N-Channel Enhancement-Mode Vertical DMOS FETs

Ordering Information

BV_{DSS} / BV_{DGS}	$R_{DS(ON)}$ (max)	$V_{GS(th)}$ (max)	$I_{D(ON)}$ (min)	Order Number / Package
				TO-92
350V	15Ω	1.8V	0.15A	VN3515L
400V	12Ω	1.8V	0.15A	VN4012L

Features

- ❑ Free from secondary breakdown
- ❑ Low power drive requirement
- ❑ Ease of paralleling
- ❑ Low C_{ISS} and fast switching speeds
- ❑ Excellent thermal stability
- ❑ Integral Source-Drain diode
- ❑ High input impedance and high gain
- ❑ Complementary N- and P-channel devices

Advanced DMOS Technology

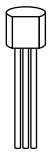
These enhancement-mode (normally-off) transistors utilize a vertical DMOS structure and Supertex's well-proven silicon-gate manufacturing process. This combination produces devices with the power handling capabilities of bipolar transistors and with the high input impedance and positive temperature coefficient inherent in MOS devices. Characteristic of all MOS structures, these devices are free from thermal runaway and thermally-induced secondary breakdown.

Supertex's vertical DMOS FETs are ideally suited to a wide range of switching and amplifying applications where high breakdown voltage, high input impedance, low input capacitance, and fast switching speeds are desired.

Applications

- ❑ Motor controls
- ❑ Converters
- ❑ Amplifiers
- ❑ Telecom Switching
- ❑ Power supply circuits
- ❑ Drivers (relays, hammers, solenoids, lamps, memories, displays, bipolar transistors, etc.)

Package Option



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TO-92

Note: See Package Outline section for dimensions.

Absolute Maximum Ratings

Drain-to-Source Voltage	BV_{DSS}
Drain-to-Gate Voltage	BV_{DGS}
Gate-to-Source Voltage	± 20V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

* Distance of 1.6 mm from case for 10 seconds.

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Thermal Characteristics

Package	I_D (continuous)*	I_D (pulsed)	Power Dissipation @ T_C = 25°C	θ_{jc} °C/W	θ_{ja} °C/W	I_{DR}*	I_{DRM}
VN3515L (TO-92)	150mA	600mA	1W	125	170	150mA	600mA
VN4012L (TO-92)	160mA	650mA	1W	125	170	160mA	650mA

* I_D (continuous) is limited by max rated T_j.

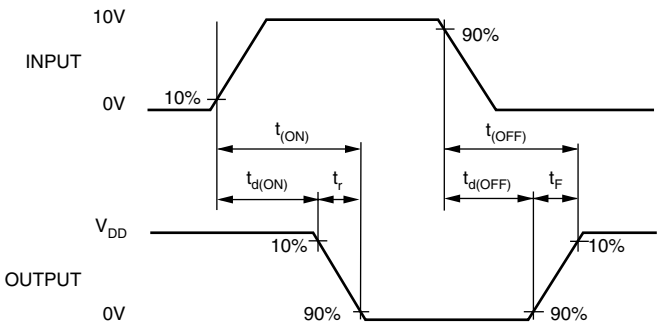
Electrical Characteristics (@ 25°C unless otherwise specified)

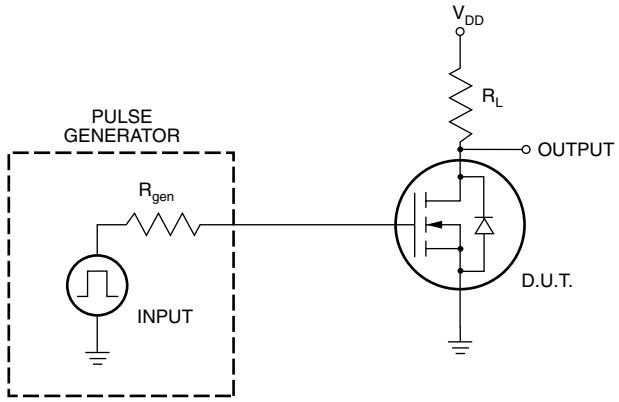
Symbol	Parameter		Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	VN3515	350			V	V_{GS} = 0V, I_D = 100μA
		VN4012	400				
$V_{GS(th)}$	Gate Threshold Voltage		0.6		1.8	V	V_{GS} = V_{DS}, I_D = 1mA
I_{GSS}	Gate Body Leakage				10	nA	V_{GS} = ± 20V, V_{DS} = 0V
I_{DSS}	Zero Gate Voltage Drain Current				1	μA	V_{GS} = 0V, V_{DS} = 0.8 Max Rating
					100		V_{GS} = 0V, V_{DS} = 0.8 Max Rating T_A = 125°C
$I_{D(ON)}$	ON-State Drain Current		0.15	0.3		A	V_{DS} = 10V, V_{GS} = 4.5V
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance	VN3515		9.5	15	Ω	V_{GS} = 4.5V, I_D = 100mA
				17	35		V_{GS} = 4.5V, I_D = 100mA, TA = 125°C
		VN4012		9.5	12		V_{GS} = 4.5V, I_D = 100mA
				17	30		V_{GS} = 4.5V, I_D = 100mA, TA = 125°C
G_{FS}	Forward Transconductance		125	350		m℧	V_{DS} =15V, I_D = 100mA
C_{ISS}	Input Capacitance				110	pF	V_{DS} = 25V, V_{GS} = 0V f = 1MHz
C_{OSS}	Common Source Output Capacitance				30		
C_{RSS}	Reverse Transfer Capacitance				10		
$t_{d(ON)}$	Turn-ON Delay Time				20	ns	V_{DD} = 25V I_D = 100mA R_{GEN} = 25Ω
t_r	Rise Time				20		
$t_{d(OFF)}$	Turn-OFF Delay Time				65		
t_f	Fall Time				65		
V_{SD}	Diode Forward Voltage Drop				1.2	V	V_{GS} = 0V, I_{SD} = 160mA

Notes:

1. All D.C. parameters 100% tested at 25°C unless otherwise stated. (Pulse test: 300μs pulse, 2% duty cycle.)
2. All A.C. parameters sample tested.
3. See TN2540 data sheet for characteristic curves.

Switching Waveforms and Test Circuit





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