Chunghwa Picture Tubes, Ltd.
Product Specification

To ：
Date ：111027

TFT LCD
CLAA070ND22CW

ACCEPTED BY : (V1.2)

Tentative

APPROVED BY	CHECKED BY	PREPARED BY
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REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First revision (Tentative)	-	2011/01/14
0.1	Modifity Brightness spec	4	2011/1/21
0.1	Modifity Backlight Spec and LED Circuit Diagram	9	2011/1/21
0.2	Modifity Drawing	10	2011/1/27
0.2	Modifity Luminance	15	2011/1/27
0.2	Modifity backlight current	15	2011/1/27
0.2	Modifity Viewing angle	15	2011/1/27
0.3	Modifity Drawing	10	2011/1/27
0.3	Modifity Luminance	15	2011/1/27
0.3	Modifity backlight current	15	2011/1/27
0.3	Modifity Viewing angle	15	2011/1/27
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0.4	Modifity Module Size and Weight	4	2011/3/2
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0.6	Modifity MTBF	17	2011/3/10
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0.7	Modifity Viewing angle	15	2011/3/30
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0.8	Modifity Drawing of Rear Side	14	2011/04/08
0.9	Modifity 3.1 TFT LCD	6	2011/04/22
1.0	Modifity Viewing angle	4	2011/05/19
1.0	Modifity Front Side	13	2011/05/19
1.0	Modifity Viewing angle	15	2011/05/19
1.1	Revised Color Coordinate.	15	2011/08/12
1.2	Modifity for Power、Signal sequence	7	2011/9/8
1.2	Modifity for Color Coordinate	15	2011/9/8

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1. OVERVIEW

CLAA070ND22CW is 7" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, LVDS driver ICs ,control circuit and LED backlight. By applying 1024×600 images are displayed on the 7" diagonal screen. Display 16.2M colors by R.G.B signal input.

General specification are summarized in the following table：

| ITEM	SPECIFICATION		
Display Area (mm)	153.6(H) X 90.0(V) (7-inch diagonal)		
Number of Pixels	1024(H) × 3 (RGB) × 600(V)		
Pixel Pitch (mm)	0.150(H) X 0.150(V)		
Color Pixel Arrangement	RGB vertical stripe		
Display Mode	Normally white		
Number of Colors	16.2M		
Viewing Direction	6 o'clock (Max. contrast ratio, Gray level inversion)		
Brightness (cd/m^2)	350nit(typ)		
Response Time (ms)	25ms(typ.)		
NTSC	50%		
Contrast Ratio	700:1(typ)		
Viewing Angle (RCP≧10) Power Consumption (W)	160degree (Horizontal.)(typ)		
	2.01(Typ.)/2.16(Max.)		
	130degree (Vertical)(typ)		
Interface connection	LVDS		
Module Size (mm)		Min.	Typ.	Max.
	Horizontal (H)	165.45	165.75	166.05
	Vertical (V)	105.09	105.39	105.69
	Depth (D)	3.0	3.25	3.5
Module Weight (g)	115 (typ)		
Backlight Unit	LED		
Surface Treatment	Anti-Glare 3H		

2. ABSOLUTE MAXIMUM RATINGS

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

Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	DVDD	-0.3	5	V	
Analog Supply Voltage	AVDD	-0.5	15	V	
Gate On Voltage	VGH	-0.3	40	V	
Gate Off Voltage	VGL	-20	0.3	V	
Gate On-Gate Off Voltage	VGH-VGL	-0.3	40	V	
Signal Input Voltage	RXIN0-~ RXIN3- RXIN0+ ~ RXIN3+ RXCLKIN- ~RXCLKIN+	-0.5	5	V	
Forward Current（per LED）	If	-	30	mA	
Reverse Voltage（per LED）	VR	-	5	V	
Pulse forward current（per LED）	Ifp	-	100	mA	Note 1、2
Operation Temperature	T_{op}	-20	60	℃	Note 3
Storage Temperature	T_{stg}	-30	70	℃	Note 3

Note1：Ifp Conditions ： Duty≦1/10＠ Pulse Width≦10msec

Note2：perating must under the condition as below drawing.

(Ambient Temperature /Allowable Forward Current) Each LED .

Forward Current vs. Ambient Temperature
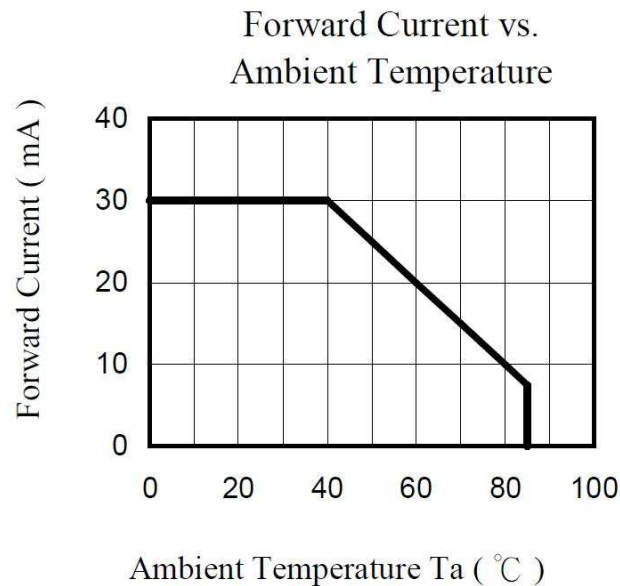
Note3：If users use the product out off the environmemtal operation range（temperature and humidity）, it will have visual quality concerns.

# 3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD

Ta=25℃

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Digital Power Supply Voltage For LCD	DVDD	3	3.3	3.6	V	
Logic Input Voltage (LVDS:IN+,IN-)	VCM	$\dfrac{\lvert VID \rvert}{2}$	-	$2.4 - \dfrac{\lvert VID \rvert}{2}$	V	Note1
	$\lvert VID \rvert$	200	-	600	mV	Note1
	VTH	-	-	100	mV	VCM=1.2V Note1
	VTL	-100	-	-	mV	
Analog Power Supply Voltage	AVDD	9.4	9.6	9.8	V	
Gate On Power Supply Voltage	VGH	17	18	19	V	
Gate Off Power Supply Voltage	VGL	-6.6	-6	-5.4	V	
Common Power Supply Voltage	VCOM	2.15	2.35	2.55	V	Note2
Logic Input Voltage	VIH	0.7*VCC	-	VCC	V	
	VIL	GND	-	0.3*VCC	V	

【Note1】LVDS signal
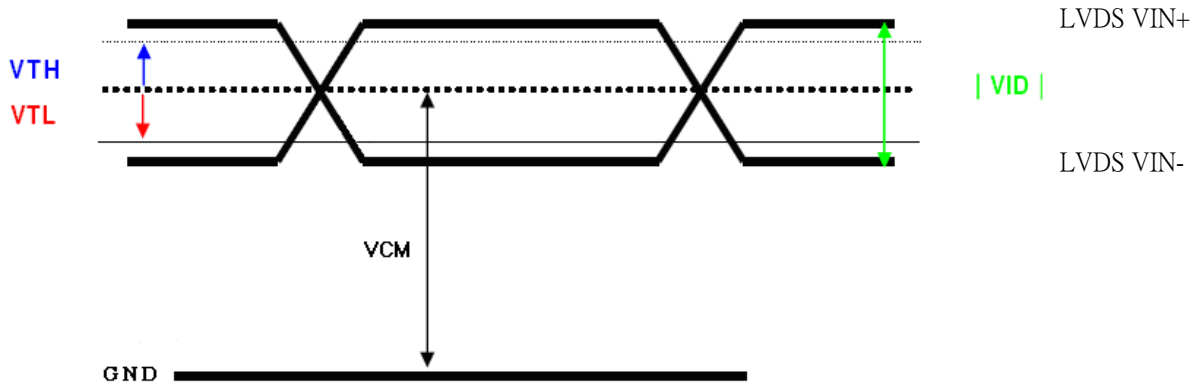
【Note2】Please adjust VCOM to make the flicker level be minimum.

3.2 TFT-LCD Current Consumption

ITEM	SYMBOL	CONDITION	MIN	TYPE	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	IVDD	DVDD = 3.3V	- -	30	45	mA	Note1
Analog power current	IAVDD	AVDD = 9.6V	- -	35	45	mA	Note1
Total Power Consumption	PC		- -	447	604	mW	Note1

Note1: Typical: Under 256 gray pattern

Maximum: Under black pattern

256 gray pattern   Black Pattern

3.3 Power、Signal Sequence

Power On：DVDD→AVDD/VGL→VGH→Video &Logic Signal→Backlight
Power Off：Backlight→Video &Logic Signal→VGH→AVDD/VGL→DVDD
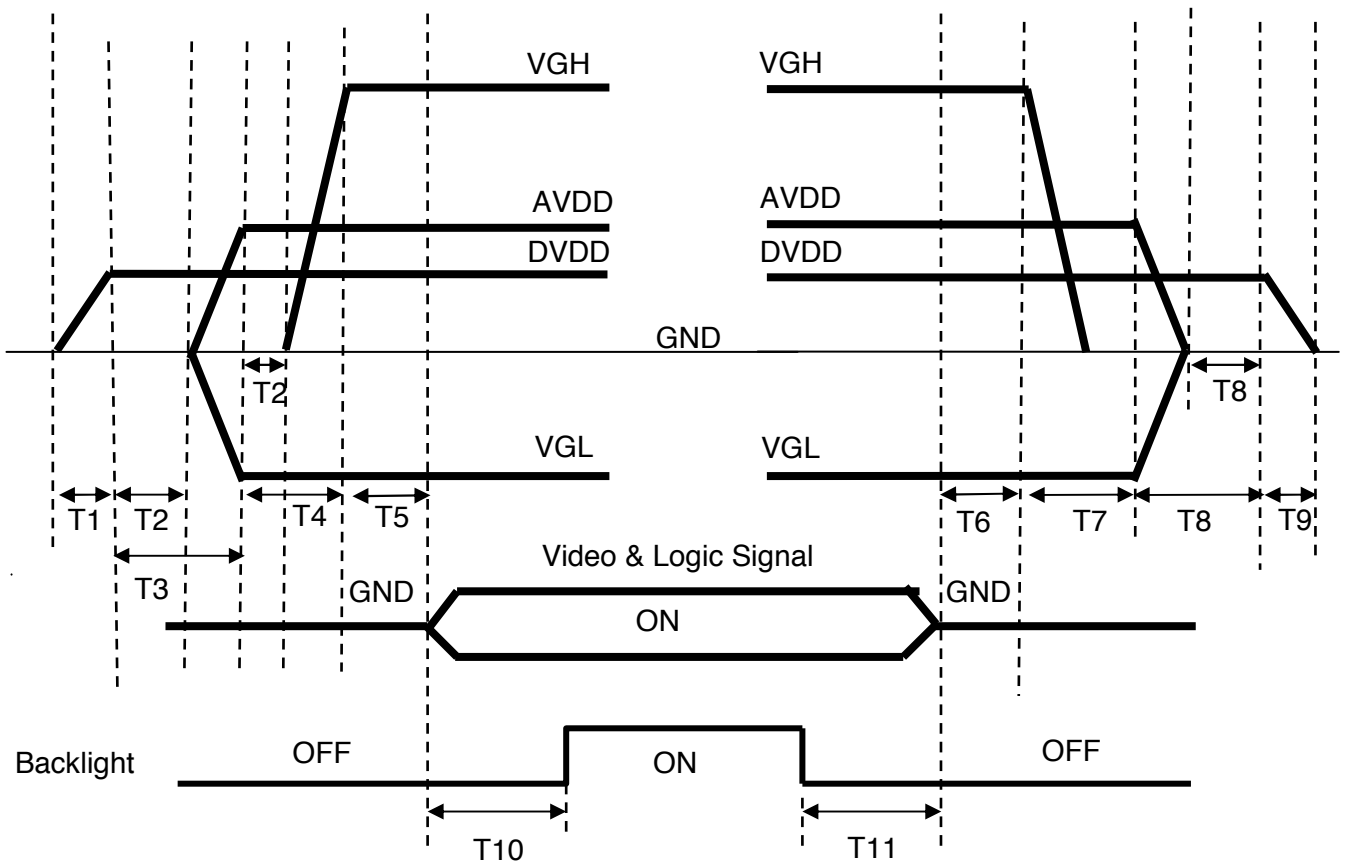
0<T1≦10ms   T6>0ms
T2>0ms   T7>0ms
T3>20ms   T8>0ms
T4>10ms   0<T9≦10ms
0<T5≦10ms   T11≧200ms
T10≧200ms

3.4 Backlight

Ta=25℃

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
LED current	IL	Ta=25℃ (20mA/serise)	--	160	--	mA	
LED voltage	VL	Ta=25℃ (20mA/serise)	8.85	9.75	10.65	V	
Power consumption	WL	Ta=25℃ (20mA/serise)	--	1.56	--	W	
LED Lifetime	-	Ta=25℃ IF=20mA	20000			Hr	

Remarks：

*1)LED Circuit Diagram
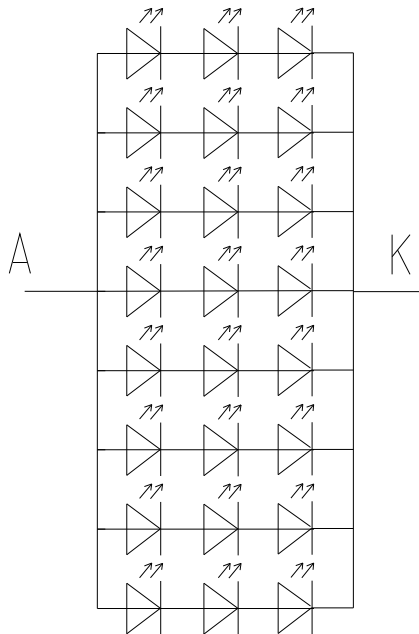
*2) A：Anode(＋)，K：Cathode(－)
*3) Suggestion: Using the constant current control to avoid the leakage light and brightness quality issue.
*4) Definition of Led lifetime：Luminance＜Initial luminance 50%.

4. INTERFACE CONNECTION

4.1 CN1 (Input Signal)

Pin No.	SYMBOL	FUNCTION	NOTE
1	VCOM	Common voltage	
2	DVDD	Digital power	
3	DVDD	Digital power	
4	NC	Not connect	
5	RESET	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=10KΩ，C=0.1μF)	
6	STBYB	Standby mode, normally pull high STBYB="1", normal operation STBYB="0",timing control, source driver will turn off, all output are high-Z	
7	GND	Ground	
8	RXIN0-	Negative LVDS differential data inputs	
9	RXIN0+	Positive LVDS differential data inputs	
10	GND	Ground	
11	RXIN1-	Negative LVDS differential data inputs	
12	RXIN1+	Positive LVDS differential data inputs	
13	GND	Ground	
14	RXIN2-	Negative LVDS differential data inputs	
15	RXIN2+	Positive LVDS differential data inputs	
16	GND	Ground	
17	RXCLKIN-	Negative LVDS differential clock inputs	
18	RXCLKIN+	Positive LVDS differential clock inputs	
19	GND	Ground	
20	RXIN3-	Negative LVDS differential data inputs	
21	RXIN3+	Positive LVDS differential data inputs	
22	GND	Ground	
23	NC	Not connect	
24	NC	Not connect	
25	GND	Ground	
26	NC	Not connect	
27	NC	Not connect	
28	SELB	6bit/8bit mode select	*1)
29	AVDD	Power for Analog Circuit	
30	GND	Ground	
31	LED-	LED Cathode	
32	LED-	LED Cathode	
33	L/R	Horizontal inversion	*2)
34	U/D	Vertical inversion	*2)
35	VGL	Negative power for TFT	
36	NC	Not connect	
37	NC	Not connect	
38	VGH	Positive power for TFT	
39	LED+	LED Anode	
40	LED+	LED Anode	

Remarks：

    *1)if LVDS input data is 6bits,SELB must must be set to High
      if LVDS input data is 8bit , SELB must be set to Low

*2)U/D and L/R control function

U/D	L/R	FUNCTION
0	1	Normal display
0	0	Inverse Left and Right
1	1	Inverse Up and Down
1	0	Inverse Left and Right Inverse Up and Down
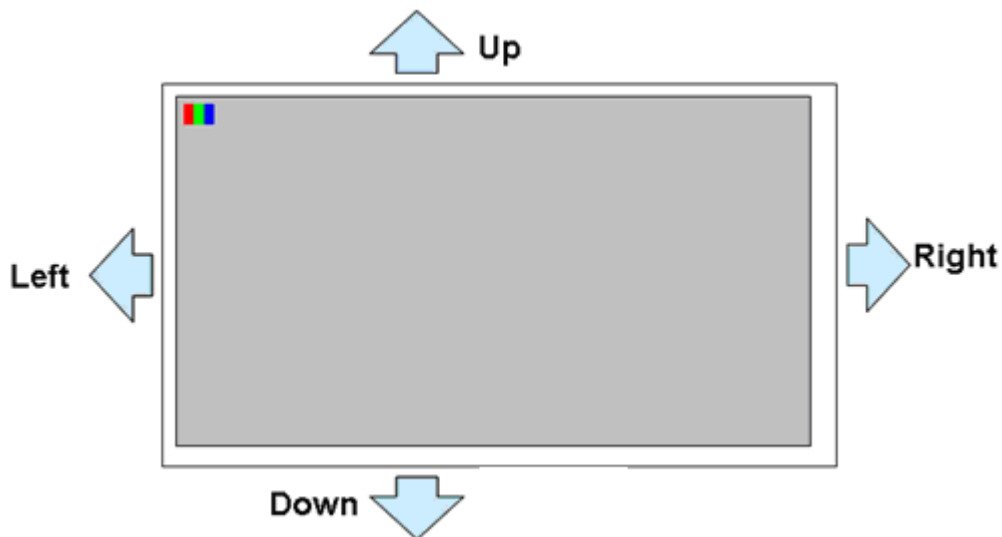
# 5. INPUT SIGNAL(DE ONLY MODE)

5.1 Timing Specification

ITEM				SYMBOL	MIN	TYP	MAX	UNIT
LVDS input signal sequence	CLK Frequency			tclk	45	51.2	57	MHz
LCD input signal sequence （Input LVDS Transmitter）	DENA	Horizontal	Horizontal total Time	t_H	1324	1344	1364	tCLK
			Horizontal effective Time	t_{HA}	1024			tCLK
			Horizontal Blank Time	t_{HB}	300	320	340	tCLK
		Vertical	Vertical total Time	t_V	625	635	645	t_H
			Vertical effective Time	t_{VA}	600			t_H
			Vertical Blank Time	t_{VB}	25	35	45	t_H

5.2 Timing sequence(Timing chart)

5.2.1 Horizontal Timing Sequence
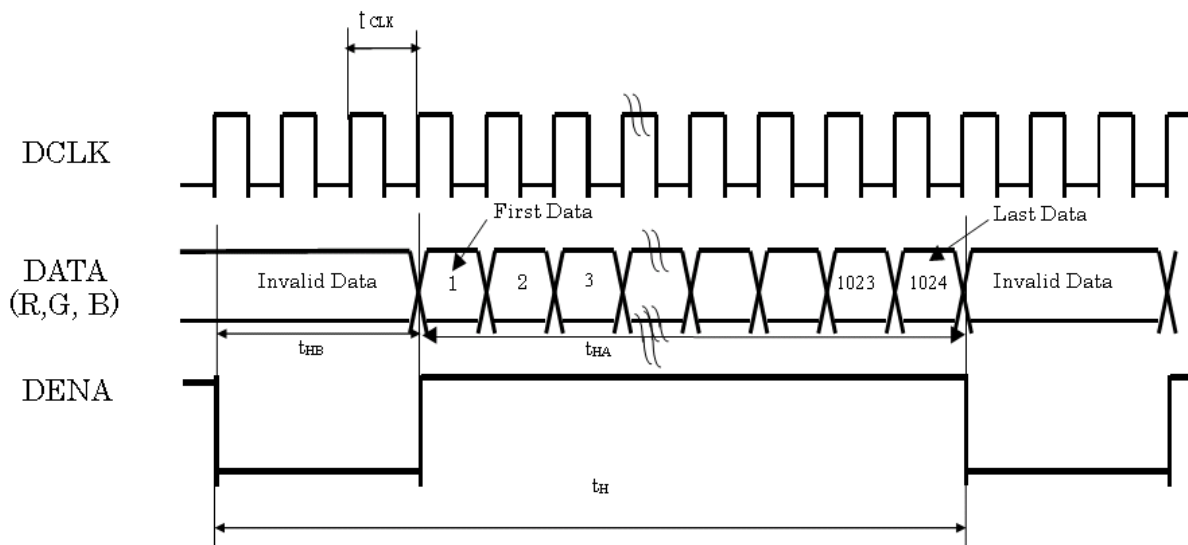
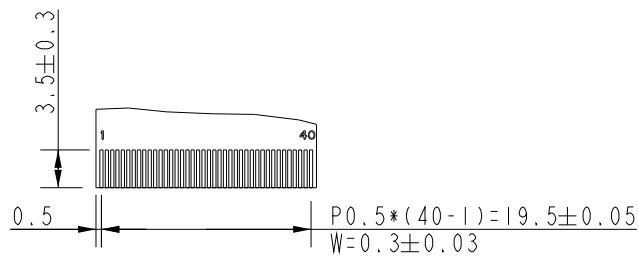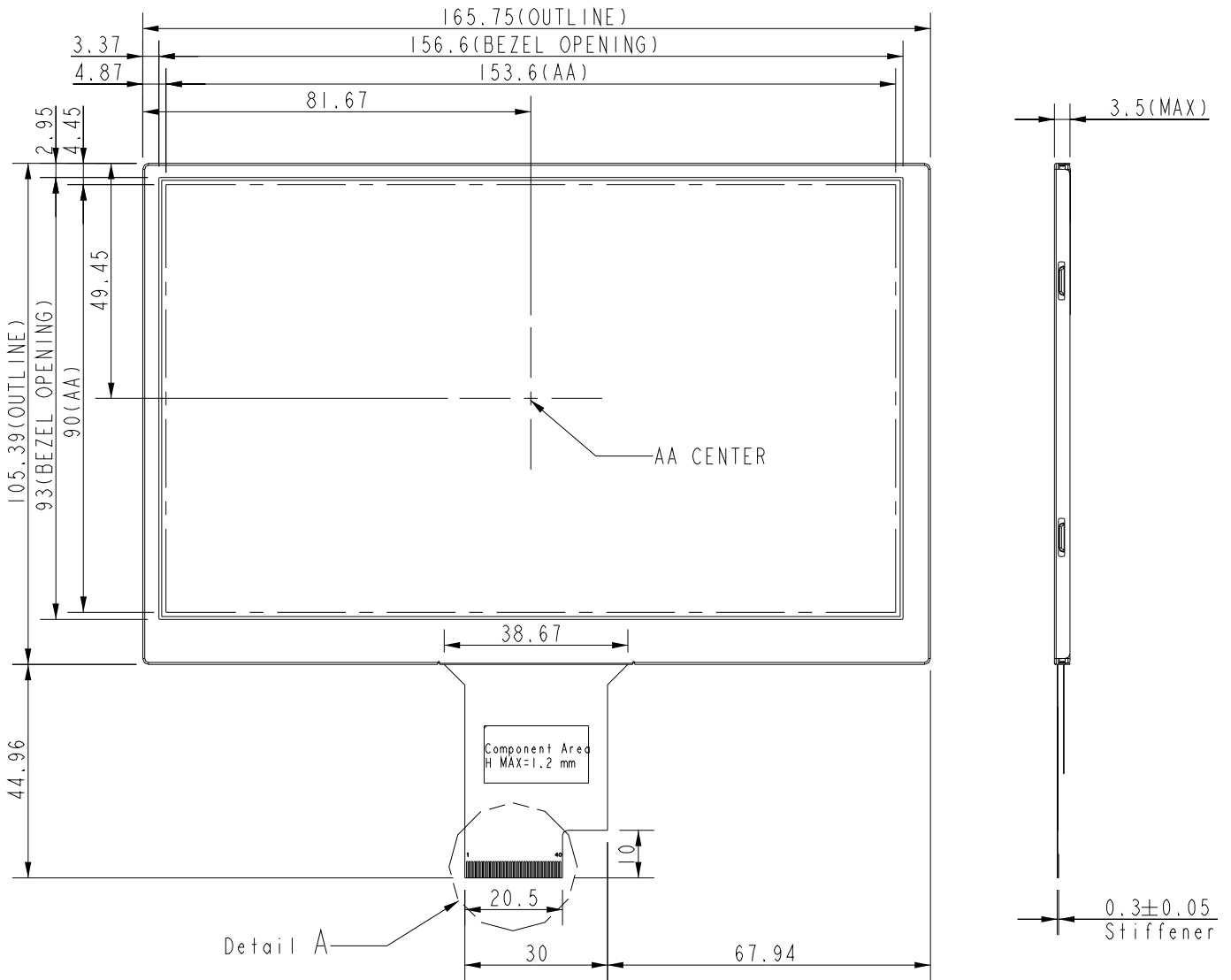## 5.2.2 Vertical Timing Sequence
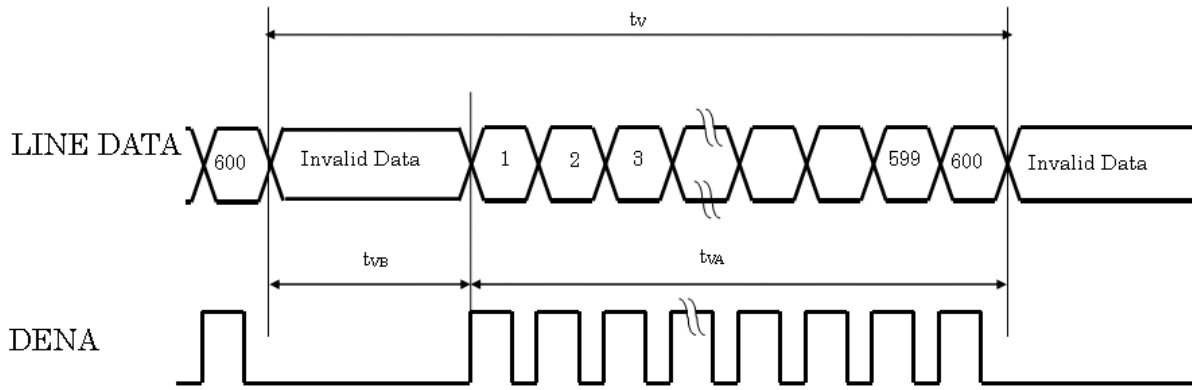
5.2.3 LVDS Input Data mapping
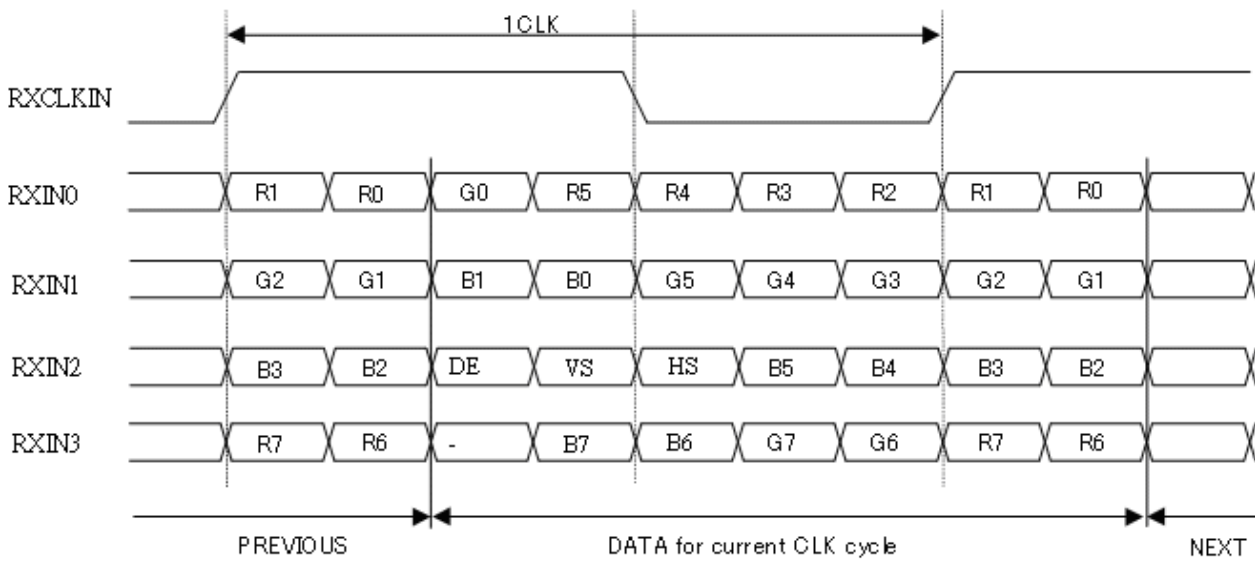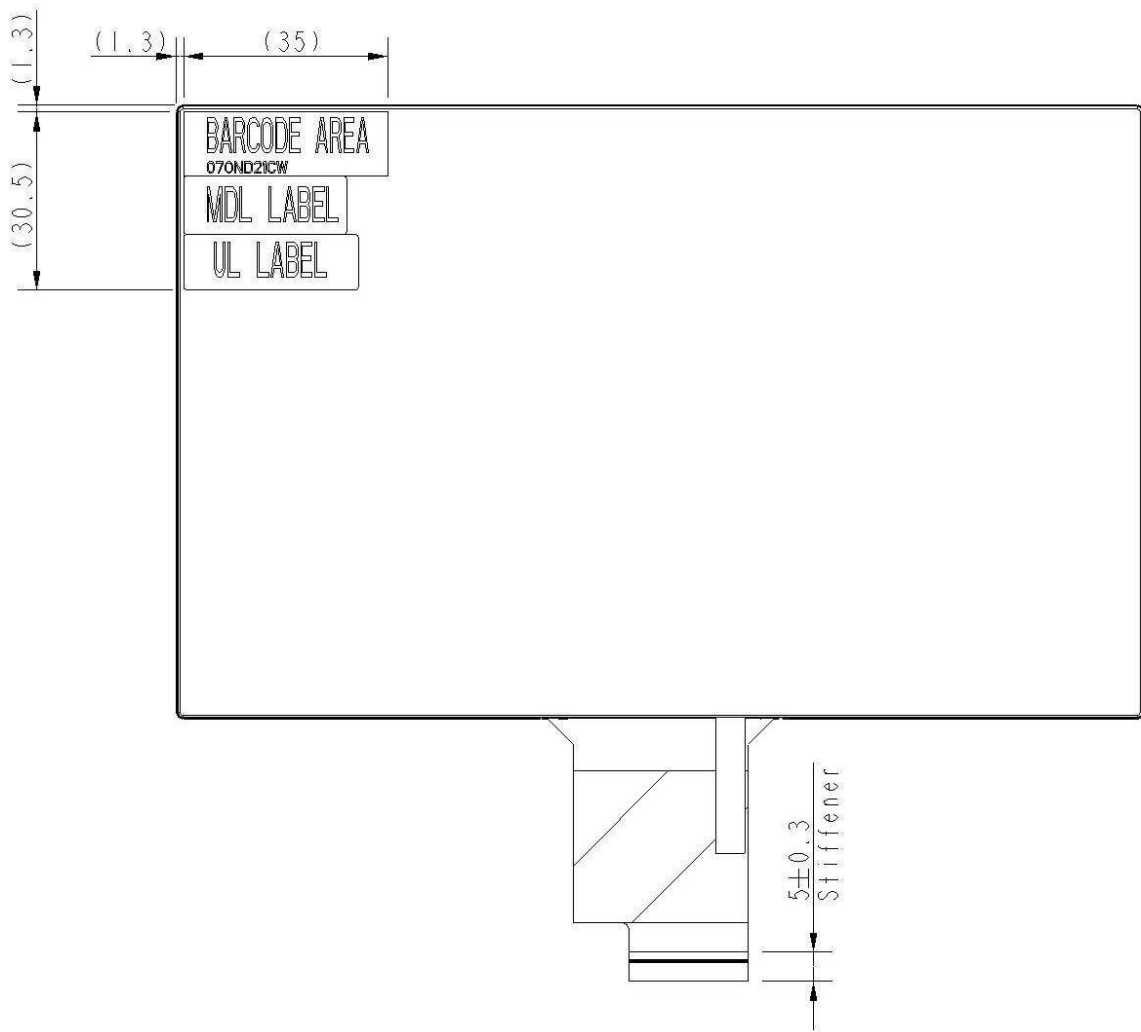
6. MECHANICAL DIMENSION

6.1 Front Side

[Unit：mm]

Detail A
Scale 6:5

6.2 Rear Side

[Unit：mm]

BARCODE AREA
070ND21CW

MDL LABEL

UL LABEL

5±0.3
Stiffener

Remark：General tolerance ±0.3mm

7. OPTICAL CHARACTERISTICS

Ta = 25℃, VCC=3.3V

ITEM		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
Constrast Ratio		CR	Point-5	500	700		--	1, 2, 3
Luminance(CEN)		Lw	Point-5	280	350		cd/m^2	1, 3
Luminance Uniformity		ΔL		70	80		%	1, 3
Response Time (White - Black)		Tr +Tf	Point-5	-	25	40	ms	1, 3, 5
NTSC		-	Point-5	45	50	-	%	1, 3
Viewing Angle	Left		CR≧10 Point-5	70	80	--	°	1, 3
	Right			70	80	--	°	1, 3
	Upper			60	70	--	°	1, 2, 4
	Lower			50	60	--	°	1, 2, 4
Color Coordinate	White	Wx Wy	Point-5	0.273 0.289	0.313 0.329	0.353 0.369	--	1, 3
	Red	Rx Ry		0.561 0.295	0.601 0.335	0.641 0.375		
	Green	Gx Gy		0.300 0.554	0.340 0.594	0.380 0.634		
	Blue	Bx By		0.125 0.077	0.165 0.117	0.205 0.157		

Note1: Measure condition：25℃±2℃，60±10%RH，under10 Lux in the dark room.BM-5A (TOPCON)，viewing angle2°，IL=160 mA（Backlight current），measurement after lighting on 10 mins.

2°

BM-5A

L=500mm
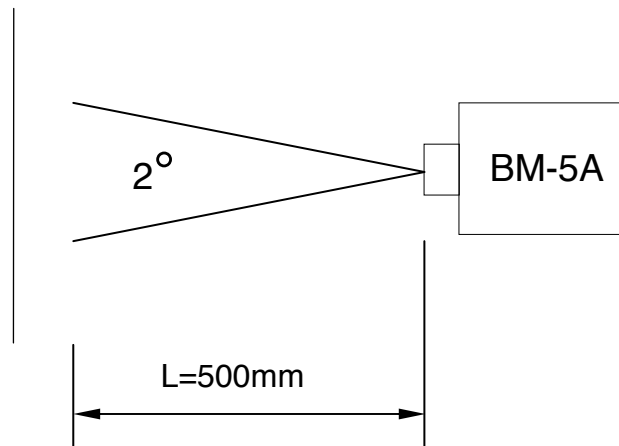
Note2: Definition of contrast ratio：
    Contrast Ratio (CR)= (White) Luminance of ON ÷ (Black) Luminance of OFF

Note3: Definition of luminance：Measure white luminance on the point 5 as figure.6-1
　　　　Definition of Luminance Uniformity: Measure white luminance on the point1~9 as figure.6-1
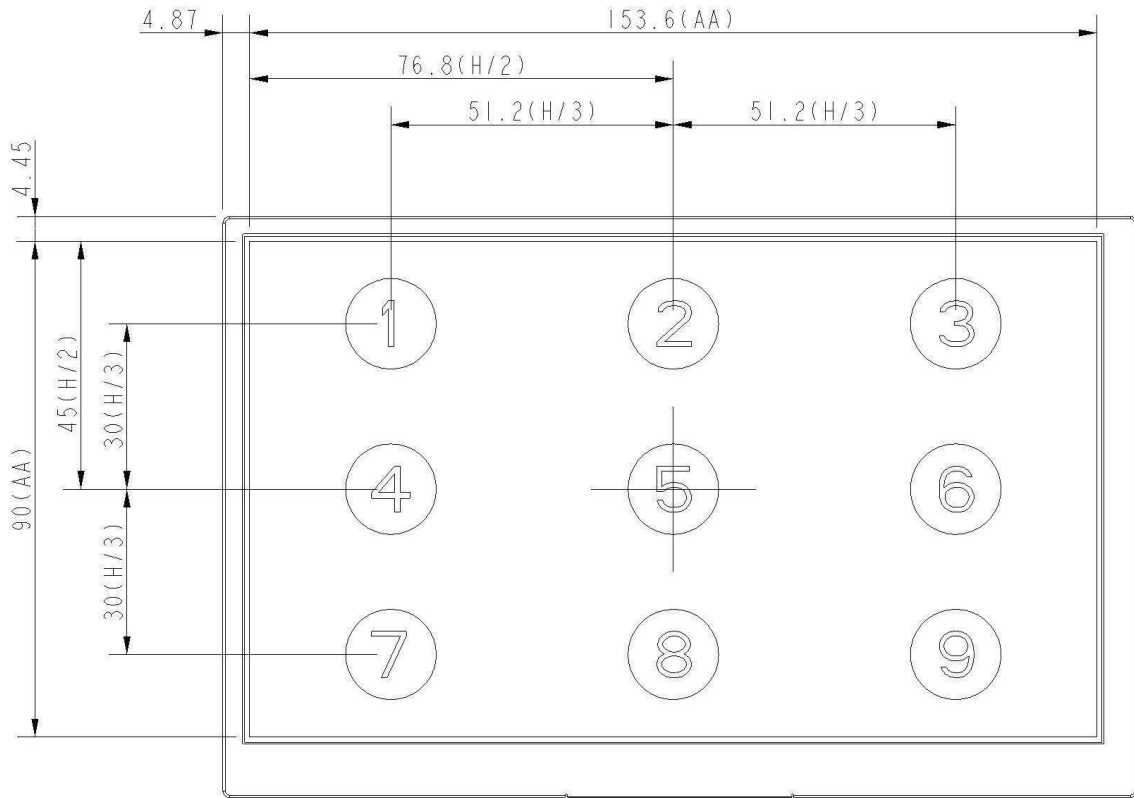
$$\triangle L = [L(MIN)/L(MAX)]\times 100$$

Fig.7-1　Measuring point

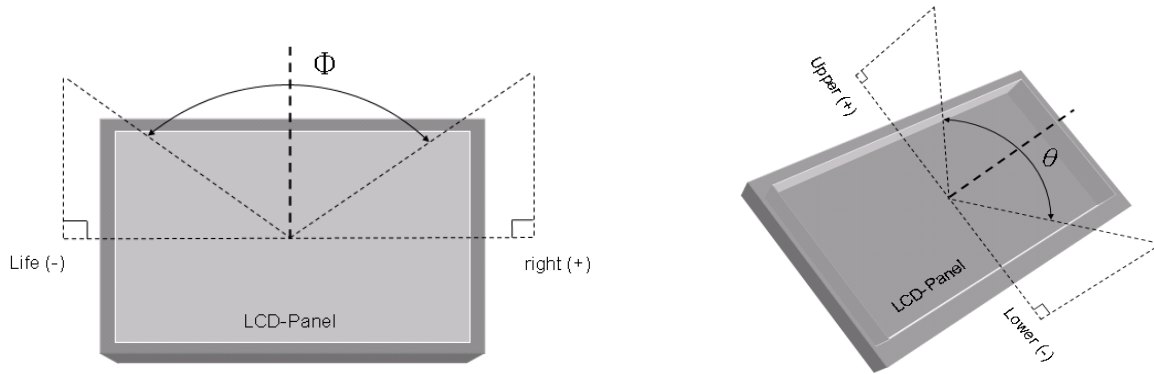Note 4: Definition of Viewing Angle(θ,ψ),refer to Fig.7-2 as below：

Fig.7-2 Definition of Viewing Angle
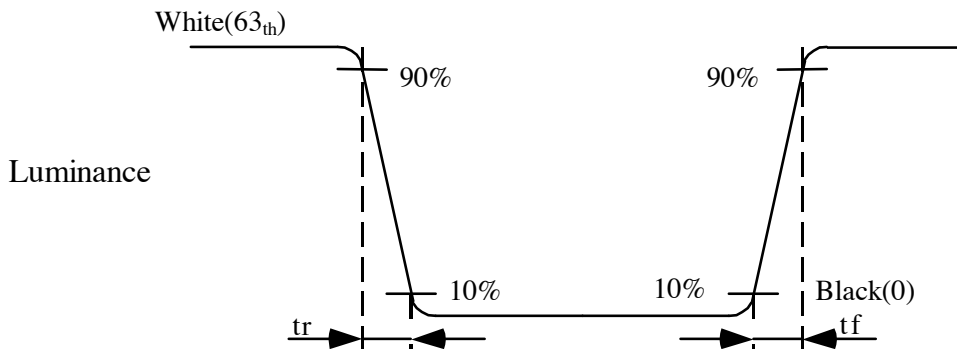
Note5: Definition of Response Time.(White-Black)

Fig.7-3 Definition of Response Time(White-Black)

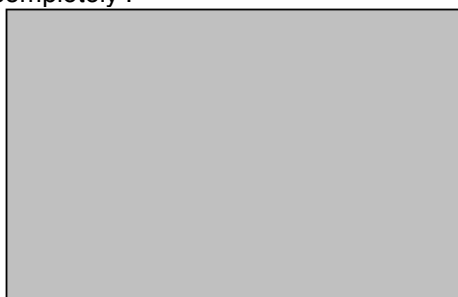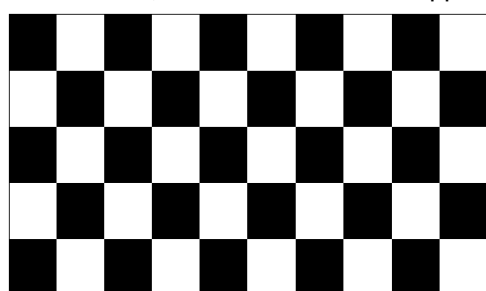## 8. RELIABILITY TEST

8.1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	60℃ ;240Hrs	
High Temperature High Humidity Operation	40℃；90%RH ;240Hrs	No condensation
Low Temperature Operation	-20℃；240Hrs	Backlight unit always turn on
High Temperature Storage	70℃ ;240Hrs	
Low Temperature Storage	-30℃；240Hrs	
Thermal Shock (No operation)	−30℃(0.5Hr)～70℃(0.5Hr)；100 Cycles	
Image Sticking	RT(25°C)，4 Hrs	
MTBF	20000Hrs	

Note：

Condition of Image Sticking test：25 ℃±2 ℃

Operation with test pattern sustained for 4 hrs, then change to gray pattern immediately.

After 5 mins, the mura must be disappeared completely .

8.2 Shock and 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, y,z axis: 2Hrs). ● Sweep: 2.9G,33.3 Hz -400 Hz ● Cycle: 15 min

8.3 Electrostatic Discharge

TEST ITEM	CONDITIONS	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

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-uniform

9. WARRANTY

9.1 The period is within 12 months since the date of shipping out under normal using and storage conditions.

9.2 The warranty will be avoided in case of defect induced by customer.