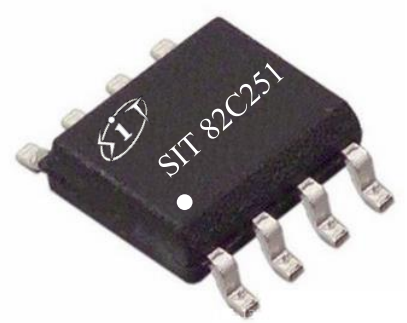
FEATURES

- Fully compatible with "ISO 11898-24 V" standard, Can be applied to 24V power supply system;
- Thermally protected
- Overcurrent protection function
- Very low-current standby mode（<5μA）;
- Transceiver in unpowered state disengages from the bus (zero load)
- At least 110 nodes can be connected
- High speed (up to 1 MBaud)
- High anti-electromagnetic interference ability;

OUTLINE



Provide Green and Environmentally Friendly Lead-free package

DESCRIPTION

SIT82C251 is an interface chip applied between the CAN protocol controller and the physical bus. It can be used in trucks, buses, cars, industrial control and other fields. The rate can reach 1Mbps. The device provides differential transmit capability to the bus and differential receive capability to the CAN controller.

PARAMETER	SYMBOL	CONDITION	MIN.	MAX.	UNIT
Supply voltage	V_{cc}		4.5	5.5	V
Supply current	I_{cc}	Standby		10	uA
Maximum transmission rate	$1/t_{bit}$	Non-return to zero code	1		Mbaud
DC voltage on pin CANH and CANL	V_{can}		-40	+40	V
Bus differential voltage	V_{diff}		1.5	3.0	V
Virtual junction temperature	T_{amb}		-40	125	℃

PIN CONFIGURATION

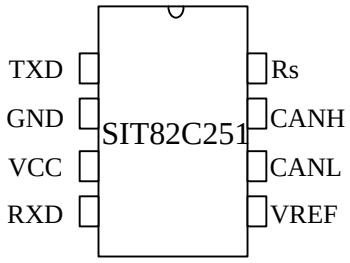


Fig1 SIT82C251 Pin Configuration

LIMITING VALUES

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
Voltage range at any bus terminal	CANL，CANH	-40~40	V
Transient voltage on pins CANH, CANL see Fig.7	V_{tr}	-200~+200	V
Storage temperature		-55~150	℃
Virtual junction temperature		-40~125	℃
Welding temperature range		300	℃
Continuous power consumption	SOP8	400	mW
	DIP8	700	mW

The maximum limit parameters means that exceeding these values may cause irreversible damage to the device. Under these conditions, it is not conducive to the normal opration of the device. The continuous operation of the device at the maximum allowable rating may affect the reliability of the device. The reference point for all voltages is ground.

PINNING

PIN	SYMBOL	DESCRIPTION
1	TXD	transmit data input
2	GND	ground supply
3	VCC	supply voltage
4	RXD	receive data output; reads out datafrom the bus lines
5	VREF	reference voltage output
6	CANL	LOW-level CAN bus line
7	CANH	HIGH-level CAN bus line
8	Rs	standby mode control input

DRIVER ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
CANH dominant output voltage	$V_{OH(D)}$	VI=0V，Rs=0V，RL=60Ω，Fig.1, Fig.2	2.9	3.4	4.5	
CANL dominant output voltage	$V_{OL(D)}$		0.8		1.5	
Bus recessive output voltage	$V_{O(R)}$	VI=3V，Rs=0V，RL=60Ω，Fig.1, Fig.2	2	2.5	3	V
Bus dominant differential output voltage	$V_{OD(D)}$	VI=0V，Rs=0V，RL=60Ω，Fig.1, Fig.2	1.5		3	V
Bus recessive differential output voltage	$V_{OD(R)}$	VI=3V，Rs=0V，Fig.1, Fig.2	-0.012		0.012	V
		VI=3V，Rs=0V，NO LOAD	-0. 5		0.05	V
Transmitter dominant voltage symmetry	$V_{dom(TX)sym}$	$V_{dom(TX)sym}=V_{CC}-V_{CANH}-V_{CANL}$	-400		400	mV
Transmitter 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
Peak-to-peak Common-mode output voltage	$\triangle V_{OC}$			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	
Recessive output current	$I_{O(R)}$	-27V<CANH<32V 0<VCC<5.25V	-2.0		2.5	mA

（V_{CC}=5V±10% and Temp=T_{MIN}~T_{MAX} unless specified otherwise; typical in V_{CC}=+5V and Temp=25℃）

DRIVER SWITCHING CHARACTERISTICS

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

（V_{CC}=5V±10% and Temp=T_{MIN}~T_{MAX} unless specified otherwise; typical in V_{CC}=+5V and Temp=25℃）

RECEIVER ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Positive-going input threshold voltage	V_{IT+}	Rs=0V，Fig.5		800	900	mV
Negative-going input threshold voltage	V_{IT-}		500	650		
Hysteresis voltage (VIT+ – VIT–)	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
Power-off bus input current	$I_{(OFF)}$	CANH or CANL=5V，Other pin=0V			5	μA
Input capacitance to ground, (CANH or CANL)	C_I			13		pF

Differential input capacitance	C_{ID}			5		pF
Input resistance, (CANH or CANL)	R_{IN}	TXD=3V，Rs=0V	15	30	40	KΩ
Differential input resistance	R_{ID}		30		80	KΩ
Input resistance matching	RI_{match}	CANH=CANL	-3%		3%	
The range of commen-mode voltage	V_{COM}		-12		12	V

（V_{CC}=5V±10% and Temp=T_{MIN}~T_{MAX} unless specified otherwise; typical in V_{CC}=+5V and Temp=25℃）

RECEIVER SWITCHING CHARACTERISTICS

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

（V_{CC}=5V±10% and Temp=T_{MIN}~T_{MAX} unless specified otherwise; typical in V_{CC}=+5V and Temp=25℃）

DEVICE SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Loop delay1, 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

（V_{CC}=5V±10% and Temp=T_{MIN}~T_{MAX} unless specified otherwise; typical in V_{CC}=+5V and Temp=25℃）

OVER TEMPERATURE PROTECTION

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Shutdown junction temperature	Tj(sd)			160		℃

TXD-PIN CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
HIGH-level input current	I_{IH}(TXD)	VI=VCC	-2		2	μA
LOW-level input current	I_{IL}(TXD)	VI=0	-50		-10	μA
When VCC=0V, current on TXD pin	I_O(off)	VCC=0V, TXD=5V			1	μA
HIGH-level input voltage	V_{IH}		2		VCC+0.3	V
LOW-level input voltage	V_{IL}		-0.3		0.8	V
Open voltage on TXD pin	TXD_O		H			logic

（V_{CC}=5V±10% and Temp=T_{MIN}~T_{MAX} unless specified otherwise; typical in V_{CC}=+5V and Temp=25℃）

COMMOM-MODE STABILIZATION OUTPUT

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Common-mode stabilization 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

（V_{CC}=5V±10% and Temp=T_{MIN}~T_{MAX} unless specified otherwise; typical in V_{CC}=+5V and Temp=25℃）

SUPPLY CURRENT

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

（V_{CC}=5V±10% and Temp=T_{MIN}~T_{MAX} unless specified otherwise; typical in V_{CC}=+5V and Temp=25℃）

FUNCTION TABLE

Table1.CAN TRANSCEIVER TRUTH TABLE

V_{CC}	TXD(1)	Rs(1)	CANH(1)	CANL(1)	BUS STATE	RXD(1)
4.5V~5.5V	L	L	H	L	Dominate	L
4.5V~5.5V	H or Open	X	0.5V_{CC}	0.5V_{CC}	Recessive	H
4.5V~5.5V	X	H or Open	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=irrelevant

Table 2. DRIVER FUNCTION TABLE

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

（1）H=high level; L=low level; X=irrelevant; Z=high impedance

Table 3. RECEIVER FUNCTION TABLE

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

(1) （1）H=high-level; L=low-level; ?=uncertain

TEST CIRCUIT

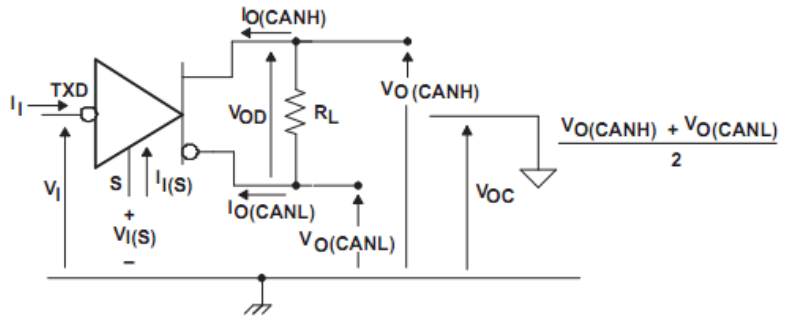


Fig.1 Driver Voltage, Current, and Test Definition

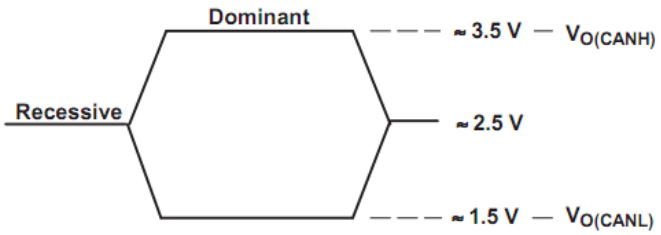


Fig.2 Bus Logic State Voltage Definition

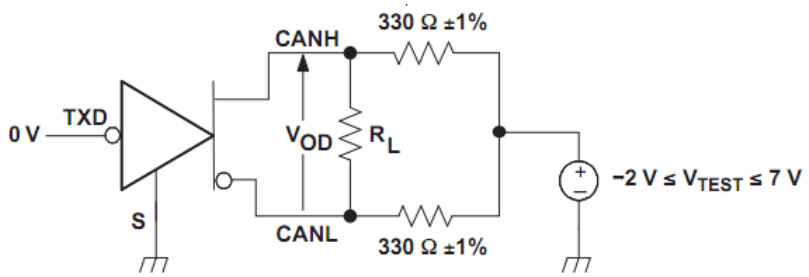


Fig.3 Driver V_{OD} Test Circuit

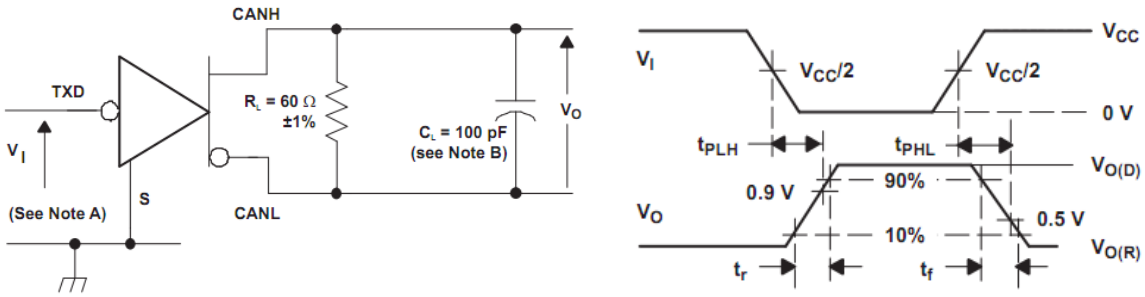


Fig.4 Driver Test Circuit and Waveform

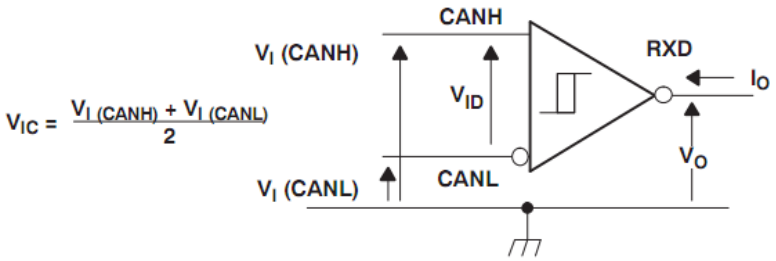
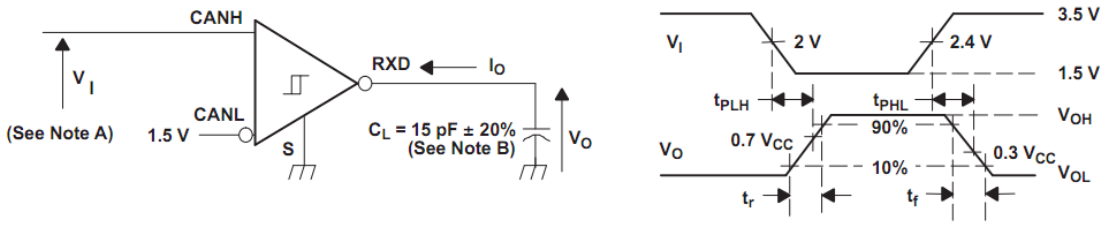


Fig.5 Receiver Voltage and Current Definition



A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 125 kHz, 50% duty cycle, t_r ≤ 6 ns, t_f ≤ 6ns, Z_O = 50 Ω.

A、 B. C_L includes instrumentation and fixture capacitance within ±20%.

Fig.6 Receiver Test Circuit and Waveform

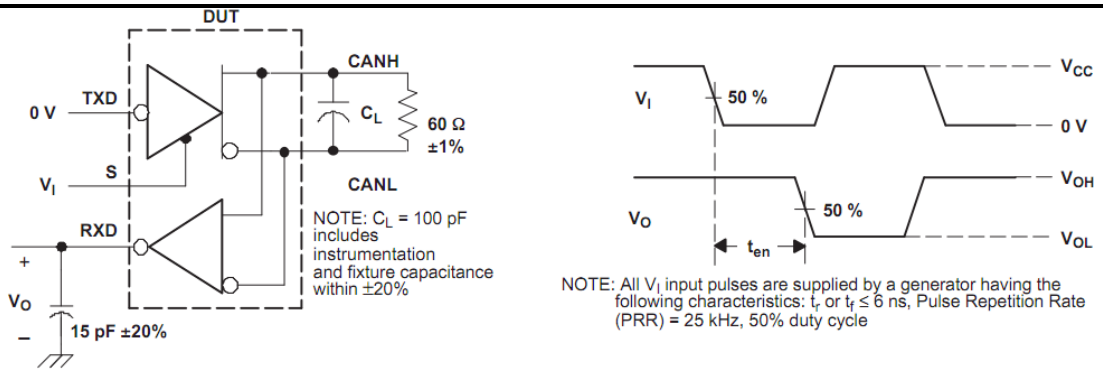
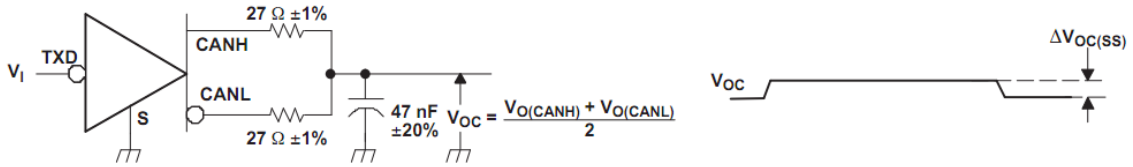


Fig.7 t_{EN} Test Circuit and Waveform



注：VI 从 0~VCC，输入脉冲产生器特点：PRR≤125KHz，50%占空比，tr<6ns，tf<6ns，Zo=50Ω

Fig.8 Peak-to-Peak Common Mode Output Voltage Test and Waveform

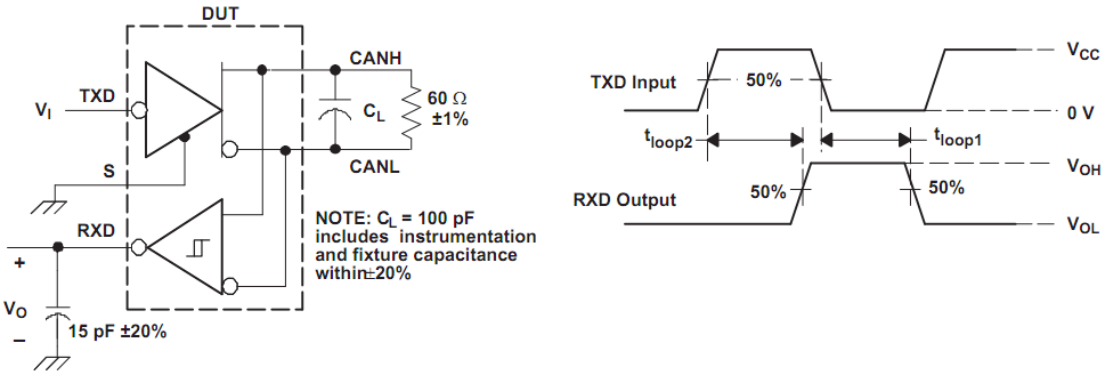


Fig.9 $t_{(LOOP)}$ Test Circuit and Waveform

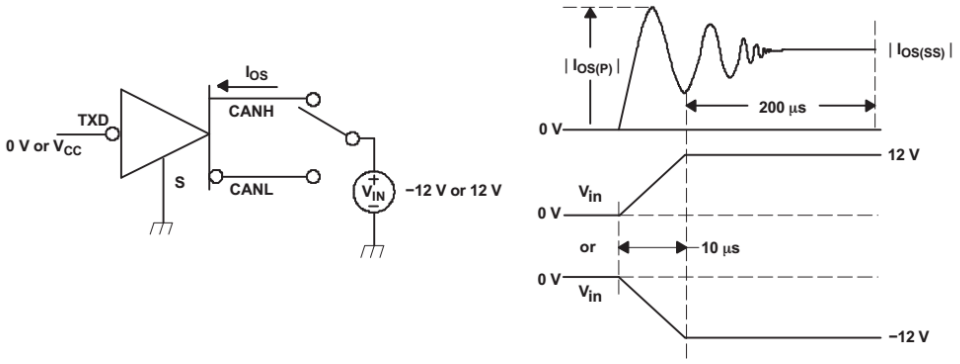


Fig.10 Driver Short-Circuit Current Test Circuit and Waveform

ADDIYIONAL DESCRIPTION

1 Sketch

SIT82C251 is an interface chip applied between the CAN protocol controller and the physical bus. It can be used in trucks, buses, cars, industrial control and other fields. The rate can reach 1Mbps. It has the ability to perform between the bus and the CAN protocol controller. 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 voltages. When a short-circuit occurs, the power consumption will increase. 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 current reduction 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.

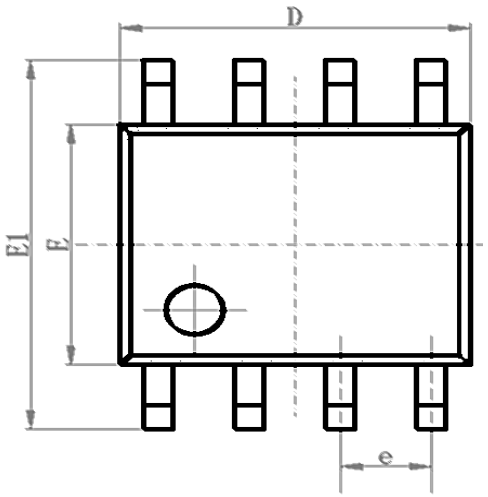
5 Control mode

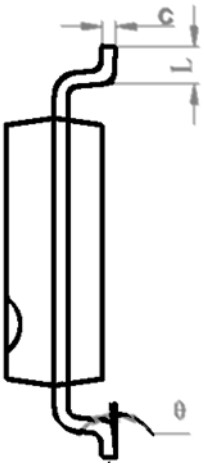
The control pin Rs allows two working modes to be selected:
High-speed mode or low-power standby mode.
The high-speed mode is a normal operating mode and is selected by grounding the pin Rs. The transceiver can send and receive data through the bus CANH and CANL. The differential receiver converts the 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 the bus dominance (bus differential voltage>0.9V), RXD switches to low level, 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.

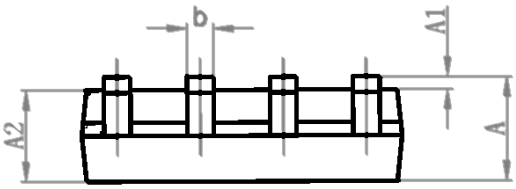
SOP8 DIMENSIONS

PACKAGE SIZE

SYMBOL	MIN./mm	TYP./mm	MAX./mm
A	1.40	-	1.80
A1	0.10	-	0.25
A2	1.30	1.40	1.50
b	0.38	-	0.51
D	4.80	4.90	5.00
E	3.80	3.90	4.00
E1	5.80	6.00	6.20
e		1.27BSC	
L	0.40	0.60	0.80
c	0.20	-	0.25
θ	0°	-	8°



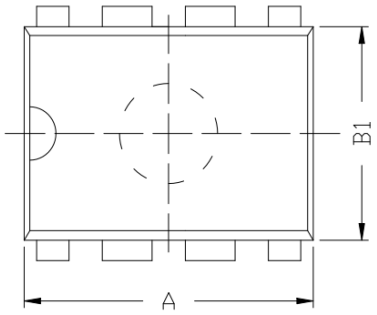


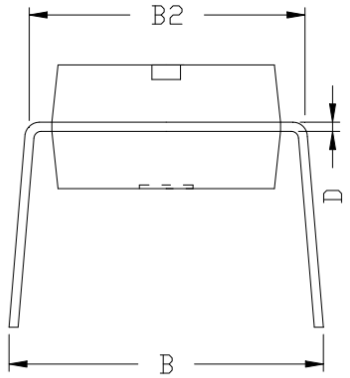


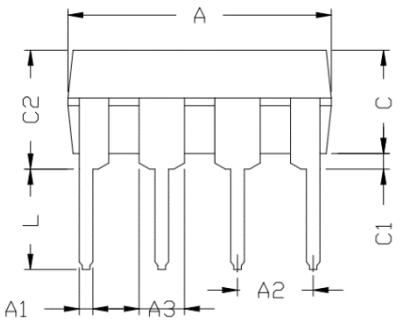
DIP8 DIMENSIONS

封装尺寸

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

Taping type packaging is 2500 pieces/disc

Important statement

SIT reserves the right to change the above-mentioned information without prior notice.