Supertex inc.

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-3	TO-39	TO-220	Dice†
350V	2.5Ω	3A	VN0335N1	VN0335N2	VN0335N5	VN0335ND
400V	2.5Ω	3A	VN0340N1	VN0340N2	VN0340N5	VN0340ND

† 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

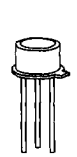
* Distance of 1.6 mm from case for 10 seconds.

Advanced DMOS Technology

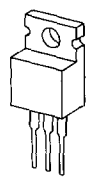
These enhancement-mode (normally-off) transistors utilize a vertical DMOS structure and Supertex's well-proven silicon-gate manufacturing process. This combination produces devices with the power handling capabilities of bipolar transistors and with the high input impedance and positive temperature coefficient 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.

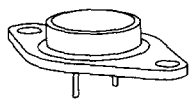
Package Options



TO-39



TO-220



TO-3

Note: See package outline section for discrete pinout.

Thermal Characteristics

Package	I_D (continuous)*	I_D (pulsed)	Power Dissipation @ T_C = 25°C	θ_{ja} °C/W	θ_{jc} °C/W	I_{DR}*	I_{DRM}
TO-3	3.5A	8A	100W	30	1.25	3.5A	8.0A
TO-39	1.0A	7A	6W	125	20.8	1.0A	7.0A
TO-220	2.1A	8A	50W	40	2.5	2.1A	8.0A

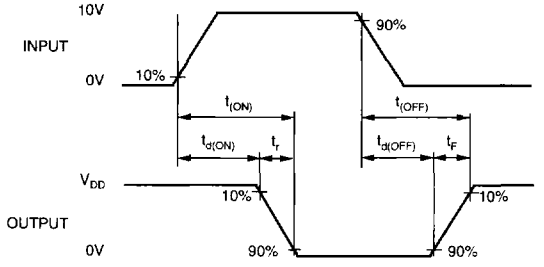
* I_D (continuous) is limited by max rated T_j.

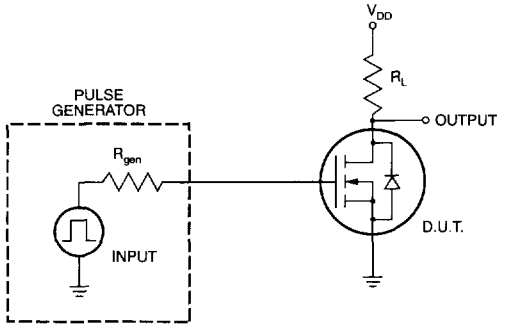
Electrical Characteristics (@ 25°C unless otherwise specified)

Symbol	Parameter		Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	VN0340	400			V	V_{GS} = 0, I_D = 10mA
		VN0335	350				
$V_{GS(th)}$	Gate Threshold Voltage		2		4	V	V_{GS} = V_{DS}, I_D = 10mA
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature			-4.8	-6.0	mV/°C	V_{GS} = V_{DS}, I_D = 10mA
I_{GSS}	Gate Body Leakage				100	nA	V_{GS} = ±20V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current				100	µA	V_{GS} = 0, V_{DS} = Max Rating
					2.0	mA	V_{GS} = 0, V_{DS} = 0.8 Max Rating, T_A = 125°C
$I_{D(ON)}$	ON-State Drain Current			5.0		A	V_{GS} = 5V, V_{DS} = 25V
			3.0	6.0			V_{GS} = 10V, V_{DS} = 25V
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance			2.2		Ω	V_{GS} = 5V, I_D = 0.5A
				1.8	2.5		V_{GS} = 10V, I_D = 1A
$\Delta R_{DS(th)}$	Change in $R_{DS(th)}$ with Temperature			1	2	%/°C	V_{GS} = 10V, I_D = 1A
G_{FS}	Forward Transconductance		1	1.25		℧	V_{DS} = 25V, I_D = 1A
C_{ISS}	Input Capacitance			550	650	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{OSS}	Common Source Output Capacitance			75	125		
C_{RSS}	Reverse Transfer Capacitance			25	50		
$t_{d(ON)}$	Turn-ON Delay Time			12	20	ns	V_{DD} = 25V, I_D = 1A, R_{GEN} = 10Ω
t_r	Rise Time			12	20		
$t_{d(OFF)}$	Turn-OFF Delay Time			65	100		
t_f	Fall Time			20	30		
V_{SD}	Diode Forward Voltage Drop			1.1	1.5	V	V_{GS} = 0, I_{SD} = 1A
t_{rr}	Reverse Recovery Time			450		ns	V_{GS} = 0, 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.

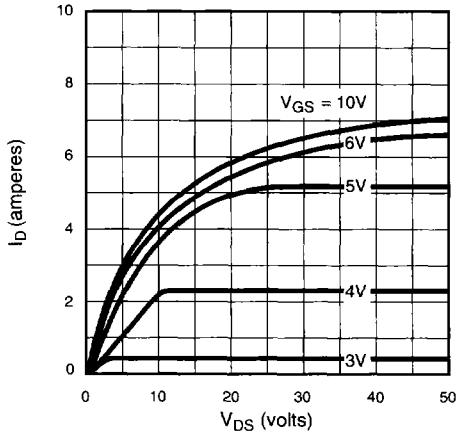
Switching Waveforms and Test Circuit



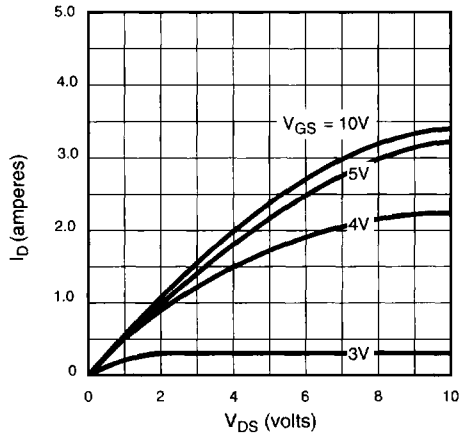


Typical Performance Curves

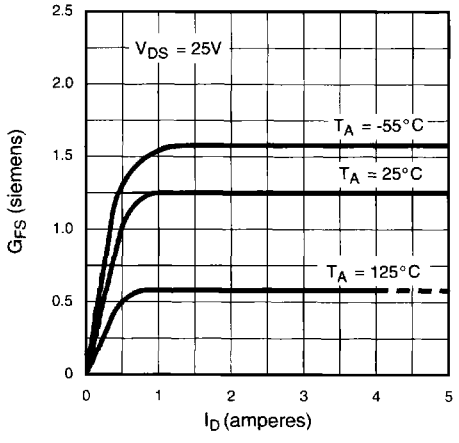
Output Characteristics



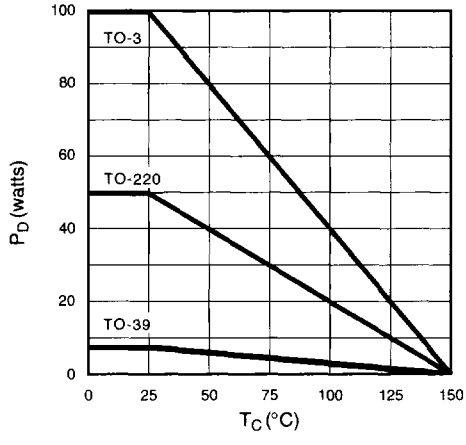
Saturation Characteristics



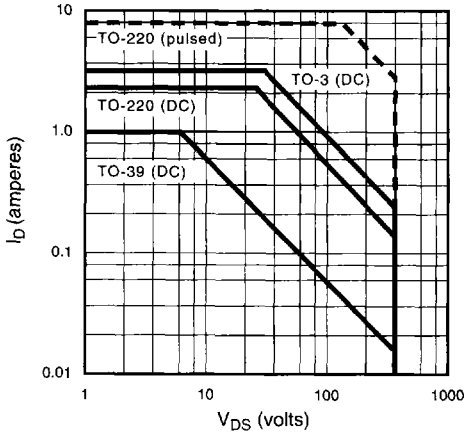
Transconductance vs. Drain Current



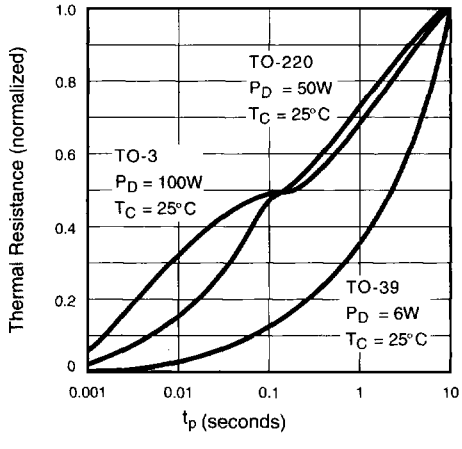
Power Dissipation vs. Case Temperature



Maximum Rated Safe Operating Area

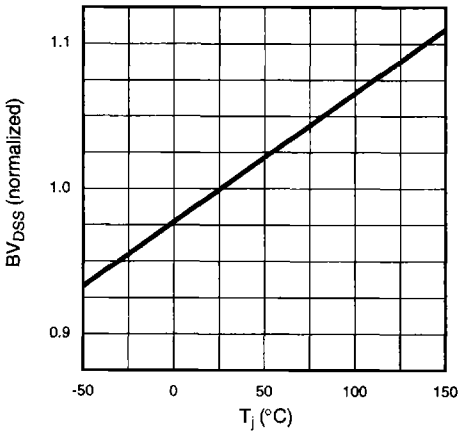


Thermal Response Characteristics

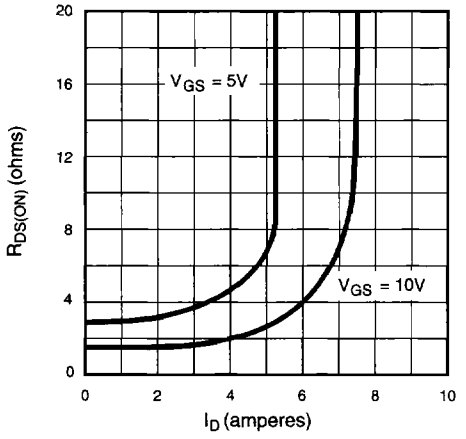


Typical Performance Curves

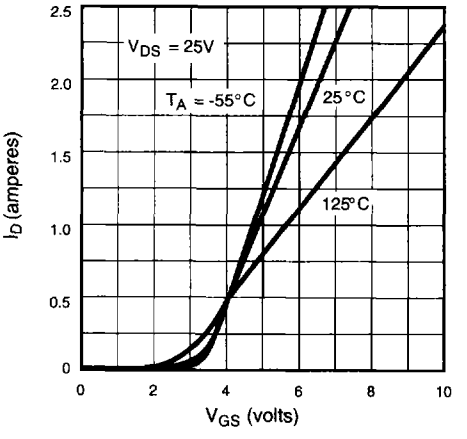
BV$_{DSS}$ Variation with Temperature



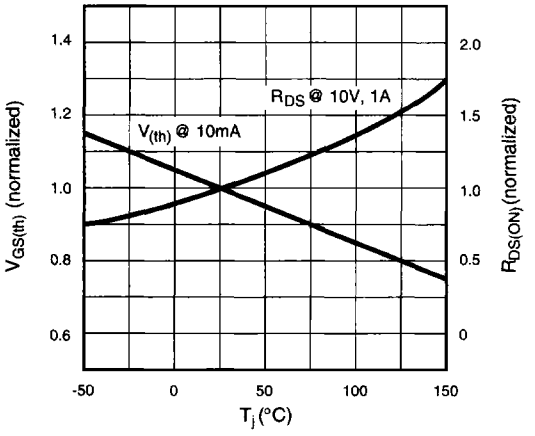
On-Resistance vs. Drain Current



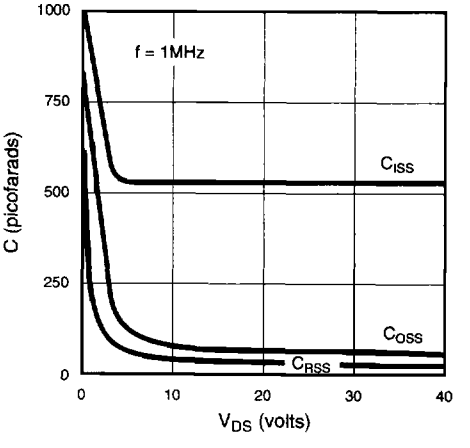
Transfer Characteristics



V$_{(th)}$ and R$_{DS}$ Variation with Temperature



Capacitance vs. Drain-to-Source Voltage



Gate Drive Dynamic Characteristics