

|                  |      |                                                                                   |      |                  |
|------------------|------|-----------------------------------------------------------------------------------|------|------------------|
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# SPECIFICATION

VXT350LQZ-01P

☐ Preliminary Specification

☐ Final Specification



**CUSTOMER:**

**Made By:**

**Checked By:**

**Approved By:**

**Quality:**

**Date:**

**Note:**

**Approved By:**

**Date:**

**Note:**

## Records of Revision

[illegible]

## Contents

|    |                                  |    |
|----|----------------------------------|----|
| 1  | Introduction-----                | 4  |
| 2  | General specification-----       | 5  |
| 3  | Mechanical drawing-----          | 6  |
| 4  | Absolute maximum ratings-----    | 7  |
| 5  | Electrical characteristics-----  | 7  |
| 6  | Touch panel specifications ----- | 8  |
| 7  | Optical characteristics -----    | 9  |
| 8  | Pin Assignment -----             | 12 |
| 9  | Block diagram -----              | 19 |
| 10 | LCM quality criteria-----        | 20 |
| 11 | Packing method-----              | 26 |

## **1. Introduction**

### **1.1 Scope of application**

This specification applies to the Negative type TFT transmissive dot matrix LCD module. This LCD module should be designed for mobile phone use.

LCD specification: Dots 320xRGBx240.

As to basic specification of the driver IC, refer to the IC (SSD2119 ) specification and datasheet.

### **1.2 Structure:**

Double display structure:

TFT Module + FPC +BL+TP;

FULL 262k Color3.5 inch TFT LCD size for main LCD;

One bare chip with gold bump (COG) TECH;

### **1.3 TFT features:**

Structure: TFT PANNEL+IC+FPC+BL+TP;

Transmissive Type LCD;

320 dot-source and 240 dot-gate outputs;

262k Color can be selected by software;

White LED back light;

### **1.4 Applications:**

Mobile phone

PSP

PDA

GPS

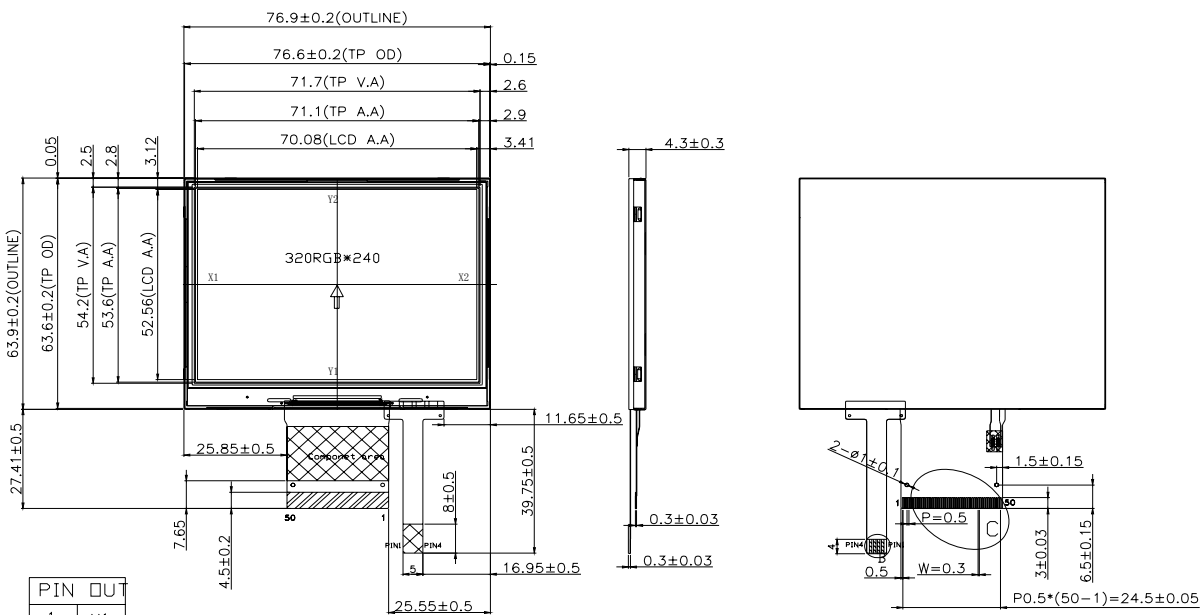
Etc...

## 2. General specification

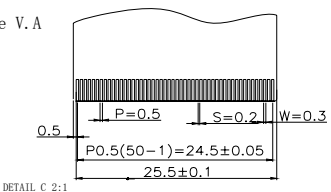
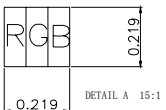
| ITEM               | Standard value                                                                                                                                                                                                                     | UNIT |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| LCD Type           | TFT Transmissive                                                                                                                                                                                                                   | ---  |
| Driver element     | a-Si TFT Active matrix                                                                                                                                                                                                             |      |
| Number of Dots     | 320*(RGB)*240                                                                                                                                                                                                                      | Dots |
| Pixel Arrangement  | RGB Vertical Stripe                                                                                                                                                                                                                |      |
| Active Area        | 70.08 *52.56                                                                                                                                                                                                                       | mm   |
| Viewing Direction  | 6 O'clock                                                                                                                                                                                                                          |      |
| Driver IC          | SSD2119                                                                                                                                                                                                                            |      |
| Module Size(W*H*T) | 76.9x63.9x4.3                                                                                                                                                                                                                      | mm   |
| Approx. Weight     | TBD                                                                                                                                                                                                                                | g    |
| Back Light         | White LED                                                                                                                                                                                                                          |      |
| System interface   | 1. 8/ 9/ 16/ 18-bit 6800-series /<br>8080-series Parallel Interface<br>2. Serial Peripheral Interface (SPI)<br>3. 18-/6-bit RGB interface (DE,<br>DOTCLK, HSYNC, VSYNC, DB[17:0])<br>4. WSYNC interface (system interface + WSYNC) |      |

|    | PIN  | SYMBL      |
|----|------|------------|
|    | 1    | VCI        |
|    | 2    | VCI        |
|    | 3    | VSS        |
|    | 4    | VDDIO      |
|    | 5    | VSS        |
|    | 6    | RESET      |
|    | 7    | DC/SPC(RS) |
|    | 8    | E/RD       |
|    | 9    | WR         |
|    | 10   | CS         |
|    | 11   | SCL        |
|    | 12   | SDO        |
|    | 13   | SDI        |
|    | 14   | WSYNC      |
|    | 15   | D17        |
|    | 16   | D16        |
|    | 17   | D15        |
|    | 18   | D14        |
|    | 19   | D13        |
|    | 20   | D12        |
| 36 | VSYN | 21 D11     |
| 37 | OE   | 22 D10     |
| 38 | VSS  | 23 D9      |
| 39 | PS0  | 24 D8      |
| 40 | PS1  | 25 D7      |
| 41 | PS2  | 26 D6      |
| 42 | PS3  | 27 D5      |
| 43 | VSS  | 28 D4      |
| 44 | NC   | 29 D3      |
| 45 | NC   | 30 D2      |
| 46 | NC   | 31 D1      |
| 47 | NC   | 32 D0      |
| 48 | VSS  | 33 VSS     |
| 49 | LEDB | 34 DOTCLK  |
| 50 | FDA  | 35 HSYN    |

|                                                                            |
|----------------------------------------------------------------------------|
| 2K COLOR TFT                                                               |
| NORMALLY WHITE TN                                                          |
| UNSMISSIVE                                                                 |
| D2119                                                                      |
| O'CLOCK                                                                    |
| VDDIO=3.3V                                                                 |
| 0°C TO 70°C                                                                |
| 50°C TO 80°C                                                               |
| 16bit/18bit MCU interface; 18or6bit<br>I2C; SPI interface;WSYNC interface. |
| LED WHITE                                                                  |
| 350cd/m <sup>2</sup>                                                       |
| 0.32±0.02/ Y0.36±0.02                                                      |



1. GENERAL TOLERANCE:  $\pm 0.2$
2. Recommended Case Open Area Should Be Less Than Module V.A
3. recommended cushion adherent area: TP V.A+1.6mm
4. Accord with RoHS
5. ( ) REFERENCE DIMENSION



|                                    |                             |                   |                        |  |                                                                                                            |                              |      |    |       |     |
|------------------------------------|-----------------------------|-------------------|------------------------|--|------------------------------------------------------------------------------------------------------------|------------------------------|------|----|-------|-----|
|                                    |                             |                   | DRAWN                  |  | TITLE                                                                                                      | DRAWING NO.<br>VXT350LQZ-01P |      |    |       |     |
|                                    |                             |                   | CHECKED                |  |                                                                                                            | MODULE SPEC.                 |      |    |       |     |
|                                    |                             |                   | APPROVED               |  |                                                                                                            |                              | UNIT | mm | SCALE | FIT |
| V00<br>VER.                        | Frist issuance<br>AMENDMENT | 2013.12.6<br>DATE | CUSTOMER'S<br>APPROVAL |  | 3rd Angle  SHEET 1 OF 1 |                              |      |    |       |     |
| Victronix Tecenstar INT'L Co., LTD |                             |                   |                        |  |                                                                                                            |                              |      |    |       |     |

## 4. ABSOLUTE MAXIMUM RATINGS

| Parameter                 | Symbol           | Min  | Max | Unit |
|---------------------------|------------------|------|-----|------|
| Supply voltage for logic  | VDDIO            | -0.3 | 4.0 | V    |
| Supply voltage for analog | VCI              | -0.5 | 5.0 | V    |
| Supply current (One LED)  | I <sub>LED</sub> |      | 30  | mA   |
| Operating temperature     | T <sub>OP</sub>  | -20  | +70 | °C   |
| Storage temperature       | T <sub>ST</sub>  | -30  | +80 | °C   |

## 5. ELECTRICAL CHARACTERISTICS

| Item                      | Symbol           | Min                 | Typ | Max                 | Unit | Applicable terminal |
|---------------------------|------------------|---------------------|-----|---------------------|------|---------------------|
| Supply voltage for logic  | ADDIO            | 1.8                 | -   | 3.3                 | V    | V <sub>DD</sub>     |
| Supply voltage for analog | VCI              | 2.5                 | 3.3 | 3.6                 |      |                     |
| Input voltage             | V <sub>IL</sub>  | -0.3                | -   | 0.2 V <sub>CC</sub> | V    |                     |
|                           | V <sub>IH</sub>  | 0.8 V <sub>CC</sub> | -   | V <sub>CC</sub>     | V    |                     |
| Input leakage current     | I <sub>LKG</sub> | -                   | -   | -                   | μA   |                     |
| LED Forward voltage       | V <sub>f</sub>   | 3.0                 | 3.2 | 3.4                 | V    | With One LED        |
| Input backlight current   | I <sub>LED</sub> | -                   | 20  | 25                  | mA   | With One LED        |

## Backlight driving conditions

| Item                      | Symbol         | Values |      |      | Unit | Remark |
|---------------------------|----------------|--------|------|------|------|--------|
|                           |                | Min.   | Typ. | Max. |      |        |
| Voltage for LED backlight | V <sub>L</sub> | 18     | 19.2 | 20.4 | V    |        |
| Current for LED backlight | I <sub>L</sub> | -      | 20   | 25   | mA   |        |
| LED life time             | -              | 20,000 | -    | -    | Hr   |        |

## 6. TOUCH PANEL SPECIFICATIONS

### 6.1 Electrical Characteristics

| ITEM                  | SPECIFICATIONS |      |     | UNIT | REMARK                        |
|-----------------------|----------------|------|-----|------|-------------------------------|
|                       | MIN.           | TYP. | MAX |      |                               |
| Linearity             | -1.5           | -    | 1.5 | %    | After environment & life test |
| Terminal Resistance   | 200            | -    | 900 | ohm  | X(Film side)                  |
|                       | 150            | -    | 600 | ohm  | Y(Glass side)                 |
| Insulation Resistance | 20             | -    | -   | Mohm | DC 25V 1min                   |
| Operating Voltage     | -              | -    | 10  | V    | DC                            |

### 6.2 Optical Characteristics

| ITEM               | SPECIFICATIONS |      |     | UNIT | REMARK          |
|--------------------|----------------|------|-----|------|-----------------|
|                    | MIN.           | TYP. | MAX |      |                 |
| Response Time      | -              | -    | 10  | ms   | 100kohm pull-up |
| Light Transparency | 78             | -    | -   | %    |                 |

### 6.3 Mechanical Characteristics

| ITEM                   | SPECIFICATIONS |      |     | UNIT  | REMARK |
|------------------------|----------------|------|-----|-------|--------|
|                        | MIN.           | TYP. | MAX |       |        |
| Operation Force        | -              | 80   | -   | gf    | Note1  |
| Surface Hardness       | 3              | -    | -   | H     |        |
| Pen Sliding Durability | 100,000        |      |     | times | Note2  |
| Hitting Durability     | 1,000,000      |      |     | times | Note3  |

Note 1: Do not operate it with a thing except a polyacetal pen (tip R0.8mm or less) or a finger, especially those with hard or sharp tips such as a ball point pen or a mechanical pencil.

Depending on the pitch & the dimension of the spacer dots in between.

Note 2: Measurement for surface area.

-Scratch 100,000 times straight line on the film with a stylus change every 20,000 times.

-Force: 100gf.

-Speed: 60mm/sec.

-Stylus: R0.8 polyacetal tip.

Note 3: Hit 1,000,000 times on the film with an R12.5mm tip.

-Force: 250gf.

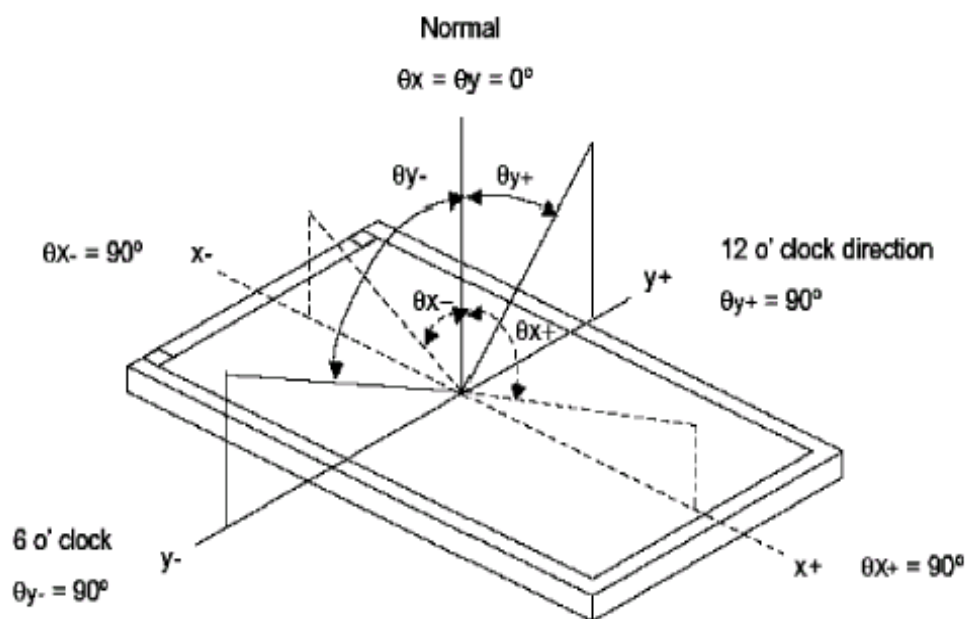
-Speed: 2 times/sec.



## 7. OPTICAL CHARACTERISTICS

| ITEM                 |       | SYMBOL         | CONDITIONS           | SPECIFICATIONS |       |     | UNIT              | NOTE                                                            |
|----------------------|-------|----------------|----------------------|----------------|-------|-----|-------------------|-----------------------------------------------------------------|
|                      |       |                |                      | MIN.           | TYP.  | MAX |                   |                                                                 |
| Brightness           |       | B              | Viewing normal angle | 280            | 350   | 420 | Cd/m <sup>2</sup> | All left side data are based on LAIBAO's product reference only |
| Contrast Ratio       |       | CR             |                      | 320            | 400   | --  | --                |                                                                 |
| Response Time        |       | Tr+Tf          |                      | --             | 25    | 35  | ms                |                                                                 |
| CIE Color coordinate | Red   | X <sub>R</sub> |                      | --             | 0.633 |     |                   |                                                                 |
|                      |       | Y <sub>R</sub> |                      |                | 0.329 |     |                   |                                                                 |
|                      | Green | X <sub>G</sub> |                      | --             | 0.297 |     |                   |                                                                 |
|                      |       | Y <sub>G</sub> |                      |                | 0.577 |     |                   |                                                                 |
|                      | Blue  | X <sub>B</sub> |                      | --             | 0.133 |     |                   |                                                                 |
|                      |       | Y <sub>B</sub> |                      |                | 0.129 |     |                   |                                                                 |
|                      | White | X <sub>W</sub> |                      | --             | 0.320 |     |                   |                                                                 |
|                      |       | Y <sub>W</sub> |                      |                | 0.360 |     |                   |                                                                 |
| Viewing Angle        | Hor.  | $\theta_{x+}$  | Center CR>=10        | 15             | 25    | --  | Deg.              |                                                                 |
|                      |       | $\theta_{x-}$  |                      | 35             | 45    | --  |                   |                                                                 |
|                      | Ver.  | $\theta_{y+}$  |                      | 35             | 45    | --  |                   |                                                                 |
|                      |       | $\theta_{y-}$  |                      | 35             | 45    |     |                   |                                                                 |
| Uniformity           | Un    |                |                      | 80             | 85    |     | %                 |                                                                 |

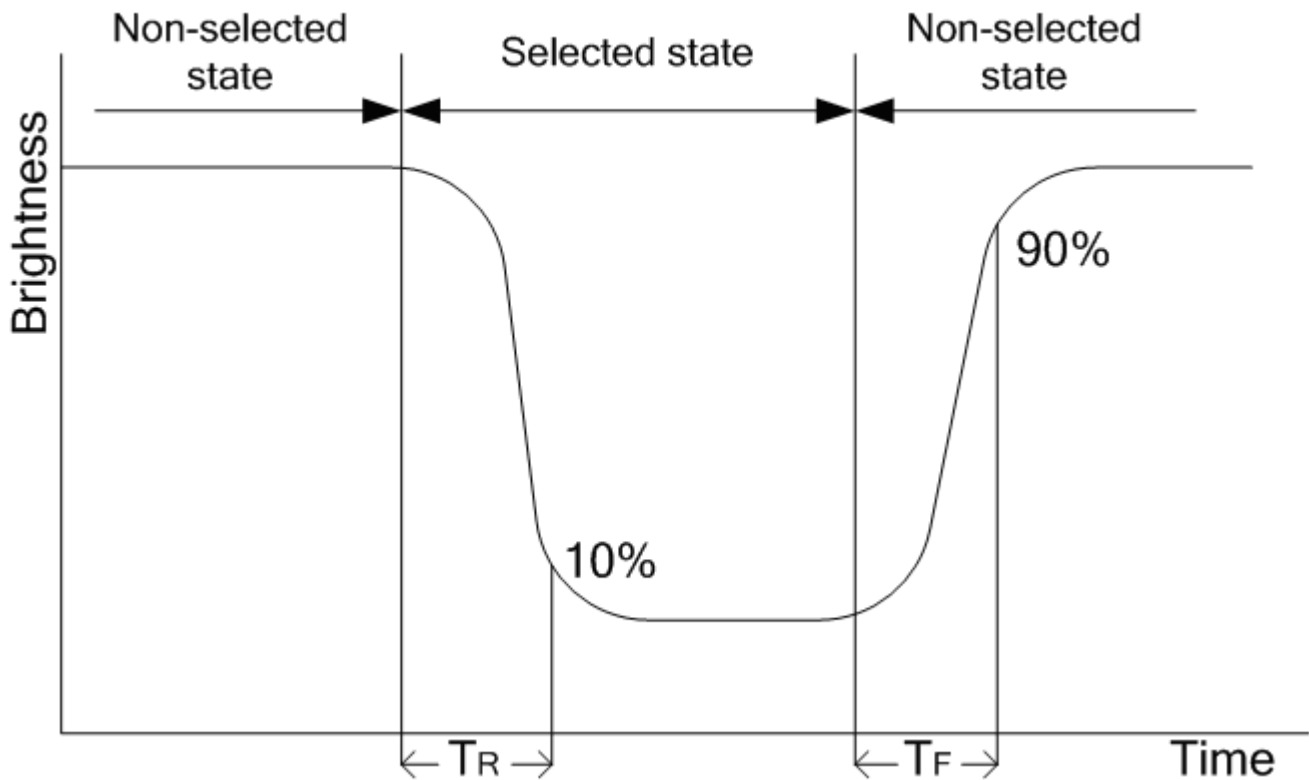
**Note 1 : Definition of Viewing Angle  $\theta_x$  and  $\theta_y$  :**



**Note 2: Definition of contrast ratio CR:**

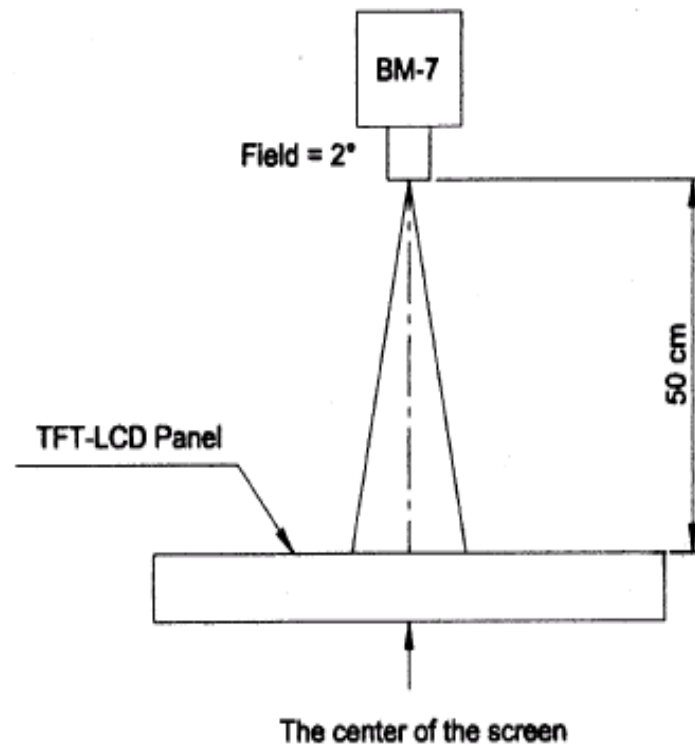
$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

**Note 3: Definition of response time ( $T_R$ ,  $T_F$ )**

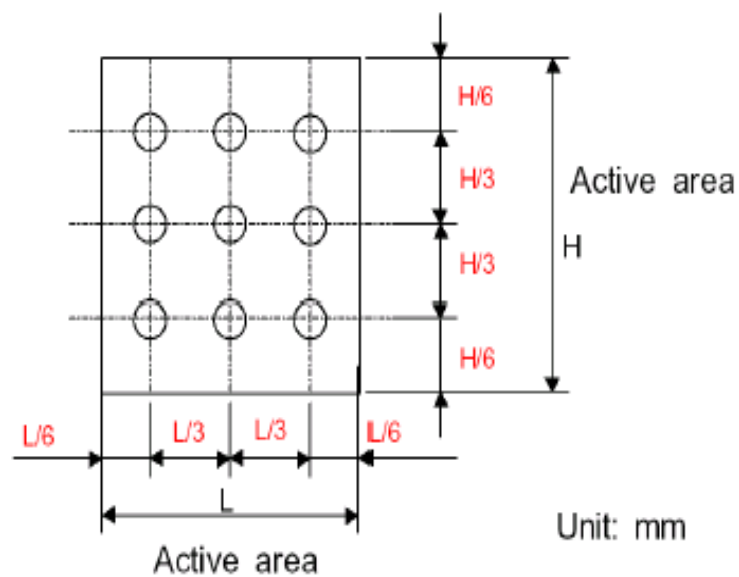


: The brightness test equipment setup

20mA Field=2° (As measuring "black" image, field=2° is the best testing condition)



Note 4 :



## 8. MCU Interface Pin Function

Table 2: Pin assignment

| Pin No. | Symbol                    | Description                                                                                                                                              |
|---------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1~2     | VCI                       | Power supply for analog                                                                                                                                  |
| 3       | VSS                       | Ground.                                                                                                                                                  |
| 4       | VDDIO                     | Voltage input pin for logic I/O                                                                                                                          |
| 5       | VSS                       | Ground.                                                                                                                                                  |
| 6       | RESB                      | System reset pin.<br>- An active low pulse at this pin will reset the IC, Connect to VDDIO in normal operation                                           |
| 7       | DC/SDC (RS)               | A register select signal.<br>Low: select an index or status register,<br>High: select a control register.                                                |
| 8       | E/ $\overline{\text{RD}}$ | 6800-system : <b>E</b> (enable signal)<br>8080-system : <b>RD</b> (read strobe signal)<br>Serial mode : Not used and should be connected to VDDIO or Vss |
| 9       | WR                        | 8080-system : <b>WR</b> (write strobe signal)                                                                                                            |
| 10      | CS                        | <b>CS</b> : Chip select pin                                                                                                                              |
| 11      | SCL                       | Serial clock input                                                                                                                                       |
| 12      | SDO                       | Data output pin in serial interface                                                                                                                      |
| 13      | SDI                       | Data input pin in serial interface                                                                                                                       |
| 14      | WSYNC                     | Ram Write Synchronization output<br>-Leave it OPEN when not used                                                                                         |
| 15~32   | DB17~DB0                  | Data bus.                                                                                                                                                |
| 33      | VSS                       | Ground.                                                                                                                                                  |
| 34      | DOTCLK                    | Dot-clock signal and oscillator source.                                                                                                                  |
| 35      | HSYNC                     | Line Synchronization input                                                                                                                               |
| 36      | VSNC                      | Frame/Ram Write Synchronization input                                                                                                                    |
| 37      | OE                        | Display enable pin from controller.                                                                                                                      |
| 38      | VSS                       | Ground.                                                                                                                                                  |
| 39      | PS0                       | Refer of Table1                                                                                                                                          |
| 40      | PS1                       |                                                                                                                                                          |
| 41      | PS2                       |                                                                                                                                                          |
| 42      | PS3                       |                                                                                                                                                          |
| 43      | VSS                       | Ground.                                                                                                                                                  |
| 44~47   | NC                        | Not Connection                                                                                                                                           |
| 48      | VSS                       | Ground.                                                                                                                                                  |
| 49      | LEDK                      | Cathode of LED backlight.                                                                                                                                |
| 50      | LEDA                      | Anode of LED backlight.                                                                                                                                  |

**Table1**

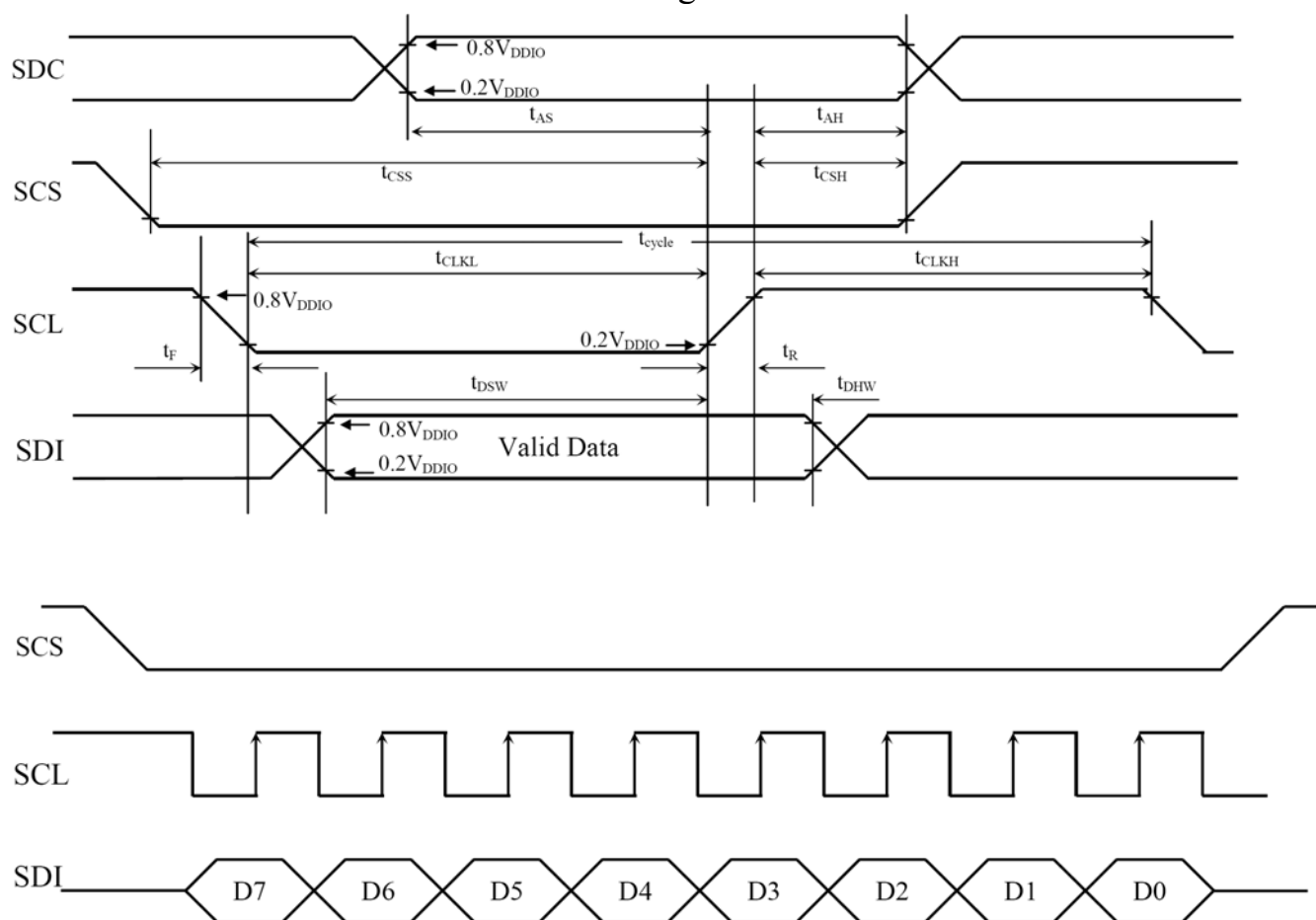
| PS<br>3 | PS2 | PS1 | PS0 | Interface Mode                                                                              |
|---------|-----|-----|-----|---------------------------------------------------------------------------------------------|
| 0       | 0   | 0   | 0   | 16-bit 6800 parallel interface                                                              |
| 0       | 0   | 0   | 1   | 8-bit 6800 parallel interface                                                               |
| 0       | 0   | 1   | 0   | 16-bit 8080 parallel interface                                                              |
| 0       | 0   | 1   | 1   | 8-bit 8080 parallel interface                                                               |
| 0       | 1   | 0   | 0   | 9-bit generic D[17:9] (262k colour) + 3-wire SPI If 65K color, D12 shorts to D17 internally |
| 0       | 1   | 0   | 1   | 16-bit generic (262k colour)+ 3-wire SPI                                                    |
| 0       | 1   | 1   | 0   | 18-bit generic (262k colour)+ 3-wire SPI                                                    |
| 0       | 1   | 1   | 1   | 6-bit generic D[17:12] (262k colour) + 3-wire SPI                                           |
| 1       | 0   | 0   | 0   | 18-bits 6800 parallel interface                                                             |
| 1       | 0   | 0   | 1   | 9-bits 6800 parallel interface                                                              |
| 1       | 0   | 1   | 0   | 18-bit 8080 parallel interface                                                              |
| 1       | 0   | 1   | 1   | 9-bit 8080 parallel interface                                                               |
| 1       | 1   | 1   | 0   | 3-wire SPI                                                                                  |
| 1       | 1   | 1   | 1   | 4-wire SPI                                                                                  |

## 8.1 Timing characteristics

### 8.1.1. Serial timing characteristics

| Symbol      | Parameter                                                  | Min | Typ | Max | Unit |
|-------------|------------------------------------------------------------|-----|-----|-----|------|
| $t_{cycle}$ | Clock Cycle Time                                           | 77  | -   | -   | ns   |
| $f_{CLK}$   | Serial Clock Cycle Time<br>SPI Clock tolerance = +/- 2 ppm | -   | -   | 15  | MHz  |
| $t_{AS}$    | Register select Setup Time                                 | 4   | -   | -   | ns   |
| $t_{AH}$    | Register select Hold Time                                  | 5   | -   | -   | ns   |
| $t_{CSS}$   | Chip Select Setup Time                                     | 2   | -   | -   | ns   |
| $t_{CSH}$   | Chip Select Hold Time                                      | 10  | -   | -   | ns   |
| $t_{DSW}$   | Write Data Setup Time                                      | 5   | -   | -   | ns   |
| $t_{DHW}$   | Write Data Hold Time                                       | 10  | -   | -   | ns   |
| $t_{CLKL}$  | Clock Low Time                                             | 38  | -   | -   | ns   |
| $t_{CLKH}$  | Clock High Time                                            | 38  | -   | -   | ns   |
| $t_R$       | Rise time                                                  | -   | -   | 4   | ns   |
| $t_F$       | Fall time                                                  | -   | -   | 4   | ns   |

#### 4 wire serial timing characteristics

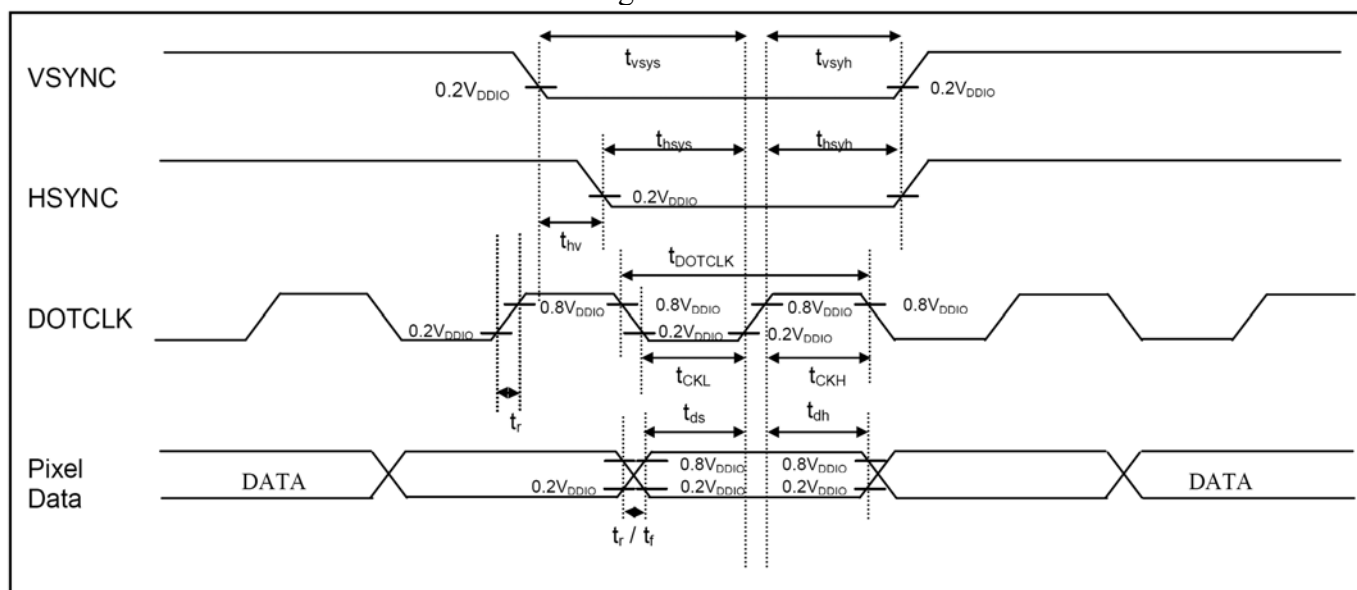


## 8.1.2. RGB timing characteristics

| Symbol              | Parameter                                    | Min | Typ | Max  | Unit                |
|---------------------|----------------------------------------------|-----|-----|------|---------------------|
| $f_{\text{DOTCLK}}$ | DOTCLK Frequency (70Hz frame rate)           | 1   | 5.5 | 8.2  | MHz                 |
| $t_{\text{DOTCLK}}$ | DOTCLK Period                                | 122 | 182 | 1000 | ns                  |
| $t_{\text{VSYs}}$   | Vertical Sync Setup Time                     | 20  | -   | -    | ns                  |
| $t_{\text{VSYH}}$   | Vertical Sync Hold Time                      | 20  | -   | -    | ns                  |
| $t_{\text{HSYs}}$   | Horizontal Sync Setup Time                   | 20  | -   | -    | ns                  |
| $t_{\text{HSYH}}$   | Horizontal Sync Hold Time                    | 20  | -   | -    | ns                  |
| $t_{\text{HV}}$     | Phase difference of Sync Signal Falling Edge | 0   | -   | 320  | $t_{\text{DOTCLK}}$ |
| $t_{\text{CLK}}$    | DOTCLK Low Period                            | 61  | -   | -    | ns                  |
| $t_{\text{CKH}}$    | DOTCLK High Period                           | 61  | -   | -    | ns                  |
| $t_{\text{DS}}$     | Data Setup Time                              | 25  | -   | -    | ns                  |
| $t_{\text{DH}}$     | Data hold Time                               | 25  | -   | -    | ns                  |

Note: External clock source must be provided to DOTCLK pin of SSD2119. The driver will not operate in absence of the clocking signal.

RGB timing characteristics



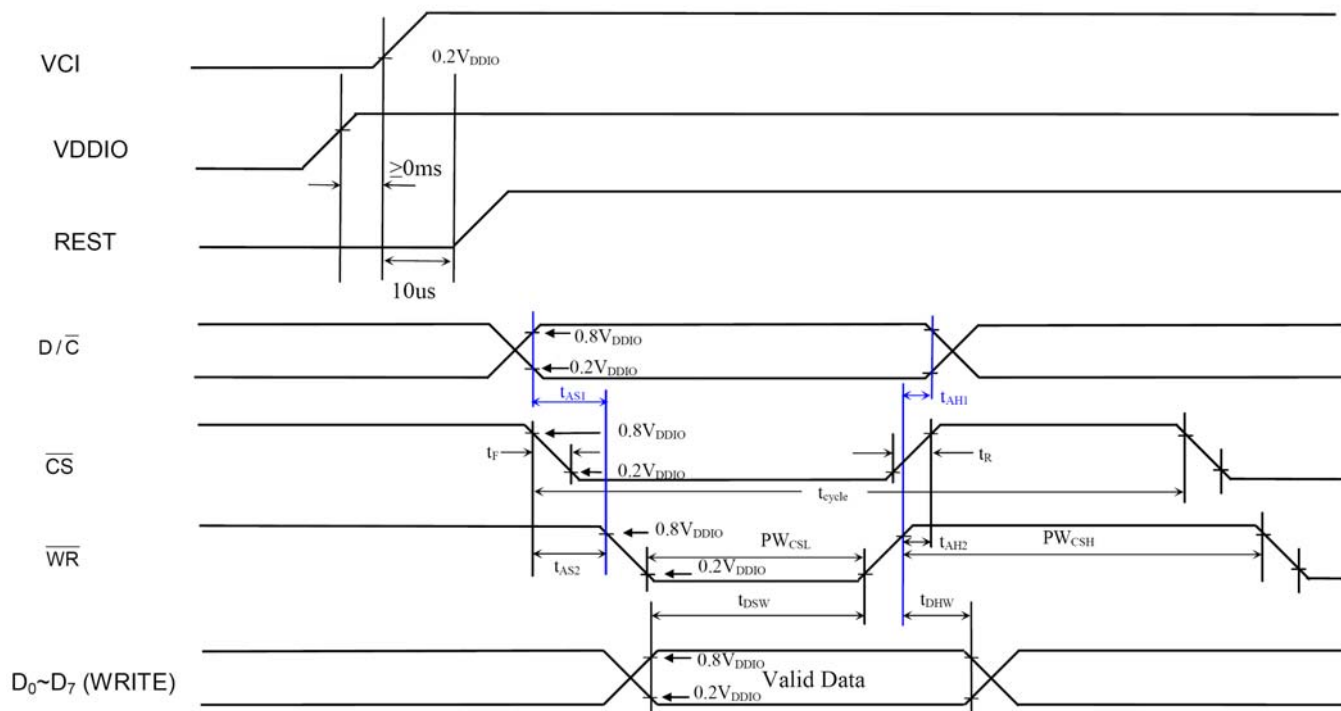
## 8.1.3. parallel 8080 MCU interface

| Symbol      | Parameter                                                                                | Min | Typ | Max | Unit |
|-------------|------------------------------------------------------------------------------------------|-----|-----|-----|------|
| $t_{cycle}$ | Clock Cycle Time (write cycle)                                                           | 75  | -   | -   | ns   |
| $t_{cycle}$ | Clock Cycle Time (read cycle)<br>(Based on $VOL/VOH = 0.3 \cdot VDDIO/0.7 \cdot VDDIO$ ) | 450 | -   | -   | ns   |
| $t_{AS1}$   | Address Setup Time between $(R/\overline{W})$ and $D/\overline{C}$                       | 0   | -   | -   | ns   |
| $t_{AH1}$   | Address Hold Time between $(R/\overline{W})$ and $D/\overline{C}$                        | 0   | -   | -   | ns   |
| $t_{AS2}$   | Address Setup Time between $(R/\overline{W})$ and $\overline{CS}$                        | 0   | -   | -   | ns   |
| $t_{AH2}$   | Address Hold Time between $(R/\overline{W})$ and $\overline{CS}$                         | 0   | -   | -   | ns   |
| $t_{DSW}$   | Data Setup Time (D0~D7, WRITE)                                                           | 5   | -   | -   | ns   |
| $t_{DHW}$   | Data Hold Time (D0~D7, WRITE))                                                           | 5   | -   | -   | ns   |
| $t_{ACC}$   | Data Access Time (D0~D7, READ)                                                           | 250 | -   | -   | ns   |
| $t_{OH}$    | Output Hold time (D0~D7, READ)                                                           | 100 | -   | -   | ns   |
| $PW_{CSL}$  | Pulse width /CS low (write cycle)                                                        | 40  | -   | -   | ns   |
| $PW_{CSH}$  | Pulse width /CS high (write cycle)                                                       | 25  | -   | -   | ns   |
| $PW_{CSL}$  | Pulse width /CS low (read cycle)                                                         | 500 | -   | -   | ns   |
| $PW_{CSH}$  | Pulse width /CS high (read cycle)                                                        | 500 | -   | -   | ns   |
| $t_R$       | Rise time                                                                                | -   | -   | 4   | ns   |
| $t_F$       | Fall time                                                                                | -   | -   | 4   | ns   |



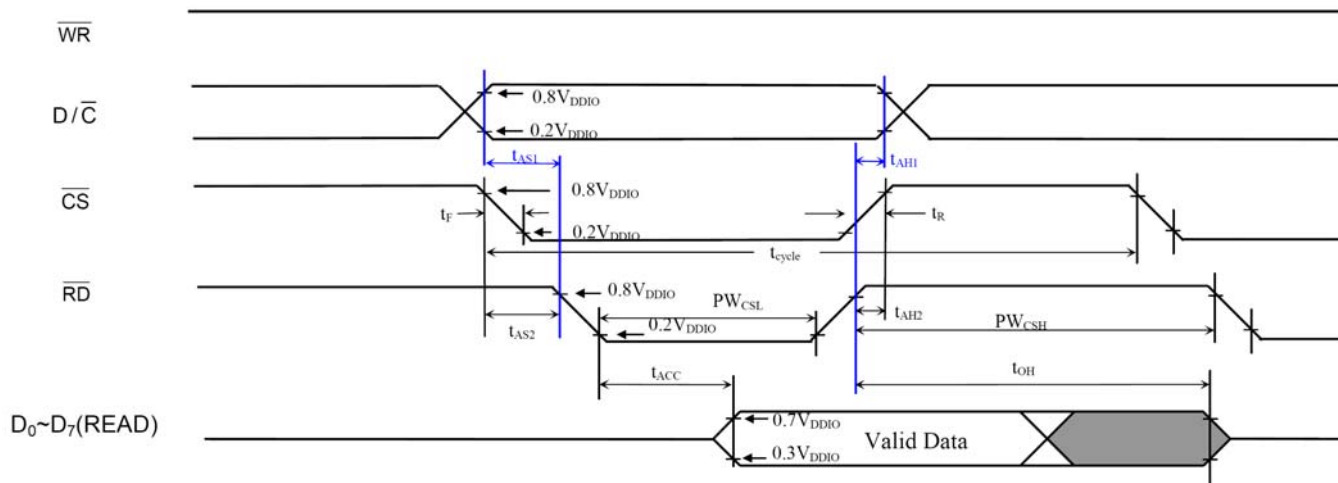
## parallel 8080 MCU interface timing characteristics

### Write Cycle



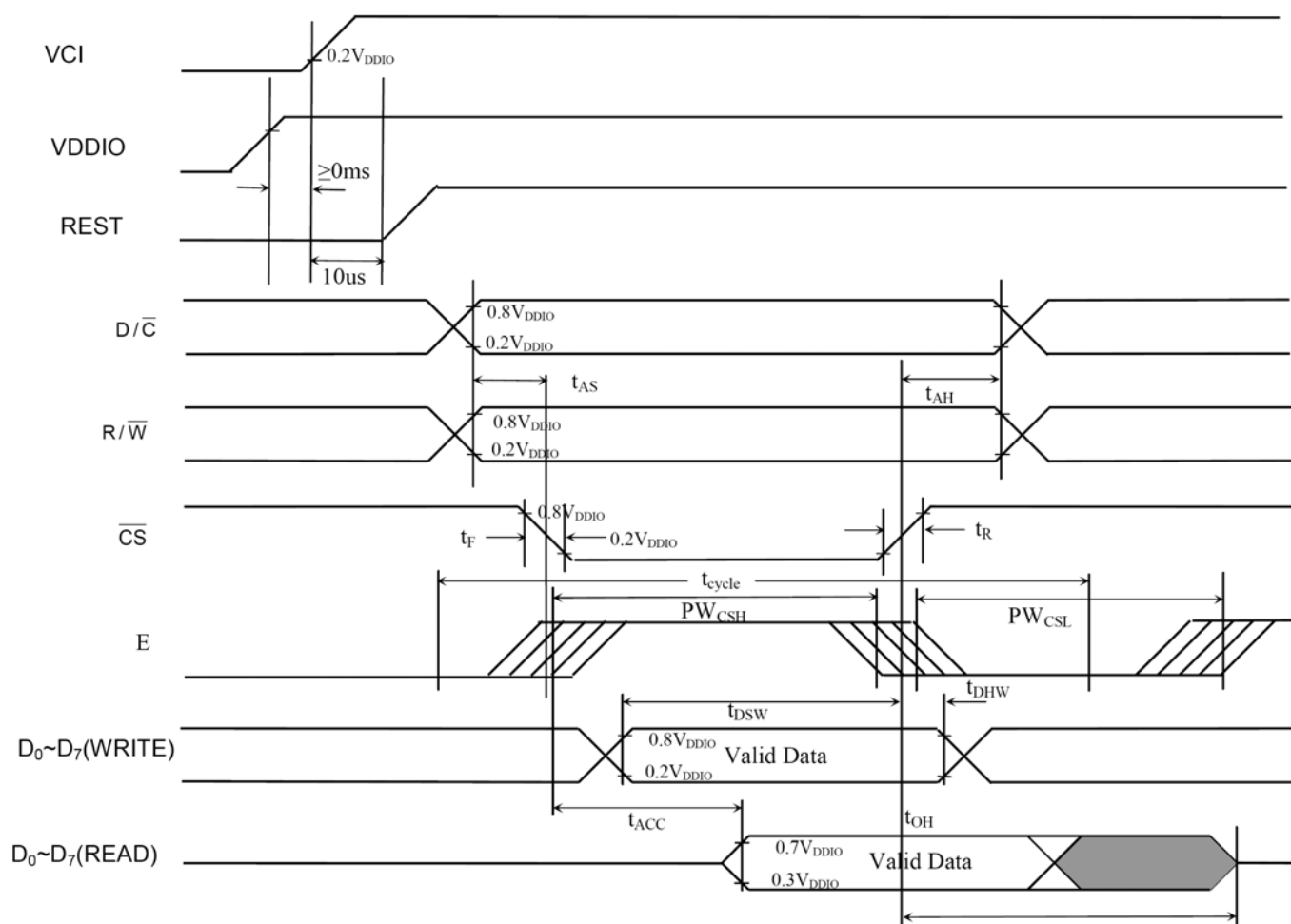
Remark: It's highly recommended that  $\overline{RD}$  remains high for the whole write cycle

### Read Cycle

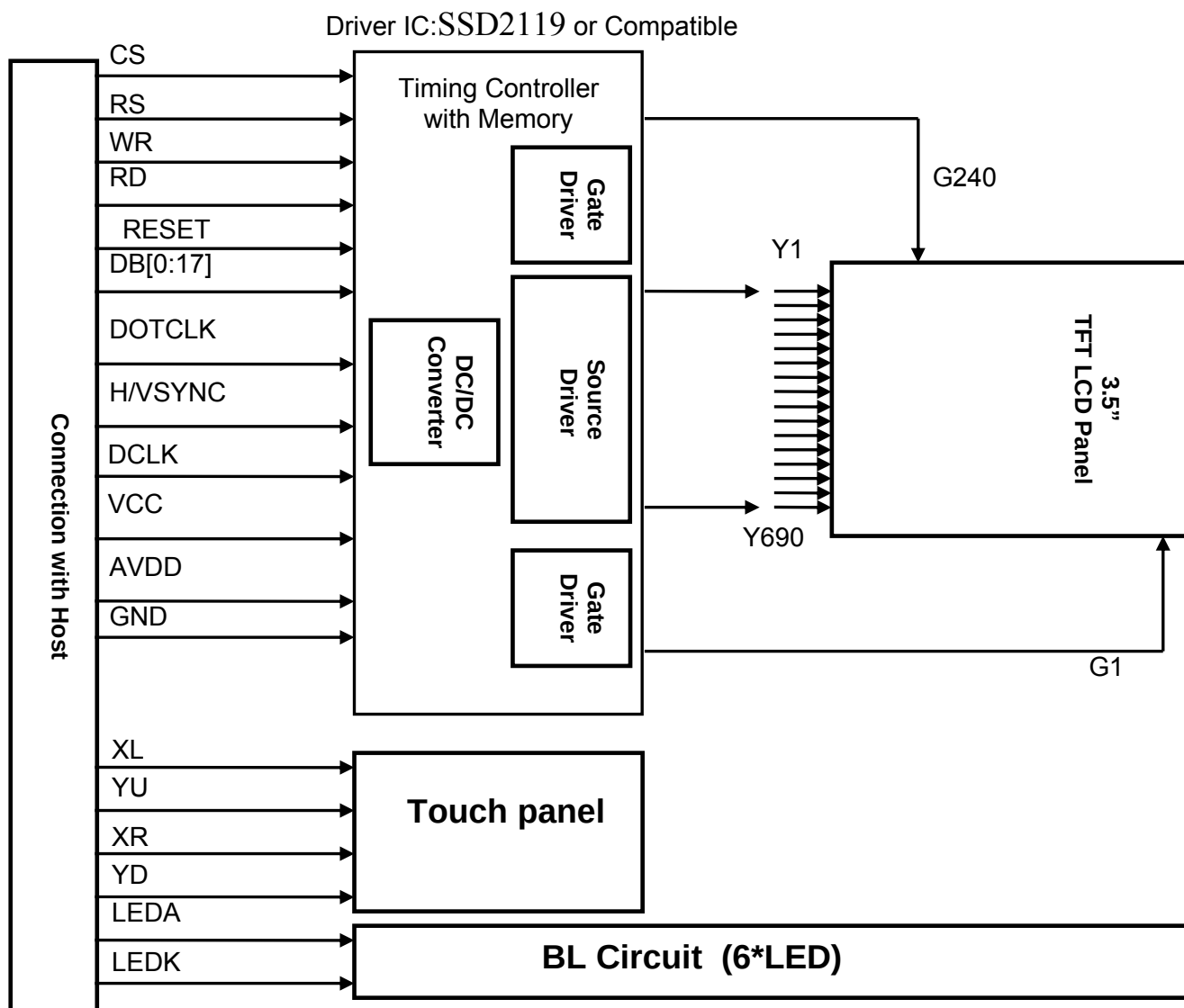


## 8.3.4 parallel 6800 interface

| Symbol      | Parameter                                                                                            | Min | Typ | Max | Unit |
|-------------|------------------------------------------------------------------------------------------------------|-----|-----|-----|------|
| $t_{cycle}$ | Clock Cycle Time (write cycle)                                                                       | 75  | -   | -   | ns   |
| $t_{cycle}$ | Clock Cycle Time (read cycle)<br>(Based on $V_{OL}/V_{OH} = 0.3 \cdot V_{DDIO}/0.7 \cdot V_{DDIO}$ ) | 450 | -   | -   | ns   |
| $t_{AS}$    | Address Setup Time (R/ $\bar{W}$ )                                                                   | 0   | -   | -   | ns   |
| $t_{AH}$    | Address Hold Time (R/ $\bar{W}$ )                                                                    | 0   | -   | -   | ns   |
| $t_{DSW}$   | Data Setup Time (D0~D7, WRITE)                                                                       | 5   | -   | -   | ns   |
| $t_{DHW}$   | Data Hold Time (D0~D7, WRITE)                                                                        | 5   | -   | -   | ns   |
| $t_{ACC}$   | Data Access Time (D0~D7, READ)                                                                       | 250 | -   | -   | ns   |
| $t_{OH}$    | Output Hold time (D0~D7, READ)                                                                       | 100 | -   | -   | ns   |
| $PW_{CSL}$  | Pulse width /CS low (write cycle)                                                                    | 40  | -   | -   | ns   |
| $PW_{CSH}$  | Pulse width /CS high (write cycle)                                                                   | 25  | -   | -   | ns   |
| $PW_{CSL}$  | Pulse width /CS low (read cycle)                                                                     | 500 | -   | -   | ns   |
| $PW_{CSH}$  | Pulse width /CS high (read cycle)                                                                    | 500 | -   | -   | ns   |
| $t_R$       | Rise time                                                                                            | -   | -   | 4   | ns   |
| $t_F$       | Fall time                                                                                            | -   | -   | 4   | ns   |



## 9. BLOCK DIAGRAM



## 10. LCM Quality Criteria

### 10.1 VISUAL & FUNCTION INSPECTION STANDARD

#### 10.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

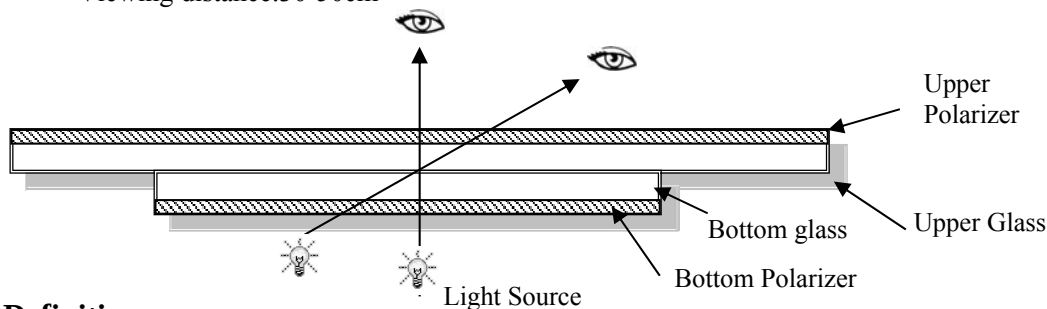
Temperature : 25±5℃

Humidity : 65%±10%RH

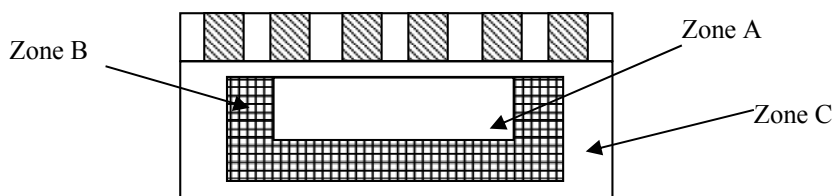
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



#### 10.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Note:

As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer.

#### 10.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class II

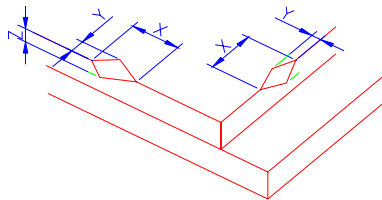
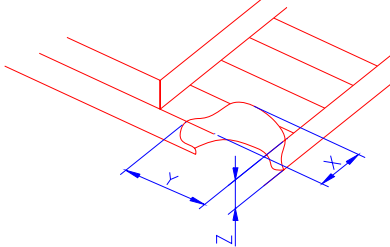
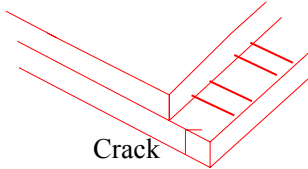
AQL:

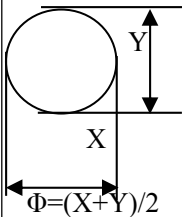
| Major defect | Minor defect |
|--------------|--------------|
| 0.65         | 1.5          |

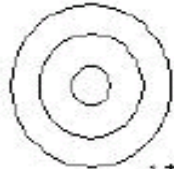
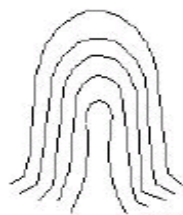
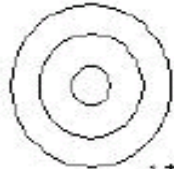
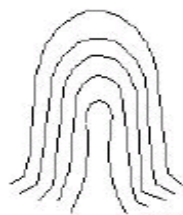
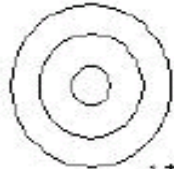
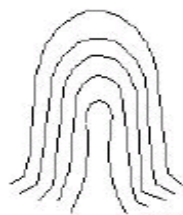
LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

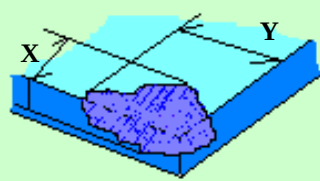
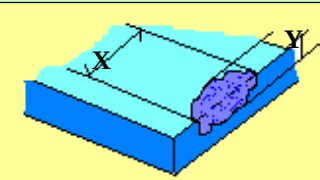
| No | Items to be inspected | Criteria                                                                                                                              | Classification of defects |
|----|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1  | Functional defects    | 1) No display, Open or miss line<br>2) Display abnormally, Short<br>3) Backlight no lighting, abnormal lighting.<br>4) TP no function | Major                     |
| 2  | Missing               | Missing component                                                                                                                     |                           |
| 3  | Outline dimension     | Overall outline dimension beyond the drawing is not allowed                                                                           |                           |
| 4  | Color tone            | Color unevenness, refer to limited sample                                                                                             | Minor                     |
| 5  | Soldering appearance  | Good soldering , Peeling off is not allowed.                                                                                          |                           |
| 6  | LCD/Polarizer/TP      | Black/White spot/line, scratch, crack, etc.                                                                                           |                           |

10.1.4 Criteria (Visual)

| Number               | Items                                                                                | Criteria(mm)                                                                                                                                                                                                           |   |   |   |        |                                |    |
|----------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|--------|--------------------------------|----|
| 1.0 LCD Crack/Broken |                                                                                      |                                                                                                                                                                                                                        |   |   |   |        |                                |    |
|                      | NOTE:<br>X: Length<br>Y: Width<br>Z: Height<br>L: Length of ITO,<br>T: Height of LCD |                                                                                                                                                                                                                        |   |   |   |        |                                |    |
|                      | (1) The edge of LCD broken                                                           |  <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td>&lt;Inner border line of the seal</td><td>≤T</td></tr></table> | X | Y | Z | ≤3.0mm | <Inner border line of the seal | ≤T |
| X                    | Y                                                                                    | Z                                                                                                                                                                                                                      |   |   |   |        |                                |    |
| ≤3.0mm               | <Inner border line of the seal                                                       | ≤T                                                                                                                                                                                                                     |   |   |   |        |                                |    |
|                      | (2)LCD corner broken                                                                 |  <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table>                               | X | Y | Z | ≤3.0mm | ≤L                             | ≤T |
| X                    | Y                                                                                    | Z                                                                                                                                                                                                                      |   |   |   |        |                                |    |
| ≤3.0mm               | ≤L                                                                                   | ≤T                                                                                                                                                                                                                     |   |   |   |        |                                |    |
|                      | (3) LCD crack                                                                        |  <p>Crack<br/>Not allowed</p>                                                                                                      |   |   |   |        |                                |    |

| Number      | Items                                                                                            | Criteria (mm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                     |                     |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|-------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|--------|--------|-----------|------------|----------------|--|--|---|---|---|--------|--------|--------|--|--------|-------------|-------|-----|--|-------------|-------|-----|--|--------|-----------------------|--|--|
| 2.0         | Spot defect<br> | ① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain )                                                                                                                                                                                                                                                                                                                                                                                            |                     |                     |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | Zone<br>Size (mm)                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     | Acceptable Qty      |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     | A                   | B      | C      |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | Φ≤0.10                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     | Ignore              |        | Ignore |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | 0.10<Φ≤0.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                     | 3( distance ≥ 10mm) |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | 0.15<Φ≤0.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     | 1                   |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | 0.2<Φ                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                     | 0                   |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | ②Dim spot ( LCD/TP/Polarizer dim dot, light leakage、dark spot )                                                                                                                                                                                                                                                                                                                                                                                                               |                     |                     |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | Zone<br>Size (mm)                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     | Acceptable Qty      |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     | A                   | B      | C      |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | Φ≤0.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                     | Ignore              |        | Ignore |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | 0.1<Φ≤0.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                     | 2( distance ≥ 10mm) |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | 0.2<Φ≤0.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                     | 1                   |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | Φ>0.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                     | 0                   |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  | ③ Polarizer accidented spot                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                     |                     |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             | Zone<br>Size (mm)                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Acceptable Qty      |                     |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | A                   | B                   | C      |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             | Φ≤0.2                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Ignore              |                     | Ignore |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             | 0.2<Φ≤0.5                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2( distance ≥ 10mm) |                     |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             | Φ>0.5                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0                   |                     |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             | Line defect<br>(LCD/TP<br>/Polarizer<br>black/white<br>line, scratch,<br>stain)                  | <table><tr><th rowspan="2">Width(mm)</th><th rowspan="2">Length(mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>Φ≤0.03</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr><tr><td>0.03&lt;W≤0.05</td><td>L≤3.0</td><td colspan="2">N≤2</td></tr><tr><td>0.05&lt;W≤0.08</td><td>L≤2.0</td><td colspan="2">N≤2</td></tr><tr><td>0.08&lt;W</td><td colspan="4">Define as spot defect</td></tr></table> |                     |                     |        |        | Width(mm) | Length(mm) | Acceptable Qty |  |  | A | B | C | Φ≤0.03 | Ignore | Ignore |  | Ignore | 0.03<W≤0.05 | L≤3.0 | N≤2 |  | 0.05<W≤0.08 | L≤2.0 | N≤2 |  | 0.08<W | Define as spot defect |  |  |
| Width(mm)   |                                                                                                  | Length(mm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Acceptable Qty      |                     |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
|             |                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | A                   | B                   | C      |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
| Φ≤0.03      |                                                                                                  | Ignore                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Ignore              |                     | Ignore |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
| 0.03<W≤0.05 |                                                                                                  | L≤3.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N≤2                 |                     |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
| 0.05<W≤0.08 |                                                                                                  | L≤2.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N≤2                 |                     |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |
| 0.08<W      |                                                                                                  | Define as spot defect                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                     |                     |        |        |           |            |                |  |  |   |   |   |        |        |        |  |        |             |       |     |  |             |       |     |  |        |                       |  |  |

| 3.0                              | Polarizer Bubble                                  | <table><tr><th rowspan="2">Zone<br/>Size (mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td><math>\Phi \leq 0.2</math></td><td colspan="3">Ignore</td></tr><tr><td><math>0.2 &lt; \Phi \leq 0.4</math></td><td colspan="3">2(distance <math>\geq 10\text{mm}</math>)</td></tr><tr><td><math>0.4 &lt; \Phi \leq 0.6</math></td><td colspan="3">1</td></tr><tr><td><math>0.6 &lt; \Phi</math></td><td colspan="3">0</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Zone<br>Size (mm)                                                                                                                                                                                                                                                                                          | Acceptable Qty         |                |  | A | B | C | $\Phi \leq 0.2$ | Ignore |                 |        | $0.2 < \Phi \leq 0.4$ | 2(distance $\geq 10\text{mm}$ ) |                       |   | $0.4 < \Phi \leq 0.6$ | 1 |                       |   | $0.6 < \Phi$ | 0 |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
|----------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------|--|---|---|---|-----------------|--------|-----------------|--------|-----------------------|---------------------------------|-----------------------|---|-----------------------|---|-----------------------|---|--------------|---|--|--------------|---|--|--|------------------------|---------------------------------------------------|--|--|-------------|---------------------------------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----|
| Zone<br>Size (mm)                | Acceptable Qty                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
|                                  | A                                                 | B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | C                                                                                                                                                                                                                                                                                                          |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
| $\Phi \leq 0.2$                  | Ignore                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
| $0.2 < \Phi \leq 0.4$            | 2(distance $\geq 10\text{mm}$ )                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
| $0.4 < \Phi \leq 0.6$            | 1                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
| $0.6 < \Phi$                     | 0                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
| 4.0                              | SMT                                               | According to IPC-A-610C class II standard . Function defect and missing part are major defect ,the others are minor defect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
| 5.0                              | TP Related                                        | <table><tr><td rowspan="5">TP bubble/<br/>accidented<br/>spot</td><td>Size <math>\Phi(\text{mm})</math></td><td colspan="3">Acceptable Qty</td></tr><tr><td></td><td>A</td><td>B</td><td>C</td></tr><tr><td><math>\Phi \leq 0.1</math></td><td colspan="3">Ignore</td></tr><tr><td><math>0.1 &lt; \Phi \leq 0.2</math></td><td colspan="3">2</td></tr><tr><td><math>0.2 &lt; \Phi \leq 0.3</math></td><td colspan="3">1</td></tr><tr><td></td><td><math>0.3 &lt; \Phi</math></td><td colspan="3">0</td></tr></table><br><table><tr><td>Assembly<br/>deflection</td><td colspan="3">beyond the edge of backlight <math>\leq 0.15\text{mm}</math></td></tr></table><br><table><tr><td rowspan="2">Newton Ring</td><td>Newton Ring area<math>&gt;1/3</math> TP area</td><td>NG</td><td rowspan="2"><br/>1 规律性<br/><br/><br/>2 非规律性<br/><br/><br/>似牛顿环</td></tr><tr><td>Newton Ring area<math>\leq 1/3</math> TP area</td><td>OK</td></tr></table> | TP bubble/<br>accidented<br>spot                                                                                                                                                                                                                                                                           | Size $\Phi(\text{mm})$ | Acceptable Qty |  |   |   | A | B               | C      | $\Phi \leq 0.1$ | Ignore |                       |                                 | $0.1 < \Phi \leq 0.2$ | 2 |                       |   | $0.2 < \Phi \leq 0.3$ | 1 |              |   |  | $0.3 < \Phi$ | 0 |  |  | Assembly<br>deflection | beyond the edge of backlight $\leq 0.15\text{mm}$ |  |  | Newton Ring | Newton Ring area $>1/3$ TP area | NG | <br>1 规律性<br><br><br>2 非规律性<br><br><br>似牛顿环 | Newton Ring area $\leq 1/3$ TP area | OK |
| TP bubble/<br>accidented<br>spot | Size $\Phi(\text{mm})$                            | Acceptable Qty                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
|                                  |                                                   | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                            | B                      | C              |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
|                                  | $\Phi \leq 0.1$                                   | Ignore                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
|                                  | $0.1 < \Phi \leq 0.2$                             | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
|                                  | $0.2 < \Phi \leq 0.3$                             | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
|                                  | $0.3 < \Phi$                                      | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
| Assembly<br>deflection           | beyond the edge of backlight $\leq 0.15\text{mm}$ |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
| Newton Ring                      | Newton Ring area $>1/3$ TP area                   | NG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <br>1 规律性<br><br><br>2 非规律性<br><br><br>似牛顿环 |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |
|                                  | Newton Ring area $\leq 1/3$ TP area               | OK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                            |                        |                |  |   |   |   |                 |        |                 |        |                       |                                 |                       |   |                       |   |                       |   |              |   |  |              |   |  |  |                        |                                                   |  |  |             |                                 |    |                                                                                                                                                                                                                                                                                                            |                                     |    |

|         |         |                                                                           |                                                                                                                                                                      |   |   |   |         |         |                 |                                                                                     |
|---------|---------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---------|---------|-----------------|-------------------------------------------------------------------------------------|
|         |         | <p>TP corner broken</p> <p>X: length</p> <p>Y: width</p> <p>Z: height</p> | <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤3.0mm</td><td>Y≤3.0mm</td><td>Z&lt;LCD thickness</td></tr></table> <p>* Circuitry broken is not allowed.</p> | X | Y | Z | X≤3.0mm | Y≤3.0mm | Z<LCD thickness |  |
| X       | Y       | Z                                                                         |                                                                                                                                                                      |   |   |   |         |         |                 |                                                                                     |
| X≤3.0mm | Y≤3.0mm | Z<LCD thickness                                                           |                                                                                                                                                                      |   |   |   |         |         |                 |                                                                                     |
|         |         | <p>TP edge broken</p> <p>X: length</p> <p>Y: width</p> <p>Z: height</p>   | <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤6.0mm</td><td>Y≤2.0mm</td><td>Z&lt;LCD thickness</td></tr></table> <p>* Circuitry broken is not allowed.</p> | X | Y | Z | X≤6.0mm | Y≤2.0mm | Z<LCD thickness |  |
| X       | Y       | Z                                                                         |                                                                                                                                                                      |   |   |   |         |         |                 |                                                                                     |
| X≤6.0mm | Y≤2.0mm | Z<LCD thickness                                                           |                                                                                                                                                                      |   |   |   |         |         |                 |                                                                                     |

## Criteria ( functional items)

| Number | Items                 | Criteria (mm) |
|--------|-----------------------|---------------|
| 1      | No display            | Not allowed   |
| 2      | Missing segment       | Not allowed   |
| 3      | Short                 | Not allowed   |
| 4      | Backlight no lighting | Not allowed   |
| 5      | TP no function        | Not allowed   |

## 10.2 RELIABILITY TEST

| NO | ITEM                                       | CONDTTION                                                                                                   | STANDARD                                                                                                                                                                                                                |
|----|--------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | High Temp. Storage                         | 80℃, 240 hours                                                                                              | 1. Functional test is OK.<br>Missing Segment, short, unclear segment, non-display, display abnormally and liquid crystal leak are un-allowed.<br>2. No low temperature bubbles, end seal loose and fall, frame rainbow. |
| 2  | Low Temp. Storage                          | -30℃, 240 hours                                                                                             |                                                                                                                                                                                                                         |
| 3  | High Temp. Operation                       | 70℃, 240 hours                                                                                              |                                                                                                                                                                                                                         |
| 4  | Low Temp. Operation                        | -20℃, 240 hours                                                                                             |                                                                                                                                                                                                                         |
| 5  | High temperature and high Humidity storage | 40℃,90%RH , 240 hours                                                                                       |                                                                                                                                                                                                                         |
| 6  | Thermal and cold shock                     | Static state, -20℃ (30 Min) ~70℃ (30 Min) ~-20℃ (30Min) , packaging, 10 cycles                              | 1. Function test is OK.<br>2. No glass crack, chipped glass, end seal loose and fall, epoxy frame crack and so on.<br>3. No structure loose and fall.                                                                   |
| 7  | Vibration test                             | Packaging, Frequency : 10-55Hz<br>Amplitude : 1.0mm,<br>Each direction on X,Y axe 0.5 heure, circle 2 hours |                                                                                                                                                                                                                         |
| 8  | Dropping test                              | Pack products into the carton box. Drop it from 80cm height to ground. Once for each side of the carton     |                                                                                                                                                                                                                         |

### NOTE:

10.2.1 The reliability items will be fully performed in new sample qualification,

10.2.2 The reliability status will be tested as monitor during mass production. Individual reliability test shall be performed by lot , Moreover, the individual reliability item shall be decided according to reliability plan.



- 10.2.3 All samples are inspected after keeping in the room with normal temperature and humidity for 2 hours or above.
- 10.2.4 Vibration test: It is not necessary to test for those products without assembly frame , back light ,PCB and so on.
- 10.2.5 Dropping test : It is necessary for affirming new package.
- 10.2.6 For the high temperature and high humidity test, pure water of over 10 MΩ.cm should be used.
- 10.2.7 Each test item applies for test LCM only once .Then tested LCM cannot be used again in any other test item.
- 10.2.8 The quantity of LCM examination for each test item is 5pcs to 10pcs.

### **10.3 Safety instructions**

- 10.3.1 If the LCD panel breaks, be careful not to get any liquid crystal substance in your mouth.
- 10.3.2 If the liquid crystal substance touches your skin or clothes, please wash it off immediately by using soap and water.

### **10.4 Handling Precautions**

- 10.4.1 Avoid static electricity damaging the LSI.
- 10.4.2 Do not remove the panel or frame from the module .
- 10.4.3 The polarizing plate of the display is very fragile . So, please handle it very carefully.
- 10.4.4 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate.
- 10.4.5 The color tone of display and background of LCM has the possibility to be changed in the storage temperature range.
- 10.4.6 Pay attention to the working environment, as the element may be destroyed by static electricity.
  - Be sure to ground human body and electric appliance during work.
  - Avoid working in a dry environment to minimize the generations of static electricity.
  - Static electricity may be generated when the protective film is fast peeled off.
- 10.4.7 When soldering the terminal of LCM, make certain the AC power source of soldering iron does not leak.
- 10.4.8 If the display surface becomes contaminated ,breathe on the surface and gently wipe it with a soft-dry- clean cloth .If it is heavily contaminated ,moisten cloth with the following solvent(ex:Ethyl alcohol).Solvents other than those above-mentioned may damage the polarizer(Especially ,do not use them .ex: Warter / Ketone)

### **10.5 Operation instructions**

- 10.5.1 It is recommended to drive the LCD within the specified voltage limits, try to adjust the operating voltage for the optimal contrast, the color and contrast of LCD panel will varies at different temperature.
- 10.5.2 Response time is greatly delayed at low operating temperature range. However, this does not mean the LCD will be out of the order, It will recover when it returns to the specified temperature range.
- 10.5.3 If the display area is pushed hard during operation, the display will become abnormal.
- 10.5.4 Do not operate the LCD at the environments over the specified conditions, this may cause damage on the LCD and shorten the lifetime.

### **10.6 Storage instructions:**

- 10.6.1 Store LCDs in a sealed polyethylene bag.
- 10.6.2 Store LCDs in a dark place, Do not expose to sunlight or fluorescent light. Keep the temperature between 0℃and 35℃.
- 10.6.3 Avoid the polarizer touch any other object, ( It is recommended to store them in the container in which they were shipped.)

### **10.7 Limited Warranty**

- 10.7.1 will replace or repair any of its LCD modules, which are found to be defective, when inspected in accordance with LCM acceptance standards ( copies available upon request ) for a period of 12 months from ink- print date on product
- 10.7.2 Any defects must be returned to within 60 days since ship-out. Confirmation of such date shall be based on freight documents. The warranty liability of wasam limited to repair and/or replacement on defects above (7.1,7.2)
- 10.7.3 No warranty can be granted if the precautions stated above have been disregarded. The typical samples are as below:
  - LCD glass crack/break
  - PCB outlet is damaged or modified.
  - PCB conductors damaged.
  - Circuit modified with by grinding, engraving or painting varnish.

--FPC crack

10.7.4 Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB outlet, conductors and terminals. Modules must be packed with the container in which they were shipped.



## 11. Packing method

-----TBD