



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

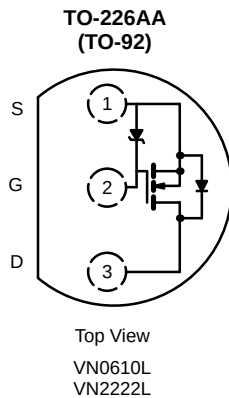
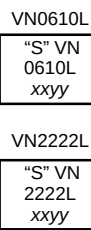
- Zener Diode Input Protected
- Low On-Resistance: $3\ \Omega$
- Ultralow Threshold: 1.2 V
- Low Input Capacitance: 38 pF
- Low Input and Output Leakage

BENEFITS

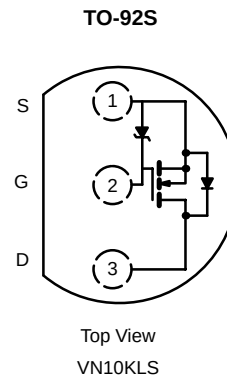
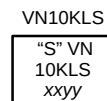
- Extra ESD Protection
- Low Offset Voltage
- Low-Voltage Operation
- High-Speed, Easily Driven
- Low Error Voltage

APPLICATIONS

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

Device Marking
Front View

"S" = Siliconix Logo
xxyy = Date Code

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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	0.27	0.31	A
		0.17	0.20	
Pulsed Drain Current ^a	I_{DM}	1	1.0	
Power Dissipation	P_D	0.8	0.9	W
		0.32	0.4	
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.

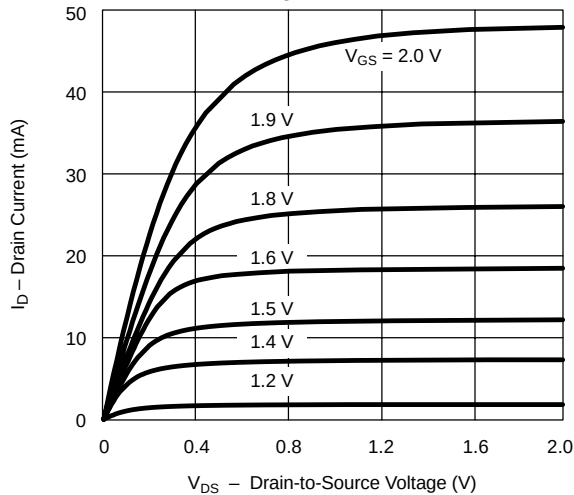
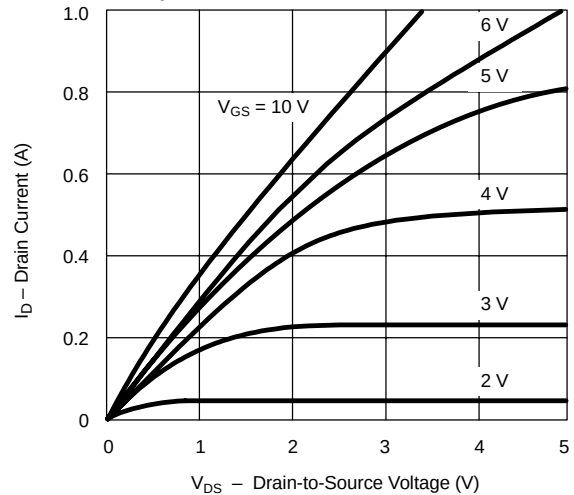
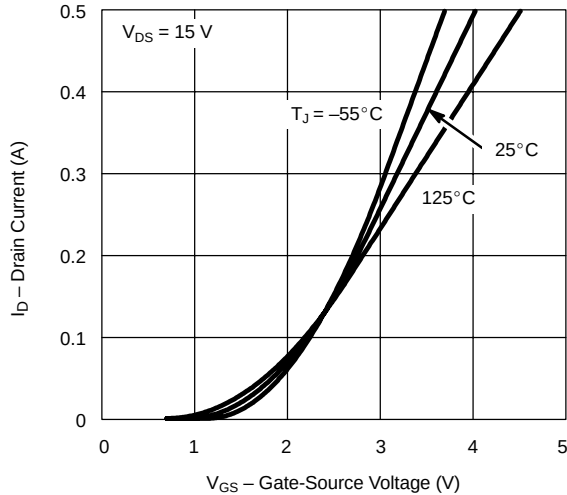
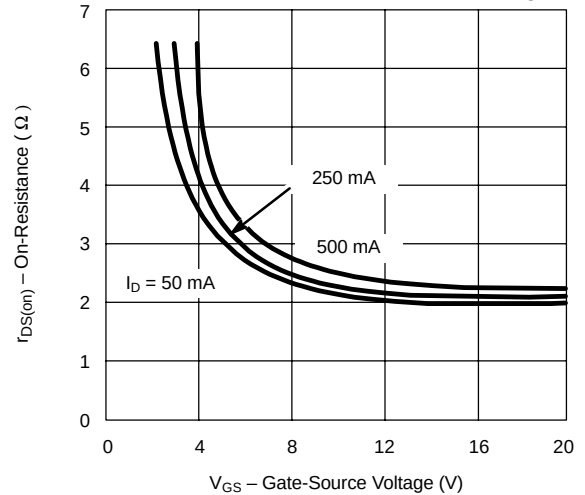
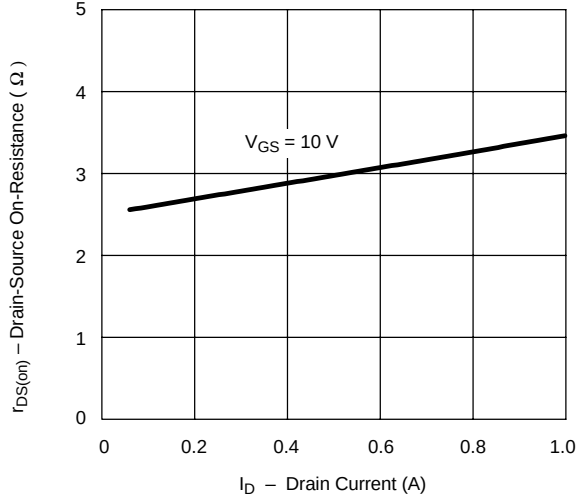
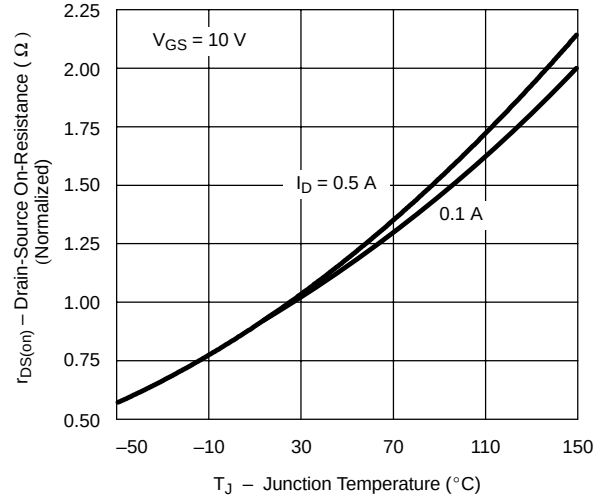
SPECIFICATIONS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

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			10		10	μA
		T _J = 125°C			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	4		7.5		7.5	Ω
		V _{GS} = 10 V, I _D = 0.5 A	3		5		7.5	
		T _J = 125°C	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: $PW \leq 300\text{ }\mu\text{s}$ duty cycle $\leq 2\%$.
c. Switching time is essentially independent of operating temperature.

VNDP06

**TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ 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)
