SAT 视安通 SAT ELECTRONIC CO.LTD

SPECIFICATION

Customer: _____

Model Name: SAT070CP40I21Y1-260975

SPEC NO.: _____

Date: _____

Version: _____

■Preliminary Specification

□Final Specification

视安通集团SAT GROUP

Approved by	Comment

Approved by	Reviewed by	Prepared by
视安通 2014.11.14 吴金荣		

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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(W) X 0.1432(H) mm	
6	Active area	154.2144(H) X 3(RGB) X 85.92(V) mm	
7	Outline dimensions	164(H) X 97(V) X 2.6(D) mm	
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	MIPI	
11	Backlight Power consumption	TBD	
12	Panel Power consumption	TBD	
13	Weight	TBD	

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2. Pin Assignment

FH19SC-40S-0.5SH (05)

Pin No.	Symbol	Type	Function
1	VCOM	P	Common voltage
2	VDD	P	Digital power
3	VDD	P	Digital power
4	NC	-	Not connect
5	RESET	I	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability.Normally pull high. (R=10KΩ，C=0.1μF)
6	STBYB	I	Standby mode, normally pull high STBYB="1", normal operation STBYB="0",timing control, source driver will turn off, all output are high-Z
7	GND	P	Ground
8	RXIN0-	I	Negative MIPI differential data inputs
9	RXIN0+	I	Positive MIPI differential data inputs
10	GND	P	Ground
11	RXIN1-	I	Negative MIPI differential data inputs
12	RXIN1+	I	Positive MIPI differential data inputs
13	GND	P	Ground
14	RXCLKIN-	I	Negative MIPI differential clock inputs
15	RXCLKIN+	I	positive MIPI differential clock inputs
16	GND	P	Ground
17	RXIN2-	I	Negative MIPI differential Data inputs
18	RXIN2+	I	positive MIPI differential Data inputs
19	GND	P	Ground
20	RXIN3-	I	Negative MIPI differential data inputs
21	RXIN3+	I	Positive MIPI differential data inputs
22	GND	P	Ground
23	NC	-	Not connect
24	NC	-	Not connect
25	GND	P	Ground
26	NC	-	Not connect
27	NC	-	Not connect
28	NC	-	Not connect
29	AVDD	P	Power for Analog Circuit

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30	GND	P	Ground
31	LED-	P	LED Cathode
32	LED-	P	LED Cathode
33	L/R	I	Horizontal inversion (1.8V)
34	U/D	I	Vertical inversion (1.8V)
35	VGL	P	Negative power for TFT
36	NC	-	Not connect
37	NC	-	Not connect
38	VGH	P	Positive power for TFT
39	LED+	P	LED Anode
40	LED+	P	LED Anode

I：input，O：output，P：Power

【Note】

*1)：When L/R="0"，set right to left scan dirction

When L/R="1"，set left to right scan dirction

When U/D="0"，set top to bottom scan dirction

When U/D="1"，set bottom to top scan dirction

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3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	V_{DD}	-0.3	2.0	V	
	AV_{DD}	-0.5	15	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.

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3.1.1. Typical Operation Conditions

(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V_{DD}	1.71	1.8	1.89	V	
	AV_{DD}	8	9.6	13.5	V	
Input signal voltage	V_{COM}	2.8	3.2	3.6	V	
Input logic high voltage	V_{IH}	0.7 V_{DD}	-	V_{DD}	V	
Input logic low voltage	V_{IL}	0	-	0.3V_{DD}	V	

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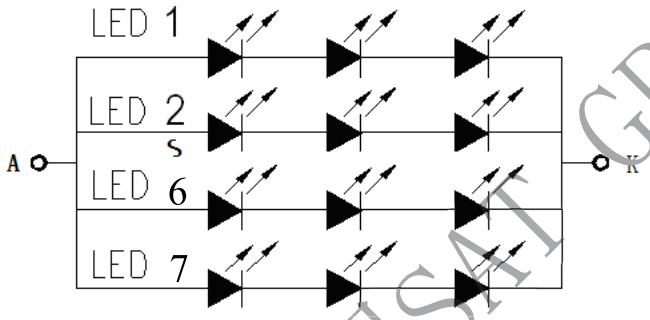
3.1.2. Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	IV_{DD}	-	4.0	10	mA	V_{DD} =1.8V
	IAV_{DD}	-	20	50	mA	AV_{DD} =9.6V

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3.1.3. Backlight Driving Conditions (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
CurrentforLEDbacklight	IL	105	140	175	mA	
Luminance (on the module surface,BM-7)		130	180	-	cd/m^2	
LED life time	-	20,000	-	-	Hr	Note 2

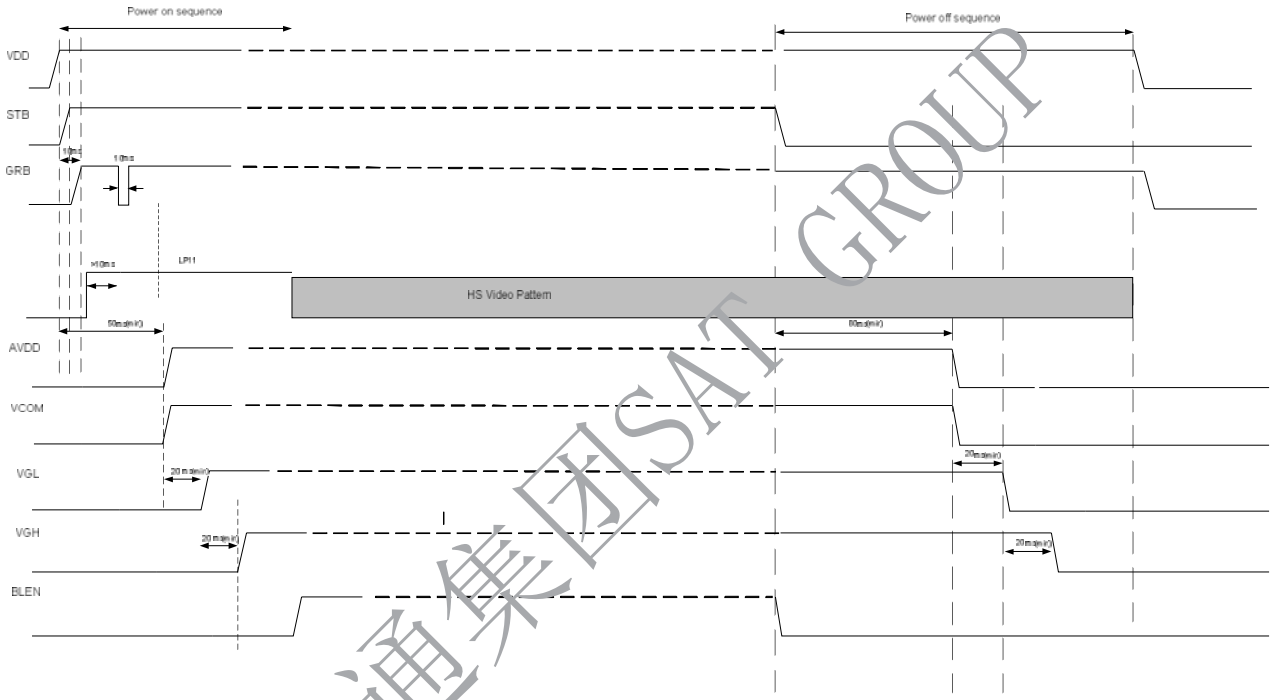


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3.2. Power Sequence

In order to prevent IC from power on reset fail, the rising time (TPOR) of the digital power supply VDD should be maintained within the given specifications. Refer to “AC Characteristics” for more detail on timing.

Power On/Off Sequence



Note: CLK and Data Lanes should keep in LP11(stop state) before GRB.

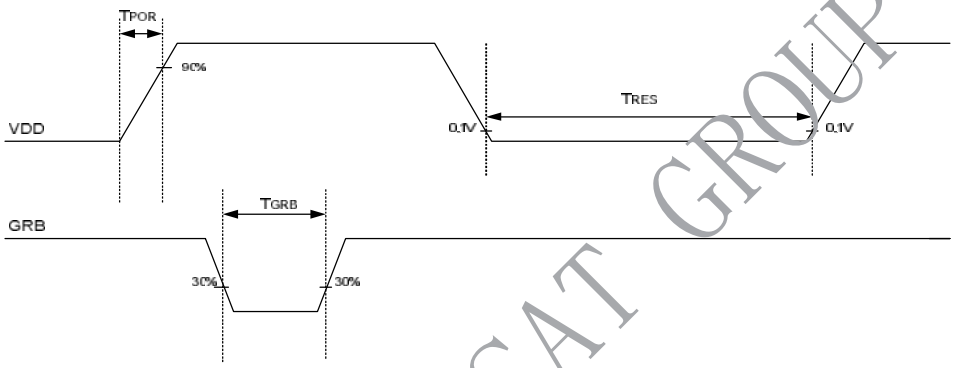
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3.3. Timing Characteristics (MIPI)

3.3.1 Basic AC Characteristic

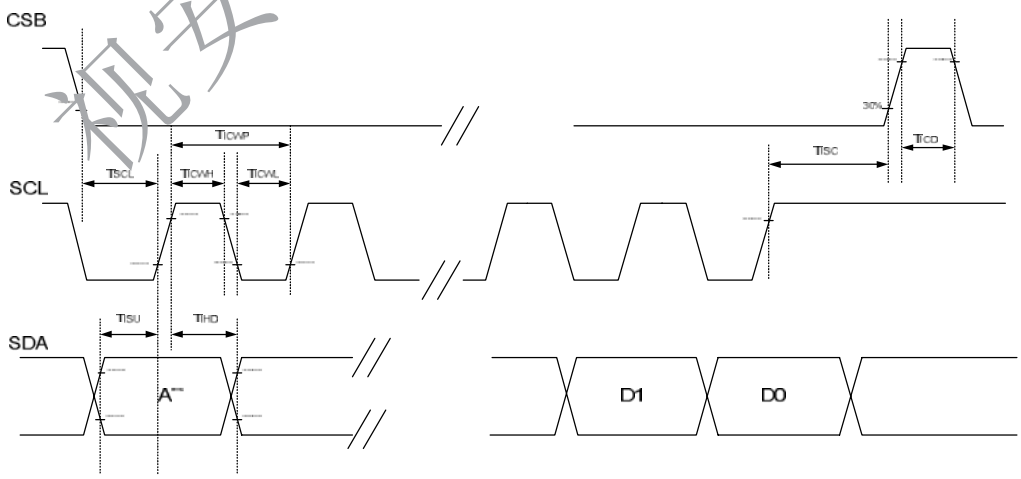
(VDD=VDD IF=1.8V, AVDD=8 to 13.5V, GND=AGND=GND IF=0V,TA=-20 to +85℃)
VDD/GRB AC characteristic

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
VDD power slew rate	T_{POR}	-	-	20	ms	From 0 to 90% VDD
GRB active pulse width	T_{GRB}	1	-	-	ms	VDD=VDD IF= 1.8V
VDD resettle time	T_{RES}	1	-	-	s	



3-wire interface AC characteristic:

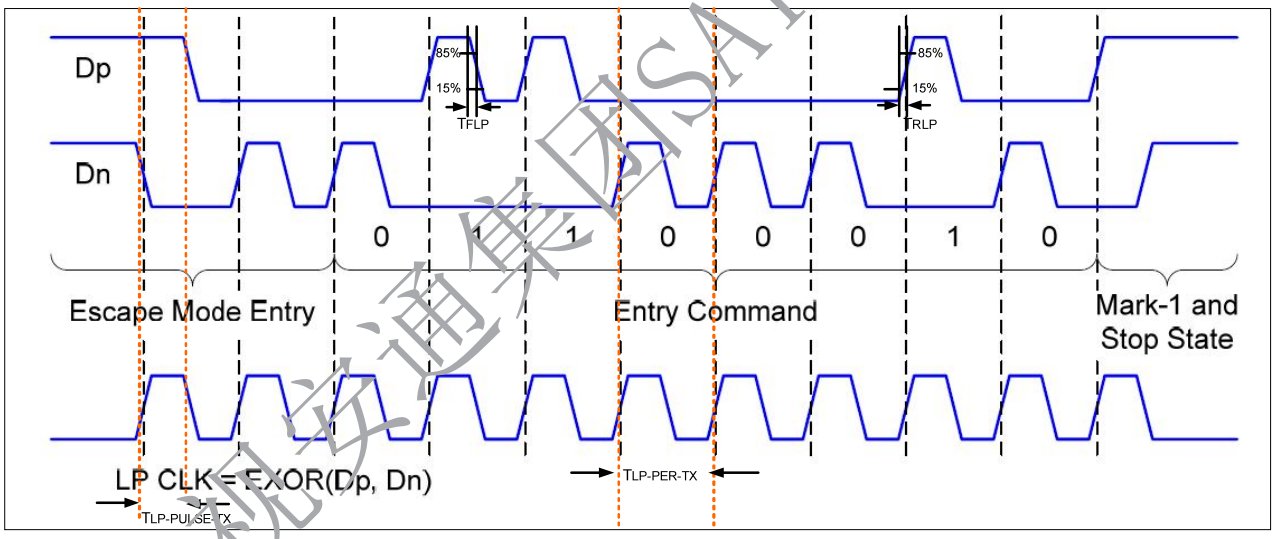
Parameter	Symbol	Min.	Typ.	Max.	Unit
CSB falling to SCL rising time	T_{SCL}	200	-	-	ns
SCL pulse high period	T_{ICWH}	100	-	-	ns
SCL pulse low period	T_{ICWL}	100	-	-	ns
SCL pulse width	T_{ICWP}	250	-	-	ns
SDA data input setup time	T_{ISU}	100	-	-	ns
SDA data input hold time	T_{IHD}	100	-	-	ns
SCL to CSB rising time	T_{ISC}	250	-	-	ns
CSB rising to failing time	T_{ICD}	1	-	-	us



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3.3.2 LP Transmitter AC Specification

Parameter		Symbol	Min	Typ	Max	Units	Notes
15%~85% rising time and falling time		T_{RLP} /T_{FLP}	-	-	25	ns	-
30%~85% rising time and falling time		T_{REOT}	-	-	35	ns	-
Pulse width of LP exclusive-OR clock	First LP EXOR clock pulse after STOP state or Last pulse before stop state	$T_{LP-PULSE-TX}$	40	-	-	ns	-
	All other pulses		20	-	-	ns	-
Period of the LP EXOR clock		$T_{LP-PER-TX}$	90	-	-	mV/ns	-
Slew Rate @C_{LOAD} =0pF		$\delta V/\delta t_{SR}$	30	-	500	mV/ns	-
Slew Rate @C_{LOAD} =5pF			30	-	200	mV/ns	-
Slew Rate @C_{LOAD} =20pF			30	-	150	mV/ns	-
Slew Rate @C_{LOAD} =70pF			30	-	100	mV/ns	-
Load Capacitance		T_{RLP}	-	-	70	pF	-

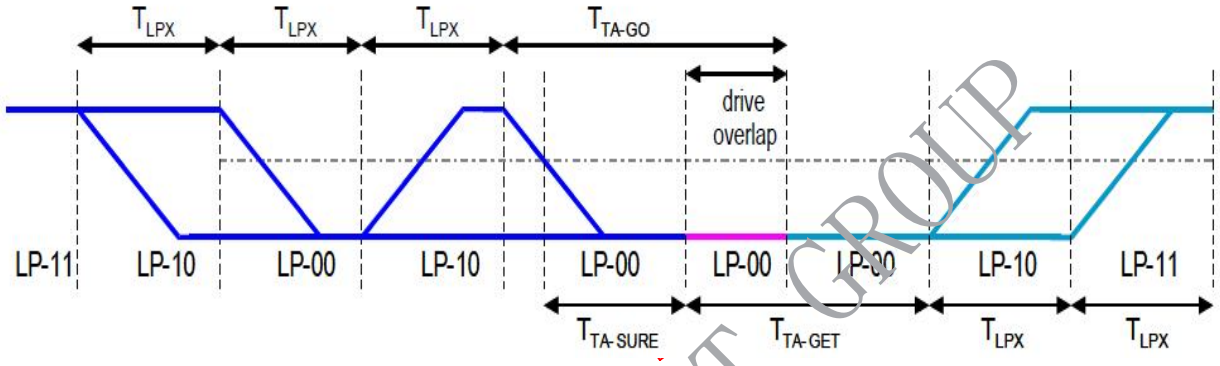


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3.3.3 Turnaround Procedure

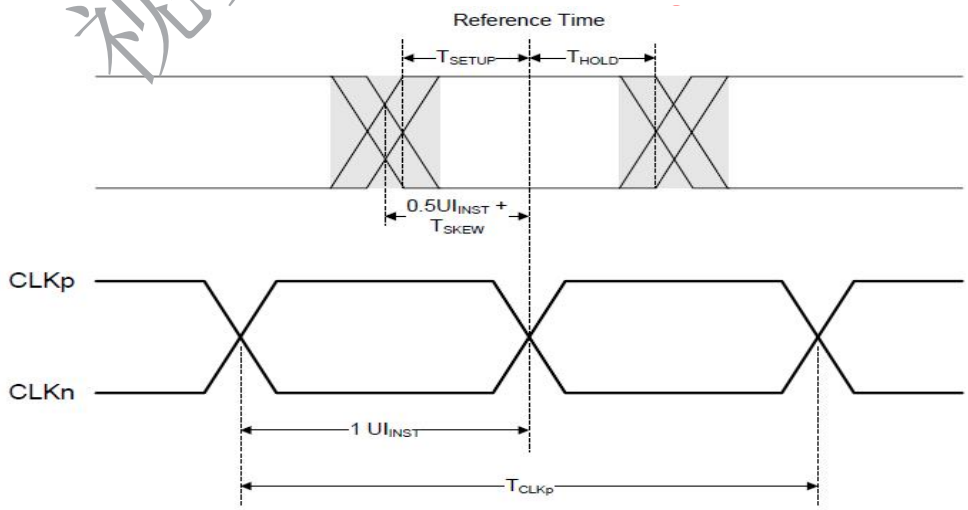
Turnaround Procedure Operation Timing Parameters

Parameter	Symbol	Min	Typ	Max	Units
Length of any Low-Power state period: Master side	T_{LPX}	50	-	75	ns
Length of any Low-Power state period: Slave side	T_{LPX}	50	55.56	58.34	ns
Ratio of T_{LPX}(Master)/ T_{LPX} (Slave) between Master and Slave side	Ratio T_{LPX}	2/3	-	3/2	
Time-out before new TX side start driving	$T_{TA-Sure}$	T_{LPX}	-	$2T_{LPX}$	ns
Time to drive LP-00 by new TX	T_{TA-GET}	-	$5T_{LPX}$	-	ns
Time to drive LP-00 after Turnaround Request	T_{TA-GO}	-	$4T_{LPX}$	-	ns



3.3.4 High speed transmission

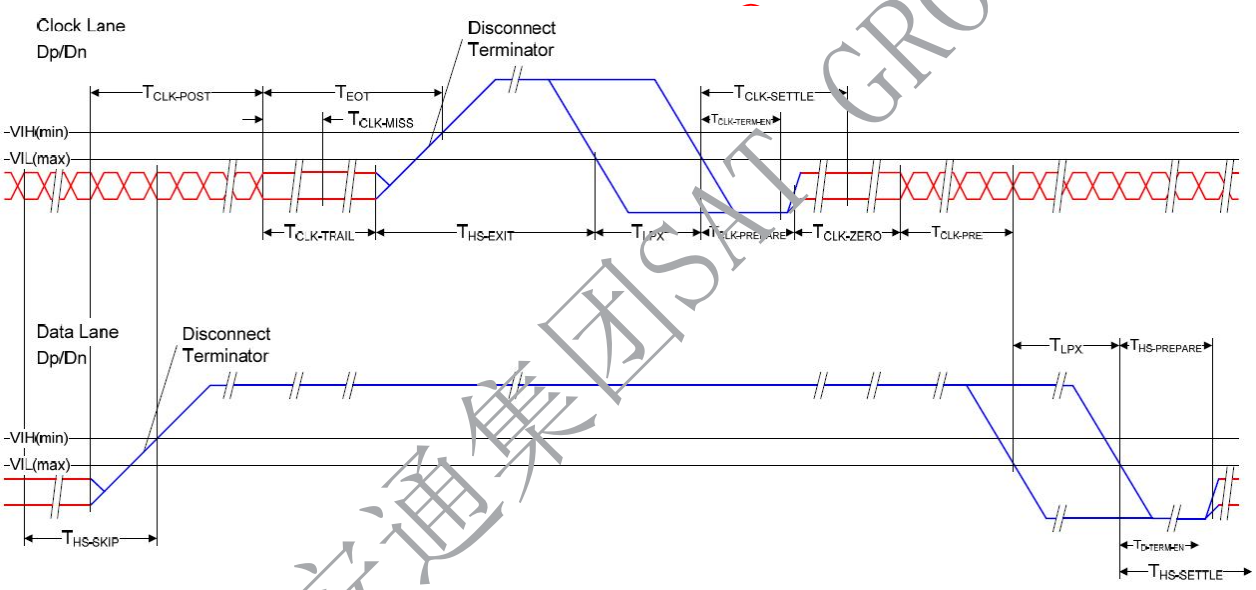
Parameter	Symbol	Min	Typ	Max	Units
UI instantaneous	UI_{INST}	2	-	12.5	ns
Data to Clock Skew(measured at transmitter)	$T_{SKEW(TX)}$	-0.15	-	0.15	UI_{INST}
Data to Clock Setup time(measured at receiver)	$T_{SETUP(RX)}$	0.15	-	-	UI_{INST}
Data to Clock Hold time(measured at receiver)	$T_{HOLD(RX)}$	0.15	-	-	UI_{INST}
20%~80% rise time and fall time	T_R, T_F	150	-	-	ps
		-	-	0.3	UI_{INST}



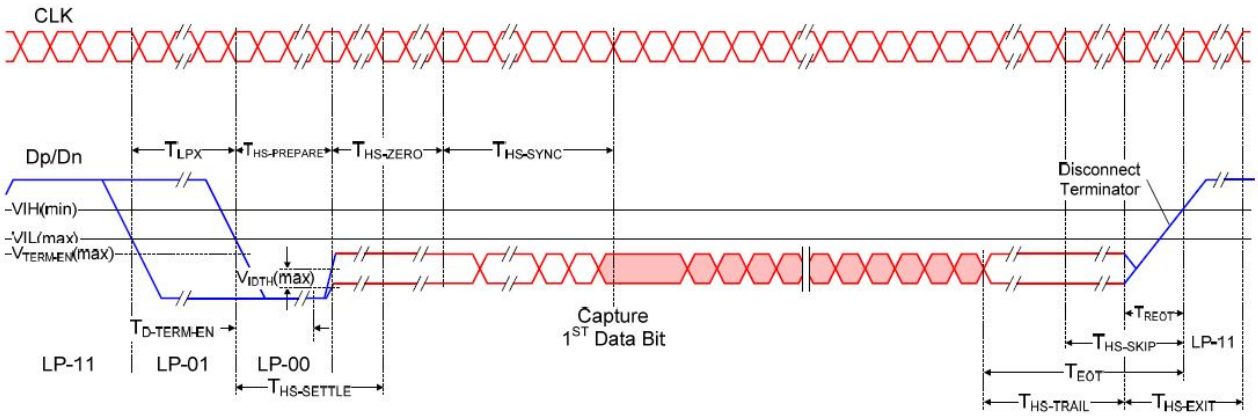
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3.3.5 High Speed Clock Transmission

Parameter	Symbol	Min	Typ	Max	Units
Time that the transmitter shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode	$T_{CLK-POST}$	60+52UI	-	-	ns
Detection time that the clock has stopped toggling	$T_{CLK-MISS}$	-	-	60	ns
Time to drive LP-00 to prepare for HS clock transmission	$T_{CLK-PREPARE}$	38	-	95	ns
Minimum lead HS-0 drive period before starting clock	$T_{CLK-PREPARE}$ + $T_{CLK-ZERO}$	300	-	-	ns
Time to enable Clock Lane receiver line termination measured from when Dn cross $V_{IL,MAX}$	$T_{HS-TERM-EN}$	-	-	38	ns
Minimum time that the HS clock must be prior to any associated data lane beginning the transmission from LP to HS mode	$T_{CLK-PRE}$	8	-	-	UI
Time to drive HS differential state after last payload clock bit of a HS transmission burst	$T_{CLK-TRAIL}$	60	-	-	ns



3.3.6 High Speed Data Transmission in Bursts

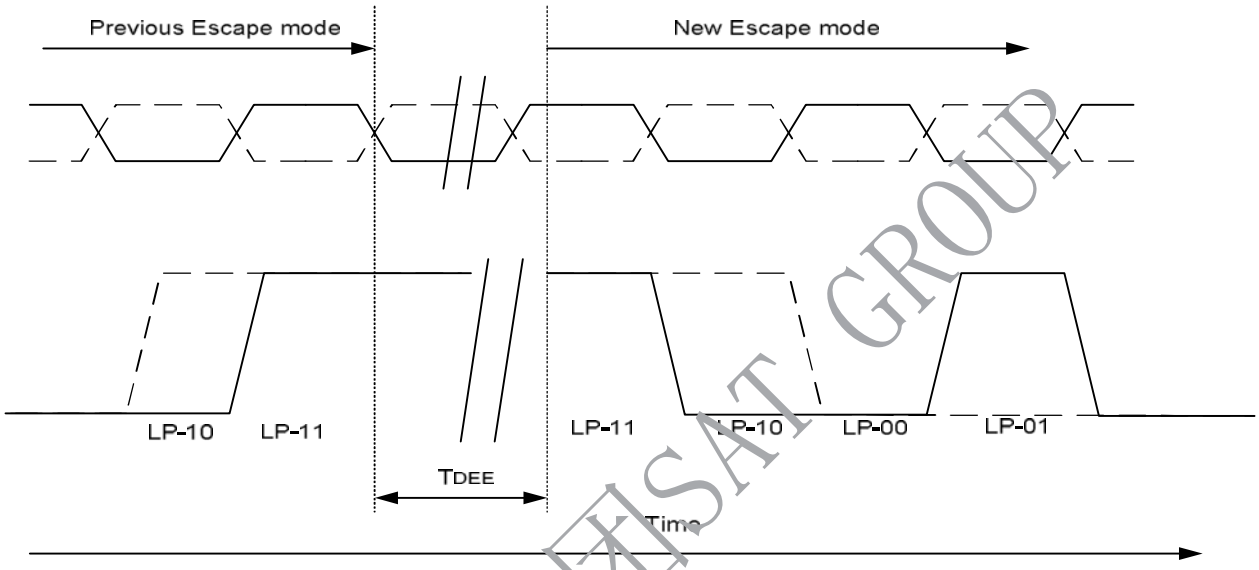


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3.3.7 LP11 timing request between data transformation

When Clock lane of DSI TX chip always keeps High speed mode, then Clock lane never go back to Low power mode. If Date lane of TX chip needs to transmit the next new data transmission or sequence, after the end of Low power mode or High speed mode or BTA. Then TX chip needs to keep LP-11 stop state before the next new data transmission, no matter in Low power mode or High speed mode or BTA. The LP-11 minimum timing is required for RX chip in the following 9 conditions, include of LP–LP, LP–HS, HS–LP, HS–HS, BTA–BTA, LP–BTA, BTA–LP, HS–BTA, and BTA–HS.This rule is suitable for short or long packet between TX and RX data transmission.

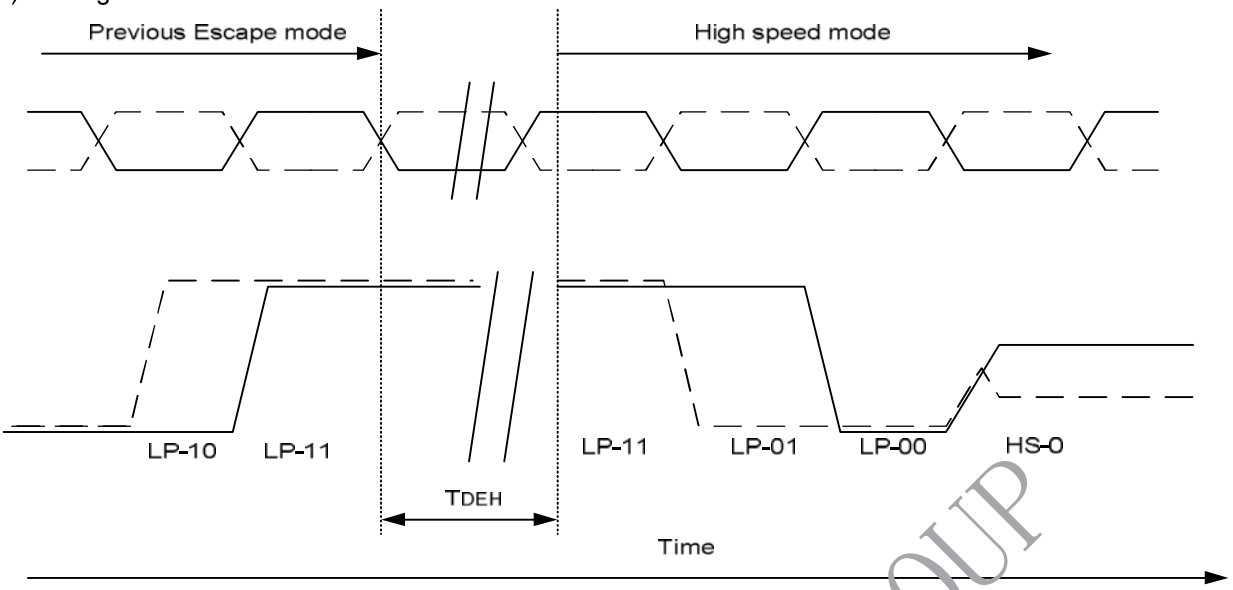
(1) Timing between LP-LP command



Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the new Escape Mode entry	TDEE	150	-	-	ns

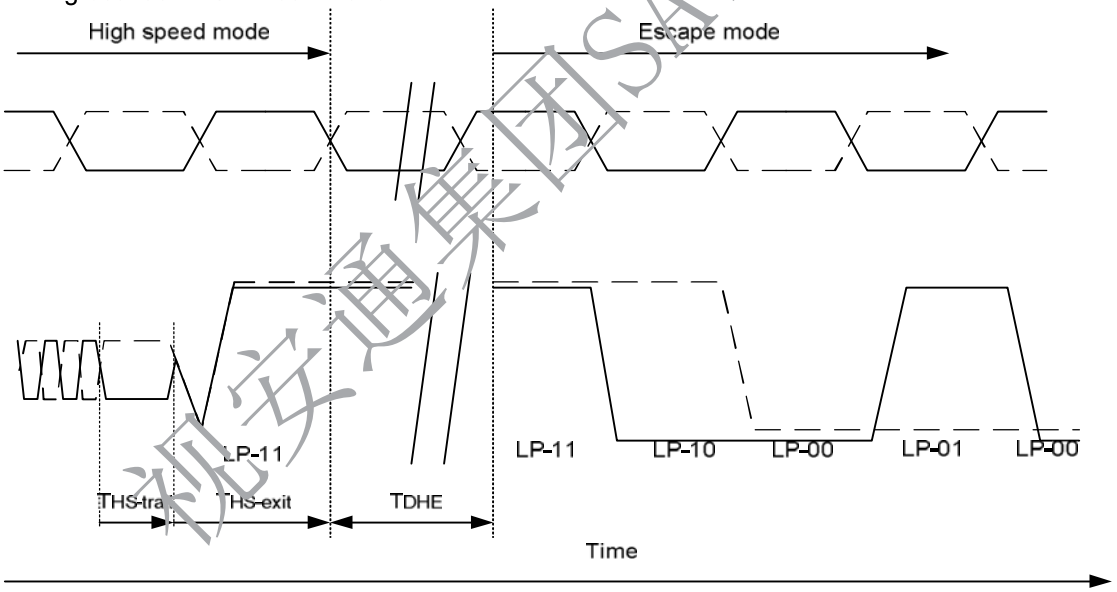
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(2) Timing between LP-HS command



Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the Entering High Speed Mode	TDEH	Max(150,32UI)	-	-	ns

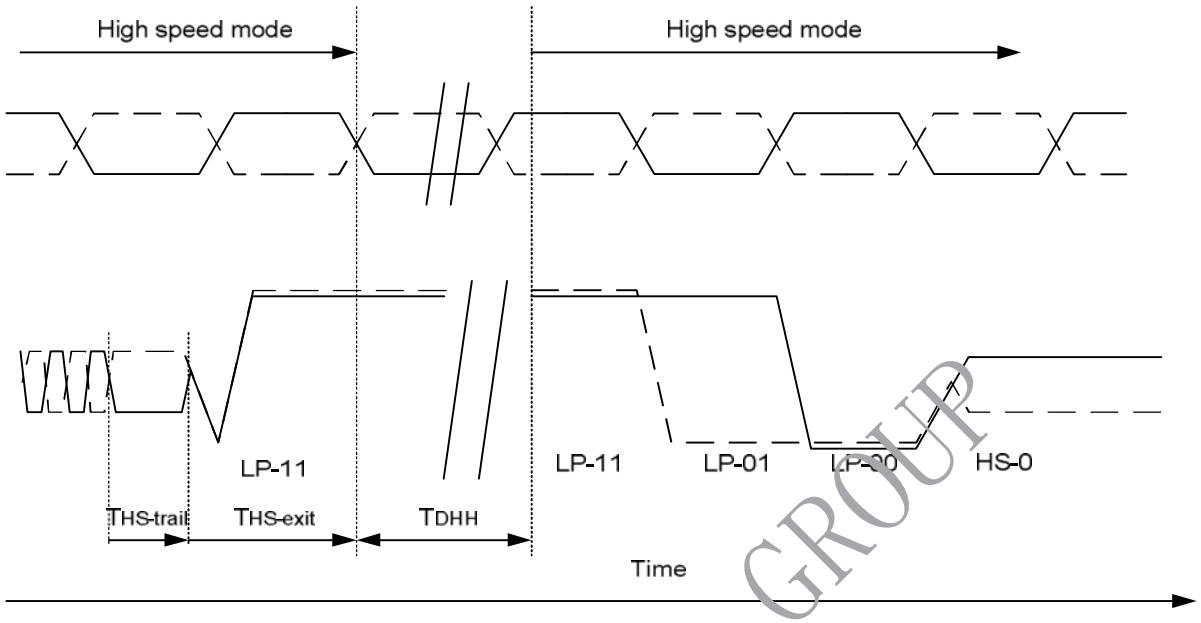
(3) Timing between HS-LP command



Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the Escape Mode Entry	TDHE	Max(150,32UI)	-	-	ns

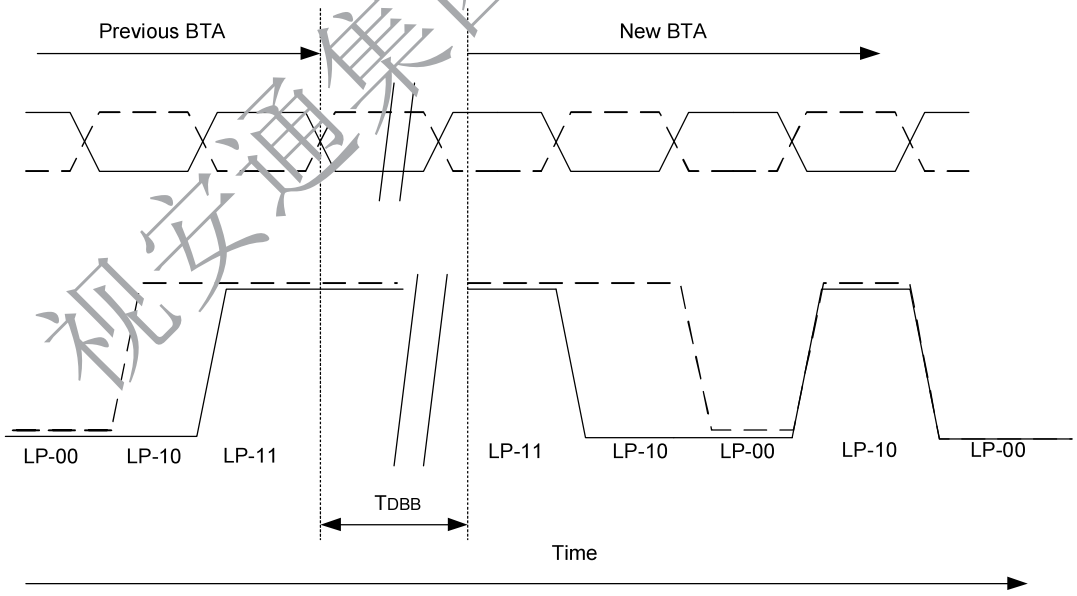
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(4) Timing between HS-HS command



Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the Entering High Speed Mode	TDHH	Max(150,32UI)	-	-	ns

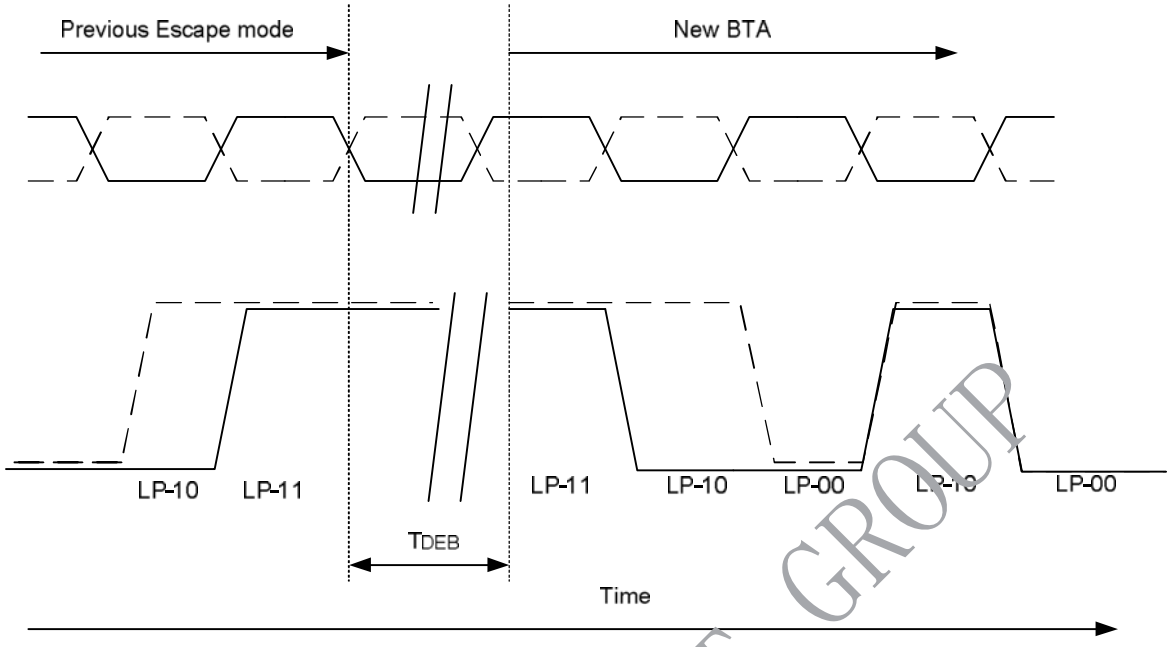
(5) Timing between BTA-BTA command



Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the new BTA	TDBB	150	-	-	ns

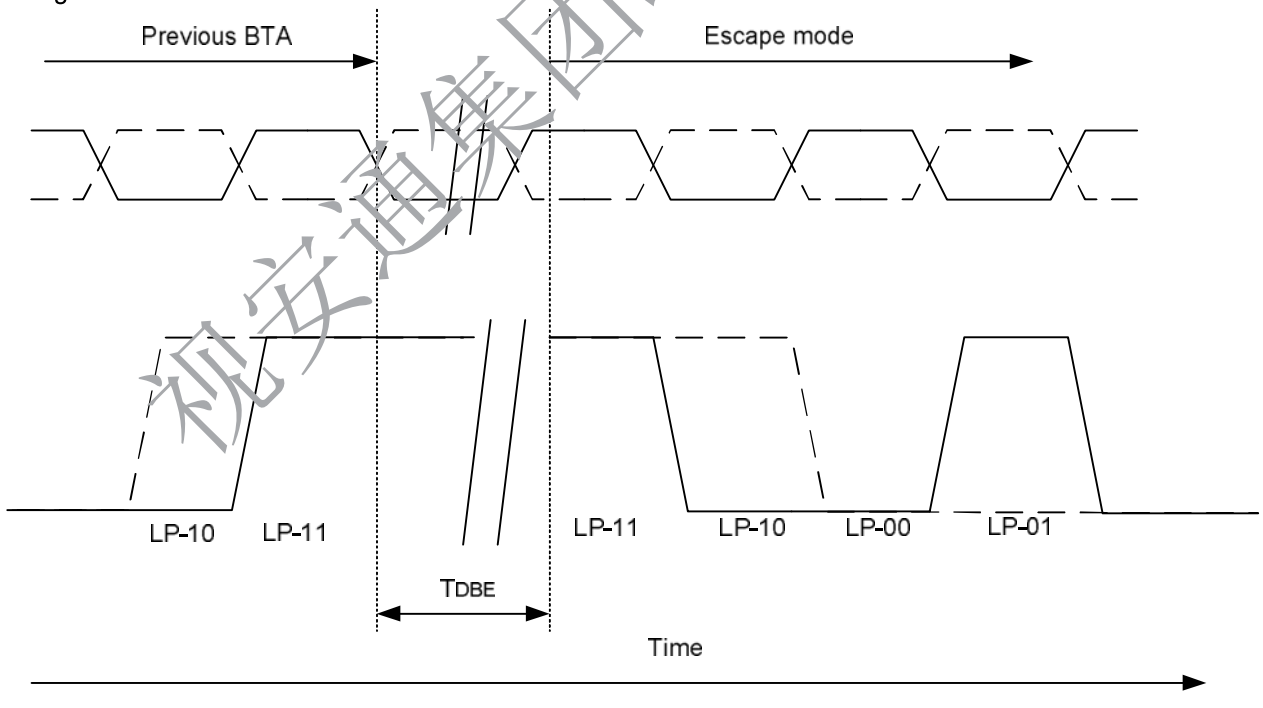
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(6) Timing between LP-BTA command



Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the new BTA	TDEB	150	-	-	ns

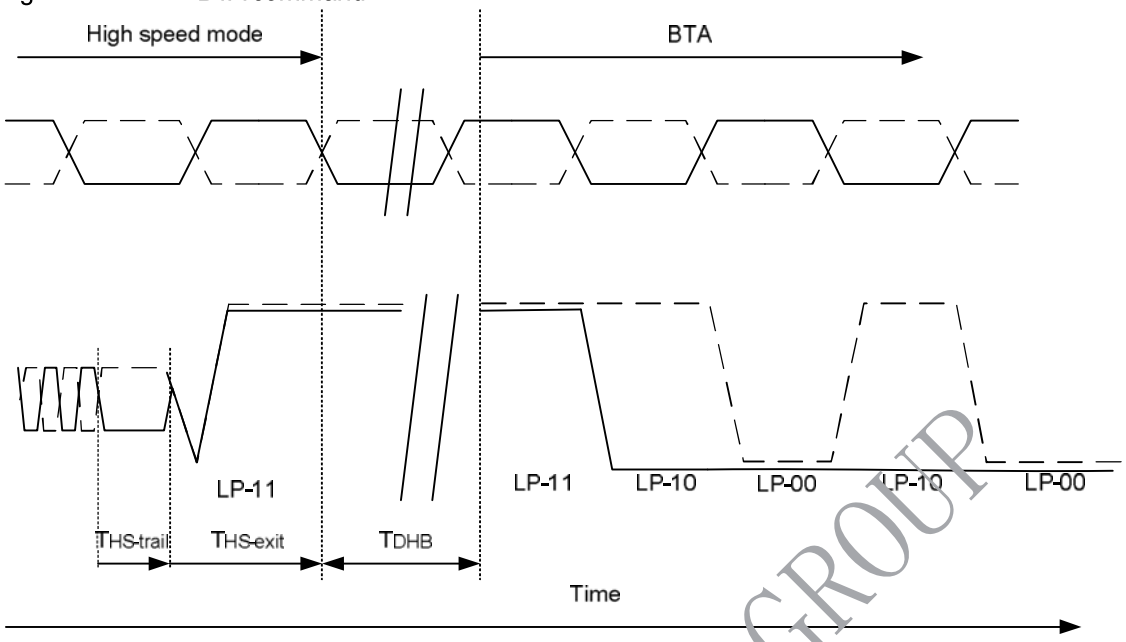
(7) Timing between BTA-LP command



Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the Escape Mode Entry	TDBE	150	-	-	ns

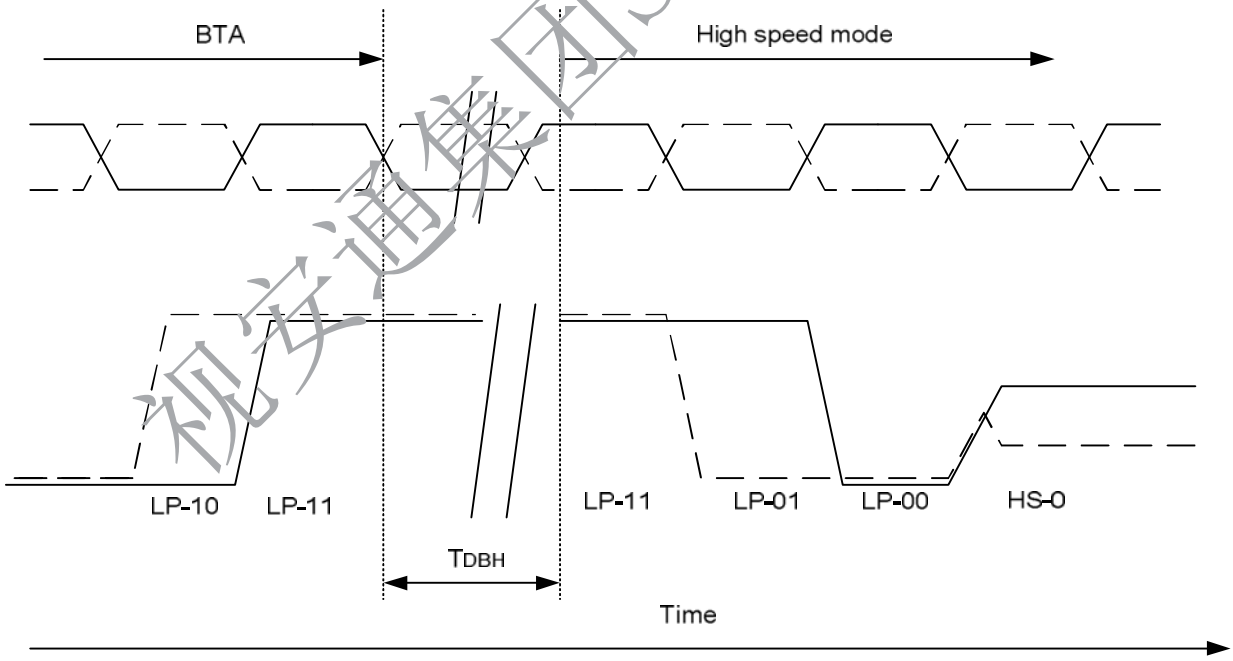
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(8) Timing between HS- BTA command



Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the BTA	TDHB	Max(150,32UI)	-	-	ns

(9) Timing between BTA-HP command



Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the Entering High Speed Mode	TDBH	Max(150,32UI)	-	-	ns

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4. Optical Specifications

Ta=25 ℃

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	80	85	--	Degree	Note1
		θB		80	85	--		
		θL		80	85	--		
		θR		80	85	--		
Contrast Ratio		CR	θ=0°	600	800	--		Note4
Response Time		T_{ON}	25℃	--	25	40	ms	Note3
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.270	0.290	0.310		Note2 Note5 Note6
		y		0.311	0.331	0.351		
	Red	x		0.612	0.632	0.652		
		y		0.291	0.311	0.331		
	Green	x		0.277	0.297	0.317		
		y		0.516	0.536	0.556		
	Blue	x		0.120	0.140	0.160		
		y		0.134	0.154	0.174		
Uniformity		U		75	80	--	%	Note7
NTSC				--	50	--	%	
Luminance		L		130	180	--	cd/m^2	Note6

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Test Conditions:

1. V_{DD}=1.8V, I_L=140mA(Backlight current),the amblent temperature is25 ℃.
2. The test systems refer to Note 2.

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Note 1: Definition of viewing angle range

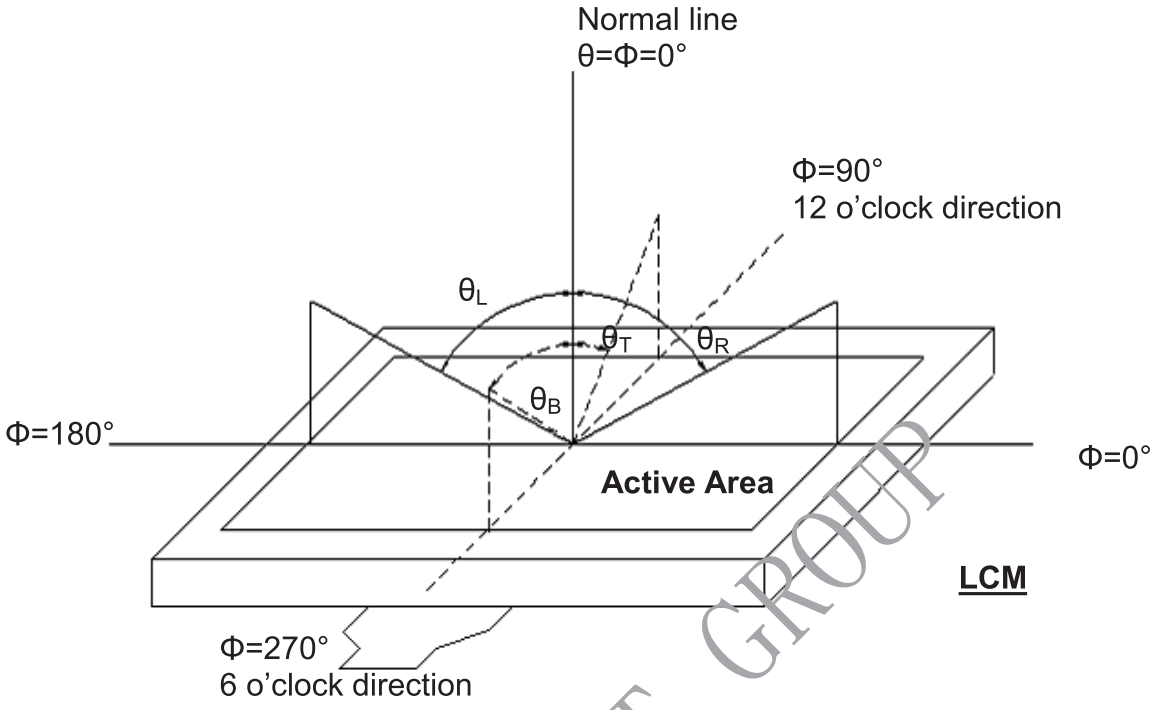


Fig. 4-1 Definition of viewing angle

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.)

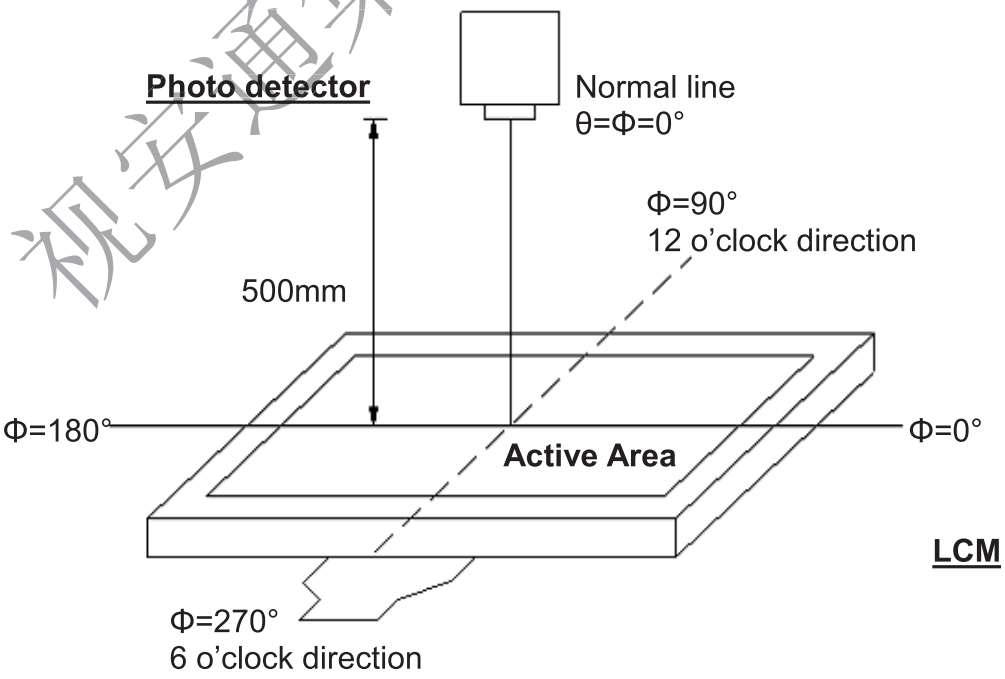


Fig. 4-2 Optical measurement system setup

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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%.

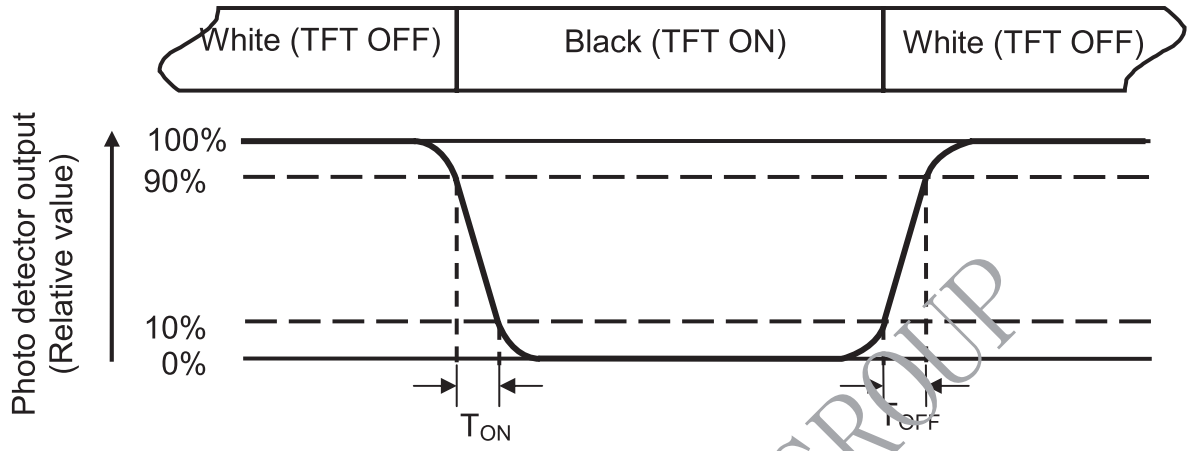


Fig. 4-3 Definition of response time

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

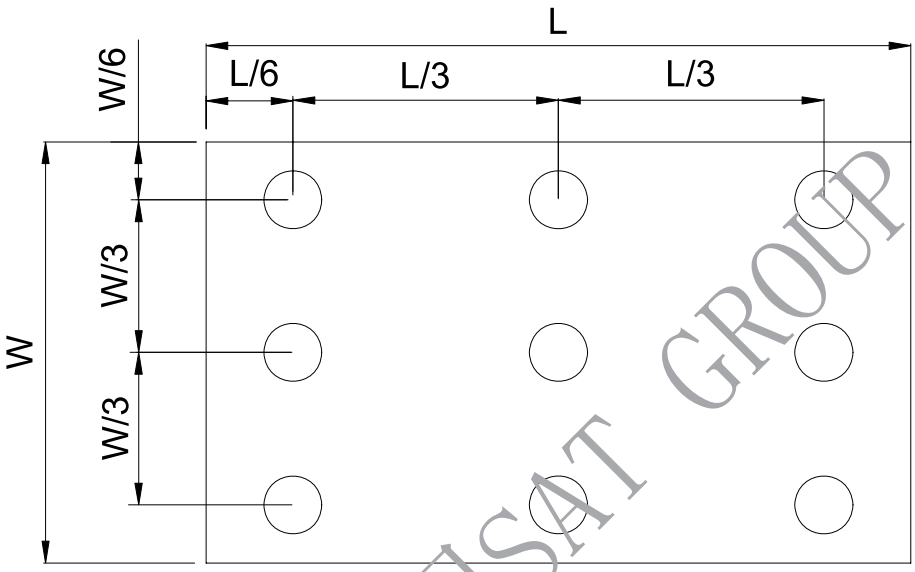


Fig. 4-4 Definition of measuring points

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	± 2KV, Human Body Mode, 100pF/1500Ω	

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.

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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

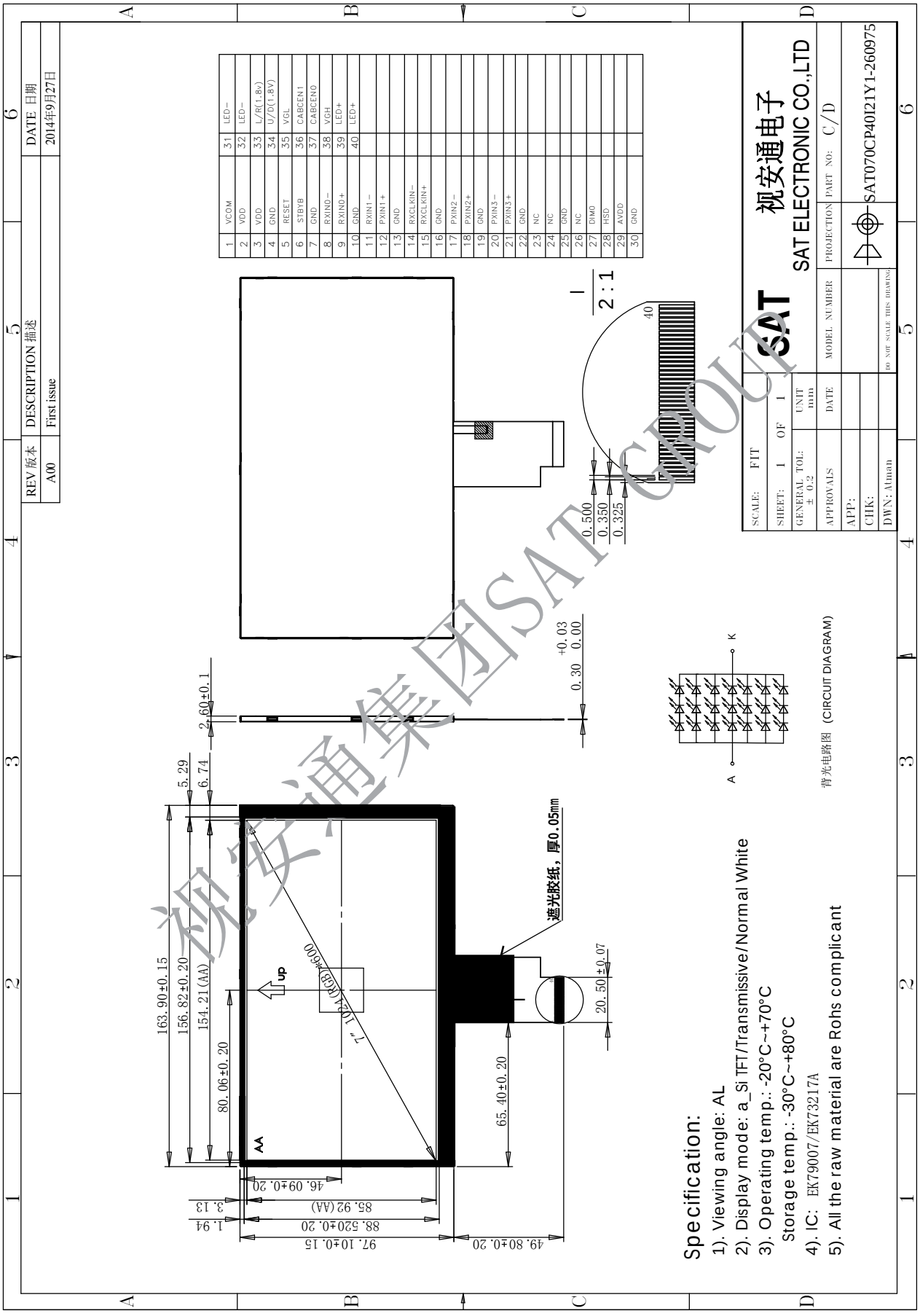
1. Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

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.

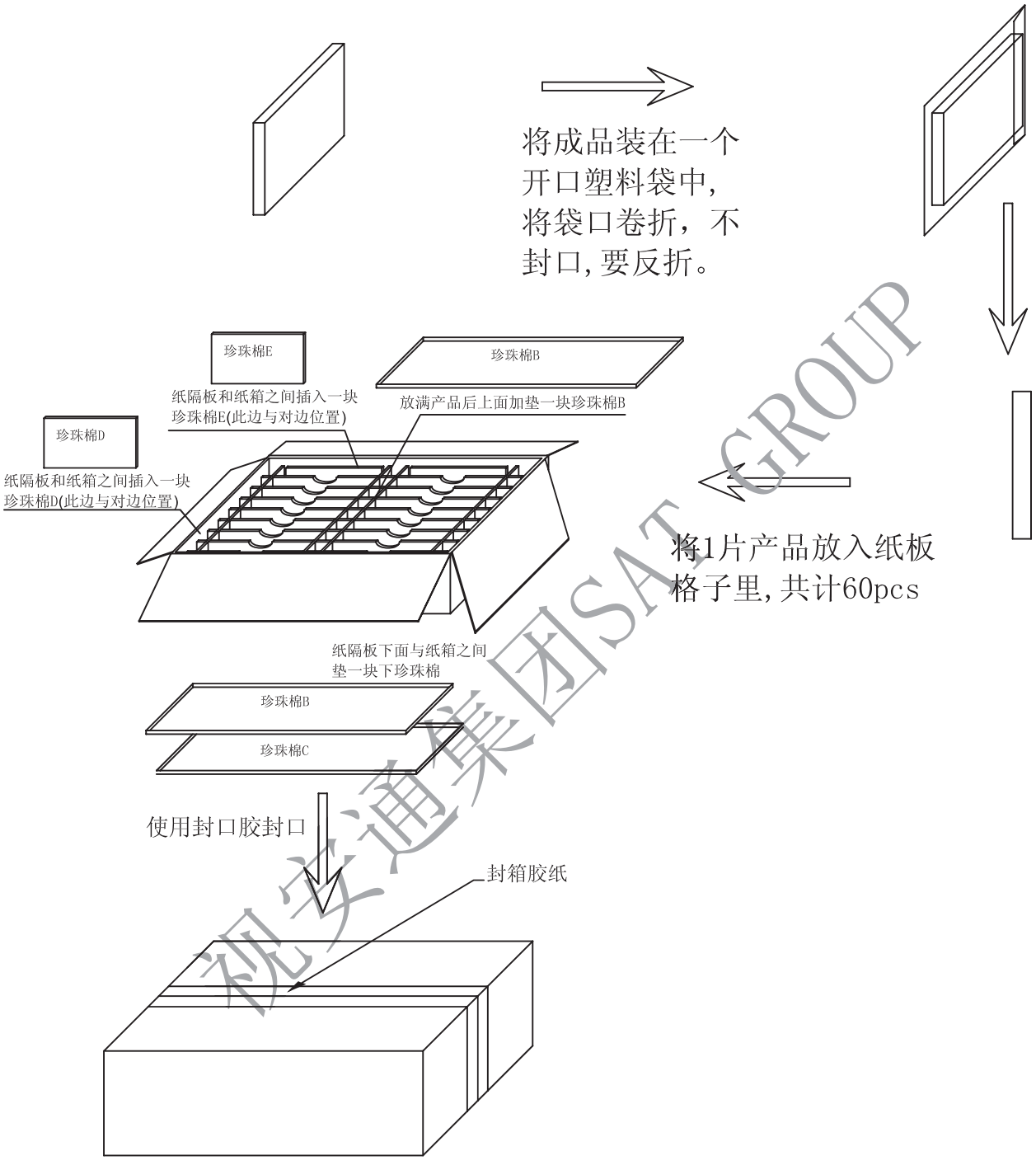
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7. Mechanical Drawing



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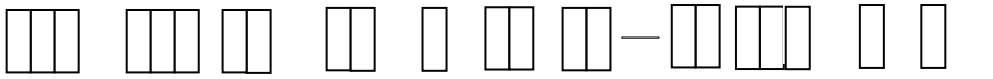
8. Package Drawing



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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)	Interface Signal Type	A---- Alternated Video Signal; D---- Data Video Signal; H----HDV; I----IPS
(6)	LED backlight Lamp Number	By two figures characters expression from 01 to 99
(7)	LED Back Light colored warp	Rx----red ; Gx----green ; Bx---- blueness; Yx----white; P----PVI; x---- warp distinction,1 minimal,9 maximal
(8)	Thickness	By two figures characters expression from 01 to 99

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No	Definition	Specifications
(9)	Width	By three figures characters expression from 001 to 999
(10)	Product information	By one figure characters expression from 0 to 9
(11)	FPC Type	S---short M---Middle L---Long

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