

SPECIFICATION

Customer: _____
Model Name: SAT043HS40I08B27-30671T052IN
ERP NO.: 1010430310
Spec Vision: V.1
Date: 2020-08-14

- Preliminary Specification
- Final Specification

Approved by	Comment

Prepared by	Reviewed by	Approved by

Record of Revision

Version	Revise Date	Page	Content	Modified by
V. 1	2020-08-14	ALL	First Issued.	ZPA

Contents

1. General Specifications.....	4
2. Pin Assignment.....	5
3. Operation Specifications.....	6
3.1. Absolute Maximum Ratings.....	6
3.1.1. Typical Operation Range.....	6
3.1.2. Current Consumption.....	6
3.1.3. Backlight Driving Conditions.....	7
3.2. Power Sequence.....	8
3.3. Timing Characteristics.....	9
3.3.1. RGB Input Timing Table.....	9
3.3.2. Timing Diagram:.....	10
4. Optical Specifications.....	15
5. Reliability Test Items.....	18
6. Mechanical Drawing.....	19
7. Package Drawing.....	20
8. Numbering System.....	21

1. General Specifications

4.3" is a color active matrix thin film transistor (TFT) IPS liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, Driver IC, FPC and Backlight.

NO.	Item	Specification	Remark
1	Panel Size	4.3 inch(Diagonal)	
2	Driver Method	a-Si TFT active matrix	
3	Display Color	65.5K	
4	Display Mode	Normally Black	
5	Viewing Direction	ALL	
6	Resolution	480 x 3(RGB) x 272	
7	Active Area	95.04(W) x 53.856(H) mm	
8	Dot Pitch	0.198(W) x 0.198 (H) mm	
9	Pixel Arrangement	RGB-stripe	
10	Module Size	105.42(W) x 67.07(H) x 3(D) mm	
11	Interface	TTL RGB-24bit parallel interface	
12	Driving IC	SC7283	
13	Backlight	White LED	
14	Weight	TBD	g

Note 1: Color tune is slightly changed by temperature and driving voltage.

Note 2: LCM weight tolerance: $\pm 5\%$

2. Pin Assignment

No.	Symbol	Function	Remarks
1	LED_K	Power for LED backlight(Cathode)	
2	LED_A	Power for LED backlight(anode)	
3	GND	Power Ground	
4	VDD	Power for Digital Circuit	
5~12	R0~R7	Red data	
13~20	G0~G7	Green data	
21~28	B0~B7	Blue data	
29	GND	Power Ground	
30	DOTCLK	Pixel clock	
31	NC	No connection	
32	HSYNC	Horizontal Sync input	
33	VSYNC	Vertical Sync input	
34	ENB	Data input enable	
35	NC	No connection	
36	GND	Power Ground	
37	XR	Right electrode-differential analog	When this PIN not used,please leave it open
38	YD	Bottom electrode-differential analog	
39	XL	Left electrode-differential analog	
40	YU	Top electrode-differential analog	

3. Operation Specifications

3.1. Absolute Maximum Ratings

Voltage (AGND=GND=0V, Ta = 25°C)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power Voltage	VDD	-0.3	4.6	V	
Operating Temperature	T _{op}	-20	70	°C	
Storage Temperature	T _{st}	-30	80	°C	

Note: 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 case, the module may be permanently destroyed.

3.1.1. Typical Operation Range

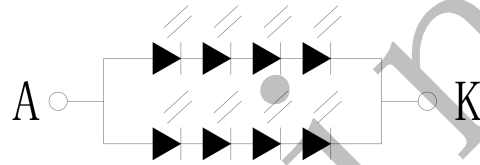
Item	Symbol	Values			Unit
		Min.	Typ.	Max.	
Power Voltage	VDD	3.0	3.3	3.6	V
Input logic high voltage	V _{IH}	0.7V _{DD}	-	V _{DD}	V
Input logic low voltage	V _{IL}	0	-	0.3V _{DD}	V

3.1.2. Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I _{VDD}	-	30	-	mA	VDD=3.3V

3.1.3. Backlight Driving Conditions

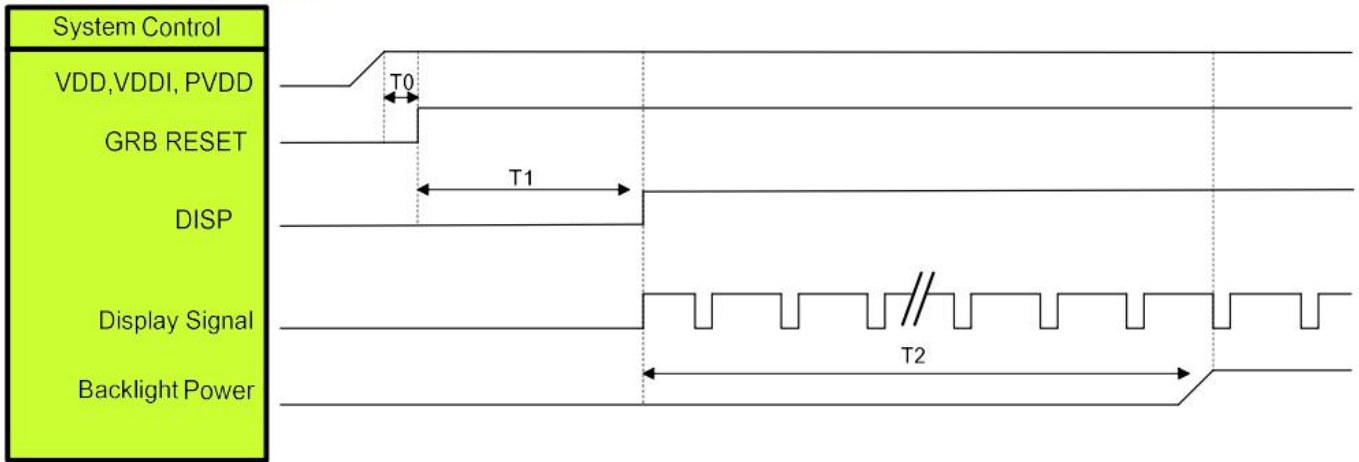
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage of white LED backlight	V_L	11.2	12.4	13.6	V	4S2P
Current for LED backlight	I_L	-	40	-	mA	20mA/LED
Power dissipation	P_d	-	496	-	mW	8LED
Luminance (on the module surface, BM-7)		250	300	-	cd/m ²	
LED life time	-	50000	-	-	Hr	



LED CIRCUIT DIAGRAM
 $V_f = 12.4 \pm 1.2V (I_f = 40mA)$

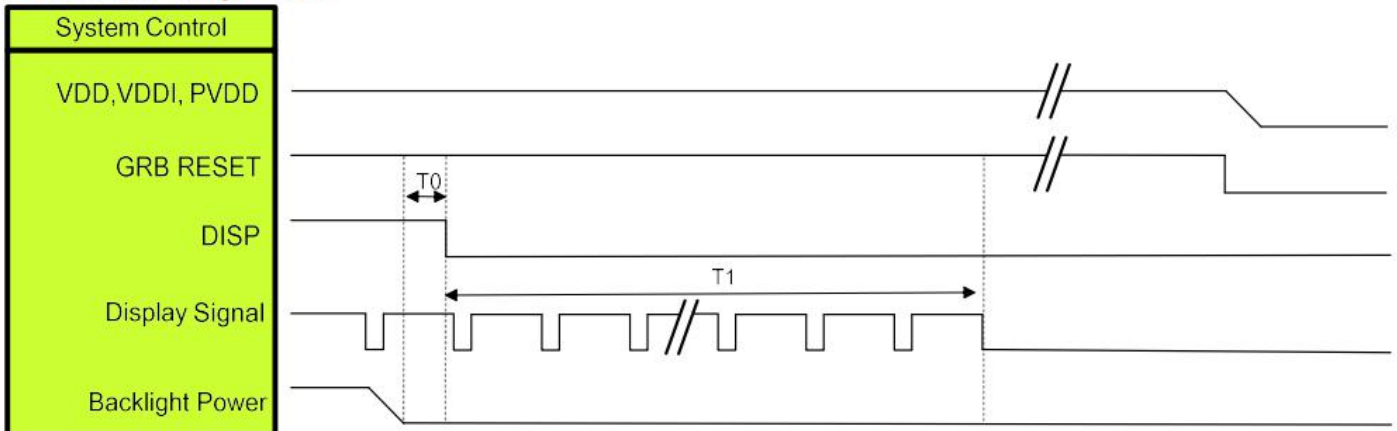
3.2. Power Sequence

Power On Sequence



Symbol	Description	Min. Time	Unit
T0	System power stability to GRB RESET signal	0	ms
T1	GRB RESET= "High" to DISP="High"	10	ms
T2	Display Signal output to Backlight Power on	250	ms

Power Off Sequence



Symbol	Description	Min. Time	Unit
T0	Backlight Power off to DISP="Low"	5	ms
T1	DISP="Low" to IC internal voltage discharge complete	80	ms

3.3. Timing Characteristics

3.3.1. RGB Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

480RGB X 272 Resolution Timing Table							
Item	Symbol	Min.	Typ.	Max.	Unit	Remark	
DCLK Frequency	Fclk	8	9	12	MHz		
DCLK Period	Tclk	83	111	125	ns		
HSYNC	Period Time	Th	485	531	598	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H_BLANKING setting
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	43	DCLK	
VSYNC	Period Time	Tv	276	292	321	HSYNC	
	Display Period	Tvdisp		272		HSYNC	
	Back Porch	Tvbp	2	12	12	HSYNC	By V_BLANKING setting
	Front Porch	Tvfp	2	8	37	HSYNC	
	Pulse Width	Tvw	2	4	12	HSYNC	

Note: It is necessary to keep Tvbp =12 and Thbp =43 in sync mode. DE mode is unnecessary to keep it.

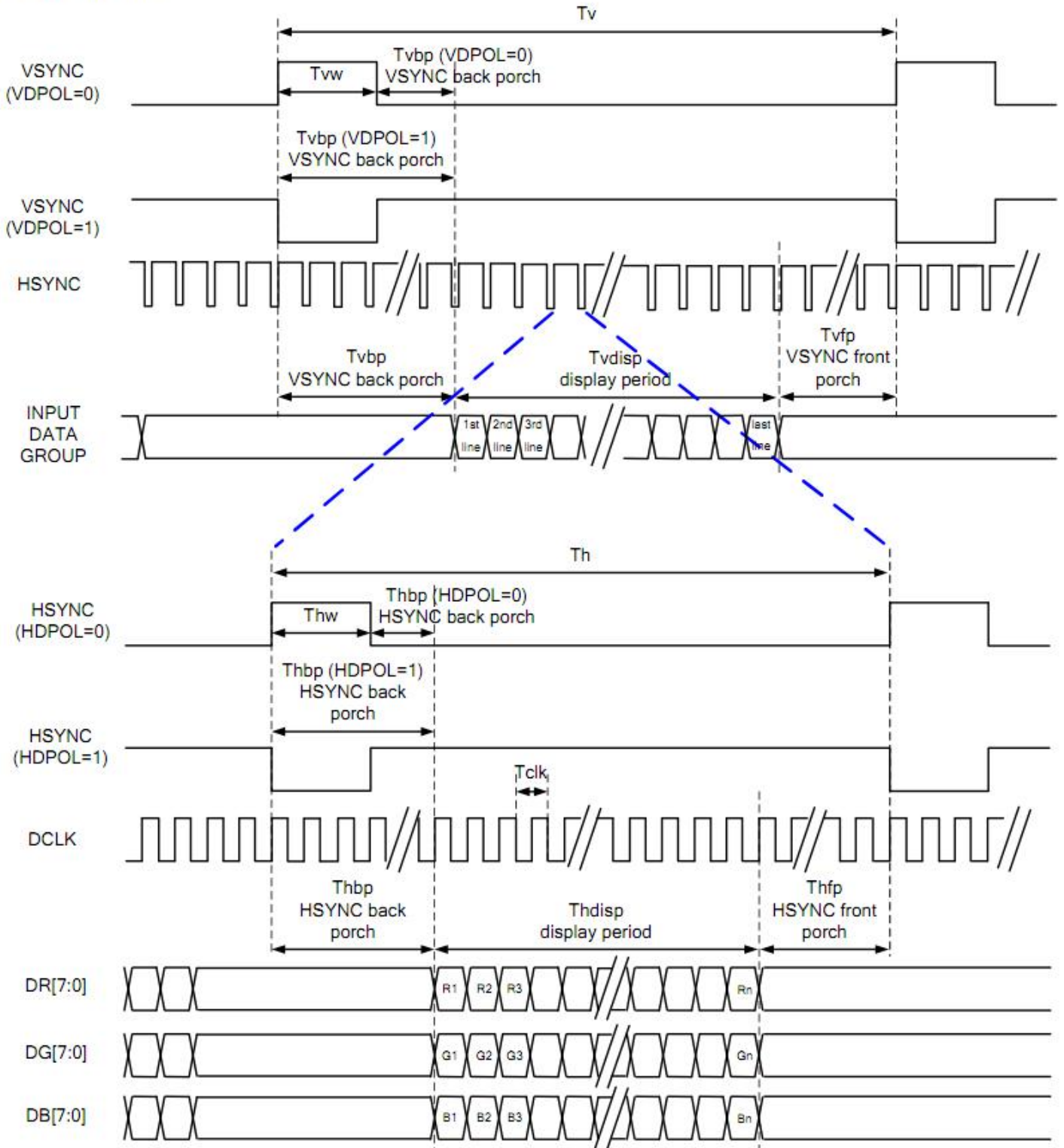
Serial 8-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

480RGB X 272 Resolution Timing Table							
Item	Symbol	Min.	Typ.	Max.	Unit	Remark	
DCLK Frequency	Fclk	24	27	30	MHz		
DCLK Period	Tclk	33	37	42	ns		
HSYNC	Period Time	Th	1445	1491	1558	DCLK	
	Display Period	Thdisp		1440		DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H_BLANKING setting
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	43	DCLK	
VSYNC	Period Time	Tv	276	292	321	HSYNC	
	Display Period	Tvdisp		272		HSYNC	
	Back Porch	Tvbp	2	12	12	HSYNC	By V_BLANKING setting
	Front Porch	Tvfp	2	8	37	HSYNC	
	Pulse Width	Tvw	2	4	12	HSYNC	

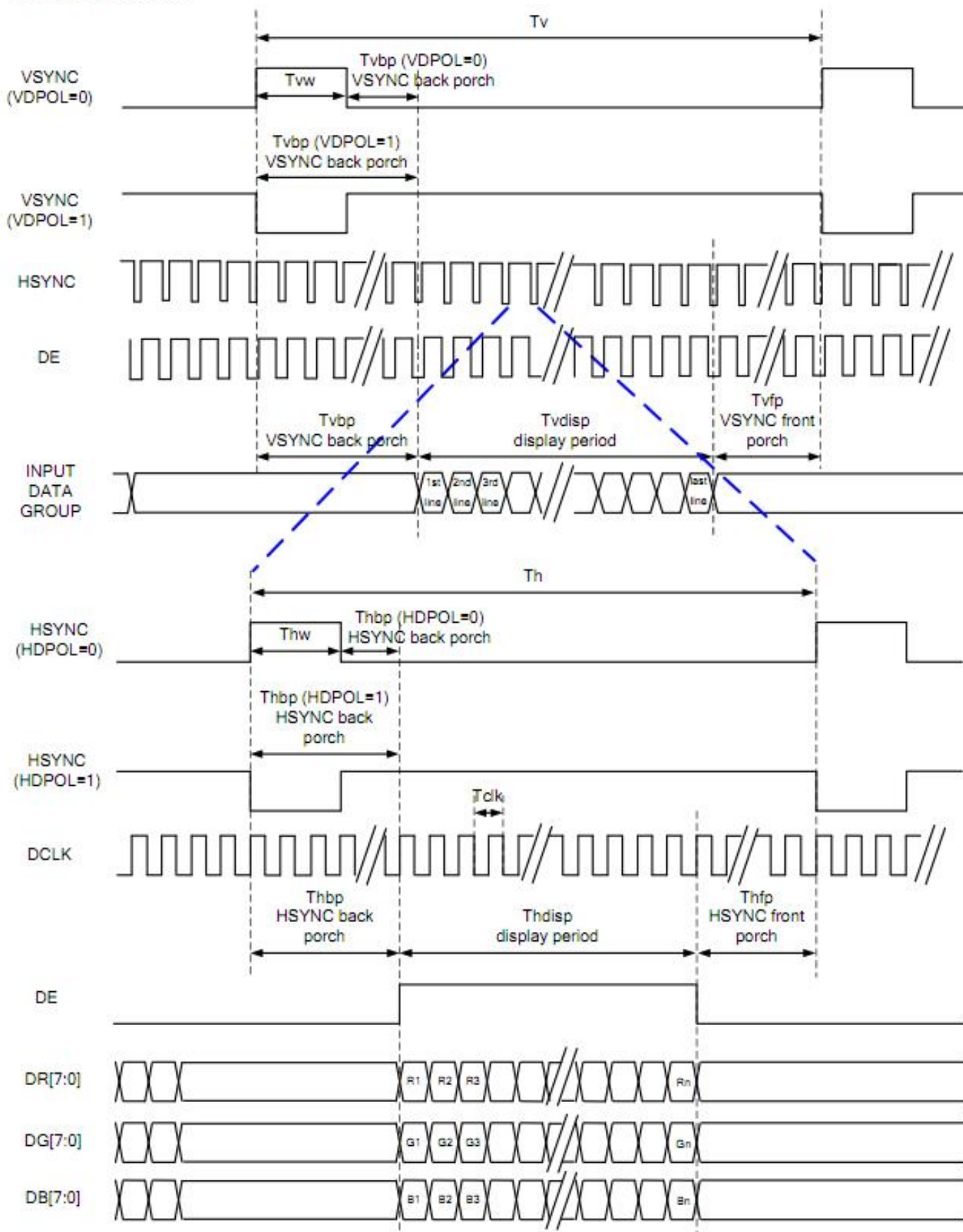
Note: It is necessary to keep Tvbp =12 and Thbp =43 in sync mode. DE mode is unnecessary to keep it.

3.3.2. Timing Diagram:

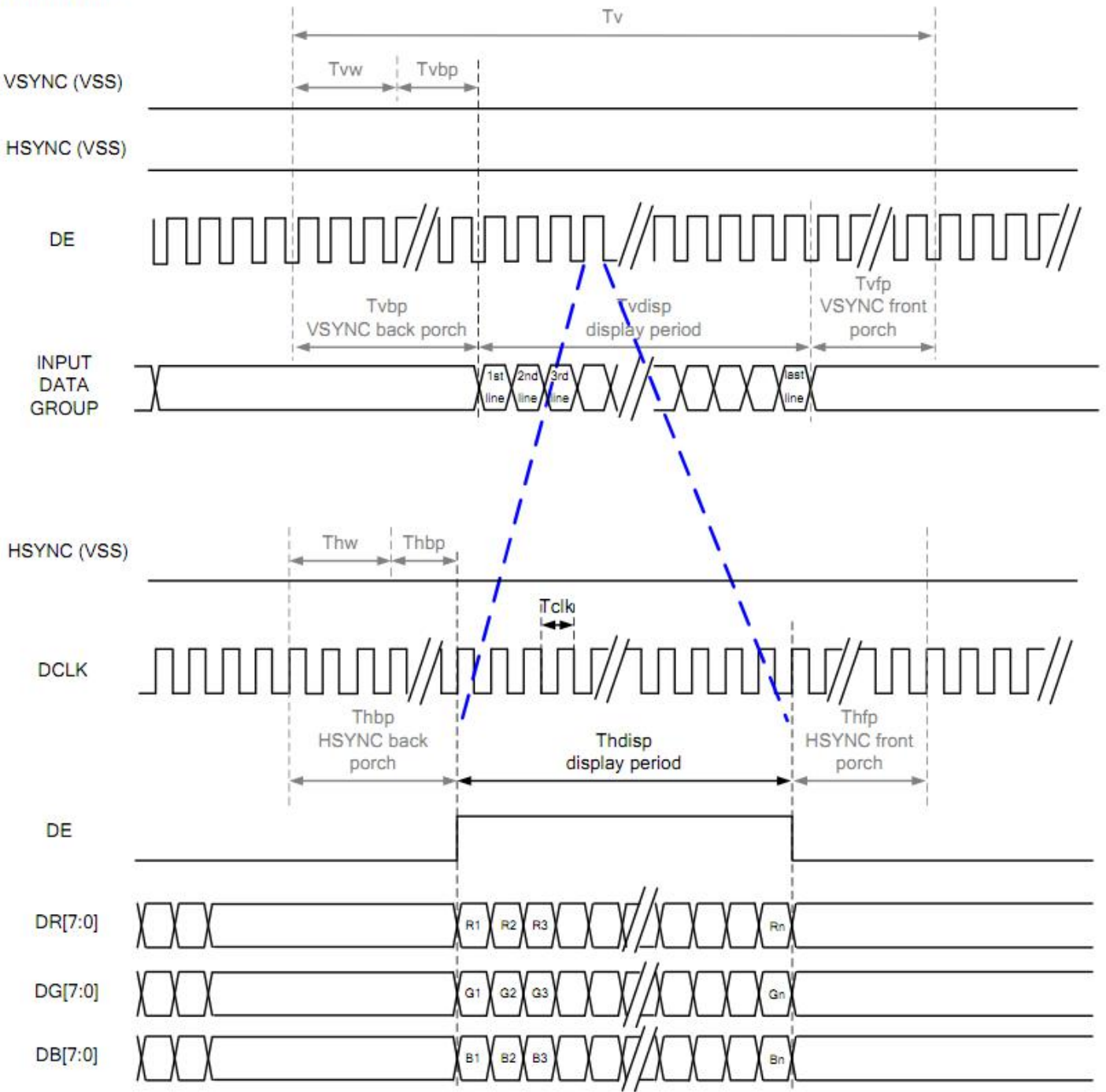
SYNC Mode



SYNC-DE Mode



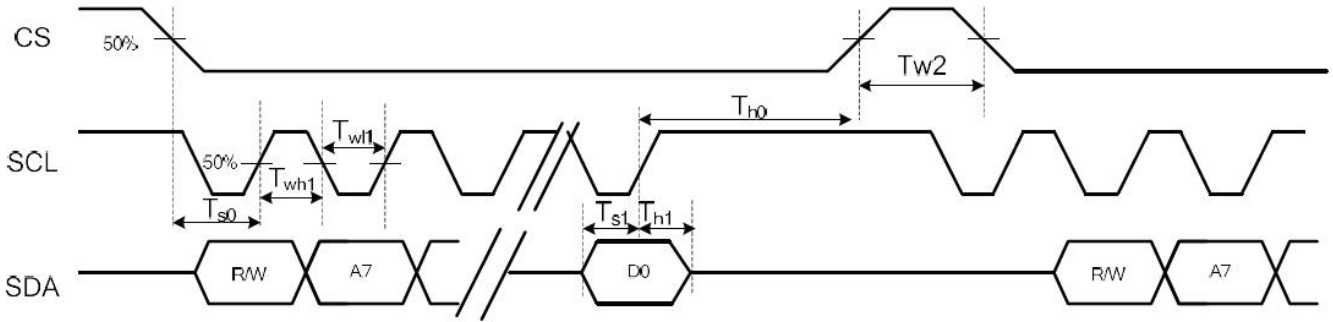
DE Mode



RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

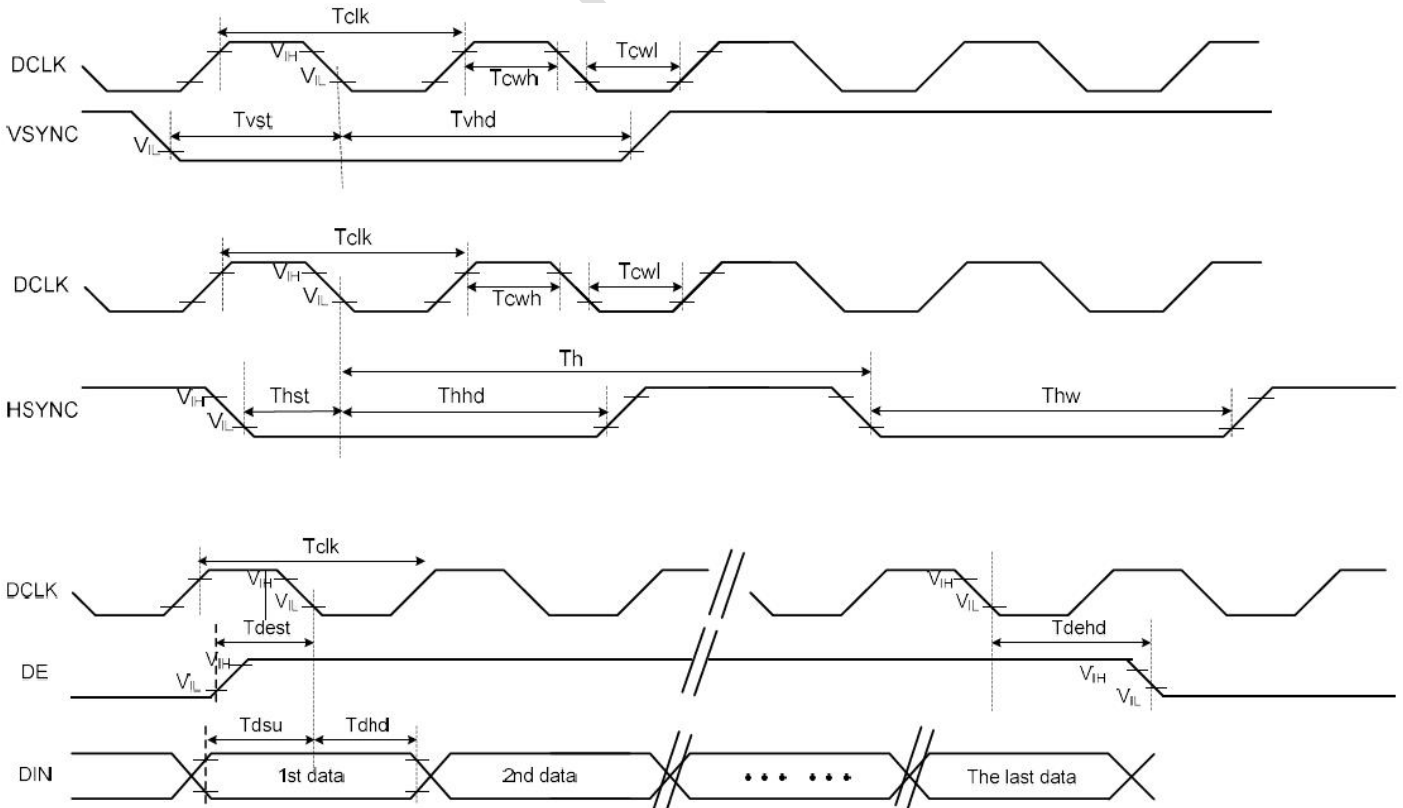
Note: "Input" means these signals are driven by host side.

System Bus Timing for 3-Wire SPI Interface:



Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CS Input Setup Time	Ts0	50	-	-	ns	
Serial Data Input Setup Time	Ts1	50	-	-	ns	
CS Input Hold Time	Th0	50	-	-	ns	
Serial Data Input Hold Time	Th1	50	-	-	ns	
SCL Write Pulse High Width	Twh1	50	-	-	ns	
SCL Write Pulse Low Width	Twl1	50	-	-	ns	
SCL Read Pulse High Width	Trh1	300	-	-	ns	
SCL Read Pulse Low Width	Trl1	300	-	-	ns	
CS Pulse High Width	Tw2	400	-	-	ns	

System Bus Timing for RGB Interface:



Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	Tcw	40	50	60	%	
HSYNC Width	Thw	2	-	-	DCLK	
HSYNC Period	Th	55	60	65	us	
VSYNC Setup Time	Tvst	12	-	-	ns	
VSYNC Hold Time	Tvhd	12	-	-	ns	
HSYNC Setup Time	Thst	12	-	-	ns	
HSYNC Hold Time	Thhd	12	-	-	ns	
Data Setup Time	Tdsu	12	-	-	ns	
Data Hold Time	Tdhd	12	-	-	ns	
DE Setup Time	Tdest	12	-	-	ns	
DE Hold Time	Tdehd	12	-	-	ns	

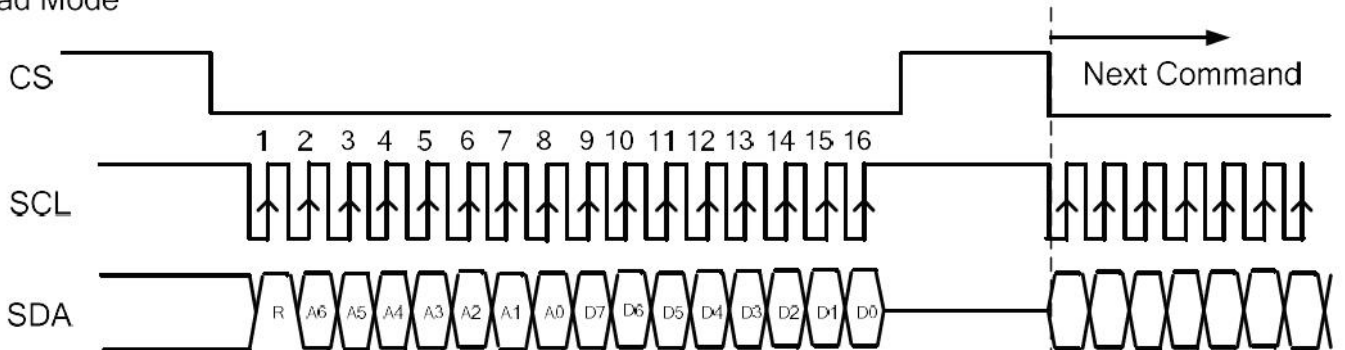
3-wire Serial Interface:

R/W: Read/Write mode control bit.

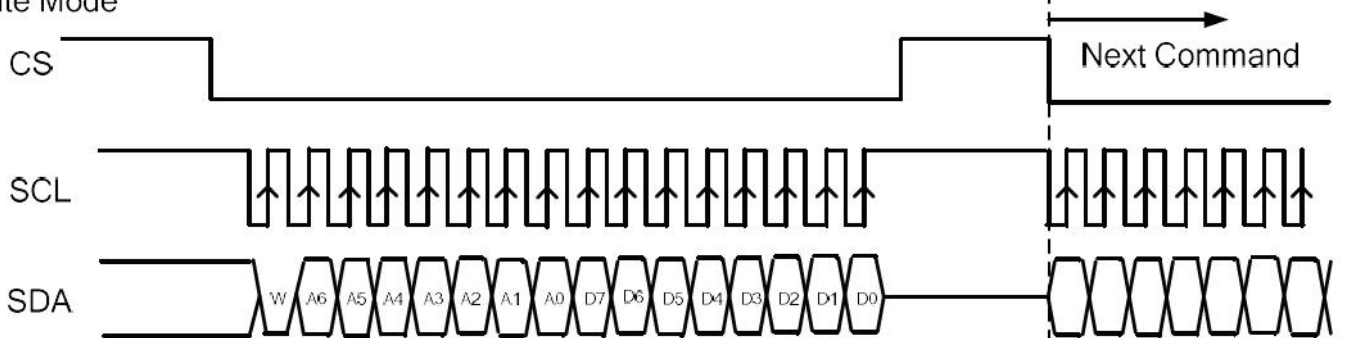
R/W=1: Read mode

R/W=0: Write mode

Read Mode



Write Mode



4. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Viewing Angle	θT	$CR \geq 10$	70	80	-	degree	3	
	θB		70	80	-			
	θL		70	80	-			
	θR		70	80	-			
Contrast Ratio	CR	$\Theta = 0^\circ$	600	800	-	-	4	
Color saturation	NTSC	CIE 1931	45	50	-	%		
Response Time	$T_{on} + T_{off}$	25°C	-	30	40	ms	5	
Chromaticity	White	LCM	-0.03	0.27	+0.03	-	1	
				Y				0.31
	Red			X				0.600
				Y				0.333
	Green			X				0.347
				Y				0.606
	Blue			X				0.143
				Y				0.098
Luminance (center)	L		250	300	-	cd/m ²	1	
Luminance Uniformity	ΔL		75	80	-	%	1.2	

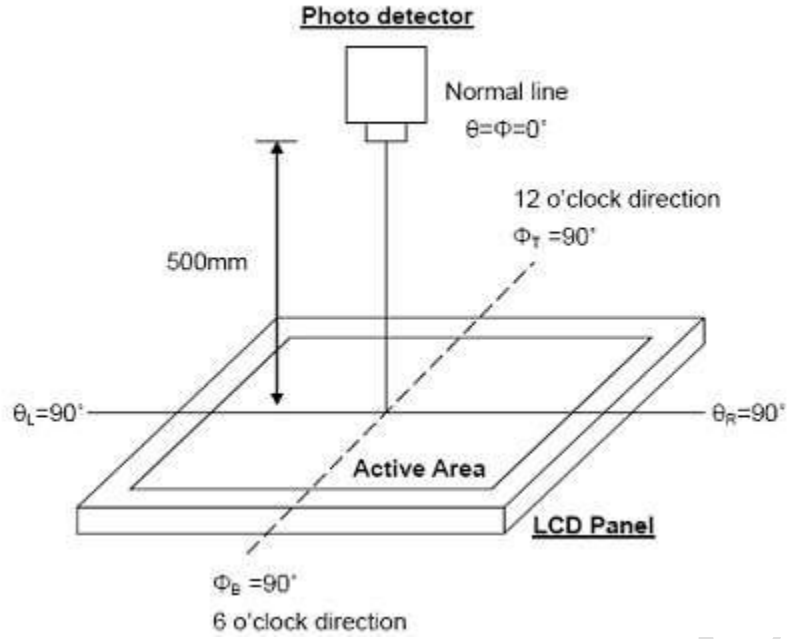
Note: The parameter is slightly changed by temperature, driving voltage and materiel

Note 1: The data are measured after LEDs are turned on for 3 minutes. LCM displays full white. The brightness is the average value of 5 measured spots. Measurement equipment BM-7 ($\Phi 8\text{mm}$)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: $T_a = 25^\circ\text{C}$.
- Adjust operating voltage to get optimum contrast at the center of the display.

The measured value is more than 3 minutes at the center point of the LCD panel, and the backlight is turned on at the same time.

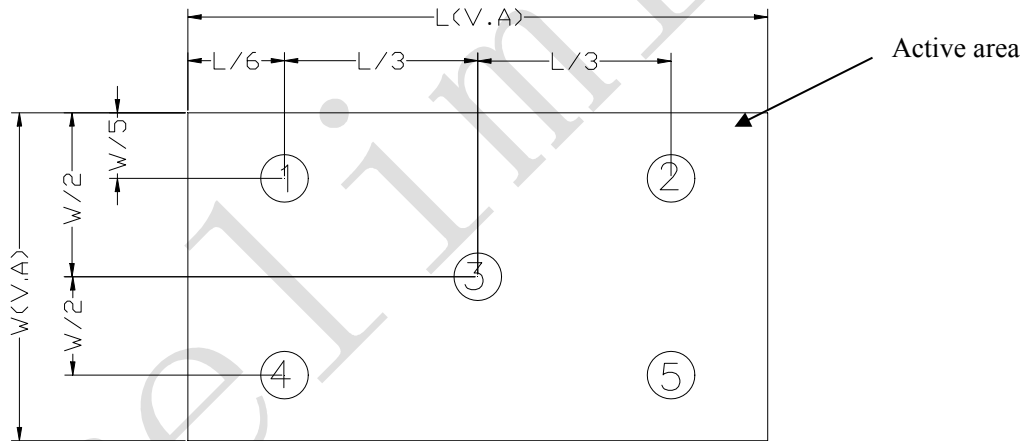


Note 2: The luminance uniformity is calculated by using following formula.

$$\Delta B_p = B_p (\text{Min.}) / B_p (\text{Max.}) \times 100 (\%)$$

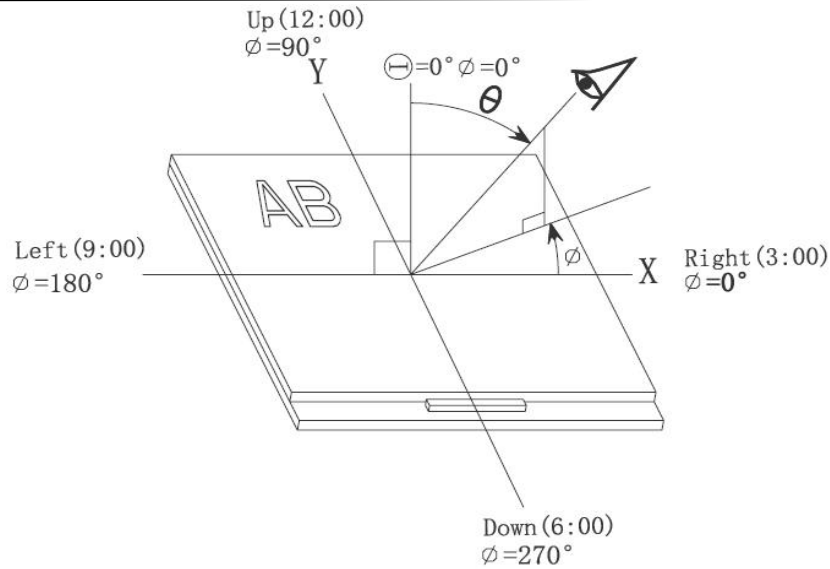
$B_p (\text{Max.})$ = Maximum brightness in 5 measured spots

$B_p (\text{Min.})$ = Minimum brightness in 5 measured spots.



Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and ϕ



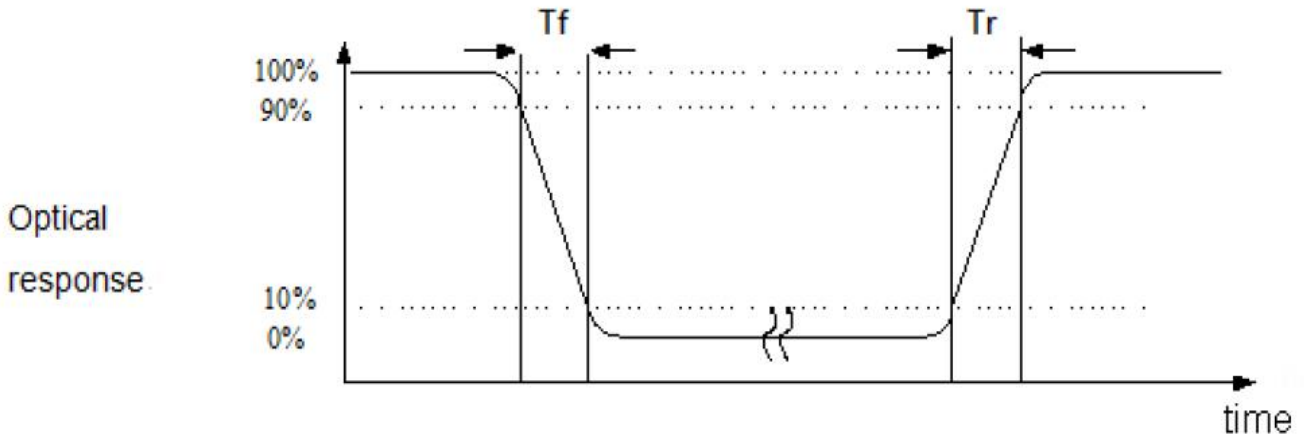
Note 4: Definition of contrast ratio

Contrast measurements shall be made at viewing angle of $\Theta = 0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

Note 5: Definition of Response time

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(Tf) and from “white” to “black”(Tr), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



5. Reliability Test Items

Item	Test Conditions	Remark
High Temperature Storage	Ta=80°C; 120Hrs	Note1 ,Note4
Low Temperature Storage	Ta=-30°C; 120Hrs	Note1, Note4
High Temperature Operation	Ts=70°C; 120Hrs	Note2 ,Note4
Low Temperature Operation	Ts=-20°C; 120Hrs	Note4
Operation at High Temperature and Humidity	+70°C,90%RH; 120Hrs (no condensation)	Note4
Thermal Shock	-20°C/30min~+70°C/30min for a total 48 cycles	Start with cold temperature and end with high temperature
Package Drop Test	Height 40cm 1corner , 3edges , 6surfaces	
Elector Static Discharge	150pF/330Ω, Contact: ± 2KV,Air: ± 4KV	Human Body Mode
Image Sticking	25°C ; 1hrs	Note5

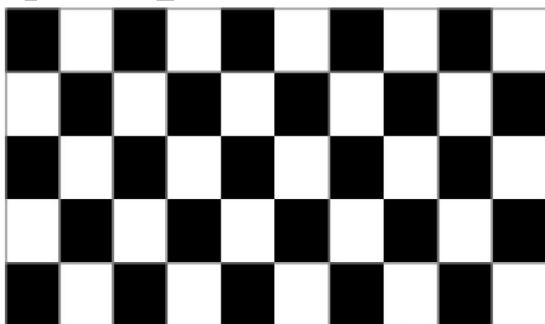
Note1: Ta is the ambient temperature of samples.

Note2: Ts is the temperature of panel's surfaces.

Note3: 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.

Note4: before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note5: Condition of image sticking test :25°C ± 2°C , Operation with test pattern sustained for 1hrs,then change to gray pattern immediately. After 5 min's, the Mura must be disappeared completely.

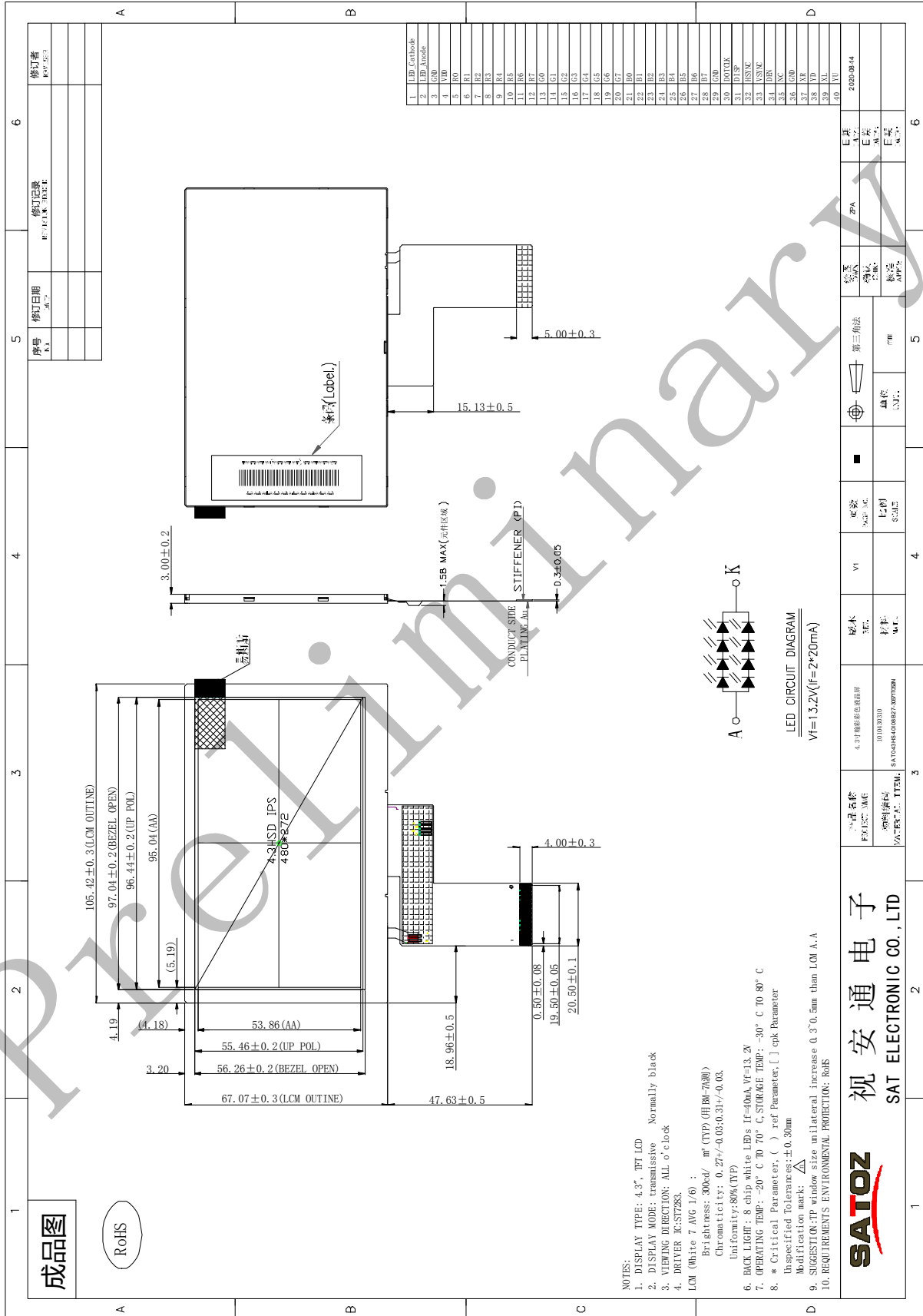


(a) Test Pattern (chess board P pattern)

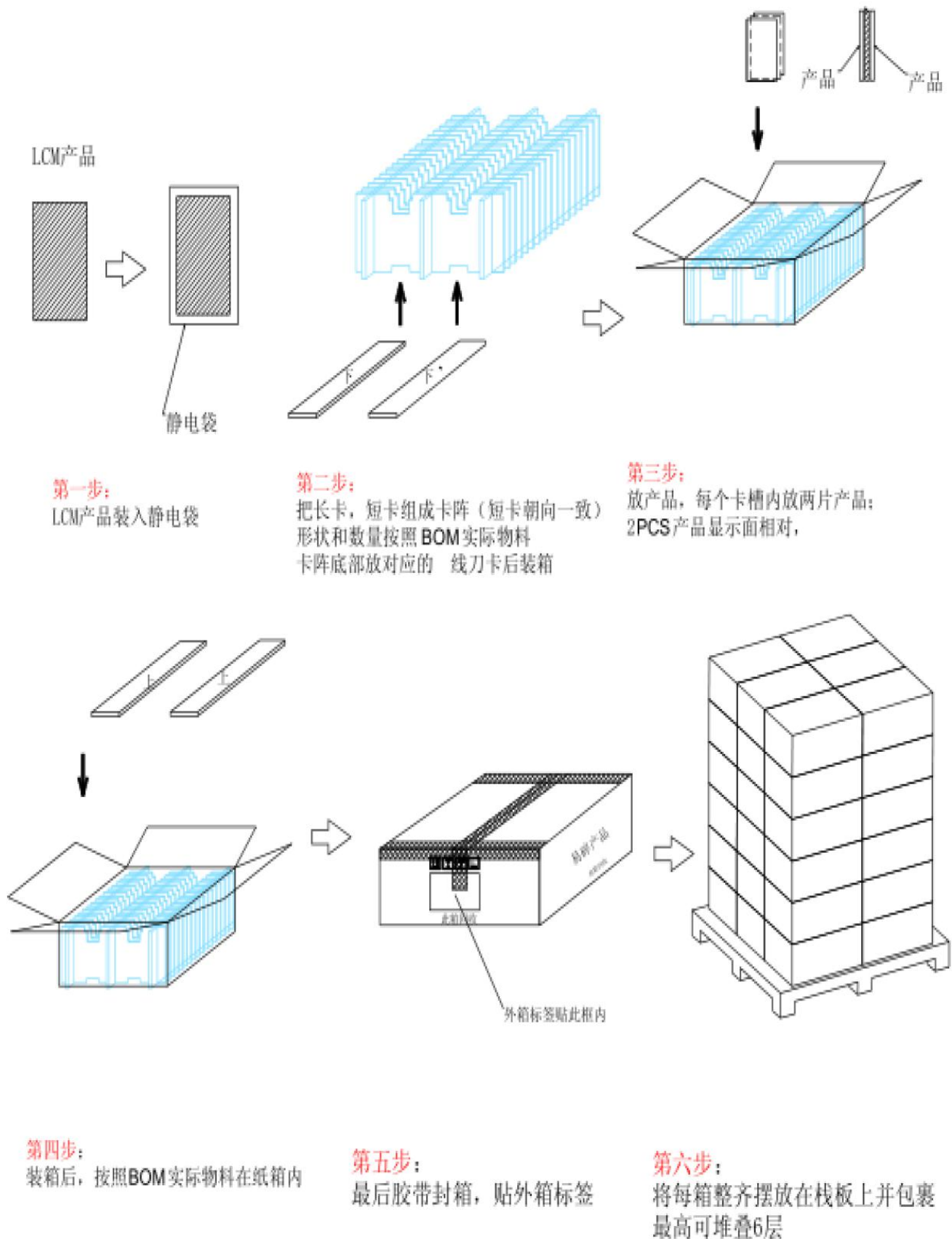


(b) Gray Pattern (127 Gray)

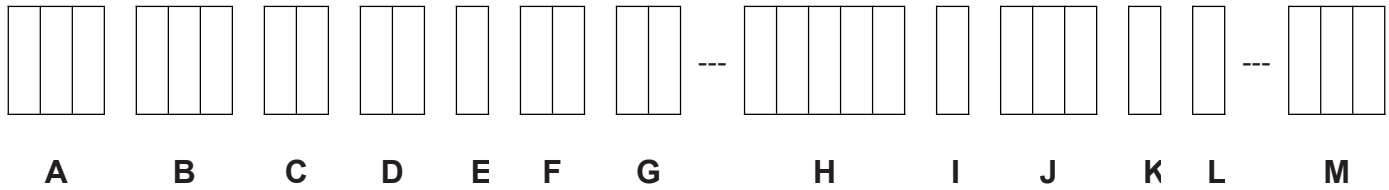
6. Mechanical Drawing



7. Package Drawing



8. Numbering System



NO.	Definition	Specifications
A	Company code	SAT INTERNATIONAL CO.LTD.
B	Display monitor opposite angle line size	Unit : inch (size<10inch:take two integers; size>=10inch:takes three integers)
C	LCD Brands	AU-AUO; CP-CPT; IV-IVO; TM-TIANMA; HS-HSD; CM-CMO; BO-BOE; AT-INNOLUX; CT-CTC
D	Interface PIN Number	Arabic numerals from 01 to 99
E	LCD Type	A--Alternated Video Signal; D--Data Video Signal; H--High Definition ; I--IPS
F	Backlight LED Number	Arabic numerals from 01 to 99
G	Backlight Color Are	Include R1、 R2、 Y0、 Y1、 B1、 B2;
H	Structure Size	Include module length and width size
I	Interface Mode	T:TTL L:LVDS M:MIPI
J	FPC Length	It represents the length of FPC with three figures, divided into long rows ,middle rows and short rows
K	View Angles	Z : represent narrow viewing angle K : represent wide viewing angle I : represent all viewing angle
L	Operating Mode	D: DE mode V: VSD mode F: Inverting mode N: No mode requirements
M	Suffix	1. NULL ; 2. TP/CTP-- Touch panel; 3. other--Insignificance