

TFT LCD Product Specification
CPT Panel for Customer's Approval

Module Type : CLAA048LA0BCT (4.8")

Customer : Beyondinfinite

Approval By:

APPROVED BY	CHECKED BY	ISSUE BY



Chunghwa Picture Tubes, Ltd.

Product Specification

TFT LCD
CLAA048LA0BCT

ACCEPTED BY : (V1.0)

APPROVED BY	CHECKED BY	PREPARED BY

Doc.No:

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2009/09/03

REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First revision (Tentative)	--	2008.11.12
0.1	Revised General specifications	P.4	2008.12.29
	Revised Power Supply Input Current & Total Power Consumption	P.6	
	Revised Touch Panel	P.13 P.14	
0.2	Revised Number of color & Power Consumption	P4	2009.01.20
	Revised Absolute Maximum Ratings	P5	
	Revised Electrical Characteristics	P.6 P.7	
	Revised Adjust control pin (ADJ) of Interface Connection	P.11	
0.3	MECHANICAL SPECIFICATION (Rear Side) & Connector	P.13	2009.05.20
0.4	Revised Input Signal timing Specification & Waveforms	P.8	2009.07.09
0.5	Revised General specification Number of Pixels (dot) : 800(H) x 480(V) x 3(RGB)→ 800(H) x 3(RGB) x 480(V)	P.4	2009.07.29
	Revised Input Signal timing Specification	P.8	
	Revised 6.2 Touch panel Mechanical and reliability characteristics (Note 2、Note3)	P.13	
	Revised Module Drawing	P.15	
	Revised OPTICAL SPECIFICATION	P.16	
	Revised Reliability Test. Adding the Remark item.	P.18	
1.0	Revised General specification 240nit(min)/280nit(typ) W-TSP→280nit(typ) wTSP 114.65(H)*74.7(V)*5.85(D)→114.65(H)*74.7(V)*5.72(D)	4	2009.09.03
	Revised Electrical Characteristics	6	
	Revised the power on/off sequence	7	
	Modify Mechanical drawing	15	

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1. OVERVIEW

CPT CLAA048LA0BCT is 4.8" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module.

The 4.8" screen produces a high resolution image that is composed of 384000 (800×480) pixel elements in a Side-stripe arrangement.

General specifications are summarized in the following table:

ITEM	SPECIFICATION
Panel Size	4.8" inch
Display Area (mm)	103.8(W)X62.28(H)
Number of Pixels (dot)	800(H) x 3(RGB) x 480(V)
Pixel Pitch (mm)	0.12975(H)*0.12975(V)
Color Pixel Arrangement	RGB vertical strip
Display Mode	Normally white TN
Number of color	16M colors
Luminance (cd/m ²)	280nit(typ) W-TSP
Contrast Ratio	400:1(typ)
Optimum Viewing Angle	6' o'clock
Electrical Interface	TTL(8 bit input)
Power Consumption (W)	1.4W(with B/L)
Surface Treatment	Hard coating(3H) Glare treatment of the TSP
Outline Dimension (mm)	114.65(H)*74.7(V)*5.72(D) W-TSP & w Component
Weight (g)	77g(Typ) w TSP w Component

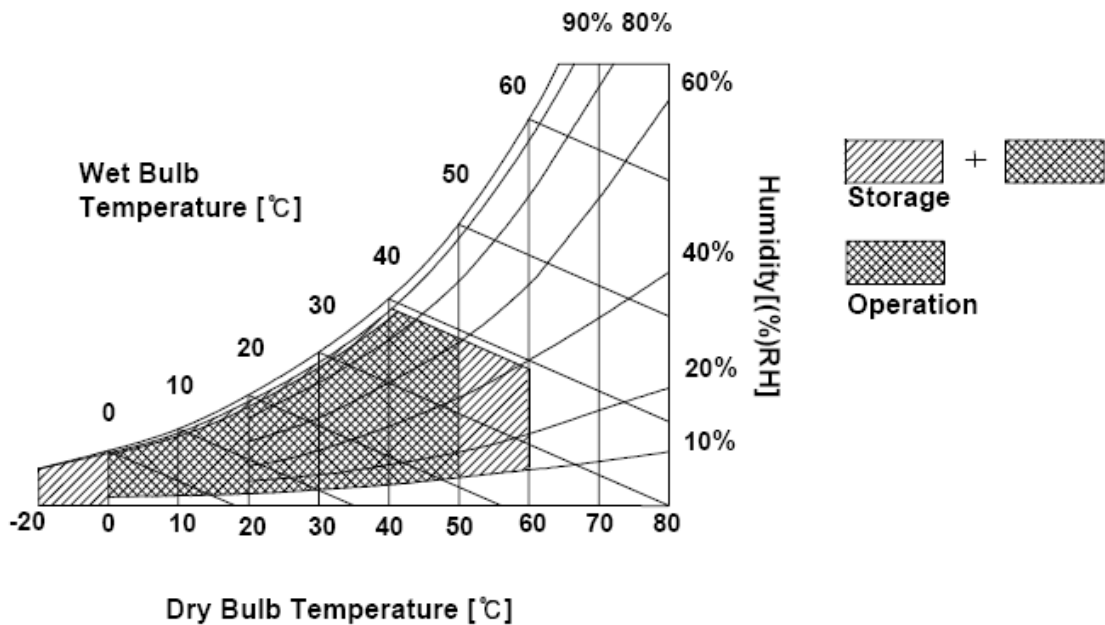
Note 1. Outline Dimension define without FPC

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 Input Voltage	VCC	-0.3	4.6	V	At 25±5°C
LED Driving Circuit Power Supply	VLED	-0.3	7.0	V	At 25±5°C
Operating Temperature	TOP	0	50	°C	
Storage Temperature	TST	-20	60	°C	
Operation Ambient Humidity	HOP	10	90	°C	
Storage Humidity	HST	10	90	°C	

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 Supply Voltage)

Ta = 25°C

PARAMETERS	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Power Supply Input Voltage	VCC	3.0	3.3	3.6	V	
Input Signal Voltage	VIH	0.8*VCC	---	VCC	V	
	VIL	GND	---	0.2*VCC	V	
LED Driving Circuit Power Supply	VLED	3	5	5.5	V	
ADJ Input Voltage	VADJH	3.0	---	3.3	V	
	VADJL	GND	---	0.3	V	

3.2. TFT-LCD (Consumption Current)

Ta = 25°C

PARAMETERS	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
LCD Power Current	ICC	---	125	135	mA	Note1
LED Power Current	ILED	170	190	320	mA	Note2

Note 1 :

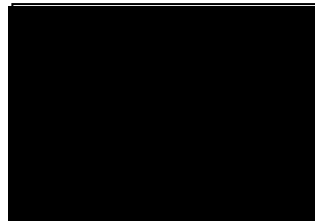
Typ. specification : Gray-256 test Pattern.

Max. specification : Black test Pattern.

The specified current and power consumption are under the VCC = 3.3V, fv = 60Hz condition. Where as Mosaic pattern is displayed and fv is the frame frequency.



(a) Gray-256 Pattern



(b) Black Pattern

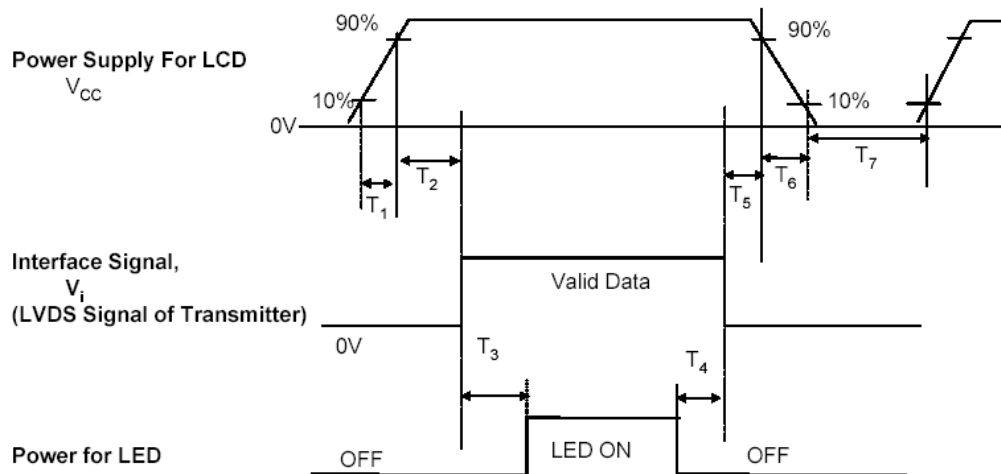
Note 2 :

Min. specification : VLED=5.5V.

Typ. specification : VLED=5V.

Max. specification : VLED=3V.

3.3. Power on/off sequence



PARAMETERS	VALUE			UNITS
	MIN.	TYP.	MAX.	
T1	0.5	---	10	ms
T2	---	---	50	ms
T3	200	---	---	ms
T4	200	---	---	ms
T5	---	---	50	ms
T6	---	---	10	ms
T7	200	---	---	ms

4. INPUT SIGNAL TIMING

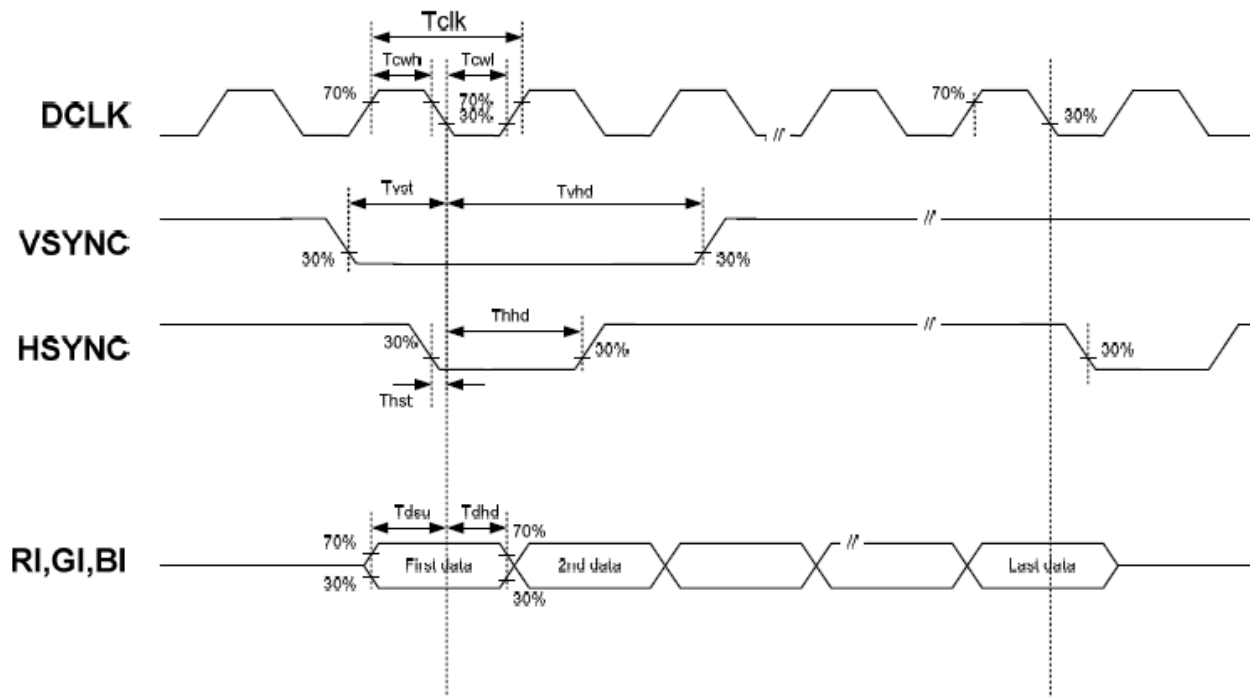
4.1 Signal Timing Specification

This is the signal timing required at the input of the user connector. All of the interface signal timing should be satisfied with the following specifications for its proper operation.

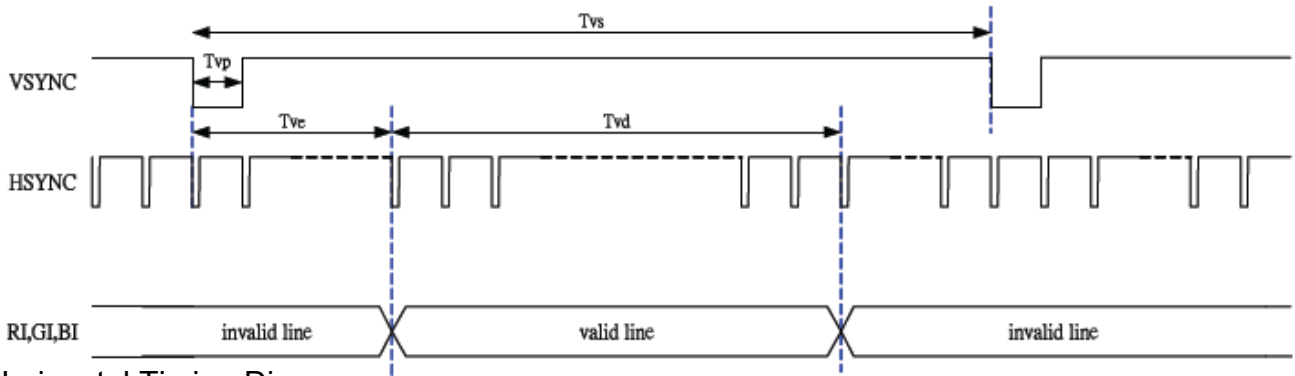
	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK	Dot Clock	1/tclk	25.578	27	39.6	MHz
	Dot Clock Period	Tclk	25.25	---	39.1	ns
	High Level Width	Tcwh	0.4	0.5	0.6	Tclk
	Low Level Width	Tcwl	0.4	0.5	0.6	
DATA	Setup Time	Tdsu	8	---	---	ns
	Hold Time	Tdhd	10	---	---	
SYNC	HSYNC Setup Time	Thst	8	---	---	ns
	HSYNC Hold Time	Thhd	10	---	---	
	HSYNC Period	Ths	870	900	1100	T _{CLK}
	HSYNC Low Pulse Width	Thp	1			
	HSYNC Display Start	The	50			
	Horizontal Active	Thd	800			
	VSYNC Setup Time	Tvst	8	---	---	ns
	VSYNC Hold Time	Tvhd	10	---	---	
	VSYNC Period	Tvs	490	500	600	Ths
	VSYNC Low Pulse Width	Tvp	1			
	VSYNC Display Start	Tve	6			
	Vertical Active	Tvd	480			
	Vertical Frequency	fV	60			

【Note1】 This module is operated by SYNC only mode.

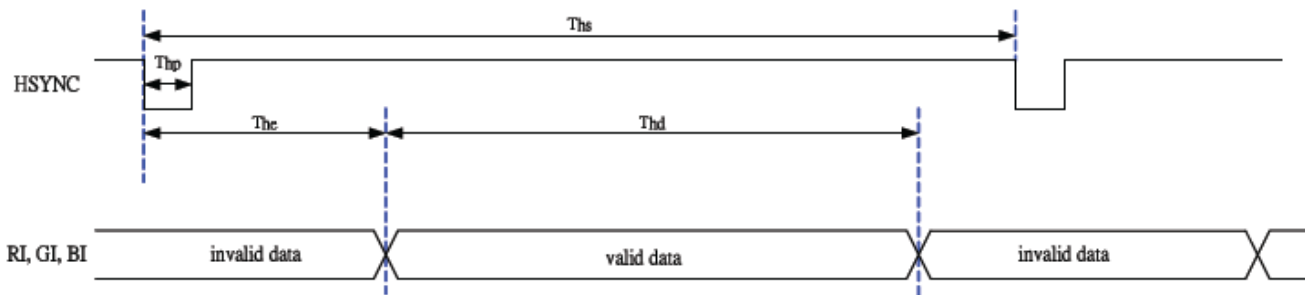
4.2 Signal Timing Waveforms



Vertical Timing Diagram



Horizontal Timing Diagram



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	
	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	
	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	
	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	
	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	
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	
	GREEN(1)	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	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	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	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	
	BLUE(1)	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	1	0	
	BLUE(254)	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	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.

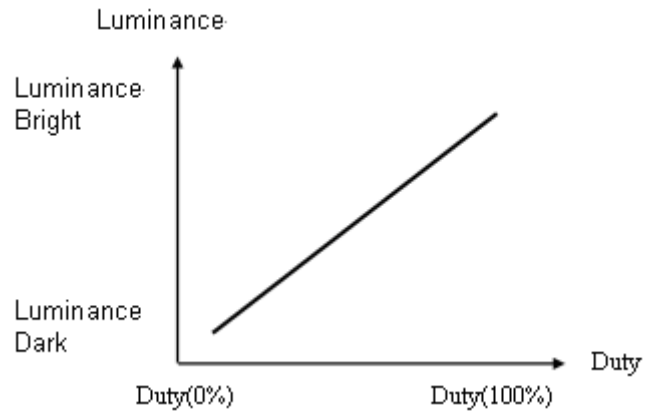
Note 2 : Data: 1= High, 0 = Low

5. INTERFACE CONNECTION

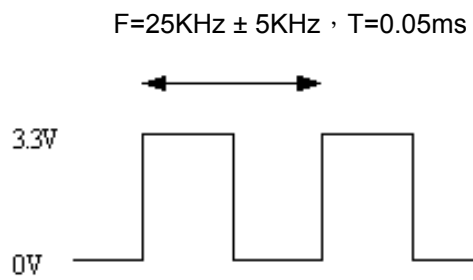
NO	SYMBOL	FUNCTION	REMARK
1	GND	Ground	
2	VCC	Power Supply	3.3V
3	VCC	Power Supply	
4	GND	Ground	
5	DCLK	Data Clock	
6	GND	Ground	
7	B0	Blue Data 0	
8	B1	Blue Data 1	
9	B2	Blue Data 2	
10	B3	Blue Data 3	
11	B4	Blue Data 4	
12	B5	Blue Data 5	
13	B6	Blue Data 6	
14	B7	Blue Data 7	
15	G0	Green Data 0	
16	G1	Green Data 1	
17	G2	Green Data 2	
18	G3	Green Data 3	
19	G4	Green Data 4	
20	G5	Green Data 5	
21	G6	Green Data 6	
22	G7	Green Data 7	
23	R0	Red Data 0	
24	R1	Red Data 1	
25	R2	Red Data 2	
26	R3	Red Data 3	
27	R4	Red Data 4	
28	R5	Red Data 5	
29	R6	Red Data 6	
30	R7	Red Data 7	
31	GND	Ground	
32	NC	No Connection	
33	NC	No Connection	
34	NC	No Connection	
35	HSYNC	Horizontal SYNC	
36	VSYNC	Vertical SYNC	
37	NC	No Connection	
38	NC	No Connection	
39	NC	No Connection	
40	GND	GND	
41	XR	TP Right electrode	
42	YU	TP Top electrode	
43	XL	TP Left electrode	
44	YD	TP Bottom electrode	
45	GND	Ground	
46	VLED	LED Power	5V/200mA
47	GND	Ground	
48	ADJ	Brightness control for LED B/L	
49	GND	Ground	
50	GND	Ground	

Note 1 : To reserve NC pin, don't make it connect with GND or any other signal.

Note 2 : Adjust control pin (ADJ) controls brightness. The bigger pulse duty, will be the brighter luminance.



Note 3 : ADJ signal=0~3.3V, operation frequency: 25KHZ±5KHZ



Note 4 : The ADJ should pull-high if not adjust brightness, this pin can't floating.

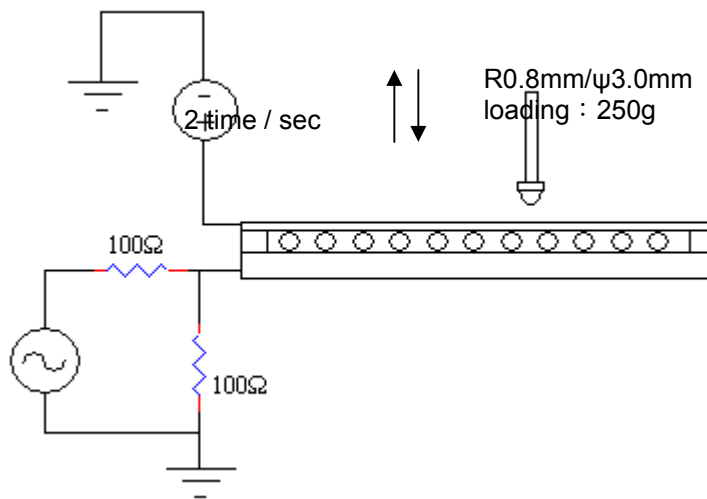
6. TOUCH PANEL

6.1. Electrical Characteristics

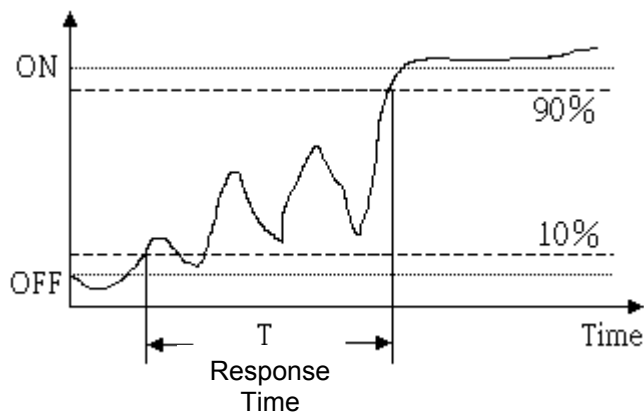
ITEM	MIN	TYP	MAX	UNIT	NOTE
Linearity error	-1.5	--	1.5	%	
Resistance Between Terminals *1)	400	--	1300	Ω	X (Film Side)
	150	--	600	Ω	Y (Glass Side)
Insulation Resistance	20M	--	--	Ω	DC 25V
Operation Voltage	--	--	20	V	DC power
Response Time	--	--	10	ms	*2)

Note 1 : Type : four-wire resistance

Note 2 :



oscilloscope



6.2. Mechanical and reliability characteristics

ITEM	MIN	TYP	MAX	UNIT	NOTE
Activation Force	5	--	80	g	Note1
Durability-surface pitting	1,000,000			time	Note2
Durability-surface scratching	100,000			time	Note3
Surface Treatment	3			H	45°/4.9 Nt

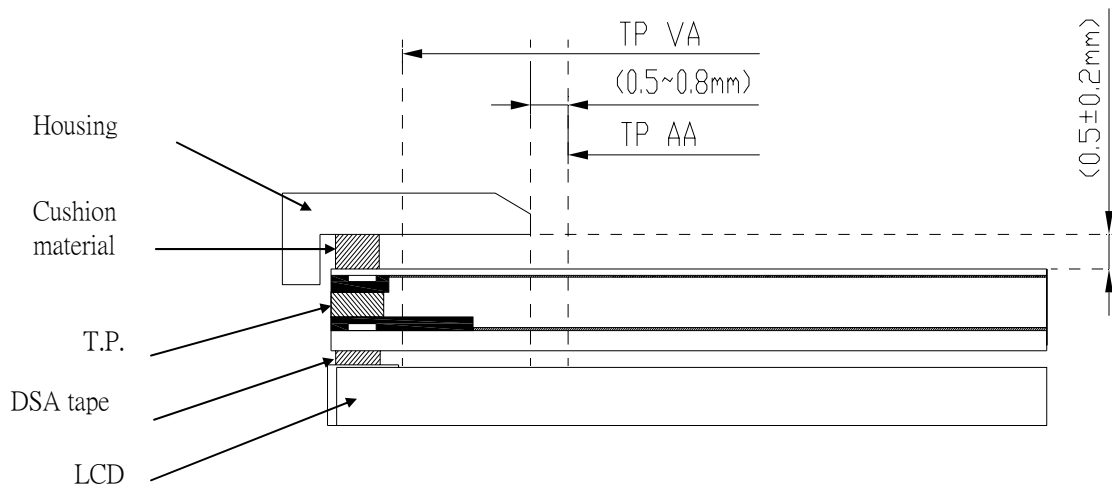
Note 1 : Test area is the center of AA area with stylus pen : R 0.8mm.
Then the Activation Force is over 80g, Touch panel always will be activated.

Note 2 : measurement for surface area
writing with the Silicon Rubber pen (R 8.0mm) on the same point of the touch panel with 250g force , frequency : 5Hz

Note 3 : writing with the test pen (R 0.8 polyacetal pen) on the touch area of the touch panel with 250g (2.45N) force , moving velocity : 300mm/sec , the length to draw : 35mm

6.3. Design guideline for Touch Panel

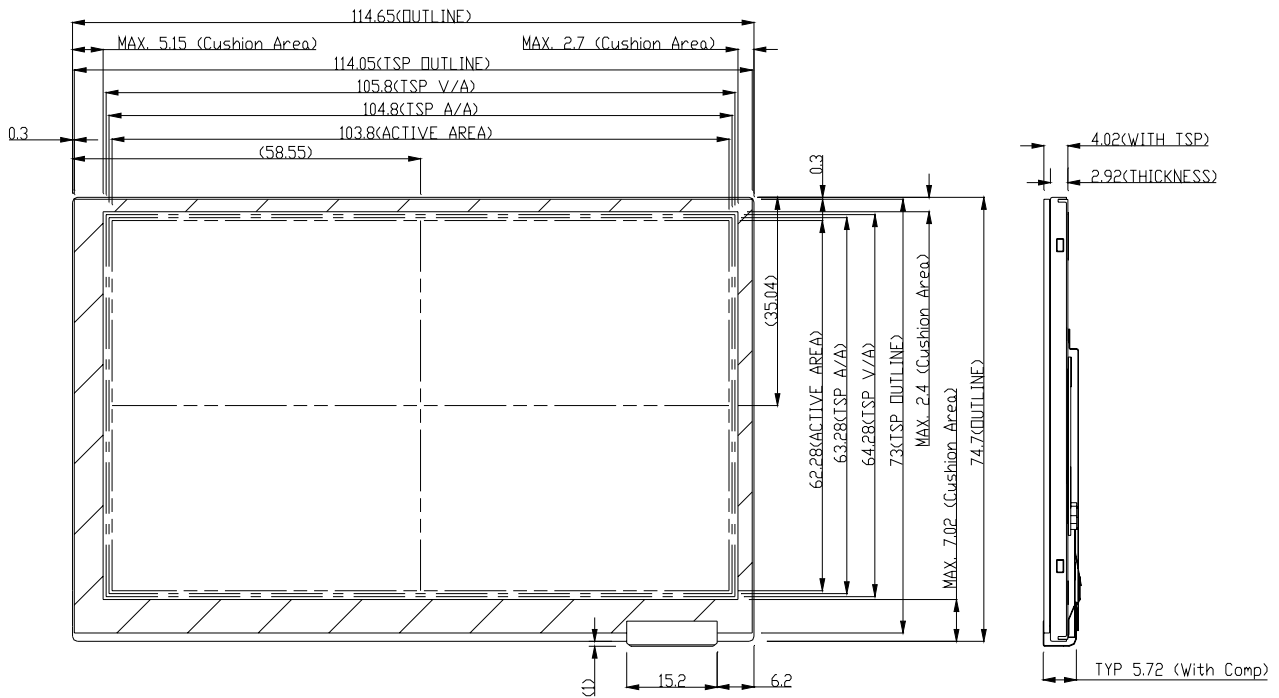
- (1).The Housing Cushion on touch-panel must be set at outside of T.P's view-area, and the gap between Cushion material and TP VA must be at least 0.8mm.
- (2).The Cushion material must be elastic material.
- (3).The housing must avoid to touch the T.P
- (4).To combine, the housing should not be stuck on T.P.
- (5).Example of housing design :



7. MECHANICAL SPECIFICATION

7.1 Front Side

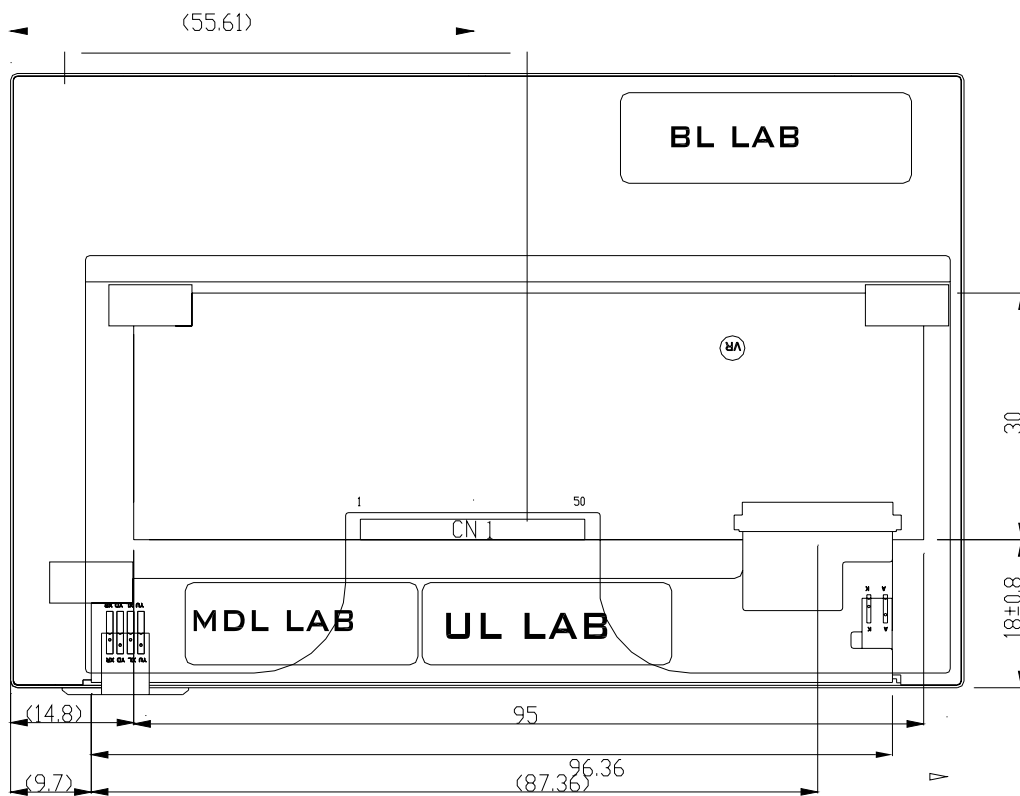
[Unit : mm]



Note : Unit:[mm], General tolerance : ± 0.3mm

7.2 Rear Side

[Unit : mm]



Note : General tolerance : ± 0.3mm

CN 01 : Reference connector is STARCONN 106A50

8. OPTICAL SPECIFICATION

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast Ratio		CR	$\theta = \psi = 0^\circ$ Point-5		400	--		*1)*2)*3)
Luminance		L	$\theta = \psi = 0^\circ$ Point-5	240	280	--	cd/m ²	*1)*2)
Luminance Uniformity		ΔL	$\theta = \psi = 0^\circ$	70	75	--	%	*1)*2)*4)
Response Time		Tr+Tf	$\theta = \psi = 0^\circ$	--	20	--	ms	*1)*2)*5)
View angle	Horizontal	ϕ	CR \geq 10 Point-5		140	--	°	*1)*2)*6)
	Vertical	θ			120	--	°	
Color Coordinate	W	x	$\theta = \psi = 0^\circ$ Point-5	0.273	0.313	0.353		*1)*2)
		y		0.289	0.329	0.369		
	R	x		0.543	0.583	0.623		
		y		0.293	0.333	0.373		
	G	x		0.301	0.341	0.381		
		y		0.544	0.584	0.624		
	B	x		0.120	0.160	0.200		
		y		0.093	0.133	0.173		

【Note】

*1) Ambient condition : $25^\circ\text{C} \pm 2^\circ\text{C}$, $60 \pm 10\% \text{RH}$, under 10 Lunx in the darkroom .
Lighting the LCM and measuring after 10 minutes.

*2) Measure device : BM-5A (TOPCON) , viewing cone= 1° , $V_{cc}=3.3\text{V}$, $f_v = 60\text{Hz}$, $f_{CLK} = 27\text{Hz}$, $I_{Led}=80.0\text{mA}$.

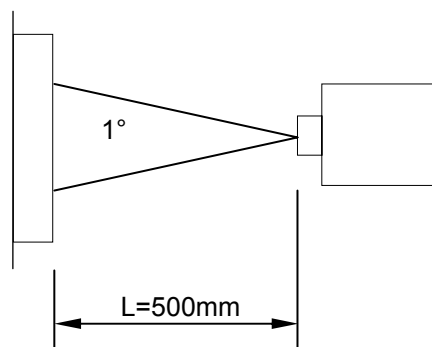


Fig.8-1 viewing cone= 1°

*3) Definition of Contrast Ratio :

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

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

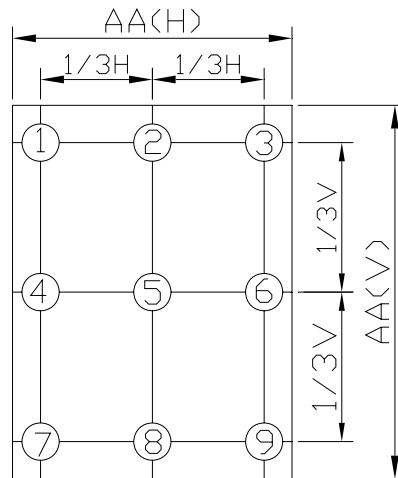


Fig.8-2 Measuring point

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

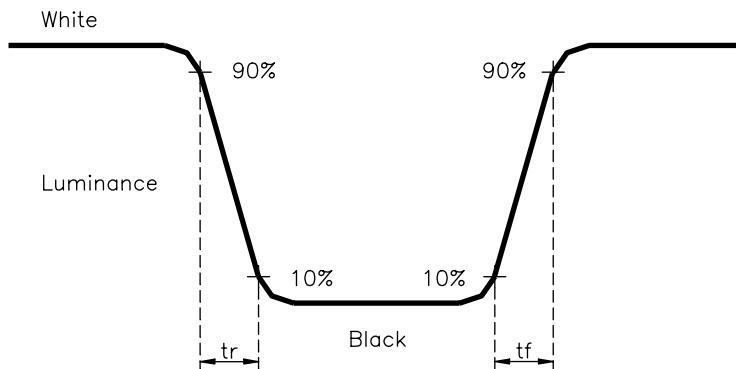


Fig.8-3 Definition of Response Time (White - Black)

*6) Definition of view angle($\theta \cdot \psi$) :

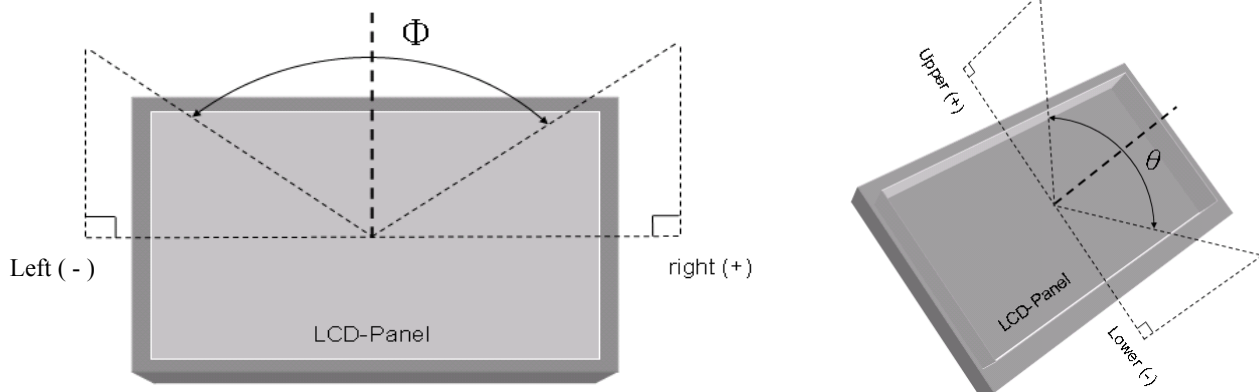


Fig.8-4 Definition of Viewing Angle

9. RELIABILITY TEST

9.1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	70° C ; 240Hrs	
High Temperature Storage	80° C ; 240Hrs	
High Temperature High Humidity Operation	60° C ; 90% RH ; 240Hrs	No condensation
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	

9.2 Shock & 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 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.