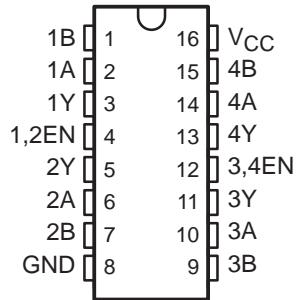


- Meets or Exceeds the Requirements of ANSI EIA/TIA-422-B, EIA/TIA-423-B, and RS-485
- Meets ITU Recommendations V.10, V.11, X.26, and X.27
- Designed for Multipoint Bus Transmission on Long Bus Lines in Noisy Environments
- Low Supply Current Requirement 27 mA Max
- Common-Mode Input Voltage Range of -12 V to 12 V
- Input Sensitivity . . .  $\pm 200$  mV
- Input Hysteresis . . . 50 mV Typ
- High Input Impedance . . . 12 k $\Omega$  Min
- Operates From Single 5-V Supply

N OR NS† PACKAGE  
(TOP VIEW)



† The NS package is only available left-ended taped and reeled (order device SN75ALS175NSLE).

### description

The SN75ALS175 is a monolithic quadruple differential line receiver with 3-state outputs. It is designed to meet the requirements of ANSI Standards EIA/TIA-422-B, EIA/TIA-423-B, and RS-485 and several ITU recommendations. Advanced low-power Schottky technology provides high speed without the usual power penalty. Each of the two pairs of receivers has a common active-high enable. The device features high input impedance, input hysteresis for increased noise immunity, and input sensitivity of  $\pm 200$  mV over a common-mode input voltage range of -12 V to 12 V.

The SN75ALS175 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE  
(each receiver)

DIFFERENTIAL INPUTS A – B	ENABLES EN	OUTPUT Y
$V_{ID} \geq 0.2$ V	H	H
$-0.2 < V_{ID} < 0.2$ V	H	?
$V_{ID} \leq -0.2$ V	H	L
X	L	Z
Open Circuit	H	H

H = high level, L = low level, ? = indeterminate,

X = irrelevant, Z = high impedance (off)

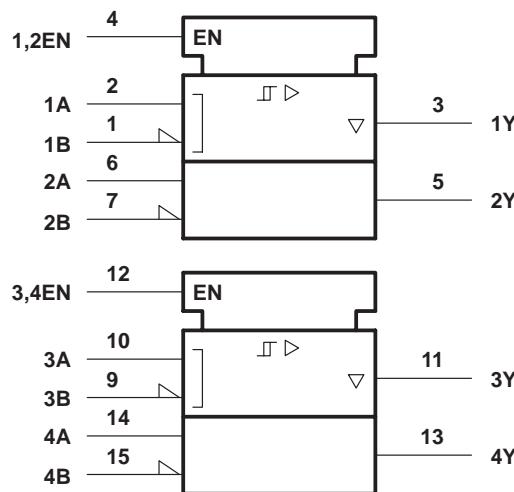


Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

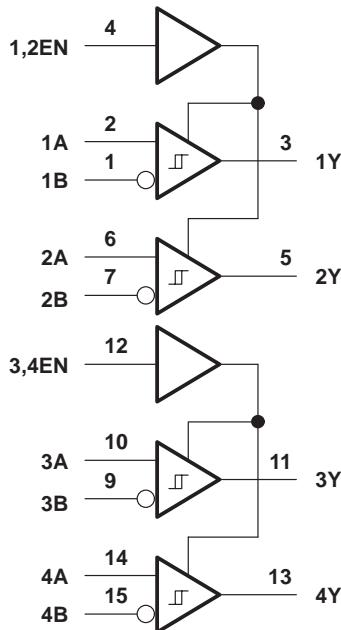
# SN75ALS175 QUADRUPLE DIFFERENTIAL LINE RECEIVER

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## logic symbol†

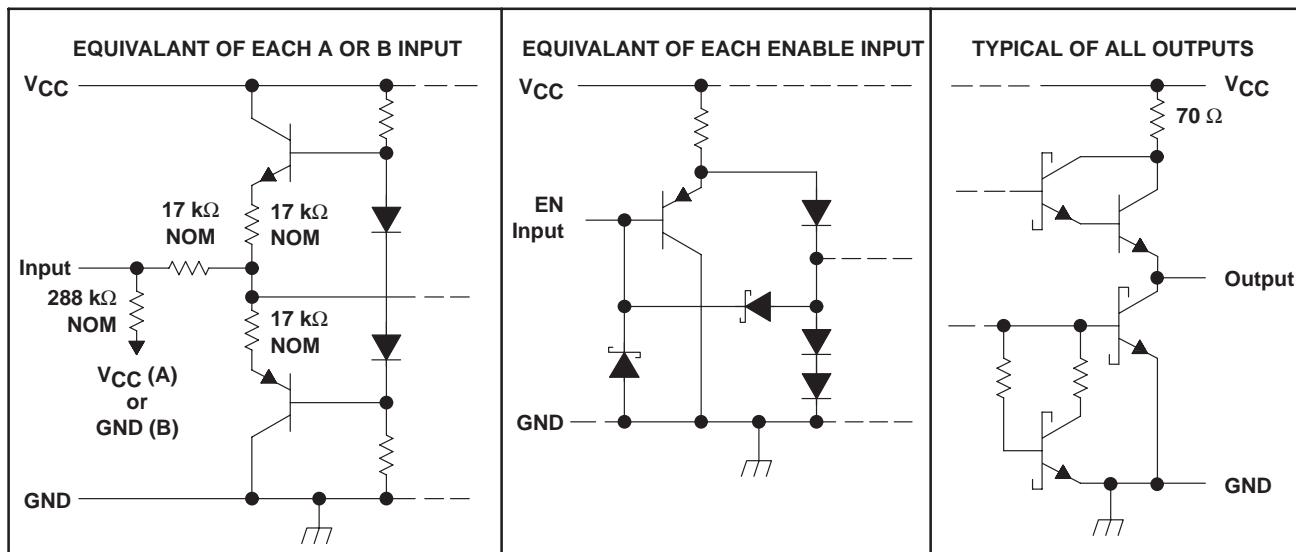


## logic diagram (positive logic)



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

## schematics of inputs and outputs



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

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Input voltage, $V_I$ (A or B inputs)	$\pm 14$ V
Differential input voltage, $V_{ID}$ (see Note 2)	$\pm 14$ V
Enable input voltage, $V_I$	7 V
Low-level output current, $I_{OL}$	50 mA
Continuous total dissipation	See Dissipation Rating Table
Operating free-air temperature range, $T_A$	0°C to 70°C
Storage temperature range, $T_{stg}$	-65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltage values, except differential input voltage, are with respect to network ground terminal.

2. Differential-input voltage is measured at the noninverting input with respect to the corresponding inverting input.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING
N	1150 mW	9.2 mW/°C	736 mW
NS	625 mW	5.0 mW/°C	400 mW

**recommended operating conditions**

	MIN	NOM	MAX	UNIT
Supply voltage, $V_{CC}$	4.75	5	5.25	V
Common-mode input voltage, $V_{IC}$			$\pm 12$	V
Differential input voltage, $V_{ID}$			$\pm 12$	V
High-level enable-input voltage, $V_{IH}$		2		V
Low-level enable-input voltage, $V_{IL}$			0.8	V
High-level output current, $I_{OH}$			-400	$\mu\text{A}$
Low-level output current, $I_{OL}$			8	mA
Operating free-air temperature, $T_A$	0		70	$^\circ\text{C}$

# SN75ALS175

## QUADRUPLE DIFFERENTIAL LINE RECEIVER

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**electrical characteristics over recommended ranges of common-mode input voltage, supply voltage and operating free-air temperature (unless otherwise noted) (see Note 3)**

PARAMETER	TEST CONDITIONS		MIN	TYP†	MAX	UNIT		
$V_{IT+}$ Positive-going input threshold voltage			200		mV			
$V_{IT-}$ Negative-going input threshold voltage			-200‡		mV			
$V_{hys}$ Hysteresis voltage ( $V_{IT+} - V_{IT-}$ )			50		mV			
$V_{IK}$ Enable-input clamp voltage	$I_I = -18 \text{ mA}$		-1.5		V			
$V_{OH}$ High-level output voltage	$V_{ID} = 200 \text{ mV}$ , $I_{OH} = -400 \mu\text{A}$ , See Figure 1		2.7		V			
$V_{OL}$ Low-level output voltage	$V_{ID} = -200 \text{ mV}$ , $I_{OL} = 8 \text{ mA}$ , See Figure 1		0.45		V			
$I_{OZ}$ High-impedance-state output current	$V_O = 0.4 \text{ V to } 2.4 \text{ V}$		±20		$\mu\text{A}$			
$I_I$ Line input current	Other input at 0 V, See Note 3		$V_I = 12 \text{ V}$		1	mA		
$I_{IH}$ High-level enable-input current			$V_I = -7 \text{ V}$		-0.8			
$I_{IL}$ Low-level enable-input current	$V_{IL(E)} = 0.4 \text{ V}$		20		$\mu\text{A}$			
$r_I$ Input resistance			12		$\text{k}\Omega$			
$I_{OS}$ Short-circuit output current	$V_O = 0$		-15		-85			
$I_{CC}$ Suply current (total package)	No load, Outputs enabled		16		24	mA		
	No load, Outputs disabled		18		27			

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

‡ The algebraic convention, in which the less positive (more negative) limit is designated as minimum, is used in this data sheet for threshold voltage levels only.

NOTE 3: Refer to ANSI Standard RS-485 for exact conditions.

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

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
$t_{PHL}$ Propagation delay time, high- to low-level output	$V_{ID} = -2.5 \text{ V to } 2.5 \text{ V}$ ,	9	18	27	ns
$t_{PLH}$ Propagation delay time, low- to high-level output	$C_L = 15 \text{ pF}$ , See Figure 2	9	18	27	ns
$t_{PZH}$ Output enable time to high level	$C_L = 15 \text{ pF}$ , See Figure 3	4	12	18	ns
$t_{PZL}$ Output enable time to low level	$C_L = 15 \text{ pF}$ , See Figure 3	6	13	21	ns
$t_{PHZ}$ Output disable time from high level	$C_L = 15 \text{ pF}$ , See Figure 3	10	21	27	ns
$t_{PLZ}$ Output disable time from low level		8	15	25	ns

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



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PARAMETER MEASUREMENT INFORMATION

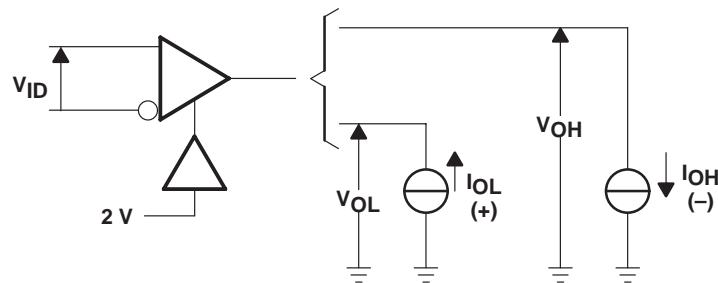
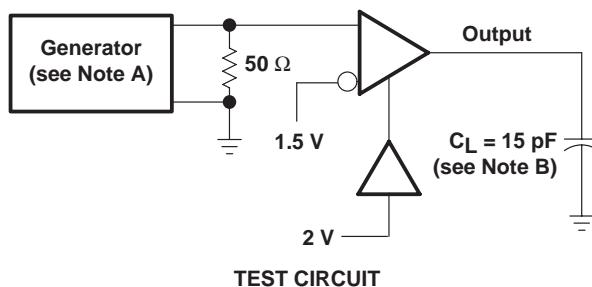
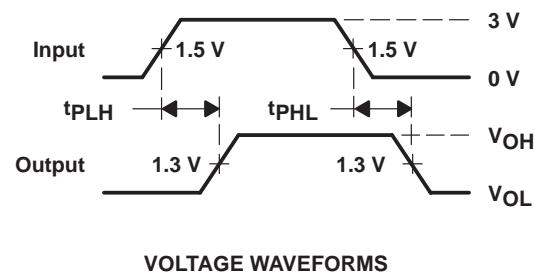


Figure 1.  $V_{OH}$ ,  $V_{OL}$



TEST CIRCUIT



VOLTAGE WAVEFORMS

NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR = 1 MHz, duty cycle = 50%,  $t_r = t_f = 6 \text{ ns}$ .  
B.  $C_L$  includes probe and jig capacitance.

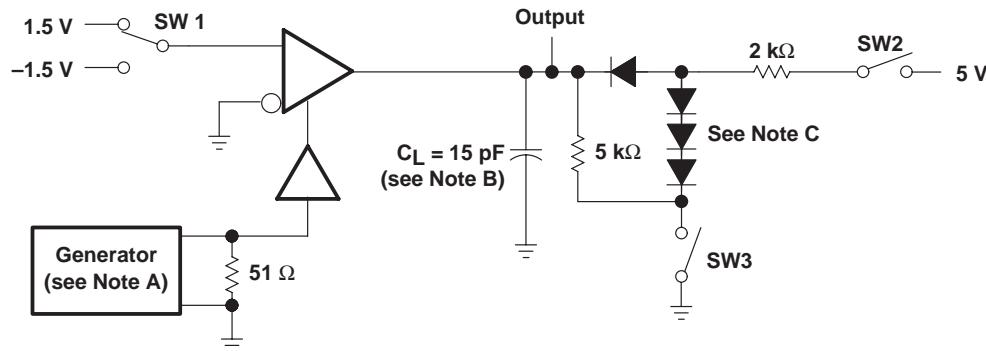
Figure 2. Propagation Delay Times

# SN75ALS175

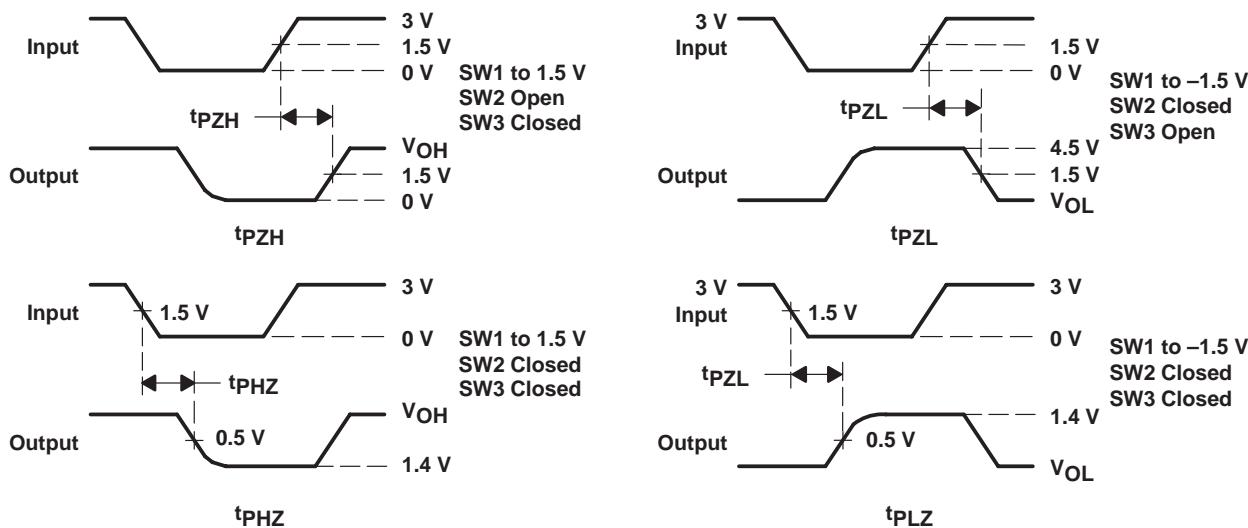
## QUADRUPLE DIFFERENTIAL LINE RECEIVER

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### PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR = 1 MHz, duty cycle = 50%,  $t_r = t_f = 6$  ns.  
 B.  $C_L$  includes probe and jig capacitance.  
 C. All diodes are 1N916 or equivalent.

Figure 3. Enable and Disable Times

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