



晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR LCD MODULE

| | |
|--------------------------|----------------------------|
| CUSTOMER | |
| CUSTOMER PART NO. | |
| AMPIRE PART NO. | AM-800480RCTMQW-00H |
| APPROVED BY | |
| DATE | |

Approved For Specifications

Approved For Specifications & Sample

AMPIRE CO., LTD.

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| APPROVED BY | CHECKED BY | ORGANIZED BY |
|--------------------|-------------------|---------------------|
| | | |

RECORD OF REVISION

| Revision Date | Page | Contents | Editor |
|---------------|------|-------------|--------|
| 2011/5/17 | -- | New Release | Titan |

1. INTRODUCTION

Ampire Display Module is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD panel, timing controller. This TFT-LCD has a high resolution (800(R.G.B) X 480) and can display up to 262,144 colors.

1-1. Features

- 7" WVGA (16:9 diagonal) configuration
- Input interface voltage: 3.3V
- Data enable mode
- LED Back-light is with CABLE connection.

1-2. Applications

- Portable TV
- Car user DVD
- Industrial application
- HMI (Human machine interface)

2. PHYSICAL SPECIFICATIONS

| Item | Specifications | unit |
|-------------------------|---------------------------|-------------------|
| Display resolution(dot) | 800RGB (W) x 480(H) | dots |
| Active area | 152.4 (W) x 91.44 (H) | mm |
| Pixel pitch | 0.1905 (W) x 0.1905 (H) | mm |
| Color configuration | R.G.B Vertical stripe | |
| Overall dimension | 165.0(W)x106.0(H)X8.76(T) | mm |
| Brightness | 1000 | cd/m ² |
| Contrast ratio | 400 : 1 | |
| Backlight unit | LED | |
| Display color | 262,144 | colors |

3. ABSOLUTE MAX. RATINGS

| ITEM | SYMBOL | MIN | MAX | UNIT |
|------------------------------|---------------------------------------|------|---------|------|
| Power Supply Voltage for LCD | Vcc | -0.5 | 6.0 | V |
| Signal input voltage | DCLK DE R0~R5 G0~G5 B0~b5 | -0.5 | VCC+0.3 | V |
| Operation Temperature | Top | -20 | 70 | °C |
| Storage Temperature | Tstg | -30 | 80 | °C |

The following values are maximum operation conditions, if exceeded; it may cause faulty operation or damage

4. ELECTRICAL CHARACTERISTICS

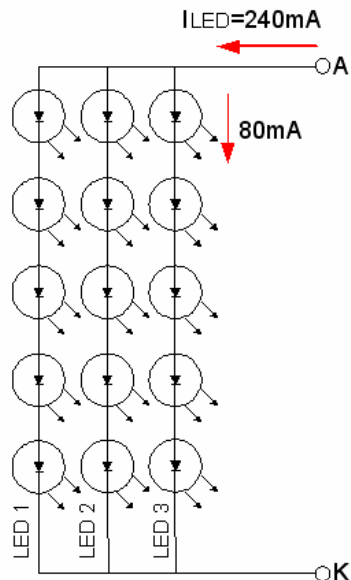
4-1 TFT LCD Module voltage

| ITEM | | SYMBOL | MIN | TYP | MAX | UNIT | CONDITION |
|------------------------------|-------------------------|-----------------|--------------------|-----|--------------------|------|---------------|
| Power Supply Voltage For LCD | | V _{CC} | 3.0 | 3.3 | 3.6 | V | |
| Power Supply Current For LCD | | I _{CC} | - | 170 | 220 | mA | Black pattern |
| Logic Input Voltage | Input Voltage | V _{IN} | 0 | - | V _{CC} | V | |
| | Threshold Voltage(High) | V _{TH} | 0.7V _{CC} | - | V _{CC} | V | |
| | Threshold Voltage(Low) | V _{TL} | 0 | - | 0.3V _{CC} | V | |

4-2 LED Driving Conditions

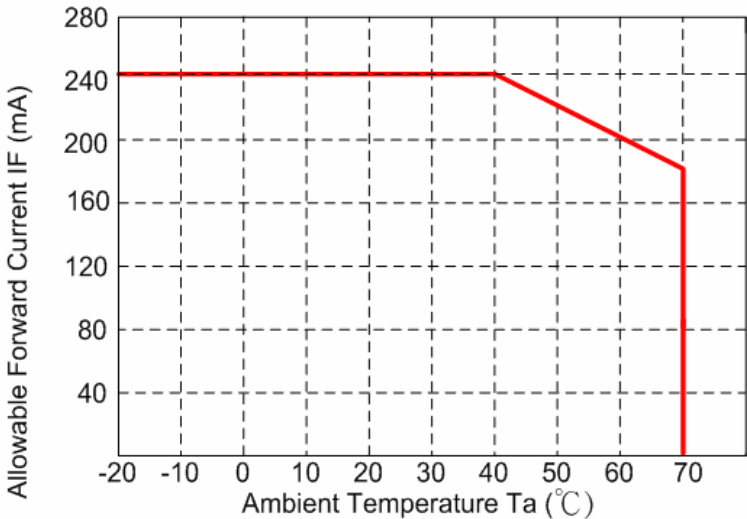
| ITEM | SYMBOL | MIN | TYP | MAX | UNIT | CONDITION |
|-----------------------|-----------------|------|------|------|------|---------------|
| LED Backlight Voltage | V _{BL} | 15.0 | 16.5 | 18.0 | V | For reference |
| LED Backlight Current | I _{BL} | - | 240 | - | mA | Ta=25°C |
| LED Life Time | | | 50K | | Hr | Note* |

Note* : Brightness to be decreased to 50% of the initial value.



The constant current source is needed for white LED back-light driving.

When LCM is operated over 60°C ambient temperature, the I_{BL} of the LED back-light should be adjusted to 200mA max



5. INTERFACE

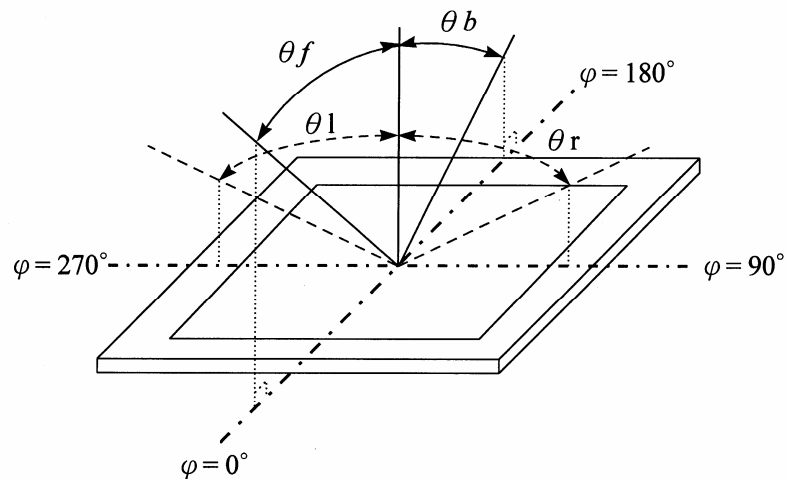
| Pin No | Symbol | Function |
|--------|--------|-----------------------------|
| 1 | LGND | LED Driver Ground |
| 2 | LGND | LED Driver Ground |
| 3 | ADJ | No Connection |
| 4 | VLED | No Connection |
| 5 | VLED | No Connection |
| 6 | VLED | No Connection |
| 7 | VCC | Power supply for LCD (3.3V) |
| 8 | VCC | Power supply for LCD (3.3V) |
| 9 | DE | Data Enable Timing Signal |
| 10 | GND | Ground |
| 11 | GND | Ground |
| 12 | GND | Ground |
| 13 | B5 | Blue data (MSB) |
| 14 | B4 | Blue data |
| 15 | B3 | Blue data |
| 16 | GND | Ground |
| 17 | B2 | Blue data |
| 18 | B1 | Blue data |
| 19 | B0 | Blue data (LSB) |
| 20 | GND | Ground |
| 21 | G5 | Green data (MSB) |
| 22 | G4 | Green data |
| 23 | G3 | Green data |
| 24 | GND | Ground |
| 25 | G2 | Green data |
| 26 | G1 | Green data |
| 27 | G0 | Green data (LSB) |
| 28 | GND | Ground |
| 29 | R5 | Red data (MSB) |
| 30 | R4 | Red data |
| 31 | R3 | Red data |
| 32 | GND | Ground |
| 33 | R2 | Red data |
| 34 | R1 | Red data |
| 35 | R0 | Red data (LSB) |
| 36 | GND | Ground |
| 37 | GND | Ground |
| 38 | DCLK | Data Clock |
| 39 | GND | Ground |
| 40 | GND | Ground |

6. OPTICAL CHARACTERISTICS

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Note | |
|----------------------|------------|---------------------------|--------------|-------|-------|-------------------|-----------|-----------|
| Viewing Angle | Front | θf | $CR \geq 10$ | 60 | 65 | -- | deg. | (1)(2)(3) |
| | Back | θb | | 60 | 65 | -- | | |
| | Left | θl | | 65 | 70 | -- | | |
| | Right | θr | | 65 | 70 | -- | | |
| Contrast ratio | CR | $\Theta = \Phi = 0^\circ$ | -- | 400 | -- | -- | (1)(3) | |
| Response Time | T_r | $\Theta = \Phi = 0^\circ$ | -- | 5 | 10 | ms | (1)(4) | |
| | T_f | | -- | 11 | 16 | ms | (1)(4) | |
| Color chromaticity | White | | W_x | 0.239 | 0.299 | 0.359 | -- | (1) |
| | | | W_y | 0.268 | 0.328 | 0.388 | | |
| Luminance | L | $\Theta = \Phi = 0^\circ$ | 800 | 1000 | -- | cd/m ² | (1)(5) | |
| Luminance Uniformity | ΔL | $\Theta = \Phi = 0^\circ$ | 70 | -- | -- | % | (1)(5)(6) | |

Note 1: $T_a = 25^\circ\text{C}$. To be measured on the center area of panel after 10 minutes operation.

Note 2: Definition of Viewing Angle



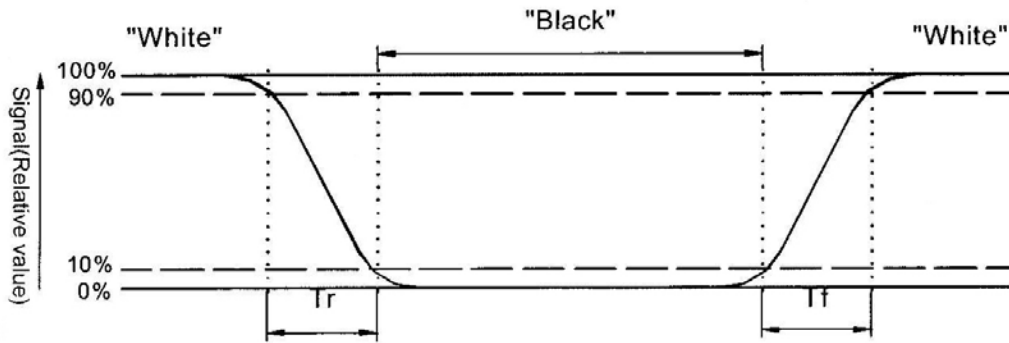
Note 3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

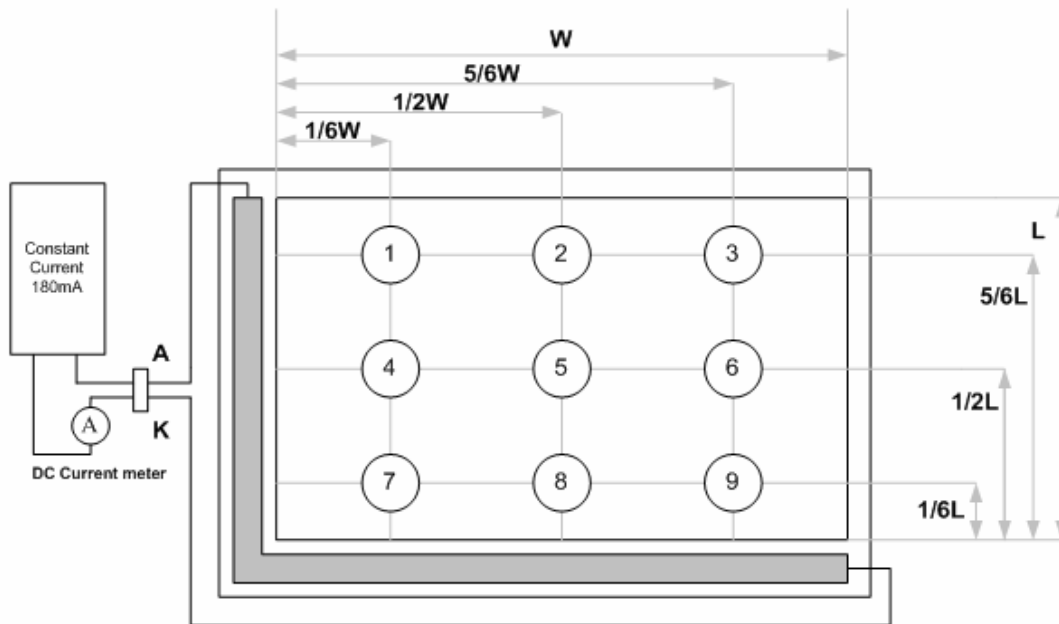
$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector Output when LCD is at "Black" state}}$$

Note 4: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black" (rising time) respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



Note 5 : Luminance is measured at point 5 of the display.



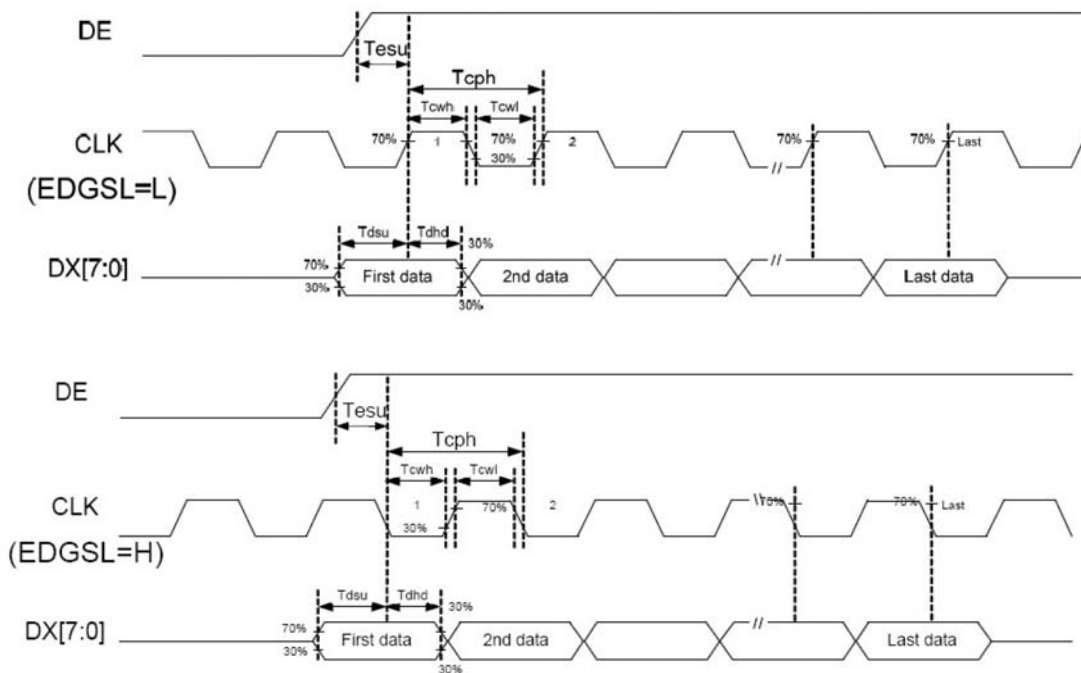
Note 6 : Definition of Luminance Uniformity

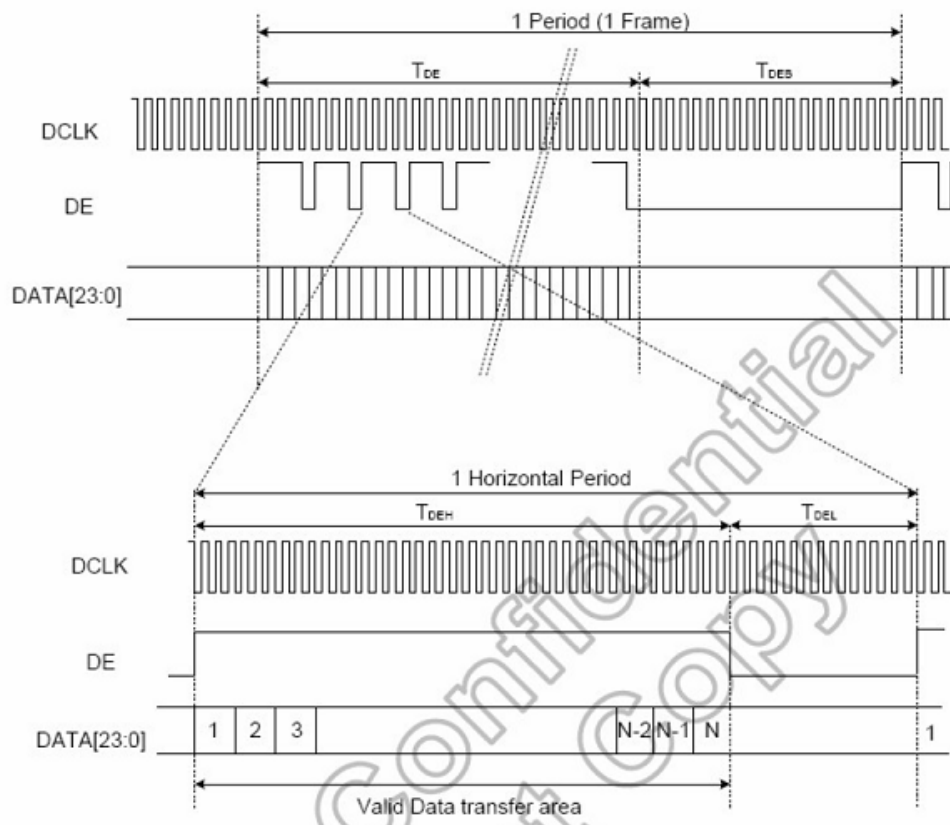
$$\Delta L = [L(\text{min.}) \text{ of } 9 \text{ points} / L(\text{max.}) \text{ of } 9 \text{ points}] \times 100\%$$

7. INPUT SIGNAL (DE ONLY MODE)

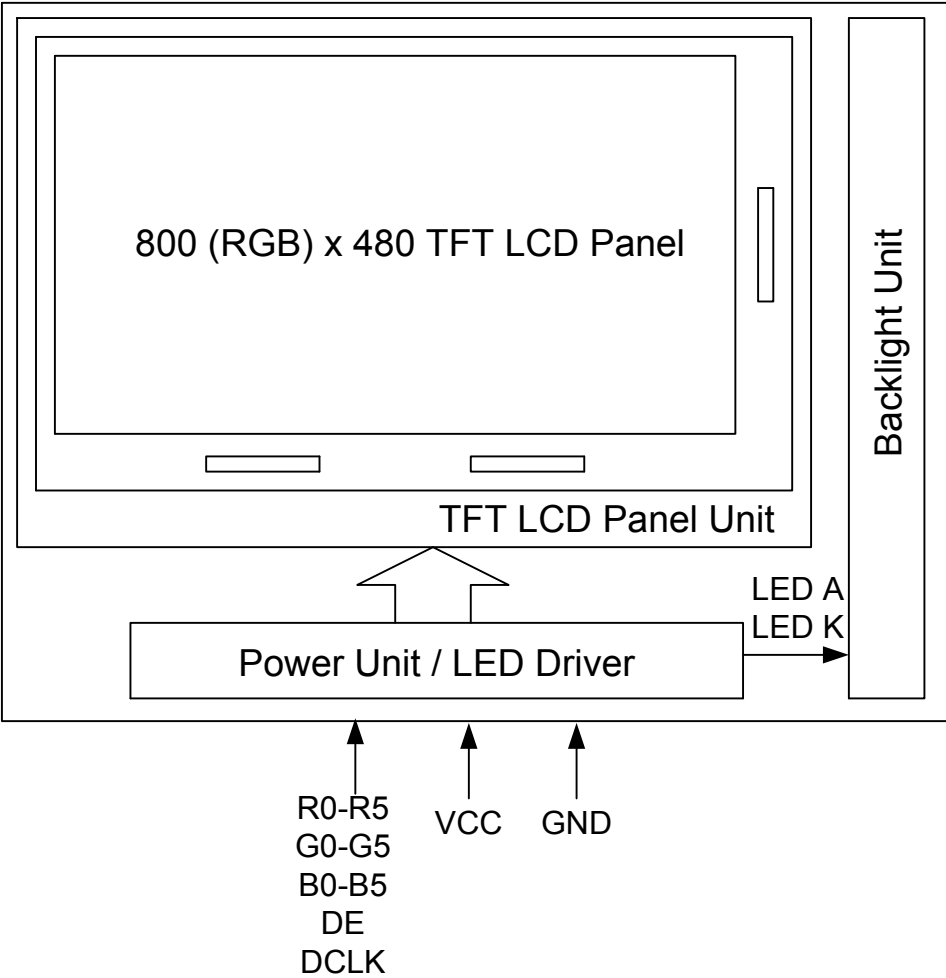
| Parameter | Symbol | | | | Unit |
|-------------------|------------------------------------|------|-------|------|------------------------------------|
| | | Min. | Typ. | Max. | |
| Data setup time | Tdsu | 6 | - | - | ns |
| Data hold time | Tdhd | 6 | - | - | Tcph |
| DE setup time | Tesu | 6 | - | - | Tcph |
| CLK frequency | F _{CPH} | | 33.26 | | MHz |
| CLK period | T _{CPH} | | 30.06 | | ns |
| CLK pulse duty | T _{CWH} | 40 | 50 | 60 | % |
| DE period | T _{DEH} +T _{DEL} | 1000 | 1056 | 1200 | T _{CPH} |
| DE pulse width | T _{DEH} | - | 800 | - | T _{CPH} |
| DE frame blanking | T _{DEB} | 10 | 45 | 110 | T _{DEH} +T _{DEL} |
| DE frame width | T _{DE} | - | 480 | - | T _{DEH} +T _{DEL} |

Note : We suggest using the typical value, so it can have better performance.





8. BLOCK DIAGRAM



9. QUALITY AND RELIABILITY

9.1. INSPECTION QUALITY CRITERIA

9.1.1. Scope

Specifications contain

9.1.1.1 Display Quality Evaluation

9.1.1.2 Mechanics Specification

9.1.2. Sampling Plan

Unless there is other agreement, the sampling plan for incoming inspection shall follow MIL-STD-105E LEVEL II.

9.1.2.1 Lot size: Quantity per shipment as one lot (different model as different lot).

9.1.2.2 Sampling type: Normal inspection, single sampling.

9.1.2.3 Sampling level: Level II.

9.1.2.4 AQL: Acceptable Quality Level

Major defect: AQL=0.65

Minor defect: AQL=1.0

9.1.3. Panel Inspection Condition

9.1.3.1 Environment:

Room Temperature: $25\pm 5^{\circ}\text{C}$.

Humidity: $65\pm 5\%$ RH.

Illumination: 300 ~ 700 Lux.

9.1.3.2 Inspection Distance:

35-40 cm

9.1.3.3 Inspection Angle:

The vision of inspector should be perpendicular to the surface of the Module.

9.1.3.4 Inspection time :

Perceptibility Test Time: 20 seconds max.

9.1.4. Display Quality

9.1.4.1 Function Related:

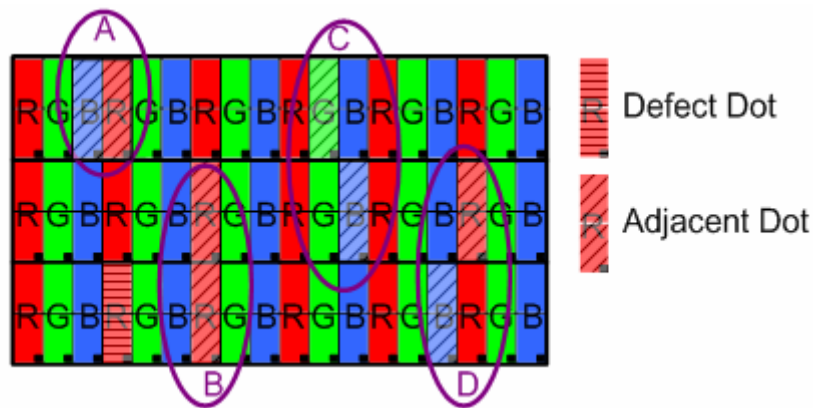
The function defects of line defect, abnormal display, and no display are considered Major defects.

9.1.4.2 Bright/Dark Dots:

| Defect Type / Specification | G0 Grade | A Grade |
|-----------------------------|----------|------------|
| Bright Dots | 0 | $N \leq 1$ |
| Dark Dots | 0 | $N \leq 3$ |
| Total Bright and Dark Dots | 0 | $N \leq 3$ |

[Note 1]

Judge defect dot and adjacent dot as following.

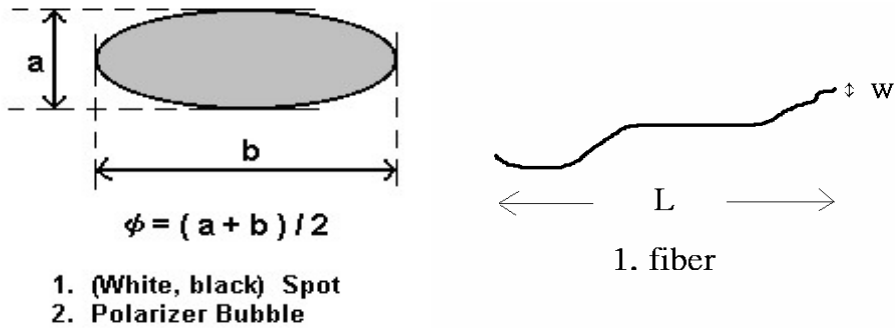


- (1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)
- (2) The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.
- (3) Allow above (as A, B, C and D status) adjacent defect dots, including bright and dart adjacent dot. And they will be counted 2 defect dots in total quantity.
- (4) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.
- (5) There should be no distinct non-uniformity visible through 6% ND Filter within 2 sec inspection times.

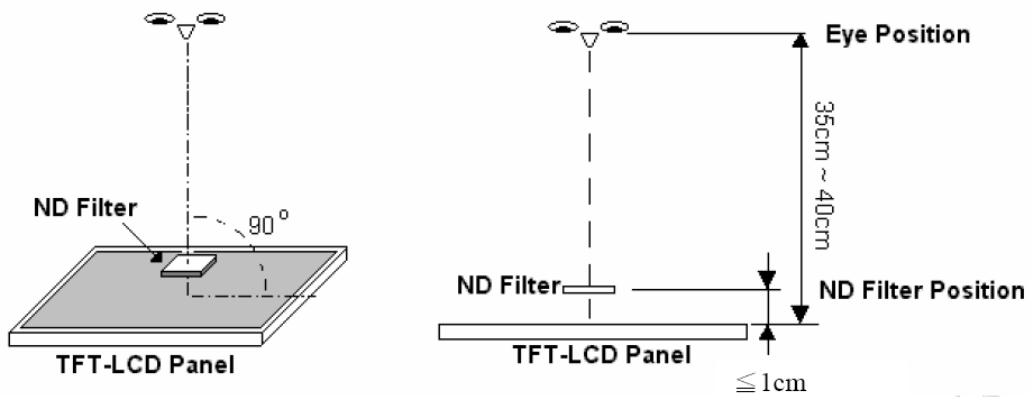
9.1.4.3 Visual Inspection specifications:

| Defect Type | Specification | Count(N) |
|----------------------------------------------------------------------|-------------------------------------------------------------|------------|
| Dot Shape (Particle, Scratch and Bubbles in display area) | $D \leq 0.15\text{mm}$ | Ignored |
| | $0.15\text{mm} < D \leq 0.3\text{mm}$ | $N \leq 3$ |
| | $D > 0.3\text{mm}$ | $N=0$ |
| Line Shape (Particles, Scratch, Lint and Bubbles in display area) | $W \leq 0.05\text{mm}$ | Ignored |
| | $0.05\text{mm} < W \leq 0.1\text{mm}$, $L \leq 3\text{mm}$ | $N \leq 3$ |
| | $W > 0.1\text{mm}$, $L > 3\text{mm}$ | $N=0$ |

[Note 2] W : Width[mm], L : Length[mm], N : Number, ϕ : Average Diameter



[Note 3] Bright dot is defined through 6% transmission ND Filter as following.



9.2. RELIABILITY TEST CONDITIONS

| Test Item | Test Conditions | Note |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------|------|
| High Temperature Operation | 70±3°C ,Dry t=240 hrs | |
| Low Temperature Operation | -20±3°C, Dry t=240 hrs | |
| High Temperature Storage | 80±3°C , Dry t=240 hrs | 1,2 |
| Low Temperature Storage | -30±3°C ,Dry t=240 hrs | 1,2 |
| Thermal Shock Test | -20°C ~ 25°C ~ 70°C 30 min. 5 min. 30 min. (1 cycle) Total 100 cycle(Dry) | 1,2 |
| Humidity Test | 40 °C, Humidity 90%, 240 hrs | 1,2 |
| Vibration Test (Packing) | Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis | 2 |

Note 1: Condensation of water is not permitted on the module.

Note 2: The module should be inspected after 1 hour storage in normal conditions
(15-35°C, 45-65%RH).

Definitions of life end point:

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

10. USE PRECAUTIONS

10-1 Handling precautions

- (1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.
- (2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzine and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.
- (3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.
- (4) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

10-2 Installing precautions

- (1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx. $1M\Omega$ and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.
- (2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.
- (3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.
- (4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off

10-3 Storage precautions

- (1) Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.
- (2) Choose the dark spaces where the product is not exposed to direct sunlight or fluorescent light.
- (3) Store the products as they are put in the boxes provided from us or in the same conditions as we recommend.

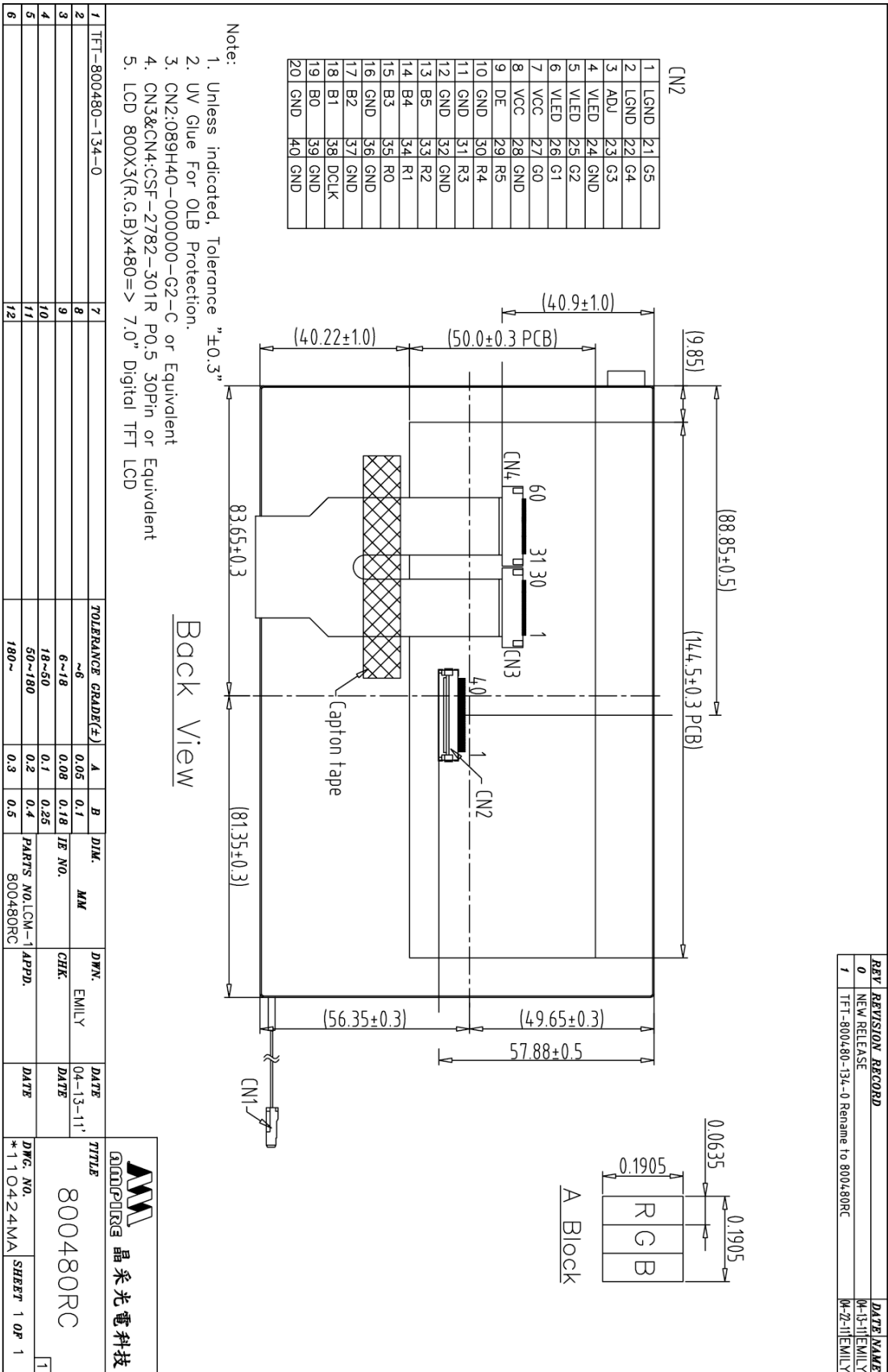
10-4 Operating precautions

- (1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.
- (2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.
- (3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC drive voltage.
- (4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.
- (5) Make certain that each signal noise level is within the standard (L level: 0.2V_{dd} or less and H level: 0.8V_{dd} or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.
- (6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.
- (7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.
- (8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

10-5 Other

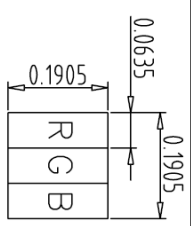
- (1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.
- (2) The residual image may exist if the same display pattern is shown for hours. This residual image, however, disappears when another display pattern is shown or the drive is interrupted and left for a while. But this is not a problem on reliability.
- (3) AMIPRE will provide one year warranty for all products and three months warranty for all repairing products..

11. OUTLINE DIMENSION



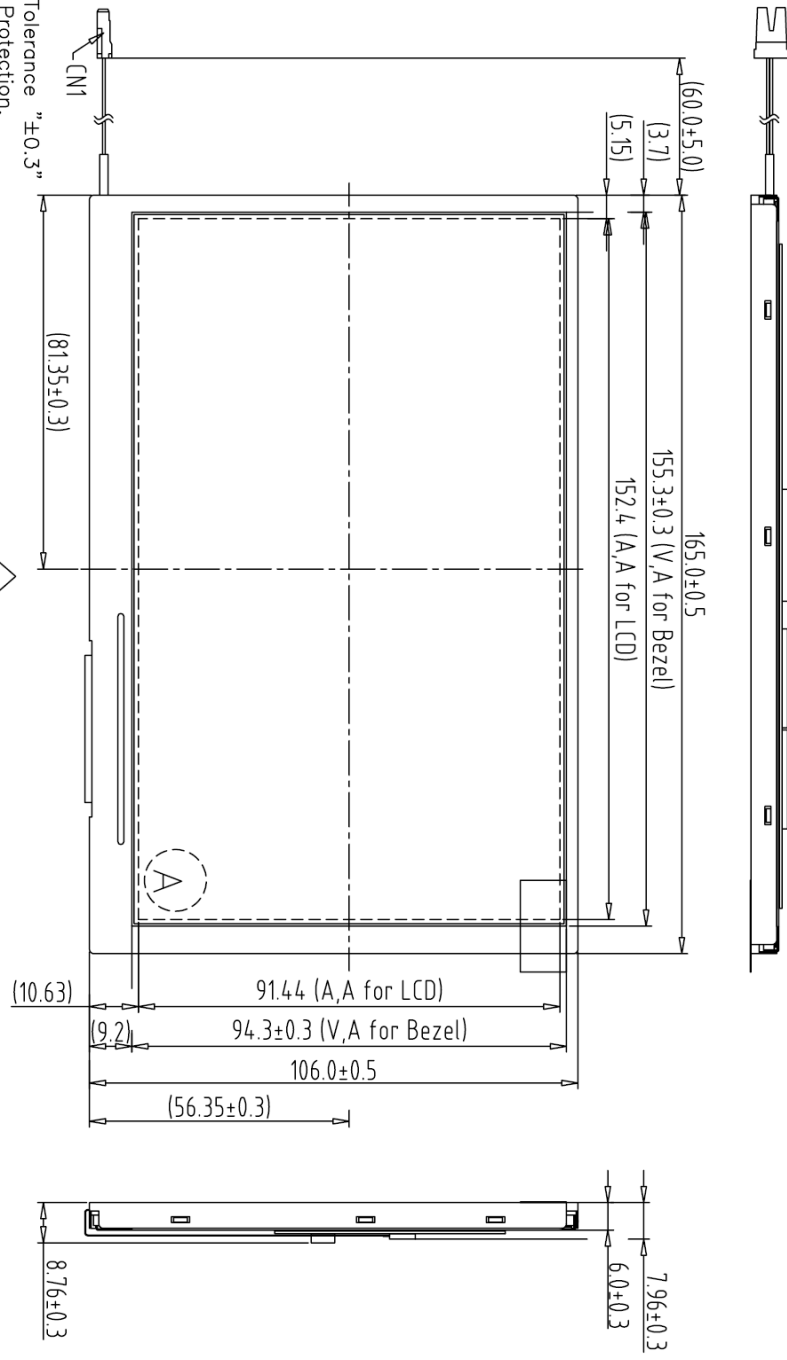
| REV. | REVISION RECORD | DATE | NAME |
|------|-------------------------------------|----------|-------|
| 0 | NEW RELEASE | 04-13-11 | EMILY |
| 1 | TFT-800480-134-0 Rename to 800480RC | 04-22-11 | EMILY |

| REV | REVISION RECORD | DATE | NAME |
|-----|-------------------------------------|----------|-------|
| 0 | NEW RELEASE | 04-13-11 | EMILY |
| 1 | TFT-800480-134-0 Rename to 800480RC | 04-21-11 | EMILY |



CN2

| | | | |
|----|------|----|------|
| 1 | LGND | 21 | G5 |
| 2 | LGND | 22 | G4 |
| 3 | ADJ | 23 | G3 |
| 4 | VLED | 24 | GND |
| 5 | VLED | 25 | G2 |
| 6 | VLED | 26 | G1 |
| 7 | VCC | 27 | G0 |
| 8 | VCC | 28 | GND |
| 9 | DE | 29 | R5 |
| 10 | GND | 30 | R4 |
| 11 | GND | 31 | R3 |
| 12 | GND | 32 | GND |
| 13 | B5 | 33 | R2 |
| 14 | B4 | 34 | R1 |
| 15 | B3 | 35 | R0 |
| 16 | GND | 36 | GND |
| 17 | B2 | 37 | GND |
| 18 | B1 | 38 | DCLK |
| 19 | B0 | 39 | GND |
| 20 | GND | 40 | GND |



- Note:
1. Unless indicated, Tolerance "±0.3"
 2. UV Glue For OLB Protection.
 3. CN2:089H40-000000-G2-C or Equivalent
 4. CN3&CN4:CSF-2782-301R P0.5 30Pin or Equivalent
 5. LCD 800X3(R,G,B)X480=> 7.0" Digital TFT LCD

| NO. | ITEM | TOLERANCE | GRADE(±) | A | B | DIM. | MM | DWN. | EMILY | DATE | TITLE |
|-----|------------------|-----------|----------|------|------|------|----|------|-------|----------|----------|
| 1 | TFT-800480-134-0 | | ~6 | 0.05 | 0.1 | | | | | 04-13-11 | 晶采光电科技 |
| 2 | | | 6~18 | 0.08 | 0.18 | | | | | DATE | 800480RC |
| 3 | | | 18~50 | 0.1 | 0.25 | | | | | DATE | |
| 4 | | | 50~180 | 0.2 | 0.4 | | | | | DATE | |
| 5 | | | 180~ | 0.3 | 0.5 | | | | | DATE | |
| 6 | | | | | | | | | | | |

晶采光电科技
AMP/PIRE
TITLE
800480RC
DWC. NO. *110423MA
SHEET 1 OF 1