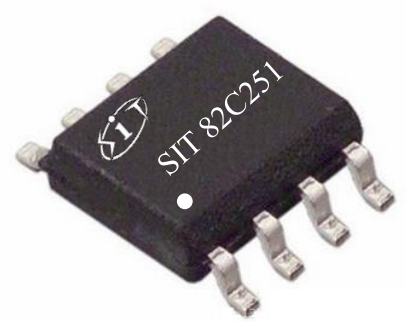
FEATURES:

- Fully compatible with "ISO 11898-24 V" standard,
- Can be applied to 24V power supply system;
- Built-in over-temperature protection;
- Overcurrent protection function;
- Ultra-low current standby mode (<5μA);
- Nodes that are not powered on do not interfere with the bus;
- At least 110 nodes are allowed to connect to the bus;
- High-speed CAN, the transmission rate can reach 1Mbps;
- High resistance to electromagnetic interference;

OUTLINE:



Provide green and environmentally friendly lead-free packaging

DESCRIPTION

SIT82C251 is an interface chip applied between CAN protocol controller and physical bus. It can be used in trucks, buses, cars, industrial control and other fields. The rate can reach 1Mbps. The ability of differential signal transmission.

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	MAX.	UNIT
Supply voltage	V_{cc}		4.5	5.5	V
Supply current	I_{cc}	Standby mode		10	uA
Maximum transmission rate	$1/t_{bit}$	Non-return to zero	1		Mbaud
CANH, CANL input and output voltage	V_{can}		-40	+40	V
Differential bus voltage	V_{diff}		1.5	3.0	V
Ambient temperature	T_{amb}		-40	125	℃

PIN CONFIGURATION

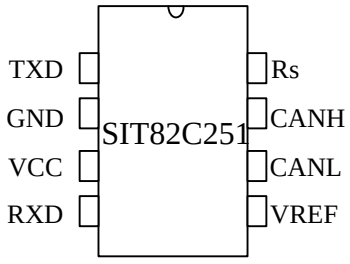


Figure 1. SIT82C251 pin layout

LIMIT PARAMETERS

PARAMETER	SYMBOL	VALUE	UNIT
Supply voltage	V_{CC}	-0.3~+7	V
MCU side Port	TXD,RXD,VREF,Rs	-0.3~VCC+0.3	V
Bus-side Port voltage	CANL，CANH	-40~40	V
Transient voltages on pins 6 and 7 are shown in Figure 7	V_{tr}	-200~+200	V
Storage operating temperature range		-55~150	℃
Ambient temperature		-40~125	℃
Welding temperature range		300	℃
Continuous power consumption	SOP8	400	mW
	DIP8	700	mW

Maximum limit parameter values are values that exceed these values that may cause unrecoverable damage to the device. Under these conditions is not conducive to the normal operation of the device, the device continuously operating at the maximum allowable rating may affect the reliability of the device, the reference point of all voltages is ground.

PIN DEFINITION

PIN	SYMBOL	DESCRIPTION
1	TXD	Transmitter data input.
2	GND	Ground
3	VCC	Power supply
4	RXD	Receiver data output
5	VREF	Reference voltage output
6	CANL	Low potential CAN voltage input and output terminal
7	CANH	High potential CAN voltage input and output terminal
8	Rs	High speed and standby mode selection, low level is high speed

DC CHARACTERISTICS OF BUS TRANSMITTER

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
CANH output voltage (dominant)	$V_{OH(D)}$	VI=0V，Rs=0V，RL=60Ω，Fig.1，Fig.2	2.9	3.4	4.5	
CANL output voltage (dominant)	$V_{OL(D)}$		0.8		1.5	
Bus output voltage (recessive)	$V_{O(R)}$	VI=3V，Rs=0V，RL=60Ω，Fig.1, Fig.2	2	2.5	3	V
Bus output differential voltage (dominant)	$V_{OD(D)}$	VI=0V，Rs=0V，RL=60Ω，Fig.1, Fig.2	1.5		3	V
Bus differential output voltage (recessive)	$V_{OD(R)}$	VI=3V，Rs=0V，Fig.1, Fig.2	-0.012		0.012	V
		VI=3V，Rs=0V，NO LOAD	-0. 5		0.05	V
Dominant output voltage symmetry	$V_{dom(TX)sym}$	$V_{dom(TX)sym}=V_{CC}-V_{CANH}-V_{CANL}$	-400		400	mV
Output voltage symmetry	V_{TXsym}	$V_{TXsym}=V_{CANH}+V_{CANL}$	$0.9V_{CC}$		$1.1V_{CC}$	V
Common-mode output voltage	V_{OC}	Rs=0V，Fig. 8	2	2.5	3	V
Dominant recessive common mode output voltage difference	$\triangle V_{OC}$			30		mV
Short circuit output current	I_{OS}	CANH=-12V，CANL=open，Fig.10	-105	-72		mA
		CANH=12V，CANL=open，Fig.10		0.36	1	
		CANL=-12V，CANH=open，Fig.10	-1	0.5		
		CANL=12V，CANH=open，Fig.10		71	105	
Hidden output current	$I_{O(R)}$	-27V<CANH<32V 0<VCC<5.25V	-2.0		2.5	mA

(If not otherwise stated, V_{CC}=5V±10%, Temp=T_{MIN}~T_{MAX}, the typical value is V_{CC}=+5V, Temp=25℃)

BUS TRANSMITTER SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Propagation delay (low to high)	tPLH	Rs=0V，Fig. 4	25	65	120	ns
Propagation delay (high to low)	tPHL		25	45	90	ns
Differential output rise delay	tr			25		ns
Differential output drop delay	tf			50		ns
Enable time from listening mode to dominant	t_{EN}	Fig. 7			10	μs
Bus wake-up time	t_{BUS}		0.7		5	μs

(If not otherwise stated, V_{CC}=5V±10%, Temp=T_{MIN}~T_{MAX}, the typical value is V_{CC}=+5V, Temp=25℃)

DC CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Positive input threshold	V_{IT+}	Rs=0V，Fig. 5		800	900	mV
Negative input threshold	V_{IT-}		500	650		
Comparator threshold hysteresis interval	V_{HYS}		100	125		
High level output voltage	V_{OH}	IO=-2mA，Fig.6	4	4.6		V
Low-level output voltage	V_{OL}	IO=2mA，Fig. 6		0.2	0.4	V
Bus input current when power off	$I_{(OFF)}$	CANH or CANL=5V，Other pin=0V			5	μA
CANH, CANL input capacitance to ground	C_I			13		pF
CANH, CANL differential input capacitance	C_{ID}			5		pF
CANH, CANL input resistance	R_{IN}	TXD=3V，Rs=0V	15	30	40	KΩ
CANH, CANL differential input resistance	R_{ID}		30		80	KΩ
RI (CANH), RIN (CANL) mismatch	RI_{match}	CANH=CANL	-3%		3%	
Common mode voltage range	V_{COM}		-12		12	V

(If not otherwise stated, V_{CC}=5V±10%, Temp=T_{MIN}~T_{MAX}, the typical value is V_{CC}=+5V, Temp=25℃)

DRIVER SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Propagation delay (low to high)	tPLH	Rs=0V or VCC, Fig.6	60	100	130	ns
Propagation delay (high to low)	tPHL		45	70	90	ns
RXD signal rise time	tr			8		ns
RXD signal fall time	tf			8		ns

(If not otherwise stated, V_{CC}=5V±10%, Temp=T_{MIN}~T_{MAX}, the typical value is V_{CC}=+5V, Temp=25℃)

DEVICE SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Loop delay 1, driver input to receiver output, recessive to dominant	Td(LOOP1)	Rs=0V， Fig.9	90		190	ns
Loop delay 2, driver input to receiver output, dominant to recessive	Td(LOOP2)		90		190	ns

(If not otherwise stated, V_{CC}=5V±10%, Temp=T_{MIN}~T_{MAX}, the typical value is V_{CC}=+5V, Temp=25℃)

OVER TEMPERATURE PROTECTION

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Over temperature shutdown	Tj(sd)			160		℃

TXD PIN CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
TXD port high level input current	I_{IH}(TXD)	VI=VCC	-2		2	μA
TXD port low-level input current	I_{IL}(TXD)	VI=0	-50		-10	μA
When VCC=0V, TXD current	I_O(off)	VCC=0V， TXD=5V			1	μA

Input High lower limit	V_{IH}		2		VCC+0.3	V
Input low upper limit	V_{IL}		-0.3		0.8	V
TXD port floating voltage	TXD_O		H			logic

(If not otherwise stated, V_{CC}=5V±10%, Temp=T_{MIN}~T_{MAX}, the typical value is V_{CC}=+5V, Temp=25℃)

COMMON-MODE STABLE OUTPUT

PARAMETER	SYMB.	CONDITION	MIN.	TYP.	MAX.	UNIT
Common-mode stable output voltage	V_O	-500uA<I_o<500uA	$0.3V_{CC}$		$0.7V_{CC}$	V
Leakage current	$I_{O(Rs)}$	Rs=2V，-12V<V_O<12V	-5		5	μA

(If not otherwise stated, V_{CC}=5V±10%, Temp=T_{MIN}~T_{MAX}, the typical value is V_{CC}=+5V, Temp=25℃)

SUPPLY CURRENT

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Standby mode power consumption	I_{CC}	Rs=VCC，V_I=VCC		5	12	μA
Dominant power consumption		V_I=0V， Rs=0V, LOAD=60Ω		50	70	mA
Hidden power consumption		V_I=VCC，Rs=0V，NO LOAD		6	10	mA

(If not otherwise stated, V_{CC}=5V±10%, Temp=T_{MIN}~T_{MAX}, the typical value is V_{CC}=+5V, Temp=25℃)

功能表

Table 1. Truth table of CAN transceiver

V_{CC}	TXD(1)	Rs(1)	CANH(1)	CANL(1)	BUS STATE	RXD(1)
4.5V~5.5V	L	L	H	L	Dominant	L
4.5V~5.5V	H（或浮空）	X	$0.5V_{CC}$	$0.5V_{CC}$	Recessive	H
4.5V~5.5V	X	H（或浮空）	$0.5V_{CC}$	$0.5V_{CC}$	Recessive	H
0<V_{CC}<4.5V	X	X	0V<V_{CANH}<V_{CC}	0V<V_{CANL}<V_{CC}	Recessive	X

(1) H=high level; L=low level; X=don’t care

Table 2. Drive Function Table

INPUTS		OUTPUTS		Bus State
TXD(1)	Rs(1)	CANH(1)	CAL(1)	
L	L	H	L	Dominate
H (Or floating)	X	Z	Z	Recessive
X	H(Or floating)	Z	Z	Recessive

(1) H=high level; L=low level; Z=high impedance; X=don't care

Table 3. Receiver function table

V_{ID}=CANH-CANL	RXD(1)	Bus State(1)
$V_{ID}\geq 0.9V$	L	Dominate
$0.5< V_{ID}<0.9V$	?	?
$V_{ID}\leq 0.5V$	H	Recessive
Open	H	Recessive

(1) H = high level; L = low level;? = Uncertain

测试电路

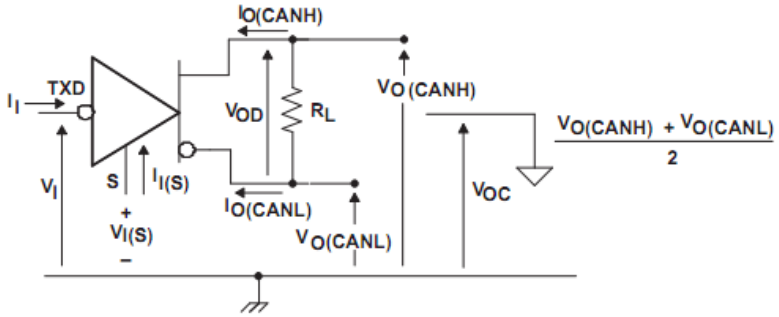


Figure 1. Drive voltage and current test definition

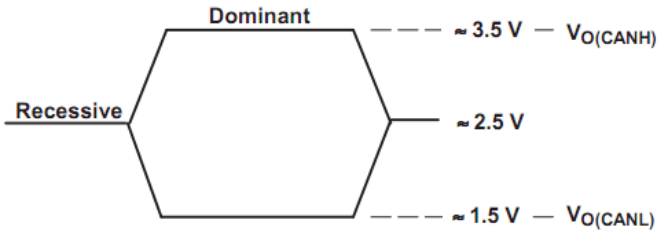


Figure 2. Bus logic voltage definition

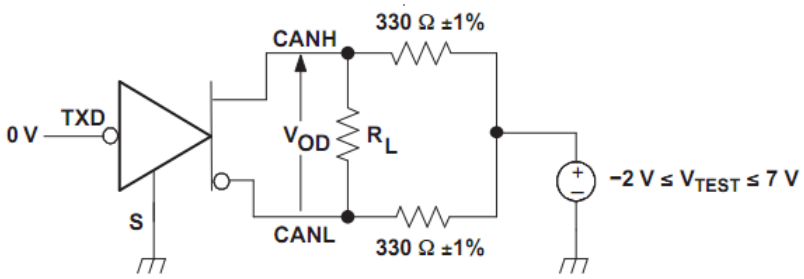


Figure 3. Drive VOD test circuit

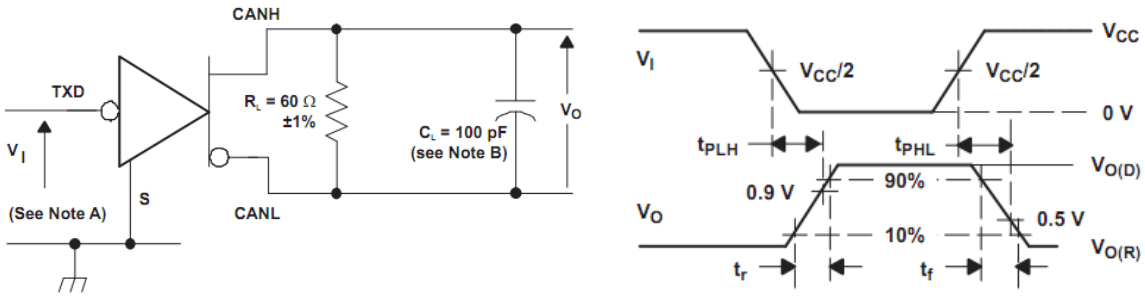


Figure 4. Drive test circuit and voltage waveform

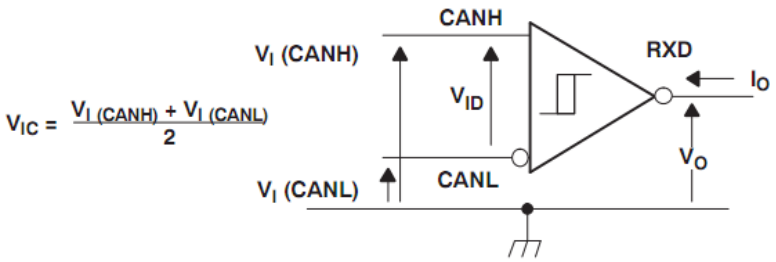
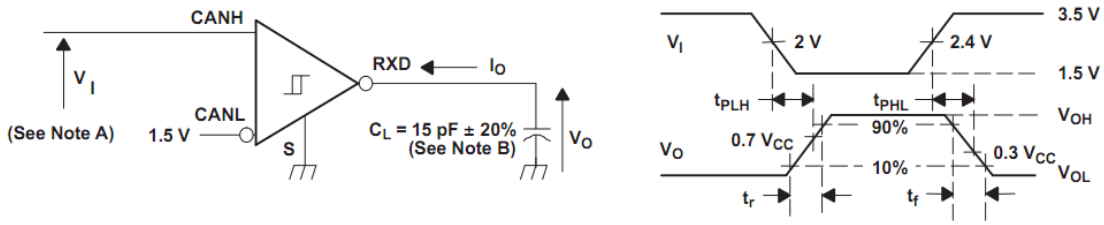


Figure 5. Definition of receiver voltage and current



A. Features of input pulse generator: PRR≤125KHz, 50% duty cycle, tr<6ns, tf<6ns, Zo=50Ω

B, CL includes instrument and fixed capacitor, the error is within 20%.

Figure 6. Receiver test circuit and voltage waveform

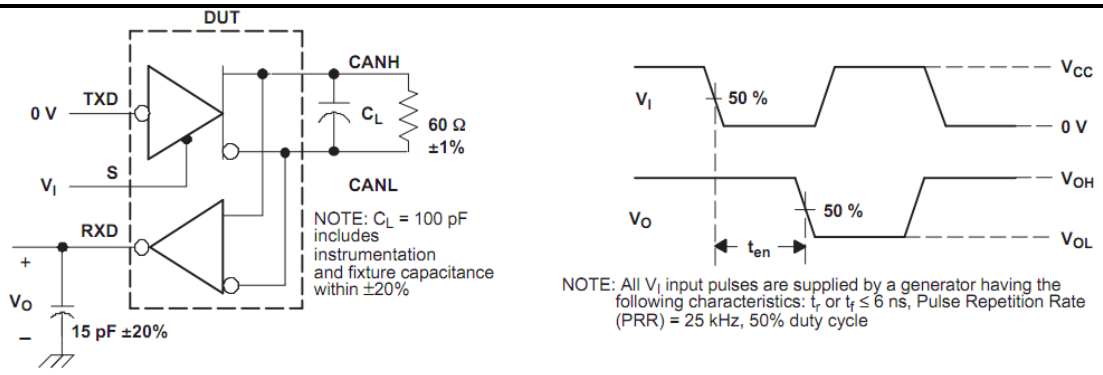
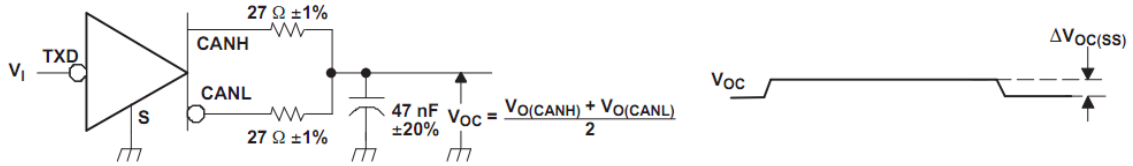


Figure 7. t_{EN} test circuit and voltage waveform



Note: VI from 0~VCC, input pulse generator characteristics: PRR≤125KHz, 50% duty cycle, tr<6ns, tf<6ns, Zo=50Ω

Figure 8. Common mode output voltage test and waveform

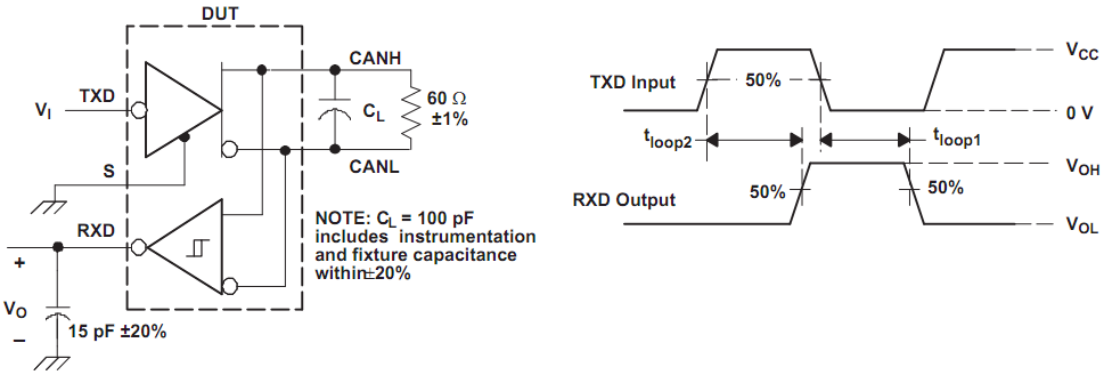


Figure 9. t(LOOP) test circuit and waveform

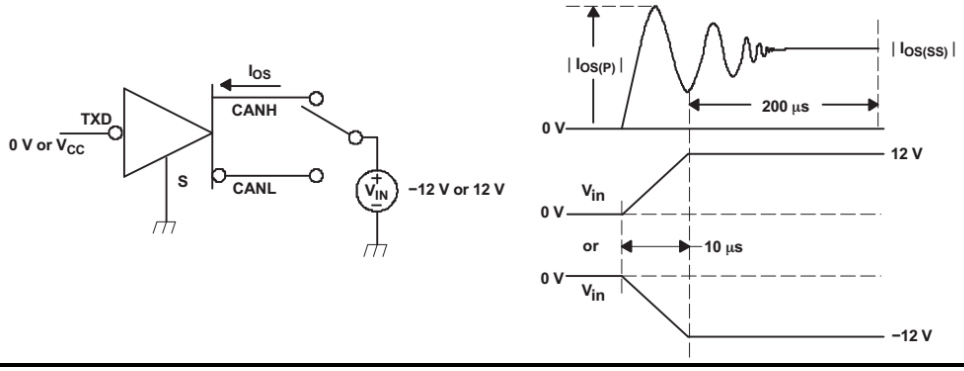


Figure 10. Drive short circuit current test circuit and waveform

DESCRIPTION

1 Brief introduction

SIT82C251 is an interface chip applied between CAN protocol controller and physical bus. It can be used in trucks, buses, cars, industrial control and other fields. The rate can reach 1Mbps. The ability of differential signal transmission is fully compatible with the "ISO 11898-24V" standard.

2 Short circuit protection

The driver stage of SIT82C251 has a current-limiting protection function to prevent the driver circuit from being short-circuited to the positive and negative power supply voltage. Power consumption will increase when a short-circuit occurs. The short-circuit protection function can protect the driver stage from damage.

3 Over temperature protection

SIT82C251 has an over-temperature protection function. When the junction temperature exceeds 160° C, the current of the driver stage will be reduced, because the driver tube is the main energy-consuming part, and the reduction of current can reduce the power consumption and thus reduce the chip temperature. At the same time, other parts of the chip are still working normally.

4 Electrical transient protection

Electrical transients often occur in automotive application environments. CANH and CANL of SIT82C251 have the function of preventing electrical transient damage.

5 Control mode

The control pin Rs allows two operating modes to be selected:

High-speed mode or low-power standby mode.

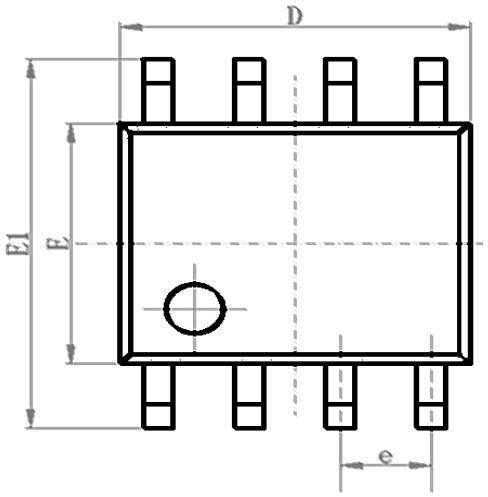
The high-speed mode is the normal operating mode, which is selected by grounding the pin Rs. The transceiver can send and receive data through the CANH and CANL buses. The differential receiver converts the analog data on the bus into digital data and outputs it to the pin RXD through a multiplexer (MUX).

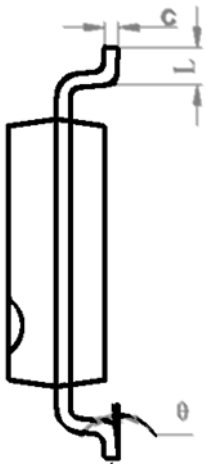
If the pin Rs is connected to a high level or not connected, it works in a low-power standby mode. In the low-power standby mode, the transmitter is turned off and the receiver enters a low current state. If the receiver detects bus dominance (bus differential voltage>0.9V), RXD switches to low level, and the MCU needs to respond to this action at this time and enter the normal operating state by controlling the Rs pin. Because in the standby state, the current is small and the response time is longer, the first signal may be lost at a higher baud rate.

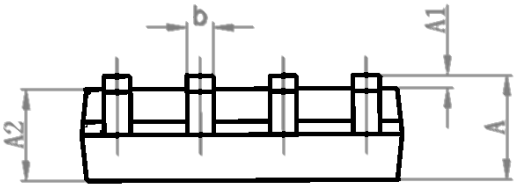
SOP8 DIMENSIONS

PACKAGE SIZE

SYMBOL	MIN./mm	TYP./mm	MAX./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 °



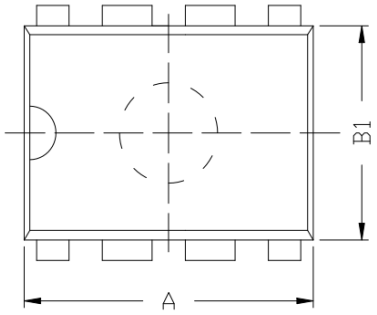


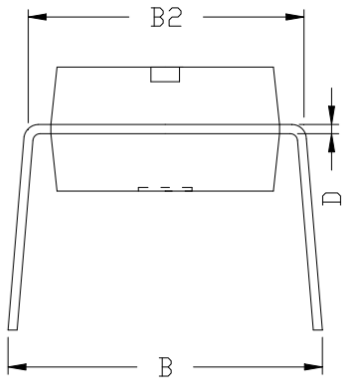


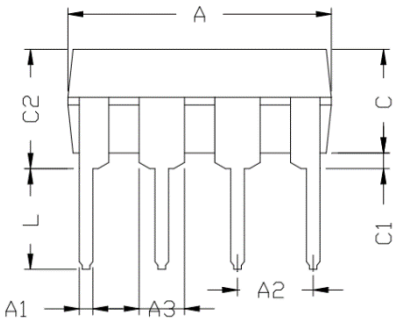
DIP8 DIMENSIONS

PACKAGE SIZE

SYMBOL	MIN./mm	TYP./mm	MAX./mm
A	9.00	9.20	9.40
A1	0.38	0.47	0.57
A2	2.54TYP		
A3	1.524TYP		
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







ORDERING INFORMATION

TYPE NUMBER	TEMPERATURE	PACKAGE
SIT82C251T	-40℃~125℃	SOP8
SIT82C251	-40℃~125℃	DIP8

Tapered package is 2500 pieces/disc.