钛地半导体
Tudi Semiconductor

Product Specification

TUDI-ADM485E/487E/1487E

5 V, ± 15 kV ESD Protected Half-Duplex, RS-485/RS-422 Transceivers

网址 www.sztdbdt.com

用芯智造·卓越品质

semiconductor device manufacturer

- Design
- research and development
- production
- and sales

Features

● TIA /EIA RS-485/RS-422 compliant
● ESD protection on RS-485 I/O pins
● ± 15 kV human body model (HBM)
● Data rates ADM487E: 250 kbps
● ADM485E/ADM1487E: 2.5 Mbps
● Half-duplex
● Reduced slew rates for low EMI
● Common-mode input range: 7 V to +12 V
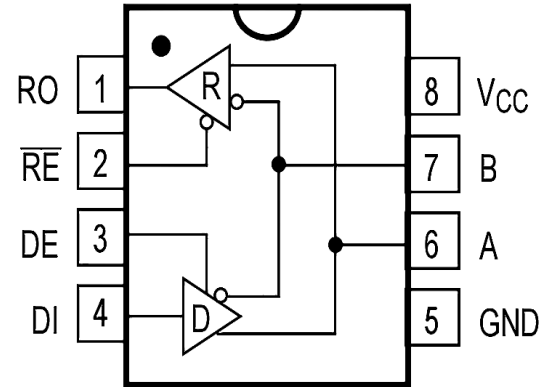● Thermal shutdown and short-circuit protection

Figure 1. Pin Diagram

Description

The ADM485E/ADM487E/ADM1487E are low power 5V dataceivers with ±15 kV ESD protection for half-duplex communication on multipoint bus transmission lines. They are designed for balanced data transmission and are compliant with T/EIA standard RS-485 and RS-422. The ADM487E and ADM148E have a 1/4 unit receiver input impedance allowing a maximum of 128 transceivers on the bus, while the ADM485E allows a maximum of 32 transceivers on bus. Since only one driver is enabled at any time, disabled or off driver outputs are tristated to avoid bus contention. The drivers are current limited to reduce EMI and errors due to reflections from improperly terminated bus. Excessive power dissipation due to bus contention or output short can be prevented by the thermal shutdown circuit. These devices are fully specified the industrial temperature range and are available in an 8-pin SOIC package.

Applications

● Energy/power metering
● Lighting systems
● Industrial control
● Telecommunications
● Security systems
● Instrumentation

Pin description

Pin Number	Pin Name	FUNCTION
1	RO	Receiver Output.When enabled,ifA-B≥-10mV,then RO=high.IfA-B ≤-200 mV,then RO=low
2	/RE	Receiver Output Enable.Alow level enables the RO;a high level places it in a high impedance state.
3	DE	Driver Output Enable.A high level enables the driver differential outputs,Pin A and Pin B;a low level places the driver in a high impedance state.
4	DI	Driver Input.When the driver is enabled,a logic low on DI forces Pin A low and Pin B high;a logic high on DI forces PinA high and Pin B low.
5	GND	Ground Connection (0V).
6	A	No inverting Receiver Input A/Driver Output A
7	B	Inverting Receiver Input B/Driver Output B.
8	VCC	Power Supply

Parameter limit

PARAMETER	Symbol	Value	Unit
CTR Port	/RE,DE,DI	-0.3~VCC+0.3	V
Driver Output Voltage	A、B	-7~13	V
Receiver Output Voltage	RO	-0.3~VCC+0.3	V
Supply Voltage	VCC	+7	V
Continuous Power Dissipation	MSOP8.SOP8.DIP8	830	mW
Soldering Temperature (reflow)		300	℃
Storage Temperature Range		-60~150	℃
Temperature Range		-40~85	℃

Stresses beyond those listed under " Parameter limit" 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 in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SWITCHING CHARACTERISTICS OF RECEIVER						
Receiver Enable to Output Low	tRZL	CL=100 pF, S1closed		20	50	ns
Receiver Enable to Output High	tRZH	CL=100 pF, S2 closed		20	50	ns
Receiver Disable Time from Low	tRLZ	CL=100 pF,		20	50	ns
Receiver Disable Time from High	tRHZ	CL=100pF, S2 closed		20	50	ns
Receiver Propagation Delay (low to high)	tRPLH	Fig 7 and 8 VD≥2.0V; Rise and fall time VID≤15ns		50	200	ns
Receiver Propagation Delay (high to low)	tRPHL			50	200	ns
|tRPLH-tRPHL|	tsKEW2			13	15	ns
SWITCHING CHARACTERISTICS OF DRIVER						
Driver Enable to Output High	tDzH	CL=100 pF, S1 closed (Fig 5,6)			70	ns
Driver Enable to Output Low	tDzL				70	ns
Driver Disable Time from Low	tDLz	CL=15 pF, S2 closed (Fig 5,6)			70	ns
Driver Disable Time from High	tDHZ				70	ns
Driver Propagation Delay(low to high)	tDPLH	RDIFF=54Ω, CLi=CL$_2$=100pF (Fig 3,4)		60		ns
Driver Propagation Delay (high to low)	tDPHL			60		ns
|tDPLH-tDPHL	tsKEW1			5	±10	ns
Driver Differential Output Rise or Fall Time	tDR,tDF			40		ns

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SUPPLY CURRENT						
Supply Current	Icc1	/RE=0V or VCC, DE=0V		200	500	uA
	Icc2	/RE=VCC, DE=VCC		300	600	uA
	Icc_3	/RE=0, DE=VCC		0.5	10	uA
DC ELECTRICAL CHARACTERISTICS OF RECEIVER						
Receiver Input Resistance	RN	$-7V \leq VcM \leq 12V$	12			kΩ
Receiver Output Short-Circuit	IosR	$0V \leq Vo \leq VCC$	±7		±95	mA
RO Output-Low Voltage	VoL	IouT=+4mA, VID=-200 mV			0.4	V
Three-State Output Current at Receiver	IozR	$0.4V < Vo < 2.4V$			±1	uA
Receiver Input Hysteresis	Vhys	$-7V \leq VCM \leq 12V$		30		mV
RO Output-High Voltage	VoH	IoUT=-4mA, VID=+200 mV	3.5			V
Positive-going input threshold voltage	VIT+	$-7V \leq VcM \leq 12V$			-10	mV
Negative-going input threshold voltage	VIT-	$-7V \leq VcM \leq 12V$	-200			mV
Input Current(A,B)	IN2	DE=0V, VCC=0 or 5V			1.0	mA
		DE=0V, VCC=0 or 5V	0.8			mA

NOTE

If no special situation occurs   VCC=5V±5% ,Temp=T^{MIN}~T^{MAX} typically VCC=+5V   Temp   25

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DC ELECTRICAL CHARACTERISTICS OF DRIVER						
Input High Voltage	VH	DE,DI,/RE	2.0			V
Input Low Voltage	Vn	DE,DI,/RE			0.8	V
Input Current (RE,DI,/RE)	IN1	DE,DI,/RE	-2		2	uA
Thermal-Shutdown Threshold				150		℃
Thermal-Shutdown Hysteresis				20		℃
Differential Driver Output(no load)	VoD1			5		V
Differential Driver Output	VoD2	Fig 2,RL=27Ω	1.5		VCC	V
		Fig 2,RL=50	2		VCC	
Change in Magnitude of Differential Output Voltage (NOTE1)	△VoD	Fig 2,RL=27Ω			0.2	V
Driver Common-Mode Output Voltage	Voc	Fig 2,RL=27Ω			3	V
Change In Magnitude of Common-Mode Voltage (NOTE1)	△Voc	Fig 2,RL=27Ω			0.2	V
Driver Short-Circuit Output Current (short to high)	IosD1	Short to 0V~12V	35		250	mA
Driver Short-Circuit Output Current (short to low)	IosD2	Short to-7V~0V	-250		-35	mA

TEST CIRCUIT
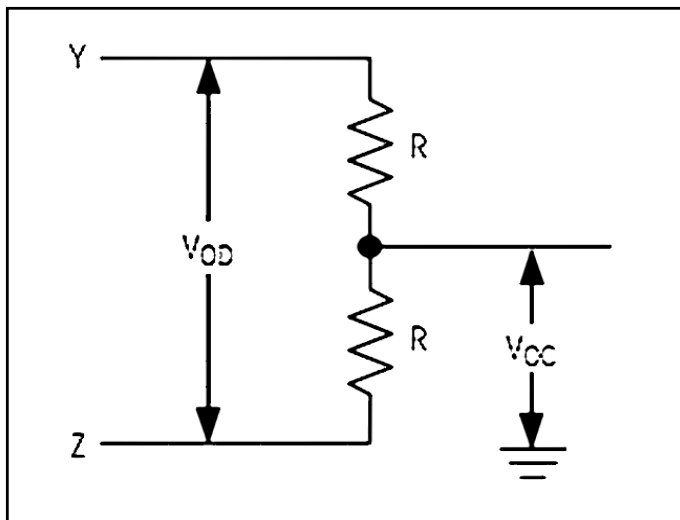
Fig 2 Driver DC Test Load
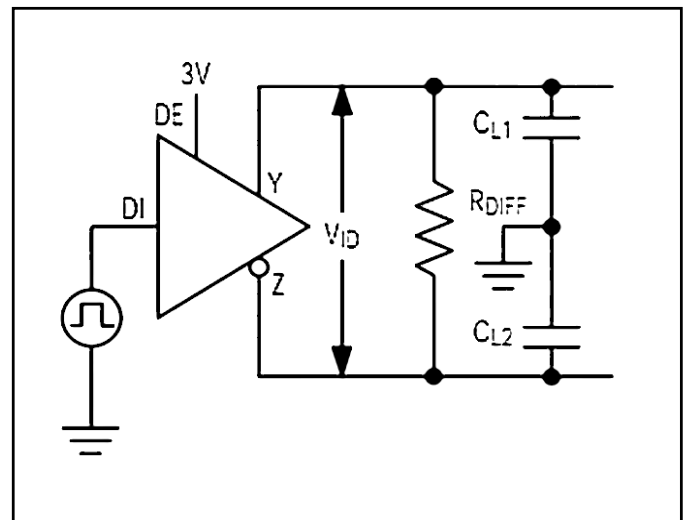
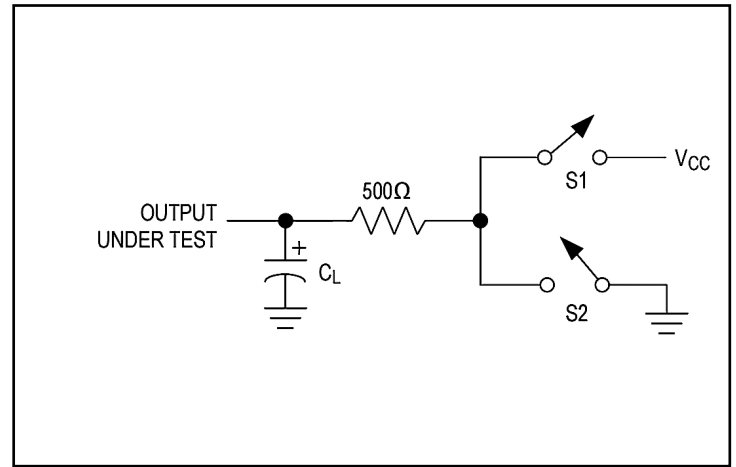Fig 3 Driver Timing Test Circuit
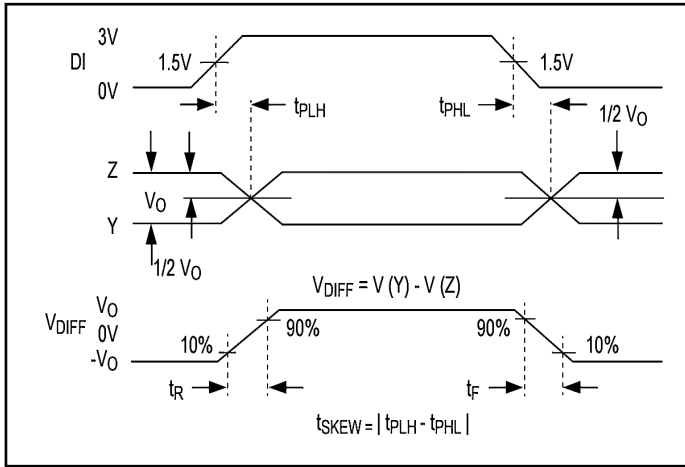
Fig 4 Driver Propagation Delays
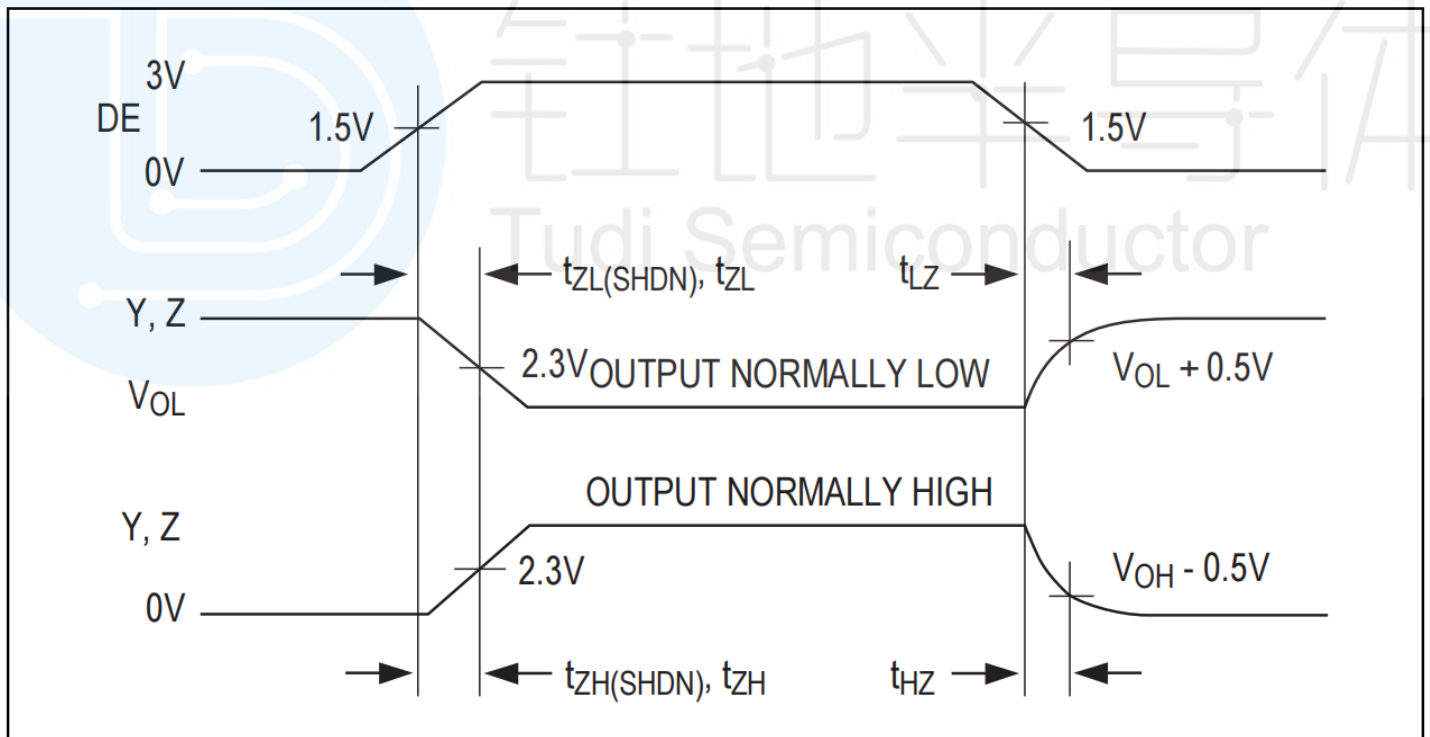

Fig 5 Driver Enable/Disable Timing Test Load
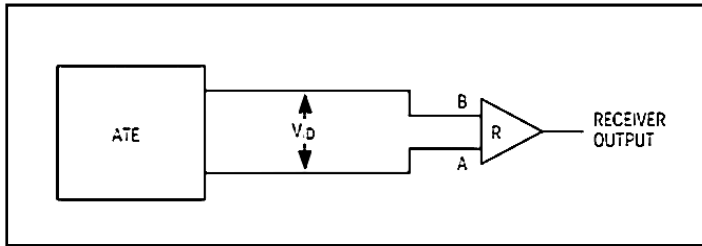

Fig 6 Driver Enable and Disable Times

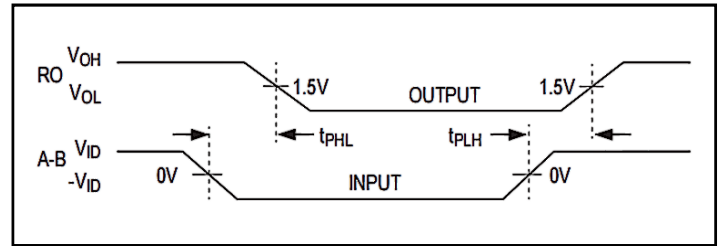Fig 7Receiver Propagation Delay Test Circuit
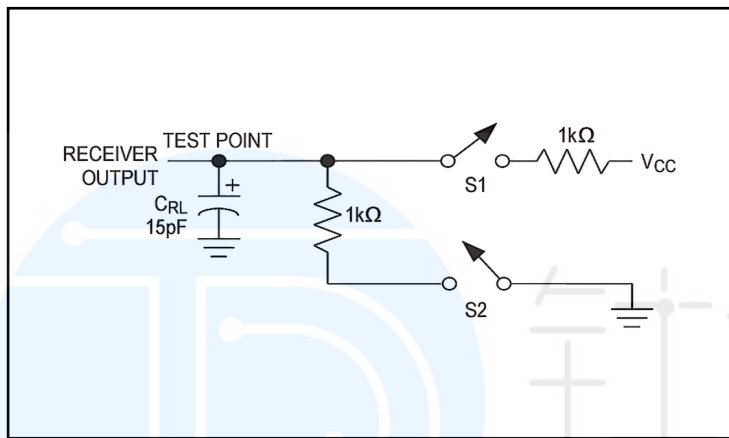

Fig 8 Receiver Propagation Delays

Fig 9 Receiver Enable/Disable Timing Test Load

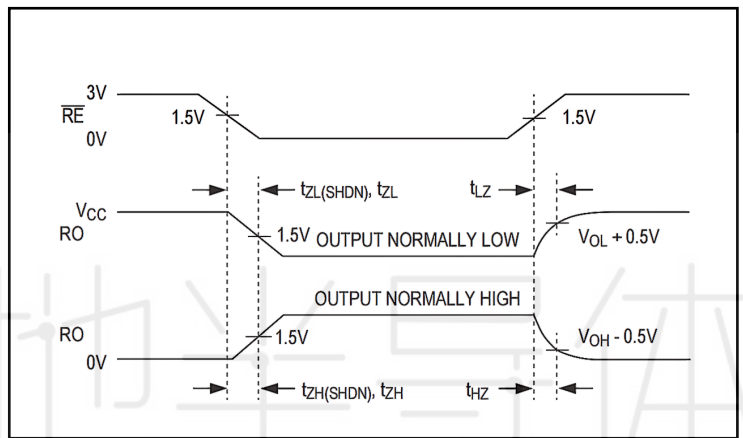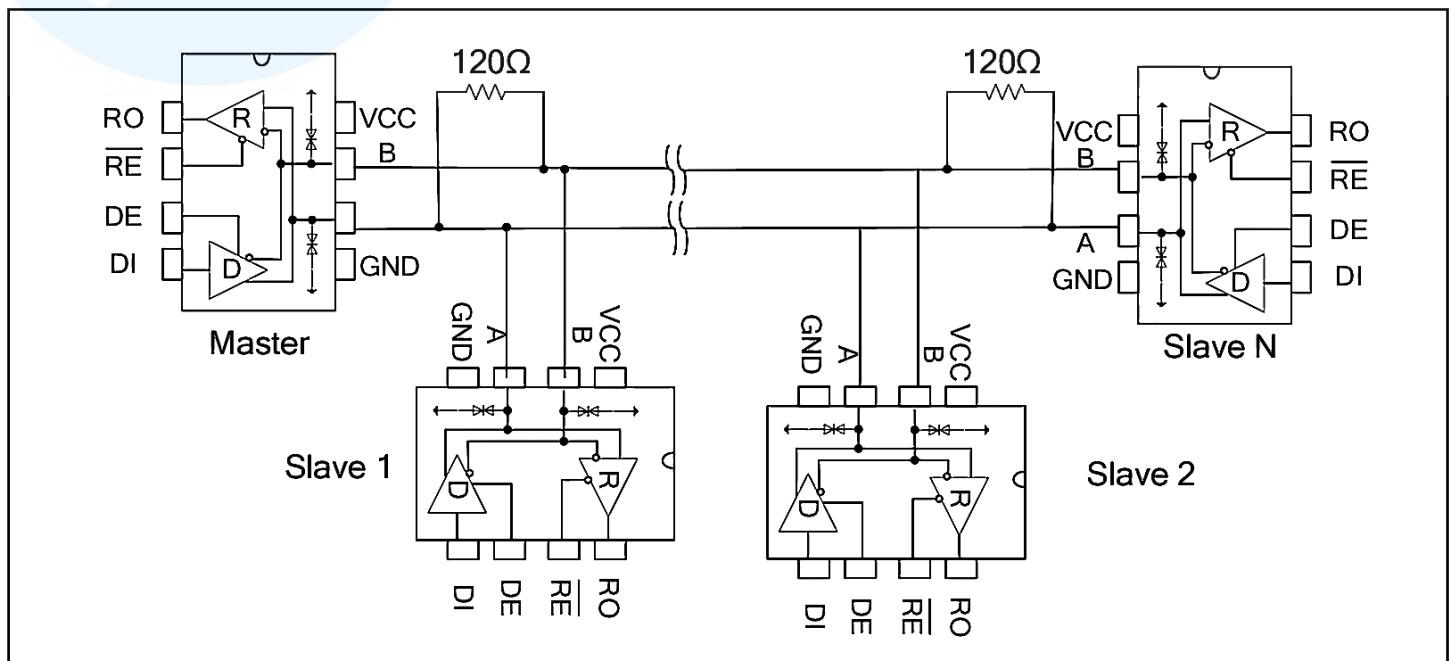Fig 10 Receiver Enable and Disable Times

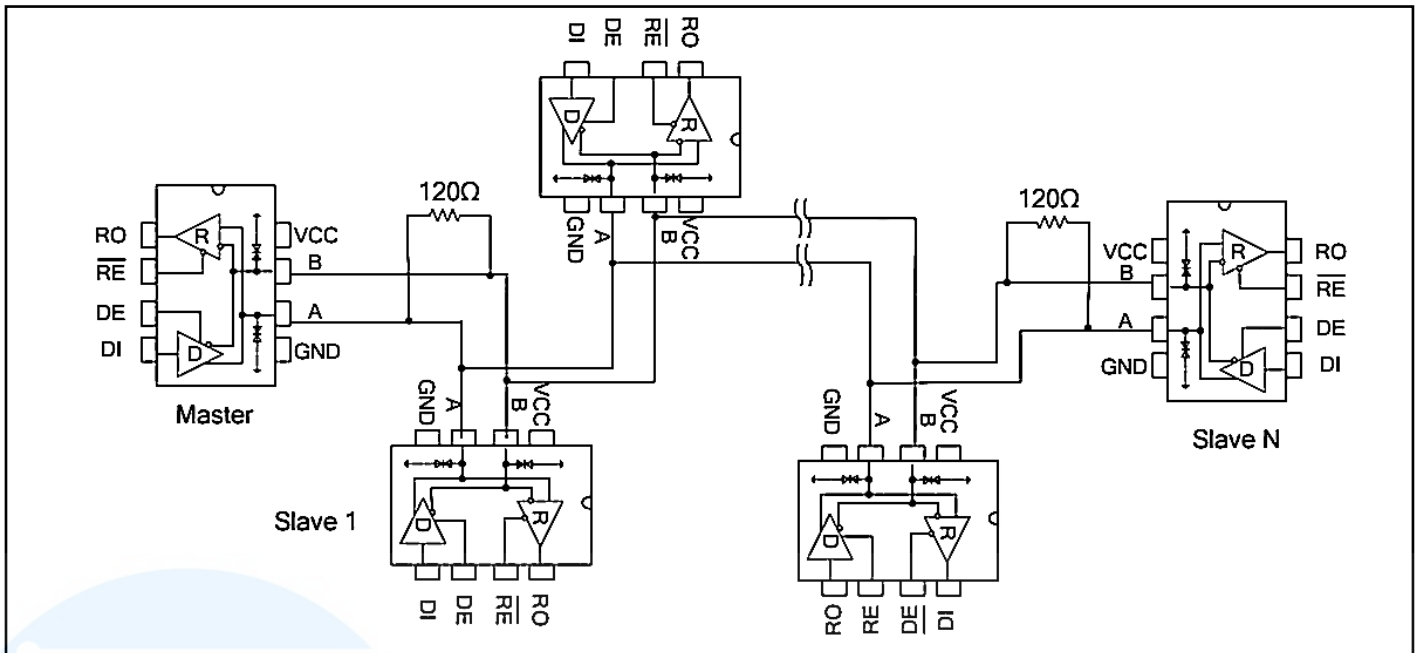Fig11 Backbone cable type RS485 communications network

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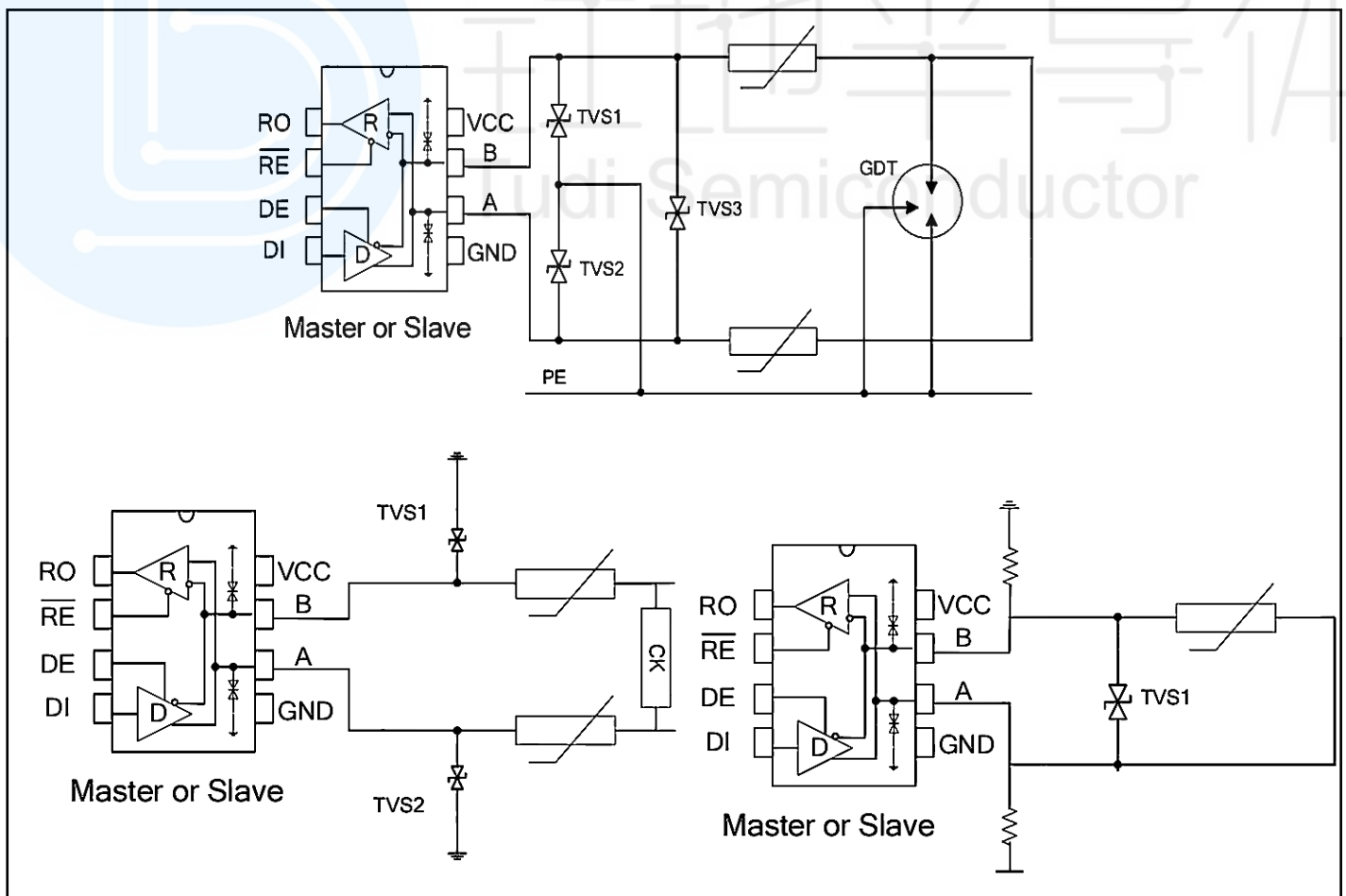
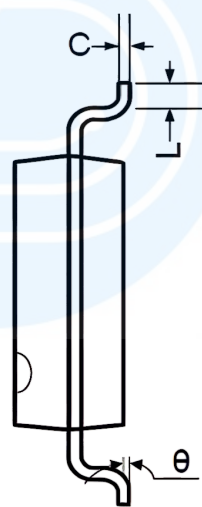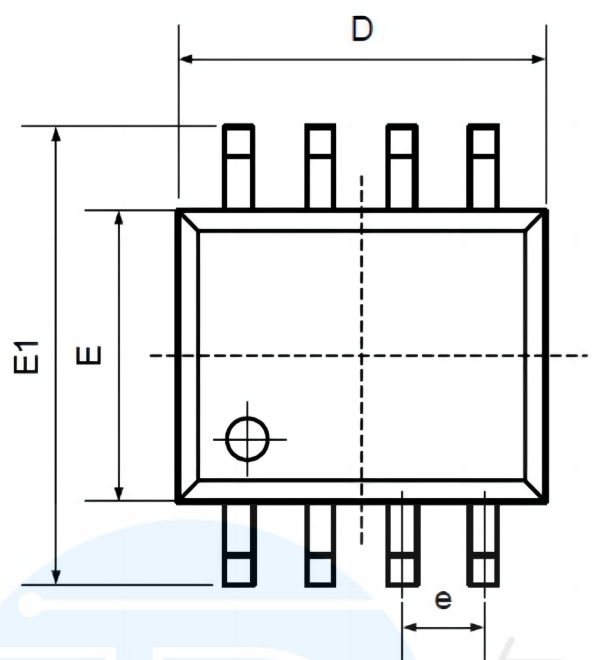Fig12 Daisy chain topology type RS485 communications network

Fig13 RS485 bus ports Protection configuration

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°
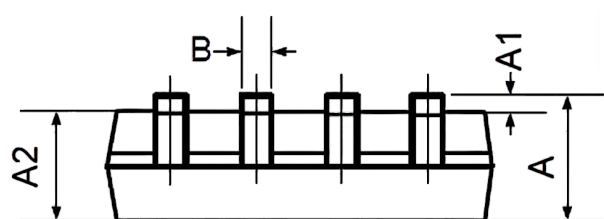
Package DIP8
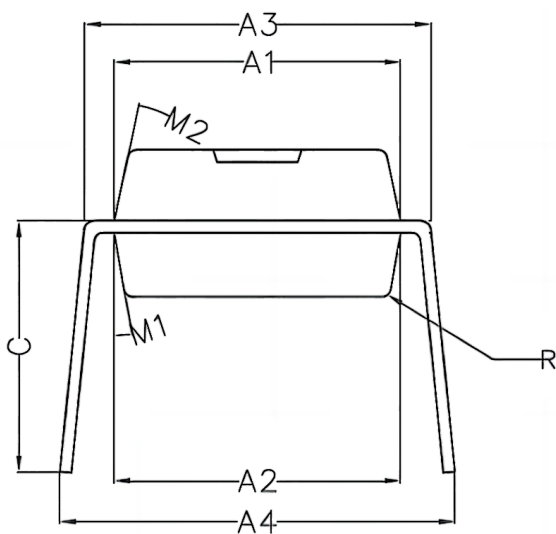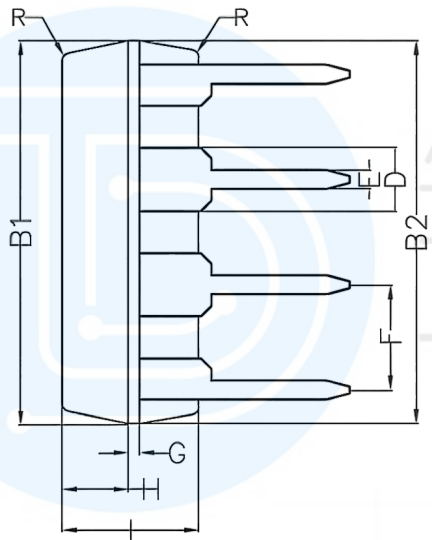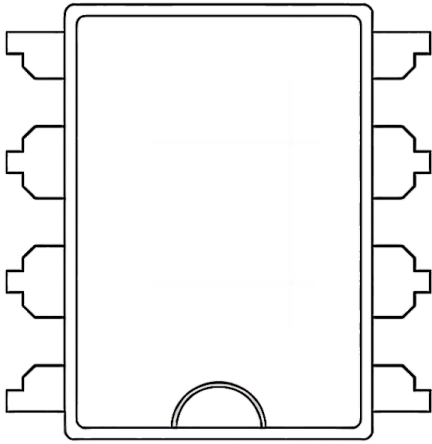
Symbol	Min	Non	Max
A1	6.28	6.33	6.38
A2	6.33	6.38	6.43
A3	7.52	7.62	7.72
A4	7.80	8.40	9.00
B1	9.15	9.20	9.25
B2	9.20	9.25	9.30
C		5.57	
D		1.52	
E	0.43	0.45	0.47
F		2.54	
G		0.25	
H	1.54	1.59	1.64
工	3.22	3.27	3.32
R		0.20	
M1	9°	10°	11°
M2	11°	12°	13°

Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
ADM485EARZ-REEL-TUDI	SOP8	Tape,Reel,2500	ADM485EARZ	- 40°C to 85°C
ADM485EANZ-TUDI	DIP8	Tube,50,A box of 2000	ADM485EANZ	
ADM1487EARZ-REEL-TUDI	SOP8	Tape,Reel,2500	ADM1487EARZ	
ADM1487EANZ-TUDI	DIP8	Tube,50,A box of 2000	ADM1487EANZ	
ADM487EARZ-REEL-TUDI	SOP8	Tape,Reel,2500	ADM487EARZ	
ADM487EANZ-TUDI	DIP8	Tube,50,A box of 2000	ADM487EANZ	
ADM487EWARZ-REEL-TUDI	SOP8	Tape,Reel,2500	ADM487EWARZ	- 40°C to 105°C

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