钍地半导体
Tudi Semiconductor

Product Specification

TUDI-SN75174N

Quad differential line driver

网址 www.sztdbdt.com

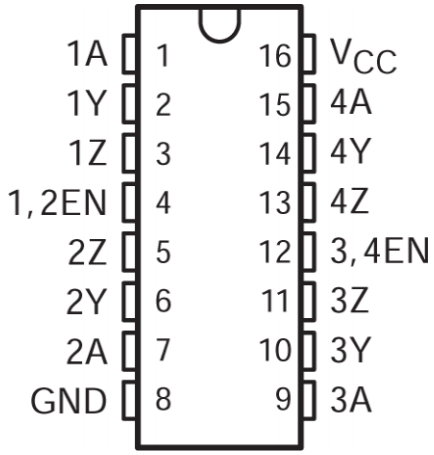
用芯智造·卓越品质

semiconductor device manufacturer

- Design
- research and development
- production
- and sales

Features

● Meets or exceeds the requirements of ANSI standards EIA/TIA-422-B, RS-485, and ITU recommendation V.1.1
Suitable for multi-point transmission on long buses in noisy environments
●Three-state output
●Common-mode output voltage range of -7V to 2V
●Active-high enable
● Thermal shutdown protection
● Positive and negative current limiting
● Powered by a single 5V supply
● Low power requirements
●ally compatible with MC3487



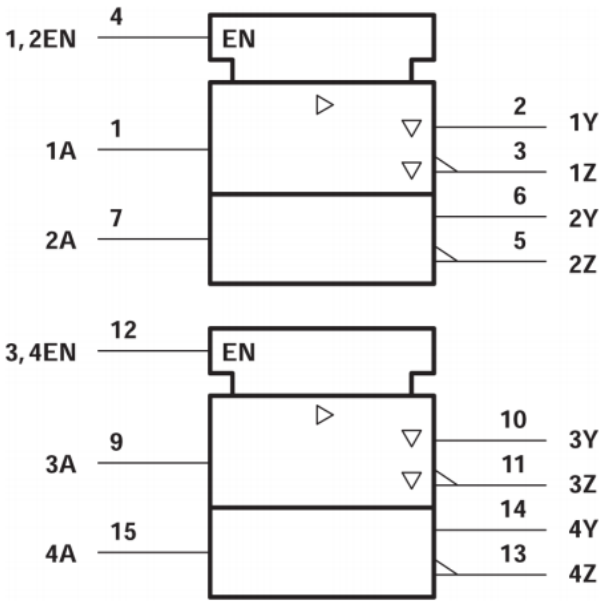
N Package (Top View)

Applications

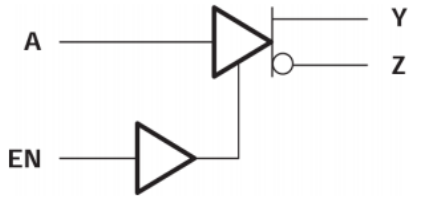
● Chemical and gas sensors
●Field transmitters: temperature sensors and pressure sensors
● Motor control: brushless DC and brushed DC
●Temperature sensor using Modbus
● Chemical and gas sensors
● Field transmitters: temperature sensors and pressure sensors
● Motor control: brushless DC and brushed DC
●Temperature sensors and controllers usingbus

Description

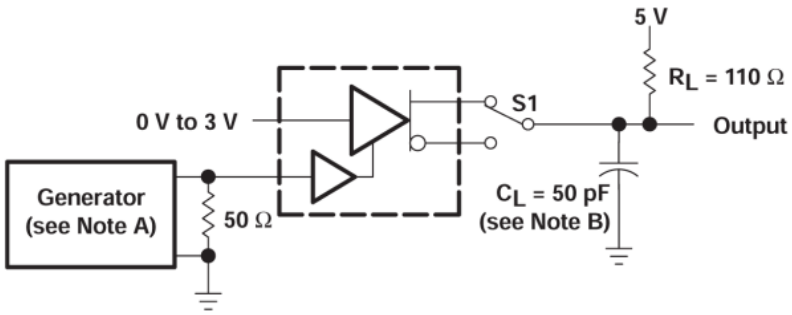
The SN75174 is a single-chip, four-channel differential line receiver with three-state outputs, compliant with the of ANSI standards EIA/TIA-422-B, RS-485, and ITU recommendation V.11. This device is optimized to achieve balanced multi- bus transmission at rates up to 4 Mbps. Each driver features a wide positive and negative common-mode output voltage range, making it suitable for use in noisy environments.
The SN7174 provides positive and negative current limiting and thermal shutdown functions to prevent line fault conditions on the transmission bus. It shuts down at a junction temperature of approximately 150°. This device performs better when used in conjunction with the SN75173 or SN75175 four-channel differential line receivers.
The operating temperature range the SN75174 is 0°C to 70°C.



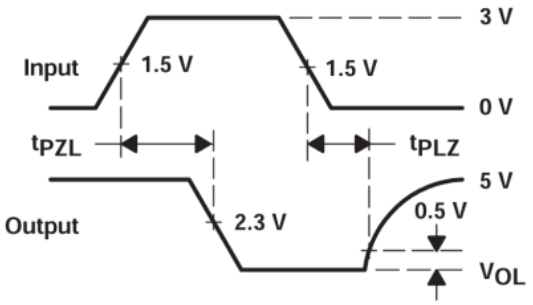
逻辑符号



逻辑图，每个驱动器（正逻辑）



TEST CIRCUIT



VOLTAGE WAVEFORMS

A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 1MHz, duty cycle = 50%, t_r ≤ 5ns, t_f ≤ 5ns, Z_O = 50Ω.

B. C_L includes probe and stray capacitance.

图 6-4. Test Circuit and Voltage Waveforms

5 Specifications

5.1 Absolute Maximum Ratings

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

		MIN	MAX	UNIT
V_{CC} (see (2))	Supply voltage	-0.3	7	V
V_O	Output voltage range	- 10	15	V
V_I	Input voltage	-0.3	5.5	V
P_D	Continuous total dissipation	See *Dissipation Rating* table		
T_A	Operating free-air temperature range	0	70	°C
T_{Lead}	Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds		260	°C
T_{stg}	Storage temperature range	- 65	150	°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 are with respect to the network ground terminal.

5.2 Dissipation Rating

PACKAGE	$T_A \leqslant 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING
DW	1125 mW	9.0 mW/°C	720 mW
N	1150 mW	9.2 mW/°C	736 mW

5.3 Recommended Operating Conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	4.75	5	5.25	V
High-level input voltage, V_{IH}	2			V
Low-level input voltage, V_{IL}			0.8	V
Common-mode output voltage, V_{OC}	- 7		12	V
High-level output current, I_{OH}			- 60	mA
Low-level output current, I_{OL}			60	mA
Operating free-air temperature, T_A	0		70	°C

5.4 Thermal Information

THERMAL METRIC(1)		N (PDIP)	DW	UNIT
		16 PINS	20 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	60.6	66.8	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	48.1	34.4	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	40.6	39.7	°C/W
ψ_{JT}	Junction-to-top characterization parameter	27.5	8.9	°C/W
ψ_{JB}	Junction-to-board characterization parameter	40.3	39	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	n/a	n/a	°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 supply voltage and operating free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP (1)	MAX	UNIT
V_{IK}	Input clamp voltage	I_I = －18 mA				－1.5	V
V_{OH}	High-level output voltage	V_{IH} = 2V, I_{OH} = －33mA	V_{IL} = 0.8V,		3.7		V
V_{OL}	Low-level output voltage	V_{IH} = 2V, I_{OL} = 33mA	V_{IL} = 0.8V,		1.1		V
V_O	Output voltage	I_O = 0		0		6	V
$\|V_{OD1}\|$	Differential output voltage	I_O = 0		1.5	6	6	V
$\|V_{OD2}\|$	Differential output voltage	R_L = 100 Ω,	See 图 6-1	1/2 V_{OD1} or 2 (2)			V
		R_I = 54 Ω,	See 图 6-1	1.5	2.5	5	V
V_{OD3}	Differential output voltage	See (5)		1.5		5	V
$\Delta\|V_{OD}\|$	Change in magnitude of differential output voltage (3)					±0.2	V
V_{OC}	Common-mode output voltage (4)	R_L = 54 Ω or 100 Ω,	See 图 6-1	-1		3	V
$\Delta\|V_{OC}\|$	Change in magnitude of common-mode output voltage (3)					±0.2	V
I_O	Output current with power off	V_{CC} = 0,	V_O = －7V to 12V			±100	μA
I_{OZ}	High-impedance-state output current	V_O = －7V to 12V				±100	μA
I_{IH}	High-level input current	V_I = 2.7V				20	μA
I_{IL}	Low-level input current	V_I = 0.5V				±360	μA
I_{OS}	Short-circuit output current	V_O = ±7V				±180	mA
		V_O = V_{CC}				180	
		V_O = 12V				500	
I_{CC}	Supply current (all drivers)	No load	Outputs enabled		38	60	mA
			Outputs disabled		18	40	

(1) All typical values are at V_{CC} = 5V and T_A = 25°C.
(2) The minimum V_{OD2} with a 100Ω load is either 1/2 V_{OD1} or 2V, whichever is greater.
(3) $\Delta|V_{OD}|$ and $\Delta|V_{OC}|$ are the changes in magnitude of V_{OD} and V_{OC}, respectively, that occur when the input is changed from a high level to a low level.
(4) In ANSI Standard EIA/TIA-422-B, V_{OC}, which is the average of the two output voltages with respect to ground, is called output offset voltage, V_{OS}.
(5) See EIA Standard RS-485.

5.6 Switching Characteristics

V_{CC} = 5V, T_A = 25°C

	PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
$t_{d(OD)}$	Differential-output delay time	R_L = 54Ω,	See 图 6-2		45	65	ns
$t_{t(OD)}$	Differential-output transition time				80	120	ns
t_{PZH}	Output enable time to high level	R_L = 110Ω,	See 图 6-3		80	120	ns
t_{PZL}	Output enable time to low level	R_L = 110Ω,	See 图 6-4		55	80	ns
t_{PHZ}	Output disable time from high level	R_L = 110Ω,	See 图 6-3		75	115	ns
t_{PLZ}	Output disable time from low level	R_L = 110Ω,	See 图 6-3		18	30	ns

5.7 Symbol Equivalents

DATA SHEET PARAMETER	EIA/TIA-422-B	RS-485
V_O	V_{oa}, V_{ob}	V_{oa}, V_{ob}
$\|V_{OD1}\|$	V_o	V_o
$\|V_{OD2}\|$	V_t (R_L = 100 Ω)	V_t (R_L = 54 Ω)
$\|V_{OD3}\|$		V_t (Test Termination Measurement 2)
$\Delta\|V_{OD}\|$	$\|\|V_t\| - \|\overline{V}_t\|\|$	$\|\|V_t\| - \|\overline{V}_t\|\|$
V_{OC}	$\|V_{os}\|$	$\|V_{os}\|$
$\Delta\|V_{OC}\|$	$\|V_{os} - \overline{V}_{os}\|$	$\|V_{os} - \overline{V}_{os}\|$
I_{OS}	$\|I_{sa}\|,\|I_{sb}\|$	
I_O	$\|I_{xa}\|,\|I_{xb}\|$	I_{ia},I_{ib}

6 Parameter Measurement Information

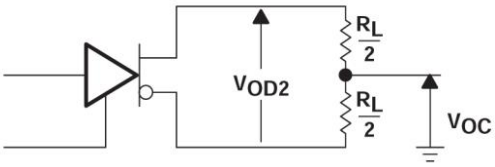
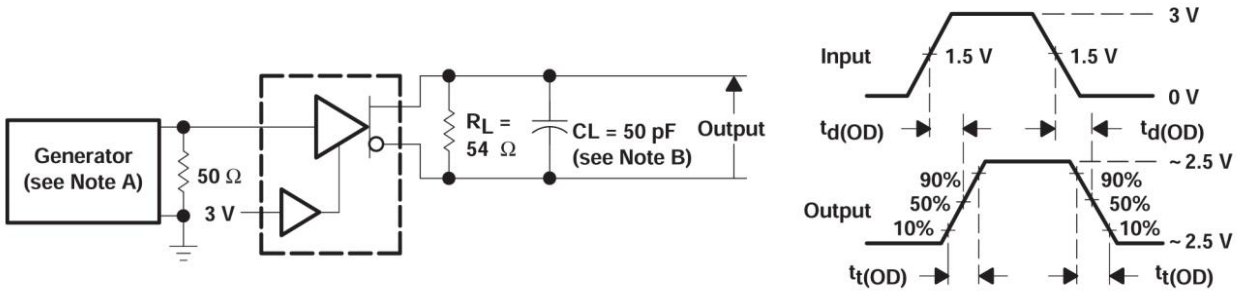


图 6-1. Differential and Common-Mode Output Voltages

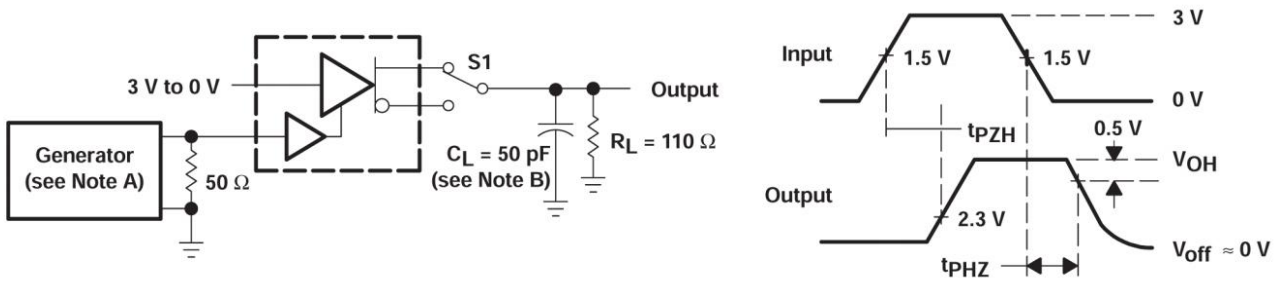


TEST CIRCUIT VOLTAGE WAVEFORMS

A. The input pulse is supplied by a generator having the following characteristics: $t_r \leqslant$ 5ns, $t_f \leqslant$ 5 ns, PRR $\leqslant$ 1MHz, duty cycle = 50%, Z_O = 50Ω.

B. C_L includes probe and stray capacitance.

图 6-2. Differential-Output Test Circuit and Voltage Waveforms



TEST CIRCUIT VOLTAGE WAVEFORMS

A. The input pulse is supplied by a generator having the following characteristics: PRR $\leqslant$ 1MHz, duty cycle = 50%, $t_r \leqslant$ 10ns, $t_f \leqslant$ 10ns, Z_O = 50Ω.

B. C_L includes probe and stray capacitance.

图 6-3. Test Circuit and Voltage Waveforms

7 Detailed Description

7.1 Device Functional Modes

表 7-1. Function Table (Each Driver)

INPUT(1)	ENABLE	OUTPUTS	
		Y	Z
H	H	H	L
L	H	L	H
X	L	Z	Z

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

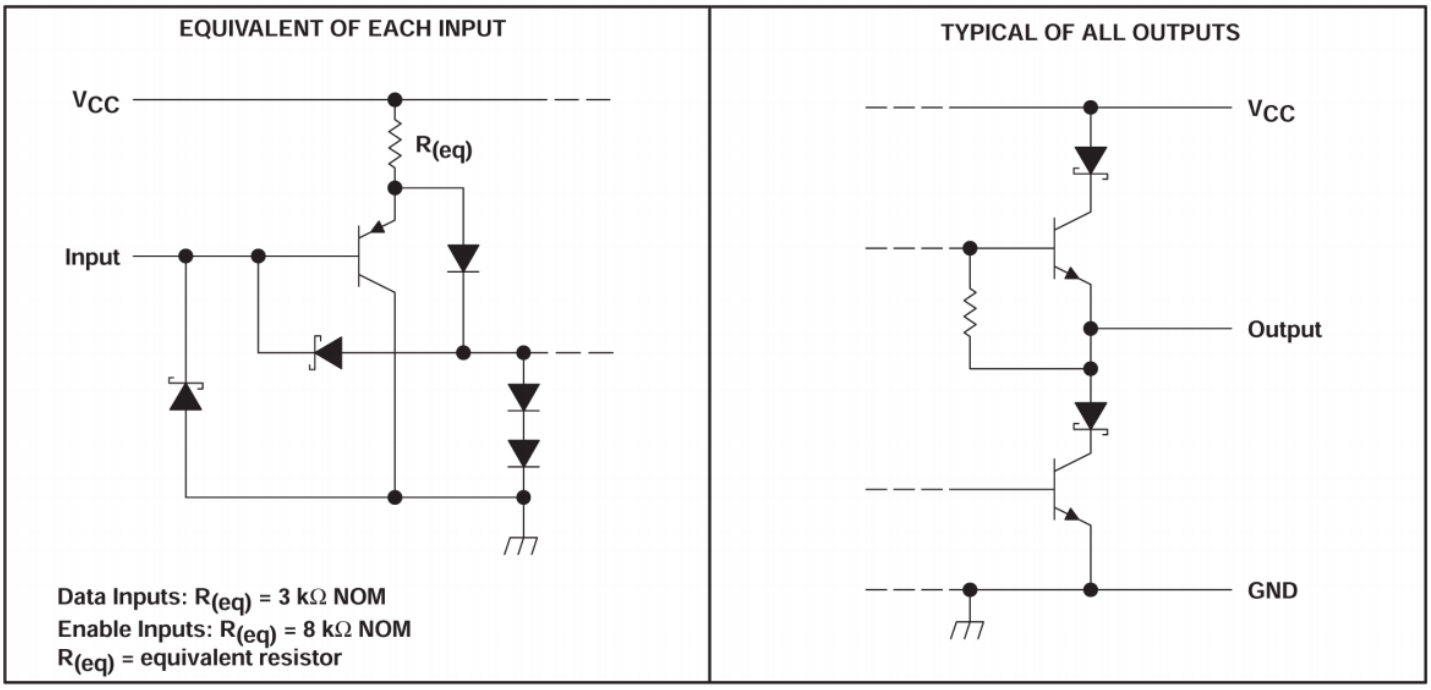
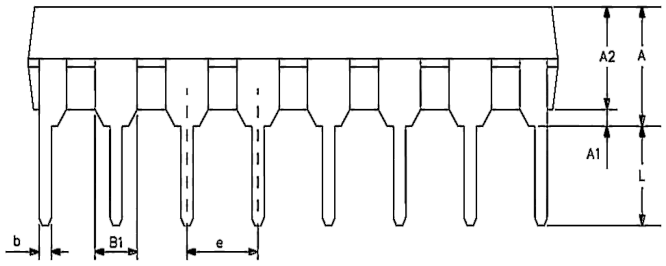


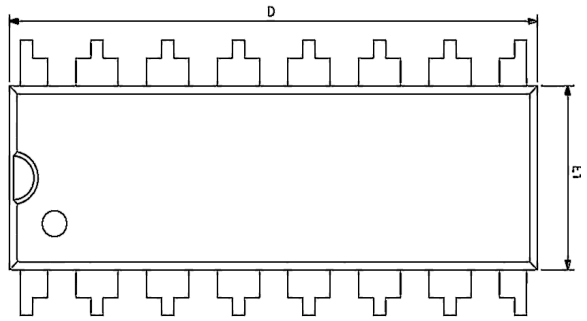
图 7-1. Schematics of Inputs and Outputs

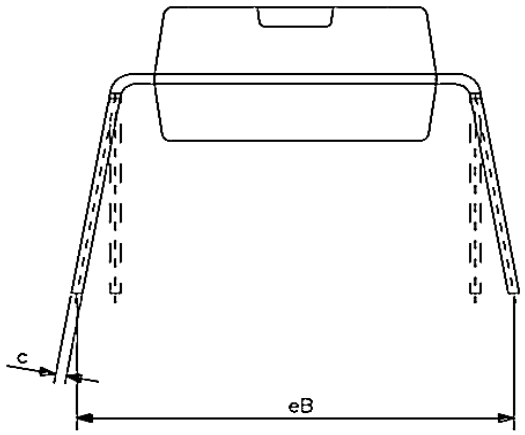
Order information

Order Number	Package	Package Quantity	Marking On The park
SN75174N-TUDI	DIP16	Tube,25,A box of 1000	SN75174N

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°
θ1	45°TYP	
02	12°TYP	
03	0°	8°
04	0°	10°

Important statement:

●TUDI Semiconductor reserves the right to modify the product manual without prior notice! Before placing an order, customers need to confirm whether the obtained information is the latest version and verify the completeness of the relevant information.

●Any semi-guide product is subject to failure or malfunction under specified conditions. It is the buyer's responsibility to comply with safety standards when using TUDI Semiconductor products for system design and whole machine manufacturing.And take the appropriate safety measures to avoid the potential in the risk of loss of personal injury or loss of property situation!

●TUDI Semiconductor products have not been licensed for life support, military, and aerospace applications,and therefore TUDI Semiconductor is not responsible for any consequences arising from the use of this product in these areas.

●If any or all TUDI Semiconductor products (including technical data, services) described or contained in this document are subject to any applicable local export control laws and regulations, they may not be exported without an export license from the relevant authorities in accordance with such laws.

●The specifications of any and all TUDI Semiconductor products described or contained in this document specify the performance, characteristics, and functionality of said products in their standalone state, but do not guarantee the performance, characteristics, and functionality of said products installed in Customer's products or equipment. In order to verify symptoms and conditions that cannot be evaluated in a standalone device, the Customer should ultimately evaluate and test the device installed in the Customer's product device.

●TUDI Semiconductor documentation is only allowed to be copied without any alteration of the content and with the relevant authorization.TUDI Semiconductor assumes no responsibility or liability for altered documents.

●TUDI Semiconductor is committed to becoming the preferred semiconductor brand for customers, and TUDI Semiconductor will strive to provide customers with better performance and better quallity products.