



VN03F

T-39-11



N-Channel Enhancement-Mode Vertical DMOS Power FETs

Ordering Information

$BV_{DSS} /$ BV_{DGS}	$R_{DS(ON)}$ (max)	$I_{D(ON)}$ (min)	Order Number / Package		
			TO-3	TO-220	Dice
550V	6Ω	1.5A	VN0335N1	VN0335N5	VN0335ND
600V	6Ω	1.5A	VN0360N1	VN0360N5	VN0360ND

Features

- ☐ Freedom 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) power 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 negative temperature coefficient inherent in MOS devices. Characteristic of all MOS structures, these devices are free from thermal runaway and thermally-induced secondary breakdown.

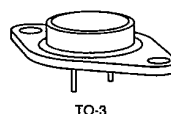
Supertex Vertical DMOS Power FETs are ideally suited to a wide range of switching and amplifying applications where high breakdown voltage, high input impedance, low input capacitance, and fast switching speeds are desired.

Applications

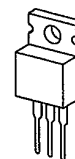
- ☐ Motor control
- ☐ Converters
- ☐ Amplifiers
- ☐ Switches
- ☐ Power supply circuits
- ☐ Drivers (Relays, Hammers, Solenoids, Lamps, Memories, Displays, Bipolar Transistors, etc.)

Package Options

(Note 1)



TO-3



TO-220

Note 1: See Package Outline section for discrete pinouts.

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

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Package	I_D (continuous)*	I_D (pulsed)*	Power Dissipation @ $T_C = 25^\circ\text{C}$	θ_{JA} $^\circ\text{C/W}$	θ_{JB} $^\circ\text{C/W}$	I_{DR}	I_{DRM} *
TO-3	2.5A	6A	100W	1.25	30	2.5A	6A
TO-220	1.5A	6A	50W	40	40	1.5A	6A

* I_D (continuous) is limited by max rated T_J .Electrical Characteristics (@ 25°C unless otherwise specified)

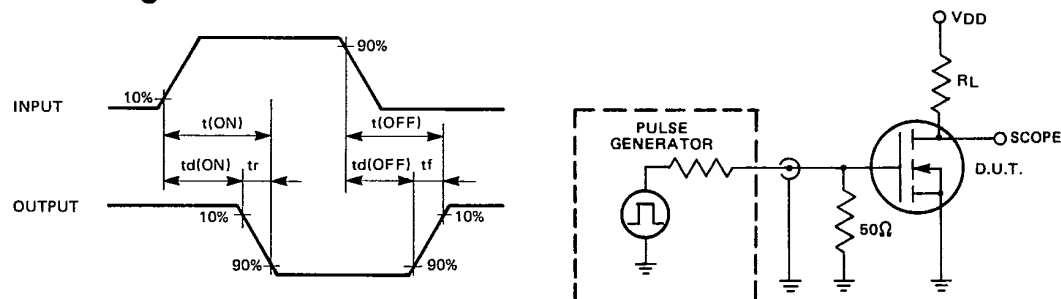
(Notes 1 and 2)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
BVDS	Drain-to-Source Breakdown Voltage	VN0360	600			$V_{GS} = 0, I_D = 10\text{mA}$
		VN0355	550			
VGS(th)	Gate Threshold Voltage	2		4	V	$V_{GS} = V_{DS}, I_D = 10\text{mA}$
$\Delta V_{GS}(\text{th})$	Change in $V_{GS}(\text{th})$ with Temperature		-4.8	-6.0	mV/ $^\circ\text{C}$	$V_{GS} = V_{DS}, I_D = 10\text{mA}$
IGSS	Gate Body Leakage			100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0$
IDSS	Zero Gate Voltage Drain Current			100	μA	$V_{GS} = 0, V_{DS} = \text{Max Rating}$
				2	mA	$V_{GS} = 0, V_{DS} = 0.8 \text{ Max Rating}$ $T_A = 125^\circ\text{C}$
ID(ON)	ON-State Drain Current		1.3		A	$V_{GS} = 5\text{V}, V_{DS} = 25\text{V}$
		1.5	3.0			$V_{GS} = 10\text{V}, V_{DS} = 25\text{V}$
RDS(ON)	Static Drain-to-Source ON-State Resistance		5.5		Ω	$V_{GS} = 5\text{V}, I_D = 0.25\text{A}$
			4.5	6.0		$V_{GS} = 10\text{V}, I_D = 0.5\text{A}$
$\Delta R_{DS}(\text{ON})$	Change in $R_{DS}(\text{ON})$ with Temperature		1	2	%/ $^\circ\text{C}$	$V_{GS} = 10\text{V}, I_D = 0.5\text{A}$
GFS	Forward Transconductance	0.5	1		S	$V_{DS} = 25\text{V}, I_D = 0.5\text{A}$
Ciss	Input Capacitance		550	650	pF	$V_{GS} = 0, V_{DS} = 25\text{V}$ $f = 1\text{MHz}$
COSS	Common Source Output Capacitance		75	125		
CRSS	Reverse Transfer Capacitance		25	50		
td(ON)	Turn-ON Delay Time		8	15	ns	$V_{DD} = 25\text{V}$ $I_D = 0.5\text{A}$ $R_S = 50\Omega$
tr	Rise Time		8	15		
td(OFF)	Turn-OFF Delay Time		65	100		
tf	Fall Time		12	25		
VSD	Diode Forward Voltage Drop		1.1	1.5	V	$V_{GS} = 0, I_{SD} = 5\text{A}$
trr	Reverse Recovery Time		450		ns	$V_{GS} = 0, I_{SD} = 5\text{A}$

Note 1: All D.C. parameters 100% tested at 25°C unless otherwise stated. (Pulse test: 300 μs pulse, 2% duty cycle.)

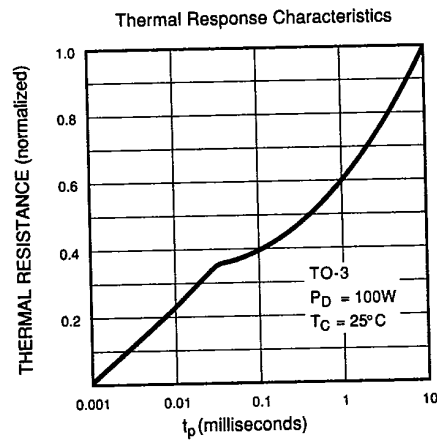
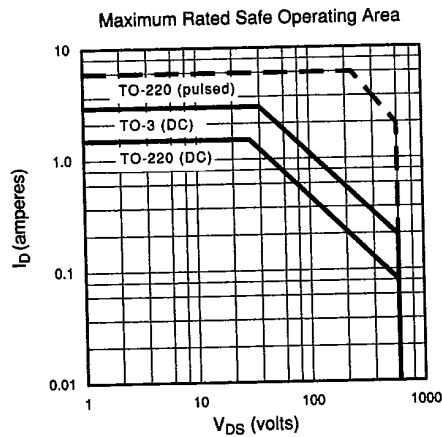
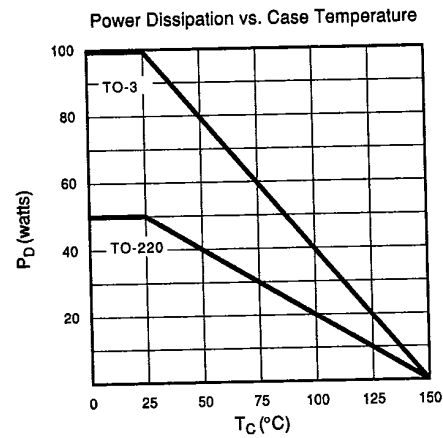
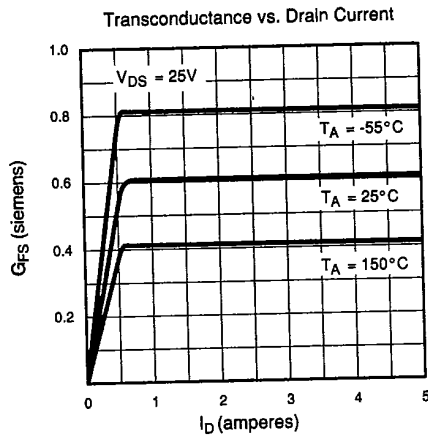
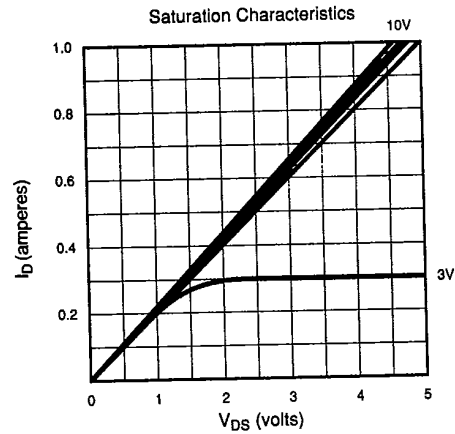
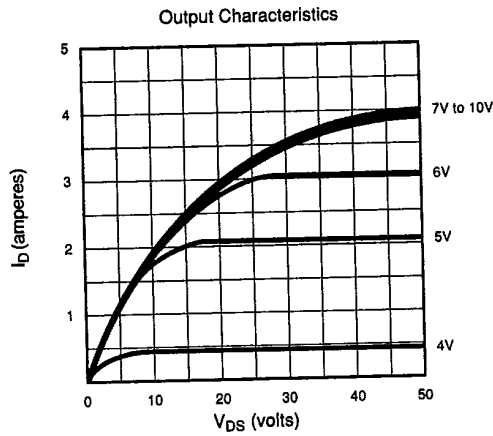
Note 2: All A.C. parameters sample tested.

Switching Waveforms and Test Circuit



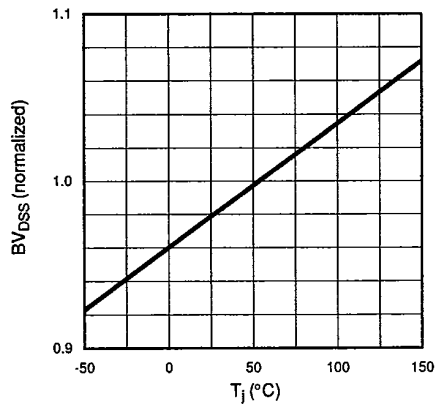
Typical Performance Curves

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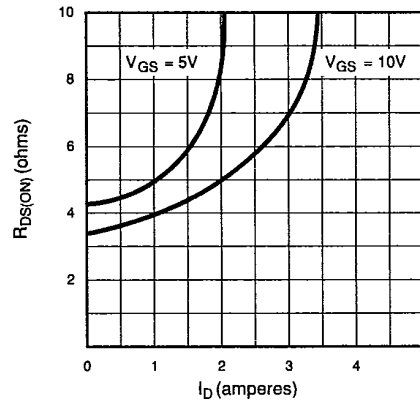


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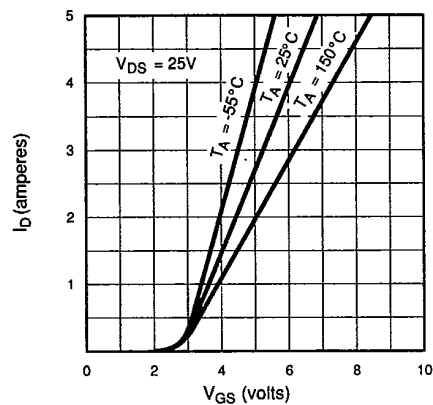
BV_{DSS} Variation with Temperature



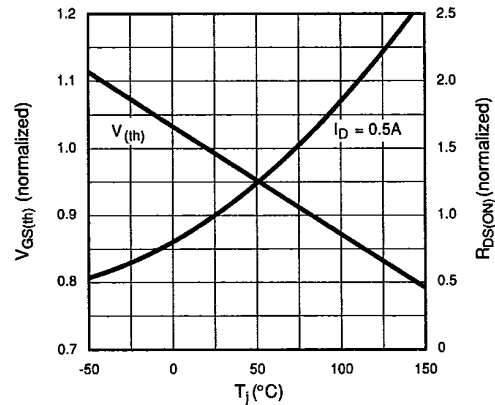
On-Resistance vs. Drain Current



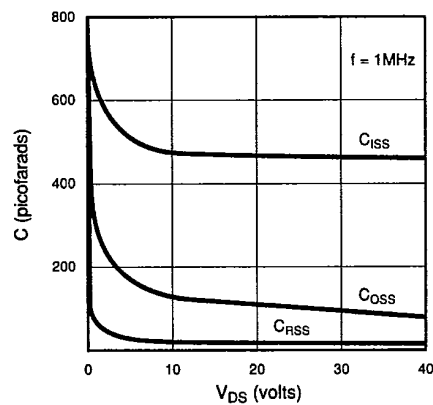
Transfer Characteristics



V_{th} and R_{DS} Variation with Temperature



Capacitance vs. Drain-to-Source Voltage



Gate Drive Dynamic Characteristics

