Chunghwa Picture Tubes, Ltd.
Product Specification

To : Syh Dar Technology Co., Ltd.
Date : 2008/08/07

TFT LCD

CLAA070JA08CW

ACCEPTED BY : (V1.0)

APPROVED BY	CHECKED BY	PREPARED BY

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REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First revision (Tentative)	--	2006.12.11
0.1	Revise VCOM-DC	P6	2007.01.05
0.2	Revise mechanical dimension	P12	2007.01.17
0.3	Revise Backlight system	P8	2007.01.25
0.4	Revise Power Consumption	P4	2007.01.30
0.4	Revise CN2 (backlight) (the number of Pin)	P11	2007.01.30
0.5	Revise CN2 (backlight) (the color of Pin)	P11	2007.02.14
0.5	Revise Backlight system	P8	2007.02.14
0.6	Revise module weight	P4	2007.06.26
0.7	Revise Color Coordinate	P13	2007.07.02
0.8	Revise CN2 (backlight) (the color of Pin)	P11	2007.07.05
0.9	Revise 3.3 Backlight system	P8	2007/9/20
1.0	Revise Power Supply Voltage (Vcc)	P6	2008/4/01

Contents

1. OVERVIEW

CLAA070JA08CW is 17.67cm(7") color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs and LED backlight.

The 17.67cm(7") screen produces 480(*3)X234 WQVGA resolution image. By applying R.G.B. input signal, full color images are displayed.The driver IC for LED backlight is not included in this module.

General specifications are summarized in the following table:

ITEM	ECIFICATION
Display Area (mm)	154.08 (H) × 86.58 (V)
Number of Pixels	480(H) × 3(RGB)× 234(V)
Pixel Pitch (mm)	0.321(H)×0.37(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white,TN
Number of color	Full color
Viewing Direction	6 o'clock
Brightness(cd/㎡)	300 (Typ.)
Power Consumption(W)	1.41 (Typ.)
Outline Dimension(mm)	164.9(W) × 100.0(H) × 5.7(D)
module weight(g)	145 (Typ.)
BL unit	LED * 18 pcs
Surface Treatment	Anti-Glare

2. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	conditions	MIN.	MAX.	UNIT	Note
Power Supply Voltage for LCD	VCC	GND=0	-0.3	6	V	
	AVDD	AVSS=0	-0.3	7	V	
	VGH	GND=0	-0.3	40	V	
	VGL		-20	0.3	V	
Signal input voltage	Vi		-0.2	AVDD+0.2	V	Note2
	VI		-0.3	VCC+0.3	V	Note3
Operating temperature	Topa		-30	85	℃	
Storage temperature	Tstg		-40	95	℃	
Forward Voltage（per LED）	Vf		-	3.75	V	
Reverse Voltage（per LED）	VR		-	5	V	
Pulse forward current（per LED）	Ifp		-	100	mA	Note4

Note1：If the module exceeds the absolute maximum ratings, it may be damaged permanently. Also, if the module operated with the absolute maximum ratings for a long time, its reliability may drop.

Note2：Analog input voltage VR, VG, VB

Note3：Logical signal STHL, STHR, OEH, L/R, CPH1~CPH3, STVR, STVL, OEV, CKV, U/D.

Note4：I**fp** Conditions ： Duty 1/10@1KHz

3. ELECTRICAL CHARACTERISTICS

3.1 Typical operation conditions

GND = Avss = 0V (Ta=25℃)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
Power Supply Voltage	V_{CC}	3.0	3.3	3.6	V	Note6
		4.5	5	5.5	V	
	AV_{DD}	4.5	5	5.5	V	
	V_{GH}	17	18	19	V	
	V_{GL}	-7	-6	-5	V	
Signal Amplitude (VR, VG, VB)	V_{iA}	0.4	-	AV_{DD}-0.4	V	Note1
	V_{iAC}	-	4	-	V	Note1
	V_{iDC}	-	AV_{DD}/2	-	V	Note1
VCOM	V_{CAC}	4	4.88	6	V_{P-P}	Note1,2
	V_{CDC}	1.85	1.95	2.05	V	Note1,3
Input Signal Voltage	V_{IH}	0.7V_{CC}	-	VCC	V	Note4
	V_{IL}	0	-	0.3V_{CC}	V	

Note1：Please refer to Fig.1
Note2：Brightness level is adjusted by varying this amplitude V_{CAC}
Note3：Please adjust V_{CDC} to make the flicker level be minimum.
Note4：Logical signal STHL,STHR,OEH,L/R,CPH1~CPH3,STVR,STVL,OEV,CKV,U/D.
Note5：Power sequence refer to Fig.2
Note6 : Vcc please refer T-con setup on system.

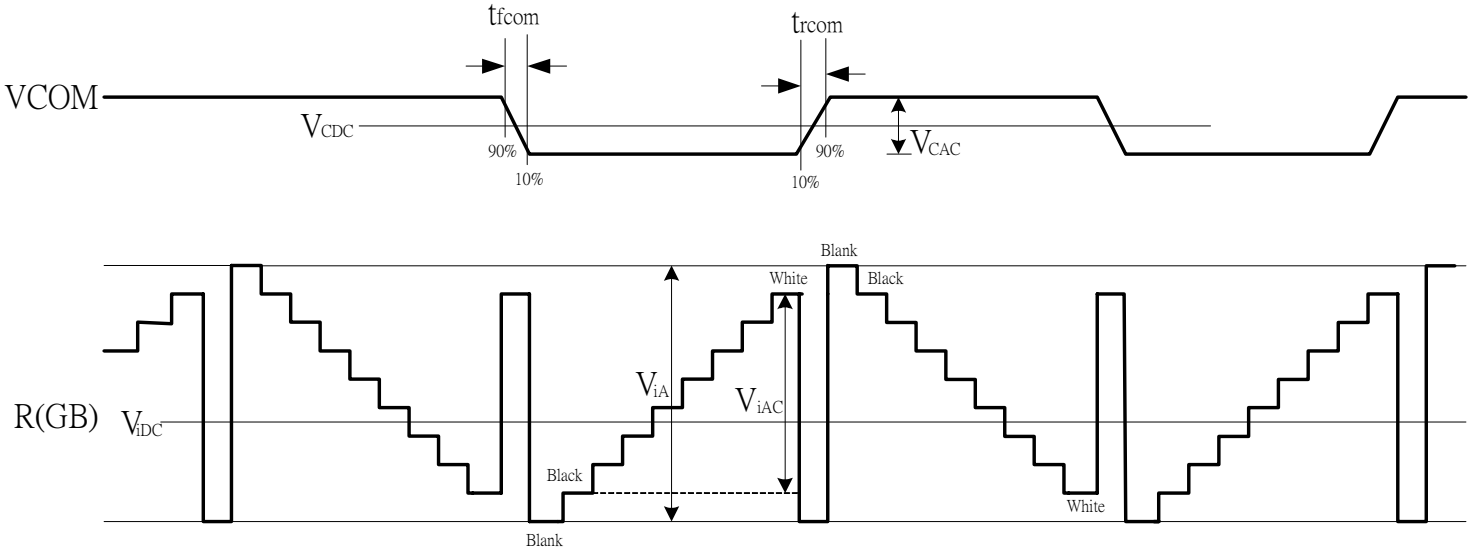
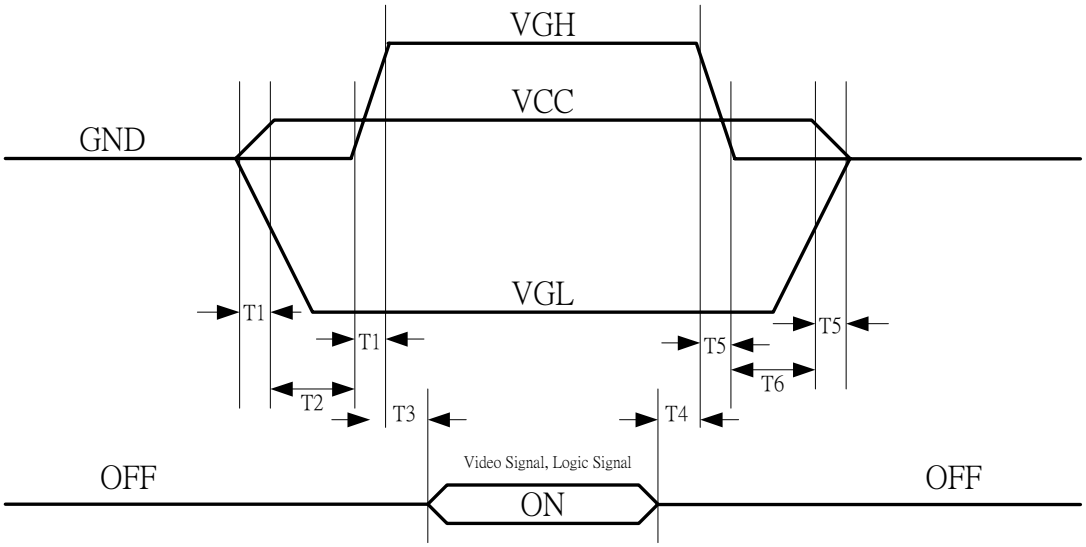


Fig.1 VCOM-RGB



T1 ≦ 15ms (From 10%*VCC to 90%*VCC，when VCC is Low to High)；

T2 ≦ 10ms (From 90%*VCC to 10%*VGH，when VCC is Low to High)；

T3 ≦ 10ms (From 90%*VGH to Video Signal，when VGH is Low to High)；

T4 ≦ 10ms (From Video signal to 90%*VGH，when VGH is High to Low)；

T5 ≦ 20ms (From 90%*VCC to 10%*VCC，when VCC is High to Low)；

T6 ≦ 10ms (From 10%*VGH to 90%*VCC，when VCC is Low to High)；

Fig.2 Power Sequence

3.2 Current consumption

(GND = Avss = 0V)

ITEM	SYMBOL	conditions	MIN.	TYP.	MAX.	UNIT	Note
Drive Current	I_{GH}	V_{GH} =18V	-	60	65	μA	Note1
	I_{GL}	V_{GL} = -6V	-	62	67	μA	Note1
	I_{CC}	V_{CC} = 5V	-	11	22	μA	Note1
	I_{DD}	AV_{DD} = 5V	-	8.3	21.6	mA	Note1

Note1：Typ. specification：Gray-level test Pattern
Max. specification：Black test Pattern

(a)Gray-level Pattern

(b)Black Pattern

3.3 Backlight system

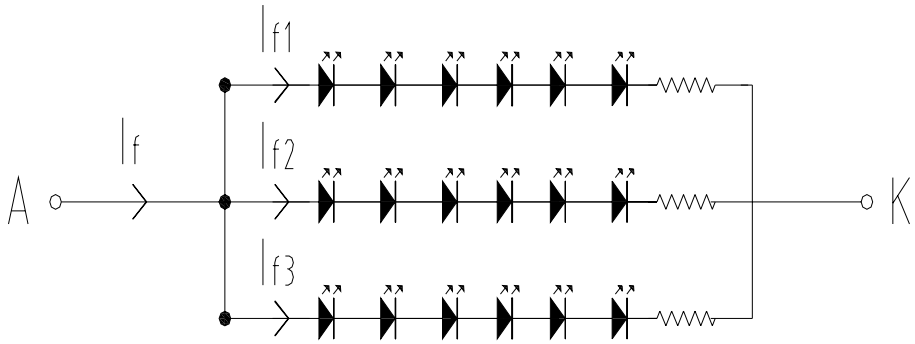
(Ta=25℃)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
LED current	IL	--	60	65.7	mA	Note 1
LED voltage	VL	--	22	23.1	V	
Power consumption	WL	--	1.32	--	W	Note 2
MTBF	--	20,000	--	--	Hr	Note 3

Note1：T=25℃， I_L=20mA（per LED）。

Note2：LED B/L circuit（as below figure），If1=If2=If3=20mA，A：Anode，K：Cathode。

Note3：IL=60mA



3.4 Timing characteristics of input signals

characteristics	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
1 Field scanning period	T_{IV}	-	262.5	-	H	
1 Line scanning period	T_{IH}	-	63.5	-	μs	
Source driver operating frequency	F_{OP}	-	9.6	-	MHz	
CLK pulse width	T_{CW}	50	103.8	2000	ns	
CLK pulse period duty	T_{CWH}	40	-	60	%	
CLK pulse delay	TC12 TC23 TC31	12	69	1/2*T_{CW}	ns	CPH1~CPH3
STH start pulse width	T_{STH}	32	114.2	-	ns	STHR,STHL
STH start pulse setup time	T_{SUH}	16	76.8	-	ns	STHR,STHL
STH start pulse hold time	T_{HDH}	16	37.6	-	ns	STHR,STHL
OEH output enable pulse width	T_{OEH}	1T_{CW}	2.7	-	μs	OEH
Sample and hold disable time OEH& STH	$T_{OEH-STH}$	1	8.9	-	μs	OEH-STH
CLKV pulse width	T_{CKVW}	1	63.5	-	μs	CKV
CLKV pulse high period	T_{CKVH}	0.5	2.64	-	μs	CKV
CLKV pulse low period	T_{CKVL}	0.5	60.9	-	μs	CKV
STV start pulse width	T_{STV}	0.5	63.5	-	μs	STVR, STVL
STV start pulse setup time	T_{SUV}	0.2	60.8	-	μs	STVR, STVL
STV start pulse hold time	T_{HDV}	0.3	2.72	-	μs	STVR,STVL
OEV pulse width	t_{OEV}	1	5.3	-	μs	OEV
Clean enable time	t_{DIS2}	-	2.54	-	μs	OEV-CKV

Note1： 1. High level of source driver and gate driver logic signal are 70%
2. Low level of source driver and gate driver logic signal are 30%

Note2：Please refer to Fig.3 and Fig.4

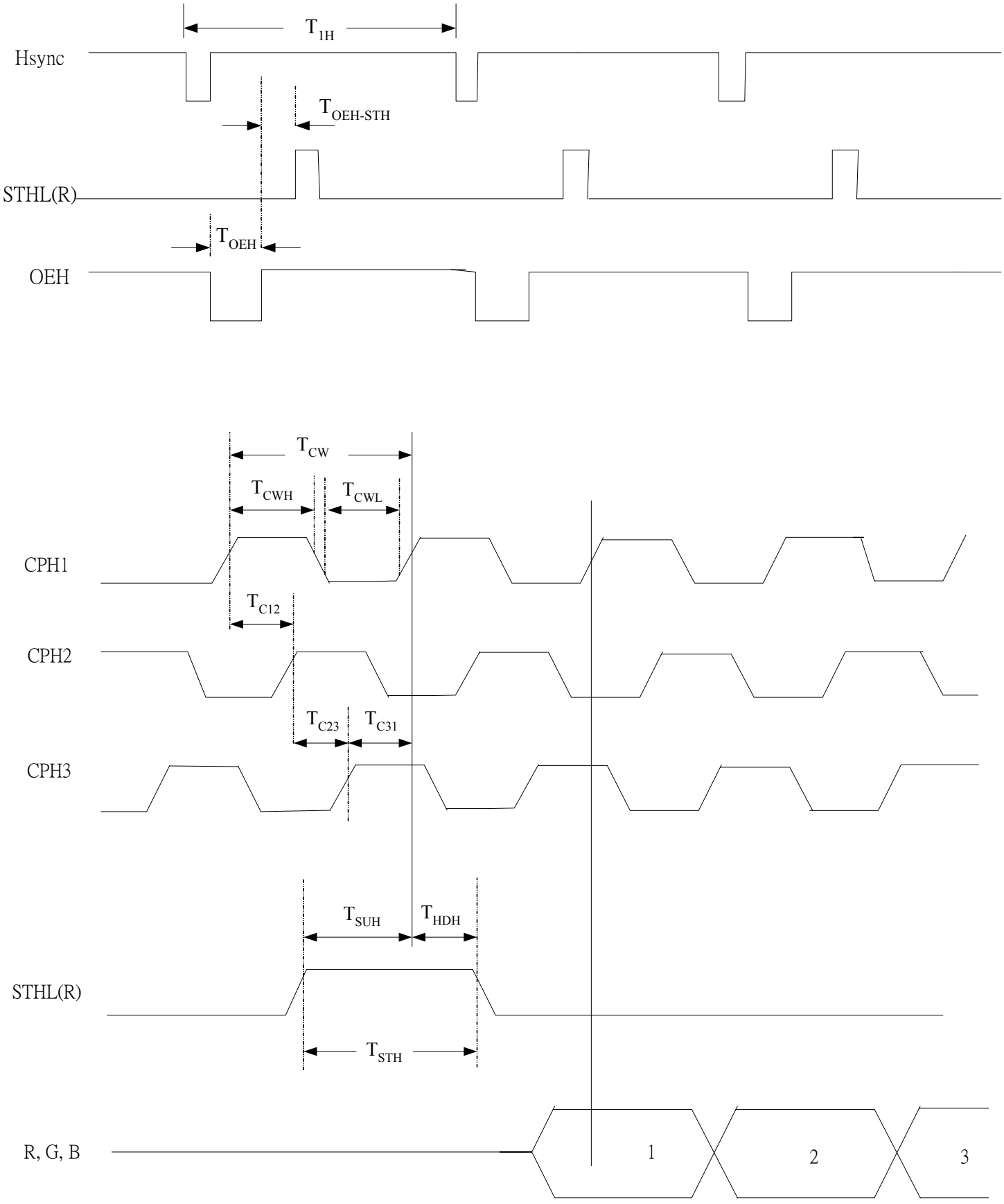


Fig.3 Horizontal Timing

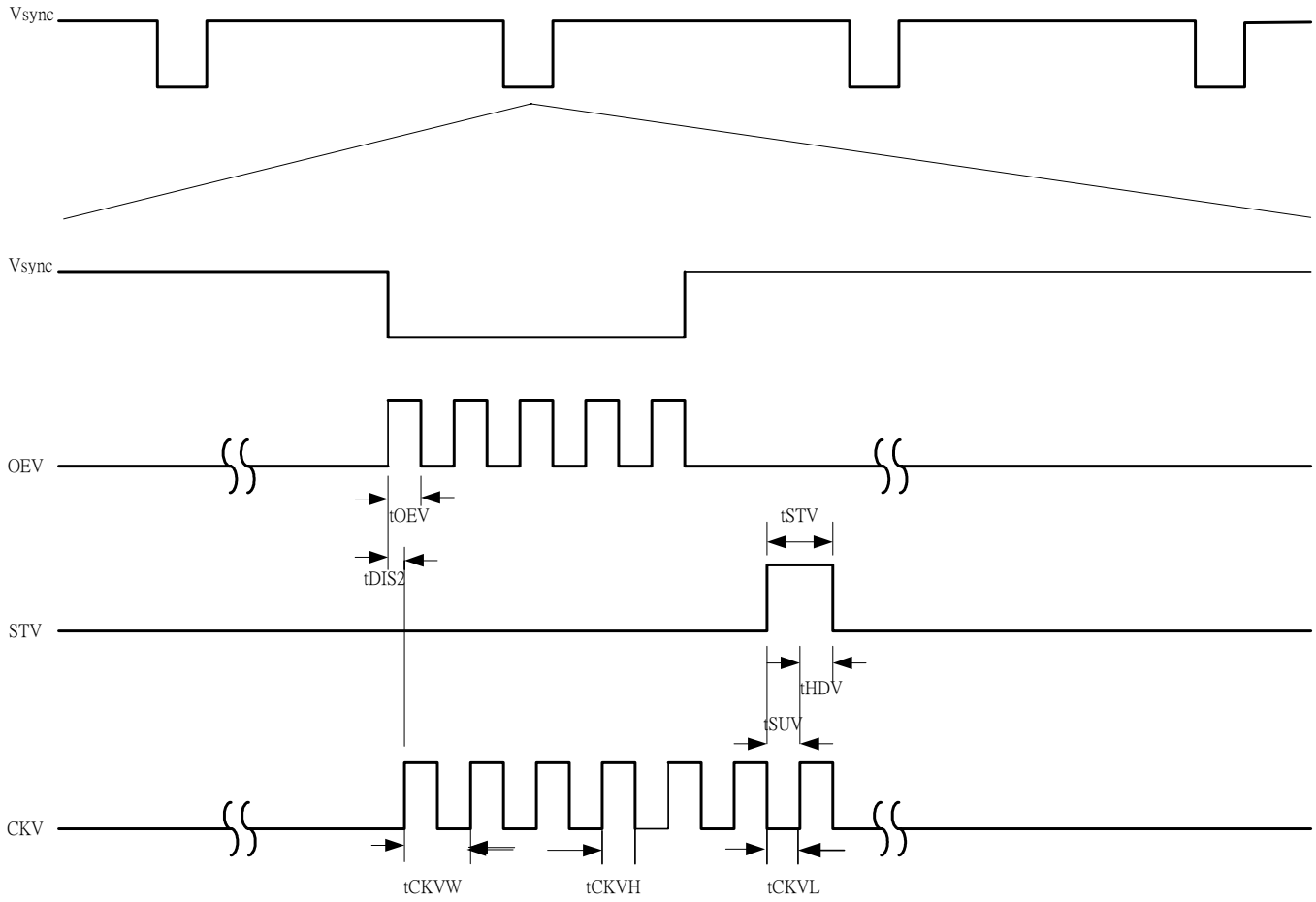


Fig.4 Vertical Timing sequence

4. INTERFACE CONNECTION:

4.1 CN1(Signal of interface)

Pin No.	SYMBOL	I/O	FUNCTION	NOTE
1	GND	-	Ground for logic circuit	
2	V_{CC}	|	Supply voltage of logic control circuit for scan driver	
3	V_{GL}	|	Negative power for scan driver	
4	V_{GH}	|	Positive power for scan driver	
5	STVR	I/O	Vertical start pulse	Note 1
6	STVL	I/O	Vertical start pulse	Note 1
7	CKV	|	Shift clock input for scan driver	
8	U/D	|	UP/DOWN scan control input	Note 1
9	OEV	|	Output enable input for driver	
10	VCOM	|	Common electrode driving signal	
11	VCOM	|	Common electrode driving signal	
12	L/R	|	LEFT/RIGHT scan control input	Note 1
13	MOD	|	Sequential sampling and simultaneous sampling setting	Note 2
14	OEH	|	Output enable input for data driver	
15	STHL	I/O	Start pulse for horizontal scan line	Note 1
16	STHR	I/O	Start pulse for horizontal scan line	Note 1
17	CPH3	|	Sampling and shifting clock pulse3 for data drive	
18	CPH2	|	Sampling and shifting clock pulse2for data drive	
19	CPH1	|	Sampling and shifting clock pulse1 for data drive	
20	V_{CC}	|	Supply voltage of logic control circuit for data driver	
21	GND	-	Ground for logic circuit	
22	VR	|	Alternated video signal input(Red)	
23	VG	|	Alternated video signal input(Green)	
24	VB	|	Alternated video signal input(Blue)	
25	AV_{DD}	|	Supply voltage for analog circuit	
26	AV_{SS}	-	Ground for analog circuit	

Note1：

Setting of scan control input		IN/OUT state for start pulse				Scanning direction
U/D	L/R	STVR	STVL	STHR	STHL	
GND	V_{CC}	OUT	IN	OUT	IN	From up to down ,and from left to right
V_{CC}	GND	IN	OUT	IN	OUT	From down to up ,and from right to left
GND	GND	OUT	IN	IN	OUT	From up to down ,and from right to left
V_{CC}	V_{CC}	IN	OUT	OUT	IN	From down to up ,and from left to right

Note2： MOD=H: Simultaneous sampling (Set CPH2 and CPH3 to LOW)
MOD=L: Sequential sampling

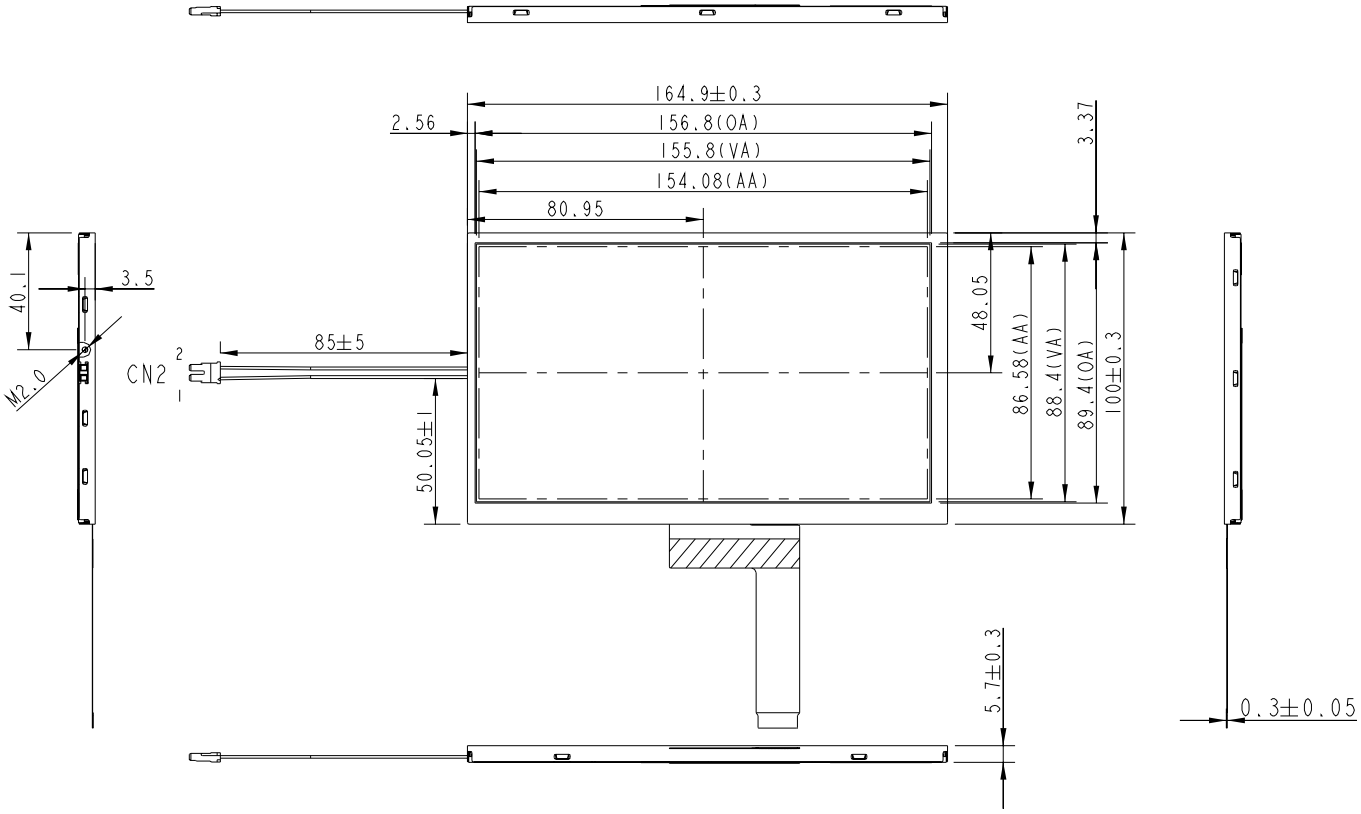
4.2 CN2 (backlight)

Pin No.	SYMBOL	FUNCTION	Remark
1	+	Power input-side positive	Black
2	-	Power input-side negative	White

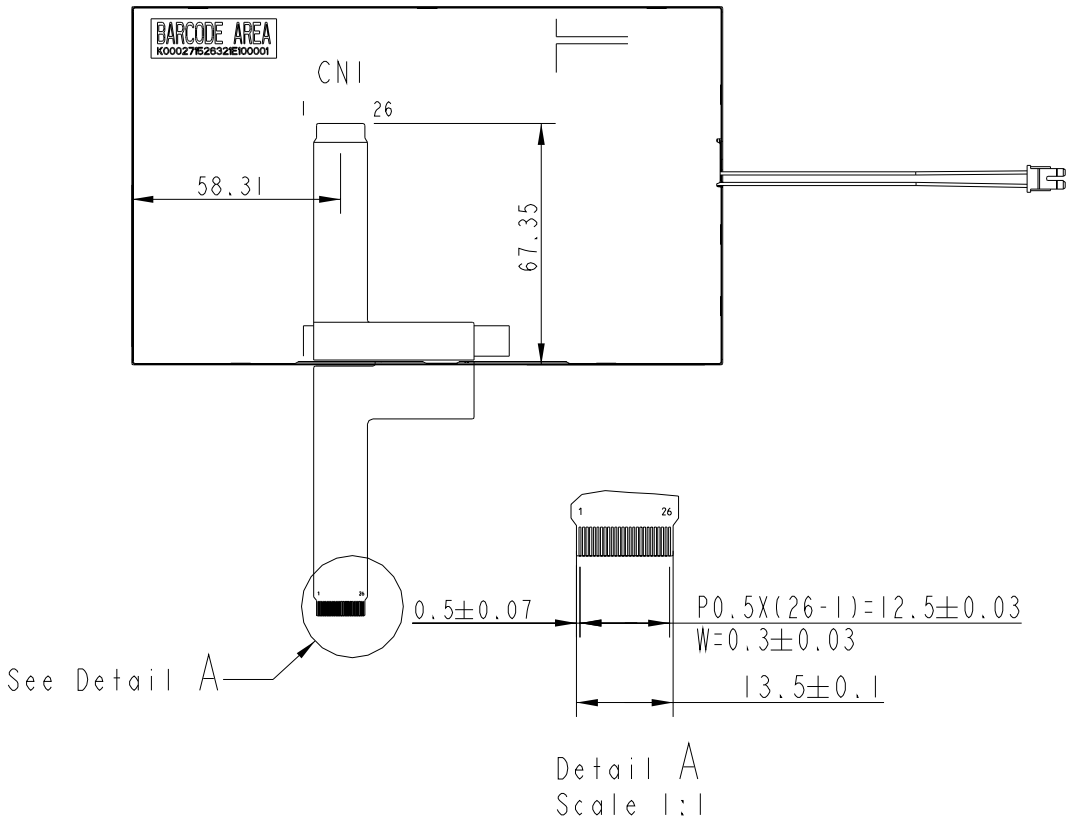
Note-1：Backlight side connector : BHSR-02VS-1 (JST)
Note-2：Inverter side connector : SM02B-BHSS-1 (JST)

5. MECHANICAL DIMENSION

(1) Front Side



(2) Rear Side



[Note]：(Tolerance is ±0.5mm unless noted) [Unit： mm]

6. OPTICAL CHARACTERISTICS

Ta=25℃，VCC=3.3V

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Contrast Ratio		CR	*1)	(350)	400	--	--
Center-Luminance		L	*2) I_f = 60mA (per LED 20mA)	240	300	--	cd/m^2
Luminance departure		ΔL	*3)	70	80	--	%
Response Time		Tr	*4)	--	25	40	ms
		Tf					
Viewing Angle	Horizontal	$\phi^{*5)}$	CR≧10	110	120	--	°
	Vertical	$\theta^{*5)}$		90	100	--	°
Color Coordinate	Red	x y	θ=φ= 0°	**0.548** **0.287**	**0.588** **0.327**	**0.628** **0.367**	--
	Green	x y		**0.317** **0.512**	**0.357** **0.552**	**0.397** **0.592**	
	Blue	x y		**0.106** **0.081**	**0.146** **0.121**	**0.186** **0.161**	
	White	x y		0.260 0.270	0.300 0.310	0.340 0.350	

[Note]：These items are measured by BM-5A (TOPCON) or CA-1000(MINOLTA) in the dark room. (no ambient light)；
Ta=25±2 ℃，60±10%RH.
Measuring point：Fig.5 Measuring point : 1~9 points
Measuring Viewing Angle：Fig.7：θ=ψ=0°

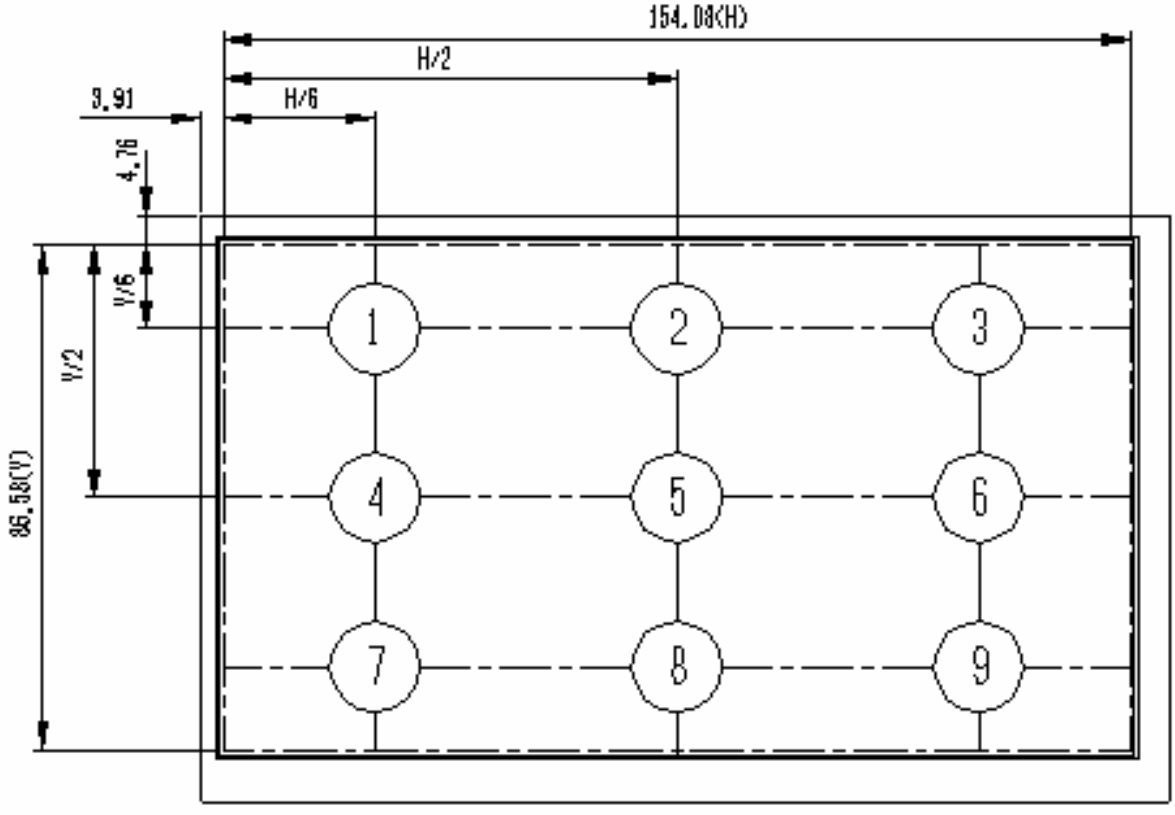


Fig.5 Measuring point

*1) Definition of contrast ratio：
Measure contrast ratio on the 9 points (refer to figure 5, # 1~# 9 point) and take the average value.
Contrast ratio is calculated with the following formula ：
Contrast Ratio (CR) = (White) Luminance of ON ÷ (Black) Luminance of OFF

*2) Definition of Center luminance：
Measure white luminance on the # 5 point as figure 5 .

*3) Definition of Luminance Uniformity：
Measure maximum luminance L(MAX) and minimum luminance L(MIN) on the 9 points as figure 5.
Luminance Uniformity is calculated with the following formula ：
△L = L(MIN) / L(MAX)×100%

*4) Definition of Response Time：
as figure 6

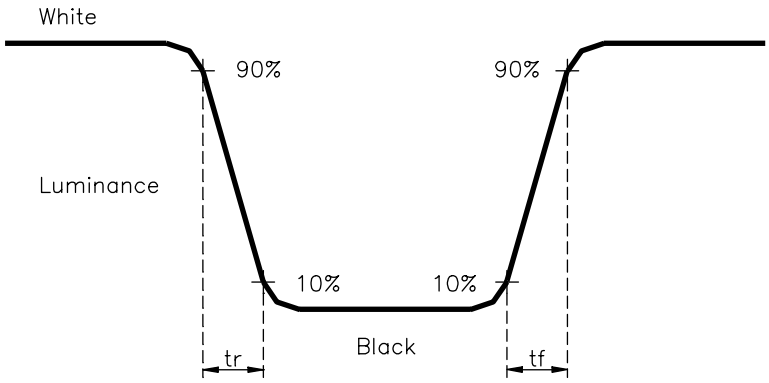


Fig.6 Definition of Response Time

*5) Definition of Viewing Angle(θ,ψ)：
as figure 7

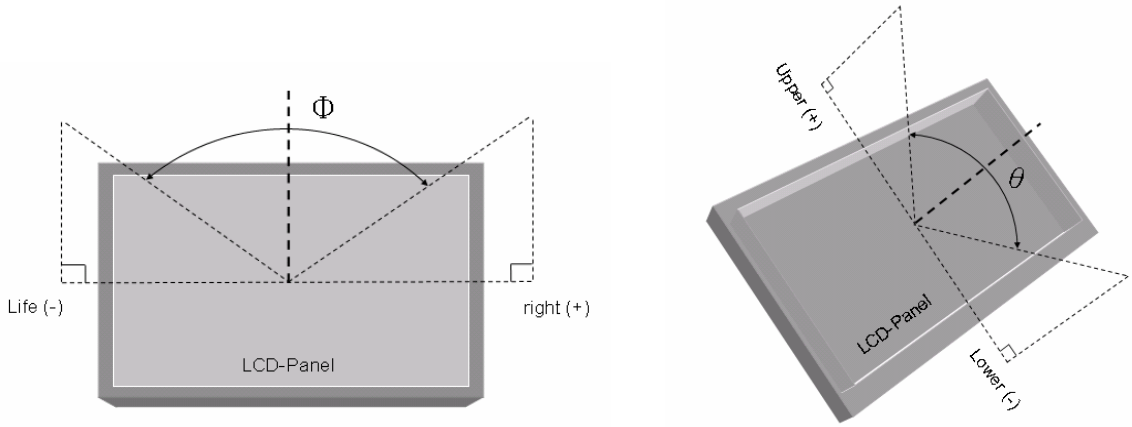


Fig.7 Definition of Viewing Angle

7. RELIABILITY TEST CONDITIONS

(1) Temperature and Humidity

TEST ITEMS	CONDITIONS
HIGH TEMPERATURE OPERATION	85°C ；240 Hrs
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	60°C ；90% RH；240 Hrs
HIGH TEMPERATURE STORAGE	95°C ；240 Hrs
LOW TEMPERATURE OPERATION	-30°C ；240Hrs (Backlight unit always turn on)
LOW TEMPERATURE STORAGE	-40°C ；240 Hrs
THERMAL SHOCK (No operation)	-30°C(0.5Hr)～85°C(0.5Hr) 200 CYCLE

(2) Shock & Vibration

TEST ITEMS	CONDITIONS
SHOCK (NON-OPERATION)	● Shock level: 980m/s^2(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：1.3 mm ● Vibration: sinusoidal wave, perpendicular axis (both x,z axis: 2Hrs , and y axis: 4Hrs). ● Sweep: 2.9G,33.3 Hz -400 Hz ● Cycle: 15 min

(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 defects.