VS232

Dual High-Performance RS232 Line Drivers/Receivers

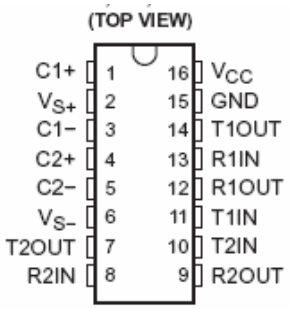
General Description

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 ±30V 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°C to 70°C.

Pin Configuration

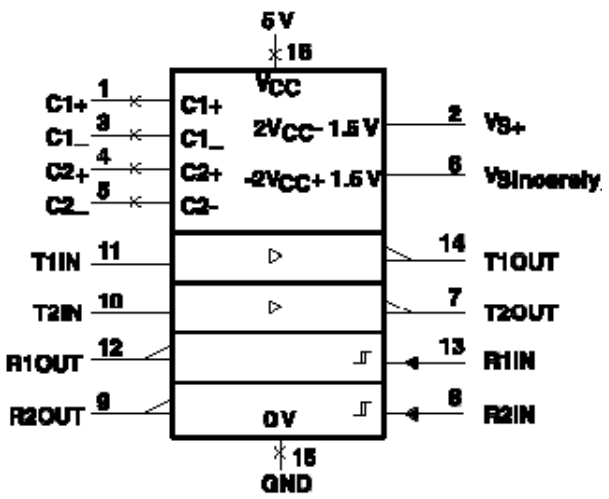
VS232 . . . DW or N PACKAGE



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 VCC + 0.3 V
Receiver	±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			±30	***V***
Operating free-air temperature T_A	***0***		***70***	℃

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 KΩ to GND	5	7		V
	R1OUT，R2OUT	I_{OH}=-1 mA	3.5			
VOL Low- level output voltage*	TIOUT，T2OUT	R_L=3 KΩ to GND		-7	-5	V
	R1OUT，R2OUT	I_{OL}=3.2 mA			0.4	
VIT+ receiver positive-going input threshold voltage	R1IN，R2IN	V_{CC}=5v T_A=25℃		1.7	2.4	V
VIT- receiver negative-going input threshold voltage	R1IN，R2IN	V_{CC}=5v T_A=25℃	0.8	1.2		V
V_{hys} Input hysteresis voltage	R1IN，R2IN	V_{CC}=5v	0.2	0.5	1	V
r_i Receive Input resistance	R1IN，R2IN	V_{CC}=5v T_A=25℃	3	5	7	kΩ
r_O Output resistance	TIOUT，T2OUT	V_{S+}=V_{S-}=0 V_O=±2 v	300			Ω
I_{OS}** Short-circuit ouput current	TIOUT，T2OUT	V_{CC}=5.5v V_O=0		±10		mA
I_{IS} Short-circuit iuput current	T1IN，T2IN	V_I=0			200	uA
I_{CC} Supply current		V_{CC}=5.5v All outputs open, T_A=25℃		8	10	mA

+ All typical values are at V_{CC} = 5 V and T_A = 25°C.

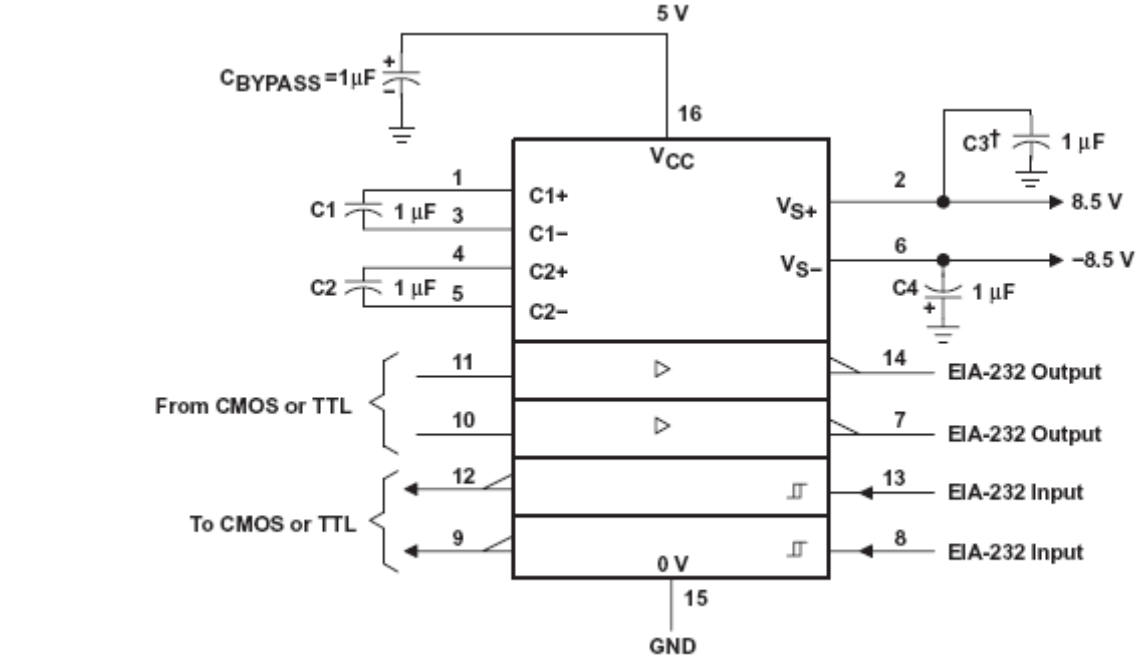
***** The algebraic convention, in which the least-positive (most negative) value is designated minimum, is used in this data sheet for logic voltage levels only.

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

Switching characteristics, VCC = 5 V, TA = 25°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	RL=3 kΩ to 7 kΩ See Figure3	30	V/μs
SR(tr) Driver transition region slew rate	See Figure4	3	V/μs

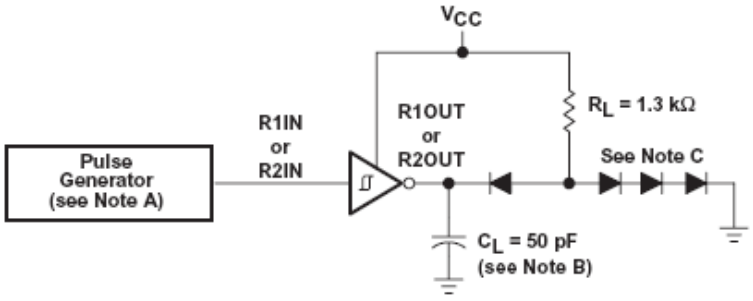
Application Information



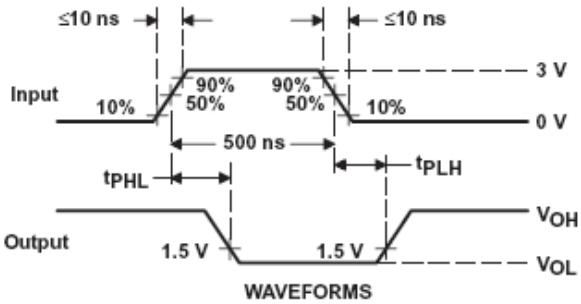
† C3 can be connected to V_{CC} or GND.

Typical Operating Circuit

Parameter Measurement Information



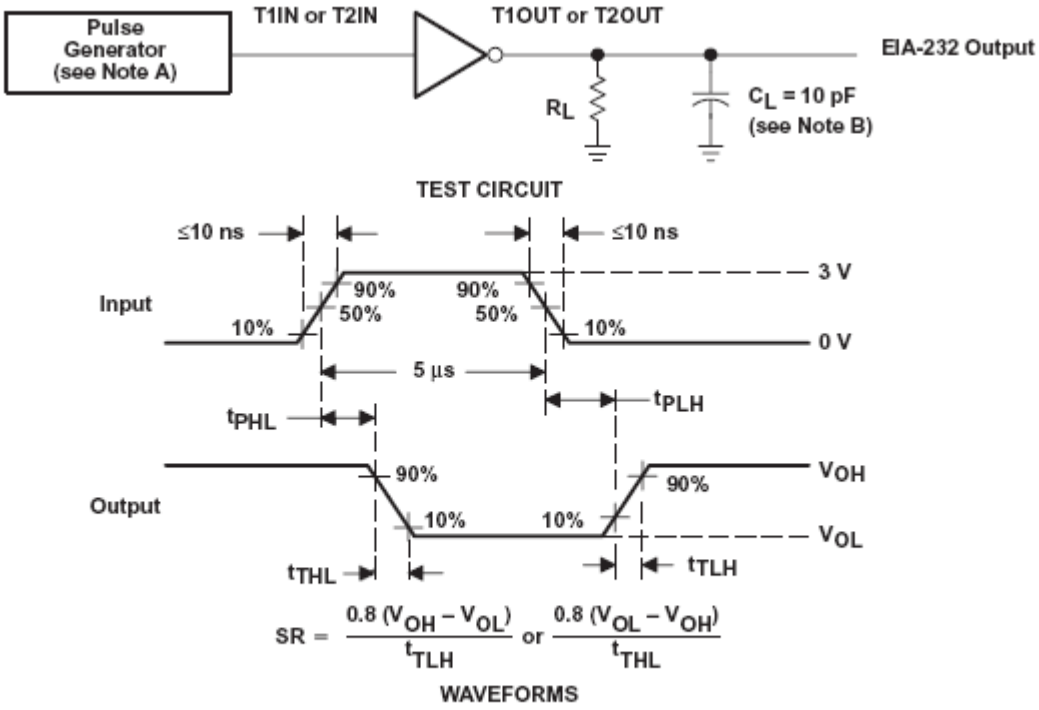
TEST CIRCUIT



WAVEFORMS

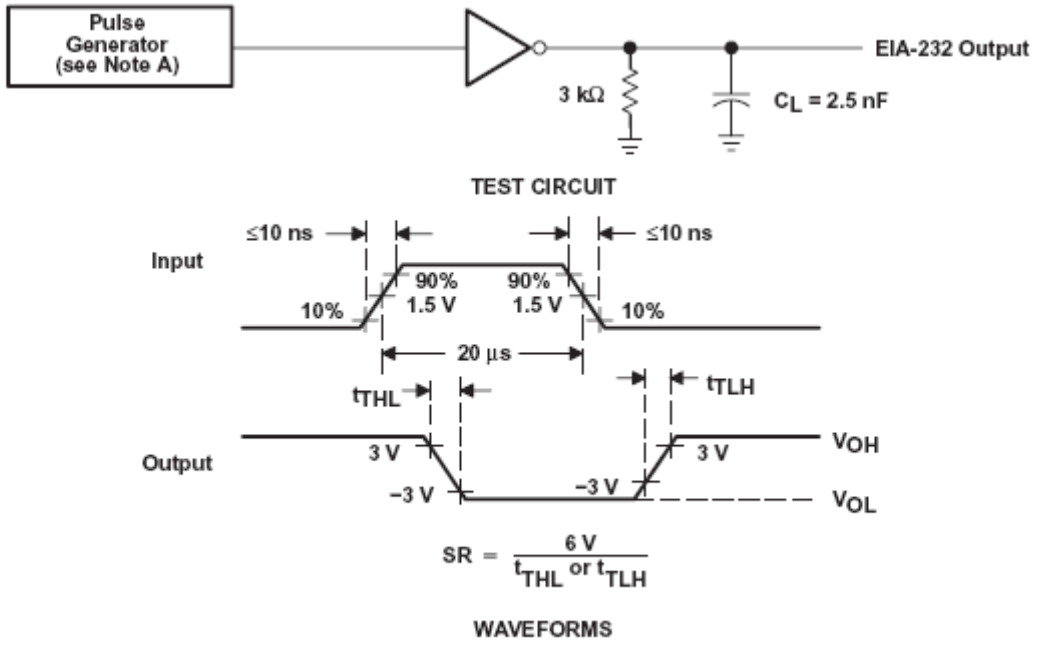
NOTES: A. The pulse generator has the following characteristics: Z_O = 50 Ω, duty cycle ≤ 50%.
B. C_L includes probe and jig capacitance.
C. All diodes are 1N3064 or equivalent.

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 Ω, duty cycle ≤ 50%.
B. C_L includes probe and jig capacitance.

Driver Test Circuit and Waveforms for t_{PHL} and t_{PLH} Measurements (5-µs Input)



NOTE A: The pulse generator has the following characteristics: Z_O = 50 Ω, duty cycle ≤ 50%.

Test Circuit and Waveforms for t_{THL} and t_{TLH} Measurements (20-µs Input)