Supertex inc.

Dual N-Channel Enhancement-Mode Vertical DMOS FETs

Ordering Information

BV$_{DSS}$ / BV$_{DGS}$	R$_{DS(ON)}$ (max)	V$_{GS(th)}$ (max)	I$_{D(ON)}$ (min)	Order Number/Package SO-8
240V	6.0Ω	2.0V	1.0A	TD9944TG

Features

❏ Dual N-channel devices

❏ Low threshold — 2.0V max.

❏ High input impedance

❏ Low input capacitance — 125pF max.

❏ Fast switching speeds

❏ Low on resistance

❏ Free from secondary breakdown

❏ Low input and output leakage

Applications

❏ Logic level interfaces – ideal for TTL and CMOS

❏ Solid state relays

❏ Battery operated systems

❏ Photo voltaic drives

❏ Analog switches

❏ General purpose line drivers

☐ Telecom switches

Low Threshold DMOS Technology

These dual low threshold 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 very low threshold voltage, high breakdown voltage, high input impedance, low input capacitance, and fast switching speeds are desired.

Pin Configuration

SO-8
top view

Note: See Package Outline section for dimensions.

Absolute Maximum Ratings

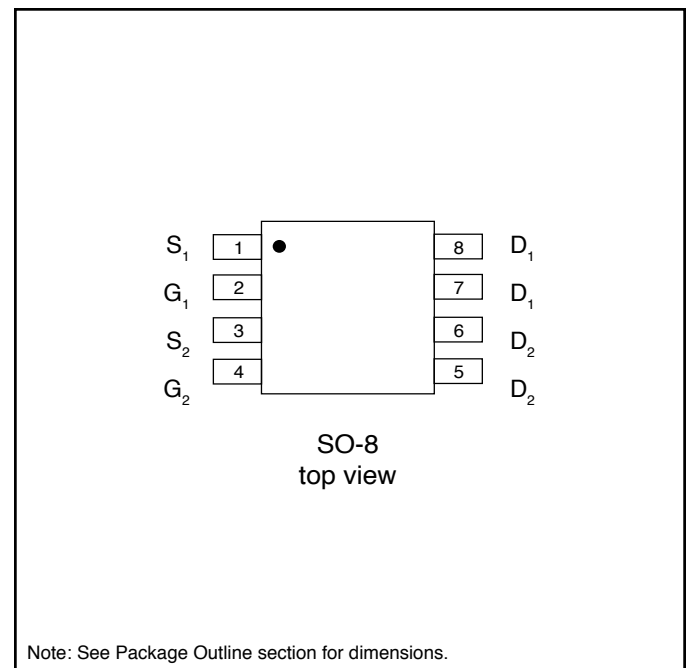|	
Drain-to-Source Voltage	BV$_{DSS}$
Drain-to-Gate Voltage	BV$_{DGS}$
Gate-to-Source Voltage	± 20V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

* Distance of 1.6 mm from case for 10 seconds.

12/13/01

Electrical Characteristics (each device, @ 25°C unless otherwise specified)

| Symbol	Parameter	Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	240			V	$V_{GS} = 0V$, $I_D = 2mA$
$V_{GS(th)}$	Gate Threshold Voltage	0.6		2.0	V	$V_{GS} = V_{DS}$, $I_D = 1mA$
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature			-5.0	mV/°C	$V_{GS} = V_{DS}$, $I_D = 1mA$
I_{GSS}	Gate Body Leakage			100	nA	$V_{GS} = \pm 20V$, $V_{DS} = 0V$
I_{DSS}	Zero Gate Voltage Drain Current			10	μA	$V_{GS} = 0V$, V_{DS} = Max Rating
				1.0	mA	$V_{GS} = 0V$, $V_{DS} = 0.8$ Max Rating $T_A = 125°C$
$I_{D(ON)}$	ON-State Drain Current	0.5	1.9		A	$V_{GS} = 4.5V$, $V_{DS} = 25V$
		1.0	2.8			$V_{GS} = 10V$, $V_{DS} = 25V$
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance		4.0	6.0	Ω	$V_{GS} = 4.5V$, $I_D = 250mA$
			4.0	6.0		$V_{GS} = 10V$, $I_D = 0.5A$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature			1.4	%/°C	$V_{GS} = 10V$, $I_D = 0.5A$
G_{FS}	Forward Transconductance	300	600		m℧	$V_{DS} = 25V$, $I_D = 0.5A$
C_{ISS}	Input Capacitance		65	125	pF	$V_{GS} = 0V$, $V_{DS} = 25V$ f = 1 MHz
C_{OSS}	Common Source Output Capacitance		35	70		
C_{RSS}	Reverse Transfer Capacitance		10	25		
$t_{d(ON)}$	Turn-ON Delay Time			10	ns	$V_{DD} = 25V$, $I_D = 1.0A$, $R_{GEN} = 25\Omega$
t_r	Rise Time			10		
$t_{d(OFF)}$	Turn-OFF Delay Time			20		
t_f	Fall Time			20		
V_{SD}	Diode Forward Voltage Drop			1.8	V	$V_{GS} = 0V$, $I_{SD} = 1.0A$
t_{rr}	Reverse Recovery Time		300		ns	$V_{GS} = 0V$, $I_{SD} = 1.0A$

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.
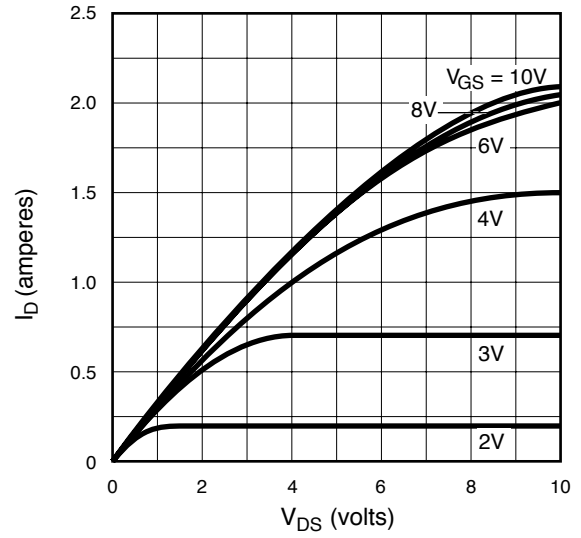
Switching Waveforms and Test Circuit
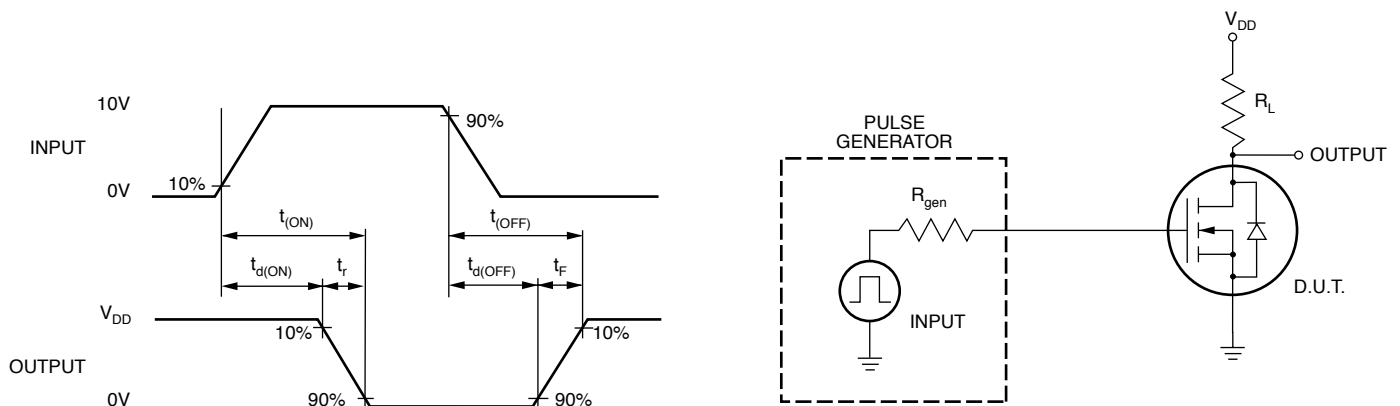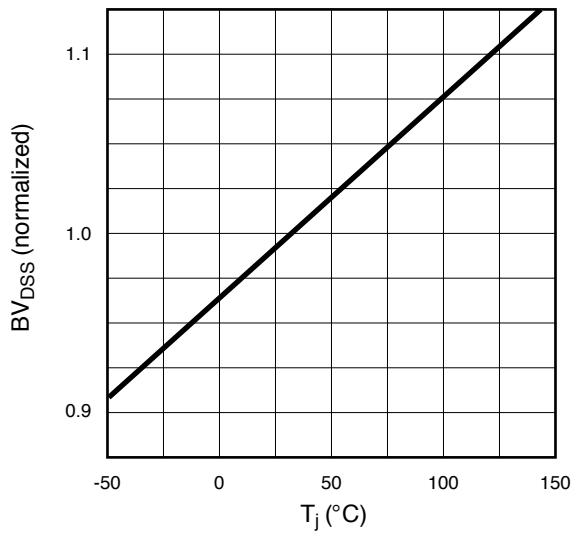
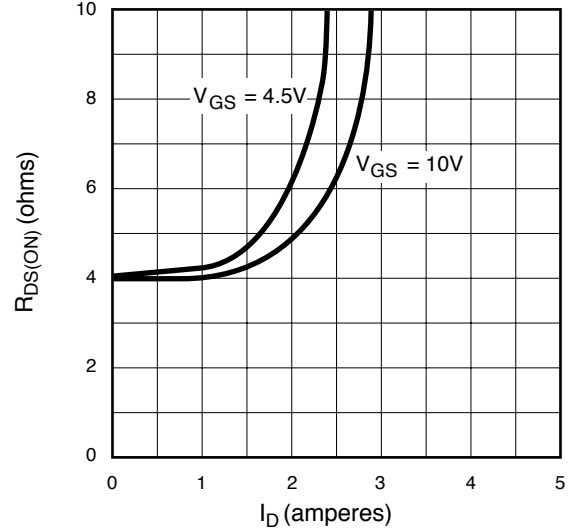# Typical Performance Curves

Output Characteristics
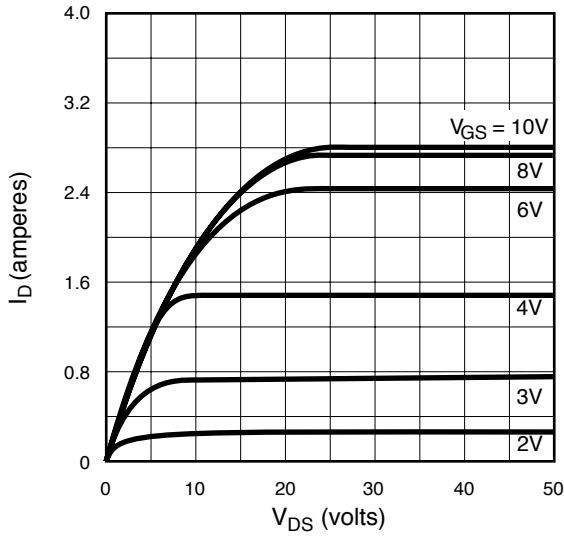
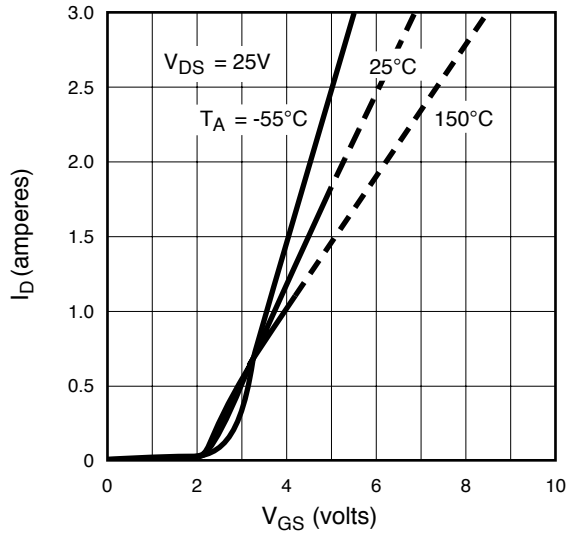### Saturation Characteristics
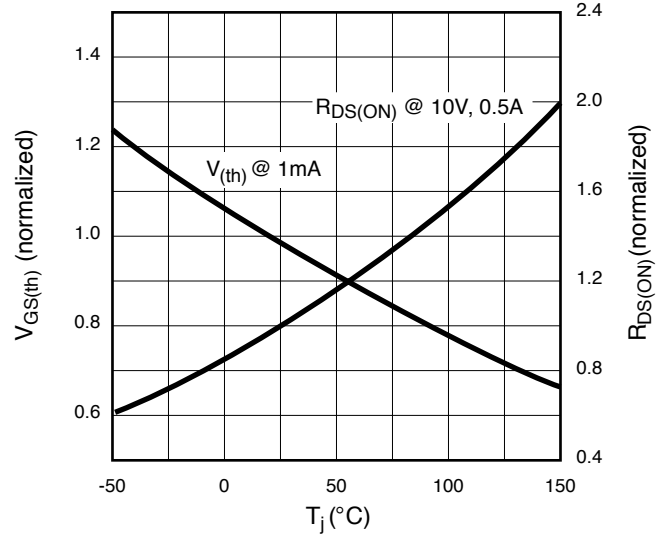

BV$_{DSS}$ Variation with Temperature

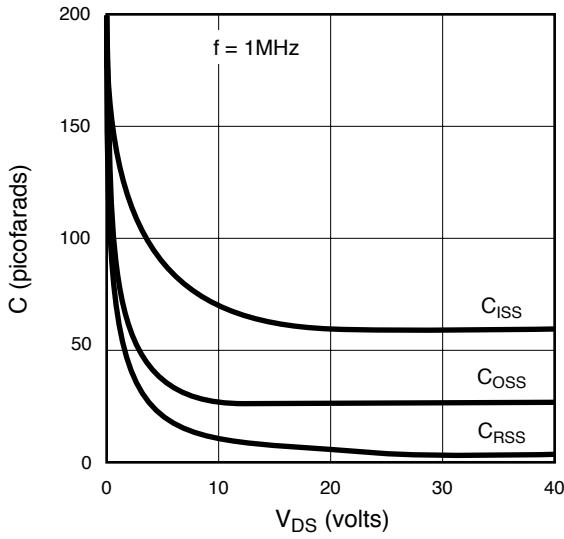### On-Resistance vs. Drain Current

Transfer Characteristics

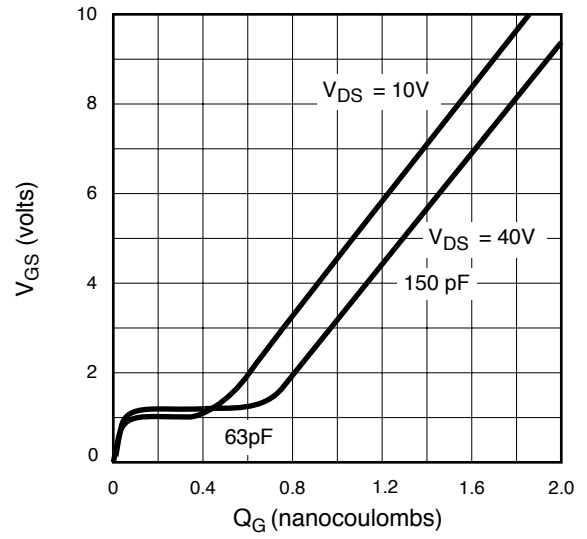### V$_{(th)}$ and R$_{DS}$ Variation with Temperature

Typical Performance Curves

Capacitance vs. Drain-to-Source Voltage

f = 1MHz

C (picofarads) vs. V$_{DS}$ (volts)

C_{ISS}

C_{OSS}

C_{RSS}

Gate Drive Dynamic Characteristics

V$_{GS}$ (volts) vs. Q$_G$ (nanocoulombs)

V$_{DS}$ = 10V

V$_{DS}$ = 40V

150 pF

63pF

Transconductance vs. Drain Current

G$_{FS}$ (siemens) vs. I$_D$ (amperes)

V$_{DS}$ = 25V

T$_A$ = -55°C

T$_A$ = 25°C

T$_A$ = 150°C

Supertex inc.

1235 Bordeaux Drive, Sunnyvale, CA 94089
TEL: (408) 744-0100 • FAX: (408) 222-4895
www.supertex.com