# 深圳立显科技有限公司

Model Name: LX T30WH006T1

Date : 2013-11-19

Version: 1.0

Drafting：_____ Checked：_____ Approval：_____

For Customer's Acceptance

| Approved by | Comment |
| --- | --- |
| | |

# Contents

# 1. General Specifications

## 1.1 Description

The LX T30WH006T1 VO is a color active matrix Thin Film Transistor (TFT) Liquid Crystal Display (LCD) that uses amorphous silicon (a-Si) TFT as a switching device. This model is composed of a single 3.0 inches transmissive type main TFT-LCD panel. The resolution of the panel is 240*400 pixels and can display up to 262K color.

## 1.2 Features

- TN type for main TFT-LCD panel
- 80-system parallel bus
- Full, Still, Partial & Sleep modes are available

## 1.3 Application

- Display terminals for cellular phone

## 1.4 General Specification

| No. | Item | Specification | Unit | Remark |
|---|---|---|---|---|
| 1 | LCD Size | 3.0 | inch | - |
| 2 | Panel Type | TFT | - | - |
| 3 | Resolution | 240 x RGB x 400 | pixel | - |
| 4 | Display Mode | Transmissive | - | - |
| 5 | Display Number of Colors | 262K | - | - |
| 6 | Viewing Direction | 12 o'clock | - | - |
| 7 | Module Size | 45.04(W) x 77.0(L) x 2.4(D) | mm | - |
| 8 | LCD Active Area | 38.88(W) x64.80(L) | mm | - |
| 9 | Pixel Pitch | 0.162mmx0.162mm | mm | - |
| 10 | Driver IC | OTM4001A | - | - |
| 11 | Light Source | 4 White LEDs in Parallel | - | - |
| 12 | Interface | 8080 8/9/16/18 bit parallel | - | - |
| 13 | Operating Temperature | -20~+70 | ℃ | - |
| 14 | Storage Temperature | -30~+80 | ℃ | - |

Note 1: Please refer to the mechanical drawing.

# 2. Pin Assigmments

| Pin No. | Symbol | I/O | Function | Remark |
|---|---|---|---|---|
| 1 | YU | I | Pin for TP | - |
| 2 | XL | I | Pin for TP | - |
| 3 | YD | I | Pin for TP | - |
| 4 | XR | I | Pin for TP | - |
| 5 | GND | P | Ground | - |
| 6 | IOVCC | P | Supply Voltage for I/O | - |
| 7 | VCC | P | Supply Voltage | - |
| 8 | FMARK | O | Frame head pulse signal | - |
| 9 | CS | I | Chip Select Signal | - |
| 10 | RS | I | Register Select Signal | - |
| 11 | WR | I | Write Date Signal | - |
| 12 | RD | I | Read Date Signal | - |
| 13 | D0 | I/O | Data bus | - |
| 14 | D1 | I/O | Data bus | - |
| 15 | D2 | I/O | Data bus | - |
| 16 | D3 | I/O | Data bus | - |
| 17 | D4 | I/O | Data bus | - |
| 18 | D5 | I/O | Data bus | - |
| 19 | D6 | I/O | Data bus | - |
| 20 | D7 | I/O | Data bus | - |
| 21 | D8 | I/O | Data bus | - |
| 22 | D9 | I/O | Data bus | - |
| 23 | D10 | I/O | Data bus | - |
| 24 | D11 | I/O | Data bus | - |
| 25 | D12 | I/O | Data bus | - |
| 26 | D13 | I/O | Data bus | - |
| 27 | D14 | I/O | Data bus | - |
| 28 | D15 | I/O | Data bus | - |
| 29 | D16 | I/O | Data bus | |
| 30 | D17 | I/O | Data bus | |
| 31 | M1 | I | Select a mode to interface to an MPU | |
| 32 | M0 | I | Select a mode to interface to an MPU | |
| 33 | NC | / | Leave It Open | |
| 34 | RESET | I | Reset Signal | |
| 35 | GND | P | Ground | |
| 36 | LEDA | P | LED A | |
| 37 | LEDK1 | P | LED K | |

| | | | | |
|---|---|---|---|---|
| 38 | LEDK2 | P | LED K | |
| 39 | LEDK3 | P | LED K | |
| 40 | LEDK4 | P | LED K | |

# 3. Electrical Specifications

## 3.1 Absolute Maximum Rating

($T_a$=+25°C)

| Item | | Symbol | Values | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | | Typ. | Max. | | |
| TFT Module | I/O circuit Supply Voltage | IOVCC | -0.3 | +4.5 | V | Note1 |
| | Analog Supply Voltage | VCI | -0.3 | +4.5 | V | Note1 |
| Backlight Unit | Current | $I_B$ | - | 200 | mA | Note2 |
| | Power Consumption | $P_{BL}$ | - | 700 | mW | Note2 |

Note1: Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is applied.

Note2: Without LED driver IC, please refer to 4.3.

## 3.2 Typical Operation Conditions

### 3.2.1 DC Characteristics

($T_a$=+25°C)

| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| I/O circuit Supply Voltage | IOVCC | - | 3.0 | 3.3 | V | Backlight Luminance= 3500cd/m2 ($V_B$ =3.1V) |
| Analog Supply Voltage | VCI | 2.8 | 3.0 | 3.3 | V | |
| Input High Voltage | $V_{IH}$ | 0.8 IOVCC | - | IOVCC | V | |
| Input Low Voltage | $V_{IL}$ | -0.3 | - | 0.2 IOVCC | V | |
| Output High Voltage | $V_{OH}$ | 0.8 IOVCC | - | IOVCC | V | |
| Output Low Voltage | $V_{OL}$ | 0 | - | 0.2 IOVCC | V | |
| Frame Frequency | $f_{FRAME}$ | - | 80 | - | Hz | |
| Backlight Current(V=3.1V) | $I_B$ | - | 60 | 80 | mA | |

Note: To prevent IC latch up or DC operation in LCD panel, the power on/off sequence should follow the driver IC specification.

### 3.2.2 Current Consumption

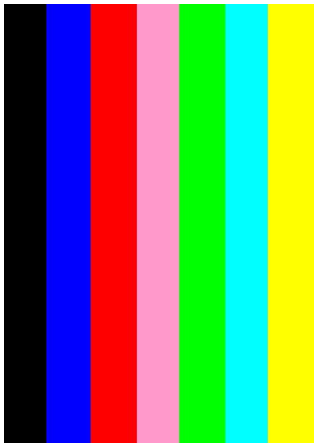
($T_a$=+25°C)

| Item | Symbol | Values | | Unit | Remark |
|---|---|---|---|---|---|
| | | Typ. | Max. | | |
| Still Mode | IDVCC | 20 | 30 | uA | Note1 |
| | IVCI | 10 | 14 | mA | Note1 |
| Sleep Mode | IDVCC | 10 | 15 | uA | Note1, Note2 |
| | IVCI | 100 | 150 | uA | Note1, Note2 |

Note1: Test Condition

Typ: IDVCC=2.8V
VCI=2.8V
Display Pattern: 8 Colorbar
Frame Rate=80Hz at Line Inversion

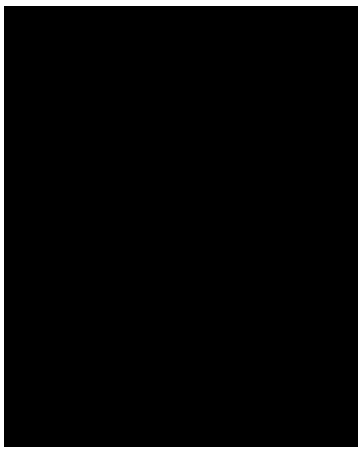
Operating Temperature: 25°C
Typ. current check pattern:



8-Colorbar

Max: IDVDD=3.3V
VCI=3.3V
Display Pattern: All Pixel Black
Frame Rate=80Hz at Line Inversion

Operating Temperature: 25°C
Max. Current check pattern:

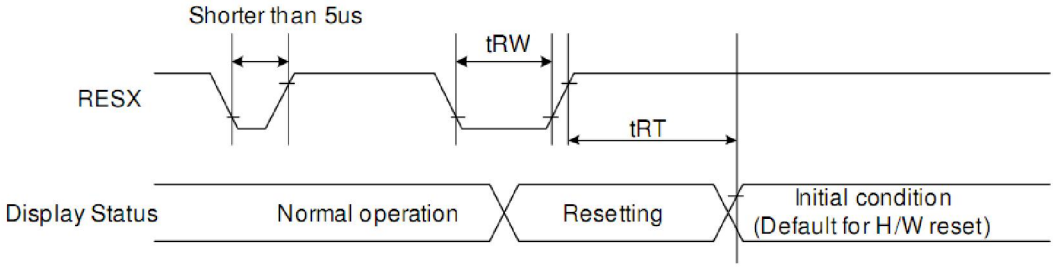


Black

Note2: In the sleep mode, all the internal display operations are suspended except for the internal R-C oscillator.

3.3 Timing Characteristic

3.3.1 Reset Timing




| Signal | Symbol | Parameter | Min | Max | Unit |
|---|---|---|---|---|---|
| RESX | tRW | Reset pulse duration | 10 | | uS |
| | tRT | Reset cancel | | 5 (note 1,5) | mS |
| | | | | 120 (note 1,6,7) | mS |

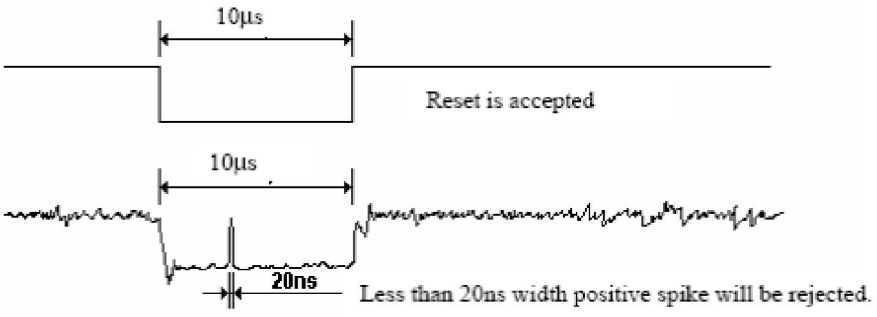
*Note 1: The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NV memory to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.*

*Note 2: Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below: -*

| RESX Pulse | Action |
|---|---|
| Shorter than 5us | Reset Rejected |
| Longer than 10us | Reset |
| Between 5us and 10us | Reset starts |

*Note 3: During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In -mode.) And then return to Default condition for Hardware Reset.*

*Note 4: Spike Rejection also applies during a valid reset pulse as shown below:*

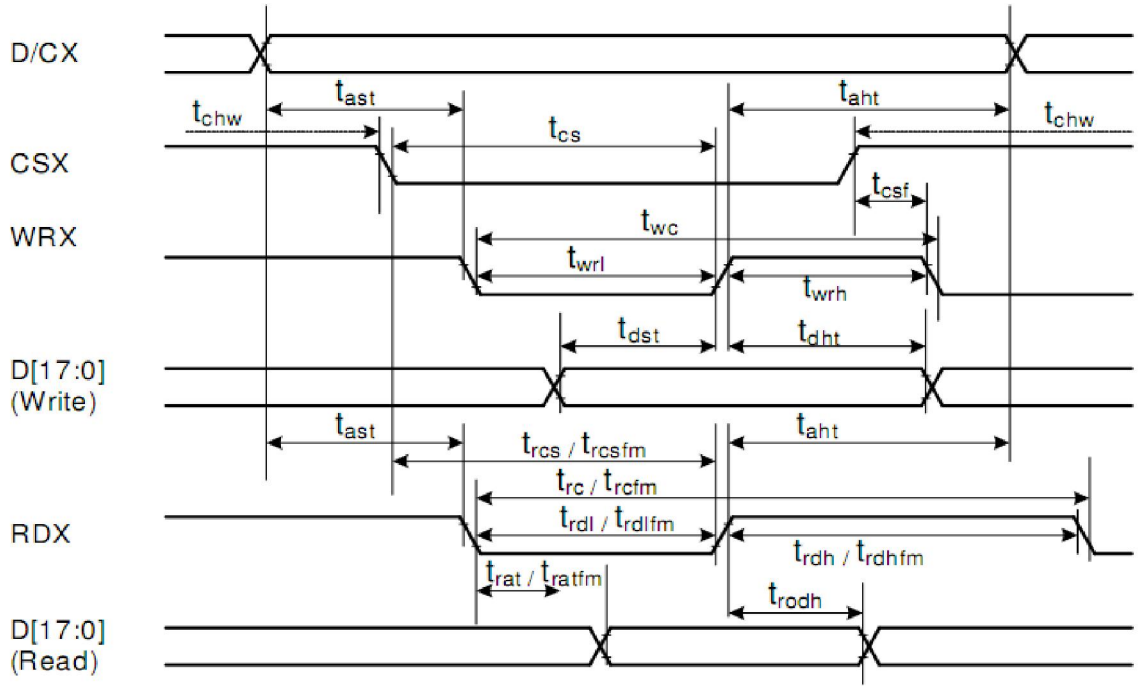



*Note 5: When Reset applied during Sleep In Mode.*

*Note 6: When Reset applied during Sleep Out Mode.*

Note 7: It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

### 3.3.2 Parallel Interface Characteristics (8080-series MPU)




(VCI=2.8 to 3.3V, IOVCC=2.8 to 3.3V, Ta=25°C)

| Signal | Symbol | Parameter | min | max | Unit | Description |
|---|---|---|---|---|---|---|
| DCX | tast | Address setup time | 0 | - | ns | |
| | taht | Address hold time (Write/Read) | 0 | - | ns | |
| CSX | tchw | CSX "H" pulse width | 0 | - | ns | |
| | tcs | Chip Select setup time (Write) | 15 | - | ns | |
| | trcs | Chip Select setup time (Read ID) | 45 | - | ns | |
| | trcsfm | Chip Select setup time (Read FM) | 355 | - | ns | |
| | tcsf | Chip Select Wait time (Write/Read) | 10 | - | ns | |
| WRX | twc | Write cycle | 66 | - | ns | |
| | twrh | Write Control pulse H duration | 15 | - | ns | |
| | twrl | Write Control pulse L duration | 15 | - | ns | |
| RDX (FM) | trcfm | Read Cycle (FM) | 450 | - | ns | |
| | trdhfm | Read Control H duration (FM) | 90 | - | ns | |
| | trdlfm | Read Control L duration (FM) | 355 | - | ns | |
| RDX (ID) | trc | Read cycle (ID) | 160 | - | ns | |
| | trdh | Read Control pulse H duration | 90 | - | ns | |
| | trdl | Read Control pulse L duration | 45 | - | ns | |
| D[17:0], D[17:10]&D[8:1], D[17:10], D[17:9] | tdst | Write data setup time | 10 | - | ns | For maximum CL=30pF<br>For minimum CL=8pF |
| | tdht | Write data hold time | 10 | - | ns | |
| | trat | Read access time | - | 40 | ns | |
| | tratfm | Read access time | - | 340 | ns | |
| | trod | Read output disable time | 20 | 80 | ns | |

*Note: Ta = -30 to 70 °C, VDDI=1.65V to 3.3V, VCI=2.5V to 3.3V, VSS=0V.*

# 4. Optical Specifications

(Ta=+25°C , VCI=+3.2V, IOVCC=+3.2V, $V_B$=3.1)

| Item | | Symbol | Condition | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | | |
| Viewing Angle Range | Left | $\theta_L$ | CR> 10 | 65 | 75 | - | degree | Note 1,2 |
| | Right | $\theta_R$ | | 65 | 75 | - | | |
| | Top | $\theta_T$ | | 65 | 75 | - | | |
| | Bottom | $\theta_B$ | | 45 | 55 | - | | |
| Response Time | | $T_{on}$ +$T_{off}$ | Normal θ=Φ=0° | - | - | 30 | ms | Note 2,3 |
| Contrast Ratio | | CR | Normal θ=Φ=0° angle | 350 | 450 | - | - | Note 2,4 |
| Luminance | | L | Normal θ=Φ=0° | - | 150 | - | $cd/m^2$ | Note 2,5 |
| Color Chromaticity (CIE1931) | White | $W_x$ | Normal θ=Φ=0° | - | 0.2639 | - | - | Note 2,6 |
| | | $W_y$ | | - | 0.3332 | - | | |
| | Red | $R_x$ | | - | 0.5235 | - | | |
| | | $R_y$ | | - | 0.3123 | - | | |
| | Green | $G_x$ | | - | 0.2944 | - | | |
| | | $G_y$ | | - | 0.5252 | - | | |
| | Blue | $B_x$ | | - | 0.1587 | - | | |
| | | $B_y$ | | - | 0.0897 | - | | |
| Color Gamut | | NTSC | CIE1931 | - | 45 | - | % | - |
| Luminance Uniformity | | $U_L$ | Normal θ=Φ=0° | 75 | 80 | - | % | Note 2,7 |
| Flicker | | - | - | No Visible | | | - | Note 8 |
| Crosstalk | | - | - | No Visible | | | - | Note 9 |

Note 1: Definition of viewing angle range

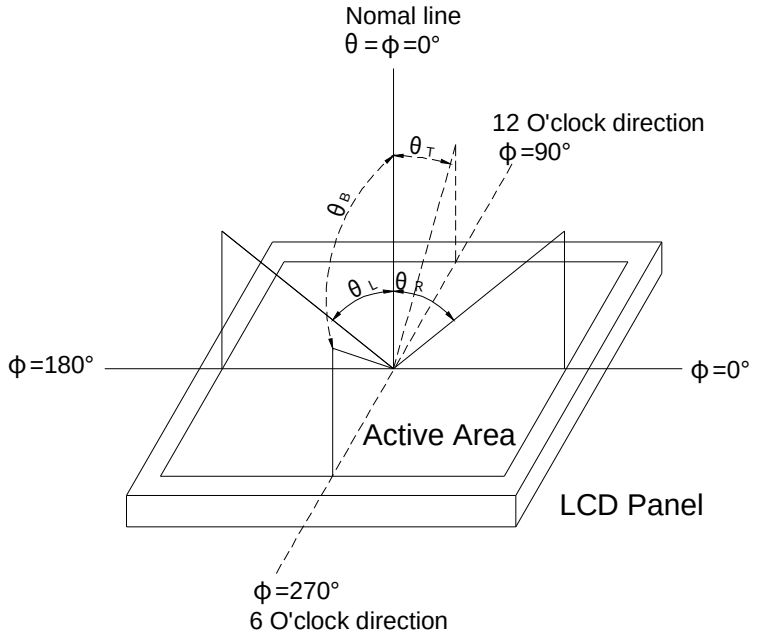



Fig . 1 Definition of viewing angle

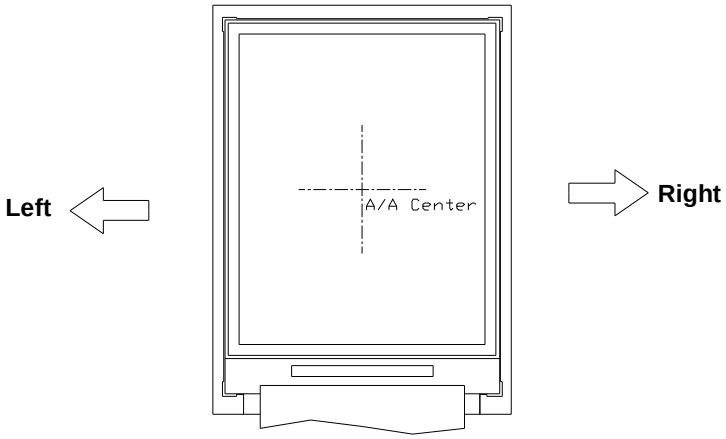



Fig. 2 Definition of viewing angle for display

Note 2: Definition of optical measurement system

The optical characteristics should be measured in a dark room with ambient temperature $T_a$=+25 °C . The optical properties are measured at the center point of the LCD screen after 5 minutes operation. (Equipment: Photo detector TOPCON BM-5A or BM-7 /Field of view: 1° /Height: 500mm .)

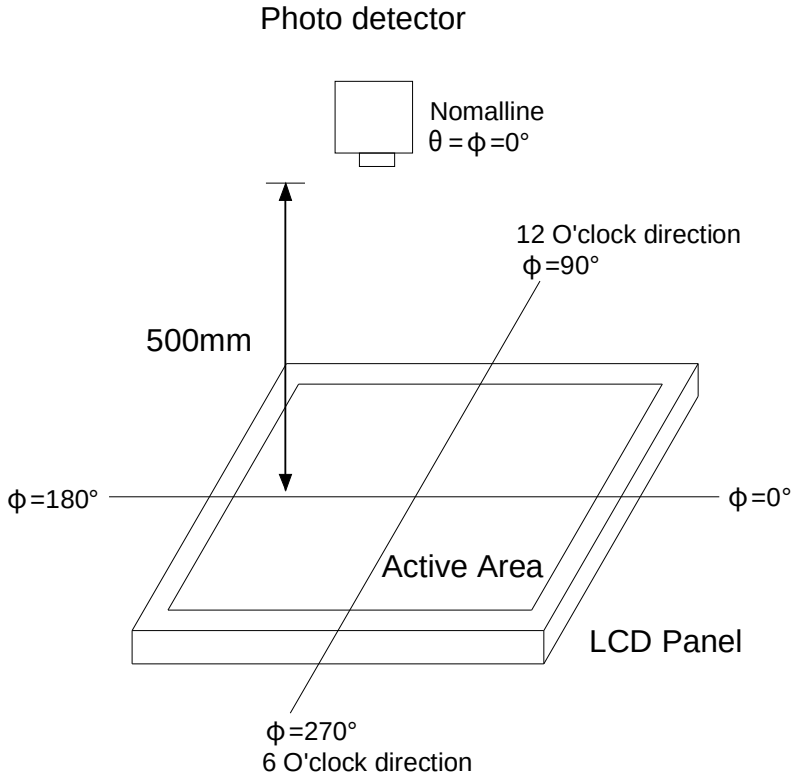



Fig. 3 Optical measurement system setup

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 ($T_{on}$) is the time between photo detector output intensity changed from 90% to 10%, and fall time ($T_{off}$) is the time between photo detector output intensity changed from 10% to 90%.

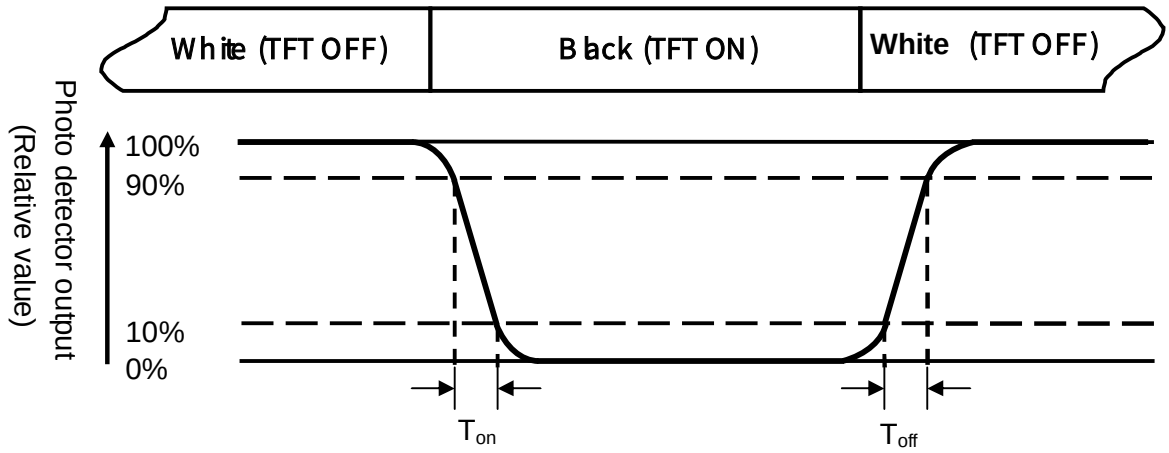



Fig. 4 Definition of response time

Note 4: Definition of contrast ratio

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

Note 5: Definition of luminance

Measured at the center area of the panel when LCD panel is driven at "white" state.

Note 6: Definition of color chromaticity (CIE1931)

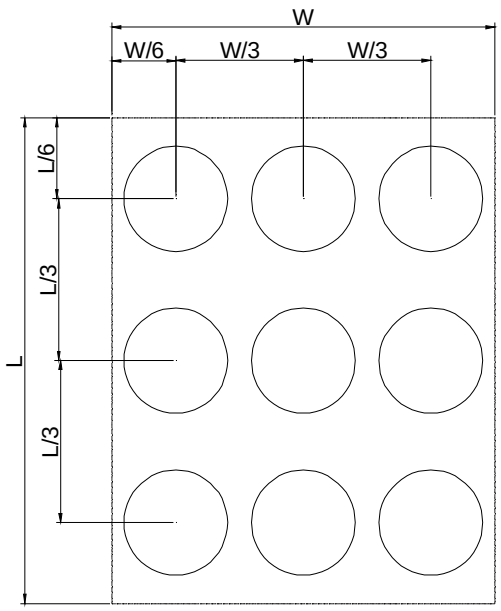
Color coordinates measured at the center point of LCD when panel is driven at "White", "Red", "Green" and "Blue" state respectively.

Note 7: Definition of luminance uniformity

To test for uniformity, the tested area is divided into 3 rows and 3 columns. The measurement spot is placed at the center of each circle as below.

$$\text{Luminance Uniformity } (U_L) = \frac{L_{min}}{L_{max}}$$

L-------Active area length W----- Active area width




$L_{max}$ : The measured maximum luminance of all measurement position.

$L_{min}$ : The measured minimum luminance of all measurement position.

# 5. Reliability Test Items

| Test Items | Test Conditions | Remark |
|---|---|---|
| High Temperature Storage | +80°C±2°C for 96 hours | - |
| Low Temperature Storage | -30°C±3°C for 96 hours | - |
| High Temperature Operation | +70°C±2°C for 96 hours | - |
| Low Temperature Operation | -20°C±2°C for 96 hours | - |
| High Temperature and Humidity Operation | +40°C±2°C, 95%±2%RH max. for 96 hours | - |
| Thermal Shock | -30°C/0.5h ~ +80°C/0.5h for a total 100 cycles, Start with cold temp and end with high temp | - |
| Vibration Test | Frequency range:10~55Hz<br>Stoke:1.5mm<br>Sweep:10Hz~55Hz~10Hz<br>2 hours for each direction of X. Y. Z.<br>(6 hours for total) | - |
| Mechanical Shock | 100G 6ms,±X,±Y,±Z 3 times for each direction | - |
| Package Vibration Test | Random Vibration :<br>0.015$G^2$/Hz from 5-200Hz, -6dB/Octave from 200-500Hz<br>1 hour for each direction of X. Y. Z.<br>(3 hours for total) | - |
| Package Drop Test | Height :72cm (Weight≦10kg);<br>60cm (Weight>10kg)<br>1 corner, 3 edges, 6 surfaces | - |
| Electro Static Discharge | ± 2KV, Human Body Mode, 100pF/1500Ω | - |

Note1: During the display practical test under normal operation condition, there shall be not change or effect to the display function.

Note2: Before function check, the test sample requires 2 hours storage at room temperature. Before test the function of TP, the sample must be placed in room temperature for 24hrs after RA test.

# 6. Handling Precautions

6.1 Safety

6.1.1 The liquid crystal in the LCD is poisonous. DO NOT put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

6.2 Handling

6.2.1 The LCD and touch panel is made of plate glass. DO NOT subject the panel to mechanical shock or to excessive force on its surface.

6.2.2 Do not handle the product by holding the flexible pattern portion in order to assure the reliability

6.2.3 Transparency is an important factor for the panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.

6.2.4 Provide a space so that the panel does not come into contact with other components.

6.2.5 To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.

6.2.6 Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.

6.2.7 Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.

6.2.8 To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.

6.3 Static Electricity

6.3.1 Ground soldering iron tips, tools and testers when they are in operation.

6.3.2 Ground your body when handling the products.

6.3.3 Power on the LCD module BEFORE applying the voltage to the input terminals.

6.3.4 DO NOT apply voltage which exceeds the absolute maximum rating.

6.3.5 Store the products in an anti-electrostatic bag or container.

6.4 Storage

6.4.1 Store the products in a dark place at +25°C±10°C with low humidity (65% RH or less).

6.4.2 DO NOT store the products in an atmosphere containing organic solvents or corrosive gas.

6.5 Cleaning

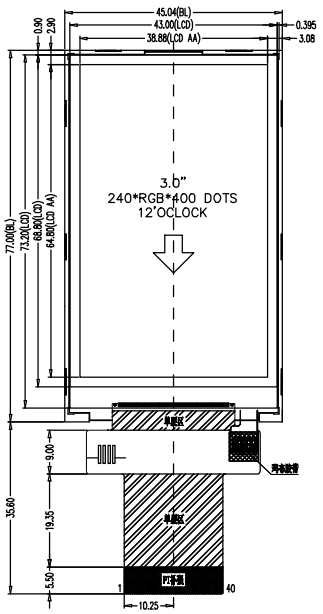
6.5.1 DO NOT wipe the panel with dry cloth, as it may cause scratch.

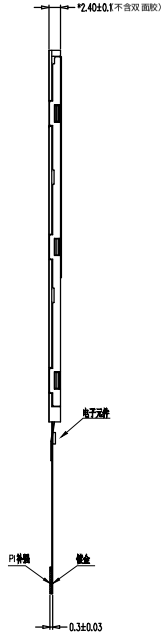
6.5.2 Wipe off the stain on the product by using soft cloth moistened with ethanol. DO not allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. Do not use any organic solvent or detergent other than ethanol.

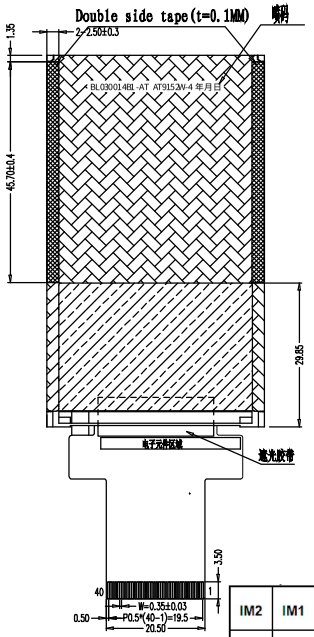
# 7. Mechanical Drawing

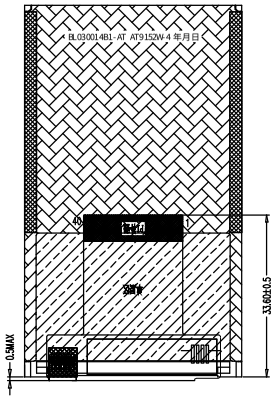
APPROVED BY:

| Ver | Date | Modify Contents |
|---|---|---|
| | | |
| | | |



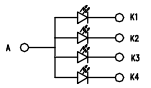

弯折参考图
展开出货

| PIN | SYMBOL |
|---|---|
| 1 | YU |
| 2 | XL |
| 3 | YD |
| 4 | XR |
| 5 | GND |
| 6 | IOVCC |
| 7 | VCI |
| 8 | FMARK |
| 9 | CS |
| 10 | RS |
| 11 | WR |
| 12 | RD |
| 13 | D0 |
| 14 | D1 |
| 15 | D2 |
| 16 | D3 |
| 17 | D4 |
| 18 | D5 |
| 19 | D6 |
| 20 | D7 |
| 21 | D8 |
| 22 | D9 |
| 23 | D10 |
| 24 | D11 |
| 25 | D12 |
| 26 | D13 |
| 27 | D14 |
| 28 | D15 |
| 29 | D16 |
| 30 | D17 |
| 31 | IM1 |
| 32 | IM0 |
| 33 | NC |
| 34 | RESET |
| 35 | GND |
| 36 | LEDA |
| 37 | LEDK1 |
| 38 | LEDK2 |
| 39 | LEDK3 |
| 40 | LEDK4 |

| IM2 | IM1 | IM0/ ID | Interface Mode | DB Pin | Colors |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 80-system 18-bit interface | DB17-0 | 262,144 |
| 0 | 0 | 1 | 80-system 9-bit interface | DB17-9 | 262,144 |
| 0 | 1 | 0 | 80-system 16-bit interface | DB17-10, DB8-1 | 262,144 see Note 1 |
| 0 | 1 | 1 | 80-system 8-bit interface | DB17-10 | 262,144 see Note 2 |

NOTE:
THE PART OF *ARE THE KEY DIMENSION TO CONTROL

| | | | |
|---|---|---|---|
| LCD TYPE | TFT | BACKLIGHT COLOR | White |
| POLARIZER TYPE | TRANSMISSIVE | FRAME TYPE | ---------- |
| DISPLAY TYPE | POSITIVE | DATA TRANSFER | 8080 8/9/16/18 bit |
| LCD COLOR | 65/262K | CONNECTOR TYPE | FPC |
| VIEWING ANGLE | 12:00 | TECHNOLOGY | COG |
| OPERATING TEMP | -20°C ~ +70°C | DC-DC IC | ---------- |
| STORAGE TEMP | -30°C ~ +80°C | LCD DUTY | 1/400 |
| BACKLIGHT TYPE | WHITE LED | LCD BIAS | ---------- |
| CONTROLLER IC | OTM4001A | | ROHS |
| REMARKS | VDD=3.0±0.2V, $V_{LED}$= 3.2V( 60mA) | | |




LED CIRCUIT DIAGRAM

技术部 ■ COG质量 ■ COB质量 ■

深圳立显科技有限公司

| | | | | | |
|---|---|---|---|---|---|
| PRODUCT NO. | LX T30WH006T1 V0 | | | | |
| DRAWN BY | SZH | SCALE | 1:1 | REV. | V01 |
| CHECKED BY | | PAGE | 1/1 | | |
| APPROVED BY | | UNIT | mm | | |

# 8. Touch Panel

T.B.D

# 9. Cosmetic Specification

9.1 Incoming Inspection

Both parties agree that the inspection specifications of TFT-LCD Modules (hereinafter known as "Modules") stipulated hereunder is the only and final standard applicable in the process of inspection. Gold-Vision shall be under no liability or obligation (including incidental loss, products liability or other consequential loss) whatsoever for any defect in quality or performance or shortage in quantity of the Modules that have passed such inspection.

9.2 Liability

9.2.1 Inspection Deadline

The Customer should inspect the Modules either at the Delivery Point or within twenty (20) calendar days after arrival at the Delivery Destination.

9.2.2 Notification of Rejection

The Customer may reject one or more defective or non-conforming Modules if the Modules fail to meet the AQL (Acceptable Quality Level) and pass the inspection. In that case, the customer should notify Gold-Vision of the rejection by either documents or mail within in five (5) business days from the date of reception of the Modules. Otherwise, the Modules shall be deemed to have met the AQL and passed the inspection.

9.3 Inspection Specifications

Both parties agree that the inspection shall contain and follow the inspection specifications stipulated in the Inspection Specifications (see attachment), including:

-Scope

-Sampling Plan

-Panel Inspection Condition

-Display Quality

-Mechanics Specifications

-Notification for Storage Handling

9.4 Limited Warranty

Gold-Vision represents and warrants that all Modules shall (i) conform to the specifications set hereunder, and (ii) be free from any defects in material and workmanship for twelve (12) months after the Customer's acceptance or deemed acceptance. Gold-Vision will replace, rework or refund the Customer for the defective or non-conforming Modules at Gold-Vision's option, provided that the Customer (i) promptly informs Gold-Vision of the defects or non-conformities within the warranty period, (ii) complies with the specifications and conditions hereunder, and (iii) complies with Gold-Vision's procedure for Modules replacement, reworking and/or return. The warranty period for the Modules replaced or reworked shall be the remaining term for such Modules.

9.5 Warranties

The warranties and remedies set forth above are exclusive and in lieu of all other or by operation of law, statutory or otherwise, including warranties or conferwarranties, terms or conditions, express or implied, either in fictions of merchantability and fitness for a particular purpose, all of which are expressly disclaimed.

Gold-vision warranties herein apply only to the customer and are not to be extended to any third party.

9.6 Governing Law

This Agreement shall be governed and construed in accordance with the laws of the Republic of China. Both parties agree to submit any dispute, which cannot be amicably resolved, to Court for the first instance.

9.7 Inspection Specifications Expand

9.7.1 SCOPE

Specifications contain

Display Quality Evaluation

Mechanics Specification

9.7.2 SAMPLING PLAN

Unless there is other agreement, sampling plan for incoming inspection should follow MIL-STD-105E.

9.7.2.1 Lot size: Quantity per shipment as one lot (different model as different lot.)

9.7.2.2 Sampling type: Normal inspection, single sampling.
9.7.2.3 Sampling level: Level II.
9.7.2.4 AQL: Acceptable Quality Level
Major defect: AQL=0.65%
Minor defect: AQL=1.0%.

9.7.3 PANEL INSPECTION CONDITION

9.7.3.1 Environment:
Room Temperature: 23±3°C.
Humidity: 55±5% RH.
Illumination: 800~1200Lux.
9.7.3.2 Inspection Distance
35±5 cm from the inspector to the module.
9.7.3.3 Inspection Angle:

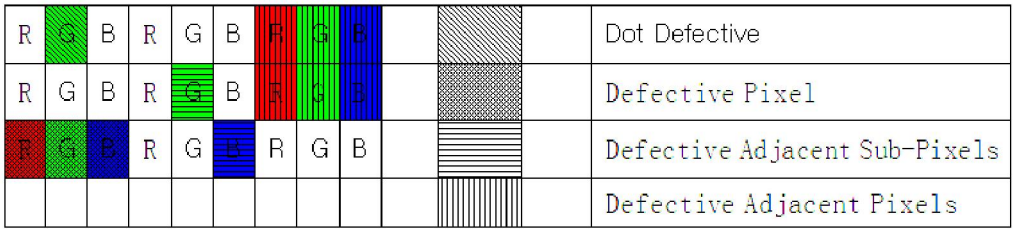
9.7.4 Display Quality

9.7.4.1 Function Related:
The function defects such as line defect, abnormal display, no display are considered as the major defects. (N: The number of defects in non-performing; d: Defects from each other; D: Bad spot diameter; L: Bad line length; W: Line width of non-performing)
9.7.4.2 Bright/Dark Dots

| Defect Type | Specification | Major | Minor |
|---|---|---|---|
| Bright Dots | N = 0 | | ● |
| Dark Dots | N <= 2 | | ● |
| Total Bright and Dark Dots | N <= 2 | | ● |
| Distance between defect dots | d>=10 mm | | ● |
| Distance between dark dots | d>=10 mm | | ● |

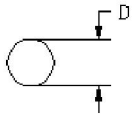
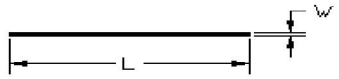
Note: Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.

9.7.4.3 Pixel Definition




Note: In cases where partial sub-pixel or pixel defects exceed 50% of the affected sub-pixel or pixel area, it will be counted as 1 defect.

9.7.4.4 Visual Inspection specification

| Defect Type | | Specification Size | Count (N) | Major | Minor |
|---|---|---|---|---|---|
| Dot Shape (Particle, Scratch and Bubbles in display area)   | | D <= 0.1 mm | Ignored | | |
| | | 0.1mm < D <= 0.2mm | N <= 2 d>=10mm | | ● |
| | | D > 0.2mm | N=0 | | |
| Line Shape (Particles, Scratch, Lint and Bubbles in display area)   | | W <= 0.03 mm | Ignored | | |
| | | 0.03< W <= 0.05mm & L <=5mm | N <= 2 d>=10mm | | ● |
| | | W > 0.05mm or L >5mm | N=0 | | |
| Bubble in cell (active area) | | It should not be found by eyes. | | | ● |
| Dent/Bump on Polarizer | | The defects confirmed only in a glare state in which the light is reflected on the polarizer are neglect. | | | ● |
| Bezel | Scratch | No harm | | | ● |
| | Dirt | | | | ● |
| | Wrap | No harm | | | ● |
| | Sunken | No harm | | | ● |
| Label | No label | NG | | | ● |
| | Invert label | | | | ● |
| | Broken | | | | ● |
| | Dirt | Word can be read. | | | ● |
| | Not clear | | | | ● |
| | Mistake | NG | | | ● |
| | Position | Be attached on right position | | | ● |
| Connector | Connection status | No bend on pins and damage | | | ● |
| FPC | Broken | NG | | | ● |

Note: Extraneous substance and scratch do not affect the display of image, for instance, the extraneous substance under polarizer film but outside the display area, scratch on metal bezel and backlight module or polar.

# 10. Record of Revision

| Version | Revise Date | Page | Content |
|---|---|---|---|
| 1.0 | 2013-11-18 | 20 | Initial Release |