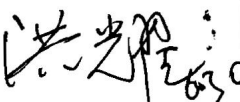
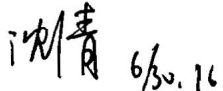


# Product Specification

**Product Name: T090KC01D01**

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

| Designed By                                                                                   | Checked by                                                                                    | Approved By                                                                               |                                                                                               |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
|                                                                                               |                                                                                               | R&D                                                                                       | QA                                                                                            |
|  2016.6.30 |  2016.6.30 |  6/30 |  6/30.16 |

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[illegible]

## 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.

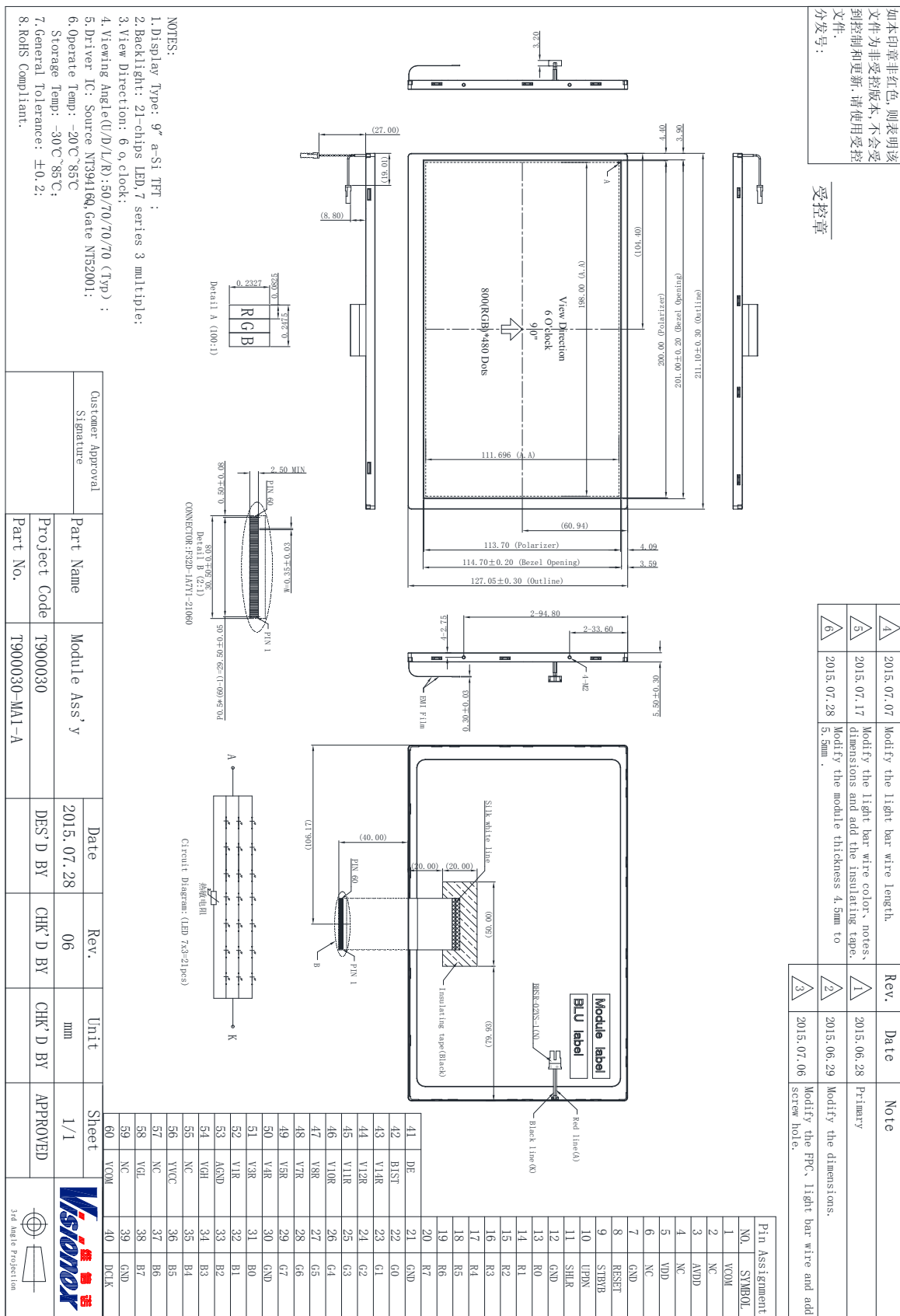
## 2 Features

- Panel Size: 9.0 inch
- Number of Pixels /Resolution: 800×RGB×480
- Interface: TTL
- RoHS and Halogen-Free Compliance
- Applications: Multimedia application and other hand application

## 3 General Information

| NO. | ITEM          | SPECIFICATION               | UNIT   |
|-----|---------------|-----------------------------|--------|
| 1   | Dot Matrix    | 800(W)×480(H)               | Pixels |
| 2   | Dot Pitch     | 0.2475 (W)×0.2327 (H)       | mm     |
| 3   | Active Area   | 198.00 (W)×111.696 (H)      | mm     |
| 4   | Module Size   | 211.10 (W)×127.05(H)×4.5(T) | mm     |
| 5   | Module Weight | TBD                         | gram   |
| 6   | Viewing Angle | 6 O'clock                   | -      |
| 7   | Driver IC     | NT39416Q+NT52001            | -      |

## 4 Mechanical Drawing



## 5 Module Interface

### Connector Name / Designation

|                  |                    |
|------------------|--------------------|
| Item             | Description        |
| Type/Part Number | 089H50-000000-G2-R |

### 5.1 LCD Module

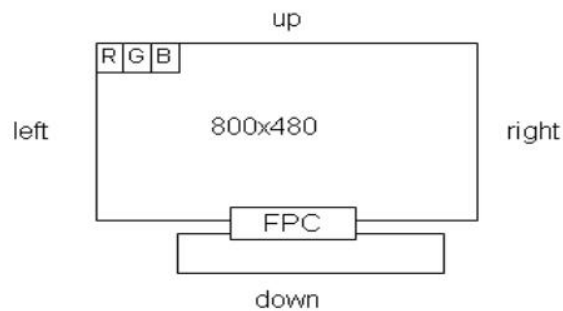
| NO.   | Symbol | Description                           |
|-------|--------|---------------------------------------|
| 1     | VCOM   | Common voltage                        |
| 2.    | NC     | No connection                         |
| 3     | AVDD   | Power for Analog                      |
| 4     | NC     | No connection                         |
| 5     | VDD    | Power for Digital Circuit             |
| 6     | NC     | No connection                         |
| 7     | GND    | Power Ground                          |
| 8     | RESET  | Global Reset pin                      |
| 9     | STBYB  | Standby mode                          |
| 10    | UPDN   | Gate Up or Down scan control          |
| 11    | SHLR   | Source Right or Left sequence control |
| 12    | GND    | Power Ground                          |
| 13-20 | R0-R7  | Red data                              |
| 21    | GND    | Power Ground                          |
| 22-29 | G0-G7  | Green data                            |
| 30    | GND    | Power Ground                          |
| 31-38 | B0-B7  | Blue data                             |
| 39    | GND    | Power Ground                          |
| 40    | DCLK   | Sample clock                          |
| 41    | DE     | Data Input Enable                     |
| 42    | BIST   | Aging Mode High Enable                |
| 43    | V14R   | Gamma Voltage                         |
| 44    | V12R   | Gamma Voltage                         |
| 45    | V11R   | Gamma Voltage                         |
| 46    | V10R   | Gamma Voltage                         |
| 47    | V8R    | Gamma Voltage                         |
| 48    | V7R    | Gamma Voltage                         |
| 49    | V5R    | Gamma Voltage                         |
| 50    | V4R    | Gamma Voltage                         |
| 51    | V3R    | Gamma Voltage                         |
| 52    | V1R    | Gamma Voltage                         |
| 53    | AGND   | Power Ground                          |
| 54    | VGH    | Gate ON Voltage                       |
| 55    | NC     | No connection                         |
| 56    | YVCC   | Power for Digital Circuit             |
| 57    | NC     | No connection                         |
| 58    | VGL    | Gate ON Voltage                       |
| 59    | NC     | No connection                         |
| 60    | VCOM   | Common voltage                        |

Note1: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

Note2: Data shall be latched at falling edge of DCLK.

Note3: Selection of scanning mode

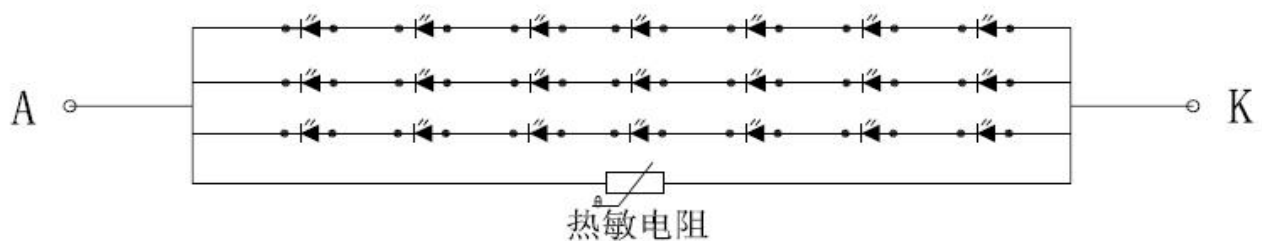
| Setting of scan controle |      | Scanning Direction         |
|--------------------------|------|----------------------------|
| SHLR                     | UPDN |                            |
| VDD                      | GND  | Left to Right , Up to Down |
| GND                      | GND  | Right to Left, Up to Down  |
| VDD                      | VDD  | Left to Right , Down to Up |
| GND                      | VDD  | Right to Left, Down to Up  |



## 5.2 Back-Light Unit

| Item                  | Symbol | MIN    | TYP | MAX  | UNIT | Test Condition | Note |
|-----------------------|--------|--------|-----|------|------|----------------|------|
| <b>Supply Voltage</b> | Vf     | 19.6   | 21  | 23.8 | V    | -              | -    |
| <b>Supply Current</b> | If     | -      | 150 | -    | mA   | -              | -    |
| <b>Uniformity</b>     | -      | 75     | 80  | -    | %    | -              | -    |
| <b>Life Time</b>      | -      | 30,000 | -   | -    | Hr   | -              | -    |

### 5.2.1 LED Backlight Block Diagram

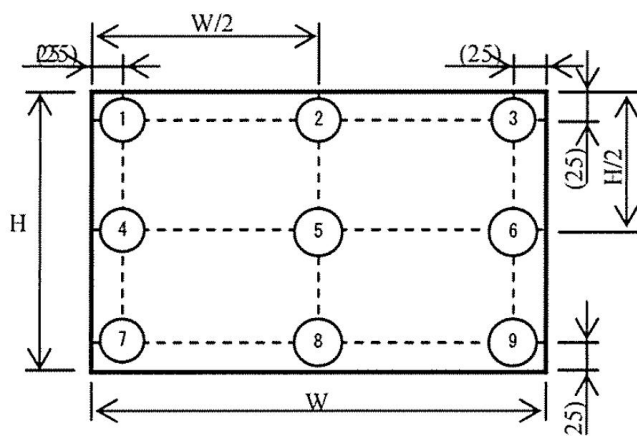


Circuit Diagram: (LED 7x3=21pcs)

## 5.2.2 Definition of Luminance Uniformity

Measure the luminance of gray level 9 points

$$\text{Transmittance} = \frac{\text{Luminance of LCD Module}}{\text{Luminance of Back light}} \times 100\%$$



## 6 Absolute Maximum Rating

### 6.1 Electrical Absolute Rating

| Item                  | Symbol           | Min | Max | Unit |
|-----------------------|------------------|-----|-----|------|
| Power Supply          | VDD              | 2.7 | 3.6 | V    |
| Operating temperature | TOP              | -20 | 85  | °C   |
| Storage temperature   | TST              | -30 | 85  | °C   |
| Humidity              | RH               | 10  | 90% | RH   |
| Supply current        | I <sub>VCC</sub> | -   | -   | mA   |

Note: When you apply the LCD module for OA system. Please make sure to keep the temperature of LCD module is less than 75°C.

## 7 Electrical Characteristics

### 7.1 DC Electrical Characteristics

| Item           | Symbol    | Condition   | Min.   | Typ.  | Max.  | Unit |
|----------------|-----------|-------------|--------|-------|-------|------|
| Supply voltage | VGH       | -           | 21.3   | 22    | 22.7  | V    |
|                | VDD       |             | 3.0    | 3.3   | 3.6   | V    |
|                | VCOM      |             | 4.0    | 4.2   | 4.4   | V    |
|                | VGL       |             | -5.7   | -5    | -4.3  | V    |
|                | AVDD      |             | 11.97  | 12.12 | 12.27 | V    |
| Input Voltage  | $V_{IN}$  | -           | 0.7VCC | -     | VCC   | V    |
| Supply current | $I_{VCC}$ | Without LED | -      | TBD   | -     | mA   |

Note: Voltage greater than above may damage the module. All voltages are specified relative to VSS=0V

## 7.2 AC Characteristics

### Timing Characteristics

Synchronization Method : DE only

| Parameter               | Symbol   | Min. | Typ. | Max. | Unit | Notes |
|-------------------------|----------|------|------|------|------|-------|
| CLKIN cycle time        | Tcph     | 20   |      |      | ns   | -     |
| CLKIN pulse duty        | Tcwh     | 40   | 50   | 60   | %    | -     |
| Data set-up time        | Tdsu     | 8    | -    | -    | ns   | -     |
| Data hold time          | Tdhd     | 8    | -    | -    | ns   | -     |
| DE setup time           | Tesu     | 8    | -    | -    | ns   | -     |
| DE hold time            | Tehd     | 8    | -    | -    | ns   | -     |
| Output stable time      | Tsst     | -    | -    | 6    | us   | -     |
| DCLK Frequency          | fclk     | 28   | 30   | 40   | MHz  | -     |
| Horizontal Display Area | thd      | 800  |      |      | DCLK | -     |
| One Horizontal Line     | th       | 908  | 928  | 1080 | DCLK | -     |
| H Blank Area            | th-blank | 108  | 128  | 280  | DCLK | -     |
| Vertical Display Area   | tvd      | 480  |      |      | H    | -     |
| V Period time           | tv       | 517  | 525  | 704  | H    | -     |
| V Blank Area            | tv-blank | 37   | 45   | 224  | H    | -     |

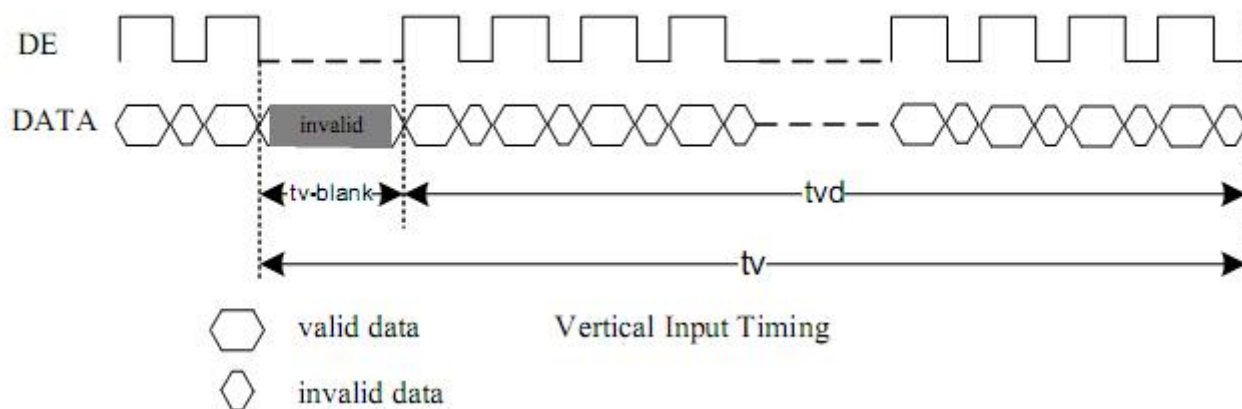
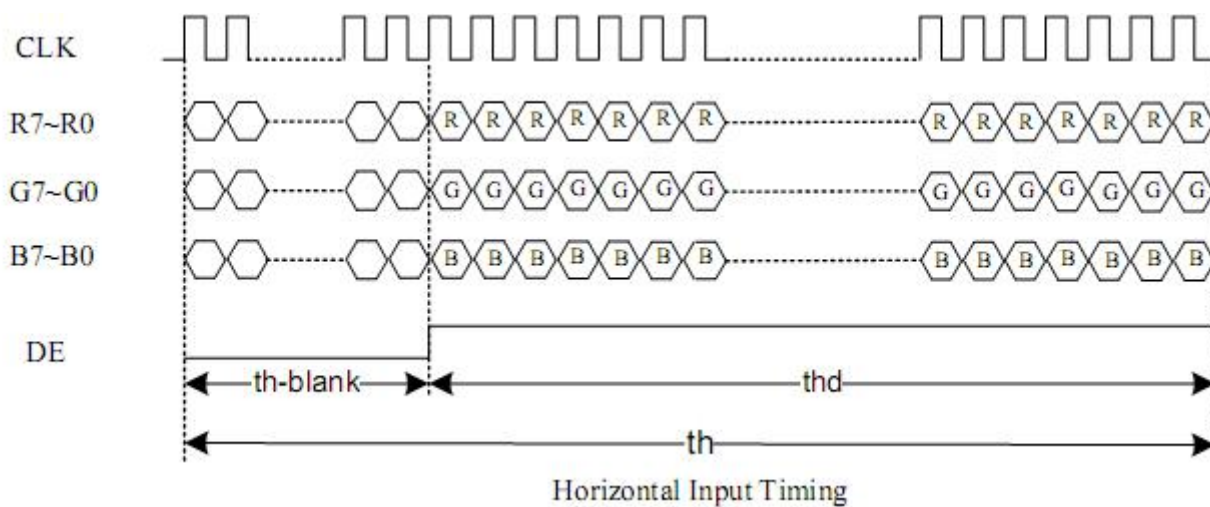
Note: H Blank area and V Blank area can not be changed at every frame

### DC Electrical

(VDD=2.7 to 3.6V ,TA=-20 to +85°C)

| Parameter                | Symbol | Min.    | Typ. | Max.    | Unit | Conditions              |
|--------------------------|--------|---------|------|---------|------|-------------------------|
| Low level input voltage  | Vil    | 0       | -    | 0.3*VDD | V    | For the digital circuit |
| High level input voltage | Vih    | 0.7*VDD | -    | VDD     | V    | For the digital circuit |

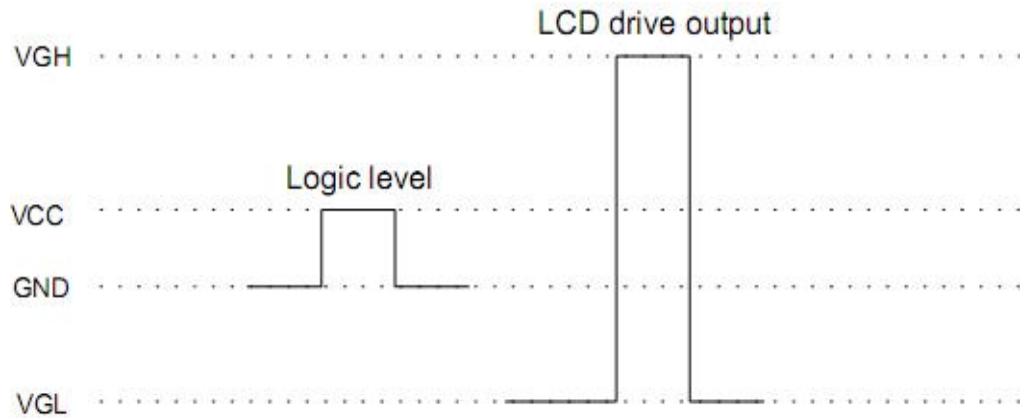
Timing Characteristics



## 8 Power ON/OFF Sequence

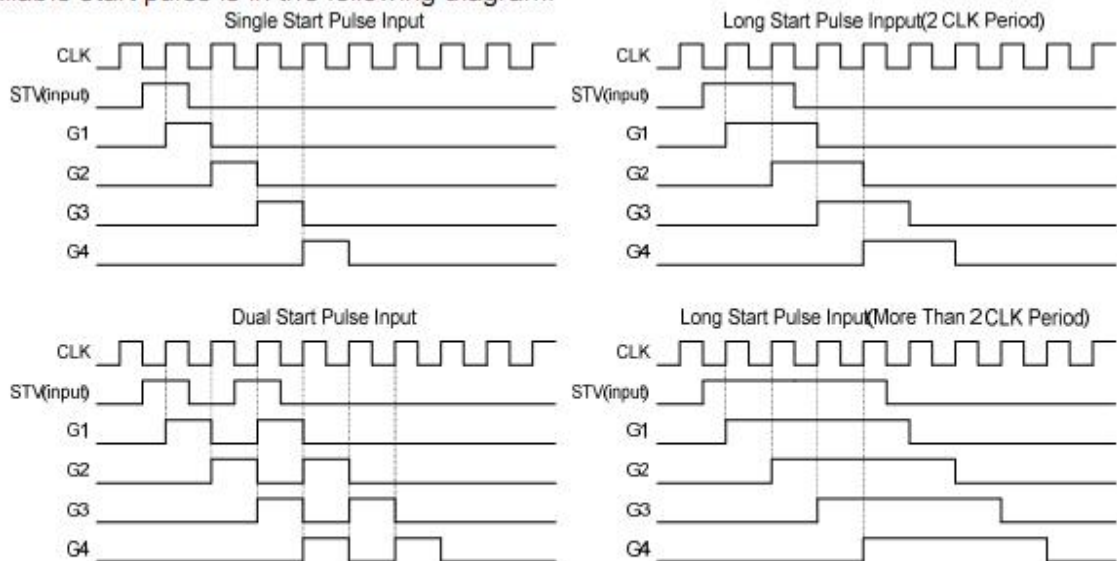
### 8.1 Power ON/OFF Sequence

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



Note1: For the input signals: CLK, MODE, XON, SEL, OE, U\_D, STVD & STVU, "High" level = VCC, "Low" level = GND.

The available start pulse is in the following diagram.



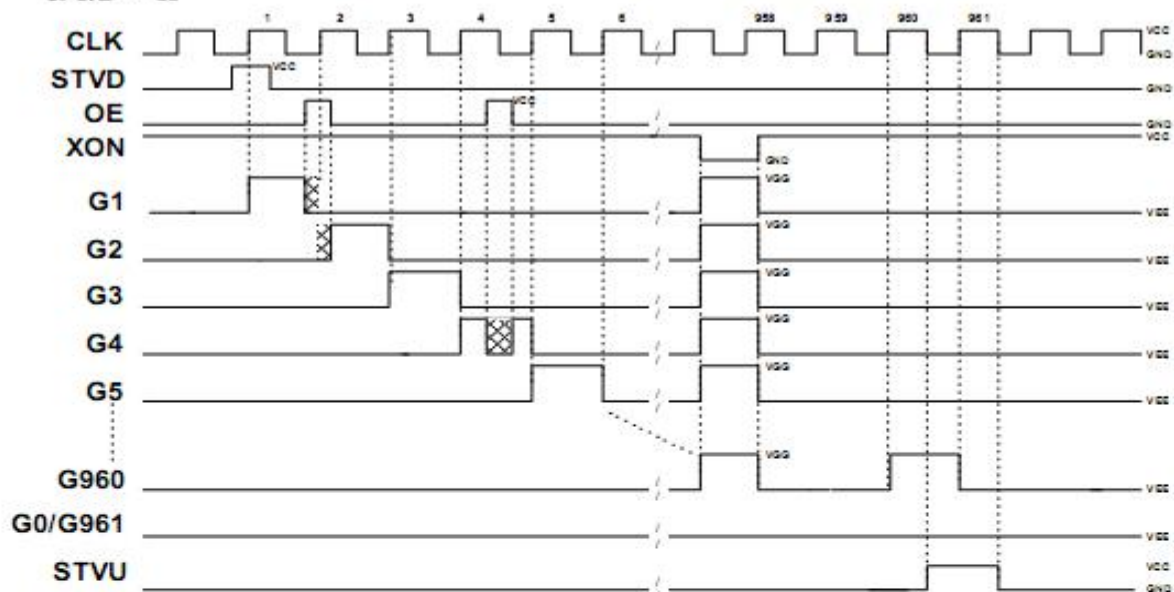
Note2: The Output Turn-On Timing will change following by Start Pulse Waveform.

Note3: For Dual Start Pulse Input, the space of STV between two pulse must be 1 CLK period.

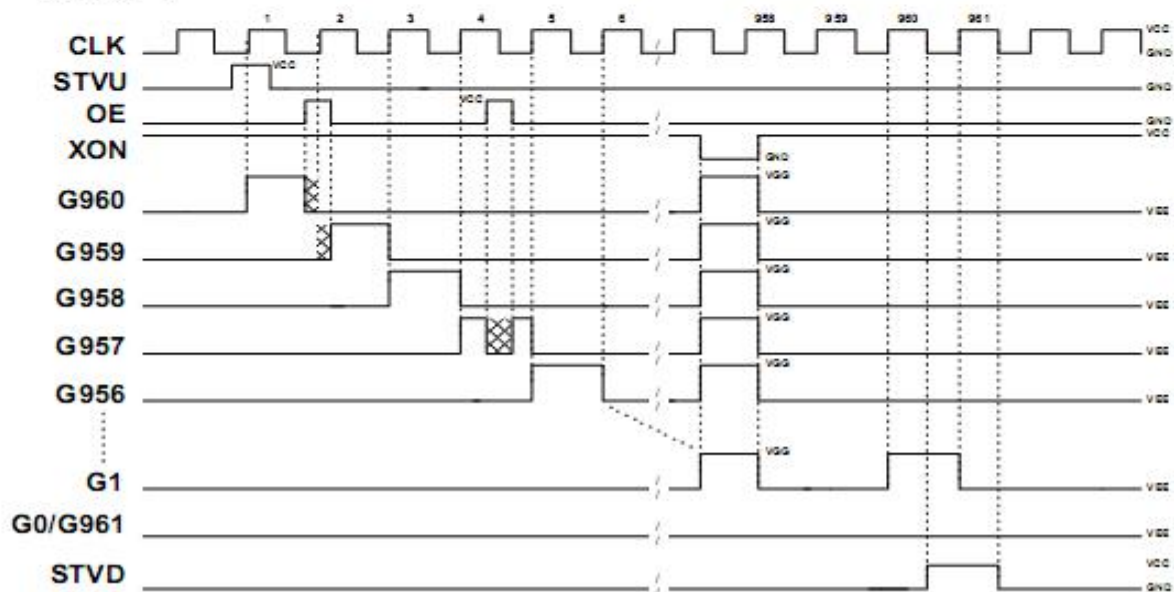
Note4: For Long Start Pulse Input (more than 2 CLK Period), the Length of Start Pulse must be less than the Length of 6 CLK Period.

## Operating Conduction

### 1. U/D = "H"



### 2. U/D = "L"



## 8.2 Recommended Software Initialization

TBD

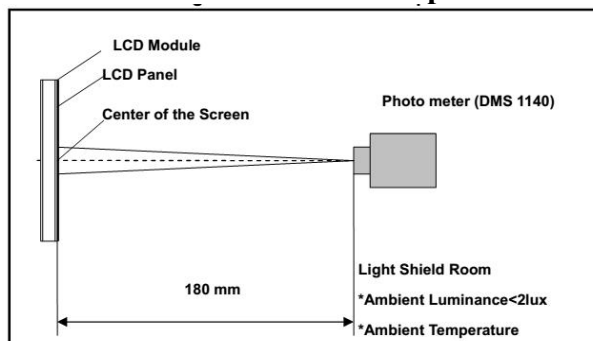
## 9 Optical characteristics

| Item                            | Conditions       | Min.          | Typ. | Max.          | Unit              | Note                            |
|---------------------------------|------------------|---------------|------|---------------|-------------------|---------------------------------|
| Viewing Angle<br>(CR>10)        | Horizontal       | $\theta_L$    | 60   | 70            | -                 | degree<br>(1)(2)(3)             |
|                                 |                  | $\theta_R$    | 60   | 70            | -                 |                                 |
|                                 | Vertical         | $\theta_T$    | 40   | 50            | -                 |                                 |
|                                 |                  | $\theta_B$    | 60   | 70            | -                 |                                 |
| Contrast Ratio                  | Center           | 400           | 500  | -             | -                 | (1)(2)(4)                       |
| Response Time                   | Rising + Falling | -             | 35   | 35            | ms                | (1)(2)(5)                       |
| Color Chromaticity<br>(CIE1931) | Red x            | Typ.<br>-0.05 | TBD  | Typ.<br>+0.05 | -                 | (1)(2)<br>$\theta=\Phi=0^\circ$ |
|                                 | Red y            |               | TBD  |               | -                 |                                 |
|                                 | Green x          |               | TBD  |               | -                 |                                 |
|                                 | Green y          |               | TBD  |               | -                 |                                 |
|                                 | Blue x           |               | TBD  |               | -                 |                                 |
|                                 | Blue y           |               | TBD  |               | -                 |                                 |
|                                 | White x          | -             | TBD  | -             | -                 |                                 |
|                                 | White y          | -             | TBD  | -             | -                 |                                 |
| White Luminance                 | -                | 600           | 650  | -             | cd/m <sup>2</sup> | (1)(2)(6)                       |

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



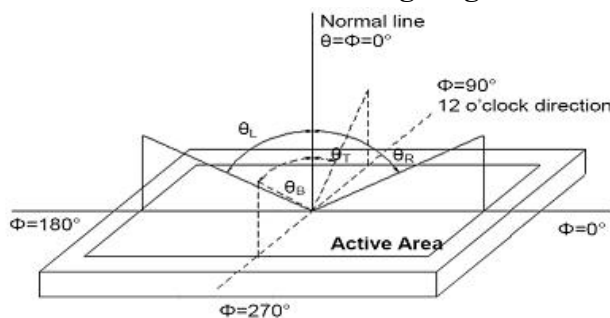
Note (2) The LED input parameter setting as:

V\_LED: 21V

PWM\_LED: duty 100 %

Note (3) Definition of Viewing Angle

### Definition of Viewing Angle

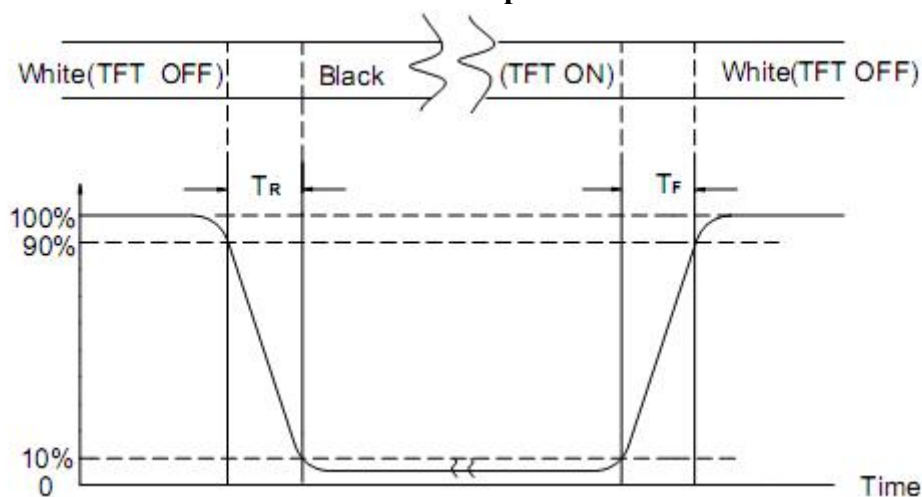


**Note (4) Definition Of Contrast Ratio (CR)**

The contrast ratio can be calculated by the following expression

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

L255: Luminance of gray level 255, L0: Luminance of gray level 0

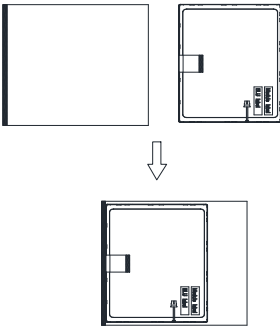
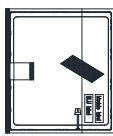
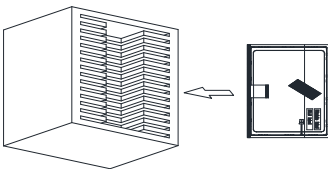
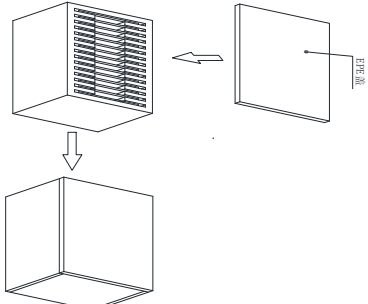
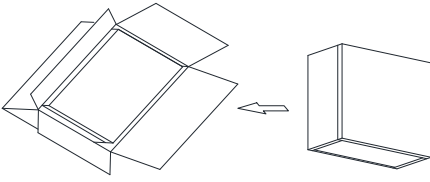
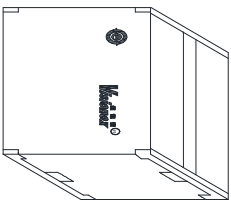
**Note (5) Definition Of Response Time (TR, TF)**
**Definition of Response Time**

**Note (6) Definition Of Luminance White**

Measure the luminance of gray level 255 at center point (Ref.: Active Area)

Display Luminance=L1

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

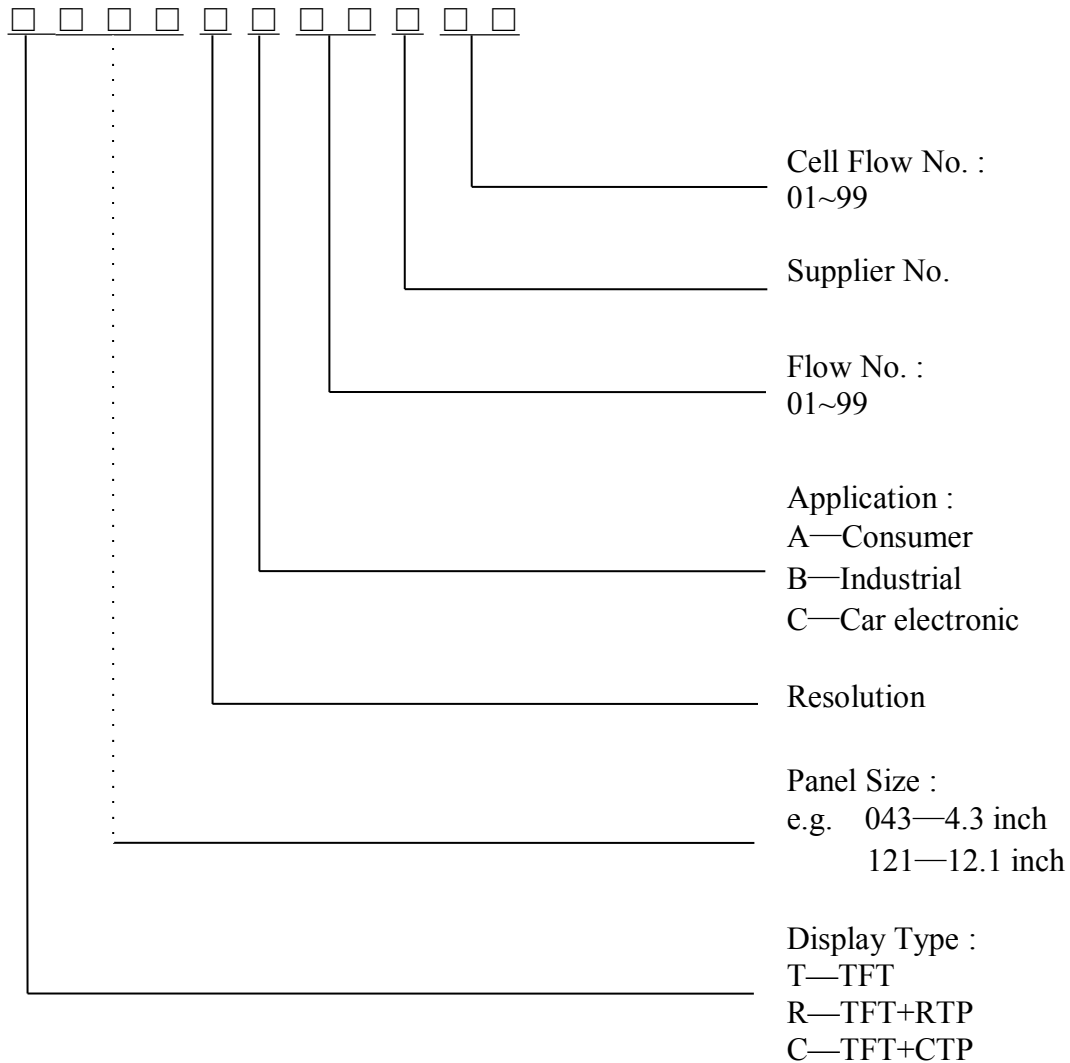
## 10 Package Specification

| Packing Process (1)~(6)                                                                                                                            |                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <p>( 1 ) Part No. : T900030-MA1-A<br/>1pcs LCM+1pcs PE bag.</p>  | <p>( 2 ) Put the LCM in the PE bag; the mouth sealed with adhesive tape.</p>  | <p>( 3 ) FPC face down, put the LCM in the EPE card slot, total 15PCS, 15pcs/inner carton.</p>                                                                                                                                                                 | <p>( 4 ) Cover EPE cap.</p>  |
| <p>( 5 ) Put the EPE box in the inner carton.</p>                 | <p>( 6 ) Package QTY:<br/>LCM 30pcs/master carton.</p>                         | <p>1、The inner carton and master carton must be sealed with adhesive tape.<br/>2、If there is a gap please add the EPE.<br/>3、If the customer has special needs with the RoHS making, the inner carton and master carton need adhesive new RoHS marking at .</p> |                                                                                                                  |

## 11 Reliability

| Item    |                                    | Test Conditions                                                                                                                                                       | Remark    |
|---------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| RA Test | High Temp. Operating               | 85℃,300hrs Judge,/500hrs Reference;                                                                                                                                   |           |
|         | High Temp. Storage                 | 85℃,300hrs Judge,/500hrs Reference;                                                                                                                                   |           |
|         | Low Temp. Operating                | -20℃,300hrs Judge,/500hrs Reference;                                                                                                                                  |           |
|         | Low Temp. Storage                  | -30℃,300hrs Judge,/500hrs Reference;                                                                                                                                  |           |
|         | High Temp. High Humidity Operating | 60℃,85%RH,300hrs Judge,/500hrs Reference;                                                                                                                             |           |
|         | High Temp. High Humidity Storage   | 60℃,90%RH,300hrs Judge,/500hrs Reference;                                                                                                                             |           |
|         | Thermal Shock Non-operating Test   | -20℃~85℃, 60min/each cycle,100 cyc,                                                                                                                                   |           |
|         |                                    | 200cyc for reference                                                                                                                                                  |           |
|         | Thermal Cycle                      | -20~85℃,20%~90%RH, 4cycle,29hrs/cycle                                                                                                                                 |           |
|         |                                    | ( 25℃/50%→85℃/20%,1hrs; 85℃/20%,6hrs;                                                                                                                                 |           |
|         |                                    | 85℃/20%→60℃/90%,1hrs; 60℃/90%,6hrs                                                                                                                                    |           |
|         |                                    | 60℃/90%→-20℃/0%,2hrs; -20℃/0%,12hrs;                                                                                                                                  |           |
|         | Image Sticking                     | -20℃/0%→25℃/50%,1hrs;)                                                                                                                                                |           |
|         |                                    | Normal temperature chessboard 7*5,change 50% Gray pattern ;                                                                                                           |           |
|         |                                    | CheckPoint:<br>2hrs(10s,8%),4hrs(10s,8%),8hrs(2min,8%),24hrs<br>Reference (5min,8% )                                                                                  |           |
|         |                                    | High Temperature65℃, chessboard 7*5,change 50% Gray pattern ;                                                                                                         | Reference |
|         | ESD                                | CheckPoint:<br>2H (10s,8%), 4H (10s,8%)                                                                                                                               |           |
|         |                                    | Operating: Contact: ±8KV(module)Class B                                                                                                                               | Reference |
|         |                                    | Air:±8KV(module),Class B                                                                                                                                              |           |
|         | Shock                              | ±15KV(Module),Classic C                                                                                                                                               |           |
|         |                                    | 100G, 6ms, sine wave,<br>±XYZx3times, Total 18times                                                                                                                   | Module    |
|         | Vibration Test                     | Hakf-sine<br>Frequency: 8Hz~33Hz<br>Stroke: 1.3mm<br>Sweep: 2.9G 33.3Hz~400Hz X,Z<br>Cycle: 15 minutes<br>2 hrs for each direction of X,Z;<br>4 hours for Y direction | Module    |
|         |                                    | Random<br>0.015G2/Hz from 5-200Hz -6Db/octave from 200-500Hz<br>1hrs for X/Y/Z, total 3hrs                                                                            | Package   |
|         | Drop Test                          | 1 cornor, 3axis, 6sides, 65cm                                                                                                                                         | Package   |

## 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.

# Mouser Electronics

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