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# Specification

## MCT024L6W240320PML



## Midas Active Matrix Display Part Number System

**MC T 057 A 6 \* W 320240 L M L \* \* \* \* \***  
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

- 1 = **MC:** Midas Components
- 2 = **T:** TFT **A:** Active Matrix OLED
- 3 = **Size**
- 4 = **Series**
- 5 = **Viewing Angle:** **6:** 6 O'clock **12:** 12 O'clock
- 6 = **Blank:** No Touch **T:** Resistive Touchscreen **C:** Capacitive Touchscreen
- 7 = **Operating Temp Range:** **S:** 0 to 50Deg C **B:** -20+60Deg C  
**W:** -20+70Deg C **E:** -30+85Deg C
- 8 = **No of Pixels**
- 9 = **Orientation:** **P:** Portrait **L:** Landscape
- 10 = **Mode:** **R:** Reflective **M:** Transmissive **T:** Transflective  
**S:** Sunlight Readable (transmissive)
- 11 = **Backlight:** **Blank:** None **L:** LED **C:** CCFL
- 12 = **Blank:** No Module/board **C:** Controller board module
- 13 = **Blank:** None **V:** Video
- 14 = **Blank:** None **B:** Bracket
- 15 = **Blank:** None **H:** Host Cable
- 16 = **Blank:** None **K:** Keyboard

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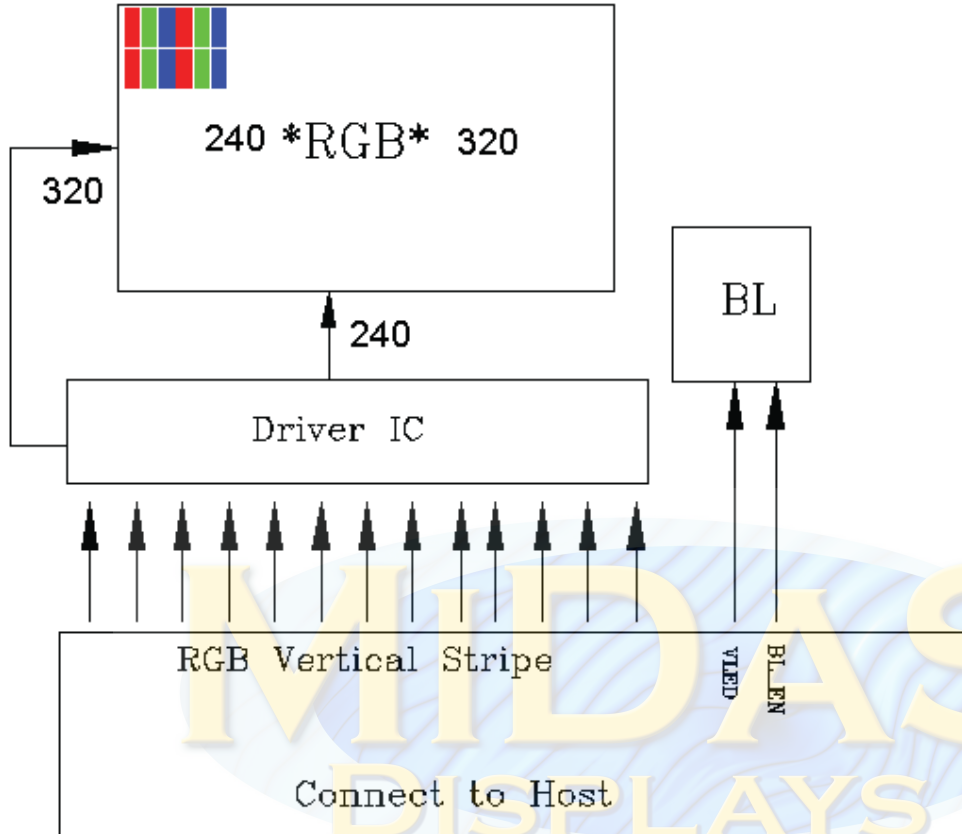


## **1. GENERAL SPECIFICATIONS**

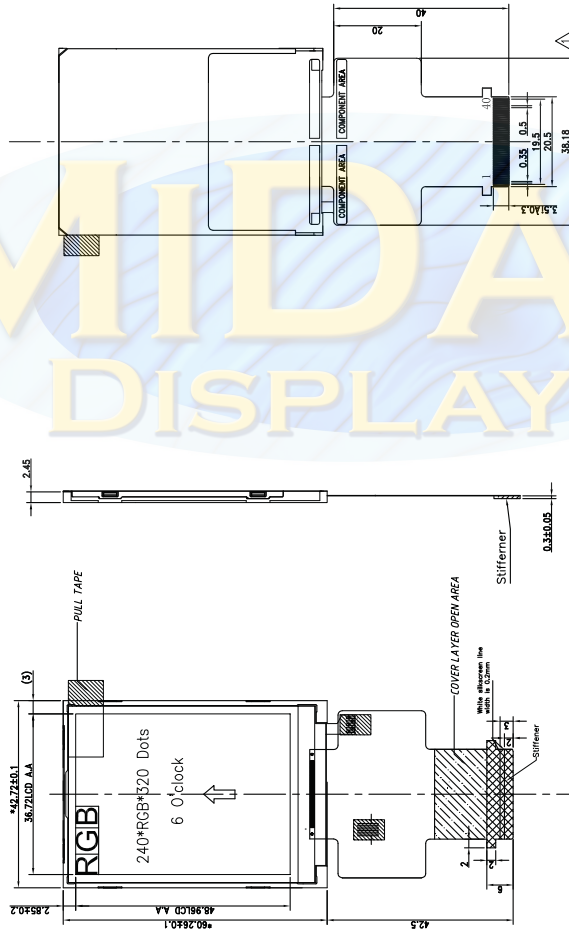
| <b>ITEM</b>               | <b>SPECIFICATION</b>          | <b>UNIT</b> |
|---------------------------|-------------------------------|-------------|
| <b>OUTLINE DIMENSIONS</b> | 47.2 (W) X60.26 (H) X2.45 (D) | mm          |
| <b>DISPLAY SIZE</b>       | 2.4                           | inch        |
| <b>DOT PITCH</b>          | 0.153mmX0.153mm               | mm          |
| <b>NUMBER OF DOTS</b>     | 240* (RGB) *320               | -           |
| <b>DRIVER IC</b>          | ILI9341                       | -           |
| <b>LCD TYPE</b>           | TFT(262K) TRANSMISSIVE        | -           |
| <b>INTERFACE</b>          | MCU 16 BITS                   |             |
| <b>BACKLIGHT TYPE</b>     | LED White                     | -           |
| <b>VIEWING DIRECTION</b>  | 6 O'clock                     | -           |

**\*See attached drawing for details.**

## 2. BLOCK DIAGRAM

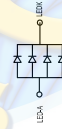


### 3. DIMENSIONAL OUTLINE

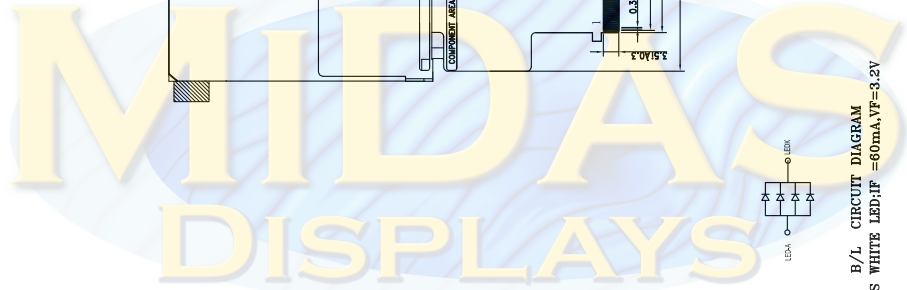


#### NOTES:

1. Display type: 2.4" TFT, 240(RGB)X320
2. Viewing angle: 6 O'clock
3. Display mode: 262K TFT/Transmissive/Normal White
4. Operating temp.: -20°C~+70°C
5. Storage temp.: -30°C~+80°C
6. IC: IL19341
7. Logic power supply voltage: 2.8V
8. Backlight: 4 chip White LED . In Parallel, If=60mA
9. Luminance: 250cd/m<sup>2</sup>
10. All the raw material are RoHS compliant



B/L CIRCUIT DIAGRAM  
4 PCS WHITE LED:IF =60mA,VF=3.2V



#### 4. PIN DESCRIPTION:

| NO.   | PIN NAME | Type | Description  |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
|-------|----------|------|--|---------------------------------------|---------------------|------------------|-----|--------------------|--------------------|---------------|------------------|------|---|---|---|---|------------------------------|--------|--------|---|---|---|---|-------------------------------|--------|---------|---|---|---|---|------------------------------|--------|--------|---|---|---|---|-------------------------------|--------|---------|---|---|---|---|--------------------------------------|-------------|--|---|---|---|---|--------------------------------------|-------------|--|---|---|---|---|--------------------------------|--------|------------------|---|---|---|---|-------------------------------|----------|----------|---|---|---|---|--------------------------------|--------|---------|---|---|---|---|-------------------------------|----------|---------|---|---|---|---|---------------------------------------|---------------------|--|---|---|---|---|---------------------------------------|---------------------|--|
| 1     | LEDK     | P    | Power supply for LED (Cathode)   |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 2     | LEDA     | P    | Power supply for LED (Anode)   |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 3     | GND      | P    | Ground(0V)   |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 4~6   | NC       | -    | No connection  |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 7     | SDA      | I/O  | SPI Serial Data Input/output   |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 8     | DOTCLK   | I    | Pixel clock signal   |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 9     | DE       | I    | Data enable  |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 10    | VSYNC    | I    | Vertical synchronizing signal  |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 11    | HSYNC    | I    | Horizontal synchronizing signal  |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 12    | VCC      | P    | Power voltage  |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 13    | RESET    | I    | Reset signal   |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 14    | GND      | P    | Ground(0V)   |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 15-32 | DB17~DB0 | I/O  | <p><b>Data bus</b><br/>- Select the MCU interface mode</p> <table border="1"> <thead> <tr> <th rowspan="2">IM3</th> <th rowspan="2">IM2</th> <th rowspan="2">IM1</th> <th rowspan="2">IM0</th> <th rowspan="2">MCU-Interface Mode</th> <th colspan="2">DB Pin in use</th> </tr> <tr> <th>Register/Content</th> <th>GRAM</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>80 MCU 8-bit bus interface I</td> <td>D[7:0]</td> <td>D[7:0]</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>80 MCU 16-bit bus interface I</td> <td>D[7:0]</td> <td>D[15:0]</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>80 MCU 9-bit bus interface I</td> <td>D[7:0]</td> <td>D[8:0]</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>1</td> <td>80 MCU 18-bit bus interface I</td> <td>D[7:0]</td> <td>D[17:0]</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>1</td> <td>3-wire 9-bit data serial interface I</td> <td colspan="2">SDA: In/OUT</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>0</td> <td>4-wire 8-bit data serial interface I</td> <td colspan="2">SDA: In/OUT</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>80 MCU 16-bit bus interface II</td> <td>D[8:1]</td> <td>D[17:10], D[8:1]</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>80 MCU 8-bit bus interface II</td> <td>D[17:10]</td> <td>D[17:10]</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>0</td> <td>80 MCU 18-bit bus interface II</td> <td>D[8:1]</td> <td>D[17:0]</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>1</td> <td>80 MCU 9-bit bus interface II</td> <td>D[17:10]</td> <td>D[17:9]</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>1</td> <td>3-wire 9-bit data serial interface II</td> <td colspan="2">SDI: In<br/>SDO: Out</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>0</td> <td>4-wire 8-bit data serial interface II</td> <td colspan="2">SDI: In<br/>SDO: Out</td> </tr> </tbody> </table> <p>MPU Parallel interface bus and serial interface select<br/>If use RGB Interface must select serial interface.<br/>*: Fix this pin at VDDI or VSS.</p> | IM3                                   | IM2                 | IM1              | IM0 | MCU-Interface Mode | DB Pin in use      |               | Register/Content | GRAM | 0 | 0 | 0 | 0 | 80 MCU 8-bit bus interface I | D[7:0] | D[7:0] | 0 | 0 | 0 | 1 | 80 MCU 16-bit bus interface I | D[7:0] | D[15:0] | 0 | 0 | 1 | 0 | 80 MCU 9-bit bus interface I | D[7:0] | D[8:0] | 0 | 0 | 1 | 1 | 80 MCU 18-bit bus interface I | D[7:0] | D[17:0] | 0 | 1 | 0 | 1 | 3-wire 9-bit data serial interface I | SDA: In/OUT |  | 0 | 1 | 1 | 0 | 4-wire 8-bit data serial interface I | SDA: In/OUT |  | 1 | 0 | 0 | 0 | 80 MCU 16-bit bus interface II | D[8:1] | D[17:10], D[8:1] | 1 | 0 | 0 | 1 | 80 MCU 8-bit bus interface II | D[17:10] | D[17:10] | 1 | 0 | 1 | 0 | 80 MCU 18-bit bus interface II | D[8:1] | D[17:0] | 1 | 0 | 1 | 1 | 80 MCU 9-bit bus interface II | D[17:10] | D[17:9] | 1 | 1 | 0 | 1 | 3-wire 9-bit data serial interface II | SDI: In<br>SDO: Out |  | 1 | 1 | 1 | 0 | 4-wire 8-bit data serial interface II | SDI: In<br>SDO: Out |  |
| IM3   | IM2      | IM1  | IM0  |                                       |                     |                  |     |                    | MCU-Interface Mode | DB Pin in use |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
|       |          |      |  | Register/Content                      | GRAM                |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 0     | 0        | 0    | 0  | 80 MCU 8-bit bus interface I          | D[7:0]              | D[7:0]           |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 0     | 0        | 0    | 1  | 80 MCU 16-bit bus interface I         | D[7:0]              | D[15:0]          |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 0     | 0        | 1    | 0  | 80 MCU 9-bit bus interface I          | D[7:0]              | D[8:0]           |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 0     | 0        | 1    | 1  | 80 MCU 18-bit bus interface I         | D[7:0]              | D[17:0]          |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 0     | 1        | 0    | 1  | 3-wire 9-bit data serial interface I  | SDA: In/OUT         |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 0     | 1        | 1    | 0  | 4-wire 8-bit data serial interface I  | SDA: In/OUT         |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 1     | 0        | 0    | 0  | 80 MCU 16-bit bus interface II        | D[8:1]              | D[17:10], D[8:1] |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 1     | 0        | 0    | 1  | 80 MCU 8-bit bus interface II         | D[17:10]            | D[17:10]         |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 1     | 0        | 1    | 0  | 80 MCU 18-bit bus interface II        | D[8:1]              | D[17:0]          |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 1     | 0        | 1    | 1  | 80 MCU 9-bit bus interface II         | D[17:10]            | D[17:9]          |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 1     | 1        | 0    | 1  | 3-wire 9-bit data serial interface II | SDI: In<br>SDO: Out |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 1     | 1        | 1    | 0  | 4-wire 8-bit data serial interface II | SDI: In<br>SDO: Out |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 33    | RD       | I    | Read signal, active at low in MCU mode;<br>In RGB and SPI mode, connect to GNG   |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 34    | WR       | I    | Write Signal, active at low in MCU mode; In RGB and SPI mode ,SPI Serial Clock   |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 35    | RS       | I    | In MCU mode, Register select signal, low is selected data register; High is selected command register. In RGB and SPI mode, connect to GND   |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 36    | CS       | I    | Chip selection pin/ Serial port data enable signal   |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 37    | XR(NC)   | -    | No connection  |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 38    | YD(NC)   | -    | No connection  |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 39    | XL(NC)   | -    | No connection  |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |
| 40    | YU(NC)   | -    | No connection  |                                       |                     |                  |     |                    |                    |               |                  |      |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                              |        |        |   |   |   |   |                               |        |         |   |   |   |   |                                      |             |  |   |   |   |   |                                      |             |  |   |   |   |   |                                |        |                  |   |   |   |   |                               |          |          |   |   |   |   |                                |        |         |   |   |   |   |                               |          |         |   |   |   |   |                                       |                     |  |   |   |   |   |                                       |                     |  |

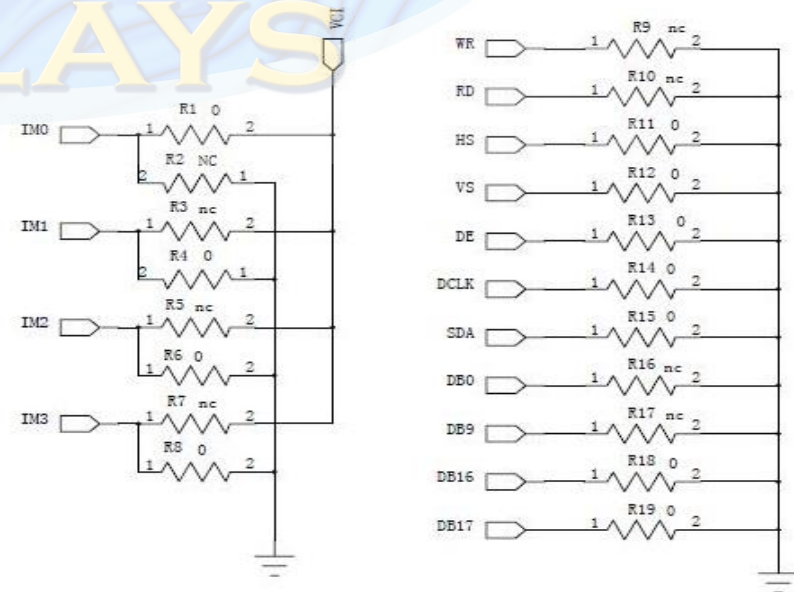
Note: 1: input, 0: output, P: Power;

Note: 2: LCM have set to 80 MCU 16-bit bus interface I. Below is circuit on FPC for IM3~IM0.

| IM3         | IM2         | IM1         | IM0         | MCU-Interface Mode       | DB pin in use    |                 | PIN of LCM to Gnd            |
|-------------|-------------|-------------|-------------|--------------------------|------------------|-----------------|------------------------------|
|             |             |             |             |                          | Register/content | GRAM            |                              |
| 0           | 0           | 0           | 0           | 80 MCU 8bit -bus         | DB(7-0)          | DB(7-0)         | HS,VS,DE,DCLK,SDA,DB8-DB17   |
| 0           | 0           | 0           | 1           | 80 MCU 16bit -bus        | DB(7-0)          | DB(15-0)        | HS,VS,DE,DCLK,SDA,DB16,DB17  |
| 0           | 0           | 1           | 0           | 80 MCU 9bit -bus         | DB(7-0)          | DB(8-0)         | HS,VS,DE,DCLK,SDA,DB9-DB17   |
| 0           | 0           | 1           | 1           | 80 MCU 18bit -bus        | DB(7-0)          | DB(17-0)        | HS,VS,DE,DCLK,SDA            |
| 0           | 1           | 0           | 1           | 3-wire 9-bit date serial | SDA in/out       |                 | HS,VS,DE,DCLK,RS,RD,DB0-DB17 |
| 0           | 1           | 1           | 0           | 4-wire 8-bit date serial | SDA in/out       |                 | HS,VS,DE,DCLK,RD,DB0-DB17    |
| 1           | 0           | 0           | 0           | 80 MCU 16bit -bus        | DB(8-1)          | DB(17-10) (8-1) | HS,VS,DE,DCLK,SDA,DB0,DB9    |
| 1           | 0           | 0           | 1           | 80 MCU 8bit -bus         | DB(17-10)        | DB(17-10)       | HS,VS,DE,DCLK,SDA,DB0-DB9    |
| 1           | 0           | 1           | 0           | 80 MCU 18bit -bus        | DB(17-10)        | DB(17-0)        | HS,VS,DE,DCLK,SDA            |
| 1           | 0           | 0           | 1           | 80 MCU 9bit -bus         | DB(8-0)          | DB(17-9)        | HS,VS,DE,DCLK,SDA,DB0-DB8    |
| <b>R6=0</b> | <b>R5=0</b> | <b>R3=0</b> | <b>R1=0</b> |                          |                  |                 |                              |
| <b>R8=1</b> | <b>R6=1</b> | <b>R4=1</b> | <b>R2=1</b> |                          |                  |                 |                              |

NOTE:

Default interface of this part is "80 MCU 16-bit bus interface I" ([IM3:IM0] =0001), and "HS", "VS", "DE", "DCLK", "SDA", "DB16", "DB17", already are connected to GND via 0 ohm resistor on FPC. Refer to below circuit.





## 5. ELECTRICAL CHARACTERISTICS

### 5.1 Absolute Maximum Ratings

| Item                        | Symbol | Values |         | Unit     | Remark |
|-----------------------------|--------|--------|---------|----------|--------|
|                             |        | Min    | Max     |          |        |
| Power Supply for Pump       | VCC    | -0.3   | 4.5     | V        |        |
| Operating temperature range | To     | -20    | 70      | Degree C |        |
| Storage temperature range   | Ts     | -30    | 80      | Degree C |        |
| Logic input voltage range   | VI     | -0.3   | VCC+0.3 | V        |        |
| Logic input voltage range   | VO     | -0.3   | VCC+0.3 | V        |        |

Note: Stresses beyond those given in the Absolute Maximum Rating table may cause operational errors or damage to the device. For normal operational conditions see AC/DC Electrical Characteristics

### 5.2 DC Characteristics

#### 5.2.2 DC Characteristics for Digital Circuit

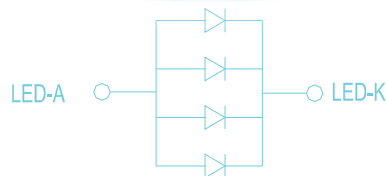
| Item                      | Symbol | Values  |      |         | Unit | Conditions |
|---------------------------|--------|---------|------|---------|------|------------|
|                           |        | Min     | Typ  | Max     |      |            |
| Low Level Input Voltage   | Vil    | GND     | -    | 0.3xVCC | v    |            |
| High Level Input Voltage  | Vih    | 0.7xVCC | -    | VCC     | uA   |            |
| High Level Output Voltage | Voh    | VCC-0.4 | -    | VCC     | ohm  |            |
| Low Level Output Voltage  | Vol    | GND     | -    | GND+0.4 | uA   |            |
| Power Supply              | VCC    | 2.5     | 2.8  | 3.3     | V    |            |
| Input Leakage Current     | Iil    |         |      | ±1.0    | uA   |            |
| Pull High/Low Resistor    | Rp     | -       | 100K | -       | ohm  |            |

### 5.3 DC Backlight Unit

| Item                       | Symbol          | Min.  | Typ.  | Max.  | Unit  | Remark        |
|----------------------------|-----------------|-------|-------|-------|-------|---------------|
| Average Luminous Intensity | Iv              |       | 250   |       | cd/m2 | IF=60mA       |
| Chromaticity Coordinates   | X               | 0.234 | 0.284 | 0.334 |       | IF=60mA       |
|                            | Y               | 0.273 | 0.323 | 0.373 |       | IF=60mA       |
| Forward Voltage            | VF              |       | 3.2   | 3.4   | V     | IF=60mA       |
| Reverse Current            | IR              |       |       | 50    | μA    | VR=5V, 1LED   |
| Luminous Tolerance         | IV-M            | 80    |       |       | %     | (MIN/MAX)×100 |
| Power Dissipation          | Pd              | 192   |       |       | mW    |               |
| Peak Forward Current       | I <sub>fp</sub> | 100   |       |       | uA    |               |
| Reverse Voltage            | VR              | 5     |       |       | V     |               |

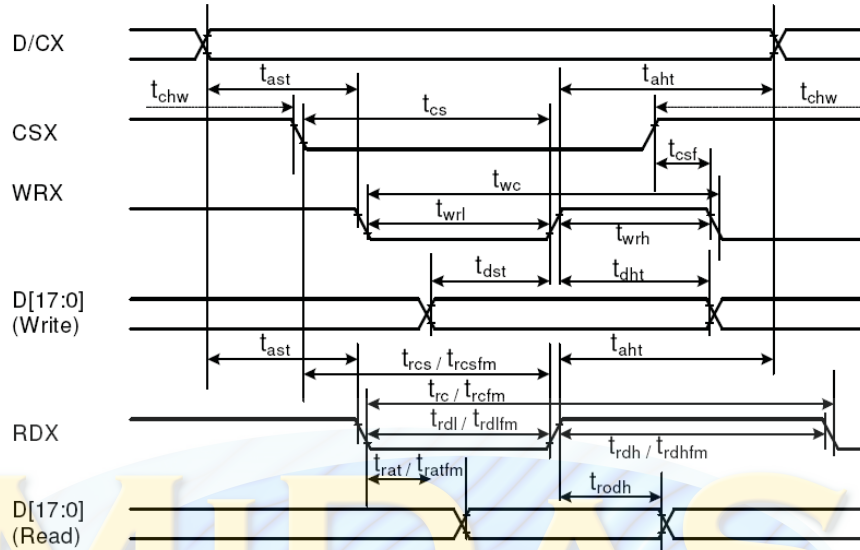
### B/L CIRCUIT DIAGRAM

4 PCS WHITE LED; IF = 60mA, VF = 3.2V



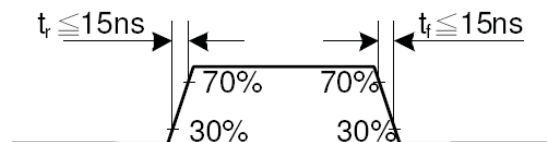
## 6. INPUT SIGNAL TIMING

### 6.1 Display Parallel 18/16/9/8-bit Interface Timing Characteristics (8080-I system)

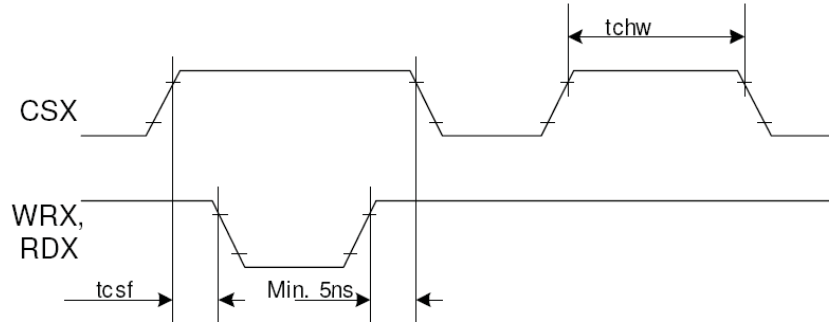


| Signal                                    | Symbol                   | Parameter                          | min | max | Unit | Description                               |
|---|--------------------------|------------------------------------|-----|-----|------|---|
| DCX                                       | tast                     | Address setup time                 | 0   | -   | ns   |   |
|   | taht                     | Address hold time (Write/Read)     | 0   | -   | ns   |   |
| CSX                                       | tchw                     | CSX "H" pulse width                | 0   | -   | ns   |   |
|   | tcs                      | Chip Select setup time (Write)     | 15  | -   | ns   |   |
|   | trcs                     | Chip Select setup time (Read ID)   | 45  | -   | ns   |   |
|   | trcsfm                   | Chip Select setup time (Read FM)   | 355 | -   | ns   |   |
| WRX                                       | tcsf                     | Chip Select Wait time (Write/Read) | 10  | -   | ns   |   |
|   | twc                      | Write cycle                        | 66  | -   | ns   |   |
|   | twrh                     | Write Control pulse H duration     | 15  | -   | ns   |   |
| RDX (FM)                                  | twrl                     | Write Control pulse L duration     | 15  | -   | ns   |   |
|   | trcfm                    | Read Cycle (FM)                    | 450 | -   | ns   |   |
|   | trdhfm                   | Read Control H duration (FM)       | 90  | -   | ns   |   |
| RDX (ID)                                  | trdlfm                   | Read Control L duration (FM)       | 355 | -   | ns   |   |
|   | trc                      | Read cycle (ID)                    | 160 | -   | ns   |   |
|   | trdh                     | Read Control pulse H duration      | 90  | -   | ns   |   |
| D[17:0],<br>D[15:0],<br>D[8:0],<br>D[7:0] | trdl                     | Read Control pulse L duration      | 45  | -   | ns   |   |
|   | tdst                     | Write data setup time              | 10  | -   | ns   | For maximum CL=30pF<br>For minimum CL=8pF |
|   | tdht                     | Write data hold time               | 10  | -   | ns   |   |
|   | trat                     | Read access time                   | -   | 40  | ns   |   |
|   | tratfm                   | Read access time                   | -   | 340 | ns   |   |
| trodh                                     | Read output disable time | 20                                 | 80  | ns  |      |   |

Note:  $T_a = -30$  to  $70$  °C,  $V_{DDI}=1.65V$  to  $3.3V$ ,  $V_{CI}=2.5V$  to  $3.3V$ ,  $V_{SS}=0V$

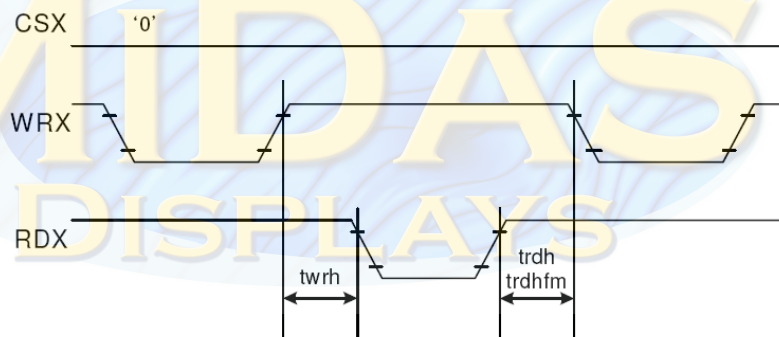


CSX timings :



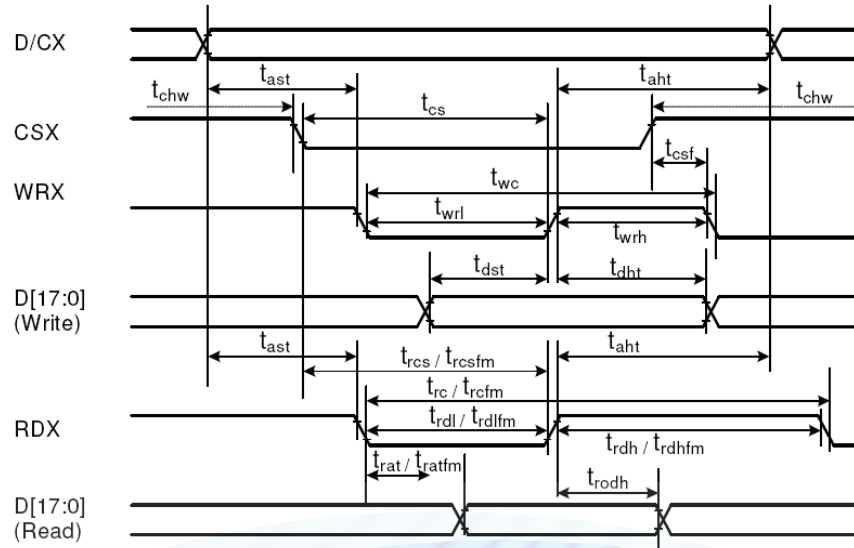
Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

Write to read or read to write timings:



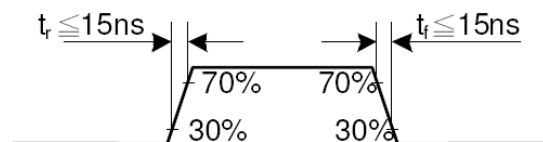
Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

## 6.2 Display Parallel 18/16/9/8-bit Interface Timing Characteristics (8080-II system)

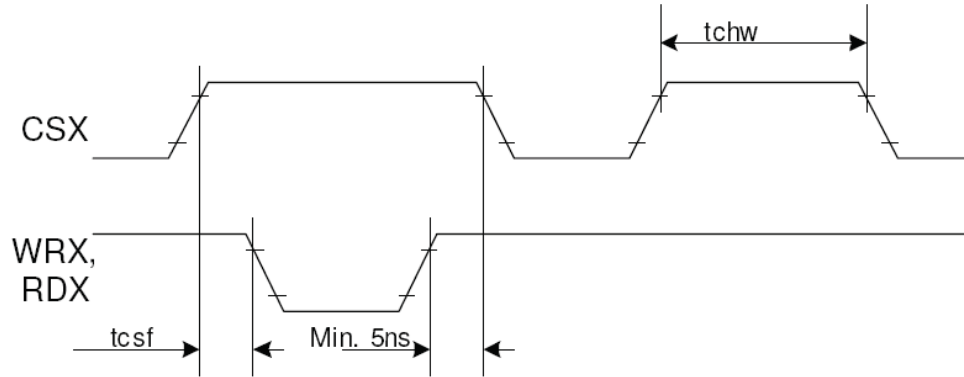


| Signal   | Symbol                        | Parameter                          | min | max | Unit | Description                               |
|--|-------------------------------|------------------------------------|-----|-----|------|---|
| DCX  | t <sub>ast</sub>              | Address setup time                 | 0   | -   | ns   |   |
|  | t <sub>ah</sub>               | Address hold time (Write/Read)     | 0   | -   | ns   |   |
| CSX  | t <sub>chw</sub>              | CSX "H" pulse width                | 0   | -   | ns   |   |
|  | t <sub>cs</sub>               | Chip Select setup time (Write)     | 15  | -   | ns   |   |
|  | t <sub>r<sub>cs</sub></sub>   | Chip Select setup time (Read ID)   | 45  | -   | ns   |   |
|  | t <sub>r<sub>csfm</sub></sub> | Chip Select setup time (Read FM)   | 355 | -   | ns   |   |
| WRX  | t <sub>csf</sub>              | Chip Select Wait time (Write/Read) | 10  | -   | ns   |   |
|  | t <sub>wc</sub>               | Write cycle                        | 66  | -   | ns   |   |
|  | t <sub>wrh</sub>              | Write Control pulse H duration     | 15  | -   | ns   |   |
| RDX (FM)   | t <sub>wrl</sub>              | Write Control pulse L duration     | 15  | -   | ns   |   |
|  | t <sub>r<sub>cfm</sub></sub>  | Read Cycle (FM)                    | 450 | -   | ns   |   |
|  | t <sub>r<sub>dhfm</sub></sub> | Read Control H duration (FM)       | 90  | -   | ns   |   |
| RDX (ID)   | t <sub>r<sub>dlfm</sub></sub> | Read Control L duration (FM)       | 355 | -   | ns   |   |
|  | t <sub>rc</sub>               | Read cycle (ID)                    | 160 | -   | ns   |   |
|  | t <sub>r<sub>dh</sub></sub>   | Read Control pulse H duration      | 90  | -   | ns   |   |
| D[17:0],<br>D[17:10]&D[8:1],<br>D[17:10],<br>D[17:9] | t <sub>r<sub>dl</sub></sub>   | Read Control pulse L duration      | 45  | -   | ns   |   |
|  | t <sub>dst</sub>              | Write data setup time              | 10  | -   | ns   |   |
|  | t <sub>dht</sub>              | Write data hold time               | 10  | -   | ns   |   |
|  | t <sub>rat</sub>              | Read access time                   | -   | 40  | ns   | For maximum CL=30pF<br>For minimum CL=8pF |
| t <sub>ratfm</sub>                                   | Read access time              | -                                  | 340 | ns  |      |   |
|  | t <sub>rodh</sub>             | Read output disable time           | 20  | 80  | ns   |   |

Note:  $T_a = -30$  to  $70$  °C,  $V_{DDI}=1.65V$  to  $3.3V$ ,  $V_{CI}=2.5V$  to  $3.3V$ ,  $V_{SS}=0V$ .

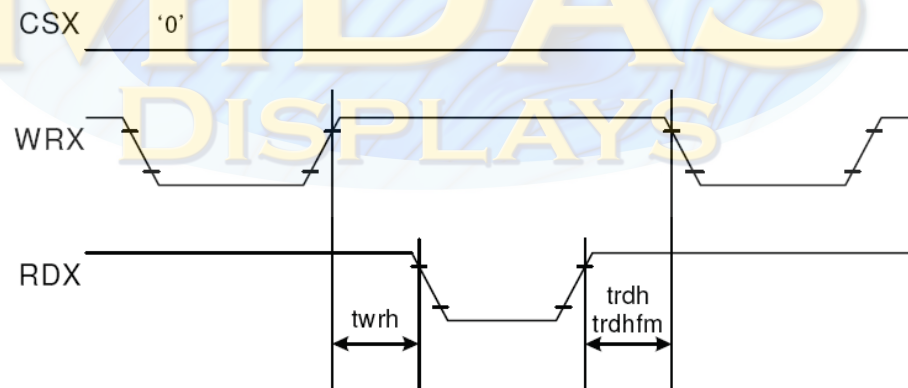


CSX timings :



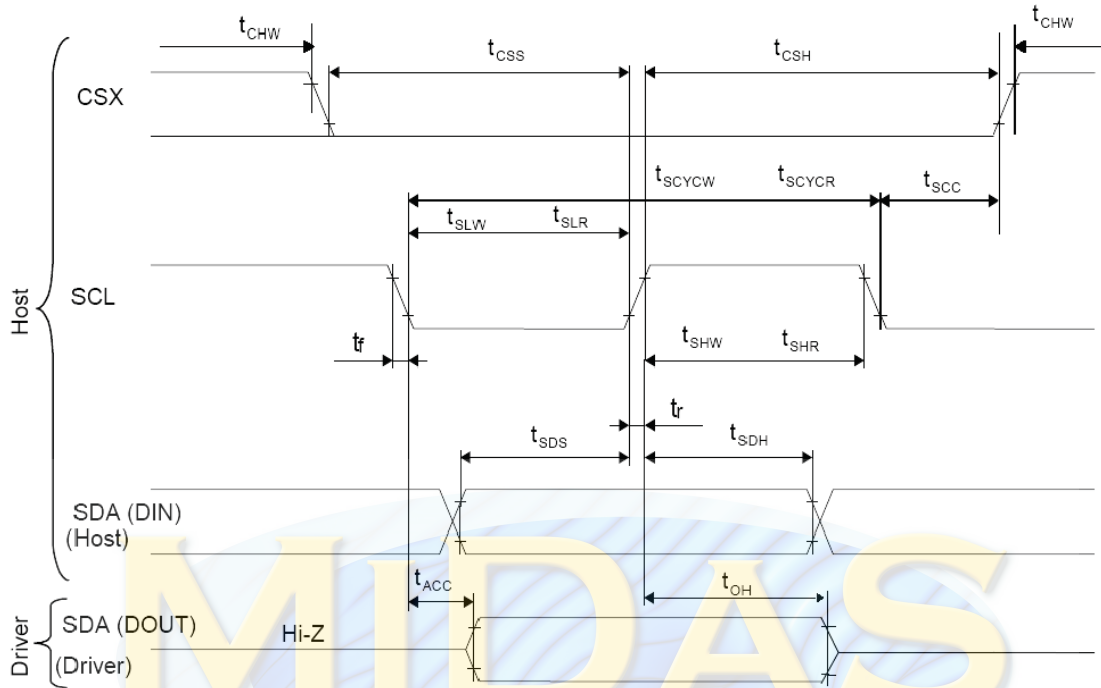
Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

Write to read or read to write timings:



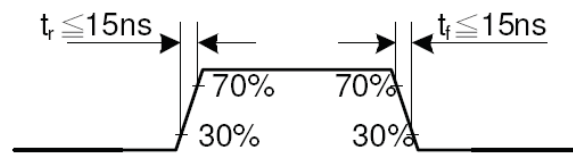
Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

### 6.3 Display Serial Interface Timing Characteristics (3-line SPI system)

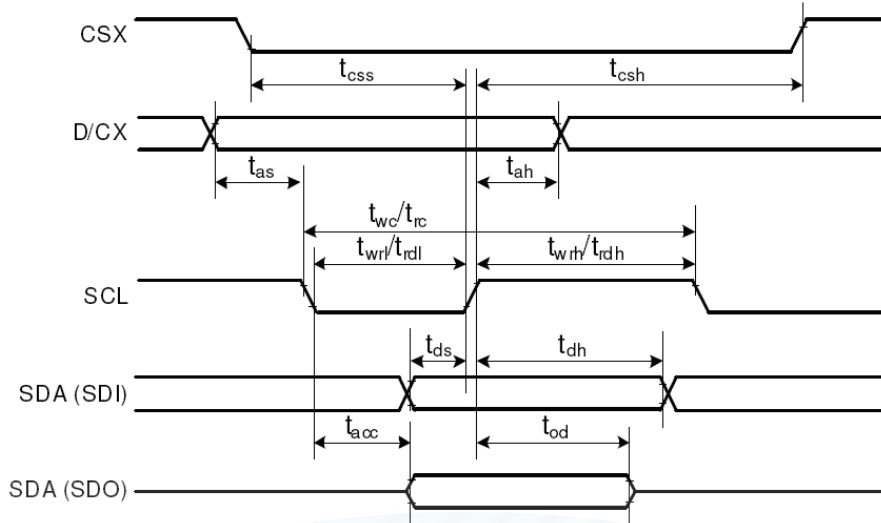


| Signal             | Symbol | Parameter                   | min | max | Unit | Description |
|--------------------|--------|-----------------------------|-----|-----|------|-------------|
| SCL                | tscycw | Serial Clock Cycle (Write)  | 100 | -   | ns   |             |
|                    | tshw   | SCL "H" Pulse Width (Write) | 40  | -   | ns   |             |
|                    | tslw   | SCL "L" Pulse Width (Write) | 40  | -   | ns   |             |
|                    | tscycr | Serial Clock Cycle (Read)   | 150 | -   | ns   |             |
|                    | tshr   | SCL "H" Pulse Width (Read)  | 60  | -   | ns   |             |
|                    | tslr   | SCL "L" Pulse Width (Read)  | 60  | -   | ns   |             |
| SDA / SDI (Input)  | tsds   | Data setup time (Write)     | 30  | -   | ns   |             |
|                    | tsdh   | Data hold time (Write)      | 30  | -   | ns   |             |
| SDA / SDO (Output) | tacc   | Access time (Read)          | 10  | -   | ns   |             |
|                    | toh    | Output disable time (Read)  | 10  | 50  | ns   |             |
| CSX                | tsc    | SCL-CSX                     | 20  | -   | ns   |             |
|                    | tchw   | CSX "H" Pulse Width         | 40  | -   | ns   |             |
|                    | tcss   | CSX-SCL Time                | 60  | -   | ns   |             |
|                    | tcsh   |                             | 65  | -   | ns   |             |

Note:  $T_a = 25\text{ }^\circ\text{C}$ ,  $V_{DDI}=1.65\text{V to }3.3\text{V}$ ,  $V_{CI}=2.5\text{V to }3.3\text{V}$ ,  $AGND=VSS=0\text{V}$

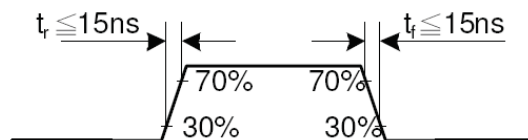


## 6.4 Display Serial Interface Timing Characteristics (4-line SPI system)



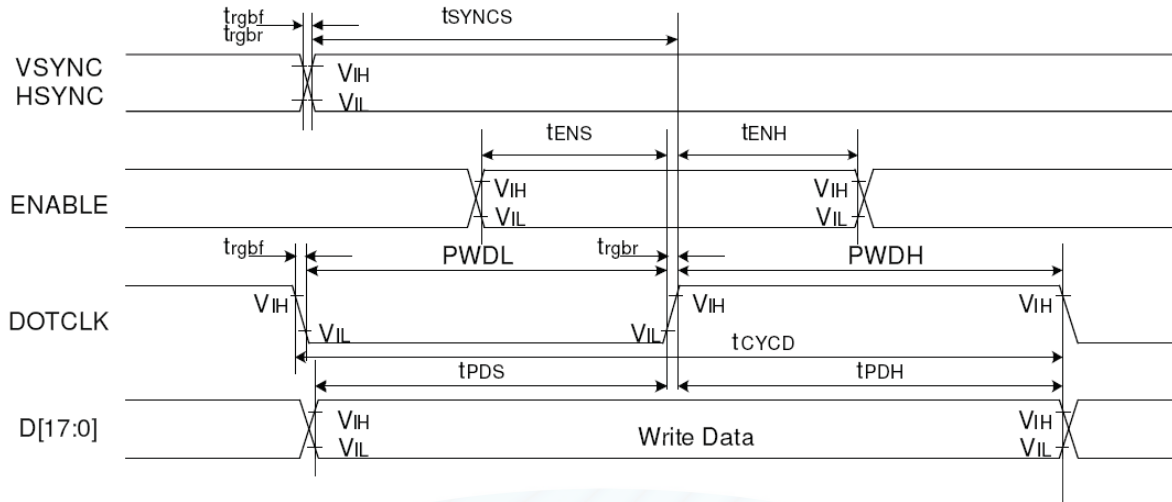
| Signal             | Symbol    | Parameter                     | min | max | Unit | Description         |
|--------------------|-----------|-------------------------------|-----|-----|------|---------------------|
| CSX                | $t_{css}$ | Chip select time (Write)      | 40  | -   | ns   |                     |
|                    | $t_{csh}$ | Chip select hold time (Read)  | 40  | -   | ns   |                     |
| SCL                | $t_{wc}$  | Serial clock cycle (Write)    | 100 | -   | ns   |                     |
|                    | $t_{wrh}$ | SCL "H" pulse width (Write)   | 40  | -   | ns   |                     |
|                    | $t_{wrl}$ | SCL "L" pulse width (Write)   | 40  | -   | ns   |                     |
|                    | $t_{rc}$  | Serial clock cycle (Read)     | 150 | -   | ns   |                     |
|                    | $t_{rdh}$ | SCL "H" pulse width (Read)    | 60  | -   | ns   |                     |
|                    | $t_{rdl}$ | SCL "L" pulse width (Read)    | 60  | -   | ns   |                     |
| D/CX               | $t_{as}$  | D/CX setup time               | 10  | -   |      |                     |
|                    | $t_{ah}$  | D/CX hold time (Write / Read) | 10  | -   |      |                     |
| SDA / SDI (Input)  | $t_{ds}$  | Data setup time (Write)       | 30  | -   | ns   |                     |
|                    | $t_{dh}$  | Data hold time (Write)        | 30  | -   | ns   |                     |
| SDA / SDO (Output) | $t_{acc}$ | Access time (Read)            | 10  | -   | ns   | For maximum CL=30pF |
|                    | $t_{od}$  | Output disable time (Read)    | 10  | 50  | ns   | For minimum CL=8pF  |

Note:  $T_a = 25\text{ }^\circ\text{C}$ ,  $V_{DDI}=1.65\text{V to }3.3\text{V}$ ,  $V_{CI}=2.5\text{V to }3.3\text{V}$ ,  $AGND=VSS=0\text{V}$



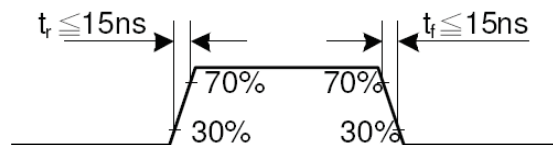


## 6.5 Parallel 18/16/6-bit RGB Interface Timing Characteristics



| Signal        | Symbol                 | Parameter                         | min | max | Unit | Description                      |
|---------------|------------------------|-----------------------------------|-----|-----|------|----------------------------------|
| VSYNC / HSYNC | $t_{SYNCS}$            | VSYNC/HSYNC setup time            | 15  | -   | ns   | 18/16-bit bus RGB interface mode |
|               | $t_{SYNCH}$            | VSYNC/HSYNC hold time             | 15  | -   | ns   |                                  |
| DE            | $t_{ENS}$              | DE setup time                     | 15  | -   | ns   |                                  |
|               | $t_{ENH}$              | DE hold time                      | 15  | -   | ns   |                                  |
| D[17:0]       | $t_{POS}$              | Data setup time                   | 15  | -   | ns   |                                  |
|               | $t_{PDH}$              | Data hold time                    | 15  | -   | ns   |                                  |
| DOTCLK        | PWDH                   | DOTCLK high-level period          | 15  | -   | ns   |                                  |
|               | PWDL                   | DOTCLK low-level period           | 15  | -   | ns   |                                  |
|               | $t_{CYCD}$             | DOTCLK cycle time                 | 100 | -   | ns   |                                  |
|               | $t_{rgrbr}, t_{rgbrf}$ | DOTCLK,HSYNC,VSYNC rise/fall time | -   | 15  | ns   |                                  |
| VSYNC / HSYNC | $t_{SYNCS}$            | VSYNC/HSYNC setup time            | 15  | -   | ns   | 6-bit bus RGB interface mode     |
|               | $t_{SYNCH}$            | VSYNC/HSYNC hold time             | 15  | -   | ns   |                                  |
| DE            | $t_{ENS}$              | DE setup time                     | 15  | -   | ns   |                                  |
|               | $t_{ENH}$              | DE hold time                      | 15  | -   | ns   |                                  |
| D[17:0]       | $t_{POS}$              | Data setup time                   | 15  | -   | ns   |                                  |
|               | $t_{PDH}$              | Data hold time                    | 15  | -   | ns   |                                  |
| DOTCLK        | PWDH                   | DOTCLK high-level pulse period    | 15  | -   | ns   |                                  |
|               | PWDL                   | DOTCLK low-level pulse period     | 15  | -   | ns   |                                  |
|               | $t_{CYCD}$             | DOTCLK cycle time                 | 100 | -   | ns   |                                  |
|               | $t_{rgrbr}, t_{rgbrf}$ | DOTCLK,HSYNC,VSYNC rise/fall time | -   | 15  | ns   |                                  |

Note:  $T_a = -30$  to  $70$  °C,  $V_{DDI} = 1.65V$  to  $3.3V$ ,  $V_{CI} = 2.5V$  to  $3.3V$ ,  $AGND = VSS = 0V$



## 6.6 Controller Information

IC: ILI9341

## 7. OPTICAL CHARACTERISTICS

| Item                            | Symbol | Condition          | Specification |       |       | Unit    | Remark     |
|---------------------------------|--------|--------------------|---------------|-------|-------|---------|------------|
|                                 |        |                    | Min.          | Typ.  | Max.  |         |            |
| Response time (By Quick)        | Tr+Tf  | $\theta = 0^\circ$ | -             | 30    | -     | ms      | Note 5     |
| Contrast ratio                  | CR     | $\theta = 0^\circ$ | -             | 250   | -     |         | Note 2,6   |
| Viewing angle                   | Top    | $CR \geq 10$       | -             | 45    | -     | deg.    | Note 2,6,7 |
|                                 | Bottom | $CR \geq 10$       | -             | 20    | -     |         |            |
|                                 | Left   | $CR \geq 10$       | -             | 45    | -     |         |            |
|                                 | Right  | $CR \geq 10$       | -             | 45    | -     |         |            |
| CF Color chromaticity(CIE 1931) | Wx     | $\theta = 0^\circ$ | 0.288         | 0.308 | 0.328 |         | Note 3     |
|                                 | Wy     |                    | 0.305         | 0.325 | 0.345 |         |            |
|                                 | Rx     |                    | 0.592         | 0.612 | 0.632 |         |            |
|                                 | Ry     |                    | 0.309         | 0.329 | 0.349 |         |            |
|                                 | Gx     |                    | 0.279         | 0.299 | 0.319 |         |            |
|                                 | Gy     |                    | 0.547         | 0.567 | 0.587 |         |            |
|                                 | Bx     |                    | 0.124         | 0.144 | 0.164 |         |            |
|                                 | By     |                    | 0.090         | 0.110 | 0.130 |         |            |
| NTSC                            |        |                    |               | 55%   |       | Note 3  |            |
| Cross talk                      | ct     |                    |               |       | 2%    | Note 10 |            |
| Transmittance                   | Trans  |                    | 4.5%          | 5.0%  | -     | Note 4  |            |

Note 1: Ambient temperature = 25°C.

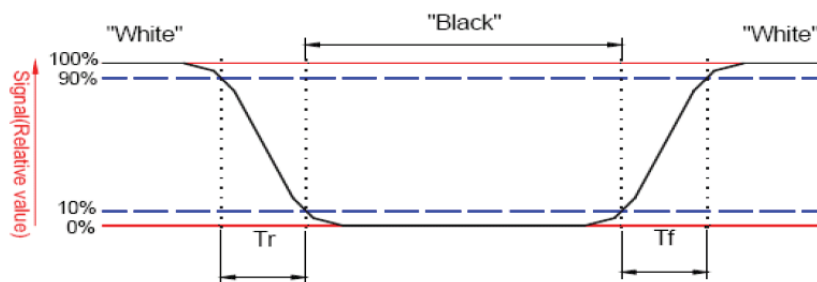
Note 2: To be measured with a viewing cone of 2° by Topcon luminance meter BM-5A.

Note 3: To be measured with Otsuta chromaticity meter LCF-2100M, CF only measure under C light simulation.

Note 4: CTC shipping status is cell without polarizer. Transmittance of Specification is cell with polarizer

Note 5: Definition of response time:

The output signals of TRD-100 are measured when the input signals are changed to "White" (falling time) and from "White" to "Black" (rising time), respectively. The interval is between the 10% and 90% of amplitudes. Refer to figure as below.

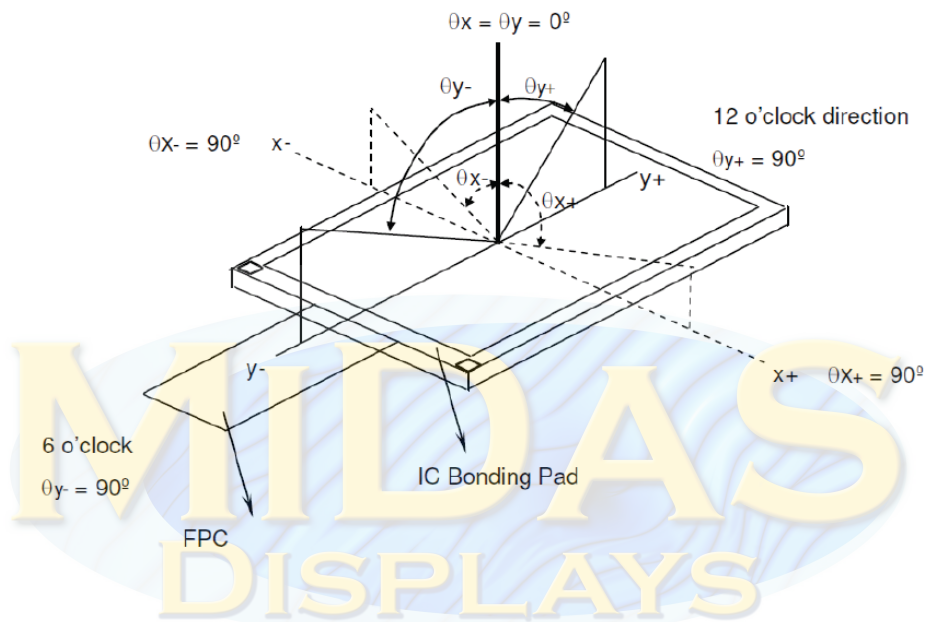


Note 6: Definition of contrast ratio:

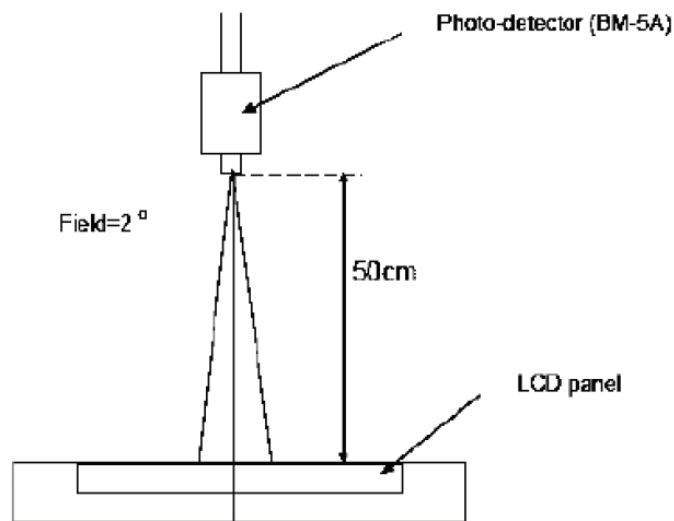
Contrast ratio is calculated by the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

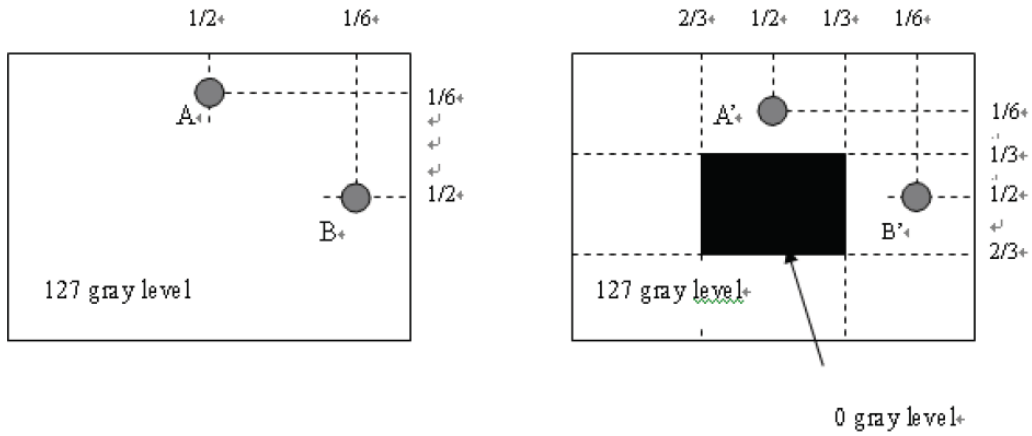
Note 7: Definition of viewing angle



Note 8: Optical characteristic measurement setup.



Note 9: Crosstalk.



$|LA - LA'| / LA \times 100\% = 2\% \text{ max.}$ , LA and LA' are brightness at location A and A'  
 $|LB - LB'| / LB \times 100\% = 2\% \text{ max.}$ , LB and LB' are brightness at location B and B'

**MIDAS**  
**DISPLAYS**

## 12. PACKAGE

