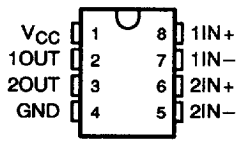
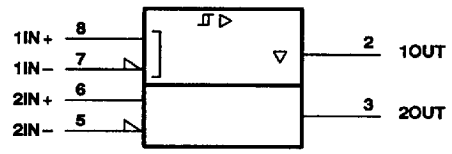
SLLS015A – D2609, FEBRUARY 1986 – REVISED FEBRUARY 1993

- **Meets EIA Standards RS-422-A and RS-423-A**
- **Meets EIA Standards RS-232 and CCITT V.28 With External Components**
- **Meets Federal Standards 1020 and 1030**
- **Built-In 5-MHz Low-Pass Filter**
- **Operates From Single 5-V Power Supply**
- **Wide Common-Mode Voltage Range**
- **High Input Impedance**
- **TTL-Compatible Outputs**
- **8-Pin Dual-In-Line Package**
- **Pinout Compatible With the μA9637 and μA9639**

D OR P PACKAGE
(TOP VIEW)

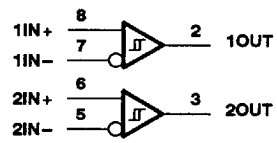


logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram

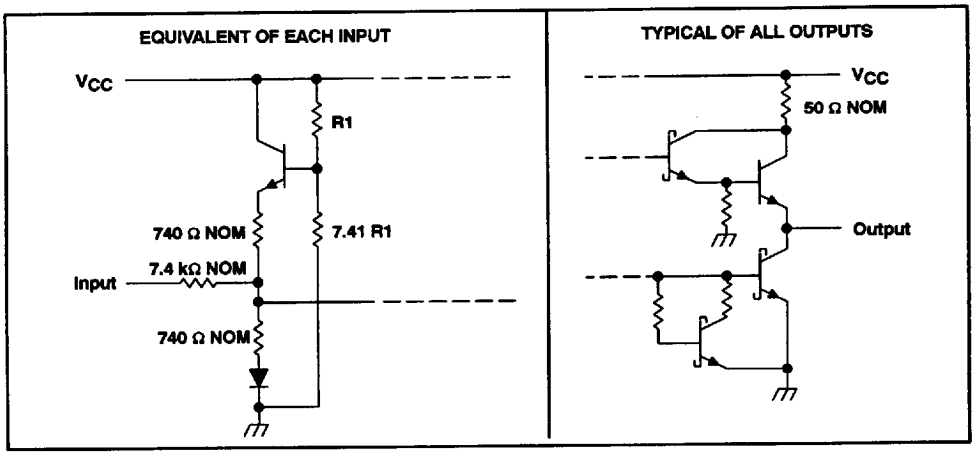


description

The SN75146 is a dual differential line receiver designed to meet EIA Standards RS-422-A and RS-423-A. The receiver is designed to have a constant impedance with input voltages of ±3 V to ±25 V allowing it to meet the requirements of EIA Standard RS-232-C and CCITT recommendation V.28 with the addition of an external bias resistor. This receiver is designed for low-speed operation below 355 kHz and has a built-in 5-MHz low-pass filter to attenuate high-frequency noise. The inputs are compatible with either a single-ended or a differential line system and the outputs are TTL compatible. This device operates from a single 5-V power supply and is supplied in both the 8-pin dual-in-line and small-outline packages.

The SN75146 is characterized for operation from 0°C to 70°C.

schematics of inputs and outputs



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

Supply voltage range, V_{CC} (see Note 1) ..... −0.5 V to 7 V
Input voltage ..... ±25 V
Differential input voltage (see Note 2) ..... ±25 V
Output voltage range (see Note 1) ..... −0.5 V to 5.5 V
Low-level output current ..... 50 mA
Continuous total dissipation ..... See Dissipation Rating Table
Operating free-air temperature range ..... 0°C to 70°C
Storage temperature range ..... − 65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds ..... 260°C

NOTES: 1. All voltage values, except differential input voltage, are with respect to the network ground terminal.
2. Differential input voltage is measured at the noninverting input with respect to the corresponding inverting input.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	OPERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING
D	725 mW	5.8 mW/°C	464 mW
P	1000 mW	8.0 mW/°C	640 mW

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	4.75	5	5.25	V
Common-mode input voltage, V_{IC}			±7	V
Operating free-air temperature, T_A	0	25	70	°C

electrical characteristics over recommended ranges of supply voltage, common-mode input voltage, and operating free-air temperature (unless otherwise noted)

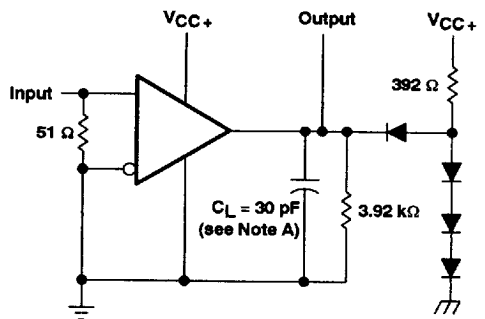
PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
V_T	Threshold voltage (V_{T+} and V_{T-})			−0.2‡		0.2	V
		See Note 3		−0.4‡		0.4	
V_{hys}	Hysteresis ($V_{T+} - V_{T-}$)			70			mV
V_{IB}	Input bias voltage	$I_I = 0$		2		2.4	V
V_{OH}	High-level output voltage	$V_{ID} = 0.2$ V,	$I_O = -1$ mA	2.5	3.5		V
V_{OL}	Low-level output voltage	$V_{ID} = -0.2$ V,	$I_O = 20$ mA		0.35	0.5	V
r_I	Input resistance	$V_I = 3$ V to 25 V or $V_I = -3$ V to −25 V, See Note 4		6	7.8	10.5	kΩ
I_I	Input current	$V_{CC} = 0$ to 5.5 V, See Note 5	$V_I = 10$ V		1.1	3.25	mA
			$V_I = -10$ V		−1.6	−3.25	
I_{OS}	Short-circuit output current§	$V_O = 0$,	$V_{ID} = 0.2$ V	−40	−75	−100	mA
I_{CC}	Supply current	$V_{ID} = -0.5$ V,	No load		35	50	mA

† All typical values are at $V_{CC} = 5$ V, $T_A = 25°C$.
‡ The algebraic convention, in which the less positive (more negative) limit is designated as minimum, is used in this data sheet for threshold levels only.
§ Only one output should be shorted at a time, and duration of the short circuit should not exceed one second.
NOTES: 3. The expanded threshold parameter is tested with a 500-Ω resistor in series with each input.
4. r_I is defined by $\Delta V_I/\Delta I_I$.
5. The input not under test is grounded.

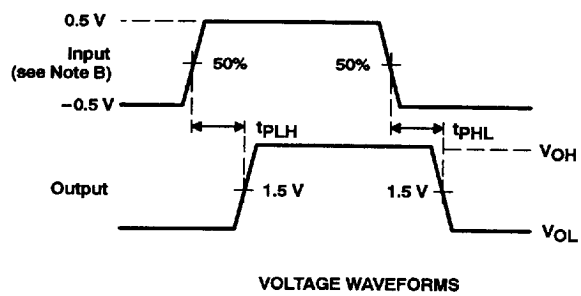
switching characteristics, $V_{CC} = 5$ V, $T_A = 25°C$

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output	$C_L = 30$ pF,	See Figure 1	100	150	300	ns
t_{PHL}	Propagation delay time, high-to-low-level output			100	150	300	ns

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

NOTES: A. C_L includes probe and jig capacitance.
B. The input pulse is supplied by a generator having the following characteristics: $t_r \le 5$ ns, $t_f \le 5$ ns, PRR ≤ 300 kHz, duty cycle = 50%.

Figure 1. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

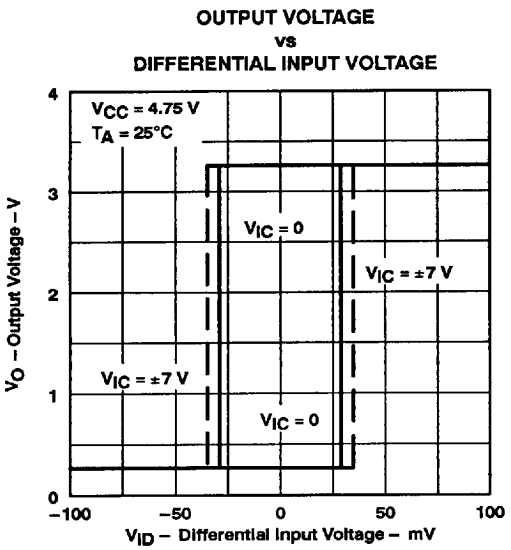


Figure 2

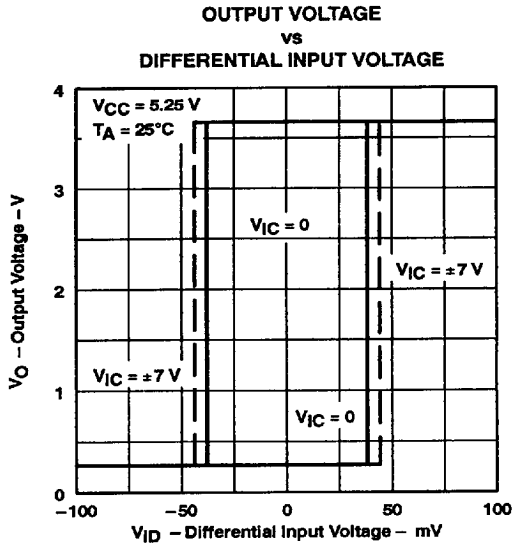
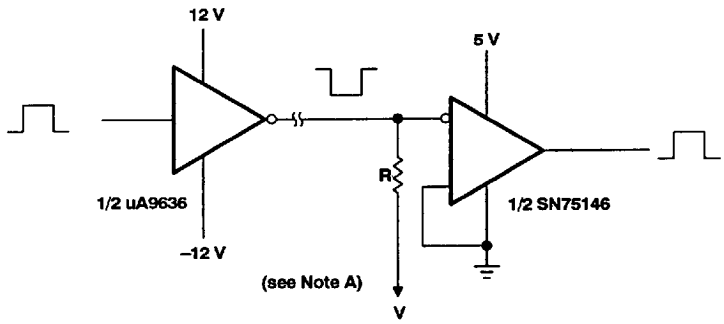


Figure 3

APPLICATION INFORMATION



NOTE A: In order to meet the input-impedance and open-circuit-input voltage requirements of RS-232-C and CCITT V.28 and ensure open-circuit-input fail-safe operation, R and V are selected to satisfy the following equations:

$$V = -1.1 - 3.3\,\frac{R}{r_i} \text{ volts}$$

$$3\ \text{k}\Omega \le \frac{R(r_i)}{R + r_i} \le 7\ \text{k}\Omega$$

Figure 4. RS-232-C System Applications

APPLICATION INFORMATION

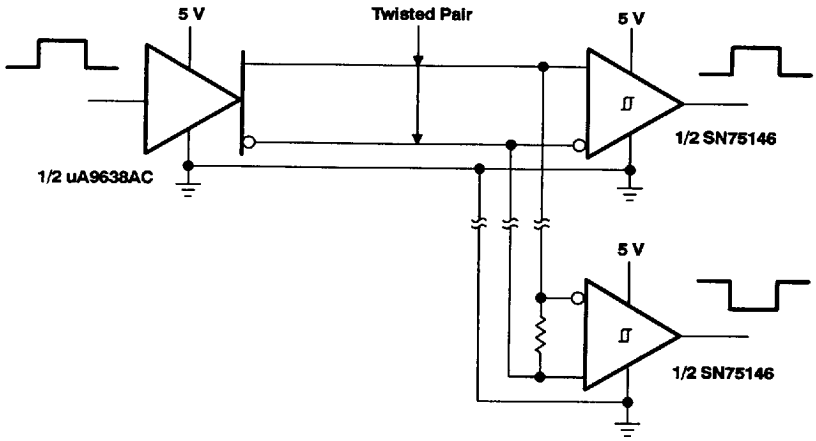


Figure 5. RS-422-A System Applications