

# SPECIFICATION FOR CTP+LCD MODULE

**Part No.: JT101TM017-V1**

**Customer No.:**

**Date: 2025-3-24**

|          |         |          |          |
|----------|---------|----------|----------|
| JUTOUCH  |         |          | Customer |
| Prepared | Checked | Approved | Approved |
|          |         |          |          |

## Record of Revision

| Rev. | Description                        | Page | Date     |
|------|------------------------------------|------|----------|
| 0    | Preliminary specification released | /    | 20240228 |
| 1    | Update drawing                     | 5    | 20250324 |
|      |                                    |      |          |
|      |                                    |      |          |
|      |                                    |      |          |
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## 1 General Specifications

### 1.1 Definition

The specification is used for capacitive touch module with TFT LCD & Backlight Unit.

### 1.2 Features and General Description

| General            | Specification                   | Unit    | Note     |
|--------------------|---------------------------------|---------|----------|
| Module size        | 10.1                            | inch    | diagonal |
| Structure          | G+G+LCD, Optical Bonding        |         |          |
| Resolution         | 1280(RGB) × 800                 |         |          |
| Display Mode       | Normally Black. Transmissive    |         |          |
| Pixel Pitch        | 0.1695(W) × 0.1695(H)           | mm      |          |
| Pixel Arrangement  | RGB stripe                      |         |          |
| Viewing direction  | ALL                             | O'clock |          |
| Outline dimensions | 247.96(W) × 166.60(H) × 7.58(D) | mm      | W/O PCBA |
| Active area        | 216.96(W) × 135.60(H)           | mm      |          |
| LCD interface      | LVDS                            |         |          |
| CTP Interface      | USB / I2C                       |         |          |
| CTP IC             | EXC81W32                        |         |          |
| Touch point        | 10                              |         |          |
| Surface hardness   | 6                               | H       |          |

[illegible]

### 3 Pin assignment

#### 3.1 LCD Pin assignment

CN1 Module Side Connector : STM MSBKT2407P30 or Compatible  
User Side Connector : JAE FI-X30H

| Pin No. | Symbol   | Description                               |
|---------|----------|-------------------------------------------|
| 1       | VLED     | Backlight power supply : 12V              |
| 2       | VLED     | Backlight power supply : 12V              |
| 3       | VLED     | Backlight power supply : 12V              |
| 4       | NC       | Not connection                            |
| 5       | LED_EN   | Backlight on/off control                  |
| 6       | LED_PWM  | Backlight dimming control                 |
| 7       | NC       | Not connection                            |
| 8       | NC       | Not connection                            |
| 9       | VDD      | LCD power Supply : 3.3V                   |
| 10      | VDD      | LCD power Supply : 3.3V                   |
| 11      | NC       | Not connection                            |
| 12      | GND      | Power Ground                              |
| 13      | RXIN0-   | Negative LVDS differential data input (0) |
| 14      | RXIN0+   | Positive LVDS differential data input (0) |
| 15      | GND      | Power Ground                              |
| 16      | RXIN1-   | Negative LVDS differential data input (1) |
| 17      | RXIN1+   | Positive LVDS differential data input (1) |
| 18      | GND      | Power Ground                              |
| 19      | RXIN2-   | Negative LVDS differential data input (2) |
| 20      | RXIN2+   | Positive LVDS differential data input (2) |
| 21      | GND      | Power Ground                              |
| 22      | RXCLKIN- | Negative LVDS differential clock input    |
| 23      | RXCLKIN+ | Negative LVDS differential clock input    |
| 24      | GND      | Power Ground                              |
| 25      | RXIN3-   | Negative LVDS differential data input (3) |
| 26      | RXIN3+   | Positive LVDS differential data input (3) |
| 27      | GND      | Power Ground                              |
| 28      | NC       | Not connection                            |
| 29      | NC       | Not connection                            |
| 30      | NC       | Not connection                            |

### 3.2 CTP Pin assignment

CN2 Module Side Connector : Molex 53216-1071 or Compatible

User Side Connector : Molex 51021-1000

| Pin No. | Symbol | Description           |
|---------|--------|-----------------------|
| 1       | VDD_5V | Power Supply : 5V     |
| 2       | SDA    | I2C data signal       |
| 3       | SCL    | I2C clock signal      |
| 4       | INT    | I2C interrupt signal  |
| 5       | RST    | Reset pin, active low |
| 6       | GND    | Power Ground          |
| 7       | VDD_5V | Power Supply : 5V     |
| 8       | D-     | USB data port minus   |
| 9       | D+     | USB data port plus    |
| 10      | GND_E  | Power Ground          |

#### 4 Absolute Maximum Rating

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table

| Parameter             | Symbol          | Min. | Max. | Unit |
|-----------------------|-----------------|------|------|------|
| Power Supply Voltage  | VDD             | -0.3 | 4.0  | V    |
|                       | VDD_5V          | -0.5 | 6    | V    |
| Operating Temperature | T <sub>OP</sub> | -30  | +80  | °C   |
| Storage Temperature   | T <sub>ST</sub> | -30  | +85  | °C   |

## 5 Electrical Characteristic

### 5.1 Driving LCD Panel

| Parameter            | Symbol           | Values |      |      | Unit | Remark |
|----------------------|------------------|--------|------|------|------|--------|
|                      |                  | Min.   | Typ. | Max. |      |        |
| Power Supply Voltage | VDD              | 3.0    | 3.3  | 3.6  | V    | Ta=25℃ |
| Power Supply Current | I <sub>VDD</sub> | -      | TBD  | TBD  | mA   |        |

### 5.2 CTP recommended Operating Condition

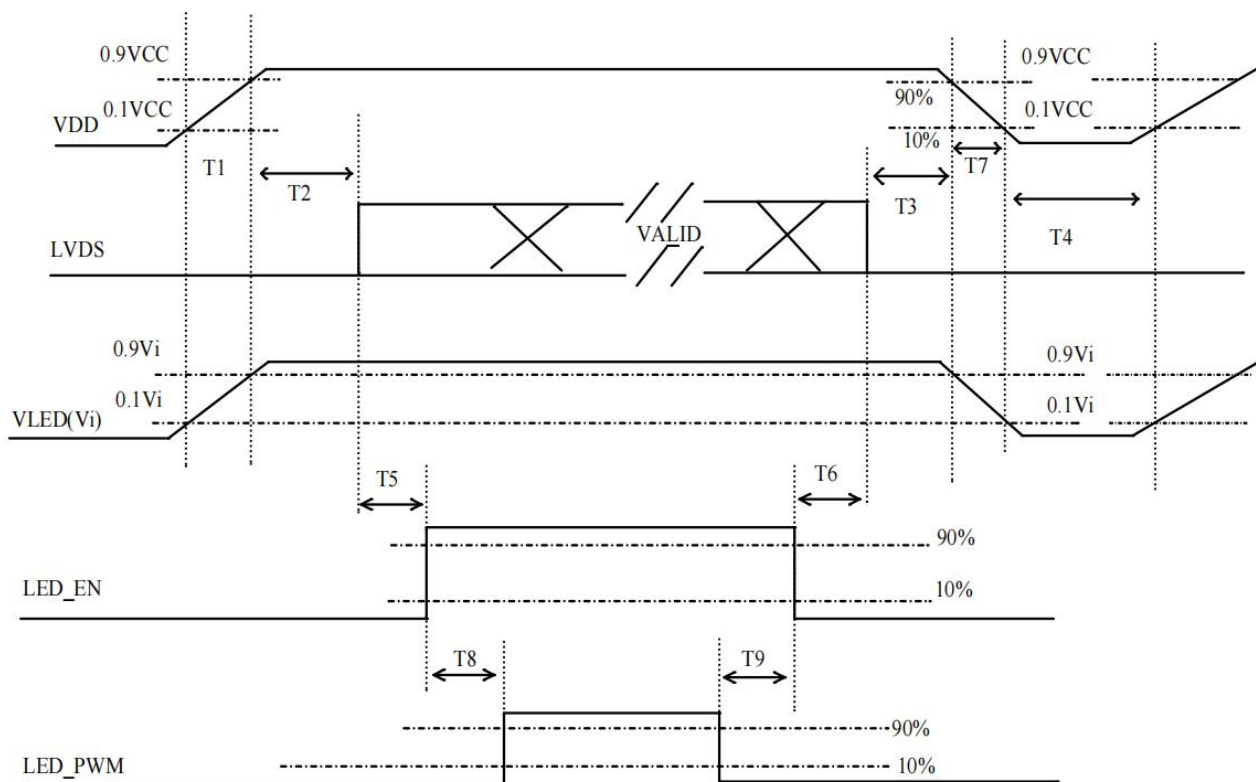
| Parameter            | Symbol | Values |      |      | Unit | Remark |
|----------------------|--------|--------|------|------|------|--------|
|                      |        | Min.   | Typ. | Max. |      |        |
| Power Supply Voltage | VDD_5V | 3.3    | 5    | 6    | V    | Ta=25℃ |
| Input Signal Voltage | VIN    | 3.0    | 3.3  | 3.6  | V    |        |

### 5.3 Driver LCD Backlight

| Parameter            |            | Symbol            | Min.  | Typ. | Max.  | Unit | Remarks |
|----------------------|------------|-------------------|-------|------|-------|------|---------|
| Power Supply Voltage |            | VLED              | 10    | 12   | 15    | V    | Ta=25℃  |
| Power Supply Current |            | I <sub>VLED</sub> | -     | 0.6  | 0.8   | A    |         |
| EN Signal Voltage    | High Level | -                 | 1.65  | -    | 5.25  | V    |         |
|                      | Low Level  |                   | 0     | -    | 0.4   | V    |         |
| PWM Control Level    | High Level | -                 | 1.65  | -    | 5.25  | V    |         |
|                      | Low Level  |                   | 0     | -    | 0.4   | V    |         |
| PWM Frequency        |            | F <sub>PWM</sub>  | 100   | -    | 20000 | Hz   |         |
| PWM Dimming duty     |            | -                 | 5     | -    | 100   | %    |         |
| LED Life Time        |            | -                 | 30000 | -    | -     | Hour | Note 1  |
| Power Consumption    |            | P <sub>LED</sub>  | -     | 7.2  | -     | W    |         |

Note 1: The lifetime is determined as the time at which luminance of LED become 50% of the initial brightness or not normal lighting at IPIN=55mA on condition of continuous operating at 25±2℃

## 5.4 Power on sequence



| Parameter | Value |      |      | Unit |
|-----------|-------|------|------|------|
|           | Min.  | Typ. | Max. |      |
| T1        | 0.5   | -    | 10   | ms   |
| T2        | 0     | -    | 50   | ms   |
| T3        | 0     | -    | 50   | ms   |
| T4        | 500   | -    | -    | ms   |
| T5        | 200   | -    | -    | ms   |
| T6        | 20    | -    | -    | ms   |
| T7        | 5     | -    | 300  | ms   |
| T8        | 10    | -    | -    | ms   |
| T9        | 10    | -    | -    | ms   |

Note 1: Please avoid floating state of interface signal at invalid period.

Note 2: When the interface signal is invalid, be sure to pull down the power supply of LCD VDD to 0 V.

Note 3: The Backlight converter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight converter power must be turned off before the power supply for the logic and the interface signal is invalid.

## 6 Signal Timing Specification

### 6.1 AC Electrical Characteristics

| Parameter              | Symbol      | Spec. |                    |      | Unit | Condition                                                  |
|------------------------|-------------|-------|--------------------|------|------|------------------------------------------------------------|
|                        |             | Min.  | Typ.               | Max. |      |                                                            |
| Clock frequency        | $R_{xCLK}$  | 30    | -                  | TBD  | MHz  | Refer to input timing table for each display resolution    |
| Input data skew margin | $T_{RSKM}$  | 500   | -                  | -    | ps   | $ VID  = 200mV$<br>$R_{xVCM} = 1.2V$<br>$R_{xCLK} = 81MHz$ |
| Clock high time        | $T_{LVCH}$  | -     | $4/(7 * R_{xCLK})$ | -    | ns   |                                                            |
| Clock low time         | $T_{LVCL}$  | -     | $3/(7 * R_{xCLK})$ | -    | ns   |                                                            |
| PLL wake-up time       | $T_{enPLL}$ | -     | -                  | 150  | us   |                                                            |

Table 13.1: LVDS mode AC electrical characteristics

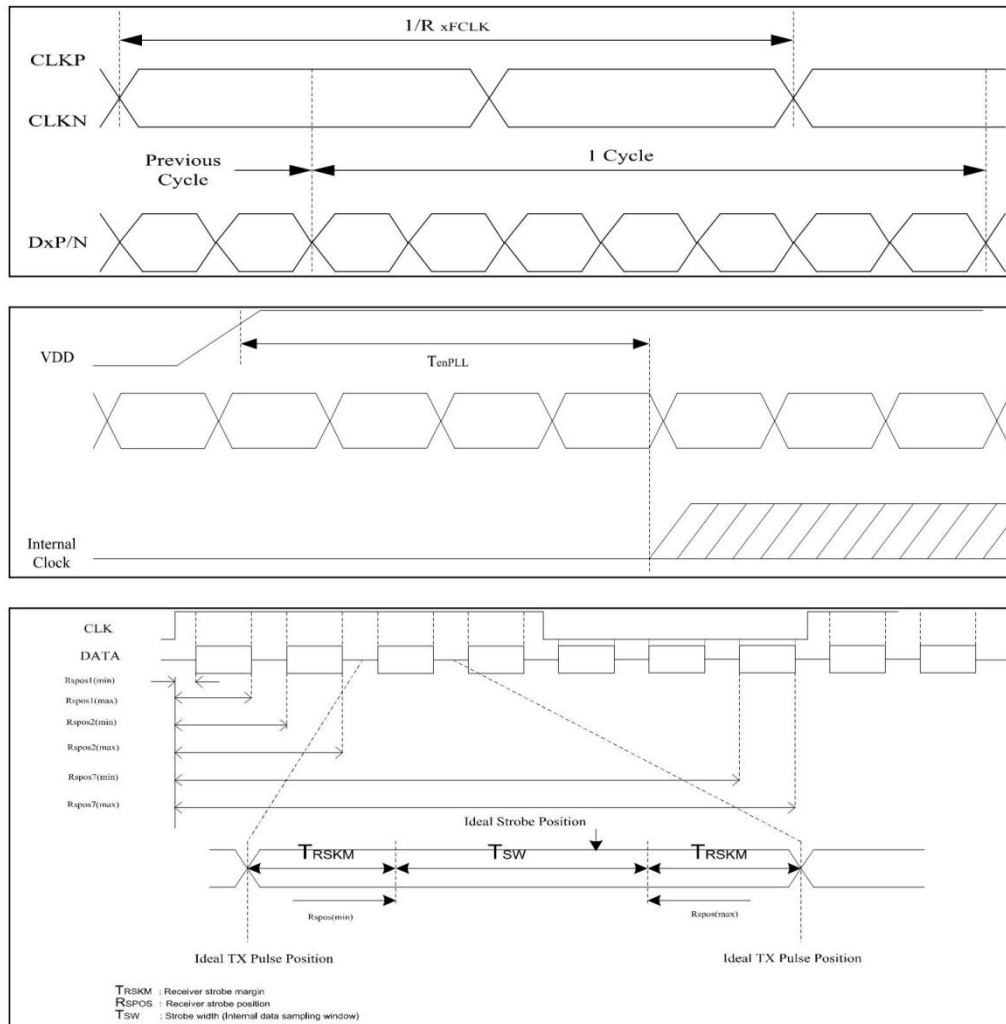


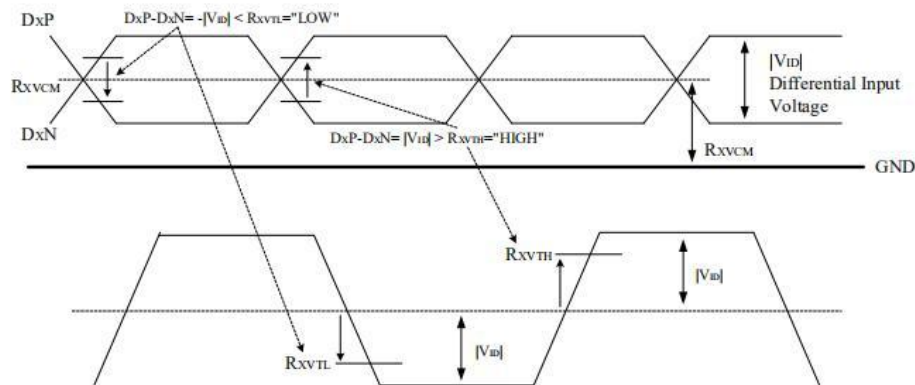
Figure 13.3: LVDS figure

## 6.2 DC electrical characteristics

(VDD=VDDIO=VDDIF=2.3 to 3.6V, VSS=VSSA=VSS\_IF=0V, TA=-20 to +85°C)

| Parameter                                 | Symbol       | Min. | Typ. | Max. | Unit | Condition                                                            |
|-------------------------------------------|--------------|------|------|------|------|----------------------------------------------------------------------|
| Differential input high threshold voltage | $R_{XVTH}$   | +0.1 | 0.2  | 0.3  | V    | $R_{XVCM}=1.2V$                                                      |
| Differential input low threshold voltage  | $R_{XVTL}$   | -0.3 | -0.2 | -0.1 | V    |                                                                      |
| Input voltage range (singled-end)         | $R_{XVIN}$   | 0.7  | -    | 1.7  | V    |                                                                      |
| Differential input common mode voltage    | $R_{XVCM}$   | 1    | 1.2  | 1.4  | V    | $ V_{ID} =0.2$                                                       |
| Differential input impedance              | $Z_{ID}$     | 80   | 100  | 125  | ohm  |                                                                      |
| Differential input voltage                | $ V_{ID} $   | 0.2  | -    | 0.6  | V    |                                                                      |
| Differential input leakage current        | $I_{LCLVDS}$ | -10  | -    | +10  | uA   |                                                                      |
| LVDS Digital Operating Current            | $I_{VDD}$    | -    | 15   | 20   | mA   | $F_{DCLK}=80MHz, VDD=3.3V$ ,<br>Input pattern:<br>55h->Aah->55h->Aah |
| LVDS Digital Stand-by Current             | $I_{ST}$     | -    | -    | 250  | uA   | Clock & all Functions are stopped                                    |

Single-end Signals

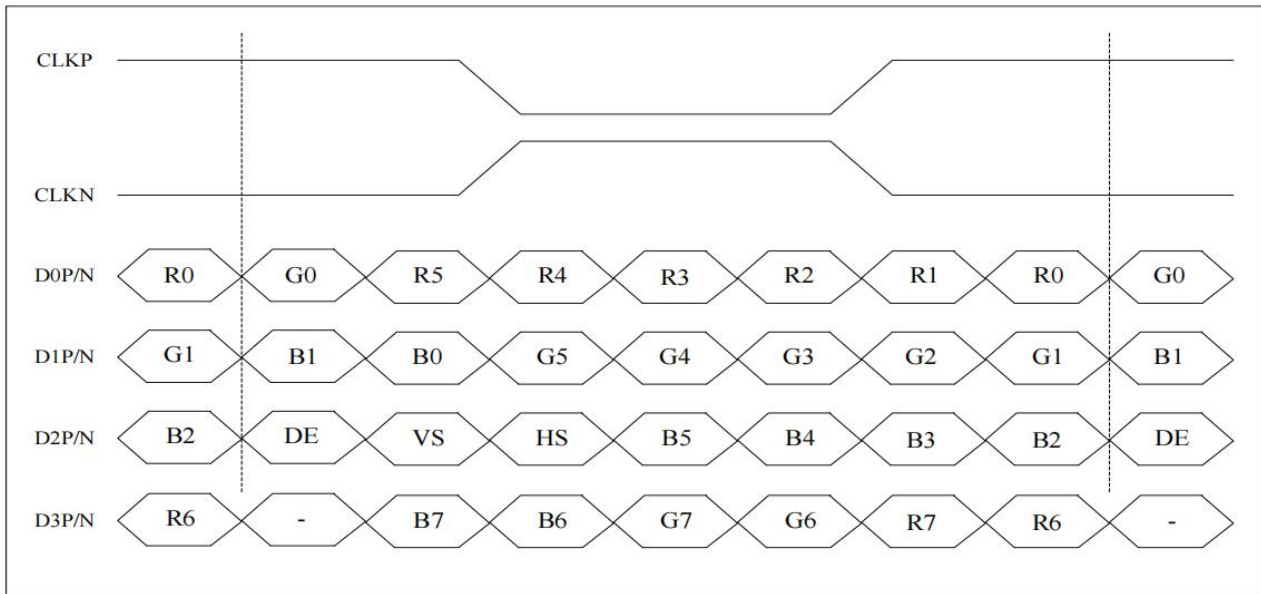


### 6.3 Timing Table

For 1280RGBx800

| Parameter                              |      | Symbol            | Value |      |      | Unit |
|----------------------------------------|------|-------------------|-------|------|------|------|
|                                        |      |                   | Min.  | Typ. | Max. |      |
| DCLK frequency @Frame rate=60Hz (LVDS) |      | F <sub>DCLK</sub> | 66.3  | 72.4 | 78.9 | MHz  |
| HSYNC period time                      |      | T <sub>H</sub>    | 1380  | 1440 | 1500 | DCLK |
| Horizontal display area                |      | T <sub>HD</sub>   | 1280  |      |      | DCLK |
| HSYNC pulse width                      | Min. | T <sub>HPW</sub>  | 2     |      |      |      |
|                                        | Typ. |                   | -     |      |      |      |
|                                        | Max. |                   | 40    |      |      |      |
| HSYNC back porch(with pulse width)     |      | T <sub>HBP</sub>  | 88    | 88   | 88   | DCLK |
| HSYNC front porch                      |      | T <sub>HFP</sub>  | 12    | 72   | 132  | DCLK |
| VSYNC period time                      |      | T <sub>V</sub>    | 824   | 838  | 872  | H    |
| Vertical display area                  |      | T <sub>VD</sub>   | 800   |      |      | H    |
| VSYNC pulse width                      | Min. | T <sub>VPW</sub>  | 2     |      |      | H    |
|                                        | Typ. |                   | -     |      |      |      |
|                                        | Max. |                   | 20    |      |      |      |
| VSYNC back porch(with pulse width)     |      | T <sub>VBP</sub>  | 23    | 23   | 23   | H    |
| VSYNC front porch                      |      | T <sub>VFP</sub>  | 1     | 15   | 49   | H    |

## 6.4 LVDS Data Input Format

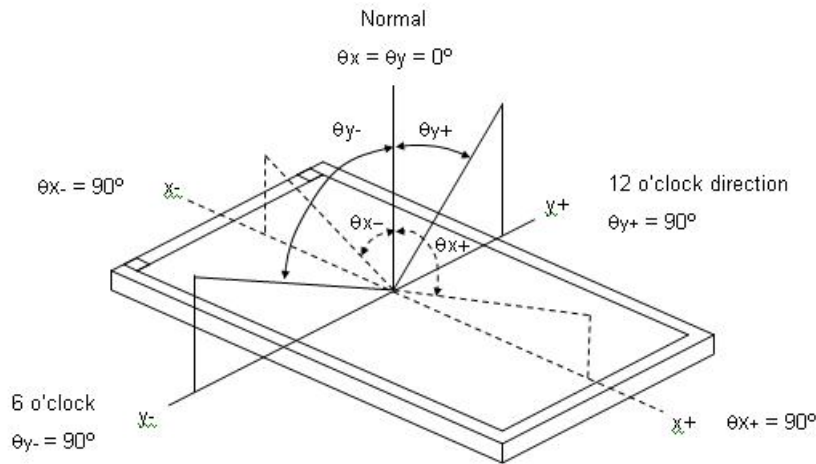


**8-bit LVDS input**

## 7 Optical Characteristics

| Item                          |            | Symbol        | Condition                                                       | Min.     | Typ. | Max.     | Unit | Note     |
|-------------------------------|------------|---------------|-----------------------------------------------------------------|----------|------|----------|------|----------|
| Viewing Angle                 | Horizontal | $\theta_{X+}$ | $CR \geq 10$                                                    | 70       | 80   | -        | Deg. | (1), (5) |
|                               |            | $\theta_{X-}$ |                                                                 | 70       | 80   | -        | Deg. |          |
|                               | Vertical   | $\theta_{Y+}$ |                                                                 | 70       | 80   | -        | Deg. |          |
|                               |            | $\theta_{Y-}$ |                                                                 | 70       | 80   | -        | Deg. |          |
| Luminance (W/ CTP)            |            | Lv            | $\theta_X=0^\circ, \theta_Y=0^\circ$                            | 750      | 850  | -        | nit  | (4), (5) |
| Uniformity                    | 9 points   | $\Delta Y9$   |                                                                 | 75       | 80   | -        | %    | (5), (6) |
| Contrast ratio                |            | CR            |                                                                 | 800      | 1000 | -        |      | (2), (5) |
| Color Chromaticity (CIE 1931) | White      | $W_x$         | $\theta_X=0^\circ, \theta_Y=0^\circ$<br>R=G=B=255<br>Gray scale | Typ-0.05 | 0.31 | Typ+0.05 | -    | (1), (5) |
|                               |            | $W_y$         |                                                                 |          | 0.35 |          | -    |          |
|                               | Red        | $R_x$         |                                                                 |          | -    |          | -    |          |
|                               |            | $R_y$         |                                                                 |          | -    |          | -    |          |
|                               | Green      | $G_x$         |                                                                 |          | -    |          | -    |          |
|                               |            | $G_y$         |                                                                 |          | -    |          | -    |          |
|                               | Blue       | $B_x$         |                                                                 |          | -    |          | -    |          |
|                               |            | $B_y$         |                                                                 |          | -    |          | -    |          |
| Response Time                 | $T_R+T_F$  |               |                                                                 | -        | 25   | 35       | ms   | (3)      |

Note (1) Definition of Viewing Angle ( $\theta_x, \theta_y$ ):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) =  $L_{255} / L_0$

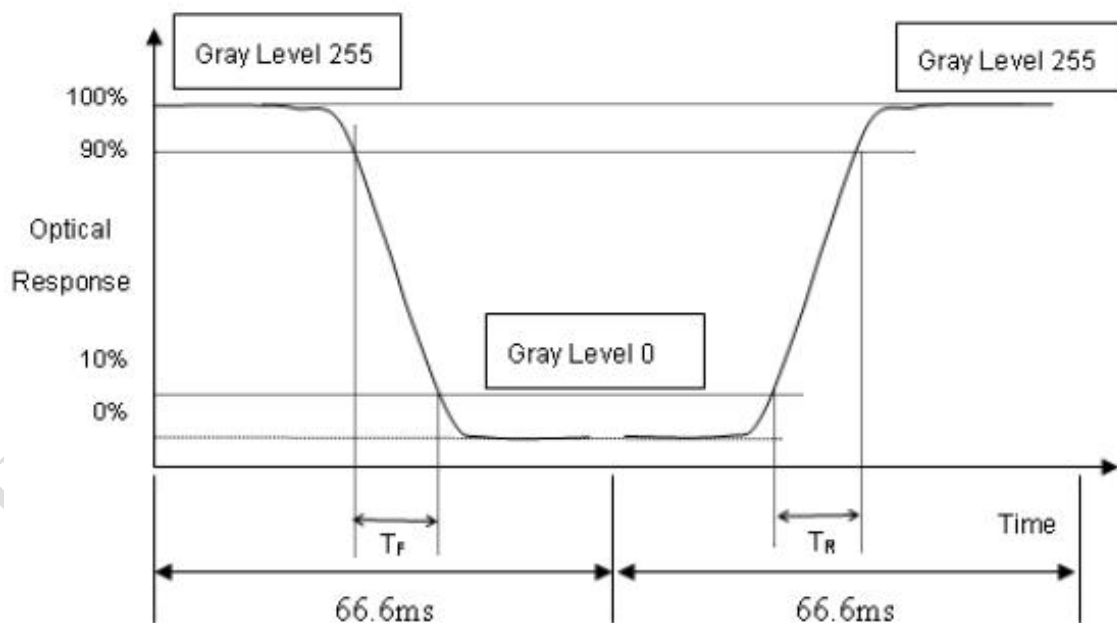
$L_{255}$ : Luminance of gray level 255

$L_0$ : Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time ( $T_R, T_F$ ):



Note (4) Definition of Luminance of White (LC):

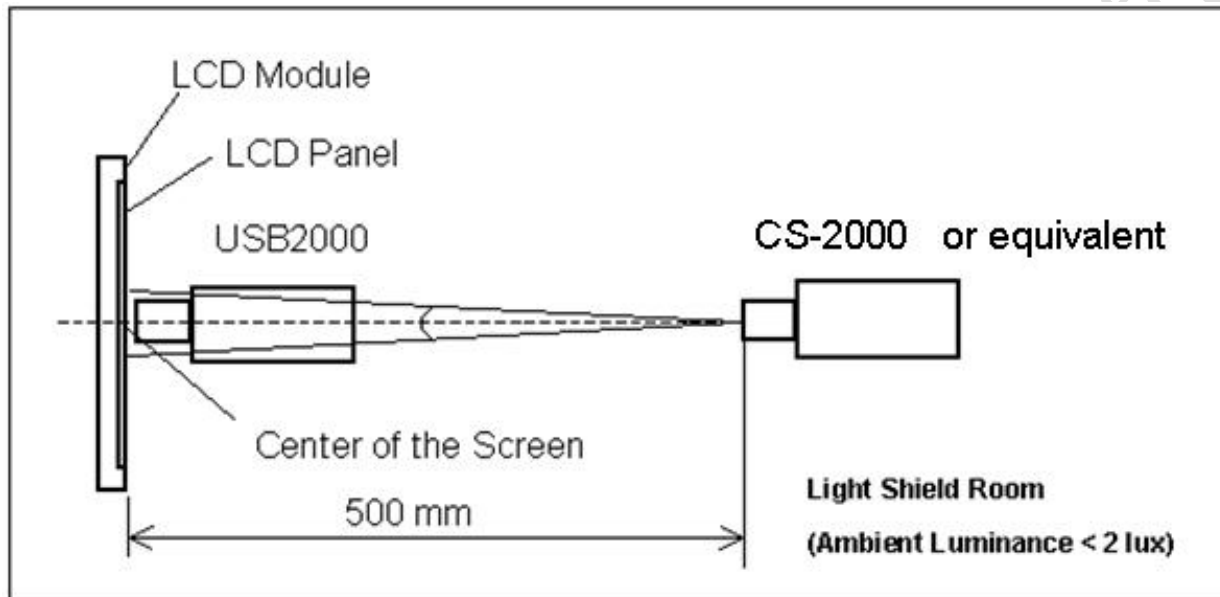
Measure the luminance of gray level 255 at center point

$$LC = L(5)$$

L (x) is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

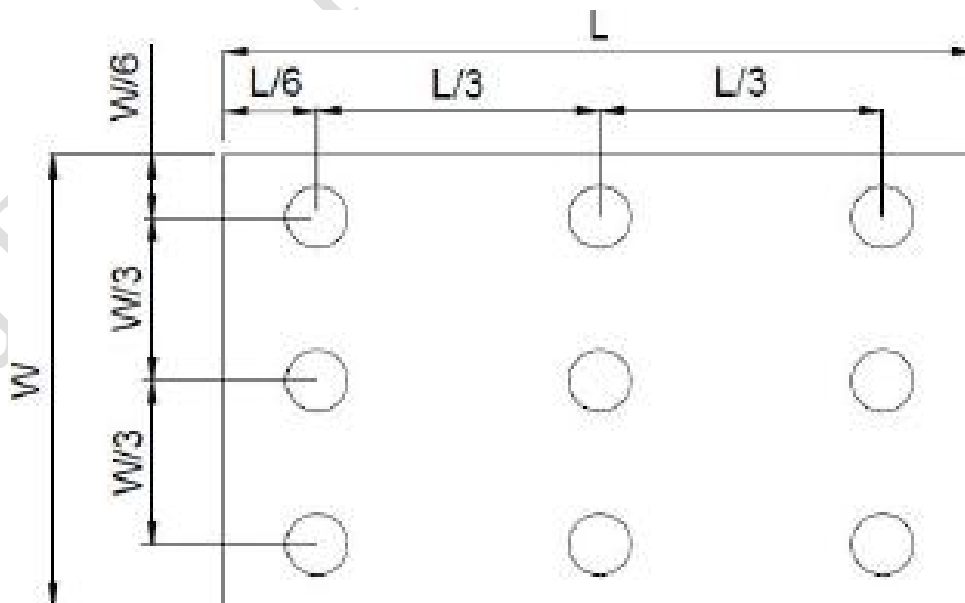
The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (6) Definition of White Variation (  $\delta W$  ):

Measure the luminance of gray level 255 at 9 points

$$\delta W = ( \text{Minimum} [L(1) \sim L(9)] / \text{Maximum} [L(1) \sim L(9)] ) * 100\%$$



## 8 Reliability Test

| Test Item                                       | Condition                                                                                                                         |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| High Temperature Storage Test                   | 85°C, 240 hours                                                                                                                   |
| Low Temperature Storage Test                    | -30°C, 240 hours                                                                                                                  |
| High Temperature Operation Test                 | 80°C, 240 hours                                                                                                                   |
| Low Temperature Operation Test                  | -30°C, 240 hours                                                                                                                  |
| High temperature & high humidity operation Test | 60°C , 90%RH, 240 hours                                                                                                           |
| Thermal Shock(Non-operation)                    | -30°C/30 min ~ +85°C/30 min, change time:5min, for a total 100 cycles, Start with cold temperature and end with high temperature. |
| ESD                                             | Contact $\pm 4\text{KV}$ , Air $\pm 8\text{KV}$<br>(R=330R,C=150pF)                                                               |

Note 1: There should be no condensation on the surface of panel during test.

Note 2: Temperature of panel display surface area should be 85°C Max.

Note 3: At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

Note 4: In the standard conditions, there is no function failure issue occurred. All the cosmetic specification is judged before reliability test.

Note 5: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

## 9 Appearance Inspection

### 9.1 Inspection Sampling Method:

Unless there is other agreement, the sampling plan for incoming inspection shall follow GB2828.1-2012.

- (1) Lot size: Quantity per shipment as one lot (different model as different lot).
- (2) Sampling type: Normal inspection, single sampling.
- (3) Sampling level: Level II.

### 9.2 Inspection Conditions

The environmental condition and visual inspection shall be conducted as below:

- (1) Light: 800~1200Lux;
- (2) Vision requirement: Naked or corrected vision of at least 1.0 and no color blindness;
- (3) Inspection background: black and white board is used as the background below the product;
- (4) Inspection distance: 20~30cm from human eyes to the measured surface;
- (5) Inspection Angle: the detected surface is 90 degree from to line of sight, and the measured Object should be rotated 45 degree from side to side;
- (6) Inspection time: 5~10s;

### 9.3 Inspection equipment

Secondary elements, calipers, feelers, filinka, petroleum ether, ND filter

### 9.4 Defect code comparison table

| Code | Name (Unit)             | Code | Name (Unit)   |
|------|-------------------------|------|---------------|
| N    | Number                  | D    | Diameter (mm) |
| L    | Length (mm)             | H    | Depth (mm)    |
| W    | Width (mm)              | S    | Distance (mm) |
| S    | Area (mm <sup>2</sup> ) |      |               |

### 9.5 Inspection precautions

- (1) Inspectors must wear finger gloves and electrostatic bracelets.
- (2) Place the inspected product in front of the inspector, and hold the edge of the product with both hands carefully. Do not bend the product.

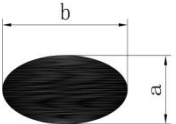
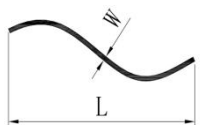
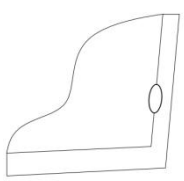
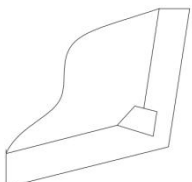
## 9.6 Product region division

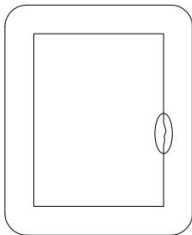
Divide the products into nine parts. The center part is area A, and the surrounding part is area B, as shown in the figure below

|   |   |   |
|---|---|---|
| B | B | B |
| B | A | B |
| B | B | B |

## 9.7 Inspection Standards for Modules

CTP and LCD fitting components

| Items                                                                                                                                          | Standard | Conclusion                                                                                                                                                                                                                                                                                                                                                                                    | Inspection tools  |
|------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Dot (white, black, heterochromatic )<br><br>$D=(a+b)/2$       | A        | $D \leq 0.15$                                                                                                                                                                                                                                                                                                                                                                                 | Visual inspection |
|                                                                                                                                                | A        | $0.15 < D \leq 0.5$                                                                                                                                                                                                                                                                                                                                                                           |                   |
|                                                                                                                                                | A        | $D > 0.3$                                                                                                                                                                                                                                                                                                                                                                                     |                   |
|                                                                                                                                                | B        | $D \leq 0.2$                                                                                                                                                                                                                                                                                                                                                                                  |                   |
|                                                                                                                                                | B        | $0.2 < D \leq 0.5$                                                                                                                                                                                                                                                                                                                                                                            |                   |
|                                                                                                                                                | B        | $D > 0.5$                                                                                                                                                                                                                                                                                                                                                                                     |                   |
| Linear defects (fibers/foreign bodies/ scratches, etc.)<br> | A        | $W \leq 0.04$                                                                                                                                                                                                                                                                                                                                                                                 | Visual inspection |
|                                                                                                                                                | A        | $0.04 < W \leq 0.06$                                                                                                                                                                                                                                                                                                                                                                          |                   |
|                                                                                                                                                | A        | $0.06 < W \leq 0.09$                                                                                                                                                                                                                                                                                                                                                                          |                   |
|                                                                                                                                                | A        | $W > 0.09, L > 6$                                                                                                                                                                                                                                                                                                                                                                             |                   |
|                                                                                                                                                | B        | $W \leq 0.05$                                                                                                                                                                                                                                                                                                                                                                                 |                   |
|                                                                                                                                                | B        | $0.05 < W \leq 0.07$                                                                                                                                                                                                                                                                                                                                                                          |                   |
|                                                                                                                                                | B        | $0.07 < W \leq 0.1$                                                                                                                                                                                                                                                                                                                                                                           |                   |
|                                                                                                                                                | B        | $W > 0.125, L > 8$                                                                                                                                                                                                                                                                                                                                                                            |                   |
| Bubble                                                                                                                                         | A        | Zone A is judged according to the point standard                                                                                                                                                                                                                                                                                                                                              | Visual inspection |
|                                                                                                                                                | B        | Zone B is judged according to the point standard                                                                                                                                                                                                                                                                                                                                              |                   |
| Edge broken loss<br>                                        | B        | 1. The sensor edge creaks, without damaging the line. The function test is OK for reception, and the front side is not visible after fitting.<br>2. Edge creak on front of cover plate: NG.<br>3. Back $X < 1.5\text{mm}$ ; $Y < 1.5\text{mm}$ ; $Z < GT$ ( $GT$ = glass thickness), without affecting the functionality of the product, each side is allowed one, no more than two in total. | Visual inspection |
| Corner broken loss<br>                                      | B        |                                                                                                                                                                                                                                                                                                                                                                                               |                   |

| Items                                                                                              |             | Standard                                                                                                                       | Conclusion                                                                                                                   | Inspection tools  |
|----------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Creak                                                                                              | A<br>+<br>B | Creaks found at any location are not allowed                                                                                   |                                                                                                                              | Visual inspection |
| Newton’s rings                                                                                     | A           | No more than 1/3 of the display area, light up invisible. If there are special requirements, the limited sample shall prevail. |                                                                                                                              |                   |
| Panel color                                                                                        |             | Consistent with the sample, no serious color difference                                                                        |                                                                                                                              |                   |
| Size                                                                                               |             | Meet the requirements of finished product inspection drawings                                                                  |                                                                                                                              |                   |
| Ink pinhole<br>   | B           | $D\leq 0.25$                                                                                                                   | Distance of two pinholes greater than 15mm, the paint can be repaired with a paint pen of the same color as the cover plate. | Visual inspection |
| Ink sawtooth<br> | A<br>+<br>B | $W\leq 0.2, L\leq 1$                                                                                                           | The distance between two serrations near the VA area is greater than or equal to 50mm, two serrations may be allowed.        |                   |
| Circular White Mura,<br>Lumination Mura,<br>Black/White Mura, etc.                                 | A           | Refer to 5% ND filter in 50% Should not be perceived, If needed or limit sample                                                |                                                                                                                              | Visual inspection |

## 10 Notices

### 10.1 Cautions for storage

Store the module in a dark room where must keep at  $25\pm 10^{\circ}\text{C}$  and 65%RH or less. Don't expose the products to the direct sunlight or stresses.

### 10.2 Cautions for operation

- (1) Do not put a heavy, hard or sharp object on the product.
- (2) Do not bend the product in order to assure the reliability.
- (3) Do not put one product on the other. Otherwise, the product to may be scratched or be changed.
- (4) Do not oile the touch panel, Do not put heavy goods on the touch panel.
- (5) Do not use any organic solvent acid or alkali solution to clean the surface of the product. Please use dry clothes or soft clothes with ethanol to clean the surface.

### 10.3 Cautions for operation

Light transmission is an important factor for the product. So, please wear clean finger sacks, gloves and mask to protect the products from fingerprint or stain attach, and also must ensure the area where your finger touches is outside the view area when handing the panel.

### 10.4 Others

- (1) Please note that dew gathering in the panel due to abrupt temperature or humidity change, etc. Which may cause deterioration of performance.
- (2) When this product was built into the package, if there is vulcanization material such as vulcanized rubber which has a possibility of generating the salutation gas near the package since abnormalities will be caused to wring of the product and it will become the cause if functional degradation, please give a constitutional cations.
- (3) Cation for product safety set

Although full care is taken to ensure product quality, failure modes such as degradation, short circuits, or open circuits might be caused, Therefore, to design a product set, please study the effects of any single failure of the panel in advance and consider the safety of product configuration.

Quality function livers for on year, outward appearance haves non-color variation in six months.