



钰地半导体
Tudi Semiconductor

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Product Specification

TUDI-SN65HVD32/31/30

3.3V full-duplex RS-485 driver and receiver

网址 www.sztdbdt.com 🔍

用芯智造 · 卓越品质

**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



Features

1/8 unit load option available (up to 256 nodes on the bus)

Bus pins ESD protection above 5kV HBM

65HVD32 1Mbps signaling rate

65HVD31 5Mbps signaling rate

65HVD30 20Mbps signaling rate

Low current standby mode

Undisturbed power up and power down protection for hot plug

5V tolerant input

Bus idle, open and short circuit fault protection

Driver current limiting and thermal shutdown

Designed for RS-422 and -485 networks

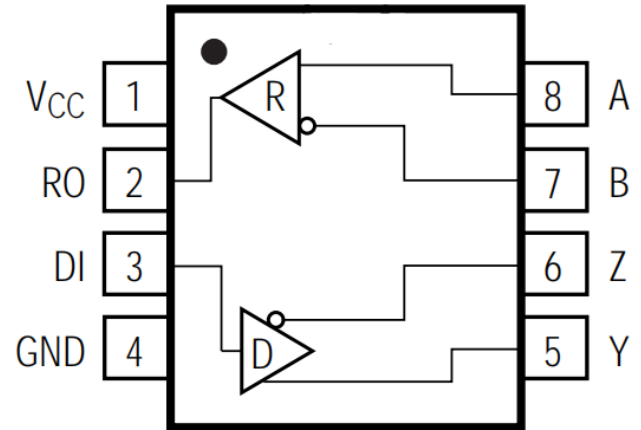


Figure 1. Pin Diagram

Description

The SN65HVD3x devices are three-state differential line drivers and differential input line receivers with 3.3V power supply. Each and receiver has separate input and output pins for full-duplex bus communication design. These devices are designed for RS-422 and RS-485 data communication through up to 1500 meters long.

The SN65HVD30, SN65HVD31, and SN65HVD32 are fully enabled and do not require an external enable pin.

All devices have a rated operating ambient temperature range of -40°C to 85°C

Applications

- Utility metering
- DTE and DCE interfaces
- Industrial, process and building automation
- POS pin and networks



Pin description

Pin number	Pin name	Pin function
1	VCC	Power supply:3.0V VCC 5.5V
2	RO	Receiver output. If A-B is greater than or equal to +200mV,RO output is high level;if A-B is less than or equal to-200mV,RO output is low level.
3	DI	DI driver input.A low level on DI causes the in-phase terminal Y output to be low and the out-of-phase terminal Z output to be high;a high level on DI causes the in-phase terminal Y output to be high and the out-of-phase terminal Z output to be low.
4	GND	Landing
5	Y	Drive in-phase output terminal
6	Z	The inverting output of the driver
7	B	Receiver inverting input
8	A	Receiver in-phase input

Extreme parameter

Parameter	Symbol	Big or small	Unit
Welding temperature range		300	°C
Operating temperature range		-40~125	°C
Storage operating temperature range		-60~150	°C
Continuous power consumption	SOP8	400	mW
	DIP8	700	mW
Supply voltage	VCC	+7	V
Control the port voltage	DI	-0.3~VCC+0.3	V
Bus-side input vol-tage	A、 B	-8~13	V
Receiver output vo-ltage	RO	-0.3~VCC+0.3	V

The maximum limit parameter value is the value beyond which irreversible damage to the device may occur. Under these conditions, the device will not function properly and continuous operation at the maximum allowable rating may affect the reliability of the device. All voltage reference points are ground.



Parameter	Symbol	Test condition	Minimum	Typical case	Maximum	Unit
supply current						
Supply current	I _{cc}	DI=0 or VCC		240	400	μA
ESD protect						
A, B, Y, Z		Mannequin (HBM)		±16		KV
Other ports		Mannequin (HBM)		±6		KV
Drive switch characteristics						
Drive input to output propagation delay(low to high)	tDPLH	RD _{DIFF} =54 Ω, CL1=CL2=100pF (see Figure 3 and Figure 4)		15	35	ns
Drive input to output propagation delay(high to low)	tDPHL			15	35	ns
tDPLH-tDPHL	tSKEW1			7	10	ns
Rise time /fall time	tDR,tDF			10	25	ns
Acceptor The propagation delay from input to output is from low to high	tRPLH	See Figure 5 and Figure 6 VID 2.0V; The rise and fall time VID is less than 15ns	20	60	90	ns
Acceptor The propagation delay from input to output is from high to low	tRPHL		20	60	90	ns
tRPLH-tRPHL	tSKEW2			7	10	ns
DC electrical characteristics of the driver						
High-level input	V _{IH}	DI	2.0			V
Low level input	V _{IL}	DI			0.8	V
Logic input current	I _{IN1}	DI	-2		2	μA
Differential output of the driver(non-loaded)	V _{oD1}			5		V
Drive differential output	V _{oD2}	Graph 2,RL=27Ω	1.5		VCC	V
		Graph 2,RL=50Ω	2		VCC	
The current output is short-circuited to high	I _{osD1}	Short circuit to 0V~12V	35		250	mA
The current output is short-circuited to low	I _{osD2}	Short circuit to -7V~0V	-250		-35	mA
Change in the amplitude of the output voltage (NOTE1)	ΔV _{oD}	Graph 2,RL=27Ω			0.2	V
Output common mode voltage	V _{oc}	Graph 2,RL=27Ω			3	V
Change in the amplitude of the common-mode output voltage(NOTE1)	ΔV _{oc}	Graph 2,RL=27Ω			0.2	V



Parameter	Symbol	Test condition	Minimum	Typical case	Maximum	Unit
DC electrical characteristics of the receiver						
Positive input threshold voltage	VIT+	$-7V \leq V_{cM} \leq 12V$			+200	mV
Reverse input threshold voltage	VIT-	$7V \leq V_{cM} \leq 12V$	-200			mV
Enter the hysteresis voltage	V _{hys}	$-7V \leq V_{cM} \leq 12V$	10	30		mV
Input current(A,B)	IIN2	VCC=0 or 3.3V VIN=12 V			125	μA
		VCC=0 or 3.3V VIN=-7 V	-100			μA
Three state input leakage current	I _{ozR}	$0.4V < V_o < 2.4V$			±1	μA
Receiver input resistance	RIN	$-7V \leq V_{cM} \leq 12V$	96			kΩ
Receiver short circuit current	I _{osR}	$0V \leq V_o \leq V_{CC}$	±7		±95	mA
High level output voltage	V _{oH}	I _{oUT} =-4mA, V _{ID} =+200 mV	VCC-1.5			V
Low level output voltage	V _{oL}	I _{oUT} =+4mA, V _{ID} =-200 mV			0.4	V

(If not otherwise specified, VCC=3.3V±10%, Temp=TMIN~TMAX, typical value is VCC=+3.3V, Temp = 25)

Test Circuit

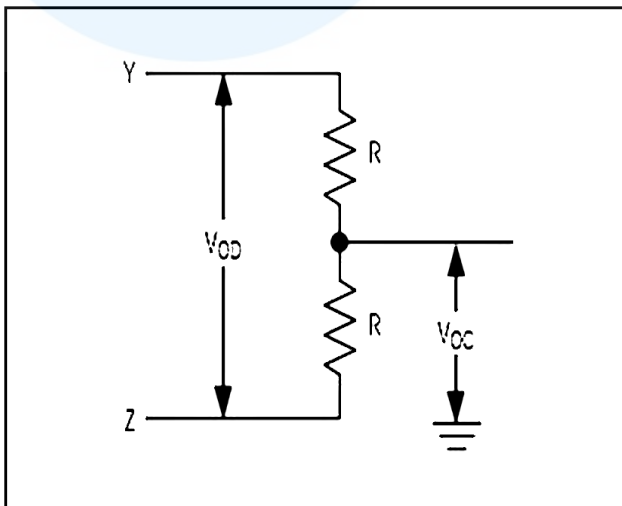


Figure 2 DC test load of the driver

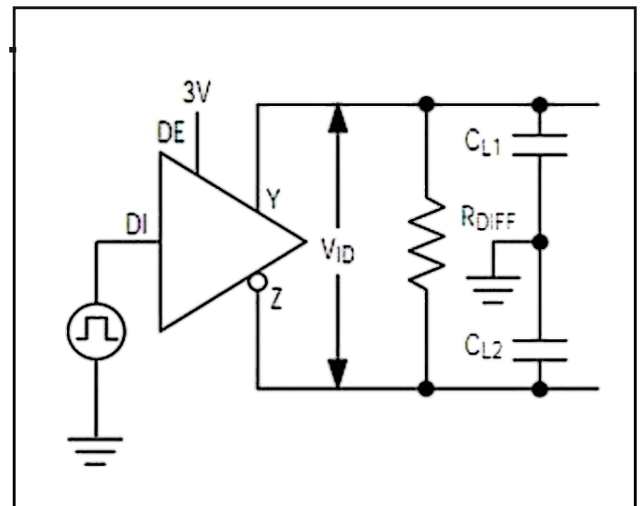


Figure 3 Driver timing test circuit

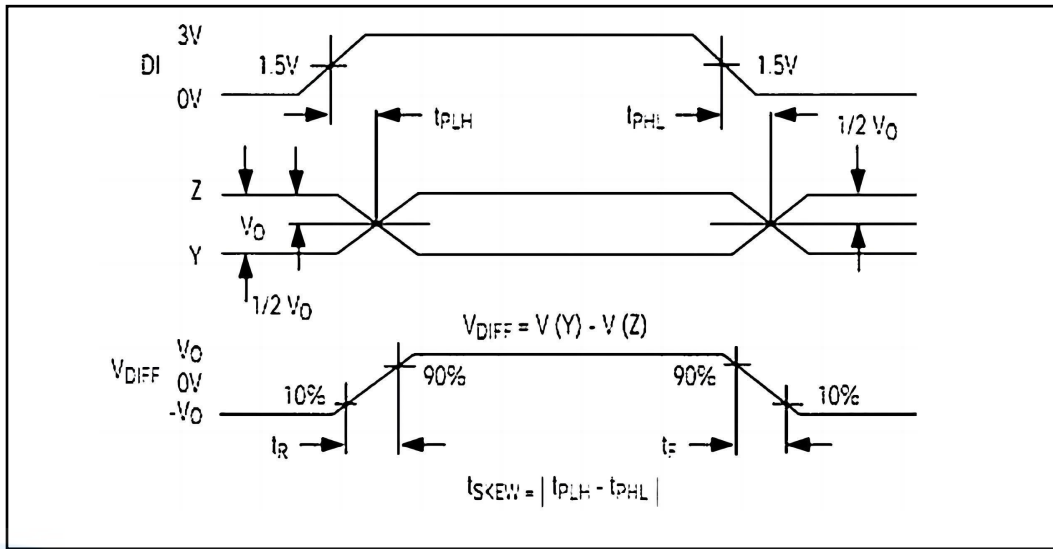


Figure 4 Driver propagation delay

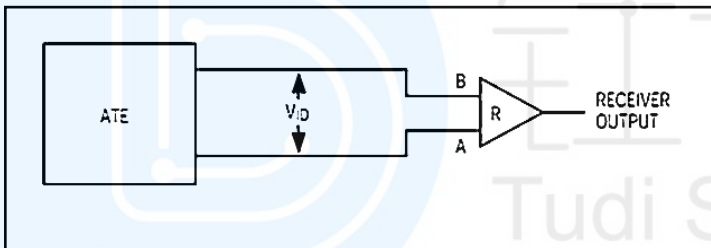


Figure 5 Receiver propagation delay test circuit

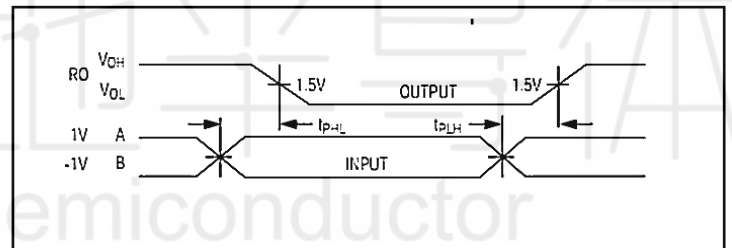


Figure 6 Receiver propagation delay timing

Function table

Send function table					Receiving function table			
input	A-B	$\geq +200\text{mV}$	$\leq -200\text{mV}$	Open/short circuit	input	DI	1	0
					output	Y	H	L
output	RO	H	L	H	output	Z	L	H

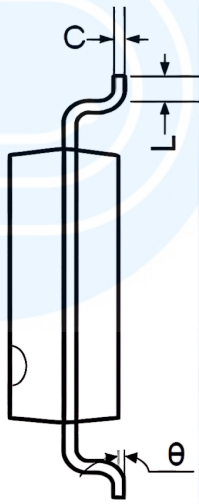
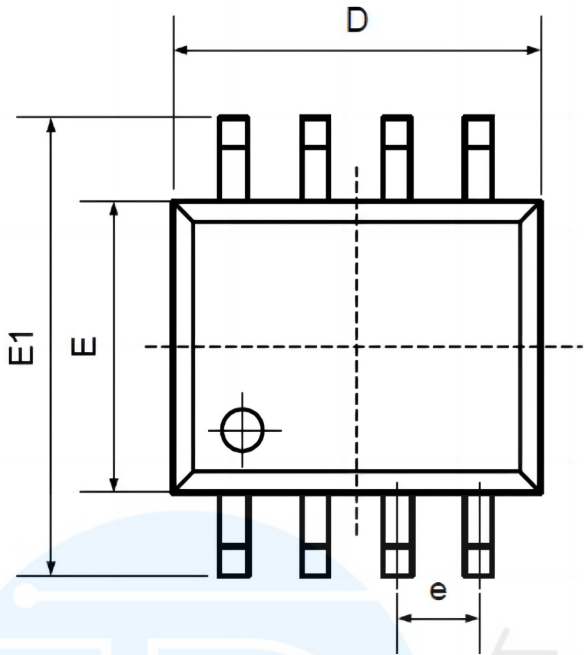


Order information

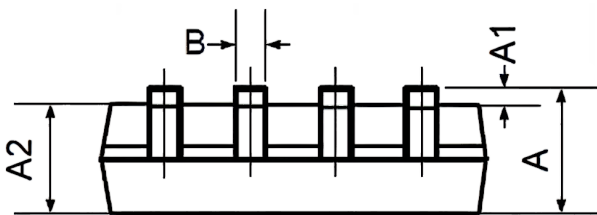
Order Number	Package	Package Quantity	Marking On The park	Temperature
SN65HVD30DR-TUDI	SOP8	Tape,Reel,2500	VP30	- 40°C to 85°C
SN65HVD30P-TUDI	DIP8	Tube,50,A box of 2000	65HVD30	
SN65HVD31DR-TUDI	SOP8	Tape,Reel,2500	VP31	
SN65HVD31P-TUDI	DIP8	Tube,50,A box of 2000	65HVD31	
SN65HVD32DR-TUDI	SOP8	Tape,Reel,2500	VP32	
SN65HVD32P-TUDI	DIP8	Tube,50,A box of 2000	65HVD32	



Package SOP8

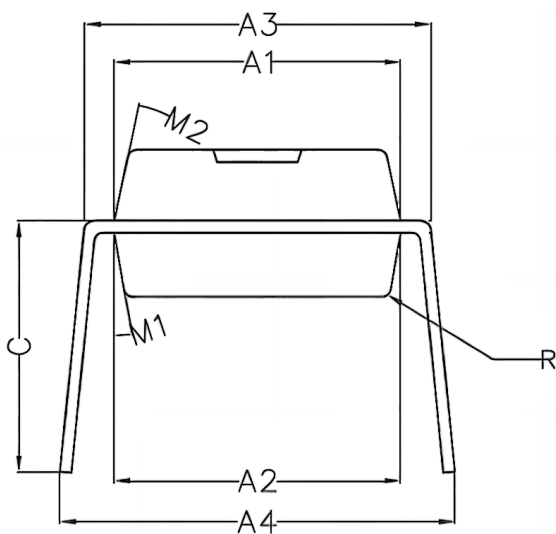
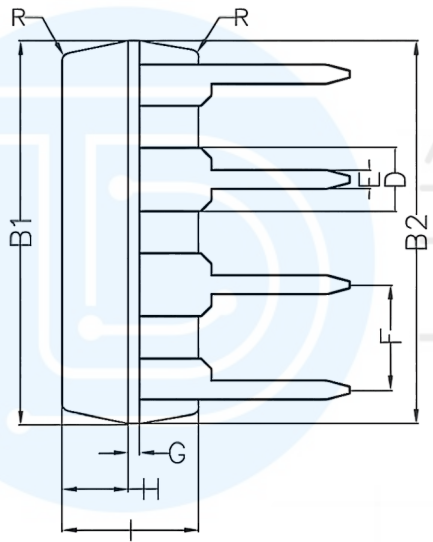
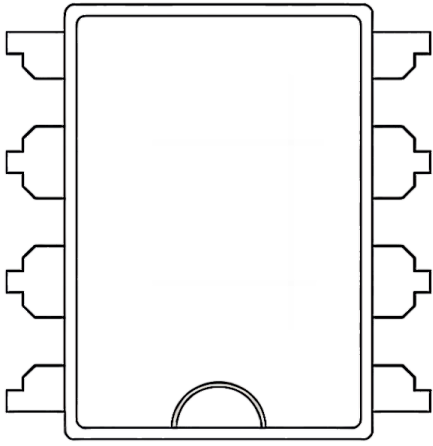


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°





Package DIP8



Symbol	Min	Non	Max
A1	6.28	6.33	6.38
A2	6.33	6.38	6.43
A3	7.52	7.62	7.72
A4	7.80	8.40	9.00
B1	9.15	9.20	9.25
B2	9.20	9.25	9.30
C		5.57	
D		1.52	
E	0.43	0.45	0.47
F		2.54	
G		0.25	
H	1.54	1.59	1.64
I	3.22	3.27	3.32
R		0.20	
M1	9°	10°	11°
M2	11°	12°	13°



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