



中显液晶  
技术资料



# 中显COG玻璃使用说明书

## ZX12864-6786B

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# 1.GENERAL DESCRIPTION

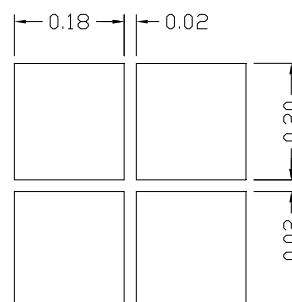
The ZX12864SPIDA-6786B is a 128X64 DOTS MATRIX LCD module which is fabricated by low power COMS technology. It has an FSTN panel composed of 128 segments and 64 commons. The LCM can be easily accessed by microcontroller via serial data interface.

## 2.FEATURES

|                     |                                 |     |
|---------------------|---------------------------------|-----|
| Display Model       | TRANSFLECTIVE and POSITIVE type |     |
|                     | FSTN Mode                       | LCD |
| Display Format      | 128X64 DOTS MATRIX              |     |
| Input Data          | Serial data input from MPU      |     |
| Multiplexing Ration | 1/64Duty , 1/9Bias              |     |
| Viewing Direction   | 6 O'clock                       |     |
| DRIVER              | ST7567                          |     |

## 3.MECHANICAL SPECIFICATION

| Item               | Specifications            | Unit |
|--------------------|---------------------------|------|
| Module Size(W*H*T) | 31.0X (22.5+13.5) X1.7MAX | mm   |
| Viewing Area (W*H) | 29.0X16.35                | mm   |
| Dot Pitch (W*H)    | 0.20X0.22                 | mm   |
| Dot Size (W*H)     | 0.18X0.20                 | mm   |
| Active Area (W*H)  | 25.58X14.06               | mm   |
| Number of Dots     | 128X64                    | ---  |



## 5. PIN DESCRIPTIONS

| PIN | SYMBOL | I/O | FUNCTION                                                                                                                                 |
|-----|--------|-----|------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | CSB    | I/O | The chip select signal                                                                                                                   |
| 2   | REST   | I/O | When /RES is set to “L” the setting are initialized                                                                                      |
| 3   | A0     | I/O | This is connect to the least significant bit of the normal MPU address bus, and it determines whether the data bits are data or command. |
| 4   | SCL    | I/O | The serial clock input                                                                                                                   |
| 5   | SI     | I/O | Serial data input                                                                                                                        |
| 6   | VDD    | –   | Power supply                                                                                                                             |
| 7   | VSS    | –   | Ground                                                                                                                                   |
| 8   | V0     | –   | V0 is the LCD driving voltage for common circuits at negative frame.                                                                     |
| 9   | XV0    | –   | XV0 is the LCD driving voltage for common circuits at positive frame.                                                                    |
| 10  | VG     | –   | VG is the LCD driving voltage for segment circuits.                                                                                      |
| 11  | NC     | –   | –                                                                                                                                        |
| 12  |        |     |                                                                                                                                          |

备注：第8脚和第9脚之间加一个105的电容

第10脚和VSS之间加一个105的电容，这样第8，9，10脚就不用连其他电路了

## 6. MAXIMUM RATINGS

| Item                  | Symbol | Min     | Max     | Unit |
|-----------------------|--------|---------|---------|------|
| Supply Voltage        | VDD    | -0.3    | 3.6     | V    |
|                       | Vout   | -0.3    | 15.0    | V    |
| Input Voltage         | Vin    | VSS-0.3 | VDD+0.3 | V    |
| Operating temperature | Topr   | -10     | 60      | °C   |
| Storage temperature   | Tstr   | -20     | 70      | °C   |

## 7. ELECTRICAL CHARACTERISTICS

| Item                |         | Symbol | Condition | Min    | Typ. | Max.   | Unit |
|---------------------|---------|--------|-----------|--------|------|--------|------|
| Supply Voltage      |         | Logic  | VDD-GND   | -      | 3.0  | -      | V    |
| Input<br>cottage    | H level | VDD    | -         | 0.8VDD | -    | VDD    | V    |
|                     | L level | VIH    |           | VSS    | -    | 0.2VDD |      |
| LCD Driving Voltage |         | VLCD   |           | -      | 9.0  | -      | V    |

Note1. The value is measure at following condition; follow same condition to test sample and mass product.

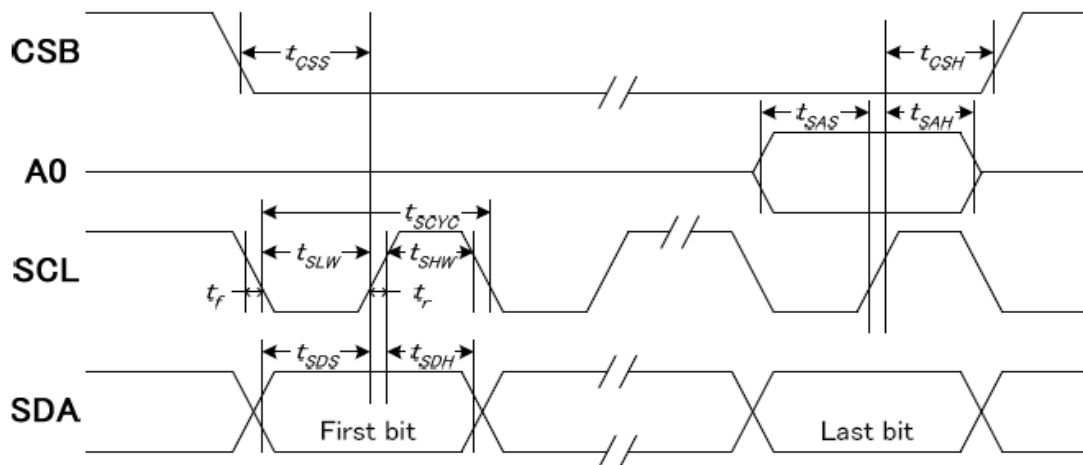
(a)VDD=3.0V

(b)1/64Duty ,1/9Bias

(c)电流：LCD的电流是1--2毫安，背光电流是30毫安。

## 8. MODULE FUNCTION DESCRIPTION

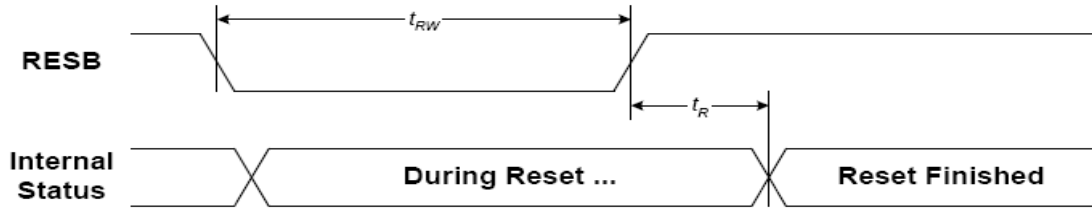
### System Bus Timing for 4-Line Serial Interface



(VDD = 3.3V , Ta = -30~85°C)

| Item                 | Signal | Symbol | Condition | Min. | Max. | Unit |
|----------------------|--------|--------|-----------|------|------|------|
| Serial clock period  | SCLK   | tSCYC  |           |      |      | ns   |
| SCLK "H" pulse width |        | tSHW   |           |      |      |      |
| SCLK "L" pulse width |        | tSLW   |           |      |      |      |
| Address setup time   | A0     | tSAS   |           |      |      |      |
| Address hold time    |        | tSAH   |           |      |      |      |
| Data setup time      | SDA    | tSDS   |           |      |      |      |
| Data hold time       |        | tSDH   |           |      |      |      |
| CSB-SCLK time        | CSB    | tCSS   |           |      |      |      |
| CSB-SCLK time        |        | tCSH   |           |      |      |      |

## Hardware Reset Timing



(VDD = 3.3V, Ta = -30~85°C)

| Item                  | Symbol | Condition | Min. | Max. | Unit |
|-----------------------|--------|-----------|------|------|------|
| Reset time            | tR     |           |      |      | us   |
| Reset "L" pulse width | tRW    |           |      |      |      |

## 2. COMMAND TABLE

| INSTRUCTION            | A0 | R/W<br>(RWR) | COMMAND BYTE     |    |     |     |     |     |     |     | DESCRIPTION                                                                      |
|------------------------|----|--------------|------------------|----|-----|-----|-----|-----|-----|-----|----------------------------------------------------------------------------------|
|                        |    |              | D7               | D6 | D5  | D4  | D3  | D2  | D1  | D0  |                                                                                  |
| (1) Display ON/OFF     | 0  | 0            | 1                | 0  | 1   | 0   | 1   | 1   | 1   | D   | D=1, display ON<br>D=0, display OFF                                              |
| (2) Set Start Line     | 0  | 0            | 0                | 1  | S5  | S4  | S3  | S2  | S1  | S0  | Set display start line                                                           |
| (3) Set Page Address   | 0  | 0            | 1                | 0  | 1   | 1   | Y3  | Y2  | Y1  | Y0  | Set page address                                                                 |
| (4) Set Column Address | 0  | 0            | 0                | 0  | 0   | 1   | X7  | X6  | X5  | X4  | Set column address (MSB)                                                         |
|                        | 0  | 0            | 0                | 0  | 0   | 0   | X3  | X2  | X1  | X0  | Set column address (LSB)                                                         |
| (5) Read Status        | 0  | 1            | 0                | MX | D   | RST | 0   | 0   | 0   | 0   | Read IC Status                                                                   |
| (6) Write Data         | 1  | 0            | D7               | D6 | D5  | D4  | D3  | D2  | D1  | D0  | Write display data to RAM                                                        |
| (7) Read Data          | 1  | 1            | D7               | D6 | D5  | D4  | D3  | D2  | D1  | D0  | Read display data from RAM                                                       |
| (8) SEG Direction      | 0  | 0            | 1                | 0  | 1   | 0   | 0   | 0   | 0   | MX  | Set scan direction of SEG<br>MX=1, reverse direction<br>MX=0, normal direction   |
| (9) Inverse Display    | 0  | 0            | 1                | 0  | 1   | 0   | 0   | 1   | 1   | INV | INV=1, inverse display<br>INV=0, normal display                                  |
| (10) All Pixel ON      | 0  | 0            | 1                | 0  | 1   | 0   | 0   | 1   | 0   | AP  | AP=1, set all pixel ON<br>AP=0, normal display                                   |
| (11) Bias Select       | 0  | 0            | 1                | 0  | 1   | 0   | 0   | 0   | 1   | BS  | Select bias setting<br>0=1/9; 1=1/7 (at 1/65 duty)                               |
| (12) Read-modify-Write | 0  | 0            | 1                | 1  | 1   | 0   | 0   | 0   | 0   | 0   | Column address increment:<br>Read:+0, Write:+1                                   |
| (13) END               | 0  | 0            | 1                | 1  | 1   | 0   | 1   | 1   | 1   | 0   | Exit Read-modify-Write mode                                                      |
| (14) RESET             | 0  | 0            | 1                | 1  | 1   | 0   | 0   | 0   | 1   | 0   | Software reset                                                                   |
| (15) COM Direction     | 0  | 0            | 1                | 1  | 0   | 0   | MY  | -   | -   | -   | Set output direction of COM<br>MY=1, reverse direction<br>MY=0, normal direction |
| (16) Power Control     | 0  | 0            | 0                | 0  | 1   | 0   | 1   | VB  | VR  | VF  | Control built-in power circuit<br>ON/OFF                                         |
| (17) Regulation Ratio  | 0  | 0            | 0                | 0  | 1   | 0   | 0   | RR2 | RR1 | RR0 | Select regulation resistor ratio                                                 |
| (18) Set EV            | 0  | 0            | 1                | 0  | 0   | 0   | 0   | 0   | 0   | 1   | Double command!! Set<br>electronic volume (EV) level                             |
|                        | 0  | 0            | 0                | 0  | EV5 | EV4 | EV3 | EV2 | EV1 | EV0 |                                                                                  |
| (19) Set Booster       | 0  | 0            | 1                | 1  | 1   | 1   | 1   | 0   | 0   | 0   | Double command!!<br>Set booster level:<br>00=4X, 01=5X, 10=6X                    |
|                        | 0  | 0            | 0                | 0  | 0   | 0   | 0   | 0   | BL1 | BL0 |                                                                                  |
| (20) Power Save        | 0  | 0            | Compound Command |    |     |     |     |     |     |     | Display OFF + All Pixel ON                                                       |
| (21) NOP               | 0  | 0            | 1                | 1  | 1   | 0   | 0   | 0   | 1   | 1   | No operation                                                                     |
| (22) Test              | 0  | 0            | 1                | 1  | 1   | 1   | 1   | 1   | 1   | -   | Do NOT use.<br>Reserved for testing.                                             |

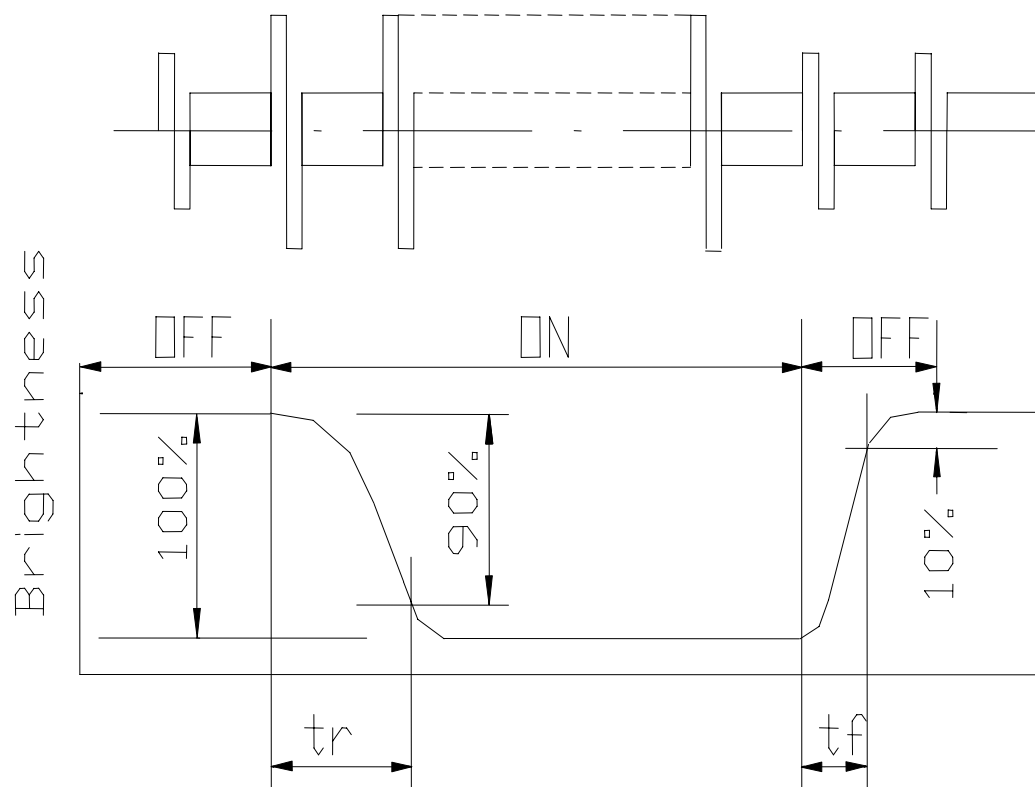
Note: Symbol "-" means this bit can be "H" or "L".

## 9. Electro-Optical Characteristics

### (1).FSTN Type

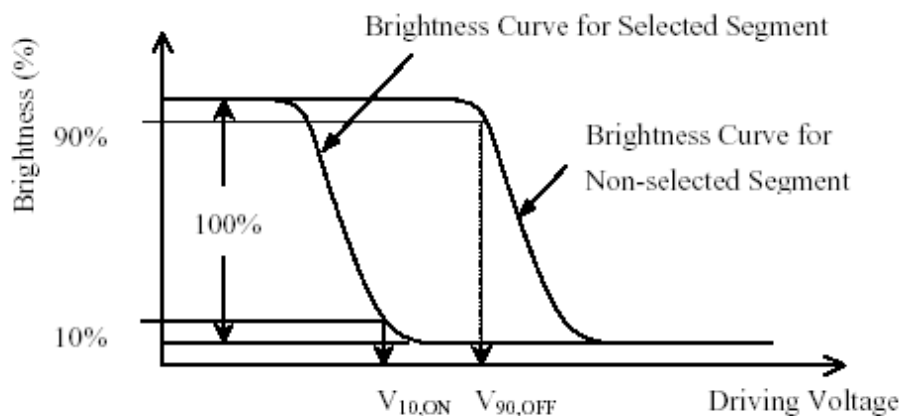
| Item          | Symbol    | Condition                       | Min                      | Typ | Max | Units |
|---------------|-----------|---------------------------------|--------------------------|-----|-----|-------|
| Contrast      | K         | $\theta=0^\circ$ $\Phi=0^\circ$ | 5 : 1                    | —   | —   | deg.  |
| Viewing Angle | $\theta$  | K=5 $\Phi=0^\circ$              | $\theta_2 - \theta_1=30$ | —   | —   | deg.  |
|               |           | K=5 $\theta=10^\circ$           | $\Phi=\pm 30$            | —   | —   | deg.  |
| Response time | $T_{on}$  | 25°C                            | —                        | —   | 250 | ms    |
|               | $T_{off}$ | 25°C                            | —                        | —   | 250 | ms    |

### (2). Definition of Optical Response Time



### (3). Definition of Driving Voltage (V<sub>lcd</sub>)

$$V_{lcd} = (V_{10,ON} + V_{90,OFF}) / 2$$



### (4). Definition of Viewing Angle $\theta$ and $\Phi$

