# MODEL NO. :  TM050QDH01

# ISSUED DATE:  2011-04-07

# VERSION     :  Ver 2.1

□**Preliminary Specification**
■**Final Product Specification**

**Customer :**

| Approved by | Notes |
|---|---|
|  |  |

**SHANGHAI TIANMA Confirmed :**

| Prepared by | Checked by | Approved by |
|---|---|---|
|  |  |  |

This technical specification is subjected to change without notice

# Table of Contents

# Record of Revision

| Rev | Issued Date | Description | Editor |
|---|---|---|---|
| 1.0 | 2010-7-18 | Preliminary Specification Release | Jianchuan Wang |
| 1.1 | 2010-11-23 | 1.Update Reliability test conditon(follow Cisco's First Level Qualification for Display Modules) 2.Update Chromaticity data according to actual sample measure data | Haitao Chen |
| 1.2 | 2010-12-02 | Update High Temperature, High Humidity Operation Test Condition | Haitao Chen |
| 1.3 | 2011-2-23 | 1. Final Product Specification Release 2. Page21: Update High Temperature, High Humidity Operation Test Condition: 60℃ 90%RH. 3. Page21: Add MTBF information and Note. 4. Page 17: Add min 75% for uniformity; Add min 46% for NTSC. | Adam Hu |
| 2.0 | 2011-2-23 | 1. Final Product Specification Release | Adam Hu |
| 2.1 | 2011-04-07 | Update the Power of LED backlight, Current of VLED and Power Consumption. | Pingping wang |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

## 1  General Specifications

| Feature | | Spec |
|---|---|---|
| **Display Spec.** | Size | 5.0 inch |
| | Resolution | 640(RGB) x 480 |
| | Interface | RGB 18 bit with TCON+SPI |
| | Color Depth | 262K |
| | Technology Type | a-Si TFT |
| | Pixel Pitch (mm) | 0.1587x0.1587 |
| | Pixel Configuration | R.G.B Vertical Stripe |
| | Display Mode | TM with Normally White |
| | Surface Treatment(Up Polarizer) | Anti-Glare (3H) |
| | Viewing Direction | 6 o'clock |
| | Gray Scale Inversion Direction | 12 o'clock |
| **Mechanical Characteristics** | LCM (W x H x D) (mm) | 117.35x88.43x7.9 |
| | Active Area(mm) | 101.568 x 76.176 |
| | With /Without TSP | Without TSP |
| | Weight (g) | 82.2(+-5%) |
| | LED Numbers | 15 LEDs |
| **Electronic** | Driver IC | NT39403Bx2+NT39207x1 |

Note 1: Viewing direction for best image quality is different from TFT definition, there is a 180 degree shift.

Note 2: Requirements on Environmental Protection: Q/S0002

Note 3: LCM weight tolerance : +/- 5%

## 2  Input/Output Terminals

### 2.1  CN1 of FPC

Matching connector: FH19S-40S-0.5SH (Hirose)

| Pin | Symbol | I/O | Description | Remark |
|-----|--------|-----|-------------|--------|
| 1 | VLED | P | Power for LED Circuit | |
| 2 | VLED | P | Power for LED Circuit | |
| 3 | VLED | P | Power for LED Circuit | |
| 4 | DIM | I | Dimmer Control for Backlight (PWM) | |
| 5 | LEDGND | P | Ground for LED Circuit | |
| 6 | LEDGND | P | Ground for LED Circuit | |
| 7 | LEDGND | P | Ground for LED Circuit | |
| 8 | GND | P | Ground | |
| 9 | VDD | P | Power Supply | |
| 10 | VDD | P | Power Supply | |
| 11 | GND | P | Ground | |
| 12 | R0 | I | Red Data (LSB) | |
| 13 | R1 | I | Red Data | |
| 14 | R2 | I | Red Data | |
| 15 | R3 | I | Red Data | |
| 16 | R4 | I | Red Data | |
| 17 | R5 | I | Red Data (MSB) | |
| 18 | GND | P | Ground | |
| 19 | G0 | I | Green Data (LSB) | |
| 20 | G1 | I | Green Data | |
| 21 | G2 | I | Green Data | |
| 22 | G3 | I | Green Data | |
| 23 | G4 | I | Green Data | |
| 24 | G5 | I | Green Data (MSB) | |
| 25 | GND | P | Ground | |
| 26 | B0 | I | Blue Data (LSB) | |
| 27 | B1 | I | Blue Data | |
| 28 | B2 | I | Blue Data | |

| 29 | B3 | I | Blue Data | |
|----|------|-----|-----------------------------|---|
| 30 | B4 | I | Blue Data | |
| 31 | B5 | I | Blue Data (MSB) | |
| 32 | GND | P | Ground | |
| 33 | DCLK | I | Pixel Clock | |
| 34 | HSYNC | I | Horizontal Sync Signal | |
| 35 | VSYNC | I | Vertical Sync Signal | |
| 36 | DE | I | Data Enable | |
| 37 | GND | P | Ground | |
| 38 | SPENA | I | Serial Port Data Enable | |
| 39 | SPCK | I | Serial Port Clock | |
| 40 | SPDA | I/O | Serial Port Data Input/Output | |

Note 1:   I/O definition：

I-----Input        O---Output        P----Power(Ground)

## 3 Absolute Maximum Ratings

### 3.1 Driving TFT LCD Panel

Ta = 25°C

| Item | Symbol | Min | Max | Unit | Remark |
|------|--------|-----|-----|------|--------|
| Power Voltage | VDD | -0.50 | 5.0 | V | |
| | VLED | -0.3 | 7.0 | V | |
| Input signal Voltage | Vin | GND | VDD | V | Note1 |
| Operating Temperature | T$_{OPR}$ | -20 | 70 | ℃ | |
| Storage Temperature | T$_{STG}$ | -20 | 70 | ℃ | |

Note1: Signals include R0~R5, G0~G5, B0~B5, DCLK, HSYNC, VSYNC, DE, SPENA, SPCK, SPDA.

**Table 3.1 absolute maximum rating**

## 4 Electrical Characteristics

### 4.1 Driving TFT LCD Panel

VDD=3.3V,GND=0V, Ta = 25℃

| Item | | Symbol | Min | Typ | Max | Unit | Remark |
|------|------|--------|-----|-----|-----|------|--------|
| POWER Supply Voltage | | VDD | 3.00 | 3.30 | 3.60 | V | |
| Input Signal Voltage | Low Level | V$_{IL}$ | GND | - | 0.2xVDD | V | Note2 |
| | High Level | V$_{IH}$ | 0.8xVDD | - | VDD | V | |
| Output Signal Voltage | Low Level | V$_{IL}$ | GND | - | 0.2xVDD | V | Note2 |
| | High Level | V$_{IH}$ | 0.8xVDD | - | VDD | V | |
| Current of VDD Power supply | | I$_{VDD}$ | - | 200 | 300 | mA | Note3 |
| Power consumption of VDD | | W$_{VDD}$ | - | 660 | 1080 | mW | |

Note2: Input Signals include DCLK,R0~R5,G0~G5,B0~B5, HSYNC, VSYNC, DE, SPENA, SPCK,SPDA. Output Signals include SPDA.

Note3: To test the current dissipation, use "all Black Pattern".

**Table 3.2 LCD module electrical characteristics**

### 4.2 Driving Backlight

LEDGND=GND=0V, Ta = 25℃

| Item | | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|---|
| POWER of LED backlight | | $V_{LED}$ | - | 9.75 | 10.35 | V | |
| Current of VLED | | $I_{VLED}$ | - | 100 | - | mA | |
| Power Consumption | | $W_{BL}$ | - | 975 | - | mW | |
| Operating Life Time | | -- | - | 50,000 | - | Hrs | |
| DIM Signal Voltage | Low Level | $V_{IL}$ | - | - | 0.4 | V | |
| | High Level | $V_{IH}$ | 2 | - | - | V | |
| DIM Signal frequency | | $f_{DIM}$ | 20 | | 40 | KHZ | |
| DIM Signal duty | | - | 0 | - | 100 | % | |

**Table 4.3 LED backlight characteristics**

Note:



LED anode                                          LED cathode
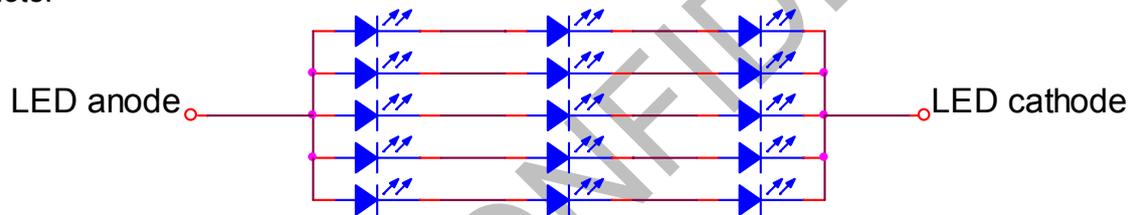
1）. The LED lifetime is defined as the module brightness decay 50% of original brightness at Ta=25 degree, VLED=5.0V.

2）. Environmental conditions such as sustained high operating temperatures, high humidity, operating conditions and other factors have an adverse effect on LED Lifetime. It is difficult to characterize LED lifetime for all the various operational, environmental and design permutations possible. Numerous environmental conditions such as ambient temperature, humidity and ventilation have impact on LED brightness decay. Brightness decay is also affected by control, thermal management, current levels, and other electrical design considerations.

3）. The SHTM typical value of LED Lifetime is estimated to be "50,000hrs" which is based on non-full life testing and our supplier's data. Full life testing for LEDs is impractical due to the long expected lifetime. Even with 24/7 operation, testing an LED for 50,000 hours would take 5.7 years, and such an endeavor is impractical because technology continues to develop and evolve so quickly, products would be obsolete by the time life testing is completed. Results based on actual usage environment may vary. This means that SHTM shall not be held liable for any problems related to LED life time that do not meet SHTM typical value from the use of SHTM's module.

### 4.3    Block Diagram
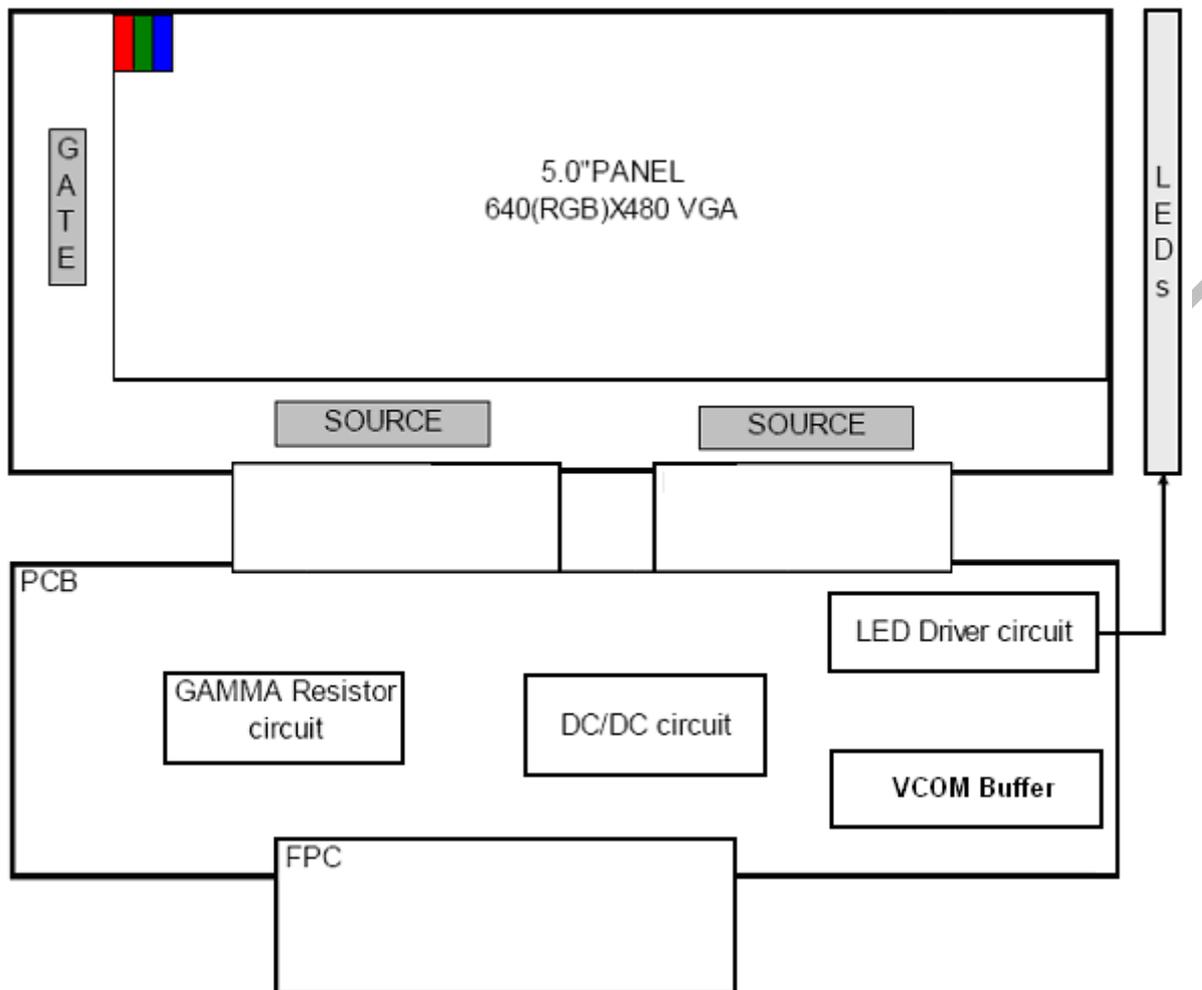
## 5 Timing Chart

### 5.1 TCON (Embedded in Source IC) Input timing at HV mode

VDD=3.3V, GND=0V, Ta=25℃

| Parameter | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|
| DCLK | Fclk | - | 25.2 | 30 | MHz | Tclk=1/Fclk |
|  | Tclk | 33.3 | 39.7 | - | ns |  |
| HSYNC | TH | - | 800 | - | Tclk |  |
|  | THD | 640 | 640 | 640 | Tclk |  |
|  | Thwh | - | 10 | - | Tclk |  |
|  | Thbp | - | 70 | - | Tclk |  |
|  | Thfp | - | 90 | - | Tclk |  |
| VSYNC | TV | - | 525 | - | TH |  |
|  | TVD | 480 | 480 | 480 | TH |  |
|  | Tvwh | - | 2 | - | TH |  |
|  | Tvbp | - | 13 | - | TH |  |
|  | Tvfp | - | 32 | - | TH |  |

Note: Above parameters are based on default setting without initial setting.

**Table 5.1 TCON input timing(HV mode)**
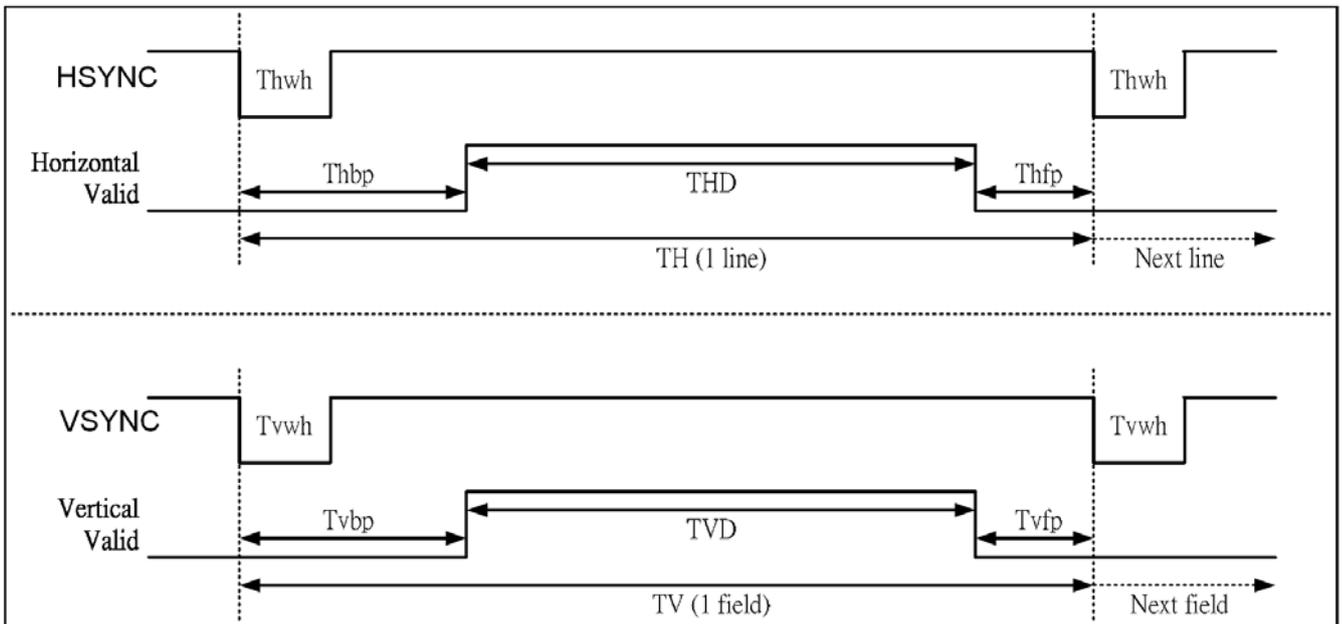


**Figure5.1 HV Mode Input Timing Diagram**

### 5.2  TCON (Embedded in Source IC) Input timing at HV mode

VDD=3.3V, GND=0V, Ta=25℃

| Parameter | | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|---|
| Dclk frequency | | Fclk | - | 25.2 | 30 | MHz | Tclk=1/Fclk |
| Horizontal section | Horizontal total | TH | 688 | 800 | 1405 | Tclk | |
| | Horizontal blanking | THC | 48 | 160 | 765 | Tclk | |
| | Valid Data Width | THD | 640 | 640 | 640 | Tclk | |
| Vertical section | Frame rate | - | - | - | 60 | - | Hz | |
| | Vertical total | TV | 486 | 525 | 735 | TH | |
| | Vertical blanking | TVC | 6 | 45 | 255 | TH | |
| | Valid Data Width | TVD | 480 | 480 | 480 | TH | |

**Table 5.2 TCON input timing (DE mode)**
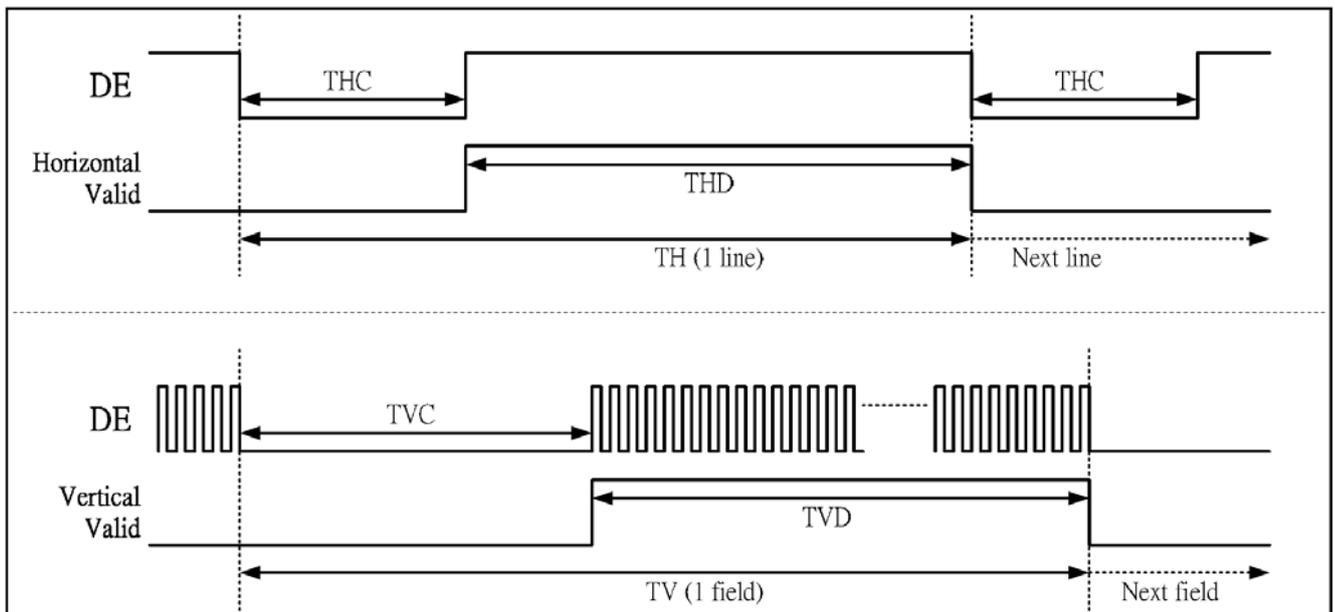


**Figure5.2 DE Mode Input Timing Diagram**

## 5.3 RGB Input Data Format
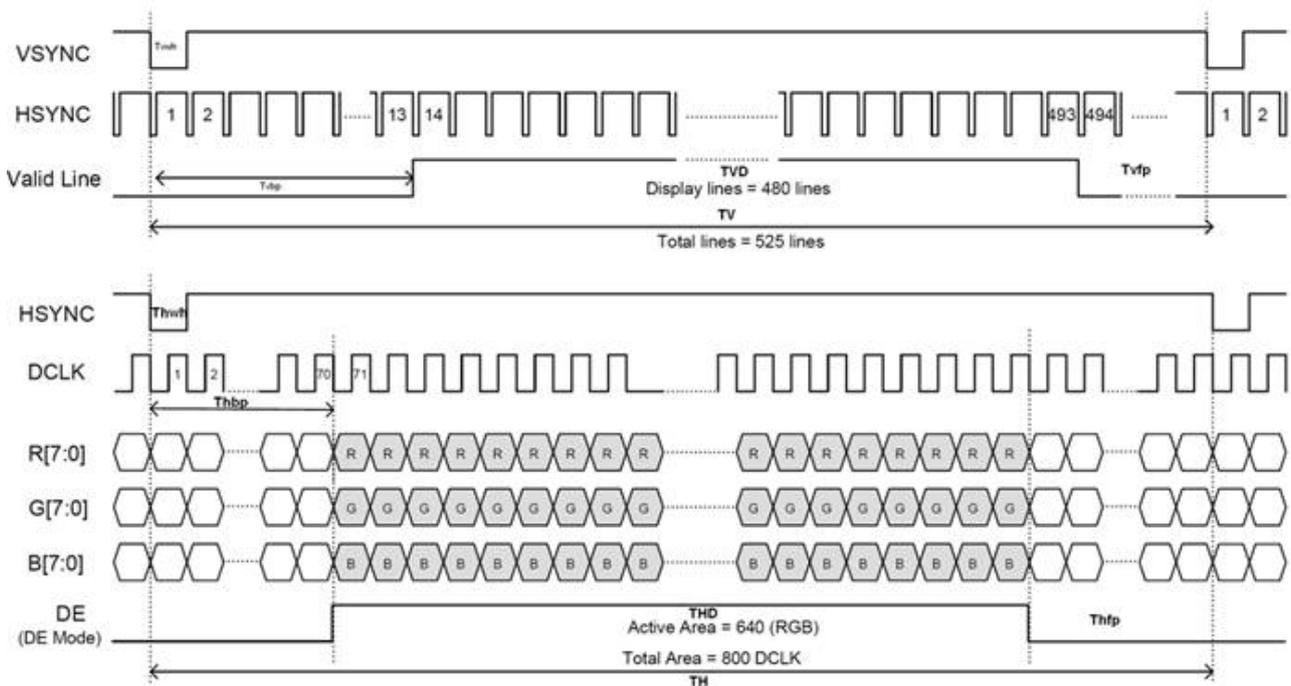


**Figure5.3 RGB input timing**

## 5.4 Input signal AC timing

VDD=3.3V, GND=0V, Ta=25℃

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| DCLK frequency | Fclk | - | 25.2 | 30 | MHz | Tclk=1/Fclk |
| DCLK duty cycle | Tcwh | 40% | 50% | 60% | Tclk | |
| HSYNC to DCLK | Thc | - | - | 1 | Tclk | |
| HSYNC width | Thwh | 1 | - | - | Tclk | |
| HSYNC Period Time | Th | 60 | 63.56 | 67 | us | |
| VSYNC setup time | Tvst | 12 | | | ns | |
| VSYNC hold time | Tvhd | 12 | - | - | ns | |
| HSYNC setup time | Thst | 12 | | | ns | |
| HSYNC hold time | Thhd | 12 | - | - | ns | |
| Data setup time | Tdsu | 12 | | | ns | Data to DCLK |
| Data hold time | Tdhd | 12 | - | - | ns | Data to DCLK |
| DE setup time | Tesu | 12 | - | - | ns | DE to DCLK |

**Table 5.3 Input signal AC timing**
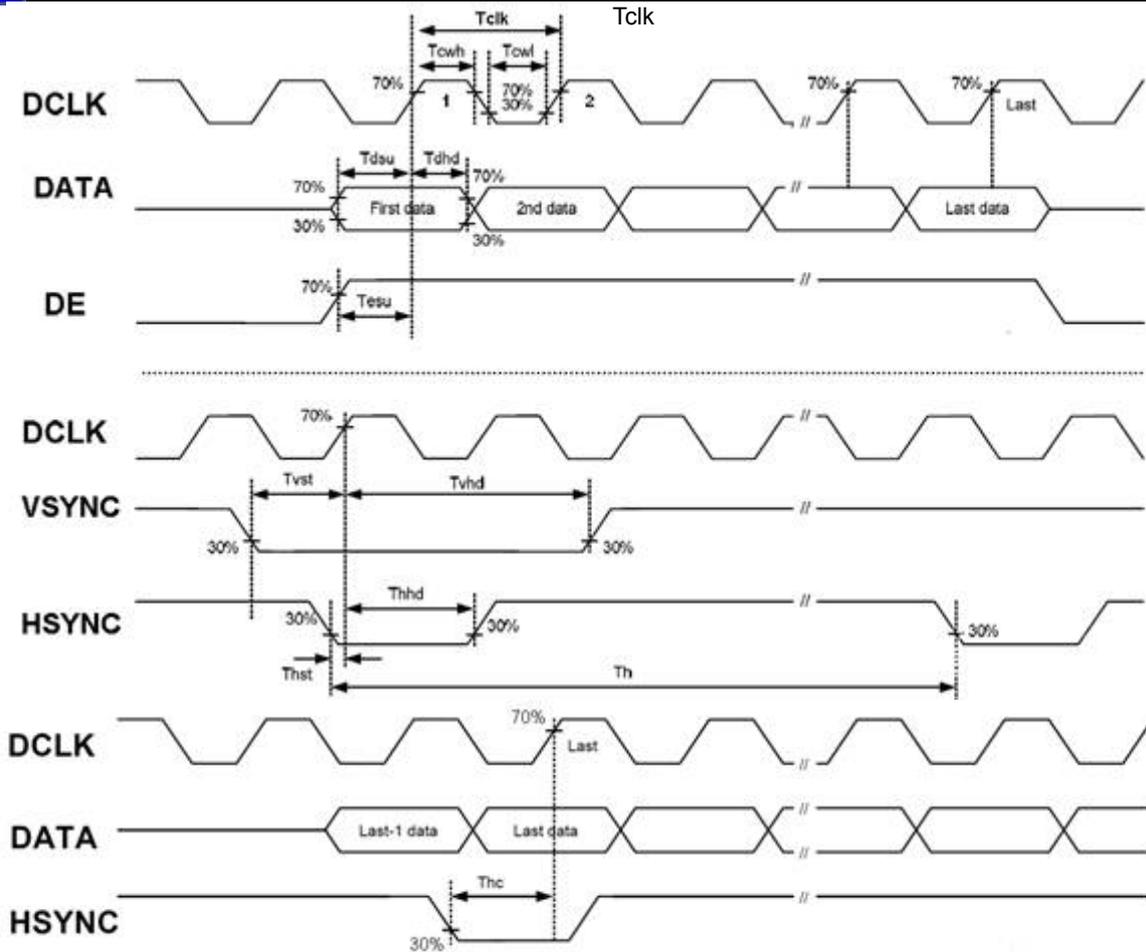
**Figure5.4 Input signal AC timing**

## 5.5 SPI input timing setting

### 5.5.1 3-Wire SPI Command Format

| Bit | Description |
|---|---|
| D15-D10 | Register Address |
| D9 | W/R control bit. "1" for write |
| D8 | Any data within this bit will be ignored during write mode |
| D7-D0 | Data for the W/R operation to the address indicated by address phase |

**Table 5.4 3-Wire SPI Command Format**
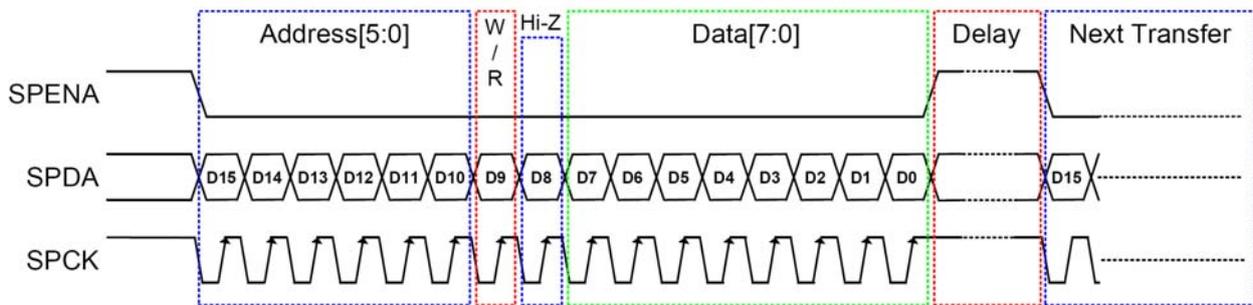


**Figure5.5 3-Wire SPI Command**

### 5.5.2 3-Wire SPI input timing

VDD=3.3V, GND=0V, Ta=25℃

| Parameter | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|
| Serial Clock Period Time | Tspck | 320 | - | - | ns | |
| SPCK Pulse High Width | Tckh | 120 | - | - | ns | Tspck = Tckh + Tckl |
| SPCK Pulse Low Width | Tckl | 120 | - | - | ns | Tspck = Tckh + Tckl |
| Serial Data Setup Time | Tisu | 120 | - | - | ns | |
| Serial Data Hold Time | Tihd | 120 | - | - | ns | |
| SPENA Select Distinguish | Tcd | 1 | - | - | us | |
| SPENA to VSYNC | Tcv | 1 | - | - | us | |
| SPENA to SPDA | Teck | 0 | - | 640 | ns | Within Tspck x 2 |
| SPDA to SPENA | Tcke | 0 | - | 640 | ns | Within Tspck x 2 |

**Table 5.5 3-Wire SPI input timing**
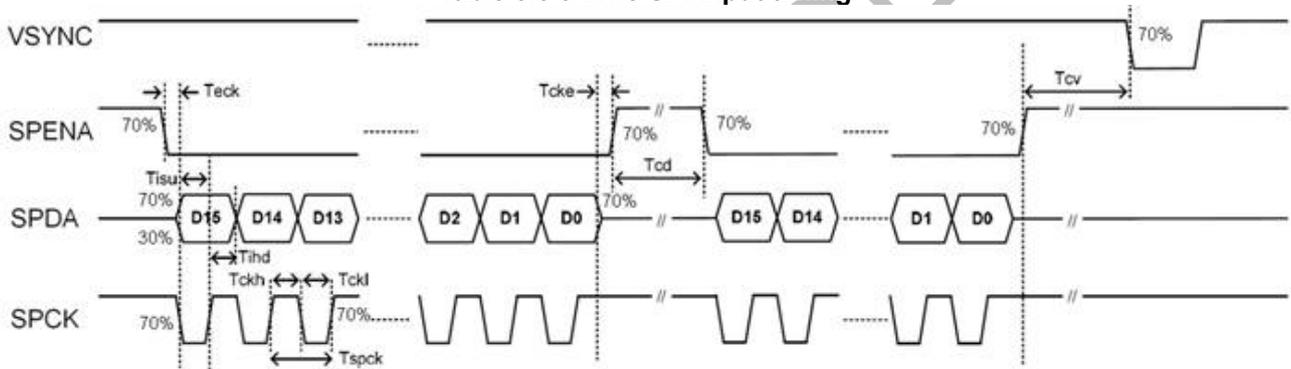


**Figure5.6 3-Wire SPI input timing**

### 5.5.3 Initial code setting

| | D15-D10 | Register name | D7-D0 Value |
|---|---|---|---|
| For master IC | 000000b | R00 | 07H |
| | 000001b | R01 | E2H |
| | 000010b | R02 | 14H |
| | 000011b | R03 | CCH |
| | 000100b | R04 | 28H |
| | 000101b | R05 | 06H |
| | 000111b | R07 | 32H |
| | 001000b | R08 | 08H |
| | 001001b | R09 | 40H |
| | 001010b | R0A | 88H |
| | 001011b | R0B | 88H |

| | | | |
|---|---|---|---|
| | 001100b | R0C | 20H |
| | 001101b | R0D | 20H |
| For slave IC | 100000b | R00 | 07H |
| | 100001b | R01 | E2H |
| | 100010b | R02 | 14H |
| | 100011b | R03 | CCH |
| | 100100b | R04 | 28H |
| | 100101b | R05 | 06H |
| | 100111b | R07 | 32H |
| | 101000b | R08 | 08H |
| | 101001b | R09 | 40H |
| | 101010b | R0A | 88H |
| | 101011b | R0B | 88H |
| | 101100b | R0C | 20H |
| | 101101b | R0D | 20H |

**Figure 5.7 Initial code setting**

### 5.6 Power On/Off Sequence

| Item | Symbol | Min | Typ | Max | Unit | Remark |
|------|--------|-----|-----|-----|------|--------|
| VDD 3.3V to signal starting | Tp1 | 5 | - | 50 | ms | |
| Signal starting to backlight on | Tp2 | 150 | - | - | ms | |
| Signal off to VDD 0V | Tp3 | 5 | - | 50 | ms | |
| Backlight off to signal off | Tp4 | 150 | - | - | ms | |

**Table 6.1 POWER ON/OFF SEQUENCE**
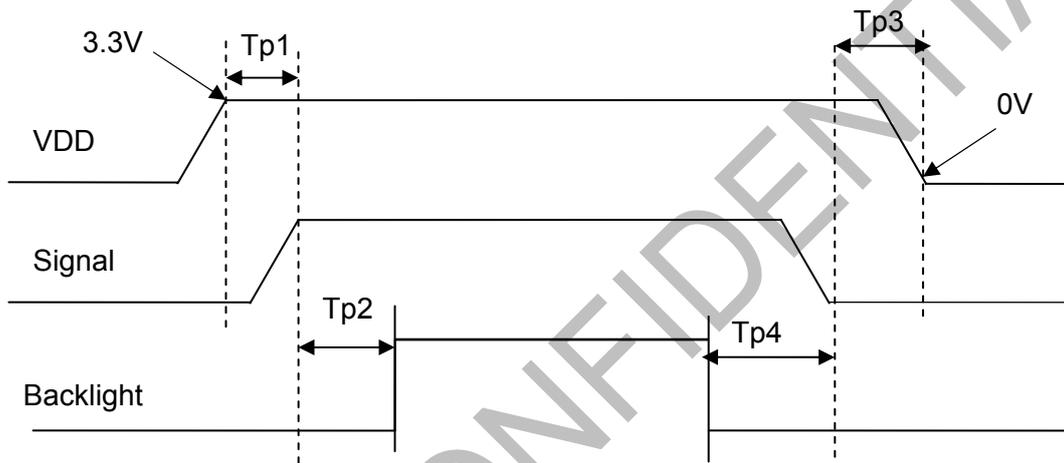
**Figure 6.1 Interface power on/off sequence**

# 6 Optical Characteristics

## 6.1 Optical Specification

Ta=25℃

| Item | | Symbol | Condition | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| View Angles | | θT | CR≧10 | 60 | 70 | - | Degree | Note 2 |
| | | θB | | 50 | 60 | - | | |
| | | θL | | 60 | 70 | - | | |
| | | θR | | 60 | 70 | - | | |
| Contrast Ratio | | CR | θ=0° | 400 | 500 | - | | Note1 Note3 |
| Response Time | | T$_{ON}$ | 25℃ | - | 20 | 35 | ms | Note1 Note4 |
| | | T$_{OFF}$ | | | | | | |
| Chromaticity | White | x | Backlight is on | 0.256 | 0.306 | 0.356 | | Note5, Note1 |
| | | y | | 0.266 | 0.316 | 0.366 | | |
| | Red | x | | 0.520 | 0.570 | 0.620 | | |
| | | y | | 0.290 | 0.340 | 0.390 | | |
| | Green | x | | 0.290 | 0.340 | 0.390 | | |
| | | y | | 0.525 | 0.575 | 0.625 | | |
| | Blue | x | | 0.097 | 0.147 | 0.197 | | |
| | | y | | 0.040 | 0.090 | 0.140 | | |
| Uniformity | | U | | 75 | 80 | - | % | Note1 Note6 |
| NTSC | | | | 46 | 50 | - | % | Note 5 |
| Luminance | | L | | 250 | 350 | - | cd/m$^2$ | Note1 Note7 |

Test Conditions:

1. V$_{LED}$ =5V, I$_{LED}$=240mA(Backlight current), the ambient temperature is 25℃.

2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



| Item | Photo detector | Field |
|---|---|---|
| Contrast Ratio | | |
| Luminance | SR-3A | 1° |
| Chromaticity | | |
| Lum Uniformity | | |
| Response Time | BM-7A | 2° |
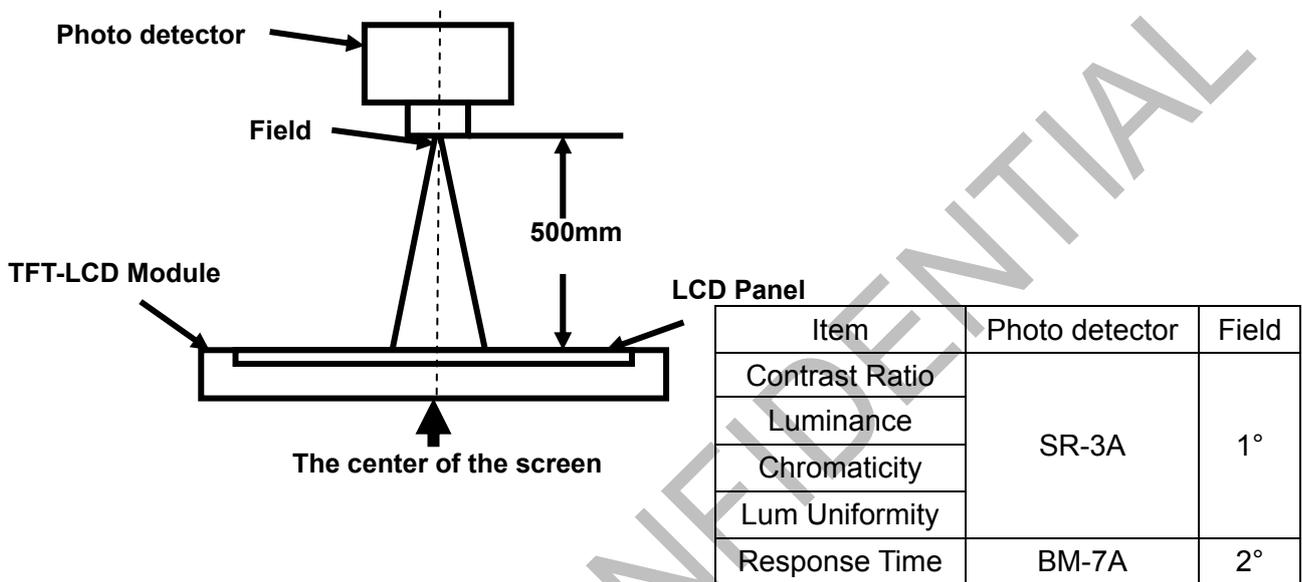
Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。
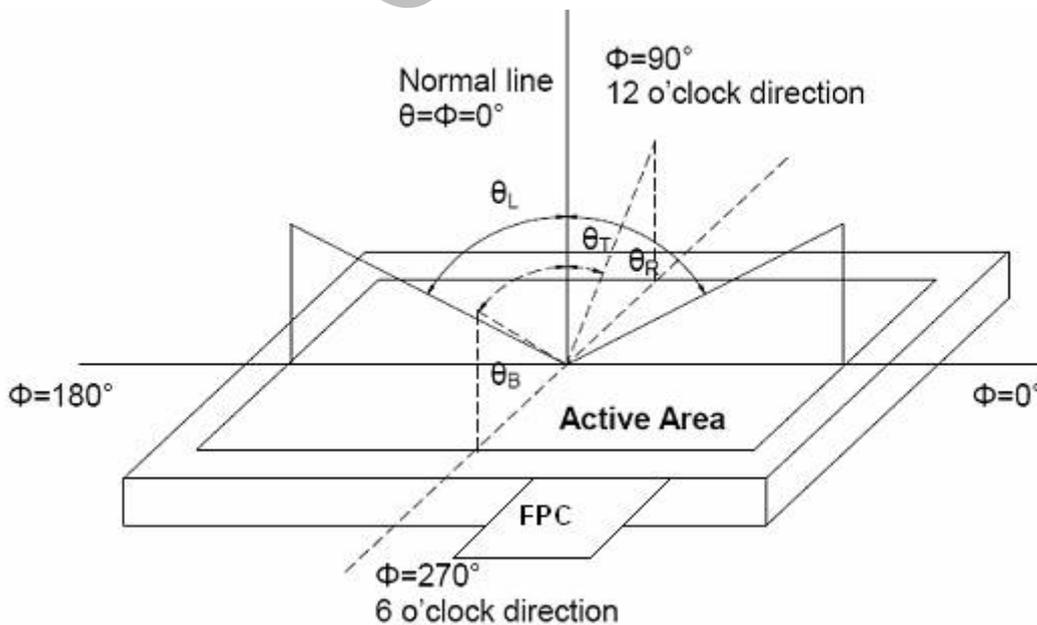


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

"White state ":The state is that the LCD should be driven by Vwhite.

"Black state": The state is that the LCD should be driven by Vblack.

Vwhite: To be determined     Vblack: To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time ($T_{ON}$) is the time between photo detector output intensity changed from 90% to 10%. And fall time ($T_{OFF}$) is the time between photo detector output intensity changed from 10% to 90%.
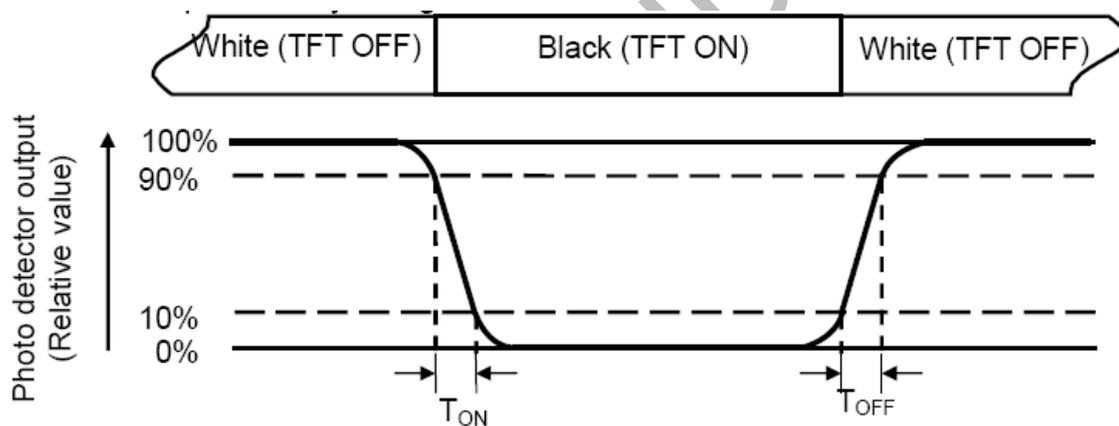
Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

## Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity(U) = Lmin/ Lmax

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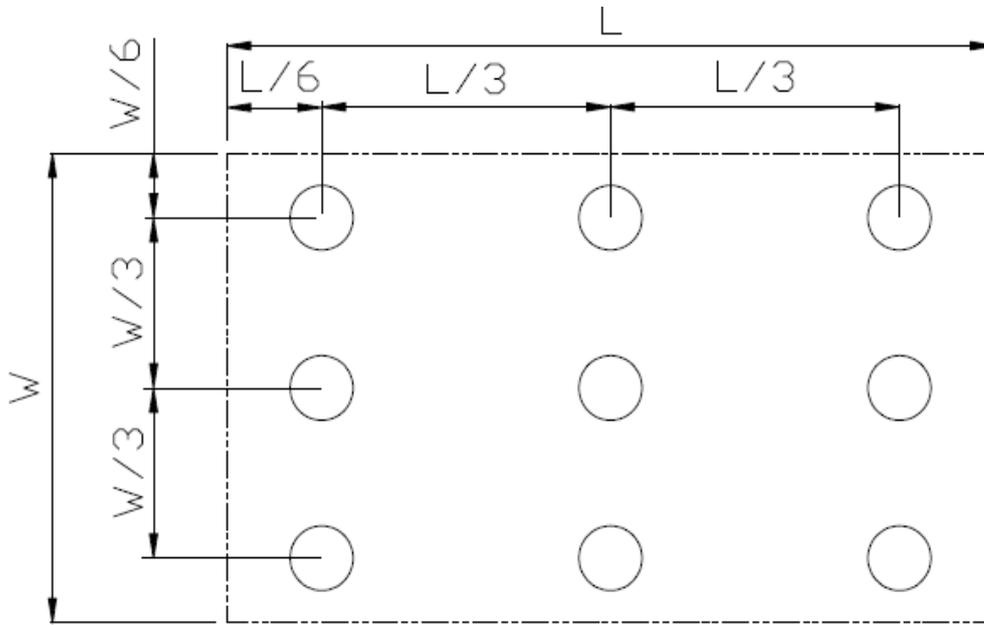


Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

## Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

## 7 Environmental / Reliability Tests

| No | Test Item | Condition | Remarks |
|---|---|---|---|
| 1 | High Temperature Operation | Ts = +70℃, 240 hours | Follow Cisco's First Level Qualification for Display Modules |
| 2 | Low Temperature Operation | Ta = -20℃, 240 hours | Follow Cisco's First Level Qualification for Display Modules |
| 3 | High Temperature Storage | Ta = +70℃, 240 hours | Follow Cisco's First Level Qualification for Display Modules |
| 4 | Low Temperature Storage | Ta = -20℃, 240 hours | Follow Cisco's First Level Qualification for Display Modules |
| 5 | Operation at High Temperature and Humidity | Ta = +60℃, 90% RH ,240hours | Follow Cisco's First Level Qualification for Display Modules |
| 6 | Temperature Cycle | -20±2 deg C. for 20 minutes    followed by<br>25±2 deg C. for 5 minutes followed by<br>70±2 deg C. for 20 minutes<br>A total of   6 cycles | Follow Cisco's First Level Qualification for Display Modules |
| 7 | ESD | Air discharge 6 times at:<br>Voltage:   8 kV<br>Resistance 330 Ohms<br>Capacitance 150 pF | Follow Cisco's First Level Qualification for Display Modules |
| 8 | Vibration Test | Amplitude 2mm<br>Direction X Y Z   for 2 Hours<br>Start at 10Hz followed by 100Hz<br>followed by 10Hz | Follow Cisco's First Level Qualification for Display Modules |
| 9 | Mechanical Shock (Non Op) | Half Sine Wave<br>60G 6ms, ±X,±Y,±Z<br>3times for each direction | IEC60068-2-27<br>GB/T2423.5 |
| 10 | Drop Test | Height 750 mm<br>Drop test must be done 6 times<br>Once   corner each time,<br>One flat sides each time | Follow Cisco's First Level Qualification for Display Modules |

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

**MTBF: 50000Hrs sample NO. 20Pcs 504Hrs, 60℃ 90%RH     Note3**
Note3: Tianma had pass MTBF test at condition: sample NO. 20Pcs 1200Hrs, 70℃ 70%RH

# 8 Mechanical Drawing



**Pin Assignment**

| PIN NO. | Symbol | PIN NO. | Symbol |
|---|---|---|---|
| 1 | VLED | 21 | G2 |
| 2 | VLED | 22 | G3 |
| 3 | VLED | 23 | G4 |
| 4 | DIM | 24 | G5 |
| 5 | LEDGND | 25 | GND |
| 6 | LEDGND | 26 | B0 |
| 7 | LEDGND | 27 | B1 |
| 8 | GND | 28 | B2 |
| 9 | VDD | 29 | B3 |
| 10 | VDD | 30 | B4 |
| 11 | GND | 31 | B5 |
| 12 | R0 | 32 | GND |
| 13 | R1 | 33 | DCLK |
| 14 | R2 | 34 | HSYNC |
| 15 | R3 | 35 | VSYNC |
| 16 | R4 | 36 | DE |
| 17 | R5 | 37 | GND |
| 18 | GND | 38 | SPENA |
| 19 | G0 | 39 | SPCK |
| 20 | G1 | 40 | SPDA |

**Notes:**
1. General tolerance to be +/-0.3;
2. Operation Temperature:-20°C~70°C;
3. Storage Temperature:-20°C~70°C;
4. FPC recommended connector type:FH19SC-40S-0.5SH;
5. Gray scale inversion:12 o'clock;
6. Requirement on Environment Protection: Q/S0002.

Detail B Scale 50:1 — RGB 0.1587 / 0.1587

LED CIRCUIT DIAGRAM
reference: IF=100mA & Vf=9.9V
LED+ / LED-

Detail A Scale 4:1
P0.5×(40-1)=19.50, W=0.35, S=0.15, 20.50, 40, 4.00

**Dimensions:** 117.35 (Outline), 109.55, 101.568 (Active Area), 58.68 (A.A. Center), 33.58±0.50, 35.0±0.5, 41.87 (A.A. Center), 76.176 (Active Area), 85.86 (TFT), 88.43 (Outline), 2.10 (Grounding Pad), 10.30, 0.3, 2.00, 4.80, 7.90, 9.00, 14.18, 15.00, 12.92, 0.50, 5.00

See Detail A / See Detail B / View Direction / A.A. Center

**Title Block:**
REFERENCE DIMENTION / CONTROL DIMENTION
APPROVED: Wei Shu — 2010/07/14
CHECKED: Xin Zhong — 2010/07/14
DESIGNED: Hua Jiang — 2010/07/14
MODEL NAME: TM050QDH01-00
DRAWING NUMBER: YG11-00
PART NAME: LCM
MATERIAL NUMBER: TM050QDH01-00
3rd ANGLE / UNIT: mm / SCALE: 1:1 / PAGE: 1 of 1
TIANMA / LABEL

## 9 Packing Drawing

| No | Item | Model(Material) | Dimensions(mm) | Unit Weight(Kg) | Quantity | Remark |
|----|------|-----------------|----------------|-----------------|----------|--------|
| 1 | LCM module | TM050QDH01 | 117.35 ×88.43×7.9 | 0.0822 | 34 | |
| 2 | Partion_1 | Corrugated Paper | 513X333X216 | 1.571 | 1 | |
| 3 | Dust-proof Bag | PE | 205X145X3 | 0.001 | 34 | |
| 4 | Anti-static bag | PE | 700X530 | 0.06 | 1 | Anti-static |
| 5 | Partion_2 | Corrugated Paper | 505X332X4.0 | 0.098 | 2 | |
| 6 | Corrugated Bar | Corrugated Paper | 513X105×33 | 0.057 | 4 | |
| 7 | Carton | Corrugated Paper | 530X350X250 | 1.12 | 1 | |
| 8 | Total weight(Kg) | 6.0038 Kg+-5% | | | | |
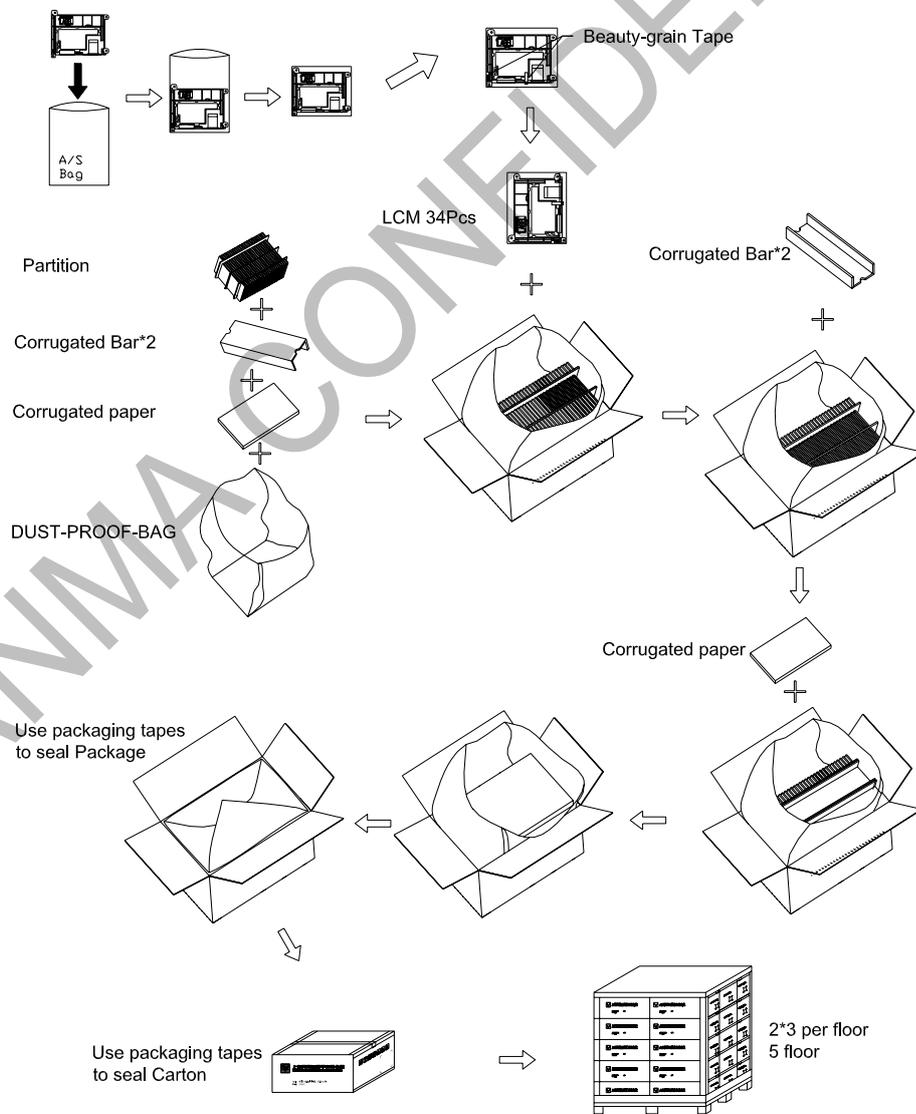


---

# 10 Precautions for Use of LCD Modules

**10.1** Handling Precautions

10.1.1   The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

10.1.2   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.

10.1.3   Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

10.1.4   The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

10.1.5   If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

－ Isopropyl alcohol

－ Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

－ Water

－ Ketone

－ Aromatic solvents

10.1.6   Do not attempt to disassemble the LCD Module.

10.1.7   If the logic circuit power is off, do not apply the input signals.

10.1.8   To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1   Be sure to ground the body when handling the LCD Modules.

10.1.8.2   Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3   To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4   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.

**10.2** Storage precautions

10.2.1   When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

10.2.2   The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ～ 40℃        Relatively humidity: ≤80%

10.2.3   The LCD modules should be stored in the room without acid, alkali and harmful gas.

**10.3** Transportation Precautions:

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.