

**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 <sup>†</sup>
60V	0.35Ω	8A	VN2206N2	VN2206N3	VN2206ND
100V	0.35Ω	8A	VN2210N2	VN2210N3	VN2210ND

<sup>†</sup> 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

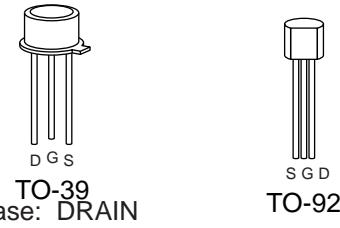
**Advanced DMOS Technology**

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
- Switches
- Power supply circuits
- Drivers (relays, hammers, solenoids, lamps, memories, displays, bipolar transistors, etc.)

**Package Options****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.

Note: See Package Outline section for dimensions.

## Thermal Characteristics

Package	$I_D$ (continuous)*	$I_D$ (pulsed)	Power Dissipation @ $T_C = 25^\circ\text{C}$	$\theta_{jc}$ °C/W	$\theta_{ja}$ °C/W	$I_{DR}^*$	$I_{DRM}$
TO-92	1.2A	8.0A	1.0W	125	170	1.2A	8.0A
TO-39	1.7A	10.0A	6.0W	21	125	1.7A	10.0A

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

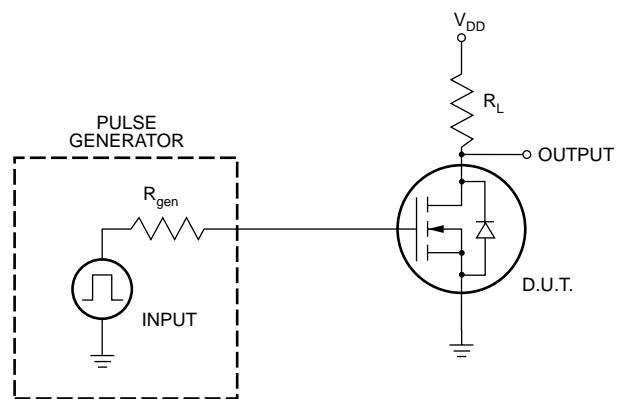
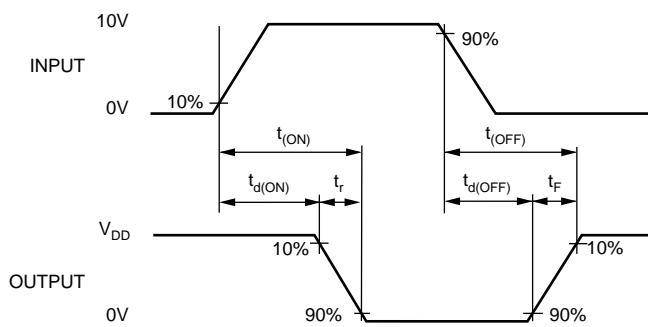
## Electrical Characteristics (@ 25°C unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	VN2210	100		V	$V_{GS} = 0\text{V}, I_D = 10\text{mA}$
		VN2206	60			
$V_{GS(th)}$	Gate Threshold Voltage	0.8		2.4	V	$V_{GS} = V_{DS}, I_D = 10\text{mA}$
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature		-4.3	-5.5	mV/°C	$V_{GS} = V_{DS}, I_D = 10\text{mA}$
$I_{GSS}$	Gate Body Leakage		1	100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
$I_{DSS}$	Zero Gate Voltage Drain Current			50	μA	$V_{GS} = 0\text{V}, V_{DS} = \text{Max Rating}$
				10	mA	$V_{GS} = 0\text{V}, V_{DS} = 0.8 \text{ Max Rating}$ $T_A = 125^\circ\text{C}$
$I_{D(ON)}$	ON-State Drain Current	3	4.5		A	$V_{GS} = 5\text{V}, V_{DS} = 25\text{V}$
		8	17			$V_{GS} = 10\text{V}, V_{DS} = 25\text{V}$
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance		0.4	0.5	Ω	$V_{GS} = 5\text{V}, I_D = 1\text{A}$
			0.27	0.35		$V_{GS} = 10\text{V}, I_D = 4\text{A}$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature		0.85	1.2	%/°C	$V_{GS} = 10\text{V}, I_D = 4\text{A}$
$G_{FS}$	Forward Transconductance	1.5	2.0		Ω	$V_{DS} = 25\text{V}, I_D = 2\text{A}$
$C_{ISS}$	Input Capacitance	300	500	pF		$V_{GS} = 0\text{V}, V_{DS} = 25\text{V}$ $f = 1 \text{ MHz}$
$C_{OSS}$	Common Source Output Capacitance	125	200			
$C_{RSS}$	Reverse Transfer Capacitance	50	65			
$t_{d(ON)}$	Turn-ON Delay Time		10	15	ns	$V_{DD} = 25\text{V}$ $I_D = 2\text{A}$ $R_{GEN} = 10\Omega$
$t_r$	Rise Time		10	15		
$t_{d(OFF)}$	Turn-OFF Delay Time		30	50		
$t_f$	Fall Time		30	50		
$V_{SD}$	Diode Forward Voltage Drop		1.0	1.6	V	$V_{GS} = 0\text{V}, I_{SD} = 4\text{A}$
$t_{rr}$	Reverse Recovery Time		500		ns	$V_{GS} = 0\text{V}, I_{SD} = 1\text{A}$

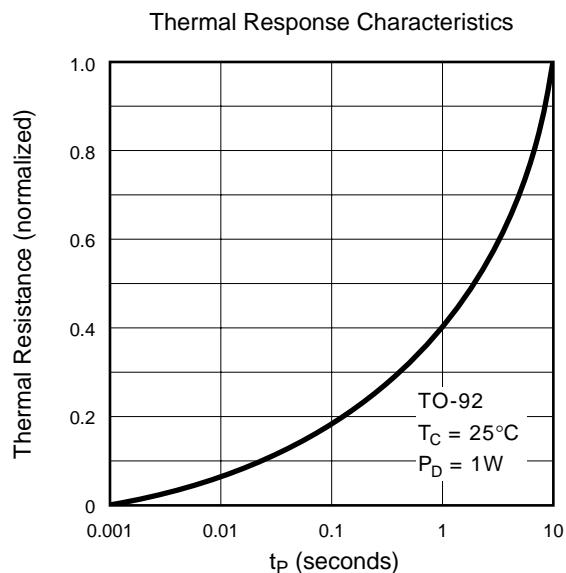
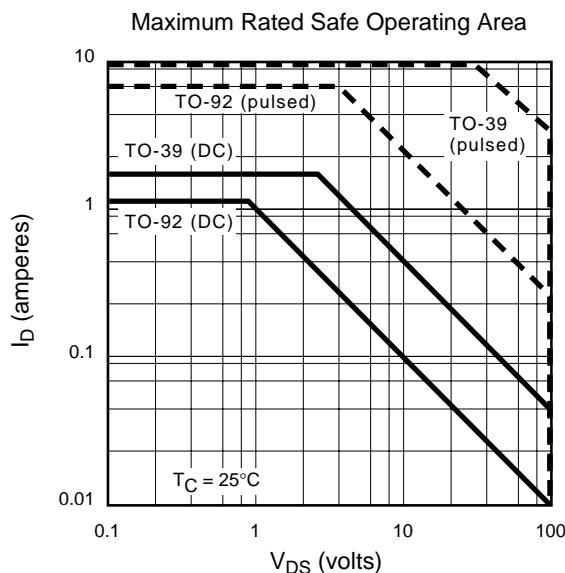
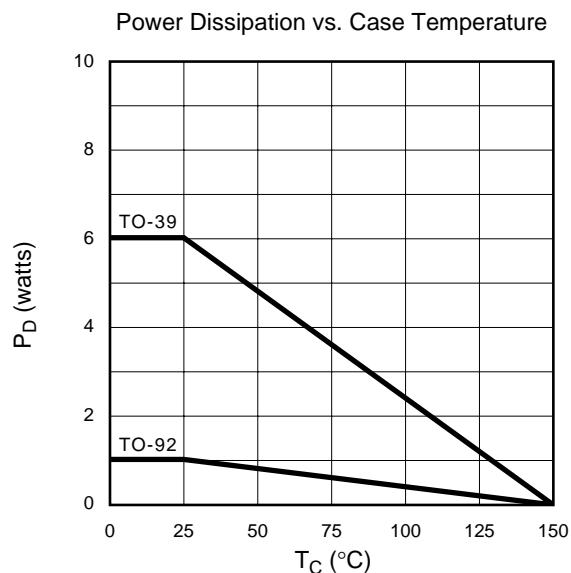
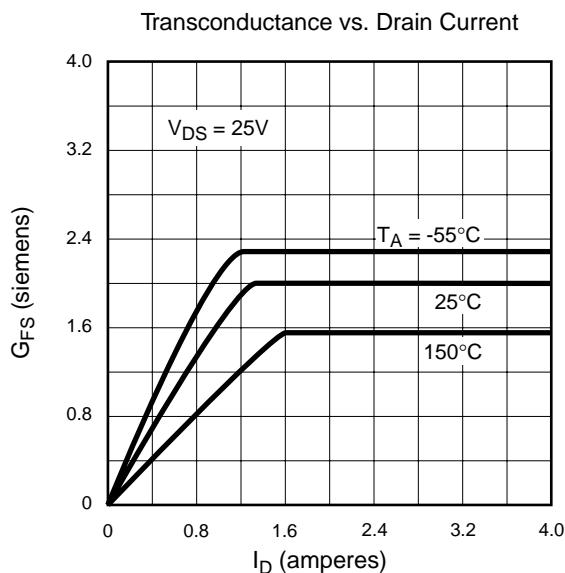
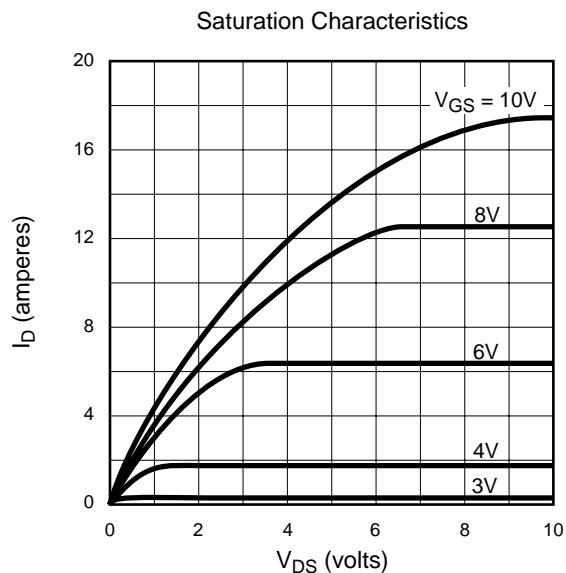
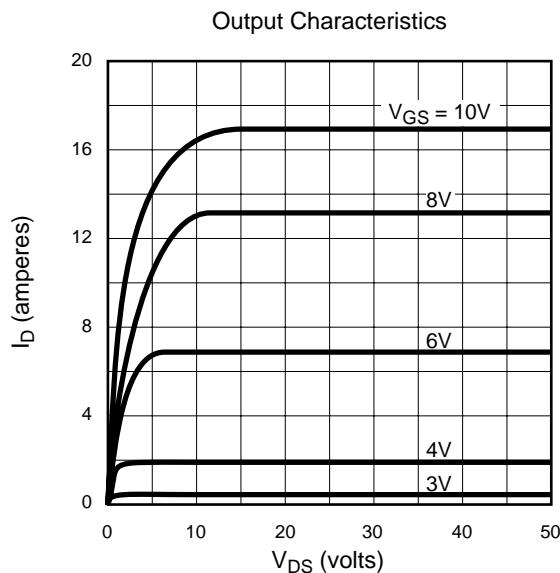
### Notes:

- All D.C. parameters 100% tested at 25°C unless otherwise stated. (Pulse test: 300μs pulse, 2% duty cycle.)
- All A.C. parameters sample tested.

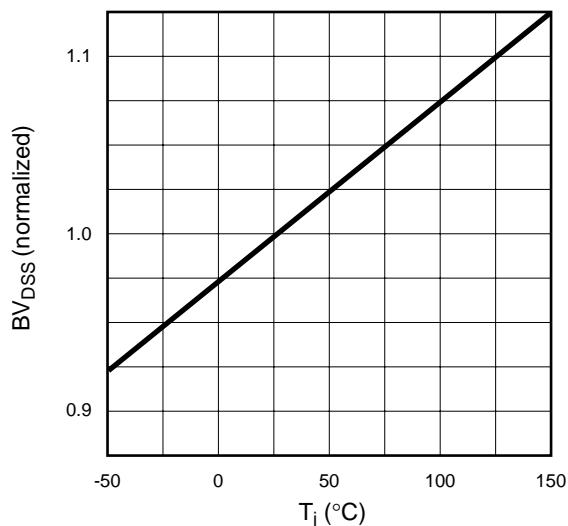
## Switching Waveforms and Test Circuit



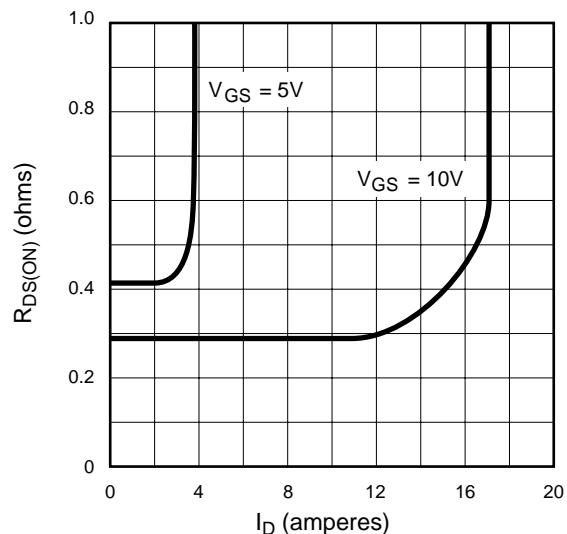
## Typical Performance Curves



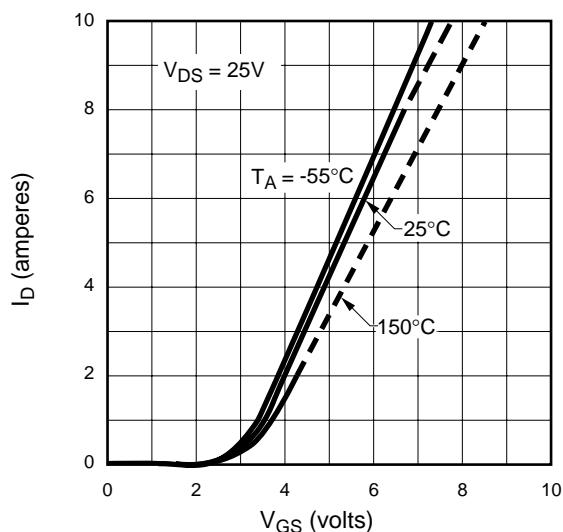
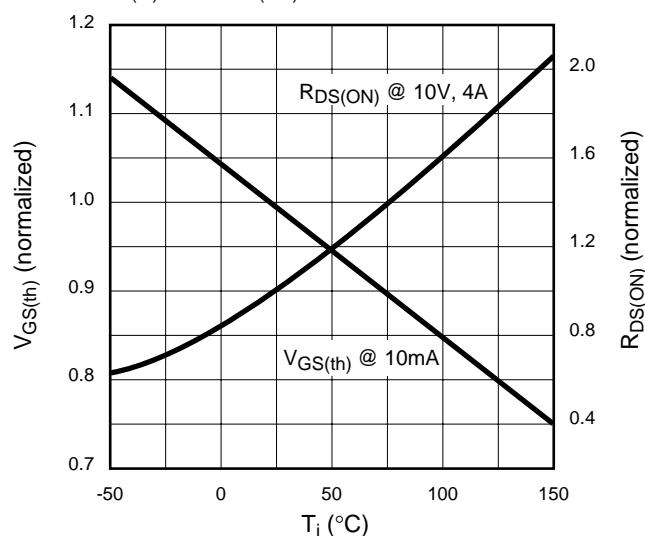
## Typical Performance Curves

BV<sub>DSS</sub> Variation with Temperature

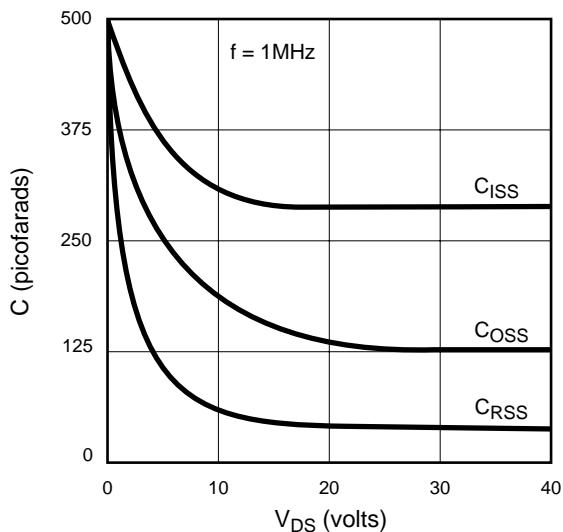
On-Resistance vs. Drain Current



Transfer Characteristics

V<sub>GS(th)</sub> and R<sub>DS(ON)</sub> Variation with Temperature

Capacitance vs. Drain-to-Source Voltage



Gate Drive Dynamic Characteristics

