



Chunghwa Picture Tubes, Ltd. Product Specification

Date : 2008/11/13

TFT LCD

CLAA070LC0DCW

ACCEPTED BY : (V0.2)

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1. OVERVIEW

CLAA070LC0DCW is 7" color TFT-LCD(Thin Film Transistor Liquid Crystal Display)module composed of LCD panel,driver ICs 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)	1.4W(Typ)
Outline Dimension(in mm)	165(W)×104(H)×4(D)
Weight(g)	110
BL unit	LED
Surface Treatment	Anti-Glare · Hardness:3H

2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Digital power voltage	VCC	-0.3	5	V	
Analog power voltage	AVDD	-0.3	12	V	
Gate On voltage	VGH	-0.3	40	V	
Gate Off voltage	VGL	-20	0.3	V	
Operation Temperature (environment)	T _{op}	-30	85	°C	*1)
Storage Temperature	T _{stg}	-40	95	°C	*1)
Forward Current (per LED)	I _f		25	mA	
Reverse Voltage (per LED)	VR		5	V	
Pulse forward current (per LED)	I _{fp}		100	mA	*2)

Note :

*1) If users use the product out off the environment operation range (temperature and humidity) ,it will concern for visual quality.

*2)I_{fp} Conditions : Pulse Width ≤ 10msec · Duty ≤ 1/10 ◦

3. ELECTRICAL CHARACTERISTICS

3.1TFT LCD Power Voltage

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	3.8	4.3	4.8	V	【Note1】
Gamma voltage	V1	-	9.357	-	V	
	V2	-	8.611	-	V	
	V3	-	7.54	-	V	
	V4	-	7.175	-	V	
	V5	-	6.882	-	V	
	V6	-	6.686	-	V	
	V7	-	5.226	-	V	
	V8	-	4.961	-	V	
	V9	-	4.184	-	V	
	V10	-	2.964	-	V	
	V11	-	2.471	-	V	
	V12	-	1.882	-	V	
	V13	-	0.731	-	V	
	V14	-	0.657	-	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

3.2TFT-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		-	412.5	537	mW	【Note1】

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

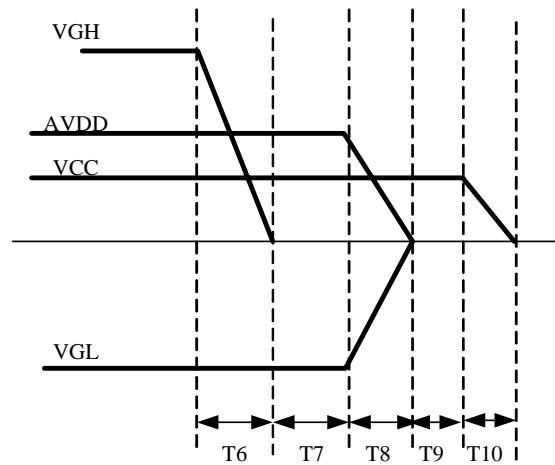
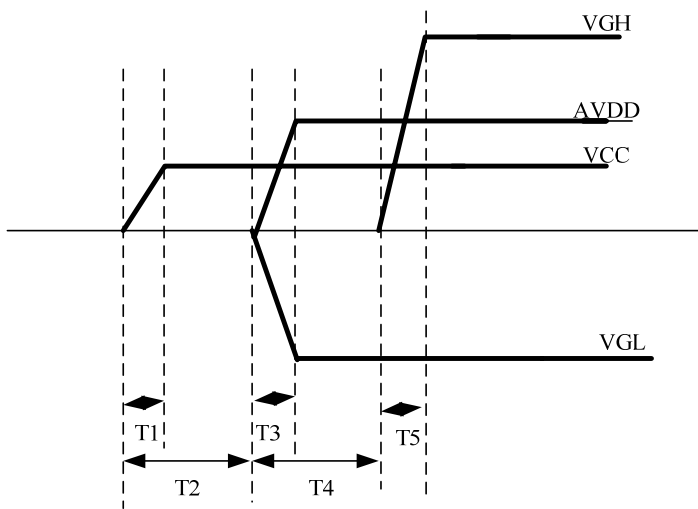


· · (a)64 Gray Pattern · · · · · (b)Black Pattern · · · ↵

3.3 Power · Signal sequence

Power On : VCC→AVDD/VGL→VGH→Data

Power Off : Data→VGH→AVDD/VGL→VCC



T1 ≤ 10ms
 T2 ≤ 20ms
 T3 ≤ 10ms
 T4 ≤ 20ms
 T5 ≤ 10ms

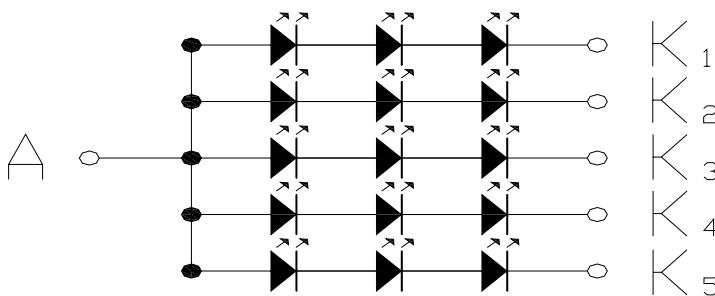
T6 ≤ 10ms
 T7 ≤ 10ms
 T8 ≤ 10ms
 T9 ≤ 10ms
 T10 ≤ 10ms

3.4 Back Light

(Ta=25°C)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
LED current	IL	--	20	--	mA	Note 1
LED voltage	VL	9.3	9.9	10.5	V	Note 4
Power consumption	WL	--	0.99	--	W	Note 1

Note 1 : The LED driving condition is defined for each LED module. (3 LED Serial)



*2) A : Anode(+) · K : Cathode(-)

*3) LED control suggested fixed current

*4) The LED supply voltage is defined by the number of LED at Ta=25°C and IL=20 mA. °

4. INTERFACE CONNECTION**4.1 CN1**

Pin NO.	SYMBOL	DESCRIPTION
1	VCOM	Common Voltage
2	XON	Output all-on control
3	DIO1	Horizontal start Pulse Signal I/O
4	VCC(S)	Power Supply for Digital Circuit of Source IC
5	CLK	Horizontal Clock
6	SHL	Select Left / Right Shift
7	D00	Red Data (LSB)
8	D01	Red Data
9	D02	Red Data
10	D03	Red Data
11	D04	Red Data
12	D05	Red Data (MSB)
13	D10	Green Data (LSB)
14	D11	Green Data
15	D12	Green Data
16	D13	Green Data
17	D14	Green Data
18	D15	Green Data (MSB)
19	AVDD(S)	Power Supply for Analog Circuit
20	VR1	Gamma Voltage Level 1
21	VR 2	Gamma Voltage Level 2
22	VR 3	Gamma Voltage Level 3
23	VR 4	Gamma Voltage Level 4
24	VR 5	Gamma Voltage Level 5
25	VR 6	Gamma Voltage Level 6
26	VR 7	Gamma Voltage Level 7
27	VR 8	Gamma Voltage Level 8
28	VR 9	Gamma Voltage Level 9
29	VR 10	Gamma Voltage Level 10
30	VR 11	Gamma Voltage Level 11
31	VR 12	Gamma Voltage Level 12
32	VR 13	Gamma Voltage Level 13
33	VR 14	Gamma Voltage Level 14
34	AVSS(S)	Power Ground
35	D20	Blue Data (LSB)
36	D21	Blue Data
37	D22	Blue Data
38	D23	Blue Data
39	D24	Blue Data
40	D25	Blue Data (MSB)
41	LD	Latch The Polarity of Output and Switch The New Data to Output
42	REV	Control Signals are Inverted or not
43	POL	Polarity Selection
44	GND(S)	Power Ground
45	DIO2	Horizontal start Pulse Signal I/O
46	OEV	Output Enable
47	UD	Up / Down Control Pin
48	VCLK	Vertical Clock
49	STVU	Vertical start Pulse Signal I/O
50	STVD	Vertical start Pulse Signal I/O
51	VDDG	Gate ON Voltage
52	VEEG	Gate OFF Voltage
53	VCC(G)	Power Supply for Digital Circuit of Gate IC
54	GND(G)	Power Ground

Remarks :

1) GND Pin must connection to ground.

2) SHL : Select left or right

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

3) UD : Shift up or down control

UD	STVD	STVU	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 (Back light)

Pin No.	SYMBOL	FUNCTION
10	+	Power input-side positive
5~9	-	Power input-side negative
1~4	-	Dummy

Note : LED power out-put-side connector : FH19SC-10S-0.5SH (HIROSE)

5. INPUT SIGNAL(DE ONLY MODE)

5.1 Timing Specification

Horizontal Timing Specification

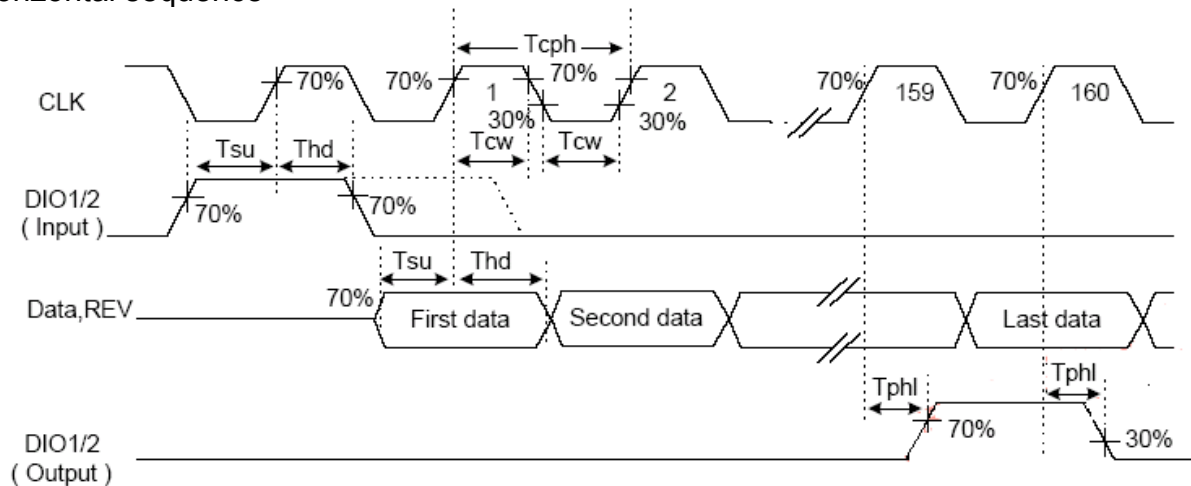
ITEM	SYMBOL	SPEC			UNIT
		Min	Typ	Max	
CLK Frequency	1/Tcph	25	27	32	MHz
CLK Pulse Width	Tcw	6	-	-	ns
Data Set-up Time	Tsu	4	-	-	ns
Data Hold Time	Thd	2	-	-	ns
Propagation Delay of DIO2/1	Tphl	6	10	15	ns
Time That The Last Data to LD	Tld	1	-	-	Tcph
Pulse Width of LD	Twd	2	-	-	Tcph
Time That LD to DIO1/2	Tlds	5	-	-	Tcph
POL Set-up Time	Tpsu	6	-	-	ns
POL Hold Time	Tphd	6	-	-	ns

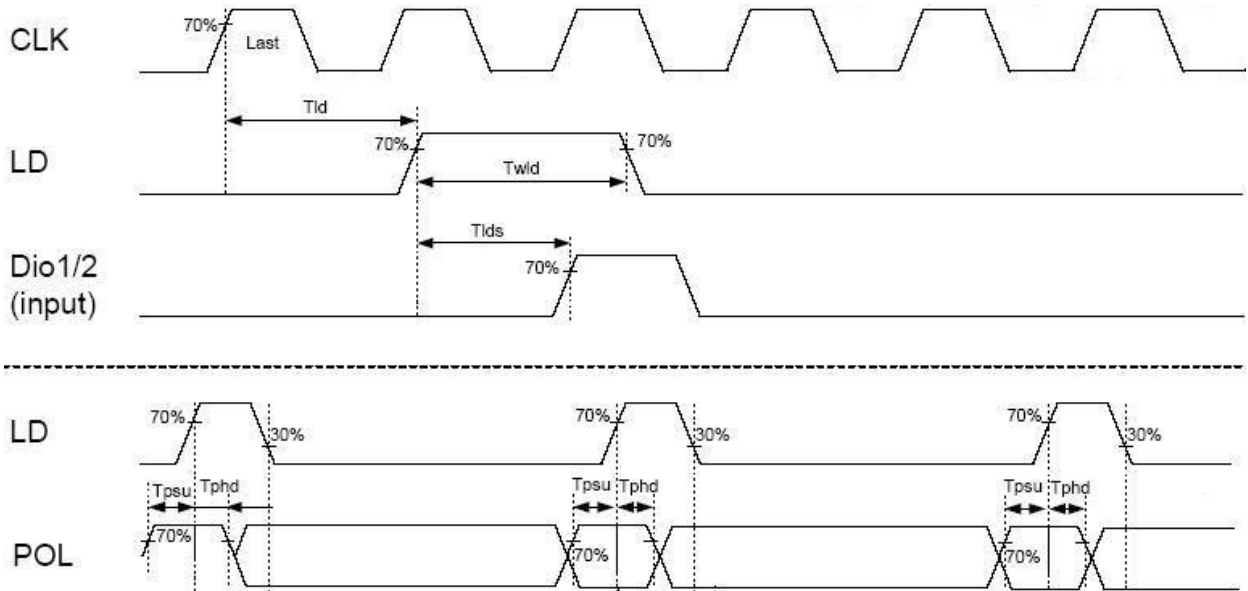
Vertical Timing Specification

ITEM	SYMBOL	SPECIFICATION			UNIT
		Min	Typ	Max	
VCLK Frequency	1/Tcpv	-	-	200	KHz
VCLK Pulse Width	Tcpvh	2.5	-	-	µs
STVD/STVU Set-up Time	Tsu	200	-	-	ns
STVD/STVU Hold Time	Thd	300	-	-	ns
Output Enabled pulse width	Twoe	1	-	-	us

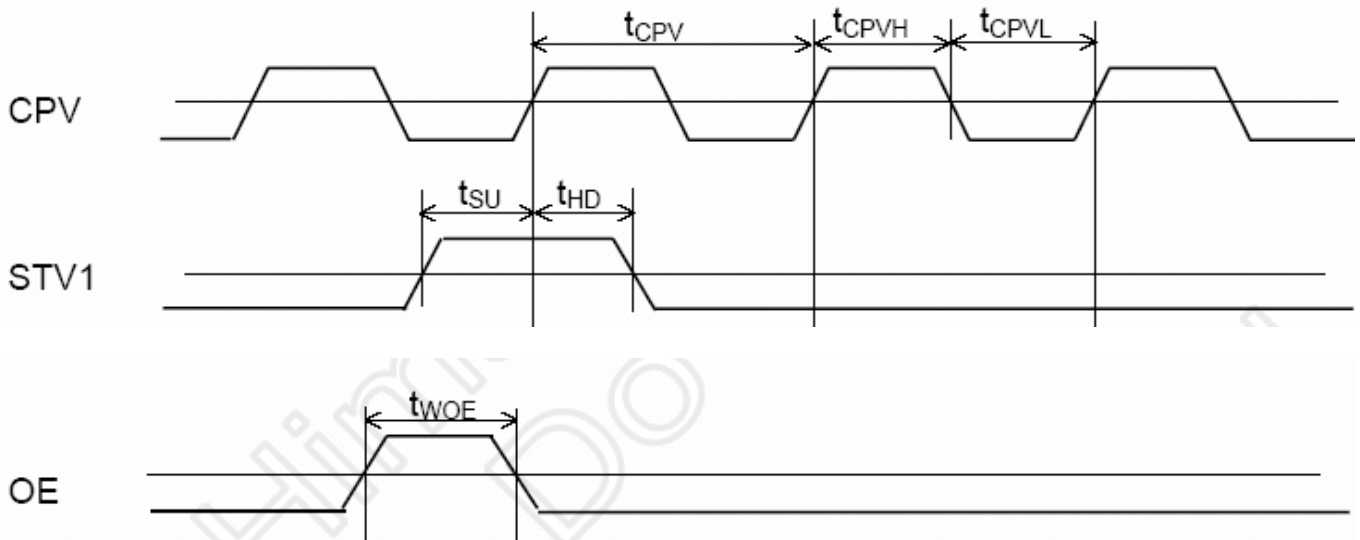
5.2 Timing sequence(Timing chart)

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

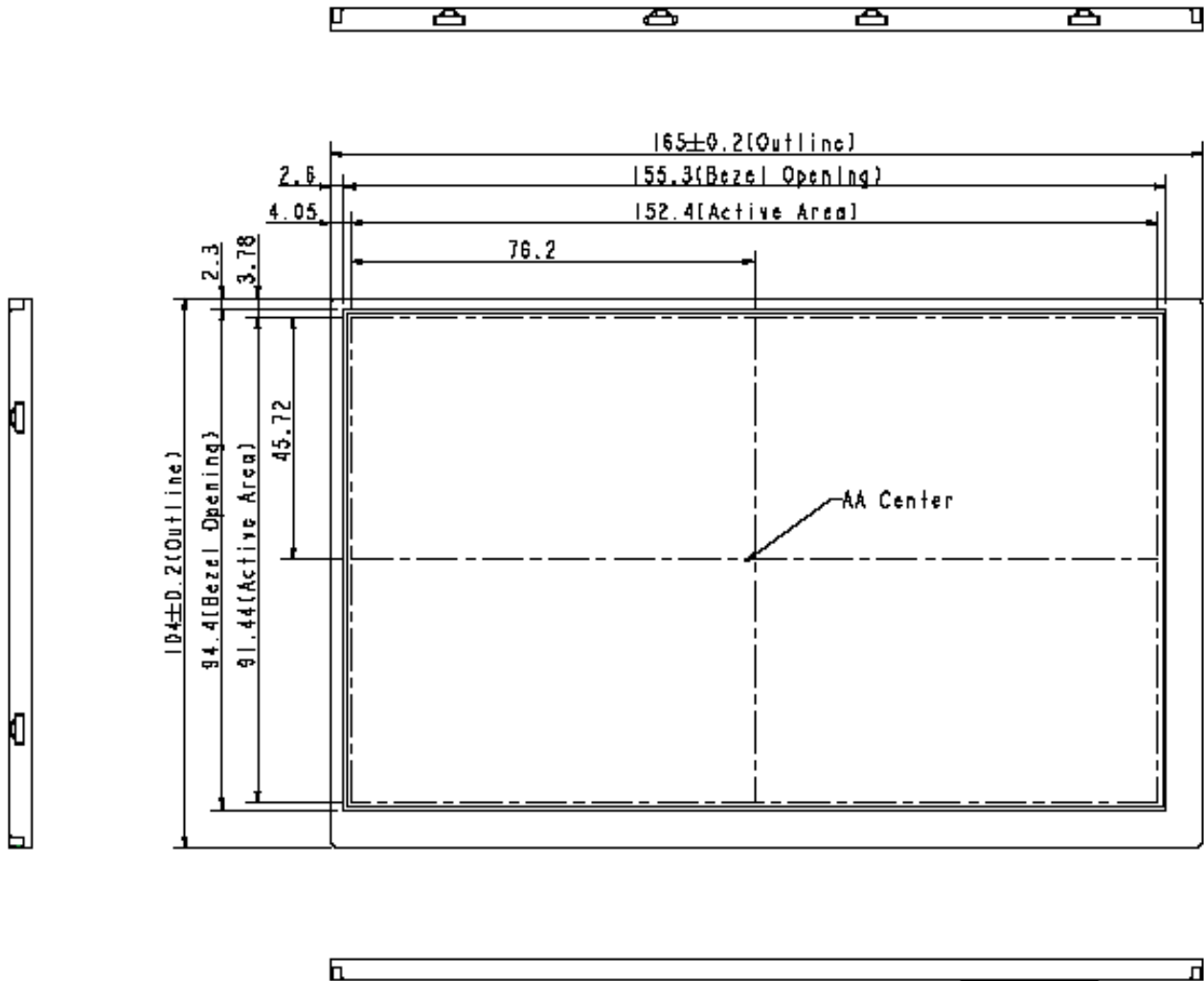
The more n value is, the bright Gray Scale.

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

6. MECHANICAL DIMENSION

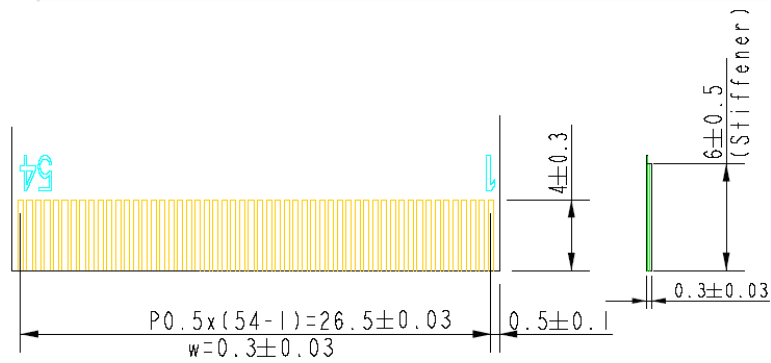
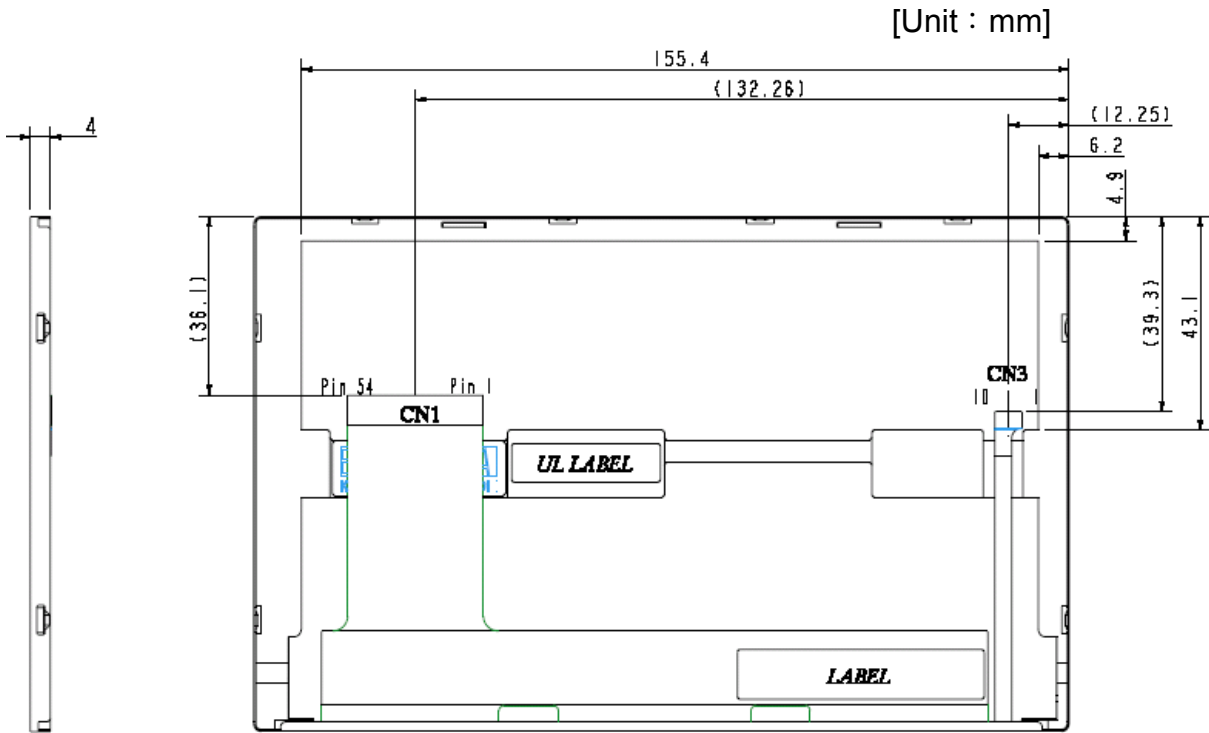
6.1 Front Side

[Unit : mm]

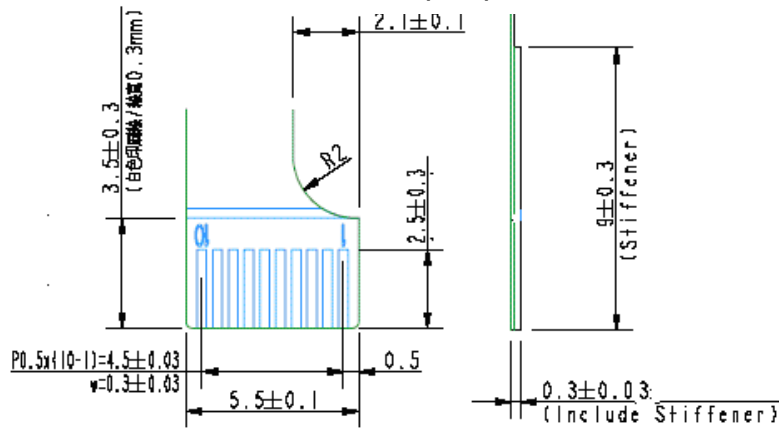


Remark : Un-indication tolerance is ± 0.5 mm

6.2 Rear Side



FPC DIM.(CN1)



FPC DIM.(CN3)

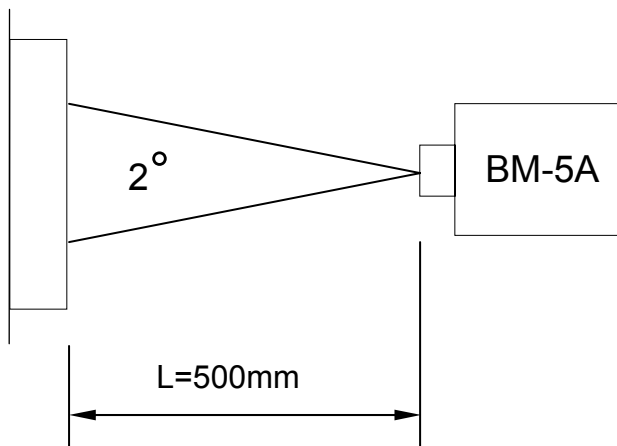
Remark : Un-indication tolerance is ±0.5mm

7. 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 \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	--	*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) Measure condition : 25°C \pm 2°C , 60 \pm 10%RH , under 10 Lux in the dark room. BM-5A (TOPCON) , view angle 2° , IL=20 mA (Backlight current) , test the panel after turning on 10 minute ago.



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

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

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

Measure white luminance on the point 5 as figure 7-1

Definition of Luminance Uniformity:

Measure white luminance on the point 1~9 as figure 7-1

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

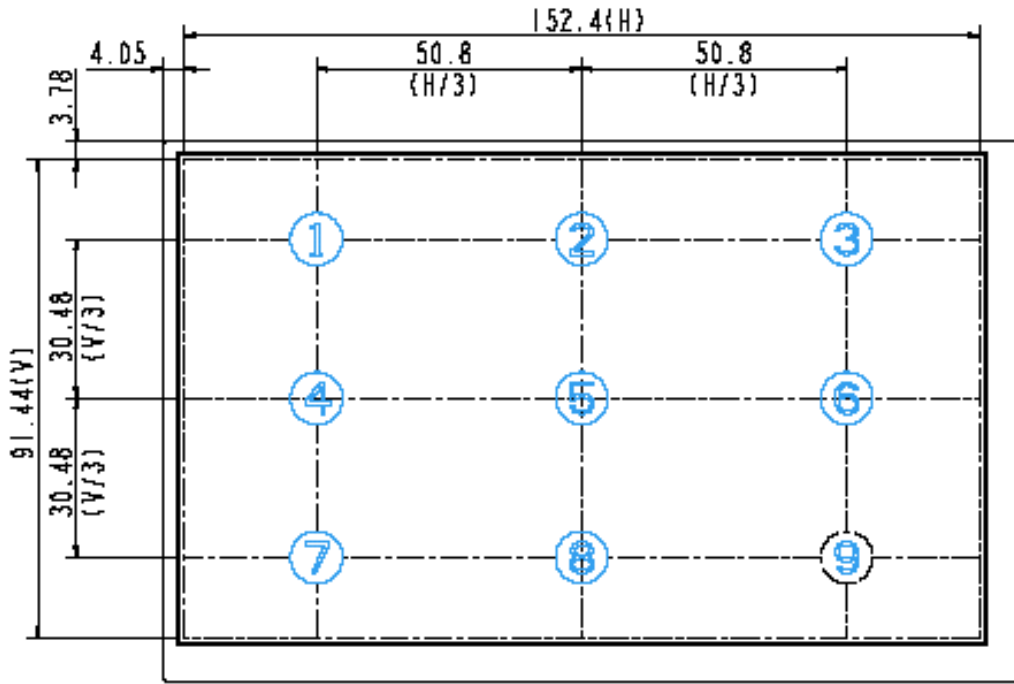


Fig7-1 Measuring point

*4) Definition of Viewing Angle(θ, ψ), refer to Fig7-2 as below : (in the dark room.EZ-CONTRAST (ELDIM))

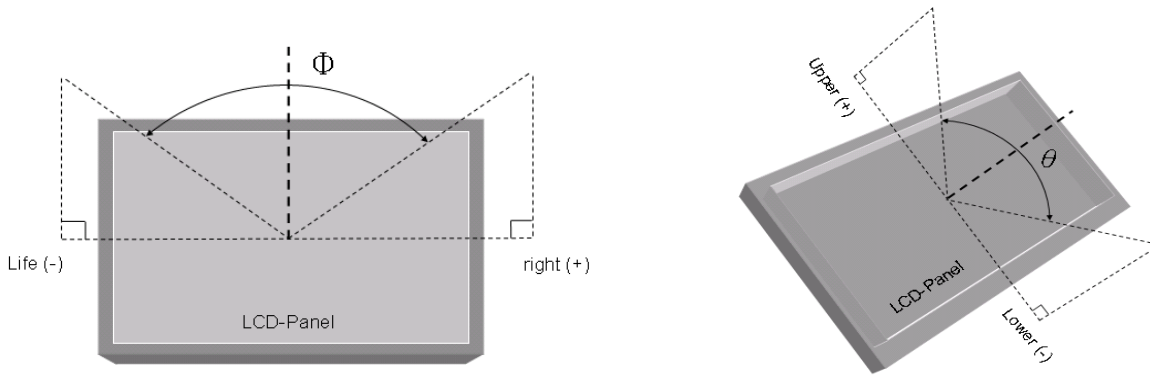


Fig7-2 Definition of Viewing Angle

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

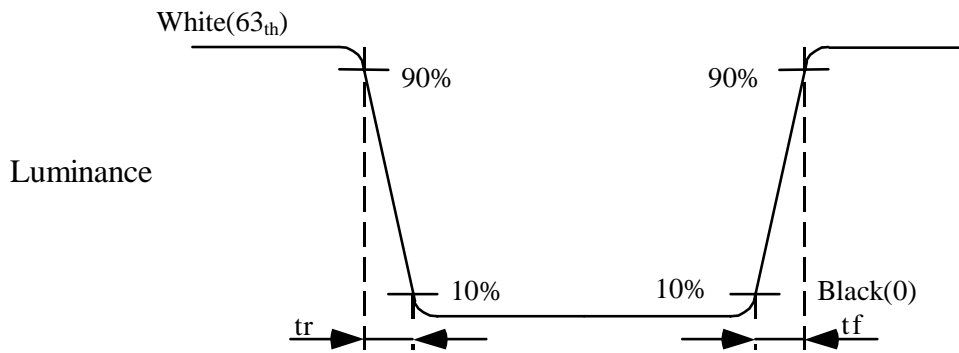


Fig7-3 Definition of Response Time(White-Black)

8. RELIABILITY TEST

8.1. 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

8.2. 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 ● Stroke:1.3mm ● Vibration:sinusoidal wave,perpendicularaxis(both x,z,axis:2Hrs,y axis:4Hrs). ● Sweep:2.9G,33.3Hz-400Hz ● Cycle:15min

8.3 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 transformation of the module parts should be ignored.

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