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-92	Die†
350V	10Ω	0.75A	VN0635N3	VN0635ND
400V	10Ω	0.75A	VN0640N3	VN0640ND

† MIL visual screening available

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-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-92	0.25A	1.5A	1W	125	170	0.25A	1.5A

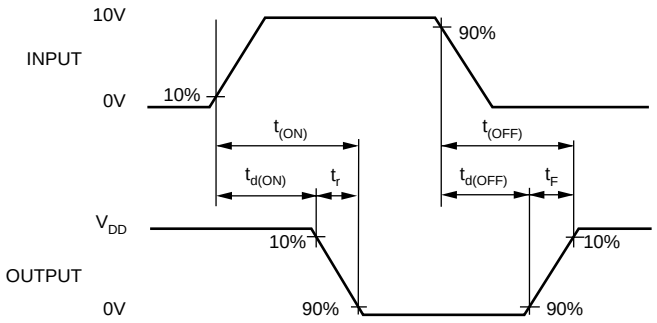
* I_D (continuous) is limited by max rated T_j.

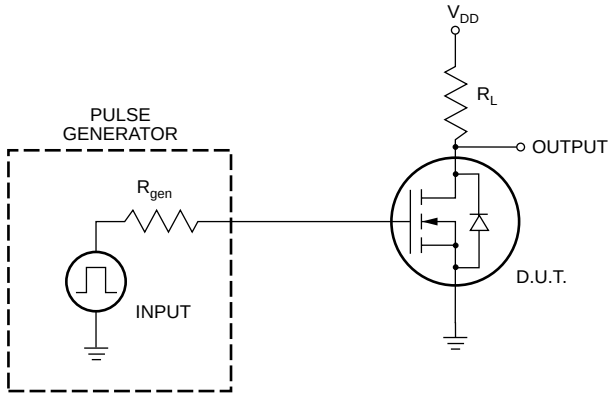
Electrical Characteristics (@ 25°C unless otherwise specified)

Symbol	Parameter		Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	VN0640	400			V	V_{GS} = 0V, I_D = 2mA
		VN0635	350				
$V_{GS(th)}$	Gate Threshold Voltage		1.0		4.0	V	V_{GS} = V_{DS}, I_D = 2mA
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature				-4.0	mV/°C	V_{GS} = V_{DS}, I_D = 2mA
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
					1	mA	V_{GS} = 0V, V_{DS} = 0.8 Max Rating, T_A = 125°C
$I_{D(ON)}$	ON-State Drain Current			0.6		A	V_{GS} = 5V, V_{DS} = 25V
			0.75				V_{GS} = 10V, V_{DS} = 25V
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance			8.0		Ω	V_{GS} = 5V, I_D = 100mA
				8.0	10		V_{GS} = 10V, I_D = 500mA
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature				0.75	%/°C	V_{GS} = 10V, I_D = 500mA
G_{FS}	Forward Transconductance		100	160		m℧	V_{DS} = 25V, I_D = 500mA
C_{ISS}	Input Capacitance			105	130	pF	V_{GS} = 0V, V_{DS} = 25V, f = 1 MHz
C_{OSS}	Common Source Output Capacitance			25	75		
C_{RSS}	Reverse Transfer Capacitance			10	20		
$t_{d(ON)}$	Turn-ON Delay Time				10	ns	V_{DD} = 25V, I_D = 0.5A, R_{GEN} = 25Ω
t_r	Rise Time				10		
$t_{d(OFF)}$	Turn-OFF Delay Time				20		
t_f	Fall Time				10		
V_{SD}	Diode Forward Voltage Drop				1.8	V	V_{GS} = 0V, I_{SD} = 0.5A
t_{rr}	Reverse Recovery Time			300		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.

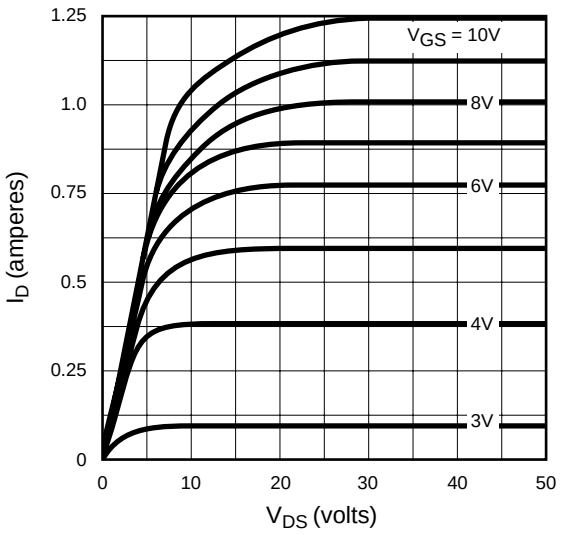
Switching Waveforms and Test Circuit



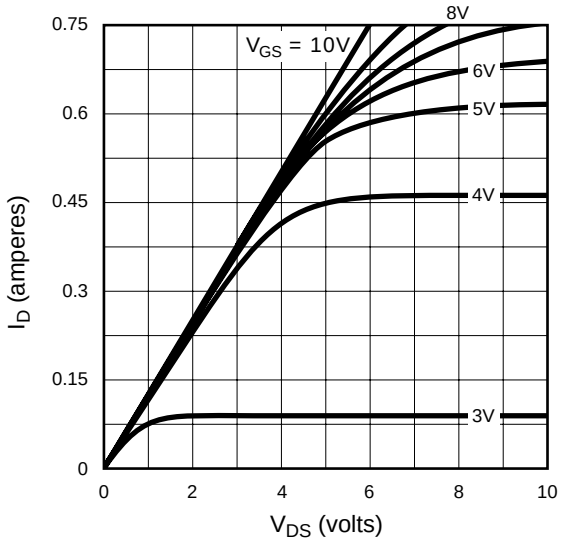


Typical Performance Curves

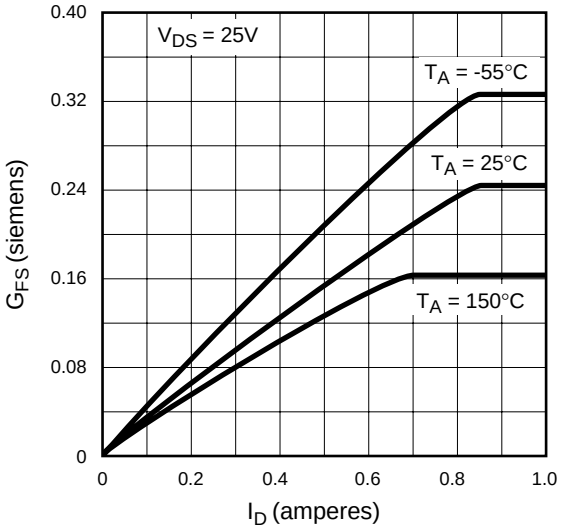
Output Characteristics



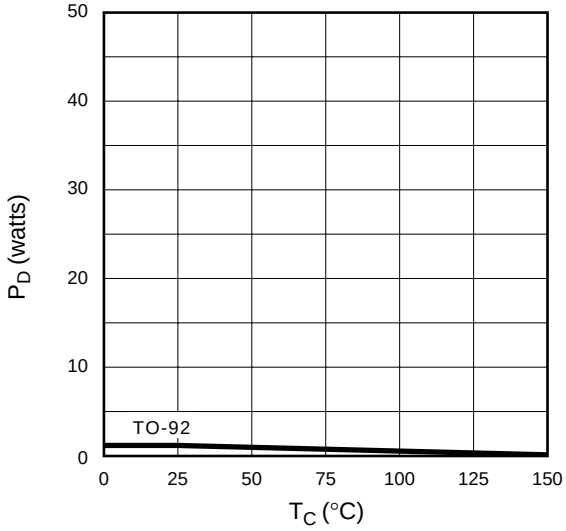
Saturation Characteristics



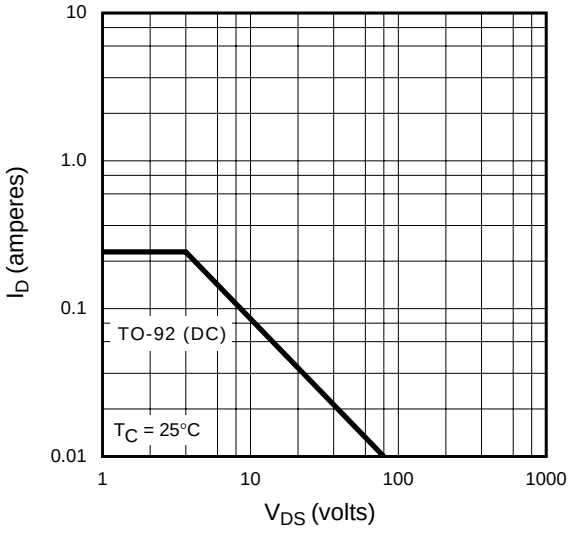
Transconductance vs. Drain Current



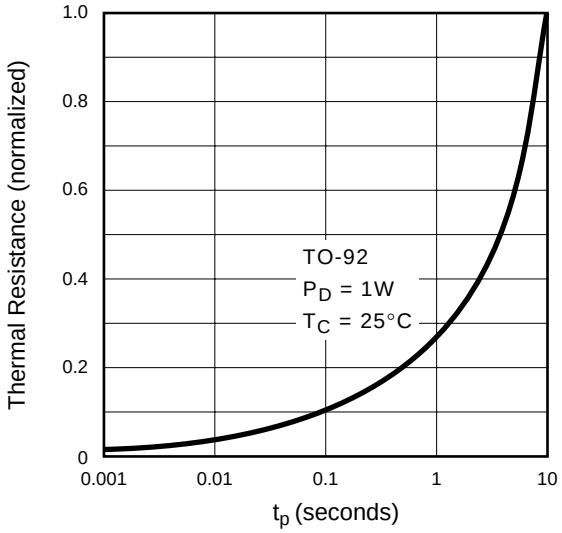
Power Dissipation vs. Case Temperature



Maximum Rated Safe Operating Area

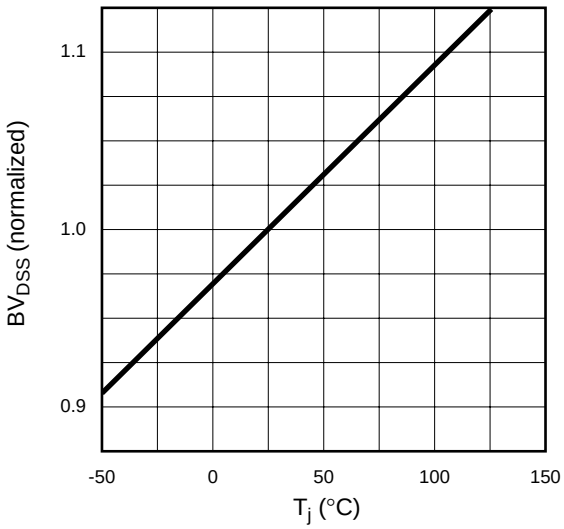


Thermal Response Characteristics

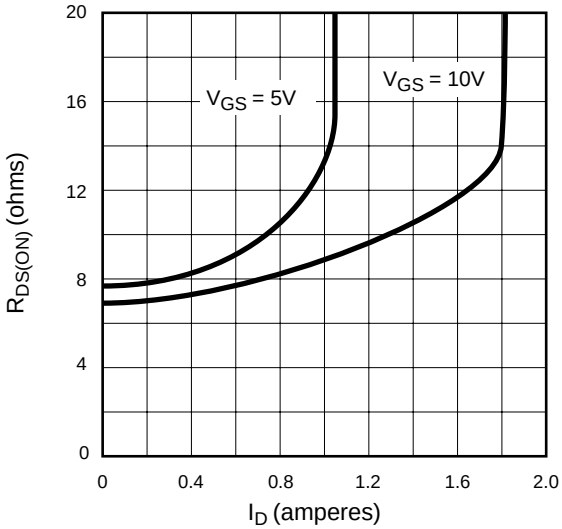


Typical Performance Curves

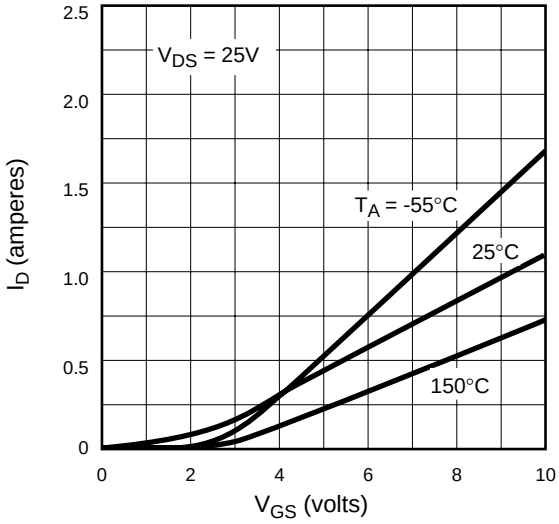
BV_{DSS} Variation with Temperature



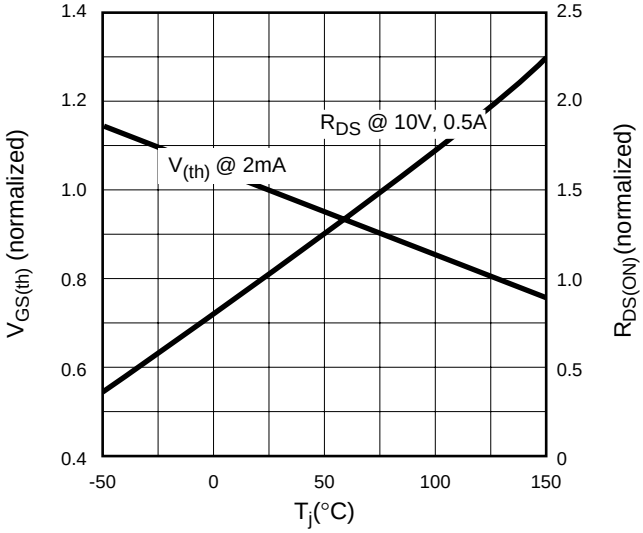
On-Resistance vs. Drain Current



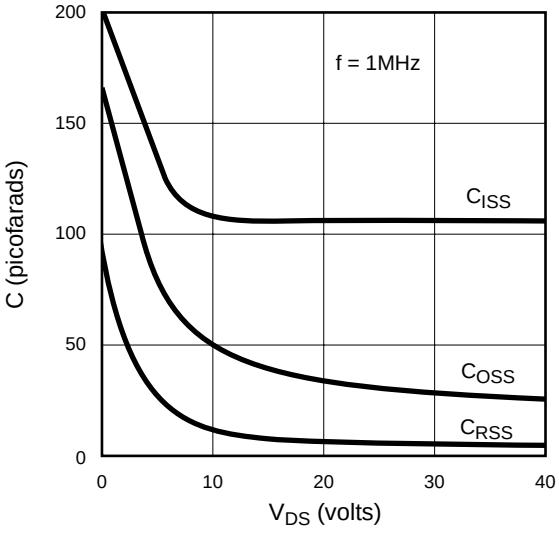
Transfer Characteristics



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



Capacitance vs. Drain-to-Source Voltage



Gate Drive Dynamic Characteristics

