

# Introduction

## Scope of application

This specification applies to the Negative type TFT transmissive dot matrix LCD module.

LCD specification: Dots 240xRGBx320.

As to basic specification of the driver IC, refer to the IC (ILI9341 ) specification and datasheet.

## Structure

Double display structure:

TFT Module + FPC + Touch Panel +BL

FULL 65k or 262k Color 2.8 inch TFT LCD size for main LCD;

One bare chip with gold bump (COG) TECH;

16 BITS 80 parallel interface;

## TFT features

Structure: TFT PANNEL+IC+FPC+BL+TP;

Transmissive Type LCD

240 dot-source and 320 dot-gate outputs;

65k or 262k Color can be selected by software;

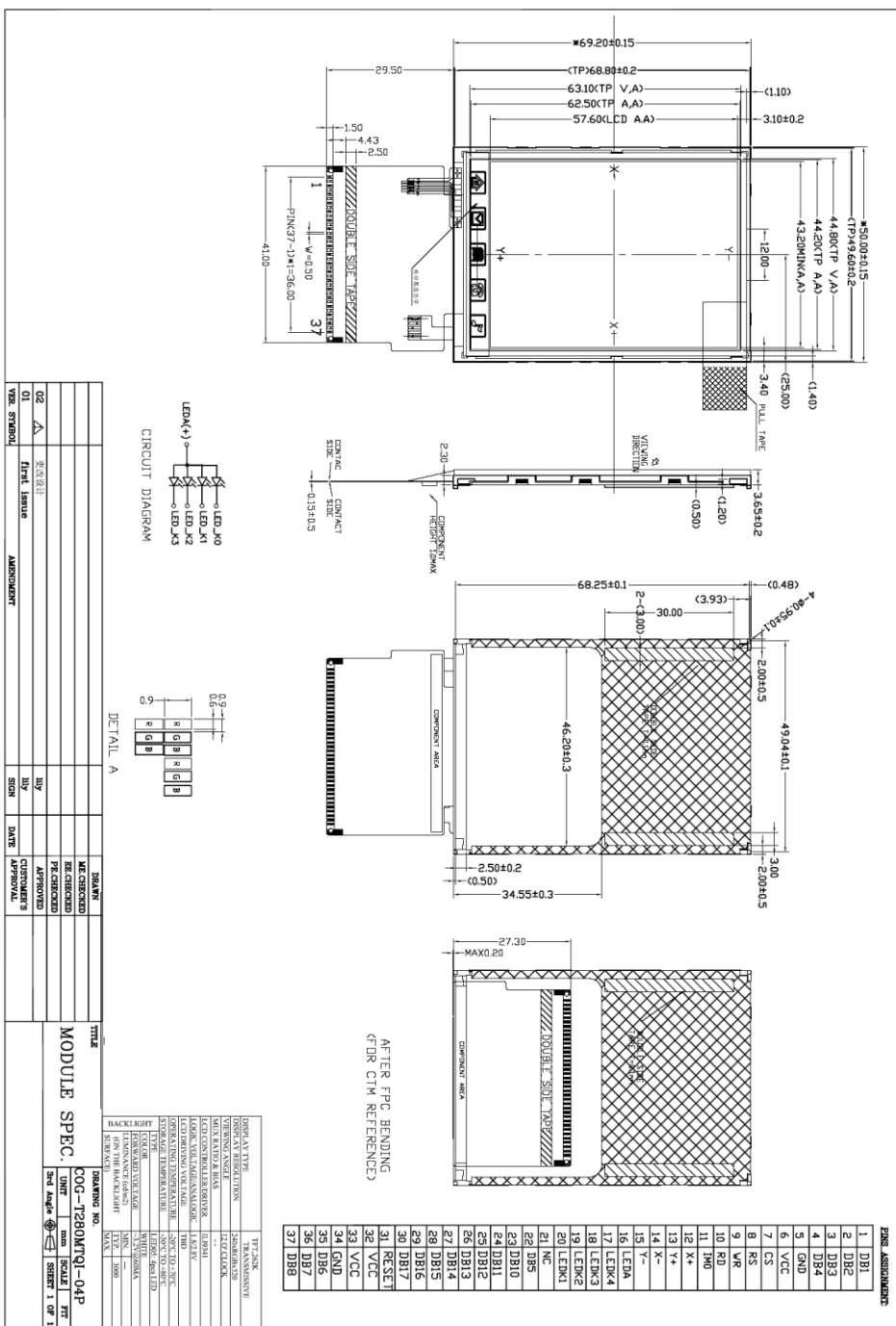
White LED back light;

16 BITS 80 parallel interface;

## General Specifications

| Item                | Standard value                  | Unit |
|---------------------|---------------------------------|------|
| LCD Type            | TFT Transmissive                | ---  |
| Driver element      | a-Si TFT Active matrix          |      |
| Number of Dots      | 240*(RGB)*320                   | Dots |
| Pixel Arrangement   | RGB Vertical Stripe             |      |
| Active Area         | 43.2 *57.6                      | mm   |
| Viewing Area (W*H)  | /                               | mm   |
| Viewing Direction   | 12 O'clock                      |      |
| Driver IC           | ILI9341                         |      |
| Module Size (W*H*T) | 50x69.2x3.65 (with touch panel) | mm   |
| Approx. Weight      |                                 | g    |
| Back Light          | White LED                       |      |
| System interface    | 16 BITS 80 parallel interface   |      |

# Mechanical Drawing



## Absolute Maximum Ratings

| Parameter                | Symbol    | Min  | Max            | Unit |
|--------------------------|-----------|------|----------------|------|
| Supply voltage for logic | $V_{CC}$  | -0.3 | 3.3            | V    |
| Input voltage for logic  | $V_{IN}$  | -0.5 | $V_{CC} + 0.3$ | V    |
| Supply current (One LED) | $I_{LED}$ |      | 30             | mA   |
| Operating temperature    | $T_{OP}$  | -10  | +60            | °C   |
| Storage temperature      | $T_{ST}$  | -20  | +70            | °C   |

## Electrical Characteristics

| Item                     | Symbol    | Min          | Typ | Max          | Unit | Applicable terminal |
|--------------------------|-----------|--------------|-----|--------------|------|---------------------|
| Supply voltage for logic | $V_{CC}$  | 2.5          | 2.8 | 3.3          | V    | $V_{DD}$            |
| Input voltage            | $V_{IL}$  | -0.3         | -   | $0.2 V_{DD}$ | V    |                     |
|                          | $V_{IH}$  | $0.8 V_{CC}$ | -   | $V_{CC}$     |      |                     |
| Input leakage current    | $I_{LKG}$ |              |     |              | μA   |                     |
| LED Forward voltage      | $V_f$     | 3.0          | 3.2 | 3.4          | V    | --                  |
| Input backlight current  | $I_{LED}$ | -            | 15  | 20           | mA   | With One LED        |

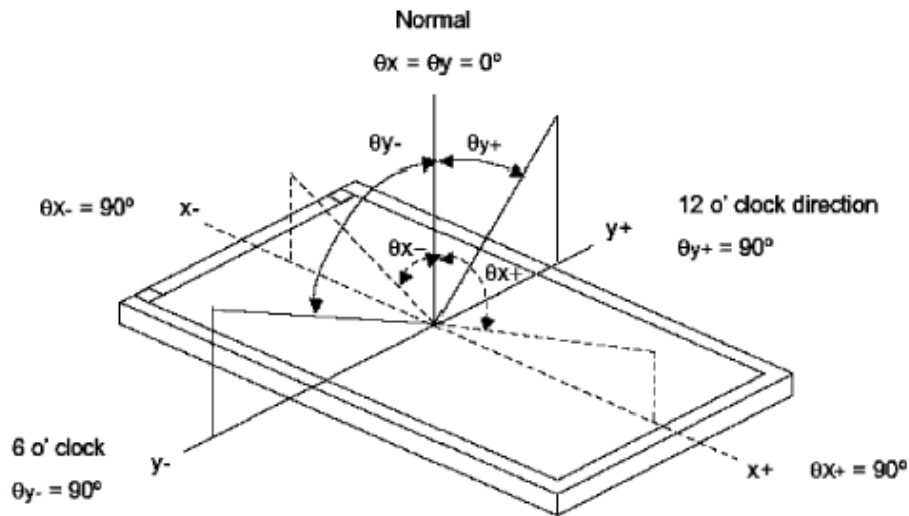
## Touch Panel Specifications

### Electrical Characteristics

## Optical Characteristics

| Item                 |       | Symbol         | Conditions             | Specifications |       |     | Unit              |
|----------------------|-------|----------------|------------------------|----------------|-------|-----|-------------------|
|                      |       |                |                        | Min.           | Typ.  | Max |                   |
| Brightness           |       | B              | Viewing normal angle   | ---            | 150   | --  | Cd/m <sup>2</sup> |
| Contrast Ratio       |       | CR             |                        | 150            | 250   | --  | --                |
| Response Time        |       | Tr+Tf          |                        | --             | 50    | 70  | ms                |
| CIE Color coordinate | Red   | X <sub>R</sub> |                        | --             | 0.633 |     |                   |
|                      |       | Y <sub>R</sub> |                        |                | 0.329 |     |                   |
|                      | Green | X <sub>G</sub> |                        | --             | 0.297 |     |                   |
|                      |       | Y <sub>G</sub> |                        |                | 0.577 |     |                   |
|                      | Blue  | X <sub>B</sub> |                        | --             | 0.133 |     |                   |
|                      |       | Y <sub>B</sub> |                        |                | 0.129 |     |                   |
|                      | White | X <sub>W</sub> |                        | --             | 0.294 |     |                   |
|                      |       | Y <sub>W</sub> |                        |                | 0.334 |     |                   |
| Viewing Angle        | Hor   | $\theta_{x+}$  | Center<br>CR $\geq$ 10 | 40             | 45    | --  | Degree (°)        |
|                      |       | $\theta_{x-}$  |                        | 40             | 45    | --  |                   |
|                      | Ver   | $\theta_{y+}$  |                        | 30             | 35    | --  |                   |
|                      |       | $\theta_{y-}$  |                        | 10             | 15    | --  |                   |
| Uniformity           | Un    |                |                        | 80             | 85    | %   |                   |

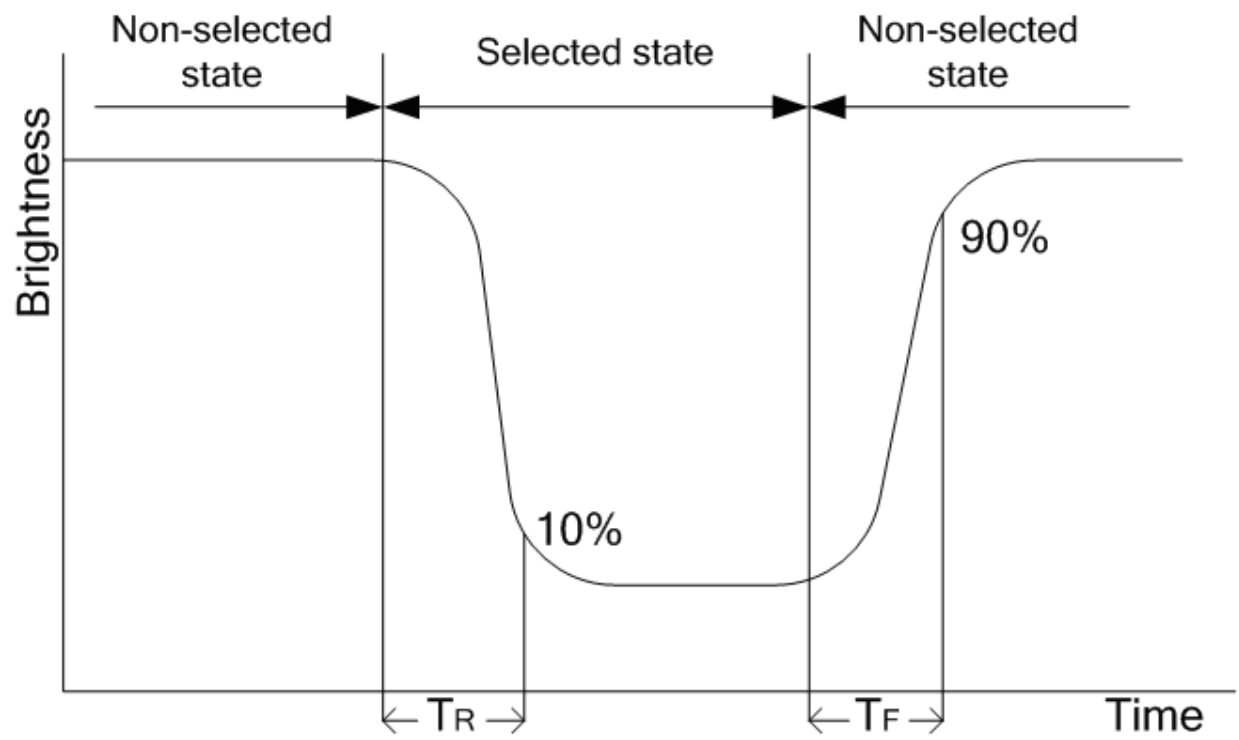
**Note 1 : Definition of Viewing Angle  $\theta_x$  and  $\theta_y$  :**



**Note 2: Definition of contrast ratio CR:**

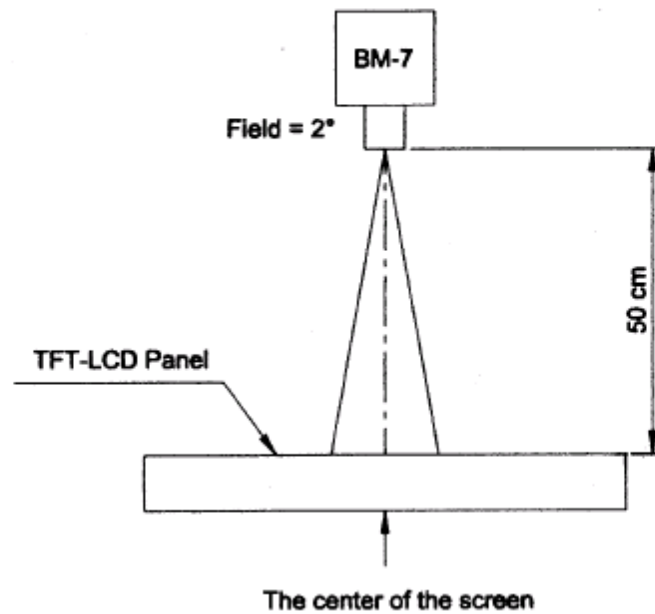
$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

Note 3: Definition of response time ( $T_R$ ,  $T_F$ )

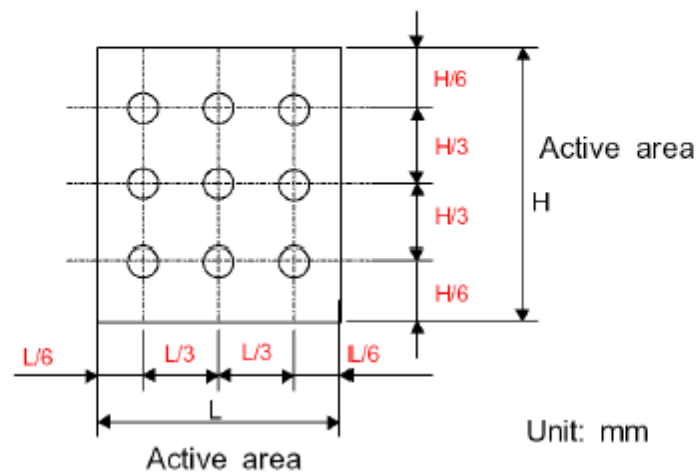


: The brightness test equipment setup

20mA Field=2° (As measuring "black" image, field=2° is the best testing condition)



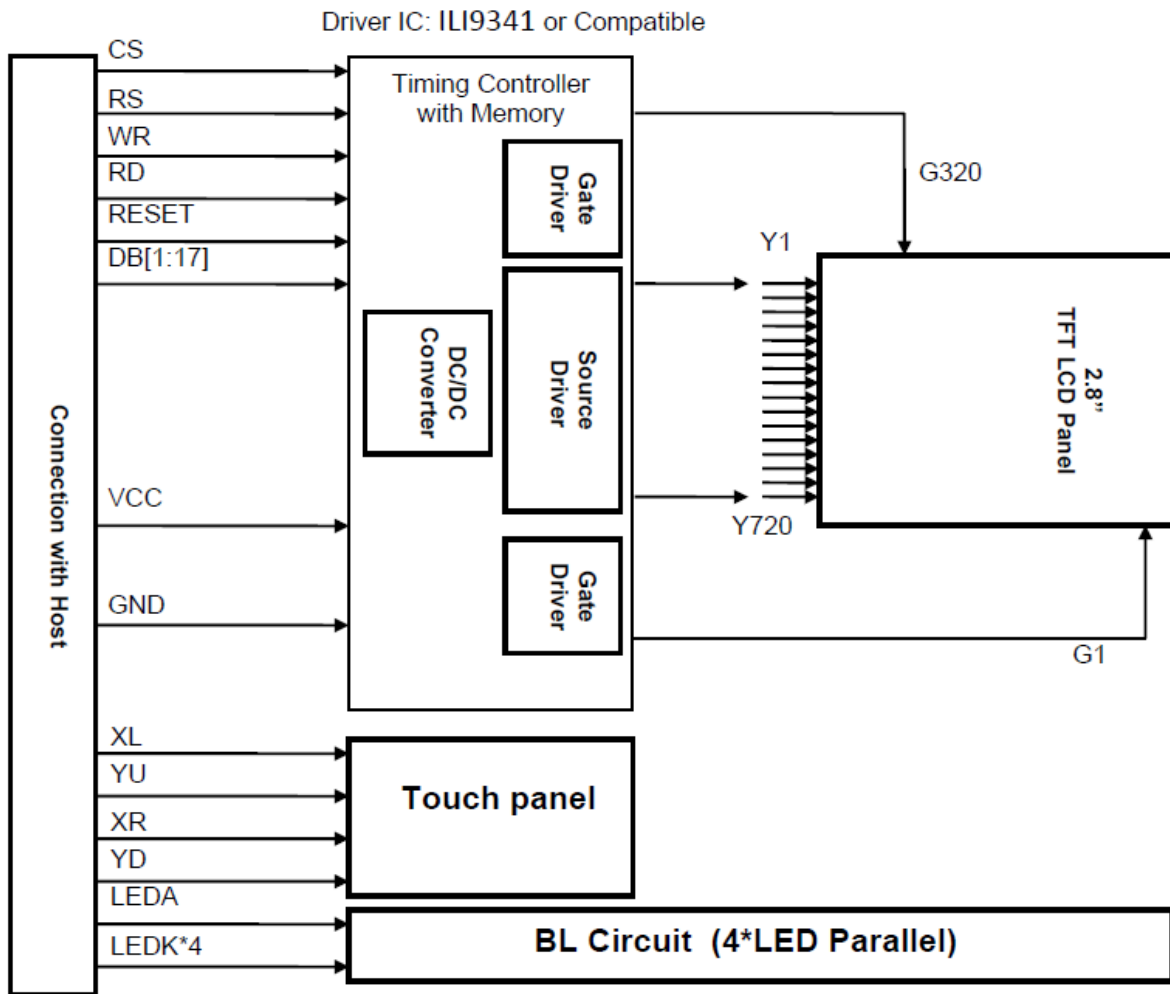
Note 4 :



## MCU Interface Pin Function

| Pin No. | Symbol                      | Description  |
|---------|-----------------------------|--|
| 1~4     | DB1~DB4                     | Data bus.  |
| 5       | GND1                        | Ground.  |
| 6       | VCC                         | Power supply for logic voltage.  |
| 7       | $\overline{CS}$ (nCS)       | A chip select signal. Low: the ILI9341 is selected and accessible. High: the ILI9341 is not selected and not accessible. |
| 8       | RS                          | A register select signal. Low: select an index or status register. High: select a control register.                      |
| 9       | $\overline{WR}$ (nWR)       | A write strobe signal and enables an operation to write data when the signal is low.                                     |
| 10      | $\overline{RD}$ (nRD)       | A read strobe signal and enables an operation to read out data when the signal is low.                                   |
| 11      | NC                          | No connection.   |
| 12      | X+                          | X+ input position of touch panel.  |
| 13      | Y+                          | Y+ input position of touch panel.  |
| 14      | X-                          | X- input position of touch panel.  |
| 15      | Y-                          | Y- input position of touch panel.  |
| 16      | LEDA                        | Anode of LED backlight.  |
| 17      | LEDK1                       | Cathode of LED backlight.  |
| 18      | LEDK2                       | Cathode of LED backlight.  |
| 19      | LEDK3                       | Cathode of LED backlight.  |
| 20      | LEDK4                       | Cathode of LED backlight.  |
| 21      | NC                          | No connection.   |
| 22      | DB5                         | Data bus.  |
| 23~30   | DB10~DB17                   | Data bus.  |
| 31      | $\overline{RESET}$ (nRESET) | A reset pin. Initializes the ILI9341 with a low input. Be sure to execute a power-on reset after supplying power.        |
| 32      | VCC                         | Power supply for analog voltage.   |
| 33      | VCC                         | Power supply for logic voltage.  |
| 34      | GND                         | Ground.  |
| 35~37   | DB6~DB8                     | Data bus.  |

## Block Diagram





## Safety Instructions

- If the LCD panel breaks, be careful not to get any liquid crystal substance in your mouth.
- If the liquid crystal substance touches your skin or clothes, please wash it off immediately by using soap and water.

## Handling Precautions

- Avoid static electricity damaging the LSI.
- Do not remove the panel or frame from the module.
- The polarizing plate of the display is very fragile. So, please handle it very carefully.
- Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate.
- The color tone of display and background of LCM has the possibility to be changed in the storage temperature range.
- Pay attention to the working environment, as the element may be destroyed by static electricity.
  - Be sure to ground human body and electric appliance during work.
  - Avoid working in a dry environment to minimize the generations of static electricity.
  - Static electricity may be generated when the protective film is fast peeled off.
- When soldering the terminal of LCM, make certain the AC power source of soldering iron does not leak.
- If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft-dry- clean cloth. If it is heavily contaminated, moisten cloth with the following solvent (ex:Ethyl alcohol).Solvents other than those above-mentioned may damage the polarizer(Especially, do not use them. ex: Warter / Ketone)

## Operation Instructions

- It is recommended to drive the LCD within the specified voltage limits, try to adjust the operating voltage for the optimal contrast, the color and contrast of LCD panel will varies at different temperature.
- Response time is greatly delayed at low operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.
- If the display area is pushed hard during operation, the display will become abnormal.
- Do not operate the LCD at the environments over the specified conditions, this may cause damage on the LCD and shorten the lifetime.

## Storage Instructions

- Store LCDs in a sealed polyethylene bag.
- Store LCDs in a dark place. Do not expose to sunlight or fluorescent light. Keep the temperature between 0°C and 35°C.