***PRODUCT : TFT TOUCH MODULE***

***MODULE NO. : WKS101WX003-WCT***

***SUPPLIER: WKS Technology Co., LTD***

***DATE: Jan 6, 2018***

# *SPECIFICATION*

*Revision: 0.0*

***WKS101WX003-WCT***

*This module uses ROHS material*

*This specification may change without prior notice in order to improve performance or quality. Please contact WKS R&D department for updated specification and product status before design for this product or release of this order.*

| *WRITTEN BY* | *CHECKED BY* | *APPROVED BY* |
|---|---|---|
| Jason | Eric | Henry |

# REVISION RECORD

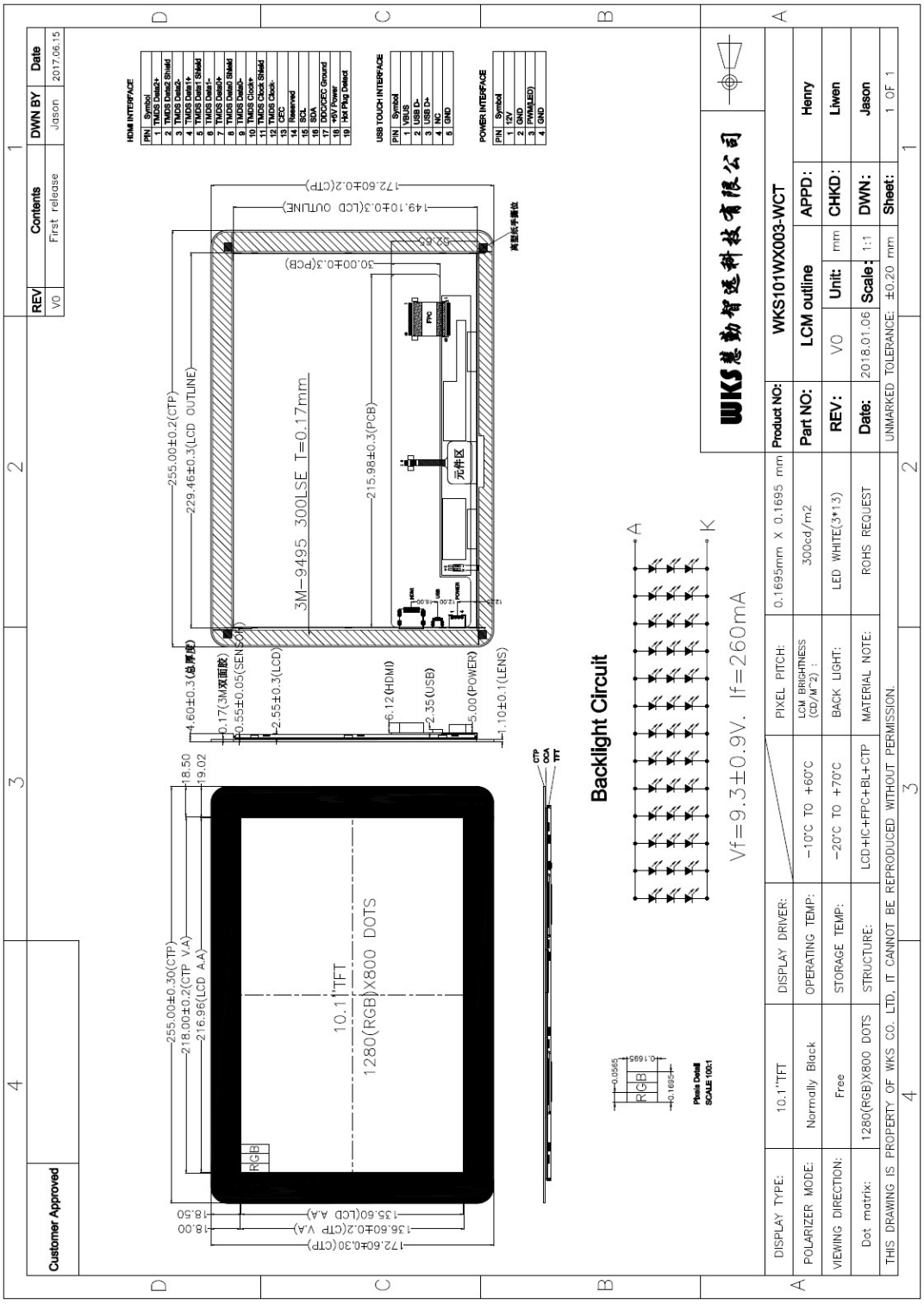
| REV NO. | REV DATE | CONTENTS | REMARKS |
|---|---|---|---|
| 0.0 | 2018-01-6 | First release | Preliminary |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# CONTENTS

# 1、GENERAL INFORMATION

| Item of general information | Contents | | Unit |
|---|---|---|---|
| LCD Display Size (Diagonal) | 10.1 | | inch |
| Module Structure | LCD Display + CTP Touch + PCB | | - |
| LCD Display Type | TFT/TRANSMISSIVE | | - |
| LCD Display Mode | Normally Black | | - |
| Recommended Viewing Direction | Free | | - |
| Gray inversion Direction | Free | | - |
| Module size (W×H×T) | 255.00×172.60×4.60 | | mm |
| Active area (W×H) | 216.96×135.60 | | mm |
| Number of pixels (Resolution) | 1280RGB×800 | | pixel |
| Pixel pitch (W×H) | 0.1695×0.1695 | | mm |
| Color Pixel Arrangement | RGB Stripe | | - |
| Module Interface Type | LCD Display | HDMI interface | - |
| | CTP | USB interface | - |
| System Support | Win7/Win8/Win10(Plug and play) | | - |
| | Android/Linux (need to be configured first) | | - |
| Power Supply | USB(400mA) + External 12V(300mA) | | - |
| Color Numbers | 16.7M | | - |
| Backlight Type | White LED | | - |

## 2、EXTERNAL DIMENSIONS



## 3、ABSOLUTE MAXIMUM RATINGS

| Parameter of absolute maximum ratings | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Operating temperature | Top | -10 | 60 | ℃ |
| Storage temperature | Tst | -20 | 70 | ℃ |
| Humidity | RH | - | 90%(Max 60℃) | RH |

Note: Absolute maximum ratings means the product can withstand short-term, not more than 120 hours. If the product is a long time to withstand these conditions, the life time would be shorter.

## 4、ELECTRICAL CHARACTERISTICS(DC CHARACTERISTICS)

| Parameter of DC characteristics | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| PCB operating voltage | VCC5V | 9V | - | 12V | V |
| LCD I/O operating voltage | VDD | 2.3 | 2.5 | 2.7 | V |
| Input voltage 'H' level | VIH | 0.8*VDD | - | VDD | V |
| Input voltage 'L' level | VIL | VSS | - | 0.2*VDD | V |
| Output voltage 'H' level | VOH | VDD-0.4 | - | VDD | V |
| Output voltage 'L' level | VOL | VSS | - | VSS+0.4 | V |

## 5、CTP CHARACTERISTICS

| Item of CTP characteristics | Specification | Unit | Remark |
|---|---|---|---|
| Panel Type | Glass Cover + Glass Sensor | - | - |
| Resolution | 1280 × 800 | pixel | - |
| Surface Hardness | 6H | - | - |
| Transparency | ≥86% | - | - |
| Interface Type | USB interface | - | - |
| Support Points | 10(MAX) | - | - |
| Sampling Rate | 20~100 | Hz | - |
| Supply voltage | 3.3 | V | - |

## 6、ELECTRO-OPTICAL CHARACTERISTICS

| Item of electro-optical characteristics | | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark | Note |
|---|---|---|---|---|---|---|---|---|---|
| Response time | | Tr+Tf | θ=0 ∅=0 Ta=25℃ | - | 25 | 50 | ms | FIG 1. | 4 |
| Contrast Ratio | | CR | | - | 600 | - | - | FIG 2. | 1 |
| Luminance uniformity | | δWHITE | | - | 80 | - | % | FIG 2. | 3 |
| Surface Luminance | | Lv | | - | 300 | - | cd/m2 | FIG 2. | 2 |
| CIE (x, y) chromaticity | White | White x | θ=0 ∅=0 Ta=25℃ | 0.27 | 0.31 | 0.35 | - | FIG 2. | 5 |
| | | White y | | 0.28 | 0.32 | 0.36 | | | |
| Viewing angle range | ∅=90(12 o'clock) | | CR ≥ 10 | 75 | 85 | - | deg | FIG 3. | 6 |
| | ∅=270(6 o'clock) | | | 75 | 85 | - | deg | | |
| | ∅=0(3 o'clock) | | | 75 | 85 | - | deg | | |
| | ∅=180(9 o'clock) | | | 75 | 85 | - | deg | | |
| NTSC ratio | - | | - | - | 50 | - | % | - | - |

***Note 1.*** *Contrast Ratio(CR) is defined mathematically by the following formula. For more information see FIG 2.:*

$$\text{Contrast Ratio(CR)} = \frac{\text{Average Surface Luminance with all white pixels(P1,P2,P3,P4,P5,P6,P7,P8,P9)}}{\text{Average Surface Luminance with all black pixels(P1,P2,P3,P4,P5,P6,P7,P8,P9)}}$$

***Note 2.*** *Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 2.*

*Lv=Average Surface Luminance with all white pixels (P1,P2,P3,P4,P5,P6,P7,P8,P9)*

***Note 3.*** *The uniformity in surface luminance（δWHITE）is determined by measuring luminance at each test position 1 through 9, and then dividing the maximum luminance of 9points luminance by minimum luminance of 9 points luminance. For more information see FIG 2.*

$$\delta WHITE = \frac{Minimum\ Surface\ Luminance\ with\ all\ white\ pixels\ (P1, P2, P3, P4, P5, P6, P7, P8, P9)}{Maximum\ Surface\ Luminance\ with\ all\ white\ pixels\ (P1, P2, P3, P4, P5, P6, P7, P8, P9)}$$

***Note 4.*** *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%. For more information see FIG 1.*

***Note 5.*** *CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5. For more information see FIG 2.*

***Note 6.*** *Viewing angle is the angle at which the contrast ratio is greater than a specific value. For TFT module, the specific value of contrast ratio is 10.The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 3.*

***Note 7.*** *For Viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope. Series Instruments. For contrast ratio, Surface Luminance, Luminance uniformity and CIE， the testing data is base on BM-7 photo detector.*

***Note 8.*** *For TN type TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing angle.*

***FIG.1. The definition of Response Time***

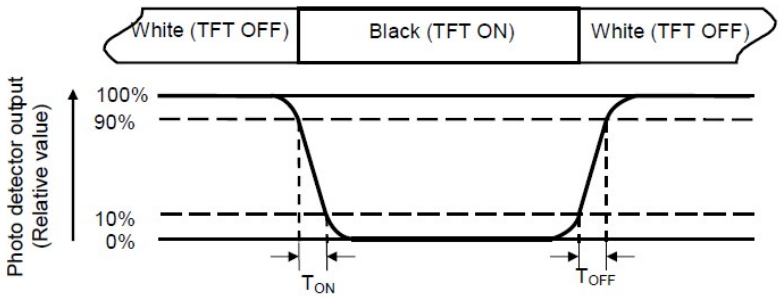


***FIG.2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x , y) chromaticity***

*A : H/6 ;*
*B : V/6 ;*
*H,V : Active Area(AA) size*
*Measurement instrument: BM-7; Light spot size=5mm, 350mm distance from the LCD surface to detector lens.*

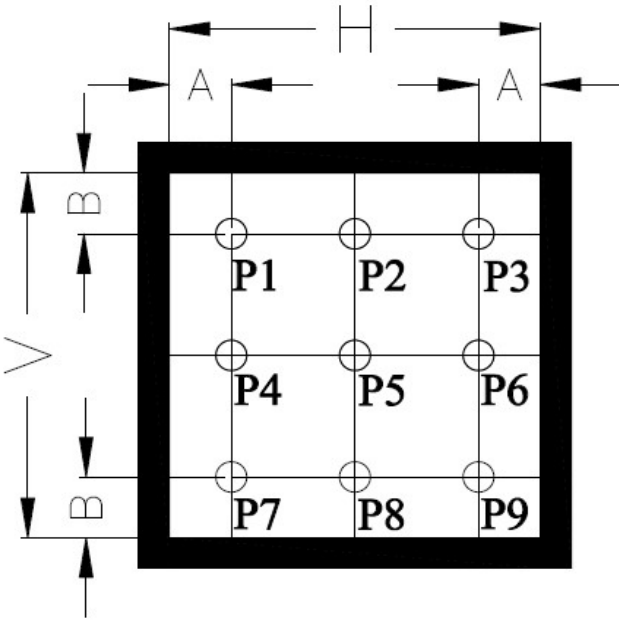
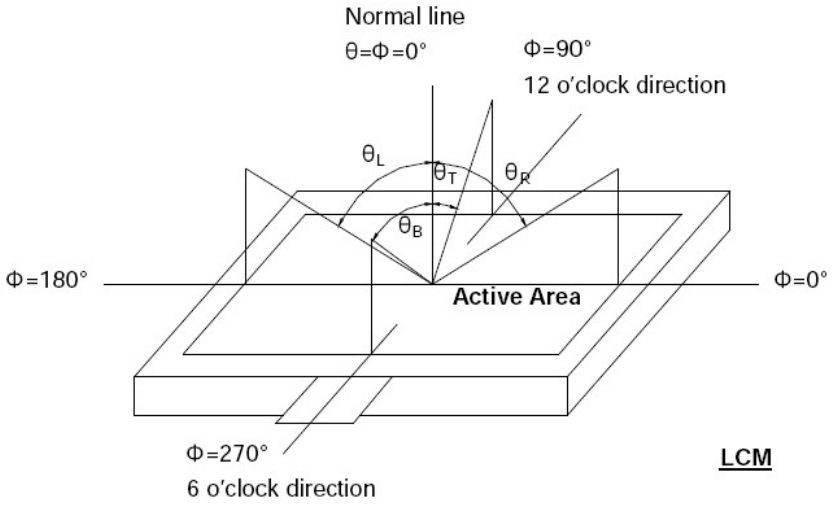



***FIG.3. The definition of viewing angle***



# 7、INTERFACE DESCRIPTION

## A、HDMI Interface Description

MICRO HDMI 0

| NO. | Symbol | DESCRIPTION |
|---|---|---|
| 1 | TMDS Data2+ | Positive side of channel 2 TMDS low-voltage signal differential input pair |
| 2 | TMDS Data2 Shield | Ground |
| 3 | TMDS Data2- | Negative side of channel 2 TMDS low-voltage signal differential input pair |
| 4 | TMDS Data1+ | Positive side of channel 1 TMDS low-voltage signal differential input pair |
| 5 | TMDS Data1 Shield | Ground |
| 6 | TMDS Data1- | Negative side of channel 1 TMDS low-voltage signal differential input pair |
| 7 | TMDS Data0+ | Positive side of channel 0 TMDS low-voltage signal differential input pair |
| 8 | TMDS Data0 Shield | Ground |
| 9 | TMDS Data0- | Negative side of channel 0 TMDS low-voltage signal differential input pair |
| 10 | TMDS Clock+ | Positive side of reference clock. TMDS low-voltage signal differential input pair |
| 11 | TMDS Clock Shield | Ground |
| 12 | TMDS Clock- | Negative side of reference clock. TMDS low-voltage signal differential input pair |
| 13 | CEC | No Connection |
| 14 | Reserved(N.C.) | No Connection |
| 15 | SCL | DDC SCL |
| 16 | SDA | DDC SDA |
| 17 | DDC/CEC Ground | Ground |
| 18 | +5V Power | +5V Power |
| 19 | Hot Plug Detect | Hot Plug Detect |

## B、USB TOUCH Interface Description

| NO. | Symbol | DESCRIPTION |
|---|---|---|
| 1 | VUSB | USB Power |
| 2 | D- | USB Data- |
| 3 | D+ | USB Data+ |
| 4 | NC | No connection |
| 5 | GND | Power Ground |

## C、External POWER Interface Description

| NO. | Symbol | DESCRIPTION |
|---|---|---|
| 1 | 9V~12V | External power input(9V~12V) |
| 2 | GND | Power Ground |
| 3 | PWM(EN) | Backlight On/Off Control Input. A high input at EN turns on the converter, and a low input turns it off. When not used, connect EN to the input source for automatic startup. The EN pin cannot be left floating.<br>To use PWM dimming, apply a 200Hz to 1KHz square wave signal with amplitude greater than 1.5V to this pin. |
| 4 | GND | Power Ground |

| Parameters | Symbol | Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Enable** | | | | | | |
| EN Threshold | | $V_{EN}$ Rising, $V_{IN}$ = 5V | 1.0 | 1.35 | 1.6 | V |
| EN Threshold | | $V_{EN}$ Rising, $V_{IN}$ = 2.5V | 0.8 | | | V |
| EN Hysteresis | | | | 90 | | mV |
| EN Input Bias Current | | $V_{EN}$ = 0V, 5V | | | 1 | µA |

***Application Note:***

***If the customer does not have additional GPIO to control the backlight, then must be connect a resistance to R41 on the PCB as follows:***

## 8、LCD TIMING

| Parameter | Symbol | Value | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| DCLK frequency@ Frame rate=60Hz | DCLK | 68.9 | 71.1 | 73.4 | MHz |
| Horizontal display area | thd | | 1280 | | DCLK |
| 1 Horizontal Line | th | 1340 | 1440 | 1470 | DCLK |
| HSYNC pulse width | thpw | - | 10 | - | DCLK |
| HSYNC Back Porch(Blanking) | thb | - | 80 | - | DCLK |
| HSYNC Front Porch | thfp | - | 70 | - | DCLK |
| Vertical display area | tvd | | 800 | | H |
| VSYNC period time | tv | 815 | 823 | 833 | H |
| VSYNC pulse width | tvpw | - | 3 | - | H |
| VSYNC Back Porch(Blanking) | tvb | - | 10 | - | H |
| VSYNC Front Porch | tvfp | - | 10 | - | H |

## 9、RELIABILITY TEST CONDITIONS

| No. | Test Item | Test Condition |
|---|---|---|
| 1 | High Temperature Storage | 70℃/120 hours |
| 2 | Low Temperature Storage | -20℃/120 hours |
| 3 | High Temperature Operating | 60℃/120 hours |
| 4 | Low Temperature Operating | -10℃/120 hours |
| 5 | Temperature Cycle Storage | -10℃(30min.)~25(5min.)~60℃(30min.)×10cycles |

**A、Inspection after test:**

Inspection after 2~4 hours storage at room temperature, the sample shall be free from defects:

- Air bubble in the LCD;
- Sealleak;
- Non-display;
- Missing segments;
- Glass crack;
- Current is twice higher than initial value.

**B、Remark:**

- The test samples should be applied to only one test item.
- Sample size for each test item is 5~10pcs.
- Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

# 10、INSPECTION CRITERION

*This specification is made to be used as the standard of acceptance/rejection criteria for TFT-LCD/IPS TFT-LCD module product, and this specification is applicable only in the case that the size of module equal to or exceed than 4.3 inch.*

## 10.1 Sample plan

*Sampling plan according to GB/T2828.1-2003/ISO 2859-1：1999 and ANSI/ASQC Z1.4-1993,normal level 2 and based on:*

*Major defect: AQL 0.65*

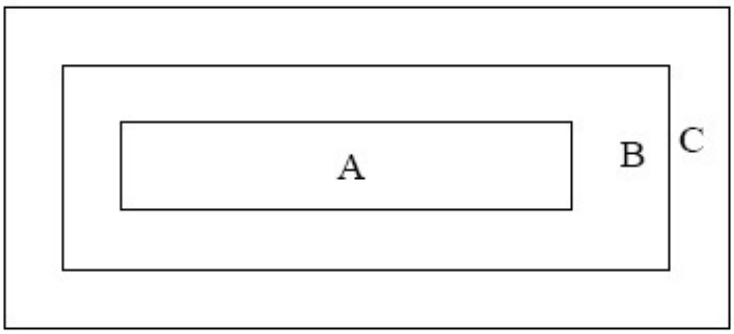
*Minor defect: AQL 1.5*

## 10.2 Inspection condition

*Viewing distance for cosmetic inspection is about 30cm with bare eyes, and under an environment of 20~40W light intensity, all directions for inspecting the sample should be within 45°against perpendicular line. (Normal temperature 20~25℃and normal humidity 60 ±15%RH )*

## 10.3 Definition of Inspection Item.

***A***、 *Definition of inspection zone in LCD.*



*Zone A: character/Digit area*

*Zone B: viewing area except Zone A (Zone A + Zone B=minimum Viewing area)*

*Zone C: Outside viewing area (invisible area after assembly in customer's product)*

*Fig.1 Inspection zones in an LCD*

*Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer's product.*

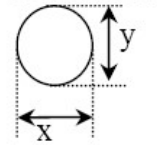
***B*、** *Definition of some visual defect*

| | |
|---|---|
| *Bright dot* | *Because of losing all or part function, bad pixel dots appear bright and the size is more than 50% of one dot in which LCD panel is displaying under black pattern.* |
| *Dark dot* | *Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture, or pure whiter picture.* |

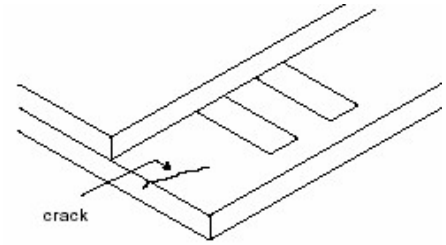
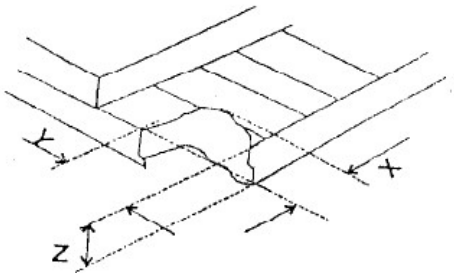
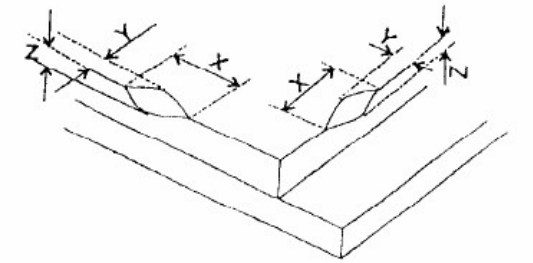
### *10.4 Major Defect*

| ***Item No.*** | ***Items to be inspected*** | ***Inspection standard*** | ***Classification of defects*** |
|---|---|---|---|
| *1* | *Functional defects* | *1) No display*<br>*2) Display abnormally*<br>*3) Missing vertical, horizontal segment*<br>*4) Short circuit*<br>*5) Excess power consumption*<br>*6)Backlight no lighting, flickering and abnormal lighting* | *major* |
| *2* | *Missing* | *Missing component* | |
| *3* | *Outline dimension* | *Overall outline dimension beyond the drawing is not allowed* | |

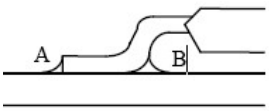
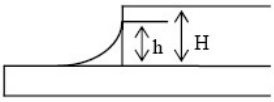
## 10.5、Minor Defect

<table>
<tr><th>Item No.</th><th>Items to be inspected</th><th>Inspection standard</th><th>Classification of defects</th></tr>
<tr><td>1</td><td>Bright dot /dark dot defect</td><td>
<table>
<tr><td rowspan="2">Zone</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td colspan="3">A+B</td><td rowspan="2">C</td></tr>
<tr><td>4.3” ～7”</td><td>7～10.1”</td><td>＞10.1”</td></tr>
<tr><td>Bright pixel dot</td><td>1</td><td>2</td><td>3</td><td rowspan="5">Acceptable</td></tr>
<tr><td>Dark pixel dot</td><td>4</td><td>4</td><td>4</td></tr>
<tr><td>2bright dots adjacent</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>2dark dots adjacent</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total bright and dark dots</td><td>5</td><td>6</td><td>7</td></tr>
</table>
Note: Minimum distance between defective dots is more than 5mm; Pixel dots’ function is normal, but bright dots caused by foreign material and other reasons are judged by the dot defect of 5.2.
</td><td>Minor</td></tr>
<tr><td>2</td><td>Dot defect<br>  <br><br>Φ=(x+y) /2</td><td>
<table>
<tr><td rowspan="2">Zone<br>Size(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td colspan="3">A+B</td><td rowspan="2">C</td></tr>
<tr><td>4.3”～7”</td><td>7～10.1”</td><td>＞10.1”</td></tr>
<tr><td>Φ≤0.2</td><td>Acceptable</td><td>Acceptable</td><td>Acceptable</td><td rowspan="3">Acceptable</td></tr>
<tr><td>0.2＜Φ≤0.5</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Φ＞0.5</td><td>0</td><td>0</td><td>0</td></tr>
</table>
Note:<br>1. Minimum distance between defective dots is more than 5 mm;<br>2. The quantity of defect is zero in operating condition.
</td><td>Minor</td></tr>
<tr><td>3</td><td>Linear defect</td><td>
<table>
<tr><td rowspan="2">Zone<br>Size (mm)</td><td colspan="4">Acceptable Qty</td></tr>
<tr><td colspan="3">A+B</td><td rowspan="2">C</td></tr>
<tr><td>Length</td><td>Width</td><td>4.3”～7”</td><td>7～10.1”</td><td>＞10.1”</td></tr>
<tr><td>Ignore</td><td>W≤0.05</td><td>Acceptable</td><td>Acceptable</td><td>Acceptable</td><td rowspan="3">Acceptable</td></tr>
<tr><td>L≤5.0</td><td>0.05＜W≤0.1</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>L＞5.0</td><td>W＞0.1</td><td>0</td><td>0</td><td>0</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

<table>
<tr>
<td>4</td>
<td>Polarizer defect</td>
<td>
5.4.1 Polarizer Position<br>
( i) Shifting in position should not exceed the glass outline dimension.<br>
( ii ) Incomplete covering of the viewing area due to shifting is not allowed.<br>
5.4.2 Dirt on polarizer<br>
Dirt which can be wiped easily should be acceptable.<br>
5.4.3 Polarizer Dent & Air bubble
<table>
<tr><td rowspan="2">Zone<br>Size(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td colspan="3">A+B</td><td>C</td></tr>
<tr><td>4.3”～7”</td><td>7～10.1”</td><td>＞10.1”</td><td></td></tr>
<tr><td>Φ≤0.2</td><td>Acceptable</td><td>Acceptable</td><td>Acceptable</td><td rowspan="3">Acceptable</td></tr>
<tr><td>0.2＜Φ≤0.5</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Φ＞0.5</td><td>0</td><td>0</td><td>0</td></tr>
</table>
5.4.4 Polarizer scratch<br>
(i) If the polarizer scratch can be seen after cover assembling or in the operating condition, judge by the linear defect of 5.3.<br>
( ii )If the polarizer scratch can be seen only in non-operating condition or some special angle, judge by the following:
<table>
<tr><td colspan="2" rowspan="2">Zone<br>Size (mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td colspan="3">A+B</td><td>C</td></tr>
<tr><td>Length</td><td>Width</td><td>4.3”～7”</td><td>7～10.1”</td><td>＞10.1”</td><td></td></tr>
<tr><td>Ignore</td><td>W≤0.05</td><td>Acceptable</td><td>Acceptable</td><td>Acceptable</td><td rowspan="3">Acceptable</td></tr>
<tr><td>1.0＜L≤5.0</td><td>0.05＜W≤0.20</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>L＞5.0</td><td>W＞0.2</td><td>0</td><td>0</td><td>0</td></tr>
</table>
</td>
<td>Minor</td>
</tr>
<tr>
<td rowspan="2">5</td>
<td>MURA</td>
<td>Using 3% ND filter, it’s NG if it can be seen in R,G,B picture.</td>
<td rowspan="2">Minor</td>
</tr>
<tr>
<td>White/Black dot（MURA）</td>
<td>Visible under：ND3%；D≦0.15mm, Acceptable；<br>0.15mm<D≦0.5mm, N≦4；D>0.5mm, Not allowable.</td>
</tr>
</table>

<table>
<tr>
<td rowspan="3">6</td>
<td rowspan="3">Glass defect</td>
<td>(i) Crack<br>Cracks are not allowed.<br>  <br></td>
<td>Minor</td>
</tr>
<tr>
<td>(ii) TFT chips on corner<br>  <br>
<table>
<tr><th>X</th><th>Y</th><th>Z</th><th>Acceptable</th></tr>
<tr><td>≤3.0</td><td>≤3.0</td><td>Not more than the thickness of glass</td><td>N≤3</td></tr>
</table>
Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.</td>
<td>Minor</td>
</tr>
<tr>
<td>(iii) Usual surface crack<br>  <br>
<table>
<tr><th>X</th><th>Y</th><th>Z</th><th>Acceptable</th></tr>
<tr><td>≤1.5</td><td>≤1.5</td><td>Not more than the thickness of glass</td><td>N≤4</td></tr>
</table>
It is only applicable to the upper glass of LCD.</td>
<td>Minor</td>
</tr>
</table>

## 10.6 Module Cosmetic Criteria

| Item No. | Items to be inspected | Inspection Standard | Classification of defects |
|---|---|---|---|
| 1 | Difference in Spec. | Not allowable | Major |
| 2 | Pattern peeling | No substrate pattern peeling and floating | Major |
| 3 | Soldering defects | No soldering missing | Major |
| | | No soldering bridge | Major |
| | | No cold soldering | Minor |
| 4 | Resist flaw on PCB | Visible copper foil (Φ0.5 mm or more) on substrate pattern is not allowed | Minor |
| 5 | FPC gold finger | No dirt, breaking, oxidation lead to black | Major |
| 6 | Backlight plastic frame | No deformation, crack, breaking, backlight positioning column breaking, obvious nick. | Minor |
| 7 | Marking printing effect | No dark marking, incomplete, deformation lead to unable to judge | Minor |
| 8 | Accretion of metallic Foreign matter | No accretion of metallic foreign matter (Not exceed Φ0.2mm) | Minor |
| 9 | Stain | No stain to spoil cosmetic badly | Minor |
| 10 | Plate discoloring | No plate fading, rusting and discoloring | Minor |
| 11 | 1. Lead parts | a. Soldering side of PCB Solder to form a 'Filet' all around the lead. Solder should not hide the lead form perfectly. | Minor |
| | | b. Components side(In case of 'Through Hole PCB') Solder to reach the Components side of PCB. | Minor |
| | 2. Flat packages | Either 'Toe'(A) or 'Seal'(B)of the lead to be covered by "Filet". Lead form to be assume over Solder.   | Minor |
| | 3. Chips | (3/2) H ≥h ≥(1/2) H   | Minor |
| | 4. Solder ball/Solder splash | a. The spacing between solder ball and the conductor or solder pad h ≥0.13 mm. The diameter of solder ball d≤0.15 mm. | Minor |
| | | b. The quantity of solder balls or solder splashes isn't beyond 5 in 600 mm2. | Minor |
| | | c. Solder balls/Solder splashes do not violate minimum electrical clearance. | Major |

## *11、PRODUCT PHOTOS*

*PRODUCT*