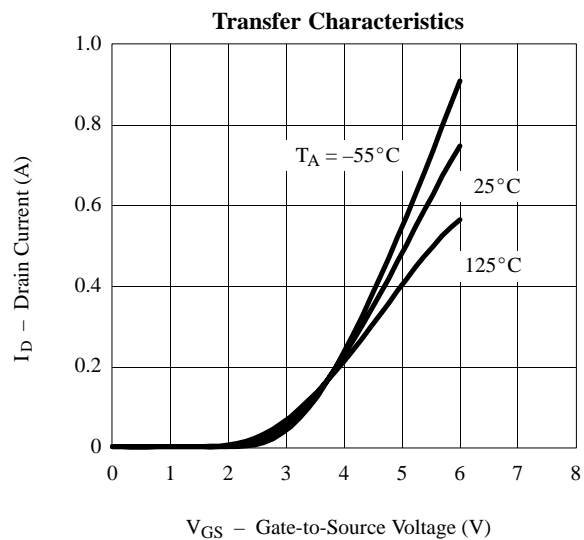
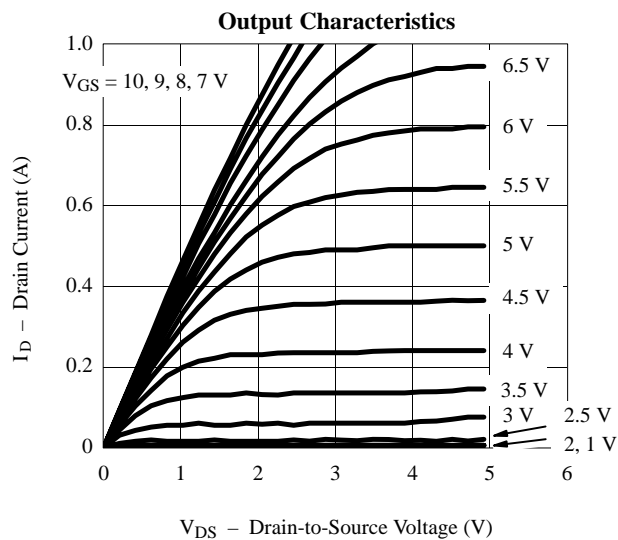
Parameter	Symbol	Test Conditions	Typ ^b	Limits						Unit
				VN10LE VN10LM VN0610LL		VN0605T		VN2222LL VN2222LM		
				Min	Max	Min	Max	Min	Max	
Dynamic										
Input Capacitance	C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$	22		60		60		60	pF
Output Capacitance	C_{oss}		11		25		25		25	
Reverse Transfer Capacitance	C_{rss}		2		5		5		5	
Switching^d										
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.

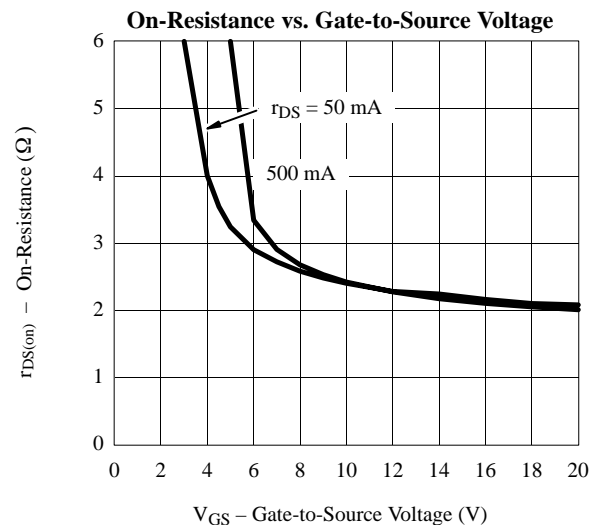
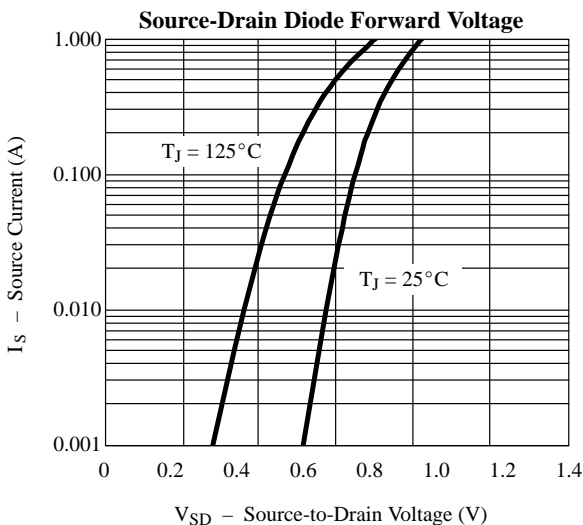
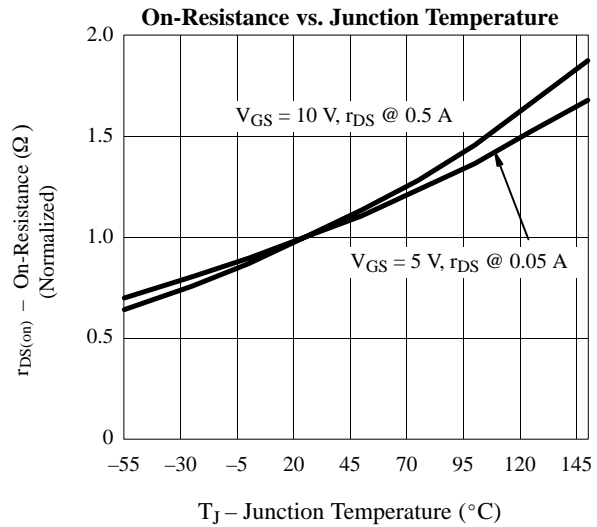
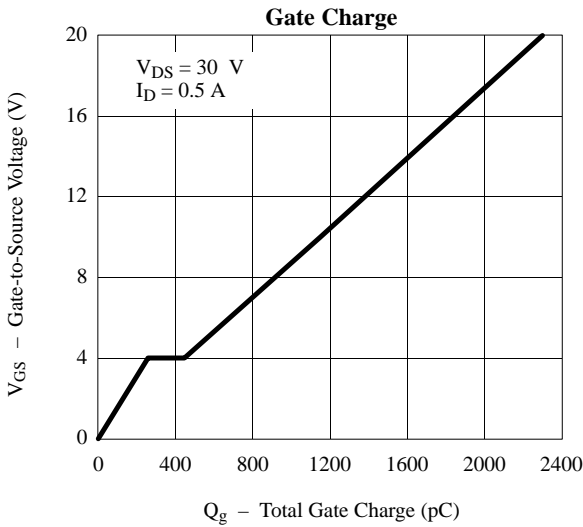
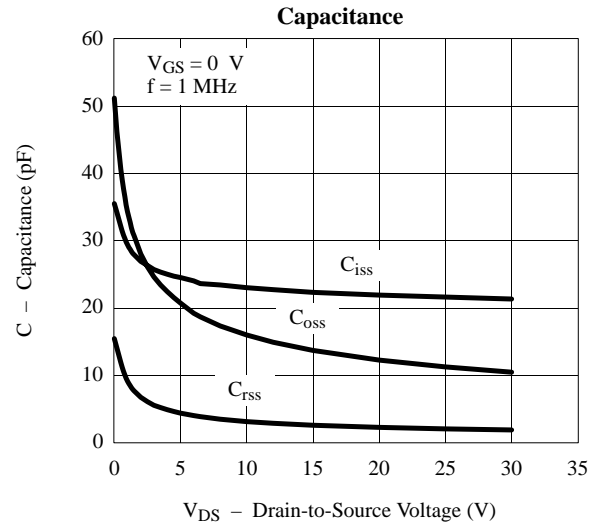
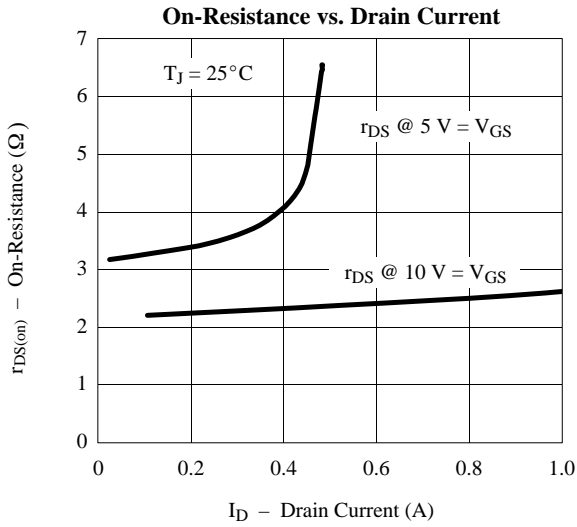
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Typical Characteristics (25° C Unless Otherwise Noted)



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