






# SPECIFICATIONS

**CUSTOMER** : \_\_\_\_\_  
**MODEL NO.** : **GFT035EA320240Y**  
**VERSION** : **G**  
**DATE** : **2023.03.06**  
**CERTIFICATION** : **ROHS**

| Customer Sign | Approved By   | Prepared By  | Prepared By   |
|---------------|---|--|---|
|               |  |  |  |

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### Revision Record

| Data(y/m/d) | Ver. | Description                    | page  |
|-------------|------|--------------------------------|-------|
| 2009.04.01  | A    | New                            |       |
| 2009.06.15  | B    | Add CONNECT DRAWING            | 32    |
| 2009.10.29  | C    | MODIFY OUTLINE DRAWING         | 31    |
| 2011.02.23  | D    | Modify touch panel information | 10-11 |
| 2012.03.30  | E    | Modify the IC to HX8238-D      | 4     |
| 2017.07.26  | F    | 修改公司抬頭、格式統一                    |       |
| 2023.03.06  | G    | 更新公司抬頭認證圖示                     |       |
|             |      |                                |       |
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## 1. SPECIFICATIONS

### 1.1 Features

#### Main LCD panel

| Item                        | Standard Value                        |
|-----------------------------|---------------------------------------|
| Display Type                | 320( R , G , B ) * 240 Dots           |
| LCD Type                    | Normally white, Transmissive type     |
| Screen size(inch)           | 3.5 inch                              |
| Viewing Direction           | 6 O'clock                             |
| Color configuration         | R.G.B-Strip                           |
| Backlight                   | LED                                   |
| Interface                   | Digital 24-bits RGB                   |
| Other(controller/driver IC) | Himax : HX8238-D                      |
| ROHS                        | This product conforms the ROHS of ptc |

### 1.2 Mechanical Specifications

| Item              | Standard Value                    | Unit |
|-------------------|-----------------------------------|------|
| Outline Dimension | 76.9 (W) * 63.9 (L) * 4.0(H)(MAX) | mm   |

#### LCD panel

| Item         | Standard Value        | Unit |
|--------------|-----------------------|------|
| Viewing Area | 72.88 (W) * 55.36 (L) | mm   |
| 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 | VDDIO           | VSS=0     | -0.3 | 4.0  | V    |
| Operating Temperature       | T <sub>OP</sub> | -         | -20  | 70   | °C   |
| Storage Temperature         | T <sub>ST</sub> | -         | -30  | 80   | °C   |

### 1.4 DC Electrical Characteristics

| Module                        |                   | VSS = 0V, Ta = 25°C         |      |        |      |      |
|-------------------------------|-------------------|-----------------------------|------|--------|------|------|
| Item                          | Symbol            | Condition                   | Min. | Typ.   | Max. | Unit |
| Power Supply Voltage1         | VDDIO             | -                           | 3.0  | 3.3    | 3.6  | V    |
| V <sub>COM</sub> High Voltage | V <sub>COMH</sub> | -                           | 2.5  | (3.6)  | -4.5 | V    |
| V <sub>COM</sub> Low Voltage  | V <sub>COML</sub> | -                           | -3   | (-2.4) | 0    | V    |
| Supply Current                | IDD               | VDD=3.3V<br>Pattern=black*1 | -    | 5.5    | 8.5  | mA   |

Note1: Maximum current display



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### 1.5 Optical Characteristics

TFT LCD panel

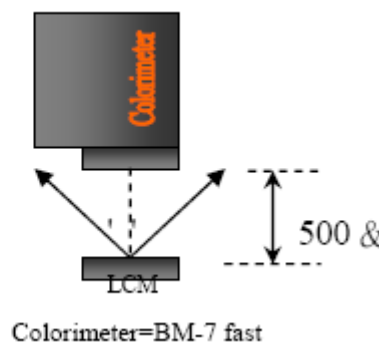
VDDIO=3.3V, Ta=25°C

| Item  | Symbol | Condition            | Min.  | Typ.  | Max.  | Unit              | -     |
|---|--------|----------------------|-------|-------|-------|-------------------|-------|
| Response time   | Tr+Tf  | Ta=25°C<br>ΘX, ΘY=0° | -     | 50    | 70    | ms                | Note2 |
| Viewing angle   | Top    | CR ≥ 10              | -     | 45    | -     | Deg.              | Note4 |
|   | Bottom |                      | -     | 50    | -     |                   |       |
|   | Left   |                      | -     | 50    | -     |                   |       |
|   | Right  |                      | -     | 50    | -     |                   |       |
| Contrast ratio  | CR     | Ta=25°C<br>ΘX, ΘY=0° | 200   | 250   | -     | -                 | Note3 |
| Color of CIE<br>Coordinate<br>(With B/L&T/P)                    | White  | X                    | 0.244 | 0.294 | 0.344 | -                 | Note1 |
|   |        | Y                    | 0.259 | 0.309 | 0.359 |                   |       |
|   | Red    | X                    | 0.577 | 0.627 | 0.677 |                   |       |
|   |        | Y                    | 0.310 | 0.360 | 0.410 |                   |       |
|   | Green  | X                    | 0.282 | 0.332 | 0.382 |                   |       |
|   |        | Y                    | 0.506 | 0.556 | 0.606 |                   |       |
|   | Blue   | X                    | 0.091 | 0.141 | 0.191 |                   |       |
|   |        | Y                    | 0.040 | 0.090 | 0.140 |                   |       |
| Average Brightness<br>Pattern=white display<br>(With B/L&T/P)*1 | IV     | IF=20mA              | 180   | 200   | -     | cd/m <sup>2</sup> |       |
| Uniformity<br>(With B/L&T/P)*2                                  | ΔB     | IF=20mA              | 70    | -     | -     | %                 |       |



Note1:

- \*1 :  $\Delta B = B(\min) / B(\max) * 100\%$
- \*2 : Measurement Condition for Optical Characteristics :
  - a : Environment:  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  /  $60 \pm 20\% \text{R.H.}$ , no wind , dark room below 10 Lux at typical lamp current and typical operating frequency.
  - b : Measurement Distance :  $500 \pm 50 \text{ mm}$  , ( $\Theta = 0^{\circ}$  )
  - c : Equipment : TOPCON BM-7 fast , (field  $1^{\circ}$ ) , after 10 minutes operation .
  - d : The uncertainty of the C.I.E coordinate measurement  $\pm 0.01$  , Average Brightness  $\pm 4\%$



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

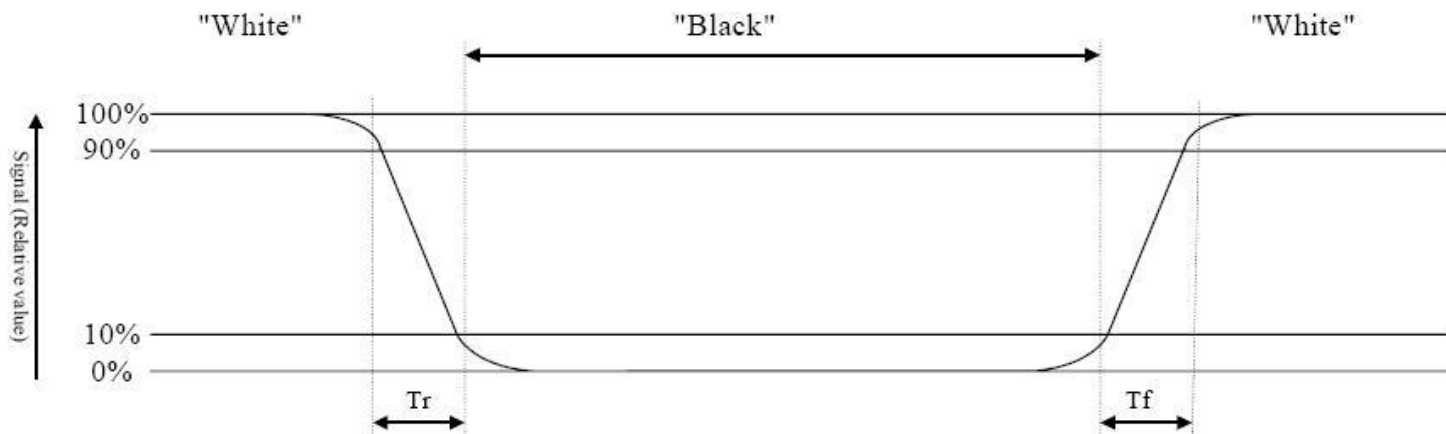
Note2: Definition of response time :

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:

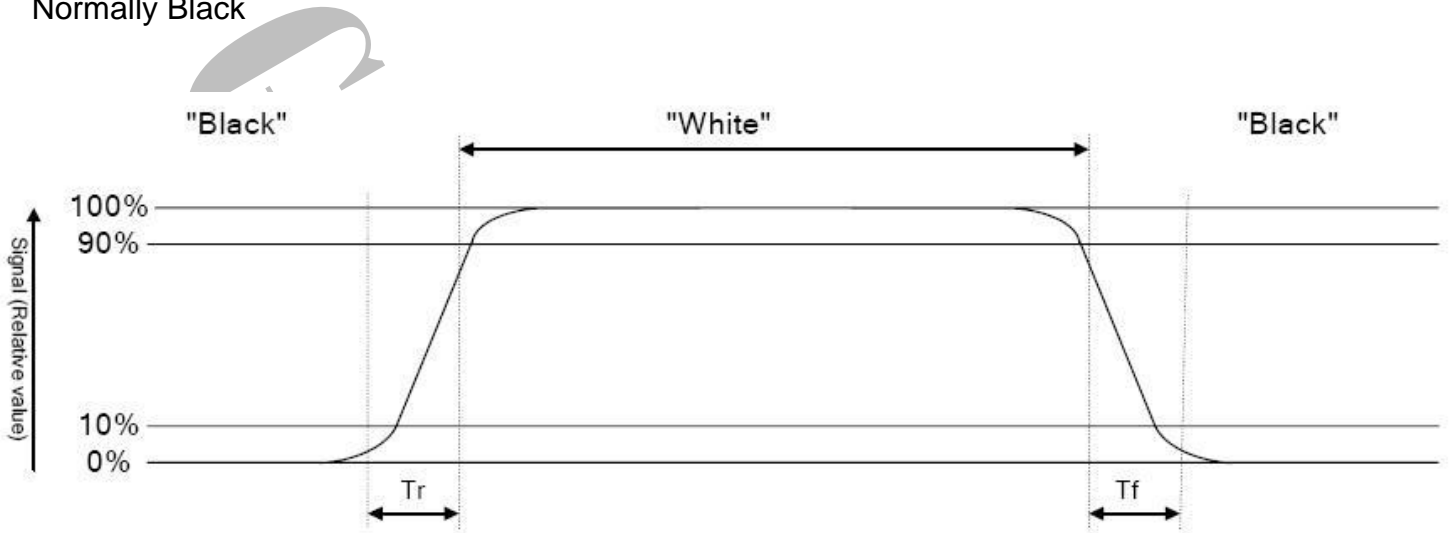
Normally White





GFT035EA320240Y

Normally Black



Note3 : Definition of contrast ratio :

Contrast ratio is calculated with the following formula

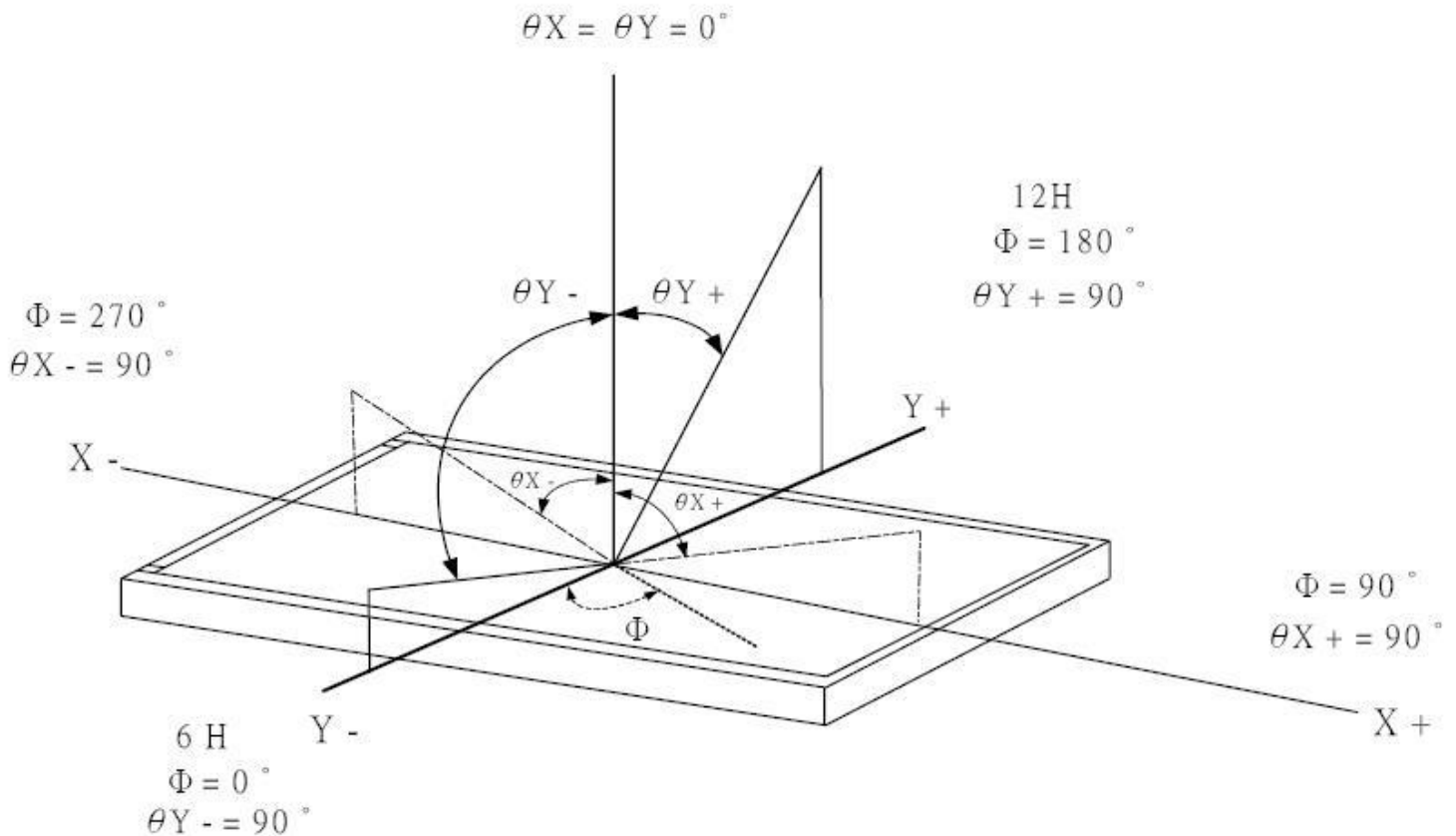
Photo detector output when LCD is at "White" state

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

Photo detector output when LCD is at "Black" state

Note4 : Definition of viewing angle :

Refer to figure as below :







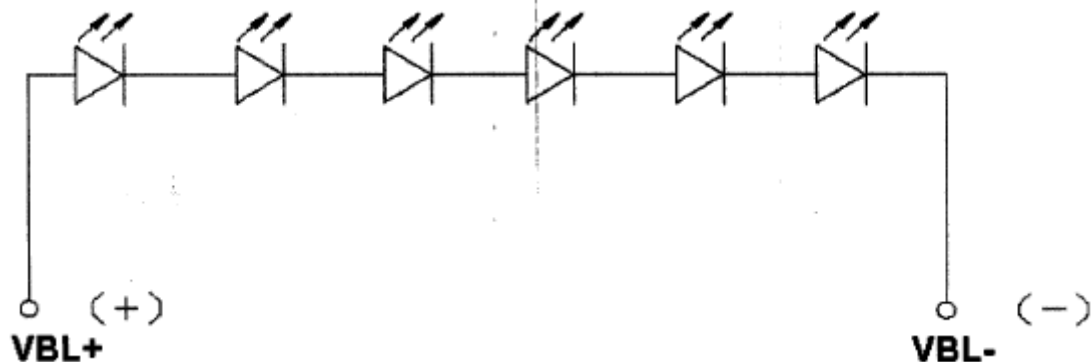
## 1.6 Backlight Characteristics

### Maximum Ratings

| Item              | Symbol | Conditions | Min. | Max.  | Unit |
|-------------------|--------|------------|------|-------|------|
| Forward Current   | IF     | Ta=25°C    | -    | 30    | mA   |
| Reverse Voltage   | VR     | Ta=25°C    | -    | 5     | V    |
| Power Dissipation | PD     | Ta=25°C    | -    | 0.720 | W    |

### Electrical / Optical Characteristics

| Item                                  | Symbol | Conditions | Min. | Typ. | Max. | Unit              |
|---------------------------------------|--------|------------|------|------|------|-------------------|
| Forward Voltage                       | VF     | IF=20mA    | 18.0 | 19.8 | 21.0 | V                 |
| Average Brightness<br>(Without LCD)   | IV     |            | 3000 | 3300 | -    | cd/m <sup>2</sup> |
| CIE Color Coordinate<br>(Without LCD) | X      |            | -    | 0.30 | -    | -                 |
|                                       | Y      |            | -    | 0.30 | -    |                   |
| Color                                 |        | White      |      |      |      |                   |





## 1.7 Touch Panel

### 1) Product type

- Resistance Type , Analogy Type
- Film/Glass Type

### 2) Criteria of Materials

#### 2.1 Uper Electrode

- ITO FILM Base material: ITO FILM
- Type: anti-glare and anti-newton ring
- Thickness:  $188\pm 10\mu\text{m}$
- Resistance:  $400\pm 100\Omega/\text{sq}$

#### 2.2 Lower Electrode

- Base material: ITO GLASS
- Thickness:  $0.7\pm 0.10\text{mm}$
- Resistance :  $400\pm 100\Omega/\text{sq}$

#### 2.3 Connector Tail

- type : FPC ( double side )

### 3) Characteristics

#### 3.1 Mechanical characteristics

- Outside dimension :  $76.44\pm 0.2\text{ mm}\times 61.46\pm 0.2\text{ mm}$
- View area :  $72.00\text{ mm}\times 55.00\text{mm}$
- Thickness :  $1.15\pm 0.10\text{mm}$
- Input method : Pen
- Operating force : 10-100g

Shape of pen end:  $\varnothing 0.3\text{mm}\sim \varnothing 0.5\text{mm}$

- Hardness of surface :

Hard surface :  $> 3\text{H}$  [ JIS K 5400 ]

- Heat seal intensity: X $>2.0\text{kgf}$  Y $>500\text{gf}$  Z $>200\text{gf}$

#### 3.2 Electrical characteristics

- Operating Voltage : DC5V
- Loop resistance: X :  $350\text{-}800\Omega$  Y :  $150\text{-}500\Omega$
- linearity :  $\leq \pm 15\%$
- Insulation resistance:  $> 10\text{M}\Omega$  At DC 25V.
- Insulation ability:  $\geq 60\text{sec.}$  At DC 25V.
- Chatting times:  $< 10\text{ms}$

#### 3.3 Optical characteristics

- Total Transmittance:  $> 80\%$  [JISK7105]



#### 4) Processing Environment :

- Operating Temperature:  $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$
- Operating Humidity:  $\leq 90\% \text{RH}$
- Storage Temperature:  $-30^{\circ}\text{C} \sim +80^{\circ}\text{C}$
- Storage Humidity:  $< 90\% \text{RH}$

#### 5) Environmental test

- High temperature :  $+70^{\circ}\text{C}$  , 120 hr.
- Low temperature :  $-20^{\circ}\text{C}$  , 120 hr.
- High temp./high humidity test:  $70^{\circ}\text{C} \& 90\%$ , 120hr.
- High Low temperature test:  $-30^{\circ}\text{C}$  30min/ $+80^{\circ}\text{C}$  30min
- Notes life  $\geq 1 \times 10^5$  words min
- Input life  $\geq 10^6$  times min



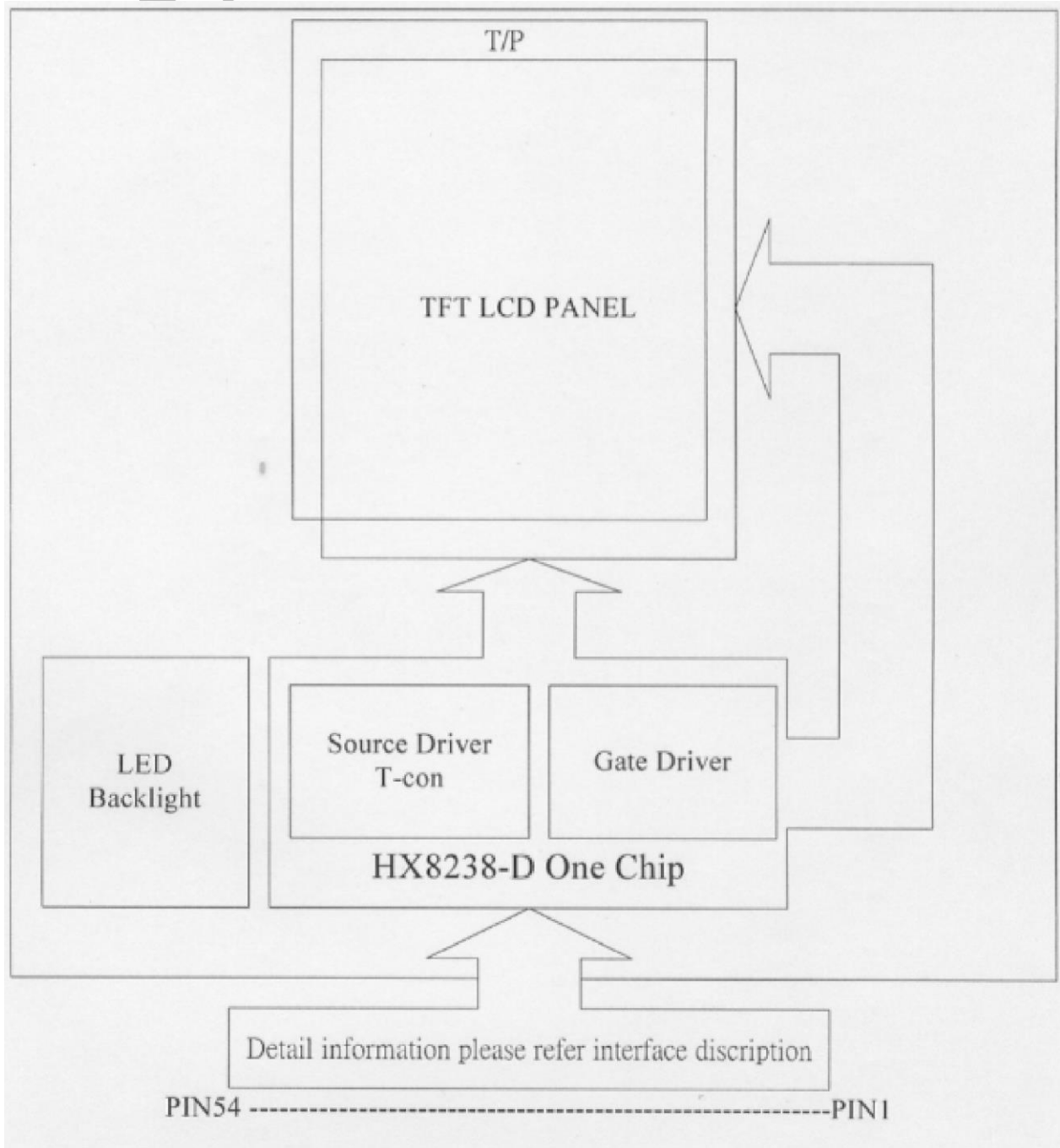
## 2. MODULE STRUCTURE

### 2.1 Counter Drawing

#### 2.1.1 LCM Mechanical Diagram

\*See Appendix

#### 2.1.2 Block Diagram





## 2.2 Interface Pin Description

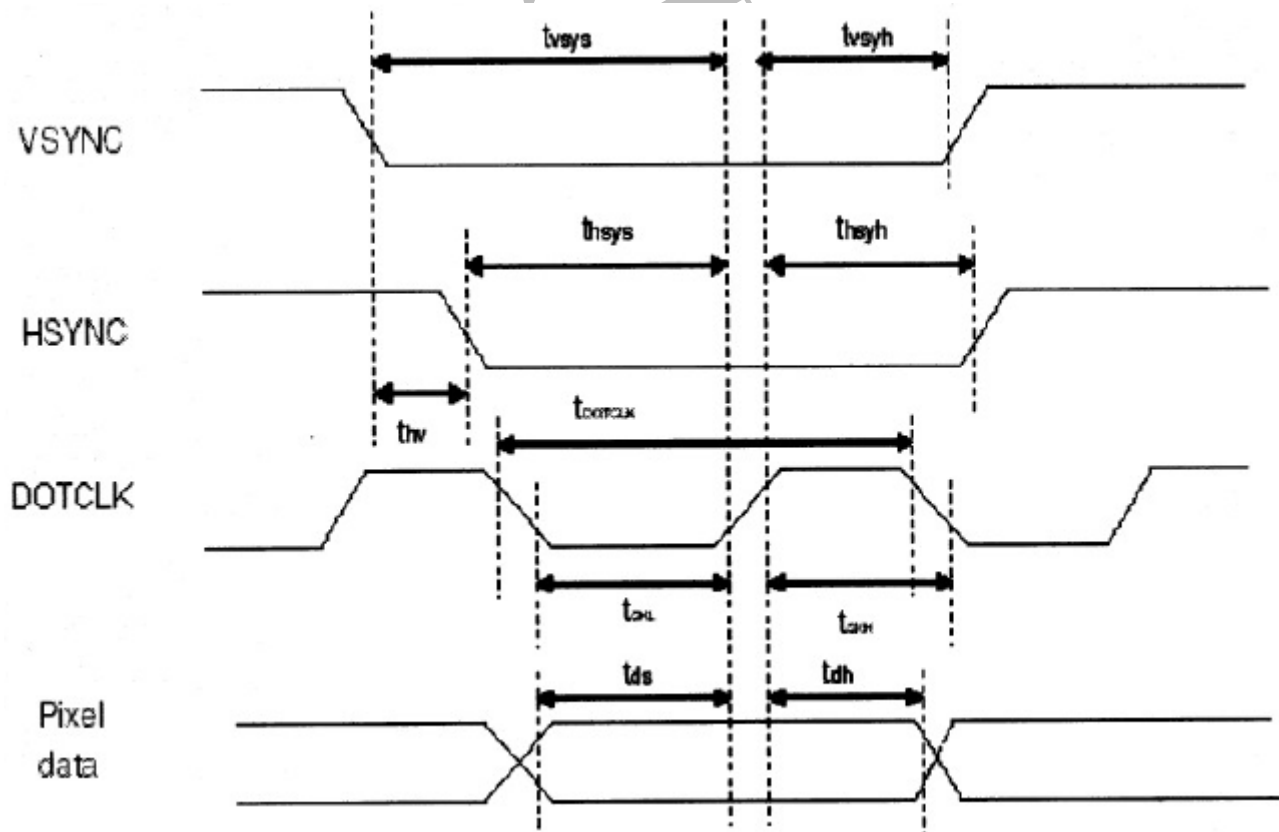
| Pin NO. | Symbol | Function   |
|---------|--------|--|
| 1       | VBL-   | Power Supply for LED Backlight cathode input     |
| 2       | VBL-   | Power Supply for LED Backlight cathode input     |
| 3       | VBL+   | Power Supply for LED Backlight cathode input     |
| 4       | VBL+   | Power Supply for LED Backlight cathode input     |
| 5       | NC     | No used, Must be open                            |
| 6       | /RESET | Hardware reset                                   |
| 7       | NC     | Not used, Must be open.(Output Pin, POL output.) |
| 8       | Y1     | Touch panel TOP                                  |
| 9       | X1     | Touch panel RIGHT                                |
| 10      | Y2     | Touch panel BOTTOM                               |
| 11      | X2     | Touch panel LEFT                                 |
| 12      | B0     | Blue data bit 0                                  |
| 13      | B1     | Blue data bit 1                                  |
| 14      | B2     | Blue data bit 2                                  |
| 15      | B3     | Blue data bit 3                                  |
| 16      | B4     | Blue data bit 4                                  |
| 17      | B5     | Blue data bit 5                                  |
| 18      | B6     | Blue data bit 6                                  |
| 19      | B7     | Blue data bit 7                                  |
| 20      | G0     | Green data bit 0                                 |
| 21      | G1     | Green data bit 1                                 |
| 22      | G2     | Green data bit 2                                 |
| 23      | G3     | Green data bit 3                                 |
| 24      | G4     | Green data bit 4                                 |
| 25      | G5     | Green data bit 5                                 |
| 26      | G6     | Green data bit 6                                 |
| 27      | G7     | Green data bit 7                                 |
| 28      | R0     | Red data bit 0                                   |
| 29      | R1     | Red data bit 1                                   |
| 30      | R2     | Red data bit 2                                   |
| 31      | R3     | Red data bit 3                                   |
| 32      | R4     | Red data bit 4                                   |
| 33      | R5     | Red data bit 5                                   |
| 34      | R6     | Red data bit 6                                   |
| 35      | R7     | Red data bit 7                                   |
| 36      | HSYNC  | Horizontal sync input                            |
| 37      | VSYNC  | Vertical sync input                              |
| 38      | DOTCLK | Dot data clock                                   |
| 39      | VDDIO  | Digital power                                    |
| 40      | VDDIO  | Digital power                                    |
| 41      | VDDIO  | Digital power                                    |
| 42      | VDDIO  | Digital power                                    |



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|    |       |   |
|----|-------|---|
| 43 | SPENA | Serial port data enable signal  |
| 44 | NC    | Not used , Must be open   |
| 45 | NC    | Not used , Must be open(Output Pin, VGL, Gate off power.)   |
| 46 | NC    | Not used , Must be open   |
| 47 | NC    | Not used , Must be open(Output Pin, VGH, Gate off power.)   |
| 48 | SHUT  | Display shut down pin to put the drive into sleep mode. A sharp falling edge must be provided to such pin when IC power on.<br>Internal pull low<br>-Connect to VDDIO for sleep mode<br>-Connect to VSS for normal operating mode<br>(Refer to Power Up Sequence) |
| 49 | SPCLK | Serial data clock   |
| 50 | SPDAT | Serial data   |
| 51 | NC    | Not used , Must be open (Output Pin , VCOM power.)  |
| 52 | ENB   | Data enable control   |
| 53 | VSS   | Ground  |
| 54 | VSS   | Ground  |

## 2.3 Timing Characteristics





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| 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      |
| Please 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.

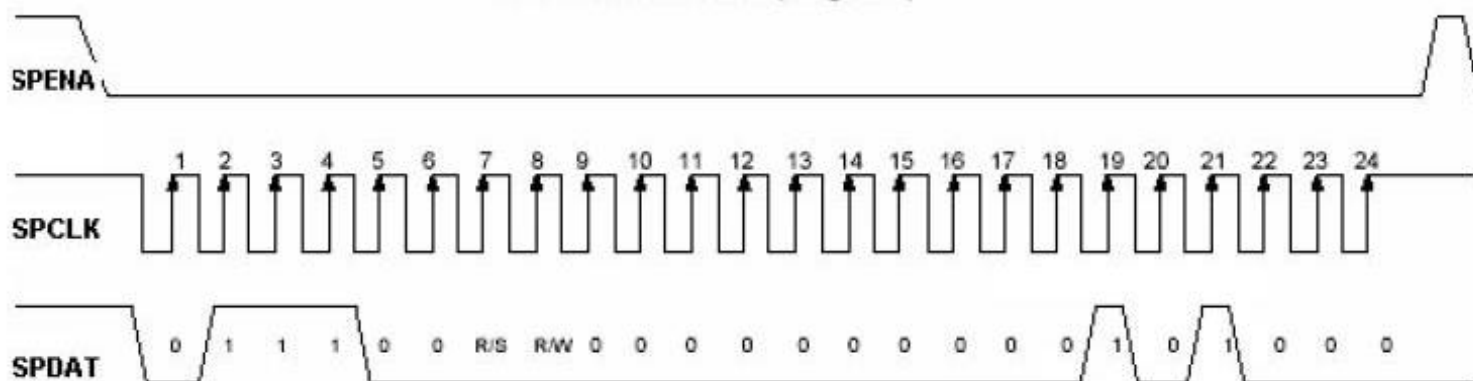
Pixel timing

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

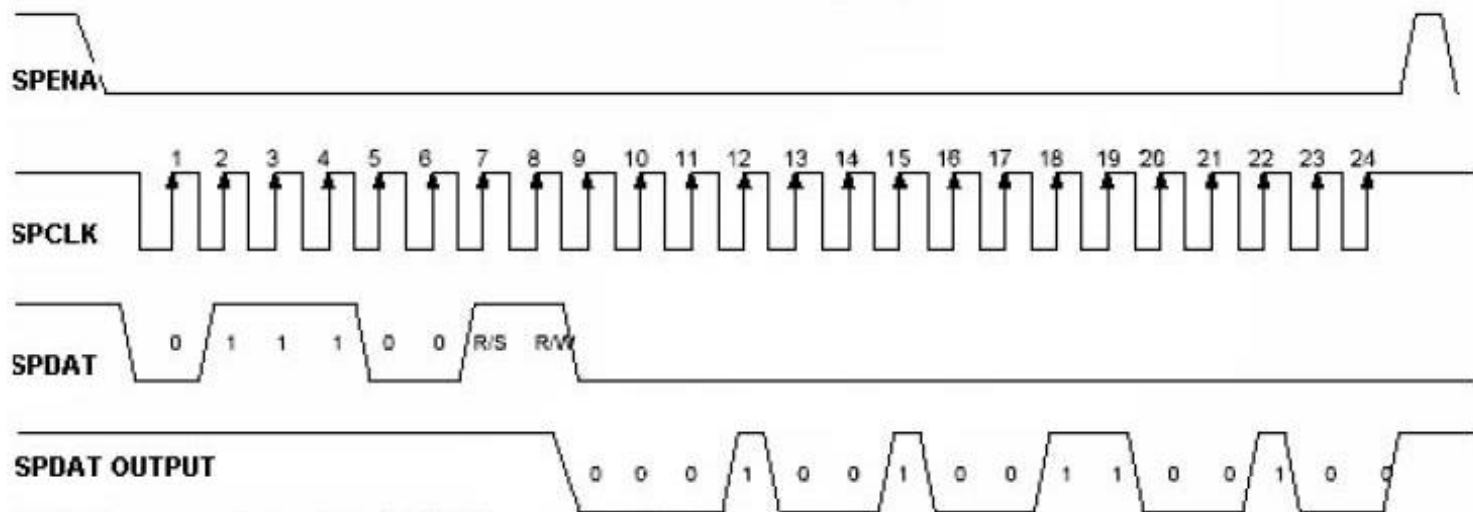
First Transmission (Register)



### 2.3.1 SPI Read



Second Transmission (Data)



Note: The example Read "0x1264h" from register R28h.

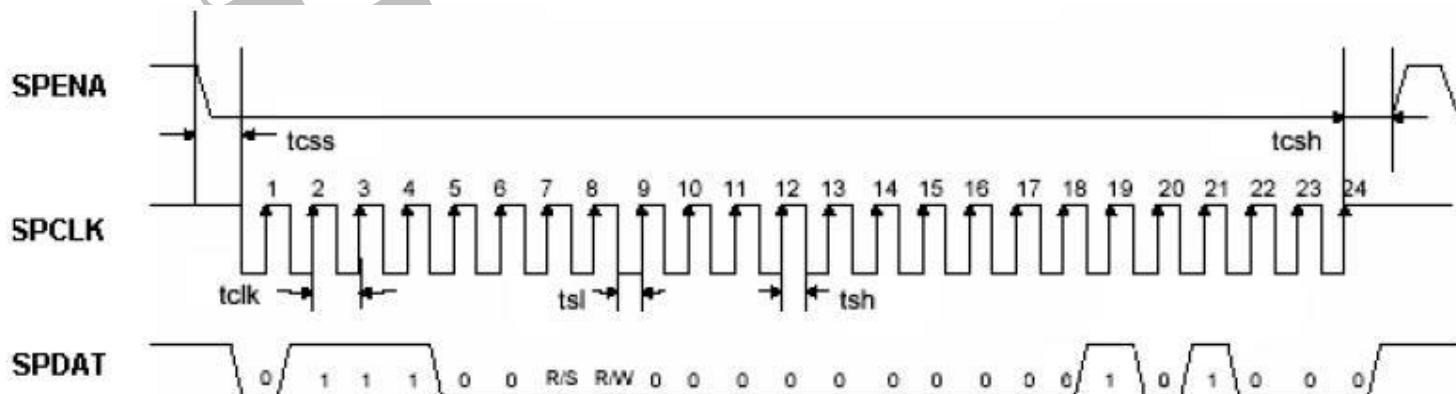
SPI interface Timing Diagram & Read SPI Example



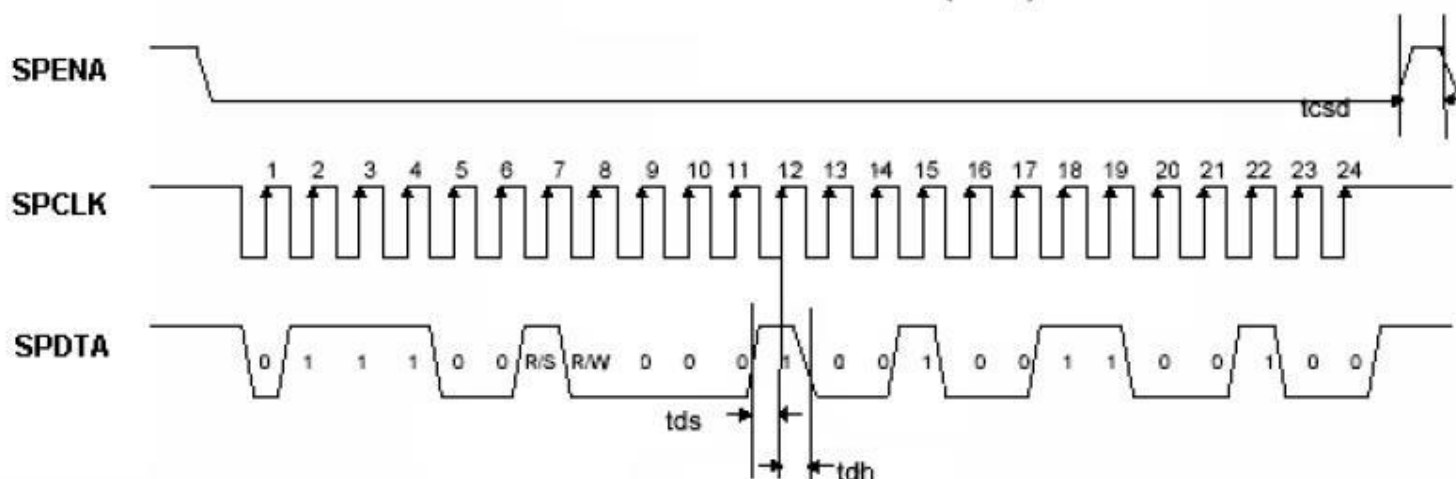


## 2.3.2 SPI Write

First Transmission (Register)



Second Transmission (Data)



Note: The example Read "0x1264h" from register R28h.

SPID connected to VSS

### SPI interface Timing Diagram & Write SPI Example

## 2.3.3 SPI Timing Table

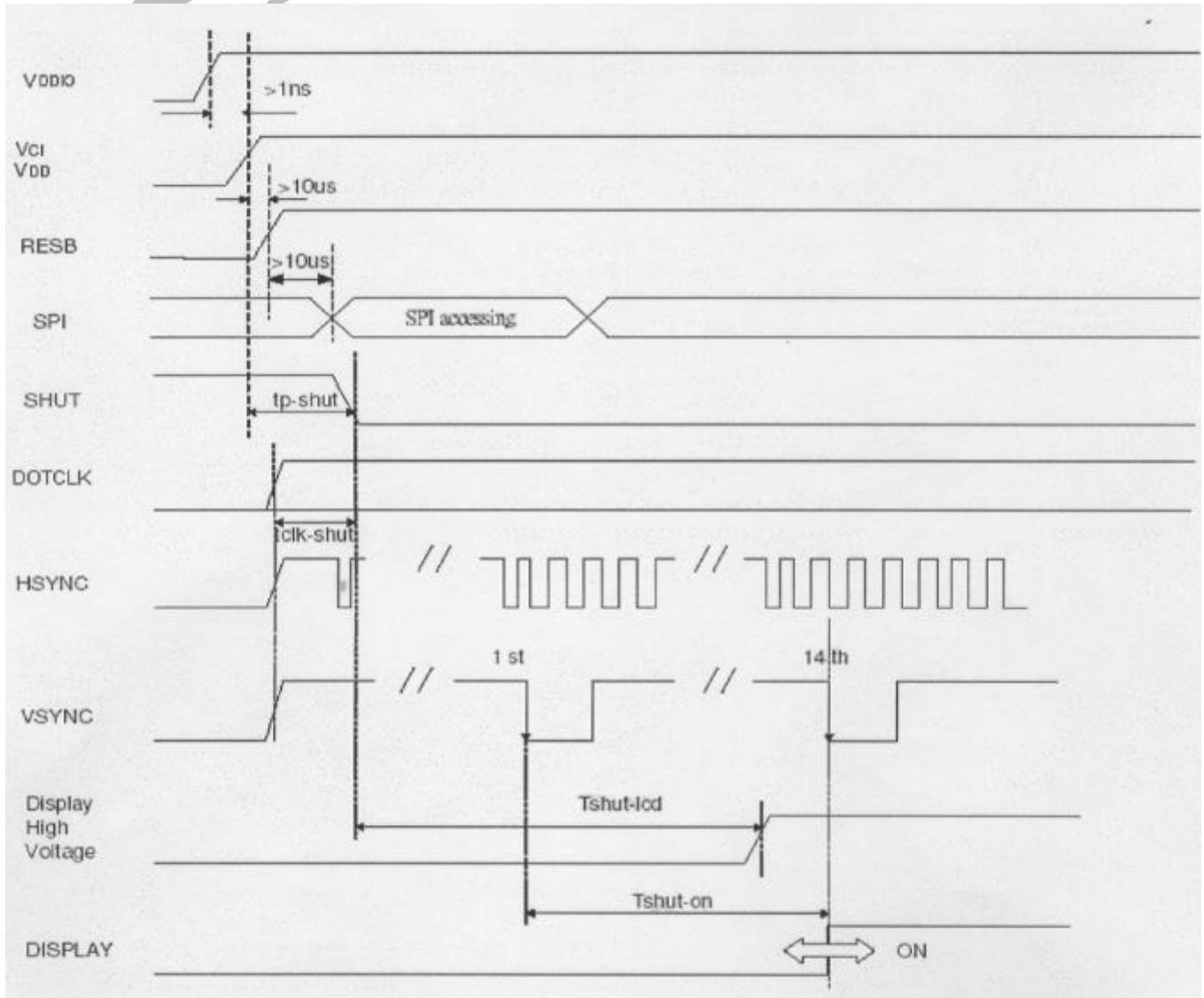
| Characteristics             | Symbol | Min | Typ | Max | Unit |
|-----------------------------|--------|-----|-----|-----|------|
| Serial Clock Frequency      | fclk   | -   | -   | 20  | MHz  |
| Serial Clock Cycle Time     | tclk   | 50  | -   | -   | ns   |
| Clock Low Width             | tsl    | 25  | -   | -   | ns   |
| Clock High Width            | tsh    | 25  | -   | -   | ns   |
| Clock Rising Time           | trs    | -   | -   | 30  | ns   |
| Clock Falling Time          | tfl    | -   | -   | 30  | ns   |
| Chip Select Setup Time      | tcss   | 0   | -   | -   | ns   |
| Chip Select Hold Time       | tcsh   | 10  | -   | -   | ns   |
| Chip Select High Delay Time | tcsd   | 20  | -   | -   | ns   |
| Data Select Time            | tds    | 5   | -   | -   | ns   |
| Data Hold Time              | tdh    | 10  | -   | -   | ns   |

### SPI timing



## 2.4 Power Sequence

### 2.4.1 Power up sequence



| Characteristics  | Symbol    | Min | Typ | Max   | Unit  |
|--|-----------|-----|-----|-------|-------|
| VDDD/VDDIO on to falling edge of SHUT                            | tp-shut   | 1   | -   | -     | us    |
| DOTCLK   | tclk-shut | 1   | -   | -     | clk   |
| Falling edge of SHUT to LCD power on                             | tshut-lcd | -   | -   | 128   | ms    |
| Falling edge of SHUT to display start                            | tshut-on  | -   | -   | 14    | frame |
| - 1 line : 408 clk<br>- 1 frame : 262 line<br>- DOTCLK = 6.5 MHz |           | -   | 166 | 232.4 | ms    |

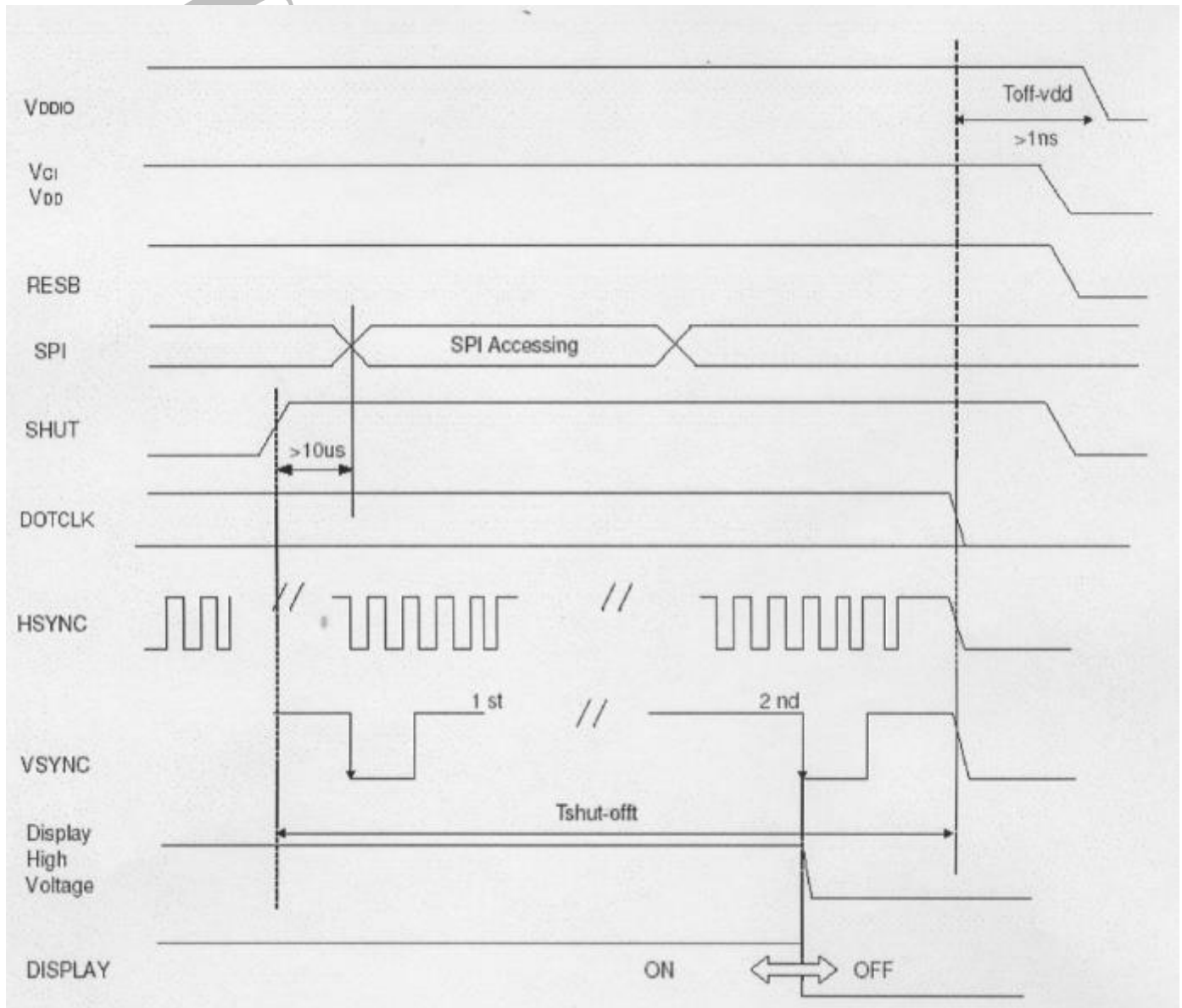
**Note** : It is necessary to input DOTCLK before the falling edge of SHUT.

Display starts at 10th falling edge of VSTNC after the falling edge of SHUT.

Note : 1、The voltage of VDD be boosted from VDDIO.



## 2.4.2 Power down sequence



| Characteristics                            | Symbol   | Min  | Typ | Max | Unit  |
|--|----------|------|-----|-----|-------|
| Rising edge of SHUT to display off         | tshut-on | 2    | -   | -   | frame |
| - 1 line : 408 clk                         |          | 33.4 | -   | -   | ms    |
| - 1 frame : 262 line<br>- DOTCLK = 6.5 MHz |          |      | -   | -   | -     |
| Input-signal-off to VDDD/VDDIO off         | toff-vdd | 1    | -   | -   | us    |

**Note:** DOTCLK must be maintained at least 2 frames after the rising edge of SHUT.

Display become off at the 2nd falling edge of VSTNC after the falling edge of SHUT.

If RESET signal is necessary for power down, provide it after the 2-frames-cycle of the SHUT period.

Note : 1 、 The voltage of VDD be boosted from VDDIO.



## 2.5 Reference Initial code

Register(0 × 0001);  
Data (0 × 7300);

Register(0 × 0002);  
Data (0 × 0200);

Register(0 × 0003);  
Data (0 × 6164);

Register(0 × 0004);  
Data (0 × 04C7);

Register(0 × 0005);  
Data (0 × FC80);

Register(0 × 00,0 × 0A); //Contrast/Brightness control;  
Data (0 × 4008);

Register(0 × 00,0 × 0D); //Power control(2);  
Data (0 × 3229);

Register(0 × 00,0 × 0E); //Power control(3);VOML  
Data (0 × 3200);

\*\*\*\*\*

Flicker!!! Plz , download below.

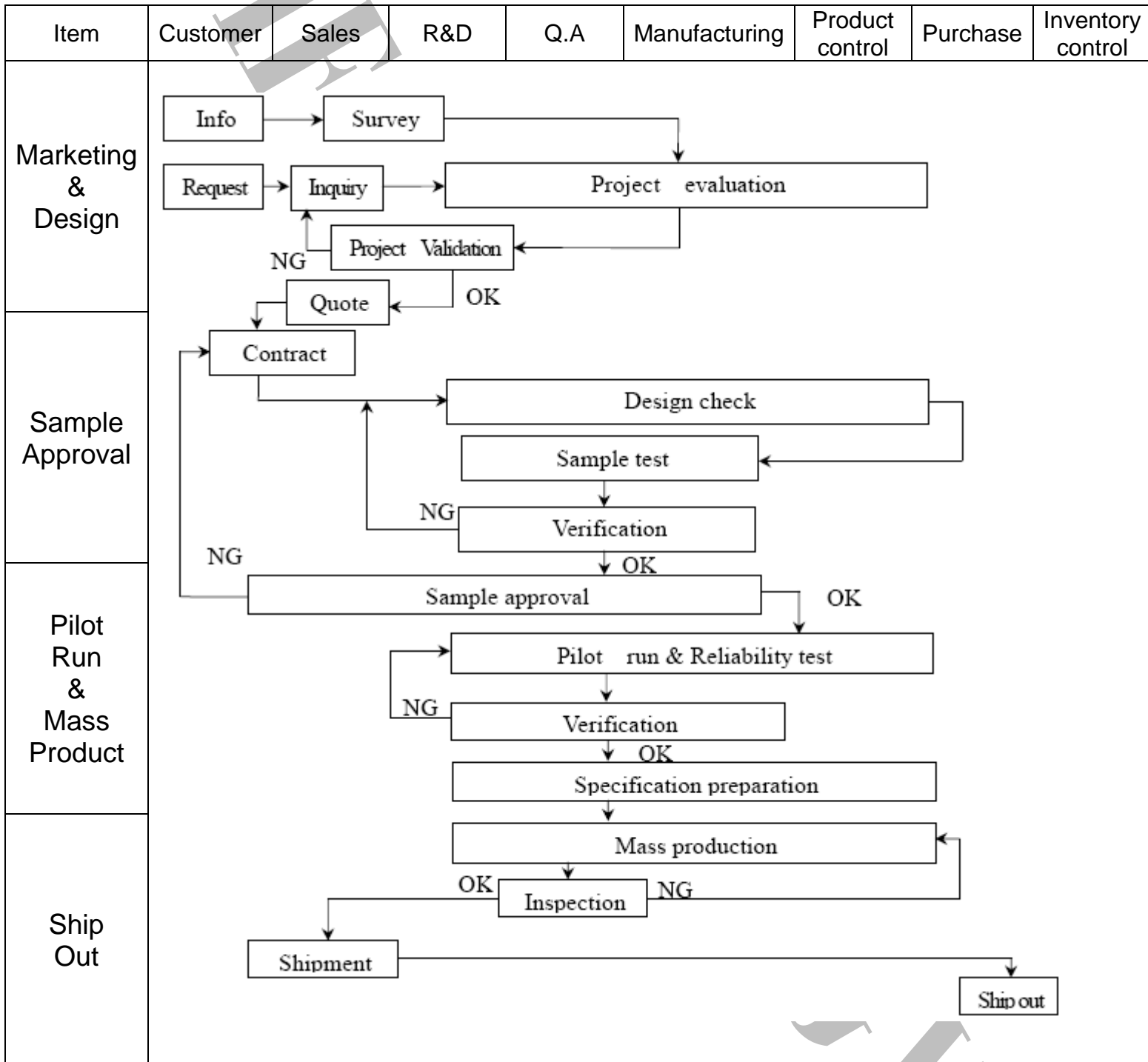
Register(0×00 , 1×1E); //Power control(4);COMH  
Data(0×00DF);

\*\*\*\*\*



### 3. QUALITY ASSURANCE SYSTEM

#### 3.1 Quality Assurance Flow Chart





GFT035EA320240Y

| Item          | Customer  | Sales | R&D | Q.A | Manufacturing   | Product control | Purchase | Inventory control |
|---------------|---|-------|-----|-----|---|-----------------|----------|-------------------|
| Sales Service | <pre> graph TD     Info[Info] --&gt; Claim[Claim]     Claim --&gt; FA[Failure analysis]     FA --&gt; CA[Corrective action]     CA --&gt; Tracking[Tracking]     FA --&gt; AR[Analysis report]           </pre> |       |     |     |   |                 |          |                   |
| Q.A Activity  | 1.ISO 9001 Maintenance Activities<br>3.Equipment calibration<br>5.Standardization Management  |       |     |     | 2.Process improvement proposal<br>4.Education And Training Activities |                 |          |                   |

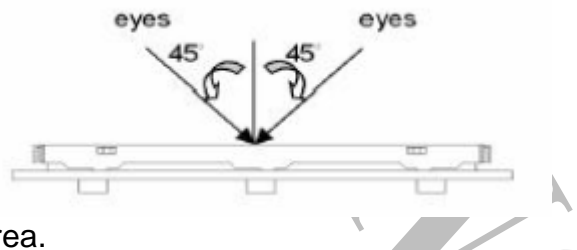
GFT035EA320240Y



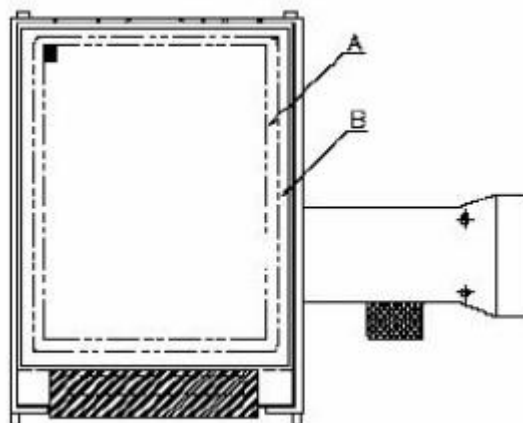
### 3.2 Inspection Specification

#### 1. Inspection Specification

- ◆ Scope : The document shall be applied to TFT-LCD module for 3.5"~ 10" (Ver.02)
- ◆ Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II .
- ◆ Equipment : Gauge 、 MIL-STD 、 Gi Far Taster 、 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" :

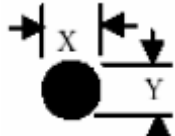
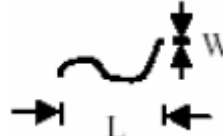
| NO            | Item   | Criterion   | Level |  |                   |               |            |          |          |          |           |          |       |          |       |
|---------------|--|---|-------|--|-------------------|---------------|------------|----------|----------|----------|-----------|----------|-------|----------|-------|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





◆ Specification For TFT-LCD Mpdule 3.5" ~ 10" :

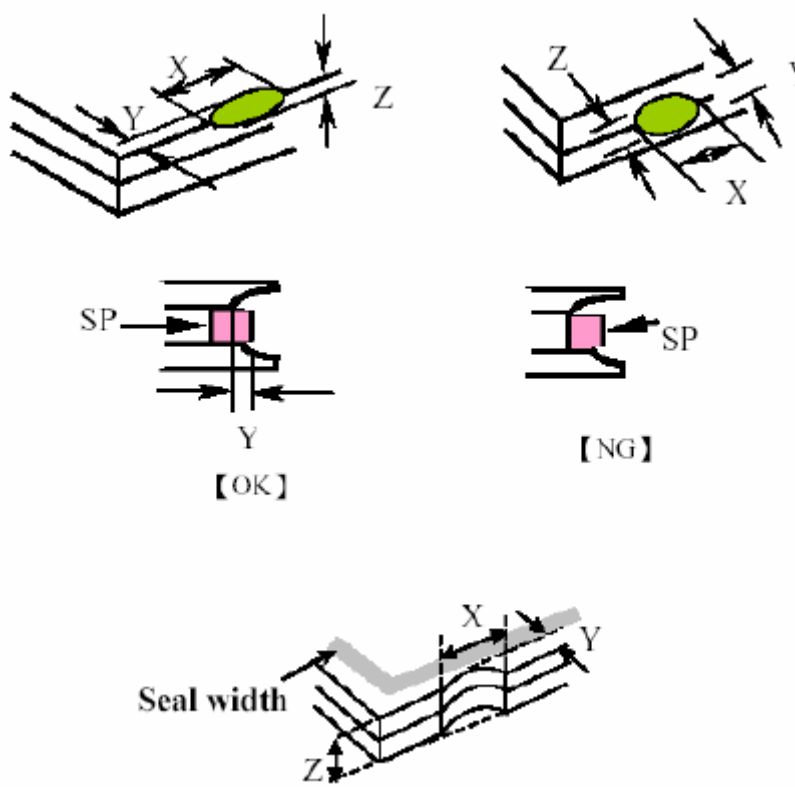
(Ver.02)

| NO  | Item  | Criterion   | Level                          |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
|---|---|---|--------------------------------|-------------------|------------------|--------|-------------------------|----------------------|-------------------------|--------------|----------------------|---|-------|------------|---------------|-------|--|---|
| 06  | Black or white dot 、 Scratch 、 contamination<br><br>Round type<br><br>$\Phi = (x+y) / 2$<br><br>Line type<br> | 6.1 Round type (Non-display or display) :<br><br><table border="1"> <thead> <tr> <th>Dimension (diameter : <math>\Phi</math>)</th> <th>Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.25</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.50</math></td> <td>5</td> </tr> <tr> <td><math>\Phi &gt; 0.50</math></td> <td>0</td> </tr> <tr> <td>Total</td> <td>5</td> </tr> </tbody> </table>                     | Dimension (diameter : $\Phi$ ) | Acceptance (Q'ty) | $\Phi \leq 0.25$ | Ignore | $0.25 < \Phi \leq 0.50$ | 5                    | $\Phi > 0.50$           | 0            | Total                | 5 | Minor |            |               |       |  |   |
|   |   | Dimension (diameter : $\Phi$ )  | Acceptance (Q'ty)              |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| $\Phi \leq 0.25$  | Ignore  |   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| $0.25 < \Phi \leq 0.50$   | 5   |   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| $\Phi > 0.50$   | 0   |   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| Total   | 5   |   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| 6.2 Line type(Non-display or display) :<br><br><table border="1"> <thead> <tr> <th>Length(L)</th> <th>Width(W)</th> <th>Acceptance(Q'ty)</th> </tr> </thead> <tbody> <tr> <td>---</td> <td><math>W \leq 0.03</math></td> <td>Ignore</td> </tr> <tr> <td><math>L \leq 10.0</math></td> <td><math>0.03 &lt; W \leq 0.05</math></td> <td>4</td> </tr> <tr> <td><math>L \leq 5.0</math></td> <td><math>0.05 &lt; W \leq 0.10</math></td> <td>2</td> </tr> <tr> <td>---</td> <td><math>W &gt; 0.10</math></td> <td>As round type</td> </tr> <tr> <td colspan="2">Total</td> <td>5</td> </tr> </tbody> </table> | Length(L)   | Width(W)  | Acceptance(Q'ty)               | ---               | $W \leq 0.03$    | Ignore | $L \leq 10.0$           | $0.03 < W \leq 0.05$ | 4                       | $L \leq 5.0$ | $0.05 < W \leq 0.10$ | 2 | ---   | $W > 0.10$ | As round type | Total |  | 5 |
| Length(L)   | Width(W)  | Acceptance(Q'ty)  |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| ---   | $W \leq 0.03$   | Ignore  |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| $L \leq 10.0$   | $0.03 < W \leq 0.05$  | 4   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| $L \leq 5.0$  | $0.05 < W \leq 0.10$  | 2   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| ---   | $W > 0.10$  | As round type   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| Total   |   | 5   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| 07  | Polarizer<br><br>Bubble   | <table border="1"> <thead> <tr> <th>Dimension (diameter : <math>\Phi</math>)</th> <th>Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.25</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.50</math></td> <td>4</td> </tr> <tr> <td><math>0.50 &lt; \Phi \leq 0.80</math></td> <td>1</td> </tr> <tr> <td><math>\Phi &gt; 0.80</math></td> <td>0</td> </tr> <tr> <td>Total</td> <td>5</td> </tr> </tbody> </table> | Dimension (diameter : $\Phi$ ) | Acceptance (Q'ty) | $\Phi \leq 0.25$ | Ignore | $0.25 < \Phi \leq 0.50$ | 4                    | $0.50 < \Phi \leq 0.80$ | 1            | $\Phi > 0.80$        | 0 | Total | 5          | Minor         |       |  |   |
| Dimension (diameter : $\Phi$ )  | Acceptance (Q'ty)   |   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| $\Phi \leq 0.25$  | Ignore  |   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| $0.25 < \Phi \leq 0.50$   | 4   |   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| $0.50 < \Phi \leq 0.80$   | 1   |   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| $\Phi > 0.80$   | 0   |   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |
| Total   | 5   |   |                                |                   |                  |        |                         |                      |                         |              |                      |   |       |            |               |       |  |   |



◆ Specification For TFT-LCD Module 3.5" ~ 10" :

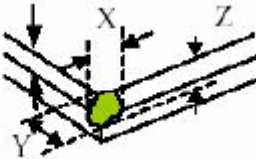
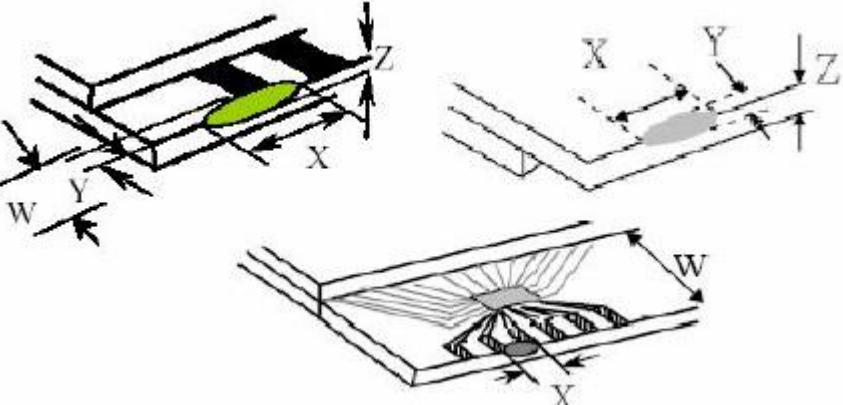
(Ver. 02)

| NO       | Item                                    | Criterion  | Level |   |   |          |                                |              |          |   |                      |  |
|----------|---|--|-------|---|---|----------|--------------------------------|--------------|----------|---|----------------------|--|
| 08       | The crack of glass                      | <p>Symbols :</p> <p>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</p> <p>8.1 General glass chip :<br/>8.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="446 1702 1356 1926"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq a</math></td> <td>Crack can't enter viewing area</td> <td><math>\leq 1/2 t</math></td> </tr> <tr> <td><math>\leq a</math></td> <td>Crack can't exceed the half of SP width</td> <td><math>1/2 t &lt; Z \leq 2 t</math></td> </tr> </tbody> </table> | X     | Y | Z | $\leq a$ | Crack can't enter viewing area | $\leq 1/2 t$ | $\leq a$ | Crack can't exceed the half of SP width | $1/2 t < Z \leq 2 t$ |  |
| X        | Y                                       | Z  |       |   |   |          |                                |              |          |   |                      |  |
| $\leq a$ | Crack can't enter viewing area          | $\leq 1/2 t$   |       |   |   |          |                                |              |          |   |                      |  |
| $\leq a$ | Crack can't exceed the half of SP width | $1/2 t < Z \leq 2 t$   |       |   |   |          |                                |              |          |   |                      |  |



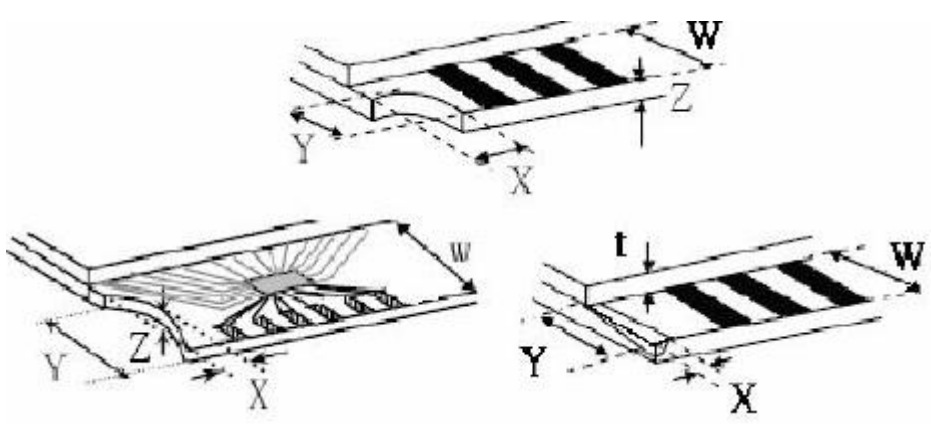
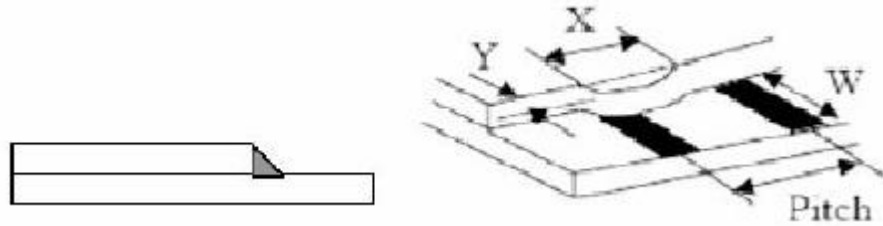
◆ Specification For TFT-LCD Module 3.5" ~ 10"

(Ver. 02)

| NO           | Item                                     | Criterion  | Level        |   |   |   |              |                                |                |              |  |                      |          |              |  |
|--------------|--|--|--------------|---|---|---|--------------|--------------------------------|----------------|--------------|--|----------------------|----------|--------------|--|
| 08           | The crack of glass                       | Symbols :<br><br>X: The length of crack<br>Z: The thickness of crack<br>t : The thickness of glass<br><br>Y : The width of crack<br>W: terminal length<br>a : LCD side length  | Minor        |   |   |   |              |                                |                |              |  |                      |          |              |  |
|              |  | 8.1.2 Corner crack :<br><br><br><br><table border="1" data-bbox="523 1012 1369 1236"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq 1/5 a</math></td> <td>Crack can't enter viewing area</td> <td><math>Z \leq 1/2 t</math></td> </tr> <tr> <td><math>\leq 1/5 a</math></td> <td>Crack can't exceed the half of SP width.</td> <td><math>1/2 t &lt; Z \leq 2 t</math></td> </tr> </tbody> </table>                                |              | X | Y | Z | $\leq 1/5 a$ | Crack can't enter viewing area | $Z \leq 1/2 t$ | $\leq 1/5 a$ | Crack can't exceed the half of SP width. | $1/2 t < Z \leq 2 t$ |          |              |  |
| X            | Y  | Z  |              |   |   |   |              |                                |                |              |  |                      |          |              |  |
| $\leq 1/5 a$ | Crack can't enter viewing area           | $Z \leq 1/2 t$   |              |   |   |   |              |                                |                |              |  |                      |          |              |  |
| $\leq 1/5 a$ | Crack can't exceed the half of SP width. | $1/2 t < Z \leq 2 t$   |              |   |   |   |              |                                |                |              |  |                      |          |              |  |
|              |  | 8.2 Protrusion over terminal :<br>8.2.1 Chip on electrode pad :<br><br><br><br><table border="1" data-bbox="478 1886 1321 2020"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Front</td> <td><math>\leq a</math></td> <td><math>\leq 1/2 W</math></td> <td><math>\leq t</math></td> </tr> <tr> <td>Back</td> <td><math>\leq a</math></td> <td><math>\leq W</math></td> <td><math>\leq 1/2 t</math></td> </tr> </tbody> </table> |              | X | Y | Z | Front        | $\leq a$                       | $\leq 1/2 W$   | $\leq t$     | Back                                     | $\leq a$             | $\leq W$ | $\leq 1/2 t$ |  |
|              | X  | Y  | Z            |   |   |   |              |                                |                |              |  |                      |          |              |  |
| Front        | $\leq a$                                 | $\leq 1/2 W$   | $\leq t$     |   |   |   |              |                                |                |              |  |                      |          |              |  |
| Back         | $\leq a$                                 | $\leq W$   | $\leq 1/2 t$ |   |   |   |              |                                |                |              |  |                      |          |              |  |



◆ Specification For TFT-LCD Module 3.5" ~ 10"

| NO           | Item               | Criterion   | Level |   |   |              |          |          |   |   |   |          |              |          |       |
|--------------|--------------------|---|-------|---|---|--------------|----------|----------|---|---|---|----------|--------------|----------|-------|
| 08           | The crack of glass | <p>Symbols :</p> <p>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</p> <p>8.2.2 Non-conductive portion :</p>  <table border="1" data-bbox="555 1227 1217 1377"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq 1/3 a</math></td> <td><math>\leq W</math></td> <td><math>\leq t</math></td> </tr> </tbody> </table> <p>⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.</p> <p>8.2.3 Glass remain :</p>  <table border="1" data-bbox="539 1926 1233 2078"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq a</math></td> <td><math>\leq 1/3 W</math></td> <td><math>\leq t</math></td> </tr> </tbody> </table> | X     | Y | Z | $\leq 1/3 a$ | $\leq W$ | $\leq t$ | X | Y | Z | $\leq a$ | $\leq 1/3 W$ | $\leq t$ | Minor |
| X            | Y                  | Z   |       |   |   |              |          |          |   |   |   |          |              |          |       |
| $\leq 1/3 a$ | $\leq W$           | $\leq t$  |       |   |   |              |          |          |   |   |   |          |              |          |       |
| X            | Y                  | Z   |       |   |   |              |          |          |   |   |   |          |              |          |       |
| $\leq a$     | $\leq 1/3 W$       | $\leq t$  |       |   |   |              |          |          |   |   |   |          |              |          |       |



◆ Specification For TFT-LCD Module 3.5" ~ 10"

| 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 $\leq 1.5\text{mm}$ .   | Minor |



## 4. RELIABILITY TEST

### 4.1 Reliability Test Condition

| NO. | ITEM                            | CONDITION                                     |         | STANDARD                     | NOTE      |
|-----|---------------------------------|---|---------|------------------------------|-----------|
| 1   | High Temp. Storage              | 80°C  | 120 hrs | Appearance<br>Without defect |           |
| 2   | Low Temp. Storage               | -30°C   | 120 hrs | Appearance<br>Without defect |           |
| 3   | High Temp. & High Humi. Storage | 40°C<br>90% RH                                | 120 hrs | Appearance<br>Without defect |           |
| 4   | High Temp. Operating Display    | 70°C  | 120 hrs | Appearance<br>Without defect |           |
| 5   | Low Temp. Operating Display     | -20°C   | 120 hrs | Appearance<br>Without defect |           |
| 6   | Thermal Shock                   | -20°C, 30min. → 70°C, 30min.<br>↑<br>(1cycle) |         | Appearance<br>Without defect | 10 cycles |

\*\* Dissipation current, contrast and display functions

\*\* Polarizing filter deterioration, other appearance defects

\*\* The function test shall be conducted after 4hours storage at the normal temperature and humidity after remove from the test chamber.



## 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  $320 \pm 10$  °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  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  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.



**OUTLINE DRAWING**

**ROHS**

|        |                  |
|--------|------------------|
| (0.23) | 76.90<Outline>   |
| (2.00) | 76.44<T/P>       |
| (2.45) | 72.90<Bezel V.A> |
| (2.95) | 72.00<T/P V.A>   |
| (3.41) | 71.00<T/P A.A>   |
|        | 70.08<LCD A.A>   |

**TP 排線下**  
邊，要對齊  
排線的對位

**TP 排線下**  
邊，要對齊  
排線的對位

**RGB**

0.219 0.219

**Scale 100:1**

**NOTES:**  
1.LCD TYPE: a-si TFT  
2.LCD DISPLAY: POSITIVE / TRANSMISSIVE  
3.VIEW DIRECTION: 6 O'CLOCK  
4.Top: -20~70°C Ist: -30~80°C  
5.The tolerance unless classified ±0.5mm

|                   |        |
|-------------------|--------|
| 76.90<Outline>    | (0.23) |
| 76.44<T/P>        | (2.00) |
| 72.90<Bezel V.A>  | (2.45) |
| 72.00<T/P V.A>    | (2.95) |
| 71.00<T/P A.A>    | (3.41) |
| 70.08<LCD A.A>    |        |
| 52.56<LCD A.A>    | (3.12) |
| 54.00<T/P A.A>    | (2.46) |
| 55.00<T/P V.A>    | (1.96) |
| 55.50<Bezel V.A>  | (2.00) |
| 61.46<T/P>        |        |
| 63.90<Outline>    |        |
| 54                |        |
| 119.80±1.0        |        |
| (55.90)           |        |
| (15.70)           |        |
| 27.50             |        |
| 4.00±0.5          |        |
| 0.219             |        |
| 0.219             |        |
| 54                |        |
| 3.00±0.5          |        |
| 5.00              |        |
| 1.25              |        |
| 25.00             |        |
| 0.50±0.07         |        |
| 0.30±0.05         |        |
| 1.25              |        |
| 54                |        |
| 2.01.00           |        |
| w=0.35±0.05       |        |
| P0.5x53=26.50±0.1 |        |

|           |           |                                 |
|-----------|-----------|---------------------------------|
| <b>日期</b> | <b>版本</b> | <b>修改內容</b>                     |
| 120303    | 01        | 增加註明，TP排線焊接在模組排線上時，要對齊模組排線的對位線。 |
| 160919    | 02        | 更新圖框                            |

晶發科技股份有限公司  
GI FAR TECHNOLOGY CO., LTD.

DATE: 2016.09.19 REV: 02 DRAWING NO.: GFT035EA320240Y(MD)

UNIT: mm SCALE: 1/1 SHEET: 1/1

Product: GFT035EA320240Y(MD) DRAWN: Hazel CHECKED: Donlin PAGE: 1/1