

# 深圳市亿显国际科技有限公司

## APPROVAL SHEET

### 承认书

|                                  |   |
|----------------------------------|---|
| Customer<br>客户名称                 |   |
| Part NO.<br>产品型号                 | YS-800480-0900N-50C-01 V1.0   |
| Product type<br>产品内容             | Mode: Transmissive type .Normally white.<br>TFT LCD Module<br>LCD Module: Graphic 800RGB*480Dot-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 |    |
|-----------|------------|-------------|----|
|           |            | PD          | QA |
|           |            |             |    |

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## RECORD OF REVISION

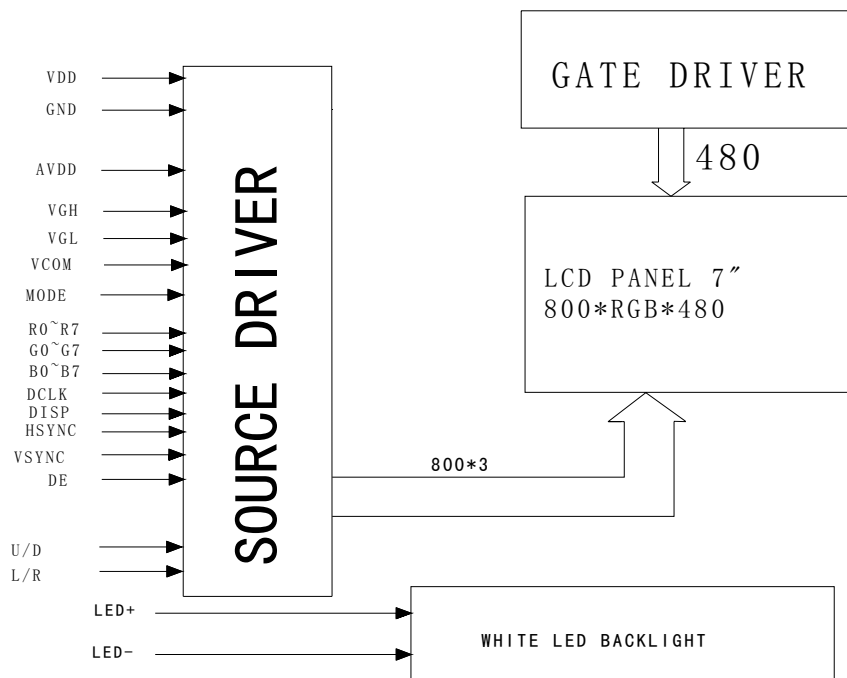
| Version | Revision Date | Contents    | Editor |
|---------|---------------|-------------|--------|
| A00     | 2014-4-15     | New Release | CZS    |
|         |               |             |        |
|         |               |             |        |
|         |               |             |        |
|         |               |             |        |
|         |               |             |        |

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## 1. PHYSICAL DATA

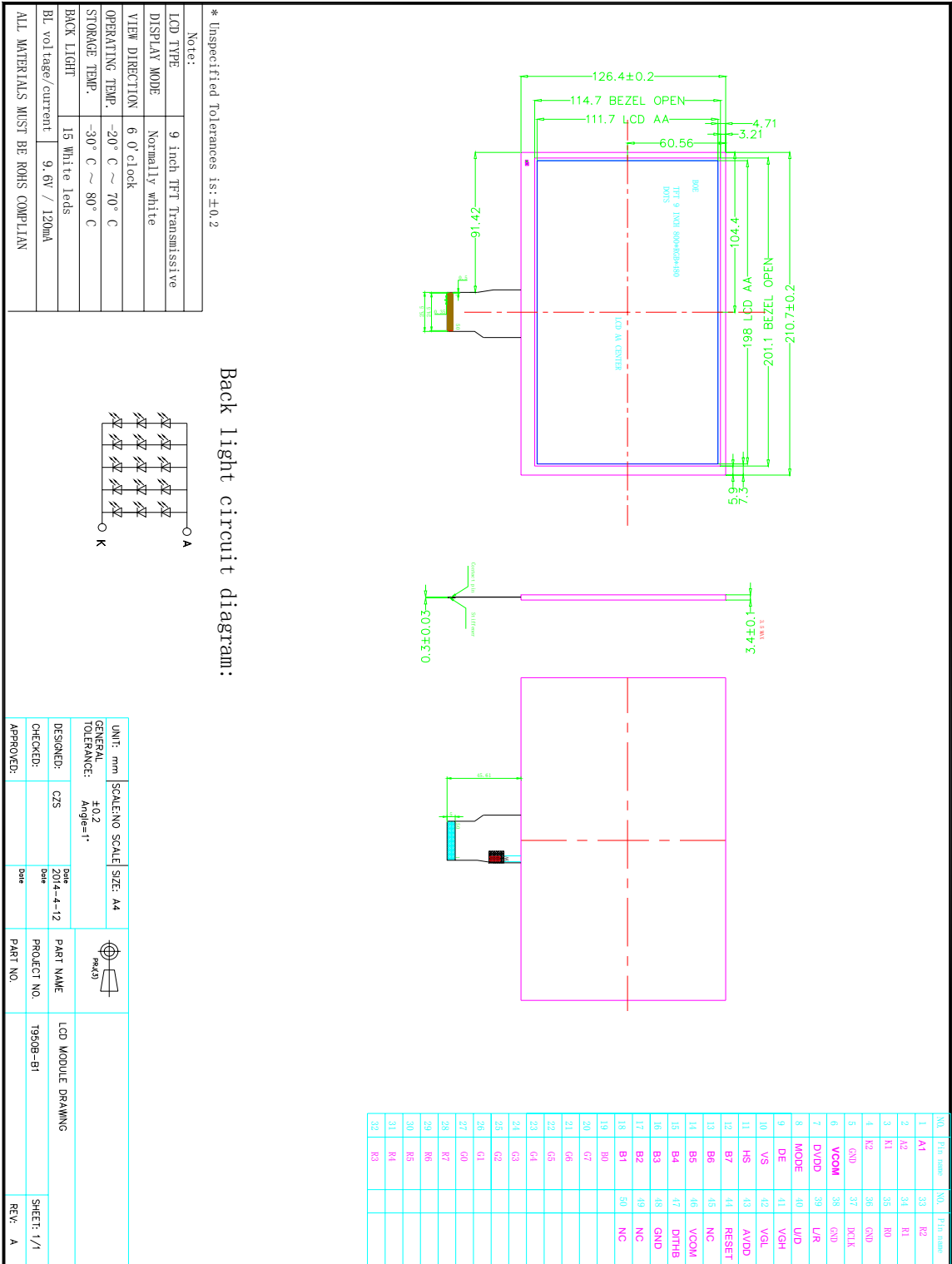
| Item                | Contents                  | Unit            |
|---------------------|---------------------------|-----------------|
| LCD type            | TFT TRANSMISSIVE          | ---             |
| Viewing direction   | 6                         | o'clock         |
| Module size (W×H×T) | 210.7× 126.4 × 3.5        | mm <sup>3</sup> |
| Active area(W×H)    | 198×117.7                 | mm <sup>2</sup> |
| Number of dots(W×H) | 800*RGB* × 480            | dots            |
| Pixel Pitch(W×H))   | 0.2475xRGB×0.2327         | mm              |
| Driver IC           | EK9716                    | ---             |
| Colors              | 16M                       | ---             |
| Backlight Type      | 18 white leds 9.6V /120mA | ---             |
| Interface Type      | RGB                       | ---             |

## 2. BLOCK DIAGRAM



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## 3. Mechanical Dimension



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## 4. Pin Descriptions

| Pin No. | Symbol | Functional  |
|---------|--------|---|
| 1       | LED A  | LED Anode   |
| 2       | LED A  | LED Anode   |
| 3       | LED K  | LED Cathode   |
| 4       | LED K  | 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 $\Omega$ , 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>  | 1.8 | 3.6  | V    |
| Power supply2         | Avdd             | 6.5 | 13.5 | V    |
| Operating temperature | T <sub>OPR</sub> | -20 | 70   | °C   |
| Storage temperature   | T <sub>STG</sub> | -30 | 80   | °C   |

### 5.2 Input driver voltage for LCD

| parameter | Typ   | Unit | remark          |
|-----------|-------|------|-----------------|
| VGH       | 18    | V    | Temp:25<br>+/-2 |
| VGL       | -5    | V    |                 |
| AVDD      | 10.75 | V    |                 |
| VCOM      | 4.0   | V    |                 |

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## 6. DC ELECTRICAL CHARACTERISTICS FOR RGB

| 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   | -        | -      | VSS+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=50 MHz, FLD=48KHz, VDD=3.3V                           | -        | 14     | 18       | mA   |
| Digital Stand-by current            | Ist1   | Clock and all functions are stopped                        | -        | 10     | 50       | μA   |
| Analog Operating Current            | Idda   | No load, Fclk=50MHz, FLD=48KHz @ VDDA=10V, V1=8V, V14=0.4V | -        | 7      | 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(Cascade Mode)               | 0.4×VDDA | -      | VDDA-1   | V    |
| Input level of V8 ~ V14             | Vref2  | Gamma correction voltage input(Cascade Mode)               | VSSA+1   | -      | 0.6×VDDA | V    |
| Input level of V1 ~ V7              | Vref3  | Gamma correction voltage input(Dual Gate Mode)             | 0.4×VDDA | -      | VDDA-0.1 | V    |
| Input level of V8 ~ V14             | Vref4  | Gamma correction voltage input(Dual Gate Mode)             | VSSA+0.1 | -      | 0.6×VDDA | V    |
| Output Voltage deviation            | Vod1   | Vo = VSSA+0.1V ~ VSSA+0.5V and Vo = VDDA-0.5V ~ VDDA-0.1V  | -        | ±20    | ±35      | mV   |
| Output Voltage deviation            | Vod2   | Vo = VSSA+0.5V ~ VDDA-0.5V                                 | -        | ±15    | ±20      | mV   |
| Output Voltage Offset between Chips | Voc    | Vo = VSSA+0.5V ~ VDDA-0.5V                                 | -        | -      | ±20      | mV   |
| Dynamic Range of Output             | Vdr    | SO1 ~ SO1200   | 0.1      | -      | VDDA-0.1 | V    |
| Sinking Current of Outputs          | IOLy   | SO1 ~ SO1200; Vo=0.1V v.s 1.0V , VDDA=13.5V                | 80       | -      | -        | uA   |
| Driving Current of Outputs          | IOHy   | SO1 ~ SO1200; Vo=13.4V v.s 12.5V , VDDA=13.5V              | 80       | -      | -        | uA   |
| Resistance of Gamma Table           | Rg     | Rn: Internal gamma resistor                                | 0.7×Rn   | 1.0×Rn | 1.3×Rn   | ohm  |

## 7. RGB MODE AC ELECTRICAL CHARACTERISTICS

(Detail please refer IC data sheet)

| Parameter              | Symbol           | Condition   | Min. | Typ. | Max. | Unit |
|------------------------|------------------|---|------|------|------|------|
| VDD Power On Slew rate | T <sub>POR</sub> | From 0V to 90% VDD                                | -    | -    | 20   | ms   |
| RSTB pulse width       | T <sub>RST</sub> | CLKIN = 50MHz                                     | 50   | -    | -    | us   |
| CLKIN cycle time       | T <sub>cph</sub> | -   | 20   | -    | -    | ns   |
| CLKIN pulse duty       | T <sub>cwh</sub> | -   | 40   | 50   | 60   | %    |
| VSD setup time         | T <sub>vst</sub> | -   | 8    | -    | -    | ns   |
| VSD hold time          | T <sub>vhd</sub> | -   | 8    | -    | -    | ns   |
| HSD setup time         | T <sub>hst</sub> | -   | 8    | -    | -    | ns   |
| HSD hold time          | T <sub>hhd</sub> | -   | 8    | -    | -    | ns   |
| Data set-up time       | T <sub>dsu</sub> | DR[7:0], DG[7:0], DB[7:0] to CLKIN                | 8    | -    | -    | ns   |
| Data hold time         | T <sub>dhd</sub> | DR[7:0], DG[7:0], DB[7:0] to CLKIN                | 8    | -    | -    | ns   |
| DEN setup time         | T <sub>esu</sub> | -   | 8    | -    | -    | ns   |
| DEN hold time          | T <sub>ehd</sub> | -   | 8    | -    | -    | ns   |
| Output stable time     | T <sub>sst</sub> | 10% to 90% target voltage.<br>CL=120pF, R=10K-ohm | -    | -    | 6    | us   |

## 8. Data input format for RGB

| Parameter                 | Symbol | Value |      |      | Unit | Note                          |
|---------------------------|--------|-------|------|------|------|-------------------------------|
| Horizontal display area   | thd    | 800   |      |      | DCLK |                               |
| DCLK frequency            | fclk   | Min.  | Typ. | Max  | MHz  | thb+thpw=88<br>DCLK is fixed. |
|                           |        | 20    | 33.3 | 50   |      |                               |
| 1 Horizontal Line         | th     | 908   | 928  | 1088 | DCLK |                               |
| HSD pulse width           | thpw   | 1     | 48   | 87   |      |                               |
| HSD Back Porch (Blanking) | thb    | 87    | 40   | 1    |      |                               |
| HSD Front Porch           | thfp   | 20    | 40   | 200  |      |                               |

Table 19. Vertical input timing

| Parameter                 | Symbol | Min. | Typ. | Max. | Unit | Note                     |
|---------------------------|--------|------|------|------|------|--------------------------|
| Vertical display area     | tvd    | 480  |      |      | H    |                          |
| VSD period time           | tv     | 517  | 525  | 712  | H    | tvpw+tvb=32H<br>Is fixed |
| VSD pulse width           | tvpw   | 1    | 1    | 3    | H    |                          |
| VSD Back Porch (Blanking) | tvb    | 31   | 31   | 29   | H    |                          |
| VSD Front Porch           | tvfp   | 5    | 13   | 200  | 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> | --  | 120     | --  | mA   |
| L/G Surface Luminance ★1          | L <sub>S</sub>   | --  | 200     | --  | mcd  |
| LCM Surface brightness uniform ★2 | L <sub>D</sub>   | 80  | --      | --  | %    |



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★ 1 Test condition is:

(a) Center point on active area.

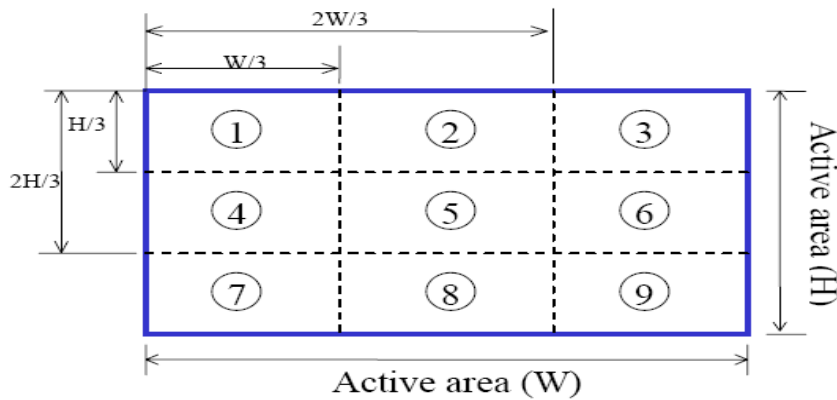
(b) Best Contrast.

★2 Uniform measure condition:

(1) Measure 9 point. Measure location show below;

(2)  $\text{Uniform} = (\text{Min. brightness} / \text{Max. brightness}) * 100\%$

(3) Best Contrast.



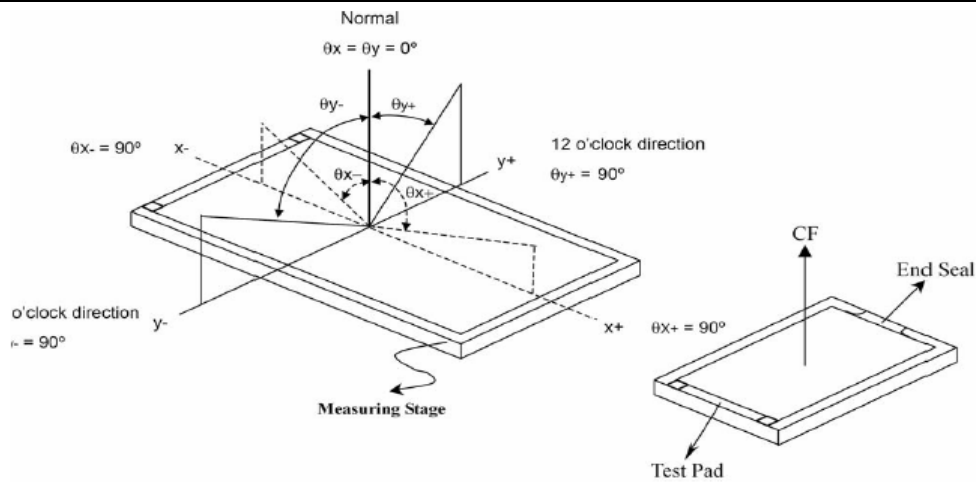
## 10. Electro-optical Characteristics

| Parameter                |      | Symbol    | Condition      | Min. | Typ. | Max. | Unit | Remark |
|--------------------------|------|-----------|----------------|------|------|------|------|--------|
| Viewing angle range      | Hor. | $\phi 3$  | $CR \geq 10$   | 60   | 70   |      | Deg. | Note 3 |
|                          |      | $\phi 9$  |                | 60   | 70   |      | Deg. |        |
|                          | Ver. | $\phi 12$ |                | 40   | 50   |      | Deg. |        |
|                          |      | $\phi 6$  |                | 60   | 70   |      | Deg. |        |
| Color gamut (C light)    |      |           |                |      | 60   |      | %    |        |
| Luminance Contrast ratio |      | T (%)     | $\phi 0^\circ$ | TBD  | TBD  |      |      | Note 4 |
| Response Time            |      | TRT       | Temp=25° C     |      | 25   |      | ms   | Note 2 |

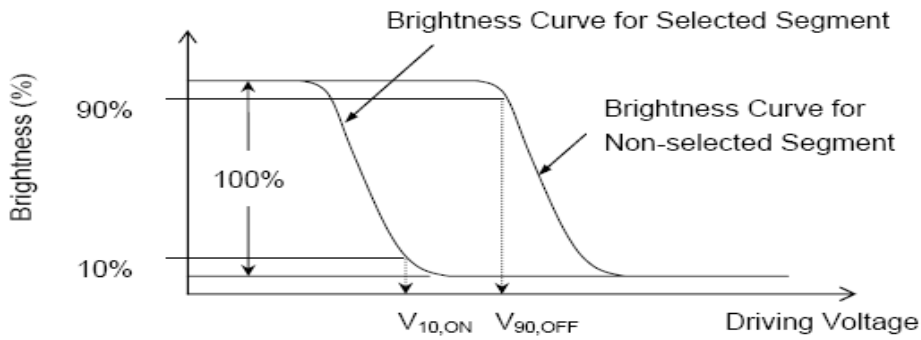
● For panel only

● Electro-Optical Characteristics Test Method

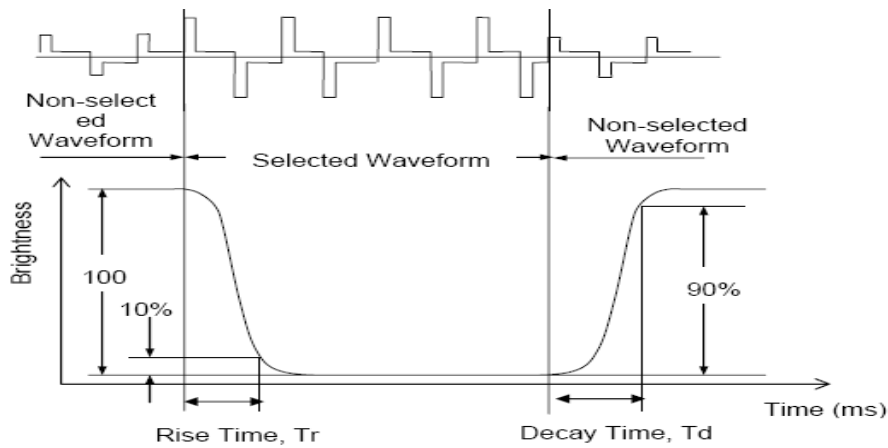
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$$V_{OP} = (V_{10,ON} + V_{90,OFF})/2$$

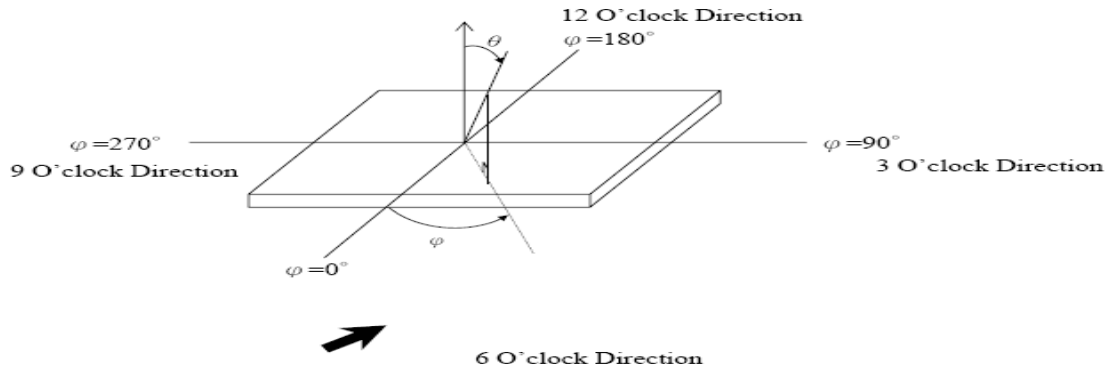


## .Note2.Definition of Optical Response Time:



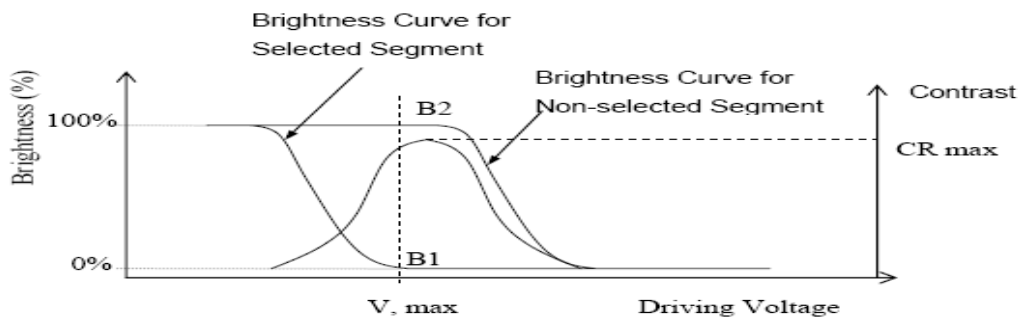
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## .Note3.Definition of Viewing Angle $\theta$ and $\phi$ :



## Note4.Definition of Contrast ratio (CR):

$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$



## 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

| NO. | ITEM   | CONDITION         | CRITERION   |
|-----|--|-------------------|---|
| 1   | High Temperature Non-Operating Test          | 80°C*240Hrs       | 。 No Defect Of Operational Function In Room Temperature Are Allowable |
| 2   | Low Temperature Non-Operating Test           | -30°C*240Hrs      |   |
| 3   | High Temperature/Humidity Non Operating Test | 60°C*90%RH*240Hrs |   |
| 4   | High Temperature Operating Test              | 70°C*240Hrs       |   |
| 5   | Low Temperature Operating Test               | -20°C*240Hrs      |   |

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|   |                    |   |   |
|---|--------------------|---|---|
| 6 | Thermal Shock Test | -20 °C (30Min) ↔ 70 °C (30Min)<br>*10CYCLES | 。 IDD of LCM in Pre-and Post-Test Should Follow Specification |
|---|--------------------|---|---|

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)

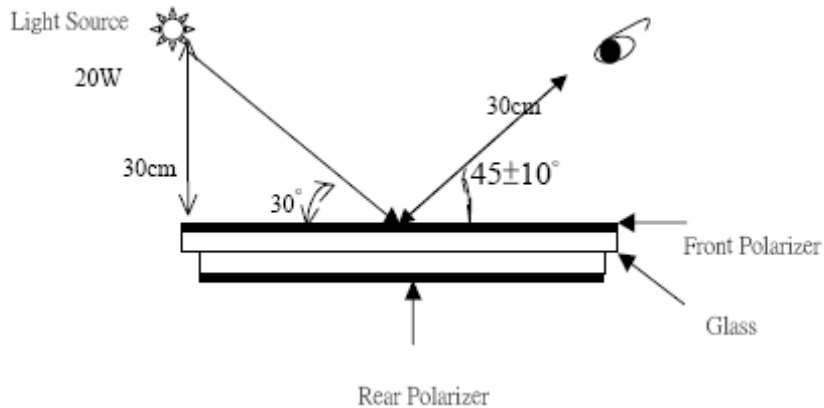
AQL of major and minor defect.

|     | 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, a distance of 30 cm with an angle of 45 degree to check the products without uncovering the film!

(As shown below)

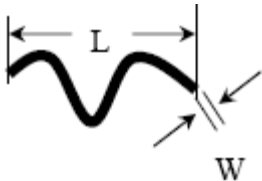
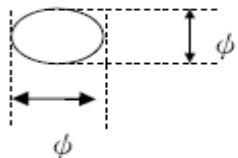


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## 3. Inspection item and criteria

### 3.1 Visual inspection criterion in immobility

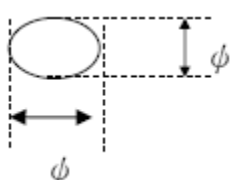
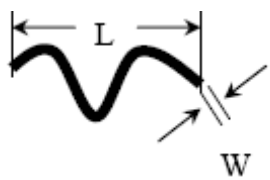
#### 3.1.1 LCD appearance defect(View area)

| NO | Defect item   | Criteria   |           | Remark  |
|----|---|--|-----------|---|
| 1  | Fiber、 glass<br>cratch、 polarizer<br>scratch/folded<br>(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、<br>concave and convex<br>(minor defect)             | $\phi \leq 0.2\text{mm}$   | disregard | note1: $\phi = (L+W)/2$ , L:Length,<br>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、<br>impurities、 eye winker<br>(minor defect)   | $\phi \leq 0.15\text{mm}$  | disregard | note2:disregard if out of AA<br>                              |
|    |   | $0.15\text{mm} < \phi \leq 0.25\text{mm}$                        | 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         |   |

### 3.2 Electrical 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                               | Over current                         |                   |

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|    |   |   |           |  |
|----|---|---|-----------|--|
|    | (major defect)  | 【Reject】  |           |  |
| 8  | Voltage out of specification<br>(major defect)                | Voltage out of 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 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 scratch/folded<br>(major defect) | $W \leq 0.03\text{mm}$  | disregard | Note1:L: Length, W: Width<br>Note2: disregard if out of AA<br> |
|    |   | $0.03\text{mm} < W \leq 0.05\text{mm}$<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         |  |

## 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 Storag 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.

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## 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.