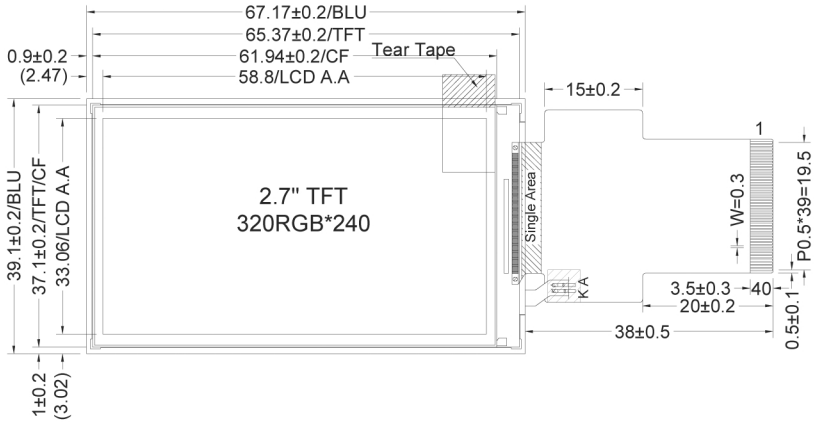


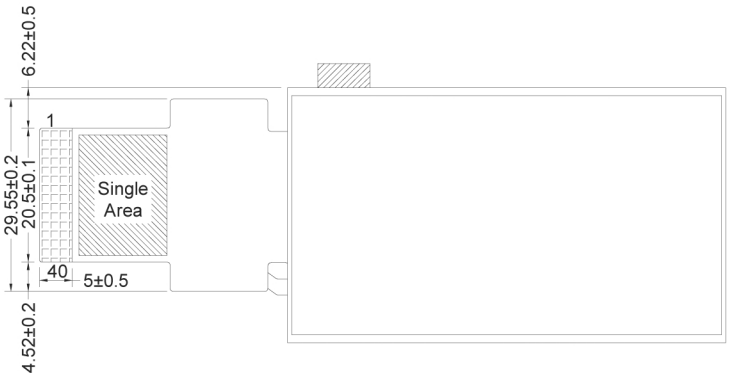




| PIN | SYMBOL | PIN | SYMBOL | PIN | SYMBOL | PIN | SYMBOL | PIN | SYMBOL | PIN | SYMBOL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | VCOM | 8 | D7 | 15 | D0 | 22 | C2P | 29 | C4P | 36 | VCAC |
| 2 | CS | 9 | D6 | 16 | GND | 23 | C2M | 30 | C4M | 37 | DRV |
| 3 | SDA | 10 | D5 | 17 | VCI | 24 | VINT1 | 31 | VGH | 38 | VLED-A |
| 4 | SCL | 11 | D4 | 18 | IOVCC | 25 | C3P | 32 | VGL | 39 | VLED-K |
| 5 | HSYNC | 12 | D3 | 19 | DVDD | 26 | C3M | 33 | AGND | 40 | VCOM |
| 6 | VSYNC | 13 | D2 | 20 | C1P | 27 | VINT4 | 34 | FRP | | |
| 7 | DCLK | 14 | D1 | 21 | C1M | 28 | VINT3 | 35 | COMDC | | |

NOTES:
1.Display type:2.7"TFT
2.Viewing direction:FULL VIEWING
3.Polarizer mode:Transmissive/Normal black
4.Operation temperature:-20°C~+70°C
5.Storage temperature:-30°C~+80°C
6.Dirver IC:ILI8961
7.Power supply voltage:3.3V
8.Backlight :White(6 LED)/18.6V(TYP)/20mA
9.Brightness:700cd/m2(TYP)
10.ROHS must be complied
* Unspecification tolerance are ±0.2mm

**Compliance: RohS III (2015/863/EU)**

| Tolerances: | | | Date | Name |
|---|---|---|---|---|
| | | | 06/24 | dr |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Modifications | Date | Name | | |

# YDP LCD I 270 SR

knitter-switch

30 54 37

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# PRODUCT SPECIFICATION

ROHS

## 2.7” TFT LCD MODULE

**MODEL:** YDP LCD I 270 SR **Ver:1.0**

< ◇> Preliminary Specification

< ◆> Finally Specification

| CUSTOMER’S APPROVAL | |
|---|---|
| CUSTOMER : | |
| SIGNATURE: | DATE: |
| | |

| APPROVED BY | PM REVIEWED | PD REVIEWED | PREPARED BY |
|---|---|---|---|
| TFT S. G. H 20220826 | | | TFT L. Q 20220826 |

## Revision History

| Revision | Date | Originator | Detail | Remarks |
|---|---|---|---|---|
| 1.0 | 2022.08.26 | LQ | Initial Release | |
| | | | | |
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| | | | | |

## Table of Contents

## 1. General Description

The specification is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT-LCD panel, driver ICs and a backlight unit.

## 2. Module Parameter

| Features | Details | Unit |
|---|---|---|
| Display Size(Diagonal) | 2.7” | |
| LCD type | IPS TFT | |
| Display Mode | Transmissive /Normally Black | |
| Resolution | 320 RGB x 240 | Pixels |
| View Direction | FULL VIEWING | |
| Module Outline | 67.17 (H) x 39.10 (V) x 2.06(T) ( Note1 ) | mm |
| Active Area | 58.8 (H) x33.06 (V) | mm |
| Pixel Size | 183.75 x137.75 | um |
| Pixel Arrangement | RGB Delta Stripe | |
| Display Colors | 262K | |
| Interface | 3-wire SPI+8-bit RGB interface | |
| With or without touch panel | Without | |
| Driver IC | ILI8961 | - |
| Operating Temperature | **-20～70** | ºC |
| Storage Temperature | **-30～80** | ºC |
| Weight | 9 | g |

Note 1: Exclusive hooks, posts, FFC/FPC tail etc.

## 3. Absolute Maximum Ratings

$V_{SS}$=0V, Ta=25ºC

| Item | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|
| Power Supply Voltage | VCI | -0.3 | 5.0 | V |
| I/O Supply Voltage | IOVCC | -0.3 | VCI+0.3 | V |
| Storage temperature | $T_{STG}$ | **-30** | **+80** | ºC |
| Operating temperature | $T_{OP}$ | **-20** | **+70** | ºC |

Note 1: If Ta below 50ºC, the maximal humidity is 90%RH, if Ta over 50ºC, absolute humidity should be less than 60%RH.

Note 2: The response time will be extremely slow when the operating temperature is around -10℃, and the back ground will become darker at high temperature operating.

## 4. DC Characteristics

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Power Supply Voltage | VCI | 2.7 | 3.3 | 3.6 | V | |
| I/O Supply Voltage | IOVCC | 1.65 | - | VCI | V | |
| Supply Voltage | VGH | - | 15 | - | V | |
| | VGL | - | -10 | - | V | |
| | VCOM | - | 0 | - | V | |
| Logic Low input voltage | $V_{IL}$ | GND | - | 0.3*IOVCC | V | |
| Logic High input voltage | $V_{IH}$ | 0.7*IOVCC | - | IOVCC | V | |
| Current Consumption All White | $I_{VCI+}$ $I_{IOVCC}$ | - | 20 | - | mA | |

Note 1: Typical VCOM is only a reference value, it must be optimized according to each LCM. Be sure to use VR.

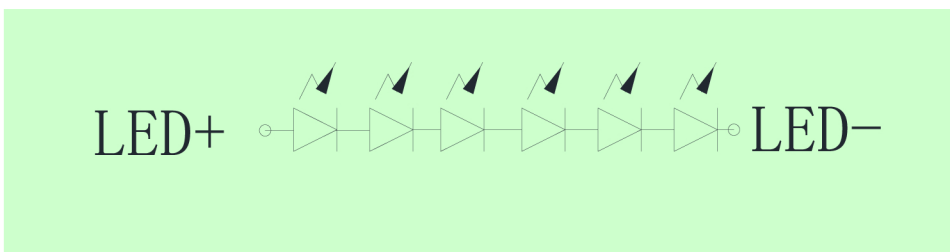
## 5. Backlight Characteristic

### 5.1. Backlight Characteristics

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_F$ | Ta=25 ºC, $I_F$=20mA/LED | 16.8 | **18.6** | 20.4 | V |
| Forward Current | $I_F$ | Ta=25 ºC, $V_F$=3.1V/LED | - | **20** | - | mA |
| Power dissipation | $P_D$ | | - | **372** | - | mW |
| Uniformity | Avg | | - | 80 | - | % |
| LED working life(25℃) | - | | - | 30,000 | - | Hrs |
| Drive method | Constant current | | | | | |
| LED Configuration | 6 White LEDs in string | | | | | |

Note1：LED life time defined as follows: The final brightness is at 50% of original brightness.
The environmental conducted under ambient air flow, at Ta=25±2 ºC,60%RH±5%, $I_F$=20mA/LED.

### 5.2. Backlighting circuit



# 6. Optical Characteristics

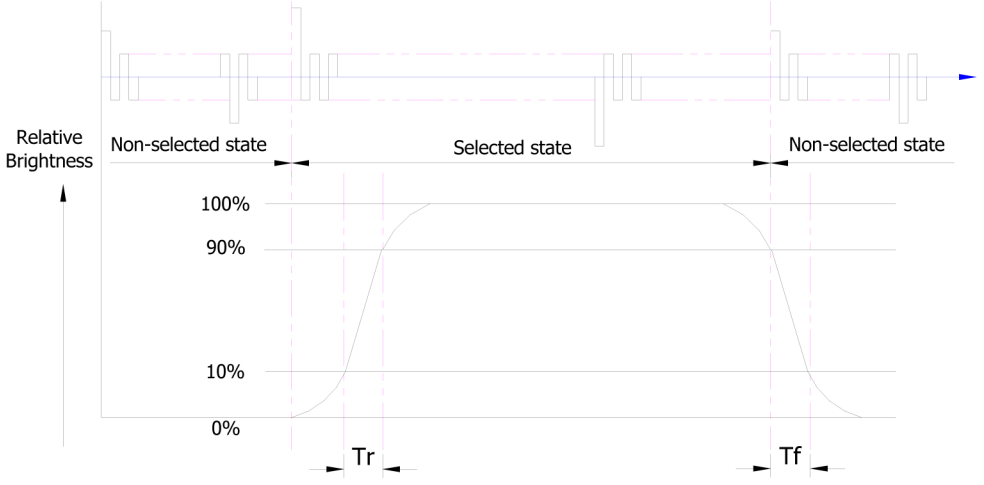
## 6.1. Optical Characteristics

Ta=25ºC, VCI=3.3V

| | Item | | Symbol | Condition | Specification | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | | | Min. | Typ. | Max. | |
| Backlight On (Transmissive Mode) | Luminance on TFT( $I_f$ =20mA/LED) | | Lv | Normally viewing angle θX = φY =0º | **560** | **700** | - | cd/m² |
| | Contrast ratio(See 6.3) | | CR | | 700 | 1200 | - | |
| | Response time (See 6.2) | | TR+TF | | - | 30 | 40 | ms |
| | Chromaticity Transmissive (See 6.5) | Red | XR | | 0.569 | **0.619** | 0.669 | |
| | | | YR | | 0.298 | **0.348** | 0.398 | |
| | | Green | XG | | 0.270 | **0.320** | 0.370 | |
| | | | YG | | 0.564 | **0.614** | 0.664 | |
| | | Blue | XB | | 0.083 | **0.133** | 0.183 | |
| | | | YB | | 0.024 | **0.074** | 0.124 | |
| | | White | XW | | 0.229 | **0.279** | 0.329 | |
| | | | YW | | 0.257 | **0.307** | 0.357 | |
| | Viewing Angle (See 6.4) | Horizontal | θX+ | Center CR≥10 | 70 | **80** | - | Deg. |
| | | | θX- | | 70 | **80** | - | |
| | | Vertical | φY+ | | 70 | **80** | - | |
| | | | φY- | | 70 | **80** | - | |
| | NTSC Ratio(Gamut) | | | | 55 | 60.4 | - | % |

## 6.2. Definition of Response Time

### 6.2.1. Normally Black Type (Negative)

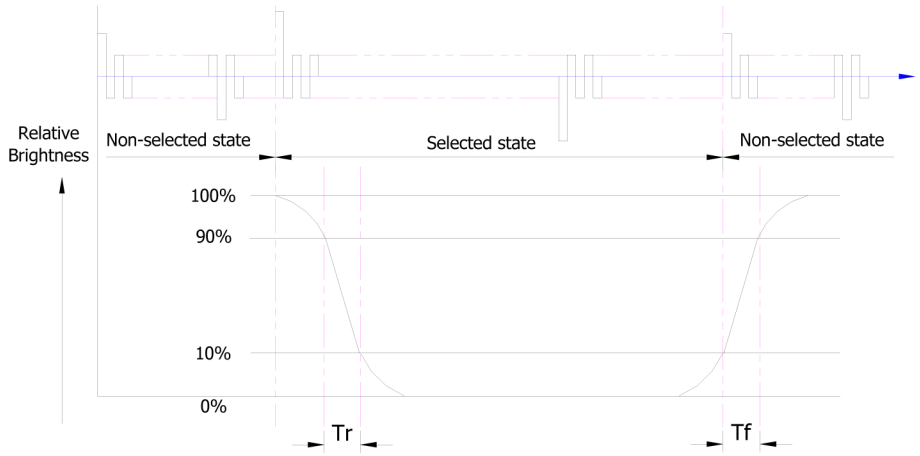



Tr is the time it takes to change form non-selected stage with relative luminance 10% to selected state with relative luminance 90%;

Tf is the time it takes to change from selected state with relative luminance 90% to non-selected state with relative luminance 10%.

Note: Measuring machine: LCD-5100

6.2.2. Normally White Type (Positive)




Tr is the time it takes to change form non-selected stage with relative luminance 90% to selected state with relative luminance 10%;

Tf is the time it takes to change from selected state with relative luminance 10% to non-selected state with relative luminance 90%;

Note: Measuring machine: LCD-5100 or EQUI

## 6.3. Definition of Contrast Ratio

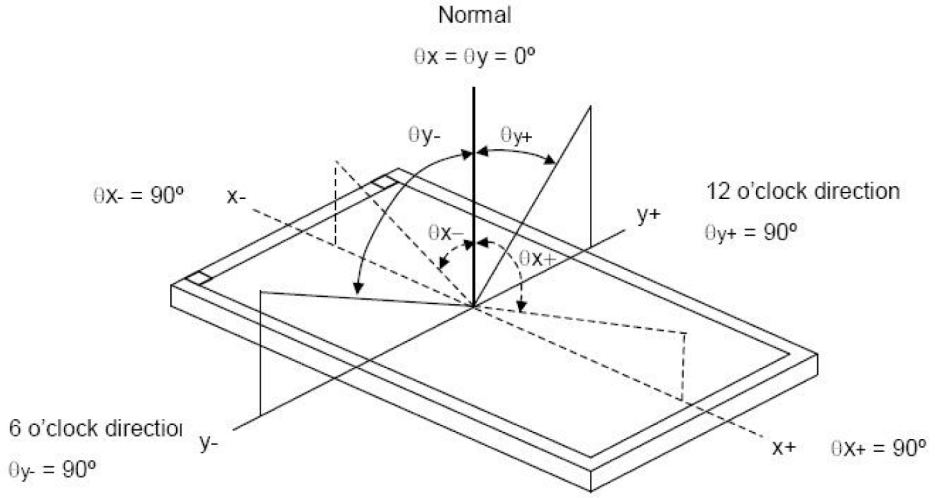
Contrast is measured perpendicular to display surface in reflective and transmissive mode.

The measurement condition is:

| | |
|---|---|
| Measuring Equipment | Eldim or Equivalent |
| Measuring Point Diameter | 3mm//1mm |
| Measuring Point Location | Active Area centre point |
| Test pattern | A: All Pixels white |
| | B: All Pixel black |
| Contrast setting | Maximum |

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

## 6.4. Definition of Viewing Angles



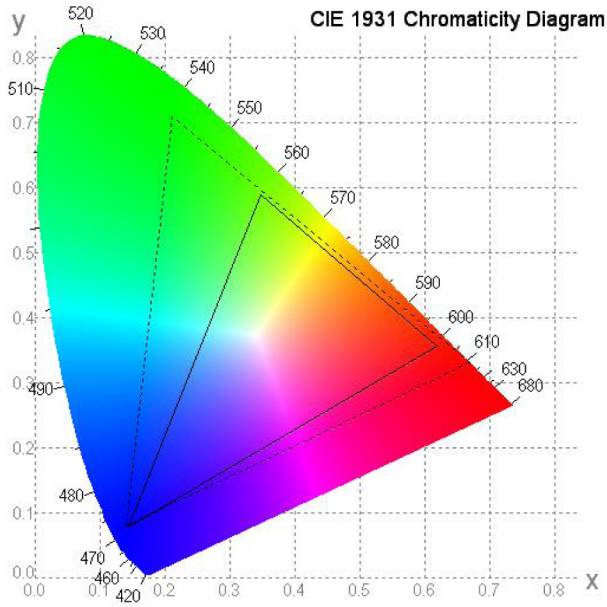

Measuring machine: LCD-5100 or EQUI

## 6.5. Definition of Color Appearance

R, G, B and W are defined by (x, y) on the IE chromaticity diagram

NTSC=area of RGB triangle/area of NTSC triangleX100%

Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)




## 6.6. Definition of Surface Luminance, Uniformity and Transmittance

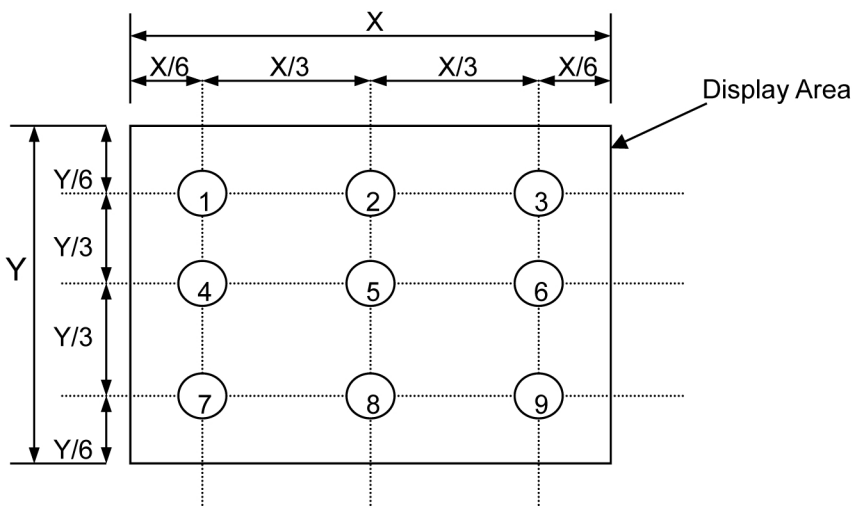
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

6.6.1. Surface Luminance: $L_V$ = average ($L_{P1}$:$L_{P9}$)

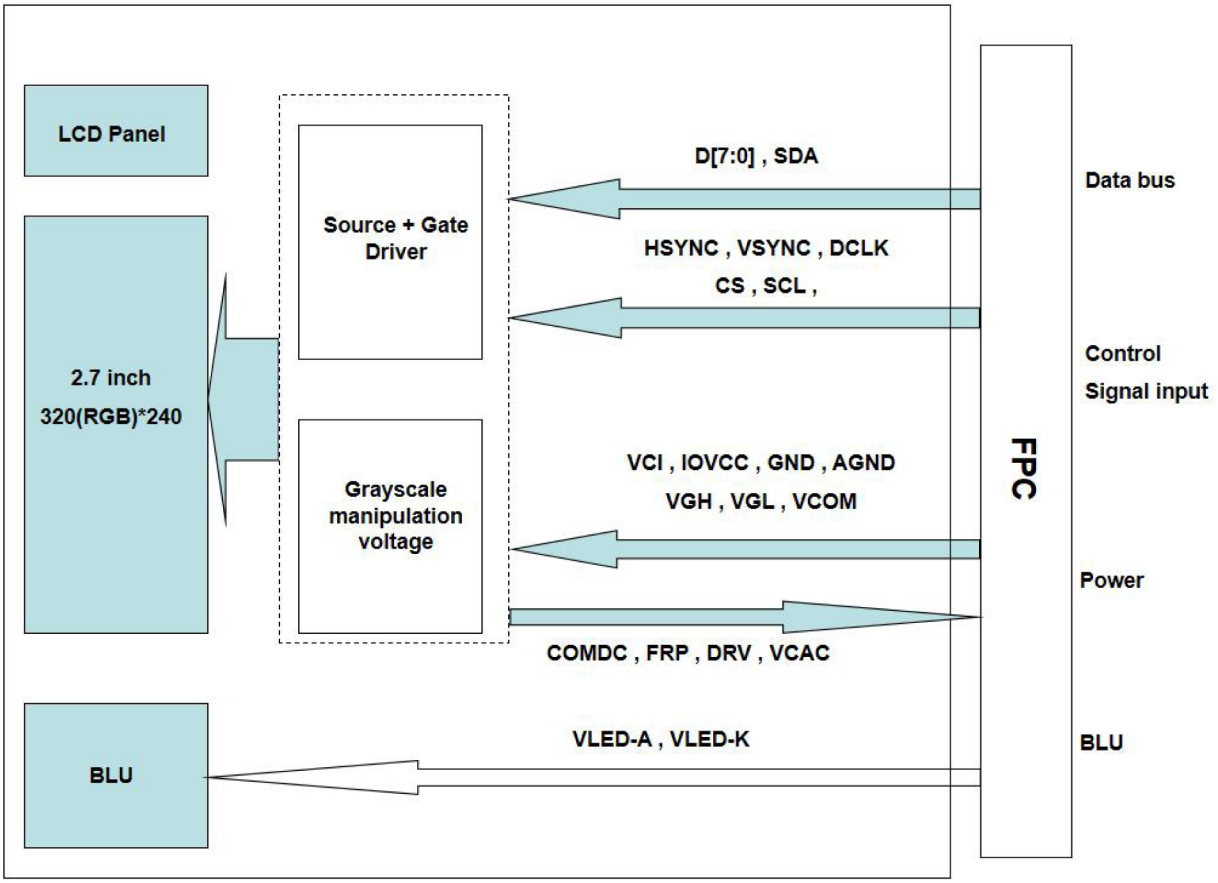
6.6.2. Uniformity = Minimal ($L_{P1}$:$L_{P9}$) / Maximal ($L_{P1}$:$L_{P9}$) * 100%

6.6.3. Transmittance = $L_V$ on LCD / $L_V$ on Backlight * 100%

Note: Measuring machine: BM-7



## 7. Block Diagram and Power Supply



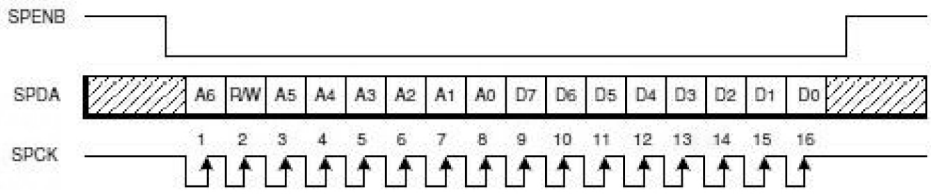
## 8. Interface Pins Definition

| No. | Symbol | Function | Remark |
|---|---|---|---|
| 1 | VCOM | Panel common voltage | |
| 2 | CS | Chip select signal. | |
| 3 | SDA | Serial command date input | |
| 4 | SCL | Serial command clock input | |
| 5 | HSYNC | Horizontal Sync input | |
| 6 | VSYNC | Vertical Sync input | |
| 7 | DCLK | Data clock input | |
| 8 | D7 | Data input | |
| 9 | D6 | Data input | |
| 10 | D5 | Data input | |
| 11 | D4 | Data input | |
| 12 | D3 | Data input | |
| 13 | D2 | Data input | |
| 14 | D1 | Data input | |
| 15 | D0 | Data input | |
| 16 | GND | Ground | |
| 17 | VCI | Power supply for charge pump circuits. | |
| 18 | IOVCC | Power supply for digital interface. | |
| 19 | DVDD | Power setting capacitor connecting pins.(internal core use, typical 1.8 V) | |
| 20 | C1P | Charge pump Power GND | |
| 21 | C1M | Charge pump Power GND | |
| 22 | C2P | Charge pump Power GND | |
| 23 | C2M | Charge pump Power GND | |
| 24 | VINT1 | Charge pump Power GND | |
| 25 | C3P | Charge pump Power GND | |
| 26 | C3M | Charge pump Power GND | |
| 27 | VINT4 | No connection | |
| 28 | VINT3 | No connection | |
| 29 | C4P | Charge pump Power GND | |
| 30 | C4M | Charge pump Power GND | |
| 31 | VGH | Power setting capacitor connect pin | |
| 32 | VGL | Power setting capacitor connect pin | |
| 33 | AGND | Ground for analog circuit. | |
| 34 | FRP | Frame polarity output for panel VCOM | |
| 35 | COMDC | VCOM DC output. | |
| 36 | VCAC | Power setting capacitor for VCOM AC. | |
| 37 | DRV | Power transistor signal for back light power boost converter. | |
| 38 | VLED-A | LED power anode | |
| 39 | VLED-K | LED power cathode | |
| 40 | VCOM | Panel common voltage | |

# 9. AC Characteristics

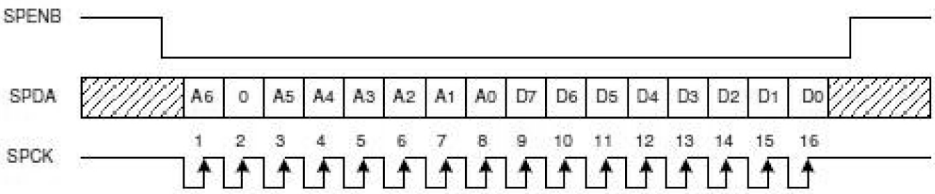
## 9.1. 3-wire Serial Interface

**3-Wire Serial command format**

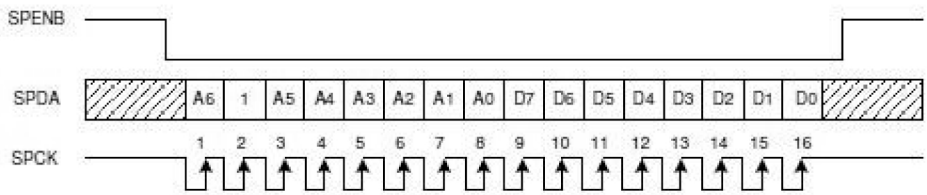



- Each serial command consists of 16 bits of data that is loaded one bit a time at the rising edge of serial clock SPCK. Command loading operation starts from the falling edge of SPENB and is completed at the next rising edge of SPENB.
- The serial control block is operational after power on reset, but commands are established by the VSD signal. If command is transferred multiple times for the same register, the last command before the VSD signal is valid.
- If less than 16 bits of SPCK are input while SPENB is low, the transferred data is ignored.
- If 16 bits or more of SPCK are input while SPENB is low, the first 16 bits of transferred data before the rising edge of SPENB pulse are valid data.
- Serial block operates with the SPCK clock.
- Serial data can be accepted in the power save modes.

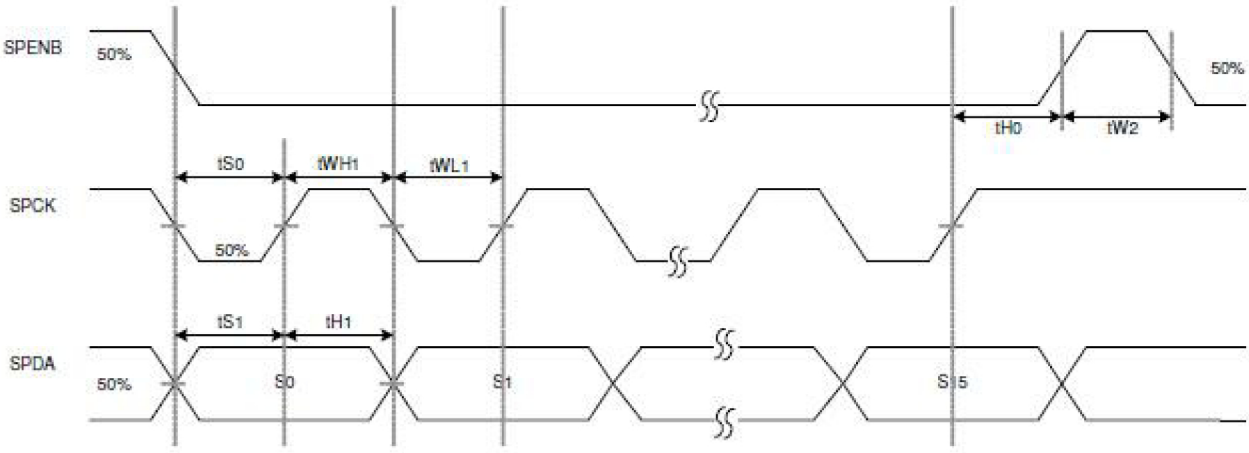
**Seiral Interface Write Sequence**




**Serial Interface Read Sequence**



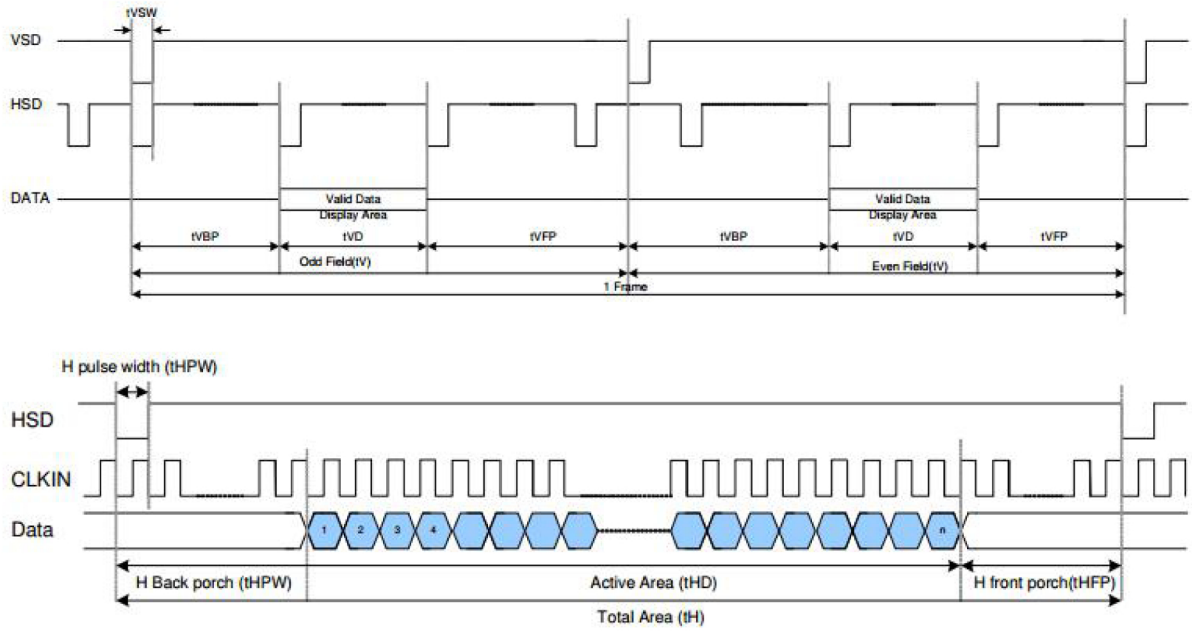
## Serial Control Timing




| Item | symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| SPENB input setup time | tS0 | 50 | | | ns |
| Serial data input setup time | tS1 | 50 | | | ns |
| SPENB input hold time | tH0 | 50 | | | ns |
| Serial Data Input hold time | tH1 | 50 | | | ns |
| SPCK pulse high width | tWH1 | 50 | | | ns |
| SPCK pulse low width | tWL1 | 50 | | | ns |
| SPENB pulse high width | tW2 | 400 | | | ns |

### 9.2. Input Timing Chart

#### 9.2.1. 8-bit RGB Input Timing Chart

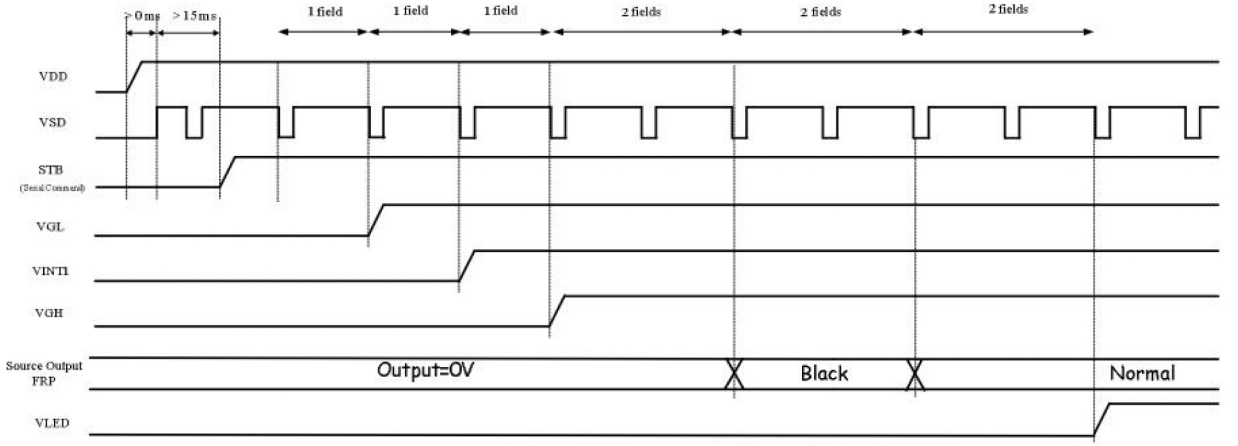


### 9.2.2. 8-bit RGB Input Timing

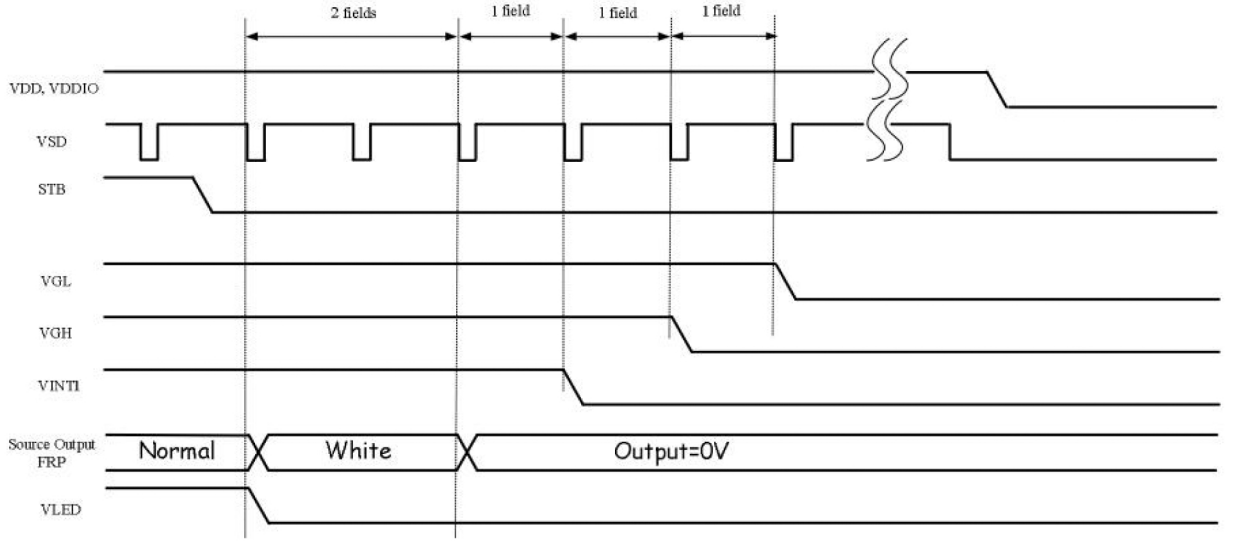
| Parameter | | Symbol | Interface | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| CLKIN frequency | | fCLKIN | - | 6.2 | 7.5 | MHz |
| HSD period | | tH | - | 390 | - | CLKIN |
| HSD display period | | tHD | | 320 | | CLKIN |
| HSD back porch | | tHBP | 40 | 61 | - | CLKIN |
| HSD front porch | | tHFP | - | 9 | - | CLKIN |
| HSD pulse width | | tHSW | - | 1 | - | CLKIN |
| VSD period time | | tV | - | 262.5 | - | H |
| Vertical display area | | tVD | | 240 | | H |
| VSD back porch | Odd field | tVBP | - | 21 | - | H |
| | Even field | | - | 21.5 | - | |
| VSD front porch | Odd field | tVFP | - | 1.5 | - | H |
| | Even field | | - | 1 | - | |
| VSD pulse width | | tVSW | - | 1 | - | CLKIN |
| 1 Frame | | | - | 525 | - | H |

## 9.3. Power On/Off Sequence

### 9.3.1. Power On Sequence




### 9.3.2. Power Off Sequence



# 10. Quality Assurance

## 10.1. Purpose

This standard for Quality Assurance assures the quality of LCD module products supplied to customer.

## 10.2. Standard for Quality Test

10.2.1. Sampling Plan:

GB2828.1-2012

Single sampling, general inspection level II

10.2.2. Sampling Criteria:

Visual inspection: AQL 1.5

Electrical functional: AQL 0.65.

10.2.3. Reliability Test:

Detailed requirement refer to Reliability Test Specification.

## 10.3. Nonconforming Analysis & Disposition

10.3.1. Nonconforming analysis:

10.3.1.1. Customer should provide overall information of non-conforming sample for their complaints.

10.3.1.2. After receipt of detailed information from customer, the analysis of nonconforming parts usually should be finished in one week.

10.3.1.3. If can not finish the analysis on time, customer will be notified with the progress status.

10.3.2. Disposition of nonconforming:

10.3.2.1. Non-conforming product over PPM level will be replaced.

10.3.2.2. The cause of non-conformance will be analyzed. Corrective action will be discussed and implemented.

## 10.4. Agreement Items

Shall negotiate with customer if the following situation occurs:

10.4.1. There is any discrepancy in standard of quality assurance.

10.4.2. Additional requirement to be added in product specification.

10.4.3. Any other special problem.

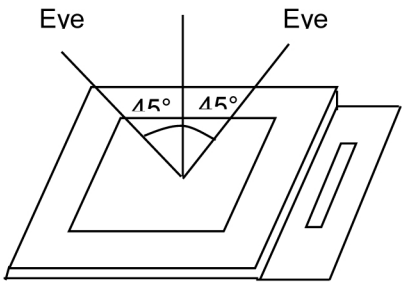
## 10.5. Standard of the Product Visual Inspection

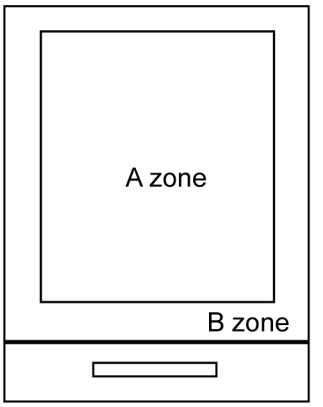
10.5.1. Appearance inspection:

10.5.1.1. The inspection must be under illumination about 1000 – 1500 lx, and the distance of view must be at 30cm ± 2cm.

10.5.1.2. The viewing angle should be 45° from the vertical line without reflection light or follows customer's viewing angle specifications.

10.5.1.3. Definition of area: A Zone: Active Area, B Zone: Viewing Area,



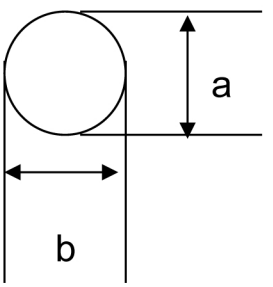




10.5.2. Basic principle:

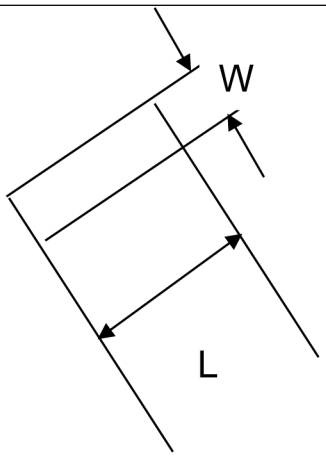
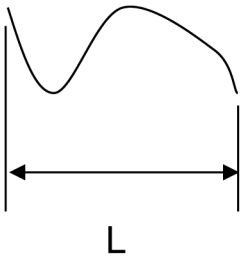
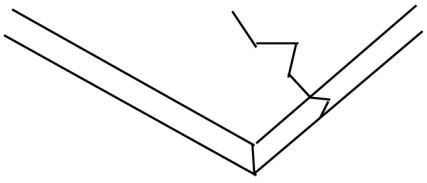
10.5.2.1. A set of sample to indicate the limit of acceptable quality level must be discussed by both us and customer when there is any dispute happened.

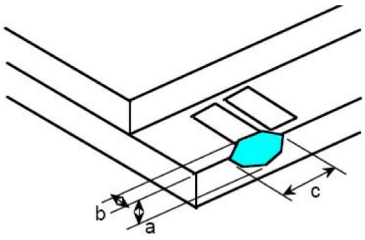
10.5.2.2. New item must be added on time when it is necessary.

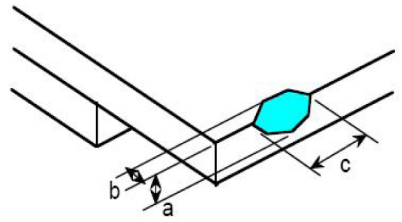
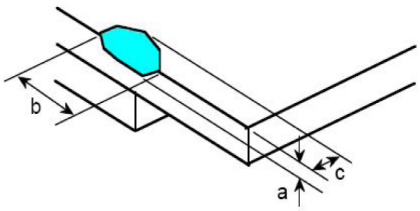
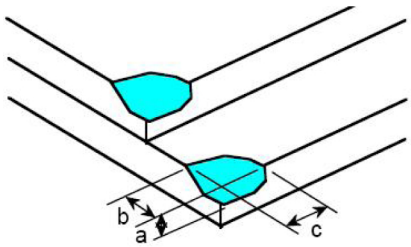
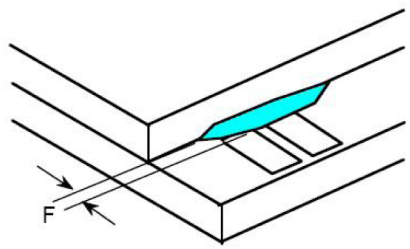
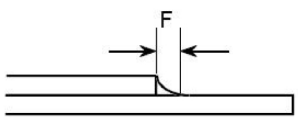
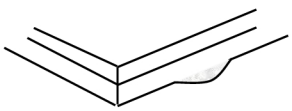
**10.6. Inspection Specification**

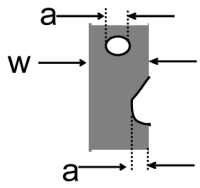
<table>
<tr><th>No.</th><th>Item</th><th>Criteria (Unit: mm)</th></tr>
<tr><td>01</td><td>Black / White spot<br>Foreign material<br>(Round type)<br>Pinholes<br>Stain<br>Particles inside cell.<br>(Minor defect)</td><td>


<table>
<tr><th>Size \ Area</th><th>Acc. Qty</th></tr>
<tr><td>φ≤0.10</td><td>Ignore</td></tr>
<tr><td>0.10<φ≤0.15</td><td>2</td></tr>
<tr><td>0.15<φ≤0.25</td><td>1</td></tr>
<tr><td>0.25<φ</td><td>0</td></tr>
<tr><td>Total</td><td>2 no include φ≤ 0.10</td></tr>
</table>
φ= ( a + b) /2<br><br>Distance between 2 defects should more than 3mm apart.
</td></tr>
<tr><td>02</td><td>Electrical Defect<br>(Minor defect)</td><td>
<table>
<tr><td></td><td>Display Area</td><td>Total</td><td rowspan="3">Note1</td></tr>
<tr><td>Bright dot</td><td>0</td><td>0</td></tr>
<tr><td>Dark dot</td><td>N≤2</td><td>N≤2</td></tr>
<tr><td>Total dot</td><td>N≤2</td><td>N≤2</td><td></td></tr>
<tr><td>Mura</td><td colspan="2">Not visible through 5% ND filters.</td><td>Note2</td></tr>
</table>
Remark:<br>1. Bright dot caused by scratch and foreign object accords to item 1.
</td></tr>
</table>

| | | |
|---|---|---|
| 03 | Black and White line<br>Scratch<br>Foreign material<br>(Line type)<br>(Minor defect) |  <br>  <br>**Length / Width / Acc. Qty**<br>/ : W ≦ 0.03 : Ignore<br>L ≦ 2.5 : 0.03 < W ≦ 0.05 : 3<br>L ≦ 2.5 : 0.05 < W ≦ 0.10 : 2<br>/ : 0.1 < W :<br>Total : 3<br>Distance between 2 defects should more than 3mm apart. Scratches not viewable through the back of the display are acceptable. |
| 04 | Glass Crack<br>(Minor defect) |  <br>Crack is potential to enlarge, any type is not allowed. |

| | | |
|---|---|---|
| 05 | Glass Chipping Pad Area:<br>(Minor defect)<br>  | **Length and Width / Acc. Qty**<br>c > 3.0, b< 1.0 : 1<br>c< 3.0, b< 1.0 : 3<br>a<Glass Thickness |
| 06 | Glass Chipping Rear of Pad Area:<br>(Minor defect) | **Length and Width / Acc. Qty**<br>c > 3.0, b< 1.0 : 1<br>c< 3.0, b< 1.0 : 2<br>c< 3.0, b< 0.5 : 4<br>a<Glass Thickness |

<table>
<tr><td></td><td> 
</td><td></td></tr>
<tr><td>07</td><td>Glass Chipping Except Pad Area:<br>(Minor defect)<br> 
</td><td><table>
<tr><td>Length and Width</td><td>Acc. Qty</td></tr>
<tr><td>c > 3.0, b< 1.0</td><td>1</td></tr>
<tr><td>c< 3.0, b< 1.0</td><td>2</td></tr>
<tr><td>c< 3.0, b< 0.5</td><td>4</td></tr>
<tr><td colspan="2">a<Glass Thickness</td></tr>
</table></td></tr>
<tr><td>08</td><td>Glass Corner Chipping:<br>(Minor defect)<br> 
</td><td><table>
<tr><td>Length and Width</td><td>Acc. Qty</td></tr>
<tr><td>c < 3.0, b< 3.0</td><td>Ignore</td></tr>
<tr><td colspan="2">a<Glass Thickness</td></tr>
</table></td></tr>
<tr><td>09</td><td>Glass Burr:<br>(Minor defect)<br> 
<br> 
<br>  </td><td><table>
<tr><td>Length</td><td>Acc. Qty</td></tr>
<tr><td>F < 1.0</td><td>Ignore</td></tr>
</table><br>Glass burr don’t affect assemble and module dimension.</td></tr>
</table>

<table>
<tr><td>10</td><td>FPC Defect:<br>(Minor defect)<br>  <br></td><td>10.1 Dent, pinhole width a<w/3.<br>(w: circuitry width.)<br>10.2 Open circuit is unacceptable.<br>10.3 No oxidation, contamination and distortion.</td></tr>
<tr><td>11</td><td>Bubble on Polarizer<br>(Minor defect)</td><td><table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td>φ≤0.20</td><td>Ignore</td></tr><tr><td>0.20 <φ≤0.30</td><td>4</td></tr><tr><td>0.30 <φ≤0.50</td><td>1</td></tr><tr><td>0.50 < φ</td><td>None</td></tr></table></td></tr>
<tr><td>12</td><td>Dent on Polarizer<br>(Minor defect)</td><td><table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td>φ≤0.20</td><td>Ignore</td></tr><tr><td>0.20 <φ≤0.30</td><td>4</td></tr><tr><td>0.30 <φ≤0.50</td><td>1</td></tr><tr><td>0.50 < φ</td><td>None</td></tr></table></td></tr>
<tr><td>13</td><td>Bezel</td><td>13.1 No rust, distortion on the Bezel.<br>13.2 No visible fingerprints, stains or other contamination.</td></tr>
<tr><td>14</td><td>PCB</td><td>14.1 No distortion or contamination on PCB terminals.<br>14.2 All components on PCB must same as documented on the BOM/component layout.<br>14.3 Follow IPC-A-600F.</td></tr>
<tr><td>15</td><td>Soldering</td><td>Follow IPC-A-610C standard</td></tr>
<tr><td>16</td><td>Electrical Defect<br>(Major defect)</td><td>The below defects must be rejected.<br>16.1 Missing vertical / horizontal segment,<br>16.2 Abnormal Display.<br>16.3 No function or no display.<br>16.4 Current exceeds product specifications.<br>16.5 LCD viewing angle defect.<br>16.6 No Backlight.<br>16.7 Dark Backlight.<br>16.8 Touch Panel no function.</td></tr>
</table>

Remark: LCD Panel Broken shall be rejected. Defect out of LCD viewing area is acceptable.

### 10.7. Classification of Defects

10.7.1. Visual defects (Except no / wrong label) are treated as minor defect and electrical defect is major.

10.7.2. Two minor defects are equal to one major in lot sampling inspection.

### 10.8. Identification/marking criteria

Any unit with illegible / wrong /double or no marking/ label shall be rejected.

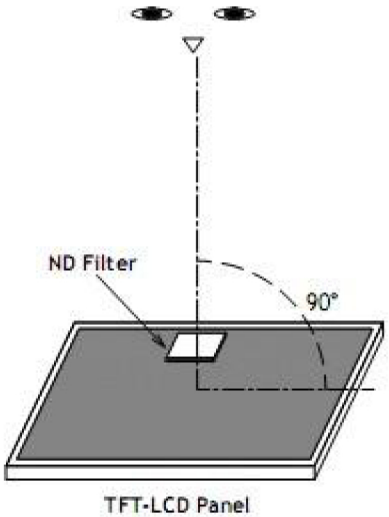
### 10.9. Packaging

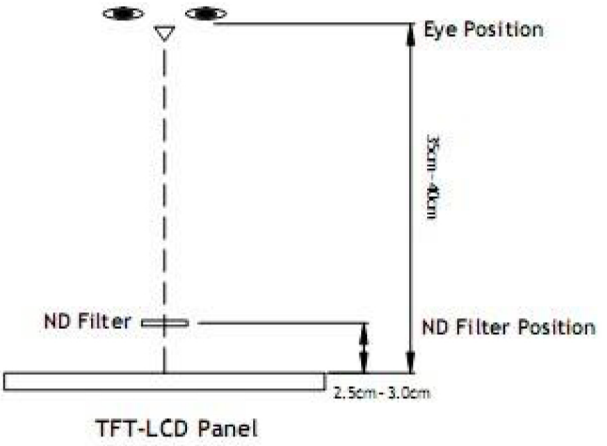
10.9.1. There should be no damage of the outside carton box, each packaging box should have one identical label.

10.9.2. Modules inside package box should have compliant mark.

10.9.3. All direct package materials shall offer ESD protection.

**Note1**: Bright dot is defined as the defective area of the dot is larger than 50% of one sub-pixel area.




Bright dot: The bright dot size defect at black display pattern. It can be recognized by 2% transparency of filter when the distance between eyes and panel is 350mm±50mm.

Dark dot: Cyan, Magenta or Yellow dot size defect at white display pattern. It can be recognized by 5% transparency of filter when the distance between eyes and panel is 350mm±50mm.

**Note2:** Mura on display which appears darker / brighter against background brightness on parts of display area.

## 11. Reliability Specification

| No | Item | Condition | Quantity | Criteria |
|---|---|---|---|---|
| 1 | High Temperature Operating | **70℃, 96Hrs** | 2 | GB/T2423.2 -2008 |
| 2 | Low Temperature Operating | **-20℃, 96Hrs** | 2 | GB/T2423.1 -2008 |
| 3 | High Humidity Storage | **50℃, 90%RH, 96Hrs** | 2 | GB/T2423.3 -2016 |
| 4 | High Temperature Storage | **80℃, 96Hrs** | 2 | GB/T2423.2 -2008 |
| 5 | Low Temperature Storage | **-30℃, 96Hrs** | 2 | GB/T2423.1 -2008 |
| 6 | Thermal Cycling Test Storage | -20℃, 60min~ 70℃, 60min, 20 cycles. | 2 | GB/T2423.22 -2012 |
| 7 | Packing vibration | Frequency range:10Hz~50Hz<br>Acceleration of gravity:5G<br>X, Y, Z 15 min for each direction. | - | GB/T5170.14 -2009 |
| 8 | Electrical Static Discharge | Air:±4KV 150pF/330Ω 5 times<br>Contact:±2KV 150pF/330Ω 5 times | 2 | GB/T17626.2 -2018 |
| 9 | Drop Test (Packaged) | Height:70 cm,1 corner, 3 edges, 6 surfaces. | - | GB/T2423.8 -1995 |

Note1. No defection cosmetic and operational function allowable.

Note2. Total current Consumption should be below double of initial value

# 12. Precautions and Warranty

## 12.1.Safety

12.1.1. The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

12.1.2. Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

## 12.2.Handling

12.2.1. Reverse and use within ratings in order to keep performance and prevent damage.

12.2.2. Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.

## 12.3.Storage

12.3.1. Do not store the LCD module beyond the specified temperature ranges.

12.3.2. Strong light exposure causes degradation of polarizer and color filter.

## 12.4.Metal Pin (Apply to Products with Metal Pins)

12.4.1. Pins of LCD and Backlight

12.4.1.1. Solder tip can touch and press on the tip of Pin LEAD during the soldering

12.4.1.2. Recommended Soldering Conditions

Solder Type: Sn96.3~94-Ag3.3~4.3-Cu0.4~1.1

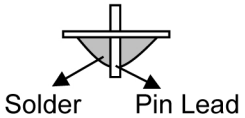
Maximum Solder Temperature: 370℃

Maximum Solder Time: 3s at the maximum temperature

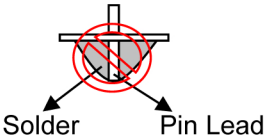
Recommended Soldering Temp: 350±20℃

Typical Soldering Time: ≤3s

12.4.1.3. Solder Wetting




Recommended




Not Recommended

12.4.2. Pins of EL

12.4.2.1. Solder tip can touch and press on the tip of EL leads during soldering.

12.4.2.2. No Solder Paste on the soldering pad on the motherboard is recommended.

12.4.2.3. Recommended Soldering Conditions

Solder type: Nippon Alimit Leadfree SR-34, size 0.5mm

Recommended Solder Temperature: 270～290℃

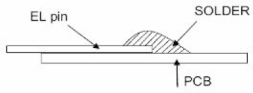
Typical Soldering Time: ≤2s

Minimum solder distance from EL lamp (body):2.0mm

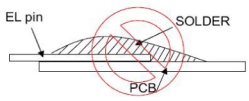
12.4.2.4. No horizontal press on the EL leads during soldering.

12.4.2.5. 180° bend EL leads three times is not allowed.

12.4.2.6. Solder Wetting

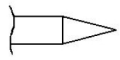



Recommended

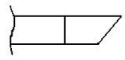



Not Recommended

12.4.2.7. The type of the solder iron:

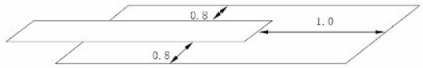


Recommended



Not Recommended

12.4.2.8. Solder Pad




## 12.5. Operation

12.5.1. Do not drive LCD with DC voltage

12.5.2. Response time will increase below lower temperature

12.5.3. Display may change color with different temperature

12.5.4. Mechanical disturbance during operation, such as pressing on the display area, may cause the segments to appear “fractured”.

12.5.5. Do not connect or disconnect the LCM to or from the system when power is on.

12.5.6. Never use the LCM under abnormal condition of high temperature and high humidity.

12.5.7. Module has high frequency circuits. Sufficient suppression to the electromagnetic interface shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

*12.5.8. Do not display the fixed pattern for long time（we suggest the time not longer than one hour）because it will develop image sticking due to the TFT structure.*

## 12.6. Static Electricity

12.6.1. CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.

12.6.2. The normal static prevention measures should be observed for work clothes and benches.

12.6.3. The module should be kept into anti-static bags or other containers resistant to static for storage.

## 12.7. Limited Warranty

12.7.1. Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.

12.7.2. If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.

12.7.3. After the product shipped, any product quality issues must be feedback within three months, otherwise, we will not be responsible for the subsequent or consequential events.

## 13. Packaging

TBD