



Chunghwa Picture Tubes, Ltd.

Product Specification

To : RB Electronics Co., Ltd

Date : 20061016

TFT LCD
CLAA070VC05T

ACCEPTED BY :

APPROVED BY	CHECKED BY	PREPARED BY
張聖暉	李家銘	謝明聰

Prepared by :

Small &Medium Product Planning Management Department

Small &Medium Product General Division

CHUNGHWA PICTUER TUBES, LTD.

1127 Hopin Rd., Padeh, Taoyuan, Taiwan 334, R.O.C.
TEL: +886-3-3675151 FAX: +886-3-377-3001

Doc.No:	CLAA070VC05T-RB Electronics Co., Ltd- Ver:1 20061016	Issue Date:	2006/06/05
---------	---	-------------	------------

REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.1	First revision	--	2006.05.22
	Change Power consumption	4	
	Change Power Supply Voltage For LED	6	
	Change Logic Input Voltage		
	Change Power Supply Voltage For LCD		
	Change Remark*2)	7	
	Change CN1 : Interface For Input Signal	8	
	Change Mechanical Dimension	14	
	Change Response Time	16	
	Change Viewing Angle	16	
	Change Remark*1)	16	
	Change Remark*3) figure9-1	17	
	0.2	Change power consumption	
Add to signal input voltage		5	
Delete note of static electricity		5	
Delete note of ICC rush current		5	
Change electrical characteristics		6	
Change PIN 35 description		8	
Change Remarks *1)		9	
Add Remarks *2) figure		9	
Change Remarks *3)		9	
Add Remarks *5) *6) °		9	
Change timing specification		10	
Add to Remarks *1) °		10	
Change timing sequence		11	
Add to Operating Voltage and Linearity Force °		13	
Delete transparency		13	
Change Remarks *1)		17	
Delete high temperature high humidity storage		20	
Change vibration condition		20	
Add to ESD test		20	

CONTENTS

1. OVERVIEW.....	3
2. ABSOLUTE MAXIMUM RATINGS	5
3. ELECTRICAL CHARACTERISTICS	6
3.1 TFT LCD	6
3.2 TFT-LCD Current Consumption	7
3.3 Power 、 signal sequence.....	7
4. INTERFACE CONNECTION.....	8
4.1 CN1	8
4.2 CN2.....	9
5. INPUT SIGNAL(DE ONLY MODE)	10
5.1 Timing Specification	10
5.2 Timing sequence(Timing chart).....	11
5.3 Color Data Assignment.....	12
6. CHARACTERISTIC OF TOUCH PANEL.....	13
6.1 Basis characteristic	13
6.2 Design guideline for Touch-Panel.....	13
6.3 Circuit Diagram	13
7. BLOCK DIAGRAM	14
8. MECHANICAL DIMENSION.....	15
8.1 Front Side	15
8.2 Rear Side	16
9. OPTICAL CHARACTERISTICS	18
10. RELIABILITY TEST	21
10.1. Temperature and humidity.....	21
10.2. Shock and Vibration.....	21
10.3. ESD Test	21
10.4Judgment standard	21

1. OVERVIEW

CLAA070VC05T 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 :

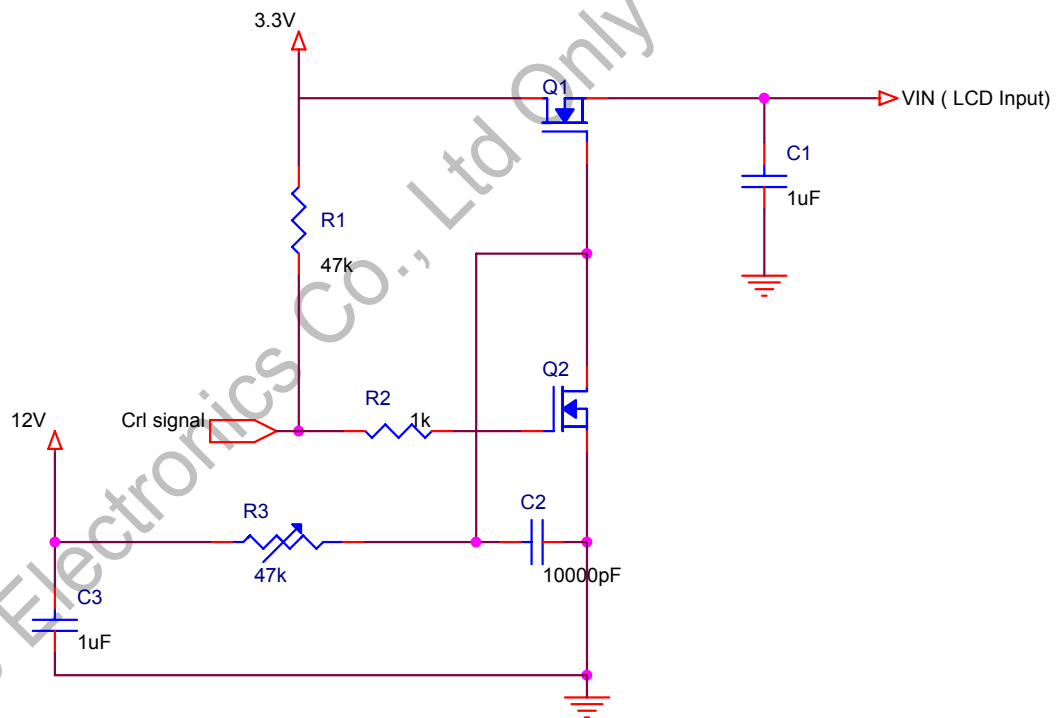
ITEM	SPECIFICATION
Panel Size	7 inch(panel diagonal)
Display Area (mm)	152.4(W)×91.44(H)
Number of Pixels	800(H)×3(RGB)×480(V)
Pixel Pitch (mm)	0.1905(H)×0.1905(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white
Number of colors	262,144
Viewing Direction	6 o'clock
Response Time (Tr+Tf)	20ms
Brightness(cd/m ²)	250nit(typ)
NTSC ratio	50%
Viewing Angle(BL on,CR≥10)	140 degree(H) , 110degree(V)
Electrical Interface(data)	TTL
Power consumption	2.81W(Typ)
Outline Dimension(in mm)	165(W)×104(H)×6(D)
Weight(g)	162g(Typ)
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	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)

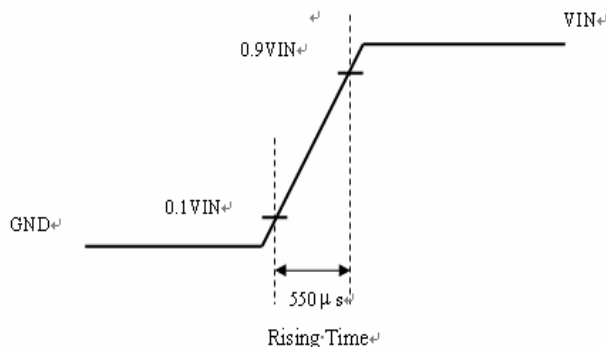
Remarks :

- *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 : Contact 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

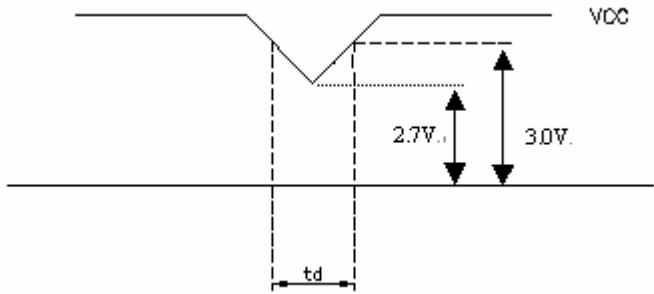
Item	Symbol	Min.	Typ	Max.	Unit	Note
Power Supply Voltage For LCD	VCC	3.0	3.3	3.6	V	*1)
Power Supply Voltage For LED	VDD	4.5	5	5.5	V	
Logic Input Voltage	VIH	VCC*0.7	-	VCC	V	
	VIL	0	-	VCC*0.3	V	
ADJ Input Voltage	VIH	3.0		3.3	V	
	VIL	GND		0.3	V	

Remarks :

*1) VCC –dip codition:

When $2.7\text{ V} \leq \text{VCC} < 3.0\text{ V}$, $t_d \leq 10\text{ ms}$.

$\text{VCC} > 3.0\text{ V}$, VCC-dip condition should be same as VCC-turn-on condition.



3.2 TFT-LCD Current Consumption

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

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



(a)64 Gray Pattern

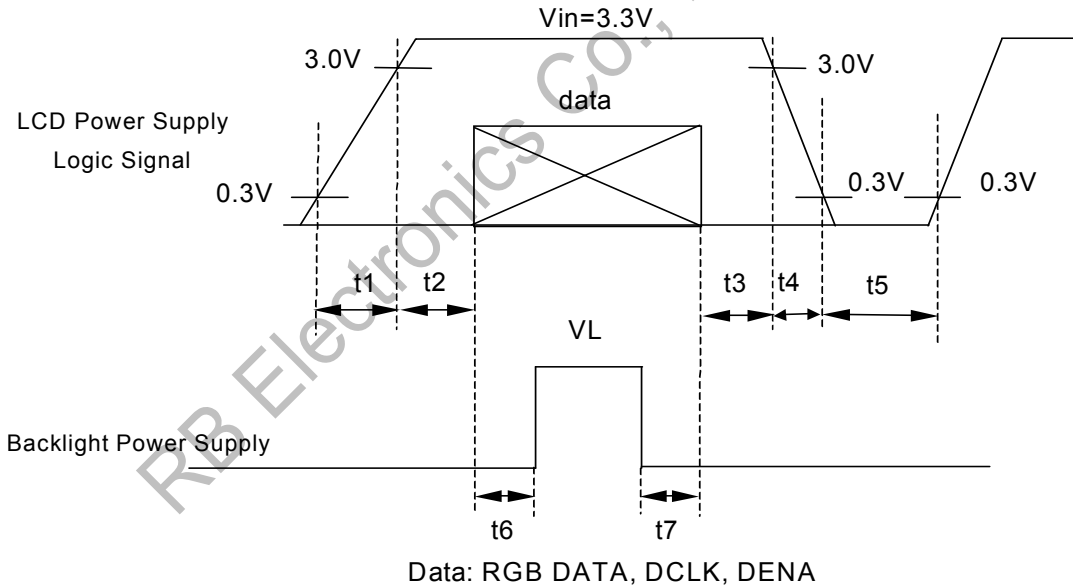


(b)Black Pattern

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

3.3 Power 、 signal sequence

$t_1 \leq 10\text{ms}$ $1\text{ sec} \leq t_5$
 $50\text{ms} \leq t_2$ $200\text{ms} \leq t_6$
 $0 < t_3 \leq 50\text{ms}$ $200\text{ms} \leq t_7$
 $0 < t_4 \leq 10\text{ms}$



4. INTERFACE CONNECTION

4.1 CN1 : Interface For Input Signal

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

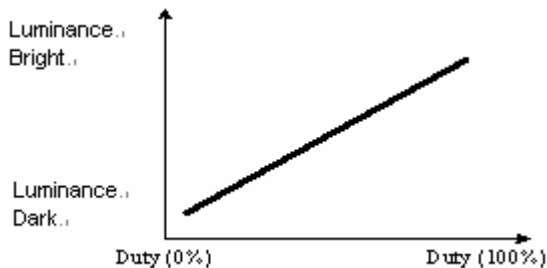
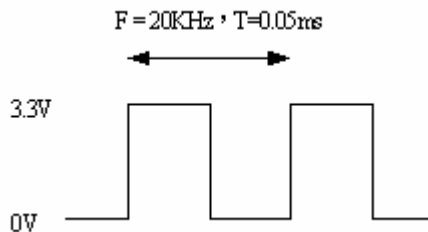
Pin NO.	SYMBOL	DESCRIPTION
1	U/D	Up or Down Display Control
2	DMS	Selection DE or SYNC
3	Hsync	Horizontal SYNC.
4	VDD	Power Supply for LED Driver circuit
5	VDD	Power Supply for LED Driver circuit
6	VDD	Power Supply for LED Driver circuit
7	V _{CC}	Power Supply for Digital Circuit
8	Vsync	Vertical SYNC.
9	DE	Data Enable
10	V _{SS}	Power Ground
11	V _{SS}	Power Ground
12	ADJ	Adjust for LED brightness
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	V _{SS}	Power Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	V _{SS}	Power Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	V _{SS}	Power Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	V _{SS}	Power Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	V _{SS}	Power Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0 (LSB)
36	V _{SS}	Power Ground
37	V _{SS}	Power Ground
38	DCLK	Clock Signals ; Latch Data at the Falling Edge
39	V _{SS}	Power 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 : $20 \pm 5\text{KHz}$ 

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 and L/R control 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

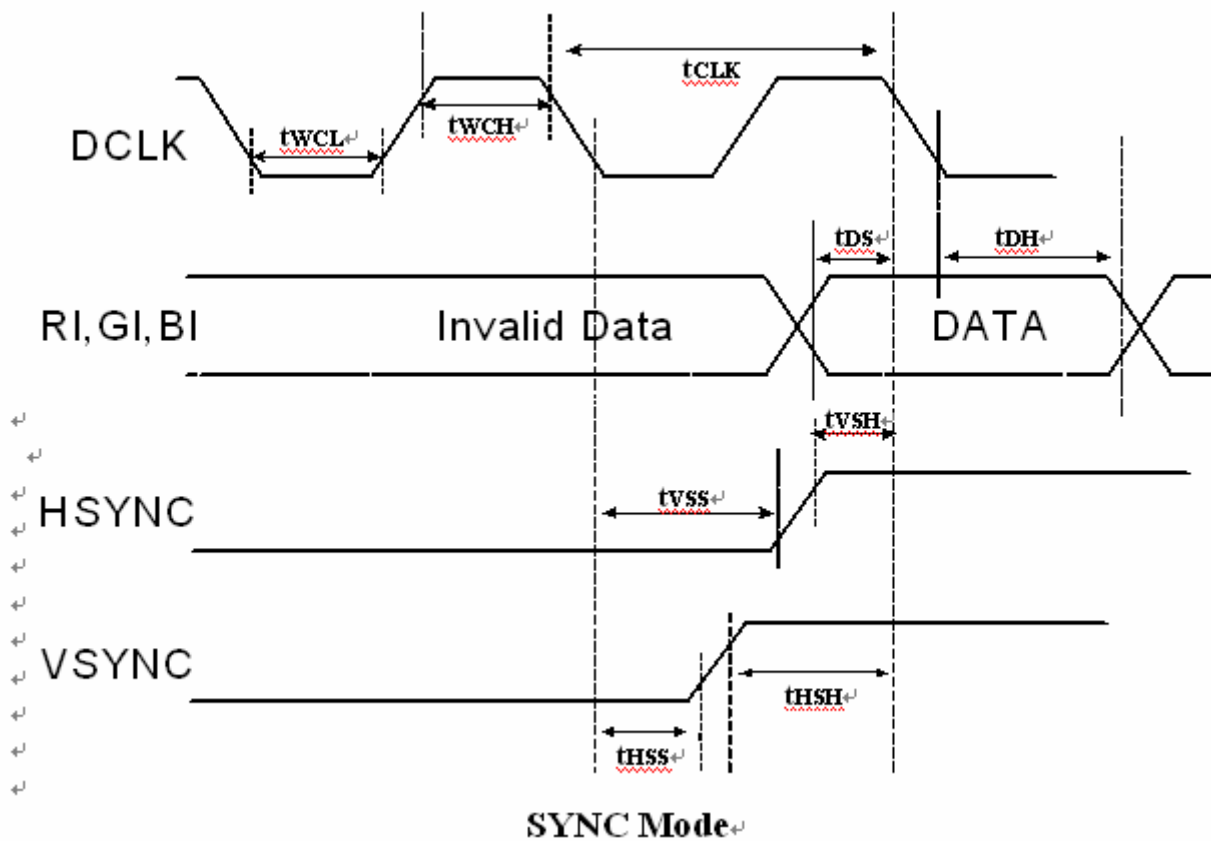
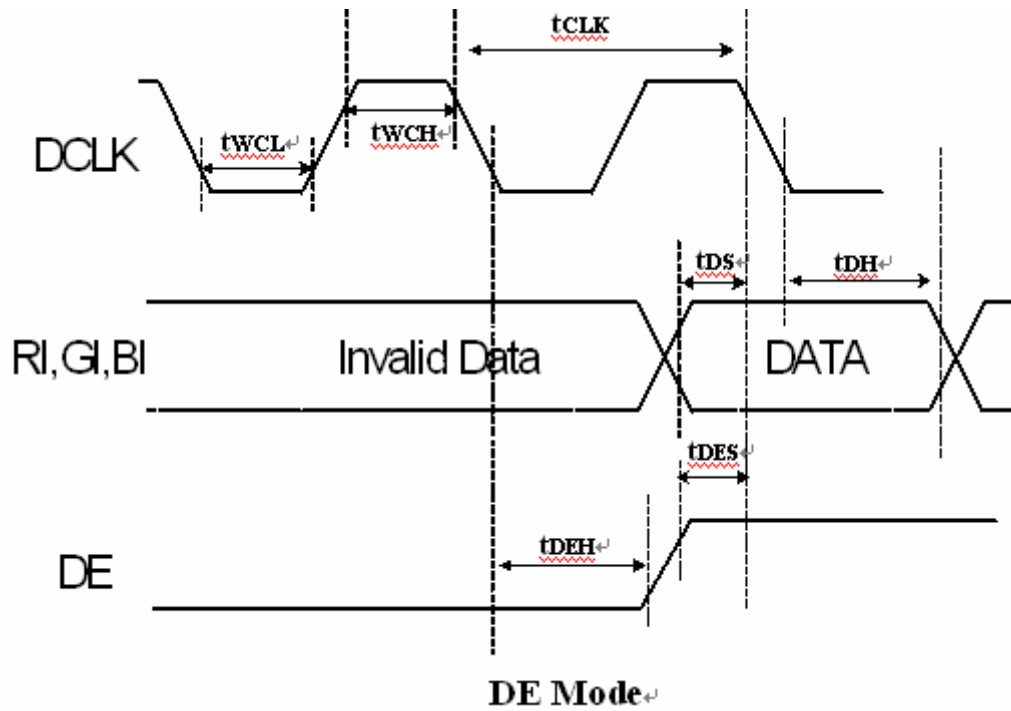
DVI Timing Specification							
	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	
DCLK	Period	t _{CLK}	31	37.0	40.0	ns	
	Dot Clock	f _{CLK}	25	27	32.11	MHz	
	Low Level Width	t _{WCL}	6	-	-	ns	
	High Level Width	t _{WCH}	6	-	-		
DE MODE	DE Setup Time	t _{DES}	5	-	-	ns	
	DE Hold Time	t _{DEH}	10	-	-		
	Horizontal Period	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		
DATA		Setup Time	t _{DS}	5	-	-	ns
	Hold Time	t _{DH}	10	-	-		

Remarks :

*1) High level of logic signal is 80%.Low level of logic signal is 20%

*2) This module is operated by DE only mode.

5.2 Timing sequence(Timing chart)



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

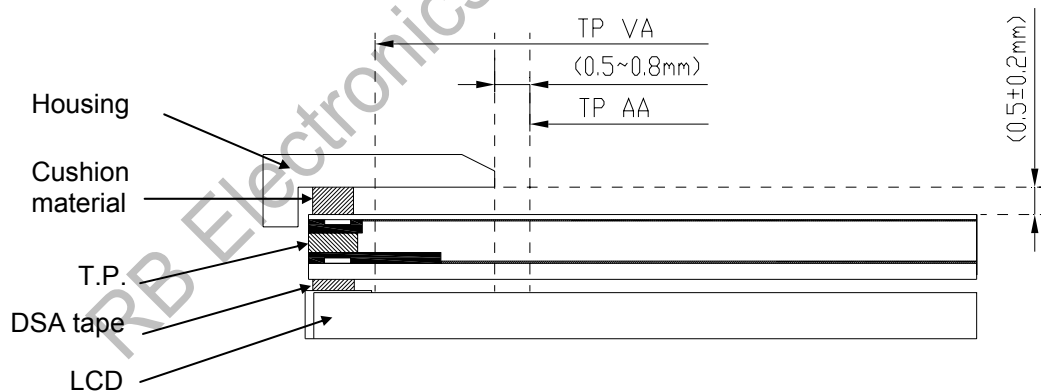
6. CHARACTERISTIC OF TOUCH PANEL

6.1 Basis characteristic

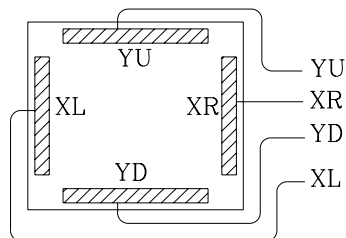
Item	Standard	Note
Operating Voltage	3V(Min)/5V(Typ)/7V(Max)	DC
Surface Treatment	Anti-Glare · Hardness : 3H	
Activation Force	20gf ± 10gf	Less than 80gf(Typical 20gf) individual with stylus pen (R 0.8mm) or finger (R 8.0mm)
Linearity Force	130 gf	Input with stylus pen (R0.8mm)
Interface Type	4 Wire 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 :

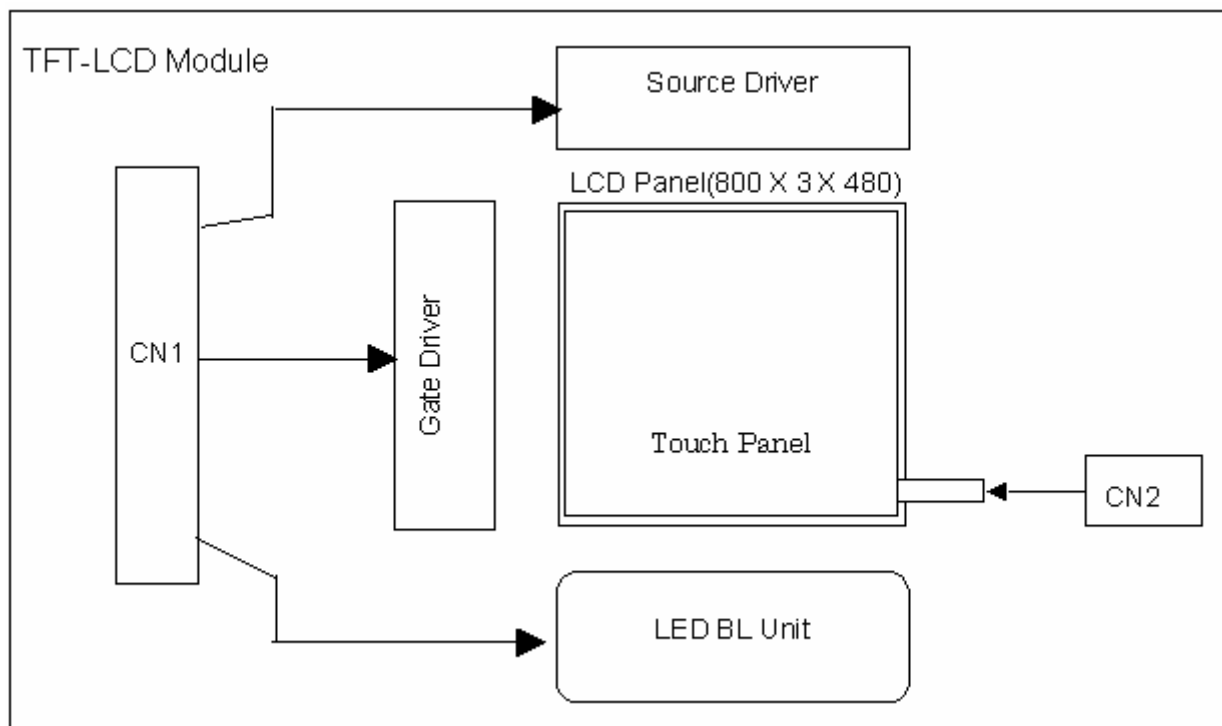


6.3 Circuit Diagram



Circuit Diagram

7. BLOCK DIAGRAM

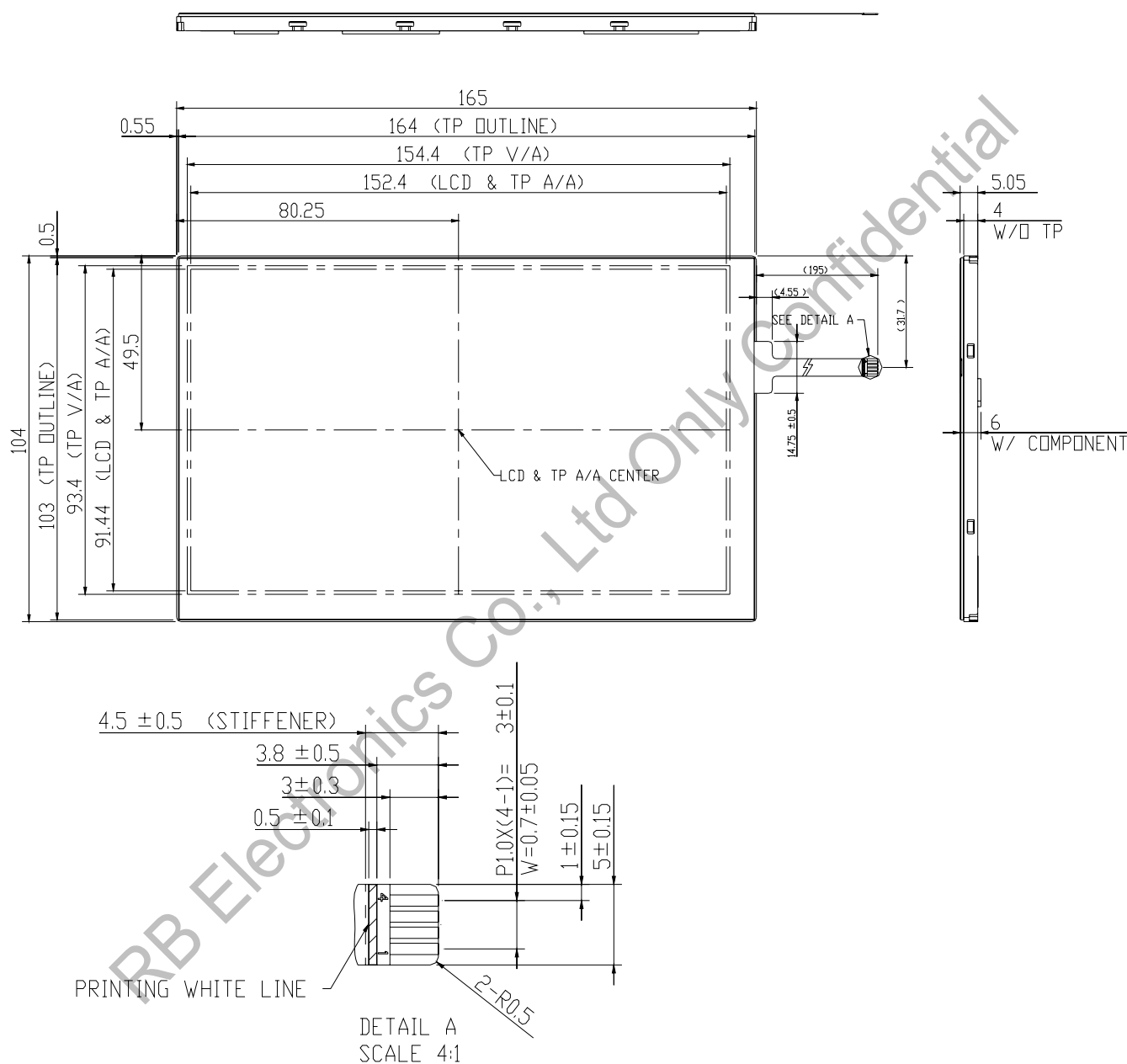


RB Electronics Co., Ltd.

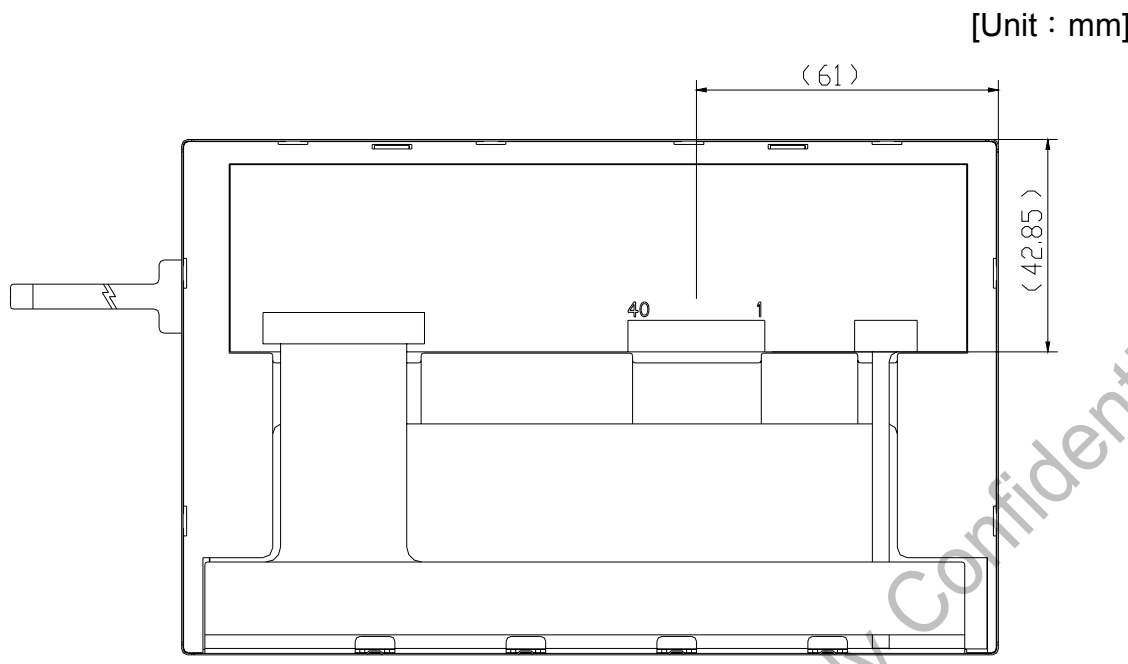
8. MECHANICAL DIMENSION

8.1 Front Side

[Unit : mm]



8.2 Rear Side



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

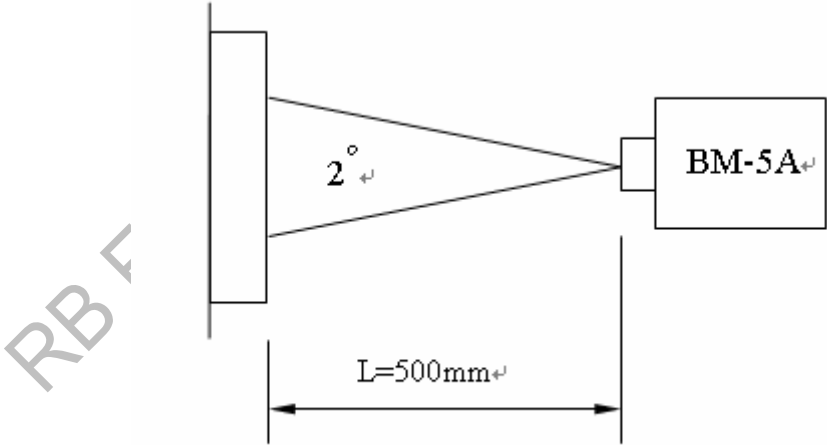
RB Electronics Co., Ltd Only Confidential

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		250	--	cd/m ²	*1)*3)
Luminance Uniformity		ΔL		70	80	--	%	*1)*3)
Response Time (White - Black)		Tr+ Tf	Point-5	--	--	20	ms	*1)*3)*5)
Viewing Angle	Horizontal	ϕ	CR≥ 10 Point-5	120	140	--	°	*1)*2)*4)
	Vertical	θ		90	110	--	°	*1)*2)*4)
Color Coordinate	White	Wx Wy	Point-5	TBD	TBD	TBD	--	*1)*3)
	Red	Rx Ry		TBD	TBD	TBD		
	Green	Gx Gy		TBD	TBD	TBD		
	Blue	Bx By		TBD	TBD	TBD		

Remarks :

*1)Measure condition : 25℃±2℃ , 60±10%RH , under 10 Lux in the dark room.BM-5A (TOPCON) , viewing angle 2° , VCC=3.3V , VDD=5V.



*2) Definition of contrast ratio :

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

*3) Definition of luminance :

Measure white luminance on the point 5 as figure9-1

Definition of Luminance Uniformity:

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

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

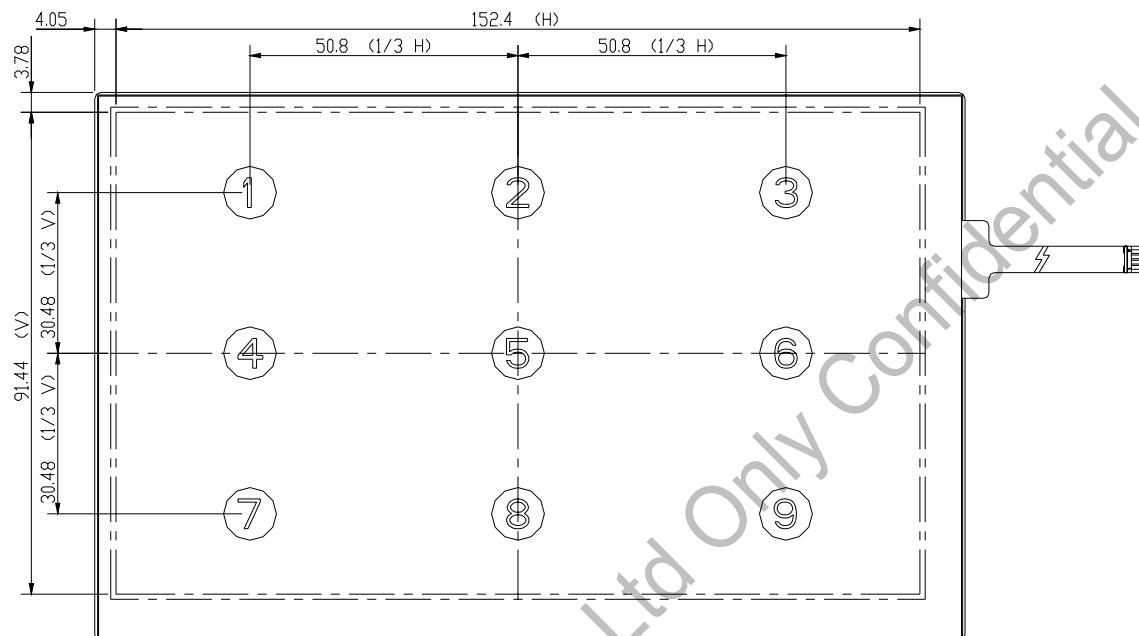


Fig9-1 Measuring point

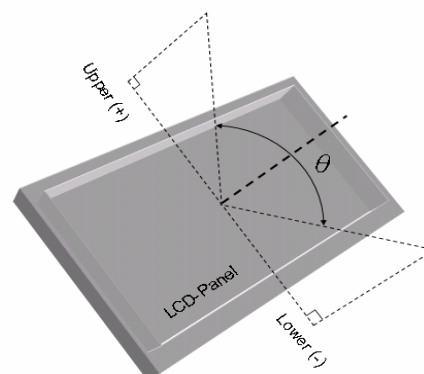
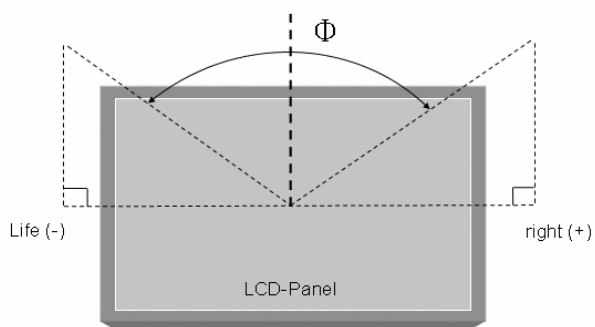
*4) Definition of Viewing Angle(θ, ψ), refer to Fig9-2 as below :

Fig9-2 Definition of Viewing Angle

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

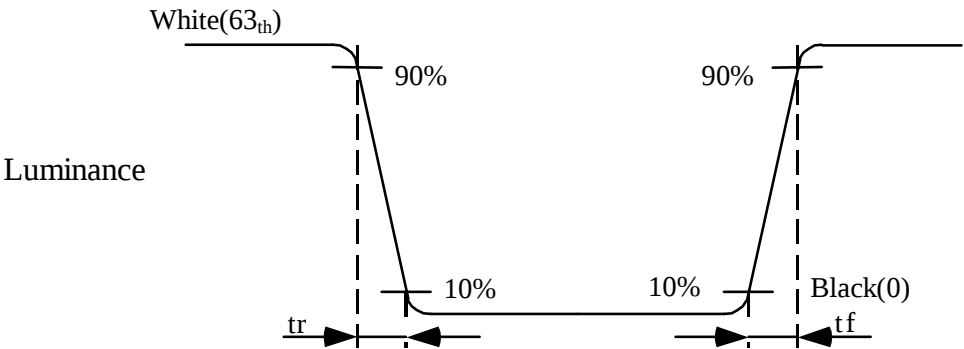


Fig9-3 Definition of Response Time(White-Black)

RB Electronics Co., Ltd Only Confidential

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)	● 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)	● Frequency range:8~33.3Hz ● Stoke: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. ESD Test

ITEM	Condition	REMARKS
ESD	150pF , 330Ω , ±8KV&±15KV air & contact test	*1)
	200pF , 0Ω , ±250V contact test	*2)

Remarks :

*1) LCD glass and metal bezel

*2) IF connector pins

10.4.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 trasformation of the module parts should be ignored.

Fail:No display image,obvious non-uniformity,or line defect.