# 億力光電股份有限公司
# EVERVISION ELECTRONICS CO., LTD.

## Product Specification For LCD Module

### (KVPF-7B-002-16)

## Model NO.：VGG804818-6UFLWA(RoHS)
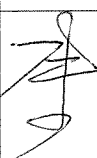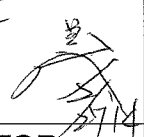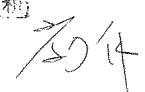
### REVISION：2

☐APPROVAL FOR SPECIFICATIONS ONLY

■APPROVAL FOR SPECIFICATIONS AND SAMPLE

| CUSTOMER： | APPROVED BY： |
|---|---|
| STD | |

### EVERVISION LCM R&D CENTER

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TEL：+886 4 2532-8889
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## 1. Table of Contents

## 2. Record of Revisions

| Rev. | Comments | Page | Date |
|---|---|---|---|
| 1 | Preliminary Specification was first issued. | All | 1/21'14 |
| 2 | Modify 8.2 Backlight Unit | 8 | 2/27'14 |
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## 3. Module Numbering System

V G G 8048 18 – 6 U F L W A ——— Serial No:A~Z

Backlight Color:
 N:Without Backlight;
 A:Amber; B:Blue; G:Green;
 L:Yellow; O:Orange; R:Red;
 W:White; Y:YellowGreen;
 X:Others

Backlight Type:
 N:Without Backlight; E:EL; F:CCFL;
 L:General LED; H:High NTSC LED ;
 R:RGB LED; X:Others

LCD Model:
 A:ASTN; B:STN Blue; C:CSTN; D:DSTN;
 F:TFT; G:STN Gray; H:HTN; I:IBN;
 K:Black Mask TN L:LTPS; M:MVA;
 N:others; O:OLED; P:PLED; S:IPS;
 T:TN; U:FSC TN; W:FSTN Black/white;
 X:FFSTN; Y:STN Yellow;

LCD Type:
 R: Reflective/Positive;
 S : Reflective/Negative ;
 F : Transflective/Positive ;
 G: Transflective/Negative ;
 U: Transmissive/Positive ;
 T: Transmissive/Negative ; N:Others

Temperature Range & View Direction:
 General Purpose  : 1:6H 2:12H 3:3H 4:9H 5:Others
 High Performance: 6:6H 7:12H 8:3H 9:9H 0:Others

STD Product Serial No.: 01~99
Customer Made Serial No.: A1,A2…A9,B1,B2…B9,C1..

Display Function:
 Segment Number / Characters Lines / Column and Row Dots
 / Length * Width of Other

Display Type:
 C:Character Type; G:Graphic Type; S:Segment Type; O:Other

Package Type:
 B:COB; F:COF; G:COG; H:Heat Seal; S:SMT; T:TAB; O:Others

## 4. Application

This specification is applied to the 7 inch WVGA supported TFT-LCD module, and can display true 262,144 colors(8 bit/ color). The module is designed for OA, Car TV application and other electronic products which require flat panel display of digital signal interface. This module is composed of a 7"TFT-LCD panel, a driver circuit and LED backlight unit.

## 5. Features

- WVGA (800×480 pixels) resolution.
- Digital 24 bit parallel RGB.
- Dot inversion mode with stripe type.

## 6. General Specifications

| Item | Specifications | Unit |
|---|---|---|
| Screen Size | 7 (Diagonal) | inch |
| Display Format | 800RGB(H)×480(V) | dot |
| Active Area | 154.08(H)×85.92(V) | mm |
| Dot Pitch | 0.0642(H)×0.1790(V) | mm |
| Pixel Configuration | RGB Vertical Stripe | - |
| Display Mode | TN Type Transmissive Mode Normally White | - |
| Surface Treatment | Anti-Glare and Hard Coating(3H) | - |
| Viewing Direction | 6 O'clock (The Gray Inversion will appear at this direction) | - |
| Outline Dimension | 164.9(W)×100.0(H)×5.7(D) | mm |
| Weight | 150 | g |
| RoHS Compliance | Evervision certifies this product to be in compliance with European Union Directive 2002/95/EC on the restriction of certain hazardous substances in electrical and electronic equipment. | - |

# 7. Absolute Maximum Ratings
## 7.1 Absolute Ratings of Environment

| Item | Symbol | Value | | Unit | Note |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| Storage Temperature | $T_{ST}$ | -30 | +85 | ℃ | (1)(2) |
| Operating Ambient Temperature | $T_{OP}$ | -30 | +85 | ℃ | (1)(2) |

Note1: Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

Note2: Please refer to item of RELIABILITY.

## 7.2 Electrical Absolute Ratings
### 7.2.1 TFT-LCD Module

(Ta=25±2℃, GND=$V_{SS}$=0V , Note 1)

| Item | Symbol | Value | | Unit | Note |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| Digital Power Supply Voltage | $DV_{DD}$ | -0.3 | 5.0 | V | - |
| Analog Power Supply Voltage | $AV_{DD}$ | 6.5 | 13.5 | V | - |
| Gate High Voltage | $V_{GH}$ | -0.3 | 40.0 | V | - |
| Gate Low Voltage | $V_{GL}$ | -20.0 | 0.3 | V | - |
| Gate High To Gate Low Voltage | $V_{GH}$ - $V_{GL}$ | - | 40.0 | V | - |

### 7.2.2 Backlight Absolute Maximum Ratings

(Ta=25±2℃ , Note 1)

| Item | Symbol | Value | | Unit | Note |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| LED Reverse Voltage | VR | - | 1.2 | V | Each LED (2) |
| LED Forward Current | IF | - | 25 | mA | Each LED |

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

Note 2: VR Conditions: Zener Diode 20mA

## 8. Electrical Characteristics
## 8.1 TFT-LCD Module

(Ta=25±2°C)

| Item | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Digital Power Supply Voltage | $DV_{DD}$ | 3.0 | 3.3 | 3.6 | V | - |
| Analog Power Supply Voltage | $AV_{DD}$ | 10.2 | 10.4 | 10.6 | V | - |
| Gate High Voltage | $V_{GH}$ | 15.3 | 16.0 | 16.7 | V | - |
| Gate Low Voltage | $V_{GL}$ | -7.7 | -7.0 | -6.3 | V | - |
| Input signal voltage | $V_{COM}$ | 3.6 | 3.8 | 4.0 | V | - |
| Digital Power Supply Current | $DI_{DD}$ | - | 4.0 | 10 | mA | (1) |
| Analog Power Supply Current | $AI_{DD}$ | | 20 | 50 | mA | (1) |
| Gate High Current | $I_{GH}$ | | 0.2 | 1 | mA | (1) |
| Gate Low Current | $I_{GL}$ | | 0.2 | 1 | mA | (1) |
| Input High Threshold Voltage | $V_{IH}$ | 0.7 $DV_{DD}$ | - | $DV_{DD}$ | V | - |
| Input Low Threshold Voltage | $V_{IL}$ | 0 | - | 0.3 $DV_{DD}$ | V | - |
| VSYNC Frequency | $F_V$ | - | 60 | - | Hz | - |
| DCLK Frequency | DCLK | - | 33.26 | - | MHz | - |

Note (1) The specified power consumption is under the conditions at $DV_{DD}$ =3.3V, $AV_{DD}$ =10.4V, $V_{GH}$ =16.0V, $V_{GL}$ =-7V, $V_{COM}$ =3.8V ,$F_V$=60Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern / 0 Gray
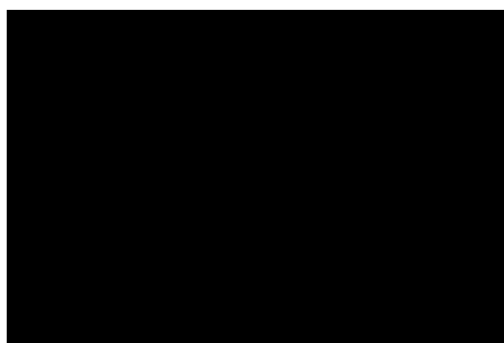
Active Area

## 8.2 Backlight Unit

(Ta=25±2℃)

| Item | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Current of Backlight Unit | $I_B$ | 170 | 180 | 200 | mA | - |
| Voltage of Backlight Unit | $V_B$ | 8.4 | 9.3 | 10.2 | V | (1) |
| Power Consumption | $P_{BL}$ | - | (1.674) | - | W | - |
| LED Life Time(25℃) | - | 20000 | - | - | hr | (2) |

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and
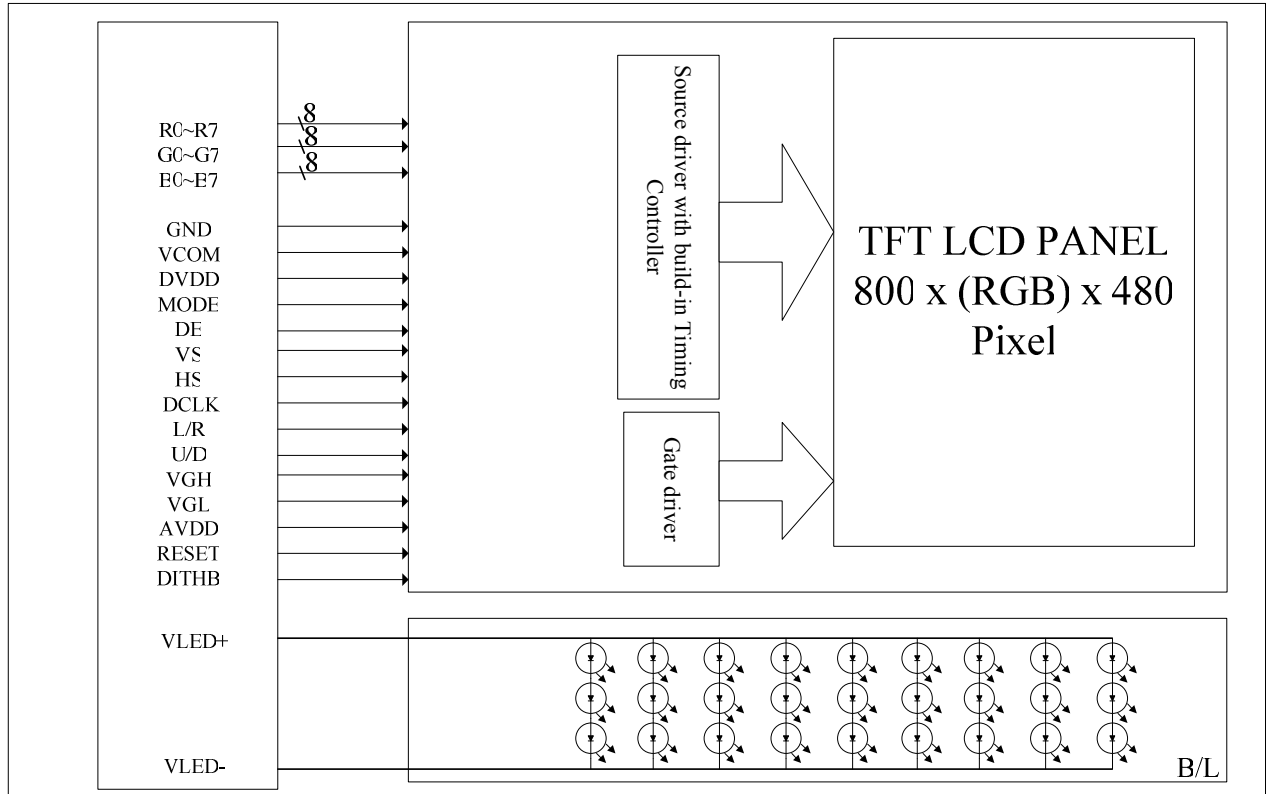IL =180mA.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original
brightness at Ta=25℃ and IL =180mA. The LED lifetime could be decreased if
operating IL is lager than 180 mA.

# 9. Block Diagram
## 9.1 TFT-LCD Module with Backlight Unit

## 10. Input / Output Terminals Pin Assignment
### 10.1 TFT-LCD Module

Connector: Hirose FH12A-50S-0.5SH

| Pin No. | Symbol | I/O | Description | Remark |
|---|---|---|---|---|
| 1 | VLED+ | P | Power for LED backlight(Anode) | |
| 2 | VLED+ | P | Power for LED backlight(Anode) | |
| 3 | VLED- | P | Ground for LED backlight(Cathode) | |
| 4 | VLED- | P | Ground for LED backlight(Cathode) | |
| 5 | GND | P | Ground | |
| 6 | $V_{COM}$ | I | Common voltage | |
| 7 | $DV_{DD}$ | P | Power for Digital Circuit | |
| 8 | MODE | I | DE/SYNC mode select | Note 1 |
| 9 | DE | I | Data Input Enable | |
| 10 | VS | I | Vertical Sync Input | |
| 11 | HS | I | Horizontal Sync Input | |
| 12 | B7 | I | Blue data(MSB) | |
| 13 | B6 | I | Blue data | |
| 14 | B5 | I | Blue data | |
| 15 | B4 | I | Blue data | |
| 16 | B3 | I | Blue data | |
| 17 | B4 | I | Blue data | |
| 18 | B1 | I | Blue data | Note 2 |
| 19 | B0 | I | Blue data(LSB) | Note 2 |
| 20 | G7 | I | GREEN data(MSB) | |
| 21 | G6 | I | GREEN data | |
| 22 | G5 | I | GREEN data | |
| 23 | G4 | I | GREEN data | |
| 24 | G3 | I | GREEN data | |
| 25 | G2 | I | GREEN data | |
| 26 | G1 | I | GREEN data | Note 2 |
| 27 | G0 | I | GREEN data(LSB) | Note 2 |
| 28 | R7 | I | RED data(MSB) | |
| 29 | R6 | I | RED data | |
| 30 | R5 | I | RED data | |

| Pin No. | Symbol | I/O | Description | Remark |
|---|---|---|---|---|
| 31 | R4 | I | RED data | |
| 32 | R3 | I | RED data | |
| 33 | R2 | I | RED data | |
| 34 | R1 | I | RED data | Note 2 |
| 35 | R0 | I | RED data (LSB) | Note 2 |
| 36 | GND | P | Ground | |
| 37 | DCLK | I | Sample clock | Note 3 |
| 38 | GND | P | Ground | |
| 39 | L/R | I | Left / right selection | Note 4,5 |
| 40 | U/D | I | Up / down selection | Note 4,5 |
| 41 | $V_{GH}$ | P | Gate ON Voltage | |
| 42 | $V_{GL}$ | P | Gate OFF Voltage | |
| 43 | $AV_{DD}$ | P | Power for Analog Circuit | |
| 44 | RESET | I | Global reset pin. | Note 6 |
| 45 | NC | - | No connection | |
| 46 | $V_{COM}$ | I | Common Voltage | |
| 47 | DITHB | I | Dithering function | Note 7 |
| 48 | GND | P | Ground | |
| 49 | NC | - | No connection | |
| 50 | NC | - | No connection | |

I: input, O: output, P: Power

Note 1: DE/SYNC mode select. Normally pull high.

When select DE mode, MODE="1", VS and HS must pull high.

When select SYNC mode, MODE= "0", DE must be grounded.

Note 2: When input 18 bits RGB data, the two low bits of R, G and B data must be grounded.

Note 3: Data shall be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode

| Setting of scan control input | | Scanning direction |
|---|---|---|
| U/D | L/R | |
| GND | $DV_{DD}$ | Up to down, left to right |
| $DV_{DD}$ | GND | Down to up, right to left |
| GND | GND | Up to down, right to left |
| $DV_{DD}$ | $DV_{DD}$ | Down to up, left to right |

Note 5: Definition of scanning direction.

Refer to the figure as below:
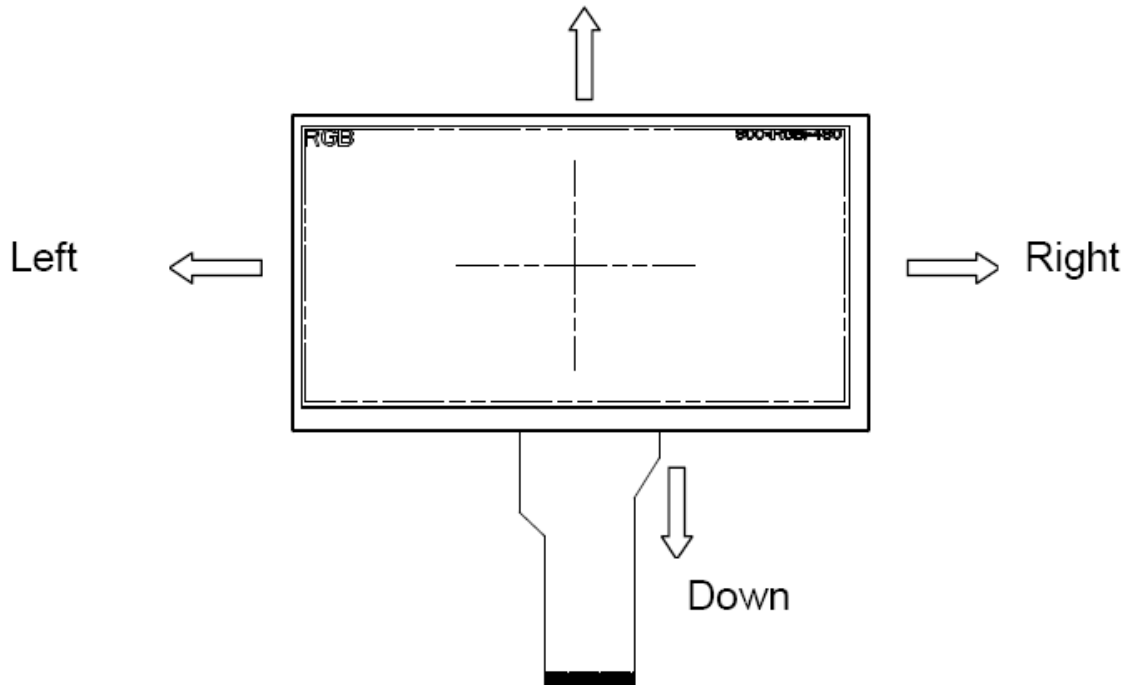


Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 7: Dithering function enable control, normally pull high.
When DITHB="1",Disable internal dithering function,
When DITHB="0",Enable internal dithering function,

## 10.2 Color Data Input Assignment

The brightness of each primary color(red, green and blue) is based on the 8 bit gray scale data input for the color. The higher the binary input, the brighter the color. The table provides the assignment of color versus data input.

| Color | | Data Signal | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Red | | | | | | | | Green | | | | | | | | Blue | | | | | | | |
| | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Yellow | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Gray Scale Of RED | Red(0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(2) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Red(253) | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(254) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(255) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale Of Green | Green(0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Green(253) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(254) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(255) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale Of Blue | Blue(0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Blue(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Blue(253) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | Blue(254) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Blue(255) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## 11. Interface Timing
### 11.1 Input Signal Characteristics

| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| HS setup time | $T_{hst}$ | 8 | - | - | ns | |
| HS hold time | $T_{hhd}$ | 8 | - | - | ns | |
| VS setup time | $T_{vst}$ | 8 | - | - | ns | |
| VS hold time | $T_{vhd}$ | 8 | - | - | ns | |
| Data setup time | $T_{dsu}$ | 8 | - | - | ns | |
| Data hole time | $T_{dhd}$ | 8 | - | - | ns | |
| DE setup time | $T_{esu}$ | 8 | - | - | ns | |
| DE hole time | $T_{ehd}$ | 8 | - | - | ns | |
| $DV_{DD}$ Power On Slew rate | $T_{POR}$ | - | - | 20 | ms | From 0 to 90% $DV_{DD}$ |
| RESET pulse width | $T_{Rst}$ | 1 | - | - | ms | |
| DCLK cycle time | $T_{coh}$ | 20 | - | - | ns | |
| DCLK pulse duty | $T_{cwh}$ | 40 | 50 | 60 | % | |

**Input Clock and Data Timing Diagram**
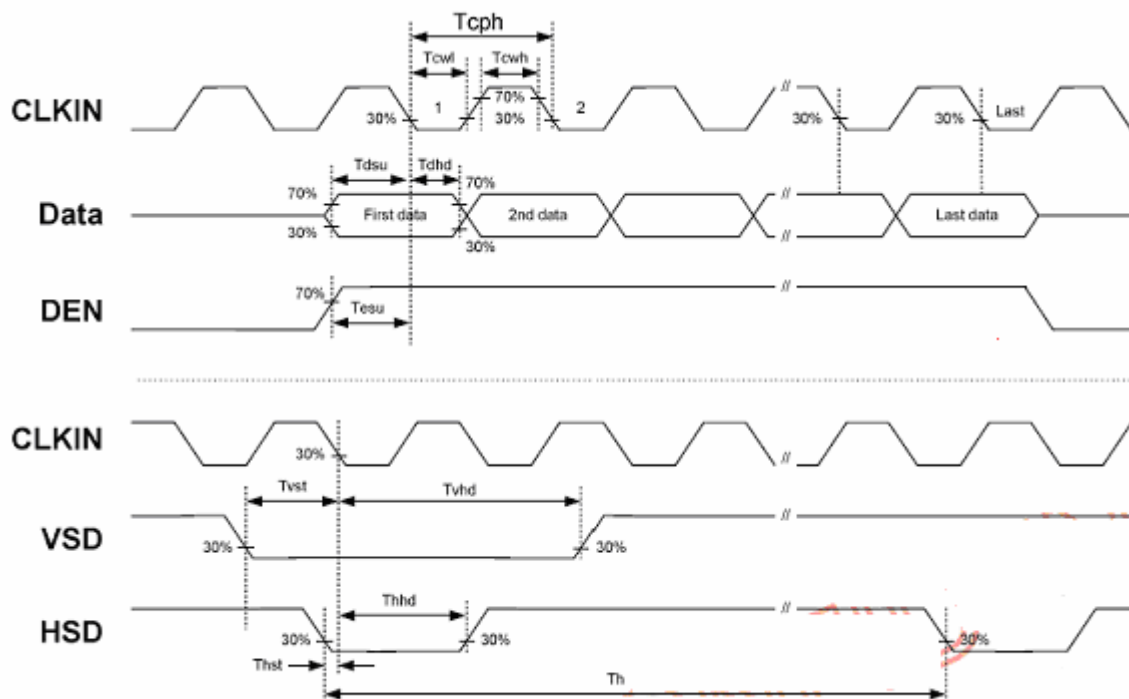
## 11.2 Power Sequence

Power on:
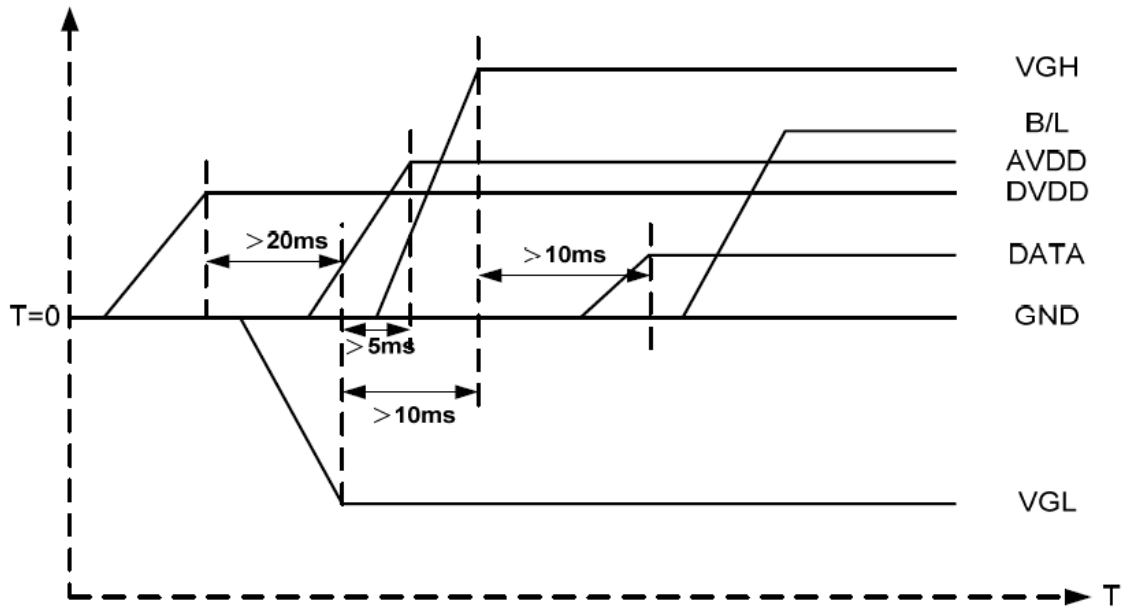


$$DV_{DD} \rightarrow VGL \rightarrow AVDD \rightarrow VGH \rightarrow Data \rightarrow B/L$$

Power off:
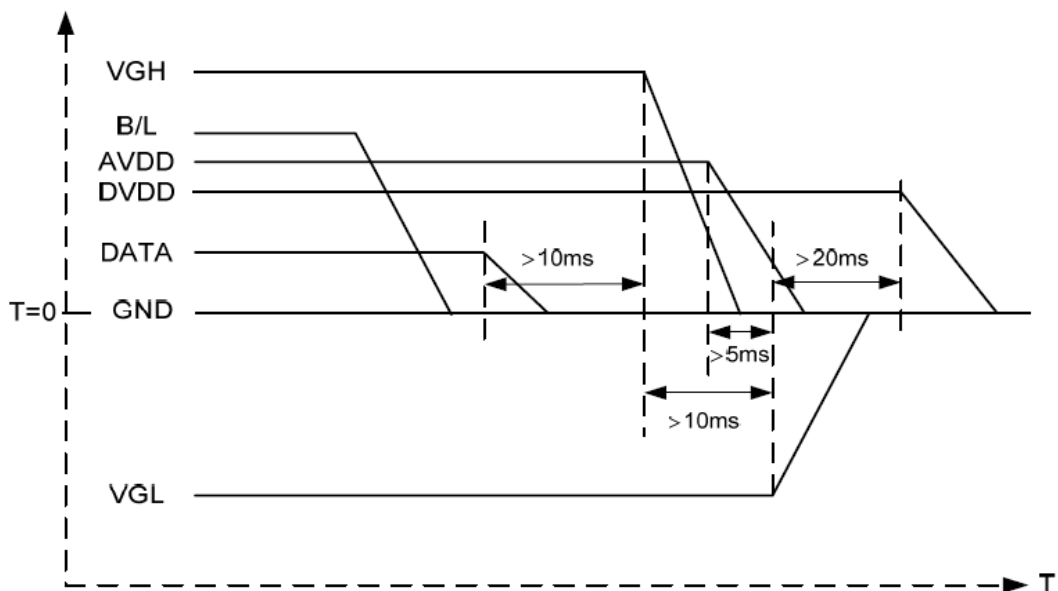


$$B/L \rightarrow Data \rightarrow VGH \rightarrow AVDD \rightarrow VGL \rightarrow DV_{DD}$$

Note: Data include R0~R7, B0~B7, G0~G7, U/D, L/R, DCLK, HS,VS,DE.

## 11.3 Timing

| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Horizontal Display Area | thd | - | 800 | - | DCLK | |
| DCLK Frequency | fclk | 26.4 | 33.3 | 46.8 | MHz | |
| One Horizontal Line | th | 862 | 1056 | 1200 | DCLK | |
| HS pulse width | thpw | 1 | - | 40 | DCLK | |
| HS Blanking | thb | 46 | 46 | 46 | DCLK | |
| HS Front Porch | thfp | 16 | 210 | 354 | DCLK | |

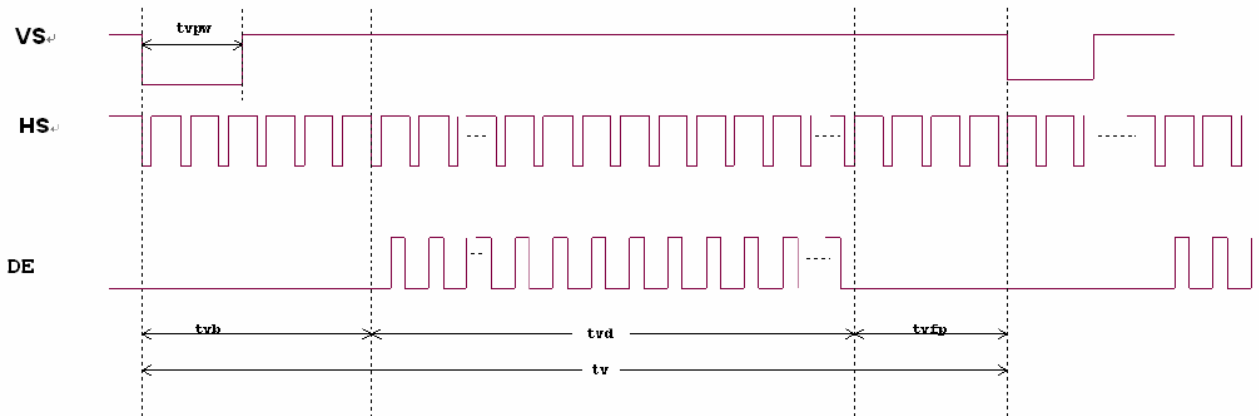| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Vertical Display Area | tvd | - | 480 | - | TH | |
| VS period time | tv | 510 | 525 | 650 | TH | |
| VS pulse width | tvpw | 1 | - | 20 | TH | |
| VS Blanking | tvb | 23 | 23 | 23 | TH | |
| VS Front Porch | tvfp | 7 | 22 | 147 | TH | |

## 11.4 Waveform

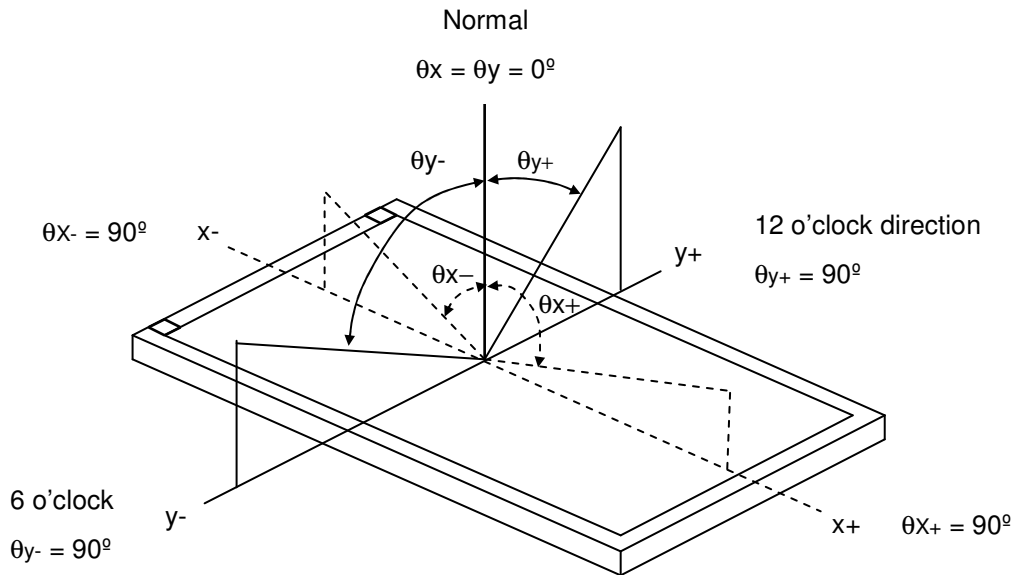### 11.4.1 Data input format
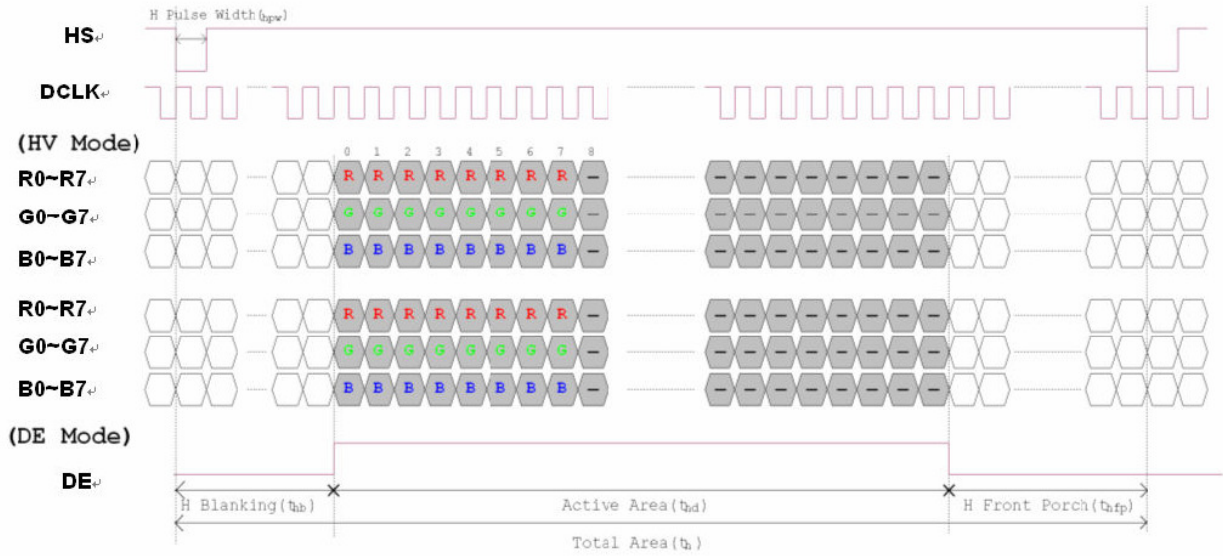


Horizontal input timing diagram.



Vertical input timing diagram.

## 12. Optical Characteristics

The optical characteristics should be measured in a dark environment ($\leq$ 1 lux) or equivalent state with the methods shown in Note (4).

| Item | | Symbol | Conditions | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| Contrast Ratio | | CR | $\theta_x=0°, \theta_Y=0°$ Viewing Normal Angle | 400 | （500） | - | - | (2) |
| Response Time | | $T_R$ | | - | 10 | 20 | ms | (3) |
| | | $T_F$ | | - | 15 | 30 | ms | |
| Luminance(Center) | | Y | | 320 | （400） | - | cd/m$^2$ | (4) |
| Brightness uniformity | | BUNI | | 70 | （75） | - | ％ | (5) |
| Color Chromaticity | White | Wx | | 0.26 | 0.31 | 0.36 | - | |
| | | Wy | | 0.28 | 0.33 | 0.38 | - | |
| Viewing Angle | Horizontal | $\theta_x+$ | CR≥10 | 60 | （70） | - | deg. | (1),(4) |
| | | $\theta_x-$ | | 60 | （70） | - | | |
| | Vertical | $\theta_Y+$ | | 40 | （50） | - | | |
| | | $\theta_Y-$ | | 60 | （70） | - | | |

Note (1) Definition of Viewing Angle ($\theta x$, $\theta y$):

Normal

$\theta x = \theta y = 0º$

$\theta y-$    $\theta y+$

$\theta X- = 90º$    x-

12 o'clock direction

$\theta y+ = 90º$

y+

$\theta x-$

$\theta x+$

6 o'clock

y-

x+    $\theta X+ = 90º$
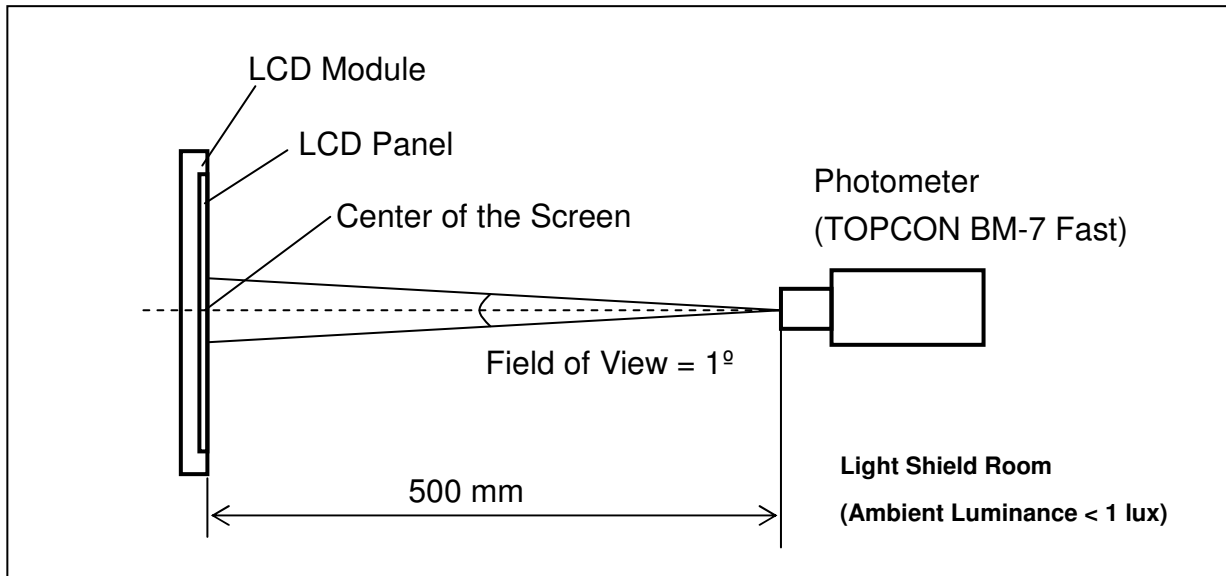
$\theta y- = 90º$

Note (2) Definition of Contrast Ratio (CR):

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

Note (3) Definition of Response Time ($T_R$, $T_F$):

White                                    White

100%

90%

Optical

Response

Black

10%

0%

$T_R$        $T_F$        Time
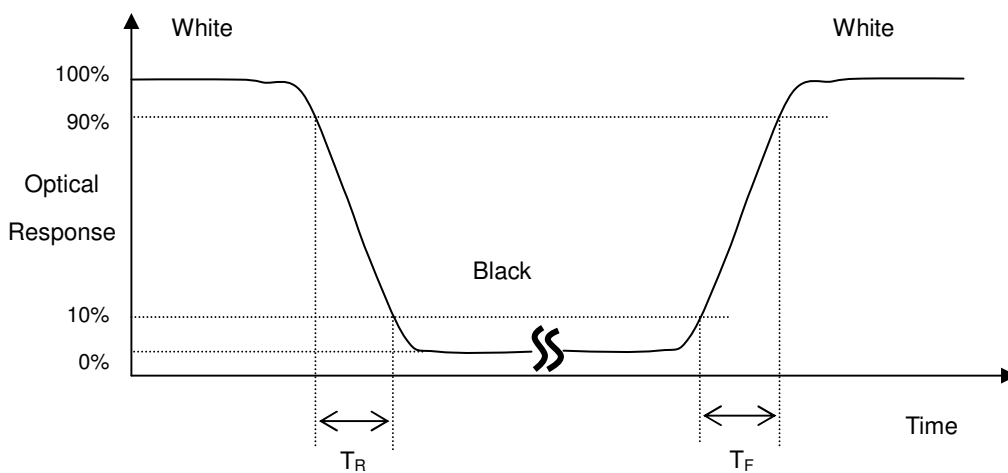
Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.

LCD Module

LCD Panel

Center of the Screen

Photometer
(TOPCON BM-7 Fast)

Field of View = 1º

500 mm

Light Shield Room
(Ambient Luminance < 1 lux)

Note (5) Definition of brightness uniformity

Brightness uniformity=(Min Luminance of 9 points)/(Max Luminance of 9 points)×100%
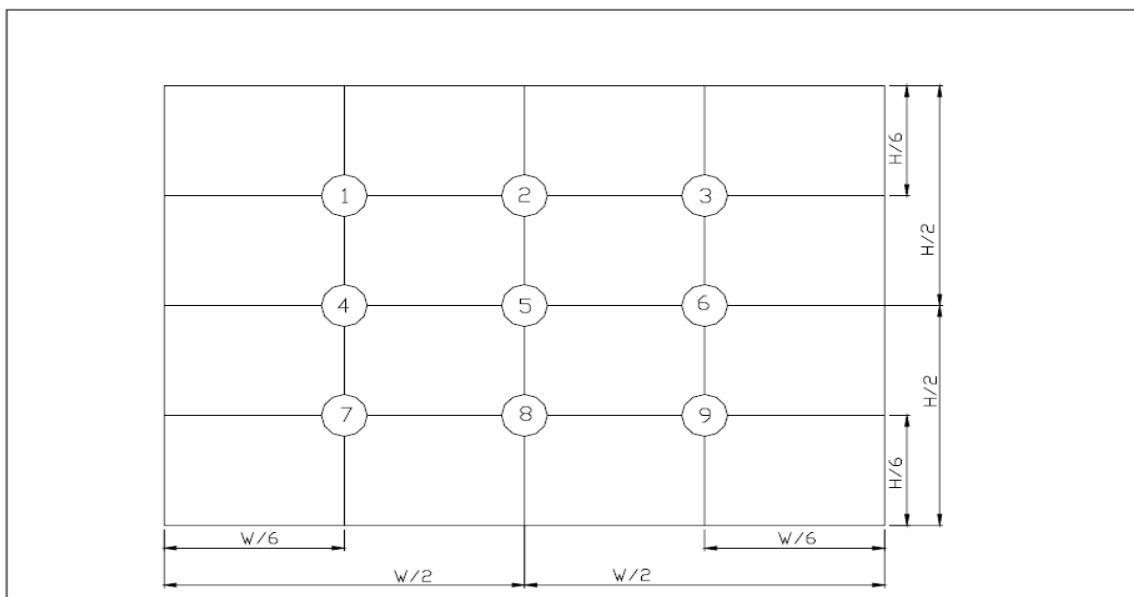
( 單位 : mm )

## 13. Reliability Test

(Note3)

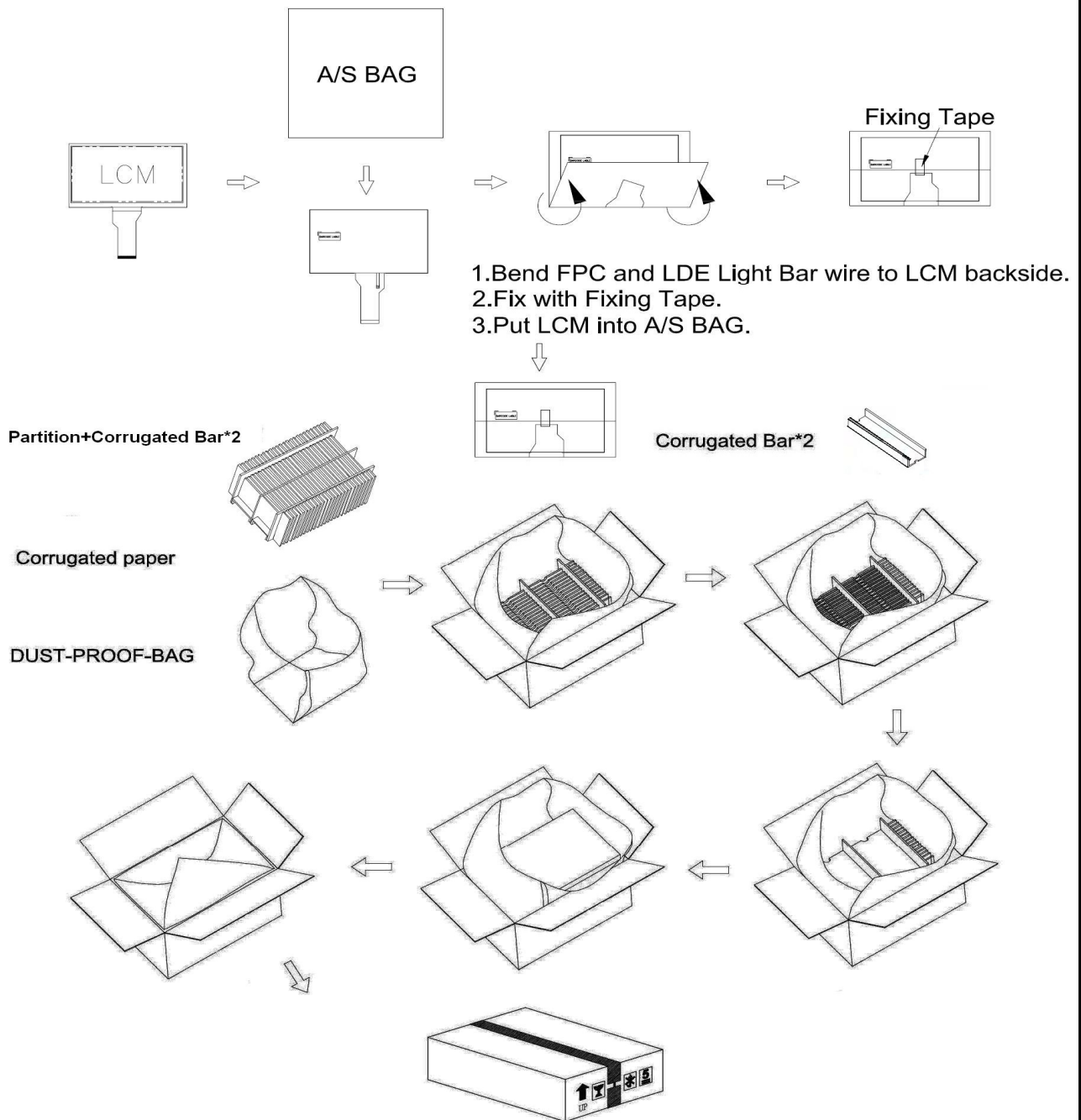| Item | Test Conditions | Remark |
| --- | --- | --- |
| High Temperature Storage | Ta = 85℃      240hrs | Note 1，Note 4 |
| Low Temperature Storage | Ta = -30℃      240hrs | Note 1，Note 4 |
| High Temperature Operation | Ts = 85℃      240hrs | Note 2，Note 4 |
| Low Temperature Operation | Ta = -30℃      240hrs | Note 1，Note 4 |
| Operate at High Temperature and Humidity | +60℃, 90%RH      240hrs | Note 4 |
| Thermal Shock | -30℃/30 min ~ +85℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature. | Note 4 |
| Vibration Test | Frequency range:10~55Hz<br>Stroke: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>0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ<br>2 hours for each direction of X. Y. Z.<br>(6 hours for total) | |
| Package Drop Test | Height:60 cm<br>1 corner, 3 edges, 6 surfaces | |
| Electro Static Discharge | ± 2KV,    Human Body Mode, 100pF/1500Ω | |

Note 1: Ta is the ambient temperature of samples.
Note 2: Ts is the temperature of panel's surface.
Note 3: In the standard condition, there shall be no practical problem that may affect the
       display function. After the reliability test, the product only guarantees operation,
       but don't guarantee all of the cosmetic specification.
Note 4: Before cosmetic and function test, the product must have enough recovery time,
       at least 2 hours at room temperature.

## 14. Packaging

A/S BAG

LCM

Fixing Tape

1.Bend FPC and LDE Light Bar wire to LCM backside.
2.Fix with Fixing Tape.
3.Put LCM into A/S BAG.

**Partition+Corrugated Bar*2**

**Corrugated Bar*2**

Corrugated paper

DUST-PROOF-BAG



| PARTS LIST | | | | |
|---|---|---|---|---|
| | ITEM | SIZE(L×W×H) unit：mm | MATERIAL | Q.T.Y | NOTE |
| 1 | PARTITION | 512.0×349.0×226.0 | CORRUGATED PAPER | 1 | |
| 2 | CORRUGATED PAPER | 510.0×350.0 | CORRUGATED PAPER | 4 | |
| 3 | CORRUGATED BAR | 512.0×11.0x3.0 | CORRUGATED PAPER | 4 | |
| 4 | DUST-PROOF BAG | 700.0×530.0 | PE | 1 | |
| 5 | A/S BAG | 180.0×133.0×0.2 | PE | 50 | |
| 6 | CARTON | 530.0×355.0×255.0 | CORRUGATED PAPER | 1 | |
| 7 | PRODUCT | 164.9×100.0×5.7 | | 50 | |

## 15. Precautions

### 15.1 Assembly and Handling Precautions

(1) Do not apply rough force such as bending or twisting to the module during assembly.

(2) It's recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) Don't apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.

(4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.

(5) Do not plug in or pull out the I/F connector while the module is in operation.

(6) Do not disassemble the module.

(7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

(8) Moisture can easily penetrate into LCD module and may cause the damage during operation.

(9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD module in the specified storage conditions.

(10) When ambient temperature is lower than 10ºC, the display quality might be reduced. For example, the response time will become slow.

### 15.2 Safety Precautions

(1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(2) After the module's end of life, it is not harmful in case of normal operation and storage.

### 15.3 Terms of Warrant

(1) Acceptance inspection period

The period is within one month after the arrival of contracted commodity at the buyer's factory site.

(2) Applicable warrant period

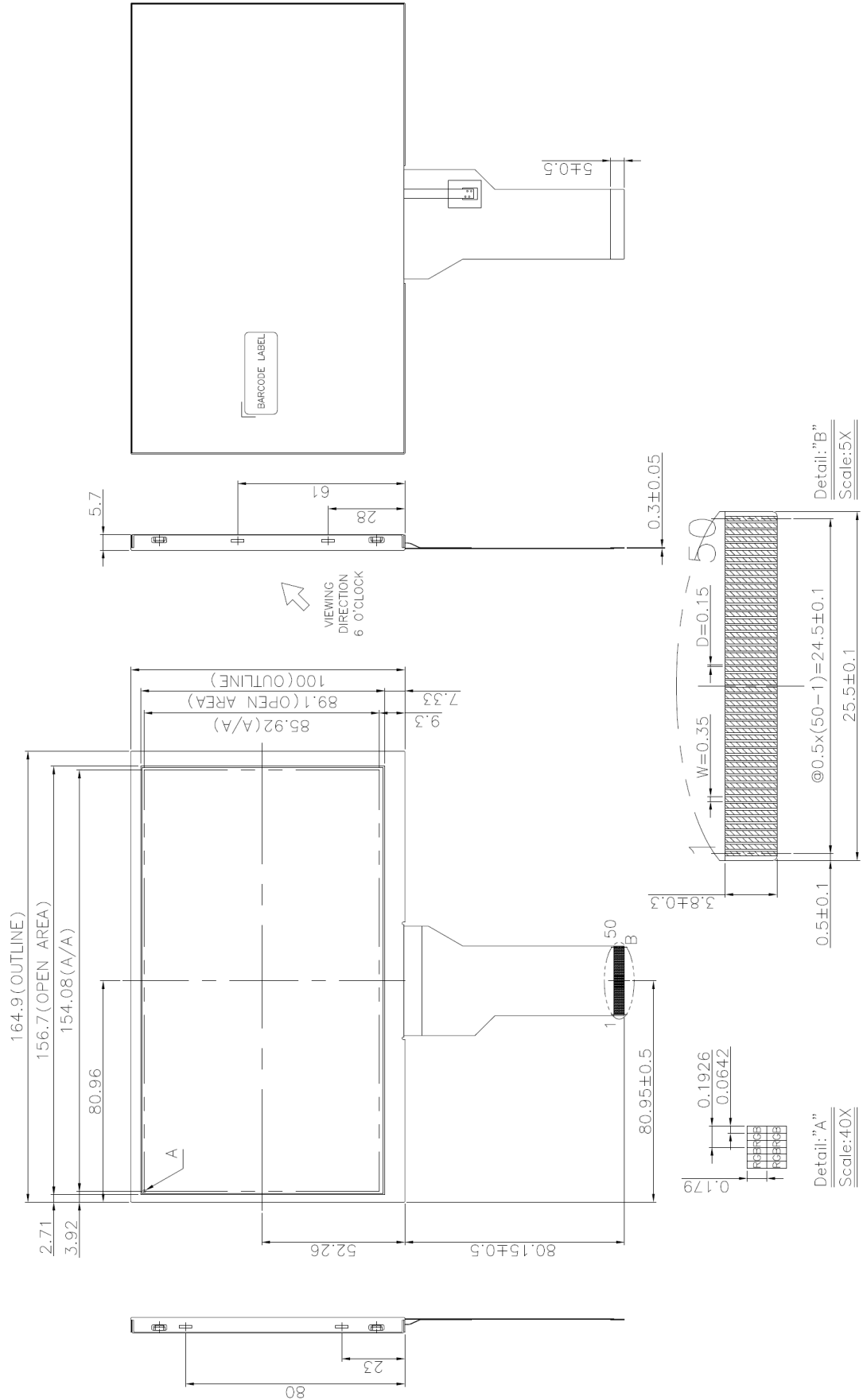The period is within twelve months since the date of shipping out under normal using and storage conditions.

## 15.4 Cautions for LCM's installing and assembling

Please keep away the FPC while assembling or fixing the LCM to avoid FPC being damaged or extruded or other related problems. Please see below picture.
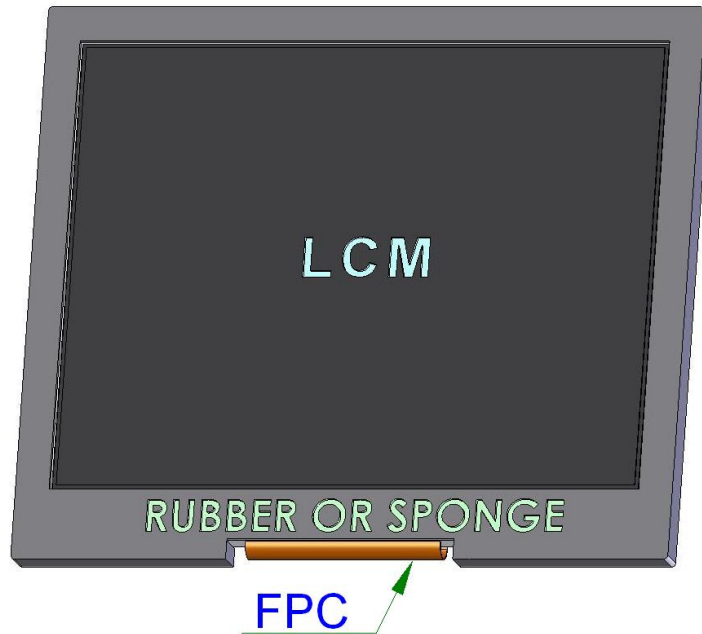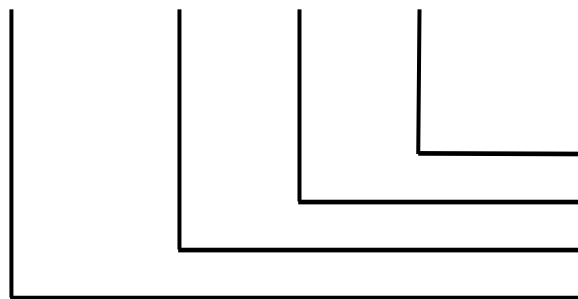
# 16.Outline Drawing

## 17. Definition of Labels

The bar code nameplate is pasted on each module as illustration, and its definitions are as following explanation.

```
|||||||||||||||||||||||||||||||||||||||||||||||||||||
VGG804818-6UFLWA
|||||||||||||||||||||||||||||||||||||||||||||||||
ABCDEFGHIJKL
```

(a) Module Name：VGG804818-6UFLWA

(b) Serial ID：

**A  B  C  D    E  F  G    H    I  J  K  L**

Serial No.
Factory Code
Manufactured Date
Screen Size

Serial ID includes the information as below:

(a) Screen size (Diagonal): Inch Code (ABCD)

3.5” → 0350

10.4” → 1040

(b) Manufactured Date: Year, Month, Day (EFG)

Year (E)

| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|
| Mark | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| Mark | A | B | C | D | E | F | G | H | I | J |

Month (F)

| Month | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|-------|------|------|------|------|-----|------|------|------|------|------|------|------|
| Mark | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |

Day (G)

| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| Mark | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | G |
| Day | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | |
| Mark | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | |

(c) Factory Code (H):

For EVERVISION internal use.

(d) Serial No. (IJKL):

Manufacturing sequence of product, for example: 0001~9999.

## 18. Incoming Inspection Standards
### 18.1 Inspection Parameters

**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. EVERVISION 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.

**2. Liability**

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.

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 EVERVISION of the rejection by either documents or mail within in three (3) 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.

**3. Inspection Specifications**

Both parties agree that the inspection shall contain and follow the inspection specifications stipulated in the attachment, including:

3.1 Scope

3.2 Sampling Plan

3.3 Panel Inspection Condition

3.4 Display Quality

3.5 Mechanics Specifications

3.6 Notification for Storage Handling

**4. Limited Warranty**

EVERVISION 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. EVERVISION will replace, rework or refund the Customer for the defective or non-conforming Modules at EVERVISION's option, provided that the Customer (i) promptly informs EVERVISION of the defects or non-conformities within the warranty period, (ii) complies with the specifications sand conditions hereunder, and (iii) complies with EVERVISION'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.

**5.** THE WARRANTIES AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, TERMS OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. EVERVISION'S WARRANTIES HEREIN APPLY ONLY TO THE CUSTOMER AND ARE NOT TO BE EXTENDED TO ANY THIRD PARTY.

**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 Hsinchu District Court for the first instance.

# Inspection Specifications

## 1. Scope

Specifications contain

1.1 Display Quality Evaluation

1.2 Mechanics Specification

## 2. Sampling Plan

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

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

2.2 Sampling type: Normal inspection, single sampling.

2.3 Sampling level: Level II.

2.4 AQL: Acceptable Quality Level

Major defect: AQL=0.65

Minor defect: AQL=1.0

## 3. Panel Inspection Condition

3.1 Environment:

Room Temperature: 25±5°C.

Humidity: 65±5% RH.

Illumination: 300 ~ 700 Lux.

3.2 Inspection Distance:

35±5 cm

3.3 Inspection Angle:

The vision of inspector should be perpendicular to the surface of the Module.

3.4 Inspection time：

Perceptibility Test Time: 20 seconds max.

## 4. Display Quality

4.1 Function Related:

The function defects of line defect, abnormal display, and no display are considered Major defects.

**4.2 Bright/Dark Dots:**

| Defect Type | Specification | Major | Minor |
|---|---|---|---|
| Bright Dots | N≤ 2 | | ● |
| Dark Dots | N≤ 3 | | ● |
| Total Bright and Dark Dots | N≤ 4 | | ● |

Note: 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

The bright dot defect must be visible through 2% ND filter

Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue pattern.

4.3  Pixel Definition:
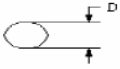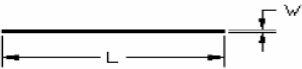
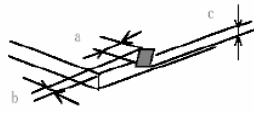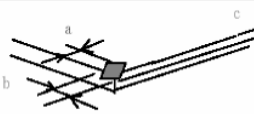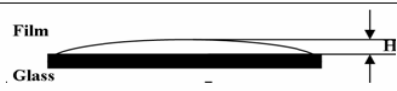| R | G | B | R | G | B | R | G | B | | ⧄ | Dot Defect |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R | G | B | R | G | B | R | G | B | | ⊟ | Adjacent Dot Defect |
| R | G | B | R | G | B | R | G | B | | ⊠ | Cluster |

Note 1:If pixel or partial sub-pixel defects exceed 50% of the affected pixel or sub-pixel area, it shall be considered as1 defect.

Note 2: There should be no distinct non-uniformity visible through 2% ND Filter within 2 sec inspection times.

4.4Visual Inspection specifications:

| Defect Type | | Specification Size | Count(N) | Major | Minor |
|---|---|---|---|---|---|
| Dot Shape (Particle、Scratch and Bubbles in display area) | | D ≤0.25 mm | Ignored | | • |
| | | 0.25mm < D ≤ 0.5mm | N ≤ 3 | | |
| | | D > 0.5mm | N=0 | | |
| Line Shape (Particles、Scratch、Lint and Bubbles in display area) | | W ≤ 0.01 mm | Ignored | | • |
| | | 0.01mm< W ≤ 0.05mm and L ≤ 3mm | N ≤ 3 | | |
| | | W > 0.05mm or L > 3 mm | N=0 | | |
| Bubble in cell (active area) | | It should be found by eyes | | | • |
| Bezel | Scratch | No harm | | | • |
| | Dirt | | | | • |
| | Wrap | No harm | | | • |
| | Sunken | No harm | | | • |
| Label | No label | No | | | • |
| | Inverted label | | | | • |
| | Broken | | | | • |
| | Dirt | Word can be read. | | | • |
| | Not clear | No | | | • |
| | Word out of shape | | | | • |
| | Mistake | No | | | • |
| | Position | Be attached on right position | | | • |
| Screw | Not enough | No | | | • |
| | Limp | No | | | • |

| Item | | Specification/Description | | | Note |
|---|---|---|---|---|---|
| Touch Panel | Scratch | L(mm) | W(mm) | Acceptable number | Note:1 |
| | | L≦10 | W<0.05 | Disregard | |
| | | | 0.05≦W<0.1 | N≦4 | |
| | | | W≧0.1 | 0 | |
| | Foreign Materials (Linear shape) | L≦10 | W<0.05 | Disregard | Note:1 |
| | | | 0.05≦W<0.1 | N≦3 | |
| | | | W≧0.1 | 0 | |
| | Foreign Materials (Circular shape) | Dimension(mm) | | Acceptable number | Note:2 |
| | | D≦0.25 | | Disregard | |
| | | 0.25<D≦0.5 | | N≦6 | |
| | | D>0.5 | | 0 | |
| | Glass chipping |  | | a≦5.0mm<br>b≦3.0mm<br>c≦t (t：Glass think) | Note:3 |
| | |  | | a≦3.0mm<br>b≦3.0mm<br>c≦t (t：Glass think) | Note:3 |
| | Newton-ring | (In case of doubtful situations) Observe on 60° from the product surface under a while Fluorescent lamp (3-wavelength lamp).<br><br> | | Average diameter ≦1/3 Touch Panel area Disregard. | Note:3 |
| | Membrane Drum |  | | H≦0.4mm | |

Note1.

W

L
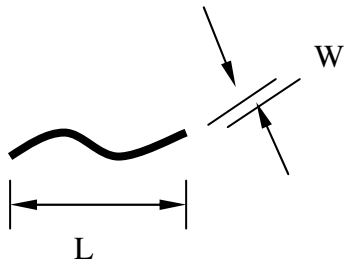
Note2.　　　　D：Diameter D=(a+b)/2

b

a

Note3.

(Touch Panel)

(Transparent Area)

(Touch undetected Area)

A　　B
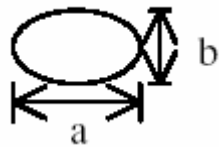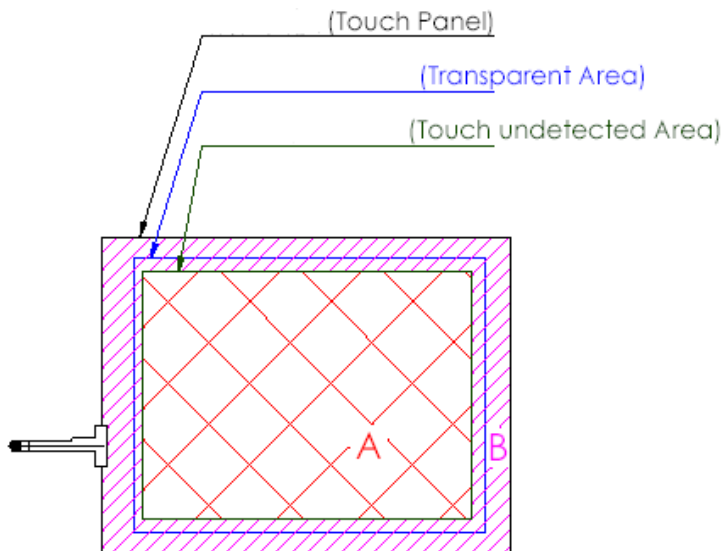
A area : Without any defect point effect on normal operation.

B area : None-specify

| Connector | Connection status | No bend on pins and damage | | ● |
|---|---|---|---|---|
| FPC/FFC | Broken | No | | ● |

Note: Extraneous substance and scratch not affecting the display of image, for instance, extraneous substance under polarizer film but outside the display area, or scratch on metal bezel and backlight module or polarizer film outside the display area, shall not be considered as defective or non-conforming.

## 5. Mechanics specifications

As for the outside dimensions and weight of the Modules, please refer to product specifications for more details.

## 6. Notification for Storage Handling

### 6.1 Storage:

**6.1.1 Enviroment condition must be within the product specifications,otherwise the Module might be damaged.**

**6.1.2 Pile of stacking shall follow the instruction of EVERVISION.**

### 6.2 Handling:

**6.2.1 Twisting or Bending of the Module is prohibited.**

**6.2.2 All chemicals are unfit for use unless otherwise instructed by EVERVISION.**

**6.2.3 Plugging in & unplugging:**

**The power must be turned off before plugging in or unplugging the Module.**

**6.2.4 ESD protection:**

**The Module must not be touched without proper grounding.**

**6.2.5 High Voltage:**

**The rear side of Module must not be touched without protection.**

**6.2.6 Power sequence:**

**Shall follow the instruction of EVERVISION.**

## 18.2 Handling of LCM

(1)Don't give external shock.

(2)Don't apply excessive force on the surface.

(3)Liquid in LCD is hazardous substance. Must not lick and swallow. when the liquid is
   attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.

(4)Don't operate it above the absolute maximum rating.

(5)Don't disassemble the LCM.