Supertex inc.

VN2222
VN2224

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	20-Pin C-Dip
220V	1.25Ω	5.0A	—	VN2222NC
240V	1.25Ω	5.0A	VN2224N3	—

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

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

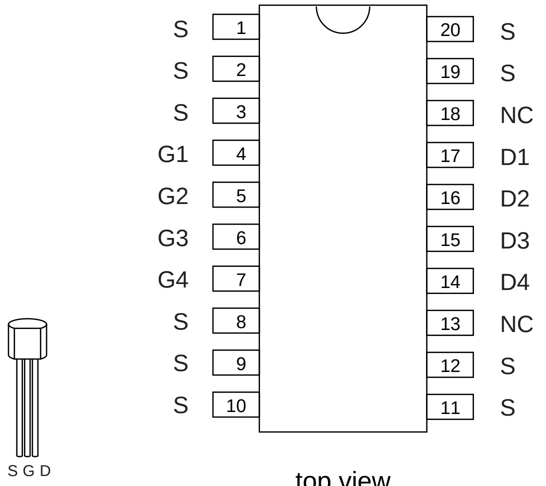
* Distance of 1.6 mm from case for 10 seconds.

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

top view
20-pin Ceramic DIP

Note: See Package Outline section for dimensions.

11/12/01

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	540mA	5.0A	1.0W	125	170	540mA	5.0A

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

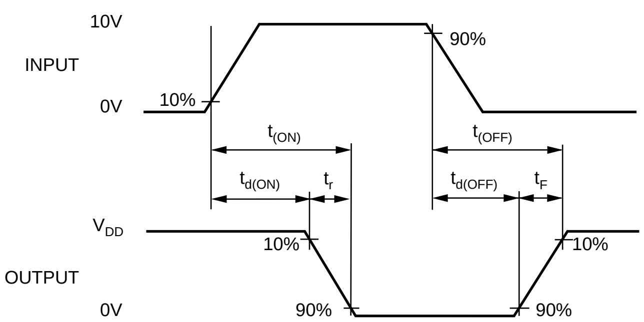
Electrical Characteristics (@ 25°C unless otherwise specified)

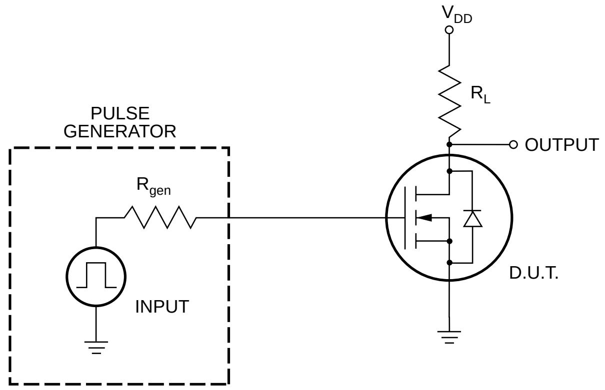
Symbol	Parameter		Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	VN2224	240			V	V_{GS} = 0V, I_D = 5mA
		VN2222	220				
$V_{GS(th)}$	Gate Threshold Voltage		1.0		3.0	V	$V_{GS} = V_{DS}$, I_D = 5mA
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature			-4	-5	mV/°C	$V_{GS} = V_{DS}$, I_D = 5mA
I_{GSS}	Gate Body Leakage			1	100	nA	V_{GS} = ±20V, V_{DS} = 0V
I_{DSS}	Zero Gate Voltage Drain Current				50	µA	V_{GS} = 0V, V_{DS} = Max Rating
					5	mA	V_{GS} = 0V, V_{DS} = 0.8 Max Rating T_A = 125°C
$I_{D(ON)}$	ON-State Drain Current		2			A	V_{GS} = 5V, V_{DS} = 25V
			5	10			V_{GS} = 10V, V_{DS} = 25V
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance			1.0	1.5	Ω	V_{GS} = 5V, I_D = 2A
				0.9	1.25		V_{GS} = 10V, I_D = 2A
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature			1.0	1.4	%/°C	V_{GS} = 10V, I_D = 2A
G_{FS}	Forward Transconductance		1.0	2.2		℧	V_{DS} = 25V, I_D = 2A
C_{ISS}	Input Capacitance			300	350	pF	V_{GS} = 0V, V_{DS} = 25V f = 1 MHz
C_{OSS}	Common Source Output Capacitance			85	150		
C_{RSS}	Reverse Transfer Capacitance			20	35		
$t_{d(ON)}$	Turn-ON Delay Time			6	15	ns	V_{DD} = 25V I_D = 2A R_{GEN} = 10Ω
t_r	Rise Time			16	25		
$t_{d(OFF)}$	Turn-OFF Delay Time			65	90		
t_f	Fall Time			30	60		
V_{SD}	Diode Forward Voltage Drop			0.8	1.0	V	V_{GS} = 0V, I_{SD} = 100mA
t_{rr}	Reverse Recovery Time			500		ns	V_{GS} = 0V, I_{SD} = 1A

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.

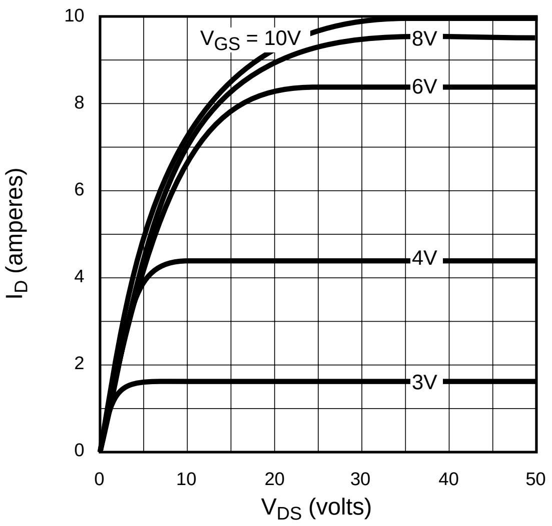
Switching Waveforms and Test Circuit



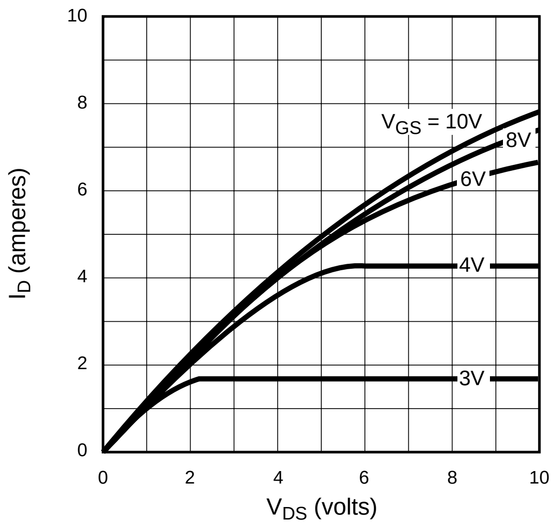


Typical Performance Curves

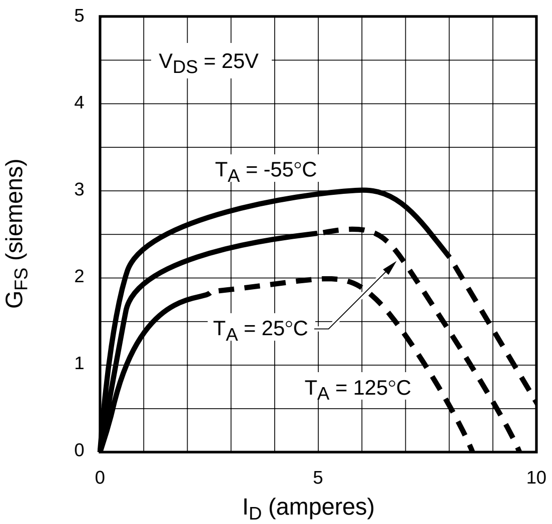
Output Characteristics



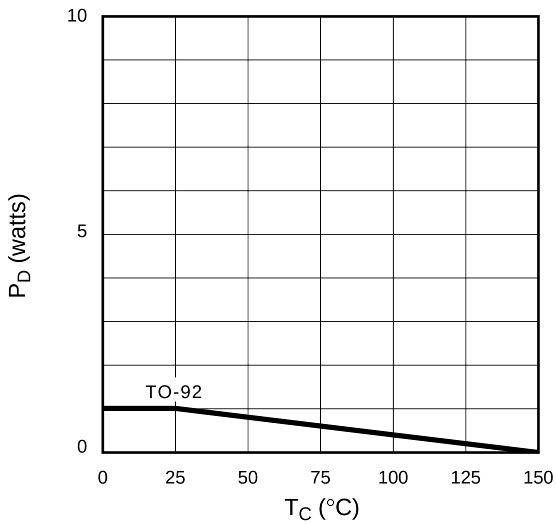
Saturation Characteristics



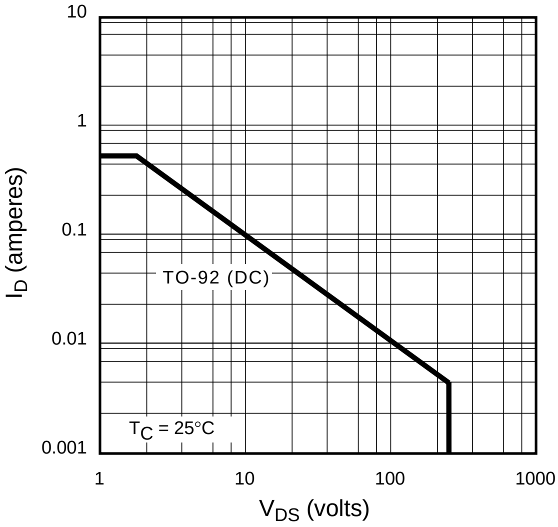
Transconductance vs. Drain Current



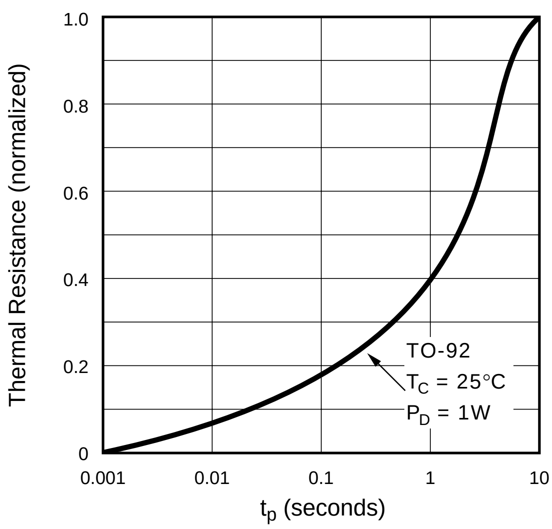
Power Dissipation vs. Case Temperature



Maximum Rated Safe Operating Area

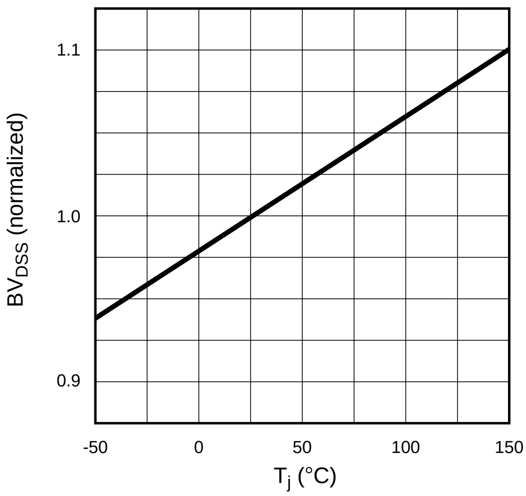


Thermal Response Characteristics

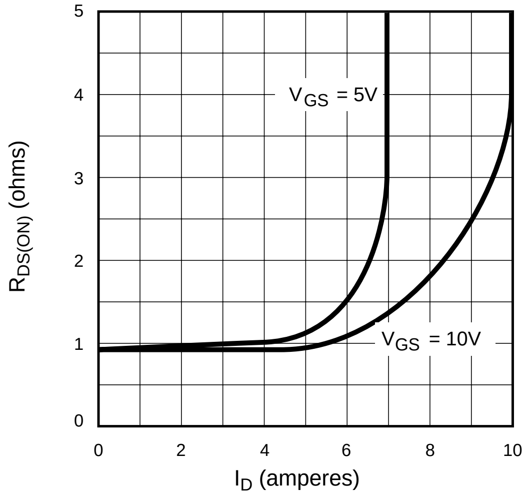


Typical Performance Curves

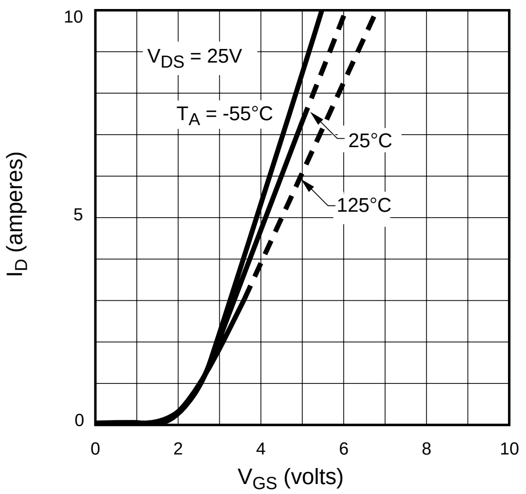
BV_{DSS} Variation with Temperature



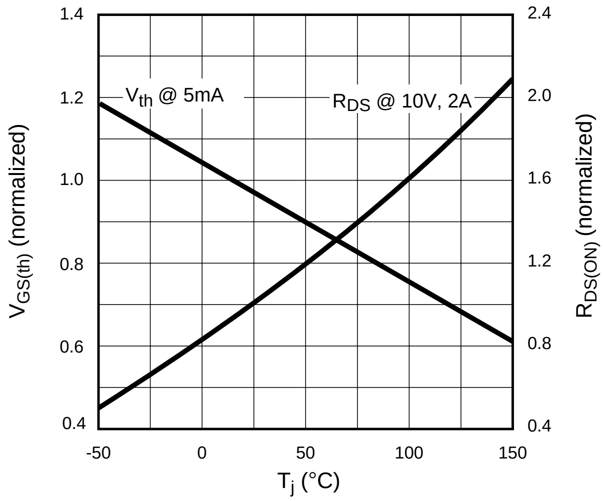
On-Resistance vs. Drain Current



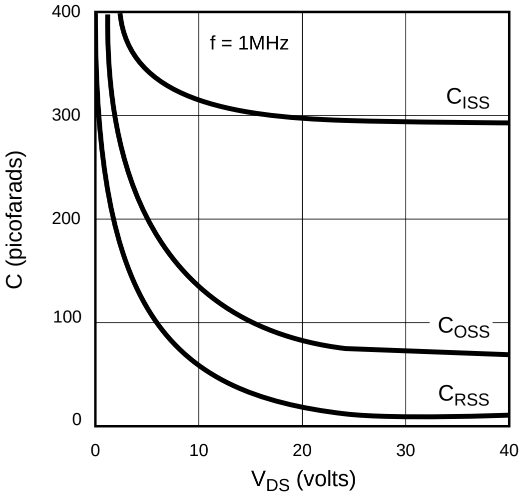
Transfer Characteristics



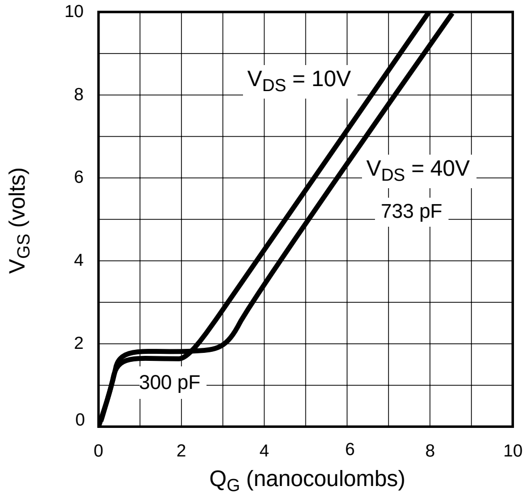
$V_{(th)}$ and R_{DS} Variation with Temperature



Capacitance vs. Drain-to-Source Voltage



Gate Drive Dynamic Characteristics



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