Chunghwa Picture Tubes, Ltd.
Product Specification

To : RB Electronics
Date : 080226

TFT LCD
CLAA070LC0FCT

ACCEPTED BY :(V0.1)
Tentative

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REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First revision (Tentative)	--	2007.04.24
0.1	Update optical characteristics	17	2007.05.03

CONTENTS

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 Treament	Anti-Glare，Hardness:3H
Touch Panel Type	4 wire resistive

2. ABSOLUTE MAXIMUM RATINGS

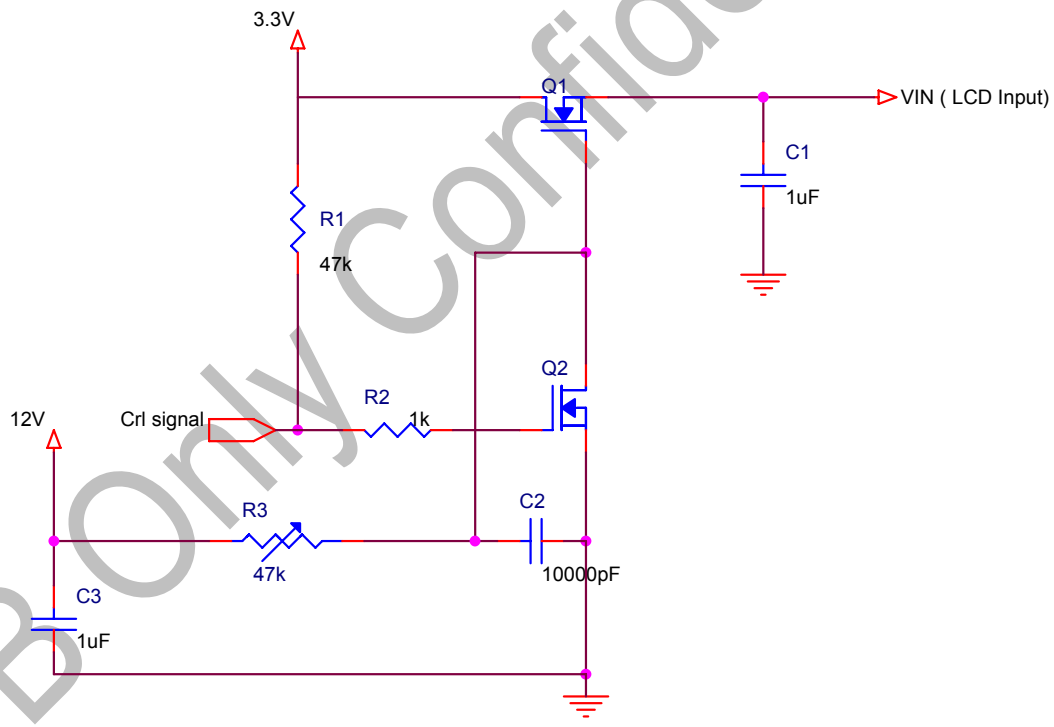
Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	Vcc	-0.5	5.0	V	
Signal Input Voltage	DCLK,DE,R0,G0,B0~R5,G5,B5	-0.5	Vcc + 0.5	V	
Static Electricity	VESDc	-200	+200	V	*2)
	VESDm	-15K	+15K	V	
ICC Rush Current	IRUSH	-	1	A	*3)
Operation Temperature	T_{op}	-30	85	℃	*1)
Storage Temperature	T_{stg}	-40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

Remarks：

*1) If users use the product out off the environmemt operation range（temperature and humidity）,it will concern for visual quality.

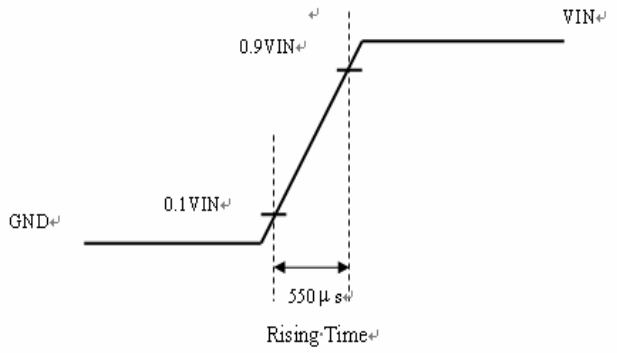
*2) Test Condition: IEC 61000-4-2 ,
VESDc ：Contact discharge to input connector
VESDm：Discontact discharge to module

*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

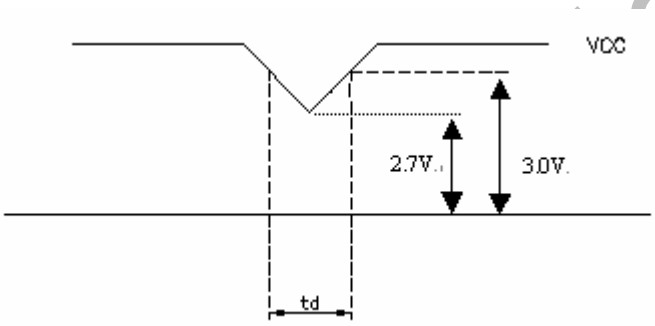
Ta=25℃

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 V≦VCC＜3.0V，td≦10ms.

*2)When VCC<3.0V, 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

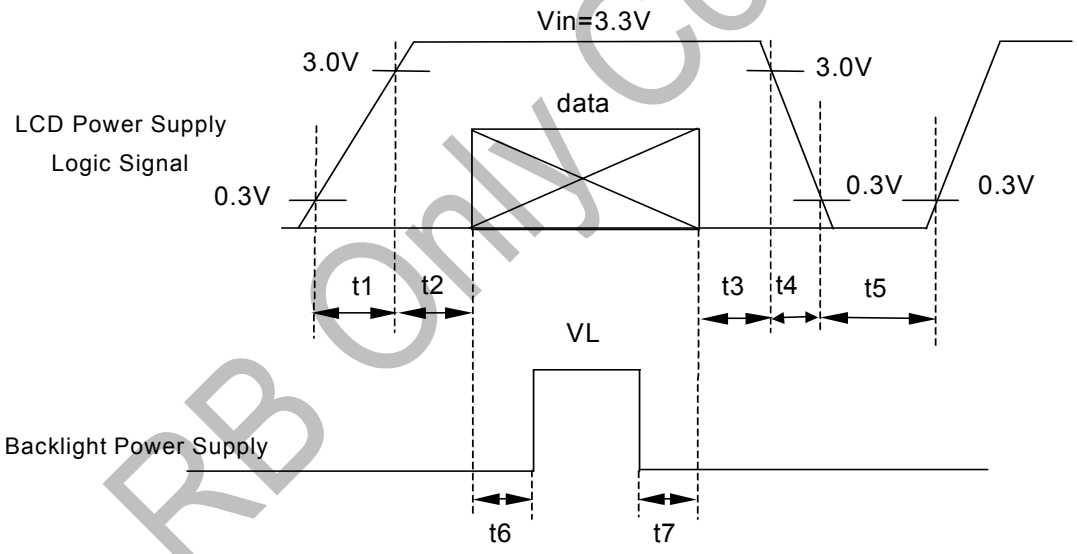
(a)64 Gray Pattern

(b)Black Pattern

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

3.3 Power、signal sequence

t1≦10ms 1 sec≦t5
0＜t2≦50ms 200ms≦t6
0＜t3≦50ms 200ms≦t7
0＜t4≦10ms



Data: RGB DATA, DCLK, DENA

4. INTERFACE CONNECTION

4.1 CN1

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

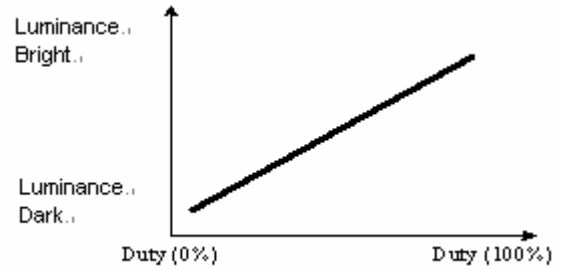
Pin NO.	SYMBOL	DESCRIPTION
1	U/D	Up or Down Display Control
2	DMS	Selection DE or SYNC
3	Hsync	Horizontal SYNC.
4	VLED	Power Supply for LED Driver circuit
5	VLED	Power Supply for LED Driver circuit
6	VLED	Power Supply for LED Driver circuit
7	VCC	Power Supply
8	Vsync	Vertical SYNC.
9	DE	Data Enable Signal
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）

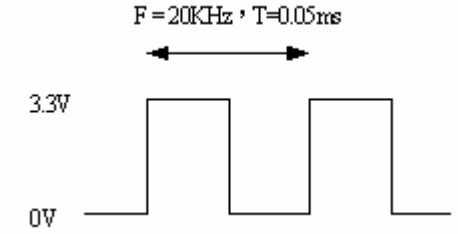
Pin No.	Symbol	function
1	XL	X axis resistance
2	YD	Y axis resistance
3	XR	X axis resistance
4	YU	Y axis resistance

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

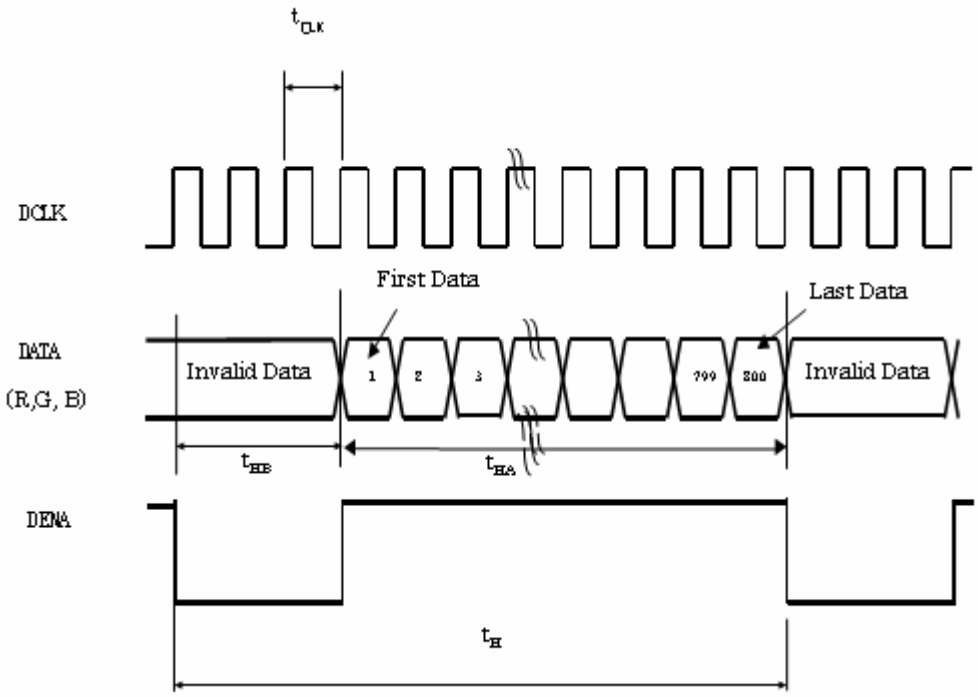
5. INPUT SIGNAL(DE ONLY MODE)

5.1 Timing Specification

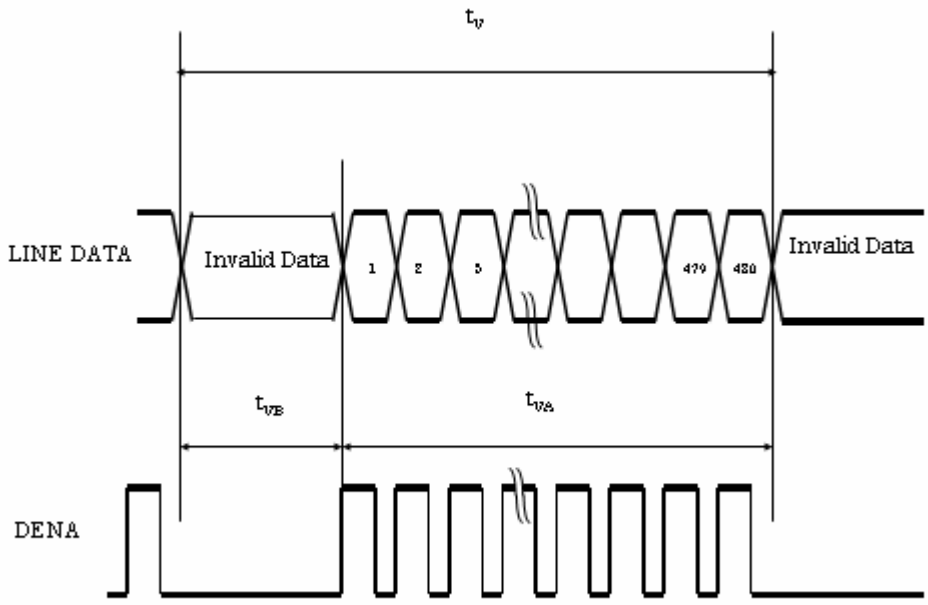
ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK	Dot Clock	f_{CLK}	25	27	32	MHz
	Low Level Width	t_{WCL}	6	-	-	ns
	High Level Width	t_{WCH}	6	-	-	
DE MODE	DE Setup Time	t_{DES}	5	-	-	ns
	DE Hold Time	t_{DEH}	10	-	-	
	Horizontal Period	t_{HP}	850	900	950	t_{CLK}
	Horizontal Valid	t_{HV}		800		
	Horizontal Blank	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		
	Vertical Period	t_{VP}	490	500	520	t_{HP}
	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

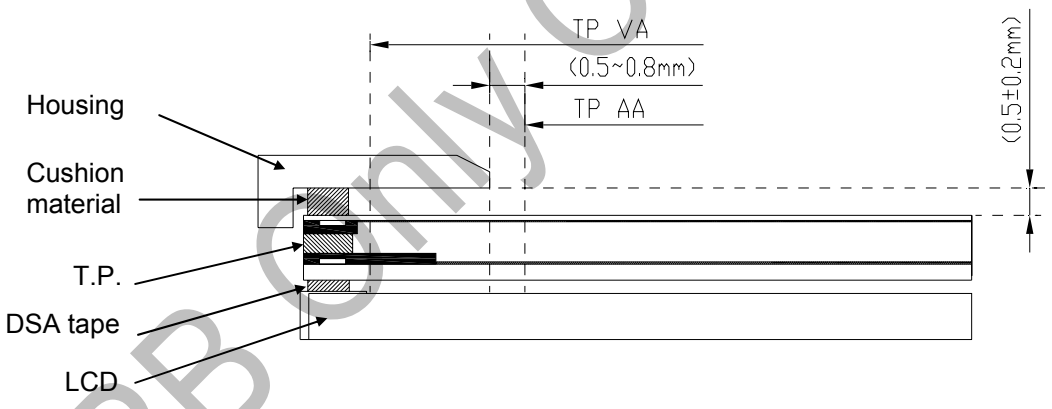
6. CHARACTERISTIC OF TOUCH PANEL

6.1 Basis characteristic

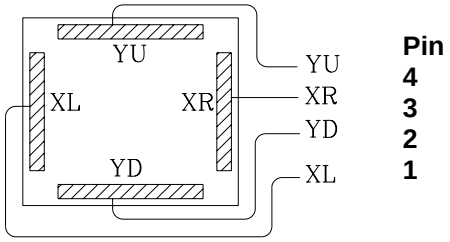
Item	Standard	Note
Operating Voltage	3V(Min)/5V(Typ)/7V(Max)	DC
Surface Treatment	Anti-Glare，Hardness：3H	
Activation Force	20gf ± 10gf	Less than 80gf(Typical 20gf) individual with stylus pen (R 0.8mm) or finger (R 8.0mm)
Linearity Force	130 gf	Input with stylus pen (R0.8mm)
Interface Type	4 Wire Resistive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

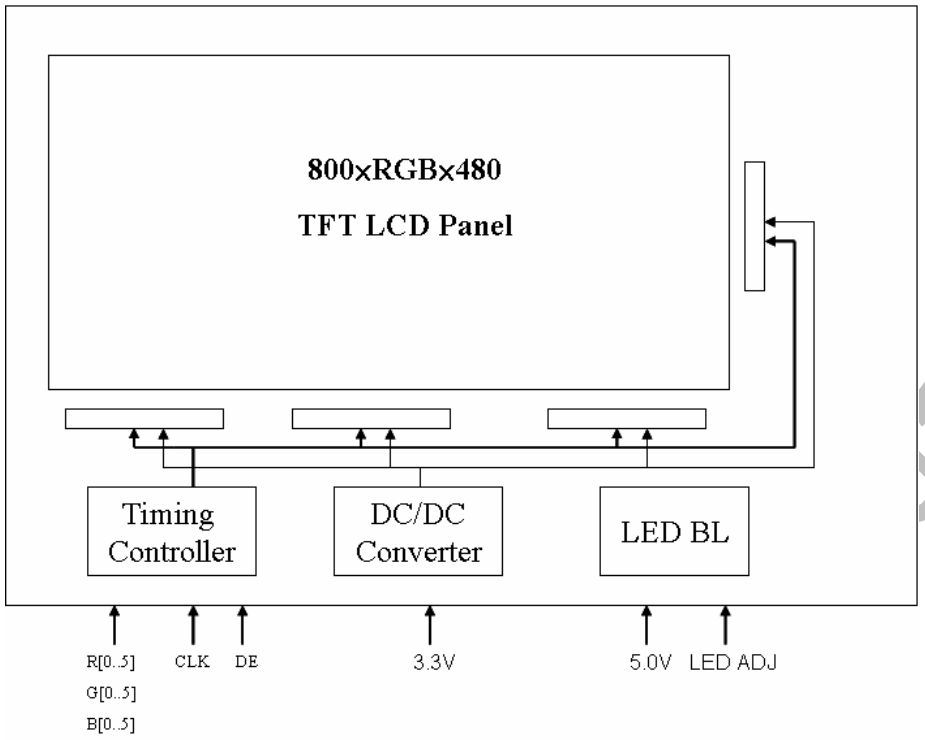


6.3 Circuit Diagram



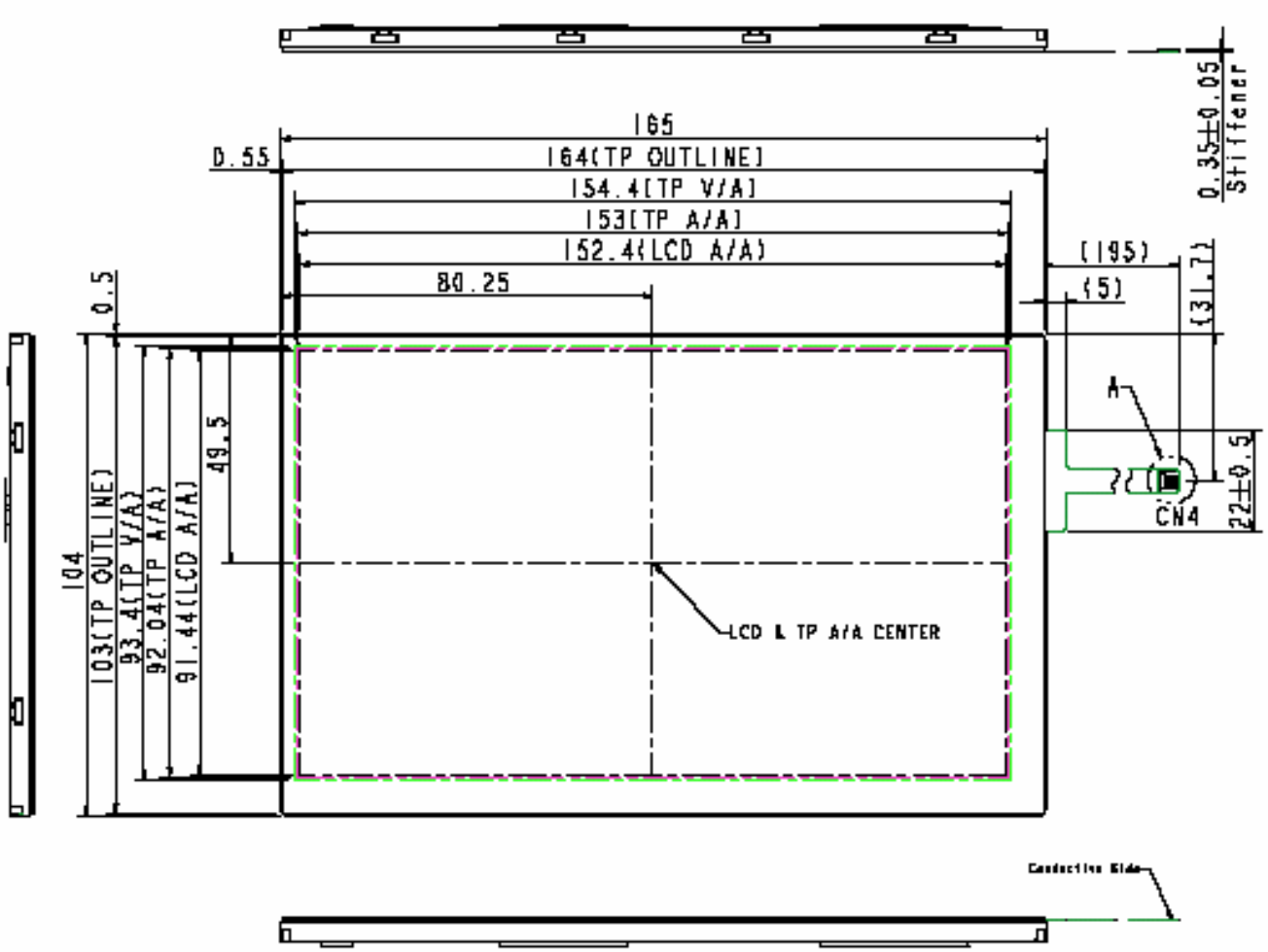
Circuit Diagram

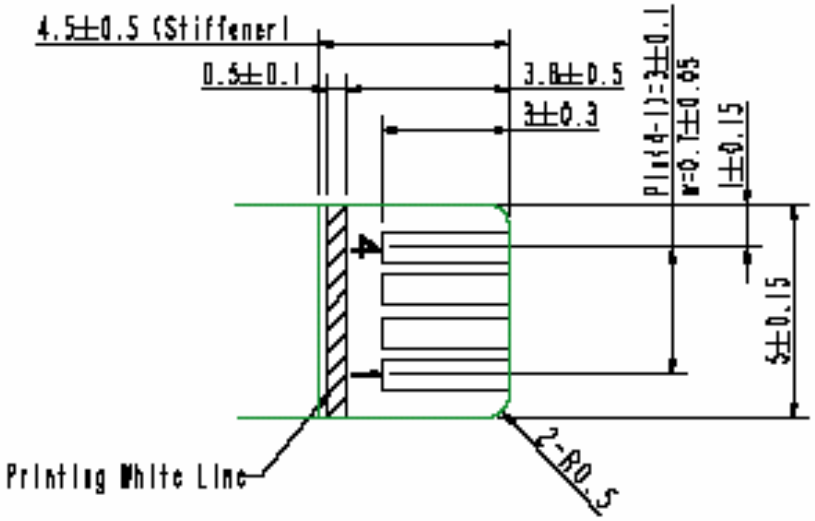
7. BLOCK DIAGRAM



8. MECHANICAL DIMENSION

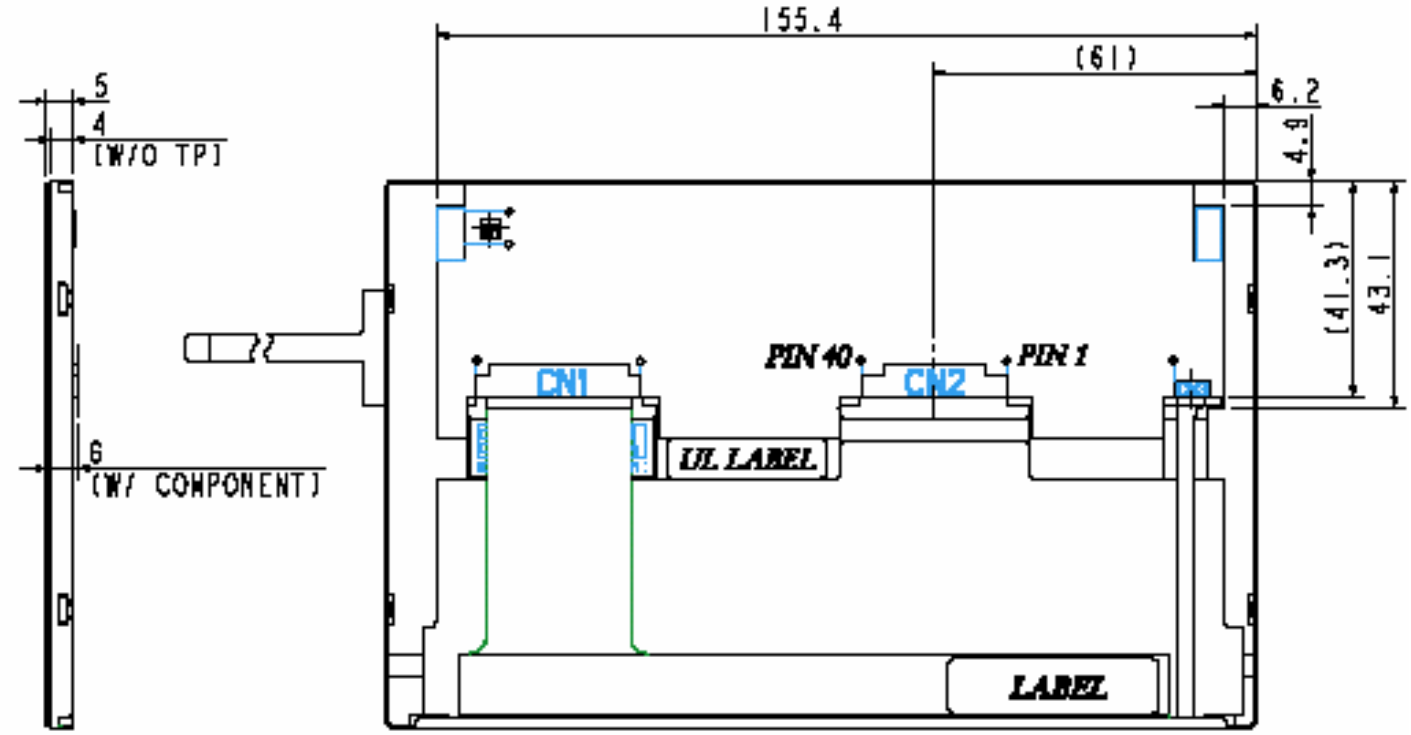
8.1 Front Side [Unit：mm]





8.2 Rear Side

[Unit：mm]



Remark：Un-indication tolerance is ±0.3mm

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	ϕ	CR≧10 Point-5	120	140	--	°	*2)*3)
	Vertical	θ		90	110	--	°	*2)*3)
Color Coordinate	White	Wx Wy	Point-5	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

△L = [L(MIN)/L(MAX)]×100

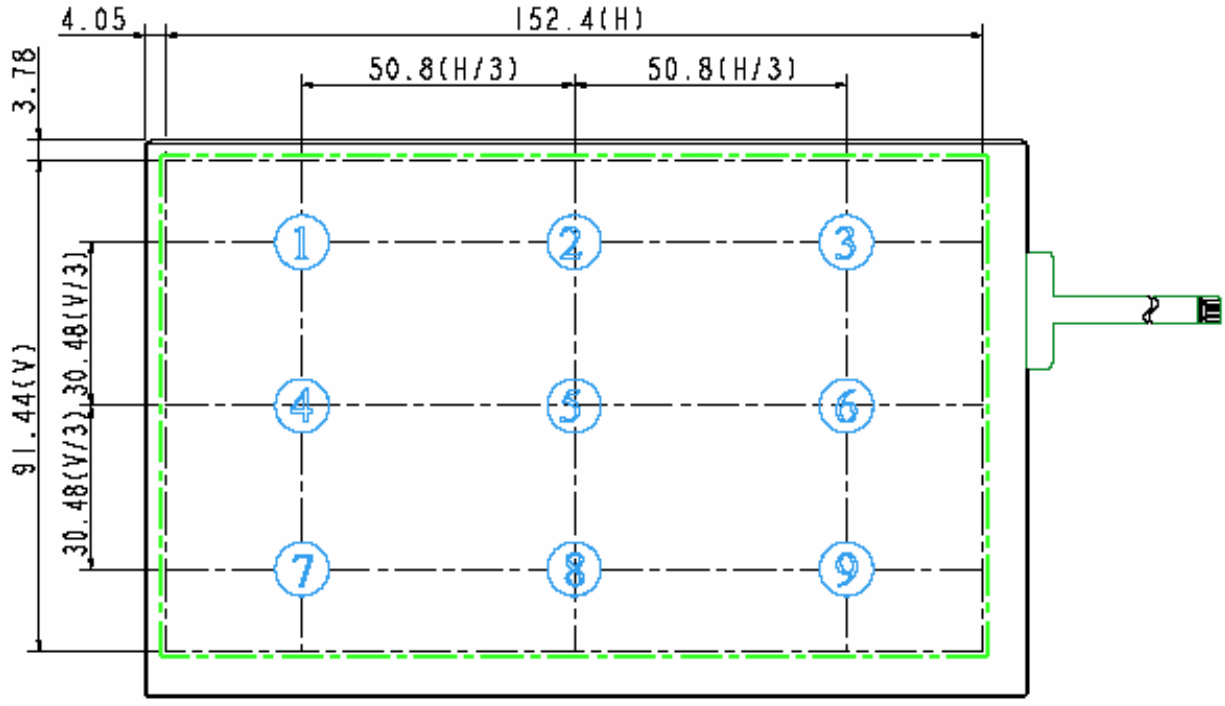


Fig9-1 Measuring point

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

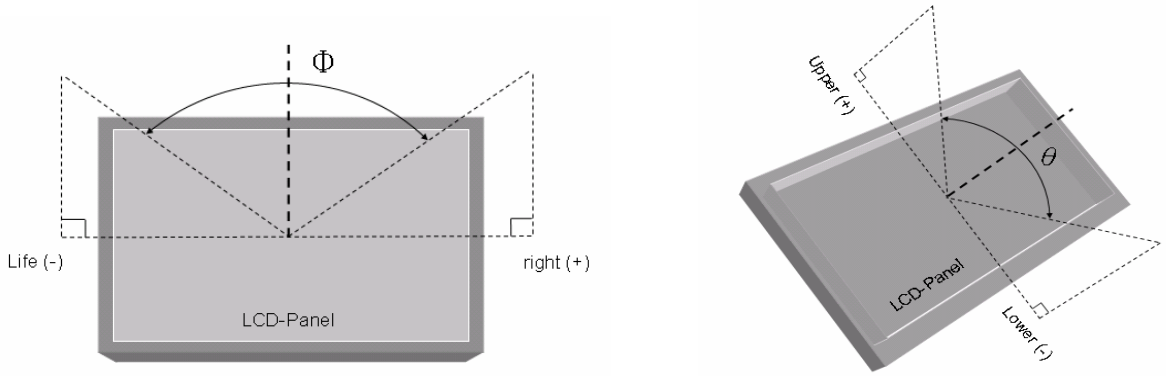


Fig9-2 Definition of Viewing Angle

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

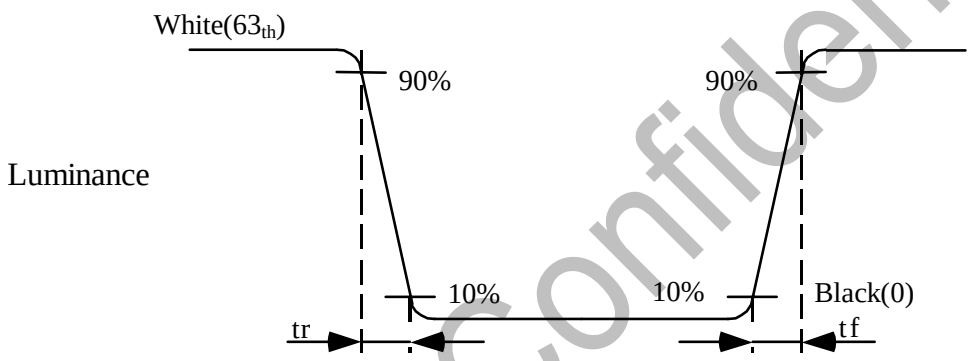


Fig9-3 Definition of Response Time(White-Black)

10. RELIABILITY TEST

10.1. Temperature and humidity

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

10.2. Shock and Vibration

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

10.3Judgment 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.