



钜地半导体
Tudi Semiconductor

Product Specification

TUDI-SN75ALS175N

Four-channel differential line receiver

网址 www.sztdbdt.com Q

用芯智造 · 卓越品质

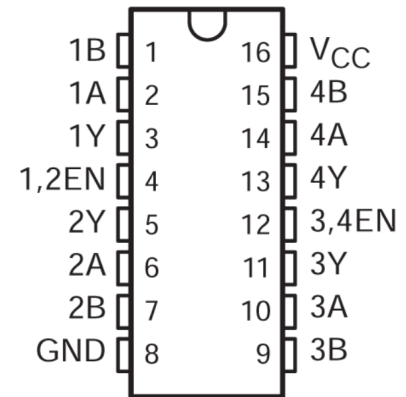
**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



Features

- Complies with or exceeds the requirements of ANSI EIA/TIA-422-B, EIA/TIA-423-B and RS485
- Complies with the requirements of ITU Recommendations V.10, V.11, X.26 and X.27
- Suitable for multi-point transmission on long buses in noisy environments
- Low power current requirement (up to 27mA)
- Common-mode input voltage range of -12V to 2V
- Input sensitivity: $\pm 200\text{mV}$
- Input hysteresis: 50mV (typical)
- High input impedance: 12k Ω (minimum)
- Powered by a 5V single supply



N or NS Package
(Top View)

Applications

- Motor drives
- Factory automation and control

Description

The SN75ALS175 is a single-chip quad differential line receiver with three-state outputs, meeting the requirements of ANSI EIA/TIA-422-B, EIA/TIA-423-B, RS-485, and several ITU recommendations. Advanced low-power Schottky technology high speed without the common power dissipation. Each pair of receivers has a common active-high enable input. The device features high input impedance, input hysteresis for improved noise immunity, and an input of $\pm 200\text{mV}$ over a common-mode input voltage range of -12V to 12V . The rated operating temperature range of the SN75175 is 0°C to 70°C .

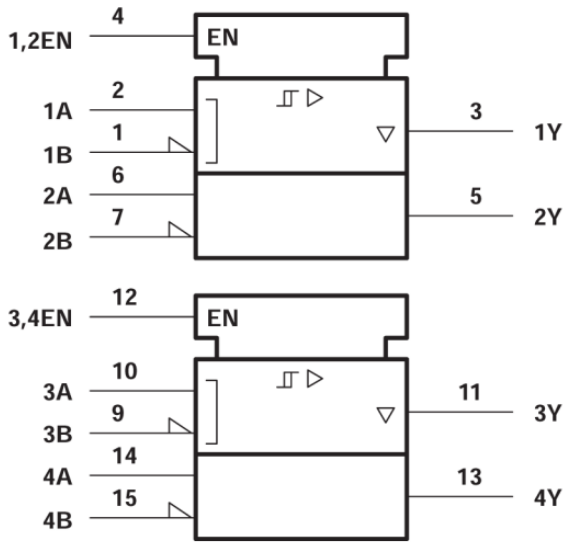
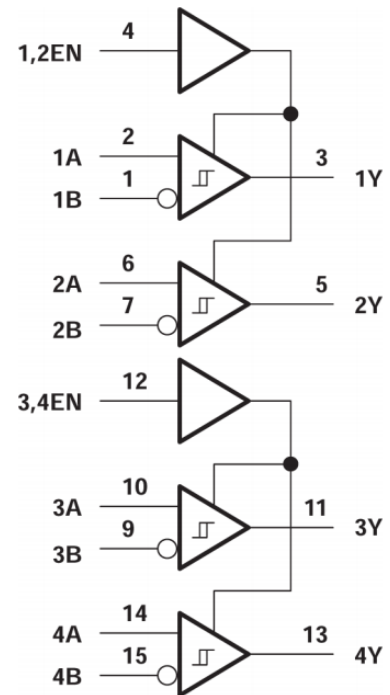


图 3-1. 逻辑符号[†]



逻辑图 (正逻辑)

表 4-1. Pin Functions

PIN		TYPE ⁽¹⁾	DESCRIPTION
NAME	NO.		
1B	1	I	Channel 1 Differential Receiver Inverting Input
1A	2	I	Channel 1 Differential Receiver Non-Inverting Input
1Y	3	O	Channel 1 Single Ended Output
G	4	I	Active High Enable
2Y	5	O	Channel 2 Single Ended Output
2A	6	I	Channel 2 Differential Receiver Non-Inverting Input
2B	7	I	Channel 2 Differential Receiver Inverting Input
GND	8	GND	Device GND
3B	9	I	Channel 3 Differential Receiver Inverting Input
3A	10	I	Channel 3 Differential Receiver Non-Inverting Input
3Y	11	O	Channel 3 Single Ended Output
$\bar{G}$	12	I	Active Low Enable
4Y	13	O	Channel 4 Single Ended Output
4A	14	I	Channel 4 Differential Receiver Non-Inverting Input
4B	15	I	Channel 4 Differential Receiver Inverting Input
V _{CC}	16	PWR	Device VCC (4.75 V to 5.25 V)

(1) Signal Types: I = Input, O = Output, I/O = Input or Output.



5 Specifications

5.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

		MIN	MAX	UNIT
V_{CC} ⁽²⁾	Supply voltage		7	V
V_I	Input voltage, (A or B inputs)		± 14	V
V_{ID} ⁽³⁾	Differential input voltage		± 14	V
V_I	Enable input voltage		7	V
I_{OL}	Low-level output current		50	mA
	Continuous total dissipation	See Dissipation Rating Table		
T_A	Operating free-air temperature range	0	70	°C
T_{stg}	Storage temperature range	- 65	150	°C
	Lead temperature 1.6 mm (1/16 inch) from case for 10 seconds		260	°C

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

5.2 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

5.3 Recommended Operating Conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	4.75	5	5.25	V
Common-mode input voltage, V_{IC}			± 12	V
Differential input voltage, V_{ID}			± 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	μA
Low-level output current, I_{OL}			8	mA
Operating free-air temperature, T_A	0		70	°C

5.4 Thermal Resistance Characteristics

THERMAL METRIC ⁽¹⁾		N (PDIP)	NS (SOP)	UNIT
		16 Pins	16 Pins	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	60.6	88.5	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	48.1	46.2	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	40.6	50.7	°C/W
ψ_{JT}	Junction-to-top characterization parameter	27.5	13.5	°C/W



5.4 Thermal Resistance Characteristics (续)

THERMAL METRIC ⁽¹⁾		N (PDIP)	NS (SOP)	UNIT
		16 Pins	16 Pins	
ψ_{JB}	Junction-to-board characterization parameter	40.3	50.3	°C/W

- (1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC package thermal metrics](#) application report.

5.5 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 ⁽¹⁾	MAX	UNIT
V _{IT+}	Positive-going input threshold voltage					200	mV
V _{IT-}	Negative-going input threshold voltage				-200 ⁽²⁾		mV
V _{hys}	Hysteresis voltage (V _{IT+} - V _{IT-})				50		mV
V _{IK}	Enable-input clamp voltage	I _I = -18 mA				-1.5	V
V _{OH}	High-level output voltage	V _{ID} = 200 mV,	I _{OH} = -400 μA,	See 图 6-1	2.7		V
V _{OL}	Low-level output voltage	V _{ID} = -200 mV,	I _{OL} = 8 mA,	See 图 6-1		0.45	V
I _{OZ}	High-impedance-state output current	V _O = 0.4 V to 2.4 V				±20	μA
I _I	Line input current	Other input at 0 V,	See Note 3	V _I = 12 V		1	mA
				V _I = -7 V		-0.8	
I _{IH}	High-level enable-input current	V _{IH(E)} = 2.7 V				20	μA
I _{IL}	Low-level enable-input current	V _{IL(E)} = 0.4 V				-100	μA
r _i	Input resistance				12		kΩ
I _{OS}	Short-circuit output current	V _O = 0			-15	-85	mA
I _{CC}	Supply current (total package)	No load,	Outputs enabled		16	24	mA
		No load,	Outputs disabled		18	27	

- (1) All typical values are at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$.
 (2) 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.
 (3) Refer to ANSI Standard RS-485 for exact conditions.

5.6 Switching Characteristics

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

PARAMETER		TEST CONDITIONS		MIN TYP ⁽¹⁾	MAX	UNIT
t_{PHL}	Propagation delay time, high- to low-level output	$V_{ID} = \pm 2.5$ V to 2.5 V,		9 18	27	ns
t_{PLH}	Propagation delay time, low- to high-level output	$C_L = 15$ pF,	See 图 6-2	9 18	27	ns
t_{PZH}	Output enable time to high level	$C_L = 15$ pF,	See 图 6-3	4 12	18	ns
t_{PZL}	Output enable time to low level			6 13	21	ns
t_{PHZ}	Output disable time from high level	$C_L = 15$ pF,	See 图 6-3	10 21	27	ns
t_{PLZ}	Output disable time from low level			8 15	25	ns

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



6 Parameter Measurement Information

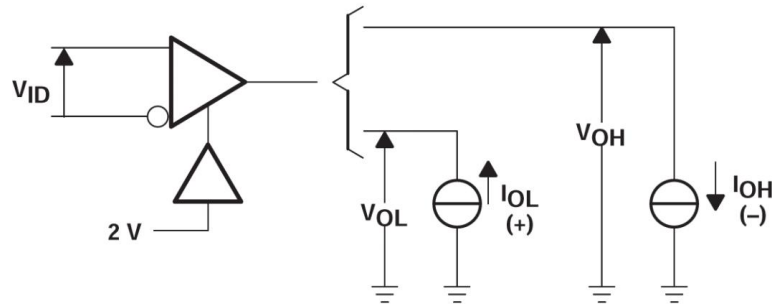
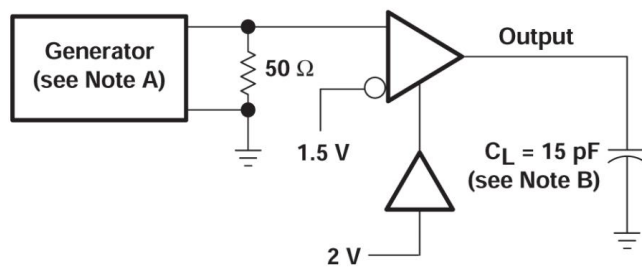
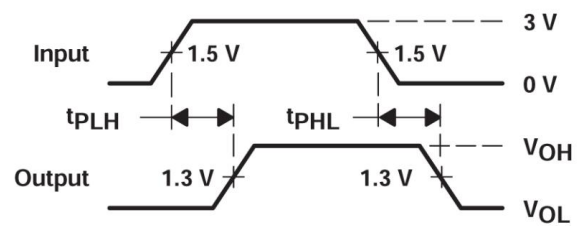


图 6-1. V_{OH} , V_{OL}



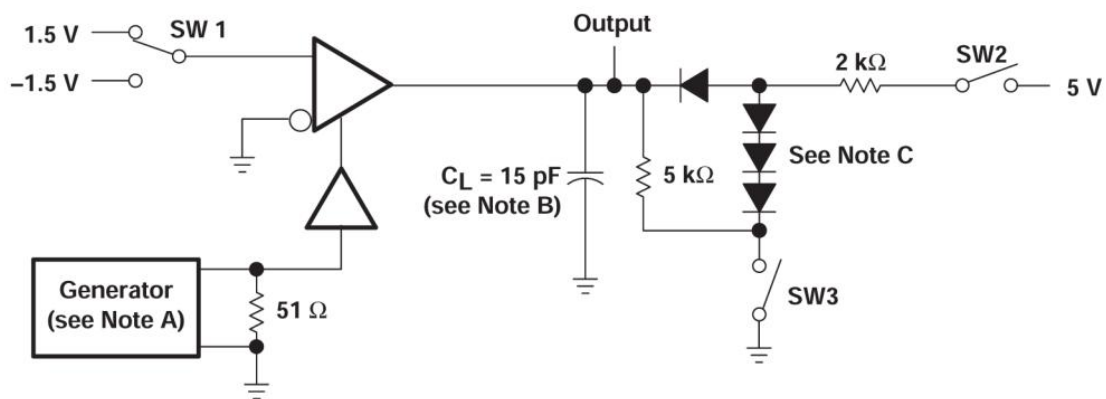
TEST CIRCUIT



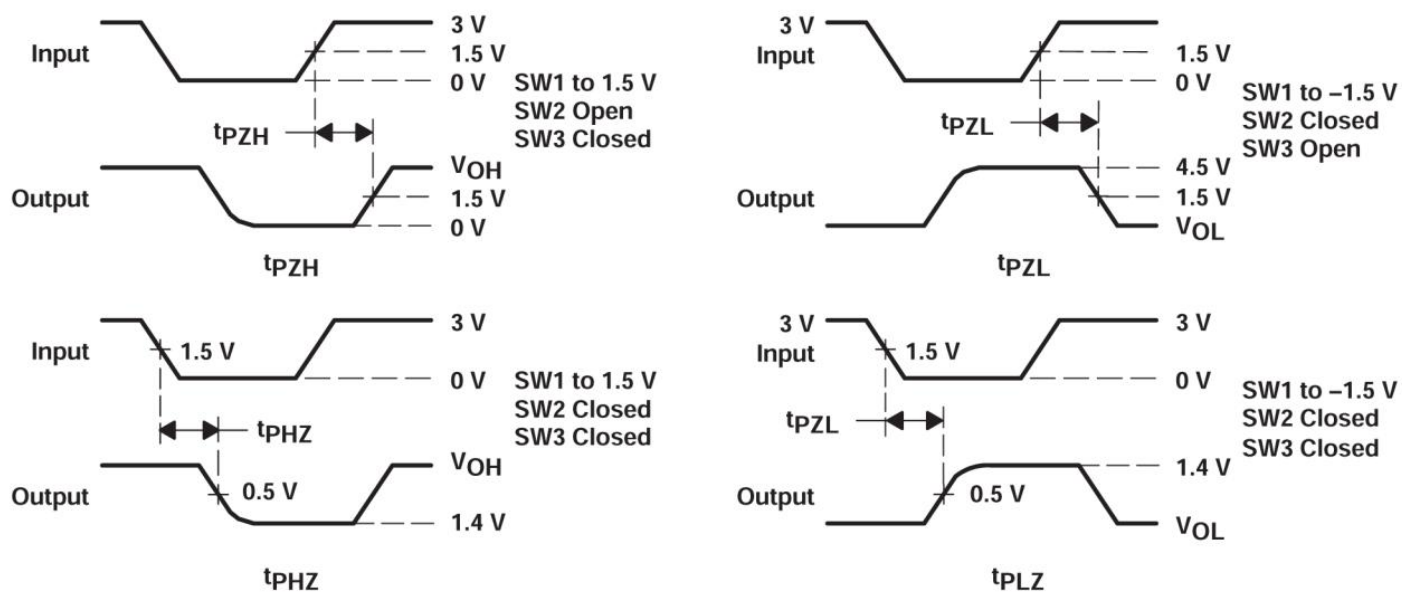
VOLTAGE WAVEFORMS

- 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.

图 6-2. Propagation Delay Times



TEST CIRCUIT



VOLTAGE WAVEFORMS

- 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.

图 6-3. Enable and Disable Times



7 Detailed Description

7.1 Device Functional Modes

表 7-1. Function Table (Each Receiver)

DIFFERENTIAL INPUTS A - B	ENABLES EN ⁽¹⁾	OUTPUT Y
$V_{ID} \geq 0.2 \text{ V}$	H	H
$-0.2 \text{ V} < V_{ID} < 0.2 \text{ V}$	H	?
$V_{ID} \leq -0.2 \text{ V}$	H	L
X	L	Z
Open Circuit	H	H

(1) H = high level, L = low level, ? = indeterminate, X = irrelevant, Z = high impedance (off)

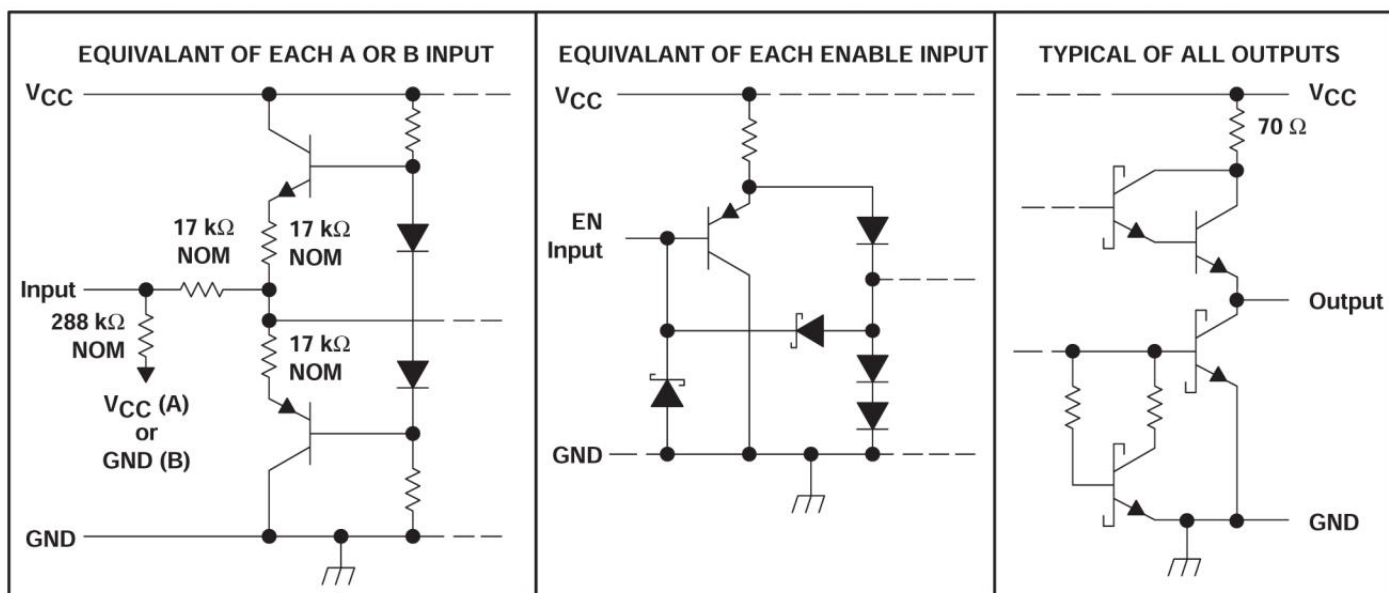


图 7-1. Schematics of Inputs and Outputs

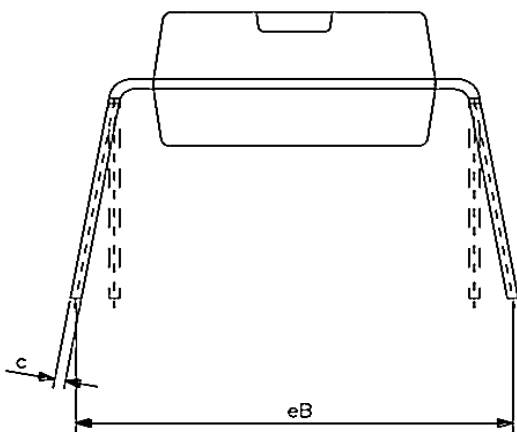
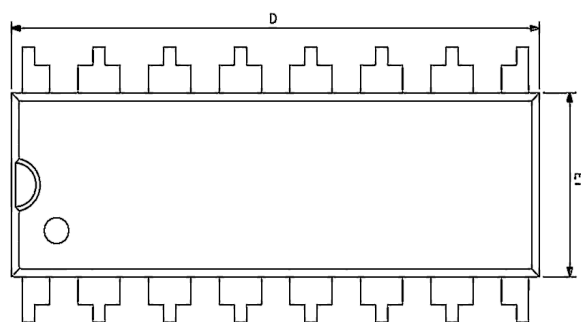
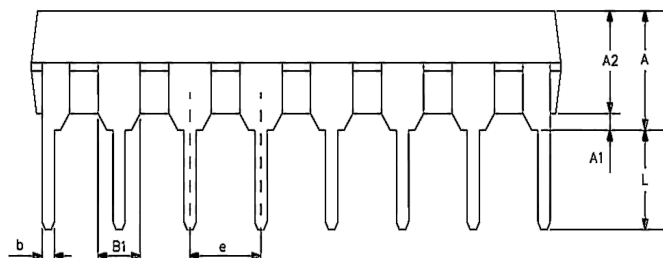


Order information

Order Number	Package	Package Quantity	Marking On The park
SN75ALS175N-TUDI	DIP16	Tube,25,A box of 1000	SN75ALS175N



Package DIP16



SIZE SYMBOL	MIN./mm	MAX./mm
A2	3.20	3.60
A1	0.51	—
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
C	0.20	0.36
eB	7.62	9.30
R	0.20TYP	
R1	0.30TYP	
θ	0°	8°
$\theta 1$	45°TYP	
02	12°TYP	
03	0°	8°
04	0°	10°



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