Chunghwa Picture Tubes, Ltd.
Product Specification

To : **DATA MODUL**
Date : 081218

TFT LCD
CLAA070LC0ACW

ACCEPTED BY : (V1.2)

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REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First revision	--	2007-03-22
0.1	Update Response Time	4	2007-04-20
	Update Viewing Angle	4	
	Update Optical Characteristics	15	
0.2	Update Optical Characteristics	15	2007-05-03
0.3	Add Electrostatic Discharge	17	2007-08-09
1.0	Update Module Weight	4	2008.03.12
	Update Logic Input Voltage	6	
	Update Mechanical Dimension	14	
1.1	Add MTBF Item	17	2008.06.16
1.2	Update the Blacklight	7	2008.12.17

Contents

1. OVERVIEW

CLAA070LC0ACW 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：

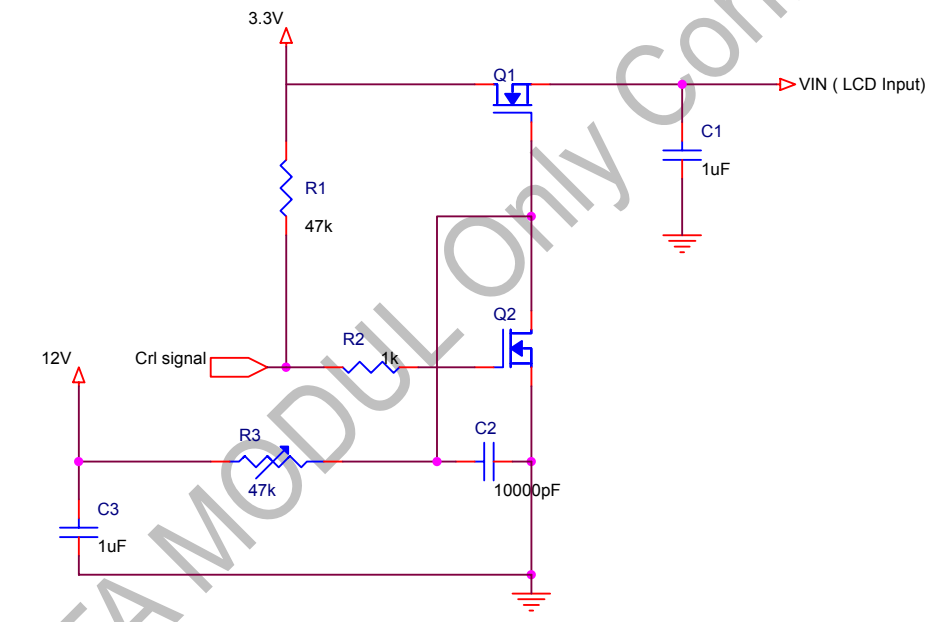
ITEM	SPECIFICATION
Display Area (mm)	152.4(W)×91.44(H)
Number of Pixels	800(H)×3(RGB)×480(V)
Pixel Pitch (mm)	0.1905(H)×0.1905(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white
Number of colors	262,144
Viewing Direction	6 o´clock
Response Time (Tr+Tf)	20ms
Brightness(cd/m^2)	220nit(typ)
Viewing Angle(BL on,CR≧10)	140 degree(H)，110degree(V)
Electrical Interface(data)	TTL
Power consumption	2.0W(Typ)
Outline Dimension(in mm)	165(W)×104(H)×5(D)
Weight(g)	115
BL unit	LED
Surface Treatment	Anti-Glare，Hardness:3H

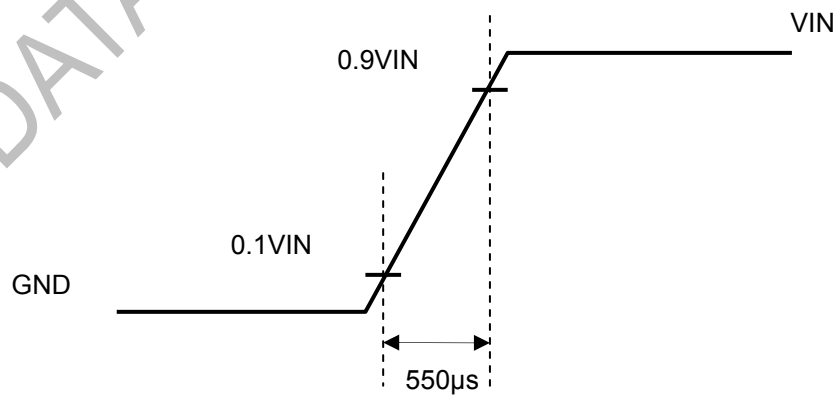
2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Input 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	【Note1】
	VESDm	-15K	15K	V	
ICC Rush Current	IRUSH	-	1	A	【Note2】

【Note1】
Test Condition: IEC 61000-4-2 ,
VESDc ：Contact discharge to input connector
VESDm：Discontact discharge to module

【Note2】
Control signal:High(+3.3V)→Low(GND)
Supply Voltage of rising time should be from R3 and C2 tune to 550 us.





Rising Time

3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD

Ta=25℃

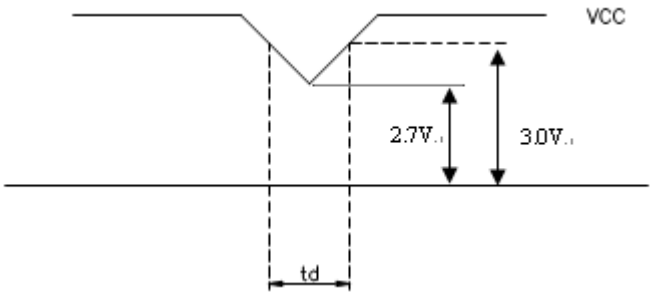
Item		Symbol	Min.	Typ	Max.	Unit	Note
Power Supply Voltage For LCD		VCC	3.0	3.3	3.6	V	【Note1】
Power Supply Voltage For LED		VLED	4.5	5	5.5	V	
Logic Input Voltage		VIH	VCC*0.7	--	VCC	V	
		VIL	GND	--	VCC*0.3	V	
ADJ Input Voltage	Threshold Voltage(high)	VADJ_H	3.0	--	3.3	V	
	Threshold Voltage(low)	VADJ_L	GND	--	0.3	V	

Remarks：

【Note1】

VCC –dip codition:

1) When 2.7 V≦VCC＜3.0V，td≦10ms.
2) When VCC<3.0V, it works abnormal that must reset power.
   VCC dip conditions should follow VCC turn on conditions



3.2 TFT-LCD Current Consumption

Item	Symbol	Min	Type	Max	Unit	Notes
LCD power current	ICC	--	150	200	mA	【Note1】
LED power current	ILED		300	350	mA	【Note2】

【Note1】
Typical: Under 64 gray pattern
Maximum: Under black pattern

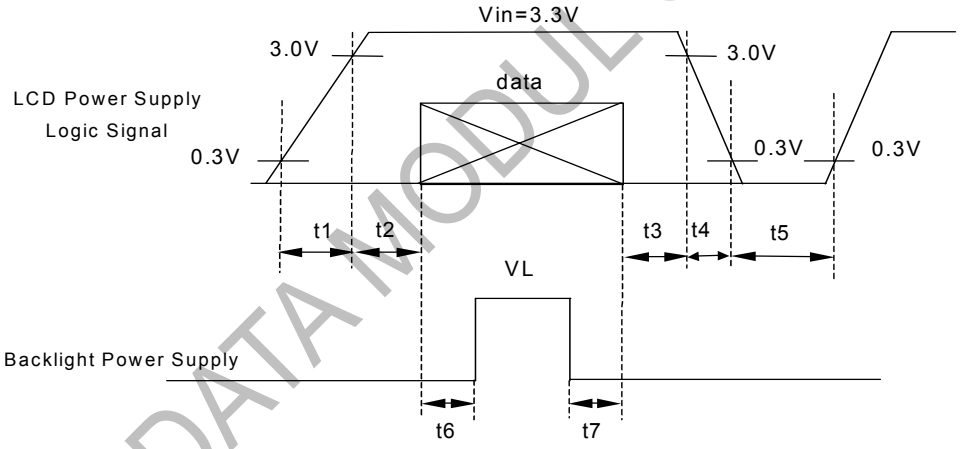
(a)64 Gray Pattern

(b)Black Pattern

【Note2】
Typical: When VLED is 5V
Maximum: When VLED is 4.5V

3.3 Power、Signal sequence

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



Data: RGB DATA, DCLK, DENA

3.4 Backlight

Ta=25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
LED Lift Time	N/A	12,000			Hour	【Note1】

【Note1】Definition of life time : Luminance＜50% initial value

4. INTERFACE CONNECTION

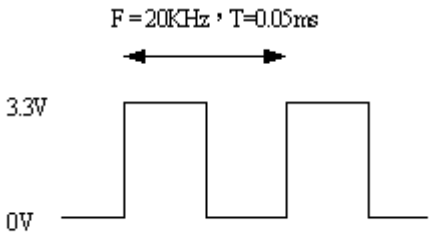
4.1 CN1：(Connector type：40pin / 0.5mm pitch / Bottom contact)：089N40-000R00-G2

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

Remarks:

1). The ADJ can adjust LED BL brightness , where Duty and Luminance are in direct radio.

2) The ADJ adjust signal level is 0~3.3V，operation frequency:20±5KHz



3) AVSS Pin must connection to ground.

5. INPUT SIGNAL(DE ONLY MODE)

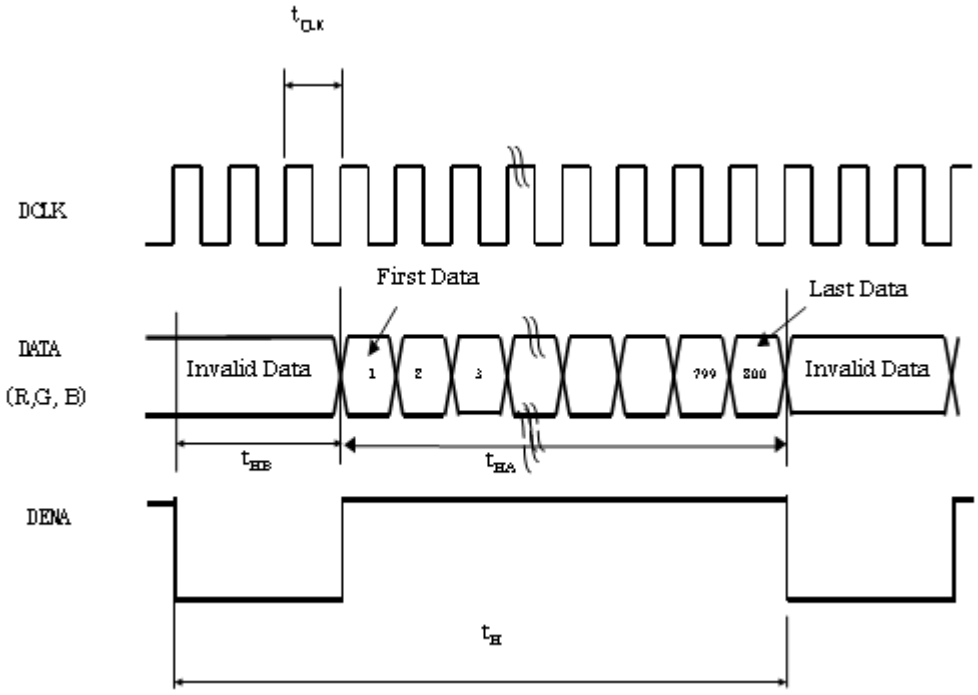
5.1 Timing Specification

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK	Dot Clock	$1/t_{CLK}$	25	27	32	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_H	850	900	950	t_{CLK}
	Horizontal Valid	t_{HA}		800		
	Horizontal Blank	t_{HB}	50	100	150	
	Vertical Period	t_V	490	500	520	t_{HP}
	Vertical Valid	t_{VA}		480		
	Vertical Blank	t_{VB}	10	20	40	
	Vertical Frequency	f_V	55	60	65	Hz
DATA	Setup Time	t_{DS}	5	-	-	ns
	Hold Time	t_{DH}	10	-	-	

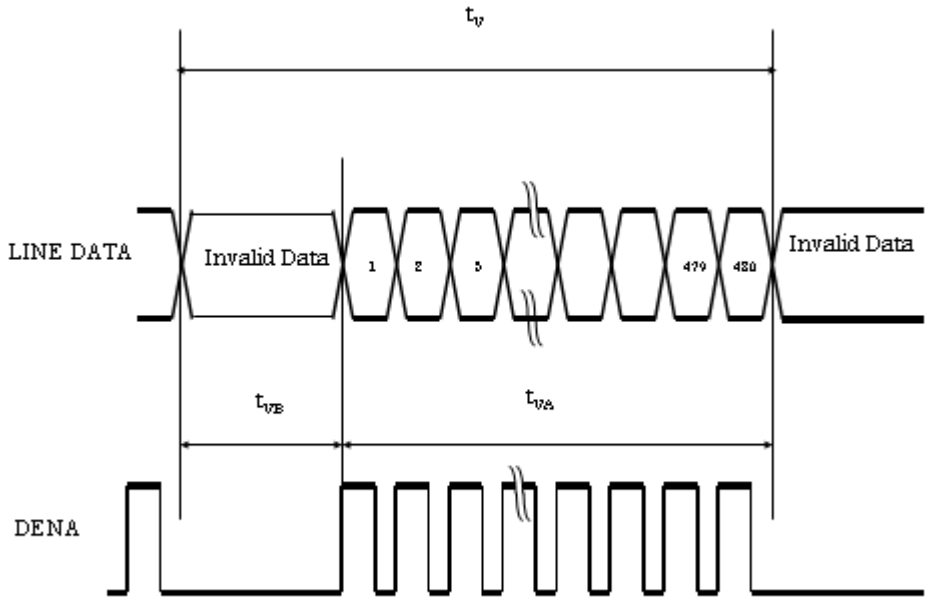
【Note1】This module is operated by DE only mode.

5.2 Timing sequence(Timing chart)

5.2.1 Horizontal Timing Sequence



5.2.2 Vertical Timing Sequence

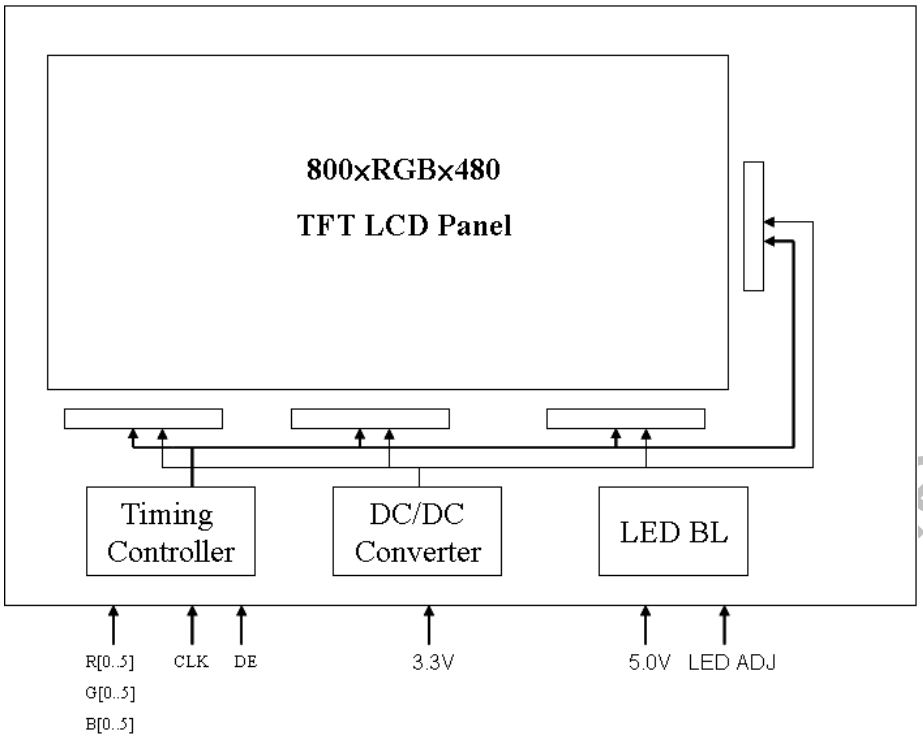


5.3 Color Data Assignment

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

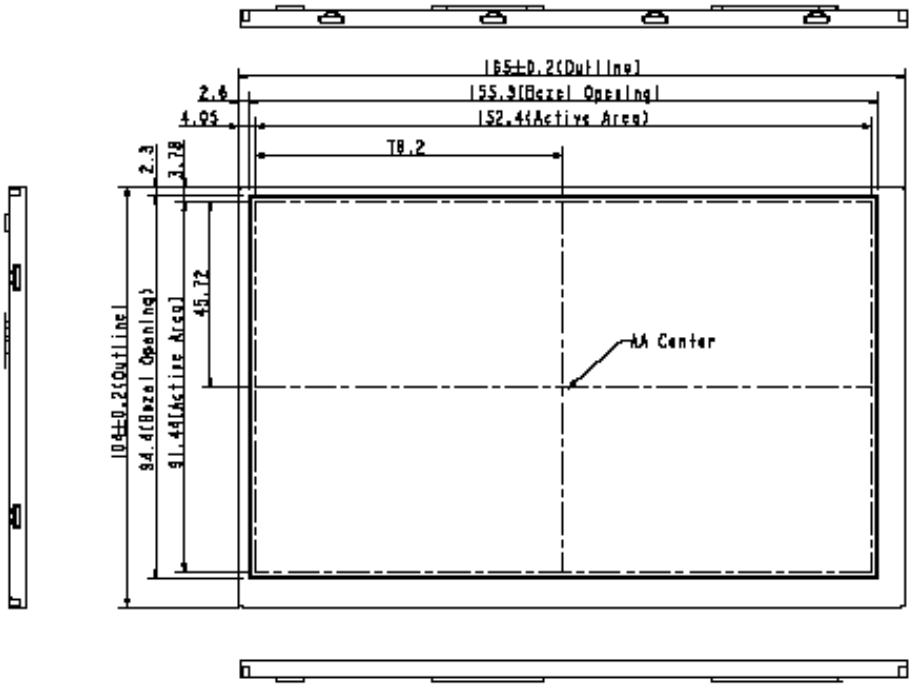
7. BLOCK DIAGRAM



8. MECHANICAL DIMENSION

8.1 Front Side

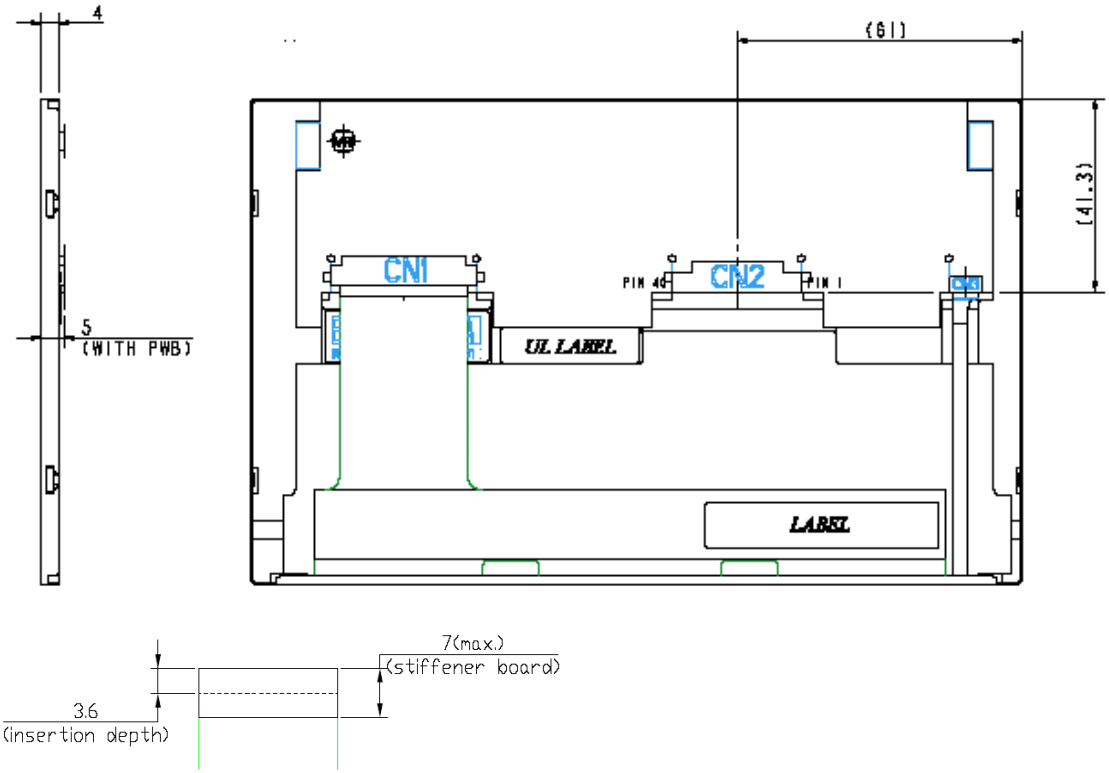
[Unit：mm]



Remark：Un-indication tolerance is ±0.3mm

8.2 Rear Side

[Unit：mm]



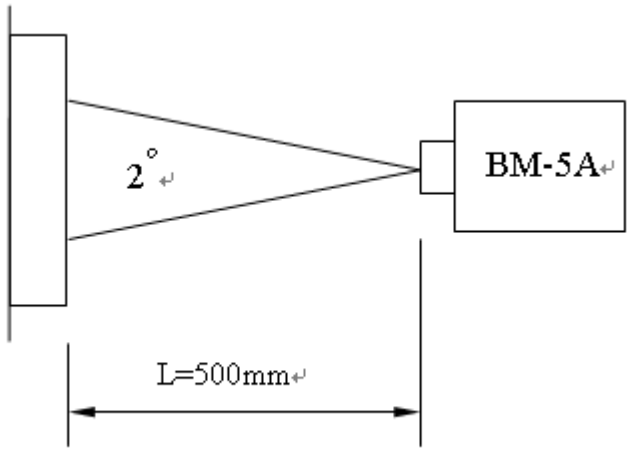
Remark：Un-indication tolerance is ±0.3mm

9. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remarks
Constrast Ratio		CR	Point-5	300	400	--	--	*1)*2)*3)
Luminance*)		Lw	Point-5	176	220	--	cd/m^2	*1)*3)
Luminance Uniformity		ΔL		70	80	--	%	*1)*3)
Response Time (White - Black)		Tr + Tf	Point-5	--	20	30	ms	*1)*3)*5)
Viewing Angle	Horizontal	ϕ	CR≧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		0.535 0.292	0.575 0.332	0.615 0.372		
	Green	Gx Gy		0.290 0.525	0.330 0.565	0.370 0.605		
	Blue	Bx By		0.110 0.080	0.150 0.120	0.190 0.160		

Remarks：

*1)Measure condition：25℃±2℃，60±10%RH，under10 Lux in the dark room.BM-5A (TOPCON)，viewing angle2°，VCC=3.3V，Vadj=3.3V. (Duty=100%)，test the panel after turning on10 minute ago.



*2）Definition of contrast ratio：(in the dark room.BM-5A (TOPCON))
Contrast Ratio (CR)= (White) Luminance of ON ÷ (Black) Luminance of OFF

*3) Definition of luminance：(in the dark room.BM-5A (TOPCON))
Measure white luminance on the point 5 as figure9-1
Definition of Luminance Uniformity:
Measure white luminance on the point1~9 as figure9-1
△L = [L(MIN)/L(MAX)]×100

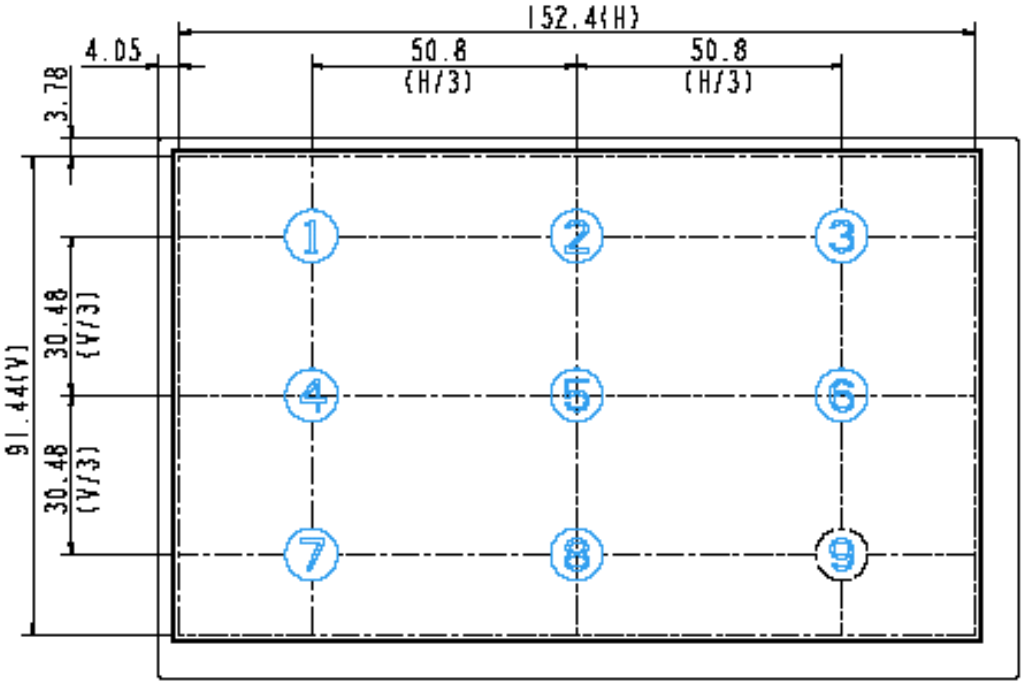


Fig9-1 Measuring point

*4) Definition of Viewing Angle(θ,ψ),refer to Fig9-2 as below：(in the dark room.EZ-CONTRAST (ELDIM))

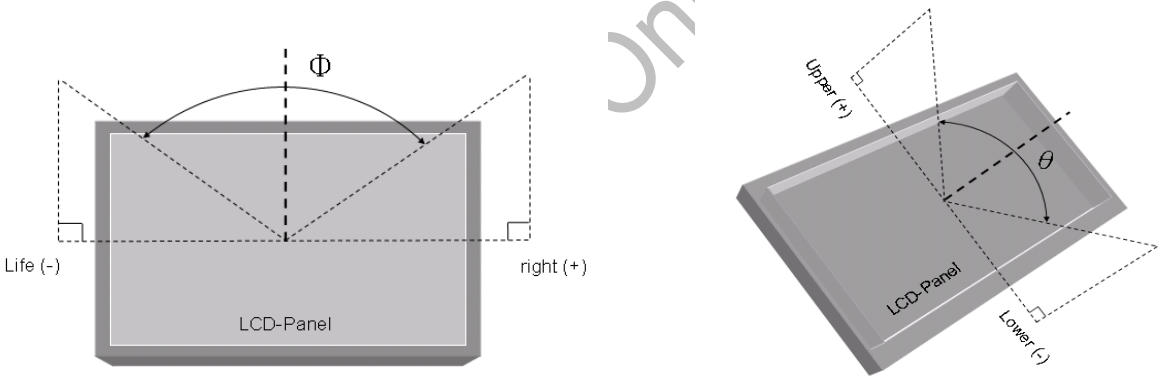


Fig9-2 Definition of Viewing Angle

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

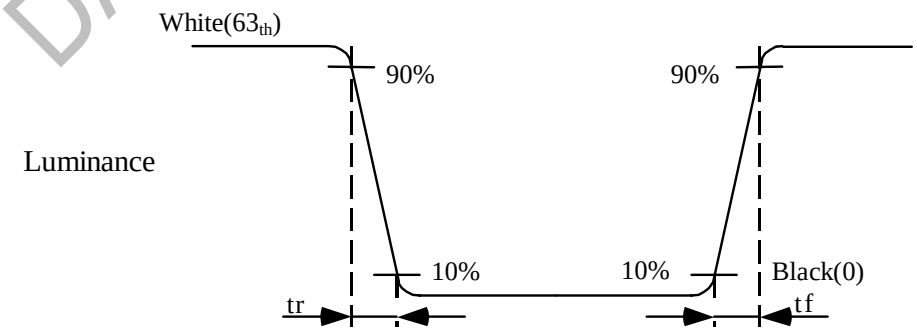


Fig9-3 Definition of Response Time(White-Black)

10. RELIABILITY TEST

10.1. Temperature and humidity

TEST ITEMS	CONDITIONS	REMARK
High Temperature Operation	85℃，240Hrs	
High Temperature Storage	95℃，240Hrs	
High Temperature High Humidity Operation	60℃，90%RH，240Hrs	No condensation
Low Temperature Operation	-30℃，240Hrs	
Low Temperature Storage	-40℃，240Hrs	
Thermal Shock	-30℃（0.5Hr）~ 85℃(0.5Hr) 200 cycles	

10.2. Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non-operation)	● Shock level:980m/s^2(equel 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)	● Frequency range:8~33.3Hz ● Stroke:1.3mm ● Vibration:sinusodial wave,perpendicularaxis(both x, z axis:2Hrs, y axis 4Hrs). ● Sweep:2.9G,33.3Hz-400Hz ● Cycle:15min

10.3 Electrostatic Discharge

TEST ITEMS	CONDITIONS	Note
ESD	150pF，330Ω，±15kV air test	(1)
	200pF，0Ω，200V contact test	(2)

[Note]
Measure point :(1) LCD glass and metal bezel..
(2) IF connector pins

10.4 MTBF : with LED B/L:20000Hrs lifetimes

10.5 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.