# Specification for Approval

Customer:_____

Model Name:_____

| Supplier Approval | | | Customer approval |
|---|---|---|---|
| R&D Designed | R&D Approved | QC Approved | |
| *Peter* | *Peng Jun* | | |

# Revision Record

| REV NO. | REV DATE | CONTENTS | Note |
|---|---|---|---|
| A | 2025/01/16 | NEW ISSUE | |
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# Table of Contents

## 1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by AMSON electronics.

If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution
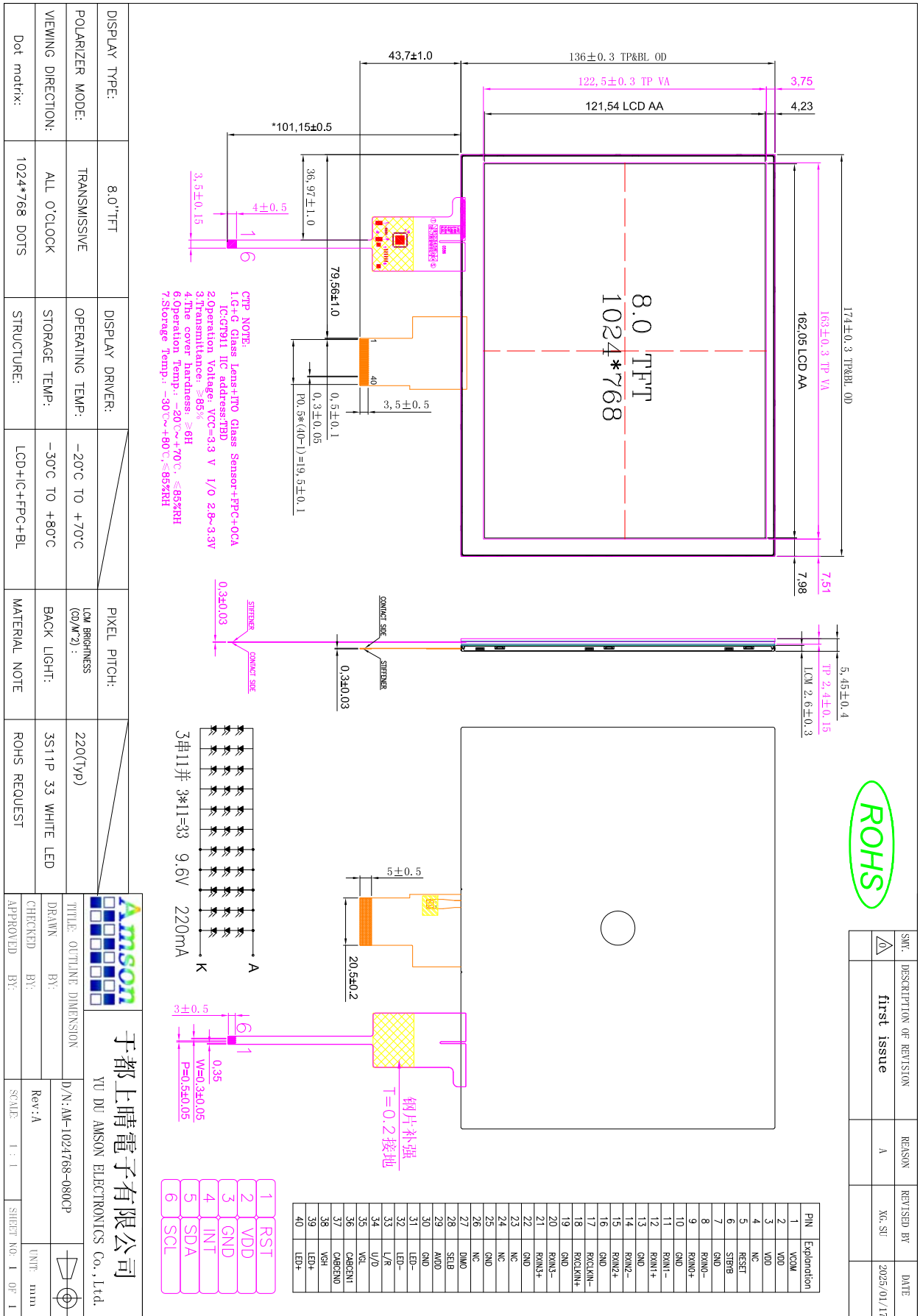
## 2. General Information

**LCM**

| TITEM | STANDARD VALUES | UNITS |
|---|---|---|
| LCD type | 8.0"TFT | -- |
| Dot arrangement | 1024×RGB×768 | dots |
| Color filter array | RGB vertical stripe | -- |
| Display mode | Normally black | - |
| Gray Scale Inversion Direction | 85/85/85/85 | -- |
| Eyes    Viewing Direction | ALL | |
| Module size | 174.00(W)×136.00(H)×5.45(T) | mm |
| Active area | 162.05(W)×121.54(H) | mm |
| Dot pitch | 0.15825(W)×0.15825(H) | mm |
| Interface | LVDS | -- |

**CTP**

| ITEM | STANDARD VALUES | UNITS |
|---|---|---|
| CTP type | Cover Lens + sensor + FPC | -- |
| CTP Driver IC | GT911 | -- |
| Transmittance | ≥85％ | -- |
| The cover hardness | 6H | -- |
| CTP size | 174.0W)×136.0(H)×2.4(T) | mm |
| CTP Viewing area | 163.0(W)×122.5(H) | mm |
| CTP Interface | I2C | |
| Operating temperature | -20  ～  +70 | °C |
| Storage temperature | -30  ～  +80 | °C |

## 3. External Dimensions



| | | |
|---|---|---|
| DISPLAY TYPE: | 8.0"TFT | |
| POLARIZER MODE: | TRANSMISSIVE | |
| VIEWING DIRECTION: | ALL O'CLOCK | |
| Dot matrix: | 1024*768 DOTS | |
| STRUCTURE: | LCD+IC+FPC+BL | |
| OPERATING TEMP.: | -20°C TO +70°C | |
| STORAGE TEMP.: | -30°C TO +80°C | |
| DISPLAY DRIVER: | | |
| PIXEL PITCH: | | |
| BACK LIGHT: | 3S11P 33 WHITE LED | |
| LCM BRIGHTNESS (cd/m^2): | 220(Typ) | |
| MATERIAL NOTE | | |
| ROHS REQUEST | | |

CTP NOTE:
1.G+G Glass Lens+ITO Glass Sensor+FPC+OCA
IC:GT911 IIC address:TBD
2.Operation Voltage: VCC=3.3 V I/O 2.8~3.3V
3.Transmittance: ≥85%
4.The cover hardness: ≥6H
6.Operation Temp.: -20℃~+70℃, ≤85%RH
7.Storage Temp.: -30℃~+80℃,≤85%RH

3串11并 3*11=33  9.6V  220mA

| PIN | Explanation |
|---|---|
| 1 | VCOM |
| 2 | VDD |
| 3 | VDD |
| 4 | NC |
| 5 | RESET |
| 6 | STBYB |
| 7 | GND |
| 8 | RXIN0- |
| 9 | RXIN0+ |
| 10 | GND |
| 11 | RXIN1- |
| 12 | RXIN1+ |
| 13 | GND |
| 14 | RXIN2- |
| 15 | RXIN2+ |
| 16 | GND |
| 17 | RXCLKN- |
| 18 | RXCLKN+ |
| 19 | GND |
| 20 | RXIN3- |
| 21 | RXIN3+ |
| 22 | GND |
| 23 | NC |
| 24 | NC |
| 25 | GND |
| 26 | NC |
| 27 | NC |
| 28 | SELB |
| 29 | DIMO |
| 30 | AVDD |
| 31 | GND |
| 32 | LED- |
| 33 | LED- |
| 34 | U/D |
| 35 | L/R |
| 36 | VGL |
| 37 | CABCEN0 |
| 38 | CABCEN1 |
| 39 | VGH |
| 40 | LED+ |
| 40 | LED+ |
| 39 | LED+ |

| 1 | RST |
| 2 | VDD |
| 3 | GND |
| 4 | INT |
| 5 | SDA |
| 6 | SCL |

## 4. Interface Description

| PIN NO. | Symbol | I/O | Description |
|---|---|---|---|
| 1 | VCOM | P | Common Voltage |
| 2 | VDD | P | Power Voltage for digital circuit |
| 3 | VDD | | |
| 4 | NC | P | No connection |
| 5 | RESET | I | Global reset pin |
| 6 | STBYB | I | Standby mode, Normally pulled high<br>STBYB = "1", normal operation<br>STBYB = "0", timing controller, source<br>driver will turn off, all output are High-Z |
| 7 | GND | P | Power   ground |
| 8 | RXIN0- | I | - LVDS differential data input |
| 9 | RXIN0+ | I | + LVDS differential data input |
| 10 | GND | P | Power   ground |
| 11 | RXIN1- | I | - LVDS differential data input |
| 12 | RXIN1+ | I | + LVDS differential data input |
| 13 | GND | P | Power   ground |
| 14 | RXIN2- | I | - LVDS differential data input |
| 15 | RXIN2+ | I | + LVDS differential data input |
| 16 | GND | P | Power   ground |
| 17 | RXCLKN- | I | - LVDS differential clock input |
| 18 | RXCLKN+ | I | + LVDS differential clock input |
| 19 | GND | P | Power   ground |
| 20 | RXIN3- | I | - LVDS differential data input |
| 21 | RXIN3+ | I | + LVDS differential data input |
| 22 | GND | P | Power   ground |
| 23,24 | NC | - | No connection |
| 25 | GND | P | Power   ground |
| 26 | NC | - | No connection |
| 27 | DIMO | O | Backlight CABC controller signal output |
| 28 | SELB | I | 6bit / 8bit mode select |
| 29 | AVDD | P | Power for Analog Circuit |
| 30 | GND | P | Power   ground |
| 31,32 | LED- | P | LED Cathode |
| 33 | L/R | I | Horizontal inversion |
| 34 | U/D | I | Vertical inversion |
| 35 | VGL | P | Gate OFF Voltage |
| 36 | CABCEN1 | I | CABC H/W enable |
| 37 | CABCEN0 | I | CABC H/W enable |
| 38 | VGH | P | Gate ON Voltage |
| 39,40 | LED+ | P | LED Anode |

I: input, O: output, P: Power

Note1: If LVDS input data is 6 bits ,SELB must be set to High;

If LVDS input data is 8 bits ,SELB must be set to Low.

Note2: When CABC_EN="00", CABC OFF.

When CABC_EN="01", user interface image.

When CABC_EN="10", still picture.

When CABC_EN="11", moving image.

When CABC off, don't connect DIMO, else connect it to backlight.

Note3: When L/R="0", set right to left scan direction.

When L/R="1", set left to right scan direction.

When U/D="0", set top to bottom scan direction.

When U/D="1", set bottom to top scan direction.


Note: Definition of scanning direction.

Refer to the figure as below:
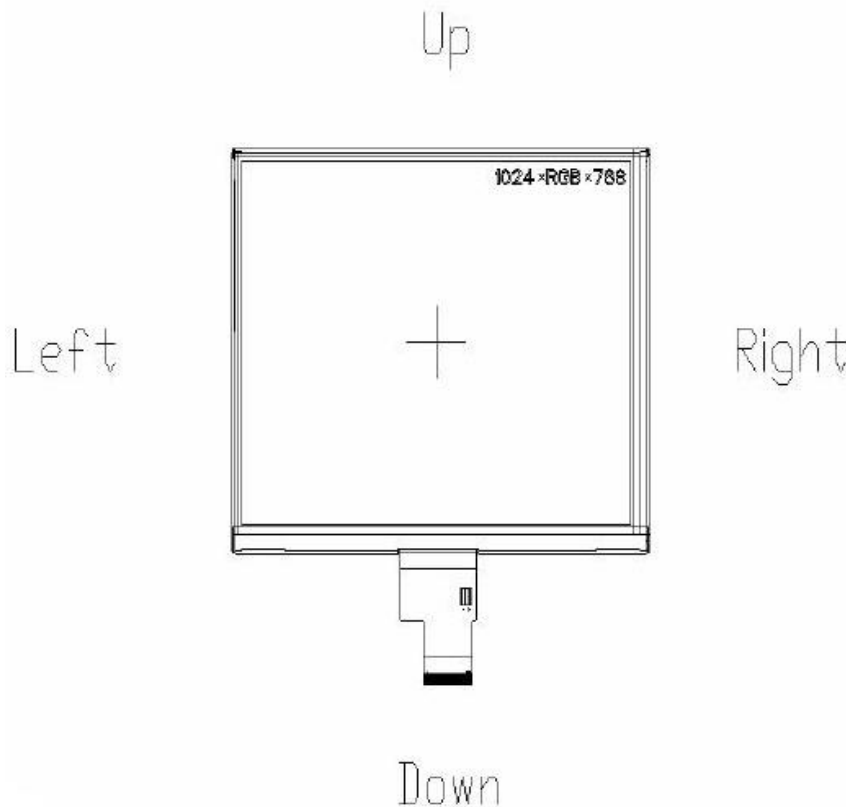


## CTP

| PIN NO. | Symbol | Description |
|---|---|---|
| 1 | INT | CTP interruption signal. |
| 2 | RES | CTP reset pin. Active low to enter reset state. |
| 3 | SDA | CTP I2C_data. |
| 4 | SCL | CTP I2C_clock. |
| 5 | TPVDD | Power supply. |
| 6 | TPGND | Power ground |

## 5. Absolute Maximum Ratings

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table

| Item | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|
| Digital Supply Voltage | VDD | -0.3 | +5.0 | V |
| | AVDD | 6.5 | 13.5 | V |
| | VGH | -0.3 | 40 | V |
| | VGL | -20 | +0.3 | V |
| Operating temperature | $T_{OP}$ | -20 | 70 | ºC |
| Storage Temperature | $T_{STG}$ | -30 | 80 | ºC |

Note 1: If Ta below 50ºC, the maximal humidity is 90%RH, if Ta over 50ºC, absolute humidity should be less than 60%RH.

Note 2: The response time will be extremely slow when the operating temperature is around -10℃, and the back ground will become darker at high temperature operating.

Note 3: These range above is maximum value not the actual operating temperature . Actual Operating temperature is no more than 40℃ and temperature refers to the LCM surface temperature:

Note 4: GWD is not responsible for product problems beyond the use conditions.

## 6. DC Characteristics

| Item | | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Supply Voltage | | VDD | 3.0 | 3.3 | 3.6 | V |
| | | AVDD | 9.8 | 10 | 10.2 | |
| | | VGH | 18.6 | 18.9 | 19.2 | V |
| | | VGL | -8.1 | -7.8 | -7.5 | V |
| Input signal voltage | | VCOM | 2.6 | 3.6 | 4.6 | V |
| Current Consumption All Black | Logic | $I_{CC+}$ $I_{IN}$ | - | TBD | - | mA |
| | Analog | | | | | |

Note 1: Be sure to apply VDD and VGL to the LCD first, and then apply VGH.

Note 2: VDD setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: Typical Vcom is only a reference value, it must be optimized according to each LCM,please use VR and base on below application circuit..

Note 4: RESET,STBYB,SELB,L/R,U/D,CABCEN0,CABCEN1.
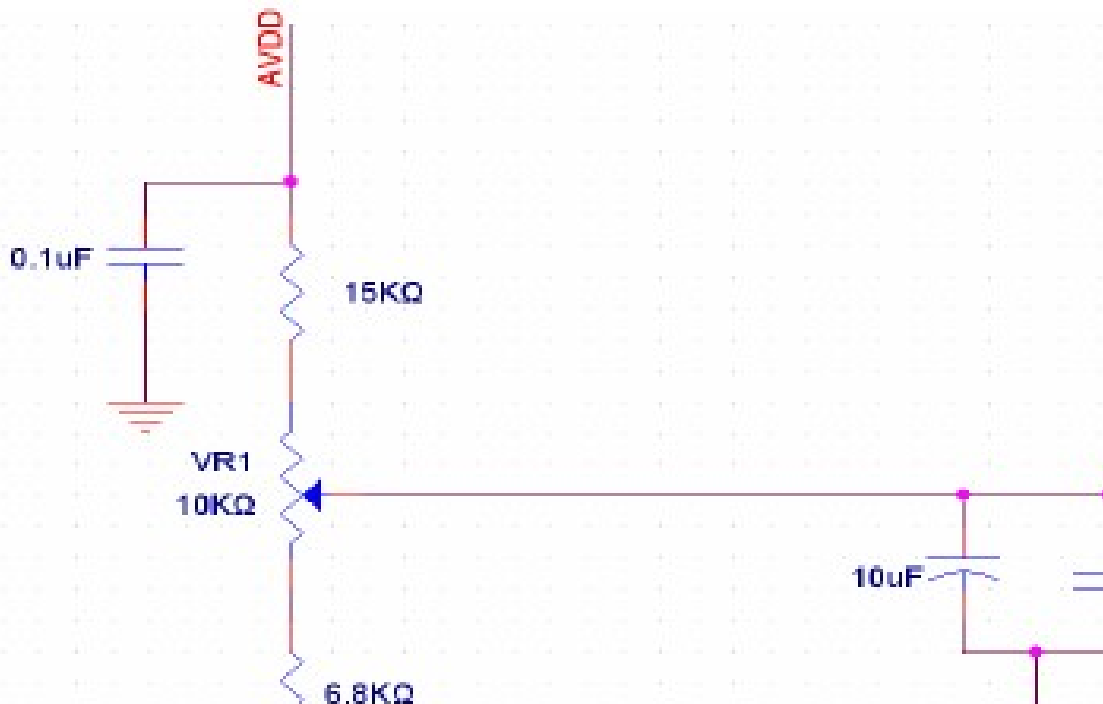
# 7. Timing Characteristics
## 7.1 Power Sequence
### a. Power on:
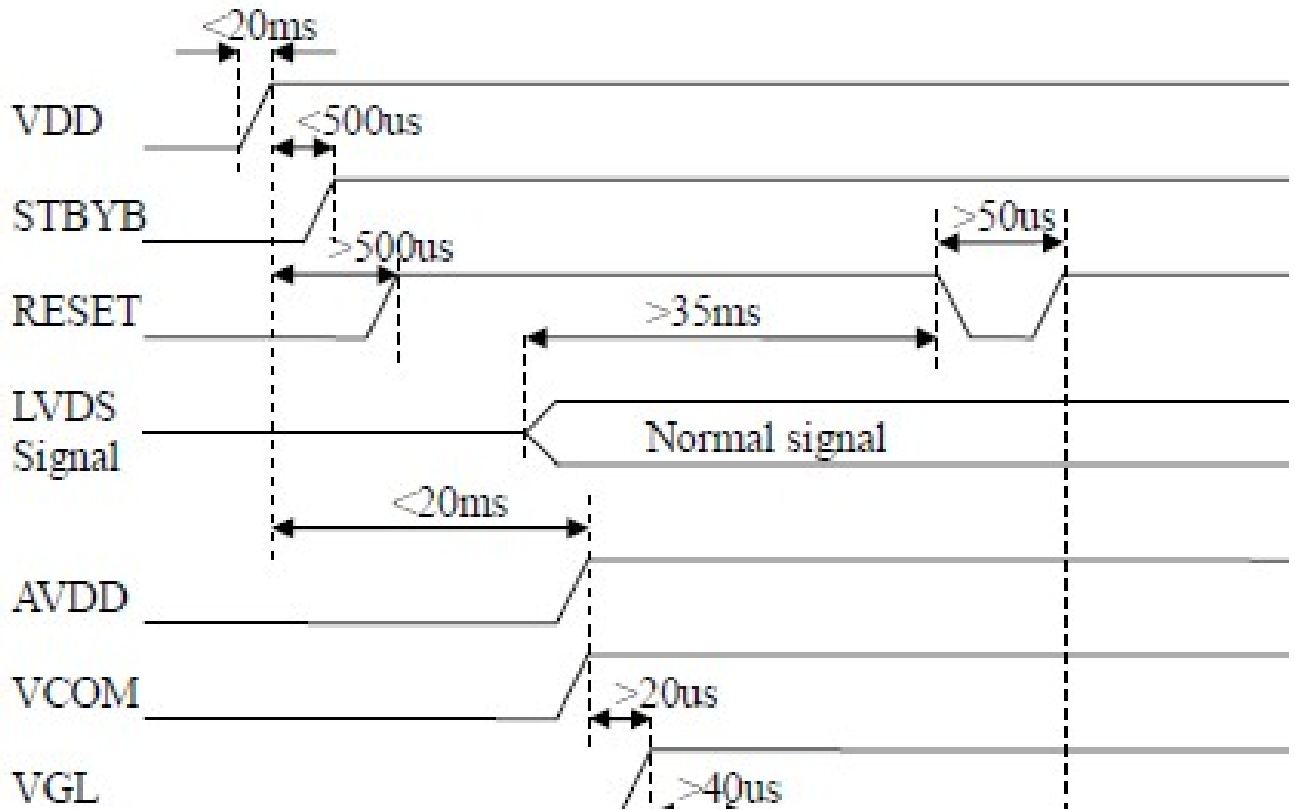
## .7.2 LVDS Signal Timing Characteristics

### AC Electrical Characteristics

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| Clock frequency | $R_{xFCLK}$ | 20 | - | 71 | MHz |
| Input data skew margin | $T_{RSKM}$ | 500 | - | - | ps |
| Clock high time | $T_{LVCH}$ | - | $4/(7* R_{xFCLK})$ | - | ns |

### Input Clock and Data Timing Diagram
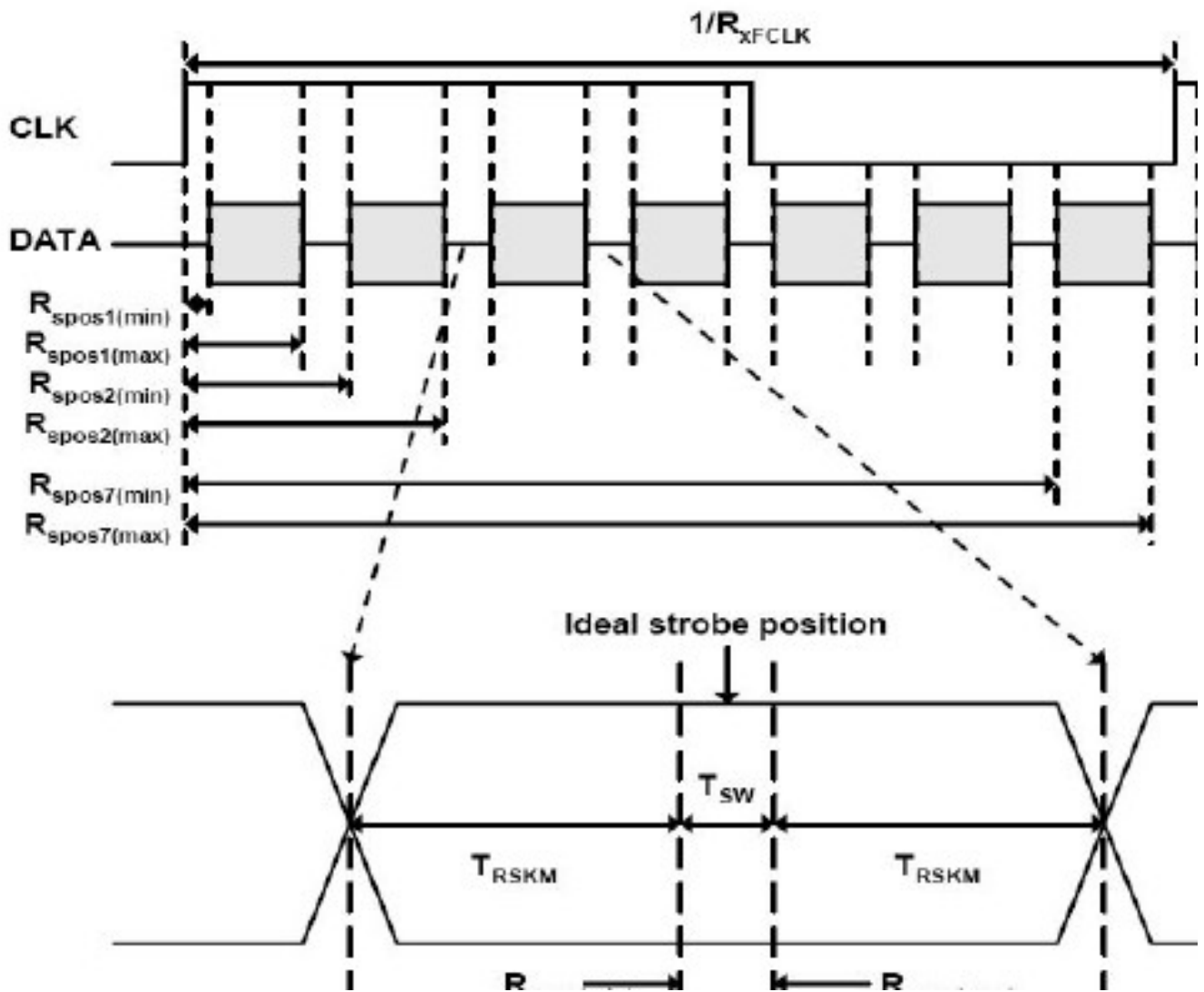
## 7.3 DC Electrical Characteristics

| Parameter | Symbol | Values | | |
|---|---|---|---|---|
| | | Min. | Typ. | Max. |
| Differential input high Threshold voltage | $R_{xVTH}$ | - | - | +0.1 |
| Differential input low Threshold voltage | $R_{xVTL}$ | -0.1 | - | - |
| Input voltage range (singled-end) | $R_{xVIN}$ | 0 | - | 2.4 |
| Differential input common mode voltage | $R_{xVCM}$ | $|V_{ID}|/2$ | - | $2.4-|V_{ID}|/2$ |

**Single-end Signals**

$PINDx-NINDx=-|V_{ID}|<R_{xVTL}="LOW"$

NINDx

$R_{xVCM}$

PINDx

$PINDx-NINDx=|V_{ID}|>R_{xVTH}="HIGH"$

$|V_{ID}|$

$R_{xVCM}$

**Differential Signal**

PINDx-NINDx

$R_{xVTH}$

$|V_{ID}|$

0V
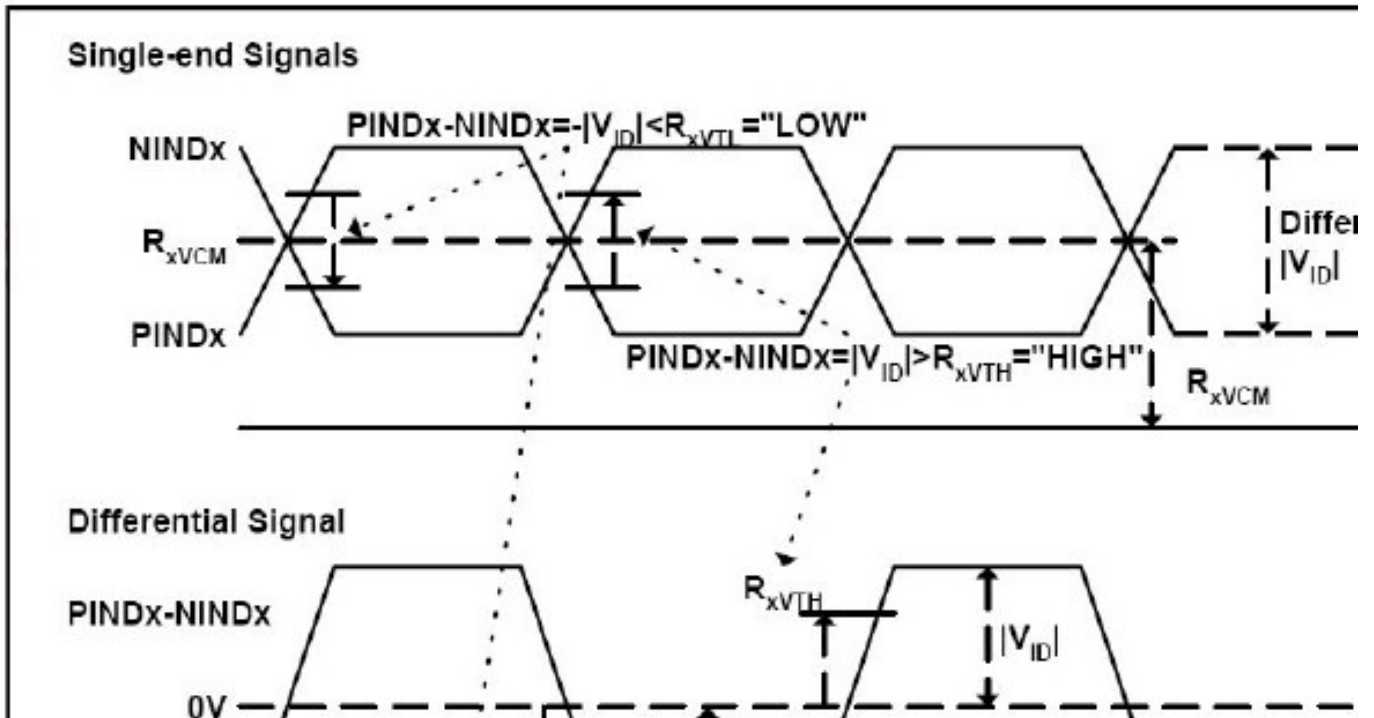
## 7.4 Timing Table

| Item | Symbol | Values | | | Un |
| --- | --- | --- | --- | --- | --- |
| | | Min. | Typ. | Max. | |
| Clock Frequency | fclk | 52 | 65 | 71 | MH |
| Horizontal display area | thd | | 1024 | | |
| HS period time | th | 1114 | 1344 | 1400 | DCL |
| HS Blanking | thb+thfp | 90 | 320 | 376 | DCL |
| Vertical display area | tvd | | 768 | | |
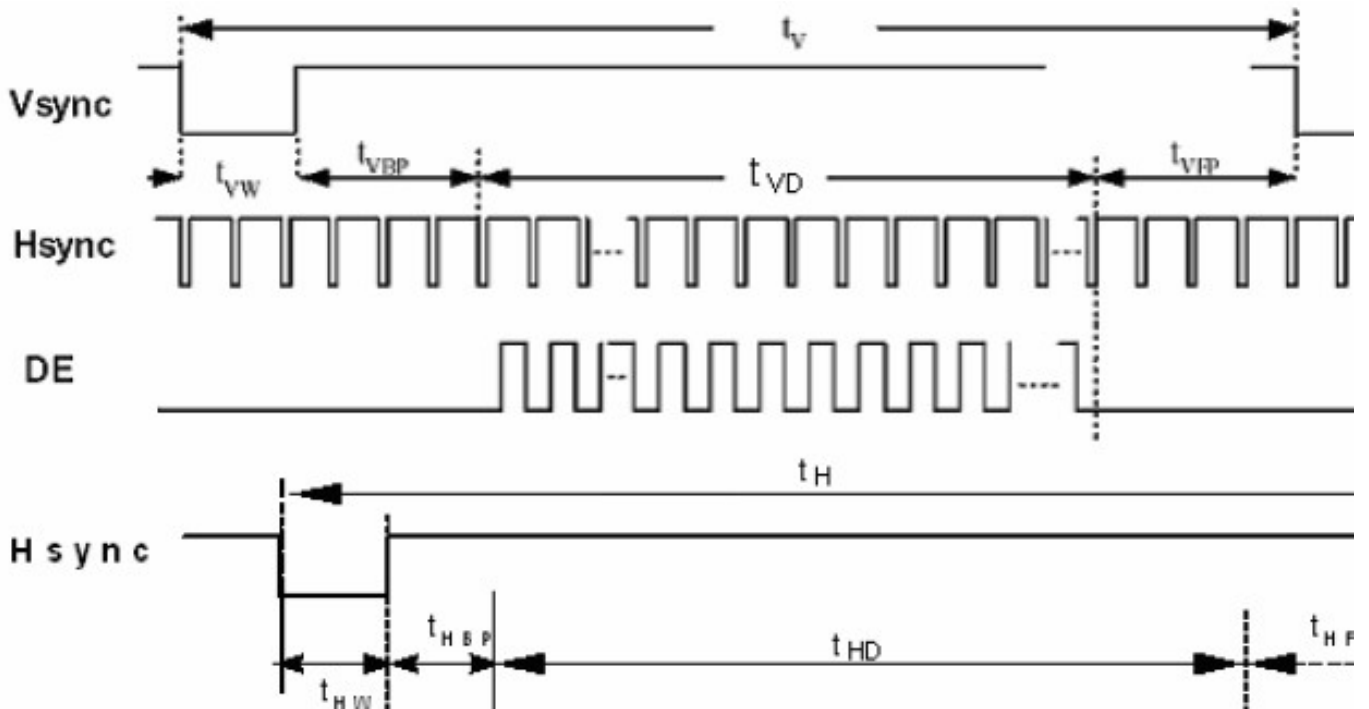
## 7.5 Data Input Format

**6bit LVDS input**
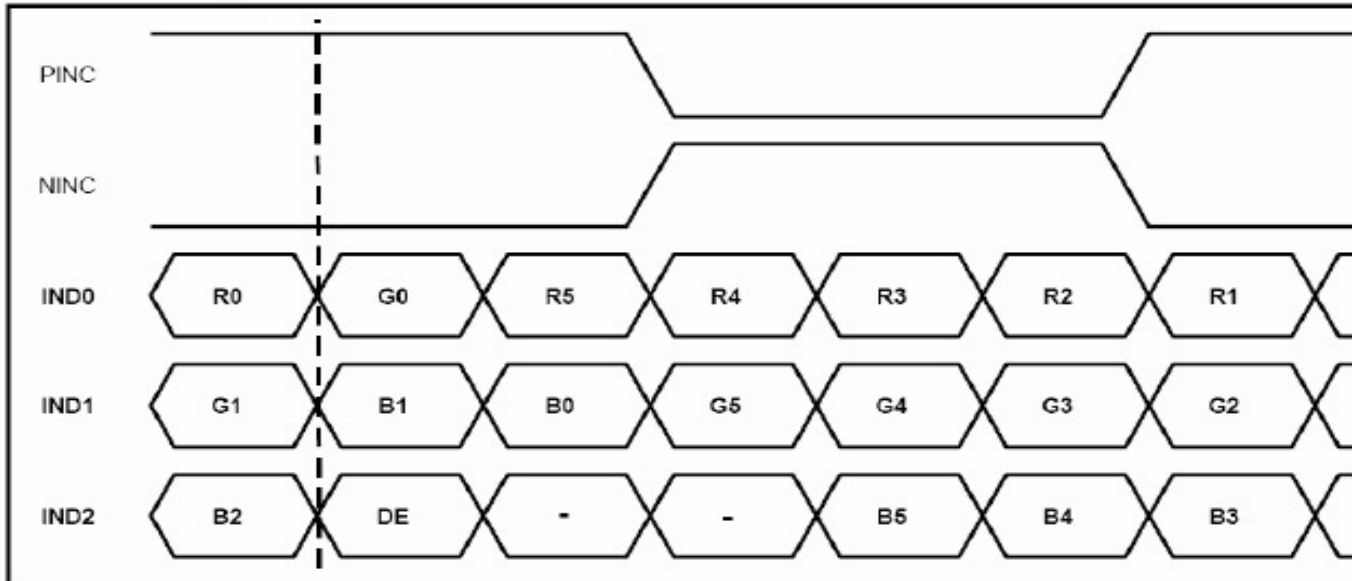


**8bit LVDS input**
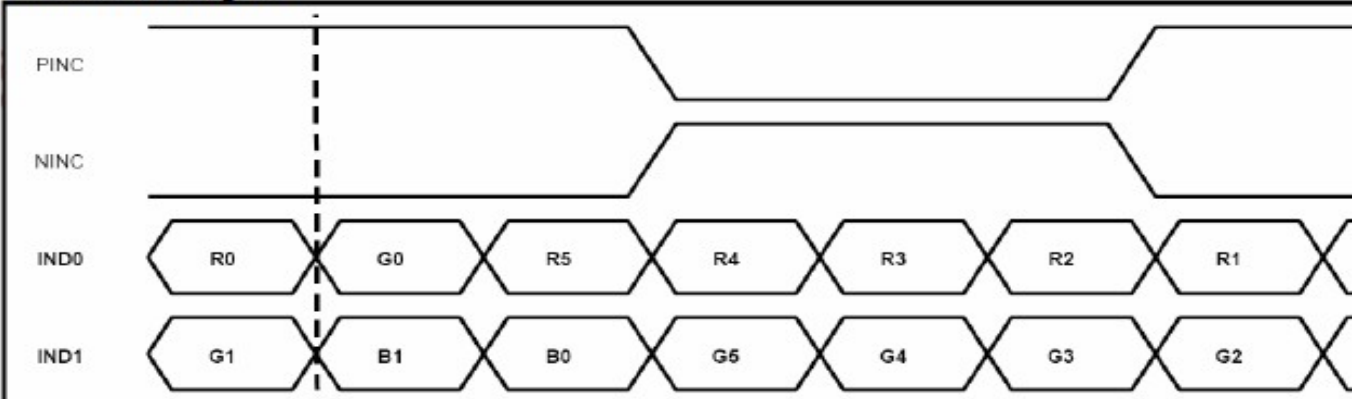
## 8. Backlight Characteristic



3串11并 3*11=33    9.6V    220mA
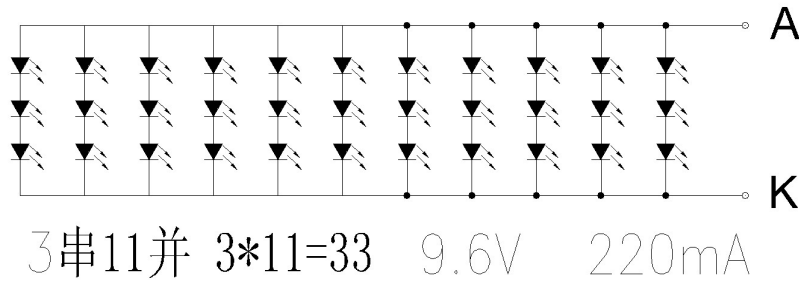
| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Forward Voltage | VF | Ta=25 ℃, $I_F$=40mA/LED | 8.4 | 9.6 | 10.4 | V |
| Forward Current | IF | Ta=25 ℃, $V_F$=3.2V/LED | - | 220 | - | mA |
| Power dissipation | PD | - | - | 2112 | - | mW |
| Uniformity | Avg | - | - | 80 | - | % |
| LED working life(25℃) | - | | - | 30,000 | - | Hrs |
| Drive method | Constant current | | | | | |
| LED Configuration | 30 White LEDs ( 3 LEDs in one string and 10 groups in parallel) | | | | | |

Note1：LED life time defined as follows: The final brightness is at 50% of original brightness. The environmental conducted under ambient air flow, at Ta=25±2 ℃,60%RH±5%, $I_F$=40mA

## 9. Optical Characteristics

| Item | Conditions | | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| Viewing Angle (CR>10) | Horizontal | $\theta_L$ | 70 | 80 | - | degree | (1),(2),(6) |
| | | $\theta_R$ | 70 | 80 | - | | |
| | Vertical | $\theta_T$ | 70 | 80 | - | | |
| | | $\theta_B$ | 70 | 80 | - | | |
| Center Luminance of White | $L_C$ | | 180 | 220 | - | cd/m$^2$ | |
| Contrast Ratio | Center | | 700 | 1000 | - | - | (1),(3),(6) |
| Response Time | Rising | | - | 25 | 35 | ms | (1),(4),(6) |
| | Falling | | | | | | |
| CF Color Chromaticity (CIE1931) | Red x | | Typ. -0.05 | TBD | Typ. +0.05 | - | (1), (6) |
| | Red y | | | TBD | | - | |
| | Green x | | | TBD | | - | |
| | Green y | | | TBD | | - | |
| | Blue x | | | TBD | | - | |
| | Blue y | | | TBD | | - | |
| | White x | | | TBD | | - | |
| | White y | | | TBD | | - | |

Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C 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.
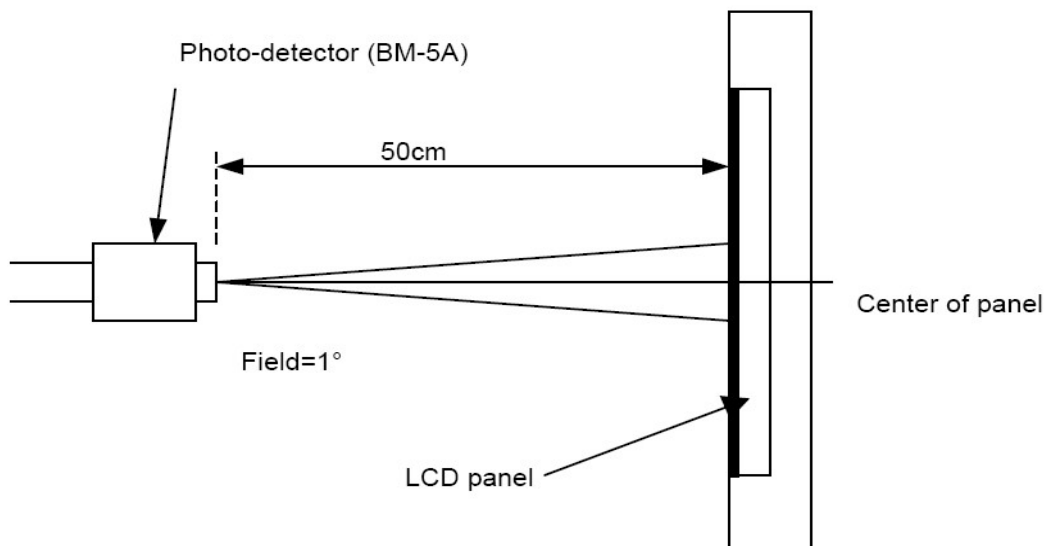
Note (2) Definition of Viewing Angle
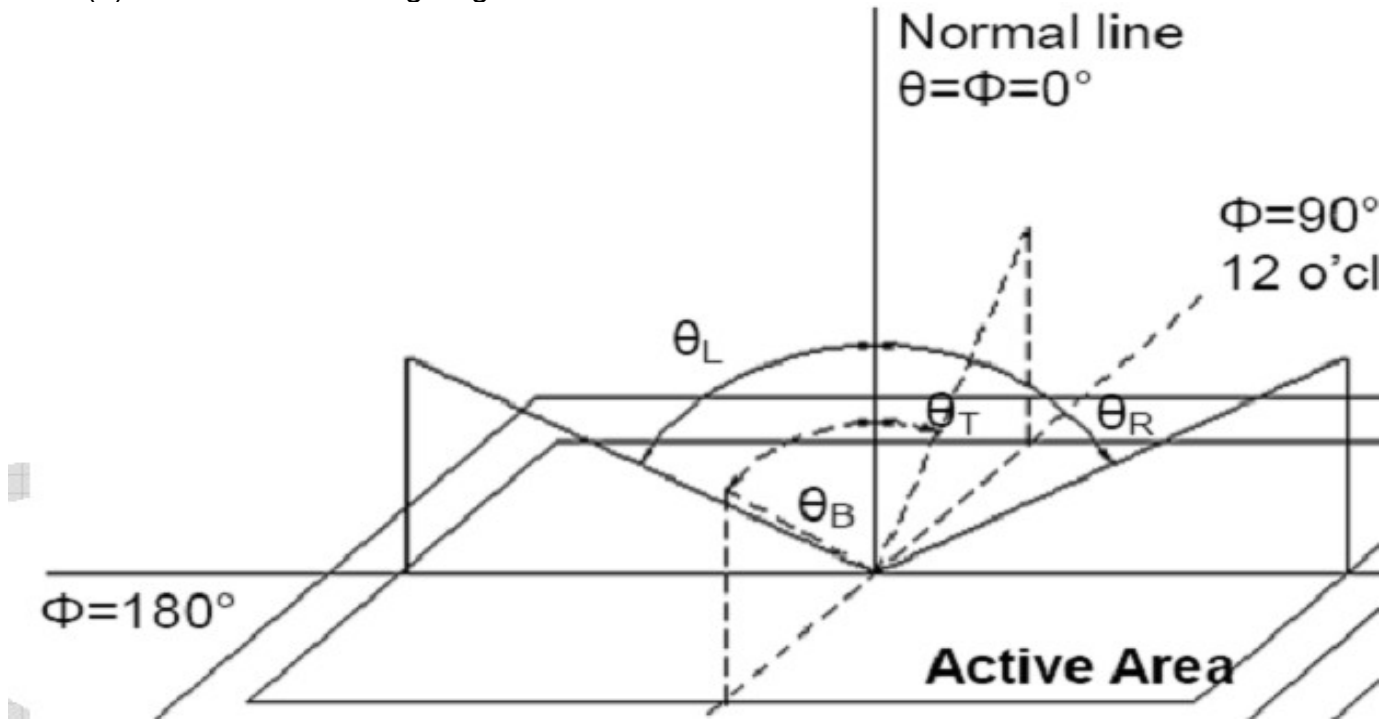


Note (3) Definition of Contrast Ratio (CR)
  The contrast ratio can be calculated by the following expression
  Contrast Ratio (CR) = L63 / L0
  L63: Luminance of gray level 63, L0: Luminance of gray level 0

Note (4) Definition of response time
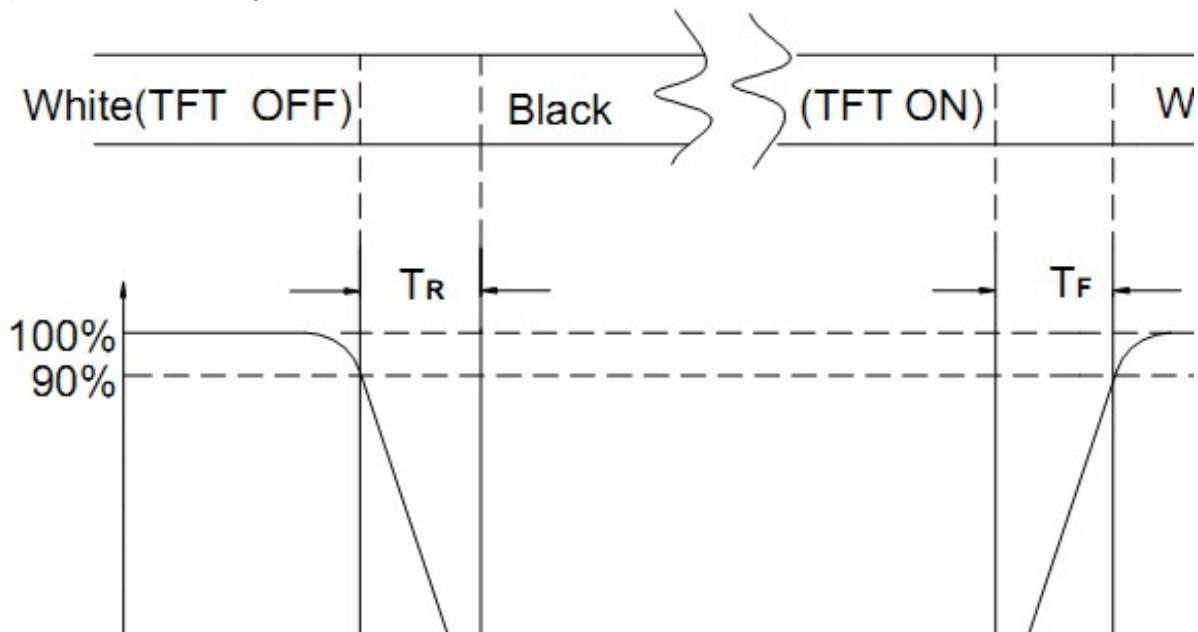


Note (5) Definition of Transmittance (Module is without signal input)
  Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

Note (6) Definition of color chromaticity (CIE1931)

  Color coordinates measured at the center point of LCD

## 10. Reliability Test Conditions and Methods

| No | Item | Condition | Quantity | Criteria |
|---|---|---|---|---|
| 1 | High Temperature Operating | Ts = +70℃, 96Hrs | 2 | IEC60068-2-2 GB2423.2-89 |
| 2 | Low Temperature Operating | Ta = -20℃, 96Hrs | 2 | IEC60068-2-1 GB2423.1-89 |
| 3 | High Humidity | Ta = 60℃, 90%RH, 96Hrs | 2 | IEC60068-2-3 GB/T2423.3-2006 |
| 4 | High Temperature Storage | Ta =80℃, 96Hrs | 2 | IEC60068-2-2 GB2423.2-89 |
| 5 | Low Temperature Storage | Ta = -30℃, 96Hrs | 2 | IEC60068-2-1 GB2423.1-89 |
| 6 | Thermal Cycling Test (non-operation) | -20℃, 60min~70℃, 60min, 20 cycles. | 2 | IEC60068-2-14 GB2423.22-87 |
| 7 | Packing vibration | Frequency range:10Hz~50Hz Acceleration of gravity:5G X,Y,Z 30 min for each direction. | 2 | GB/T5170.14 -2009 |
| 8 | Electrical Static Discharge | Air:±8KV 150pF/330Ω 5 times<br>Contact:±4KV 150pF/330Ω 5 times | 2 | IEC61000-4-2 GB/T2423.5-1995 |
| 9 | Drop Test (Packaged) | Height:80 cm,1 corner, 3 edges, 6 surfaces. | 2 | GB/T2423.8 -1995 |

Note1. After the reliability test, the product only guarantee function normally without any fatal defect (non-display, line defect, abnormal display). All the appearance inspection is judged before the reliability test (the product must have enough recovery time, at least 2 hours at room temperature);
Note2. Total current Consumption should be below double of initial value;
Note3. One product only can use to conduct one Item test;
Note4. Ts is the temperature of panel's surface. Ta is the ambient temperature of samples.

## 11. Quality Assurance

11.1 Purpose

This standard for Quality Assurance assures the quality of LCD module products supplied to customer.

11.2 Standard for Quality Test

11.2.1 Sampling Plan:

GB2828.1-2012

Single sampling, general inspection level II

11.2.2 Sampling Criteria:

Visual inspection: AQL 1.5%

Electrical functional: AQL 0.65%.

11.2.3 Reliability Test:

Detailed requirement refer to Reliability Test Specification.

11.3 Nonconforming Analysis & Disposition

11.3.1 Nonconforming analysis:

11.3.1.1 Customer should provide overall information of non-conforming sample for their complaints.

11.3.1.2 After receipt of detailed information from customer, the analysis of nonconforming parts usually should be finished in one week.

11.3.1.3 If cannot finish the analysis on time, customer will be notified with the progress status.

11.3.2 Disposition of nonconforming:

11.3.2.1 Non-conforming product over PPM level will be replaced.

11.3.2.2 The cause of non-conformance will be analyzed. Corrective action will be discussed and implemented.

11.4 Agreement Items

Shall negotiate with customer if the following situation occurs:

11.4.1There is any discrepancy in standard of quality assurance.

11.4.2 Additional requirement to be added in product specification.

11.4.3 Any other special problem.

11.5 Standard of the Product Visual Inspection

11.5.1Appearance inspection:

11.5.1.1 The inspection must be under illumination about 1000 – 1500 lx, and the distance of view must be at 30cm ± 2cm.

11.5.1.2 The viewing angle should be 45° from the vertical line without reflection light or follows customer's viewing angle specifications.

11.5.1.3Definition of area: A Zone: Active Area, B Zone: Viewing Area
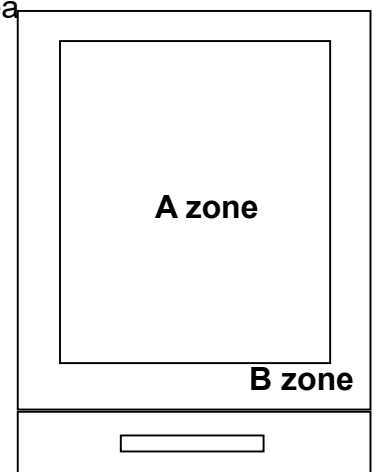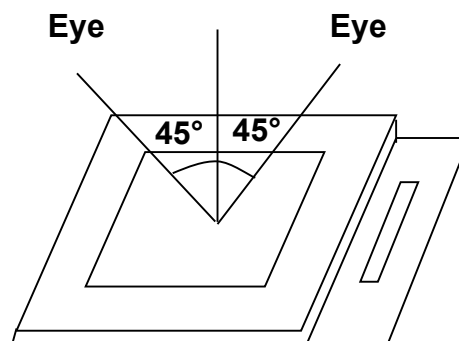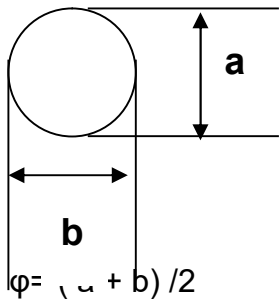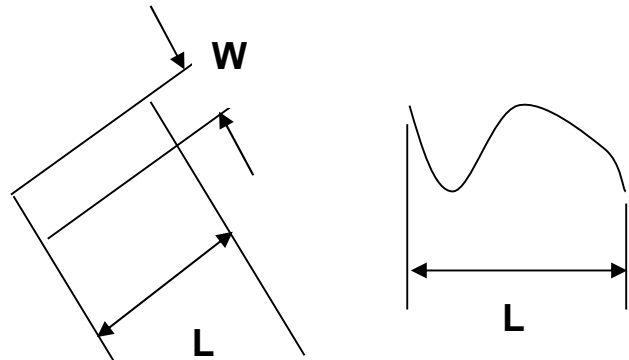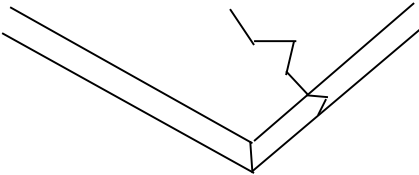
11.5.2 Basic principle:
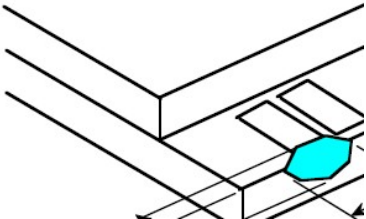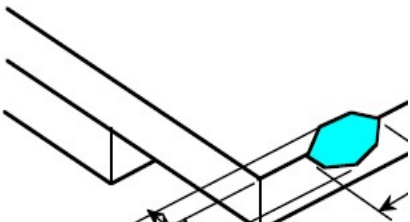
11.5.2.1 A set of sample to indicate the limit of acceptable quality level must be discussed by both us and customer when there is any dispute happened.
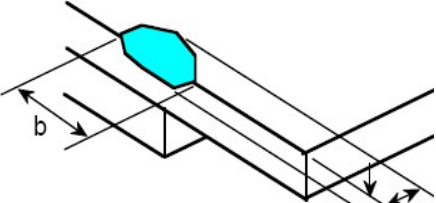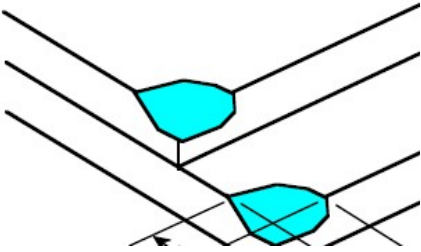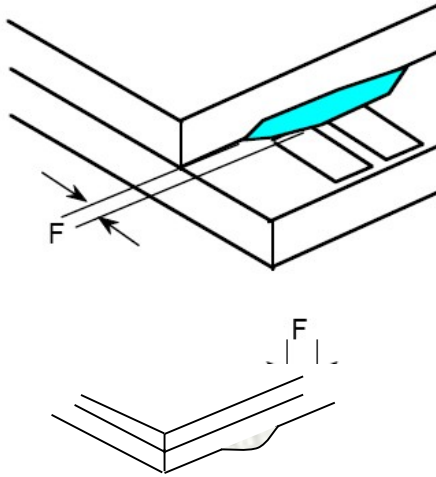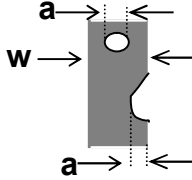
11.5.2.2 New item must be added on time when it is necessary.

11.6 Inspection Specification

| No. | Item | Criteria (Unit: mm) | | |
|---|---|---|---|---|
| 01 | Black / White spot<br>Foreign material (Round type)<br>Pinholes<br>Stain<br>Particles inside cell. (Minor defect) |  $\varphi = (a + b) / 2$<br><br>Distance between 2 defects should more than 5mm apart. | | |

| | | Area / Size | Acc. Qty |
|---|---|---|---|
| | | φ≤0.20 | Ignore |
| | | 0.20<φ≤0.40 | N≤3 |
| | | 0.40<φ | 0 |

| No. | Item | Criteria (Unit: mm) | | | |
|---|---|---|---|---|---|
| 02 | Electrical Defect (Minor defect) | | Display Area | Total | Note1 |
| | | Bright dot | N≤2 | N≤2 | |
| | | Dark dot | N≤3 | N≤3 | |
| | | Total dot | N≤4 | N≤4 | |
| | | Mura | Not visible through 5% ND filters. | | |

Remark:
1. Bright dot caused by scratch and foreign object accords to item 1.

| No. | Item | Criteria (Unit: mm) |
|---|---|---|
| 03 | Black and White line<br>Scratch<br>Foreign material (Line type)<br>(Minor defect) |  |

| Length | Width | Acc. Qty |
|---|---|---|
| / | W ≤ 0.1 | Ignore |
| L ≤ 2 | 0.1 < W ≤ 0.2 | 3 |
| L > 2 | 0.2 < W | 0 |
| Total | | 3 |

Distance between 2 defects should more than 3mm apart.
Scratches not viewable through the back of the display are

| | | |
|---|---|---|
| | | acceptable. |
| 04 | Glass Crack (Minor defect) |  Crack is potential to enlarge, any type is not allowed. |

| | | |
|---|---|---|
| 05 | Glass Chipping Pad Area: (Minor defect)  | <table> |

| Length and Width | Acc. Qty |
|---|---|
| c > 3.0, b< 1.0 | 1 |
| c< 3.0, b< 1.0 | 3 |
| a<Glass Thickness | |

| 06 | Glass Chipping Rear of Pad Area: (Minor defect) |

| Length and Width | Acc. Qty |
|---|---|
| c > 3.0, b< 1.0 | 1 |
| c< 3.0, b< 1.0 | 2 |
| c< 3.0, b< 0.5 | 4 |
| a<Glass Thickness | |

| 07 | Glass Chipping Except Pad Area:<br>(Minor defect)<br> | | |
|---|---|---|---|

| Length and Width | Acc. Qty |
|---|---|
| c > 3.0, b< 1.0 | 1 |
| c< 3.0, b< 1.0 | 2 |
| c< 3.0, b< 0.5 | 4 |
| a<Glass Thickness | |

| 08 | Glass Corner Chipping:<br>(Minor defect)<br> | | |
|---|---|---|---|

| Length and Width | Acc. Qty |
|---|---|
| c < 3.0, b< 3.0 | Ignore |
| a<Glass Thickness | |

| 09 | Glass Burr:<br>(Minor defect)<br> | | |
|---|---|---|---|

| Length | Acc. Qty |
|---|---|
| F < 1.0 | Ignore |

Glass burr don't affect assemble and module dimension.

| 10 | FPC Defect:<br>(Minor defect)<br> | 10.1 Dent, pinhole width a<w/3.<br>(w: circuitry width.)<br>10.2 Open circuit is unacceptable.<br>10.3 No oxidation, contamination and distortion. |
|---|---|---|

| 11 | Bubble on Polarizer (Minor defect) | | Diameter | Acc. Qty |
|---|---|---|---|---|
| | | | φ≤0.30 | Ignore |
| | | | 0.30 <φ≤0.50 | N≤2 |
| | | | 0.50 < φ | N=0 |

| 12 | Dent on Polarizer (Minor defect) | | Diameter | Acc. Qty |
|---|---|---|---|---|
| | | | φ≤0.25 | Ignore |
| | | | 0.25 <φ≤0.50 | N≤4 |
| | | | 0.50 < φ | None |

| 13 | Bezel | 13.1 No rust, distortion on the Bezel.<br>13.2 No visible fingerprints, stains or other contamination. |
|---|---|---|
| 14 | Touch Panel | D: Diameter   W: width   L: length<br>14.1 Spot: D<0.25 is acceptable<br>　　　　0.25≤D≤0.4<br>2dots are acceptable and the distance between defects should more than 10 mm.<br>　　　　D>0.4 is unacceptable<br>14.2 Dent: D>0.40 is unacceptable<br>14.3 Scratch: W≤0.03, L≤10 is acceptable,<br>　　　　0.03<W≤0.10, L≤10 is acceptable<br>Distance between 2 defects should more than 10 mm.<br>　　　　W>0.10 is unacceptable. |
| 15 | LCD Ripple | Touch the touch panel, cannot see the LCD ripple.<br>Pen: R 0.8mm silicon rubber.<br>Operation Force:120g |
| 16 | PCB | 16.1 No distortion or contamination on PCB terminals.<br>16.2 All components on PCB must same as documented on the BOM/component layout.<br>16.3 Follow IPC-A-600F. |
| 17 | Soldering | Follow IPC-A-610C standard |
| 18 | Electrical Defect (Major defect) | The below defects must be rejected.<br>18.1 Missing vertical / horizontal segment,<br>18.2 Abnormal Display.<br>18.3 No function or no display.<br>18.4 Current exceeds product specifications.<br>18.5 LCD viewing angle defect. |

| | | 18.6 No Backlight. |
| | | 18.7 Dark Backlight. |
| | | 18.8 Touch Panel no function. |

# 12. Handling Precautions

## 12.1 Mounting method

The LCD panel of AMSON TFT module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

## 12.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent

[Recommended below] and wipe lightly

● Isopropyl alcohol
● Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

● Water
● Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

● Soldering flux
● Chlorine (Cl) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (Cl), Sulfur (S) from customer, Responsibility is on customer.

## 12.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to power or ground, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

## 12.4 packing

● Module employs LCD elements and must be treated as such.
● Avoid intense shock and falls from a height.
● To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

## 12.5 Caution for operation

● It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
● An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
● Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.

- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- Slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

  Usage under the maximum operating temperature, 50%Rh or less is required.

## 12.6 storing

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.

  [It is recommended to store them as they have been contained in the inner container at the time of delivery from us

## 12.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

## 13. Precaution for Use

### 13.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

### 13.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to AMSON TFT , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

## 14. Packing Method
**TBD**