VN0540
– OBSOLETE –

N-Channel Enhancement-Mode Vertical DMOS FETs

Ordering Information

BV_{DSS} / BV_{DGS}	$R_{DS(ON)}$ (max)	$I_{D(ON)}$ (min)	Order Number / Package		
			TO-39	TO-92	Die†
350V	35Ω	250mA	VN0535N2	VN0535N3	VN0535ND
400V	35Ω	250mA	—	VN0540N3	VN0540ND

† MIL visual screening available

7

High Reliability Devices

See pages 5-4 and 5-5 for MILITARY STANDARD Process Flows and Ordering Information.

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

Applications

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

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

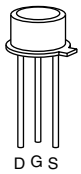
* Distance of 1.6 mm from case for 10 seconds.

Advanced DMOS Technology

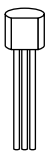
These enhancement-mode (normally-off) transistors utilize a vertical DMOS structure and Supertex's well-proven silicon-gate manufacturing process. This combination produces devices with the power handling capabilities of bipolar transistors and with the high input impedance and positive temperature coefficient 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.

Package Options



TO-39
Case: DRAIN



TO-92

Note: See Package Outline section for dimensions.

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}
TO-39	250mA	500mA	6.0W	20.8	125	250mA	500mA
TO-92	100mA	400mA	1.0W	125	170	100mA	400mA

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

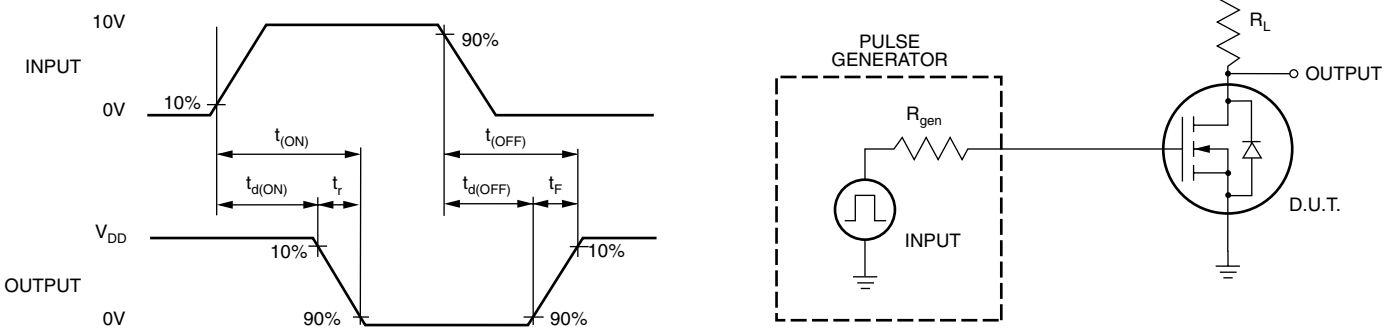
VN0540
– OBSOLETE –

Electrical Characteristics (@ 25°C unless otherwise specified)

Symbol	Parameter		Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	VN0540	400			V	V_{GS} = 0V, I_D = 1mA
		VN0535	350				
$V_{GS(th)}$	Gate Threshold Voltage		2		4	V	V_{GS} = V_{DS}, I_D = 1mA
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature			-3.5	-4.5	mV/°C	V_{GS} = V_{DS}, I_D = 1mA
I_{GSS}	Gate Body Leakage				100	nA	V_{GS} = ±20V, V_{DS} = 0V
I_{DSS}	Zero Gate Voltage Drain Current				10	µA	V_{GS} = 0V, V_{DS} = Max Rating
					500		V_{GS} = 0V, V_{DS} = 0.8 Max Rating T_A = 125°C
$I_{D(ON)}$	ON-State Drain Current			300		mA	V_{GS} = 5V, V_{DS} = 25V
			250	340			V_{GS} = 10V, V_{DS} = 25V
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance			30		Ω	V_{GS} = 5V, I_D = 20mA
				25	35		V_{GS} = 10V, I_D = 0.1A
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature			0.9	1.5	%/°C	V_{GS} = 10V, I_D = 0.1A
G_{FS}	Forward Transconductance		100	180		m℧	V_{DS} = 25V, I_D = 0.1A
C_{ISS}	Input Capacitance			45	55	pF	V_{GS} = 0V, V_{DS} = 25V f = 1 MHz
C_{OSS}	Common Source Output Capacitance			8	10		
C_{RSS}	Reverse Transfer Capacitance			2	5		
$t_{d(ON)}$	Turn-ON Delay Time				10	ns	V_{DD} = 25V, I_D = 250mA R_{GEN} = 25Ω
t_r	Rise Time				10		
$t_{d(OFF)}$	Turn-OFF Delay Time				10		
t_f	Fall Time				10		
V_{SD}	Diode Forward Voltage Drop			0.8		V	V_{GS} = 0V, I_{SD} = 0.5A
t_{rr}	Reverse Recovery Time			400		ns	V_{GS} = 0V, I_{SD} = 0.5A

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.

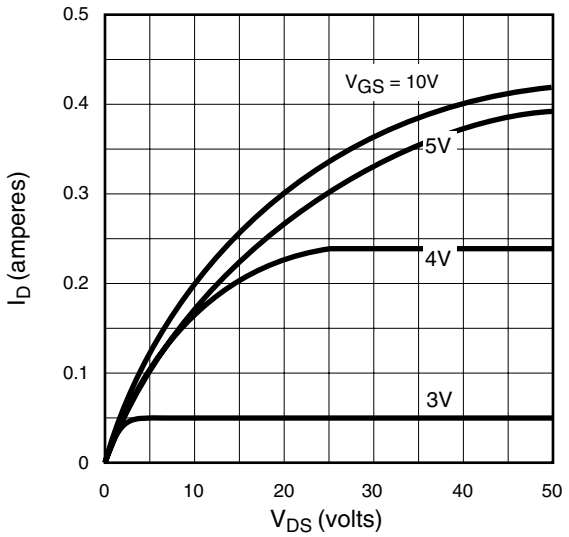
Switching Waveforms and Test Circuit



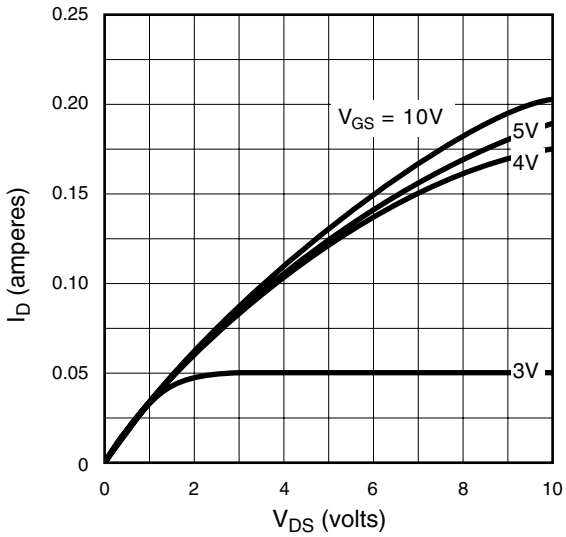
Typical Performance Curves

VN0540
– OBSOLETE –

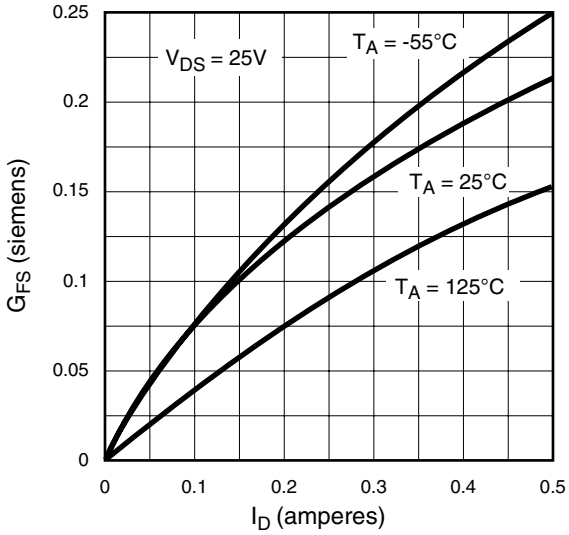
Output Characteristics



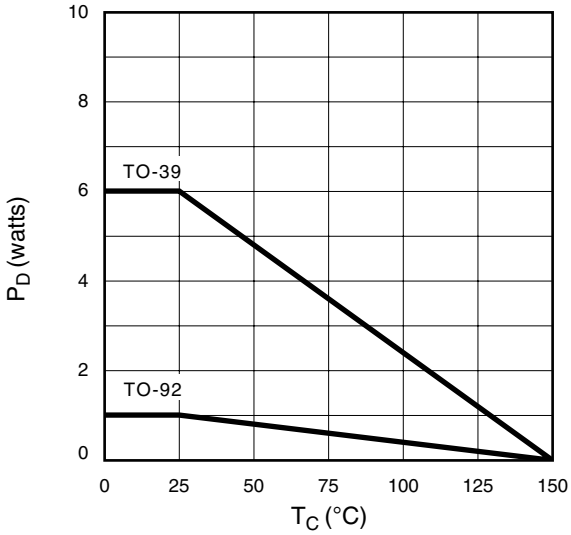
Saturation Characteristics



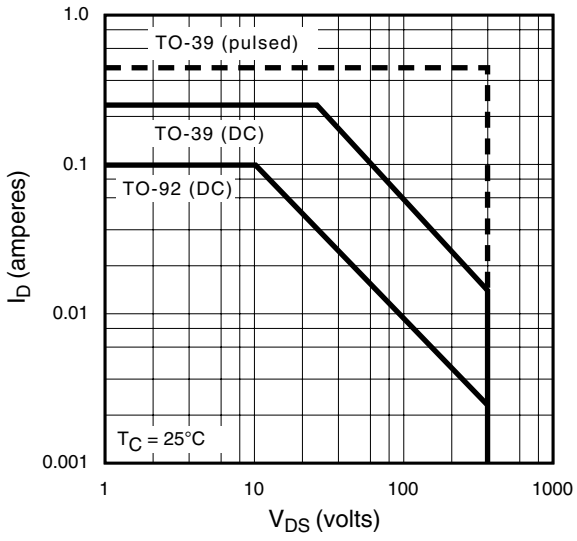
Transconductance vs. Drain Current



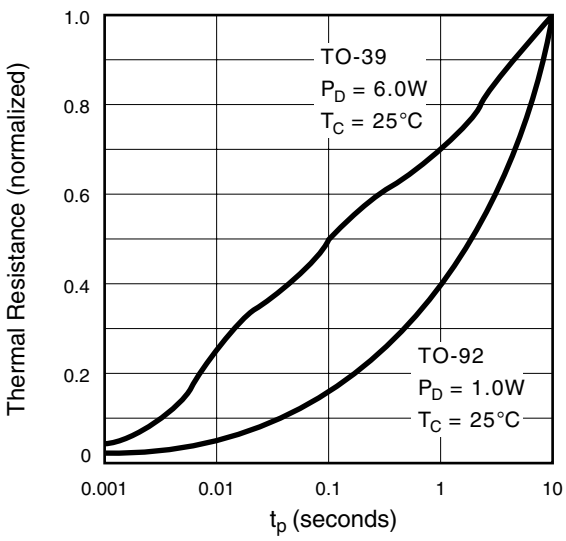
Power Dissipation vs. Case Temperature



Maximum Rated Safe Operating Area



Thermal Response Characteristics

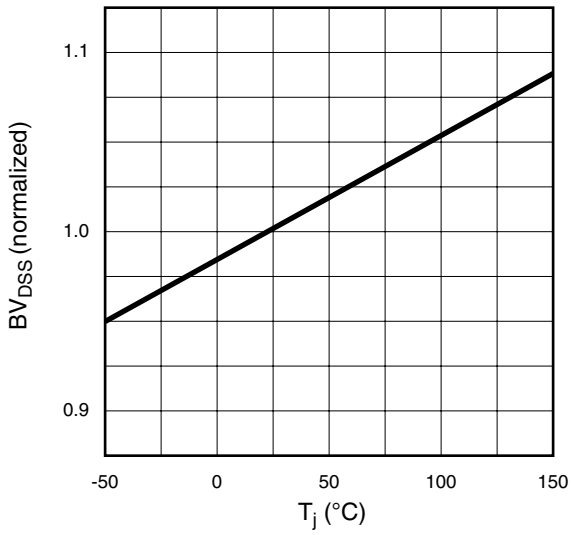


7

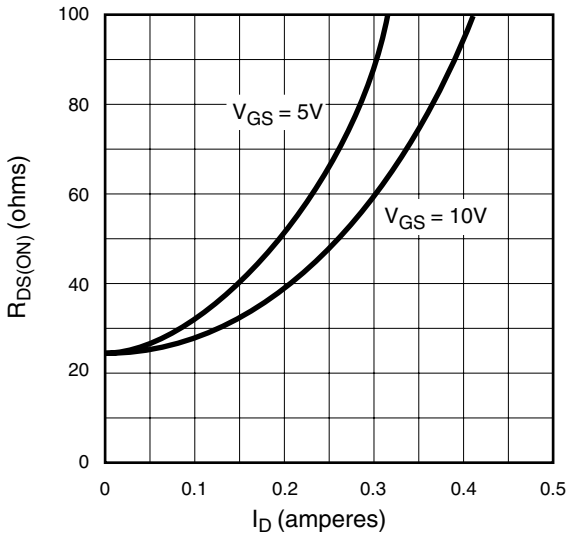
Typical Performance Curves

VN0540
– OBSOLETE –

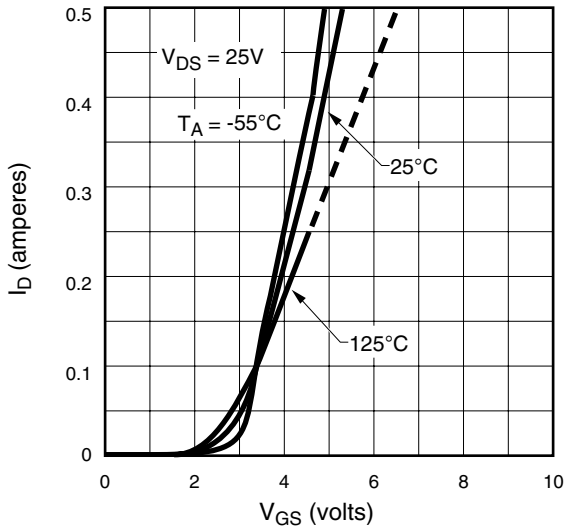
BVDSS Variation with Temperature



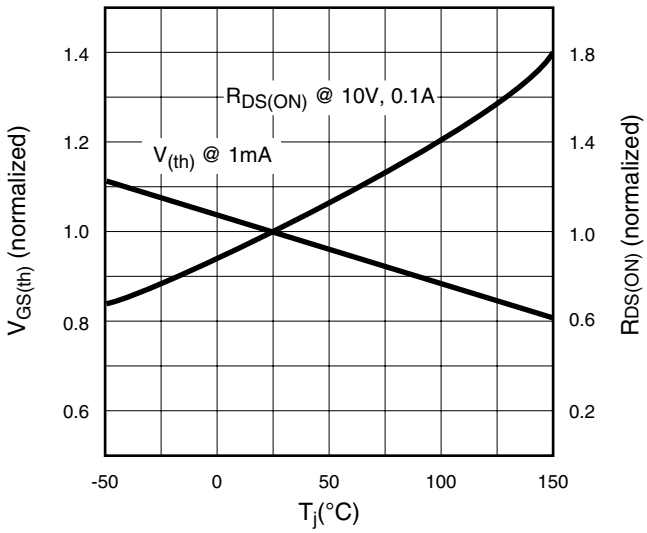
On-Resistance vs. Drain Current



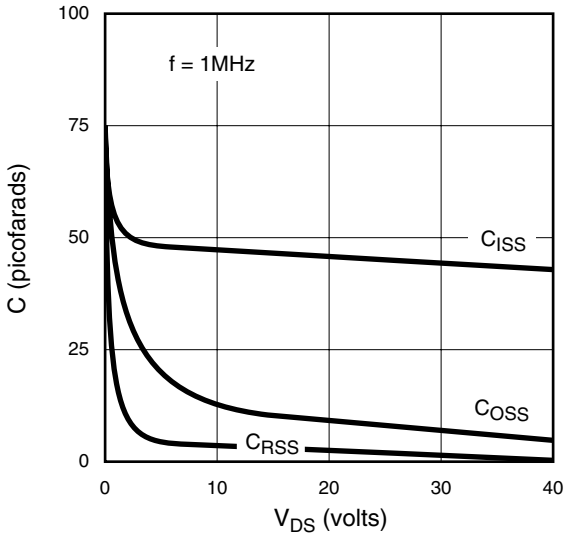
Transfer Characteristics



$V_{(th)}$ and R_{DS} Variation with Temperature



Capacitance vs. Drain-to-Source Voltage



Gate Drive Dynamic Characteristics