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SPEC. NUMBER
AM-0900002A

PRODUCT GROUP
TFT- LCM

REV.
V1

ISSUE DATE
2023-05-09

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FN0900D002A

Product Specification Rev.V0


BUYER	
SUPPLIER	FANNAL Electronics CO., LTD
FG-Code	FN0900D002A

☐ Preliminary Specification

☒ Approval Specification


ITEM	BUYER SIGNATURE	DATE
<u>Quality</u>	_____	_____
<u>R&D</u>	_____	_____
<u>Approved</u>	_____	_____

ITEM	SUPPLIER SIGNATURE	DATE
Prepared	<u>Dong</u>	<u>2023-05-09</u>
Reviewed	<u>Xiong</u>	<u>2023-05-09</u>
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1.0 General Description /一般说明


1.1 Application /应用

- ☒ Industrial
- ☐ Medical
- ☐ Outdoor highlight
- ☐ Automotive
- ☐ Smart Home
- ☐ Digital & Consumer

1.2 General Specification

Parameter	Specification	Unit
LCD size	9.0 (Diagonal)	inch
Resolution Ratio	1024(H)×600(V)	pixels
Pixel Pitch	0.192(H)×0.19025(V)	mm
Active Area	196.608(H)×114.15(V)	mm
Module Size	210.7(W)×126.5(H)×5.0(D)	mm
Display Mode	Transmissive , Normally White	
Display Colors	16.2M	colors
Interface	MIPI	
Pixel arrangement	RGB-Vertical Stripe	
View Direction	6:00	
Power Supply	1.8	V
Power Consumption	LCD: 0.036@VDD=1.8V Backlight: 2.3 @IF=240mA	W
Weight	210(TYP.)	g
Luminance	400(TYP.)	cd/m²
Driver IC	EK79007AD+EK7321BCGA	

1		2		3		4		5		6		7		8		9	
TECHNOLOGY CHARACTERISTICS LCM																01	VCOM
SIZE	9.0inch															02	VDD (1. 8)
Resolution ratio	1024(RGB)x600															03	VDD (1. 8)
Display mode	Transmissive Normally White															04	NC
Display direction	■ 6 □ 12 □ 3 □ 9 □ Free															05	RESET
Contrast ratio	500:1															06	STBYB
Luminance	400Typ															07	GND
Uniformity	75%MIN															08	DON
Interface	MIPI															09	DOP
Power supply	■ 1.8 □ 3.3															10	GND
Operation temperature	-20~70															11	D1N
Storage temperature	-30~80															12	D1P
Driver IC	EK79007+EK73217															13	GND
Connection mode	■ FPC Plug-in □ FPC Welded □ Connector															14	CLKN
Environmental requirements	■ RoHS-2.0 □ REACH															15	CLKP
Unmarked tolerance	±0.2mm															16	GND
																17	D2N
																18	D2P
																19	GND
																20	D3N
																21	D3P
																22	GND
																23	NC
																24	AVDD
																25	NC
																26	VGL
																27	NC
																28	VGH
																29	NC
																30	GND

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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	2.0	V
	AVDD	-0.5	15.0	V
Operating Temperature	T _{OP}	-20	+70	°C
Storage Temperature	T _{ST}	-30	+80	°C
Humidity	RH	--	90%(Max60 °C)	RH

4.0 ELECTRICAL SPECIFICATIONS/电气规范

4.1 TFT LCM Module

[Ta =25±2 °C]

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDD	1.7	1.8	1.9	V
	AVDD	8.0	9.6	13.5	V
	VGH	17	18	19	V
	VGL	-11	-10	-9	V
	VCOM	4.3	4.5	4.7	V
Power Supply current	IDD	-	20	-	mA
Input logic high voltage	VIH	0.7VDD	-	VDD	V
Input logic low voltage	VIL	0	-	0.3VDD	V


Note:

1、VGH is TFT Gate operating Voltage.

2、VGL is TFT Gate operating Voltage.

The storage structure of this model is Cst (Storage on Common)

3、Vcom must be adjusted to optimize display quality_Cross talk, Contrast Ratio and etc.

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4.2 Backlight Driving Conditions /背光驱动条件

[Ta =25 ± 2 °C]

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Forward voltage	V _F	8.4	9.6	10.5	V	Note 1
Forward current	I _F	-	240	-	mA	-
LED Life Time	-	30K	50K	-	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°C. 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.


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5.0 Interface Description/接口说明


Connector Name/Designation	Interface Connector/Interface Card
Type Part Number	FPC 0.5Pitch 30P
Mating Housing Part Number	101049-203030(BJD)

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

Pin No.	Symbol	Description
1	VCOM	Common Voltage
2	VDD	Power Voltage for digital circuit
3	VDD	Power Voltage for digital circuit
4	NC	No connection
5	RESET	Global reset pin
6	STBYB	Standby mode, Normally pulled high
7	GND	Ground
8	D0N	MIPI data lane0 input
9	D0P	MIPI data lane0 input
10	GND	Ground
11	D1N	MIPI data lane1 input
12	D1P	MIPI data lane1 input
13	GND	Ground
14	CLKN	MIPI clock input
15	CLKP	MIPI clock input
16	GND	Ground
17	D2N	MIPI data lane2 input
18	D2P	MIPI data lane2 input
19	GND	Ground
20	D3N	MIPI data lane3 input
21	D3P	MIPI data lane3 input

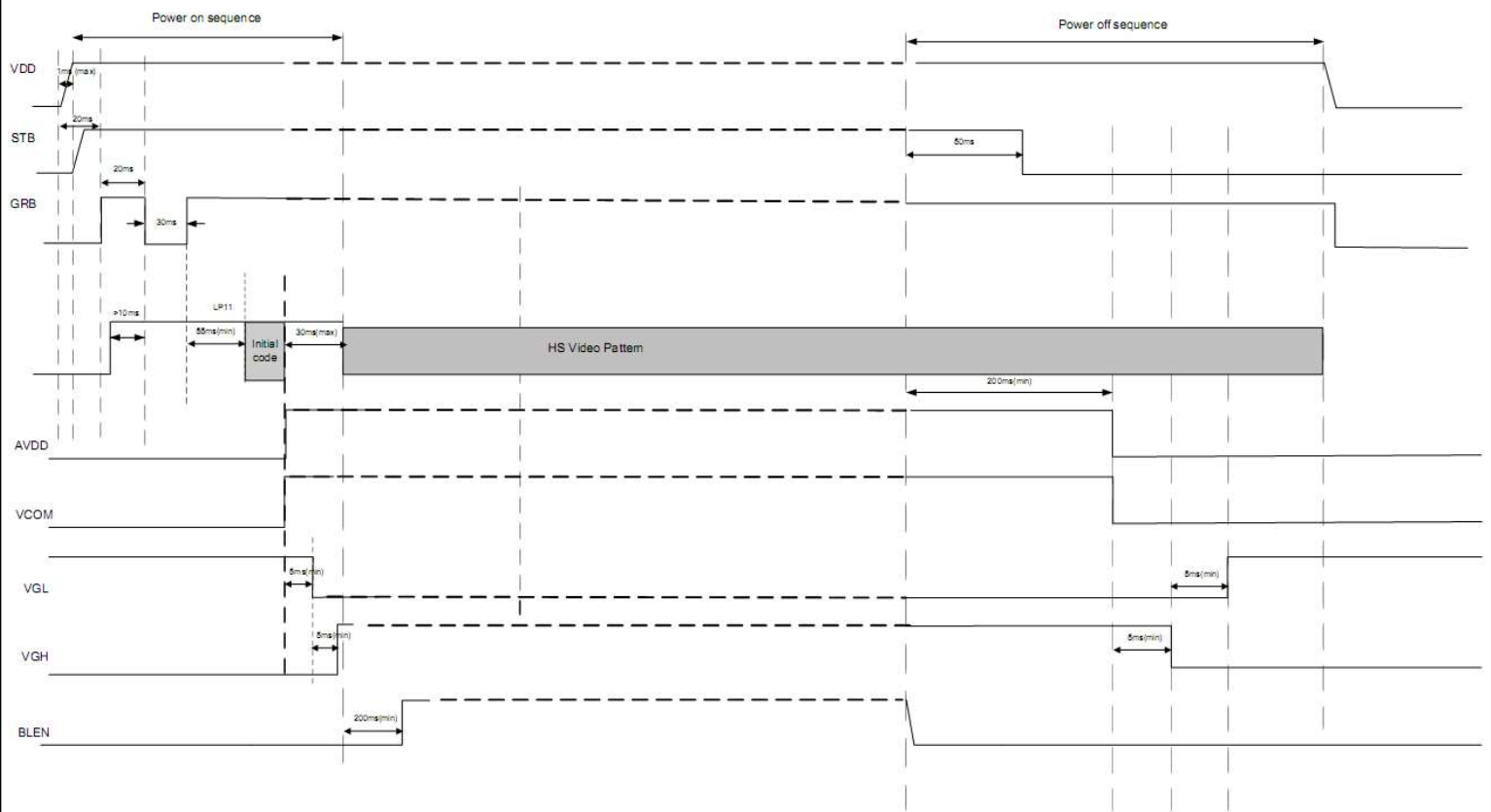
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Pin No.	Symbol	Description
22	GND	Ground
23	NC	No connection
24	AVDD	Power for Analog Circuit
25	NC	No connection
26	VGL	Gate OFF Voltage
27	NC	No connection
28	VGH	Gate ON Voltage
29	NC	No connection
30	GND	Ground.

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5.2 Power on/off 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.



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5.3 DC ELECTRICAL CHARACTERISTICS

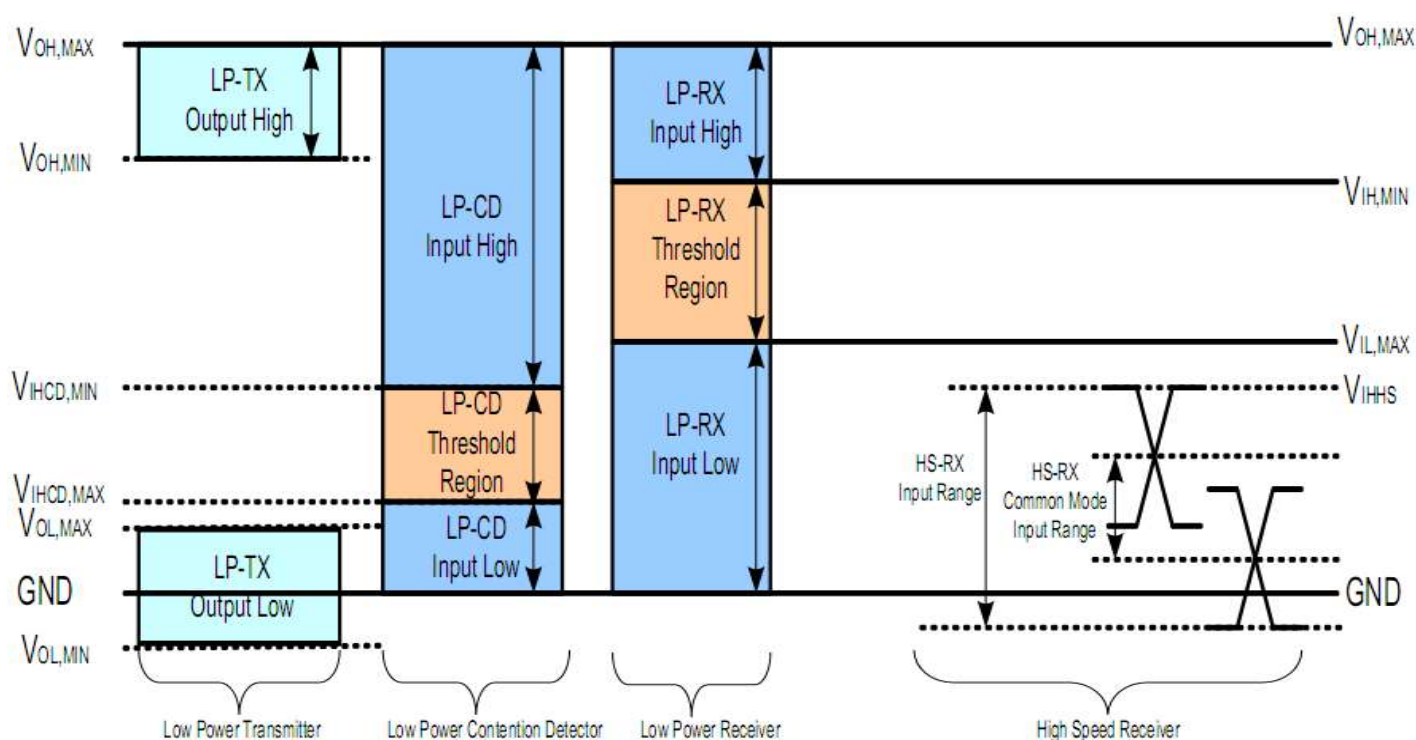
(VDD=VDD_IF=1.8V, AVDD=8 to 13.5V, GND=AGND=GND_IF=0V)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Low level input voltage	Vil	For the digital circuit	0	-	0.3×VDD	V
High level input voltage	Vih	For the digital circuit	0.7×VDD	-	VDD	V
Input leakage current	Ii	For the digital circuit	-	-	±1	μA
High level output voltage	Voh	Ioh= -400 μA	VDD – 0.4	-	-	V
Low level output voltage	Vol	Iol= +400 μA	-	-	GND+0.4	V
Pull low/high resistor	Ri	For the digital input pin @ VDD_IF=1.8V	200K	250K	300K	ohm
Digital Operation current	Idd	Fclk=51.2MHz, VDD=VDD_IF=1.8V	-	TBD	-	mA
Digital Stand-by current	Ist1	Clock and all functions are stopped	-	10	50	μA
Analog Operating Current	Idda	No load, Fclk=51.2MHz, @AVDD=13.5V, V1=13.4V, V14=0.1V	-	10	12	mA
Analog Stand-by current	Ist2	No load, clock and all functions are stopped	-	10	50	μA
Input level of V1 ~ V7	Vref1	Gamma correction voltage input	0.4*AVDD	-	AVDD-0.1	V
Input level of V8 ~ V14	Vref2	Gamma correction voltage input	0.1	-	0.6*AVDD	V
Output Voltage deviation	Vod1	Vo = AGND+0.1V ~ AGND+0.5V and Vo = AVDD-0.5V ~ AVDD-0.1V	-	±20	±35	mV
Output Voltage deviation	Vod2	Vo = AGND+0.5V ~ AVDD-0.5V	-	±15	±20	mV
Output Voltage Offset between Chips	Voc	Vo = AGND+0.5V ~ AVDD-0.5V	-	-	±20	mV
Dynamic Range of Output	Vdr	SO1 ~ 1536	0.1	-	AVDD-0.1	V
Sinking Current of Outputs	IOLy	SO1 ~ 1536; Vo=0.1V v.s 1.0V , AVDD=13.5V	80	-	-	uA
Driving Current of Outputs	IOHy	SO1 ~ 1536; Vo=13.4V v.s 12.5V , AVDD=13.5V	80	-	-	uA
Resistance of Gamma Table	Rg	Rn: Internal gamma resistor	0.7*Rn	1.0*Rn	1.3*Rn	ohm

5.4 MIPI Interface DC Characteristic

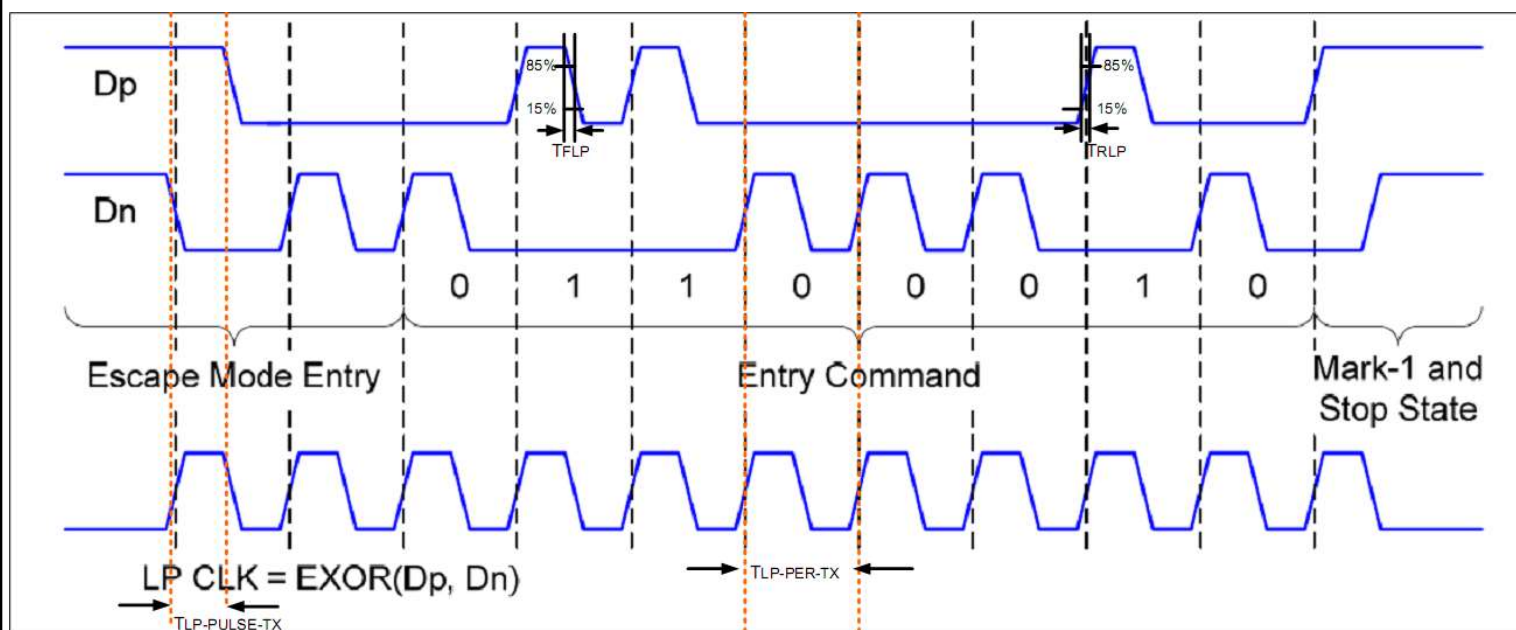
(VDD=VDD_IF=1.8V, AVDD=8 to 13.5V, GND=AGND=GND_IF=0V, TA=-20°C to 85°C)


Parameter	Symbol	Min.	Typ.	Max.	Unit
MIPI Characteristics for High Speed Receiver					
Single-ended input low voltage	VILHS	-40	-	-	mV
Single-ended input high voltage	VIHHS	-	-	460	mV
Common-mode voltage	VCDRXDC	70	-	330	mV
Differential input impedance	ZID		100		ohm
HS transmit differential voltage(VOD=VDP-VDN)	VOD	140	200	250	mV
MIPI Characteristics for Low Power Mode					
Pad signal voltage range	VI	-50	-	1350	mV
Ground shift	VGNDSH	-50	-	50	mV
Logic 0 input threshold	VIL	0	-	550	mV
Logic 1 input threshold	VIH	880	-	1350	mV
Input hysteresis	VHYST	25	-	-	mV
Output low level	VOL	-50	-	50	mV
Output high level	VOH	1.1	1.2	1.3	V
Output impedance of Low Power Transmitter	ZOLP	80	100	125	ohm
Logic 0 contention threshold	VILCD,MAX	-	-	200	mV
Logic 0 contention threshold	VIHCD,MIN	450	-	-	mV



5.5 MIPI AC Characteristic

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	$T_{LP-PULSE-TX}$	40	-	-	ns	-
First LP EXOR clock pulse after STOP state or Last pulse before stop state						
All other pulses		20	-	-	ns	-
Period of the LP EXOR clock	$T_{LP-PER-TX}$	90	-	-	mV/ns	-
Slew Rate @CLOAD =0pF	$\delta V / \delta t_{SR}$	30	-	500	mV/ns	-
Slew Rate @CLOAD =5pF		30	-	200	mV/ns	-
Slew Rate @CLOAD =20pF		30	-	150	mV/ns	-
Slew Rate @CLOAD =70pF		30	-	100	mV/ns	-
Load Capacitance	T_{RLP}	-	-	70	pF	-



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5.6 Input Timing Table

DE mode

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	40.8	51.2	67.2	Mhz
Horizontal display area	thd	1024			DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	Tvd	600			H
VSYNC period time	Tv	610	635	800	H
VSYNC blanking	Tvb+Tvfp	10	35	200	H

HV mode


Horizontal input timing

Parameter		Symbol	Value			Unit
Horizontal display area		thd	1024			DCLK
DCLK frequency@ Frame rate=60hz		fclk	Min.	Typ.	Max.	
			44.9	51.2	63	Mhz
1 Horizontal Line		th	1200	1344	1400	DCLK
HSYNC pulse width	Min.	thpw	1			
	Typ.		70			
	Max.		140			
HSYNC blanking		thb	160	160	160	
HSYNC front porch		thfp	16	160	216	

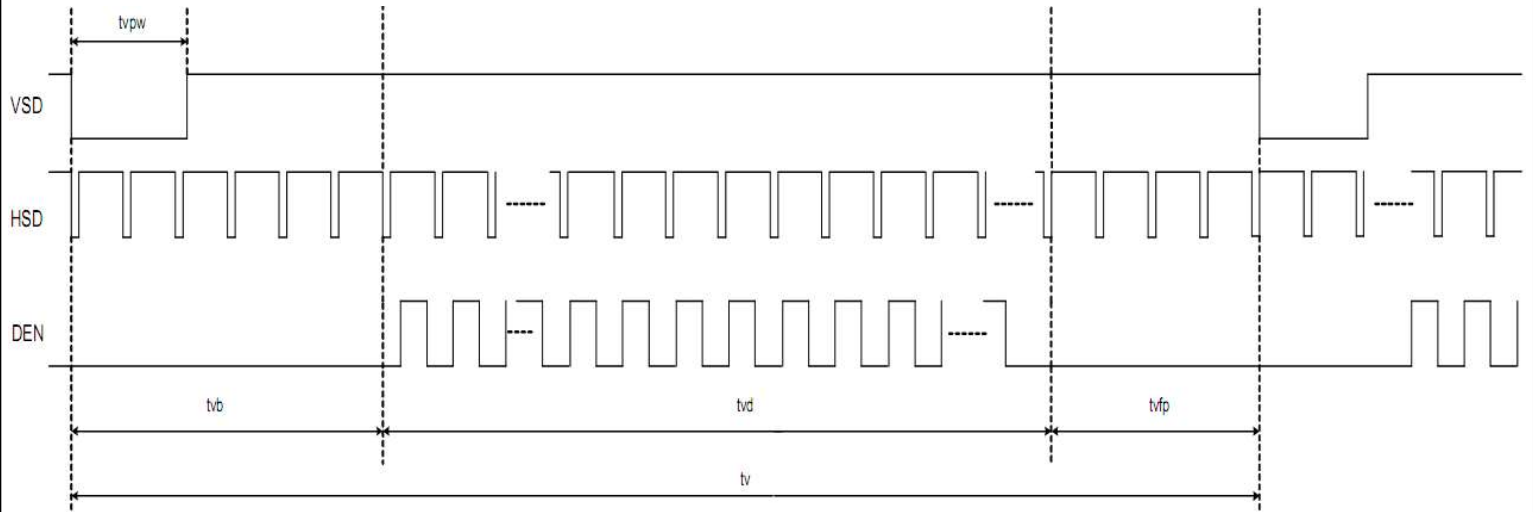
HV mode

Vertical input timing

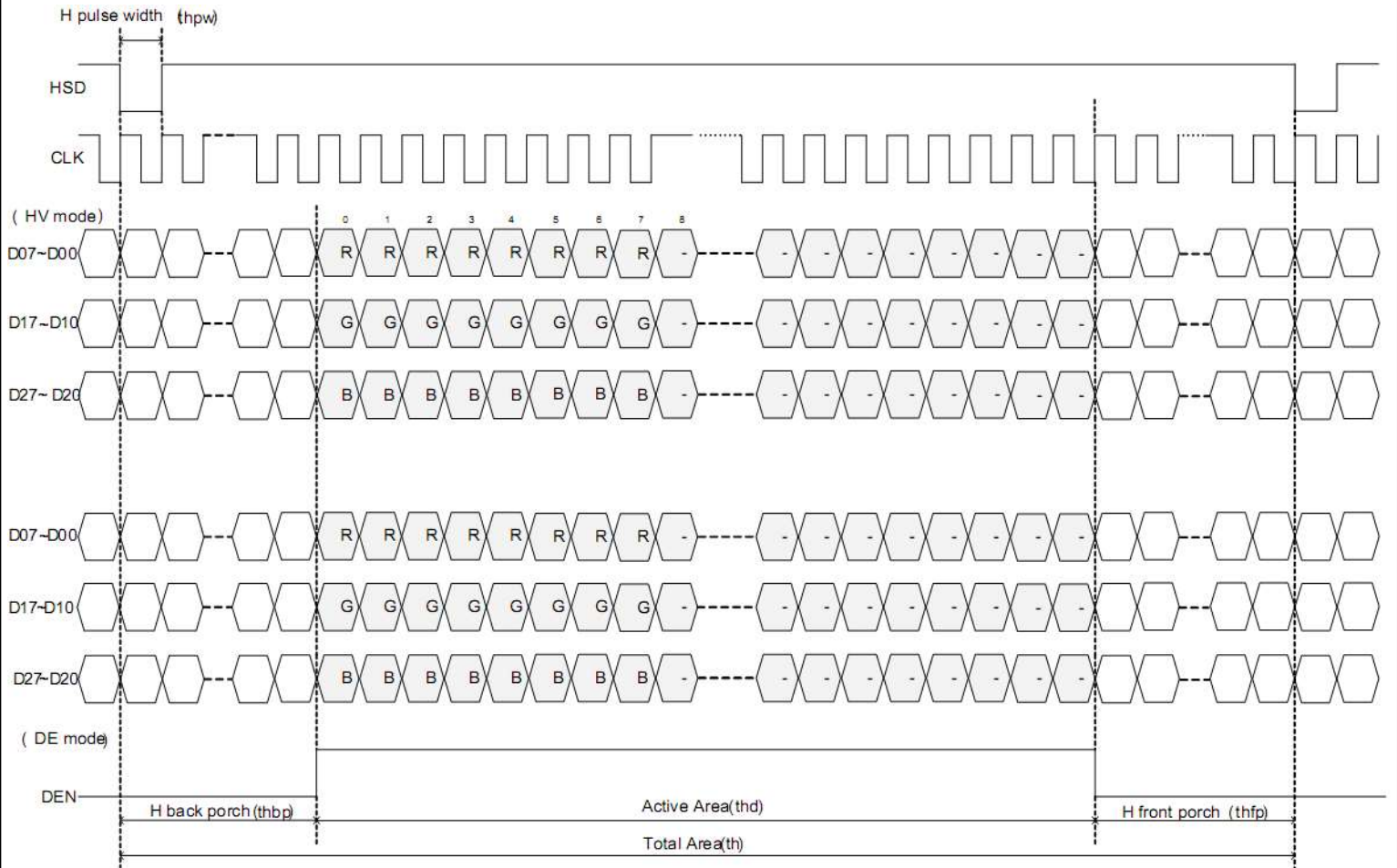
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	600			H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tpw	1	10	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H


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5.6.1 Vertical input timing



5.6.2 Horizontal input timing



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6.0 OPTICAL SPECIFICATIONS /光学规格

6.1 Overview /概述

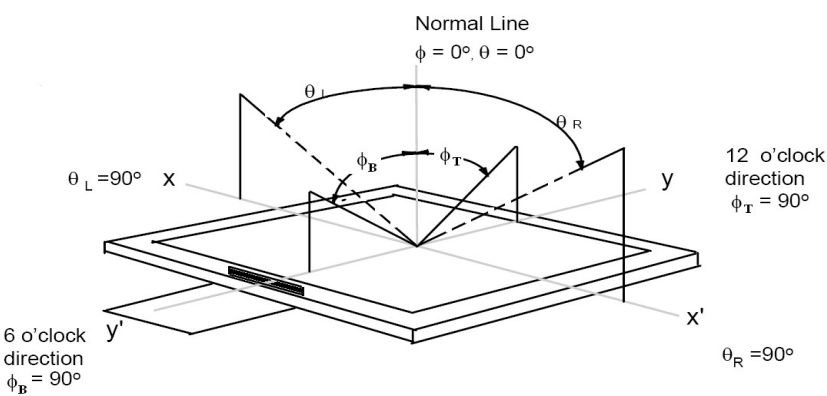
The test of optical specifications shall be measured in a dark room (ambient luminance $\leq 1\text{lux}$ and temperature = $25\pm 2^{\circ}\text{C}$) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0° . We refer to $\theta\emptyset=0$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta\emptyset=90$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta\emptyset=180$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta\emptyset=270$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and/or \emptyset , 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	θ_L	$Cr \geq 10$	60	70	-	deg	Note 1
	θ_R		60	70	-		
	ψ_T		60	70	-		
	ψ_B		60	70	-		
Contrast Ratio	Cr	$\theta=0^{\circ}$	400	500		-	Note 2
Response Time	Tr+Tf	FF= 0°	--	16	32	ms	Note 3
Color Coordinate of CIE1931	Wx	$\theta=0^{\circ}$	0.265	0.295	0.325	-	Note 4
	Wy		0.278	0.308	0.338		
	Rx		0.576	0.606	0.636		
	Ry		0.331	0.341	0.371		
	Gx		0.321	0.351	0.381		
	Gy		0.555	0.585	0.615		
	Bx		0.131	0.151	0.181		
	By		0.063	0.093	0.123		
Uniformity	U		75	80	--	%	Note 5
Color Gamut			45	50	--	%	
Luminance	L		320	400	--	cd/m ²	Note 6

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



Note2:The definition of Contrast Ratio

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

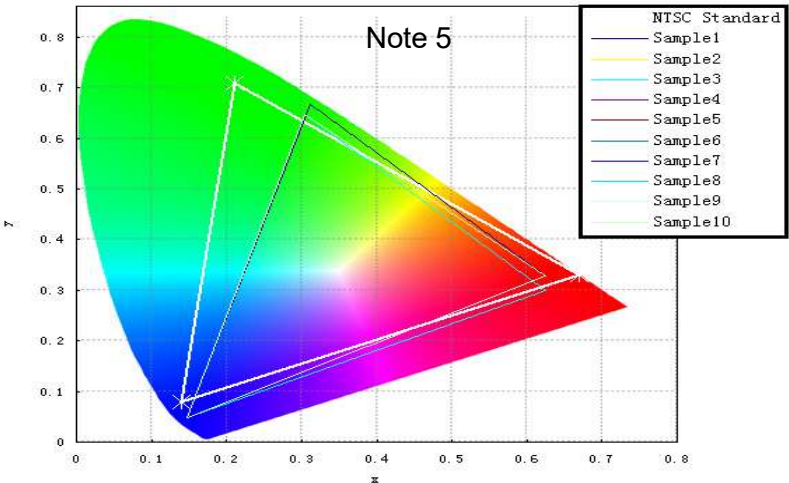
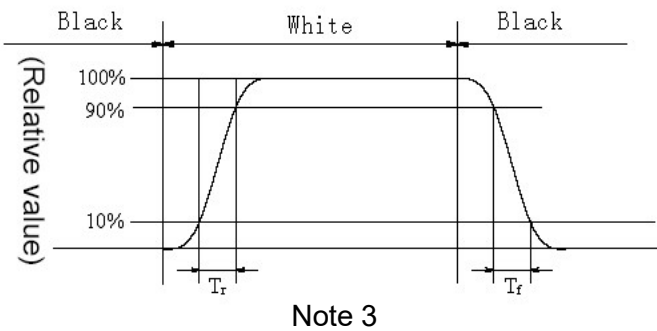
(Contrast Ratio is measured in optimum common electrode voltage)


Note3:Definition of Response 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°C.
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.

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



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7.0 RELIABILITY TEST

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

No	Test Items	Conditions	Testing standard
1	High temperature storage Test	Ta=+80°C, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low temperature storage Test	Ta=-30°C, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
3	High temperature operation Test	Ta=+70°C, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low temperature operation Test	Ta=-20°C, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	High temperature & humidity (storage Test)	Ta=+60°C, 90%RH max, 240 hours	IEC60068-2-78:2001 GB/T2423.3-2006
6	Thermal shock Test	-20°C 30min~70°C 30min, Change time:5min 20cycle	Start with cold temperature End with high temperature IEC60068-2-14:1984,GB2423.22-2002
7	Vibration Test	Frequency range:10Hz-55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z (6 hours for total)	IEC60068-2-6 GB/T17626.2
8	Mechanical shock	Half Sine Wave 100G 6ms,+X,+Y,+Z 3times for each direction	IEC60068-2-27 GB/T2423.5
9	Dropping Test	Height: 60 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32:1990 GB/T2423.8-1995
10	ESD Test	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5times; (Environment:15°C~35°C, 30%~60%RH,86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006 Class C

Notes:

- 1、Maximum acceleration 20g, 1g=9.8m/s²
- 2、Maximum amplitude 5mm
- 3、Maximum acceleration =0.002 x F² (frequency Hz) x D (amplitude p-pmm)


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• **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 falls 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.

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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 Long/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.

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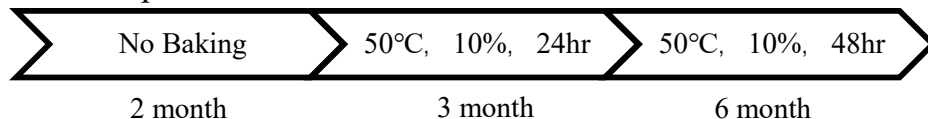
8.4 Precautions for Strong Light Exposure /强光照射注意事项

It is not allowed to store or run directly in strong light or in high temperature and humidity for a long time; 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 °C
- (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 the 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°C
 - 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 advice. Otherwise, its reliability and function may not be guaranteed.

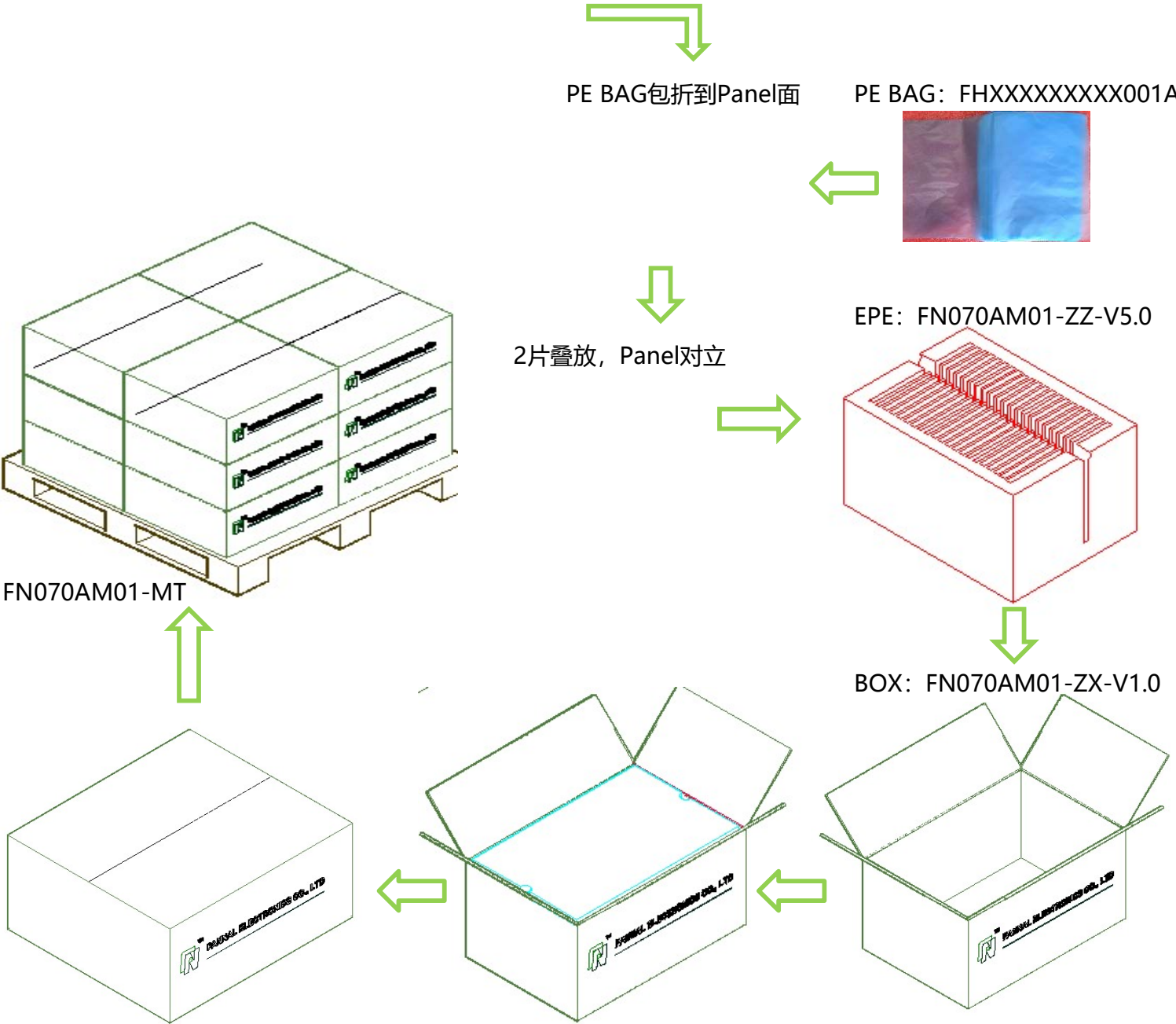
- (3) Black image or moving image is strongly recommended as a screen save.


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<ul style="list-style-type: none">• (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				
<ul style="list-style-type: none">• 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				
<ul style="list-style-type: none">• 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)				

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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	pcs/BOX	530*360*275mm	pcs/Pallet



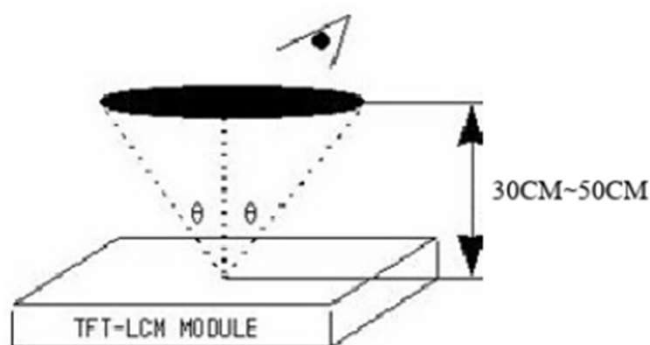
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10.0 VISUAL INSPECTION CRITERIA FOR ALL CUSTOMERS /所有客户的目视检查标准

10.1 Sampling Method /抽样方法

Unless otherwise agreed upon in writing, the sampling inspection shall be applied to the 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: $25 \pm 3^{\circ}\text{C}$
- b. Relative Humidity: $65 \pm 20\% \text{RH}$
- 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] : $\pm 25^{\circ}$

[Horizontal] : $\pm 40^{\circ}$

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 from 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 against a darker background and do not vary in size.

10.3.5 Bright Dot Defects

Dots (sub-pixels) on display which appear bright in the display area and visible through the 5%ND filter at Black Pattern.

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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.

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10.7 Customer Induced Defects /顾客引起的缺陷

The Customer can return the customer 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 :

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

- When the warranty period is expired.
- The Customer induced defective LCMs.
- When the LCMs were repaired by 3rd party without Supplier's approval.
- 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 cooperate and make efforts to solve it with mutual confidence and respect