

ON TAT INDUSTRIAL COMPANY

SPECIFICATION FOR LCD MODULE

Customer : _____

Product Model: KD070D20-50NC-A3

Sample code: _____

| Designed by | Checked by | Approved by |
|--------------------|-------------------|--------------------|
| | | |

Final Approval by Customer

| | |
|---|--|
| LCM Machinery OK Checked By _____ | <input type="checkbox"/> LCM OK |
| LCM Display OK Checked By _____ | <input type="checkbox"/> NG, Problem survey: |
| | Approved By _____ |

※ The specification of "TBD" should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.

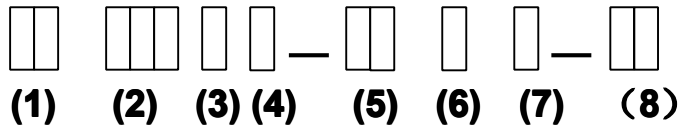
Revision History

| Version | Contents | Date | Note |
|---------|----------|-----------|------|
| A | Original | 2013-11-5 | |
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1 Numbering System



| No | Definition | Specifications |
|------------|--|---|
| (1) | TFT LCM Productor No. | KD ---- ON TAT INDUSTRIAL COMPANY |
| (2) | Display monitor opposite angle line size | Unit :mm or mmm (size <10 inch: takes two integers ; size >=10 inch: takes three integers) |
| (3) | Productor Types | D ---- Digital photo frame / DVD G ----GPS M ----MP P ----Mobil-Phone |
| (4) | Productor Development Series No. | By two figures characters expression from 01 to 99 |
| (5) | Interface PIN Number | By two figures characters expression from 01 to 99 |
| (6) | With Touch Panel Or Not | T----With T/P ; N----Without T/P |
| (7) | LCD Type | A----AUO ; M----CMO ; C----CPT; B----BOE; L----LG; W----Wintek; H----HSD; T----Tianma; Y----Hydis; I----INNOLUX; S----Sharp |
| (8) | Productor Development edition No. | By The English litters : A 1~ Z9 |

2 Scope

This specification applies to the TFT LCD module which is designed and manufactured by LCM Factory of ON TAT INDUSTRIAL COMPANY

3 Normative Reference

GB/T4619-1996 《Liquid Crystal Display Test Method》

GB/T2424 《Basic environmental Testing Procedures for Electric and Electronic Products.》

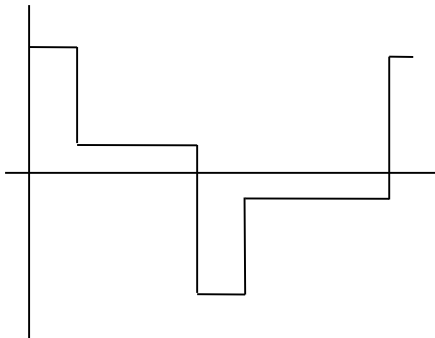
GB/T2423 《Basic Testing Procedures for Electric and Electronic Products》

IEC61747-1 《SIXTH PART GB2828`2829-87 《National Standard of PRC》

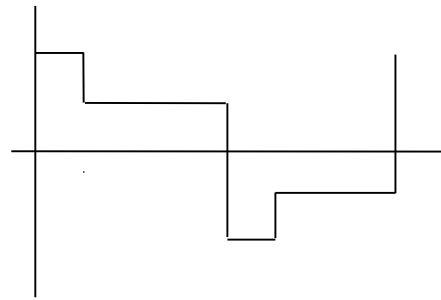
4 Definitions

4.1 Definitions of Vop

The definitions of threshold voltage V_{th1} , V_{th2} the following typical waveforms are applied on liquid crystal by the method of equalized voltage for each duty and bias.



【 selected waveform 】



【 non-selected waveform 】

① V_{th1} : The voltage which the brightness of segment indicates 50% of saturated value on the conditions of selected waveform
($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

② V_{th2} : The voltage which the brightness of segment indicates 50% of saturated value on the conditions of non-selected waveform
($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

③ V_{op} : $(V_{th1}(50\%)+V_{th2}(50\%))/2$ ($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

4.2 Definition of Response Time T_r , T_d

① T_r : The time required which the brightness of segment becomes 10% from 100% when waveform is switched to selected one from non-selected one. ($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

② T_d : The time required which the brightness of segment

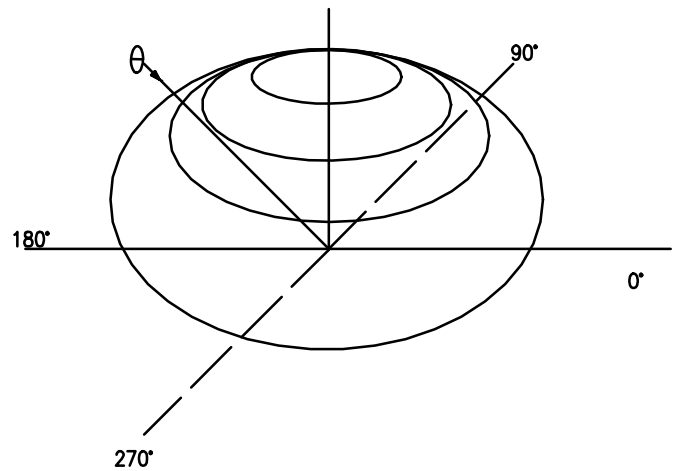
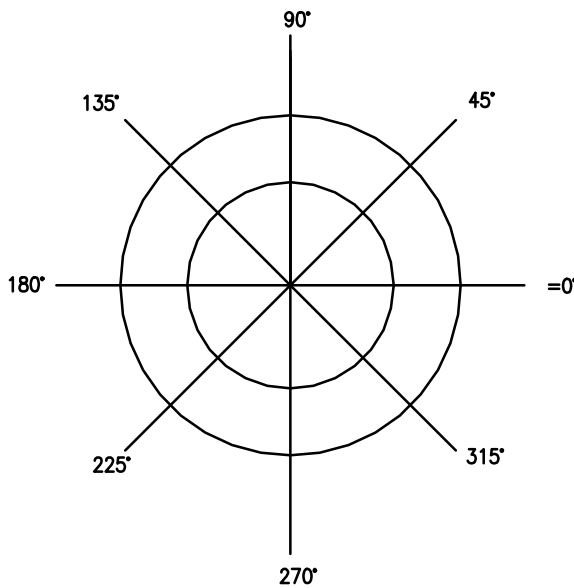
becomes 90% from 10% when waveform is switched to selected one from selected one. ($f_i=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

4.3 Definition of Contrast Ratio Cr

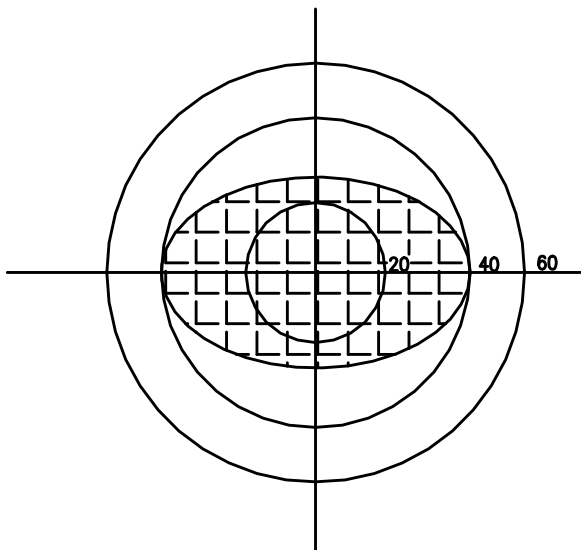
$Cr=A/B$

- ① A: Segments brightness in case of non-selected waveform
- ② B: Segments brightness in case of selected waveform

4.4 Definition of Angle and Viewing Range



Angular Graph: Constrast Ratio



Such as:
Viewing Angle Range:
80(Cr>2) Horizontal
70(Cr>2) Vertical

5 Technology Specifications

5.1 Feature

This single-display module is suitable for use in Multimedia Player products. The LCD adopts one backlight with High brightness 15-lamps white LED.

- 1) Construction: 7" a-Si color TFT-LCD ,White LED backlight and FPC.
- 2) LCD:
 - 2.1 Amorphous-TFT 7-inch display, transmissive, normally white type.
 - 2.2 1024(RGB)×600 dots Matrix.
 - 2.3 Narrow-contact ledge technique.
- 3) RGB interface.
- 4) Video signal interface: Parallel RGB.

5.2 Mechanical Specifications

| Item | Specifications | Unit |
|---------------------|---------------------------|-------|
| Dimensional outline | 164.7(W) ×99.8(H) ×2.8(D) | mm |
| Active area | 154.2144(W) × 85.92(H) | mm |
| Pixel size | 50.2(W) ×RGB×143.2(H) | um |
| Resolution | 1024(RGB) ×600 | pixel |
| Luminance | 200 (TYP) | cd/m2 |

5.3 Absolute Max. Rating

| Item | Symbol | Values | | Unit | Remark |
|-----------------------|------------------|--------|------|------|--------|
| | | Min. | Max | | |
| Power voltage | DV _{DD} | -0.3 | 4.0 | V | |
| | AV _{DD} | -0.3 | 13.5 | V | |
| | V _{GH} | -0.3 | 20 | V | |
| | V _{GL} | -20 | 0.3 | V | |
| Operation temperature | T _{OP} | -10 | 60 | ℃ | |
| Storage temperature | T _{ST} | -20 | 70 | ℃ | |

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

5.4 Electrical Characteristics

Note 1

| Item | Symbol | Values | | | Unit | Remark |
|--------------------------|-----------|--------------|-----|--------------|------|--------|
| | | Min. | Typ | Max | | |
| Power voltage | DV_{DD} | 3.0 | 3.3 | 3.6 | V | Note 2 |
| | AV_{DD} | 9.4 | 9.6 | 9.8 | V | |
| | V_{GH} | 17.5 | 18 | 18.5 | V | |
| | V_{GL} | -6.5 | -6 | -5.5 | V | |
| Input signal voltage | V_{COM} | 3.2 | 3.4 | 3.6 | V | |
| Input logic high voltage | V_{IH} | $0.7DV_{DD}$ | - | DV_{DD} | V | Note 3 |
| Input logic low voltage | V_{IL} | 0 | - | $0.3DV_{DD}$ | V | |

Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH} .

Note 2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of Customer's system board.

Note 3: DCLK, HS, VS, RESET, U/D, L/R, DE, R0-R7, G0-G7, G0-G7, MODE, DITHB.

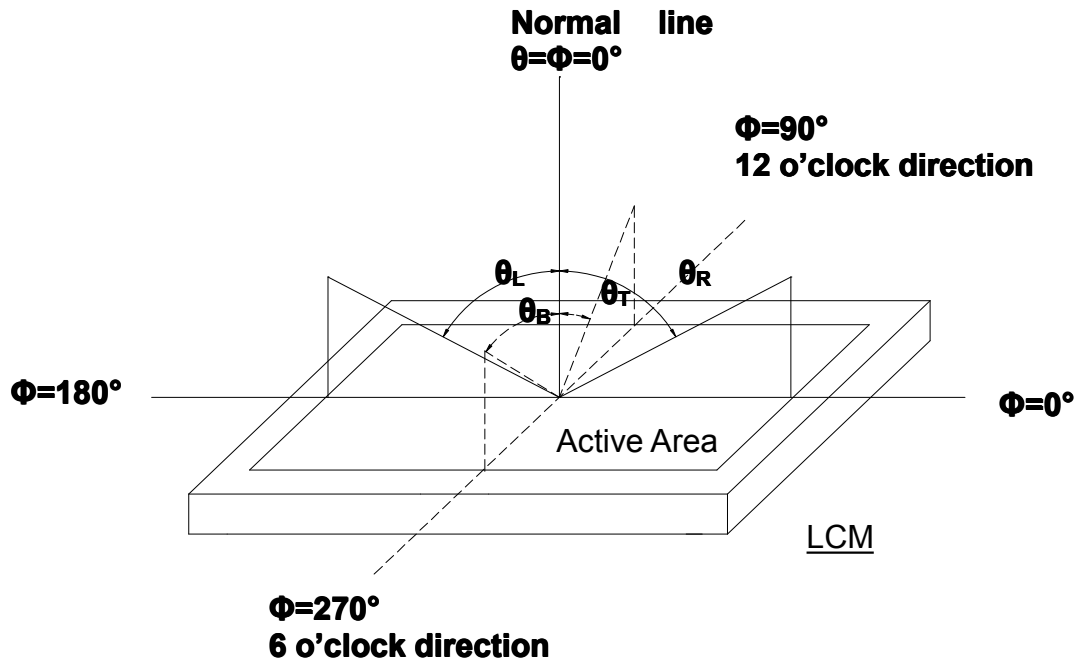
5.5 Optical specifications

| Item | Symbol | Condition | Values | | | Unit | Remark |
|-----------------------------------|------------|-------------------------------------|--------|-------|-------|-------------------|------------------|
| | | | Min. | Typ. | Max. | | |
| Viewing angle ($CR \geq 10$) | θ_L | $\Phi = 180^\circ$ (9 o'clock) | 70 | 80 | - | degree | Note 1 |
| | θ_R | $\Phi = 0^\circ$ (3 o'clock) | 70 | 80 | - | | |
| | θ_T | $\Phi = 90^\circ$ (12 o'clock) | 60 | 70 | - | | |
| | θ_B | $\Phi = 270^\circ$ (6 o'clock) | 50 | 60 | - | | |
| Response time | T_{ON} | Normal $\theta = \Phi = 0^\circ$ | - | 10 | 20 | msec | Note 3 |
| | T_{OFF} | | - | 15 | 30 | msec | Note 3 |
| Contrast ratio | CR | | 350 | 400 | - | - | Note 4 |
| Color chromaticity | W_X | | 0.263 | 0.313 | 0.363 | - | Note 2 |
| | W_Y | | 0.279 | 0.329 | 0.379 | - | Note 5 Note 6 |
| Luminance | L | | 180 | 200 | - | cd/m ² | Note 6 |
| Luminance uniformity | Y_U | | 70 | 75 | - | % | Note 6,7 |

Test Conditions:

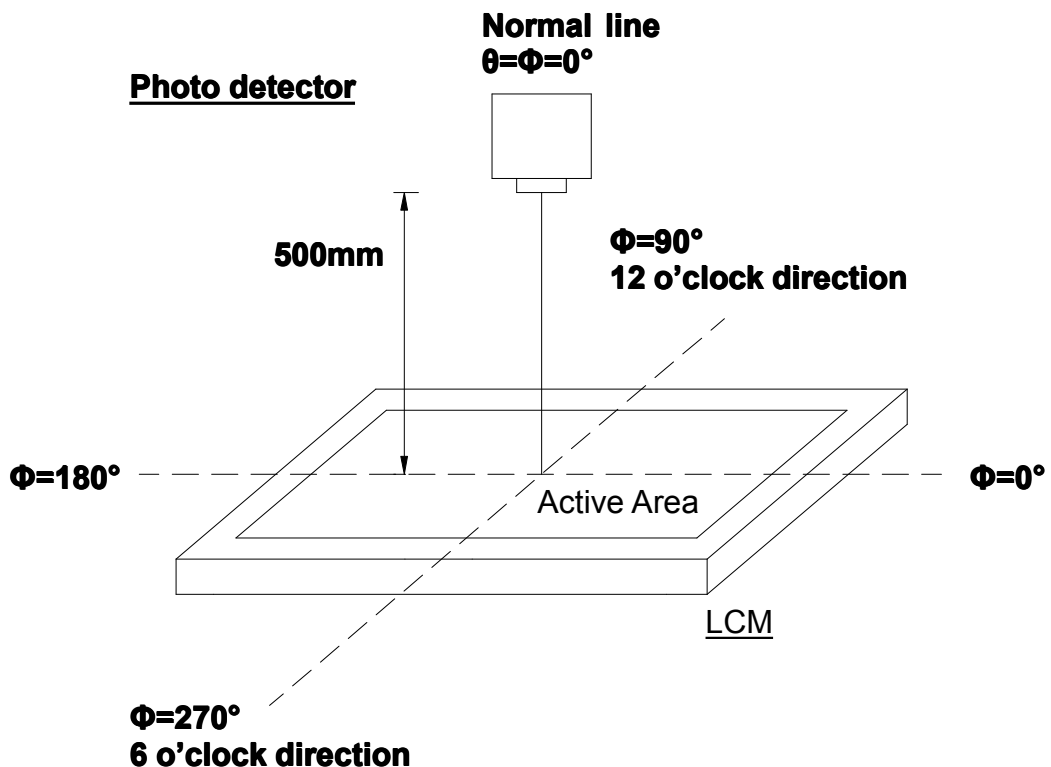
1. $DV_{DD} = 3.3V$, $I_{LED} = 100mA$, the ambient temperature is $25^\circ C$.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range



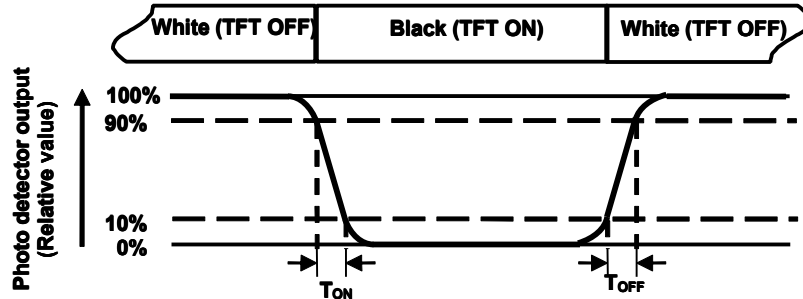
Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm ,Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.)



Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 4: Definition of contrast ratio

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

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

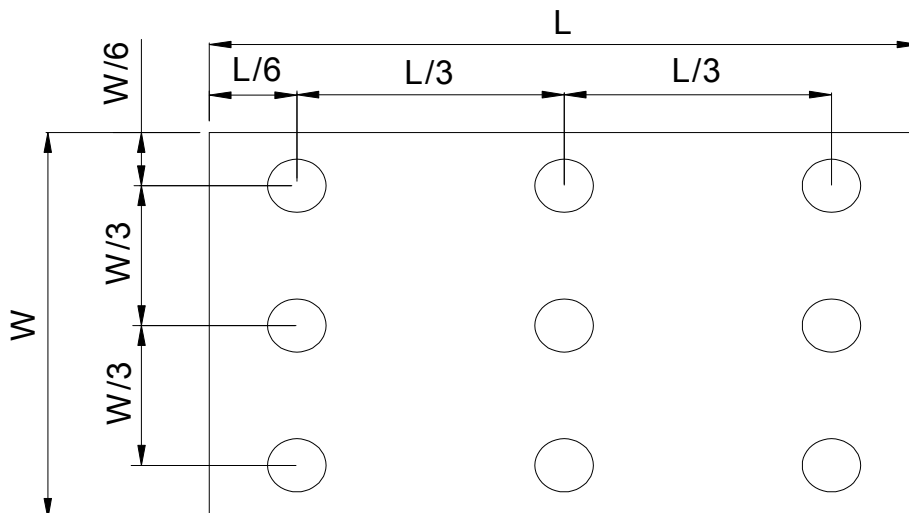
Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is $I_{LED}=100\text{mA}$.

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas. Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$

L-----Active area length W----- Active area width

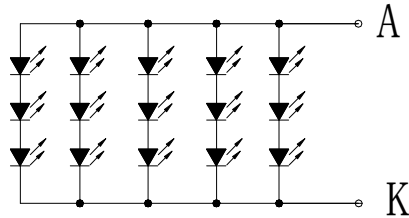


B_{max} : The measured maximum luminance of all measurement position.

B_{min} : The measured minimum luminance of all measurement position.

5.6 LED back light specification (15 White Chips)

| Item | Symbol | Condition | Min | Typ | Max | Unit |
|-----------------------|------------------|-----------------------|-----|-----|-----|------|
| Forward Voltage | V _f | I _f =100mA | 9 | 9.6 | 9.9 | V |
| Uniformity (with L/G) | Δ B _p | I _f =100mA | 70 | 75 | - | % |



LED电路图

5.7 Interface Pin Connections

| Pin No. | Symbol | I/O | Function | Remark |
|---------|--------|-----|----------------------------------|--------|
| 1 | LED+ | P | Power for LED Backlight(Anode) | |
| 2 | LED+ | P | Power for LED Backlight(Anode) | |
| 3 | LED- | P | Power for LED Backlight(Cathode) | |
| 4 | LED- | P | Power for LED Backlight(Cathode) | |
| 5 | GND | P | Power ground | |
| 6 | VCOM | I | Common voltage | |
| 7 | DVDD | P | Power for Digital Circuit | |
| 8 | MODE | I | DE/SYNC mode select | Note 1 |
| 9 | DE | I | Data Input Enable | |
| 10 | VS | I | Vertical Sync Input | |
| 11 | HS | I | Horizontal Sync Input | |
| 12 | B7 | I | Blue data(MSB) | |
| 13 | B6 | I | Blue data | |
| 14 | B5 | I | Blue data | |
| 15 | B4 | I | Blue data | |
| 16 | B3 | I | Blue data | |
| 17 | B2 | I | Blue data | |
| 18 | B1 | I | Blue data | Note 2 |
| 19 | B0 | I | Blue data(LSB) | Note 2 |
| 20 | G7 | I | Green data(MSB) | |

| | | | | |
|----|-------|---|--------------------------|----------|
| 21 | G6 | I | Green data | |
| 22 | G5 | I | Green data | |
| 23 | G4 | I | Green data | |
| 24 | G3 | I | Green data | |
| 25 | G2 | I | Green data | |
| 26 | G1 | I | Green data | Note 2 |
| 27 | G0 | I | Green data(LSB) | Note 2 |
| 28 | R7 | I | Red data(MSB) | |
| 29 | R6 | I | Red data | |
| 30 | R5 | I | Red data | |
| 31 | R4 | I | Red data | |
| 32 | R3 | I | Red data | |
| 33 | R2 | I | Red data | |
| 34 | R1 | I | Red data | Note 2 |
| 35 | R0 | I | Red data(LSB) | Note 2 |
| 36 | GND | P | Power Ground | |
| 37 | DCLK | I | Sample clock | Note 3 |
| 38 | GND | P | Power Ground | |
| 39 | L/R | I | Left / right selection | Note 4,5 |
| 40 | U/D | I | Up/down selection | Note 4,5 |
| 41 | VGH | P | Gate ON Voltage | |
| 42 | VGL | P | Gate OFF Voltage | |
| 43 | AVDD | P | Power for Analog Circuit | |
| 44 | RESET | I | Global reset pin. | Note 6 |
| 45 | NC | - | No connection | |
| 46 | VCOM | I | Common Voltage | |
| 47 | DITHB | I | Dithering function | Note 7 |
| 48 | GND | P | Power Ground | |
| 49 | NC | - | No connection | |
| 50 | NC | - | No connection | |

I: input, O: output, P: Power

Note 1: DE/SYNC mode select. Normally pull high.

When select DE mode, MODE="1", VS and HS must pull high.

When select SYNC mode, MODE="0", DE must be grounded.

Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

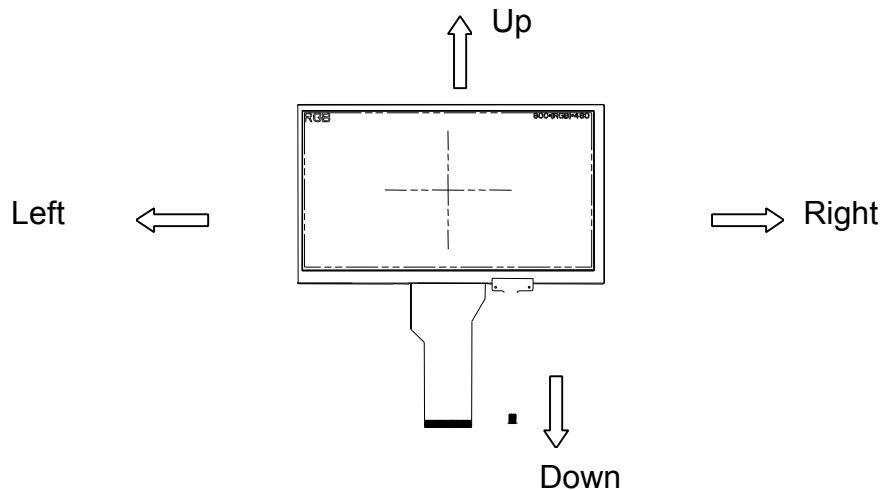
Note 3: Data shall be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode

| Setting of scan control input | | Scanning direction |
|-------------------------------|------|---------------------------|
| U/D | L/R | |
| GND | DVDD | Up to down, left to right |
| DVDD | GND | Down to up, right to left |
| GND | GND | Up to down, right to left |
| DVDD | DVDD | Down to up, left to right |

Note 5: Definition of scanning direction.

Refer to the figure as below:



Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

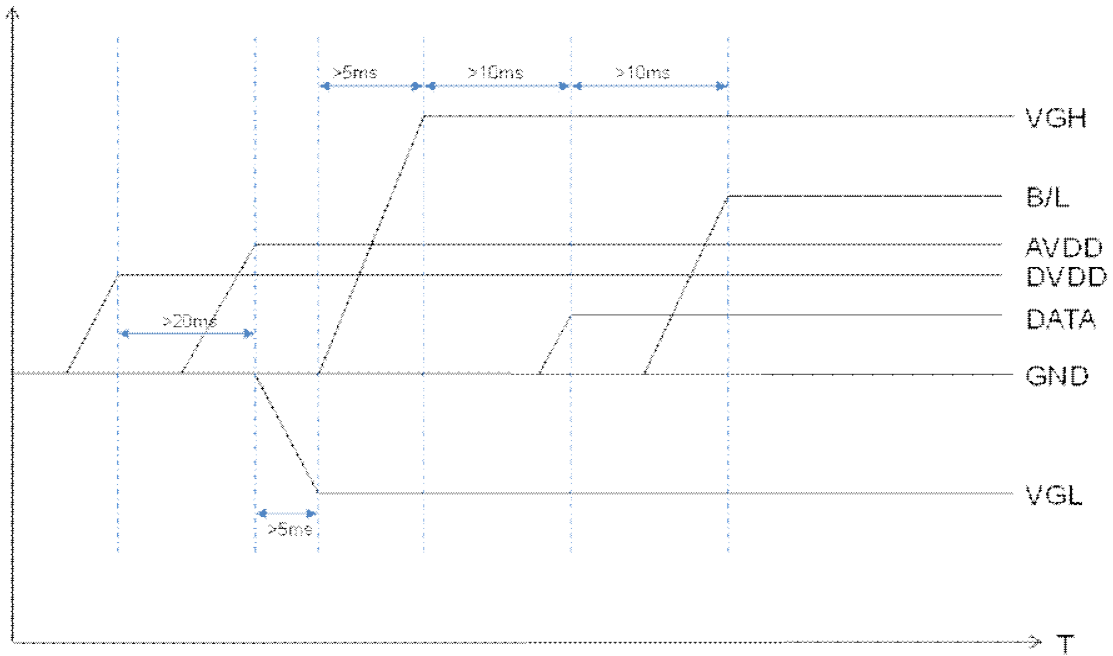
Note 7: Dithering function enable control, normally pull high.
 When DITHB="0", Disable internal dithering function,
 When DITHB="1", Enable internal dithering function,

6 Signal timing diagram

6.2 Signal Timing Diagram

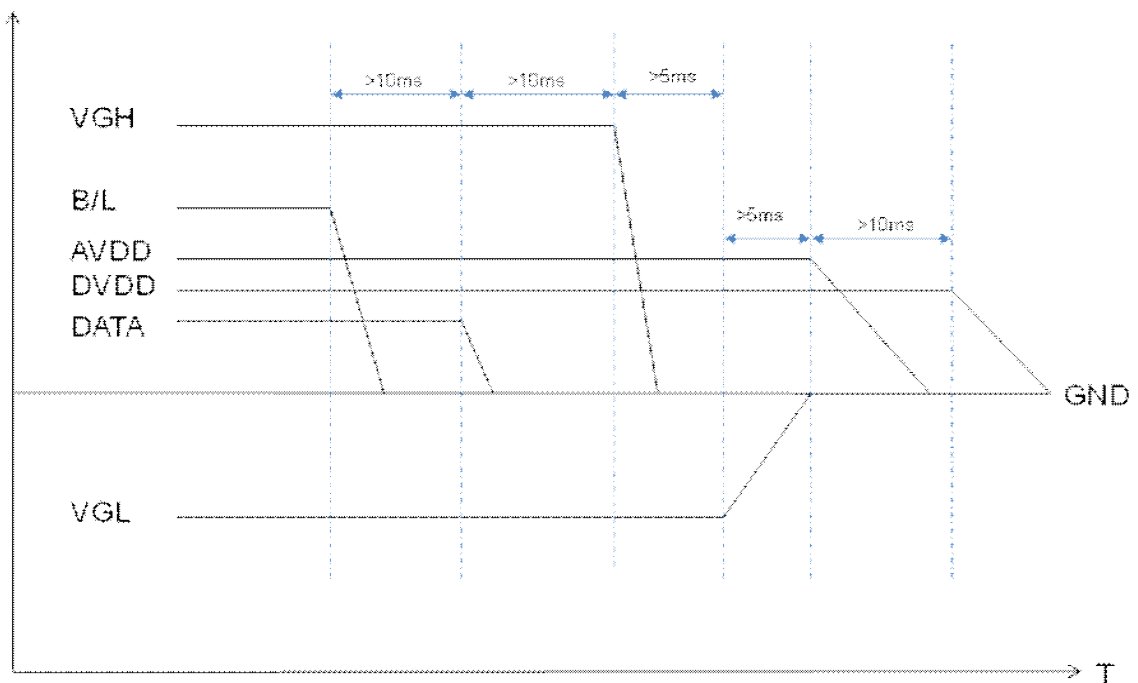
6.2.1 Power ON/OFF Sequence

a Power on



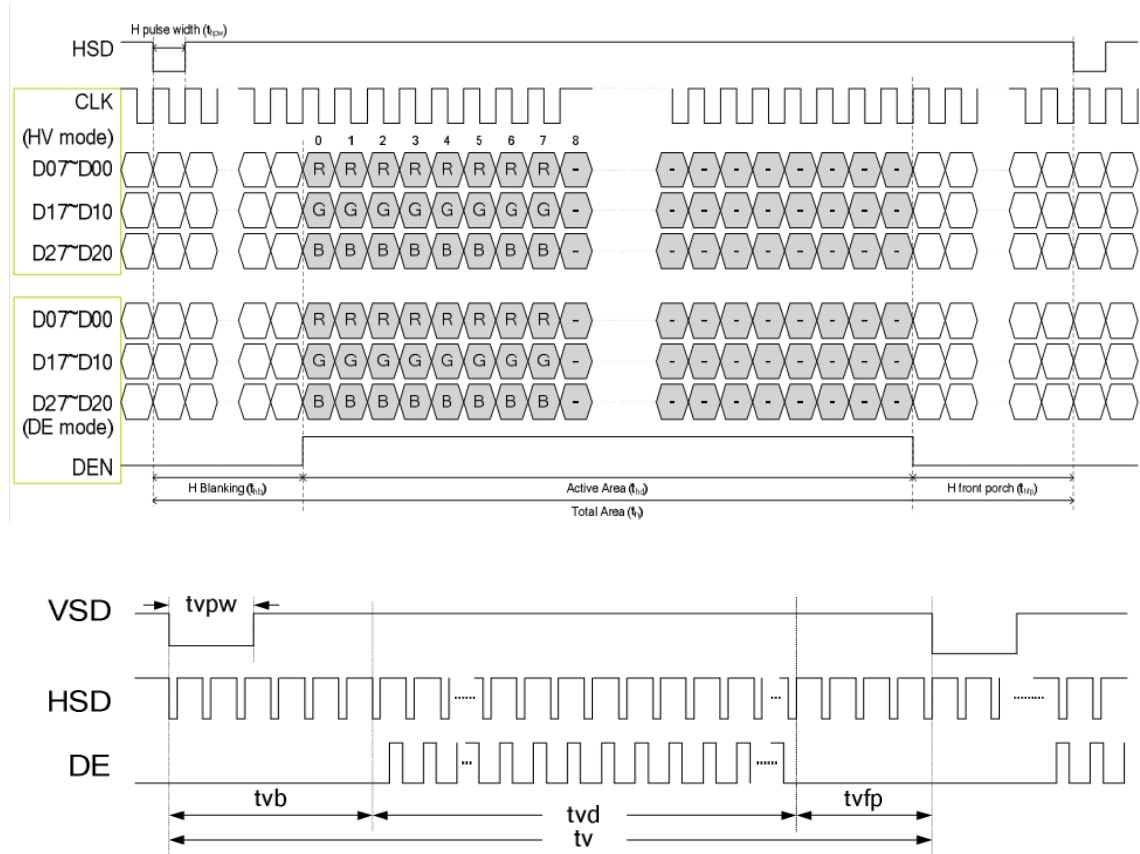
DVDD → AVDD → VGL → VGH → DATA → B/L

b Power off



B/L → DATA → VGH → VGL → AVDD → DVDD

6.2.2 Data input format



6.2.3 Timing Diagram

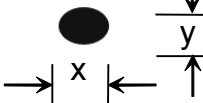
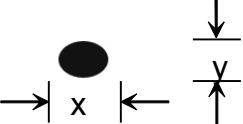
| Item | Symbol | Values | | | Unit | Remark |
|-------------------------|--------|--------|------|------|------|--------|
| | | Min | Typ | Max | | |
| Horizontal Display Area | thd | - | 1024 | - | DCLK | |
| DCLK frequency | fck | 40.8 | 51.2 | 67.2 | MHz | |
| One horizontal line | th | 1114 | 1344 | 1400 | DCLK | |
| HS pulse width | thpw | 1 | - | 140 | DCLK | |
| HS Blanking | thb | 90 | 320 | 376 | DCLK | |
| HS Front Porch | thfp | 16 | 160 | 216 | DCLK | |

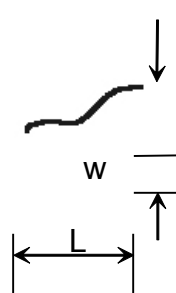
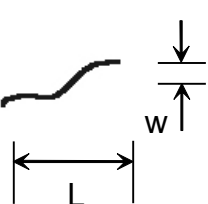
| Item | Symbol | Values | | | Unit | Remark |
|-----------------------|--------|--------|-----|-----|------|--------|
| | | Min | Typ | Max | | |
| Vertical display Area | tvd | - | 600 | - | TH | |
| VS period time | tv | 610 | 635 | 800 | TH | |
| VS pulse width | tvpw | 1 | - | 20 | TH | |
| VS Blanking | tvb | 10 | 35 | 200 | TH | |
| VS Front Porch | tvfp | 1 | 12 | 127 | TH | |

7 Reliability Test Conditions And Methods

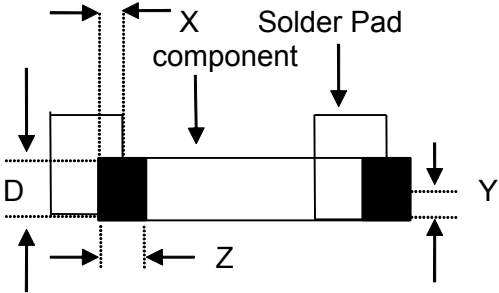
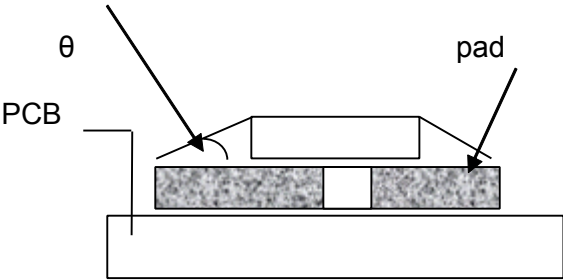
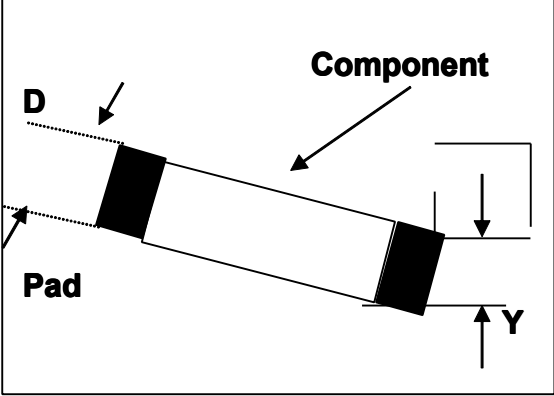
| NO | Item | Condition | Method |
|----|--|--|--|
| 1 | High / Low Temperature Storage | 70°C/-20°C 120hrs | Check and record every 48Hrs |
| 2 | High / Low Temperature Life | 60°C/-10°C 120hrs (operating mode) | Check and record every 48Hrs |
| 3 | High Temperature、High Humidity Operating | 60°C,90% RH, 96Hrs | Check and record every 48hrs |
| 4 | Thermal Shock | -20°C(30Min) → 25°C(5Min) → 70°C(30Min) (conversion time, : 5 sec) 20 cycles | Each 10 cycles end , check |
| 5 | Static Electricity | Gap mood: ±1KV~±8KV (10 times air discharge with positive/negative voltage voltage gap : 1kv) Touch mood: ±1KV~±4KV | Each discharge end, Check the Electrical Characteristics |

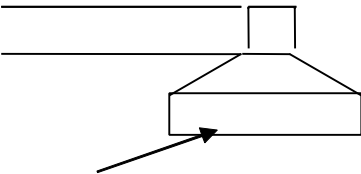
8 Inspection standard

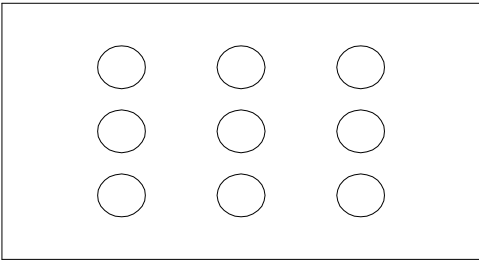
| No | Item | Criterion | | | | | | | | | |
|--|--|---|---|-----------|---------------------|--------------|----------------------|---------------------|------------|------------|---|
| 01 | Outline Dimension | In accord with drawing | | | | | | | | | |
| 02 | Position-finding Dimension Assemble Dimension | In accord with drawing | | | | | | | | | |
| 03 | LCD black spots, white spots (Round type) | Round type: non display 3.1 Small area LCD | Unit : mm  <table border="1"> <thead> <tr> <th>Dimension</th> <th>Qualified Quantity</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.1$</td> <td>Ignore</td> </tr> <tr> <td>$0.1 < D \leq 0.15$</td> <td>2</td> </tr> <tr> <td>$D > 0.15$</td> <td>0</td> </tr> </tbody> </table> | Dimension | Qualified Quantity | $D \leq 0.1$ | Ignore | $0.1 < D \leq 0.15$ | 2 | $D > 0.15$ | 0 |
| | | Dimension | Qualified Quantity | | | | | | | | |
| $D \leq 0.1$ | Ignore | | | | | | | | | | |
| $0.1 < D \leq 0.15$ | 2 | | | | | | | | | | |
| $D > 0.15$ | 0 | | | | | | | | | | |
| 3.2 Large area LCD  <table border="1"> <thead> <tr> <th>Dimension</th> <th>Qualified Quantity</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.1$</td> <td>Ignore</td> </tr> <tr> <td>$0.1 < D \leq 0.15$</td> <td>2</td> </tr> <tr> <td>$0.15 < D \leq 0.20$</td> <td>1</td> </tr> <tr> <td>$D > 0.20$</td> <td>0</td> </tr> </tbody> </table> <p>C-STN : if $D > 0.1$, unqualified</p> | Dimension | Qualified Quantity | $D \leq 0.1$ | Ignore | $0.1 < D \leq 0.15$ | 2 | $0.15 < D \leq 0.20$ | 1 | $D > 0.20$ | 0 | |
| Dimension | Qualified Quantity | | | | | | | | | | |
| $D \leq 0.1$ | Ignore | | | | | | | | | | |
| $0.1 < D \leq 0.15$ | 2 | | | | | | | | | | |
| $0.15 < D \leq 0.20$ | 1 | | | | | | | | | | |
| $D > 0.20$ | 0 | | | | | | | | | | |

| 04 | LCD black spots, white spots (Line Style) | <p>Unit : mm</p>  | | 4.1 Small area LCD | | | | | | | | | | | | | | | |
|------------|---|---|--------|--|--------------------|-------|--------------------|--------|--------------|------------------------|------------|------------------------|---|------------|-----------------------|---|---|------------|---------------------|
| | | <table border="1"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Qualified Quantity</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>≤ 0.015</td> <td>Ignore</td> </tr> <tr> <td>≤ 1.0</td> <td rowspan="2">$0.015 < W \leq 0.025$</td> <td>2</td> </tr> <tr> <td>≤ 2.0</td> <td>1</td> </tr> <tr> <td>≤ 1.0</td> <td>$0.025 < W \leq 0.05$</td> <td>1</td> </tr> <tr> <td>-</td> <td>$D > 0.05$</td> <td>According to circle</td> </tr> </tbody> </table> | Length | Width | Qualified Quantity | - | ≤ 0.015 | Ignore | ≤ 1.0 | $0.015 < W \leq 0.025$ | 2 | ≤ 2.0 | 1 | ≤ 1.0 | $0.025 < W \leq 0.05$ | 1 | - | $D > 0.05$ | According to circle |
| Length | Width | Qualified Quantity | | | | | | | | | | | | | | | | | |
| - | ≤ 0.015 | Ignore | | | | | | | | | | | | | | | | | |
| ≤ 1.0 | $0.015 < W \leq 0.025$ | 2 | | | | | | | | | | | | | | | | | |
| ≤ 2.0 | | 1 | | | | | | | | | | | | | | | | | |
| ≤ 1.0 | $0.025 < W \leq 0.05$ | 1 | | | | | | | | | | | | | | | | | |
| - | $D > 0.05$ | According to circle | | | | | | | | | | | | | | | | | |
| 05 | LCD Scratch , Threadlike Fiber | <p>4.2 Large area LCD</p>  | | <table border="1"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Qualified Quantity</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>≤ 0.015</td> <td>Ignore</td> </tr> <tr> <td>≤ 2.0</td> <td>$0.015 < W \leq 0.025$</td> <td>2</td> </tr> <tr> <td>≤ 1.0</td> <td>$0.025 < W \leq 0.05$</td> <td>1</td> </tr> <tr> <td>-</td> <td>$D > 0.05$</td> <td>According to circle</td> </tr> </tbody> </table> <p>CSTN : If $W \geq 0.015$, unqualified Ignore beyond viewing area</p> | Length | Width | Qualified Quantity | - | ≤ 0.015 | Ignore | ≤ 2.0 | $0.015 < W \leq 0.025$ | 2 | ≤ 1.0 | $0.025 < W \leq 0.05$ | 1 | - | $D > 0.05$ | According to circle |
| | | Length | Width | Qualified Quantity | | | | | | | | | | | | | | | |
| - | ≤ 0.015 | Ignore | | | | | | | | | | | | | | | | | |
| ≤ 2.0 | $0.015 < W \leq 0.025$ | 2 | | | | | | | | | | | | | | | | | |
| ≤ 1.0 | $0.025 < W \leq 0.05$ | 1 | | | | | | | | | | | | | | | | | |
| - | $D > 0.05$ | According to circle | | | | | | | | | | | | | | | | | |
| 06 | POL | <p>It is not admissible that POL is beyond the edge of glass, else, unqualified. It is essential that POL is over the 50 percent of width of frame , else ,unqualified. According to the drawing in case of special definition.</p> | | | | | | | | | | | | | | | | | |
| 07 | IC/FPC Bonding | Scratch | Reject | | | | | | | | | | | | | | | | |

| | | | | |
|----|----------------|-------------------------------------|--|--|
| | | Intensity Of Adhesion | If lower than specification, reject | |
| | | Gold Fold Twist | Reject | |
| 07 | IC/FPC Bonding | Silicon | According to outline, no gold outside, seal can not be higher than LCD | |
| | | FPC Gold Sever | Reject | |
| 08 | SMT | Lack of Component, Polarity Inverse | If exist, reject | |
| | | Leak Solder, Virtual Solder | If exist, reject | |
| | | Short Circuit In Solder Point | If exist, reject | |
| | | Tin Ball | If exist, reject | |
| | | Tin Acumination | If visual, reject | |
| | | Height Solder Point | If higher 0.5mm than component. reject | |
| | | Height of component | Either side higher 0.5mm than component, reject | |

| | | | |
|----|-----|----------------------------|--|
| | | Component Shift |  <p>$X < 3/4Z$ $y > 1/3D$</p> <p>reject reject</p> |
| 08 | SMT | Few Tin |  <p>If $\theta \leq 20^\circ$ reject</p> |
| | | Component Deflection |  <p>If $Y > 1/3D$ reject</p> |
| | | Component Carcass Sideways | Reject |

| | | | | |
|----|-------|--|--|--|
| | | Component Carcass Sideways | If exist with visual inspection , reject | |
| | | Lot Tin | A: Tin accrete the solder side completely , hollowly ,Ok B: Tin accrete the solder side completely , full circle arc , ok C: Jointing include whole solder side, height of tin>50 percent of height of component, reject | |
| | | Few Tin | A: Tin accrete the solder side completely , hollowly ,Ok B: height of tin > 1/3 of solder side of component , ok C: height of tin ≤ 1/3 of solder side of component, reject | |
| 08 | SMT | <p style="text-align: center;">Normal</p>  <p style="text-align: center;">Jointing side</p> | | |
| | | Short circuit 、 Open circuit | Forbid | |
| 09 | Light | Quality of CSTN Display | 1、 Rolling strake with visual inspection, forbid 2、 Differentness of color in viewing area with visual inspection (full white、 red、 green、 blue), forbid 3 、 Display change with visual inspection , forbid | |

| | | | | | |
|----|-------------------------|---|--|-------|---|
| 10 | Color Of CIE Coordinate | | x | y | Drive LCD under normal condition, 25°C $\phi=0$ $\theta=0$ Test white、red、green blue with DMS Record |
| | | white | ±0.05 | ±0.05 | |
| | | Red | ±0.05 | ±0.05 | |
| | | Green | ±0.05 | ±0.05 | |
| | | Blue | ±0.05 | ±0.05 | |
| | | According to the specification or sample customer have approved | | | |
| 11 | Brightness | In accord with product specification | Drive condition is according to specification Measure location is in Follow Picture 3、 Adjust brightness instrument to zero , burrow against the surface of LCD , press “measure” , record when the display is steady. (YOKOGAWA-3298) | | |
| | | |  <p style="text-align: center;">Measure location</p> | | |
| 12 | CR (Max) | According to specification | According to product specification Measure instrument (DMS-501) | | |
| 13 | Response time | According to specification | According to product specification Measure instrument (DMS-501) | | |
| 14 | Viewing angle | According to specification | According to product specification Measure instrument (DMS-501) | | |
| 15 | Vibration、 Ring | Compare with the sample customer supply | Compare with the sample customer supply when assemble | | |
| 16 | Frequency Of FPC Bend | According to the use of product (main FPC of foldaway cell phone ≥ 6 thousand) | Measure instrument Bend angle : 150° Fix FPC in the casement when customer supply | | |

9 Handling Precautions

9.1 Mounting method

The LCD panel of Daxian LCD module consists of two thin glass plates with polarizers which easily be damaged. And since the module is so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

9.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Sulfur (S)

If goods were sent without being sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (Cl), Sulfur (S) from customer, Responsibility is on customer.

9.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

9.4 packing

- Module employ LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

9.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean

malfunction or out of order with LCD's, which will come back in the specified operation temperature.

- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

9.6 storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.

[It is recommended to store them as they have been contained in the inner container at the time of delivery from us

9.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

10 Precaution for use

10.1

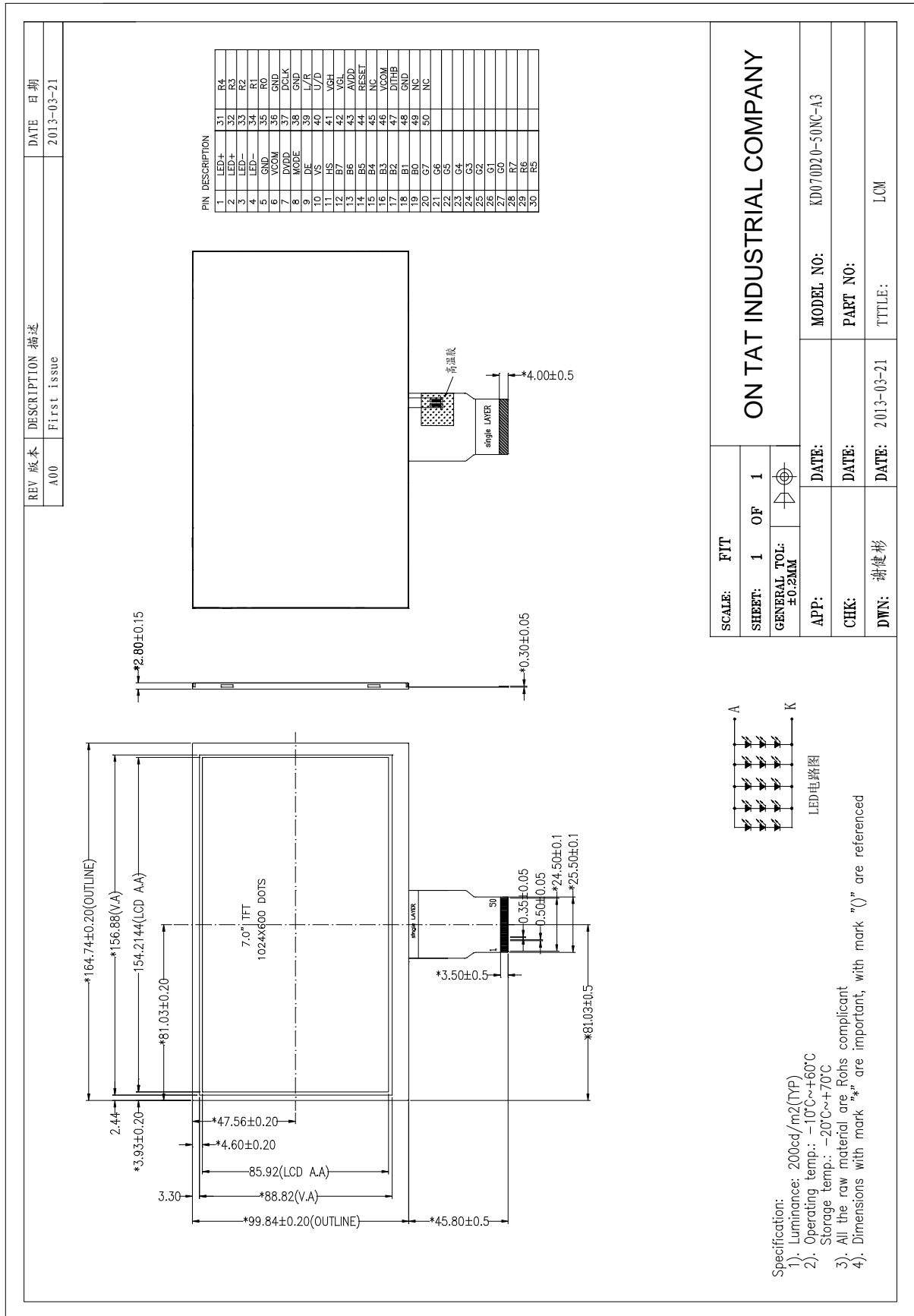
A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

10.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported , and some problem is arisen in this specification due to the change.
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

11 Dimensional Outline



12. Package Drawing

TBD