

Rocktech Displays Limited



LCD Module Specification

Module P/N: RK101HI34E-CT

Version: 1.0

Description : 10.1 inch TFT 1280*800 Pixels with LED
backlight, All viewing angle, 800 nits
brightness and capacitive touch panel

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Revision History

| Date | Rev. | Page | Description |
|-------------------|-------------|-------------|--------------------|
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| | | | |

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1. General Features

| Item | Spec | Remark |
|--------------------|------------------------------|----------|
| Display Mode | Normally Black transmissive | |
| Viewing Direction | Free | IPS |
| Input Signals | LVDS Signal | |
| Outside Dimensions | 229.46(W) x149.1(H) x6.85(D) | With CTP |
| Active Area | 216.96mm(W)×135.60mm(H) | |
| Number of Pixels | 1280(RGB)×800 | |
| Dot Pitch | 0.1695mm(W) ×0.1695mm(H) | |
| Pixel Arrangement | RGB Vertical stripes | |
| CTP Driver IC | GT928 | |

2. Absolute Maximum Ratings

The following are maximum values which, if exceeded may cause operation or damage to the unit.

| ITEM | Sym. | Min. | Max. | Unit | Remark |
|-----------------------|------|------|------|------|--------|
| Supply Voltage | VDD | -0.3 | 3.9 | V | |
| Operation Temperature | Top | -20 | 70 | °C | |
| Storage Temperature | Tst | -30 | 80 | °C | |

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

3. Electrical Specification

3.1 Driving TFT LCD Panel

| ITEM | Sym. | Min. | Typ | Max. | Unit | Remark |
|-------------------------|------|--------|-----|--------|------|--------|
| Supply Voltage | VDD | 2.6 | 3.3 | 3.6 | V | |
| Input Voltage "H" Level | VIH | 0.7VDD | - | VDD | V | |
| Input Voltage "L" Level | VIL | 0 | - | 0.3VDD | V | |

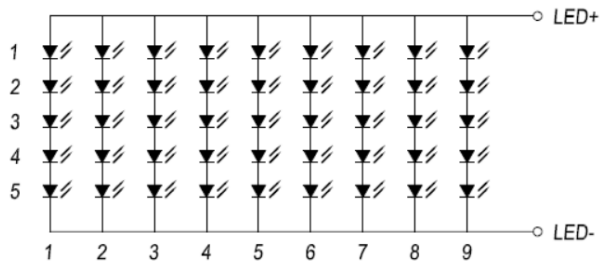
3.2 Backlight Driving Conditions

| Item | Sym. | Min | Typ. | Max | Unit | Note |
|-----------------------------|-----------------|------|--------|------|------|------|
| Backlight driving voltage | V _F | 14.2 | 15.2 | 16.2 | V | |
| Backlight driving current | I _F | 315 | 360 | 405 | mA | |
| Backlight Power Consumption | W _{BL} | - | 5472 | - | mW | |
| Life Time | - | - | 50,000 | - | | |

Note 1: Each LED, I_f=40mA, V_f=3.0+/-0.2V.

Note 2: Optical performance should be evaluated at T_a=25°C only.

Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.



LED Diagram Circuit

3.3 Driving CTP

| Item | Value |
|-----------------|-------------|
| Working Voltage | DC 2.8-3.3V |
| Interface | I2C |
| Support Touch | 5 points |

4. Optical Specifications

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25 °C. The values specified are at an approximate distance 500mm from the LCD surface at a viewing angle of Φ and θ equal to 0°.

| Item | Sym. | Values | | | Unit | Note |
|---------------------|------------|--------|------|------|-------------------|-----------|
| | | Min. | Typ. | Max. | | |
| 1) Contrast Ratio | C/R | 800 | 1000 | - | | FIG.1 |
| 2) Module Luminance | L | 700 | 800 | - | cd/m ² | After CTP |
| 3) Response time | Tr+Tf | - | 25 | 35 | ms | FIG.2 |
| 4) Viewing Angle | θ_T | 75 | 85 | - | Degree | FIG.3 |
| | θ_B | 75 | 85 | - | | |
| | θ_L | 75 | 85 | - | | |
| | θ_R | 75 | 85 | - | | |
| 5) Chromaticity | Wx | 0.28 | 0.32 | 0.36 | | |
| | Wy | 0.29 | 0.33 | 0.37 | | |
| | Rx | - | - | - | | |
| | Ry | - | - | - | | |
| | Gx | - | - | - | | |
| | Gy | - | - | - | | |
| | Bx | - | - | - | | |
| | By | - | - | - | | |

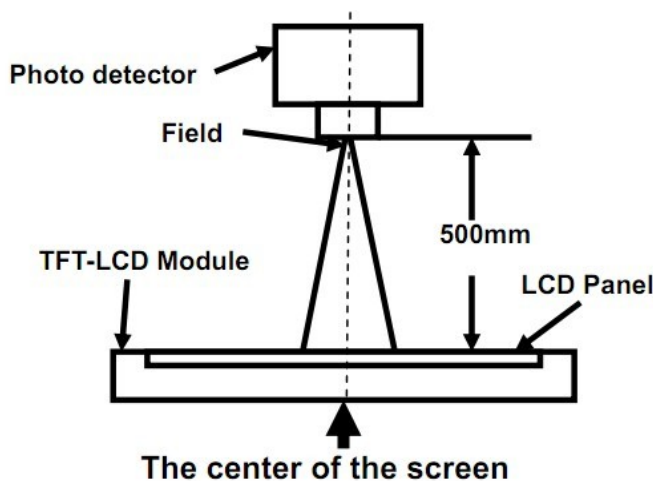
◆ Measurement System

Notes:

1. Contrast Ratio(CR) is defined mathematically as :

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$
2. Surface luminance is the center point across the LCD surface 500mm from the surface with all pixels displaying white. For more information see FIG 1.
3. Response time is the time required for the display to transition from white to black (Rising Time, Tr) and from black to white (Falling Time, Tf). For additional information see FIG 2.
4. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 3.

FIG. 1 Optical Characteristic Measurement Equipment and Method



| Item | Photo detector | Field |
|----------------|----------------|-------|
| Contrast Ratio | SR-3A | 1° |
| Luminance | | |
| Chromaticity | | |
| Lum Uniformity | | |
| Response Time | BM-7A | 2° |

FIG. 2 The definition of Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.

Response Time = Rising Time(T_r) + Falling Time(T_f)

- Rising Time(T_r) : Full White 90% → Full White 10% Transmittance.
- Falling Time(T_f) : Full White 10% → Full White 90% Transmittance.

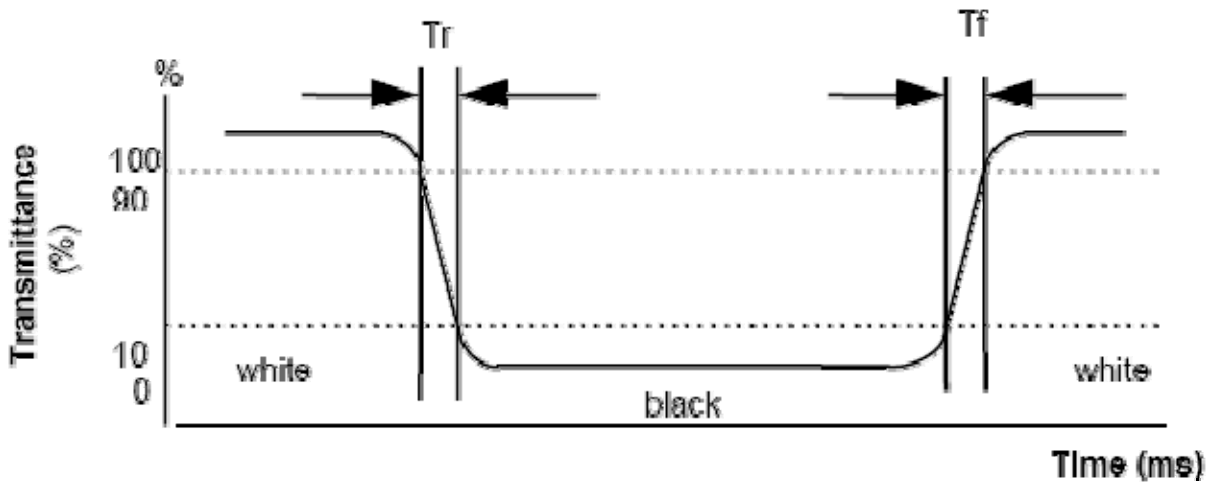
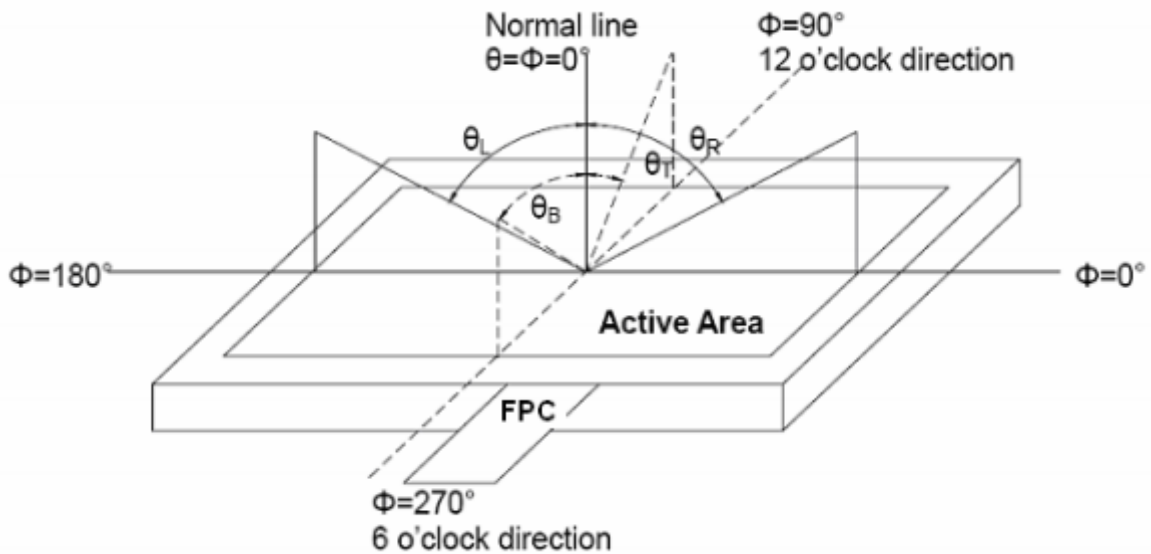
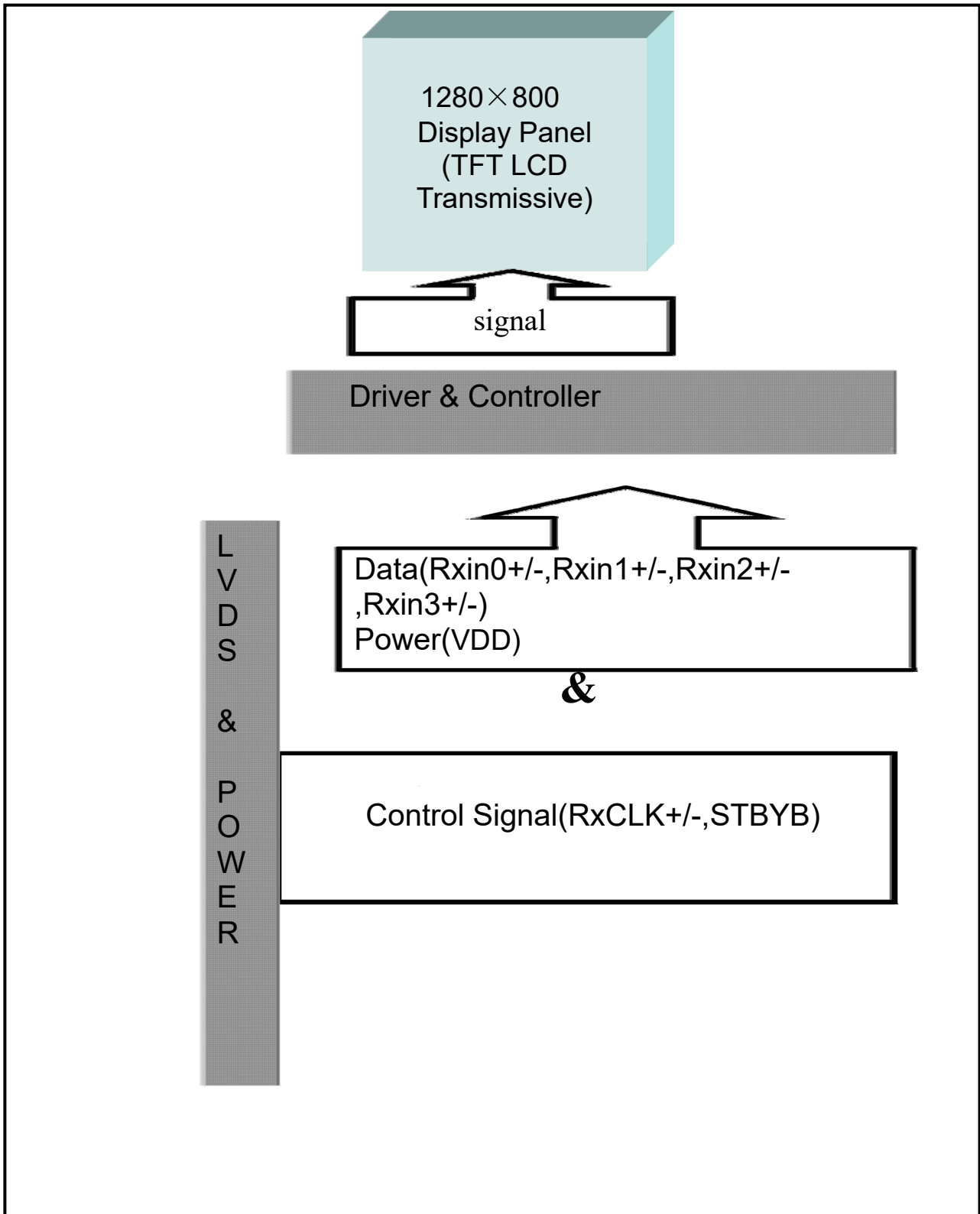


FIG. 3 The definition of Viewing Angle

Use Fig. 1(Test Procedure) under Measurement System to measure the contrast from the measuring direction specified by the conditions as the following figure.



5. Block Diagram



6.Pin Description

6.1 LCD Pin interface

| Item | Terminal | I/O | Functions |
|-------|----------|-----|---|
| 1 | NC | - | No connection |
| 2,3 | VDD | P | Power Supply, 3.3V |
| 4,5 | NC | - | No connection |
| 6 | STBYB | I | STBYB=1 is normal operation(default). STBYB=0 is standby mode. |
| 7 | GND | P | Ground |
| 8 | Rxin0- | I | -LVDS Differential Data Input |
| 9 | Rxin0+ | I | +LVDS Differential Data Input |
| 10 | GND | P | Ground |
| 11 | Rxin1- | I | -LVDS Differential Data Input |
| 12 | Rxin1+ | I | +LVDS Differential Data Input |
| 13 | GND | P | Ground |
| 14 | Rxin2- | I | -LVDS Differential Data Input |
| 15 | Rxin2+ | I | +LVDS Differential Data Input |
| 16 | GND | P | Ground |
| 17 | RxCLK- | I | -LVDS Differential Data Input |
| 18 | RxCLK+ | I | +LVDS Differential Data Input |
| 19 | GND | P | Ground |
| 20 | Rxin3- | I | -LVDS Differential Data Input |
| 21 | Rxin3+ | I | +LVDS Differential Data Input |
| 22 | GND | P | Ground |
| 23,24 | NC | - | No connection |
| 25 | GND | P | Ground |
| 26,27 | NC | - | No connection |
| 28 | LVBIT | I | LVBIT=1 is 8-bit mode(default). LVBIT=0 is 6-bit mode. |
| 29 | NC | - | No connection |
| 30 | GND | P | Ground |
| 31,32 | LED- | P | LED Cathode |
| 33-38 | NC | - | No connection |
| 39,40 | LED+ | P | LED Anode |

I: input, O: output, P: Power

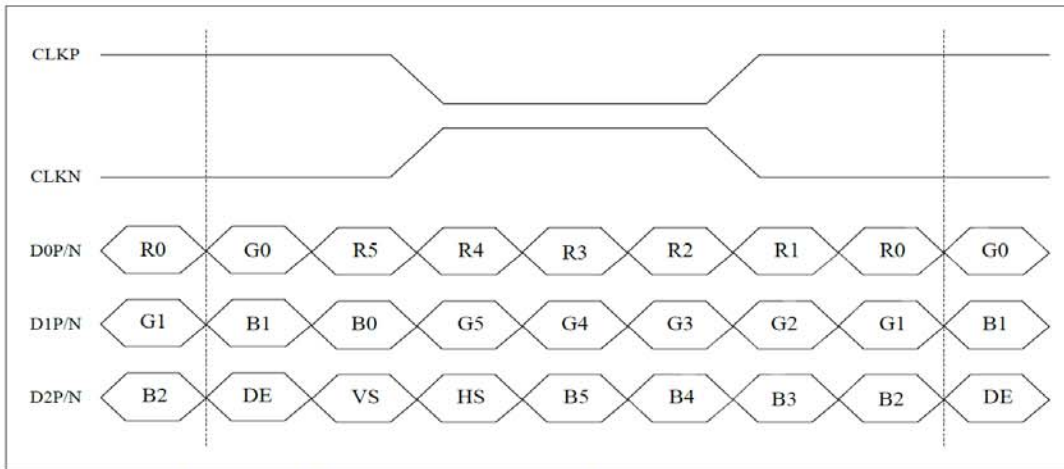
6.2 CTP Pin interface

| Pin | Symbol | Description |
|-----|--------|----------------------|
| 1 | GND | Ground |
| 2 | VDD | Working voltage 3.3V |
| 3 | RST | Reset |
| 4 | SCL | I2C clock |
| 5 | INT | Interrupt |
| 6 | SDA | I2C data |

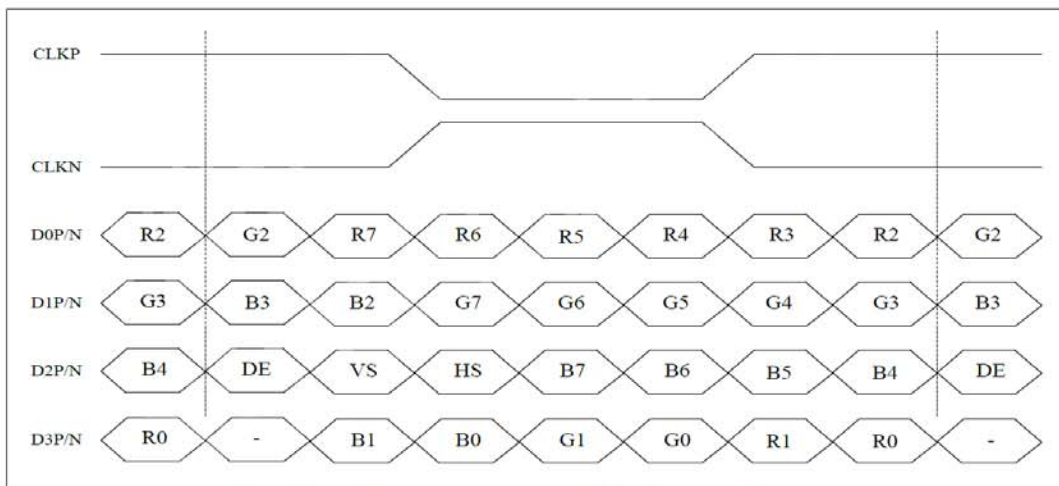
CTP IC driver source code will be offered separately.

7. Timing Characteristics

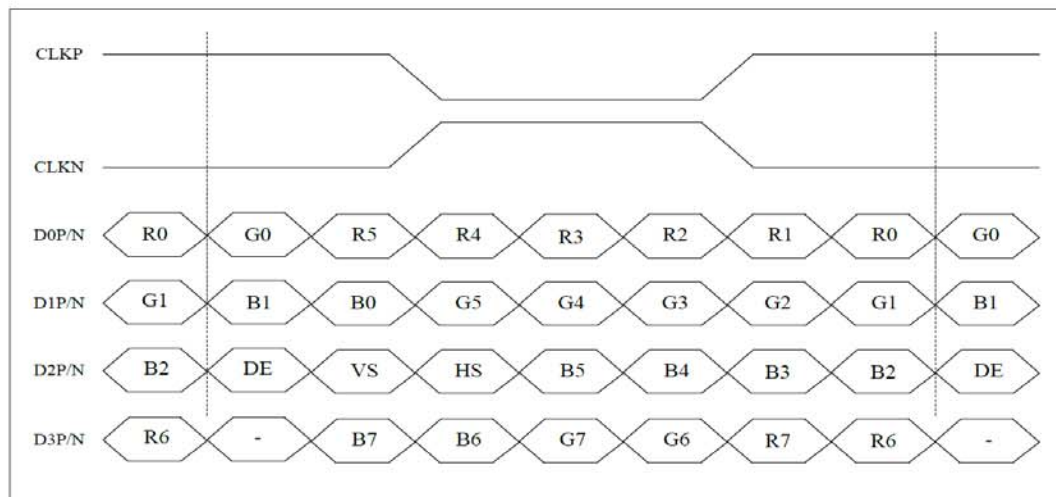
7.1 LVDS interface Characteristics



6-bit LVDS input (LVBIT=L, LVFMT=Don't care)



8-bit LVDS input (LVBIT=H, LVFMT=L)



8-bit LVDS input(LVBIT=H, LVFMT=H)

7.2 Timing Table

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

7.3 Reset Timing Characteristics

When RESETB of the reset pin equals to Low, it will be in the condition of reset. When it is in the condition of reset, it will make the device recover the initial set.

However, in order to avoid the reset noise cause reset, there is a mechanism to judge about whether the reset is needed or not.

The closed interval of Low can be shown as the following.

(Test condition: VDDIO=2.3V~3.6V, VSS=0V, T_A=-20 ~+85)

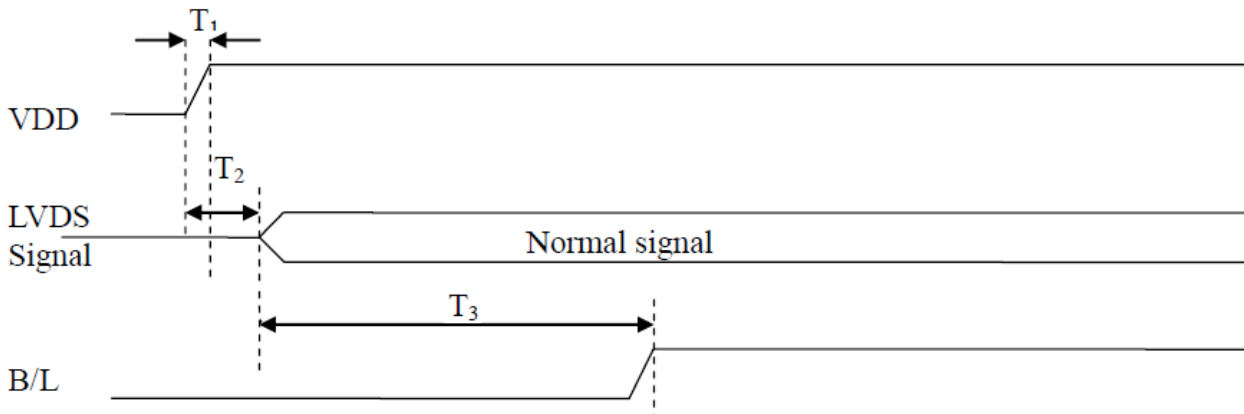
| Parameter | Symbol | Conditions | Spec. | | | Unit |
|-----------------------|--------|------------|-------|------|------|------|
| | | | Min. | Typ. | Max. | |
| Reset low pulse width | Trst | | 20 | - | - | μs |



Figure 13.5: Reset timing

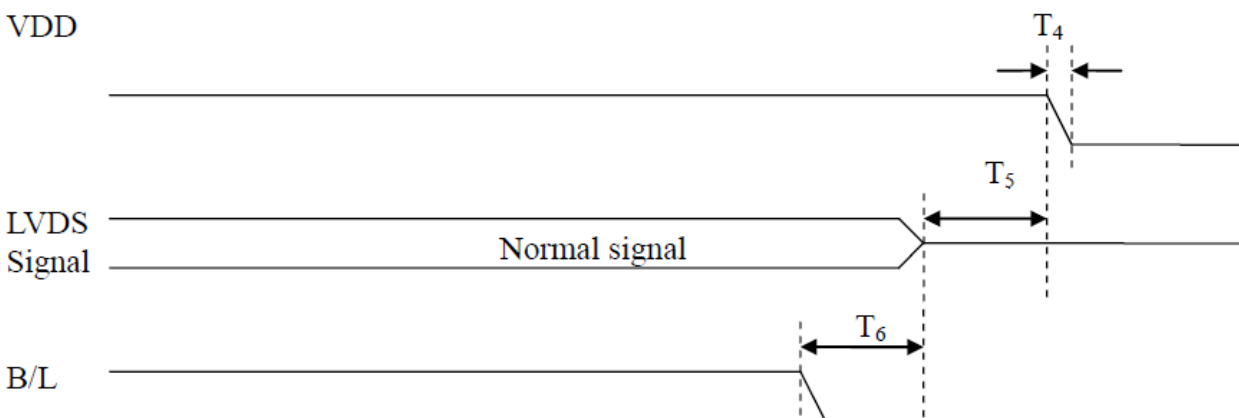
7.4 Power ON/OFF Sequence

Power On Sequence



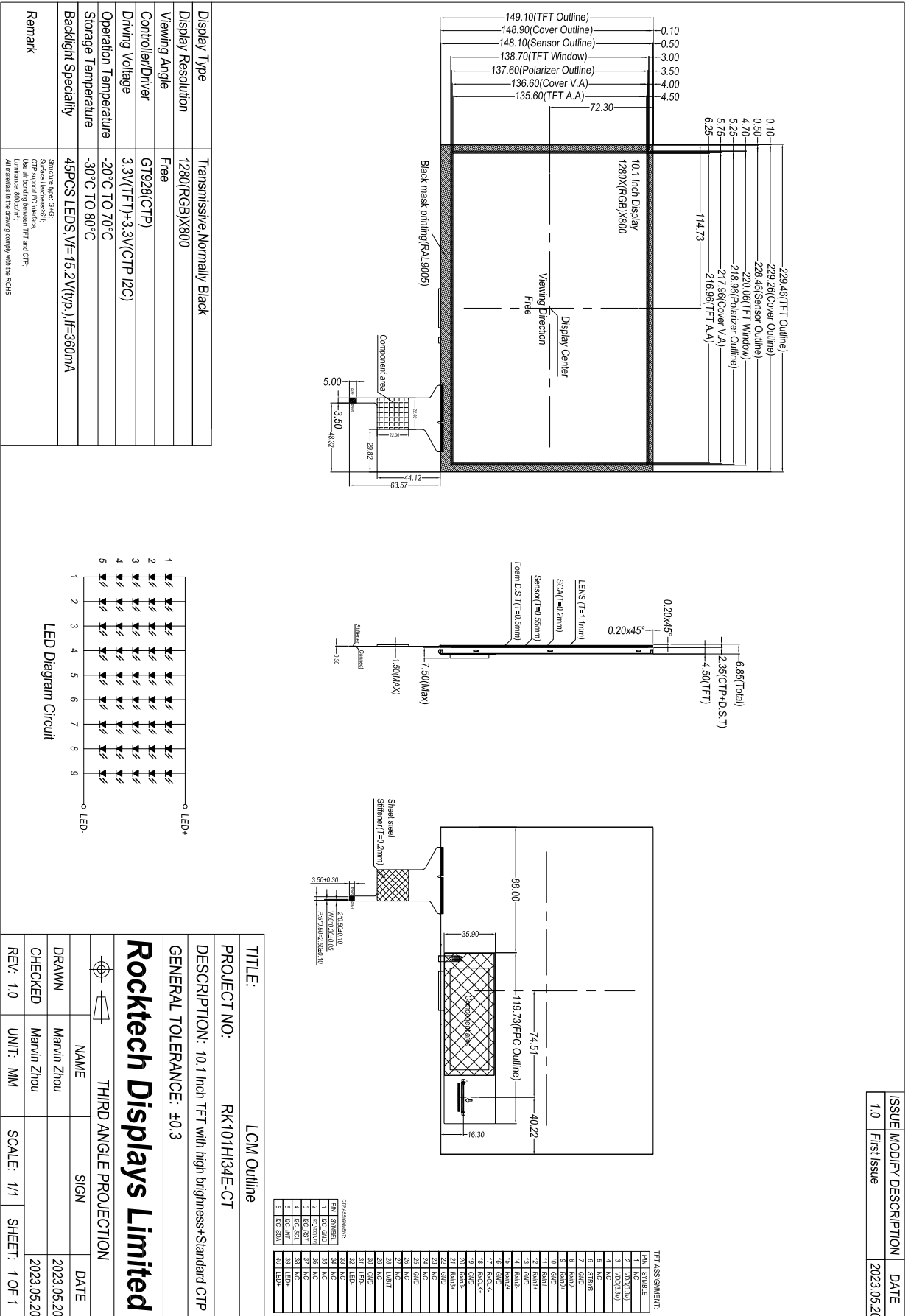
| Symbol | Value | | | Unit |
|--------|-------|------|------|------|
| | Min. | Typ. | Max. | |
| T1 | 0.5 | 2 | 10 | ms |
| T2 | 0 | 5 | 50 | ms |
| T3 | 130 | 136 | 210 | ms |

Power Off Sequence



| Symbol | Value | | | Unit |
|--------|-------|------|------|------|
| | Min. | Typ. | Max. | |
| T4 | 0.5 | 2 | 10 | ms |
| T5 | 0 | 7 | 50 | ms |
| T6 | 0 | 2 | 100 | ms |

8.Outline Dimension



9. Reliability and Inspection Standard

| No. | Test Item | Test Conditions | Remark | |
|-----|------------------------------------|---|--------------|------|
| 1 | High Temperature | Storage | 80°C, 120Hr | Note |
| | | Operation | 70°C, 120Hr | Note |
| 2 | Low Temperature | Storage | -30°C, 120Hr | Note |
| | | Operation | -20°C, 120Hr | |
| 3 | High Temperature and High Humidity | 40°C, 90%RH, 120Hr | Note | |
| 4 | Thermal Cycling Test(No operation) | -20°C for 30min, 70°C for 30 min. 100 cycles. Then test at room temperature after 1 hour | Note | |
| 5 | Vibration Test(No operation) | Frequency :10~55 HZ; Stroke :1.5 mm;Sweep:10HZ~55HZ~10HZ; 2hours for each direction of X, Y, Z(6 hours for total) | | |
| 6 | Package Drop Test | Height:60 cm, 1 corner, 3 edges, 6 surfaces | | |
| 7 | Electro Static Discharge | ±2KV, Human Body Mode, 100pF/1500Ω | | |

Note:

- 1) Sample quantity for each test item is 5~10pcs.
- 2) Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

10. PRECAUTIONS FOR USING LCD MODULES

Handling Precautions

- (1) The display panel is made of glass and polarizer. As glass is fragile, it tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.
- (2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.
- (3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).
- (4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming in contact with room temperature air.
- (5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents
 - Isopropyl alcohol
 - Ethyl alcoholDo not scrub hard to avoid damaging the display surface.
- (6) Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.
 - Water
 - Ketone
 - Aromatic solventsWipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contacting oil and fats.
- (7) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
- (8) Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
- (9) Do not attempt to disassemble or process the LCD module.
- (10) NC terminal should be open. Do not connect anything.
- (11) If the logic circuit power is off, do not apply the input signals.
- (12) Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.
 - Do not alter, modify or change the shape of the tab on the metal frame.
 - Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
 - Do not damage or modify the pattern writing on the printed circuit board.
 - Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.

- Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- Do not drop, bend or twist LCM.

Storage Precautions

When storing the LCD modules, the following precaution is necessary.

- (1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for the desiccant.
- (2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.
- (3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped).

Others

Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.

- Exposed area of the printed circuit board.
- Terminal electrode sections.