OCM4064 图形点阵液晶显示模块

使用说明书

感谢您关注和使用我们的液晶显示器产品， 欢迎您提出您的要求、意见和建议，我们将竭诚为您服务、让您满意。您可以浏览 www.GPTLCM.CN 了解最新的产品与应用信息,或拨打热线电话 0758-2317153 以及向 syl@gptlcm.cn 邮箱发 E-mail 获取具体的技术咨询与服务

金鹏实业有限公司

Golden Palm Industry Co., Ltd

目录

1、 产品简介

主要工艺：COG

显示内容：40X64 点阵

显示模式：STN，POSITIVE

驱动条件：1/64Duty,1/9Bias

视向：6：00

背光：LED，黄绿

工作温度：-10℃-+60℃

储存温度：-20℃-+70℃

驱动 IC：S6B0724

2、 引用文件

S6B0724 规格书

3、机械特性

类别	标准值	单位
模块	23.38（w）X51.56(h)X10.5(t)Max	mm
有效显示区	19.05(w)X29.2(h)	mm
点大小	0.40(w)X0.40(h)	mm
点间隙	0.02 （w)X0.02 （h)	mm

4、产品框图
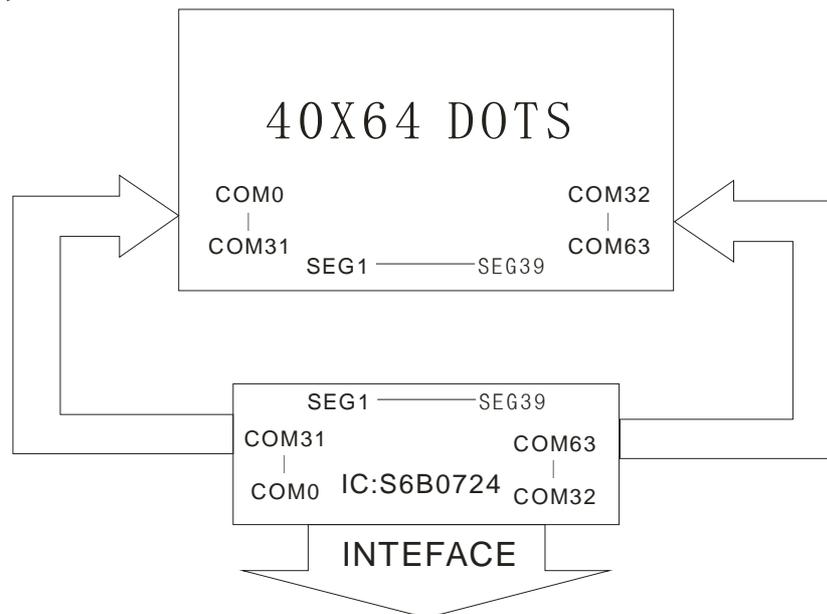
5、光电特性

类别	符号	条件	最小值	TYP	最大值	单位
驱动电压	Vop.	25℃	8.8	9.0	9.2	V
响应时间	Ton	25℃	—	127	400	Ms
对比度	Toff	25℃	—	263	400	Ms
	CR	25℃	—	9	—	—
视角范围		25℃	—	88	—	DEG
交叉效应		25℃	—	1.2	—	—

6、极限参数

参数	符号	最小值	最大值	单位
逻辑电压	Vdd	-0.3	+3.30	V
驱动电压	Vout,VO	-0.3	+12.0	V
工作温度	Top	-10	+60	℃
存储温度	Tst	-20	+70	℃

7、接口时序

Read / Write Characteristics (8080-series MPU)

** tPWL80(W) and tPWL80(R) is specified in the overlapped period when CS1B is low (CS2 is high) and /WR(/RD) is low.
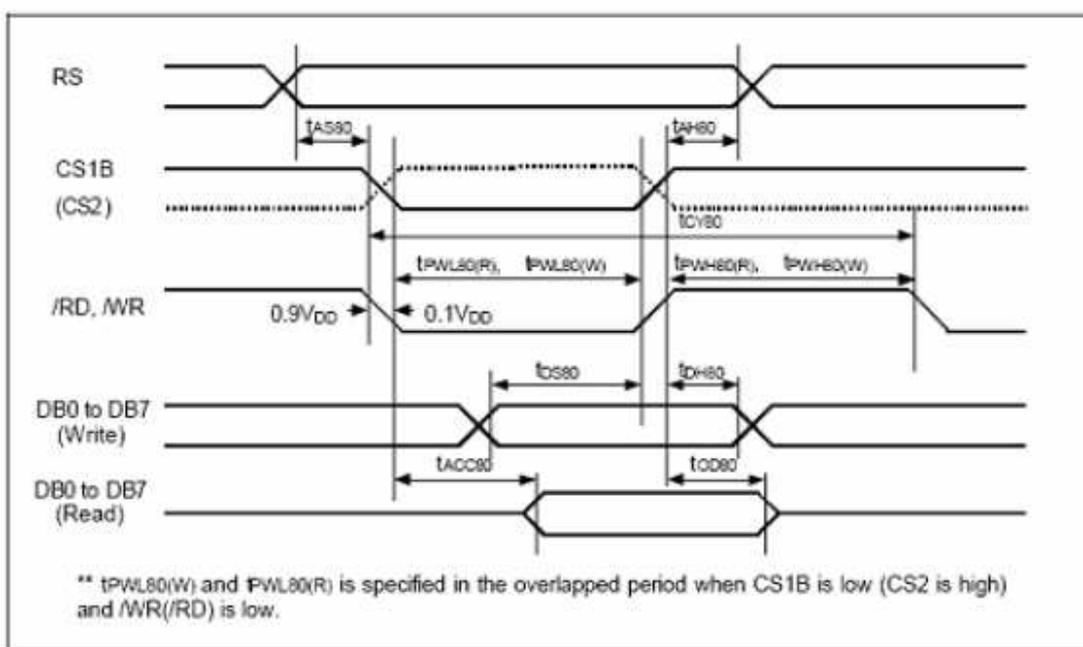
Figure 32. Read / Write Characteristics (8080-series MPU)

(VDD = 2.4 to 3.6V, Ta = -40 to +85°C)

Item		Signal	Symbol	Min.	Typ.	Max.	Unit	Remark
Address setup time		RS	tAS80	0	-	-	ns	
Address hold time			tAH80	0				
System cycle time		/WR, /RD	tCY80	300	-	-	ns	
Enable Pulse	Read	/RD	tPWL80 (R)	120	-	-	ns	
Low width	Write	/WR	tPWL80 (W)	60	-	-	ns	
Enable Pulse	Read	/RD	tPWH80 (R)	60	-	-	ns	
High width	Write	/WR	tPWH80 (W)	60	-	-	ns	
Data setup time		DB7	tDS80	40	-	-	ns	
Data hold time		To	tDH80	15				
Read access time		DB0	tACC80	-	-	140	ns	CL = 100 pF
Output disable time			tOD80	10		100		

Read / Write Characteristics (6800-series Microprocessor)
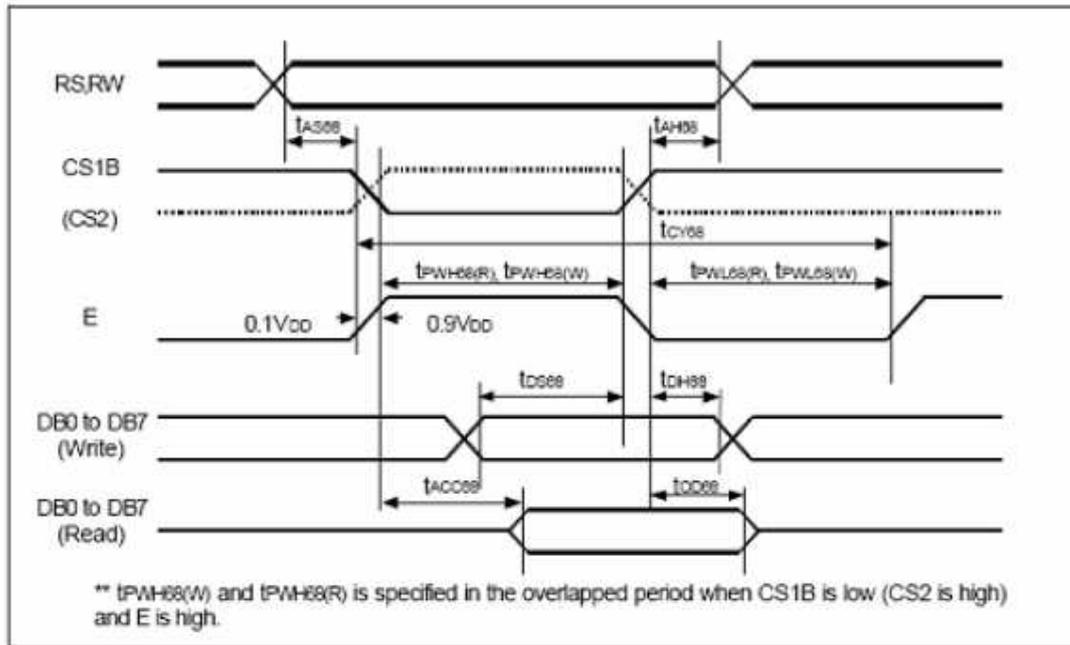
** tPWH68(W) and tPWH68(R) is specified in the overlapped period when CS1B is low (CS2 is high) and E is high.

(VDD = 2.4 to 3.6V, Ta = -40 to +85°C)

Item		Signal	Symbol	Min.	Typ.	Max.	Unit	Remark
Address setup time Address hold time		RS,RW	tAS68 tAH68	0 0	- -	- -	ns	
System cycle time		E	tCY68	300	-	-	ns	
Enable Pulse High Width	Read	E	tPWH68 (R)	120			ns	
	Write		tPWH68 (W)	60				
Enable Pulse Low Width	Read	E	tPWL68 (R)	60			ns	
	Write		tPWL68 (W)	60				
Data setup time Data hold time		DB7 To DB0	tDS68 tDH68	40 15	- 	- 	ns	
Access time Output disable time			tACC68 tOD68	- 10	- 	140 100	ns	CL = 100 pF

Serial Interface Characteristics

Figure 34. Serial Interface Characteristics

(VDD = 2.4 to 3.6V, Ta = -40 to +85°C)

Item	Signal	Symbol	Min.	Typ.	Max.	Unit	Remark
Serial clock cycle SCLK high pulse width SCLK low pulse width	DB6 (SCLK)	tCYS tWHS tWLS	250 100 100	- - -	- - -	ns	
Address setup time Address hold time	RS	tASS tAHS	150 150	- -	- -	ns	
Data setup time Data hold time	DB7 (SID)	tDSS tDHS	100 100	- -	- -	ns	
CS1B setup time CS1B hold time	CS1B	tCSS tCHS	150 150	- -	- -	ns	
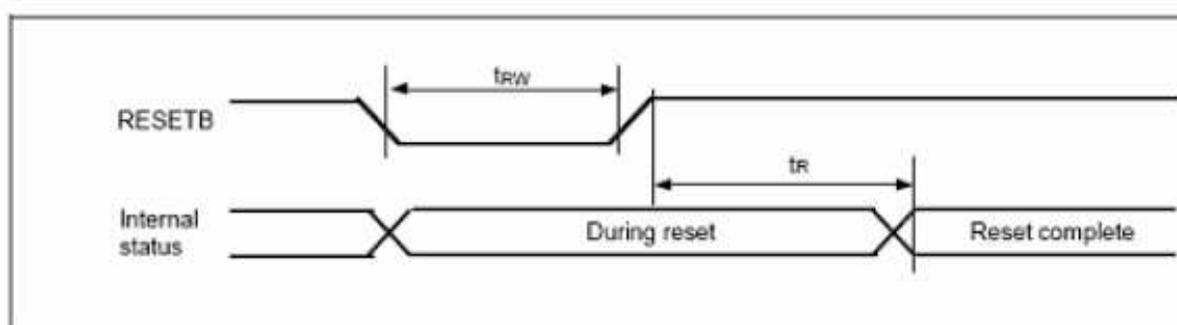
Figure 35. Reset Input Timing

(VDD = 2.4 to 3.6V, Ta = -40 to +85°C)

Item	Signal	Symbol	Min.	Typ.	Max.	Unit	Remark
Reset low pulse width	RESETB	tRW	1.0	-	-	µs	
Reset time	-	tR	-	-	1.0	µs	

8、直流特性（**VDD=2.84V**）

(VSS = 0V, VDD = 2.4 to 5.5V, Ta = -40 to 85°C)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Pin used
Operating voltage (1)		VDD	Select by product code	2.4	-	3.6	V	VDD *1
				2.4	-	5.5		
Operating voltage (2)		V0		4.5	-	15.0	V	V0 *2
Input voltage	High	VIH		0.8VDD	-	VDD	V	*3
	Low	VIL		VSS	-	0.2VDD		
Output voltage	High	VOH	ICH = -0.5mA	0.8VDD	-	VDD	V	*4
	Low	VOL	IOL = 0.5mA	VSS	-	0.2VDD		
Input leakage current		IIL	VDD = 3.0V VIN = VDD or VSS	- 1.0	-	+ 1.0	µA	*5
Output leakage current		IOZ	VIN = VDD or VSS	- 3.0	-	+ 3.0	µA	*6
LCD driver ON resistance		RON	Ta = 25°C, V0 = 8V	-	2.0	3.0	kΩ	SEGn COMn *7
Oscillator frequency	Internal	fOSC	VDD = 3.0V Ta = 25°C Duty ratio = 1/65	32.7	43.6	54.5	kHz	CL *8
	External	fCL		4.09	5.45	6.81		
Voltage converter input voltage		VCI	× 2	2.4	-	5.5	V	VCI
			× 3	2.4	-	5.0		
			× 4	2.4	-	3.75		
			× 5	2.4	-	3.0		
Voltage converter output voltage		VOUT	×2 / ×3 / ×4 / ×5 voltage conversion (no-load)	95	99	-	%	VOUT
Voltage regulator operating voltage		VOUT		6.0	-	16.0	V	VOUT
Voltage follower operating voltage		V0		4.5	-	15.0	V	V0 *9
Reference voltage		VREF	VDD=3.0V Ta = 25°C -0.05%/°C	2.04	2.1	2.16	V	*10

9、引脚描述

接口定义：

引脚编号	引脚名称	方向	引脚功能描述
1	LED+	I	背光电源,LED+（3.0V）
2	LED-	I	背光电源,LED-（0V）
3	PS	I	串口/并口选择： H=并口；L=串口
4	C68	I	H=6800 接口；L=8080 接口
5	VSS	I	逻辑电源地
6	VDD	I	逻辑电源正（DC 3.0V）
7	(SID)DB7	I/O	数据输入输出引脚
8	(SCLK)DB6	I/O	数据输入输出引脚
9	DB5	I/O	数据输入输出引脚
10	DB4	I/O	数据输入输出引脚
11	DB3	I/O	数据输入输出引脚
12	DB2	I/O	数据输入输出引脚
13	DB1	I/O	数据输入输出引脚
14	DB0	I/O	数据输入输出引脚
15	E（/RD）	I	当接口定义为6800接口时，为使能控制脚，E=H有效 当接口定义为8080接口时，/RD 为读控制脚，低有效
16	R/W（/WR）	I	读/写控制脚： 当接口定义为 6800 接口时，RW=H：读操作 RW=L：写操作 当接口定义为 8080 接口时，/WR 为写入控制脚
17	RS	I	数据\指令选择：高电平：DB0-DB7 为显示数据 低电平：DB0-DB7 为操作指令
18	/RES	O	复位控制，L 有效
19	/CS1	I	片选择信号，低电平时有效
20	NC		悬空
21	NC		悬空
22	NC		悬空
23	NC		悬空
24	NC		悬空

10、命令描述

指令表：

Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Display ON / OFF	0	0	1	0	1	0	1	1	1	DON	Turn on/off LCD panel When DON = 0: display OFF When DON = 1: display ON
Initial display line	0	0	0	1	ST5	ST4	ST3	ST2	ST1	ST0	Specify DDRAM line for COM0
Set page address	0	0	1	0	1	1	P3	P2	P1	P0	Set page address
Set column address MSB	0	0	0	0	0	1	Y7	Y6	Y5	Y4	Set column address MSB
Set column address LSB	0	0	0	0	0	0	Y3	Y2	Y1	Y0	Set column address LSB
Read status	0	1	BUSY	ADC	ONOFF	RESETB	0	0	0	0	Read the internal status
Write display data	1	0	Write data								Write data into DDRAM
Read display data	1	1	Read data								Read data from DDRAM
ADC select	0	0	1	0	1	0	0	0	0	ADC	Select SEG output direction When ADC = 0: normal direction (SEG0→SEG131) When ADC = 1: reverse direction (SEG131→SEG0)
Reverse display ON / OFF	0	0	1	0	1	0	0	1	1	REV	Select normal / reverse display When REV = 0: normal display When REV = 1: reverse display
Entire display ON / OFF	0	0	1	0	1	0	0	1	0	EON	Select normal/entire display ON When EON = 0: normal display. When EON = 1: entire display ON
LCD bias select	0	0	1	0	1	0	0	0	1	BIAS	Select LCD bias
Set modify-read	0	0	1	1	1	0	0	0	0	0	Set modify-read mode
Reset modify-read	0	0	1	1	1	0	1	1	1	0	release modify-read mode
Reset	0	0	1	1	1	0	0	0	1	0	Initialize the internal functions
SHL select	0	0	1	1	0	0	SHL	x	x	x	Select COM output direction When SHL = 0: normal direction (COM0→COM63) When SHL = 1: reverse direction (COM63→COM0)
Power control	0	0	0	0	1	0	1	VC	VR	VF	Control power circuit operation
Regulator resistor select	0	0	0	0	1	0	0	R2	R1	R0	Select internal resistance ratio of the regulator resistor
Set reference voltage mode	0	0	1	0	0	0	0	0	0	1	Set reference voltage mode
Set reference voltage register	0	0	x	x	SV5	SV4	SV3	SV2	SV1	SV0	Set reference voltage register
Set static indicator mode	0	0	1	0	1	0	1	1	0	SM	Set static indicator mode
Set static indicator register	0	0	x	x	x	x	x	x	S1	S0	Set static indicator register
Power save	-	-	-	-	-	-	-	-	-	-	Compound Instruction of display OFF and entire display ON

指令介绍：

Display ON / OFF

Turns the Display ON or OFF

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	1	1	1	DON

DON = 1: display ON
DON = 0: display OFF

Initial Display Line

Sets the line address of display RAM to determine the Initial Display Line. The RAM display data is displayed at the top row (COM0 when SHL = L, COM63 when SHL = H) of LCD panel.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	1	ST5	ST4	ST3	ST2	ST1	ST0

ST5	ST4	ST3	ST2	ST1	ST0	Line address
0	0	0	0	0	0	0
0	0	0	0	0	1	1
:	:	:	:	:	:	:
1	1	1	1	1	0	62
1	1	1	1	1	1	63

Set Page Address

Sets the Page Address of display data RAM from the microprocessor into the Page Address register. Any RAM data bit can be accessed when its Page Address and column address are specified. Along with the column address, the Page Address defines the address of the display RAM to write or read display data. Changing the Page Address doesn't effect to the display status.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	1	P3	P2	P1	P0

P3	P2	P1	P0	Page
0	0	0	0	0
0	0	0	1	1
:	:	:	:	:
0	1	1	1	7
1	0	0	0	8

Set Column Address

Sets the Column Address of display RAM from the microprocessor into the Column Address register. Along with the Column Address, the Column Address defines the address of the display RAM to write or read display data. When the microprocessor reads or writes display data to or from display RAM, Column Addresses are automatically increased.

Set Column Address MSB

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	1	Y7	Y6	Y5	Y4

Set Column Address LSB

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	0	Y3	Y2	Y1	Y0

Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0	Column address
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	1
:	:	:	:	:	:	:	:	:
1	0	0	0	0	0	1	0	130
1	0	0	0	0	0	1	1	131

Read Status

Indicates the internal status of the S6B0724

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	1	BUSY	ADC	ON/OFF	RESETB	0	0	0	0

Flag	Description
BUSY	The device is busy when internal operation or reset. Any instruction is rejected until BUSY goes Low. 0: chip is active, 1: chip is being busy.
ADC	Indicates the relationship between RAM column address and segment driver 0: reverse direction (SEG131 → SEG0), 1: normal direction (SEG0 → SEG131)
ON / OFF	Indicates display ON / OFF status 0: display ON, 1: display OFF
RESETB	Indicates the initialization is in progress by RESETB signal 0: chip is active, 1: chip is being reset

Write Display Data

8-bit data of display data from the microprocessor can be written to the RAM location specified by the column address and page address. The column address is increased by 1 automatically so that the microprocessor can continuously write data to the addressed page.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
1	0	Write data							
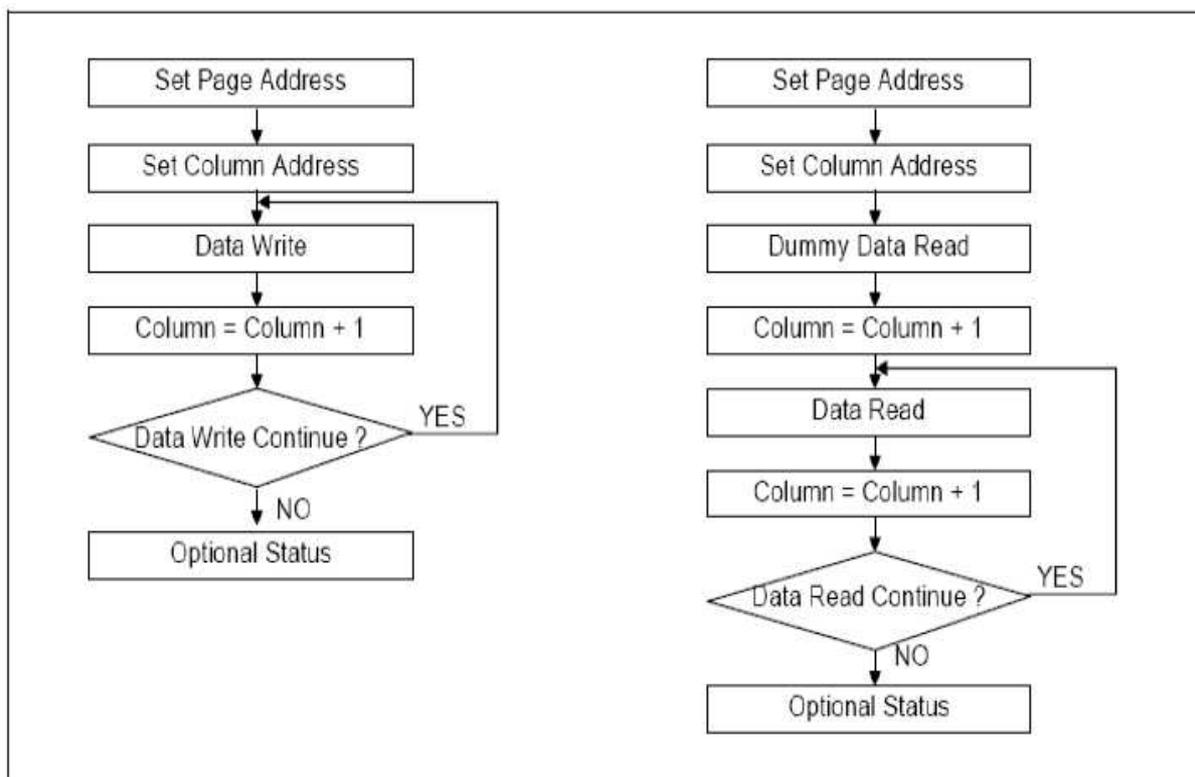
Figure 21. Sequence for Writing Display Data   Figure 22. Sequence for Reading Display Data

Data Read Display Data

8-bit data from display data RAM specified by the column address and page address can be read by this instruction. As the column address is increased by 1 automatically after each this instruction, the microprocessor can continuously read data from the addressed page. A dummy read is required after loading an address into the column address register. Display data cannot be read through the serial interface.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
1	1	Read data							

ADC Select (Segment Driver Direction Select)

Changes the relationship between RAM column address and segment driver. The direction of segment driver output pins can be reversed by software. This makes IC layout flexible in LCD module assembly.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	0	0	0	ADC

ADC = 0: normal direction (SEG0 → SEG131)
ADC = 1: reverse direction (SEG131 → SEG0)

Reverse Display ON / OFF

Reverses the display status on LCD panel without rewriting the contents of the display data RAM.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	0	1	1	REV

REV	RAM bit data = "1"	RAM bit data = "0"
0 (normal)	LCD pixel is illuminated	LCD pixel is not illuminated
1 (reverse)	LCD pixel is not illuminated	LCD pixel is illuminated

Entire Display ON / OFF

Forces the whole LCD points to be turned on regardless of the contents of the display data RAM. At this time, the contents of the display data RAM are held. This instruction has priority over the reverse display ON / OFF instruction.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	0	1	0	EON

EON = 0: normal display
EON = 1: entire display ON

Select LCD Bias

Selects LCD bias ratio of the voltage required for driving the LCD.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	0	0	1	Bias

Duty ratio	DUTY1	DUTY0	LCD bias	
			Bias = 0	Bias = 1
1/33	0	0	1/6	1/5
1/49	0	1	1/8	1/6
1/55	1	0	1/8	1/6
1/65	1	1	1/9	1/7

Set Modify-Read

This instruction stops the automatic increment of the column address by the read display data instruction, but the column address is still increased by the write display data instruction. And it reduces the load of microprocessor when the data of a specific area is repeatedly changed during cursor blinking or others. This mode is canceled by the reset Modify-read instruction.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	0	0	0	0	0

Reset Modify-Read

This instruction cancels the Modify-read mode, and makes the column address return to its initial value just before the set Modify-read instruction is started.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	0	1	1	1	0

Set Page Address
↓
Set Column Address (N)
↓
Set Modify-Read
↓
Dummy Read
↓
Data Read ⎫
↓   ⎬ Data Process
Data Write ⎭
↓
Change Complete ? — NO
↓ YES
Reset Modify-Read
↓
Return Column Address (N)
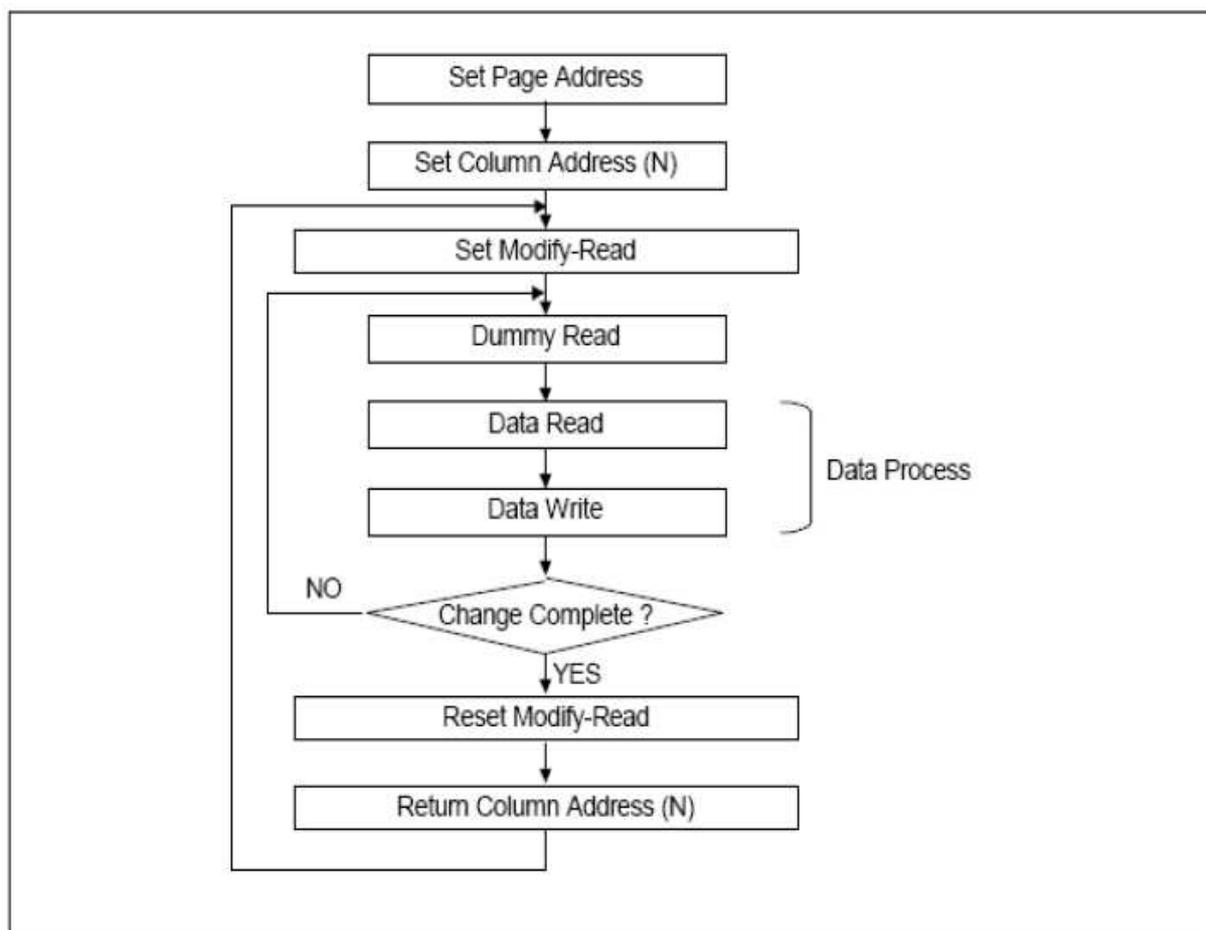
Reset

This instruction resets initial display line, column address, page address, and common output status select to their initial status, but dose not affect the contents of display data RAM. This instruction cannot initialize the LCD power supply, which is initialized by the RESETB pin.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	0	0	0	1	0

SHL Select (Common Output Mode Select)

COM output scanning direction is selected by this instruction which determines the LCD driver output status.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	0	0	SHL	x	x	x

x: Don't care

SHL = 0: normal direction (COM0 → COM63)
SHL = 1: reverse direction (COM63 → COM0)

Power Control

Selects one of eight power circuit functions by using 3-bit register. An external power supply and part of internal power supply functions can be used simultaneously.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	1	0	1	VC	VR	VF

VC	VR	VF	Status of internal power supply circuits
0			Internal voltage converter circuit is OFF
1			Internal voltage converter circuit is ON
	0		Internal voltage regulator circuit is OFF
	1		Internal voltage regulator circuit is ON
		0	Internal voltage follower circuit is OFF
		1	Internal voltage follower circuit is ON

Regulator Resistor Select

Selects resistance ratio of the internal resistor used in the internal voltage regulator. See voltage regulator section in power supply circuit. Refer to the table 15.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	1	0	0	R2	R1	R0

R2	R1	R0	$(1 + Rb / Ra)$ ratio
0	0	0	3.0
0	0	1	3.5
0	1	0	4.0
0	1	1	4.5
1	0	0	5.0 (default)
1	0	1	5.5
1	1	0	6.0
1	1	1	6.4

Reference Voltage Select

Consists of 2-byte instruction. The 1st instruction sets reference voltage mode, the 2nd one updates the contents of reference voltage register. After second instruction, reference voltage mode is released.

The 1st Instruction: Set Reference Voltage Select Mode

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	0	0	0	0	0	1

The 2nd Instruction: Set Reference Voltage Register

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	×	×	SV5	SV4	SV3	SV2	SV1	SV0

SV5	SV4	SV3	SV2	SV1	SV0	Reference voltage parameter (α)	V0	Contrast
0	0	0	0	0	0	0	Minimum	Low
0	0	0	0	0	1	1		
:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:
1	0	0	0	0	0	32 (default)	:	:
:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:
1	1	1	1	1	0	62		
1	1	1	1	1	1	63	Maximum	High

```
┌─────────────────────────────────┐
│   Setting Reference Voltage Start   │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│   1ˢᵗ Instruction for Mode Setting   │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│  2ⁿᵈ Instruction for Register Setting │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│   Setting Reference Voltage End    │
└─────────────────────────────────┘
```
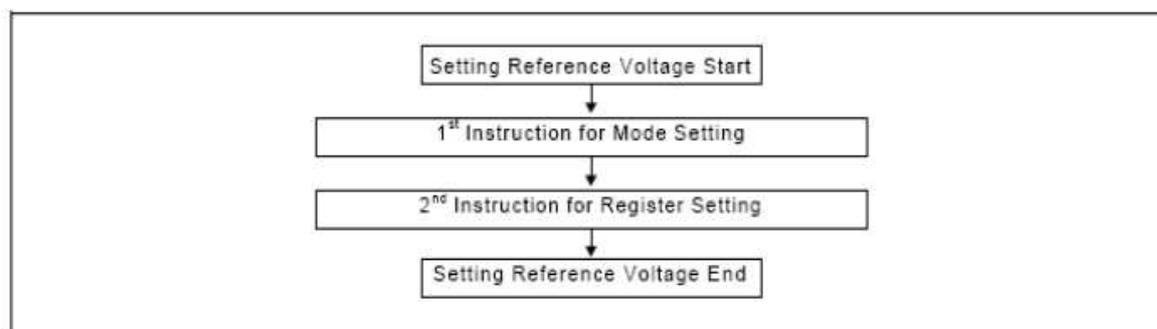
Set Static Indicator State

Consists of two bytes instruction. The first byte instruction (set Static Indicator mode) enables the second byte instruction (set Static Indicator register) to be valid. The first byte sets the Static Indicator ON / OFF. When it is ON, the second byte updates the contents of Static Indicator register without issuing any other instruction and this Static Indicator state is released after setting the data of indicator register.

The 1ˢᵗ Instruction: Set Static Indicator Mode (ON / OFF)

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	1	1	0	SM

SM = 0: static indicator OFF
SM = 1: static indicator ON

The 2ⁿᵈ Instruction: Set Static Indicator Register

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	×	×	×	×	×	×	S1	S0

S1	S0	Status of static indicator output
0	0	OFF
0	1	ON (about 1 second blinking)
1	0	ON (about 0.5 second blinking)
1	1	ON (always ON)

NOP

Non Operation Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	0	0	0	1	1

Test Instruction (Test Instruction_1 & Test Instruction_2)

These are the instruction for IC chip testing. Please do not use it. If the Test Instruction is used by accident, it can be cleared by applying "0" signal to the RESETB input pin or the reset instruction.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	1	×	×	×	×
0	0	1	0	0	1	×	×	×	×

Power Save (Compound Instruction)

If the entire display ON / OFF instruction is issued during the display OFF state, S6B0724 enters the Power Save status to reduce the power consumption to the static power consumption value. According to the status of static indicator mode, Power Save is entered to one mode of sleep and standby mode. When Static Indicator mode is ON, standby mode is issued. When OFF, sleep mode is issued. Power Save mode is released by the entire display OFF instruction.

```
┌──────────────────────────┐        ┌──────────────────────────┐
│    Static Indicator OFF   │        │    Static Indicator ON    │
└──────────────────────────┘        └──────────────────────────┘
            │                                     │
            ▼                                     ▼
┌──────────────────────────────────────────────────────────────┐
│             Power Save (Compound Instruction)                 │
│                       [Display OFF]                           │
│                     [Entire Display ON]                       │
└──────────────────────────────────────────────────────────────┘
            │                                     │
            ▼                                     ▼
┌──────────────────────────┐        ┌──────────────────────────┐
│        Sleep Mode         │        │       Standby Mode        │
│  [Oscillator Circuit: OFF]│        │ [Oscillator Circuit: ON]  │
│[LCD Power Supply Circuit: │        │[LCD Power Supply Circuit: │
│          OFF]             │        │          OFF]             │
│ [All COM / SEG Outputs:   │        │ [All COM / SEG Outputs:   │
│          VSS]             │        │          VSS]             │
│[Consumption Current: <2uA]│        │[Consumption Current:<10uA]│
└──────────────────────────┘        └──────────────────────────┘
            │                                     │
            ▼                                     ▼
┌──────────────────────────┐        ┌──────────────────────────┐
│Power Save OFF (Compound   │        │      Power Save OFF       │
│       Instruction)        │        │   [Entire Display OFF]    │
│   [Entire Display OFF]     │        │                           │
│   [Static Indicator ON]    │        │                           │
│     2 Bytes Command        │        │                           │
└──────────────────────────┘        └──────────────────────────┘
            │                                     │
            ▼                                     ▼
┌──────────────────────────┐        ┌──────────────────────────┐
│     Release Sleep Mode    │        │    Release Standby Mode   │
└──────────────────────────┘        └──────────────────────────┘
```

– Sleep Mode

This stops all operations in the LCD display system, and as long as there are no access from the MPU, the consumption current is reduced to a value near the static current. The internal modes during sleep mode are as follows:

a. The oscillator circuit and the LCD power supply circuit are halted.

b. All liquid crystal drive circuits are halted, and the segment in common drive outputs output a VSS level.

– Standby Mode

The duty LCD display system operations are halted and only the static drive system for the indicator continues to operate, providing the minimum required consumption current for the static drive.
The internal modes are in the following states during standby mode.

a. The LCD power supply circuits are halted. The oscillator circuit continues to operate.

b. The duty drive system liquid crystal drive circuits are halted and the segment and common driver outputs a VSS level. The static drive system does not operate.
When a reset command is performed while in standby mode, the system enters sleep mode.

Referential Instruction Setup Flow (1)

```
┌─────────────────────────────────────────────────────┐
│          User System Setup by External Pins          │
└─────────────────────────────────────────────────────┘
                          ↓
┌─────────────────────────────────────────────────────┐
│                Start of Initialization               │
└─────────────────────────────────────────────────────┘
                          ↓
┌─────────────────────────────────────────────────────┐
│      Power ON (VDD - VSS) Keeping the RESETB Pin = "L" │
└─────────────────────────────────────────────────────┘
                          ↓
┌─────────────────────────────────────────────────────┐
│             Waiting for Stabilizing the Power        │
└─────────────────────────────────────────────────────┘
                          ↓
┌─────────────────────────────────────────────────────┐
│                    RESETB Pin = "H"                  │
└─────────────────────────────────────────────────────┘
                          ↓
┌─────────────────────────────────────────────────────┐
│      User Application Setup by Internal Instructions │
│                     [ADC Select]                     │
│                     [SHL Select]                     │
│                  [LCD Bias Select]                   │
└─────────────────────────────────────────────────────┘
                          ↓
┌─────────────────────────────────────────────────────┐
│      User LCD Power Setup by Internal Instructions   │
│                [Voltage Converter ON]                │
└─────────────────────────────────────────────────────┘
                          ↓   Waiting for ≥ 1ms
┌─────────────────────────────────────────────────────┐
│      User LCD Power Setup by Internal Instructions   │
│                [Voltage Regulator ON]                │
└─────────────────────────────────────────────────────┘
                          ↓   Waiting for ≥ 1ms
┌─────────────────────────────────────────────────────┐
│      User LCD Power Setup by Internal Instructions   │
│                 [Voltage Follower ON]                │
└─────────────────────────────────────────────────────┘
                          ↓
┌─────────────────────────────────────────────────────┐
│      User LCD Power Setup by Internal Instructions   │
│              [Regulator Resistor Select]             │
│            [Reference Voltage Register Set]          │
└─────────────────────────────────────────────────────┘
                          ↓
┌─────────────────────────────────────────────────────┐
│       Waiting for Stabilizing the LCD Power Levels   │
└─────────────────────────────────────────────────────┘
                          ↓
┌─────────────────────────────────────────────────────┐
│                 End of Initialization                │
└─────────────────────────────────────────────────────┘
```

Referential Instruction Setup Flow (2)

```
┌──────────────────────────────────────────────────┐
│         User System Setup by External Pins         │
└──────────────────────────────────────────────────┘
                         ↓
┌──────────────────────────────────────────────────┐
│              Start of Initialization               │
└──────────────────────────────────────────────────┘
                         ↓
┌──────────────────────────────────────────────────┐
│   Power ON (VDD - VSS) Keeping the RESETB Pin = "L" │
└──────────────────────────────────────────────────┘
                         ↓
┌──────────────────────────────────────────────────┐
│          Waiting for Stabilizing the Power         │
└──────────────────────────────────────────────────┘
                         ↓
┌──────────────────────────────────────────────────┐
│                 RESETB Pin = "H"                   │
└──────────────────────────────────────────────────┘
                         ↓
┌──────────────────────────────────────────────────┐
│                   Set Power Save                   │
└──────────────────────────────────────────────────┘
                         ↓
┌──────────────────────────────────────────────────┐
│    User Application Setup by Internal Instructions │
│                   [ADC Select]                     │
│                   [SHL Select]                     │
│                 [LCD Bias Select]                  │
└──────────────────────────────────────────────────┘
                         ↓
┌──────────────────────────────────────────────────┐
│    User LCD Power Setup by Internal Instructions   │
│             [Regulator Resistor Select]            │
│           [Reference Voltage Register Set]         │
└──────────────────────────────────────────────────┘
                         ↓
┌──────────────────────────────────────────────────┐
│                 Release Power Save                 │
└──────────────────────────────────────────────────┘
                         ↓
┌──────────────────────────────────────────────────┐
│      Waiting for Stabilizing the LCD Power Levels  │
└──────────────────────────────────────────────────┘
                         ↓
┌──────────────────────────────────────────────────┐
│               End of Initialization                │
└──────────────────────────────────────────────────┘
```

Referential Instruction Setup Flow (3)


```
┌──────────────────────────────────────┐
│        End of Initialization         │
└──────────────────────────────────────┘
                   ↓
┌──────────────────────────────────────┐
│  Display Data RAM Addressing by      │
│            Instruction               │
│        [Initial Display Line]        │
│         [Set Page Address]           │
│        [Set Column Address]          │
└──────────────────────────────────────┘
                   ↓
┌──────────────────────────────────────┐
│   Write Display ON / OFF by          │
│            Instruction               │
│         [Display ON / OFF]           │
└──────────────────────────────────────┘
                   ↓
┌──────────────────────────────────────┐
│   Turn Display ON / OFF by           │
│            Instruction               │
│         [Display ON / OFF]           │
└──────────────────────────────────────┘
                   ↓
┌──────────────────────────────────────┐
│         End of Data Display          │
└──────────────────────────────────────┘
```

Referential Instruction Setup Flow (4)


```
┌──────────────────────────────────────┐
│           Optional Status            │
└──────────────────────────────────────┘
                   ↓
┌──────────────────────────────────────┐
│   Turn Display ON /OFF by            │
│            Instruction               │
│           [Display OFF]              │
└──────────────────────────────────────┘
                   ↓
┌──────────────────────────────────────┐
│  User LCD Power Setup by Internal    │
│            Instructions              │
│       [Voltage Regulator OFF]        │
└──────────────────────────────────────┘
                   ↓   Waiting for ≥ 50ms
┌──────────────────────────────────────┐
│  User LCD Power Setup by Internal    │
│            Instructions              │
│        [Voltage Follower OFF]        │
└──────────────────────────────────────┘
                   ↓   Waiting for ≥ 1ms
┌──────────────────────────────────────┐
│  User LCD Power Setup by Internal    │
│            Instructions              │
│       [Voltage Converter OFF]        │
└──────────────────────────────────────┘
                   ↓   Waiting for ≥ 1ms
┌──────────────────────────────────────┐
│        Power OFF (VDD-VSS)           │
└──────────────────────────────────────┘
```

11、附录
初始化程序参考：

```
//初始化
void lcd_initial(void) small
{

    LCD_RES=1;
    LCD_PS=1;
    LCD_C68=1;
    delay_nms(50);
    send_cmd(0xE2);
    send_cmd(0xA0);
    send_cmd(0xC8);
    send_cmd(0xA2);
    delay_nms(30);
    send_cmd(0x2F);
    delay_nms(30);
    send_cmd(0x25);
    send_cmd(0x81);
    send_cmd(0x3F);
    delay_nms(30);
    send_cmd(0xAF);

}
```

模块外形图
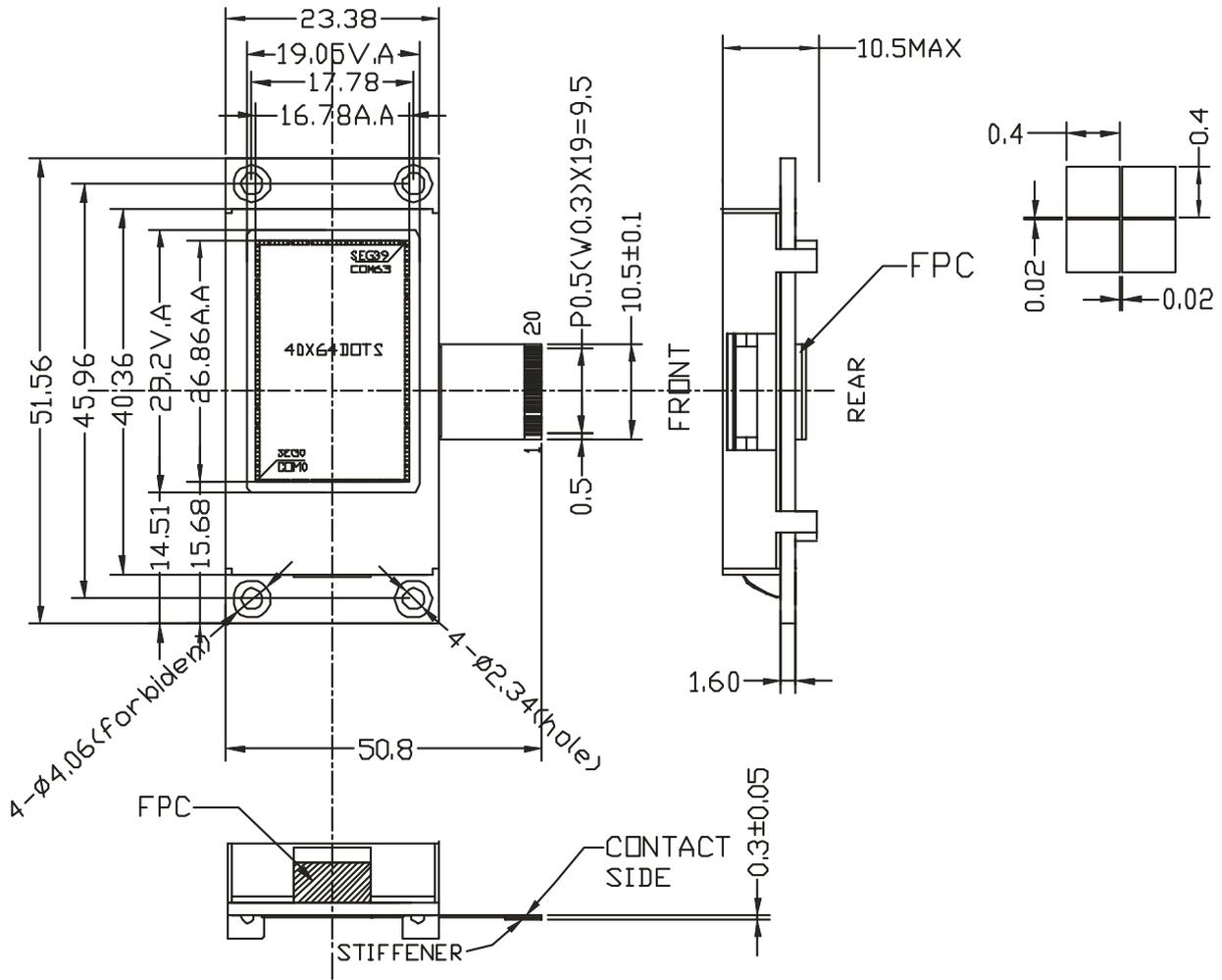
J1 接口定义

1	2	3	4	5	6	7	8	9	10
LED+	LED-	PS	C68	VSS	VDD	（SID）DB7	（SCLK）DB6	DB5	DB4
11	12	13	14	15	16	17	18	19	20
DB3	DB2	DB1	DB0	E/RD	R/W	RS	/RES	/CS1	NC