



AiP6932

3-Line Serial Interface, Common Cathode, 8 Seg×16 Grid LED Driver and Controller

Product Specification

Specification Revision History:

Version	Date	Description
2013-09-A1	2013-09	New
2018-03-B1	2025-08	Update the template; modify the ambient temperature; modify the ordering information and package information
2025-08-C1	2025-08	Update the template; modify the ambient temperature; modify the ordering information and package information



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**1、General Description**

The AiP6932 is a 3-line serial interface, common cathode, 8 Seg×16 Grid LED driver and controller, it integrates an MCU digital interface, data latches, LED drivers and other circuits internally. This product features excellent performance and reliable quality.

Features:

- Built-in display RAM
- Built-in automatic blanking circuit
- Serial interface (CLK, DATA, STB)
- Display brightness software adjustable
- Built-in RC oscillation
- Package form: SOP32

Applications:

LED display panels are used in various household applications such as induction cooktop displays, rice cooker displays, air conditioner displays and set-top box displays.

Ordering Information:**Tube packing specifications:**

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP6932SA32.TB	SOP32	AiP6932	20 PCS/tube	80 tube/box	1600 PCS/box	Dimensions of plastic enclosure: 21.0mm×7.5mm Pin spacing: 1.27mm

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP6932SA32.TR	SOP32	AiP6932	1250PCS/reel	1250PCS/box	Dimensions of plastic enclosure: 21.0mm×7.5mm Pin spacing: 1.27mm

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.



2、Pin Description

2.1、Pin Configurations

1	GRID13	GRID12	32
2	GRID14	GRID11	31
3	GRID15	GRID10	30
4	GRID16	GRID9	29
5	GND	GND	28
6	DATA	GRID8	27
7	CLK	GRID7	26
8	STB	GRID6	25
9	NC	GRID5	24
10	SEG1	GRID4	23
11	SEG2	GRID3	22
12	SEG3	GRID2	21
13	SEG4	GRID1	20
14	SEG5	GND	19
15	SEG6	VDD	18
16	SEG7	SEG8	17

2.2、Pin Description

Pin No.	Pin Name	I/O	Description
1	GRID13	O	grid output, N-channel open-drain output
2	GRID14	O	grid output, N-channel open-drain output
3	GRID15	O	grid output, N-channel open-drain output
4	GRID16	O	grid output, N-channel open-drain output
5	GND	-	ground
6	DATA	I	serial data input
7	CLK	I	serial clock input
8	STB	I	chip select input
9	NC	-	floating
10	SEG1	O	segment output, P-channel open-drain output
11	SEG2	O	segment output, P-channel open-drain output
12	SEG3	O	segment output, P-channel open-drain output
13	SEG4	O	segment output, P-channel open-drain output
14	SEG5	O	segment output, P-channel open-drain output
15	SEG6	O	segment output, P-channel open-drain output
16	SEG7	O	segment output, P-channel open-drain output
17	SEG8	O	segment output, P-channel open-drain output
18	VDD	-	power supply
19	GND	-	ground
20	GRID1	O	grid output, N-channel open-drain output
21	GRID2	O	grid output, N-channel open-drain output
22	GRID3	O	grid output, N-channel open-drain output



23	GRID4	O	grid output, N-channel open-drain output
24	GRID5	O	grid output, N-channel open-drain output
25	GRID6	O	grid output, N-channel open-drain output
26	GRID7	O	grid output, N-channel open-drain output
27	GRID8	O	grid output, N-channel open-drain output
28	GND	-	ground
29	GRID9	O	grid output, N-channel open-drain output
30	GRID10	O	grid output, N-channel open-drain output
31	GRID11	O	grid output, N-channel open-drain output
32	GRID12	O	grid output, N-channel open-drain output

3、Electrical Parameter

3.1、Absolute Maximum Ratings

($T_{amb}=25^{\circ}\text{C}$, GND=0V, unless otherwise specified)

Characteristic	Symbol	Conditions	Value	Unit
supply voltage	VDD	-	-0.5 to +7.0	V
logic input voltage	VIN	-	-0.5 to VDD+0.5	V
output High level current (SEG)	I _{O1}	-	-50	mA
output Low level current (GRID)	I _{O2}	-	+150	mA
ambient temperature	T _{amb}	-	-40 to +105	°C
storage temperature	T _{stg}	-	-65 to +150	°C
soldering temperature	T _L	10s	250	°C

3.2、Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
logic supply voltage	VDD	3	5	5.5	V
input High level voltage	V _{IH}	0.7VDD	-	VDD	V
input Low level voltage	V _{IL}	0	-	0.2VDD	V



3.3、Electrical Characteristics

3.3.1、DC Characteristics

(VDD=5V, GND=0V, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
High level output current	I _{OH1}	SEG1 to SEG8, V _{OH} =VDD-2V	-20	-25	-40	mA
	I _{OH2}	SEG1 to SEG8, V _{OH} =VDD-3V	-20	-30	-50	mA
Low level output	I _{OL1}	GRID1 to GRID16, V _{OL} = 0.3V	80	100	-	mA
High level output current tolerance	I _{TOLSG}	SEG1 to SEG8, V _{OH} =VDD-3V	-	-	5	%
High level input voltage	V _{IH}	CLK, DATA, STB	0.7VDD	-	-	V
Low level input voltage	V _{IL}	CLK, DATA, STB	-	-	0.2VDD	V
hysteresis voltage	V _H	CLK, DATA, STB	-	0.35	-	V
Input leakage current	I _I	VIN=VDD/GND	-	-	±1	uA
quiescent current	I _{DD}	No load, VIN=VDD	110	130	150	uA

3.3.2、AC Characteristics 1

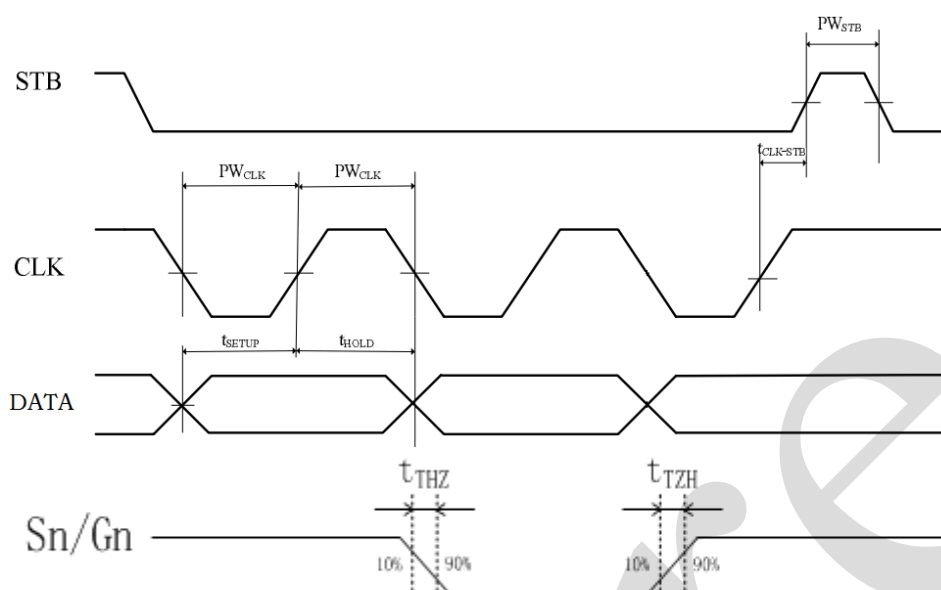
(VDD=4.5V to 5.5V, GND=0V, unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
oscillation frequency	f _{OSC}	-		-	400	-	KHz
rise time	t _{TZH1}	C _L =300pF	SEG1 to SEG8	-	-	2	us
	t _{TZH2}		GRID1 to GRID16	-	-	0.5	us
fall time	t _{THZ}	C _L =300pF, SEGn, GRIDn		-	-	120	us
maximum clock frequency	f _{max}	Duty cycle 50%		1	-	-	MHz

3.3.3、AC Characteristics 2

(VDD=4.5V to 5.5V, GND=0V, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
clock pulse width	PW _{CLK}	-	400	-	-	ns
strobe pulse width	PW _{STB}	-	1	-	-	us
data setup time	t _{SETUP}	-	100	-	-	ns
data hold time	t _{HOLD}	-	100	-	-	ns
CLK→STB time	t _{CLK-STB}	CLK↑→STB↑	1	-	-	us
waiting time	t _{WAIT}	CLK↑→CLK↓	1	-	-	us



4、Function Description

4.1、Display Register Address

This register stores the data that is transmitted from an external device via the serial interface to AiP6932.

The address allocation is as follows:

SEG1	SEG2	SEG3	SEG4	SEG5	SEG6	SEG7	SEG8	
B0	B1	B2	B3	B4	B5	B6	B7	
				00H				GRID1
				01H				GRID2
				02H				GRID3
				03H				GRID4
				04H				GRID5
				05H				GRID6
				06H				GRID7
				07H				GRID8
				08H				GRID9
				09H				GRID10
				0AH				GRID11
				0BH				GRID12
				0CH				GRID13
				0DH				GRID14
				0EH				GRID15
				0FH				GRID16

Note: When power up, first transfer data to RAM, and then setup display on.

**4.2、Commands Description**

Command is used to set the display mode and the status of the LED driver. After the STB falling edge, the first byte of DATA input is regarded as the command. After decoding, take the B7, B6 two highest bit to distinguish different commands.

B7	B6	Command
0	1	Data setting command
1	0	Display control command
1	1	Address setting command

ata transmission, serial communication will be initialized, and the transmitting of command or data is invalid (Command or Data transmitted remains valid).

4.2.1、Data Setting

This command is used to set the data writing mode, B1 and B0 bit cannot be set as 01 or 11.

MSB				LSB				Function	Description
B7	B6	B5	B4	B3	B2	B1	B0		
0	1	Irrelevant item write 0		0	0	X	X	Address mode setting	Address increasing mode
0	1			0	1	X	X		Fixed address mode
0	1			0	X	X	X	Test mode setting	Normal mode
0	1			1	X	X	X		Test mode (for internal use)

4.2.2、Address Setting

The command is used to set address of display register. If address is set to higher than 0FH, data will be ignored until effective address is set. Access to electricity, the address is 00H by default.

MSB				LSB				Display address
B7	B6	B5	B4	B3	B2	B1	B0	
1	1	Irrelevant item write 0		0	0	0	0	00H
1	1			0	0	0	1	01H
1	1			0	0	1	0	02H
1	1			0	0	1	1	03H
1	1			0	1	0	0	04H
1	1			0	1	0	1	05H
1	1			0	1	1	0	06H
1	1			0	1	1	1	07H
1	1			1	0	0	0	08H
1	1			1	0	0	1	09H
1	1			1	0	1	0	0AH
1	1			1	0	1	1	0BH
1	1			1	1	0	0	0CH
1	1			1	1	0	1	0DH
1	1			1	1	1	0	0EH
1	1			1	1	1	1	0FH



4.2.3、Display Control

The command is used to set the display switch and adjust the display brightness. This circuit offers a total of 8 levels of brightness for adjustment.

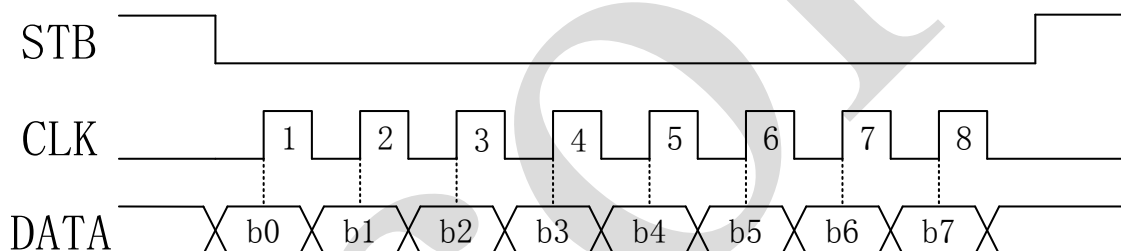
MSB

LSB

B7	B6	B5	B4	B3	B2	B1	B0	Function	Description
1	0	Irrelevant item write 0		—	0	0	0	Display brightness setting	Pulse width 1/16
1	0			—	0	0	1		Pulse width 2/16
1	0			—	0	1	0		Pulse width 4/16
1	0			—	0	1	1		Pulse width 10/16
1	0			—	1	0	0		Pulse width 11/16
1	0			—	1	0	1		Pulse width 12/16
1	0			—	1	1	0		Pulse width 13/16
1	0			—	1	1	1		Pulse width 14/16
1	0			0	—	—	—	Display switch setting	Display off
1	0			1	—	—	—		Display on

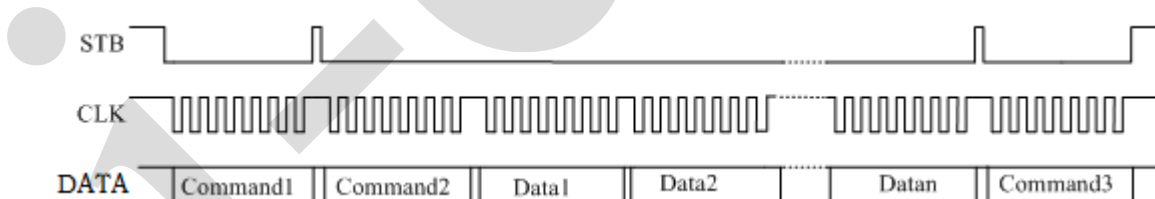
4.3、Serial Data Transfer Format

Each data transmission is performed during the rising edge of the clock, and the format is as follows:



4.4、Transmission Of Serial Data In Application

4.4.1、Communication Timing Sequence In Address Increasing Mode

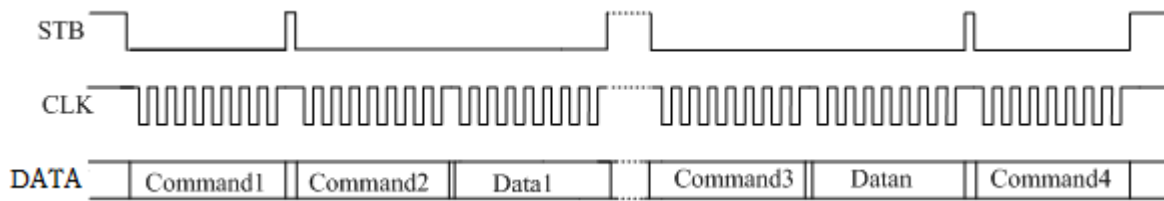


Command1: Data setting command

Command2: Display address setting command

Data1~Daten: Transfer display data

Command3: Display control command

**4.4.2、Communication Timing Sequence In Fixed Address Mode**

Command1: Data setting command

Command2: Display address 1 setting command

Data1: Display data written to the address of Command2

.

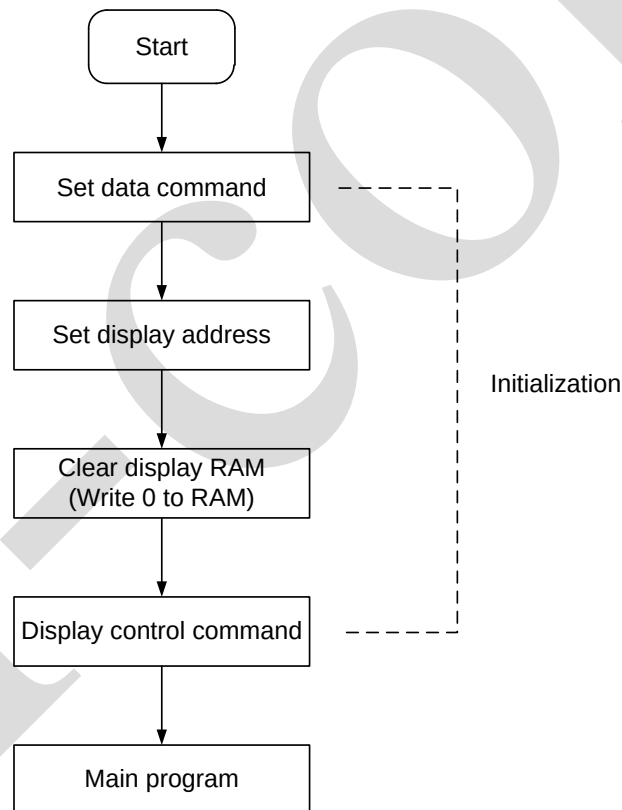
.

.

Command3: Display address 3 setting command

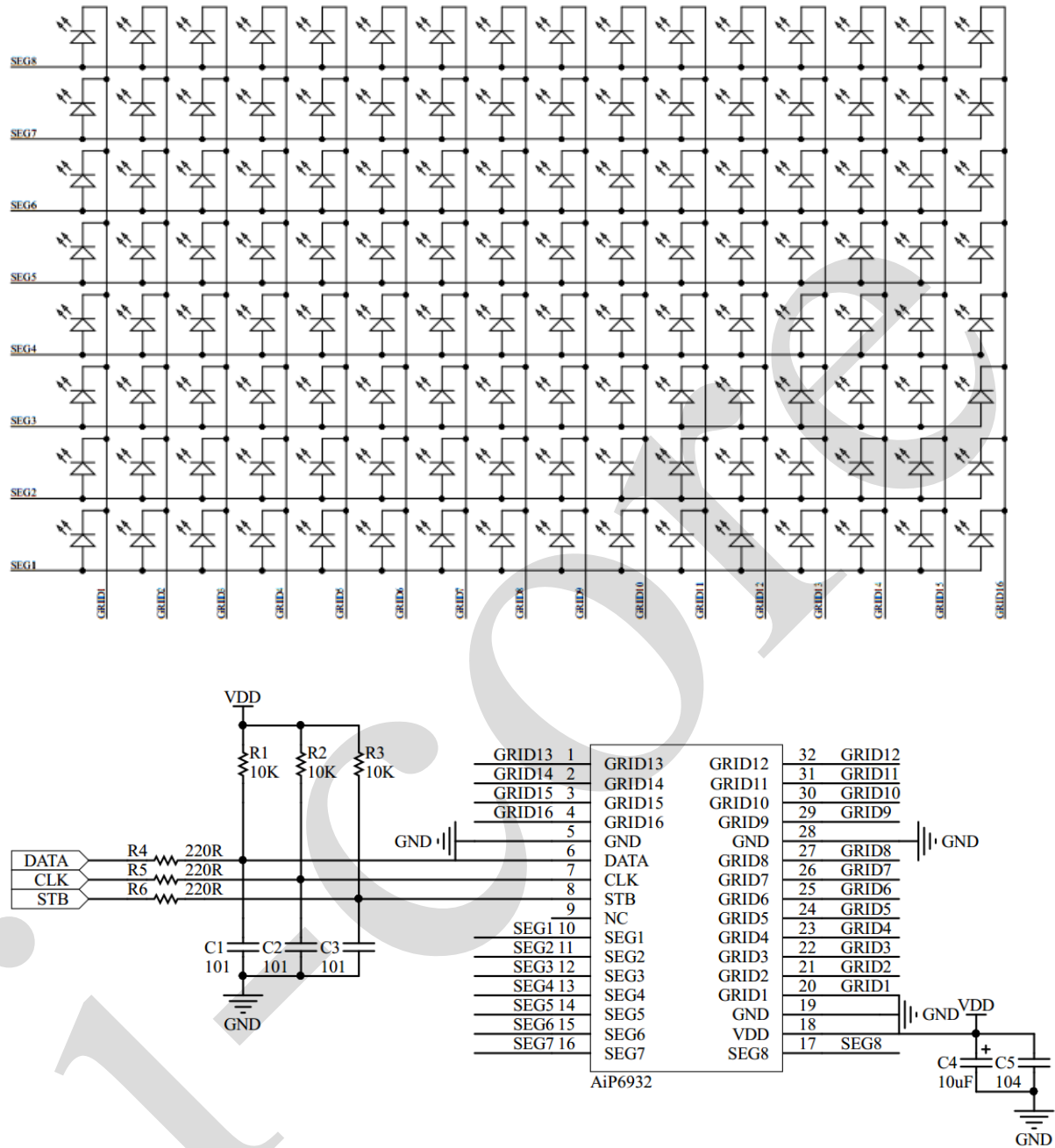
Datan: Display data written to the address of Command3

Command4: Display control command

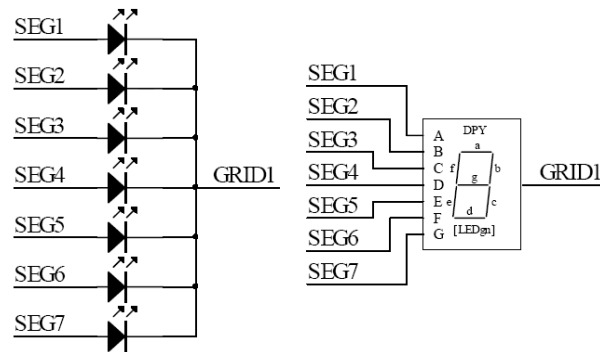
4.5、Initialization Flow Chart

Note:

1. The data command is used to select to write display data for the RAM area (divided into two types: fixed address and address self-addition)
2. When the IC is powered on, the content of RAM is not fixed. In order to prevent the display from appearing randomly when the display is turned on first. It is recommended to clear the RAM and then turn on the display.

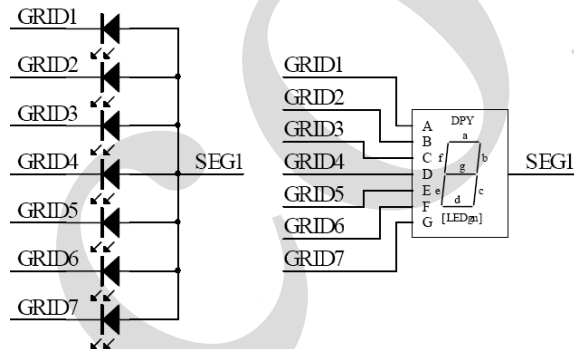
**5、Typical Application Circuit And Application Note****Note:**

1. The filter capacitor between VDD and GND should be close to AiP6932 to enhance the filter effect.
2. In order to improve the anti-interference ability of the circuit, the communication port is recommended to be connected according to the above figure. The specific parameter values can be adjusted according to actual needs.

**5.1、 Drive Common Cathode Digital Tube**

As shown in the figure, if the digital tube is to display “0”, then when GRID1 is at a Low level, SEG1, SEG2, SEG3, SEG4, SEG5, SEG6 will be at a High level, while SEG7 will be at a Low level. All that is needed is to write the data 3FH in the 00H address unit to make the digital tube display “0”.

SEG8	SEG7	SEG6	SEG5	SEG4	SEG3	SEG2	SEG1	地址
B7	B6	B5	B4	B3	B2	B1	B0	
0	0	1	1	1	1	1	1	00H

5.2、 Drive Common Anode Digital Tube

As shown in the figure, if the digital tube is to display “0”, SEG1 should be set to High level when GRID1, GRID2, GRID3, GRID4, GRID5 and GRID6 are at Low level, and SEG1 should be set to Low level when GRID7 is at Low level.

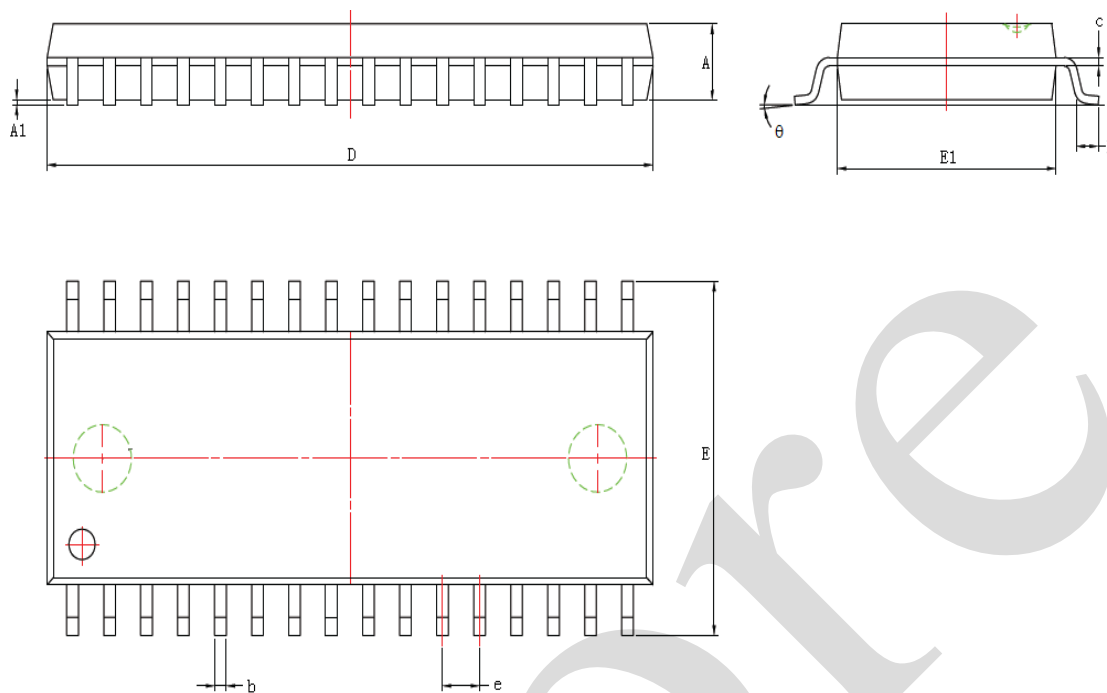
SEG8	SEG7	SEG6	SEG5	SEG4	SEG3	SEG2	SEG1	地址
B7	B6	B5	B4	B3	B2	B1	B0	
0	0	0	0	0	0	0	1	00H
0	0	0	0	0	0	0	1	01H
0	0	0	0	0	0	0	1	02H
0	0	0	0	0	0	0	1	03H
0	0	0	0	0	0	0	1	04H
0	0	0	0	0	0	0	1	05H
0	0	0	0	0	0	0	0	06H

Note: SEGn is P-channel open-drain output, and GRIDn is N-channel open-drain output. During use, SEGn can only be connected to the anode of LED, and GRIDn can only be connected to the cathode of LED. Reverse connection is not allowed.



6、Package Information

6.1、SOP32



2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	2.24	2.59
A1	0.05	0.25
E	10.20	10.60
E1	7.40	7.62
D	20.68	21.08
L	0.55	0.95
e	1.27	
b	0.30	0.50
c	0.25	
θ	0°	8°

**7、Statements And Notes****7.1、The name and content of Hazardous substances or Elements in the product**

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

7.2、Notes

We recommend you to read this chapter carefully before using this product.

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