It is protected by ±15KV ESD, has a fast rate of 500kbps, and has a 256-node RS485/RS422 transceiver

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Product features

- 5V 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;
- The RE and DE ports allow hot-plugging input
- 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 500kbps;
- A, B port protection: contact discharge ±15KV; HBM ±15KV.

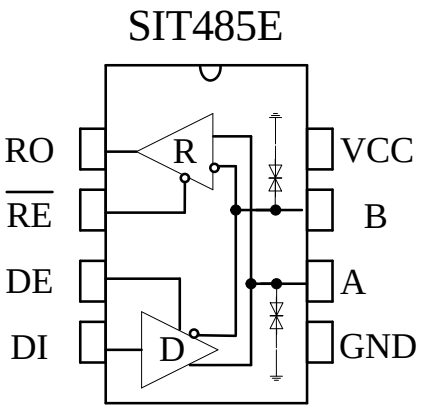


Figure 1 Pin distribution diagram

application area

- Meter reading communication for electricity meter, water meter and gas meter;
- level switch
- industrial computer
- intelligent instrument
- central air-conditioning
- EMI sensitive transceiver applications
- fire-alarm
- lighting system
- electric lift controller
- Access control security

Product overview

SIT485E is a 5V powered, half-duplex, low-power, low swing rate RS-485 transceiver that fully meets the requirements of TIA/EIA-485 standards.

SIT485E 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. SIT485E features 1/8 load, allowing 256 transmitters to be connected in parallel on the same communication bus. Using a voltage-limited swing driver significantly reduces EMI and reflections caused by improper termination cable matching, enabling error-free data transmission up to 500kbps.

SIT485E, the working voltage range is 4.75~5.25V, with fail-safe (fail-safe), overtemperature protection, current limiting protection, overvoltage protection, hot plug-in input of control port and other functions.

SIT485E It has excellent ESD release capability, HBM reaches ±15KV, contact discharge, IEC61000-4-2 ±15KV.

Order information

Order code	Temperature	Package
SIT485EESA	-40℃~85℃	8 SO
SIT485EEPA	-40℃~85℃	DIP8

The tape packaging is 2500 beads per disc

absolute rating:

Parameter	Symbol	Big or small	Unit
Supply voltage	VCC	+7	V
Control the port voltage	/RE, DE, DI	-0.3~VCC+0.3	V
Total input voltage on the bus	A、B	-7~13	V
Receiver output voltage	RO	-0.3~VCC+0.3	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 irreversible 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>= -50mV, RO output is high; if A-B<= -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 a low-power shutdown mode.
3	DE	Driver output enable control. When DE is connected to a high level and DE is connected to a low level, the device enters low-power shutdown mode when DE is connected to a high level and DE is connected to a low level.
4	DI	Driver input. When DE is high, the low level on DI makes the driver's in-phase terminal A output low and the driver's out-of-phase terminal B 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 end

Electrical characteristics of direct current

(If no other explanation is given, VCC=5V±5%, TA=TMIN~TMAX, the typical value is VCC=+5V and TA = 25)

Parameter	Symbol	Minimum	Typical case	Maximum	Unit	Test condition
Actuator						
Driver differential output (no load)	V_{OD1}		5		V	
Drive differential output	V_{OD2}	1.5		5	V	Graph 2,RL=27Ω
		2				Graph 2,RL=50Ω
Change in the amplitude of the output voltage (NOTE 1)	ΔV_{OD}			0.2	V	Graph 2,RL=27Ω
Output common-mode voltage	V_{OC}			3	V	Graph 2,RL=27Ω
Change in the amplitude of the common-mode output voltage (NOTE1)	ΔV_{OC}			0.2	V	Graph 2,RL=27Ω
High-level input	V_{IH}	2.0			V	DE, DI, /RE
Low level input	V_{IL}			0.8	V	DE, DI, /RE
Logic input current	I_{IN1}	-2		2	uA	DE, DI, /RE
The current at the time of short circuit is high	I_{OSD1}	35		250	mA	Short circuit to 0V~12V
The current at short circuit output goes down to low	I_{OSD2}	-250		-35	mA	Short circuit to-7V~0V
Overtemperature shutdown threshold temperature			150		℃	
Overtemperature shutdown hysteresis temperature			20		℃	
Acceptor						
Input current (A, B)	I_{IN2}			125	uA	DE = 0 V, VCC=0 or 5V VIN = 12 V
	I_{IN2}	-100			uA	DE = 0 V, VCC=0 or 5V VIN = -7 V
Positive input threshold voltage	V_{IT+}			-50	mV	-7V≦V_{CM} ≦

						12V
Reverse input threshold voltage	V_{IT-}	-200			mV	
Input hysteresis voltage	V_{hys}	10	30		mV	-7V≦V_{CM}≦12 V
High level output voltage	V_{OH}	VCC-1.5			V	I_{OUT} = −4mA, V_{ID} = +200 mV
Low level output voltage	V_{OL}			0.4	V	I_{OUT} = +4mA, V_{ID} = -200 mV

Three state input leakage current	I_{OZR}			±1	uA	0.4 V < V_O < 2.4 V
Input resistance at the receiver	R_{IN}	96			kΩ	-7V≦V_{CM}≦12V
Receiver short circuit current	I_{OSR}	±7		±95	mA	0 V≤V_O≤VCC
Supply current						
Supply current	ICC		180	500	uA	/RE=0V or VCC, DE = 0 V
			170	400	uA	/RE=VCC，DE = VCC
Shut off the current	I_{SHDN}		0.5	10	uA	DE =0 V，/RE= VCC
ESD protect						
A、B			±15		KV	Human Body Model (HBM)
			±15		KV	Contact discharge
Other ports		±4			KV	HBM

Note 1: ΔVOD and ΔVOC are the amplitude changes of VOD and VOC caused by the state change of input signal DI.

switching characteristic

(If no other explanation is given, VCC=5V±5%, TA=TMIN~TMAX, typical value is VCC=5V, TA = 25)

Parameter	Symbol	Minimum	Typical case	Maximum	Unit	Test condition
Actuator						
Drive input to output propagation delay (low to high)	t_{DPLH}			1000	ns	RDIFF = 54 Ω, CL1=CL2=100pF (see Figure 3 and Figure 4)
Drive input to output propagation delay (high to low)	t_{DPHL}			1000	ns	
$\|t_{DPLH}- t_{DPHL}\|$	t_{SKEW1}			±100	ns	
Rise time / fall time	t_{DR}, t_{DF}	200	500	700	ns	
Enable to output high	t_{DZH}			2500	ns	CL = 100 pF, S1, closed (see Figures 5 and 6)
Enable to output low	t_{DZL}			2500	ns	
Input is low to the forbidden energy	t_{DLZ}			100	ns	CL = 15 pF, S2, closed (see Figures 5 and

						6)
Input high enough to disable energy	t_{DHZ}			100	ns	
Under the shutdown condition, Enable to output high	$t_{DZH(SHDN)}$			4500	ns	CL = 15 pF, S2, closed (see Figures 5 and 6)
Under the shutdown condition, Enable to output low	$t_{DZL(SHDN)}$			4500	ns	CL = 15 pF, S1, closed (see Figures 5 and 6)

Acceptor						
Acceptor Input to output propag-ation delay From low to high	t_{RPLH}		127	200	ns	See Figure 7 and Figure 8 for VID 2.0V; rising and falling edge time VID 15ns
Acceptor Input to output propag-ation delay From high to low	t_{RPHL}		127	200	ns	
$\|t_{RPLH} - t_{RPHL}\|$	t_{SKEW2}		3	30	ns	See Figure 7 and Figure 8
Enable to output low time	t_{RZL}		20	50	ns	CL = 100 pF, S1 closed (see Figure 9,10)
Enable the high time to output	t_{RZH}		20	50	ns	CL = 100 pF, S 2, closed (see Fig. 9,10)
From low output to fo-rbidden time	t_{RLZ}		20	50	ns	CL = 100 pF, S 1 closed (see Figure 9,10)
From high output to fo-rbidden time	t_{RHZ}		20	50	ns	CL = 100 pF, S 2 closed (see Figure 9,10)
In the off state Enable the high time to output	$t_{RZH(SHDN)}$			3500	ns	CL = 100 pF, S 2, closed (see Fig. 9,10)
Enable the output low time in the off state	$t_{RZL(SHDN)}$			3500	ns	CL = 100 pF, S1 closed (see Figure 9,10)
Enter the shutdown st-ate time	t_{SHDN}	50	200	600	ns	NOTE2

Note2: When /RE=1 and DE=0, the duration is less than 50ns, the device must not enter the shutdown state; when it is greater than 600ns, the device must enter the shutdown state.

SIT485E Function table:

Transmit by radio						Receive			
Control		Import	Output			Control		Import	Output
/RE	DE	DI	A	B		/RE	DE	A-B	RO
X	1	1	1	0		0	X	⩾-50mV	1
X	1	0	0	1		0	X	⩽-200mV	0
0	0	X	Z	Z		0	X	Open cir-cuit/ circuit short	1

1	0	X	Z（Shutdown）		1	1	X	Z
X: any level; Z: high resistance.					1	0	X	Z（Shutdown）

test circuit

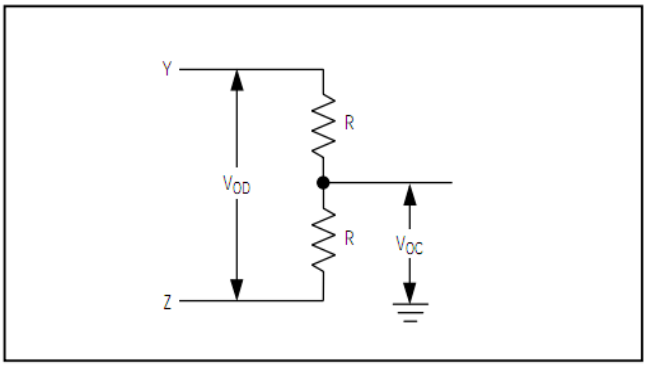


Figure 2 DC test load for the driver

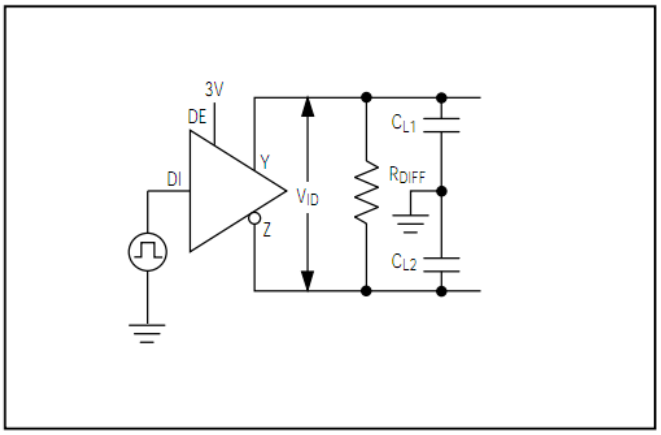


Figure 3 Driver timing test circuit

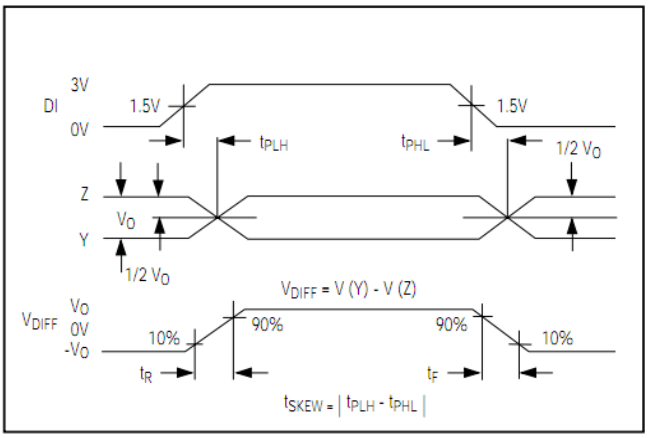


Figure 4 Driver propagation delay

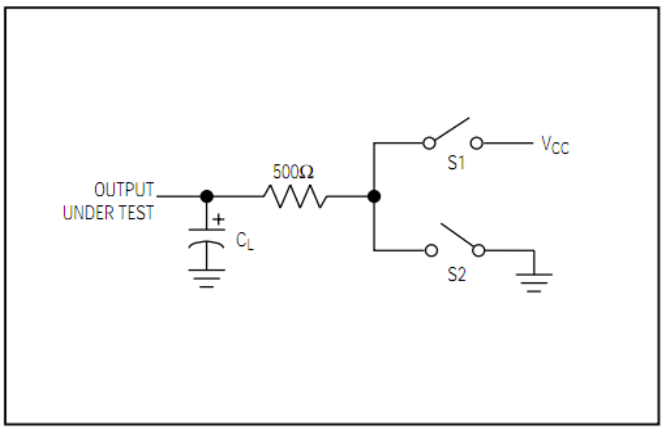


Figure 5 Driver enable/disable timing test circuit

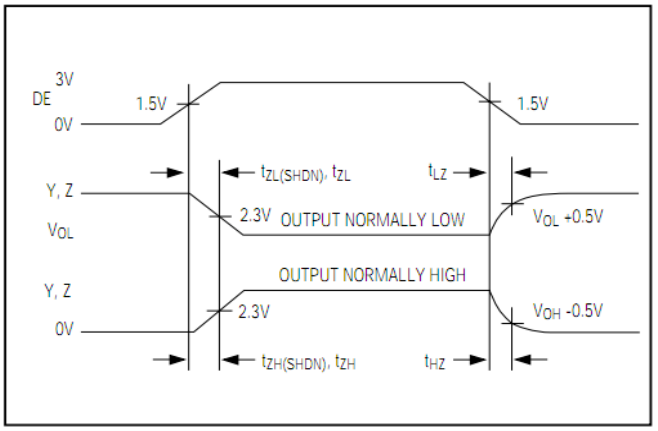


Figure 6 Driver enable/disable timing

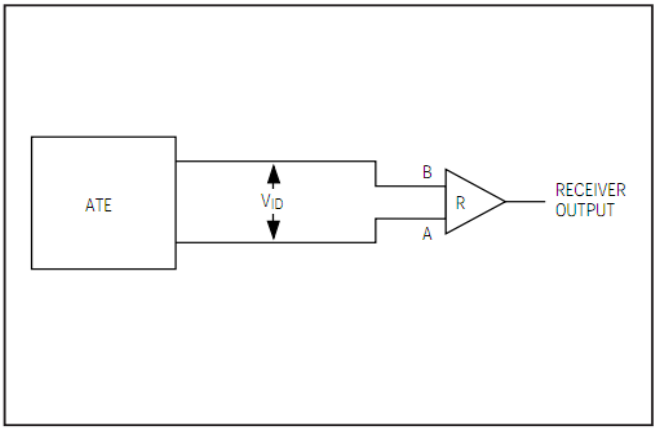


Figure 7 Receiver propagation delay test circuit

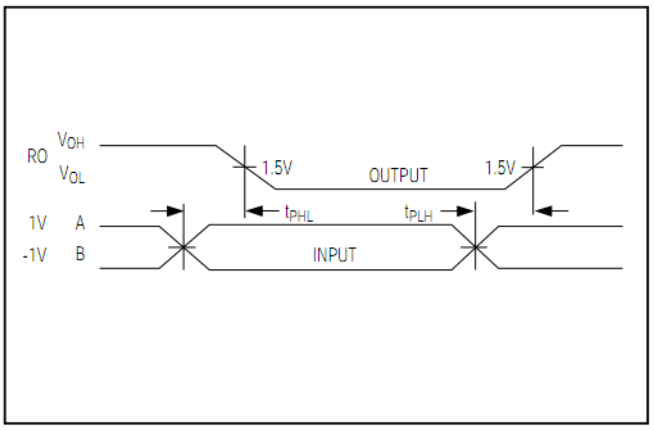


Figure 8 Receiver propagation delay sequence

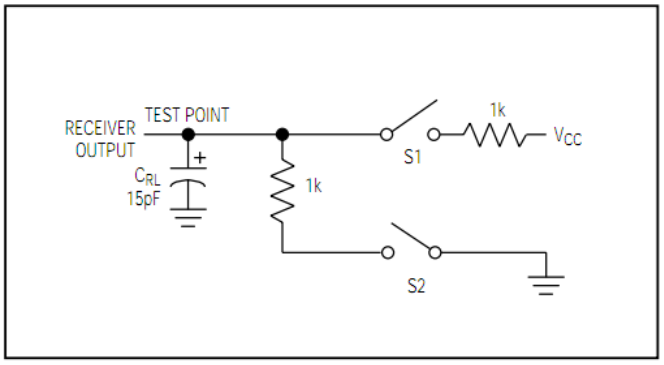


Figure 9 Receiver enable/disable timing test circuit

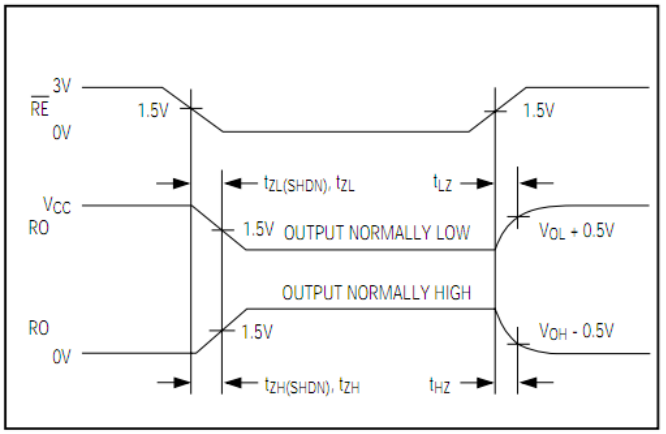


Figure 10 Receiver enable and disable timing

1 resume

SIT485E is a half-duplex high-speed transceiver for RS-485/RS-422 communication, consisting of a driver and receiver. It has fail-safe, overvoltage protection, overcurrent protection, overheating protection functions, and allows/RE, DE port hot plug-in input.

SIT485E Low swing driver reduces EMI and reflections caused by improper cable termination for error-free data transmission up to 500 kbps.

2 Failure safety

The SIT485E ensures that the receiver output is at a logic high level when the receiver input is shorted or open, or all drivers are disabled (idle) when they are connected to the terminal matching transmission line. This is done by setting the receiver input threshold to-50mV and-200mV respectively
Achievable. If the differential receiver input voltage (A-B) is -50mV, RO is at a logic high level; if the voltage (A-B) is -200mV, RO is at a logic low level. When all transmitters connected to the terminal matching bus are disabled, the differential input voltage of the receiver will be pulled to 0V through the termination resistor. Based on the receiver threshold, a logic high level with a minimum noise tolerance of 50mV can be achieved. The threshold voltage from-50mV to-200mV complies with the EIA/TIA-485 standard for ±200mV.

3 A total of 256 transceivers are connected to the wall

The input impedance of the standard RS-485 receiver is 12kΩ (one unit load), and the standard driver can drive up to 32 unit loads. The SIT485E 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 RS-485 transceivers, as long as the total load does not exceed 32 unit loads, they can all be connected on the same bus.

4 Reduce EMI and reflection

The low swing rate driver of SIT485E can reduce EMI and reduce reflections caused by inappropriate terminal matching cables. The time it takes for the driver to rise depends on the length of the terminal.

5 Driver output protection

To prevent excessive output current and high power consumption caused by faults or bus conflicts, two mechanisms are employed. First, overcurrent protection, which provides rapid short-circuit protection across the entire common-mode voltage range (refer to typical operating characteristics). Second, thermal shutdown circuitry, which forces the driver output into a high-impedance state when the die temperature exceeds 150 .

Typical application

SIT485E 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 transponders with cable lengths exceeding 4000 feet. To reduce reflections, termination matching at the characteristic impedance should be performed at both ends of the transmission line, and branch connections outside the main trunk should be as short as possible.

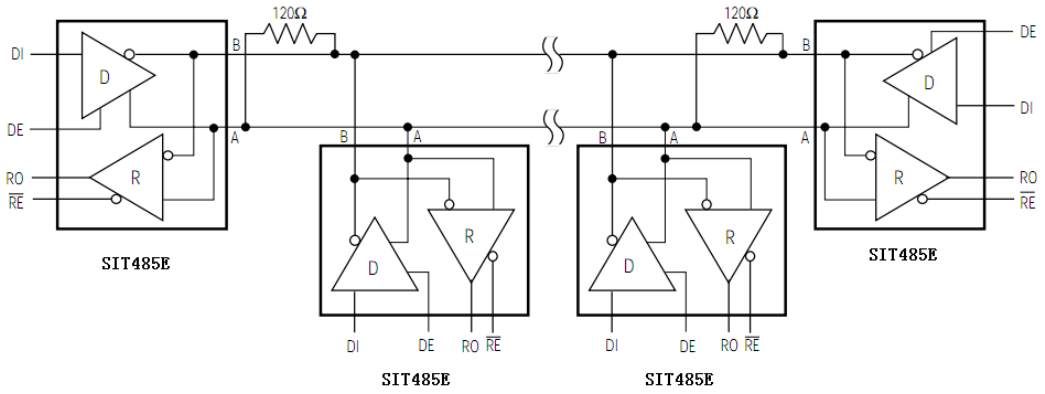
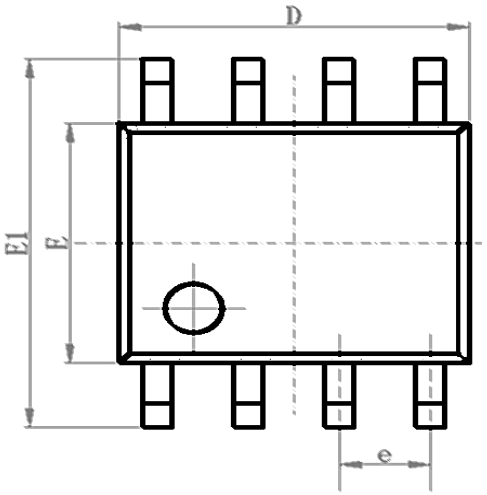
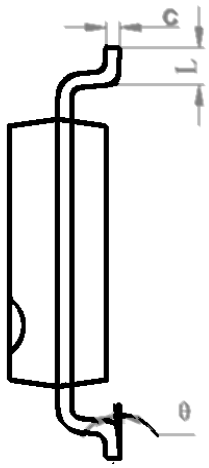


Figure 11 Typical RS485 half-duplex communication network

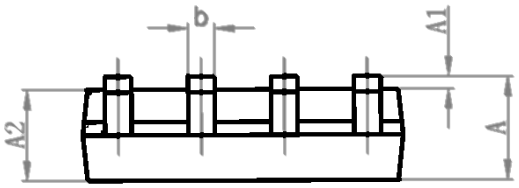
SO8 package size:



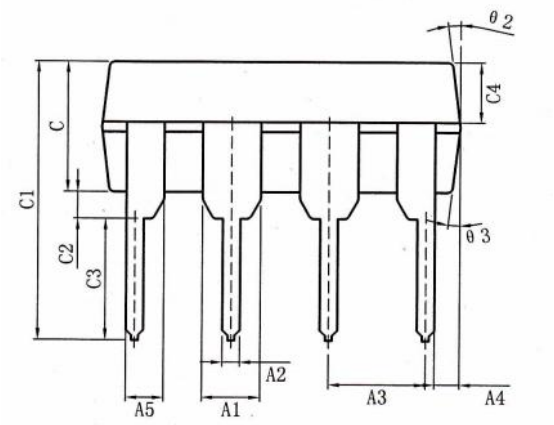


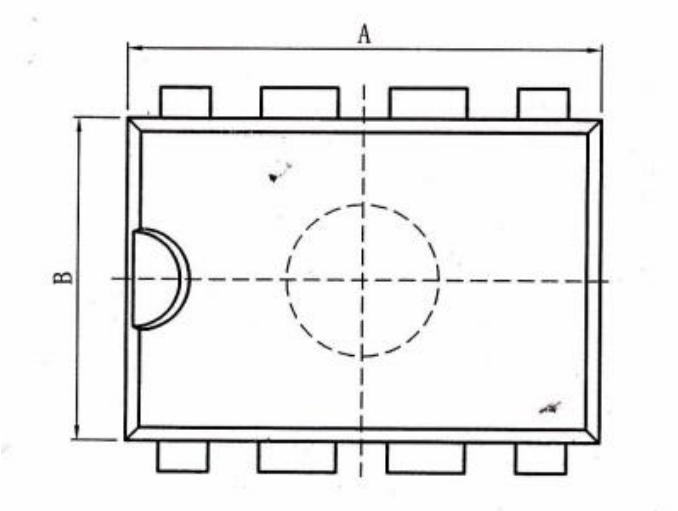
Package size

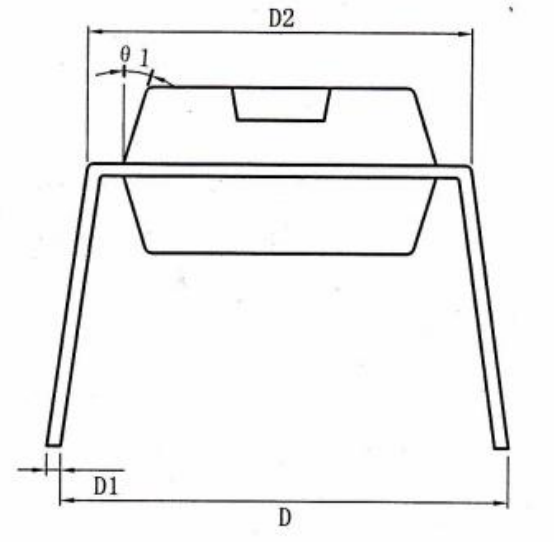
Symbol	Least value /mm	Representative value /mm	Crest value /mm
A	1.50	1.60	1.70
A1	0.1	0.15	0.2
A2	1.35	1.45	1.55
b	0.355	0.400	0.455
D	4.800	4.900	5.00
E	3.780	3.880	3.980
E1	5.800	6.000	6.200
e		1.270BSC	
L	0.40	0.60	0.80
c	0.153	0.203	0.253
θ	-2°	-4°	-6°



DIP8 package size:







Symbol	Least value / mm	Representative value /mm	Crest value / mm
A	9.00		9.20
A1	1.474		1.574
A2	0.41		0.51
A3	2.44		2.64
A4		0.51 TYP	
A5		0.99 TYP	
B	6.10		6.30
C	3.20		3.40
C1	7.10		7.30
C2		0.50 TYP	
C3	3.20		3.40
C4	1.47		1.57
D	8.20		8.80
D1	0.244		0.264
D2	7.62		7.87
θ1		17° TYP4	

0 2		10° TYP4	
0 3		8° TYP4	