Chunghwa Picture Tubes, Ltd.
Product Specification

To :

Date :

TFT LCD

CLAA043JD02CW

ACCEPTED BY : (V0.1)

Tentative

APPROVED BY	CHECKED BY	PREPARED BY
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REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First revision (Tentative)	-	2012/01/13
0.1	Protective tape	12	2012/04/20

Contents

1. OVERVIEW

CPT CLAA043JD02CW is 4.3" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs and backlight. The 4.3" screen produces a high resolution image that is composed of 130,560 (480×272) pixel elements and 16.2M-color images are displayed on the 4.3" diagonal screen. General specifications are summarized in the following table：

General specifications are summarized in the following table:

ITEM	SPECIFICATION
Panel Size	4.3" inch
Display Area (mm)	95.04(W)×53.856(H)
Number of Pixels (dot)	480(H) x 3(RGB) x 272(V)
Pixel Pitch(mm)	0.198(H) x 0.198(V)
Color Pixel Arrangement	RGB stripe
Display Mode	Normally white TN
Number of color	16.2M
Luminance (cd/m^2)	600(Typ)
Contrast Ratio	500(Typ)
Optimum Viewing Angle	6' o'clock
Electrical Interface	RGB 24Bits
Power Consumption(W)	0.95
Surface Treatment	AG
Outline Dimension (mm)	105.5(W)× 67.2(H)× 2.8(D),without FPC
Weight (g)	45.4(Typ)

Note 1. Outline Dimension define without FPC

The LCD Products listed on this document are not suitable for use of aerospace equipments, submarine cables, nuclear reactor control systems and life support systems. If customers intend to use these LCD products for above applications or not listed in "Standard" as follows, please contact our sales people in advance.

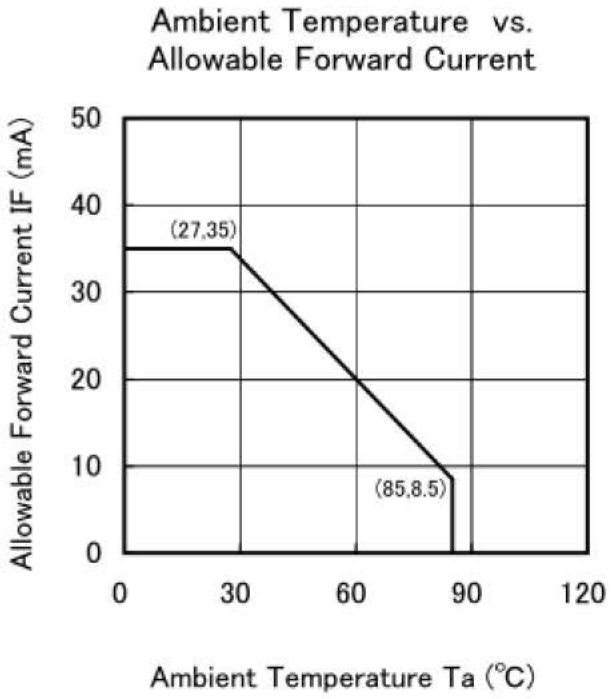
2. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
Power Voltage	VCC	-0.3	4.5	V	Note1
Input Signal Voltage Range	VI	-0.3	VCC+0.3	V	
LED forward current	If	--	35	mA	Note2 Note3
LED pulse forward current	Ifp	--	100	mA	
LED reverse voltage	Vr	--	5	V	
Operation Temperature	T_{op}	-20	70	℃	Note4
Storage Temperature	T_{stg}	-30	85	℃	

Note 1：Absolute maximum rating is the limit value. When the panel is exposed operating environment beyond this range, the Panel can not assure operations and may be damaged permanently, not be able to be recovered

Note 2：condition: 1 pcs LED、1/10 duty、10ms width。

Note 3：Ambient temperature and the maximum input are fulfilling the following operating conditions



Note 4：While the panel is used in normal temperature, the temperature in the center of panel's surface must be low than 40 ℃

3. ELECTRICAL CHARACTERISTICS

3.1. TFT LCD (Power Supply Voltage)

Ta = 25℃

Parameter	SYMBOL	Min	Typ	Max	Unit	Remarks
Power Voltage	VCC	3	3.3	3.6	V	
Input Signal Voltage	VIH	0.7VCC	-	VCC	V	
	VIL	0	-	0.3VCC	V	

3.2. TFT-LCD (Current Consumption)

Ta = 25℃

Parameter	SYMBOL	Condition	Min	Typ	Max	Unit	Remarks
Current For Driving	ICC	VCC=3.3		15	27	mA	Note1
Total Power Consumption	PC		-	49.5	89.1	mW	Note1

Note 1：Typ. specification：Gray-256 test Pattern
Max. specification：Black test Pattern

(a)Gray-256 Pattern

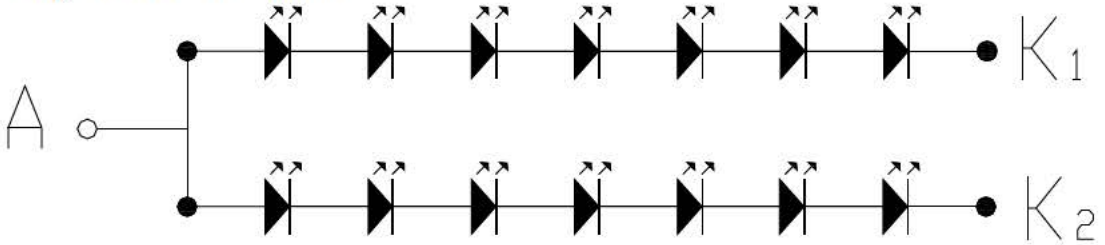
(b)Black Pattern

3.3. Backlight system

Ta=25℃

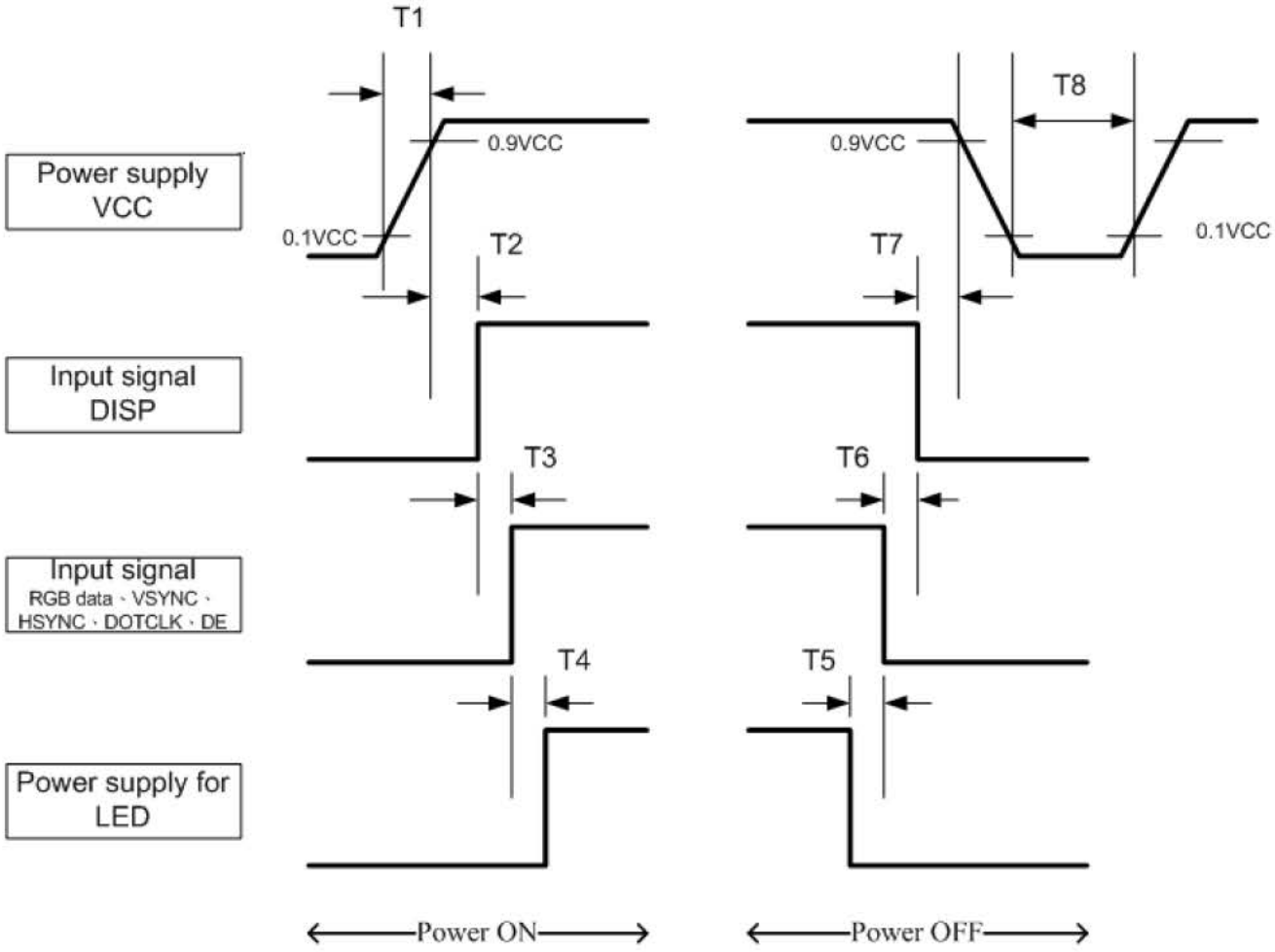
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED Voltage	VL	18.41	--	23.45	V	IL=36.0 mA
LED Current	IL	--	36	--	mA	
Power consumption	W_L	662.76	--	844.2	mW	Note1

Note 1：W_L =VL×IL，IL=36mA



The frame of the LEDs is 7 series-2 parallel connection.

3.4. Power on/off sequence



T1≦10ms
100ms≦T2
100ms≦T3
200ms≦T4
200ms≦T5
100ms≦T6
100ms≦T7
1sec≦T8

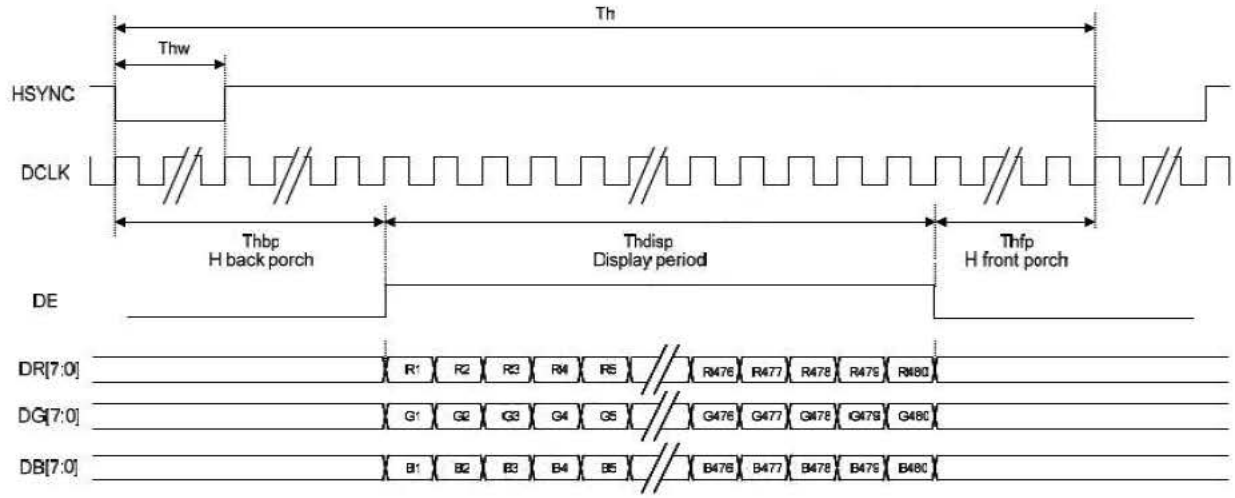
4. INPUT SIGNAL TIMING

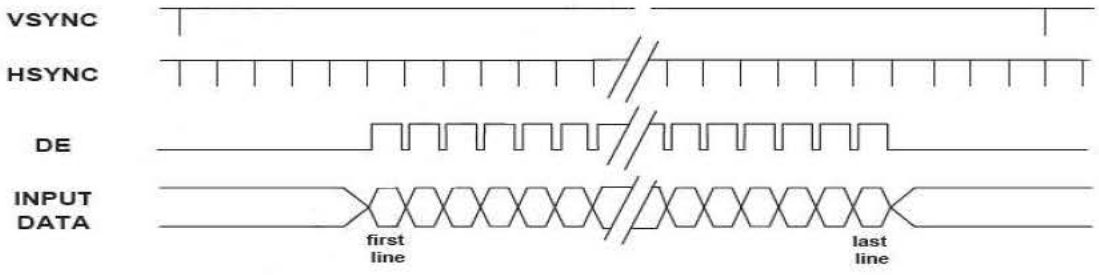
4.1 TTL Timing

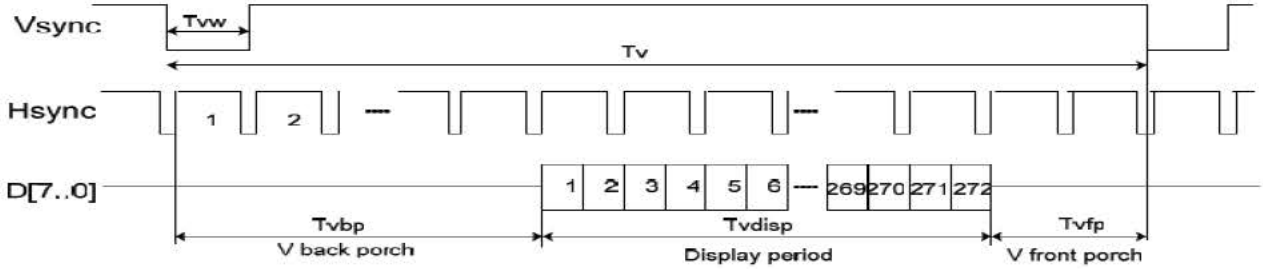
4.1.1 Timing Specification

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	Note
Clock	Frequency	DCLK	6.9	9	10.5	MHz	
Horizontal Section	Frame Rate	Fr	48	60	65	Hz	
	Horizontal Total	Th	513	525	535	DCLK	Th= Thdisp+ Thbp+Thfp
	Horizontal Valid	Thdisp		480		DCLK	
	Horizontal Back Porch	Thbp	29	37	43	DCLK	
	Horizontal Front Porch	Thfp	4	8	12	DCLK	
	Horizontal pulse Width	Thw	1			DCLK	
Vertical Section	Vertical Total	Tv	280	286	302	Th	Tv= Tvdisp+ Tvbp+Tvfp
	Vertical Valid	Tvdisp		272		Th	
	Vertical Back Porch	Tvbp	4	8	22	Th	
	Vertical I Front Porch	Tvfp	4	6	8	Th	
	Vertical pulse Width	Tvw	1			Th	

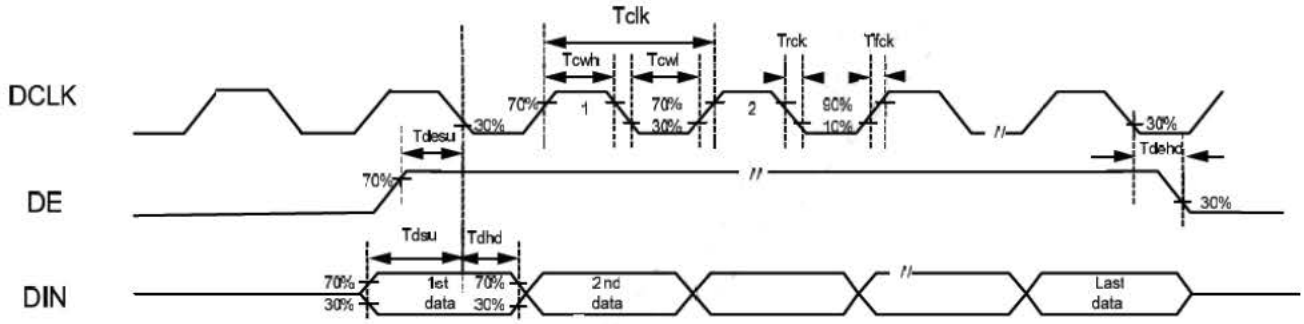
4.1.2 Timing Diagram

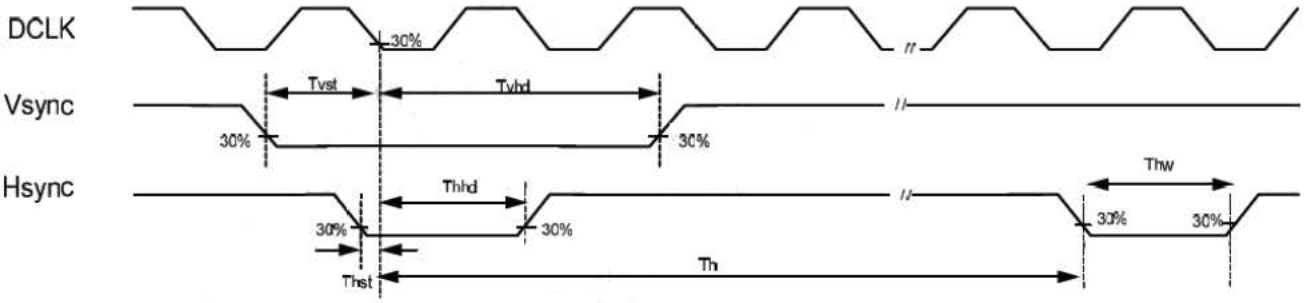






4.2 AC Characteristics





NOTE: VCC=3.3V

Item	Symbol	Min	Typ.	Max	Unit	Conditions
DCLK Pulse duty	Tcwh	40	50	60	%	
DCLK Rising time	Trck	–	–	5	ns	
DCLK Falling time	Tfck	–	–	5	ns	
Hsync width	Thw	1.0	–	–	DCLK	
Hsync period	Th	55	60	65	us	
Vsync setup time	Tvst	12	–	–	ns	
Vsync hold time	Tvhd	12	–	–	ns	
Hsync setup time	Thst	12	–	–	ns	
Hsync hold time	Thhd	12	–	–	ns	
Data setup time	Tdsu	12	–	–	ns	
Data hold time	Tdhd	12	–	–	ns	
DE setup time	Tdesu	12	–	–	ns	
DE hold time	Tdehd	12	–	–	ns	

4.3 Color data definition

COLOR	INPUT DATA	R DATA								G DATA								B DATA							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	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	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	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	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	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	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	GREEN(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	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	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	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	0	0	0	0	0	0	1	0
	BLUE(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note 1：Definition of gray scale:
Color (n): n means level of gray scale. Larger n means brighter level.
Note 2：Data: 1= High, 0 = Low

5. INTERFACE CONNECTION

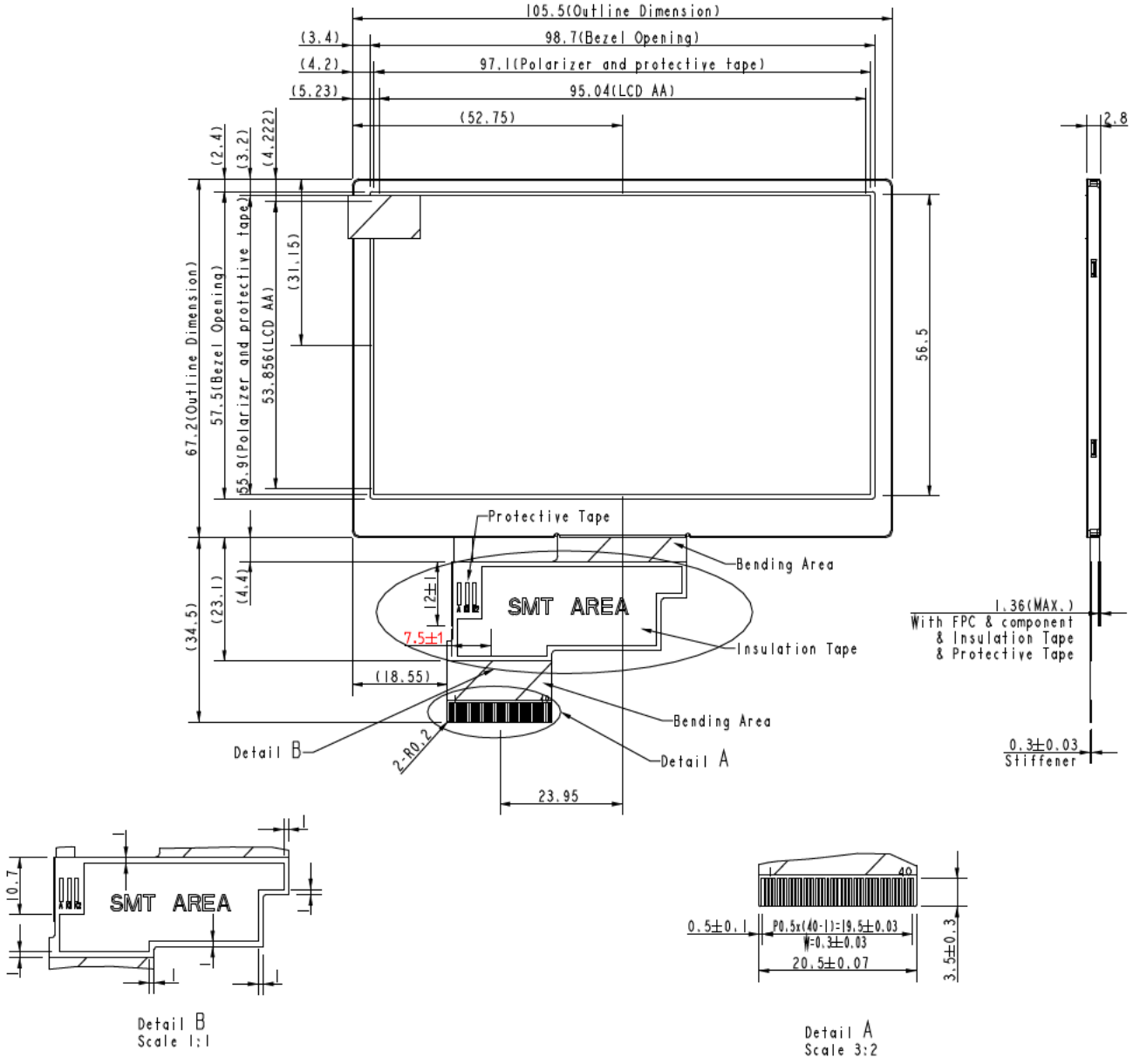
No	Symbol	Function	Remark
1	NC	Not connect	
2	VLED+	Power Supply for LED+	
3	VLED-	Power Supply for LED-	
4	VLED-	Power Supply for LED-	
5	GND	Ground	
6	VCC	Power supply	3.3V
7	GND	Ground	
8	R0	Red data (LSB)	
9	R1	Red data	
10	R2	Red data	
11	R3	Red data	
12	R4	Red data	
13	R5	Red data	
14	R6	Red data	
15	R7	Red data(MSB)	
16	G0	Green data (LSB)	
17	G1	Green data	
18	G2	Green data	
19	G3	Green data	
20	G4	Green data	
21	G5	Green data	
22	G6	Green data	
23	G7	Green data(MSB)	
24	B0	Blue data (LSB)	
25	B1	Blue data	
26	B2	Blue data	
27	B3	Blue data	
28	B4	Blue data	
29	B5	Blue data	
30	B6	Blue data	
31	B7	Blue data(MSB)	
32	GND	Ground	
33	DOTCLK	Pixel clock	
34	GND	Ground	
35	DISP	Display On/Off	
36	HSYNC	Horizontal Sync Signal	
37	VSYNC	Vertical Sync Signal	
38	DE	Data Enable	
39	NC	Not connect	
40	GND	Ground	

Note 1：DISP set High, input data are valid. DISP set Low, input data are invalid.

6. MECHANICAL SPECIFICATION

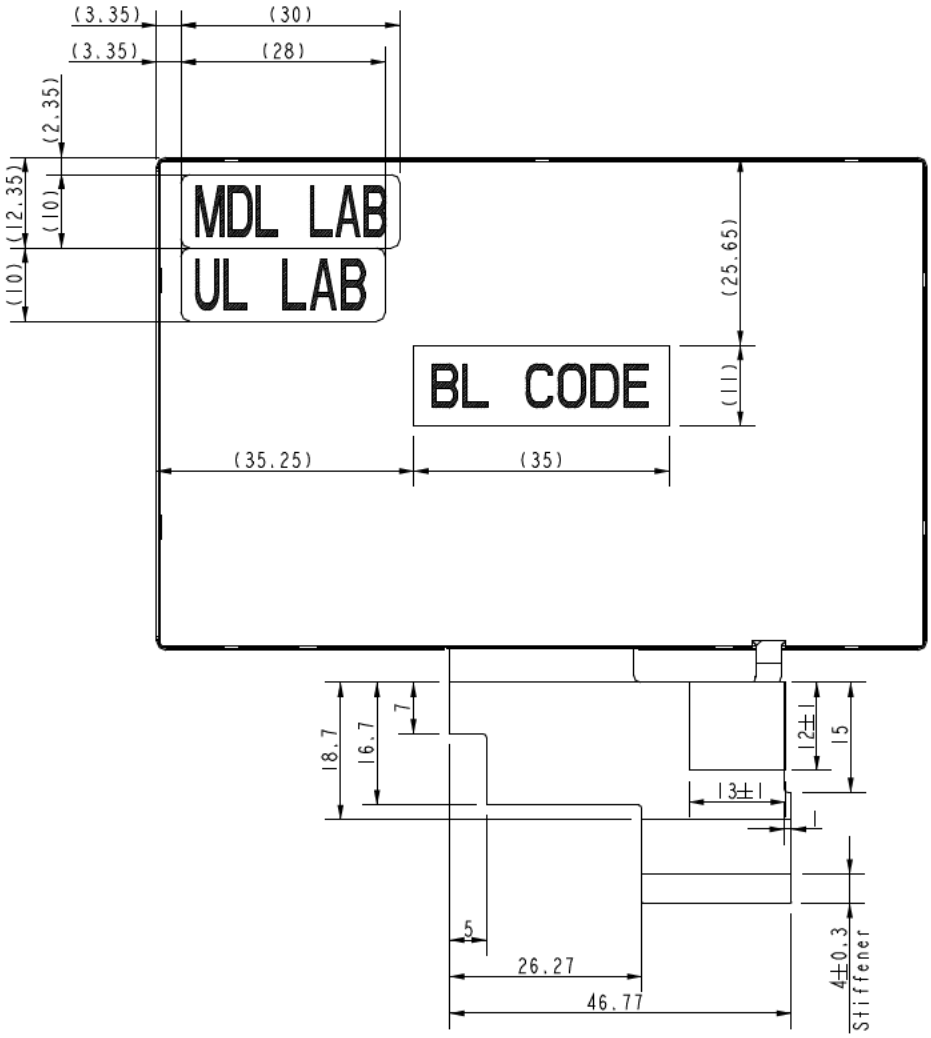
Front View

Unit:mm



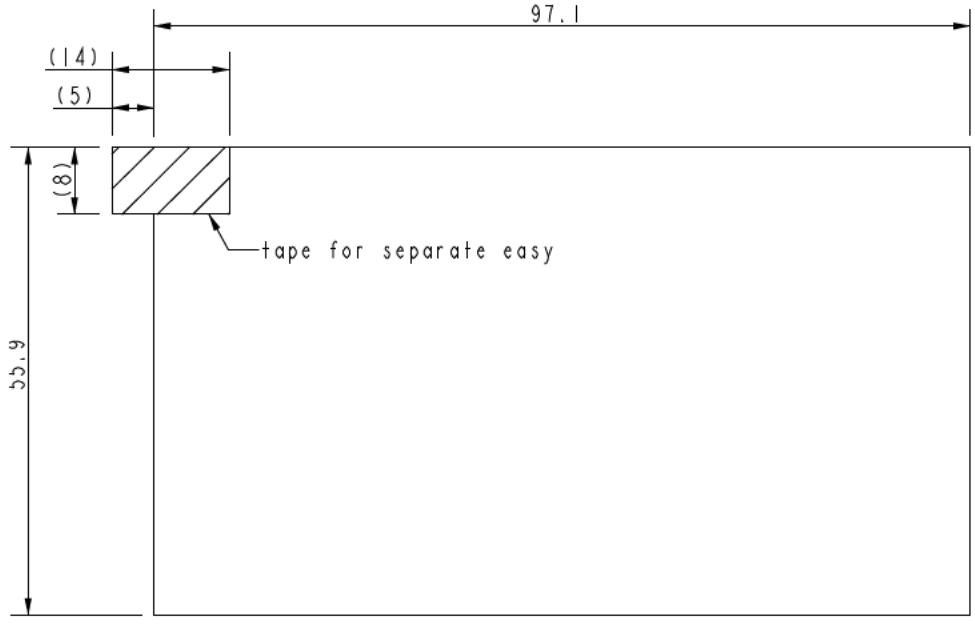
Note ：General tolerance =±0.2mm

Rear View



Note ：General tolerance =±0.2mm

Protective Tape



Note ：General tolerance =±0.2mm

7. OPTICAL SPECIFICATION

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Contrast Ratio		CR	θ =ψ= 0° Point-5	(400)	(500)	--		Note 3
Luminance		L	θ =ψ= 0° Point-5	480	600	--	cd/m^2	
Luminance Uniformity		ΔL	θ =ψ= 0°	70	80	--	%	Note 4
Response Time		Tr+Tf	θ =ψ= 0°	--	(20)	(35)	ms	Note 5
NTSC				(45)	(50)	--	%	
View angle	Horizontal	ϕ	CR≧10 Point-5	(120)	(140)	--	°	Note 6
	Vertical	θ		(100)	(120)	--	°	
Color Coordinate	R	x	θ =ψ= 0° Point-5	(0.553)	(0.593)	(0.633)		
		y		(0.294)	(0.334)	(0.374)		
	G	x		(0.306)	(0.346)	(0.386)		
		y		(0.556)	(0.596)	(0.636)		
	B	x		(0.118)	(0.158)	(0.198)		
		y		(0.075)	(0.115)	(0.155)		
	W	x		0.273	0.313	0.353		
		y		0.289	0.329	0.369		

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

Note 2.Measure device：BM-5A (TOPCON)，viewing cone=1°，I_L=36.0mA。

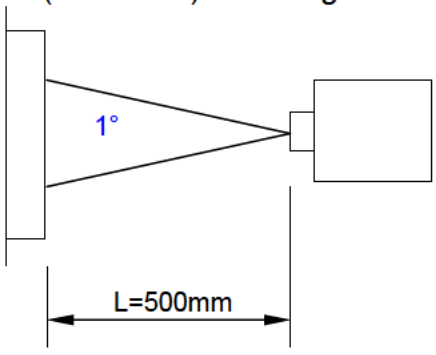


Fig.8-1 viewing cone=1°

Note 3. Definition of Contrast Ratio：

CR = White Luminance (ON) / Black Luminance (OFF)

Note 4.Definition of Luminance Uniformity：△L = L(MIN) / L (MAX) × 100%

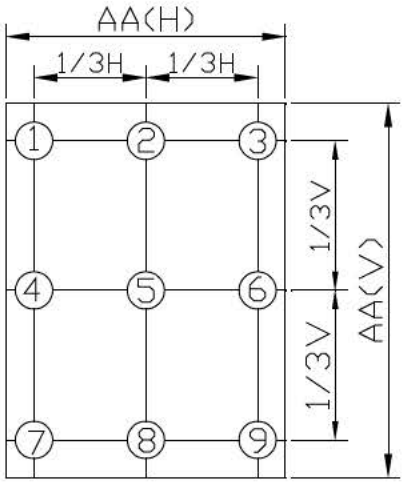


Fig.8-2 Measuring point

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

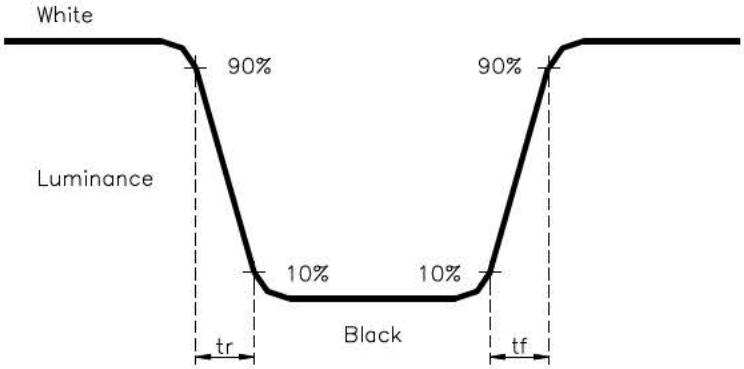


Fig.8-3 Definition of Response Time (White - Black)

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

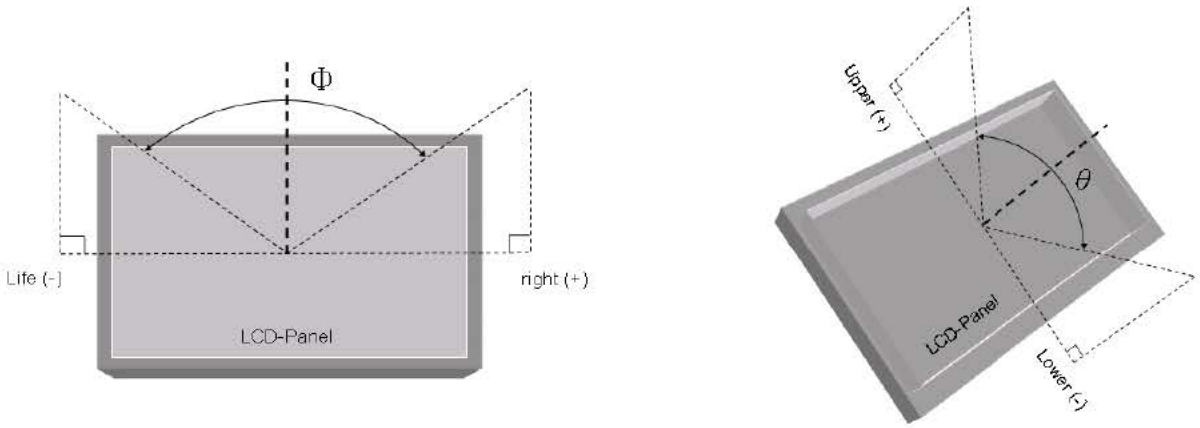


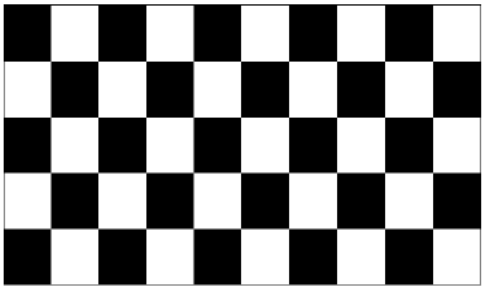
Fig.8-4 Definition of Viewing Angle

8. RELIABILITY TEST

8.1 Temperature and Humidity

TEST ITEMS	CONDITIONS
HIGH TEMPERATURE OPERATION	70°C ; 240Hrs
HIGH TEMPERATURE STORAGE	85°C ; 240Hrs
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	60°C ; 90% RH ; 240Hrs
LOW TEMPERATURE OPERATION	-20°C ; 240Hrs
LOW TEMPERATURE STORAGE	-30°C ; 240Hrs
THERMAL SHOCK (No operation)	-30°C (0.5Hr)～80°C (0.5Hr) 200 Cycles
Image Sticking	White background and black square 4hrs

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 & 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(±X, ±Y, ±Z)for a total of 6 shock inputs.
VIBRATION (Non operation)	● 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

8.3 ESD

TEST ITEM	CONDITIONS	Note
ESD (Non operation)	150 pF、330Ω、±8KV,±15KV	Air mode
	150 pF、330Ω、±8KV,±15KV	Contact mode
	200pF、0Ω、±200V	Connector mode

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 defects.