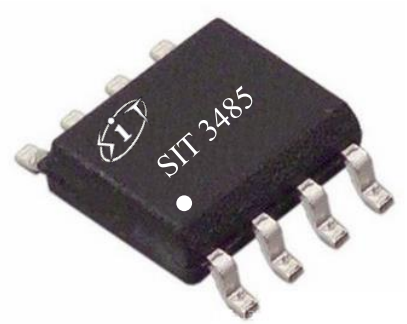
characteristic:

- 3.3V power supply, half-duplex;
- 1/8 unit load, allowing up to 256 devices to be connected to the bus;
- Driver short circuit output protection;
- Over temperature protection function;
- Low power consumption shutdown function;
- Receiver open circuit failure protection;
- Strong anti-noise ability;
- Integrated transient voltage resistance function;
- The data transmission rate in the electrical noise environment can reach 12Mbps;

Product shape:



Provide green, lead-free packaging

description

SIT3485 is a 3.3V powered, half-duplex, low-power RS-485 transceiver that fully meets the requirements of TIA/EIA-485 standards.

SIT3485 includes a driver and a receiver, both of which can be independently enabled or disabled. When both are disabled, the driver and receiver output high impedance states. SIT3485 has 1/8 load capacity, allowing 256 SIT3485 transceivers to be connected in parallel on the same communication bus. It supports error-free data transmission up to 12 Mbps.

SIT3485 The working voltage range is 3.0~3.6V, and it has fail-safe (fail-safe), over temperature protection, current limiting protection, overvoltage protection and other functions.

Pin distribution diagram

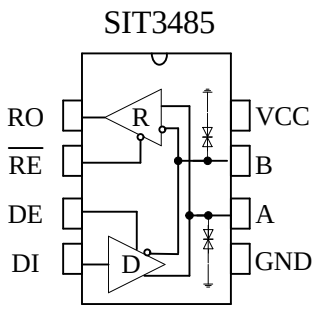


Figure 1 SIT3485 Pin distribution diagram

absolute rating

Parameter	Symbol	Big or small	Unit
Supply voltage	VCC	+7	V
Control the port voltage	/RE，DE，DI	-0.3~+7	V
Total input voltage on the bus	A、B	-7~13	V
Receiver output voltage	RO	-0.3~+7	V
Operating temperature range		-40~85	℃
Storage working temperature range		-60~150	℃
Welding temperature range		300	℃
Continuous power consumption	SOP8	400	mW
	DIP8	700	mW

The maximum limit parameter value is the value beyond which the device may suffer irrecoverable damage. Under these conditions, it is not conducive to the normal operation of the device. Continuous operation of the device at the maximum allowable rating may affect the reliability of the device. All voltage reference points are ground.

Pin definition

Pin number	Pin name	Pin function
1	RO	Receiver output end. When /RE is low, if A-B is greater than or equal to 200 mV, RO output is high; if A-B is less than or equal to-200mV, RO output is low.
2	/RE	Receiver output enable control. When /RE is connected to low voltage, the receiver output enables and RO output is valid; when /RE is connected to high voltage, the receiver output is disabled and RO is in high resistance state; When the RE is connected to a high level and the DE is connected to a low level, the device enters the low-power shutdown mode.
3	DE	Driver output enable control. When DE is high and DE is low, the driver output is valid; when DE is high and DE is low, the device enters low-power shutdown mode.
4	DI	DI driver input. When DE is high, the low level on DI makes the in-phase terminal A of the driver output low and the out-of-phase terminal B of the driver output

		high; the high level on DI will make the in-phase terminal output high and the out-of-phase terminal output low.
5	GND	Landing
6	A	Receiver in-phase input and driver in-phase output
7	B	Receiver inverting input and driver inverting output
8	VCC	Power connection

DC electrical characteristics of the driver

Parameter	Symbol	Test condition	Minimum	Typical case	Maximum	Unit
Driver differential output (non-loaded)	V_{OD1}			3.3		V
Drive differential output	V_{OD2}	Graph 2,RL=54Ω	1.5		VCC	V
		Graph 2,RL=100Ω	2		VCC	
Change in the amplitude of the output voltage (NOTE1)	ΔV_{OD}	Graph 2,RL=54Ω			0.2	V
Output common mode voltage	V_{OC}	Graph 2,RL=54Ω			3	V
Change in the amplitude of the common-mode output voltage (NOTE1)	ΔV_{OC}	Graph 2,RL=54Ω			0.2	V
High-level input	V_{IH}	DE，DI，/RE	2.0			V
Low level input	V_{IL}	DE，DI，/RE			0.8	V
Logic input current	I_{IN1}	DE，DI，/RE	-2		2	uA
The current at the output short circuit is high	I_{OSD1}	Short circuit to 0V~12V			250	mA
The current at the time of output short circuit is low	I_{OSD2}	Short circuit to-7V~0V	-250			mA
Overtemperature shutdown threshold temperature				140		℃
Overtemperature shutdown hysteresis temperature				20		℃

(If no other explanation is given, VCC=3.3V±10%, Temp=TMIN~TMAX, typical value in VCC=+3.3V, Temp = 25) NOTE1: VOD and VOC are the changes in VOD and VOC amplitude caused by the state change of input signal DI.

DC electrical characteristics of the receiver

Parameter	Symbol	Test condition	Minimum	Typical	Maximum	Unit

				case		
Input current (A, B)	I_{IN2}	DE = 0 V, VCC=0 or 3.3V VIN = 12 V			125	uA
		DE = 0 V, VCC=0 or 3.3V VIN = -7 V	-100			uA

Positive input threshold voltage	V_{IT+}	-7V≦V_{CM}≦12V			+200	mV
Reverse input threshold voltage	V_{IT-}	-7V≦V_{CM}≦12V	-200			mV
Input hysteresis voltage	V_{hys}	-7V≦V_{CM}≦12V	10	30		mV
High level output voltage	V_{OH}	I_{OUT} = −2.5mA, V_{ID} = +200 mV	VCC-1.5			V
Low level output voltage	V_{OL}	I_{OUT} = +2.5mA, V_{ID} = -200 mV			0.4	V
Three state input leakage current	I_{OZR}	0.4 V < V_O < 2.4 V			±1	uA
Input resistance at the receiver	R_{IN}	-7V≦V_{CM}≦12V	96			kΩ
Receiver short circuit current	I_{OSR}	0 V≤V_O≤VCC	±8		±60	mA

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

supply current

Parameter	Symbol	Test condition	Minimum	Typical case	Maximum	Unit
Supply current	I_{CC1}	/RE=0V, DE = 0 V		520	800	uA
	I_{CC2}	/RE=VCC, DE=VCC		540	700	uA
Shut off the current	I_{SHDN}	/RE=VCC, DE=0V		0.5	10	uA

Driver switch characteristics

Parameter	Symbol	Test condition	Minimum	Typical case	Maximum	Unit
Driver differential output delay	t_{DD}	RDIFF = 60 Ω, CL1=CL2=100pF (see Figure 3 and Figure 4)		10	35	ns
Drive differential output transition time	t_{TD}			12	25	ns
Driver propagation delay From low to high	t_{PLH}	R_{DIFF} = 27 Ω, (See Figure 3 and Figure 4)		8	35	ns

Driver propagation delay From high to low	t_{PHL}			8	35	ns

$\|t_{PLH}-t_{PHL}\|$	t_{PDS}			1	8	ns
Enable to output high	t_{PZH}	$R_L = 110\Omega$, (See Figures 5 and 6)		20	90	ns
Enable to output low	t_{PZL}			20	90	ns
Input is low to the forbidden energy	t_{PLZ}	$R_L = 110\Omega$, (See Figures 5 and 6)		20	80	ns
Input high enough to disable energy	t_{PHZ}			20	80	ns
Under shutdown conditions, Enable to output high	t_{DSH}	$R_L = 110\Omega$, (See Figures 5 and 6)		500	900	ns
Under shutdown conditions, Enable to output low	t_{DSL}	$R_L = 110\Omega$, (See Figures 5 and 6)		500	900	ns

Receiver switch characteristics

Parameter	Symbol	Test condition	Minimum	Typical case	Maximum	Unit
Acceptor The input to output propagation delay goes from low to high	t_{RPLH}	C_L=15pF See Figure 7 and Figure 8		80	150	ns
Acceptor The input to output propagation delay goes from high to low	t_{RPHL}			80	150	ns
$\|t_{RPLH} - t_{RPHL}\|$	t_{RPDS}			7	10	ns
Enable to output low time	t_{RPZL}	C_L=15pF See Figure 7 and Figure 8		20	50	ns
Enable the high time to output	t_{RPZH}	C_L=15pF See Figure 7 and Figure 8		20	50	ns
From low output to forbidden time	t_{PRLZ}	C_L=15pF See Figure 7 and Figure 8		20	45	ns
From high output						

to forbidden time	t_{PRHZ}	C_L=15pF See Figure 7 and Figure 8		20	45	ns
In the off state Enable the high time to output	t_{RPSH}	C_L=15pF See Figure 7 and Figure 8		200	1400	ns
In the off state Enable low time to output	t_{RPSL}	C_L=15pF See Figure 7 and Figure 8		200	1400	ns
Enter the shutdown state time	t_{SHDN}	NOTE2	80		300	ns

Note2: When /RE=1 and DE=0, the duration is less than 80ns, the device must not enter the shutdown state; when it is greater than 300ns, the device must enter the shutdown state.

Function table

Send function table

Control		Import	Output	
/RE	DE	DI	A	B
X	1	1	H	L
X	1	0	L	H
0	0	X	Z	Z
1	0	X	Z(shutdown)	

X: any level; Z: high resistance.

Receive function table

Control		Import	Output
/RE	DE	A-B	RO
0	X	≥200mV	H
0	X	≤-200mV	L
0	X	Open/ circuit	H
1	X	X	Z

X: any level; Z: high resistance.

test circuit

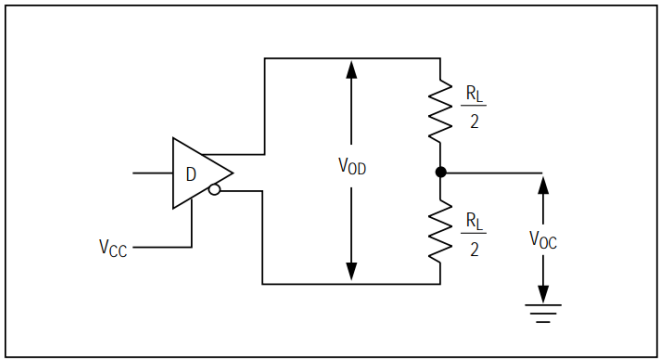
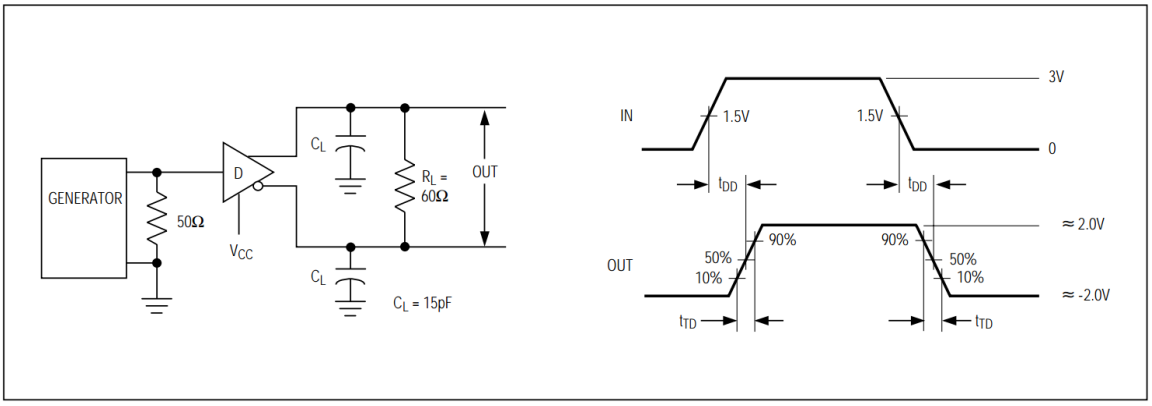


Figure 2 DC test load for the driver



CL contains probes and stray capacitance (same below)

Figure 3 Driver differential delay and transit time

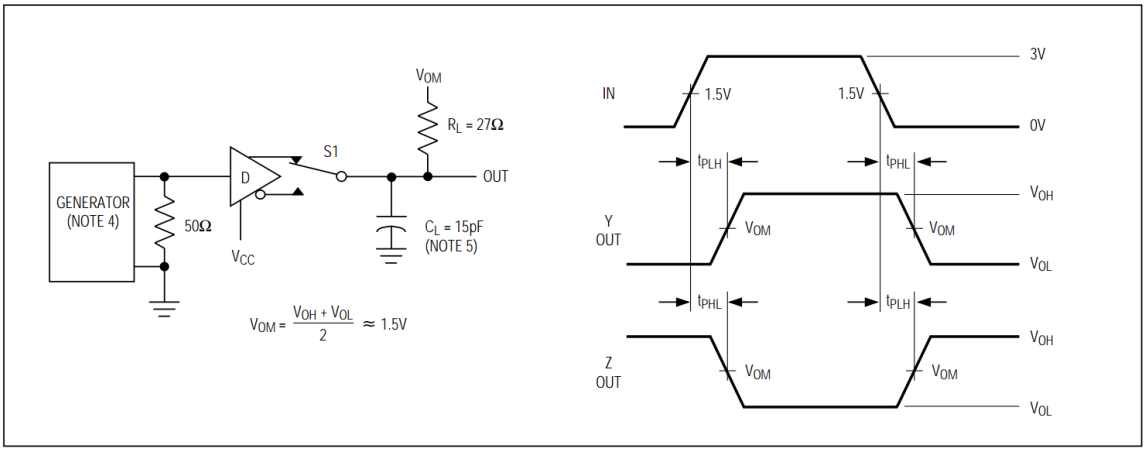


Figure 4 Driver propagation delay

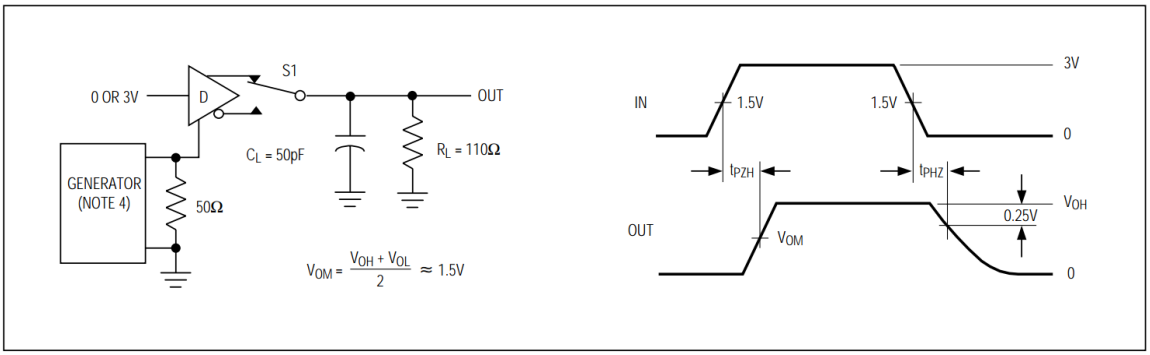


Figure 5 Driver enable and disable time

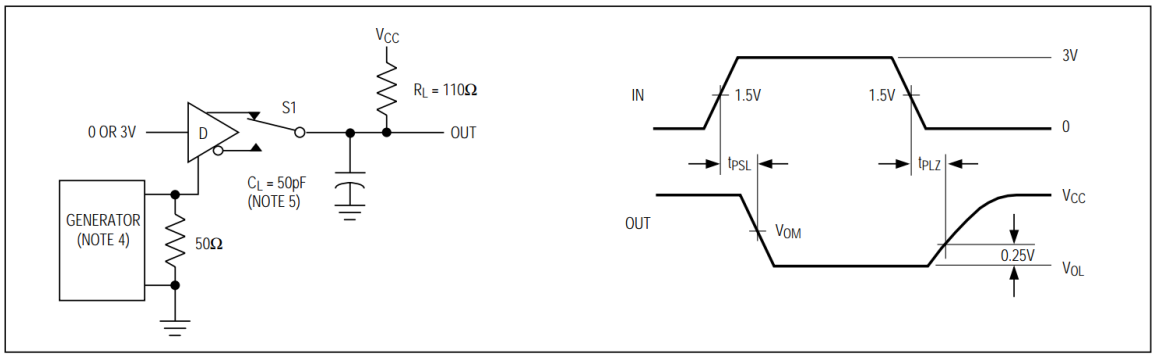


Figure 6 Driver enable and disable time

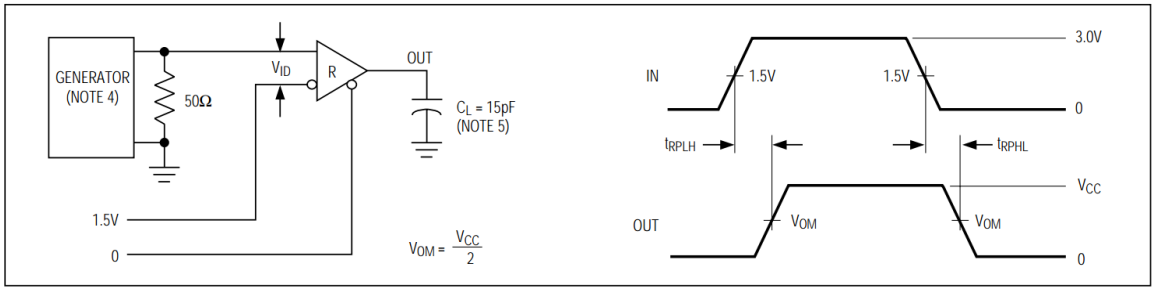


Figure 7 Receiver propagation delay test circuit

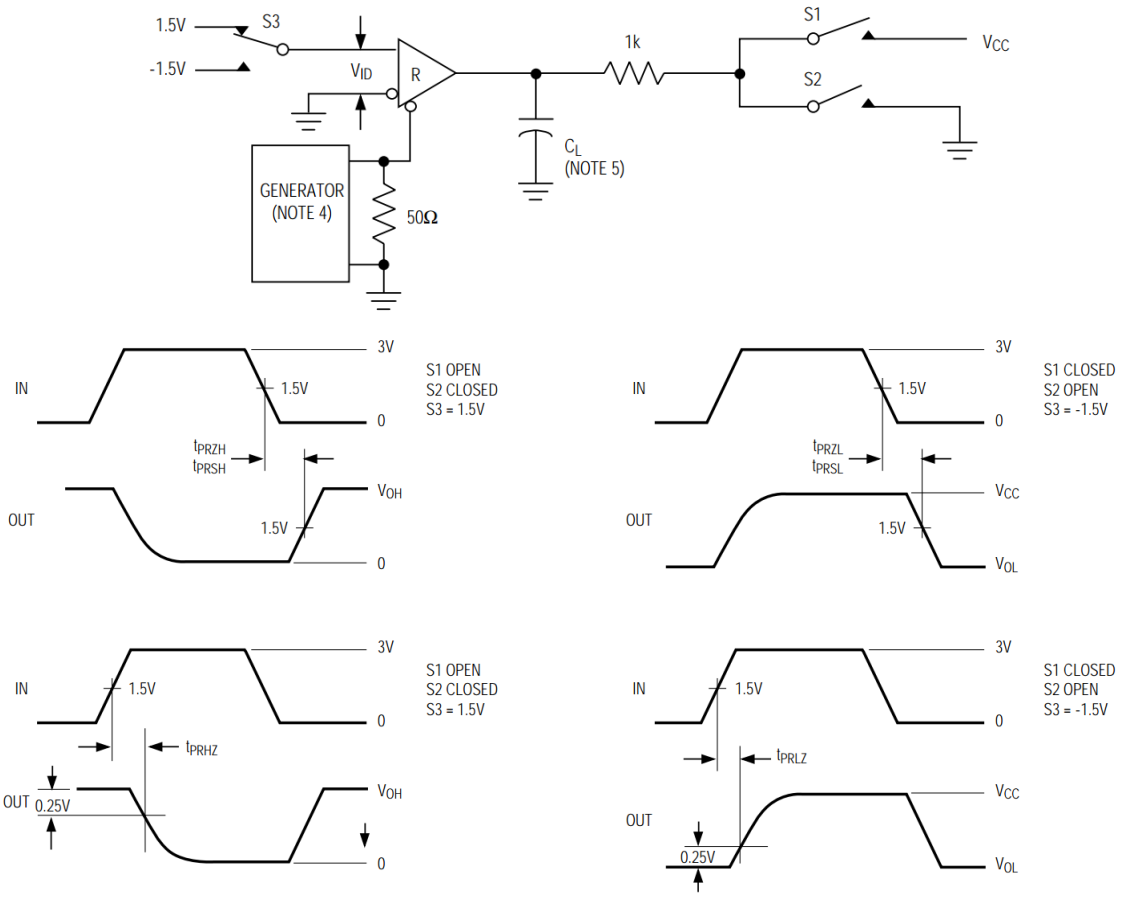


Figure 8 Receiver enable and disable time

explain

1 resume

SIT3485 is a half-duplex high-speed transceiver for RS-485/RS-422 communication, including a driver and receiver. It has fail-safe, overvoltage protection, overcurrent protection, and overheating protection functions. SIT3485 achieves error-free data transmission up to 12Mbps.

2 A total of 256 transceivers are connected to the wall

The standard RS485 receiver has an input impedance of 12kΩ (one unit load), and the standard driver can drive up to 32 unit loads. The SIT3485 transceiver's receiver has an input impedance of 1/8 unit load (96kΩ), allowing up to 256 transceivers to be connected in parallel on the same communication bus. These devices can be combined arbitrarily or with other RS485 transceivers, as long as the total load does not exceed 32 unit loads, they can all be connected on the same bus.

4 Driver output protection

To prevent excessive output current and high power consumption caused by faults or bus conflicts through two mechanisms. First, overcurrent protection, providing rapid short-circuit protection across the entire common-mode voltage range (refer to typical operating characteristics). Second, thermal shutdown circuit, which forces the driver output into a high-impedance state when the die temperature exceeds 140 .

5 Typical application

5.1 Bus topology networking: SIT3485 RS485 transceivers are designed for bidirectional data communication on multi-drop bus transmission lines. Figure 11 shows a typical network application circuit. These devices can also be used as linear repeaters when the cable length exceeds 4000 feet. To reduce reflections, termination matching at both ends of the transmission line should be performed with their characteristic impedance, and branch connections outside the main trunk should be as short as possible.

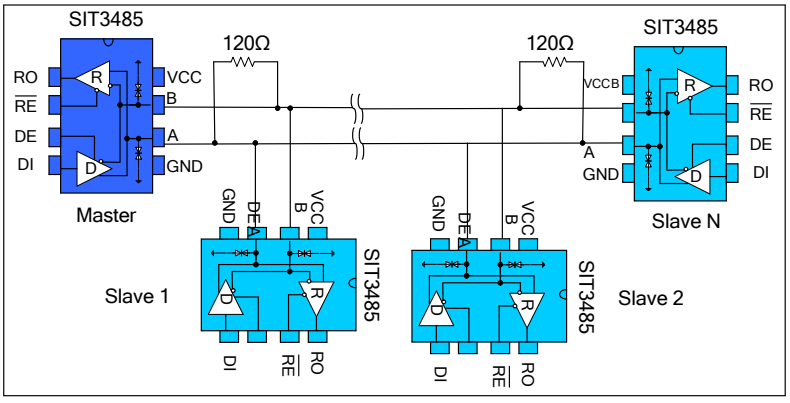


Figure 11 Bus type RS485 half-duplex communication network

5.2 Hand-in-hand networking: Also known as the daisy chain topology, it is the standard and specification for RS485 bus cabling, recommended by organizations such as TIA for RS485 bus topologies. The wiring method involves forming hand-in-hand connections between the master control device and multiple slave devices, as shown in Figure 12. This method does not leave any branches, which is what defines a hand-in-hand connection. This wiring method has advantages such as minimal signal reflection and high communication success rates.

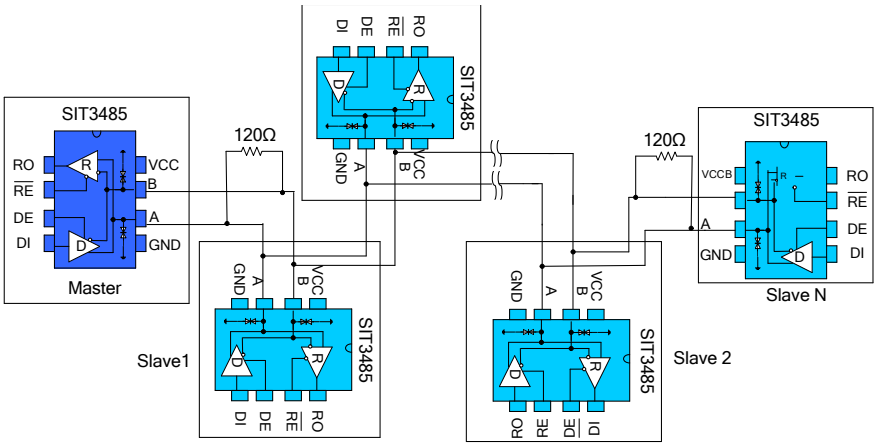
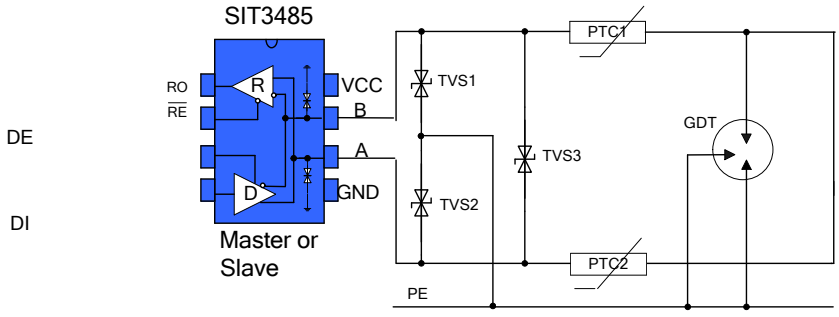


Figure 12 Hand-in-hand RS485 half-duplex communication network

5.3 Total Bus Port Protection: In harsh environments, RS485 communication ports are typically equipped with additional protections such as electrostatic protection and surge protection against lightning strikes. They may even require solutions to prevent the connection of 380V mains electricity to avoid damage to smart meters and industrial control hosts. Figure 13 shows three common RS485 bus port protection schemes. The first scheme involves paralleling TVS devices between the AB ports to ground, with TVS devices also connected between the AB ports. Additionally, thermal resistors are connected in series between the AB ports, and gas discharge tubes are connected in parallel to ground, forming a three-level protection system. The second scheme involves paralleling TVS devices between the AB ports to ground and connecting thermal resistors in series between the AB ports, forming a three-level protection system. The third scheme involves connecting pull-up resistors between the AB ports to power and ground, connecting TVS devices between the AB ports, and connecting thermal resistors to either port A or B.



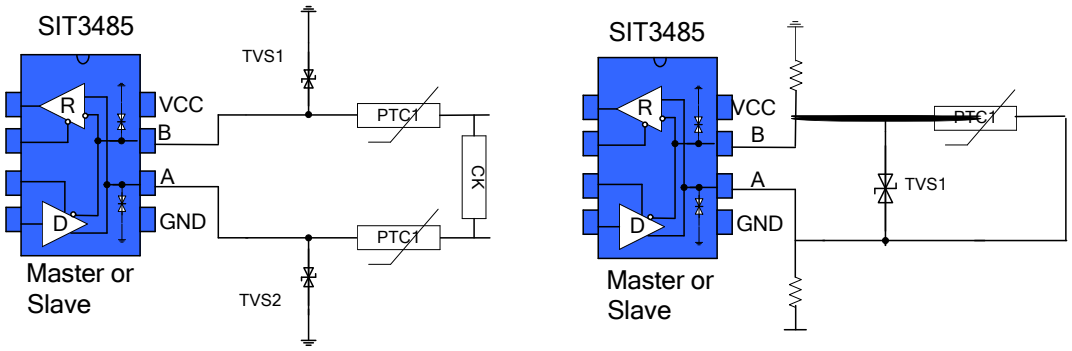
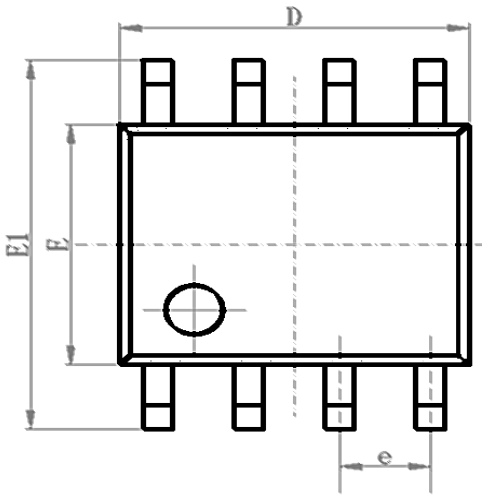


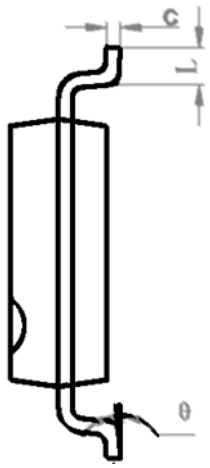
Figure 13 Port protection scheme

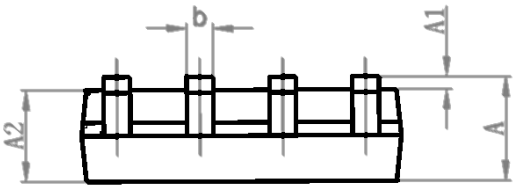
SOP8, external dimens-ions

Package size

Symbol	Least value / mm	Representative value / mm	Crest value / mm
A	1.50	1.60	1.70
A1	0.1	0.15	0.2
A2	1.35	1.45	1.55
b	0.355	0.400	0.455
D	4.800	4.900	5.00
E	3.780	3.880	3.980
E1	5.800	6.000	6.200
e		1.270BSC	
L	0.40	0.60	0.80
c	0.153	0.203	0.253
θ	-2 °	-4 °	-6 °



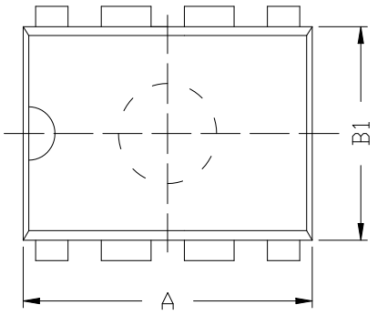


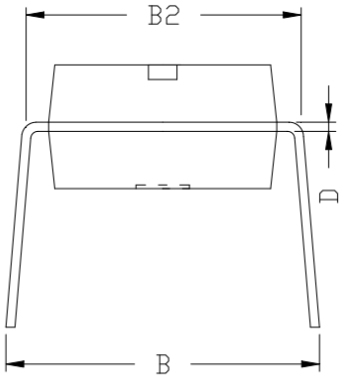


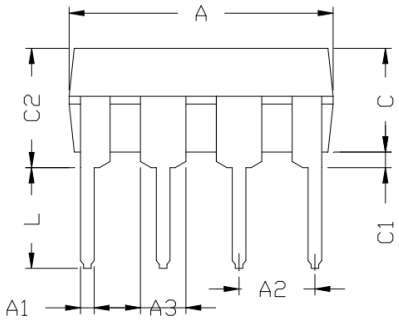
DIP8, external dimensions

Package size

Symbol	Least value / mm	Representative value / mm	Crest value / mm
A	9.00	9.20	9.40
A1	0.33	0.45	0.51
A2	2.54TYP		
A3	1.525TYP		
B	8.40	8.70	9.10
B1	6.20	6.40	6.60
B2	7.32	7.62	7.92
C	3.20	3.40	3.60
C1	0.50	0.60	0.80
C2	3.71	4.00	4.31
D	0.20	0.28	0.36
L	3.00	3.30	3.60







Order information

Order code	Temperature	Package
SIT3485ESA	-40℃~85℃	8 SO
SIT3485EPA	-40℃~85℃	DIP8

The tape packaging is 2500 beads per disc