



# 深圳市知行者电子有限公司

## APPROVAL SHEET

### 承认书

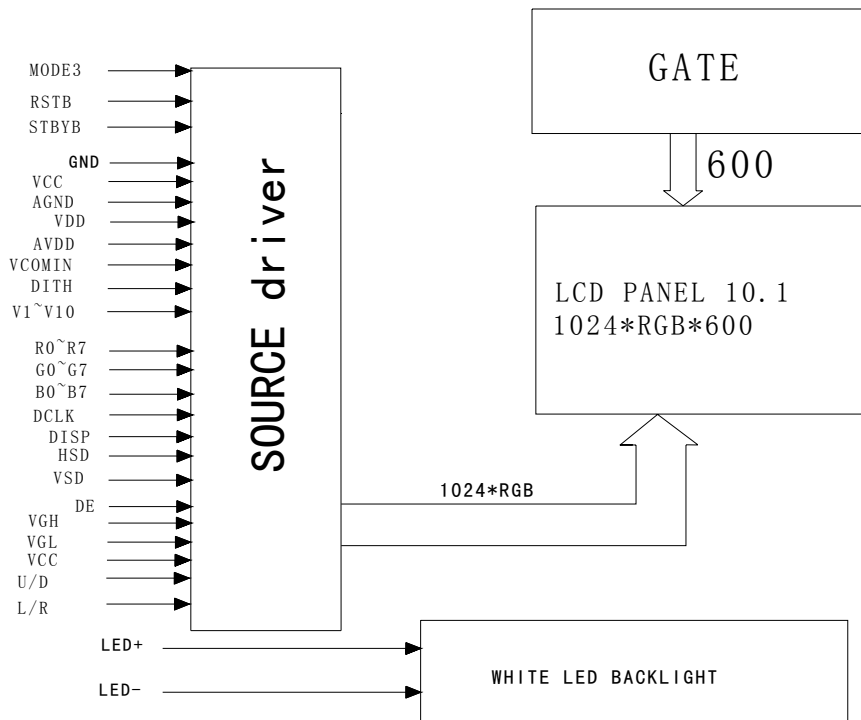
|                                  |   |
|----------------------------------|---|
| Customer<br>客户名称                 |   |
| Part NO.<br>产品型号                 | CC0101T50R-01   |
| Product type<br>产品内容             | Mode: Transmissive type .Normally white.<br>TFT LCD Module<br>LCD Module: Graphic 1024RGB*600Dot-matrix                                 |
| Remarks<br>备注栏                   | <input type="checkbox"/> APPROVAL FOR SEPCIFICATIONS ONLY<br><input checked="" type="checkbox"/> APPROVAL FOR SEPCIFICATIONS AND SAMPLE |
| Signature by Customer:<br>客户确认签章 |   |

| Issued by | Checked by | Approved by |
|-----------|------------|-------------|
|           |            |             |

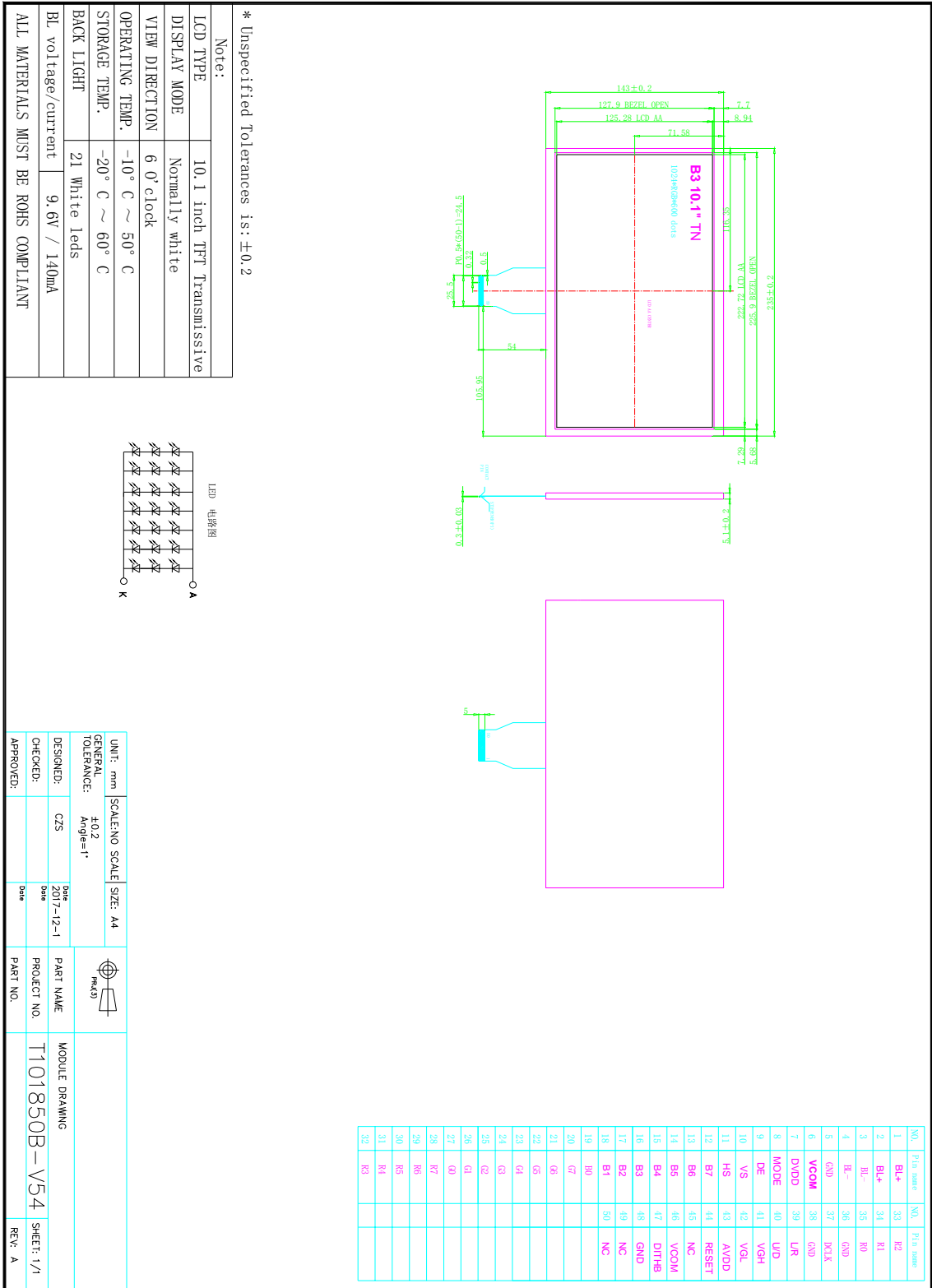
## 1. PHYSICAL DATA

| Item                | Contents                | Unit            |
|---------------------|-------------------------|-----------------|
| LCD type            | TFT TRANSMISSIVE        | ---             |
| Viewing direction   | 6                       | o'clock         |
| Module size (W×H×T) | 235 × 143 × 5.1         | mm <sup>3</sup> |
| Active area(W×H)    | 222.72×125.28           | mm <sup>2</sup> |
| Number of dots(W×H) | 1024(RGB) × 600         | dots            |
| Pixel Pitch(H×V)    | 0.2175×0.2088           | mm              |
| Driver IC           | EK79001                 | ---             |
| Colors              | 16.7M                   | ---             |
| Backlight Type      | 21 white leds 9.6/140mA | ---             |
| Interface Type      | RGB                     | ---             |

## 2. BLOCK DIAGRAM



### 3. Mechanical Dimension



## 4. Pin Descriptions

| Pin No. | Symbol | Functional  |
|---------|--------|---|
| 1       | BL +   | LED Anode   |
| 2       | BL +   | LED Anode   |
| 3       | BL -   | LED Cathode   |
| 4       | BL -   | LED Cathode   |
| 5       | GND    | Digital Ground  |
| 6       | VCOM   | For external VCOM DC input  |
| 7       | DVDD   | Digital Power   |
| 8       | MODE   | DE/SYNC mode select<br>MODE=H: DE mode( normally pull high)<br>MODE=L: HSD/VSD mode   |
| 9       | DE     | Data enable signal  |
| 10      | VSYNC  | Vertical sync input.Negative polarity   |
| 11      | HSYNC  | Horizontal sync input.Negative polarity   |
| 12~19   | B7~B0  | Blue data Input   |
| 20~27   | G7~G0  | Green data Input  |
| 28~35   | R7~R0  | Red data Input  |
| 36      | GND    | Digital Ground  |
| 37      | DCLK   | Clock input   |
| 38      | GND    | Digital Ground  |
| 39      | L/R    | Source right or left sequence control<br>SHLR=H: right shift, Left → Right<br>SHLR=L: left right, Right → Left  |
| 40      | U/D    | Gate up or down scan control<br>UPDN=H: up shift, Down → Up<br>UPDN=L: down shift, Up → Down  |
| 41      | VGH    | Positive Power for TFT  |
| 42      | VGL    | Negative Power for TFT  |
| 43      | AVDD   | Analog Power  |
| 44      | RSTB   | Global reset pin.Active low to enter reset state<br>Suggest to connecting with an RC reset circuit for stability.<br>Normally pull high. (RC circuit :R=10K Ω , C=1uF)) |
| 45      | NC     | Not connect   |
| 46      | VCOM   | For external VCOM DC input  |
| 47      | DITHB  | Dithering setting   |
| 48      | GND    | Digital Ground  |
| 49      | NC     | Not connect   |
| 50      | NC     | Not connect   |

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## 5. ABSOLUTE MAXIMUM RATINGS

5.1 (GND=AGND=0V)

| Parameter             | Symbol           | Min  | Max    | Unit |
|-----------------------|------------------|------|--------|------|
| Power supply1         | V <sub>DD</sub>  | -0.5 | +3.96  | V    |
| Power supply2         | Avdd             | -0.5 | +13.85 | V    |
| Operating temperature | T <sub>OPR</sub> | -10  | 50     | °C   |
| Storage temperature   | T <sub>STG</sub> | -20  | 60     | °C   |

### 5.2 Input voltage refer list

| Parameter                    | Symbol           | Value | Unit | Remarks |
|------------------------------|------------------|-------|------|---------|
| TFT Gate ON Voltage          | V <sub>GH</sub>  | 21    | V    |         |
| TFT Gate Off Voltage         | V <sub>GL</sub>  | -8    | V    |         |
| TFT Common Electrode Voltage | V <sub>COM</sub> | 3.8   | V    | *       |
| Analog Power Supply Voltage  | AVDD             | 10.85 | V    |         |

Note: Please adjust Vcom to make the flicker level be minimum

## 6. DC ELECTRICAL CHARACTERISTICS

| Parameter                           | Symbol | Condition  | Min.     | Typ.   | Max.     | Unit |
|-------------------------------------|--------|--|----------|--------|----------|------|
| Low level input voltage             | Vil    | For the digital circuit                                    | 0        | -      | 0.3×VDD  | V    |
| High level input voltage            | Vih    | For the digital circuit                                    | 0.7×VDD  | -      | VDD      | V    |
| Input leakage current               | Ii     | For the digital circuit                                    | -        | -      | ±1       | µA   |
| High level output voltage           | Voh    | Ioh= -400 µA   | VDD-0.4  | -      | -        | V    |
| Low level output voltage            | Vol    | Iol= +400 µA   | -        | -      | GND+0.4  | V    |
| Pull low/high resistor              | Ri     | For the digital input pin @ VDD=3.3V                       | 200K     | 250K   | 300K     | ohm  |
| Digital Operation current           | Idd    | Fclk=65 MHz, FLD=50KHz, VDD=3.3V                           | -        | 15     | 25       | mA   |
| Digital Stand-by current            | Ist1   | Clock and all functions are stopped                        | -        | 10     | 50       | µA   |
| Analog Operating Current            | Idda   | No load, Fclk=65MHz, FLD=50KHz @ AVDD=10V, V1=8V, V14=0.4V | -        | 10     | 12       | mA   |
| Analog Stand-by current             | Ist2   | No load, Clock and all functions are Stopped               | -        | 10     | 50       | µA   |
| Input level of V1 ~ V7              | Vref1  | Gamma correction voltage input                             | 0.4*AVDD | -      | AVDD-0.1 | V    |
| Input level of V8 ~ V14             | Vref2  | Gamma correction voltage input                             | 0.1      | -      | 0.6*AVDD | V    |
| Output Voltage deviation            | Vod1   | Vo = AVSS+0.1V ~ AVSS+0.5V and Vo = AVDD-0.5V ~ AVDD-0.1V  | -        | ±20    | ±35      | mV   |
| Output Voltage deviation            | Vod2   | Vo = AVSS+0.5V ~ AVDD-0.5V                                 | -        | ±15    | ±20      | mV   |
| Output Voltage Offset between Chips | Voc    | Vo = AVSS+0.5V ~ AVDD-0.5V                                 | -        | -      | ±20      | mV   |
| Dynamic Range of Output             | Vdr    | SO1 ~ SO1536   | 0.1      | -      | AVDD-0.1 | V    |
| Sinking Current of Outputs          | IOLy   | SO1 ~ SO1536; Vo=0.1V v.s 1.0V , AVDD=13.5V                | 80       | -      | -        | µA   |
| Driving Current of Outputs          | IOHy   | SO1 ~ SO1536; Vo=13.4V v.s 12.5V , AVDD=13.5V              | 80       | -      | -        | µA   |
| Resistance of Gamma Table           | Rg     | Rn: Internal gamma resistor                                | 0.7*Rn   | 1.0*Rn | 1.3*Rn   | ohm  |

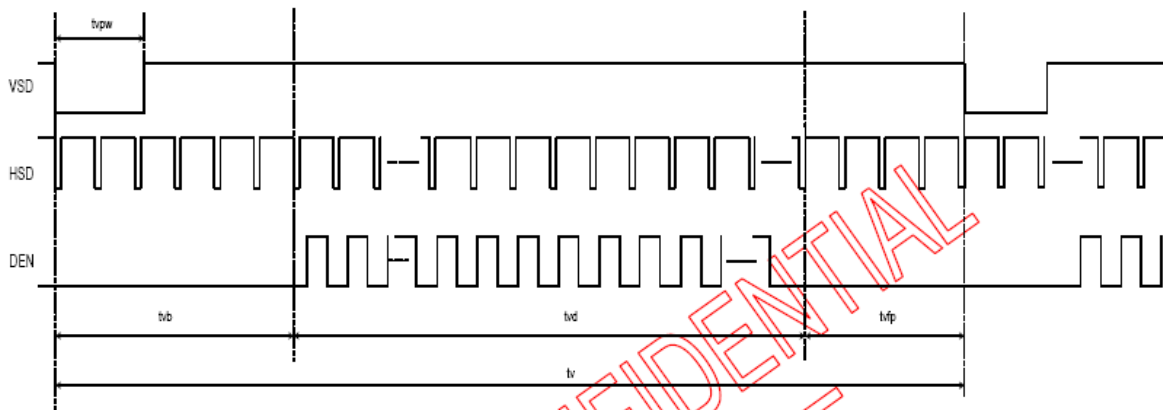
## 7. TTL MODE AC ELECTRICAL CHARACTERISTICS

TTL mode

| Parameter              | Symbol | Condition                         | Min. | Typ. | Max. | Unit |
|------------------------|--------|-----------------------------------|------|------|------|------|
| VDD Power On Slew rate | TPOR   | From 0V to 90% VDD                | 1    | -    | 20   | ms   |
| RST pulse width        | TRST   | DCLK = 65MHz                      | 50   | -    | -    | us   |
| DCLK cycle time        | Tcph   | -                                 | 14   | -    | -    | ns   |
| DCLK pulse duty        | Tcwh   | -                                 | 40   | 50   | 60   | %    |
| VSD setup time         | Tvst   | -                                 | 5    | -    | -    | ns   |
| VSD hold time          | Tvhd   | -                                 | 5    | -    | -    | ns   |
| HSD setup time         | Thst   | -                                 | 5    | -    | -    | ns   |
| HSD hold time          | Thhd   | -                                 | 5    | -    | -    | ns   |
| Data set-up time       | Tdsu   | D0[7:0], D1[7:0], D2[7:0] to DCLK | 5    | -    | -    | ns   |
| Data hold time         | Tdhd   | D0[7:0], D1[7:0], D2[7:0] to DCLK | 5    | -    | -    | ns   |
| DE setup time          | Tesu   | -                                 | 5    | -    | -    | ns   |
| DE hold time           | Tehd   | -                                 | 5    | -    | -    | ns   |
| Output stable time     | Tsst   | Dual gate                         | -    | -    | 3    | us   |

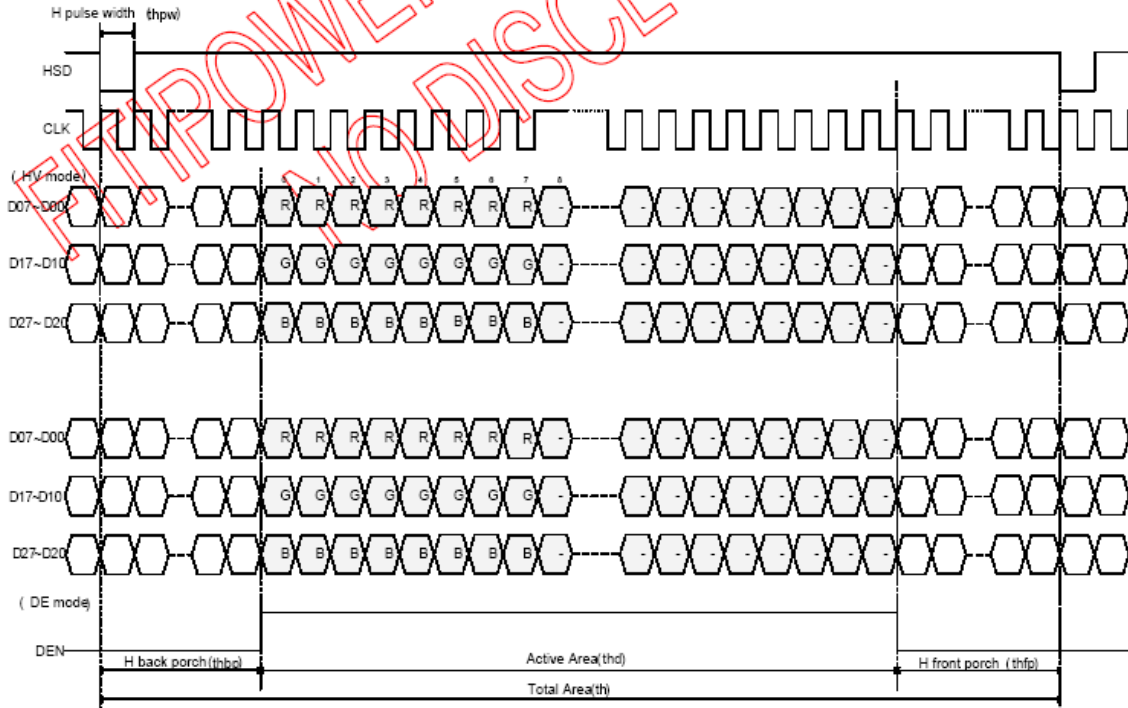
## 8. Data input format for RGB

### 8.1 For 24-Bit RGB input



Vertical input timing

### 6.8.2. Horizontal input timing



Horizontal input timing

DE mode

| Parameter                       | Symbol   | Value |      |      | Unit |
|---------------------------------|----------|-------|------|------|------|
|                                 |          | Min.  | Typ. | Max. |      |
| DCLK frequency @Frame rate=60hz | fclk     | 40.8  | 51.2 | 67.2 | Mhz  |
| Horizontal display area         | thd      | 1024  |      |      | DCLK |
| HSYNC period time               | th       | 1114  | 1344 | 1400 | DCLK |
| HSYNC blanking                  | thb+thfp | 90    | 320  | 376  | DCLK |
| Vertical display area           | tvd      | 600   |      |      | H    |
| VSYNC period time               | tv       | 610   | 635  | 800  | H    |
| VSYNC blanking                  | tvb+tvfp | 10    | 35   | 200  | H    |



HV mode(1)

| HV mode<br>Horizontal input timing |        |       |      |      |      |
|------------------------------------|--------|-------|------|------|------|
| Parameter                          | Symbol | Value |      |      | Unit |
| Horizontal display area            | thd    | 1024  |      |      | DCLK |
| DCLK frequency@ Frame rate=60hz    | fclk   | Min.  | Typ. | Max. | Mhz  |
|                                    |        | 44.9  | 51.2 | 63   |      |
| 1 Horizontal Line                  | th     | 1200  | 1344 | 1400 | DCLK |
| HSYNC pulse width                  | thpw   | Min.  | 1    |      |      |
|                                    |        | Typ.  | -    |      |      |
|                                    |        | Max.  | 140  |      |      |
| HSYNC back porch                   | thbp   | 160   | 160  | 160  |      |
| HSYNC front porch                  | thfp   | 16    | 160  | 216  |      |

HV mode(2)

| Vertical input timing |        |       |      |      |      |
|-----------------------|--------|-------|------|------|------|
| Parameter             | Symbol | Value |      |      | Unit |
|                       |        | Min.  | Typ. | Max. |      |
| Vertical display area | tvd    | 600   |      |      | H    |
| VSYNC period time     | tv     | 624   | 635  | 750  | H    |
| VSYNC pulse width     | tvpw   | 1     | -    | 20   | H    |
| VSYNC back porch      | tvb    | 23    | 23   | 23   | H    |
| VSYNC front porch     | tvfp   | 1     | 12   | 127  | H    |

## 9. Backlight Characteristic

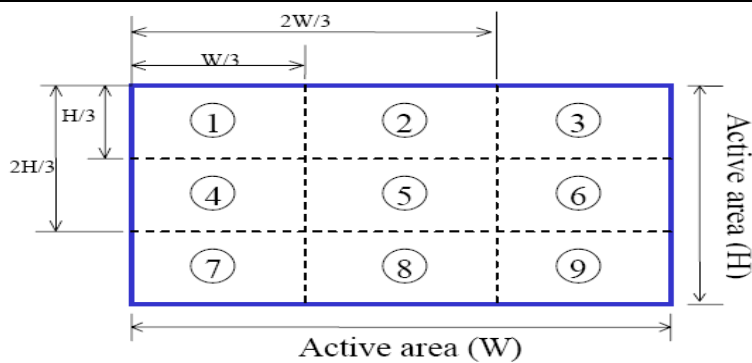
| Item                              | Symbol           | Min | Typical | Max | Unit |
|-----------------------------------|------------------|-----|---------|-----|------|
| LED module Forward voltage        | V <sub>LED</sub> | --  | 9.6     | --  | V    |
| LED module current                | I <sub>LED</sub> | --  | 140     | --  | mA   |
| L/G Surface Luminance ★1          | L <sub>S</sub>   | --  | TBD     | --  | mcd  |
| LCM Surface brightness uniform ★2 | L <sub>D</sub>   | 80  | --      | --  | %    |

★ 1 Test condition is:

- (a) Center point on active area.
- (b)Best Contrast.

★2 Uniform measure condition:

- (1)Measure 9 point. Measure location show below;
- (2)Uniform=(Min. brightness /Max. brightness)\*100%
- (3)Best Contrast.



## 10. Electro-optical Characteristics

| Parameter                |      | Symbol    | Condition      | Min. | Typ. | Max. | Unit | Remark |
|--------------------------|------|-----------|----------------|------|------|------|------|--------|
| Viewing angle range      | Hor. | $\phi 3$  | $CR \geq 10$   |      | 60   |      | Deg. |        |
|                          |      | $\phi 9$  |                |      | 60   | Deg. |      |        |
|                          | Ver. | $\phi 12$ |                |      | 70   | Deg. |      |        |
|                          |      | $\phi 6$  |                |      | 60   | Deg. |      |        |
| Color gamut (C light)    |      |           |                | 50   |      | %    |      |        |
| Luminance Contrast ratio |      | T (%)     | $\phi 0^\circ$ |      | 600  |      |      |        |
| Response Time            |      | TRT       | Temp=25° C     |      | 8    |      | ms   |        |

## 11. Reliability

### 11.1 Mtbf

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal

### 11.2 Test condition

| N O. | ITEM   | CONDITION                                   | CRITERION   |
|------|--|---|---|
| 1    | High Temperature Non-Operating Test          | 60°C*240Hrs                                 | <ul style="list-style-type: none"> <li>No Defect Of Operational Function In Room</li> <li>Temperature Are Allowable</li> <li>IDD of LCM in Pre-and Post-Test Should Follow Specification</li> </ul> |
| 2    | Low Temperature Non-Operating Test           | -20°C*240Hrs                                |   |
| 3    | High Temperature/Humidity Non Operating Test | 60°C*90%RH*240Hrs                           |   |
| 4    | High Temperature Operating Test              | 50°C*240Hrs                                 |   |
| 5    | Low Temperature Operating Test               | -10°C*240Hrs                                |   |
| 6    | Thermal Shock Test                           | -10 °C (30Min) ~ 50 °C (30Min)<br>*10CYCLES |   |

Notes:

1. Judgments should be made after exposure in room temperature for two hours.
2. The distill water is used for the high temperature/humidity test.
3. The sample above is individually for every reliability tests condition.

## 12. Inspection standards

1.AQL(Acceptable Quality Level

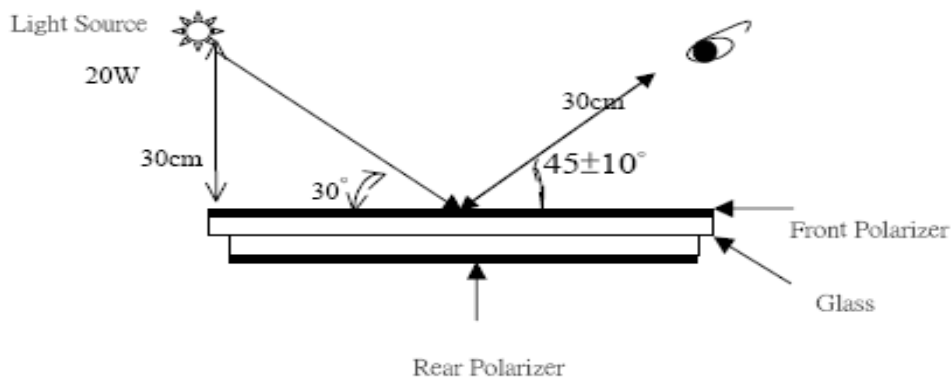
AQL of major and minor defect.

|     | MAJOR DEFECT | MINOR DEFECT |
|-----|--------------|--------------|
| AQL | 0.65         | 1.5          |

### 2. Basic conditions for inspection

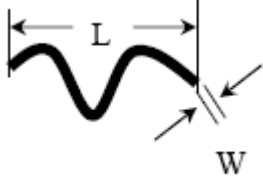
The LCM face to us, in normal environment, the lux is  $1000 \pm 200$ . (Darkroom's lux:  $100 \pm 50$ ), About an angle of incidence  $30^\circ$ , a distance of 30 cm with an angle of  $45 \pm 10^\circ$  to check the products without uncovering the film!

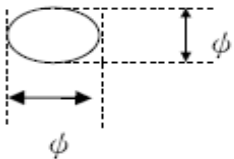
(As shown below)



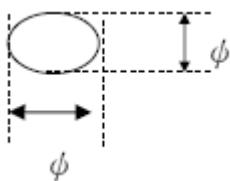
### 3. Inspection item and criteria

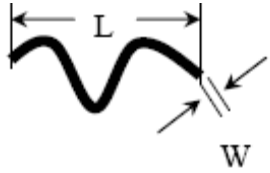
#### 3.1 LCD appearance defect(View area)

| NO | Defect item  | Criteria   |           | Remark  |
|----|--|--|-----------|---|
| 1  | Fiber、 glass cratch、 polarizer scratch/folded (minor defect) | Specification  | Allowable | note1:L: Length, W: Width<br>note2: disregard if out of AA<br> |
|    |  | $W \leq 0.03\text{mm}$   | disregard |   |
|    |  | $0.03\text{mm} < W \leq 0.05\text{mm};$<br>$L \leq 3.0\text{mm}$ | 2         |   |
|    |  | $0.05\text{mm} < W \leq 0.1\text{mm};$<br>$L \leq 3.0\text{mm}$  | 1         |   |
|    | $W > 0.1\text{mm}; L > 3.0\text{mm}$                         | 0  |           |   |
| 2  | Polarizer bubble、 concave and convex (minor defect)          | $\phi \leq 0.2\text{mm}$   | disregard | note1: $\phi = (L+W)/2$ , L:Length, W :Width<br>note2:disregard if out of AA  |
|    |  | $0.2\text{mm} < \phi \leq 0.3\text{mm}$                          | 2         |   |
|    |  | $0.3\text{mm} < \phi \leq 0.5\text{mm}$                          | 1         |   |
|    |  | $0.5\text{mm} < \phi$  | 0         |   |
| 3  | Black dots、 dirty dots、                                      | $\phi \leq 0.15\text{mm}$  | disregard | note2:disregard if out of AA  |

|   |  |   |           |  |
|---|--|---|-----------|--|
|   | impurities、 eye winker<br>(minor defect) | $0.15\text{mm} < \phi \leq 0.25\text{mm}$ | 2         |           |
|   |  | $0.25\text{mm} < \phi \leq 0.3\text{mm}$  | 1         |  |
|   |  | $0.3\text{mm} < \phi$                     | 0         |  |
| 4 | Polarizer prick<br>(minor defect)        | $\phi \leq 0.1\text{mm}$                  | disregard | note1: $\phi = (L+W)/2$ , L=Length,<br>W=Width<br>note2:the distance between two<br>dots>5mm |
|   |  | $0.1\text{mm} < \phi \leq 0.25\text{mm}$  | 3         |  |
|   |  | $\phi > 0.25\text{mm}$                    | 0         |  |

### 3.2Electrical criteria

| NO | Defect item  | Criteria                                    | Remark            |   |
|----|--|---|-------------------|---|
| 1  | No display<br>(major defect)                                   | No display<br>【Reject】                      |                   |   |
| 2  | Missing line<br>(major defect)                                 | Missing line<br>【Reject】                    |                   |   |
| 3  | Seg-com light and dark<br>(major defect)                       | Seg-com light and dark<br>【Reject】          | ND filter 2% test |   |
| 4  | No display in immobility<br>(major defect)                     | No display in immobility<br>【Reject】        |                   |   |
| 5  | Flicker of Pattern<br>(major defect)                           | Flicker of Pattern<br>【Reject】              |                   |   |
| 6  | Mura<br>(major defect)   | ND filter 2%test                            |                   |   |
| 7  | Over current<br>(major defect)                                 | Over current<br>【Reject】                    |                   |   |
| 8  | Voltage out of specification<br>(major defect)                 | Voltage out of<br>specification<br>【Reject】 |                   |   |
| 9  | Pattern blur, error code<br>(major defect)                     | Pattern blur, error code<br>【Reject】        |                   |   |
| 10 | Dark light, Flicker<br>(major defect)                          | Dark light, Flicker<br>【Reject】             |                   |   |
| 11 | Black/white dots 、 Dirty<br>dots、 eye winker<br>(major defect) | Specification                               | Allowable         | Note1:disregard if out of AA<br> |
|    |  | $\phi \leq 0.15\text{mm}$                   | disregard         |   |
|    |  | $0.15\text{mm} < \phi \leq 0.25\text{mm}$   | 2                 |   |
|    |  | $0.25\text{mm} < \phi \leq 0.3\text{mm}$    | 1                 |   |
|    |  | $0.3\text{mm} < \phi$                       | 0                 |   |
| 12 | Fiber、glass crutch、Polarizer                                   | $W \leq 0.03\text{mm}$                      | disregard         | Note1:L: Length, W: Width   |

|                                  |                            |   |  |
|----------------------------------|----------------------------|---|--|
| scratch/folded<br>(major defect) | 0.03mm<W≤0.05mm<br>L≤3.0mm | 2 | Note2: disregard if out of AA<br> |
|                                  | 0.05mm<W≤0.1mm<br>L≤3.0mm  | 1 |  |
|                                  | W>0.1mm;L>3.0mm            | 0 |  |

## 13. Precautions for using LCD modules.

### 13.1 Safety

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

### 13.2 Storage Conditions

- (4) Store the panel or module in a dark place where the temperature is  $23 \pm 5^\circ\text{C}$  and the humidity is below  $45 \pm 20\% \text{RH}$ .
- (5) Store in anti-static electricity container.
- (6) Store in clean environment, free from dust, active gas, and solvent.
- (7) Do not place the module near organics solvents or corrosive gases.
- (8) Do not crush, shake, or jolt the module.

### 13.3 Handling Precautions

- (9) Avoid static electricity, which can damage the CMOS LSI.
- (10) The polarizing plate of the display is very fragile, please handle it very carefully.
- (11) Do not give external shock.
- (12) Do not apply excessive force on the surface.
- (13) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (14) Do not use ketonic solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (15) Do not operate it above the absolute maximum rating.
- (16) Do not remove the panel or frame from the module.

### 13.4 Warranty

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