

N- and P-Channel Enhancement-Mode MOSFET Pair

Features

- Integrated gate-source resistor
- Integrated gate-source zener diode
- Low threshold
- Low on-resistance
- Independent N- and P-channels
- Electrically isolated N- and P-channels
- Low input capacitance
- Fast switching speeds
- Free from secondary breakdowns
- Low input and output leakage

Application

- High voltage pulsers
- Amplifiers
- Buffers
- Piezoelectric transducer drivers
- General purpose line drivers
- Logic level interfaces

General Description

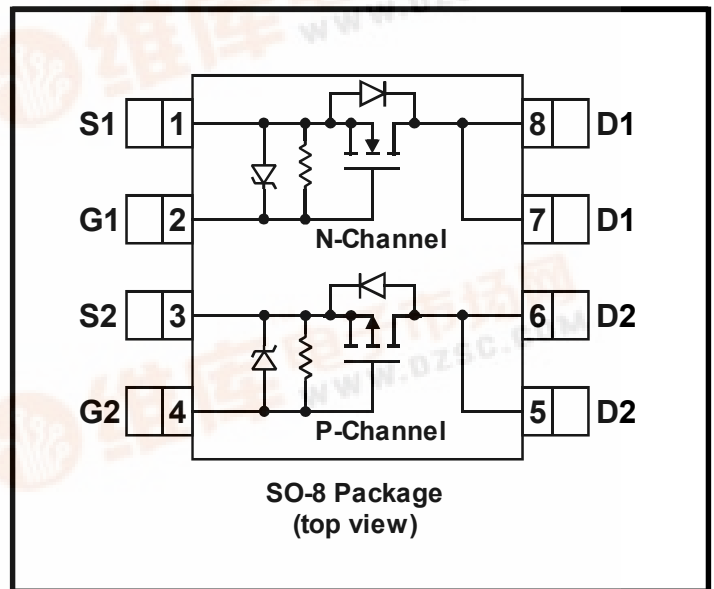
The Supertex TC6320TG consists of a high voltage low threshold N-channel and P-channel MOSFET in an SO-8 package. Both MOSFETs have integrated gate-source resistors and gate-source zener diode clamps which are desired for high voltage pulser applications. TC6320TG, a complementary high-speed, high voltage, gate-clamped N- and P-channel MOSFET pair in a single SO-8 package. The TC6320TG offers 200V breakdown voltage, 2.0A output peak current and low input capacitance. The 2.0A output current capability will minimize rise and fall times. The low input capacitance will minimize propagation delay times and also rise and fall times. The MOSFETs have integrated gate-source resistors and gate-source zener diode clamps that are desired for high voltage pulser applications saving board space and improving performance. It is specifically designed for applications in medical ultrasound transmitters and non-destructive evaluation in materials flaw detection, but it can also be used as an efficient buffer.

Absolute Maximum Ratings*

Drain-to-Source Voltage	BV_{DSS}
Drain-to-Gate Voltage	BV_{DGS}
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

*Distance of 1.6mm from case for 10 seconds.

Package Option



BV _{DSS} / BV _{DGS}		R _{DS(ON)} (max)		Order Number / Package
N-Channel	P-Channel	N-Channel	P-Channel	SO-8
200V	-200V	7.0Ω	8.0Ω	TC6320TG

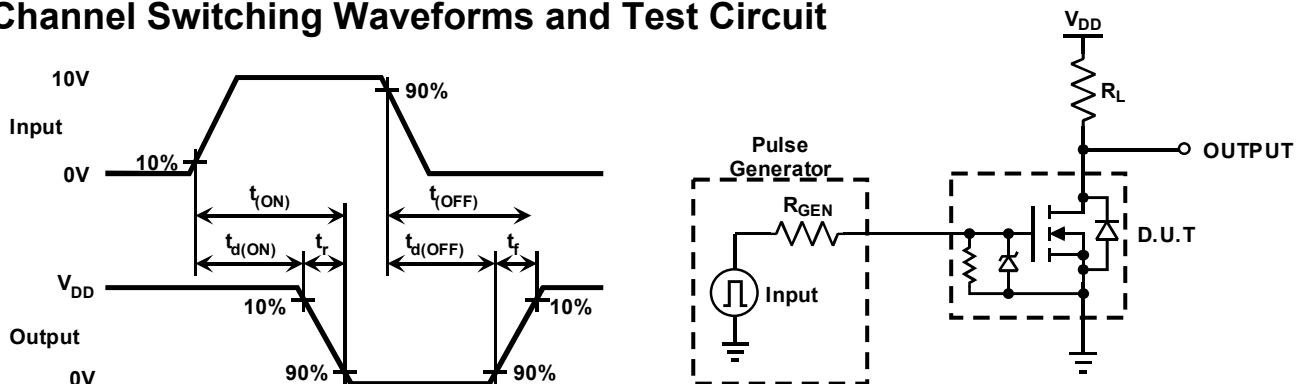
N-Channel Electrical Characteristics (at T_A=25°C unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
BV _{DSS}	Drain-to-Source Breakdown Voltage	200			V	V _{GS} =0V, I _D =2mA
V _{GS(th)}	Gate Threshold Voltage	1.0		2.0	V	V _{GS} =V _{DS} , I _D =1mA
ΔV _{GS(th)}	Change in V _{GS(th)} with Temperature			-4.5	mV/°C	V _{GS} =V _{DS} , I _D =1mA
R _{GS}	Gate-Source Shunt Resistor	10		50	KΩ	I _{GS} =100μA
ΔR _{GS}	Change in R _{GS} with Temperature			TBD	%/°C	I _{GS} =100μA
V _{ZGS}	Gate-Source Zener Voltage	13.2		25	V	I _{GS} =2mA
ΔV _{ZGS}	Change in V _{ZGS} with Temperature			TBD	mV/°C	I _{GS} =2mA
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	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	Ω	V _{GS} =4.5V, I _D =150mA
				7.0		V _{GS} =10V, I _D =1.0A
ΔR _{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 Ω
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		
t _{rr}	Reverse Recovery Time		300		ns	V _{GS} =0V, I _{SD} =0.5A

Notes:

- 1) All DC parameters 100% tested at 25°C unless otherwise stated. (Pulsed test: 300μs pulse at 2% duty cycle.)
- 2) All AC parameters sample tested.

N-Channel Switching Waveforms and Test Circuit



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

Symbol	Parameter	Min	Typ	Max	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	-200			V	$V_{GS}=0V, I_D=-2mA$
$V_{GS(th)}$	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	$V_{GS}=V_{DS}, I_D=-1mA$
R_{GS}	Gate-Source Shunt Resistor	10		50	K Ω	$I_{GS}=-100\mu A$
ΔR_{GS}	Change in R_{GS} with Temperature			TBD	%/°C	$I_{GS}=-100\mu A$
V_{ZGS}	Gate-Source Zener Voltage	13.2		25	V	$I_{GS}=-2mA$
$\Delta V_{ZGS(th)}$	Change in V_{ZGS} with Temperature			TBD	mV/°C	$I_{GS}=-2mA$
I_{DSS}	Zero Gate Voltage Drain Current			-10	μA	$V_{GS}=0V, V_{DS}=\text{Max Rating}$
				-1.0	mA	$V_{GS}=0V, V_{DS}=0.8 \text{ Max Rating}, T_A=125^\circ\text{C}$
$I_{D(ON)}$	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			10	Ω	$V_{GS}=-4.5V, I_D=-150mA$
				8.0		$V_{GS}=-10V, I_D=-1.0A$
$\Delta R_{DS(ON)}$	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		
t_{rr}	Reverse Recovery Time		300		ns	$V_{GS}=0V, I_{SD}=-0.5A$

Notes:

- 1) All DC parameters 100% tested at 25°C unless otherwise stated. (Pulsed test: 300 μs pulse at 2% duty cycle.)
- 2) All AC parameters sample tested.

P-Channel Switching Waveforms and Test Circuit

