ORIENT DISPLAY

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SPECIFICATION
FOR
LCD MODULE

MODULE NO: AFU1280768HD-8.0-WX800V31
REVISION NO: 3.0

Customer's Approval:

	SIGNATURE	DATE
PREPARED BY (RD ENGINEER)		2010-12-30
CHECKED BY		2010-12-30
APPROVED BY		2010-12-30

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1 General Specifications

1.1 General Specifications

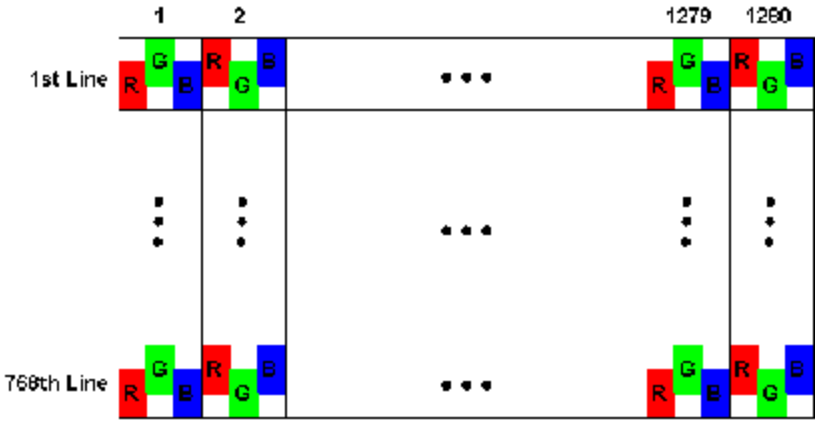
Feature			Spec
Display Spec	Size		8 inch
	Resolution		1280(RGB)×768
	Interface		6 pairs Mini-LVDS
	Color Depth		262.144K
	Technology Type		a-Si
	Pixel Pitch (mm)		0.1358(H)×0.1358(V)
	Pixel Configuration		R.G.B. Vertical Stripe
	Display Mode		TM with Normally White
	Surface Treatment (Up Polarizer)		Anti Glare
	Viewing Direction (Note 1)		12 o'clock
	Gray Scale Inversion Direction		6 o'clock
Mechanical Characteristics	DIM.	Panel (W x H x D)(mm)	185.4×117×3.8
	Active Area (W x H)(mm)		173.76×104.256
	With /Without TSP		Without TSP
	Weight (g)(Note 3)		180
	LED Numbers		24 LEDS

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: Weight tolerance: +/- 5%

1.2 Pixel Format Image



2 Input/Output Terminals

2.1 INPUT TERMINALS PIN ASSIGNMENT

Pin No.	Symbol	I/O (Note1)	Description	Comment
1	VCOM	P	Common voltage	-
2	EVEN	P	Frame selection	-
3	GND	P	Ground	-
4	VCC	P	Power supply 3.3V	-
5	VCC	P	Power supply 3.3V	-
6	VGL	P	Power supply for Gate off output	-
7	VGH	P	Power supply for Gate on output	-
8	STV2	I	Start pulse input/output pin	-
9	STV1	I	Start pulse input/output pin	-
10	CLK	I	Shift clock input	-
11	UPDN	I	Up/Down shift direction control input	Note2
12	OE	I	Output enable control	-
13	XON	I	Output all-on control	-
14	VCOM	P	common voltage	-
15	DIO1	I	Start pulse input/output	-
16	GND	P	Ground	-
17	SHL	I	Left/Right Shift direction control input	Note2
18	LV0A	I	Mini-LVDS data input	-
19	LV0B	I	Mini-LVDS data input	-
20	LV1A	I	Mini-LVDS data input	-
21	LV1B	I	Mini-LVDS data input	-
22	LV2A	I	Mini-LVDS data input	-
23	LV2B	I	Mini-LVDS data input	-
24	CLKA	I	Mini-LVDS data input	-
25	CLKB	I	Mini-LVDS data input	-
26	LV3A	I	Mini-LVDS data input	-
27	LV3B	I	Mini-LVDS data input	-
28	LV4A	I	Mini-LVDS data input	-
29	LV4B	I	Mini-LVDS data input	-
30	LV5A	I	Mini-LVDS data input	-
31	LV5B	I	Mini-LVDS data input	-
32	AVDD	P	Analog power input,6.5V~13.5V	-
33	GND	P	Ground	-
34	LD	I	Latch input, For normal operation, it is required to input one LD per horizontal display line.	-
35	REV	I	The REV signal controls data inversion internally to the driver. Display data is inverted when REV=H, Display data is not inverted when REV=L.	-
36	POL	I	Polarity inverting input	-
37	GND	P	Ground	-

38	AVDD	P	Analog power input, 6.5V~13.5V	-
39	DIO2	I	Start pulse input/output	-
40	VCOM	P	common voltage	-

Note1: I/O----definition, I----Input, O----Output, P----Power

Note2: SHL=H, DIO1->OUT1->----OUT1920->DIO2;
SHL=L, DIO2->OUT1920->----OUT1->DIO1.
UPDN=H, STV1->G1->----G1536->STV2;
UPDN=L, STV2->G1536->----G1->STV1.

2.2 U/D R/L Function Description

Scan Control Input		Scanning Direction
UPDN	SHLR	
GND	VCC	Up to Down, Left to Right
VCC	GND	Down to Up, Right to Left
GND	GND	Up to Down, Right to Left
VCC	VCC	Down to Up, Left to Right

3 Absolute Maximum Ratings

Ta = 25℃

Item	Symbol	Min	Max	Unit	Remark
Digital supply voltage	VCC	-0.5	5.0	V	-
Analog supply voltage	AVDD	-0.5	13.5	V	-
Power supply voltage 1	VGH	-0.3	42	V	-
Power supply voltage 2	VGL	VGH-42	+0.3	V	-
Operating temperature	T_{OPR}	-20	70	℃	-
Storage temperature	T_{STG}	-30	80	℃	-

4 Electrical Characteristics

4.1 Recommended Operating Condition

GND=0V, Ta = 25℃

Item		Symbol	Min	Typ	Max	Unit	Remark
Digital Supply Voltage		VCC	2.3	3.3	3.6	V	-
Analog Supply Voltage		AVDD		12.625		V	-
Gate On Voltage		VGH		22		V	-
Gate Off Voltage		VGL		-7.5		V	-
Common Electrode Driving Signal		VCOM		3.3		V	-
Logic Supply Voltage		DVDD	（2.8）	3.3	（3.6）	V	-
Input Signal Voltage	Low Level	V_{IL}	0	-	0.3×VCC	V	LV0A, LV0B, LV1A, LV1B, LV2A, LV2B, CLKA, CLKB, LV3A, LV3B, LV4A, LV4B, LV5A, LV5B
	High Level	V_{IH}	0.7×VCC	-	VCC	V	
Output Signal Voltage	Low Level	V_{OL}	GND	-	GND+0.4	V	-
	High Level	V_{OH}	VCC-0.4	-	-	V	

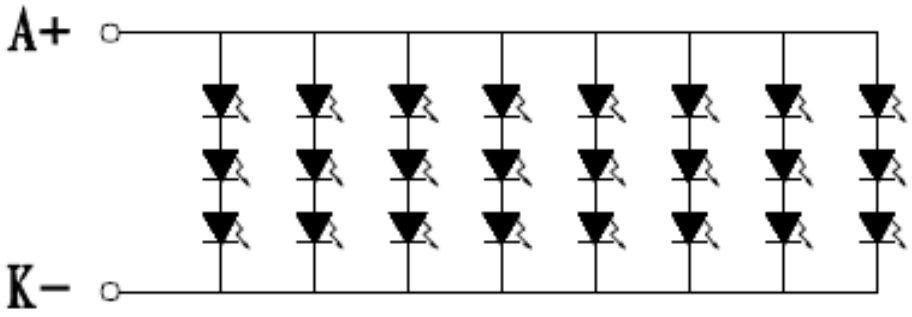
4.2 Power Consumption

AGND=GND=0V, Ta = 25℃

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Digital Supply Current	I_{VCC}	VCC=3.3V	-	11.57	12.73	mA	-
Analog Supply Current	I_{AVDD}	AVDD=12.625V	-	40.63	57.38	mA	-
Gate On Current	I_{VGH}	VGH=22.0V	-	0.29	0.31	mA	-
Gate Off Current	I_{VGL}	VGL=-7.5V	-	0.29	0.31	mA	-
Power Consumption	Panel&Gamma	-	-	554.5	778.2	mW	-

4.3 ELECTRICAL/OPRICALCHARACTERISTICS AT Ta=25℃

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
LED Voltage	V_F	9.0	9.9	10.8	V	I_F=160mA 3*8=24
Center luminous Intensity	LCD(Module Center)	180	200	--	cd/m2	I_F=160mA 3*8=24
Reverse Current	I_R	-	-	50	uA	VR=5V
Luminous Tolerance	Iv-m	75	80	-	%	(mix/max)*100



LED CIRCUIT

3*8=24EA, 20mA*8=160mA

4.4 Block Diagram

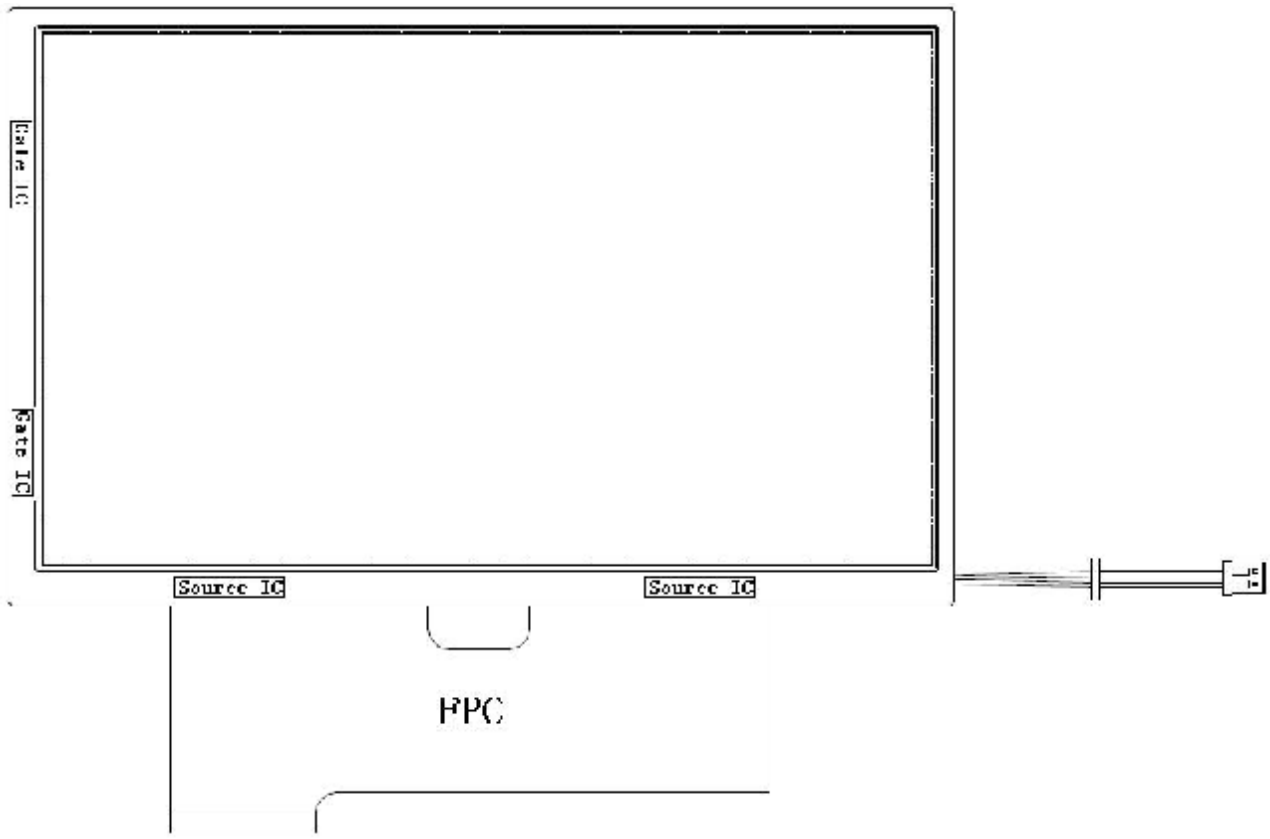


Figure 4.4 LCD module diagram

5 Interface Timing

5.1 AC Electrical Characteristics (For mini-LVDS input mode)

VDD=3.3V, Ta=25℃

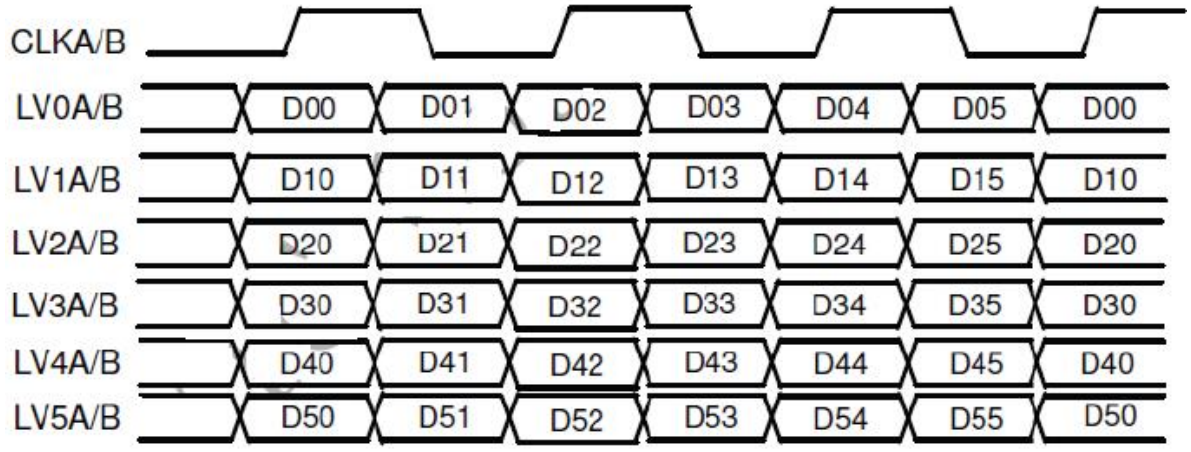
Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Clock period	t_{clk}	5.4	-	-	ns	VCC=2.3V to 3.0V
		4	-	-	ns	VCC=3.0V to 3.6V
Clock low pulse width	$t_{clk(l)}$	2.2	-	-	ns	VCC=2.3V to 3.0V
		1.6	-	-	ns	VCC=3.0V to 3.6V
Clock high pulse width	$t_{clk(h)}$	2.2	-	-	ns	VCC=2.3V to 3.0V
		1.6	-	-	ns	VCC=3.0V to 3.6V
Data setup time	T_{setup1}	1.1	-	-	ns	VCC=2.3V to 3.0V
		0.7	-	-	ns	VCC=3.0V to 3.6V
Data hold time	T_{hold1}	1.1	-	-	ns	VCC=2.3V to 3.0V
		0.7	-	-	ns	VCC=3.0V to 3.6V
CLK,LV[5:0] rising time	T_{rise}	-	-	0.5	ns	VCC=2.3V to 3.0V
		-	-	0.4	ns	VCC=3.0V to 3.6V
CLK,LV[5:0] falling time	T_{fall}	-	-	0.5	ns	VCC=2.3V to 3.0V
		-	-	0.4	ns	VCC=3.0V to 3.6V
Start pulse setup time	T_{setup2}	1	-	-	ns	VCC=2.3V to 3.0V
		1	-	-	ns	VCC=3.0V to 3.6V
Start pulse delay time	T_{plh1}	-	-	13	ns	VCC=2.3V to 3.0V Loading=15pF
		-	-	13	ns	VCC=3.0V to 3.6V Loading=15pF
		-	-	13	ns	VCC=2.3V to 3.0V Loading=15pF
		-	-	13	ns	VCC=3.0V to 3.6V Loading=15pF
Reset(RST)high period	T_{reseth}	50ns over 3 CLK	-	-	-	-
LD high period	$T_{LD(H)}$	200	-	-	ns	-
POL to LD setup time	T_{POL-LD}	5	-	-	ns	POL toggle to TP1 rising
LD to POL hold time	T_{LD-POL}	6	-	-	ns	TP1 falling to POL toggle
Receiver off to LD timing	$T_{REC-OFF}$	5	-	-	CLK	-
LD to reset input time	$T_{LD-RESET}$	200	-	-	ns	-
Reset low to LD rising time	$T_{RESET-LD}$	0	-	-	ns	-
Output stable time	T_{ST}	-	-	6	us	10% or 90% target voltage CL=120PF, r=4KΩ
Repair output delay time	T_{ST1}	-	-	20	us	10% or 90% target voltage CL=190PF, r=2KΩ

1280 X 768 HV mode Timing

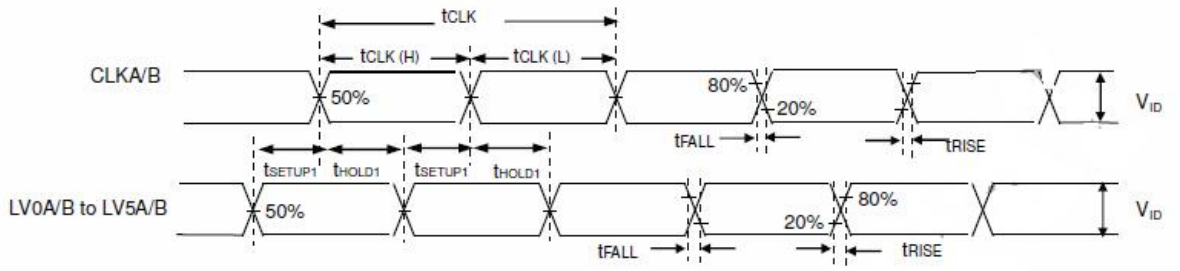
Ta =25℃

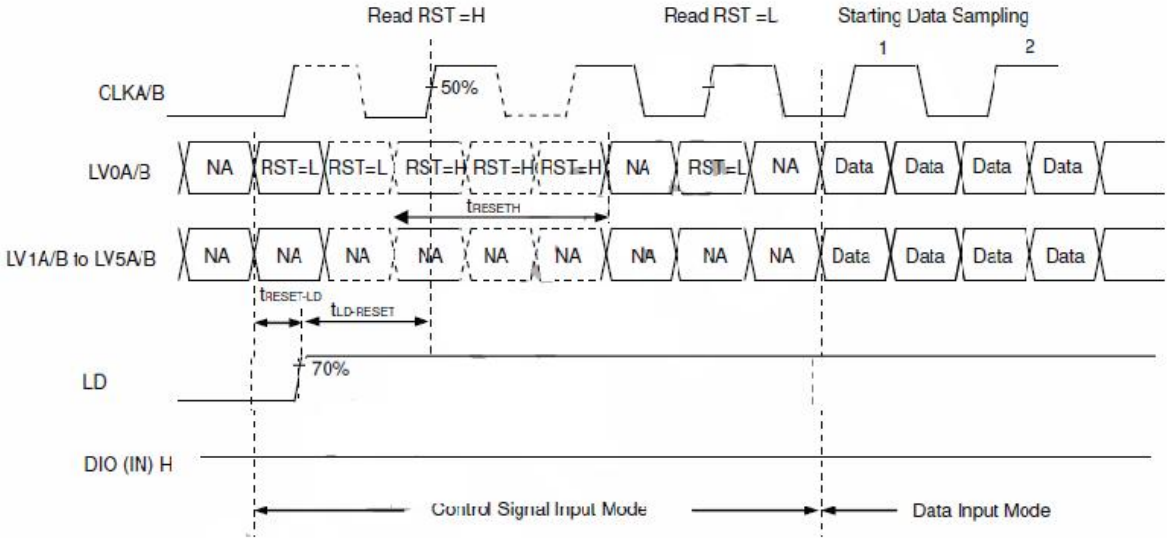
Parameter	Symbol	Value			Unit
Horizontal display area	thd	1280			DCLK
PCLK frequency @ Frame rate = 60 HZ	fclk	Min	Typ.	Max	
		-	68.25		MHZ
1 Horizontal Line	th	1440			DCLK
HSYNC pulse width	thpw	-	48		
HYNC blanking	thb	-	60		
HYNC front porch	thfp	-	60		
DE mode Blanking	Th-thd		-		
Vertical display area	tvd	768			H
VSYNC period time	tv		790		
VSYNC pulse width	tvpw	-	3	-	H
VSYNC Blanking(tvb)	tvb	-	10	-	H
VSYNC Front proch(tvfp)	tvfp	-	12	-	H
DE mode Blanking	Tv-tvd		-		

5.2 Data mapping for mini-LVDS input mode

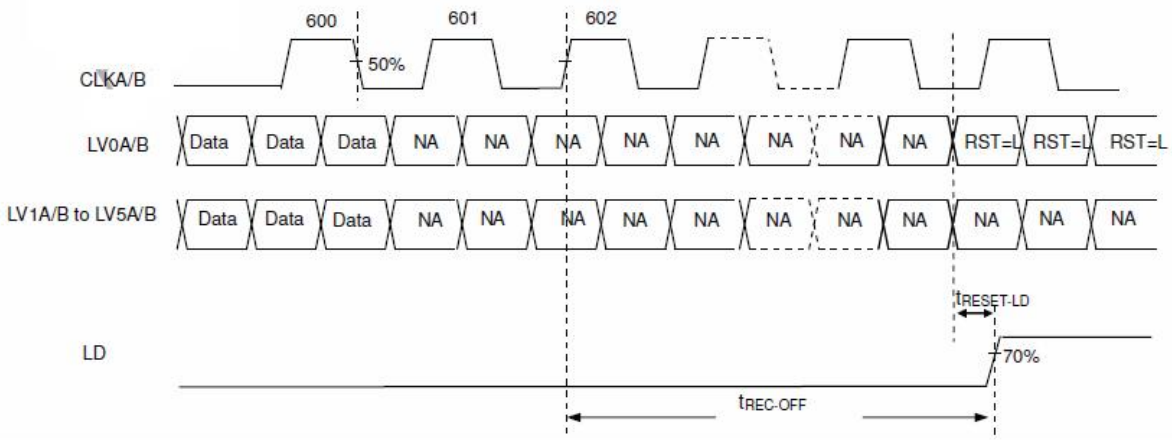


5.3 Timing waveforms

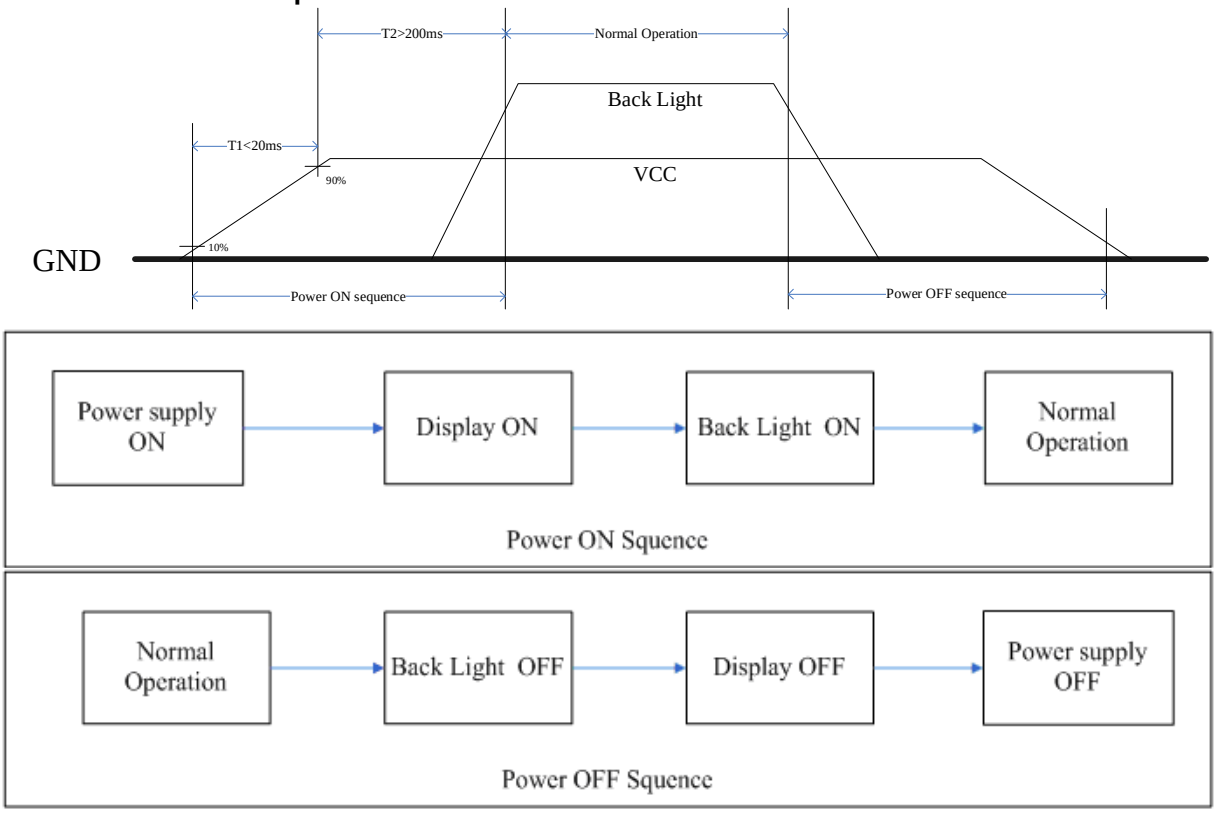




5.4 Last data sampling to LD timing



5.5 Power ON/OFF Sequence



6 Optical Characteristics

Light Source : C-light (With Normal Polarizer) Ta=25℃

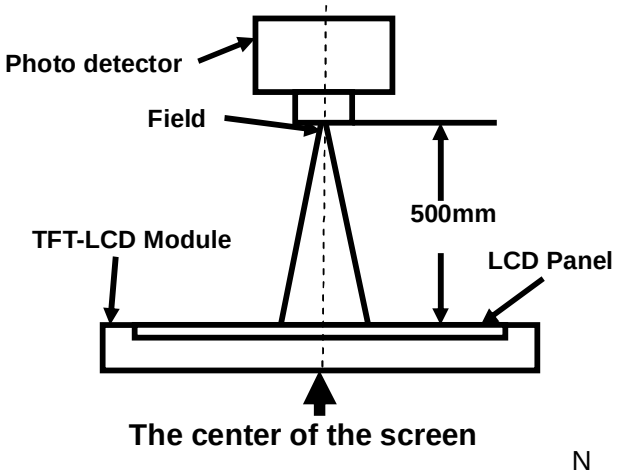
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	--	60	--	Degree	Note 2
		θB		--	70	--		
		θL		--	70	--		
		θR		--	70	--		
Contrast Ratio		CR	θ=0°	--	400	--		Note1 Note3
Response Time		T_{ON}	25℃	--	25	--	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	C-light	0.2647	0.3147	0.3647		Note5 Note1
		y		0.2881	0.3381	0.3881		
	Red	x		0.5538	0.6038	0.6538		
		y		0.2759	0.3259	0.3759		
	Green	x		0.2547	0.3047	0.3547		
		y		0.5020	0.5520	0.6020		
	Blue	x		0.0880	0.1380	0.1880		
		y		0.0862	0.1362	0.1862		
NTSC				--	50	--	%	Note 5
Transmittance		L		--	4.0	--	%	Note1 Note7

Test Conditions:

1. 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.

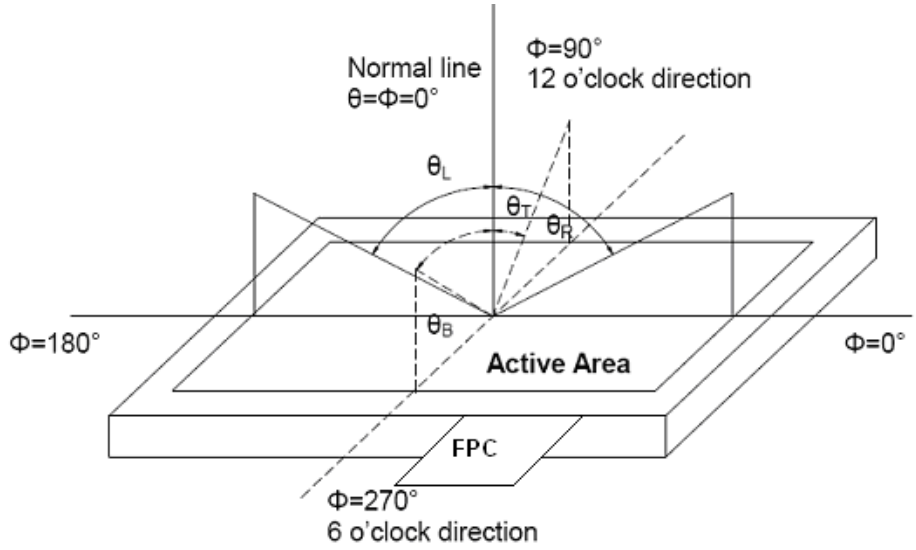


Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

N

ote 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

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

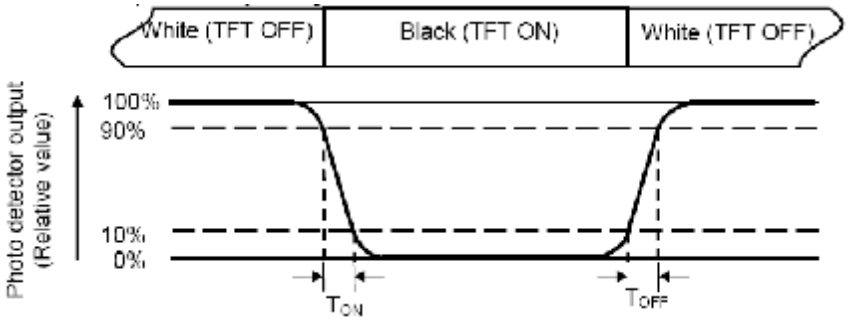
“White state “: The state is that the LCD should drive by Vwhite.

“Black state”: The state is that the LCD should drive by Vblack.

Vwhite: To be determined Vblack: To be determined.

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 (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%.



Note 5: Definition of color chromaticity (CIE1931)

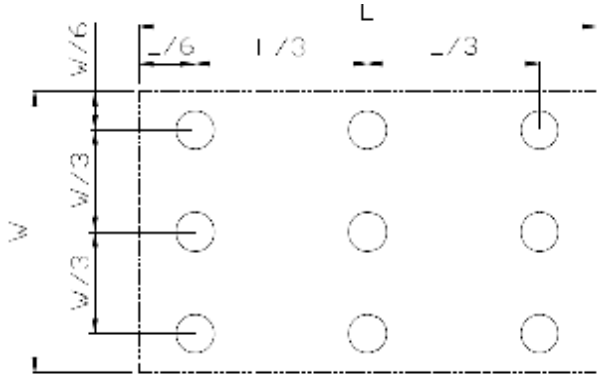
Color coordinates measured at center point of LCD.

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

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



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.

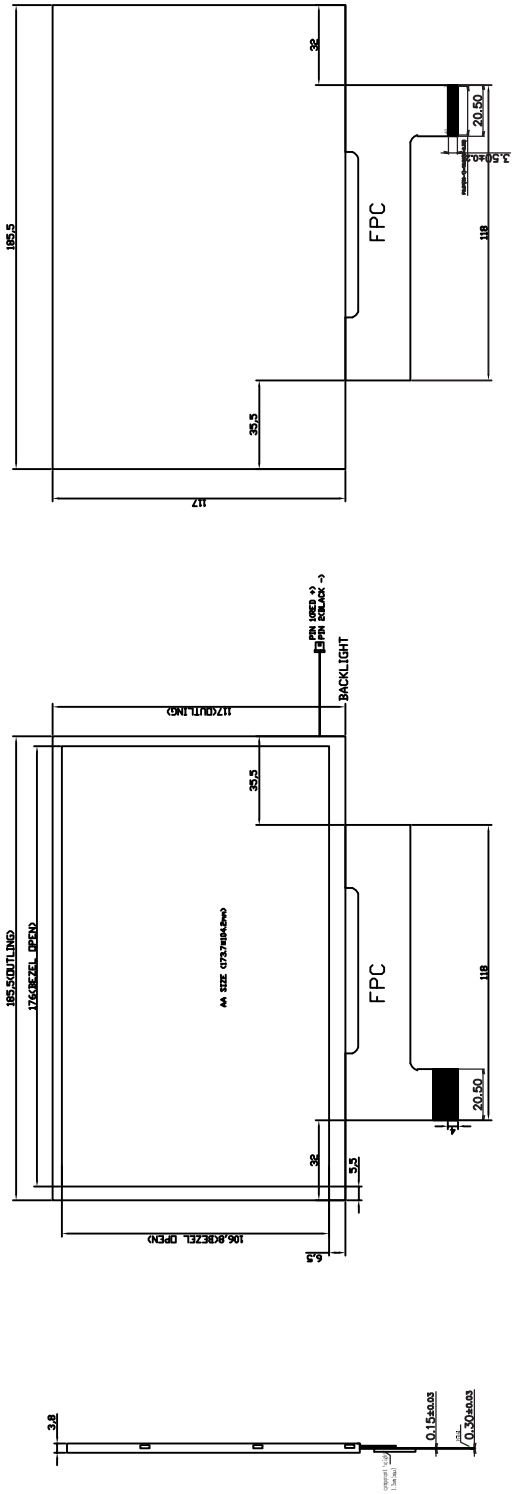
7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 240 hours （Note1）	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20℃, 240 hours （Note2）	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max,240hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30 min~ +80℃ 30 min, Change time:5min, 20 Cycles	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
7	ESD	C=150pF,R=330Ω,5point/panel Air:±8Kv,5times; Contact:±4Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 1 hour for each direction of X.Y.Z. (3 hours for total)	IEC60068-2-6:1982 GB/T2423.10—1995
9	Mechanical Shock (Non Op)	Half Sine Wave 60G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995
10	Package Drop Test	Height:60cm, 1corner,3edges,6surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

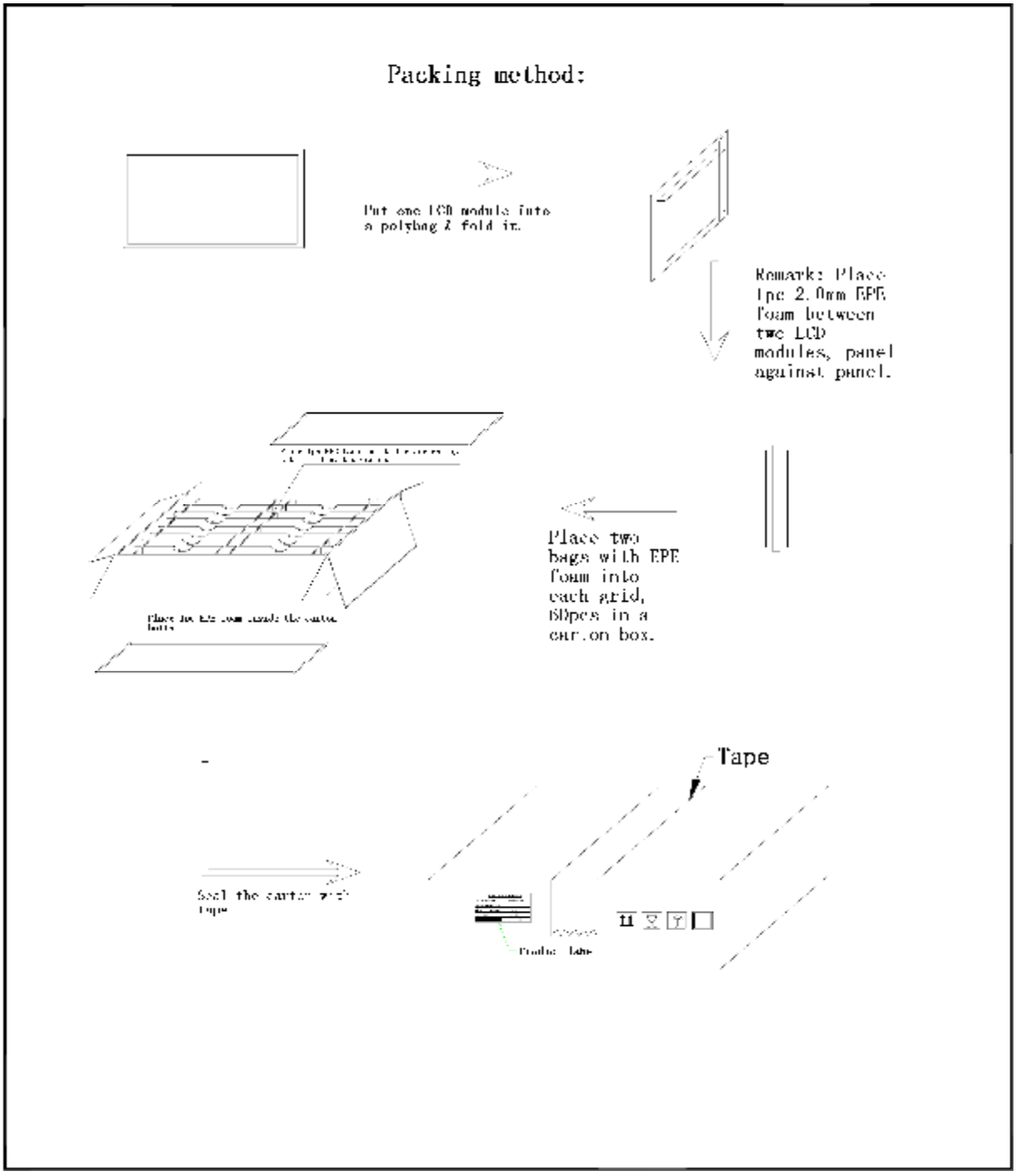
Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of samples.

8 Mechanical Drawing



9 Packing Drawing



10 Precautions for Use of LCD Modules

10.1 Handling Precautions

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

10.1.2 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.

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

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

10.1.5 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

10.1.6 Do not attempt to disassemble the LCD Module.

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

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

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

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

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

10.1.8.4 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.

10.2 Storage precautions

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

10.2.2 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 mperature : 0℃ ～ 40℃, Relatively humidity: ≤80%

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

10.3 Transportation Precautions

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