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FANNAL ELECTRONICS

SPEC. NUMBER	PRODUCT GROUP	REV.	ISSUE DATE	PAGE
AM-0500037A	TFT- LCM	V0	2023-02-09	1 OF 29

FN0500D037A

Product Specification Rev.V0

BUYER	
SUPPLIER	FANNAL Electronics CO., LTD
FG-Code	FN0500D037A

■ Preliminary Specification
□ Approval Specification

ITEM	BUYER SIGNATURE	DATE
Quality		
R&D		
Approved		

ITEM	SUPPLIER SIGNATURE	DATE
Prepared	MA	2023-02-09
Reviewed	XIONG	2023-02-09
Approved	JACK	2023-02-09

REV.	Page.	DESCRIPTION OF CHANGES	DATE	PREPARED
V0		On the basis of FN0500D033B changes: 1. Add bezel; 2. Change the Interface to RGB 50PIN; 3. Change the LED circuit into 5 series and 4 parall el	2023-02-09	MA

Contents

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1.0 General Description /一般说明

1.1 Application /应用

■ Industrial ☐ Automotive ☐ Medical

☐ Outdoor highlight ☐ Smart Home

1.2 General Specification /通用技术条件

Parameter	Specification	Unit
LCD size	5.0 inch(Diagonal)	inch
Resolution Ratio	800(H)×480(V)	pixels
Pixel Pitch	0.135x0.135(V)	mm
Active Area	108(H)×64.8(V)	mm
Module Size	120.7(W)×75.8(H)×2.8(D)	mm
Display Mode	Normally Black	
Interface	RGB 24-bit	
Pixel arrangement	RGB-Vertical Stripe	
View Direction	ALL	
Power Supply	3.3	V
Power Consumption	0.198	W
Weight	50	g
Luminance	1000 (MIN.)	cd/m²
Driver IC	ST72568	

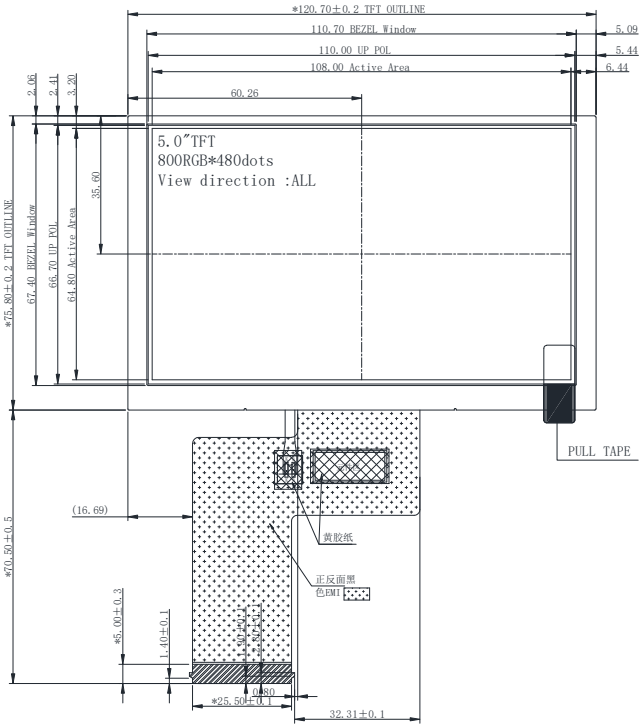
2.0 Mechanical Drawing /机械制图

TECHNOLOGY CHARACTERISTICS LCM	
SIZE	5.0 inch
Resolution ratio	800x480
Display mode	Transmissive Normally Black
Display direction	□ 6 □ 12 □ 3 □ 9 ■ Free
Contrast ratio	1200:1
Luminance	1000(MIN)1100(TYP)
Uniformity	80% MIN
Interface	RGB
Power supply	■ 3.3 □ 5.0
Operation temperature	-30~+80
Storage temperature	-30~+80
Driver IC	ST72568
Connection mode	■ FPC Plug-in □ FPC Welded □ Connector
Environmental Requirements	■ RoHS-2.0 □ REACH
Unmarked Tolerance	±0.2mm

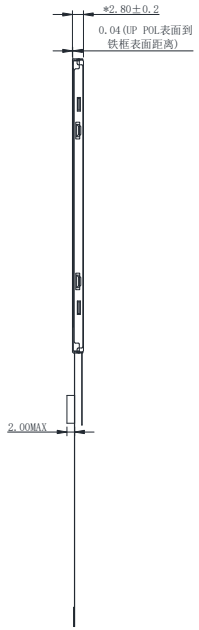
LED CIRCUIT DIAGRAM:

Backlight LED Circuit
IF=80mA VF=14.0~16.0V

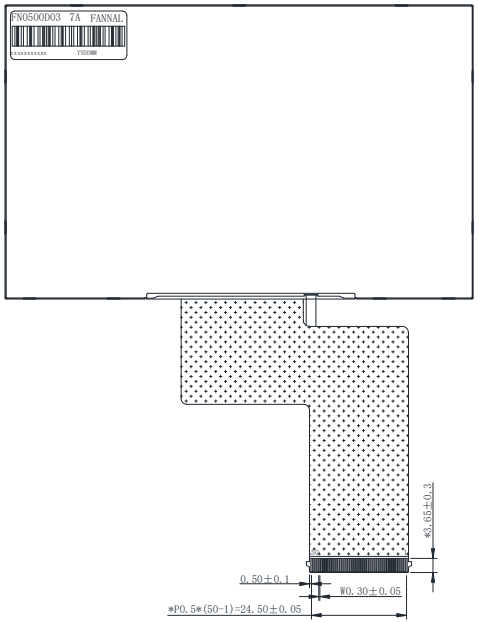
TOP VIEW



SIDE VIEW



BOTTOM VIEW



PIN	SYMBOL
1	LEDK2
2	LEDK1
3	LEDA
4	LEDA
5	CS
6	GND
7	NC
8	NC
9	SDA
10	SCL
11	LR
12	UD
13	VCC
14	VCC
15	END
16	DE
17	HSYNC
18	VSYNC
19	GND
20	CLK
21	GND
22	B07
23	B06
24	B05
25	B04
26	B03
27	B02
28	B01
29	B00
30	GND
31	G07
32	G06
33	G05
34	G04
35	G03
36	G02
37	G01
38	G00
39	GND
40	R07
41	R06
42	R05
43	R04
44	R03
45	R02
46	R01
47	R00
48	GND
49	RESET
50	STBYB

VER.	SYMBOL	AMENDMENT	SIGN	DATE
		First issue	LCF	2023 0209

DRAWN	LCF
CHECKED	JACK
APPROVED	JACK
CSR APPROVED	
Customer No:	
SHEET 1 OF 1	

TITLE

MODULE SPEC.

Drawing NO: FN0500D037A

Project No: LCM70087

FANNAL ELECTRONICS CO., LTD

3.0 ABSOLUTE MAXIMUM RATINGS /绝对最大额定值

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

Parameter	Symbol	Min.	Max.	Unit
Power Voltage	VDD	-0.3	+4.0	V
Operating Temperature	T_{OP}	-20	+70	℃
Storage Temperature	T_{ST}	-30	+80	℃
Humidity	RH	--	90%(Max60 °C)	RH

NOTE: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

4.0 ELECTRICAL SPECIFICATIONS/电气规范

4.1 TFT LCM Module

[Ta =25±2 ℃]

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDD	3.1	3.3	3.6	V
Power Supply current	IDD	--	60	--	mA
Input logic high voltage	VIH	0.7VDD	-	VDD	V
Input logic low voltage	VIL	0	-	0.3VDD	V

4.2 Backlight Driving Conditions /背光驱动条件

[Ta =25±2 ℃]

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Forward voltage	VF	14.0	15.0	16.0	V	Note 1
Forward current	IF	-	80	--	mA	-
LED Life Time	--	20000	30000	--	Hrs	Note 2

Note1: Under LCM operating, the stable forward current should be inputted. And forward voltage is for reference only.

Note2: Optical performance should be evaluated at Ta=25℃. if LED is driven by high current, high ambient temperature & Humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

5.0 Interface Description/接口说明

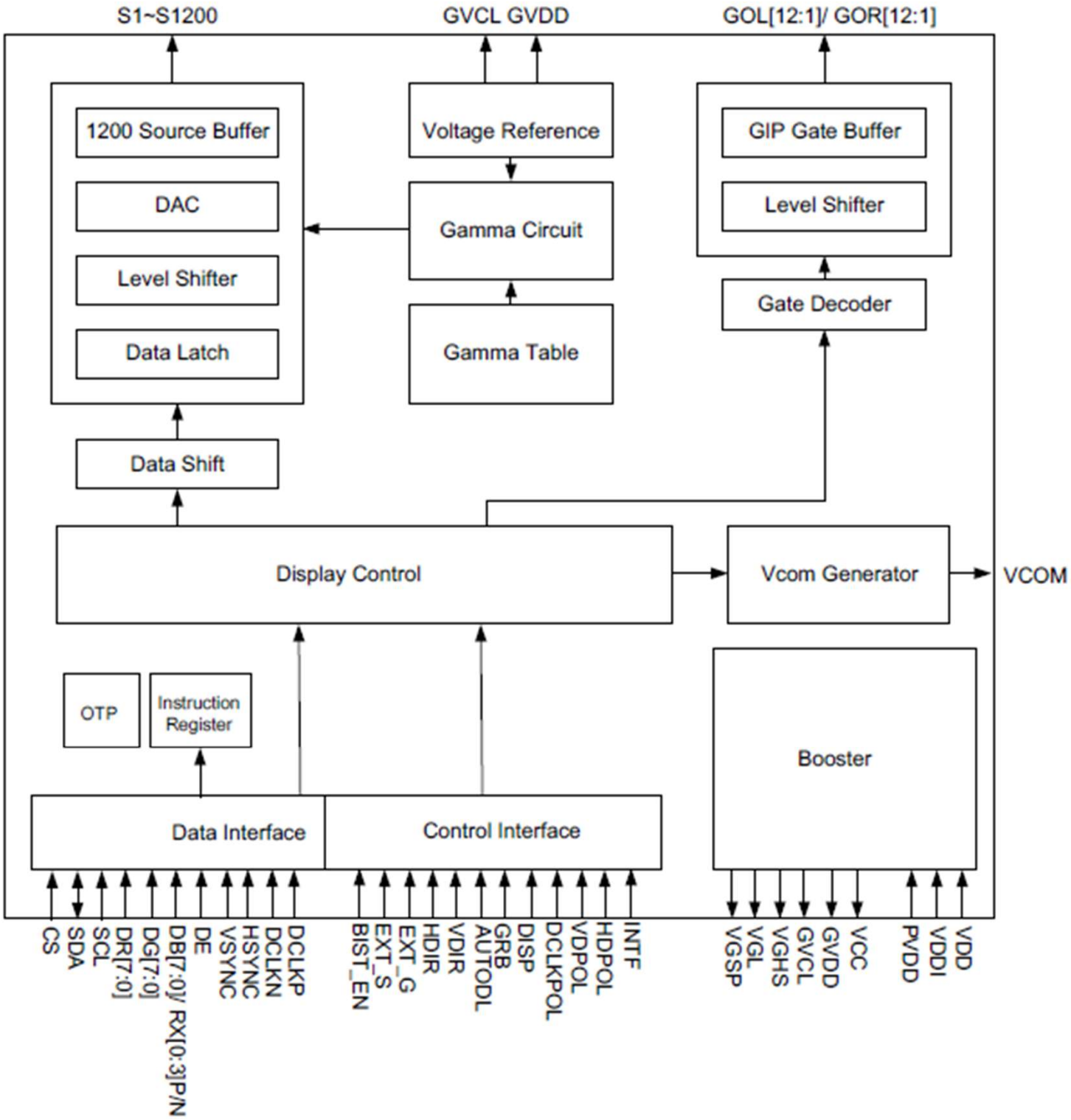
Connector Name/Designation	Interface Connector/Interface Card
Type Part Number	FPC 50PIN 0.5Pitch
Mating Housing Part Number	FH28-50S-0.5SH

5.1 Pin assignment for LCM module /模组引脚分配

Pin No.	Symbol	Description	Note.
1-2	LEDK	Backlight Ground	
3-4	LEDA	Backlight Anode	
5	CS	Chip select pin. Low level active	
6	GND	Power Ground	
7	NC	No connection	
8	NC	No connection	
9	SDA	SPI INTPUT	
10	SCL	SPI Pixel clock	
11	LR	LR= “H” : Shift from left to right. LR= “L” : Shift for right to left. When not used, user should connect it to “Hight”	
12	UD	UD= “H” : Shift from up to down. UD= “L” : Shift from down to up. When not used, user should connect it to “Hight”	
13-14	VCC	Power Supply voltage	
15	GND	Power Ground	
16	DE	Input data enable control	
17	HSYNC	Horizontal sync input with negative. Internally pull high	
18	VSYNC	Vertical sync input with negative, Internally pull high	
19	GND	Power Ground	
20	CLK	Pixel clock	
21	GND	Power Ground	
22-29	B07-B00	Blue data	
30	GND	Power Ground	

Pin No.	Symbol	Description	Note.
31-38	G07-G00	Green data	
39	GND	Power Ground	
40-47	R07-R00	Red data	
48	GND	Power Ground	
49	RESET	Reset pin	
50	STBYB	Pattern selection STBYB= “H” : Normal model STBYB= “L” : Sleep model	

5.2 BLOCK DIAGRAM

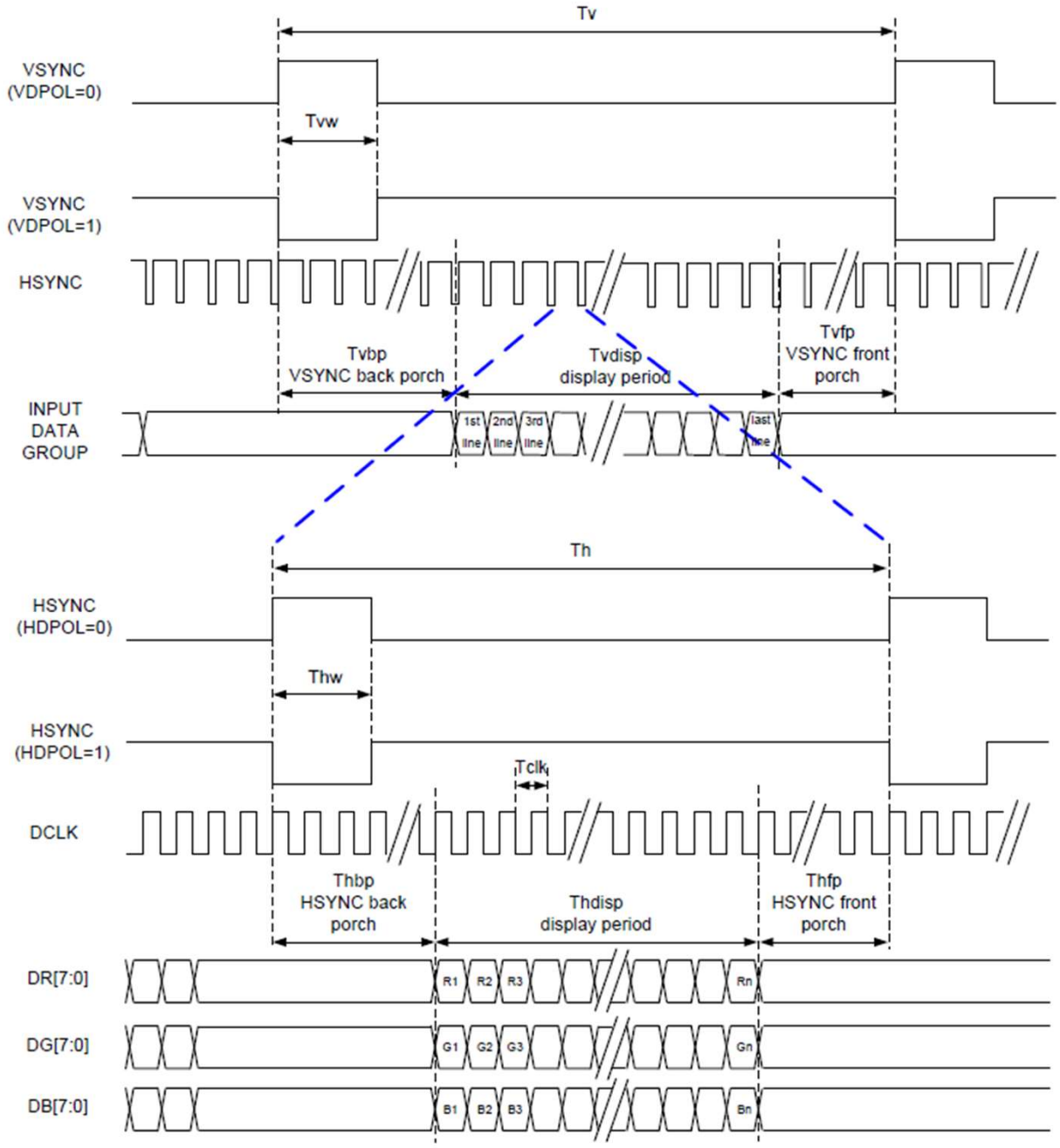


5.3 RGB Interface

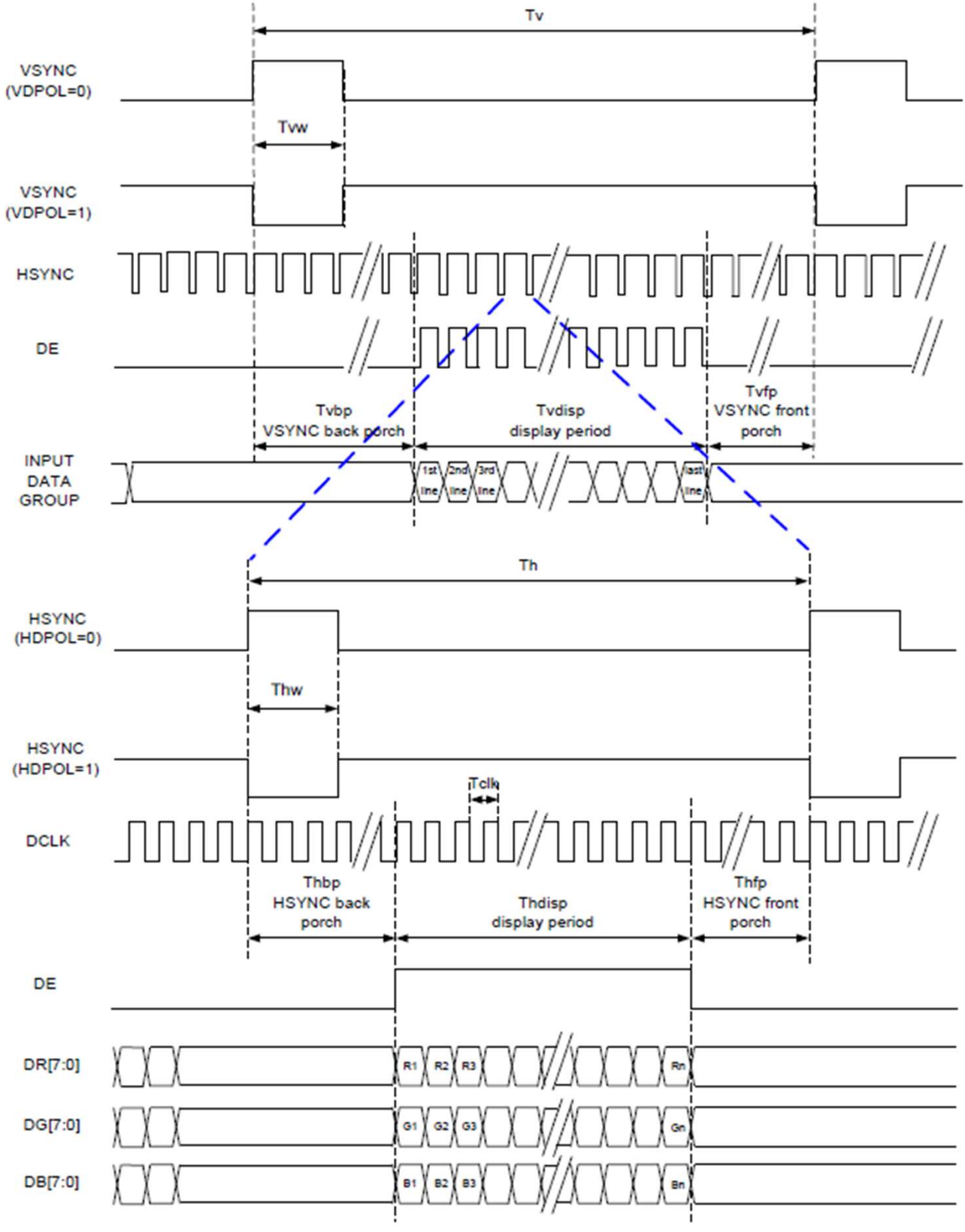
RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

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

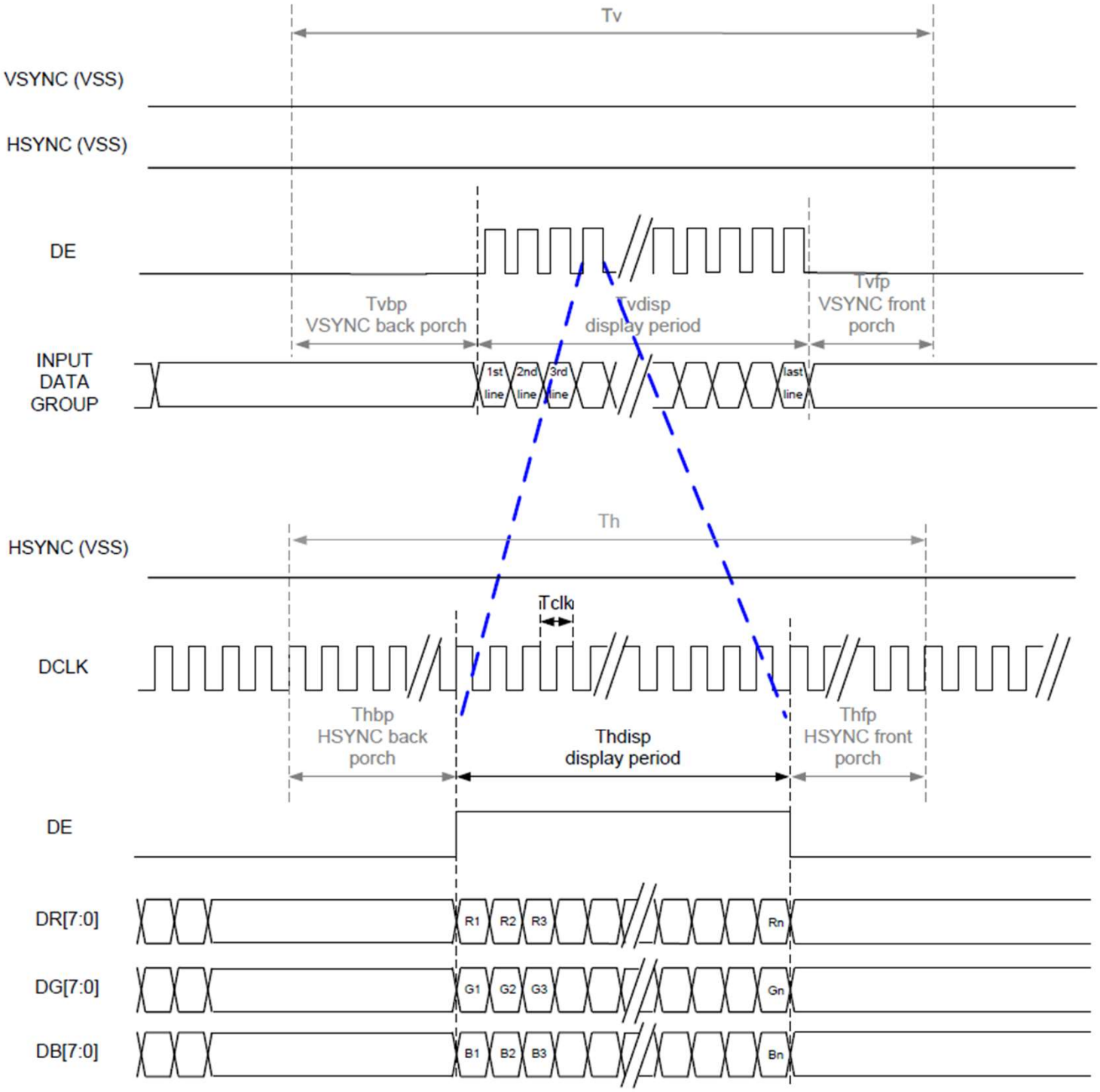
5.3.1 SYNC Mode



5.3.2 SYNC-DE Mode



5.3.3 DE Mode


Tv
VSYNC (VSS)
HSYNC (VSS)
DE
Tvbp
VSYNC back porch
Tvdisp
display period
Tvfp
VSYNC front
porch
INPUT
DATA
GROUP
1st
line
2nd
line
3rd
line
last
line
Th
HSYNC (VSS)
iTclk
DCLK
Thbp
HSYNC back
porch
Thdisp
display period
Thfp
HSYNC front
porch
DE
DR[7:0]
R1
R2
R3
Rn
DG[7:0]
G1
G2
G3
Gn
DB[7:0]
B1
B2
B3
Bn

5.4 Parallel 24-bit RGB Input Timing Tale

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

Parallel 24-bit RGB Interface Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	23	25	27	MHz	.
HSYNC	Period Time	Th	808	816	848	DCLK	
	Display Period	Thdisp		800		DCLK	
	Back Porch	Thbp	4	8	24	DCLK	
	Front Porch	Thfp	4	8	24	DCLK	
	Pulse Width	Thw	2	4	8	DCLK	
VSYNC	Period Time	Tv	496	512	528	HSYNC	
	Display Period	Tvdisp		480		HSYNC	
	Back Porch	Tvbp	8	16	24	HSYNC	
	Front Porch	Tvfp	8	16	24	HSYNC	
	Pulse Width	Tvw	2	4	8	HSYNC	

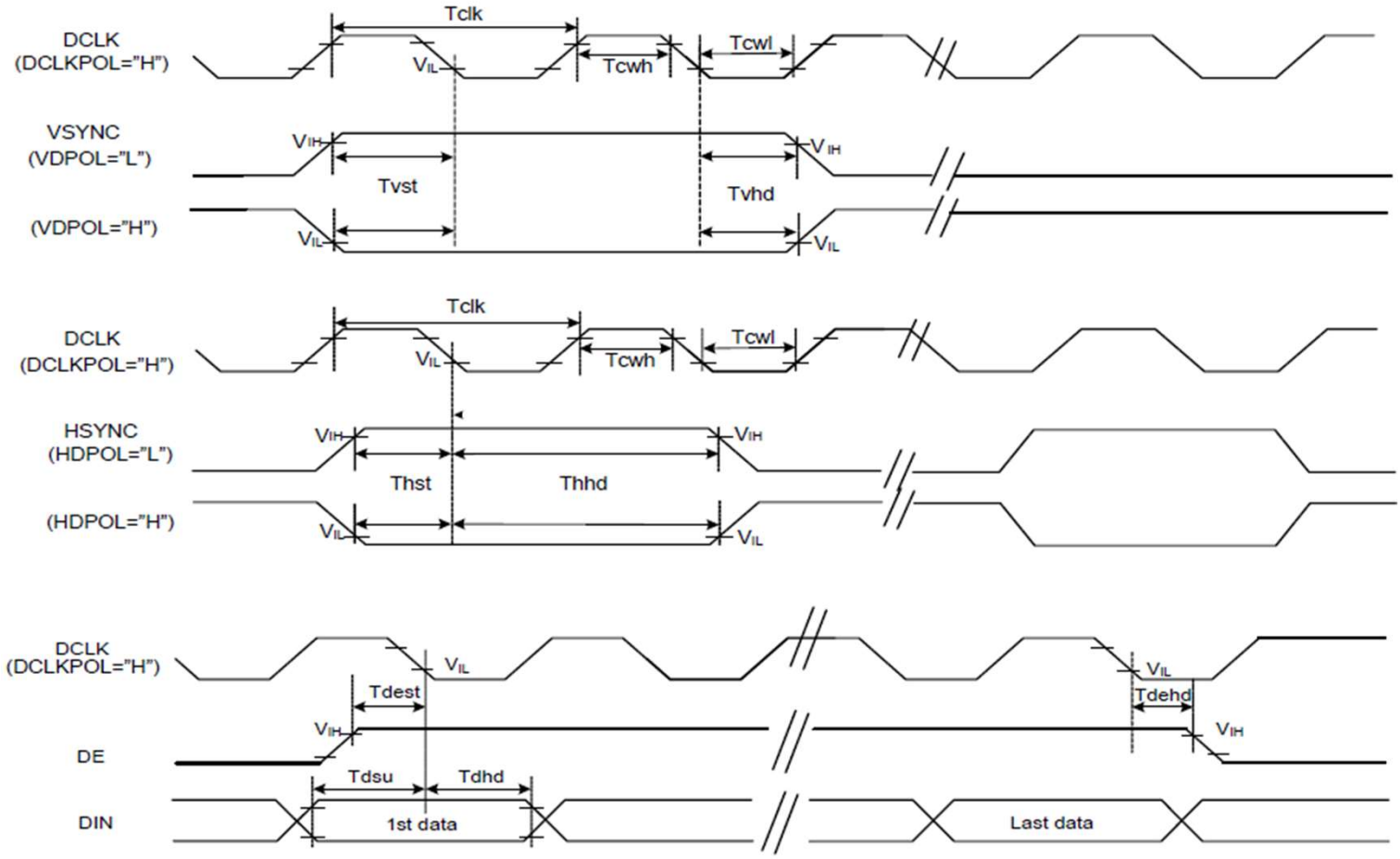
Note: 1. The minimum blanking time depends on the GIP timing of the panel specification

2. To ensure the compatibility of different panels, it is recommended to use the typical setting.

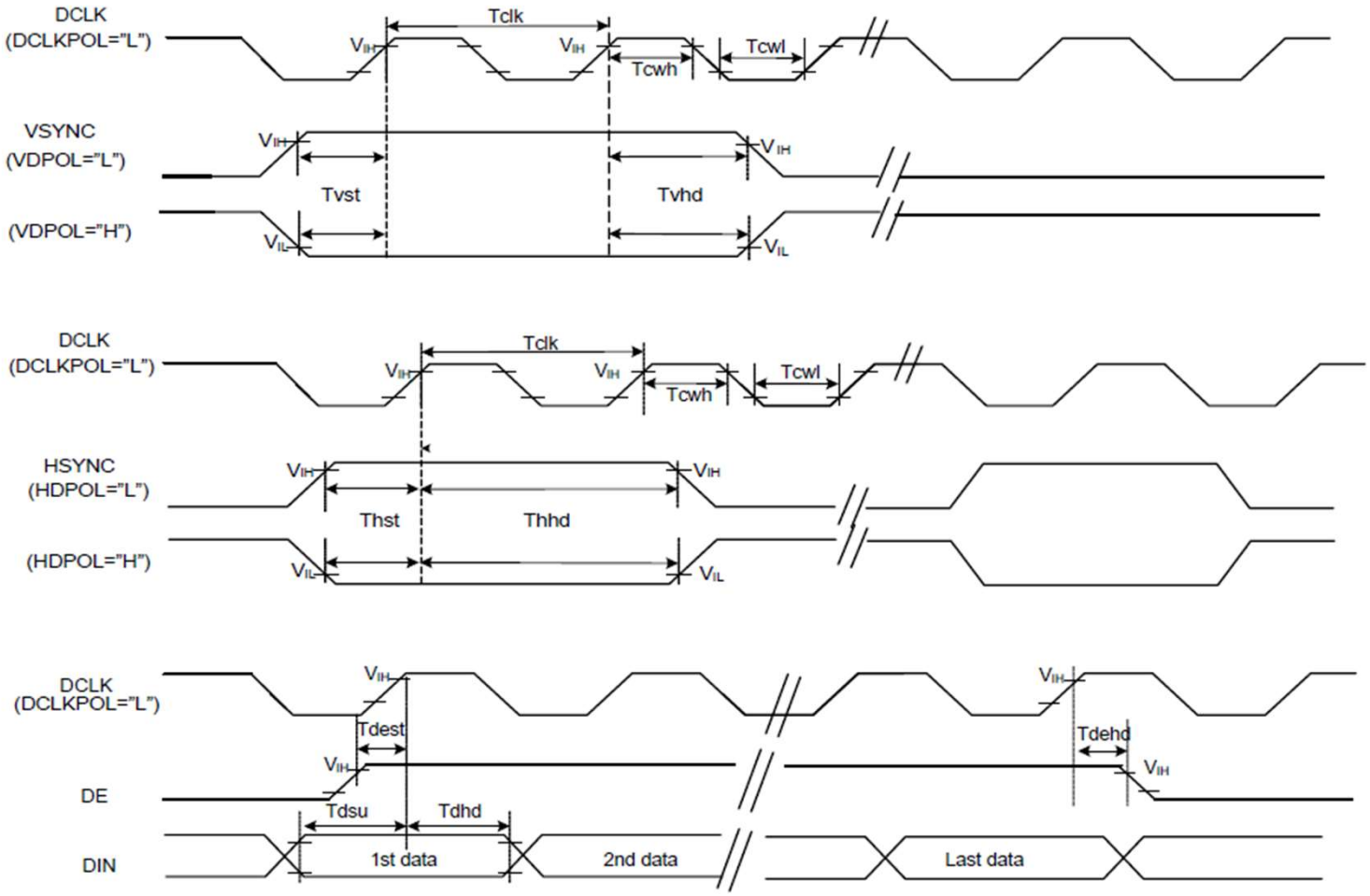
3. It is necessary to keep Tvbp =16 and Thbp =8 in sync mode. DE mode is unnecessary to keep it.

5.5 System Bus Timing for RGB Interface

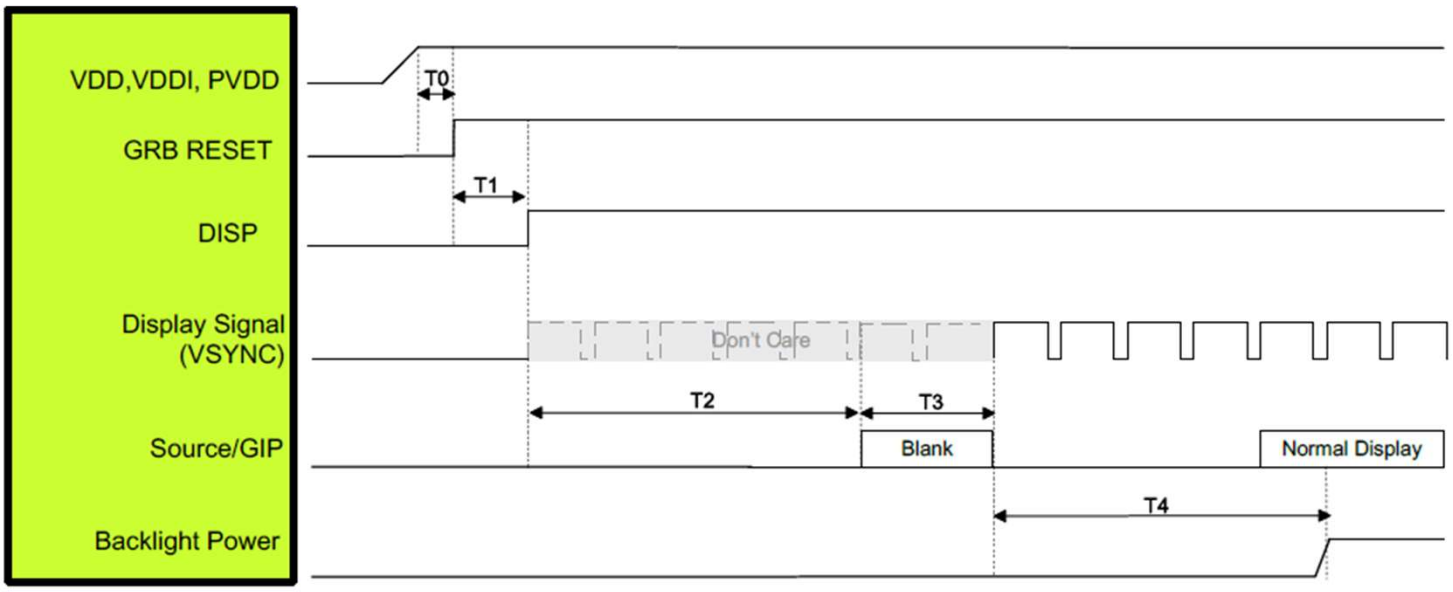
DCLK Neagtive Polarity (DCLPOL="H")



DCLK Positive Polarity (DCLPOL="L")



5.6 Power On Sequence



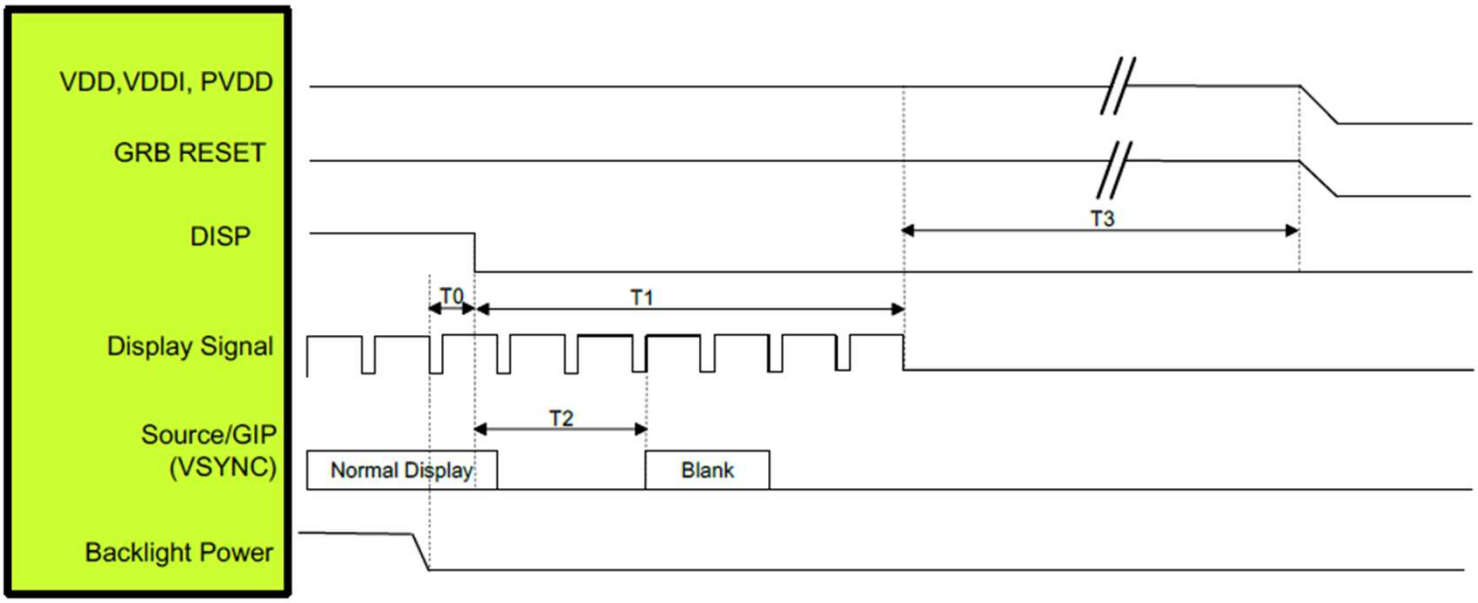
Symbol	Description	Time	Unit
T0	System power stability to GRB RESET signal	≥1	ms
T1	GRB RESET= "High" to DISP="High"	≥10	ms
T2	DISP="High" to Source/GIP scan blank	85	ms
T3	IC scan blanking signal	≥33	ms
T4	Display signal input to Backlight power on (base on Display Signal Frame Rate 60Hz)	≥100	ms

Note: 1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures .Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0].

3. LVDS interface Display signal: DCLK P/N; RX[3:0] P/N

5.7 Power Off Sequence



Symbol	Description	Time	Unit
T0	Backlight Power off to DISP="Low"	≥1	ms
T1	DISP="Low" to IC internal voltage discharge complete	≥100	ms
T2	DISP="Low" to Source/GIP scan blank (base on Display Signal Frame Rate 60Hz)	≤50	ms
T3	IC internal voltage discharge is completed to VDD/VDDI/PVDD off	≥0	ms

Note: 1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures .Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0].

3. LVDS interface Display signal: DCLK P/N; RX[3:0] P/N.

6.0 OPTICAL SPECIFICATIONS /光学规格

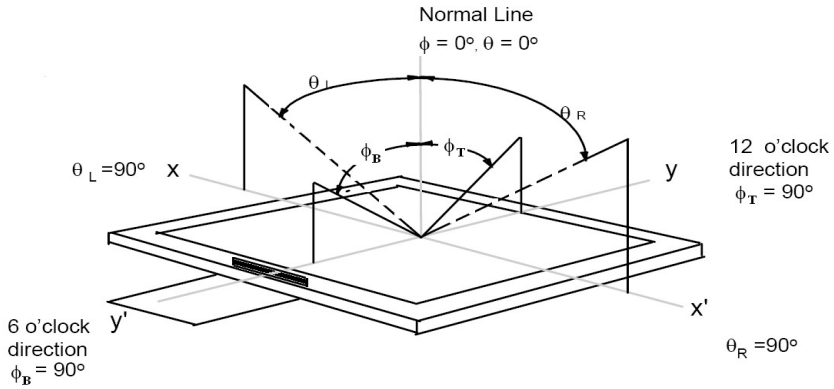
6.1 Overview /概述

The test of optical specifications shall be measured in a dark room (ambient luminance ≤1lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to θØ=0 (=θ3) as the 3 o'clock direction (the "right"), θØ=90 (= θ12) as the 12 o'clock direction ("upward"), θØ=180 (= θ9) as the 9 o'clock direction ("left") and θØ=270(= θ6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuring spot on the display surface shall stay fixed.

6.2 Optical Specifications /光学规格

Item	Symbol	Condition	Min	Typ.	Max	Unit	Note
Viewing Angle	θL	Cr≥10	70	80	--	deg	Note 1
	θ_R		70	80	--		
	ψ_T		70	80	--		
	ψ_B		70	80	--		
Contrast Ratio	Cr	θ=0° FF=0°	1000	1200		-	Note 2
Response Time	Tr+Tf		--	30	40	ms	Note 3
Color Coordinate of CIE1931	Wx	θ=0°	0.275	0.305	0.335	-	Note 4
	Wy		0.296	0.326	0.356		
	Rx		0.563	0.593	0.623		
	Ry		0.295	0.325	0.355		
	Gx		0.324	0.354	0.384		
	Gy		0.570	0.600	0.630		
	Bx		0.128	0.158	0.188		
	By		0.063	0.093	0.123		
Uniformity	U		80	--	--	%	Note 5
Color Gamut			50	55	--	%	
Luminance	L		1000	1100	--	cd/m²	Note 6

Note 1:**The definition of Viewing Angle**
Refer to the graph below marked by θ and Φ.



Note2:**ThedefinitionofContrastRatio**

$$\text{Contrast Ratio(CR)} = \frac{\text{Luminance When LCD is at “White” state}}{\text{Luminance When LCD is at “Black” state}}$$

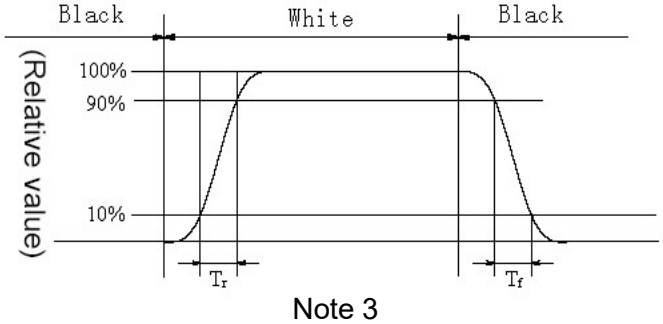
(Contrast Ratio is measured in optimum common electrode voltage)

Note3:**DefinitionofResponse time.**(Test LCD using RD80S or similar equipments):
The output sign also photo detector are measured when the input sign also are changed from “black ” to “white” (Voltage falling time)and from “white” to “black” (Voltage rising time), respectively . The response time is defined as the time interval between the 10% and 90% of amplitudes . Refer to fi gures below.

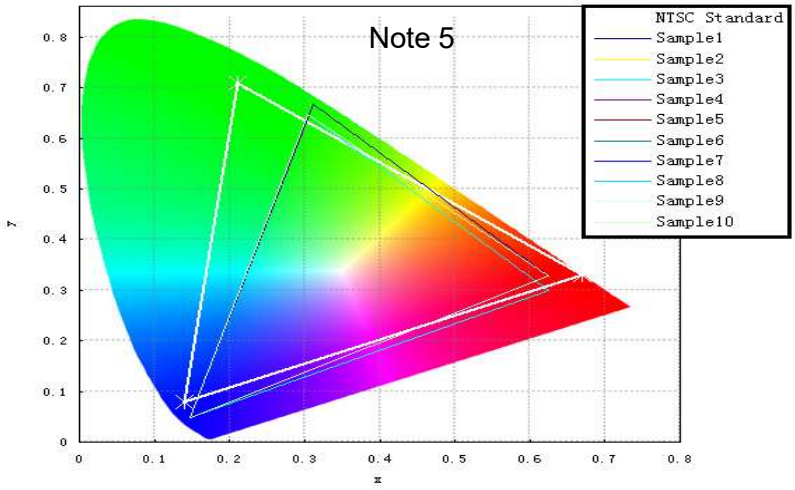
Note 4: Color Coordinates of CIE 1931
The test condition is at ILED=20mA and measured on the surface of LCD module at 25℃.
Measurement equipment:CS2000 or similar equipments
The Color Coordinate (CIE 1931) is the measurement of the center of the display shown in below figure.

Note 5: Definition of Color of CIE Coordinate and NTSC Ratio.

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$



Note 3



7.0 RELIABLITY TEST /可靠性测试

The Reliability test items and its conditions are shown in below.

No	Test Items	Conditions	Testing standard
1	High temperature storage test	80℃ 240hrs	IEC60068-2-1:2007 GB2423.2-2008
2	Low temperature storage test	-30℃ 240hrs	
3	High temperature operation test	80℃ 240hrs	
4	Low temperature operation test	-30℃ 240hrs	
5	High temperature & humidity (storage test)	60℃ 90%RH 240hrs	IEC60068-2-78:2001 GB/T2423.3-2006
6	Thermal Shock Test	-30℃~80℃ 1hr/cycle 50cycle	Start with cold temperature End with high temperature IEC60068-2-14:1984, GB2423.22-2002
7	Vibration Test	10Hz-55Hz 100m/s² 120min	IEC60068-2-32:1990 GB/T2423.8-1995
8	Mechanical shock	100G ±X, ±Y, ±Z, 3times for each direction	
9	Dropping test	Height: 60 cm, 1 corner, 3 edges, 6 surfaces	
10	ESD test	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times;	IEC61000-4-2:2001 GB/T17626.2-2006 Class C

• 8.0 Precautions /注意事项

• Please pay attention to the followings when you use this TFT LCD Panel.

• 8.1 Mounting Precautions /安装注意事项

• (1) Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

• (2) You must mount a module using specified mounting holes (Details refer to the drawings).

• (3) Please make sure to avoid external forces applied to the Source PCB or FPC and D-IC during the process of handling or assembling. If not, It causes panel damage or malfunction.

• (4) Note that polarizers are very fragile and could be easily damaged. Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.

• (5) Do not pull or fold the source D-IC which connect the source PCB or FPC and the panel.

• Do not pull or fold the LED wire.

• (6) After removing the protective film, when the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with alcohol or purified water.

• Do not strong polar solvent because they cause chemical damage to the polarizer.

• (7) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.

• (8) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

• (9) Since the LCD is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration, and careless handling may seriously affect the product. If it f alls from a high place or receives a strong shock, the glass may be broken.

• (10) Do not disassemble the module.

• (11) To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.

• (12) If the customer's set presses the main parts of the LCD, the LCD may show the abnormal display. But this phenomenon does not mean the malfunction of the LCD and should be pressed by the way of mutual agreement.

• (13)Do not drop water or any chemicals onto the LCD’s surface.

8.2 Operating Precautions /操作注意事项

- (1) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- (2) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.
- (3) The electrochemical reaction caused by DC voltage will lead to LCD degradation, so DC drive should be avoided.
- (4) The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.
- (5) Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.
- (6) Design the length of cable to connect between the connector for back-light and the converter as short as possible and the shorter cable shall be connected directly.
The longer cable between that of back-light and that of converter may cause the luminance of LED to lower and need a higher startup voltage(Vs).
- (7) Connectors are precise devices for connecting PCB and transmitting electrical signals. Operators should insert and unplug MDL in parallel when assembling MDL.
- (8) Do not connect or disconnect the cable to/ from the module at the "Power On" condition.
- (9) When the module is operating, do not lose CLK, ENAB signals. If any one these signals is lost, the LCD panel would be damaged.
- (10) Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
- (11) Do not re-adjust variable resistor or switch etc.
- (12) For the Q/Single/OC Product, If the LED designed side view, LED bar should be putted in the L ong/short side；Otherwise, its reliability and function may not be guaranteed.

注:
①(1)涉及到Pol相关条目适用于OC/MDL出货产品，
②(6)(7)涉及到connector相关适用于OC/MDL出货产品
③ (12) 涉及到客户进行BLU设计，LED Bar位置需要避开GOA位置；

8.3 Electrostatic Discharge Control /静电放电控制

- (1) Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don’t touch interface pin directly. Keep products as far away from static electricity as possible.
- (2) Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.

8.4 Precautions for Strong Light Exposure /强光照射注意事项

It is not allowed to store or run directly in strong light or in high temperature and humidity for a long ti me; Strong light exposure causes degradation of polarizer and color filter.

8.5 Storage Precautions /存储注意事项

When storing modules as spares for a long time, the following precautions are necessary.

•(1) The polarizer surface should not come in contact with any other object.
It is recommended that they be stored in the container in which they were shipped.
Temperature : 5 ~ 40 ℃

•(2) Humidity : 35 ~ 75 %RH

•(3) Period : 6 months

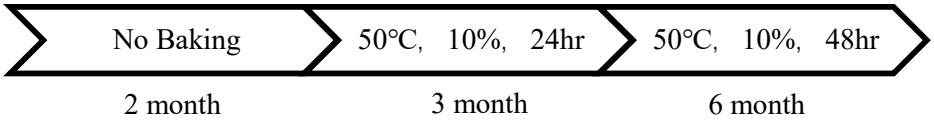
•(4) Control of ventilation and temperature is necessary.

•(5) Please make sure to protect the product from strong light exposure, water or moisture.
Be careful for condensation.

•(6) Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.

•(7)Do not store the LCD near organic solvents or corrosive gasses.

•(8) Please keep the Modules/OC/FOG at a circumstance shown below Fig.



8.6 Precautions for Protection Film /保护膜注意事项

• (1) Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and th e humidity of working room should be kept over 50%RH to reduce the risk of static charge.

• (2) In handling the LCD, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

8.7 Appropriate Condition for Display /适当的显示条件

•(1) Normal operating condition
- Temperature: 0 ~ 40℃
- Operating Ambient Humidity : 10 ~ 90 %
- Display pattern: dynamic pattern (Real display)
- Suitable operating time: under 12 hours a day.

•(2) Special operating condition

If the product will be used in extreme conditions such as high temperature, humidity, display patterns or 7*24hrs operation time etc.., It is strongly recommended to contact us for Application engineering advi ce. Otherwise, its reliability and function may not be guaranteed.

•(3)Black image or moving image is strongly recommended as a screen save.

- (4) Lifetime in this spec. is guaranteed only when commercial display is used according to operating usages.
- (5) Please contact us in advance when you display the same pattern for a long time.
- (6) If the Module keeps displaying the same pattern for a long period of time, the image may be "sticked" or "turn off" to the screen. To avoid image sticking, it is recommended to use a screen saver.
- (7) Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.
- (8) Dew drop atmosphere should be avoided.
- (9) The storage room should be equipped with a good ventilation facility and avoid to expose to corrosive gas , which has a temperature controlling system.
- (10) The LCD should be avoided to expose to corrosive gas for long time, ,the LCD may be affected by the gas as SO2 ,H2S etc.
- (11) When expose to drastic fluctuation of temperature (hot to cold or cold to hot) ,the LCD may be affected; Specifically, drastic temperature fluctuation from cold to hot ,produces dew on the LCD's surface which may affect the operation of the polarizer and the LCD.
- (12) Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD may turn black at temperature above its operational range. However those phenomena do not mean malfunction or out of order with the LCD. The LCD will revert to normal operation once the temperature returns to the recommended temperature range for normal operation

8.8 Others /其他

A. LC Leak /液晶泄露

- If the liquid crystal material leaks from the panel, it is recommended to wash the LC with acetone or ethanol and then burn it.
- In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- If LC in mouth, mouth need to be washed, drink plenty of water to induce vomiting and follow medical advice.
- If LC touch eyes, eyes need to be washed with running water at least 15 minutes.

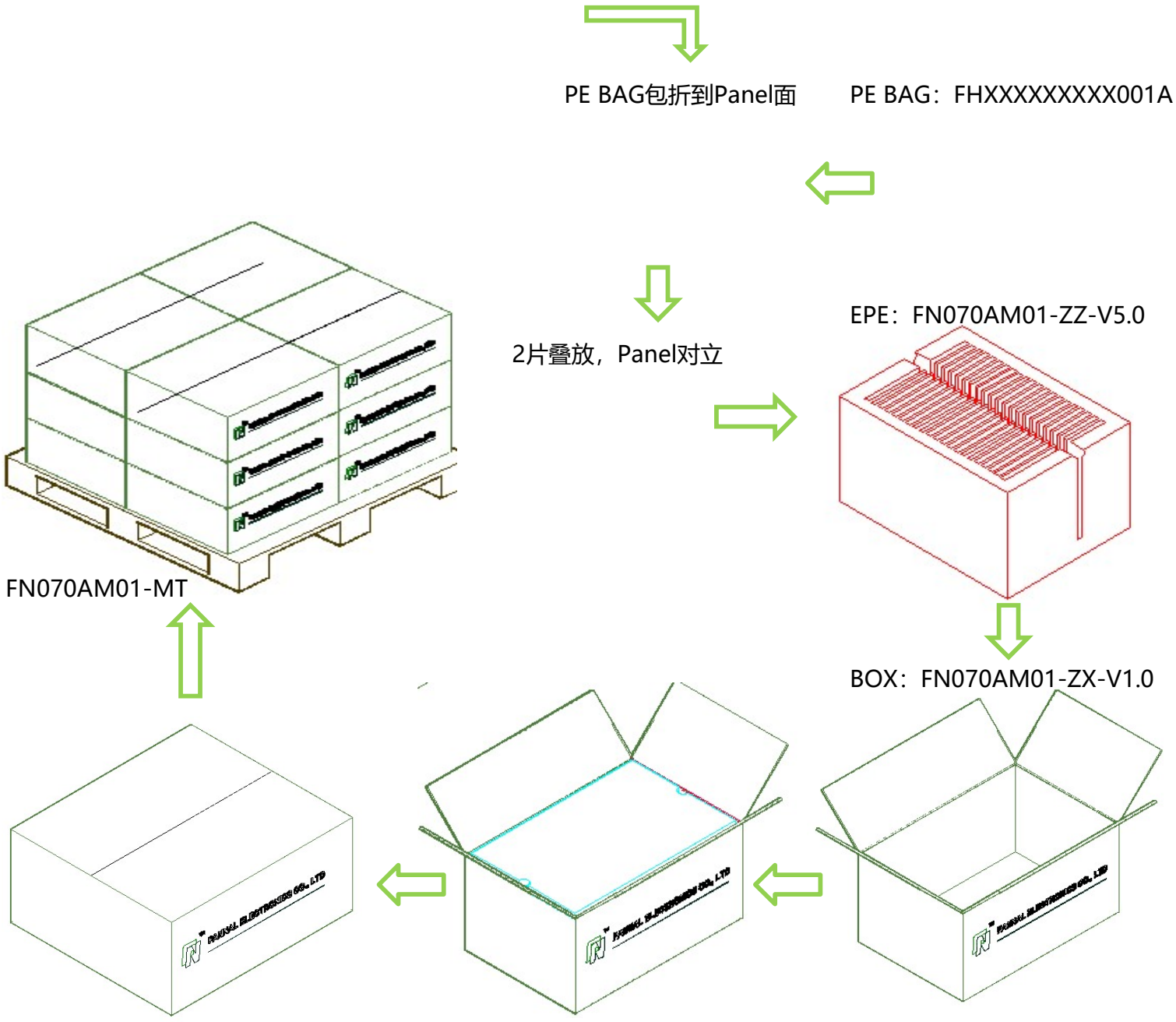
B. Rework /返工

- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

C. In order to prevent potential problems, flicker should be adjusted by optimizing the Vcom value in customer LCM Line (适用于Q/Single/OC出货产品)

9.0 PACKING INFORMATION(产品形态： LCM)

LCM MODEL	LCM Qty. in the Box	Carton Size(mm)	LCM Qty. in the Pallet
TBD			

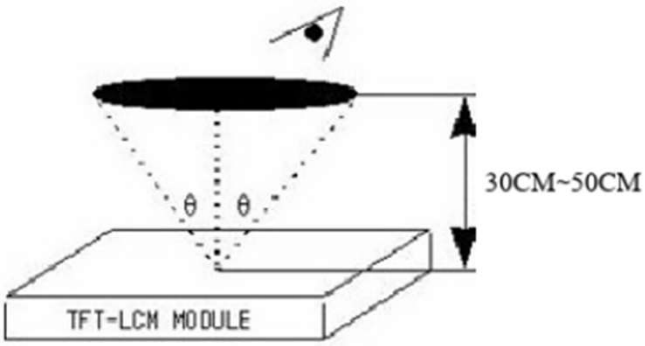


10.0 VISUAL INSPECTION CRITERIA FOR ALL CUSTMERS /所有客户的目视检查标准

10.1 Sampling Method /抽样方法

Unless otherwise agreed upon in writing, the sampling insepction shall be applied to t he Customers incoming inspection.

10.1.1 Lot size：1 pallet per same model
10.1.2 Sampling type：Random sampling
10.1.3 Inspection level：II
10.1.4 Sampling table：MIL-STD-105E



10.2 Inspection Environment /检验环境

10.2.1 Ambient conditions
a. Ambient Temperature:25±3℃
b. Relative Humidity:65±20%RH
c. Ambient Illumination:300-700LUX(Normal:500LUX)

10.2.2 Viewing Distance
The distance between the LCM and the inspector's eyes shall be at least 30cm-50cm

10.2.3 Viewing Angle
performing in front of the panel
[Vertical]：±25degree
[Horizontal]：±40degree

10.2.4 Inspection Area:
Display Area(Active Area)

10.3 Definitions /定义

10.3.1 Dark / Bright Spots
Points on display which appear dark/bright and usually result form the contamination. These defects do not vary in size or intensity(contrast)when contrast is varied.
10.3.2 Dark / Bright Lines
Lines on display which appear dark/bright and usually result from the contamination.
10.3.3 Polarizer Scratch
Lines on display which are seen across a darker background and do not vary in size.
10.3.4 Polarizer Dent
White spots on display which appear againse a darker backgound and do not vary in size.
103.5 Bright Dot Defects
Dots(sub-pixels)on display which appear bright in the display area and visible throug h the 5%ND filter at Black Pattern.

10.3.6 Dark Dot Defects

Dots(sub-pixels)on display which appear dark in the display area at R.G.B Color Pattern.

10.3.7 Line Defects

All line defects on display which appear brigh/dark such as vertical,horizontal,or cross lines.

10.3.8 Mura

Mura on display which appears darker/brighter against background birghtness on parts of display area.

10.3.9 BM Defects

Bright(white)Points on display which are off BM(Black Matrix).

10.3.10 Visual Inspection

Inspection for LCM when the unit turns on.

10.3.11 Appearance Inspection

External inspection for LCM when the unit turns off.

10.3.12 Other

Defects which cannot be classified into the above defect definitions.

Note 1: Bright& Dark dots are not smaller than a sub-pixel(Dots smaller than a sub-pixel are not counted as defect dots)

10.4 Inspectin Criteria /检验标准

Refer to 《TFT LCM general inspection standard》

10.5 Verification /验证

The supplier can verify the defective LCMs to segregate the responsibilities at customer's facility or can request the Customer to ship the defective LCMs to assigned place for verification

This verificatin result shall be agreed mutually buy the Customer and Supplier. This result can be corrected/changed after detail failure analysis at Supplier's facilities.

10.6 Supplier Induced Defects /供应商引起的缺陷

All of the Supplier induced defective LCMs shall be returned to the Supplier for repair or replacement.

Bfore return the defective LCMs, the Customer needs Supplier's confirmatin with RMA Number.

All of the returned LCMs shall be returned to the Customer within agreed time period.

10.7 Customer Induced Defects /顾客引起的缺陷

The Customer can return the custmoer induced defective LCMs to the Supplier for repair.

The repair cost for Customer induced defective LCMs shall be agreed with both parties, Customer and Supplier.

10.8 Warranty Period /质量保证期

In-warranty period is Eighteen(18)Months from manufacturing month of LCM

Note：

a. Eighteen months are composed of twelfth months in-warranty period and sixth months distribution period

b. The manufacturing Month is on the LCMs as Supplier's serial No.

10.9 Repair Warranty /维修保证书

Repair warranty is Twelve(12)Months from repaired month for repaired LCMs

Note：a. The Label for repair will be added after repairing.

10.10 Warranty avoidance /避免担保

The warranty will be avoided in cases of below:

a. When the warranty period is expired.

b. The Customer induced defective LCMs.

c. When the LCMs were repaired by 3rd party without Suppolier's approval.

d.When the LCMs were treated like Disassemble and Rework by the Customer and/or Customer's representatives without Supplier's approval.

10.11 Others /其他

If any problems arise with the LCMs supplied by supplier, the customer and supplier will coopeate and make ettorts to solve it with mutual contidence and respect