



N-Channel Enhancement-Mode Vertical DMOS FETs

Ordering Information Standard Commercial Devices

BV _{DSS} / BV _{DGS}	R _{DS(ON)} (max)	I _{D(ON)} (min)	Order Number / Package			
			TO-39	TO-92	TO-220	Dice†
160V	10Ω	0.4A	VN0116N2	VN0116N3	VN0116N5	VN0116ND
200V	10Ω	0.4A	VN0120N2	VN0120N3	VN0120N5	VN0120ND

† MIL visual screening available

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
- Complementary N- and P-channel devices

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	± 20V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

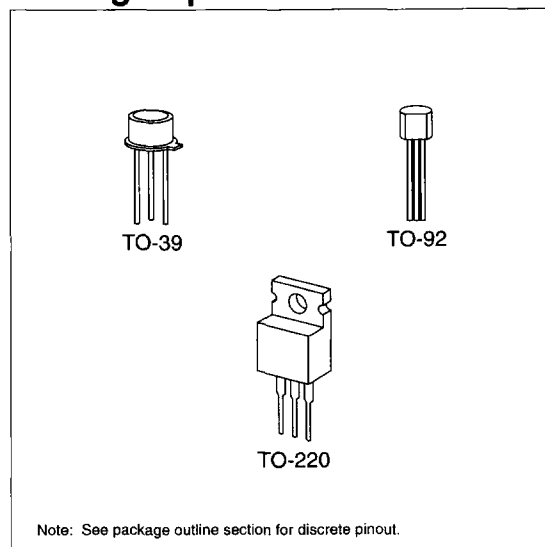
* Distance of 1.6 mm from case for 10 seconds.

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 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



Thermal Characteristics

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-39	350mA	1.0A	3.5W	125	35	350mA	1.0A
TO-92	250mA	0.9A	1.0W	170	125	250mA	0.9A
TO-220	700mA	1.2A	15.0W	70	8.3	700mA	1.2A

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

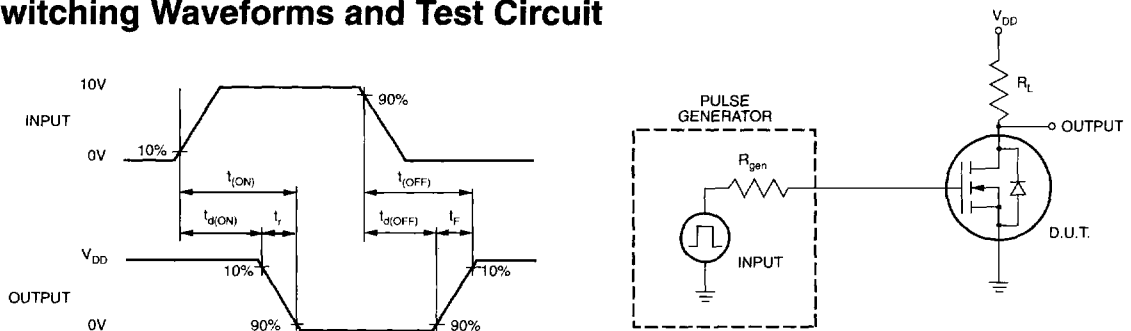
Electrical Characteristics (@ 25°C unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	VN0120	200		V	$V_{GS} = 0, I_D = 1\text{mA}$
		VN0116	160			
$V_{GS(th)}$	Gate Threshold Voltage	1		3	V	$V_{GS} = V_{DS}, I_D = 1\text{mA}$
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature		-5.1	-6.0	mV/ $^\circ\text{C}$	$V_{GS} = V_{DS}, I_D = 1\text{mA}$
I_{GSS}	Gate Body Leakage			100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0$
I_{DSS}	Zero Gate Voltage Drain Current			10	μA	$V_{GS} = 0, V_{DS} = \text{Max Rating}$
				1	mA	
$I_{D(ON)}$	ON-State Drain Current	0.3	0.6		A	$V_{GS} = 5\text{V}, V_{DS} = 25\text{V}$ $V_{GS} = 10\text{V}, V_{DS} = 25\text{V}$
		0.4	0.9			
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance		10	15	Ω	$V_{GS} = 5\text{V}, I_D = 100\text{mA}$ $V_{GS} = 10\text{V}, I_D = 100\text{mA}$
			8	10		
$\Delta R_{DS(th)}$	Change in $R_{DS(th)}$ with Temperature		1.0	1.2	%/ $^\circ\text{C}$	$V_{GS} = 10\text{V}, I_D = 500\text{mA}$
G_{FS}	Forward Transconductance	100	200		$\text{m}\Omega$	$V_{DS} = 25\text{V}, I_D = 250\text{mA}$
C_{ISS}	Input Capacitance		40	55	pF	$V_{GS} = 0, V_{DS} = 25\text{V}$ $f = 1\text{MHz}$
C_{OSS}	Common Source Output Capacitance		20	30		
C_{RSS}	Reverse Transfer Capacitance		5	8		
$t_{d(ON)}$	Turn-ON Delay Time		3	5		
t_r	Rise Time		5	8	ns	$V_{DD} = 25\text{V},$ $I_D = 1\text{A},$ $R_{GEN} = 25\Omega$
$t_{d(OFF)}$	Turn-OFF Delay Time		6	9		
t_f	Fall Time		5	8		
V_{SD}	Diode Forward Voltage Drop		1.2	1.8	V	$V_{GS} = 0, I_{SD} = 1.0\text{A}$
t_{rr}	Reverse Recovery Time		400		ns	$V_{GS} = 0, I_{SD} = 1.0\text{A}$

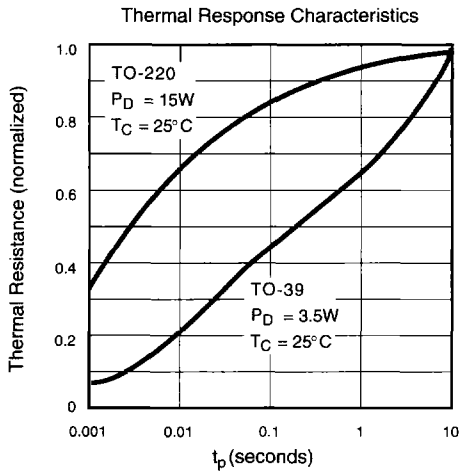
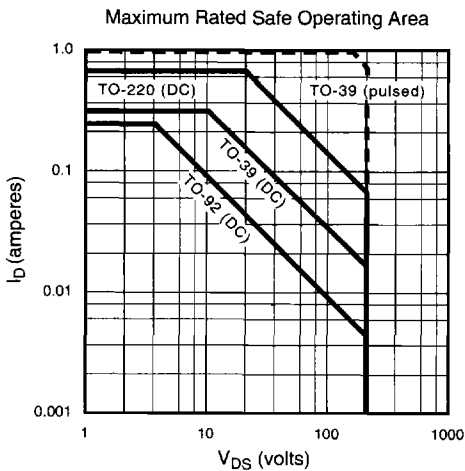
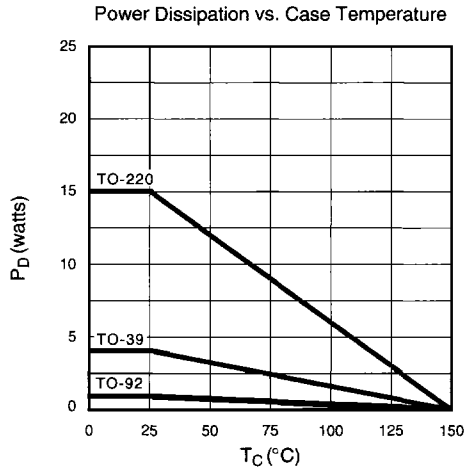
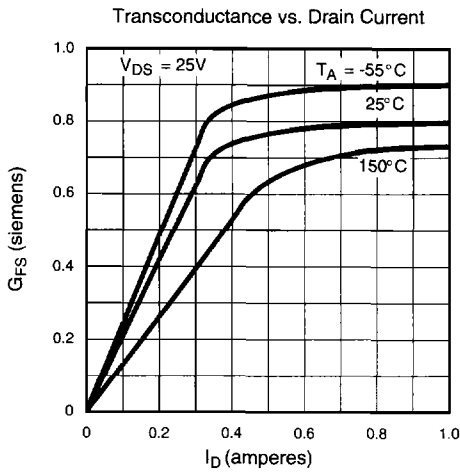
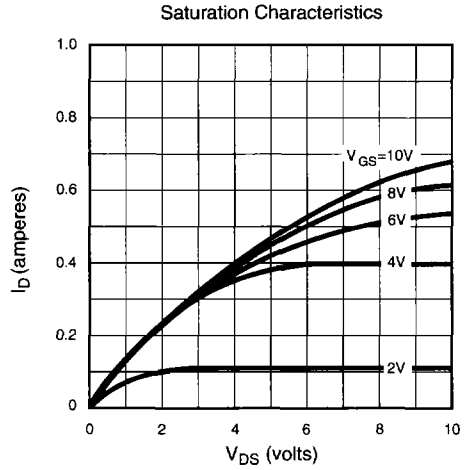
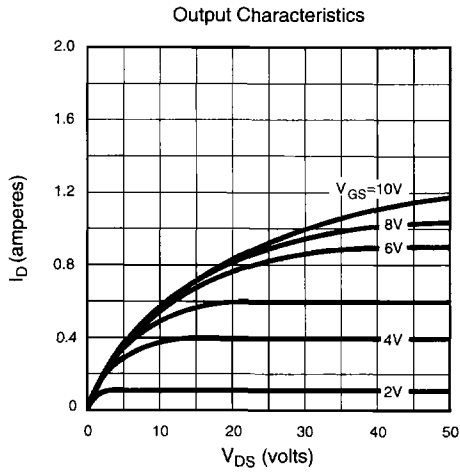
Notes:

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

Switching Waveforms and Test Circuit



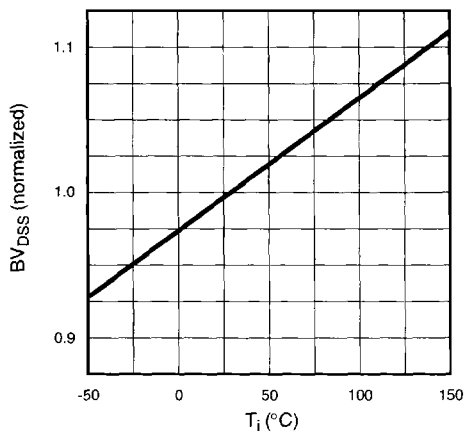
Typical Performance Curves



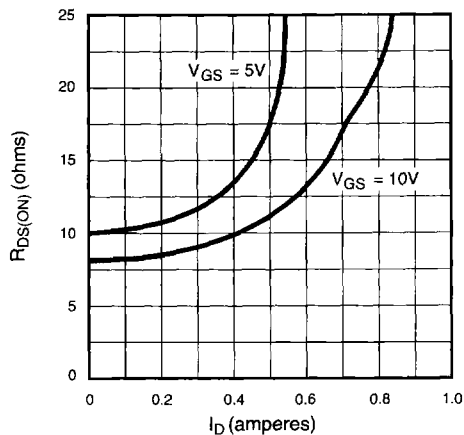
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Typical Performance Curves

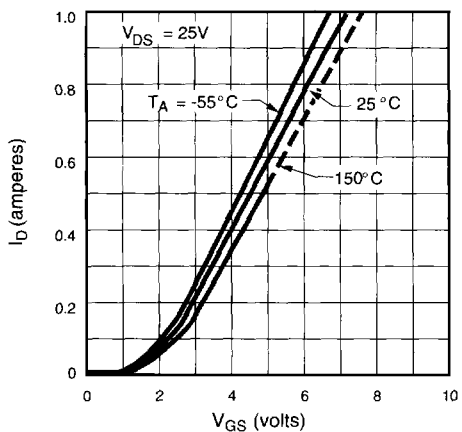
BV_{DSS} Variation with Temperature



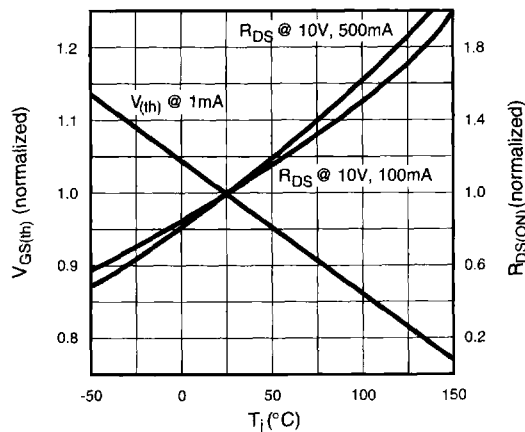
On-Resistance vs. Drain Current



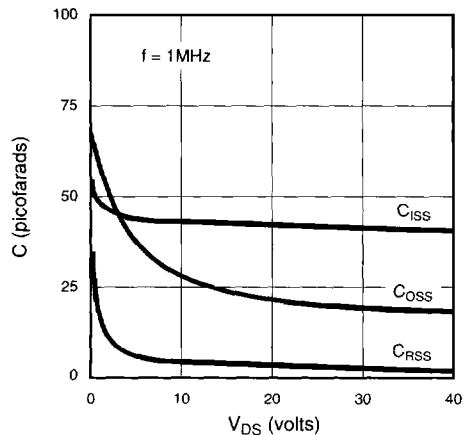
Transfer Characteristics



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



Capacitance vs. Drain-to-Source Voltage



Gate Drive Dynamic Characteristics

