


SPECIFICATION

Customer: _____
Model Name: SAT070CP50HDHY0-A0M
SPEC NO.: _____
Date: _____
Version: _____

Preliminary Specification
 Final Specification

Approved by	Comment

Approved by	Reviewed by	Prepared by
		

Record of Revision

Version	Revise Date	Page	Content
Pre-spec.A	2014/02/25		Initial Release

视安通集团 SAT GROUP

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1. General Specifications

No.	Item	Specification	Remark
1	LCD size	7.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1024 × 3(RGB) × 600	
4	Display mode	Normally White, Transmissive	
5	Pixel pitch	0.1506(H) X 0.1790(V) mm	
6	Active area	154.2144(H) X 3(RGB) X 35.92(V) mm	
7	Outline dimensions	165(H) X 100(V) X 3.5(D) mm	
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	TTL	
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-50S-0.5SH manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Remark
1	NC	-	No connection	Note 8
2	NC	-	No connection	Note 8
3	NC	-	No connection	Note 8
4	NC	-	No connection	Note 8
5	GND	P	Power ground	
6	V _{COM}	I	Common voltage	
7	DV _{DD}	P	Power for Digital Circuit	
8	MODE	I	DE/SYNC mode select	Note 1
9	DE	I	Data Input Enable	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	Note 2
19	B0	I	Blue data(LSB)	Note 2
20	G7	I	Green data(MSB)	
21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	Note 2

27	G0	I	Green data(LSB)	Note 2
28	R7	I	Red data(MSB)	
29	R6	I	Red data	
30	R5	I	Red data	
31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	Note 2
35	R0	I	Red data(LSB)	Note 2
36	GND	P	Power Ground	
37	DCLK	I	Sample clock	Note 3
38	GND	P	Power Ground	
39	L/R	I	Left / right selection	Note 4,5
40	U/D	I	Up/down selection	Note 4,5
41	V _{GH}	P	Gate ON Voltage	
42	V _{GL}	P	Gate OFF Voltage	
43	AV _{DD}	P	Power for Analog Circuit	
44	RESET	I	Global reset pin.	Note 6
45	NC	-	No connection	
46	V _{COM}	I	Common Voltage	
47	DITHB	I	Dithering function	Note 7
48	GND	P	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.

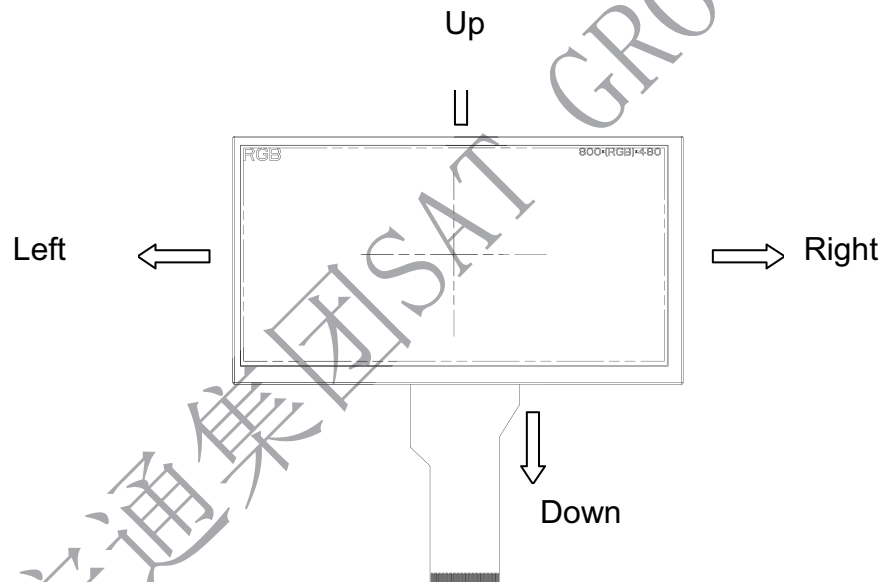
Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

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.

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	70	°C	
Storage Temperature	T_{ST}	-30	80	°C	

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}	9.4	9.6	9.8	V	
	V _{GH}	17	18	19	V	
	V _{GL}	-6.6	-6.0	-5.4	V	
Input signal voltage	V _{COM}	3.4	3.9	4.4	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 output voltage (refer to Note 3) of customer's system board.

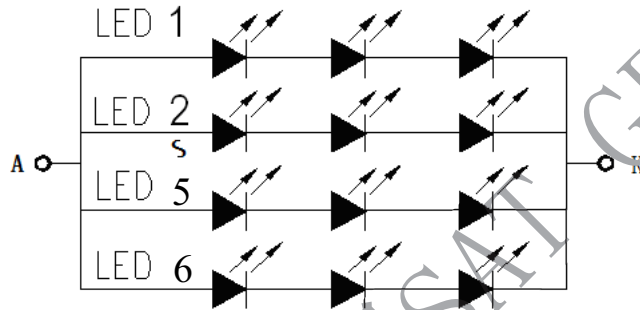
Note 3: DCLK,HS,VS,RESET,U/D, L/R,DE,R0~R7,G0~G7,B0~B7,MODE,DITHB.

3.1.2. Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I _{GH}	-	0.2	1.0	mA	V _{GH} =18.0V
	I _{GL}	-	0.2	1.0	mA	V _{GL} = -6.0V
	IDV _{DD}	-	4.0	10	mA	DV _{DD} =3.3V
	IAV _{DD}	-	20	50	mA	AV _{DD} =9.6V

3.1.3. Backlight Driving Conditions (18 White Chips)

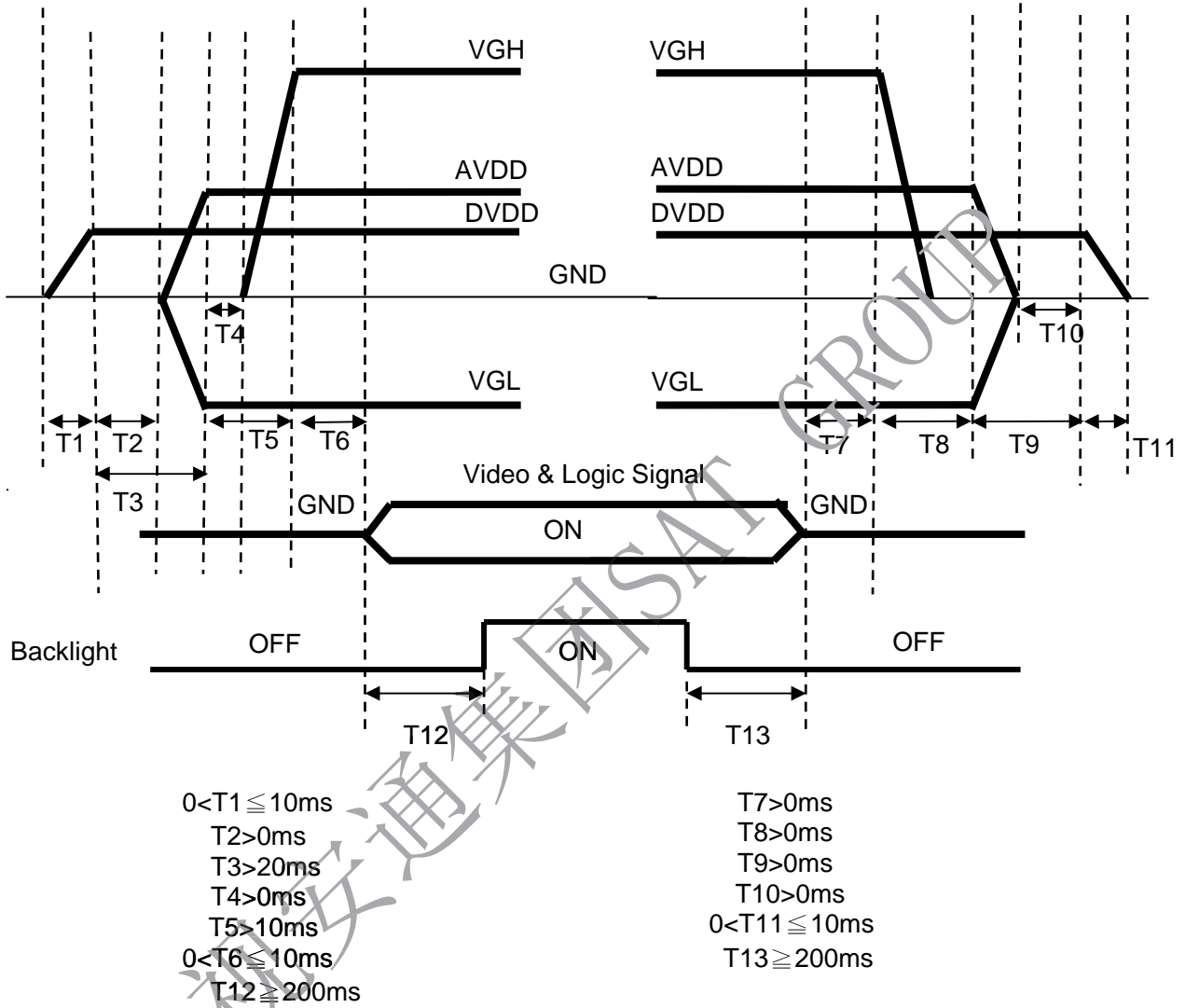
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage of white LED backlight	VL	8.7	9.6	10.5	V	Note 1
Current for LED backlight	IL	90	120	150	mA	
Luminance (on the module surface, BM-7)		110	140	-	cd/m ²	
LED life time	-	20,000	-	-	Hr	Note 2



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3.2. Power Sequence

Power On : DVDD→AVDD/VGL →VGH →Video & Logic Signal→Backlight
 Power Off : Backlight→Video & Logic Signal→ VGH→AVDD/VGL→DVDD



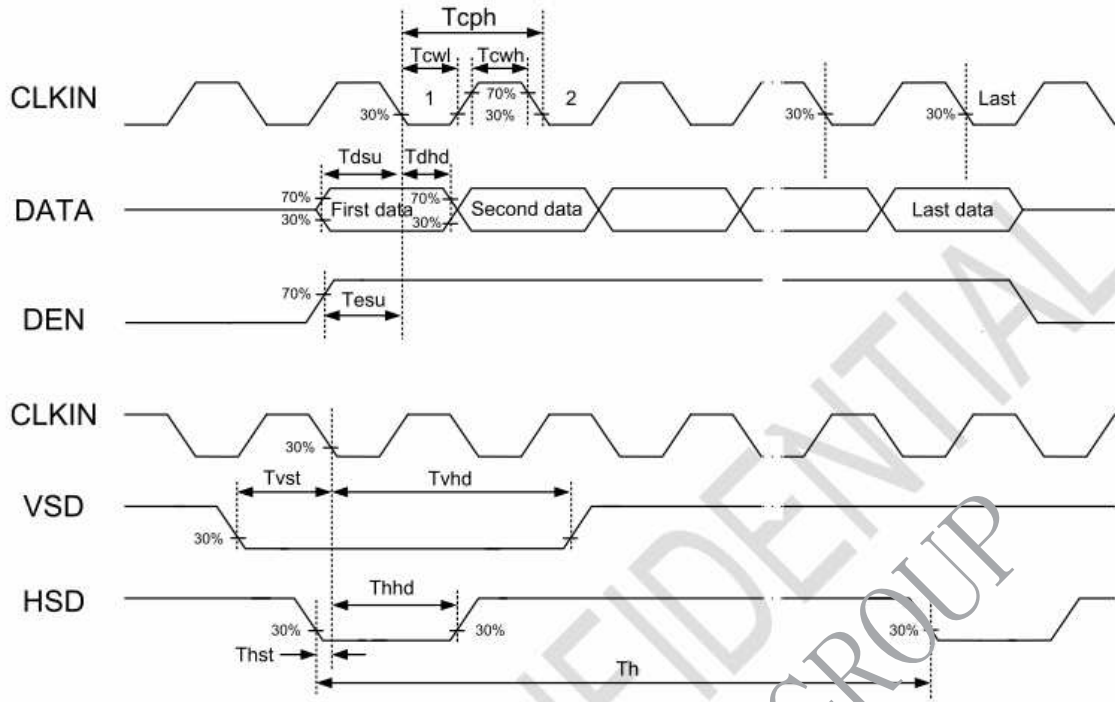
3.3. Timing Characteristics

3.3.1 Input Timing Table

	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DE MODE	Dot Clock	1/tCLK	45	51.2	57	MHz	
	DCLK Pulse Duty	Tcwh	40	50	60	%	
	Horizontal Total Time	tH	1324	1344	1364	tCLK	
	Horizontal Effective Time	tHA	1024			tCLK	
	Horizontal Blank Time	tHB	300	320	340	tCLK	
	Vertical Total Time	tV	625	635	645	tH	
	Vertical Effective Time	tVA	600			tH	
	Vertical Blank Time	tVB	25	35	45	tH	
SYNC MODE	Horizontal Total Time	TH	1324	1344	1364	tCLK	
	Horizontal Pulse Width	Thpw		20	-	tCLK	thb + thpw =160DCLK is fixed
	Horizontal Back Porch	Thb		140	-	tCLK	
	Horizontal Front Porch	Thfp	140	160	180	tCLK	
	Horizontal Effective Time	THA	1024			tCLK	
	Vertical Total Time	TV	625	635	645	tH	
	Vertical Pulse Width	Tvpw		3	-	th	tvpw + tvb =23th is fixed
	Vertical Back Porch	Tvb	-	20	-	th	
	Vertical Front Porch	Tvfp	2	12	22	th	
	Vertical Valid	Tvd	600			th	

3.3.2 Input Clock and Data Timing Diagram

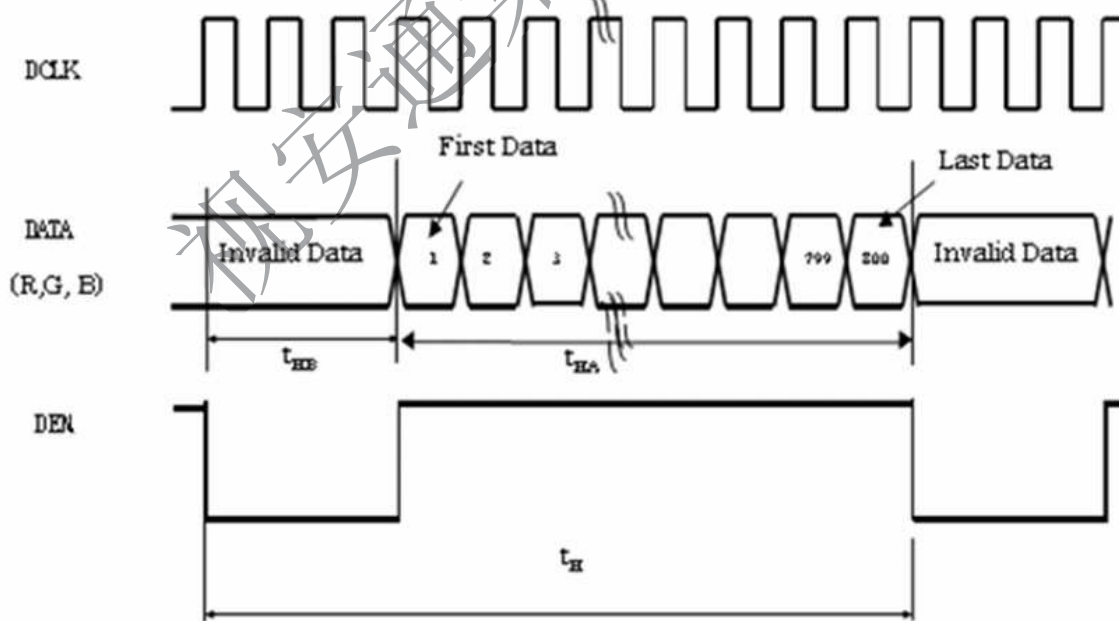
Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
DVDD Power On Slew Rate	TPOR	-	-	20	ms	From 0V to 90% DVDD
RSTB Pulse Width	TRst	50	-	-	us	DCLK=65MHz
DCLK Cycle Time	Tcph	14	-	-	ns	
DCLK Pulse Duty	Tcwh	40	50	60	%	
VSD Setup Time	Tvst	5	-	-	ns	
VSD Hold Time	Tvhd	5	-	-	ns	
HSD Setup Time	Thst	5	-	-	ns	
HSD Hold Time	Thhd	5	-	-	ns	
Data Setup Time	Tdsu	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
Data Hold Time	Tdhd	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
DEN Setup Time	Tesu	5	-	-	ns	
DEN Hold Time	Tehd	5	-	-	ns	



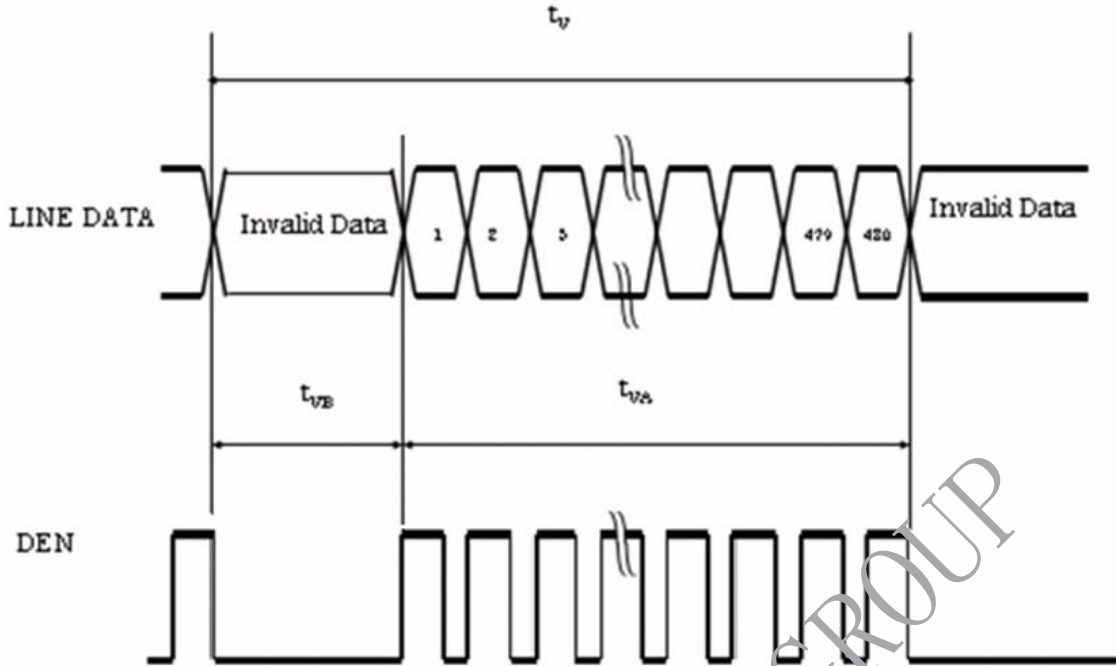
3.3.3 Timing Sequence(Timing Chart)

DE Mode

Horizontal timing :

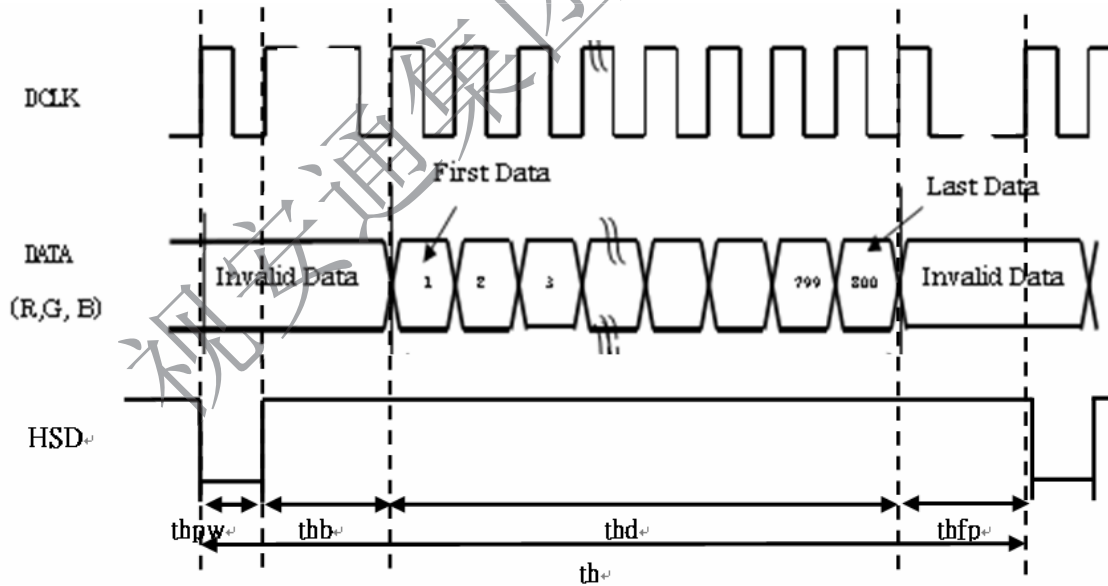


Vertical timing :

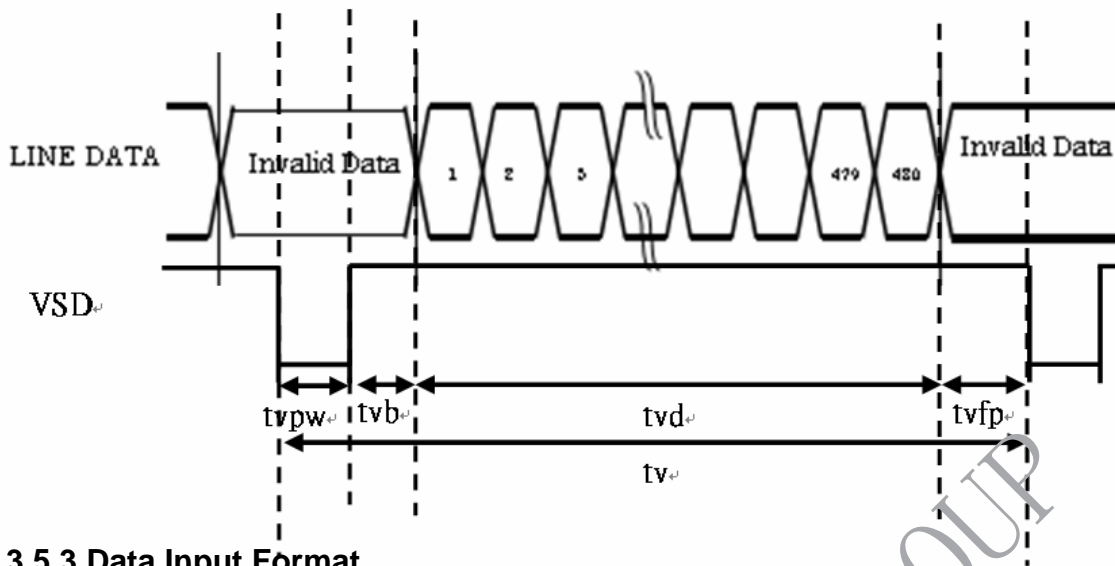


SYNC Mode

Horizontal timing :

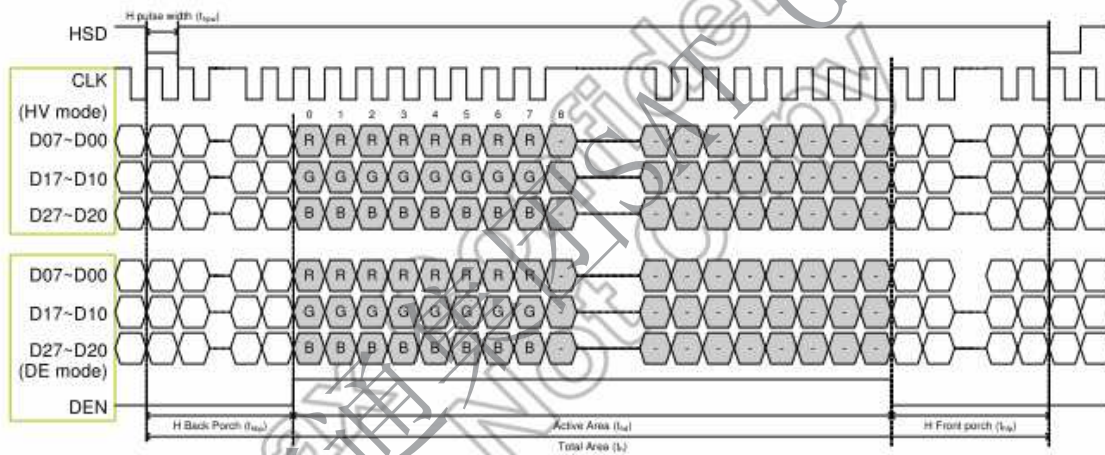


Vertical timing :

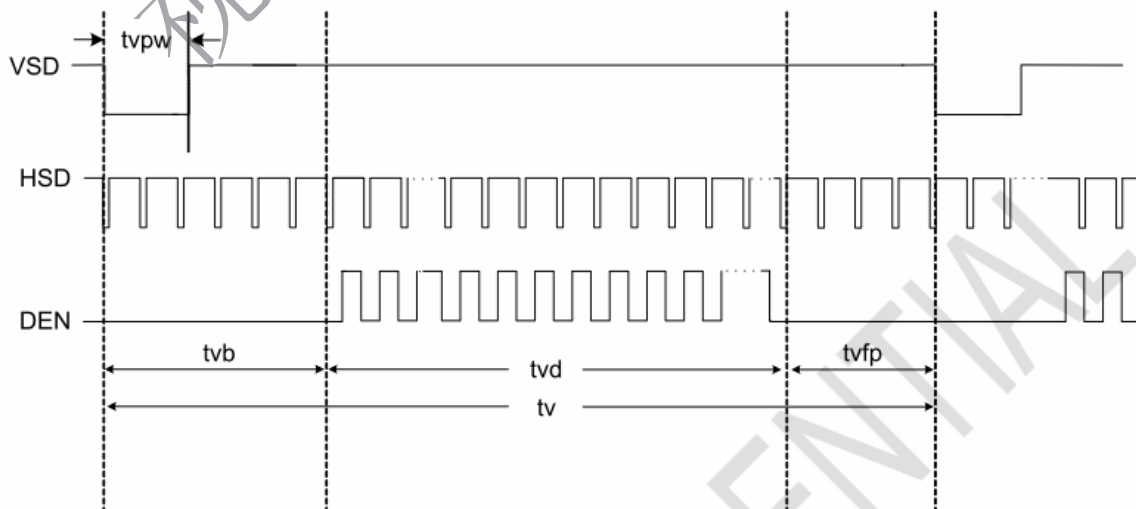


3.5.3 Data Input Format

Horizontal timing :



Vertical timing :



4. Optical Specifications

Ta=25 °C

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	θT	$CR \geq 10$	50	60	--	Degree	Note1
	θB		60	70	--		
	θL		70	80	--		
	θR		70	80	--		
Contrast Ratio	CR	$\theta=0^\circ$	600	800	--		Note4
Response Time	T_{ON}	25°C	--	25	40	ms	Note3
	T_{OFF}						
Chromaticity	White	Backlight is on	x	0.273	0.313	0.353	Note2 Note5 Note6
			y	0.289	0.329	0.369	
	Red		x	0.573	0.593	0.613	
			y	0.315	0.335	0.355	
	Green		x	0.322	0.342	0.362	
			y	0.580	0.600	0.620	
	Blue		x	0.138	0.158	0.178	
			y	0.091	0.111	0.131	
Uniformity	U		75	80	--	%	Note7
NTSC			--	50	--	%	
Luminance	L		110	140	--	cd/m ²	Note6

Test Conditions:

1. $DV_{DD}=3.3V$, $I_L=120mA$ (Backlight current), the ambient temperature is 25°C.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

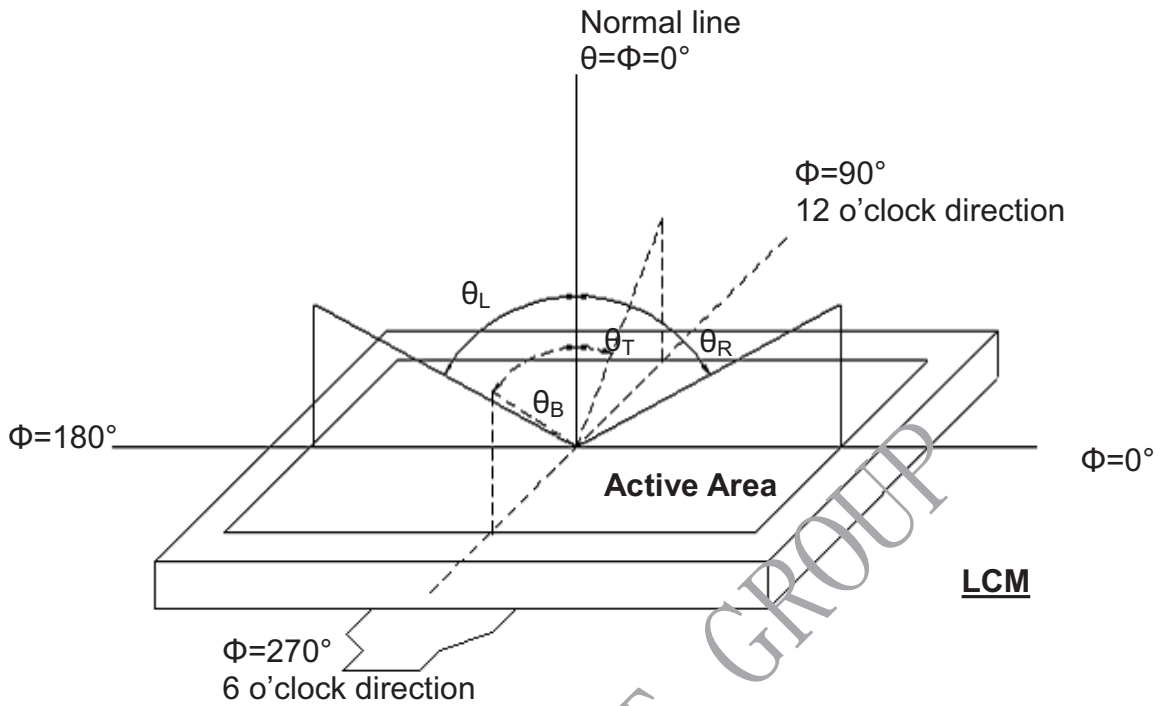


Fig. 4-1 Definition of viewing angle

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.)

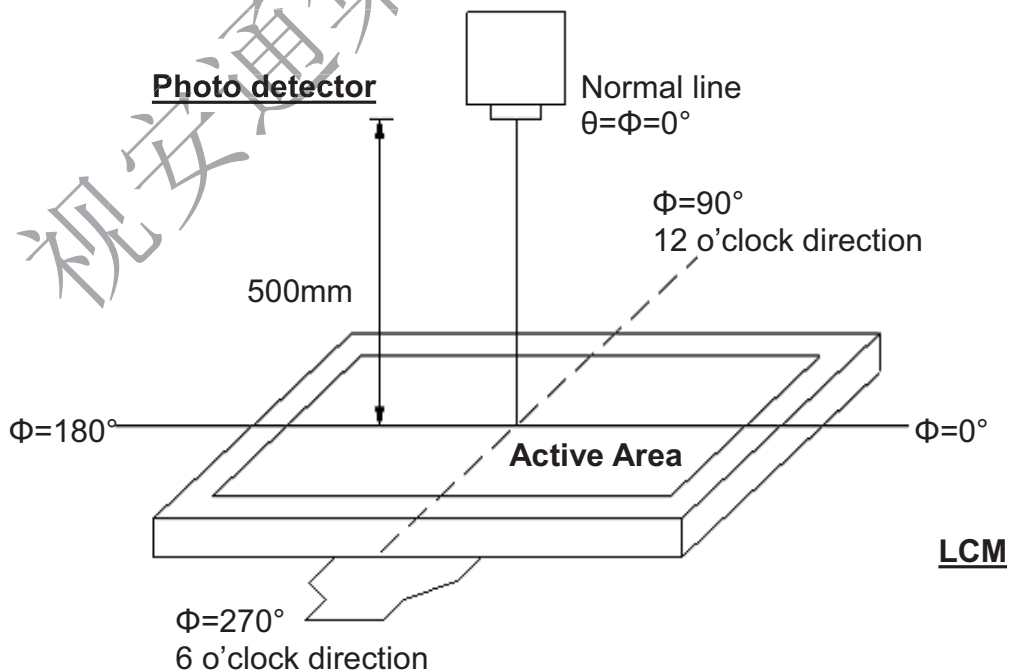


Fig. 4-2 Optical measurement system setup

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%.

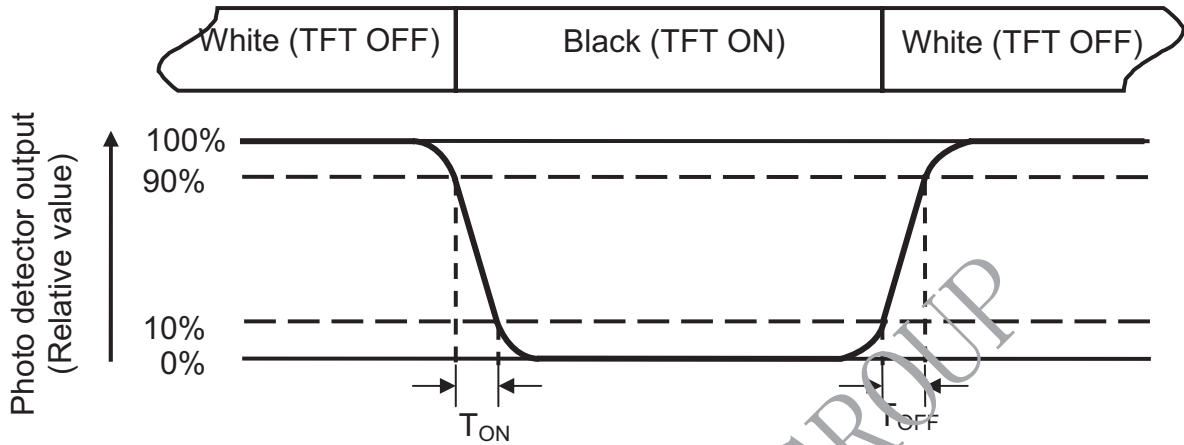


Fig. 4-3 Definition of response time

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.

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

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

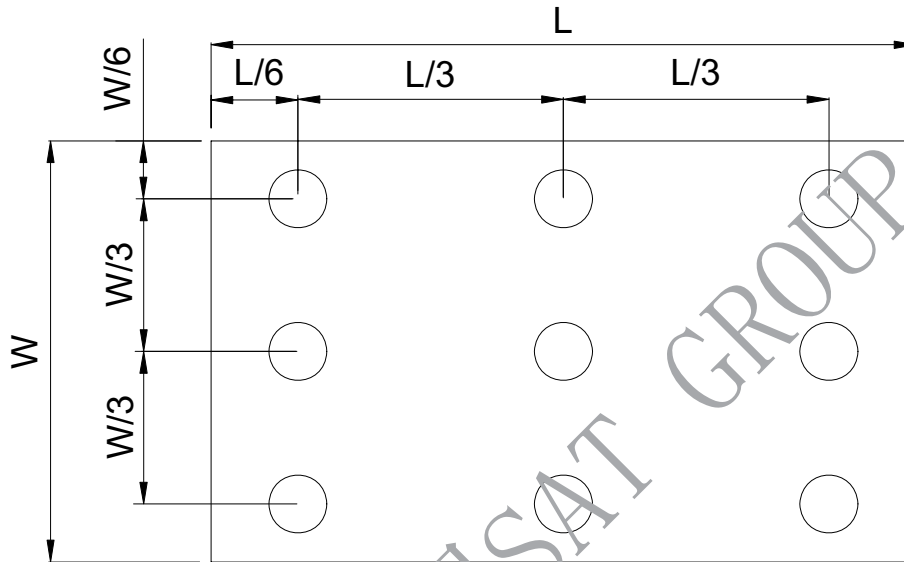


Fig. 4-4 Definition of measuring points

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

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

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.

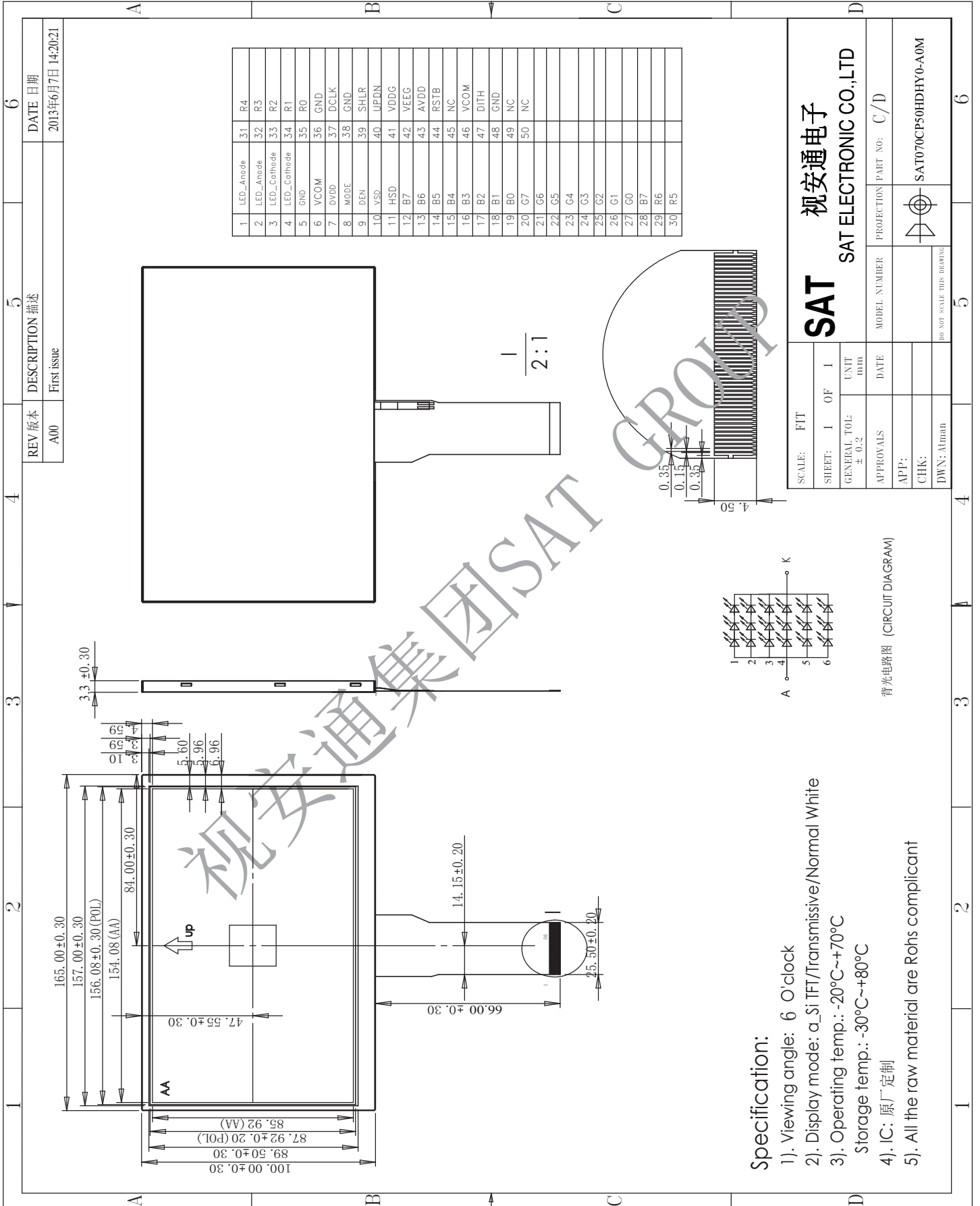
6.4. Storage

1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ 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.

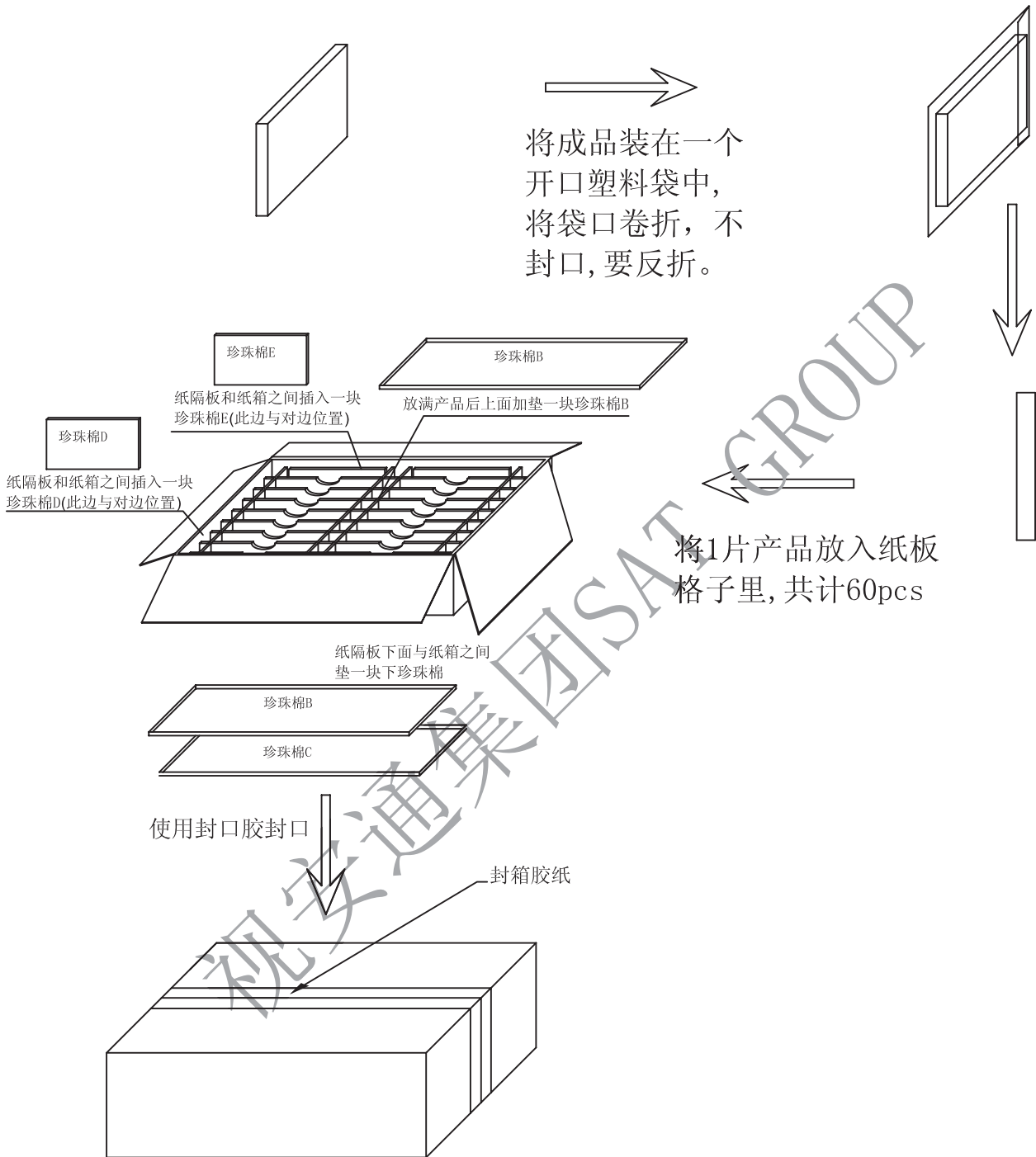
6.5. Cleaning

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

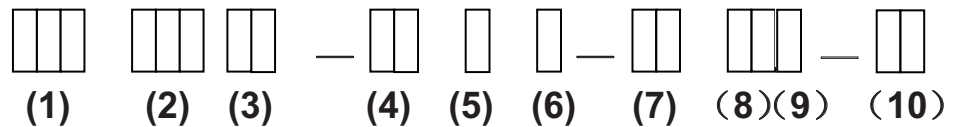


8. Package Drawing



9 . Product ID Rule

Product Name



No	Definition	Specifications
(1)	TFT LCM Productor No.	SAT ---- SAT ELECTRONIC CO.LTD
(2)	Display monitor opposite angle line size	Unit :inch or mmm (size <10 inch: takes two integers ; size >=10 inch: takes three integers)
(3)	LCD Type	AU----AUO ; CP----CPT ; PV----PVI ; TM----TIANMA ; HS----HSD ; LG----LG ; Wi----Wintek ; CM----CMO ; HY----Hydis ; HI----Hitach; Sh----Sharp ; BO---BOE ...
(4)	Interface PIN Number	By two figures characters expression from 01 to 99
(5)	Type	A---- Alternated Video Signal; D---- Data Video Signal;
(6)	LED Back Light Type	H----high light ; M---- Commonly light; L---- low light
(7)	LED Back Light colored warp	Rx----red ; Gx----green ; Bx---- blueness; Yx---- white; P----PVI; x---- warp distinction, 1 minimal, 9 maximal
(8)	BK Productor number	By The English litters : A 0~ Z9 A0---MeX

No	Definition	Specifications
(9)	FPC Type	S---short L---Long
(10)	IC Type	By two figures characters expression from 01 to 99

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