

# TFT DISPLAY SPECIFICATION

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**Winstar Display Co., LTD**  
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## **SPECIFICATION**

**CUSTOMER :** \_\_\_\_\_

**MODULE NO.:** **WF70A2SIAGDNGA#**

|                                                  |                                              |
|--------------------------------------------------|----------------------------------------------|
| <b>APPROVED BY:</b><br>( FOR CUSTOMER USE ONLY ) | <b>PCB VERSION:</b> _____ <b>DATA:</b> _____ |
|--------------------------------------------------|----------------------------------------------|

| SALES BY                | APPROVED BY | CHECKED BY | PREPARED BY |
|-------------------------|-------------|------------|-------------|
|                         |             |            | 葉虹蘭         |
| ISSUED DATE: 2021/06/15 |             |            |             |

TFT Display Inspection Specification: <https://www.winstar.com.tw/technology/download.html>

Precaution in use of TFT module: <https://www.winstar.com.tw/technology/download/declaration.html>



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MODLE NO :

**RECORDS OF REVISION**

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| VERSION | DATE       | REVISED<br>PAGE NO. | SUMMARY                                  |
|---------|------------|---------------------|------------------------------------------|
| 0       | 2021/04/19 |                     | First issue                              |
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# 1.Module Classification Information

W F 70 A2 S I A G D N G A #  
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬

|   |                                                                                                                                                                           |                                                                                                                                                                                                                         |                                          |         |   |         |                                                                                                                           |                                                                                                                                                                                                                                              |   |         |                                |         |  |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---------|---|---------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---------|--------------------------------|---------|--|
| ① | Brand : WINSTAR DISPLAY CORPORATION                                                                                                                                       |                                                                                                                                                                                                                         |                                          |         |   |         |                                                                                                                           |                                                                                                                                                                                                                                              |   |         |                                |         |  |
| ② | Display Type : F→TFT Type, J→Custom TFT                                                                                                                                   |                                                                                                                                                                                                                         |                                          |         |   |         |                                                                                                                           |                                                                                                                                                                                                                                              |   |         |                                |         |  |
| ③ | Display Size : 7.0” TFT                                                                                                                                                   |                                                                                                                                                                                                                         |                                          |         |   |         |                                                                                                                           |                                                                                                                                                                                                                                              |   |         |                                |         |  |
| ④ | Model serials no.                                                                                                                                                         |                                                                                                                                                                                                                         |                                          |         |   |         |                                                                                                                           |                                                                                                                                                                                                                                              |   |         |                                |         |  |
| ⑤ | Backlight Type :                                                                                                                                                          | F→CCFL, White<br>S→LED, High Light White                                                                                                                                                                                |                                          |         |   |         |                                                                                                                           | T→LED, White<br>Z→Nichia LED, White                                                                                                                                                                                                          |   |         |                                |         |  |
| ⑥ | LCD Polarize Type/<br>Temperature range/ Gray Scale Inversion Direction                                                                                                   | A→Transmissive, N.T, IPS TFT<br>C→Transmissive, N. T, 6:00 ;<br>F→Transmissive, N.T,12:00 ;<br>I→Transmissive, W. T, 6:00<br>K→Transflective, W.T,12:00<br>L→Transmissive, W.T,12:00<br>N→Transmissive, Super W.T, 6:00 |                                          |         |   |         |                                                                                                                           | Q→Transmissive, Super W.T, 12:00<br>R→Transmissive, Super W.T, O-TFT<br>V→Transmissive, Super W.T, VA TFT<br>W→Transmissive, Super W.T, IPS TFT<br>X→Transmissive, W.T, VA TFT<br>Y→Transmissive, W.T, IPS TFT<br>Z→Transmissive, W.T, O-TFT |   |         |                                |         |  |
| ⑦ | A : TFT LCD<br>B : TFT+SCREW HOLES+CONTROL BOARD<br>C : TFT+ SCREW HOLES +A/D BOARD<br>D : TFT+ SCREW HOLES +A/D BOARD+CONTROL BOARD<br>E : TFT+ SCREW HOLES +POWER BOARD |                                                                                                                                                                                                                         |                                          |         |   |         | F : TFT+CONTROL BOARD<br>G : TFT+ SCREW HOLES<br>H : TFT+D/V BOARD<br>I : TFT+ SCREW HOLES +D/V BOARD<br>J : TFT+POWER BD |                                                                                                                                                                                                                                              |   |         |                                |         |  |
| ⑧ | Resolution:                                                                                                                                                               |                                                                                                                                                                                                                         |                                          |         |   |         |                                                                                                                           |                                                                                                                                                                                                                                              |   |         |                                |         |  |
|   | A                                                                                                                                                                         | 128160                                                                                                                                                                                                                  | B                                        | 320234  | C | 320240  | D                                                                                                                         | 480234                                                                                                                                                                                                                                       | E | 480272  | F                              | 640480  |  |
|   | G                                                                                                                                                                         | 800480                                                                                                                                                                                                                  | H                                        | 1024600 | I | 320480  | J                                                                                                                         | 240320                                                                                                                                                                                                                                       | K | 800600  | L                              | 240400  |  |
|   | M                                                                                                                                                                         | 1024768                                                                                                                                                                                                                 | N                                        | 128128  | P | 1280800 | Q                                                                                                                         | 480800                                                                                                                                                                                                                                       | R | 640320  | S                              | 480128  |  |
|   | T                                                                                                                                                                         | 800320                                                                                                                                                                                                                  | U                                        | 8001280 | V | 176220  | W                                                                                                                         | 1280398                                                                                                                                                                                                                                      | X | 1024250 | Y                              | 1920720 |  |
|   | Z                                                                                                                                                                         | 800200                                                                                                                                                                                                                  | 2                                        | 1024324 | 3 | 7201280 | 4                                                                                                                         | 19201200                                                                                                                                                                                                                                     | 5 | 1366768 | 6                              | 1280320 |  |
| ⑨ | D: Digital L : LVDS M:MIPI                                                                                                                                                |                                                                                                                                                                                                                         |                                          |         |   |         |                                                                                                                           |                                                                                                                                                                                                                                              |   |         |                                |         |  |
| ⑩ | Interface:                                                                                                                                                                |                                                                                                                                                                                                                         |                                          |         |   |         |                                                                                                                           |                                                                                                                                                                                                                                              |   |         |                                |         |  |
|   | N                                                                                                                                                                         | Without control board                                                                                                                                                                                                   |                                          |         | A | 8Bit    | B                                                                                                                         | 16Bit                                                                                                                                                                                                                                        |   | H       | HDMI                           |         |  |
|   | I                                                                                                                                                                         | I2C Interface                                                                                                                                                                                                           |                                          |         | R | RS232   | S                                                                                                                         | SPI Interface                                                                                                                                                                                                                                |   | U       | USB                            |         |  |
| ⑪ | TS:                                                                                                                                                                       |                                                                                                                                                                                                                         |                                          |         |   |         |                                                                                                                           |                                                                                                                                                                                                                                              |   |         |                                |         |  |
|   | N                                                                                                                                                                         | Without TS                                                                                                                                                                                                              |                                          |         |   | T       | Resistive touch panel                                                                                                     |                                                                                                                                                                                                                                              |   | C       | Capacitive touch panel (G-F-F) |         |  |
|   | G                                                                                                                                                                         | Capacitive touch panel (G-G)                                                                                                                                                                                            |                                          |         |   |         | C1                                                                                                                        | Capacitive touch panel (G-F-F)+OCA                                                                                                                                                                                                           |   |         |                                |         |  |
|   | C2                                                                                                                                                                        | Capacitive touch panel (G-F-F)+OCR                                                                                                                                                                                      |                                          |         |   |         | G1                                                                                                                        | Capacitive touch panel (G-G)+OCA                                                                                                                                                                                                             |   |         |                                |         |  |
|   | G2                                                                                                                                                                        | Capacitive touch panel (G-G)+OCR                                                                                                                                                                                        |                                          |         |   |         | B                                                                                                                         | CTP+GG+USB                                                                                                                                                                                                                                   |   |         |                                |         |  |
| ⑫ | Version: X:Raspberry pi                                                                                                                                                   |                                                                                                                                                                                                                         |                                          |         |   |         |                                                                                                                           |                                                                                                                                                                                                                                              |   |         |                                |         |  |
| ⑬ | Special Code                                                                                                                                                              |                                                                                                                                                                                                                         | #:Fit in with ROHS directive regulations |         |   |         |                                                                                                                           |                                                                                                                                                                                                                                              |   |         |                                |         |  |

## **2.Summary**

TFT 7.0" is a TN transmissive type color active matrix TFT liquid crystal display that uses amorphous silicon TFT as switching devices. This module is composed of a TFT\_LCD module. It is usually designed for industrial application and this module follows RoHS.



### 3.General Specifications

| Item                           | Dimension                               | Unit |
|--------------------------------|-----------------------------------------|------|
| Size                           | 7.0                                     | inch |
| Dot Matrix                     | 800 x RGB x 480 (TFT)                   | dots |
| Module dimension               | 165 x 100.0x 7.45                       | mm   |
| Active area                    | 154.08 x 85.92                          | mm   |
| Pixel Pitch                    | 0.1926 X 0.179                          | mm   |
| LCD type                       | TFT, Normally White, Transmissive       |      |
| View Direction                 | 12 o'clock                              |      |
| Gray Scale Inversion Direction | 6 o'clock                               |      |
| Aspect Ratio                   | 16:9                                    |      |
| Backlight Type                 | LED ,Normally White                     |      |
| TFT Interface                  | 24-bit RGB                              |      |
| Color arrangement              | RGB-STRIPLE                             |      |
| TFT Driver IC                  | Source IC: ST-5623D, Gate IC: ST5091D   |      |
| CTP IC                         | ILI2130 or Equivalent                   |      |
| CTP Interface                  | I2C                                     |      |
| CTP FW Version                 | 0x07.0x00.0x00.0x00.0x65.0x90.0x00.0x01 |      |
| CTP Resolution                 | 16384*16384                             |      |
| With /Without TP               | With CTP                                |      |
| Surface                        | Glare                                   |      |

\*Color tone slight changed by temperature and driving voltage.

## 4. Absolute Maximum Ratings

| Item                  | Symbol | Min | Typ | Max | Unit |
|-----------------------|--------|-----|-----|-----|------|
| Operating Temperature | TOP    | -20 | —   | +70 | °C   |
| Storage Temperature   | TST    | -30 | —   | +80 | °C   |

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. 60°C, 90% RH MAX. Temp. > 60°C, Absolute humidity shall be less than 90% RH at 60°C



# 5. Electrical Characteristics

## 5.1. Operating conditions

| Item                     | Symbol           | Min   | Typ  | Max  | Unit | Remark |
|--------------------------|------------------|-------|------|------|------|--------|
| Supply Voltage For Logic | VCC              | 3.0   | 3.3  | 3.6  | V    | Note 2 |
| Supply CTP               | VDDT             | 3.0   | 3.3  | 3.6  | V    |        |
|                          | I <sub>CTP</sub> | —     | 65   | 98   | mA   |        |
| Power voltage            | AVDD             | 10.2  | 10.4 | 10.6 | V    |        |
| Power Supply For Current | VCC = 3.3V       | -     | 4.3  | -    | mA   | -      |
| Power voltage            | VGH              | 14.5  | 15.0 | 15.5 | V    | -      |
| Power voltage            | VGL              | -10.5 | -10  | -9.5 | V    | -      |
| Input signal voltage     | VCOM             | 3.54  | 4.04 | 4.54 | V    | Note 4 |

Note: (1) Vcom must be adjusted to optimize display quality: cross-talk, contrast ratio and etc.

(2) VGH is TFT gate operating voltage

(3) VGL is TFT gate operating voltage

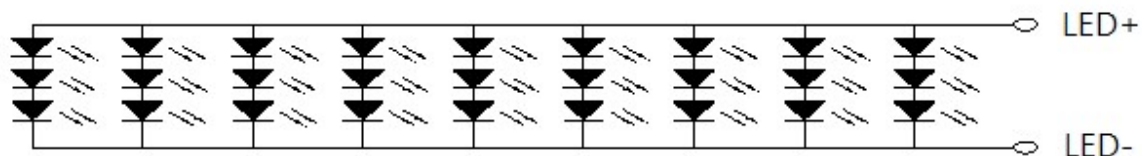
(4) Environmental condition: 25±5

(5) Reference waveform for panel light on is as below: (release after sample output)

## 5.2. LED driving conditions

| Parameter         | Symbol | Min. | Typ.   | Max. | Unit | Remark     |
|-------------------|--------|------|--------|------|------|------------|
| LED current       | -      | -    | 270    | -    | mA   | -          |
| Power Consumption | -      | 2268 | 2430   | 2592 | mW   | -          |
| LED voltage       | LED+   | 8.4  | 9.0    | 9.6  | V    | Note 1     |
| LED Life Time     | -      | -    | 50,000 | -    | Hr   | Note 2,3,4 |

Note 1 : There are 1 Groups LED



Backlight LED Circuit

Note 2 : Ta = 25 °C

Note 3 : Brightness to be decreased to 50% of the initial value

Note 4 : The single LED lamp case

## 6.DC CHARATERISTICS

| Parameter                | Symbol   | Rating |     |        | Unit | Condition |
|--------------------------|----------|--------|-----|--------|------|-----------|
|                          |          | Min    | Typ | Max    |      |           |
| Low level input voltage  | $V_{IL}$ | 0      | -   | 0.3VCC | V    |           |
| High level input voltage | $V_{IH}$ | 0.7VCC | -   | VCC    | V    |           |



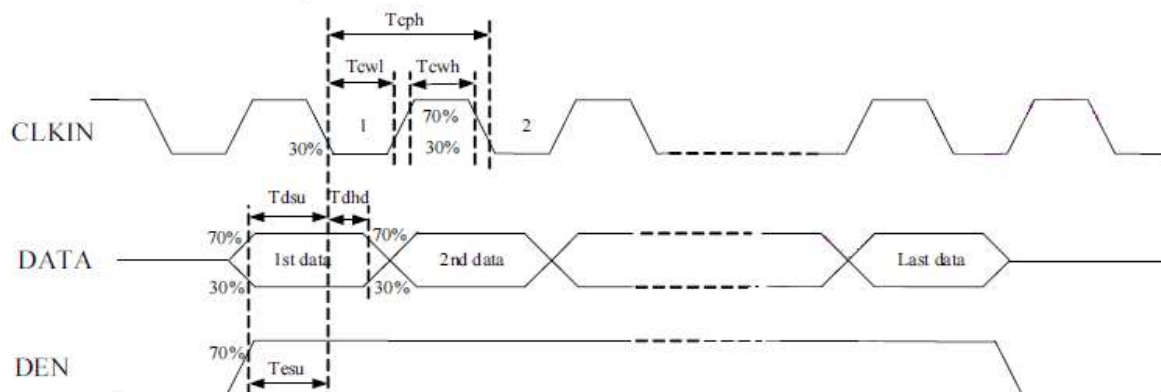
# 7.AC CHARATERISTICS

## 7.1. Parallel DE mode RGB input timing table

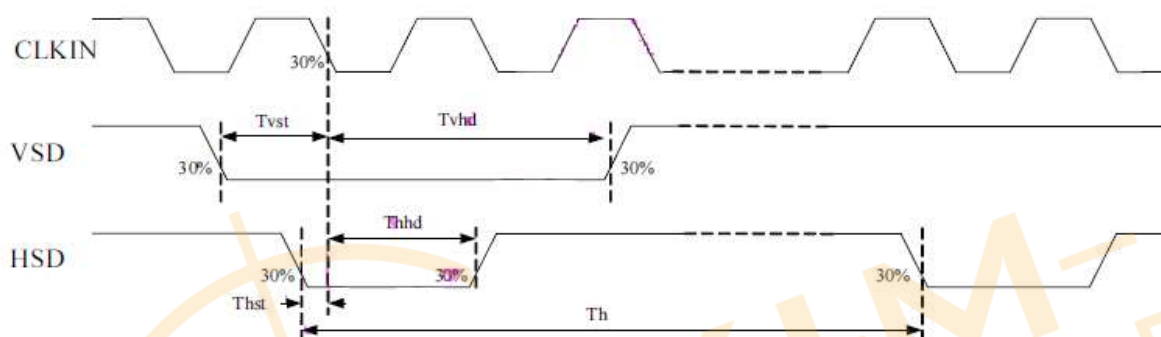
| Signal                         | Symbol | Min | Typ | Max | Unit  | Conditions                                       |
|--------------------------------|--------|-----|-----|-----|-------|--------------------------------------------------|
| VDD Power on Slew Rate         | TPOR   | -   | -   | 20  | ms    | From 0V to 90% VDD                               |
| RSTB pulse width               | TRST   | 10  | -   | -   | us    | Clkin=50MHz                                      |
| CLKIN cycle time               | Tcph   | 20  |     | -   | ns    |                                                  |
| CLKIN pulse duty               | Tcwh   | 40  | 50  | 60  | %     |                                                  |
| 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    | D[7:0], D1[7:0], D2[7:0] to clkin                |
| Date hold time                 | Tdhd   | 8   | -   | -   | ns    | D[7:0], D1[7:0], D2[7:0] to clkin                |
| DE setup time                  | Tesu   | 8   | -   | -   | ns    |                                                  |
| DE hold time                   | Tehd   | 8   | -   | -   | ns    |                                                  |
| Output stable time             | Tsst   | -   | -   | 6   | us    | 10% to 90% target voltage.<br>CL=120pF, R=10Kohm |
| CLKIN Frequency                | Fclk   | -   | 40  | 50  | MHz   | VDD=3.0V~3.6V                                    |
| CLKIN Cycle Time               | Tclk   | 20  | 25  | -   | ns    |                                                  |
| CLKIN Pulse Duty               | Tcwh   | 40  | 50  | 60  | %     | Tclk                                             |
| Time from HSD to Source Output | Thso   | -   | 20  | -   | CLKIN |                                                  |
| Time from HSD to LD            | Thld   | -   | 20  | -   | CLKIN |                                                  |
| Time from HSD to STV           | Thstv  | -   | 2   | -   | CLKIN |                                                  |
| Time from HSD to CKV           | Thckv  | -   | 20  | -   | CLKIN |                                                  |
| Time from HSD to OEV           | Thoev  | -   | 4   | -   | CLKIN |                                                  |
| LD pulse width                 | Twld   | -   | 10  | -   | CLKIN |                                                  |
| CKV pulse width                | Twckv  | -   | 66  | -   | CLKIN |                                                  |
| OEV pulse width                | Twoev  | -   | 74  | -   | CLKIN |                                                  |

## 7.2. Input Clock and Data Timing Diagram

DE MODE(CLKPOL="0")



SYNC MODE



## 7.3. Timing

Horizontal input timing

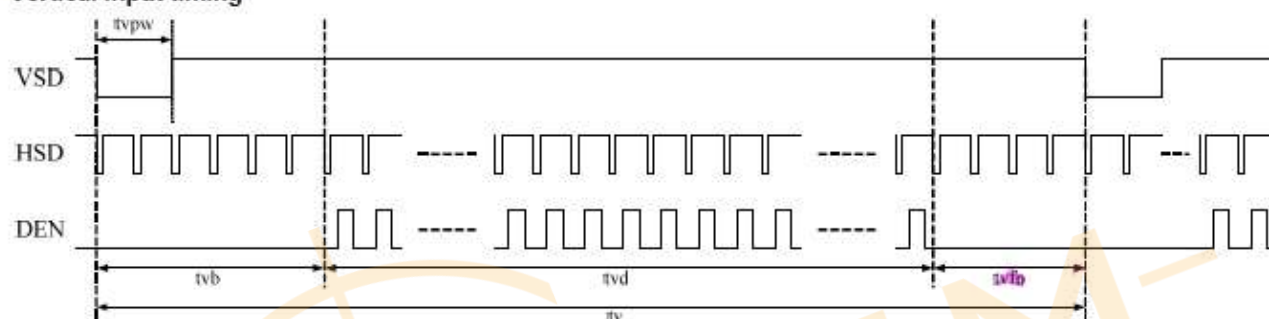
| Item                    |      | Symbol | Values |      |      | Unit |
|-------------------------|------|--------|--------|------|------|------|
| Horizontal display area |      | thd    | 800    |      |      | DCLK |
| DCLK frequency          |      | fclk   | Min.   | Typ. | Max. |      |
|                         |      |        | -      | 33.3 | 50   | MHz  |
| 1 Horizontal Line       |      | th     | 862    | 1056 | 1200 | DCLK |
| HSD pulse width         | Min. | thpw   | 1      |      |      |      |
|                         | Typ. |        | -      |      |      |      |
|                         | Max. |        | 40     |      |      |      |
| HSD Blanking            |      | thb    | 46     | 46   | 46   |      |
| HSD Front Porch         |      | thfp   | 16     | 210  | 354  |      |

## Vertical input timing

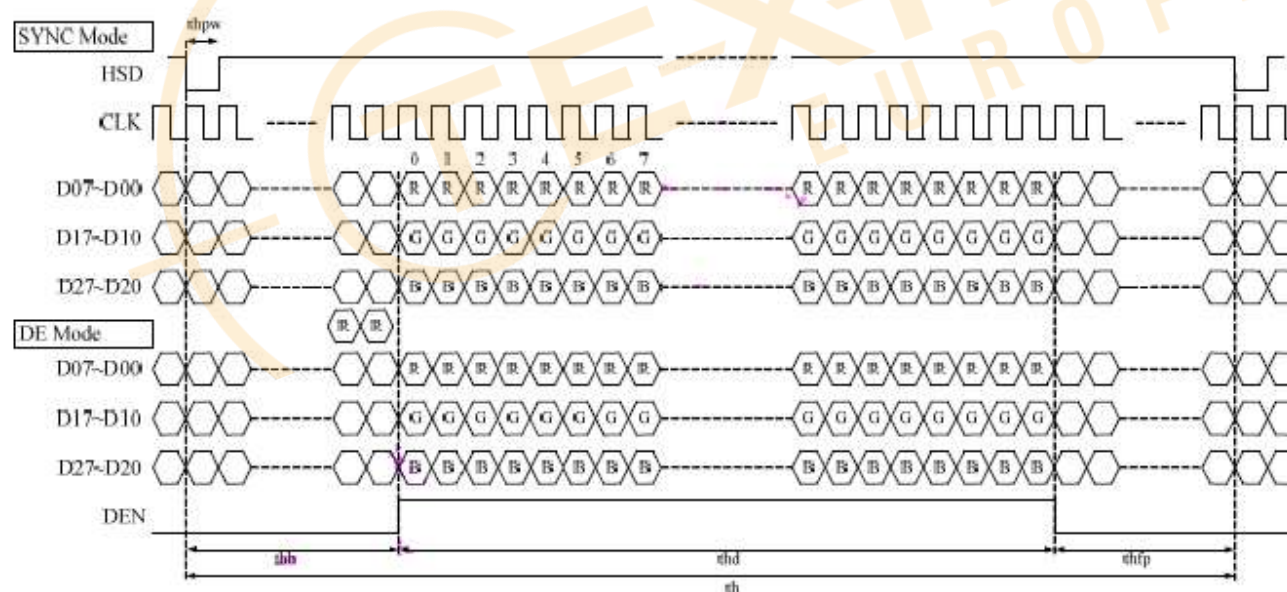
| Item                  | Symbol           | Values |      |      | Unit |
|-----------------------|------------------|--------|------|------|------|
|                       |                  | Min    | Typ. | Max. |      |
| Vertical display area | tv <sub>d</sub>  | 480    |      |      | H    |
| VSD period time       | tv               | 510    | 525  | 650  | H    |
| VSD pulse width       | tv <sub>pw</sub> | 1      | -    | 20   | H    |
| VSD Blanking          | tv <sub>b</sub>  | 23     | 23   | 23   | H    |
| VSD Front Porch       | tv <sub>fp</sub> | 7      | 22   | 147  | H    |

## 7.4. Data Input Format

### Vertical input timing



### Horizontal input timing



## 8.Optical Characteristics

| Item                                              |       | Symbol     | Condition.                            | Min  | Typ. | Max. | Unit              | Remark            |
|---------------------------------------------------|-------|------------|---------------------------------------|------|------|------|-------------------|-------------------|
| Response time                                     |       | Tr+ Tf     | $\theta=0^{\circ}$ 、 $\Phi=0^{\circ}$ | -    | 25   | 50   | .ms               | Note 3            |
| Contrast ratio                                    |       | CR         | At optimized viewing angle            | 500  | 800  | -    | -                 | Note 4            |
| Color Chromaticity                                | White | Wx         | $\theta=0^{\circ}$ 、 $\Phi=0$         | 0.26 | 0.31 | 0.36 | -                 | Note 2,5,6        |
|                                                   |       | Wy         |                                       | 0.28 | 0.33 | 0.38 | -                 |                   |
| Viewing angle<br>(Gray Scale Inversion Direction) | Hor.  | $\Theta$ R | $CR\geq 10$                           | 60   | 70   | -    | Deg.              | Note 1            |
|                                                   |       | $\Theta$ L |                                       | 60   | 70   | -    |                   |                   |
|                                                   | Ver.  | $\Phi$ T   |                                       | 50   | 60   | -    |                   |                   |
|                                                   |       | $\Phi$ B   |                                       | 60   | 70   | -    |                   |                   |
| Brightness                                        |       | -          | -                                     | 600  | 700  | -    | cd/m <sup>2</sup> | Center of display |
| Uniformity                                        |       | (U)        | -                                     | 70   | -    | -    | %                 | Note 5            |

Ta=25±2°C

Note 1: Definition of viewing angle range

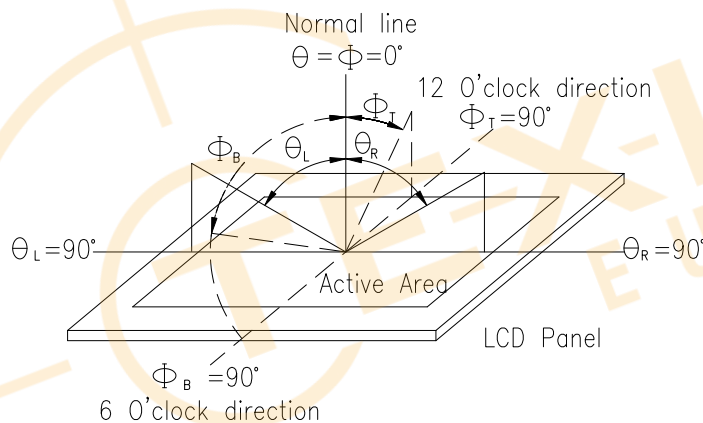


Fig. 8.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

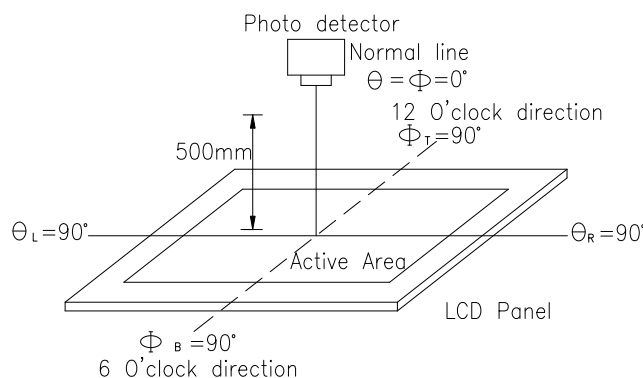
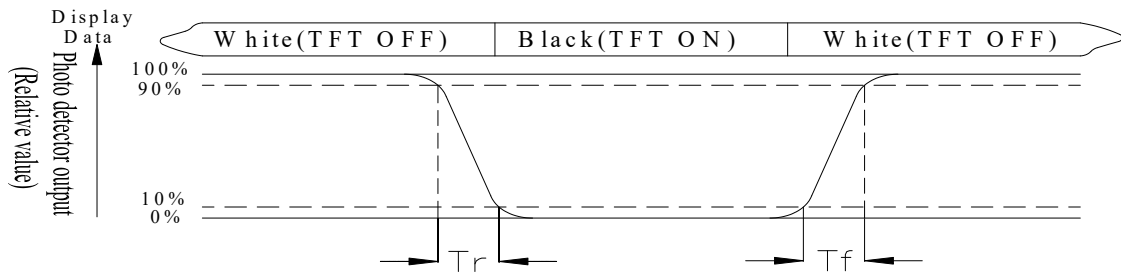


Fig. 8.2. Optical measurement system setup

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,  $T_r$ , is the time between photo detector output intensity changed from 90% to 10%. And fall time,  $T_f$ , is the time between photo detector output intensity changed from 10% to 90%



Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

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

Note 5: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (U)} = L_{\min}/L_{\max} \times 100\%$$

$L$  = Active area length

$W$  = Active area width

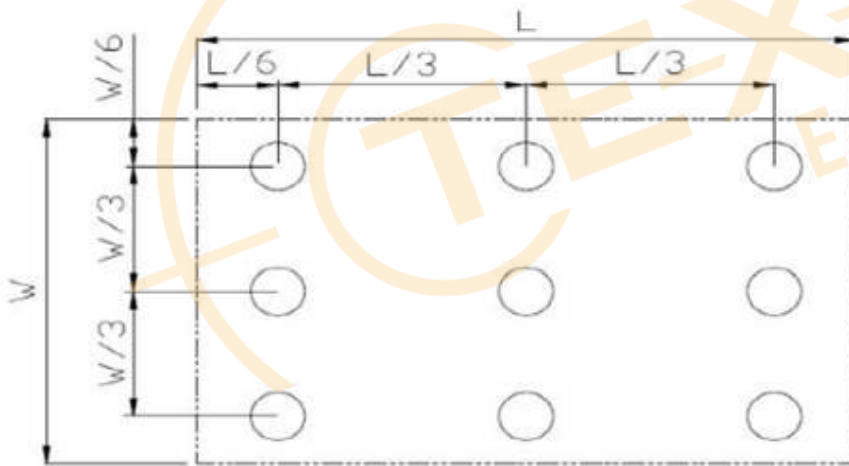


Fig8.3. Definition of uniformity

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

# 9.Interface

## 9.1. LCM PIN Definition

| Pin | Symbol | Function                   | Remark |
|-----|--------|----------------------------|--------|
| 1   | LED+   | Power supply for backlight |        |
| 2   | LED+   | Power supply for backlight |        |
| 3   | LED-   | Backlight ground           |        |
| 4   | LED-   | Backlight ground           |        |
| 5   | GND    | Power ground               |        |
| 6   | VCOM   | Common voltage             |        |
| 7   | VCC    | Power for Digital Circuit  |        |
| 8   | MODE   | DE/SYNC mode select        | Note 1 |
| 9   | DE     | Data Input Enable          |        |
| 10  | VS     | Vertical Sync Input        |        |
| 11  | HS     | Horizontal Sync Input      |        |
| 12  | B7     | Blue data(MSB)             |        |
| 13  | B6     | Blue data                  |        |
| 14  | B5     | Blue data                  |        |
| 15  | B4     | Blue data                  |        |
| 16  | B3     | Blue data                  |        |
| 17  | B2     | Blue data                  |        |
| 18  | B1     | Blue data                  | Note 2 |
| 19  | B0     | Blue data(LSB)             | Note 2 |
| 20  | G7     | Green data(MSB)            |        |
| 21  | G6     | Green data                 |        |
| 22  | G5     | Green data                 |        |
| 23  | G4     | Green data                 |        |
| 24  | G3     | Green data                 |        |
| 25  | G2     | Green data                 |        |
| 26  | G1     | Green data                 | Note 2 |
| 27  | G0     | Green data(LSB)            | Note 2 |
| 28  | R7     | Red data(MSB)              |        |
| 29  | R6     | Red data                   |        |
| 30  | R5     | Red data                   |        |
| 31  | R4     | Red data                   |        |
| 32  | R3     | Red data                   |        |

|    |       |                          |        |
|----|-------|--------------------------|--------|
| 33 | R2    | Red data                 |        |
| 34 | R1    | Red data                 | Note 2 |
| 35 | R0    | Red data(LSB)            | Note 2 |
| 36 | GND   | Power Ground             |        |
| 37 | DCLK  | Sample clock (CLK)       | Note 3 |
| 38 | GND   | Power Ground             |        |
| 39 | L/R   | Left / right selection   | Note 4 |
| 40 | U/D   | Up/down selection        | Note 5 |
| 41 | VGH   | Gate ON Voltage          |        |
| 42 | VGL   | Gate OFF Voltage         |        |
| 43 | AVDD  | Power for Analog Circuit |        |
| 44 | RESET | Global reset pin.        | Note 6 |
| 45 | NC    | No connection            |        |
| 46 | VCOM  | Common Voltage           |        |
| 47 | DITHB | Dithering function       | Note 7 |
| 48 | GND   | Power Ground             |        |
| 49 | NC    | No connection            |        |
| 50 | NC    | No connection            |        |

I: input, O: output, P: Power

Note 1: 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: Source Right or Left sequence control

L/R="L", shift left: last data=S1←S2←S3...←S1200=first data

L/R="H", shift left: last data=S1←S2←S3...←S1200=last data

Note 5: Gate Up or Down scan control

U/D="L", STV2 output vertical start pulse and UD pin output logical "0" to gate driver

U/D="H", STV1 output vertical start pulse and UD pin output logical "1" to gate driver

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="1", Disable internal dithering function,

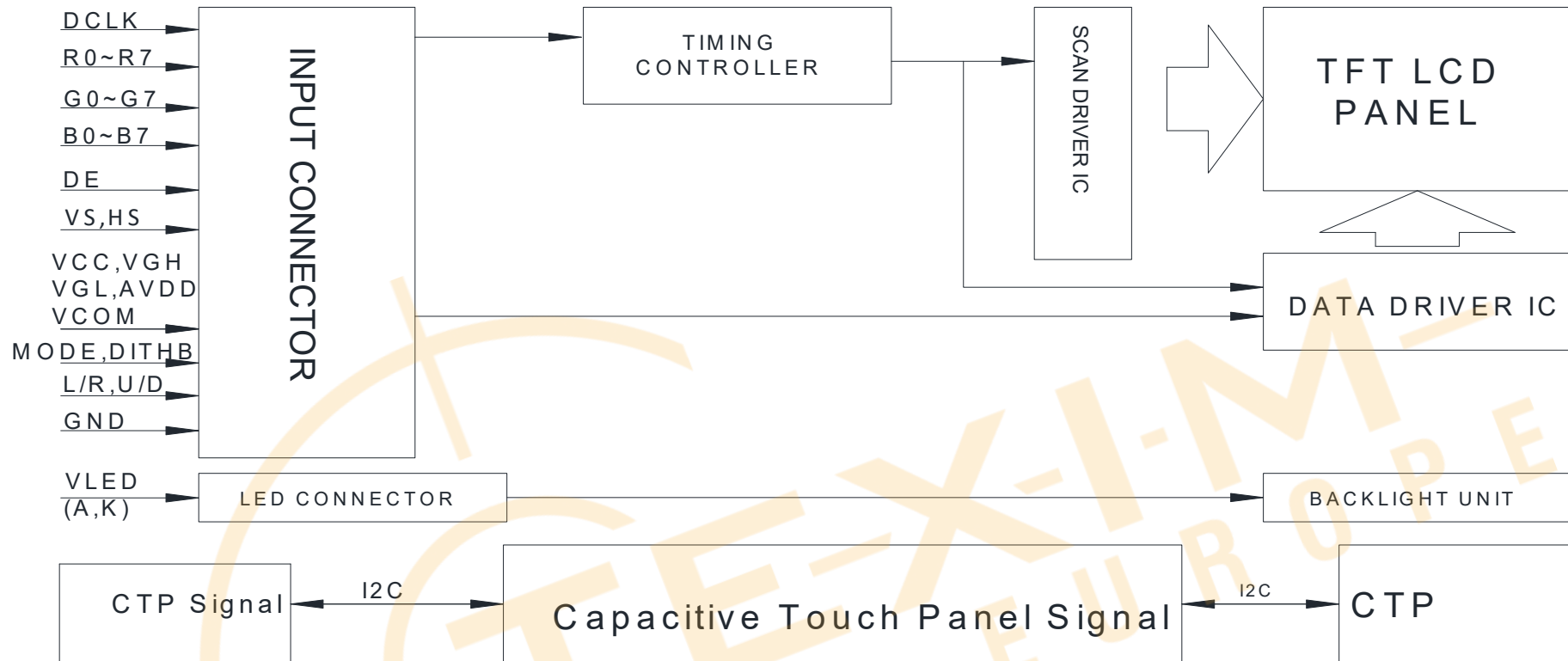
When DITHB="0", Enable internal dithering function,

## 9.2. CTP PIN Definition

| Pin | Symbol | Function                       | Remark |
|-----|--------|--------------------------------|--------|
| 1   | VSS    | Ground for analog circuit      |        |
| 2   | VDDT   | Power Supply : +3.3V           |        |
| 3   | SCL    | I2C clock input                |        |
| 4   | NC     | No connect                     |        |
| 5   | SDA    | I2C data input and output      |        |
| 6   | NC     | No connect                     |        |
| 7   | RST    | External Reset, Low is active  |        |
| 8   | NC     | No connect                     |        |
| 9   | INT    | External interrupt to the host |        |
| 10  | VSS    | Ground for analog circuit      |        |

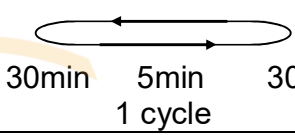


# 10. Block Diagram



# 11. Reliability

Content of Reliability Test (Wide temperature, -20°C~70°C)

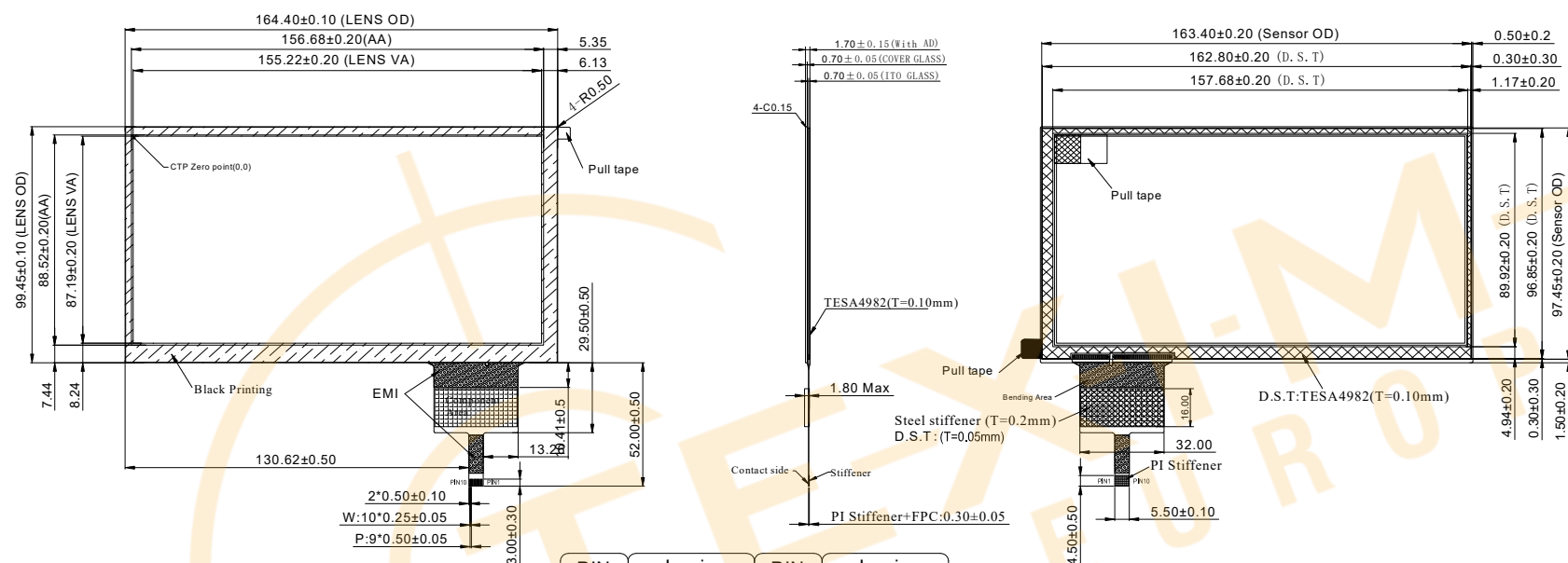
| Environmental Test                   |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                  |      |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Test Item                            | Content of Test                                                                                                                                                                                                                                                                                                                 | Test Condition                                                                                                                                   | Note |
| High Temperature storage             | Endurance test applying the high storage temperature for a long time.                                                                                                                                                                                                                                                           | 80°C<br>200hrs                                                                                                                                   | 2    |
| Low Temperature storage              | Endurance test applying the low storage temperature for a long time.                                                                                                                                                                                                                                                            | -30°C<br>200hrs                                                                                                                                  | 1,2  |
| High Temperature Operation           | Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.                                                                                                                                                                                                          | 70°C<br>200hrs                                                                                                                                   | —    |
| Low Temperature Operation            | Endurance test applying the electric stress under low temperature for a long time.                                                                                                                                                                                                                                              | -20°C<br>200hrs                                                                                                                                  | 1    |
| High Temperature/ Humidity Operation | The module should be allowed to stand at 60°C,90%RH max                                                                                                                                                                                                                                                                         | 60°C,90%RH<br>96hrs                                                                                                                              | 1,2  |
| Thermal shock resistance             | <p>The sample should be allowed stand the following 10 cycles of operation</p> <p style="text-align: center;">-20°C    25°C    70°C</p>  <p style="text-align: center;">30min    5min    30min</p> <p style="text-align: center;">1 cycle</p> | -20°C/70°C<br>10 cycles                                                                                                                          | —    |
| Vibration test                       | Endurance test applying the vibration during transportation and using.                                                                                                                                                                                                                                                          | <p>Total fixed amplitude : 1.5mm<br/>Vibration<br/>Frequency : 10~55Hz<br/>One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes</p> | 3    |
| Static electricity test              | Endurance test applying the electric stress to the terminal.                                                                                                                                                                                                                                                                    | <p>VS=±600V(contact),<br/>±800v(air),<br/>RS=330Ω<br/>CS=150pF<br/>10 times</p>                                                                  | —    |

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

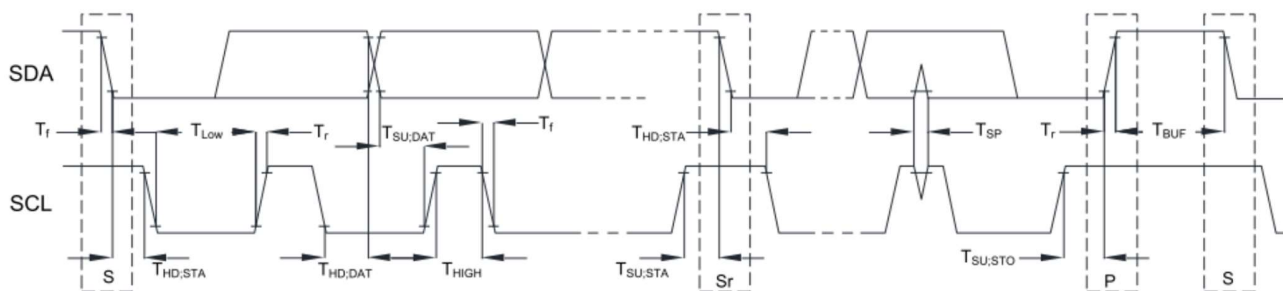
Note3: The packing have to including into the vibration testing.

# 12.Touch Panel Information



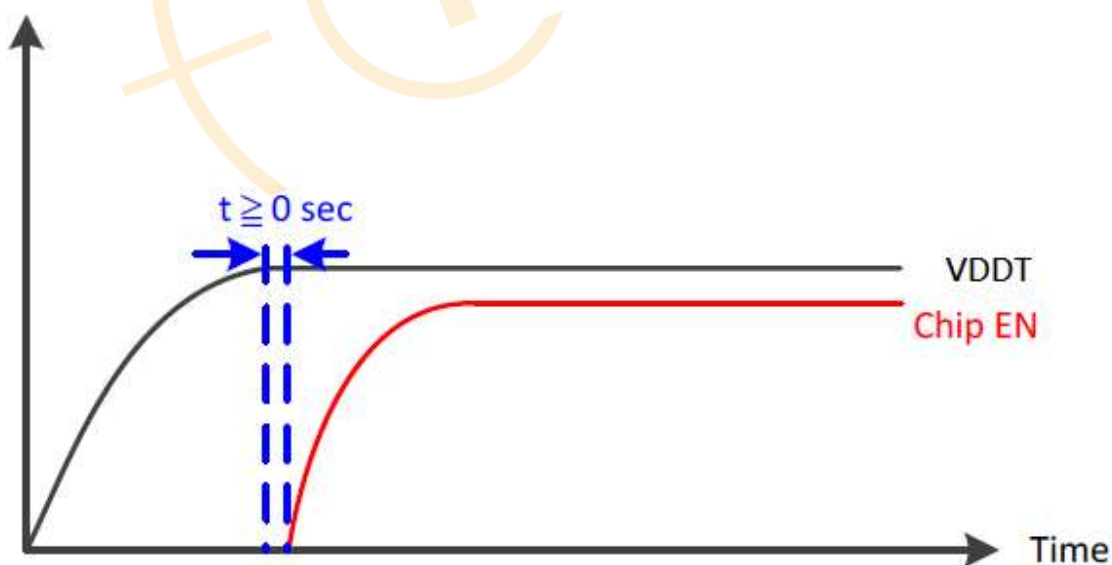
| PIN | Logic | PIN | Logic |
|-----|-------|-----|-------|
| 1   | VSS   | 6   | NC    |
| 2   | VDDT  | 7   | /RST  |
| 3   | SCL   | 8   | NC    |
| 4   | NC    | 9   | /INT  |
| 5   | SDA   | 10  | VSS   |

## 12.1. I2C AC Characteristics

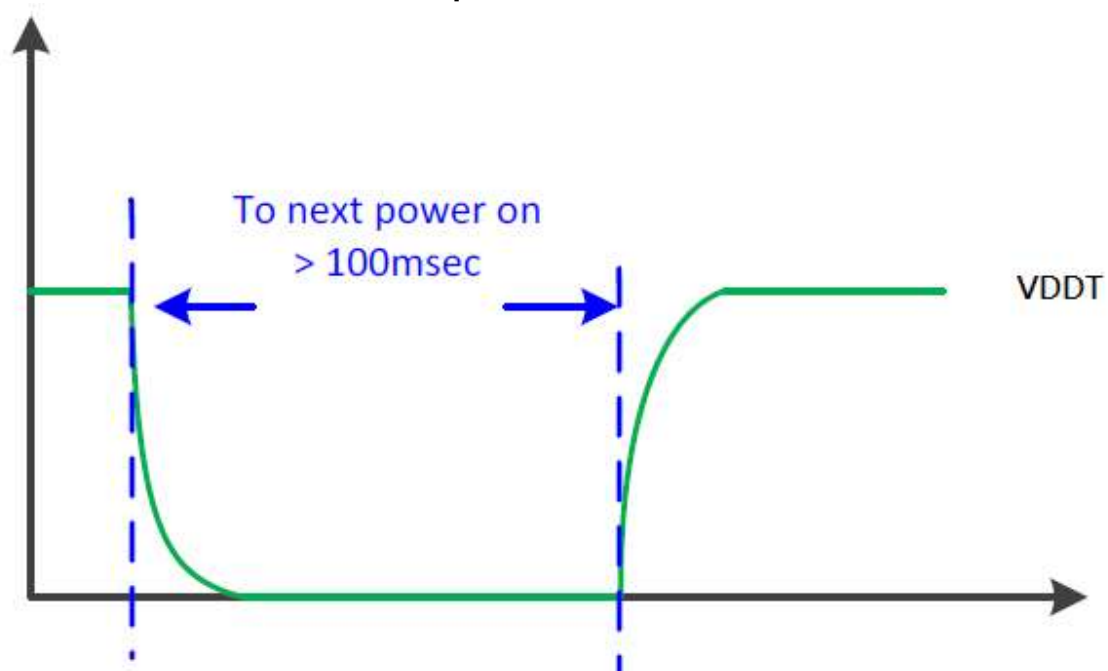


| Item                                                                                      | Symbol              | 100kHz |      | 400kHz |      | Unit |
|-------------------------------------------------------------------------------------------|---------------------|--------|------|--------|------|------|
|                                                                                           |                     | Min.   | Max. | Min.   | Max. |      |
| SCL standard mode clock frequency                                                         | F <sub>SCL</sub>    | 0      | 100  | 0      | 400  | kHz  |
| Hold time (repeated) START condition.<br>After this period, the first clock is generated. | T <sub>HD;STA</sub> | 4      | --   | 0.6    | --   | us   |
| LOW period of the SCL clock                                                               | T <sub>LOW</sub>    | 4.7    | --   | 1.3    | --   | us   |
| HIGH period of the SCL clock                                                              | T <sub>HIGH</sub>   | 4      | --   | 0.6    | --   | us   |
| Setup time for a repeat START condition.                                                  | T <sub>SU;STA</sub> | 4.7    | --   | 0.6    | --   | us   |
| Data hold time                                                                            | T <sub>HD;DAT</sub> | 0      | 3.45 | 0      | 0.9  | us   |
| Data setup time                                                                           | T <sub>SU;DAT</sub> | 250    | --   | 100    | --   | ns   |
| Rising time of both SDA and SCL signals                                                   | T <sub>r</sub>      | --     | 1000 | --     | 300  | ns   |
| Falling time of both SDA and SCL signals                                                  | T <sub>f</sub>      | --     | 300  | --     | 300  | ns   |
| Setup time for STOP condition.                                                            | T <sub>SU;STO</sub> | 4      | --   | 0.6    | --   | us   |
| Free time between STOP and START condition                                                | T <sub>BUF</sub>    | 4.7    | --   | 1.3    | --   | us   |
| Pulse width of spikes which must be suppressed<br>by input filter                         | T <sub>SP</sub>     | --     | --   | 0      | 50   | ns   |

## 12.2. Power On Sequence

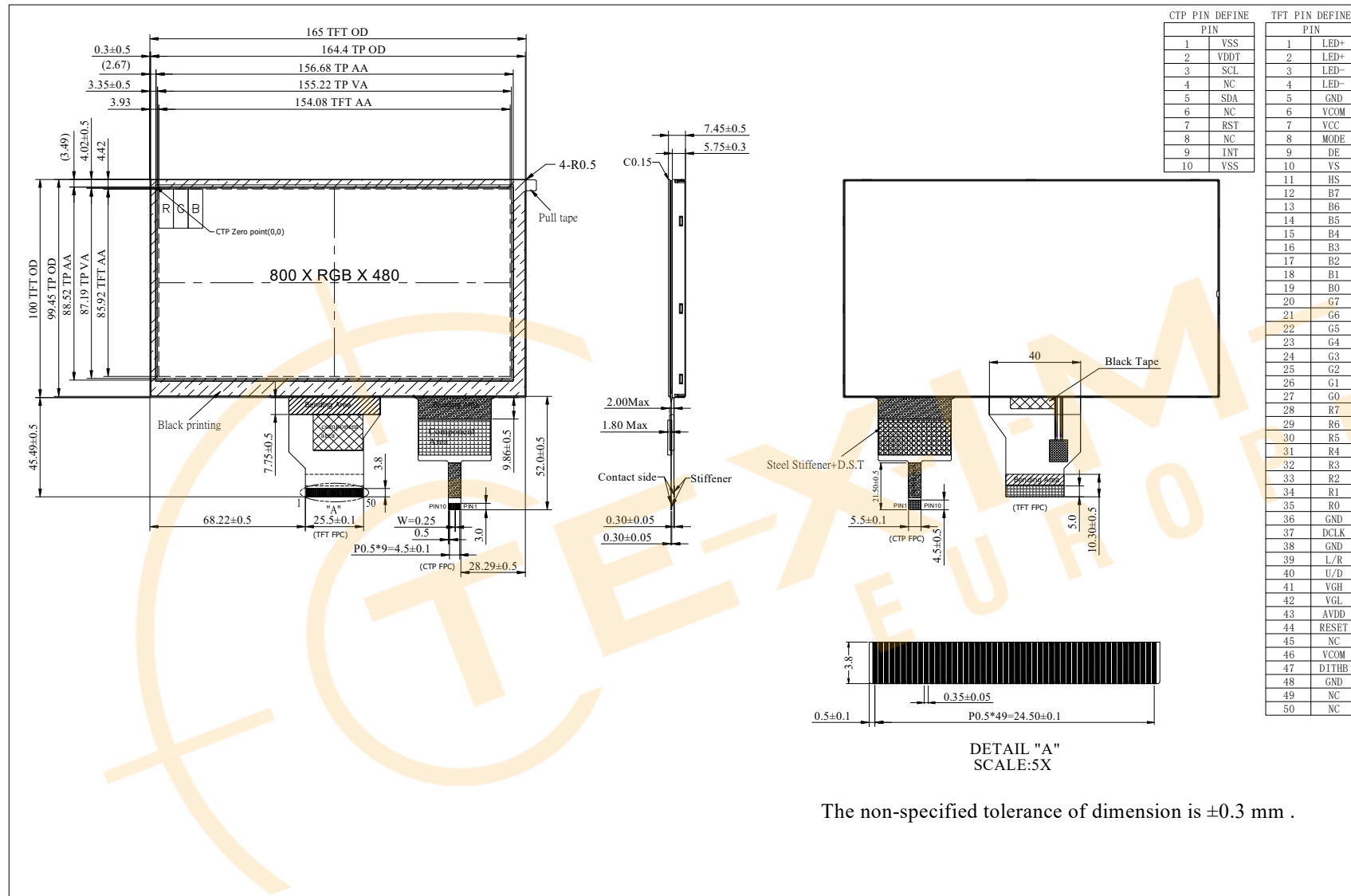


### 12.3. Power Off to Power On Sequence



TEXIM-  
EUROPE

# 13. Contour Drawing





winstar

**LCM Sample Estimate Feedback Sheet**

Module Number : \_\_\_\_\_

Page: 1

**1、Panel Specification :**

- |                            |                               |                                     |
|----------------------------|-------------------------------|-------------------------------------|
| 1. Panel Type :            | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. View Direction :        | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Numbers of Dots :       | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. View Area :             | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Active Area :           | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. Operating Temperature : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Storage Temperature :   | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 8. Others :                | _____                         |                                     |

**2、Mechanical**

- |                             |                               |                                     |
|-----------------------------|-------------------------------|-------------------------------------|
| 1. PCB Size :               | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. Frame Size :             | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Material of Frame :      | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. Connector Position :     | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Fix Hole Position :      | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. Backlight Position :     | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Thickness of PCB :       | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 8. Height of Frame to PCB : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 9. Height of Module :       | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 10. Others :                | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

**3、Relative Hole Size :**

- |                             |                               |                                     |
|-----------------------------|-------------------------------|-------------------------------------|
| 1. Pitch of Connector :     | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. Hole size of Connector : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Mounting Hole size :     | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. Mounting Hole Type :     | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Others :                 | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

**4、Backlight Specification :**

- |                                                          |                               |                                     |
|----------------------------------------------------------|-------------------------------|-------------------------------------|
| 1. B/L Type :                                            | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. B/L Color :                                           | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. B/L Driving Voltage (Reference for LED Temperature) : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. B/L Driving Current :                                 | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Brightness of B/L :                                   | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. B/L Solder Method :                                   | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Others :                                              | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

&gt;&gt; Go to page 2 &lt;&lt;



Winstar      Module Number : \_\_\_\_\_

Page: 2

**5、Electronic Characteristics of Module :**

- |                              |                               |                                     |
|------------------------------|-------------------------------|-------------------------------------|
| 1. Input Voltage :           | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. Supply Current :          | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Driving Voltage for LCD : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. Contrast for LCD :        | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. B/L Driving Method :      | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. Negative Voltage Output : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Interface Function :      | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 8. LCD Uniformity :          | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 9. ESD test :                | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 10. Others :                 | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

**6、Summary :**

Sales signature : \_\_\_\_\_

Customer Signature : \_\_\_\_\_

Date :      /      /

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