

## **TFT LCD Module**

### **Product Specification**

#### **DT050TFT-TS**

**5.0" (800(RGB) x 480 PIXELS) TFT Module  
with Resistive Touch Panel**

June 1, 2016

**Remark:**

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**Revision Record**

| <b>REV</b>                   | <b>CHANGES</b> | <b>DATE</b> |
|------------------------------|----------------|-------------|
| 0.0<br>(Ref 1.0<br>20131206) | First release  | Jun 1, 2016 |
|                              |                |             |
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## 1. Scope

This data sheet is to introduce the specification of DT050TFT-TS, active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC, RTP, and a backlight unit. The 5.0" display area contains 800RGB x 480 pixels.

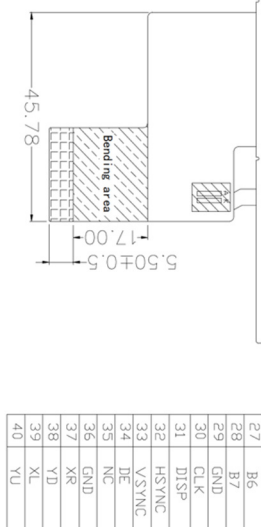
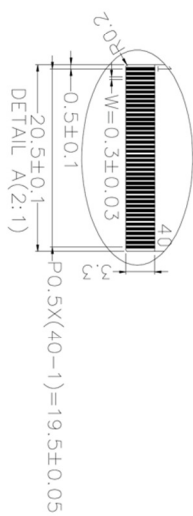
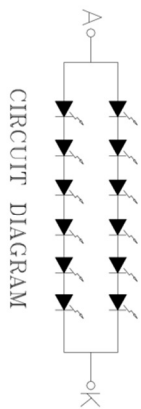
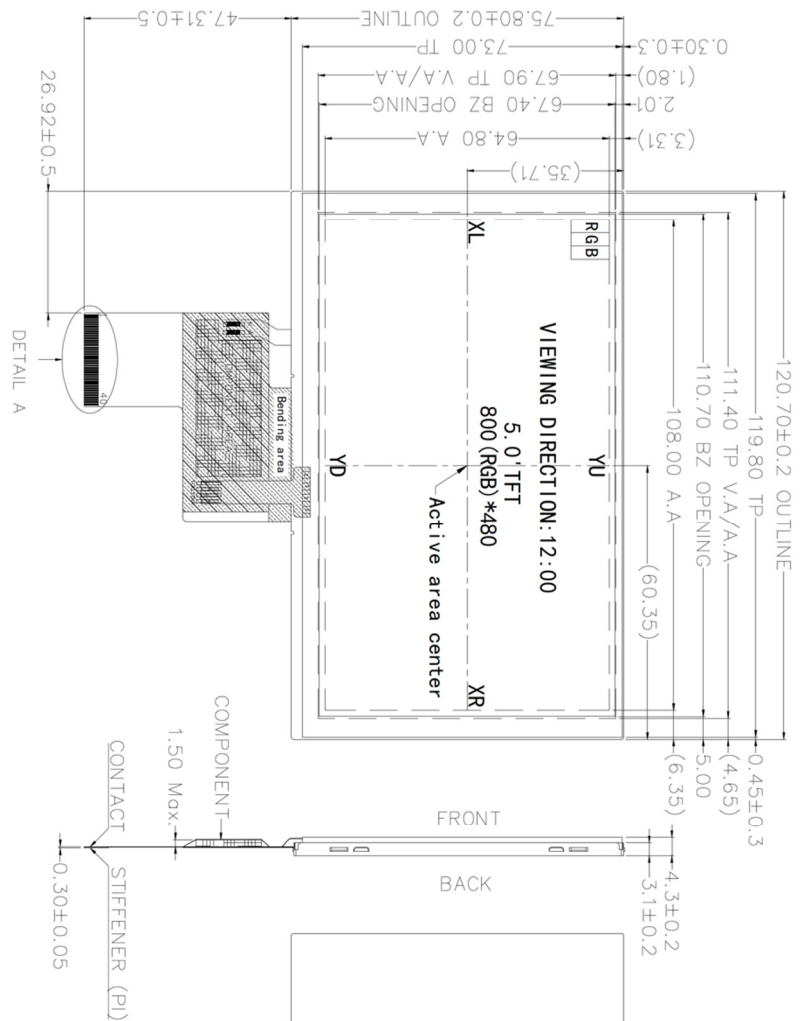
## 2. Application

Digital equipments which need color display, mobile navigator/video systems.

## 3. General Information

| Item                          | Contents                     | Unit |
|-------------------------------|------------------------------|------|
| Size                          | 5.0                          | Inch |
| Resolution                    | 800(RGB) x 480               |      |
| Technology Type               | a-Si TFT                     |      |
| Interface                     | RGB 24 bits                  |      |
| Pixel Pitch                   | 0.135 x 0.135                | mm   |
| Pixel Configuration           | R.G.B. Vertical Stripe       |      |
| Outline Dimension (W x H x D) | 120.70 x 75.80 x 4.3         | mm   |
| Active Area                   | 108.00 x 64.80               | mm   |
| Display Mode                  | Transmissive, Normally white |      |
| Backlight Type                | LED                          |      |
|                               |                              |      |
|                               |                              |      |

## 4. Outline Drawing



| IN ASSIGNMENT |       |
|---------------|-------|
| 1             | LED-K |
| 2             | LED-A |
| 3             | NC    |
| 4             | VDD   |
| 5             | R0    |
| 6             | R1    |
| 7             | R2    |
| 8             | R3    |
| 9             | R4    |
| 10            | R5    |
| 11            | R6    |
| 12            | R7    |
| 13            | G0    |
| 14            | G1    |
| 15            | G2    |
| 16            | G3    |
| 17            | G4    |
| 18            | G5    |
| 19            | G6    |
| 20            | G7    |
| 21            | B0    |
| 22            | B1    |
| 23            | B2    |
| 24            | B3    |
| 25            | B4    |
| 26            | B5    |
| 27            | B6    |
| 28            | B7    |
| 29            | GND   |
| 30            | CLK   |
| 31            | DISP  |
| 32            | HSYNC |
| 33            | VSYNC |
| 34            | DE    |
| 35            | NC    |
| 36            | GND   |
| 37            | XR    |
| 38            | YD    |
| 39            | XL    |
| 40            | YU    |

- NOTES:
1. DISPLAY TYPE: 5.0 TFT, TRANSMISSIVE
  2. VIEWING DIRECTION : 12 0' CLOCK
  3. Driver IC : ILI6122/ILI5960
  4. Top : -20° C ~ 70° C, Tst : -30° C ~ 80° C
  5. GENERAL TOLERANCE:  $\pm 0.2$
  6. BACKLIGHT: LED/240c/d<sup>2</sup> (Typical)
  7. RoHS Compliant

# Displaytech Ltd.

|                           |                    |          |                                                                                     |
|---------------------------|--------------------|----------|-------------------------------------------------------------------------------------|
| <h1>Displaytech Ltd.</h1> |                    |          |                                                                                     |
| DRAWN BY:                 | TITLE: DT050TFT-TS |          |  |
| CHECKED BY:               | DWG NO:            | SCALE:   |  |
| APPROVED BY:              | DWG NAME:          | UNIT: mm |                                                                                     |
| CONFIRMED BY:             | SHEET NO. OF       |          |                                                                                     |

## 5. Interface signals

| No | Symbol | Description             | Remark |
|----|--------|-------------------------|--------|
| 1  | LED-K  | Backlight LED Cathode   |        |
| 2  | LED-A  | Backlight LED Anode     |        |
| 3  | NC     | No connection           |        |
| 4  | VDD    | Digital power supply    |        |
| 5  | R0     | Red data                |        |
| 6  | R1     | Red data                |        |
| 7  | R2     | Red data                |        |
| 8  | R3     | Red data                |        |
| 9  | R4     | Red data                |        |
| 10 | R5     | Red data                |        |
| 11 | R6     | Red data                |        |
| 12 | R7     | Red data                |        |
| 13 | G0     | Green data              |        |
| 14 | G1     | Green data              |        |
| 15 | G2     | Green data              |        |
| 16 | G3     | Green data              |        |
| 17 | G4     | Green data              |        |
| 18 | G5     | Green data              |        |
| 19 | G6     | Green data              |        |
| 20 | G7     | Green data              |        |
| 21 | B0     | Blue data               |        |
| 22 | B1     | Blue data               |        |
| 23 | B2     | Blue data               |        |
| 24 | B3     | Blue data               |        |
| 25 | B4     | Blue data               |        |
| 26 | B5     | Blue data               |        |
| 27 | B6     | Blue data               |        |
| 28 | B7     | Blue data               |        |
| 29 | GND    | Power ground            |        |
| 30 | CLK    | Clock for input data    |        |
| 31 | DISP   | Display on/off control  |        |
| 32 | HSYNC  | Horizontal sync signal  |        |
| 33 | VSNC   | Vertical sync signal    |        |
| 34 | DE     | Data enable             |        |
| 35 | NC     | No connection           |        |
| 36 | GND    | Power ground            |        |
| 37 | XR     | Touch panel right side  |        |
| 38 | YD     | Touch panel bottom side |        |
| 39 | XL     | Touch panel left side   |        |
| 40 | YU     | Touch panel up side     |        |

## 6. Absolute Maximum Ratings

### 6.1 Electrical Absolute Max. Ratings

| Item           | Symbol | Min  | Max | Unit | Remark |
|----------------|--------|------|-----|------|--------|
| Supply voltage | VDD    | -0.5 | 5.0 | V    |        |

### 6.2 Environment Conditions

| Item                  | Symbol | Min | Max | Unit | Remark |
|-----------------------|--------|-----|-----|------|--------|
| Operating Temperature | TOPR   | -20 | 70  | °C   |        |
| Storage Temperature   | TSTG   | -30 | 80  | °C   |        |

### 6.3 LED Backlight Absolute Max. Ratings

| Item                | Symbol | Min | Max | Unit | Remark       |
|---------------------|--------|-----|-----|------|--------------|
| LED forward current | ILED   | --  | 25  | mA   | For each LED |

## 7. Electrical Specifications

### 7.1 Electrical Characteristics

Ta=25°C

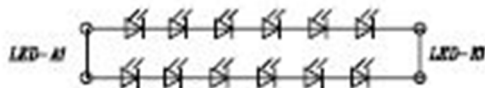
| Item                   | Symbol | Min | Typ | Max | Unit | Remark |
|------------------------|--------|-----|-----|-----|------|--------|
| Digital supply voltage | VDD    | 3.0 | 3.3 | 3.6 | V    |        |

### 7.2 LED Backlight

Ta=25°C

| Item              | Symbol | Min | Typ    | Max  | Unit | Remark |
|-------------------|--------|-----|--------|------|------|--------|
| Forward current   | IF     | --  | 40     | 50   | mA   | Note   |
| Forward voltage   | VF     | --  | 19.8   | 21.0 | V    |        |
| Power consumption | WBL    | --  | 792    | --   | mW   |        |
| LED life time     | --     | --  | 30,000 | --   | Hr   |        |

Note 1. The figure below shows the connection of backlight LED.



### CIRCUIT DIAGRAM

Note 2. One LED: IF=20mA, VF=3.2V

Note 3. The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL=40mA. The LED lifetime could be decreased if operating IL is larger than 40mA.

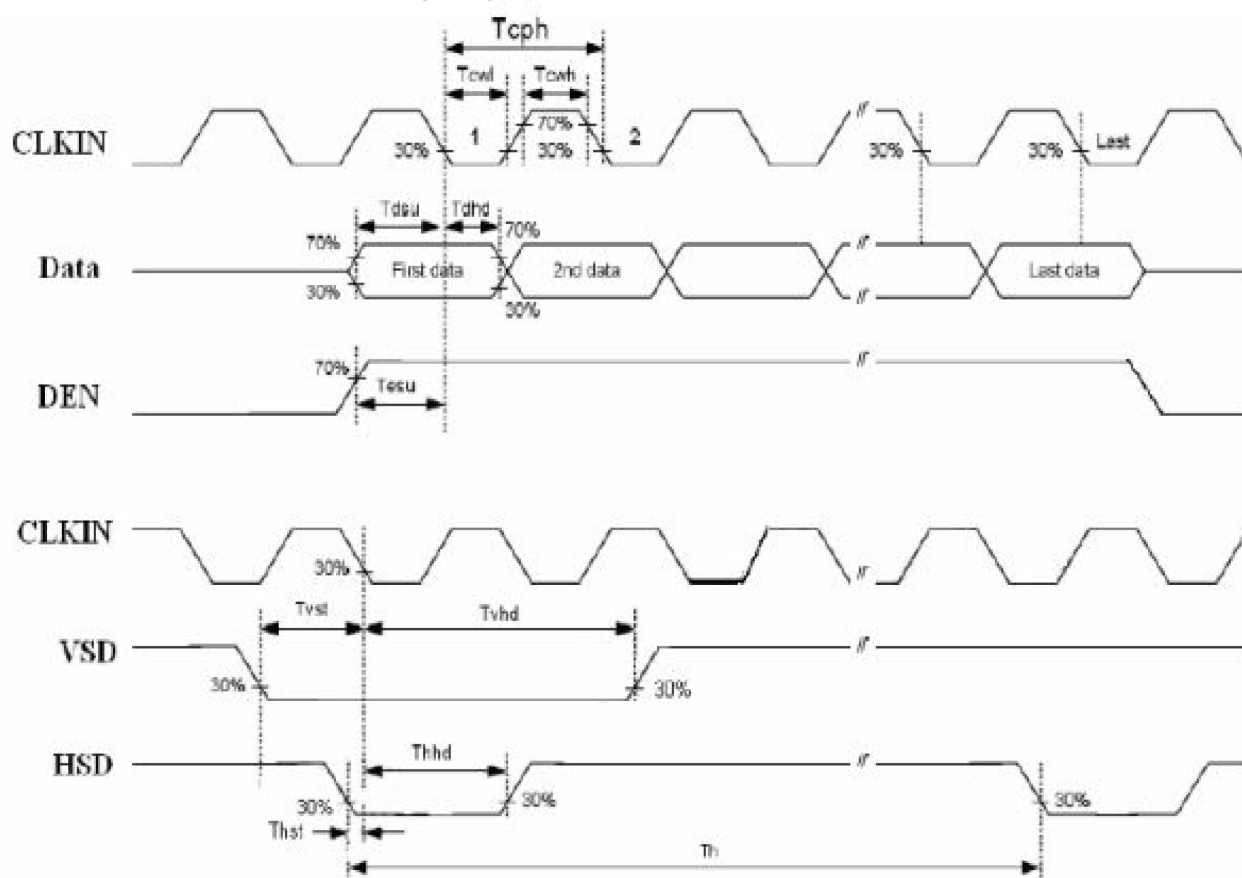
## 8. Command/AC Timing

### 8.1 TFT-LCD Input Timing

VCC=3.3V, AVDD=12.61V, AGND=GND=0V, Ta=25°C

| Parameter        | Symbol | Min | Typ  | Max  | Unit | Conditions   |
|------------------|--------|-----|------|------|------|--------------|
| DCLK Frequency   | Fclk   | -   | 30.0 | 50.0 | MHz  |              |
| DCLK Cycle Time  | Tcph   | 20  | 33.3 | -    | ns   |              |
| DCLK Pulse Width | Tcw    | 40% | 50%  | 60%  | Tcph |              |
| VSD Setup Time   | Tvst   | 8   | -    | -    | ns   |              |
| VSD Hold Time    | Tvhd   | 8   | -    | -    | ns   |              |
| HSD Setup Time   | Thst   | 8   | -    | -    | ns   |              |
| HSD Hold Time    | Thhd   | 8   | -    | -    | ns   |              |
| Data Setup Time  | Tdsu   | 8   | -    | -    | ns   | Data to DCLK |
| Data Hold Time   | Tdhd   | 8   | -    | -    | ns   | Data to DCLK |
| DE Setup Time    | Tesu   | 8   | -    | -    | ns   |              |
| DE Hold Time     | Tehd   | 8   | -    | -    | ns   |              |

Input Clock and Data timing Diagram:



## 8.2 Recommended Timing Setting of TCON

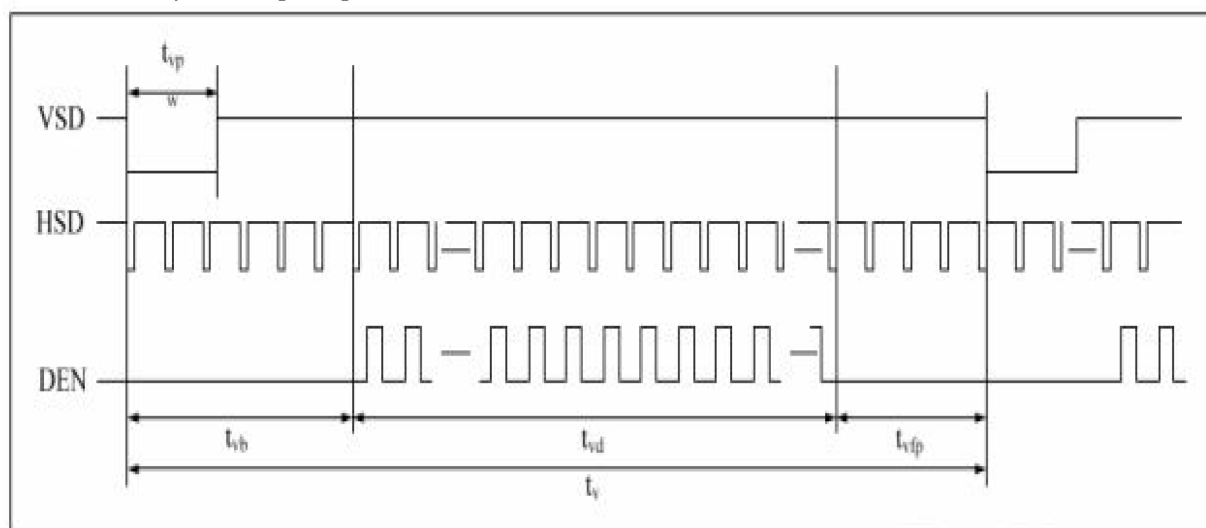
TCON (Embedded In Source IC ) Input Timing (DCLK, HSD, VSD, ED)

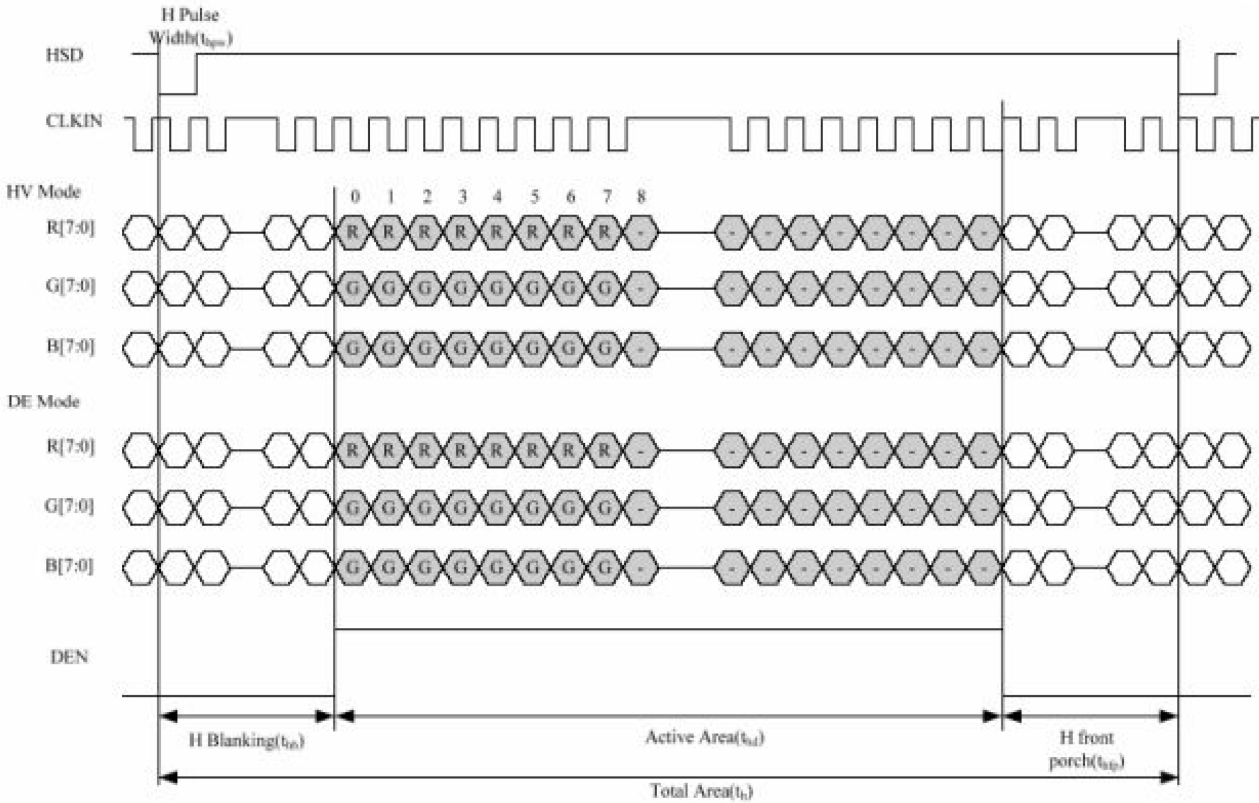
VCC=3.3V, AVDD=12.61V, AGND=GND=0V, Ta=25°C

| Parameter | Symbol | Min | Typ  | Max  | Unit | Remark |
|-----------|--------|-----|------|------|------|--------|
| DCLK      | Fclk   | -   | 30   | 50   | MHZ  |        |
|           | tclk   | -   | 33.3 | -    | ns   |        |
| HSD       | th     | 889 | 928  | 1143 | tclk |        |
|           | thd    | -   | 800  | -    | tclk |        |
|           | thpw   | 1   | 48   | 255  | tclk |        |
|           | thb    | -   | 88   | -    | tclk |        |
|           | thfp   | 1   | 40   | 255  | tclk |        |
|           |        |     |      |      |      |        |
| VSD       | tv     | 513 | 525  | 767  | th   |        |
|           | tvd    | -   | 480  | -    | th   |        |
|           | tvpw   | 3   | 3    | 255  | th   |        |
|           | tvb    | -   | 32   | -    | th   |        |
|           | tvfp   | 1   | 13   | 255  | th   |        |
|           |        |     |      |      |      |        |

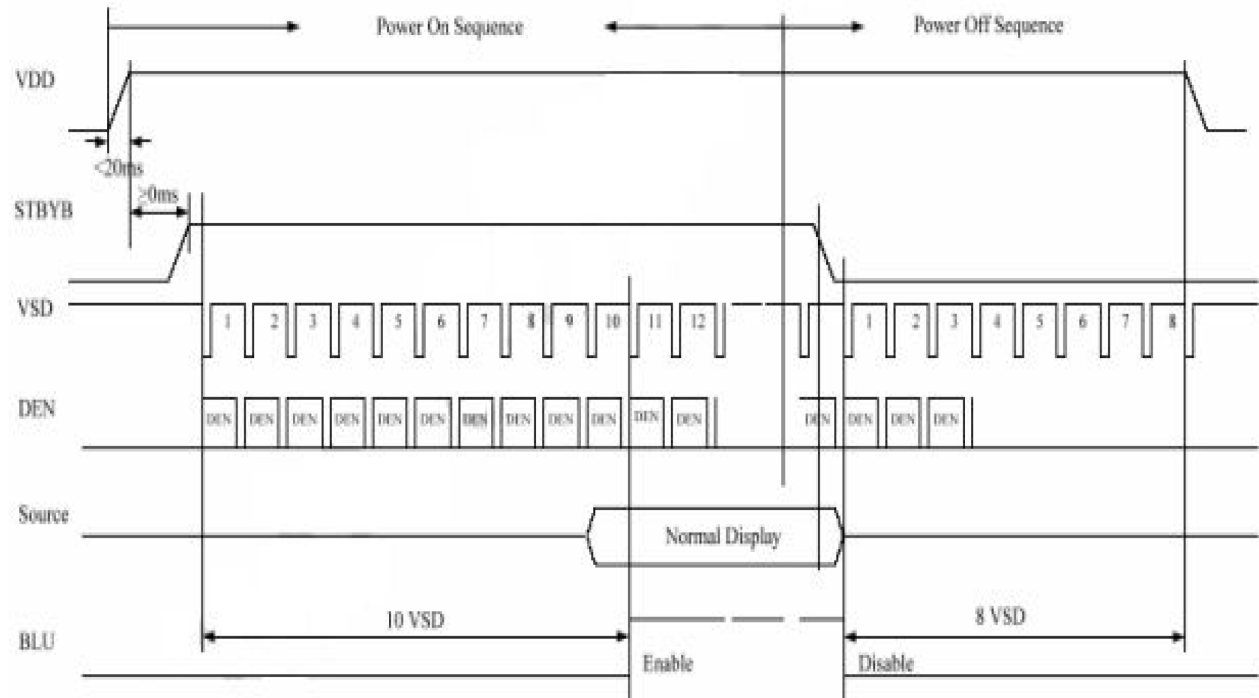
Note: DE timing refer to HSD, VSD input timing.

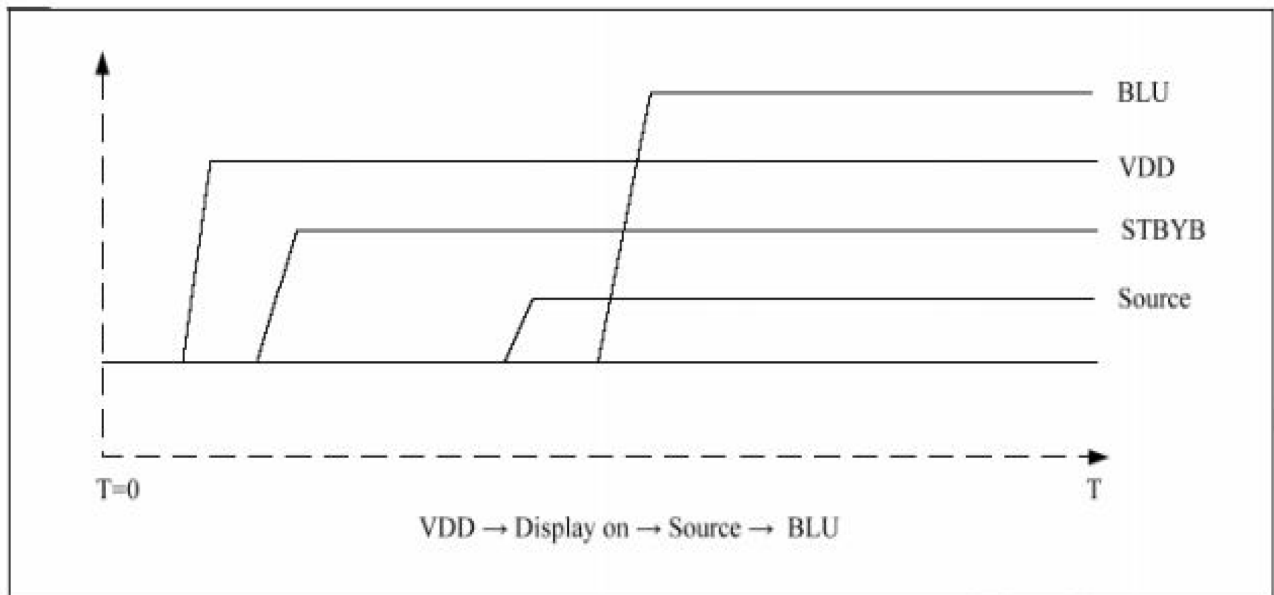
Vertical input timing Diagram:



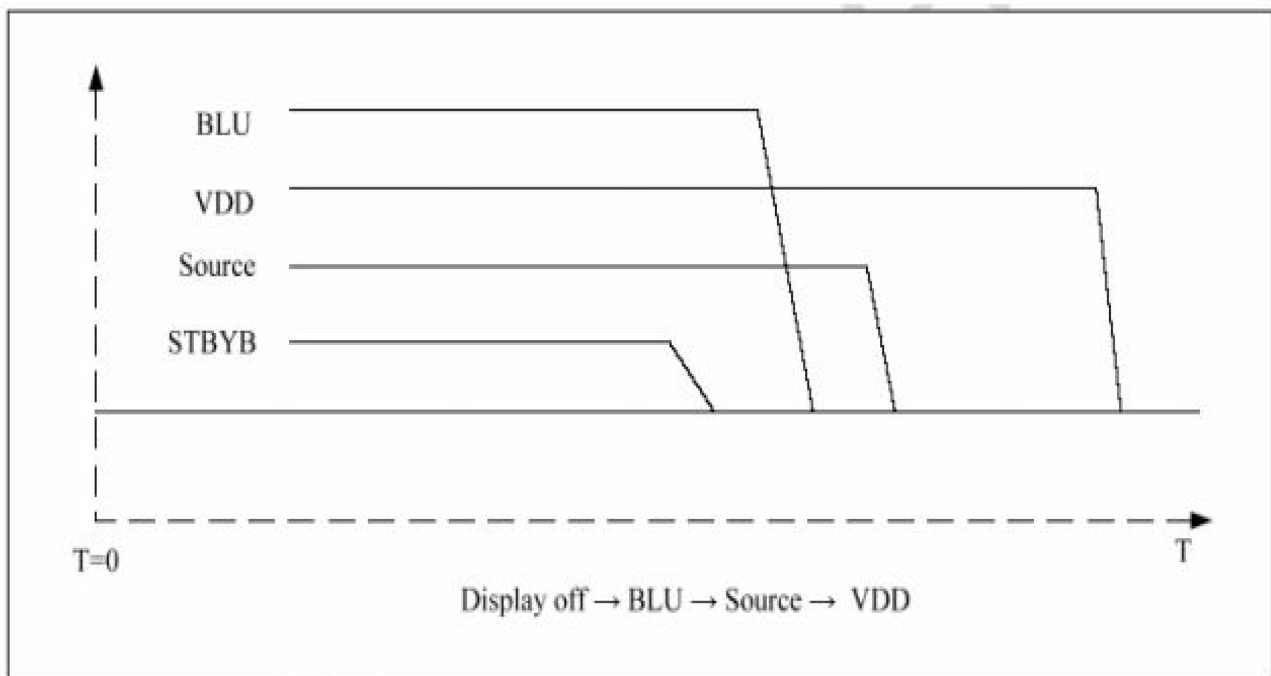


8.3 Power On/Off Sequence





Power On Sequence



Power Off Sequence

## 9. Optical Specification

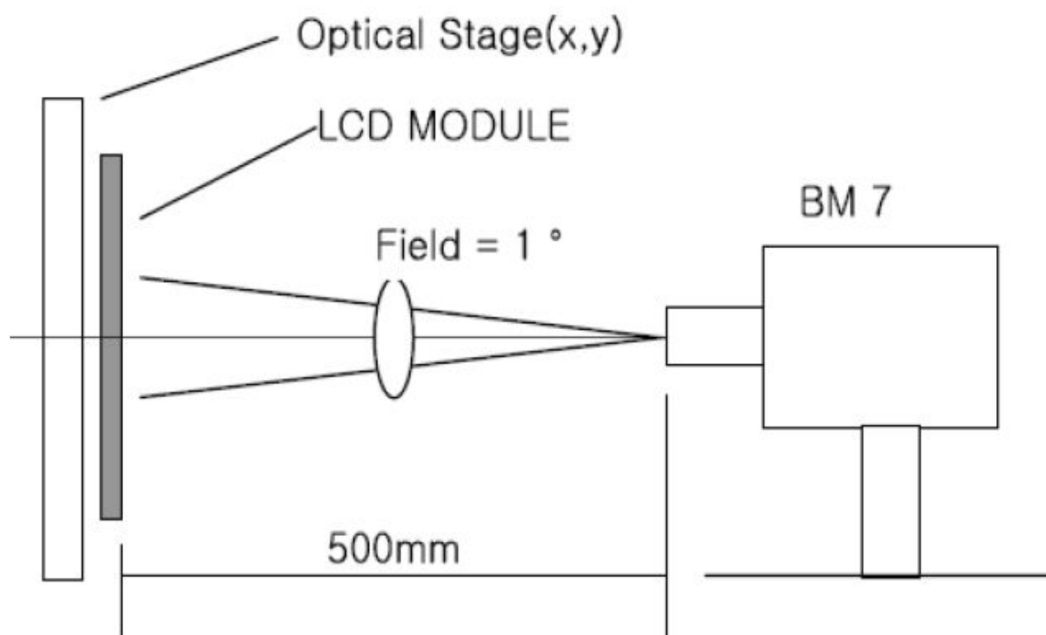
Ta=25°C

| Item           |       | Symbol     | Condition           | Min | Typ   | Max | Unit              | Remark           |
|----------------|-------|------------|---------------------|-----|-------|-----|-------------------|------------------|
| Contrast Ratio |       | CR         | $\theta=0^{\circ}$  | 400 | 500   | -   |                   | Note 1<br>Note 2 |
| Response Time  |       | Ton/Toff   | 25℃                 | -   | 20    | 30  | ms                | Note 1<br>Note 3 |
| View Angles    |       | $\theta T$ | $CR\geq 10$         | 40  | 50    | -   | Degree            | Note 4           |
|                |       | $\theta B$ |                     | 60  | 70    | -   |                   |                  |
|                |       | $\theta L$ |                     | 60  | 70    | -   |                   |                  |
|                |       | $\theta R$ |                     | 60  | 70    | -   |                   |                  |
| Chromaticity   | Red   | X          | Brightness<br>is on | -   | 0.618 | -   |                   | Note 1<br>Note 5 |
|                |       | Y          |                     | -   | 0.326 | -   |                   |                  |
|                | Green | X          |                     | -   | 0.317 | -   |                   |                  |
|                |       | Y          |                     | -   | 0.568 | -   |                   |                  |
|                | Blue  | X          |                     | -   | 0.127 | -   |                   |                  |
|                |       | Y          |                     | -   | 0.165 | -   |                   |                  |
|                | White | X          |                     | -   | 0.330 | -   |                   |                  |
|                |       | Y          |                     | -   | 0.357 | -   |                   |                  |
| NTSC           |       | S          |                     | -   | 50    | -   | %                 | Note 5           |
| Luminance      |       | L          |                     | -   | 240   | -   | cd/m <sup>2</sup> | Note 1<br>Note 6 |
| Uniformity     |       | U          |                     | 75  | 80    | -   | %                 | Note 1<br>Note 7 |

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C)

LED back-light: ON, Environment brightness < 150 lx

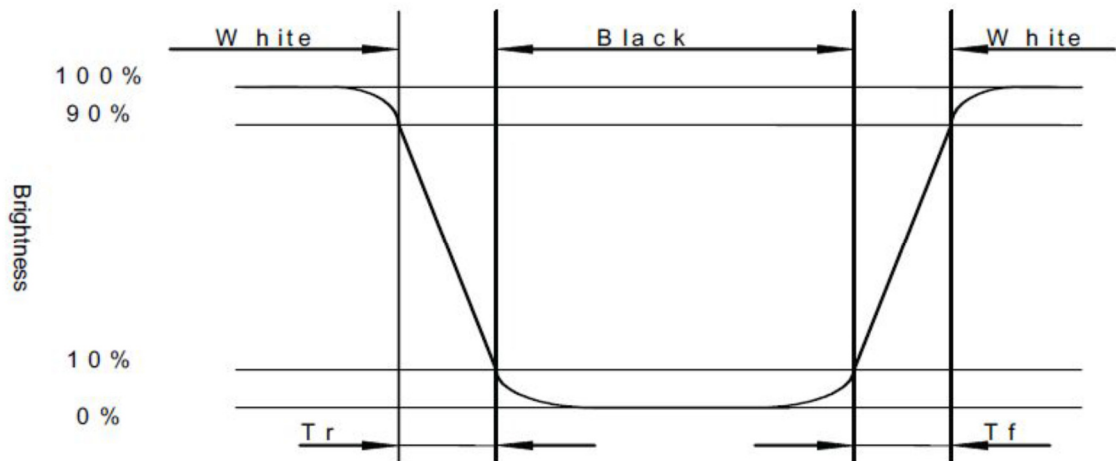


Note 2: Contrast ratio is defined as follow:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

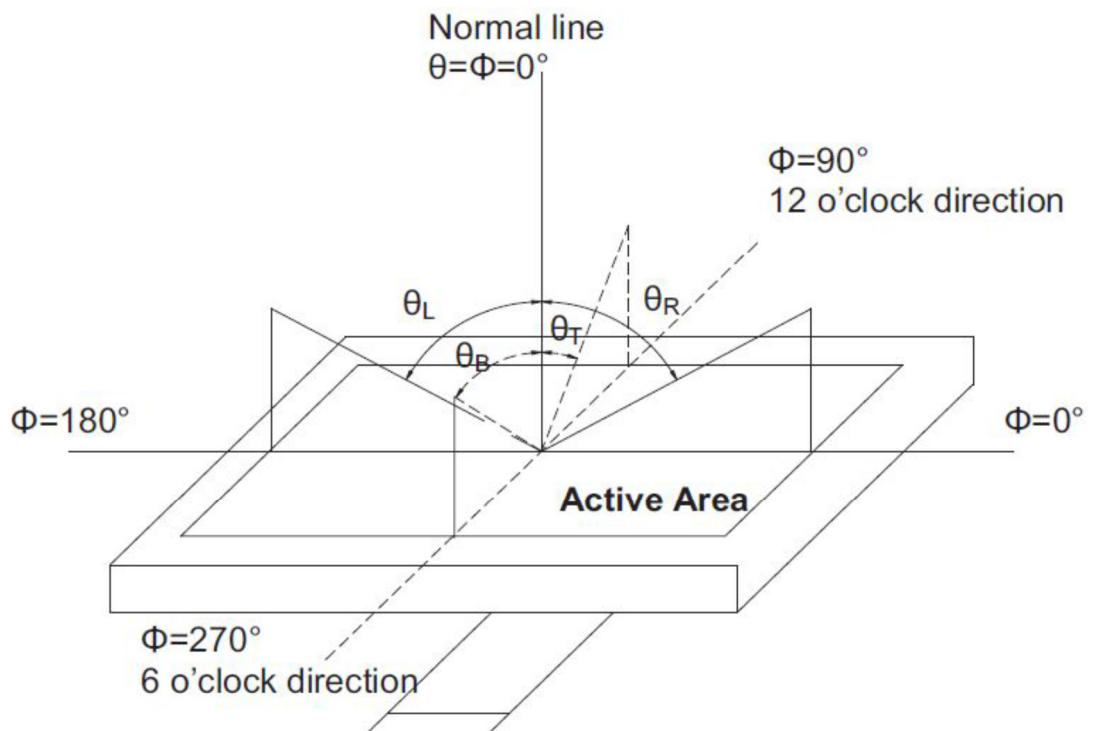
Note 3: Response time is defined as follow:

Response time is the time required for the display to transition from black to white (Rise Time,  $T_r$ ) and from white to black (Decay Time,  $T_f$ ).



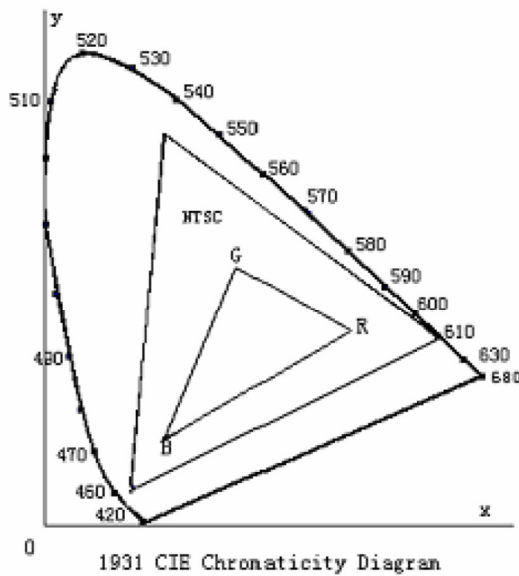
Note 4: Viewing angle range is defined as follow:

Viewing angle is measured at the center point of the LCD.



Note 5: Color chromaticity is defined as follow: (CIE1931)

Color coordinates measured at center point of LCD.



$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 6: Luminance is defined as follow:

Luminance is defined as the brightness of all pixels “White” at the center of display area on optimum contrast.

Note 7: Luminance Uniformity is defined as follow:

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Uniformity (U)} = \frac{\text{Minimum Luminance( brightness ) in 9 points}}{\text{Maximum Luminance( brightness ) in 9 points}}$$

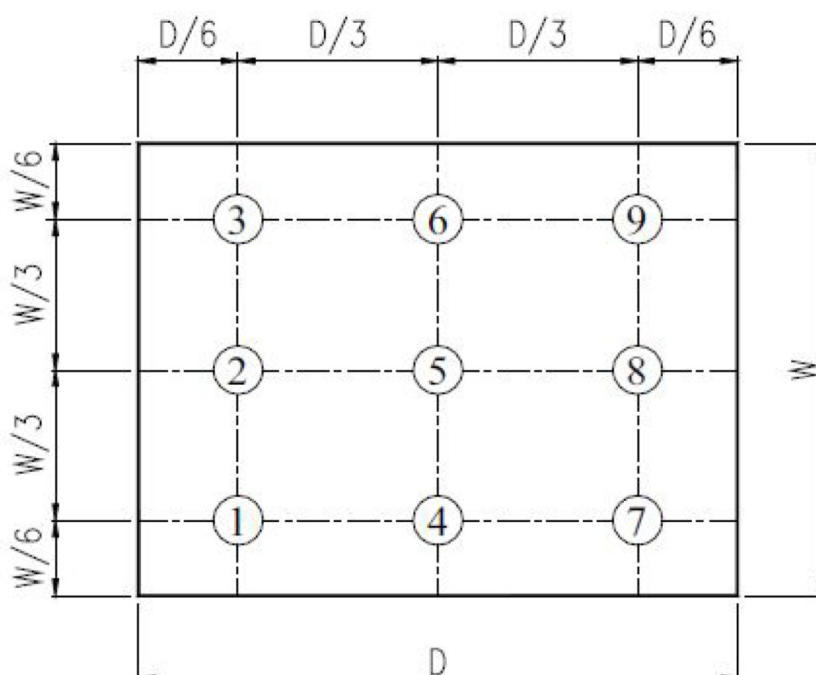


Fig. 2 Definition of uniformity

## 10. Environmental / Reliability Tests

| No | Test Item                         | Condition                                                                                                   | Judgment Criteria                                           |
|----|-----------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| 1  | High Temp Operation               | Ts=+70℃, 120hrs                                                                                             | Per table in below                                          |
| 2  | Low Temp Operation                | Ta=-20℃, 120hrs                                                                                             | Per table in below                                          |
| 3  | High Temp Storage                 | Ta=+80℃, 120hrs                                                                                             | Per table in below                                          |
| 4  | Low Temp Storage                  | Ta=-30℃, 120hrs                                                                                             | Per table in below                                          |
| 5  | High Temp & High Humidity Storage | Ta=+60℃, 90% RH<br>120 hours                                                                                | Per table in below<br>(polarizer discoloration is excluded) |
| 6  | Thermal Shock (Non-operation)     | -30℃ 30 min~+80℃ 30 min,<br>Change time: 5min, 10 Cycles                                                    | Per table in below                                          |
| 7  | ESD (Operation)                   | C=150pF, R=330Ω, 5points/panel<br>Air: ±8KV, 5times;<br>Contact: ±4KV, 5 times;                             | Per table in below                                          |
| 8  | Vibration (Non-operation)         | Frequency range: 10~55Hz,<br>Stroke: 1.5mm<br>Sweep: 10Hz~55Hz~10Hz 2 hours<br>for each direction of X.Y.Z. | Per table in below                                          |
| 9  | Shock (Non-operation)             | 60G 6ms, ±X,±Y,±Z 3times, for<br>each direction                                                             | Per table in below                                          |
| 10 | Package Drop Test                 | Height: 80 cm,<br>1 corner, 3 edges, 6 surfaces                                                             | Per table in below                                          |

| Inspection             | Criterion (after test)                                                              |
|------------------------|-------------------------------------------------------------------------------------|
| Appearance             | No Crack on the FPC, on the LCD Panel                                               |
| Alignment of LCD Panel | No Bubbles in the LCD Panel<br>No other Defects of Alignment in Active area         |
| Electrical current     | Within device specifications                                                        |
| Function / Display     | No Broken Circuit, No Short Circuit or No Black line<br>No Other Defects of Display |

## 11. Precautions for Use of LCD Modules

### 11.1 Safety

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

### 11.2 Handling

- The LCD and touch panel is made of plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
- Do not handle the product by holding the flexible pattern portion in order to assure the Reliability
- Transparency is an important factor for the touch panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.
- Provide a space so that the panel does not come into contact with other components.

- E. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.
- F. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.
- G. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.
- H. To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.

#### 11.3 Static Electricity

- A. Ground soldering iron tips, tools and testers when they are in operation.
- B. Ground your body when handling the products.
- C. Power on the LCD module before applying the voltage to the input terminals.
- D. Do not apply voltage which exceeds the absolute maximum rating.
- E. Store the products in an anti-electrostatic bag or container.

#### 11.4 Storage

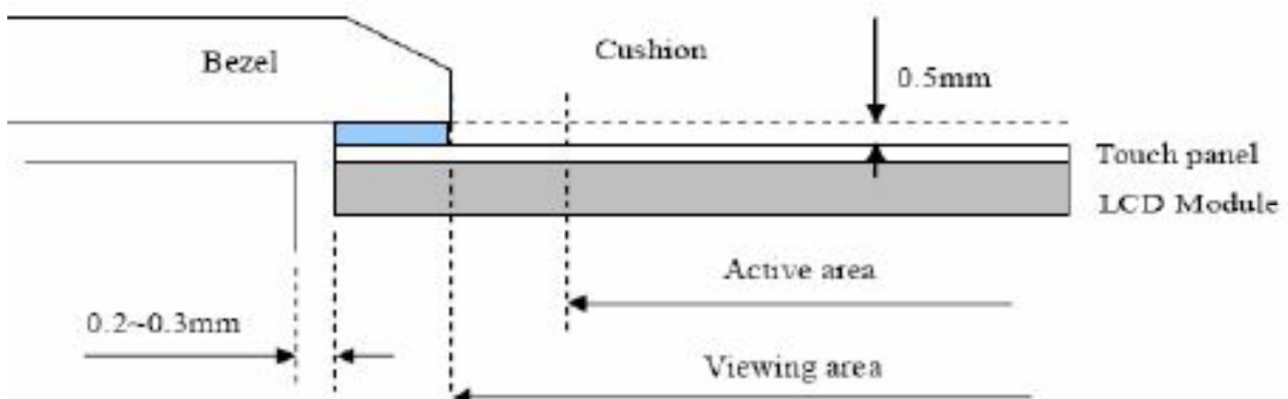
- A. Store the products in a dark place at  $+25^{\circ}\text{C} \pm 10^{\circ}\text{C}$  with low humidity (40% RH to 60% RH). Don't expose to sunlight or fluorescent light.
- B. Storage in a clean environment, free from dust, active gas, and solvent.

#### 11.5 Cleaning

- A. Do not wipe the touch panel with dry cloth, as it may cause scratch.
- B. Wipe off the stain on the product by using soft cloth moistened with ethanol. Do not allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. Do not use any organic solvent or detergent other than ethanol.

#### 11.6 Cautions for installing and assembling

Bezel edge must be positioned in the area between the Active area and View area. The bezel may press the touch screen and cause activation if the edge touches the active area. A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected activation if the gap is too narrow. There is a tolerance of 0.2 to 0.3mm for the outside dimensions of the touch panel and tail. A gap must be made to absorb the tolerance in the case and connector.



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В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

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