



N-Channel 60-V (D-S) MOSFETs with Zener Gate

PRODUCT SUMMARY				
Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max (Ω)	$V_{GS(th)}$ (V)	I_D (A)
VN0610L	60	5 @ $V_{GS} = 10$ V	0.8 to 2.5	0.27
VN10KLS		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

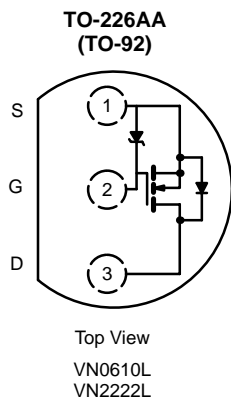
- Zener Diode Input Protected
- Low On-Resistance: 3 Ω
- Ultralow Threshold: 1.2 V
- Low Input Capacitance: 38 pF
- Low Input and Output Leakage

BENEFITS

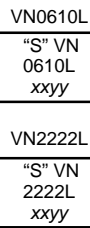
- Extra ESD Protection
- Low Offset Voltage
- Low-Voltage Operation
- High-Speed, Easily Driven
- Low Error Voltage

APPLICATIONS

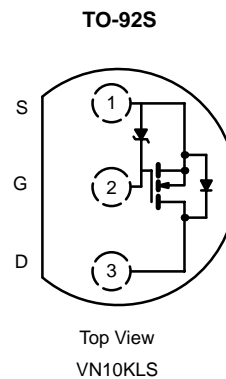
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays
- Inductive Load Drivers



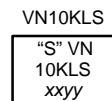
Device Marking
Front View



"S" = Siliconix Logo
xxyy = Date Code



Device Marking
Front View



"S" = Siliconix Logo
xxyy = Date Code

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter	Symbol	VN2222L VN0610L	VN10KLS	Unit
Drain-Source Voltage	V_{DS}	60	60	V
Gate-Source Voltage	V_{GS}	15/-0.3	15/-0.3	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_A = 25^\circ\text{C}$	0.27	A
		$T_A = 100^\circ\text{C}$	0.17	
Pulsed Drain Current ^a	I_{DM}	1	1.0	
Power Dissipation	P_D	$T_A = 25^\circ\text{C}$	0.8	W
		$T_A = 100^\circ\text{C}$	0.32	
Thermal Resistance, Junction-to-Ambient	R_{thJA}	156	139	$^\circ\text{C/W}$
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.



SPECIFICATIONS (T _A = 25 °C UNLESS OTHERWISE NOTED)								
Parameter	Symbol	Test Conditions	Typ ^a	Limits				Unit
				VN0610L VN10KLS		VN2222L		
				Min	Max	Min	Max	
Static								
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 100 μA	120	60		60		V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 1 mA	1.2	0.8	2.5	0.6	2.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = 15 V	1		100		100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 48 V, V _{GS} = 0 V T _J = 125 °C			10		10	μA
					500		500	
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 10 V, V _{GS} = 10 V	1	0.75		0.75		A
Drain-Source On-Resistance ^b	r _{DS(on)}	V _{GS} = 5 V, I _D = 0.2 A V _{GS} = 10 V, I _D = 0.5 A T _J = 125 °C	4		7.5		7.5	Ω
			3		5		7.5	
			5.6		9		13.5	
Forward Transconductance ^b	g _{fs}	V _{DS} = 10 V, I _D = 0.5 A	300	100		100		mS
Common Source Output Conductance ^b	g _{os}	V _{DS} = 7.5 V, I _D = 0.05 A	0.2					
Dynamic								
Input Capacitance	C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	38		60		60	pF
Output Capacitance	C _{oss}		16		25		25	
Reverse Transfer Capacitance	C _{rss}		2		5		5	
Switching^c								
Turn-On Time	t _{ON}	V _{DD} = 15 V, R _L = 23 Ω I _D ≅ 0.6 A, V _{GEN} = 10 V R _G = 25 Ω	7		10		10	ns
Turn-Off Time	t _{OFF}		9		10		10	

Notes

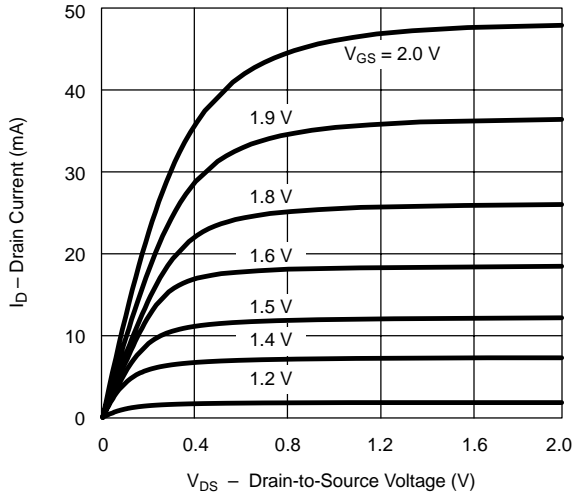
- a. For DESIGN AID ONLY, not subject to production testing.
- b. Pulse test: PW ≤ 300 μs duty cycle ≤ 2%.
- c. Switching time is essentially independent of operating temperature.

VNDP06

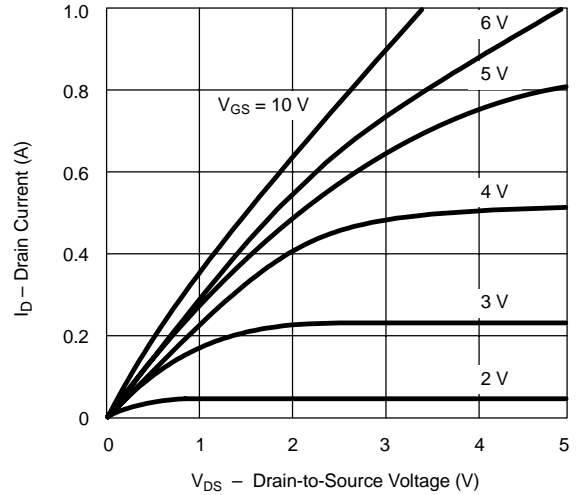


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

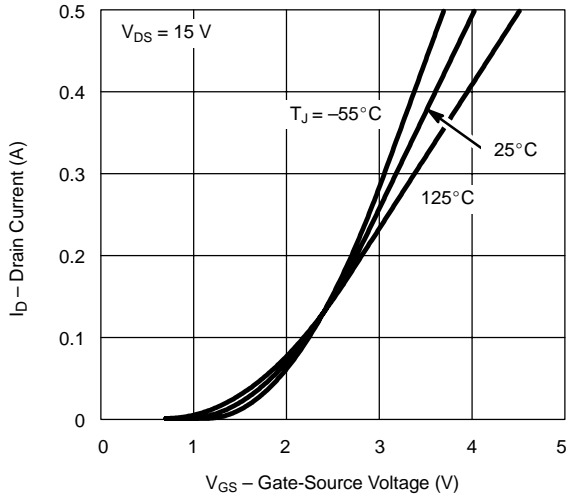
Ohmic Region Characteristics



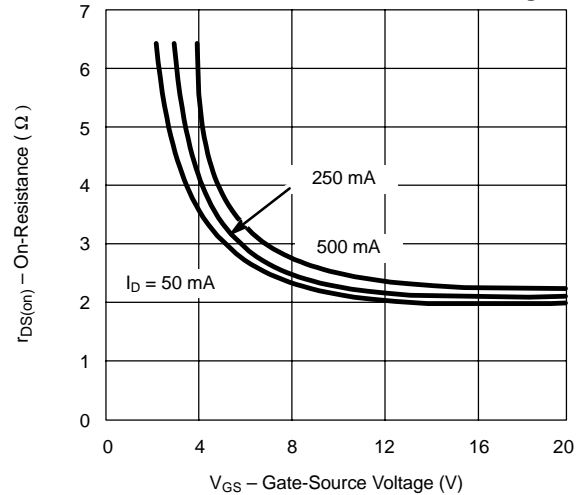
Output Characteristics for Low Gate Drive



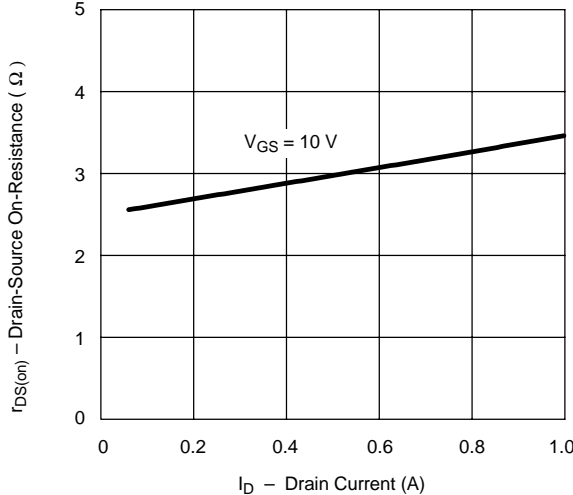
Transfer Characteristics



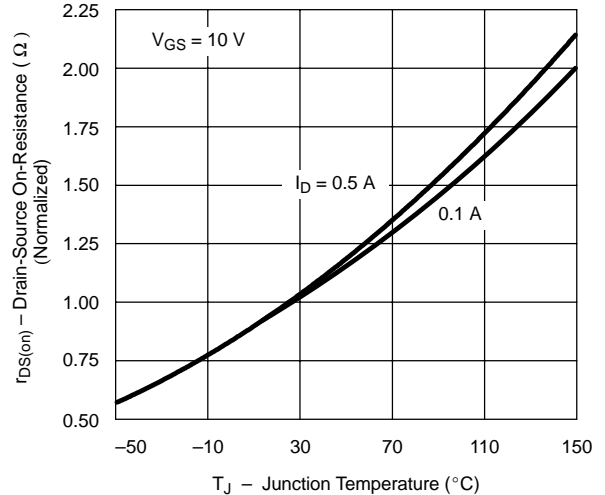
On-Resistance vs. Gate-to-Source Voltage



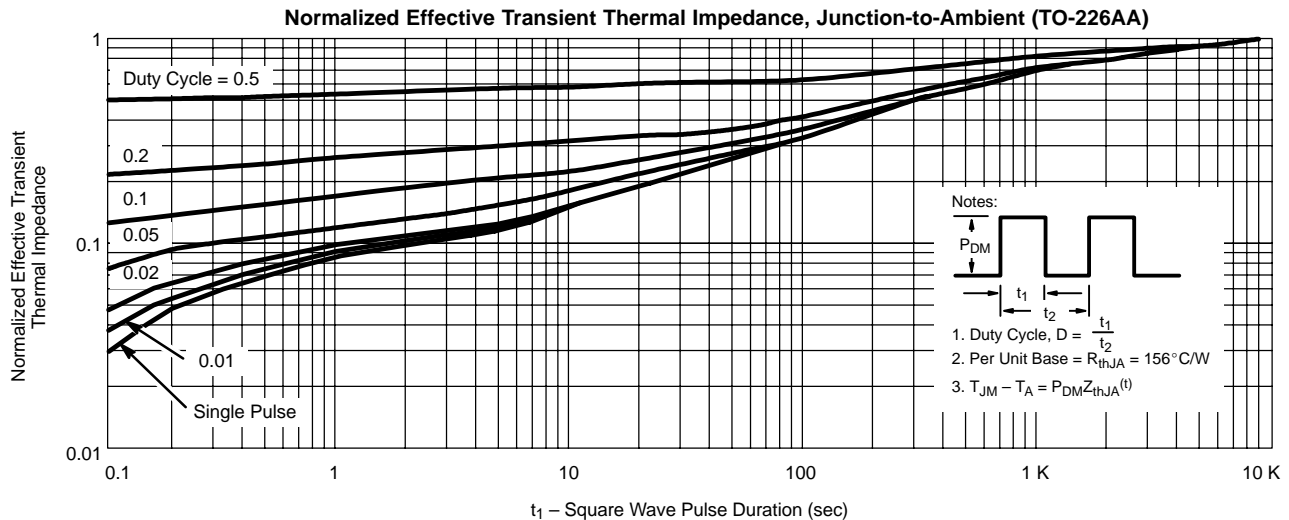
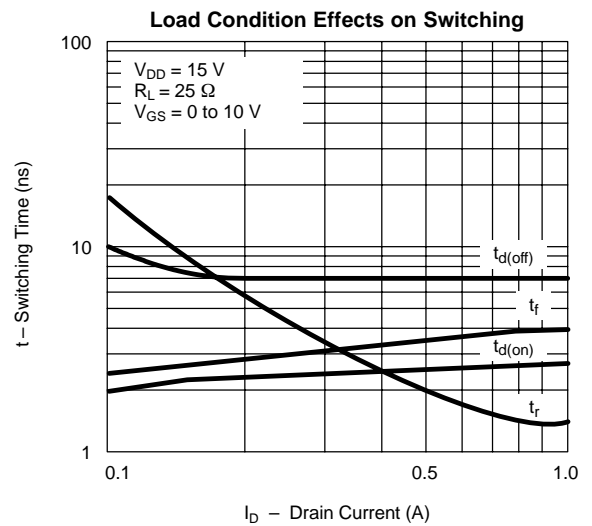
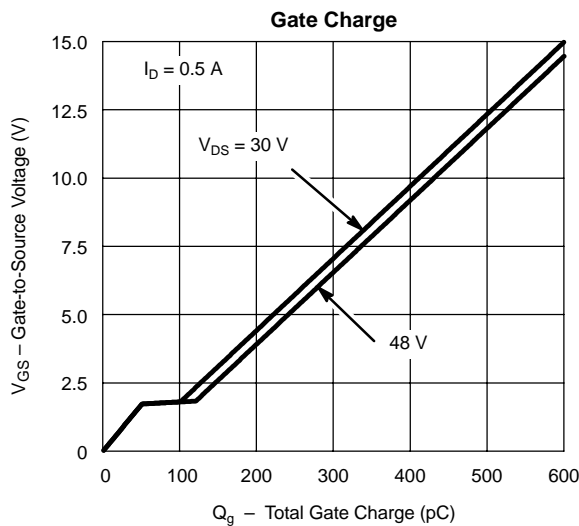
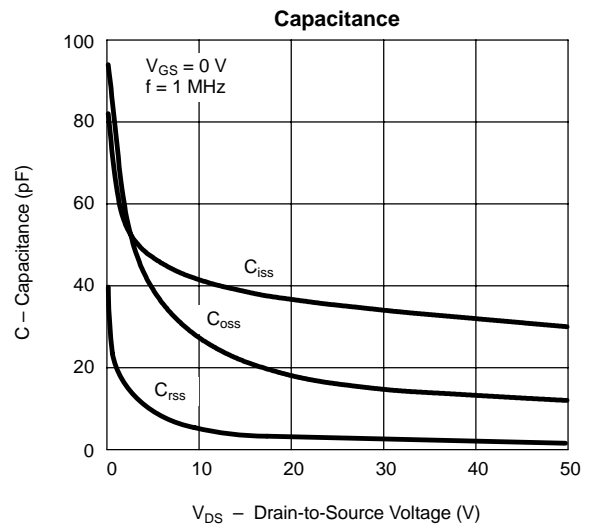
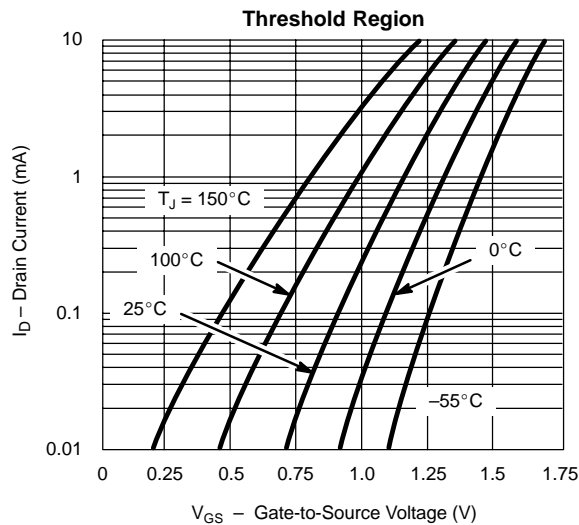
On-Resistance vs. Drain Current



Normalized On-Resistance vs. Junction Temperature



TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)





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