VN1206L/M, VN1210M

N-Channel Enhancement-Mode MOS Transistors

Product Summary

Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max (Ω)	$V_{GS(th)}$ (V)	I_D (A)
VN1206L	120	6 @ V_{GS} = 10 V	0.8 to 2	0.23
VN1206M		6 @ V_{GS} = 10 V	0.8 to 2	0.26
VN1210M		10 @ V_{GS} = 2.5 V	0.8 to 2	0.2

Features

- Low On-Resistance: 3.8 Ω
- Low Threshold: 1.4 V
- Low Input Capacitance: 35 pF
- Fast Switching Speed: 10 ns
- Low Input and Output Leakage

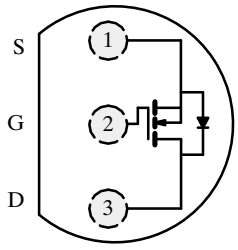
Benefits

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

Applications

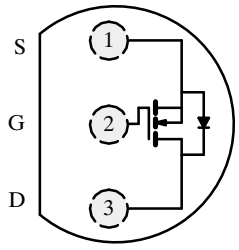
- Direct Logic-Level Interface: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays

TO-226AA
(TO-92)



Top View
VN1206L

TO-237
(Tab Drain)



Top View
VN1206M
VN1210M

Absolute Maximum Ratings (T_A = 25°C Unless Otherwise Noted)

Parameter		Symbol	VN1206L	VN1206M	VN1210M	Unit
Drain-Source Voltage		V_{DS}	120	120	120	V
Gate-Source Voltage		V_{GS}	±30	±30	±30	
Continuous Drain Current (T_J = 150°C)	T_A= 25°C	I_D	0.23	0.26	0.2	A
	T_A= 100°C		0.15	0.16	0.13	
Pulsed Drain Current[a]		I_{DM}	2	2	2	
Power Dissipation	T_A= 25°C	P_D	0.8	1	1	W
	T_A= 100°C		0.32	0.4	0.4	
Maximum Junction-to-Ambient		R_{thJA}	156	125	125	°C/W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to 150			°C

Notes
a. Pulse width limited by maximum junction temperature.

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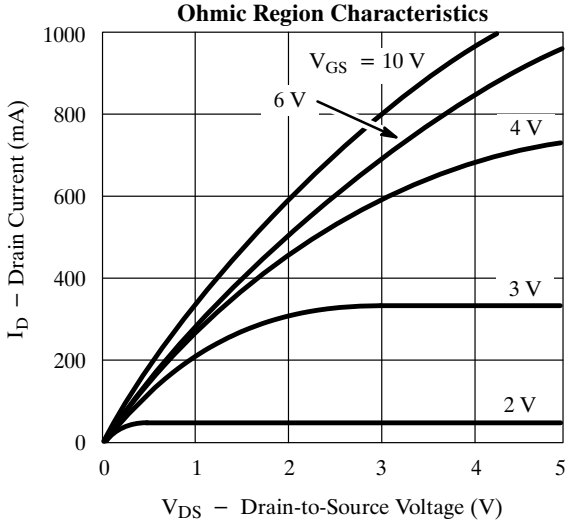
Specifications[a]

Parameter	Symbol	Test Conditions	Typ[b]	Limits VN1206L VN1206M Min	Limits VN1206L VN1206M Max	Limits VN1210M Min	Limits VN1210M Max	Unit
Static								
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 100 µA	145	120		120		V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1.4					
		V_{DS} = V_{GS}, I_D = 1 mA	1.5	0.8	2	0.8	2	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±15 V			±100		±100	nA
		T_J = 125°C			±500		±500	
		V_{DS} = 0 V, V_{GS} = ±20 V						
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 96 V, V_{GS} = 0 V						µA
		T_J = 125°C						
		V_{DS} = 120 V, V_{GS} = 0 V			10		10	
		T_J = 125°C			500		500	
On-State Drain Current[c]	$I_{D(on)}$	V_{DS} = 10 V, V_{GS} = 4.5 V	0.6					A
		V_{DS} = 10 V, V_{GS} = 10 V	1.6	1		1		
Drain-Source On-Resistance[c]	$r_{DS(on)}$	V_{GS} = 2.5 V, I_D = 0.1 A	6		10		10	Ω
		V_{GS} = 3.5 V, I_D = 0.1 A	4.5					
		V_{GS} = 10 V, I_D = 0.3 A	3.3					
		V_{GS} = 4.5 V, I_D = 0.2 A	3.8					
		T_J = 125°C	7.6					
		V_{GS} = 10 V, I_D = 0.5 A	3.3		6		10	
		T_J = 125°C	7		14.8		24.7	
Forward Transconductance[c]	g_{fs}	V_{DS} = 10 V, I_D = 0.2 A	400					mS
		V_{DS} = 10 V, I_D = 0.5 A	425	300		300		
Common Source Output Conductance[c]	g_{os}	V_{DS} = 7.5 V, I_D = 0.1 A	0.4					
Dynamic								
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V f = 1 MHz	35		125		125	pF
Output Capacitance	C_{oss}		15		50		50	
Reverse Transfer Capacitance	C_{rss}		2		20		20	
Switching[d]								
Turn-On Time	t_{ON}	V_{DD} = 60 V, R_L = 150 Ω I_D ≅ 0.4 A, V_{GEN} = 10 V R_G = 25 Ω	6					ns
	$t_{d(on)}$		3		8		8	
	t_r		3		8		8	
Turn-Off Time	t_{OFF}		10					
	$t_{d(off)}$		7		18		18	
	t_f		2.5		12		12	

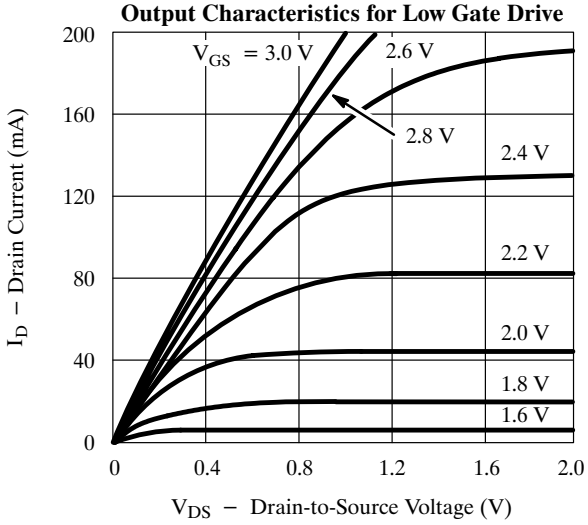
Notes
a. T_A = 25°C unless otherwise noted. VNDQ12
b. For DESIGN AID ONLY, not subject to production testing.
c. Pulse test: PW ≤ 300 µs duty cycle ≤ 2%.
d. Switching time is essentially independent of operating temperature.

Typical Characteristics (25°C Unless Otherwise Noted)

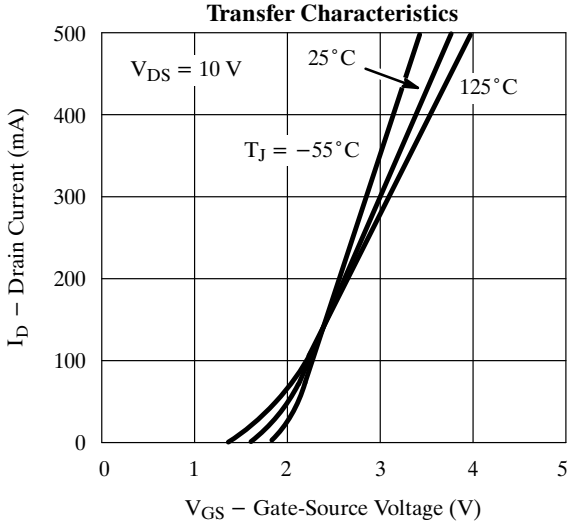
Ohmic Region Characteristics



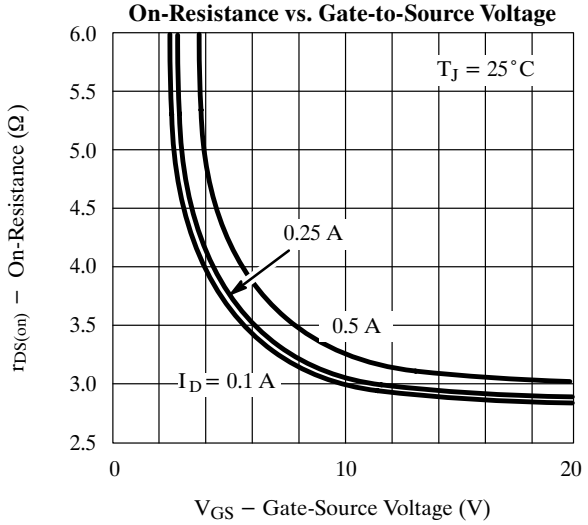
Output Characteristics for Low Gate Drive



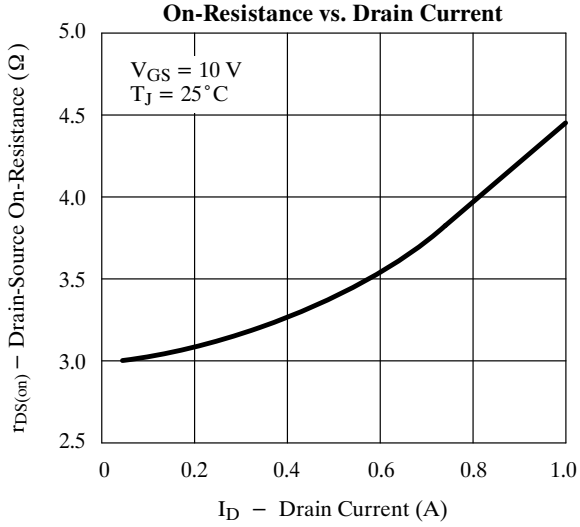
Transfer Characteristics



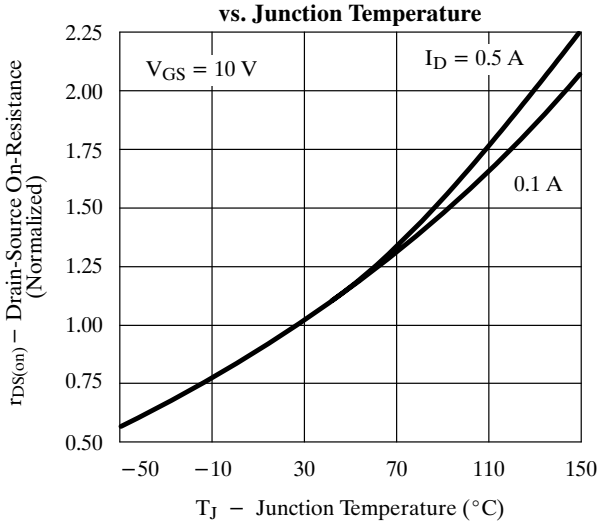
On-Resistance vs. Gate-to-Source Voltage



On-Resistance vs. Drain Current



Normalized On-Resistance vs. Junction Temperature



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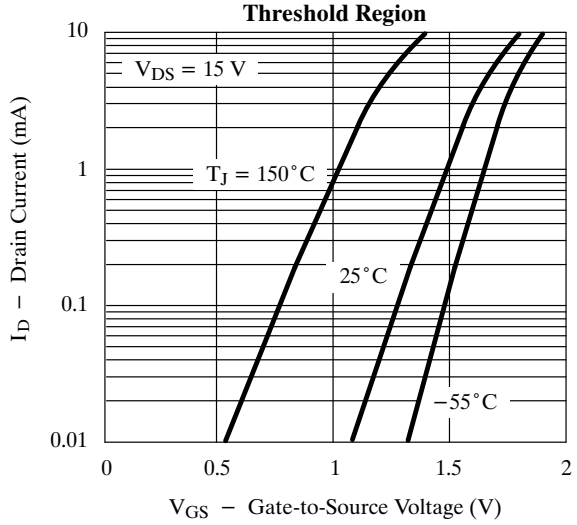
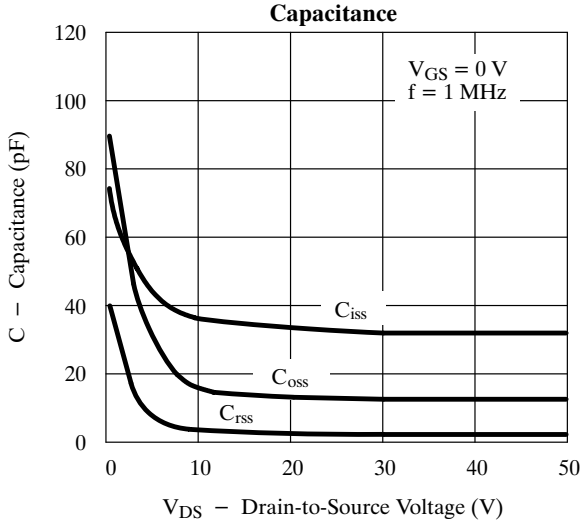
Typical Characteristics (25°C Unless Otherwise Noted) (Cont'd)

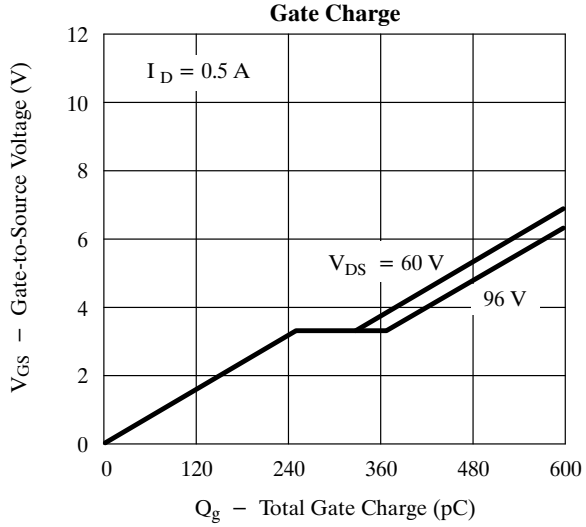
Threshold Region



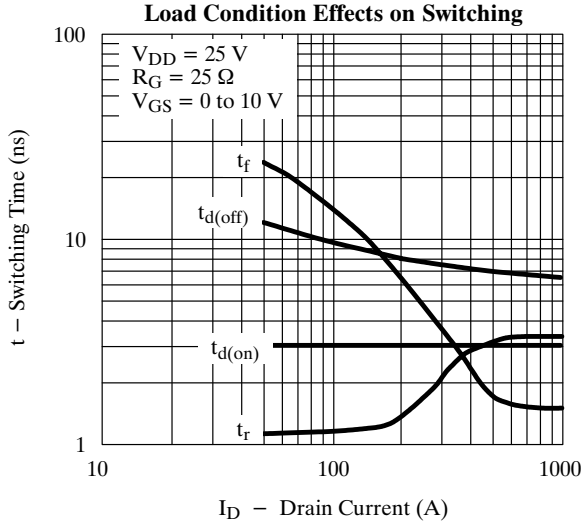
Capacitance



Gate Charge



Load Condition Effects on Switching



Normalized Effective Transient Thermal Impedance, Junction-to-Ambient (TO-226AA)