Supertex inc.

P-Channel Enhancement-Mode Vertical DMOS FET Quad Array

Ordering Information

BV$_{DSS}$ / BV$_{DGS}$	R$_{DS (ON)}$ Max	Order Number / Package SOW-20*
-40V	2.0Ω	TP0604WG

* Same as SO-20 with 300 mil wide body.

Features

- ❏ 4 independent channels
- ❏ 4 electrically isolated die
- ❏ Commercial and Military versions available
- ❏ Free from secondary breakdown
- ❏ Low power drive requirement
- ❏ Low C$_{ISS}$ and fast switching speeds
- ❏ High input impedance and high gain

Applications

- ❏ Telecom switches
- ❏ Logic level interfaces
- ❏ Battery operated systems
- ❏ Photo voltaic drives
- ❏ Soild state relays
- ❏ Motor controls

Advanced DMOS Technology

These enhancement-mode (normally-off) DMOS FET arrays 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 quad arrays use four independent DMOS transistors. They 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.

Pin Configuration

	Pin		Pin	
D$_1$	1	●	20	D$_4$
D$_1$	2		19	D$_4$
D$_1$	3		18	D$_4$
G$_1$	4		17	G$_4$
S$_1$	5		16	S$_4$
S$_2$	6		15	S$_3$
G$_2$	7		14	G$_3$
D$_2$	8		13	D$_3$
D$_2$	9		12	D$_3$
D$_2$	10		11	D$_3$

top view
SOW - 20

Note: See Package Outline section for dimensions.

Absolute Maximum Ratings

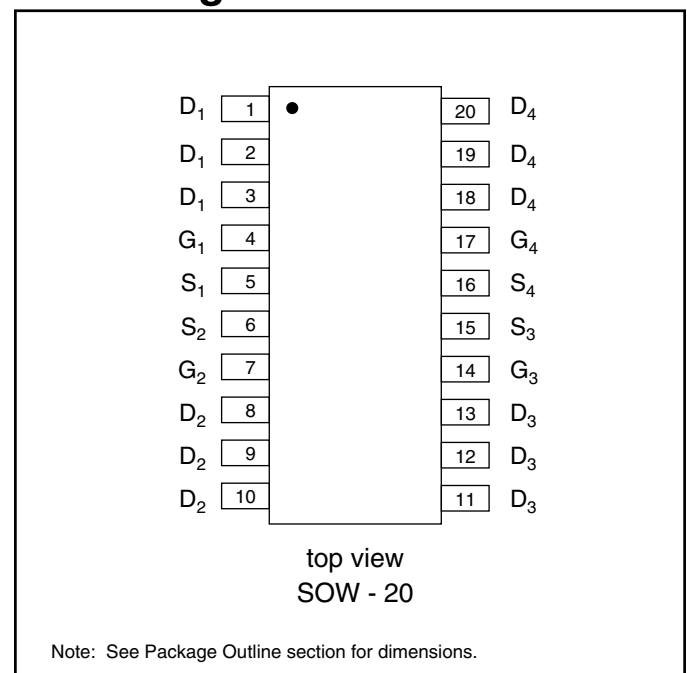|	
Drain-to-Source Voltage	BV$_{DSS}$
Drain-to-Gate Voltage	BV$_{DGS}$
Gate-to-Source Voltage	± 20V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

* Distance of 1.6 mm from case for 10 seconds.

02/26/03

Thermal Characteristics

Package	I_D (continuous)* (single die)	I_D (pulsed)	Power Dissipation @ T_A = 25°C	θ_{jc} °C/W	θ_{ja} °C/W	I_{DR}* (single die)	I_{DRM}
SOW-20	-0.6A	-2.0A	1.5W	—	84	-0.6A	-2.0A

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

Electrical Characteristics (@ 25°C unless otherwise specified)

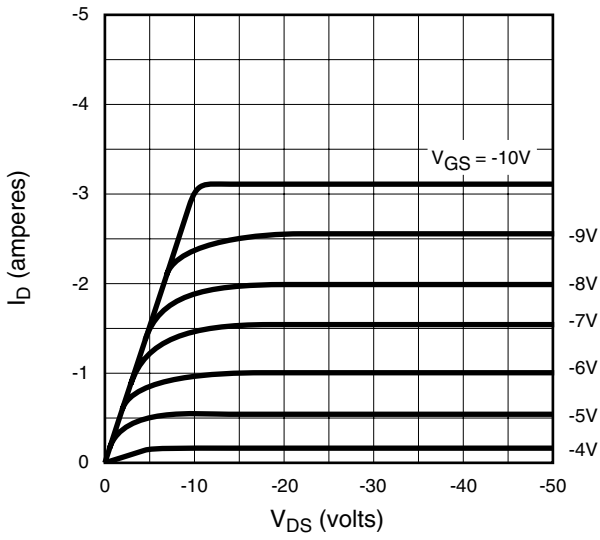| Symbol	Parameter	Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	-40			V	V_{GS} = 0V, I_D = -2.0mA
$V_{GS(th)}$	Gate Threshold Voltage	-1.0		-2.4	V	V_{GS} = V_{DS}, I_D = -1.0mA
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature		-3.0	-4.5	mV/°C	V_{GS} = V_{DS}, I_D = -1.0mA
I_{GSS}	Gate Body Leakage			-100	nA	V_{GS} = ±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	-0.4	-0.6		A	V_{GS} = -5V, V_{DS} = -20V
		-2.0	-3.3			V_{GS} = -10V, V_{DS} = -20V
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance		2.0	3.5	Ω	V_{GS} = -5V, I_D = -250mA
			1.5	2.0		V_{GS} = -10V, I_D = -1.0A
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature		0.75	1.2	%/°C	V_{GS} = -10V, I_D = -1.0A
G_{FS}	Forward Transconductance	0.4	0.6		℧	V_{DS} = -20V, I_D = -1.0A
C_{ISS}	Input Capacitance		95	150		V_{GS} = 0V, V_{DS} = -20V f = 1 MHz
C_{OSS}	Common Source Output Capacitance		85	120	pF	
C_{RSS}	Reverse Transfer Capacitance		35	60		
$t_{d(ON)}$	Turn-ON Delay Time		5.0	8		V_{DD} = -20V I_D = -1.0A R_{GEN} = 25Ω
t_r	Rise Time		7.0	18	ns	
$t_{d(OFF)}$	Turn-OFF Delay Time		10	15		
t_f	Fall Time		6.0	19		
V_{SD}	Diode Forward Voltage Drop		-1.3	-2.0	V	V_{GS} = 0V, I_{SD} = -1.5A
t_{rr}	Reverse Recovery Time		300		ns	V_{GS} = 0V, I_{SD} = -1.5A

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.
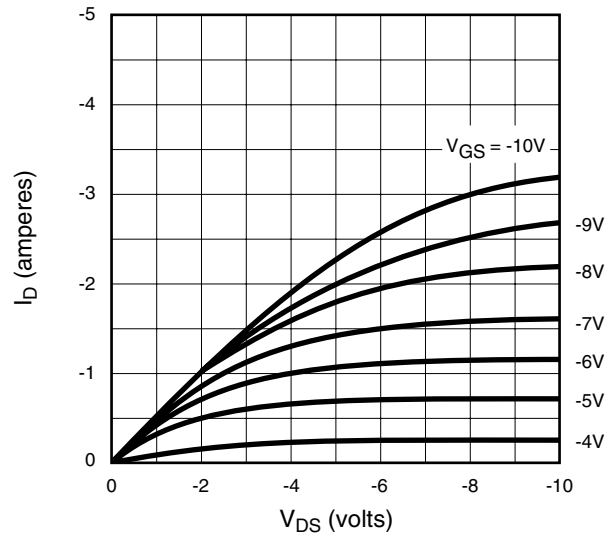
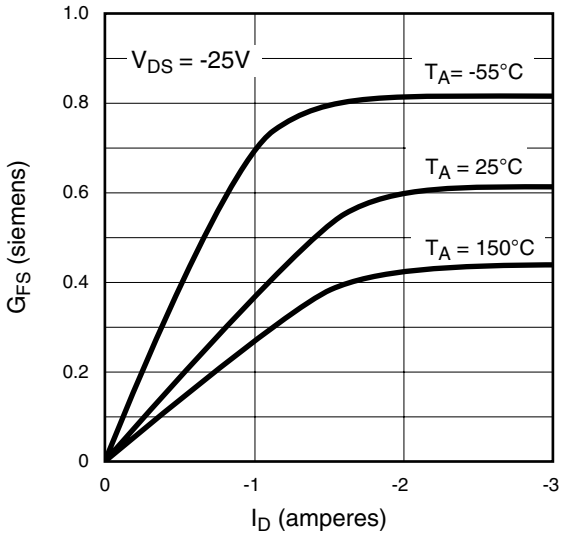# Switching Waveforms and Test Circuit
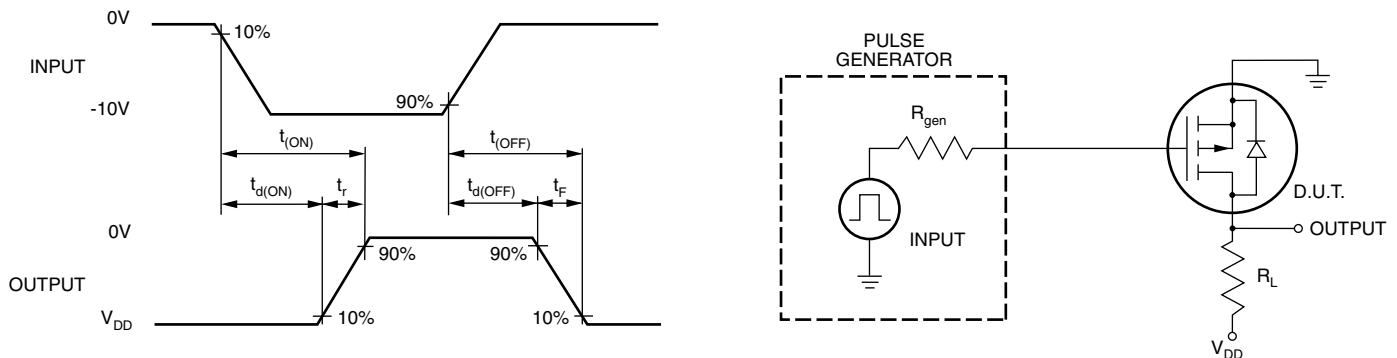
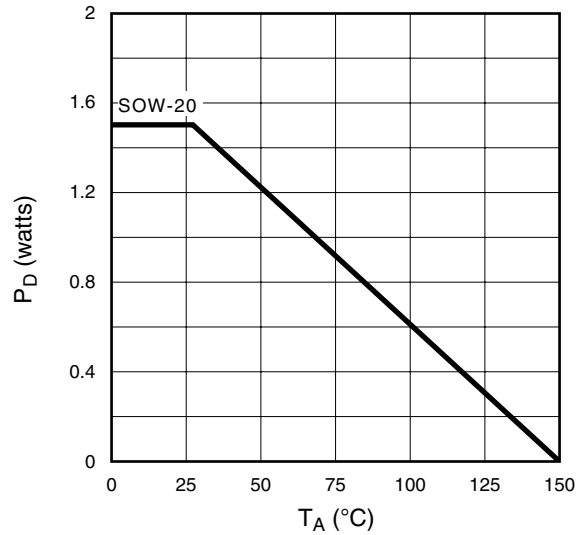# Typical Performance Curves

Output Characteristics

I_D (amperes) vs. V_{DS} (volts)

V_{GS} = -10V
-9V
-8V
-7V
-6V
-5V
-4V

Saturation Characteristics

I_D (amperes) vs. V_{DS} (volts)

V_{GS} = -10V
-9V
-8V
-7V
-6V
-5V
-4V

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

Power Dissipation vs. Ambient Temperature

P_D (watts) vs. T_A (°C)

SOW-20

Maximum Rated Safe Operating Area

I_D (amperes) vs. V_{DS} (volts)

SOW-20 (pulsed)
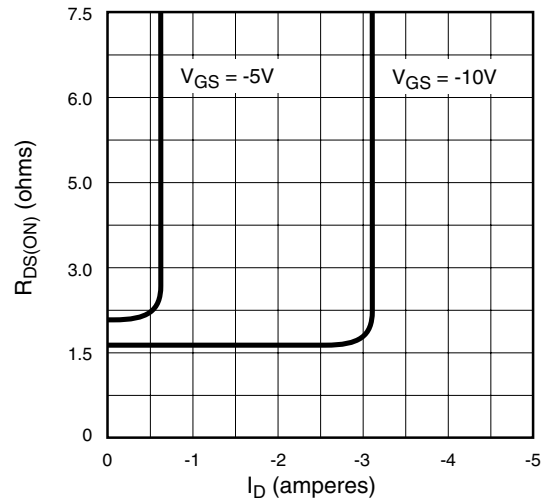SOW-20 (DC)
T_A = 25°C
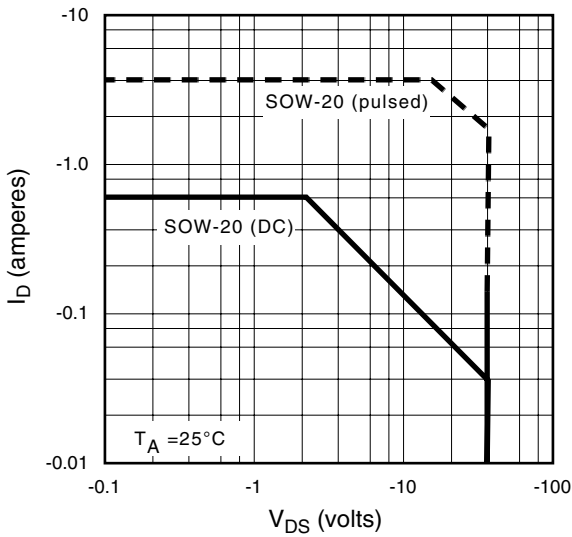
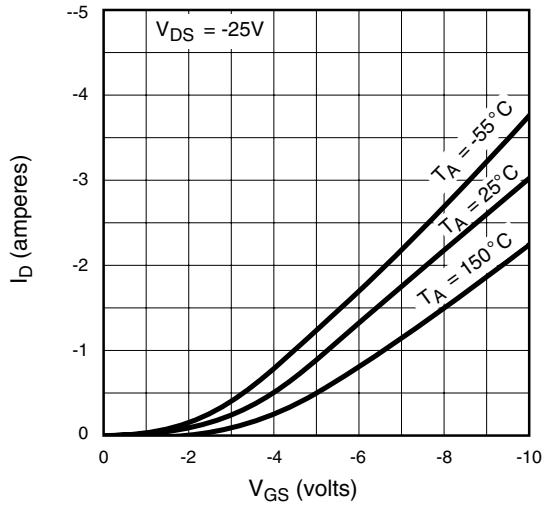# Typical Performance Curves

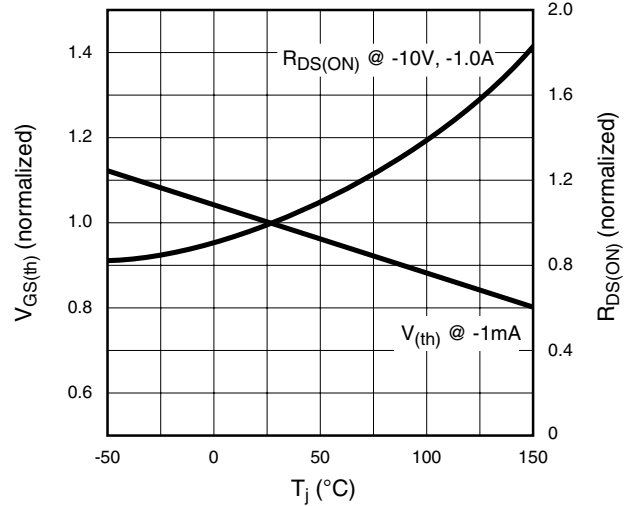### BV$_{DSS}$ Variation with Temperature
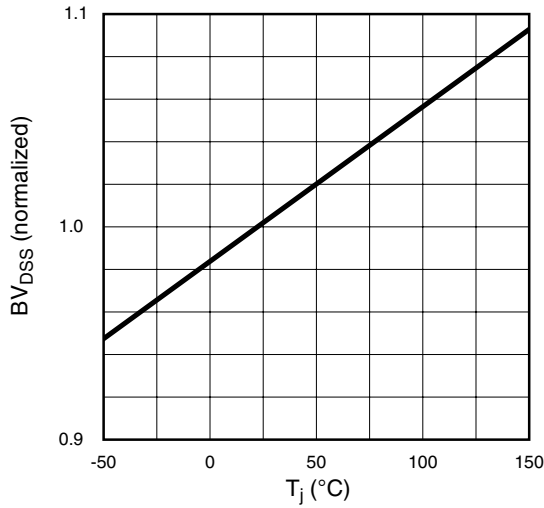
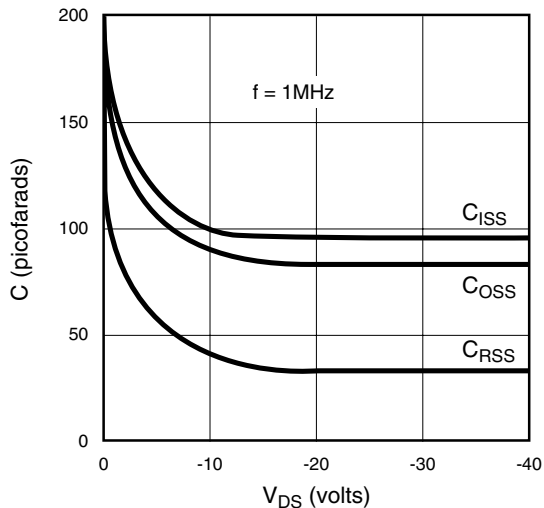### On-Resistance vs. Drain Current

Transfer Characteristics

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

Capacitance vs. Drain-to-Source Voltage

Gate Drive Dynamic Characteristics