

# Hunan Huayuan display technology CO.,LTD

## VISLCD-043HYA40Q

4.3 inchTFT

### SPECIFICATION

| Standard code | Department | Rev No. |
|---------------|------------|---------|
|               |            |         |
| Checked by    | Written by | Date    |
|               |            |         |

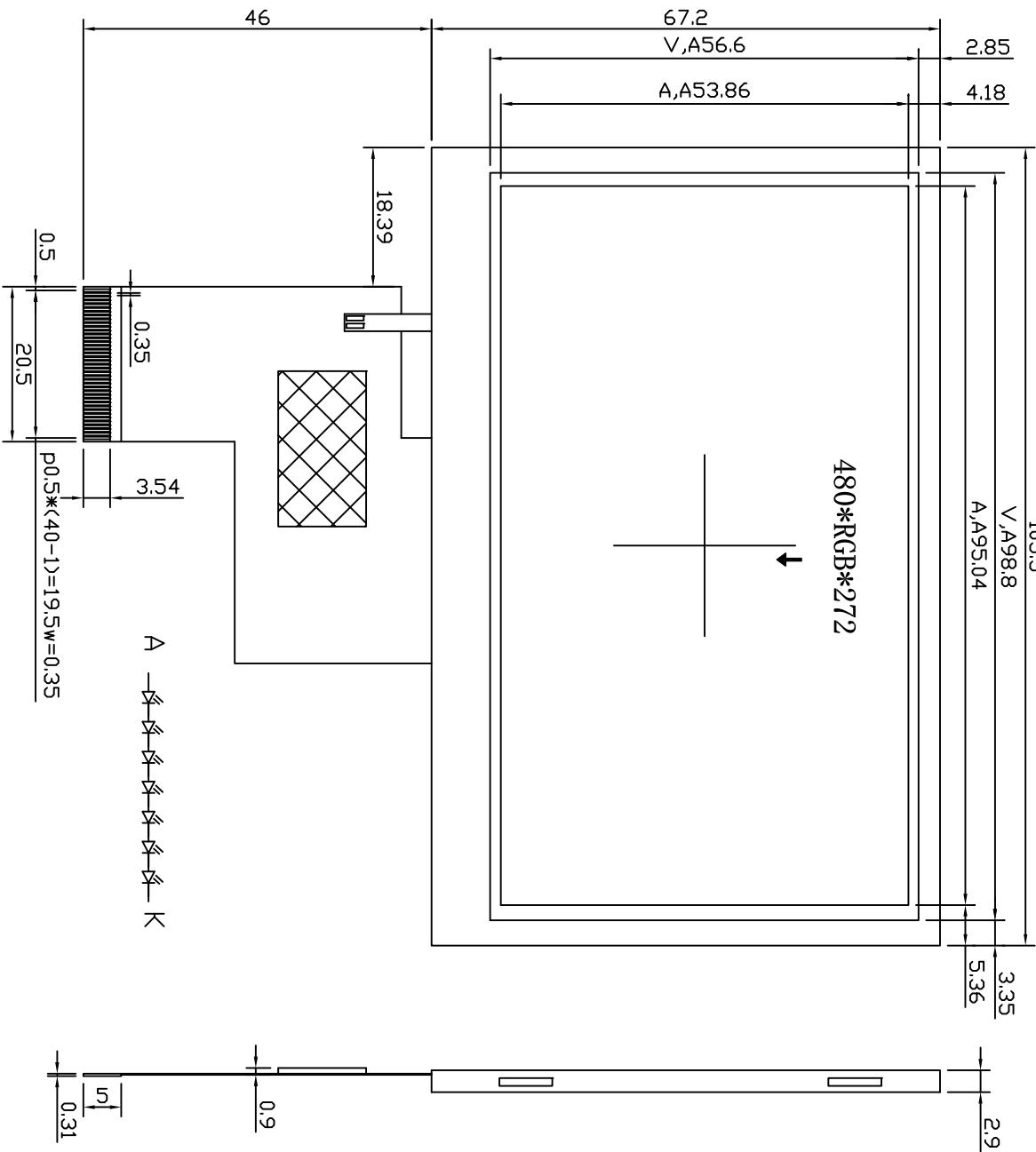
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## Contents

|                                              |    |
|----------------------------------------------|----|
| 1. General specification .....               |    |
| 2. Mechanical Drawing .....                  |    |
| 3. Pin Assignment .....                      |    |
| 4. Absolute Maximum Ratings .....            |    |
| 5. Operating Specifications .....            | 7  |
| 5.1. Electrical Characteristics .....        | 7  |
| 5.2. Backlight Driving Conditions .....      | 8  |
| 5.3. Power Sequence .....                    | 8  |
| 6. Optical Characteristics .....             | 10 |
| 7. Block Diagram .....                       | 14 |
| 8. Timing/characteristics .....              | 15 |
| 8.1. Time clock and input data diagram ..... | 15 |
| 8.2. Parallel RGB input data table .....     | 15 |
| 9. LCM Reliability .....                     | 16 |
| 10. LCM Quality .....                        | 18 |
| 11. Generally Precautions .....              | 26 |
| 12. Packing method .....                     | 26 |

## 1. General specification

| NO | Item              | Specification           | Remark |
|----|-------------------|-------------------------|--------|
| 1  | LCD size          | 4.3inch                 |        |
| 2  | Driver element    | a-SiTFTActivematrix     |        |
| 3  | Resolution        | 480(RGB)X272            |        |
| 4  | Display mode      | CMO with Normally White |        |
| 5  | Dot Pitch         | 0.198 x 0.198           |        |
| 6  | Active area       | 53.86 x 95.04 mm        |        |
| 7  | Module Size       | 67.2*105.5*2.9 mm       |        |
| 8  | Viewing Direction | 12CLOCK                 |        |
| 9  | Color arrangement |                         |        |
| 10 | Interface         | RGB                     |        |
| 11 | Driver IC         | ILI6480BQ               |        |
| 12 | LED Numbers       | 7LEDs                   |        |
| 13 | Luminance         | 250cd/m2                |        |
| 14 | With /Without TP  | Without                 |        |



|    |    |      |                  |
|----|----|------|------------------|
| 设计 | 郭峰 | 产品型号 |                  |
| 审核 |    | 规格名称 | 彩屏               |
| 批准 |    | 产品代码 | VISLCD-043HYA40Q |

|      |            |      |     |
|------|------------|------|-----|
| 设计日期 | 2016-08-25 | 制订部门 | 研发部 |
|------|------------|------|-----|

|      |      |       |     |
|------|------|-------|-----|
| 更改单号 | 更改内容 | 签名    | 日期  |
| 比例   | 单位   | 第 1 页 | 版次  |
| 1:1  | mm   | 共 1 页 | A/0 |

### 3. Pin Assignment

. Table 2: Pin assignment

| Pin No. | Symbol | Description              |
|---------|--------|--------------------------|
| 1       | VLED-  | Cathode of LED backlight |
| 2       | VLED+  | Anode of LED backlight   |
| 3       | GND    | Power ground             |
| 4       | VDD    | Power voltage            |
| 5       | R0     | Red data (LSB)           |
| 6       | R1     | Red data                 |
| 7       | R2     | Red data                 |
| 8       | R3     | Red data                 |
| 9       | R4     | Red data                 |
| 10      | R5     | Red data                 |
| 11      | R6     | Red data                 |
| 12      | R7     | Red data (MSB)           |
| 13      | G0     | Green data (LSB)         |
| 14      | G1     | Green data               |
| 15      | G2     | Green data               |
| 16      | G3     | Green data               |
| 17      | G4     | Green data               |
| 18      | G5     | Green data               |
| 19      | G6     | Green data               |
| 20      | G7     | Green data (MSB)         |
| 21      | B0     | Blue data (LSB)          |
| 22      | B1     | Blue data                |
| 23      | B2     | Blue data                |
| 24      | B3     | Blue data                |
| 25      | B4     | Blue data                |
| 26      | B5     | Blue data                |
| 27      | B6     | Blue data                |
| 28      | B7     | Blue data (MSB)          |
| 29      | GND    | Power ground             |
| 30      | DCLK   | Pixel clock              |
| 31      | DISP   | Display on/off           |
| 32      | HSYN   | Horizontal sync signal   |
| 33      | VSYNC  | Vertical sync signal     |
| 34      | DE     | Data enable              |
| 35      | NC     | NO connect               |
| 36      | GND    | Power ground             |
| 37      | NC     | NO connect               |
| 38      | NC     | NO connect               |
| 39      | NC     | NO connect               |
| 40      | NC     | NO connect               |

## 4. Absolute Maximum Ratings

| Parameter                | Symbol    | Min     | Max      | Unit |
|--------------------------|-----------|---------|----------|------|
| Supply voltage for logic | $V_{DD}$  | -0.5    | 5.0      | V    |
| Input voltage for logic  | $V_{IN}$  | VSS-0.5 | $V_{DD}$ | V    |
| Supply current (One LED) | $I_{LED}$ | --      | 30       | mA   |
| Operating temperature    | $T_{OP}$  | -20     | +70      | °C   |
| Storage temperature      | $T_{ST}$  | -30     | +80      | °C   |

**Note** : The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

## 5. 0

### 5.1. Electrical Characteristics

| Item                     | Symbol    | Min         | Typ | Max          | Unit | Applicable terminal |
|--------------------------|-----------|-------------|-----|--------------|------|---------------------|
| Supply voltage for logic | $V_{DD}$  | 3.0         | 3.3 | 3.6          | V    | $V_{DD}$            |
| Input voltage            | $V_{IL}$  | VSS         | -   | $0.3 V_{DD}$ | V    |                     |
|                          | $V_{IH}$  | $0.7V_{DD}$ | -   | $V_{DD}$     | V    |                     |
| Input current            | $I_{DD}$  | -           | TBD | -            | mA   |                     |
| LED Forward voltage      | $V_f$     | 3.0         | 3.2 | 3.4          | V    | With One LED        |
| Input backlight current  | $I_{LED}$ | -           | 20  | 25           | mA   | With One LED        |

### 5.2. Backlight Driving Conditions

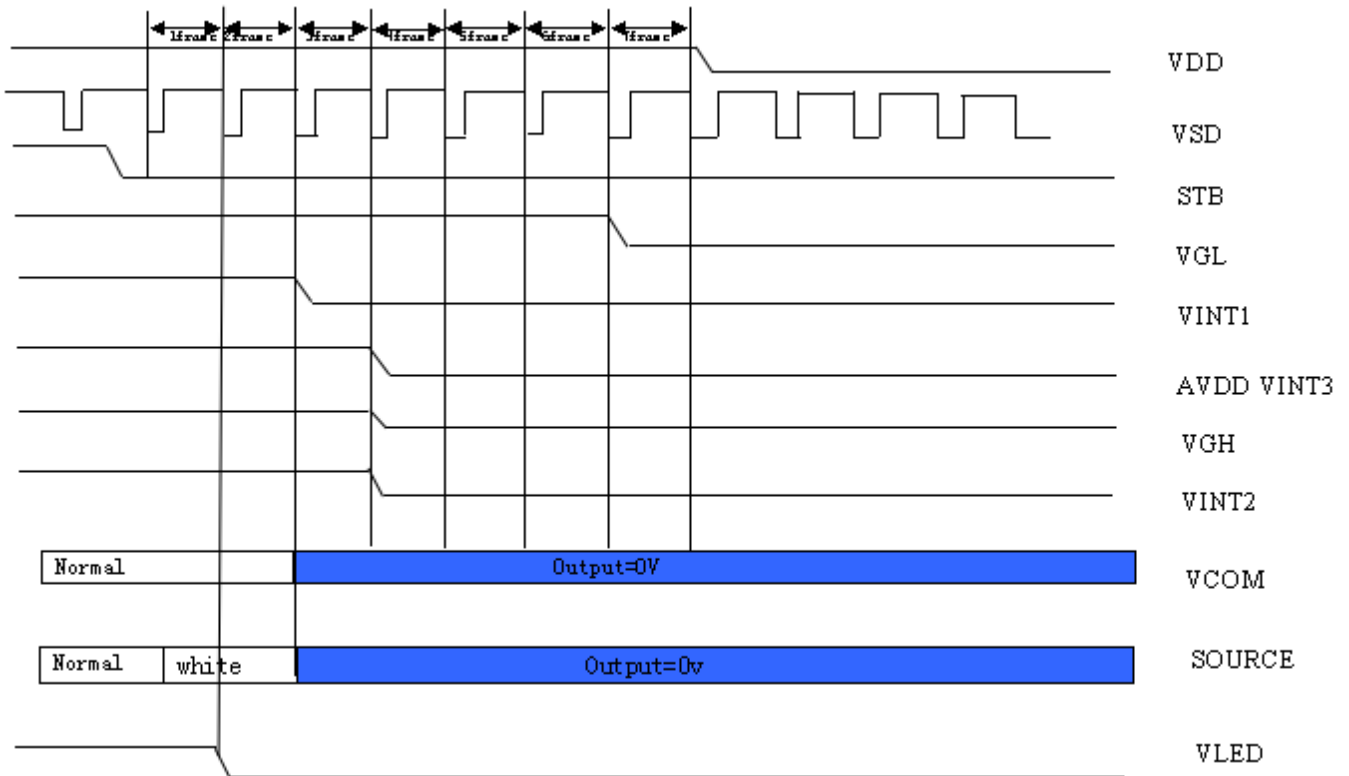
| Item                      | Symbol | Values |      |      | Unit | Remark |
|---------------------------|--------|--------|------|------|------|--------|
|                           |        | Min.   | Typ. | Max. |      |        |
| Voltage for LED backlight | $V_L$  | 21     | 22.4 | 23.8 | V    | Note 1 |
| Current for LED backlight | $I_L$  | 18     | 20   | 25   | mA   |        |
| LED life time             | -      | 20,000 | -    | -    | Hr   | Note 2 |

Note 1: The LED Supply Voltage is defined by the number of LED at  $T_a=25^{\circ}\text{C}$  and  $I_L=20\text{mA}$ .

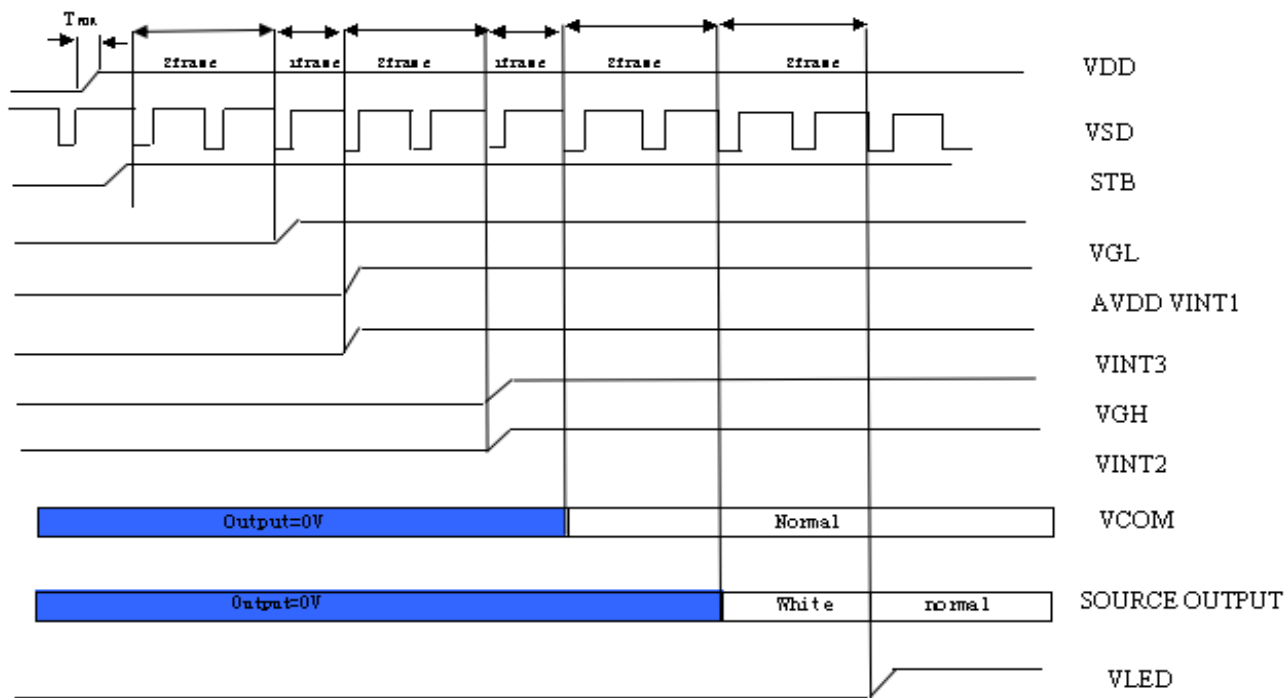
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and I<sub>L</sub> =20mA. The LED lifetime could be decreased if operating I<sub>L</sub> is lager than 20 mA.

### 5.3. Power Sequence

#### 5.3.1. power off sequence



5.3.2. Power on sequence

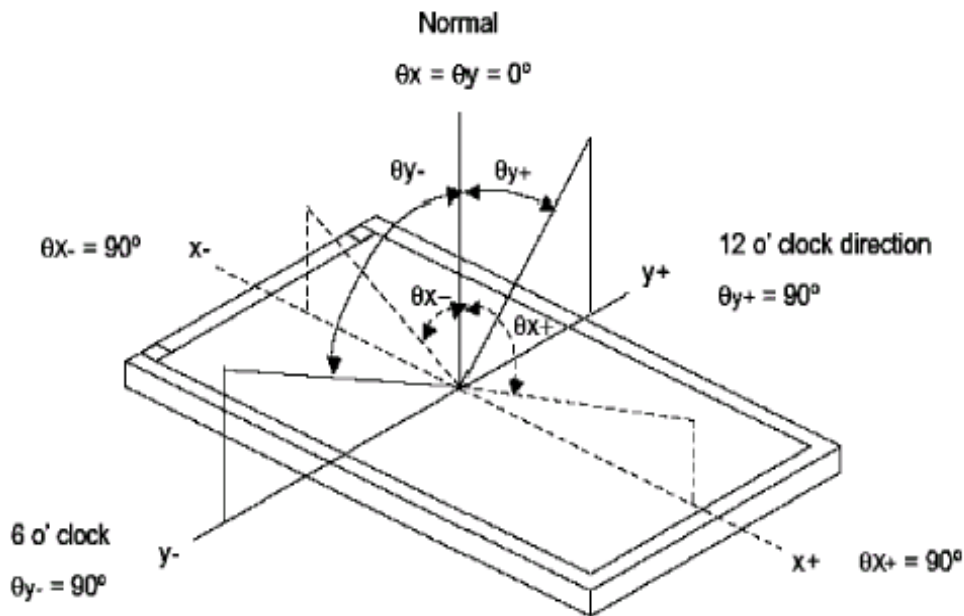




6. Optical Characteristics

| ITEM                                   | SYMBOL | CONDITIONS           | SPECIFICATIONS |       |       | UNIT              | NOTE                                                             |  |
|----------------------------------------|--------|----------------------|----------------|-------|-------|-------------------|------------------------------------------------------------------|--|
|                                        |        |                      | MIN.           | TYP.  | MAX   |                   |                                                                  |  |
| Brightness                             | B      | Viewing normal angle | 230            | 280   | -     | Cd/m <sup>2</sup> | All left side data are based on Innolux's product reference only |  |
| Contrast Ratio                         | CR     |                      | 400            | 500   | --    | --                |                                                                  |  |
| Response Time                          | Tr+Tf  |                      | --             | 25    | 30    | ms                |                                                                  |  |
| Chromaticity Coordinate (Transmissive) | Red    |                      | X              | 0.551 | 0.591 | 0.631             |                                                                  |  |
|                                        |        |                      | Y              | 0.270 | 0.310 | 0.350             |                                                                  |  |
|                                        | Green  |                      | X              | 0.302 | 0.342 | 0.382             |                                                                  |  |
|                                        |        |                      | Y              | 0.516 | 0.561 | 0.601             |                                                                  |  |
|                                        | Blue   | X                    | 0.105          | 0.145 | 0.185 |                   |                                                                  |  |
|                                        |        | Y                    | 0.047          | 0.087 | 0.127 |                   |                                                                  |  |
| White                                  | X      | 0.250                | 0.300          | 0.350 |       |                   |                                                                  |  |
|                                        | Y      | 0.270                | 0.320          | 0.370 |       |                   |                                                                  |  |
| Viewing Angle                          | Hor.   | $\theta_{x+}$        | 60             | 70    | --    | Deg.              |                                                                  |  |
|                                        |        | $\theta_{x-}$        | 60             | 70    | --    |                   |                                                                  |  |
|                                        | Ver.   | $\theta_{y+}$        | 40             | 50    | --    |                   |                                                                  |  |
|                                        |        | $\theta_{y-}$        | 60             | 70    |       |                   |                                                                  |  |
| Uniformity                             | Un     |                      | 80             | --    | %     |                   |                                                                  |  |

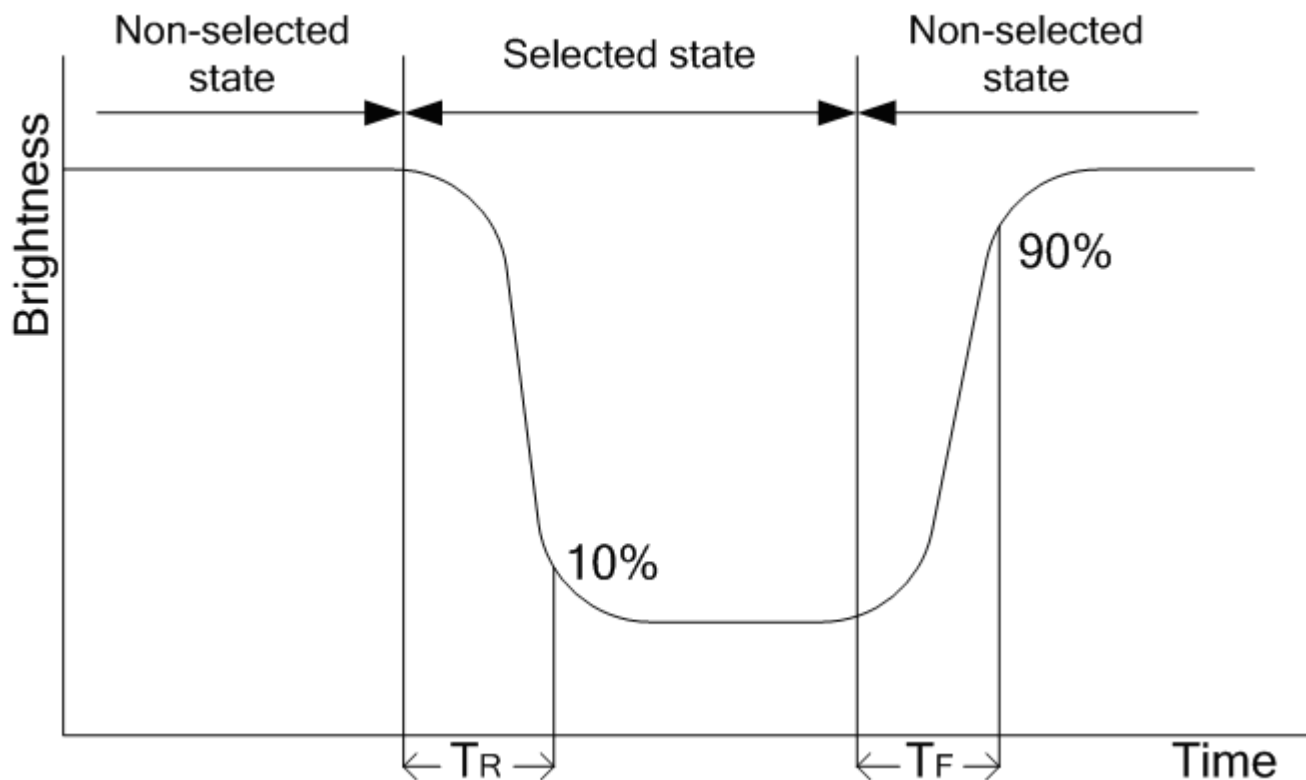
Note 1 : Definition of Viewing Angle  $\theta_x$  and  $\theta_y$  :



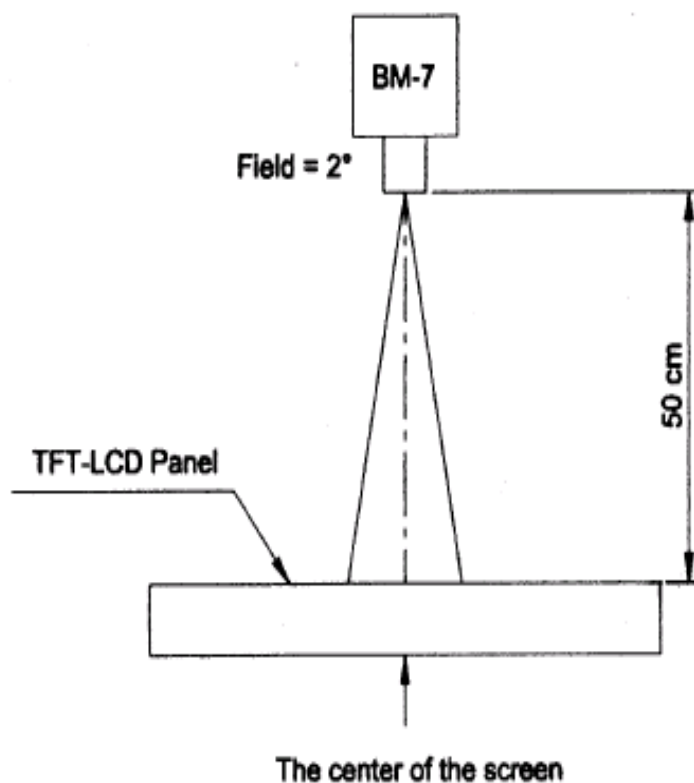
Note 2: Definition of contrast ratio CR:

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

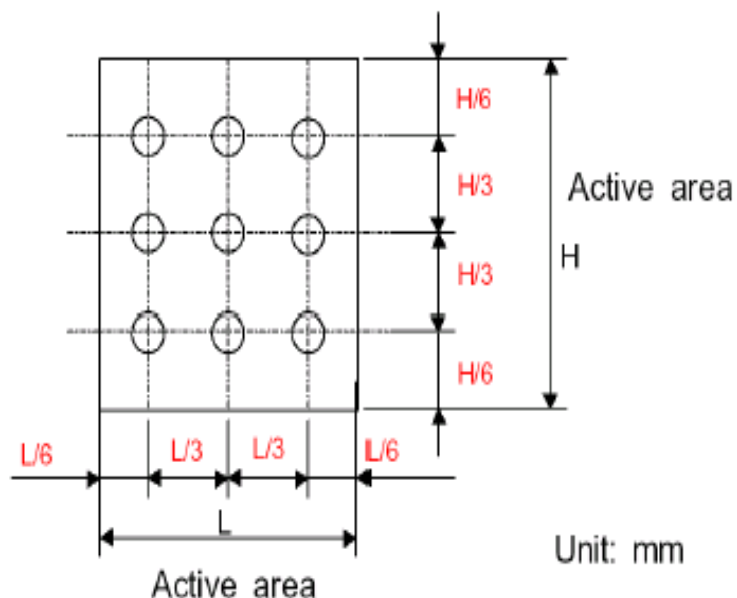
Note 3: Definition of response time ( $T_R$ ,  $T_F$ )



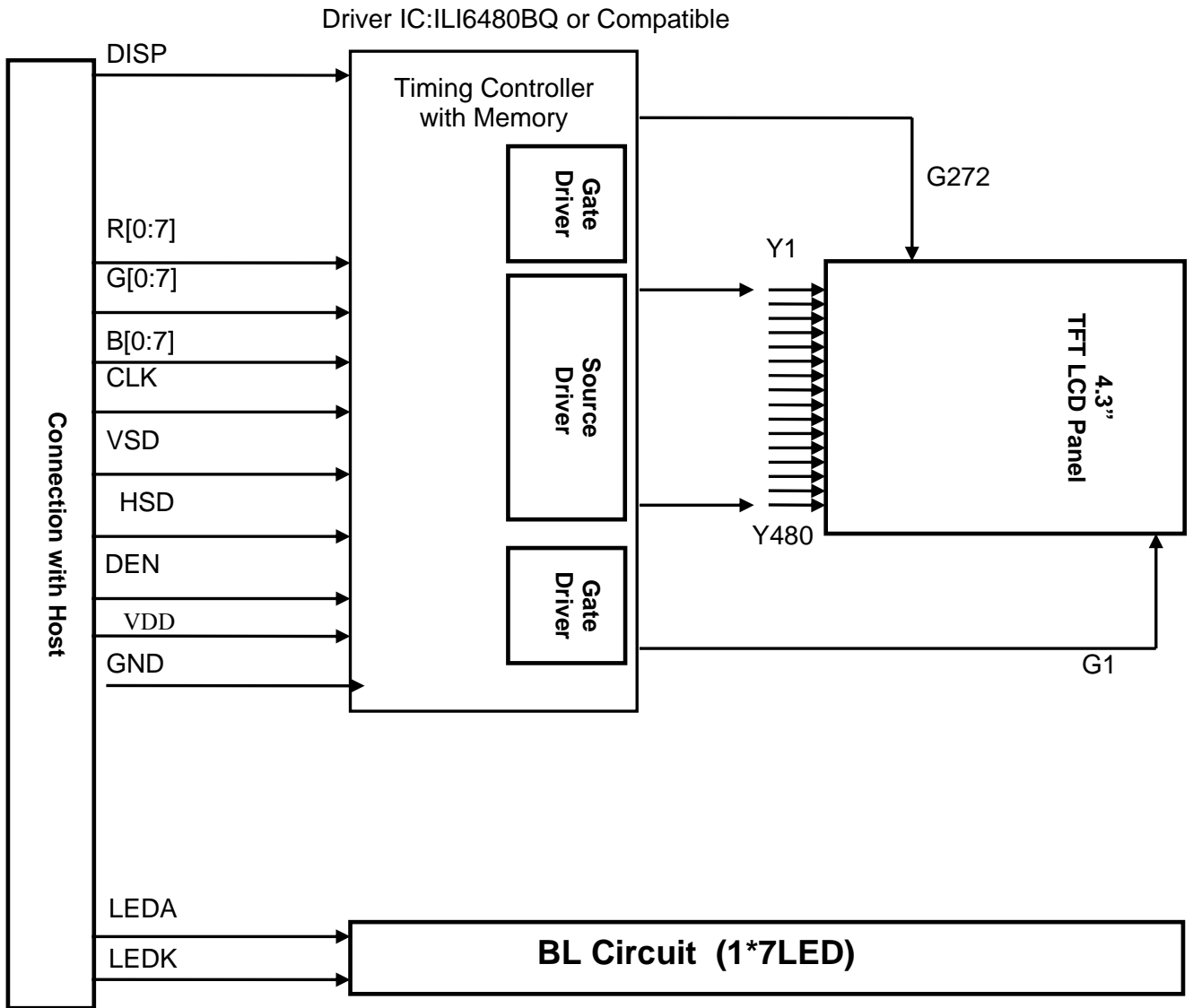
The brightness test equipment setup  
 20mA Field=2° (As measuring "black" image, field=2° is the best testing condition)



Note 4 :



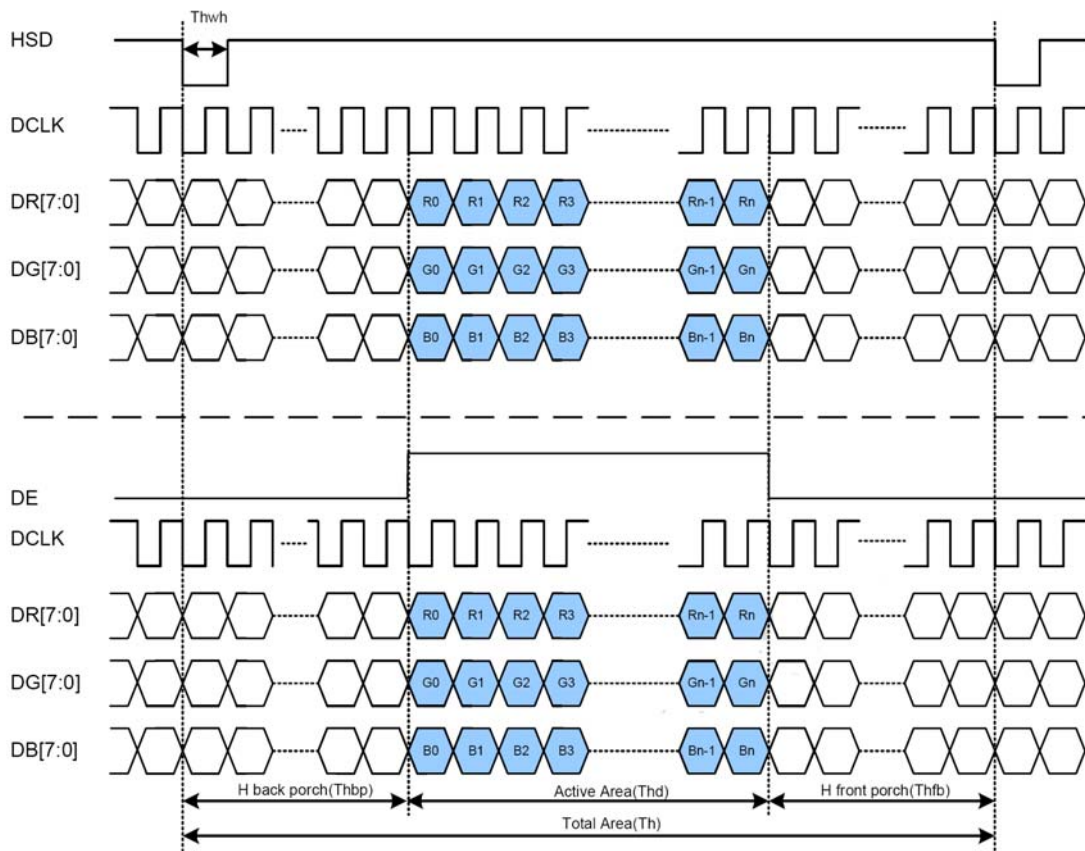
7. Block Diagram



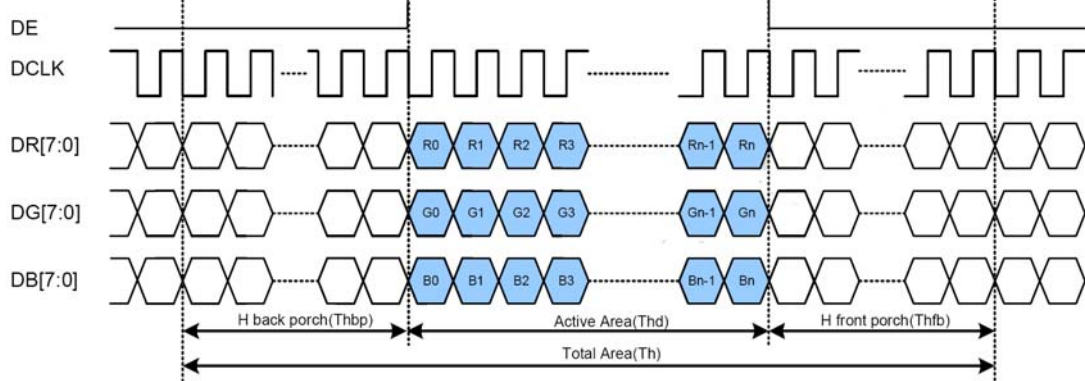
## 8. Timing/Characteristics

### 8.1 Clock and data input time diagram

(HV Mode)



(DE Mode)



### 8.2 Parallel RGB input timing table

| Parameter        | Symbol | Min | Typ | Max | Unit |
|------------------|--------|-----|-----|-----|------|
| DCLK frequency   | Fclk   | 5   | 9   | 12  | MZH  |
| VSD period time  | Tv     | 277 | 288 | 400 | H    |
| VSD display area | Tvd    | 272 |     |     | H    |
| VSD back porch   | Tvb    | 3   | 8   | 31  | H    |
| VSD front porch  | Tvfp   | 2   | 8   | 97  | H    |
| HSD period time  | Th     | 520 | 525 | 800 | DCLK |
| HSD display area | Thd    | 480 |     |     | DCLK |
| HSD back porch   | Thbp   | 36  | 40  | 255 | DCLK |
| HSD front porch  | Thfp   | 4   | 5   | 65  | DCLK |

9. Standard Specification for Reliability :

## 10-1. Standard Specifications for Reliability of LCD Module

| No | Item                        | Description                                                                                                                                                                                       |
|----|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01 | High temperature operation  | The sample should be allowed to stand at 70℃ for 96 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.                       |
| 02 | Low temperature operation   | The sample should be allowed to stand at -20℃ for 96 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.                      |
| 03 | High temperature storage    | The sample should be allowed to stand at 80℃ for 96 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours.                      |
| 04 | Low temperature storage     | The sample should be allowed to stand at -30℃ for 96 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.                         |
| 05 | Moisture storage            | The sample should be allowed to stand at 60℃,90%RH MAX for 96 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.                                  |
| 06 | Thermal shock storage       | The sample should be allowed to stand the following 10 cycles :<br>-30℃ for 30 minutes → normal temperature for 5 minutes → +80℃ for 30 minutes → normal temperature for 5 minutes, as one cycle. |
| 07 | Packing vibration           | Frequency range : 10Hz ~ 55Hz<br>Amplitude of vibration : 1.5mm Sweep time: 12 min<br>X,Y,Z 2 hours for each direction.                                                                           |
| 08 | Packing drop test           | According to ISTA 1A 2001.                                                                                                                                                                        |
| 09 | Electrical Static Discharge | Air: ±4KV 150pF/330Ω 5 times                                                                                                                                                                      |
|    |                             | Contact: ±2KV 150pF/330Ω 5 time                                                                                                                                                                   |

\*Sample size for each test item is 3~5pcs

## 9 - 2. Testing Conditions and Inspection Criteria

For the final test the testing sample must be stored at room temperature for 24 hours, after the tests listed in Table 12.2, Standard specifications for Reliability have been executed in order to ensure stability.

| No | Item                | Test Model             | In section Criteria                                                                                                |
|----|---------------------|------------------------|--------------------------------------------------------------------------------------------------------------------|
| 01 | Current Consumption | Refer To Specification | The current consumption should conform to the product specification.                                               |
| 02 | Contrast            | Refer To Specification | After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests. |
| 03 | Appearance          | Visual inspection      | Defect free.                                                                                                       |

## 9- 3. MTBF

|      |                                                                                                                                                                                                                                                                                                      |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MTBF | Functions, performance, appearance, etc. shall be free from remarkable deterioration within 10,000 hours under ordinary operating and storage conditions room temperature ( $25 \pm 5^{\circ}\text{C}$ ), normal humidity ( $50 \pm 10\% \text{ RH}$ ), and in area not exposed to direct sun light. |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Specification of Quality Assurance:

### 10-1. Purpose

This standard for Quality Assurance should affirm the quality of LCD module products to supply to purchaser by TeCenStar.

### 10-2. Standard for Quality Test

#### a. Inspection:

Before delivering, the supplier should take the following tests, and affirm the quality of product.

#### b. Electro-Optical Characteristics:

According to the individual specification to test the product.

#### c. Test of Appearance Characteristics:

According to the individual specification to test the product.

#### d. Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

#### e. Delivery Test:

Before delivering, the supplier should take the delivery test.

(i) Test method: According to MIL-STD105E. General Inspection Level II take a single time.

(ii) The defects classify of AQL as following:

Major defect: AQL = 0.65

Minor defect: AQL = 2.5

Total defects: AQL = 2.5

### 10-3. Non-conforming Analysis & Deal With Manners

#### a. Non-conforming Analysis:

(i) Purchaser should supply the detail data of non-conforming sample and the non-conforming.

(ii) After accepting the detail data from purchaser, the analysis of non-conforming should be finished in two weeks.

(iii) If supplier can not finish analysis on time, must announce purchaser before 3 days.

#### b. Disposition of non-conforming:

(i) If find any product defect of supplier during assembly time, supplier must change the good product for every defect after recognition.

(ii) Both supplier and customer should analyze the reason and discuss the disposition of non-conforming when the reason of nonconforming is not sure.

### 10-4. Agreement items

Both sides should discuss together when the following problems happen.

a. There is any problem of standard of quality assurance, and both sides should think that must be modified.

b. There is any argument item which does not record in the standard of quality assurance.

c. Any other special problem.



10-5. Standard of The Product Appearance Test

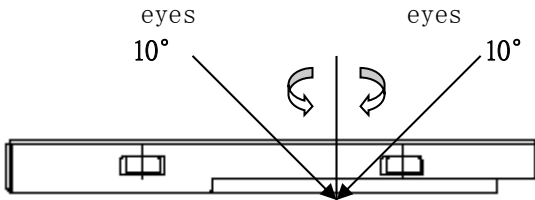
a. Manner of appearance test:

(i) The test must be under 20W × 2 or 40W fluorescent light, and the distance of view must be at 30±5cm.

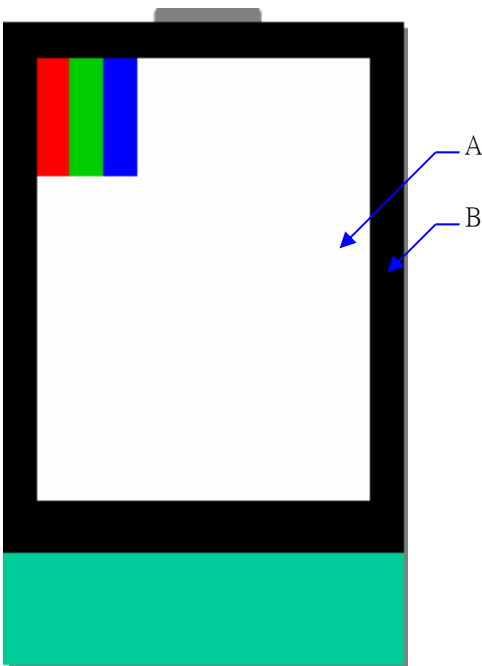
(ii) When test the model of transmissive product must add the reflective plate.

(iii)The test direction is base on around 10° of vertical line.

(iiii)Temperature: 25±5℃ Humidity: 60±10%RH



(iv) Definition of area:



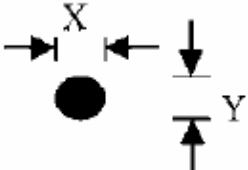
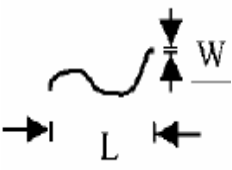
- A. Area: Viewing area.
- B. Area: Out of viewing area.  
(Outside viewing area)

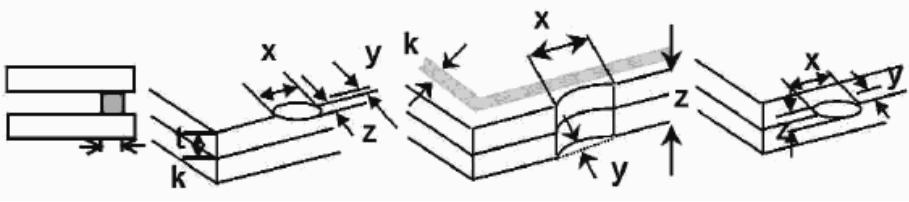
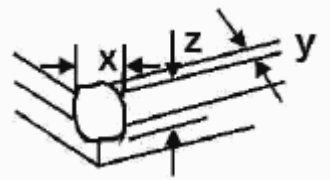
b. Basic principle:

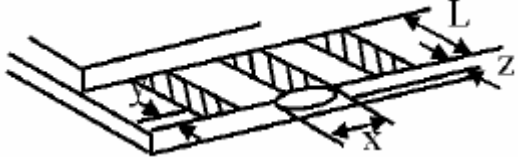
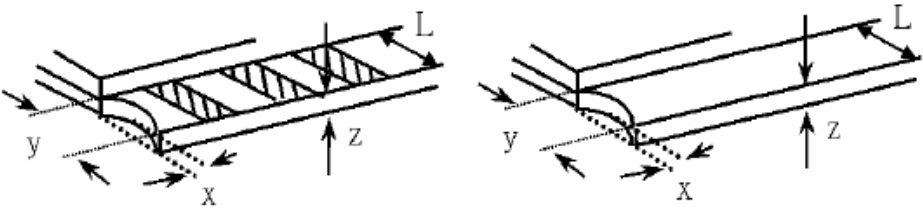
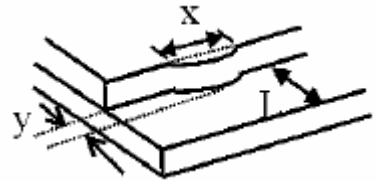
- (i) It will accord to the AQL when the standard can not be described.
- (ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
- (iii) Must add new item on time when it is necessary.

c. Standard of inspection: (Unit: mm)

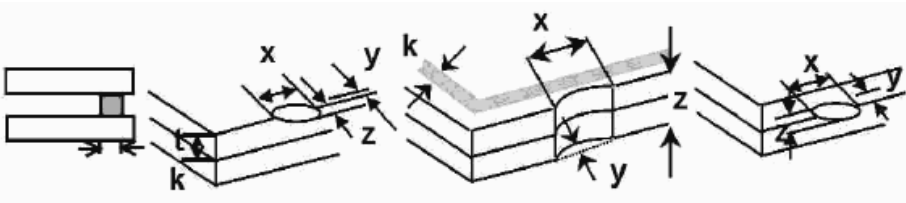
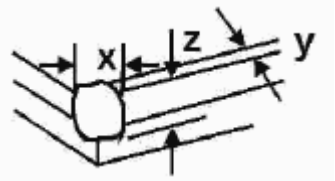
10-6. Inspection specification

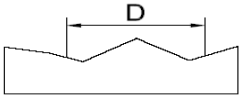
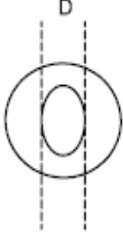
| NO                      | Item                                                                        | Criterion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | AQL      |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
|-------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------|------------------|-----------------|-------------------------|---|-------------------------|---|-------------------------|---|---------------|---|-----------|-----------|------------------|-----|---------------|-----------------|--------------|----------------------|---|--------------|----------------------|-----|------------|-----------|-----|
| 01                      | Electrical Testing                                                          | 1.1 Missing vertical, horizontal segment, segment contrast defect.<br>1.2 Missing character, dot or icon.<br>1.3 Display malfunction.<br>1.4 No function or no display.<br>1.5 Current consumption exceeds product specifications.<br>1.6 LCD viewing angle defect.<br>1.7 Mixed product types.<br>1.8 Flicker                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0.65     |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| 02                      | Black or White spots or Bright spots or Color spots on LCD (Display only)   | 2.1 White and black or color spots on display $\leq 0.25\text{mm}$ , no more than Five spots.<br>2.2 Densely spaced: No more than three spots within 3mm.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2.5      |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| 03                      | LCD and Touch Panel black spots, white spots, contamination (non - display) | <p>3.1 Round type: As following drawing<br/> <math>\Phi = (X+Y) / 2</math></p>  <table border="1" data-bbox="805 1052 1337 1276"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable Q' ty</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.10</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.10 &lt; \Phi \leq 0.20</math></td> <td>2</td> </tr> <tr> <td><math>0.20 &lt; \Phi \leq 0.25</math></td> <td>2</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.30</math></td> <td>1</td> </tr> <tr> <td><math>0.30 &lt; \Phi</math></td> <td>0</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two spots within 3mm.</p> <p>3.2 Line type: (As following drawing)</p>  <table border="1" data-bbox="710 1411 1337 1635"> <thead> <tr> <th>Length(m)</th> <th>Width(mm)</th> <th>Acceptable Q' ty</th> </tr> </thead> <tbody> <tr> <td>---</td> <td><math>W \leq 0.02</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>L \leq 3.0</math></td> <td><math>0.02 &lt; W \leq 0.05</math></td> <td rowspan="2">2</td> </tr> <tr> <td><math>L \leq 2.5</math></td> <td><math>0.03 &lt; W \leq 0.08</math></td> </tr> <tr> <td>---</td> <td><math>0.08 &lt; W</math></td> <td>Rejection</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two lines within 3mm.</p> | Size(mm) | Acceptable Q' ty | $\Phi \leq 0.10$ | Accept no dense | $0.10 < \Phi \leq 0.20$ | 2 | $0.20 < \Phi \leq 0.25$ | 2 | $0.25 < \Phi \leq 0.30$ | 1 | $0.30 < \Phi$ | 0 | Length(m) | Width(mm) | Acceptable Q' ty | --- | $W \leq 0.02$ | Accept no dense | $L \leq 3.0$ | $0.02 < W \leq 0.05$ | 2 | $L \leq 2.5$ | $0.03 < W \leq 0.08$ | --- | $0.08 < W$ | Rejection | 2.5 |
| Size(mm)                | Acceptable Q' ty                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| $\Phi \leq 0.10$        | Accept no dense                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| $0.10 < \Phi \leq 0.20$ | 2                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| $0.20 < \Phi \leq 0.25$ | 2                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| $0.25 < \Phi \leq 0.30$ | 1                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| $0.30 < \Phi$           | 0                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| Length(m)               | Width(mm)                                                                   | Acceptable Q' ty                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| ---                     | $W \leq 0.02$                                                               | Accept no dense                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| $L \leq 3.0$            | $0.02 < W \leq 0.05$                                                        | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| $L \leq 2.5$            | $0.03 < W \leq 0.08$                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |
| ---                     | $0.08 < W$                                                                  | Rejection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |                  |                  |                 |                         |   |                         |   |                         |   |               |   |           |           |                  |     |               |                 |              |                      |   |              |                      |     |            |           |     |

| NO                      | Item                  | Criterion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | AQL               |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
|-------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|------------------|-----------------|-------------------------|---------------|-------------------------|-----------------|---------------|-------------------|---------------|----------------|---------------|-----------------------|---------------|--------------------|-----------------|---------------|-----|
| 04                      | Polarizer bubbles     | If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction <table border="1" data-bbox="874 309 1372 533" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Size <math>\Phi</math> (mm)</th> <th>Acceptable Q' ty</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.20</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.20 &lt; \Phi \leq 0.50</math></td> <td>3</td> </tr> <tr> <td><math>0.50 &lt; \Phi \leq 1.00</math></td> <td>2</td> </tr> <tr> <td><math>1.00 &lt; \Phi</math></td> <td>0</td> </tr> <tr> <td>Total Q' ty</td> <td>3</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Size $\Phi$ (mm)  | Acceptable Q' ty | $\Phi \leq 0.20$ | Accept no dense | $0.20 < \Phi \leq 0.50$ | 3             | $0.50 < \Phi \leq 1.00$ | 2               | $1.00 < \Phi$ | 0                 | Total Q' ty   | 3              | 2.5           |                       |               |                    |                 |               |     |
| Size $\Phi$ (mm)        | Acceptable Q' ty      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $\Phi \leq 0.20$        | Accept no dense       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $0.20 < \Phi \leq 0.50$ | 3                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $0.50 < \Phi \leq 1.00$ | 2                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $1.00 < \Phi$           | 0                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| Total Q' ty             | 3                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| 05                      | Scratches             | Follow NO.3 -2 Line Type.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| 06                      | Chipped glass         | Symbols:<br>x: Chip length      y: Chip width      z: Chip thickness<br>k: Seal width      t: Glass thickness      a: LCD side length<br>L: Electrode pad length<br>6.1 General glass chip:<br>6.1.1 Chip on panel surface and crack between panels:<br> <table border="1" data-bbox="363 1019 1181 1205" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td><math>Z \leq 1/2t</math></td> <td>Not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> <tr> <td><math>1/2t &lt; z \leq 2t</math></td> <td>Not exceed 1/3k</td> <td><math>x \leq 1/8a</math></td> </tr> </tbody> </table> ☉ Unit: mm<br>☉ If there are 2 or more chips, x is the total length of each chip<br>6.1.2 Corner crack:<br> <table border="1" data-bbox="363 1523 1181 1709" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td><math>Z \leq 1/2t</math></td> <td>Not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> <tr> <td><math>1/2t &lt; z \leq 2t</math></td> <td>Not exceed 1/3k</td> <td><math>x \leq 1/8a</math></td> </tr> </tbody> </table> ☉ Unit: mm<br>☉ If there are 2 or more chips, x is the total length of each chip | z: Chip thickness | y: Chip width    | x: Chip length   | $Z \leq 1/2t$   | Not over viewing area   | $x \leq 1/8a$ | $1/2t < z \leq 2t$      | Not exceed 1/3k | $x \leq 1/8a$ | z: Chip thickness | y: Chip width | x: Chip length | $Z \leq 1/2t$ | Not over viewing area | $x \leq 1/8a$ | $1/2t < z \leq 2t$ | Not exceed 1/3k | $x \leq 1/8a$ | 2.5 |
| z: Chip thickness       | y: Chip width         | x: Chip length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $Z \leq 1/2t$           | Not over viewing area | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $1/2t < z \leq 2t$      | Not exceed 1/3k       | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| z: Chip thickness       | y: Chip width         | x: Chip length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $Z \leq 1/2t$           | Not over viewing area | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $1/2t < z \leq 2t$      | Not exceed 1/3k       | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |                  |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |

| NO                    | Item           | Criterion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | AQL           |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
|-----------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|-------------------|-----------------------|---------------|----------------|---------------|----------------|-------------------|------------|---------------|----------------|----------|-----------|---------------|------------|-----|
| 07                    | Glass crack    | <p>Symbols:<br/>                     x: Chip length      y: Chip width      z: Chip thickness<br/>                     k: Seal width      t: Glass thickness      a: LCD side length<br/>                     L: Electrode pad length</p> <p>7.2 Protrusion over terminal:<br/>                     7.2.1 Chip on electrode pad:</p>  <table border="1" data-bbox="542 705 1228 862"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq 0.5\text{mm}</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table> <p>7.2.2 Non-conductive portion:</p>  <table border="1" data-bbox="542 1220 1228 1377"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq L</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table> <p>⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.<br/>                     ⊙ If the product will be heat sealed by the customer, the alignment mark must not be damaged.</p> <p>7.2.3 Substrate protuberance and internal crack</p>  <table border="1" data-bbox="853 1668 1300 1825"> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td><math>y \leq 1/3L</math></td> <td><math>X \leq a</math></td> </tr> </table> | y: Chip width | x: Chip length | z: Chip thickness | $y \leq 0.5\text{mm}$ | $x \leq 1/8a$ | $0 < z \leq t$ | y: Chip width | x: Chip length | z: Chip thickness | $y \leq L$ | $x \leq 1/8a$ | $0 < z \leq t$ | y: width | x: length | $y \leq 1/3L$ | $X \leq a$ | 2.5 |
| y: Chip width         | x: Chip length | z: Chip thickness                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
| $y \leq 0.5\text{mm}$ | $x \leq 1/8a$  | $0 < z \leq t$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
| y: Chip width         | x: Chip length | z: Chip thickness                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
| $y \leq L$            | $x \leq 1/8a$  | $0 < z \leq t$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
| y: width              | x: length      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
| $y \leq 1/3L$         | $X \leq a$     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |

| NO | Item               | Criterion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | AQL                                      |
|----|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| 08 | Cracked glass      | The LCD with extensive crack is not acceptable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2.5                                      |
| 09 | Backlight elements | 9.1 Illumination source flickers when lit.<br>9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards.<br>9.3 Backlight doesn't light or color is wrong.                                                                                                                                                                                                                                                                                                                                                                                           | 2.5<br>2.5<br>0.65                       |
| 10 | Bezel              | Bezel must comply with product specifications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2.5                                      |
| 11 | PCB、COB            | 11.1 COB seal may not have pinholes larger than 0.2mm or contamination.<br>11.2 COB seal surface may not have pinholes through to the IC.<br>11.3 The height of the COB should not exceed the height indicated in the assembly diagram.<br>11.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places.<br>11.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts.<br>11.6 The jumper on the PCB should conform to the product characteristic chart. | 2.5<br>2.5<br>2.5<br>2.5<br>0.65<br>0.65 |
| 12 | FPC                | 12.1 FPC terminal damage $\leq$ 1/2 FPC terminal width and can not affect the function , we judge accept.<br>12.2 FPC alignment hole damage $\leq$ 1/2 alignment area and can not affect the function , we judge accept.                                                                                                                                                                                                                                                                                                                                                                                 | 2.5<br>2.5                               |
| 13 | Soldering          | 13.1 No cold solder joints, missing solder connections, oxidation or icicle.<br>13.2 No short circuits in components on PCB or FPC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2.5<br>0.65                              |

| NO                | Item                                   | Criterion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | AQL               |               |                |            |                                        |               |                   |               |                |            |                                        |               |     |
|-------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|----------------|------------|----------------------------------------|---------------|-------------------|---------------|----------------|------------|----------------------------------------|---------------|-----|
| 14                | Touch Panel Chipped glass              | <p>Symbols:<br/>                     x: Chip length      y: Chip width      z: Chip thickness<br/>                     k: Seal width      t: Touch Panel Total thickness    a: LCD side length<br/>                     L: Electrode pad length</p> <p>14.1 General glass chip:<br/>                     14.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="363 817 1181 1034"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td><math>z \leq t</math></td> <td><math>\leq 1/2 k</math> and not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> </table> <p>⊙ Unit: mm<br/>                     ⊙ If there are 2 or more chips, x is the total length of each chip</p> <p>14.1.2 Corner crack:</p>  <table border="1" data-bbox="363 1400 1181 1617"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td><math>z \leq t</math></td> <td><math>\leq 1/2 k</math> and not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> </table> <p>⊙ Unit: mm<br/>                     ⊙ If there are 2 or more chips, x is the total length of each chip</p> | z: Chip thickness | y: Chip width | x: Chip length | $z \leq t$ | $\leq 1/2 k$ and not over viewing area | $x \leq 1/8a$ | z: Chip thickness | y: Chip width | x: Chip length | $z \leq t$ | $\leq 1/2 k$ and not over viewing area | $x \leq 1/8a$ | 2.5 |
| z: Chip thickness | y: Chip width                          | x: Chip length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |               |                |            |                                        |               |                   |               |                |            |                                        |               |     |
| $z \leq t$        | $\leq 1/2 k$ and not over viewing area | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |               |                |            |                                        |               |                   |               |                |            |                                        |               |     |
| z: Chip thickness | y: Chip width                          | x: Chip length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |               |                |            |                                        |               |                   |               |                |            |                                        |               |     |
| $z \leq t$        | $\leq 1/2 k$ and not over viewing area | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |               |                |            |                                        |               |                   |               |                |            |                                        |               |     |

| NO                 | Item                                            | Criterion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | AQL                          |                  |                 |                 |                    |   |                    |   |           |   |     |
|--------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------|-----------------|-----------------|--------------------|---|--------------------|---|-----------|---|-----|
| 15                 | Touch Panel (Fish eye, dent and bubble on film) | <table border="1" data-bbox="384 293 916 483"> <thead> <tr> <th>SIZE (mm)</th> <th>Acceptable Q' ty</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.2</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.2 &lt; D \leq 0.4</math></td> <td>5</td> </tr> <tr> <td><math>0.4 &lt; D \leq 0.5</math></td> <td>2</td> </tr> <tr> <td><math>0.5 &lt; D</math></td> <td>0</td> </tr> </tbody> </table>   | SIZE (mm)                    | Acceptable Q' ty | $\Phi \leq 0.2$ | Accept no dense | $0.2 < D \leq 0.4$ | 5 | $0.4 < D \leq 0.5$ | 2 | $0.5 < D$ | 0 | 2.5 |
| SIZE (mm)          | Acceptable Q' ty                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                              |                  |                 |                 |                    |   |                    |   |           |   |     |
| $\Phi \leq 0.2$    | Accept no dense                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                              |                  |                 |                 |                    |   |                    |   |           |   |     |
| $0.2 < D \leq 0.4$ | 5                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                              |                  |                 |                 |                    |   |                    |   |           |   |     |
| $0.4 < D \leq 0.5$ | 2                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                              |                  |                 |                 |                    |   |                    |   |           |   |     |
| $0.5 < D$          | 0                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                              |                  |                 |                 |                    |   |                    |   |           |   |     |
| 16                 | Touch Panel Newton ring                         | Newton ring dimension $\leq 1/2$ touch panel area and not affect font and line distortion ( $\leq 2.5\%$ ), it is acceptable.                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2.5                          |                  |                 |                 |                    |   |                    |   |           |   |     |
| 17                 | Touch Panel Linearity                           | Less than 2.5% is acceptable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2.5                          |                  |                 |                 |                    |   |                    |   |           |   |     |
| 18                 | LCD Ripple                                      | Touch the touch panel, can not see the LCD ripple.<br>Pen: R 1.0mm silicon rubber.<br>Operation Force: 80g                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2.5                          |                  |                 |                 |                    |   |                    |   |           |   |     |
| 19                 | General appearance                              | 19.1 Pin type must match type in specification sheet.<br>19.2 LCD pin loose or missing pins.<br>19.3 Product packaging must the same as specified on packaging specification sheet.<br>19.4 Product dimension and structure must conform to product specification sheet.                                                                                                                                                                                                                                                                                                              | 0.65<br>0.65<br>0.65<br>0.65 |                  |                 |                 |                    |   |                    |   |           |   |     |

## 11. General Precautions

### 11.1. Safety

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

### 11.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

### 11.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

### 11.4. Storage

1. Store the module in a dark room where must keep at  $25\pm 10^{\circ}\text{C}$  and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

### 11.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer .

## 12. Packing method

-----TBD