AISON TECHNOLOGY (HK) CO., LIMITED

Product Specification

（）**Preliminary Specification**

（）**Final Specification**

Customer	
Model Name	Z090WV01
Description	Standard LCD Module 800(RGB)x480 Dots 9" TFT LCD
Date	2017/05/16
Revision	1.0

Engineering			
Check	Date	Prepared	Date

Table of Contents

1 Record of Revision

Rev	Issued Date	Description	Editor
1.0	2017/5/16	First Release.	King Liang

2 General Specifications

Feature		Spec
Characteristics	Size	9 inch
	Resolution	800× 3(RGB) × 480
	Interface	RGB-24bit
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.0825 x 0.2327
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally White
	Driver IC	TBD
	Surface Treatment	3H
	Viewing Direction	12 O'clock
	View direction(Gray Inversion)	6 O'clock
Mechanical	LCM (W x H x D) (mm)	210.6*126.5*5.3
	Active Area(mm)	198 x111.69
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	30 LEDs

Note 1: Viewing direction is follow the data which measured by optics equipment..
Note 2: Requirements on Environmental Protection: RoHS
Note 3: LCM weight tolerance: +/- 5%

3 Pin Definition

No.	Symbol	Description
1,2	LEDA	Power for LED backlight (Anode)
3,4	LEDK	Power for LED backlight (Cathode)
5	GND	Power Ground
6	VCOM	Common voltage
7	VCC	Power for Digital Circuit
8	MODE	DE/SYNC mode select Note1
9	DE	Data Enable
10	VS	Vertical sync signal
11	HS	Horizontal sync Signal
12	B7	Blue data(MSB)
13	B6	Blue data
14	B5	Blue data
15	B4	Blue data
16	B3	Blue data
17	B2	Blue data
18	B1	Blue data Note2
19	B0	Blue data(LSB) Note2
20	G7	Green data(MSB)
21	G6	Green data
22	G5	Green data
23	G4	Green data
24	G3	Green data
25	G2	Green data
26	G1	Green data Note2
27	G0	Green data (LSB) Note2
28	R7	Red Data(MSB) Note2
29	R6	Red Data
30	R5	Red Data
31	R4	Red Data
32	R3	Red Data

33	R2	Red Data	
34	R1	Red Data	Note2
35	R0	Red Data(LSB)	Note2
36	GND	Power Ground	
37	DCLK	Pixel clock	Note3
38	GND	Power Ground	
39	L/R	Left/right selection	Note4/5
40	U/D	up/down selection	Note4/5
41	VGH	Gate ON Voltage	
42	VGL	Gate OFF Voltage	
43	AVDD	Power for Analog Circuit	
44	RESET	Global reset pin	Note6
45	NC	NO connection	
46	Vcom	Common Voltage	
47	DITHB	Dithering function	Note7
48	GND	Power Ground	
49	NC	NO connection	
50	NC	NO connection	

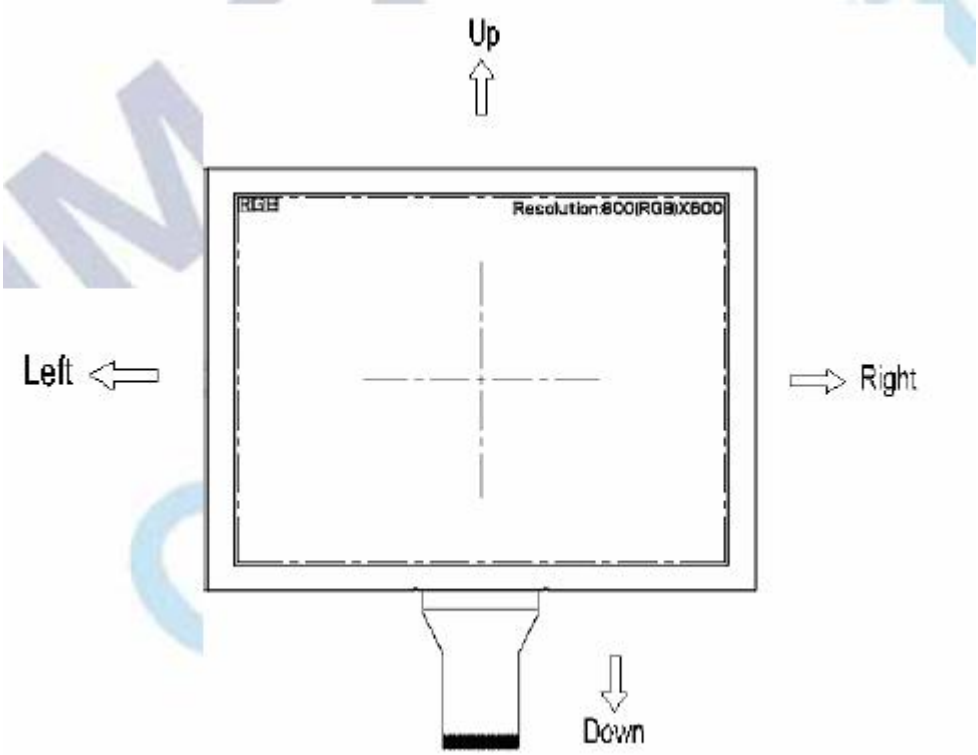
I: input, O: output, P: Power

Note 1: DE/SYNC mode select. Normally pull high.
When select DE mode, MODE="1", VS and HS must pull high.
When select SYNC mode, MODE= "0", DE must be grounded.
Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.
Note 3: Data shall be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DV_{DD}	Up to down, left to right
DV_{DD}	GND	Down to up, right to left
GND	GND	Up to down, right to left
DV_{DD}	DV_{DD}	Down to up, left to right

Note 5: Definition of scanning direction.
Refer to the figure as below:



Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.
Note 7: Dithering function enable control, normally pull high.
When DITHB=”1”, Disable internal dithering function,
When DITHB=”0”, Enable internal dithering function,
Note 8: Reserve for LED power input.

4 Absolute Maximum Ratings

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

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	DV_{DD}	-0.3	5.0	V	
	AV_{DD}	-0.5	13.5	V	
	V_{GH}	13.0	19.0	V	
	V_{GL}	-12.0	-2.0	V	
	V_{GH}-V_{GL}	-	31.0	V	
Operation Temperature	T_{OP}	-20	70	℃	
Storage Temperature	T_{ST}	-30	80	℃	

Note 1: 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.

Note 2: V_R Conditions: Zener Diode 20mA

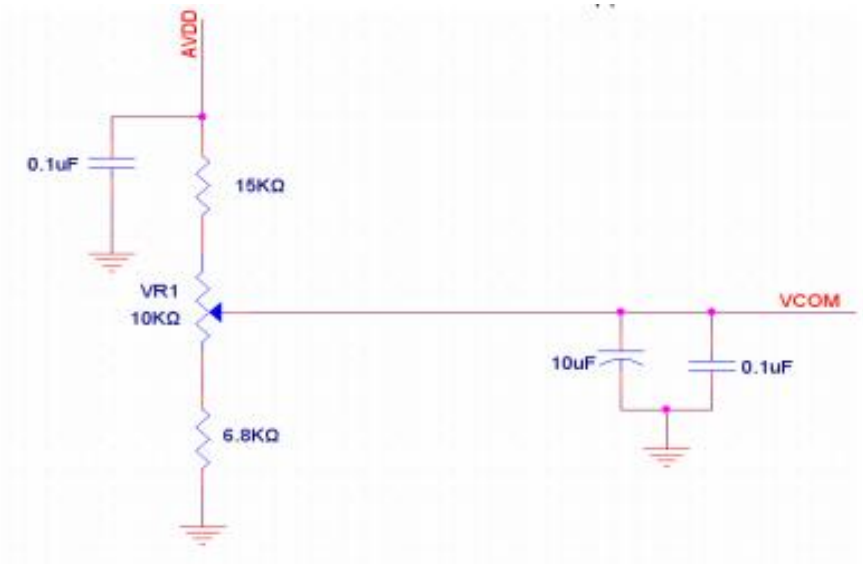
5 Electrical Characteristics

5.1Typical operation conditions

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

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VCC	3.0	3.3	3.6	V	Note 2
	AV_{DD}	10.2	10.4	10.6	V	
	V_{GH}	16.3	17.0	17.7	V	
	V_{GL}	-5.7	-5.0	-4.3	V	
Input signal voltage	V_{COM}	4.0	4.2	4.4	V	
Input logic high voltage	V_{IH}	0.7 DV_{CC}	-	DV_{CC}	V	Note 3
Input logic low voltage	V_{IL}	0	-	0.3 DV_{CC}	V	

Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.
Note 3: DCLK,HS,VS,RESET,U/D, L/R,DE,R0~R7,G0~G7,B0~B7,MODE,DITHB.



5.2 Current Consumption

(GND=AV_{SS}=0V)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	0.3	1	mA	V_{GH} =17.0V
	I_{GL}	-	0.3	1	mA	V_{GL} = -5.0V
	IV_{CC}	-	5.5	10	mA	V_{CC} =3.3V
	IAV_{DD}	-	32	50	mA	AV_{DD} =10.4V

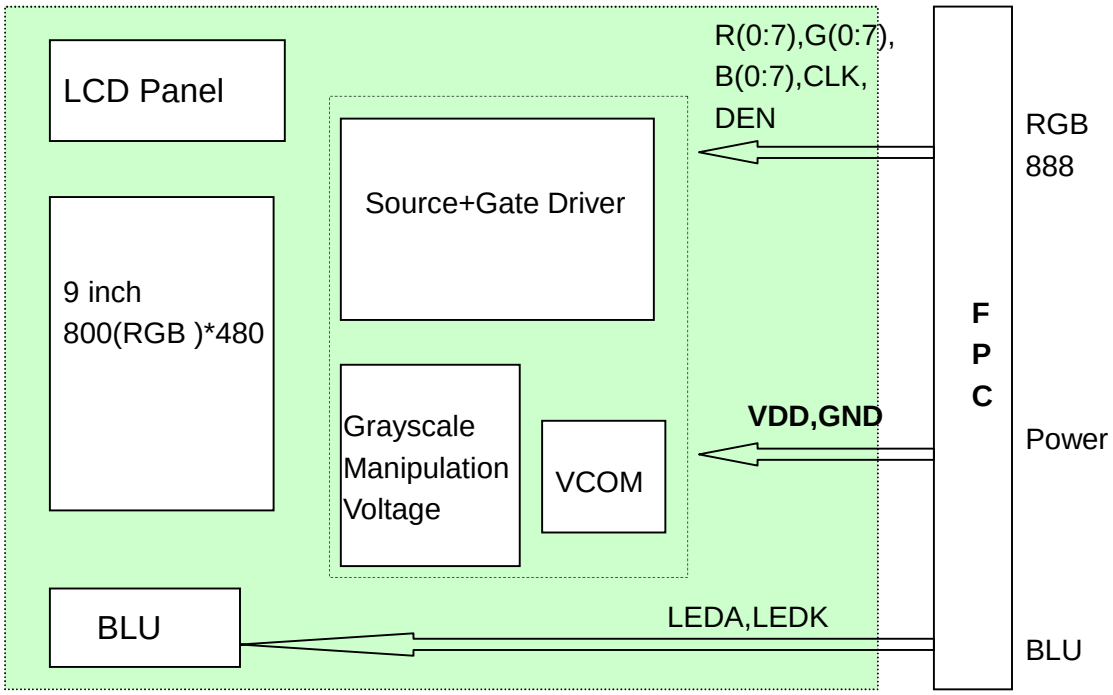
5.3 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	100	-	mA	
Forward Voltage	V_F	-	16		V	
Backlight Power consumption	W_{BL}	-	TBD	-	W	
LED lifetime		20000			Hr	

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and IL =100mA.

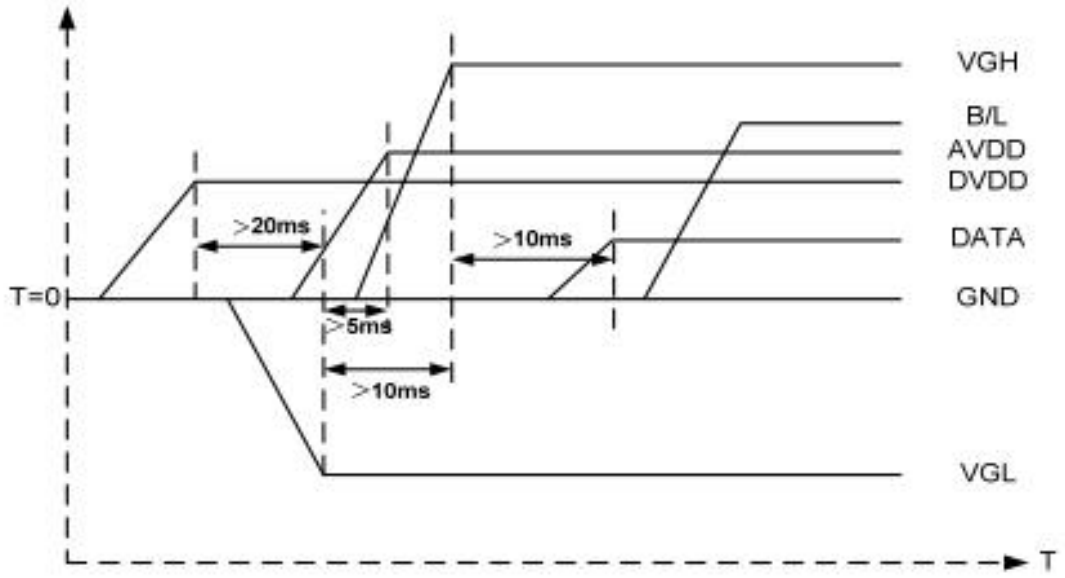
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL =40mA. The LED lifetime could be decreased if operating IL is lager than 100mA.

5.4 Block Diagram



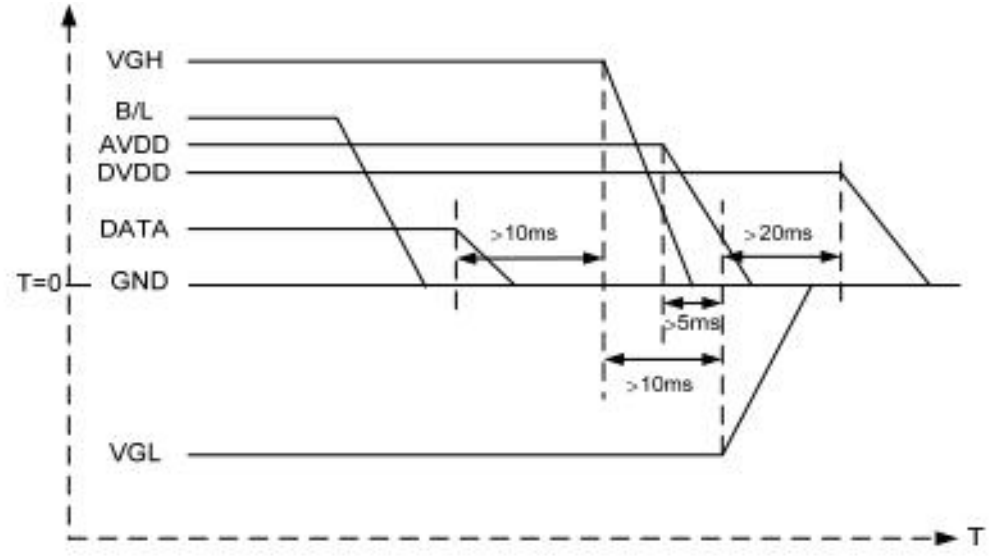
6 Interface Timing

6.1Power ON



DVDD→VGL→VGH→Data→B/L

Power OFF



B/L→Data→VGH→VGL→DVDD

Note: Data include R0~R7, B0~B7, GO~G7, U/D, L/R, DCLK, HS,VS,DE.

6.2Timing Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS setup time	T_{hst}	8	-	-	ns	
HS hold time	T_{hhd}	8	-	-	ns	
VS setup time	T_{vst}	8	-	-	ns	
VS hold time	T_{vhd}	8	-	-	ns	
Data setup time	T_{dsu}	8	-	-	ns	
Data hole time	T_{dhd}	8	-	-	ns	
DE setup time	T_{esu}	8	-	-	ns	
DE hole time	T_{ehd}	8	-	-	ns	
DV_{DD} Power On Slew rate	T_{POR}	-	-	20	ms	From 0 to 90% DV_{DD}
RESET pulse width	T_{Rst}	1	-	-	ms	
DCLK cycle time	T_{coh}	20	-	-	ns	
DCLK pulse duty	T_{cwh}	40	50	60	%	

6.3 Data Input Format

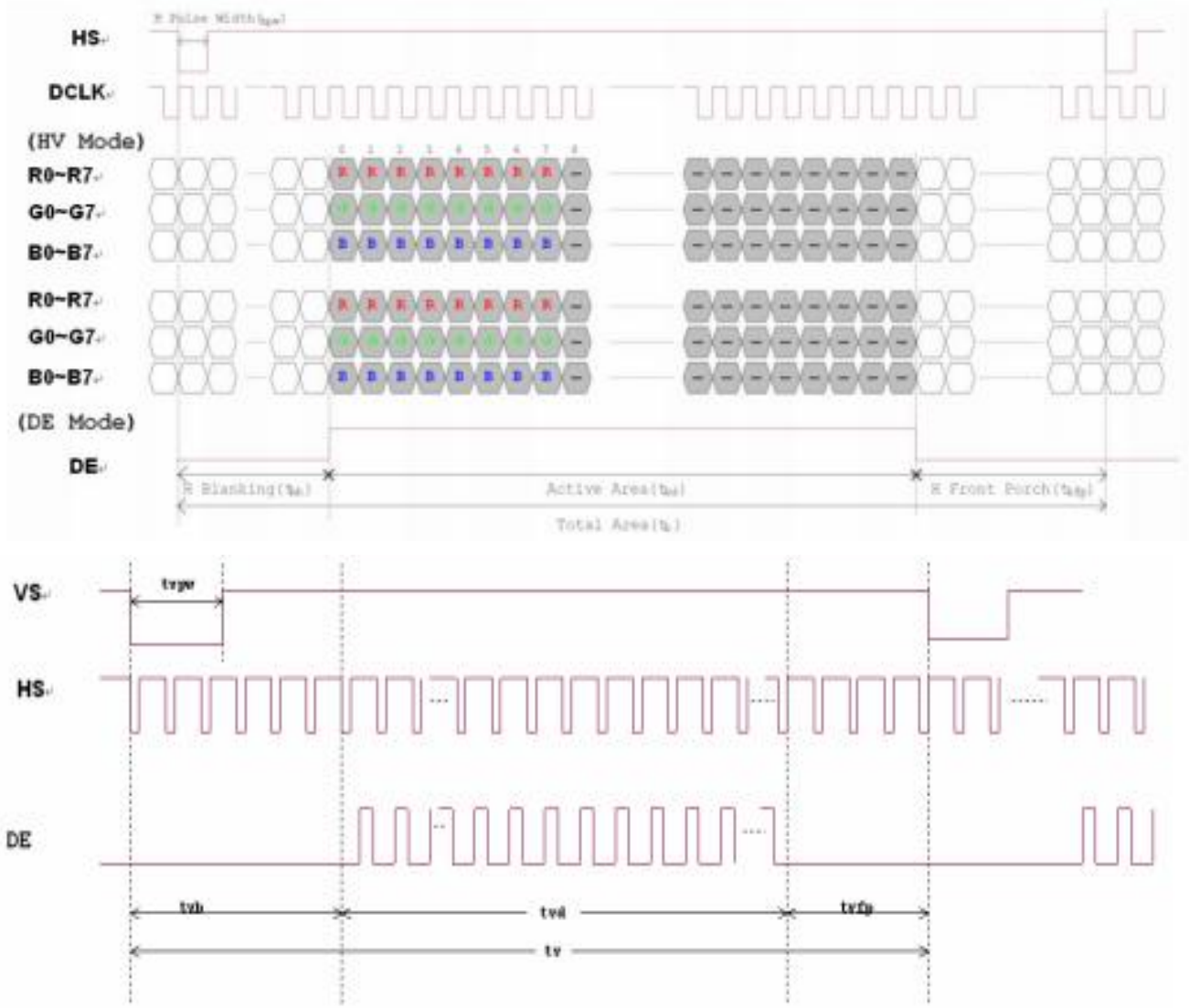


Figure 3. 2 Vertical input timing diagram.

6.4 Timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

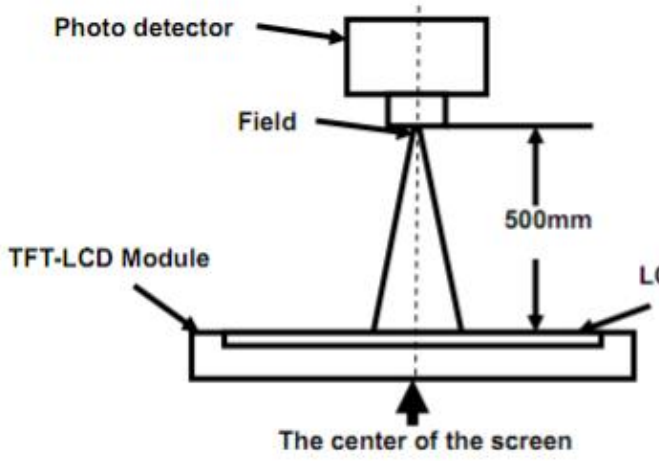
7 Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles	θ_T	Center CR≥10	60	70	-	Degree.	Note2
	θ_B		60	70	-		
	θ_L		40	50	-		
	θ_R		60	70	-		
Contrast Ratio	CR	Θ =0	400	500		-	Note1, Note3
Response Time	T_{ON}	25°C	-	10	20	ms	Note1, Note4
	T_{OFF}			15	30		
Color chromaticity	W_X	Normal θ=Φ=0°	0.26	0.31	0.36	-	Note1, Note5
	W_Y		0.28	0.33	0.38	-	
Uniformity	U		-	-	-	%	Note1, Note6
NTSC				75		%	Note5
Luminance	L			500		Nits	Note1, Note7

Test Conditions:
1. IF= 20mA(one channel),the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

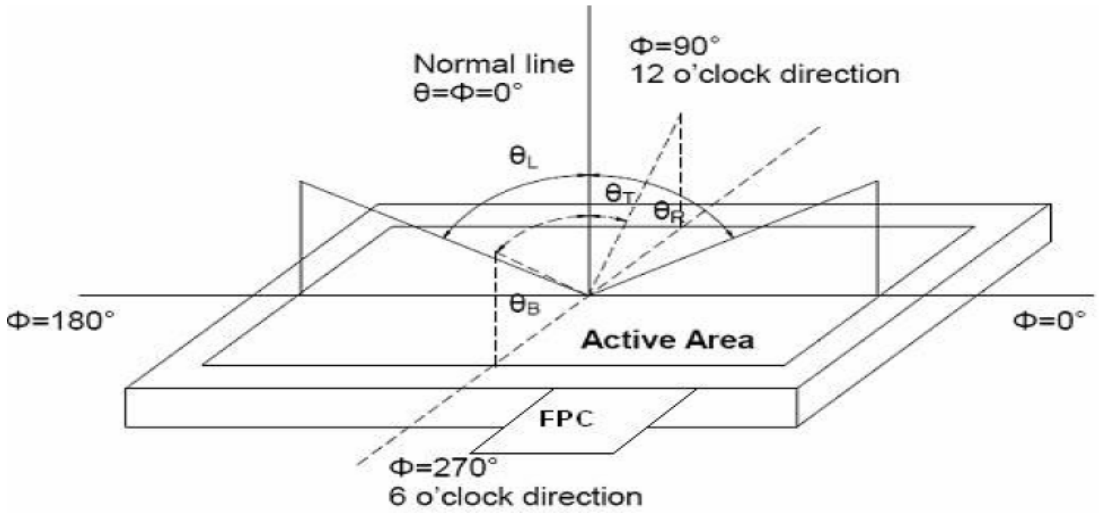
Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	BM-7A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	SR-3A	2°

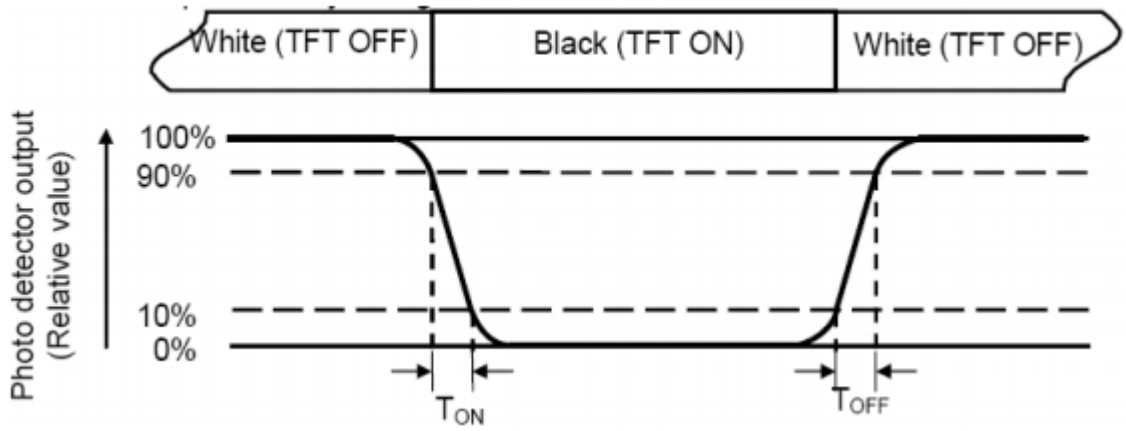
Note 2: Definition of viewing angle range and measurement system.
viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).



Note 3: Definition of contrast ratio

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

Note 4: Definition of Response time
The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.
Note 6: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity(U) = Lmin/ Lmax X100%

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

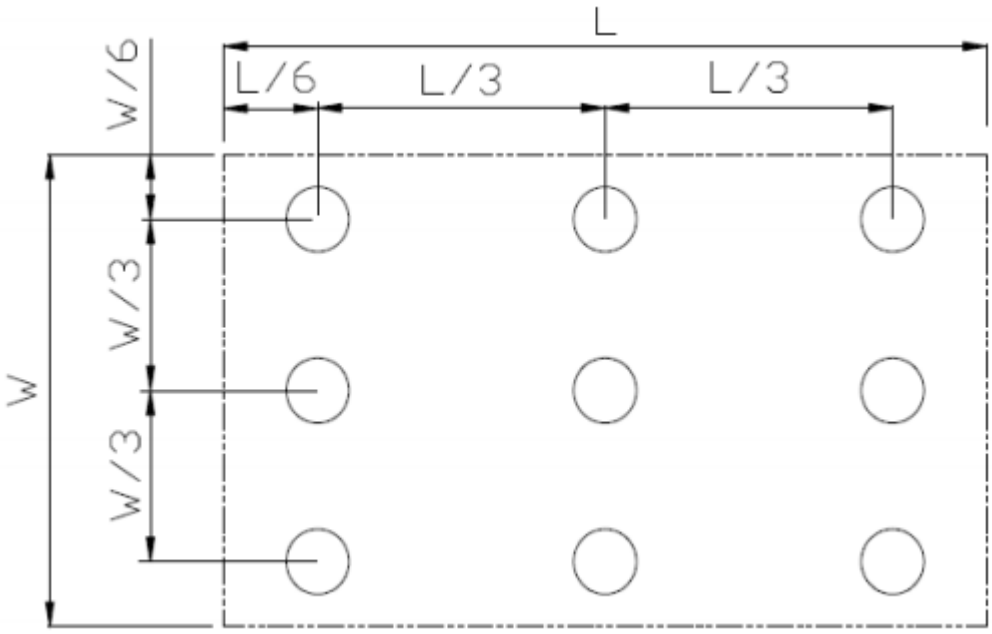


Fig. 2 Definition of uniformity

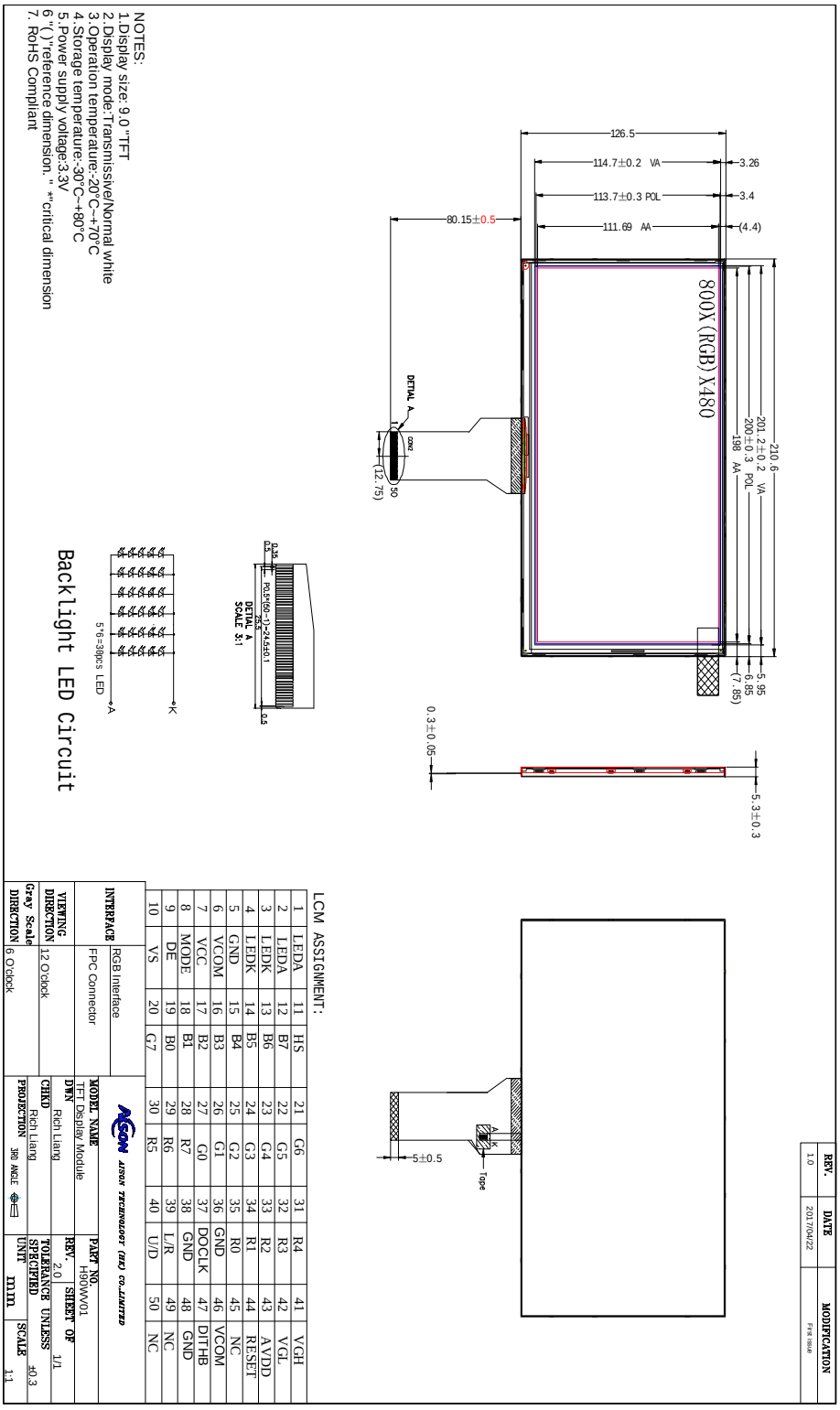
Lmax: The measured maximum luminance of all measurement position.
Lmin: The measured minimum luminance of all measurement position.
Note 7: Definition of Luminance:
Measure the luminance of white state at center point.

8 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃, 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20℃, 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80℃, 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30℃, 240hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60℃, 90% RH max, 160 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30℃ 30 min ~ +80℃ 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Static Discharge (Operation)	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

Note: 1. T_S is the temperature of panel's surface.
2. Ta is the ambient temperature of sample.

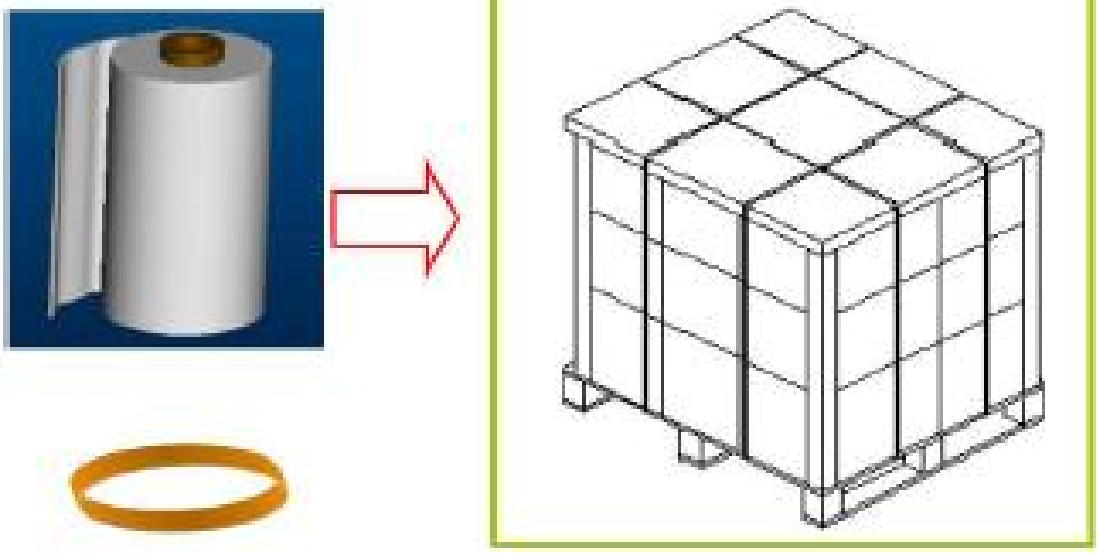
9 Mechanical Drawing



LCM ASSIGNMENT:

1	LEDA	11	HS	21	G6	31	R4	41	VGH
2	LEDA	12	B7	22	G5	32	R3	42	VGL
3	LEDK	13	B6	23	G4	33	R2	43	AVDD
4	LEDK	14	B5	24	G3	34	R1	44	RESET
5	GND	15	B4	25	G2	35	R0	45	NC
6	VCOM	16	B3	26	G1	36	GND	46	VCOM
7	VCC	17	B2	27	G0	37	DOCLK	47	DITHB
8	MODE	18	B1	28	R7	38	GND	48	GND
9	DE	19	B0	29	R6	39	L/R	49	NC
10	VS	20	G7	30	R5	40	U/D	50	NC

1 0.Packing



11. Precautions for Use of LCD modules

11.1 Handling Precautions

11.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

11.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

11.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

11.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

11.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

11.1.7. If the logic circuit power is off, do not apply the input signals.

11.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

11.1.8.1. Be sure to ground the body when handling the LCD Modules.

11.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

11.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

11.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

11.2 Storage Precautions

11.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2. The LCD modules should be stored under the storage temperature range If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ～ 40℃ Relatively humidity: ≤80%

11.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

11.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.