# PRODUCT SPECIFICATION

**CDTECH Model:** **S070QWS134EP-FC141-GFR**

**CUSTOMER Model:** -

**Description:** **7.0” TFT-LCD Module with CTP**

**Version:** **1.0**

| CDTECH | PREPARED BY | CHECKED BY | APPROVED BY |
|---|---|---|---|
| SIGNATURE | 罗洪飞 | 洪晓仪 | 罗洪飞 |
| DATE | 2023.4.27 | 2023.4.27 | 2023.4.27 |

| | SIGNATURE | DATE |
|---|---|---|
| CUSTOMER APPROVAL | | |

## Record of Revisions

| Version | Revise Date | Description | Page |
|---|---|---|---|
| 1.0 | 2023-4-27 | First Release | - |
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# Contents

# 1. General Specifications

## 1.1 LCM General Information

| Item | Specification | Unit |
|---|---|---|
| LCD Size | 7.0 | inch |
| Number of Pixels | 1024 (H) RGB x 600 (V) | pixels |
| Display Mode | Normally Black | - |
| Viewing Direction | Free | o' clock |
| Interface | LVDS | - |
| Display Colors | 16.7M | colors |
| Outline Dimension | 207.00 (H) x 123.12 (V) x 16.14 (D) | mm |
| Active Area | 154.21 (H) x 85.92 (V) | mm |
| Pixel Pitch | 0.1505 (H) x 0.1432 (V) | mm |
| Driver IC | HX8696+HX8282 | - |
| Operation Temperature | -30~85 | ℃ |
| Storage Temperature | -30~85 | ℃ |

## 1.2 Touch Panel Information

| Item | Specification |
|---|---|
| Touch Structure | G+G |
| Bonding Type with LCM | OCA Optical Bonding |
| Driver IC | MXT640T |
| Interface | FPC |
| Touch Count Max | 5 Points |
| Surface treatment | GFR |
| Surface hardness | 3H |
| I2C slave address | 0x4A |
| Origin of coordinate | Top Left Corner |

Note1:Requirements on environmental protection RoHS compliant.

# 2. Absolute Maximum Ratings

| Item | Symbol | MIN. | MAX. | Unit | Note |
|---|---|---|---|---|---|
| Analog Supply voltage | VDD | -0.3 | 5.0 | V | Note 1 |

Note 1:Permanent damage may occur to the LCD module if beyond this specification.
Functional operation should be restricted to the conditions described under normal operating conditions.

# 3. Elecrical Characteristics

## 3.1 Recommended Operating Condition for TFT LCD

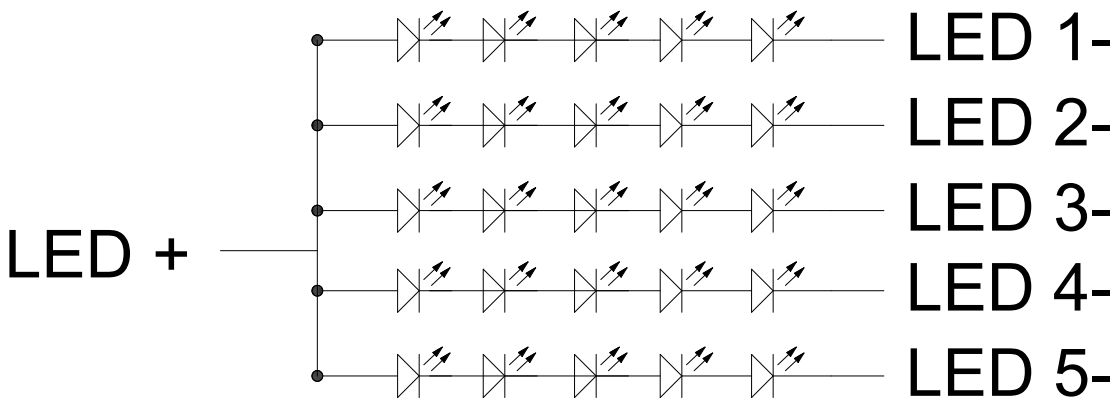
| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Analog Supply voltage | VCC | 3.0 | 3.3 | 3.6 | V | |
| Analog supply current | $I_{VCC}$ | - | TBD | - | mA | VCC=3.3V |
| Logic input voltage | VIH | 0.7*VCC | - | VCC | V | |
| | VIL | GND | - | 0.3*VCC | V | |

## 3.2 Recommended Driving Condition for Backlight

| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Driving Current | $I_F$ | - | 250 | - | mA | |
| Driving Voltage | $V_F$ | 13.5 | - | 17.0 | V | |
| Power consumption | $W_{BL}$ | 3.375 | - | 4.250 | W | |
| LED Life-Time | N/A | 30,000 | 50,000 | - | Hours | Ta=25℃<br>Note 1 |

Note 1:LED lifetime is defined as the module brightness decay 50% of original brightness at Ta=25 degree, typical current.

Note 2:LED circuit :




### 3.3 Touch Panel

| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Power Supply voltage | VDD | - | 3.3 | - | V | |
| Analog supply current | $I_{VDD}$ | - | TBD | - | mA | VCC=3.3V |
| Input high-level voltage | VIH | 0.7*VDD | - | VDD | V | |
| Input low -level voltage | VIL | GND | - | 0.3*VDD | V | |

# 4. Interface Pin Assignment

## 4.1 LCM Pin Assignment

| No. | Symbol | Description |
|---|---|---|
| 1 | A1 | Power for LED backlight (Anode) |
| 2 | K1 | Power for LED backlight (Cathode) |
| 3 | K2 | Power for LED backlight (Cathode) |
| 4 | NC | No connection |
| 5 | K3 | Power for LED backlight (Cathode) |
| 6 | K4 | Power for LED backlight (Cathode) |
| 7 | K5 | Power for LED backlight (Cathode) |
| 8 | NC | No connection |
| 9 | NTC+ | Thermistor pin1 |
| 10 | NTC- | Thermistor pin2 |
| 11 | NC | No connection |
| 12-13 | VCC | Power Supply |
| 14-16 | GND | Ground |
| 17 | STDBY | Standbymode & Normally pulled high.<br>STBYB = “1”, normal operation<br>STBYB = “0”, timing controller, source driver will turn off, all output are High-Z |
| 18 | LR | Horizontal inversion （Note 1） |
| 19 | UD | Vertical inversion （Note 1） |
| 20 | NC | No connection |
| 21 | GND | Ground |
| 22 | LVDS_Rx_IN3+ | +LVDS differential data input |
| 23 | LVDS_Rx_IN3- | -LVDS differential data input |
| 24 | GND | Ground |
| 25 | LVDS_CLK_IN+ | +LVDS differential clock input |
| 26 | LVDS_CLK_IN- | -LVDS differential clock input |
| 27 | GND | Ground |
| 28 | LVDS_RX_IN2+ | +LVDS differential data input |
| 29 | LVDS_RX_IN2- | -LVDS differential data input |
| 30 | GND | Ground |
| 31 | LVDS_RX_IN1+ | +LVDS differential data input |

| | | |
|---|---|---|
| 32 | LVDS_RX_IN1- | -LVDS differential data input |
| 33 | GND | Ground |
| 34 | LVDS_RX_IN0+ | +LVDS differential data input |
| 35 | LVDS_RX_IN0- | -LVDS differential data input |
| 36 | GND | Ground |
| 37 | RST | Global reset pin |
| 38 | GND | Ground |
| 39 | NC | No connection |
| 40 | GND | Ground |

Note 1: When L/R=0 set right to left scan direction
When L/R=1 set left to right scan direction
When U/D=0 set bottom to top scan direction
When U/D=1 set top to bottom scan direction

### 4.2 Touch FPC Pin Assignment

| No. | Symbol | Description |
|---|---|---|
| 1 | SCL | I2C clock input |
| 2 | SDA | I2C data input and output |
| 3 | GND | Ground |
| 4 | GND | Ground |
| 5 | INT | Interrupt signal from CTP |
| 6 | GND | Ground |
| 7 | RESET | Reset pin |
| 8 | VDD | Power supply |
| 9 | GND | Ground |
| 10 | GND | Ground |

# 5. Interface Characteristics

## 5.1 Power seqence

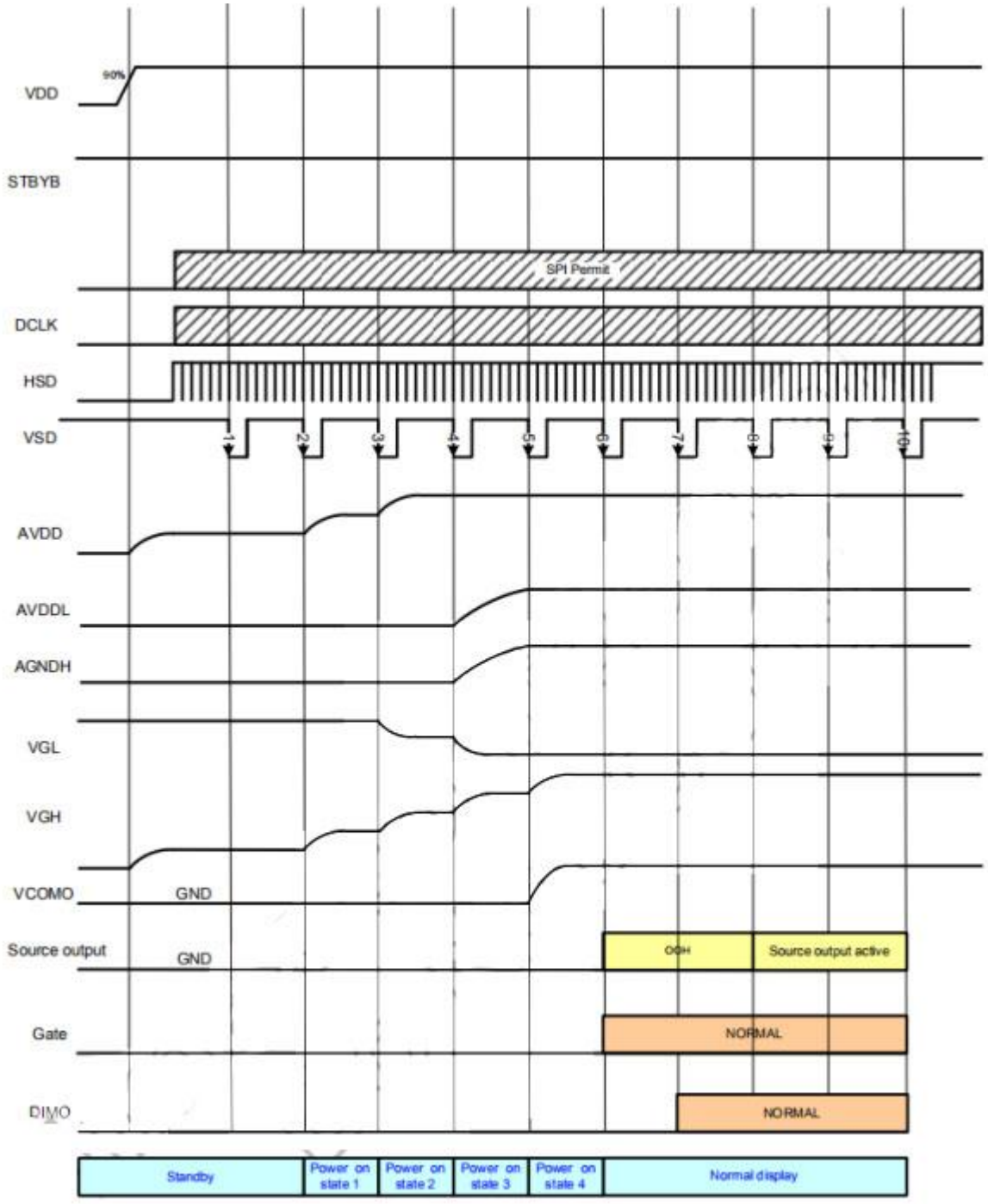
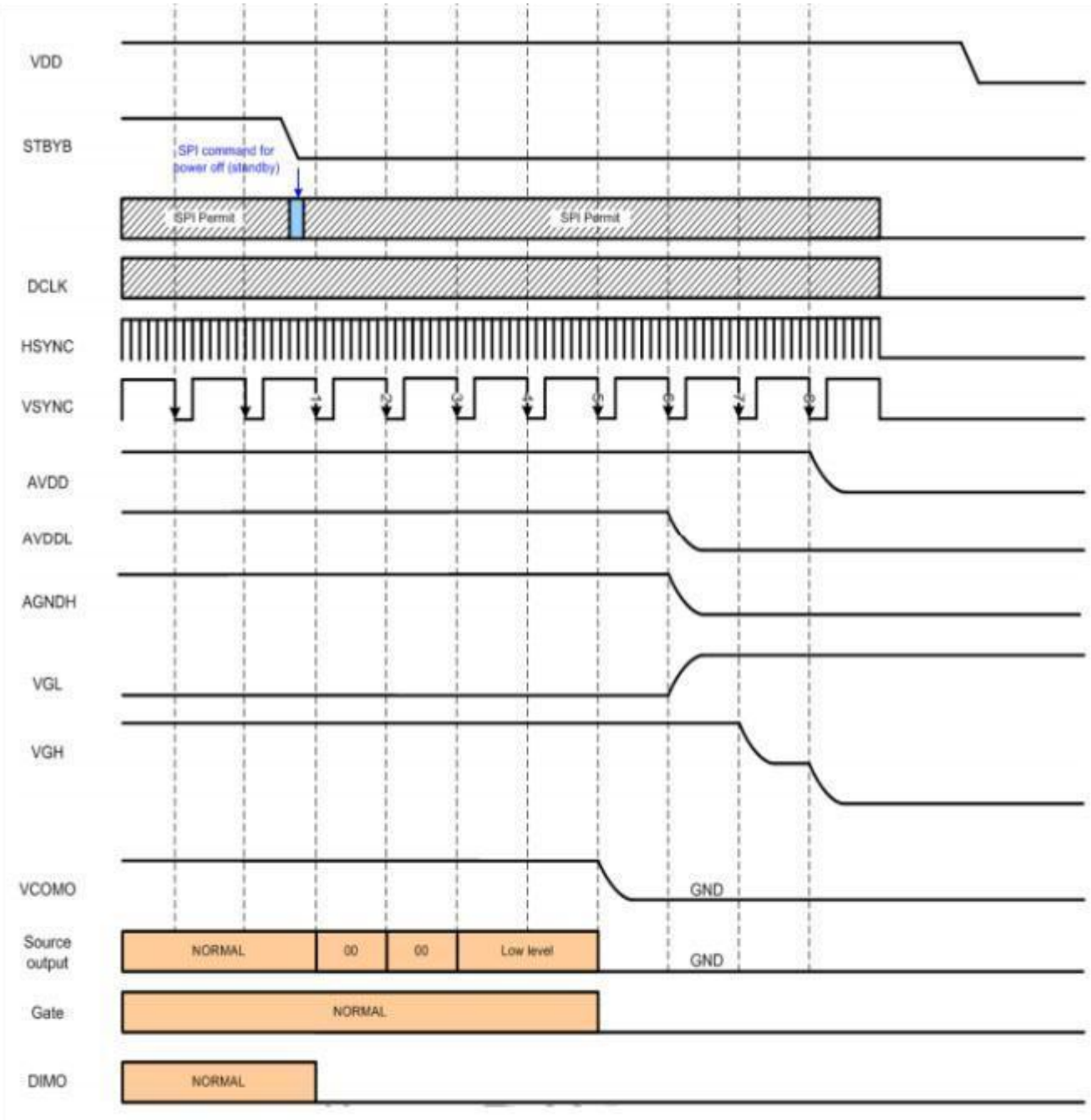



Figure 8.1: Power on timing sequence




**Note:** (1) Low level=3FH, when NBW=L. **(Normally white)**
(2) Low level=00H, when NBW=H. **(Normally black)**

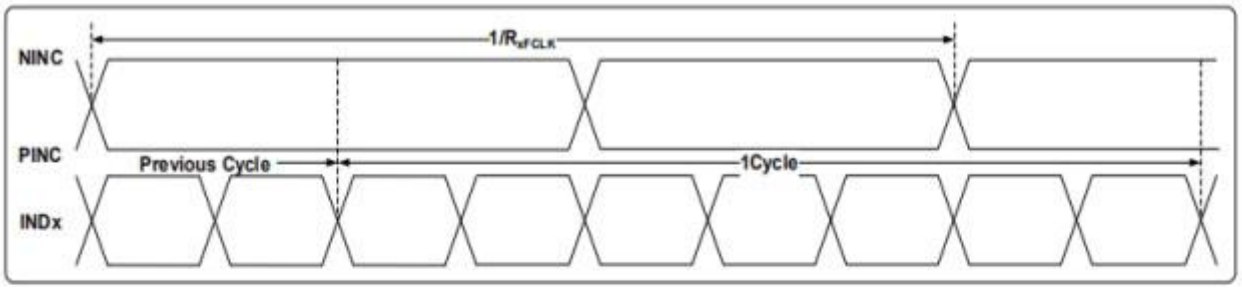
**Figure 8.2: Power off timing sequence**

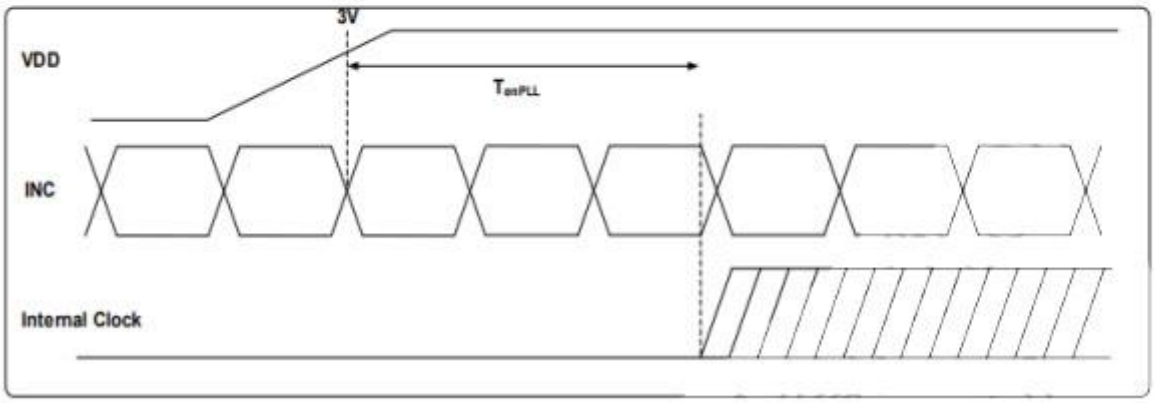
## 5.2 Timing Characteristics

| Parameter | Symbol | Condition | Spec. | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Clock frequency | $R_{XFCLK}$ | - | 20 | - | 71 | MHz |
| Input data skew margin | $T_{RSKM}$ | $\|V_{ID}\|$=400mV<br>$R_{XVCM}$=1.2V<br>$R_{XFCLK}$=71MHz | 500 | - | - | pS |
| Clock high time | $T_{LVCH}$ | - | - | 4/(7x$R_{XFCLK}$) | - | ns |
| Clock low time | $T_{LVCL}$ | - | - | 3/(7x$R_{XFCLK}$) | - | ns |
| PLL wake-up time | $T_{enPLL}$ | - | - | - | 150 | μs |

Table 10.2: LVDS mode AC electrical characteristics

| Parameter | Symbol | Spec. | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| DCLK frequency | fclk | 40.8 | 51.2 | 67.2 | MHz |
| Horizontal display area | thd | | 1024 | | DCLK |
| HSD period | th | 1114 | 1344 | 1400 | DCLK |
| HSD blanking | thb+thfp | 90 | 320 | 376 | DCLK |
| Vertical display area | tvd | | 600 | | $T_H$ |
| VSD period | tv | 610 | 635 | 800 | $T_H$ |
| VSD blanking | tvbp+tvfp | 10 | 35 | 200 | $T_H$ |



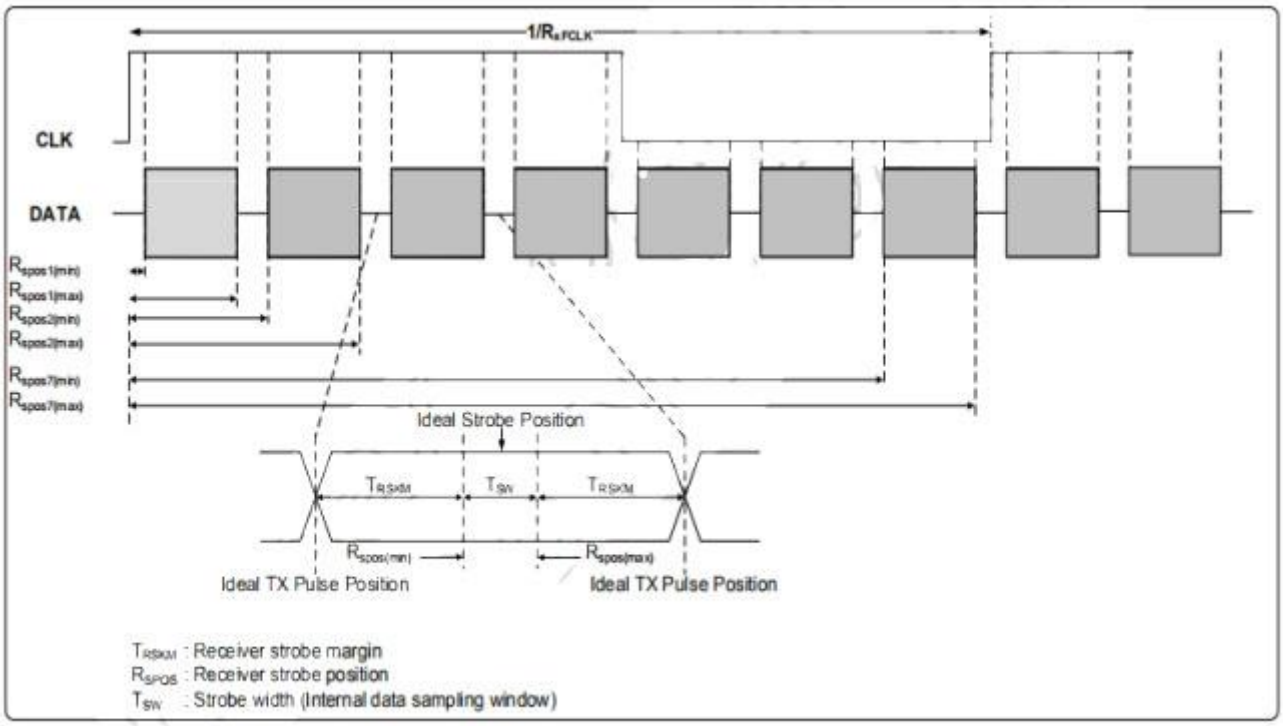




**Figure 10.1: LVDS figure**

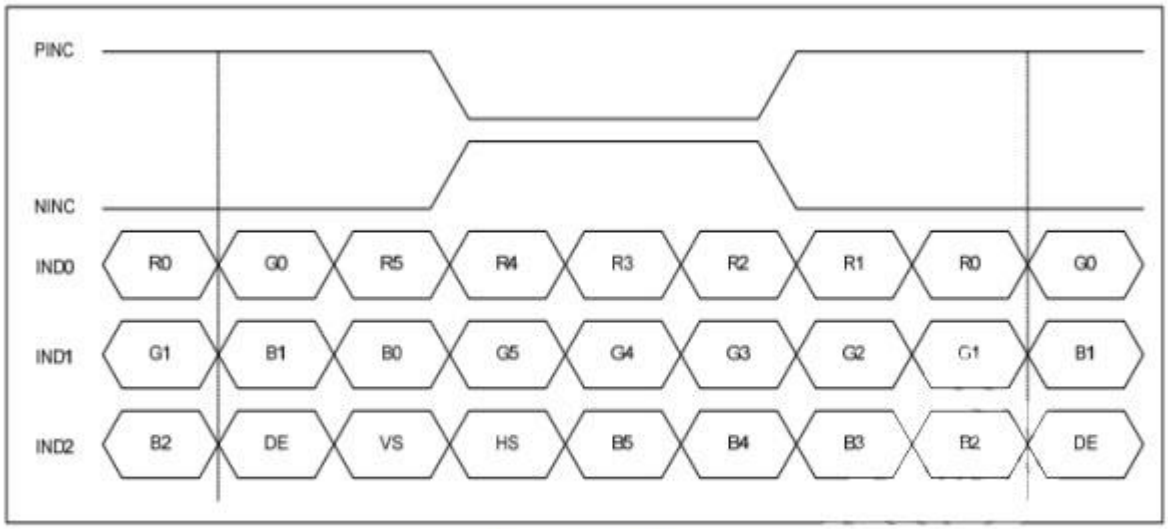



Figure 10.4: 6-bit LVDS input

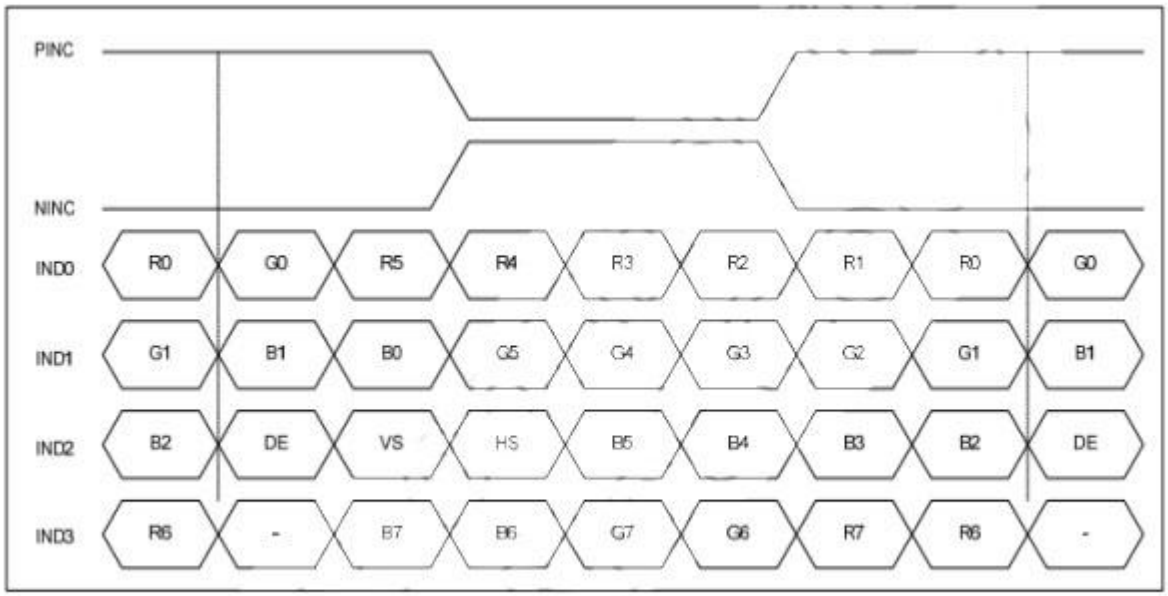
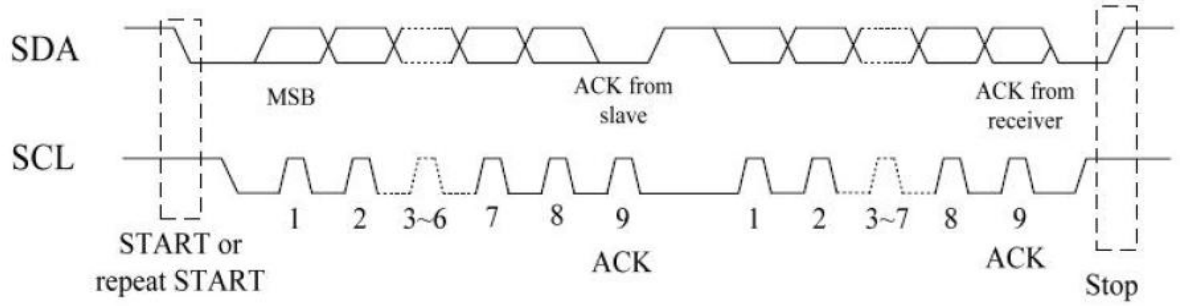



Figure 10.5: 8-bit LVDS input

## 5.3 Capacitive touch panel Specification

I2C

The I2C is always configured in the Slave mode. The data transfer format is shown in Figure 2-4.



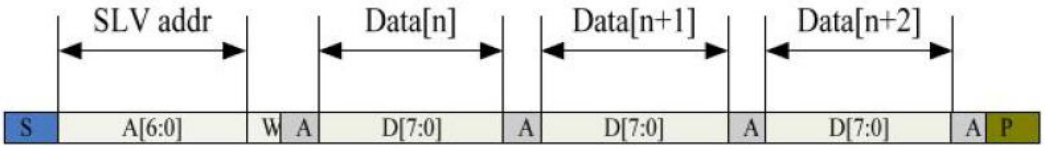




*Figure 2-5 I2C master write, slave read*

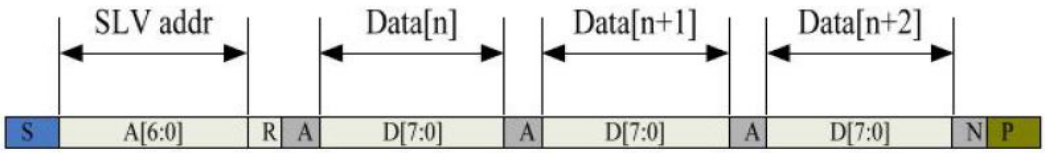



*Figure 2-6 I2C master read, slave write*

Table 2-1 lists the meanings of the mnemonics used in the above figures.

Table 2-1 Mnemonics Description

| Mnemonics | Description |
|---|---|
| S | I2C Start or I2C Restart |
| A[6:0] | Slave address<br>A[6:4]: 3'b011<br>A[3:0]: data bits are identical to those of I2CCON[7:4] register. |
| W | 1'b0: Write |
| R | 1'b1: Read |
| A(N) | ACK(NACK) |
| P | STOP: the indication of the end of a packet (if this bit is missing, S will indicate the end of the current packet and the beginning of the next packet) |

I2C Interface Timing Characteristics is shown in Table 2-2.

Table 2-2 I2C Timing Characteristics

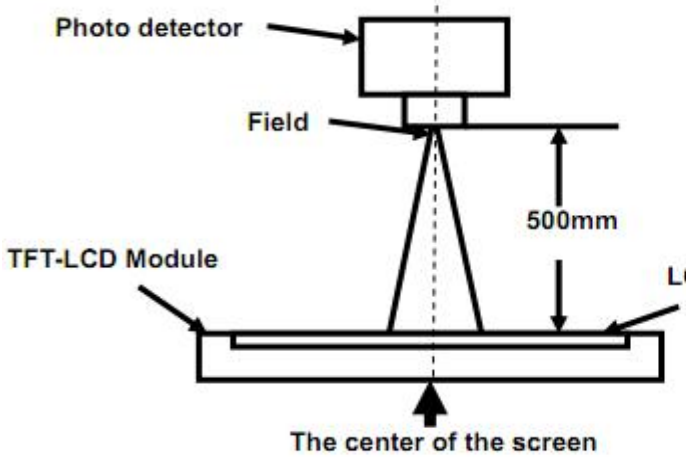
| Parameter | Unit | Min | Max |
|---|---|---|---|
| SCL frequency | KHz | 0 | 400 |
| Bus free time between a STOP and START condition | us | 4.7 | \ |
| Hold time (repeated) START condition | us | 4.0 | \ |
| Data setup time | ns | 250 | \ |
| Setup time for a repeated START condition | us | 4.7 | \ |
| Setup Time for STOP condition | us | 4.0 | \ |

# 6. Optical Specifications

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| Viewing Angle (CR≥10) B/L ON | $\theta_T$ | Φ=90°(12 o'clock) | 80 | - | - | deg | Note2 |
| | $\theta_B$ | Φ=270°(6 o'clock) | 80 | - | - | deg | Note2 |
| | $\theta_L$ | Φ=180°(9 o'clock) | 80 | - | - | deg | Note2 |
| | $\theta_R$ | Φ=0°(3 o'clock) | 80 | - | - | deg | Note2 |
| Response Time | $T_{ON}$ | Normal θ=Φ=0° | - | 12 | 17 | msec | Note4 |
| | $T_{OFF}$ | | - | 12 | 17 | msec | Note4 |
| Contrast Ratio | CR | | 800 | 1000 | - | - | Note1 Note3 |
| Color Chromaticity | $W_X$ | | 0.259 | 0.309 | 0.359 | - | Note1 Note5 |
| | $W_Y$ | | 0.280 | 0.330 | 0.380 | - | Note1 Note5 |
| Luminance | L | | 800 | 1000 | - | cd/m² | Note1 Note7 |
| Luminance Uniformity | $Y_U$ | | 75 | 80 | - | % | Note1 Note6 |
| NTSC | - | | 45 | 50 | - | % | - |

Note 1:Definition of optical measurement system

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.




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

Note 2:Definition of viewing angle range and measurement system
Viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

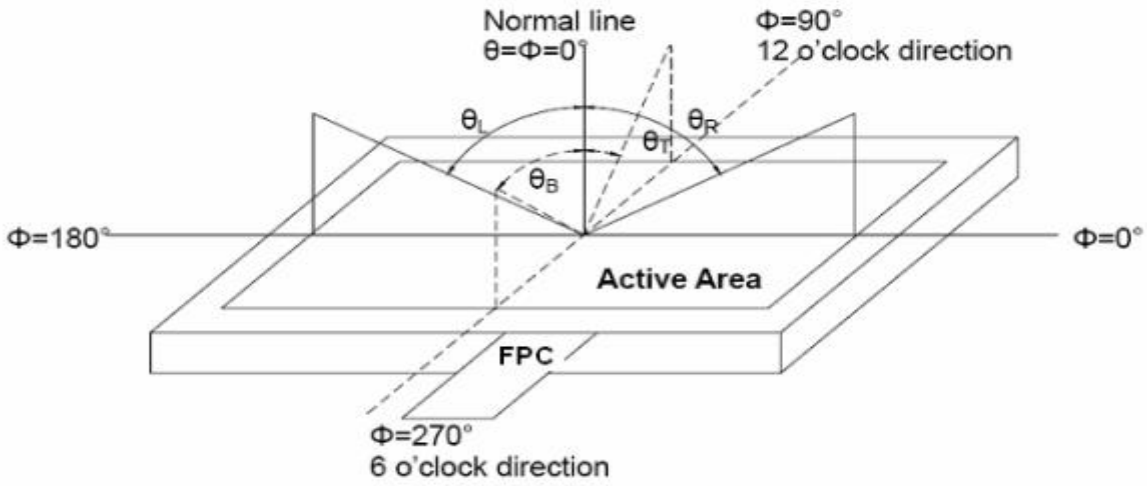


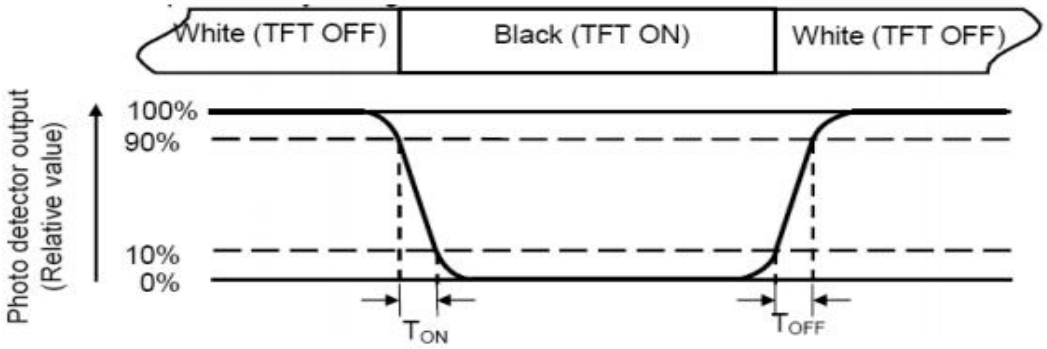

Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black”state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.




Note 5:Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6:Definition of Luminance Uniformity

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.2.

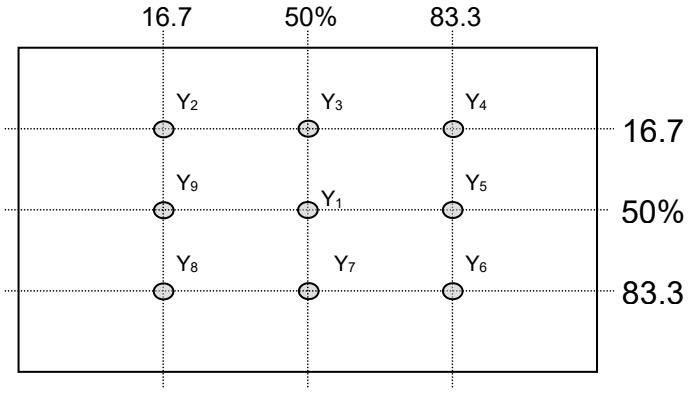



Fig. 2 Definition of points

Note 7:Definition of Luminance (Refer Fig. 2)

Surface luminance is the luminance with all pixels displaying white.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3, ......,Pn).

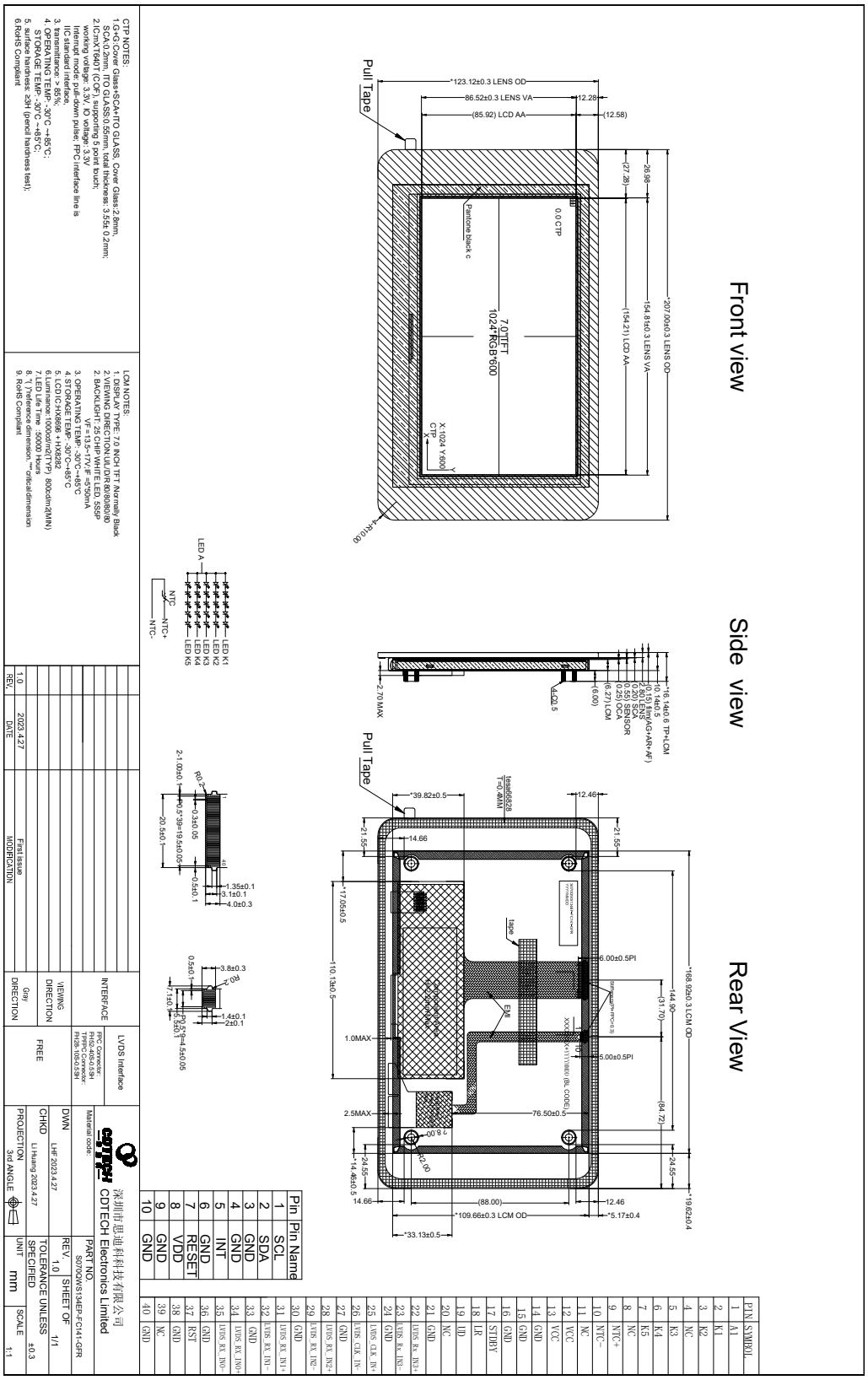
# 7. Reliability Test Items

| Test Item | Test Conditions | |
|---|---|---|
| High Temperature Storage | Ta= +85℃ | 240hrs |
| Low Temperature Storage | Ta= -30℃ | 240hrs |
| High Temperature Operation | Ta= +85℃ | 240hrs |
| Low Temperature Operation | Ta= -30℃ | 240hrs |
| High Temperature and Humidity Storage | Ta= +60℃, 90% RH | 240hrs |
| Thermal Shock (Non-operation) | -30℃/30 min ~ +85℃/30 min for 20 cycles<br>Start with cold temperature<br>end with high temperature | |
| Electro Static Discharge | Contact = ± 4 kV, class B<br>Air = ± 8 kV, class B<br>R=330Ω,C=150pF | |
| Vibration | Sweep: 10Hz~55Hz~10Hz<br>Stroke: 1.5mm<br>2 hrs for each direction of X .Y. Z. | |
| Mechanical Shock | 60G 6ms,±X,±Y,±Z<br>3 times for each direction | |
| Package Drop Test | Height: 60 cm<br>1 corner, 3 edges, 6 surfaces | |

Notes: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:

1). Air bubble in the LCD
2). Seal leak or Glass crack
3). Non display or abnormal display
4). Brightness reduction >50%

# 8. Mechanical Drawing




CTP NOTES:
1.G+G Cover Glass+SCA+ITO GLASS, Cover Glass:2.8mm, SCA:0.2mm, ITO GLASS:0.55mm, total thickness: 3.55± 0.2mm;
2.IC:mXT640T (C2F), supporting 5 point touch;
Working voltage:3.3V;
Interface: 4-wire I²C, 1-wire interrupt, 1-wire reset, I²C interface line is IIC standard interface;
3. transmittance: > 85%;
4. OPERATING TEMP: -30°C ~+85°C;
STORAGE TEMP: -30°C ~+85°C;
5. Surface hardness: ≥3H (pencil hardness test);
6.RoHS Compliant

LCM NOTES:
1. DISPLAY TYPE: 7.0 INCH TFT /Normally Black
2. VIEWING DIRECTION:U6/D/R 60/80/80/80
3. BACKLIGHT: 21 CHIP WHITE LED, 535P
4. OPERATING TEMP: -30°C~+85°C
5. LCD IC:HX8696 +HX8282
6. Luminance:1000cd/m2(TYP) 800cd/m2(MIN)
7. LED life time: 50000 Hours
8. "[ ]"Parameter is reference dimension, "critical"dimension
9. RoHS Compliant

| REV. | DATE | MODIFICATION |
|---|---|---|
| 1.0 | 2023.4.27 | First Issue |

| | |
|---|---|
| INTERFACE | FPC Connector: FH12-40S-0.5SH; FPC Connector: FH28-50S-0.5SH |
| VIEWING DIRECTION | Grey |
| FREE | LVDS Interface |

| | |
|---|---|
| DWN | LHF 2023.4.27 |
| CHKD | LI Huang 2023.4.27 |
| PROJECTION | 3rd ANGLE |

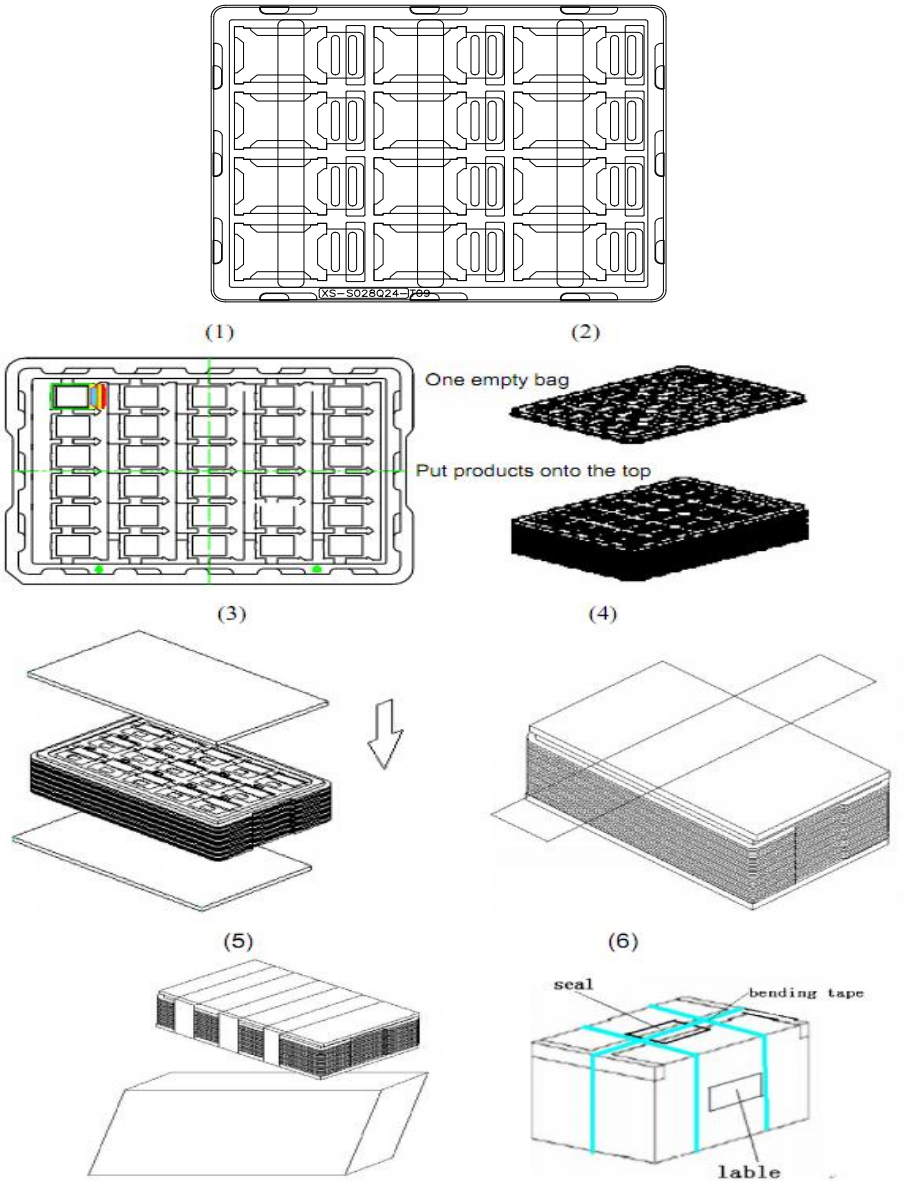
深圳市思迪科技有限公司
CDTECH Electronics Limited
Material Code
PART NO. S070QWS134EP-FC141-GFR
SHEET OF 1/1
TOLERANCE UNLESS ±0.3
SPECIFIED
UNIT mm
SCALE 1:1

| Pin | Pin Name |
|---|---|
| 1 | SCL |
| 2 | SDA |
| 3 | GND |
| 4 | GND |
| 5 | INT |
| 6 | GND |
| 7 | RESET |
| 8 | VDD |
| 9 | GND |
| 10 | GND |

| PIN | SYMBOL |
|---|---|
| 1 | A1 |
| 2 | K1 |
| 3 | K2 |
| 4 | NC |
| 5 | K3 |
| 6 | K4 |
| 7 | K5 |
| 8 | NC |
| 9 | NTC+ |
| 10 | NTC- |
| 11 | NC |
| 12 | VCC |
| 13 | VCC |
| 14 | GND |
| 15 | GND |
| 16 | GND |
| 17 | STDBY |
| 18 | LR |
| 19 | UD |
| 20 | NC |
| 21 | GND |
| 22 | LVDS_RX0- |
| 23 | LVDS_RX0+ |
| 24 | GND |
| 25 | LVDS_CLK_IN- |
| 26 | LVDS_CLK_IN+ |
| 27 | GND |
| 28 | LVDS_RX1- |
| 29 | LVDS_RX1+ |
| 30 | GND |
| 31 | LVDS_RX2- |
| 32 | LVDS_RX2+ |
| 33 | GND |
| 34 | LVDS_RX3- |
| 35 | LVDS_RX3+ |
| 36 | GND |
| 37 | RST |
| 38 | GND |
| 39 | NC |
| 40 | GND |

# 9. Packing

**Packing Method**




Steps:

1. Put module into tray cavity
2. Tray stacking
3. Put 1 cardboard under the tray stack and 1 cardboard above
4. Fix the cardboard to the tray stack with adhesive tape
5. Put the tray stack into carton
6. Carton sealing with adhesive tape

# 10. Precautions for Use of LCD modules

## 10.1 Handling Precautions

10.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

10.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

10.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

10.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

10.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketene
- Aromatic solvents

10.1.6. Do not attempt to disassemble the LCD Module.

10.1.7. If the logic circuit power is off, do not apply the input signals.

10.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1. Be sure to ground the body when handling the LCD Modules.

10.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

## 10.2 Storage Precautions

10.2.1.When storing the LCD modules,avoid exposure to direct sunlight or to the light of fluorescent lamps.

10.2.2.The LCD modules should be stored under the storage temperature range if the LCD modules will be stored for a long time,the recommend condition is :

Temperature : 0℃ ~40℃ Relatively humidity: ≤80%

10.2.3.The LCD modules should be stored in the room without acid, alkali and harmful gas.

## 10.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.