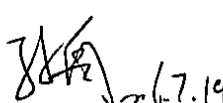
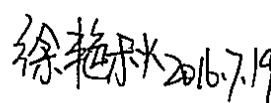
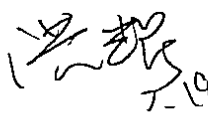
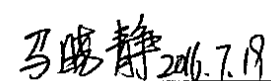


# Product Specification

**Product Name: T121NB01D01**

|                             |
|-----------------------------|
| <b>Customer</b>             |
|                             |
| <b>Approved by Customer</b> |
|                             |
| <b>Approved Date:</b>       |

| Designed By  | Checked by   | Approved By  |  |
|--|--|--|--|
|  |  | R&D  | QA   |
| <br>2016.7.19 | <br>2016.7.19 | <br>7-19 | <br>2016.7.19 |

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## 1 Overview

The specifications is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver IC, FPC, and a backlight unit.

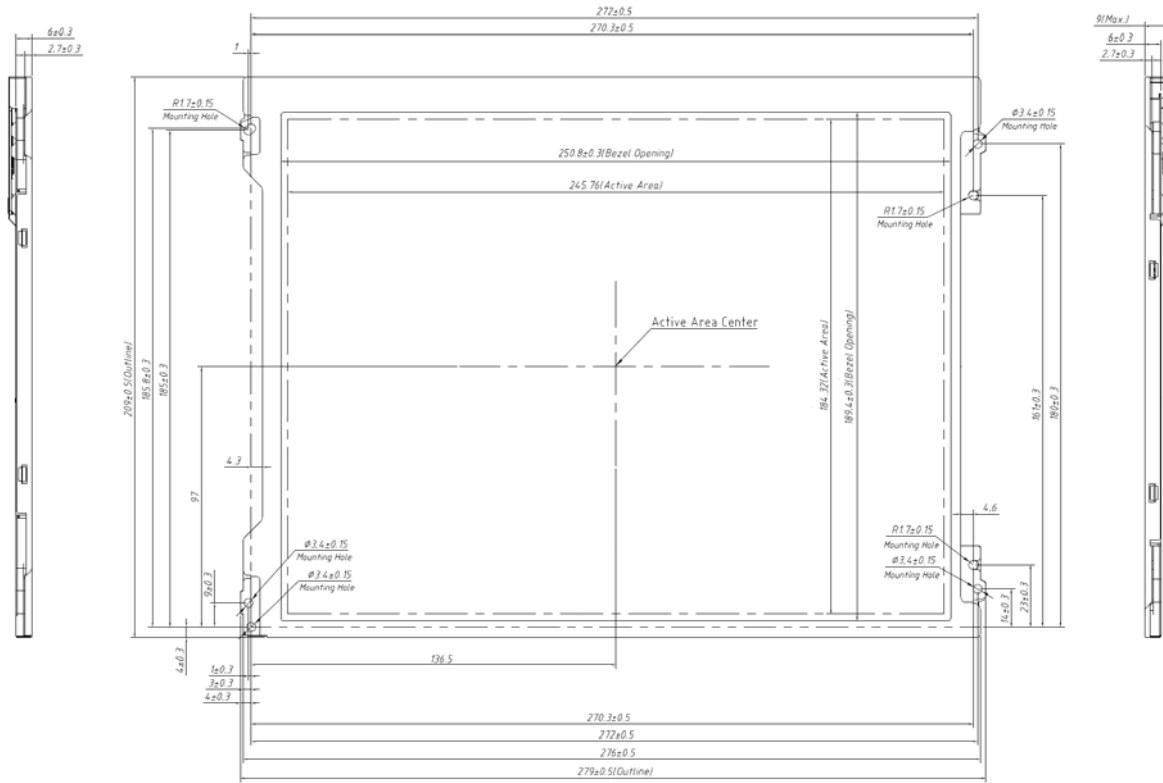
## 2 Features

- Panel Size: 12.1 inch
- Number of Pixels /Resolution: 1024×RGB×768
- Interface: LVDS
- RoHS and Halogen-Free Compliance
- Applications: Multimedia application and other hand application

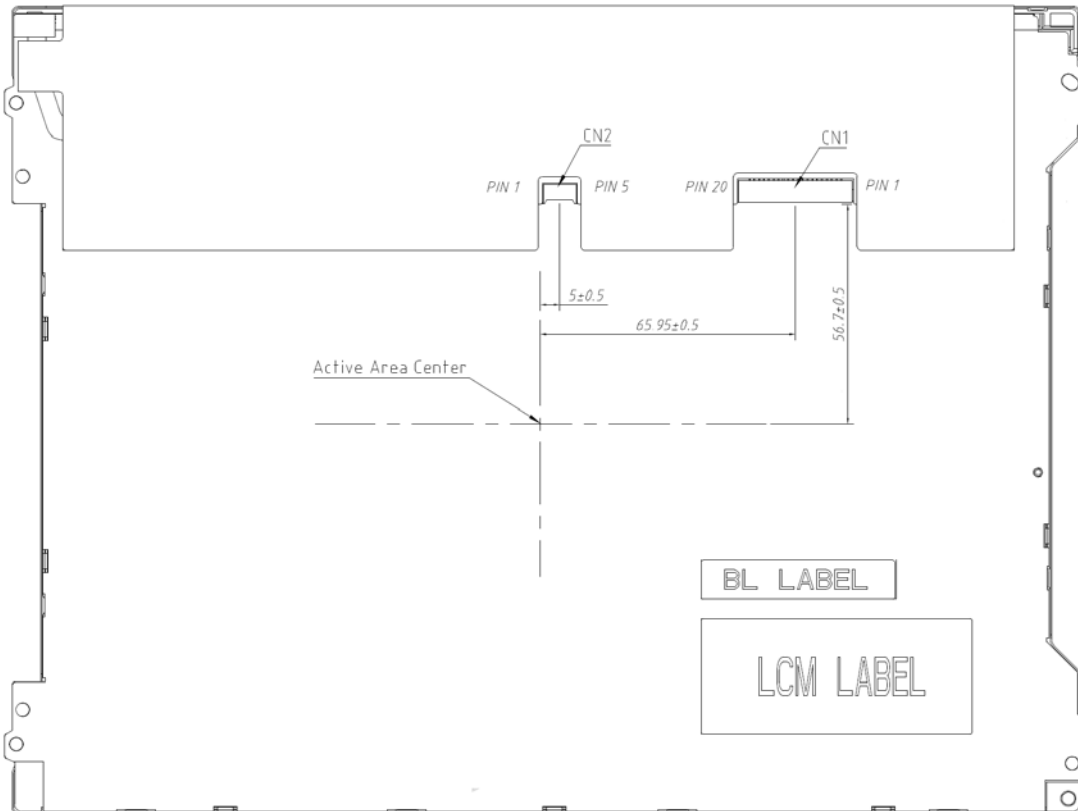
## 3 General Information

| NO. | ITEM          | SPECIFICATION            | UNIT   |
|-----|---------------|--------------------------|--------|
| 1   | Dot Matrix    | 1024(W)×768(H)           | Pixels |
| 2   | Dot Pitch     | 0.24(W)×0.24(H)          | mm     |
| 3   | Active Area   | 245.76(W)×184.32(H)      | mm     |
| 4   | Module Size   | 279.0(W)×209.0(H)×9.0(T) | mm     |
| 5   | Viewing Angle | 6 O'clock                | mm     |
| 6   | Module Weight | 545(MAX)                 | gram   |

4 Mechanical Drawing



Front Side



Back Side

**5 Module Interface**  
**5.1 PIN Description**

| NO. | Symbol | Description   |
|-----|--------|---|
| 1   | VDD    | Power Supply, 3.3V (typical)  |
| 2   | VDD    | Power Supply, 3.3V (typical)  |
| 3   | VSS    | GND   |
| 4   | REV    | Reverse Scan selection<br>{High:2.5(min), 3.3(typ),3.6(max); Low: 0.5(max)} |
| 5   | Rin1-  | -LVDS differential data input (R0-R5,G0)                                    |
| 6   | Rin1+  | +LVDS differential data input (R0-R5,G0)                                    |
| 7   | VSS    | Ground  |
| 8   | Rin2-  | LVDS differential data input (G1-G5,B0-B1)                                  |
| 9   | Rin2+  | +LVDS differential data input (G1-G5,B0-B1)                                 |
| 10  | VSS    | Ground  |
| 11  | Rin3-  | -LVDS differential data input (B2-B5,HS,VS,DE)                              |
| 12  | Rin3+  | +LVDS differential data input (B2-B5,HS,VS,DE)                              |
| 13  | VSS    | Ground  |
| 14  | ClkIN- | -LVDS differential clock input  |
| 15  | ClkIN+ | +LVDS differential clock input  |
| 16  | GND    | Ground  |
| 17  | Rin4-  | -LVDS differential data input (R6-R7,G6-G7,B6-B7)                           |
| 18  | Rin4+  | +VDS differential data input (R6-R7,G6-G7,B6-B7)                            |
| 19  | SEL68  | 6/8 bits LVDS data input selection(H:8bit L/NC:6bit)                        |
| 20  | Bist   | Internal use  |

Note(1) : All input signals shall be low or Hi-resistance state when VDD is off.

Note (2)                      REV = LOW/NC

Note (3) REV = High



5.2 Back-Light Unit

| Item           | Symbol | Min.   | Typ. | Max. | Unit |
|----------------|--------|--------|------|------|------|
| Supply Voltage | Vf     | 2.8    | 3.3  | 3.6  | V    |
| Supply Current | If     | -      | 60   | -    | mA   |
| Uniformity     | -      | 75     | 80   | -    | %    |
| Life Time      | -      | 30,000 | -    | -    | Hr   |

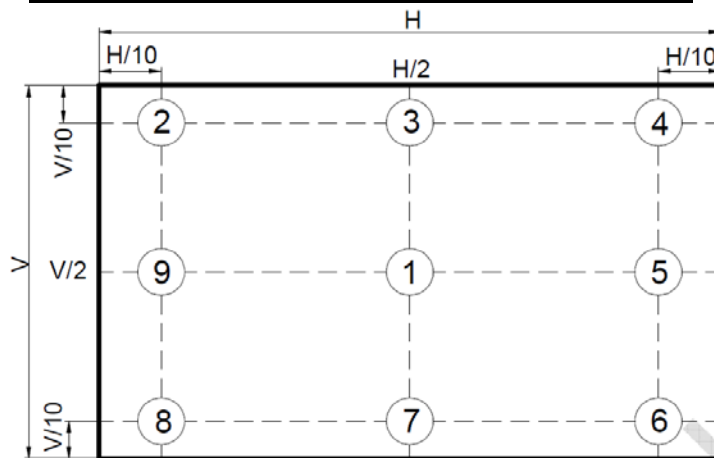
5.2.1 LED Backlight Block Diagram

TBD

5.2.2 Definition of Luminance Uniformity

Measure the luminance of gray level 255 at 9 points.

$$UNF(9pts) = \frac{\text{Min}(L1, L2, \dots L9)}{\text{Max}(L1, L2, \dots L9)}$$



## 6 Absolute Maximum Rating

### Electrical Absolute Rating

| Item                     | Symbol | Min. | Max. | Unit |
|--------------------------|--------|------|------|------|
| Supply voltage for logic | VDD    | -0.5 | 5    | V    |
| Operating temperature    | TOP    | -20  | 70   | °C   |
| Operating Humidity       | HOP    | 10   | 85   | %RH  |
| Storage temperature      | TST    | -30  | 80   | °C   |
| Storage Humidity         | HST    | 10   | 95   | %RH  |

## 7 Electrical Characteristics

### 7.1 DC Electrical Characteristics

| Item                  | Symbol   | Min.     | Typ.             | Max.  | Unit             |   |
|-----------------------|----------|----------|------------------|-------|------------------|---|
| Supply voltage(Logic) | VDD      | 3.0      | 3.3              | 3.6   | V                |   |
| Input Voltage         | H level  | $V_{IH}$ | $0.7 \times VCC$ | -     | VCC              | V |
|                       | L level  | $V_{IL}$ | -0.3             | -     | $0.3 \times VCC$ | V |
| Supply current        | $I_{DD}$ | -        | -                | 250   | mA               |   |
| VDD Power Consumption | PDD      | -        | -                | 0.825 | W                |   |

Note: Voltage greater than above may damage the module.

All voltages are specified relative to VSS=0V.



7.2 AC Electrical Characteristics

7.2.1 LVDS Receiver

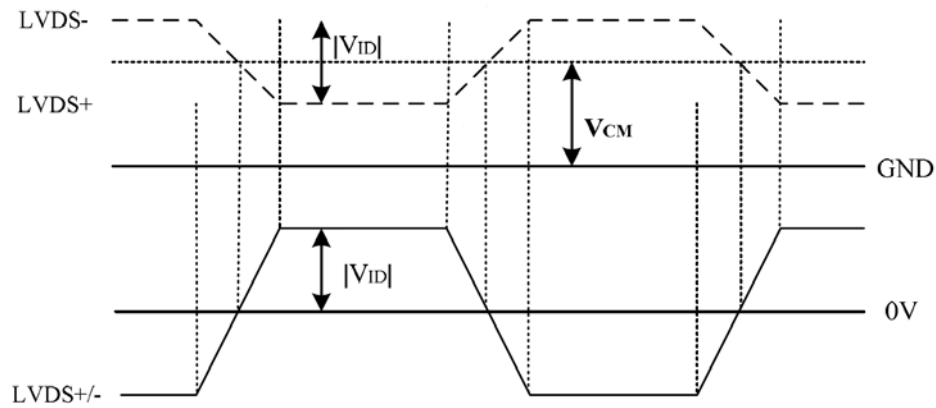
Signal Electrical Characteristics For LVDS Receiver

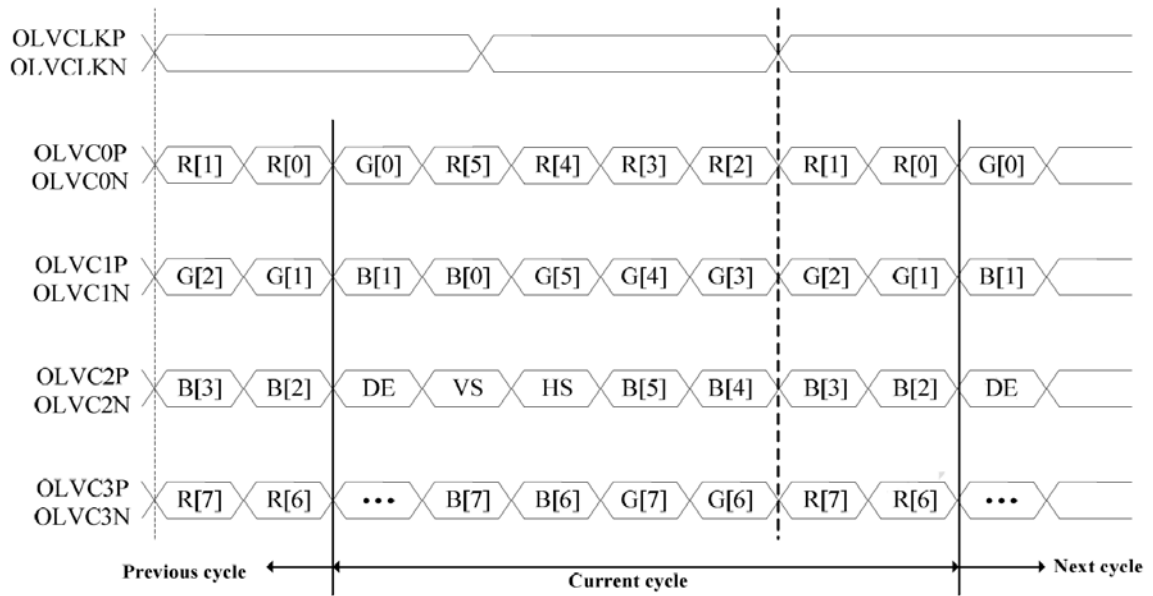
The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644 ) standard.

| Parameter                            | Symbol          | Min.          | Typ. | Max.          | Unit | Conditions     |
|--------------------------------------|-----------------|---------------|------|---------------|------|----------------|
| Differential Input High Threshold    | Vth             | -             | -    | +100          | mV   | $V_{CM}=+1.2V$ |
| Differential Input Low Threshold     | Vtl             | -100          | -    | -             | mV   | $V_{CM}=+1.2V$ |
| Magnitude Differential Input Voltage | VID             | 100           | -    | 600           | mV   | -              |
| Common Mode Voltage                  | $V_{CM}$        | $ VID /2+0.6$ | 1.2  | $1.8- VID /2$ | V    | -              |
| Common Mode Voltage Offset           | $\Delta V_{CM}$ | -             | -    | 50            | mV   | $V_{CM}=+1.2V$ |

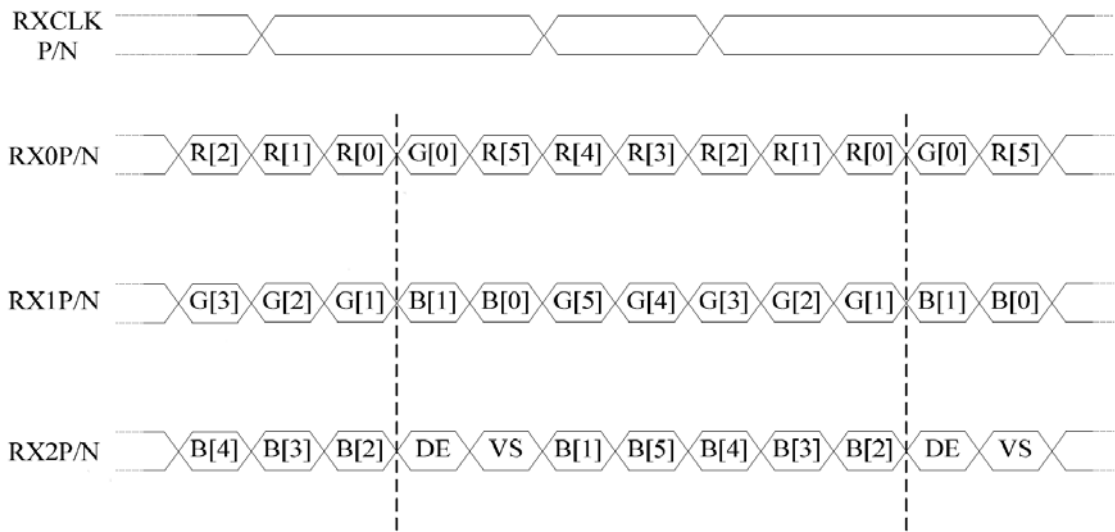
- Note:
- (1) Input signals shall be low or Hi- resistance state when VDD is off.
  - (2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.

Voltage Definitions





**Data Mapping(8 Bit)**



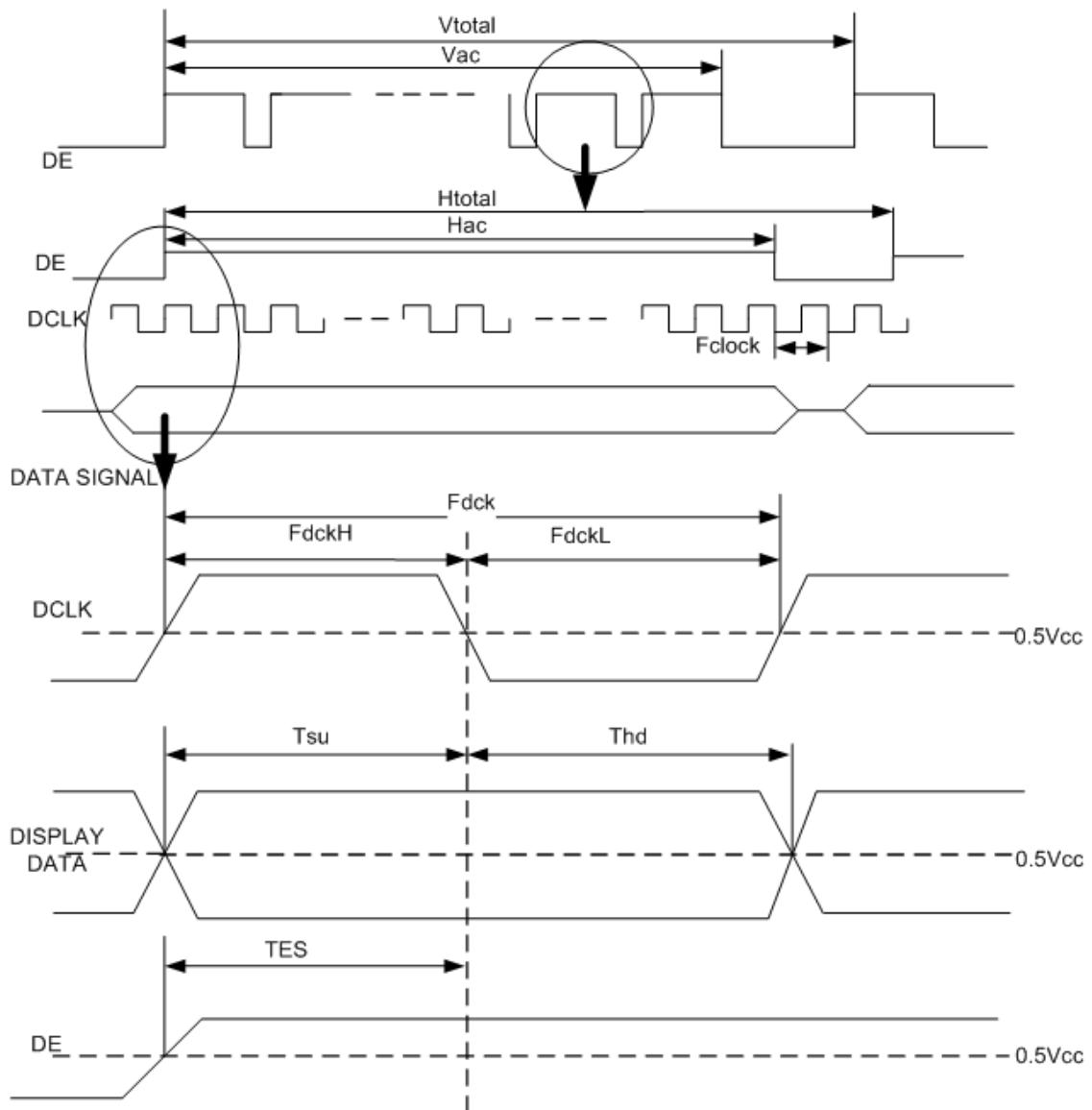
**Data Mapping(6 Bit)**

7.2.2 Interface Timings

| Parameter            | Symbol | Unit   | Min. | Typ. | Max. |
|----------------------|--------|--------|------|------|------|
| LVDS Clock Frequency | Fclk   | MHz    | 50   | 65   | 80   |
| H Total Time         | HT     | Clocks | 1100 | 1344 | 2047 |
| H Active Time        | HA     | Clocks | 1024 | 1024 | 1024 |
| H Blanking Time      | HBL    | Clocks | 76   | 320  | 1023 |
| V Total Time         | VT     | Lines  | 776  | 806  | 1023 |
| V Active Time        | VA     | Lines  | 768  | 768  | 768  |
| V Blanking Time      | VBL    | Lines  | 8    | 38   | 255  |
| Frame Rate           | Vsync  | Hz     | 55   | 60   | 65   |

Note: H Blanking Time and V Blanking Time can not be changed at every frame.

Timing Characteristics

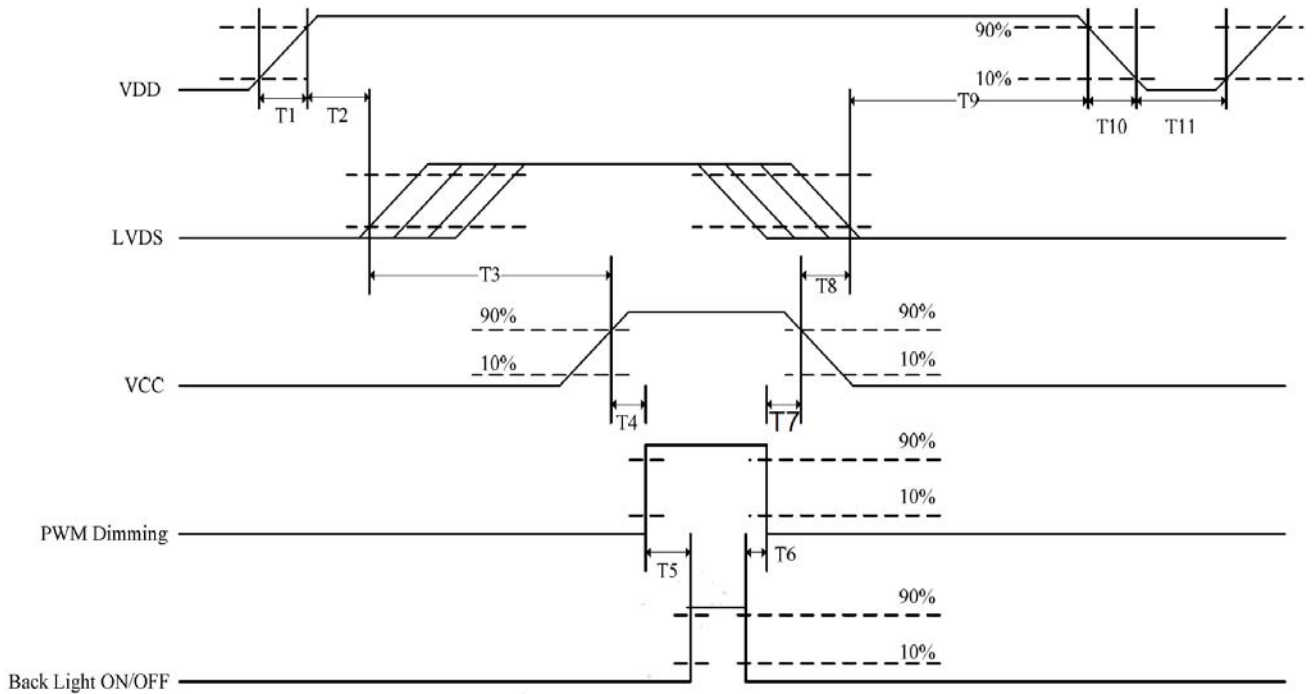


## 8 Functional Specification and Application Circuit

### 8.1 Power ON/OFF Sequence

Power on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-resistance state or low level when VDD is off.

#### Power Voltage



#### Power Sequencing Requirements

| Parameter | Unit | min  | typ | max |
|-----------|------|------|-----|-----|
| T1        | ms   | 0.5  | -   | 10  |
| T2        | ms   | 30   | 40  | 50  |
| T3        | ms   | 200  | -   | -   |
| T4        | ms   | 10   | -   | -   |
| T5        | ms   | 10   | -   | -   |
| T6        | ms   | 0    | -   | -   |
| T7        | ms   | 10   | -   | -   |
| T8        | ms   | 100  | -   | -   |
| T9        | ms   | 0    | 16  | 50  |
| T10       | ms   | -    | -   | 10  |
| T11       | ms   | 1000 | -   | -   |

Note (1) Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L

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

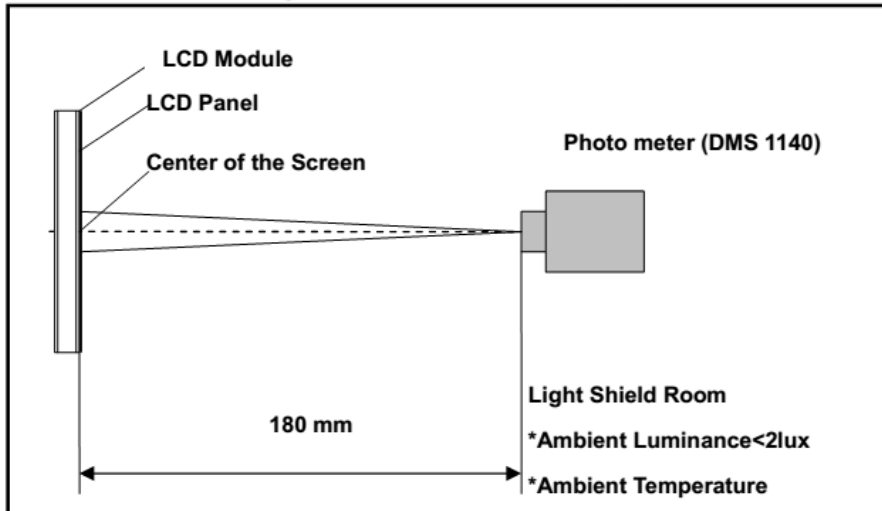
9 Optical characteristics

| Item                      | Symbol           | Condition     | Min.          | Typ.  | Max.          | Units  | Note        |                   |
|---------------------------|------------------|---------------|---------------|-------|---------------|--------|-------------|-------------------|
| Viewing Angle             | Horizontal       | $\theta_{x+}$ | 70            | 80    | -             | degree | (1),(2),(3) |                   |
|                           |                  | $\theta_{x-}$ | 70            | 80    | -             |        |             |                   |
|                           | Vertical         | $\theta_{y+}$ | 70            | 80    | -             |        |             |                   |
|                           |                  | $\theta_{y-}$ | 60            | 80    | -             |        |             |                   |
| Contrast Ratio            | Center           |               | 720           | 800   | -             | -      | (1),(2),(4) |                   |
| Response Time             | Rising (90%-10%) |               | -             | 4     | 5.2           | ms     | (1),(2),(5) |                   |
|                           | Falling(90%-10%) |               | -             | 12    | 15.6          |        |             |                   |
|                           | Rising + Falling |               | -             | 16    | 20.8          |        |             |                   |
| Chromaticity<br>(CIE1931) | White            | x             | 0.255         | 0.305 | 0.355         | -      | (1),(2)     |                   |
|                           |                  | y             | 0.275         | 0.325 | 0.375         |        |             |                   |
|                           | Red              | x             | Typ.<br>-0.03 | 0.644 | Typ.<br>+0.03 |        |             |                   |
|                           |                  | y             |               | 0.344 |               |        |             |                   |
|                           | Green            | x             |               | 0.310 |               |        |             |                   |
|                           |                  | y             |               | 0.634 |               |        |             |                   |
|                           | Blue             | x             |               | 0.152 |               |        |             |                   |
|                           |                  | y             |               | 0.081 |               |        |             |                   |
| NTSC                      |                  |               |               | -     |               | 72     | -           | -                 |
| White Luminance           | 5 Points Average |               |               | 315   |               | 350    | -           | cd/m <sup>2</sup> |

Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature(25 ) for 15 minutes to Avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

**Measurement Setup**



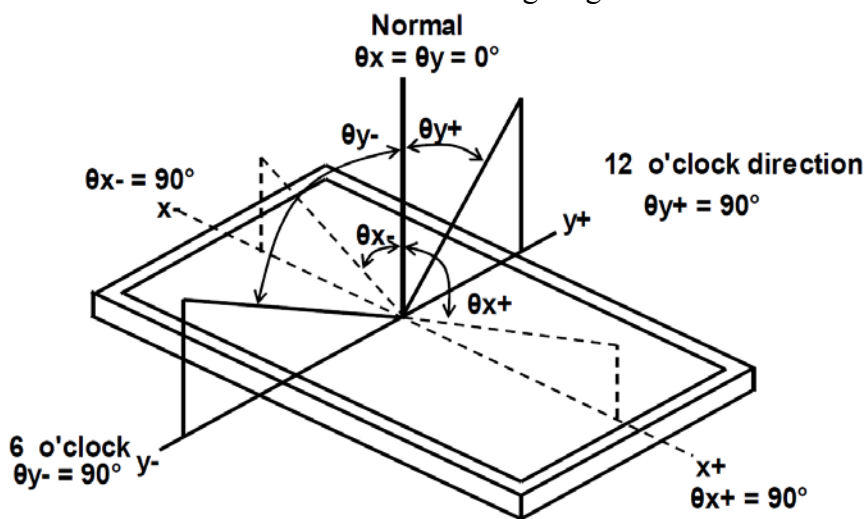
Note (2) The LED input parameter setting as:

VLED: 12V;

PWM\_LED: Duty 100 %

Note (3) Definition of Viewing Angle

Definition of Viewing Angle



Note (4) Definition Of Contrast Ratio (CR)

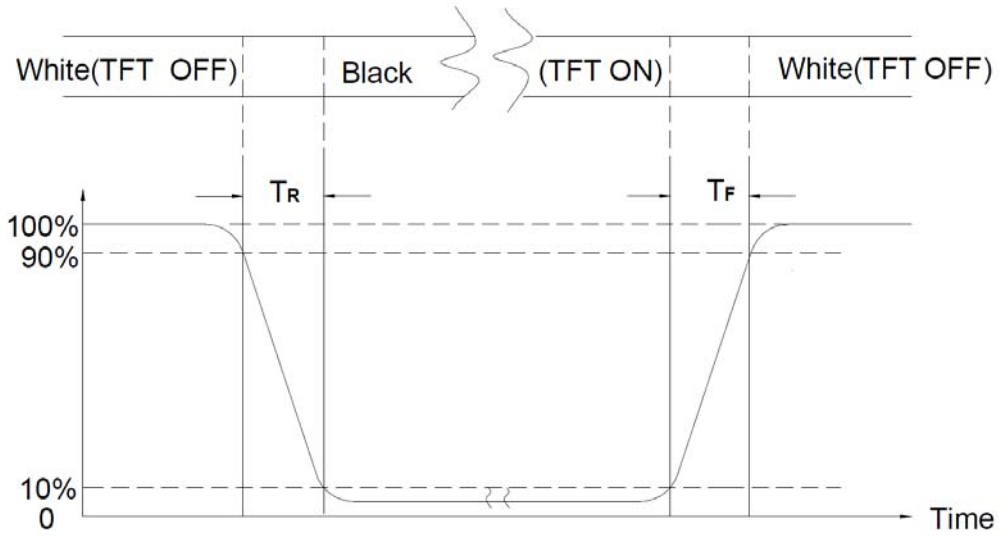
The contrast ratio can be calculated by the following expression

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

$L_{255}$ : Luminance of gray level 255,  $L_0$ : Luminance of gray level 0

Note (5) Definition Of Response Time (TR, TF)

**Definition of Response Time**

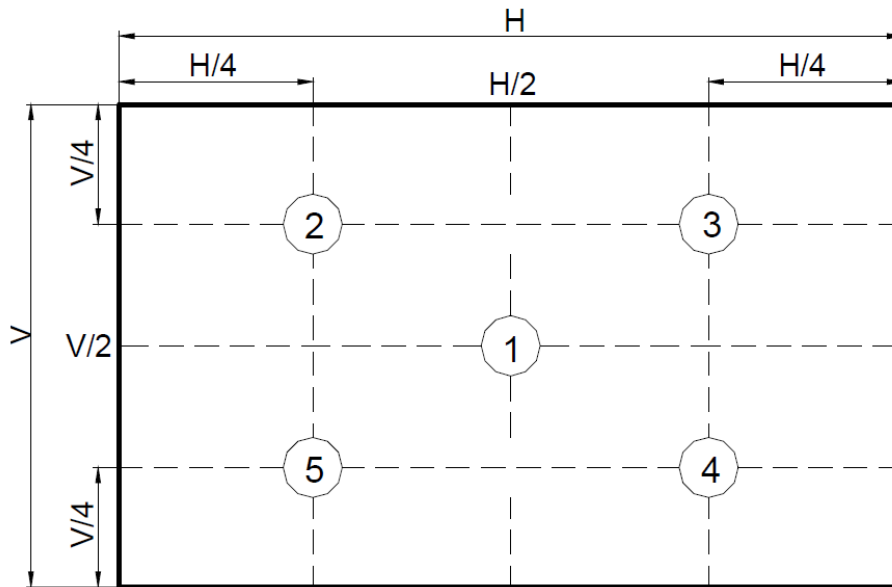


Note (6) Definition Of Luminance White

Measure the luminance of gray level L255 at center point (Ref.: Active Area) Display Luminance=  
 $(L1+L2+L3+L4+L5) / 5$

H—Active area length, V—Active area width, L—Luminance

**Measurement Locations**



## 10 Package Specification

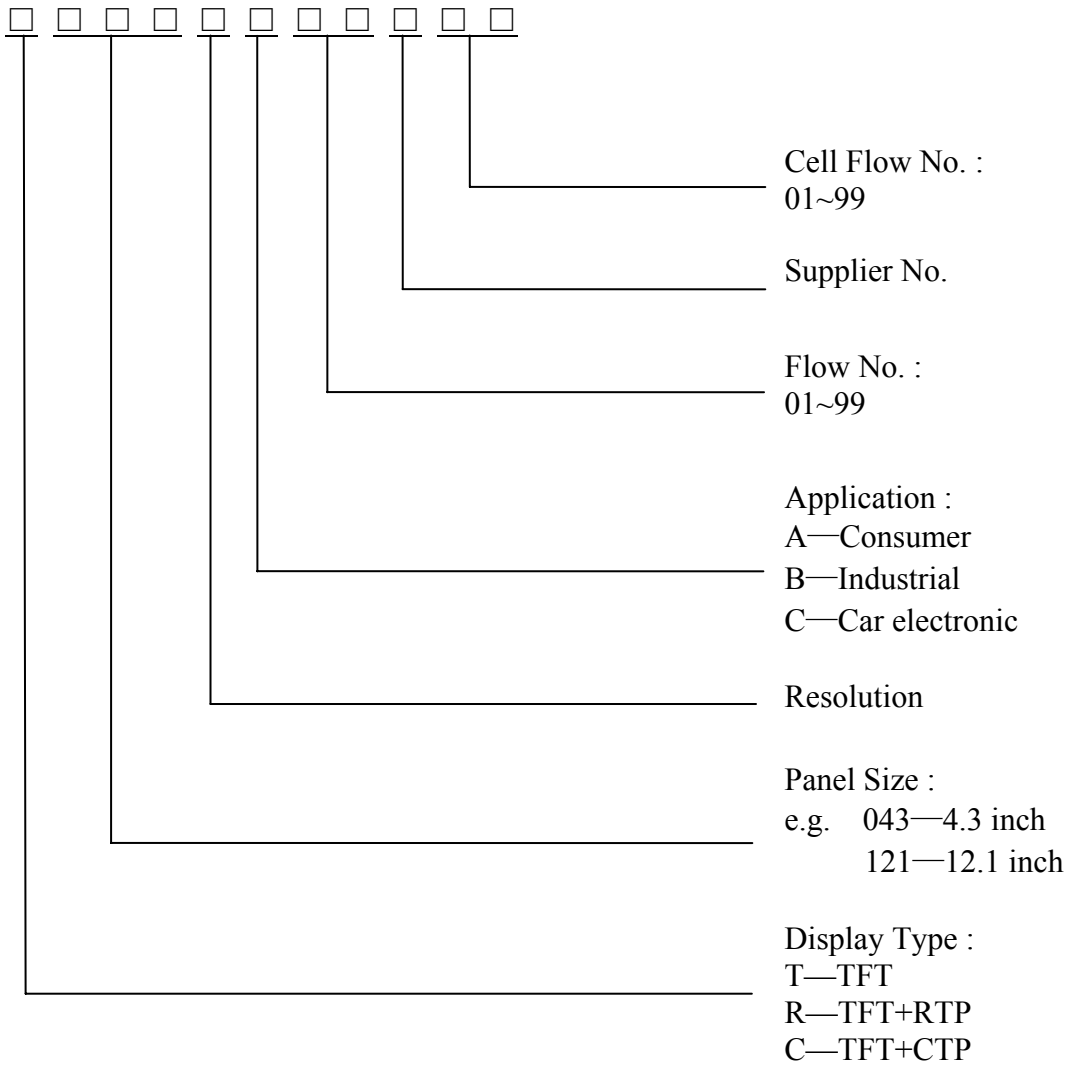
TBD



## 11 Reliability

| Item.                       | Condition                                   | Time (hrs) | Assessment                                   |
|-----------------------------|---|------------|--|
| High temp. Storage          | 85°C  | 240        | No abnormalities in function sand appearance |
| High temp. Operating        | 85°C  | 240        |  |
| Low temp. Storage           | -40°C                                       | 240        |  |
| Low temp. Operating         | -30°C                                       | 240        |  |
| Humidity                    | 60°C/ 90%RH                                 | 240        |  |
| Thermal Shock<br>Temp.Cycle | -40°C (30min.) ~85°C<br>(30min.),200 cycles | -          |  |

**12 Illustration of Product Name**



## 13 Precautions for operation and Storage

### 13.1 Precautions for Operation

- (1) Since the display panel is made of glass, do not apply any mechanical shock or impact or excessive force to it when installing the module. Any strong mechanical impact due to falling dropping etc. may cause damage (breakage or cracking).
- (2) If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- (3) The polarizer on the display surface is made of soft material and is easily scratched. Please take most care when handing. When the display surface is contaminated, please wipe it off gently by using moisten soft cloth with isopropyl alcohol, do not use water, ketone or aromatics. If still not completely clear, moisten cloth with isopropyl alcohol or ethyl alcohol solvents.
- (4) When handling the LCD module, please be sure that the body and the tools are properly grounded. And do not touch I/O pins with bare hands or contaminate I/O pins, it will cause disconnection or defective insulation of terminals.
- (5) Do not attempt to disassemble or process the LCD module.
- (6) The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
- (7) Do not put one product on the other .Otherwise, it may cause the product to bescratched and/or change on cosmetic occur (ex. Newton ring).

### 13.2 Soldering

- (1) Soldering should be performed only on the I/O terminals.
- (2) Use soldering irons with proper grounding and no leakage.
- (3) Iron: no higher than 300°C and 3~4 sec during soldering.

### 13.3 Precautions for Storage

- (1) Please store LCD module in a dark place. Avoid exposure to sunlight, the light of fluorescent lamp or any ultraviolet ray.
- (2) Keep the environment temperature between 0°C and 40°C and the relative humidity less than 80%.Avoid high temperature and high humidity.
- (3) Keep the LCD modules stored in the room without acid ,alkali and harmful gas.

### 13.4 Warranty period

Visionox warrants for a period of 12 months from the shipping date when stored or used under normal condition.