



## SPECIFICATIONS FOR LCD MODULE

|                          |                           |
|--------------------------|---------------------------|
| <b>CUSTOMER</b>          |                           |
| <b>CUSTOMER PART NO.</b> |                           |
| <b>AMPIRE PART NO.</b>   | <b>AM-640480GTMQW-00H</b> |
| <b>APPROVED BY</b>       |                           |
| <b>DATE</b>              |                           |

☒ Preliminary Specification

☐ Approved Specification

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|                    |                   |                     |
|--------------------|-------------------|---------------------|
| <b>APPROVED BY</b> | <b>CHECKED BY</b> | <b>ORGANIZED BY</b> |
|                    |                   |                     |

## RECORD OF REVISION

| Revision Date | Page  | Contents                                                                                                                                                              | Editor |
|---------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 2006/09/01    | -     | New Release                                                                                                                                                           | LEE    |
| 2007/03/05    | 3     | 2. PHYSICAL SPECIFICATIONS : Overall dimension :<br>127.0(W)x100.0(H)x7.0(D)→127.0(W)x100.0(H)x6.6(D)                                                                 | LEE    |
|               | 5     | 4-1 TFT LCD Module Voltage : LED Voltage :<br>2.7(min)→4.5(min) ; 3.3(typ)→5.0(typ) ;<br>5(max)→5.5(max)                                                              | LEE    |
|               | 7     | 4-2 TFT LCD current consumption : LCD Power current :<br>I <sub>CC</sub> TBD→150(typ);TBD→190(max) LED Power current :<br>I <sub>DD</sub> TBD→320(typ) ; TBD→360(max) | LEE    |
|               | 9     | 6. INTERFACE : PIN2 (DMS→NC) ; PIN3 (Hsync→NC) ;<br>PIN 4~6 (V <sub>CC</sub> →V <sub>LED</sub> ) ; PIN8 (Vsync→NC)                                                    | LEE    |
|               | 11    | NOTE : 1 (Pulse duty the more small the more bright →<br>Pulse duty the bigger the brighter)                                                                          | LEE    |
|               | 13    | 7-2 Timing Specification : f <sub>CLK</sub> → 25MHZ<br>Color chromaticity                                                                                             | LEE    |
|               | 14    | 9. RELIABILITY TEST CONDITIONS:THERMAL<br>SHOCK{-30℃(1Hr) ~85℃(1Hr) 200Cycle → -30℃<br>(0.5Hr) ~85℃(0.5Hr) 200Cycle                                                   | LEE    |
| 2007/03/07    | 4     | 10. OUTLINE DIMENSION<br>Modify Absolute Max. Ratings and the paragraph<br>arrange.                                                                                   | Edward |
|               | 5     | Add a figure to TFT LCD current consumption.                                                                                                                          | Edward |
| 2007/8/7      | 9-10  | Modify 7-1 Timing chart and 7-2 Timing specification                                                                                                                  | Edward |
| 2007/9/6      | 4-5   | Modify Absolute Maximum Ratings                                                                                                                                       | Edward |
|               | 5-6   | Modify Electrical Characteristics                                                                                                                                     | Edward |
|               | 7     | Modify Block Diagram                                                                                                                                                  | Edward |
|               | 8-9   | Modify Interface                                                                                                                                                      | Edward |
|               | 10-11 | Modify Input Signal                                                                                                                                                   | Edward |
|               | 13-14 | Modify Optical Characteristics                                                                                                                                        | Edward |
|               | 15    | Modify Reliability Test Conditions                                                                                                                                    | Edward |

## 1. INTRODUCTION

Ampire Display Module AM640480G is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device . This model is composed of a 5.7inch TFT-LCD panel , a driving circuit and LED backlight system . This TFT-LCD has a high resolution (640(R.G.B) X 480) and can display up to 262,144 colors .

### 1-1. Features

- VGA Resolution
- 6 Bits color driver with 1 channel TTL interface
- Wide range operation temperature

### 1-2. Applications

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

## 2. PHYSICAL SPECIFICATIONS

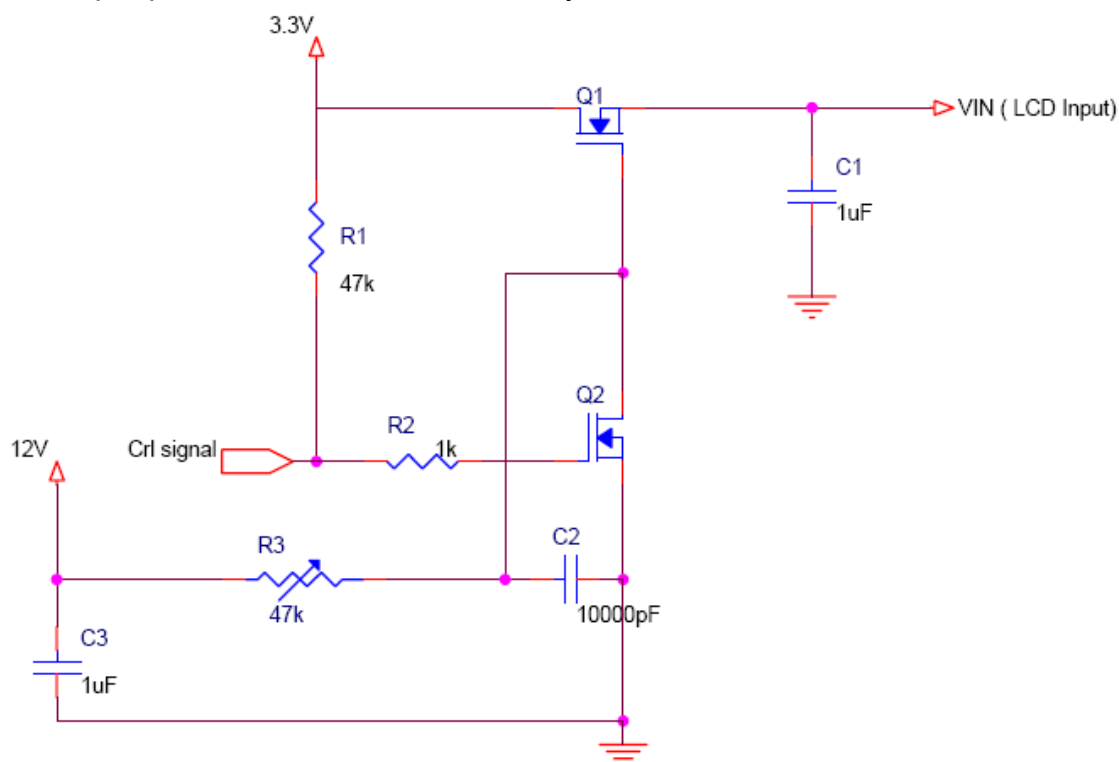
| Item                    | Specifications                   | unit              |
|-------------------------|----------------------------------|-------------------|
| Display resolution(dot) | 640RGB (W) x 480(H)              | dots              |
| Display area            | 116.16 (W) x 87.12 (H)           | mm                |
| Pixel pitch             | 0.1815 (W) x 0.1815 (H)          | mm                |
| Color configuration     | R.G.B Vertical stripe            |                   |
| Overall dimension       | 127.0(W)x100.0(H)x6.6(D)---(Typ) | mm                |
| Surface treatment       | Antiglare , Hard-Coating(3H)     |                   |
| Brightness              | 220 nit(typ)                     | cd/m <sup>2</sup> |
| Contrast ratio          | 300 : 1                          |                   |
| Backlight unit          | LED                              |                   |
| Display color           | 262,144                          | colors            |

### 3. ABSOLUTE MAX. RATINGS

| ITEM                  | SYMBOL                               | MIN  | MAX       | UNIT | NOTE |
|-----------------------|--------------------------------------|------|-----------|------|------|
| Power Supply Voltage  | Vcc                                  | -0.5 | 5         | V    |      |
| Signal Input Voltage  | DCLK , DE<br>R0~R5<br>G0~G5<br>B0~B5 | -0.5 | Vcc + 0.5 | V    |      |
| Static Electricity    | VESDc                                | -200 | +200      | V    | (2)  |
|                       | VESDm                                | -15K | +15K      | V    |      |
| ICC Rush Current      | IRUSH                                | --   | 1         | A    | (3)  |
| Operation Temperature | Top                                  | -30  | 85        | °C   | (1)  |
| Storage Temperature   | Tstg                                 | -40  | 95        | °C   | (1)  |

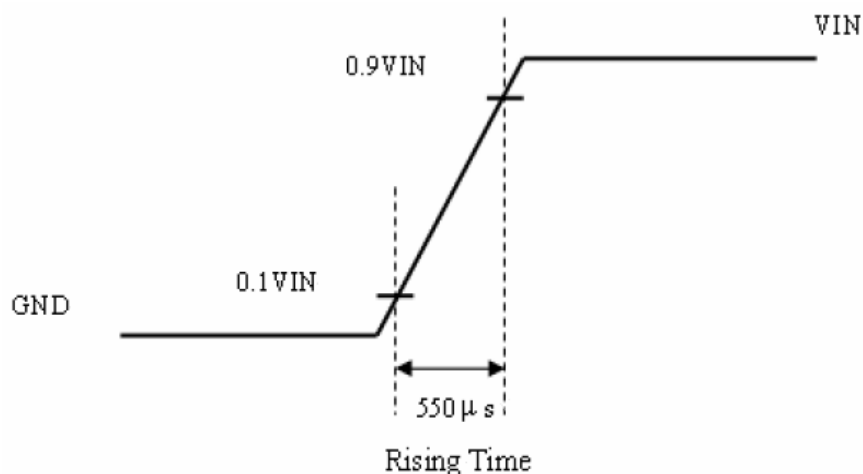
#### NOTE :

1. If users use the product out off the environment operation range (temperature and humidity) , it will concern for visual quality.
2. Test Condition : IEC 61000-4-2  
VESDc : Contact discharge to input connector.  
VESDm : Contact discharge to module.
3. The input pulse-current measurement system as below :



Control signal : High(+3.3V)→Low(GND)

Supply Voltage of rising time should be from R3 and C2 tune to 550 us.



## 4. ELECTRICAL CHARACTERISTICS

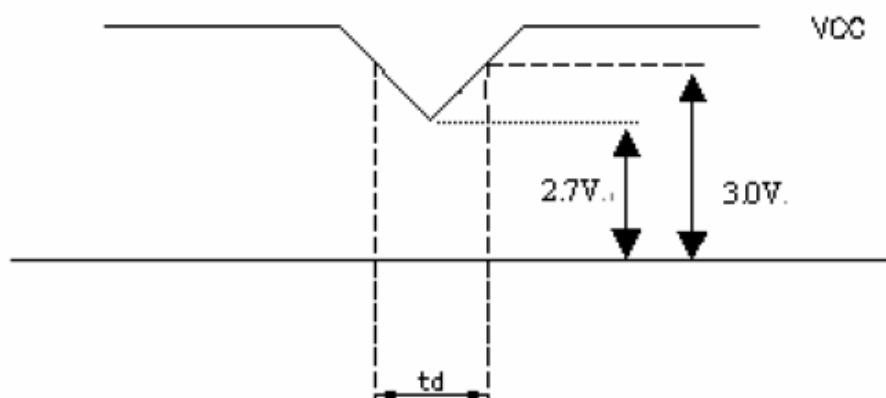
### 4-1 TFT LCD Module voltage

| ITEM                  | SYMBOL   | MIN                | TYP | MAX                | UNIT | NOTE |
|-----------------------|----------|--------------------|-----|--------------------|------|------|
| Power Voltage For LCD | $V_{CC}$ | 3.0                | 3.3 | 3.6                | V    | (1)  |
| Power Voltage For LED | $V_{DD}$ | 4.5                | 5.0 | 5.5                | V    |      |
| Logic Input Voltage   | $V_{IH}$ | $V_{CC} \cdot 0.7$ | --  | $V_{CC}$           | V    |      |
|                       | $V_{IL}$ | 0                  | --  | $V_{CC} \cdot 0.3$ | V    |      |
| ADJ Input Voltage     | $V_{IH}$ | 3.0                | --  | 3.3                | V    |      |
|                       | $V_{IL}$ | GND                | --  | 0.3                | V    |      |

NOTE : 1.  $V_{CC}$  – dip condition :

When  $2.7V \leq V_{CC} < 3.0V$  ,  $t_d \leq 10ms$

$V_{CC} > 3.0V$  ,  $V_{CC}$  – dip condition should be same as  $V_{CC}$  turn-on condition



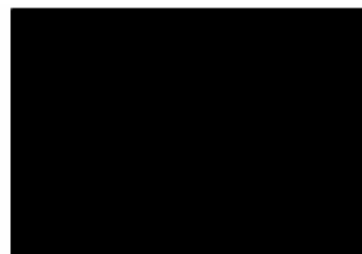
## 4-2 TFT LCD current consumption

| ITEM              | SYMBOL           | MIN | TYP | MAX | UNIT | NOTE |
|-------------------|------------------|-----|-----|-----|------|------|
| LCD Power Current | I <sub>cc</sub>  | -   | 140 | 190 | mA   | (1)  |
| LED Power Current | I <sub>LED</sub> | -   | 300 | 350 | mA   | (2)  |

NOTE : (1) Typ : under 64 gray pattern Max : under black pattern



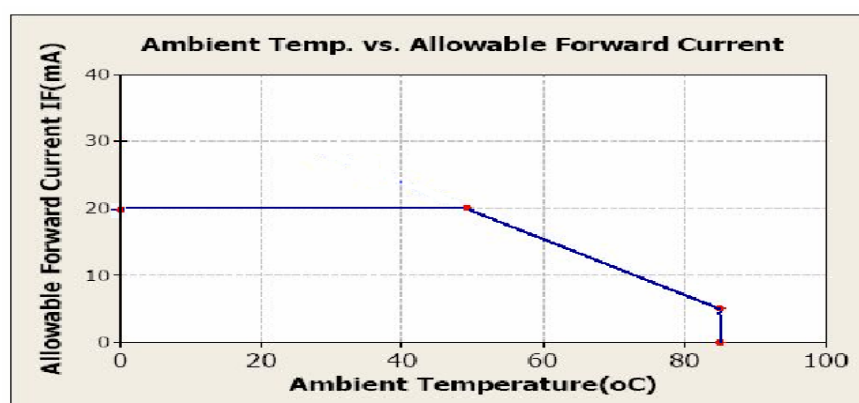
(a) 64 Gray Pattern



(b) Black Pattern

(2) Typ : When V<sub>LED</sub> is 5.0V Max : When V<sub>LED</sub> is 4.5V

One LED Dice :



## 4-3 Power Signal sequence

$$t1 \leq 10\text{ms}$$

$$50\text{ms} \leq t2$$

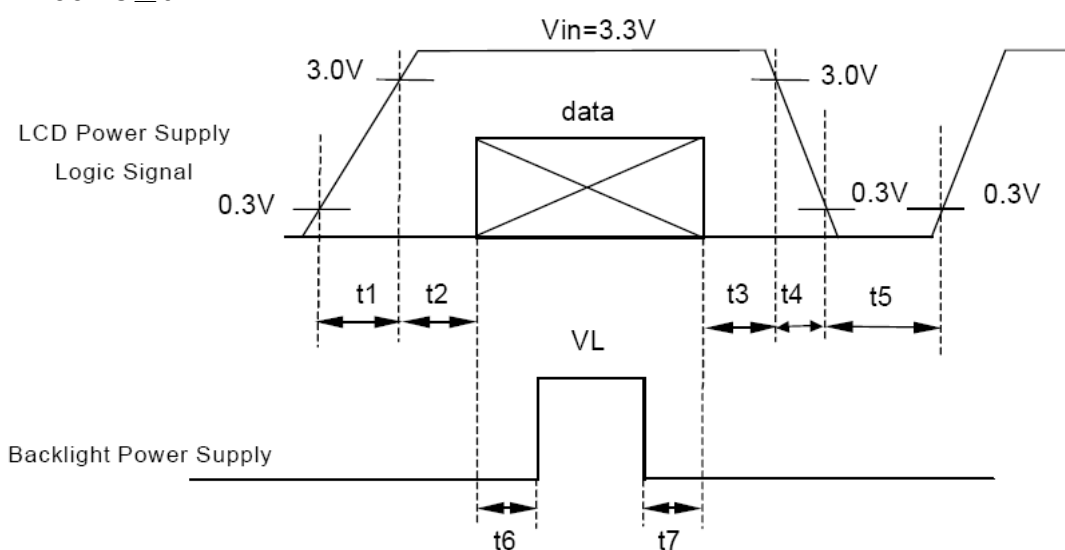
$$0 < t3 \leq 50\text{ms}$$

$$0 < t4 \leq 10\text{ms}$$

$$1\text{sec} \leq t5$$

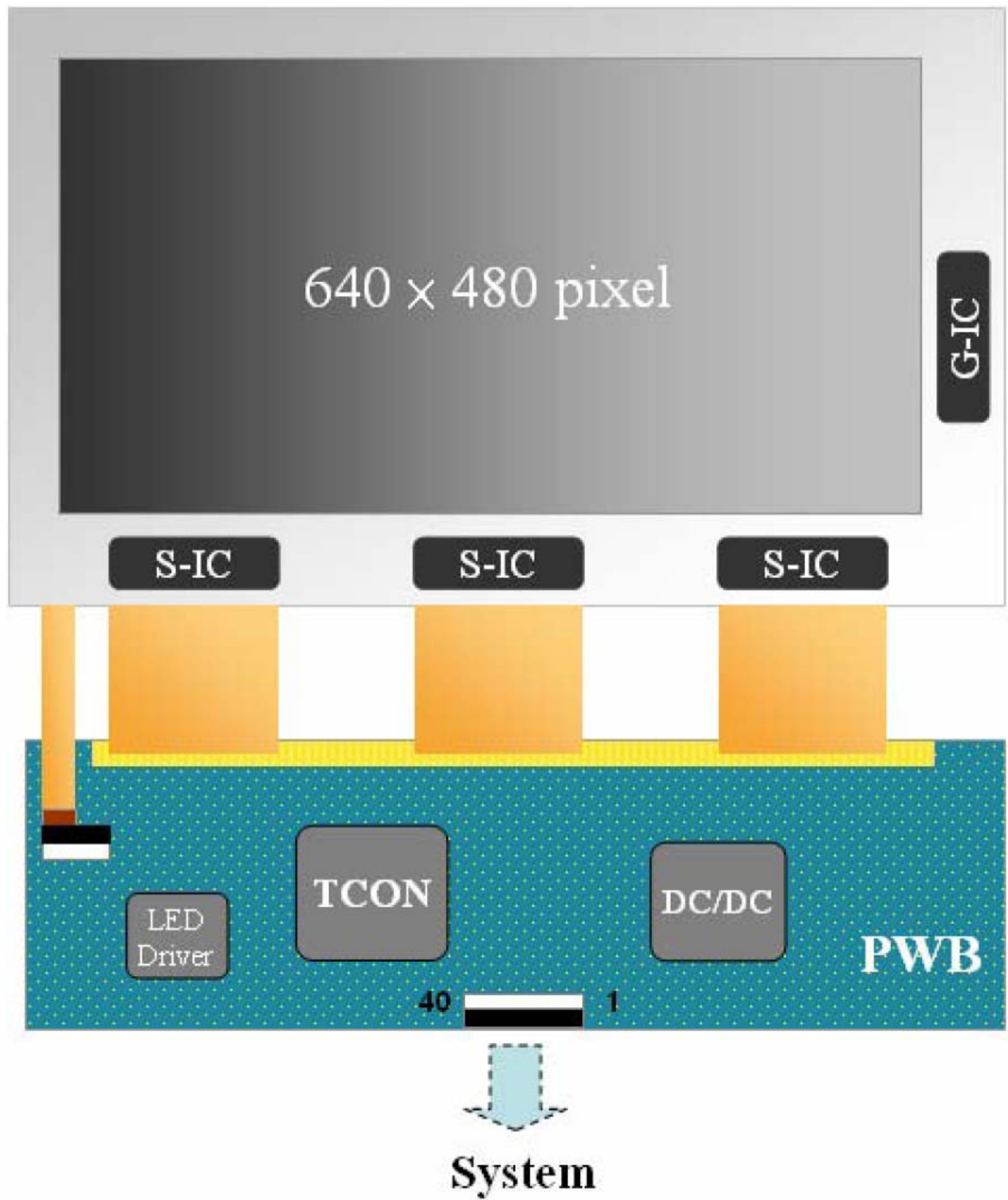
$$200\text{ms} \leq t6$$

$$200\text{ms} \leq t7$$



Data: RGB DATA, DCLK, DENA

## 5. BLOCK DIAGRAM

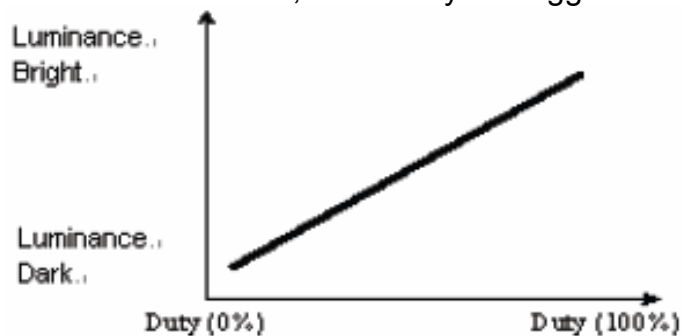


## 6. INTERFACE

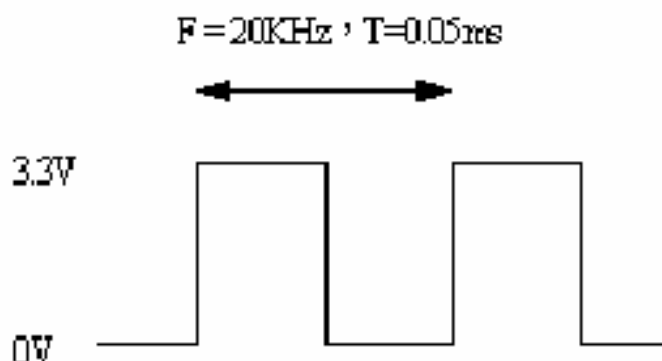
| Pin No | Symbol | Function                      |
|--------|--------|-------------------------------|
| 1      | U/D    | Up or Down Display Control    |
| 2      | DMS    | DE / SYNC Mode Selection      |
| 3      | Hsync  | Horizontal SYNC.              |
| 4      | VLED   | Power Supply for LED          |
| 5      | VLED   | Power Supply for LED          |
| 6      | VLED   | Power Supply for LED          |
| 7      | Vcc    | Power Supply for LCD          |
| 8      | Vsync  | Vertical SYNC                 |
| 9      | DE     | Data Enable                   |
| 10     | Vss    | Power Ground                  |
| 11     | Vss    | Power Ground                  |
| 12     | ADJ    | Adjust for LED Brightness     |
| 13     | B5     | Blue Data 5 (MSB)             |
| 14     | B4     | Blue Data 4                   |
| 15     | B3     | Blue Data 3                   |
| 16     | Vss    | Power Ground                  |
| 17     | B2     | Blue Data 2                   |
| 18     | B1     | Blue Data 1                   |
| 19     | B0     | Blue Data 0 (LSB)             |
| 20     | Vss    | Power Ground                  |
| 21     | G5     | Green Data 5 (MSB)            |
| 22     | G4     | Green Data 4                  |
| 23     | G3     | Green Data 3                  |
| 24     | Vss    | Power Ground                  |
| 25     | G2     | Green Data 2                  |
| 26     | G1     | Green Data 1                  |
| 27     | G0     | Green Data 0 (LSB)            |
| 28     | Vss    | Power Ground                  |
| 29     | R5     | Red Data 5 (MSB)              |
| 30     | R4     | Red Data 4                    |
| 31     | R3     | Red Data 3                    |
| 32     | Vss    | Power Ground                  |
| 33     | R2     | Red Data 2                    |
| 34     | R1     | Red Data 1                    |
| 35     | R0     | Red Data 0 (LSB)              |
| 36     | Vss    | Power Ground                  |
| 37     | Vss    | Power Ground                  |
| 38     | DCLK   | Clock Signals                 |
| 39     | Vss    | Power Ground                  |
| 40     | L/R    | Left or Right Display Control |

NOTE :

1. ADJ adjust brightness to control Pin , Pulse duty the bigger the brighter.



2. ADJ signal = 0 ~ 3.3V , operation frequency :  $20 \pm 10\text{KHz}$



3. VSS Pin must ground contact , can not be floating.

4. U/D and L/R are controlled function

| L/R | U/D | Function                                       |
|-----|-----|------------------------------------------------|
| 1   | 0   | Normally display                               |
| 0   | 0   | Left and Right opposite                        |
| 1   | 1   | Up and Down opposite                           |
| 0   | 1   | Left and Right opposite , Up and Down opposite |

5. DMS ( Selection DE / SYNC mode )

| DMS | Function  |
|-----|-----------|
| 1   | DE Mode   |
| 0   | SYNC Mode |

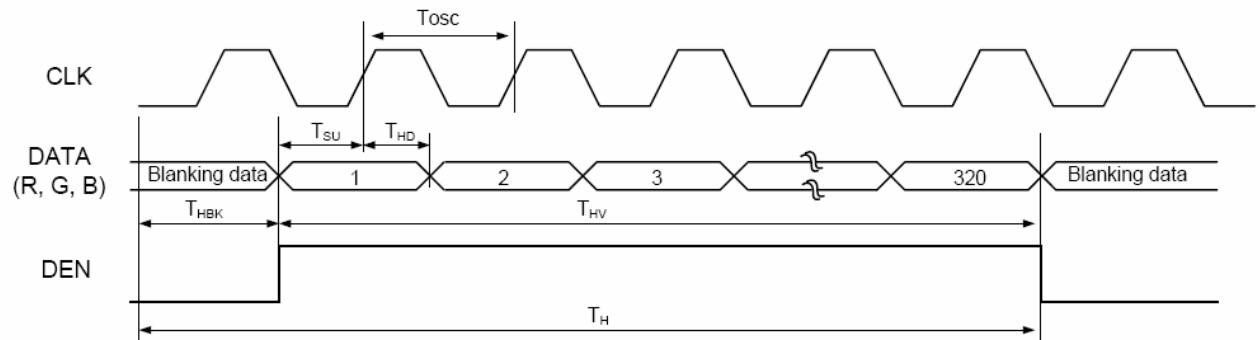
## 7. INPUT SIGNAL :

### 7-1 Timing Specification

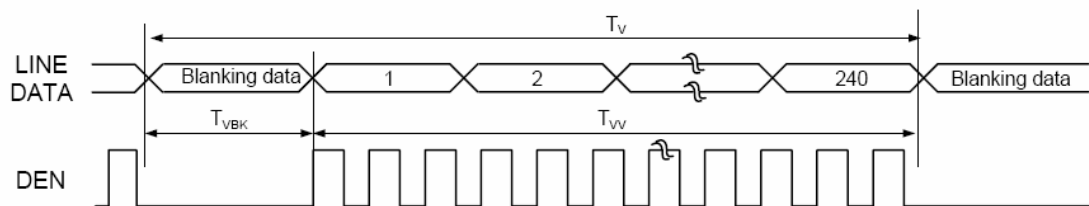
| characteristics |                                     | Symbol            | SPEC |     |     | UNIT             |
|-----------------|-------------------------------------|-------------------|------|-----|-----|------------------|
|                 |                                     |                   | Min  | Typ | Max |                  |
| DE MODE         | Dot Clock                           | F <sub>OSC</sub>  | 23   | 25  | 30  | MHz              |
|                 | Horizontal Period                   | T <sub>H</sub>    | 750  | 800 | 900 | T <sub>OSC</sub> |
|                 | Horizontal Valid                    | T <sub>HV</sub>   | 640  |     |     |                  |
|                 | Horizontal Blank                    | T <sub>HBK</sub>  | 110  | 160 | 260 |                  |
|                 | Vertical Period                     | T <sub>VP</sub>   | 515  | 525 | 560 | T <sub>H</sub>   |
|                 | Vertical Valid                      | T <sub>VV</sub>   | 480  |     |     |                  |
|                 | Vertical Blank                      | T <sub>VBK</sub>  | 35   | 45  | 80  |                  |
|                 | Vertical Frequency                  | F <sub>V</sub>    | 55   | 60  | 65  | Hz               |
| SYNC MODE       | Horizontal Period                   | T <sub>H</sub>    | 750  | 800 | 900 | T <sub>OSC</sub> |
|                 | Horizontal Pulse Width              | T <sub>HS</sub>   | 1    | 1   | 1   |                  |
|                 | Horizontal Pulse Width + Back Proch | T <sub>HPWB</sub> | 46   | 46  | 46  |                  |
|                 | Horizontal Front Proch              | T <sub>HF</sub>   | 64   | 114 | 214 |                  |
|                 | Horizontal Valid                    | T <sub>HV</sub>   | 640  |     |     | T <sub>H</sub>   |
|                 | Vertical Period                     | T <sub>VP</sub>   | 515  | 525 | 560 |                  |
|                 | Vertical Pulse Width                | T <sub>VS</sub>   | 1    | 1   | 1   |                  |
|                 | Vertical Pulse Width + Back Proch   | T <sub>VPWB</sub> | 34   | 34  | 34  |                  |
|                 | Vertical Front Proch                | T <sub>VF</sub>   | 1    | 11  | 46  |                  |
|                 | Vertical Valid                      | T <sub>VV</sub>   | 480  |     |     |                  |
|                 | Vertical Frequency                  | F <sub>V</sub>    | 55   | 60  | 65  | Hz               |

## 7-2 Timing chart

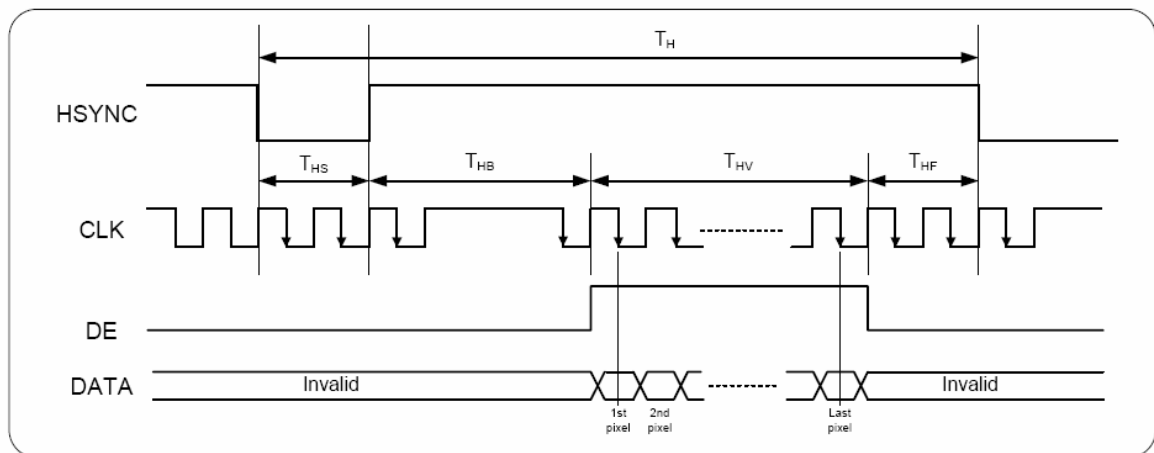
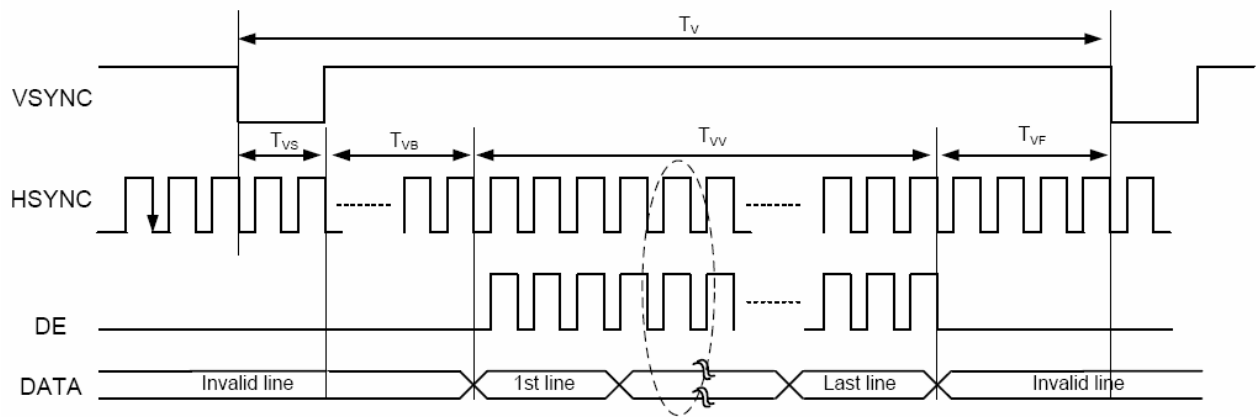
Horizontal Timing Sequence



Vertical Timing Sequence



DE mode Timing



Sync mode Timing

### 7-3 Color Data Assignment

| COLOR       | Input Data | R DATA    |    |    |    |    |           | G DATA    |    |    |    |    |           | B DATA    |    |    |    |    |           |
|-------------|------------|-----------|----|----|----|----|-----------|-----------|----|----|----|----|-----------|-----------|----|----|----|----|-----------|
|             |            | R5<br>MSB | R4 | R3 | R2 | R1 | R0<br>LSB | G5<br>MSB | G4 | G3 | G2 | G1 | G0<br>LSB | B5<br>MSB | B4 | B3 | B2 | B1 | B0<br>LSB |
| BASIC COLOR | BLACK      | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         |
|             | RED(63)    | 1         | 1  | 1  | 1  | 1  | 1         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         |
|             | GREEN(63)  | 0         | 0  | 0  | 0  | 0  | 0         | 1         | 1  | 1  | 1  | 1  | 1         | 0         | 0  | 0  | 0  | 0  | 0         |
|             | BLUE(63)   | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         | 1         | 1  | 1  | 1  | 1  | 1         |
|             | CYAN       | 0         | 0  | 0  | 0  | 0  | 0         | 1         | 1  | 1  | 1  | 1  | 1         | 1         | 1  | 1  | 1  | 1  | 1         |
|             | MAGENTA    | 1         | 1  | 1  | 1  | 1  | 1         | 0         | 0  | 0  | 0  | 0  | 0         | 1         | 1  | 1  | 1  | 1  | 1         |
|             | YELLOW     | 1         | 1  | 1  | 1  | 1  | 1         | 1         | 1  | 1  | 1  | 1  | 1         | 0         | 0  | 0  | 0  | 0  | 0         |
|             | WHITE      | 1         | 1  | 1  | 1  | 1  | 1         | 1         | 1  | 1  | 1  | 1  | 1         | 1         | 1  | 1  | 1  | 1  | 1         |
| RED         | RED(0)     | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         |
|             | RED(1)     | 0         | 0  | 0  | 0  | 0  | 1         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         |
|             | RED(2)     | 0         | 0  | 0  | 0  | 1  | 0         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         |
|             |            |           |    |    |    |    |           |           |    |    |    |    |           |           |    |    |    |    |           |
|             | RED(62)    | 1         | 1  | 1  | 1  | 1  | 0         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         |
|             | RED(63)    | 1         | 1  | 1  | 1  | 1  | 1         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         |
| GREEN       | GREEN (0)  | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         |
|             | GREEN (1)  | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 1         | 0         | 0  | 0  | 0  | 0  | 0         |
|             | GREEN (2)  | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 1  | 0         | 0         | 0  | 0  | 0  | 0  | 0         |
|             |            |           |    |    |    |    |           |           |    |    |    |    |           |           |    |    |    |    |           |
|             | GREEN (62) | 0         | 0  | 0  | 0  | 0  | 0         | 1         | 1  | 1  | 1  | 1  | 0         | 0         | 0  | 0  | 0  | 0  | 0         |
|             | GREEN (63) | 0         | 0  | 0  | 0  | 0  | 0         | 1         | 1  | 1  | 1  | 1  | 1         | 0         | 0  | 0  | 0  | 0  | 0         |
| BLUE        | BLUE (0)   | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         |
|             | BLUE (1)   | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 1         |
|             | BLUE (2)   | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 1  | 0         |
|             |            |           |    |    |    |    |           |           |    |    |    |    |           |           |    |    |    |    |           |
|             | BLUE (62)  | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 1         |
|             | BLUE (63)  | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 0  | 0         | 0         | 0  | 0  | 0  | 1  | 0         |

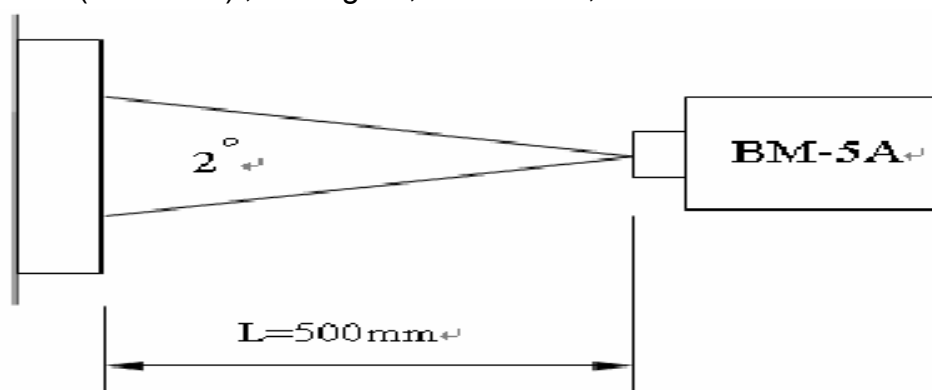
NOTE : (1) Definition of Gray Scale , Color(n) : n is series of Gray Scale  
The more n value is the bright Gray Scale  
(2) Data : 1-High , 0-Low

## 8. OPTICAL CHARACTERISTICS

| Item                               |            | Symbol                         | Condition                                | Min.                                     | Typ.  | Max.  | Unit              | Note      |        |
|------------------------------------|------------|--------------------------------|------------------------------------------|------------------------------------------|-------|-------|-------------------|-----------|--------|
| Contrast ratio                     |            | CR                             | Point - 5<br>$\Theta = \Phi = 0^{\circ}$ | 200                                      | 300   | --    | --                | (1)(2)(3) |        |
| Luminance                          |            | Lw                             |                                          | 180                                      | 220   | -     | cd/m <sup>2</sup> | (1)(3)    |        |
| Luminance Uniformity               |            | $\Delta L$                     |                                          | 70                                       | 80    | -     | %                 | (1)(3)    |        |
| Response Time<br>( White – Black ) |            | T <sub>r</sub> +T <sub>f</sub> |                                          | --                                       | 30    | 50    | ms                | (1)(3)(5) |        |
| Viewing<br>Angle                   | Vertical   | $\Theta$                       | CR $\geq$ 10<br>Point – 5                | 80                                       | 100   | -     | Deg.              | (1)(2)(4) |        |
|                                    | Horizontal | $\Phi$                         |                                          | 120                                      | 140   | -     |                   |           |        |
| Color<br>chromaticity              |            | Red                            | Rx                                       | Point - 5<br>$\Theta = \Phi = 0^{\circ}$ | 0.580 | 0.610 | 0.640             | --        | (1)(3) |
|                                    |            |                                | Ry                                       |                                          | 0.306 | 0.336 | 0.366             |           |        |
|                                    |            | Green                          | Gx                                       |                                          | 0.300 | 0.330 | 0.360             |           |        |
|                                    |            |                                | Gy                                       |                                          | 0.544 | 0.574 | 0.604             |           |        |
|                                    |            | Blue                           | Bx                                       |                                          | 0.116 | 0.148 | 0.176             |           |        |
|                                    |            |                                | By                                       |                                          | 0.080 | 0.110 | 0.140             |           |        |
|                                    |            | White                          | Wx                                       |                                          | 0.283 | 0.313 | 0.343             |           |        |
|                                    |            |                                | Wy                                       |                                          | 0.299 | 0.329 | 0.359             |           |        |

NOTE :

- (1) Measure conditions :  $25^\circ\text{C} \pm 2^\circ\text{C}$  ,  $60 \pm 10\% \text{RH}$  under 10Lux , in the dark room by BM-5A(TOPCON) ,viewing  $2^\circ$  , VCC=3.3V , VDD=3.3V



- (2) Definition of Contrast Ratio :

**Contrast Ratio (CR) = (White) Luminance of ON ÷ (Black) Luminance of OFF**

- (3) Definition of Luminance :

Definition of Luminance Uniformity

Measure white luminance on the point 5 as figure9-1

Measure white luminance on the point 1 ~ 9 as figure9-1

$$\Delta L = [ L(\text{MIN}) / L(\text{MAX}) ] \times 100\%$$

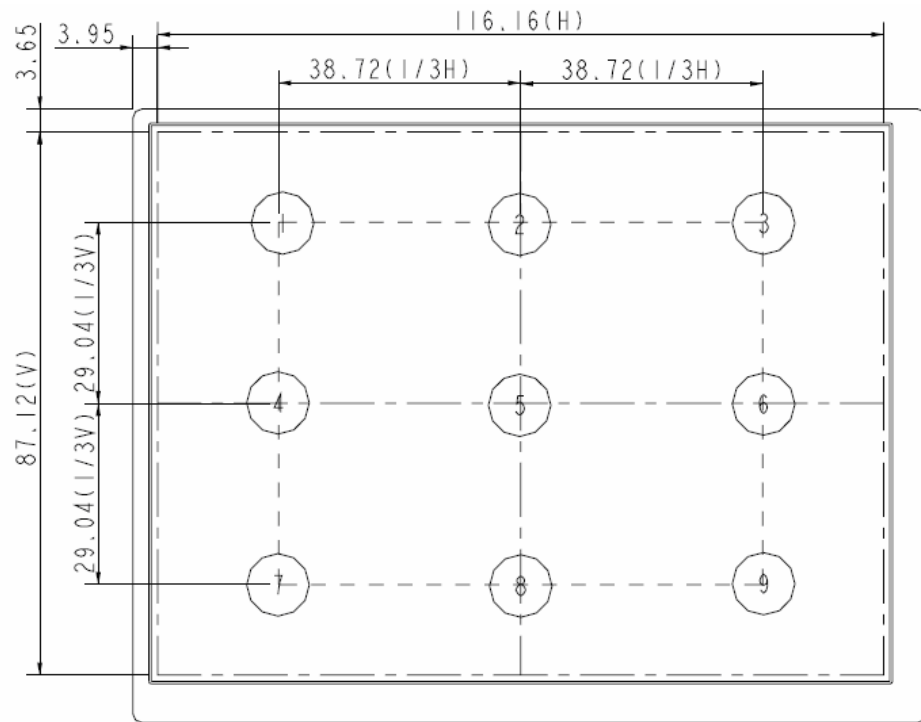


Fig8-1 Measuring point

(4) Definition of Viewing Angle( $\Theta, \Phi$ ), refer to Fig9-2 as below :

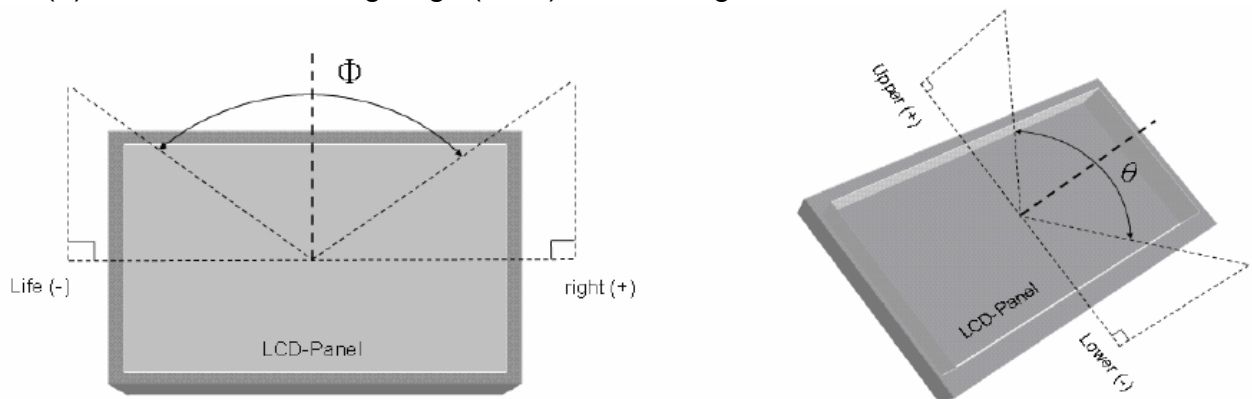


Fig8-2 Definition of Viewing Angle

(5) Definition of Response Time.(White – Black)

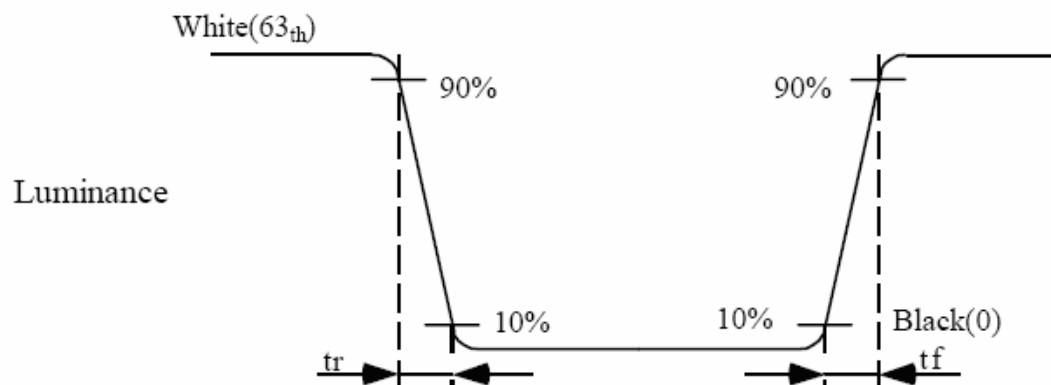


Fig8-3 Definition of Response Time(White-Black)

## 9. RELIABILITY TEST CONDITIONS

| ITEM                                         | CONDITIONS                                                                                                                                                                                                                                                                               |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HIGH TEMPERATURE OPERATION                   | 85℃ , 240Hrs                                                                                                                                                                                                                                                                             |
| HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION | 60℃ , 90%RH , 240Hrs                                                                                                                                                                                                                                                                     |
| HIGH TEMPERATURE STORAGE                     | 90℃ , 240Hrs                                                                                                                                                                                                                                                                             |
| LOW TEMPERATURE OPERATION                    | -30℃ , 240Hrs                                                                                                                                                                                                                                                                            |
| LOW TEMPERATURE STORAGE                      | -40℃ , 240Hrs                                                                                                                                                                                                                                                                            |
| THERMAL SHOCK                                | -30℃ (0.5Hr) ~85℃ (0.5Hr)<br>200Cycle                                                                                                                                                                                                                                                    |
| SHOCK<br>(NON-OPERATIONS)                    | <ul style="list-style-type: none"><li>● Shock level : 980m/s<sup>2</sup>(equal to 100G)</li><li>● Waveform : half sinusoidal wave, 6ms.</li><li>● Number of shocks : one shock input in each direction of three mutually perpendicular axes for a total of three shock inputs.</li></ul> |
| VIBRATION<br>(NON-OPERATIONS)                | <ul style="list-style-type: none"><li>● Frequency range:8~33.3Hz</li><li>● Stoke:1.3mm</li><li>● Vibration sinusoidal wave, perpendicular axis (both x, y, z axis:2Hrs)</li><li>● sweep:2.9G , 33.3~400Hz</li><li>● cycle : 15min</li></ul>                                              |

NOTE : Judgment standard

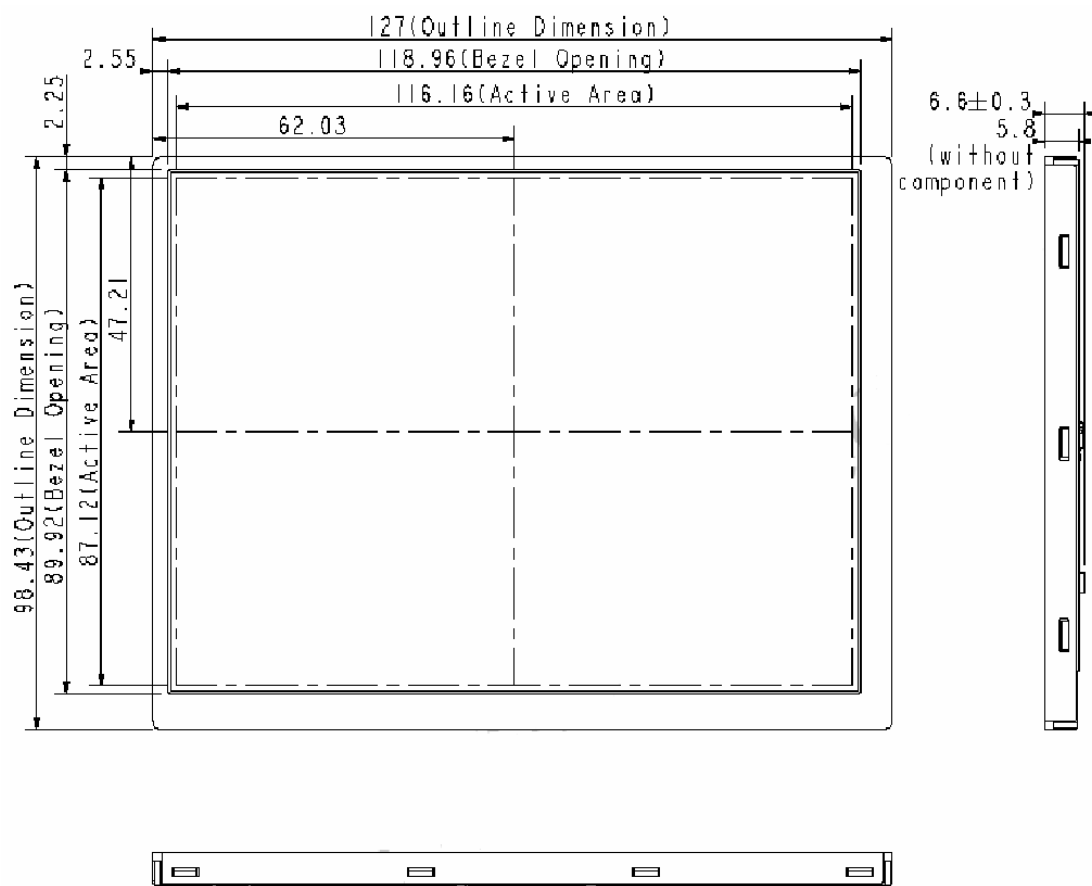
The Judgment of the above test should be made as follow :

Pass : Normal display image with no obvious non-uniformity and no line defect . Partial transformation of the module parts should be ignored.

Fail : No display image , obvious non-uniformity or line defect

## 10. OUTLINE DIMENSION

### 10-1 Front view(unit:mm)



### 10-2 Back view(unit:mm)

