



VN11C

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-39	TO-220	Dice
160V	3 Ω	2.0A	VN1116N1	VN1116N2	VN1116N5	VN1116ND
200V	3 Ω	2.0A	VN1120N1	VN1120N2	VN1120N5	VN1120ND

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.)

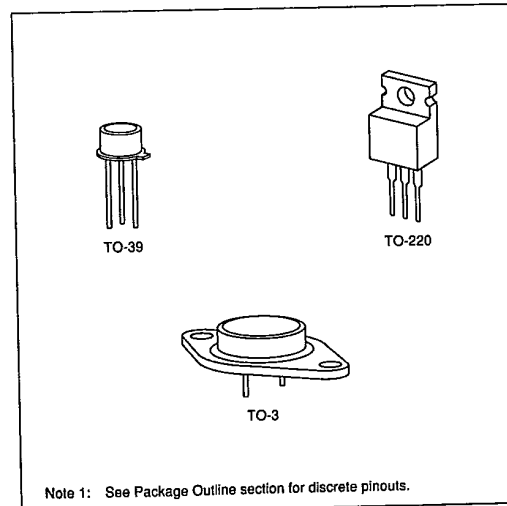
Absolute Maximum Ratings

Drain-to-Source Voltage	BV_{DSS}
Drain-to-Gate Voltage	BV_{DGS}
Gate-to-Source Voltage	$\pm 20V$
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

*Distance of 1.6 mm from case for 10 seconds.

Package Options

(Note 1)



Note 1: See Package Outline section for discrete pinouts.

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_{JC} $^\circ\text{C/W}$	I_{DR}	I_{DRM} *
TO-3	3A	4.5A	100W	9.1	1.25	3A	4.5A
TO-39	1A	2.5A	4W	33	31	1A	2.5A
TO-220	2A	3.5A	45W	11.4	2.7	2A	3.5A

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

Electrical Characteristics (@ 25°C unless otherwise specified)

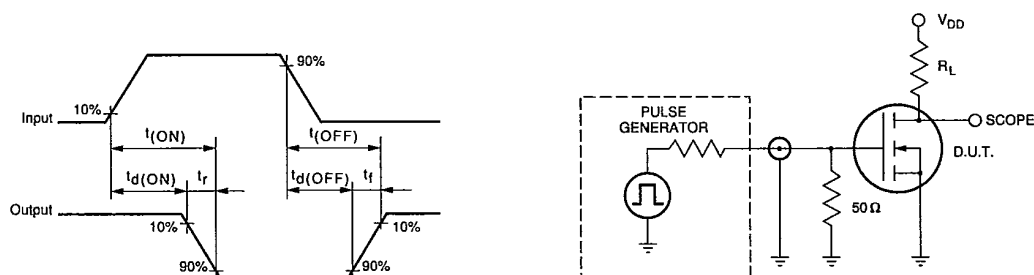
(Notes 1 and 2)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	VN1116 160 VN1120 200			V	$V_{GS} = 0, I_D = 5\text{mA}$
$V_{GS(th)}$	Gate Threshold Voltage	1		3	V	$V_{GS} = V_{DS}, I_D = 5\text{mA}$
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature		-3.5	-6	mV/ $^\circ\text{C}$	$V_{GS} = V_{DS}, I_D = 5\text{mA}$
I_{GSS}	Gate Body Leakage			100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0$
I_{DSS}	Zero Gate Voltage Drain Current			50 5	μA mA	$V_{GS} = 0, V_{DS} = \text{Max Rating}$ $V_{GS} = 0, V_{DS} = 0.8 \text{ Max Rating}$ $T_A = 125^\circ\text{C}$
$I_{D(ON)}$	ON-State Drain Current	1 2	1.5 2.5		A	$V_{GS} = 5\text{V}, V_{DS} = 25\text{V}$ $V_{GS} = 10\text{V}, V_{DS} = 25\text{V}$
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance		3.5 2.5	4 3	Ω	$V_{GS} = 5\text{V}, I_D = 0.5\text{A}$ $V_{GS} = 10\text{V}, I_D = 1\text{A}$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature		0.6	1	%/ $^\circ\text{C}$	$V_{GS} = 10\text{V}, I_D = 1\text{A}$
G_{FS}	Forward Transconductance	0.2	0.4		S	$V_{DS} = 25\text{V}, I_D = 0.5\text{A}$
C_{ISS}	Input Capacitance		300	350	pF	$V_{GS} = 0, V_{DS} = 25\text{V}$ $f = 1\text{MHz}$
C_{OSS}	Common Source Output Capacitance		75	150		
C_{RSS}	Reverse Transfer Capacitance		20	30		
$t_{d(ON)}$	Turn-ON Delay Time		20	30	ns	$V_{DD} = 25\text{V}$ $I_D = 2\text{A}$ $R_S = 50\Omega$
t_r	Rise Time		3	10		
$t_{d(OFF)}$	Turn-OFF Delay Time		32	40		
t_f	Fall Time		8	15		
V_{SD}	Diode Forward Voltage Drop		0.7	1.0	V	$V_{GS} = 0, I_{SD} = 100\text{mA}$
t_{rr}	Reverse Recovery Time		400		ns	$V_{GS} = 0, I_{SD} = 0.1\text{A}$

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

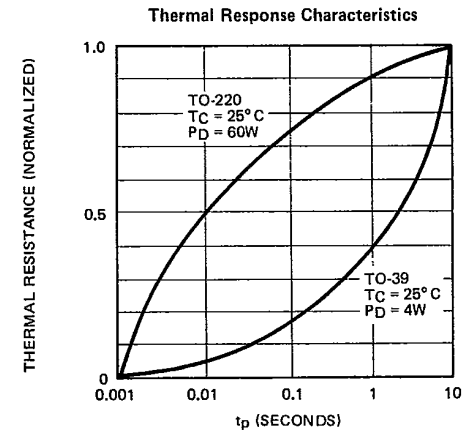
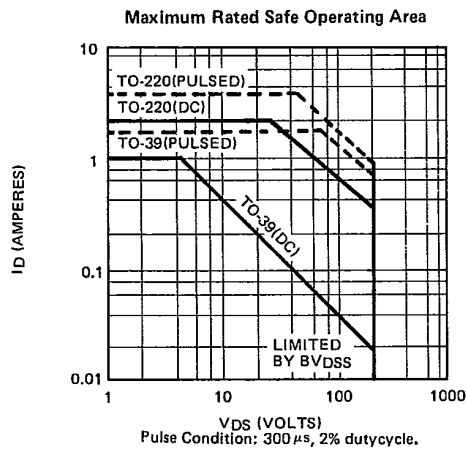
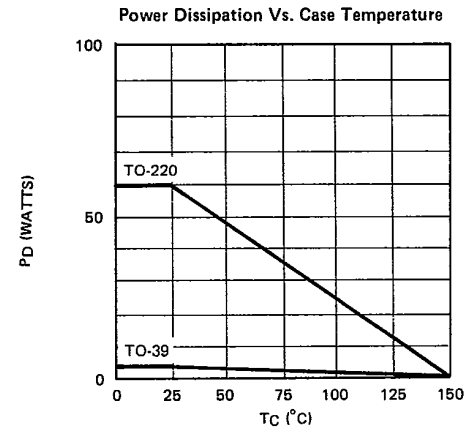
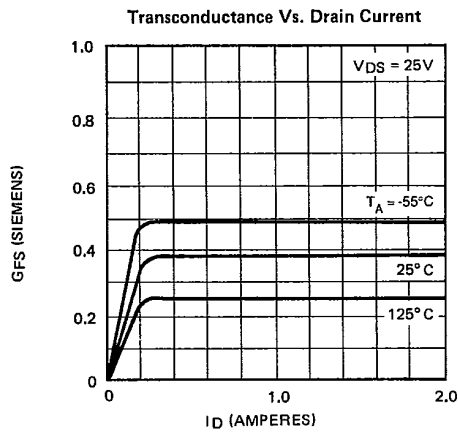
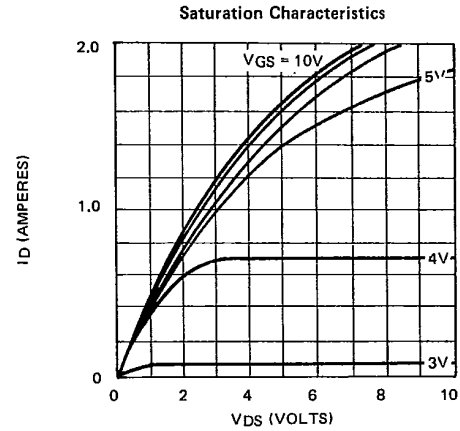
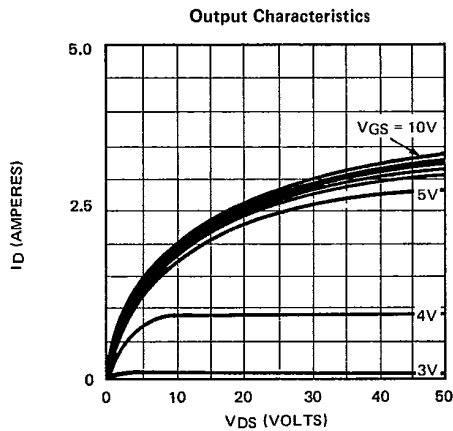
Note 2: All A.C. parameters sample tested.

Switching Waveforms and Test Circuit



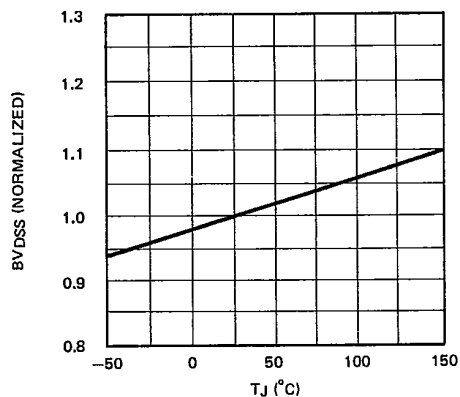
Typical Performance Curves

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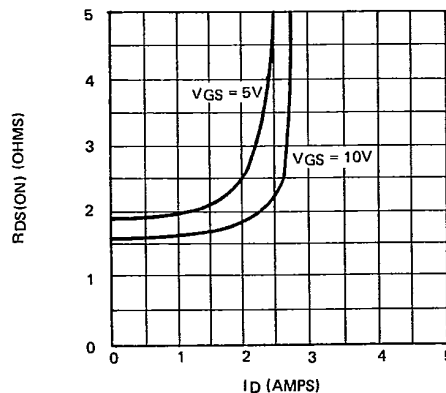


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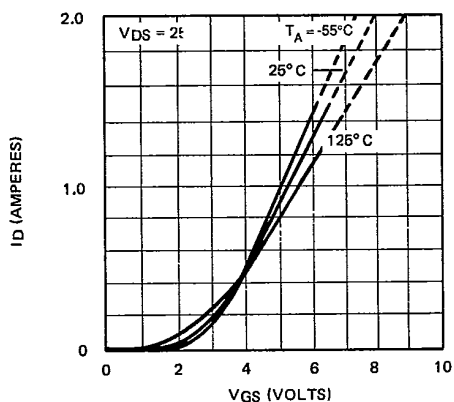
BVDSS Variation with Temperature



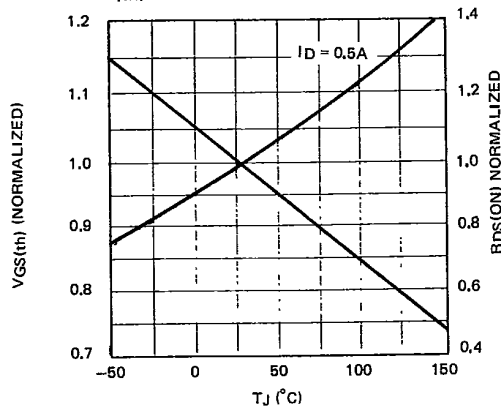
ON-Resistance Vs. Drain Source Current



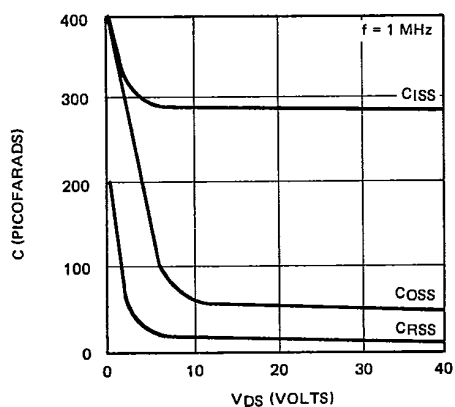
Transfer Characteristics



V(th) and RDS Variation with Temperature



Capacitance Vs. Drain-to-Source Voltage



Gate Drive Dynamic Characteristics

