



Product Specification

| | |
|--------------------|--|
| Model Name | LM070SWS05NS |
| Description | Standard LCD Module 7.0" WSVGA 1024x(RGB)x600 Dots |
| Date | 2018/09/17 |
| Version | 1.0 |

- Preliminary Specification
- Final Product Specification

| Prepared by | Checked by | Approved by |
|----------------|----------------|---------------|
| SXY 2018/09/17 | SXY 2018/09/17 | LX 2018/09/17 |

For Customer Approval

| Approved By | Comment |
|-------------|---------|
| | |



深圳市美显实业有限公司 LCD Mall Limited

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1. Record of Revision

| Rev | Issued Date | Description | Editor |
|-----|-------------|----------------|--------|
| 1.0 | 2018/09/17 | First Release. | SXY |
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2. General Specifications

| | Feature | Spec |
|-----------------|----------------------|--------------------------------|
| Characteristics | Size | 7.0 inch |
| | Resolution | 1024(horizontal)*600(Vertical) |
| | Interface | LVDS |
| | Pixel pitch (mm) | 0.150*0.150 |
| | Pixel Configuration | R.G.B.-Stripe |
| | Display color | Normally white |
| | LCD Driver IC | NT51008CH+NT52002H |
| | CTP Driver IC | TBD |
| | Viewing Direction | 12 O'CLOCK |
| Mechanical | LCM (W x H x D) (mm) | 165.75*105.39*3.40 |
| | Active Area(mm) | 153.60*90.00 |
| | With /Without TSP | Without TSP |
| | Weight (g) | TBD |
| | LED Numbers | 24 LEDs |

Note 1: Requirements on Environmental Protection: RoHs

Note 2: LCM weight tolerance: +/- 5%



3. Input/Output Terminals

LCD PIN-MAP

| No. | Symbol | Description |
|-----|----------|--|
| 1 | VCOM | Common voltage |
| 2 | VDD | Power Voltage for digital circuit |
| 3 | VDD | Power Voltage for digital circuit |
| 4 | NC | No connection |
| 5 | Reset | Global reset pin |
| 6 | STBYB | Standby mode, Normally pulled high STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z |
| 7 | GND | Ground |
| 8 | RXIN0- | -LVDS differential data input |
| 9 | RXIN0+ | +LVDS differential data input |
| 10 | GND | Ground |
| 11 | RXIN1- | -LVDS differential data input |
| 12 | RXIN1+ | +LVDS differential data input |
| 13 | GND | Ground |
| 14 | RXIN2- | -LVDS differential data input |
| 15 | RXIN2+ | +LVDS differential data input |
| 16 | GND | Ground |
| 17 | RXCLKIN- | -LVDS differential data input |
| 18 | RXCLKIN+ | +LVDS differential data input |
| 19 | GND | Ground |
| 20 | RXIN3- | -LVDS differential data input |
| 21 | RXIN3+ | +LVDS differential data input |
| 22 | GND | Ground |
| 23 | NC | No connection |
| 24 | NC | No connection |
| 25 | GND | Ground |
| 26 | NC | No connection |
| 27 | DIMO | Backlight CABC controller signal output |
| 28 | SELB | Backlight CABC controller signal output |
| 29 | AVDD | Power for Analog Circuit |
| 30 | GND | Ground |
| 31 | LED- | LED Cathode |
| 32 | LED- | LED Cathode |
| 33 | L/R | Horizontal inversion |



| | | |
|----|---------|--------------------|
| 34 | U/D | Vertical inversion |
| 35 | VGL | Gate OFF Voltage |
| 36 | CABCEN1 | CABC H/W enable |
| 37 | CABCEN0 | CABC H/W enable |
| 38 | VGH | Gate ON Voltage |
| 39 | LED+ | Anode of LED |
| 40 | LED+ | Anode of LED |

4. Absolute Maximum Rating

| Item | Symbol | MIN | MAX | Unit |
|---------------------------|------------------|------|------|------|
| Supply voltage for logic | DVDD | -0.3 | 5.0 | V |
| Supply voltage for analog | AVDD | -0.5 | 13.5 | V |
| Power supply | VGH | -0.3 | 40 | V |
| Power supply | VGL | -20 | 0.3 | V |
| Power supply | VGH-VGL | | 40 | 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. Electrical Characteristics

5.1 Input Power

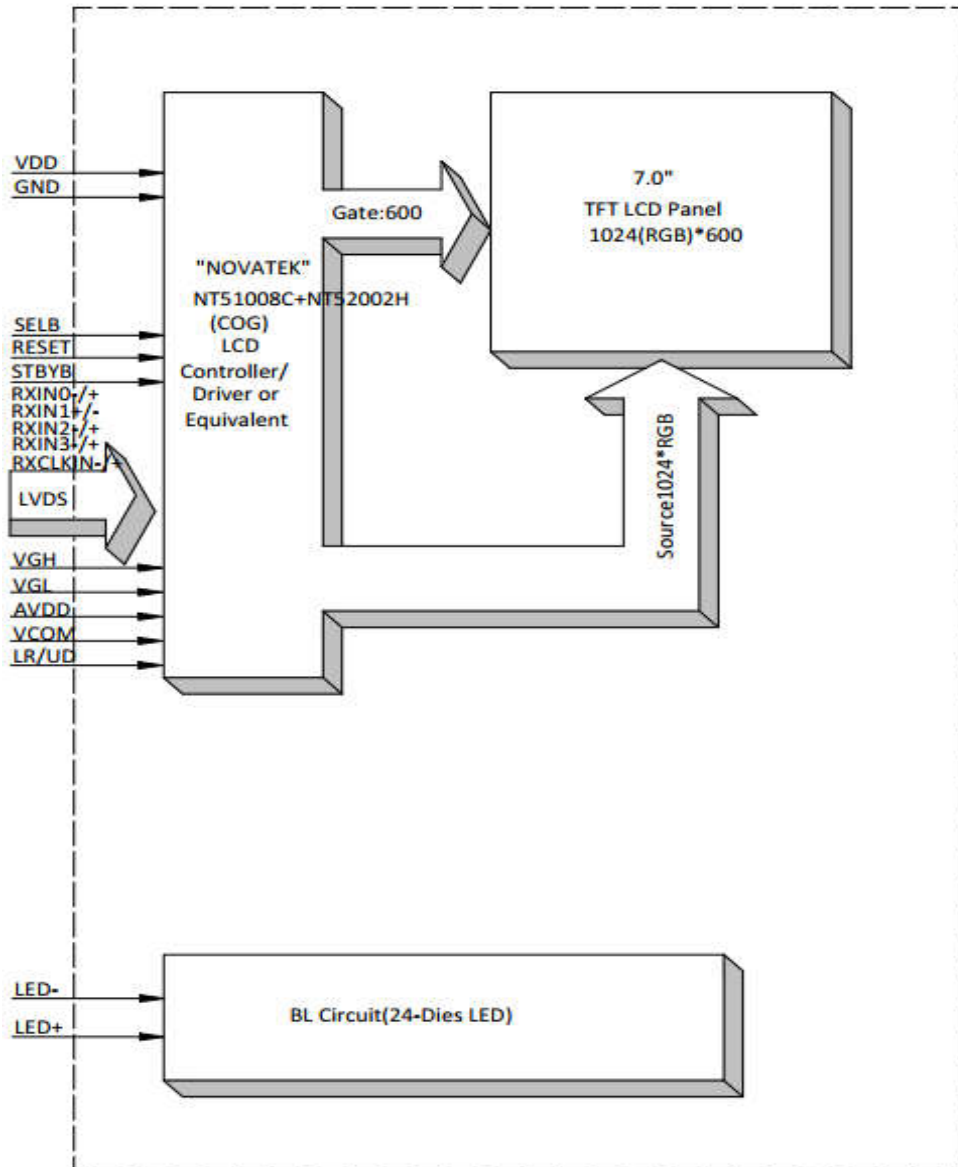
| Item | Symbol | Min | Typ | Max | Unit | Applicable terminal |
|---------------------------|------------------|---------|------|---------|------|---------------------|
| Supply Voltage for Analog | DVDD | 3.0 | 3.3 | 3.6 | V | |
| Supply Voltage for Logic | AVDD | 10.8 | 11 | 11.2 | V | |
| Power supply | VGH | 19.7 | 20 | 20.3 | | |
| Power supply | VGL | -6.5 | -6.8 | -7.1 | | |
| Power supply | VCOM | 3.56 | 3.76 | 3.96 | | |
| Input Voltage | V _{IL} | 0 | - | 0.3DVDD | V | |
| | V _{IH} | 0.7DVDD | - | DVDD | | |
| Input leakage Current | I _{LKG} | - | - | - | uA | |

5.2 Backlight Driving Conditions

| Item | Symbol | Value | | | Unit | Remark |
|---------------------------|--------|--------|--------|------|------|--------------------|
| | | Min | Typ | Max | | |
| Voltage for LED Backlight | V_F | - | 9.6 | 10.8 | V | $I_L=160\text{mA}$ |
| Current for LED Backlight | I_L | | 160 | | mA | |
| Power Consumption | P | | 1.536 | | W | |
| LED Life Time | | 30,000 | 50,000 | | Hr | Note |

Note: Brightness to be decreased to 50% of the initial value at ambient temperature $T_A=25^\circ\text{C}$

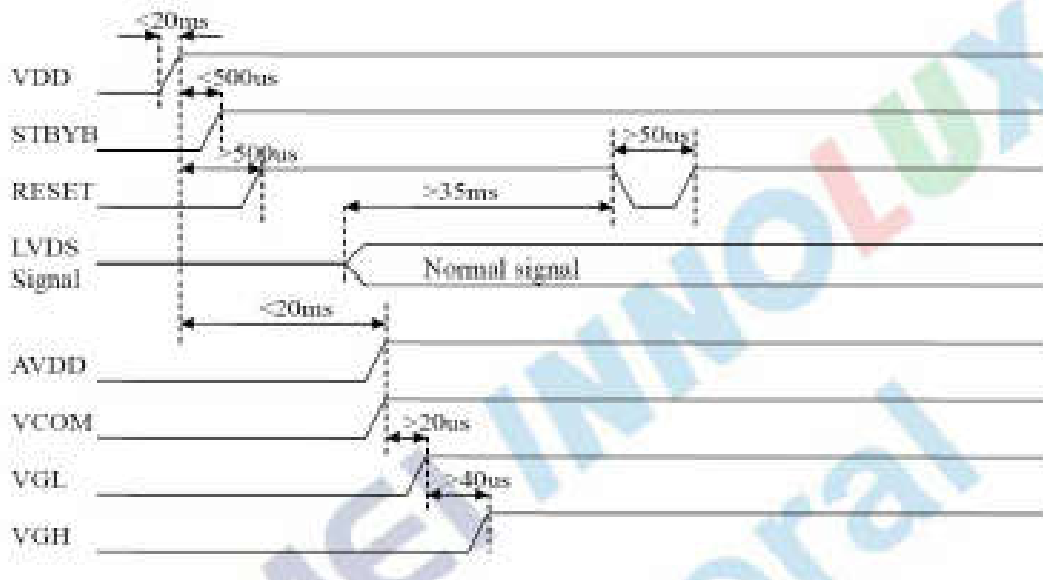
5.3 Block Diagram



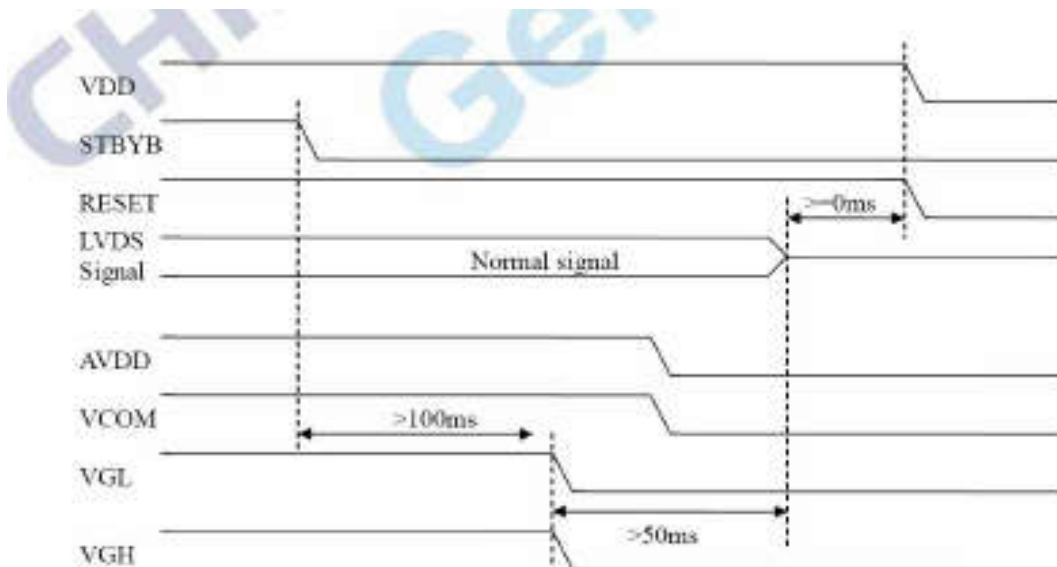
6. Interface Timing

6.1 Power Sequence

Power on



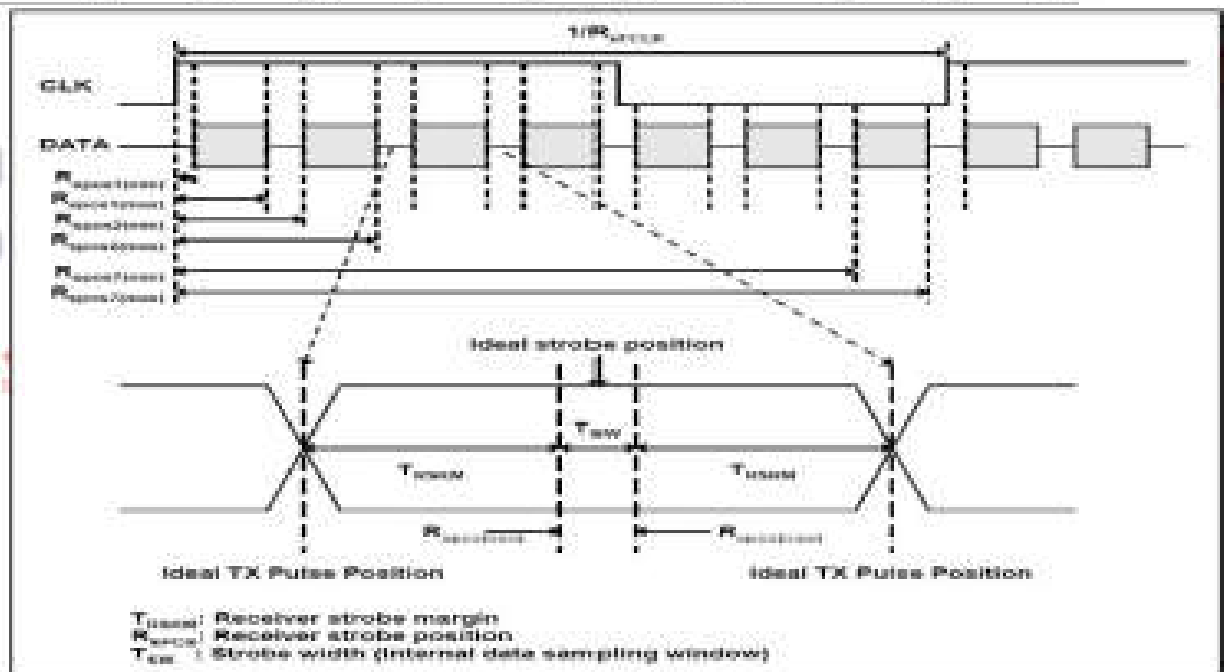
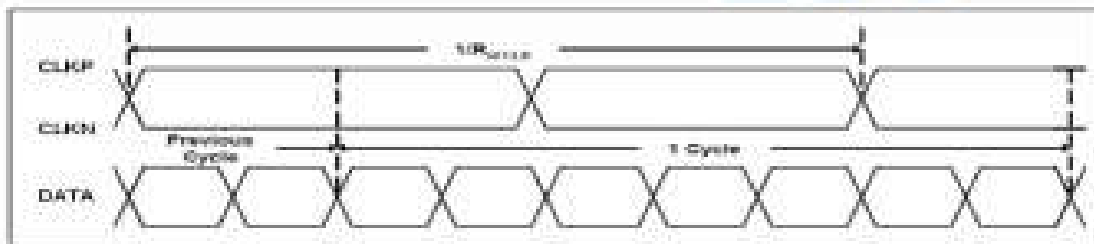
Power off



6.2 AC electrical characteristics

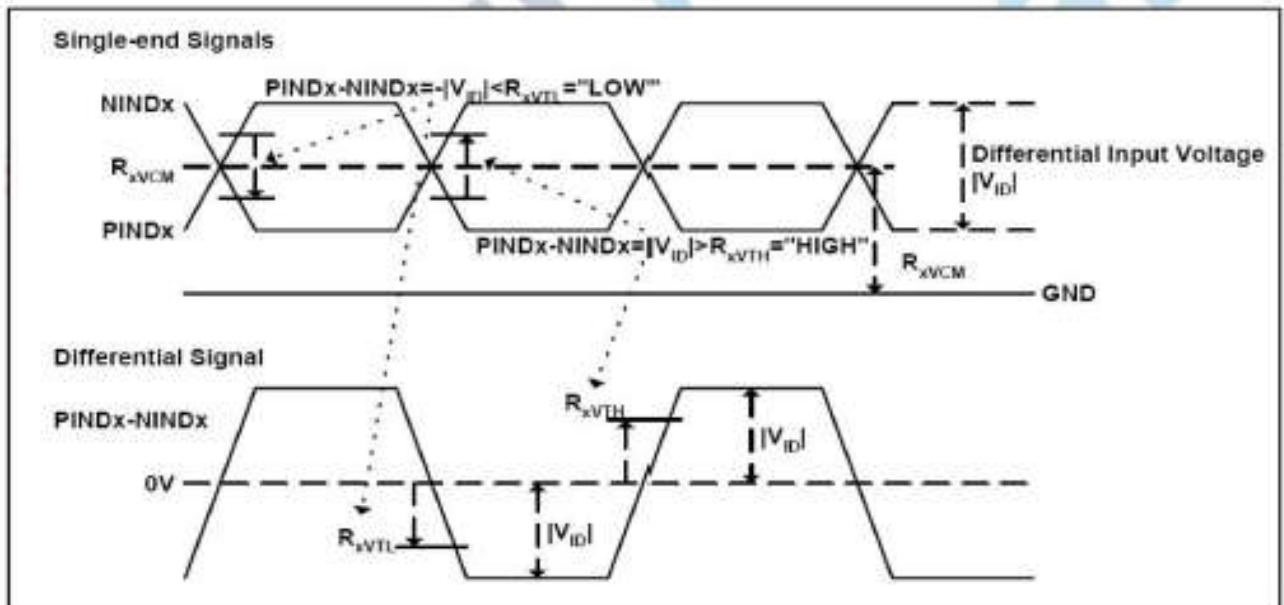
| Item | Symbol | values | | | Unit | Remark |
|------------------------|--------|--------|------------------|------|------|--------|
| | | Min | Typ | Max | | |
| Clock frequency | Rxfclk | 40.8 | 51.2 | 67.2 | MHz | |
| Input data skew margin | Trskm | 500 | | - | ps | |
| Clock high time | Tlvch | - | 4/(7* RxFCLK) | - | ns | |
| Clock low time | Tlvcl | - | 3/(7* RxFCLK) | - | ns | |

6.3 Input data format



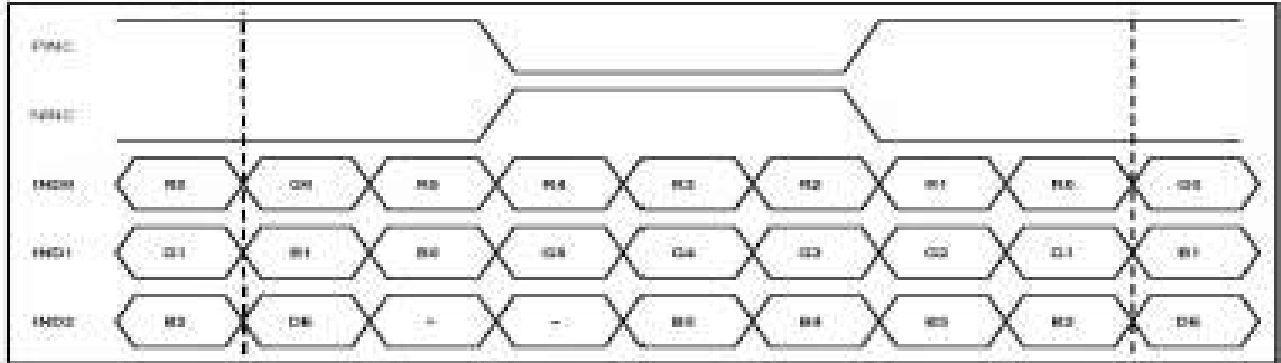
6.4 DC Electrical Characteristics

| Parameter | Symbol | Values | | | Unit | Remark |
|---|---------------|--------------|-----|------------------|---------|-----------------|
| | | Min | Typ | Max | | |
| Differential input high Threshold voltage | R_{xVTH} | - | - | +0.1 | V | $R_{xVCM}=1.2V$ |
| Differential input low Threshold voltage | R_{xVTL} | -0.1 | - | - | V | |
| Input voltage range (singled-end) | R_{xVIN} | 0 | - | 2.4 | V | |
| Differential input common mode voltage | R_{xVCM} | $ V_{ID} /2$ | - | $2.4- V_{ID} /2$ | V | |
| Differential voltage | $ V_{ID} $ | 0.2 | - | 0.6 | V | |
| Differential input leakage current | $R_{V_{slz}}$ | -10 | - | +10 | μA | |

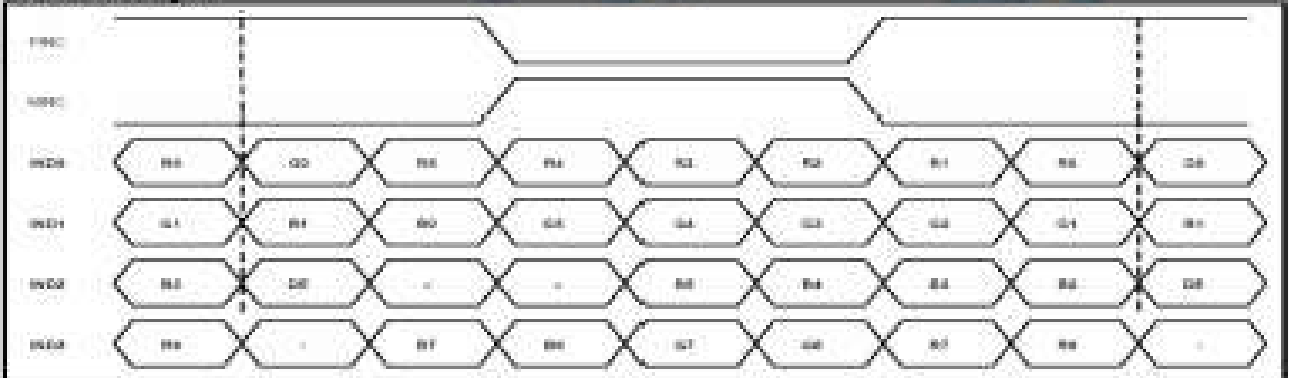


8.5 Data input format

8bit LVDS input



8bit LVDS input



Note: Support DE timing mode only, SYNC mode not supported.

8.6 Data input format

| Item | Symbol | Values | | | Unit | Remark |
|-------------------------|--------|--------|------|------|------|-----------------|
| | | Min | Typ | Max | | |
| Clock frequency | Fclk | 40.8 | 51.2 | 67.2 | MHz | Frame rate=60Hz |
| Horizontal display area | Thd | 1024 | | | DCLK | |
| HS period time | Th | 1114 | 1344 | 1400 | DCLK | |
| HS Blanking | Thb | 90 | 320 | 376 | DCLK | |
| Vertical display area | Tvd | 600 | | | H | |
| VS period time | Tv | 610 | 635 | 800 | H | |
| VS blanking | Thb | 10 | 35 | 200 | H | |

7. Optical Characteristics

| ITEM | SYMBOL | CONDITIONS | SPECIFICATIONS | | | UNIT | NOTE |
|----------------------|------------------|------------------|----------------------|-------|-------|-------------------|------|
| | | | MIN | TYP | MAX | | |
| Luminance | L | IL=160mA | - | 350 | - | Cd/m ² | |
| Contrast Ratio | CR | $\theta=0^\circ$ | 500 | 700 | | | |
| Response Time | T _{ON} | 25°C | | 10 | 20 | ms | |
| | T _{OFF} | | | 15 | 30 | | |
| CIE Color Coordinate | Red | X _R | Viewing normal angle | 0.578 | 0.618 | 0.658 | |
| | | Y _R | | 0.307 | 0.347 | 0.387 | |
| | Green | X _G | | 0.300 | 0.340 | 0.380 | |
| | | Y _G | | 0.565 | 0.605 | 0.645 | |
| | Blue | X _B | | 0.103 | 0.143 | 0.183 | |
| | | Y _B | | 0.022 | 0.062 | 0.102 | |
| | White | X _W | | 0.250 | 0.290 | 0.330 | |
| | | Y _W | | 0.280 | 0.320 | 0.360 | |
| Viewing Angle | Hor | θ_{x+} | CR ≥ 10 | 60 | 70 | Degree | |
| | | θ_{x-} | | 60 | 70 | | |
| | Ver | θ_{y+} | | 40 | 50 | | |
| | | θ_{y-} | | 60 | 70 | | |
| Uniformity | Un | | | 70 | 75 | % | |

Note1. Definition of contrast ratio

Contrast ratio(Cr) is defined mathematically by the following formula. For more information see FIG.2.

$$\text{Contrast ratio} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

For contrast ratio, Surface Luminance, Luminance uniformity and CIE, the testing data is based on TOPCON's BM-5 or BM-7 photo detector or compatible.

Note2. Definition of surface luminance.

Surface luminance is the luminance with all pixels displaying white. For more information see FIG.2.

L_v = Average Surface Luminance with all white pixels (P₁, P₂, P₃, ..., P_n)

Note3. Definition of luminance uniformity

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.2.

$$YU = \frac{\text{Minimum surface luminance with all white pixels (P}_1, P_2, P_3, \dots, P_n)}{\text{Maximum surface luminance with all white pixels (P}_1, P_2, P_3, \dots, P_n)}$$

Note4. Definition of response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black”state. Rise time (Tr) is the time between photo detector output intensity changed from 90% to 10%. And fall time (Tf) is the time between photo detector output intensity changed from 10% to 90%.

For additional information see FIG1.

Note5. Definition of color chromaticity (CIE1931)

CIE (x,y) chromaticity, The x,y value is determined by screen active area center position P5. For more information see FIG.2.

Note6. Definition of viewing angle

Viewing angle is the angle at which the contrast ratio is greater than 10. Angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG.3.

For viewing angle and response time testing, the testing data is base on Autronic-Melchers’s ConoScope or DMS series Instruments or compatible.

FIG.1. The definition of response Time

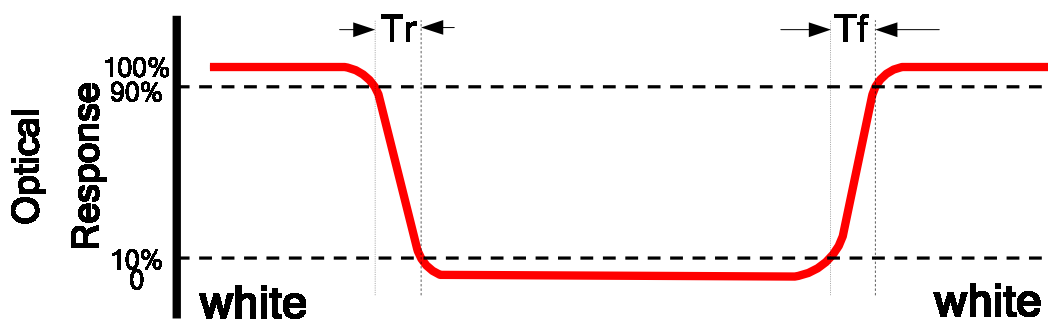


FIG.2. Measuring method for contrast ratio, surface luminance,

luminance uniformity, CIE (x,y) chromaticity

Size : S≤5”(see Figure a) A : 5 mm B : 5 mm

H,V : Active area

Light spot size $\phi=5\text{mm}$ (BM-5) or $\phi=7.7\text{mm}$ (BM-7) 50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure a.

measurement instrument : TOPCON’s luminance meter BM-5 or BM-7 or compatible (see Figure c).

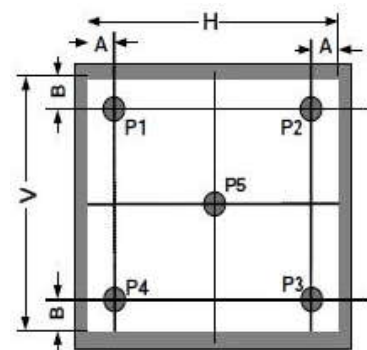


Figure a

Size : 5" < S ≤ 12.3" (see Figure b) H,V : Active area

Light spot size $\phi=5\text{mm}$ (BM-5) or $\phi=7.7\text{mm}$ (BM-7) 50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure b.

measurement instrument : TOPCON's luminance meter BM-5 or BM-7 or compatible (see Figure c).

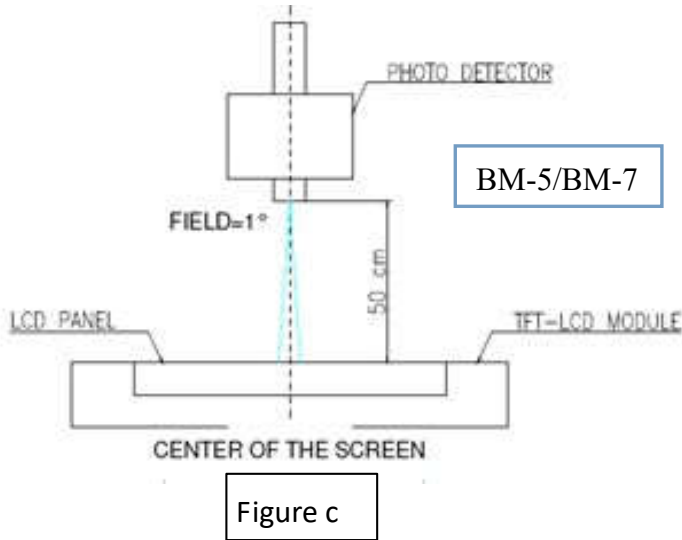
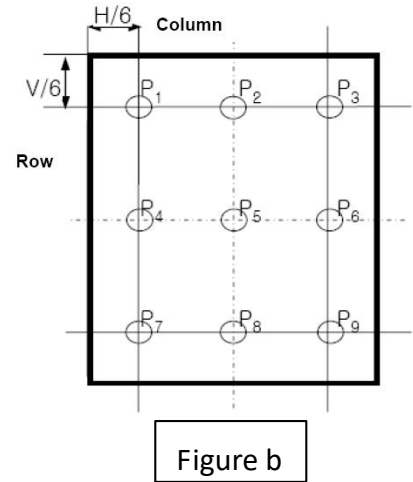
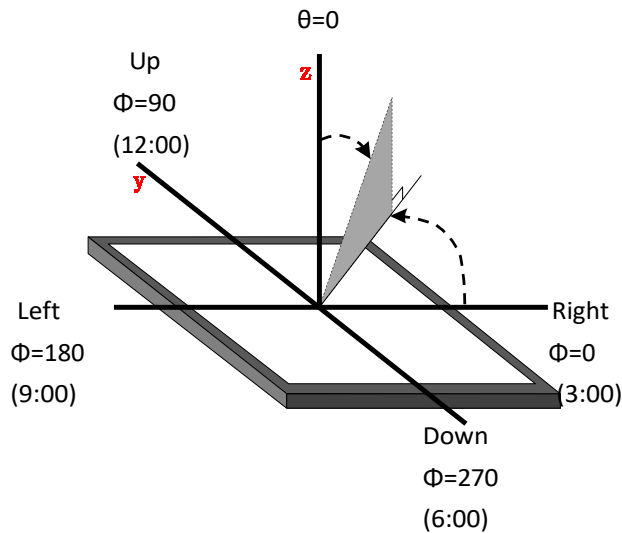


FIG.3.The definition of viewing angle

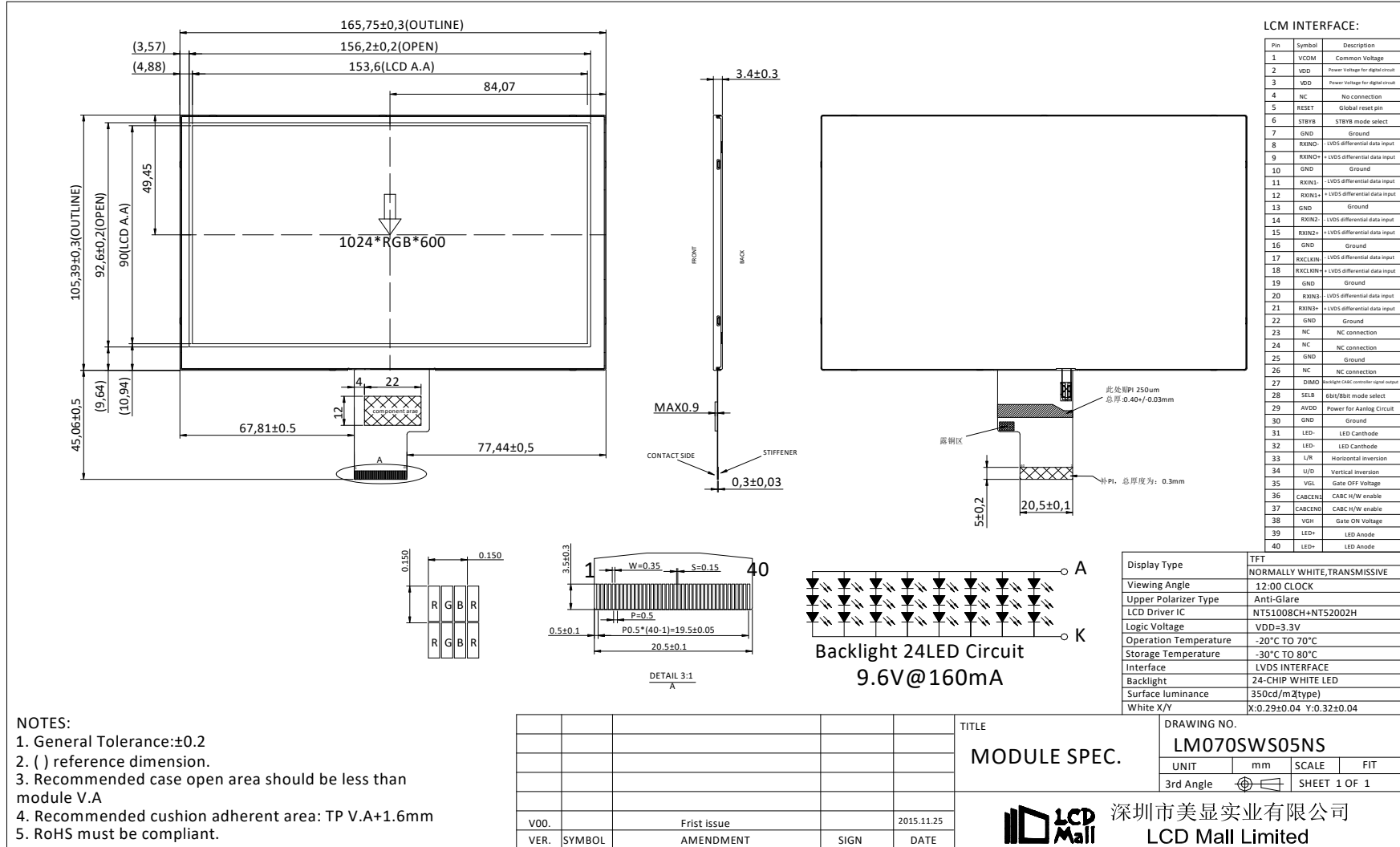


8. Environmental / Reliability Tests

| No | Test Item | Condition | Remarks |
|----|--------------------------------------|--|--|
| 1 | High Temperature Operation | Ts= +70°C, 240hrs | Note 1 IEC60068-2-2, GB2423.2-89 |
| 2 | Low Temperature Operation | Ta= -20°C, 240hrs | Note 2 IEC60068-2-1 GB2423.1-89 |
| 3 | High Temperature Storage | Ta= +80°C, 240hrs | IEC60068-2-2 GB2423.2-89 |
| 4 | Low Temperature Storage | Ta= -30°C, 240hrs | IEC60068-2-1 GB/T2423.1-89 |
| 5 | High Temperature & Humidity Storage | Ta= +60°C, 90% RH max, 240 hours | IEC60068-2-3 GB/T2423.3-2006 |
| 6 | Thermal Shock (Non-operation) | -20°C 30 min ~ +60°C 30 min Change time: 5min, 20 Cycle | Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87 |
| 7 | Electro Static Discharge (Operation) | C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15°C ~ 35°C, 30% ~ 60%, 86Kpa ~ 106Kpa) | IEC61000-4-2 GB/T17626.2-1998 |
| 8 | Vibration (Non-operation) | Frequency range: 10~55Hz, Stroke: 1mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (package condition) | IEC60068-2-6 GB/T2423.5-1995 |
| 9 | Shock (Non-operation) | 60G 6ms, ± X, ±Y, ± Z 3 times for each direction | IEC60068-2-27 GB/T2423.5-1995 |
| 10 | Package Drop Test | Height: 80 cm, 1 corner, 3 edges, 6 surfaces | IEC60068-2-32 GB/T2423.8-1995 |

- Note: 1. Ts is the temperature of panel's surface.
2. Ta is the ambient temperature of sample.
3. The size of sample is 5pcs.

9. Mechanical Drawing

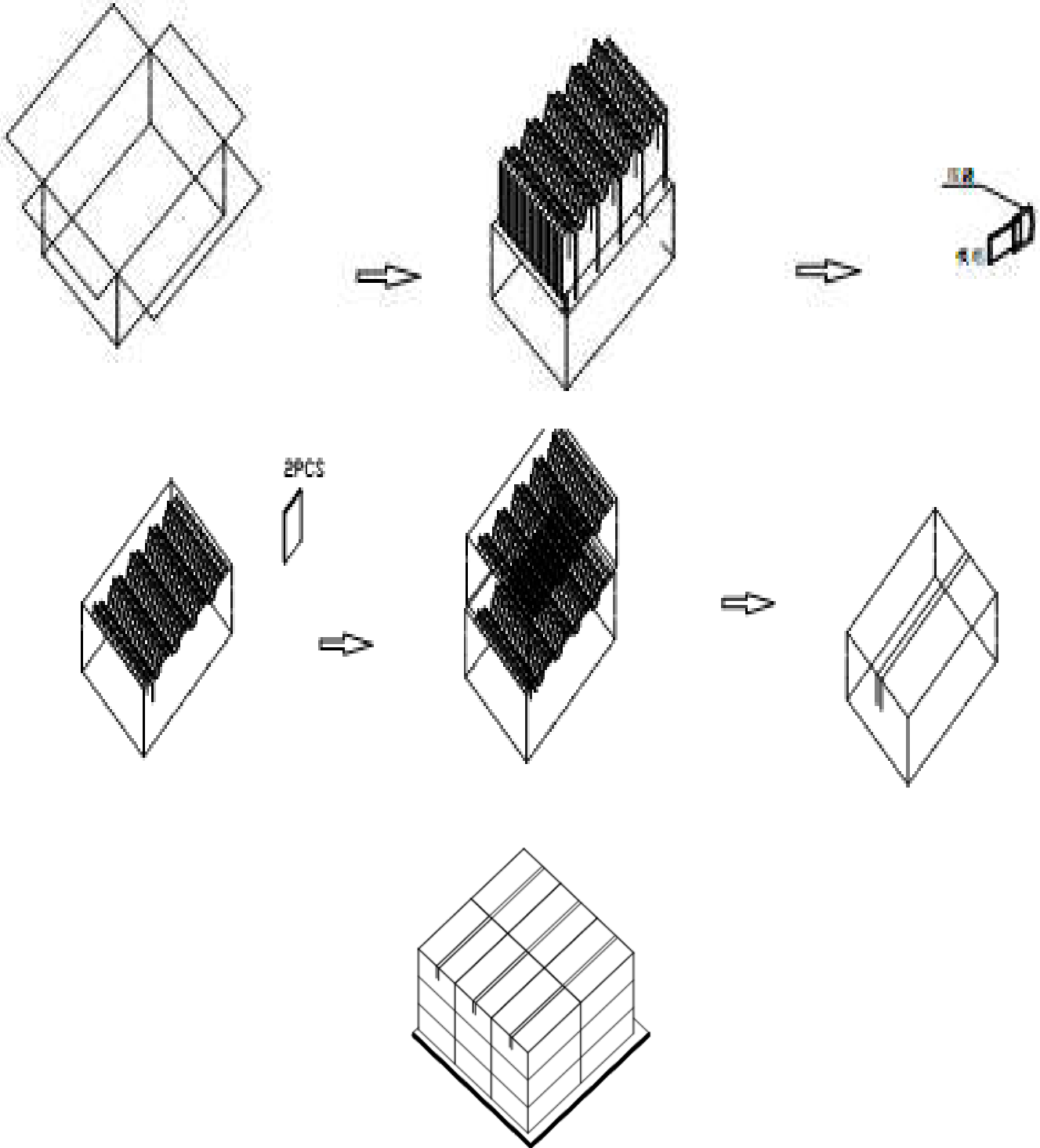


NOTES:

- General Tolerance:±0.2
- () reference dimension.
- Recommended case open area should be less than module V.A
- Recommended cushion adherent area: TP V.A+1.6mm
- RoHS must be compliant.

10. Packing

Packing Method



11. TFT-LCD Module Inspection Criteria

11.1 Scope

The incoming inspection standards shall be applied to TFT –LCD Modules (hereinafter Called "Modules") that supplied by LCD Mall Limited.

11.2 Incoming Inspection

The customer shall inspect the modules within twenty calendar days of the delivery date (the inspection period) at its own cost. The result of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to The seller, If the results of the inspecting from buyer does not send to the seller within twenty Calendar days of the delivery date. The modules shall be regards as acceptance.

Should the customer fail to notify the seller within the inspection period, the buyers Right to reject the modules shall be lapsed and the modules shall be deemed to have Been accepted by the buyer

11.3 Inspection Sampling

- 3.1. Lot size: Quantity per shipment lot per model
 - 3.2. Sampling type: Normal inspection, Single sampling
 - 3.3. Inspection level: II
 - 3.4. Sampling table: MIL-STD-105E
 - 3.5. Acceptable quality level (AQL)
- Major defect: AQL=0.65 Minor defect: AQL=1.00

11.4 Inspection Conditions

4.1 Ambient conditions:

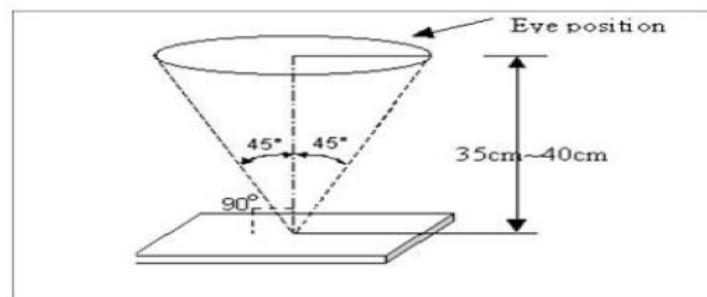
- a. Temperature: Room temperature $25\pm 5^{\circ}\text{C}$
- b. Humidity: $(60\pm 10)\% \text{RH}$
- c. Illumination: Single fluorescent lamp non-directive (300 to 700 Lux)

4.2 Viewing distance

The distance between the LCD and the inspector's eyes shall be at least $35\pm 5 \text{ cm}$.

4.3 Viewing Angle

U/D: $45^{\circ}/45^{\circ}$, L/R:



$45^{\circ}/45^{\circ}$

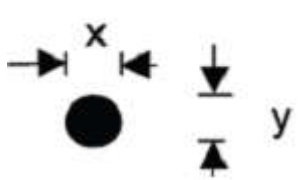
11.5 Inspection Criteria

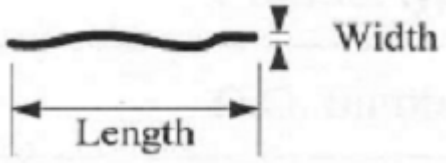

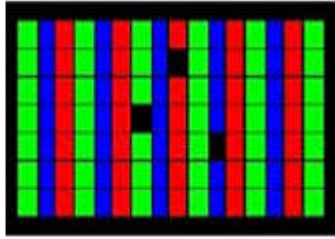
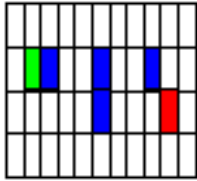
Defects are classified as major defects and minor defects according to the degree of Defectiveness defined herein.

11.5.1 Major defect

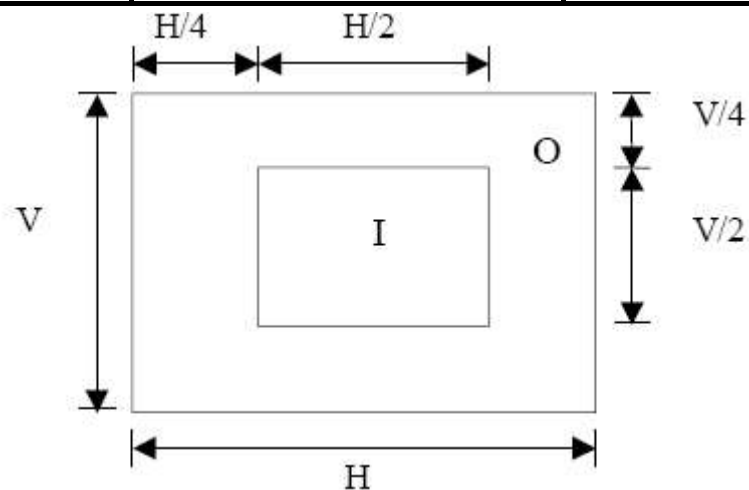
| Item No | Items to be inspected | Inspection Standard |
|---------|------------------------|--|
| 5.1.1 | All functional defects | 1) No display 2) Display abnormally 3) Short circuit 4) line defect |
| 5.1.2 | Missing | Missing function component |
| 5.1.3 | Crack | Glass Crack |

11.5.2 Minor defect

| Item No | Items to be inspected | Inspection standard | |
|---------|--|---|---------------------|
| 5.2.1 | Spot Defect Including Black spot White spot Pinhole Foreign particle Polarizer dirt | For dark/white spot is defined $\phi = (x+y) / 2$  | |
| | | Size ϕ (mm) | Acceptable Quantity |
| | | $\phi \leq 0.2$ | Ignore |
| | | $0.2 < \phi \leq 0.5$ | 3 |
| | | $0.5 < \phi$ | Not allowed |

| | | | | |
|------------------|---|---|---|---------------------|
| 5.2.2 | Line Defect Including Black line White line Scratch | Define:  | | |
| | | Width(mm) Length(mm) | | Acceptable Quantity |
| | | W≤0.05 | | Ignore |
| | | 0.05 < W≤0.1 L≤2.5 | | 3 |
| | | 0.1 < W, or L>2.5 | | Not allowed |
| 5.2.3 | Polarizer Dent/Bubble | Sizeφ(mm) | | Acceptable Quantity |
| | | φ≤0.2 | | Ignore |
| | | 0.2 < φ≤0.3 | | 2 |
| | | 0.3 < φ≤0.5 | | 1 |
| | | 0.5 < φ | | Not allowed |
| | | Total QTY | | 3 |
| 5.2.4 | Electrical Dot Defect | Bright and Black dot define:  and  | | |
| | |  | | |
| | | Two Adjacent Dot | | |
| | | Inspection pattern: Full white、Full black、Red、green and blue screens | | |
| | | Item | | Acceptable Quantity |
| | | I | O | Note |
| Black dot defect | | 2 | | |

| | | | | |
|--------------------------|---|----------------------------|---|----------------|
| | | Bright dot defect | 1 | (5mm≤Distance) |
| | | Two Adjacent Dot | 1 | |
| | | There or more Adjacent Dot | Not allowed | |
| | | Total Dot | 2 | |
| 5.2.5 | Glass defect | <p>1. Corner Fragment:</p> | | |
| | | Size(mm) | Acceptable Quantity | |
| | | X≤3mm Y≤1mm Z≤T | Ignore T: Glass thickness X: Length Y: Width Z: thickness | |
| | | <p>2. Side Fragment:</p> | | |
| | | Size(mm) | Acceptable Quantity | |
| X≤5.0mm Y ≤1mm Z≤T | T: Glass thickness X: Length Y: Width Z: thickness | | | |





I area & O area

- Note:
- 1). Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.
 - 2). The distance between two bright dot defects (red, green, blue, and white) should be larger than 15mm.
 - 3). The distance between black dot defects or black and bright dot defects should be more than 5mm apart.
 - 4). Polarizer bubble is defined as the bubble appears on active display area. The defect of polarizer bubble shall be ignored if the polarizer bubble appears on the outside of active display area.

11.6 Mechanics specification

As for the outside dimension, weight of the modules, please refer to product specification
For more details



12. Precautions for Use of LCD modules

12.1 Handling Precautions

12.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

12.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

12.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

12.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

12.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

Isopropyl alcohol & Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following: Water & Ketene & Aromatic solvents

12.1.6. Do not attempt to disassemble the LCD Module.

12.1.7. If the logic circuit power is off, do not apply the input signals.

12.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

12.1.8.1. Be sure to ground the body when handling the LCD Modules.

12.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

12.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

12.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

12.2 Storage Precautions

12.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

12.2.2. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0°C ~ 40°C Relatively humidity: ≤80%

12.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

12.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.