

**VS232**

Dual High-Performance RS232 Line Drivers/Receivers

**General Description**

The VS232 is a dual driver/receiver that includes a capacitive voltage generator to supply TIA/EIA-232-F voltage levels from a single 5-V supply. Each receiver converts TIA/EIA-232-F inputs to 5-V TTL/CMOS levels.

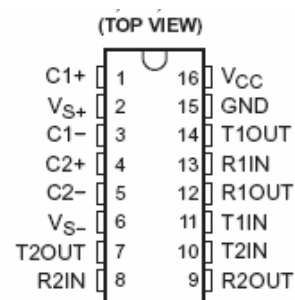
These receivers have a typical threshold of 1.3 V, a typical hysteresis of 0.5 V, and can accept  $\pm 30\text{V}$  inputs.

Each driver converts TTL/CMOS input levels into TIA/EIA-232-F levels. The driver, receiver, and voltage-generator functions are available as cells in the Texas Instruments LinASIC™ library.

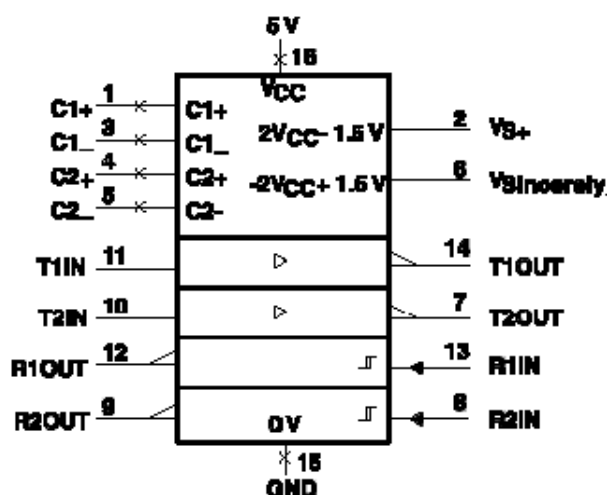
The Operating free-air temperature  $T_A$  of VS232 is from  $0^\circ\text{C}$  to  $70^\circ\text{C}$ .

**Pin Configuration**

VS232 . . . DW or N PACKAGE

**General Characteristics**

- Operates from a Single 5-V Power Supply
- By LinBiCMOS™ technology
- Two Drivers and Two Receivers
- 30-V Input Levels
- Low Supply Current . . . 8 mA Typical
- Compatible with Maxim MAX232
- ESD Protection Exceeds 2000V

**Logic diagram**

## Applications

- Battery-Powered Systems,
- Terminals,
- Modems, and
- Computers

## SPECIFICATIONS

### Absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Input supply voltage range, $V_{CC}$	-0.3 V to 6 V
Positive output supply voltage range, $V_{S+}$	$V_{CC} - 0.3$ V to 15 V
Negative output supply voltage range, $V_{S-}$	-0.3 V to -15 V
Input voltage range, $V_I$ : Driver	-0.3 V to $V_{CC} + 0.3$ V
Receiver	$\pm 30$ V
Output voltage range, $V_O$ : T1OUT, T2OUT	$V_{S-} - 0.3$ V to $V_{S+} + 0.3$ V
R1OUT, R2OUT	-0.3 V to $V_{CC} + 0.3$ V
Short-circuit duration : T1OUT, T2OUT	Unlimited
Operating free-air temperature range, $T_A$ : VS232	0°C to 70°C
Storage temperature range, $T_{stg}$	-65°C to 150°C
Lead Temperature : 1.6mm from case (1/16 inch), soldering 10sec	260°C

### Recommended operating conditions

	MIN	NOM	MAX	UNIT
$V_{CC}$ Supply voltage	4.5	5	5.5	V
$V_{IH}$ High-level input voltage (T1IN, T2IN)	2			V
$V_{IL}$ Low-level input voltage (T1IN, T2IN)			0.8	V
Receiver input voltage R1IN, R2IN			$\pm 30$	V
Operating free-air temperature $T_A$	0		70	°C

### Electrical characteristics over recommended ranges of supply voltage and operating free-air emperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP+	MAX	UNIT
VOH High-level output voltage	TIOUT, T2OUT	$R_L=3\text{ K}\Omega$ to GND	5	7		V
	R1OUT, R2OUT	$I_{OH}=-1\text{ mA}$	3.5			
VOL Low-level output voltage*	TIOUT, T2OUT	$R_L=3\text{ K}\Omega$ to GND		-7	-5	V
	R1OUT, R2OUT	$I_{OL}=3.2\text{ mA}$			0.4	
VIT+ receiver positive-going input threshold voltage	R1IN, R2IN	$V_{CC}=5\text{V}$ $T_A=25^\circ\text{C}$		1.7	2.4	V
VIT- receiver negative-going input threshold voltage	R1IN, R2IN	$V_{CC}=5\text{V}$ $T_A=25^\circ\text{C}$	0.8	1.2		V
$V_{hys}$ Input hysteresis voltage	R1IN, R2IN	$V_{CC}=5\text{V}$	0.2	0.5	1	V
$r_i$ Receive Input resistance	R1IN, R2IN	$V_{CC}=5\text{V}$ $T_A=25^\circ\text{C}$	3	5	7	$\text{k}\Omega$
$r_O$ Output resistance	TIOUT, T2OUT	$V_{Sr}=V_{Ss}=0$ $V_O=\pm 2\text{ V}$	300			$\Omega$
$I_{OS}$ Short-circuit output current	TIOUT, T2OUT	$V_{CC}=5.5\text{V}$ $V_O=0$		$\pm 10$		mA
$I_{IS}$ Short-circuit input current	TIIN, T2IN	$V_I=0$			200	$\mu\text{A}$
$I_{CC}$ Supply current		$V_{CC}=5.5\text{V}$ All outputs open, $T_A=25^\circ\text{C}$		8	10	mA

+ All typical values are at  $V_{CC} = 5\text{ V}$  and  $T_A = 25^\circ\text{C}$ .

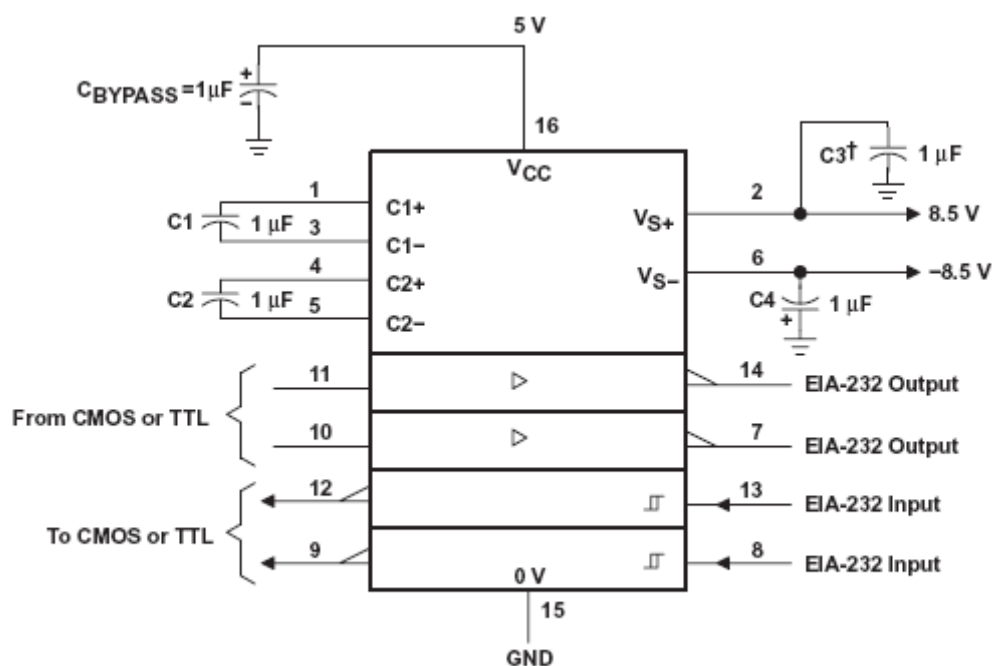
\* The algebraic convention, in which the least-positive (most negative) value is designated minimum, is used in this data sheet for logic voltage levels only.

\*\* Not more than one output should be shorted at a time.

### Switching characteristics, $V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}$

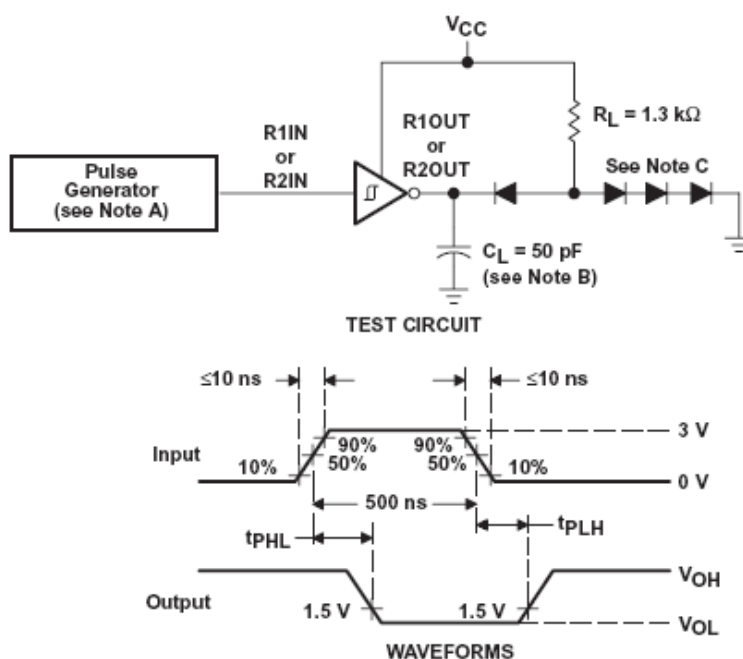
PARAMETER	TEST CONDITIONS	MIN TYP MAX	UNIT
tPLH(R) Receiver propagation delay time, low-to high-level output	See Figure2	500	ns
tPLH(R) Receiver propagation delay time, high-to low-level output	See Figure2	500	ns
SR Driver slew rate	$R_L=3\text{ k}\Omega$ to $7\text{ k}\Omega$ See Figure3	30	$\text{V}/\mu\text{s}$
SR(tr) Driver transition region slew rate	See Figure4	3	$\text{V}/\mu\text{s}$

## Application Information



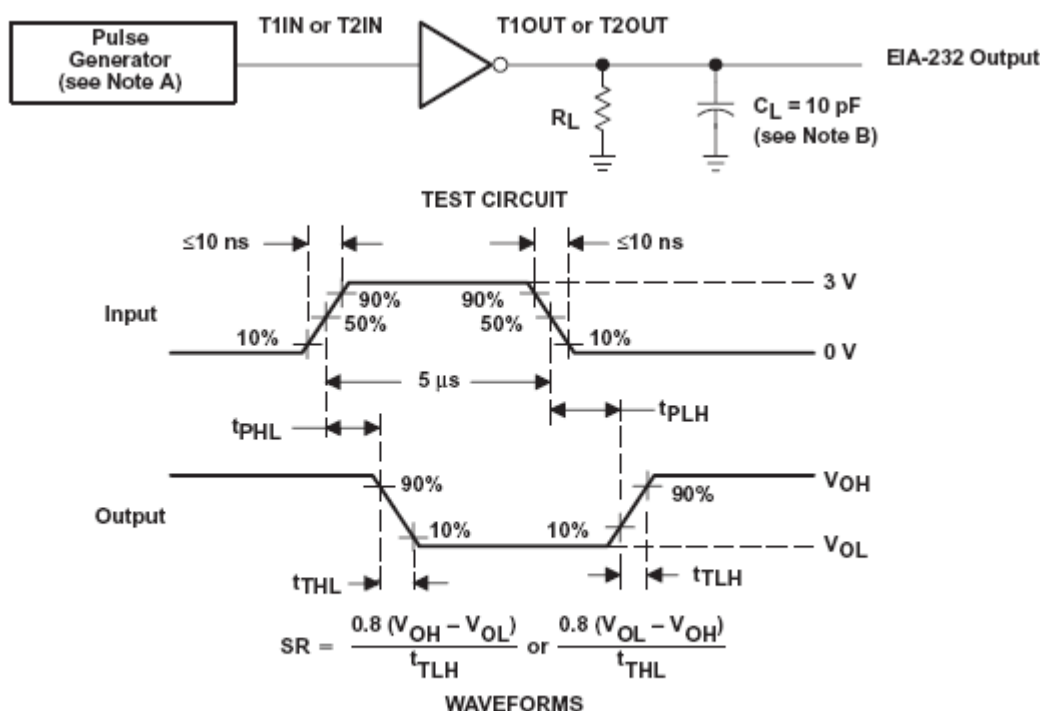
Typical Operating Circuit

## Parameter Measurement Information



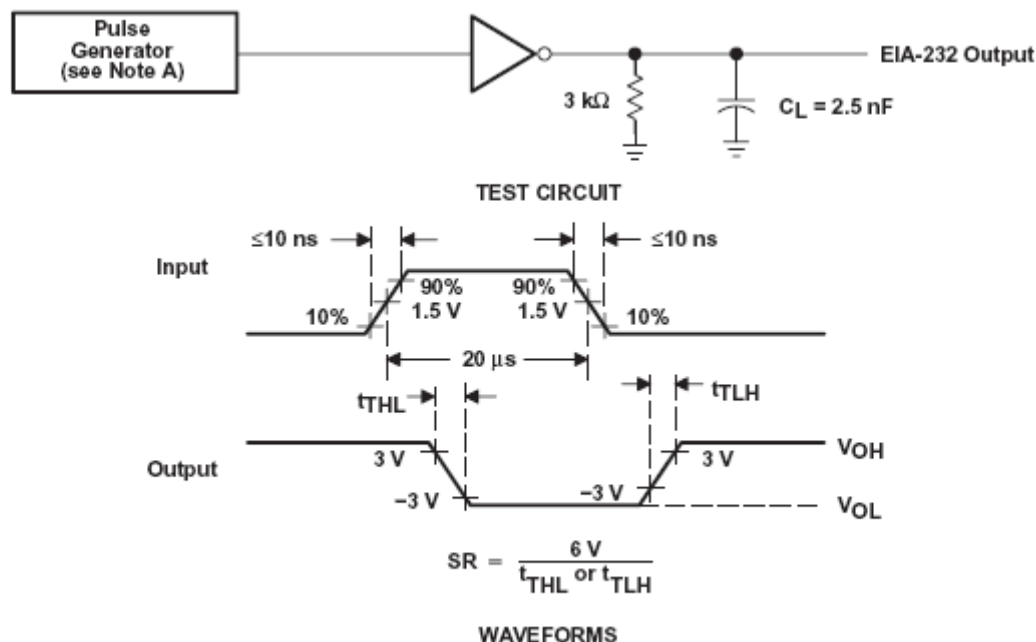
- NOTES: A. The pulse generator has the following characteristics:  $Z_O = 50 \Omega$ , duty cycle  $\leq 50\%$ .  
 B.  $C_L$  includes probe and jig capacitance.  
 C. All diodes are 1N3064 or equivalent.

Figure 1. Receiver Test Circuit and Waveforms for  $t_{pHL}$  and  $t_{pLH}$  Measurements



NOTES: A. The pulse generator has the following characteristics:  $Z_O = 50 \Omega$ , duty cycle  $\leq 50\%$ .  
B.  $C_L$  includes probe and jig capacitance.

#### Driver Test Circuit and Waveforms for $t_{PHL}$ and $t_{PLH}$ Measurements (5- $\mu\text{s}$ Input)



NOTE A: The pulse generator has the following characteristics:  $Z_O = 50 \Omega$ , duty cycle  $\leq 50\%$ .

#### Test Circuit and Waveforms for $t_{THL}$ and $t_{TLH}$ Measurements (20- $\mu\text{s}$ Input)