



# Chunghwa Picture Tubes, Ltd.

## Product Specification

To :

Date :

**TFT LCD**

**CLAA069LA0ACW**

**ACCEPTED BY : (V0.5)**

Tentative

APPROVED BY	CHECKED BY	PREPARED BY

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**REVISION STATUS**

Revision Notice	Description	Page	Rev. Date
0.0	First revision	--	2009/2/23
0.1	Add LED Life time	8	2009/4/16
	Revise interface connection	9	
	Revise MECHANICAL DIMENSION	13-15	
	Revise Reliability test	18	
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	Revise BLU connector	10	
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	Revise ELECTRICAL CHARACTERISTICS	6	
	Revise TFT-LCD current consumption	7	
	Revise Backlight unit	9	
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## 1. OVERVIEW

CLAA069LA0ACW is 17.66cm ( 6.95") color TFT-LCD(Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs, control circuit, and backlight.

The 6.95" 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. Inverter for backlight and drive board for panel are not included in this module.

General specifications are summarized in the following table:

ITEM	SPECIFICATION
Panel Size	6.95 inch (panel diagonal)
Display Area (mm)	156.6(H)×81.6(V)
Number of Pixels	800(H) × 3 (RGB) × 480(V)
Pixel Pitch (mm)	0.19575 (H) × 0.170 (V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white
Number of colors	262K
Viewing Direction	6 o'clock
Response Time (Tr+Tf)	20ms
Brightness (cd/m <sup>2</sup> )	500nit (typ)
Viewing Angle (CR ≥ 10)	140 degree(H) , 120degree(V)
Electrical Interface(data)	TTL
Power consumption(W)	1.95W(typ)
Outline Dimension (in mm)	167.0(W) × 93.0(H) × 6(D)
Weight(g)	165g(typ)
BL unit	LED
Surface Treatment	Anti-Glare

## 2. ABSOLUTE MAXIMUM RATINGS

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE	ITEM
Power Supply Voltage	V <sub>cc</sub>	-0.3	5	V		GND=0
	AVDD	-0.3	13.5	V		AVSS=0
	V <sub>GH</sub>	-0.3	40	V		GND=0
	V <sub>GL</sub>	-20	0.3	V		
Operation Temperature	T <sub>opa</sub>	-30	85	°C		【Note1】
Storage Temperature	T <sub>stg</sub>	-40	90	°C		【Note1】
Forward Current ( per LED )	I <sub>f</sub>	-	25	mA		
Reverse Voltage ( per LED )	V <sub>R</sub>	-	5	V		
Pulse forward current ( per LED )	I <sub>fp</sub>	-	80	mA		【Note2】

### 【Note】

【Note1】 If users use the product out of the environment operation range (temperature and humidity), it will concern for visual quality.

【Note2】 I<sub>fp</sub> condition : Pulse width ≤ 10msec , Duty ≤ 1/10 .

### 3. ELECTRICAL CHARACTERISTICS

#### 3.1 Typical operation conditions

Ta=25°C

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Digital Power Voltage	VCC	3	3.3	3.6	V	
Analog Power Voltage	AVDD	9.4	9.6	9.8	V	
Gate On Power Voltage	VGH	17	18	19	V	
Gate Off Power Voltage	VGL	-6.6	-6	-5.4	V	
Common Power Voltage	VCDC	3.18	3.28	3.38	V	【Note1】
Gamma Voltage	V1	-	8.37	-	V	
	V2	-	6.89	-	V	
	V3	-	6.49	-	V	
	V4	-	6.15	-	V	
	V5	-	5.23	-	V	
	V6	-	3.71	-	V	
	V7	-	2.79	-	V	
	V8	-	2.45	-	V	
	V9	-	2.05	-	V	
	V10	-	0.57	-	V	
Input signal Voltage	VIH	0.7VCC	-	VCC	V	
	VIL	GND	-	0.3VCC	V	

【Note1】 Please adjust VCDC to make the flicker level be minimum.

## 3.2 TFT-LCD current consumption

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	NOTE
Gate on power current	IVGH	VGH = 18V	-	(0.5)	(1)	mA	【Note1】
Gate off power current	IVGL	VGL = -6V	-	(0.5)	(1)	mA	【Note1】
Digital power current	IVCC	VCC = 3.3V	-	(5)	(10)	mA	【Note1】
Analog power current	IAVDD	AVDD = 9.6V	-	(40)	(50)	mA	【Note1】
Total Power Consumption	PC		-	(413)	(537)	mW	【Note1】

## 【Note1】

Vcc = 3.3V 、 Frequency = 60Hz

Typical: Under 64 gray pattern

Maximum: Under black pattern

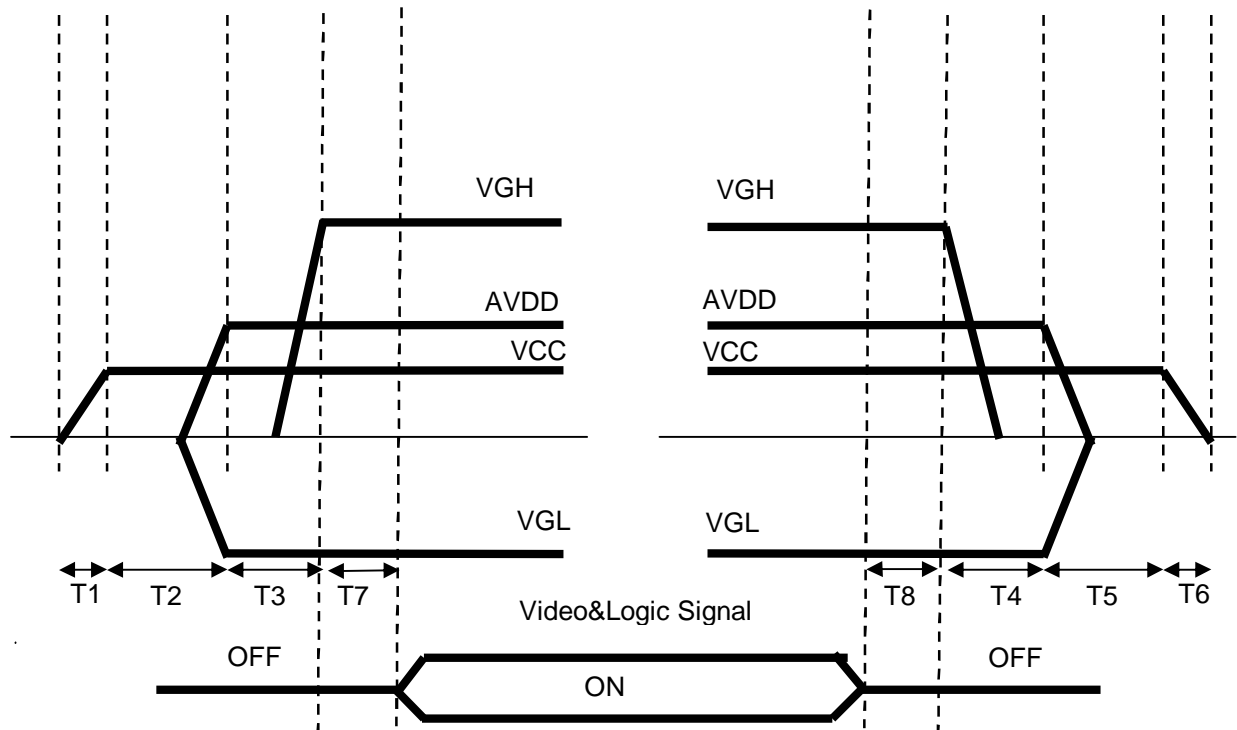


.. (a)64 Gray Pattern .. (b)Black Pattern .. ↵

## 3.3 Power、Signal sequence

Power On : VCC→AVDD/VGL→VGH→Video & Logic Signal

Power Off : Video & Logic Signal→VGH→AVDD/VGL→VCC



$$\begin{aligned}
 0 < T1 &\leq 10\text{ms} \\
 T2 &> 20\text{ms} \\
 T3 &> 10\text{ms} \\
 0 < T7 &\leq 10\text{ms}
 \end{aligned}$$

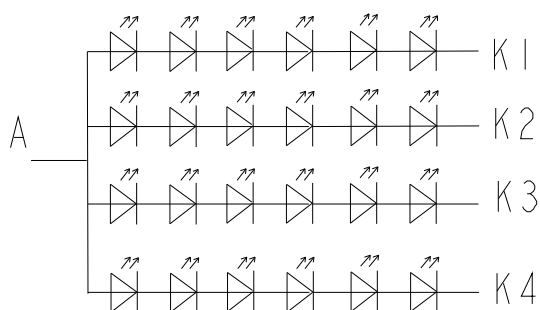
$$\begin{aligned}
 T4 &> 10\text{ms} \\
 T5 &> 20\text{ms} \\
 T6 &< 10\text{ms} \\
 0 < T8 &\leq 10\text{ms}
 \end{aligned}$$



## 3.4 Backlight unit

(Ta=25°C)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
LED current	IL	--	80	--	mA	
LED voltage	VL	16.62	19.2	21.18	V	
Power consumption	WL	--	1.536	--	W	
LED LifeTime	TBD	TBD	TBD		hrs	IF=20mA

**NOTE****\*1)LED Circuit Diagram**

\*2) A : Anode(+) , K : Cathode(—)

\*3)We suggest using the constant current control, IL=80mA,to avoid the leakage light and brightness quality issue.

\*4) Difinition of Led lifetime : Luminance < Initial luminance 50%

## 4. INTERFACE CONNECTION

### 4.1 CN1

Pin NO.	SYMBOL	DESCRIPTION
1	GND	Power Ground
2	DIO1	Horizontal start Pulse Signal I/O
3	NC	NC
4	VR 1	Gamma Voltage Level 1
5	VR 2	Gamma Voltage Level 2
6	VR 3	Gamma Voltage Level 3
7	VR 4	Gamma Voltage Level 4
8	VR 5	Gamma Voltage Level 5
9	VR 6	Gamma Voltage Level 6
10	VR 7	Gamma Voltage Level 7
11	VR 8	Gamma Voltage Level 8
12	VR 9	Gamma Voltage Level 9
13	VR 10	Gamma Voltage Level 10
14	D00	Red Data ( LSB )
15	D01	Red Data
16	D02	Red Data
17	D03	Red Data
18	D04	Red Data
19	D05	Red Data ( MSB )
20	D10	Green Data ( LSB )
21	D11	Green Data
22	D12	Green Data
23	D13	Green Data
24	D14	Green Data
25	D15	Green Data ( MSB )
26	D20	Blue Data ( LSB )
27	D21	Blue Data
28	D22	Blue Data
29	D23	Blue Data
30	D24	Blue Data
31	D25	Blue Data ( MSB )
32	LD	Latch The Polarity of Output and Switch The New Data to Output
33	SHL	Select Left / Right Shift
34	AVDD	Power Supply for Analog Circuit
35	AVDD	Power Supply for Analog Circuit
36	GND	Power Ground
37	GND	Power Ground
38	CLK	Horizontal Clock
39	DVDD	Digital Power +3.3V
40	DIO2	Horizontal start Pulse Signal I/O
41	GND	Power Ground
42	GND	Power Ground
43	GND	Power Ground
44	STV2	Vertical start Pulse Signal I/O
45	UD	Up / Down Control Pin
46	OEV	Output Enable
47	VCLK	Vertical Clock
48	GND	Power Ground
49	GND	Power Ground
50	POL	Polarity Selection
51	XON	Gate Output all-on control
52	NC	NC
53	VEEG	Gate OFF Voltage -6V
54	NC	NC
55	VDDG	Gate ON Voltage +18V
56	NC	NC
57	STV1	Vertical start Pulse Signal I/O
58	NC	NC

59	VCOM	Common Voltage
60	VCOM	Common Voltage

Remarks :

- 1) GND Pin had been connected to “ground”, should not be “ Non-Connect ”.
- 2) SHL : Select left or right

SHL	DIO1	DIO2	SHIFT
1	Input	Output	Right
0	Output	Input	Left

- 3) U/D : Shift up or down control

UD	STV1	STV2	SHIFT
1	Input	Output	UP
0	Output	Input	Down

- 4) XON : Output all-on control

As XON is low then all output pins are forced to VDDG level

#### 4.2 CN2 (BLU connector)

Outlet connector: STARCONN FR06-S10R1HF-2-E3000

Pin No.	SYMBOL	FUNCTION
1	A	Anode
2	A	Anode
3	A	Anode
4	NC	NC
5	K1	Cathode
6	K2	Cathode
7	K3	Cathode
8	K4	Cathode
9	NC	NC
10	NC	NC

## 5. INPUT SIGNAL(TTL )

### 5.1 Timing Specification

#### 5.1.1 Horizontal Timing spec:

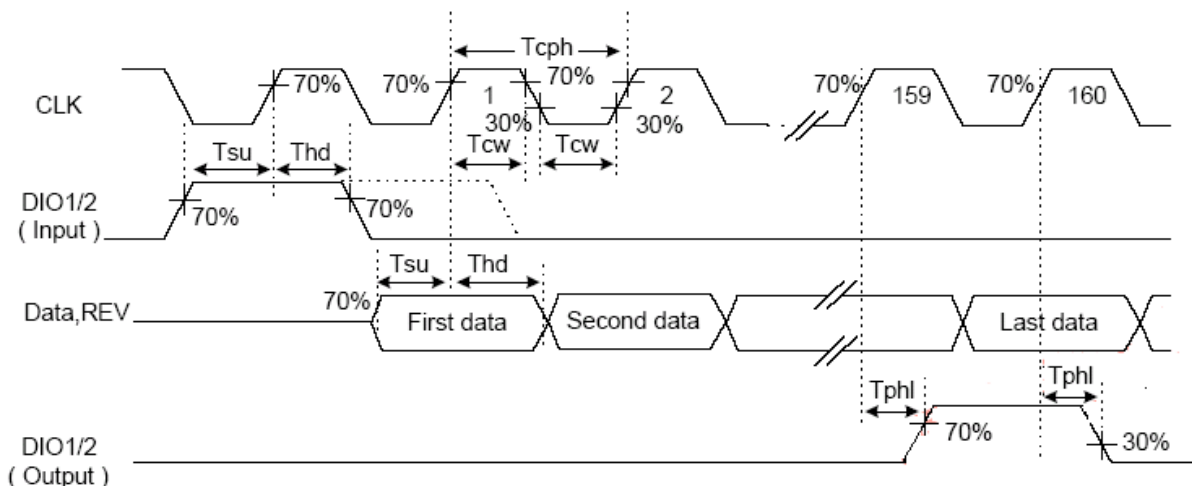
ITEM	SYMBOL	SPECIFICATION			UNIT
		MIN.	TYP.	MAX.	
CLK Frequency	1/Tcph	25	32	40	MHz
CLK Pulse Width	Tcw	40%	-	60%	Tcph
Data Set-up Time	Tsu	4	-	-	ns
Data Hold Time	Thd	2	-	-	ns
Propagation Delay of DIO2/1	Tphl	6	10	15	ns
Time That The Last Data to LD	Tld	1	-	-	Tcph
Pulse Width of LD	Twld	2	-	-	Tcph
Time That LD to DIO1/2	Tlds	5	-	-	Tcph
POL Set-up Time	Tpsu	6	-	-	ns
POL Hold Time	Tphd	6	-	-	ns

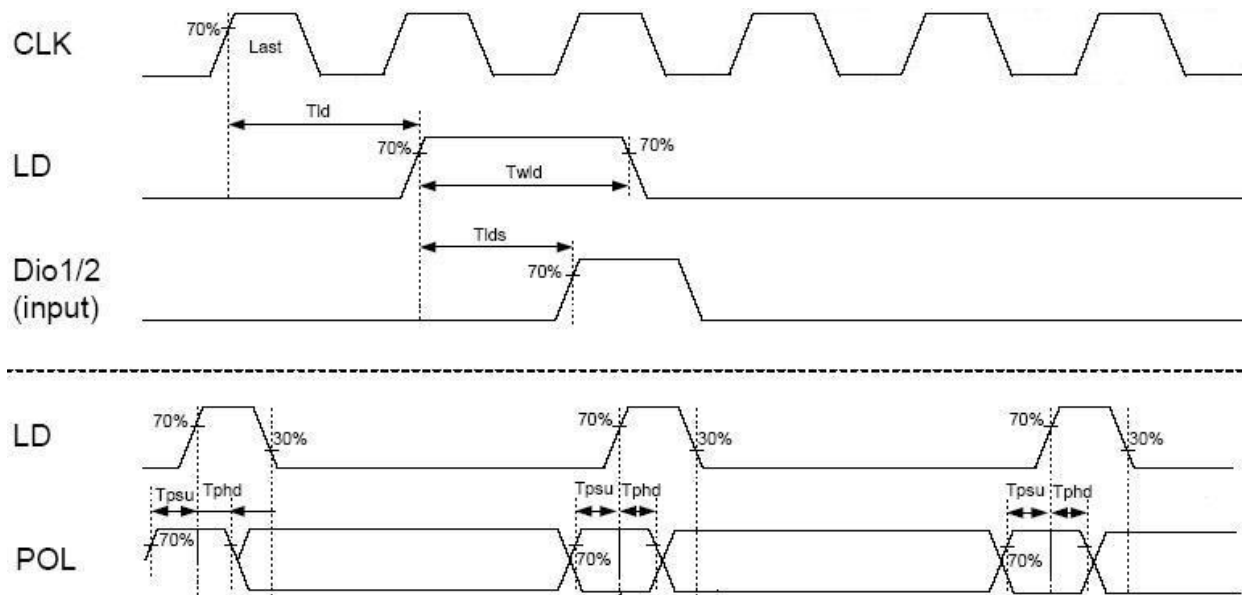
#### 5.1.2 Vertical Timing spec :

ITEM	SYMBOL	SPECIFICATION			UNIT
		MIN.	TYP.	MAX.	
VCLK Frequency	1/Tcpv	-	-	200	Khz
VCLK Pulse Width	Tcpvh	2.5	-	-	$\mu$ s
STVD/STVU Set-up Time	Tsu	700	-	-	ns
STVD/STVU Hold Time	Thd	700	-	-	ns
Output Enabled pulse width	Twoe	1	-	-	us

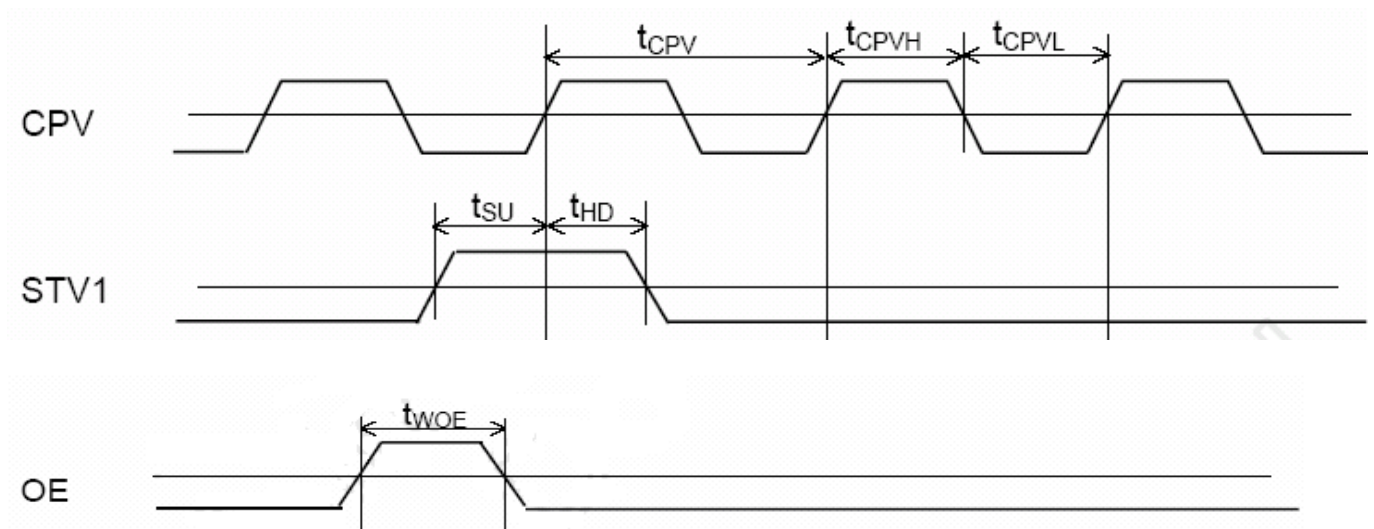
## 5.2 Timing Sequence (Timing chart)

### 5.2.1 Horizontal Timing Sequence





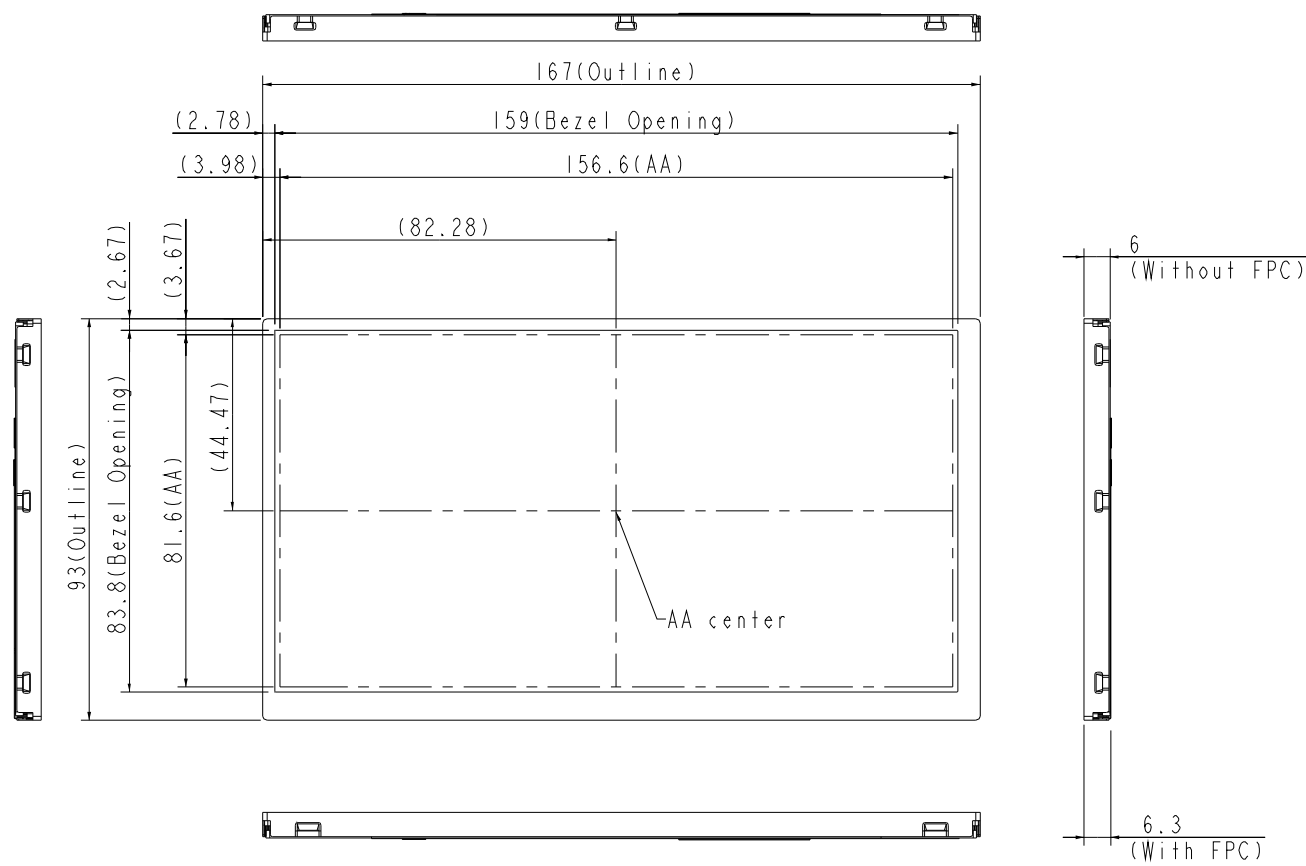
### 5.2.2 Vertical Timing Sequence



6. MECHANICAL DIMENSION

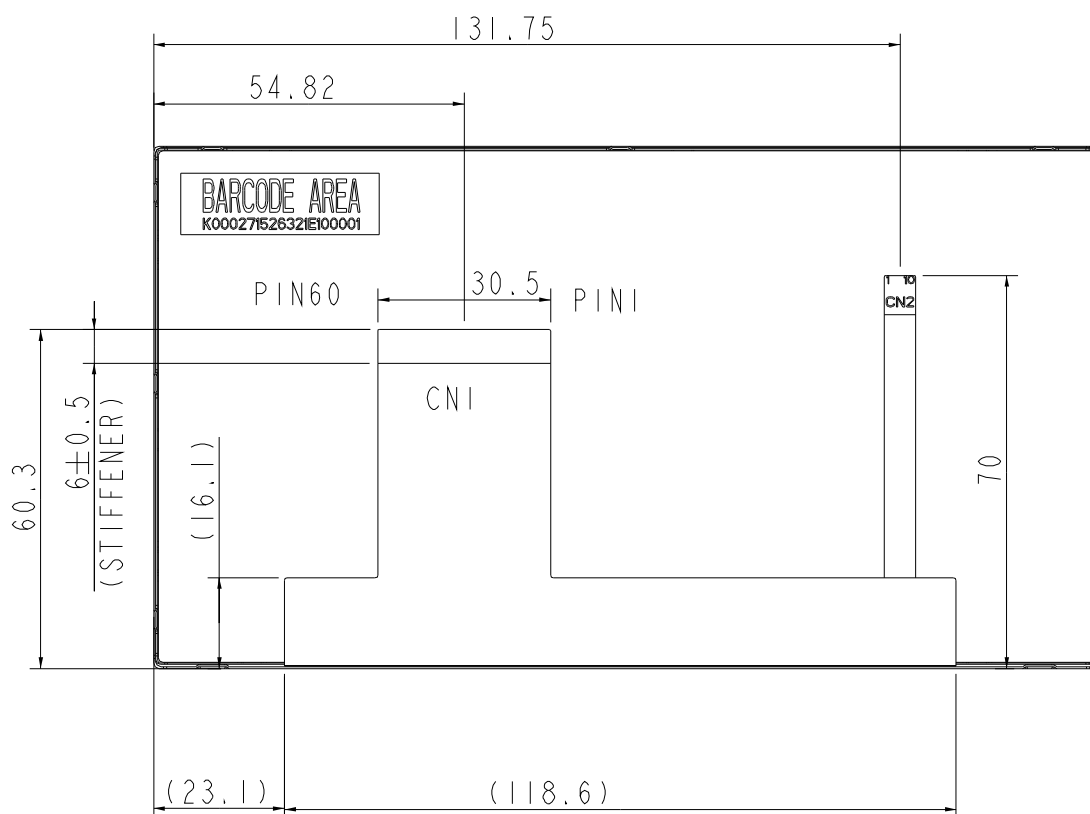
6.1 Front Side

[Unit : mm]



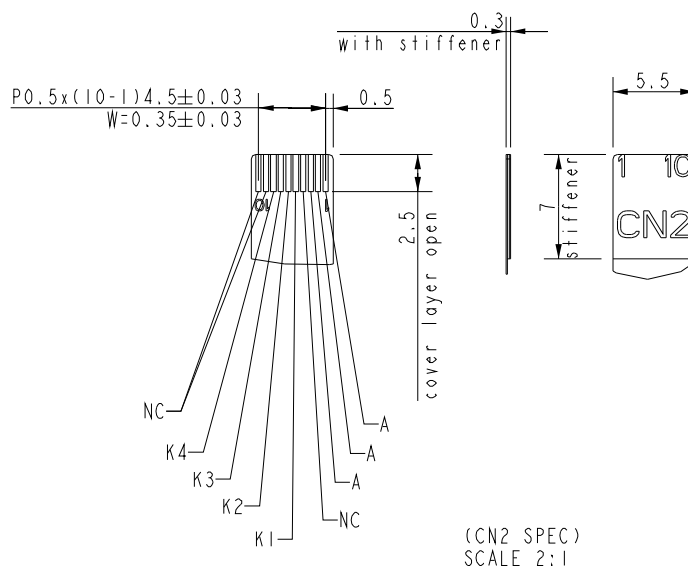
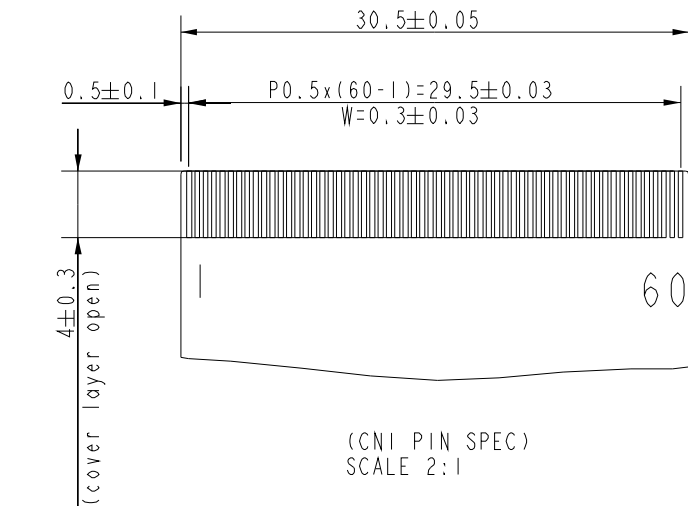
[Note]: General Tolerance =  $\pm 0.3$ mm

## 6.2 Rear Side



[Note]: General Tolerance =  $\pm 0.3\text{mm}$

### 6.3 connector detailed Figure



NOTES:

1. GENERAL TOLERANCE:  $\pm 0.3\text{mm}$
2. CN1 suggested connector(60 pin) : STARCONN 089N54-00R00-G21 or other compatible connectors
3. CN2 suggested connector(10 pin): STARCONN FR06-SIORIHF-2-E30001 or other compatible connectors



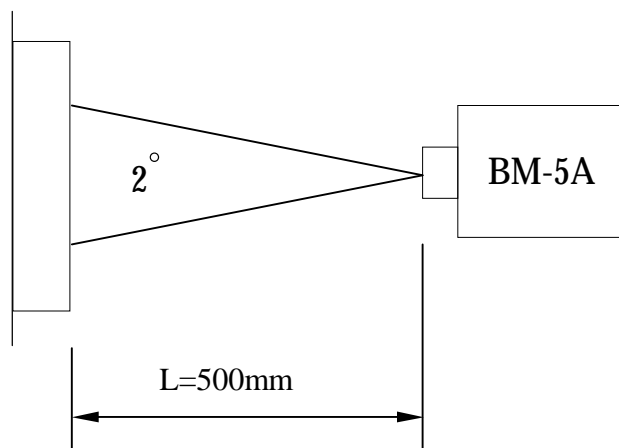
## 7. OPTICAL CHARACTERISTICS

Ta=25°C

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARKS
Contrast		CR	$\theta = \phi = 0^\circ$ Point-5	300	400	--	--	*1)
Luminance	Luminance (CEN)	Lw		400	500	--	cd/m <sup>2</sup>	*2)
	Luminance Uniformity	$\Delta L$		70	80	--	%	*2)
Response Time		Tr	$\theta = \phi = 0^\circ$	--	7	12	ms	*3) *5)
		Tf			13	18		
View angle	Horizontal		CR $\geq$ 10 Point-5	120	140	--	°	*4)
	Vertical			100	120	--	°	*4)
Color Coordinate	White	Wx Wy	$\theta = \phi = 0^\circ$ Point-5	0.273 0.289	0.313 0.329	0.353 0.369	--	*1)*2)*3)
	Red	Rx Ry		(0.583) (0.314)	(0.623) (0.354)	(0.663) (0.394)	--	
	Green	Gx Gy		(0.264) (0.599)	(0.304) (0.639)	(0.344) (0.679)	--	
	Blue	Bx By		(0.116) (0.000)	(0.156) (0.040)	(0.196) (0.080)	--	

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 , LED current=80mA , Inverter= EMAX PLCD0607101C(57kHz) , measuring after lighting on for 10 min .



\*2) Definition of contrast ratio :

Contrast Ratio (CR)= (White) Luminance of ON  $\div$  (Black) 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

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

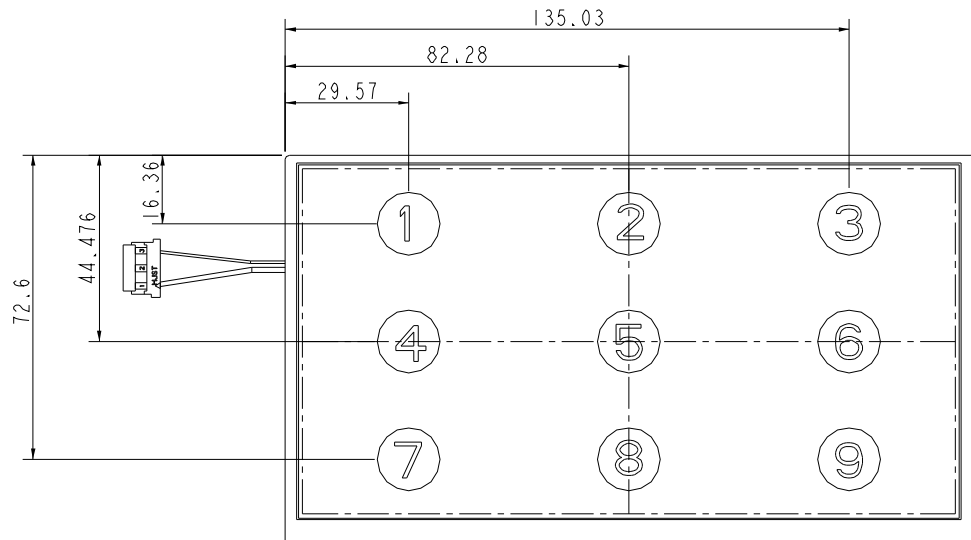


Fig8-1 Measuring point

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

These items are measured by EZ-CONTRAST(ELDIM) in the dark room. (no ambient light).

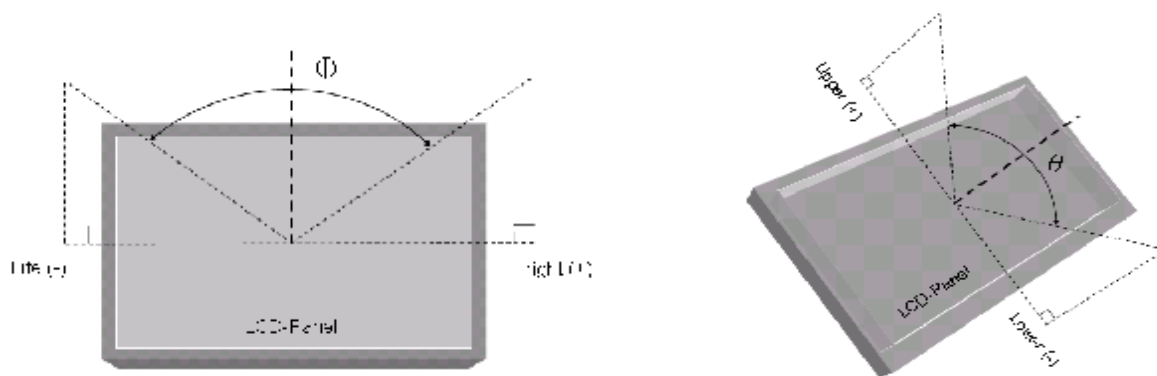


Fig8-2 Definition of Viewing Angle

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

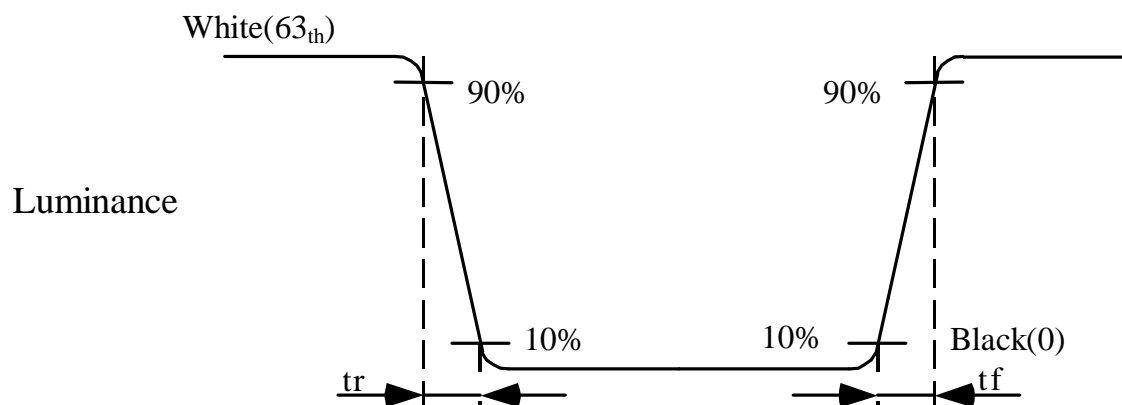


Fig8-3 Definition of Response Time(White-Black)

## 8. RELIABILITY TEST

### 8.1. Temperature and humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	85° C , 1000Hrs	
High Temperature Storage	90° C , 1000Hrs	
High Temperature High Humidity Operation	60° C , 90% RH, 1000Hrs	No condensation
Low Temperature Operation	-30° C , 1000Hrs	
Low Temperature Storage	-40° C ; 1000Hrs	
Thermal Shock	-30° C (1 hr)~85° C (1 hr), 500 CYCLE	

### 8.2. Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non-operation)	735m/s <sup>2</sup> (equal to 75G) 11msec 1/2 Sine wave,. ±X , ±Y , ±Z , each axis 3times.
Vibration (Non-operation)	15~60Hz 29.4m/s <sup>2</sup> (equal to 3G) 2mm XYZ 2hrs each axis

### 8.3 ESD

ITEM	CONDITION	NOTE
E S D	150pF , 330Ω , ±8KV&±15KV air & contact test	【Note1】
	200pF , 0Ω , ±200V contact test	【Note2】

【Note】

【Note1】 LCD glass and metal bezel ◦

【Note2】 IF connector pins ◦

### 8.4. 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 transformation of the module parts should be ignored.

Fail:No display image,obvious non-uniformity,or line defect.