LCD MODULE

MODULE NO. :

GME128128-02 SERIES

Customer:
Approved by:

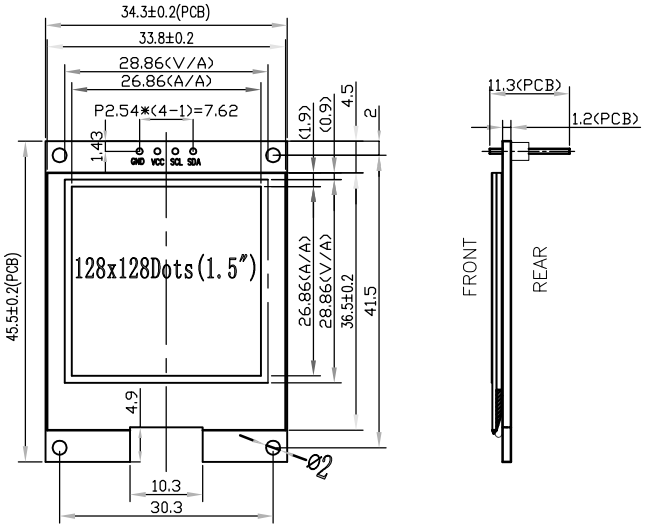
RECORDS OF REVISION

Part Number	Revision	Revision Content	Revised on
GME128128-02	V1.0	First issue	2019-07-22

CONTENTS

VER.	REVISED RECORD	DATA
V1.0	第一次发行	2019-07-22

1.外形图



2.功能&特性

2-1. 点阵: 128X128 Dots
2-2. 模式: 正性
2-3. 支持16级灰度显示
2-4. 接口方式: IIC
2-5. 工作电压 (VDD): 3.3V~5V
2-6. LCD驱动电压Vcc(VOP): 14.5~15.5V
2-7. 工作温度: -40℃~70℃
2-8. 储存温度: -40℃~85℃
2-9. 连接方式/驱动IC:COG/SSD1327Z

3.机械规格

3-1. 模块尺寸: 34.3mm(L)*45.5mm(W)*11.3Maxmm(T)
3-2. 可视区域(V/A): 28.86mm(L)*28.86mm(W)
3-3. 有效区域(A/A): 26.86mm(L)*26.86mm(W)
3-4. 点距离: 0.21mm(L)*0.21mm(W)
3-5. 点尺寸: 0.19mm(L)*0.19mm(W)

PIN	DESCRIPTION
1	GND
2	VCC
3	SCL
4	SDA

SHEET: 1 of 1

APPROVALS		DATE
DWN	ZJP	2019-07-22
CHK		
APP		

MODEL NUMBER : GME128128-02_LCM

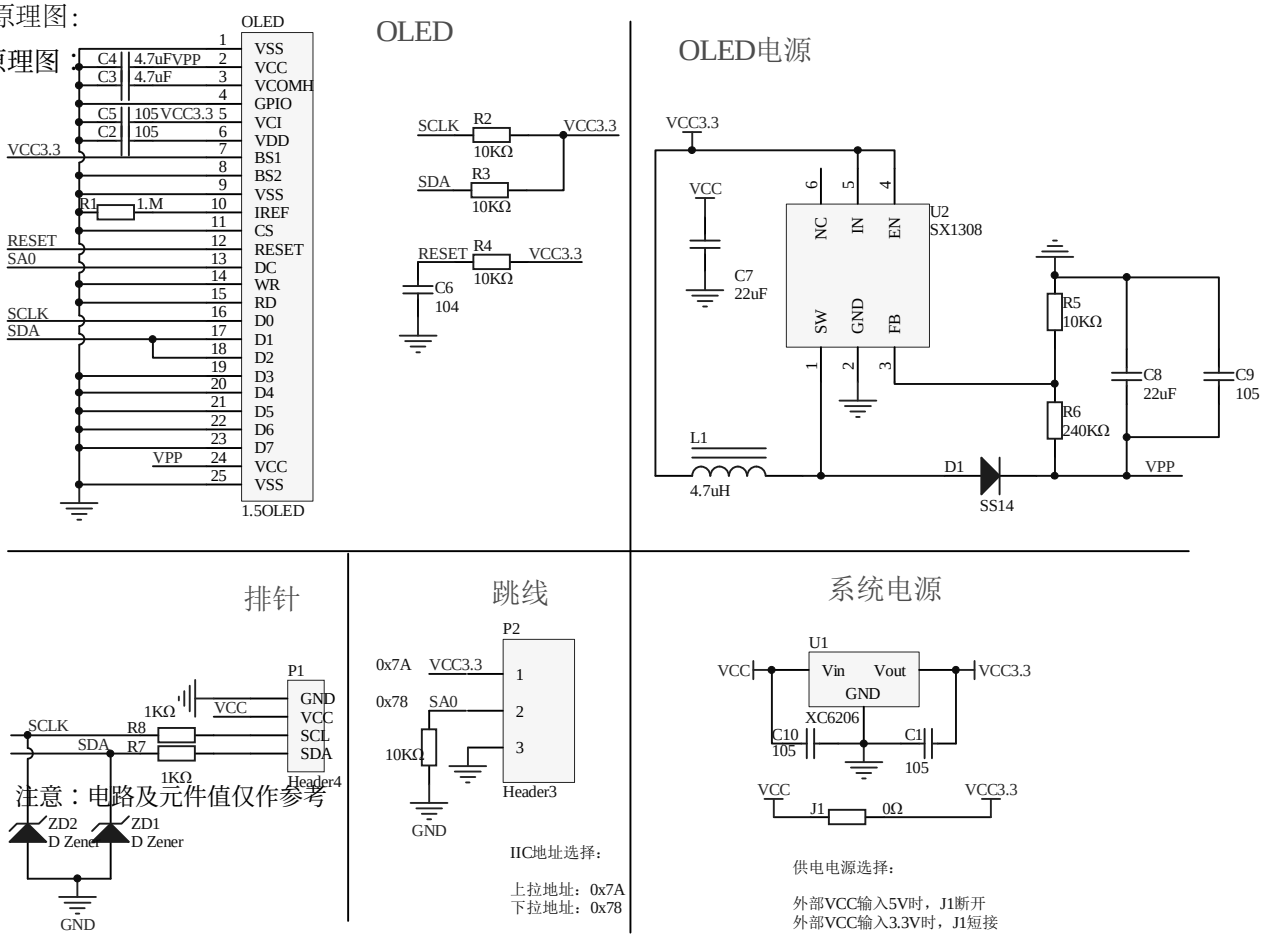
SCALE: Unspecified TOL:± 0.1

UNITS: MM

DO NOT SCALE THIS DRAWING.

4. 原理图:

原理图：



注意：电路及元件值仅作参考

注意：电路及元件值仅作参考

5. 引脚说明:

Pin no.	Symbol	Function
1	GND	地
2	VDD	LCD工作电压(3.3~5V)
3	SCL	时钟
4	SDA	数据

K
A

6. 电气特性

6-1 DC 电气特性

SYMBOL	PARAMETERS	TEST CONDITION	MIN	TYP	MAX	UNIT
V_{CC}	Driver power supply (for OLED panel)	-	14.5	15	15.5	V
V_{CI}	Low voltage power supply	-	2.6	-	3.5	V
V_{OH}	High logic output level	Iout=100 uA,	0.9* V_{CI}	-	V_{CI}	V
V_{OL}	Low logic output level	Iout=100uA,	0	-	0.1* V_{CI}	V
V_{IH}	High logic input level	Iout=100uA,	0.8* V_{CI}	-	V_{CI}	V
V_{IL}	Low logic input level	Iout=100uA,	0	-	0.2* V_{CI}	V
I_{CC}	V_{CC} Supply Current	V_{CI} = 3.5V, V_{CC} = 18V, Display ON, No panel attached, contrast = FF	External V_{DD}= 2.5V	600	750	uA
			Internal V_{DD}= 2.5V	600	750	
I_{CI}	V_{CI} Supply Current	V_{CI} = 3.5V, V_{CC} = 18V, Display ON, No panel attached, contrast = FF	External V_{DD}= 2.5V	35	50	uA
			Internal V_{DD}= 2.5V	95	120	
I_{SEG}	Segment output current Setting V_{CC}=18V, IREF=10uA	Contrast=FF	-	300	370	uA
		Contrast=AF	-	206	-	uA
		Contrast=7F	-	150	-	uA
		Contrast=3F	-	75	-	uA
		Contrast=1F	-	37.5	-	uA

6-2 AC 电气特性

Conditions:

Voltage referenced to V_{SS}
V_{DD} = 2.4 to2.6V
T_A = 25°C

AC Characteristics Table

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
F_{OSC} (1)	Oscillation Frequency of Display Timing Generator	V_{CI} = 2.8V, internal V_{DD}	535	595	655	kHz
F_{FRM}	Frame Frequency for 128 MUX Mode	128x128 Graphic Display Mode, Display ON, Internal Oscillator Enabled	-	F_{OSC} * 1 / (D * K * 128)(2)	-	Hz
t_{RES}	Reset low pulse width (RES#)	-	2000	-	-	ns

Note

(1) F_{OSC} stands for the frequency value of the internal oscillator and the value is measured when command B3h A[7:4] is in default value.

(2) D: divide ratio
K: Phase 1 period + Phase 2 period + X
X: DCLKs in current drive period.
Default K is 4 + 7 + 30 = 41

6-3 ELECTRO-OPTICAL CHARACTERISTICS

PANEL ELECTRICAL SPECIFICATIONS

PARAMETER	MIN	TYP.	MAX	UNITS	COMMENTS
Normal mode current consumption	-	32	34	mA	All pixels on
Standby mode current consumption	-	3	4	mA	Standby mode 10% pixels on
Normal mode power consumption	-	480	510	mW	All pixels on
Standby mode power consumption	-	45	60	mW	Standby mode 10% pixels on
Pixel Luminance	70	90		cd/m^2	Display Average
Standby Luminance		20		cd/m^2	
CIEx (White)	0.24	0.28	0.32		CIE1931
CIEy (White)	0.28	0.32	0.36		CIE1931
Dark Room Contrast	2000:1				
Viewing Angle	160			degree	
Response Time		10		μs	

Normal mode condition :

- Driving Voltage : 15V
- Contrast setting : 0x77
- Frame rate : 105Hz
- Duty setting : 1/128

Standby mode condition :

- Driving Voltage : 15V
- Contrast setting : 0x14
- Frame rate : 105Hz
- Duty setting : 1/128

7. 指令表

(R/W#(WR#) = 0, E(RD#) = 1 unless specific setting is stated)

1. Fundamental Command Table											
D/C#	**Hex**	**D7**	**D6**	**D5**	**D4**	**D3**	**D2**	**D1**	**D0**	**Command**	**Description**
0 0 0	15 A[5:0] B[5:0]	0 * *	0 * *	0 A_5 A_5	1 A_4 A_4	0 A_3 A_3	1 A_2 A_2	0 A_1 A_1	1 A_0 A_0	Set Column Address	Setup Column start and end address A[5:0]: Start Address, range:00h~3Fh, (RESET = 00h) B[5:0]: End Address, range:00h~3Fh, (RESET = 3Fh)
0 0 0	75 A[6:0] B[6:0]	0 * *	0 A_6 A_6	0 A_5 A_5	1 A_4 A_4	0 A_3 A_3	1 A_2 A_2	0 A_1 A_1	1 A_0 A_0	Set Row Address	Setup Row start and end address A[6:0]: Start Address, range:00h~7Fh, (RESET = 00h) B[6:0]: End Address, range:00h~7Fh, (RESET = 7Fh)
0 0	81 A[7:0]	1 A_7	0 A_6	0 A_5	0 A_4	0 A_3	0 A_2	0 A_1	1 A_0	Set Contrast Control	Double byte command to select 1 out of 256 contrast steps. Contrast increases as the value increases. (RESET = 7Fh)
0	84 ~ 86	1	0	0	0	0	1	X_1	X_0	Reserved	Command for no operation
0 0	A0 A[7:0]	1 0	0 A_6	1 0	0 A_4	0 0	0 A_2	0 A_1	0 A_0	Set Re-map	Re-map setting in Graphic Display Data RAM (GDDRAM) A[0] = 0b, Disable Column Address Re-map (RESET) A[0] = 1b, Enable Column Address Re-map A[1] = 0b, Disable Nibble Re-map (RESET) A[1] = 1b, Enable Nibble Re-map A[2] = 0b, Enable Horizontal Address Increment (RESET) A[2] = 1b, Enable Vertical Address Increment A[3] = 0b, Reserved (RESET) A[4] = 0b, Disable COM Re-map (RESET) A[4] = 1b, Enable COM Re-map A[5] = 0b, Reserved (RESET) A[6] = 0b, Disable COM Split Odd Even (RESET) A[6] = 1b, Enable COM Split Odd Even A[7] = 0b, Reserved (RESET)
0 0	A1 A[6:0]	1 *	0 A_6	1 A_5	0 A_4	0 A_3	0 A_2	0 A_1	1 A_0	Set Display Start Line	A[6:0]: Vertical shift by setting the starting address of display RAM from 0 ~ 127 (RESET = 00h)

1. Fundamental Command Table											
D/C#	**Hex**	**D7**	**D6**	**D5**	**D4**	**D3**	**D2**	**D1**	**D0**	**Command**	**Description**
0 0	A2 A[6:0]	1 *	0 A_6	1 A_5	0 A_4	0 A_3	0 A_2	1 A_1	0 A_0	Set Display Offset	A[6:0]: Set vertical offset by COM from 0 ~ 127 (RESET = 00h) e.g. Set A[6:0] to 010000b to move COM16 towards COM0 direction for 16 row
0	A4 ~ A7	1	0	1	0	0	1	X_1	X_0	Set Display Mode	A4h = Normal display (RESET) A5h = All ON (All pixels have gray scale of 15, GS15) A6h = All OFF (All pixels have gray scale of 0, GS0) A7h = Inverse Display (GS0 → GS15, GS1 → GS14, GS2 → GS13, …)
0 0	A8 A[6:0]	1 *	0 A_6	1 A_5	0 A_4	1 A_3	0 A_2	0 A_1	0 A_0	Set MUX Ratio	A[6:0]: Set MUX ratio from 16MUX ~ 128MUX: A[6:0] = 15 represents 16MUX A[6:0] = 16 represents 17MUX : A[6:0] = 126 represents 127MUX A[6:0] = 127 represents 128MUX (RESET) It should be noted that A[6:0]=0~14 is not allowed
0 0	AB A[0]	1 0	0 0	1 0	0 0	1 0	0 0	1 0	1 A_0	Function Selection A	A[0]=0b, Select external V_{DD} (i.e. Disable internal V_{DD} regulator) A[0]=1b, Enable internal V_{DD} regulator (RESET)
0	AE / AF	1	0	1	0	1	1	1	A_0	Set Display ON/OFF	A[0] = 0b, AEh = Display OFF (sleep mode) (RESET) A[0] = 1b, AFh = Display ON in normal mode
0 0	B1 A[7:0]	1 A_7	0 A_6	1 A_5	1 A_4	0 A_3	0 A_2	0 A_1	1 A_0	Set Phase Length	A[3:0]: Phase 1 period of 1~15 DCLK's e.g. A[3:0] = 1111b, 15 DCLK Clock (RESET = 0100b) A[7:4]: Phase 2 period of 1~15 DCLK's e.g. A[7:4] = 1111b, 15 DCLK Clocks (RESET = 0111b) **Note** (1) 0 DCLK is invalid in phase 1 & phase 2 (2) GS15 level pulse width must be set larger than the period of phase 1 + phase 2
0	B2	1	0	1	1	0	0	1	0	NOP	Command for no operation

1. Fundamental Command Table

D/C#	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0 0	B3 A[7:0]	1 A_7	0 A_6	1 A_5	1 A_4	0 A_3	0 A_2	1 A_1	1 A_0	Set Front Clock Divider /Oscillator Frequency	A[3:0]: Define divide ratio (D) of display clock (DCLK) Divide ratio=A[3:0]+1 (RESET is 0000b, i.e. divide ratio = 1) A[7:4]: Set the Oscillator Frequency, F_{OSC}. Oscillator Frequency increases with the value of A[7:4] and vice versa. (Range:0000b~1111b) (RESET = 0000b)
0 0	B5 A[1:0]	1 0	0 0	1 0	1 0	0 0	1 0	0 A_1	1 A_0	GPIO	A[1:0] = 00b represents GPIO pin HiZ, input disable (always read as low) A[1:0] = 01b represents GPIO pin HiZ, input enable A[1:0] = 10b represents GPIO pin output Low (RESET) A[1:0] = 11b represents GPIO pin output High
0 0	B6 A[3:0]	1 *	0 *	1 *	1 *	0 A_3	1 A_2	1 A_1	0 A_0	Set Second pre-charge Period	A[3:0]: Second Pre-charge period of 1~15 DCLK's e.g. A[3:0] = 1111b, 15 DCLK Clock (RESET = 0100b) **Note** (1) This command is used to adjust the second pre-charge period after enabling the second pre-charge by setting A[1] = 1b in command D5h
0 0 0 … … … 0 0	B8 A1[5:0] A2[5:0] … … … A14[5:0] A15[5:0]	1 * * … … … * *	0 * * … … … * *	1 $A1_5$ $A2_5$ … … … $A14_5$ $A15_5$	1 $A1_4$ $A2_4$ … … … $A14_4$ $A15_4$	1 $A1_3$ $A2_3$ … … … $A14_3$ $A15_3$	0 $A1_2$ $A2_2$ … … … $A14_2$ $A15_2$	0 $A1_1$ $A2_1$ … … … $A14_1$ $A15_1$	0 $A1_0$ $A2_0$ … … … $A14_0$ $A15_0$	Set Gray Scale Table	The next 15 data bytes set the gray scale pulse width in unit of DCLK's. A1[5:0], value for GS1 level Pulse width A2[5:0], value for GS2 level Pulse width … A14[5:0], value for GS14 level Pulse width A15[5:0], value for GS15 level Pulse width **Note** (1) The pulse width value of GS1, GS2, ... , GS15 should not be equal. i.e. 0<GS1<GS2 … <GS15 (2) GS15 level pulse width must be set larger than the period of phase 1 + phase 2
0	B9	1	0	1	1	1	0	0	1	Linear LUT	The default Linear Gray Scale table is set in unit of DCLK's as follow GS0 level pulse width = 0; GS1 level pulse width = 0; GS2 level pulse width = 2; GS3 level pulse width = 4; : : GS14 level pulse width = 26; GS15 level pulse width = 28

1. Fundamental Command Table

D/C#	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0	BB	1	0	1	1	1	0	1	1	NOP	Command for no operation
0 0	BC A[3:0]	1 0	0 0	1 0	1 0	1 A_3	1 A_2	0 A_1	0 A_0	Set Pre-charge voltage	Set pre-charge voltage level. **A[3:0] / Hex code / Pre-charge voltage** 0000 / 00h / 0.20 x V_{CC} : / : / : 0101 / 05h / 0.5 x V_{CC} (RESET) : / : / : 0111 / 07h / 0.613 x V_{CC} 1xxx / 08h / V_{COMH}
0 0	BE A[2:0]	1 0	0 0	1 0	1 0	1 0	1 A_2	1 A_1	0 A_0	Set V_{COMH}	Set COM deselect voltage level. **A[2:0] / Hex code / V_{COMH}** 000 / 00h / 0.72 x V_{CC} : / : / : 101 / 05h / 0.82 x V_{CC} (RESET) : / : / : 111 / 07h / 0.86 x V_{CC}
0 0	D5 A[2:0]	1 0	1 1	0 1	1 0	0 0	1 0	0 A_1	1 A_0	Function Selection B	A[1] = 0b: Disable second precharge (RESET) A[1] = 1b: Enable second precharge A[0] = 0b: Internal VSL (RESET) A[0] = 1b: Enable external VSL **Note** (1) Refer to Table 7-1 for VSL pin details
0 0	FD A[2]	1 0	1 0	1 0	1 1	1 0	1 A_2	0 1	1 0	Set Command Lock	A[2]: MCU protection status. A[2] = 0b, Unlock OLED driver IC MCU interface from entering command (RESET) A[2] = 1b, Lock OLED driver IC MCU interface from entering command **Note** (1) The locked OLED driver IC MCU interface prohibits all commands and memory access except the FDh command

2. **Scrolling Command Table**

D/C#	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0	26 / 27	0	0	1	0	0	1	1	X_0	Continuous Horizontal Scroll Setup	26h, X[0]=0, Right Horizontal Scroll 27h, X[0]=1, Left Horizontal Scroll (Horizontal scroll by 1 column) A[7:0] : Dummy byte (Set as 00h) B[2:0] : Define start row address; range:00h~7Fh, (RESET = 00h) C[2:0] : Set time interval between each scroll step in terms of frame frequency 000b – 6 frames / 100b – 3 frames 001b – 32 frames / 101b – 4 frames 010b – 64 frames / 110b – 5 frame 011b – 256 frames / 111b – 2 frame D[2:0] : Define end row address; range:00h~7Fh, (RESET = 7Fh) The value of D[2:0] must be larger or equal to B[2:0] E[7:0] : Define start column address; range:00h~3Fh, (RESET = 00h) F[7:0] : Define end column address; range:00h~3Fh, (RESET = 3Fh) The value of F[2:0] must be larger or equal to E[2:0] G[7:0] : Dummy byte (Set as 00h)
0	A[7:0]	0	0	0	0	0	0	0	0		
0	B[6:0]	*	B_6	B_5	B_4	B_3	B_2	B_1	B_0		
0	C[2:0]	*	*	*	0	0	C_2	C_1	C_0		
0	D[6:0]	*	D_6	D_5	D_4	D_3	D_2	D_1	D_0		
0	E[5:0]	*	*	E_5	E_4	E_3	E_2	E_1	E_0		
0	F[5:0]	*	*	F_5	F_4	F_3	F_2	F_1	F_0		
0	G[7:0]	0	0	0	0	0	0	0	0		
0	2E	0	0	1	0	1	1	1	0	Deactivate scroll	Stop scrolling that is configured by command 26h/27h **Note** (1) After sending 2Eh command to deactivate the scrolling action, the ram data needs to be rewritten.
0	2F	0	0	1	0	1	1	1	1	Activate scroll	Start scrolling that is configured by the scrolling setup commands :26h/27h with the following valid sequences: Valid command sequence 1: 26h ;2Fh. Valid command sequence 2: 27h ;2Fh.

Note

(1) "*" stands for "Don't care".