INNOLUX DISPLAY CORPORATION

LCD MODULE

SPECIFICATION

Customer: _____

Model Name: AT080TN42

SPEC NO.: A080-42-TT-01

Date: 2006/10/12

Version: 01

■ Preliminary Specification

□ Final Specification

Option
■ AT080TN42 (LCM)
■ DPF MB (FDP12)

For Customer's Acceptance

Approved by	Comment

INNOLUX DISPLAY CORPORATION

LCD MODULE SPECIFICATION

Customer:	
Model Name:	**AT080TN42**
SPEC NO.:	**A080-42-TT-02**
Date:	**2006/09/25**
Version:	**02**

■ **Preliminary Specification**

□ **Final Specification**

Approved by	Reviewed by	Prepared by

Record of Revision

Version	Revise Date	Page	Content
1	2006/08/02		Initial Release.
2	2006/09/25	4	Modify “Note 1: Selection of scanning mode”
		3	Modify the definition of Pin38 & Pin43
		1	Add Backlight power consumption and Weight.

Contents

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	8.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800X3(RGB)X600	
4	Display mode	Normally White, Transmissive	
5	Dot pitch	0.0675(W)X0.2025(H) mm	
6	Active area	162(W)X121.5(H) mm	
7	Module size	183(W)X141(H)X6.3(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	Digital	
11	Backlight power consumption	1.782W	
12	Panel power consumption	TBD	
13	Weight	262.58 g	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

2.1. TFT LCD Panel Driving Section

Pin No.	Symbol	I/O	Function	Remark
1	POL	I	Polarity selection	
2	STVD	I/O	Vertical start pulse input when U/D= H	Note 1
3	OEV	I	Output enable	
4	CKV	I	Vertical clock	
5	STVU	I/O	Vertical start pulse input when U/D= L	Note 1
6	GND	P	Power ground	
7	EDGSL	I	Select rising edge or falling edge	
8	V_{CC}	P	Power supply for digital circuit	
9	V9	I	Gamma voltage level 9	
10	V_{GL}	P	Gate OFF voltage	
11	V2	I	Gamma voltage level 2	
12	V_{GH}	P	Gate ON voltage	
13	V6	I	Gamma voltage level 6	
14	U/D	I	Up/down selection	Note 1, 2
15	V_{COM}	I	Common voltage	
16	GND	P	Power ground	
17	AV_{DD}	P	Power supply for analog circuit	
18	V14	I	Gamma voltage level 14	
19	V11	I	Gamma voltage level 11	
20	V8	I	Gamma voltage level 8	

21	V5	I	Gamma voltage level 5	
22	V3	I	Gamma voltage level 3	
23	GND	P	Power ground	
24	R5	I	Red data(MSB)	
25	R4	I	Red data	
26	R3	I	Red data	
27	R2	I	Red data	
28	R1	I	Red data	
29	R0	I	Red data(LSB)	
30	GND	P	Power ground	
31	GND	P	Power ground	
32	G5	I	Green data(MSB)	
33	G4	I	Green data	
34	G3	I	Green data	
35	G2	I	Green data	
36	G1	I	Green data	
37	G0	I	Green data(LSB)	
38	STHL	I/O	Horizontal start pulse input when R/L = L	Note 1
39	REV	I	Control signal are inverted or not	
40	GND	I	Power ground	
41	DCLK	I	Sample clock	
42	V_{CC}	P	Power supply for digital circuit	
43	STHR	I/O	Horizontal start pulse input when R/L =H	Note 1
44	LD	I	Latches the polarity of outputs and switches the new data to outputs	

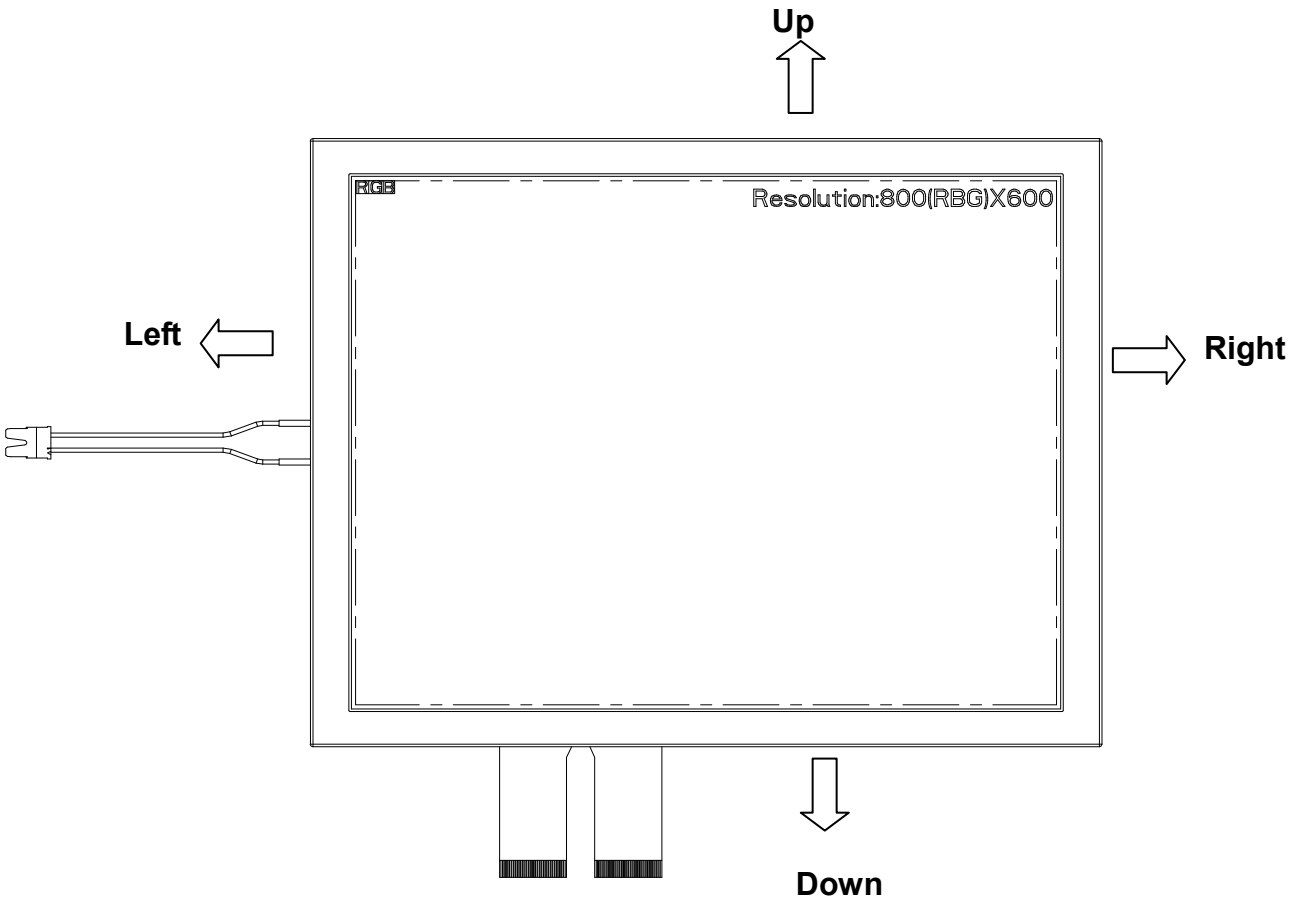
45	B5	I	Blue data (MSB)	
46	B4	I	Blue data	
47	B3	I	Blue data	
48	B2	I	Blue data	
49	B1	I	Blue data	
50	B0	I	Blue data (LSB)	
51	R/L	I	Right/ left selection	Note 1, 2
52	V1	I	Gamma voltage level 1	
53	V4	I	Gamma voltage level 4	
54	V7	I	Gamma voltage level 7	
55	V10	I	Gamma voltage level 10	
56	V12	I	Gamma voltage level 12	
57	V13	I	Gamma voltage level 13	
58	AV_{DD}	P	Power supply for analog circuit	
59	GND	P	Power ground	
60	V_{COM}	I	Common voltage	

I: input, O: output, P: Power

Note 1: Selection of scanning mode

Setting of scan control input		IN/OUT state for start pulse				Scanning direction
U/D	R/L	STVD	STVU	STHR	STHL	
GND	V_{CC}	O	I	I	O	Up to down, left to right
V_{CC}	GND	I	O	O	I	Down to up, right to left
GND	GND	O	I	O	I	Up to down, right to left
V_{CC}	V_{CC}	I	O	I	O	Down to up, left to right

Note 2: Definition of scanning direction.
Refer to the figure as below:



Note 3: When REV=”L” , normally
REV=”H”, these data will be inverted.

2.2. Backlight Unit Section

Pin No.	Symbol	I/O	Function	Remark
1	HI	P	Power supply for backlight unit(High voltage)	Pink
2	GND	P	Ground for backlight unit	White

3. Operation Specifications

3.1. Absolute Maximum Rating

(GND=AV_{SS}=0V, Note 2)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	V_{CC}	-0.3	5.0	V	
	AV_{DD}	-0.5	13.5	V	
	V_{GH}	TBD	TBD	V	
	V_{GL}	TBD	TBD	V	
	V_{GH}-V_{GL}	-	33.0	V	
Input signal voltage	V1~V7	0.4 AV_{DD}	AV_{DD}+0.3	V	Note 1
	V8~V14	-0.3	0.6AV_{DD}	V	Note 1
Operation Temperature	T_{OP}	(-30)	(85)	℃	
Storage Temperature	T_{ST}	(-40)	(95)	℃	

Note 1: AV_{DD}-0.1≥ V1≥ V2≥ V3≥ V4≥ V5≥ V6≥ V7≥ V8≥ V9≥ V10≥ V11≥ V12≥ V13≥ V14≥ AV_{SS}+0.1

Note 2: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

3.1.1. Typical Operation Conditions

(GND=AV_{SS}=0V, Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V_{CC}	3.0	3.3	3.6	V	Note 2
	AV_{DD}	-	10.0	-	V	
	V_{GH}	-	(16.0)	-	V	
	V_{GL}	-	(-7.0)	-	V	
Input signal voltage	V_{COM}	-	TBD	-	V	
	V1~V7	0.4 A_{VDD}	-	A_{VDD} -0.1	V	
	V8~V14	0.1	-	0.6 A_{VDD}	V	
Input logic high voltage	V_{IH}	0.7V_{CC}	-	V_{CC}	V	Note 3
Input logic low voltage	V_{IL}	0	-	0.3V_{CC}	V	

Note : Be sure to apply V_{CC} and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: V_{CC} setting should match the signals output voltage (refer to Note 3) of customer's system board .
Note 3: STHL, STHR, OEH, L/R, CPH1~CPH3, STVD, STVU, OEV, CKV, U/D.

3.1.2. Current Consumption

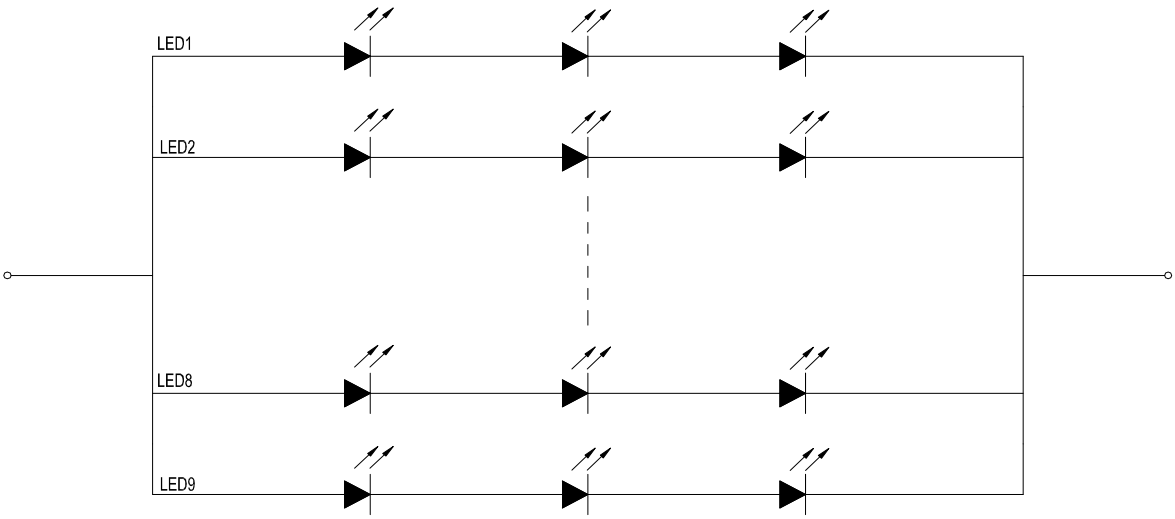
(GND=AV_{SS}=0V)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	TBD	TBD	mA	V_{GH} =16.0V
	I_{GL}	-	TBD	TBD	mA	V_{GL} = -7.0V
	I_{CC}	-	TBD	TBD	mA	V_{CC} =3.3V
	IAV_{DD}	-	TBD	TBD	mA	AV_{DD} =10.0V

3.1.3. Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LED voltage	V_L	-	9.9	10.5	V	Note 1
LED current	I_L	-	20	-	mA	Note 1
LED life time	-	20,000	-	-	Hr	Note 2

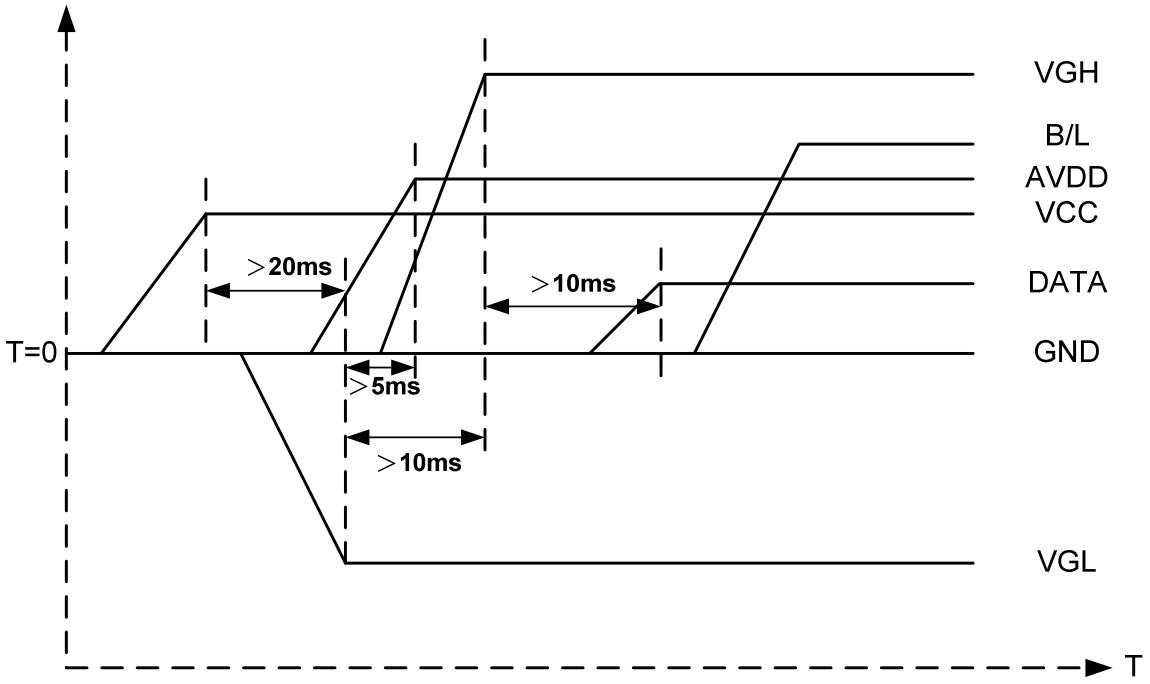
Note 1: The LED driving condition is defined for each LED module (3 LED Serial).



Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25℃ and I_L =20mA.

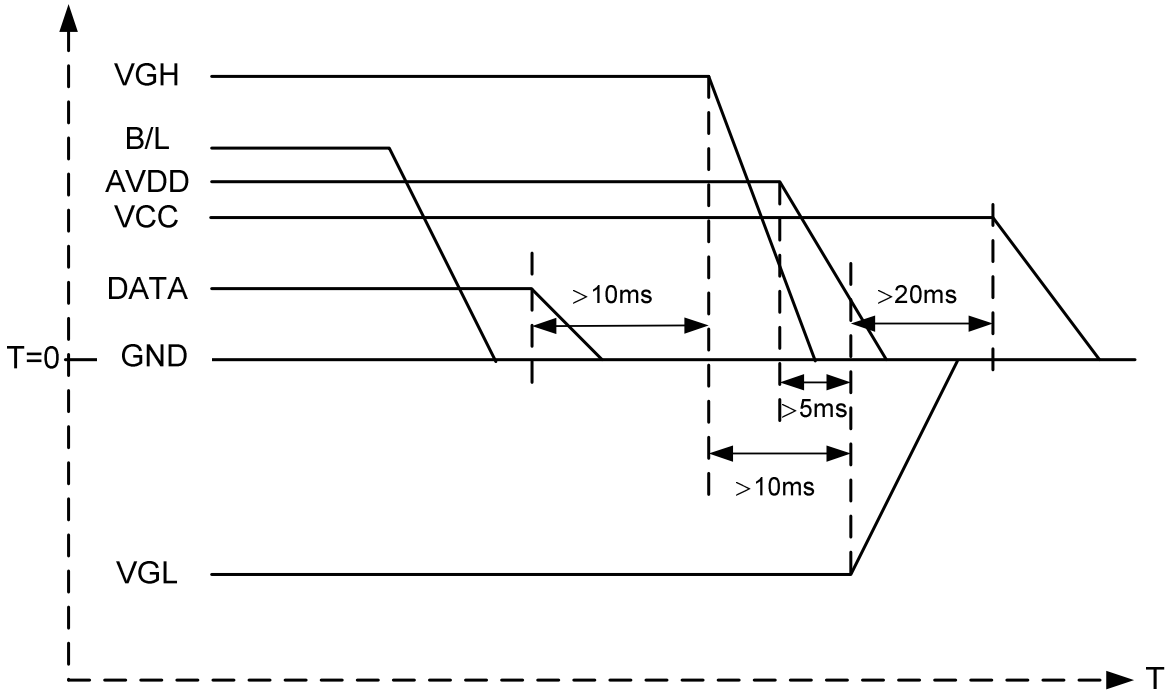
3.2. Power Sequence

3.2.1. Power on:



VCC→VGL→VGH→Data→B/L

3.2.2. Power off:



B/L→Data→VGH→VGL→VCC

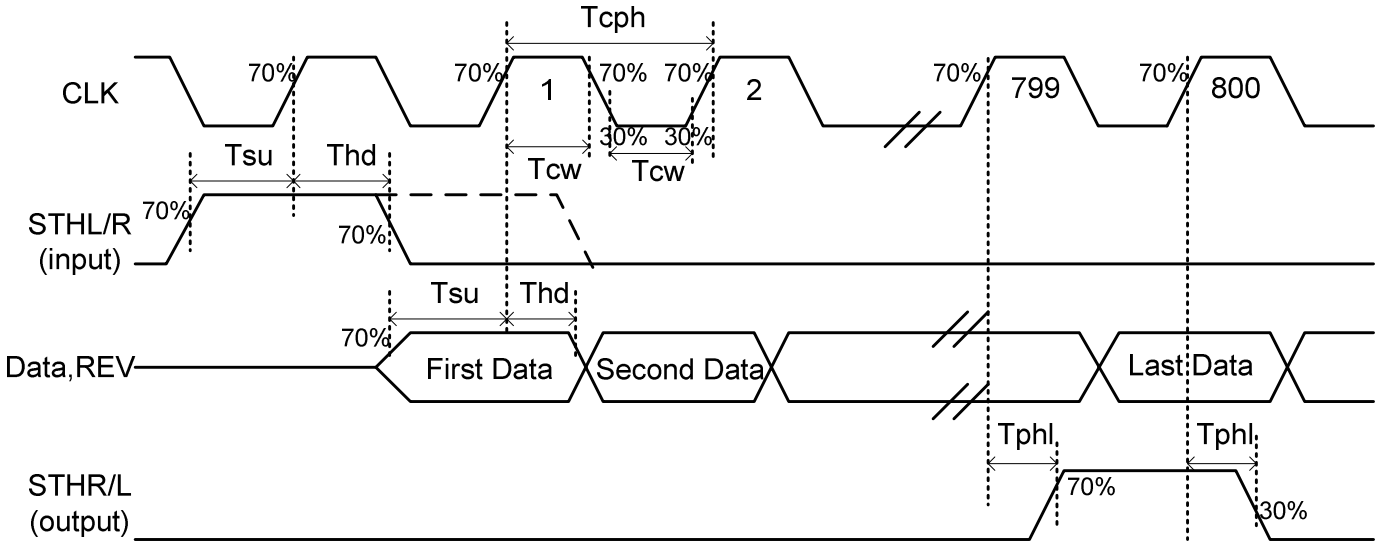
3.3. Timing Characteristics

3.3.1. Timing Conditions

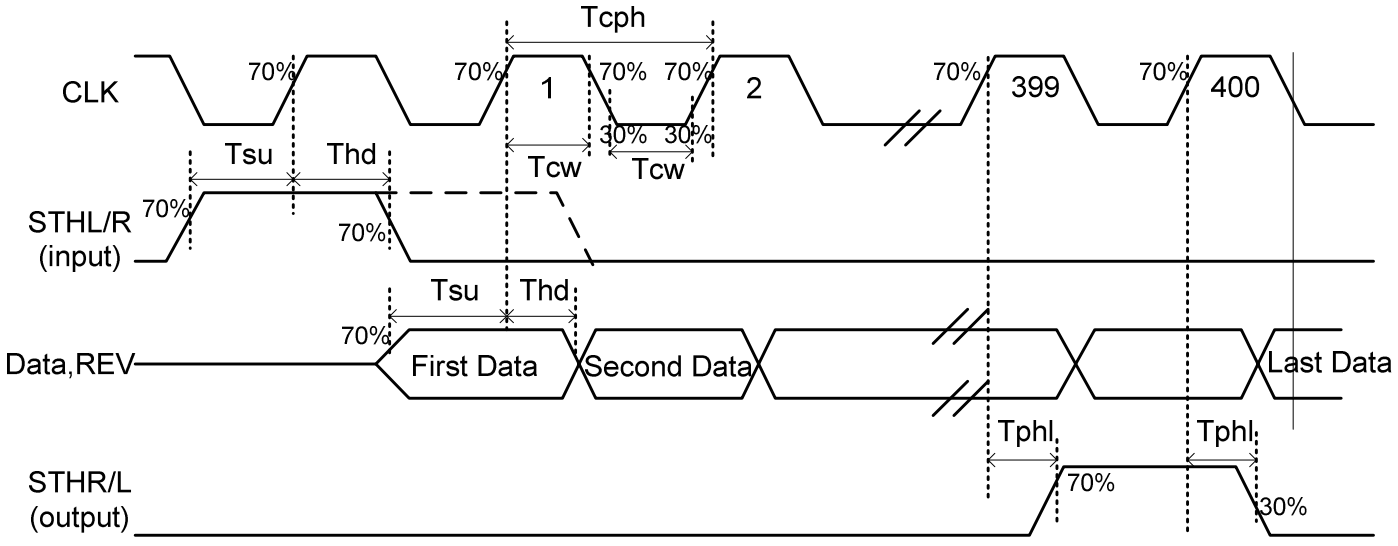
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
DCLK frequency	Fclk	-	40	45	MHz	
DCLK cycle	Tcph	22	25	-	ns	
DCLK pulse width	Tcw	8	-	-	ns	
Data set-up time	Tsu	4	-	-	ns	
Data hold time	Thd	2	-	-	ns	
Time that the last data to LD	Tld	1	-	-	Tcph	
Pulse width of LD	Twld	2	-	-	Tcph	
Time that LD to STVD/U	Tlds	5	-	-	Tcph	
POL set-up time	Tpsu	6	-	-	ns	
POL hold time	Tphd	6	-	-	ns	
OEV pulse width	Toev	1	-	-	us	
CKV pulse width	Tckv	2.5	-	-	us	
Horizontal display timing range	Tdh	-	800	-	Tcph	
Horizontal timing range	Th	-	1056	-	Tcph	
STV setup time	Tsuv	700	-	-	ns	
STV hold time	Thdv	700	-	-	ns	
Horizontal lines per field	Tv	628	635	650	Tdh	
Vertical display timing range	Tvd	-	600	-	Tdh	

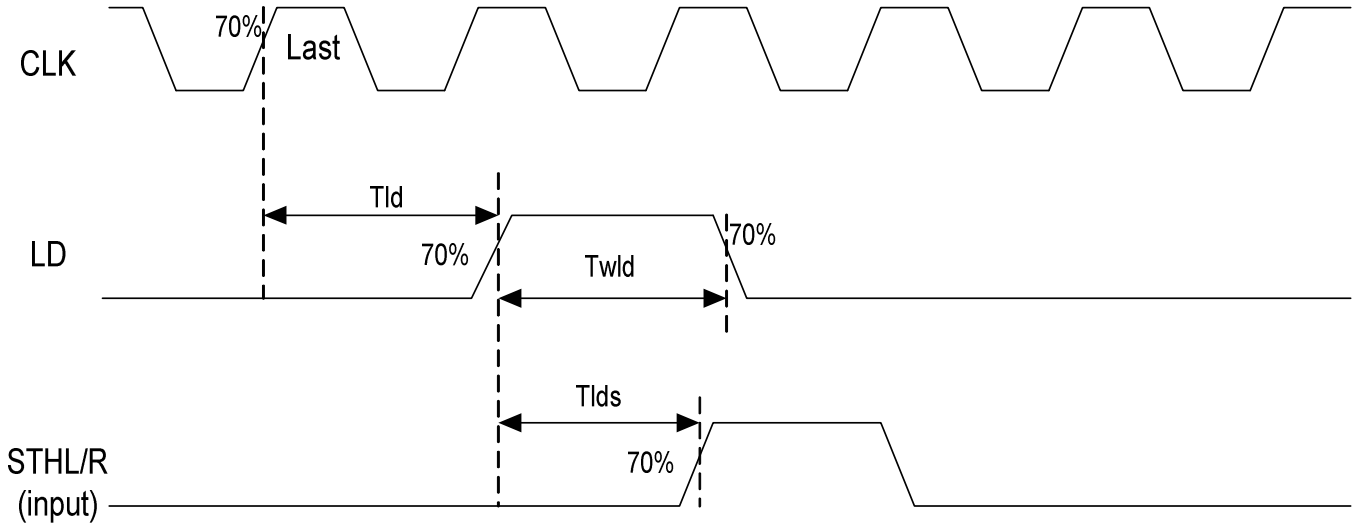
3.3.2. Timing Diagram

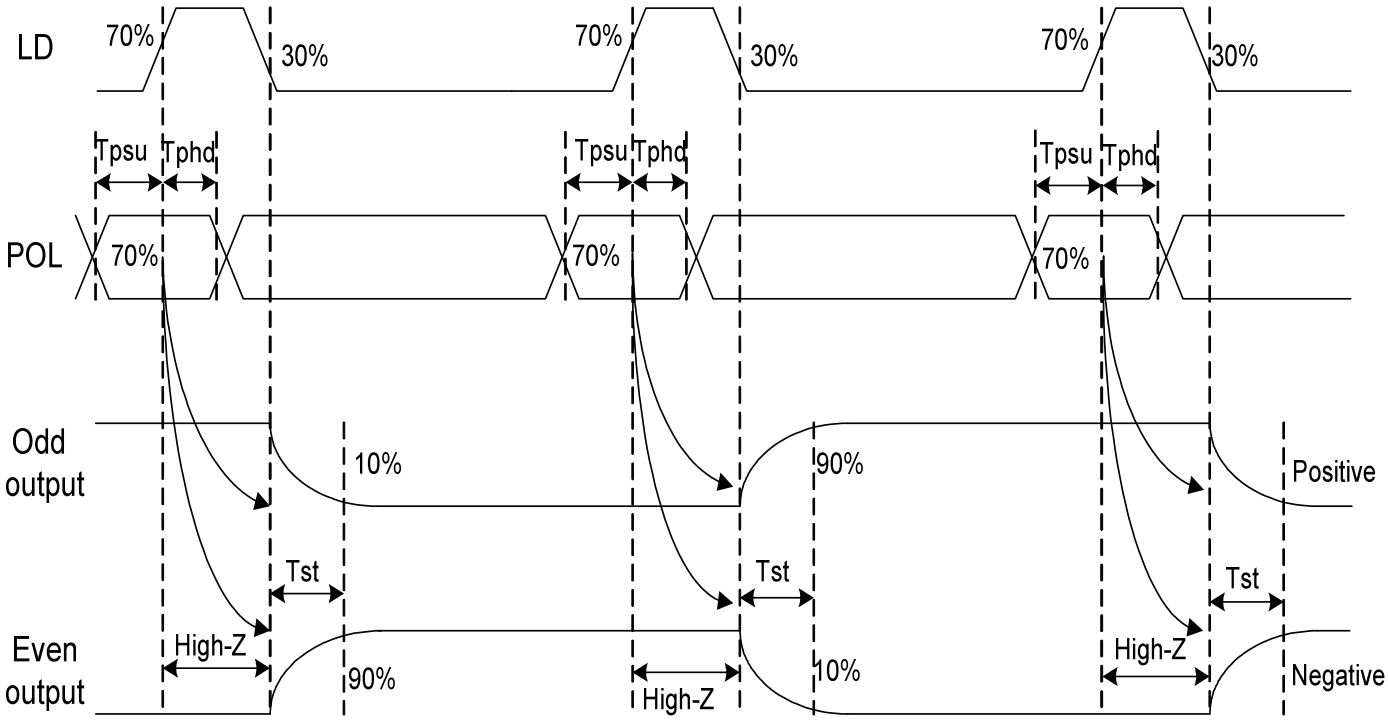
EDGSL=L or open

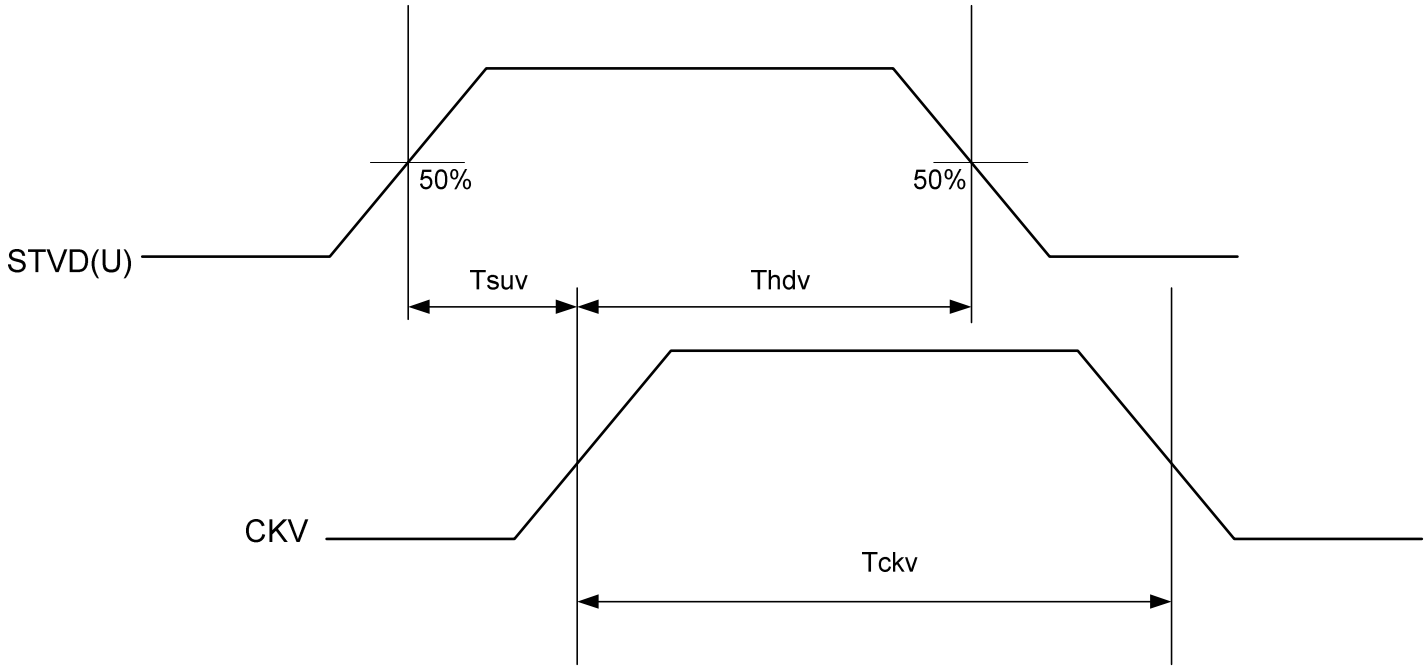


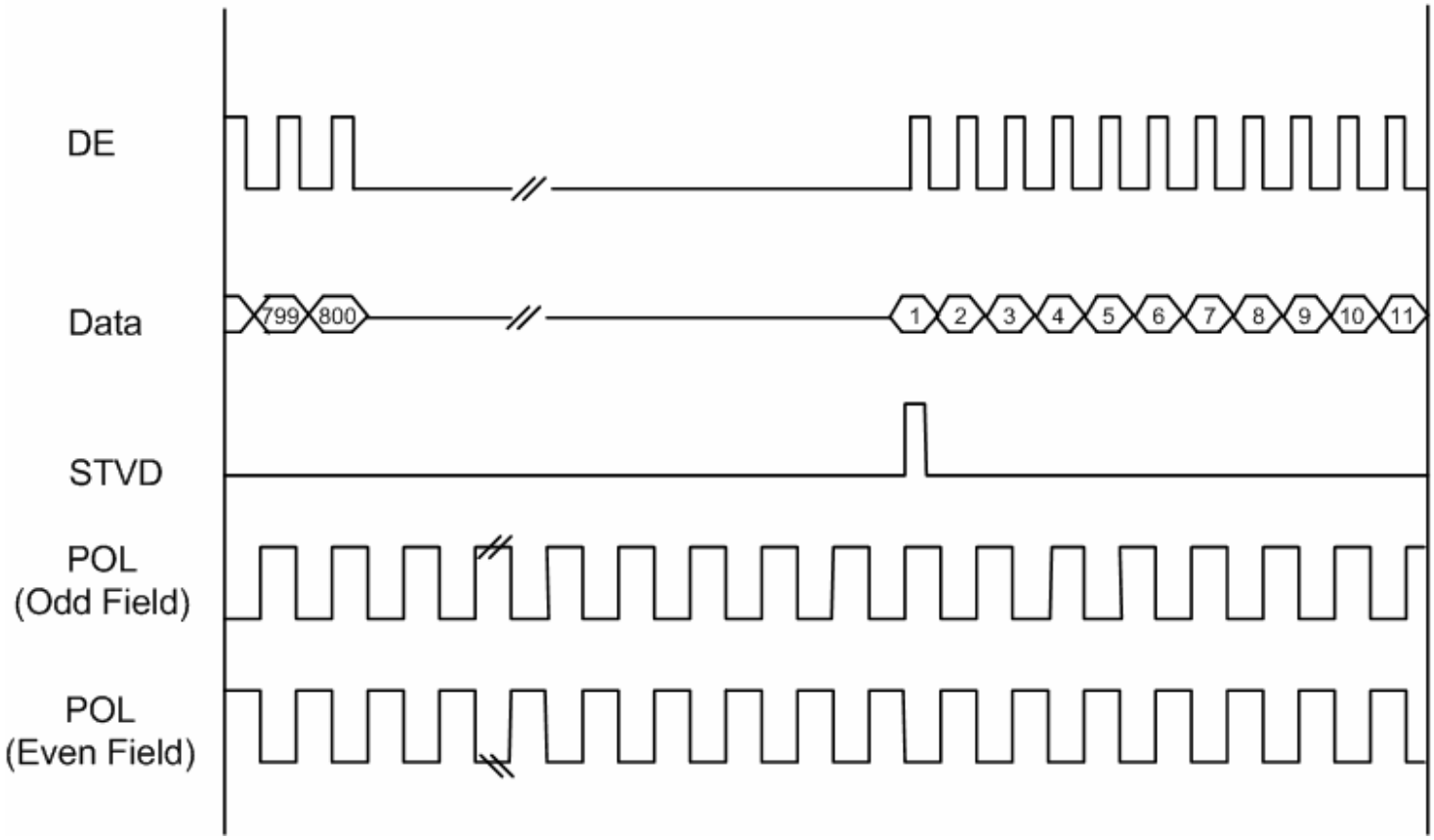
EDGSL=H











4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	(60)	(70)	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	(60)	(70)	-		
	θ_T	Φ=90°(12 o'clock)	(40)	(50)	-		
	θ_B	Φ=270°(6 o'clock)	(60)	(70)	-		
Response time	T_{ON}	Normal θ=Φ=0°	-	(10)	TBD	msec	Note 3
	T_{OFF}		-	(15)	TBD	msec	Note 3
Contrast ratio	CR		(400)	(500)	-	-	Note 4
Color chromaticity	W_X		(0.26)	(0.31)	(0.36)	-	Note 2 Note 5 Note 6
	W_Y		(0.28)	(0.33)	(0.38)	-	
Luminance	L		200	(250)	-	cd/m²	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 7

Test Conditions:

1. V_{CC}=3.3V, I_L=20mA (Backlight current), the ambient temperature is 25℃.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

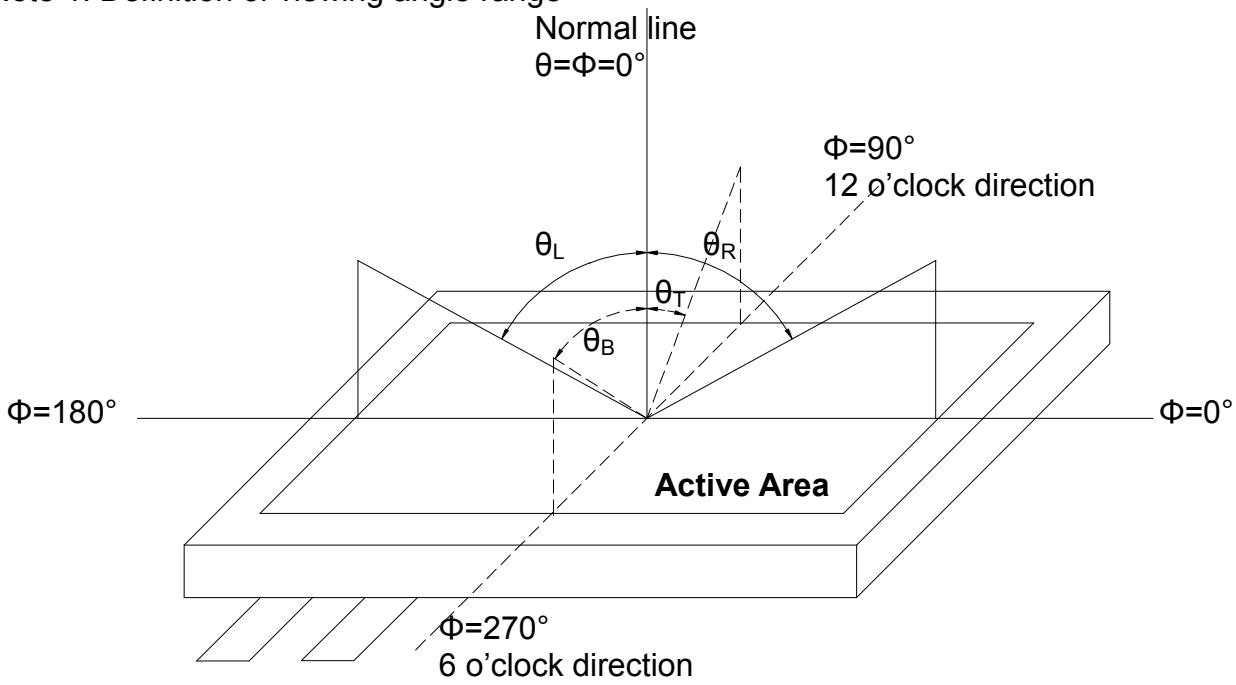


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

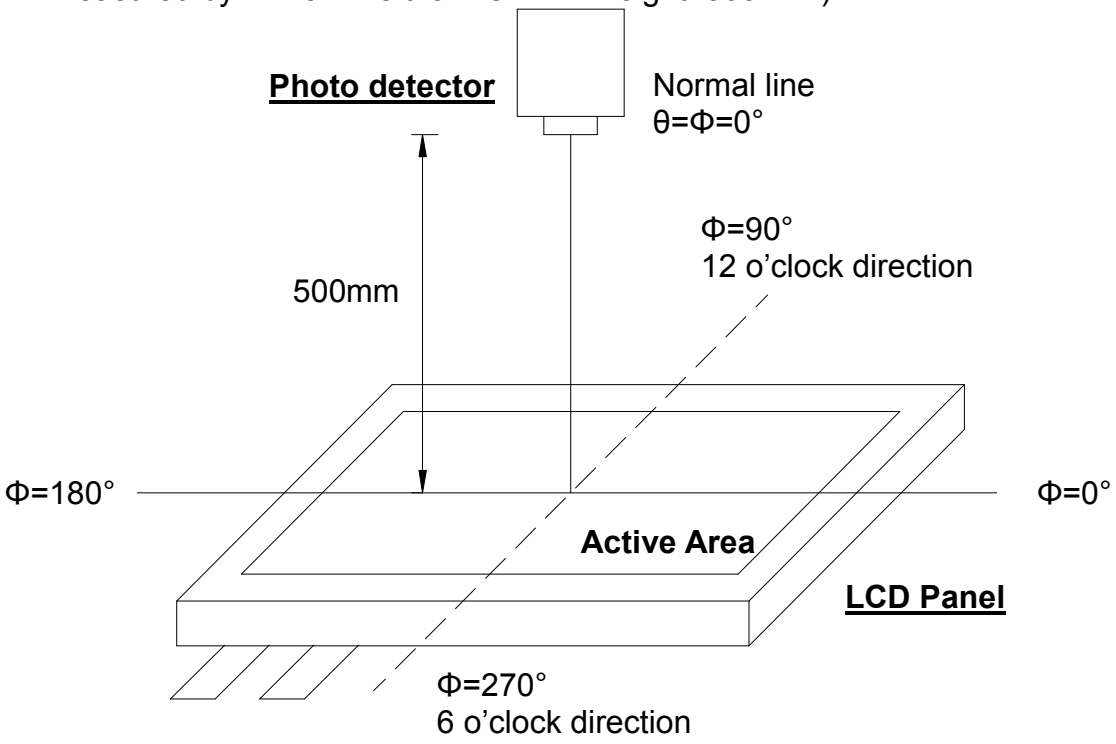


Fig. 4-2 Optical measurement system setup

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

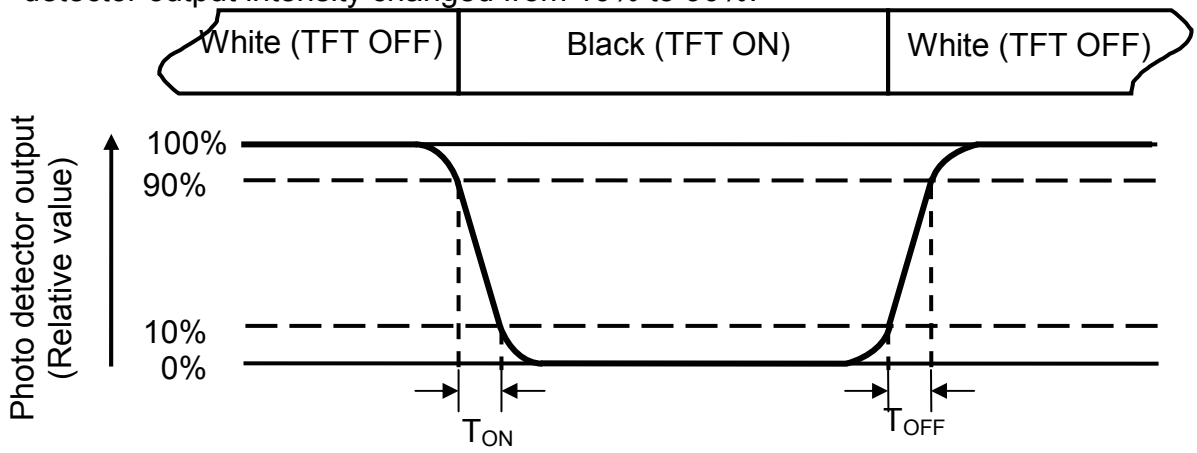


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel.

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$Luminance\ \ Uniformity\ (Yu) = \frac{B_{min}}{B_{max}}$$

L-------Active area length W----- Active area width

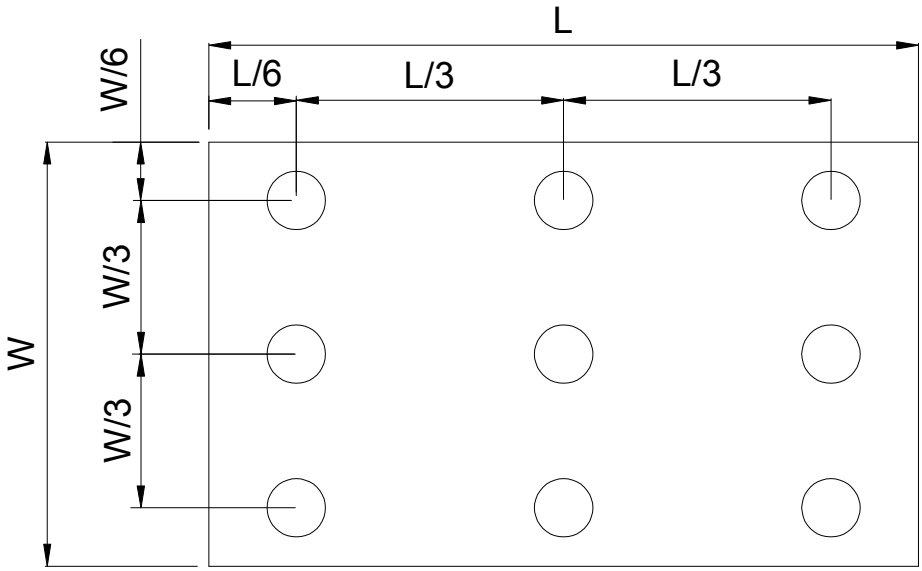


Fig. 4-4 Definition of measuring points

$\mathbf{B_{max}}$: The measured maximum luminance of all measurement position.
$\mathbf{B_{min}}$: The measured minimum luminance of all measurement position.

5. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = (95℃) 240hrs	Note 1
Low Temperature Storage	Ta = (-40℃) 240hrs	Note 1
High Temperature Operation	Ts = (85℃) 240hrs	Note 2
Low Temperature Operation	Ta = (-30℃) 240hrs	Note 1
Operate at High Temperature and Humidity	+60℃, 90%RH 240hrs	
Thermal Shock	-40℃/30 min ~ +95℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	
Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: Ta is the ambient temperature of samples.
Note 2: Ts is the temperature of panel's surface.
Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

6. General Precautions

6.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

6.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

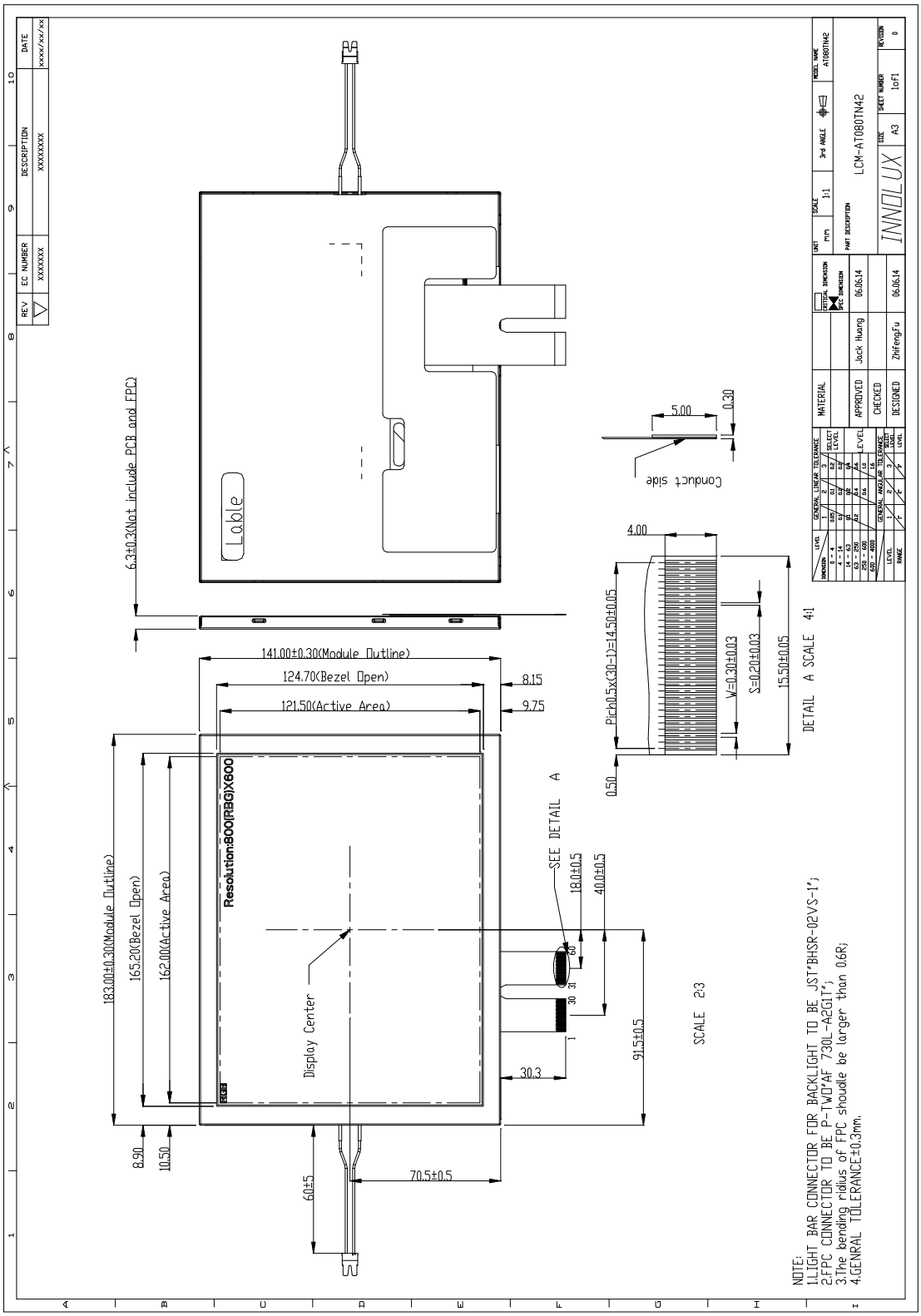
6.4. Storage

1. Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

6.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

7. Mechanical Drawing



8. Package Drawing

TBD

INNOLUX

INNOLUX DISPLAY CORPORATION

Mother Board

SPECIFICATION

Customer:	
Model Name:	Mother Board for DPF (FDP12 For Digital LCM)
SPEC NO.:	
Date:	2006/10/11
Version:	02

■ Preliminary Specification(Draft)
□ Final Specification

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

INNOLUX

Record of Revision

Version	Revise Date	Page	Content
01	2006/07/27	8	Initial Release.
02	2006/10/11	10	Update Operation Specification &Mechanical Drawing

INNOLUX

Contents

1. Features

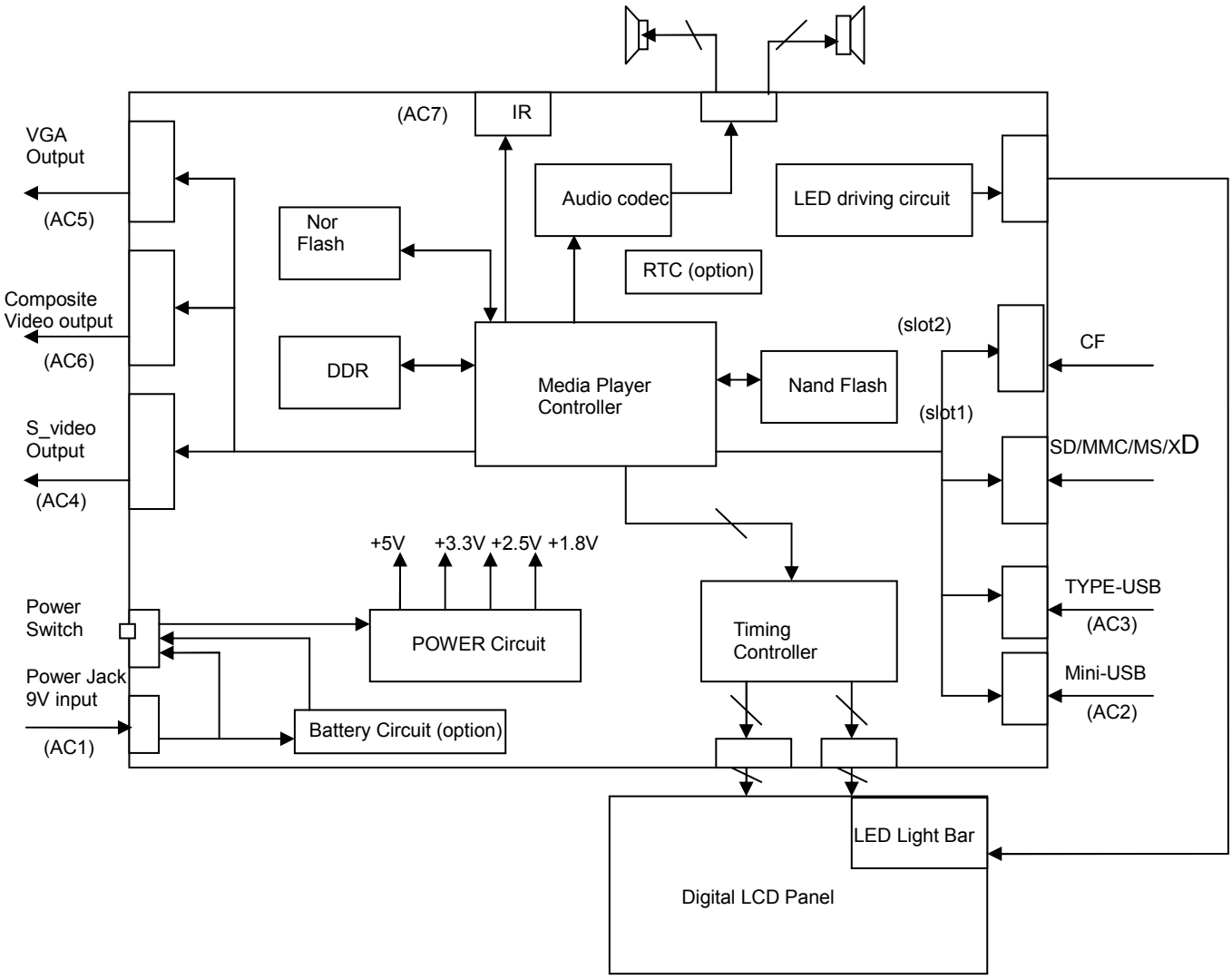
Digital Picture Frame (DPF) features all-in-one:

- High resolution of 8 inch display: 800*600 SVGA.
- USB device2.0 and USB host1.1 interface
- Copy、delete or paste files among USB host、cards and NAND Flash memory.
- Support to show photos with music.
- Aspect ratio 16:9 and 4:3.
- Card player solution: it can play MP3, JPEG (up to 5MP), MPEG1/4.
- Memory card reader: SD、CF、MMC、MS and XD.
- With IR Remote control.
- Speaker outputs 2 channels (left / right channel).
- Built-in rechargeable battery of life about 1 hour (option).
- Built-in NAND Flash(option).
- Has 8 pictures preview mode.
- Composite video output、D_SUB output(720*480) and S _video output(option).
- Support connecting to printer (with picture _bridge function on) to print the photos directly.
- Clock and calendar function to catch different photos//developing
- Alarm clock and picture-scheduler to remind you someone’s birthday, an important event or appointment.//developing

2. General Specifications

No.	Item	Specification
1	Video Format	Mpeg 1/4 (XVID)
2	Display Color	262,144 (18 bit color)
3	Audio	MP3, WAV,AAC,WMA
4	Image Format	JPEG, BMP
5	Speaker Amplifier	0.5w + 0.5w(option)
6	Connectivity	USB 2.0 slave and PIC _bridge connector
7	Connectivity	USB1.1 host
8	AV I/O	Composite Output(option)
9	D_sub I/O	VGA(Analog RGB 、 Hsync&Vsync) output(720*480)(option)
10	S_video	Y/C output(option)
11	Display mode	4:3/16:9 mode
12	NAND flash	Up to 1G(option)
13	File manage	Delete and copy
14	JPEG decode speed	48M/S
15	File System	FAT32/16/FAT
16	Language	English + any others
17	Card Sources	CF、SD、MMC、MS and XD
18	Power Consumption	TBD
19	IR Remote Control	Yes
20	Screen OSD	Yes
21	Rechargeable Battery	1900 MAH (1 hour)(option)
22	Slide Show	Yes
23	AC Power Input	AC 90 ~ 240 V
24	Outside Dimension	TBD
25	Weight	TBD

3. Block Drawing



Notes:

The system mother board(SMB) include media-player controller、Timing controller、LED driver、Audio codec(option)、Battery Circuit(option) 、 Real time control (option) and Infra-red receiver(option).

Infra-red receiver is usually at the keypad board, and it will output to the media processor. The keypad board have eight buttons. These buttons have the same function as Infra-red receiver.

4. Control Buttons (on keyboard)

Item No.	Symbol	Description
1	Up,Down, Right,Left	Direction of OSD menu or IR interface
2	Enter	To select the item or photos
3	Music,Photo Movie	To preview photo files、music files、movie files in current memory
4	Menu	Setup menu will be shown.
5	VOL+,VOL-	Volume control + / -
6	Select	To select the card you want to display

5. I/O Interfaces

Item	Name	Label	Description
1	Power input	DC in	With external AC to DC power adaptor.
2	Memory card slot-1	SD/MMC/ MS/XD	SD, MS,MMC,XD (on SMB).
3	Memory card slot-2	CF	Slot for memory card CF / Micro-drive (on SMB).
4	Mini-USB socket	USB	Mini-USB slave port on SMB, to be connected to PC or connect to printer
5	TYPE-USB socket	USB HOST	Mini-USB HOST port on SMB, to be connected to pen driver
6	D _sub socket	Analog RGB	Connect to Monitor or Digital TV(option)
7	S _video socket	Y/C	Connect to displays or TV(option)
8	AV Stereo Phone jack	AV OUT	Video and audio output on SMB in CVBS and stereo line-out to TV(option)

6. Software

Item	Name	Label	Description
1	FDP12	SMB-DPF8.0	IC on System Mother Board for DPF8.0 Using FDP12.
2		V.1	Beautiful interface, can select card , can switch over fast between music , video and picture

7. Major Components

Item	Name	Description
1	SMB(System Mother Board)	System Mother Board. Board with audio codec、card reader & media-player function to play JPEG, MP3, or video files and to output VGA(Analog RGB、Hsync、Vsync)、CVBS format and S_video format.
2	Keypad board	It depends on customer's design.
3	NAND internal	NAND flash internally plugged inside the DPF(option).
4	Battery Pack	The charge voltage is +9.0V

8. Supports

Type	Format	Support
Photo	JPEG Baseline	64M
Music	MP3	32-320KBPS，CBR/VBR
	WMA	32-320KBPS，CBR/VBR
	AAC_LC	32-320KBPS，CBR/VBR
Video	Motion-JPEG （*.AVI;*.MOV）	MAX:VGA30fps
	MPEG1	MAX:CIF30fps
	MPEG4（MP4）	MAX:QVGA30fps MAX DATA: 100kbps MAX DATA:768kVideo+48kbps/22.05kAAC_LC
	MPEG4（3GPP）	MAX:CIF15fps MAX DATA:60kbps MAX DATA:384kVideo+8kAMR
	MPEG4（AVI/XVID） MPEG4+MP3	MAX:CIF30fps MAX DATA:100kbps MAX DATA:768kVideo+48kbps/22.05kMP3

9. Operation Specification

9.1 Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Voltage	Vin	-	-	-	V	Applied to 7.0”D
		-	-	-	V	Applied to 8.0”D 16:9,12parallel
		-	-	-	V	Applied to 8.0”D 16:9,9parallel
		6.0	7.5	13	V	Applied to 8.0”D 4:3
		-	-	-	V	Applied to 10.2”D

9.2 Current Consumption

(Total Power consumption =MB Power consumption +Panel Power consumption)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Total Current	Iin	-	-	-	mA	Vin=6.0V~13V (Applied to 7”D)
		-	-	-	mA	Vin=6.0V~13V (Applied to 8”D 16:9),12parallel
		-	-	-	mA	Vin=6.0V~13V (Applied to 8”D 16:9),9 parallel
		600	1170	1500	mA	Vin=6.0V~13V (Applied to 8”D 4:3)
					mA	Vin=6.0V~13V (Applied to 10.2”D)

10. Mechanical Drawing

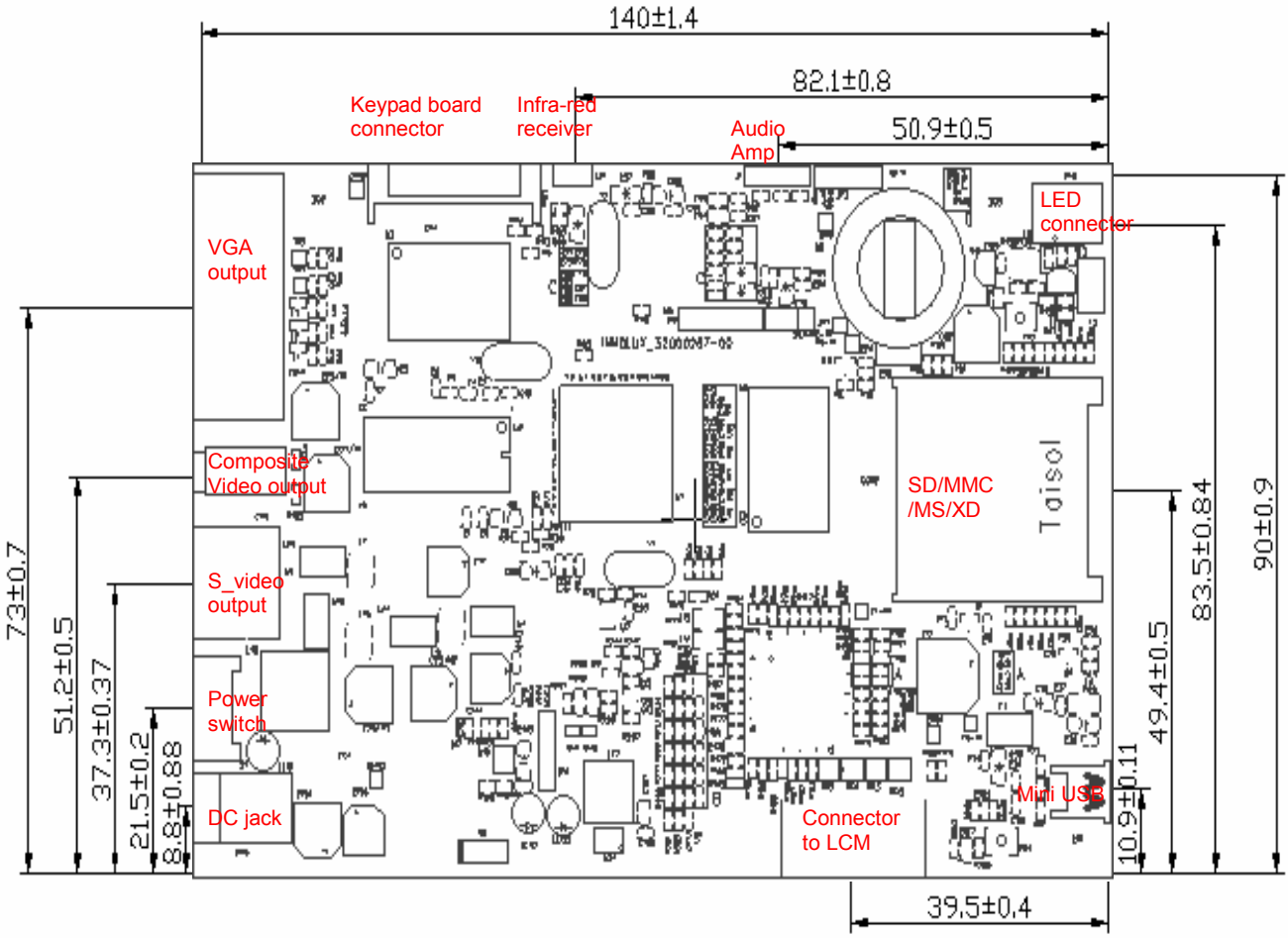


Fig.1: Top Layer

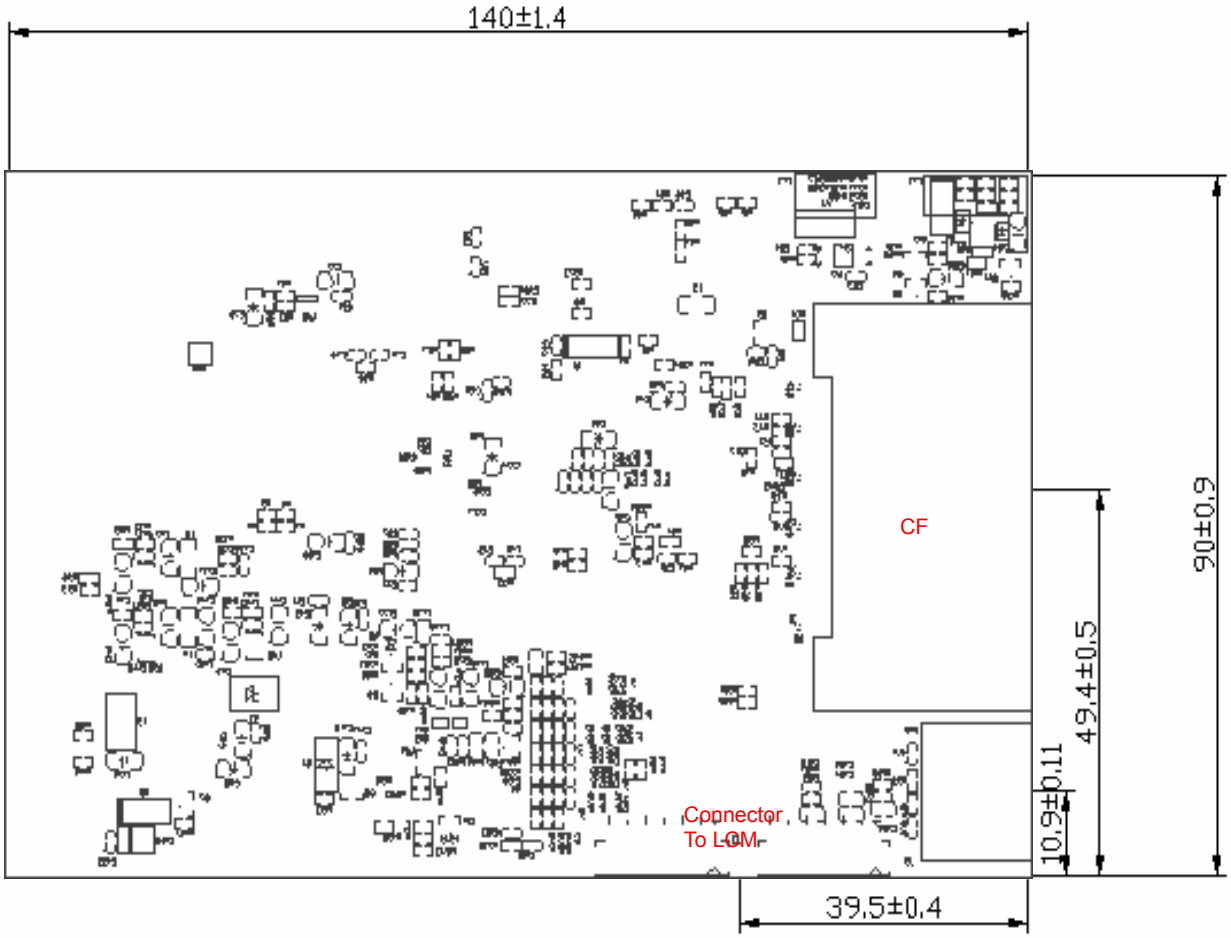


Fig.2: Bottom Layer

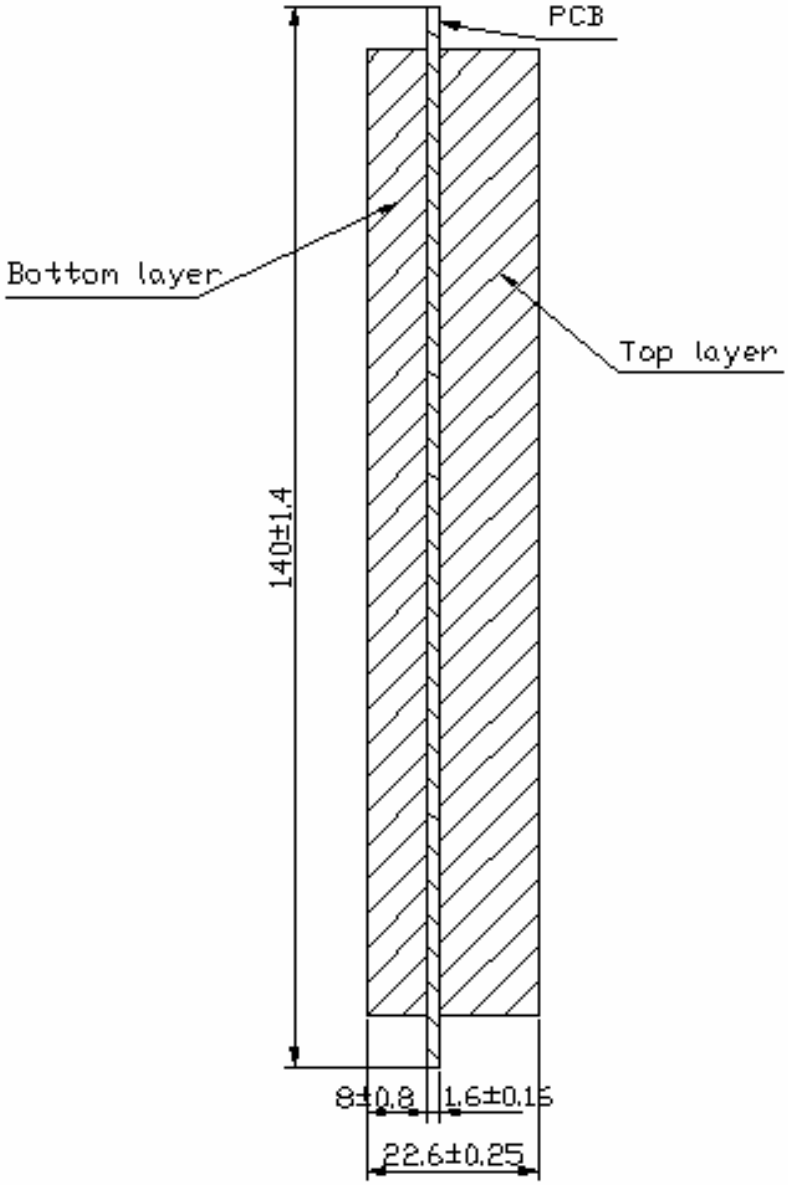


Fig.3: side view

Note: The thickness of PCB is 1.6±0.1mm; The highest section on Top layer is 13±0.15mm; The highest section on Bottom layer is 8±0.1mm