



**SPECIFICATION
FOR
LCD MODULE**

**MODULE NO: AFK800480A2-5.0N12NTH
REVISION NO: V03**

Customer's Approval:

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| | SIGNATURE | DATE |
|---------------------------|-----------|------|
| PREPARED BY (RD ENGINEER) | | |
| CHECKED BY | | |
| APPROVED BY | | |

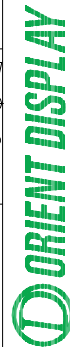
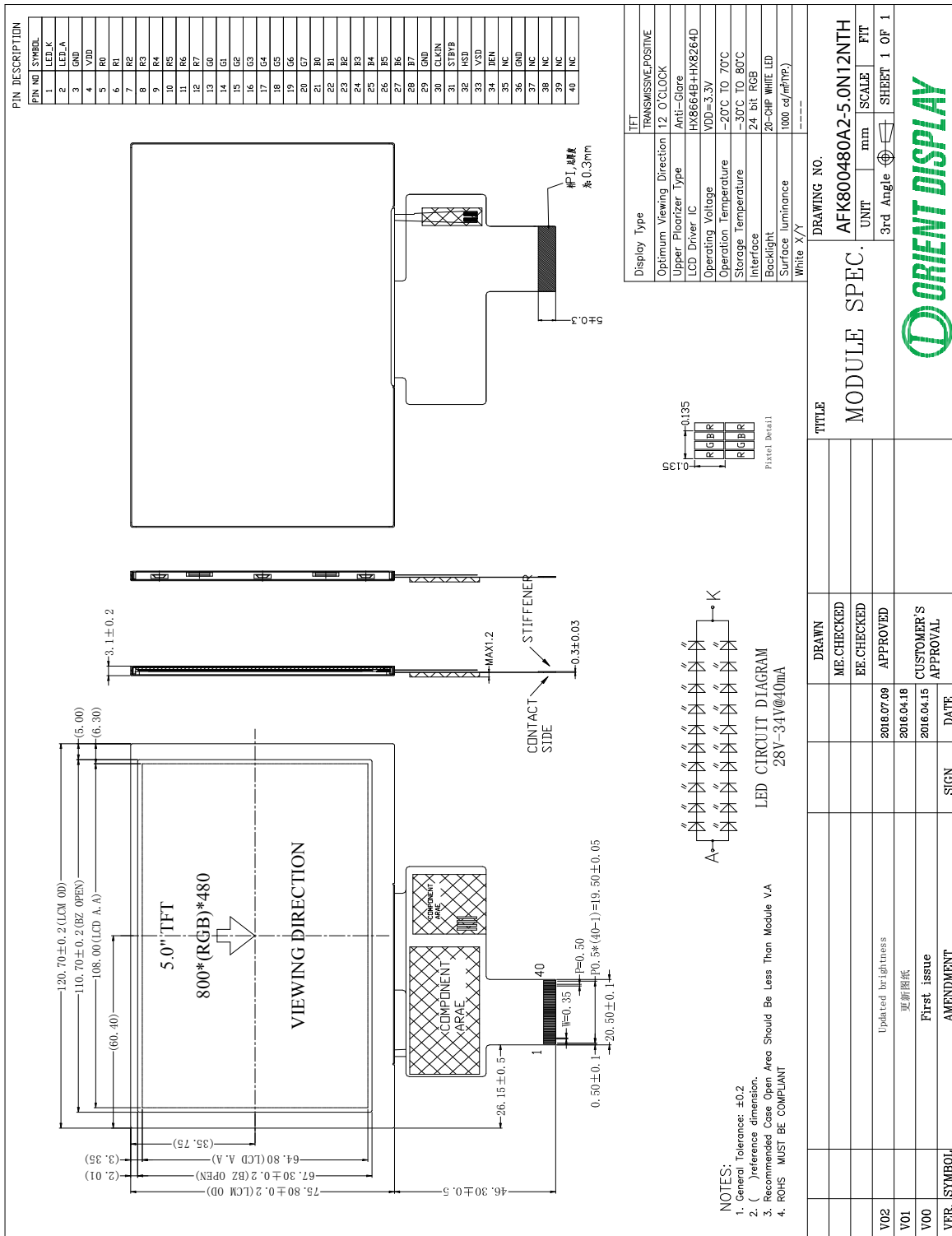
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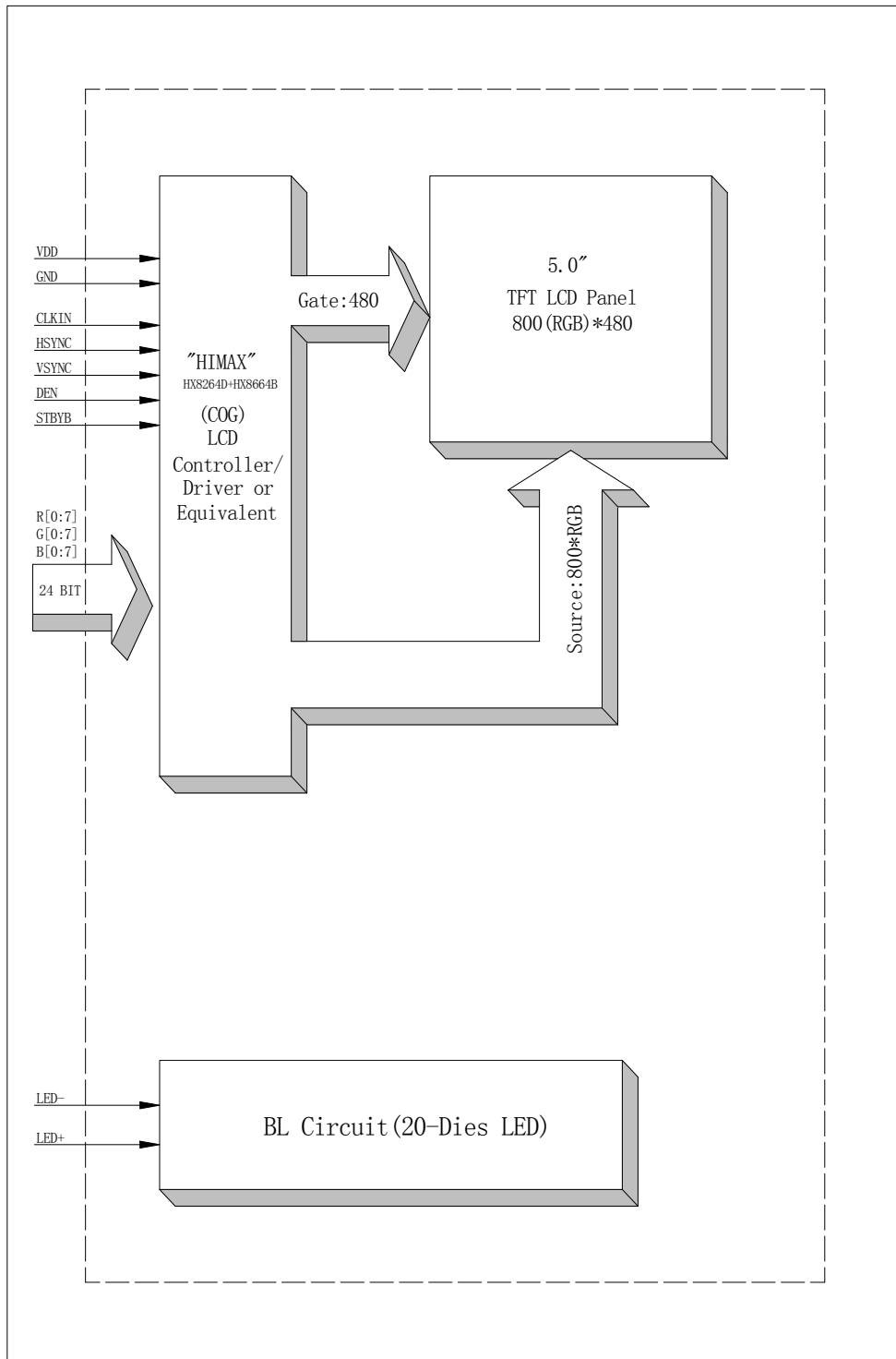
1. General Specification

| Item | Contents | Unit |
|--------------------------------|-------------------|-------------|
| LCD TYPE | TFT/TRANSMISSIVE | |
| MODULE SIZE (W*H*T) | 120.7*75.80*3.10 | MM |
| ACTIVE SIZE (W*H) | 108.00*64.80 | MM |
| PIXEL PITCH (W*H) | 0.135*0.135 | MM |
| NUMBER OF DOTS | 800*480 | |
| DRIVER IC | HX8664B+HX8264D | |
| INTERFACE TYPE | 24-BIT RGB | |
| TOP POLARIZER TYPE | ANTI-GLARE | |
| RECOMMEND VIEWING DIRECTION | 12 | O'CLOCK |
| GRAY SCALE INVERSION DIRECTION | 6 | O'CLOCK |
| BACKLIGHT TYPE | 20-DIES WHITE LED | |
| TOUCH PANEL TYPE | WITHOUT | |

2. Mechanical Drawing



3. Block Diagram



4. Interface Pin Function

| Pin No. | Symbol | Description |
|---------|--------|---|
| 1 | LED- | Cathode of LED backlight |
| 2 | LED+ | Anode of LED backlight |
| 3 | GND | Power ground |
| 4 | VDD | Power supply |
| 5~12 | R0~R7 | 8-bit digital Red data input, |
| 13~20 | G0~G7 | 8-bit digital Green data input, |
| 21~28 | B0~B7 | 8-bit digital Blue data input, |
| 29 | GND | Power ground |
| 30 | CLKIN | Clock signal; latching data at the falling edge |
| 31 | STBYB | Display control / standby mode selection. STBYB = "Low" : Standby; STBYB = "High" : Normal display(Default) |
| 32 | HSD | Horizontal sync signal; negative polarity |
| 33 | VSD | Vertical sync signal; negative polarity |
| 34 | DEN | Data input enable. Active High to enable the data input. |
| 35 | NC | No connection. |
| 36 | GND | Power ground |
| 37 | NC | No connection. |
| 38 | NC | No connection. |
| 39 | NC | No connection. |
| 40 | NC | No connection. |

5. Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|---------------------------|------------------|------|-----|------|
| Supply voltage for analog | VDD | -0.3 | 5 | V |
| Supply voltage for logic | VDD | -0.5 | 5 | V |
| Supply current (One LED) | I _{LED} | | 40 | mA |
| Operating temperature | T _{OP} | -20 | +70 | °C |
| Storage temperature | T _{ST} | -30 | +80 | °C |

Note: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the 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. Electrical Characteristics

6.1 Input Power

| Item | Symbol | Min | Typ. | Max | Unit | Applicable terminal |
|---------------------------|------------------|---------|------|--------|------|---------------------|
| Supply Voltage for Analog | VDD | 3.0 | 3.3 | 3.6 | V | |
| Supply Voltage for Logic | VDD | 3.0 | 3.3 | 3.6 | V | |
| Input Voltage | V _{IL} | GND | - | 0.2VDD | V | |
| | V _{IH} | 0.8 VDD | - | VDD | | |
| Input leakage Current | I _{LKG} | - | | - | μA | |

6.2 Backlight Driving Conditions

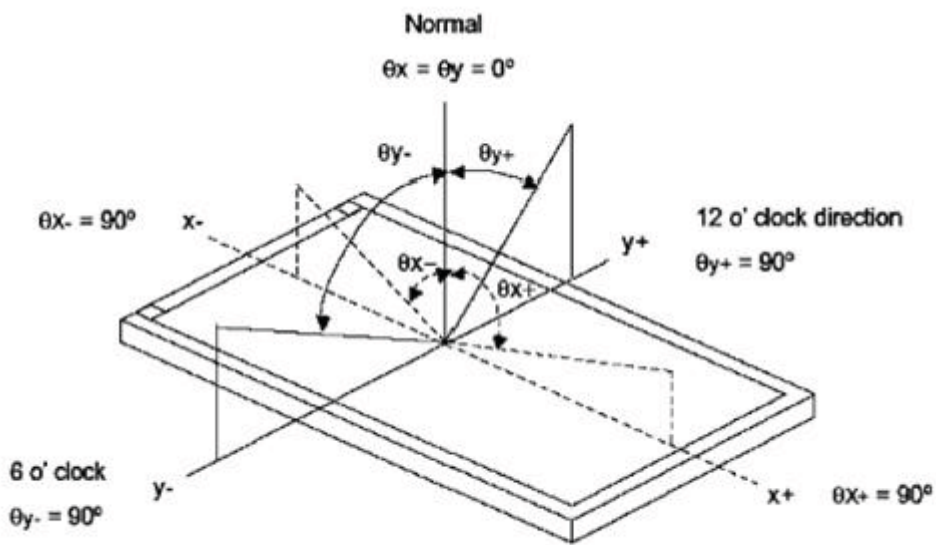
| Item | Symbol | Value | | | Unit | Remark |
|---------------------------|----------------|--------|--------|------|------|----------------------|
| | | Min. | Typ. | Max. | | |
| Voltage for LED Backlight | V _F | 28 | 32 | 34 | V | I _L =40mA |
| Current for LED Backlight | I _L | | 40 | | mA | |
| Power Consumption | P | | 1.28 | | W | |
| LED Life Time | | 30,000 | 50,000 | | Hr | Note |

Note: Brightness to be decreased to 50% of the initial value at ambient temperature TA=25°C

7. Optical Characteristics

| ITEM | SYMBOL | CONDITIONS | SPECIFICATIONS | | | UNIT | NOTE |
|----------------------------|------------------|---------------------|-------------------------|-------|-------|-----------------|------|
| | | | MIN | TYP. | MAX | | |
| Luminance | L | $I_L = 40\text{mA}$ | 800 | 1000 | 1200 | Cd/m^2 | |
| Contrast Ratio | CR | $\theta = 0^\circ$ | | 500 | | | |
| Response Time | T_{ON} | 25°C | | 20 | | ms | |
| | T_{OFF} | | | | | | |
| CIE Color Coordinate | Red | X_R | Viewing normal angle | | | | |
| | | Y_R | | | | | |
| | Green | X_G | | | | | |
| | | Y_G | | | | | |
| | Blue | X_B | | | | | |
| | | Y_B | | | | | |
| | White | X_W | | 0.315 | 0.335 | 0.355 | |
| | | Y_W | | 0.352 | 0.372 | 0.392 | |
| Viewing Angle | Hor. | θ_{X+} | $\text{CR} \geq 10$ | 60 | 70 | Degree | |
| | | θ_{X-} | | 60 | 70 | | |
| | Ver. | θ_{Y+} | | 40 | 50 | | |
| | | θ_{Y-} | | 60 | 70 | | |
| Uniformity | Un | | | 75 | 80 | % | |

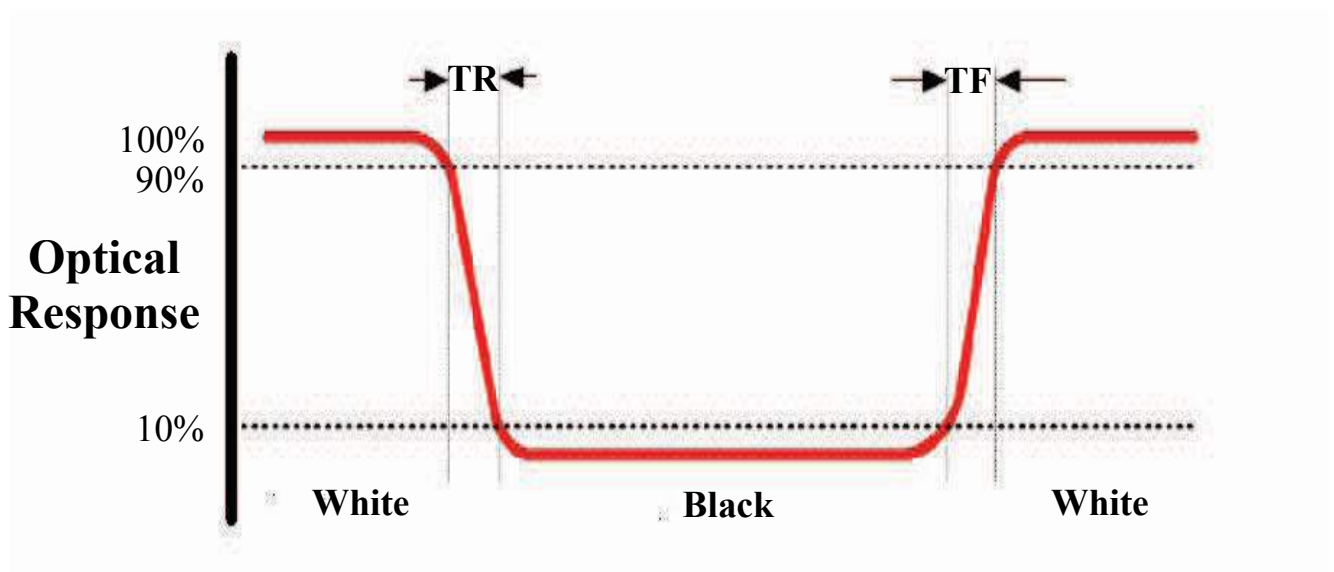
Note 1: Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Luminance of white state}}{\text{Luminance of black state}}$$

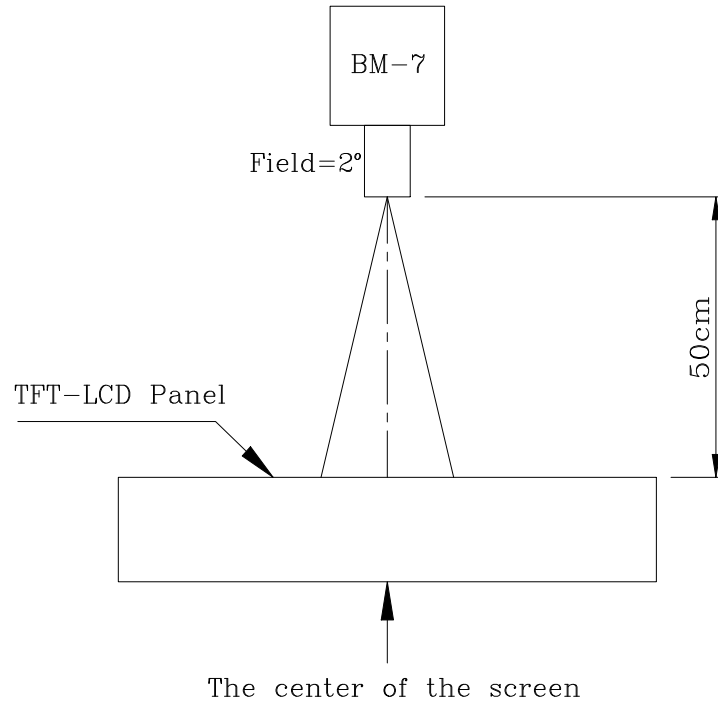
Note 3: Definition of Response Time (T_r, T_f)



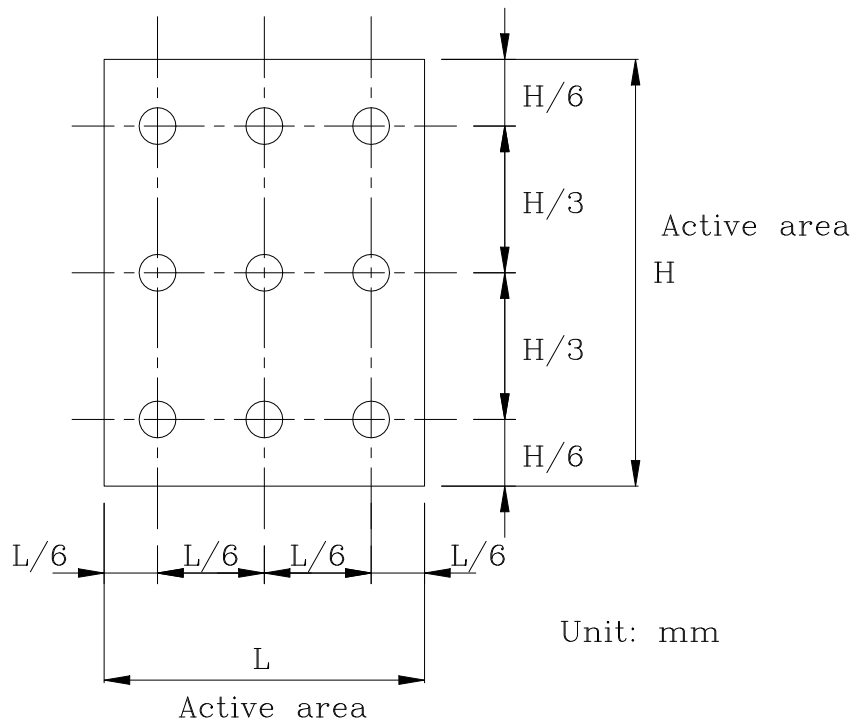
Note 4: Definition of Luminance

①The Brightness Test Equipment Setup

Field=2° (As measuring “black” image, field=2° is the best testing condition)



②The Brightness Test Point Setup



8. Timing Characteristics

8.1 RGB Mode Timing Diagram

- Horizontal timing

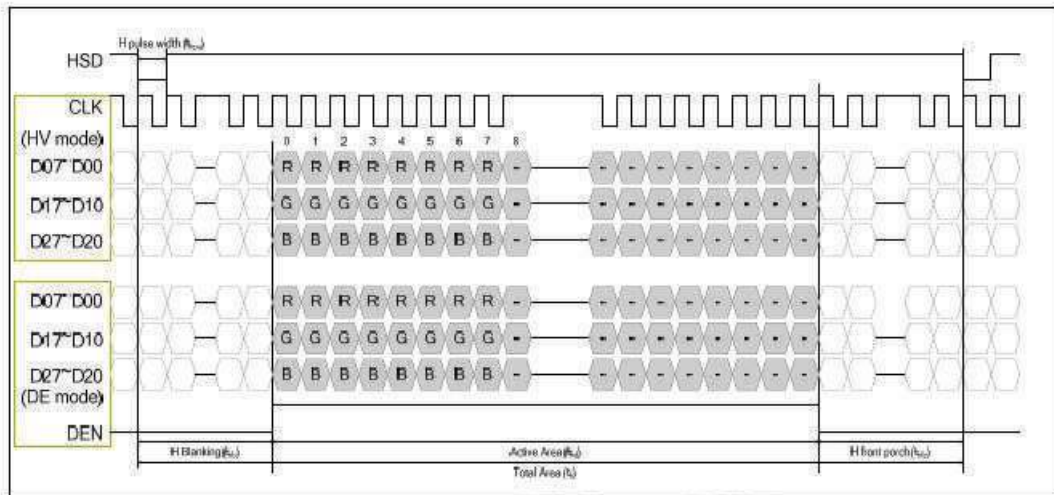


Figure 11. 1: Horizontal Input Timing Diagram

- Vertical timing

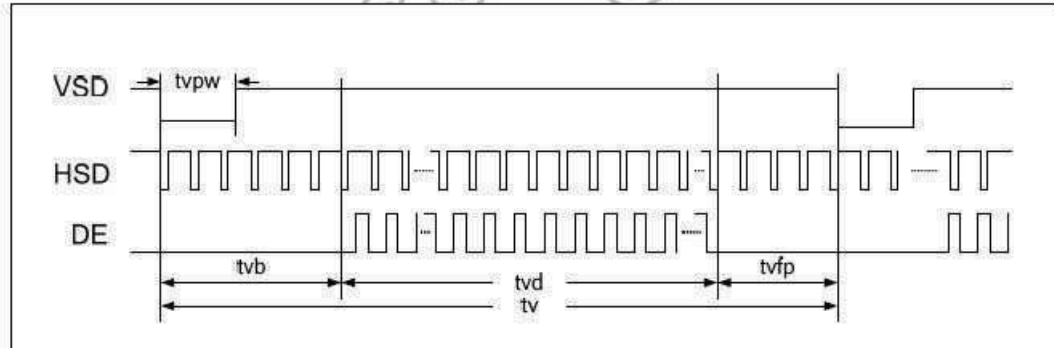


Figure 11. 2: Vertical Input Timing Diagram

8.2 RGB Timing Table

- Horizontal timing

| Parameter | Symbol | Spec. | | | Unit |
|--------------------------|--------|-------|------|------|------|
| | | Min. | Typ. | Max. | |
| Horizontal Display Area | thd | 800 | | | DCLK |
| DCLK frequency | fclk | - | 30 | 50 | MHz |
| One Horizontal Line | th | 862 | 1056 | 1200 | DCLK |
| HS pulse width | thpw | 1 | - | 40 | DCLK |
| HS Back Porch (Blanking) | thb | 46 | | | DCLK |
| HS Front Porch | thfp | 16 | 210 | 354 | DCLK |
| DE mode Blanking | th-thd | 85 | 256 | 400 | DCLK |

- Vertical timing

| Parameter | Symbol | Spec. | | | Unit |
|--------------------------|--------|-------|------|------|----------------|
| | | Min. | Typ. | Max. | |
| Vertical Display Area | tvd | 480 | | | T _H |
| VS period time | tv | 513 | 525 | 650 | T _H |
| VS pulse width | tvpw | 3 | - | 20 | T _H |
| VS Back Porch (Blanking) | tvb | 23 | | | T _H |
| VS Front Porch | tvfp | 7 | 22 | 147 | T _H |
| DE mode Blanking | tv-tvd | 30 | 45 | 170 | T _H |

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--------------------------------|--------|------|------|------|-------|---------------|
| CLKIN Frequency | Fclk | - | 40 | 50 | MHz | VDD=3.0V~3.6V |
| CLKIN Cycle Time | Tclk | 20 | 25 | - | ns | - |
| CLKIN Pulse Duty | Tcwh | 40 | 50 | 60 | % | Tclk |
| Time from HSD to Source Output | Thso | 64 | | | CLKIN | - |
| Time from HSD to LD | Thld | 64 | | | CLKIN | - |
| Time from HSD to STV | Thstv | 2 | | | CLKIN | - |
| Time from HSD to CKV | Thckv | 20 | | | CLKIN | - |
| Time from HSD to OEV | Thoev | 4 | | | CLKIN | - |
| LD Pulse Width | Twld | 10 | | | CLKIN | - |
| CKV Pulse Width | Twckv | 66 | | | CLKIN | - |
| OEV Pulse Width | Twoev | 74 | | | CLKIN | - |

9. Standard Specification for Reliability

9.1 Standard Specification for Reliability of LCD Module

| No. | Item | Description | Remarks |
|-----|-----------------------------|---|---|
| 01 | High temperature operation | The sample should be allowed to stand at 70°C for 240 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours. | Note 1 IEC60068-2-2, GB2423.2-89 |
| 02 | Low temperature operation | The sample should be allowed to stand at -20°C for 240 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours. | Note2 IEC60068-2-1 GB2423.1-89 |
| 03 | High temperature storage | The sample should be allowed to stand at 80°C for 240 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours. | IEC60068-2-2 GB2423.2-89 |
| 04 | Low temperature storage | The sample should be allowed to stand at -30°C for 240 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours. | IEC60068-2-1 GB/T2423.1-89 |
| 05 | Moisture storage | The sample should be allowed to stand at 60°C,90%RH MAX for 240 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours. | IEC60068-2-1 GB/T2423.3-2006 |
| 06 | Thermal shock storage | The sample should be allowed to stand the following 10 cycles : -30°C for 30 minutes → normal temperature for 5 minutes → +80°C for 30 minutes → normal temperature for 5 minutes, as one cycle. | Start with cold temperature,end with high temperature IEC60068-2-14, GB2423.22-87 |
| 07 | Packing vibration | Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm Sweep time: 12 min X,Y,Z 2 hours for each direction. | IEC61000-2-6 GB/T2423.5-1995 |
| 08 | Packing drop test | According to ASTM-D-5327. | IEC60068-2-32 GB/T2423.8-1995 |
| 09 | Electrical Static Discharge | Air: ±8KV 150pF/330Ω 5 times | IEC61000-4-2 GB/T17626.2-1998 |
| | | Contact: ±4KV 150pF/330Ω 5 times | |

- Note:1.Ts is the temperature of panel's surface.
2.Ta is the ambient temperature of sample.
3.Sample size for each test item is 3~5pcs.

10. General Precautions

10.1. Safety

- Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

10.2. Handling

- The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
- The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
- To avoid contamination on the display surface, do not touch the module surface with bare hands.
- Keep a space so that the LCD panels do not touch other components.
- Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
- Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
- Do not leave module in direct sunlight to avoid malfunction of the ICs.

10.3. Static Electricity

- Be sure to ground module before turning on power or operating module.
- Do not apply voltage which exceeds the absolute maximum rating value.

10.4. Storage

- Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
- Do not store the module in surroundings containing organic solvent or corrosive gas.
- Store the module in an anti-electrostatic container or bag.

10.5. Cleaning

- Do not wipe the polarizer with dry cloth. It might cause scratch.
- Only use a soft cloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

11. Packing Method

| No. | Item | Dimensions(mm) | Quantity | Remark |
|-----|------------|---|----------|--------|
| 1 | LCM Module | 120.7*75.80*3.10 | 100PCS | |
| 2 | CARTON | 385*315*227 (include 100pcs products/one carton) | 1PCS | |