深圳市勋瑞光电科技有限公司

**Xunrui photoelectric technology（shenzhen）CO,.LTD.**

# Product Specification

（ ） **Preliminary Specification**

（ ） **Final Specification**

| Customer | |
|---|---|
| **Model Name** | H121HHD20I1K001-CT1 |
| **Description** | Standard LCD Module 1024(RGB)x768 Dots 12.1" TFT LCD |
| **Date** | 2022/11/29 |
| **Revision** | A0 |

| Engineering | | | |
|---|---|---|---|
| **Check** | **Date** | **Prepared** | **Date** |
| | | | |

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## 1 Record of Revision

| Rev | Issued Date | Description | Editor |
|-----|-------------|-------------|--------|
| A0 | 2022/11/29 | First Release. | |
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## 2 General Specifications

| Feature | | Spec |
|---|---|---|
| Characteristics | Size | 12.1(4:3 diagonal) inch |
| | Resolution | $1024\times 3(RGB) \times 768$ |
| | Interface | LVDS |
| | Connect type | Connector |
| | Color Depth | 16.7M |
| | Technology type | a-Si |
| | Pixel pitch (mm) | 0.72 x 0.24 |
| | Pixel Configuration | R.G.B. Vertical Stripe |
| | Display Mode | Normally Black |
| | Driver IC | TBD |
| | Surface Treatment | Antiglare, Hard-Coating (3H) |
| | Viewing Direction | ALL |
| | View direction(Gray Inversion) | FREE |
| Mechanical | LCM+CTP (W x H x D) (mm) | 286.5*225*12.19 |
| | Active Area(mm) | 245.76 x184.32 |
| | With /Without TSP | With  TSP |
| | Weight (g) | TBD |
| | LED Numbers | 55 LEDs |

Note 1: Viewing direction is follow the data which measured by optics equipment..

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%

# 3 Input/Output Terminals

3.1 LCM connector pin assignment(CN1):STARCONN 076B20-0048RA-G4or

JAEFI-SEB20P-HFE(or equivalent)

| No. | Symbol | Description | |
|---|---|---|---|
| 1 | RX3+ | Differential Data Input, CH3 ( Positive ) | |
| 2 | RX3- | Differential Data Input, CH3 (Negative ) | |
| 3 | BIST | Normal operation/BIST pattern select.<br>BIST="1" : BIST mode.<br>BIST="0" : Normal operation. | Note* |
| 4 | SEL68 | 6bit/8bit mode select,<br>SELB = "1" : LVDS input data is 8bits<br>SELB = "0" : LVDS input data is 6bits | Note* |
| 5 | GND | Ground | |
| 6 | RXC+ | Differential Clock Input ( Positive ) | |
| 7 | RXC- | Differential Clock Input ( Negative ) | |
| 8 | GND | Ground | |
| 9 | RX2+ | Differential Data Input , CH2 ( Positive ) | |
| 10 | RX2- | Differential Data Input , CH2 ( Negative ) | |
| 11 | GND | Ground | |
| 12 | RX1+ | Differential Data Input , CH1 ( Positive ) | |
| 13 | RX1- | Differential Data Input, CH1 ( Negative ) | |
| 14 | GND | Ground | |
| 15 | RX0+ | Differential Data Input, CH0 ( Positive ) | |
| 16 | RX0- | BDifferential Data Input, CH0 (Negative ) | |
| 17 | reLR | Left or right display control<br><br>SHLR="1" : Right → Left<br><br>SHLR="0" :Left → Right | Note* |

| 18 | reUD | Up / down display control<br><br>UPDN="1" : Down → Up<br><br>UPDN="0" : Up → Down | Note* |
|----|------|------|------|
| 19 | VDD | Power supply, 3.3V | |
| 20 | VDD | Power supply, 3.3V | |

Note* : The high level voltage "1" is 3.3V, and the low level voltage "0" is GND.

**Note 1：UPDN and SHLR control function**

| reLR | reUD | Data shifting |
|------|------|---------------|
| 0 | 0 | Left→Right, Up→Down |
| 1 | 0 | Right→Left, Up→Down |
| 0 | 1 | Left→Right, Down→Up |
| 1 | 1 | Right→Left, Down→Up |
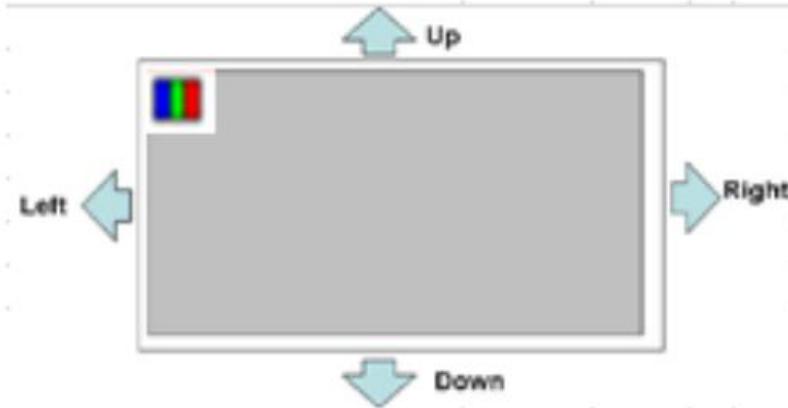
# 4 Absolute Maximum Ratings

## 4.1 Electrical Absolute Rating

### 4.1.1 TFT LCD Module

| Item | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Logic supply voltage | $V_{DD}$ | -0.3 | 5.0 | V | |

## 4.2 Environment Absolute Rating

| Item | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Operating Temperature | $T_{opa}$ | -20 | 70 | ℃ | |
| Storage Temperature | $T_{stg}$ | -30 | 80 | ℃ | |

# 5 Electrical Characteristics

## 5.1 TFT LCD Module

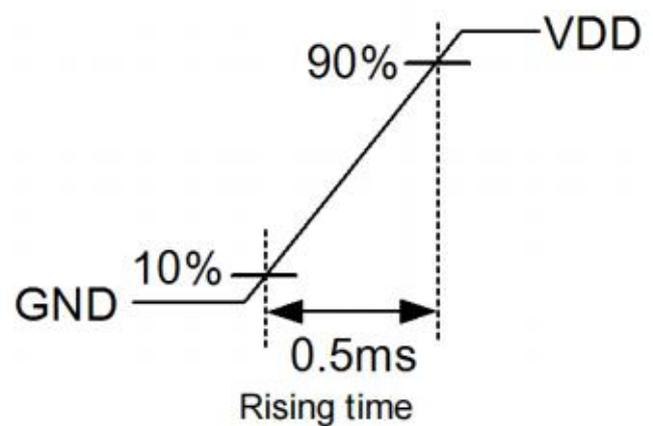| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{DD}$ | 3.0 | 3.3 | 3.6 | V | |
| Current of $V_{DD}$ (White pattern) | $I_{DD}$ | — | 0.242 | 0.364 | A | Note* |
| Logic power | $P_{DD}$ | — | — | 6.6 | W | Note** |
| Inrush current | $I_{RUSH}$ | — | — | 2.0 | A | Note*** |

Note* : The test conditions are $V_{DD}$=3.3V and room temperature=25℃.

Note** : The min. output current of the $V_{DD}$ (3.3V) supply should be more than 2.0A.

Note*** : Inrush current test circuit and rising time setting ($V_{DD}$ =3.3V and room temperature=25℃).
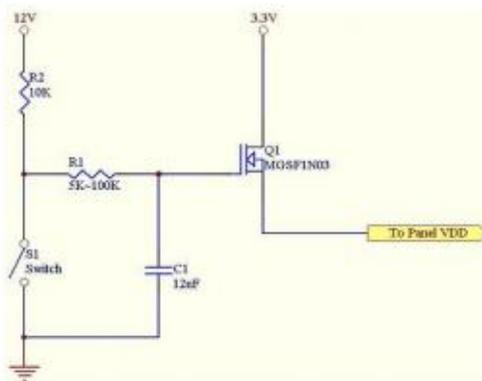


Test circuit



Rising time

## 5.2 Switching Characteristics for LVDS Receiver

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Differential Input High Threshold | $V_{TH}$ | 100 | - | 300 | mV | |
| Differential Input Low Threshold | $V_{TL}$ | -300 | - | -100 | mV | |
| Differential input common mode voltage | $V_{CM}$ | 1.0 | 1.2 | $1.7-|V_{ID}|/2$ | V | |
| Input Current | $I_{IN}$ | -10 | - | 10 | uA | RX+/-, RXC+/- |
| Differential input Voltage | $|V_{ID}|$ | 200 | - | 600 | mV | |

## 5.3 Bit LVDSinput

### 5.3.1 6Bit LVDS input
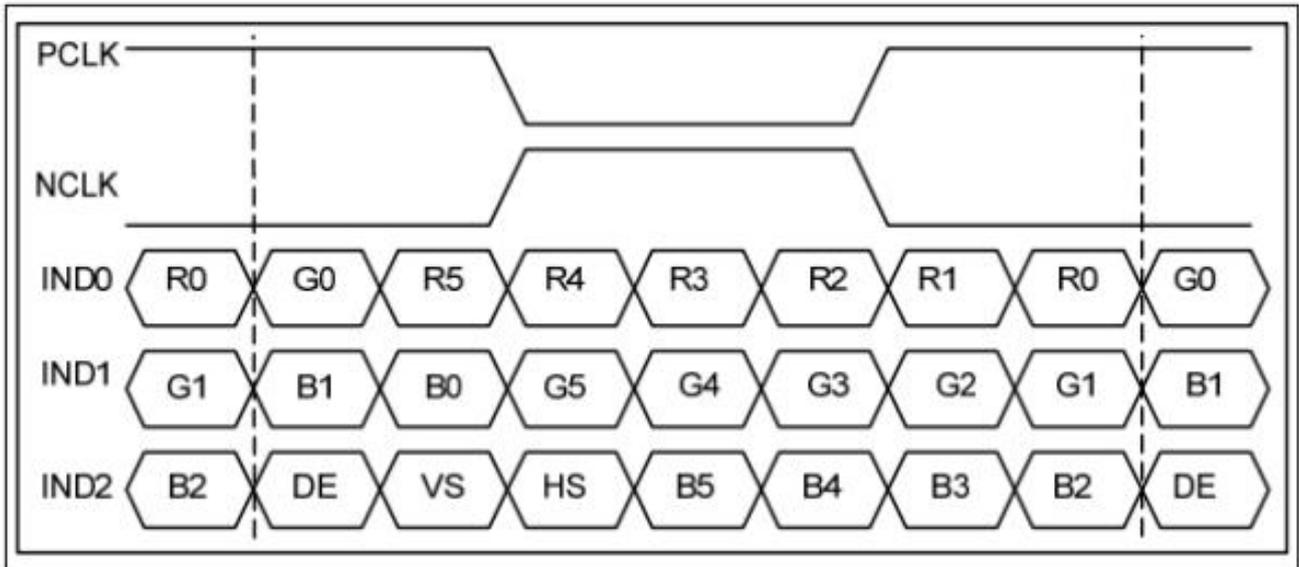
## 5.3.2 8Bit LVDS input
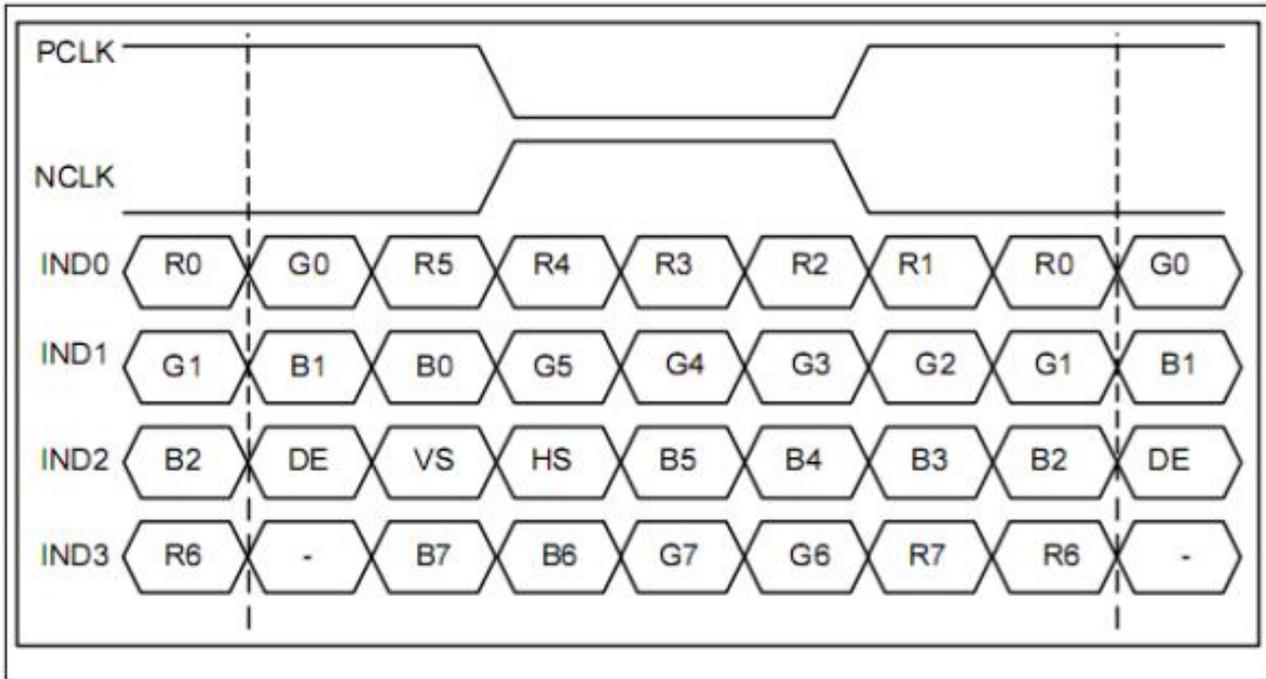


## 5.4 Interface Tining(DE mode)

| Item | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Frame Rate | -- | 55 | 60 | 65 | Hz |
| Vertical Total Time | $T_V$ | 783 | 798 | 813 | line |
| Vertical Display Time | $T_{VD}$ | | 768 | | |
| Vertical Blanking Time | $T_{VB}$ | 15 | 30 | 45 | line |
| Horizontal Total Time | $T_H$ | 1104 | 1124 | 1144 | clock |
| Horizontal Display Time | $T_{HD}$ | | 1024 | | |
| Horizontal Blanking Time | $T_{HB}$ | 80 | 100 | 120 | clock |
| Clock Rate | $1/T_{Clock}$ | 51.2 | 53.8 | 56.2 | MHz |

## Tining Diagram of interface Signal(DE mode)
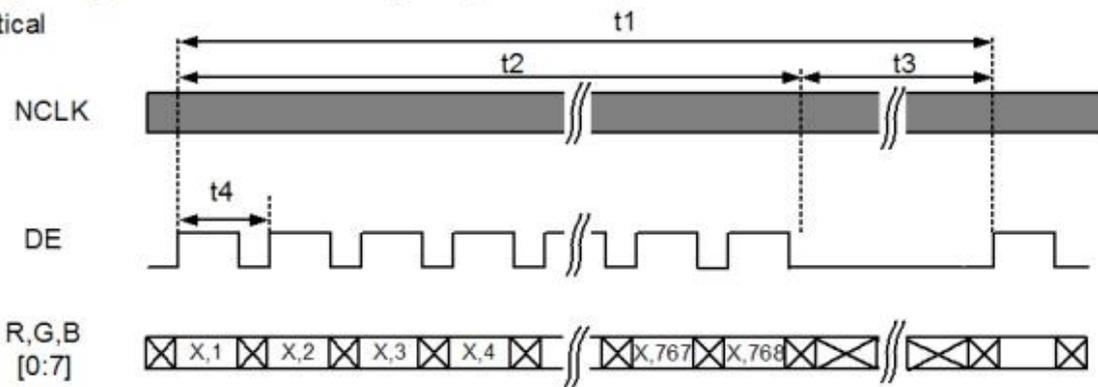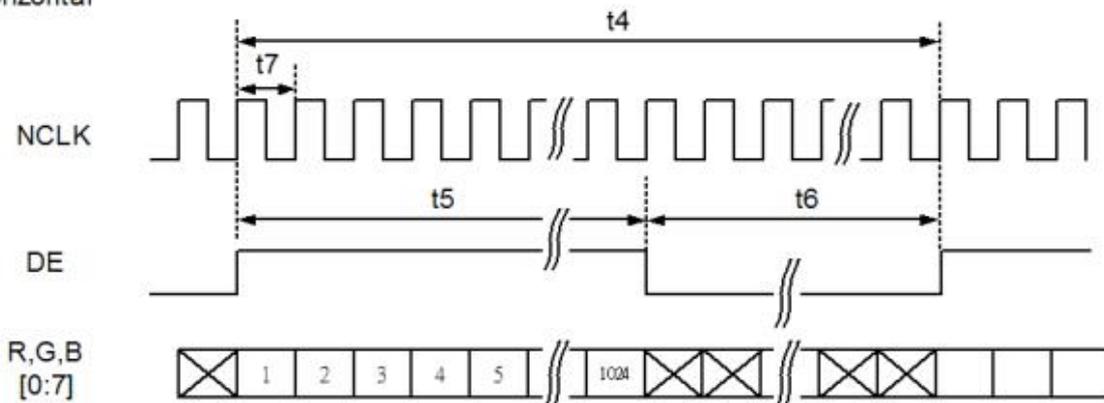
## 5.5 Power On/Off Sequence
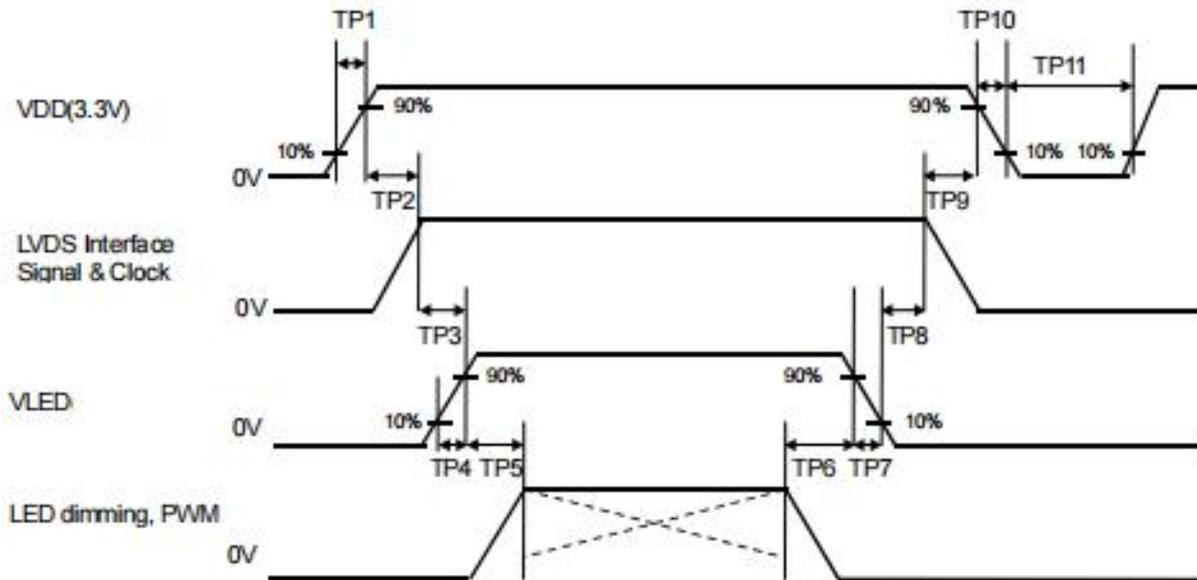


| Item | Min. | Typ. | Max. | Unit |
|------|------|------|------|------|
| TP1 | 0.5 | -- | 10 | msec |
| TP2 | 0 | -- | 50 | msec |
| TP3 | 200 | -- | -- | msec |
| TP4 | 0.5 | -- | 10 | msec |
| TP5 | 10 | -- | -- | msec |
| TP6 | 10 | -- | -- | msec |
| TP7 | 0 | -- | 10 | msec |
| TP8 | 200 | -- | -- | msec |
| TP9 | 0 | -- | 50 | msec |
| TP10 | 1 | -- | 10 | msec |
| TP11 | 1000 | -- | -- | msec |

# 6 BLOCK DIAGRAM

## 6.1 TFT LCD Module:
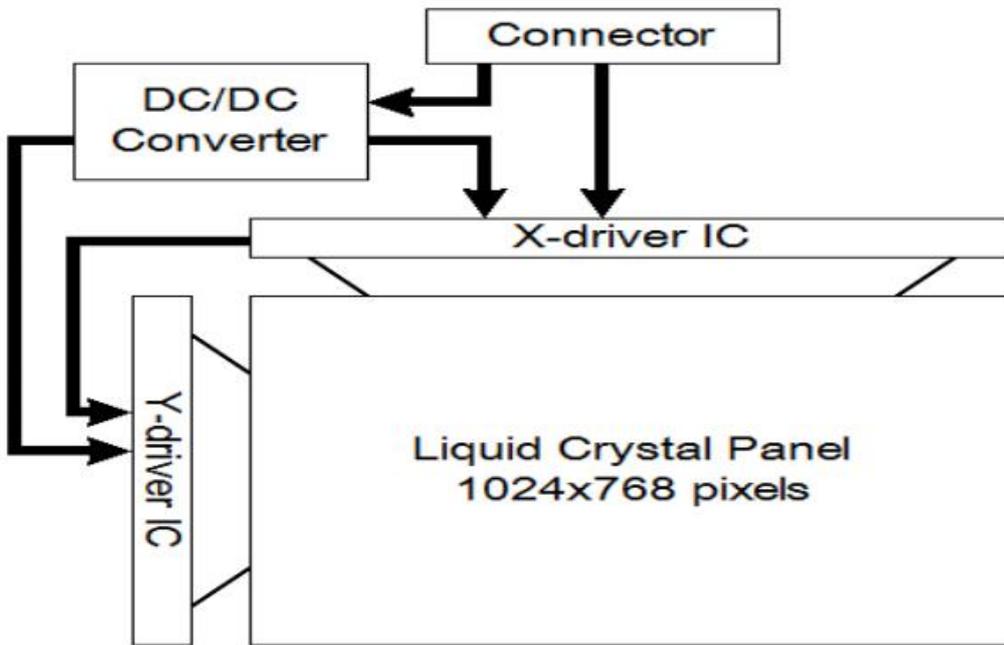


## 6.2 Pixel Format
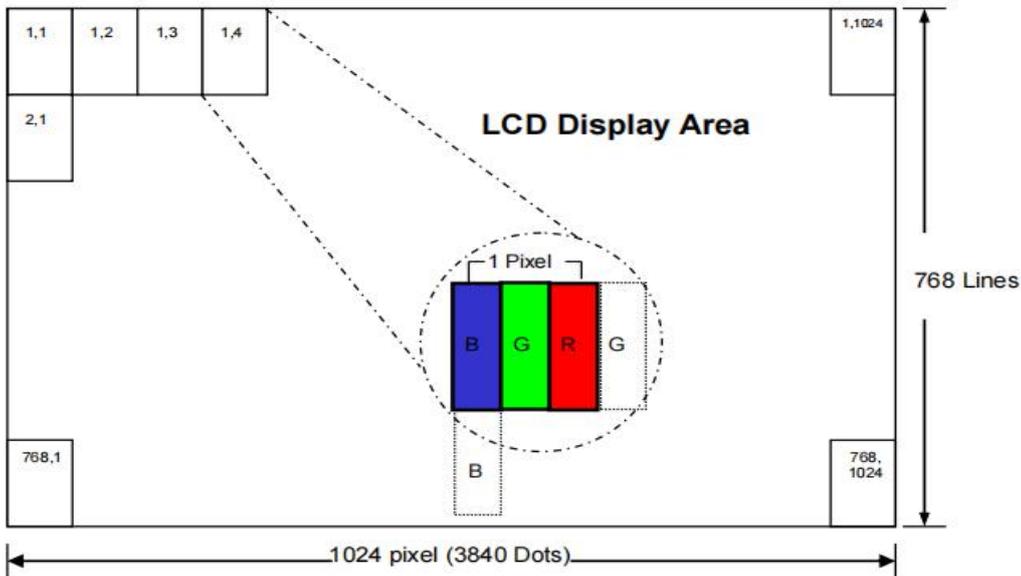
## 6.3 Relationship Between Displayed Color and Input

| | Display | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | Gray scale Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MSB | | | | | | | LSB | MSB | | | | | | | LSB | MSB | | | | | | | LSB | |
| Basic color | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | - |
| | Blue | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | - |
| | Green | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | - |
| | Light Blue | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | - |
| | Red | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | - |
| | Purple | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | - |
| | Yellow | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | - |
| | White | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | - |
| Gray scale of Red | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L1 |
| | | L | L | L | L | L | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L2 |
| | ↑ ↓ | | | : | | | | | | | | : | | | | | | | | : | | | | | L3…L251 |
| | Light | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L252 |
| | | H | H | H | H | H | H | L | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L253 |
| | | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L254 |
| | Red | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | Red L255 |
| Gray scale of Green | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | L | L1 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | L | L | L2 |
| | ↑ ↓ | | | : | | | | | | | | : | | | | | | | | : | | | | | L3…L251 |
| | Light | L | L | L | L | L | L | L | L | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L | L252 |
| | | L | L | L | L | L | L | L | L | H | H | H | H | H | H | L | H | L | L | L | L | L | L | L | L | L253 |
| | | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | L | L254 |
| | Green | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | L | L | L | L | L | L | L | L | Green L255 |
| Gray scale of Blue | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L1 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | L | L2 |
| | ↑ ↓ | | | : | | | | | | | | : | | | | | | | | : | | | | | L3…L251 |
| | Light | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | L | L | L252 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | L | H | L253 |
| | | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | L | L254 |
| | Blue | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | Blue L255 |
| Gray scale of White & Black | Black | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L0 |
| | Dark | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | H | L1 |
| | | L | L | L | L | L | L | H | L | L | L | L | L | L | L | H | L | L | L | L | L | L | L | H | L | L2 |
| | ↑ ↓ | | | : | | | | | | | | : | | | | | | | | : | | | | | L3…L251 |
| | Light | H | H | H | H | H | H | L | L | H | H | H | H | H | H | L | L | H | H | H | H | H | H | L | L | L252 |
| | | H | H | H | H | H | H | L | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H | L | H | L253 |
| | | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H | L | L254 |
| | White | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | White L255 |

# 7 Optical Characteristics

| Items | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|-------|--------|-----------|------|------|------|------|--------|
| Viewing angles | $\theta_T$ | Center CR≥10 | 80 | 85 | - | Degree. | Note2 |
|  | $\theta_B$ |  | 80 | 85 | - |  |  |
|  | $\theta_L$ |  | 80 | 85 | - |  |  |
|  | $\theta_R$ |  | 80 | 85 | - |  |  |
| Contrast Ratio | CR | $\Theta = 0$ | 700 | 1900 | - | - | Note1 Note3 |
| Response Time | $T_R + T_F$ | 25°C | - | 25 | 35 | ms | Note1 Note4 |
| Color chromaticity | $W_X$ | Normal $\theta=\Phi=0°$ | 0.28 | 0.32 | 0.36 | - | Note1 Note5 |
|  | $W_Y$ |  | 0.29 | 0.33 | 0.37 | - |  |
| Uniformity | U |  | 75 | - | - | % | Note1 Note6 |
| NTSC |  |  |  | 70 |  | % | Note5 |
| LCM+CTP Luminance | L |  | 850 | 900 | - | cd/m2 | Note1 Note7 |

Test Conditions:

1. IF=350mA(one channel),the ambient temperature is 25℃.

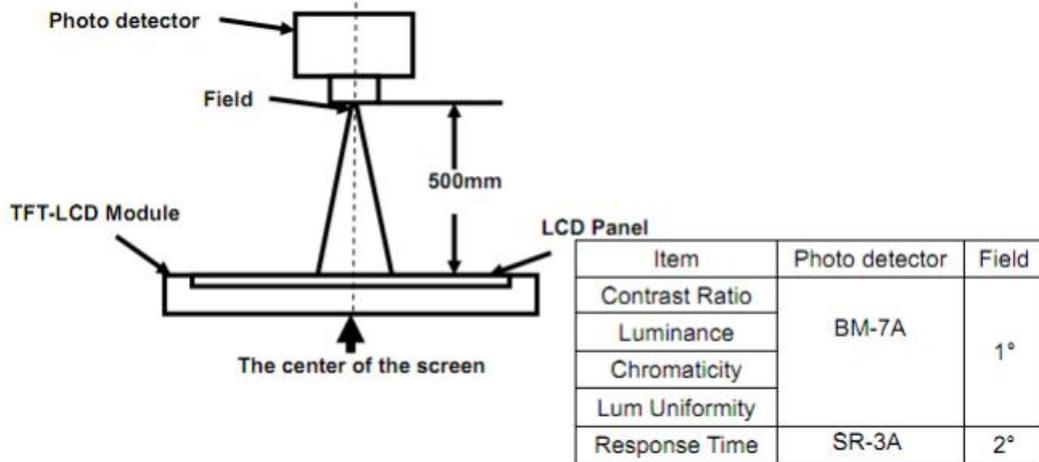2. The test systems refer to Note 1 and Note 2.

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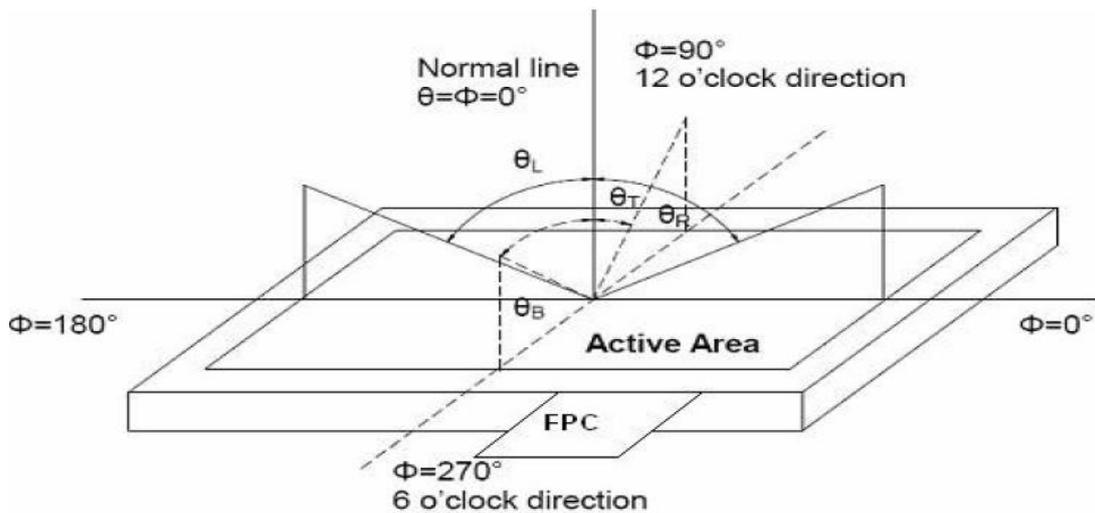
| Item | Photo detector | Field |
|---|---|---|
| Contrast Ratio | BM-7A | 1° |
| Luminance | | |
| Chromaticity | | |
| Lum Uniformity | | |
| Response Time | SR-3A | 2° |

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).



Note 3: Definition of contrast ratio

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

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%.
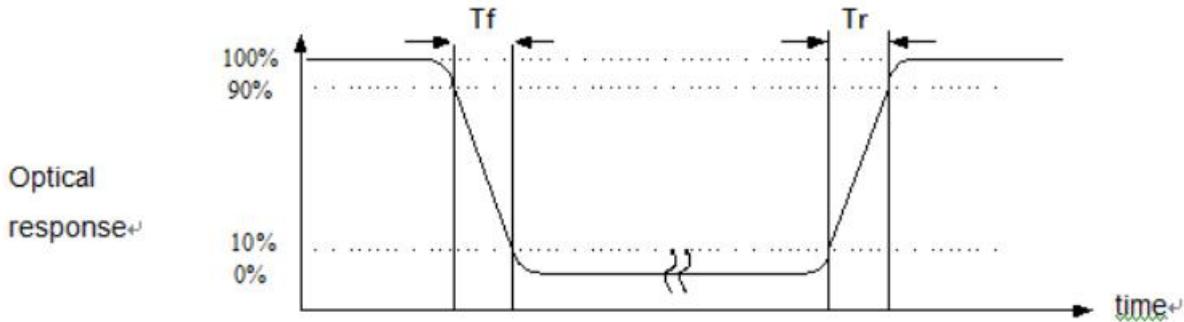
Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center   of each measuring area.

   Luminance Uniformity(U)    = Lmin/ Lmax X100%
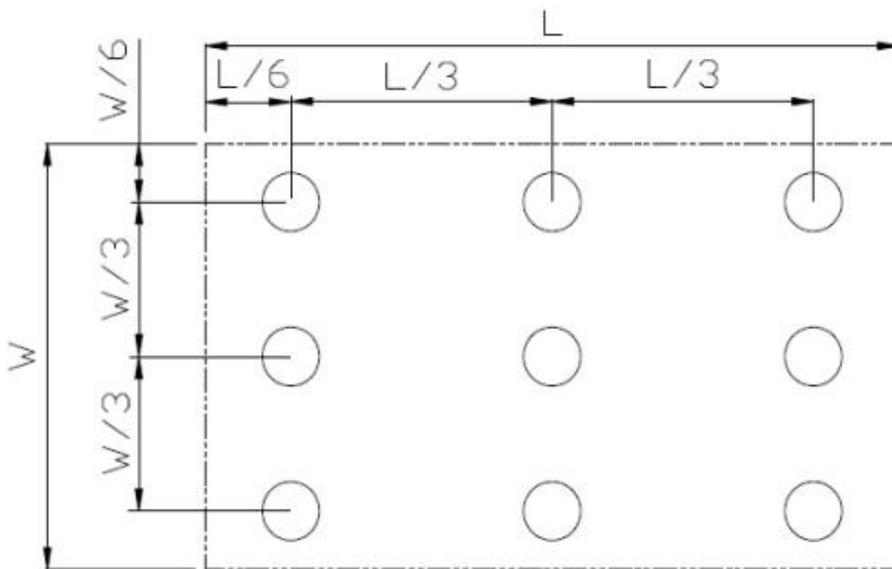
   L-------Active area length W----- Active area width



Fig. 2 Definition of uniformity

 Lmax: The measured maximum luminance of all measurement position.

 Lmin: The measured minimum luminance of all measurement position.

 Note 7: Definition of Luminance：

Measure the luminance of white state at center point.

## 8 Environmental / Reliability Tests

| No | Test Item | Condition | Remarks |
|---|---|---|---|
| 1 | High Temperature Opeartion | Ts= +60℃, 96hrs | Note 1 IEC60068-2-2, GB2423. 2-89 |
| 2 | Low Temperature Opeartion | Ta= -10℃, 96hrs | Note 2 IEC60068-2-1 GB2423.1-89 |
| 3 | High Temperature Storage | Ta= +70℃, 96hrs | IEC60068-2-2 GB2423. 2-89 |
| 4 | Low Temperature Storage | Ta= -20℃, 96hrs | IEC60068-2-1 GB/T2423.1-89 |
| 5 | High Temperature & Humidity Storage | Ta= +60℃, 90% RH max, 96 hours | IEC60068-2-3 GB/T2423.3-2006 |
| 6 | Thermal Shock (Non-operation) | -20℃ 30 min ~ +70℃ 30 min Change time: 5min, 20 Cycle | Start with cold temperature,end with high temperature IEC60068-2-14, GB2423.22-87 |
| 7 | Electro Static Discharge (Opeartion) | C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa) | IEC61000-4-2 GB/T17626.2-1998 |
| 8 | Vibration (Non-operation) | Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition) | IEC60068-2-6 GB/T2423.5-1995 |
| 9 | Shock (Non-operation) | 60G 6ms, ± X, ±Y , ± Z 3 times for each direction | IEC60068-2-27 GB/T2423.5-1995 |
| 10 | Package Drop Test | Height: 80 cm, 1 corner, 3 edges, 6 surfaces | IEC60068-2-32 GB/T2423.8-1995 |

Note: 1. $T_S$ is the temperature of panel's surface.

　　　2. Ta is the ambient temperature of sample.

## 9 Mechanical Drawing

LCM NOTES:
1. DISPLAY TYPE: 12.1 INCH TFT /BLACK
2. BACKLIGHT:55 CHIP WHITE LED, IN PARALLEL
3. OPERATING TEMP: -10°C~+60°C
4. STORAGE TEMP: -20°C~+70°C
5. RESOLUTION: 1024RGBx768
6. LCD IC: TBD
7. Luminous listensity(9 AVG):Module:850cd/m2(MIN.), 900cd/m2(TYP.)
8. Uniformity:75%(Min)
9. "( )"reference dimension. " * "critical dimension
10. RoHS Compliant

CTP技术参数:
1. 结构:G-G+LCM
2. LENS材质:T2.0钠钙玻璃、高温烧结油墨，表面硬度≥6H(750g)
3. IC(COB):GT911OH(RX21*TX28)
4. 控制板P/N:云鼎TB64C-M2-C4, USB接口,VDD工作电压5V
5. 透光率:≥86%
6. 工作环境:-10℃~+60℃
7. 储存环境:-20℃~+70℃  ≤90%RH
8. 未注尺寸按CAD 1:1实测。  ≤90%RH
9. 所有材料均符合□RoHS □无卤素 □其它

正视图

侧视图

背视图



CTP控制板(2:1)
25
43.7
J1
J3

FPC金手指(2:1)A
5±0.3 (丝印对位线)
0.5±0.1
4.2±0.3
34.5±0.2
33.5±0.1
P:0.5±0.05
W:0.3±0.05
1
68

BACKLIGHT CIRCUIT DIAGRAM:
A+
55颗灯 11串5并
(If=350mA, VF=31.9V~36.3V)
K-

CTP USB
| PIN# | Assignment |
| --- | --- |
| 1 | VBUS-5V |
| 2 | DM |
| 3 | DP |
| 4 | GND |

CTP PIN J1
| PIN# | Assignment |
| --- | --- |
| 1 | GND |
| 2-22 | GND |
| 23-24 | RX1-RX0(NC) |
| 25-26 | GND |
| 27-39 | TX0-TX12(NC) |
| 40-67 | TX13-TX40 |
| 68 | GND |

| INTERFACE | FPC Connector |
| --- | --- |
| VIEWING DIRECTION | ALL |
| Gray Scale DIRECTION | FREE |

MODEL NAME: TFT Display Module
PART NO.: H121HHD201K001-CT1
REV.: A0
SHEET OF: 1/1
TOLERANCE UNLESS SPECIFIED
UNIT: mm
SCALE: 1:1
PROJECTION: 3RD ANGLE

LCM PIN
| PIN | ASSIGN |
| --- | --- |
| 1 | RX3+ |
| 2 | RX3- |
| 3 | BIST |
| 4 | SEL6 |
| 5 | GND |
| 6 | RXC+ |
| 7 | RXC- |
| 8 | RX2+ |
| 9 | RX2- |
| 10 | GND |
| 11 | RX1+ |
| 12 | RX1- |
| 13 | GND |
| 14 | GND |
| 15 | RX0+ |
| 16 | RX0- |
| 17 | reLR |
| 18 | relD |
| 19 | VDD |
| 20 | VDD |

A0
2022.11.05
First issue

**深圳市勋瑞光电科技有限公司**

Xunrui photoelectric technology （shenzhen）CO,.LTD.

## 1 0.Packing

TBD

深圳市勋瑞光电科技有限公司

**Xunrui photoelectric technology（shenzhen）CO,.LTD.**

# 11. Precautions For Use of LCD modules

## 11.1 Handling Precautions

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

11.1.2. 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.

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

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

11.1.5. 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

－ Ketone

－ Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

11.1.8.4. 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.

## 11.2 Storage Precautions

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

11.2.2. 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%

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

## 11.3 Transportation Precautions

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