CHIMEI INNOLUX DISPLAY CORPORATION

LCD MODULE

APPLICATION NOTE

Customer:	**All**
LCD SIZE:	**4.3**
Date:	**2010/12/17**
Version:	**K**

Remark
■ **Single Power**

Approved by	Reviewed by	Prepared by
Hans Chen 2010/12/17	David Tang 2010/12/17	YC Guan 2010/12/17

Record of Revision

Version	Revise Date	Page	Content
A	2006/09/07		Preliminary Version
B	2006/12/16	3	Add LCM FPC “VR” mark
C	2007/03/16	3	Modify the LCM FPC “VR” mark
D	2007/11/23	3~6	Modify a New Control Board
E	2008/05/19		New version and standardization
F	2008/12/1	6 9	Modify the Hsync & Vsync definition Modify recommended LED driver from MPS3202 to MPS3302
G	2009/3/18		Modify the application notes format Delete customized version LCM application
H	2009/6/22	3 7	Add low luminance model AT043TN22 and AT043TN23 V.2 Delete the other recommended LED driver IC except MPS3302
I	2009/11/4	8	Add recommended LED driver IC FP6745
J	2010/7/29	3 6	Modify the model promoted Add timing table for LR430LC9001
K	2010/12/17	10	Add main FPC mechanical design

1. Module Introduction

1.1 Module Photo

Model name	Top	Bottom
AT043TN24 V.7 AT043TN25 V.2		
LR430LC9001		

1.2 Model Comparison

Module name	Brightness(nits)	Pin Num.	Recommended connector
AT043TN24 V.7	400(with TP)	40 pin	FH19-40S-0.5SH
AT043TN25 V.2	500(without TP)	40 pin	FH19-40S-0.5SH
LR430LC9001	350(without TP)	40 pin	FH19-40S-0.5SH

2. Pin Assignment Table

Pin/No.	AT043TN24 V.7 AT043TN25 V.2	LR430LC9001	**Function**	**Remark**
1	V_{LED-}	V_{LED-}	Power for LED backlight cathode	

2	V_{LED+}	V_{LED+}	Power for LED backlight anode	
3	GND	GND	Power ground	
4	V_{DD}	V_{DD}	Power supply	
5	R0	R0	Red data (LSB)	
6	R1	R1	Red data	
7	R2	R2	Red data	
8	R3	R3	Red data	
9	R4	R4	Red data	
10	R5	R5	Red data	
11	R6	R6	Red data	
12	R7	R7	Red data (MSB)	
13	G0	G0	Green data (LSB)	
14	G1	G1	Green data	
15	G2	G2	Green data	
16	G3	G3	Green data	
17	G4	G4	Green data	
18	G5	G5	Green data	
19	G6	G6	Green data	
20	G7	G7	Green data (MSB)	
21	B0	B0	Blue data (LSB)	
22	B1	B1	Blue data	
23	B2	B2	Blue data	
24	B3	B3	Blue data	
25	B4	B4	Blue data	
26	B5	B5	Blue data	
27	B6	B6	Blue data	
28	B7	B7	Blue data (MSB)	
29	GND	GND	Power ground	
30	PCLK	DCLK	Pixel clock	
31	DISP	DISP	Display on/off	
32	NC	Hsync	Horizontal sync input	
33	NC	Vsync	Vertical sync input	
34	DE	DE	Data Enable	

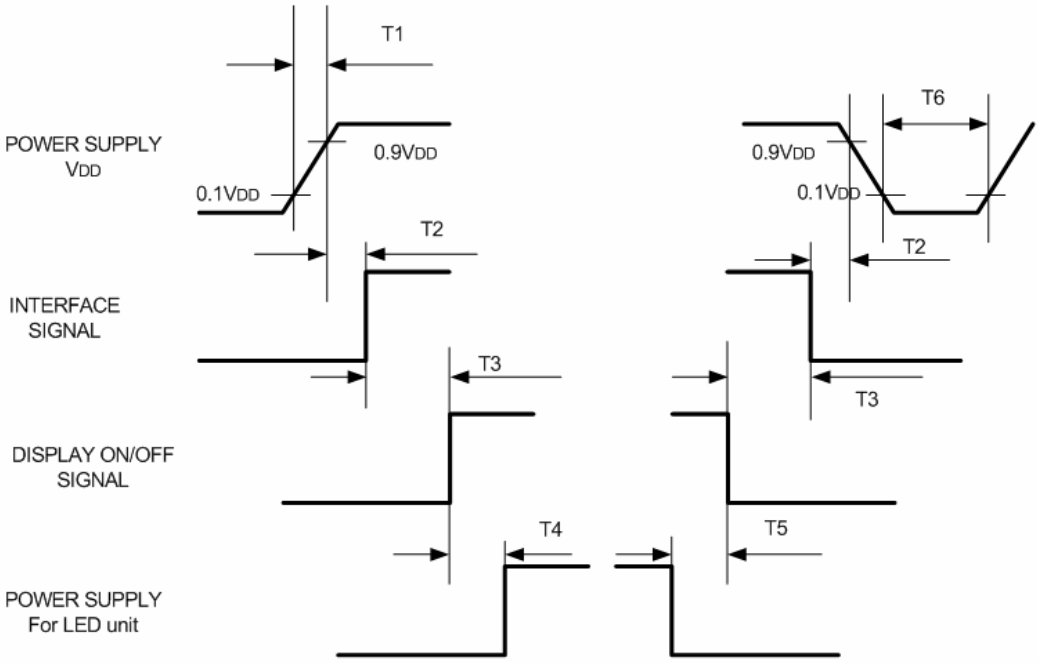
35	NC	NC	No connection	
36	GND	GND	Power ground	
37	X1	NC	Right side of touch panel	Note 1
38	Y1	NC	Bottom side of touch panel	Note 1
39	X2	NC	Left side of touch panel	Note 1
40	Y2	NC	Top side of touch panel	Note 1

Note 1: For the model without touch panel, these pins need not to be connected.

3. Power &Timing Characteristic

3.1. Power Sequence

Customer should follow our product power sequence, other it would lead to display abnormal, please refer to the figures as below.



Symbol	Specification	Symbol	Specification
T1	0≦T1≦10 msec	T4	160 msec ≦T4
T2	0≦T2≦100 msec	T5	160 msec ≦T5
T3	0≦T3≦200 msec	T6	1 msec ≦T6

3.2 Power Operation Conditions

Customer should notice the red mark specially, if you do not follow it, it would lead to display abnormal.

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V_{DD}	3.1	3.3	3.5	V	
Current for Driver	IV_{DD}	-	17	25	mA	V_{DD} = 3.3V
Input logic high voltage	V_{IH}	0.8V_{DD}	-	V_{DD}	V	Note 1
Input logic low voltage	V_{IL}	GND	-	0.2V_{DD}	V	

Note 1: CLK, DE, R0~ R7, G0~ G7, B0~ B7.

3.3 Timing Description

Input signals must follow our timing specification, Otherwise the LCM will display abnormally. About the detail timing parameters of LCD display, please follow the product specification.

3.3.1 Timing parameter table

For AT043TN24 V.7, AT043TN25 V.2:

Parameter	Description	Unit	Values		
			Min.	Typ.	Max.
Tv	DE vertical period	H(line)	277	288	400
Tvd	DE vertical display area	H(line)		272	
Tvb	DE vertical blanking area	H(line)	5	16	128
Th	DE horizontal period	Dclok	520	525	800
Thd	DE horizontal display	Dclock		480	
Thb	DE horizontal blanking area	Dclock	40	45	320
DCLK	Dot clock frequency	MHz	7	9	12

For LR430LC9001:

Parameter	Description	Unit	Values		
			Min.	Typ.	Max.
Tv	vertical period	H(line)	-	286	-
Tvd	vertical display area	H(line)		272	
Tvp	vertical pulse width	H(line)	1	10	-
Tvb	Vertical back porch	H(line)	1	2	-

Tvf	Vertical front porch	H(line)	1	2	-
Th	Horizontal period	Dclok	520	525	800
Thd	Horizontal display area	Dclock		480	
Thb	Horizontal back porch	Dclock	2	-	-
Thp	Horizontal pulse width	Dclock	2	41	-
Thf	Horizontal front portch	Dclock	2	-	-
DCLK	Dot clock frequency	MHz	7	9	12

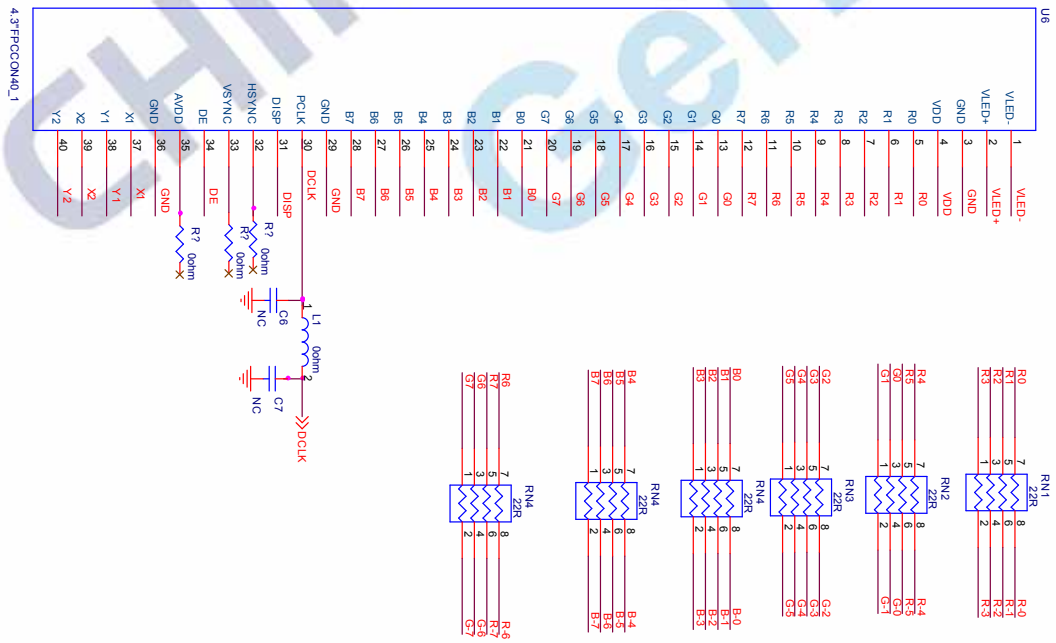
Remark: thf+ thp+ thb >44

4. Software Introduction

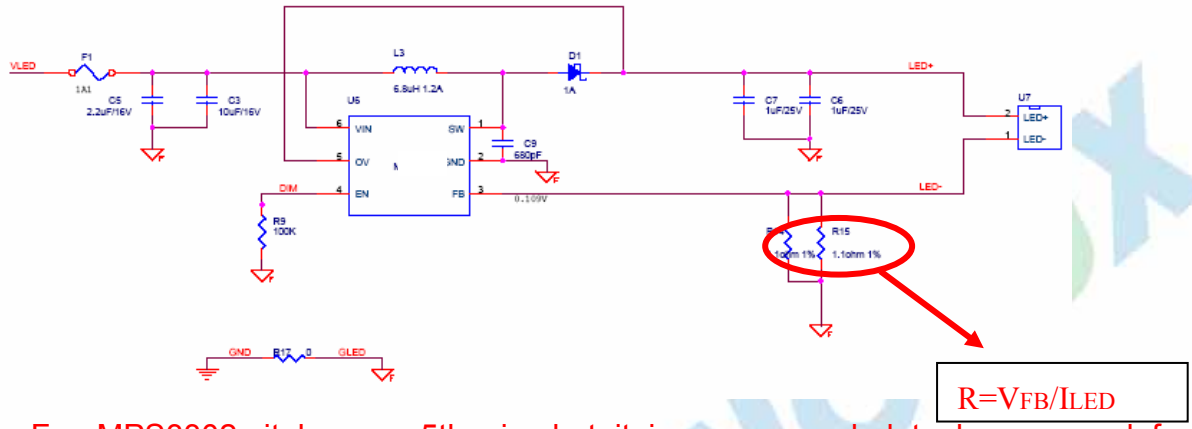
NA

5. Reference Circuit

5.1 Interface Reference Circuit



5.2 Backlight Driver Reference Circuit



Note1. For MPS3302, it has no 5th pin, but it is recommended to be reserved for other compatible driver ICs,

Note2. Pay attention that the LED driver IC output could be up to 31.5V.

5.3 Vendor Recommend

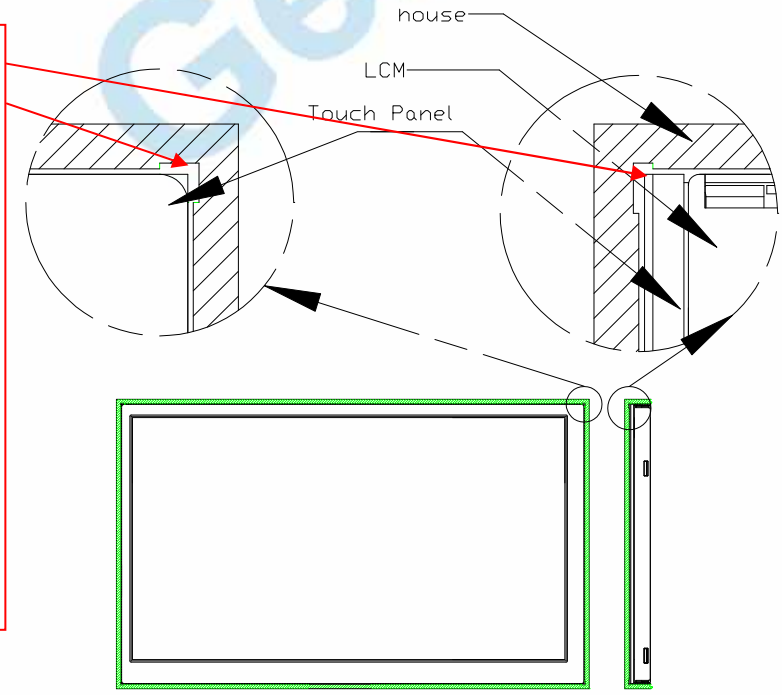
Item	Vendor	Type	Remark
LED Driver	Fiti Power	FP6745	PWM Frequency:100Hz~50KHz

6. Mechanics Design Guide

6.1 Touch panel corner /edge protection cutting.

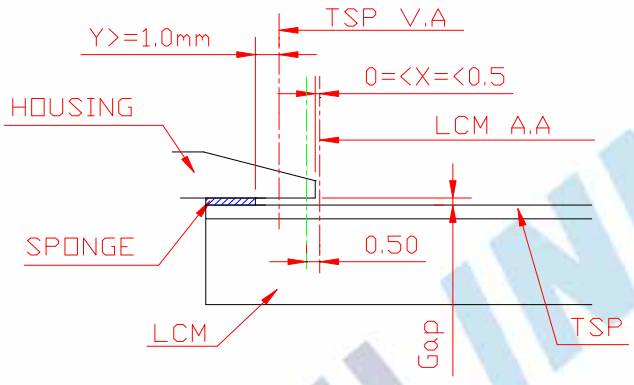
Touch panel corner /edge protection cutting

Touch panel's outline dimensions are same as LCM's, and there are no chamfer-cuts on its edges and corners. So it is essential to do protection cut on plastic house as right drawings show. It is good for protecting edges of TSP and easy to assembly.



6.2 Using sponge on housing to overcome bending or unexpected protrusion

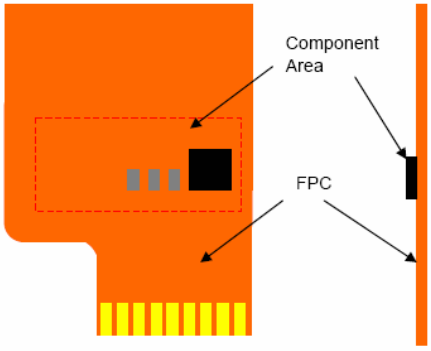
Because touch film is made of flexible PET, any unexpected touch with it would cause malfunction of touch panel. So here a sponge between touch panel and plastic housing is recommended for users. And the drawing will show you how to design the housing and sponge.

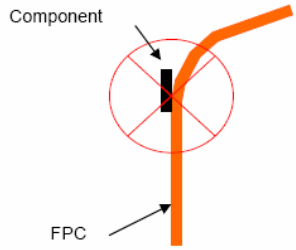


TSP section sketch

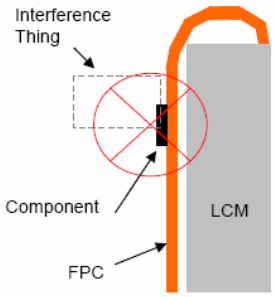
Notes: 1. X is the distance from LCM A.A to housing opening.
2. Y is the distance from TSP V.A to Sponge opening.
3. The active force will be bigger when you touch the area near the housing opening.
4. If you want to provide more protection for LCM, you can add same buffer material on the bottom of LCM.

6.3 Main FPC





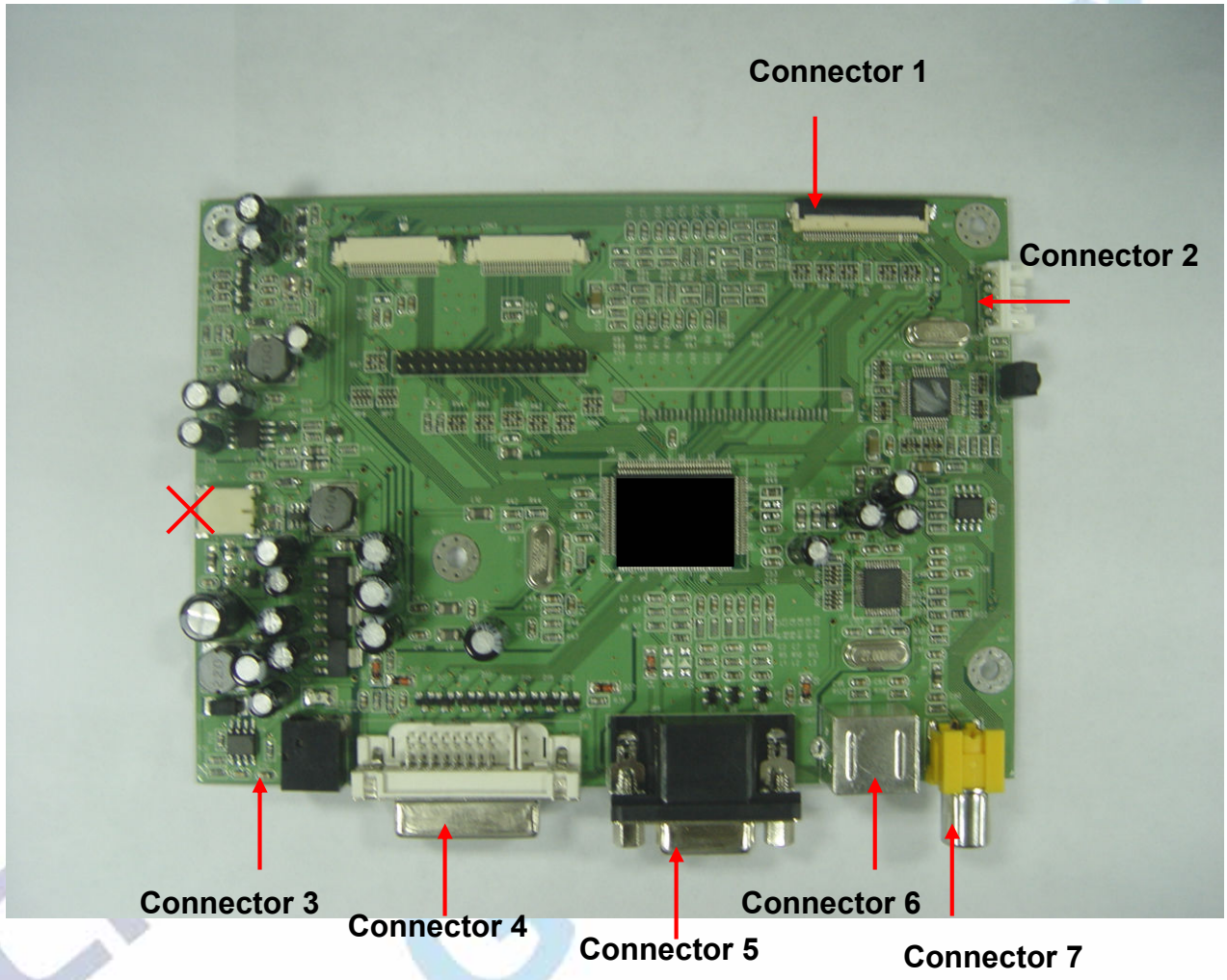
1,Don't bend the Component Area on FPC when assembling. The Component maybe peeling when FPC bending.



2.Don't allow anything interference with the components on FPC

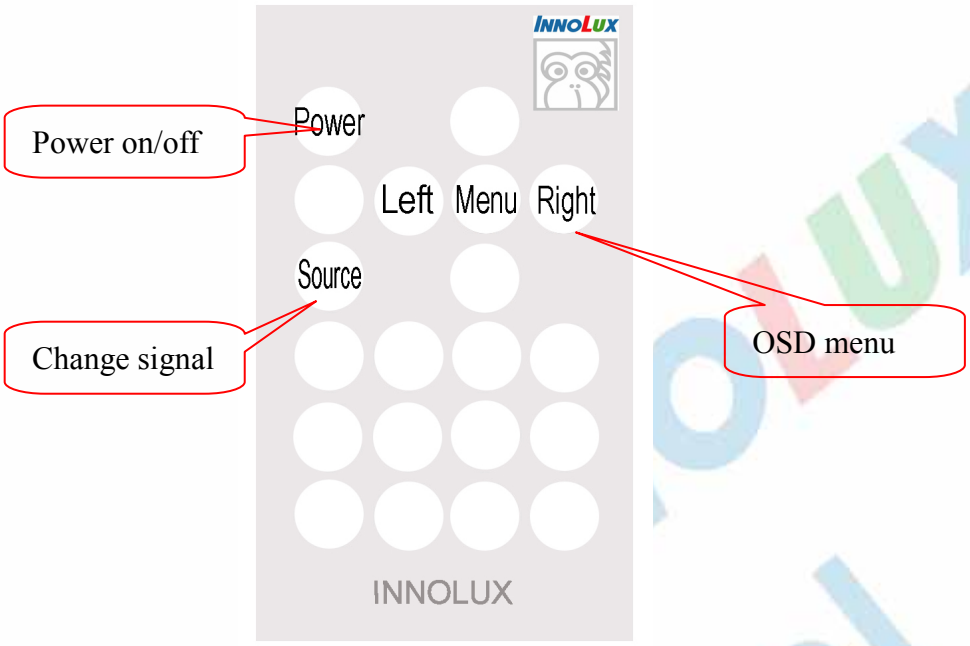
7. Demo Board Introduction

7.1 Interface of demo board

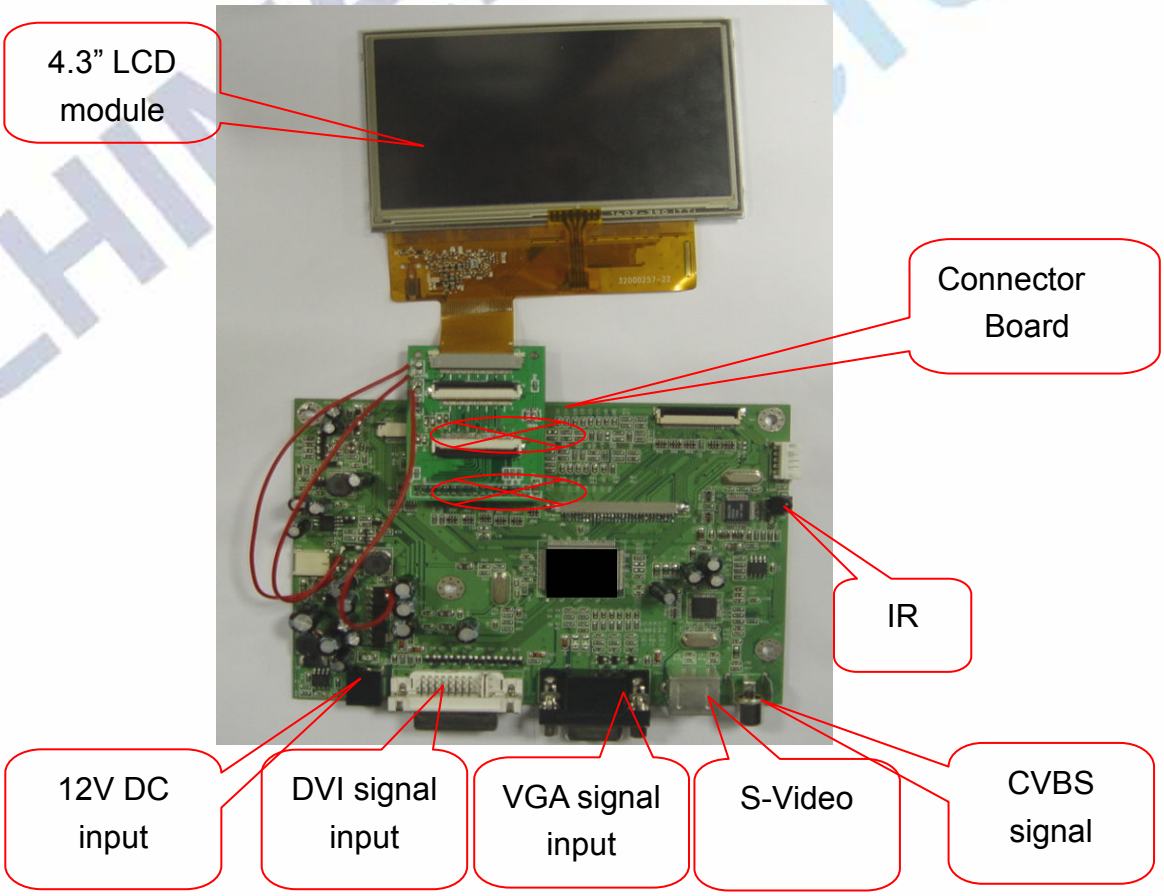


Connector	I/O	Function
1	O	5.0”D, 7Dconnector
2	I	The hand-off controller of CVBS and D-Sub
3	P	12V DC input
4	I	DVI signal input
5	I	VGA signal input
6	I	S-video
7	I	CVBS

7.2 Interface of Remote Control



7.3 Linking LCM



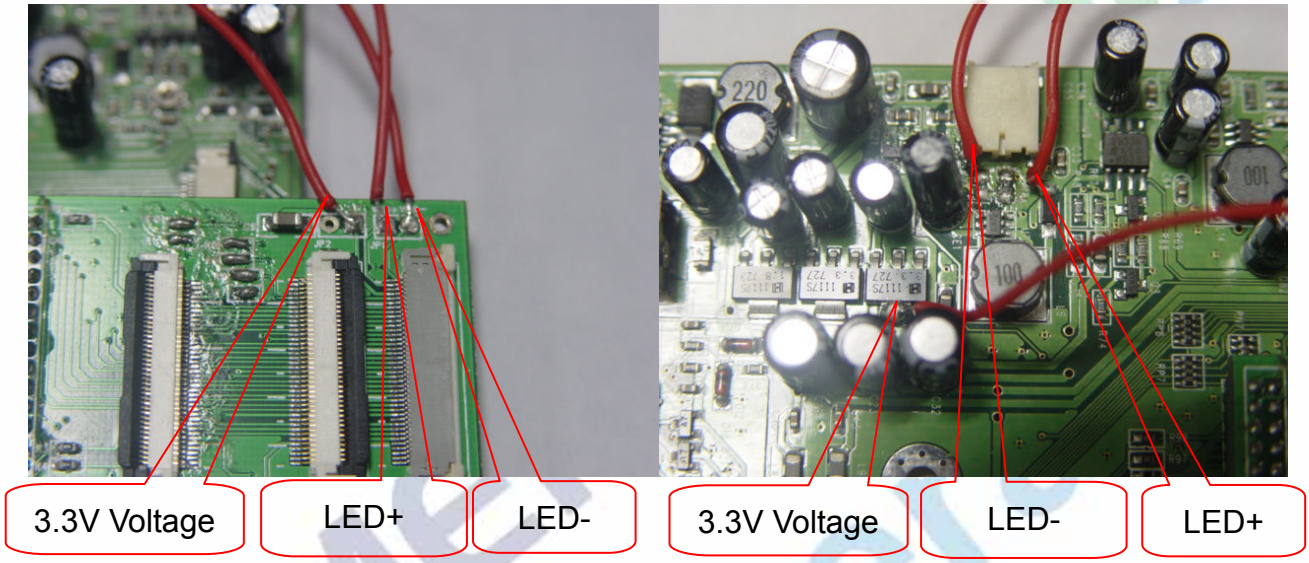
Note 1 : The system board recommended input signal is the VGA signal, if the CVBS signal

input is needed, it can be selected by remote controller.

7.4 Converter board

This system board needs to connect one connector board. The connector board needs to link the backlight voltage and 3.3V VCC voltage from system board.

The photo of the jumper wire shows as bellow:



Notes:

1. We don't guarantee any power & timing & optical characteristic be measured by INL control board.
2. INL control board is just for demo INL digital panel.