

**Supertex inc.**

**TC2320**

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

$BV_{DSS}/BV_{DGS}$		$R_{DS(ON)}$ (max)		Order Number/Package
N-Channel	P-Channel	N-Channel	P-Channel	SO-8
200V	-200V	7.0	12	TC2320TG

### Features

- ☐ Low threshold
- ☐ Low on resistance
- ☐ Independent, electrically isolated N- and P-channels
- ☐ Low input capacitance
- ☐ Fast switching speeds
- ☐ Free from secondary breakdowns
- ☐ Low input and output leakage

### Application

- ☐ Medical Ultrasound Transmitters
- ☐ High voltage pulsers
- ☐ Amplifiers
- ☐ Buffers
- ☐ Piezoelectric transducer drivers
- ☐ General purpose line drivers
- ☐ Logic level interfaces

### Absolute Maximum Ratings\*

Drain-to-Source Voltage	$BV_{DSS}$
Drain-to-Gate Voltage	$BV_{DGS}$
Gate-to-Source Voltage	$\pm 20V$
Operating and Storage Temperature	$-55^{\circ}C$ to $+150^{\circ}C$
Soldering Temperature*	$300^{\circ}C$

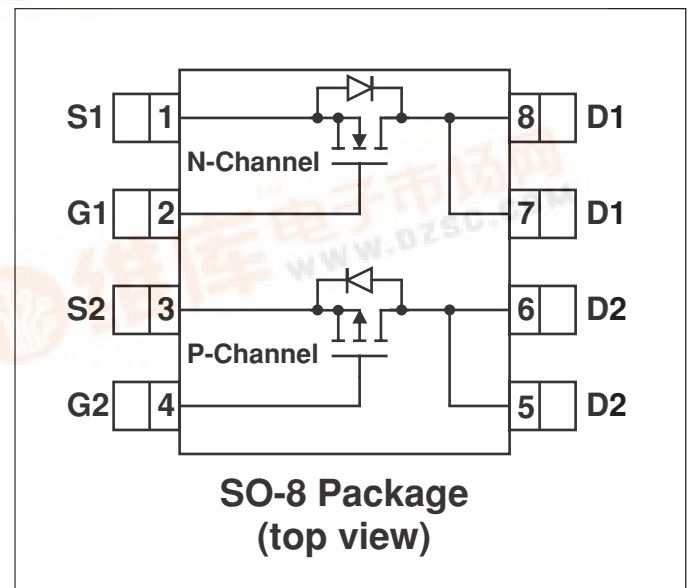
\*Distance of 1.6mm from case for 10 seconds.

### Low Threshold DMOS Technology

The Supertex TC2320TG consist of a high voltage low threshold N-channel and P-channel MOSFET 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.

### Package Option



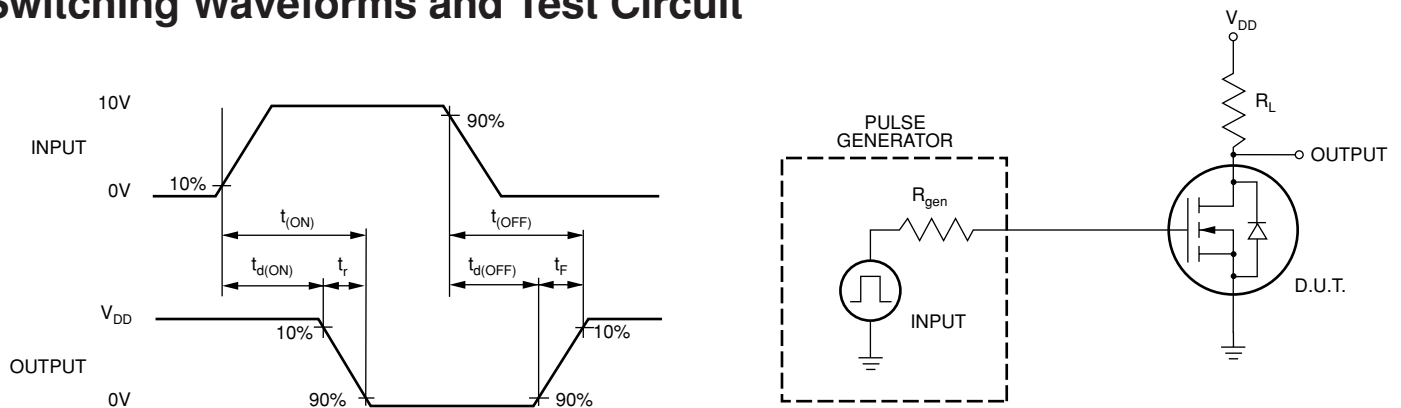
## N-Channel Electrical Characteristics (@ 25°C unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	200			V	$I_D = 100\mu A$ , $V_{GS} = 0V$
$V_{GS(th)}$	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			-4.5	mV/°C	$I_D = 1mA$ , $V_{GS} = V_{DS}$
$I_{GSS}$	Gate Body Leakage			100	nA	$V_{GS} = \pm 20V$ , $V_{DS} = 0V$
$I_{DSS}$	Zero Gate Voltage Drain Current			1.0	$\mu A$	$V_{GS} = 0V$ , $V_{DS} = 100V$
				10.0	$\mu A$	$V_{GS} = 0V$ , $V_{DS} = \text{Max Rating}$
				1.0	mA	$V_{GS} = 0V$ , $V_{DS} = 0.8 \text{ Max Rating}$ $T_A = 125^\circ C$
$I_{D(ON)}$	ON-State Drain Current	0.6			A	$V_{GS} = 4.5V$ , $V_{DS} = 25V$
		1.2				$V_{GS} = 10V$ , $V_{DS} = 25V$
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance			8.0	$\Omega$	$V_{GS} = 4.5V$ , $I_D = 150mA$
				7.0	$\Omega$	$V_{GS} = 10V$ , $I_D = 1.0A$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature			1.0	%/°C	$V_{GS} = 4.5V$ , $I_D = 150mA$
$G_{FS}$	Forward Transconductance	150			mS	$V_{DS} = 25V$ , $I_D = 200mA$
$C_{ISS}$	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			20	ns	$V_{DD} = 25V$ $I_D = 150mA$ $R_{GEN} = 25\Omega$
$t_r$	Rise Time			15		
$t_{d(OFF)}$	Turn-OFF Delay Time			25		
$t_f$	Fall Time			25		
$V_{SD}$	Diode Forward Voltage Drop			1.8	V	$I_{SD} = 200mA$ , $V_{GS} = 0V$
$t_{rr}$	Reverse Recovery Time		300		ns	$I_{SD} = 200mA$ , $V_{GS} = 0V$

### Notes:

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

## Switching Waveforms and Test Circuit



## P-Channel Electrical Characteristics (@ 25°C unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	-200			V	$V_{GS} = 0V, I_D = -2mA$
$V_{GS(th)}$	Gate Threshold Voltage	-1.0		-2.4	V	$V_{GS} = V_{DS}, I_D = -1mA$
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature			4.5	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	$\mu A$	$V_{GS} = 0V, V_{DS} = \text{Max Rating}$
				-1.0	mA	$V_{GS} = 0V, V_{DS} = 0.8 \text{ Max Rating}$ $T_A = 125^\circ C$
$I_{D(ON)}$	ON-State Drain Current	-0.25	-0.7		A	$V_{GS} = -4.5V, V_{DS} = -25V$
		-0.75	-2.1			$V_{GS} = -10V, V_{DS} = -25V$
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance		10	15	$\Omega$	$V_{GS} = -4.5V, I_D = -100mA$
			8.0	12		$V_{GS} = -10V, I_D = -200mA$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature			1.7	%/°C	$V_{GS} = -10V, I_D = -200mA$
$G_{FS}$	Forward Transconductance	100	250		mS	$V_{DS} = -25V, I_D = -200mA$
$C_{ISS}$	Input Capacitance		75	125	pF	$V_{GS} = 0V, V_{DS} = -25V$ $f = 1 \text{ MHz}$
$C_{OSS}$	Common Source Output Capacitance		20	85		
$C_{RSS}$	Reverse Transfer Capacitance		10	35		
$t_{d(ON)}$	Turn-ON Delay Time			10	ns	
$t_r$	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 25°C unless otherwise stated. (Pulse test: 300 $\mu$ s pulse, 2% duty cycle.)
2. All A.C. parameters sample tested.

## Switching Waveforms and Test Circuit

