POWERTIP TECH. CORP.

# SPECIFICATIONS

| | | |
|---|---|---|
| CUSTOMER | : | |
| SAMPLE CODE | : | SH480272T009-IHA |
| MASS PRODUCTION CODE | : | PH480272T009-IHA |
| SAMPLE VERSION | : | 01 |
| SPECIFICATIONS EDITION | : | 001 |
| DRAWING NO. (Ver.) | : | LMD-PH480272T009-IHA (Ver.001) |
| PACKAGING NO. (Ver.) | : | |

## Customer Approved

Date:

| Approved | Checked | Designer |
|---|---|---|
| 黃秋源<br>Oliver Huang | 石建莊<br>Stone Shin | 黃俊清<br>Ackey Huang |

POWERTIP
2016.09.12
TW RD APR

■ Preliminary specification for design input

□ Specification for sample approval


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## History of Version

| Date (mm / dd / yyyy) | Ver. | Edi. | Description | Page | Design by |
|---|---|---|---|---|---|
| 09/06/2016 | 01 | 001 | New Drawing. | - | Ackey |
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## Contents



Note: For detailed information please refer to IC data sheet:ILITEK--- ILI6480B

# 1. SPECIFICATIONS

## 1.1 Features

| Item | Standard Value |
|---|---|
| Display Resolution | 480*3(RGB) * 272 Dots |
| LCD Type | a-Si TFT , Normally white , Transmissive type |
| Screen size(inch) | 4.3 inch |
| Viewing Direction | 6 O'clock |
| Surface treatment | Anti-Glare |
| Color configuration | R, G, B Vertical Stripe |
| Backlight Type | White LED B/L |
| Weight | 42 g |
| Interface | 24 Bits RGB Interface |
| ROHS | THIS PRODUCT CONFORMS THE ROHS OF PTC<br>Detail information please refer website :<br>http://www.powertip.com.tw/news.php?area_id_view=1085560481/ |

## 1.2 Mechanical Specifications

| Item | Standard Value | Unit |
|---|---|---|
| Outline Dimension | 105.5(W) x 67.2 (L) x 2.6(H) | mm |

**LCD panel**

| Item | Standard Value | Unit |
|---|---|---|
| Active Area | 95.04 (W) x 53.856 (L) | mm |

Note : For detailed information please refer to LCM drawing.

## 1.3 Absolute Maximum Ratings

**Module**

| Item | Symbol | Condition | Min. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| Power Supply for TFT Panel | VDD | GND=0 | -0.3 | 4.5 | V | - |
| Power Supply for Backlight Unit | VCC | GND=0 | -0.3 | +20.0 | V | |
| Operating Temperature | $T_{OP}$ | - | -20 | 70 | ℃ | |
| Storage Temperature | $T_{ST}$ | - | -30 | 80 | ℃ | |

The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

## 1.4 DC Electrical Characteristics

**Module** GND = 0V, Ta = 25℃

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Power Supply for TFT Panel | VDD | GND=0V | 3.0 | 3.3 | 3.6 | V |
| Power Supply for Backlight Unit | VCC | GND=0V | 5 | 12 | 15 | V |
| Input Voltage for TFT Panel | $V_{IH}$ | GND=0V | 0.7VDD | - | VDD | V |
| | $V_{IL}$ | GND=0V | 0 | - | 0.3VDD | |
| Supply Current for TFT Panel | IDD | IDD@VDD=3.3V | - | 20 | 30 | mA |
| Supply Current for Backlight Unit | ICC | ICC@VCC=5V | - | 200 | 300 | |
| Supply Current for Backlight Unit | ICC | ICC@VCC=12V | - | 90 | 135 | |
| Input Voltage for PWM Signal | VPH | GND=0V | 1.2 | - | - | V |
| | VPL | GND=0V | - | - | 0.4 | V |
| Dimming Clock Rate | fP | GND=0V | 5 | - | 100 | KHz |

## 1.5 Optical Characteristics

**TFT LCD Module** VDD = 3.3 V, Ta=25℃

| Item | | Symbol | Condition | Min. | Typ. | Max. | unit | |
|---|---|---|---|---|---|---|---|---|
| Response time | | Tr + Tf | Ta = 25℃<br>θX, θY = 0° | - | 29 | 44 | ms | Note2 |
| Viewing angle | Top | θY+ | CR ≥ 10 | - | 60 | - | Deg. | Note4 |
| | Bottom | θY- | | - | 60 | - | | |
| | Left | θX- | | - | 60 | - | | |
| | Right | θX+ | | - | 60 | - | | |
| Contrast ratio | | CR | Ta = 25℃<br>θX , θY = 0° | 500 | 600 | - | - | - |
| Color of CIE Coordinate | White | X | | 0.24 | 0.29 | 0.34 | - | Note1 |
| | | Y | | 0.24 | 0.29 | 0.34 | | |
| | Red | X | | 0.52 | 0.57 | 0.62 | | |
| | | Y | | 0.29 | 0.34 | 0.39 | | |
| | Green | X | | 0.29 | 0.34 | 0.39 | | |
| | | Y | | 0.55 | 0.60 | 0.65 | | |
| | Blue | X | | 0.09 | 0.14 | 0.19 | | |
| | | Y | | 0.03 | 0.08 | 0.13 | | |
| Average Brightness<br>Pattern=white display<br>( With LCD ) *1 | | IV | VCC=12V<br>PWM="High"<br>(Duty=100%) | 800 | 1000 | - | $cd/m^2$ | Note1 |
| Uniformity<br>( With LCD ) *2 | | △B | VCC=12V<br>PWM="High"<br>(Duty=100%) | 70 | - | - | % | Note1 |

Note 1:

*1：△B=B(min) / B(max) * 100%

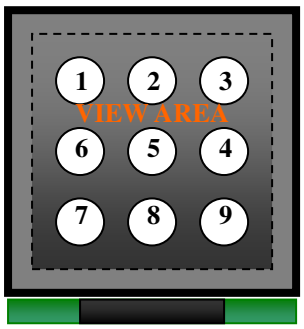
*2：Measurement Condition for Optical Characteristics:

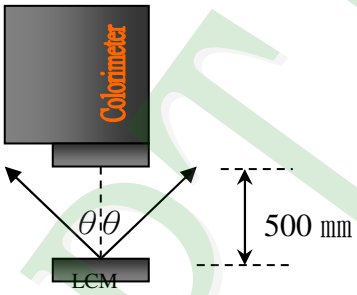
a：Environment: 25℃±5℃ / 60±20%R.H，no wind，dark room below 10 Lux at typical lamp current and typical operating frequency.

b：Measurement Distance: 500 ± 50 ㎜ ，(θ= 0°)

c：Equipment: TOPCON BM-7 fast，(field 1°)，after 10 minutes operation.

d：The uncertainty of the C.I.E coordinate measurement ±0.01，Average Brightness ± 4%




Colorimeter=BM-7 fast

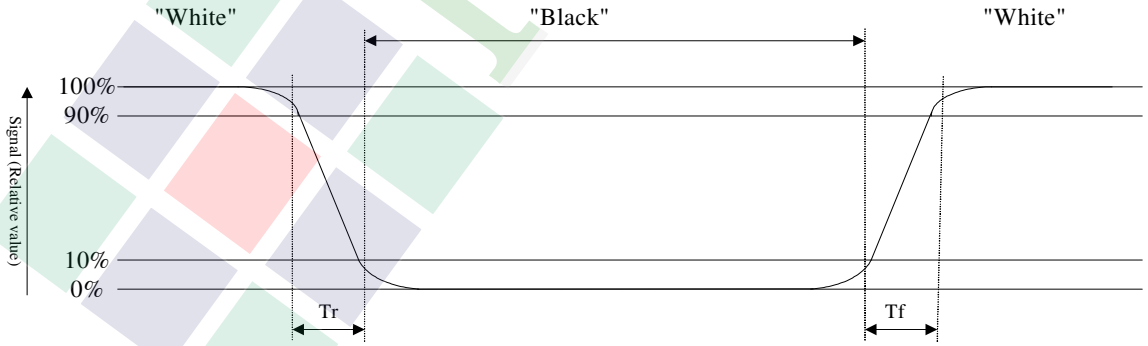
To be measured at the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-7, after 10 minutes operation (module)

Note2: Definition of response time:

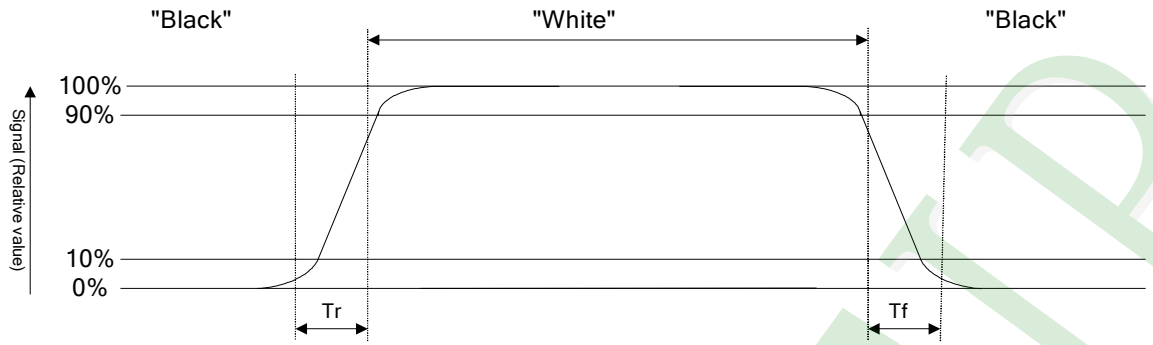
The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:

Normally White



Normally Black



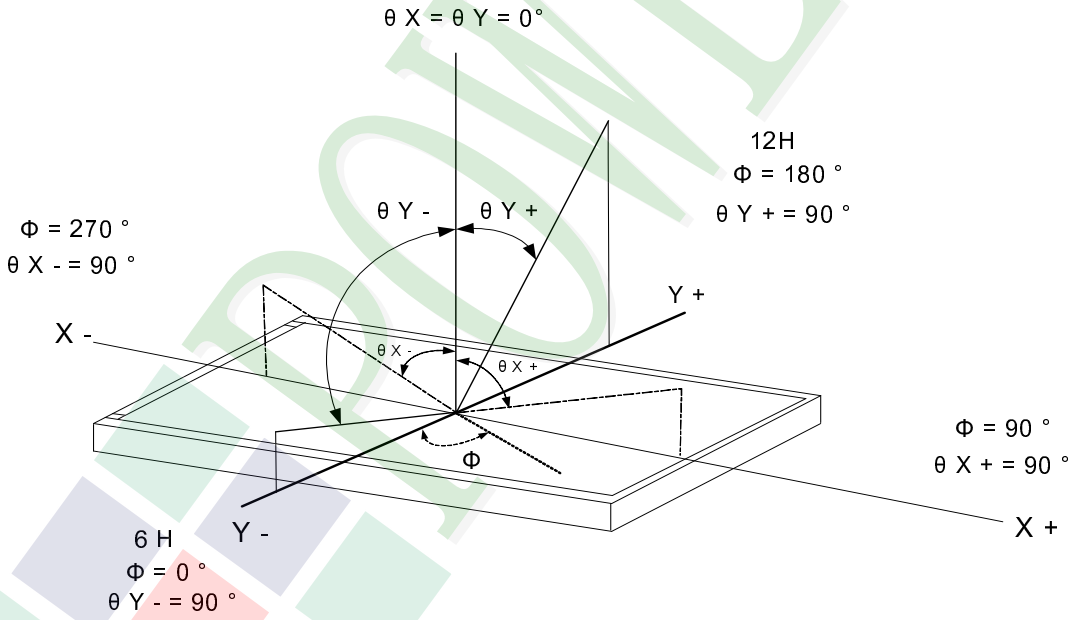

Note3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at “White” state}}{\text{Photo detector output when LCD is at “Black” state}}$$

Note4: Definition of viewing angle:

Refer to figure as below:



## 1.6 Backlight Characteristics

Maximum Ratings

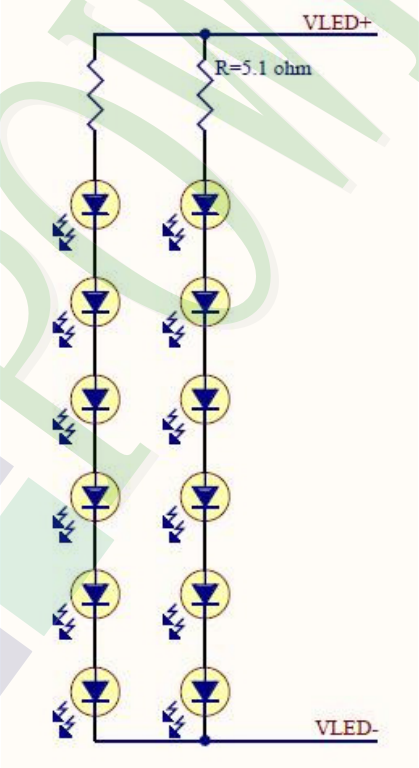
| Item | Symbol | Min. | Max. | Unit | Remark |
|---|---|---|---|---|---|
| LED Forward Current | $I_F$ | 30 | | mA | One LED |
| LED Reverse Voltage | $V_R$ | 5 | | V | |

Electrical / Optical Characteristics

| Item | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| LED Voltage | $V_L$ | 17.6 | 19.2 | 20.4 | V | Note1 |
| LED Current | $I_L$ | - | 40 | - | mA | - |
| LED life time | - | 50000 | | - | HR | Note2 |

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and $I_L$=40 mA.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and $I_L$=40 mA. The LED life time could be decreased if operating $I_L$ is larger than 40 mA.



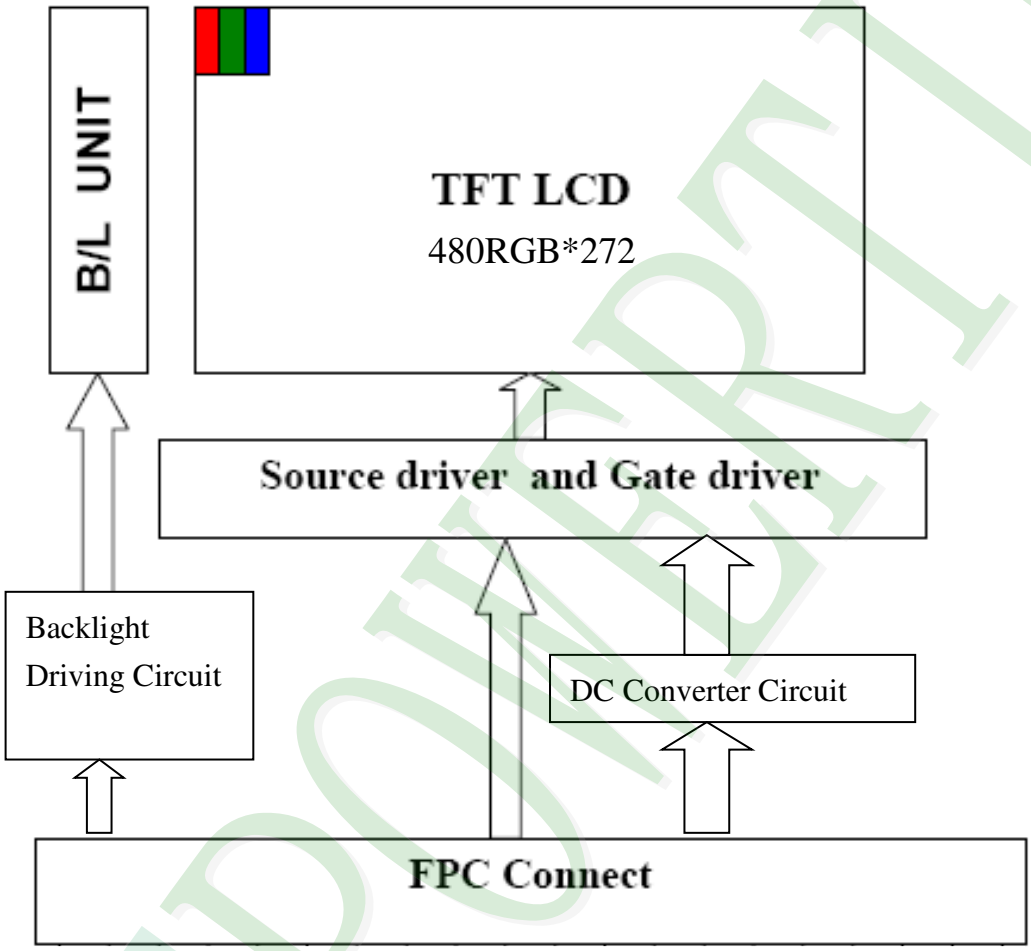
# 2. MODULE STRUCTURE

## 2.1 Counter Drawing

### 2.1.1 LCM Mechanical Diagram

* See Appendix

### 2.1.2 Block Diagram



## 2.2 Interface Pin Description

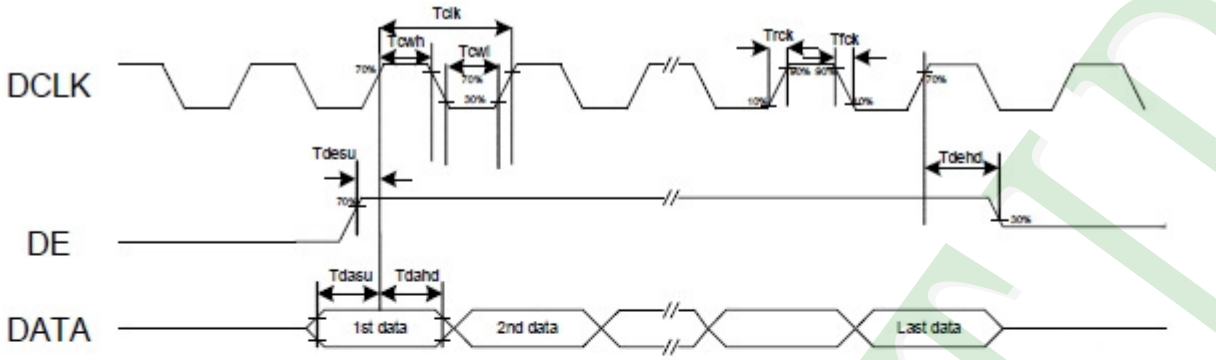
### TFT LCM Interface

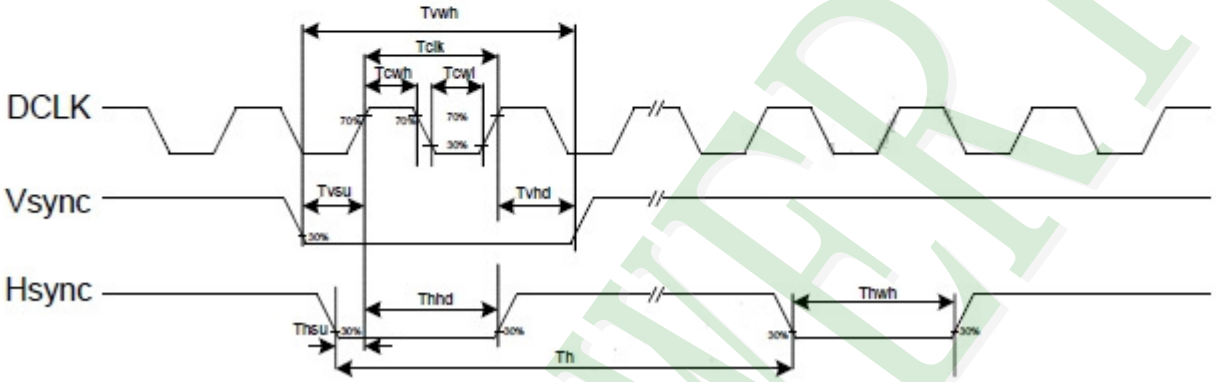
| Pin# | Name | DESCRIPTION |
|---|---|---|
| 1 | GND | Power ground. |
| 2 | VDD | Power for Digital Circuit. |
| 3 | VDD | Power for Digital Circuit. |
| 4 | VCC | Power For LED backlight. |
| 5 | VCC | Power For LED backlight. |
| 6 | PWM | Shutdown & Dimming control input for backlight. Do not allow this pin to float. “Hi” =100%, “Low” = 0%. |
| 7 | GND | Power ground. |
| 8 | R0 | Red Data. |
| 9 | R1 | Red Data. |
| 10 | R2 | Red Data. |
| 11 | R3 | Red Data. |
| 12 | GND | Power ground. |
| 13 | R4 | Red Data. |
| 14 | R5 | Red Data. |
| 15 | R6 | Red Data. |
| 16 | R7 | Red Data. |
| 17 | GND | Power ground. |
| 18 | G0 | Green Data. |
| 19 | G1 | Green Data. |
| 20 | G2 | Green Data. |
| 21 | G3 | Green Data. |
| 22 | GND | Power ground. |
| 23 | G4 | Green Data. |
| 24 | G5 | Green Data. |
| 25 | G6 | Green Data. |
| 26 | G7 | Green Data. |
| 27 | GND | Power ground. |
| 28 | B0 | Blue Data. |
| 29 | B1 | Blue Data. |

| Pin# | Name | DESCRIPTION |
|---|---|---|
| 30 | B2 | Blue Data. |
| 31 | B3 | Blue Data. |
| 32 | GND | Power ground. |
| 33 | B4 | Blue Data. |
| 34 | B5 | Blue Data. |
| 35 | B6 | Blue Data. |
| 36 | B7 | Blue Data. |
| 37 | GND | Power ground. |
| 38 | HS | Line synchronization signal. Horizontal Sync Input. |
| 39 | VS | Frame synchronization signal. Vertical Sync Input. |
| 40 | GND | Power ground. |
| 41 | DE | Display enable pin from controller. Data Input Enable. |
| 42 | GND | Power ground. |
| 43 | DCLK | Sample clock. Data will be latched at the falling edge of DCLK. |
| 44 | GND | Power ground. |
| 45 | CS(NC) / ID1 | No Function./ ID[4:1]These pins select LCM type. |
| 46 | SDIN(NC) / ID2 | No Function./ ID[4:1]These pins select LCM type. |
| 47 | SCK(NC) / ID3 | No Function ./ ID[4:1]These pins select LCM type. |
| 48 | DISPLAY CONTROL / ID4 | Display Enable(Hi Active)./ ID[4:1]These pins select LCM type. |
| 49 | /RESET | Global Reset (Low Active). |
| 50 | GND | Power ground. |

## 2.3 Timing Characteristics

### 2.3.1 Clock and Data Input Waveforms

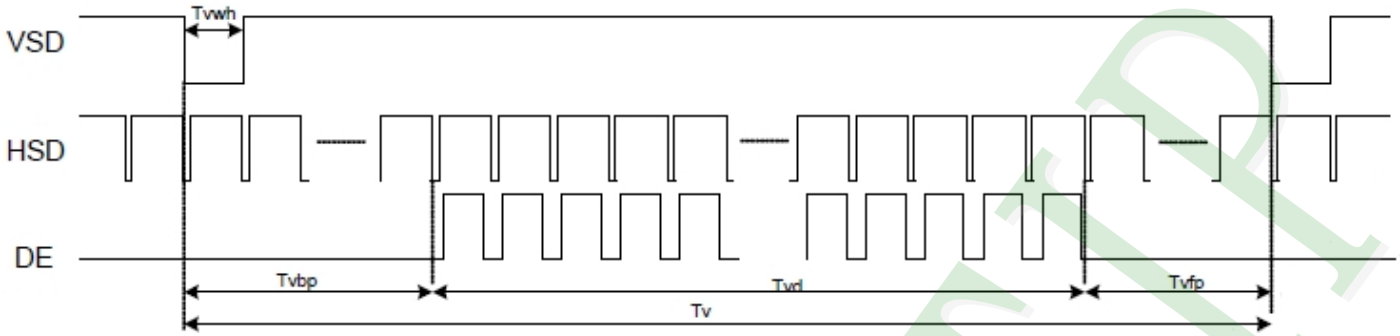


| Parameters | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| **System operation timing** | | | | | | |
| VDD power source slew time | TPOR | - | - | 20 | ms | From 0V to 99% VDD |
| GRB pulse width | tRSTW | 10 | 50 | - | us | R=10Kohm, C=1uF |
| **Input Output timing** | | | | | | |
| DCLK clock time | Tclk | 33.3 | - | - | ns | DCLK=30MHz |
| DCLK clock low period | Tcwl | 40 | - | 60 | % | |
| DCLK clock high period | Tcwh | 40 | - | 60 | % | |
| Clock rising time | Trck | 9 | - | - | ns | |
| Clock falling time | Tfck | 9 | - | - | ns | |
| HSD width | Thwh | 1 | - | - | DCLK | |
| HSD period time | Th | 55 | 60 | 65 | us | |
| HSD setup time | Thsu | 12 | - | - | ns | |
| HSD hold time | Thhd | 12 | - | - | ns | |
| VSD width | Tvwh | 1 | - | - | Th | |
| VSD setup time | Tvsu | 12 | - | - | ns | |
| VSD hold time | Tvhd | 12 | - | - | ns | |
| Data setup time | Tdasu | 12 | - | - | ns | |
| Data hold time | Tdahd | 12 | - | - | ns | |
| DE setup time | Tdesu | 12 | - | - | ns | |
| DE hold time | Tdehd | 12 | - | - | ns | |
| Source output setting time | Tsst | - | - | TBD | us | 10% to 90%<br>CL=60pF, RL=2Kohm |
| Gate output setting time | Tgst | - | - | TBD | ns | 10% to 90%, CL=60pF |
| VCOM output setting time | Tcst | - | - | TBD | us | 10% to 90%,<br>CL=40nF, RL=50ohm |
| Time from VSD to 1st line data input | Tvs | 3 | 8 | 31 | Th | HV mode<br>By HDL[4:0] setting |

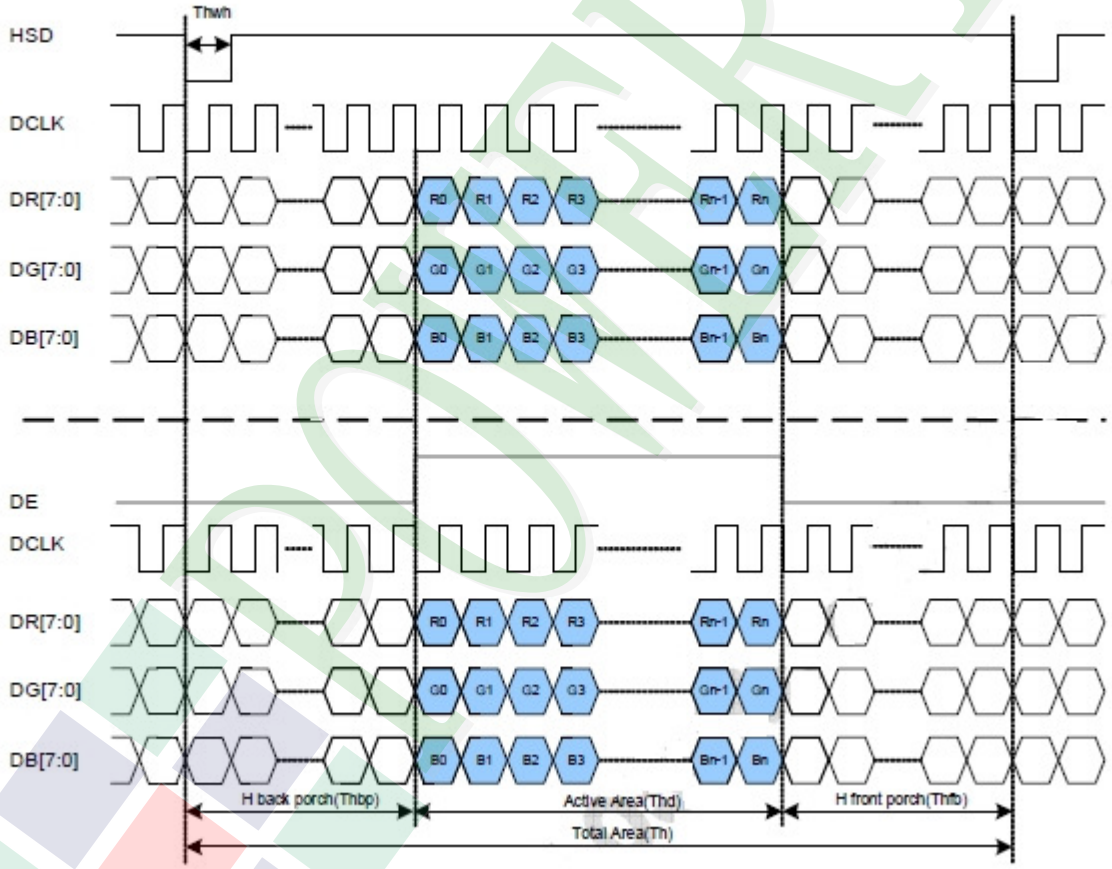
### 2.3.2 Data Input Format

Vertical input timing




Parallel RGB Mode Data format

(HV Mode)

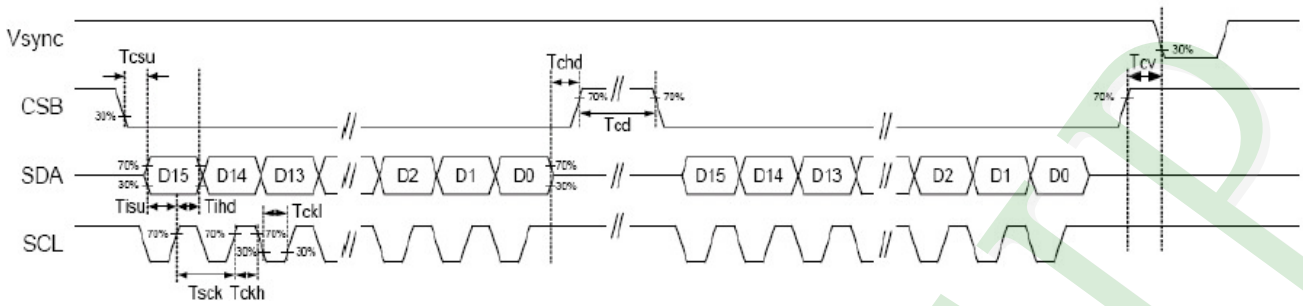



(DE Mode)

**Parallel RGB input timign table**

| Parameters | Symbol | Value | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| DCLK frequency | Fclk | 5 | 9 | 12 | MHz |
| VSYNC period time | Tv | 277 | 288 | 400 | H |
| VSYNC display area | Tvd | | 272 | | H |
| VSYNC back porch | Tvb | 3 | 8 | 31 | H |
| VSYNC front porch | Tvfp | 2 | 8 | 97 | H |
| HSYNC period time | Th | 520 | 525 | 800 | DCLK |
| HSYNC display area | Thd | | 480 | | DCLK |
| HSYNC back porch | Thbp | 36 | 40 | 255 | DCLK |
| HSYNC front porch | Thfp | 4 | 5 | 65 | DCLK |

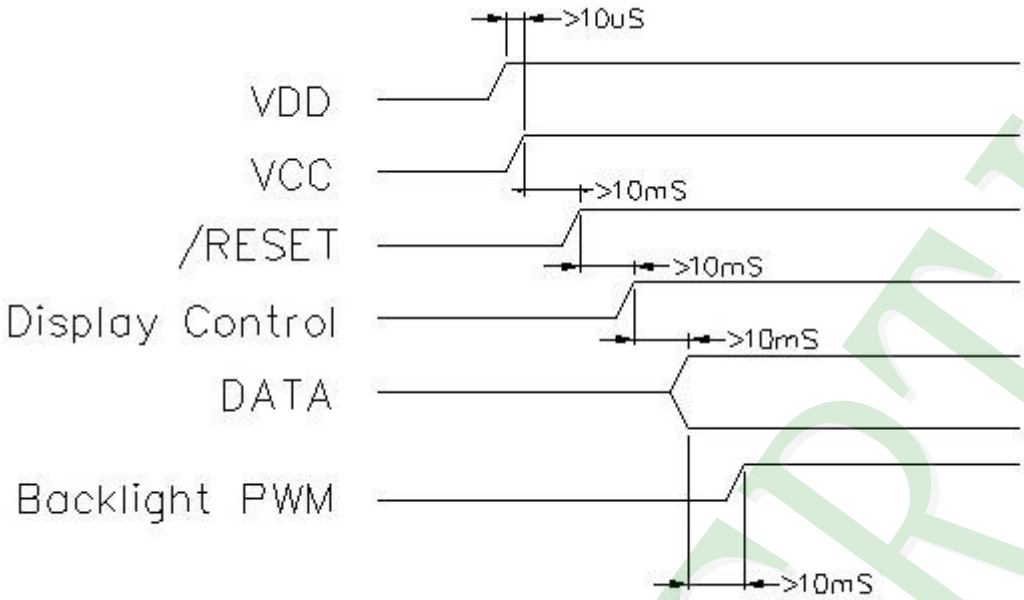
### 2.3.3 3-wire Timing Diagram



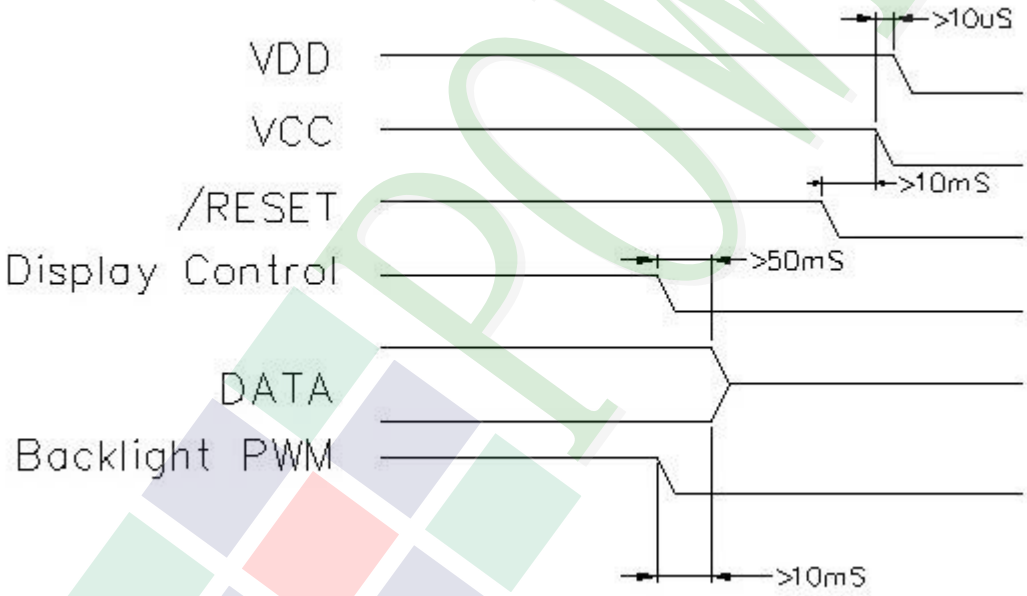

| 3-wire serial communication AC timing | | | | | | |
|---|---|---|---|---|---|---|
| Serial clock | Tsck | 200 | - | - | ns | For SCL Pin |
| SCL pulse low period | Tckl | 40 | - | 60 | % | |
| SCL pulse high period | Tckh | 40 | - | 60 | % | |
| Serial data setup time | Tisu | 50 | - | - | ns | |
| Serial data hold time | Tihd | 50 | - | - | ns | |
| Serial clock high/low | Tssw | 50 | - | - | ns | |
| CSB to VSD | Tcv | 1 | | | us | |
| CSB distinguish time | Tcd | 400 | - | - | ns | |
| CSB input setup time | Tcsu | 50 | - | - | ns | |
| CSB input hold time | Tchd | 50 | - | - | ns | |

### 2.3.4 Power Sequence

POWER ON

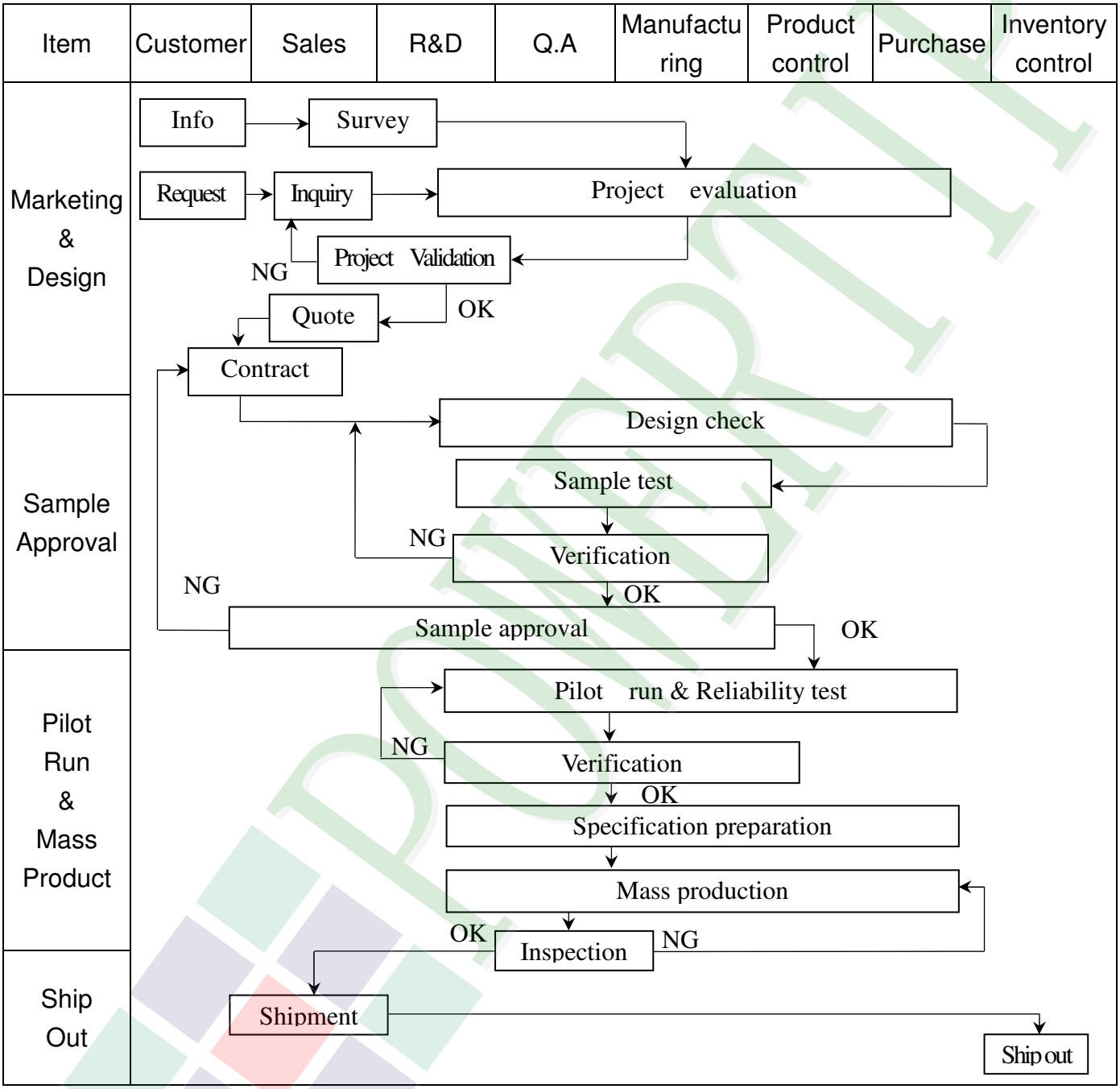


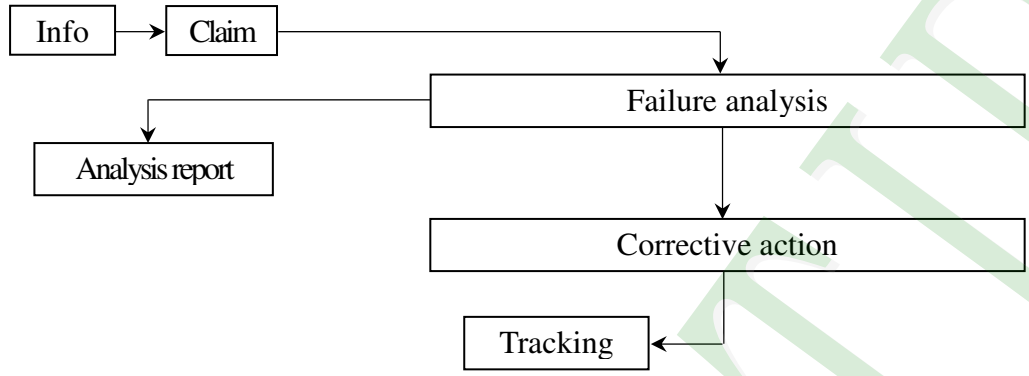

POWER OFF



# 3. QUALITY ASSURANCE SYSTEM

## 3.1 Quality Assurance Flow Chart



| Item | Customer | Sales | R&D | Q.A | Manufacturing | Product control | Purchase | Inventory control |
|---|---|---|---|---|---|---|---|---|
| Sales Service |  | | | | | | | |
| Q.A Activity | 1. ISO 9001 Maintenance Activities<br>2. Process improvement proposal<br>3. Equipment calibration<br>4. Education And Training Activities<br>5. Standardization Management | | | | | | | |

## 3.2. Inspection Specification

◆Scope：The document shall be applied to TFT-LCD Module for 3.5″ ~10″ (Ver.B01).

◆Inspection Standard：MIL-STD-105E Table Normal Inspection Single Sampling Level Ⅱ.

◆Equipment：Gauge、MIL-STD、Powertip Tester、Sample

◆Defect Level：Major Defect AQL： 0.4 ； Minor Defect AQL： 1.5

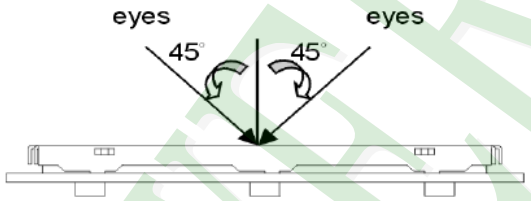
◆OUT Going Defect Level：Sampling.

◆Standard of the product appearance test：

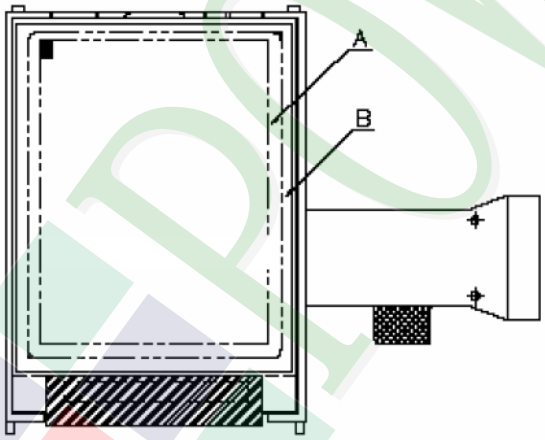
a. Manner of appearance test：

(1). The test best be under 20W×2 fluorescent light，and distance of view must be at 30 cm.

(2). The test direction is base on about around 45° of vertical line.




(3). Definition of area.




*A* area : viewing area

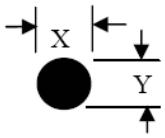
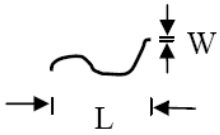
*B* area : Outside of viewing area

(4). Standard of inspection： (Unit：mm)

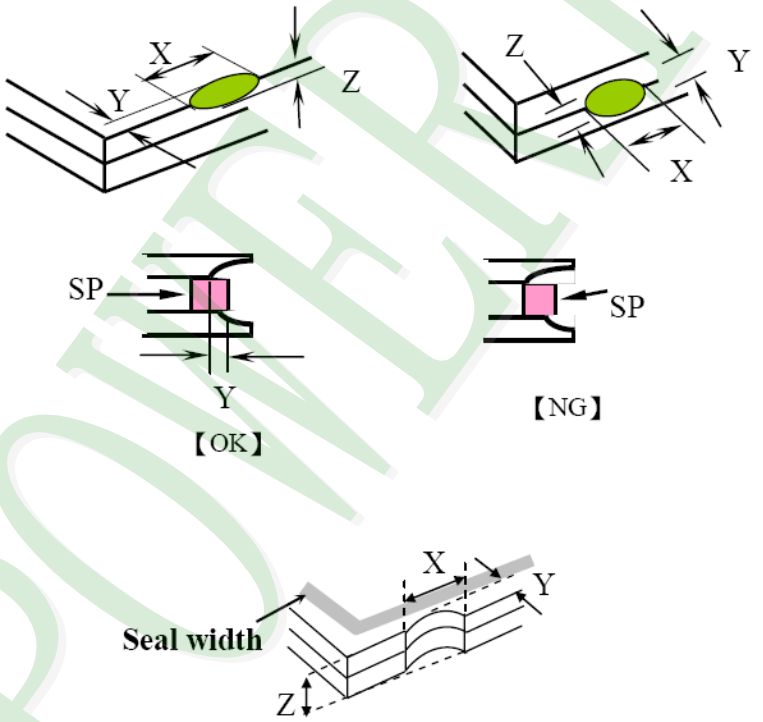
◆Specification For TFT-LCD Module 3.5″ ~10″ : (Ver.B01)

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="3">01</td><td rowspan="3">Product condition</td><td>1.1 The part number is inconsistent with work order of production.</td><td>Major</td></tr>
<tr><td>1.2 Mixed product types.</td><td>Major</td></tr>
<tr><td>1.3 Assembled in inverse direction.</td><td>Major</td></tr>
<tr><td>02</td><td>Quantity</td><td>2.1 The quantity is inconsistent with work order of production.</td><td>Major</td></tr>
<tr><td>03</td><td>Outline dimension</td><td>3.1 Product dimension and structure must conform to structure diagram.</td><td>Major</td></tr>
<tr><td rowspan="5">04</td><td rowspan="5">Electrical Testing</td><td>4.1 Missing line character and icon.</td><td>Major</td></tr>
<tr><td>4.2 No function or no display.</td><td>Major</td></tr>
<tr><td>4.3 Display malfunction.</td><td>Major</td></tr>
<tr><td>4.4 LCD viewing angle defect.</td><td>Major</td></tr>
<tr><td>4.5 Current consumption exceeds product specifications.</td><td>Major</td></tr>
<tr><td>05</td><td>Dot defect<br>(Bright dot、Dark dot)<br>On -display</td><td>
<table>
<tr><th colspan="2">Item</th><th>Acceptance (Q'ty)</th></tr>
<tr><td rowspan="4">Dot Defect</td><td>Bright Dot</td><td>≦ 4</td></tr>
<tr><td>Dark Dot</td><td>≦ 5</td></tr>
<tr><td>Joint Dot</td><td>≦ 3</td></tr>
<tr><td>Total</td><td>≦ 7</td></tr>
</table>
5.1 Inspection pattern：full white , full black , Red , Green and blue screens.<br>
5.2 It is defined as dot defect if defect area ＞1/2 dot.<br>
5.3 The distance between two dot defect ≧5 mm.
</td><td>Minor</td></tr>
</table>

◆Specification For TFT-LCD Module 3.5″ ~10″ : (Ver.B01)

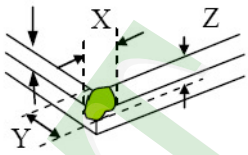
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>06</td><td>Black or white dot、scratch、contamination<br><br>Round type<br>  <br><br>Φ=(x+y) / 2<br><br>Line type<br>  <br></td><td>6.1 Round type ( Non-display or display) :<br><table><tr><th rowspan="2">Dimension (diameter : Φ)</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>A area</th><th>B area</th></tr><tr><td>Φ ≦ 0.25</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.25 < Φ ≦ 0.50</td><td>5</td></tr><tr><td>Φ > 0.50</td><td>0</td></tr><tr><td>Total</td><td>5</td></tr></table><br>6.2 Line type( Non-display or display) :<br><table><tr><th rowspan="2">Length (L)</th><th rowspan="2">Width (W)</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>A area</th><th>B area</th></tr><tr><td>---</td><td>W ≦ 0.03</td><td>Ignore</td><td rowspan="5">Ignore</td></tr><tr><td>L ≦10.0</td><td>0.03 < W ≦ 0.05</td><td>4</td></tr><tr><td>L ≦5.0</td><td>0.05 < W ≦ 0.10</td><td>2</td></tr><tr><td>---</td><td>W >0.10</td><td>As round type</td></tr><tr><td colspan="2">Total</td><td>5</td></tr></table></td><td>Minor</td></tr>
<tr><td>07</td><td>Polarizer Bubble</td><td><table><tr><th rowspan="2">Dimension (diameter : Φ)</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>A area</th><th>B area</th></tr><tr><td>Φ ≦ 0.25</td><td>Ignore</td><td rowspan="5">Ignore</td></tr><tr><td>0.25 < Φ ≦ 0.50</td><td>4</td></tr><tr><td>0.50 < Φ ≦ 0.80</td><td>1</td></tr><tr><td>Φ > 0.80</td><td>0</td></tr><tr><td>Total</td><td>5</td></tr></table></td><td>Minor</td></tr>
</table>

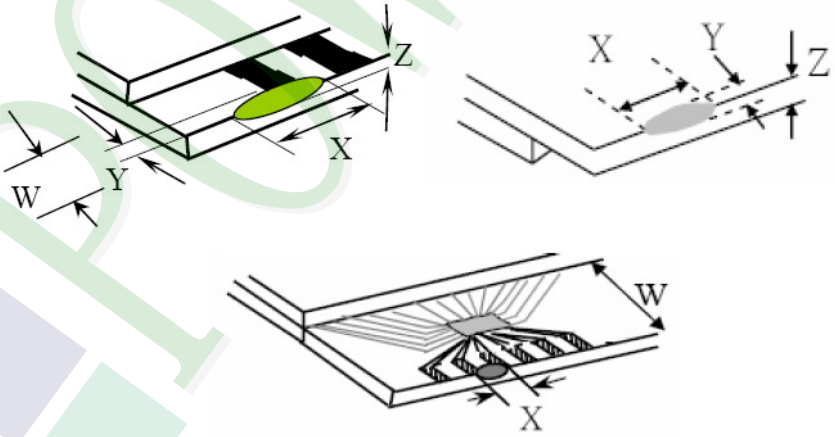
◆Specification For TFT-LCD Module 3.5″ ~10″ : (Ver.B01)

| NO | Item | Criterion | Level |
|---|---|---|---|
| 08 | The crack of glass | Symbols :<br>X : The length of crack<br>Y : The width of crack.<br>Z : The thickness of crack<br>W : terminal length<br>t : The thickness of glass<br>a : LCD side length<br><br>8.1 General glass chip :<br>8.1.1 Chip on panel surface and crack between panels:<br>  <br> | Minor |

| X | Y | Z |
|---|---|---|
| ≦ a | Crack can't enter viewing area | ≦1/2 t |
| ≦ a | Crack can't exceed the half of SP width. | 1/2 t < Z ≦2 t |

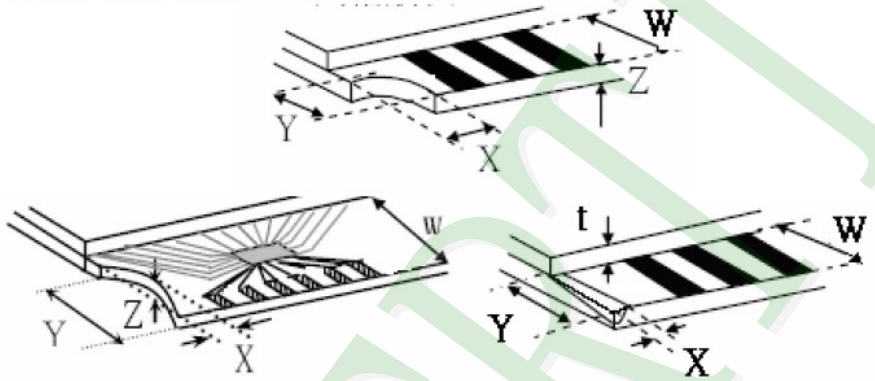
◆Specification For TFT-LCD Module 3.5″ ~10″ : (Ver.B01)

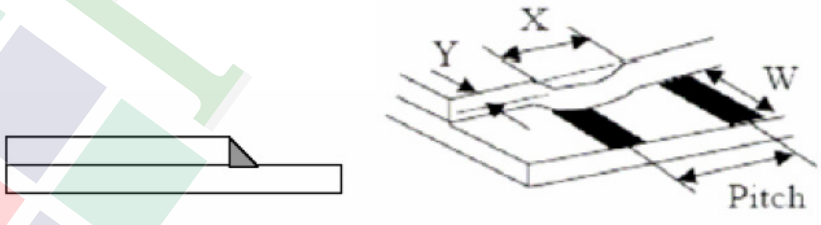
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="2">08</td><td rowspan="2">The crack of glass</td><td>Symbols :<br><br>X : The length of crack　　Y : The width of crack.<br>Z : The thickness of crack　　W : terminal length<br>t : The thickness of glass　　a : LCD side length<br><br>8.1.2 Corner crack :<br> 

<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦1/5 a</td><td>Crack can't enter viewing area</td><td>Z ≦ 1/2 t</td></tr>
<tr><td>≦1/5 a</td><td>Crack can't exceed the half of SP width.</td><td>1/2 t < Z ≦ 2 t</td></tr>
</table></td><td></td></tr>
<tr><td>8.2 Protrusion over terminal :<br>8.2.1 Chip on electrode pad :<br> 

<table>
<tr><th></th><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>Front</td><td>≦ a</td><td>≦ 1/2 W</td><td>≦ t</td></tr>
<tr><td>Back</td><td>≦ a</td><td>≦ W</td><td>≦ 1/2 t</td></tr>
</table></td><td>Minor</td></tr>
</table>

◆Specification For TFT-LCD Module 3.5″ ~10″ : (Ver.B01)

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>08</td><td>The crack of glass</td><td>
Symbols :<br><br>
X : The length of crack Y : The width of crack.<br>
Z : The thickness of crack W : terminal length<br>
t : The thickness of glass a : LCD side length<br><br>
8.2.2 Non-conductive portion :<br>


<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦ 1/3 a</td><td>≦ W</td><td>≦t</td></tr>
</table>
⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.<br><br>
8.2.3 Glass remain :<br>


<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦ a</td><td>≦ 1/3 W</td><td>≦t</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

# 4. RELIABILITY TEST

## 4.1 Reliability Test Condition

(Ver.B01)

<table>
<tr><th>NO.</th><th>TEST ITEM</th><th>TEST CONDITION</th></tr>
<tr><td>1</td><td>High Temperature<br>Storage Test</td><td>Keep in +80 ±2℃ 96 hrs<br>Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td>2</td><td>Low Temperature<br>Storage Test</td><td>Keep in -30 ±2℃ 96 hrs<br>Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td>3</td><td>High Temperature /<br>High Humidity<br>Storage Test</td><td>Keep in +60℃ / 90% R.H duration for 96 hrs<br>Surrounding temperature, then storage at normal condition 4hrs.<br>(Excluding the polarizer)</td></tr>
<tr><td>4</td><td>Temperature Cycling<br>Storage Test</td><td>-30℃ → +25℃ → +80℃ → +25℃<br>(30mins) (5mins) (30mins) (5mins)<br>10 Cycle<br>Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">ESD Test</td><td>Air Discharge:<br>Apply 2 KV with 5 times<br>Discharge for each polarity +/-<br>Contact Discharge:<br>Apply 250 V with 5 times<br>discharge for each polarity +/-</td></tr>
<tr><td>1. Temperature ambiance : 15℃～35℃<br>2. Humidity relative : 30%～60%<br>3. Energy Storage Capacitance(Cs+Cd) : 150pF±10%<br>4. Discharge Resistance(Rd) : 330Ω±10%<br>5. Discharge, mode of operation :<br>Single Discharge (time between successive discharges at least 1 sec)<br>(Tolerance if the output voltage indication : ±5%)</td></tr>
<tr><td>6</td><td>Vibration Test<br>(Packaged)</td><td>1. Sine wave 10～55 Hz frequency (1 min)<br>2. The amplitude of vibration :1.5 mm<br>3. Each direction (X、Y、Z) duration for 2 Hrs</td></tr>
<tr><td>7</td><td>Drop Test<br>(Packaged)</td><td><table><tr><th>Packing Weight (Kg)</th><th>Drop Height (cm)</th></tr><tr><td>0 ~ 45.4</td><td>122</td></tr><tr><td>45.4 ~ 90.8</td><td>76</td></tr><tr><td>90.8 ~ 454</td><td>61</td></tr><tr><td>Over 454</td><td>46</td></tr></table>Drop direction :※1 corner / 3 edges / 6 sides each 1times</td></tr>
</table>

# 5. PRECAUTION RELATING PRODUCT HANDLING

## 5.1 SAFETY

5.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.

5.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

## 5.2 HANDLING

5.2.1 Avoid any strong mechanical shock which can break the glass.

5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.

5.2.3 Do not remove the panel or frame from the module.

5.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully ,do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)

5.2.5 Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.

5.2.6 Do not touch the display area with bare hands , this will stain the display area.

5.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.

5.2.8 To control temperature and time of soldering is 320±10℃and 3-5 sec.

5.2.9 To avoid liquid (include organic solvent) stained on LCM .

## 5.3 STORAGE

5.3.1 Store the panel or module in a dark place where the temperature is 25℃ ±5℃ and the humidity is below 65% RH.

5.3.2 Do not place the module near organics solvents or corrosive gases.

5.3.3 Do not crush , shake , or jolt the module.

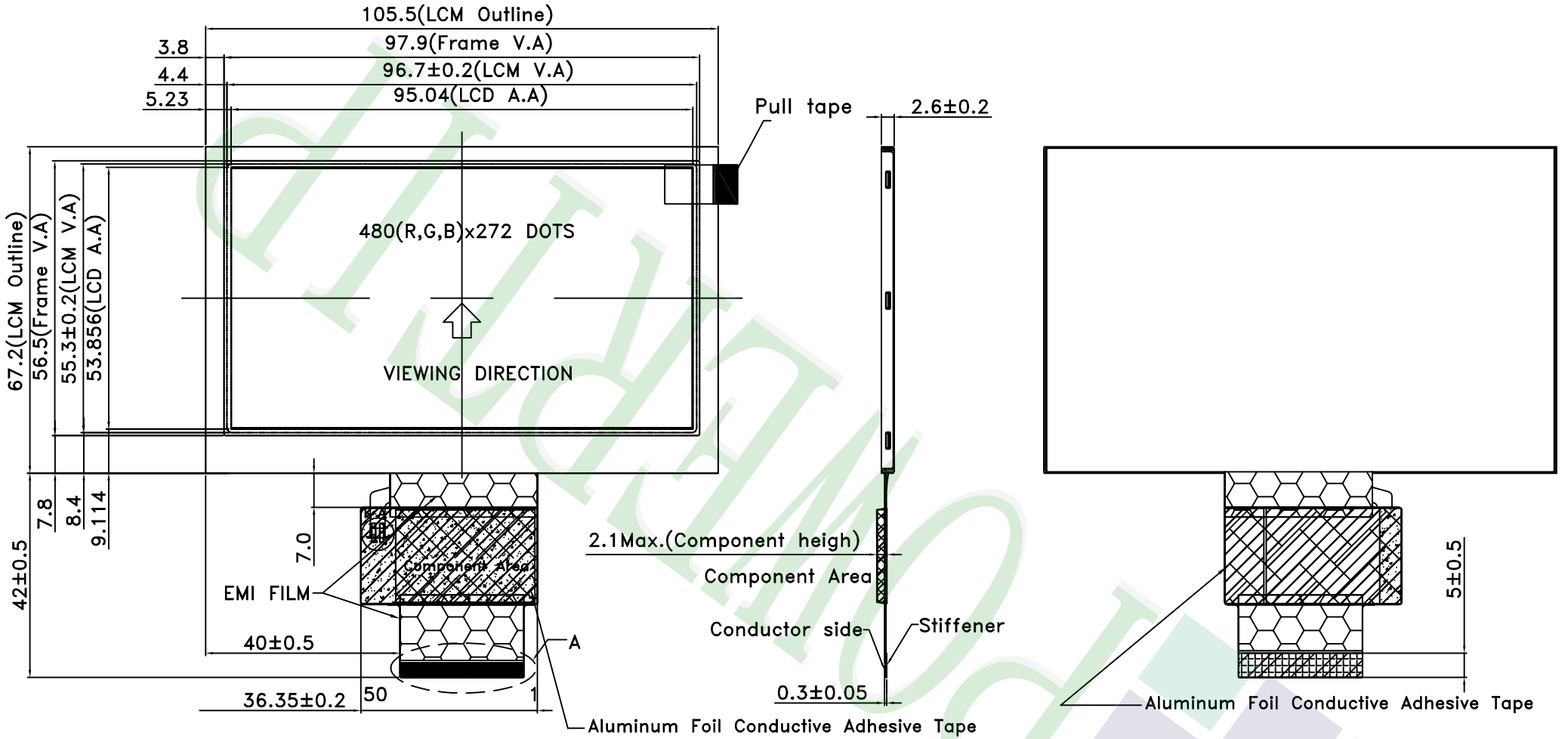
## 5.4 TERMS OF WARRANTY

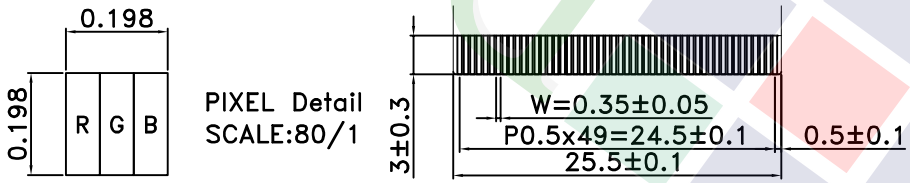
5.4.1 Applicable warrant period

The period is within thirteen months since the date of shipping out under normal using and storage conditions.

5.4.2 Unaccepted responsibility

This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment , we cannot take responsibility if the product is used in nuclear power control equipment , aerospace equipment , fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.




DETAIL A
SCALE 2/1

NOTES:
1. LCD TYPE: a-Si TFT
2. LCD DISPLAY:POSITIVE/TRANSMISSIVE
3. VIEW DIRECTION: 6 O'CLOCK
4. The tolerance unless classified ±0.3mm
5. FPC suggested connector : CviLux CF31501D0R2-05-NH or compatible.

| REV | REV BY | REVISER | DATE |
|---|---|---|---|
| 007 | | | |
| 006 | | | |
| 005 | | | |
| 004 | | | |
| 003 | | | |
| 002 | | | |
| 001 | NEW DRAWING | Kevin | 2016/09/09 |

PART NO: PH480272T009-IHA
DRAWING NAME : LMD-PH480272T009-IHA
TITLE: LCD Module Drawing

久正光電股份有限公司
POWERTIP TECHNOLOGY CORPORATION

| | | | | | |
|---|---|---|---|---|---|
| Design | Kevin | (3) | Surface | | |
| Check | Stone | Unit | MM | Material | |
| Approve | Oliver | Scale | 1:1 | Thickness | |
| | | Page | 1/1 | Quantity | |

| Length(Min) (mm) \ Tolerance \ Precision | Precision Level |
|---|---|
| 1 ~ 4 | - |
| 4 ~ 16 | - |
| 16 ~ 63 | - |
| 63 ~ 250 | - |
| 250 ~ 1000 | - |