



SPECIFICATION



P0840VGF1MA01

8.4" - VGA – LVDS

Version: 1.2

Date: 15.12.2023

Note: This specification is subject to change without prior notice

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1. Summary

1.1 General Description

This is a 8.4 inch a-Si TFT-LCD module with Normal- Black technology. It is composed of a TFT-LCD panel, a driver circuit, a PCB, and a LED backlight unit.

1.2 Features

- Ultra-wide viewing angle
- High luminance
- Interface: RGB 6bits
- Anti- glare Surface treatment
- Acquisition product for UL62368-1/CSA C22.2 No.62368-1-03 (File number: TBD)
- Compliant with the European RoHS Directive (2011/65/EU) and Delegated Directive (2015/863/EU, Amending Annex II of 2011/65/EU)

2. General Specifications

| | Feature | Spec | Unit |
|-----------------------------------|--------------------------------|-----------------------------------|-------------------|
| Display Spec | Size | 8.4 inches | |
| | Resolution | 640(RGB)x480 | |
| | Pixel Pitch | 0.267*0.267 | mm |
| | TFT Active Area | 170.88*128.16 | mm |
| | Technology Type | a-Si | |
| | Pixel Configuration | R.G.B Vertical Stripe | |
| | Display Mode | SFT | |
| | Surface Treatment | Anti-Glare | |
| | Viewing Direction | ALL | |
| | Gray Scale Inversion Direction | No Gray Scale Inversion Direction | |
| Mechanical Characteristics | LCM (W x H x D) | 200*152*8.8 | mm |
| | Weight | TBD | g |
| Optical Characteristics | Luminance | 800 | cd/m ² |
| | Contrast Ratio | 1000 | |
| | NTSC | 50 | % |
| | Viewing Angle | 88/88/88/88 | degree |
| Electrical Characteristics | Interface | RGB 6 bits | |
| | Color Depth | 262K | color |
| | Power Consumption | LCD:TBD Backlight:2270 | mW |

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

| Connector Information | |
|-----------------------|-----------------------------|
| LCD Module connector | MSAK24025P40 (TBD) |
| Matching connector | 20453-240T-03 or equivalent |

Table 3.1.1 Connector information

| No | Symbol | I/O | Description | Comment |
|----|--------|-----|-------------------------------|---------------------------------|
| 1 | GND | P | Ground | - |
| 2 | CLK | I | Dot clock | - |
| 3 | Hsync | I | Horizontal synchronous signal | - |
| 4 | Vsync | I | Vertical synchronous signal | |
| 5 | GND | P | Ground | |
| 6 | R0 | I | Red data | |
| 7 | R1 | I | Red data | |
| 8 | R2 | I | Red data | |
| 9 | R3 | I | Red data | |
| 10 | R4 | I | Red data | |
| 11 | R5 | I | Red data | |
| 12 | GND | P | Ground | |
| 13 | G0 | I | Green data | |
| 14 | G1 | I | Green data | |
| 15 | G2 | I | Green data | |
| 16 | G3 | I | Green data | |
| 17 | G4 | I | Green data | |
| 18 | G5 | I | Green data | |
| 19 | GND | P | Ground | |
| 20 | B0 | I | Blue data | |
| 21 | B1 | I | Blue data | |
| 22 | B2 | I | Blue data | |
| 23 | B3 | I | Blue data | |
| 24 | B4 | I | Blue data | |
| 25 | B5 | I | Blue data | |
| 26 | GND | P | Ground | |
| 27 | DE | I | Selection of DE / Fixed mode | |
| 28 | VCC | P | Power supply | |
| 29 | VCC | P | Power supply | |
| 30 | MODE | I | Select DE or SYNC mode | High: SYNC Mode Low or |

| | | | | |
|----|-----|---|---|---------------|
| | | | | Open: DE Mode |
| 31 | DPS | I | DPS = "Low" or "Open" : Normal scan; DPS = "High" : Reverse scan | |
| 32 | NC | | Not Connect | Note1 |
| 33 | NC | | Not Connect | Note1 |
| 34 | NC | | Not Connect | Note1 |
| 35 | NC | | Not Connect | |
| 36 | NC | | Not Connect | |
| 37 | NC | | Not Connect | |
| 38 | NC | | Not Connect | |
| 39 | NC | | Not Connect | |
| 40 | NC | | Not Connect | |

Table 3.1.2 Pin Assignment for LCD Interface

Note1: I/O definition: I---Input, P---Power/Ground

Note2: All of the GND pins should be connected to the system ground.

3.2 CN2 Pin assignment (Back Light)

| Connector Information | |
|-----------------------|------------------------|
| LCD Module connector | MS24011P8RA (TBD) |
| Matching connector | P24011P8 or equivalent |

Table 3.2.1 Connector information

| No | Symbol | I/O | Description |
|----|--------|-----|-----------------------------------|
| 1 | LEDA1 | P | LED driving anode (high voltage) |
| 2 | LEDK1 | P | LED driving cathode (low voltage) |
| 3 | LEDA2 | P | LED driving anode (high voltage) |
| 4 | LEDK2 | P | LED driving cathode (low voltage) |
| 5 | LEDA3 | P | LED driving anode (high voltage) |
| 6 | LEDK3 | P | LED driving cathode (low voltage) |
| 7 | LEDA4 | P | LED driving anode (high voltage) |
| 8 | LEDK4 | P | LED driving cathode (low voltage) |

Table 3.2.2 Pin Assignment for Back Light Interface

Note1: I/O definition: I---Input, O---Output, P---Power/Ground, N---No connection

Note2: All of the GND pins should be connected to the system ground.

4. Absolute Maximum Ratings

| Item | Symbol | MIN | MAX | Unit | Remark |
|----------------------------|-----------------|------|-----|------------------|-----------------|
| Power Voltage | VCC | -0.5 | 6.0 | V | Note1 |
| Input voltage for signals | V _{IN} | -0.5 | 4.0 | V | |
| Backlight Forward Current | IL | -- | 25 | mA | Per one circuit |
| Operating Temperature | Top | -20 | 70 | °C | |
| Storage Temperature | Tst | -30 | 80 | °C | |
| Relative Humidity Note2 | RH | -- | ≤95 | % | Ta≤40°C |
| | | -- | ≤85 | % | 40°C < Ta≤50°C |
| | | -- | ≤55 | % | 50°C < Ta≤60°C |
| | | -- | ≤36 | % | 60°C < Ta≤70°C |
| | | -- | ≤24 | % | 70°C < Ta≤80°C |
| Absolute Humidity | AH | -- | ≤70 | g/m ³ | Ta=80°C |

Table 4.1 Absolute Maximum Ratings

Note1: Input voltage include all in put data.

Note2: Ta means the ambient temperature. It is necessary to limit the relative humidity to the specified temperature range. Condensation on the module is not allowed.

Note3: 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

5. Electrical Characteristics

5.1 DC Characteristics for Panel Driving

| Item | Symbol | MIN | TYP | MAX | Unit | Remark | |
|------------------------------|------------|-------|---------|-------|---------|----------|---------------|
| Supply Voltage | VCC | (3.2) | 3.3 | (3.4) | V | | |
| Supply Current | ICC | | TBD | | mA | VCC=3.3V | |
| Display and function signals | Low Level | VIL | GND | -- | 0.2×VCC | V | |
| | High Level | VIH | 0.8×VCC | -- | VCC | V | |
| Power Consumption | 60Hz | P | -- | TBD | -- | mW | White pattern |

Table 5.1.1 Operating Voltages

Note1: Indicated the subsequent version may be updated.

5.2 Characteristics for Backlight Driving

| Item | Symbol | MIN | TYP | MAX | Unit | Remark |
|-----------------------------|--------|------|-------|------|------|--|
| Forward Current | IF | -- | 25 | 27.5 | mA | 32 LEDs (4 LED Parallel,8 LED Serial) |
| Forward Current Voltage | VF | 20.4 | 22.7 | 24.9 | V | |
| Backlight Power Consumption | WBL | -- | 2270 | -- | mW | |
| LED life time | -- | -- | 50000 | -- | Hrs | |

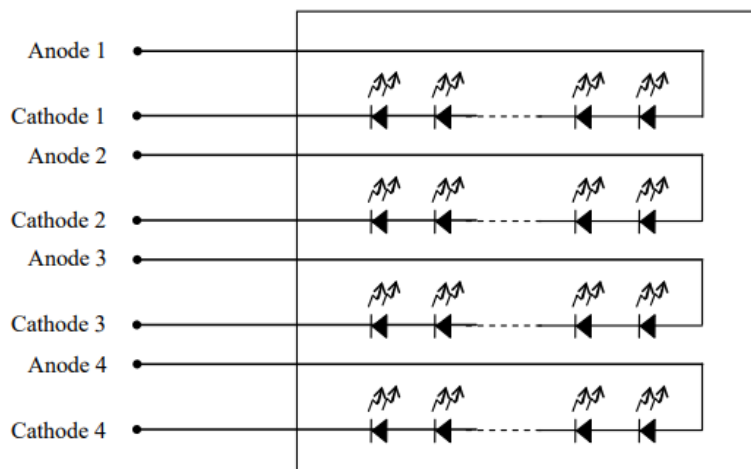
Table 5.2.1 LED Backlight Characteristics

Note1: I_F is defined for each channel.

Note2: Optical performance should be evaluated at $T_a=25^\circ\text{C}$ only.

Note3: If LED is driven by high current, high ambient temperature & humidity condition, The life time of LED will be reduced.

Note4: Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is estimated data.



5.3 Power supply voltage ripple

| Power supply voltage | | MIN | Remark |
|----------------------|-------|-------|--------|
| VCC | 3.3 V | ≤ 100 | mVp-p |

Note1: The permissible ripple voltage includes spike noise.

5.4 Fuse

| Parameter | Fuse | | Rating | Fusing current | Remarks |
|-----------|------|----------|--------|----------------|---------|
| | Type | Supplier | | | |
| VCC | TBD | TBD | TBD | TBD | Note1 |
| | | | TBD | | |

Note1: The power supply's rated current must be more than the fusing current. If it is less than the fusing current, the fuse may not blow in a short time, and then nasty smell, smoke and so on may occur.

5.5 Power ON/OFF Sequence

5.5.1 LCD power on/off

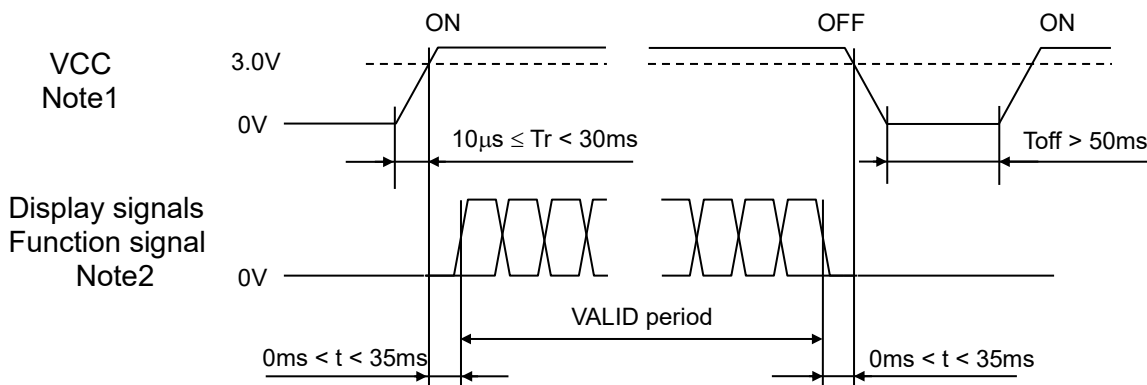


Figure 5.5.1 Backlight on/off

Note1: If there is a voltage variation (voltage drop) at the rising edge of VCC below 3.0V, there is a possibility that a product does not work due to a protection circuit.

Note2: Display signals (CLK, Hsync, Vsync, DE, DATA (R0 to R5, G0 to G5, B0 to B5)) and function signal (DPS) must be set to Low or High-impedance, except the VALID period (See above sequence diagram), in order to avoid the circuitry damage.

If some of display and function signals of this product are cut while this product is working, even if the signal input to it once again, it might not work normally. If a customer stops the display and function signals, VCC also must be shut down.

5.5.2 Backlight on/off

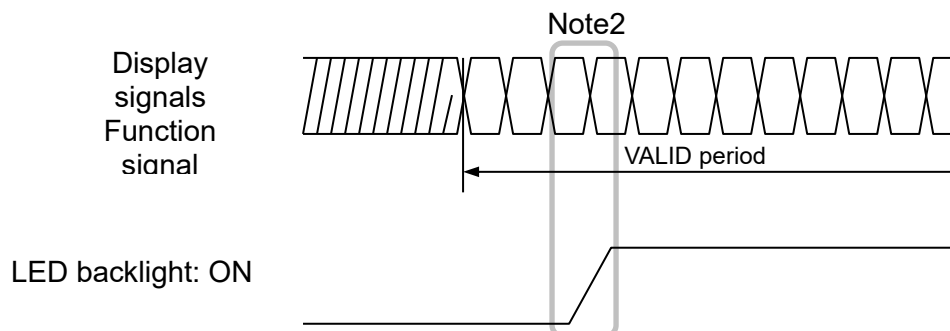


Figure 5.5.2 Backlight on/off

Note1: These are the display and function signals for LCD panel signal processing board.

Note2: The backlight should be turned on within the VALID period of display and function signals, in order to avoid unstable data display.

5.6 LCD Module Block Diagram

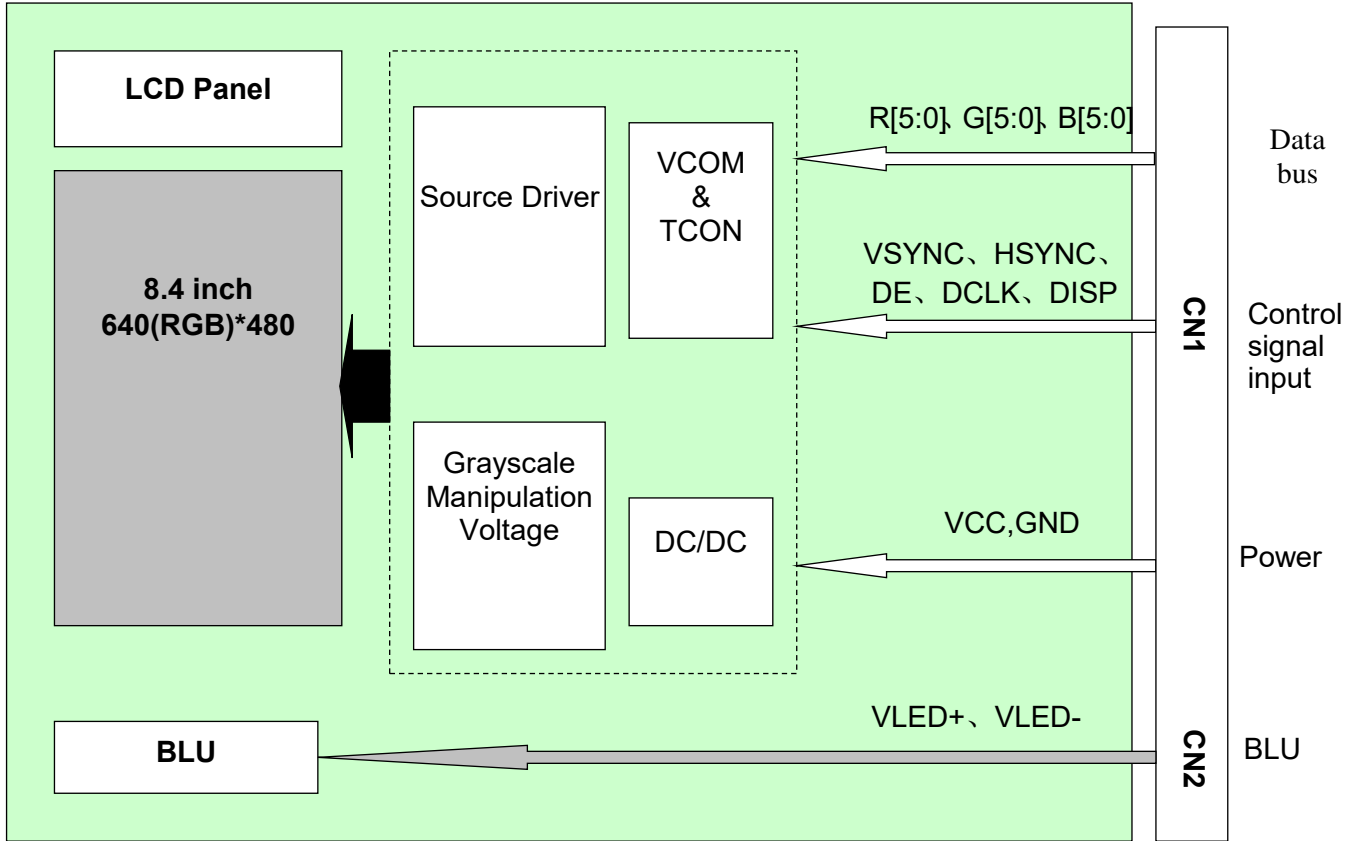


Figure 5.6.1 LCD Module Block Diagram

6. Timing Characteristics

6.1 AC characteristics

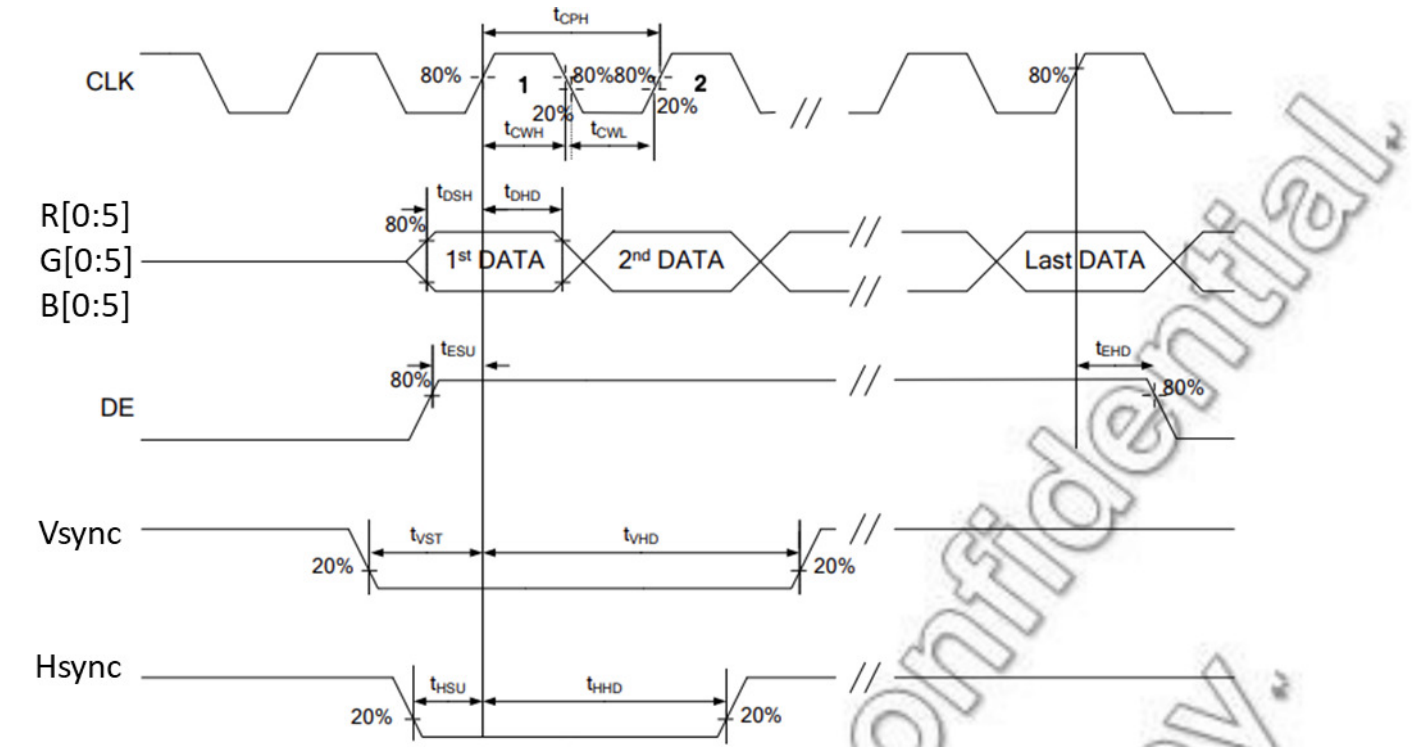


Figure 6.1.1 Input Timing Chart

| Item | Signal | Symbol | Condition | Rating | | Unit |
|---------------------|----------------------------|-----------|-----------|--------|------|------|
| | | | | Min. | Max. | |
| CLK cycle time | CLK | t_{CPH} | | 42.3 | 46.3 | ns |
| CLK pulse high duty | | t_{CWH} | | 40 | 60 | % |
| CLK pulse low duty | | t_{CWL} | | 40 | 60 | |
| Vsync setup time | Vsync | t_{VST} | | 4 | - | ns |
| Vsync hold time | | t_{VHD} | | 2 | - | |
| Hsync setup time | Hsync | t_{HST} | | 4 | - | |
| Hsync hold time | | t_{HHD} | | 2 | - | |
| Data setup time | R[0:5] G[0:5] B[0:5] | t_{DSH} | | 4 | - | |
| Data hold time | | t_{DHD} | | 2 | - | |
| DE setup time | DE | t_{ESU} | | 4 | - | |

| | | | | | | |
|--------------|--|-----------|--|---|---|--|
| DE hold time | | t_{EHD} | | 2 | - | |
|--------------|--|-----------|--|---|---|--|

Table 6.1.1 Input Timing Chart

6.2 Data Input Timing Parameter Setting

6.2.1 SYNC MODE

| Parameter | | Symbol | min. | typ. | max. | Unit | Remarks |
|-----------|----------------|-----------|------|------|------|------|-----------------------|
| CLK | Frequency | 1/tc | 23.1 | 25.2 | 27.1 | MHz | Note1 |
| | Cycle | t_H | 744 | 800 | 840 | CLK | |
| Hsync | Display period | t_{HD} | 640 | | | CLK | |
| | Front-porch | t_{HFP} | 80 | 136 | 176 | CLK | |
| | Pulse width | t_{HPW} | 2 | 2 | 5 | CLK | |
| | Back-porch | t_{HBP} | 24 | 24 | 24 | CLK | Note2 Register HBP |
| | Cycle | t_V | 517 | 525 | 537 | H | |
| Vsync | Display period | t_{VD} | 480 | | | H | |
| | Front-porch | t_{VFP} | 17 | 25 | 37 | H | |
| | Pulse width | t_{VPW} | 2 | 2 | 5 | H | |
| | Back-porch | t_{VBP} | 20 | 20 | 20 | H | Note2 Register VBP |
| | Frame Rate | FR | 60 | | | Hz | |

Table 6.2.1 Input Timing Parameters on Fixed Mode

Note1: Definition of parameters is as follows.

$t_c = 1\text{CLK}$, $t_h = 1\text{H}$

Note2: Need to be consistent with the register settings.

6.2.2 DE MODE

| Parameter | | Symbol | min. | typ. | max. | Unit | Remarks | |
|-----------|-------------------------|----------------|----------|------|------|------|---------|-------|
| CLK | Frequency | 1/tc | 23.1 | 25.2 | 27.1 | MHz | Note1 | |
| DE | Horizontal | Cycle | t_H | 744 | 800 | 840 | | CLK |
| | | Display period | t_{HD} | 640 | | | CLK | Note2 |
| | Vertical (One frame) | Cycle | t_V | 517 | 525 | 537 | H | Note3 |
| | | Display period | t_{VD} | 480 | | | H | |
| FR | Frame Rate | FR | 60 | | | Hz | | |

Table 6.2.2 Input Timing Parameters on DE Mode

Note1: Definition of parameters is as follows.

$t_c = 1\text{CLK}$, $t_h = 1\text{H}$

Note2: Hsync signal (Pin No.3 of CN1) and Vsync signal (Pin No.4 of CN1) are not used inside the product at DE mode.

Do not keep pin open to avoid noise problem.

Note3: Vertical cycle (t_v) should be specified in integral multiple of Horizontal cycle (t_h).

6.3 SYNC Mode Timing Diagram

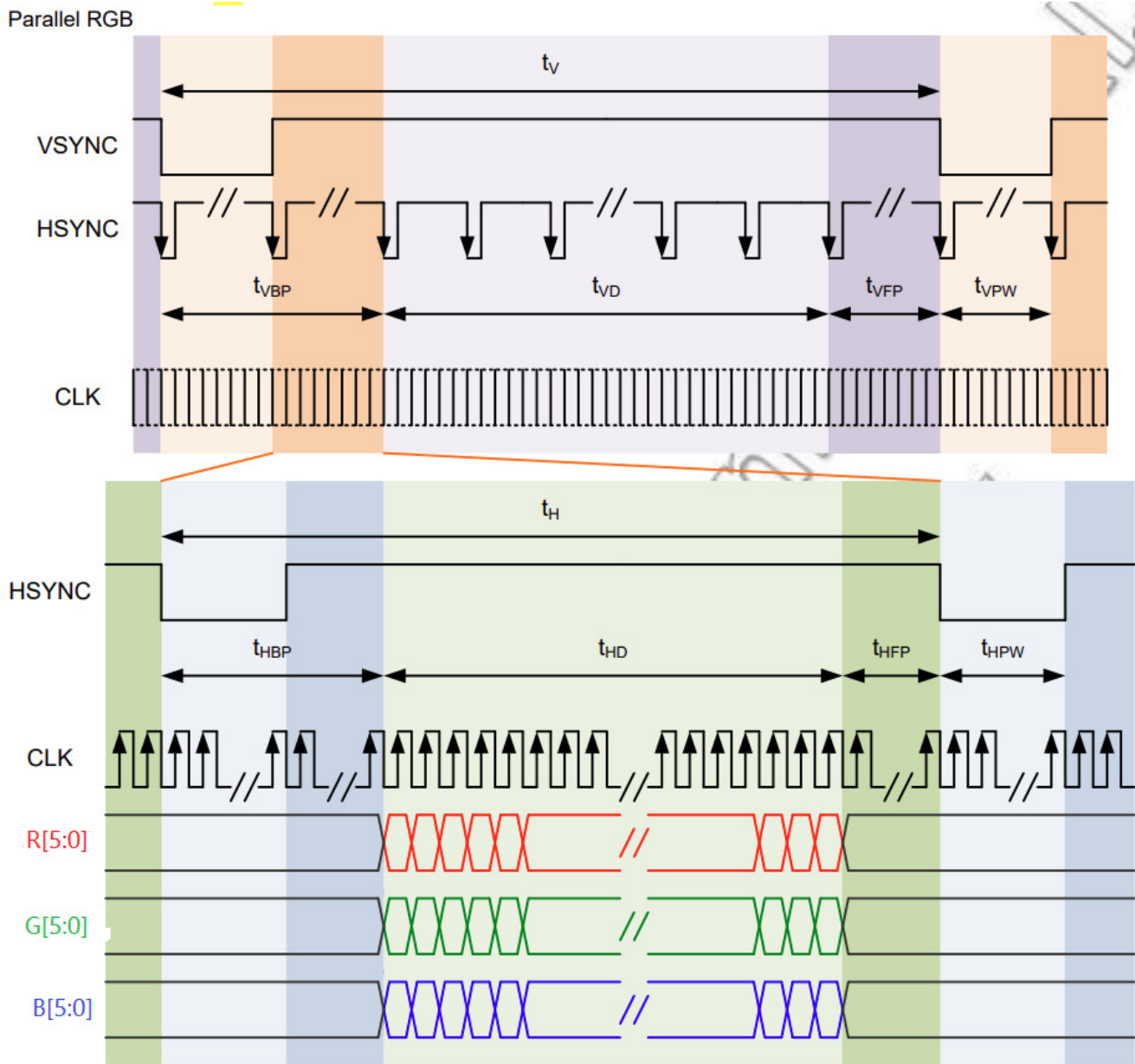


Figure 6.3.1 Data Input Timing Diagram Under SYNC Mode

6.4 DE Mode Timing Diagram

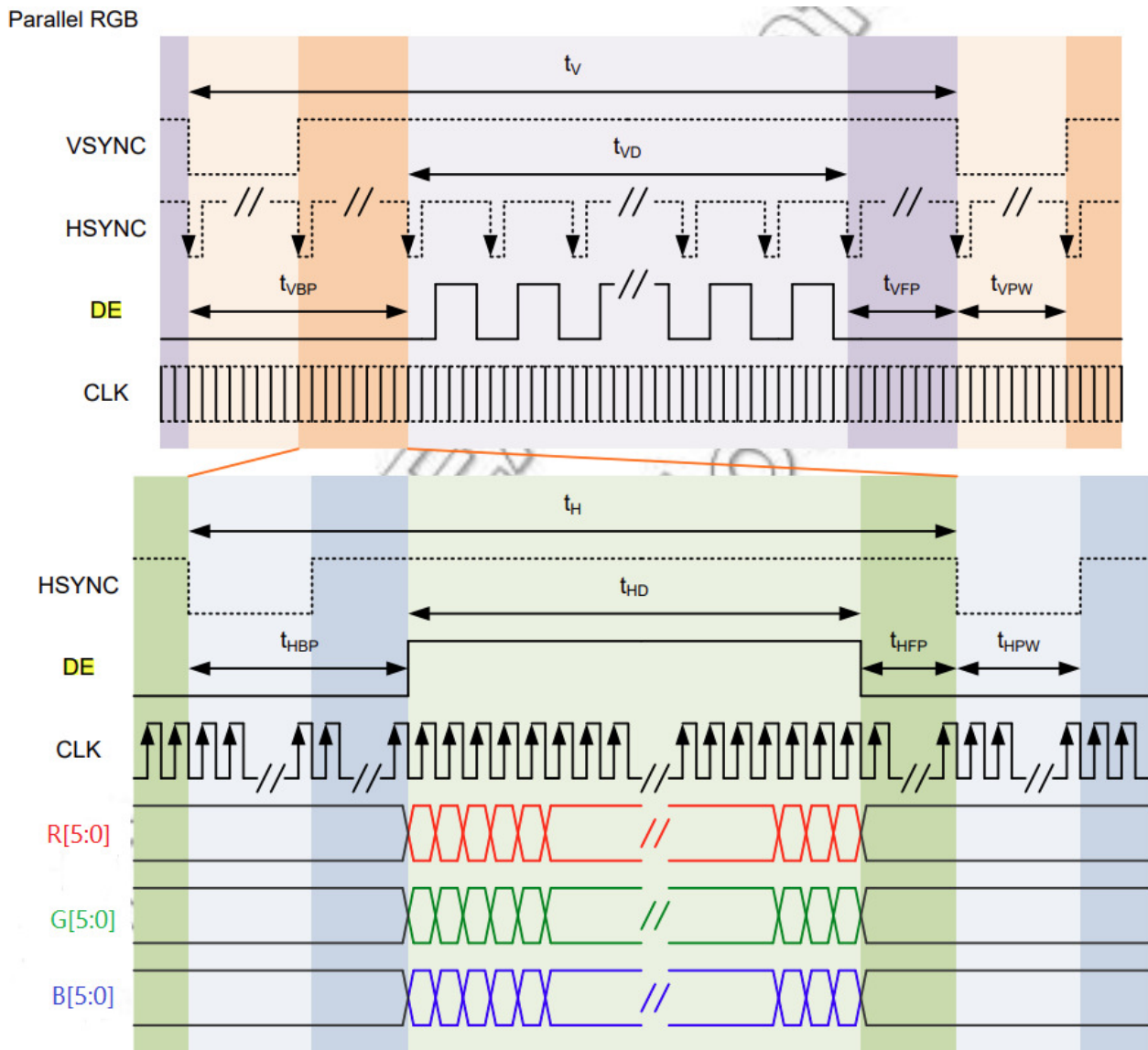


Figure 6.4.1 Data Input Timing Diagram Under DE Mode

6.5 Initial Code

TBD

7. Optical Characteristics

| Item | Symbol | Condition | Min | Typ | Max | Unit | Remark |
|----------------|------------|------------------|-----|------|-----|-------------------|----------|
| View Angles | θT | $CR \geq 10$ | 70 | 88 | | degree | Note2,3 |
| | θB | | 70 | 88 | | | |
| | θL | | 70 | 88 | | | |
| | θR | | 70 | 88 | | | |
| Contrast Ratio | CR | $\theta=0^\circ$ | 800 | 1000 | | | Note 3 |
| Response Time | T_r | 25°C | | 30 | 40 | ms | Note 4 |
| | T_f | | | | | | |
| Chromaticity | White | x | TBD | TBD | TBD | | Note 1,5 |
| | | y | TBD | TBD | TBD | | |
| | Red | x | TBD | TBD | TBD | | Note 1,5 |
| | | y | TBD | TBD | TBD | | |
| | Green | x | TBD | TBD | TBD | | Note 1,5 |
| | | y | TBD | TBD | TBD | | |
| | Blue | x | TBD | TBD | TBD | | Note 1,5 |
| | | y | TBD | TBD | TBD | | |
| Uniformity | U | | TBD | 80 | | % | Note 6 |
| NTSC | - | | 45 | 50 | | % | Note 5 |
| Luminance | L | | 450 | 800 | | cd/m ² | Note 7 |

Table 7.1 Optical Parameters

Test Conditions:

1. $I_f = \mathbf{XX}$ mA, and the ambient temperature is 25°C.
2. The test systems refer to Note1 and Note2.

Note1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical characteristics are measured at the center point of the LCD screen.

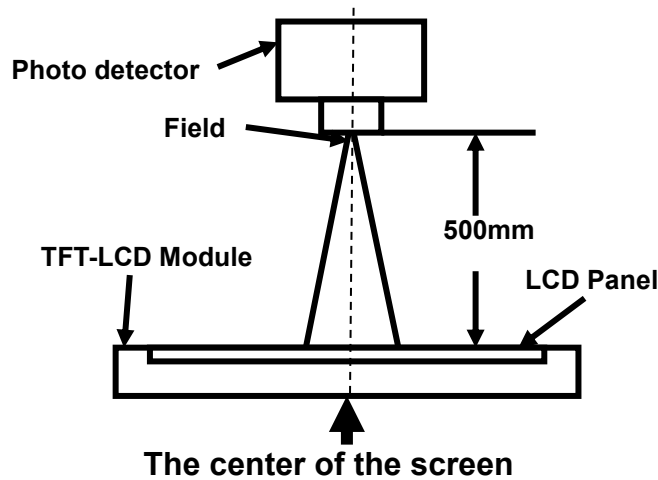


Fig1. Measurement Set Up

Note2: Definition of viewing angle range and measurement system. Viewing angle is measured at the center point of the LCD .

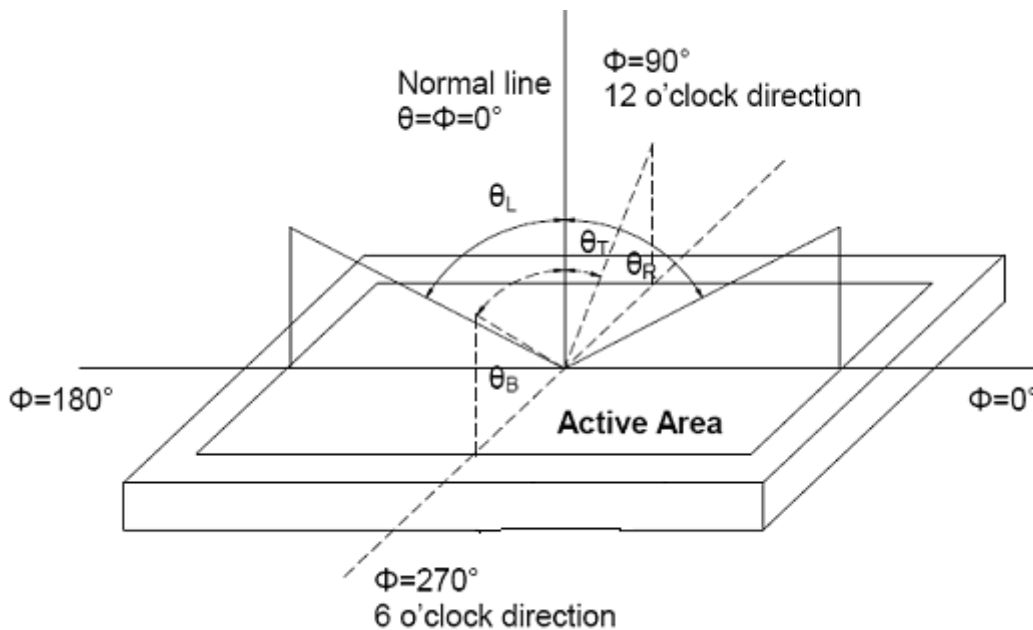


Fig2. Measurement viewing angle

Note3: Definition of contrast ratio

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

Note4: Definition of Response time

For SFT LCM, the response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_r) is the time between photo detector output intensity changed from 10% to 90%. And fall time (T_f) is the time between photo detector output intensity changed from 90% to 10%.

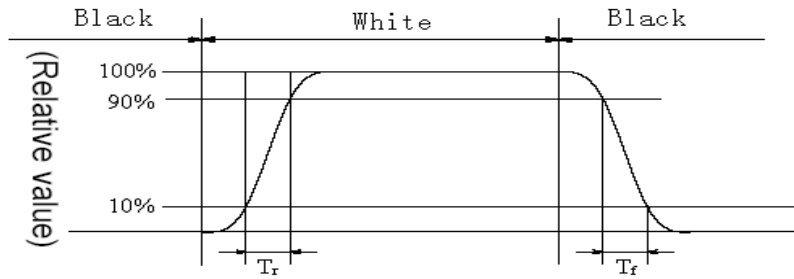


Fig3. Response Time Testing(SFT)

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig.5). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = L_{min} / L_{max}

Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

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

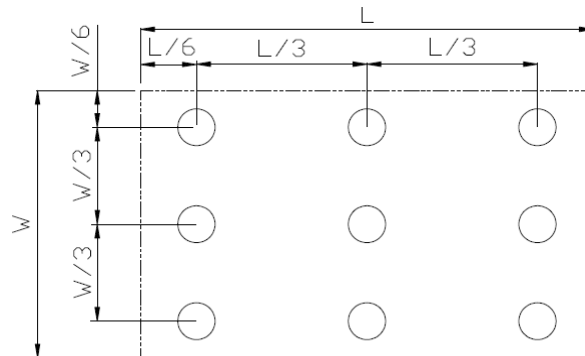


Fig4. Luminance Uniformity Measurement Locations(9 points)

Note7: Definition of Luminance:

Measure the luminance of white state at center point.

8. Reliability Test

| No | Test Item | Condition | Remarks |
|----|--|--|---|
| 1 | High Temperature Operation | Ta = +80±3°C, 240 hours Display data is white | IEC60068-2-1:2007 GB2423.2-2008 |
| 2 | High Temperature and Humidity(operation) | Ta = 60±2°C, 90% RH,240hours Display data is white | IEC60068-2-78 GB/T2423.3 |
| 3 | Heat Cycle (operation) | -30±3°C,1 hour 80±3°C,1 hour 50cycles,4 hours/cycle Display data is white | Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002 |
| 4 | Thermal Shock (non-operation) | -30±3°C,30minutes 80±3°C,30minutes 100cycles,1hours/cycle temperature transition time is within 5 minutes | Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002 |
| 5 | ESD | C=150pF,R=150Ω,±10Kv 9 point/panel 10 times each place at 1 sec interval | IEC61000-4-2:2001 GB/T17626.2-2006 |
| 6 | Vibration (Non-operation) | 5~100Hz 19.6m/s ² 1 minute/cycle X 、 Y 、 Z 120 times each direction | IEC60068-2-6 GB/T17626.6 |
| 7 | Mechanical shock (Non-operation) | 539m/s ² ,11 ms ±X 、 ±Y 、 ±Z 5 times each direction | IEC60068-2-27 GB/T2423.5 |

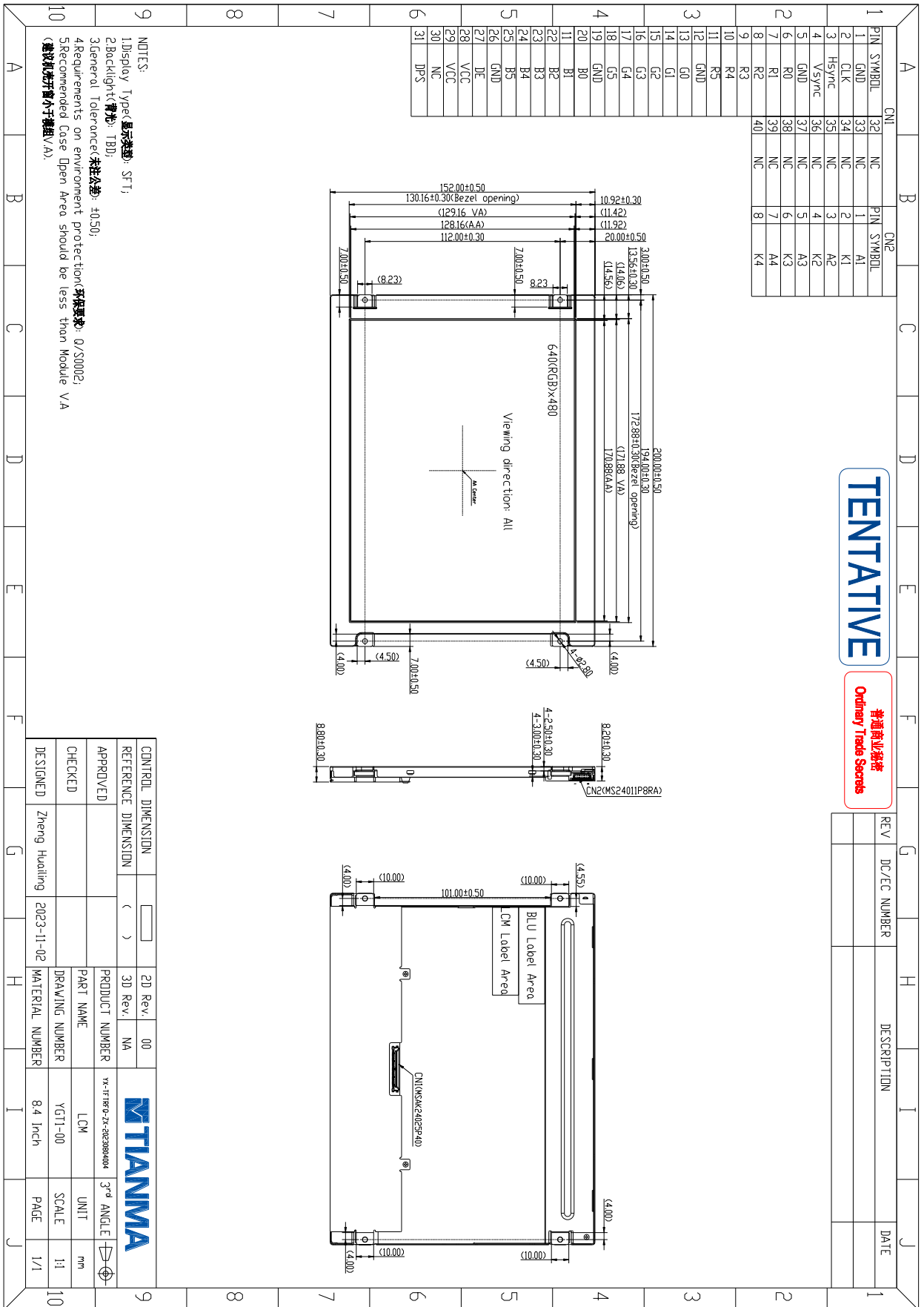
Table 8.1 RA test condition

Note1: Temperature is the ambient temperature of sample

Note2: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product's function only be guaranteed, but not for all of the cosmetic specification.

9. Mechanical Drawing



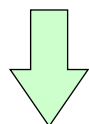
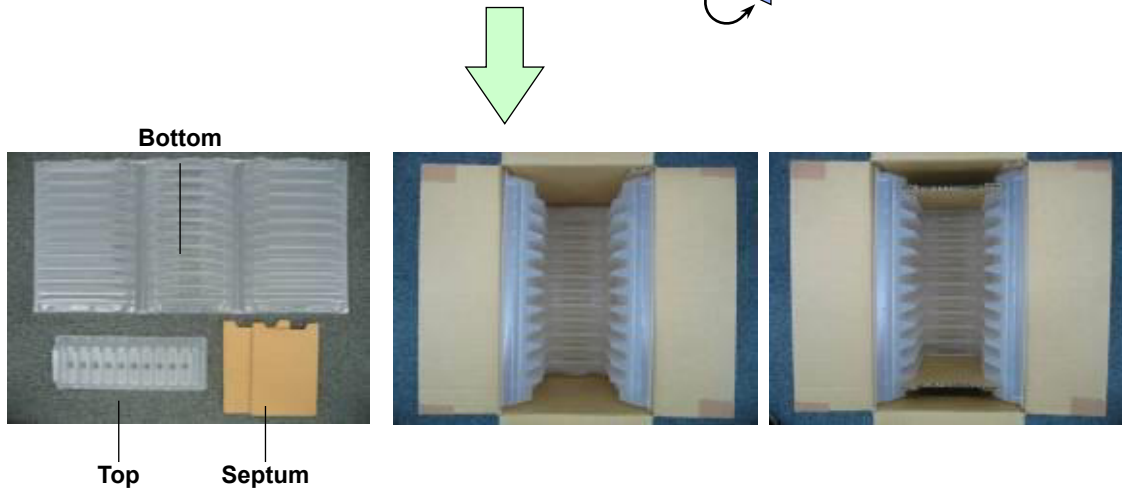
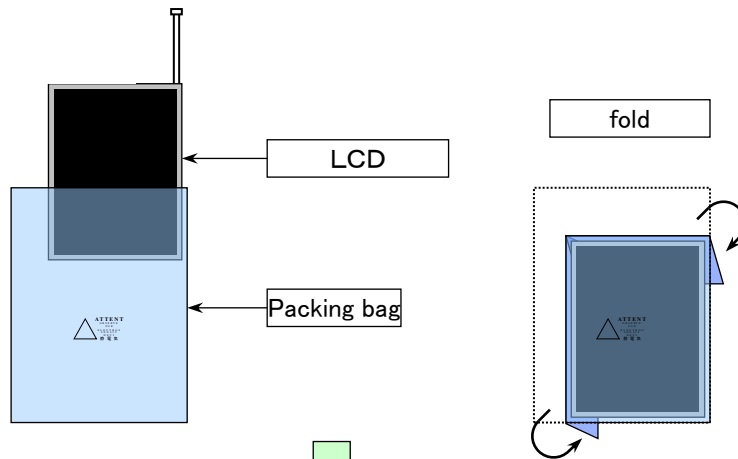
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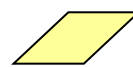
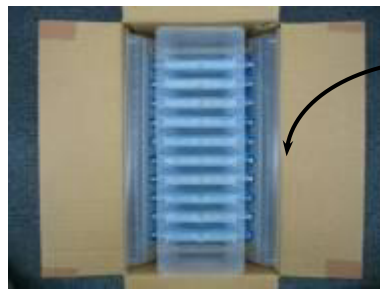
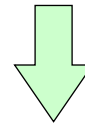
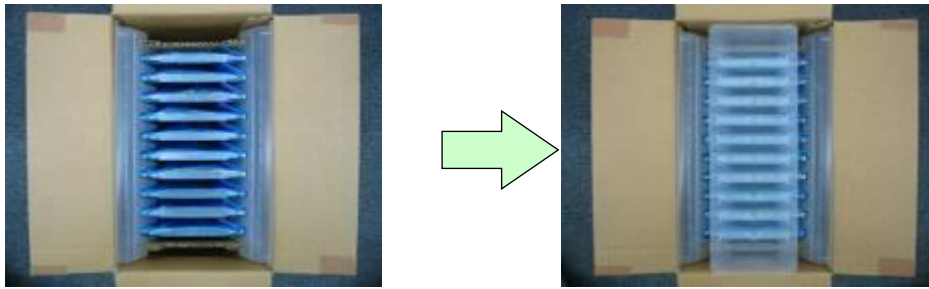
普通商业授权
Ordinary Trade Secrets

| REV | DC/EC NUMBER | DESCRIPTION | DATE |
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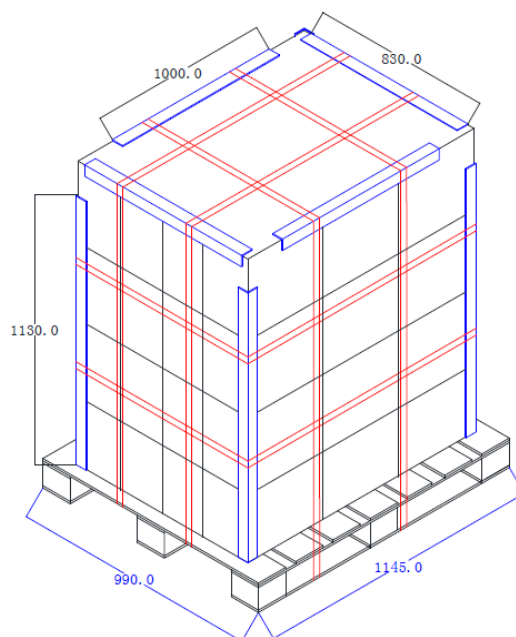
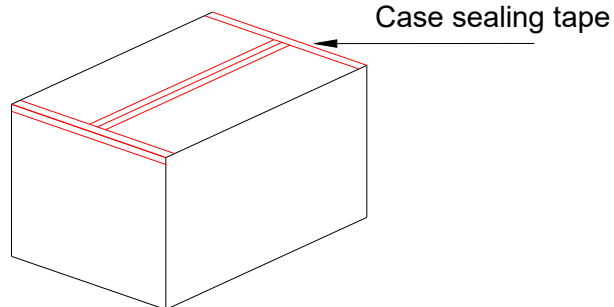
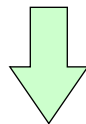
10. Packing Instruction

| No | Item | Model (Material) | Dimensions(mm) | Unit Weight(Kg) | Quantity | Remark |
|----|-----------------|------------------|----------------|-----------------|----------|------------|
| 1 | LCM module | P0840VGF1MB00 | 200x152x8.8 | | 10 | --- |
| 2 | Partition board | Corrugated paper | 216x152 | | 2 | 1687003450 |
| 3 | Anti-static Bag | LD-PE | 270x210 | | 10 | 1687003440 |
| 4 | Base Pad | PP | 753x357x55 | | 1 | 1687003430 |
| 5 | Top Pad | PP | 355x128x45 | | 1 | 1687003420 |
| 6 | Carton-inside | Corrugated paper | 360x220x265 | | 1 | 1687003461 |
| 7 | Barcode Label | Paper | 76x104 | | 1 | 1697000140 |
| 8 | Total weight | | | | | |





• Inspection specification



11. Precautions for Use of LCD Modules

11.1 Handling Precautions

- (1) The display panel is made of glass. Do not subject it to mechanical shock by dropping it, etc.
- (2) If the display panel is damaged and the liquid crystal fluid inside it leaks out be sure not to get any in your mouth. If the fluid comes into contact with your skin or clothes promptly wash it off using soap and water.
- (3) Do not apply excessive force to the display surface or the bezel since this may cause the color tone to vary.
- (4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle the polarizer carefully.
- (5) If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is still not completely clear use a moist cloth with one of the following solvents:
 - Isopropyl alcohol
 - Ethyl alcoholSolvents other than those mentioned above may damage the polarizer. Specifically, do not use the following:
 - Water
 - Ketone
 - Aromatic solvents
- (6) Do not disassemble the LCD Module.
- (7) If powered off, do not apply the input signals.
- (8) To prevent destruction of the module by static electricity, be careful to maintain an optimum work environment.
- (9) Be sure to ground your body when handling the LCD Modules.
- (10) Tools used for assembly, must be properly grounded.
- (11) To reduce the amount of static electricity generated, do not conduct assembly or other work under very low humidity conditions.
- (12) The LCD Module is covered with a film to protect the display surface, remove film slowly under the ionizer.

11.2 Storage precautions

- (1) When storing the LCD modules avoid exposure to direct sunlight or to the light of fluorescent lamps.
- (2) The LCD modules should be stored within the rated storage temperature range. The recommend condition is: Temperature: 0 ~ 35 °C at normal humidity.
- (3) The LCD modules should be stored in a room without acid, alkali or other harmful gas.

11.3 Transportation Precautions

The LCD modules should not be dropped or subject to violent mechanical shock during transportation. Also they should avoid excessive pressure, water, high humidity and direct sunlight.

11.4 Screen saver Precautions

Not display the fixed pattern for a long time. Use a screen saver, if the fixed pattern is displayed on the screen

11.5 Safety Precautions

- (1) When you waste damaged or unnecessary LCDs, it is recommended to crush LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned
- (2) Be sure to turn off the power supply when inserting or disconnecting the LED backlight cable.
- (3) LED driver should be designed to limit or stop its function when over current is detected on the LED.



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