

## N- and P- Channel Enhancement-Mode Dual MOSFET

### Features

- ▶ Low threshold
- ▶ Low on resistance
- ▶ Low input capacitance
- ▶ Fast switching speeds
- ▶ Freedom from secondary breakdown
- ▶ Low input and output leakage
- ▶ Independent, electrically isolated N- and P-channels

### Applications

- ▶ Medical ultrasound transmitters
- ▶ High voltage pulsers
- ▶ Amplifiers
- ▶ Buffers
- ▶ Piezoelectric transducer drivers
- ▶ General purpose line drivers

### General Description

The Supertex TC6320 consists of high voltage low threshold N-channel and P-channel MOSFETs in an SO-8 package. Both MOSFETs have integrated gate-source resistors and gate-source zener diode clamps which are desired for high voltage pulser applications. The TC6320 is a complimentary, high-speed, high voltage, gate-clamped N- and P-channel MOSFET pair in an SO-8 package. These low threshold enhancement-mode (normally-off) transistors utilize an advanced 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.

### Ordering Information

Device	Package Options		BV <sub>DSS</sub> /BV <sub>DGS</sub>		R <sub>DS(ON)</sub> (MAX)	
	8-Lead SOIC (Narrow Body)		N-Channel	P-Channel	N-Channel	P-Channel
TC6320	TC6320TG	TC6320TG-G	200V	-200V	7.0Ω	8.0Ω

-G indicates package is RoHS compliant ('Green')



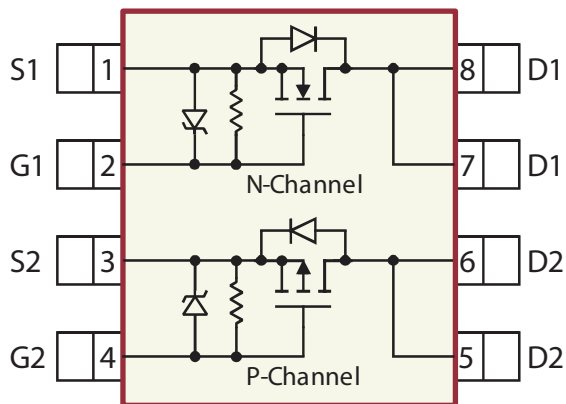
### Absolute Maximum Ratings

Parameter	Value
Drain to source voltage	BV <sub>DSS</sub>
Drain to gate voltage	BV <sub>DGS</sub>
Operating and storage temperature	-55°C to +150°C
Soldering temperature <sup>1</sup>	+300°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.

**Note 1.** Distance of 1.6mm from case for 10 seconds.

### Pin Configuration



**SO-8 Package  
(top view)**

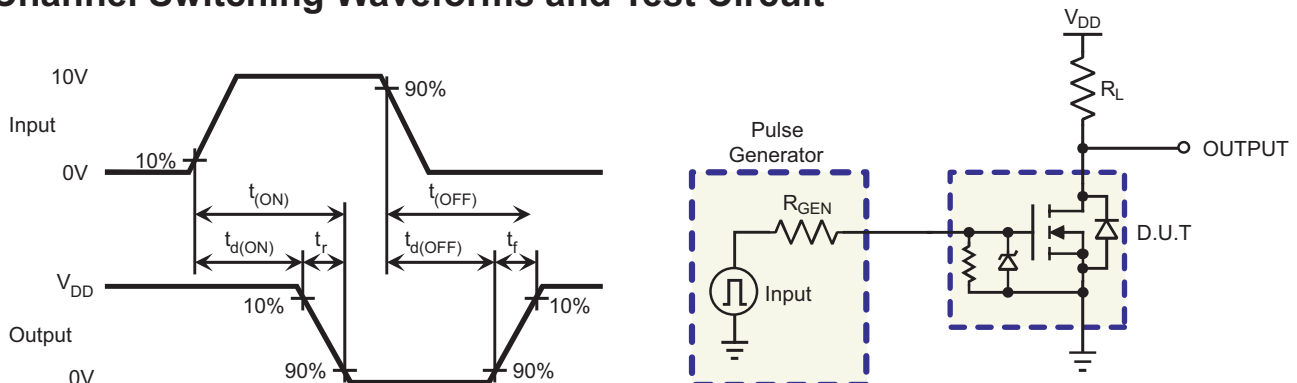
**N- Channel Electrical Characteristics** ( $T_j = 25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$BV_{DSS}$	Drain-to-source breakdown voltage	200	-	-	V	$V_{GS} = 0V, I_D = 2.0mA$
$V_{GS(th)}$	Gate threshold voltage	1.0	-	2.0	V	$V_{GS} = V_{DS}, I_D = 1.0mA$
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with temperature	-	-	-4.5	mV/°C	$V_{GS} = V_{DS}, I_D = 1.0mA$
$R_{GS}$	Gate-Source Shunt Resistor	10	-	50	K $\Omega$	$I_{GS} = 100\mu A$
$\Delta R_{GS}$	Change in RGS with Temperature	-	-	TBD	%/°C	$I_{GS} = 100\mu A$
$VZ_{GS}$	Gate-Source Zener Voltage	13.2	-	25	V	$I_{GS} = 2.0mA$
$\Delta VZ_{GS}$	Change in VZGS with Temperature	-	-	TBD	mV/°C	$I_{GS} = 2.0mA$
$I_{DSS}$	Zero gate voltage drain current	-	-	10.0	$\mu A$	$V_{DS} = \text{Max rating}, V_{GS} = 0V$
		-	-	1.0	mA	$V_{DS} = 0.8 \text{ Max Rating}, V_{GS} = 0V, T_A = 125^\circ\text{C}$
$I_{D(ON)}$	ON-state drain current	1.0	-	-	A	$V_{GS} = 4.5V, V_{DS} = 25V$
		2.0	-	-		$V_{GS} = 10V, V_{DS} = 25V$
$R_{DS(ON)}$	Static drain-to-source ON-state resistance	-	-	8.0	$\Omega$	$V_{GS} = 4.5V, I_D = 150mA$
		-	-	7.0		$V_{GS} = 10V, I_D = 1.0A$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with temperature	-	-	1.0	%/°C	$V_{GS} = 4.5V, I_D = 150mA$
$G_{FS}$	Forward transconductance	400	-	-	mmho	$V_{DS} = 25V, I_D = 200mA$
$C_{ISS}$	Input capacitance	-	-	110	pF	$V_{GS} = 0V, V_{DS} = 25V, f = 1MHz$
$C_{OSS}$	Common source output capacitance	-	-	60		
$C_{RSS}$	Reverse transfer capacitance	-	-	23		
$t_{d(ON)}$	Turn-ON delay time	-	-	10	ns	$V_{DD} = 25V, I_D = 1.0A, R_{GEN} = 25\Omega$
$t_r$	Rise time	-	-	15		
$t_{d(OFF)}$	Turn-OFF delay time	-	-	20		
$t_f$	Fall time	-	-	15		
$V_{SD}$	Diode forward voltage drop	-	-	1.8	V	$V_{GS} = 0V, I_{SD} = 0.5A$
$t_{rr}$	Reverse recovery time	-	300	-	ns	$V_{GS} = 0V, I_{SD} = 0.5A$

**Notes:**

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

**N- Channel Switching Waveforms and Test Circuit**



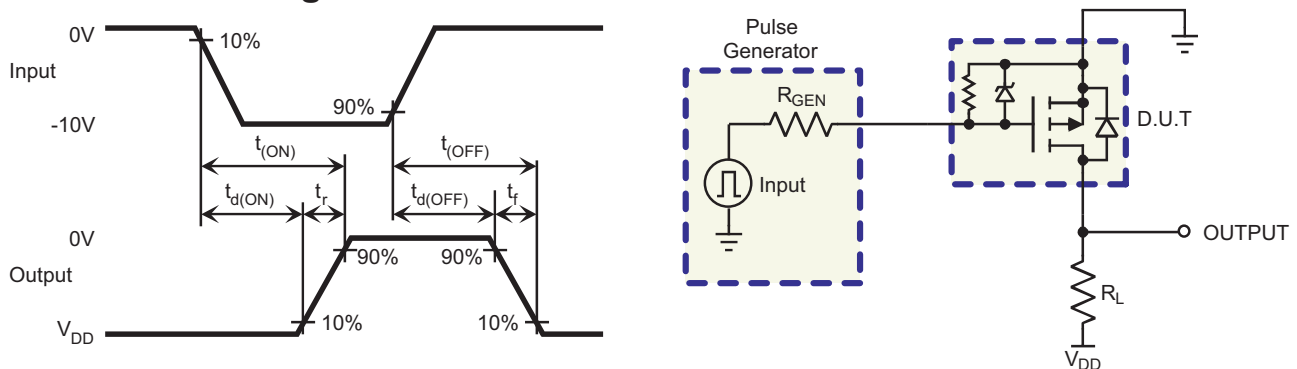
**P- Channel Electrical Characteristics** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$BV_{DSS}$	Drain-to-source breakdown voltage	-200	-	-	V	$V_{GS} = 0V, I_D = -2.0\mu A$
$V_{GS(th)}$	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	-	-	4.5	mV/°C	$V_{GS} = V_{DS}, I_D = -1.0mA$
$R_{GS}$	Gate-source shunt resistor	10	-	50	K $\Omega$	$I_{GS} = 100\mu A$
$\Delta R_{GS}$	Change in $R_{GS}$ with temperature	-	-	TBD	%/°C	$I_{GS} = 100\mu A$
$VZ_{GS}$	Gate-source zener voltage	13.2	-	25	V	$I_{GS} = -2mA$
$\Delta VZ_{GS}$	Change in RGS with temperature	-	-	TBD	mV/°C	$I_{GS} = -2mA$
$I_{DSS}$	Zero gate voltage drain current	-	-	-10	$\mu A$	$V_{DS} = \text{Max rating}, V_{GS} = 0V$
		-	-	-1.0	mA	$V_{DS} = 0.8 \text{ Max Rating}, V_{GS} = 0V, T_A = 125^\circ\text{C}$
$I_{D(ON)}$	ON-state drain current	-1.0	-	-	A	$V_{GS} = -4.5V, V_{DS} = -25V$
		-2.0	-	-	A	$V_{GS} = -10V, V_{DS} = -25V$
$R_{DS(ON)}$	Static drain-to-source ON-state resistance	-	-	10	$\Omega$	$V_{GS} = -4.5V, I_D = -150mA$
		-	-	8.0	$\Omega$	$V_{GS} = -10V, I_D = -1.0A$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with temperature	-	-	1.0	%/°C	$V_{GS} = -10V, I_D = -200mA$
$G_{FS}$	Forward transconductance	400	-	-	mmho	$V_{DS} = -25V, I_D = -200mA$
$C_{ISS}$	Input capacitance	-	-	200	pF	$V_{GS} = 0V, V_{DS} = -25V, f = 1MHz$
$C_{OSS}$	Common source output capacitance	-	-	55		
$C_{RSS}$	Reverse transfer capacitance	-	-	30		
$t_{d(ON)}$	Turn-ON delay time	-	-	10	ns	$V_{DD} = -25V, I_D = -1.0A, R_{GEN} = 25\Omega$
$t_r$	Rise time	-	-	15		
$t_{d(OFF)}$	Turn-OFF delay time	-	-	20		
$t_f$	Fall time	-	-	15		
$V_{SD}$	Diode forward voltage drop	-	-	-1.8	V	$V_{GS} = 0V, I_{SD} = -0.5A$
$t_{rr}$	Reverse recovery time	-	300	-	ns	$V_{GS} = 0V, I_{SD} = -0.5A$

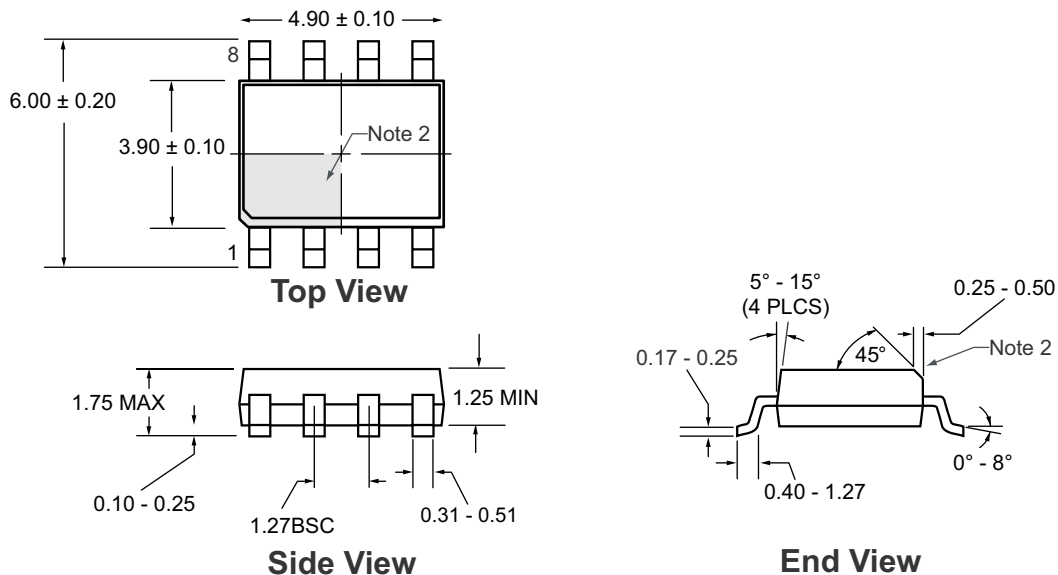
**Notes:**

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

**P- Channel Switching Waveforms and Test Circuit**



## 8-Lead SO (TG) Package Outline



## Notes:

1. All dimensions in millimeters. Angles in degrees.
2. If the corner is not chamfered, then a Pin 1 identifier must be located within the area indicated.

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information go to <http://www.supertex.com/packaging.html>.)

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**Supertex inc.**

1235 Bordeaux Drive, Sunnyvale, CA 94089  
TEL: (408) 222-8888 / FAX: (408) 222-4895

[www.supertex.com](http://www.supertex.com)