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Chunghwa Picture Tubes, Ltd.

Product Specification

To :
Date : 110317

TFT LCD
CLAA048LA12CE

ACCEPTED BY : (V0.5)

APPROVED BY	CHECKED BY	PREPARED BY
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1. OVERVIEW

CLAA048LA12CE is 4.8" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, LVDS driver ICs, control circuit, Directional backlight. By applying 6 bit digital data, 800×RGB×480 (2D / 3D mode), 262K-color images are displayed on the 4.8" diagonal screen.

General specification are summarized in the following table:

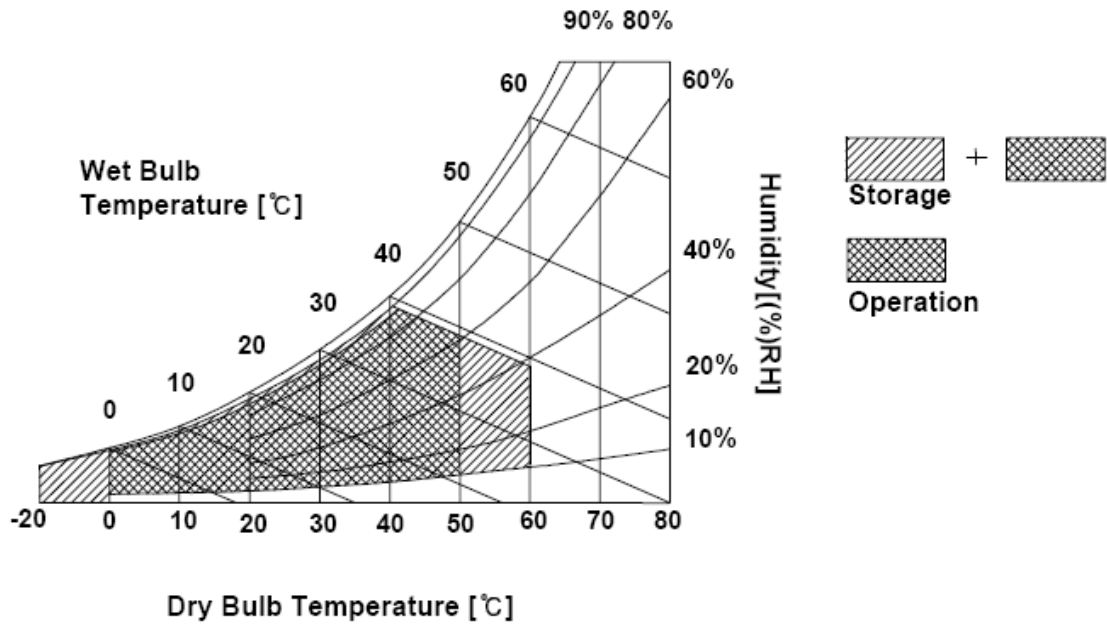
ITEM	SPECIFICATION
Display Area	103.8 (H) x 62.28 (V) (mm) (4.8-inch diagonal)
Number of Pixels	2D Mode : 800 ×3(H)×480 (V) 3D Mode : 800 ×3(H)×480 (V)
Pixel Pitch	0.12975(mm)*0.12975 (mm)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white
Number of Colors	262,144(6bits)
Signal Interface	LVDS
Gamut	45%
Optimum Viewing Angle	6 o'clock
Response Time	8ms (Typ)
Surface Treatment	HC
Viewing Angle	140° (H)/120°(V)
Brightness	3D Mode : 200nit(Typ.) 2D Mode : 200nit(Typ.)
2D/3D Switch-able	Yes
3D Optimum Viewing Distance	40
Consumption of Power	TBD
Module Size	136.3 (W)x74.6(H)x7(D) ±0.3(W comp)
Module Weight	76g (Typ)

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
Power Supply Voltage	V_{CC}	-0.3	4.0	Vdc	At $25 \pm 5^\circ\text{C}$
LED Driving Circuit Power Supply	V_{LED}	-0.3	7.0	Vdc	At $25 \pm 5^\circ\text{C}$
Operating Temperature	T_{op}	0	50	$^\circ\text{C}$	1
Storage Temperature	T_{stg}	-20	60	$^\circ\text{C}$	1

Note : 1. Temperature and relative humidity range are shown in the figure below.
 Wet bulb temperature should be 39°C Max, and no condensation of water.



3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD Power Voltage

Ta=25°C

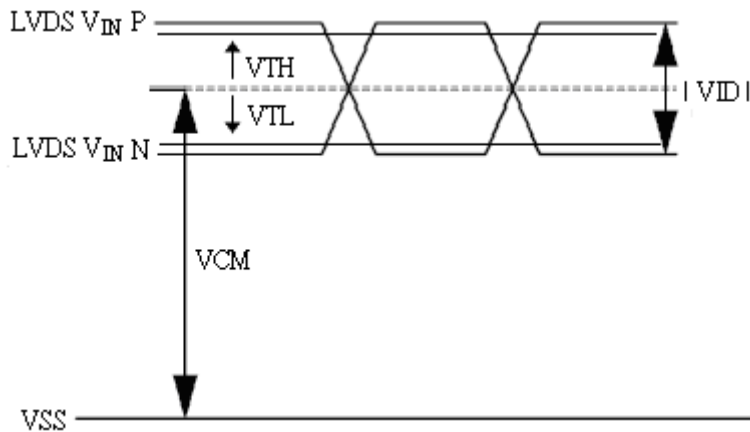
Item	Symbol	Min.	Typ	Max.	Unit	Note	
Power Supply Voltage For LCD	V _{CC}	3.0	3.3	3.6	V		
Power Supply Voltage For LED Driver	V _{LED}	4.5	5	5.5	V		
Differential Impedance	Z _m	90	100	110	Ohm	【Note 1】	
Logic Input Voltage (LVDS:IN+,IN-)	Common Mode Voltage	V _{CM}	1.125	1.25	1.375	V	【Note 2】
	Differential Input Voltage	VID	250	350	450	mV	【Note 2】
	Threshold Voltage(high)	V _{TH}	-	-	100	mV	【Note 2】
	Threshold Voltage(low)	V _{TL}	-100	-	-	mV	【Note 2】
PWM Input Voltage	Input Voltage(high)	V _{IH}	3.0	3.3	V		
	Input Voltage(low)	V _{IL}	GND	0.3	V		

Remarks :

【Note1】

This impedance value is needed to proper display and measured from LVDS Tx to the mating connector.

【Note2】 LVDS signal



$$|VID| = |V_{TH} - V_{TL}|$$

$$V_{CM} = (V_{TH} + V_{TL})/2$$

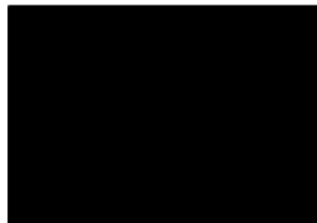
3.2 TFT-LCD Current Consumption

Ta = 25°C

Item	Symbol	Min.	Typ	Max.	Unit	Note
LCD Power Current	I _{CC}	--	250	300	mA	【Note1】
LED Power Current	I _{LED}	--	TBD	TBD	mA	【Note2】

【Note1】

Typical: Under 64 gray pattern
 Maximum: Under black pattern

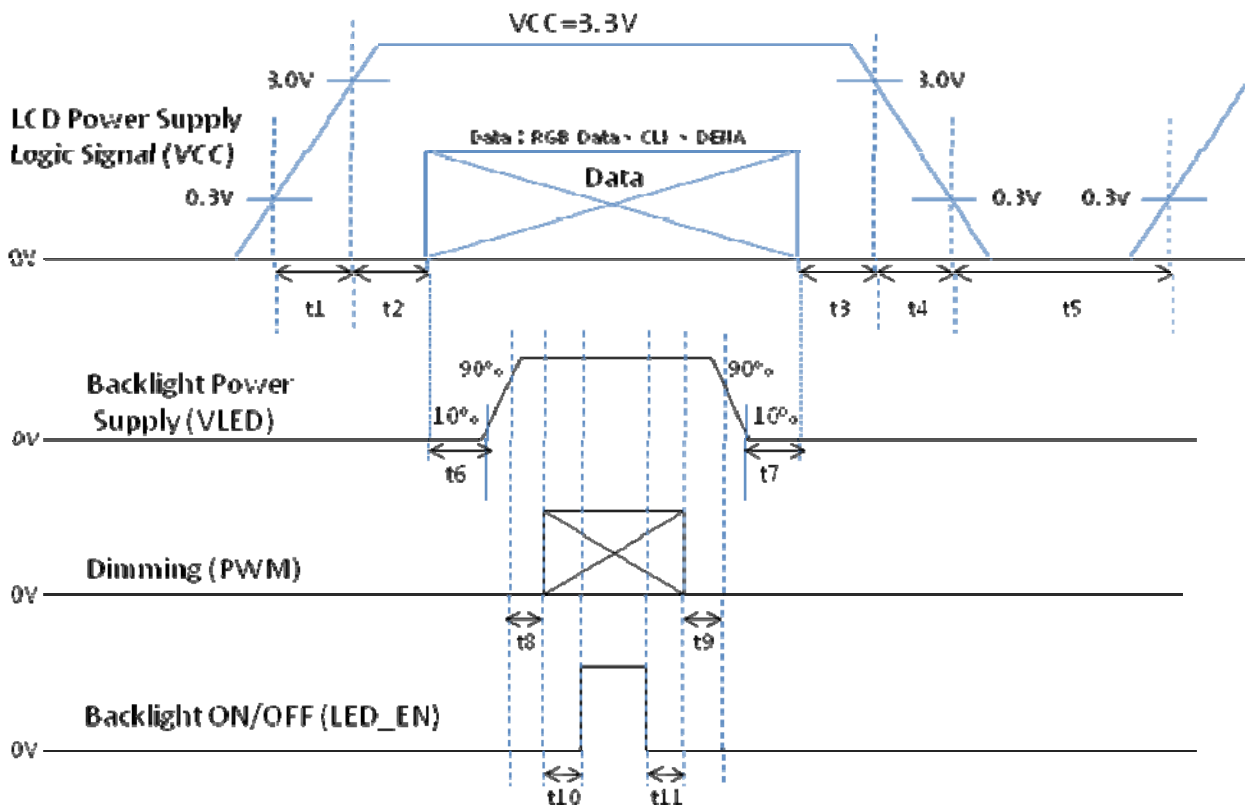


·· (a)64-Gray-Pattern······ (b)Black-Pattern····

【Note2】

Typical: When VLED is 5V
 Maximum: When VLED is 4.5V
 PWM high pulse is TBD %

3.3 Power · Signal sequence



- 0.5 < t1 ≤ 10ms
- 0 < t2 ≤ 50ms
- 0 < t3 ≤ 50ms
- 0 < t4 ≤ 10ms
- 200ms ≤ t5
- 200ms ≤ t6
- 200ms ≤ t7
- 10ms ≤ t8
- 10ms ≤ t9
- 10ms ≤ t10
- 0ms ≤ t11

4. INTERFACE CONNECTION

4.1 Connector

Connector type : JAE/FI-JH30SB-HF10-R3000

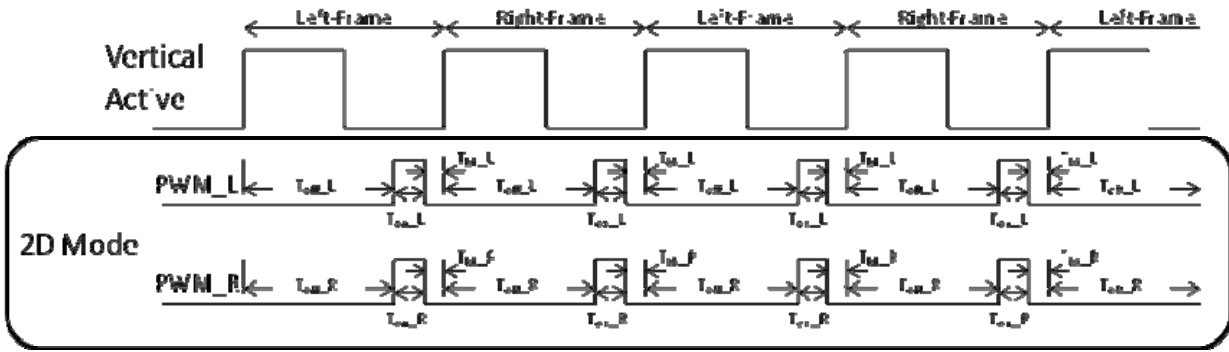
Pin No.	SYMBOL	FUNCTION
1	GND	Ground
2	V _{CC}	+3.3V Power
3	V _{CC}	+3.3V Power
4	NC	NC (Please let it floating for CPT test only)
5	NC	NC (Please let it floating for CPT test only)
6	NC	NC (Please let it floating for CPT test only)
7	NC	NC (Please let it floating for CPT test only)
8	RXIN0-	LVDS Signal(-)—channel 0
9	RXIN0+	LVDS Signal(+)—channel 0
10	GND	Ground
11	RXIN1-	LVDS Signal(-)—channel 1
12	RXIN1+	LVDS Signal(+)—channel 1
13	GND	Ground
14	RXIN2-	LVDS Signal(-)—channel 2
15	RXIN2+	LVDS Signal(+)—channel 2
16	GND	Ground
17	RXCLKIN-	LVDS Clock Signal(-)
18	RXCLKIN+	LVDS Clock Signal(+)
19	GND	Ground
20	NC	NC (Please let it floating for CPT test only)
21	VLED	Power Supply for LED(V _{LED} = 5V)
22	VLED	Power Supply for LED(V _{LED} = 5V)
23	GND	Ground
24	NC	NC (Please let it floating for CPT test only)
25	PWM_L	BL Control enable pin for 3D operating (Left)
26	PWM_R	BL Control enable pin for 3D operating (Right)
27	NC	NC (Please let it floating for CPT test only)
28	NC	NC (Please let it floating for CPT test only)
29	NC	NC (Please let it floating for CPT test only)
30	NC	NC (Please let it floating for CPT test only)

【Note】

- 1) GND Pin must be connected to ground. Don't be floating.
- 2) NC Pin must be floating.
- 3) PWM signal=0~3.3V, operation frequency : 2D mode : 120Hz // 3D mode : 60Hz.

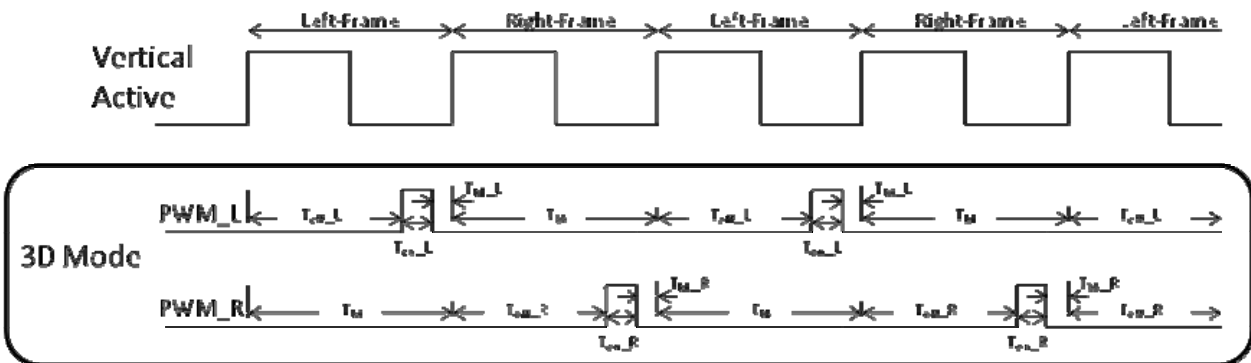
A. 2D Mode timing

ITEM	SYMBOL	200 nit	400 nit	UNIT
2D Mode LED Timing	T _{off_L}	5.93	TBD	msec
	T _{off_R}	5.93	TBD	msec
	T _{on_L}	2.4	TBD	msec
	T _{on_R}	2.4	TBD	msec
	T _{bk_L}	0	0	msec
	T _{bk_R}	0	0	msec
	T _{bk}	8.33	8.33	msec



B. 3D Mode timing

ITEM	SYMBOL	200 nit	UNIT
2D Mode LED Timing	T_{off_L}	5.93	msec
	T_{off_R}	5.93	msec
	T_{on_L}	2.4	msec
	T_{on_R}	2.4	msec
	T_{bk_L}	0	msec
	T_{bk_R}	0	msec
	T_{bk}	8.33	msec



5. INPUT SIGNAL(DE ONLY MODE)

5.1 Timing Specification

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	
LCD Timing	Frame Rate		-	120		Hz	
	DCLK		Frequency	f_{CLK}	86.03		MHz
	DENA	Horizontal	Horizontal total time	t_H	870		t_{CLK}
			Horizontal Active time	t_{HA}	800		t_{CLK}
			Horizontal Blank time	t_{HB}	70		t_{CLK}
	Vertical	Vertical	Vertical total time	t_V	824		t_H
			Vertical Active time	t_{VA}	480		t_H
Vertical Blank time			t_{VB}	344		t_H	

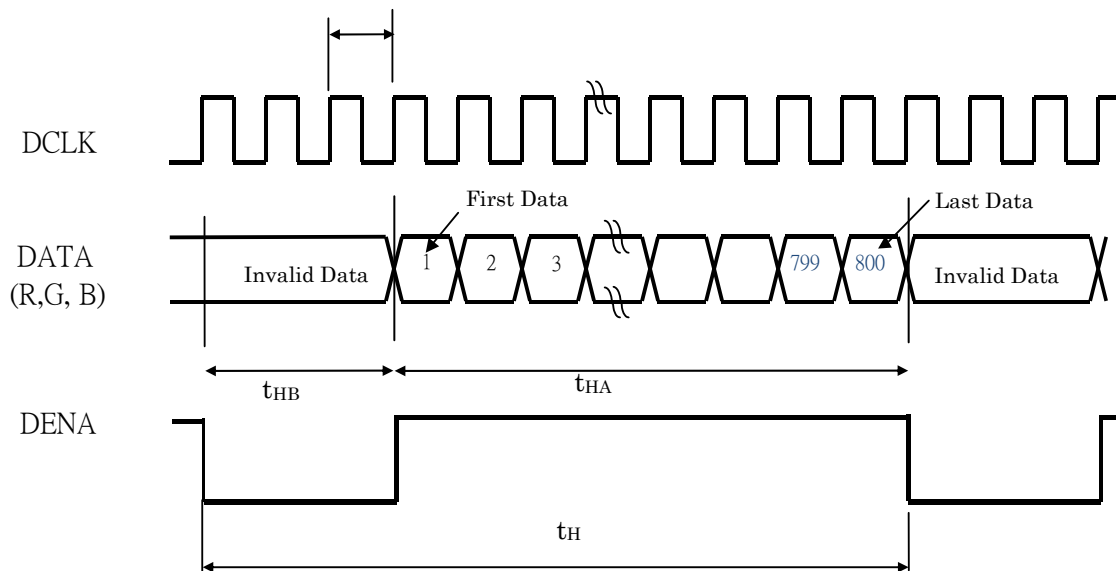
【Note】

*1) DENA (DATA ENABLE) usually is positive.

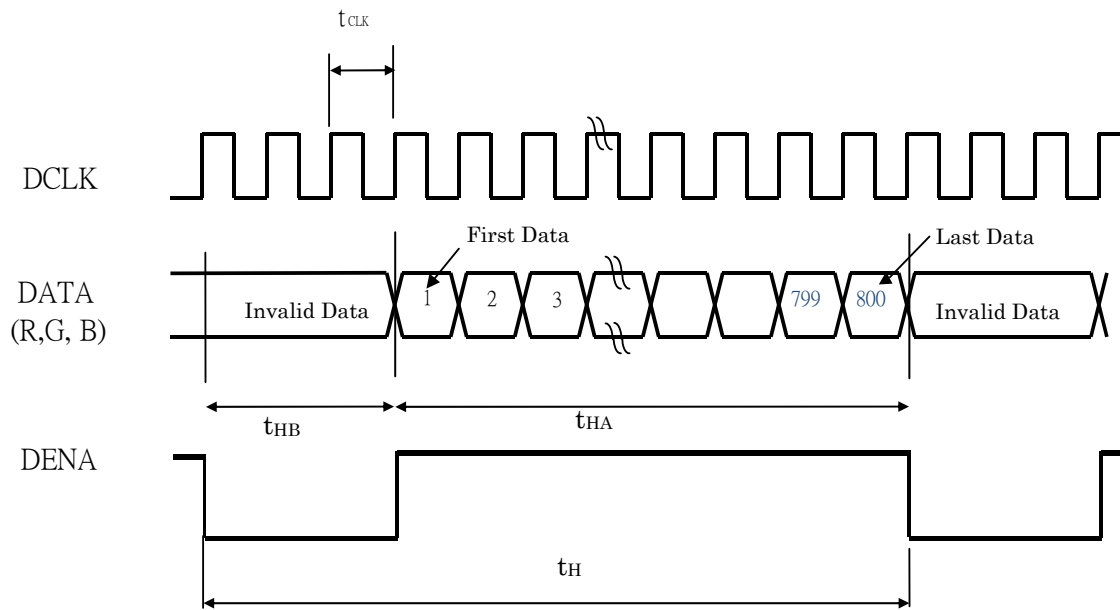
*2) During the whole blank period, DCLK should keep input.

5.2 Timing sequence (Timing chart)

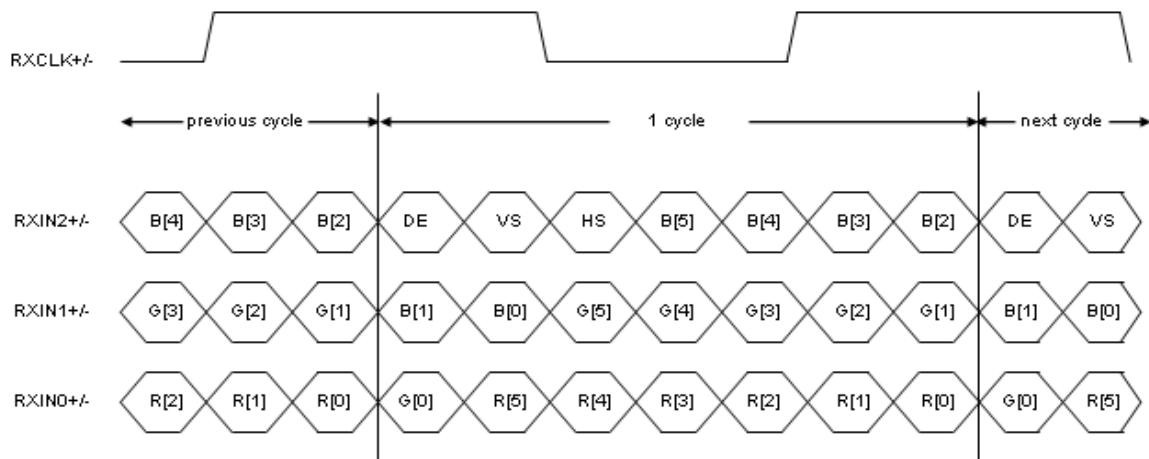
5.2.1 Horizontal Timing Sequence



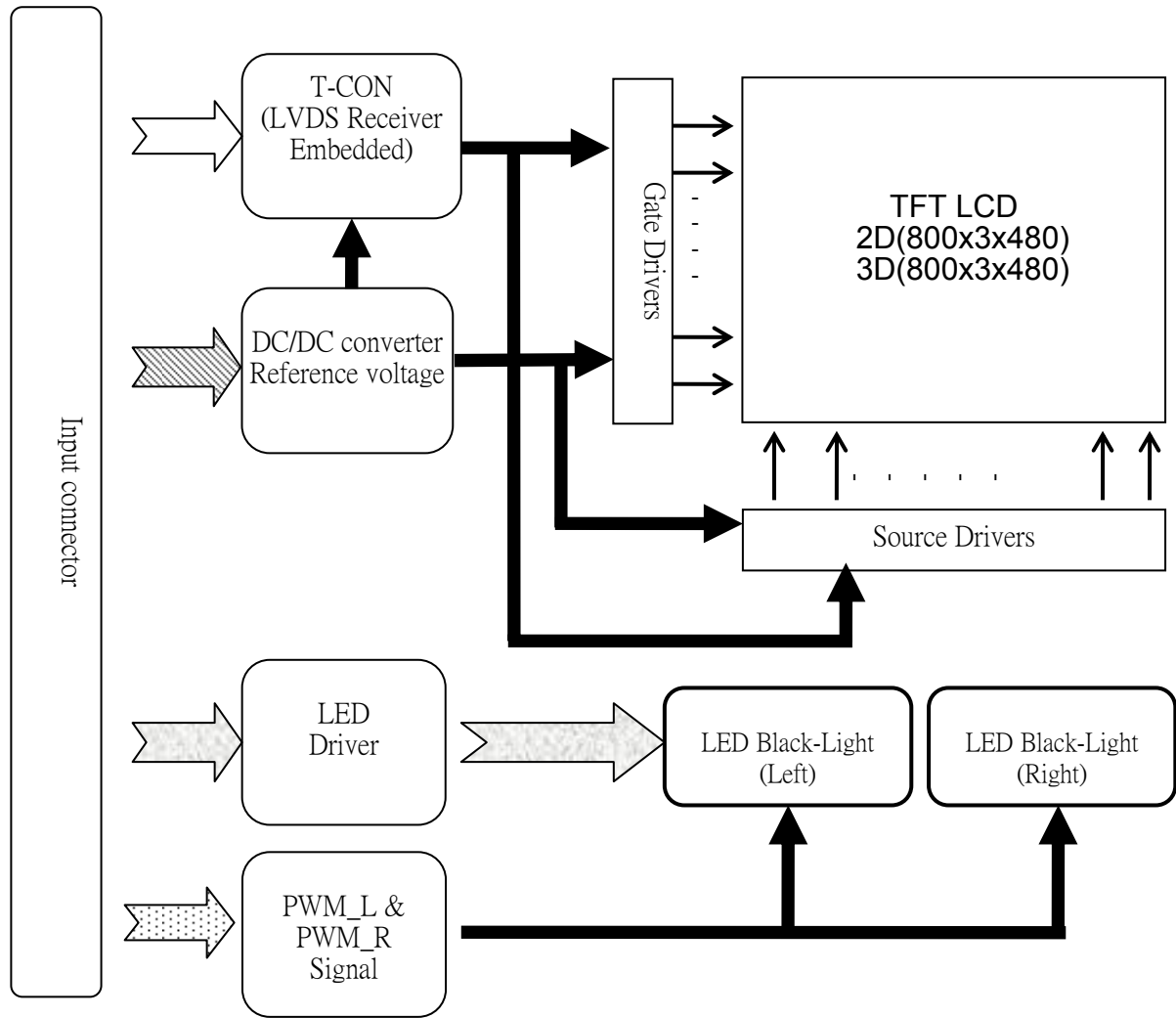
5.2.2 Vertical Timing Sequence



5.2.3 LVDS Input Data mapping

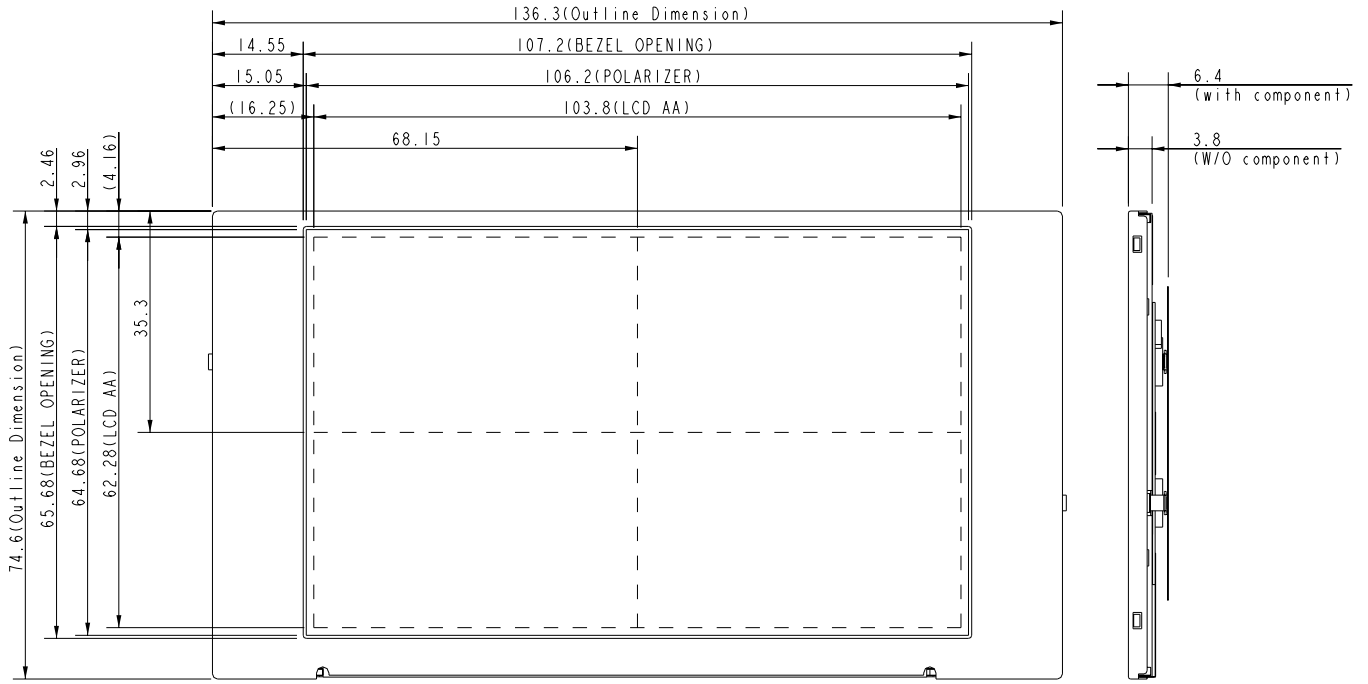


6. BLOCK DIAGRAM



7. MECHANICAL DIMENSION

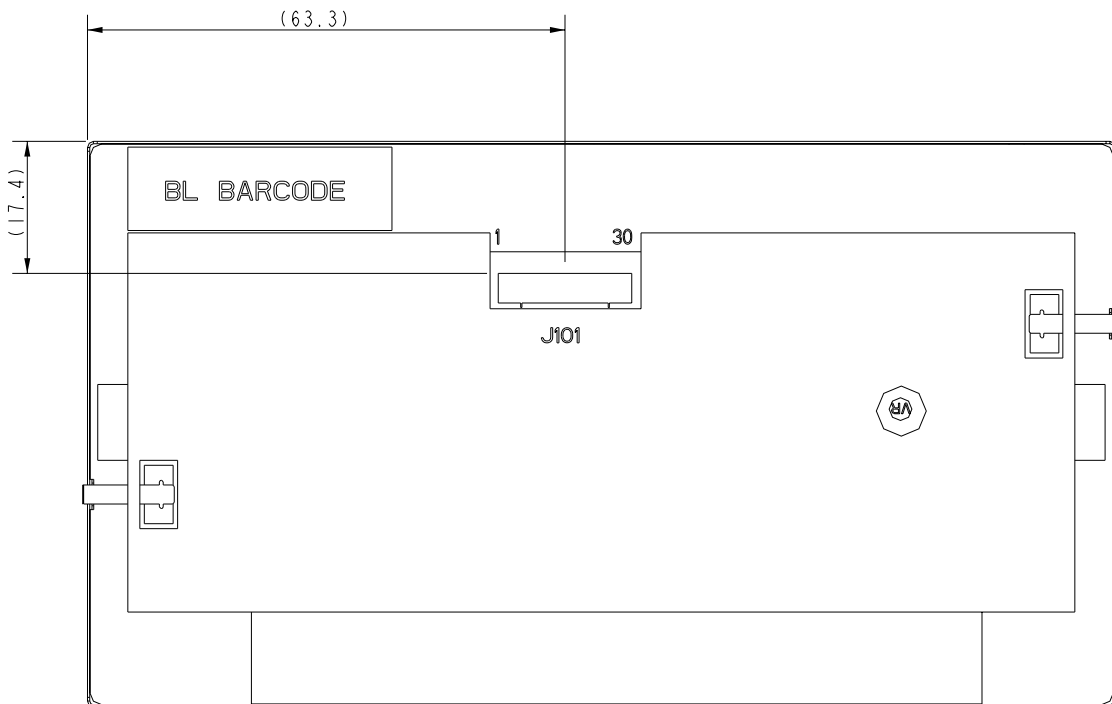
7.1 Front Side



[Note] : Tolerance is $\pm 0.3\text{mm}$ unless noted

[Unit : mm]

7.2 Rear Side



NOTE:
 1. General tolerance $\pm 0.3\text{mm}$
 2. J101: STARCONN 107H30-A000RA-G3

[Note] : Tolerance is $\pm 0.3\text{mm}$ unless noted

[Unit : mm]

8. OPTICAL CHARACTERISTICS

Ta = 25°C, V_{CC} = 3.3V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remarks
Contrast Ratio	CR	Point-5		400		--	Note 3
Luminance(CEN)-2D Mode	Lw(2D)	Point-5		200		cd/m ²	
Luminance(CEN)-3D Mode	Lw(3D)	Point-5		200		cd/m ²	
Luminance Uniformity(9P)	ΔL	θ=ψ= 0°	TBD	TBD	--	%	Note 4
Response Time (White - Black)	Tr +Tf	Point-5		8		ms	Note 5
NTSC		-	Point-5	45		%	
Viewing Angle	Horizontal		CR ≥ 10 Point-5	140		°	Note 6
	Vertical			120		°	
Color Coordinate	White	Wx Wy	Point-5	0.29±0.02 0.29±0.02		--	
	Red	Rx Ry		0.57±0.02 0.31±0.02			
	Green	Gx Gy		0.33±0.02 0.57±0.02			
	Blue	Bx By		0.16±0.02 0.10±0.02			

Note 1. Ambient condition : 25°C ± 2°C , 60 ± 10%RH , under 10 Lux in the darkroom .
Lighting the LCM and measuring after 10 minutes.

Note 2. Measure device : BM-5A (TOPCON) , viewing cone=1° , V_{CC}=3.3V , f_V =60HZ, f_{CLK} =27HZ, I_{Led}=110.0mA .

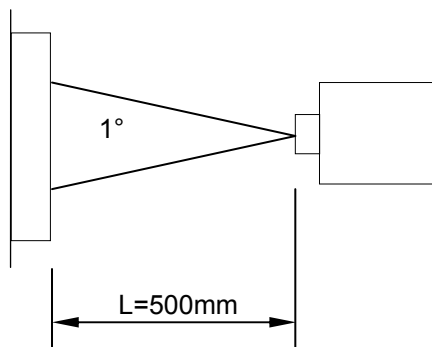


Fig.8-1 viewing cone=1°

Note 3. Definition of Contrast Ratio :

$$CR = \text{White Luminance (ON)} / \text{Black Luminance (OFF)}$$

Note 4. Definition of Luminance Uniformity : $\Delta L = L(\text{MIN}) / L(\text{MAX}) \times 100\%$

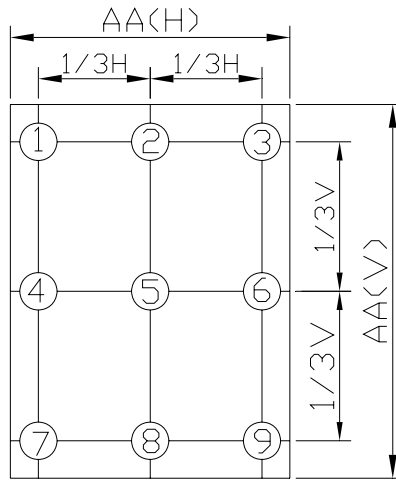


Fig.8-2 Measuring point

Note 5. Definition of response time : The response time is defined as the time interval between the 10% and 90% amplitudes.

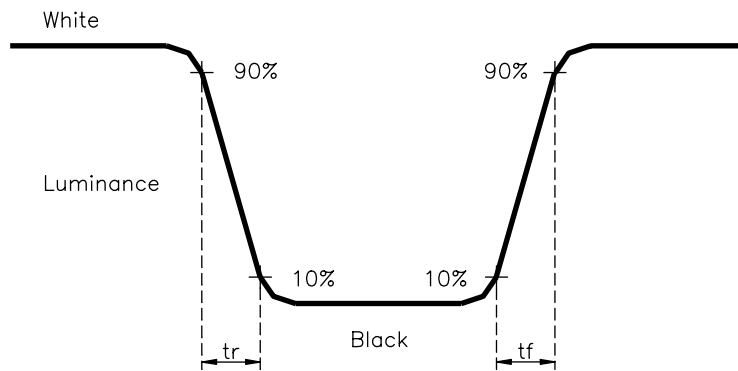


Fig.8-3 Definition of Response Time (White - Black)

Note 6. Definition of view angle(θ , ψ) :

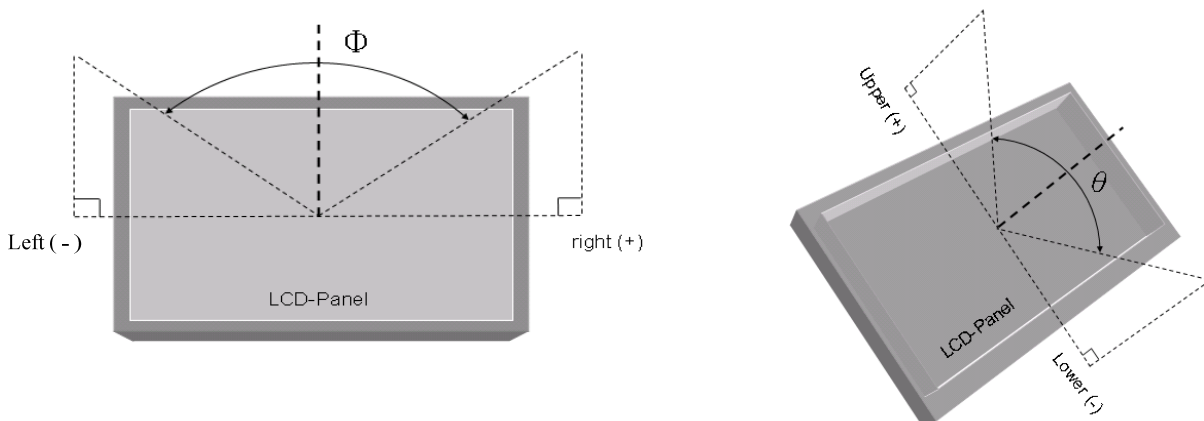


Fig.8-4 Definition of Viewing Angle

9. RELIABILITY TEST

9.1. Temperature and humidity

TEST ITEMS	CONDITIONS	Remark
HIGH TEMPERATURE OPERATION	50° C ; 240Hrs	
HIGH TEMPERATURE STORAGE	60° C ; 240Hrs	
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	50° C ; 90% RH ; 240Hrs	No condensation
LOW TEMPERATURE OPERATION	0° C ; 240Hrs	
LOW TEMPERATURE STORAGE	-20° C ; 240Hrs	
THERMAL SHOCK (No operation)	-20° C (0.5Hr)~60° C (0.5Hr) 200 Cycles	

9.2. 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(±X, ±Y, ±Z)for a total of 6 shock inputs.
VIBRATION (Non operation)	<ul style="list-style-type: none"> ● Frequency range:8~33.3Hz ● Stroke:1.3 mm ● Vibration:sinusoidal wave, perpendicular axis Each direction on X, Z axes: 2hrs, Y axes: 4hrs. ● Sweep:2.9G,33.3 Hz ~ 400 Hz ● Cycle:15 min

9.3 Electrostatic Discharge

ITEM	CONDITION	NOTE
ESD	150pF , 330Ω , ±8kV&±15kV air & contact test	*1)
	200pF , 0Ω , ±200V contact test	*2)

Note: Measure

- 1: LCD glass and metal bezel
- 2: IF connector pins

9.4. 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-uniform,or line defect.