POWERTIP TECH. CORP.

# SPECIFICATIONS

| | | |
|---|---|---|
| CUSTOMER | : | PTC |
| SAMPLE CODE | : | SH320240T023-IBG |
| MASS PRODUCTION CODE | : | PH320240T023-IBG |
| SAMPLE VERSION | : | 01 |
| SPECIFICATIONS EDITION | : | 004 |
| DRAWING NO. (Ver.) | : | LMD-PH320240T023-IBG (Ver.002) |
| PACKAGING NO. (Ver.) | : | PKG-PH320240T023-IBG (Ver.001) |

## Customer Approved

Date:

| Approved | Checked | Designer |
|---|---|---|
| 黃秋源<br>Oliver Huang | 李健弘<br>Lambert Lee | 黃俊清<br>Ackey Huang |

POWERTIP
2014.04.07
TW RD APR

☐ Preliminary specification for design input

■ Specification for sample approval


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## History of Version

| Date | Ver. | Edi. | Description | Page | Design by |
|---|---|---|---|---|---|
| 15/08/2013 | 01 | 001 | New Drawing. | - | Ackey |
| 10/08/2013 | 01 | 002 | New Sample. | - | Ackey |
| 12/16/2013 | 01 | 003 | Update QUALITY ASSURANCE SYSTEM | - | Ackey |
| 04/03/2014 | 01 | 004 | Add CN & Initcode. | 14, Appendix | Ackey |
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## Contents



Note : For detailed information please refer to IC data sheet :

Primacy(TFT LCD): Himax: HX8238-D

# 1. SPECIFICATIONS

## 1.1 Features

**Main LCD Panel**

| Item | Standard Value |
|---|---|
| Display Type | 320* (R、G、B) * 240 Dots |
| LCD Type 1 | Normally white , Transmissive type |
| LCD Type 2 | Sunlight Visible |
| Screen size(inch) | 3.5(Diagonal) |
| Viewing Direction | 6 O'clock |
| Color configuration | R.G.B. vertical stripe |
| Backlight | White LED |
| Interface | Digital 24-bits Parallel RGB<br>HSYNC,VSYNC.3Wires SPI |
| Other<br><br>(controller / driver IC) | Himax:HX8238-D |
| 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 | 76.9(W) * 63.9 (L) * 3.2 (H) | mm |

**LCD panel**

| Item | Standard Value | Unit |
|---|---|---|
| Active Area | 70.08 (W) * 52.56 (L) | mm |

Note : For detailed information please refer to LCM drawing

## 1.3 Absolute Maximum Ratings

**Module**

| Item | Symbol | Condition | Min. | Max. | Unit |
|---|---|---|---|---|---|
| System Power Supply Voltage | VDD | GND=0 | -0.3 | 4.0 | V |
| Booster Reference Supply Voltage | VCI | GND=0 | GND-0.3 | 3.96 | V |
| Operating Temperature | $T_{OP}$ | - | -20 | 70 | °C |
| Storage Temperature | $T_{ST}$ | - | -30 | 80 | °C |
| Storage Humidity | HD | Ta < 60 °C | 20 | 90 | %RH |

## 1.4 DC Electrical Characteristics

**Module** GND = 0V, Ta = 25°C

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Power Supply Voltage | VDD | - | 3.0 | 3.3 | 3.6 | V |
| Booster Reference Supply Voltage | VCI | - | 3.0 | 3.3 | 3.6 | V |
| $V_{COM}$ High Voltage | $V_{COMH}$ | - | - | - | 5.54 | V |
| $V_{COM}$ Low Voltage | $V_{COML}$ | - | -2.8 | - | - | V |
| Input H/L Level Voltage | VIH | - | 0.8VDD | - | VDD | V |
| | VIL | - | 0 | - | 0.2VDD | V |
| Output H/L Level Voltage | VOH | - | 0.9VDD | - | VDD | V |
| | VOL | - | - | - | 0.1VDD | V |
| Supply Current | IDD | VDD=VCI=3.3V<br>Pattern= black*1 | - | 9 | 14 | mA |

Note1: Maximum current display.

## 1.5 Optical Characteristics

**TFT LCD Panel** VDD=VCI=3.3V, Ta=25°C

| Item | | Symbol | Condition | Min. | Typ. | Max. | unit | - |
|---|---|---|---|---|---|---|---|---|
| Response time | | Tr + Tf | Ta = 25°C<br>θX, θY = 0° | - | 35 | - | 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°C<br>θX , θY = 0° | 500 | 600 | - | - | Note3 |
| Color of CIE Coordinate (With B/L ) | White | X | | 0.25 | 0.30 | 0.35 | - | Note1 |
| | | Y | | 0.29 | 0.34 | 0.39 | | |
| | Red | X | | 0.56 | 0.61 | 0.66 | | |
| | | Y | | 0.32 | 0.37 | 0.42 | | |
| | Green | X | | 0.28 | 0.33 | 0.38 | | |
| | | Y | | 0.56 | 0.61 | 0.66 | | |
| | Blue | X | | 0.09 | 0.14 | 0.19 | | |
| | | Y | | 0.02 | 0.07 | 0.12 | | |
| Average Brightness Pattern=white display | | IV | IF= 20 mA | 400 | 500 | - | $cd/m^2$ | Note1 |
| Uniformity | | △B | | 80 | - | - | % | Note1 |
| Reflective Ratio | | - | | - | - | 0.5 | % | - |

Note1:

1：△B=B(min) / B(max) × 100%

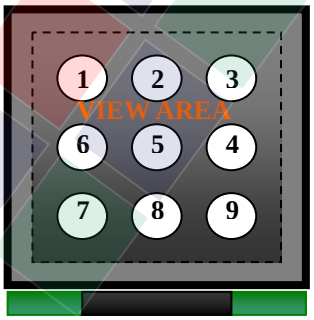
2：Measurement Condition for Optical Characteristics:

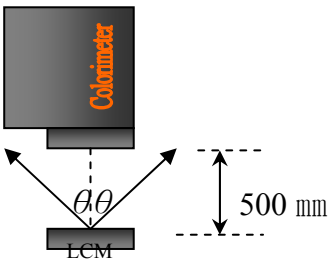
a：Environment: 25℃±5℃ / 60±20%R.H，no wind，dark room below 10 Lux at typical lamp current and typical operating frequency.

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%



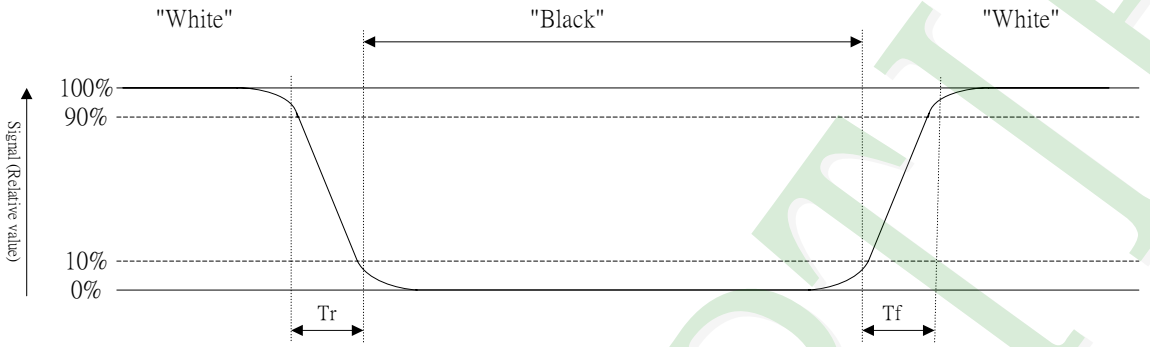




Colorimeter=BM-7 fast

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:



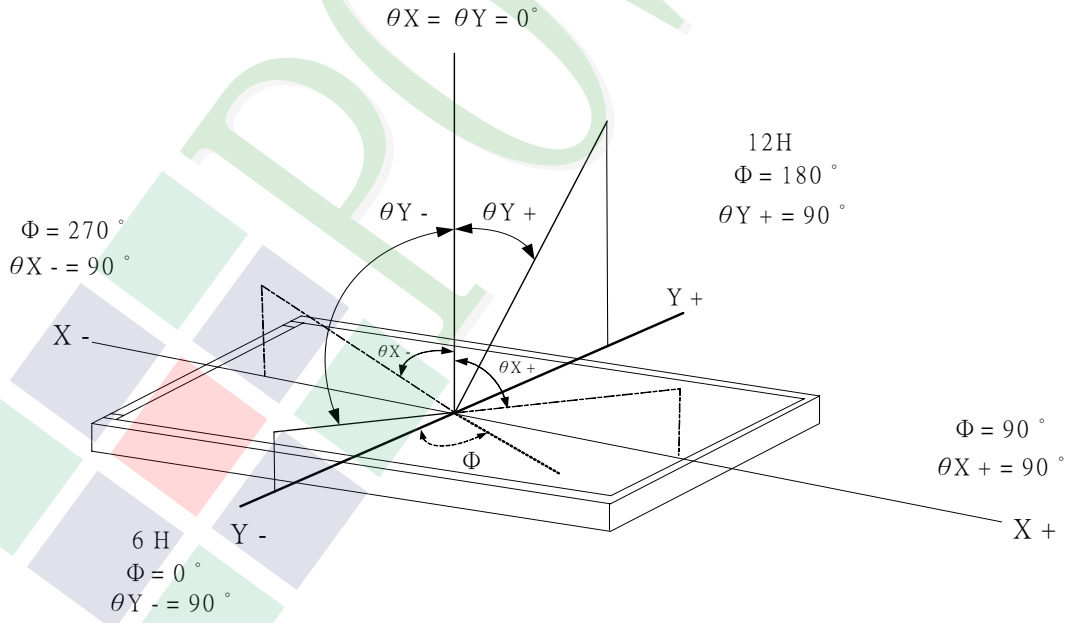

Note3: Definition of contrast ratio:

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

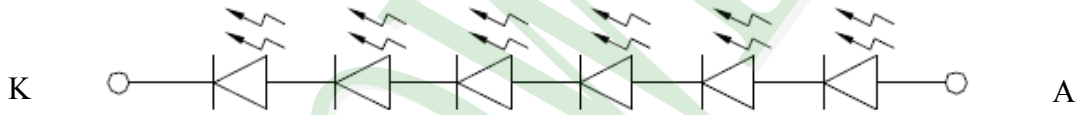
Maximum Ratings

| Item | Symbol | Conditions | Min. | Max. | Unit |
|---|---|---|---|---|---|
| Forward Current | IF | Ta =25℃ | - | 48 | mA |
| Power Dissipation | PD | Ta =25℃ | - | 540 | mW |

Electrical / Optical Characteristics

| Item | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Forward Voltage | VF | IF= 20 mA | - | 19.2 | 21 | V |
| Color of CIE Coordinate | X | | 0.28 | 0.30 | 0.32 | - |
| (Without LCD & TP) | Y | | 0.28 | 0.30 | 0.32 | |
| Color | White | | | | | |

**Internal Circuit Diagram**



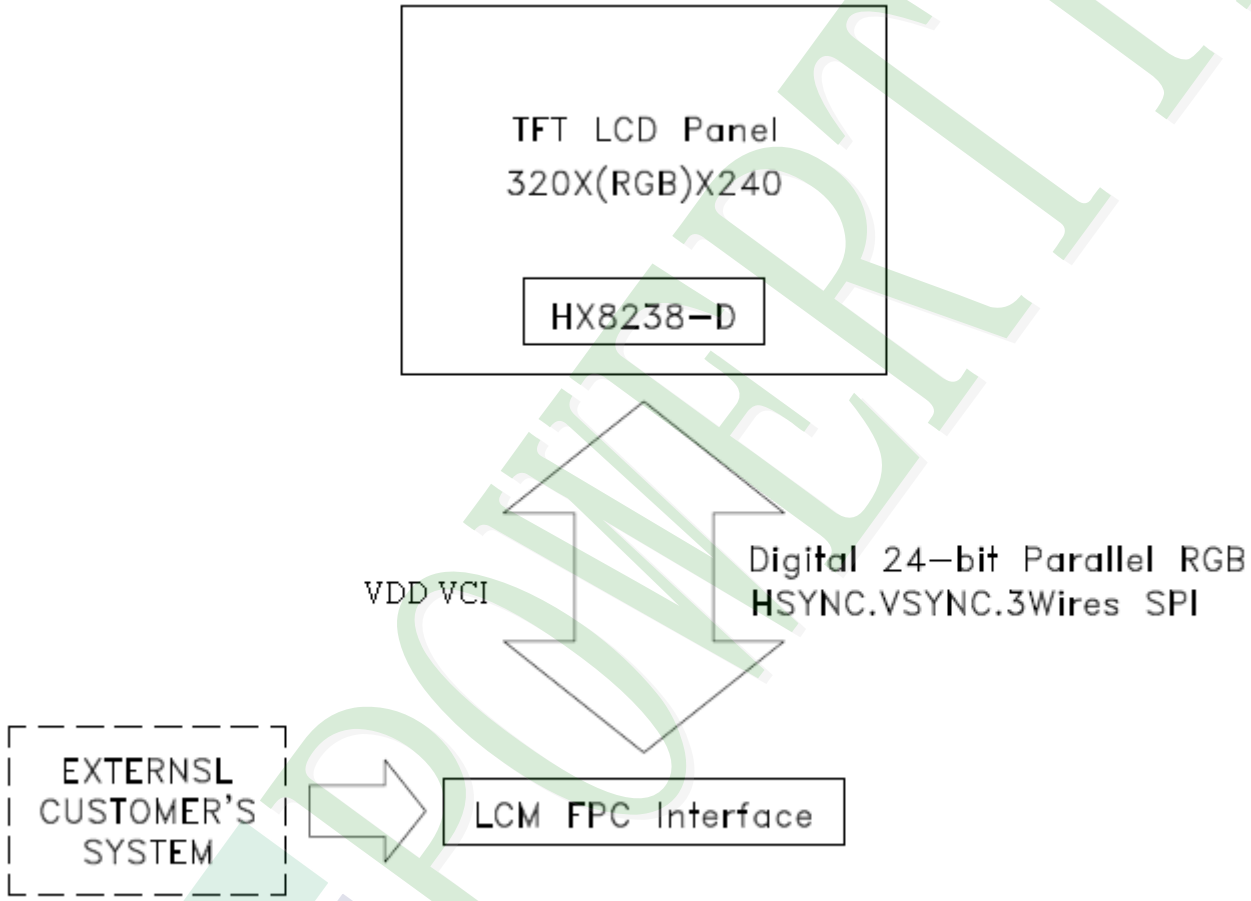
# 2. MODULE STRUCTURE

## 2.1 Counter Drawing

### 2.1.1 LCM Mechanical Diagram

* See Appendix

### 2.1.2 Block Diagram



## 2.2 Interface Pin Description

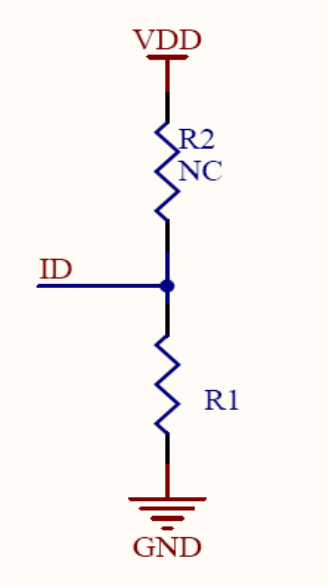
| Pin No. | Symbol | Function |
|---|---|---|
| 1 | A | LED Anode. |
| 2 | K | LED Cathode. |
| 3 | GND | Ground. |
| 4 | VCI | Booster Reference Supply Voltage. |
| 5 | ID | Note1. |
| 6 | VDD | Power Supply Voltage. |
| 7 | GND | Ground. |
| 8 | RESB | Reset. |
| 9 | CSB | Chip select Input:<br>CSB = L - selected and accessible.<br>CSB = H - is not selected and not accessible. |
| 10 | SCK | SPI Clock Input. |
| 11 | SDO | SPI Data Output.<br>The data is valid on the falling edge of the SCK signal. |
| 12 | SDI | SPI Data Input.<br>The data is latched on the rising edge of the SCK signal. |
| 13 | GND | Ground. |
| 14 | B0 | Graphic display Blue data. |
| 15 | B1 | |
| 16 | B2 | |
| 17 | B3 | |
| 18 | B4 | |
| 19 | B5 | |
| 20 | B6 | |

| Pin No. | Symbol | Function |
|---|---|---|
| 21 | B7 | Graphic display Blue data. |
| 22 | G0 | Graphic display Green data. |
| 23 | G1 | |
| 24 | G2 | |
| 25 | G3 | |
| 26 | G4 | |
| 27 | G5 | |
| 28 | G6 | |
| 29 | G7 | |
| 30 | R0 | Graphic display Red data. |
| 31 | R1 | |
| 32 | R2 | |
| 33 | R3 | |
| 34 | R4 | |
| 35 | R5 | |
| 36 | R6 | |
| 37 | R7 | |
| 38 | GND | Ground. |
| 39 | DCLK | Video Clock Input.<br>The data is latched on the rising edge of DCLK. |
| 40 | HSYNC | Horizontal Sync Input. |
| 41 | VSYNC | Vertical Sync Input. |

| Pin No. | Symbol | Function |
|---|---|---|
| 42 | DEN | Video Data Enable Input.<br>VSYNC+HSYNC mode - This pin is shorted to GND normally and the back/front porch is determined by the control register.<br>VSYNC+HSYNC+DE mode -<br>The valid data is determined by the VSYNC+HSYNC+DEN pin.<br>DE mode - VSYNC and HSYNC are unused and shorted to GND. The valid input.<br>data is determined by DEN pin. |
| 43 | GND | Ground. |
| 44 | SEL0 | Note2. |
| 45 | SEL1 | |
| 46 | SEL2 | |
| 47 | Y+ | Touch Panel Y_Top. (NC) |
| 48 | X+ | Touch Panel X_Right.(NC) |
| 49 | Y- | Touch Panel Y_Bottom. (NC) |
| 50 | X- | Touch Panel X_Left. (NC) |

## Note1: ID code Circuit

Vendor ID (On FPC, ID resistor as specified in vendor table shall be connected to this pin, and other side of the resistor shall be connected to GND)




**R1=44.2KΩ**

## Note2: Define the input interface mode

| SEL2 | SEL1 | SEL0 | Format | Operating frequency |
|---|---|---|---|---|
| 0 | 0 | 0 | Parallel-RGB data format (only support stripe type color filter) | 6.5MHz |
| 0 | 0 | 1 | Serial-RGB data format | 19.5MHz |
| 0 | 1 | 0 | CCIR 656 data format (640RGB) | 24.54MHz |
| 0 | 1 | 1 | CCIR 656 data format (720RGB) | 27MHz |
| 1 | 0 | 0 | YUV mode A data format (Cr-Y-Cb-Y) | 24.54MHz |
| 1 | 0 | 1 | YUV mode A data format (Cr-Y-Cb-Y) | 27MHz |
| 1 | 1 | 0 | YUV mode B data format (Cb-Y-Cr-Y) | 27MHz |
| 1 | 1 | 1 | YUV mode B data format (Cb-Y-Cr-Y) | 24.54MHz |

| Input format | DOTCLK Freq (MHz) | Display data | Active area (DOTCLK) |
|---|---|---|---|
| YUV mode | 24.54 | 640 | 1280 |
| | 27 | 720 | 1440 |

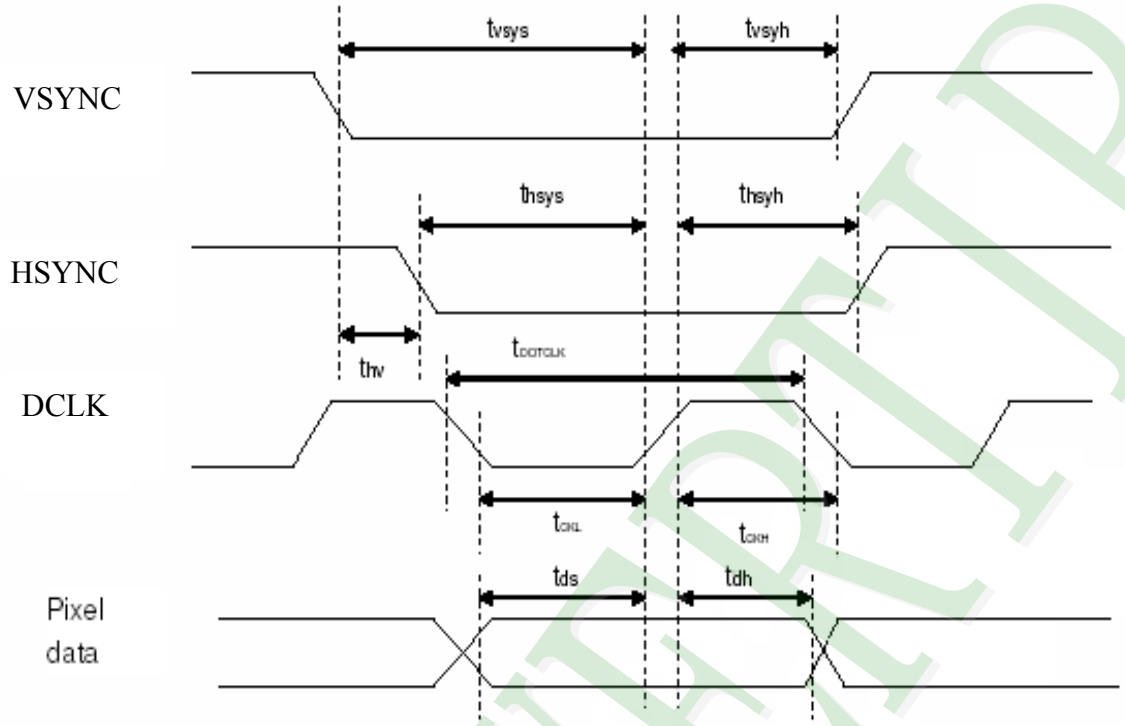
### 2.2.1 Refer Initial code:

```
//Initial----------------------------------------------------------
\void Initial_Main(void)                    // For ILI9341
{
MOV     DPH,#00H            ;Register 0001
MOV     DPL,#01H
CALL    COM_SER
MOV     DPH,#63H
MOV     DPL,#00H
CALL    DATA_SER

MOV     DPH,#00H            ;Register 0002
MOV     DPL,#02H
CALL    COM_SER
MOV     DPH,#02H
MOV     DPL,#00H
CALL    DATA_SER

MOV     DPH,#00H            ;Register 0003
MOV     DPL,#03H
CALL    COM_SER
MOV     DPH,#01100100B       ;DB3 ~ DB0
MOV     DPL,#01100100B
CALL    DATA_SER
```

```
MOV     DPH,#00H            ;Register 0004
MOV     DPL,#04H
CALL    COM_SER
MOV     DPH,#04H
MOV     DPL,#C7H            ;Parallel 24 bits
CALL    DATA_SER

MOV     DPH,#00H            ;Register 0005
MOV     DPL,#05H
CALL    COM_SER
MOV     DPH,#FCH
MOV     DPL,#80H
CALL    DATA_SER

MOV     DPH,#00H            ;Register 000A
MOV     DPL,#0AH
CALL    COM_SER
MOV     DPH,#40H
MOV     DPL,#08H
CALL    DATA_SER

MOV     DPH,#00H            ;Register 000D
MOV     DPL,#0DH
CALL    COM_SER
MOV     DPH,#00000010B
```

```
MOV     DPL,#00110001B          ;DB5 ~ DB0   VLCD63
CALL    DATA_SER

MOV     DPH,#00H                ;Register 000E
MOV     DPL,#0EH
CALL    COM_SER
MOV     DPH,#00101110B          ;DB4 ~ DB0 VCOM
MOV     DPL,#10000000B          ;DB7 ~ DB6
CALL    DATA_SER

CALL    DELAY2
}
```

## 2.3 Timing Characteristics



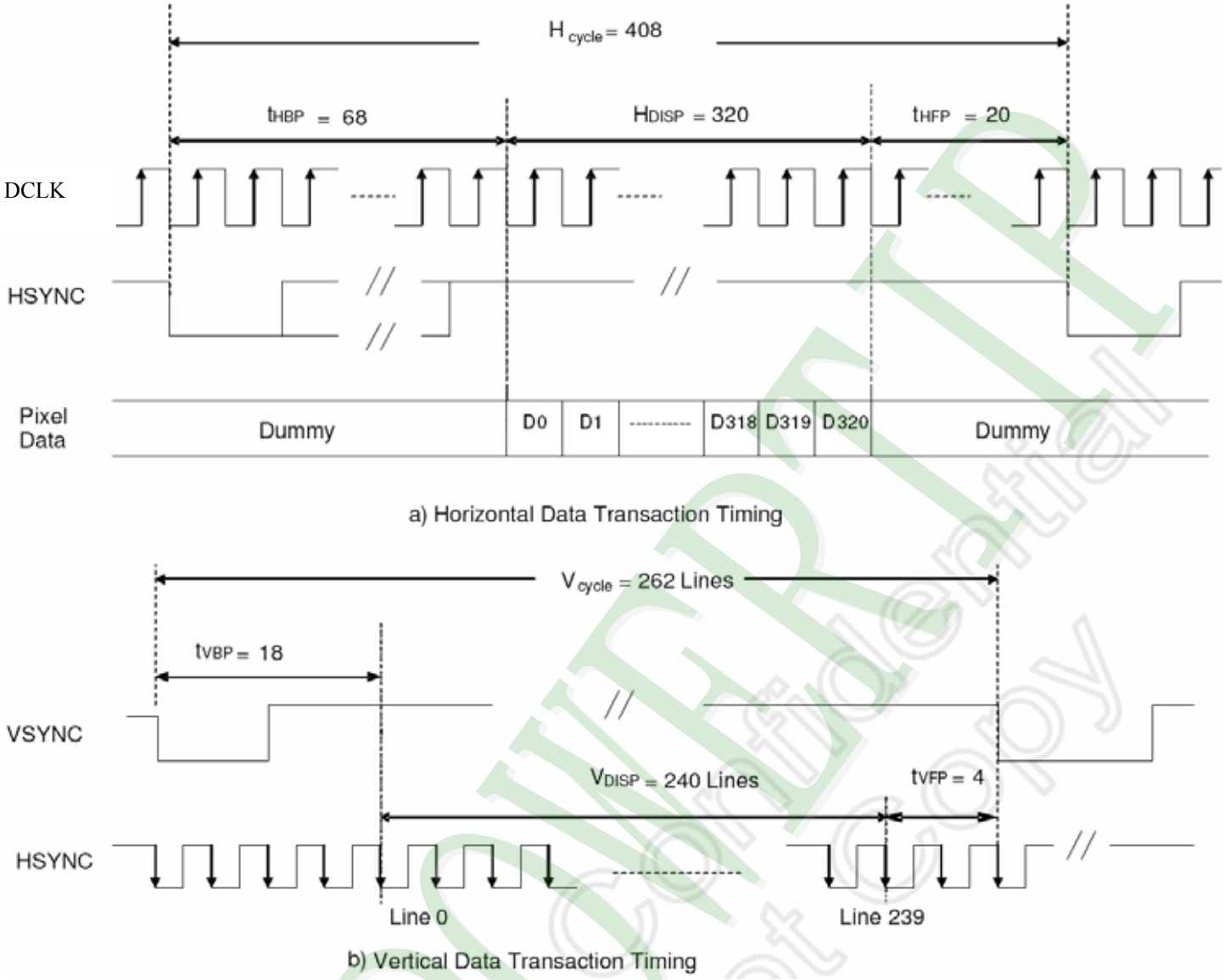

Pixel timing

| Characteristics | Symbol | Min | | Typ | | Max | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | 24 bit | 8 bit | 24 bit | 8 bit | 24 bit | 8 bit | |
| DOTCLK Frequency | fDOTCLK | - | | 6.5 | 19.5 | 10 | 30 | MHz |
| DOTCLK Period | tDOTCLK | 100 | 33.3 | 154 | 51.3 | - | | ns |
| Vertical Sync Setup Time | tvsys | 20 | 10 | - | | - | | ns |
| Vertical Sync Hold Time | tvsyh | 20 | 10 | - | | - | | ns |
| Horizontal Sync Setup Time | thsys | 20 | 10 | - | | - | | ns |
| Horizontal Sync Hold Time | thsyh | 20 | 10 | - | | - | | ns |
| Phase difference of Sync Signal Falling Edge | thv | 1 | | - | | 240 | | tDOTCLK |
| DOTCLK Low Period | tCKL | 50 | 15 | - | | - | | ns |
| DOTCLK High Period | tCKH | 50 | 15 | - | | - | | ns |
| Data Setup Time | tds | 12 | 10 | - | | - | | ns |
| Data hold Time | tdh | 12 | 10 | - | | - | | ns |
| Reset pulse width | tRES | 10 | | - | | - | | us |

Note: External clock source must be provided to DOTCLK pin of HX8238-A. The driver will not operate if absent of the clocking signal.

Pixel timing

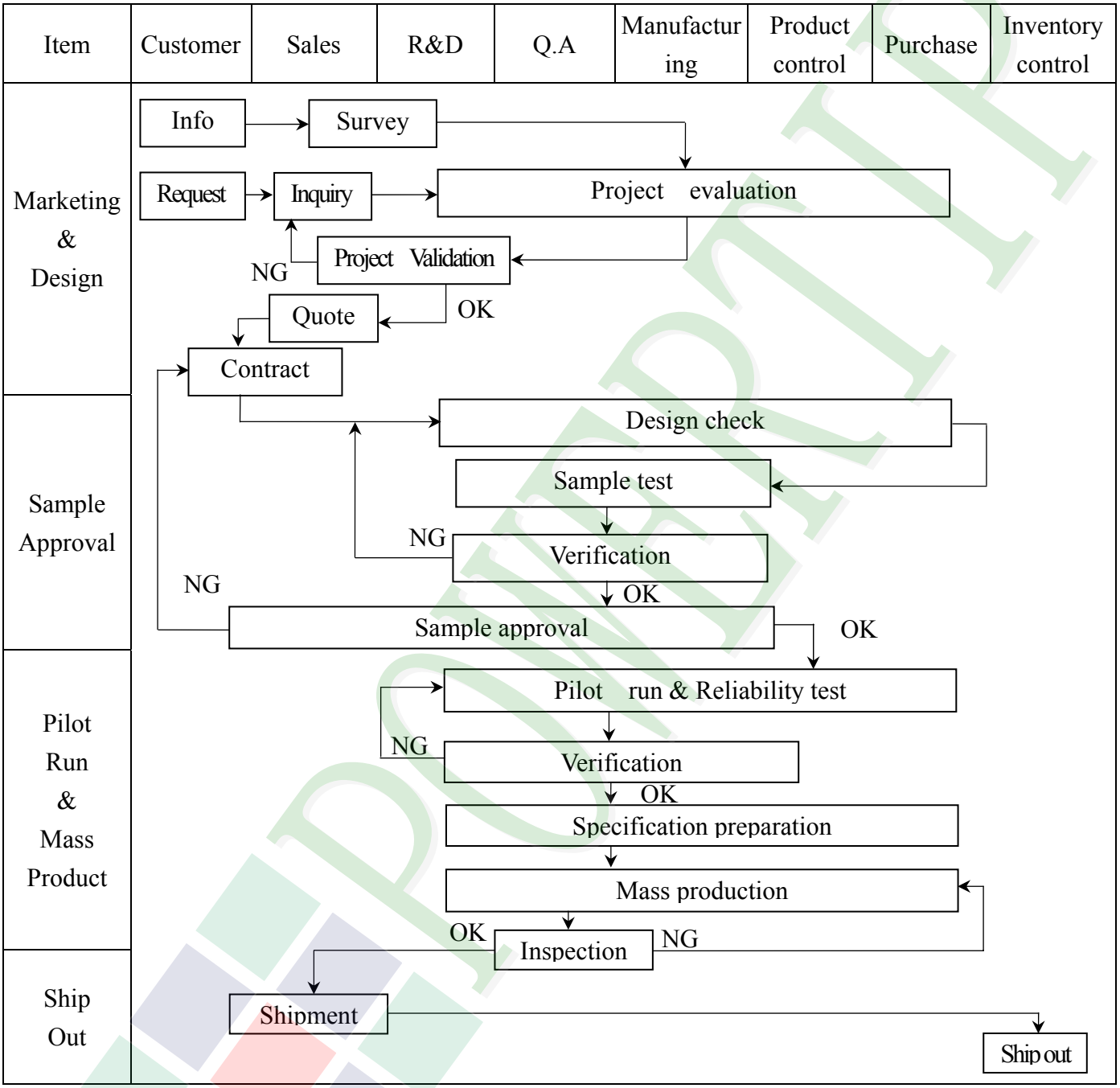
Note：The interface of this module can drive by digital 24-bit data.

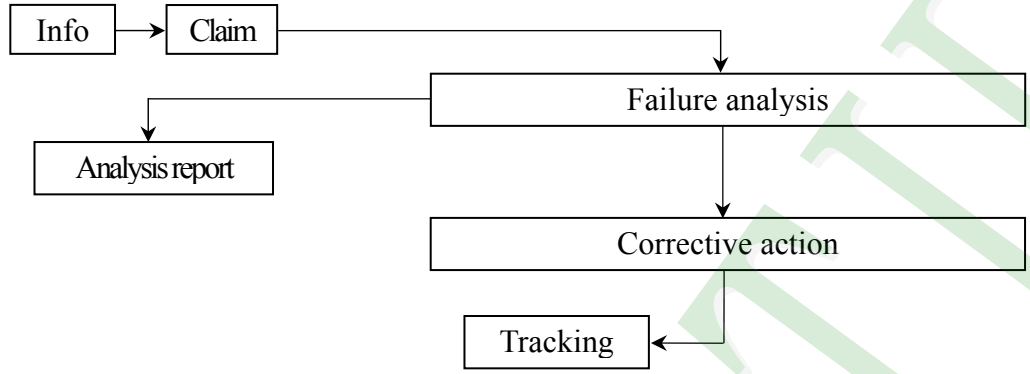



Data transaction timing in parallel RGB(24 bit)interface (SYNC mode)

# 3. QUALITY ASSURANCE SYSTEM

## 3.1 Quality Assurance Flow Chart



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

## 3.2. Inspection Specification

◆Scope: The document shall be applied to Sunlight Readable TFT-LCD Module for 3.5"~7.0" (Ver. 02).

◆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

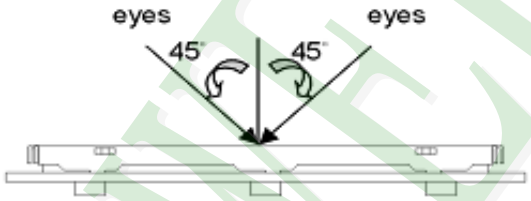
◆OUT Going Defect Level：Sampling.

◆Standard of the product appearance test：

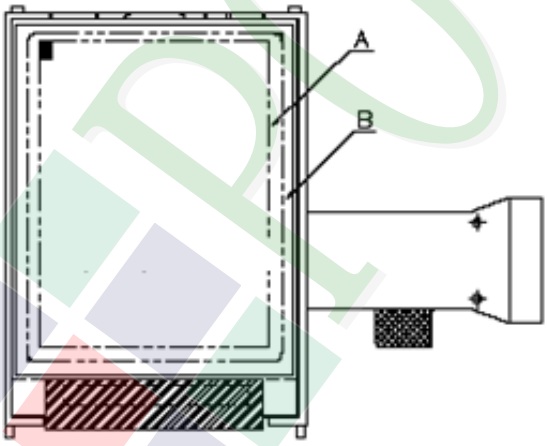
a. Manner of appearance test：

(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

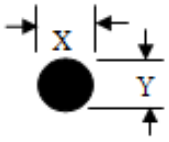
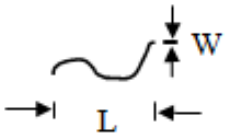
*B* area : Outside of viewing area

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

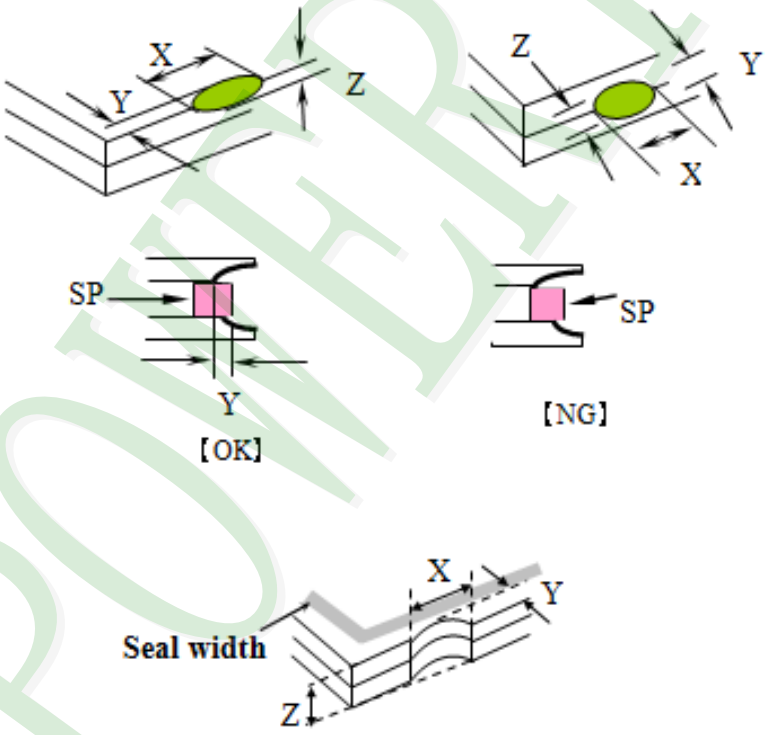
◆Specification For Sunlight Readable TFT-LCD Module 3.5" ~7.0" : (Ver. 02)

<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 Sunlight Readable TFT-LCD Module 3.5" ~7.0" : (Ver. 02)

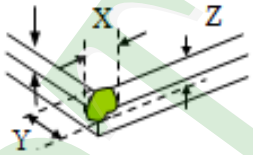
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>06</td><td>Black or white dot、scratch、contamination<br><br>Round type<br>  <br><br>Φ=(x+y)/2<br><br>Line type<br>  <br></td><td>6.1 Round type ( Non-display or display) :<br><table><tr><th rowspan="2">Dimension (diameter : 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="3">Ignore</td></tr><tr><td>0.25 < Φ ≦ 0.50</td><td>7</td></tr><tr><td>Φ > 0.50</td><td>0</td></tr></table><br>6.2 Line type( Non-display or display) :<br><table><tr><th colspan="2">Dimension</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>Length (L)</th><th>Width (W)</th><th>A area</th><th>B area</th></tr><tr><td>---</td><td>W ≦ 0.05</td><td>Ignore</td><td rowspan="3">Ignore</td></tr><tr><td>L ≦10.0</td><td>0.05 < W ≦ 0.10</td><td>4</td></tr><tr><td>L >10.0</td><td>W >0.10</td><td>0</td></tr></table><br>Can be wiped clean spot and particle, stain …etc negligible</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="4">Ignore</td></tr><tr><td>0.25 < Φ ≦ 0.50</td><td>6</td></tr><tr><td>0.50 < Φ ≦ 0.80</td><td>1</td></tr><tr><td>Φ > 0.80</td><td>0</td></tr></table></td><td>Minor</td></tr>
</table>

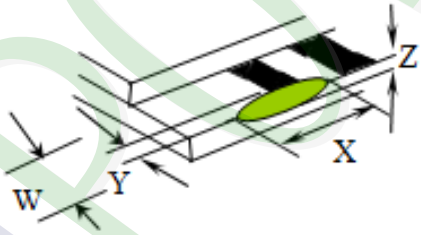
◆Specification For Sunlight Readable TFT-LCD Module 3.5" ~7.0" : (Ver. 02)

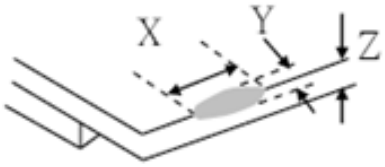
| NO | Item | Criterion | Level |
|---|---|---|---|
| 08 | The crack of glass | Symbols :<br>X : The length of crack<br>Y : The width of crack.<br>Z : The thickness of crack<br>W : terminal length<br>t : The thickness of glass<br>a : LCD side length<br>8. 1 General glass chip :<br>8. 1. 1 Chip on panel surface and crack between panels:<br>  | Minor |

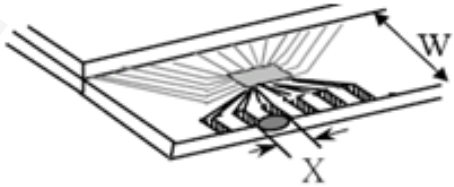
| X | Y | Z |
|---|---|---|
| ≦ a | Crack can't enter viewing area | ≦1/2 t |
| ≦ a | Crack can't exceed the half of SP width. | 1/2 t < Z ≦2 t |

◆Specification For Sunlight Readable TFT-LCD Module 3.5" ~7.0" : (Ver. 02)

<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>


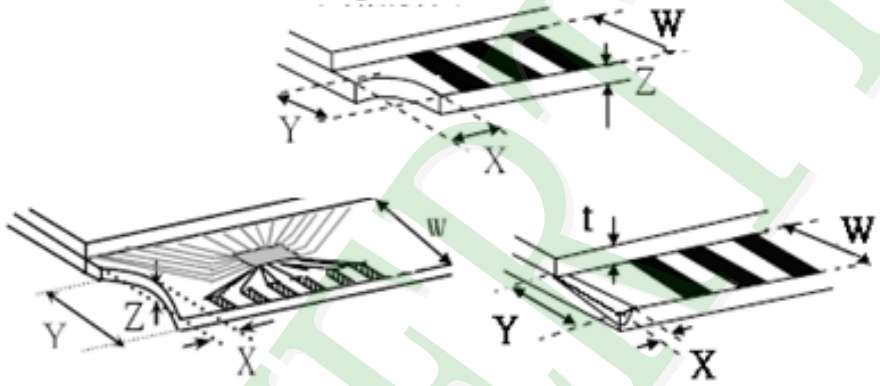
<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦1/5 a</td><td>Crack can't enter viewing area</td><td>Z ≦ 1/2 t</td></tr>
<tr><td>≦1/5 a</td><td>Crack can't exceed the half of SP width.</td><td>1/2 t < Z ≦ 2 t</td></tr>
</table>
</td><td rowspan="2">Minor</td></tr>
<tr><td>
8. 2 Protrusion over terminal :<br>
8. 2. 1 Chip on electrode pad :<br>


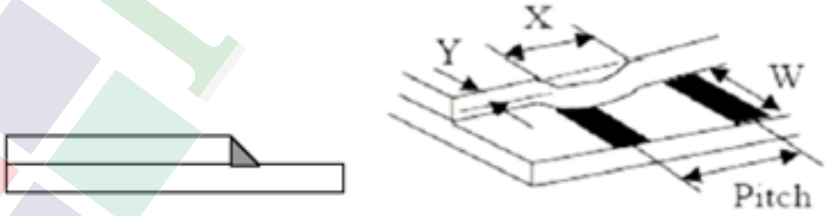




<table>
<tr><th></th><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>Front</td><td>≦ a</td><td>≦ 1/2 W</td><td>≦ t</td></tr>
<tr><td>Back</td><td>≦ a</td><td>≦ W</td><td>≦ 1/2 t</td></tr>
</table>
</td></tr>
</table>

◆Specification For Sunlight Readable TFT-LCD Module 3.5" ~7.0" : (Ver. 02)

<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<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. 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>

◆Specification For Sunlight Readable TFT-LCD Module 3.5″ ~7.0″ : (Ver. 02)

| NO | Item | Criterion | Level |
|---|---|---|---|
| 09 | Backlight elements | 9. 1 Backlight can't work normally. | Major |
| | | 9. 2 Backlight doesn't light or color is wrong. | Major |
| | | 9. 3 Illumination source flickers when lit. | Major |
| 10 | General appearance | 10. 1 Pin type、quantity、dimension must match type in structure diagram. | Major |
| | | 10. 2 No short circuits in components on PCB or FPC . | Major |
| | | 10. 3 Parts on PCB or FPC must be the same as on the production characteristic chart .There should be no wrong parts , missing parts or excess parts. | Major |
| | | 10. 4 Product packaging must the same as specified on packaging specification sheet. | Minor |
| | | 10. 5 The folding and peeled off in polarizer are not acceptable. | Minor |
| | | 10. 6 The PCB or FPC between B/L assembled distance(PCB or FPC ) is ≦1. 5 mm. | Minor |

# 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 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 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 / High Humidity 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 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>5</td><td>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 +/-<br>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 (Packaged)</td><td>1. Sine wave 10 55 Hz frequency (1 min/sweep)<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 (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 1time</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°C 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°C ± 5°C 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.

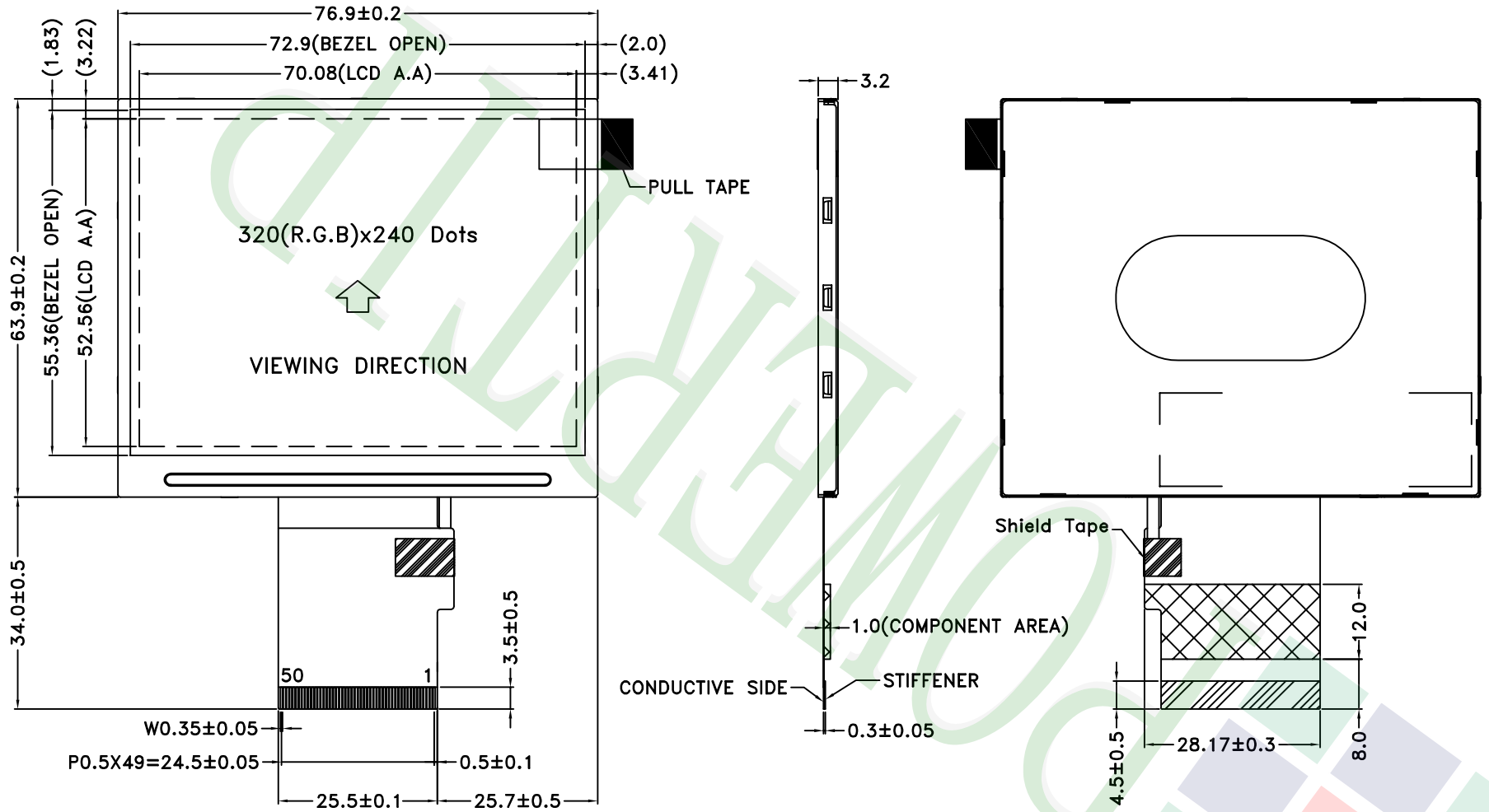
## 5.4 TERMS OF WARRANTY

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.




NOTES:

1. LCD TYPE: a-Si TFT
2. LCD DISPLAY:POSITIVE/ TRANSMISSIVE
3. The tolerance unless classified ±0.2mm
2. 4. FPC Matching Connector: Kyocera 08 6282 050 340 829+ or EQUIVALENT

| REV | REV BY | REVISER | DATE |
|---|---|---|---|
| 007 | | | |
| 006 | | | |
| 005 | | | |
| 004 | | | |
| 003 | | | |
| 002 | MODIFY NOTE | Stone | 2014/03/31 |
| 001 | NEW DRAWING | Stone | 2013/08/14 |

PART NO: PH320240T023-IBG

DRAWING NAME : LMD-PH320240T023-IBG

TITLE: LCD MODULE DRAWING

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

| | | | | | |
|---|---|---|---|---|---|
| Design | Stone | (3) | Surface | | |
| Check | Sam | Unit | MM | Material | |
| Approve | Oliver | Scale | FIT | Thickness | |
| | | Page | 1/2 | Quantity | |

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

| Ver.001 | |
|---|---|
| Documents NO. | PKG-PH320240T023-IBG |

# LCM包裝規格書
## LCM Packaging Specifications (For Tray)

| Approve | Check | Contact |
|---|---|---|
| Oliver | Sam | Stone |

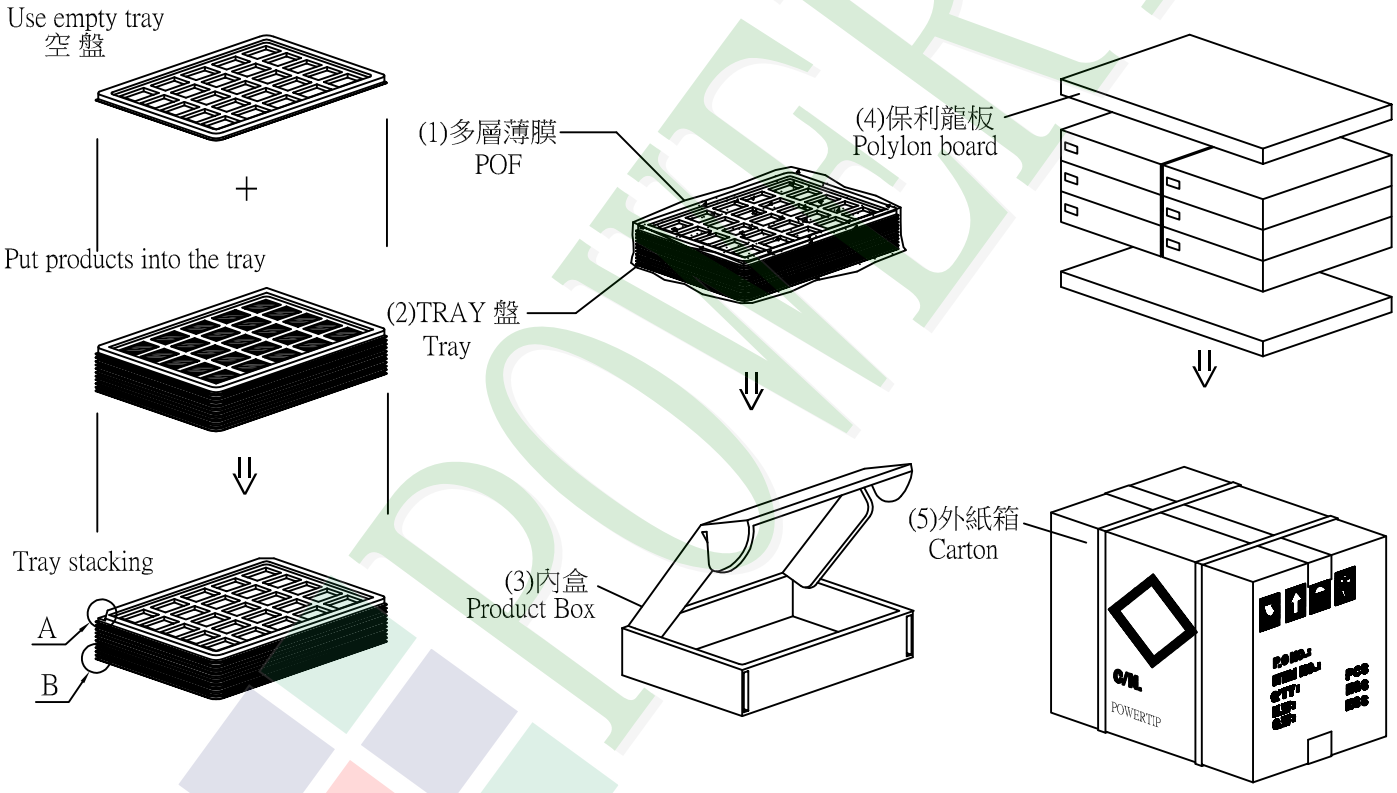
1.包裝材料規格表 (Packaging Material) : (per carton)

| No. | Item | Model | Dimensions (mm) | 1Pcs Weight | Quantity | Total Weight |
|---|---|---|---|---|---|---|
| 1 | 成品 (LCM) | PH320240T023-IBG | 76.9 X 63.9 | 0.032 | 288 | 9.216 |
| 2 | 多層薄膜(1)POF | OTFILM0BA03ABA | 19"X350X0.015 | —— | 6 | —— |
| 3 | TRAY 盤 (2)Tray | TY32024001TZBA | 352 X 260 X 10.8 | 0.1 | 54 | 5.4 |
| 4 | 內盒(3)Product Box | BX36627063ABBA | 393 X 274 X 68 | 0.2692 | 6 | 1.6152 |
| 5 | 保利龍板(4)Polylon board | OTPLB00PL08ABA | 550 X 393 X 20 | 0.0284 | 2 | 0.0568 |
| 6 | 外紙箱(5)Carton | BX57041027CCBA | 570 X 410 X 265 | 1.4208 | 1 | 1.4208 |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

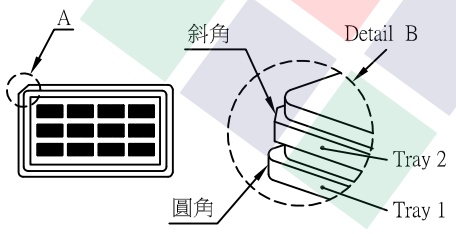
2.一 整箱總重量 (Total LCD Weight in carton ) : 17.71 Kg±10%

3.單箱數量規格表 (Packaging Specifications and Quantity) :

| | | | | | |
|---|---|---|---|---|---|
| (1)LCM quantity per box : no per tray | 6 | x no of tray | 8 | = | 48 |
| (2)Total LCM quantity in carton : quantity per box | 48 | x no of boxes | 6 | = | 288 |




## 特 記 事 項 (REMARK)




5.TRAY盤相疊時,需旋轉180度,請詳見B視圖
Rotate tray 180 degrees and place on top of stack.
Check the tray stack using Fig. B.