PRODUCT SPECIFICATION

MODEL:HT050AWV40T

<◇> PRELIMINARY SPECIFICATION

<◆> APPROVAL SPECIFICATION

CUSTOMER
APPROVED BY
DATE:

DESIGNED	CHECKED	APPROVED

REVISION STATUS

Version	Revise Date	Page	Content	Modified by
V1.0	2013.02.28	-	First Issued.	Lixingwen
V1.1	2013.10.14	-	Modify Viewing angle	Lixingwen

TABLE OF CONTENTS

1. GENERAL DESCRIPTION

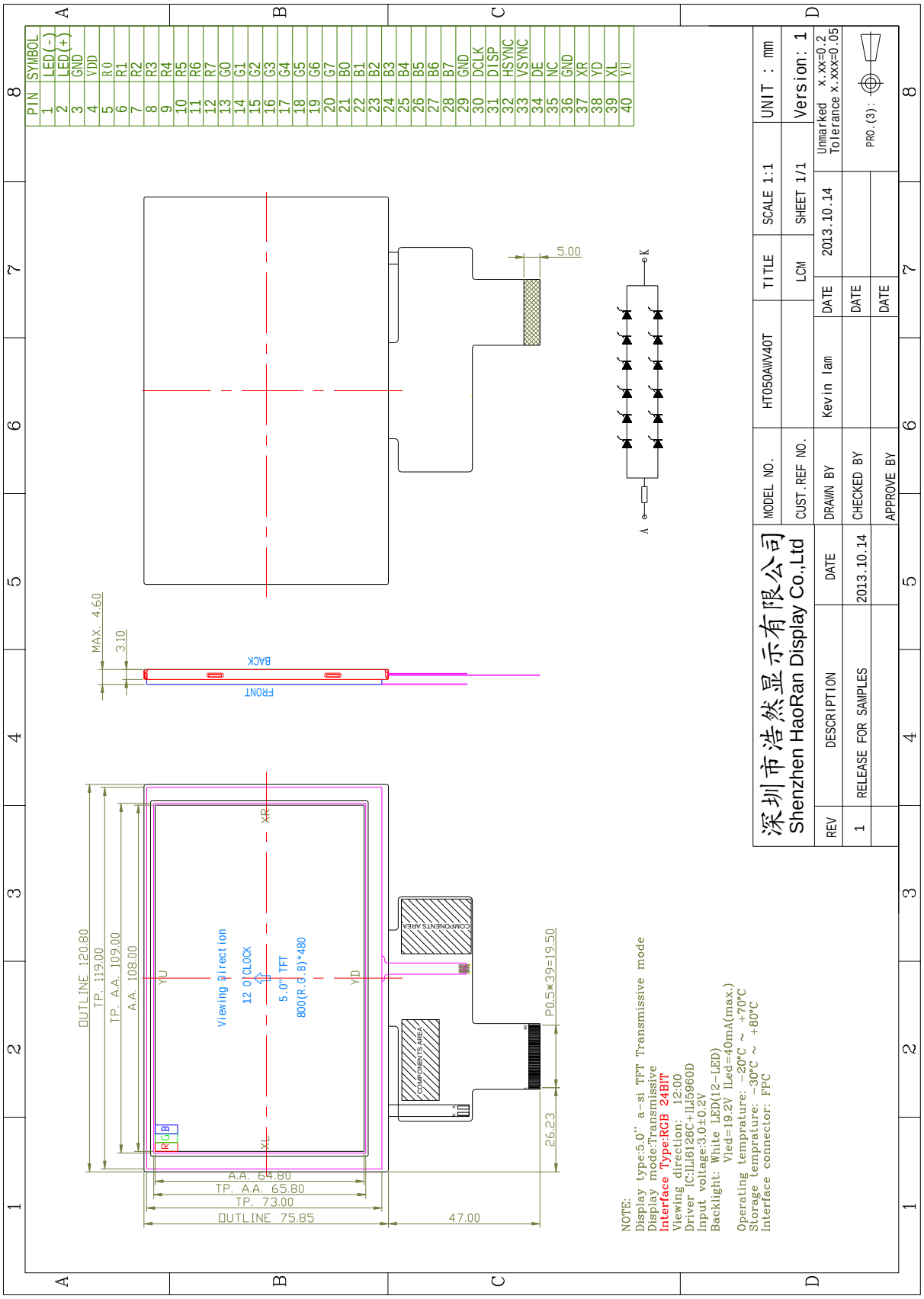
1.1 DESCRIPTION

HT050AWV40T is a color active matrix thin film transistor(TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This module is composed of a TFT LCD panel, driver ICs, FPC and a backlight unit.

1.2 FEATURES:

No.	Item	Specification	Unit
1	Panel Size	5.0”	inch
2	Number of Pixels	800(H) × 3(RGB) ×480(V)	pixels
3	Active Area	108.00x64.80	mm
4	Pixel Pitch	0.135(W) × 0.135(H)	mm
5	Outline Dimension	120.80(W)x75.85(H)x4.6(T)	mm
6	Pixel arrangement	RGB vertical stripe	-
7	Display Mode	Normally White	-
8	Viewing Direction	12 o’clock	-
9	Display Color	16.7M	-
10	Luminance(cd/m2)	500(TYP.)	nit
11	Contrast Ratio	400(TYP.)	-
12	Surface Treatment	Anti-Glare	-
13	Interface	24bit-TTL	-
14	Backlight	White LED	-
15	Drive IC	ILI6126C+ILI5960D	-
16	Operation Temperature	-20~70	℃
17	Storage Temperature	-30~80	℃
18	Weight	47.46	g

2. MECHANICAL SPECIFICATION



3. PIN DESCRIPTION

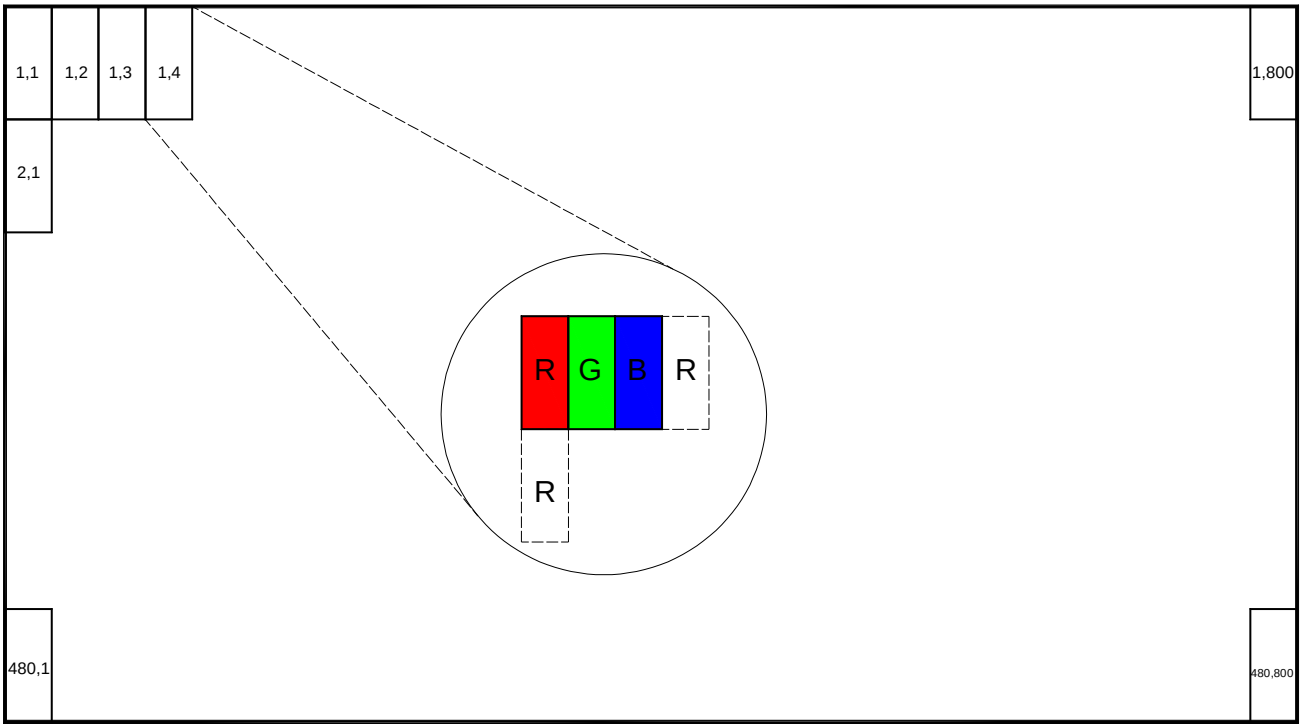
FPC connector is used for electronics interface. The recommended model is FH19SC-40S-0.5SH (05) manufactured by HIROSE.

No.	Symbol	I/O	Function
1	LED(-)	P	Power for LED backlight cathode
2	LED(+)	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	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/O: I: input, O: output, P: power

4. BLOCK DIAGRAM



5. Electrical Characteristics

5.1 Absolute Maximum Ratings

Ta = 25℃

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Supply voltage	VDD	-0.3	4.0	V	
Logical Supply voltage	VDDIO	1.8	3.6	V	

5.2 TFT LCD MODULE

5.2.1 Operating Conditions

Item	Symbol	Values			Unit	Remark
		Min.	**Typ.**	Max.		
TFT Gate On Voltage	VGH	13.4	14.4	15.4	V	
TFT Gate Off Voltage	VGL	-10.6	-9.6	-8.6	V	
TFT Common Electrode Voltage	VCOMH	4	4.2	4.4	V	
	VCOML	-0.9	-0.7	-0.5	V	
Supply voltage	VDD	-	3.3	-	V	

Note1: Vcom must be adjusted to optimize display quality: cross talk, contrast ratio and etc.

Note2: VGH is TFT gate on voltage

Note3: VGL is TFT gate off voltage

The storage capacitance structure of this product is Cst(Storage on Common).

The low voltage level of VGL signal must be fluctuated with same phase as Vcom, in case of Storage on Gate structure.

Note4: Environmental condition: 25℃

5.3POWER、SIGNAL SEQUENCE

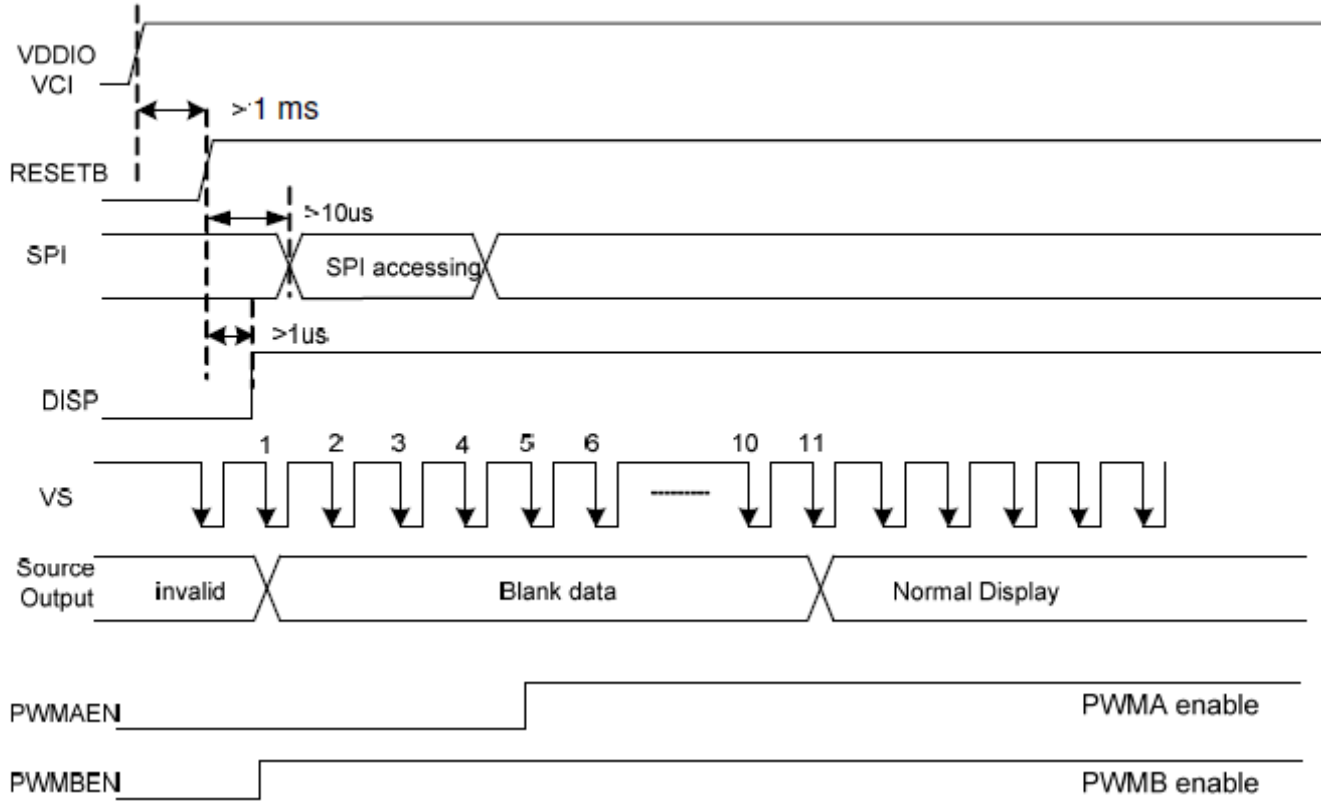


Figure 1 · Power On Sequence

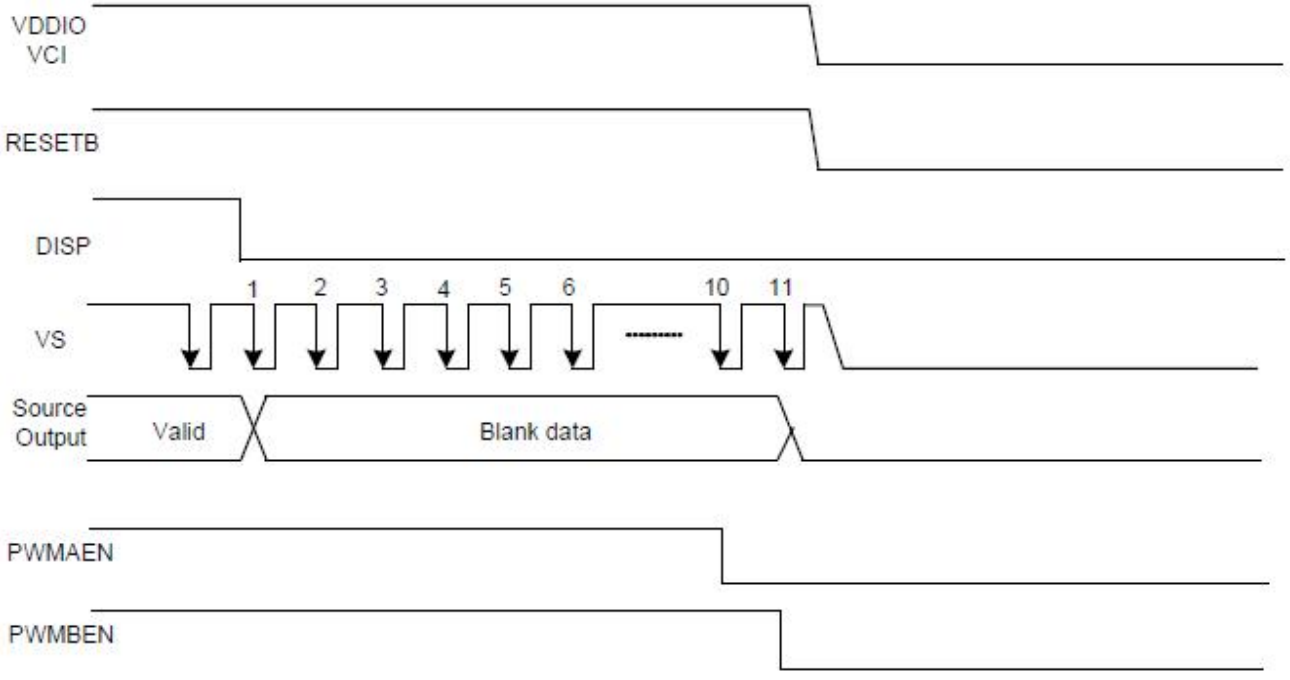
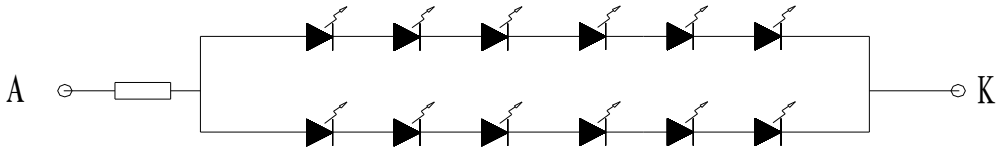


Figure 2 · Power Off Sequence

5.4 BACKLIGHT UNIT

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LED Current	Iled		40		mA	12LEDS
Forward voltage	VF		19.2		V	IF=40mA,6LEDS
Reverse current	IR			50	μA	VR=5V,1LED
Power dissipation	Pd	756			mW	6LEDS
Peak forward current	IFP	60			mA	6LEDS
Reverse Voltage	VR	5			V	1LED
Life	Life	40k			hour	IF=40mA

5.4.1Internal Circuit Diagram



CURRENT IF=40mA

6. INPUT SIGNAL TIMING

6.1 AC ELECTRICAL CHARACTERISTICS

6.1.1 Timing relationship among DE、Source Output、Gate Output、VCOM

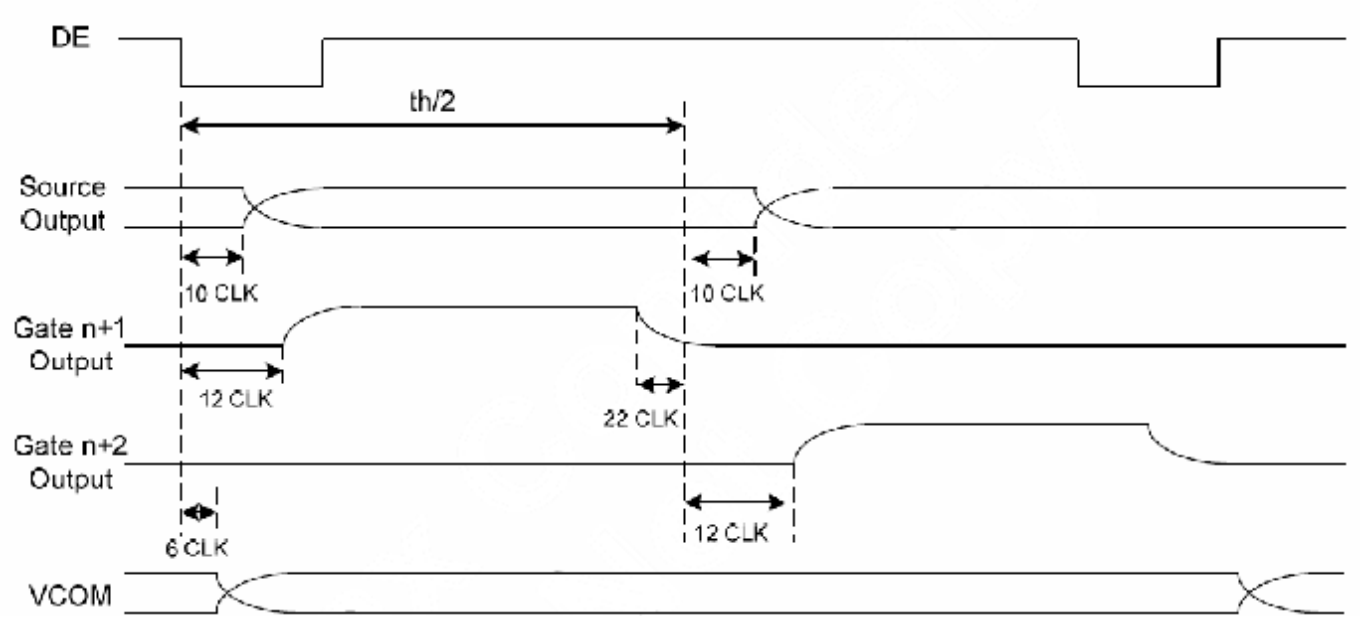


Figure 3.Timing Relationship

6.1.2 Parallel RGB input timing requirement

TA =25°C, VDDIO=1.8V to 3.6V, DVSS= 0V)

Parameter	Symbol	Spec.			Unit	Remark
		Min.	Typ.	Max.		
Clock cycle	fCLK	-	9	15	MHz	Note1
Hsync cycle	1/th	-	17.14	-	KHz	
Vsync cycle	1/tv	-	59.94	-	Hz	
Horizontal Signal						
Horizontal cycle	th	525	525	605	CLK	
Horizontal display period	thd	480	480	480	CLK	
Horizontal front porch	thf	2	2	82	CLK	
Horizontal pulse width	thp	2	41	41	CLK	
Horizontal back porch	thb	2	2	41	CLK	
Vertical Signal						
Vertical cycle	tv	285	286	399	H	Note1
Vertical display period	tvd	272	272	272	H	Note1
Vertical front porch	tvf	1	2	227	H	Note1
Vertical pulse width	tvp	1	10	11	H	Note1
Vertical back porch	tvb	1	2	11	H	Note1

Note 1: Unit: CLK=1/ fCLK , H=th

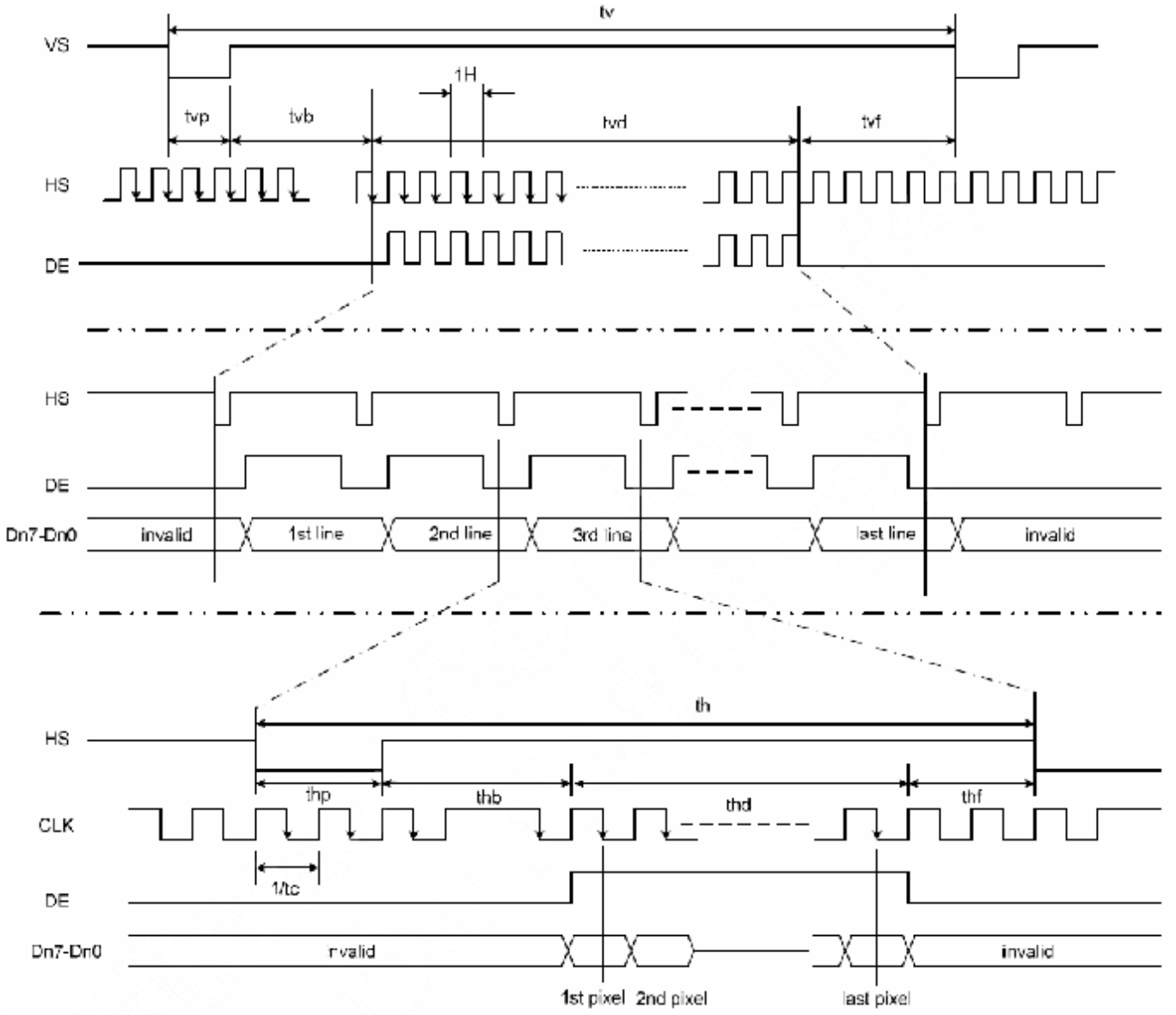


Figure 4 · Parallel RGB Input Timing

6.2 INPUT SETUP TIMING REQUIREMENT

(TA =25℃, VDDIO=1.8V to 3.6V, DVSS= 0V, tr =tf =2ns)

Parameter	Symbol	Spec.			Unit	Remark
		Min.	Typ.	Max.		
DISP setup time	tdiss	10	-	-	ns	
DISP hold time	tdish	10	-	-	ns	
Clock period	PWCLK	66.7	-	-	ns	Note2
Clock pulse high period	PWH	26.7	-	-	ns	Note2
Clock pulse low period	PWL	26.7	-	-	ns	Note2
Hsync setup time	ths	10	-	-	ns	
Hsync hold time	thh	10	-	-	ns	
Data setup time	tds	10	-	-	ns	
Data hold time	tdh	10	-	-	ns	
DE setup time	tdes	10	-	-	ns	
DE hold time	tdeh	10	-	-	ns	
Vsync setup time	tvhs	10	-	-	ns	
Vsync hold time	tvhh	10	-	-	ns	

Note1： tr, tf is defined 10% to 90% of signal amplitude.

Note2 ：For parallel interface, maximum clock frequency is 15MHz.

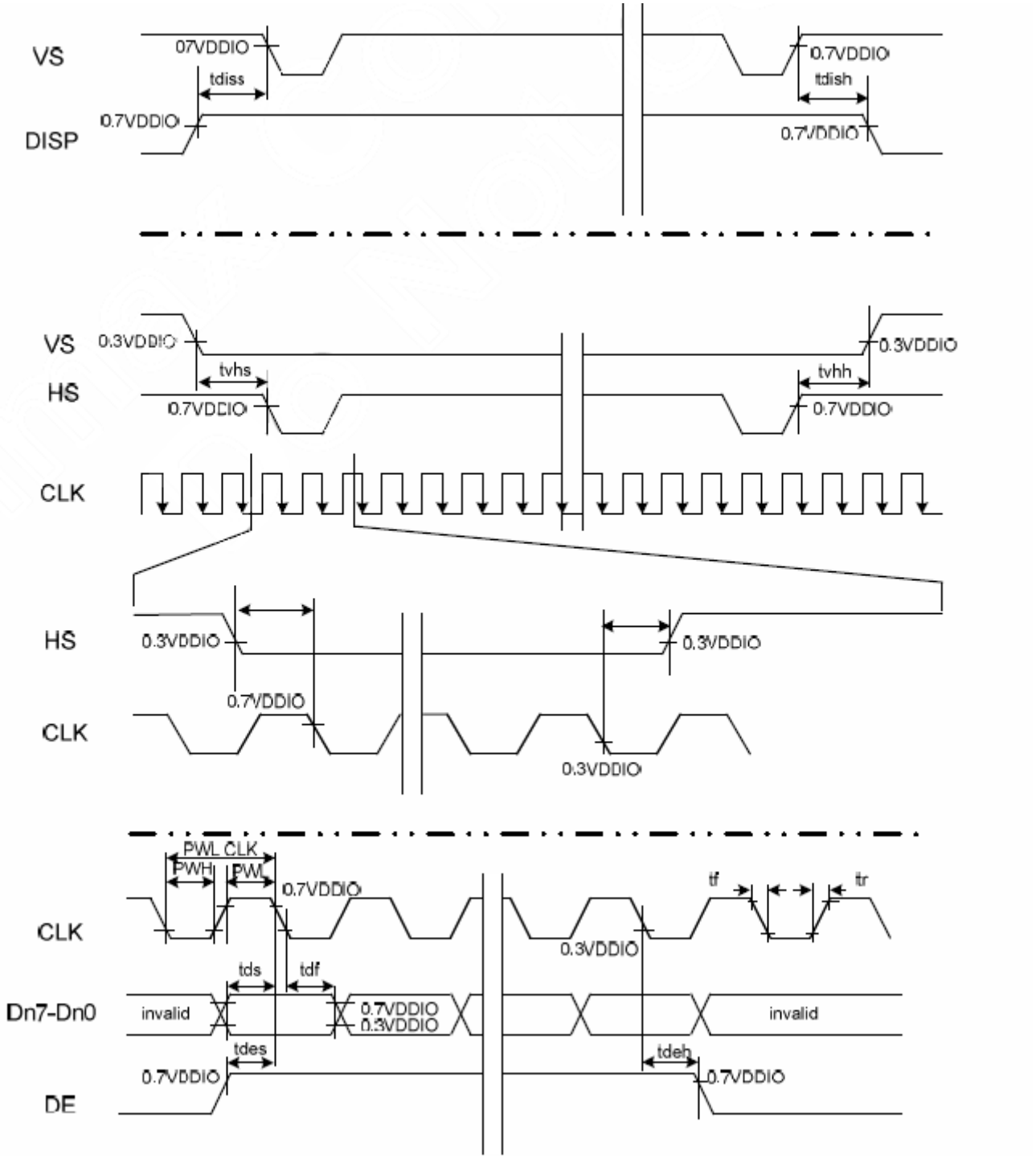


Figure 4 · Input Setup Timing Requirement

7. OPTICAL CHARACTERISTICS

Ta = 25 ± 2℃

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Response time	Rising	T_R		-	3	6	msec	Note3
	Falling	T_F		-	7	14		Note3
Contrast ratio		CR			400			Note4
Color Chromaticity	White	X	Θ=0	0.250	0.290	0.330		Note2 Note5 Note6
		Y		0.290	0.330	0.370		
	Red	X		0.530	0.560	0.590		
		Y		0.310	0.340	0.370		
	Green	X		0.290	0.320	0.350		
		Y		0.560	0.590	0.620		
	Blue	X		0.110	0.140	0.170		
		Y		0.070	0.100	0.130		
Luminance		L		250	500	-	cd/m2	Note6
Luminance uniformity		YU		70	75	-	%	Note6
Viewing Angle	Hor.	Θ_L	CR>10	45	50	-		Note1
		Θ_R		45	50	-		
	Ver.	Θ_U		65	70	-		
		Θ_D		25	30	-		
NTSC					51		%	

Note1:Definition of viewing angle range

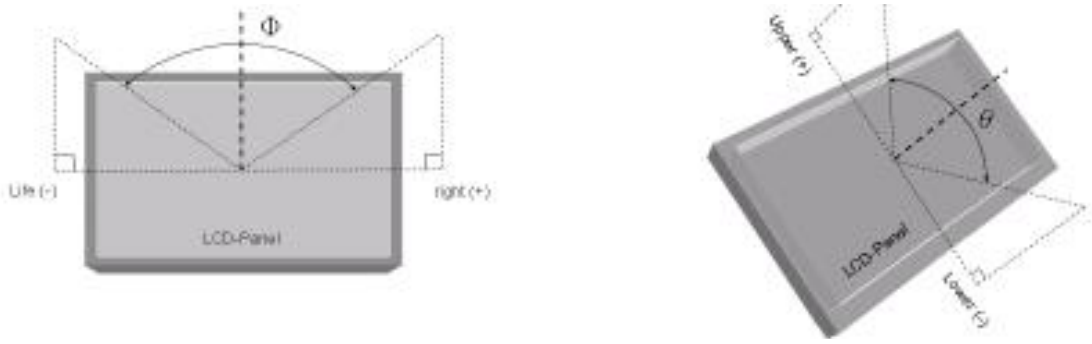


Fig. 7-1 Definition of viewing angle

Note2: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.)

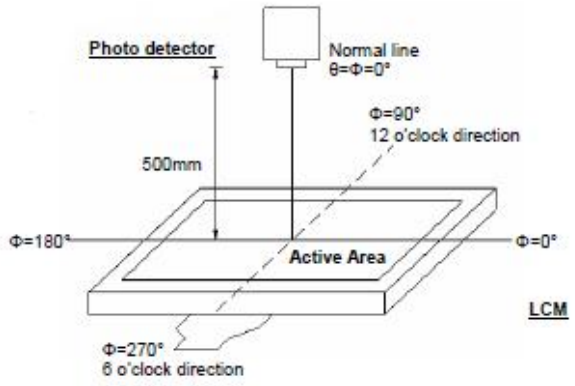


Fig. 7-2 Optical measurement system setup

Note3:Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.

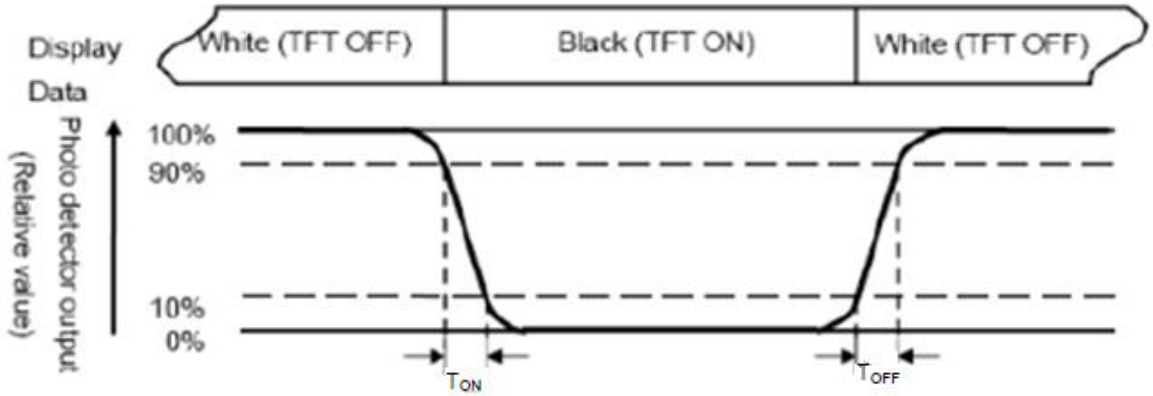


Fig. 7-3 Definition of response time

Note4:Definition of contrast ratio:

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: All input terminals LCD panel must be ground while measuring the center area of the panel.

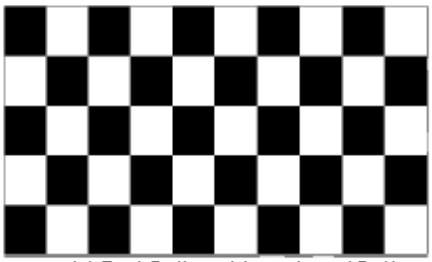
8.QUALITY ASSURANCE SYSTEM

8.1 TEMPERATURE AND HUMIDITY

Test Item	Test Condition	Remark
HighTemperatureStorage	Ta=80℃; 240hrs	IEC60068-2-1：2007 GB2423.2-2008
Low Temperature Storage	Ta=-30℃; 240hrs	IEC60068-2-1：2007 GB2423.1-2008
High Temperature Operation	Ta=70℃，240Hrs	IEC60068-2-1：2007 GB2423.2-2008
Low Temperature Operation	Ta=-20℃; 240hrs	IEC60068-2-1：2007 GB2423.1-2008
High Temperature High Humidity Operation	Ta=60℃，90%RH， 240Hrs(no condensation)	IEC60068-2-78：2001 GB/T2423.3-2006
Thermal Shock	-30℃(0.5h) ~ 80℃(0.5h) / 100cycles	Start with cold temperature ， End with high temperature， IEC60068-2-14:1984,GB2423.22-2002
Image Sticking	25℃ ; 4hrs	Note1

Note1:Condition of image sticking test :25℃±2℃

Operation with test pattern sustained for 4hrs,then change to gray pattern immediately.after 5 mins,the mura must be disappeared completely



(a) Test Pattern (chess board Pattern)

(b) Gray Pattern

8.2 VIBRATION&SHOCK

Test item	Conditions	Remark
Packing Shock (non-operation)	980m/s2,6ms, ±x,y,z 3times for direction	IEC60068-2-27：1987 GB/T2423.5-1995
Packing Vibration (non-operation)	Frequency range:10 HZ~50HZ Stroke:1.0mm,sweep:10 HZ ~50HZ x,y,z 2 hours for each direction	IEC60068-2-32：1990 GB/T2423.8-1995

8.3ESD

Test item	Conditions	Remark	
Electro Static Discharge Test (non-operation)	150pF，330Ω， Contact:±4KV,Air:±8KV	1	IEC61000-4-2：2001 GB/T17626.2-2006
	200pF，0Ω，±200V contact test	2	

Note: Measure point :
1. LCD glass and metal bezel
2. IF connector pins

9. PRECAUTION RELATING PRODUCT HANDLING

9.1 SAFETY

1. Do not swallow any liquid crystal, even if there is no proof that liquid crystal ispoisonous.
2. If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
3. If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

9.2 STORAGE CONDITIONS

1. Store the panel or module in a dark place where the temperature is 23±5°C andthe humidity is below 50±20%RH.
2. Store in anti-static electricity container.
3. Store in clean environment, free from dust, active gas, and solvent.
4. Do not place the module near organics solvents or corrosive gases.
5. Do not crush, shake, or jolt the module.

9.3 HANDLING PRECAUTIONS

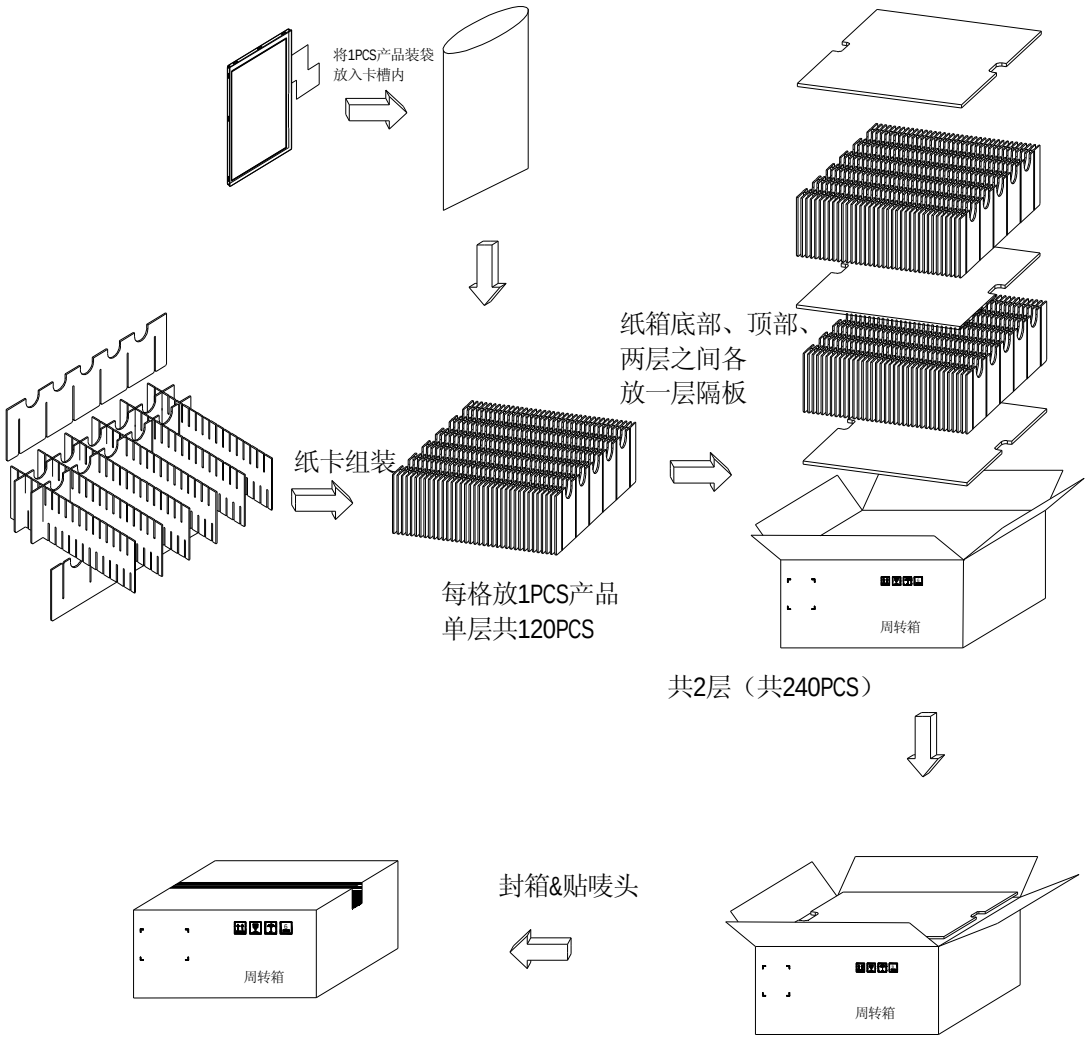
(1) Avoid static electricity which can damage the CMOS LSI.
(2) The polarizing plate of the display is very fragile. So, please handle it verycarefully.
(3) Do not give external shock.
(4) Do not apply excessive force on the surface.
(5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch theSurface of plate.
(6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(7) Do not operate it above the absolute maximum rating.
(8) Do not remove the panel or frame from the module.
(9)When the module is assembled, it should be attached to the system firmly,Be careful not to twist and bend the module.
(10)Wipe off water droplets or oil immediately. If you leave the droplets for a longtime, staining and discoloration may occur.
(11) If the liquid crystal material leaks from the panel,it should be kept away from theeyesormouth.In case of contact with hands,legs or clothes, it must be washedaway thoroughly with soap.

9.4 WARRANTY

(1)The period is within twelve months since the date of shipping out under normal using and storage conditions.
(2) Do not repaired or modified the LCM . It may cause function to lose efficacy ,HaoRan does not warrant the LCM.
(3) All process and material comply ROHS.

10. PACKAGE DRAWING

包装方式示意图



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