



TFT LCD Module

Product Specification

DT043BTFT-PTS2

**4.3" (480RGB x 272 DOTS) TFT Module
With Capacitive Touch Screen**

January 11, 2021

Remark:

Contents in this document are subject to change without notice. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of Displaytech.

Displaytech

Email: sales@displaytech.com.hk

Website: <http://www.displaytech.com.hk>

Revision Record

| REV | CHANGES | DATE |
|-------------------------------|--|--------------|
| 1.0 | First release | Sep 30, 2016 |
| 2.0 (Ref. 3.0 20200410) | <ul style="list-style-type: none">• Changed P/N from DT043BTFT-PTS1 to DT043BTFT-PTS2• Changed touch driver IC from FT5346 to FT5446 | Apr 10, 2020 |
| 3.0 (Ref. 3.1 20201127) | Updated some details. | Nov 27, 2020 |
| 3.1 (Ref 3.2 20210111) | <ul style="list-style-type: none">• Updated the section 4 Outline Drawing;• Updated CTP pin 5 signal in section 5;• Updated section 7.2 forward voltage from 15V to 16V. | Jan 11, 2021 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Table of Content

| | |
|---|-----------|
| Revision Record | 1 |
| 1. Scope | 3 |
| 2. Application | 3 |
| 3. General Information..... | 3 |
| 4. Outline Drawing | 4 |
| 5. Interface signals | 5 |
| 6. Absolute maximum Ratings | 6 |
| 6.1. Electrical Absolute max. ratings | 6 |
| 6.2. Environment Conditions | 6 |
| 7. Electrical Specifications | 7 |
| 7.1 Electrical characteristics..... | 7 |
| 7.2 LED Backlight..... | 7 |
| 8. Optical Specification | 8 |
| 9. Environmental / Reliability Tests..... | 11 |
| 10. Precautions for Use of LCD Modules | 12 |

1. Scope

This data sheet is to introduce the specification of DT043BTFT-PTS2 active matrix TFT module. It is composed of a color TFT-LCD panel, driver IC, FPC, a backlight unit and capacitive touch panel. The 4.3" display area contains 480(RGB) x 272 pixels.

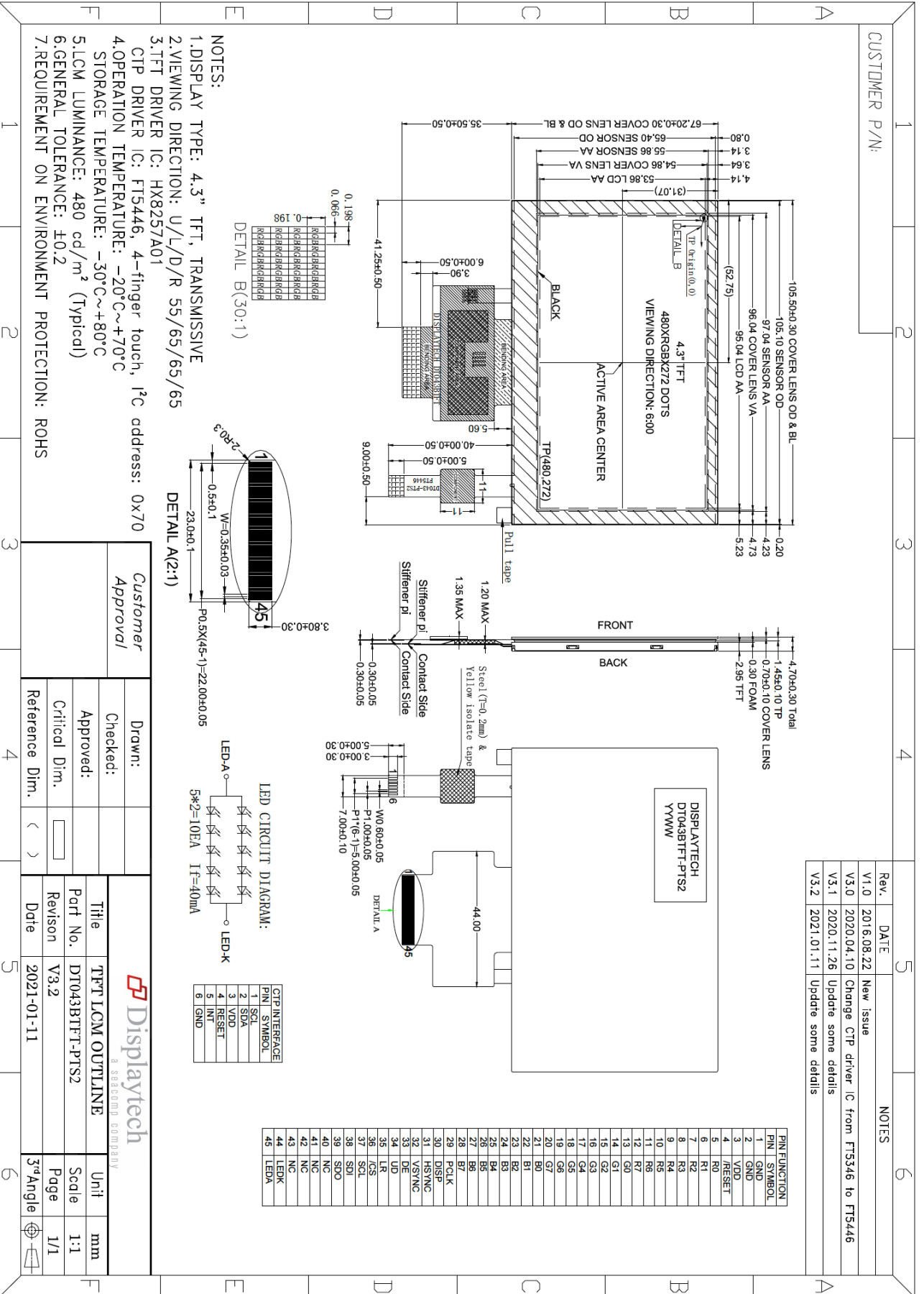
2. Application

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

3. General Information

| Item | Contents | Unit |
|-------------------------------|-----------------------|------|
| Size | 4.3 | Inch |
| Resolution | 480(RGB)x272 | / |
| Interface | RGB | / |
| Technology type | a-Si TFT | / |
| Pixel Configuration | R.G.B Vertical Stripe | |
| Outline Dimension (W x H x D) | 105.50x67.20x4.70 | mm |
| Active Area | 95.04x53.86 | mm |
| Display Mode | Transmissive | / |
| Backlight Type | LED | / |
| Display IC | HX8257A01 | / |
| Driver IC for CTP | FT5446 | / |
| Viewing Direction | 6 o'clock | / |

4. Outline Drawing



5. Interface signals

Recommended connector: FH12-45S-0.5SH

| Pin No. | Symbol | I/O | Function |
|---------|---------|-----|--|
| 1~2 | GND | P | Ground |
| 3 | VDD | P | Power supply |
| 4 | RESET | I | Reset the display, active low |
| 5~12 | R0 – R7 | I | Red data bus |
| 13~20 | G0 – G7 | I | Green data bus |
| 21~28 | B0 – B7 | I | Blue data bus |
| 29 | PCLK | I | Data clock |
| 30 | DISP | I | Display ON/OFF control |
| 31 | HSYNC | I | Horizontal synchronous signal input |
| 32 | VSYNC | I | Vertical synchronous signal input |
| 33 | ENABLE | I | Data enable pin Note 1 |
| 34 | U/D | I | Select up or down scanning direction Note 2 |
| 35 | L/R | I | Select left to right scanning direction Note 2 |
| 36 | CS | I | Chip select signal |
| 37 | SCL | I | Serial clock signal |
| 38 | SDI | I | Serial in signal |
| 39 | SDO | I | Serial out signal |
| 40 | NC | O | No connection |
| 41 | NC | O | No connection |
| 42 | NC | O | No connection |
| 43 | NC | O | No connection |
| 44 | LEDK | P | LED backlight Cathode |
| 45 | LEDA | P | LED backlight Anode |

Notes:

1. See display driver datasheet for usage details.

2.

| U/D | L/R | Function |
|-----|-----|--------------------------|
| 0 | 1 | Inverse U/D |
| 0 | 0 | Inverse L/R, Inverse U/D |
| 1 | 1 | Normal |
| 1 | 0 | Inverse L/R |

CTP signal interface:

Recommended connector: FH12-6S-1SH(55)

| Pin No. | Symbol | Function |
|---------|--------|-----------------------------------|
| 1 | SCL | I2C clock signal |
| 2 | SDA | I2C data signal |
| 3 | VDD | Power supply |
| 4 | RESET | External reset/wake. Active low. |
| 5 | INT | Interrupt output pin. Active low. |
| 6 | GND | Ground |

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

| Parameter | Symbol | MIN | MAX | Unit | Remark |
|----------------------|--------|------|-----|------|--------|
| Power Supply Voltage | VDD | -0.3 | 3.6 | V | |

Notes:

- 1.If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. VDD >VSS must be maintained.

6.2. Environment Conditions

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

Notes:

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature.
The phenomenon is reversible.
3. Ta<=40°C:85%RH MAX.
Ta>=40°C:Absolute humidity must be lower than the humidity of 85%RH at 40°C.

7. Electrical Specifications

7.1 Electrical characteristics

GND=0V, Ta=25°C

| Parameter | Symbol | Condition | MIN | TYP | MAX | Note |
|---------------------|------------------|-----------------|-----------------------|---------|-----|---------|
| Power supply | VDD | Ta=25°C | 3.0 | 3.3 | 3.6 | |
| Input Voltage | "H" | V _{IH} | V _{DD} =3.3V | 0.7*VDD | - | VDD |
| | "L" | V _{IL} | V _{DD} =3.3V | 0 | - | 0.3*VDD |
| Current consumption | I _{CC1} | Normal mode | - | 20 | 30 | |
| | I _{CC2} | Sleep mode | - | 0.05 | 0.1 | |
| Clock frequency | f _{CLK} | - | - | 9 | 12 | |

Note: Tested in 1×1 chessboard pattern.

7.2 LED Backlight

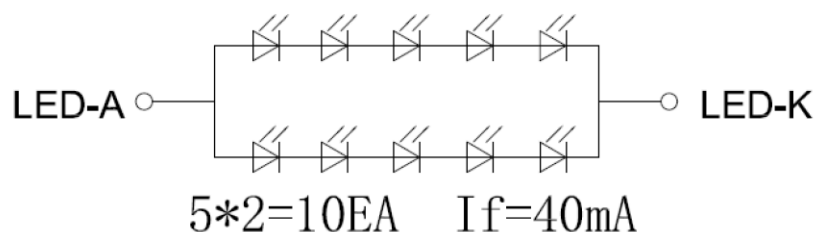
Ta=25°C

| Item | Symbol | MIN | TYP | MAX | Unit | Remark |
|-----------------|----------------|-----|-------|-----|------|--------|
| Forward Current | I _F | - | 40 | - | mA | |
| Forward Voltage | V _F | - | 16 | - | V | |
| LED life time | - | - | 20000 | - | Hr | Note |

Notes:

- The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and I_F=40mA. The LED lifetime could be decreased if operating I_F is larger than 40mA.
- Backlight should be driven in constant current mode. Use a supply voltage of 17 Volts or higher with a series resistor to limit the current to 40 mA (e.g. (17V - (5 x 3.2V))/0.040 = 25 ohms). Alternatively, the backlight can be driven from lower voltages with a boost LED driver such as the ON Semiconductor CAT4139.
- LED Power Consumption: 640mW (Typ).
- LED Circuit Diagram as follow:

LED CIRCUIT DIAGRAM:



8. Optical Specification

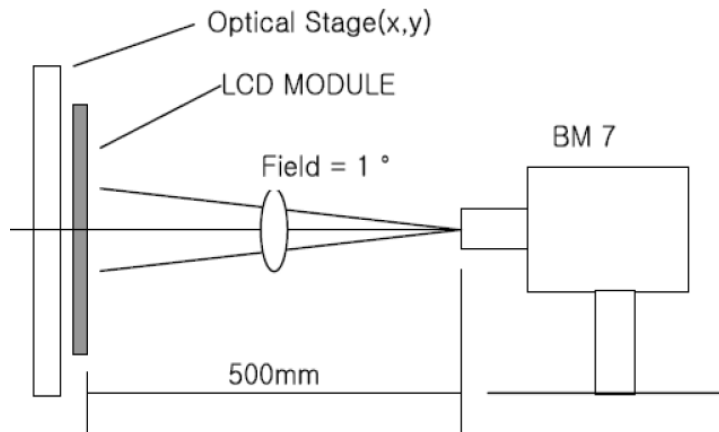
Ta=25°C

| Item | Symbol | Condition | Min | Typ | Max | Unit | Remark |
|----------------|------------|--------------------|-----|-------|-------|-------------------|----------------|
| Contrast Ratio | CR | $\Theta=0^{\circ}$ | 350 | 500 | - | | Note1 Note2 |
| Response Time | Tr | 25°C | - | 10 | - | ms | Note1 |
| | Tf | | - | 10 | - | ms | Note3 |
| View Angles | ΘT | CR \geq 10 | - | 55 | - | Degree | Note4 |
| | ΘB | | - | 65 | - | | |
| | ΘL | | - | 65 | - | | |
| | ΘR | | - | 65 | - | | |
| Chromaticity | White | Brightness is on | X | 0.294 | 0.314 | 0.334 | Note5 Note1 |
| | | | Y | 0.324 | 0.344 | 0.364 | |
| | Red | | X | 0.631 | 0.651 | 0.671 | |
| | | | Y | 0.311 | 0.331 | 0.351 | |
| | Green | | X | 0.296 | 0.316 | 0.336 | |
| | | | Y | 0.553 | 0.573 | 0.593 | |
| | Blue | | X | 0.118 | 0.138 | 0.158 | |
| | | | Y | 0.111 | 0.131 | 0.151 | |
| NTSC | S | | 50 | 60 | - | % | Note5 |
| Luminance | L | | 350 | 480 | - | Cd/m ² | Note1 Note6 |
| Uniformity | U | | -- | 80 | - | % | Note1 Note7 |

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C);

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

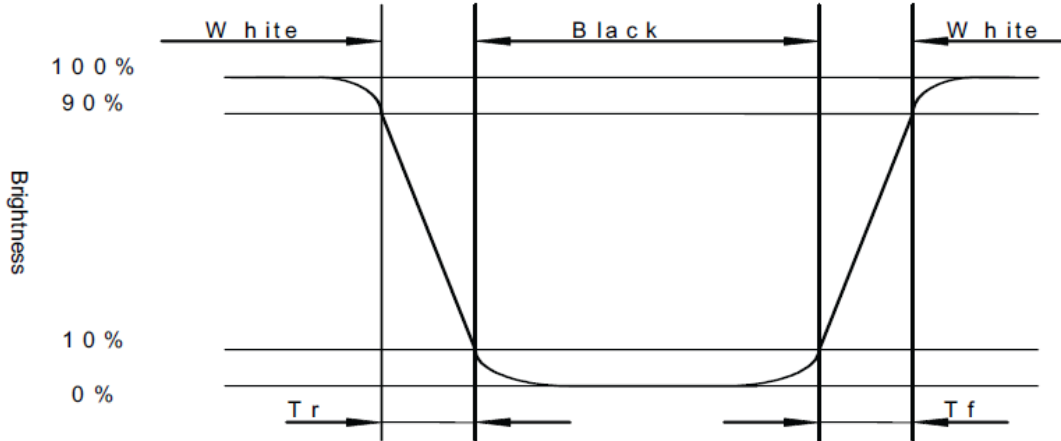


Note 2: Contrast ratio is defined as follow:

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

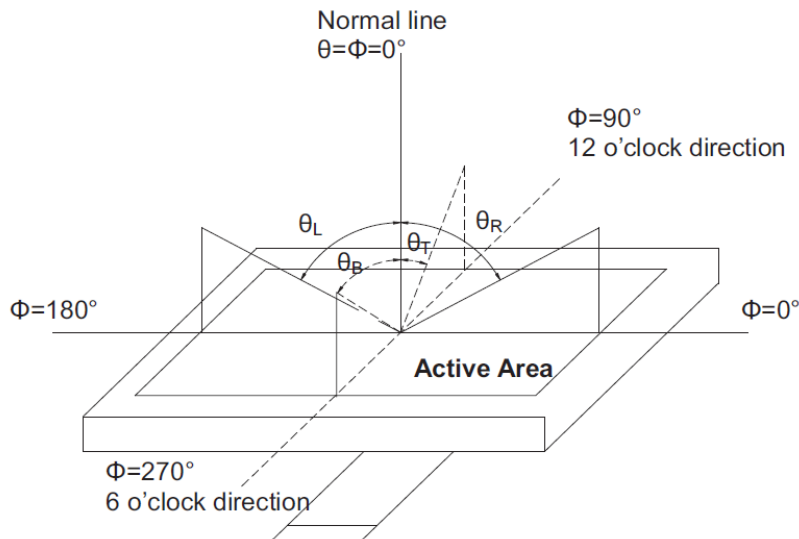
Note 3: Response time is defined as follow:

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).



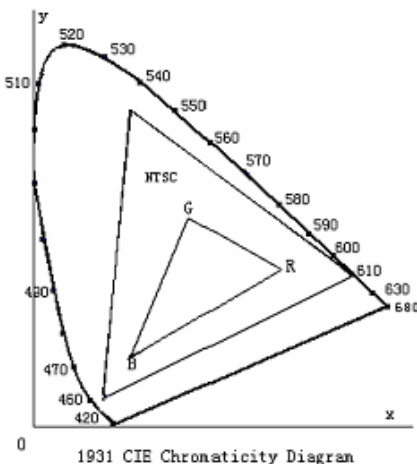
Note 4: Viewing angle range is defined as follow:

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.

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

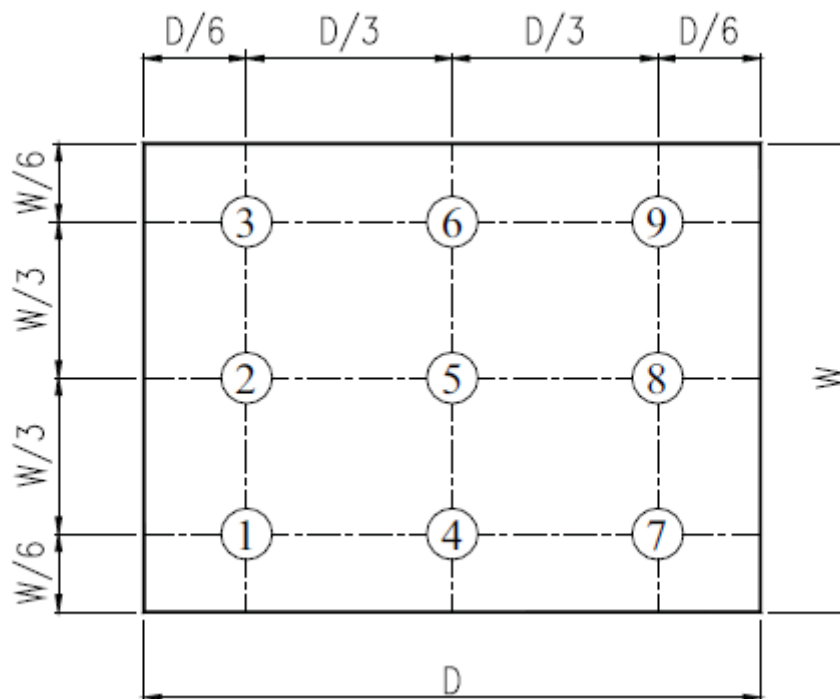


Fig. 2 Definition of uniformity

9. Environmental / Reliability Tests

| No | Test Item | Condition | Judgment criteria |
|----|-----------------------------------|--|---|
| 1 | High Temp Operation | Ta= +70℃, 96hrs | Per table in below |
| 2 | Low Temp Operation | Ta= -20℃, 96hrs | Per table in below |
| 3 | High Temp Storage | Ts= +80℃, 96hrs | Per table in below |
| 4 | Low Temp Storage | Ts= -30℃, 96hrs | Per table in below |
| 5 | High Temp & High Humidity Storage | Ts=+60℃, 90% RH, 96 hours | Per table in below (polarizer discoloration is excluded) |
| 6 | Thermal Shock (Non-operation) | -30℃ 30 min~+80℃ 30 min, Change time:5min, 5 Cycles | Per table in below |
| 7 | ESD (Operation) | C=150pF, R=330Ω · 5points/panel Air:±8KV, 5times; Contact:±4KV, 5 times; | Per table in below |
| 8 | Vibration (Non-operation) | 10Hz~150Hz, 100m/s ² , 120min | Per table in below |
| 9 | Shock (Non-operation) | Half- sine wave,300m/s ² ,11ms | Per table in below |
| 10 | Package Drop Test | Height:80 cm, 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 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 No Other Defects of Display |

10. Precautions for Use of LCD Modules

10.1 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.

10.2 Handling

- A. 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.
- B. Do not handle the product by holding the flexible pattern portion in order to assure the reliability
- C. 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.
- D. 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.

10.3 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.

10.4 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.

10.5 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.

10.6 Cautions for installing and assembling

- A. 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.
- B. In order to make the display assembly stable and firm, Displaytech recommends to design some supporting at the display backside, especially for the display with tape-attached touch panel, such supporting is important and essential, or else, the display may drop-off from front after some period of time.
- C. Do not display the fixed pattern for a long time because it may develop image sticking due to the LCD structure. If the screen is displayed with fixed pattern, use a screen saver.

