



Chunghwa Picture Tubes, Ltd.

Product Specification

To : RB Electronics

Date : 080226

TFT LCD
CLAA070LC0FCT

ACCEPTED BY :(V0.1)

Tentative

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1. OVERVIEW

CLAA070LC0FCT is 7" color TFT-LCD(Thin Film Transistor Liquid Crystal Display)module which integrates Touch-Screen.Composed of LCD panel,driver ICs,control circuit,and LED backlight.

The 7.0"screen produces a high resolution image that is composed of 800×480 pixel elements in a stripe arrangement.Display 262K colors by 6 Bit R.G.B signal input.

General specifications are summarized in the following table :

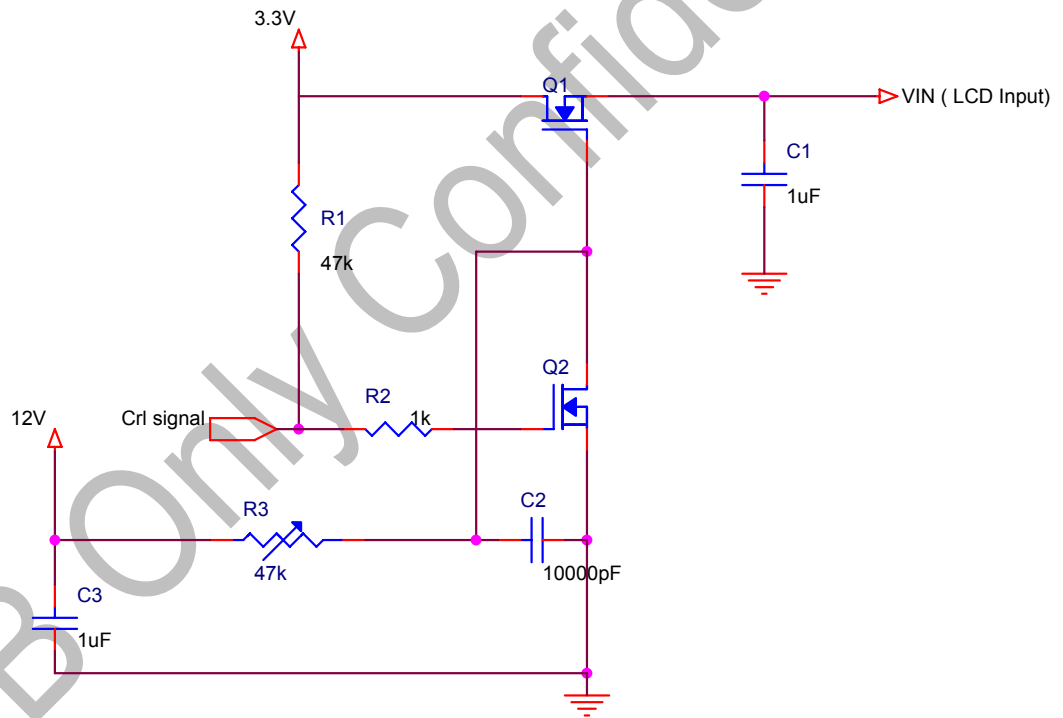
ITEM	SPECIFICATION
Display Area (mm)	152.4(W)×91.44(H)
Number of Pixels	800(H)×3(RGB)×480(V)
Pixel Pitch (mm)	0.1905(H)×0.1905(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white
Number of colors	262,144
Viewing Direction	6 o'clock
Response Time (Tr+Tf)	20ms
Brightness(cd/m ²)	250nit(typ)
Viewing Angle(BL on,CR≥10)	140 degree(H) · 110degree(V)
Electrical Interface(data)	TTL
Power consumption	2.5W(Typ)
Outline Dimension(in mm)	165(W)×104(H)×6(D)
Weight(g)	TBD
BL unit	LED
Surface Treatment	Anti-Glare · Hardness:3H
Touch Panel Type	4 wire resistive

2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V _{cc}	-0.5	5.0	V	
Signal Input Voltage	DCLK,DE,R0,G0,B0~R5,G5,B5	-0.5	V _{cc} + 0.5	V	
Static Electricity	VESDc	-200	+200	V	*2)
	VESDm	-15K	+15K	V	
ICC Rush Current	IRUSH	-	1	A	*3)
Operation Temperature	T _{op}	-30	85	°C	*1)
Storage Temperature	T _{stg}	-40	95	°C	*1)

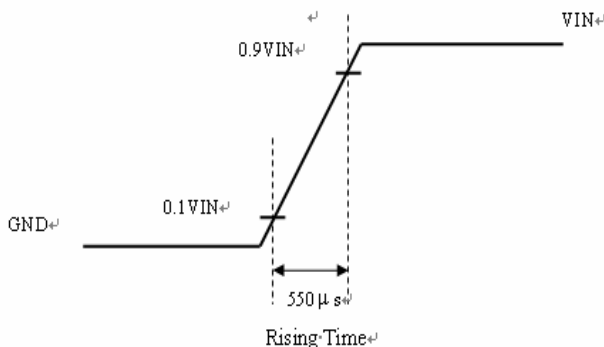
Remarks :

- *1) If users use the product out off the environment operation range (temperature and humidity) ,it will concern for visual quality.
- *2) Test Condition: IEC 61000-4-2 ,
 VESDc : Contact discharge to input connector
 VESDm : Discontact discharge to module
- *3) The input pulse-current measurement system as below :



Control signal: High(+3.3V)→Low(GND)

Supply Voltage of rising time should be from R3 and C2 tune to 550 us.



3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD

Ta=25°C

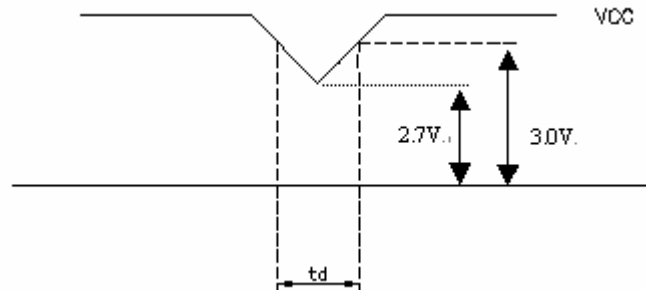
Item	Symbol	Min.	Typ	Max.	Unit	Note
Power Supply Voltage For LCD	VCC	3.0	3.3	3.6	V	*1)
Power Supply Voltage For LED	VDD	4.5	5	5.5	V	
Logic Input Voltage	VIH	VCC*0.7	-	VCC	V	
	VIL	0	-	VCC*0.3	V	
ADJ Input Voltage	VADJ_H	3.0		3.3	V	
	VADJ_L	GND		0.3	V	

Remarks :

*1) VCC –dip codition:

When $2.7\text{ V} \leq \text{VCC} < 3.0\text{V}$, $t_d \leq 10\text{ms}$.*2)When $\text{VCC} < 3.0\text{V}$, it works abnormal that must reset power.

VCC dip conditions should follow VCC turn on conditions



3.2 TFT-LCD Current Consumption

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
LCD Power Current	ICC	--	150	200	mA	*1)
LED Power Current	ILED		400	450	mA	*2)

*1) Typical: Under 64 gray pattern
 Maximum: Under black pattern



(a)64 Gray Pattern

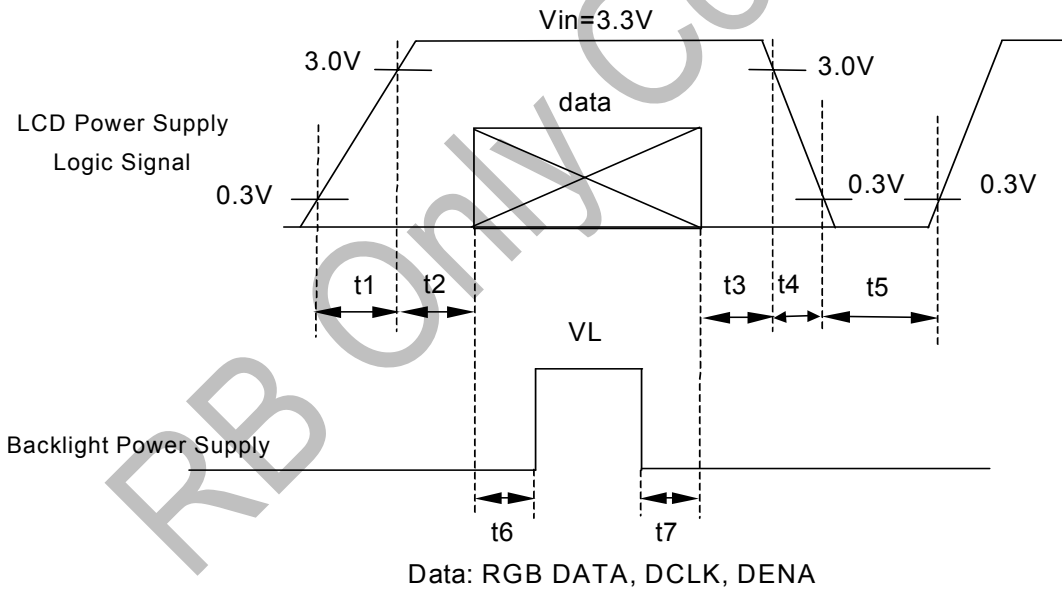


(b)Black Pattern

*2) Typical: When VDD is 5V
 Maximum: When VDD is 4.5V

3.3 Power · signal sequence

- $t1 \leq 10\text{ms}$ $1 \text{ sec} \leq t5$
- $0 < t2 \leq 50\text{ms}$ $200\text{ms} \leq t6$
- $0 < t3 \leq 50\text{ms}$ $200\text{ms} \leq t7$
- $0 < t4 \leq 10\text{ms}$



4. INTERFACE CONNECTION

4.1 CN1

(Connector type:40pin/0.5mm pitch/Bottom contact)-089N40-000R00-G2

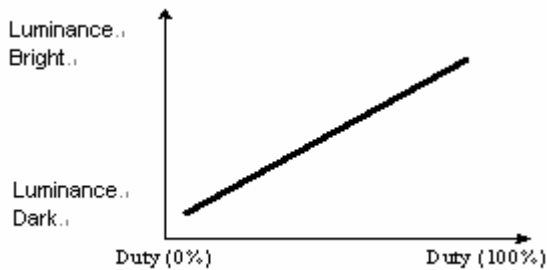
Pin NO.	SYMBOL	DESCRIPTION
1	U/D	Up or Down Display Control
2	DMS	Selection DE or SYNC
3	Hsync	Horizontal SYNC.
4	VLED	Power Supply for LED Driver circuit
5	VLED	Power Supply for LED Driver circuit
6	VLED	Power Supply for LED Driver circuit
7	VCC	Power Supply
8	Vsync	Vertical SYNC.
9	DE	Data Enable Signal
10	AV _{SS}	Ground
11	AV _{SS}	Ground
12	ADJ	Brightness control for LED B/L
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	V _{SS}	Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	AV _{SS}	Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	AV _{SS}	Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	AV _{SS}	Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	AV _{SS}	Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0 (LSB)
36	AV _{SS}	Ground
37	AV _{SS}	Ground
38	DCLK	Clock Signal
39	AV _{SS}	Ground
40	L/R	Left or Right Display Control

4.2 CN2 (Touch Panel)

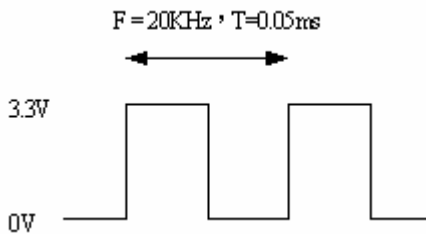
Pin No.	Symbol	function
1	XL	X axis resistance
2	YD	Y axis resistance
3	XR	X axis resistance
4	YU	Y axis resistance

Remarks :

1).ADJ adjust brightness to control Pin · Pulse duty the more big the more bright



2) ADJ signal=0~3.3V , operation frequency : 20±5KHz



3) AVSS Pin must ground contact , can not be floating.

4) TP_FPC suggested connector(CN2) : molex 52207-0490 (or compatible connectors)

5) U/D andL/R controled Function

L/R	U/D	Function
1	0	Normally display
0	0	Left and Right opposite
1	1	Up and Down opposite
0	1	Left and Right opposite , Up and Down opposite

6) DMS (Selection DE / SYNC mode)

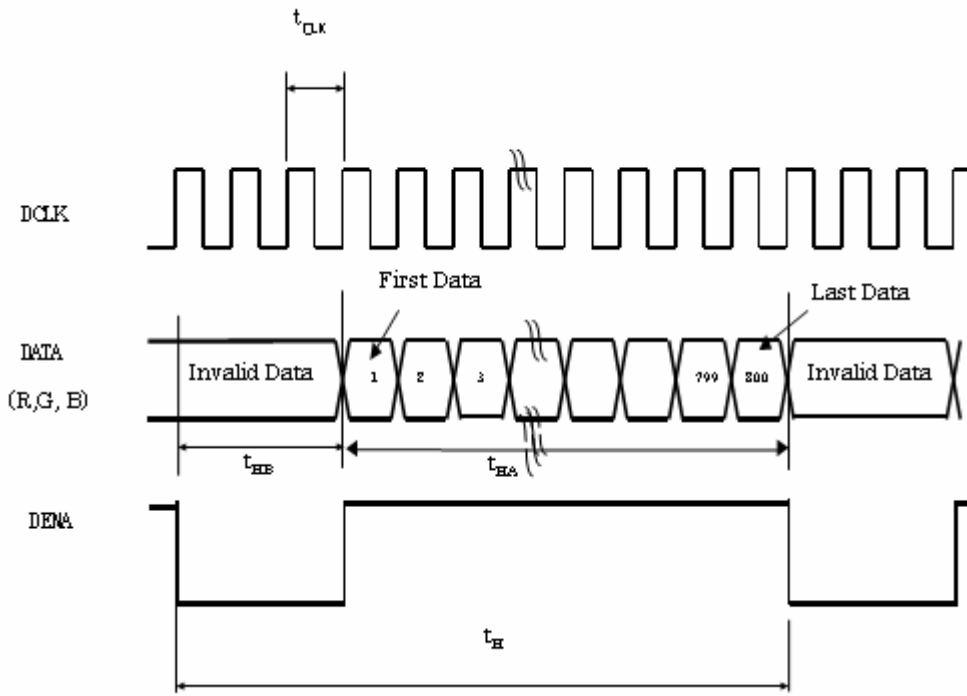
DMS	Function
1	DE Mode
0	SYNC Mode

5. INPUT SIGNAL(DE ONLY MODE)

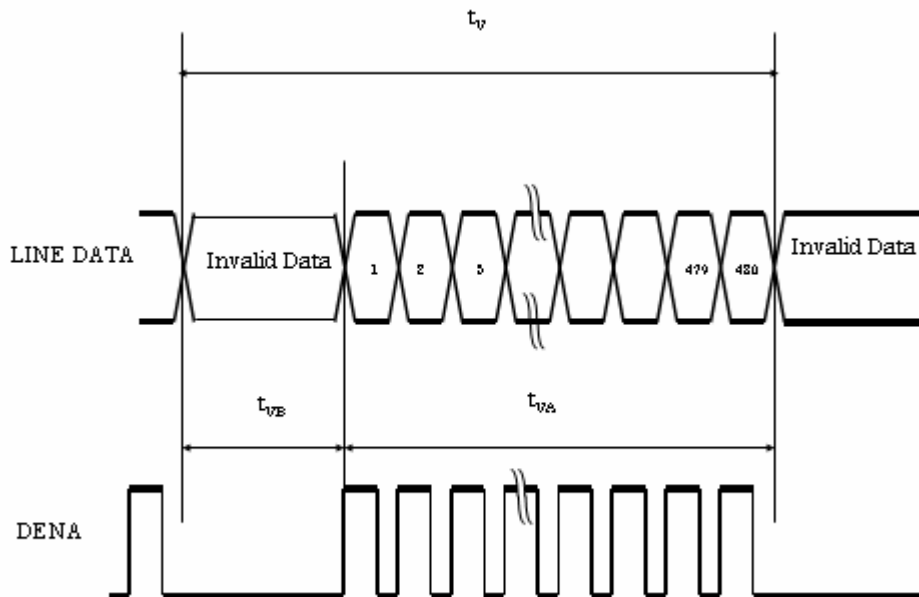
5.1 Timing Specification

	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	
DCLK	Dot Clock	f_{CLK}	25	27	32	MHz	
	Low Level Width	t_{WCL}	6	-	-	ns	
	High Level Width	t_{WCH}	6	-	-		
DE MODE	DE Setup Time	t_{DES}	5	-	-	ns	
	DE Hold Time	t_{DEH}	10	-	-		
	Horizontal Period	t_{HP}	850	900	950	t_{CLK}	
	Horizontal Valid	t_{HV}	800				
	Horizontal Blank	t_{HBK}	50	100	150		
	Vertical Period	t_{VP}	490	500	520	t_{HP}	
	Vertical Valid	t_{VV}	480				
	Vertical Blank	t_{VBK}	10	20	40		
	Vertical Frequency	f_V	55	60	65	Hz	
	SYNC MODE	HSYNC Setup Time	t_{HSS}	5	-	-	ns
		HSYNC Hold Time	t_{HSH}	10	-	-	
VSYNC Setup Time		t_{VSS}	5	-	-		
VSYNC Hold Time		t_{VSH}	10	-	-		
Horizontal Period		t_{HP}	850	900	950	t_{CLK}	
Horizontal Pulse Width		t_{HPW}	4	-	-		
Horizontal Pulse Width + Back Proch		t_{HPWB}	50	50	50		
Horizontal Front Proch		t_{HFP}	0	50	100		
Horizontal Valid		t_{HV}	800			t_{HP}	
Vertical Period		t_{VP}	490	500	520		
Vertical Pulse Width		t_{VPW}	1	-	-		
Vertical Pulse Width + Back Proch		t_{VPWB}	6	6	6		
Vertical Front Proch		t_{VFP}	4	14	34		
Vertical Valid		t_{VV}	480				
Vertical Frequency	f_V	55	60	65	Hz		
DATA	Setup Time	t_{DS}	5	-	-		ns
	Hold Time	t_{DH}	10	-	-		

5.2 Timing sequence(Timing chart)
Horizontal sequence



Vertical sequence



5.3 Color Data Assignment

COLOR	INPUT DATA	R DATA						G DATA						B DATA					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	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
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	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
RED	RED(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	1	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	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
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	GREEN(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	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
	BLUE(1)	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	1	0
	BLUE(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

Remarks :

- (1) Definition of Gray Scale
 color(n) : n is series of Gray Scale
 The more n value is, the bright Gray Scale.
- (2)Data: 1-High, 0-Low

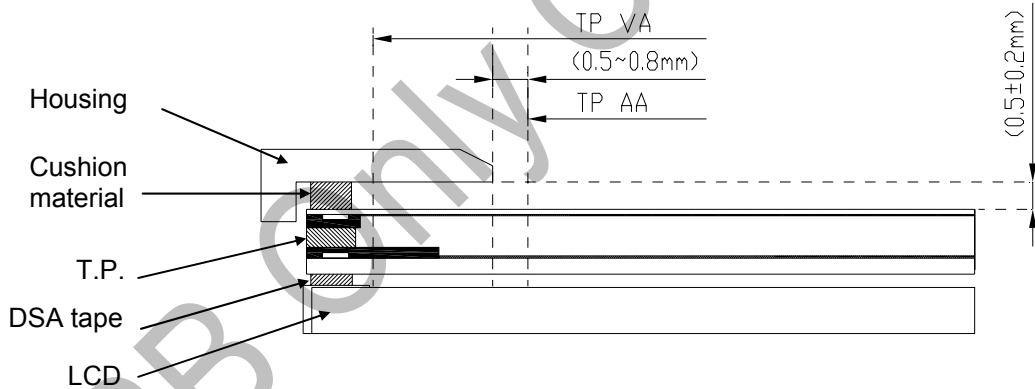
6. CHARACTERISTIC OF TOUCH PANEL

6.1 Basis characteristic

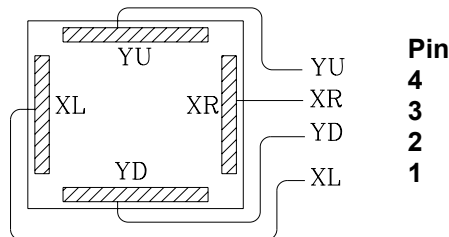
Item	Standard	Note
Operating Voltage	3V(Min)/5V(Typ)/7V(Max)	DC
Surface Treatment	Anti-Glare · Hardness : 3H	
Activation Force	20gf ± 10gf	Less than 80gf(Typical 20gf) individual with stylus pen (R 0.8mm) or finger (R 8.0mm)
Linearity Force	130 gf	Input with stylus pen (R0.8mm)
Interface Type	4 Wire Resistive	
Resistance Between Terminals	X(Glass side) : 360~1140Ω Y(Film side) : 120~640Ω	At the connector
Linearity	X(Glass side) : ≤ 1.5% Y(Film side) : ≤ 1.5%	Testing interval is 2mm with load 100g
Insulation Resistance	Min. 20MΩ	At DC 25V

6.2 Design guideline for Touch-Panel

- (a) The Housing Cushion on touch-panel must be set at outside of T.P's view-area .
- (b) The Cushion material must be elastic material.
- (c) The housing must avoid to touch the T.P
- (d) To combine, the housing should not be stuck on T.P.
- (e) Example of housing design :

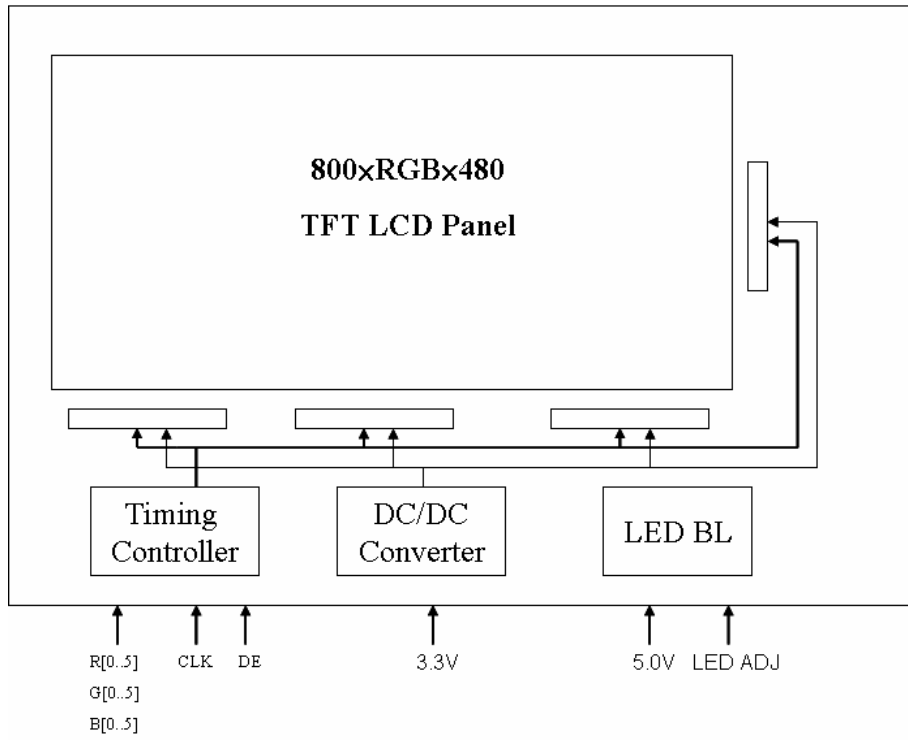


6.3 Circuit Diagram



Circuit Diagram

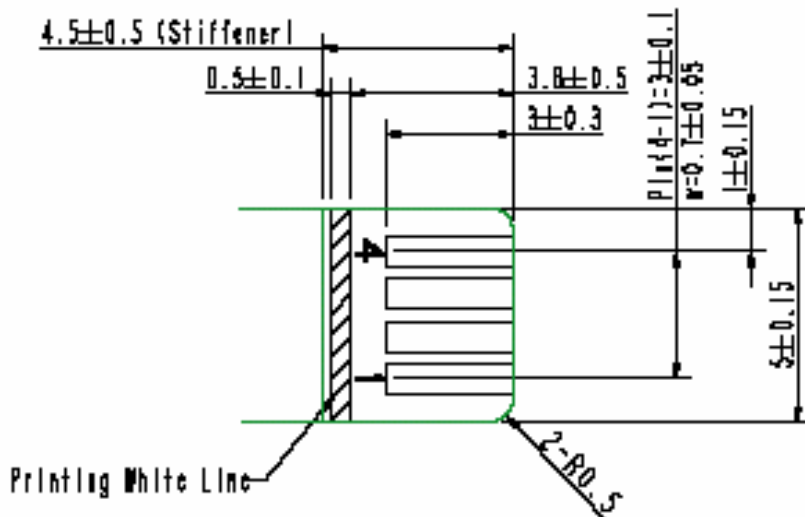
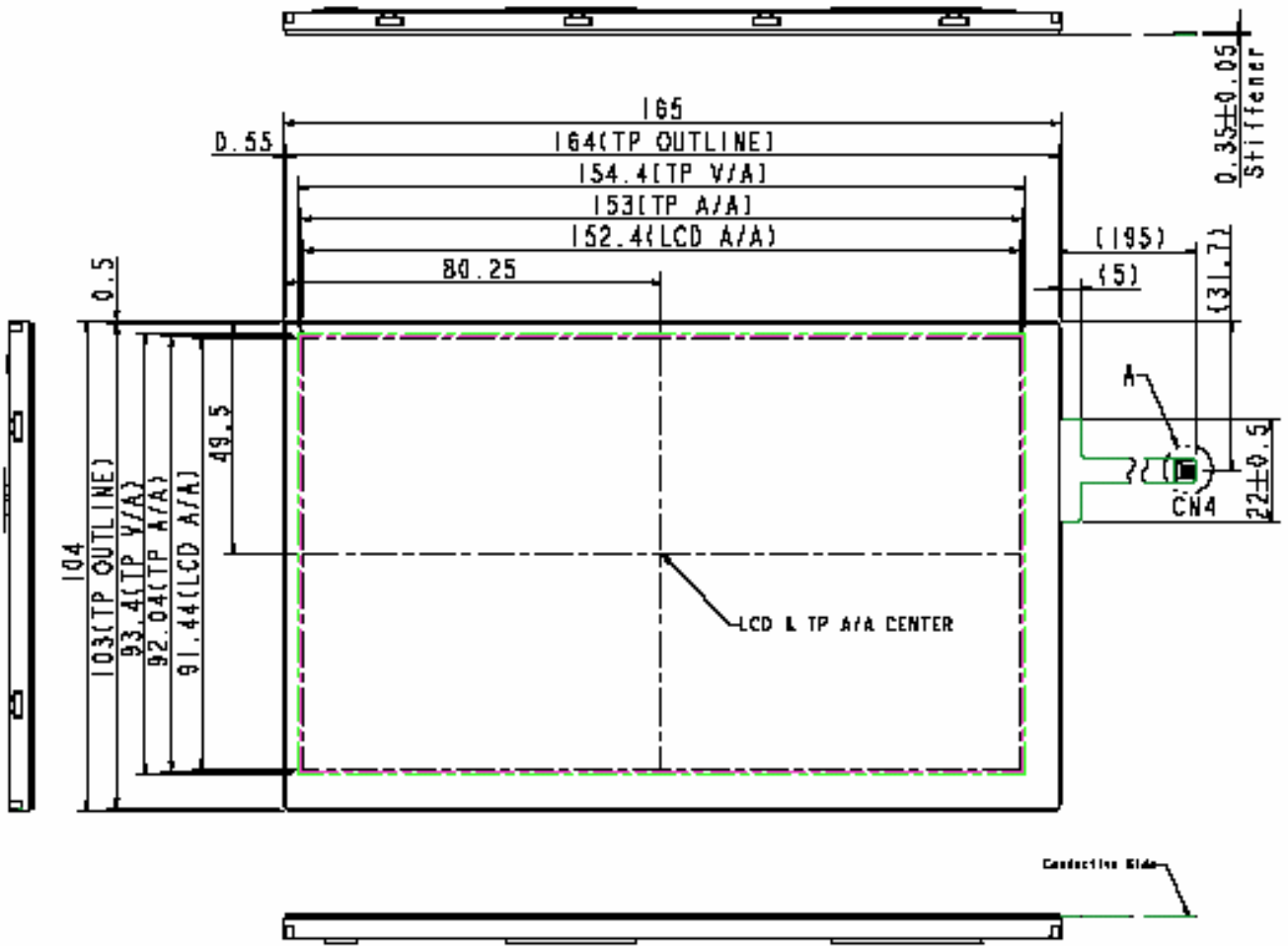
7. BLOCK DIAGRAM



8. MECHANICAL DIMENSION

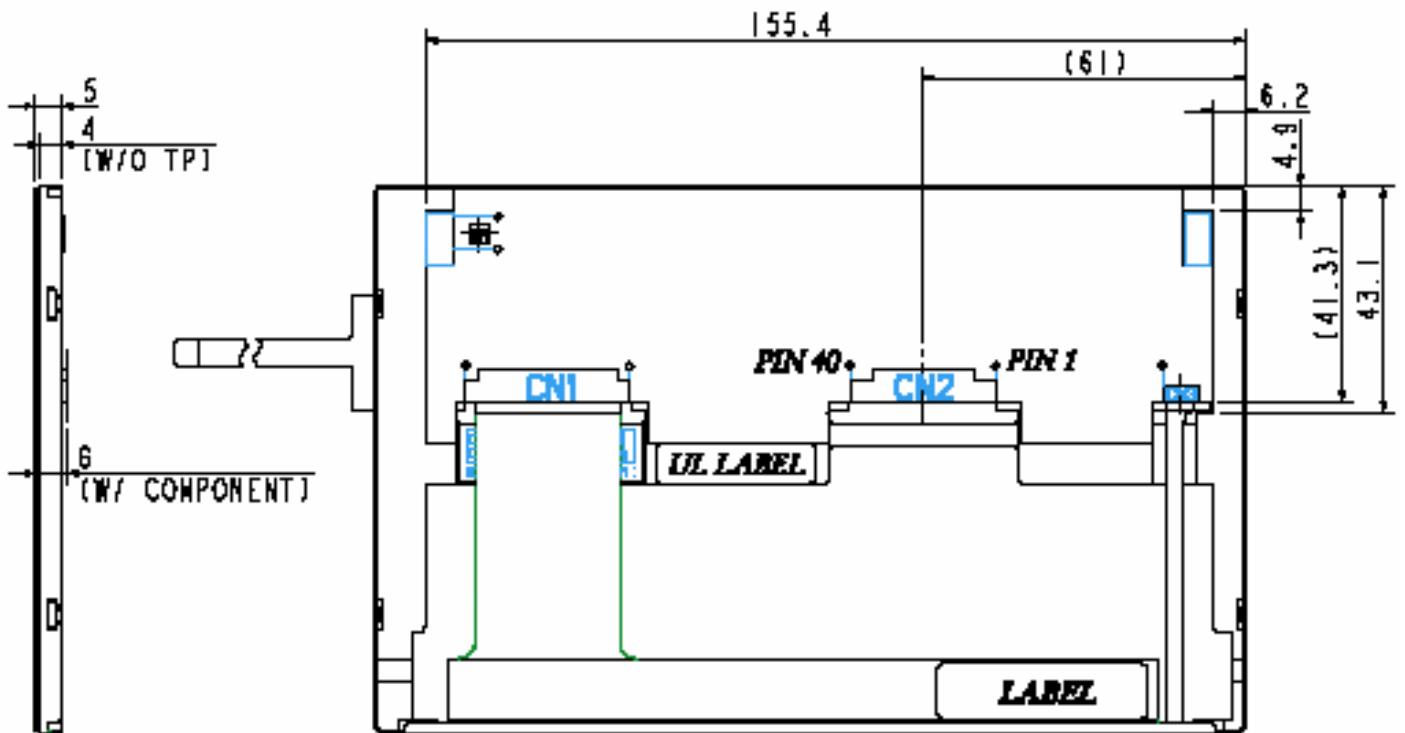
8.1 Front Side

[Unit : mm]



8.2 Rear Side

[Unit : mm]



Remark : Un-indication tolerance is $\pm 0.3\text{mm}$

RB Only Co.

9. OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remarks
Constrast Ratio	CR	Point-5	300	400	--	--	*1)*2)*3)
Luminance*)	Lw	Point-5	200	250	--	cd/m ²	*2)
Luminance Uniformity	ΔL		70	80	--	%	*2)
Response Time (White - Black)	Tr+ Tf	Point-5	--	--	20	ms	*2)*4)
Viewing Angle	Horizontal	CR ≥ 10 Point-5	120	140	--	°	*2)*3)
	Vertical		90	110	--	°	
Color Coordinate	White	Wx Wy	0.273 0.289	0.313 0.329	0.353 0.369	--	*2)*3)
	Red	Rx Ry	0.535 0.292	0.575 0.332	0.615 0.372		
	Green	Gx Gy	0.290 0.525	0.330 0.565	0.370 0.605		
	Blue	Bx By	0.110 0.080	0.150 0.120	0.190 0.160		

Remarks :

*1) Definition of contrast ratio : (in the dark room.BM-5A (TOPCON))

Contrast Ratio (CR)= (White) Luminance of ON ÷ (Black) Luminance of OFF

*2) Definition of luminance : (in the dark room.BM-5A (TOPCON))

Measure white luminance on the point 5 as figure9-1

Definition of Luminance Uniformity:

Measure white luminance on the point1 ~9as figure9-1

$$\Delta L = [L(\text{MIN})/L(\text{MAX})] \times 100$$

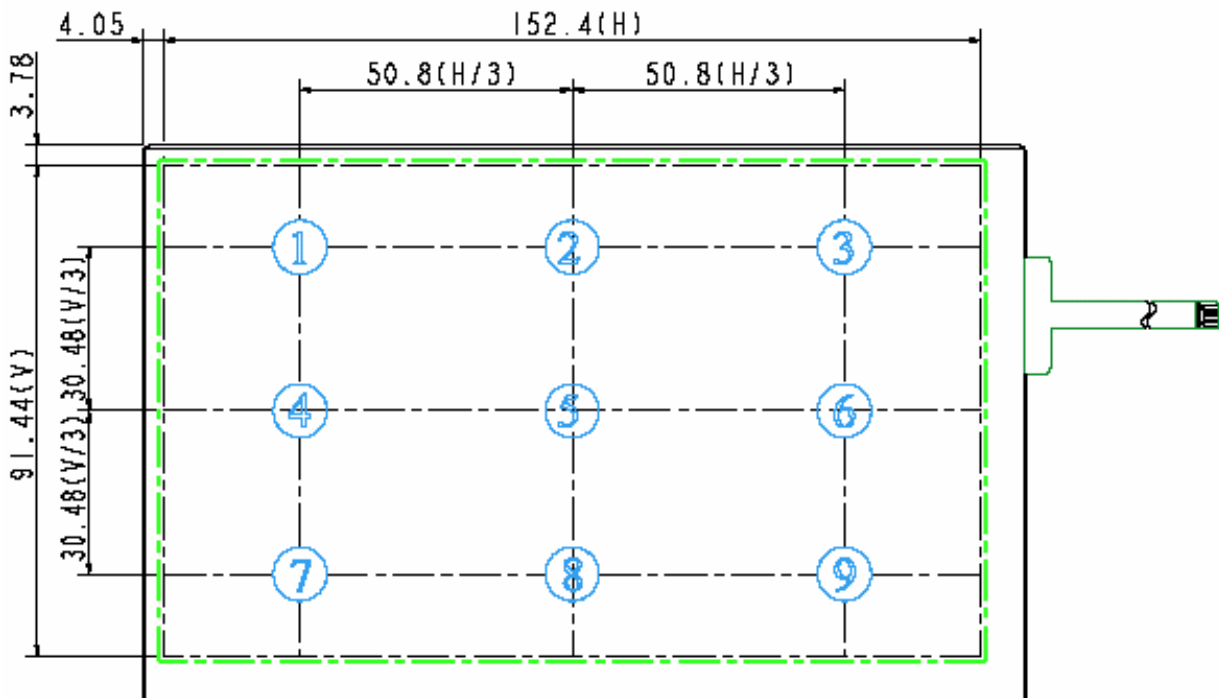


Fig9-1 Measuring point

*4) Definition of Viewing Angle(θ, ψ),refer to Fig9-2 as below : (in the dark room.EZ-CONTRAST (ELDIM))

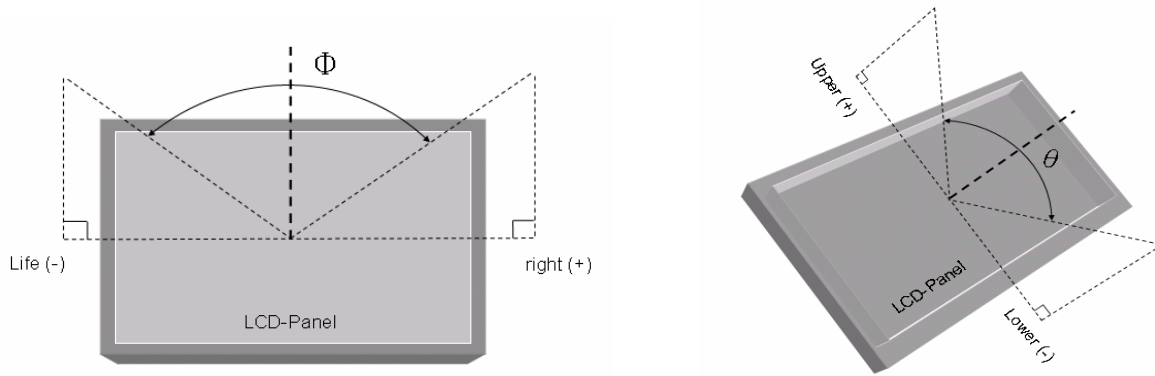


Fig9-2 Definition of Viewing Angle

*5) Definition of Response Time.(White-Black)

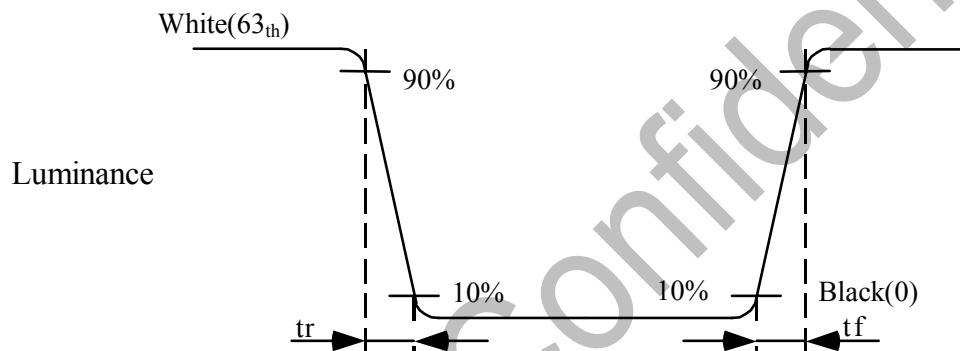


Fig9-3 Definition of Response Time(White-Black)

10. RELIABILITY TEST

10.1. Temperature and humidity

TEST ITEMS	CONDITIONS	REMARK
High Temperature Operation	85°C , 240Hrs	
High Temperature Storage	95°C , 240Hrs	
High Temperature High Humidity Operation	60°C , 90%RH , 240Hrs	No condensation
Low Temperature Operation	-30°C , 240Hrs	
Low Temperature Storage	-40°C , 240Hrs	
Thermal Shock	-30°C (0.5Hr) ~ 85°C(0.5Hr) 200 cycles	

10.2. 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 for a total of three shock inputs.
Vibration (Non-operation)	<ul style="list-style-type: none"> ● Frequency range:8~33.3Hz ● Stroke:1.3mm ● Vibration: sinusoidal wave, perpendicular axis(both x, z axis:2Hrs, y axis 4Hrs). ● Sweep:2.9G,33.3Hz-400Hz ● Cycle:15min

10.3.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 defect.