

# 深圳市金逸晨电子有限公司

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**LCD MODULE**

MODULE NO. :

**GME128128-02 SERIES**

**Customer:**

Approved by:

深圳市金逸晨电子有限公司

Approved by

Checked by

Prepared by

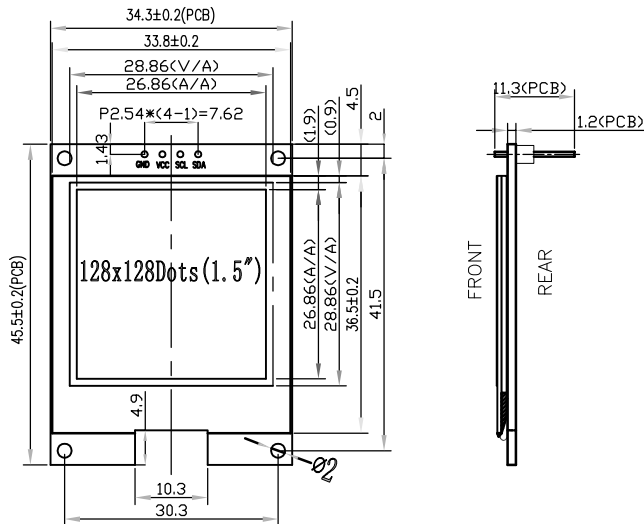


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| VER. | REVISED RECORD | DATA       |
|------|----------------|------------|
| V1.0 | 第一次发行          | 2019-07-22 |

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         |

|               |      |                                 |        |
|---------------|------|---------------------------------|--------|
|               |      | 金逸晨电子有限公司                       |        |
| SHEET: 1 of 1 |      | MODEL NUMBER : GME128128-02_LCM |        |
| APPROVALS     | DATE | SCALE:                          | UNITS: |
| DWN           | ZJP  | 2019-07-22                      | MM     |
| CHK           |      | Unspecified TOL:± 0.1           |        |
| APP           |      | DO NOT SCALE THIS DRAWING.      |        |



## 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<br>(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                                                                 | $I_{out}=100\text{ }\mu\text{A}$ ,                                                                    | $0.9*V_{CI}$                     | -    | $V_{CI}$     | V             |
| $V_{OL}$  | Low logic output level                                                                  | $I_{out}=100\text{ }\mu\text{A}$ ,                                                                    | 0                                | -    | $0.1*V_{CI}$ | V             |
| $V_{IH}$  | High logic input level                                                                  | $I_{out}=100\text{ }\mu\text{A}$ ,                                                                    | $0.8*V_{CI}$                     | -    | $V_{CI}$     | V             |
| $V_{IL}$  | Low logic input level                                                                   | $I_{out}=100\text{ }\mu\text{A}$ ,                                                                    | 0                                | -    | $0.2*V_{CI}$ | V             |
| $I_{CC}$  | $V_{CC}$ Supply Current                                                                 | $V_{CI}=3.5\text{V}$ ,<br>$V_{CC}=18\text{V}$ ,<br>Display ON,<br>No panel attached,<br>contrast = FF | External<br>$V_{DD}=2.5\text{V}$ | 600  | 750          | $\mu\text{A}$ |
|           |                                                                                         |                                                                                                       | Internal<br>$V_{DD}=2.5\text{V}$ | 600  | 750          |               |
| $I_{CI}$  | $V_{CI}$ Supply Current                                                                 | $V_{CI}=3.5\text{V}$ ,<br>$V_{CC}=18\text{V}$ ,<br>Display ON,<br>No panel attached,<br>contrast = FF | External<br>$V_{DD}=2.5\text{V}$ | 35   | 50           | $\mu\text{A}$ |
|           |                                                                                         |                                                                                                       | Internal<br>$V_{DD}=2.5\text{V}$ | 95   | 120          |               |
| $I_{SEG}$ | Segment output current Setting<br>$V_{CC}=18\text{V}$ , $I_{REF}=10\text{ }\mu\text{A}$ | Contrast=FF                                                                                           | -                                | 300  | 370          | $\mu\text{A}$ |
|           |                                                                                         | Contrast=AF                                                                                           | -                                | 206  | -            | $\mu\text{A}$ |
|           |                                                                                         | Contrast=7F                                                                                           | -                                | 150  | -            | $\mu\text{A}$ |
|           |                                                                                         | Contrast=3F                                                                                           | -                                | 75   | -            | $\mu\text{A}$ |
|           |                                                                                         | Contrast=1F                                                                                           | -                                | 37.5 | -            | $\mu\text{A}$ |

## 6-2 AC 电气特性

### Conditions:

Voltage referenced to  $V_{SS}$

$V_{DD} = 2.4$  to  $2.6V$

$T_A = 25^{\circ}C$

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

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

<sup>(2)</sup> 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 <sup>2</sup> | Display Average            |
| Standby Luminance                |        | 20   |      | cd/m <sup>2</sup> |                            |
| CIE <sub>x</sub> (White)         | 0.24   | 0.28 | 0.32 |                   | CIE1931                    |
| CIE <sub>y</sub> (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<br>0<br>0                  | 15<br>A[5:0]<br>B[5:0] | 0<br>*<br>*         | 0<br>*<br>*                           | 0<br>A <sub>5</sub><br>A <sub>5</sub> | 1<br>A <sub>4</sub><br>A <sub>4</sub> | 0<br>A <sub>3</sub><br>A <sub>3</sub> | 1<br>A <sub>2</sub><br>A <sub>2</sub> | 0<br>A <sub>1</sub><br>A <sub>1</sub> | 1<br>A <sub>0</sub><br>A <sub>0</sub> | Set Column Address     | Setup Column start and end address<br>A[5:0]: Start Address, range:00h~3Fh, (RESET = 00h)<br>B[5:0]: End Address, range:00h~3Fh, (RESET = 3Fh)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 0<br>0<br>0                  | 75<br>A[6:0]<br>B[6:0] | 0<br>*<br>*         | 0<br>A <sub>6</sub><br>A <sub>6</sub> | 0<br>A <sub>5</sub><br>A <sub>5</sub> | 1<br>A <sub>4</sub><br>A <sub>4</sub> | 0<br>A <sub>3</sub><br>A <sub>3</sub> | 1<br>A <sub>2</sub><br>A <sub>2</sub> | 0<br>A <sub>1</sub><br>A <sub>1</sub> | 1<br>A <sub>0</sub><br>A <sub>0</sub> | Set Row Address        | Setup Row start and end address<br>A[6:0]: Start Address, range:00h~7Fh, (RESET = 00h)<br>B[6:0]: End Address, range:00h~7Fh, (RESET = 7Fh)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 0<br>0                       | 81<br>A[7:0]           | 1<br>A <sub>7</sub> | 0<br>A <sub>6</sub>                   | 0<br>A <sub>5</sub>                   | 0<br>A <sub>4</sub>                   | 0<br>A <sub>3</sub>                   | 0<br>A <sub>2</sub>                   | 0<br>A <sub>1</sub>                   | 1<br>A <sub>0</sub>                   | 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 <sub>1</sub>                        | X <sub>0</sub>                        | Reserved               | Command for no operation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 0<br>0                       | A0<br>A[7:0]           | 1<br>0              | 0<br>A <sub>6</sub>                   | 1<br>0                                | 0<br>A <sub>4</sub>                   | 0<br>0                                | 0<br>A <sub>2</sub>                   | 0<br>A <sub>1</sub>                   | 0<br>A <sub>0</sub>                   | Set Re-map             | Re-map setting in Graphic Display Data RAM (GDDRAM)<br><br>A[0] = 0b, Disable Column Address Re-map (RESET)<br>A[0] = 1b, Enable Column Address Re-map<br><br>A[1] = 0b, Disable Nibble Re-map (RESET)<br>A[1] = 1b, Enable Nibble Re-map<br><br>A[2] = 0b, Enable Horizontal Address Increment (RESET)<br>A[2] = 1b, Enable Vertical Address Increment<br><br>A[3] = 0b, Reserved (RESET)<br><br>A[4] = 0b, Disable COM Re-map (RESET)<br>A[4] = 1b, Enable COM Re-map<br><br>A[5] = 0b, Reserved (RESET)<br><br>A[6] = 0b, Disable COM Split Odd Even (RESET)<br>A[6] = 1b, Enable COM Split Odd Even<br><br>A[7] = 0b, Reserved (RESET) |
| 0<br>0                       | A1<br>A[6:0]           | 1<br>*              | 0<br>A <sub>6</sub>                   | 1<br>A <sub>5</sub>                   | 0<br>A <sub>4</sub>                   | 0<br>A <sub>3</sub>                   | 0<br>A <sub>2</sub>                   | 0<br>A <sub>1</sub>                   | 1<br>A <sub>0</sub>                   | 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<br>0 | A2<br>A[6:0] | 1<br>*              | 0<br>A <sub>6</sub> | 1<br>A <sub>5</sub> | 0<br>A <sub>4</sub> | 0<br>A <sub>3</sub> | 0<br>A <sub>2</sub> | 1<br>A <sub>1</sub> | 0<br>A <sub>0</sub> | Set Display Offset   | A[6:0]: Set vertical offset by COM from 0 ~ 127 (RESET = 00h)<br><br>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 <sub>1</sub>      | X <sub>0</sub>      | Set Display Mode     | A4h = Normal display (RESET)<br><br>A5h = All ON (All pixels have gray scale of 15, GS15)<br><br>A6h = All OFF (All pixels have gray scale of 0, GS0)<br><br>A7h = Inverse Display (GS0 → GS15, GS1 → GS14, GS2 → GS13, ...)                                                                                                                                                         |
| 0<br>0 | A8<br>A[6:0] | 1<br>*              | 0<br>A <sub>6</sub> | 1<br>A <sub>5</sub> | 0<br>A <sub>4</sub> | 1<br>A <sub>3</sub> | 0<br>A <sub>2</sub> | 0<br>A <sub>1</sub> | 0<br>A <sub>0</sub> | Set MUX Ratio        | A[6:0]: Set MUX ratio from 16MUX ~ 128MUX:<br><br>A[6:0] = 15 represents 16MUX<br>A[6:0] = 16 represents 17MUX<br>:<br>A[6:0] = 126 represents 127MUX<br>A[6:0] = 127 represents 128MUX (RESET)<br><br>It should be noted that A[6:0]=0~14 is not allowed                                                                                                                            |
| 0<br>0 | AB<br>A[0]   | 1<br>0              | 0<br>0              | 1<br>0              | 0<br>0              | 1<br>0              | 0<br>0              | 1<br>0              | 1<br>A <sub>0</sub> | Function Selection A | A[0]=0b, Select external V <sub>DD</sub> (i.e. Disable internal V <sub>DD</sub> regulator)<br><br>A[0]=1b, Enable internal V <sub>DD</sub> regulator (RESET)                                                                                                                                                                                                                         |
| 0      | AE / AF      | 1                   | 0                   | 1                   | 0                   | 1                   | 1                   | 1                   | A <sub>0</sub>      | Set Display ON/OFF   | A[0] = 0b, AEh = Display OFF (sleep mode) (RESET)<br><br>A[0] = 1b, AFh = Display ON in normal mode                                                                                                                                                                                                                                                                                  |
| 0<br>0 | B1<br>A[7:0] | 1<br>A <sub>7</sub> | 0<br>A <sub>6</sub> | 1<br>A <sub>5</sub> | 1<br>A <sub>4</sub> | 0<br>A <sub>3</sub> | 0<br>A <sub>2</sub> | 0<br>A <sub>1</sub> | 1<br>A <sub>0</sub> | Set Phase Length     | A[3:0]: Phase 1 period of 1~15 DCLK's<br>e.g. A[3:0] = 1111b, 15 DCLK Clock (RESET = 0100b)<br><br>A[7:4]: Phase 2 period of 1~15 DCLK's<br>e.g. A[7:4] = 1111b, 15 DCLK Clocks (RESET = 0111b)<br><br><b>Note</b><br>( <sup>1</sup> ) 0 DCLK is invalid in phase 1 & phase 2<br><br>( <sup>2</sup> ) 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<br>0                                     | B3<br>A[7:0]                                                          | 1<br>A <sub>7</sub>                        | 0<br>A <sub>6</sub>                        | 1<br>A <sub>5</sub>                                                                                  | 1<br>A <sub>4</sub>                                                                                  | 0<br>A <sub>3</sub>                                                                                  | 0<br>A <sub>2</sub>                                                                                  | 1<br>A <sub>1</sub>                                                                                  | 1<br>A <sub>0</sub>                                                                                  | Set Front Clock<br>Divider /Oscillator<br>Frequency | <p>A[3:0]: Define divide ratio (D) of display clock (DCLK)<br/>Divide ratio=A[3:0]+1<br/>(RESET is 0000b, i.e. divide ratio = 1)</p> <p>A[7:4]: Set the Oscillator Frequency, F<sub>OSC</sub>.<br/>Oscillator Frequency increases with the value of A[7:4] and vice versa.<br/>(Range:0000b~1111b)<br/>(RESET = 0000b)</p>                                                                                                                                                                               |
| 0<br>0                                     | B5<br>A[1:0]                                                          | 1<br>0                                     | 0<br>0                                     | 1<br>0                                                                                               | 1<br>0                                                                                               | 0<br>0                                                                                               | 1<br>0                                                                                               | 0<br>A <sub>1</sub>                                                                                  | 1<br>A <sub>0</sub>                                                                                  | GPIO                                                | <p>A[1:0] = 00b represents GPIO pin HiZ, input disable (always read as low)</p> <p>A[1:0] = 01b represents GPIO pin HiZ, input enable</p> <p>A[1:0] = 10b represents GPIO pin output Low (RESET)</p> <p>A[1:0] = 11b represents GPIO pin output High</p>                                                                                                                                                                                                                                                 |
| 0<br>0                                     | B6<br>A[3:0]                                                          | 1<br>*                                     | 0<br>*                                     | 1<br>*                                                                                               | 1<br>*                                                                                               | 0<br>A <sub>3</sub>                                                                                  | 1<br>A <sub>2</sub>                                                                                  | 1<br>A <sub>1</sub>                                                                                  | 0<br>A <sub>0</sub>                                                                                  | Set Second pre-charge Period                        | <p>A[3:0]: Second Pre-charge period of 1~15 DCLK's<br/>e.g. A[3:0] = 1111b, 15 DCLK Clock<br/>(RESET = 0100b)</p> <p><b>Note</b><br/>(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</p>                                                                                                                                                                                                                        |
| 0<br>0<br>0<br>...<br>...<br>...<br>0<br>0 | B8<br>A1[5:0]<br>A2[5:0]<br>...<br>...<br>...<br>A14[5:0]<br>A15[5:0] | 1<br>*<br>*<br>...<br>...<br>...<br>*<br>* | 0<br>*<br>*<br>...<br>...<br>...<br>*<br>* | 1<br>A1 <sub>5</sub><br>A2 <sub>5</sub><br>...<br>...<br>...<br>A14 <sub>5</sub><br>A15 <sub>5</sub> | 1<br>A1 <sub>4</sub><br>A2 <sub>4</sub><br>...<br>...<br>...<br>A14 <sub>4</sub><br>A15 <sub>4</sub> | 1<br>A1 <sub>3</sub><br>A2 <sub>3</sub><br>...<br>...<br>...<br>A14 <sub>3</sub><br>A15 <sub>3</sub> | 0<br>A1 <sub>2</sub><br>A2 <sub>2</sub><br>...<br>...<br>...<br>A14 <sub>2</sub><br>A15 <sub>2</sub> | 0<br>A1 <sub>1</sub><br>A2 <sub>1</sub><br>...<br>...<br>...<br>A14 <sub>1</sub><br>A15 <sub>1</sub> | 0<br>A1 <sub>0</sub><br>A2 <sub>0</sub><br>...<br>...<br>...<br>A14 <sub>0</sub><br>A15 <sub>0</sub> | Set Gray Scale Table                                | <p>The next 15 data bytes set the gray scale pulse width in unit of DCLK's.</p> <p>A1[5:0], value for GS1 level Pulse width<br/>A2[5:0], value for GS2 level Pulse width<br/>...<br/>A14[5:0], value for GS14 level Pulse width<br/>A15[5:0], value for GS15 level Pulse width</p> <p><b>Note</b><br/>(1) The pulse width value of GS1, GS2, ..., GS15 should not be equal. i.e. 0&lt;GS1&lt;GS2 ... &lt;GS15<br/>(2) GS15 level pulse width must be set larger than the period of phase 1 + phase 2</p> |
| 0                                          | B9                                                                    | 1                                          | 0                                          | 1                                                                                                    | 1                                                                                                    | 1                                                                                                    | 0                                                                                                    | 0                                                                                                    | 1                                                                                                    | Linear LUT                                          | <p>The default Linear Gray Scale table is set in unit of DCLK's as follow</p> <p>GS0 level pulse width = 0;<br/>GS1 level pulse width = 0;<br/>GS2 level pulse width = 2;<br/>GS3 level pulse width = 4;<br/>:<br/>:<br/>GS14 level pulse width = 26;<br/>GS15 level pulse width = 28</p>                                                                                                                                                                                                                |

| 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                            | BC       | 1                              | 0  | 1  | 1  | 1              | 1              | 0              | 0              | Set Pre-charge voltage | Set pre-charge voltage level. <div><table><tr><th>A[3:0]</th><th>Hex code</th><th>Pre-charge voltage</th></tr><tr><td>0000</td><td>00h</td><td>0.20 x V<sub>CC</sub></td></tr><tr><td>:</td><td>:</td><td>:</td></tr><tr><td>0101</td><td>05h</td><td>0.5 x V<sub>CC</sub> (RESET)</td></tr><tr><td>:</td><td>:</td><td>:</td></tr><tr><td>0111</td><td>07h</td><td>0.613 x V<sub>CC</sub></td></tr><tr><td>1xxx</td><td>08h</td><td>V<sub>COMH</sub></td></tr></table></div> | A[3:0] | Hex code | Pre-charge voltage | 0000 | 00h | 0.20 x V <sub>CC</sub> | : | : | : | 0101 | 05h | 0.5 x V <sub>CC</sub> (RESET)  | : | : | : | 0111 | 07h | 0.613 x V <sub>CC</sub> | 1xxx | 08h | V <sub>COMH</sub> |
| A[3:0]                       | Hex code | Pre-charge voltage             |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 0000                         | 00h      | 0.20 x V <sub>CC</sub>         |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| :                            | :        | :                              |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 0101                         | 05h      | 0.5 x V <sub>CC</sub> (RESET)  |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| :                            | :        | :                              |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 0111                         | 07h      | 0.613 x V <sub>CC</sub>        |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 1xxx                         | 08h      | V <sub>COMH</sub>              |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 0                            | A[3:0]   | 0                              | 0  | 0  | 0  | A <sub>3</sub> | A <sub>2</sub> | A <sub>1</sub> | A <sub>0</sub> |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 0                            | BE       | 1                              | 0  | 1  | 1  | 1              | 1              | 1              | 0              | Set V <sub>COMH</sub>  | Set COM deselect voltage level. <div><table><tr><th>A[2:0]</th><th>Hex code</th><th>V<sub>COMH</sub></th></tr><tr><td>000</td><td>00h</td><td>0.72 x V<sub>CC</sub></td></tr><tr><td>:</td><td>:</td><td>:</td></tr><tr><td>101</td><td>05h</td><td>0.82 x V<sub>CC</sub> (RESET)</td></tr><tr><td>:</td><td>:</td><td>:</td></tr><tr><td>111</td><td>07h</td><td>0.86 x V<sub>CC</sub></td></tr></table></div>                                                               | A[2:0] | Hex code | V <sub>COMH</sub>  | 000  | 00h | 0.72 x V <sub>CC</sub> | : | : | : | 101  | 05h | 0.82 x V <sub>CC</sub> (RESET) | : | : | : | 111  | 07h | 0.86 x V <sub>CC</sub>  |      |     |                   |
| A[2:0]                       | Hex code | V <sub>COMH</sub>              |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 000                          | 00h      | 0.72 x V <sub>CC</sub>         |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| :                            | :        | :                              |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 101                          | 05h      | 0.82 x V <sub>CC</sub> (RESET) |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| :                            | :        | :                              |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 111                          | 07h      | 0.86 x V <sub>CC</sub>         |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 0                            | A[2:0]   | 0                              | 0  | 0  | 0  | 0              | A <sub>2</sub> | A <sub>1</sub> | A <sub>0</sub> |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 0                            | D5       | 1                              | 1  | 0  | 1  | 0              | 1              | 0              | 1              | Function Selection B   | A[1] = 0b: Disable second precharge (RESET)<br>A[1] = 1b: Enable second precharge<br><br>A[0] = 0b: Internal VSL (RESET)<br>A[0] = 1b: Enable external VSL<br><br><b>Note</b><br>(1) Refer to Table 7-1 for VSL pin details                                                                                                                                                                                                                                                   |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 0                            | A[2:0]   | 0                              | 1  | 1  | 0  | 0              | 0              | A <sub>1</sub> | A <sub>0</sub> |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 0                            | FD       | 1                              | 1  | 1  | 1  | 1              | 1              | 0              | 1              | Set Command Lock       | A[2]: MCU protection status.<br><br>A[2] = 0b, Unlock OLED driver IC MCU interface from entering command (RESET)<br>A[2] = 1b, Lock OLED driver IC MCU interface from entering command<br><br><b>Note</b><br>(1) The locked OLED driver IC MCU interface prohibits all commands and memory access except the FDh command                                                                                                                                                      |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
| 0                            | A[2]     | 0                              | 0  | 0  | 1  | 0              | A <sub>2</sub> | 1              | 0              |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |
|                              |          |                                |    |    |    |                |                |                |                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |          |                    |      |     |                        |   |   |   |      |     |                                |   |   |   |      |     |                         |      |     |                   |

**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 <sub>0</sub> | Continuous        | 26h, X[0]=0, Right Horizontal Scroll                                                                                                                                                                                                                                                                                                                                                     |                 |                 |                  |                 |                  |                |                   |                |
| 0                 | A[7:0]          | 0  | 0              | 0              | 0              | 0              | 0              | 0              | 0              | Horizontal Scroll | 27h, X[0]=1, Left Horizontal Scroll                                                                                                                                                                                                                                                                                                                                                      |                 |                 |                  |                 |                  |                |                   |                |
| 0                 | B[6:0]          | *  | B <sub>6</sub> | B <sub>5</sub> | B <sub>4</sub> | B <sub>3</sub> | B <sub>2</sub> | B <sub>1</sub> | B <sub>0</sub> | Setup             | (Horizontal scroll by 1 column)                                                                                                                                                                                                                                                                                                                                                          |                 |                 |                  |                 |                  |                |                   |                |
| 0                 | C[2:0]          | *  | *              | *              | 0              | 0              | C <sub>2</sub> | C <sub>1</sub> | C <sub>0</sub> |                   | A[7:0] : Dummy byte (Set as 00h)                                                                                                                                                                                                                                                                                                                                                         |                 |                 |                  |                 |                  |                |                   |                |
| 0                 | D[6:0]          | *  | D <sub>6</sub> | D <sub>5</sub> | D <sub>4</sub> | D <sub>3</sub> | D <sub>2</sub> | D <sub>1</sub> | D <sub>0</sub> |                   | B[2:0] : Define start row address; range:00h~7Fh,<br>(RESET = 00h)                                                                                                                                                                                                                                                                                                                       |                 |                 |                  |                 |                  |                |                   |                |
| 0                 | E[5:0]          | *  | *              | E <sub>5</sub> | E <sub>4</sub> | E <sub>3</sub> | E <sub>2</sub> | E <sub>1</sub> | E <sub>0</sub> |                   | C[2:0] : Set time interval between each scroll step in terms<br>of frame frequency                                                                                                                                                                                                                                                                                                       |                 |                 |                  |                 |                  |                |                   |                |
| 0                 | F[5:0]          | *  | *              | F <sub>5</sub> | F <sub>4</sub> | F <sub>3</sub> | F <sub>2</sub> | F <sub>1</sub> | F <sub>0</sub> |                   | <table><tr><td>000b – 6 frames</td><td>100b – 3 frames</td></tr><tr><td>001b – 32 frames</td><td>101b – 4 frames</td></tr><tr><td>010b – 64 frames</td><td>110b – 5 frame</td></tr><tr><td>011b – 256 frames</td><td>111b – 2 frame</td></tr></table>                                                                                                                                    | 000b – 6 frames | 100b – 3 frames | 001b – 32 frames | 101b – 4 frames | 010b – 64 frames | 110b – 5 frame | 011b – 256 frames | 111b – 2 frame |
| 000b – 6 frames   | 100b – 3 frames |    |                |                |                |                |                |                |                |                   |                                                                                                                                                                                                                                                                                                                                                                                          |                 |                 |                  |                 |                  |                |                   |                |
| 001b – 32 frames  | 101b – 4 frames |    |                |                |                |                |                |                |                |                   |                                                                                                                                                                                                                                                                                                                                                                                          |                 |                 |                  |                 |                  |                |                   |                |
| 010b – 64 frames  | 110b – 5 frame  |    |                |                |                |                |                |                |                |                   |                                                                                                                                                                                                                                                                                                                                                                                          |                 |                 |                  |                 |                  |                |                   |                |
| 011b – 256 frames | 111b – 2 frame  |    |                |                |                |                |                |                |                |                   |                                                                                                                                                                                                                                                                                                                                                                                          |                 |                 |                  |                 |                  |                |                   |                |
| 0                 | G[7:0]          | 0  | 0              | 0              | 0              | 0              | 0              | 0              | 0              |                   | D[2:0] : Define end row address; range:00h~7Fh,<br>(RESET = 7Fh)<br>The value of D[2:0] must be larger or equal to<br>B[2:0]<br><br>E[7:0] : Define start column address; range:00h~3Fh,<br>(RESET = 00h)<br><br>F[7:0] : Define end column address; range:00h~3Fh,<br>(RESET = 3Fh)<br>The value of F[2:0] must be larger or equal to<br>E[2:0]<br><br>G[7:0] : Dummy byte (Set as 00h) |                 |                 |                  |                 |                  |                |                   |                |
| 0                 | 2E              | 0  | 0              | 1              | 0              | 1              | 1              | 1              | 0              | Deactivate scroll | Stop scrolling that is configured by command 26h/27h<br><br><b>Note</b><br>( <sup>1</sup> ) After sending 2Eh command to deactivate the scrolling<br>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<br>commands :26h/27h with the following valid<br>sequences:<br><br>Valid command sequence 1: 26h ;2Fh.<br>Valid command sequence 2: 27h ;2Fh.                                                                                                                                                                                  |                 |                 |                  |                 |                  |                |                   |                |

**Note**

(1) “\*” stands for “Don’t care”.