



Chunghwa Picture Tubes, Ltd.

Product Specification

Date : 090714

TFT LCD
CLAA070VC07

ACCEPTED BY : (V0.2)
Tentative

APPROVED BY	CHECKED BY	PREPARED BY
張聖暉	李家銘	張朝璋

Prepared by :
Product Planning Management Division
Small & Medium TFT Product Business Unit
CHUNGHWA PICTURE TUBES, LTD.

1127 Hopin Rd., Padeh, Taoyuan, Taiwan 334, R.O.C.
TEL: +886-3-3675151 FAX: +886-3-377-3858

Doc.No: SPEC_CLAA070VC07_V0.2_090714

Issue Date: 2007/04/25

REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First revision	--	2006.06.16
0.1	Add : ADJ input voltage	6	2006.07.27
	Change Remarks *2)	7	
	Change Pin24 、 25 、 26 Symbol and description	8	
	Change Remarks *1)	8	
	Change Remarks *3)	9	
	Change CLK Frequency	10	
	Change Block diagram	13	
	Change Remarks *1)	16	
	Delete High Temperature High Humidity storage	18	
	Change thermal shock	18	
	Change Vibration condition	18	
	Add : ESD specification	18	
0.2	Update Electrical Interface	4	2007.04.25
	Update TFT-LCD current consumption	7	
	Update Mechanical dimension	14	

CONTENTS

1. OVERVIEW	4
2. ABSOLUTE MAXIMUM RATINGS	5
3. ELECTRICAL CHARACTERISTICS	6
3.1 TFT LCD	6
3.2 TFT-LCD current consumption.....	7
3.3 Power 、 Signal sequence.....	7
4. INTERFACE CONNECTION	8
5. INPUT SIGNAL(DE ONLY MODE)	10
5.1 Timing Specification	10
5.2 Timing sequence(Timing chart).....	10
5.3 LVDS Input Data mapping	11
5.4 Color Data Assignment.....	12
6. BLOCK DIAGRAM	13
7. MECHANICAL DIMENSION	14
7.1 Front Side	14
7.2 Rear Side	15
8. OPTICAL CHARACTERISTICS	16
9. RELIABILITY TEST	19
9.1. Temperature and humidity	19
9.2. Shock and Vibration.....	19
9.3. ESD Test.....	19
9.4 Judgment standard.....	19

1. OVERVIEW

CLAA070VC07 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:

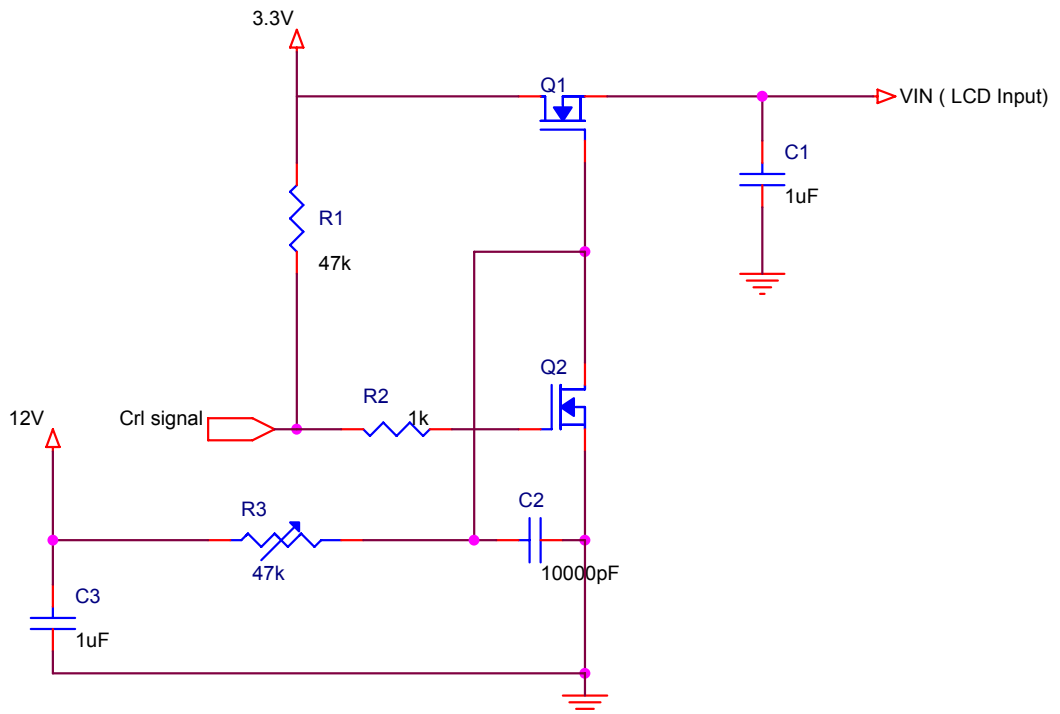
ITEM	SPECIFICATION
Display Area (mm)	152.4(W)×91.44(H)
Number of Pixels	800(RGB)×3(H)×480(V)
Pixel Pitch (mm)	0.1905(H)×0.1905(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white
Number of colors	262,144
Viewing Direction	6 o'clock
Response Time (Tr+Tf)	20ms
Brightness(cd/m ²)	220nit(typ)
Viewing Angle(BL on,CR ≥ 10)	140 degree(H) · 110degree(V)
Electrical Interface(data)	LVDS
Power consumption(W)	2.0W(Typ)
Outline Dimension(in mm)	165(W)×104(H)×5(D)
Weight(g)	155g(Typ)
BL unit	LED
Surface Treatment	Anti-Glare · Hardness:3H

2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Input Voltage	Vcc	-0.3	4.0	V	
Input Signal Voltage	RxIN0+ ~ RxIN2+ RxIN0- ~ RxIN2- Rx CLK IN +/-	-0.3	Vcc + 0.3	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	°C	*1)
Storage Temperature	T _{stg}	-40	95	°C	*1)

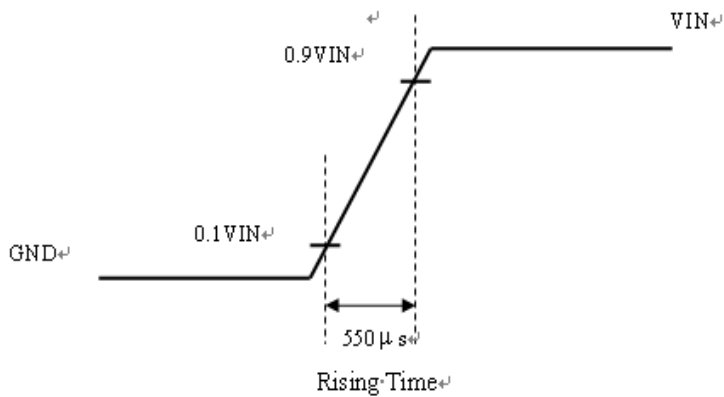
Remarks :

- *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

3.1 TFT LCD

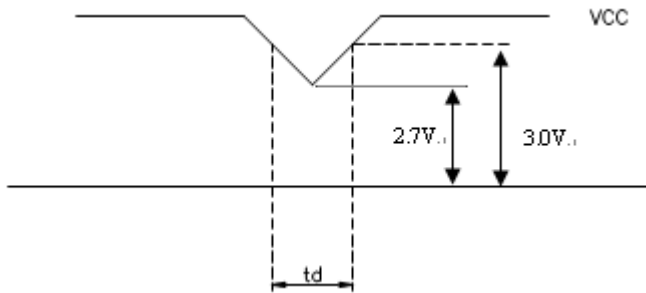
Ta=25°C

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 Voltage (LVDS:IN+,IN-)	Input Voltage	VIN	0	-	VCC	V	*2)
	Common Mode Voltage	VCM	1.08	1.2	1.32	V	*2)
	Differential Input Voltage	VID	250	350	450	mV	*2)
	Threshold Voltage(high)	VTH	-	-	100	mV	*2) When VCM=+1.2V
	Threshold Voltage(low)	VTL	-100	-	-	mV	*2)
ADJ Input Voltage	Threshold Voltage(high)	VIH		3.3	V		
	Threshold Voltage(low)	VIL	GND	0.3	V		

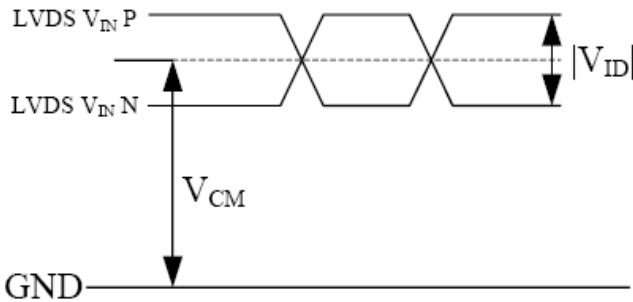
Remarks:

*1) VCC –dip condition:

- 1) When $2.7\text{V} \leq VCC < 3.0\text{V}$, $td \leq 10\text{ms}$.
- 2) $VCC > 3.0\text{V}$, VCC-dip condition should be same as VCC-turn-on condition.



*2) LVDS Signal



$$|VID| = |VTH - VTL|,$$

$$VCM = (VTH + VTL)/2$$

3.2 TFT-LCD current consumption

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

Remarks:

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

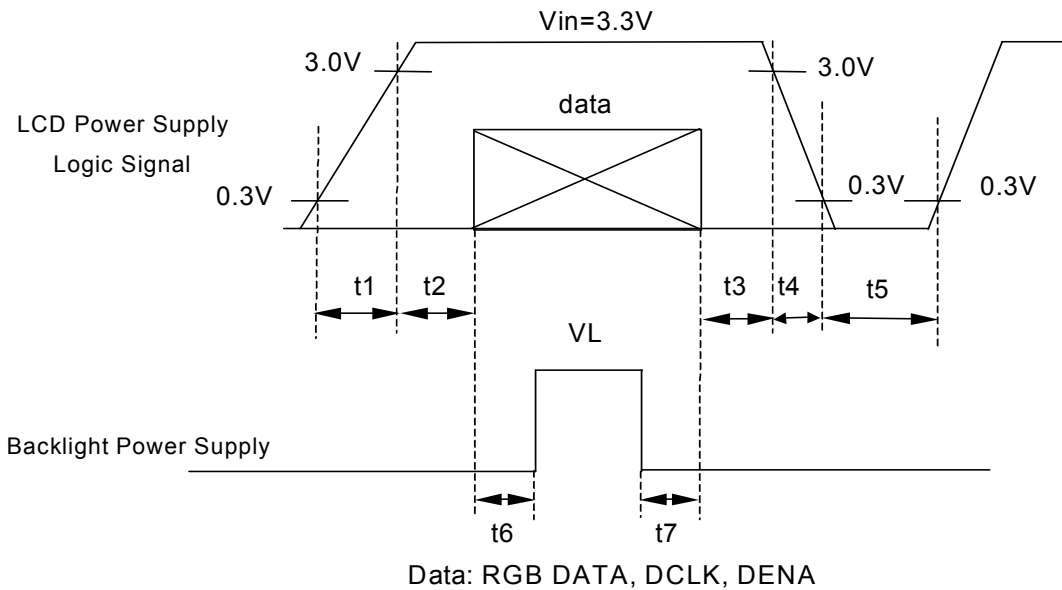


(a)64-Gray-Pattern (b)Black-Pattern

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

3.3 Power 、 Signal sequence

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



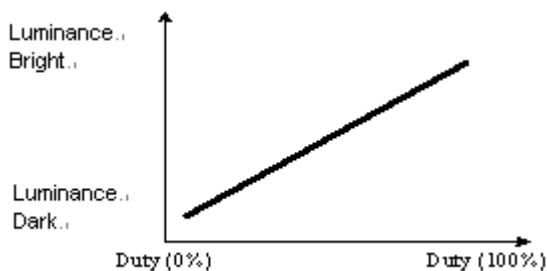
4. INTERFACE CONNECTION

Connector type : STARCONN 093M30-00B0RA-G4

Pin NO.	SYMBOL	DESCRIPTION
1	AVSS	Power Ground
2	VCC	Power Supply for Digital circuit
3	VCC	Power Supply for Digital circuit
4	NC	NC
5	ADJ	Adjust for LED brightness
6	NC	NC
7	AVSS	Power Ground
8	RXIN0-	Negative LVDS differential data inputs
9	RXIN0+	Positive LVDS differential data inputs
10	AVSS	Power Ground
11	RXIN1-	Negative LVDS differential data inputs
12	RXIN1+	Positive LVDS differential data inputs
13	AVSS	Power Ground
14	RXIN2-	Negative LVDS differential data inputs
15	RXIN2+	Positive LVDS differential data inputs
16	AVSS	Power Ground
17	RXCLK-	Negative LVDS differential clock inputs
18	RXCLK+	Positive LVDS differential clock inputs
19	AVSS	Power Ground
20	NC	NC
21	NC	NC
22	AVSS	Power Ground
23	NC	NC
24	VDD(LED)	Power Supply for LED(Vled=5.0±0.5)
25	VDD(LED)	Power Supply for LED(Vled=5.0±0.5)
26	VDD(LED)	Power Supply for LED(Vled=5.0±0.5)
27	NC	NC
28	AVSS	Power Ground
29	NC	NC
30	NC	NC

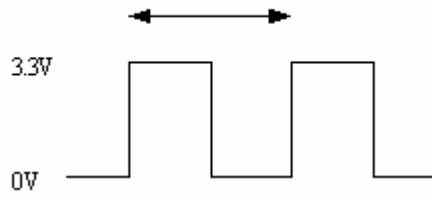
Remarks :

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

F = 20KHz , T=0.05ms



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

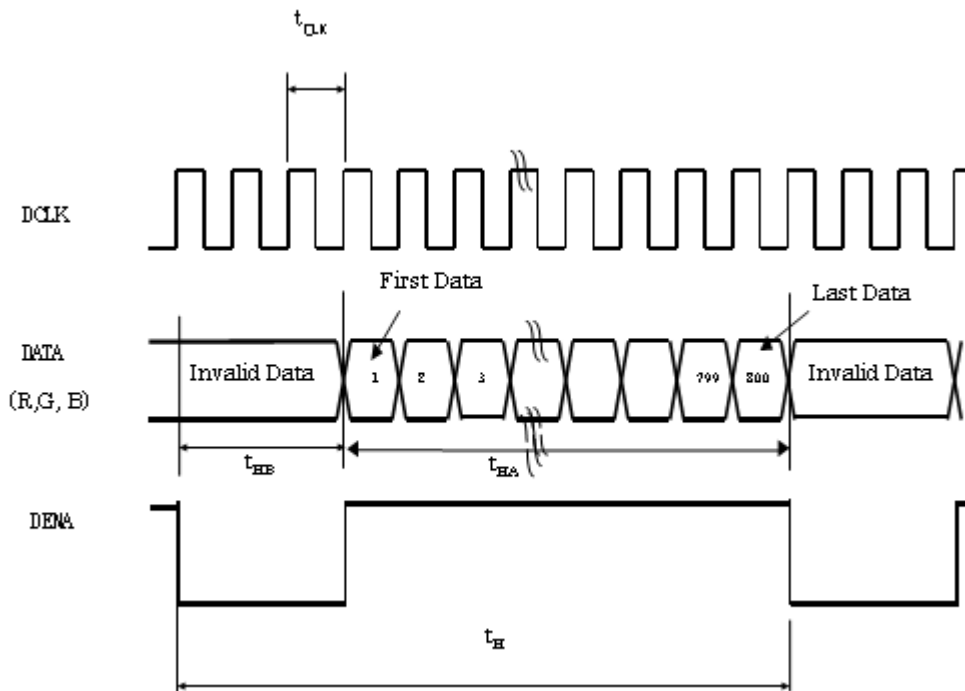
5. INPUT SIGNAL(DE ONLY MODE)

5.1 Timing Specification

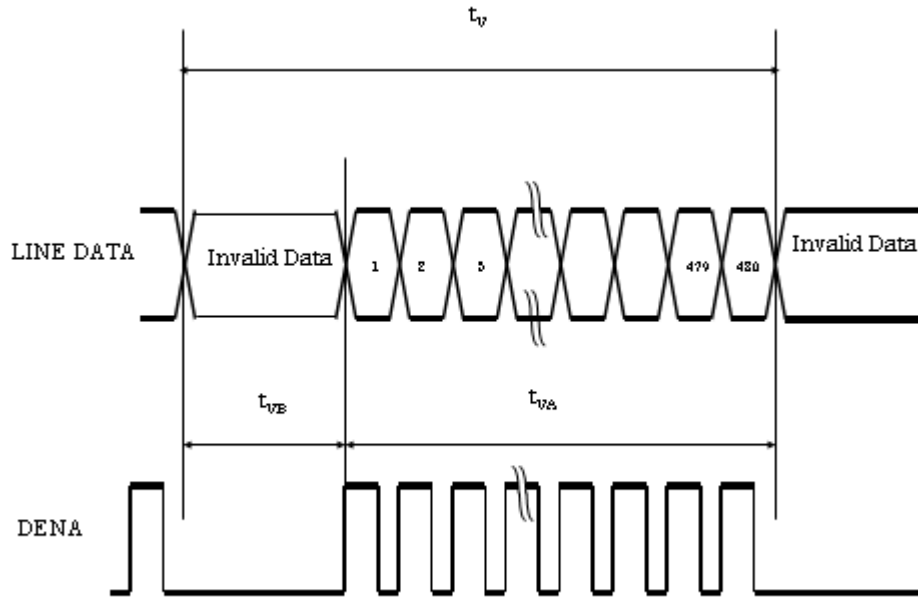
Item		Symbol	Min	Typ	Max	Unit	
LVDS input signal sequence	CLK Frequency	fCLKin	25	27	32	MHz	
LCD input signal sequence (Input LVDS Transmitter)	Horizontal	Horizontal total Time	t_H	850	900	950	tCLK
		Horizontal effective Time	t_{HA}	800	800	800	tCLK
		Horizontal Blank Time	t_{HB}	50	100	150	tCLK
	Vertical	Frame	fV	55	60	65	Hz
		Vertical total Time	t_V	490	500	520	t_H
		Vertical effective Time	t_{VA}	480	480	480	t_H
		Vertical Blank Time	t_{VB}	10	20	40	t_H

5.2 Timing sequence(Timing chart)

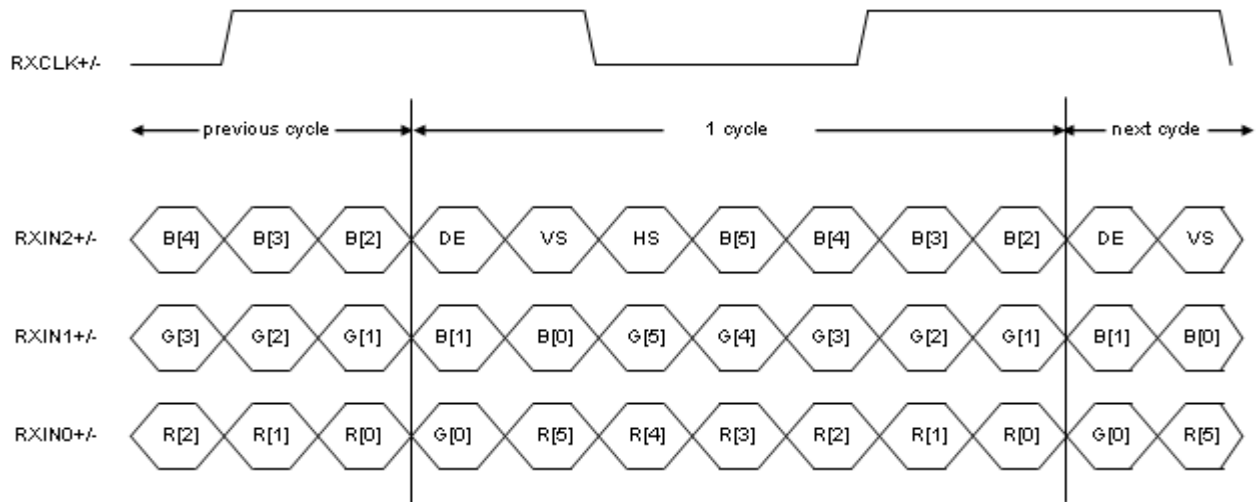
5.2.1 Horizontal Timing Sequence



5.2.2 Vertical Timing Sequence



5.3 LVDS Input Data mapping



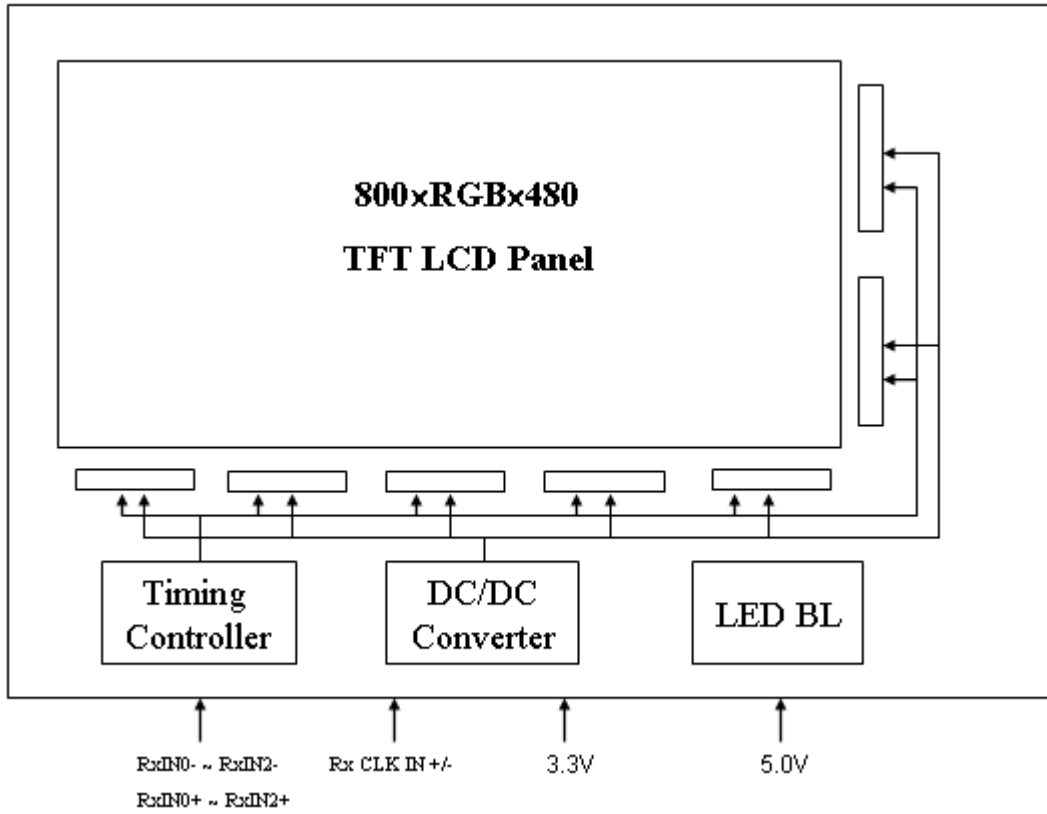
5.4 Color Data Assignment

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

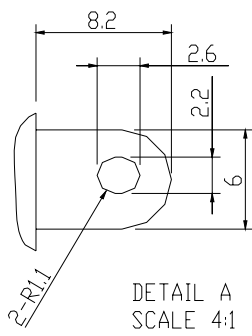
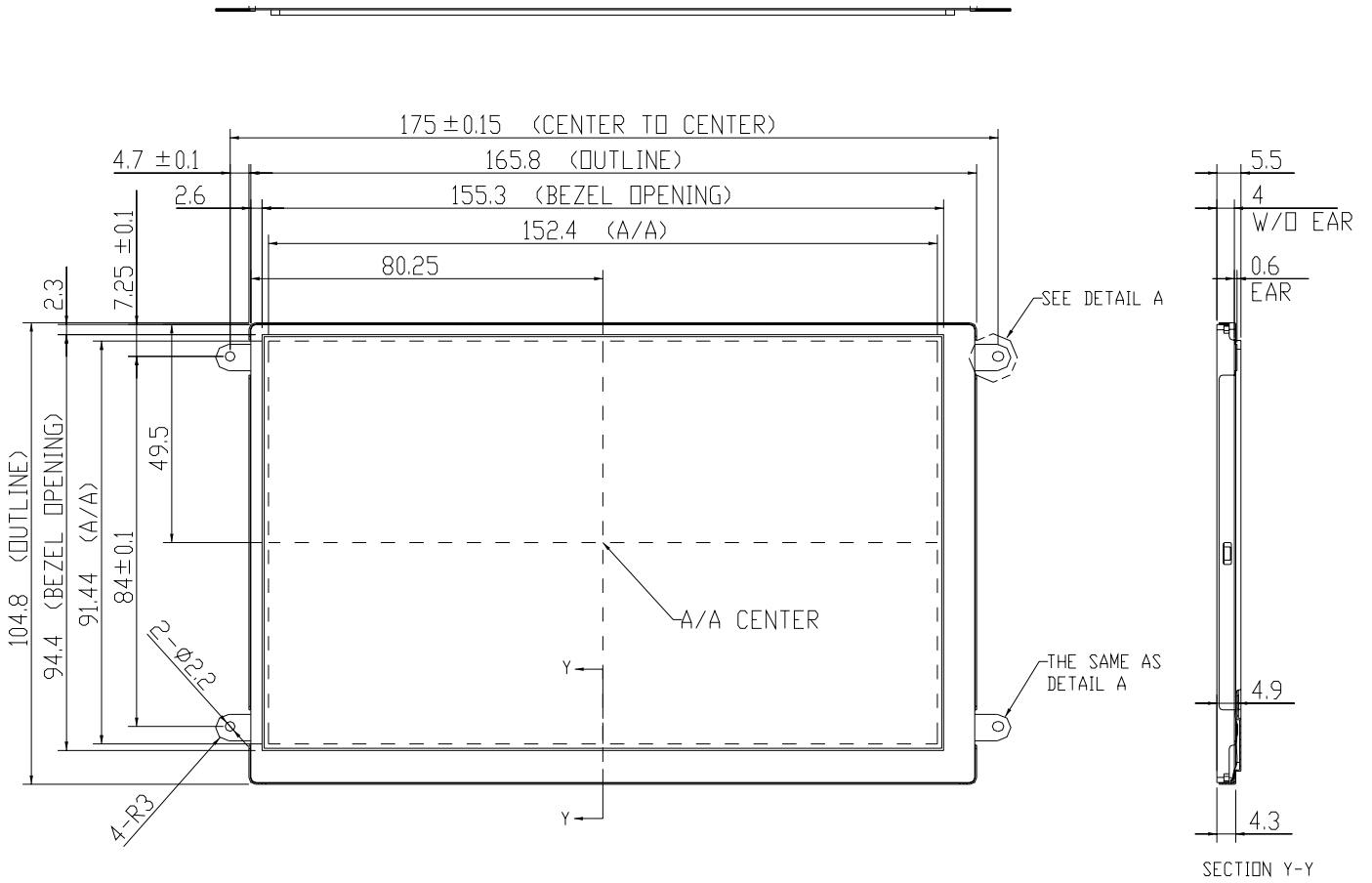
6. BLOCK DIAGRAM



7. MECHANICAL DIMENSION

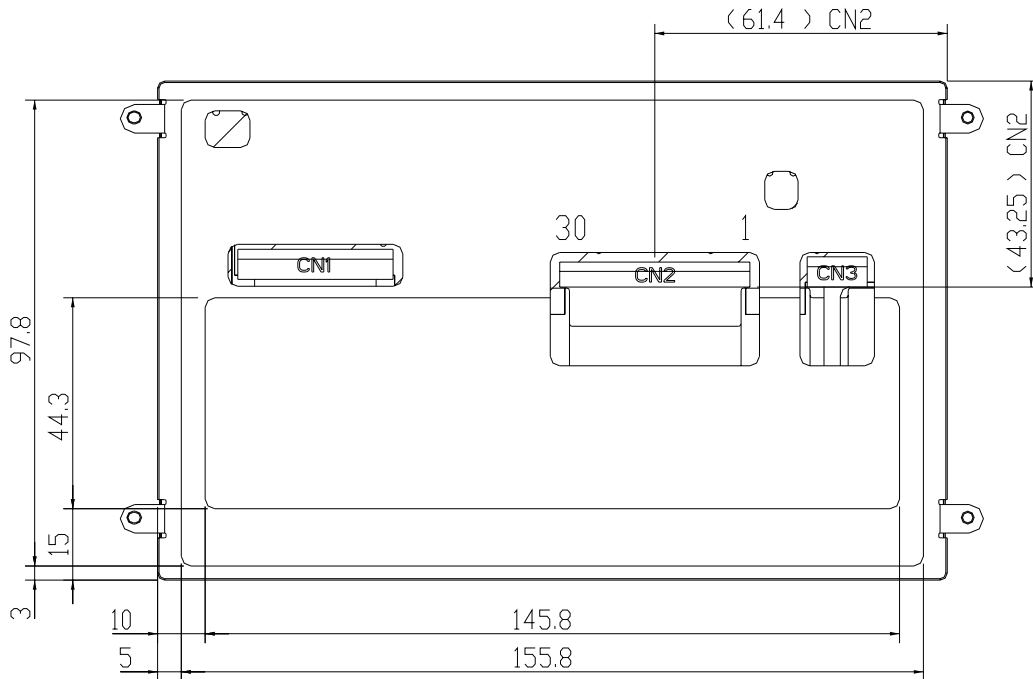
7.1 Front Side

[Unit : mm]



7.2 Rear Side

[Unit : mm]



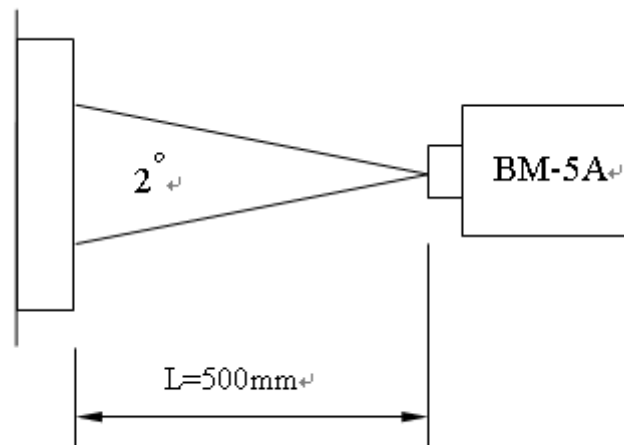
NOTE:
1. GENERAL TOLERANCE : ±0.3mm

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 ²	*1)*3)
Luminance Uniformity		ΔL		70	80	--	%	*1)*3)
Response Time (White - Black)		Tr+ Tf	Point-5	--	--	20	ms	*1)*3)*5)
NTSC		-	Point-5	42	50		%	*1)*3)
Viewing Angle	Horizontal	ϕ	CR \geq 10 Point-5	120	140	--	°	*1)*2)*4)
	Vertical	θ		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

$$\Delta L = [L(\text{Min})/L(\text{Max})] \times 100$$

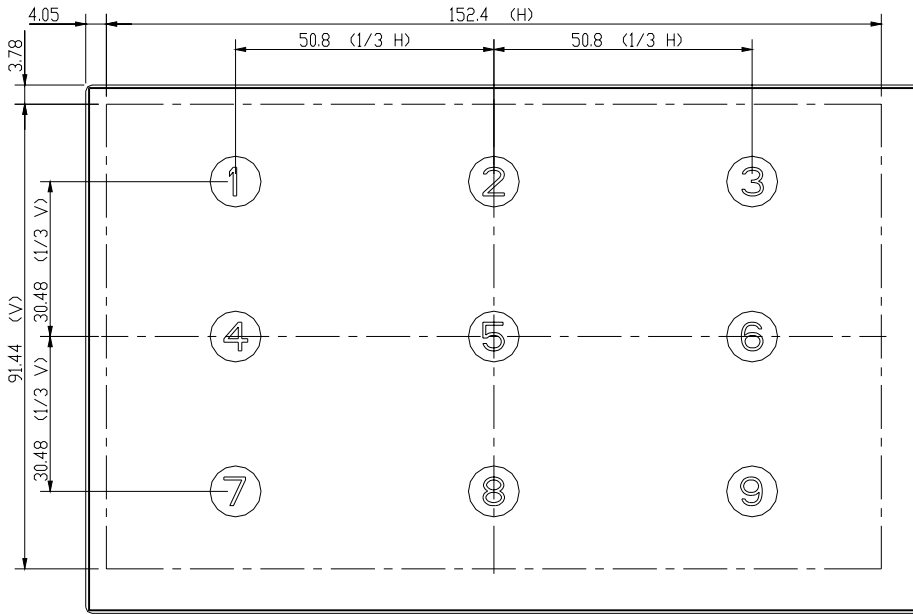


Fig8-1 Measuring point

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

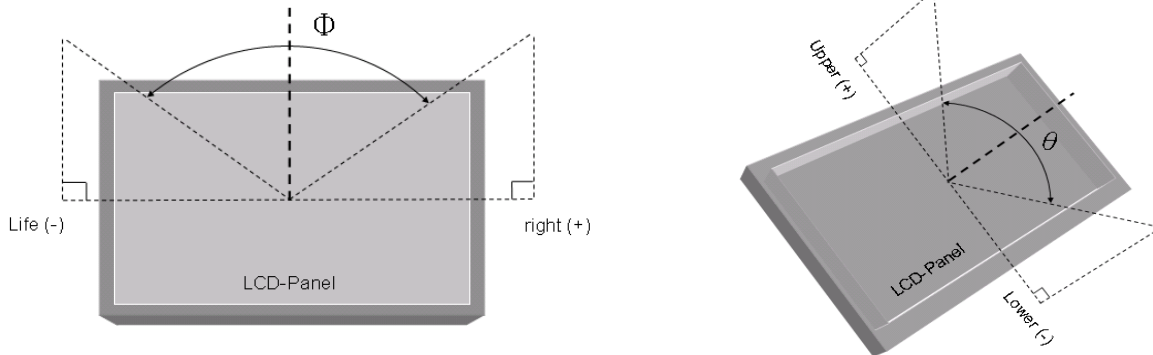


Fig8-2 Definition of Viewing Angle

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

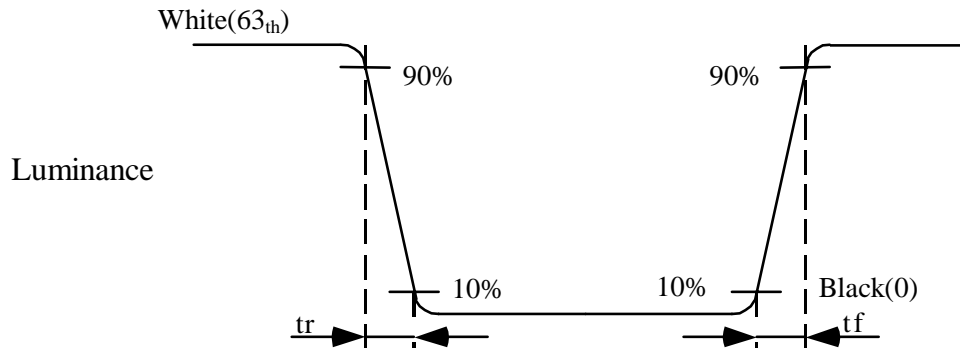


Fig8-3 Definition of Response Time(White-Black)

9. RELIABILITY TEST

9.1. Temperature and humidity

TEST ITEMS	CONDITIONS	NOTES
High Temperature Operation	85°C , 240Hrs	
High Temperature Storage	95°C , 240Hrs	
High Temperature High Humidity Operation	60°C , 90%RH , 240Hrs	No condensation
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"> ● Shock level:980m/s²(equal to 100G) ● Waveform:half sinusoidal wave,6ms. ● Number of shocks:one shock input in each direction of three mutually perpendicular axes for a total of three shock inputs.
Vibration (Non-operation)	<ul style="list-style-type: none"> ● Frequency range:8~33.3Hz ● Stoke:1.3mm ● Vibration:sinusoidal wave,perpendicularaxis(both x,z axis:2Hrs,y axis:4Hrs). ● Sweep:2.9G,33.3Hz-400Hz ● Cycle:15min

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.