AGTechnologies
LCD Displays

SPECIFICATION

AGO-070S1-NN-R

Atualizado em 22/05/19.

Record of Revision

Version	Revise Date	Page	Content
Pre-spec.A	2015/03/30		Initial Release

Contents

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	7.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800 h 3(RGB) h480	
4	Display mode	Normally White, Transmissive	
5	Pixel pitch	0.192(H) X 0.1805(V) mm	
6	Active area	153.6(H) X 3(RGB) X 86.64(V) mm	
7	Outline dimensions	165(H) X 100(V) **X** 4.3(D) mm	
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	**TTL** RGB-24bit parallel interface	
11	Backlight Power consumption	TBD	
12	Panel Power consumption	TBD	
13	Weight	TBD	

2. Pin Assignment

FPC Connector is used for the module electronics interface. The recommended model is FH12A-40S-0.5SH manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Remark
1	VLED-	P	Power for LED backlight(Cathode)	Note 6
2	VLED+	P	Power for LED backlight(anode)	Note 6
3	GND	P	Power ground	
4	VDD	P	Power supply(3.3V)	
5	R0	I	Red data	Note 2
6	R1	I	Red data	Note 2
7	R2	I	Red data	
8	R3	I	Red data	
9	R4	I	Red data	
10	R5	I	Red data	
11	R6	I	Red data	
12	R7	I	Red data	
13	G0	I	Green data	Note 2
14	G1	I	Green data	Note 2
15	G2	I	Green data	
16	G3	I	Green data	
17	G4	I	Green data	
18	G5	I	Green data	
19	G6	I	Green data	
20	G7	I	Green data	
21	B0	I	Blue data	Note 2
22	B1	I	Blue data	Note 2
23	B2	I	Blue data	
24	B3	I	Blue data	
25	B4	I	Blue data	
26	B5	I	Blue data	

27	B6	I	Blue data	
28	B7	I	Blue data	
29	GND	P	Power ground	
30	DOT CLK	I	Data clock	
31	DISP	I	Standby mode control pin	Note 7
32	HSYNC	I	Horizontal synchronous signal	Note 1
33	VSYNC	I	Vertical synchronous signal	Note 1
34	DEN	I	Data enabling signal	Note 1
35	NC	-	No Connect	
36	GND	P	Power ground	
37	XR	I/O	Right electrode-differential analog	
38	YD	I/O	Bottom electrode-differential analog	
39	XL	I/O	Left electrode-differential analog	
40	YU	I/O	Top electrode-differential analog	

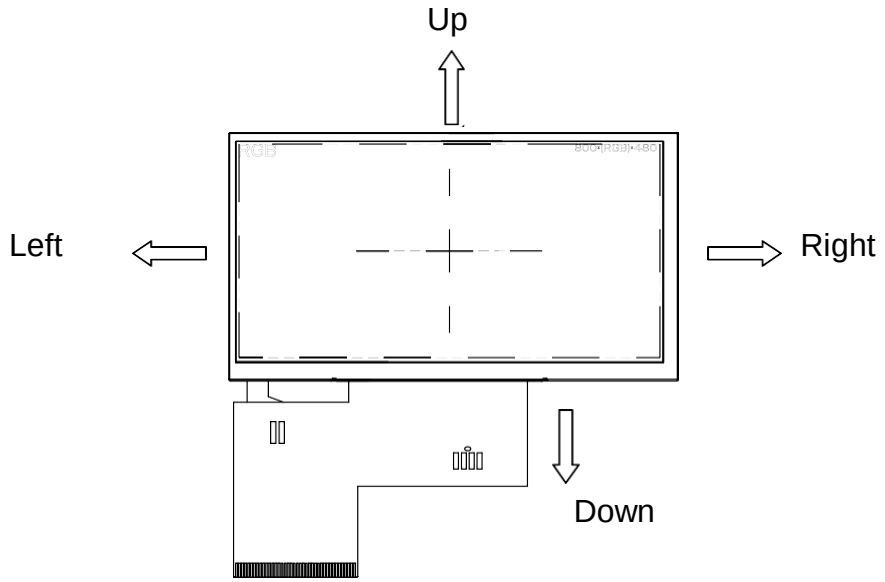
I: input, O: output, P: Power

Note 1: DE/SYNC mode select. Normally pull high.
When select DE mode,R114=4.7K,R117=NC,VS and HS must pull high.
When select SYNC mode,R114=NC,R117=4.7K,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	
R115=4.7K	R112=4.7K	Up to down, left to right
R113=4.7K	R116=4.7K	Down to up,right to left
R115=4.7K	R116=4.7K	Up to down,right to left
R113=4.7K	R112=4.7K	Down to up, left to right

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



Note 6 : Reserve for LED power intput

Note 7: Dithering function enable control, normally pull high.
When DISP="1",Disable internal dithering function,
When DISP="0",Enable internal dithering function,

3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	DV_{DD}	-0.3	3.96	V	
	AV_{DD}	-0.5	14.85	V	
	V_{GH}	-0.3	40.0	V	
	V_{GL}	-20.0	0.3	V	
	V_{GH}-V_{GL}	12	40.0	V	
Operation Temperature	T_{OP}	-20	55	K	
Storage Temperature	T_{ST}	-20	60	K	

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.

3.1.1. Typical Operation Conditions

(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	DV_{DD}	3.0	3.3	3.6	V	Note 2
	AV_{DD}	9.85	10	10.15	V	
	V_{GH}	14.5	15	15.5	V	
	V_{GL}	-7.5	-7.0	-6.5	V	
Input signal voltage	V_{COM}	3.22	3.72	4.22	V	
Input logic high voltage	V_{IH}	0.7 DV_{DD}	-	DV_{DD}	V	Note 3
Input logic low voltage	V_{IL}	0	-	0.3 DV_{DD}	V	

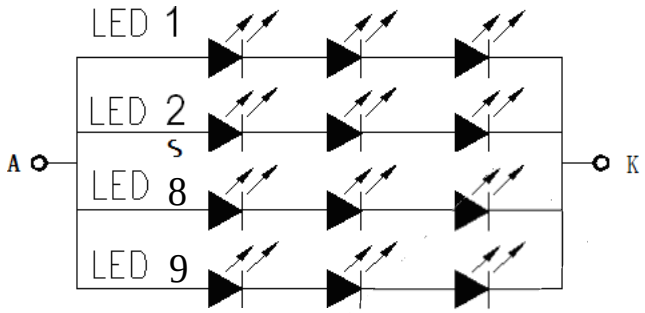
Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: DV_{DD} setting should match the signals outp t voltage (refer to Note 3) of customer's system board.
Note 3: DCLK,HS,VS,RESET,U/D, **L**/R,DE,R**0**~R7,G0~G7,B0~B7,MODE,DITHB.

3.1.2. Current Consumptio**n**

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	0.2	1.0	mA	V_{GH} =15.0V
	I_{GL}	-	0.2	1.0	mA	V_{GL} = -7.0V
	IDV_{DD}	-	4.0	10	mA	DV_{DD} =3.3V
	IAV_{DD}	-	20	50	mA	AV_{DD} =10V

3.1.3. %DFNOLJKW ’ULYLQJ &RQGLWLRQV (21 White Chips)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage of white LED backlight	VL	8.7	9.6	10.5	V	Note 1
Curt for LED backlight	IL	105	140	175	mA	
Luminance (on the module surface,BM-7)		190	240	-	cd/m^2	
LED life time	-	20,000	-	-	Hr	Note 2



3.2. Power Sequence

To prevent the device damage from latch up, the power on/off sequence shown below must be followed.

Power ON: VDD, GND ® AVDD, AVSS ® V1 to V14
Power OFF: V1 to V14 ® AVDD, AVSS ® VDD, GND

Power on/off control

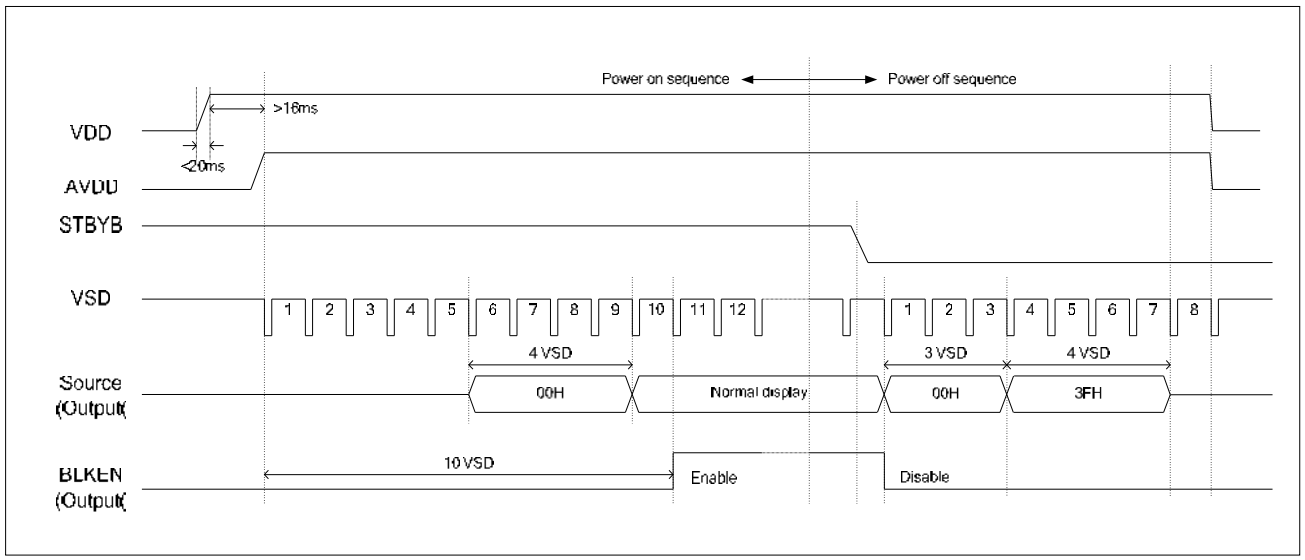


Figure 3.1: Power on/off timing sequence

Enter and exit standby mode sequence

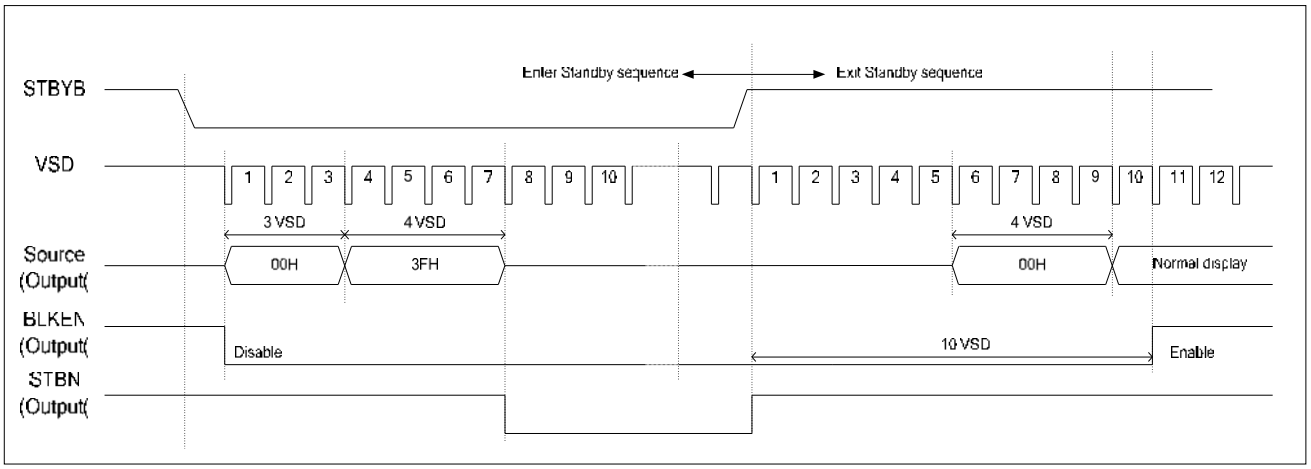


Figure 3.2: Enter and exit standby mode sequence

3.3. Timing Characteristics

3.3.1 AC electrical characteristics

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
HS setup time	Thst	8	-	-	ns
HS hold time	Thhd	8	-	-	ns
VS setup time	Tvst	8	-	-	ns
VS hold time	Tvhd	8	-	-	ns
Data setup time	Tdsu	8	-	-	ns
Data hold time	Tdhd	8	-	-	ns
DE setup time	Tesu	8	-	-	ns
DE hold time	Tehd	8	-	-	ns
VDD Power On Slew rate	TPOR	-	-	20	ms
RSTB pulse width	TRst	10	-	-	μs
CLKIN cycle time	Tcph	20	-	-	ns
CLKIN pulse duty	Tcwh	40	50	60	%
Output stable time	Tsst	-	-	6	μs

3.3.2. Data Input Format

- **Horizontal timing**

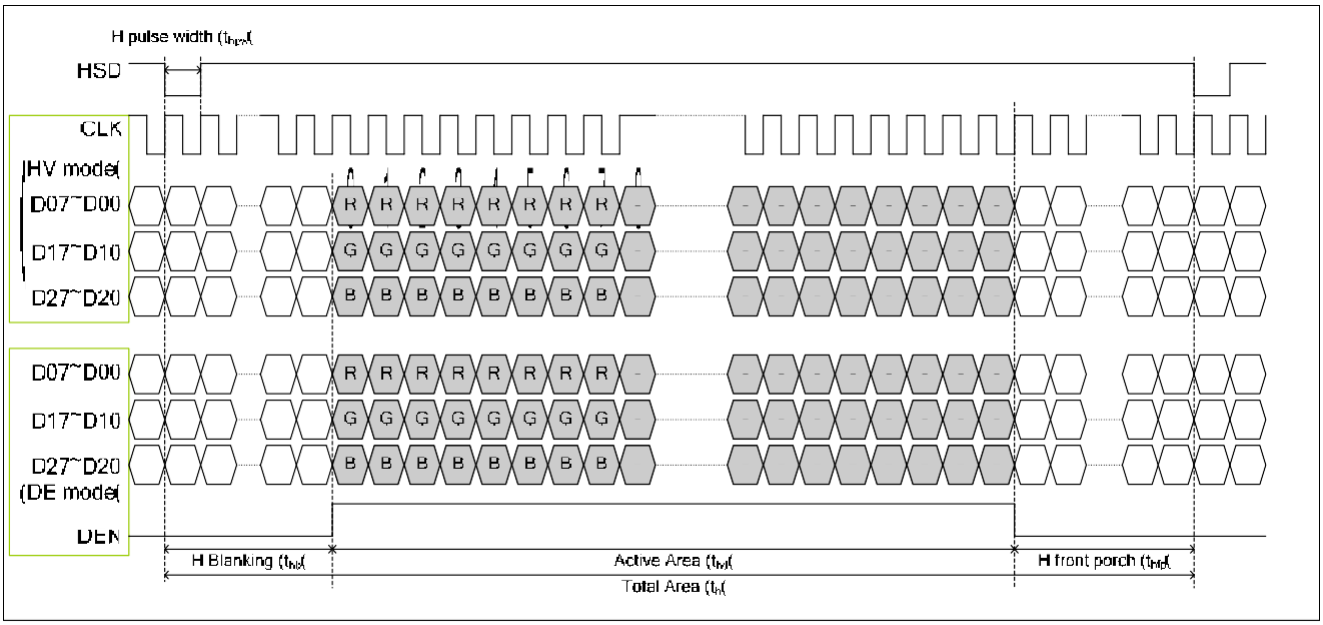


Figure 3.3 Horizontal input timing diagram

- **Vertical Timing**

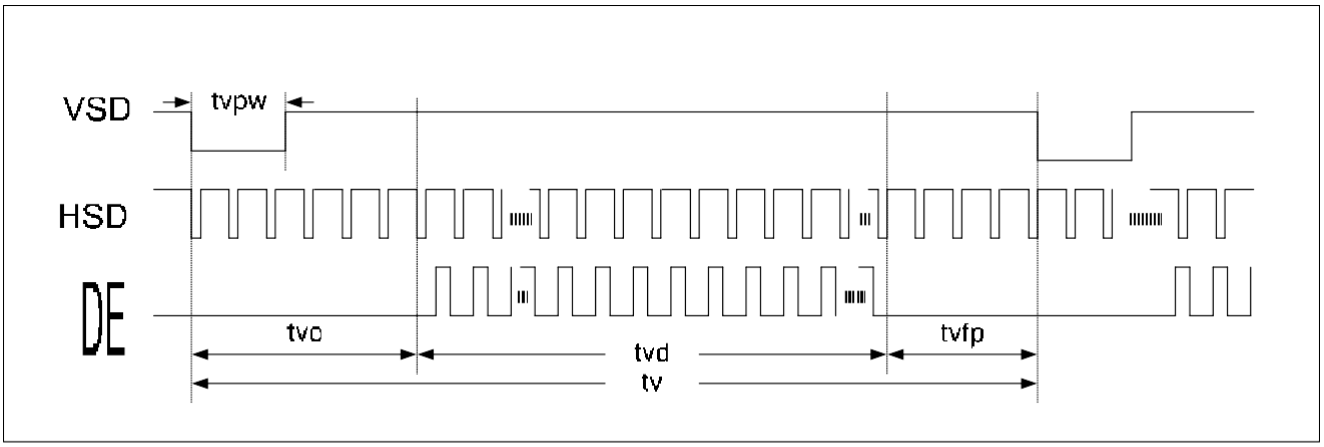


Figure 3.4: Vertical input timing diagram

3.3.3. Timing

- **Horizontal Timing**

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd	-	800	-	DCLK
DCLK frequency	fclk	-	33.3	50	MHz
One Horizontal Line	th	862	1056	1200	DCLK
HS pulse width (Min.)	thpw		1		DCLK
HS pulse width (Typical.)	thpw		-		DCLK
HS pulse width (Max.)	thpw		40		DCLK
HS Back Porch (Blanking)	thb	46	46	46	DCLK
HS Front Porch	thfp	16	210	354	DCLK
DE mode Blanking	th-thd	45	256	400	DCLK

- **Vertical Timing**

Parameter	Symbol	Spec.			Unit
		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 Back Porch (Blanking)	tvb	23	23	23	TH
VS Front Porch	tvfp	7	22	147	TH
DE mode Blanking	tv-tvd	4	45	170	TH

4. Optical Specifications

Ta=25 ℃

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	40	50	--	Degree	Note1
		θB		50	60	--		
		θL		60	70	--		
		θR		60	70	--		
Contrast Ratio		CR	θ=0°	400	500	--		Note4
Response Time		T_{ON}	25℃	--	5	7	ms	Note3
		T_{OFF}		--	20	28		
Chromaticity	White	x	Backlight is on	0.237	0.287	0.337		Note2 Note5 Note6
		y		0.265	0.315	0.365		
Luminance		L		190	240	--	cd/m ^{2}	Note6

Test Conditions:

1. DV_{DD}=3.3V, I_L=140mA(Backlight current),the amblent temperature is 25℃.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

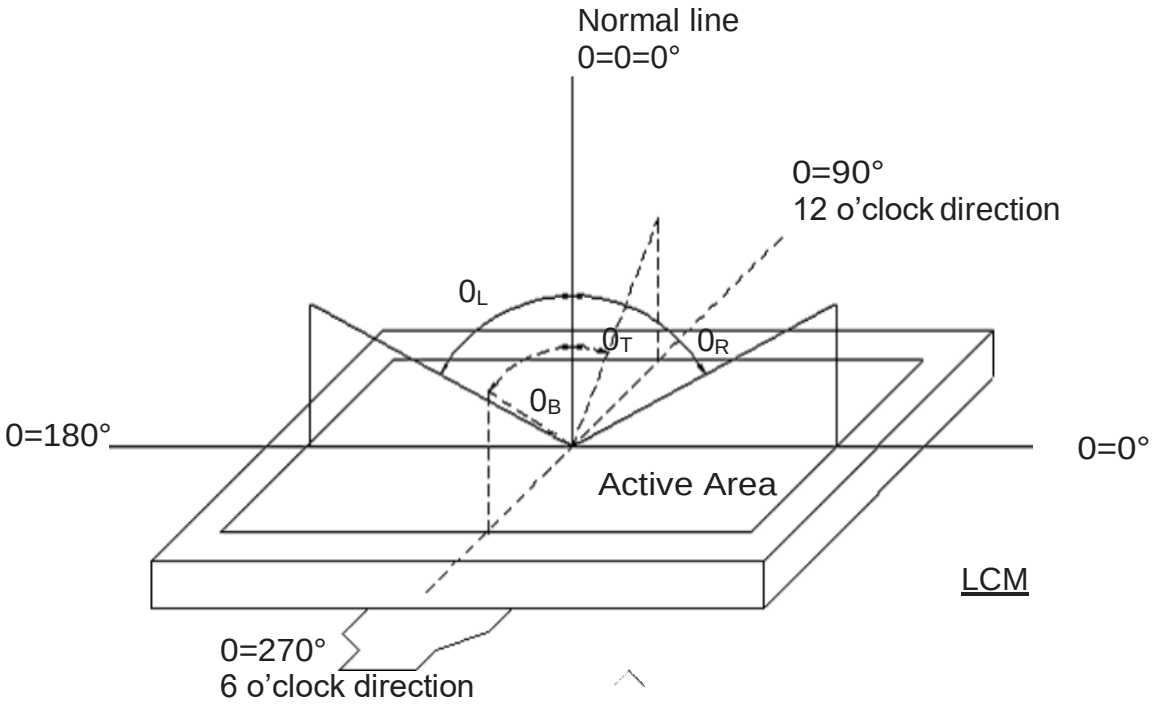


Fig. 4-1 Definition of **v**iewing angle

Note 2: Definition of optical measure**m**ent system.
The optical characteristics sho**u**ld **be m**easured in dark room. After 30 minutes operation, the optical properti**es 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-5**A Field of view: 1° /Height: 500mm.)

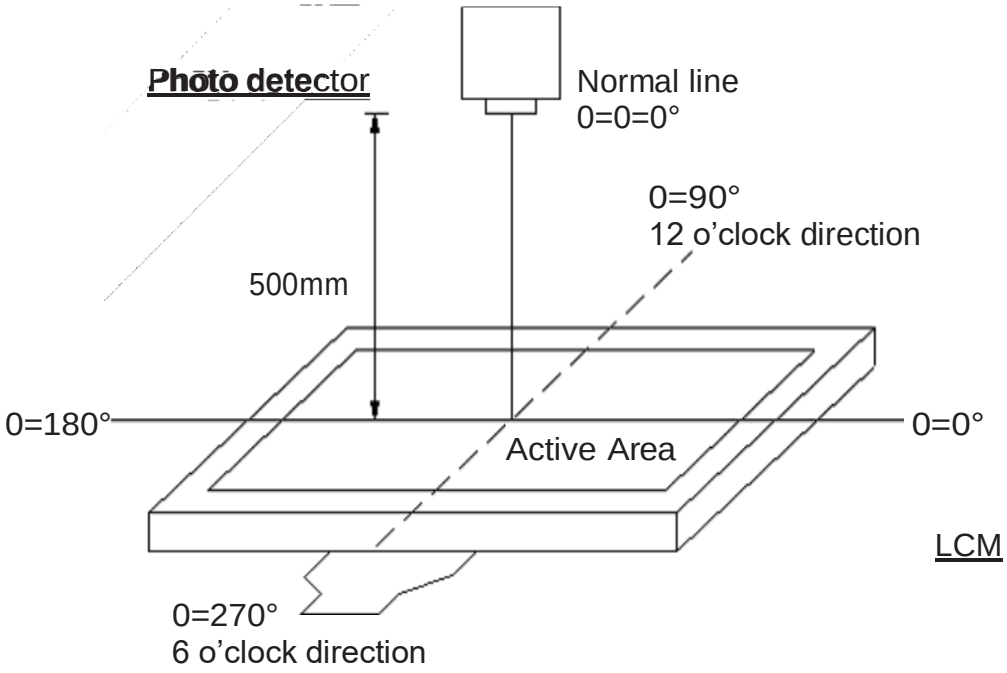


Fig. 4-2 Optical measurement system setup

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%.

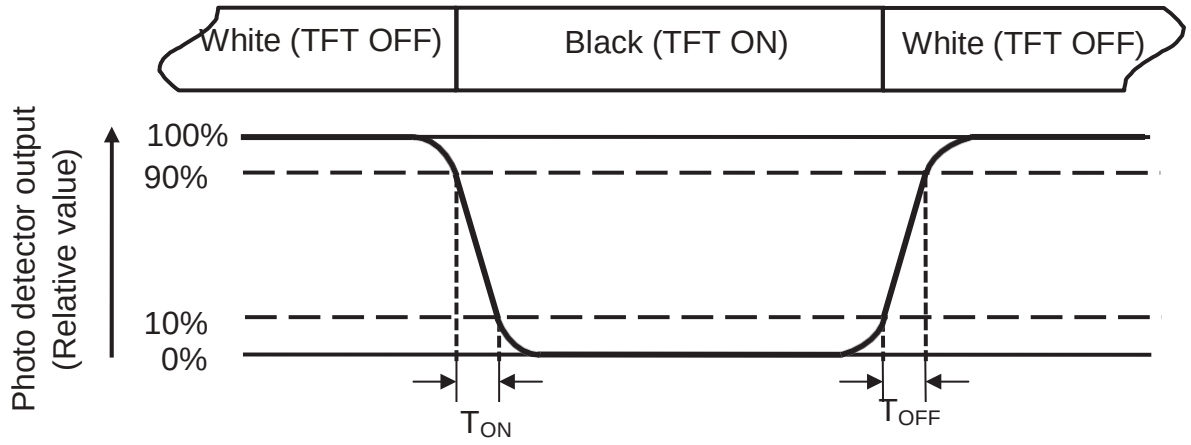


Fig. 4-3 Definition of response time

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 meas**ur**ed at center point of LCD.

Note 6: All input terminals LCD **p**anel **m**ust 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.

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

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

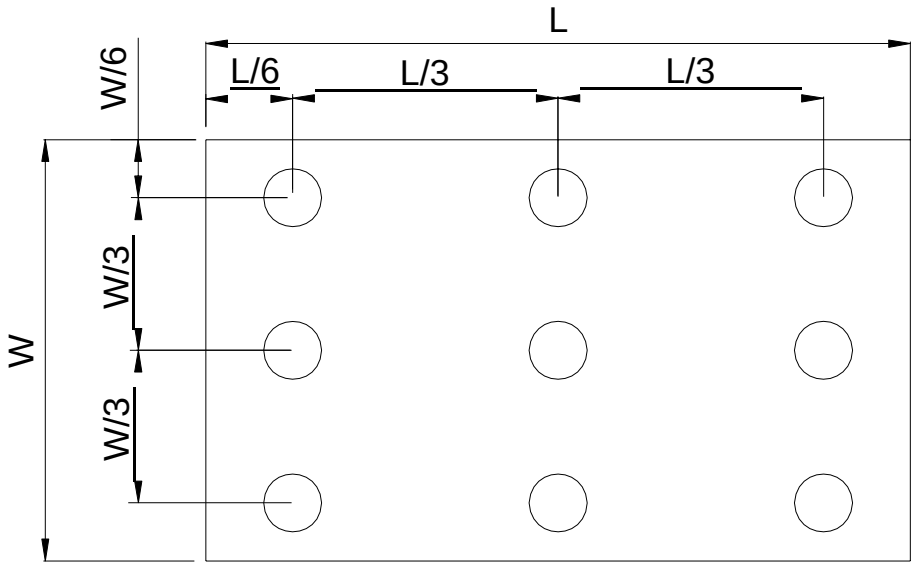


Fig. 4-4 Definition of measuring points

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

5. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 60℃ 240hrs	Note 1 > Note 4
Low Temperature Storage	Ta = -20℃ 240hrs	Note 1 > Note 4
High Temperature Operation	Ts = 55℃ 240hrs	Note 2 > Note 4
Low Temperature Operation	Ta = -20℃ 240hrs	Note 1 > Note 4
Operate at High Temperature and Humidity	+60℃, 90%RH 240hrs	Note 4
Thermal Shock	-20℃/30 min ~ +60℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note 4
Vibration Test	Frequency range:10~**55**Hz Stroke:1.5mm Sweep:10Hz~55Hz~**10H**z 2 hours for each direction of X. Y. Z. (6 hours fo**r** total)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each di**rection**	
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/1500K	

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.
Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

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

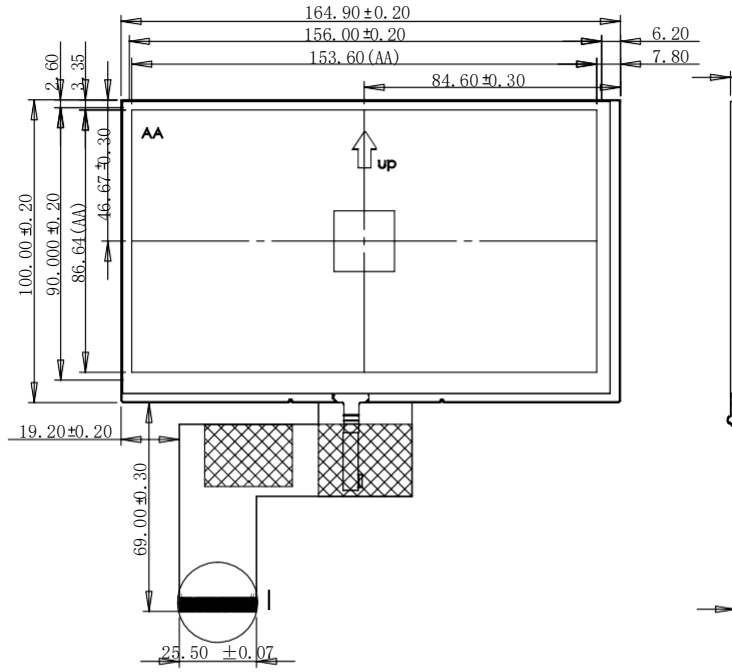
1. Store the module in a dark room where must keep at 25±10 ☾ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Stor**e** th**e** m dule in an anti-electrostatic container or bag.

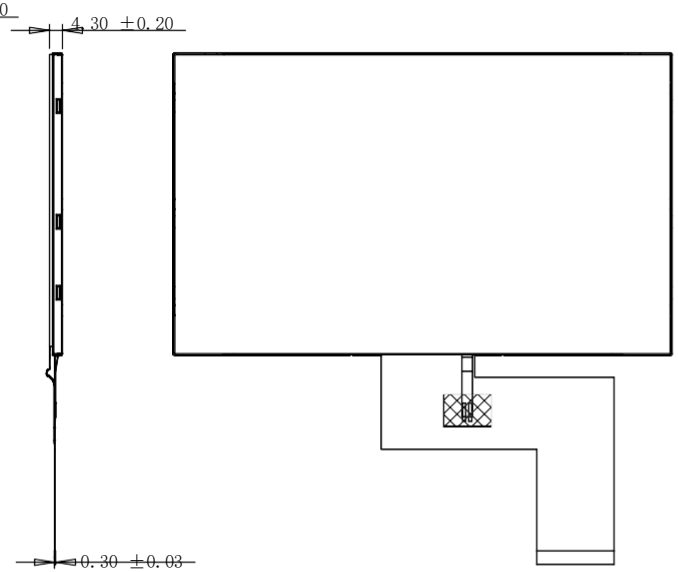
6.5. Cleaning

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.

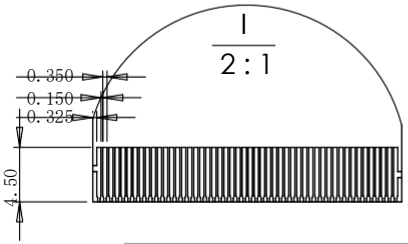
7.Mechanical Drawing

REV	DESCRIPTION
A00	First issue





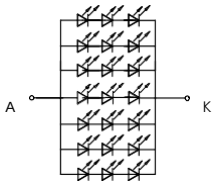
1	LED_Cathode	31	DISP
2	LED_Anode	32	HSYNC
3	GND	33	VSYNC
4	VDD	34	ENB
5	R0	35	NC
6	R1	36	GND
7	R2	37	XR
8	R3	38	YD
9	R4	39	XL
10	R5	40	YU
11	R6		
12	R7		
13	G0		
14	G1		
15	G2		
16	G3		
17	G4		
18	G5		
19	G6		
20	G7		
21	B0		
22	B1		
23	B2		
24	B3		
25	B4		
26	B5		
27	B6		
28	B7		
29	GND		
30	DOTCLK		



Specification:

1). Viewing angle: 6 O'clock
2). Display mode: a_Si TFT/Transmissive/Normal White
3). Operating temp.: -20°C~+55°C
Storage temp.: -20°C~+6 0°C
4). IC:
5). All the raw material are Rohs complicant

POL：0.22EWV
TP:M7048A



(CIRCUIT DIAGRAM)

SCALE: FIT		AGO-070S1-NN-R	
SHEET: 1 OF 1			
GENERAL TOL: ± 0.2	UNIT mm		
APPROVALS	DATE	MODEL NUMBER	PROJECTION PART NO: C/D
APP:			
CHK:			
DWN: Atman		DO NOT SCALE THIS DRAWING	

8. Touch Panel Specification

8.1 Electrical Characteristics

Item	Value			Unit	Remark
	Min.	Typ.	Max.		
Lineanty	-2.0	-	+2.0	%	After environment and life lest
Terminal Resistance	160	-	900	Ω	X(Glass side)
	160	-	900	Ω	Y(Glass side)
Insulation Resistance	20	-	-	MΩ	DC 25V 1min
Operating Voltage	-	5	-	V	DC

8.2 Optical Characteristics

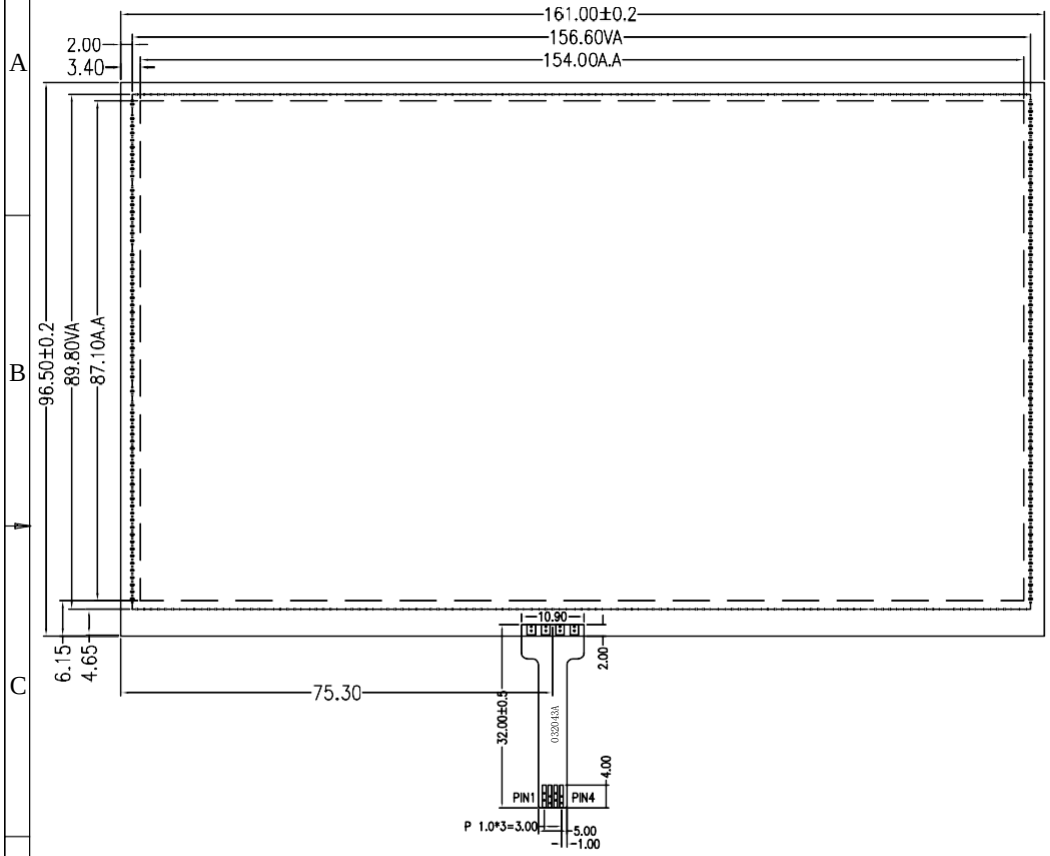
Item	Value			Unit	Remark
	Min.	Typ.	Max.		
Response Time	-	-	10	ms	100KΩ pull-up
Light Transparency	80	-	-	%	-

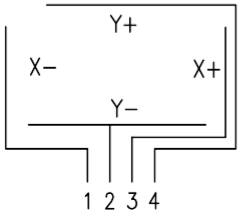
8.3 Mechanical Characteristics

Item	Value			Unit	Remark
	Min.	Typ.	Max.		
Active Force	35	-	150	g	
Surface Hardness	3	-	-	H	
Pen Sliding Durability	100.000	-	-	time	
Hitting Durability	1.000.000	-	-	time	

8.4 Mechanical Drawing

REV	DESCRIPTION
A00	First issue





FPC:032043A

SCALE: FIT		AGO-070S1-NN-R		
SHEET: 1 OF 1				
GENERAL TOL: ± 0.2	UNIT mm			
APPROVALS	DATE	MODEL NUMBER	PROJECTION	PART NO: C/D
APP:				
CHK:				
DWN: Atman		DO NOT SCALE THIS DRAWING.		