



SIT3232E

High ESD Protection 3.3V Single Power Supply Dual Channel RS232 Transceiver

Features:

- 3.0V~5.5V power supply;
- Dual channel;
- 120kbps communication rate;
- 15kV HBM electrostatic protection;
- 8kV IEC-4100-4-2 contact discharge.

Product appearance:



Provide green lead-free package

describe

SIT3232E is a 3.3V power supply, dual channel, low power consumption, high electrostatic protection ESD protection, fully meet the requirements of TIA/EIA-232 standard RS-232 transceiver.

SIT3232E includes two drivers and two receivers with enhanced ESD protection to reach HBM above 15KV ESD, 8kV IEC-4100-4-2 contact discharge protection capability.

Under the 3.3V power supply, the charge pump only needs four 0.1uF external capacitors, and the rate can reach at least 120Kbps without error. According to the transmission, both can be independently enabled and disabled. Each driver and receiver can be used independently.

pinout diagram

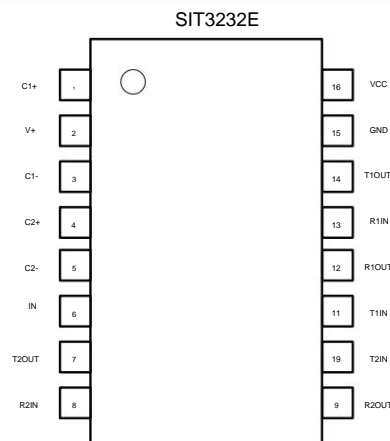


Figure 1 SIT3232E pinout diagram

Limit parameters

parameter	symbol	size	unit
voltage	VCC	-0.3~+6	IN
Voltage doubler pin	V+	VCC-0.3~+7	IN
reverse voltage pin	IN-	+0.3~-7	IN
V+ + V- 		+13	IN
Transmitter input pin	T1IN~T2IN	-0.3~+6	IN
receiver input pin	R1IN~R2IN	±25	IN
Transmitter output pins T1OUT, T2OUT		±13.2	IN
Receiver output pins R1OUT, R2OUT		-0.3~VCC+0.3	IN
range of working temperature		-40~85	°C
Storage operating temperature range		-60~150	°C
Soldering temperature range		300	°C
Continuous power consumption	SOP16	760	mW
	DIP16	840	mW

Maximum limit parameter values are those values that may cause irreversible damage to the device. Under these conditions it is not conducive to the normal operation of the device, continuous operation of the device under the maximum allowable rating may affect the reliability of the device, and the reference point of all voltages is ground.

pin definition

Pin No.	Pin Name	Pin Function
1	C1+	Positive terminal of voltage doubler charge pump capacitor
2	V+	voltage doubler charge pump voltage port
3	C1-	Negative terminal of voltage doubler charge pump capacitor
4	C2+	Positive terminal of the inverting charge pump capacitor
5	C2-	Negative terminal of the inverting charge pump capacitor
6	V-	Inverting charge pump voltage output
7	T2OUT	second transmitter signal output terminal
8	R2IN	second receiver signal input terminal
9	R2OUT	The second receiver signal output terminal
10	T2IN	second transmitter signal input terminal
11	T1IN	First transmitter signal input terminal

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12	R1OUT First receiver signal output terminal
13	R1IN First receiver signal input terminal
14	T1OUT First transmitter signal output terminal
15	GND ground
16	VCC power



Supply current

parameter	symbol	Test Conditions	Minimum	Typical	Maximum	Unit
No-load supply current	I_{sup}				2	mA

(Unless otherwise stated, the typical value is measured at $V_{CC}=+3.3V$, $Temp=25^{\circ}C$, and capacitors C1-C4=0.1 μ F)

Logic Input Electrical Characteristics

parameter	symbol	Test Conditions	Minimum	Typical	Maximum	Unit
Logic control low level	V_{TIN_L}	T1IN, T2IN port			0.8	IN
Logic control high level	V_{TIN_H}	T1IN, T2IN port 2				IN
Logic Control Hysteresis		T1IN, T2IN port		0.3		IN
Input logic current	I_{TIN}	T1IN, T2IN ports			± 1	μ A

(Unless otherwise stated, the typical value is measured at $V_{CC}=+3.3V$, $Temp=25^{\circ}C$, and capacitors C1-C4=0.1 μ F)

Receiver Output Electrical Characteristics

parameter	symbol	Test Conditions	Minimum	Typical	Maximum	Unit
Receiver output low level	V_{ROL}	$I_{OUT}=1.6mA$, $V_{CC}=5V$ or $3.3V$			0.4	IN
Receiver output high level	V_{ROH}	$I_{OUT}=-0.5mA$, $V_{CC}=5V$ or $3.3V$	$V_{CC}-0.6$	$V_{CC}-0.1$		IN

(Unless otherwise stated, the typical value is measured at $V_{CC}=+3.3V$, $Temp=25^{\circ}C$, and capacitors C1-C4=0.1 μ F)

Receiver Input Electrical Characteristics

parameter	symbol	Test Conditions	Minimum	Typical	Maximum	Unit
Receiver Input Range	V_{RIN}		-25		+25	IN
Receiver Input Low Threshold	V_{RIL}	$V_{CC}=3.3V$	0.6	1.1		IN



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		VCC=5V	0.8	1.5		IN
receiver input high threshold	THE HILL	VCC=3.3V		1.5	2.4	IN
		VCC=5V		1.9	2.4	IN
receiver input Hysteresis				0.4		IN
Receiver Input Impedance RRIN			3	5	7	k Ω

(Unless otherwise stated, the typical value is measured at VCC=+3.3V, Temp=25 μ , and capacitors C1~C4=0.1 μ F)

Transmitter Output Electrical Characteristics

parameter	symbol	Test Conditions	Minimum	Typical	Maximum	Unit
Transmitter output swing	V _{TOUT}	All transmitter outputs Terminated with 3 k Ω to ground load	± 4		± 5	IN
Transmitter output impedance	R _{TOUT}	VCC=0V μ Transmitter Input = ± 2 V	300			Oh
Transmitter short circuit current	I _{tsc}				60	mA

(Unless otherwise stated, the typical value is measured at VCC=+3.3V, Temp=25 μ , and capacitors C1~C4=0.1 μ F)

ESD protection

parameter	symbol	Test Conditions	Minimum	Typical	Maximum	Unit
R1IN μ R2IN T1OUT μ T2OUT		mannequin μ HBM μ			± 15	KV
		air discharge			± 15	KV
		contact discharge			± 8	KV



Switching Characteristics

parameter	symbol	Test Conditions	Minimum	Typical	Maximum	Unit
rate	Speed	RL=3k Ω , CL=1000pF a sender action		120		kbps
Receiver propagation delay	tRPHL	CL=150pF		2	8.5	us
	tRPLH			2	8.5	us
tRPHL- tRPLH				150		ns
tTPHL- tTPLH				150		ns
Slew rate	SR	RL=3k Ω ~7 k Ω CL=150pF~1000pF a sender action, From -3.0V to 3.0V or 3.0V~-3.0V Slew rate test circuit see Figures 2 and 3.	4		30	V/us

(Unless otherwise stated, the typical value is measured at VCC=+3.3V, Temp=25 $^{\circ}$ C, and capacitors C1~C4=0.1uF)

test circuit

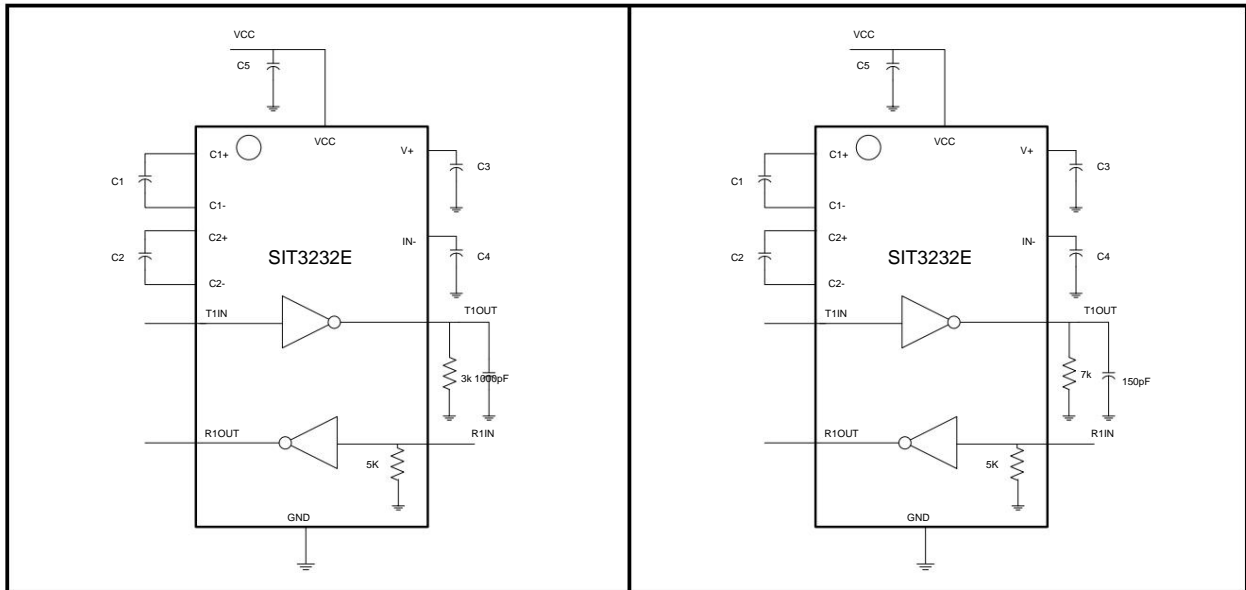


Figure 2 Minimum slew rate test circuit

Figure 3 Maximum slew rate test circuit

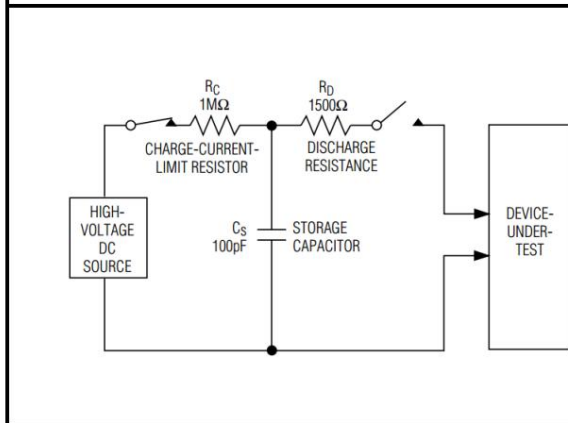


Figure 4 Human Body Model ESD Test Model

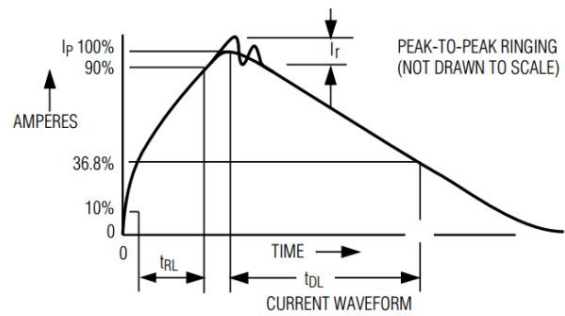


Figure 5 Human Body Model Current Waveform

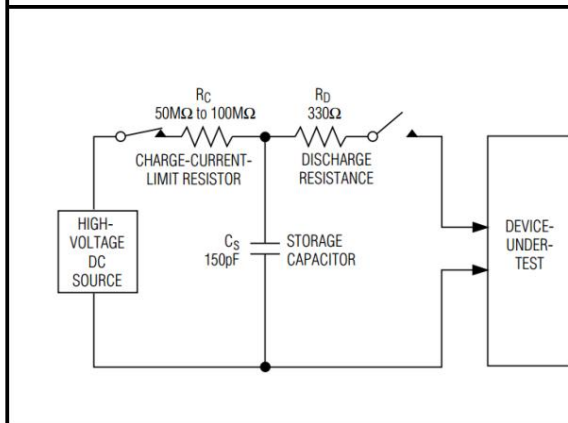


Figure 6 IEC 1000-4-2 ESD test model

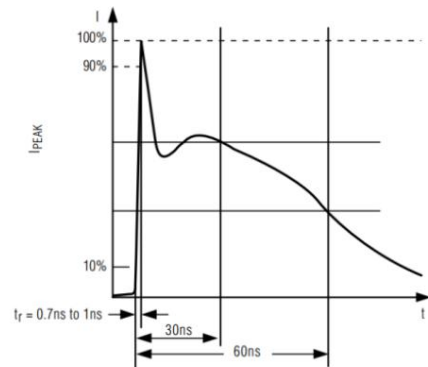


Figure 7 Current waveform of IEC 1000-4-2 ESD test

illustrate

1 Dual charge pump operation

There are two charge pumps inside SIT3232E to support the level conversion work of the chip.

+5.5V and -5.5V output voltage, each charge pump needs a flying capacitor (C1, C2) and a storage capacitor (C3, C4) to generate V+ and V-supply. As shown in Figure 8.

2 RS232 transmitter

Converting TTL/CMOS logic levels to levels compatible with EIA/TIA-232 standards, the SIT3232E transmitter operates at worst

The data rate of 120kbps can be guaranteed under the device (parallel load of 3k Ω resistor and 1000pF capacitor), and the transmitter can drive multiple connections in parallel.

There is no pull-up resistor inside the SIT3232E transmitter input terminals T1IN and T2IN. If the transmitter is not used, the unused

Input terminals T1IN/T2IN are connected to GND or VCC.

3 RS232 receiver

The SIT3232E has two independent receivers that convert RS-232 signals to CMOS logic output levels.

4 ESD protection

All pins of SIT3232E use ESD protection structure, all driver outputs and receiver inputs (T1OUT, T2OUT,

R1IN, R2IN) have additional electrostatic protection capability. Make it capable of withstanding $\pm 15\text{kV}$ ESD (HBM) discharge, above $\pm 8\text{kV}$

Contact discharge, air gap discharge above $\pm 15\text{kV}$. ESD protection structures withstand high voltage ESD strikes in all conditions, including standard industrial operating mode and power-off mode.

5 Typical applications

A typical dual-channel application scheme is shown in Figure 8, where the typical capacitance value of C1-C5 is 0.1 μF .

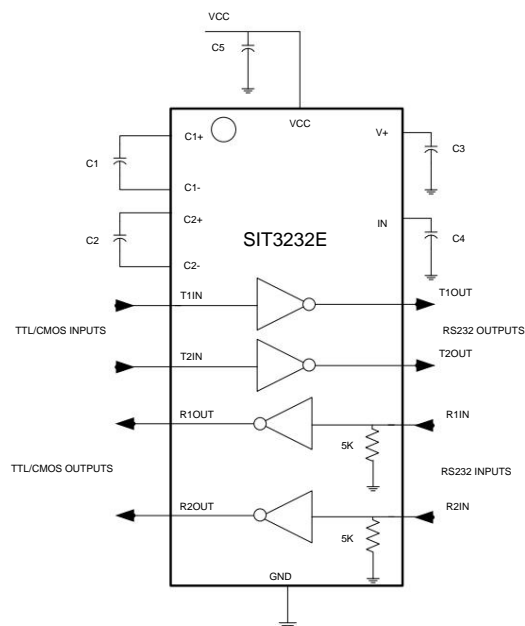
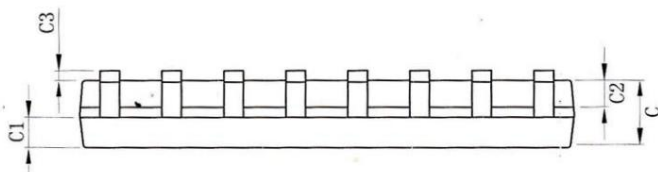
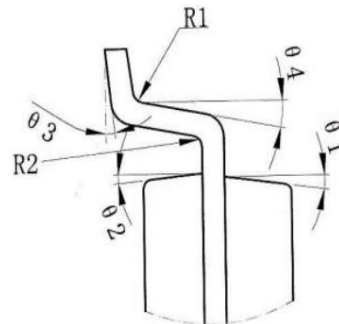
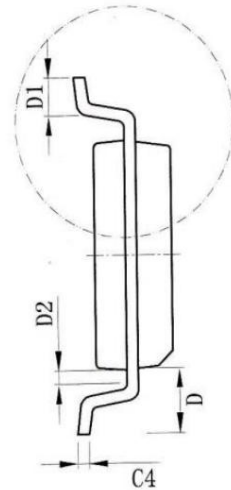
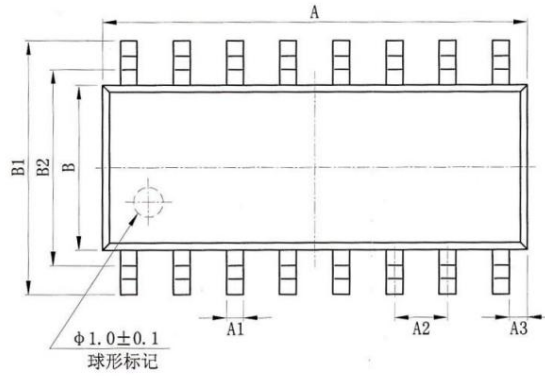


Figure 8 Typical dual-channel application scheme

SOP16 Dimensions

Package size

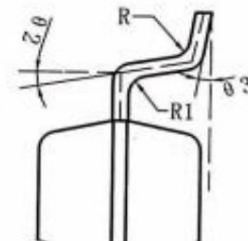
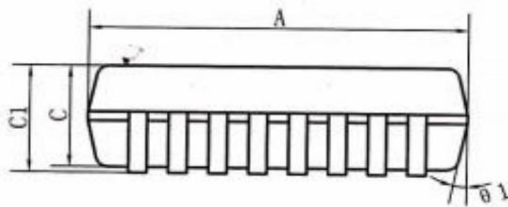
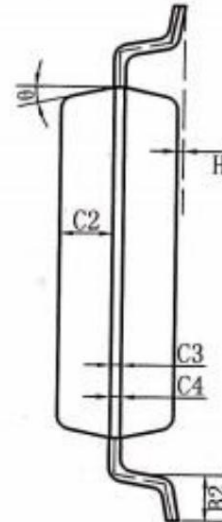
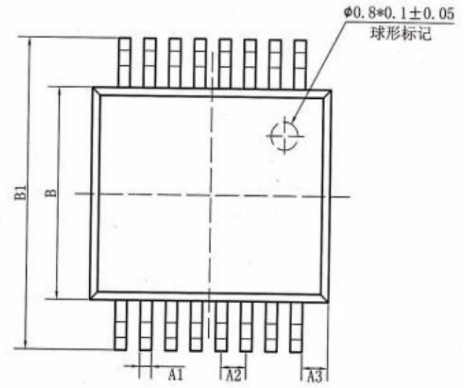
Dimension	minimum value/mm	maximum value/mm
A	9.80	10.00
A1	0.356	0.456
A2	1.27TYP	
A3	0.302TYP	
B	3.85	3.95
B1	5.84	6.24
B2	5.00 TYPE	
C	1.40	1.60
C1	0.61	0.71
C2	0.54	0.64
C3	0.05	0.25
C4	0.203	0.233
D	1.05 TYPE	
D1	0.40	0.70
D2	0.15	0.25
R1	0.20TYPE	
R2	0.20TYPE	
i1	8°~12°TYP4	
i2	8°~12°TYP4	
i3	0°~8°	
i4	4°~12°	



SSOP16(0.65) Dimensions

Package size

Dimension	minimum value/mm	maximum value/mm
A	6.15	6.25
A1	0.30TYP	
A2	0.65TYP	
A3	0.675TYP	
B	5.25	5.35
B1	7.65	7.95
B2	0.60	0.80
c	1.70	1.80
C1	1.75	1.95
C2	0.799	
C3	0.152	
C4	0.172	
H	0.05	0.15
i	12°TYP4	
i1	12°TYP4	
i2	10° TYPE	
i3	0°~8°	
R	0.20° TYPE	
R	0.15° TYPE	





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Ordering Information

order code	temperature	package
SIT3232EESE	-40ÿ~85ÿ	SOP16
SIT3232EEAE	-40ÿ~85ÿ	SSOP16

Tape packaging is 2500 pcs/reel