

深圳市金逸晨电子有限公司

ShenZhen GoldenMorning Electronic Co.,Ltd

PRODUCT SPECIFICATION

Model No	E150XE-W-H25-01
Product Name	1.5 OLED Module
Version	V1.0
Date	2020-05-25

- ☐ Preliminary Specification
- ☒ Final Specification

PREPARED BY	CHECKED BY	APPROVED BY

Revision History

Version	Date	Page	Revise record	Remarks
1.0	2020-05-25	-	First issued	-

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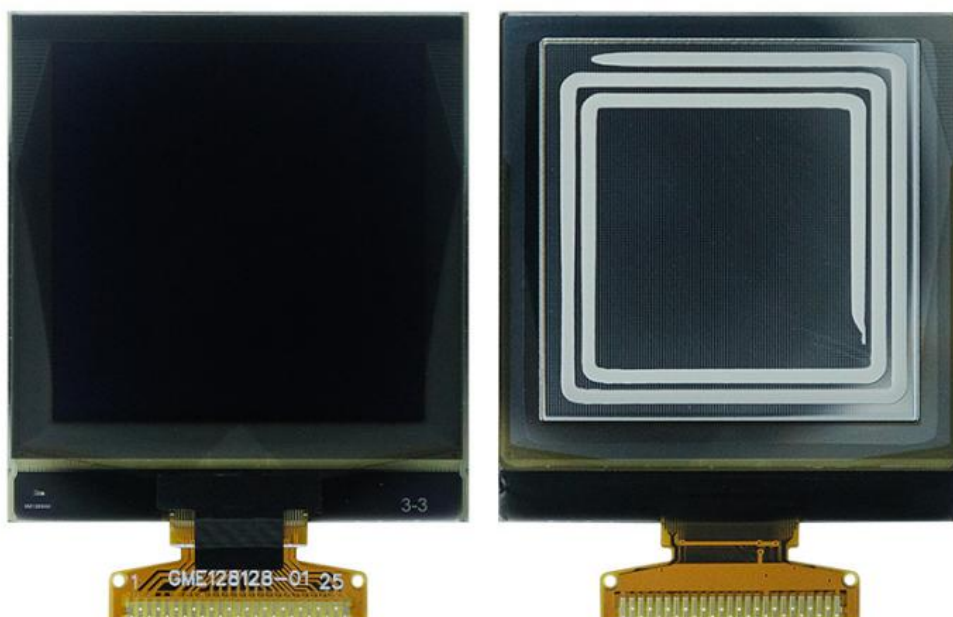
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1. General Parameter

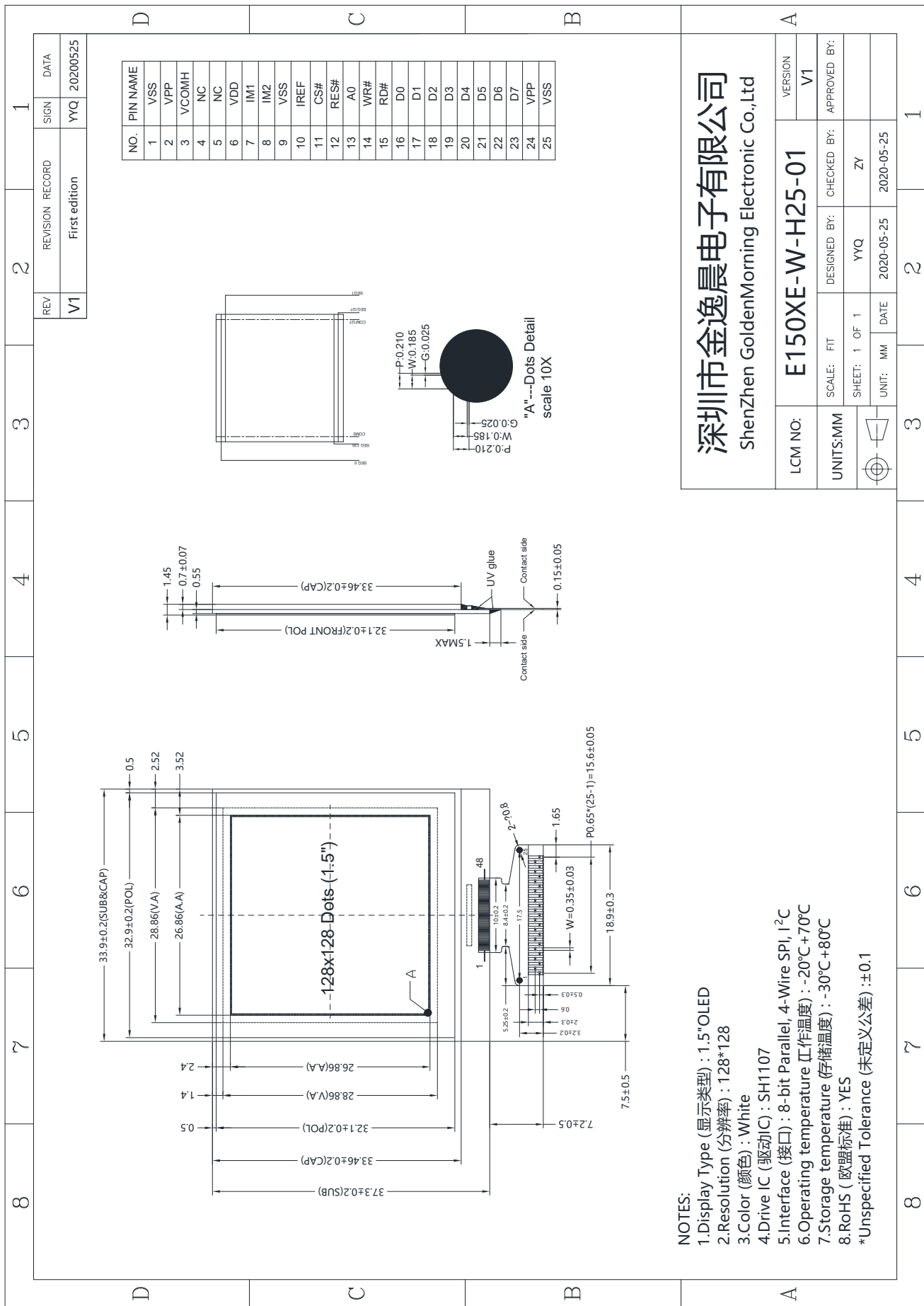
NO.	Features	Details	Unit
1	Display Size(Diagonal)	1.5"	Inch
2	LCD type	OLED	-
3	View Direction	ALL	-
4	Drive Duty	1/128	-
5	Resolution	128x 128	Pixels
6	Module size	33.90(W) x 37.30(H) x 1.45(T)	mm
7	Active Area	26.86(W) x 26.86(H)	mm
8	Pixel Pitch	0.21(W) x 0.21(H)	mm
9	Pixel Size	0.185(W) x 0.185(H)	mm
10	Interface	8-bit Parallel, 4-Wire SPI, I2/C	-
11	Display Colors	White	-
12	Driver IC	SH1107	-
13	IC package type	COG	-
14	Operating Temperature	-20℃~70℃	℃
15	Storage Temperature	-30℃~80℃	℃
16	Weight	3.55	g

Note 1 : Please refer to the mechanical drawing.

2. Physical drawing



3. Mechanical Dimension



4. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Logic Supply Voltage	VDD	-0.3	3.6	V
Supply Voltage for Display	VPP	-0.3	17	V
Operating temperature	Top	-20	70	°C
Storage temperature	Tst	-30	80	°C

Note 1 : All the above voltages are on the basis of “VSS = 0V” .

Note 2 : When this module is used beyond the above absolute maximum ratings, permanent breakage of the module may occur. Also, for normal operations, it is desirable to use this module under the conditions according “Optics & Electrical Characteristics” . If this module is used beyond these conditions, malfunctioning of the module can occur and the reliability of the module may deteriorate.

Note 3 : The defined temperature ranges do not include the polarizer. The maximum withstood temperature of the polarizer should be 80°C.

Note 4 : 50% Checkerboard.End of lifetime is specified as 50% of initial brightness reached. The average operating lifetime at room temperature is estimated by the accelerated operation at high temperature conditions.

5. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Operating voltage	VDD	1.65	-	3.5	V	
DC-DC voltage	AVDD	2.4	3.0	3.5	V	
OLED Operating voltage	VPP	7	15	16.5	V	
Input high voltage	V _{IN}	0.8*VDD	-	-	V	
Input low voltage	V _{IL}	-	-	0.2*VDD	V	
Output high voltage	V _{OH}	0.8*VDD	-	-	V	
Output low voltage	V _{OL}	-	-	0.2*VDD	V	
Dynamic current consumption 1(in VDD)	IDD1	-	110	160	uA	Note 1
Dynamic current consumption 2 (in AVDD)	IDD2	-	190	285	uA	Note 1
OLED dynamic current consumption	IPP	-	1	1.27	mA	Note 2

Note 1 : VDD=3V, AVDD=3V, IREF = -15.625m A, Contrast a= 256, Bulid-in DC-DC ON, VPP=15V, Display ON, display data = All ON, No panel attached.

Note 2 : VDD = 3V, AVDD =3V ,VPP = 15V, IREF = -15.625m A, Contrast a= 256, Display ON, Display data = All ON, No panel attached

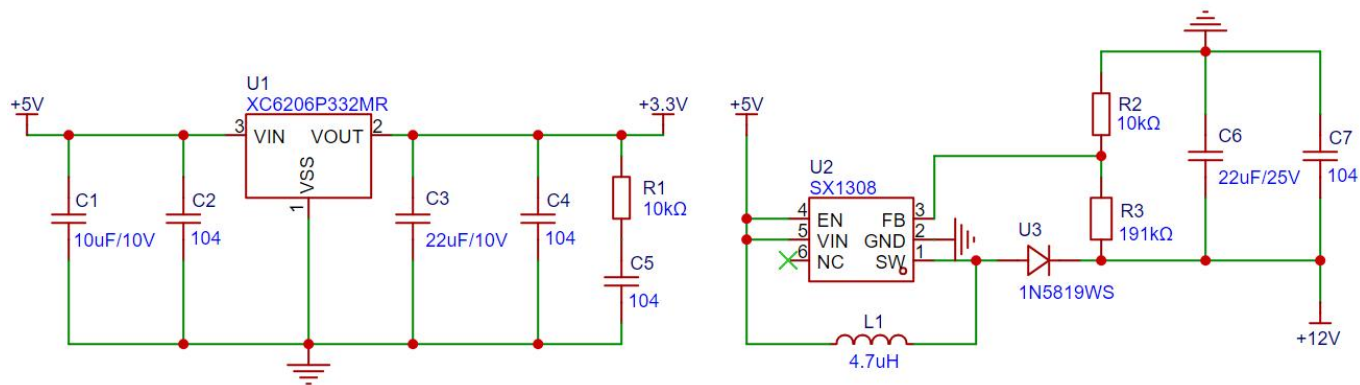
6. Pins Definitions.

Pin.No	Symbol	Description												
1	VSS	Ground output for pad option.												
2	VPP	This is the most positive voltage supply pad of the chip. It should be supplied externally												
3	VCOMH	This is a pad for the voltage output high level for common signals. A capacitor should be connected between this pad and VSS.												
4-5	NC	No connection.												
6	VDD	Power Supply for Logic (1.65V-3.5V)												
7	IM1	Communicating Protocol Select <table><tr><th>Name</th><th>8080</th><th>I²C</th><th>4-Wire SPI</th></tr><tr><td>IM1</td><td>1</td><td>1</td><td>0</td></tr><tr><td>IM2</td><td>1</td><td>0</td><td>0</td></tr></table>	Name	8080	I ² C	4-Wire SPI	IM1	1	1	0	IM2	1	0	0
Name	8080		I ² C	4-Wire SPI										
IM1	1		1	0										
IM2	1	0	0											
8	IM2													
9	VSS	Ground output for pad option.												
10	IREF	This is a segment current reference pad. A resistor should be connected between this pad and VSS. Set the current at 15.625mA												
11	CS#	This pad is the chip select input. When CS# = “L”, then the chip select becomes active, and data/command I/O is enabled.												
12	RES#	This is a reset signal input pad. When RES is set to “L”, the settings are initialized. The reset operation is performed by the RES signal level.												
13	A0 (SA0)	In SPI interface, This is the Data/Command control pad that determines whether the data bits are data or a command. A0 = “H”: display data. A0 = “L”: command registers. In I ² C interface, this pad serves as SA0 to distinguish the different address of OLED driver.												
14	WR#	This is a MPU interface input pad. When connected to an 8080 MPU, this is active LOW. This pad connects to the 8080 MPU WR# signal. The signals on the data bus are latched at the rising edge of the WR# signal. When WR# = “H”: Read. When WR# = “L”: Write.												
15	RD#	This is a MPU interface input pad. When connected to an 8080 series MPU, it is active LOW. This pad is connected to the RD signal of the 8080 series MPU, and the data bus is in an output status when this signal is “L”.												
16-23	D0-D7	This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus. When the serial interface is selected, then D0 serves as the serial clock input pad (SCL) and D1 serves as the serial data input pad (SI). At this time, D2 to D7 are set to high impedance. When the I2C interface is selected, then D0 serves as the serial clock input pad (SCL) and D1 serves as the serial data input pad (SDA). At this time, D2 to D7 are set to high impedance												
24	VPP	This is the most positive voltage supply pad of the chip. It should be supplied externally												
25	VSS	Ground output for pad option.												

Note 1 : See the IC Specification manual for details.

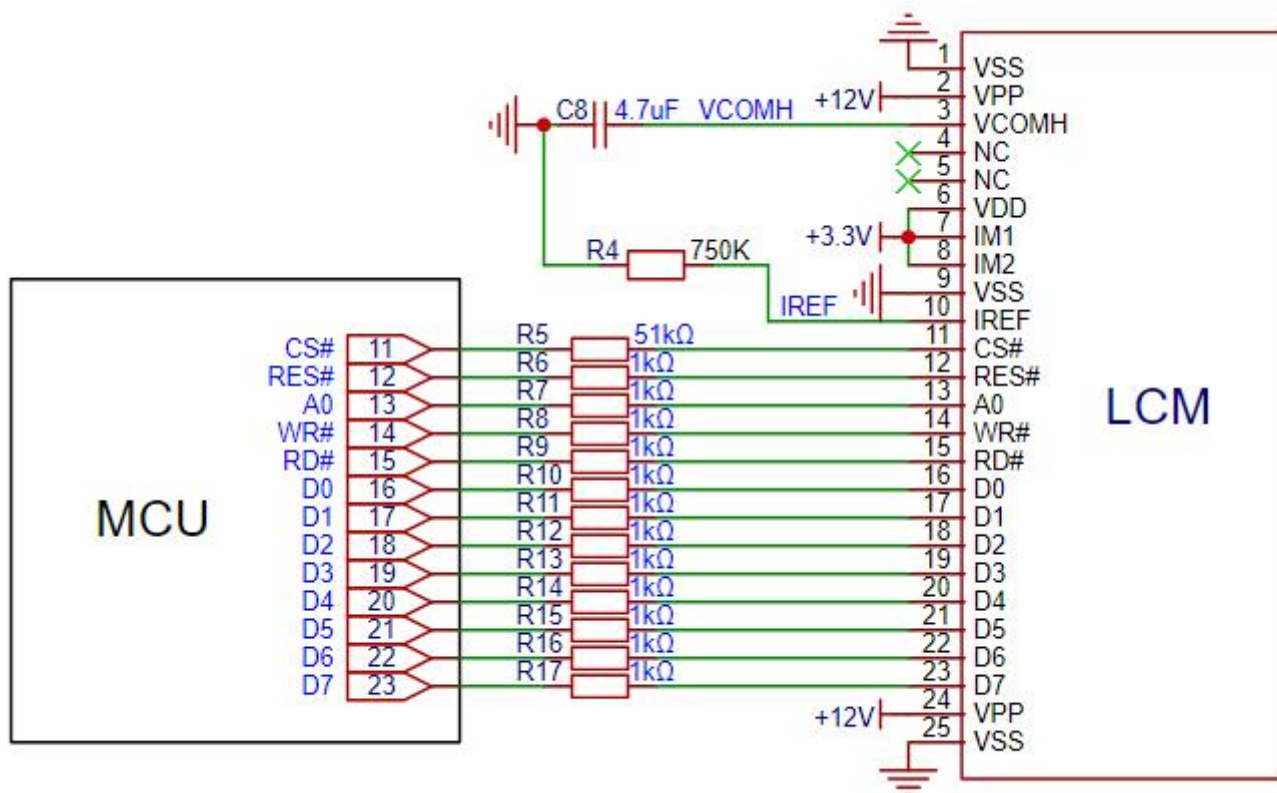
7. Schematic Diagram.

电源参考原理图



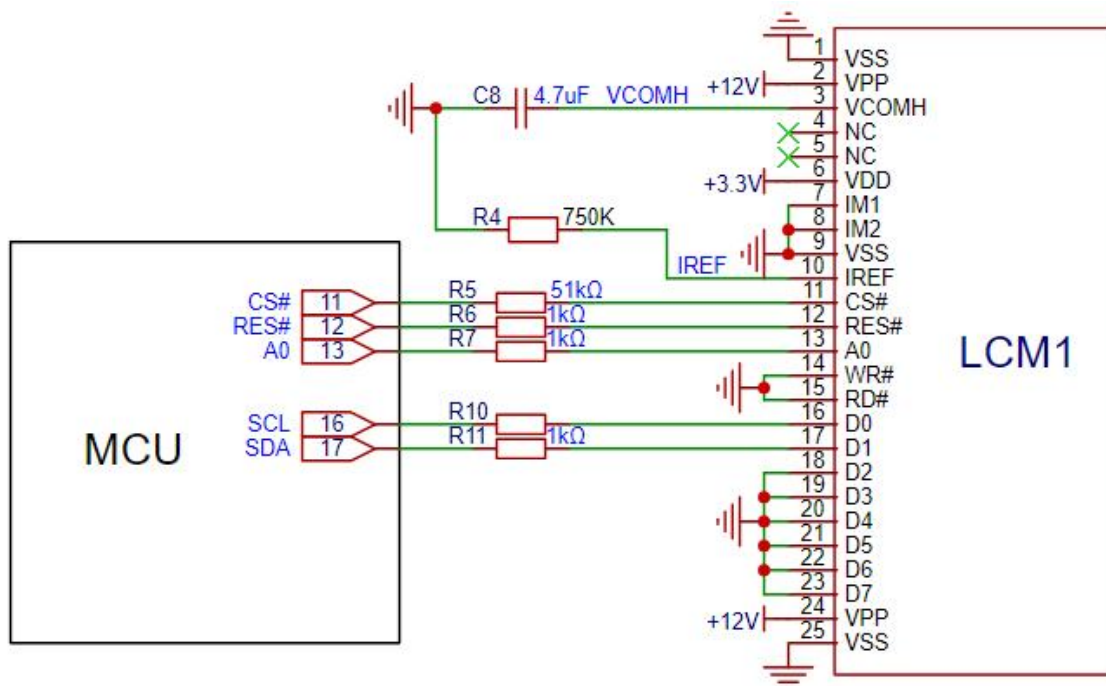
R2: 10k/1% R3: 191k/1%

MCU 8080 8 位 参考原理图

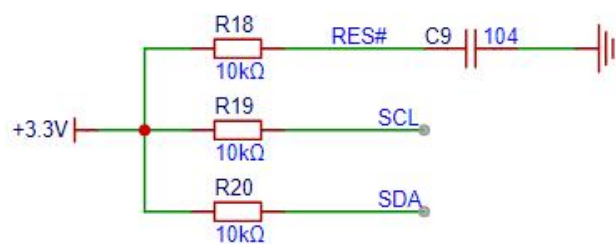
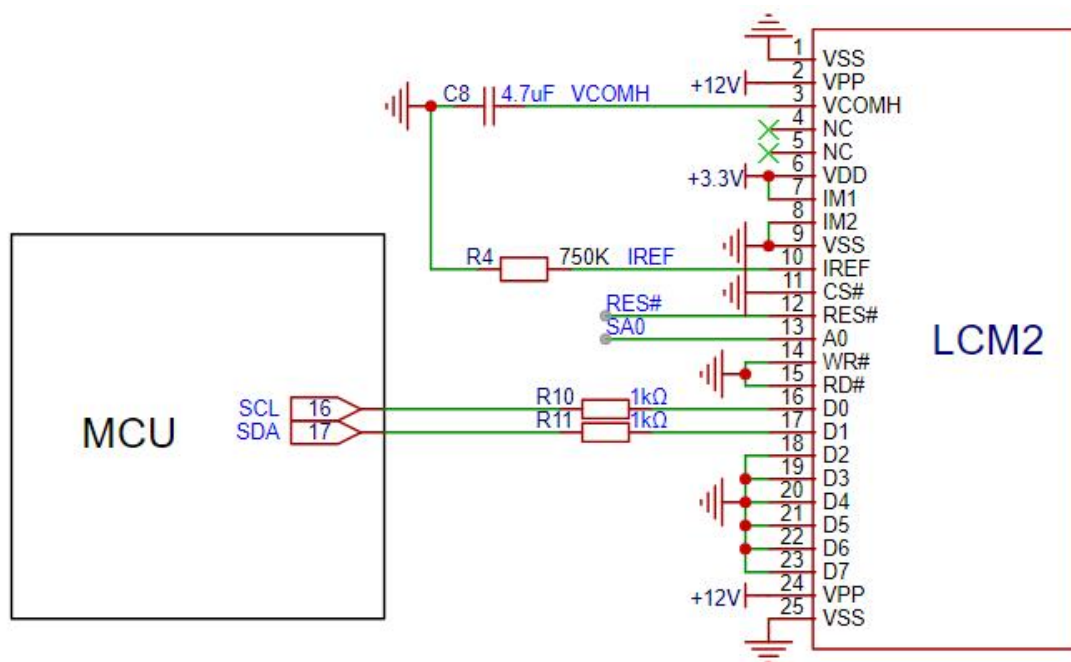


C8: 4.7uF/25V IREF=15.625uA

4 线 SPI 参考原理图



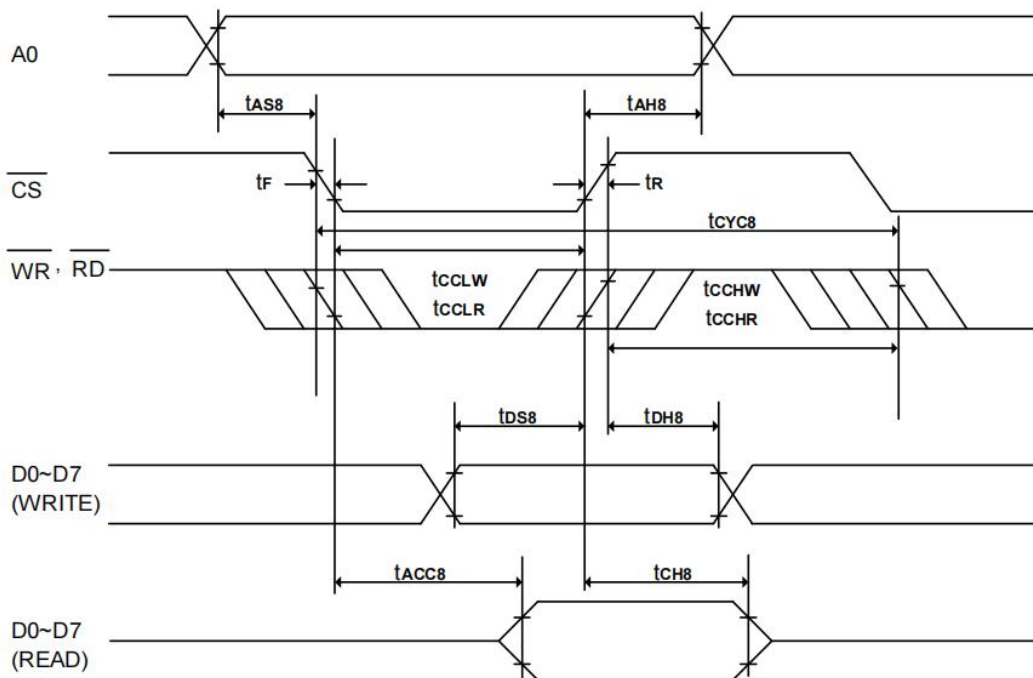
I2C 参考原理图



C8: 4.7uF/25V IREF=15.625uA

8. Timing Characteristics.

Serial interface characteristics (MCU 8080)



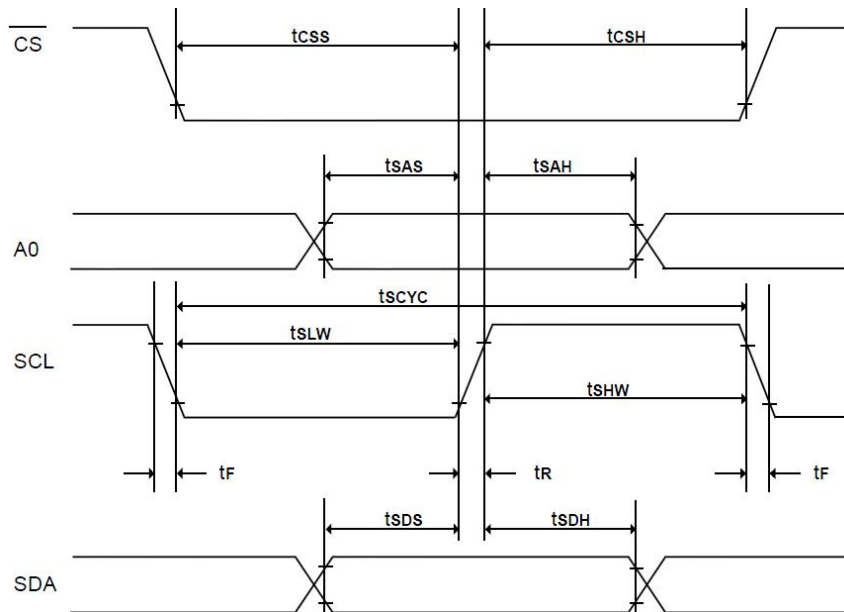
(VDD - VSS = 1.65V~2.4V, TA = 25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tCYC8	System cycle time	300	-	-	ns	
tAS8	Address setup time	0	-	-	ns	
tAH8	Address hold time	0	-	-	ns	
tDS8	Data setup time	40	-	-	ns	
tDH8	Data hold time	30	-	-	ns	
tCH8	Output disable time	10	-	70	ns	CL = 100pF
tACC8	RD access time	-	-	280	ns	CL = 100pF
tCCLW	Control L pulse width (WR)	100	-	-	ns	
tCCLR	Control L pulse width (RD)	120	-	-	ns	
tCCHW	Control H pulse width (WR)	100	-	-	ns	
tCCHR	Control H pulse width (RD)	100	-	-	ns	
tR	Rise time	-	-	15	ns	
tF	Fall time	-	-	15	ns	

(VDD - VSS = 2.4V~3.5V, TA = 25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tCYC8	System cycle time	300	-	-	ns	
tAS8	Address setup time	0	-	-	ns	
tAH8	Address hold time	0	-	-	ns	
tDS8	Data setup time	40	-	-	ns	
tDH8	Data hold time	15	-	-	ns	
tCH8	Output disable time	10	-	70	ns	CL = 100pF
tACC8	RD access time	-	-	140	ns	CL = 100pF
tCCLW	Control L pulse width (WR)	100	-	-	ns	
tCCLR	Control L pulse width (RD)	120	-	-	ns	
tCCHW	Control H pulse width (WR)	100	-	-	ns	
tCCHR	Control H pulse width (RD)	100	-	-	ns	
tR	Rise time	-	-	15	ns	
tF	Fall time	-	-	15	ns	

Serial interface characteristics (4 Wire SPI)



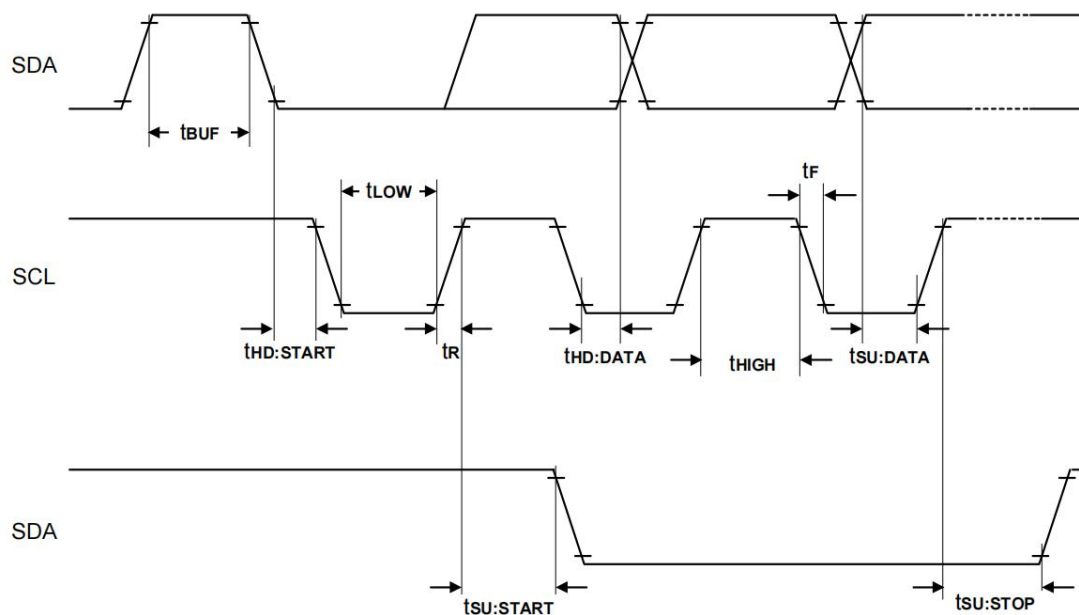
(VDD - VSS = 1.65V~2.4V, TA = 25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tSCYC	Serial clock cycle	500	-	-	ns	
tSAS	Address setup time	300	-	-	ns	
tSAH	Address hold time	300	-	-	ns	
tSDS	Data setup time	200	-	-	ns	
tSDH	Data hold time	200	-	-	ns	
tCSS	CS $\overline{\text{setup}}$ time	240	-	-	ns	
tCSH	CS $\overline{\text{hold}}$ time time	120	-	-	ns	
tSHW	Serial clock H pulse width	200	-	-	ns	
tSLW	Serial clock L pulse width	200	-	-	ns	
tR	Rise time	-	-	30	ns	
tF	Fall time	-	-	30	ns	

(VDD - VSS = 2.4V~3.5V, TA = 25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tSCYC	Serial clock cycle	250	-	-	ns	
tSAS	Address setup time	150	-	-	ns	
tSAH	Address hold time	150	-	-	ns	
tSDS	Data setup time	100	-	-	ns	
tSDH	Data hold time	100	-	-	ns	
tCSS	CS $\overline{\text{setup}}$ time	120	-	-	ns	
tCSH	CS $\overline{\text{hold}}$ time time	60	-	-	ns	
tSHW	Serial clock H pulse width	100	-	-	ns	
tSLW	Serial clock L pulse width	100	-	-	ns	
tR	Rise time	-	-	15	ns	
tF	Fall time	-	-	15	ns	

Serial interface characteristics (I²C)



(VDD - VSS = 1.65V~3.5V, TA = 25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
fSCL	SCL clock frequency	DC	-	400	kHz	
TLOW	SCL clock Low pulse width	1.3	-	-	μs	
THIGH	SCL clock H pulse width	0.6	-	-	μs	
TSU:DATA	data setup time	100	-	-	ns	
THD:DATA	data hold time	0	-	0.9	μs	
TR	SCL, SDA rise time	20+0.1Cb	-	300	ns	
TF	SCL, SDA fall time	20+0.1Cb	-	300	ns	
Cb	Capacity load on each bus line	-	-	400	pF	
TSU:START	Setup time for re-START	0.6	-	-	μs	
THD:START	START Hold time	0.6	-	-	μs	
TSU:STOP	Setup time for STOP	0.6	-	-	μs	
TBUF	Bus free times between STOP and START condition	1.3	-	-	μs	

9. Optical Characteristics.

All data in below based the condition (Ta = 22±3℃, 60±10%RH).

Items		Symbol	Min.	Typ.	Max.	Unit	Remark
Operating Luminance		L	80	100*	-	cd/m ²	-
Color Coordinate	White	CIE x	0.25	0.29	0.33	CIE1931	Darkroom
		CIE y	0.29	0.33	0.37		
Operating Life Time*		Top	20,000	-	-	Hours	L= 100 cd/m2

Note:

- 1.L=90 cd/m2 is based on VDD=3.0V, VPP=13.0V, Contrast command setting 0x2F.
- 2.Life Time is defined when the Luminance has decayed to less than 50% of the initial Luminance specification.
(Odd and even chess board alternately displayed).
(The initial value should be closed to the typical value after adjusting.)

The above data are the data of OLED MODULE with polarizer, for reference only.

10. Reliability

10.1. MTBF

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal.

10.2. Test Condition

No	Item	Condition	Criteria
1	High Temperature Operating	70℃*24Hrs	1. No Defect Of Operational Function In Room Temperature Are Allowable. 2. IDD of LCM in Pre-and Post-Test Should Follow Specification.
2	Low Temperature Operating	-20℃*24Hrs	
3	High Humidity Storage	50℃*90%RH*24Hrs	
4	High Temperature Storage	80℃*24Hrs	
5	Low Temperature Storage	-30℃*24Hrs	
6	Thermal Cycling Test Storage	-	
7	Packing vibration	-	
8	Electrical Static Discharge	-	
		-	
9	Drop Test (Packaged)	-	

Note 1 : The test samples should be applied to only one test item.

Note 2 : Sample size for each test item is 2pcs.

Note 3 : No defective function allowable.

11. Precautions

11.1. Storage Conditions

- 11.1.1. Store the panel or module in a dark place where the temperature is $23\pm5^{\circ}\text{C}$ and the humidity is below $45\pm20\%\text{RH}$.
- 11.1.2. Store in anti-static electricity container.
- 11.1.3. Store in clean environment, free from dust, active gas, and solvent.
- 11.1.4. Do not place the module near organics solvents or corrosive gases.
- 11.1.5. Do not crush, shake, or jolt the module.
- 11.1.6. Strong light exposure causes degradation of polarizer and color filter.

11.2. Handling Precautions

- 11.2.1. Avoid static electricity, which can damage the CMOS LSI.
- 11.2.2. The polarizing plate of the display is very fragile, please handle it very carefully.
- 11.2.3. Do not give external shock.
- 11.2.4. Do not apply excessive force on the surface.
- 11.2.5. Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.
- 11.2.6. Reverse and use within ratings in order to keep performance and prevent damage
- 11.2.7. Do not remove the panel or frame from the module.
- 11.2.8. Except for soldering the interface, do not make any alterations or modifications with a soldering iron; Ensure welding temperature at 320°C to 350°C , the welding time control within the 10 s, welding note don't stay too long in the same place to avoid scald FPC.

11.3. Limited Warranty

- 11.3.1. Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss. (我们的保证责任仅限于修理和/或更换。我们将不负任何相应的损失。)
- 11.3.2. If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used. (如果可能, 我们建议客户在 6 个月内用完所有模块。如果模块存放时间超过 12 个月, 我们建议在使用模块前重新检查。)
- 11.3.3. The warranty period is twelve months from the date of delivery. Buyer shall complete the assembly of all processes within twelve months of validity. During the warranty period, if the product quality problems, our company will be responsible for repair and replacement. All products must be stored and handled in accordance with regulations. Under warranty. When the goods do not comply with the above terms, we do not provide warranty services. (保修期为交货之日起十二个月。买方应在 12 个月内完成所有流程的组装。在保修期内, 如果产品出现质量问题, 我公司将负责维修和更换。所有产品必须按照规定储存和处理。在保修期内。当货物不符合上述条款时, 我们不提供保修服务。)