



Chunghwa Picture Tubes, Ltd.

Product Specification

To : Ceramate

Date : 070831

TFT LCD

CLAA070LC0HCW

ACCEPTED BY : (V0.2)

Tentative

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REVISION STATUS

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1. OVERVIEW

CLAA070LC0HCW 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(W)	2.0W(Typ)
Outline Dimension(in mm)	165(W)×104(H)×5(D)
Weight(g)	114.5g(Typ)
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	*1)
	VESDm	-15K	+15K	V	
ICC Rush Current	IRUSH	-	1	A	*2)

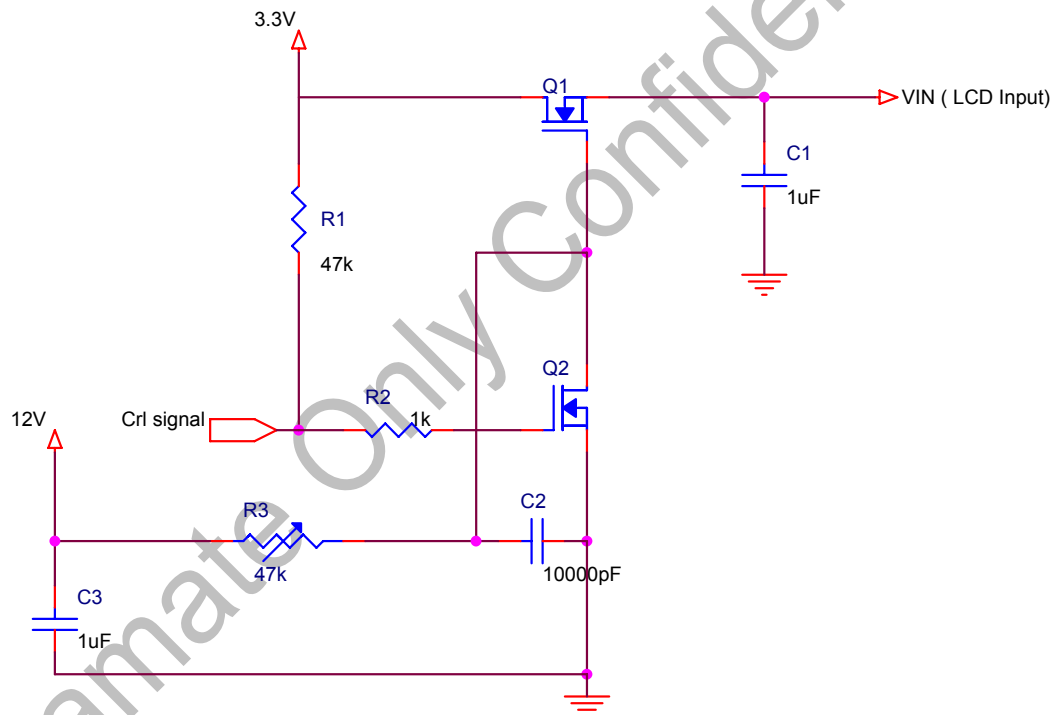
Remarks :

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

VESDc : Contact discharge to input connector

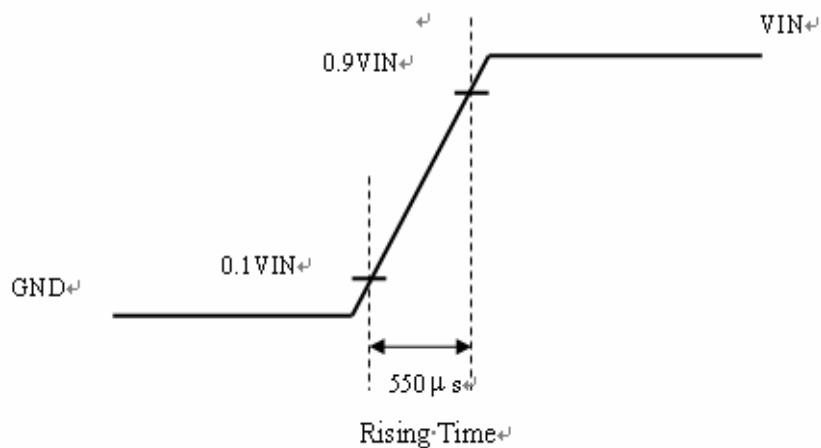
VESDm : Contact discharge to module

*2) 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

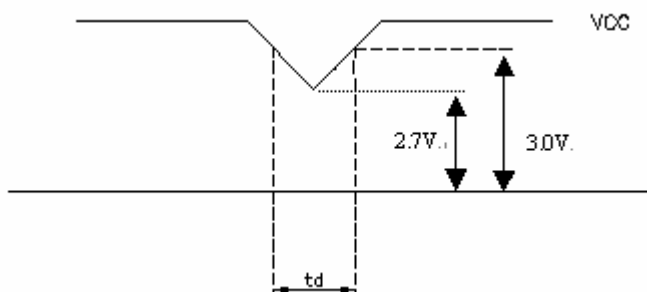
Item	Symbol	Min.	Typ	Max.	Unit	Note
Power Supply Voltage For LCD	VCC	3.0	3.3	3.6	V	*1)
Power Supply Voltage For LED	VDD	4.5	5	5.5	V	
Logic Input Voltage	VIH	VCC*0.7	--	VCC	V	
	VIL	GND	--	VCC*0.3	V	
ADJ Input Voltage	VADJ_H	3.0	--	3.3	V	
	VADJ_L	GND	--	0.3	V	

Remarks :

*1) VCC –dip codition:

When $2.7\text{ V} \leq \text{VCC} < 3.0\text{ V}$, $t_d \leq 10\text{ ms}$.*2) When $\text{VCC} < 3.0\text{ V}$, it works abnormal that must reset power.

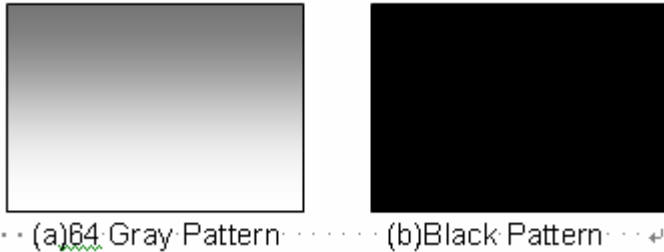
VCC dip conditions should follow VCC turn on conditions.



3.2 TFT-LCD current consumption

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

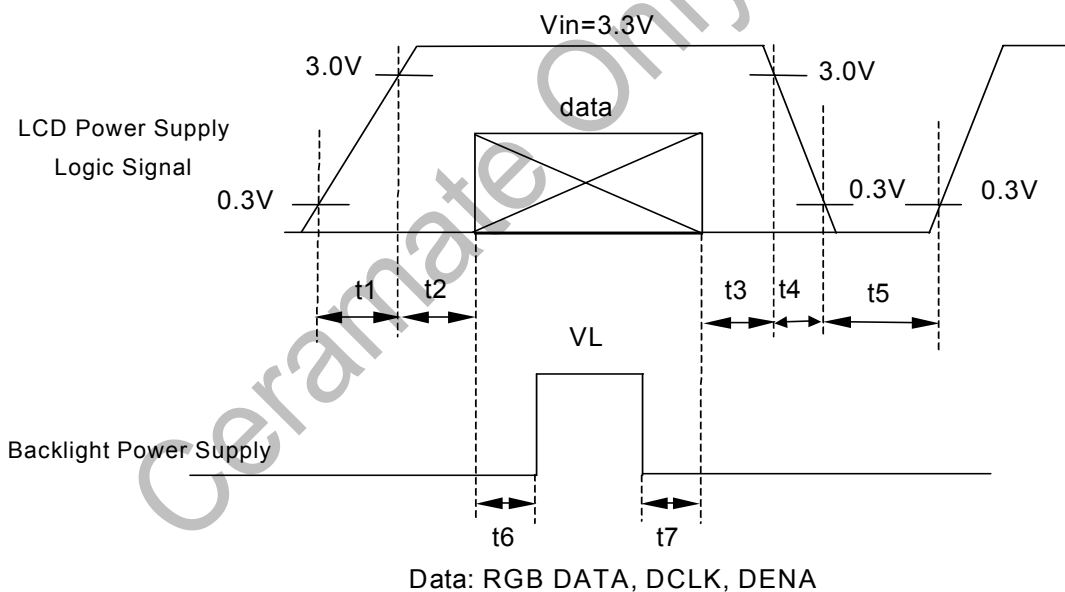
*1) Typical: Under 64 gray pattern
Maximum: Under black pattern



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

3.3 Power 、Signal sequence

$t_1 \leq 10\text{ms}$ $1\text{ sec} \leq t_5$
 $0 < t_2 \leq 50\text{ms}$ $200\text{ms} \leq t_6$
 $0 < t_3 \leq 50\text{ms}$ $200\text{ms} \leq t_7$
 $0 < t_4 \leq 10\text{ms}$



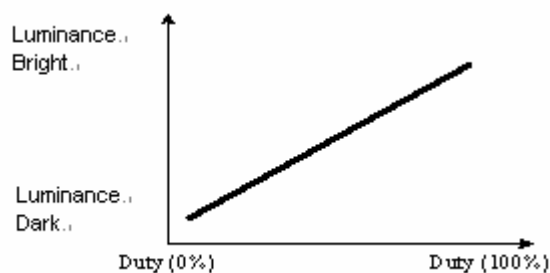
4. INTERFACE CONNECTION

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

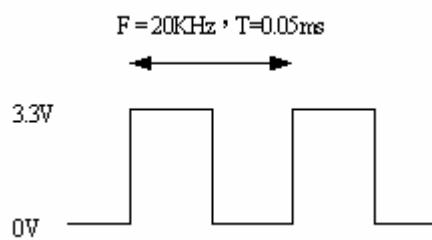
Pin NO.	SYMBOL	DESCRIPTION
1	VLED	Power Supply for LED Driver circuit
2	VLED	Power Supply for LED Driver circuit
3	ADJ	Brightness control for LED B/L
4	AV _{SS}	Ground
5	AV _{SS}	Ground
6	VCC	Power Supply
7	VCC	Power Supply
8	NC	NC
9	DE	Data Enable Signal
10	NC	NC
11	NC	NC
12	AV _{SS}	Ground
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	AV _{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 (LSB)
36	AV _{SS}	Ground
37	DCLK	Clock Signal
38	AV _{SS}	Ground
39	L/R	Left/Right select
40	U/D	Up/Down select

Remarks :

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



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



3) AVSS Pin must connection to ground.

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

5.1 Timing Specification

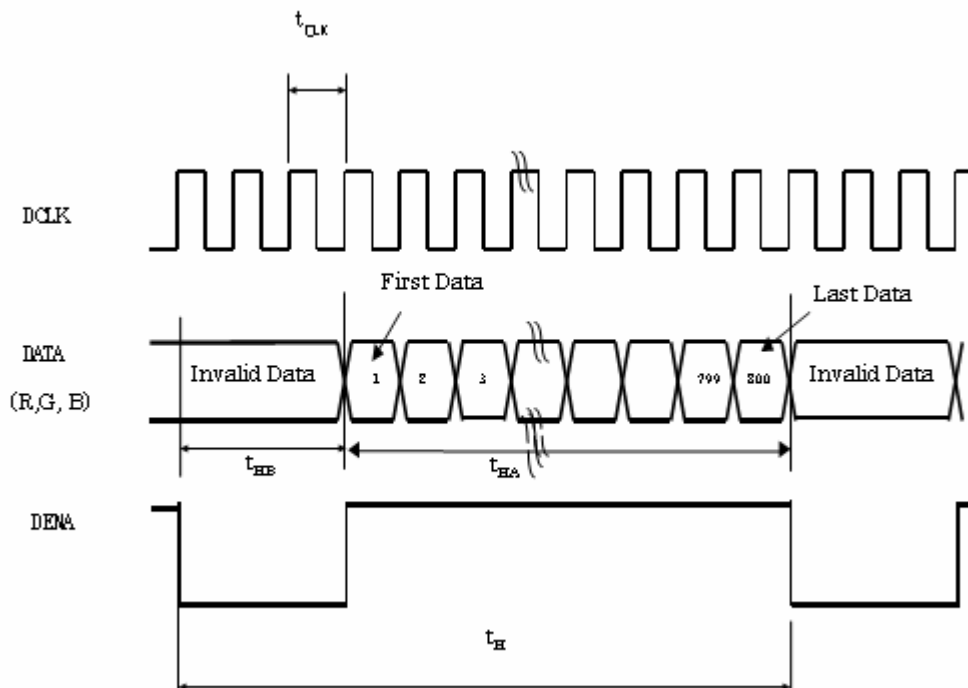
ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK	Dot Clock	f _{CLK}	25	27	32	MHz
	Low Level Width	t _{WCL}	6	-	-	ns
	High Level Width	t _{WCH}	6	-	-	
DE	Setup Time	t _{DES}	5	-	-	ns
	Hold time	t _{DEH}	10	-	-	
	Horizontal Period	t _{HP}	850	900	950	t _{CLK}
	Horizontal Valid	t _{HV}	800			
	Horizontal Blank	t _{HBK}	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 :

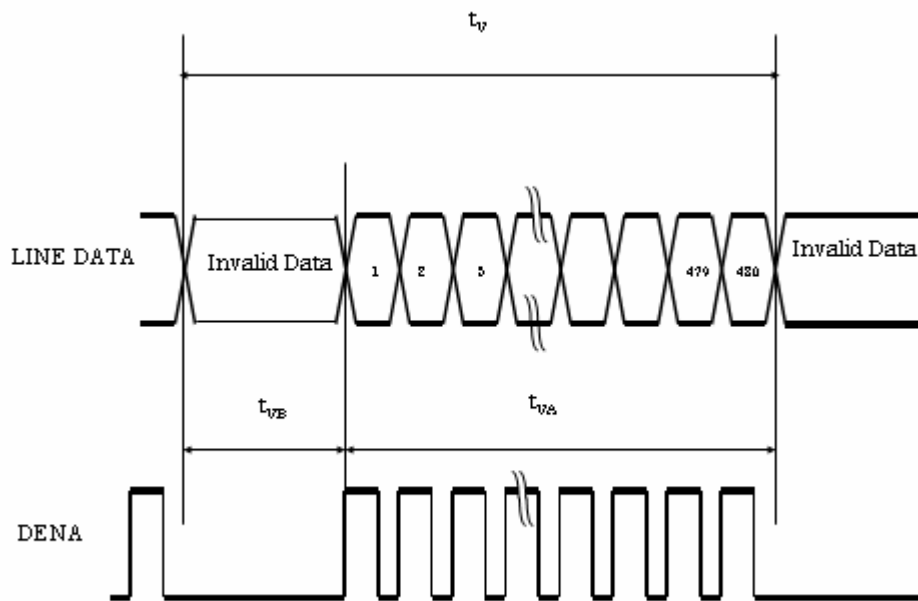
*1) This module is operated by DE only mode

5.2 Timing sequence(Timing chart)

Horizontal sequence



Vertical 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 :

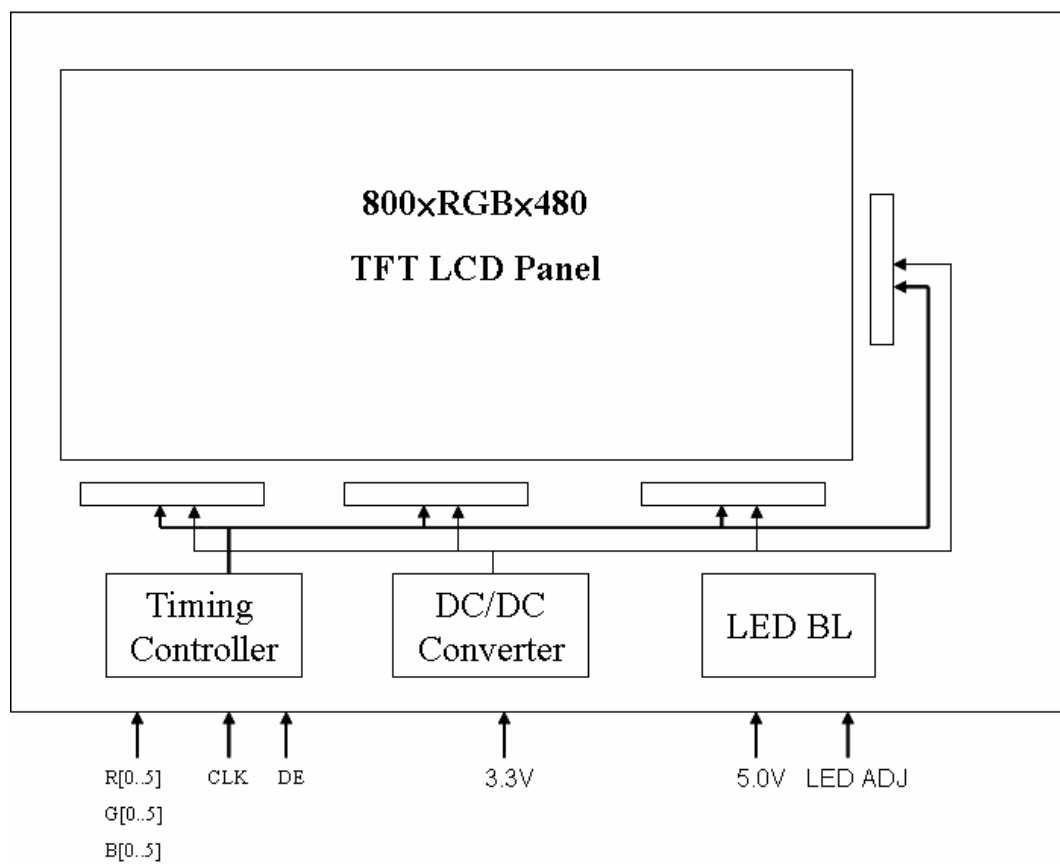
(1) Definition of Gray Scale

color(n) : n is series of Gray Scale

The more n value is, the bright Gray Scale.

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

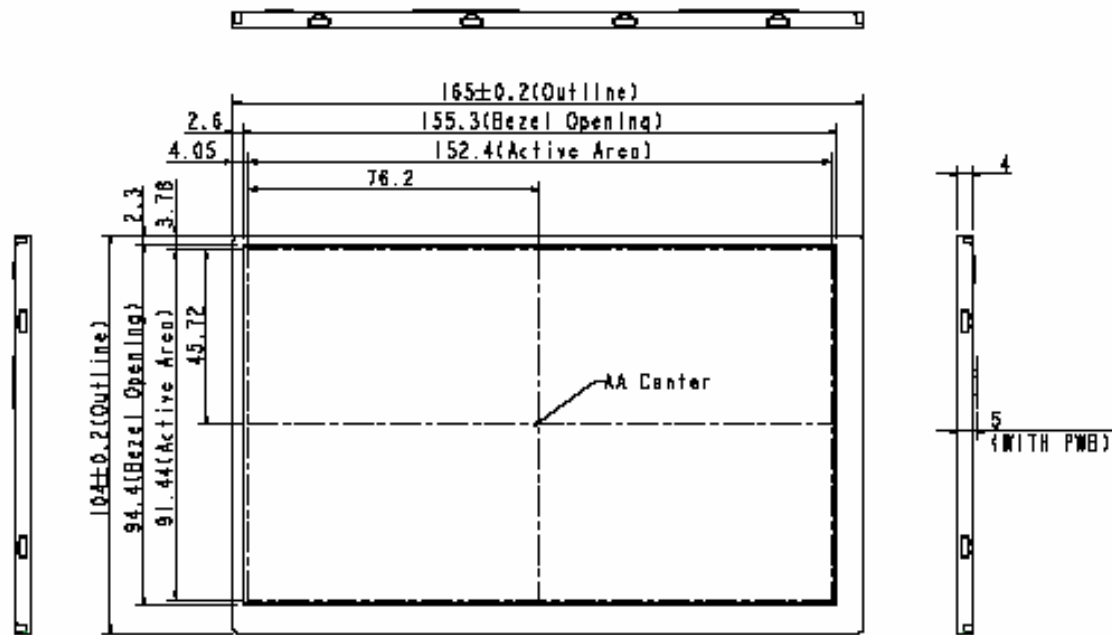
6. BLOCK DIAGRAM



7. MECHANICAL DIMENSION

7.1 Front Side

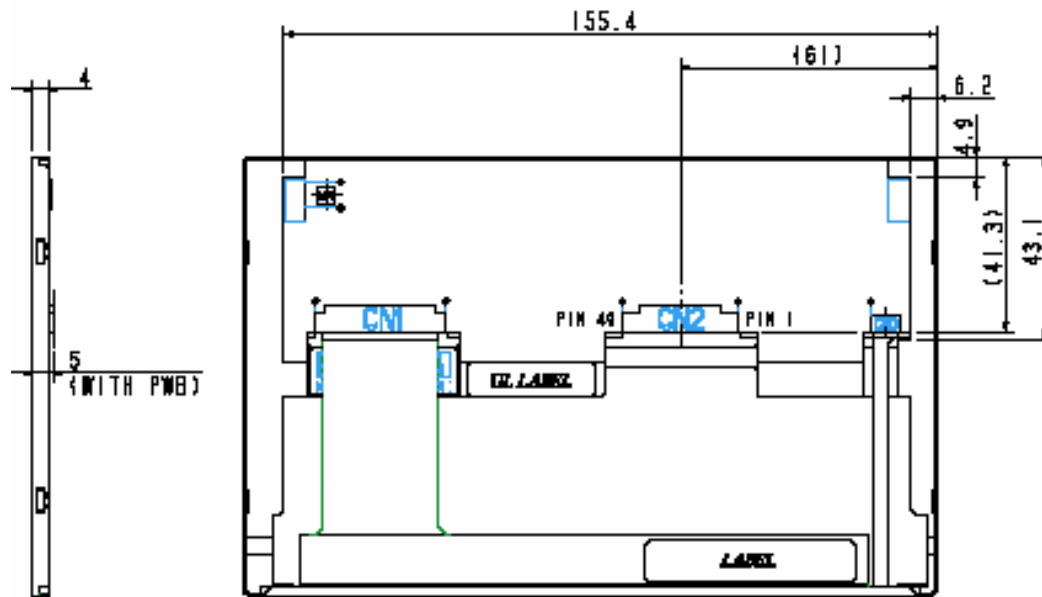
[Unit : mm]



Remark : Un-indication tolerance is ±0.3mm

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
Contrast Ratio		CR	Point-5	300	400	--	--	*1)*2)*3)
Luminance		Lw	Point-5	200	250	--	cd/m ²	*2)
Luminance Uniformity		ΔL		70	80	--	%	*2)
Response Time (White - Black)		Tr+ Tf	Point-5	--	20	30	ms	*2)*4)
Viewing Angle	Horizontal	ϕ	CR ≥ 10 Point-5	120	140	--	°	*2)*3)
	Vertical	θ		90	110	--	°	*2)*3)
Color Coordinate	White	Wx Wy	Point-5	0.283 0.299	0.313 0.329	0.343 0.359	--	*2)*3)
	Red	Rx Ry		0.56 0.305	0.59 0.335	0.62 0.365		
	Green	Gx Gy		0.295 0.528	0.325 0.558	0.355 0.588		
	Blue	Bx By		0.117 0.080	0.147 0.110	0.177 0.140		

Remarks :

*1) Definition of contrast ratio : (in the dark room.BM-5A (TOPCON))

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

*2) Definition of luminance : (in the dark room.BM-5A (TOPCON))

Measure white luminance on the point 5 as figure8-1

Definition of Luminance Uniformity:

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

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

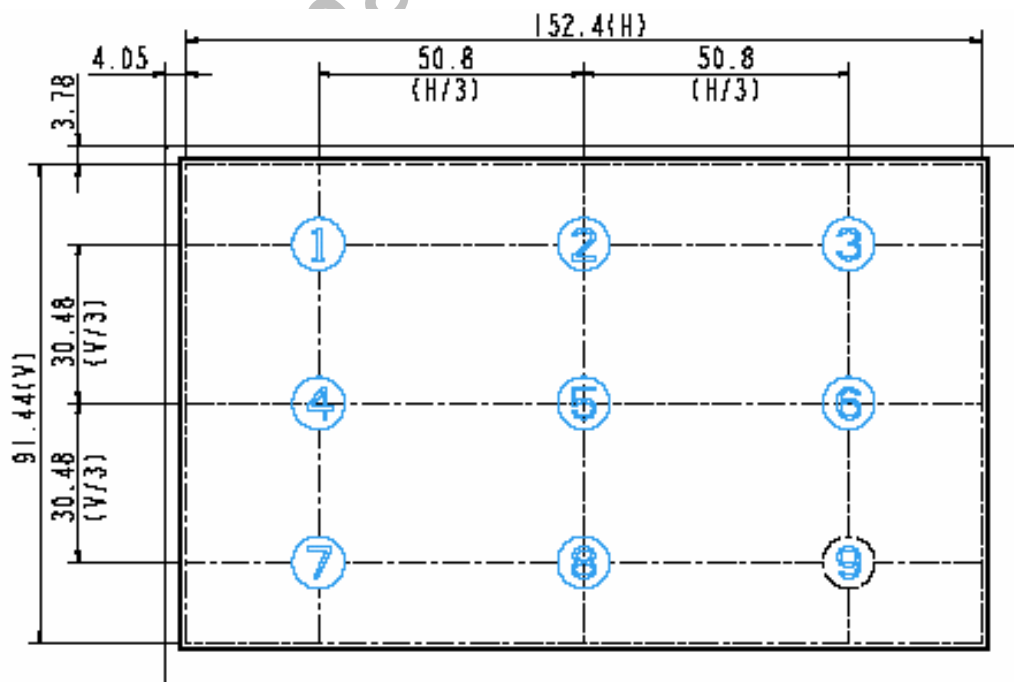


Fig8-1 Measuring point

*3) Definition of Viewing Angle(θ, ψ), refer to Fig8-2 as below : (in the dark room.EZ-CONTRAST (ELDIM))

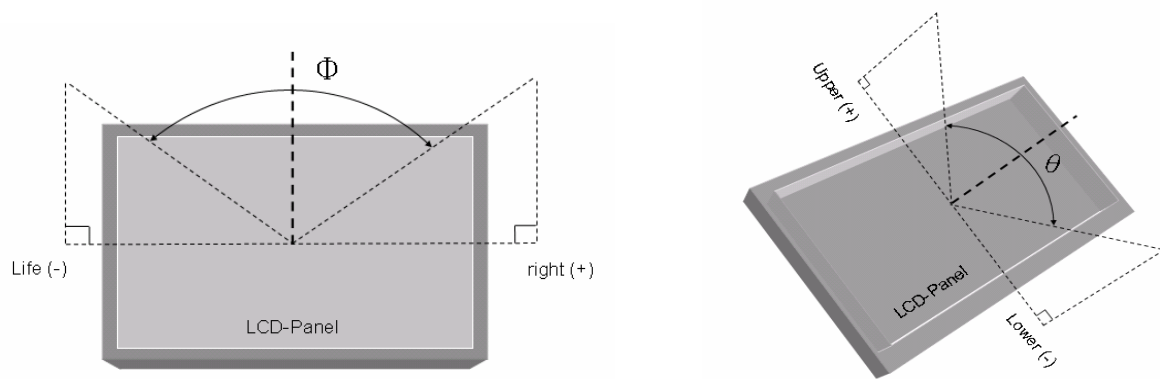


Fig8-2 Definition of Viewing Angle

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

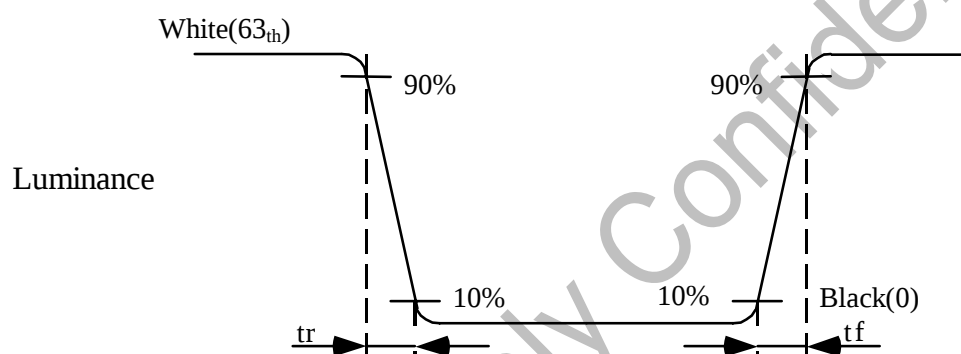


Fig8-3 Definition of Response Time(White-Black)

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)	● 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)	● Frequency range:8~33.3Hz ● Stoke:1.3mm ● Vibration:sinusodial wave,perpendicularaxis(both x,z,axis:2Hrs,y axis:4Hrs). ● Sweep:2.9G,33.3Hz-400Hz ● 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.