# LCM Specification

**( √ ) Preliminary Specification**
**(  ) Final Specification**



| | |
|---|---|
| Customer: | |
| Part NO: | TFT201BJ1040-15A |
| Product type: | Mode: Transmissive type .Normally white.<br>TFT LCD Module |
| Remarks: | □APPROVAL FOR SEPCIFICATIONS ONLY<br>■APPROVAL FOR SEPCIFICATIONS AND SAMPLE |
| Signature by Customer:<br>客户确认签章 | |

## 2. Features

| | |
|---|---|
| Display Mode | Transmissive type |
| | 2.01" Active matrix TFT-LCD |
| Display Format | Graphic 240*（RGB）*296t-matrix |
| Driver IC | JD9853 |
| Display color | 262K colors |
| Luminance | 580 cd/m$^2$ (Typ) |
| Interface | 4 Line Serial interface |
| Viewing Direction | ALL |
| Back Light | Light Emitting Diode (LED), 4s connected in parallel |

## 3. Mechanical Specification

| Item | Specifications | Unit | Remarks |
|---|---|---|---|
| Dimensional Outline | 34.04(W)*43.32(H)*1.86 | mm | FPC not include |
| Resolution | 240(W) *(RGB)* 296(H)pixels | dots | |
| LCD Active Area | 32.04(W)* 39.52(H) | mm | |
| Pixel Size | 0.1335(W)* 0.1335(H) | mm | |
| Weight | T.B.D | g | |

## 4.Electrical Characteristics

| Item | | Symbol | Min. | Typ. | Max. | Unit | Remarks |
|---|---|---|---|---|---|---|---|
| Power Supply | Analog | VDD | 2.5 | 2.8 | 3.3 | V | |
| | Logic | VDDIO | | | | V | |
| Current for LCD | | IVDD | - | - | 30 | mA | |
| LEDs Forward Voltage | | VF | | 3.0 | 3.3 | V | |
| LEDs Forward Current | | IF | - | 80 | | mA | 4 LEDs in parallel,80mA |
| Frame Frequency | | FFRAME | | 60 | | Hz | Frame Inversion |
| Operating temperature | | TOPR | -20 | - | 70 | ℃ | |
| Storage temperature | | TSTR | -30 | - | 80 | ℃ | |

## 5. Revision history

| Version | Revise record | Date |
|---|---|---|
| A | Original version | 2024.07.17 |
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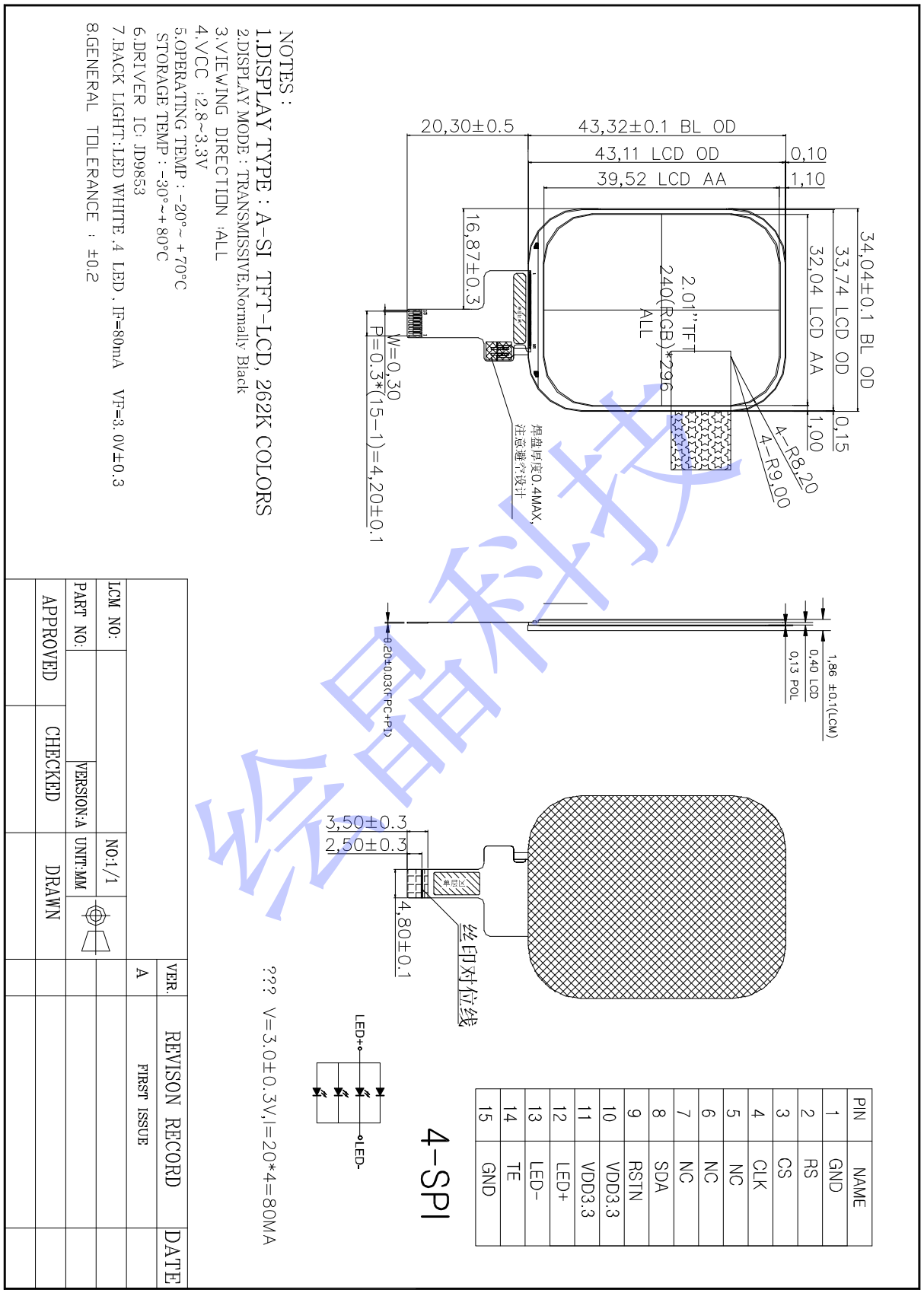
# 6. **Outline Dimension**



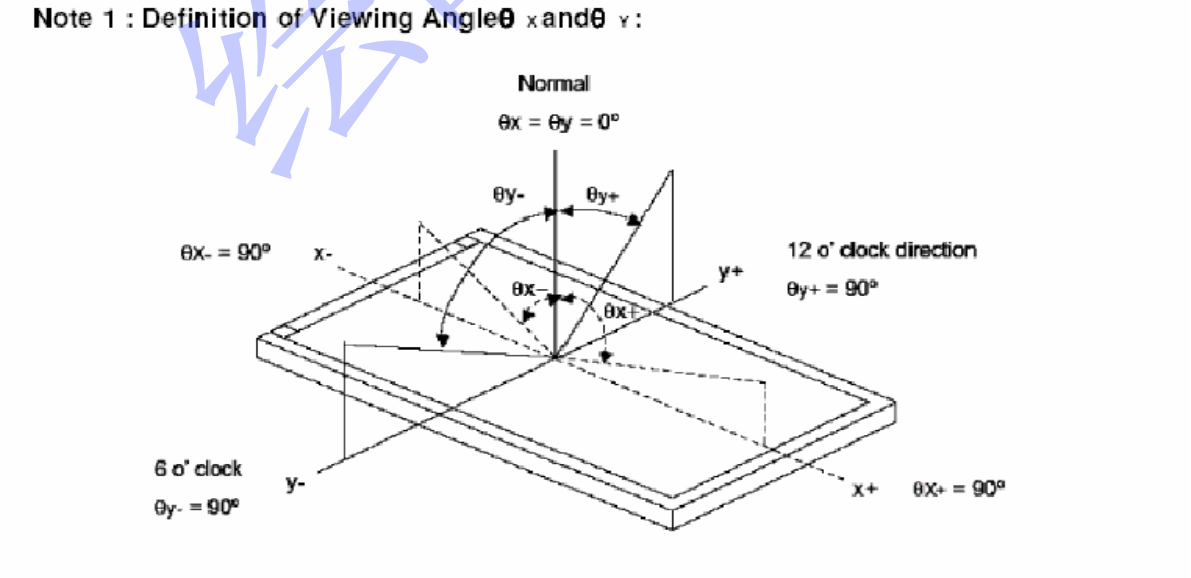
## 7. Pin Descriptions

| Pin No. | Signal | Discription |
|---|---|---|
| 1 | GND | Ground |
| 2 | RS | Serves as command or parameter select in 4-wire 8-bit serial data interface |
| 3 | CS | Chip select input pin (“Low” enable). |
| 4 | CLK | used serial interface clock in 4-wire 8-bit serial data interface |
| 5 | NC | NC |
| 6 | NC | NC |
| 7 | NC | NC |
| 8 | SDA | Serial input signal. |
| 9 | RSTN | Chip reset pin |
| 10 | VDD | Power supply(compatible 2.5V and 3.3V) |
| 11 | VDD | Power supply(compatible 2.5V and 3.3V) |
| 12 | LED+ | Positive backlight |
| 13 | LED- | Negetive backlight |
| 14 | TE | Tearing effect output pin to synchronize MPU to frame writing. If not used, open this pin. |
| 15 | GND | Ground |
| | | |
| | | |
| | | |

# 8. Optical Characteristics

| ITEM | | SYMBOL | CONDITIONS | SPECIFICATIONS | | | UNIT | NOTE |
|---|---|---|---|---|---|---|---|---|
| | | | | MIN. | TYP. | MAX | | |
| Brightness | | B | Viewing normal angle | 500 | 580 | - | $Cd/m^2$ | |
| Contrast Ratio | | CR | | 900 | 1200 | -- | -- | |
| Response Time | | Tr+Tf | | -- | 30 | 35 | ms | |
| Chromaticity Coordinate (Transmissive) | Red | X | | 0.606 | 0.626 | 0.646 | | |
| | | Y | | 0.305 | 0.325 | 0.345 | | |
| | Green | X | | 0.304 | 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. | $\theta_{X+}$ | Center CR>=10 | 80 | 85 | -- | Deg. | |
| | | $\theta_{X-}$ | | 80 | 85 | -- | | |
| | Ver. | $\theta_{Y+}$ | | 80 | 85 | -- | | |
| | | $\theta_{Y-}$ | | 80 | 85 | | | |
| Uniformity | Un | | | 80 | -- | | % | |

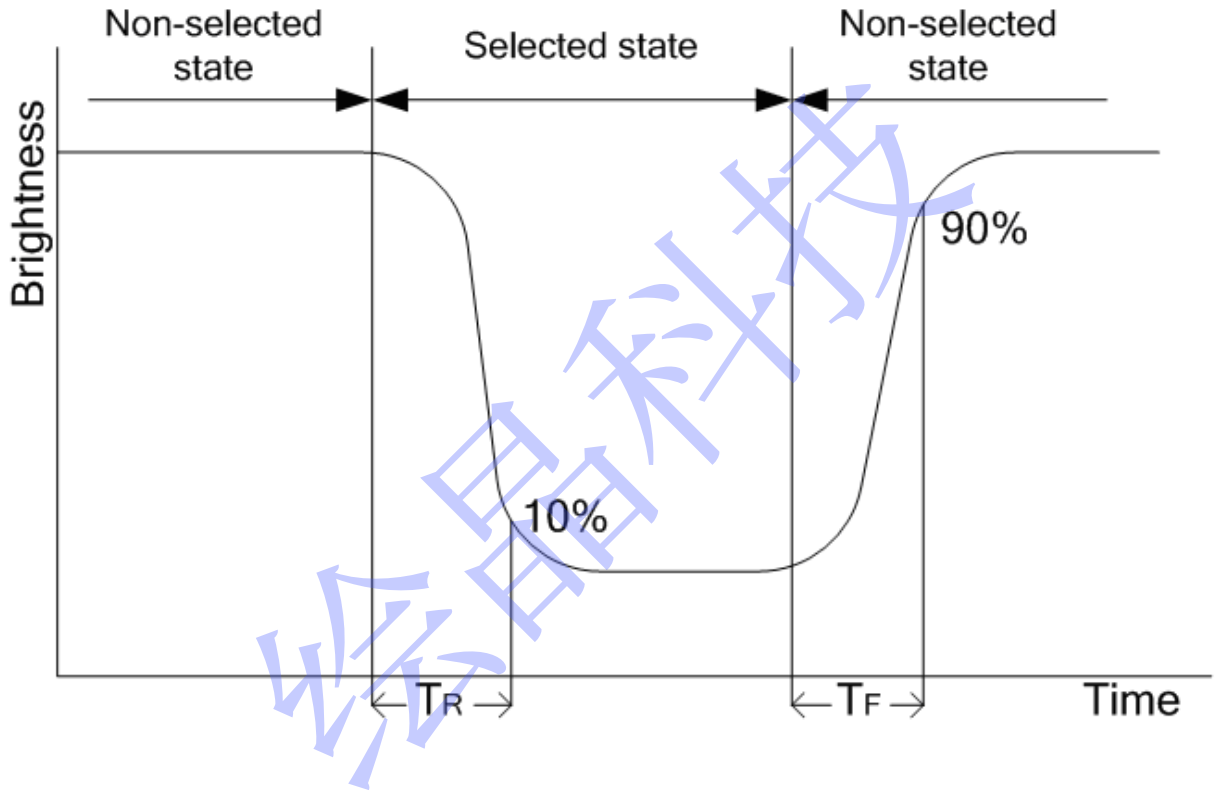
Note 1 : Definition of Viewing Angle$\theta_x$ and$\theta_y$ :

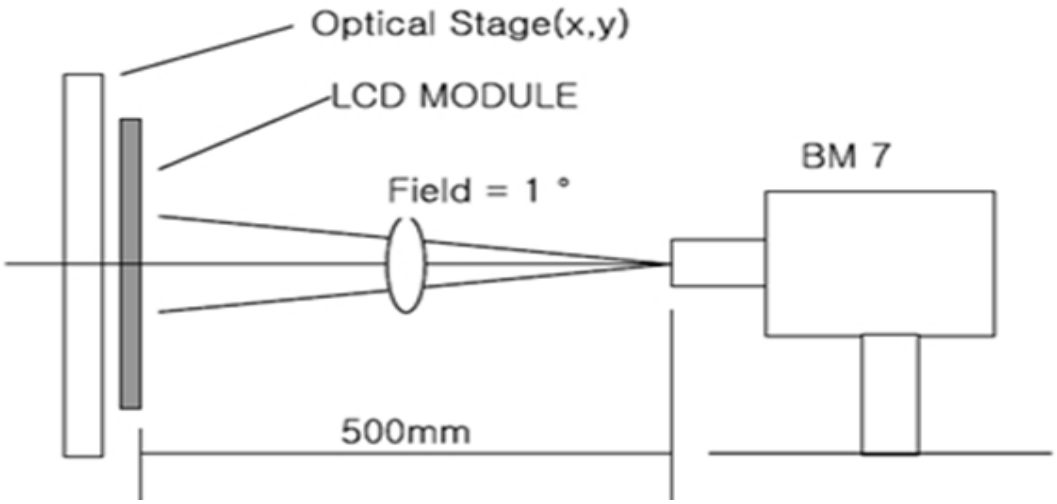


2: Definition of contrast ratio CR:

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

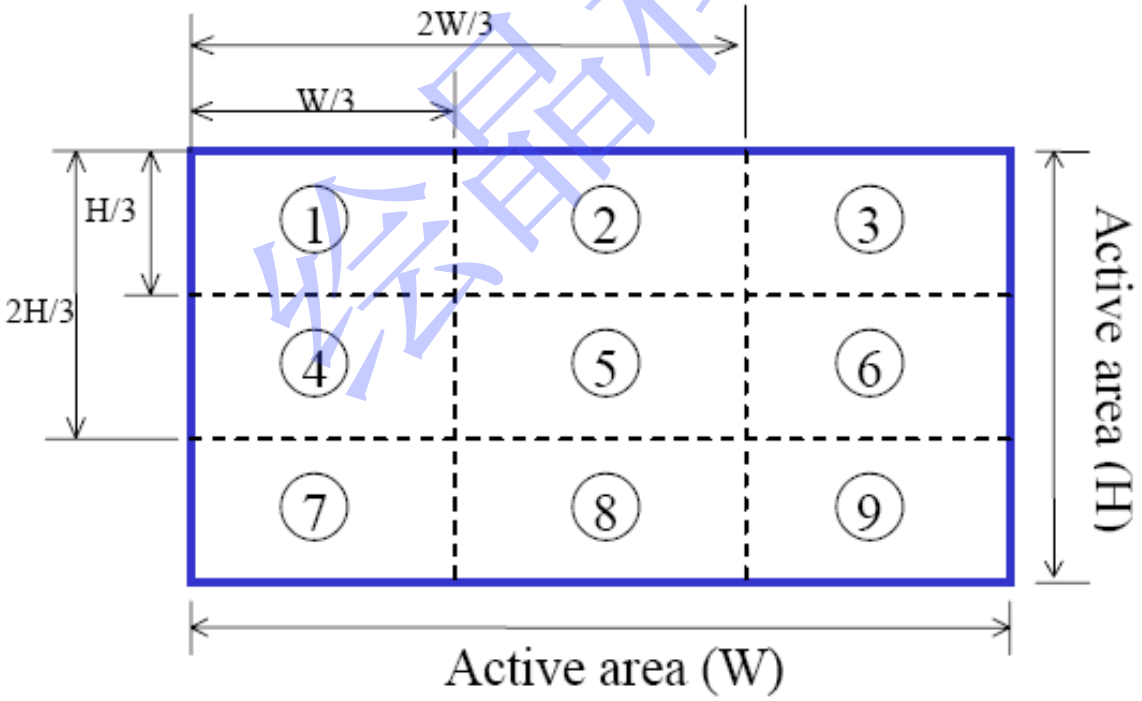
Note 3: Definition of response time ($T_R$, $T_F$)






<Transmissive Mode>

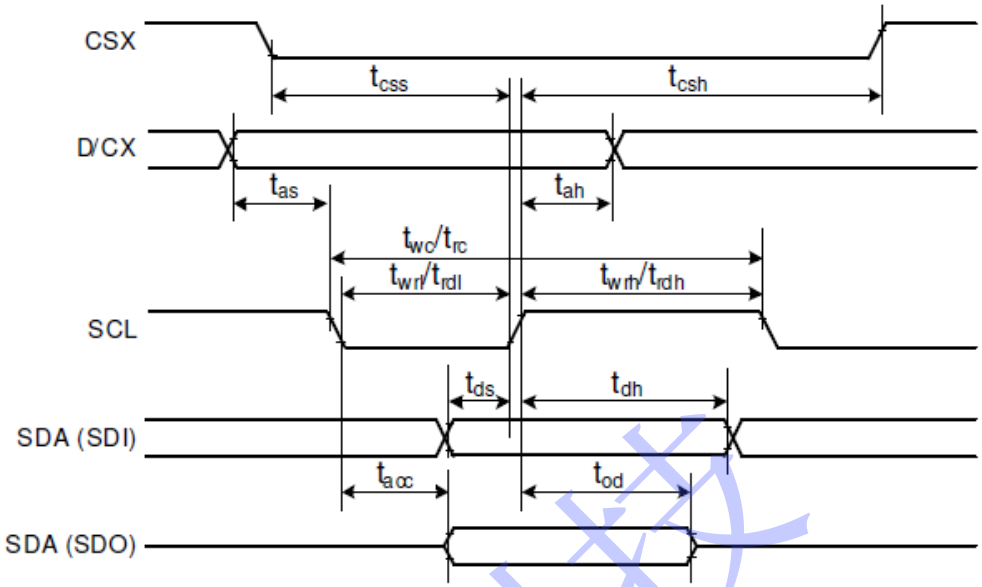
Optical Characteristic Measurement Equipment and method




Main Measuring point

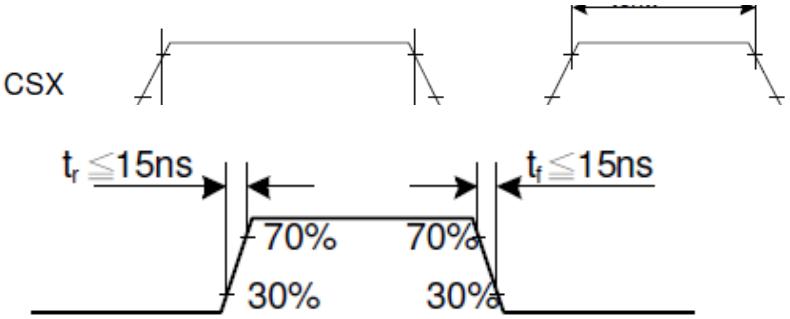
# 9. AC Characteristics

## 9.1 Display Serial Interface Timing Characteristics

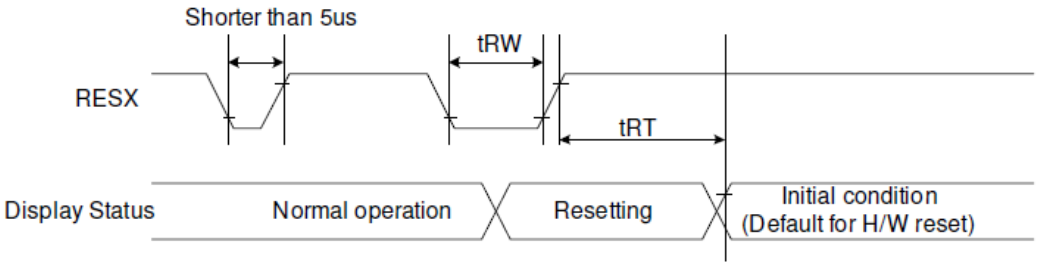



| Signal | Symbol | Parameter | min | max | Unit | Description |
|---|---|---|---|---|---|---|
| CSX | tcss | Chip select time (Write) | 40 | - | ns | |
| | tcsh | Chip select hold time (Read) | 40 | - | ns | |
| SCL | twc | Serial clock cycle (Write) | 100 | - | ns | |
| | twrh | SCL "H" pulse width (Write) | 40 | - | ns | |
| | twrl | SCL "L" pulse width (Write) | 40 | - | ns | |
| | trc | Serial clock cycle (Read) | 150 | - | ns | |
| | trdh | SCL "H" pulse width (Read) | 60 | - | ns | |
| | trdl | SCL "L" pulse width (Read) | 60 | - | ns | |
| D/CX | tas | D/CX setup time | 10 | - | | |
| | tah | D/CX hold time (Write / Read) | 10 | - | | |
| SDA / SDI (Input) | tds | Data setup time (Write) | 30 | - | ns | |
| | tdh | Data hold time (Write) | 30 | - | ns | |
| SDA / SDO (Output) | tacc | Access time (Read) | 10 | - | ns | For maximum CL=30pF |
| | tod | Output disable time (Read) | 10 | 50 | ns | For minimum CL=8pF |

*Note: Ta = 25 ℃, VDDI=1.65V to 3.3V, VCI=2.5V to 3.3V, AGND=VSS=0V*



## 10. Reset Timing




| Signal | Symbol | Parameter | Min | Max | Unit |
|---|---|---|---|---|---|
| RESX | tRW | Reset pulse duration | 10 | | uS |
| | tRT | Reset cancel | | 5 (note 1,5) | mS |
| | | | | 120 (note 1,6,7) | mS |

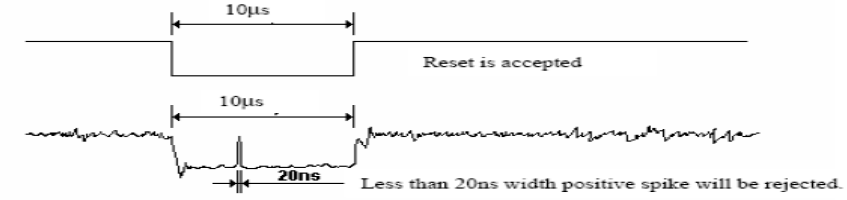
*Note 1: The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NV memory to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.*

*Note 2: Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below: -*

| RESX Pulse | Action |
|---|---|
| Shorter than 5us | Reset Rejected |
| Longer than 10us | Reset |
| Between 5us and 10us | Reset starts |

*Note 3: During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In -mode.) And then return to Default condition for Hardware Reset.*

*Note 4: Spike Rejection also applies during a valid reset pulse as shown below:*




*Note 5: When Reset applied during Sleep In Mode.*

*Note 6: When Reset applied during Sleep Out Mode.*

Note 7: It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

## 11. Reliability

| Item NO. | Item | Test Conditions | Remark |
|---|---|---|---|
| 1 | High temperature Operation | +70℃ 96Hours | Note 2，Note 4 |
| 2 | Low temperature Operation | -20℃ 96Hours | Note 1，Note 4 |
| 3 | High Temperature Storage | +80℃ 96Hours | Note 1，Note 4 |
| 4 | Low temperature Storage | -30℃ 96Hours | Note 1，Note 4 |
| 5 | Operate at High Temp and Humidity | +50℃ 90%RH 96Hours | Note 4 |
| 6 | Thermal Shock | -20℃(30min)→25℃(5min)→70℃(30min)→25℃(5min)<br>Cycle:10 | Note 4 |
| 7 | ESD Test | ±6KV ,R=330Ω,C=150pF,Air<br>±4KV ,R=330Ω,C=150pF,Contact<br>10 times | |
| 8 | Packing vibration test | Frequency:10HZ~55HZ~10HZ<br>Amplitude:1.5mm<br>X,Y,Zdirection for total 2 hours<br>(6 hours for total) | |

Note 1: Ta is the ambient temperature of samples.
Note 2: Ts is the temperature of panel's surface.
Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.
Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

# 12.Inspection standards

1.AQL(Acceptable Quality Level

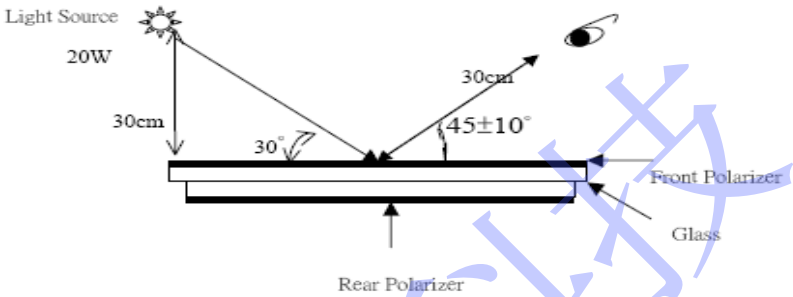
AQL of major and minor defect.

| | MAJOR DEFECT | MINOR DEFECT |
|---|---|---|
| AQL | 0.65 | 1.0 |

**2. Basic conditions for inspection**

The LCM face to us, in normal environment, the lux is 1000±200.(Darkroom's lux: 100±50),About an angle of incidence 30,a distance of 30 cm with an angle of 45 degree to check the products without uncovering the film!

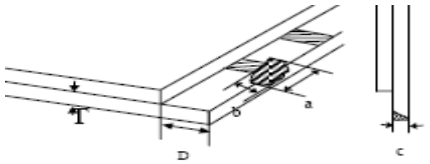
**(As shown below)**

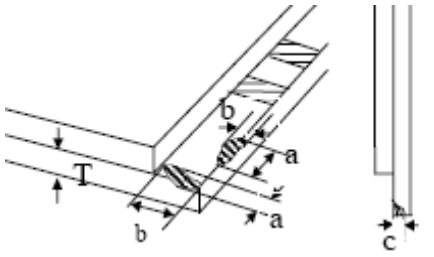
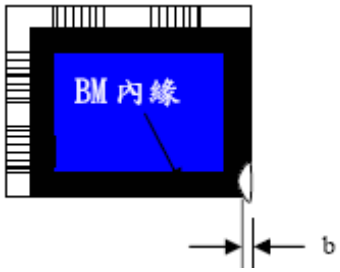



**3.Inspection item and criteria**

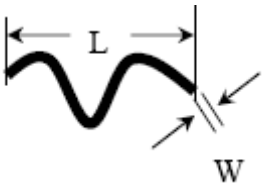
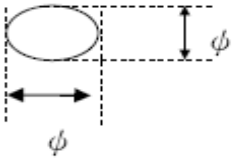
**3.1 Visual inspection criterion in immobility**

**3.1.1Glass defect**

| NO | Defect item | Criteria | Remark |
|---|---|---|---|
| 1 | Dimension Unconformity (Major defect) | By Engineering Drawing | |
| 2 | Cracks (Major defect) | 1. Linear cracks panel 【Reject】<br>2. Nonlinear crack contrast by limited sample |  |
| 3 | Glass extrude the conductive area (minor defect) | a: disregards and no influence assemblage.<br>1) b≤1/3Pin width(non bonding area) 【Accept】<br>2)bonding area≤0. 5㎜ 【Accept】 | A: Length, b: Width |
| 4 | Pin-side ,conductive area damaged (minor defect) | (a c: disregards)<br>b≤1/3of effective length for bonding electrode 【Accept】 | a: length, b: Width, c: Thickness  |
| 5 | Pin-side,non-conductive area damaged | 1)Damage area don't touch the ITO (Inclueling contraposition mark, | a: Length, b: Width c: Thickness |

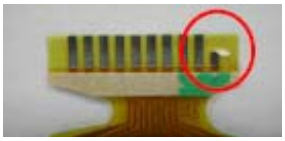
| | | | |
|---|---|---|---|
| | (minor defect) | except scribing mark)<br>【Accept】<br>2)C<T b≦BM1/3of width<br>【Accept】<br>3)c=T<br>b not touch the seal glue<br>【Accept】<br>4)a disregards |  |
| 6 | Non-pin-side damage<br>(minor defect) | c<T<br>1)b exceeds 1/3Bm<br>【Reject】<br>c=T<br>b not touch the seal glue<br>【Reject】 | c: Thickness b: width of<br>  <br>damage |

3.1.2LCD appearance defect(View area)

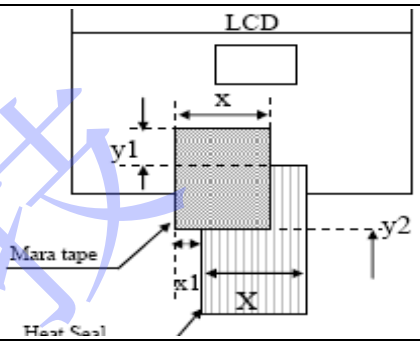
| NO | Defect item | Criteria | | Remark |
|---|---|---|---|---|
| 1 | Fiber、glass cratch、polarizer scratch/folded (minor defect) | Specification | Allowable | note1:L: Length, W: Width<br>note2: disregard if out of AA<br>  |
| | | W≦0.03mm | disregard | |
| | | 0.03mm<W≦0.05mm; L≦3.0mm | 2 | |
| | | 0.05mm<W≦0.1mm; L≦3.0mm | 1 | |
| | | W>0.1mm;L>3.0mm | 0 | |
| 2 | Polarizer bubble、concave and convex (minor defect) | Φ≦0.2mm | disregard | note1: Φ=(L+W)/2, L:Length, W :Width<br>note2:disregard if out of AA |
| | | 0.2mm<Φ≦0.3mm | 2 | |
| | | 0.3mm<Φ≦0.5mm | 1 | |
| | | 0.5mm<Φ | 0 | |
| 3 | Black dots、dirty dots、impurities、eye winker (minor defect) | Φ≦0.15mm | disregard | note2:disregard if out of AA<br>  |
| | | 0.15mm<Φ≦0.25mm | 2 | |
| | | 0.25mm<Φ≦0.3mm | 1 | |
| | | 0.3mm<Φ | 0 | |
| 4 | Polarizer prick (minor defect) | Φ≦0.1mm | disregard | note1: Φ=(L+W)/2, L=Length, W=Width<br>note2:the distance between two dots>5mm |
| | | 0.1mm<Φ≦0.25mm | 3 | |
| | | Φ>0.25mm | 0 | |

## 3.1.3FPC

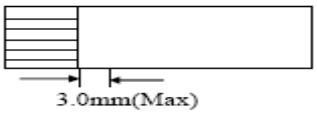
| NO | Defect item | Criteria | Remark |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 1 | Copper screen peel<br>(minor defect) | Copper screen peel<br>【Reject】 | |  |
| 2 | No release tape or peel | No release tape or peel<br>【Reject】 | | |
| 3 | Dirty dot and impurity of FPC for customer using side<br>(minor defect) | Specification | Allowable | Note1: Cannot have stride ITO impurities |
| | | ϕ≦0.25mm | 2 | |
| | | ϕ>0. 25 | 0 | |

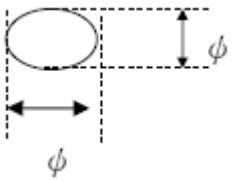
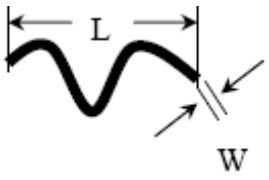
## 3.1.4Black tape &Mara tape

| NO | Defect item | Criteria | Remark |
|---|---|---|---|
| 1 | FPC or H/S black tape<br>(minor defect) | 1. shift spec:<br>1) glue to the polarize<br>【Reject】<br>2) IC bare 【Reject】<br>2. left-and-right spec:<br>1)exceed of FPC edge or H-S edge【Reject】<br>2) IC bare 【Reject】 |  |
| 2 | No black tape<br>(major defect) | No black tape<br>【Reject】 | |
| 3 | Tape position mistake<br>(minor defect) | Not by engineering drawing | |
| 4 | Mara tape defect<br>(minor defect) | Peel before pulling the protecting film<br>【Reject】 | |

## 3.1.5Silicon and Taffy glue

| NO | Defect item | Criteria | Remark |
|---|---|---|---|
| 1 | Quantity of silicon<br>(major defect) | Uncover the ITO and circuit area<br>【Reject】 | note: compared by engineering |
| 2 | Taffy glue<br>(major defect) | 1.Uncover the reveal copper area 【Reject】<br>2.Cover layer 0.3mm(Min)~3.0mm(Max)<br>【Reject】 | note: if customer has special requirement, refer to the technical document<br>  |
| 3 | Depth of glue covering<br>(major defect) | Depth of glue covering overtop front Polarizer<br>【Reject】 | Except of the special requirement |

## 3.2 Electrical criteria

| NO | Defect item | Criteria | Remark | |
|---|---|---|---|---|
| 1 | No display<br>(major defect) | No display<br>【Reject】 | | |
| 2 | Missing line<br>(major defect) | Missing line<br>【Reject】 | | |
| 3 | Seg-com light and dark<br>(major defect) | Seg-com light and dark<br>【Reject】 | ND filter 2% test | |
| 4 | No display in immobility<br>(major defect) | No display in immobility<br>【Reject】 | | |
| 5 | Flicker of Pattern<br>(major defect) | Flicker of Pattern<br>【Reject】 | | |
| 6 | Mura<br>(major defect) | ND filter 2%test | | |
| 7 | Over current<br>(major defect) | Over current<br>【Reject】 | | |
| 8 | Voltage out of specification<br>(major defect) | Voltage out of specification<br>【Reject】 | | |
| 9 | Pattern blur, error code<br>(major defect) | Pattern blur, error code<br>【Reject】 | | |
| 10 | Dark light, Flicker<br>(major defect) | Dark light, Flicker<br>【Reject】 | | |
| 11 | Black/white dots 、 Dirty dots、eye winker<br>(major defect) | Specification | Allowable | Note1:disregard if out of AA<br>  |
| | | ϕ ≦0.15mm | disregard | |
| | | 0.15mm< ϕ ≦0. 25mm | 2 | |
| | | 0.25mm< ϕ ≦0. 3mm | 1 | |
| | | 0.3mm< ϕ | 0 | |
| 12 | Fiber、glass crutch、Polarizer scratch/folded<br>(major defect) | W≦0.03mm | disregard | Note1:L: Length, W: Width<br>Note2: disregard if out of AA<br>  |
| | | 0.03mm<W≦0. 0. 05mm<br>L≤3. 0mm | 2 | |
| | | 0.05mm<W≦0. 1mm<br>L≤3. 0mm | 1 | |
| | | W>0.1mm;L>3.0mm | 0 | |

# 13.Precautions for using LCD modules.

## 13.1 Safety

(1)Do mot swallow any liquid crystal ,even if there is no proof that liquid crystal is poisonous.
(2)If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
(3)If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

## 13.2Storage Conditions

(4)Store the panel or module in a dark place where the temperature is 23±5℃and the humidity is below 45 ±20%RH.
(5)Store in anti-static electricity container.
(6)Store in clean environment, free from dust, active gas, and solvent.
(7)Do not place the module near organics solvents or corrosive gases.
(8) )Do not crush, shake, or jolt the module.

## 13.3 Handling Precautions

(9)Avoid static electricity, which can damage the CMOS LSI.
(10)The polarizing plate of the display is very fragile, please handle if very carefully.
(11)Do not give external shock.
(12)DO mot apply excessive force on the surface.
(13)Bo not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
(14)Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(15)Do not operate it above the absolute maximum rating.
(16)Do not remove the panel or frame from the module.

## 13.4 Warranty

The period is within twelve months since the date of shipping out under normal using and storage conditions.