



**SPECIFICATION
FOR
LCD Module
PV05505TD39C-C**

| | |
|------------------|-----------------------|
| MODULE: | PV05505TD39C-C |
| CUSTOMER: | |



| | | |
|--------------------|----------------|-------------|
| CUSTOMER | INITIAL | DATE |
| APPROVED BY | | |

REVISION STATUS

| Version | Revise Date | Page | Content | Modified by |
|---------|-------------|------|--------------------------|-------------|
| V1.0 | 2018-10-11 | - | First Issued. | YANG |
| V1.1 | 2019-08-16 | 5 | Updata drawing(更改 TP IC) | XIAO |
| | | | | |
| | | | | |
| | | | | |



TABLE OF CONTENTS

- 1.General Description
2. Mechanical Characteristics
3. Pin Description
4. Electrical Characteristics
5. Optical Characteristics
6. Quality Specifications
7. Reliability
8. Handling Precaution



1. General Description

* DESCRIPTION

PV05505TD39C-C is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 5.46" TFT-LCD contains 720 x 1280 pixels, and can display up to 16.7M colors.

* Features

- Low Input Voltage: IOVCC: 1.65~3.3V;VCC: 2.5~3.3V
- Display Colors of TFT LCD: 16.7M colors
- Interface: MIPI-4Lanes
- Internal Power Supply Circuit.

| General Information Items | Specification | Unit | Note |
|---------------------------|----------------------------------|---------|------|
| | Main Panel | | |
| Display area(AA) | 68.04(H) *120.96(V) (5.46 inch) | mm | - |
| Driver element | a-Si TFT active matrix | - | - |
| Display colors | 16.7M | colors | - |
| Number of pixels | 720(RGB) *1280 | dots | - |
| Pixel arrangement | RGB vertical stripe | - | - |
| Pixel pitch | 0.0315(H) *0.0945(V) | mm | - |
| Viewing angle | All | o'clock | - |
| Drive IC | ST7703 | - | - |
| Display mode | Normally black | - | - |
| Operating temperature | -20~+70 | °C | - |
| Storage temperature | -30~+80 | °C | - |

Mechanical Information

| Item | | Min. | Typ. | Max. | Unit | Note |
|-------------|---------------|------|-------|------|------|-------|
| Module size | Horizontal(H) | - | 79 | - | mm | ±0.05 |
| | Vertical(V) | - | 144.4 | - | mm | ±0.05 |
| | Depth(D) | - | 2.84 | - | mm | ±0.3 |
| Weight | | - | TBD | - | g | - |



规格受控编号: 版本号: A/1 发布日期: 三年

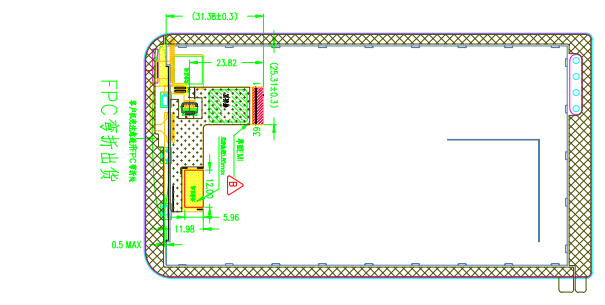
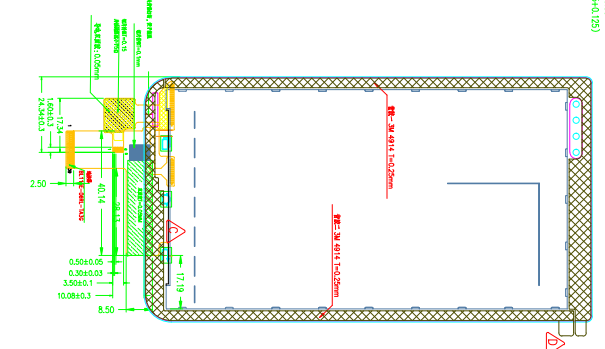
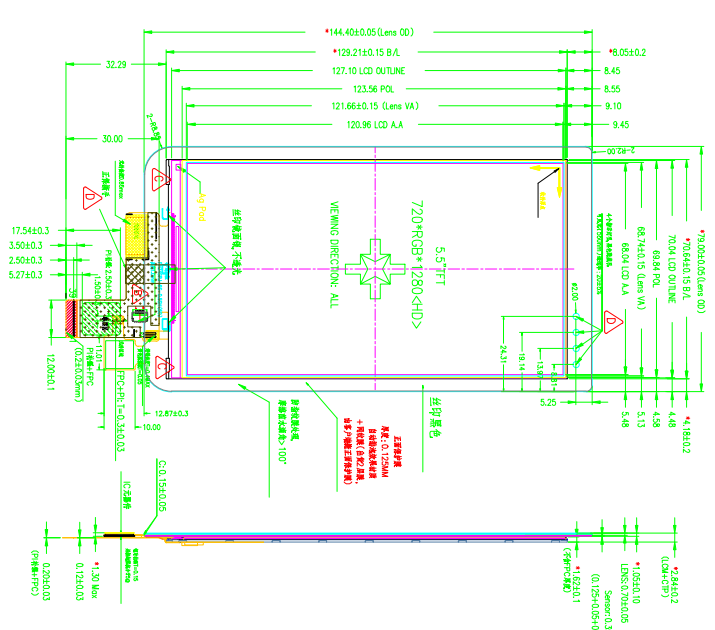
- LCM 产品特征 (LCM Features) :

| | |
|---------------------------------|---------------------------------------------|
| 显示模组 (Display mode): | TF1/Normal BLACK |
| 驱动芯片 (Driver IC): | S17703 |
| 液晶模组 (Viewing direction): | All |
| 接口类型 (Interface Types): | MPI VIDEO MODE |
| 背光类型 (Backlight Types): | 14pcs, 7#2#共90mA (20mA/LED), 总功率 19.6~23.8W |
| LCM 芯片 (LCM chip Partname): | 300 ad/n2 Km, 300 ad/n2 Tpe |
| 液晶模组坐标 (LCM Coordinate): | (X=0.29±0.03, Y=0.30±0.03) |
| 液晶模组温度 (Openen Temperature): | -20° C ~ 70° C |
| 液晶模组存储温度 (Storage Temperature): | -30° C ~ 80° C |
| 液晶模组厚度 (Openen Working Depth): | <=0.3MM |
| 连接器 (FPC connector): | BL115E-06RL-1A3G |

二、CTP 技术要求 (CTP Technical requirements)

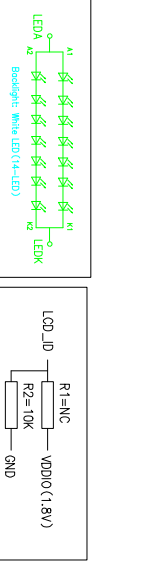
1. 材料: +F: Cover Glass+OCA+ITO Film+OCA+ITO Film+FPC, 总厚度: 1.05±0.1mm;
2. IC 型号: GT1151Q, 通道数: 20*11, 支持5点触控, 工作电压: 3.3V, 中板方板: 下板触点, EOC接口侧, C板接口, I/O电压: 1.8V, IIC地址: 0x28;
3. 透光率: >85% (TP分辨率: X, Y, (可接受片要求);
4. 工作温度范围: -20°~+70°, <90%RH; 推荐温度范围: -30°~+80°, <90%RH;
5. 表面硬度: >6H (铅笔硬度测试);
6. Cover Glass 材质: 钢化玻璃, 符合ROHS标准;
7. 其他标注公差: ±0.2;

Sensor ID
OPT1=GNID
OPT2=GNID



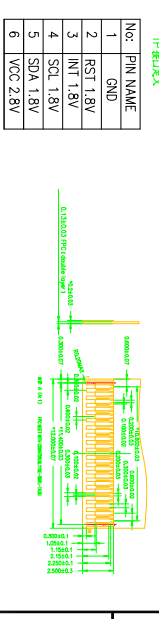
接口定义

| NO. | PIN NAME |
|-----|-------------|
| 1 | GND |
| 2 | NC |
| 3 | TP_VCC 2.8V |
| 4 | TP_SDA 1.8V |
| 5 | TP_SCL 1.8V |
| 6 | GND |
| 7 | TP_RST 1.8V |
| 8 | TP_INT 1.8V |
| 9 | TP_AST 1.8V |
| 10 | NC |
| 11 | NC |
| 12 | NC |
| 13 | NC |
| 14 | GND |
| 15 | VDD 2.8V |
| 16 | I/OV0 1.8V |
| 17 | GND |
| 18 | LED-0 |
| 19 | RST |
| 20 | TE |
| 21 | GND |
| 22 | LCM_DATA1 |
| 23 | LCM_DATA1 |
| 24 | GND |
| 25 | CLKP |
| 26 | GND |
| 27 | GND |
| 28 | LCM_DATA0 |
| 29 | LCM_DATA0 |
| 30 | GND |
| 31 | LCM_DATA2 |
| 32 | LCM_DATA2 |
| 33 | GND |
| 34 | LCM_DATA3 |
| 35 | LCM_DATA3 |
| 36 | GND |
| 37 | LED |
| 38 | LEDA |
| 39 | GND |



屏接口定义

| NO. | PIN NAME |
|-----|----------|
| 1 | GND |
| 2 | RST 1.8V |
| 3 | INT 1.8V |
| 4 | SCL 1.8V |
| 5 | SDA 1.8V |
| 6 | VCC 2.8V |



| NO. | REV | DESCRIPTION | DATE | BY | CHK | APP |
|-----|-----|-------------|------------|----|-----|-----|
| V4 | 1 | 增加LED背光驱动IC | 2019.08.06 | | | |
| V3 | 1 | 增加LED背光驱动IC | 2018.10.30 | | | |
| V2 | 1 | 增加LED背光驱动IC | 2018.10.17 | | | |
| V1 | 1 | 增加LED背光驱动IC | 2018.10.04 | | | |
| V0 | 1 | 增加LED背光驱动IC | 2018.09.10 | | | |

| | | |
|--------------|---------------|-----------------------|
| 版本 (Version) | 物料 (MATERIAL) | 变更记录 (Change History) |
| V4 | | 增加LED背光驱动IC |
| V3 | | 增加LED背光驱动IC |
| V2 | | 增加LED背光驱动IC |
| V1 | | 增加LED背光驱动IC |
| V0 | | 增加LED背光驱动IC |

TITLE: **Kingtech Group Co., Ltd**

设计 (DESIGN) 1:1 审核 (AUDITING) 批准 (APPROVED)

物料代码 (Material Code) **PV055051TD39C-C**



3.Pin Description

| Pin NO. | Symbol | Level | Remark |
|---------|------------|-------|---------------------------------------------|
| 1 | GND | L | Ground |
| 2 | NC | / | Not connect |
| 3 | TP VCC2.8 | H | A supply voltage |
| 4 | GND | L | Ground |
| 5 | TP-SCL | H | Serial clock input |
| 6 | TP-SDA | H | Serial data input pin |
| 7 | GND | L | Ground |
| 8 | TP-INT | H | Interrupt pin |
| 9 | TP-RST | H | Reset pin |
| 10-13 | NC | / | Not connect |
| 14 | GND | L | Ground |
| 15 | VDD 2.85V | H | A supply voltage |
| 16 | IOVDD 1.8V | H | A supply voltage |
| 17 | GND | L | Ground |
| 18 | LCD-ID | / | Read ID |
| 19 | RST | H/L | Reset pin |
| 20 | TE | H/L | Tearing effect output |
| 21 | GND | L | Ground |
| 22 | LCM_DATAP1 | H/L | MIPI_DP1+are differential data signal line |
| 23 | LCM_DATAN1 | H/L | MIPI_DP1- are differential data signal line |
| 24 | GND | L | Ground |
| 25 | CLKN | H/L | CLOCK Lane negative-end input pin |
| 26 | CLKP | H/L | CLOCK Lane positive-end input pin |
| 27 | GND | L | Ground |
| 28 | LCM_DATAP0 | H/L | MIPI_DP0+ are differential data signal line |
| 29 | LCM_DATAN0 | H/L | MIPI_DP0- are differential data signal line |
| 30 | GND | L | Ground |
| 31 | LCM_DATAP2 | H/L | MIPI_DP2+ are differential data signal line |
| 32 | LCM_DATAN2 | H/L | MIPI_DP2- are differential data signal line |
| 33 | GND | L | Ground |
| 34 | LCM_DATAP3 | H/L | MIPI_DP3+ are differential data signal line |
| 35 | LCM_DATAN3 | H/L | MIPI_DP3- are differential data signal line |



| | | | |
|----|-------|---|-------------------|
| 36 | GND | L | Ground |
| 37 | LEDK | L | Backlight Cathode |
| 38 | LED_A | H | Backlight Anode |
| 39 | GND | L | Ground |



4. ELECTRICAL CHARACTERISTICS

4.1 ABSOLUTE MAXIMUM RATINGS

| Item | Symbol | Values | | Unit | Remark |
|-----------------------------------|-----------------|--------|------|------|--------|
| | | Min | Max. | | |
| Supply Voltage for Logic circuit | IOVCC | 1.65 | 3.3 | V | |
| Supply Voltage for analog circuit | V _{CC} | 2.5 | 3.3 | V | |

4.2 DC ELECTRICAL CHARACTERISTICS

4.2.1 OPERATING CONDITIONS

Typical Operating Conditions (Ta=25°C)

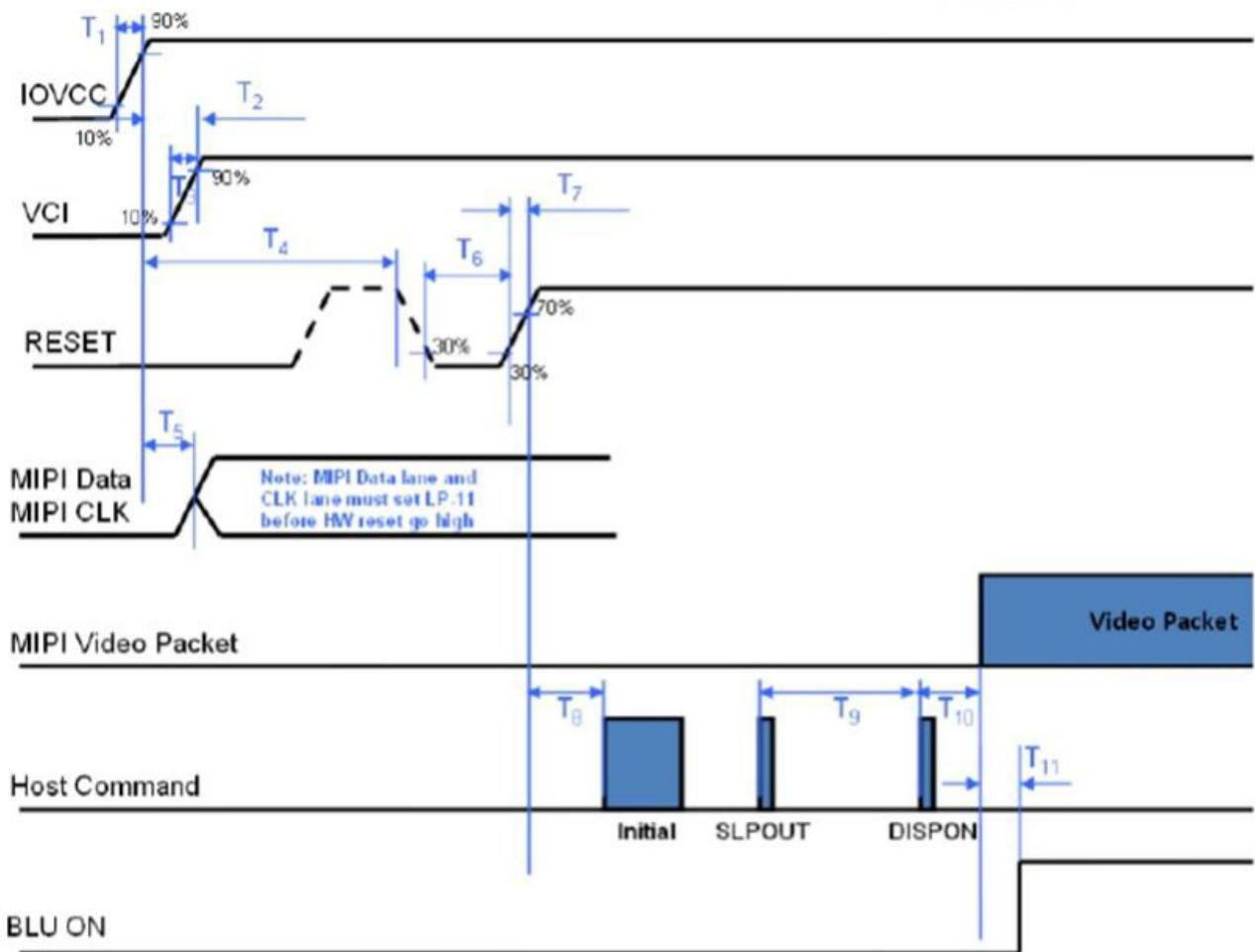
| Item | Symbol | Values | | | Unit | Remark |
|---------------------------------|-----------------|--------|-----|------|------|-----------------------|
| | | Min | Typ | Max. | | |
| Power Supply | V _{CC} | 2.5 | 2.8 | 3.3 | V | |
| Power Supply | IOVCC | 1.65 | 1.8 | 2.0 | V | |
| Normal mode Current consumption | I _{CC} | - | 50 | - | mA | V _{CC} =2.8V |
| TFT Gate ON Voltage | V _{GH} | 15 | - | 18 | V | |
| TFT Gate OFF Voltage | V _{GL} | -12 | - | -10 | V | |

4.2.2 BACKLIGHT UNIT (GND=0V)

| Item | Symbol | Values | | | Unit | Remark |
|------------------------|----------------|--------|-----|------|-------------------|----------------------|
| | | Min | Typ | Max. | | |
| Forward supply Voltage | V _f | 19.6 | - | 23.8 | V | |
| Forward supply Current | I _f | - | 40 | - | mA | |
| LCM Luminance | L _v | 360 | 390 | - | cd/m ² | I _B =40mA |
| Uniformity | / | 80 | | | % | - |



4.3 MIPI Interface Characteristics



| | Min. | Typ. | Max. | Unit |
|-----|----------|------|------|------|
| T1 | 0.01 | - | 10 | ms |
| T2 | No Limit | | | ms |
| T3 | 0.01 | - | 10 | ms |
| T4 | 1 | - | - | ms |
| T5 | 1 | - | - | ms |
| T6 | 10 | - | - | us |
| T7 | No Limit | | | ns |
| T8 | 15 | - | - | ms |
| T9 | 120 | - | - | ms |
| T10 | No Limit | | | ms |
| T11 | 100 | 150 | - | ms |



High Speed Mode

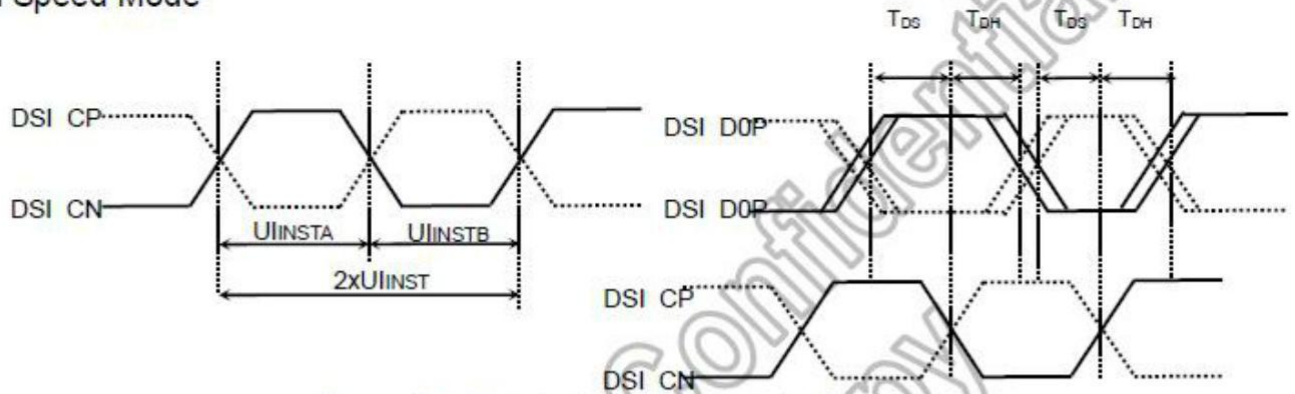


Figure 7.4: DSI clock timing Characteristics

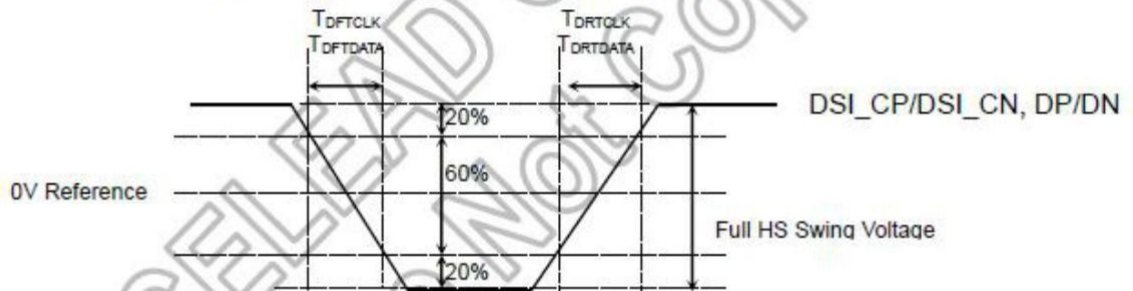


Figure 7.5: Rising and falling time on clock and data channel

(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.5V to 3.3V, TA = -30 to 70°C)

| Signal | Item | Symbol | Spec. | | | Unit |
|-------------------|----------------------------------|----------------------|---------|------|-------|------|
| | | | Min. | Typ. | Max. | |
| DSI_CP/ DSI_CN | Double UI instantaneous | 2xUINST | TBD | - | 25 | ns |
| | UI instantaneous | UINSTA UINSTB | TBD | - | 12.5 | ns |
| DP/DN | Data to clock setup time | T _{DS} | 0.15xUI | - | - | ps |
| | Data to clock hold time | T _{DH} | 0.15xUI | - | - | ps |
| DSI_CP/ DSI_CN | Differential rise time for clock | T _{DRTCLK} | 150 | - | 0.3UI | ps |
| | Differential fall time for clock | T _{DFTCLK} | 150 | - | 0.3UI | ps |
| DP/DN | Differential rise time for data | T _{DRTDATA} | 150 | - | 0.3UI | ps |
| | Differential fall time for data | T _{DFTDATA} | 150 | - | 0.3UI | ps |

Table 7.3: DSI High Speed Mode Characteristics



Low Power Mode

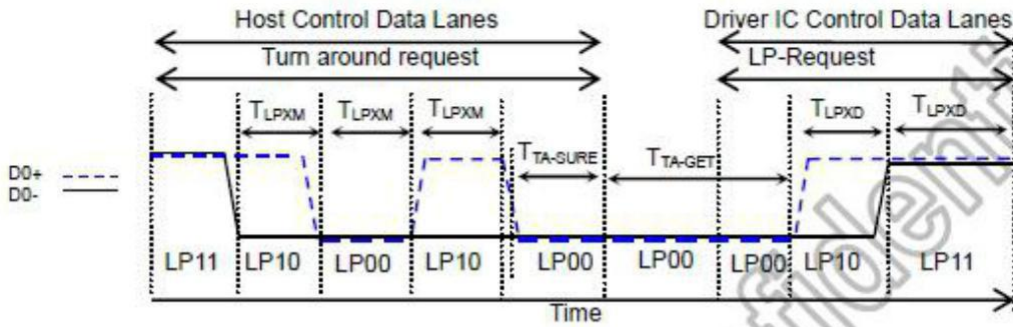


Figure 7.6: BTA from HOST to Display Module Timing

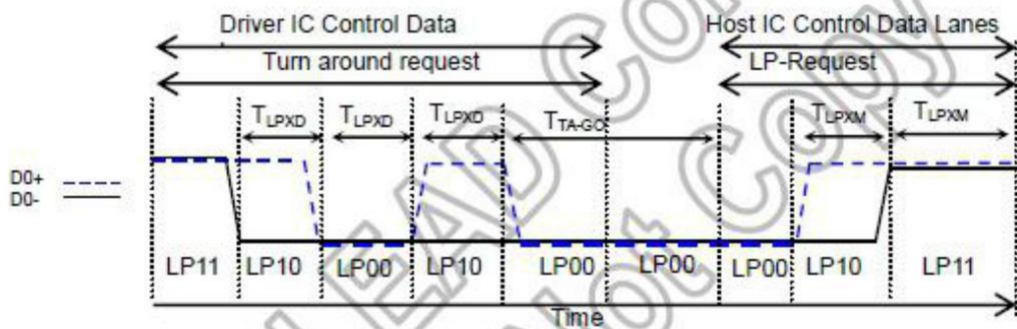
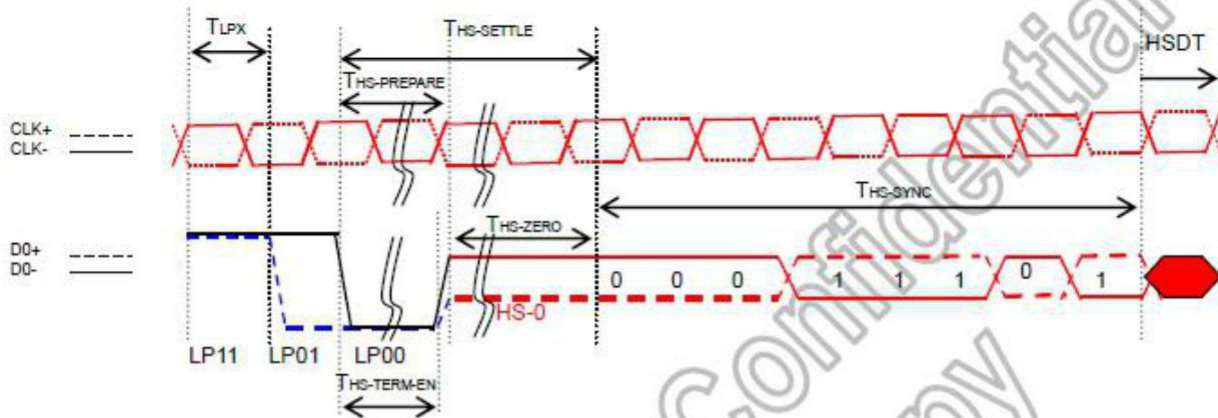


Figure 7.7: BTA from Display Module Timing to HOST

(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.3V to 3.3V, TA = -30 to 70°C)

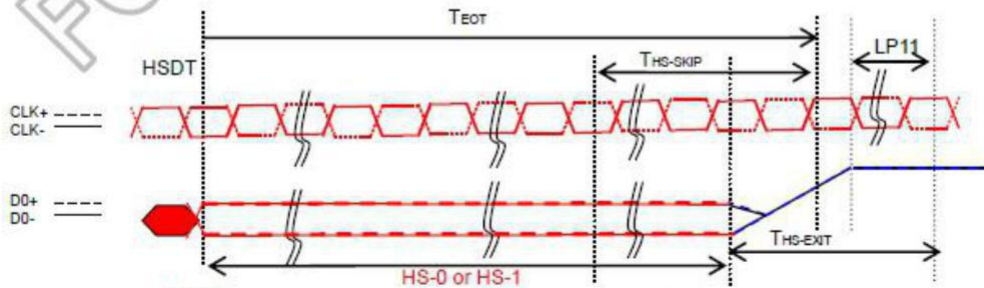
| Signal | Item | Symbol | Spec. | | | Unit |
|---------------------|---------------------------------------------------------|----------------------|---------------------|------|---------------------|------|
| | | | Min. | Typ. | Max. | |
| DSI_D0P/ DSI_D0P | Length of LP-00/LP01/LP10/LP11 Host → Display module | T _{LPXM} | 50 | - | - | ns |
| | Length of LP-00/LP01/LP10/LP11 Display module → Host | T _{LPXD} | 50 | - | - | ns |
| | Time-out before the MPU start driver | T _{TA-SURE} | T _{LPXD} | - | 2xT _{LPXD} | ns |
| | Time to drive LP-00 by display module | T _{TA-GET} | 5xT _{LPXD} | - | - | ns |
| | Time to drive LP-00 after turnaround request Host | T _{TAGO} | 4xT _{LPXD} | - | - | ns |

Table 7.4: DSI Low Power Mode Characteristics



| Signal | Item | Symbol | Spec. | | | Unit |
|---------------------|-----------------------------------------------------|---------------------|---------|------|---------|------|
| | | | Min. | Typ. | Max. | |
| DSI_D0P/ DSI_D0P | Length of LP-00/LP01/LP10/LP11 | TLPX | 50 | - | - | ns |
| | Time to Driver LP-00 to prepare for HS transmission | THS-PREPARE | 40+4UI | - | 85+6UI | ns |
| | Time to enable data receiver line termination | THS-TERM-EN | - | - | 35+4xUI | ns |
| | Time to drive LP-00 by display module | T _{TA-GET} | 5xTLPXD | - | - | ns |
| | Time to drive LP-00 after turnaround request Host | T _{TAGO} | 4xTLPXD | - | - | ns |

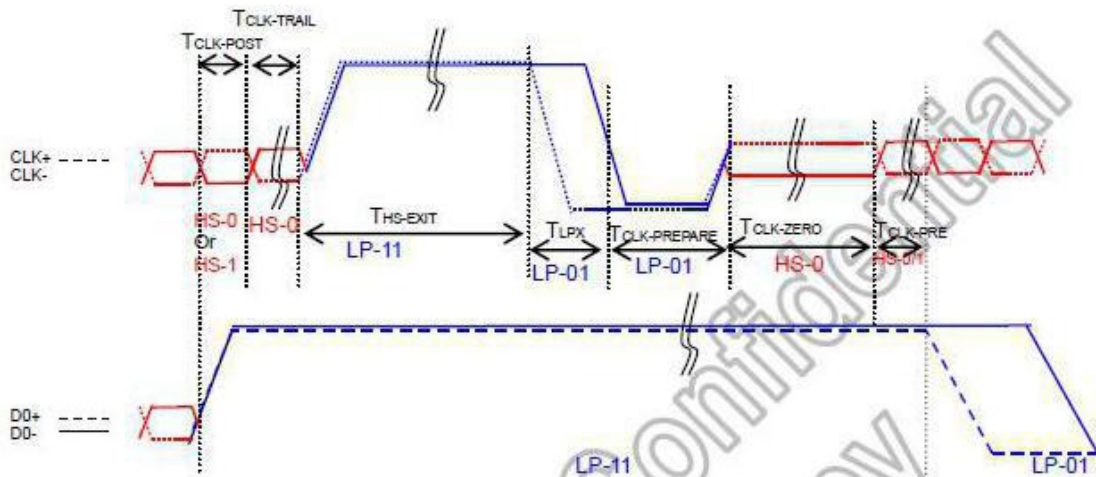
Table 7.5: DSI Low Power Mode to High Speed Mode Timing



NOTE:
If the last bit is HS-0, the transmitter changes from HS-0 to HS-1
If the last bit is HS-1, the transmitter changes from HS-1 to HS-0

| Signal | Item | Symbol | Spec. | | | Unit |
|---------------------|---------------------------------------------------------------|----------|-------|------|---------|------|
| | | | Min. | Typ. | Max. | |
| DSI_D0P/ DSI_D0P | Time-Out at Display Module to Ignore Transition Period of EoT | THS-SKIP | 40 | - | 55+4xUI | ns |
| | Time to Driver LP-11 after HS Burst | THS-EXIT | 100 | - | - | ns |

Table 7.6: DSI Low Power Mode to High Speed Mode Timing



| Signal | Item | Symbol | Spec. | | | Unit |
|-------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------|------|------|------|
| | | | Min. | Typ. | Max. | |
| DSI_CP/ DSI_CN | Time that the MCU shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode | T _{CLK-POST} | 60+52xUI | - | - | ns |
| | Time to drive HS differential state after last payload clock bit of a HS transmission burst | T _{CLK-TRAIL} | 60 | - | - | ns |
| | Time to drive LP-11 after HS burst | T _{HS-EXIT} | 100 | - | - | ns |
| | Time to drive LP-00 to prepare for HS transmission | T _{CLK-PREPARE} | 38 | - | 95 | ns |
| | Time-out at Clock Lane Display Module to enable HS Termination | T _{CLK-TERM-EN} | - | - | 38 | ns |
| | Minimum lead HS-0 drive period before starting Clock | T _{CLK-PREPARE} + T _{CLK-ZERO} | 300 | - | - | ns |
| | Time that the HS clock shall be driven prior to any associated data Lane beginning the transition from LP to HS mode | T _{CLK-PRE} | 8xUI | | | |

Table 7.7: Clock Lanes High Speed Mode to/from Low Power Mode Timing



5. OPTICAL CHARACTERISTICS

(LCD optical characteristics)

| Item | Symbol | Conditions | Specifications | | | Unit | Note |
|--------------------------------------|-----------------------------------|-----------------------------------|----------------|-------|-------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | Min. | Typ. | Max. | | |
| Transmittance (without DBEF) | T% | Viewing normal angle x = y = 0 | | 3.5 | -- | % | All left side data are based on INX's following condition (at 25 °C) 1.LC : AAS 2.Light Source : INX BLU Spectrum. 3.CF / TFT side Film : SRW062APN1HC5 / SRW062APN1 4.Machine : DMS 803 (Cono Scope for View Angle) 5. VLC white > 4.5 V VLC dark < 0.2 V |
| Contrast Ratio | CR | | 600 | 1000 | -- | -- | |
| Response Time | T _{on} +T _{off} | | -- | 25 | 35 | ms | |
| Viewing Angle | Hor. | x+ | 75 | 80 | -- | deg. | |
| | | x- | 75 | 80 | -- | | |
| | Ver. | y+ | 75 | 80 | -- | | |
| | | y- | 75 | 80 | -- | | |
| CF Only Color Chromaticity (CIE1931) | Red | X _R | 0.635 | 0.655 | 0.675 | -- | Under C light simulation |
| | | Y _R | 0.301 | 0.321 | 0.341 | | |
| | Green | X _G | 0.237 | 0.257 | 0.277 | | |
| | | Y _G | 0.539 | 0.559 | 0.579 | | |
| | Blue | X _B | 0.119 | 0.139 | 0.159 | | |
| | | Y _B | 0.071 | 0.091 | 0.111 | | |
| | White | X _W | 0.274 | 0.294 | 0.314 | | |
| | | Y _W | 0.294 | 0.314 | 0.334 | | |
| Color Gamut | CG | | 60 | 68 | -- | % | |

*Note (1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L63 / L0$$

L63: Luminance of gray level 63

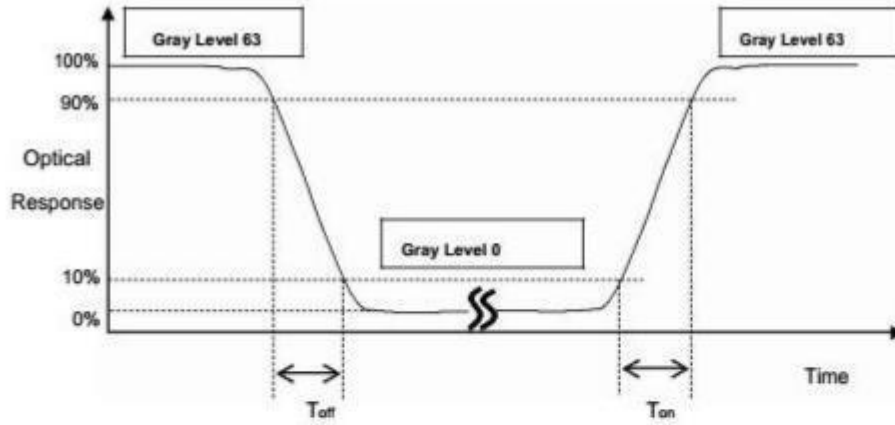
L 0: Luminance of gray level 0

$$\text{CR} = \text{CR} (5)$$

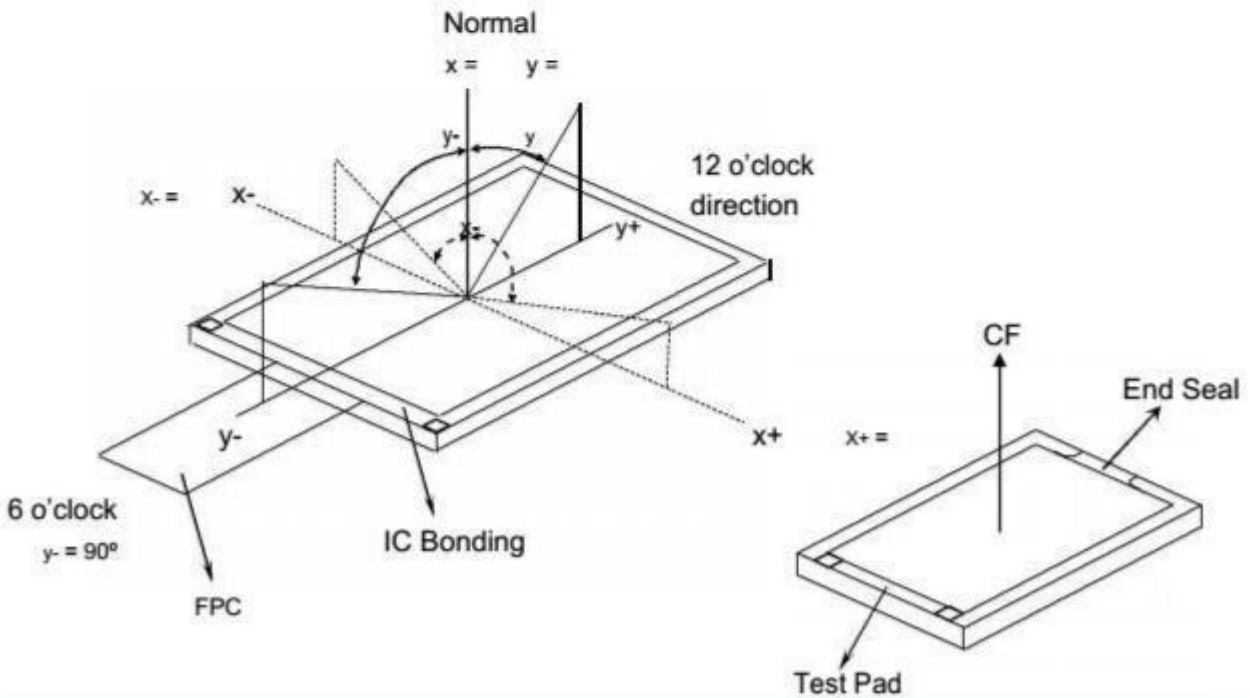
CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).



*Note (2) Definition of Response Time (T_{on} , T_{off}):



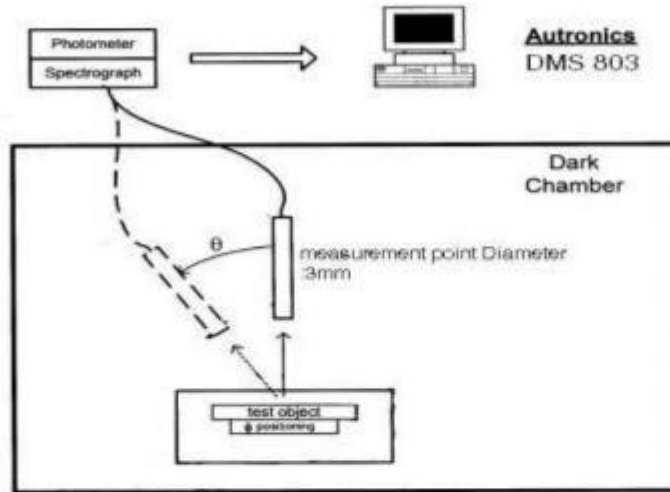
*Note(3) Definition of Viewing Angle



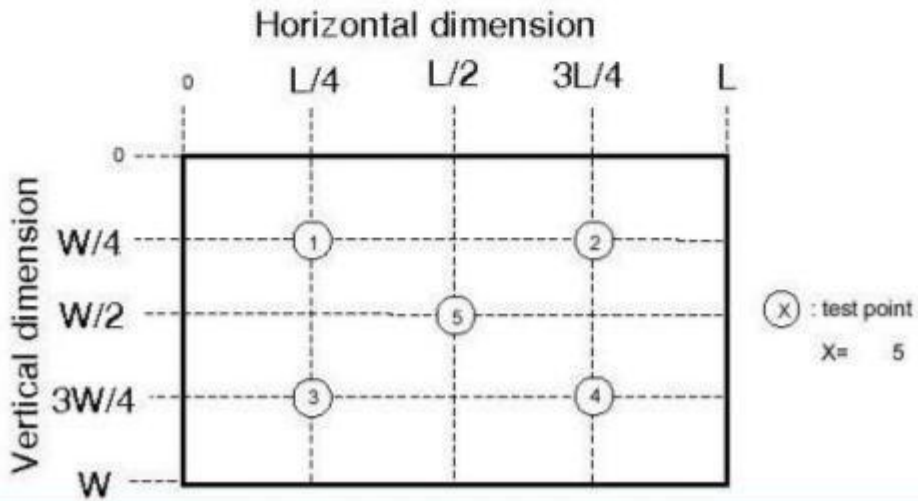


***Note (4) Measurement Set-Up:**

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



***Note (5)**



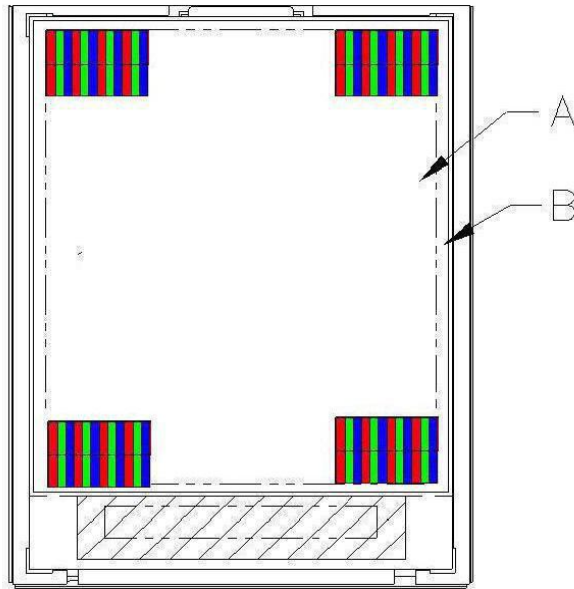


6. QUALITY SPECIFICATIONS

6.1 INSPECTION CONDITION

- (1) Inspect under 300~500Lux fluorescent light, leaving 30~35cm between panels and eyes, and between panels and lights.
- (2) Inspection condition is $23\pm 5^{\circ}\text{C}$, $50\pm 20\%RH$ maximum.

6.2 DEFINITION OF AREA





A Area : Viewing area.


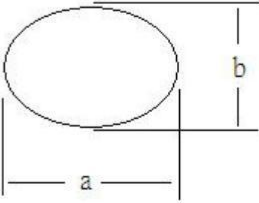
B Area : Out of viewing.(outside viewing area)



6.3 INSPECTION SPECIFICATION

| NO | Item | Acceptable specification | Judgment Criterion |
|----|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| 1 | Electrical Testing | <p>1-1 sub pixel classification</p> <ul style="list-style-type: none"> Sub Pixel: Number of sub pixel doesn't exceed one dot. <div style="text-align: center;">  <p>Sub Pixel (Dot)</p> </div> <p>a> Dark dot ----one Allowed b> Bright dot ---- one Allowed</p> <ul style="list-style-type: none"> Pixel : Three dots link together doesn't exceed ones <div style="text-align: center;">  <p>Pixel</p> </div> <p>1-2Leakage to light</p> <ul style="list-style-type: none"> Leakage to light be not allowed. <p>1-3Picture to shake</p> <ul style="list-style-type: none"> Picture had shake, twinkle and noise etc. instable of defect that be not allowed. <p>1-4 Function</p> <ul style="list-style-type: none"> No display or No function. Source Line, Gate Line. Contrast Ratio Current consumption exceeds product specifications. Display malfunction. | <p>$N \leq 2$</p> <p>$N \leq 0$</p> <p>$N=0$</p> <p>$N=0$</p> <p>$N=0$</p> |
| 2 | Mechanical Dimension | <p>2-1 Mechanical Dimension exceeds product specifications.</p> <p>2-2 Out of frame and boss of plastic changed shape that be not allowed.</p> | <p>$N=0$</p> |



| NO | Item | Acceptable specification | Judgment Criterion | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------|-------------------|-------------|-----|---------------|--------|-------|--------------|----------------------|---|--------------|----------------------|---|----|------------|-------------|-----|-----------|-------------------|-------------|------------------|--------|-----|-------------------------|---|-------|-------------------------|---|---------------|---|-----|-----------|-------------------|-------------|------------------|--------|-----|-------------------------|---|--------|---------------|---|-----|--|
| 3 | Cosmetic Inspection | <p>3-1 Blemish: Line shapes of defect</p> <table border="1" data-bbox="363 443 1315 797"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable number</th> <th>Mini. space</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.05$</td> <td>Ignore</td> <td rowspan="3">5 m m</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.05 < W \leq 0.08$</td> <td>4</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.08 < W \leq 0.15$</td> <td>3</td> </tr> <tr> <td>--</td> <td>$W > 0.15$</td> <td>Not allowed</td> <td>---</td> </tr> </tbody> </table> <p>L: length(mm) W: width(mm)</p>  <p>3-2 Blemish: dot shapes of defect.</p> <table border="1" data-bbox="435 1055 1286 1285"> <thead> <tr> <th>Dimension</th> <th>Acceptable number</th> <th>Mini. Space</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.15$</td> <td>Ignore</td> <td>---</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.20$</td> <td>3</td> <td rowspan="2">5 m m</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.30$</td> <td>2</td> </tr> <tr> <td>$\Phi > 0.30$</td> <td>0</td> <td>---</td> </tr> </tbody> </table> <p>3-3 Polarizer Bubble</p> <table border="1" data-bbox="435 1361 1286 1525"> <thead> <tr> <th>Dimension</th> <th>Acceptable number</th> <th>Mini. Space</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.25$</td> <td>Ignore</td> <td>---</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.35$</td> <td>3</td> <td>15 m m</td> </tr> <tr> <td>$\Phi > 0.35$</td> <td>0</td> <td>---</td> </tr> </tbody> </table> <p>Foreign Substances</p>  <p>$\Phi = (a+b)/2$</p> | Length | Width | Acceptable number | Mini. space | --- | $W \leq 0.05$ | Ignore | 5 m m | $L \leq 3.0$ | $0.05 < W \leq 0.08$ | 4 | $L \leq 3.0$ | $0.08 < W \leq 0.15$ | 3 | -- | $W > 0.15$ | Not allowed | --- | Dimension | Acceptable number | Mini. Space | $\Phi \leq 0.15$ | Ignore | --- | $0.15 < \Phi \leq 0.20$ | 3 | 5 m m | $0.20 < \Phi \leq 0.30$ | 2 | $\Phi > 0.30$ | 0 | --- | Dimension | Acceptable number | Mini. Space | $\Phi \leq 0.25$ | Ignore | --- | $0.25 < \Phi \leq 0.35$ | 3 | 15 m m | $\Phi > 0.35$ | 0 | --- | |
| | | Length | Width | Acceptable number | Mini. space | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | --- | $W \leq 0.05$ | Ignore | 5 m m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | $L \leq 3.0$ | $0.05 < W \leq 0.08$ | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | $L \leq 3.0$ | $0.08 < W \leq 0.15$ | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | -- | $W > 0.15$ | Not allowed | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Dimension | Acceptable number | Mini. Space | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | $\Phi \leq 0.15$ | Ignore | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | $0.15 < \Phi \leq 0.20$ | 3 | 5 m m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | $0.20 < \Phi \leq 0.30$ | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi > 0.30$ | 0 | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dimension | Acceptable number | Mini. Space | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi \leq 0.25$ | Ignore | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.25 < \Phi \leq 0.35$ | 3 | 15 m m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi > 0.35$ | 0 | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| NO | Item | Acceptable specification | | | | Judgment Criterion |
|----|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------|
| 3 | Cosmetic Inspection | 3-4 Scratch ● Sensate scratch not allowed. ● Impassive scratch as below. | | | | |
| | | Length | Width | Acceptable number | Mini. space | |
| | | ----- | $W \leq 0.05$ | Ignore | 5 m m | |
| | | $L \leq 3.0$ | $0.05 < W \leq 0.08$ | 4 | | |
| | | $L \leq 3.0$ | $0.08 < W \leq 0.15$ | 3 | | |
| | | ---- | $0.15 < W$ | Not allowed | --- | |
| | | $L > 3.0$ | ---- | Not allowed | | |
| | | 4 | Package | 4-1 Mixed product types 4-2 Shipping q'ty should be the same as "shipping notice form" q'ty. 4-3 Outer box can't broken. | | |
| 5 | LCD Mura | LCD Mura according to ND 5% keep out to determine, if keep out distance at 30cm be seen by eyes is NG, otherwise will be ok if invisible. | | | | |



7. RELIABILITY

| Test Item | Test Condition |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| High Temperature Operation | 70°C for 96 hours |
| Low Temperature Operation | -20°C for 96 hours |
| High Temperature Storage | 80°C for 96 hours |
| Low Temperature Storage | -30°C for 96 hours |
| High Temperature Operation Humidity Operation | 60°C, 90%RH for 72 hours |
| Thermal Shock | -10°C (30min) ~+25°C (5min)~ +60°C (30min) for 10 cycles |
| Vibration Test (No Operation) | Frequency: 10~55Hz Amplitude:1.0mm Sweep Time: 11min Test Period: 6 Cycles for each direction of X, Y, Z |
| Static electricity test | Touch 4KV, air touch 8KV |



8. HANDLING PRECAUTION

8.1 SAFETY

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

8.2 STORAGE CONDITIONS

- (1) Store the panel or module in a dark place where the temperature is $23\pm 5^{\circ}\text{C}$ and the humidity is below $50\pm 20\% \text{RH}$.
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.

8.3 HANDLING PRECAUTIONS

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (6) Do not use ketonic solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.

8.4 WARRANTY

- 1) The period is within twelve months since the date of shipping out under normal using and storage conditions.
- 2) According to KINGTECH TFT LCD quality standard, KINGTECH will rework or exchange for functional defect goods since within one year.