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# Specification

**CLAA070LCOACW**  
**7.0" / 800x480 / TTL / LED**

**Version November 2007**

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## 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 <sup>2</sup> )	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)	TBD
BL unit	LED
Surface Treatment	Anti-Glare · Hardness:3H

## 2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Input Voltage	$V_{CC}$	0.5	5.0		
Signal Input Voltage	DCLK, DE, R0, G0, B0~R5, G5, B5	-0.5	$V_{CC}+0.5$	V	
Static Electricity	VESDc	-200	200	V	【Note1】
	VESDm	-15K	15K	V	
ICC Rush Current	IRUSH	-	1	A	【Note2】
Operation Temperature	$T_{op}$	-30	85	°C	
Storage Temperature	$T_{stg}$	-40	95	°C	

### 【Note1】

Test Condition: IEC 61000-4-2 ,

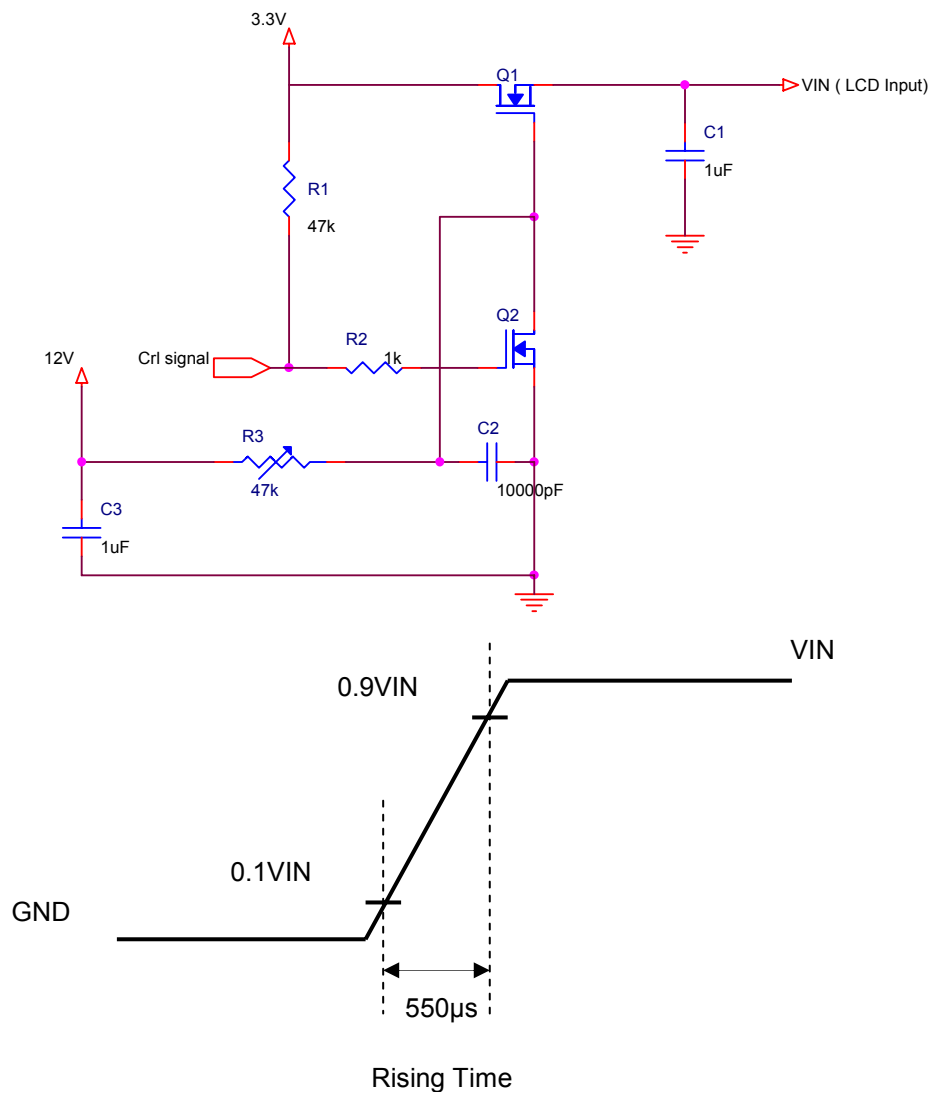
VESDc : Contact discharge to input connector

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.



### 3. ELECTRICAL CHARACTERISTICS

#### 3.1 TFT LCD

Ta=25°C

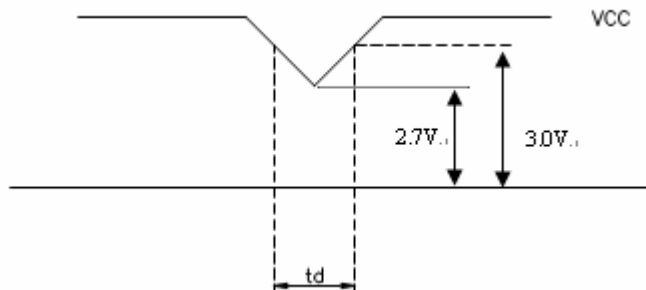
Item	Symbol	Min.	Typ	Max.	Unit	Note	
Power Supply Voltage For LCD	VCC	3.0	3.3	3.6	V	【Note1】	
Power Supply Voltage For LED	VLED	4.5	5	5.5	V		
Logic Input Voltage	VIH	VCC*0.7	--	VCC	V		
	VIL	0	--	VCC*0.3	V		
ADJ Input Voltage	Threshold Voltage(high)	VADJ_H	3.0	--	3.3	V	
	Threshold Voltage(low)	VADJ_L	GND	--	0.3	V	

Remarks :

【Note1】

VCC –dip condition:

- 1) 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

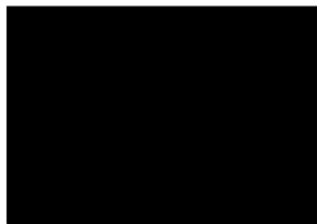
Item	Symbol	Min	Type	Max	Unit	Notes
LCD power current	ICC	--	150	200	mA	【Note1】
LED power current	ILED		300	350	mA	【Note2】

**【Note1】**

Typical: Under 64 gray pattern  
 Maximum: Under black pattern



(a) 64 Gray Pattern



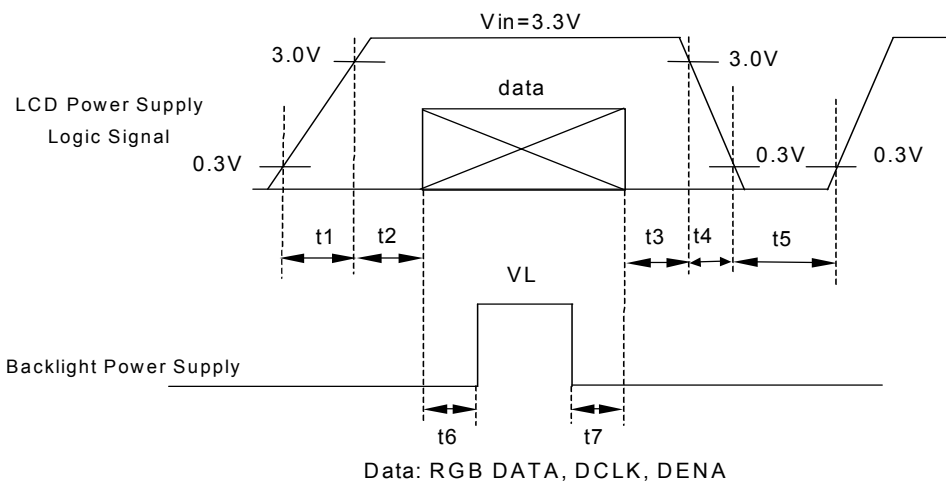
(b) Black Pattern

**【Note2】**

Typical: When VLED is 5V  
 Maximum: When VLED is 4.5V

### 3.3 Power · Signal sequence

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



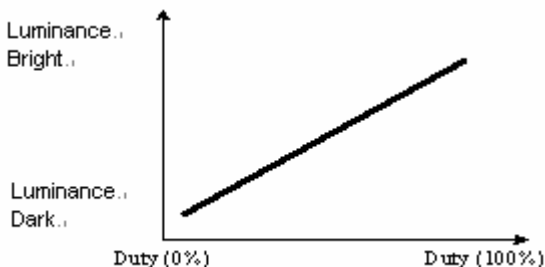
## 4. INTERFACE CONNECTION

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

Pin NO.	SYMBOL	DESCRIPTION
1	AV <sub>SS</sub>	Ground
2	AV <sub>SS</sub>	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 <sub>SS</sub>	Ground
11	AV <sub>SS</sub>	Ground
12	AV <sub>SS</sub>	Ground
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	V <sub>SS</sub>	Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	AV <sub>SS</sub>	Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	AV <sub>SS</sub>	Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	AV <sub>SS</sub>	Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	AV <sub>SS</sub>	Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0
36	AV <sub>SS</sub>	Ground
37	AV <sub>SS</sub>	Ground
38	DCLK	Clock Signal
39	AV <sub>SS</sub>	Ground
40	AV <sub>SS</sub>	Ground

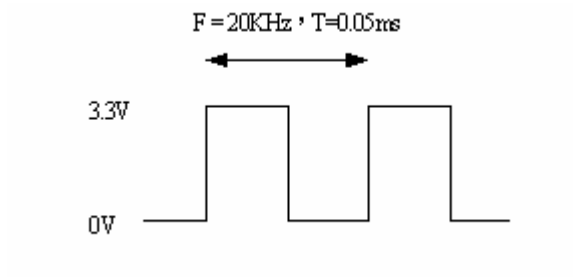
Remarks:

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





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)

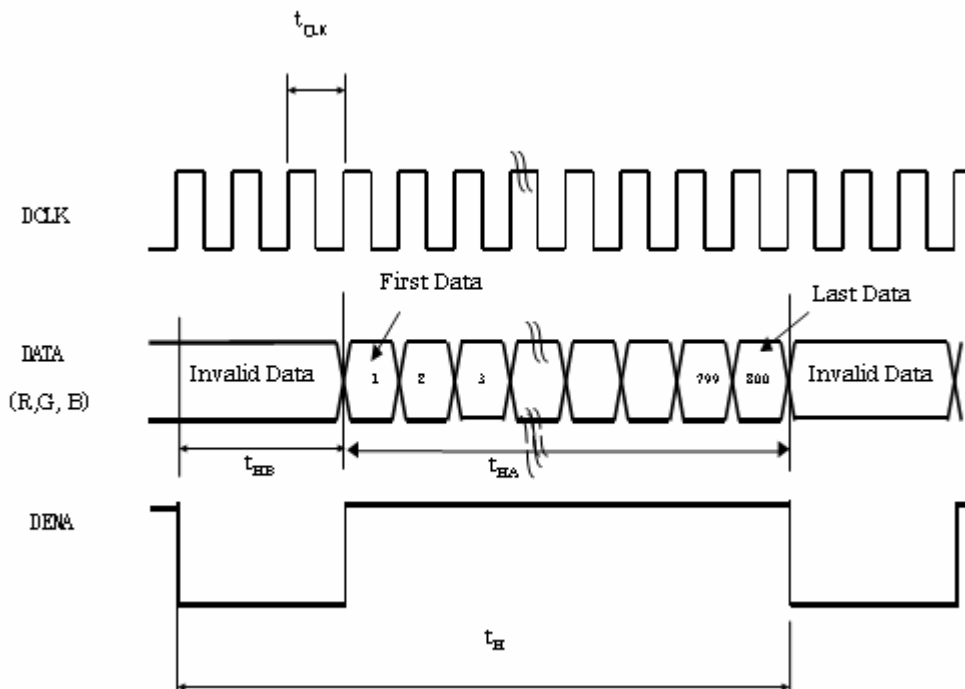
### 5.1 Timing Specification

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	
DATA	Setup Time	$t_{DS}$	5	-	-	ns
	Hold Time	$t_{DH}$	10	-	-	

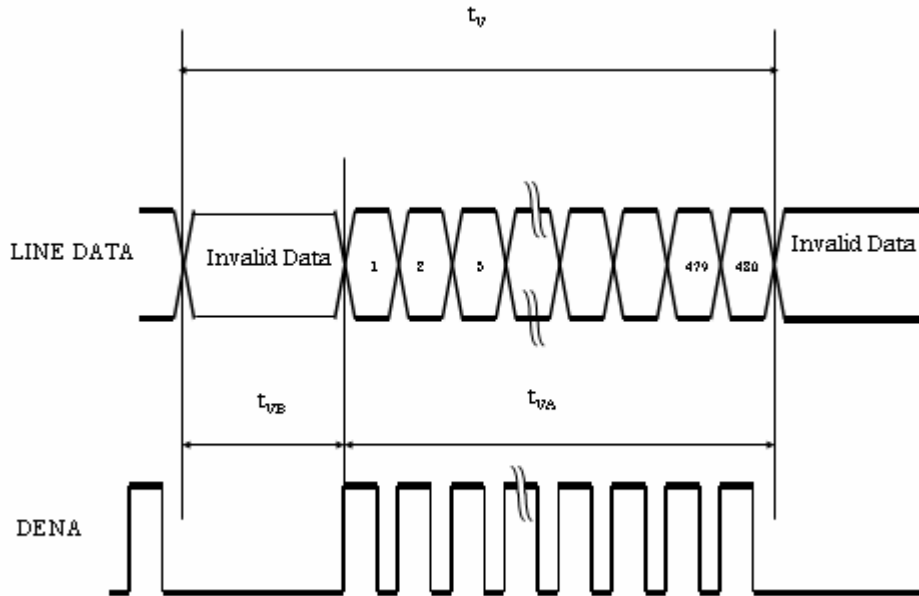
【Note1】 This module is operated by DE only mode.

### 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:

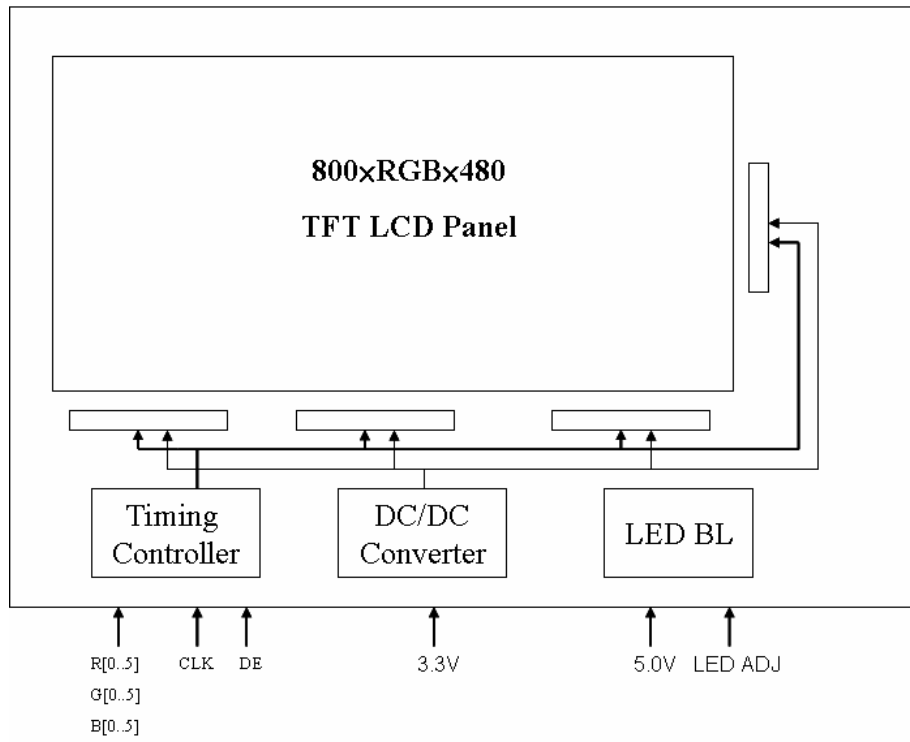
(1)Definition of Gray Scale

color(n) : n is series of Gray Scale

The more n value is, the bright Gray Scale.

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

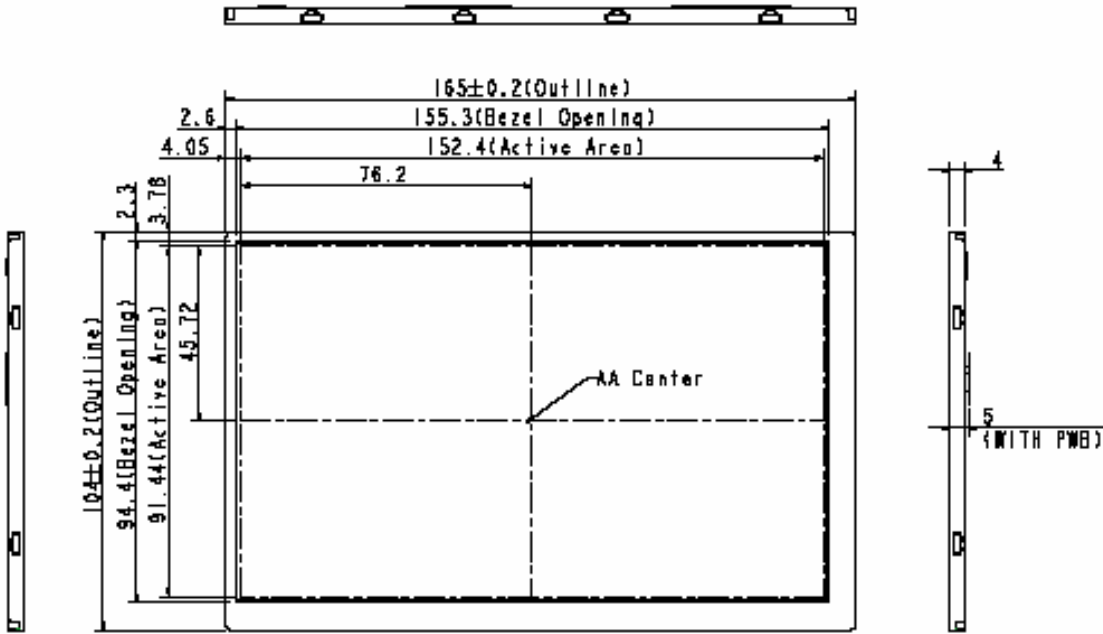
## 7. BLOCK DIAGRAM



## 8. MECHANICAL DIMENSION

### 8.1 Front Side

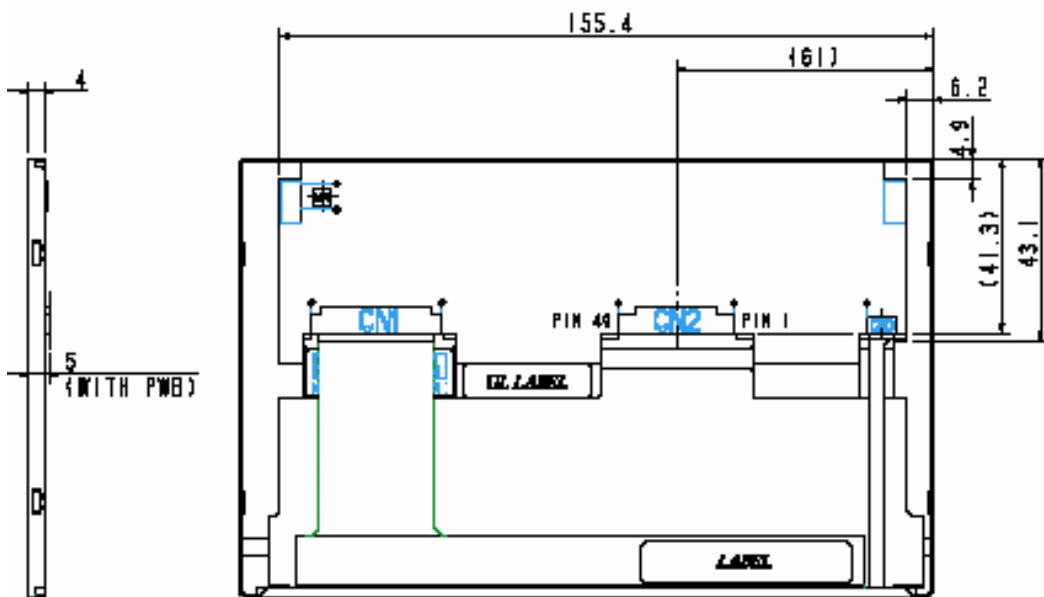
[Unit : mm]



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

### 8.2 Rear Side

[Unit : mm]



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

## 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 <sup>2</sup>	*2)
Luminance Uniformity		ΔL		70	80	--	%	*2)
Response Time (White - Black)		Tr + Tf	Point-5	--	--	20	ms	*2)*4)
Viewing Angle	Horizontal	$\phi$	CR ≥ 10 Point-5	120	140	--	°	*2)*3)
	Vertical	$\theta$		90	110	--	°	2)*3)
Color Coordinate	White	Wx Wy	Point-5	0.273 0.289	0.313 0.329	0.353 0.369	--	2)*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) 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 figure9-1

Definition of Luminance Uniformity:

Measure white luminance on the point1~9 as figure9-1

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

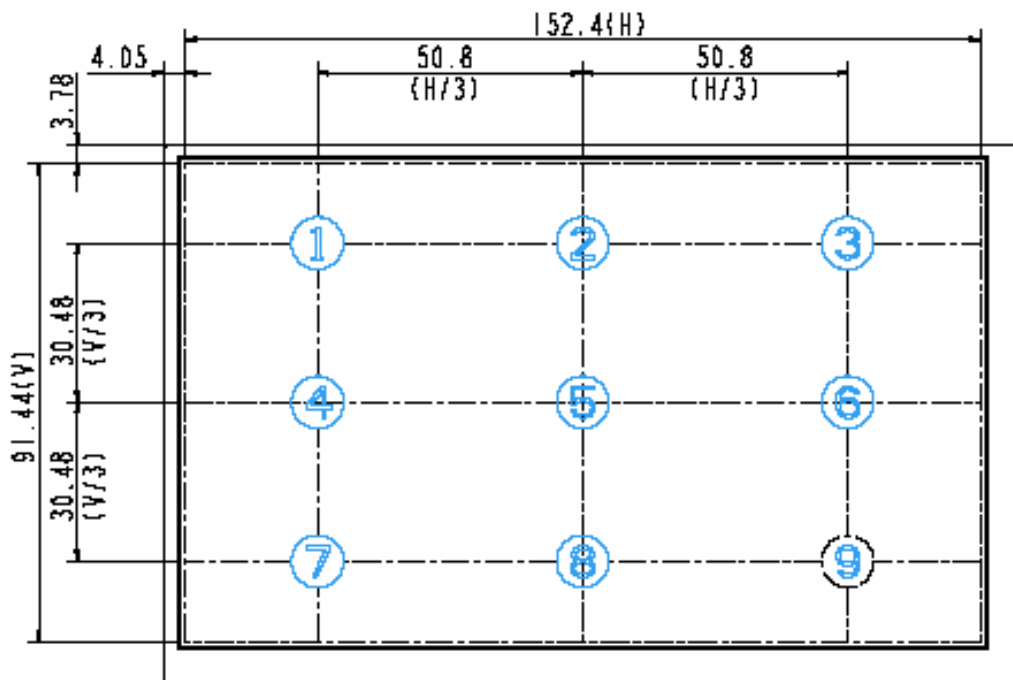


Fig9-1 Measuring point

\*3) Definition of Viewing Angle( $\theta, \psi$ ),refer to Fig9-2 as below : (in the dark room.EZ-CONTRAST (ELDIM))

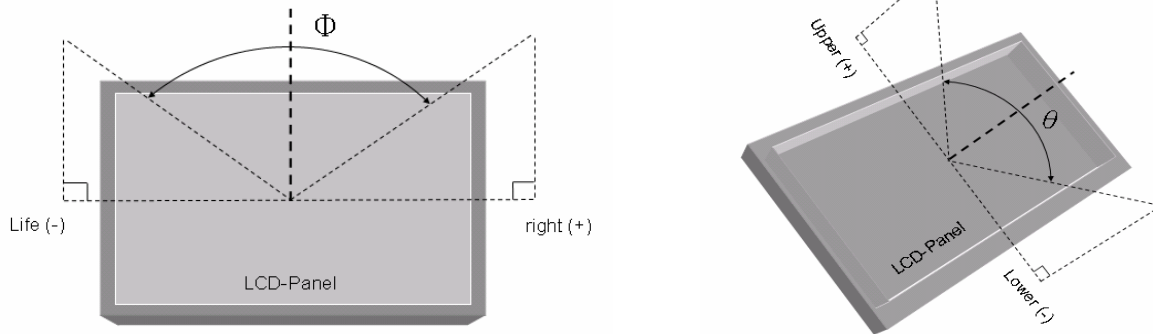


Fig9-2 Definition of Viewing Angle

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

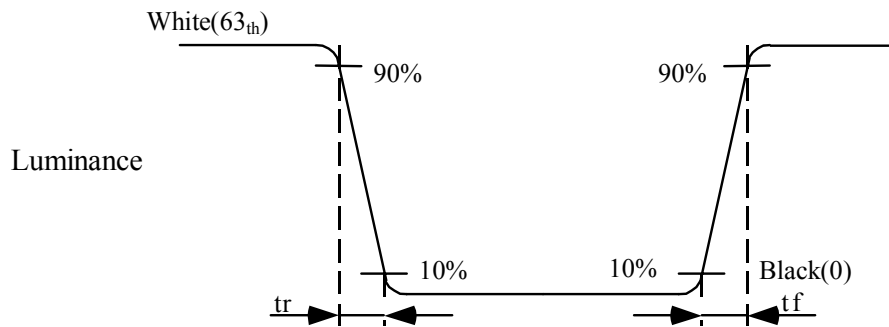


Fig9-3 Definition of Response Time(White-Black)



## 10. RELIABILITY TEST

### 10.1. Temperature and humidity

TEST ITEMS	CONDITIONS	REMARK
High Temperature Operation	85°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	

### 10.2. 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>

### 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 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.