SAT 视安通 SAT ELECTRONIC CO.LTD

SPECIFICATION

Customer: _____

Model Name: SAT043HS40DMY0-A0-VSD

SPEC NO.: _____

Date: _____

Version: _____

■Preliminary Specification

□Final Specification

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Approved by	Comment

Approved by	Reviewed by	Prepared by
视安通 2014.08.22 吴金荣		

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Pre-spec.A	2014/08/22		Initial Release

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1. General Specifications

No.	Item	Specification	Remark
1	LCD Size	4.3 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	480 × 3(RGB) ×272	
4	Display mode	Normally White, Transmissive	
5	Dot pitch	0.198(W) X 0.198(H) mm	
6	Active area	95.04(W) X 3(RGB) X 53.856(H) mm	
7	Outline dimensions	105.5(H) X 67.1(V) X 3.0(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	

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2. Pin Assignment

FPC connector is used for electronics interface. The recommended model is FH19SC-40S-0.5SH (05) manufactured by HIROSE.

No.	Symbol	I/O	Function
1	VLED-	P	Power for LED backlight cathode
2	VLED+	P	Power for LED backlight anode
3	GND	P	Power ground
4	VDD	P	Power voltage
5	R0	I	Red data (LSB)
6	R1	I	Red data
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 (MSB)
13	G0	I	Green data (LSB)
14	G1	I	Green data
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 (MSB)
21	B0	I	Blue data (LSB)
22	B1	I	Blue data
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 (MSB)
29	GND	P	Power ground
30	DCLK	I	Pixel clock
31	DISP	I	Display on/ off
32	HSYNC	I	Horizontal sync signal
33	VSYNC	I	Vertical sync signal
34	DE	I	Data enable
35	NC	-	No connect
36	GND	P	Power ground
37	X_R	I/O	Right electrode - differential analog

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38	Y_B	I/O	Bottom electrode - differential analog
39	X_L	I/O	Left electrode - differential analog
40	Y_T	I/O	Top electrode - differential analog

I/O: I: input, O: output, P: power

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3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Supply voltage	V_{DD}	-0.3	4.5	V	
Operation Temperature	T_{OP}	-20	60	℃	
Storage Temperature	T_{ST}	-30	70	℃	

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.

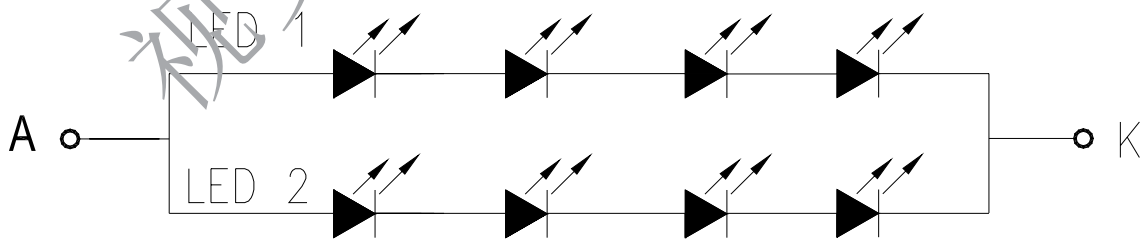
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3.1.1. Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ	Max.		
Power voltage	V_{DD}	3.0	3.3	3.6	V	Note 2
Current for Driver	IV_{DD}	-	17	25	mA	
Input logic high voltage	V_{IH}	0.8 V_{DD}	-	V_{DD}	V	Note 3
Input logic low voltage	V_{IL}	0	-	0.2 V_{DD}	V	

3.1.2. Backlight Driving Conditions (8 White Chips)

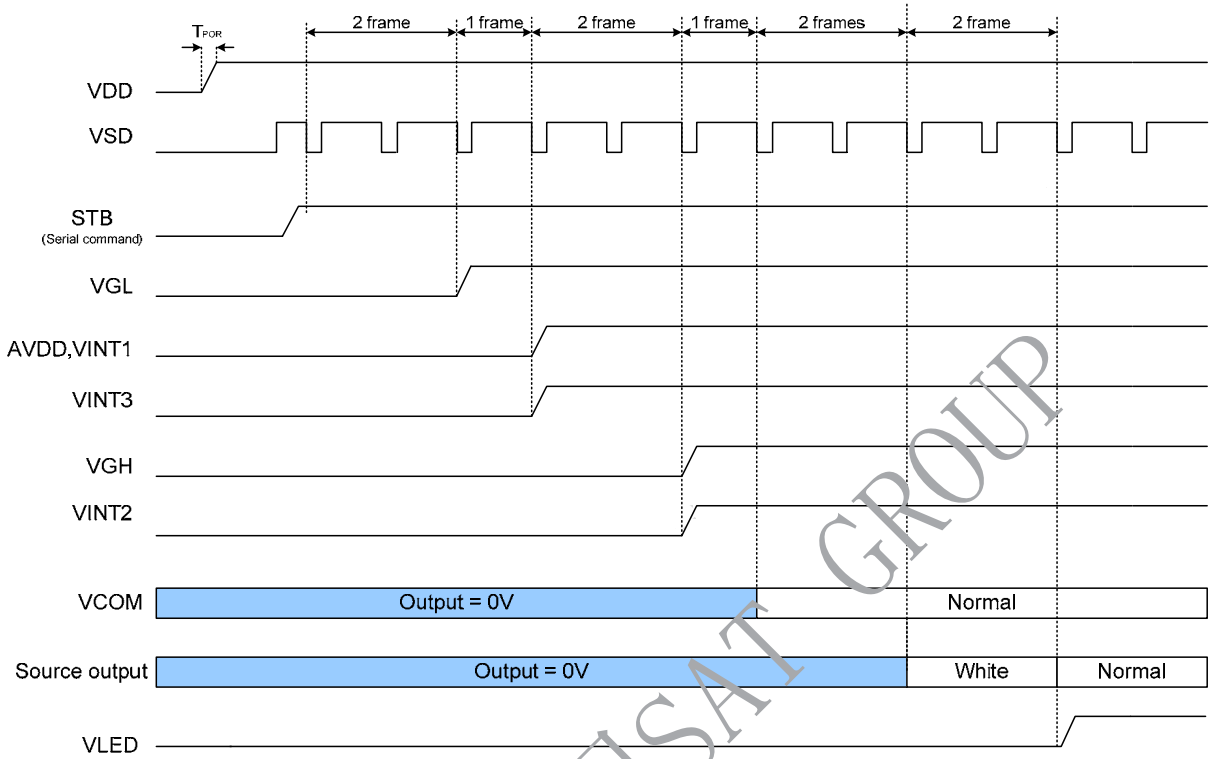
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage of white LED backlight	VL	12	13.2	14	V	Note 1
Current for LED backlight	IL	30	40	50	mA	
Luminance (on the module surface,BM-7)		250	300	-	cd/m^2	
LED life time	-	20,000	-	-	Hr	Note 2



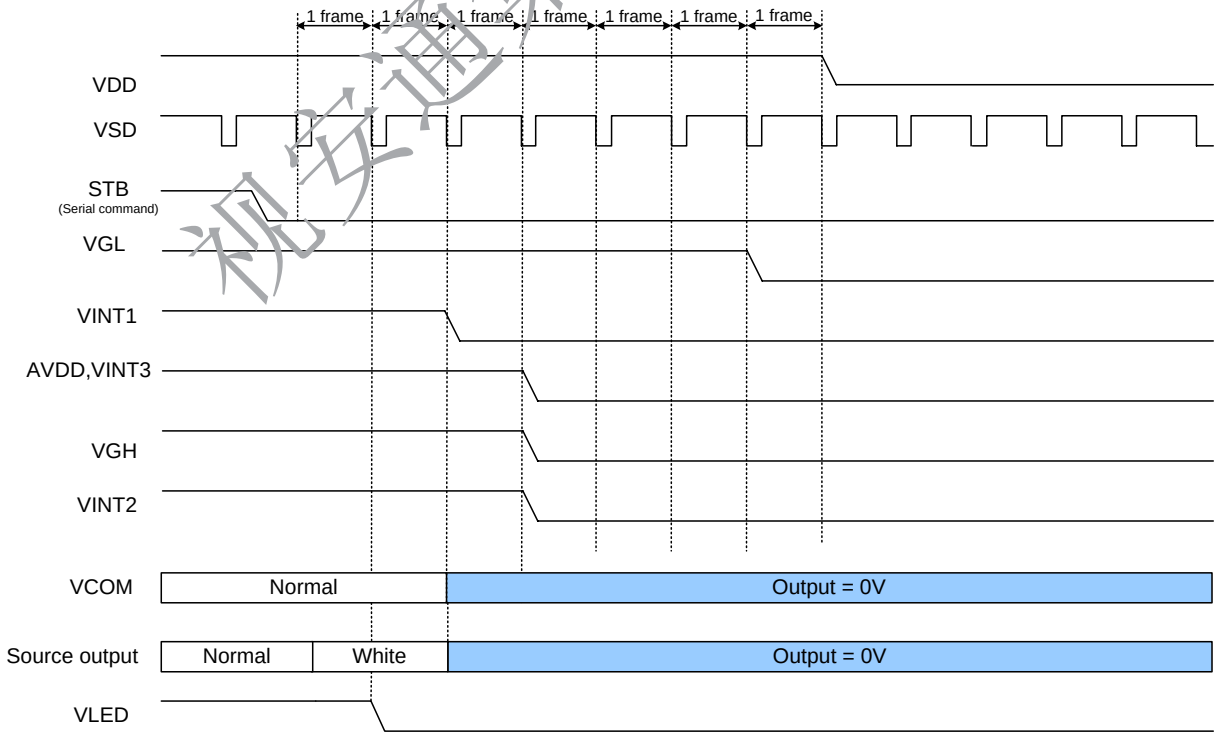
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3.2. Power Sequence

Power On Sequence



Power Off Sequence



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3.3. Timing Characteristics

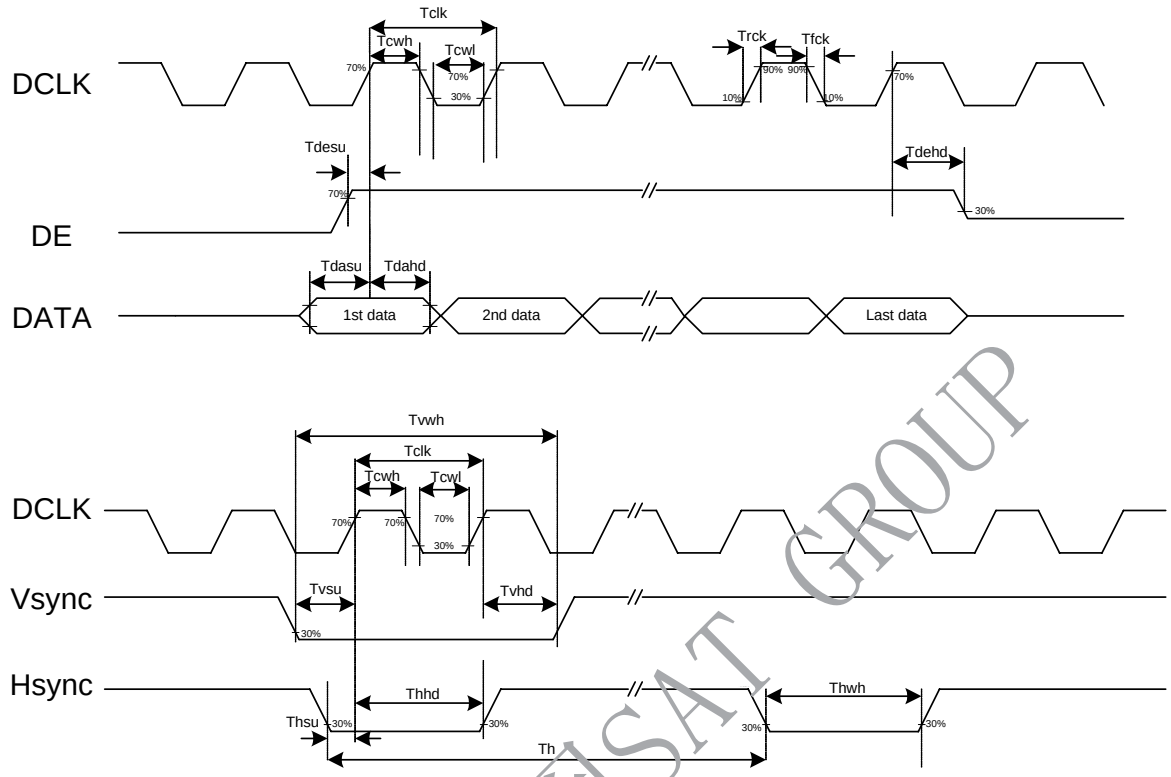
3.3.1. AC Electrical Characteristics

AC Electrical Characteristics (VDDIO=VDD=2.7 to 3.6v, GND=0V, TA=-20 to +85 ℃)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
System operation timing						
VDD power source slew time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
Input Output timing						
DCLK clock time	Tclk	33.3	-	-	ns	DCLK=30MHz
DCLK clock low period	Tcwl	40	-	60	%	
DCLK clock high period	Tcwh	40	-	60	%	
Clock rising time	Trck	9	-	-	ns	
Clock falling time	Tfck	9	-	-	ns	
HSD width	Thwh	1	-	-	DCLK	
HSD period time	Th	55	60	65	us	
HSD setup time	Thsu	12	-	-	ns	
HSD hold time	Thhd	12	-	-	ns	
VSD width	Tvwh	1	-	-	Th	
VSD setup time	Tvsu	12	-	-	ns	
VSD hold time	Tvhd	12	-	-	ns	
Data setup time	Tdasu	12	-	-	ns	
Data hold time	Tdahd	12	-	-	ns	
DE setup time	Tdesu	12	-	-	ns	
DE hold time	Tdehd	12	-	-	ns	
Source output setting time	Tsst	-	-	TBD	us	10% to 90% CL=60pF, RL=2Kohm
Gate output setting time	Tgst	-	500	1000	ns	10% to 90%, CL=60pF
VCOM output setting time	Tcst	-	-	TBD	us	10% to 90%, CL=40nF, RL=50ohm
Time from VSD to 1st line data input	Tvs	3	8	31	Th	HV mode By HDL[4:0] setting
3-wire serial communication AC timing						
Serial clock	Tsck	200	-	-	ns	For SCL pin
SCL pulse low period	Tckl	40	-	60	%	
SCL pulse low period	Tckh	40	-	60	%	
Serial data setup time	Tisu	50	-	-	ns	
Serial data hold time	Tihd	50	-	-	ns	
Serial clock high/low	Tssw	50	-	-	ns	
CSB to VSD	Tcv	1			us	
CSB distinguish time	Tcd	400	-	-	ns	
CSB input setup time	Tcsu	50	-	-	ns	
CSB input hold time	Tchd	50	-	-	ns	

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3.3.2. Input Clock and Data Timing Diagram



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3.3.3. Timing

Vertical input timing

Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
DCLK frequency	Fclk	24	27	30	MHz	
DCLK cycle time	Tclk	83	110	200	ns	
DCLK pulse duty	Tcwh	40	50	60	%	
Time from HSD to source output	Thso	-	13	-	DCLK	
Time from HSD to gate output	Thgo	-	27	-	DCLK	
Time from HSD to gate output off	Thgz	-	3	-	DCLK	
Time from HSD to VCOM	Thvc	-	12	-	DCLK	

Parallel RGB input timign table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	5	9	12	MHz
VSD period time	Tv	277	288	400	H
VSD display area	Tvd		272		H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	93	H
HSD period time	Th	520	525	800	DCLK
HSD display area	Thd		480		DCLK
HSD back porch	Thbp	36	40	255	DCLK
HSD front porch	Thfp	4	5	65	DCLK

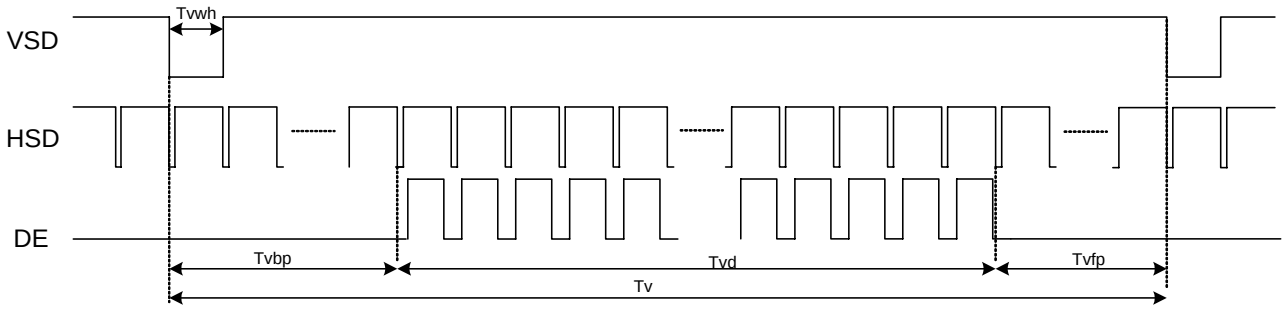
Serial RGB input timign table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	-	27	-	MHz
VSD period time	Tv	277	288	400	H
VSD display area	Tvd		272		H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	93	H
HSD period time	Th	-	1575	-	DCLK
HSD display area	Thd		1440		DCLK
HSD back porch	Thbp	-	120	-	DCLK
HSD front porch	Thfp	-	15	-	DCLK

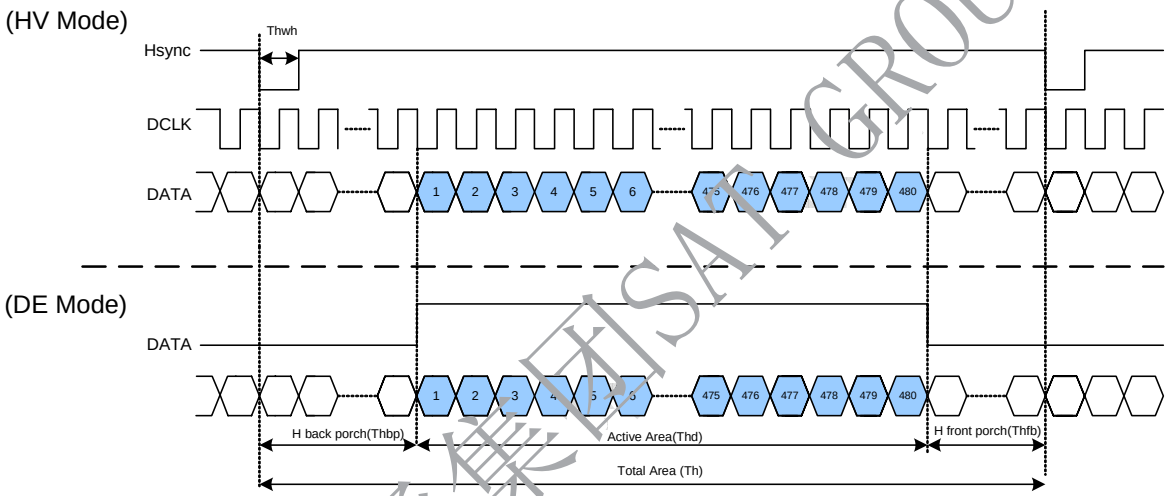
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3.3.4. Data Input Format

Vertical input timing



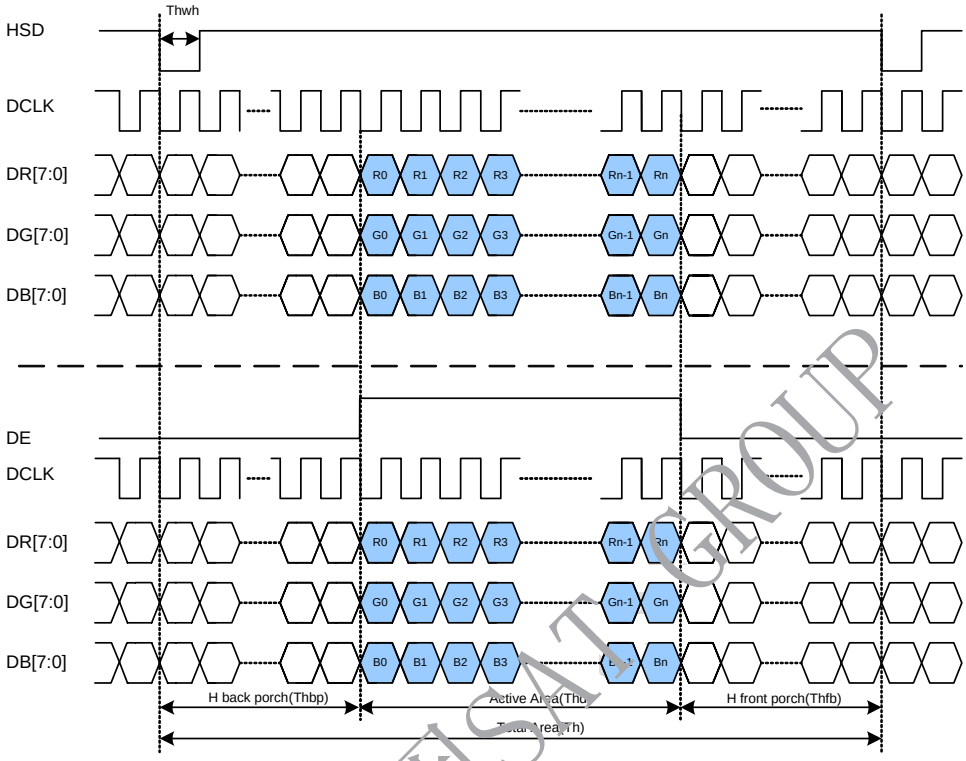
Serial 8-bit RGB Mode Data format



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Parallel RGB Mode Data format

(HV Mode)



(DE Mode)

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4. Optical Specifications

Ta=25 ℃

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	30	40	--	Degree	Note1
		θB		40	50	--		
		θL		40	50	--		
		θR		40	50	--		
Contrast Ratio		CR	θ=0°	480	600	--		Note4
Response Time		T_{ON}	25℃	--	3	6	ms	Note3
		T_{OFF}		--	7	14		
Chromaticity	White	x	Backlight is on	0.292	0.307	0.322		Note2 Note5 Note6
		y		0.333	0.348	0.363		
	Red	x		0.616	0.631	0.646		
		y		0.327	0.342	0.357		
	Green	x		0.306	0.321	0.336		
		y		0.538	0.553	0.568		
	Blue	x		0.134	0.149	0.164		
		y		0.168	0.183	0.198		
Uniformity		U		75	80	--	%	Note7
NTSC				--	50	--	%	
Luminance		L		250	300	--	cd/m^2	Note6

Test Conditions:

1. DV_{DD}=3.3V, I_L=40mA (Backlight current),the amblent temperature is 25℃.
2. The test systems refer to Note 2.

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Note 1: Definition of viewing angle range

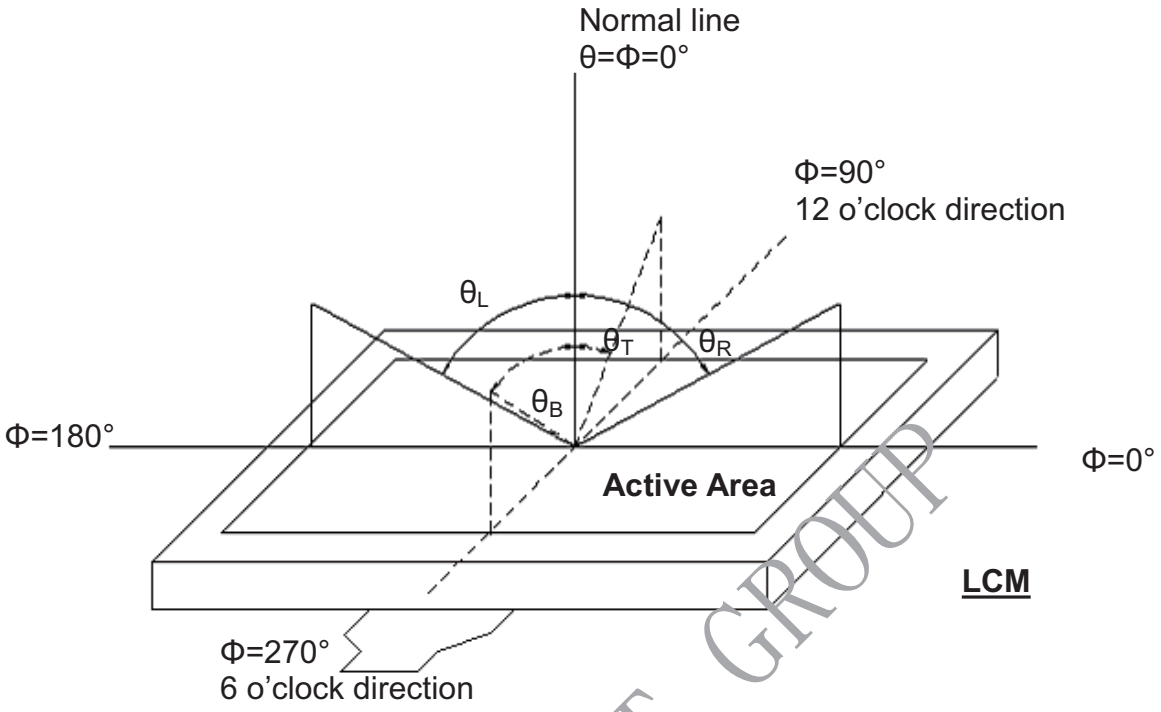


Fig. 4-1 Definition of viewing angle

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.)

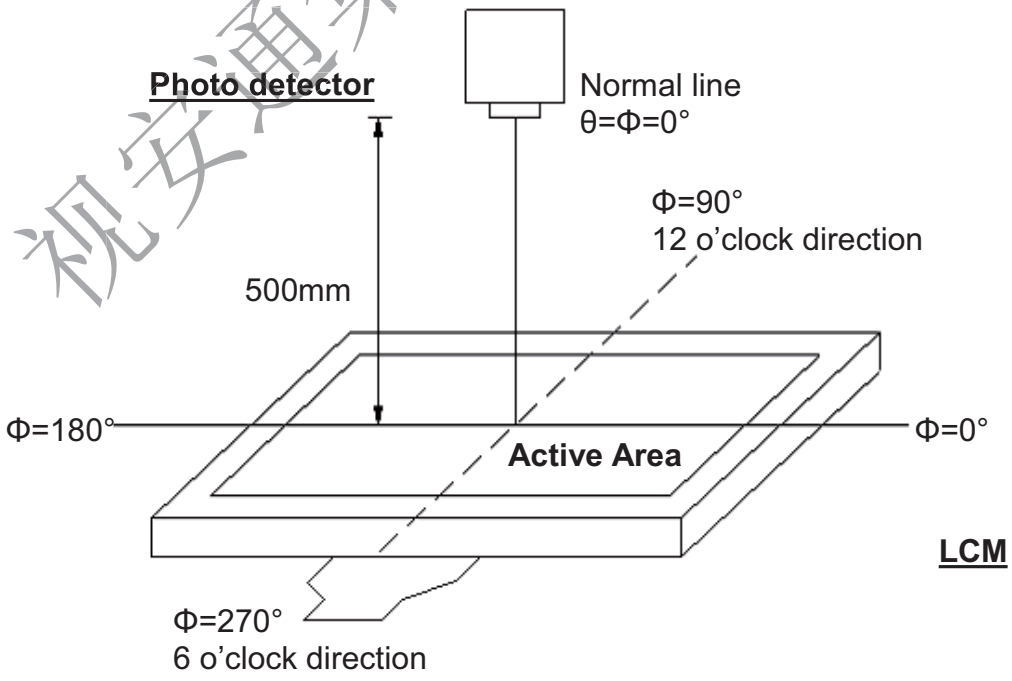


Fig. 4-2 Optical measurement system setup

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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%.

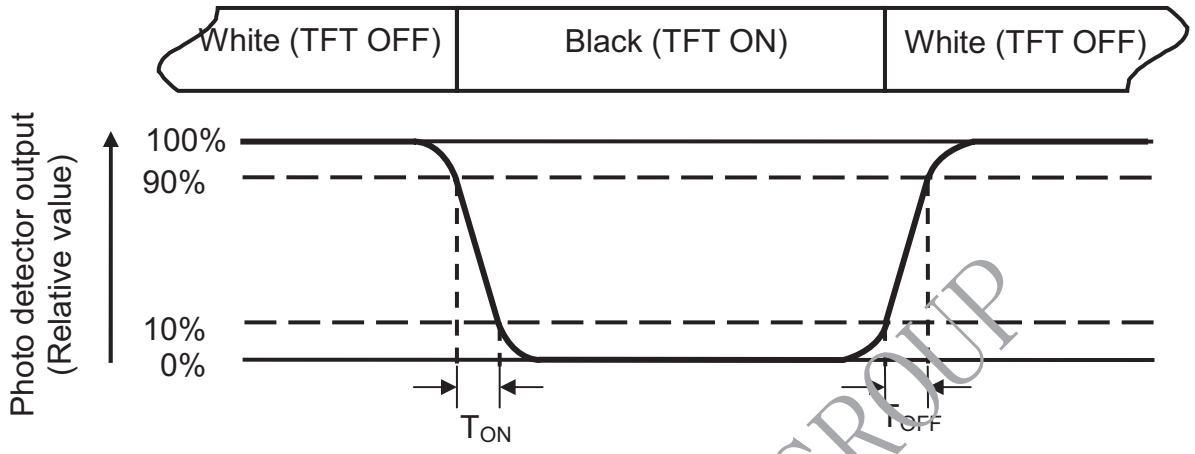


Fig. 4-3 Definition of response time

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.

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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

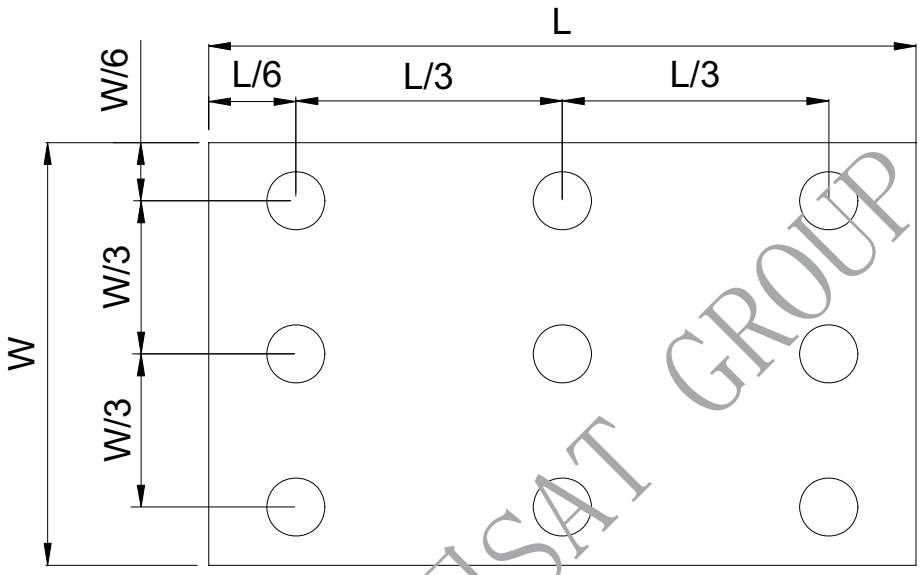


Fig. 4-4 Definition of measuring points

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

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5. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 80℃ 240hrs	Note 1，Note 4
Low Temperature Storage	Ta = -30℃ 240hrs	Note 1，Note 4
High Temperature Operation	Ts = 70℃ 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	-30℃/30 min ~ +80℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note 4
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	Contact:±6KV,Air:±8KV 150pF，330Ω，	Note 5

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.
Note 5: LCD glass and metal bezel .

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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

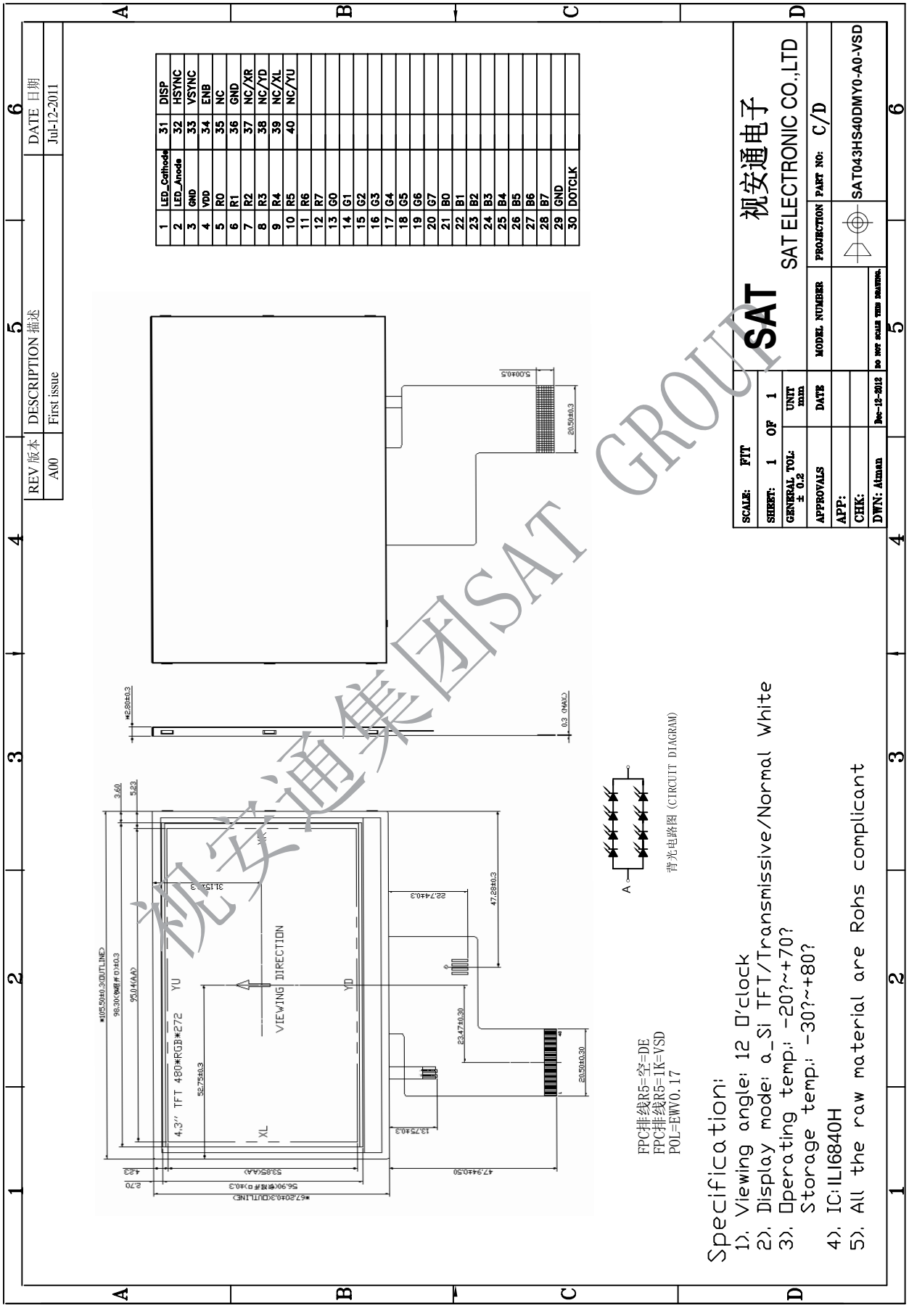
1. Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

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.

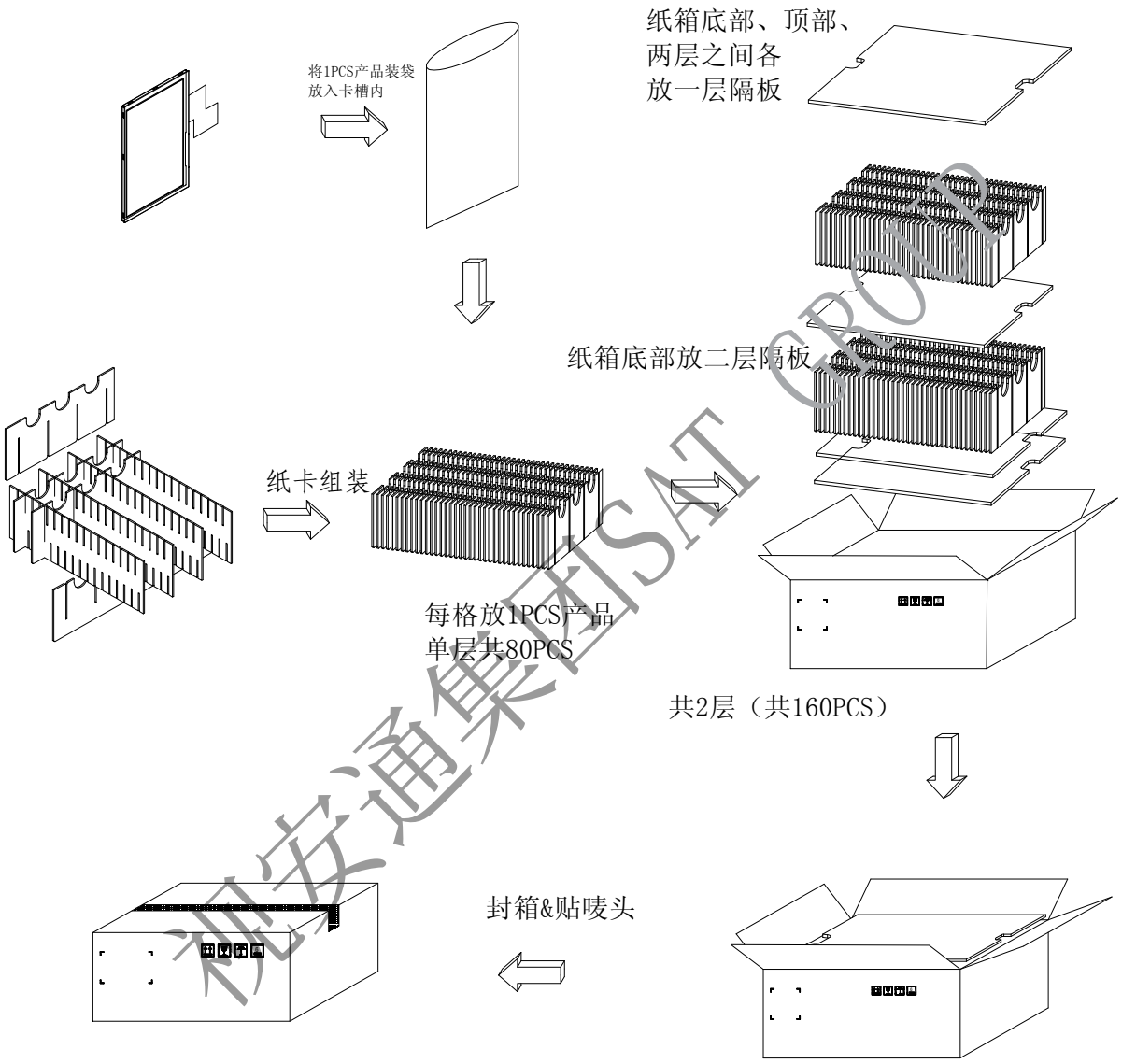
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7. Mechanical Drawing



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8. Package Drawing



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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

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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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