晶采光電科技股份有限公司
AMPIRE CO., LTD.

# Specifications for LCD module

| | |
|---|---|
| **Customer** | |
| **Customer part no.** | |
| **Ampire part no.** | **AM-800480MTZQW-10H** |
| **Approved by** | |
| **Date** | |

☐ **Preliminary Specification**
■ **Formal Specification**

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| Approved by | Checked by | Organized by |
|---|---|---|
| Patrick | Lawlite | Jessica |

This Specification is subject to change without notice.

## RECORD OF REVISION

| Revision Date | Page | Contents | Editor |
|---|---|---|---|
| 2024/09/19 | -- | New Release | Jessica |

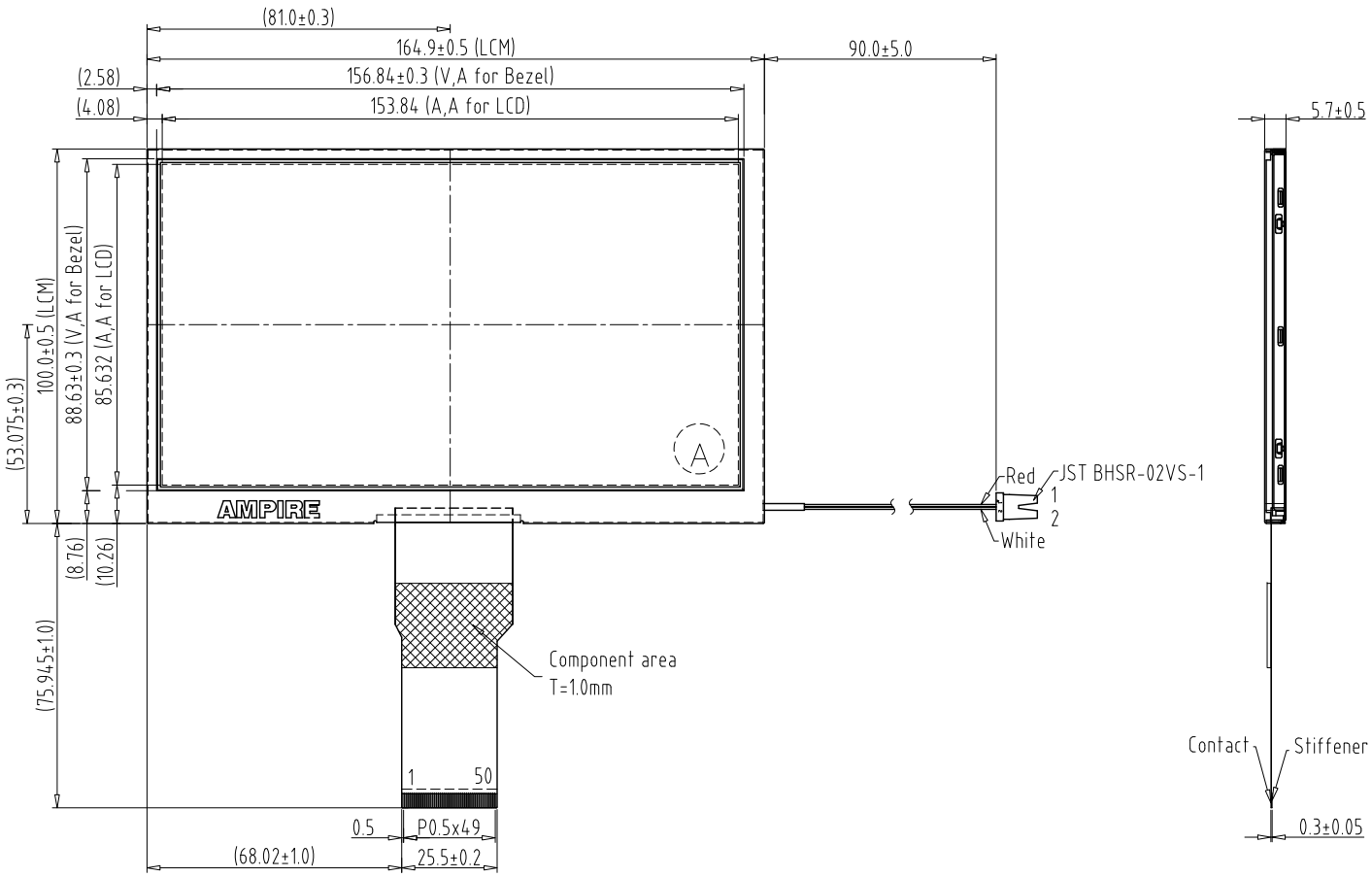
## 1. Features

(1) 3.3 V Logic Power

(2) Green Product (RoHS)

## 2. Specifications

| Items | Specifications | Unit |
|---|---|---|
| Screen Diagonal | 7 | Inch |
| Pixel Format | 800 (H) x RGB x 480 (V) | - |
| Pixel Pitch | 0.1923 (H) x 0.1784 (V) | mm |
| Pixel Arrangement | R.G.B. Vertical Stripe | - |
| Display Mode | Normally Black | - |
| White Luminance | **500(Typ.)** | cd /m2 |
| Contrast Ratio | 1000 : 1 (Typ.) | - |
| Color Depth | 16.7M | - |
| LCM Interface | TTL | - |



## 3. Absolute Max. Ratings

| Item | Symbol | Values | | UNIT | Note |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| Power Supply Voltage | VDD | -0.3 | +4.0 | V | |
| Operation Temperature | TOP | **-20** | **70** | ℃ | |
| Storage Temperature | TST | **-30** | **80** | ℃ | |

Note(1) Permanent damage to the device may occur if maximum values are exceeded functional operation should be restricted to the condition described under normal operating conditions.

Note(2) Ta =25±2℃

# 4. Electrical Characteristics

## 4.1 TFT LCD Module

| Item | Symbol | Min. | Typ. | Max. | Unit. | Note |
|---|---|---|---|---|---|---|
| Power supply voltage | VDD | 3.1 | 3.3 | 3.6 | V | GND=0 |
| | IVCC | - | TBD | -- | mA | AGND=0 |
| | IRUSH | | | TBD | A | |

Note(1) The supply voltage is measured and specified at the interface connector of LCM.

Note(2) The current draw and power consumption specified is for VCC=3.3V at 25℃.

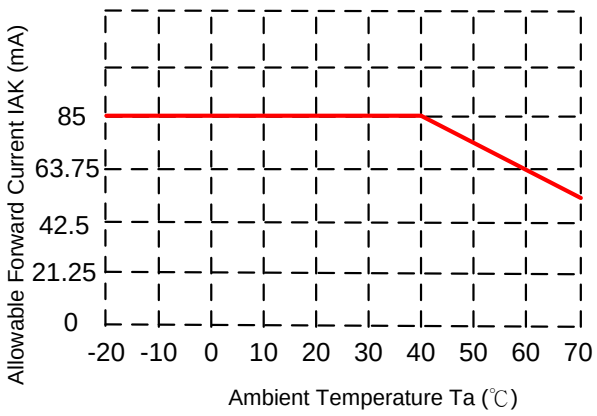
## 5. Backlight Unit

The characteristics of the LED are shown in the following tables.

| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| LED Voltage | VAK | - | 23.1 | - | V | |
| LED Current | IAK | - | 85 | - | mA | (2) |
| Operating LED life time | Hr | - | 30K | - | Hrs | (1)(2) |

Note(1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3℃, typical IAK value indicated in the above table until the brightness becomes less than 50%.

Note(2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IAK=85mA. The LED lifetime could be decreased if operating IAK is larger than 85mA. The constant current driving method is suggested.



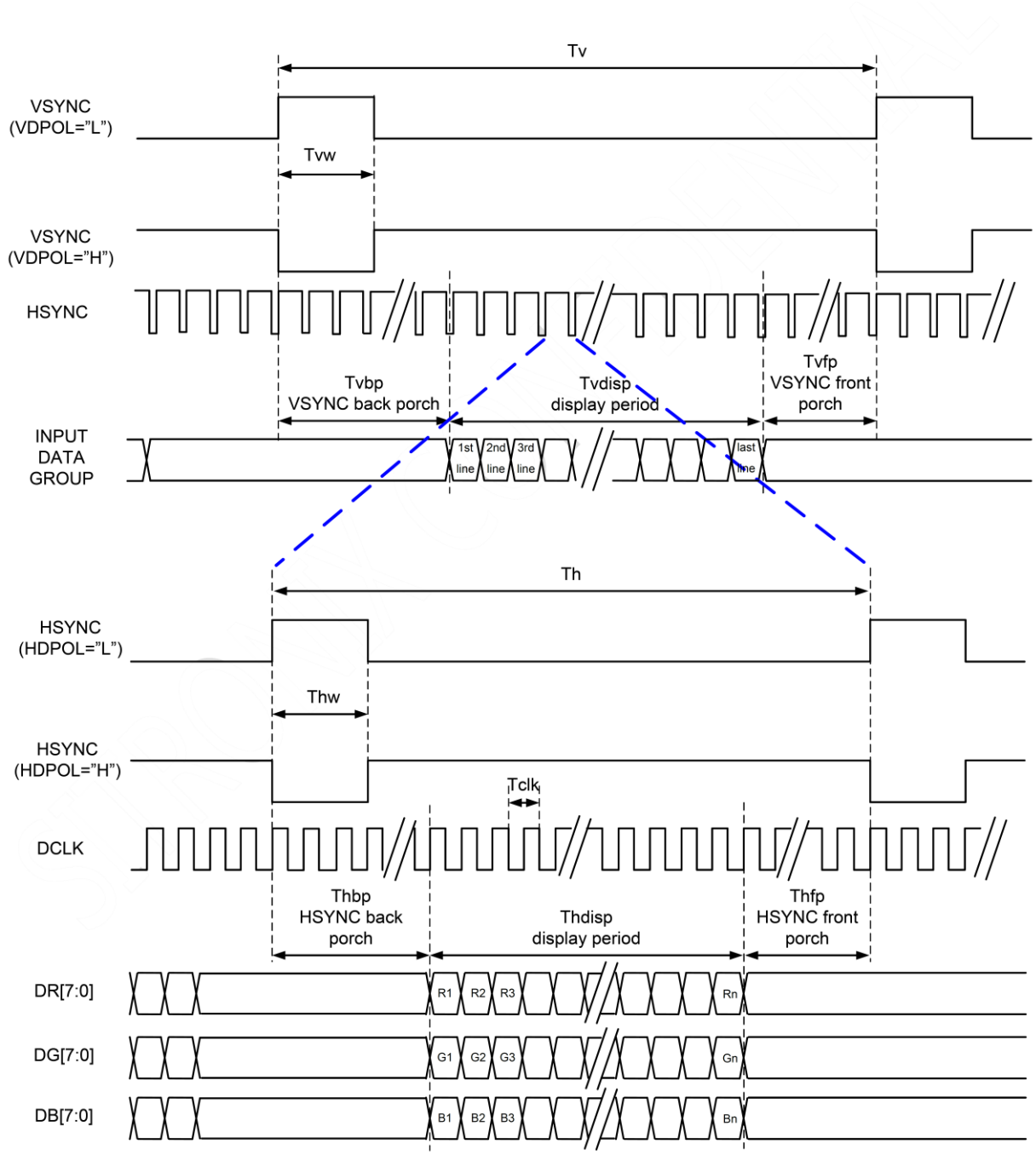
# 6. Interface Timings

## 6.1 RGB Interface

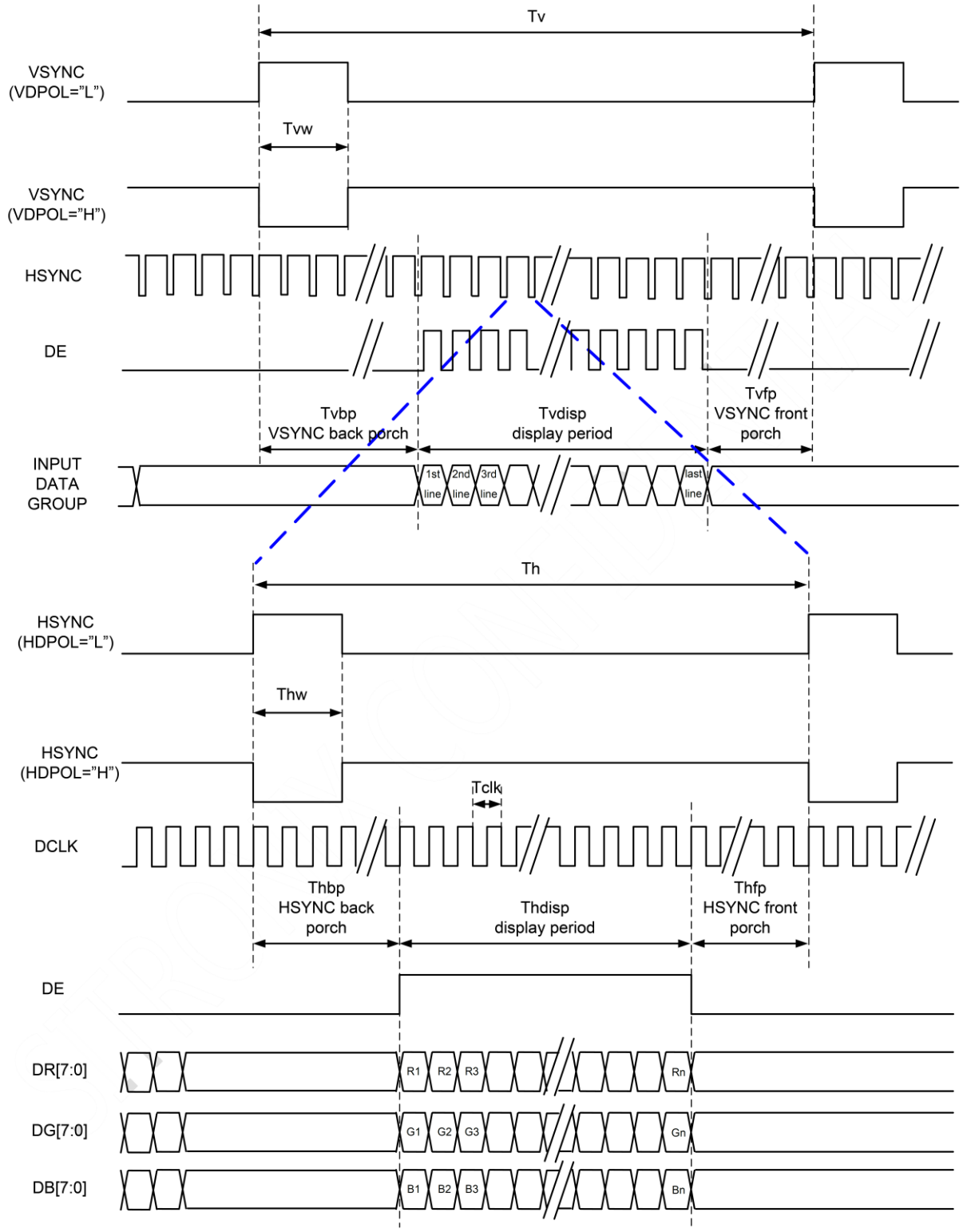
| RGB Mode Selection Table | DCLK | HSYNC | VSYNC | DE |
|---|---|---|---|---|
| SYNC - DE Mode | Input | Input | Input | Input |
| SYNC Mode | Input | Input | Input | GND |
| DE Mode | Input | GND | GND | Input |

*Note: "Input" means these signals are driven by host side.*

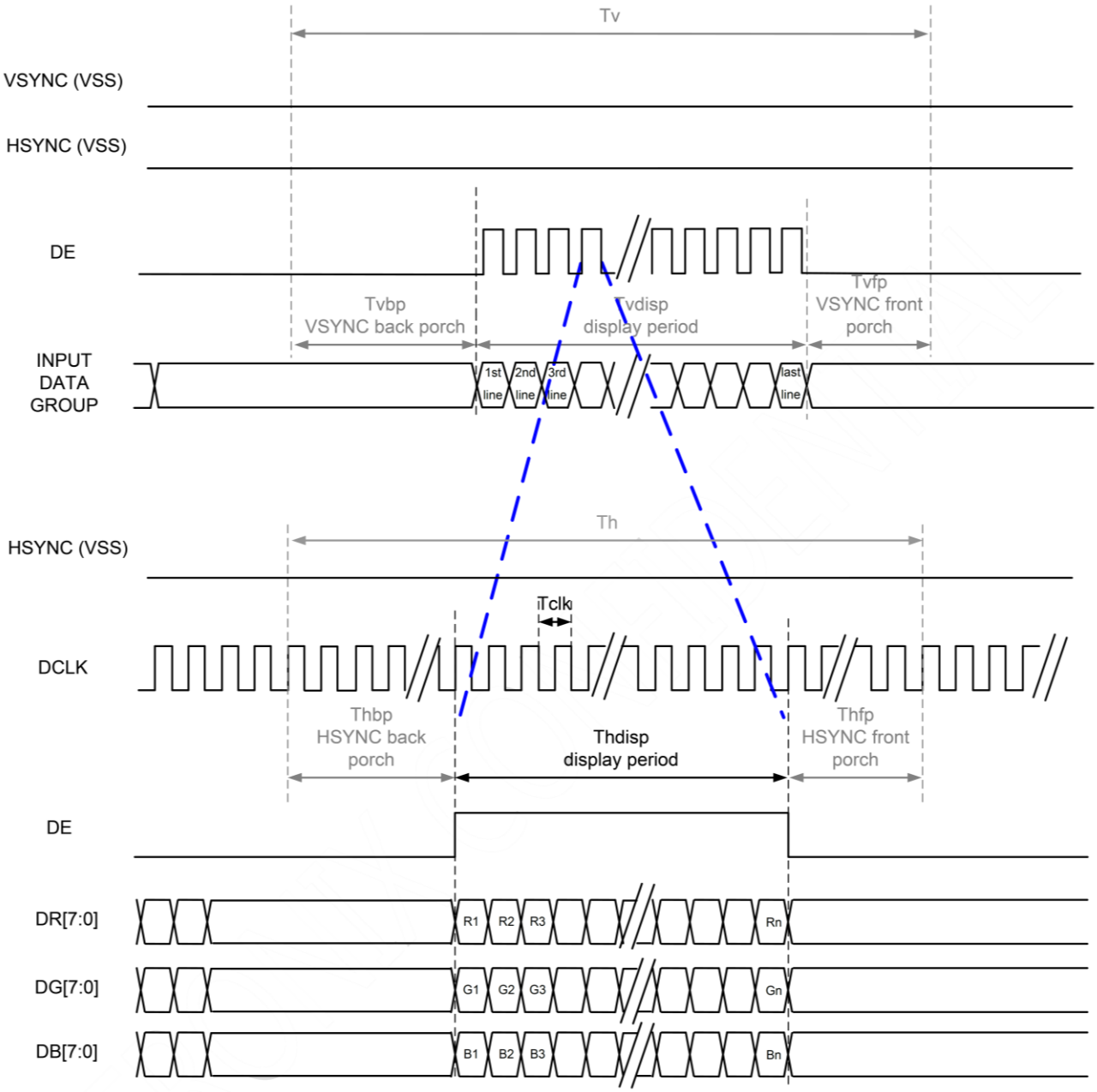
### SYNC Mode



**SYNC-DE Mode**


Tv
VSYNC
(VDPOL="L")
Tvw
VSYNC
(VDPOL="H")
HSYNC
DE
Tvbp
VSYNC back porch
Tvdisp
display period
Tvfp
VSYNC front
porch
INPUT
DATA
GROUP
1st line
2nd line
3rd line
last line
Th
HSYNC
(HDPOL="L")
Thw
HSYNC
(HDPOL="H")
Tclk
DCLK
Thbp
HSYNC back
porch
Thdisp
display period
Thfp
HSYNC front
porch
DE
DR[7:0]
R1
R2
R3
Rn
DG[7:0]
G1
G2
G3
Gn
DB[7:0]
B1
B2
B3
Bn

**DE Mode**


Tv
VSYNC (VSS)
HSYNC (VSS)
DE
Tvbp
VSYNC back porch
Tvdisp
display period
Tvfp
VSYNC front
porch
INPUT
DATA
GROUP
1st
line
2nd
line
3rd
line
last
line
Th
HSYNC (VSS)
Tclk
DCLK
Thbp
HSYNC back
porch
Thdisp
display period
Thfp
HSYNC front
porch
DE
DR[7:0]
R1
R2
R3
Rn
DG[7:0]
G1
G2
G3
Gn
DB[7:0]
B1
B2
B3
Bn

## 6.2 Parallel 24-bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25℃).

| Parallel 24-bit RGB Interface Timing Table | | | | | | | |
|---|---|---|---|---|---|---|---|
| Item | | Symbol | Min. | Typ. | Max. | Unit | Remark |
| DCLK Frequency | | Fclk | 23 | 25 | 27 | MHz | . |
| HSYNC | Period Time | Th | 808 | 816 | 848 | DCLK | |
| | Display Period | Thdisp | | 800 | | DCLK | |
| | Back Porch | Thbp | 4 | 8 | 24 | DCLK | |
| | Front Porch | Thfp | 4 | 8 | 24 | DCLK | |
| | Pulse Width | Thw | 2 | 4 | 8 | DCLK | |
| VSYNC | Period Time | Tv | 496 | 512 | 528 | HSYNC | |
| | Display Period | Tvdisp | | 480 | | HSYNC | |
| | Back Porch | Tvbp | 8 | 16 | 24 | HSYNC | |
| | Front Porch | Tvfp | 8 | 16 | 24 | HSYNC | |
| | Pulse Width | Tvw | 2 | 4 | 8 | HSYNC | |

Note(1) The minimum blanking time depends on the GIP timing of the panel specification.

Note(2) To ensure the compatibility of different panels, it is recommended to use the typical setting.

Note(3) It is necessary to keep Tvbp =16 and Thbp =8 in sync mode. DE mode is unnecessary to keep it.

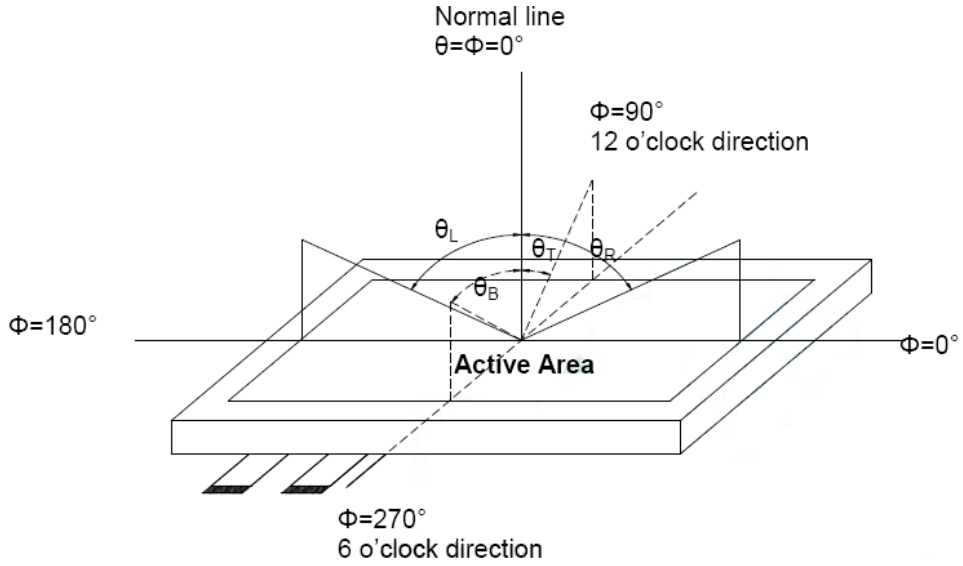
Note(4) The maximum DCLK Frequency is 27MHz.

## 7. Optical Specifications

The optical characteristics are measured under stable conditions as following notes

| Item | Conditions | | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| Viewing Angle （CR>10） | Horizontal | $\theta_L$ | 80 | 85 | - | degree | (1) |
| | | $\theta_R$ | 80 | 85 | - | | |
| | Vertical | $\theta_T$ | 80 | 85 | - | | |
| | | $\theta_B$ | 80 | 85 | - | | |
| Contrast Ratio | Center | | 800 | 1000 | - | - | (2) |
| Response Time | Rising + Falling | | - | 25 | 30 | ms | (4) |
| Color Chromaticity (CIE1931) | Red | x | Typ. -0.05 | TBD | Typ. +0.05 | - | (3) |
| | Red | y | | TBD | | - | |
| | Green | x | | TBD | | - | |
| | Green | y | | TBD | | - | |
| | Blue | x | | TBD | | - | |
| | Blue | y | | TBD | | - | |
| | White | x | | TBD | | - | |
| | White | y | | TBD | | - | |
| White Luminance | Center | | **400** | **500** | - | cd/m^2 | (3) |
| Luminance Uniformity | 9Points | | - | 75 | - | % | (3) |

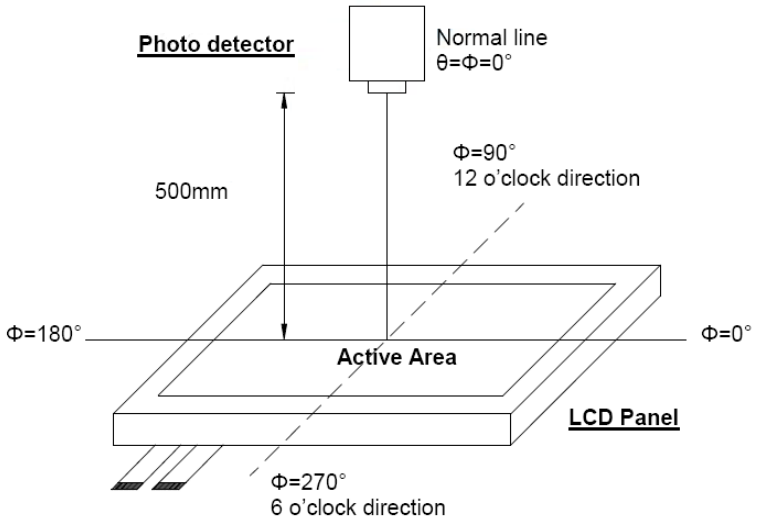
Note(1) Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see Figure1).



Note(2) Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state (see Figure1). Luminance Contrast Ratio (CR) is defined mathematically as CR = Luminance when displaying a white raster / Luminance when displaying a black raster.

Note(3) Definition of optical measurement system

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° / Height: 500mm.)



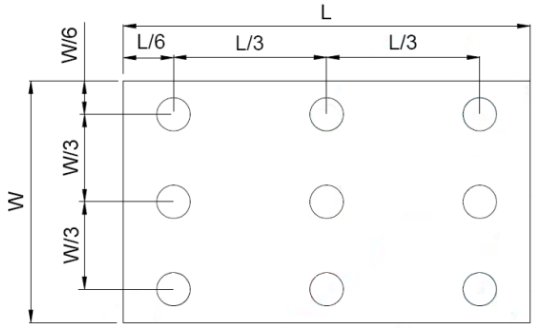

Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to bellow figure).

Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$

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

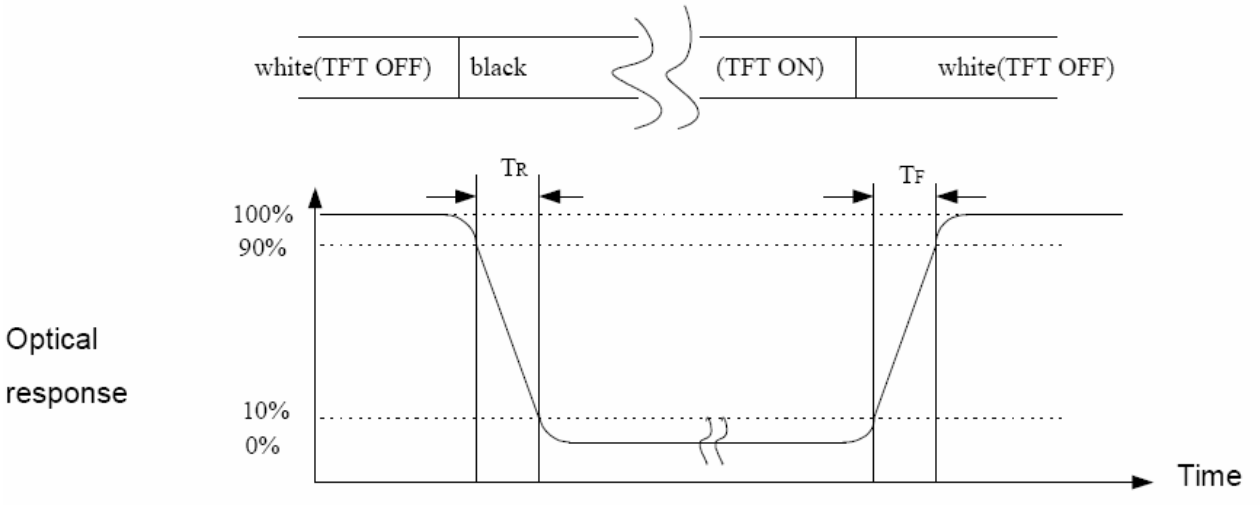



Bmax : The measured maximum luminance of all measurement position.

Bmin : The measured minimum luminance of all measurement position.

Note(4) Definition of Response Time: Sum of TR and TF

The electro-optical response time measurements shall be made as Figure 4 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is TR, and 90% to 10% is TF



# 8. Interface

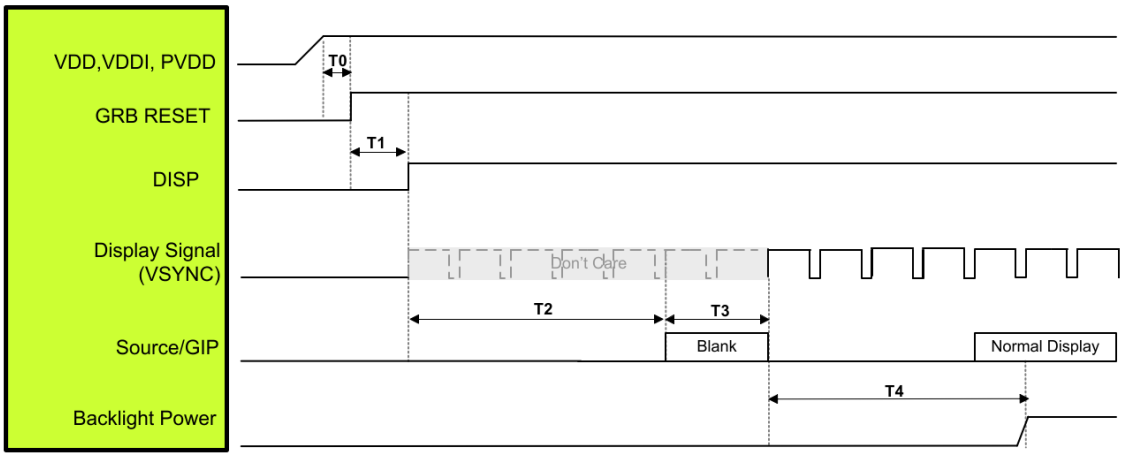
## 8.1 Pin Description

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | NC | No connection |
| 2 | NC | No connection |
| 3 | NC | No connection |
| 4 | NC | No connection |
| 5 | GND | Power ground |
| 6 | GND | Power ground |
| 7 | VDD | Power for Digital circuit |
| 8 | VDD | Power for Digital circuit |
| 9 | RSTB | Global reset pin |
| 10 | UPDN | Up/down selection |
| 11 | SHLR | Right/ left selection |
| 12 | NC | No connection |
| 13 | NC | No connection. |
| 14 | CLKPOL | “L” DCLK polarity: positive<br>“H” DCLK polarity: negative |
| 15 | NC | No connection |
| 16 | DR0 | Red data(LSB) |
| 17 | DR1 | Red data |
| 18 | DR2 | Red data |
| 19 | DR3 | Red data |
| 20 | DR4 | Red data |
| 21 | DR5 | Red data |
| 22 | DR6 | Red data |
| 23 | DR7 | Red data(MSB) |
| 24 | DG0 | Green Data(LSB) |
| 25 | DG1 | Green Data |
| 26 | DG2 | Green Data |
| 27 | DG3 | Green Data |
| 28 | DG4 | Green Data |
| 29 | DG5 | Green Data |
| 30 | DG6 | Green Data |
| 31 | DG7 | Green Data(MSB) |
| 32 | DB0 | Blue Data(LSB) |
| 33 | DB1 | Blue Data |
| 34 | DB2 | Blue Data |

| | | |
|---|---|---|
| 35 | DB3 | Blue Data |
| 36 | DB4 | Blue Data |
| 37 | DB5 | Blue Data |
| 38 | DB6 | Blue Data |
| 39 | DB7 | Blue Data(MSB) |
| 40 | GND | Power ground |
| 41 | DCLK | Sample clock |
| 42 | GND | Power ground |
| 43 | DE | Data Input Enable |
| 44 | HSD | Horizontal Sync Input |
| 45 | VSD | Vertical Sync Input |
| 46 | BIST | BIST=”H” for LCD TEST mode.<br>BIST=”L” for Normal operation. |
| 47 | NC | No connection |
| 48 | NC | No connection. |
| 49 | NC | No connection |
| 50 | NC | No connection. |

## 9. Power On/Off Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown below.




| Symbol | Description | Time | Unit |
|---|---|---|---|
| T0 | System power stability to GRB RESET signal | ≥1 | ms |
| T1 | GRB RESET= “High” to DISP=“High” | ≥10 | ms |
| T2 | DISP=“High” to Source/GIP scan blank | 85 | ms |
| T3 | IC scan blanking signal | ≥33 | ms |
| T4 | Display signal input to Backlight power on (base on Display Signal Frame Rate 60Hz) | ≥100 | ms |

## 10. Reliability Test

The reliability test items and its conditions are shown below.

| Test Item | Test Conditions | Note |
|---|---|---|
| High Temperature Operation | **70±3°C , t=240 hrs** | |
| Low Temperature Operation | **-20±3°C , t=240 hrs** | |
| High Temperature Storage | **80±3°C , t=240 hrs** | 1,2 |
| Low Temperature Storage | **-30±3°C , t=240 hrs** | 1,2 |
| Storage at High Temperature and Humidity | 60°C, 90% RH , 240 hrs | 1,2 |
| Vibration Test (Packing) | Sweep frequency : 10~55~10 Hz/1min<br>Amplitude : 0.75mm<br>Test direction : X.Y.Z/3 axes<br>Duration : 30 min/each axis | 2 |

Note(1) Condensation of water is not permitted on the module.

Note(2) The module should be inspected after 1 hour storage in normal conditions (15-35°C, 45-65%RH).

Note(3) The module shouldn't be tested more than one condition, and all the test conditions are independent.

Note(4) All the reliability tests should be done without protective film on the module.

Definitions of life end point:

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

# 11. General Precaution

## 11.1 Use Restriction

(1) This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

## 11.2 Disassembling or Modification

(1) Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. AMPIRE does not warrant the module, if customers disassemble or modify the module.

## 11.3 Breakage of LCD Panel

(1) If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.
(2) If liquid crystal contacts mouth or eyes, rinse out with water immediately.
(3) If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
(4) Handle carefully with chips of glass that may cause injury, when the glass is broken.

## 11.4 Electric Shock

(1) Disconnect power supply before handling LCD module.
(2) Do not pull or fold the LED cable.
(3) Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

## 11.5 Absolute Maximum Ratings and Power Protection Circuit

(1) Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.
(2) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
(3) It's recommended to employ protection circuit for power supply.

### 11.6 Operation

(1) Do not touch, push or rub the polarizer with anything harder than HB pencil lead.
(2) Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.
(3) When the surface is dusty, please wipe gently with absorbent cotton or other soft material.
(4) Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may cause deformation or color fading.
(5) When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzene or other adequate solvent.

### 11.7 Mechanism

(1) Please mount LCD module by using mounting holes arranged in four corners tightly.
(2)

### 11.8 Static Electricity

(1) Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.
(2) Because LCD modules use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

### 11.9 Strong Light Exposure

(1) The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

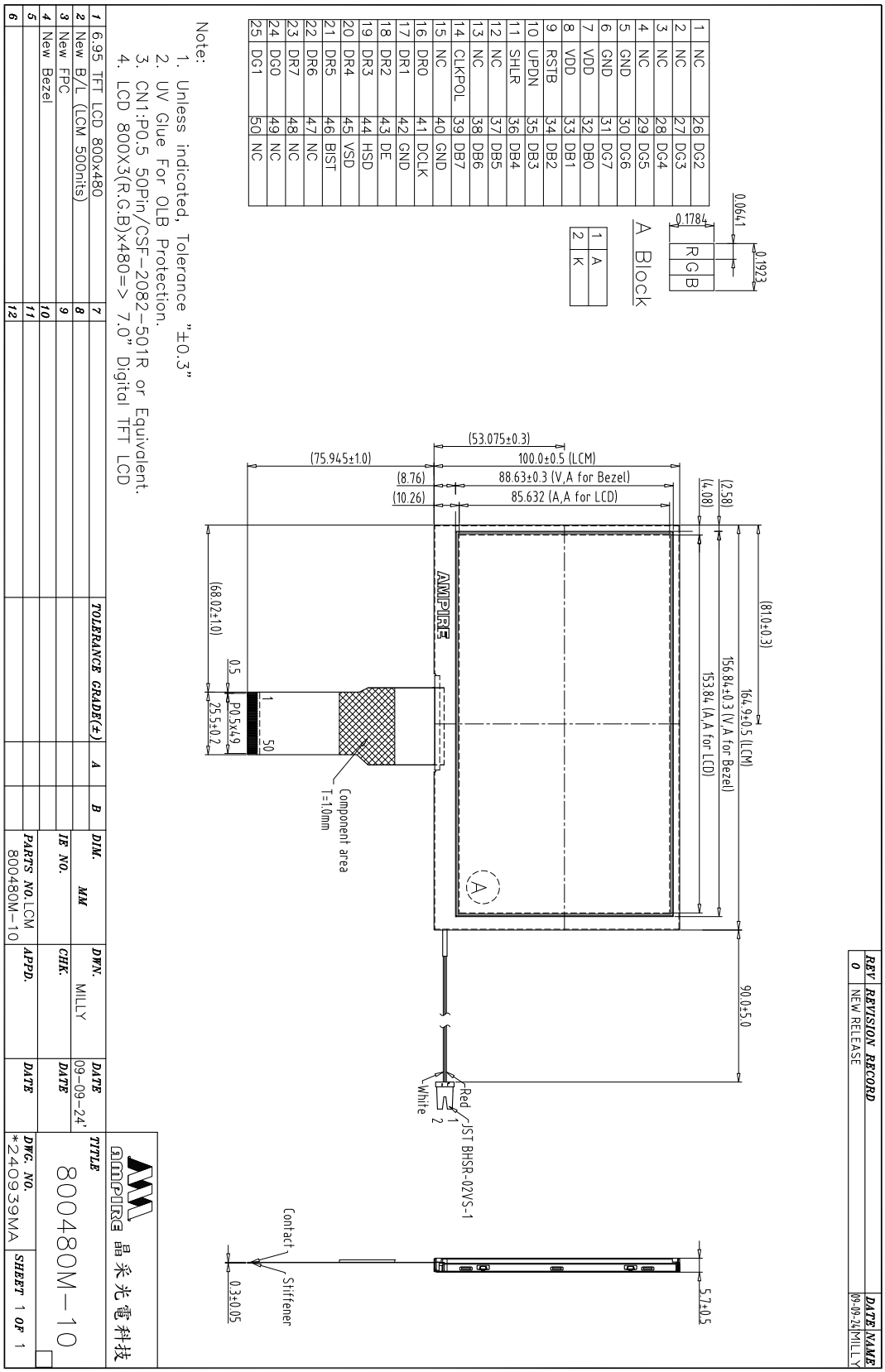
### 11.10 Disposal

(1) When disposing LCD module, obey the local environmental regulations.

### 11.11 Others

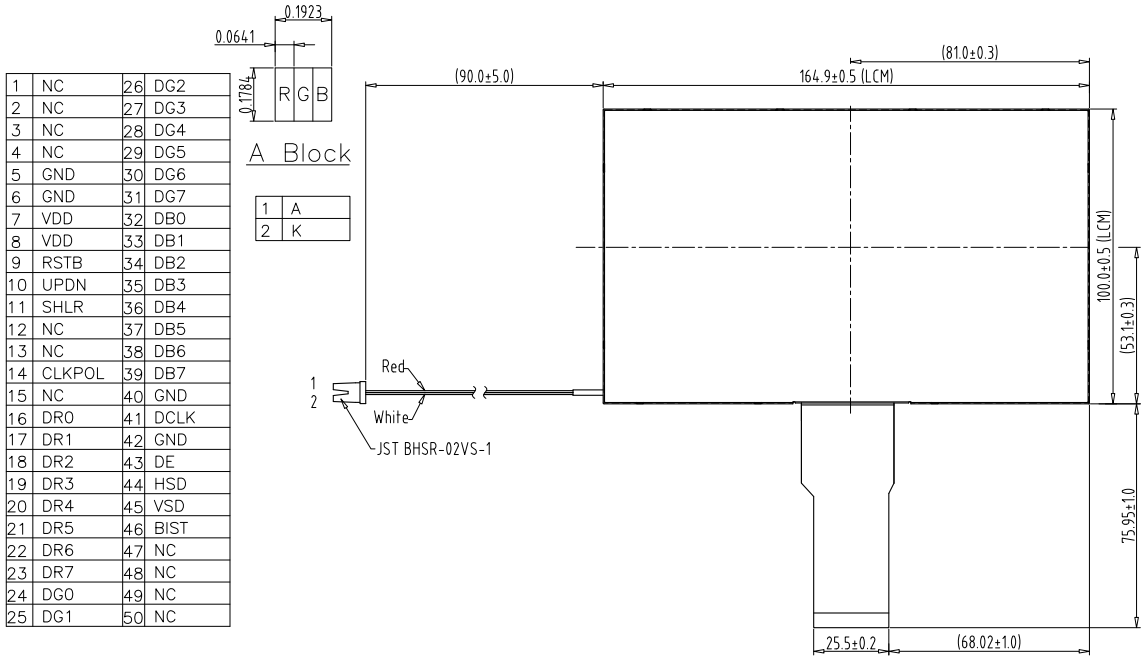
(1) Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.

## 12. Outline Dimension



| REV | REVISION RECORD | DATE | NAME |
|---|---|---|---|
| 0 | NEW RELEASE | 09-09-24 | MILLY |

| | | | |
|---|---|---|---|
| 1 | NC | 26 | DG2 |
| 2 | NC | 27 | DG3 |
| 3 | NC | 28 | DG4 |
| 4 | NC | 29 | DG5 |
| 5 | GND | 30 | DG6 |
| 6 | GND | 31 | DG7 |
| 7 | VDD | 32 | DB0 |
| 8 | VDD | 33 | DB1 |
| 9 | RSTB | 34 | DB2 |
| 10 | UPDN | 35 | DB3 |
| 11 | SHLR | 36 | DB4 |
| 12 | NC | 37 | DB5 |
| 13 | NC | 38 | DB6 |
| 14 | CLKPOL | 39 | DB7 |
| 15 | NC | 40 | GND |
| 16 | DR0 | 41 | DCLK |
| 17 | DR1 | 42 | GND |
| 18 | DR2 | 43 | DE |
| 19 | DR3 | 44 | HSD |
| 20 | DR4 | 45 | VSD |
| 21 | DR5 | 46 | BIST |
| 22 | DR6 | 47 | NC |
| 23 | DR7 | 48 | NC |
| 24 | DG0 | 49 | NC |
| 25 | DG1 | 50 | NC |




Back View

Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1:P0.5 50Pin/CSF-2082-501R or Equivalent.
4. LCD 800X3(R.G.B)x480=> 7.0" Digital TFT LCD

| | | | | TOLERANCE GRADE(±) | A | B | DIM. | DWN. | DATE |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.95 TFT LCD 800x480 | 7 | | | | | MM | MILLY | 09-09-24' |
| 2 | New B/L (LCM 500nits) | 8 | | | | | IE NO. | CHK. | DATE |
| 3 | New FPC | 9 | | | | | | | |
| 4 | New Bezel | 10 | | | | | | | |
| 5 | | 11 | | | | | PARTS NO. LCM-1 800480M-10 | APPD. | DATE |
| 6 | | 12 | | | | | | | |

晶采光電科技

TITLE: 800480M-10

DWG. NO. *240940MA

SHEET 1 OF 1

## 13. Package

**TBD**