



# SPECIFICATION FOR LCD MODULE

MODULE NO: YB-YG320240S16A-C-A0

Doc.Version:00

Customer Approval:

|                                 |                                 |
|---------------------------------|---------------------------------|
| <input type="checkbox"/> Accept | <input type="checkbox"/> Reject |
|---------------------------------|---------------------------------|

| YEEBO    | NAME                | SIGNATURE | DATE      |
|----------|---------------------|-----------|-----------|
| Prepare  | Electronic Engineer | 傅國長       | 2014.4.25 |
| Check    | Mechanical Engineer | 連翹琪       | 2014.4.25 |
| Verify   |                     | 何志強       | 2014.4.25 |
| Approval |                     | 陳志偉       | 2014.4.25 |

APPROVAL FOR SPECIFICATIONS ONLY

APPROVAL FOR SPECIFICATIONS AND SAMPLE

WIMRD005-02-C





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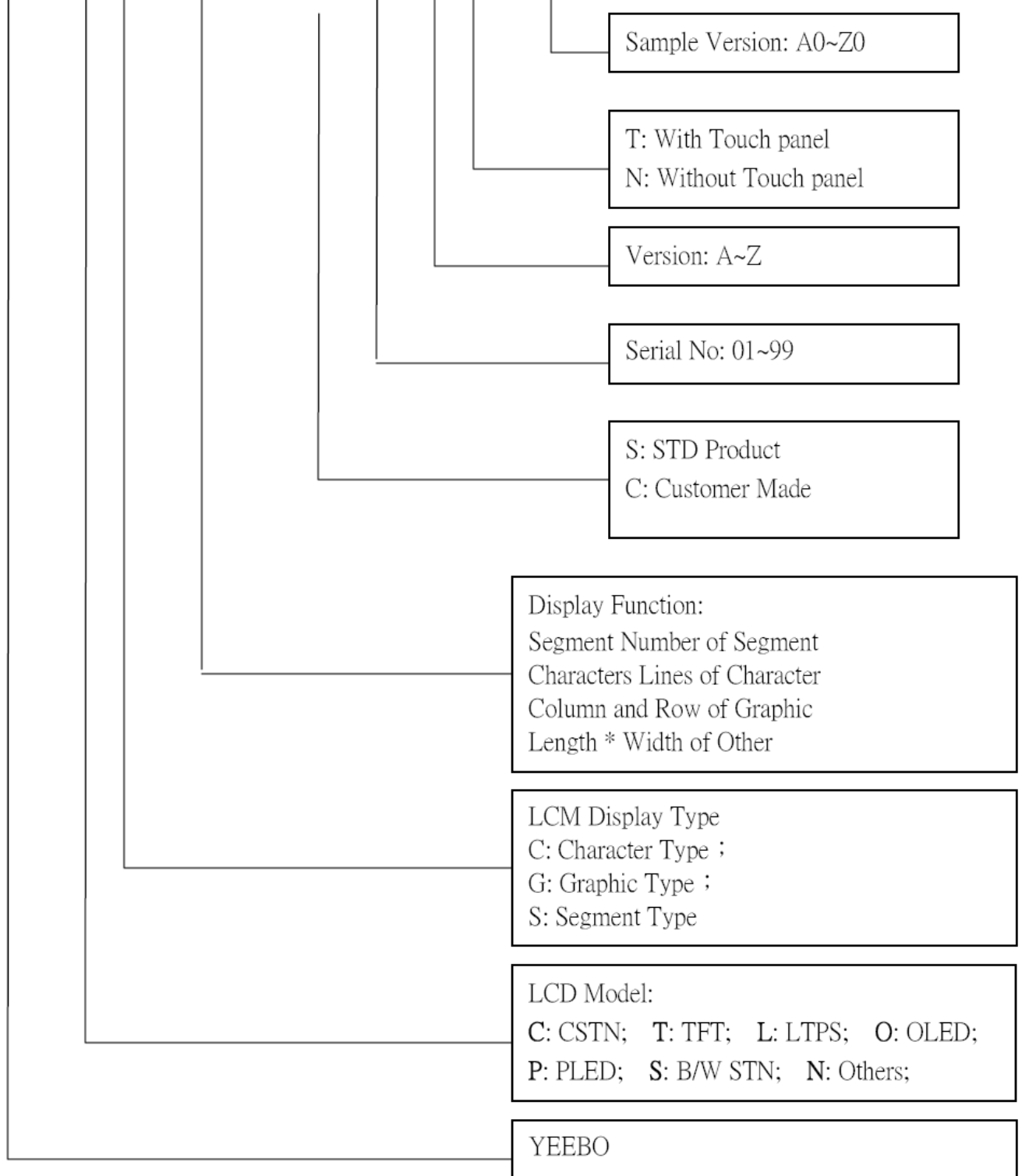
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### 3. Module Numbering System:

(Example)

**YB- T G 240320 S 01 D -T - A0**





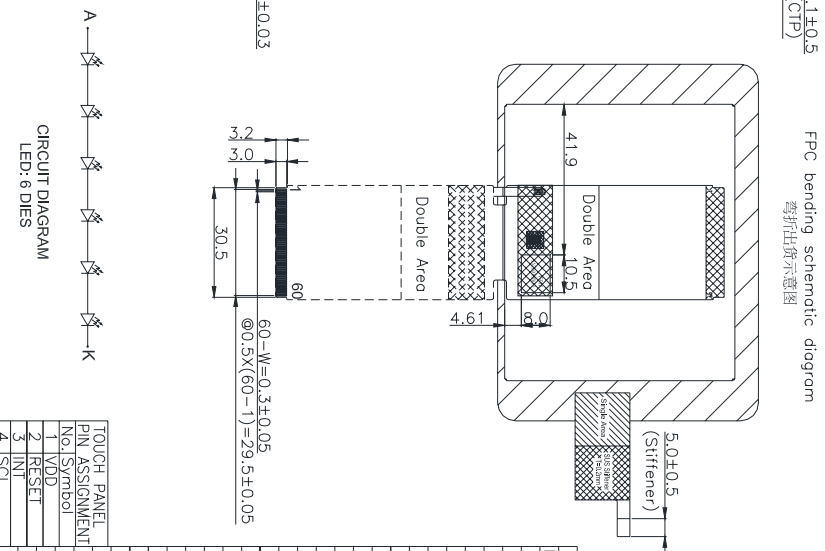
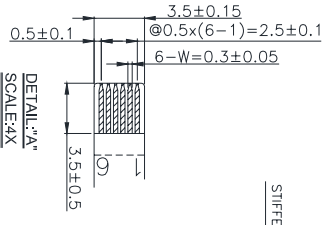
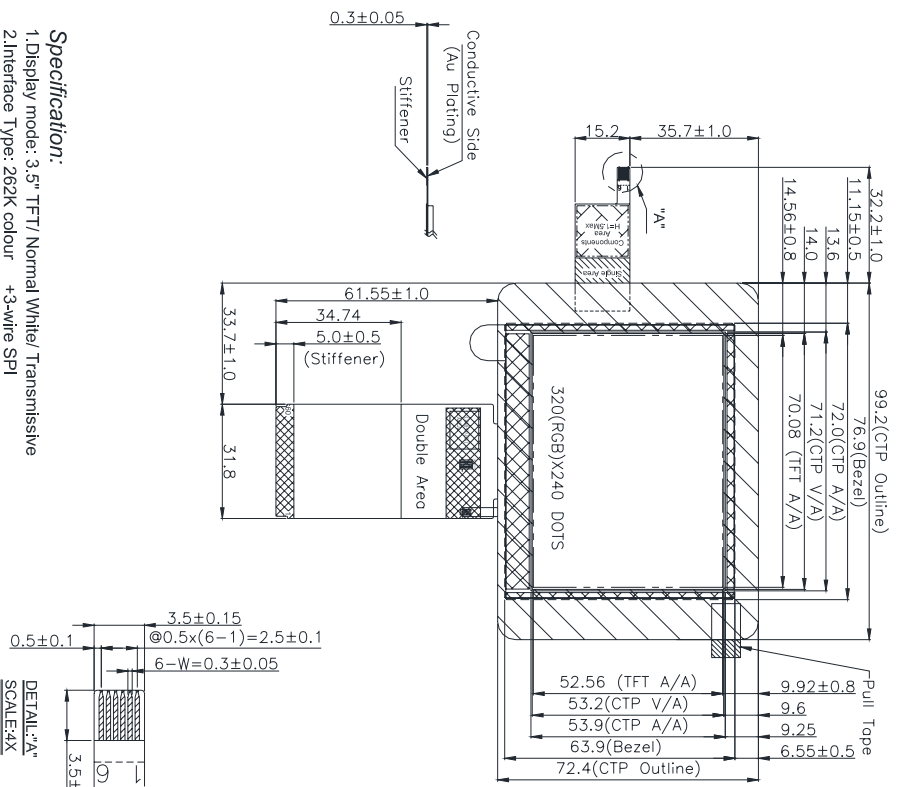
#### **4. General Specification:**

| ITEM                   | CONTENTS                         |
|------------------------|----------------------------------|
| Module Size            | 99.2(W) * 72.4 (H) * 4.1(T) mm   |
| Module Size(With FPC)  | 99.2(W) *133.95 (H) * 4.1 (T) mm |
| Display Size(Diagonal) | 3.5 inch                         |
| Display Format         | 320(RGB)* 240 Pixels             |
| Active Area            | 70.08(W) *52.56(H) mm            |
| Pixel Pitch            | 0.219mm*0.219 mm                 |
| LCD Type               | TFT (262K)/ Transmissive / NW    |
| Touch panel Type       | OLS/ Cover glass                 |
| View Angle             | 12 O'clock                       |
| CTP IC                 | ILI2830                          |
| Controller IC          | HX8238-D                         |
| Weight                 | TBD                              |

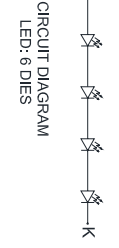


# 5. LCM drawing:

|          |                                                                      |                 |
|----------|----------------------------------------------------------------------|-----------------|
| Rec.     | Count drawing & Specification record during discussion with customer |                 |
| Revision | Revision content description                                         |                 |
| #1       | FIRST ISSUE                                                          | Date 2014-04-18 |



| TOUCH PANEL |        | PIN ASSIGNMENT |        |
|-------------|--------|----------------|--------|
| No.         | Symbol | No.            | Symbol |
| 1           | VDD    | 31             | DATA9  |
| 2           | RESSET | 32             | DATA10 |
| 3           | INI    | 33             | DATA11 |
| 4           | SCL    | 34             | NC     |
| 5           | SDA    | 35             | NC     |
| 6           | GND    | 36             | DATA12 |
| 7           | NC     | 37             | DATA13 |
| 8           | NC     | 38             | DATA14 |
| 9           | NC     | 39             | DATA15 |
| 10          | NC     | 40             | DATA16 |
| 11          | NC     | 41             | DATA17 |
| 12          | NC     | 42             | HSYNC  |
| 13          | NC     | 43             | VSYNC  |
| 14          | RESET  | 44             | DOTCLK |
| 15          | CS     | 45             | NC     |
| 16          | SCL    | 46             | NC     |
| 17          | SDI    | 47             | VCI    |
| 18          | NC     | 48             | VCI    |
| 19          | NC     | 49             | NC     |
| 20          | DATA0  | 50             | NC     |
| 21          | DATA1  | 51             | NC     |
| 22          | DATA2  | 52             | NC     |
| 23          | DATA3  | 53             | NC     |
| 24          | DATA4  | 54             | NC     |
| 25          | DATA5  | 55             | NC     |
| 26          | NC     | 56             | NC     |
| 27          | NC     | 57             | NC     |
| 28          | DATA6  | 58             | ENABLE |
| 29          | DATA7  | 59             | GND    |
| 30          | DATA8  | 60             | GND    |



- Specification:**
1. Display mode: 3.5" TFT/ Normal White/ Transmissive
  2. Interface Type: 262K colour +3-wire SPI
  3. Viewing direction: 12 O'clock(Gray Inversion)
  4. Operating temperature: -10°C to +70°C
  5. Storage temperature: -30°C to +80°C
  6. Drive IC: HX8238-D
  7. Backlight: 6 CHIP WHITE LED/ LCM Luminance(with T/P): 200 cd/m<sup>2</sup> (TYP)
  8. V<sub>f</sub>: 19.2V(TYP) I<sub>f</sub>: 15mA
  9. Unspecified tolerance: ±0.30mm.
  10. ROHS compliant

9. Glass Type: OLG5 PCTP
10. Channel NO.: 15(X) x 11(Y)
11. Drive IC: IL12830

|           |          |         |          |          |                     |         |          |          |           |
|-----------|----------|---------|----------|----------|---------------------|---------|----------|----------|-----------|
|           |          | UNIT    | SIZE     | SCALE    | DESIGNED            | CHECKED | VERIFIED | APPROVED | FILE NAME |
|           |          | mm      | A4       | N-T-S    | 連翊班                 |         |          |          |           |
| MOD. Name | DESIGNED | CHECKED | VERIFIED | APPROVED | YB-YG320240S16A-C-A |         |          |          |           |
| Sheet 1   | Of 1     |         |          |          |                     |         |          |          |           |



## 6. Electrical Characteristics

### 6-1 Absolute Maximum Ratings TFT IC HX8238-D Parameter

| Item                  | Symbol            | Min. | Type | Max. | Unit | Remark |
|-----------------------|-------------------|------|------|------|------|--------|
| Input Voltage         | $V_{CI}-V_{SS}$   | -0.3 | -    | +5.0 | Volt | Note1  |
| Supply Voltage        | $V_{DDIO}-V_{SS}$ | -0.3 | -    | +4.0 | Volt | Note1  |
| Operating Temperature | $T_{opr}$         | -10  | -    | +70  | °C   | -      |
| Storage Temperature   | $T_{stg}$         | -30  | -    | +80  | °C   | -      |

Note1: Absolute maximum rating is the limit value beyond which the IC maybe broken.  
They do not assure operations.

### Touch panel controller ILI2839 Parameter

| Item                         | Symbol | Min. | Type | Max.  | Unit | Humidity |
|------------------------------|--------|------|------|-------|------|----------|
| Supply Voltage               | VDD    | -0.3 | -    | +3.6  | V    | Note1    |
| Digital power supply voltage | VDDD   | -0.3 | -    | +1.98 |      | Note1    |
| I/O power supply Voltage     | VDDIO  | -0.3 | -    | +3.6  | V    | Note1    |

Note1: Absolute maximum rating is the limit value beyond which the IC maybe broken.  
They do not assure operations.



## 6-2 Operating Conditions

(Ta=25°C )

### TFT IC HX8238-D Characteristics

| Item                         | Symbol       | Condition     | Min.             | Typ. | Max.             | Unit |
|------------------------------|--------------|---------------|------------------|------|------------------|------|
| Power Supply voltage         | $V_{CI-VSS}$ | -             | 2.6              | 2.8  | 3.0              | Volt |
| Input Voltage                | $V_{IH}$     | -             | $0.8 * V_{DDIO}$ | -    | $V_{DDIO}$       | V    |
|                              | $V_{IL}$     | -             | $V_{SS}$         | -    | $0.2 * V_{DDIO}$ | V    |
| Power Supply Current for LCM | $I_{DD}$     | $V_{CI}=2.8V$ | -                | 8    | -                | mA   |

### Touch panel controller ILI2839 Characteristics

| Item           | Symbol   | Condition | Min.             | Typ.       | Max.             | Unit |
|----------------|----------|-----------|------------------|------------|------------------|------|
| Power Supply   | $V_{DD}$ | -         | 2.6              | 3.3        | 3.6              | Vt   |
| Input Voltage  | $V_{IH}$ | -         | $0.7 * V_{DDIO}$ | -          | $V_{DDIO}$       | V    |
|                | $V_{IL}$ | -         | -0.3             | -          | $0.3 * V_{DDIO}$ | V    |
| Output Voltage | $V_{OH}$ |           |                  | $V_{DDIO}$ |                  | V    |
|                | $V_{OL}$ |           |                  | 0.3        |                  |      |



### 6-3 Timing Characteristics

#### TFT IC HX8238-D

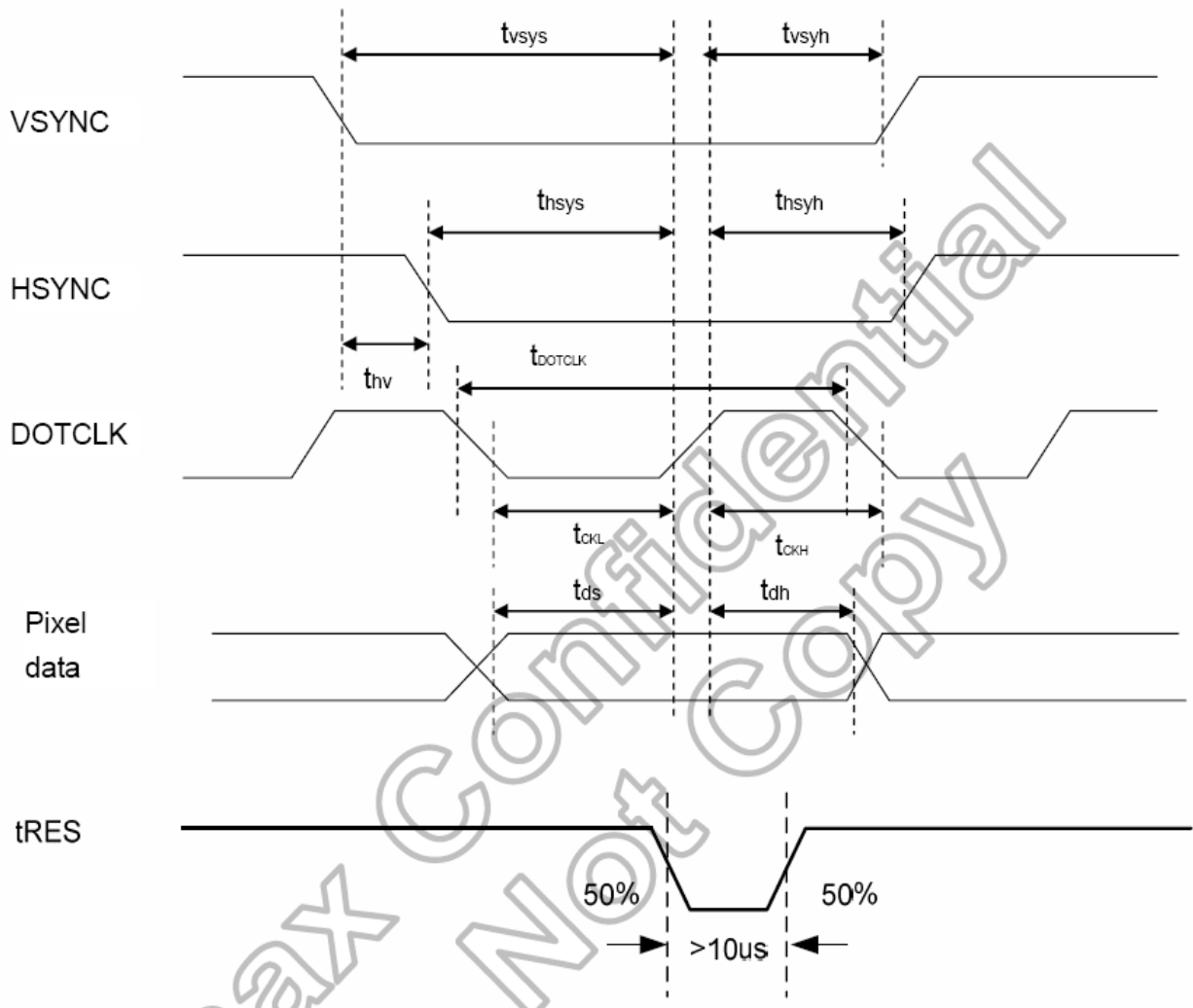
#### Pixel Timing

| 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     |       | -      |       | -      |       | μs      |

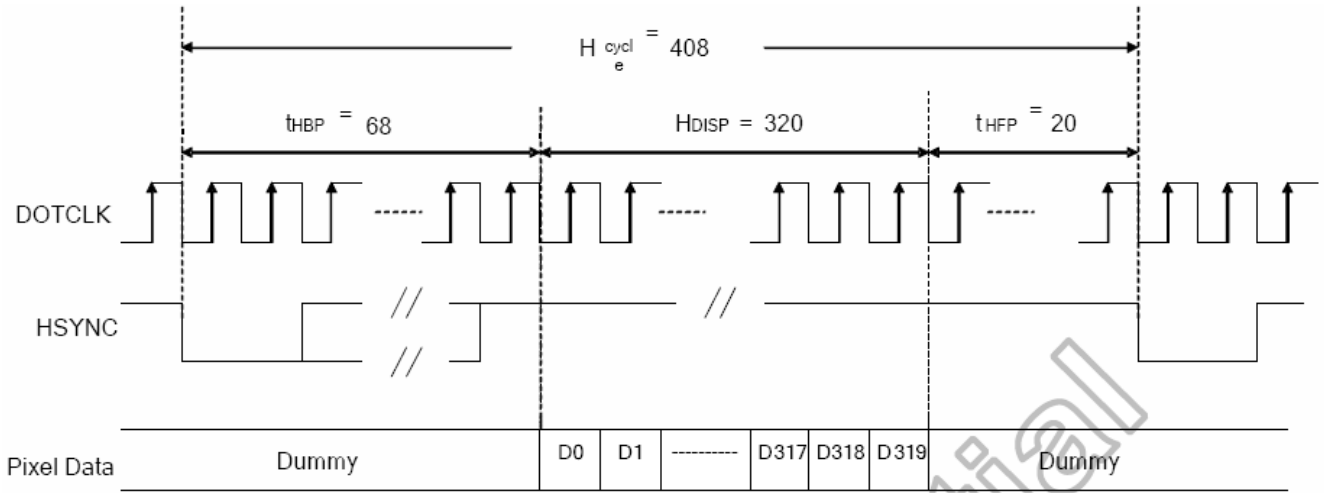
Note: External clock source must be provided to DOTCLK pin of HX8238-D. The driver will not operate if absent of the clocking signal.

### AC Characteristics

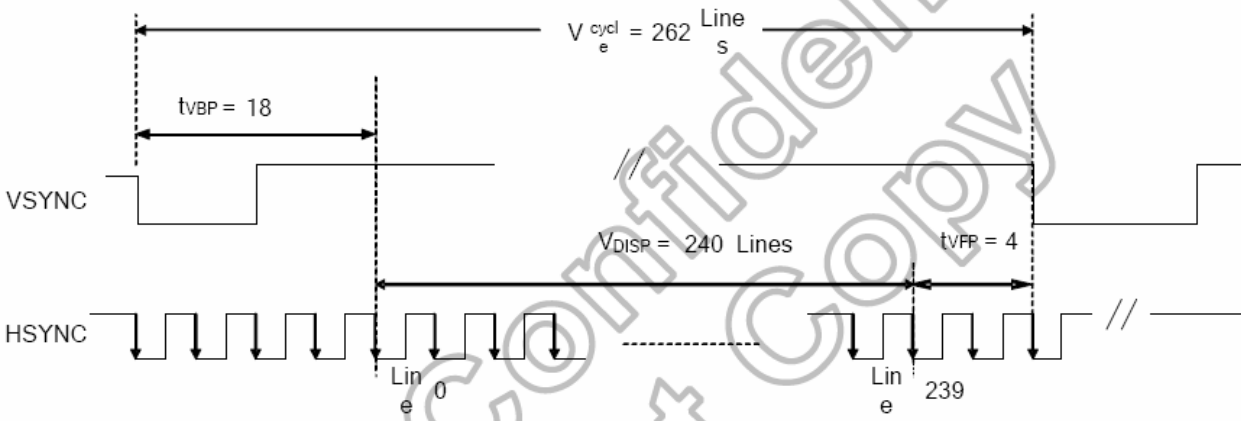
(Unless otherwise specified, Voltage Referenced to V<sub>SS</sub>, V<sub>DDIO</sub> = 2.2V, T<sub>A</sub> = 25°C)



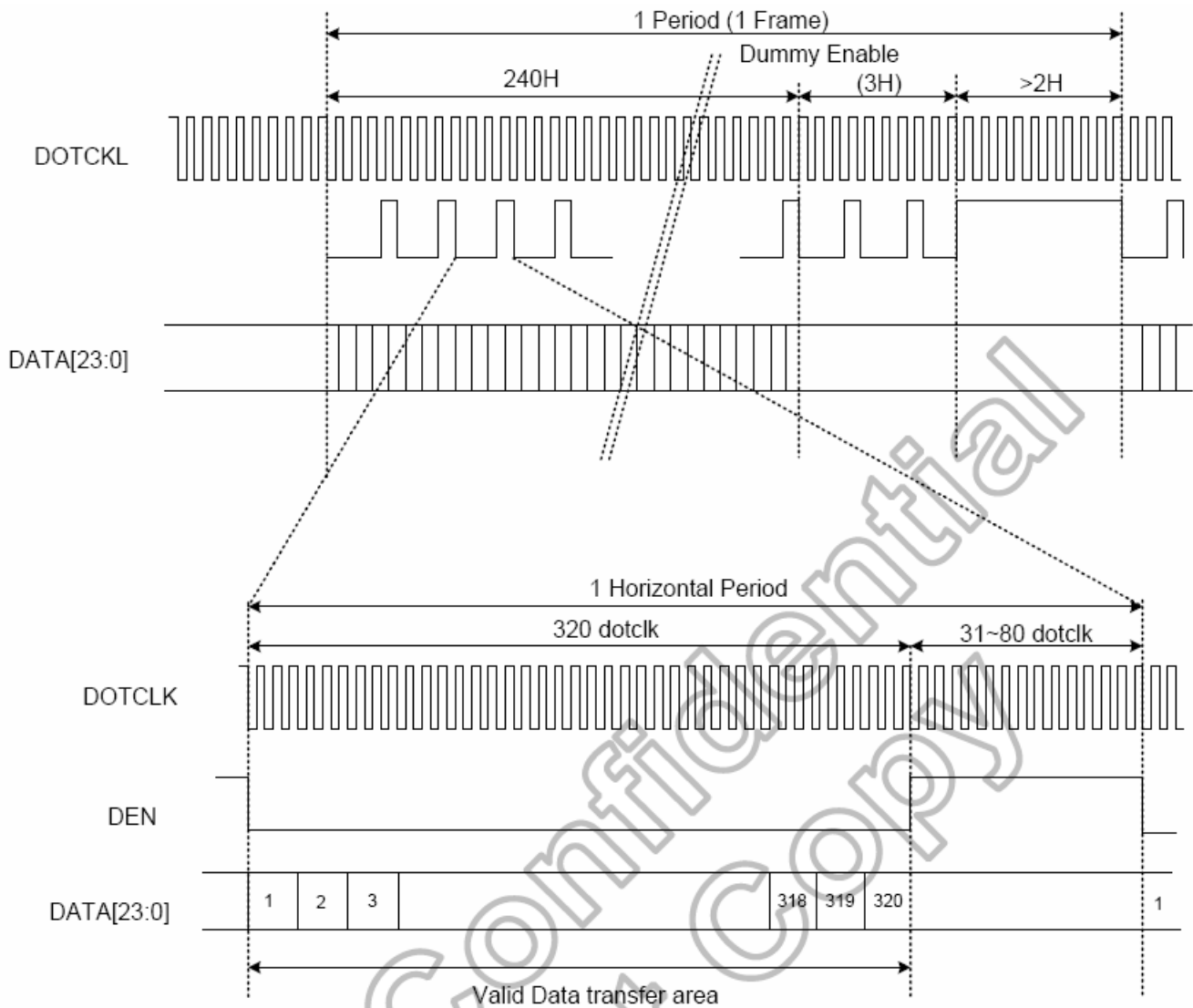
### Data Transaction Timing in Parallel RGB Interface (SYNC Mode)



(a) Horizontal Data Transaction Timing

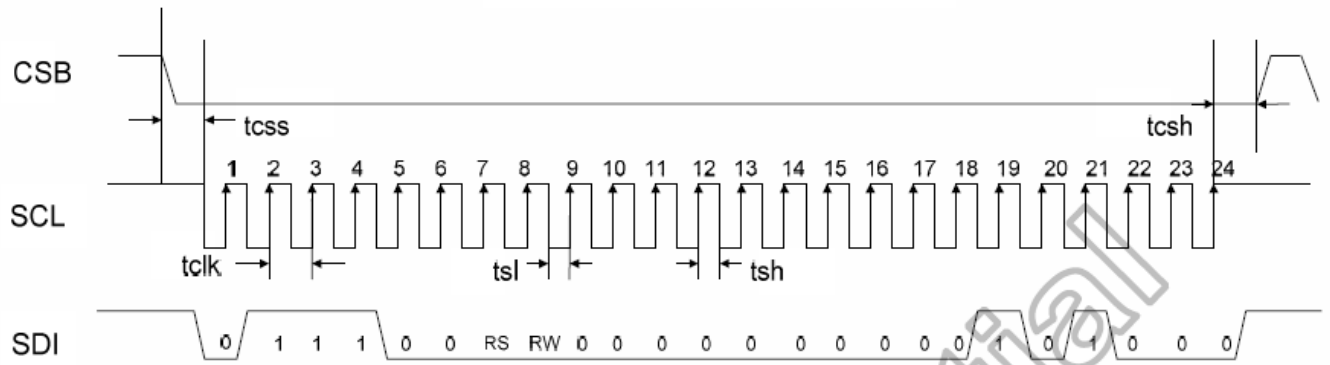


## Data Transaction Timing in Parallel RGB Interface (DE Mode)

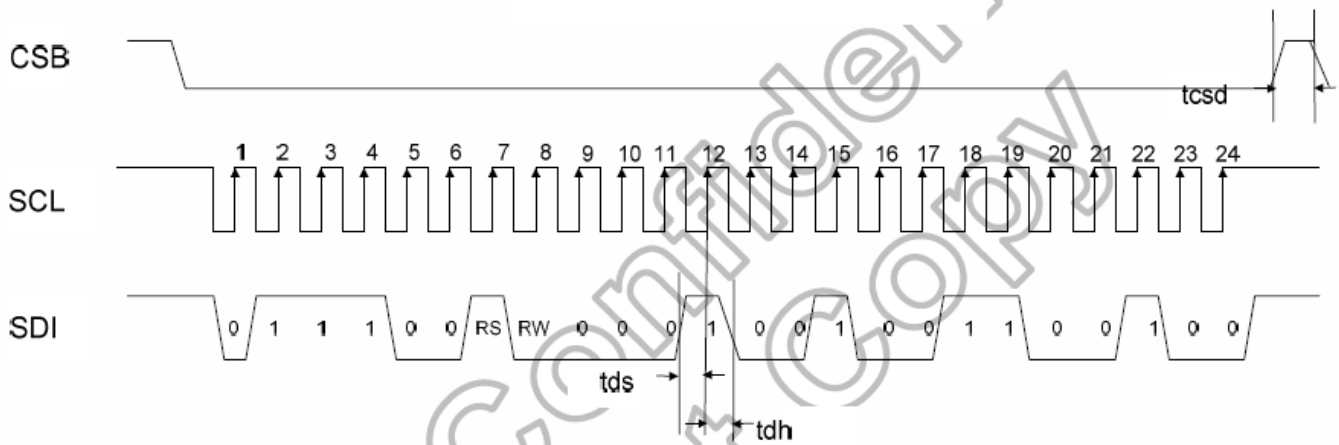


| Characteristics              | Symbol      | Min.   |       | Typ.        |       | Max.   |       | Unit    |
|------------------------------|-------------|--------|-------|-------------|-------|--------|-------|---------|
|                              |             | 24 bit | 8 bit | 24 bit      | 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      |
| Horizontal Frequency (Line)  | fH          | -      | -     | 14.9        |       | 22.35  |       | KHz     |
| Vertical Frequency (Refresh) | fV          | -      | -     | 60          |       | 90     |       | Hz      |
| Horizontal Back Porch        | tHBP        | -      | -     | 68          | 204   | -      | -     | tDOTCLK |
| Horizontal Front Porch       | tHFP        | -      | -     | 20          | 60    | -      | -     | tDOTCLK |
| Horizontal Data Start Point  | tHBP        | -      | -     | 68          | 204   | -      | -     | tDOTCLK |
| Horizontal Blanking Period   | tHBP + tHFP | -      | -     | 88          | 264   | -      | -     | tDOTCLK |
| Horizontal Display Area      | HDISP       | -      | -     | 320         | 960   | -      | -     | tDOTCLK |
| Horizontal Cycle             | Hcycle      | -      | -     | 408         | 1224  | 450    | 1350  | tDOTCLK |
| Vertical Back Porch          | tVBP        | -      | -     | 18          |       | -      |       | Lines   |
| Vertical Front Porch         | tVFP        | -      | -     | 4           |       | -      |       | Lines   |
| Vertical Data Start Point    | tVBP        | -      | -     | 18          |       | -      |       | Lines   |
| Vertical Blanking Period     | tVBP + tVFP | -      | -     | 22          |       | -      |       | Lines   |
| Vertical Display Area        | NTSC        | VDISP  | -     | 240         |       | -      |       | Lines   |
|                              | PAL         |        |       | 280(PALM=0) |       |        |       |         |
|                              | PAL         |        |       | 288(PALM=1) |       |        |       |         |
| Vertical Cycle               | NTSC        | Vcycle | -     | 262         |       | 350    |       | Lines   |
|                              | PAL         |        |       | 313         |       |        |       |         |

## Write SPI

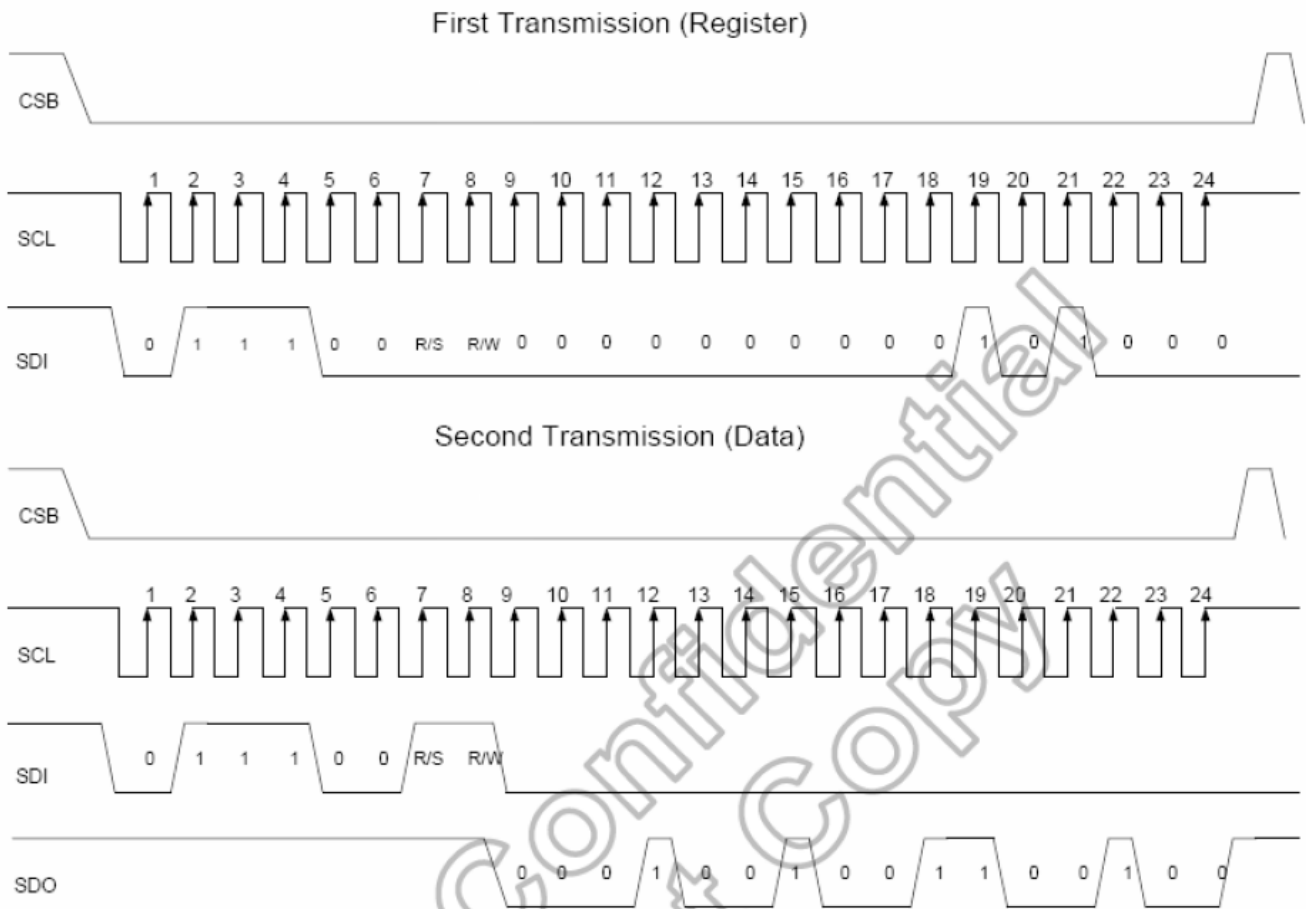


### Second Transmission (Data)



**Note:** The example writes "0x1264h" to register R28h.  
SPID connected to VSS.

## Read SPI



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

## SPI Time

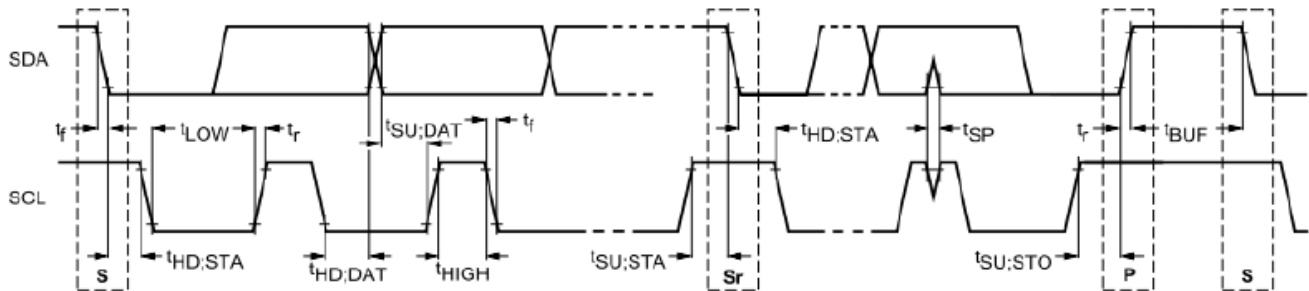
| Characteristics             | Symbol | Min. | Typ. | Max. | Unit |
|-----------------------------|--------|------|------|------|------|
| Serial Clock Frequency      | fclk   | -    | -    | 20   | MHz  |
| Serial Clock Cycle Time     | tclk   | 50   | -    | -    | ns   |
| Clock Low Width             | 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 Setup Time             | tds    | 5    | -    | -    | ns   |
| Data Hold Time              | tdh    | 10   | -    | -    | ns   |

### Touch panel controller ILI2830

| Item                         | Specification   |     |     |     |      | Remarks          |
|------------------------------|-----------------|-----|-----|-----|------|------------------|
| 7-1 Supply voltage for logic | Symbol          | Min | Typ | Max | Unit | -                |
|                              | V <sub>DD</sub> | 2.6 | 3.3 | 3.6 | V    |                  |
| 7-2 Supply current for logic | Symbol          | Min | Typ | Max | Unit | -                |
|                              | I <sub>DD</sub> | -   | -   | -   | mA   |                  |
| 7-3 Insulation resistance    | ≧ 20M Ω(DC 25V) |     |     |     |      | -                |
| 7-4 Linearity                | ≧ 3.0%          |     |     |     |      | Use Linear Teste |
| 7-5 Chattering               | ≧ 15ms          |     |     |     |      | -                |

#### 7-6 Timing Characteristics

#### I<sup>2</sup>C interface



| Symbol              | Parameter                                                                                   | 100KHz |      |      | 400KHz |     |      |
|---------------------|---------------------------------------------------------------------------------------------|--------|------|------|--------|-----|------|
|                     |                                                                                             | Min    | Max  | Unit | Min    | Max | Unit |
| f <sub>SCL</sub>    | SCL clock frequency                                                                         | 0      | 100  | kHz  | 0      | 400 | kHz  |
| t <sub>HD:STA</sub> | Hold time (repeated) START condition. After this period, the first clock pulse is generated | 4.0    | -    | μs   | 0.6    | -   | μs   |
| t <sub>LOW</sub>    | LOW period of the SCL clock                                                                 | 4.7    | -    | μs   | 1.3    | -   | μs   |
| t <sub>HIGH</sub>   | HIGH period of the SCL clock                                                                | 4.0    | -    | μs   | 0.6    | -   | μs   |
| t <sub>SU:STA</sub> | Set-up time for a repeated START condition                                                  | 4.7    | -    | μs   | 0.6    | -   | μs   |
| t <sub>HD:DAT</sub> | Data hold time                                                                              | 5.0    | -    | μs   | 0      | 0.9 | μs   |
| t <sub>SU:DAT</sub> | Data set-up time                                                                            | 250    | -    | ns   | 100    | -   | ns   |
| t <sub>r</sub>      | Rise time of both SDA and SCL signals                                                       | -      | 1000 | ns   | -      | 300 | ns   |
| t <sub>f</sub>      | Fall time of both SDA and SCL signals                                                       | -      | 300  | ns   | -      | 300 | ns   |
| t <sub>SU:STO</sub> | Set-up time for STOP condition                                                              | 4.0    | -    | μs   | 0.6    | -   | μs   |
| t <sub>BUF</sub>    | Bus free time between a STOP and START condition                                            | 4.7    | -    | μs   | 1.3    | -   | μs   |



## 7. Optical Characteristics:

| Item                       | Symbol | Conditions                           | Specifications |     |     | Unit | Note    |   |
|----------------------------|--------|--------------------------------------|----------------|-----|-----|------|---------|---|
|                            |        |                                      | Min            | Typ | Max |      |         |   |
| Transmittance (Without PL) | T(%)   | -                                    | -              | 7.4 | -   | -    | -       |   |
| Contrast Ratio             | CR     | $\Theta = 0$<br>Normal Viewing angle | 200            | 300 | -   |      | (1) (2) |   |
| Response time              | TR+TF  | -                                    | -              | 50  | 80  | ms   | (1) (3) |   |
| Viewing angle              | Hor.   | $\Theta_{x+}$                        | CR $\geq 10$   | -   | 45  | -    | deg.    | - |
|                            |        | $\Theta_{x-}$                        |                | -   | 45  | -    |         |   |
|                            | Ver.   | $\Theta_{y+}$                        |                | -   | 45  | -    |         |   |
|                            |        | $\Theta_{y-}$                        |                | -   | 45  | -    |         |   |

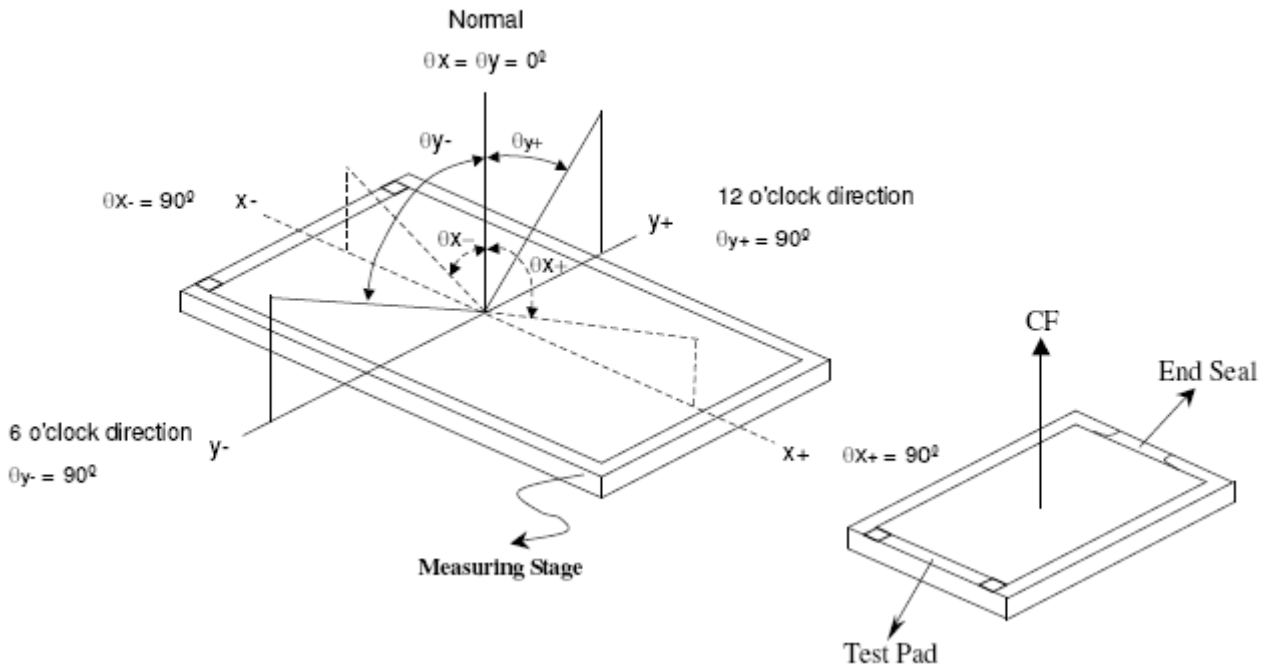
### Measuring Condition

1. Measuring surrounding: dark room
2. Ambient temperature:  $25 \pm 2^\circ\text{C}$
3. 30 min. Warm-up time.

### Color of CIE Coordinate:

| Item                                    | Symbol | Condition | Min.                                                                                                          | Typ.   | Max.   | Brightness            |                       |
|-----------------------------------------|--------|-----------|---------------------------------------------------------------------------------------------------------------|--------|--------|-----------------------|-----------------------|
| Chromaticity Coordinates (Transmissive) | Red    | x         | -                                                                                                             | 0.6155 | -      | TBD Cd/m <sup>2</sup> |                       |
|                                         |        | y         | -                                                                                                             | 0.3673 | -      |                       |                       |
|                                         | Green  | x         | $\theta = 0^\circ$<br>LED Backlight<br>Color Degree<br>X=0.26<br>Y=0.26<br>Brightness = TBD Cd/m <sup>2</sup> | -      | 0.3386 | -                     | TBD Cd/m <sup>2</sup> |
|                                         |        | y         |                                                                                                               | -      | 0.5901 | -                     |                       |
|                                         | Blue   | x         |                                                                                                               | -      | 0.2966 | -                     | TBD Cd/m <sup>2</sup> |
|                                         |        | y         |                                                                                                               | -      | 0.3099 | -                     |                       |
|                                         | White  | x         |                                                                                                               | -      | 0.2966 | -                     | TBD Cd/m <sup>2</sup> |
|                                         |        | y         |                                                                                                               | -      | 0.3099 | -                     |                       |

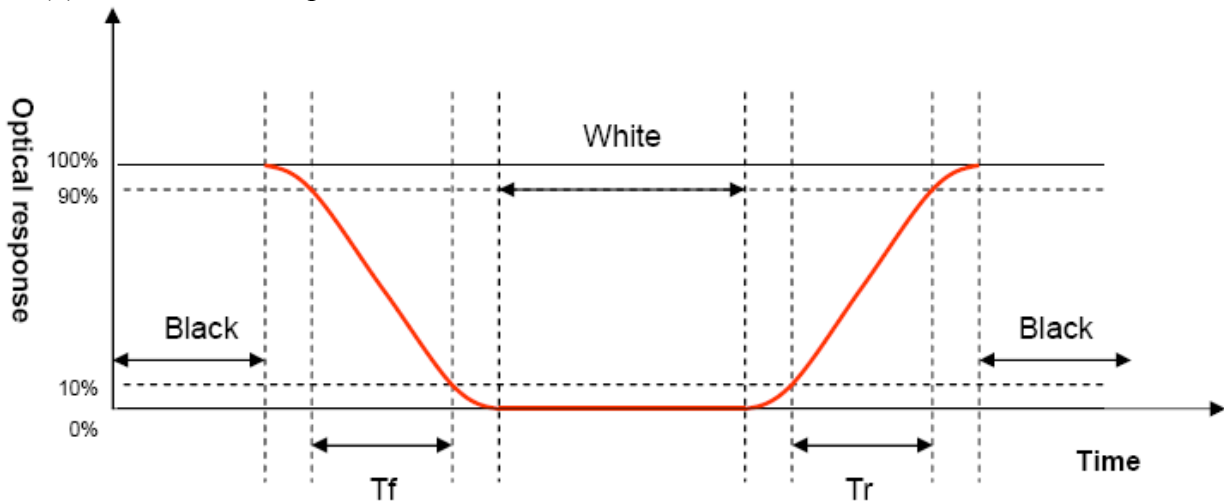
Note (1) Definition of Viewing Angle :



Note (2) Definition of Contrast Ratio(CR) :  
measured at the center point of panel

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

Note (3) Definition of Response Time : Sum of TR and TF







## 8. Interface Pin Assignment:

### TFT Interface Pin

| No. | Symbol | Function                                                              |
|-----|--------|-----------------------------------------------------------------------|
| 1   | LED-   | Power Supply for Backlight.                                           |
| 2   | LED-   | Power Supply for Backlight.                                           |
| 3   | LED+   | Power Supply for Backlight.                                           |
| 4   | LED+   | Power Supply for Backlight.                                           |
| 5   | GND    | Power Ground.                                                         |
| 6   | NC(XR) | Open.                                                                 |
| 7   | NC(YD) | Open.                                                                 |
| 8   | NC(XL) | Open.                                                                 |
| 9   | NC(YU) | Open.                                                                 |
| 10  | GND    | Power Ground.                                                         |
| 11  | NC     | Open.                                                                 |
| 12  | NC     | Open.                                                                 |
| 13  | NC     | Open.                                                                 |
| 14  | RESET  | System reset pin. Internal pull high.- Connect to VDDIO when not used |
| 15  | CS     | Chip select pin of serial interface.-Leave it OPEN when mot use.      |
| 16  | SCL    | Clock pin of serial interface.- Leave it OPEN when mot use.           |
| 17  | SDI    | Data input pin in serial mode.-Leave it OPEN when mot use.            |
| 18  | NC     | Open.                                                                 |
| 19  | NC     | Open.                                                                 |
| 20  | DATA0  | Blue Data Input Pins.<br>-- If not use pins,plese connect to GND.     |
| 21  | DATA1  |                                                                       |
| 22  | DATA2  |                                                                       |
| 23  | DATA3  |                                                                       |
| 24  | DATA4  |                                                                       |
| 25  | DATA5  |                                                                       |
| 26  | NC     | Open                                                                  |
| 27  | NC     | Open                                                                  |
| 28  | DATA6  | Green Data Input Pins.<br>--If not use pins,plese connect to GND.     |
| 29  | DATA7  |                                                                       |
| 30  | DATA8  |                                                                       |
| 31  | DATA9  |                                                                       |

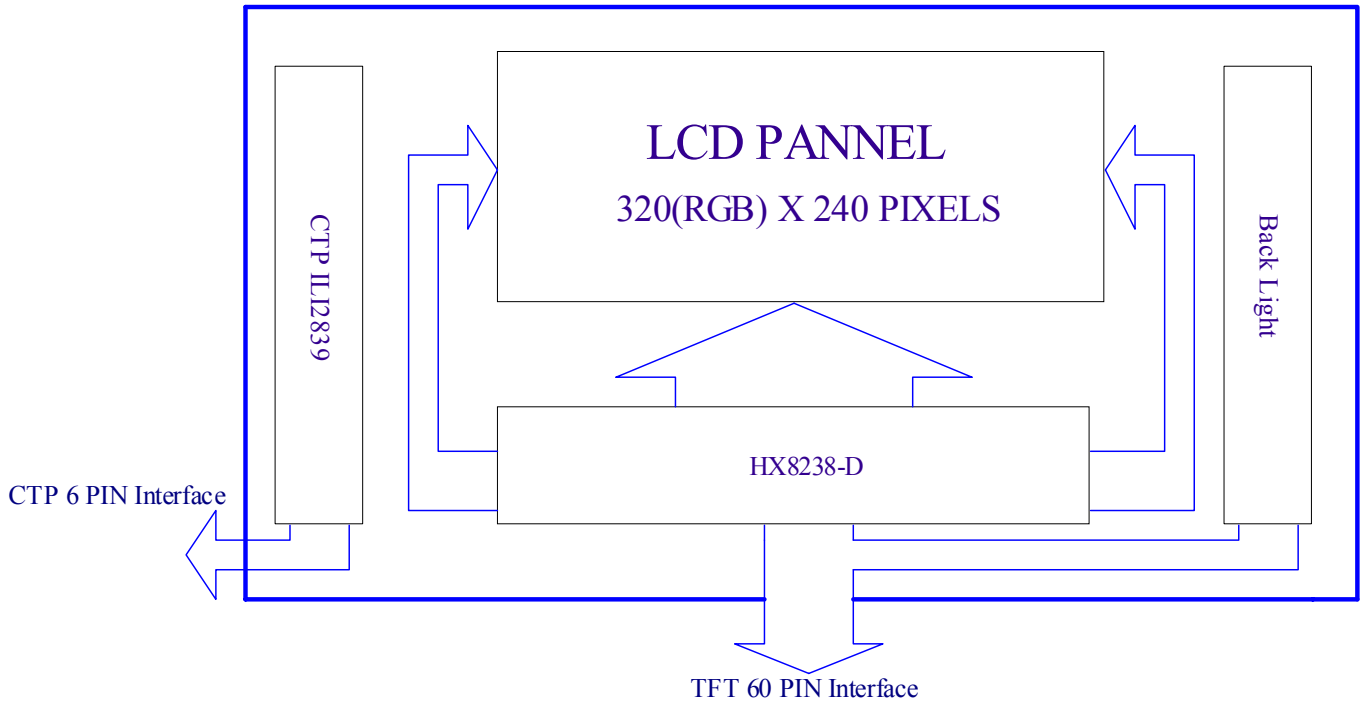


|       |        |                                                                   |
|-------|--------|-------------------------------------------------------------------|
| 32    | DATA10 |                                                                   |
| 33    | DATA11 |                                                                   |
| 34    | NC     | Open.                                                             |
| 35    | NC     | Open.                                                             |
| 36    | DATA12 | Red Data Input Pins.<br>--If not use pins, please connect to GND. |
| 37    | DATA13 |                                                                   |
| 38    | DATA14 |                                                                   |
| 39    | DATA15 |                                                                   |
| 40    | DATA16 |                                                                   |
| 41    | DATA17 |                                                                   |
| 42    | HSYNC  | Horizontal Sync Input.                                            |
| 43    | VSYNC  | Vertical Sync Input.                                              |
| 44    | DOTCLK | Dot Data Clock.                                                   |
| 45    | NC     | Open.                                                             |
| 46    | NC     | Open.                                                             |
| 47    | VCI    | Power Supply.                                                     |
| 48    | VCI    | Power Supply.                                                     |
| 49-57 | NC     | Open.                                                             |
| 58    | ENABLE | Display enable pin from controller.                               |
| 59    | GND    | Power Ground.                                                     |
| 60    | GND    | Power Ground.                                                     |

#### CTP Interface Pin

| No. | Symbol | Function                            |
|-----|--------|-------------------------------------|
| 1   | VDD    | Analog power supply.                |
| 2   | RESET  | RESET.                              |
| 3   | INT    | External interrupt pin to host.     |
| 4   | SCL    | Serial clock pin for I2C interface. |
| 5   | SDA    | Serial data pin for I2C interface.  |
| 6   | GDN    | Ground.                             |

## 9. Block Diagram:



## 10. Backlight:

1. Standard Lamp Styles (Edge Lighting Type):  
 The LED chips are distributed over the edge light area of the illumination unit, which gives the less power consumption:
2. The Main Advantages of the LED Backlight are as following:
  - 2.1 The brightness of the backlight can simply be adjusted.  
 By a resistor or a potentiometer.

### 3. Data About LED Backlight:

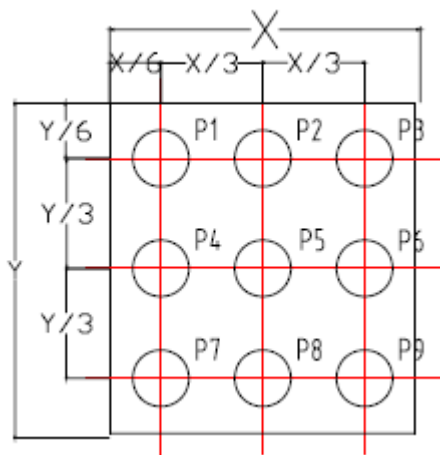
| PARAMETER                  | Sym.  | Min.  | Typ. | Max. | Unit              | Test Condition | Note |
|----------------------------|-------|-------|------|------|-------------------|----------------|------|
| Supply Current             | I     | -     | 15   | -    | mA                | V=19.2V        |      |
| Supply Voltage             | V     | -     | 19.2 | -    | V                 | If=15mA        |      |
| Reverse Voltage            | VR    | -     | -    | 5.0  | V                 | -              |      |
| Luminous Intensity for LCM | IV    | -     | 200  | -    | Cd/m <sup>2</sup> | If=15mA        | 2    |
| Uniformity for LCM         | -     | 70    |      | -    | %                 |                | 3    |
| Life Time                  | -     | 20000 |      | -    | Hr.               | If=15mA        | 4    |
| Color                      | White |       |      |      |                   |                |      |

NOTE:

1. Backlight Only
2. Average Luminous Intensity of P1-P9
3. Uniformity = Min/Max \* 100%
4. LED life time defined as follows: The final brightness is at 70% of original brightness

**Measured Method: (X\*Y: Light Area)**

**Internal Circuit Diagram**





## **11. Standard Specification for Reliability:**

### 11 - 1 Standard Specifications for Reliability of LCD Module

| No | Item                       | Description                                                                                                                                                                                         |
|----|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01 | High temperature operation | The sample should be allowed to stand at 70°C for 120 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.                       |
| 02 | Low temperature operation  | The sample should be allowed to stand at -20°C for 120 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.                      |
| 03 | High temperature storage   | The sample should be allowed to stand at 80°C for 240 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours.                      |
| 04 | Low temperature storage    | The sample should be allowed to stand at -30°C for 240 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.                         |
| 05 | Moisture storage           | The sample should be allowed to stand at 60°C,90%RH MAX for 240 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.                                  |
| 06 | Thermal shock storage      | The sample should be allowed to stand the following 10 cycles :<br>-30°C for 30 minutes → normal temperature for 5 minutes → +80°C for 30 minutes → normal temperature for 5 minutes, as one cycle. |
| 07 | Packing vibration          | Frequency range : 10Hz ~ 55Hz<br>Amplitude of vibration : 1.5mm      Sweep time: 12 min<br>X,Y,Z 2 hours for each direction.                                                                        |
| 08 | Packing drop test          | According to ISTA 1A 2001.                                                                                                                                                                          |



|    |                             |                                                     |
|----|-----------------------------|-----------------------------------------------------|
| 09 | Electrical Static Discharge | Air: $\pm 4\text{KV}$ 150pF/330 $\Omega$ 5 times    |
|    |                             | Contact: $\pm 2\text{KV}$ 150pF/330 $\Omega$ 5 time |

\*Sample size for each test item is 3~5pcs

## 11 - 2. Testing Conditions and Inspection Criteria

For the final test the testing sample must be stored at room temperature for 24 hours, after the tests listed in Table 11-1, Standard specifications for Reliability have been executed in order to ensure stability.

| No | Item                | Test Model             | In section Criteria                                                                                                |
|----|---------------------|------------------------|--------------------------------------------------------------------------------------------------------------------|
| 01 | Current Consumption | Refer To Specification | The current consumption should conform to the product specification.                                               |
| 02 | Contrast            | Refer To Specification | After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests. |
| 03 | Appearance          | Visual inspection      | Defect free.                                                                                                       |

## 11- 3. MTBF

|      |                                                                                                                                                                                                                                                                                           |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MTBF | Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature ( $25\pm 5^{\circ}\text{C}$ ), normal humidity ( $50\pm 10\%$ RH), and in area not exposed to direct sun light. |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



## **12. Specification of Quality Assurance:**

### 12-1. Purpose

This standard for Quality Assurance should affirm the quality of LCD module products to supply to purchaser by YEEBO CORPORATION (Supplier).

### 12-2. Standard for Quality Test

#### a. Inspection:

Before delivering, the supplier should take the following tests, and affirm the quality of product.

#### b. Electro-Optical Characteristics:

According to the individual specification to test the product.

#### c. Test of Appearance Characteristics:

According to the individual specification to test the product.

#### d. Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

#### e. Delivery Test:

Before delivering, the supplier should take the delivery test.

(i) Test method: According to MIL-STD105E.General Inspection Level II take a single time.

(ii) The defects classify of AQL as following:

Major defect: AQL = 0.65

Minor defect: AQL = 2.5

Total defects: AQL = 2.5

### 12-3. Non- conforming Analysis & Deal With Manners

#### a. Non- conforming Analysis:

(i) Purchaser should supply the detail data of non- conforming sample and the non-conforming.

(ii) After accepting the detail data from purchaser, the analysis of non- conforming should be finished in two weeks.

(iii) If supplier can not finish analysis on time, must announce purchaser before 3 days.

#### b. Disposition of non- conforming:

(i) If find any product defect of supplier during assembly time, supplier must change the good product for every defect after recognition.

(ii) Both supplier and customer should analyze the reason and discuss the disposition of non- conforming when the reason of nonconforming is not sure.

### 12-4. Agreement items

Both sides should discuss together when the following problems happen.

a. There is any problem of standard of quality assurance, and both sides should think that must be modified.

b. There is any argument item which does not record in the standard of quality assurance.

c. Any other special problem.

12-5. Standard of The Product Appearance Test

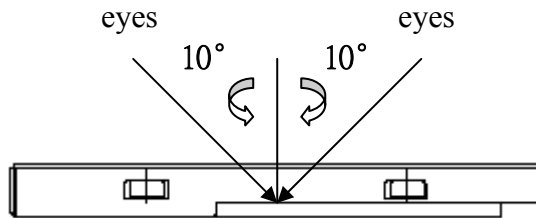
a. Manner of appearance test:

(i) The test must be under  $20W \times 2$  or  $40W$  fluorescent light, and the distance of view must be at  $30 \pm 5cm$ .

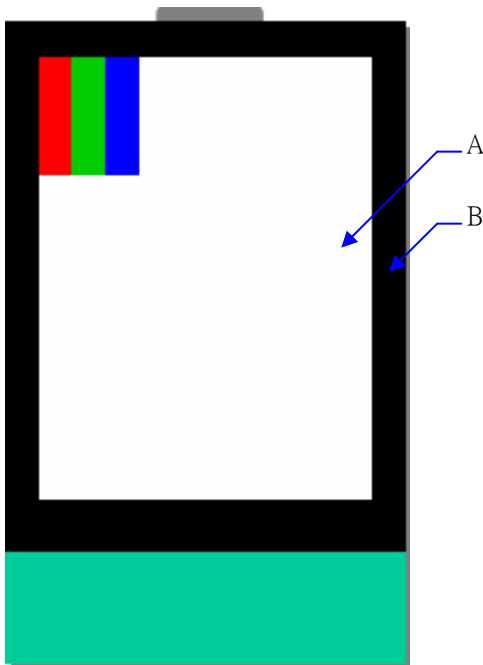
(ii) When test the model of transmissive product must add the reflective plate.

(iii) The test direction is base on around  $10^\circ$  of vertical line.

(iii) Temperature:  $25 \pm 5^\circ C$  Humidity:  $60 \pm 10\% RH$



(iv) Definition of area:



A. Area: Viewing area.

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

b. Basic principle:

(i) It will accord to the AQL when the standard can not be described.

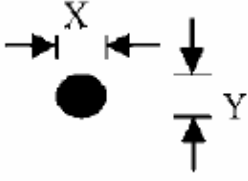
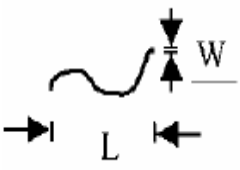
(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

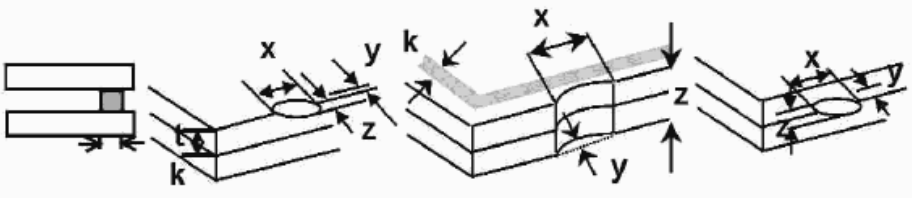
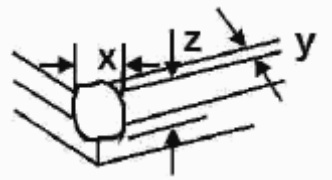
(iii) Must add new item on time when it is necessary.

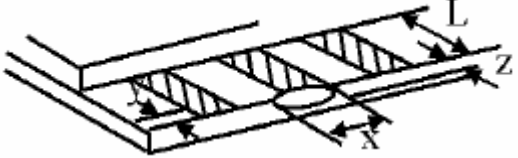
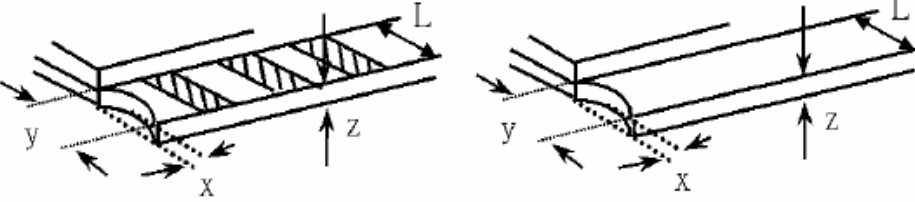
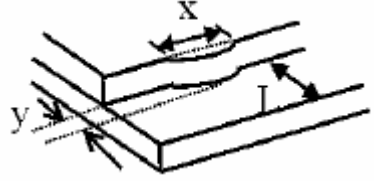
c. Standard of inspection: (Unit: mm)



12-6. Inspection specification

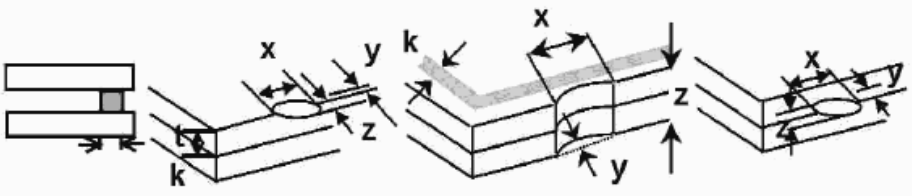
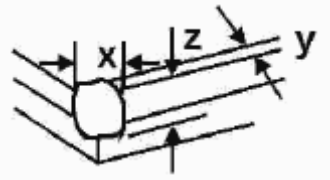
| NO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Item                                                                        | Criterion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | AQL             |                 |                  |                 |                         |   |               |           |           |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|------------------|-----------------|-------------------------|---|---------------|-----------|-----------|-----|
| 01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Electrical Testing                                                          | 1.1 Missing vertical, horizontal segment, segment contrast defect.<br>1.2 Missing character, dot or icon.<br>1.3 Display malfunction.<br>1.4 No function or no display.<br>1.5 Current consumption exceeds product specifications.<br>1.6 LCD viewing angle defect.<br>1.7 Flicker                                                                                                                                                                                                                                                                                                                | 0.65            |                 |                  |                 |                         |   |               |           |           |     |
| 02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Black or White spots or Bright spots or Color spots on LCD (Display only)   | 2.1 White and black or color spots on display $\leq 0.25\text{mm}$ , no more than Five spots.<br>2.2 Densely spaced: No more than three spots within 3mm.                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2.5             |                 |                  |                 |                         |   |               |           |           |     |
| 03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | LCD and Touch Panel black spots, white spots, contamination (non – display) | 3.1 Round type: As following drawing<br>$\Phi = (X+Y) / 2$  <table border="1" data-bbox="829 996 1364 1153"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.20</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.20 &lt; \Phi \leq 0.40</math></td> <td>5</td> </tr> <tr> <td><math>0.40 &lt; \Phi</math></td> <td>0</td> </tr> </tbody> </table> <p style="text-align: center;">* Densely spaced: No more than two spots within 3mm.</p> | Size(mm)        | Acceptable Q'ty | $\Phi \leq 0.20$ | Accept no dense | $0.20 < \Phi \leq 0.40$ | 5 | $0.40 < \Phi$ | 0         | 2.5       |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                             | Size(mm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Acceptable Q'ty |                 |                  |                 |                         |   |               |           |           |     |
| $\Phi \leq 0.20$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Accept no dense                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                 |                  |                 |                         |   |               |           |           |     |
| $0.20 < \Phi \leq 0.40$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                 |                  |                 |                         |   |               |           |           |     |
| $0.40 < \Phi$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                 |                  |                 |                         |   |               |           |           |     |
| 3.2 Line type: (As following drawing)  <table border="1" data-bbox="734 1400 1364 1635"> <thead> <tr> <th>Length(mm)</th> <th>Width(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td rowspan="2"><math>L \leq 3.0</math></td> <td><math>W \leq 0.05</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.05 &lt; W \leq 0.1</math></td> <td>5</td> </tr> <tr> <td><math>L &gt; 3.0</math></td> <td><math>0.1 &lt; W</math></td> <td>Rejection</td> </tr> </tbody> </table> <p style="text-align: center;">* Densely spaced: No more than two lines within 3mm.</p> | Length(mm)                                                                  | Width(mm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Acceptable Q'ty | $L \leq 3.0$    | $W \leq 0.05$    | Accept no dense | $0.05 < W \leq 0.1$     | 5 | $L > 3.0$     | $0.1 < W$ | Rejection | 2.5 |
| Length(mm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Width(mm)                                                                   | Acceptable Q'ty                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                 |                  |                 |                         |   |               |           |           |     |
| $L \leq 3.0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | $W \leq 0.05$                                                               | Accept no dense                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                 |                  |                 |                         |   |               |           |           |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | $0.05 < W \leq 0.1$                                                         | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |                 |                  |                 |                         |   |               |           |           |     |
| $L > 3.0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | $0.1 < W$                                                                   | Rejection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                 |                  |                 |                         |   |               |           |           |     |

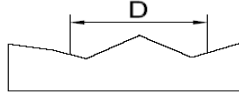
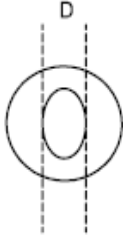
| NO                      | Item                  | Criterion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | AQL               |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
|-------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------|------------------|-----------------|-------------------------|---------------|-------------------------|-----------------|---------------|-------------------|---------------|----------------|---------------|-----------------------|---------------|--------------------|-----------------|---------------|-----|
| 04                      | Polarizer bubbles     | <p>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction</p> <table border="1" data-bbox="868 293 1366 533"> <thead> <tr> <th>Size <math>\Phi</math>(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.20</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.20 &lt; \Phi \leq 0.50</math></td> <td>3</td> </tr> <tr> <td><math>0.50 &lt; \Phi \leq 1.00</math></td> <td>2</td> </tr> <tr> <td><math>1.00 &lt; \Phi</math></td> <td>0</td> </tr> <tr> <td>Total Q'ty</td> <td>3</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Size $\Phi$ (mm)  | Acceptable Q'ty | $\Phi \leq 0.20$ | Accept no dense | $0.20 < \Phi \leq 0.50$ | 3             | $0.50 < \Phi \leq 1.00$ | 2               | $1.00 < \Phi$ | 0                 | Total Q'ty    | 3              | 2.5           |                       |               |                    |                 |               |     |
| Size $\Phi$ (mm)        | Acceptable Q'ty       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $\Phi \leq 0.20$        | Accept no dense       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $0.20 < \Phi \leq 0.50$ | 3                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $0.50 < \Phi \leq 1.00$ | 2                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $1.00 < \Phi$           | 0                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| Total Q'ty              | 3                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| 05                      | Scratches             | Follow NO.3 -2 Line Type.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| 06                      | Chipped glass         | <p>Symbols:<br/> x: Chip length      y: Chip width      z: Chip thickness<br/> k: Seal width      t: Glass thickness      a: LCD side length<br/> L: Electrode pad length</p> <p>6.1 General glass chip:<br/> 6.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="416 1021 1235 1178"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td><math>Z \leq 1/2t</math></td> <td>Not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> <tr> <td><math>1/2t &lt; z \leq 2t</math></td> <td>Not exceed 1/3k</td> <td><math>x \leq 1/8a</math></td> </tr> </tbody> </table> <p>⊙ Unit: mm<br/> ⊙ If there are 2 or more chips, x is the total length of each chip</p> <p>6.1.2 Corner crack:</p>  <table border="1" data-bbox="416 1541 1235 1697"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td><math>Z \leq 1/2t</math></td> <td>Not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> <tr> <td><math>1/2t &lt; z \leq 2t</math></td> <td>Not exceed 1/3k</td> <td><math>x \leq 1/8a</math></td> </tr> </tbody> </table> <p>⊙ Unit: mm<br/> ⊙ If there are 2 or more chips, x is the total length of each chip</p> | z: Chip thickness | y: Chip width   | x: Chip length   | $Z \leq 1/2t$   | Not over viewing area   | $x \leq 1/8a$ | $1/2t < z \leq 2t$      | Not exceed 1/3k | $x \leq 1/8a$ | z: Chip thickness | y: Chip width | x: Chip length | $Z \leq 1/2t$ | Not over viewing area | $x \leq 1/8a$ | $1/2t < z \leq 2t$ | Not exceed 1/3k | $x \leq 1/8a$ | 2.5 |
| z: Chip thickness       | y: Chip width         | x: Chip length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $Z \leq 1/2t$           | Not over viewing area | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $1/2t < z \leq 2t$      | Not exceed 1/3k       | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| z: Chip thickness       | y: Chip width         | x: Chip length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $Z \leq 1/2t$           | Not over viewing area | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |
| $1/2t < z \leq 2t$      | Not exceed 1/3k       | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |                 |                  |                 |                         |               |                         |                 |               |                   |               |                |               |                       |               |                    |                 |               |     |

| NO                    | Item           | Criterion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | AQL           |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
|-----------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|-------------------|-----------------------|---------------|----------------|---------------|----------------|-------------------|------------|---------------|----------------|----------|-----------|---------------|------------|-----|
| 07                    | Glass crack    | <p>Symbols:<br/>           x: Chip length      y: Chip width      z: Chip thickness<br/>           k: Seal width      t: Glass thickness      a: LCD side length<br/>           L: Electrode pad length</p> <p>7.2 Protrusion over terminal:<br/>           7.2.1 Chip on electrode pad:</p>  <table border="1" data-bbox="555 678 1233 826"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq 0.5\text{mm}</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table> <p>7.2.2<br/>           Non-conductive portion:</p>  <table border="1" data-bbox="555 1193 1233 1341"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq L</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table> <p>⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.<br/>           ⊙ If the product will be heat sealed by the customer, the alignment mark must not be damaged.</p> <p>7.2.3 Substrate protuberance and internal crack</p>  <table border="1" data-bbox="880 1668 1318 1816"> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td><math>y \leq 1/3L</math></td> <td><math>X \leq a</math></td> </tr> </table> | y: Chip width | x: Chip length | z: Chip thickness | $y \leq 0.5\text{mm}$ | $x \leq 1/8a$ | $0 < z \leq t$ | y: Chip width | x: Chip length | z: Chip thickness | $y \leq L$ | $x \leq 1/8a$ | $0 < z \leq t$ | y: width | x: length | $y \leq 1/3L$ | $X \leq a$ | 2.5 |
| y: Chip width         | x: Chip length | z: Chip thickness                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
| $y \leq 0.5\text{mm}$ | $x \leq 1/8a$  | $0 < z \leq t$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
| y: Chip width         | x: Chip length | z: Chip thickness                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
| $y \leq L$            | $x \leq 1/8a$  | $0 < z \leq t$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
| y: width              | x: length      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |
| $y \leq 1/3L$         | $X \leq a$     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |               |                |                   |                       |               |                |               |                |                   |            |               |                |          |           |               |            |     |



| NO | Item               | Criterion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | AQL                                      |
|----|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| 08 | Cracked glass      | The LCD with extensive crack is not acceptable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2.5                                      |
| 09 | Backlight elements | 9.1 Illumination source flickers when lit.<br>9.2 Spots or scratches that appear when lit must be judged.<br>Using LCD spot, lines and contamination standards.<br>9.3 Backlight doesn't light or color is wrong.                                                                                                                                                                                                                                                                                                                                                                                        | 2.5<br>2.5<br>0.65                       |
| 10 | Bezel              | Bezel must comply with product specifications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2.5                                      |
| 11 | PCB、COB            | 11.1 COB seal may not have pinholes larger than 0.2mm or contamination.<br>11.2 COB seal surface may not have pinholes through to the IC.<br>11.3 The height of the COB should not exceed the height indicated in the assembly diagram.<br>11.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places.<br>11.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts.<br>11.6 The jumper on the PCB should conform to the product characteristic chart. | 2.5<br>2.5<br>2.5<br>2.5<br>0.65<br>0.65 |
| 12 | FPC                | 12.1 FPC terminal damage $\leq$ 1/2 FPC terminal width and can not affect the function , we judge accept.<br>12.2 FPC alignment hole damage $\leq$ 1/2 alignment area and can not affect the function , we judge accept.                                                                                                                                                                                                                                                                                                                                                                                 | 2.5<br>2.5                               |
| 13 | Soldering          | 13.1 No cold solder joints, missing solder connections, oxidation or icicle.<br>13.2 No short circuits in components on PCB or FPC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2.5<br>0.65                              |

| NO                | Item                                   | Criterion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | AQL               |               |                |            |                                        |               |                   |               |                |            |                                        |               |     |
|-------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|----------------|------------|----------------------------------------|---------------|-------------------|---------------|----------------|------------|----------------------------------------|---------------|-----|
| 14                | Touch Panel Chipped glass              | <p>Symbols:<br/>           x: Chip length                      y: Chip width                      z: Chip thickness<br/>           k: Seal width                      t: Touch Panel Total thickness    a: LCD side length<br/>           L: Electrode pad length</p> <p>14.1 General glass chip:<br/>           14.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="416 801 1235 1014"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td><math>Z \leq t</math></td> <td><math>\leq 1/2 k</math> and not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> </table> <p>⊙ Unit: mm<br/>           ⊙ If there are 2 or more chips, x is the total length of each chip</p> <p>14.1.2 Corner crack:</p>  <table border="1" data-bbox="416 1395 1235 1608"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td><math>z \leq t</math></td> <td><math>\leq 1/2 k</math> and not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> </table> <p>⊙ Unit: mm<br/>           ⊙ If there are 2 or more chips, x is the total length of each chip</p> | z: Chip thickness | y: Chip width | x: Chip length | $Z \leq t$ | $\leq 1/2 k$ and not over viewing area | $x \leq 1/8a$ | z: Chip thickness | y: Chip width | x: Chip length | $z \leq t$ | $\leq 1/2 k$ and not over viewing area | $x \leq 1/8a$ | 2.5 |
| z: Chip thickness | y: Chip width                          | x: Chip length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |               |                |            |                                        |               |                   |               |                |            |                                        |               |     |
| $Z \leq t$        | $\leq 1/2 k$ and not over viewing area | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |               |                |            |                                        |               |                   |               |                |            |                                        |               |     |
| z: Chip thickness | y: Chip width                          | x: Chip length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |               |                |            |                                        |               |                   |               |                |            |                                        |               |     |
| $z \leq t$        | $\leq 1/2 k$ and not over viewing area | $x \leq 1/8a$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |               |                |            |                                        |               |                   |               |                |            |                                        |               |     |

| NO        | Item                                          | Criterion                                                                                                                                                                                                                                                                                                                                                                          | AQL             |                 |                 |                 |                    |   |                    |   |           |   |                                                                                                                                                                      |     |
|-----------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|--------------------|---|--------------------|---|-----------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 15        | Touch Panel(Fish eye、dent and bubble on film) | <table border="1"> <thead> <tr> <th>SIZE(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.2</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.2 &lt; D \leq 0.4</math></td> <td>5</td> </tr> <tr> <td><math>0.4 &lt; D \leq 0.5</math></td> <td>2</td> </tr> <tr> <td><math>0.5 &lt; D</math></td> <td>0</td> </tr> </tbody> </table> | SIZE(mm)        | Acceptable Q'ty | $\Phi \leq 0.2$ | Accept no dense | $0.2 < D \leq 0.4$ | 5 | $0.4 < D \leq 0.5$ | 2 | $0.5 < D$ | 0 |   | 2.5 |
|           |                                               | SIZE(mm)                                                                                                                                                                                                                                                                                                                                                                           | Acceptable Q'ty |                 |                 |                 |                    |   |                    |   |           |   |                                                                                                                                                                      |     |
|           |                                               | $\Phi \leq 0.2$                                                                                                                                                                                                                                                                                                                                                                    | Accept no dense |                 |                 |                 |                    |   |                    |   |           |   |                                                                                                                                                                      |     |
|           |                                               | $0.2 < D \leq 0.4$                                                                                                                                                                                                                                                                                                                                                                 | 5               |                 |                 |                 |                    |   |                    |   |           |   |                                                                                                                                                                      |     |
|           |                                               | $0.4 < D \leq 0.5$                                                                                                                                                                                                                                                                                                                                                                 | 2               |                 |                 |                 |                    |   |                    |   |           |   |                                                                                                                                                                      |     |
| $0.5 < D$ | 0                                             |                                                                                                                                                                                                                                                                                                                                                                                    |                 |                 |                 |                 |                    |   |                    |   |           |   |                                                                                                                                                                      |     |
| 16        | Touch Panel Newton ring                       | Newton ring dimension $\leq 1/2$ touch panel area and not affect font and line distortion( $\leq 2.5\%$ ), it is acceptable.                                                                                                                                                                                                                                                       | 2.5             |                 |                 |                 |                    |   |                    |   |           |   |                                                                                                                                                                      |     |
| 17        | Touch Panel Linearity                         | Less than 2.5% is acceptable.                                                                                                                                                                                                                                                                                                                                                      | 2.5             |                 |                 |                 |                    |   |                    |   |           |   |                                                                                                                                                                      |     |
| 18        | LCD Ripple                                    | Touch the touch panel , can not see the LCD ripple.<br>Pen: R 1.0mm silicon rubber.<br>Operation Force: 80g                                                                                                                                                                                                                                                                        | 2.5             |                 |                 |                 |                    |   |                    |   |           |   |                                                                                                                                                                      |     |
| 19        | General appearance                            | 19.1 Product packaging must the same as specified on packaging specification sheet.                                                                                                                                                                                                                                                                                                | 0.65            |                 |                 |                 |                    |   |                    |   |           |   |                                                                                                                                                                      |     |
|           |                                               | 19.2 Product dimension and structure must conform to product specification sheet.                                                                                                                                                                                                                                                                                                  | 0.65            |                 |                 |                 |                    |   |                    |   |           |   |                                                                                                                                                                      |     |



## **13. Handling Precaution:**

### 13-1 Handling of LCM

- Don't give external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance. Must not lick and swallow. when the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.
- The operators should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.
- The modules should be kept in antistatic bags or other containers resistant to static for storage.
- The module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

### 13-2 Storage

- Store in an ambient temperature of  $25\pm 10^{\circ}\text{C}$ , and in a relative humidity of  $50\pm 10\%\text{RH}$ . Don't expose to sunlight or fluorescent light.
- Storage in a clean environment, free from dust, active gas, and solvent.
- Store in anti-static electricity container.
- Store without any physical load.

### 13-3 Soldering

- Use only soldering irons with proper grounding and no leakage.
- Iron: No higher than  $280\pm 10^{\circ}\text{C}$  and less than 3 sec during Hand soldering.
- Rewiring: no more than 2 times.

## **14. Guarantee:**

Our products could meet requirements of the environment.  
YB's RoHS is introduce European Union Directive 2011/65/EU (ROHS)  
Requirements and Update