# Chunghwa Picture Tubes, Ltd.
# Product Specification

To :

Date : 20070110

*TFT LCD*

## CLAA057VA01CW

**ACCEPTED BY : V0.3**

| APPROVED BY | CHECKED BY | PREPARED BY |
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## REVISION STATUS

| Revision Notice | Description | Page | Rev. Date |
|---|---|---|---|
| 0.0 | First revision (Tentative) | 18 | 2006/9/6 |
| 0.1 | Product name change to CLAA057VA01CW | 18 | 2006/9/13 |
| | Revise the contact of 1.OVERVIEW (P.3) | | |
| | The thickness of MDL appearance is revised for 6.6mm (P.3) | | |
| | MDL weight is revised for 110g (P.3) | | |
| | Delete three items Forward Current, Reverse Voltage, Pulse forward current in 2.ABSOLUTE MAXIMUM RATINGS(P4) | | |
| | Voltage of LED power in the 3.ELECTRICAL CHARACTERISTICS ($V_{LED}$) as Minimum= 4.5V Stand= 5V & Maximum= 5.5V. | | |
| | Revision LED power electric current mark is $I_{LED}$ in the 3.ELECTRICAL CHARACTERISTICS | | |
| | Revise standard specification value:$V_{LED}$ is input for 5.0 V.<br>Maximum specification value:$V_{LED}$is input for 4.5 V. | | |
| | Revise 4.INTERFACE CONNECTION SYMBOL & DESCRIPTION of 2nd, 3rd & 8th pin. | | |
| | Alter ADJ: Luminance control pin, the bigger the brighter its pulse duty is. | | |
| | Revise 5. Input signal (DE only mode): Dot Clock ($f_{CLK}$) TYP value is 25. | | |
| | Modification of figures of front view and back view in the 7. MECHANICAL DIMENSION. | | |
| | Modification of the high temperature keeping testing is 95℃ for 240 hours.<br>Thermal shock testing is -30℃(0.5hours) to 85℃(0.5hours) for 200 cycles in 9.RELIABILITY TEST.<br>Supplementary: Low-temperature turn on testing condition : Backlight unit always turn on. | | |
| | 4. interface connection(p8.) | | |
| 0.2 | Power consumption(p.4) | | 2006/10/31 |
| | TFT-LCD current comsumption (p.6) | | |
| 0.3 | MECHANICAL DIMENSION (p.14 &p.15) | | 2006/11/6 |
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# 1. OVERVIEW

CLAA057VAO1CW is 5.7" color TFT-LCD(Thin Film Transistor Liquid Crystal Display)module composed of LCD panel,driver ICs,control circuit,and LED backlight.

The 14.52cm(5.7") screen produces a high resolution image that is composed of 640×480 pixel elements in a stripe arrangement.Display 262K colors by 6 Bit R.G.B signal input.Use 3.3 Voltage to drive the power of LCD system,and 5 Voltage to drive the black light LED.

General specifications are summarized in the following table:

| ITEM | SPECIFICATION |
|---|---|
| Panel Size | 5.7 inch(panel diagonal) |
| Display Area (mm) | 116.16(W)×87.12(H) |
| Number of Pixels | 640×3(H)×480(V) |
| Pixel Pitch (mm) | 0.1815(H)×0.1815(V) |
| Color Pixel Arrangement | RGB vertical stripe |
| Display Mode | Normally white |
| Number of colors | 262,144 |
| Viewing Direction | 6 o´clock |
| Response Time (Tr+Tf) | 30ms |
| Brightness(cd/$m^2$) | 220nit(typ) |
| NTSC ratio | 50% |
| Viewing Angle(BL on,CR≧10) | 140 degree(H)，100degree(V) |
| Electrical Interface(data) | TTL |
| Power consumption(W) | 2.1W |
| Outline Dimension(in mm) | 127(W)×100(H)×6.6(D) |
| Weight(g) | 110g |
| BL unit | LED |
| Surface Treament | Anti-Glare，Hardness:3H |

## 2. ABSOLUTE MAXIMUM RATINGS

| Item | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Power Supply Voltage | Vcc | -0.5 | 5.0 | V | |
| Signal Input Voltage | DCLK,DE,R0,G0 ,B0~R5,G5,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 | $T_{op}$ | -30 | 85 | ℃ | *1) |
| Storage Temperature | $T_{stg}$ | -40 | 95 | ℃ | *1) |

Remarks：

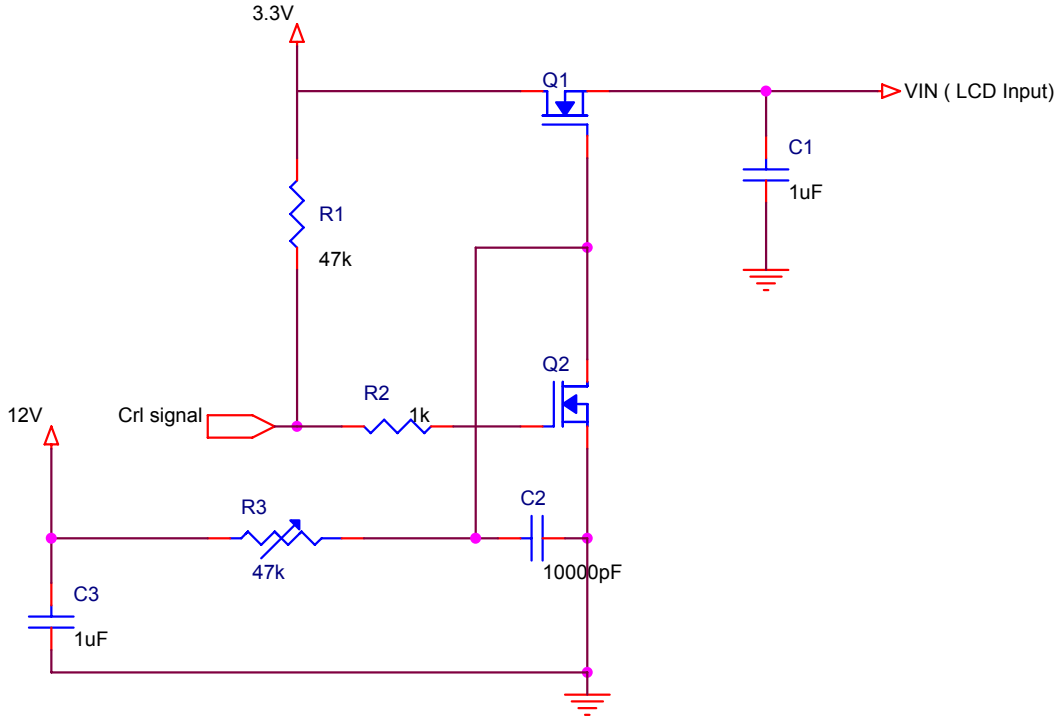
*1) If users use the product out off the environmemt operation range（temperature and humidity）,it will concern for visual quality.

*2) Test Condition: IEC 61000-4-2 ,

VESDc ：Contact discharge to input connector

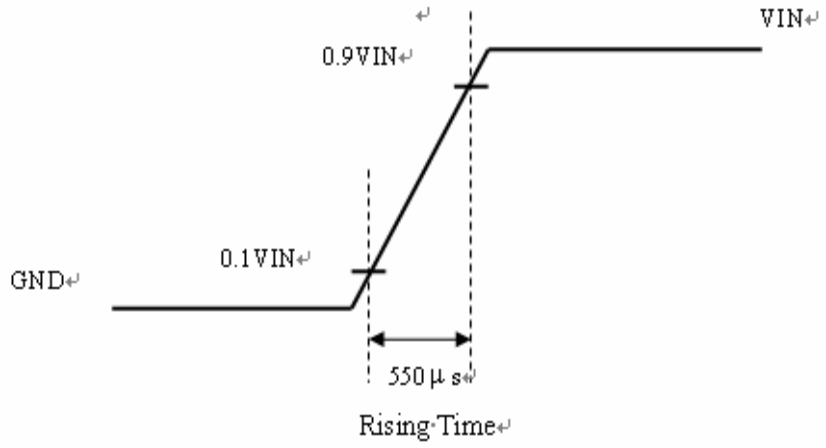
VESDm：Contact discharge to module

*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) Ifp Conditions ： Pulse Width=10msec and Duty=1/10。

# 3. ELECTRICAL CHARACTERISTICS

## 3.1TFT LCD

Ta=25℃

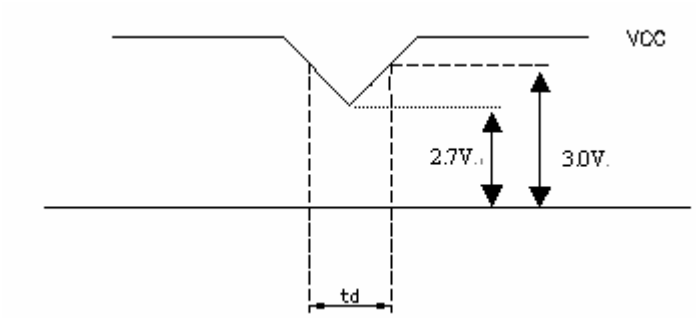
| Item | Symbol | Min. | Typ | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Power Supply Voltage For LCD | $V_{CC}$ | 3.0 | 3.3 | 3.6 | V | *1) |
| Power Supply Voltage For LED | $V_{LED}$ | 4.5 | 5 | 5.5 | V | |
| Logic Input Voltage | $V_{IH}$ | VCC*0.7 | -- | VCC | V | |
| | $V_{IL}$ | 0 | -- | VCC*0.3 | V | |

Remarks：

*1) VCC –dip codition:

When 2.7 V≦VCC＜3.0V，td≦10ms.

VCC＞3.0V，VCC-dip condition should be same as VCC-turn-on condition.

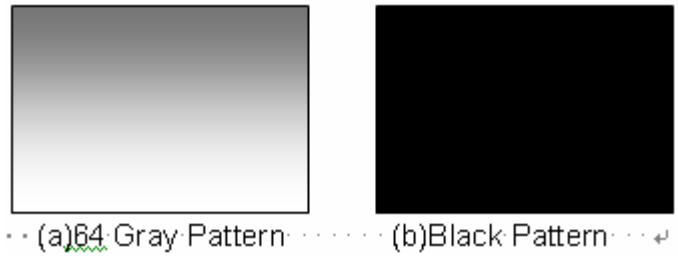



## 3.2TFT-LCD current comsumption

| Item | Symbol | Min. | Typ | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| LCD power current | $I_{CC}$ | -- | 150 | 190 | mA | *1) |
| LED power current | $I_{LED}$ | | 320 | 360 | mA | *2) |

*1) Typical: Under 64 gray pattern

Maximum: Under black pattern

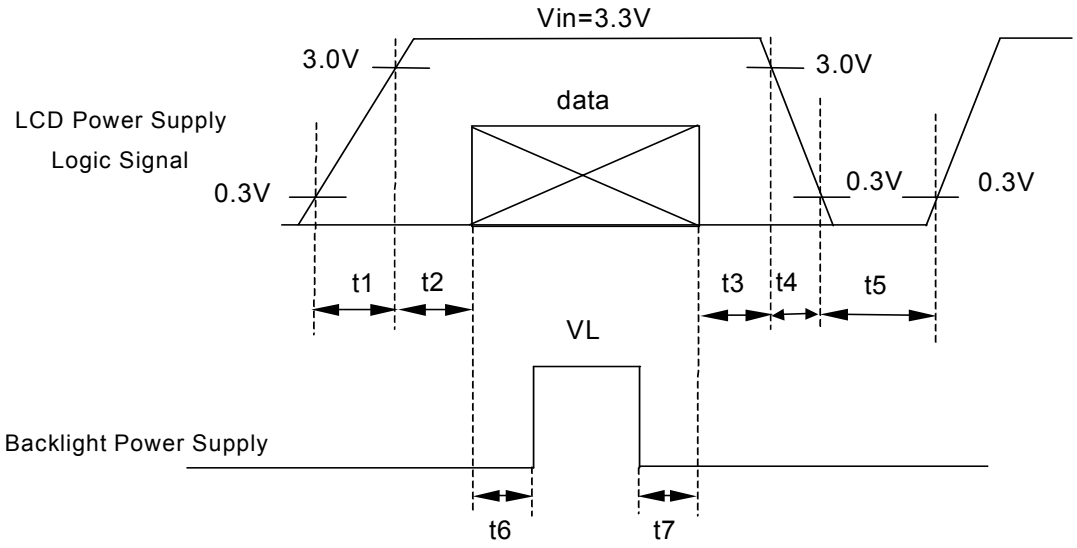



*2) Typical: When $V_{LED}$ is 5.0V

Maximum: When $V_{LED}$ is 4.5V

3.3 Power、Signal sequence

t1≦10ms 1 sec≦t5
50ms≦t2 200ms≦t6
0＜t3≦50ms 200ms≦t7
0＜t4≦10ms




Data: RGB DATA, DCLK, DENA

# 4. INTERFACE CONNECTION

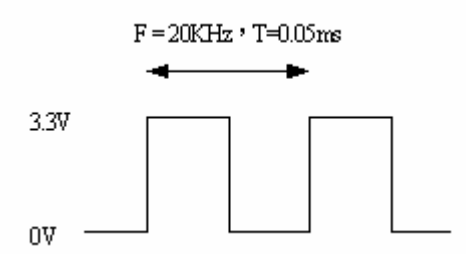
(Connector type:40pin/0.5mm pitch/Bottom contact)-089N40-000R00-G2

| Pin NO. | SYMBOL | DESCRIPTION |
|---|---|---|
| 1 | U/D | Up or Down Display Control |
| 2 | NC | Customer non-connect ; initial pull high =DE mod |
| 3 | NC | NC |
| 4 | Vled | Power Supply for Digital Circuit LED |
| 5 | Vled | Power Supply for Digital Circuit LED |
| 6 | Vled | Power Supply for Digital Circuit LED |
| 7 | Vcc | Power Supply for Digital Circuit LCD |
| 8 | NC | NC |
| 9 | DE | Data Enable |
| 10 | $V_{SS}$ | Power Ground |
| 11 | $V_{SS}$ | 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 | $V_{SS}$ | Power Ground |
| 17 | B2 | Blue Data 2 |
| 18 | B1 | Blue Data 1 |
| 19 | B0 | Blue Data 0 (LSB) |
| 20 | $V_{SS}$ | Power Ground |
| 21 | G5 | Green Data 5 (MSB) |
| 22 | G4 | Green Data 4 |
| 23 | G3 | Green Data 3 |
| 24 | $V_{SS}$ | Power Ground |
| 25 | G2 | Green Data 2 |
| 26 | G1 | Green Data 1 |
| 27 | G0 | Green Data 0 (LSB) |
| 28 | $V_{SS}$ | Power Ground |
| 29 | R5 | Red Data 5 (MSB) |
| 30 | R4 | Red Data 4 |
| 31 | R3 | Red Data 3 |
| 32 | $V_{SS}$ | Power Ground |
| 33 | R2 | Red Data 2 |
| 34 | R1 | Red Data 1 |
| 35 | R0 | Red Data 0 (LSB) |
| 36 | $V_{SS}$ | Power Ground |
| 37 | $V_{SS}$ | Power Ground |
| 38 | DCLK | Clock Signals |
| 39 | $V_{SS}$ | Power Ground |
| 40 | L/R | Left or Right Display Control |

Remarks：

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

2) ADJ signal =0~3.3V，operation frequency:20±5KHZ




3) GND Pin must ground contact，can not be floating.

4) U/D and L/R are controled 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. INPUT SIGNAL(DE ONLY MODE)

5.1 Timing Specification

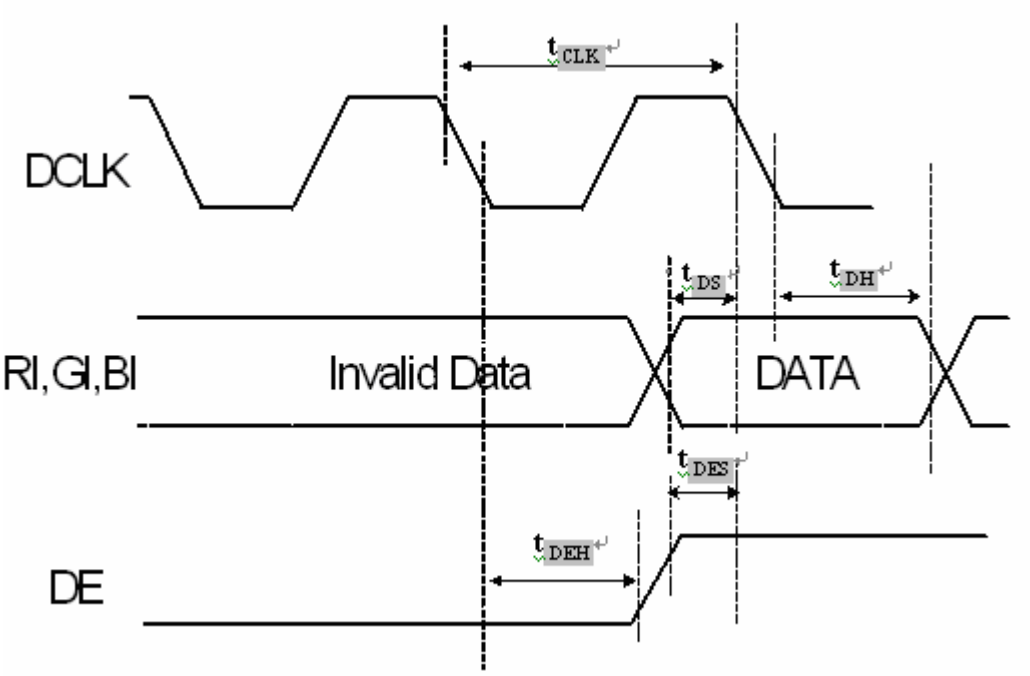
| ITEM | | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| DCLK | Period | $t_{CLK}$ | 16.67 | | | ns |
| | Dot Clock | $f_{CLK}$ | 5 | 25 | 40 | MHz |
| | Low Level Width | $t_{WCL}$ | 0.3 | - | - | ns |
| | High Level Width | $t_{WCH}$ | 0.3 | - | - | |
| DE | Setup Time | $t_{DES}$ | 5 | - | - | ns |
| | Hold time | $t_{DEH}$ | 10 | - | - | |
| | Horizontal Period | $t_{HP}$ | 750 | 800 | 900 | $t_{CLK}$ |
| | Horizontal Valid | $t_{HV}$ | | 640 | | |
| | Horizontal Blank | $t_{HBK}$ | 110 | 160 | 260 | |
| | Vertical Period | $t_{VP}$ | 515 | 525 | 560 | $t_{HP}$ |
| | Vertical Valid | $t_{VV}$ | | 480 | | |
| | Vertical Blank | $t_{VBK}$ | 35 | 45 | 80 | |
| | Vertical Frequency | $f_V$ | 55 | 60 | 65 | Hz |
| DATA | Setup Time | $t_{DS}$ | 4 | - | - | ns |
| | Hold Time | $t_{DH}$ | 8 | - | - | |

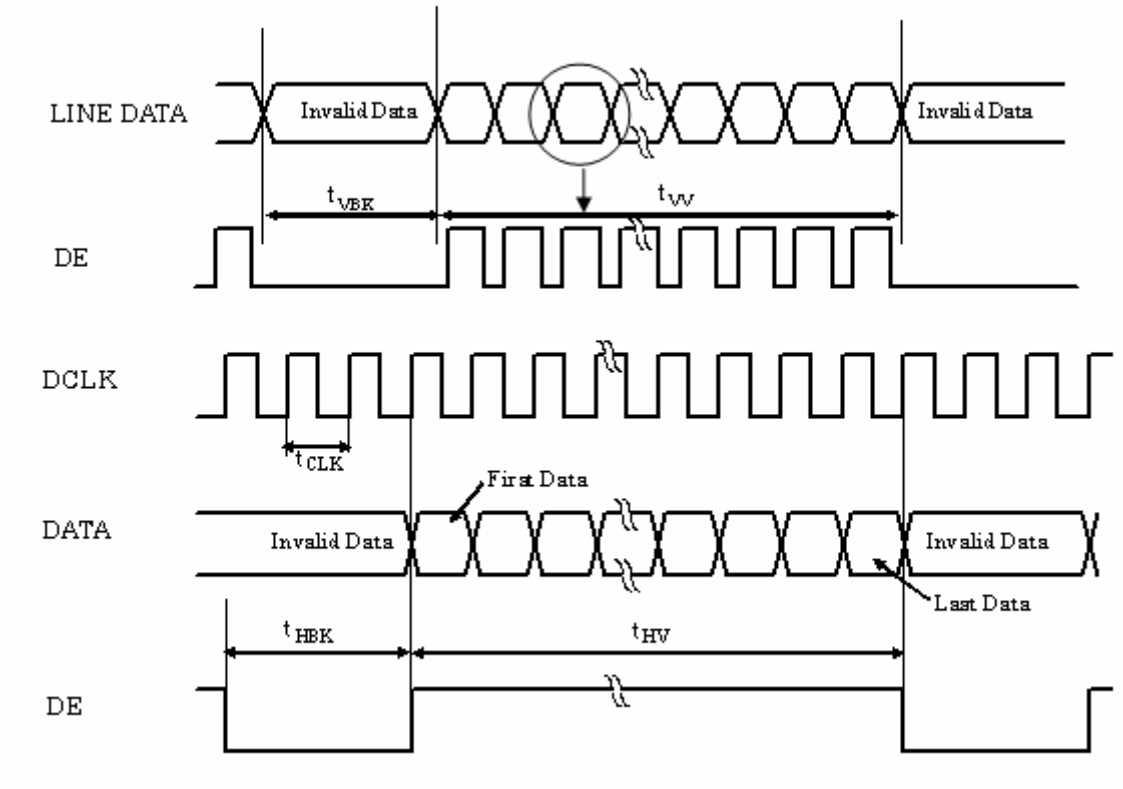
Remarks：

*1) High level of logic signal is 80%。Low level of logic signal is 20%。

*2) This module is operated by DE only mode

5.2 Timing sequence(Timing chart)



## 5.3 Color Data Assignment

| COLOR | INPUT | R DATA | | | | | | G DATA | | | | | | B DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DATA | R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 |
| | | MSB | | | | | LSB | MSB | | | | | LSB | MSB | | | | | LSB |
| | 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 |
| BASIC | GREEN(63) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| COLOR | 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(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 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | 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(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 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | 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(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 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | BLUE(62) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| | BLUE(63) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

Remarks：

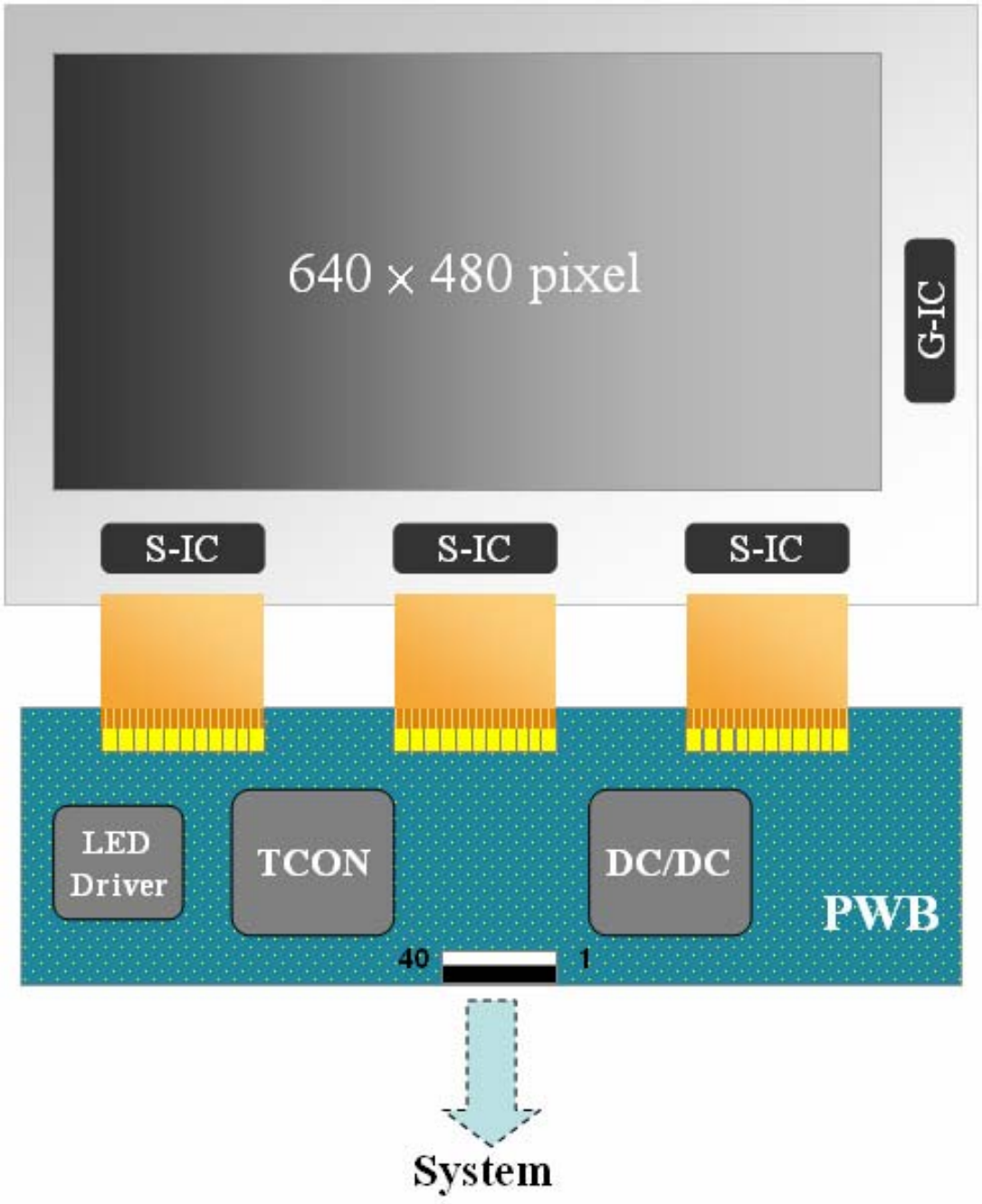
(1) Definition of Gray Scale

color(n)：n is series of Gray Scale

The more n value is, the bright Gray Scale.

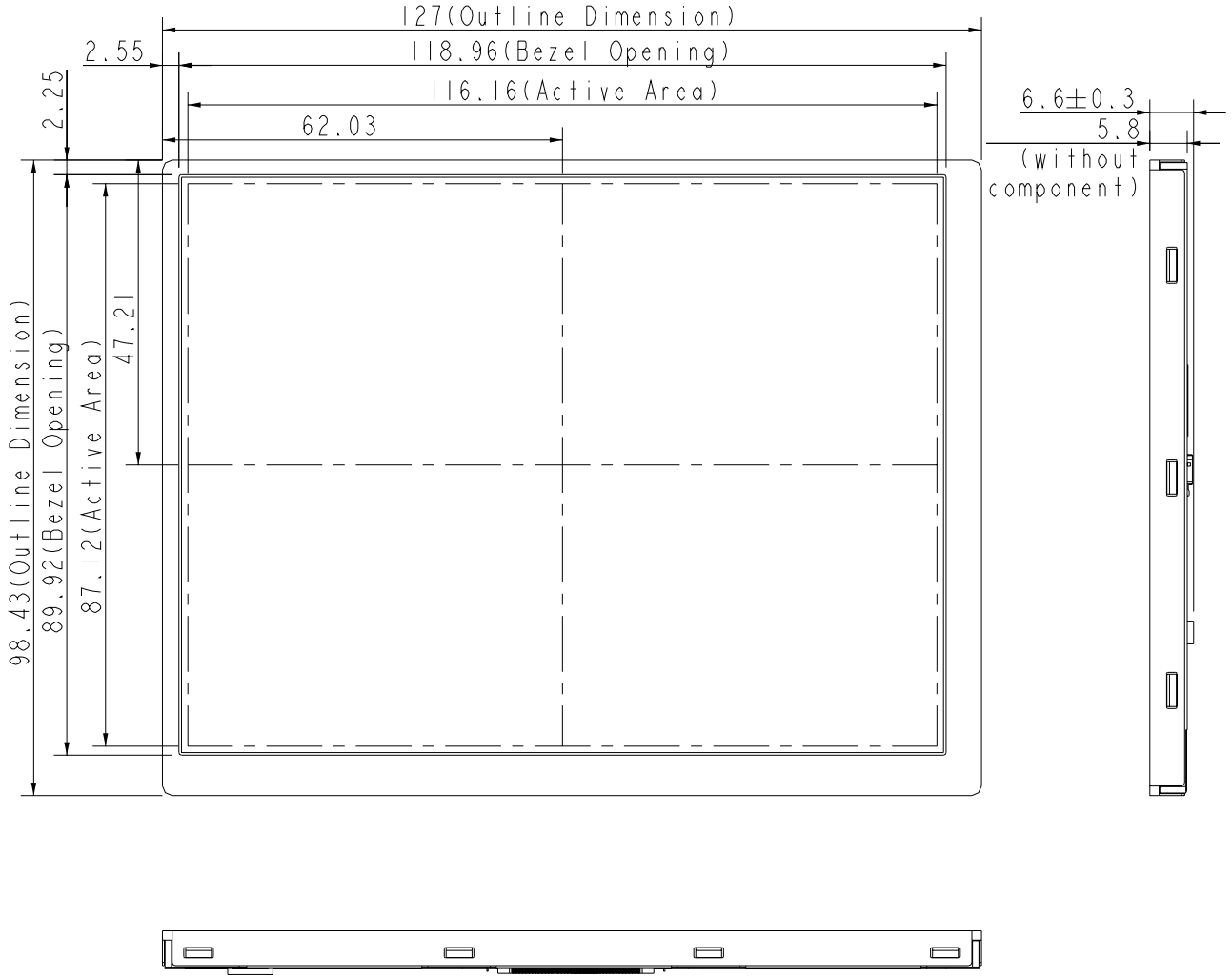
(2)Data:1-High,0-Low

## 6. BLOCK DIAGRAM



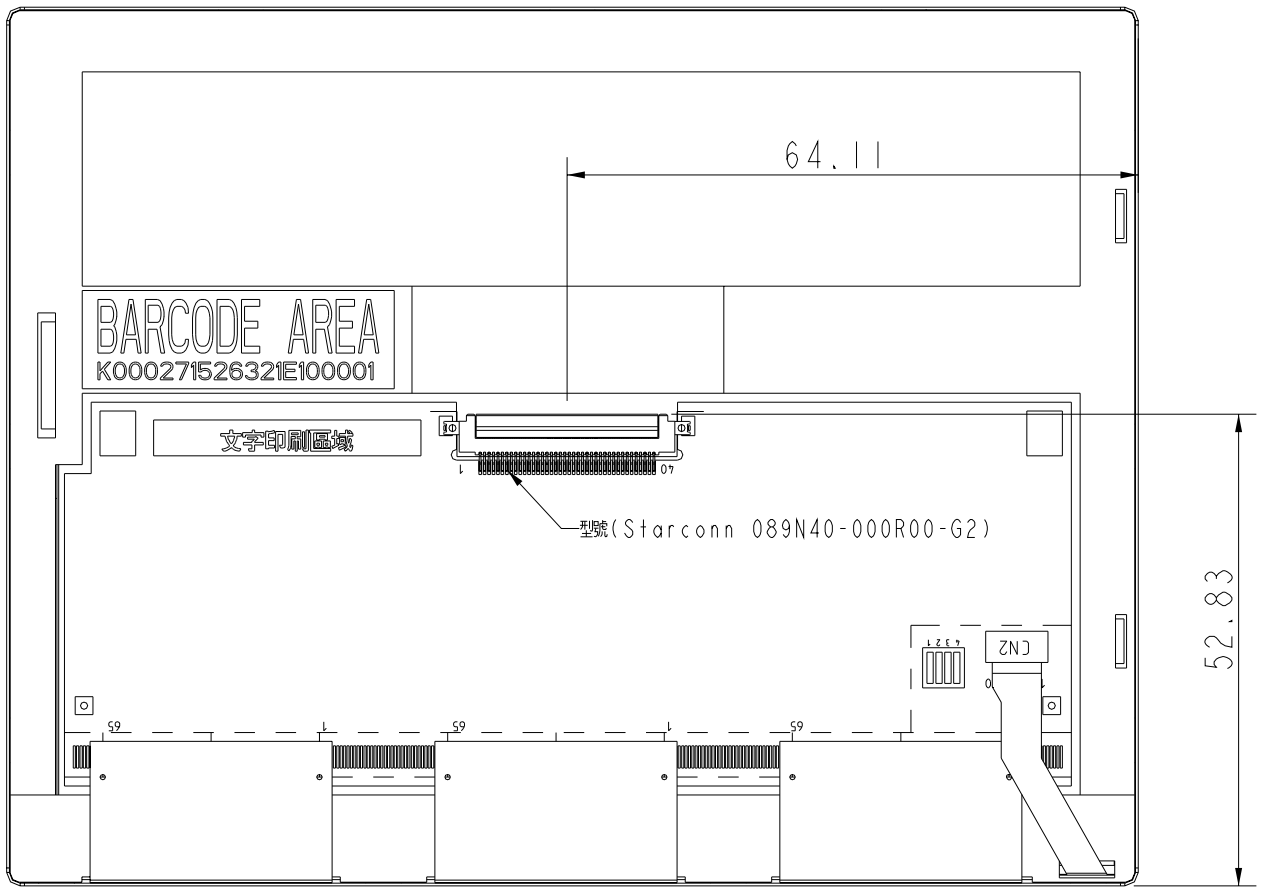
# 7. MECHANICAL DIMENSION

7.1 Front Side [Unit：mm]



## 7.2 Rear Side

[Unit：mm]



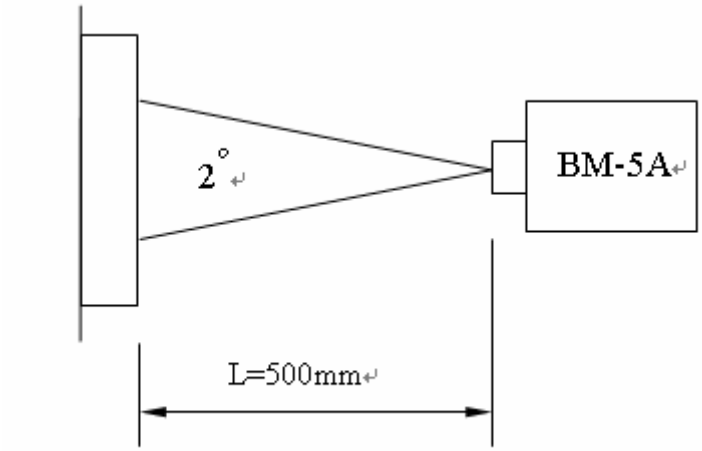

Remark：Un-indication tolerance is ±0.3mm

## 8. OPTICAL CHARACTERISTICS

| ITEM | | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | Remarks |
|---|---|---|---|---|---|---|---|---|
| Constrast Ratio | | CR | Point-5 | 200 | 300 | -- | -- | *1)*2)*3) |
| Luminance | | Lw | Point-5 | 180 | 220 | -- | $cd/m^2$ | *1)*3) |
| Luminance Uniformity | | ΔL | | 70 | 80 | -- | % | *1)*3) |
| Response Time (White - Black) | | Tr+ Tf | Point-5 | -- | 30 | 50 | ms | *1)*3)*5) |
| Viewing Angle | Horizontal | $\phi$ | CR≧10 Point-5 | 120 | 140 | -- | ° | *1)*2)*4) |
| | Vertical | $\theta$ | | 80 | 100 | -- | ° | *1)*2)*4) |
| Color Coordinate | White | Wx<br>Wy | Point-5 | 0.273<br>0.289 | 0.313<br>0.329 | 0.353<br>0.369 | -- | *1)*3) |
| | Red | Rx<br>Ry | | 0.570<br>0.296 | 0.610<br>0.336 | 0.650<br>0.376 | | |
| | Green | Gx<br>Gy | | 0.290<br>0.534 | 0.330<br>0.574 | 0.370<br>0.614 | | |
| | Blue | Bx<br>By | | 0.106<br>0.070 | 0.146<br>0.110 | 0.186<br>0.150 | | |

Remarks：

*1)Measure condition：25℃±2℃，60±10%RH，under10 Lux in the dark room.BM-5A (TOPCON)，viewing angle2°，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：

Measure white luminance on the point 5 as figure8-1

Definition of Luminance Uniformity:

Measure white luminance on the point1~9 as figure8-1

△L = [L(MIN)/L(MAX)]×100

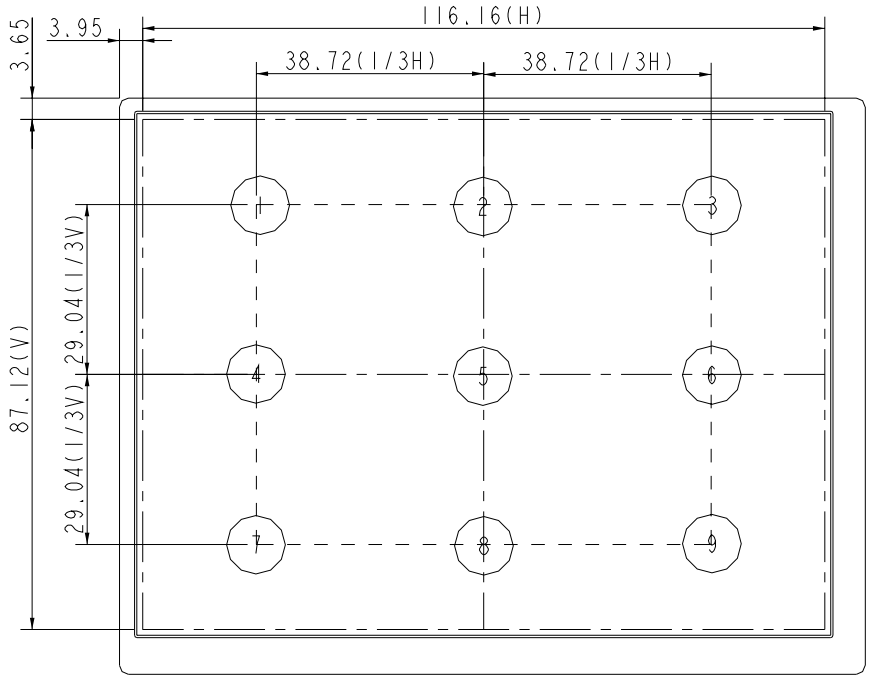



Fig8-1 Measuring point

*4) Definition of Viewing Angle(θ,ψ),refer to Fig8-2 as below：

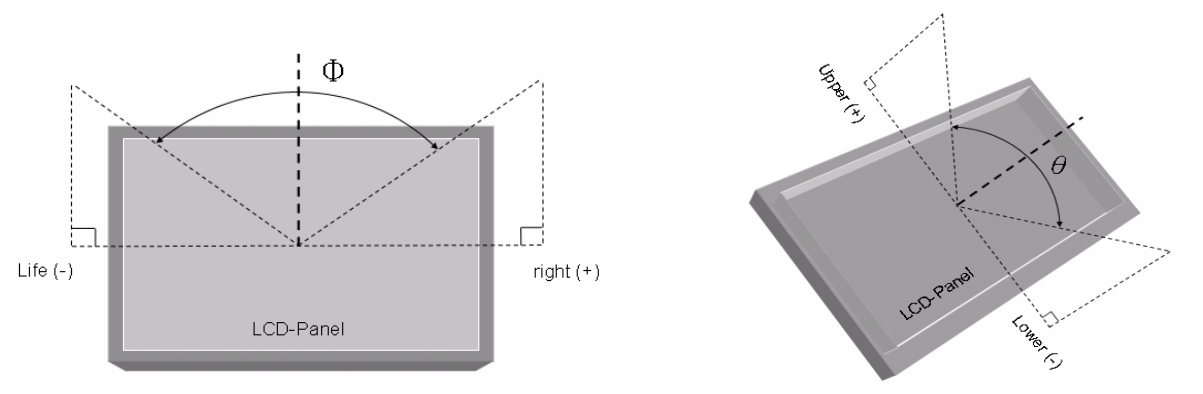



Fig8-2 Definition of Viewing Angle

*5) Definition of Response Time.(White-Black)

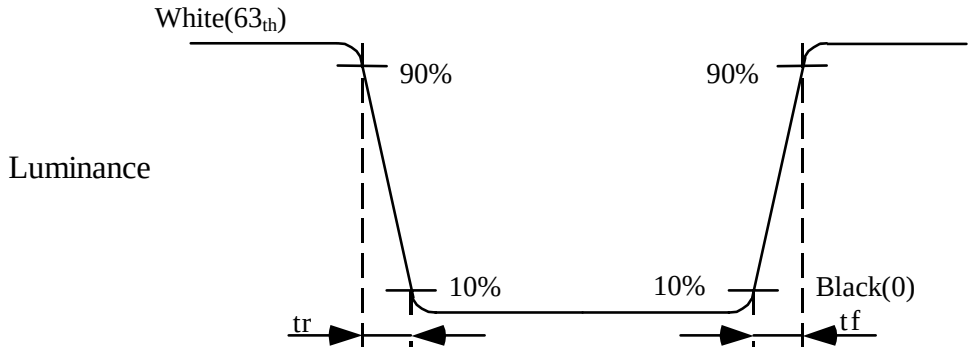



Fig8-3 Definition of Response Time(White-Black)

# 9. RELIABILITY TEST

9-1. Temperature and humidity

| TEST ITEMS | CONDITIONS |
|---|---|
| High Temperature Operation | 85℃，240H |
| High Temperature Storage | 95℃，240H |
| High Temperature High Humidity Operation | 60℃，90%RH，240H |
| Low Temperature Operation | -30℃，240H, Backlight unit always turn on |
| Low Temperature Storage | -40℃，240H |
| Thermal Shock | -30℃（0.5Hr）~ 85℃(0.5Hr)<br>200 cycles |

9-2. Shock and Vibration

| TEST ITEMS | CONDITIONS |
|---|---|
| Shock<br>(Non-operation) | ● Shock level:980m/s$^2$(equel to 100G)<br>● Waveform:half sinusoidal wave,6ms.<br>● Number of shocks:one shock input in each direction of three mutually perpendicular axes for a total of three shock inputs. |
| Vibration<br>(Non-operation) | ● Frequency range:8~33.3Hz<br>● Stoke:1.3mm<br>● Vibration:sinusodial wave,perpendicularaxis(both x,y,z axis:2Hrs).<br>● Sweep:2.9G,33.3Hz-400Hz<br>● Cycle:15min |

9-3. 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 trasformation of the module parts should be ignored.

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