**MODEL NO. : TM104SCH01**

**ISSUED DATE: 2008-12-03**

**VERSION : Ver 2.2**

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

**Customer :**

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

**SHANGHAI TIANMA Confirmed :**

| Prepared by | Checked by | Approved by |
|---|---|---|
| 2008-12-03 | | 08'12/3 |

This technical specification is subjected to change without notice

# Table of Contents

# Record of Revision

| Rev | Issued Date | Description | Editor |
|---|---|---|---|
| 1.0 | 2008-05-07 | Preliminary Release | Yebo Gu |
| 1.1 | 2008-08-13 | Add Gamma Voltage, Add Packing Drawing | Zhenying zhang |
| 1.2 | 2008-08-27 | Update Lamp Current | Zhenying zhang |
| 2.0 | 2008-10-14 | Final Product Specification<br>Update Luminance Minimum Value to 185nits | Zhenying zhang |
| 2.1 | 2008-11-18 | Update Model Name from TS104SAATC01-00 to TM104SCH02 | Zhenying zhang |
| 2.2 | 2008-12-03 | Revise Model Name from TM104SCH02 to TM104SCH01<br>Update Model Name in Mechanical Drawing<br>Update Chromaticity Gx typical value from 0.333 to 0.300 | Zhenying zhang |
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# 1 General Specifications

| Feature | | Spec |
|---|---|---|
| **Display Spec.** | Size | 10.4 inch |
| | Resolution | 800(RGB) x 600 |
| | Interface | TTL |
| | Color Depth | 262K |
| | Technology Type | a-Si |
| | Pixel Pitch (mm) | 0.264x0.264 |
| | Pixel Configuration | R.G.B. Vertical Stripe |
| | Display Mode | TM with Normally White |
| | Surface Treatment(Up Polarizer) | Anti-Glare(3H) |
| | Viewing Direction | 12 o'clock |
| | Gray Scale Inversion Direction | 6 o'clock |
| **Mechanical Characteristics** | LCM (W x H x D) (mm) | 236.00x176.90x5.60 |
| | Active Area(mm) | 211.20x158.40 |
| | With /Without TSP | Without TSP |
| | Weight (g) | 283.0 |

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: RoHS

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

# 2 Input/Output Terminals

## 2.1 TFT LCD Panel

Matching connector of Hirose FH12A-30S-0.5SH(55)

| No | Symbol | I/O | Description | Comment |
|---|---|---|---|---|
| 1 | POL | I | Polarity selection | |
| 2 | STVD | I/O | Vertical start pulse input when U/D=H | Note1 |
| 3 | OEV | I | Gate output enable | |
| 4 | CKV | I | Vertical clock | |
| 5 | STVU | I/O | Vertical start pulse input when U/D=L | Note1 |
| 6 | GND | P | Power ground | |
| 7 | EDGSL | I | Clock edge selection | Note2 |
| 8 | VCC | P | Power supply for digital circuit | |
| 9 | V9 | I | Gamma voltage level 9 | |
| 10 | VGL | P | Gate OFF voltage | |
| 11 | V2 | I | Gamma voltage level 2 | |
| 12 | VGH | P | Gate ON voltage | |
| 13 | V6 | I | Gamma voltage level 6 | |
| 14 | U/D | I | Up/down selection | Note1 |
| 15 | VCOM | I | Common voltage | |
| 16 | GND | P | Power ground | |
| 17 | AVDD | P | Power supply for analog circuit | |
| 18 | V14 | I | Gamma voltage level 14 | |
| 19 | V11 | I | Gamma voltage level 11 | |
| 20 | V8 | I | Gamma voltage level 8 | |
| 21 | V5 | I | Gamma voltage level 5 | |
| 22 | V3 | I | Gamma voltage level 3 | |
| 23 | GND | P | Power ground | |
| 24 | R5 | I | Red data(MSB) | |
| 25 | R4 | I | Red data | |
| 26 | R3 | I | Red data | |
| 27 | R2 | I | Red data | |
| 28 | R1 | I | Red data | |
| 29 | R0 | I | Red data(LSB) | |
| 30 | GND | P | Power ground | |
| 31 | GND | P | Power ground | |
| 32 | G5 | I | Green data(MSB) | |
| 33 | G4 | I | Green data | |

| | | | | |
|---|---|---|---|---|
| 34 | G3 | I | Green data | |
| 35 | G2 | I | Green data | |
| 36 | G1 | I | Green data | |
| 37 | G0 | I | Green data(LSB) | |
| 38 | STHL | I/O | Horizontal start pulse input when R/L =H | Note1 |
| 39 | REV | I | Control display data are inverted or not.<br>When “REV”=H, data will be inverted. | |
| 40 | GND | P | Power ground | |
| 41 | DCLK | I | Dot clock input. Latching source data onto the line latches at the rising or falling edge by EDGSL signal selected. | |
| 42 | VCC | P | Power supply for digital circuit | |
| 43 | STHR | I/O | Horizontal start pulse input when R/L =L | Note1 |
| 44 | LD | I | Latches the polarity of outputs and switches the new data to outputs. | |
| 45 | B5 | I | Blue data (MSB) | |
| 46 | B4 | I | Blue data | |
| 47 | B3 | I | Blue data | |
| 48 | B2 | I | Blue data | |
| 49 | B1 | I | Blue data | |
| 50 | B0 | I | Blue data (LSB) | |
| 51 | R/L | I | Right/ left selection | Note1 |
| 52 | V1 | I | Gamma voltage level 1 | |
| 53 | V4 | I | Gamma voltage level 4 | |
| 54 | V7 | I | Gamma voltage level 7 | |
| 55 | V10 | I | Gamma voltage level 10 | |
| 56 | V12 | I | Gamma voltage level 12 | |
| 57 | V13 | I | Gamma voltage level 13 | |
| 58 | AVDD | P | Power supply for analog circuit | |
| 59 | GND | P | Power ground | |
| 60 | VCOM | I | Common voltage | |

I/O definition:

I-----Input O---Output P----Power/Ground

**Note1: The following SPEC is for PCB1.**

| Scan control input | | In/Out state for start pulse | | | | Scanning direction |
|---|---|---|---|---|---|---|
| U/D | R/L | STVD | STVU | STHR | STHL | |
| GND | VCC | O | I | O | I | Up to down, left to right |
| VCC | GND | I | O | I | O | Down to up, right to left |
| GND | GND | O | I | I | O | Up to down, right to left |
| VCC | VCC | I | O | O | I | Down to up, left to right |

**Note2:**

| | |
|---|---|
| When EDGSL=L | Latching source data onto the line latches at the rising edge. |
| When EDGSL=H | Latching source data onto the line latches at the rising edge and falling edge. |

## 2.2 CN2 (CCFL connector)

| No | Symbol | I/O | Description | Wire Color |
|---|---|---|---|---|
| 1 | VL1 | P | CCFL power supply(high voltage) | Pink |
| 2 | VL2 | P | CCFL power supply(GND) | White |

# 3 Absolute Maximum Ratings

## 3.1 Driving TFT LCD Panel

GND=0V,Ta = 25℃

| Item | Symbol | Min | Max | Unit | Remark |
|---|---|---|---|---|---|
| Power Voltage | VDD | -0.3 | 5.0 | V | |
| | AVDD | -0.5 | 15.0 | V | |
| | VGH | -0.3 | 42.0 | V | |
| | VGL | -20.0 | 0.3 | V | |
| | VGH-VGL | -0.3 | 40.0 | V | |
| Input voltage | $V_{IN}$ | -0.3 | 5.0 | V | Note1 |
| Operating Temperature | $T_{OPR}$ | -20 | 70 | ℃ | |
| Storage Temperature | $T_{STG}$ | -30 | 80 | ℃ | |

Note1: $V_{IN}$ represent POL,STVD,OEV,CKV,STVU,STHL,REV,STHR,DCLK,LD,EDGSL,U/D,R/L, R0~R5,G0~G5,B0~B5

# 4 Electrical Characteristics

## 4.1 Driving TFT LCD Panel

GND=0V, Ta=25℃

| Item | | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|---|
| Digital supply Voltage | | VCC | 3.0 | 3.3 | 3.6 | V | |
| Analog supply Voltage | | AVDD | 9.4 | 9.8 | 10.2 | V | |
| Gate on voltage | | VGH | 19.8 | 22.0 | 24.2 | V | |
| Gate off voltage | | VGL | -7.7 | -7.0 | -6.3 | V | |
| Common Electrode Driving Signal | | VCOM | - | 4.36 | - | V | Note3 |
| Input level of Gamma voltage | | V1~V7 | 0.4xAVDD | - | AVDD-0.1 | V | |
| | | V8~V14 | 0.1 | - | 0.6xAVDD | V | |
| Input Signal Voltage | Low Level | $V_{IL}$ | 0 | - | 0.2xVCC | V | Note1 |
| | High Level | $V_{IH}$ | 0.8xVCC | - | VCC | V | |
| Output Signal Voltage | Low Level | $V_{OL}$ | 0 | - | 0.2xVCC | V | Note2 |
| | High Level | $V_{OH}$ | 0.8xVCC | - | VCC | V | |
| Current of digital supply voltage | | $I_{CC}$ | - | 11.00 | 16.00 | mA | VCC=3.3V Note2 |
| Current of analog supply voltage | | $I_{AVDD}$ | - | 50.00 | 75.00 | mA | AVDD=9.8V Note2 |
| Current of Gate on voltage | | $I_{GH}$ | - | 0.30 | 0.45 | mA | VGH=22.0V Note2 |
| Current of Gate off voltage | | $I_{GL}$ | - | 0.51 | 0.75 | mA | VGL=-7.0V Note2 |

Note1:Input Signal:POL,STVD,OEV,CKV,STVU,STHL,REV,STHR,DCLK,LD,EDGSL,U/D,R/L, R0~R5,G0~G5,B0~B5
Note2:Output Signal: STVD, STVU, STHL, STHR
Note3:The value may be different for different LCM.
Note4:To test the current dissipation, using the “color bar” testing pattern shown as below:

1. White
2. Yellow
3. Cyan
4. Green
5. Magenta
6. Red
7. Blue
8. Black

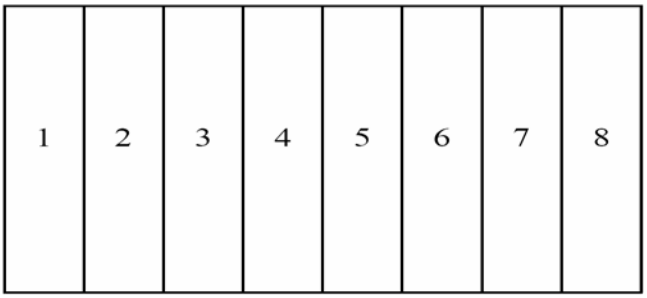



**Figure 4.1 Current dissipation testing pattern**

## 4.2 Driving Backlight

Ta=25℃

| Parameter | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|
| Lamp voltage | $V_L$ | 468 | 520 | 572 | Vrms | |
| Lamp current | $I_L$ | 3.0 | 5.5 | 7.0 | mArms | |
| Lamp start voltage | $V_{LS}$ | - | - | 890 | Vrms | |
| Lamp frequency | $F_L$ | 40 | 60 | 80 | KHz | |

Note 1: The Minimum Life of CCFL : 20,000 hours

## 4.3 Gamma Correction Voltage

**Gamma correction reference voltage setting**

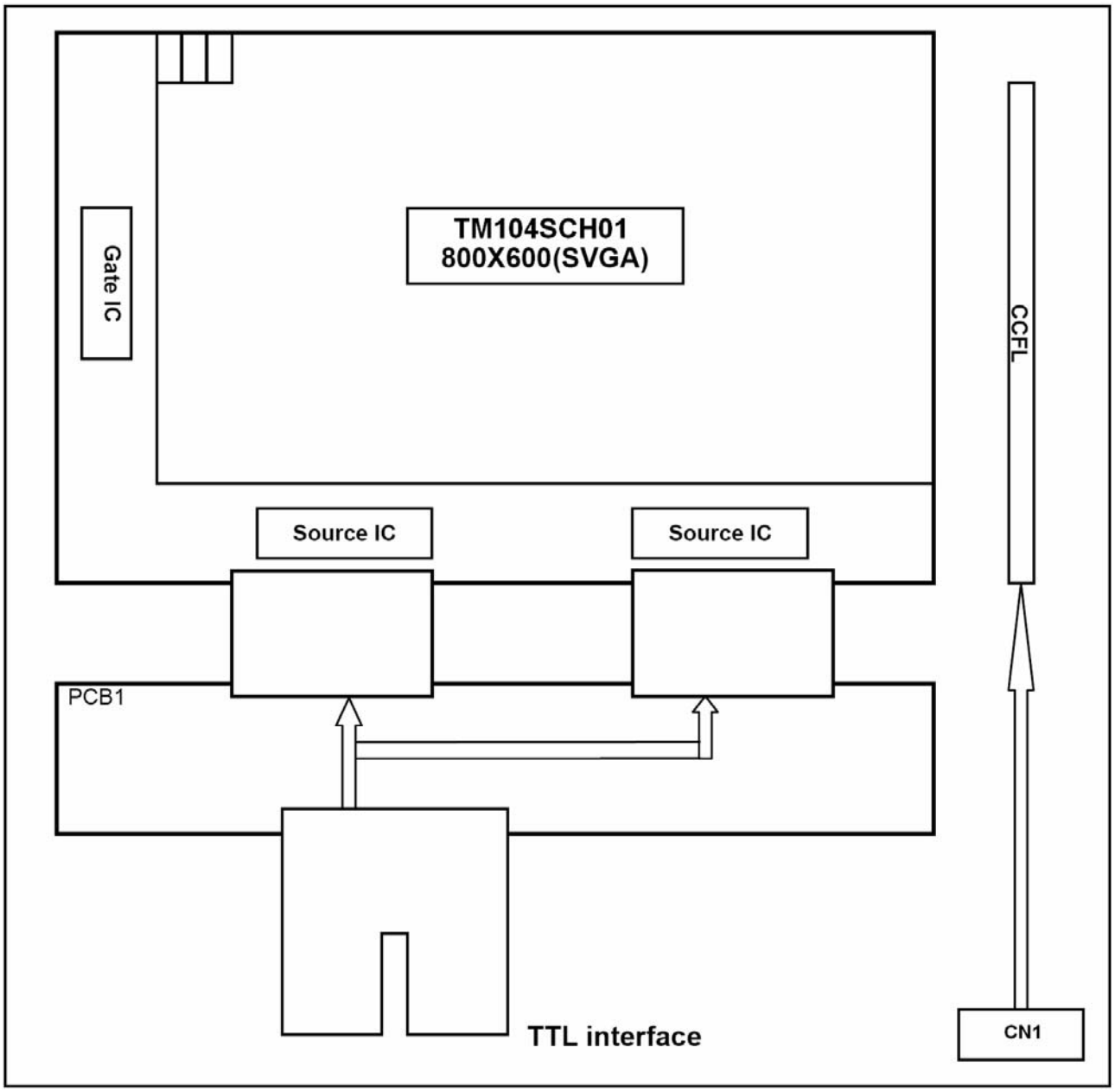
| Parameter | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|
| Gamma correction reference voltage V1~V14 | V1 | - | 9.600 | AVDD-0.1 | V | |
| | V2 | - | 9.362 | - | V | |
| | V3 | - | 7.798 | - | V | |
| | V4 | - | 7.195 | - | V | |
| | V5 | - | 6.803 | - | V | |
| | V6 | - | 6.159 | - | V | |
| | V7 | - | 5.000 | - | V | |
| | V8 | - | 4.800 | - | V | |
| | V9 | - | 3.641 | - | V | |
| | V10 | - | 2.997 | - | V | |
| | V11 | - | 2.605 | - | V | |
| | V12 | - | 2.002 | - | V | |
| | V13 | - | 0.438 | - | V | |
| | V14 | AVSS+0.1 | 0.200 | - | V | |

Note1: AVDD-0.1> V1 > V2> V3 > V4 > V5 > V6 > V7; V8 > V9 > V10 > V11 > V12 > V13 > V14 >AVSS+0.1V

Note2: This table is for Gamma 2.2

**Table 4.3 Gamma correction reference voltage**

## 4.4 Block Diagram



# 5 Timing Chart

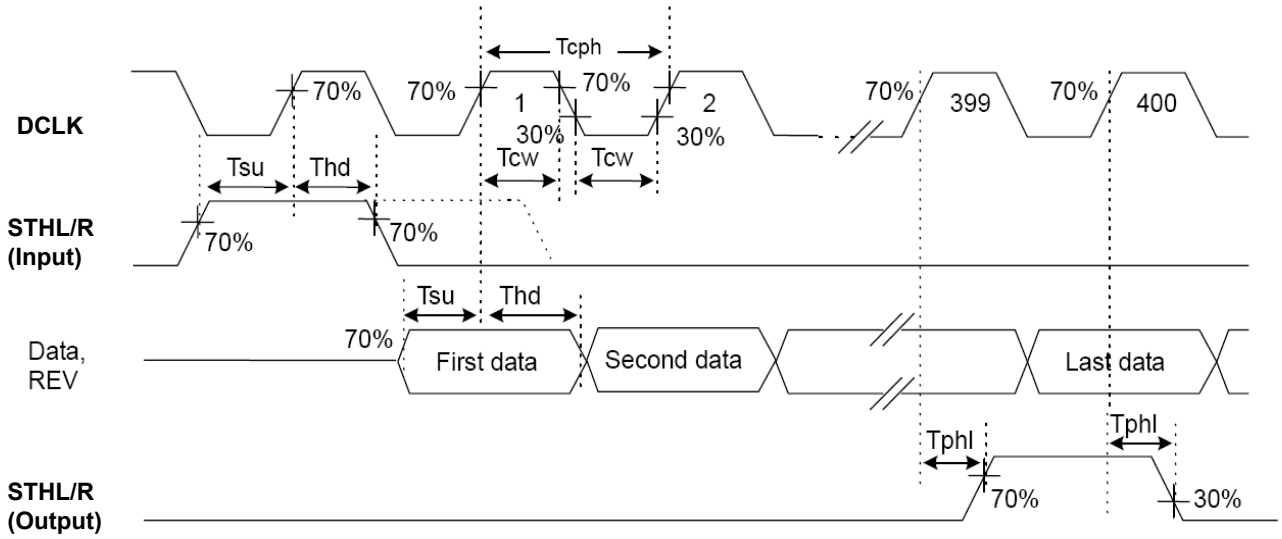
## 5.1 Source Driver Input Timing

(VCC=3.3V, AVDD=10V, AVSS=GND=0V, Ta=25℃)

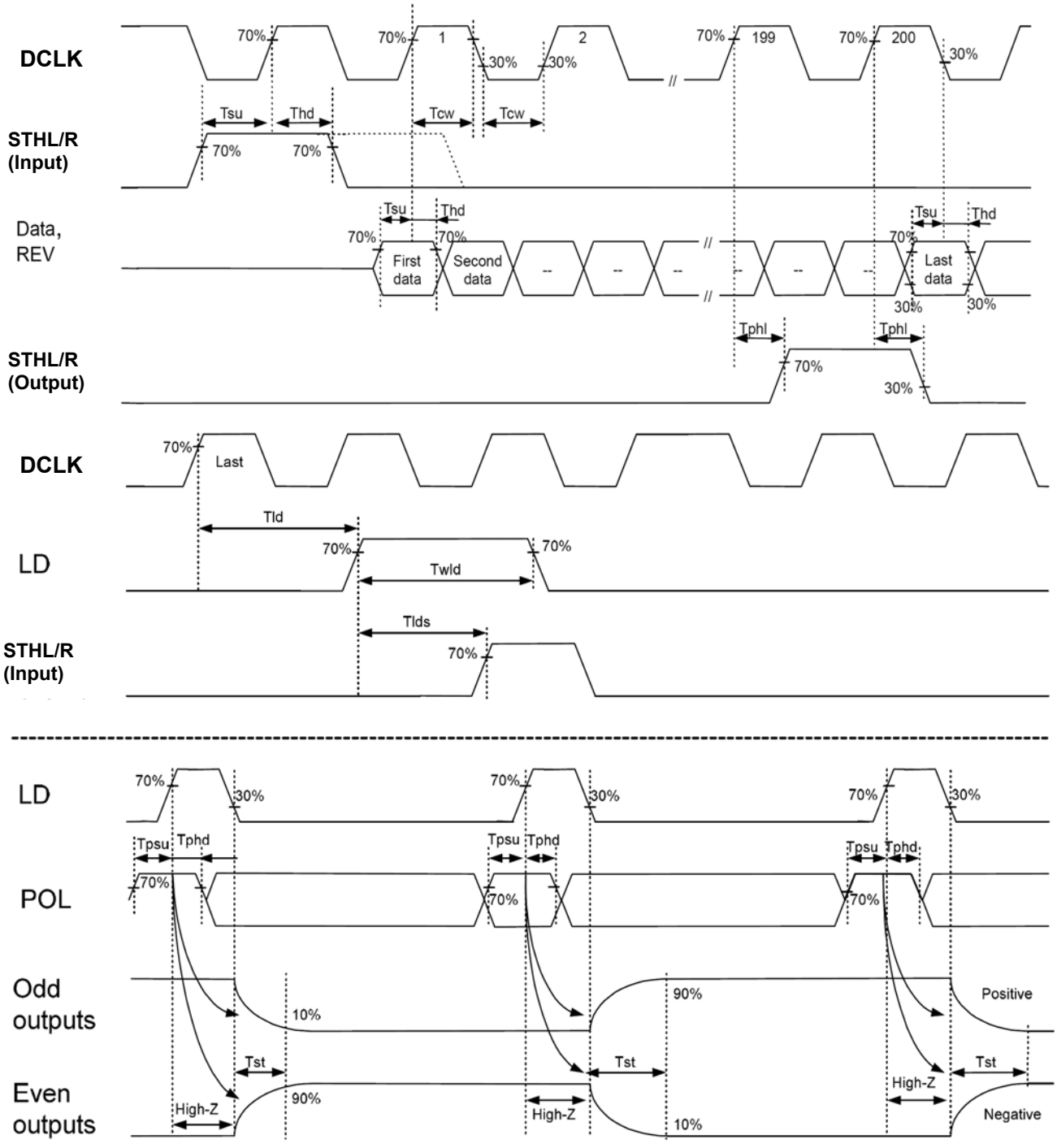
| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|---|---|---|---|---|---|---|
| DCLK frequency | $F_{CLK}$ | - | 40 | 45 | MHz | EDGSL="0" |
| | $F_{CLK}$ | - | 20 | 22.5 | MHz | EDGSL="1" |
| DCLK pulse width | Tcw | 40% | - | 60% | Tcph | Tcph is DCLK cycle |
| Data set-up time | Tsu | 4 | - | - | ns | |
| Data hold time | Thd | 2 | - | - | ns | |
| Propagation delay of STHR/L | Tphl | 6 | 10 | 15 | ns | CL=25pF (Output) |
| Time that the last data to LD | Tld | 1 | - | - | Tcph | |
| Pulse width of LD | Twld | 2 | - | - | Tcph | |
| Time that LD to STHL/R | Tlds | 5 | - | - | Tcph | |
| POL set-up time | Tpsu | 6 | - | - | ns | POL to LD |
| POL hold time | Tphd | 6 | - | - | ns | POL to LD |
| Output stable time | Tst | - | - | 9 | us | 10% or 90% target voltage. CL=60pF, R=2Kohm |
| Repair output delay stable time | Tst1 | - | - | 20 | us | CL=190pF, R=5.5Kohm |

**Table 5.1 timing parameter**

**<< EDGSL= "0", Default >>**



<< EDGSL= "1">>

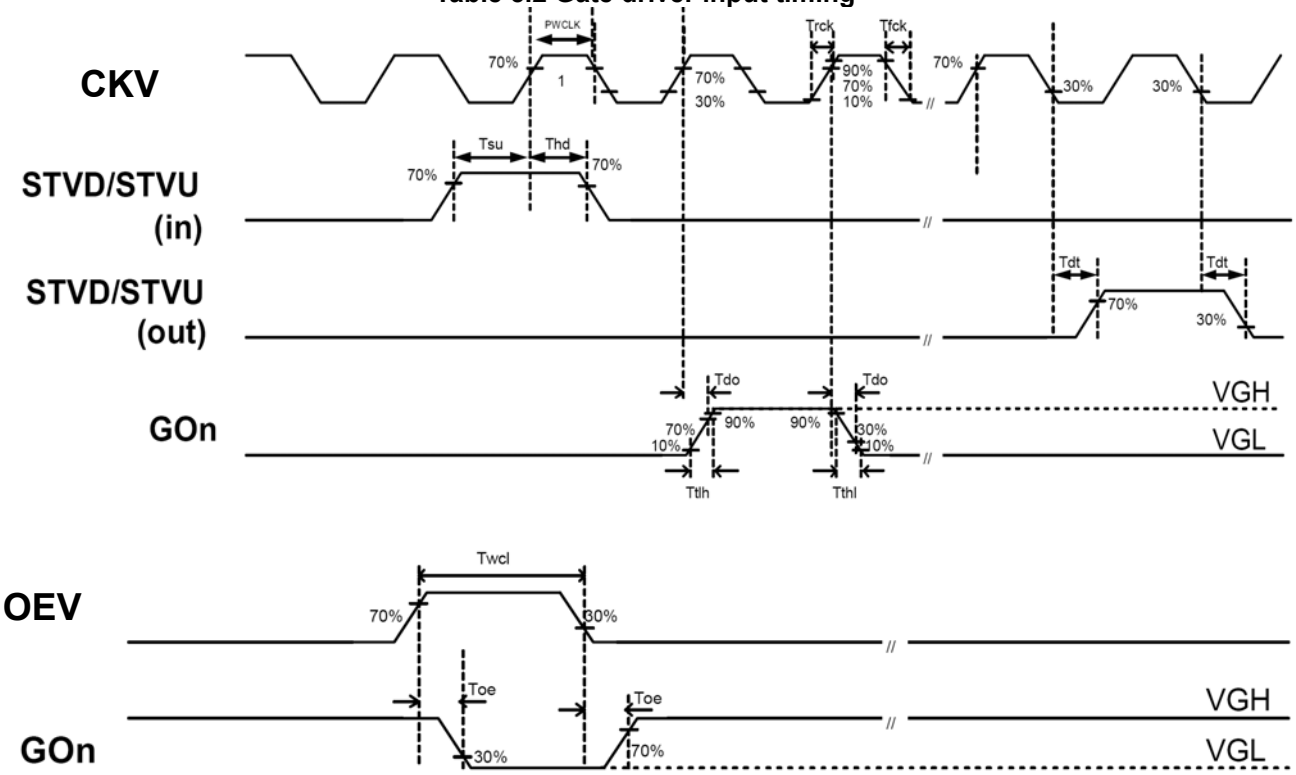


## 5.2 Gate Driver Input Timing

(VGH=25V, VGL=-15V, VCC=3.3V, GND=0V, Ta=25℃)

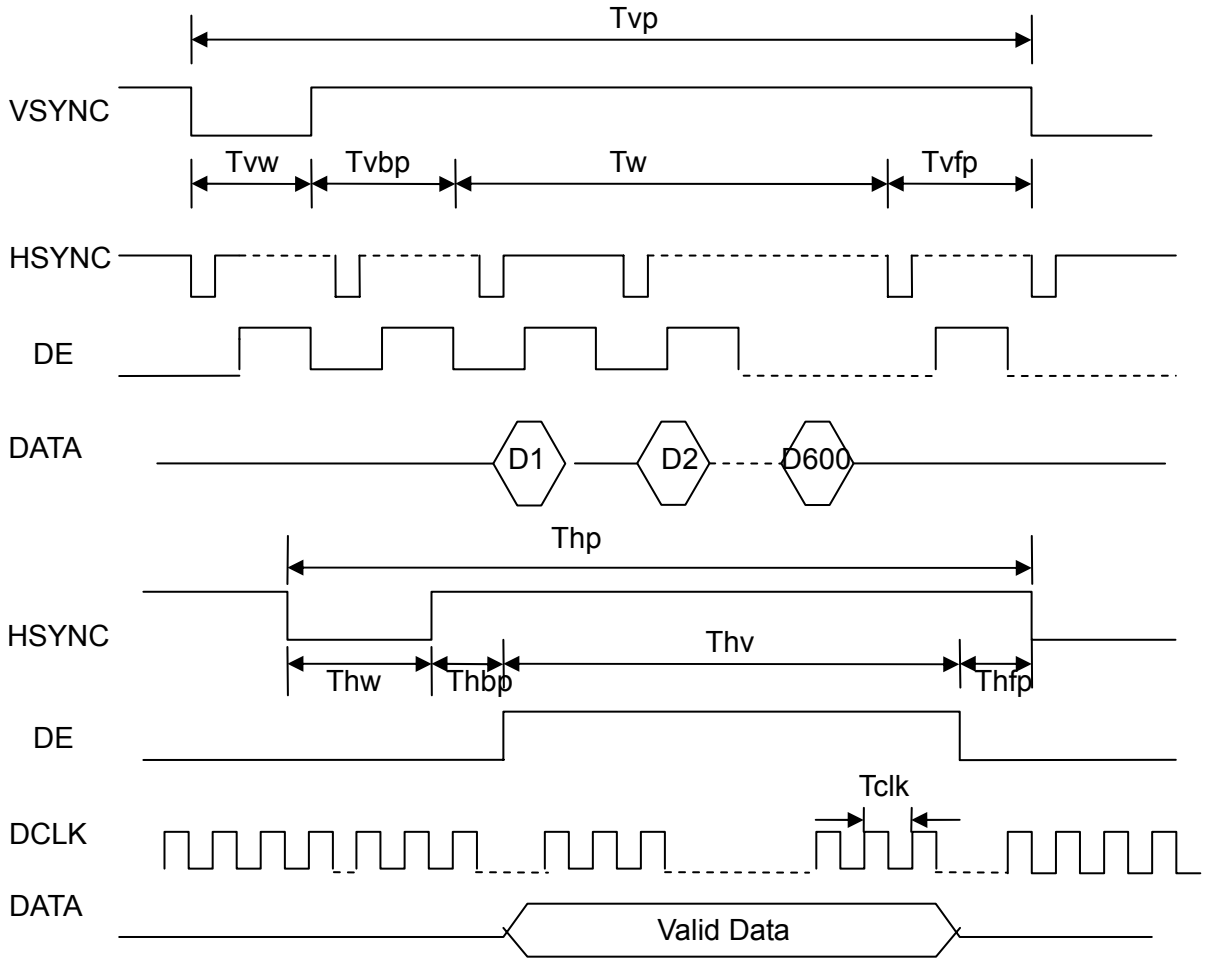
| Symbol | Parameters | Min | Typ | Max | Unit | Condition |
|---|---|---|---|---|---|---|
| Tdt | STVD/STVU delay time | - | - | 500 | ns | CL=20pF |
| Tdo | Driver output delay time | - | - | 900 | ns | CL=200pF<br>When Twcl=1us |
| Tthl | Output falling time | - | 400 | 800 | ns | CL=200pF<br>90% to 10% |
| Ttlh | Output rising time | - | 500 | 1000 | ns | CL=200pF<br>10% to 90% |
| Toe | OEx to driver output delay time | - | - | 900 | ns | CL=200pF |
| Fclk | Clock(CKV) frequency | - | - | 200 | KHz | In cascade connection |
| Trck | Clock rising time | - | - | 100 | ns | CL=20pF |
| Tfck | Clock falling time | - | - | 100 | ns | CL=20pF |
| PWCLK | Clock pulse width (High&Low) | 500 | - | - | ns | |
| Tsu | STVD/STVU set-up time | 200 | - | - | ns | |
| Thd | STVD/STVU hold time | 300 | - | - | ns | |
| Twcl | Output enabled pulse width | 1 | - | - | us | |

**Table 5.2 Gate driver input timing**



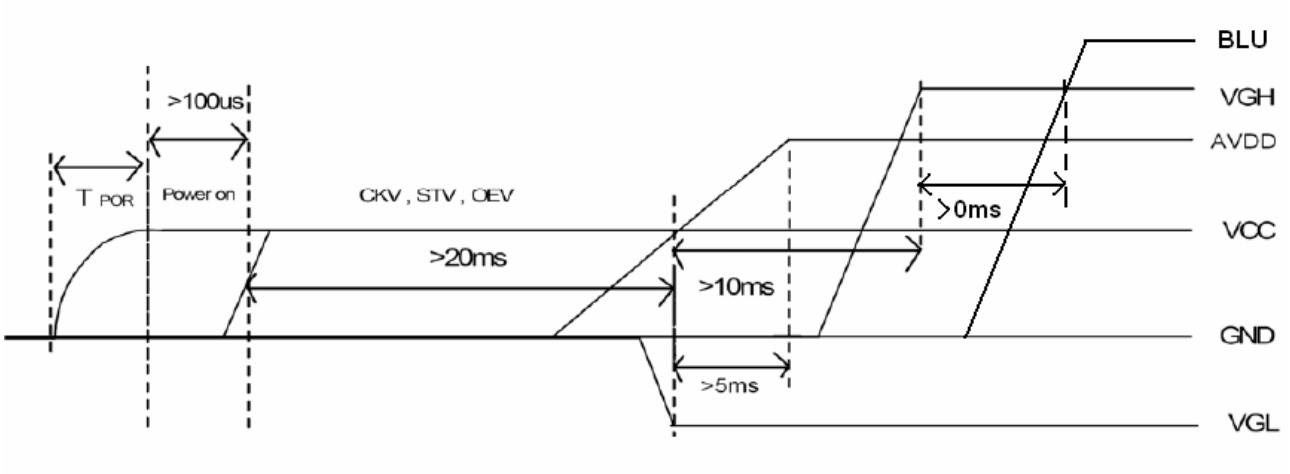
### 5.3 DCLK, Hsync, Vsync timing (Recommended setting)

| Parameter | | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|---|
| Dot clock frequency | | Tclk | - | 40 | 45 | MHz | |
| Hsync | Period | Thp | 866 | 1056 | 1064 | Tclk | |
| | Horizontal total blank | Thw+Thbp+Thfp | 66 | 256 | 264 | Tclk | |
| | Valid Data Width | Thv | - | 800 | - | Tclk | |
| Vsync | Period (Frame rate) | Tvp | 628 | 635 | 650 | Thp | |
| | Vertical total blank | Tvw+Tvbp+Tvfp | 28 | 35 | 50 | Thp | |
| | Valid Data Width | Tw | - | 600 | - | Thp | |



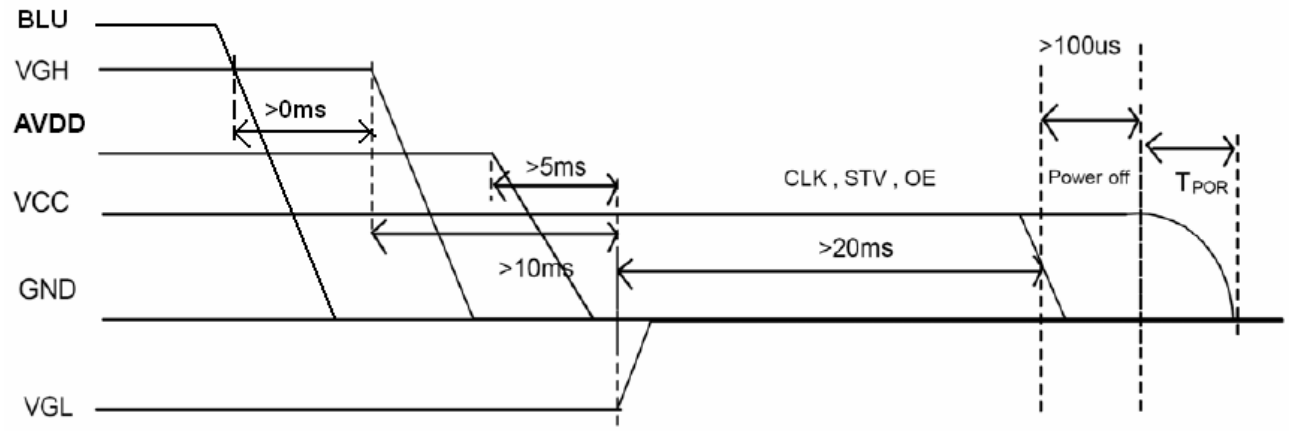
## 5.4 Power On/Off Sequence

### 5.4.1 Power on Sequence




**VCC→AVDD→VGL→VGH→Data→B/L**
**Figure 5.4.1 power on sequence**

### 5.4.2 Power off Sequence




**B/L→Data→VGH→AVDD→VGL→VCC**
**Figure 5.4.2 power off sequence**

# 6 Optical Characteristics

## 6.1 Optical Specification

Ta=25℃

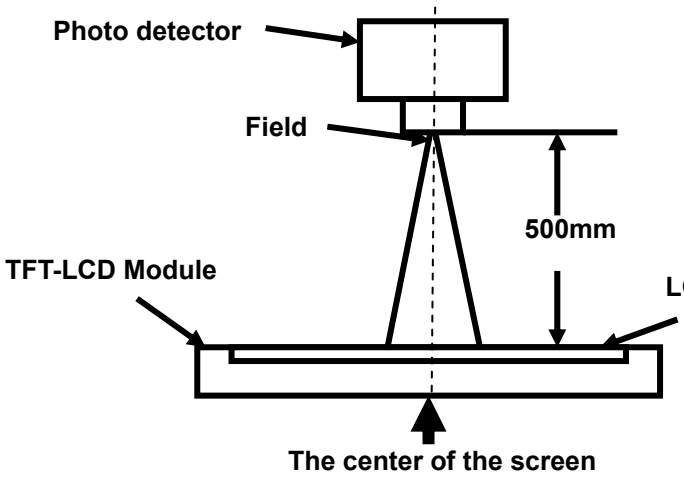
| Item | | Symbol | Condition | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| View Angles | | θT | CR≧10 | 35 | 45 | - | Degree | Note 2 |
| | | θB | | 55 | 65 | - | | |
| | | θL | | 55 | 65 | - | | |
| | | θR | | 55 | 65 | - | | |
| Contrast Ratio | | CR | θ=0° | 300 | 400 | - | - | Note1<br>Note3 |
| Response Time | | $T_{ON}$ | 25℃ | - | 10 | 15 | ms | Note1<br>Note4 |
| | | $T_{OFF}$ | | - | 15 | 25 | | |
| Chromaticity | White | x | Backlight is on | 0.261 | 0.311 | 0.361 | - | Note5<br>Note1 |
| | | y | | 0.280 | 0.330 | 0.380 | | |
| | Red | x | | 0.550 | 0.600 | 0.650 | | |
| | | y | | 0.297 | 0.347 | 0.397 | | |
| | Green | x | | 0.250 | 0.300 | 0.350 | | |
| | | y | | 0.517 | 0.567 | 0.617 | | |
| | Blue | x | | 0.097 | 0.147 | 0.197 | | |
| | | y | | 0.065 | 0.115 | 0.165 | | |
| Uniformity | | U | - | 70 | 80 | - | % | Note1<br>Note6 |
| NTSC | | - | - | - | 50 | - | % | Note 5 |
| Luminance | | L | | 185 | 230 | - | $cd/m^2$ | Note1<br>Note7 |

Test Conditions:

1. The ambient temperature is 25±2℃.humidity is 65±7%
2. The test systems refer to Note 1 and Note 2.
3. Testing invertor: TDK/TAD347SR-4

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 | SR-3A | 1° |
| Luminance | | |
| 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)。

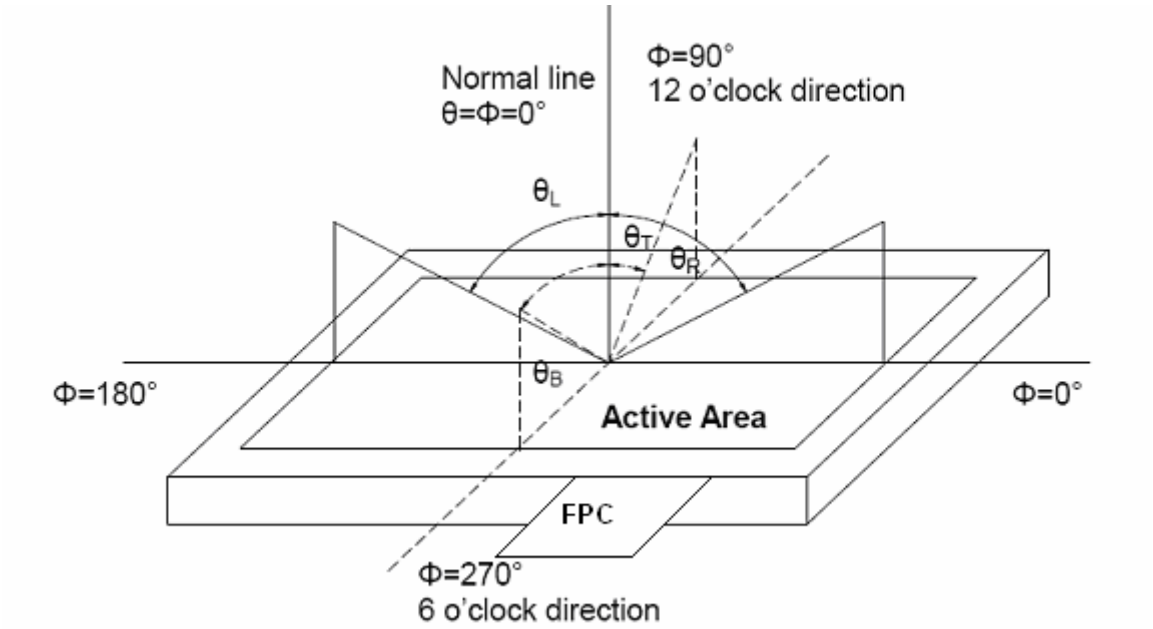



Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

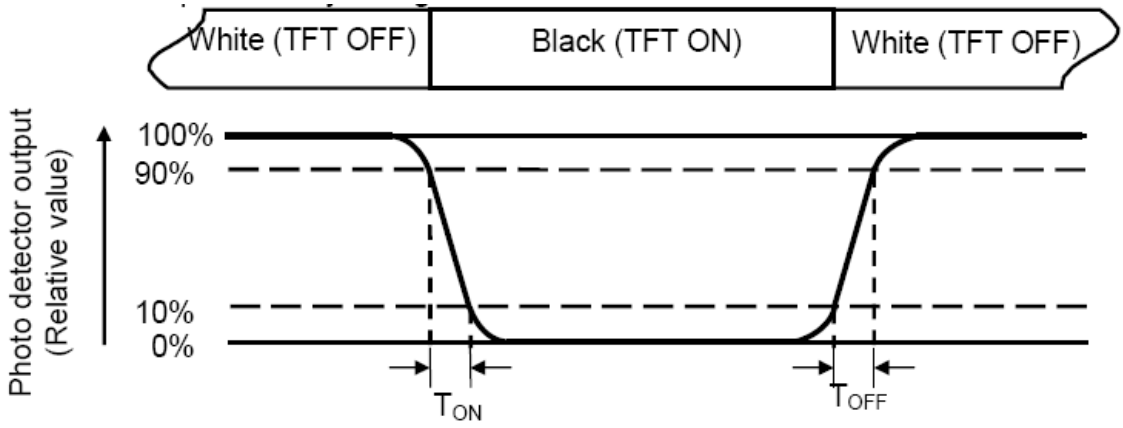
“White state “:The state is that the LCD should driven by Vwhite.

“Black state”: The state is that the LCD should 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 (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) 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

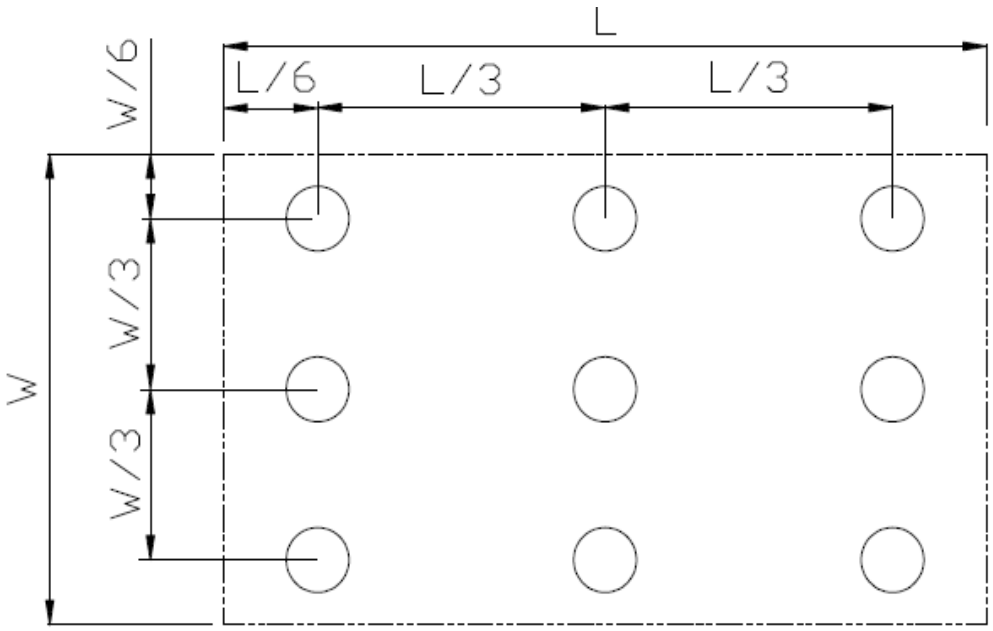



Fig. 2 Definition of uniformity

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.

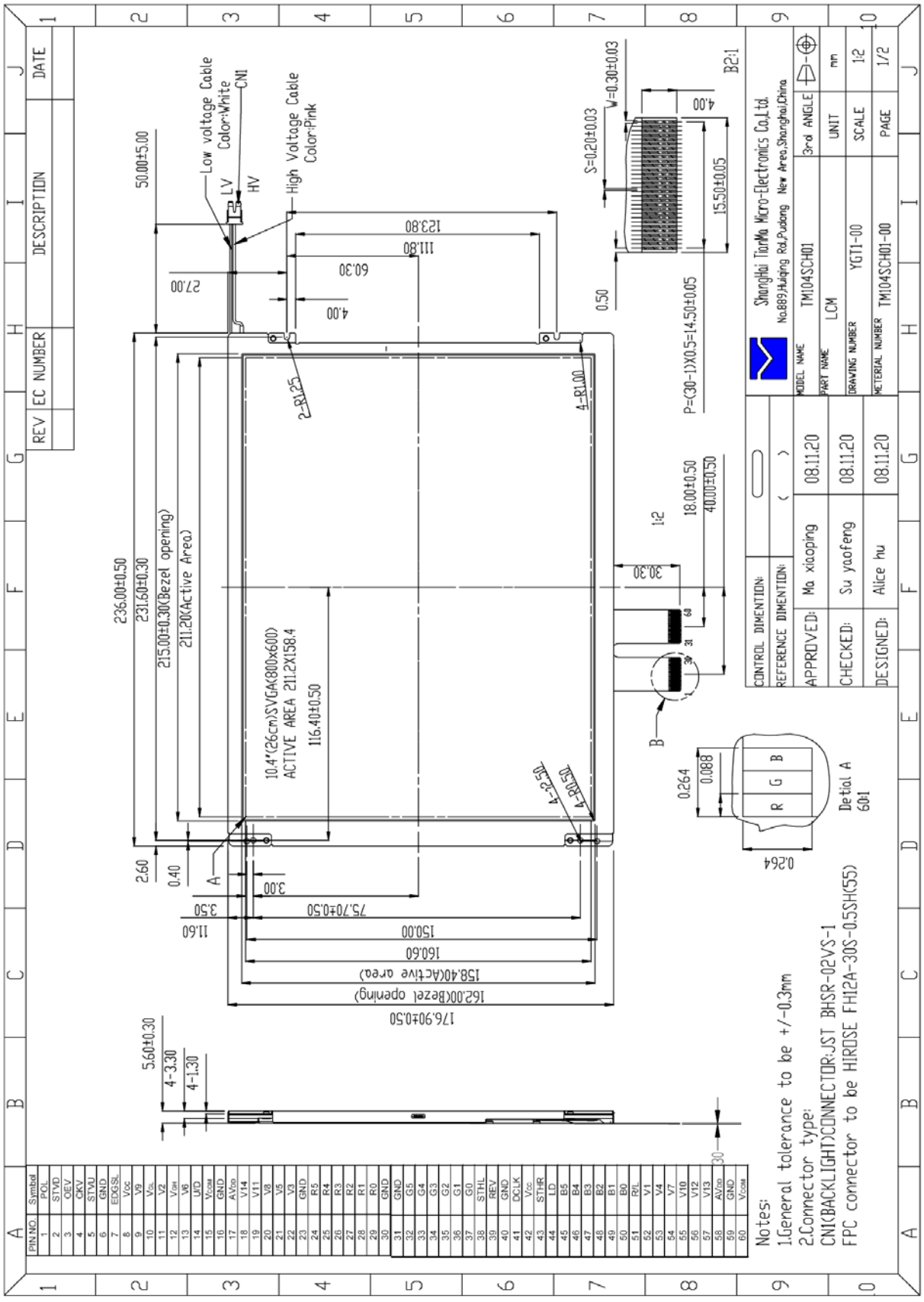
# 7 Environmental / Reliability Test

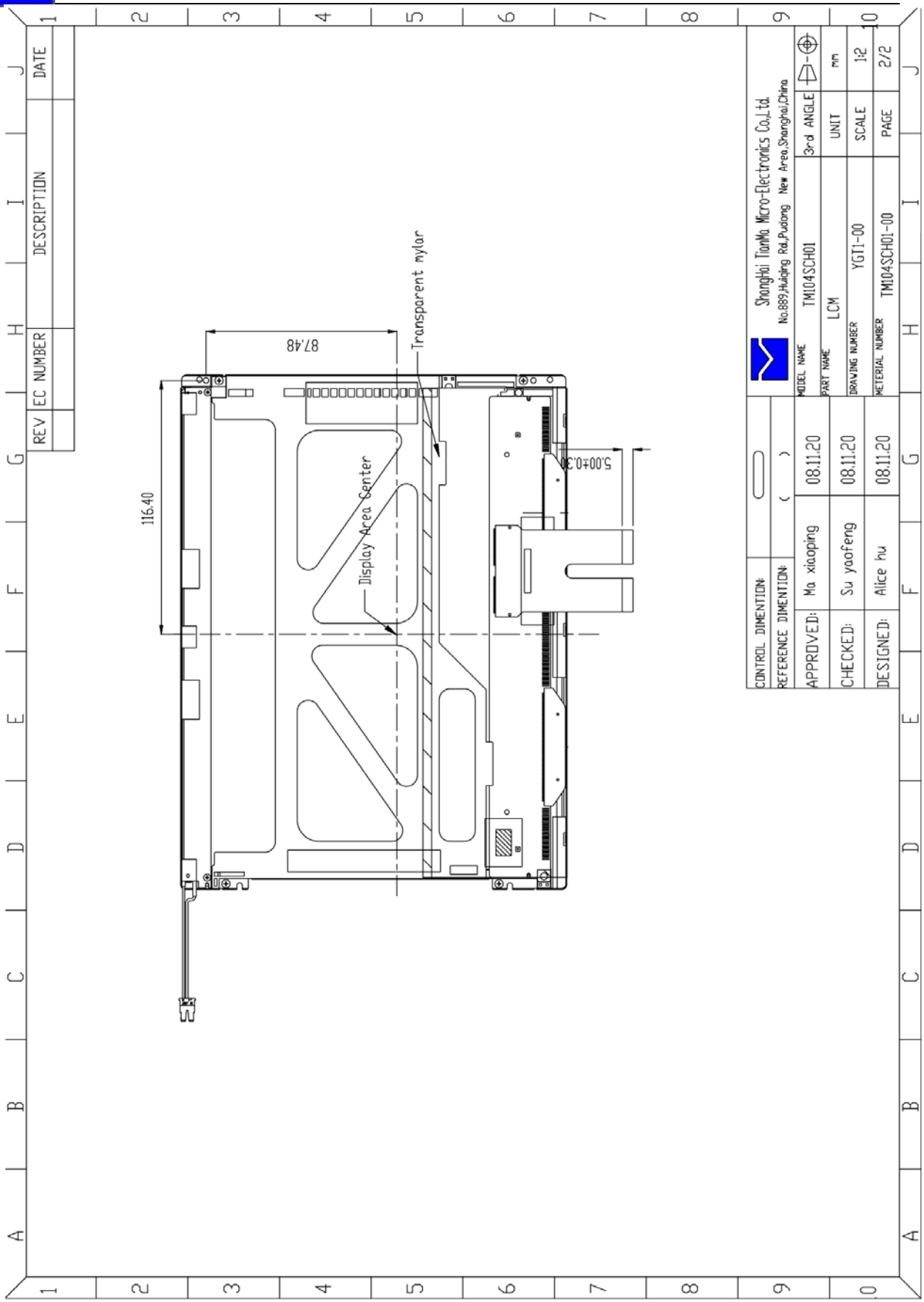
| No | Test Item | Condition | Remark |
|---|---|---|---|
| 1 | High Temperature Operation | Ts=+70℃, 240hrs | Note1<br>IEC60068-2-2,GB2423.2—89 |
| 2 | Low Temperature Operation | Ta=-20℃, 240hrs | IEC60068-2-1<br>GB2423.1—89 |
| 3 | High Temperature Storage (non-operation) | Ta=+80℃, 240hrs | IEC60068-2-2,<br>GB2423.2—89 |
| 4 | Low Temperature Storage (non-operation) | Ta=-30℃, 240hrs | IEC60068-2-1<br>GB2423.1—89 |
| 5 | High Temperature & High Humidity Operation | Ta = +60℃, 90% RH max,240 hours | Note2<br>IEC60068-2-3,<br>GB/T2423.3—2006 |
| 6 | Thermal Shock (non-operation) | -20℃ 30 min~+70℃ 30 min,<br>Change time:5min, 100 Cycles | Start with cold temperature, end with high temperature<br>IEC60068-2-14,GB2423.22—87 |
| 7 | Electro Static Discharge (operation) | C=150pF,R=330Ω,<br>Air:±15Kv,<br>Contact:±8Kv,<br>10times/terminal | IEC61000-4-2<br>GB/T17626.2—1998 |
| 8 | Vibration (non-operation) | Frequency range:10～55Hz,<br>Stroke:1.5mm<br>Sweep:10Hz～55Hz～10Hz 2hours for each direction of X.y.z (6 hours for total) | IEC60068-2-6<br>GB/T2423.10—1995 |
| 9 | Shock (non-operation) | 80G 6ms, ±X,±Y,±Z 3 times for each direction | IEC60068-2-27<br>GB/T2423.5—1995 |
| 10 | Package Drop Test | Height:80 cm,1 corner, 3 edges, 6 surfaces | IEC60068-2-32<br>GB/2423.8—1995 |
| 11 | Package Vibration Test | Random Vibration:<br>0.015GxG/Hz for 5-200Hz,<br>-6dB/Octave from 200-500Hz<br>2 hours for each direction of X,Y,Z<br>(6 hours for total) | IEC60068-2-34 |

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

Note2: Ta is the ambient temperature of sample.

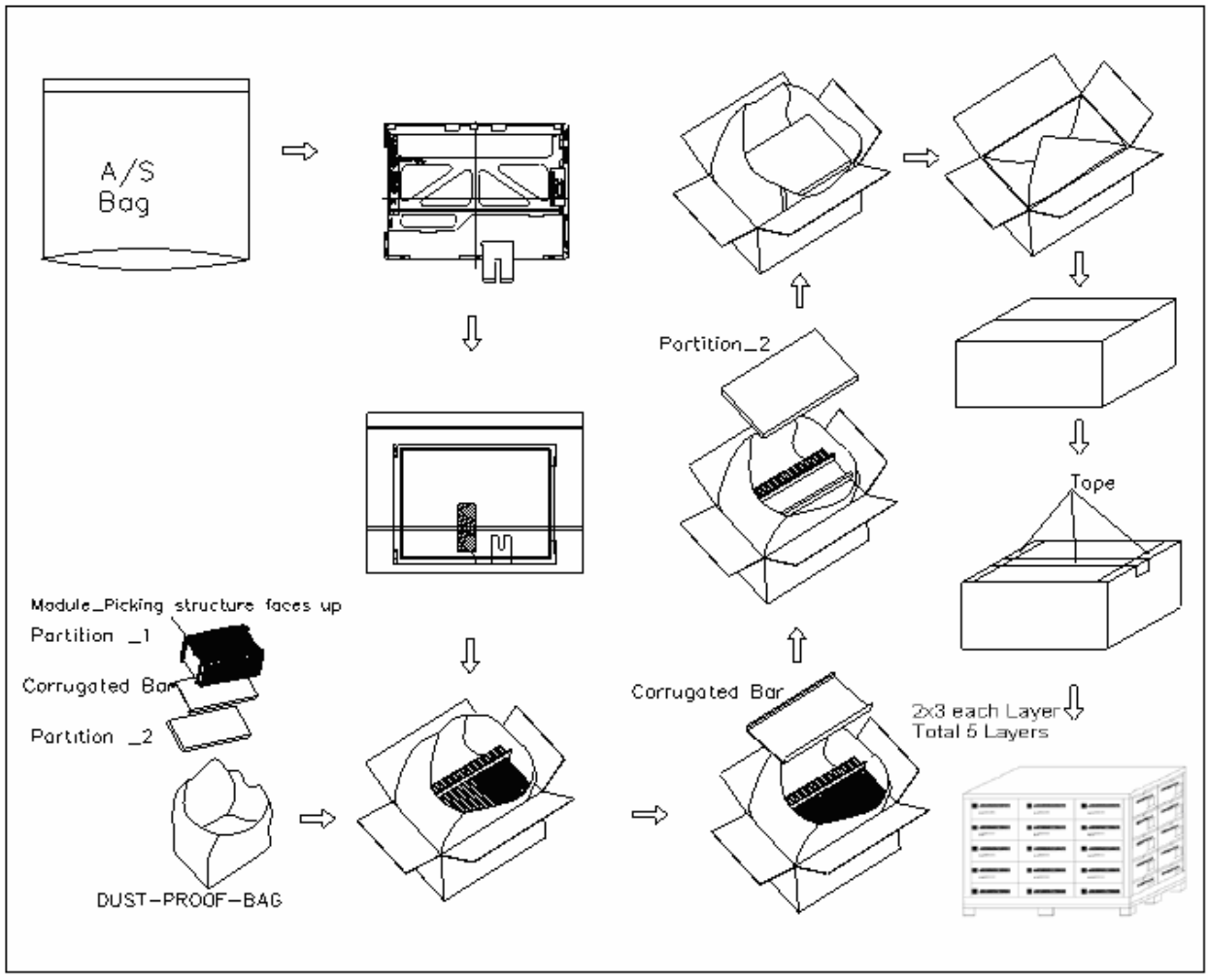
# 8 Mechanical Drawing





# 9 Packing Drawing

| No | Item | Model (Material) | Dimensions(mm) | Unit Weight(Kg) | Quantity | Remark |
|---|---|---|---|---|---|---|
| 1 | LCM module | TM104SCH01 | 236.00x176.90x5.60 | 0.28 | 25 | |
| 2 | Partition_1 | CORRUGATED PAPER | 513x333x217 | 1.96 | 1 | |
| 3 | Anti-static Bag | PE | 247x256x0.05 | 0.04 | 25 | |
| 4 | DUST-PROOF BAG | PE | 700×530 | 0.06 | 1 | |
| 5 | Partition_1 | CORRUGATED PAPER | 505x332x4.0 | 0.1 | 2 | |
| 6 | CORRUGATED | CORRUGATED PAPER | 513x248 | 0.09 | 2 | |
| 7 | Carton | CORRUGATED PAPER | 530x350x250 | 1.12 | 1 | |
| 8 | Total weight(Kg) | 11.5 | | | | |



# 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.