# Specification for Approval

Customer:_____

Model Name:_____

| Supplier Approval | | | Customer approval |
|---|---|---|---|
| R&D Designed | R&D Approved | QC Approved | |
| *Peter* | *Peng Jun* | | |

# C O N T E N T S

# 1.RECORD OF REVISION

| Rev | DATE | PAGE | SUMMARY |
|-----|------|------|---------|
| A | 2020.04.08 | ALL | Preliminary specification was first issued. |
|  |  |  |  |

## 2.MECHANICAL   SPECIFICATIONS

| (1) | Number  Of  Dots | 800R.G.B X 600 |
|-----|------------------|----------------|
| (2) | Module  Size(mm) | 189.75 (W)  X 149.4 (H) X 5.0 (D) |
| (3) | Active  Area(mm) | 170.4(W) X 127.8(H) |
| (4) | Pixel Pitch(mm) | 0.213(W) X0.213(H) |
| (5) | LCD / Polarizer Model | TFT , Transmissive , Normally White ,<br>Anti-Glare ,Hard coating |
| (6) | LED Backlight Color | White |
| (7) | Viewing  Direction | 6 O'clock<br>Horizontal：Right side 75°(typ.), Left side 75°(typ.)<br>Vertical：Up side 70°(typ.), Down side 60°(typ.) |
| (8) | Gray Scale Inversion Direction | 12 O'clock |
| (9) | Color Configuration | R.G.B Vertical Stripe |
| (10) | Interface | LVDS |
| (11) | Module  Weight(g) | 250g±5% |

## 3. OUTLINE DIMENSIONS
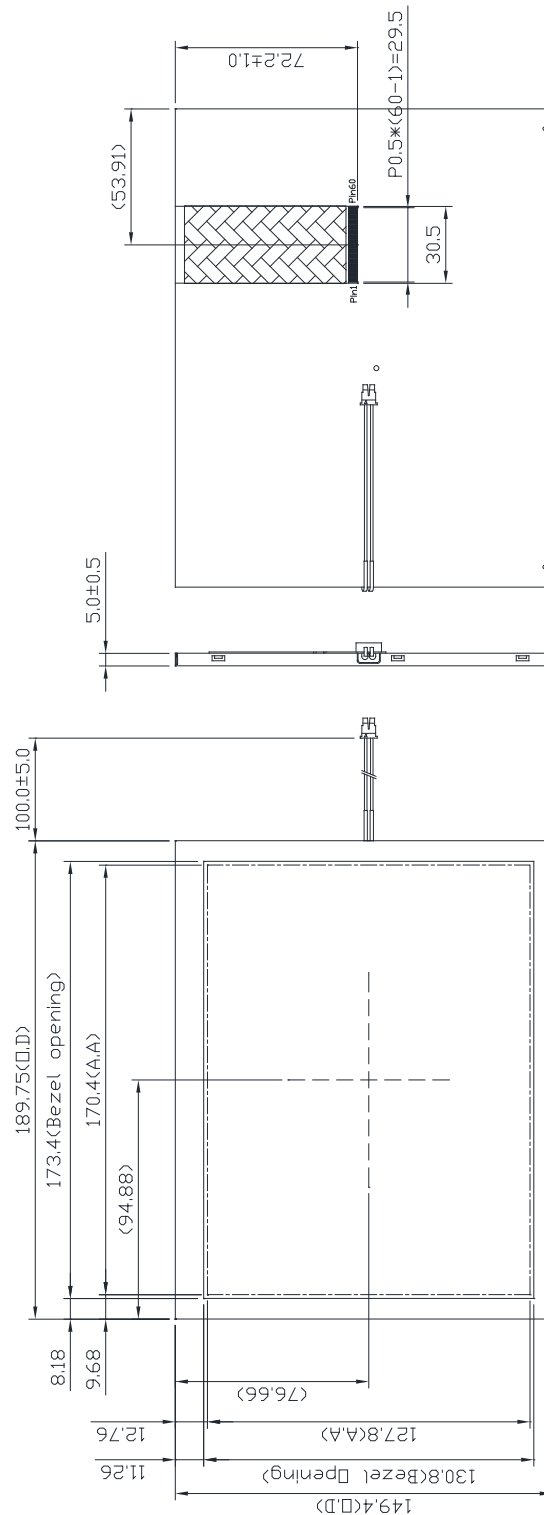
## 4. INTERFACE PIN CONNECTION

### 4.1 TFT LCM Module

FPC Down Connector, (FH28-60S-0.5SH (HIROSE or equivalent), 60pin, pitch = 0.5mm)

| Pin NO. | Symbol | I/O | Description | Remark |
|---|---|---|---|---|
| 1 | AGND | P | Analog Ground | - |
| 2 | AVDD | P | Analog Power | - |
| 3 | VCC | P | Digital Power | - |
| 4 | R0 | I | Data Input (LSB) | |
| 5 | R1 | I | Data Input | - |
| 6 | R2 | I | Data Input | - |
| 7 | R3 | I | Data Input | - |
| 8 | R4 | I | Data Input | - |
| 9 | R5 | I | Data Input | |
| 10 | R6 | I | Data Input | - |
| 11 | R7 | I | Data Input (MSB) | - |
| 12 | G0 | I | Data Input (LSB) | - |
| 13 | G1 | I | Data Input | - |
| 14 | G2 | I | Data Input | - |
| 15 | G3 | I | Data Input | - |
| 16 | G4 | I | Data Input | - |
| 17 | G5 | I | Data Input | - |
| 18 | G6 | I | Data Input | - |
| 19 | G7 | I | Data Input (MSB) | - |
| 20 | B0 | I | Data Input (LSB) | - |
| 21 | B1 | I | Data Input | - |
| 22 | B2 | I | Data Input | - |
| 23 | B3 | I | Data Input | - |
| 24 | B4 | I | Data Input | - |
| 25 | B5 | I | Data Input | - |
| 26 | B6 | I | Data Input | - |
| 27 | B7 | I | Data Input (MSB) | - |
| 28 | DCLK | I | Clock input | - |
| 29 | DE | I | Data Enable signal | - |
| 30 | HSD | I | Horizontal sync input. Negative polarity | - |

| Pin NO. | Symbol | I/O | Description | Remark |
|---------|--------|-----|-------------|--------|
| 31 | VSD | I | Vertical sync input. Negative polarity | - |
| 32 | MODE3 | I | DE/SYNC mode select. Normally pull high H：DE mode L：HSD/VSD mode | - |
| 33 | RSTB | I | Global reset pin. Active low to enter reset state. suggest to connecting with an RC reset circuit for stability .normally pull high. | - |
| 34 | STBYB | I | Standby mode, normally pull high STBYB="1",normal operation STBYB="0",timming control , source driver will turn off, all output are high-Z | - |
| 35 | SHLR | I | Source right or left sequence control .SHLR="L", shift left: last data=S1<-S2...S1200=first data ; SHLR="H", shift right :first data=S1->S2...S1200=last data | - |
| 36 | VCC | P | Digital Power | - |
| 37 | UPDN | I | gate up or down scan control. UPDN="L" , DOWN shift : G1->G2...->G600 ; UPDN="H", up shift: G1<-G2...<-G600 | - |
| 38 | GND | P | Digital Ground | - |
| 39 | AGND | P | Analog Ground | - |
| 40 | AVDD | P | Analog Power | - |
| 41 | VCOM | I | For external VCOM DC input (Adjustable) | |
| 42 | DITH | I | Dithering setting DITH="H" 6bit resolution (last 2 bits of input data truncated)  (default setting) | |
| 43、44 | NC | - | Not connect | |
| 45 | V10 | P | Gamma correction voltage reference | |
| 46 | V9 | P | Gamma correction voltage reference | |
| 47 | V8 | P | Gamma correction voltage reference | |
| 48 | V7 | P | Gamma correction voltage reference | |
| 49 | V6 | P | Gamma correction voltage reference | |
| 50 | V5 | P | Gamma correction voltage reference | |
| 51 | V4 | P | Gamma correction voltage reference | |
| 52 | V3 | P | Gamma correction voltage reference | |
| 53 | V2 | P | Gamma correction voltage reference | |
| 54 | V1 | P | Gamma correction voltage reference | |

| Pin NO. | Symbol | I/O | Description | Remark |
|---------|--------|-----|-------------|--------|
| 55 | NC | - | Not connect | - |
| 56 | VGH | P | Positive Power for TFT | - |
| 57 | VCC | P | Digital Power | - |
| 58 | VGL | P | Negative Power for TFT | - |
| 59 | GND | P | Digital Ground | - |
| 60 | NC | - | Not connect | - |

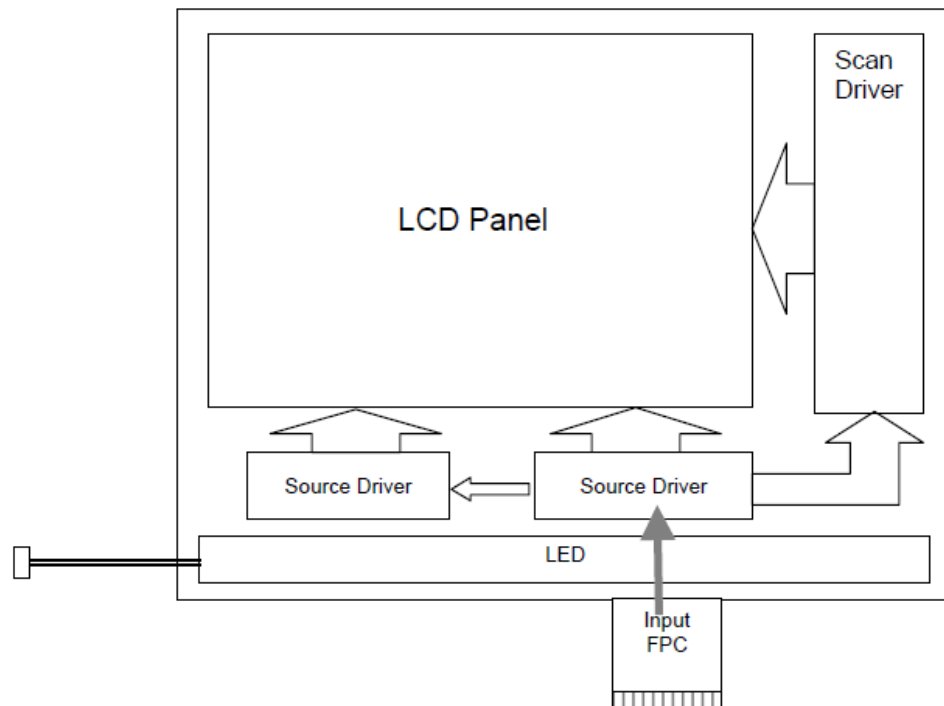Note : 'P' stand for Power, 'I' stand for Input

## 4.2 Black Light Unit

LED Power Source (BHSR-02VS-1) or equivalent

Mating Connector: (SBHT-002T-P0.5) or equivalent

| Pin NO. | Symbol | I/O | Description | Remark |
|---------|--------|-----|-------------|--------|
| 1 | VL | P | LED power supply (high voltage) | - |
| 2 | GL | P | LED power supply (low voltage) | - |

## 5. BLOCK DIAGRAM
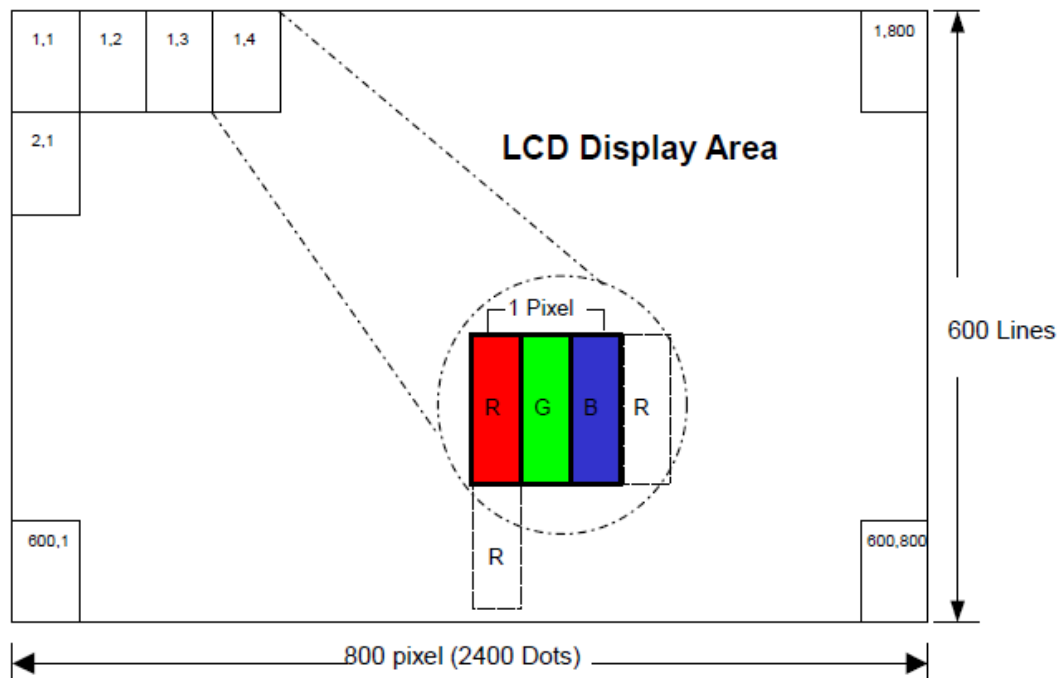
## 6.ABSOLUTE MAXIMUM RATINGS

### 6.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

6.1.1 TFT LCM                                                                 Ta=25℃

| ITEM | SYMBOL | MIN. | MAX. | UNIT | REMARK |
|---|---|---|---|---|---|
| Power supply Voltage | VCC | -0.3 | +5.0 | V | GND=0 |
| | AVDD | -0.5 | 15 | V | AGND=0 |
| | $V_{COM}$ | 0 | 6 | V | |
| Logic Signal Input Level | $V_I$ | -0.3 | Vcc+0.3 | V | |
| LED current | $I_L$ | | | | |
| LED voltage | $V_L$ | | | | |

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

6.1.2 Back Light Unit                                                         Ta=25℃

| ITEM | SYMBOL | Typ. | MAX. | UNIT | REMARK |
|---|---|---|---|---|---|
| LED current | $I_L$ | 180 | - | mA | Note 1,2 |
| LED voltage | $V_L$ | 10.5 | - | V | |

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.

Note2：Test Condition: LED current 180 mA. The LED lifetime could be decreased if operating IL is larger than 180mA.

### 6.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

| ITEM | OPERATING | | STORAGE | | REMARK |
|---|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. | |
| Ambient Temperature(℃) | Ta=-20 | Ts=+70 | Ta=-30 | Ts=+80 | Note 1,2 |
| Humidity(% RH) | 5 ~ 90 | | 5 ~ 90 | | Note 3 |

Note 1 : The response time will become lower when operated at low temperature.

Note 2 : Background color changes slightly depending on ambient temperature.

Note 3 : Operating Ta=40℃ & RH=90%≦240Hrs.

# 7.ELECTRICAL CHARACTERISTICS

## 7.1 ELECTRICAL CHARACTERISTICS OF LCD                    Ta=25℃

| ITEM | SYMBOL | MIN. | TYP. | MAX. | UNIT | REMARK |
|---|---|---|---|---|---|---|
| Power Voltage | VCC | 2.5 | 3.0 | 3.3 | V | |
| | VGH | 14 | 15 | 16 | V | |
| | VGL | -8 | -7 | -6 | V | |
| | AVDD | 9.85 | 10.0 | 10.15 | V | |
| VCOM | VCOM | 3.96 | 4.16 | 4.36 | V | |
| Input signal Voltage | VIH | 0.7VCC | - | VCC | | Note 1 |
| | VIL | 0 | - | 0.3VCC | | |
| Current of power supply | ICC | | 7.4 | | mA | Vcc = 3.3V(Black) |
| | IADD | | 32.8 | | mA | AVDD= 10 V(Black) |
| | IGH | | 0.281 | | mA | VGH= 15 V(Black) |
| | IGL | | 0.569 | | mA | VGL= -7V(Black) |
| Input level of V1~V5 | Vx | AVDD/2 | - | AVDD-0.1 | | |
| Input level of V6~V10 | Vx | 0.1 | - | AVDD/2 | | |

Note 1： HSYNC , VSYNC , DE , Digital Data

Note 2：Be sure to apply the power voltage as the power sequence spec.

Note 3： DGND=AGND=0V

## 7.2 BACKLIGHT UNITS

Ta=25℃

| ITEM | SYMBOL | MIN. | TYP. | MAX. | UNIT | Remark |
|---|---|---|---|---|---|---|
| LED current | IL | - | 180 | - | mA | Note 1 |
| LED voltage | VL | - | 10.5 | - | V | |
| Operating LED life time (For Reference Only) | Hr | 20,000 | - | - | Hour | Note 1,2 |

Note 1: The LED of B/L is drive by current only, drive voltage is for reference only. drive voltage

can make driving current under safety area(current between minimum and maximum).

50,000 hours is only an estimate for reference.

Note 2: The lifetime of LED is defined as the time when it continues to operate under the

conditions at Ta= 25 ±3℃ and PWM = 100% (LED forward current) until the brightness

becomes ≦50% of its original value.

## 8.OPTICAL CHARACTERISTICS

Ta=25℃

| Item | | Symbol | Conditions | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Contrast Ratio | | CR | Viewing Normal Angle Θx=Θy=0° | 480 | 600 | - | - | Note 1 |
| Response Time | | TR | | - | 2 | 4 | ms | Note 2 |
| | | TF | | | 6 | 12 | Ms | |
| Color chromaticity | White | x | | (0.24) | (0.29) | (0.34) | - | |
| | | y | | (0.25) | (0.30) | (0.35) | - | |
| Viewing Angle | Hor. | $\theta_L$ | Viewing Angle Θx=Θy=0° CR≥10 | 65 | 75 | - | Deg. | Note 3 |
| | | $\theta_R$ | | 65 | 75 | - | | |
| | Ver. | $\theta_T$ | | 50 | 60 | - | | |
| | | $\theta_B$ | | 60 | 70 | - | | |
| Luminance | | L | PWM=100% | 180 | 250 | - | cd/m$^2$ | |
| Uniformity | | YU | | 70 | - | - | % | Note 5 |

Note 1：Definition of Contrast Ratio (CR)：

   The contrast ratio can be calculated by the following expression.

   Contrast Ratio (CR) = L63/L0

   L63：Luminance of gray level 63

   L0：Luminance of gray level 0

   CR = CR(5)

   CR(X) is corresponding to the Contrast Ratio of the point X at Figure in Note 5

Note 2：Definition of Response Time (TR.TF)
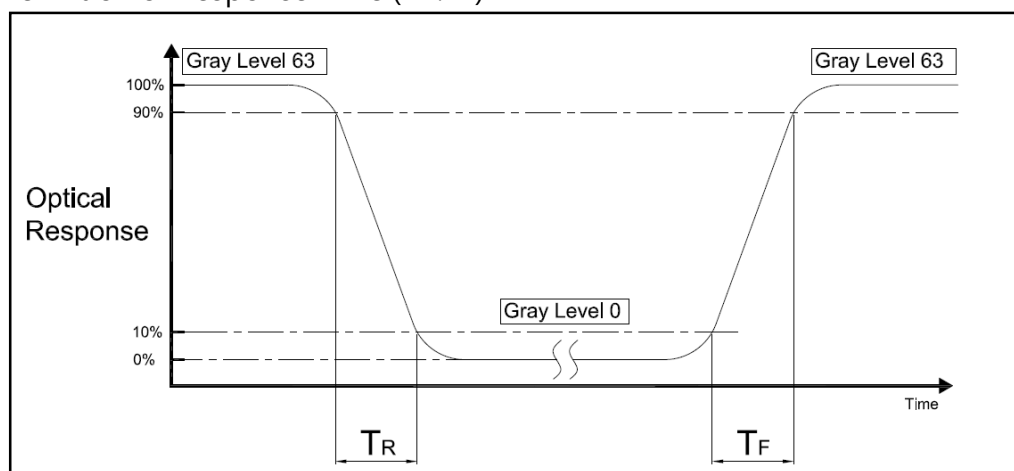
Note 3 : Definition of Viewing Angle
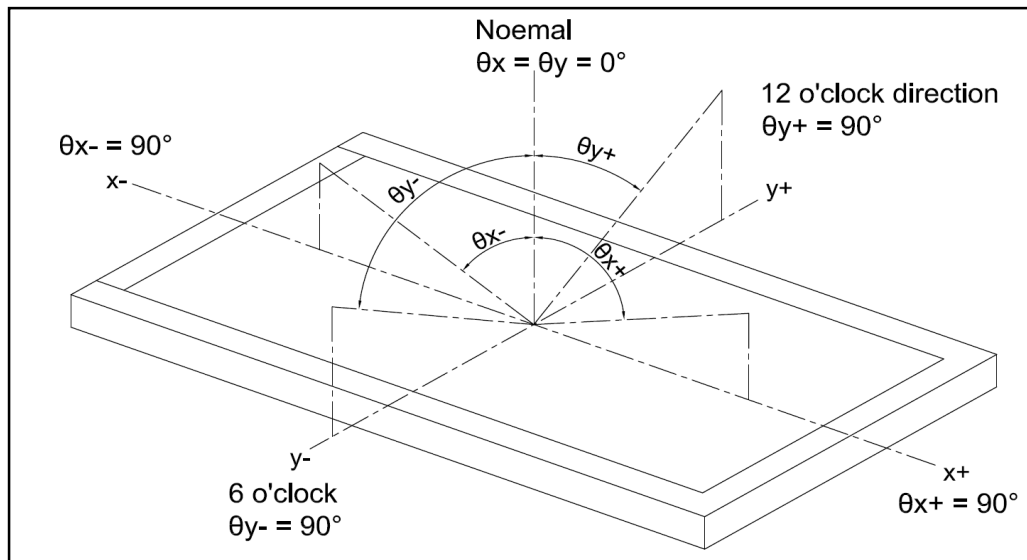


Note 4 : Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

Note 5 :



$$1 - \frac{\text{MAX Luminance - Average Luminance}}{\text{Average Luminance}} \times 100\% = YU$$
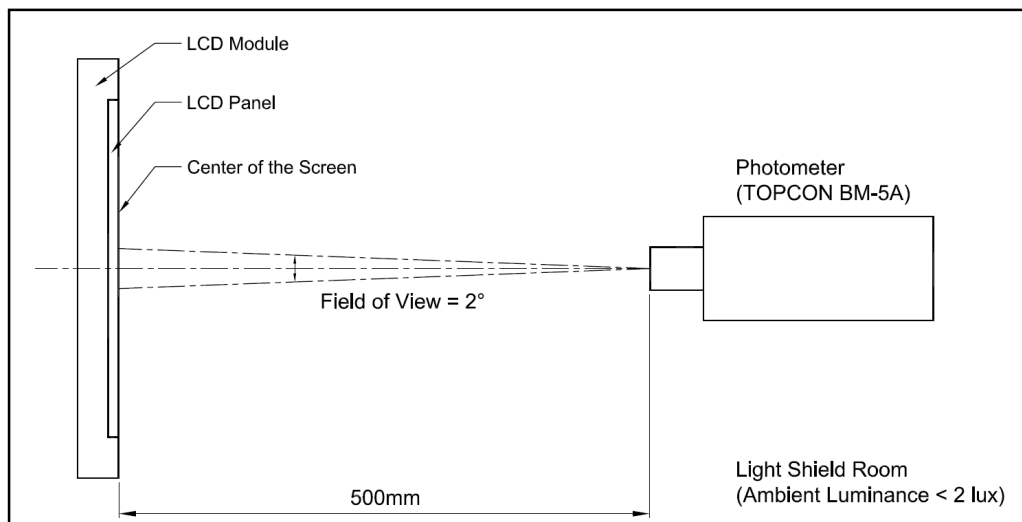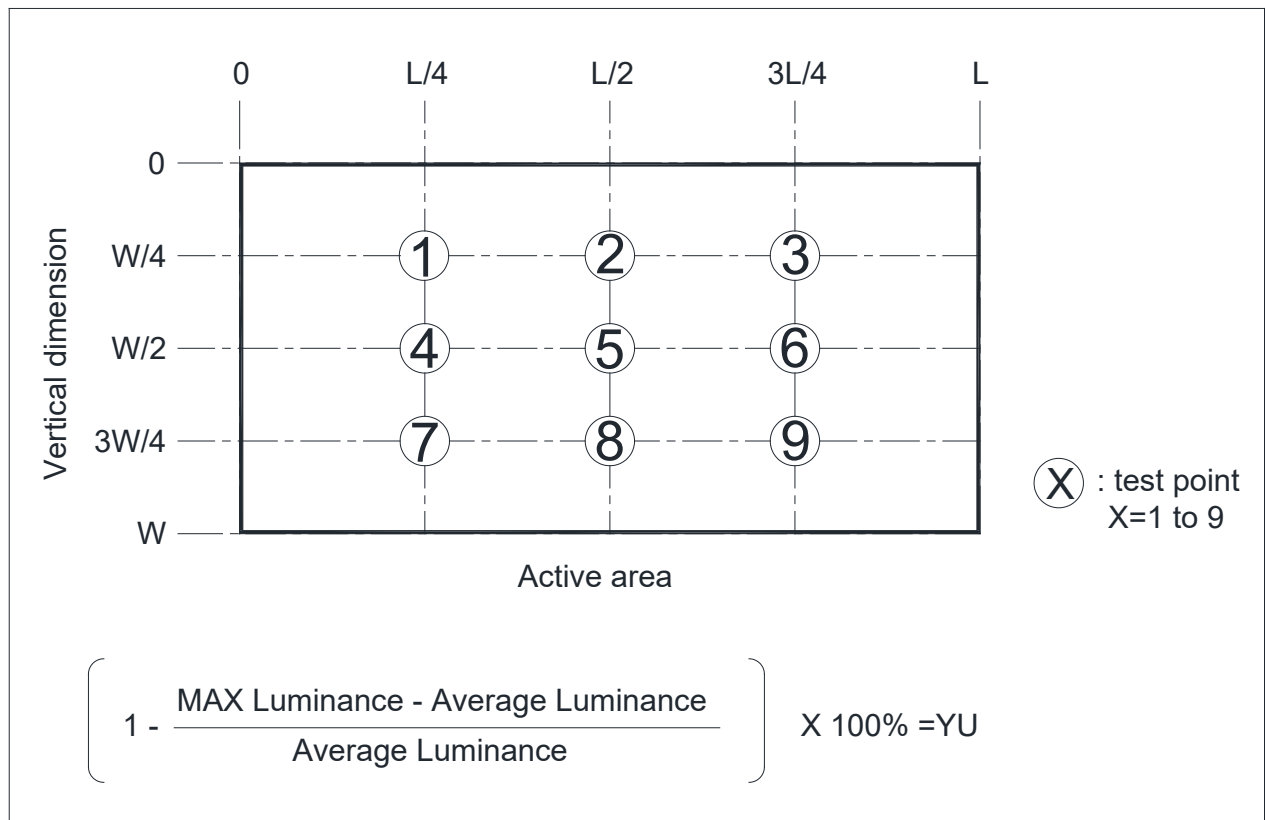
# 9. TIMING SPECIFICATIONS

## 9.1 AC Characteristics

| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| DCLK cycle time | Tcph | 20 | | | ns | |
| DCLK frequency | fclk | | 40 | 50 | MHz | |
| DCLK pulse duty | Tcwh | 40 | 50 | 60 | % | |
| VSD setup time | Tvst | 8 | | | ns | |
| VSD hold time | Tvhd | 8 | | | ns | |
| HSD setup time | Thst | 8 | | | ns | |
| HSD hold time | Thhd | 8 | | | ns | |
| Data setup time | Tdsu | 8 | | | ns | |
| Data hold time | Tdhd | 8 | | | ns | |
| DE setup time | Tesu | 8 | | | ns | |
| DE hold time | Tehd | 8 | | | ns | |
| Horizontal display area | thd | | 800 | | Tcph | |
| HSD period time | th | | 1000 | | Tcph | |
| HSD pulse width | thpw | 1 | 48 | | Tcph | |
| HSD back porch | thb | | 40 | | Tcph | |
| HSD front porch | thfp | | 112 | | Tcph | |
| Vertical display area | tvd | | 600 | | th | |
| VSD period time | tv | | 660 | | th | |
| VSD pulse width | tvpw | | 3 | | th | |
| VSD back porch | tvb | | 39 | | th | |
| VSD front porch | tvfp | | 18 | | th | |

## 9.2 Timing Diagram of Interface Signal
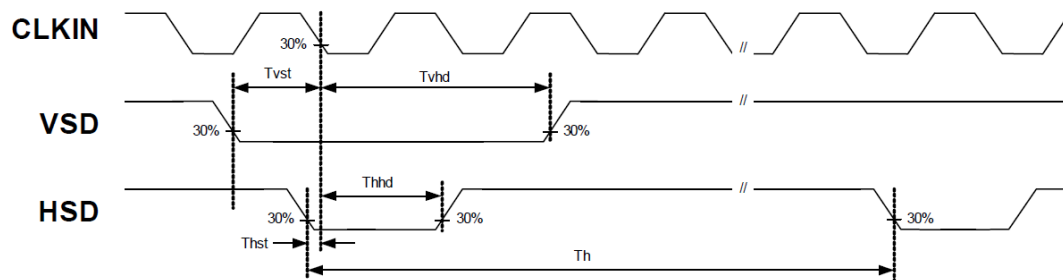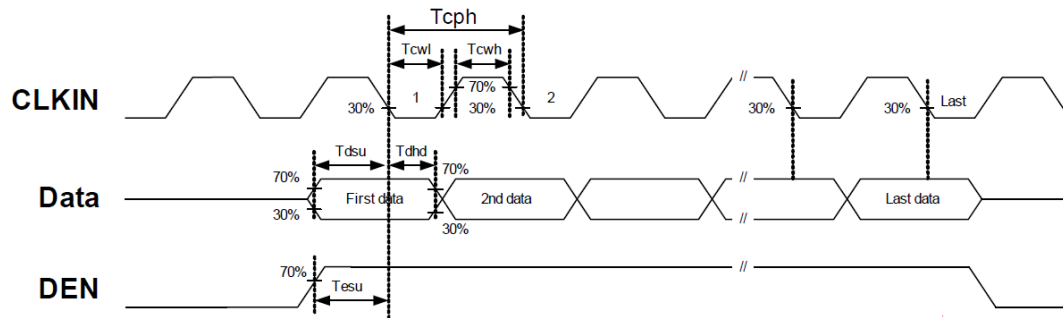


**Sampling clock timing**
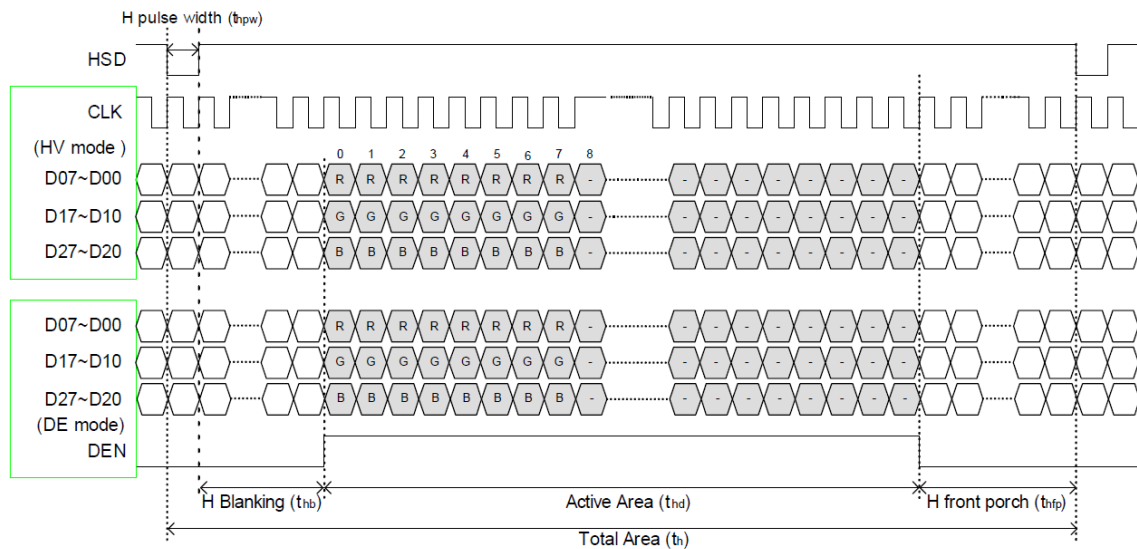


**Horizontal display timing range**
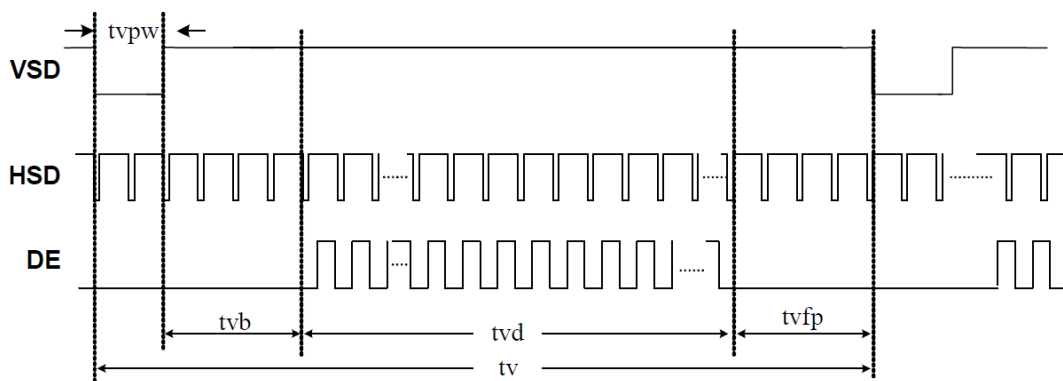


**Vertical timing**

## 9.3 Power Sequence
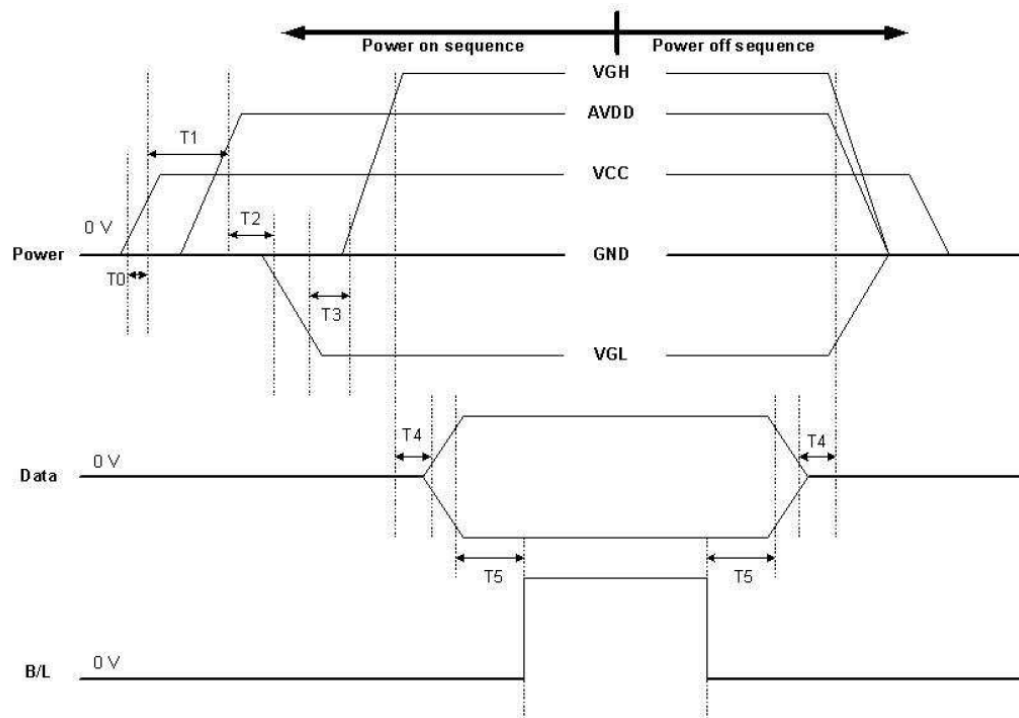


| Item | Min. | Typ. | Max. | Unit |
|------|------|------|------|------|
| T0 | 0.5 | -- | 20 | msec |
| T1 | 16 | | | msec |
| T2 | 0 | | | msec |
| T3 | 20 | | | μsec |
| T4 | 10 | | 50 | msec |
| T5 | 50 | | | msec |
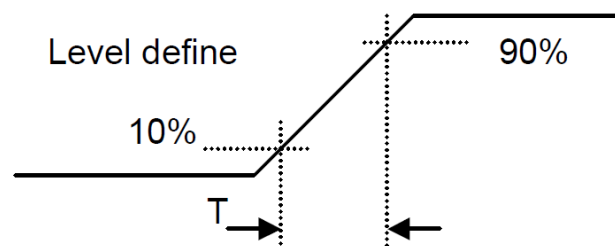


Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L

Power Off Sequence: B/L-> Data -> VGH -> VGL -> AVDD -> VCC

Notes : Data include R0~R7, G0~G7 , B0~B7 , HSD , VSD, DCLK , SHLR , UPDN , DE

MODE , RSTB , STBYB , SHLR ,UPDN , DITH

## 10. RELIABILITY TEST

| ENVIRONMENTAL TEST | | | | |
|---|---|---|---|---|
| NO. | ITEM | CONDITIONS | TIME PERIOD | REMARK |
| 1 | High Temperature Storage | Ta=80℃ | 240Hours | Note 1,3 |
| 2 | Low Temperature Storage | Ta=-30℃ | 240Hours | Note 1,3 |
| 3 | High Temperature and Humidity Storage | Ta=+40℃,90%RH | 240Hours | Note 3 |
| 4 | High Temperature Operation | Ts=70℃ | 240Hours | Note 2,3 |
| 5 | Low Temperature Operation | Ta=-20℃ | 240Hours | Note1,3 |
| 6 | Temperature Cycle Storage | Ta=-20℃ ～ Ts=70℃ (30min)　(30min) | 100CYCLE | Note 2,4 |

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 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

Note 3: Before cosmetic and function test, the product must have enough

recovery time, at least 2 hours at room temperature.

Note 4: Star with cold temperature and end with high temperature.

## 11. LCM INSPECTION STANDARD

Inspection specifications refer AMSON LCM INSPECTION
STANDARD Document.

## 12. PACKAGE INFORMATION

| LCM Model | LCM Qty. in the box | Inner Box Size (mm) | Weight (Kg) | REMARK |
|---|---|---|---|---|
| AM-800600-084A | 50 | 530*430*220 | 14.5±10% | |

## 13.PRECAUTIONS FOR USE

### 13.1 SAFETY

(1)Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.

(2)If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.

(3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

### 13.2 STORAGE CONDITIONS

(1)Store the panel or module in a dark place where the temperature is 23±5°C and the humidity is below 50±20%RH.

(2)Store in anti-static electricity container.

(3)Store in clean environment, free from dust, active gas, and solvent.

(4)Do not place the module near organics solvents or corrosive gases.

(5) Do not crush, shake, or jolt the module.

### 13.3 HANDLING PRECAUTIONS

(1) Avoid static electricity which can damage the CMOS LSI.

(2) The polarizing plate of the display is very fragile. So, please handle it very carefully.

(3) Do not give external shock.

(4) Do not apply excessive force on the surface.

(5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.

(6)  Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent

(7) Do not operate it above the absolute maximum rating.

(8) Do not remove the panel or frame from the module.

(9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.

(10) Wipe off water droplets or oil immediately . If you leave the droplets for a long time, staining and discoloration may occur.

(11) 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, legs or clothes, it must be washed away thoroughly with soap.

### 13.4 WARRANTY

 (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 12 months since the date of shipping out under normal using and storage conditions.