



# Chunghwa Picture Tubes, Ltd.

## Product Specification

To :

Date : 20061026

**TFT LCD**  
**CLAA070VC01**

ACCEPTED BY :

--

APPROVED BY	CHECKED BY	PREPARED BY

Prepared by :

Small &Medium Product Planning Management Department  
Small &Medium Product General Division  
**CHUNGHWA PICTURE TUBES, LTD.**

Doc.No:	CLAA070VC01 -- Ver.0.2	Issue Date:	2006/07/17
---------	------------------------	-------------	------------

## REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First revision	--	
0.1	Change Power consumption	4	2006.05.22
	Delete Signal Input Voltage		
	Change Power Supply Current For LED	6	
	Change Logic Input Voltage		
	Change Power Supply Current For LCD		
	Change Remark*2)	7	
	Modify mechanical dimension : Front side	13	
	Change response time	15	
	Change viewing angle	15	
	Change Rmark*1)	15	
0.2	Change power consumption	4	2006.07.17
	Add to signal input voltage	5	
	Delete note*3) of static eletricity	5	
	Delete remark*2 of ICC rush current	5	
	Change electrical characteristics	7	
	Change definition of PIN 35	9	
	Change remarks *1)	9	
	Add to figure of remarks *2)	10	
	Change remarks *3)	10	
	Add to remarks *1)	11	
	Change block diagram	14	
	Change color coordinate	17	
	Change remarks *1)	17	
	Change condition of high temperature high humidity storage	20	
	Change condition of vibration	20	
	Add to ESD specification	20	

## CONTENTS

<b>1. OVERVIEW</b> .....	<b>4</b>
<b>2. ABSOLUTE MAXIMUM RATINGS</b> .....	<b>5</b>
<b>3. ELECTRICAL CHARACTERISTICS</b> .....	<b>7</b>
3.1TFT LCD .....	7
3.2TFT-LCD current consumption .....	8
3.3 Power 、 Signal sequence .....	8
<b>4. INTERFACE CONNECTION</b> .....	<b>9</b>
<b>5. INPUT SIGNAL(DE ONLY MODE)</b> .....	<b>11</b>
5.1 Timing Specification .....	11
5.2 Timing sequence(Timing chart).....	12
5.3 Color Data Assignment.....	13
<b>6. BLOCK DIAGRAM</b> .....	<b>14</b>
<b>7. MECHANICAL DIMENSION</b> .....	<b>15</b>
7.1 Front Side .....	15
7.2 Rear Side .....	16
<b>8. OPTICAL CHARACTERISTICS</b> .....	<b>17</b>
<b>9. RELIABILITY TEST</b> .....	<b>20</b>
9.1. Temperature and humidity .....	20
9.2. Shock and Vibration .....	20
9.3. ESD Test.....	20
9.4 Judgment standard.....	20

## 1. OVERVIEW

CLAA070VC01 is 7" color TFT-LCD(Thin Film Transistor Liquid Crystal Display)module composed of LCD panel,driver ICs,control circuit,and LED backlight.

The 7.0"screen produces a high resolution image that is composed of 800×480 pixel elements in a stripe arrangement.Display 262K colors by 6 Bit R.G.B signal input.

General specifications are summarized in the following table:

ITEM	SPECIFICATION
Display Area (mm)	152.4(W)×91.44(H)
Number of Pixels	800(H)×3(RGB)×480(V)
Pixel Pitch (mm)	0.1905(H)×0.1905(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)	20ms
Brightness(cd/m <sup>2</sup> )	220nit(typ)
NTSC ratio	50%
Viewing Angle(BL on,CR≥10)	140 degree(H) , 110degree(V)
Electrical Interface(data)	TTL
Power consumption(W)	2.0W(Typ)
Outline Dimension(in mm)	165(W)×104(H)×5(D)
Weight(g)	110g(Typ)
BL unit	LED
Surface Treatment	Anti-Glare , Hardness:3H

## 2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V <sub>cc</sub>	-0.5	5.0	V	
Signal Input Voltage	DCLK,DE,R0,G0,B0~R5,G5,B5	-0.5	V <sub>cc</sub> + 0.5	V	
Static Electricity	VESDc	-200	+200	V	*2)
	VESDm	-15K	+15K	V	
ICC Rush Current	IRUSH	-	1	A	*3)
Operation Temperature	T <sub>op</sub>	-30	85	°C	*1)
Storage Temperature	T <sub>stg</sub>	-40	95	°C	*1)

Remarks :

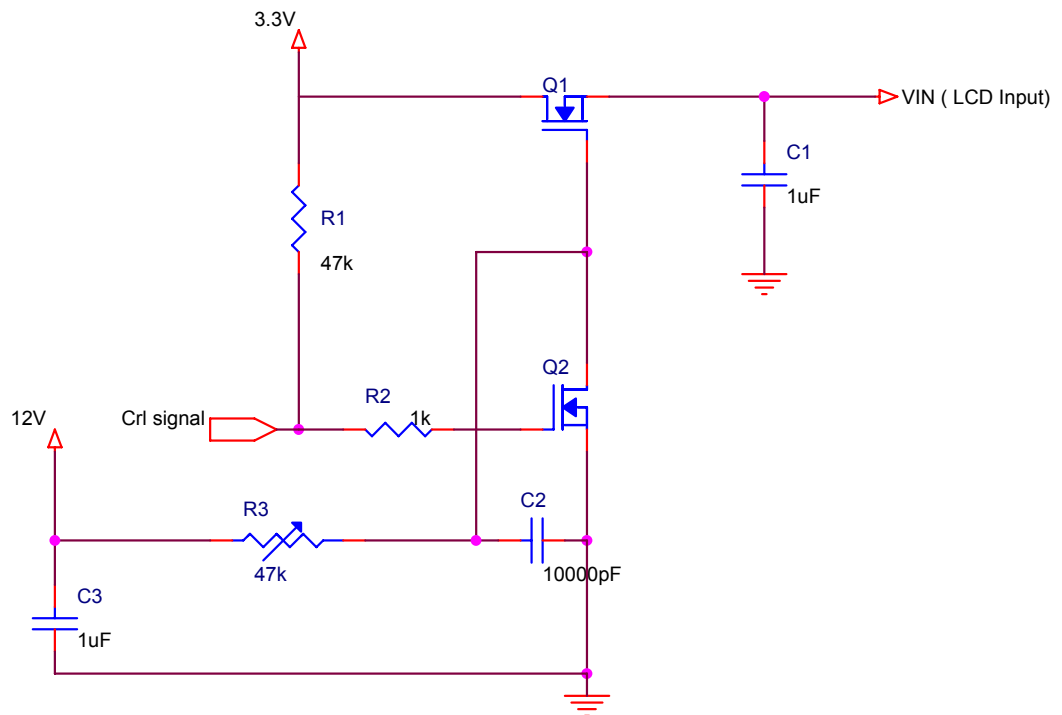
\*1) If users use the product out off the environment operation range ( temperature and humidity ) ,it will concern for visual quality.

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

VESDc : Contact discharge to input connector

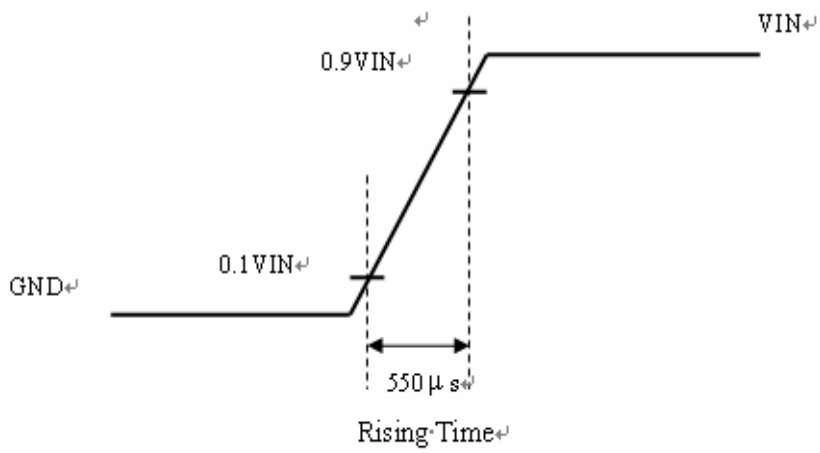
VESDm : Contact discharge to module

\*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.



### 3. ELECTRICAL CHARACTERISTICS

#### 3.1TFT LCD

Ta=25°C

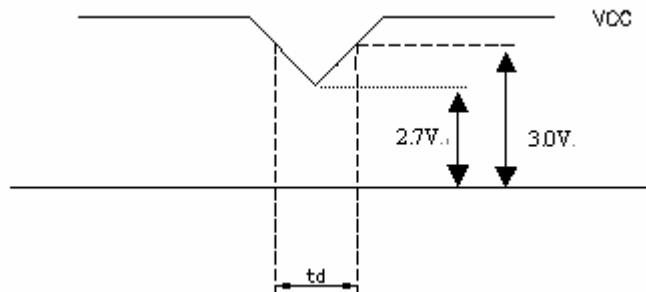
Item	Symbol	Min.	Typ	Max.	Unit	Note
Power Supply Voltage For LCD	VCC	3.0	3.3	3.6	V	*1)
Power Supply Voltage For LED	VDD	4.5	5	5.5	V	
Logic Input Voltage	VIH	VCC*0.7	--	VCC	V	
	VIL	0	--	VCC*0.3	V	
ADJ Input Voltage	VIH	3.0		3.3	V	
	VIL	GND		0.3	V	

Remarks :

\*1)VCC –dip condition:

When  $2.7\text{ V} \leq \text{VCC} < 3.0\text{ V}$  ,  $t_d \leq 10\text{ ms}$ .

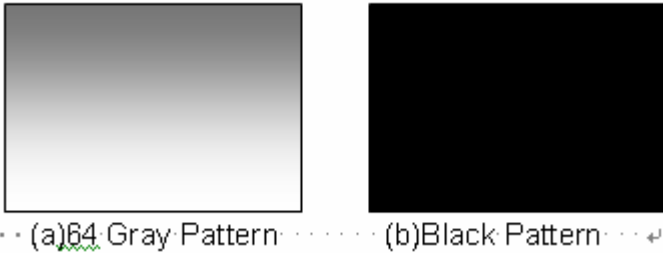
VCC &gt; 3.0V , VCC-dip condition should be same as VCC-turn-on condition.



3.2TFT-LCD current consumption

Item	Symbol	Min.	Typ	Max.	Unit	Note
LCD power current	ICC	--	150	200	mA	*1)
LED power current	IDD		300	350	mA	*2)

\*1) Typical: Under 64 gray pattern  
 Maximum: Under black pattern

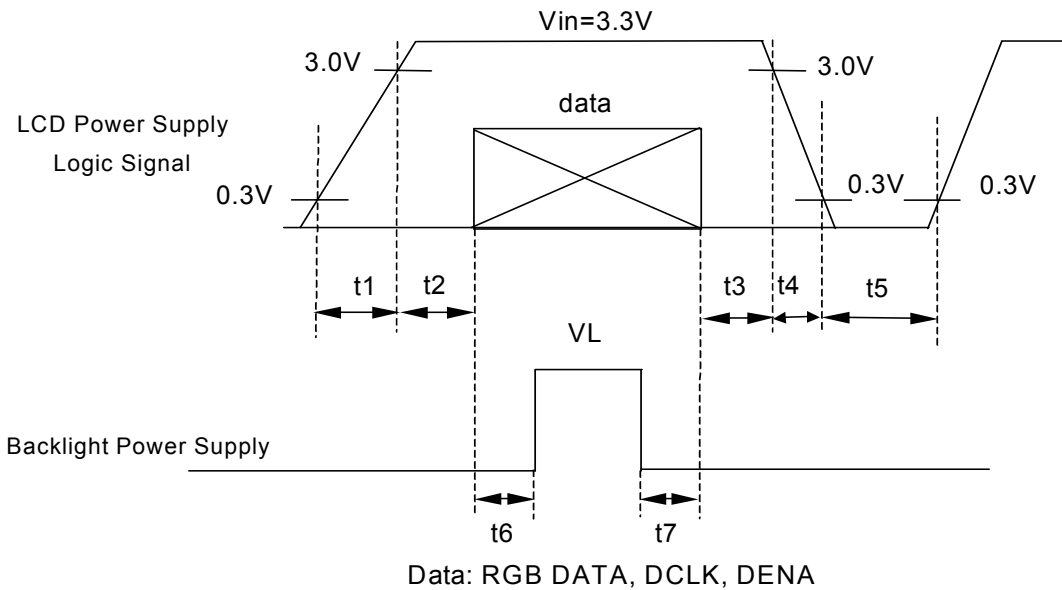


(a) 64 Gray Pattern (b) Black Pattern

\*2) Typical: When VDD is 5V  
 Maximum: When VDD is 4.5V

3.3 Power 、 Signal sequence

- $t1 \leq 10ms$        $1 \text{ sec} \leq t5$
- $50ms \leq t2$        $200ms \leq t6$
- $0 < t3 \leq 50ms$        $200ms \leq t7$
- $0 < t4 \leq 10ms$





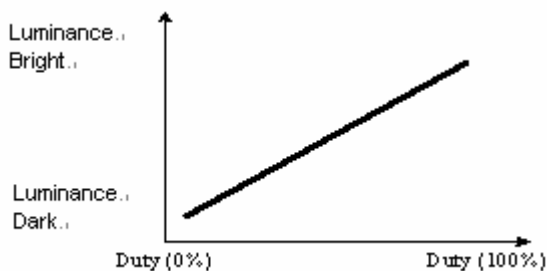
## 4. INTERFACE CONNECTION

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

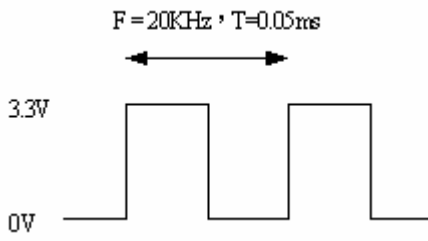
Pin NO.	SYMBOL	DESCRIPTION
1	V <sub>SS</sub>	Power Ground
2	V <sub>SS</sub>	Power Ground
3	ADJ	Brightness control for LED B/L
4	VDD	Power Supply for LED Driver circuit
5	VDD	Power Supply for LED Driver circuit
6	VDD	Power Supply for LED Driver circuit
7	V <sub>CC</sub>	Power Supply for Digital Circuit
8	V <sub>CC</sub>	Power Supply for Digital Circuit
9	DE	Data Enable
10	V <sub>SS</sub>	Power Ground
11	V <sub>SS</sub>	Power Ground
12	V <sub>SS</sub>	Power Ground
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	V <sub>SS</sub>	Power Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	V <sub>SS</sub>	Power Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	V <sub>SS</sub>	Power Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	V <sub>SS</sub>	Power Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	V <sub>SS</sub>	Power Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0 (LSB)
36	V <sub>SS</sub>	Power Ground
37	V <sub>SS</sub>	Power Ground
38	DCLK	Clock Signals ; Latch Data at the Falling Edge
39	V <sub>SS</sub>	Power Ground
40	V <sub>SS</sub>	Power Ground

Remarks :

1).ADJ adjust brightness to control Pin · Pulse duty the more big the more bright



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



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

## 5. INPUT SIGNAL(DE ONLY MODE)

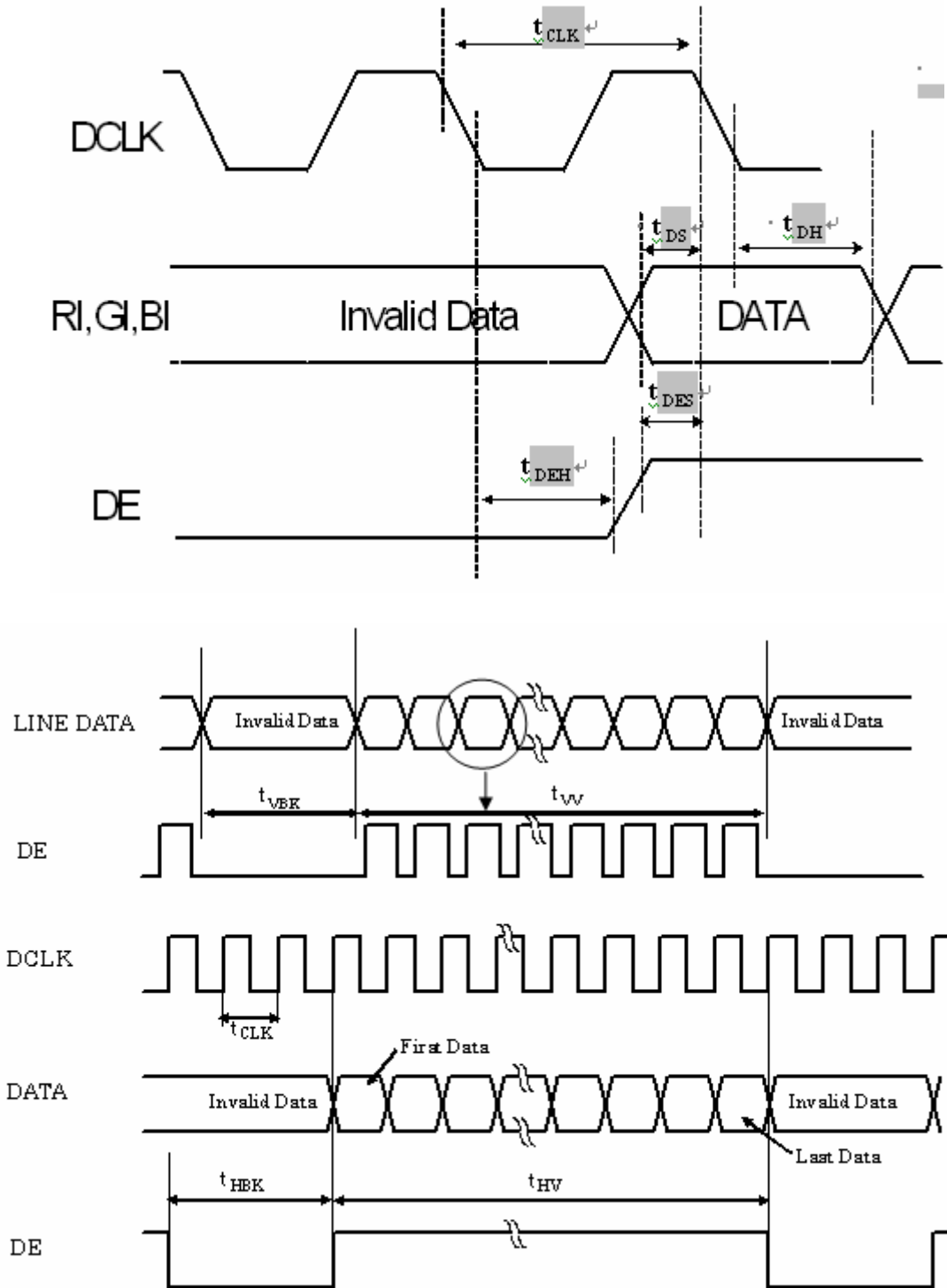
### 5.1 Timing Specification

	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK	Period	$t_{CLK}$	31	37.0	40.0	ns
	Dot Clock	$f_{CLK}$	25	27	32.11	MHz
	Low Level Width	$t_{WCL}$	6	-	-	ns
	High Level Width	$t_{WCH}$	6	-	-	
DE	Setup Time	$t_{DES}$	5	-	-	ns
	Hold time	$t_{DEH}$	10	-	-	
	Horizontal Period	$t_{HP}$	850	900	950	$t_{CLK}$
	Horizontal Valid	$t_{HV}$	800			
	Horizontal Blank	$t_{HBK}$	50	100	150	
	Vertical Period	$t_{VP}$	490	500	520	$t_{HP}$
	Vertical Valid	$t_{VV}$	480			
	Vertical Blank	$t_{VBK}$	10	20	40	
	Vertical Frequency	$f_V$	55	60	65	Hz
DATA	Setup Time	$t_{DS}$	5	-	-	ns
	Hold Time	$t_{DH}$	10	-	-	

Remarks :

- \*1) High level of logic signal is 70% ◦ 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 DATA	R DATA						G DATA						B 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		
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	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 :

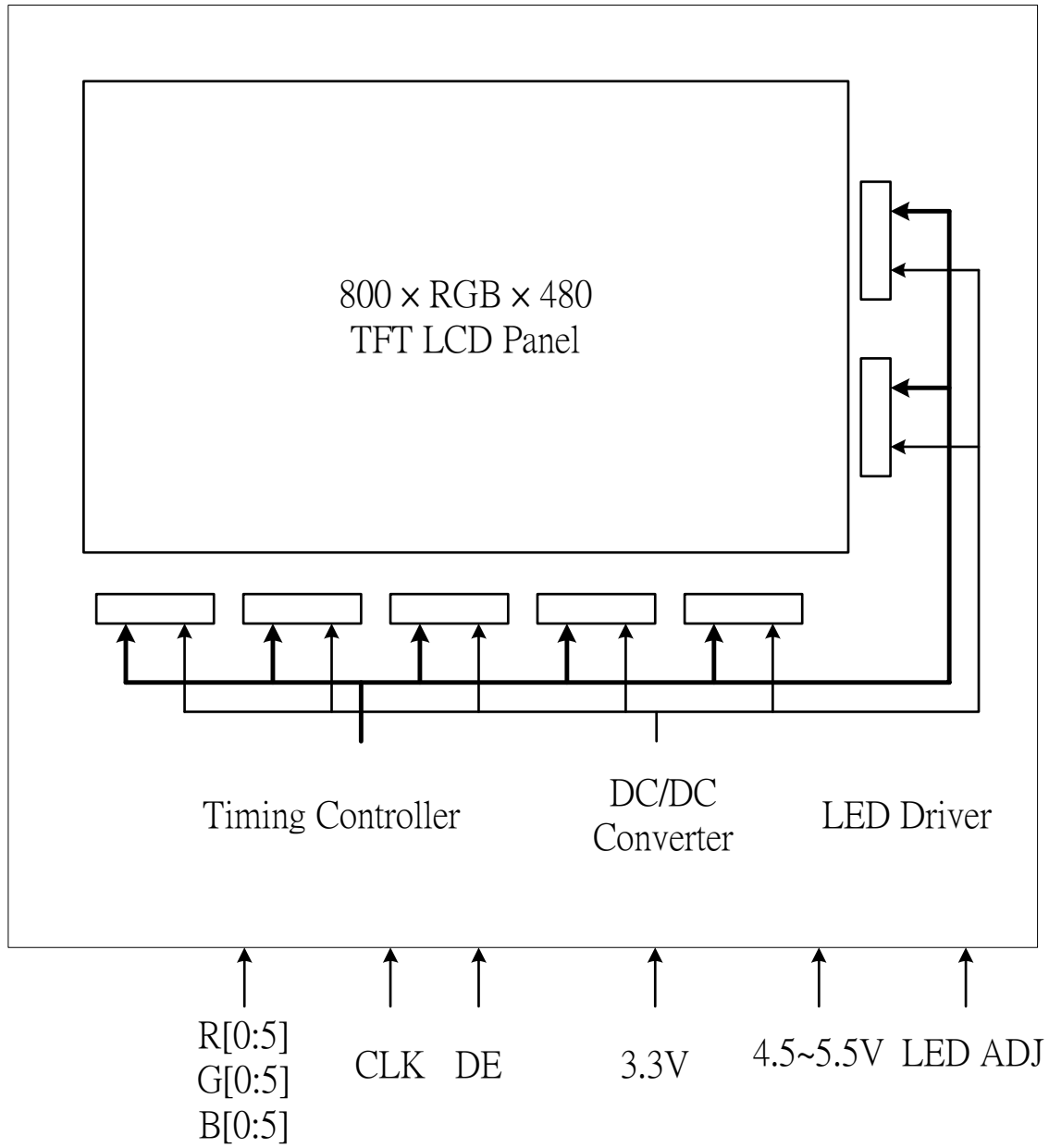
(1) Definition of Gray Scale

color(n) : n is series of Gray Scale

The more n value is, the bright Gray Scale.

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

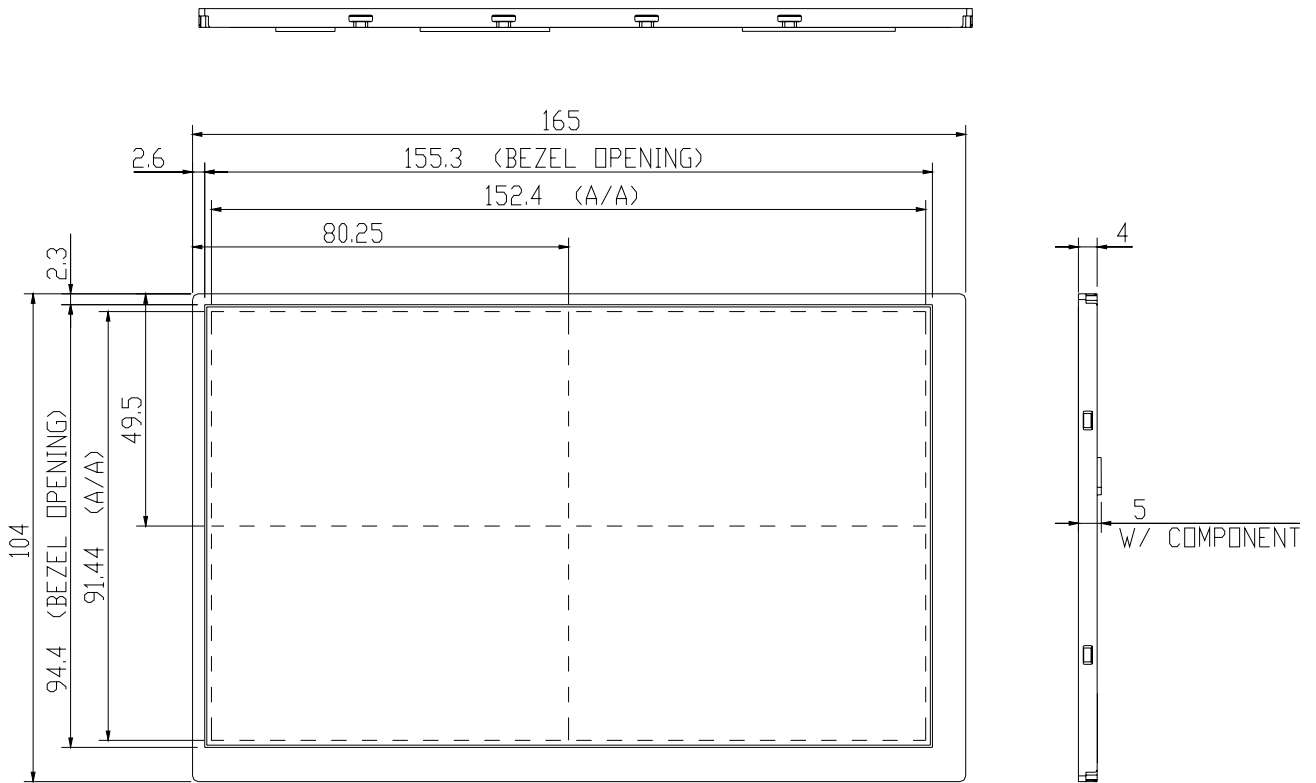
### 6. BLOCK DIAGRAM



### 7. MECHANICAL DIMENSION

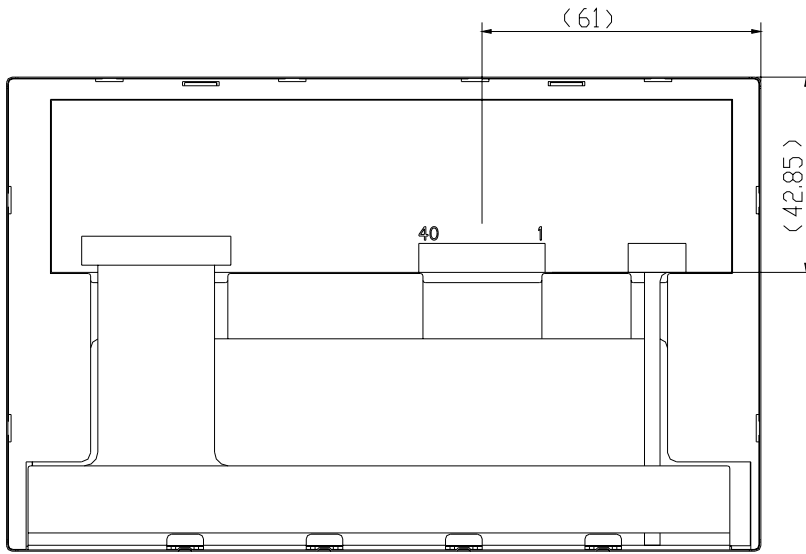
#### 7.1 Front Side

[Unit : mm]



7.2 Rear Side

[Unit : mm]



Remark : Un-indication tolerance is  $\pm 0.3\text{mm}$

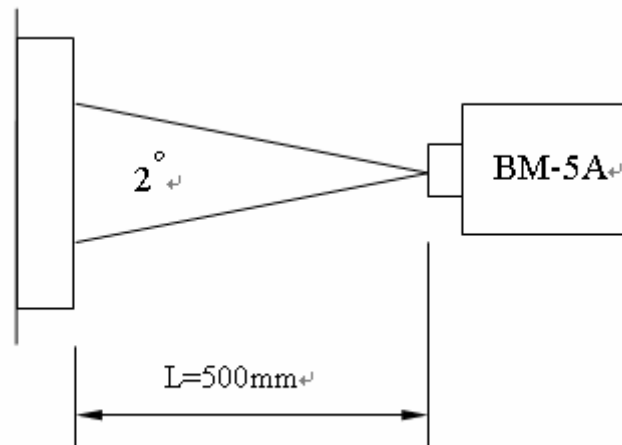


## 8. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remarks
Constrast Ratio		CR	Point-5	300	400	--	--	*1)*2)*3)
Luminance		Lw	Point-5	180	220	--	cd/m <sup>2</sup>	*1)*3)
Luminance Uniformity		$\Delta L$		70	80	--	%	*1)*3)
Response Time (White - Black)		Tr+ Tf	Point-5	--	--	20	ms	*1)*3)*5)
Viewing Angle	Horizontal	$\phi$	CR $\geq$ 10 Point-5	120	140	--	°	*1)*2)*4)
	Vertical	$\theta$		90	110	--	°	*1)*2)*4)
Color Coordinate	White	Wx Wy	Point-5	0.273 0.289	0.313 0.329	0.353 0.369	--	*1)*3)
	Red	Rx Ry		0.544 0.291	0.584 0.331	0.624 0.371		
	Green	Gx Gy		0.291 0.524	0.331 0.564	0.371 0.604		
	Blue	Bx By		0.108 0.084	0.148 0.124	0.188 0.164		

Remarks :

\*1)Measure condition : 25°C $\pm$ 2°C , 60 $\pm$ 10%RH , under10 Lux in the dark room.BM-5A (TOPCON) , viewing angle2° , VCC=3.3V , VDD=5V.



\*2) Definition of contrast ratio :

$$\text{Contrast Ratio (CR)} = (\text{White}) \text{ Luminance of ON} \div (\text{Black}) \text{ Luminance of OFF}$$

\*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

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

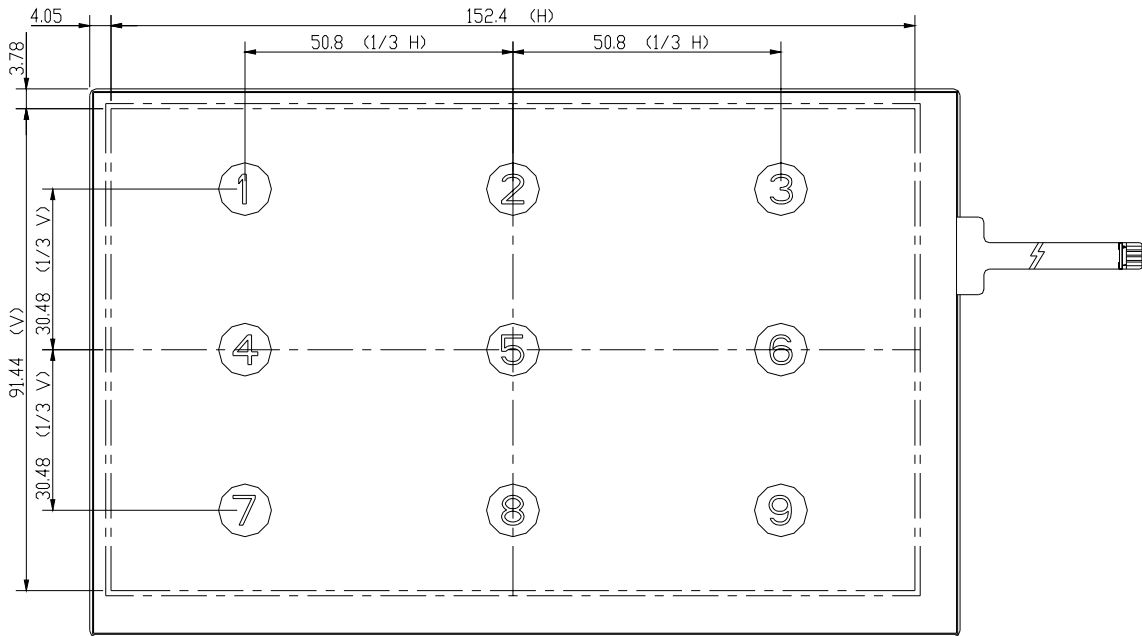


Fig8-1 Measuring point

\*4) Definition of Viewing Angle( $\theta, \psi$ ), refer to Fig8-2 as below :

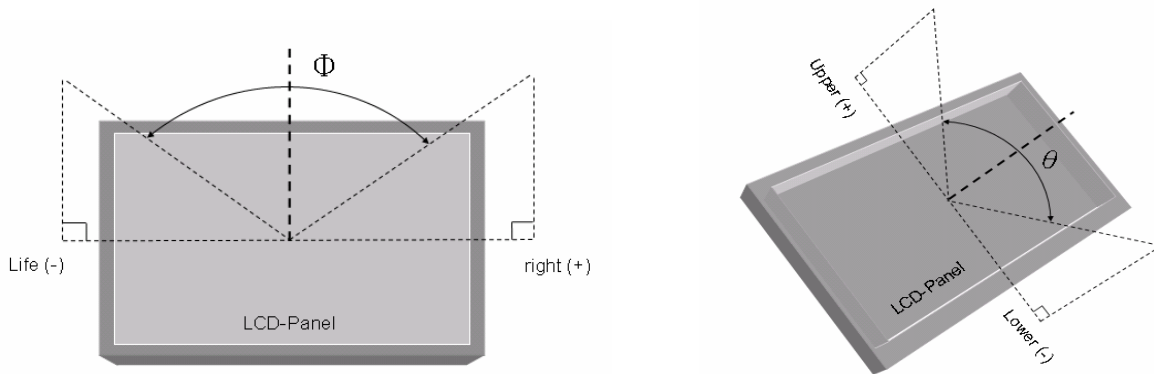


Fig8-2 Definition of Viewing Angle

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

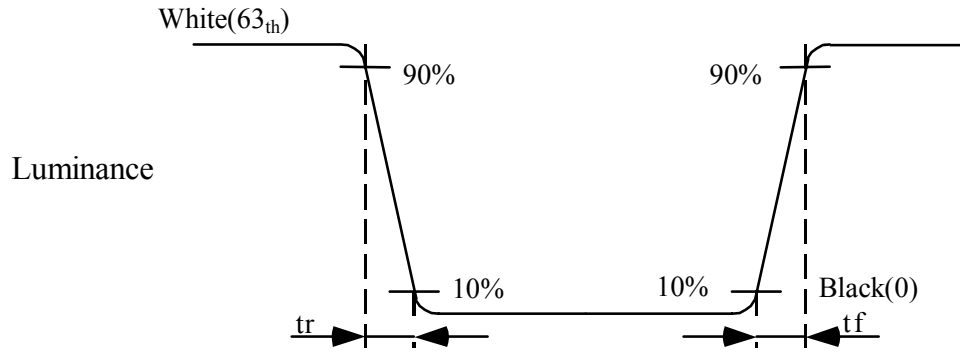


Fig8-3 Definition of Response Time(White-Black)

## 9. RELIABILITY TEST

### 9.1. Temperature and humidity

TEST ITEMS	CONDITIONS
High Temperature Operation	85°C , 240Hrs
High Temperature Storage	95°C , 240Hrs
High Temperature High Humidity Operation	60°C , 90%RH , 240Hrs
Low Temperature Operation	-30°C , 240Hrs
Low Temperature Storage	-40°C , 240Hrs
Thermal Shock	-30°C ( 0.5Hr) ~ 85°C(0.5Hr) 200 cycles

### 9.2. Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non-operation)	<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 (Non-operation)	<ul style="list-style-type: none"> <li>● Frequency range:8~33.3Hz</li> <li>● Stoke:1.3mm</li> <li>● Vibration:sinusodial wave,perpendicularaxis(both x,z,axis:2Hrs,y axis:4Hrs).</li> <li>● Sweep:2.9G,33.3Hz-400Hz</li> <li>● Cycle:15min</li> </ul>

### 9.3. ESD Test

ITEM	CONDITION	REMARKS
ESD	150pF , 330Ω , ±8KV&±15KV air & contact test	*1)
	200pF , 0Ω , ±250V contact test	*2)

Remarks :

\*1) LCD glass and metal bezel

\*2) IF connector pins

### 9.4 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.