

**SPECIFICATION
OF LIQUID CRYSTAL DISPLAY MODULE
TFT 产品规格书**

PRODUCT NO. 产品型号: **TG070TN83**

CUSTOMER NO. 客户代码: **23001**

CUSTOMER P/N 客户型号: **TBD**

DRAWING VERSION 图纸版本: **A0**

SAMPLE NO. 样品版本: **TBD**

SPEC VERSION 规格书版本: **V1.0**

Preliminary Specification

Final Product Specification

Customer : _____

Approved by	Notes

Techshine Confirmed :

Prepared by	Checked by	Approved by
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This technical specification is subjected to change without notice

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Record of Revision

Rev	Issued Date	Description	Editor
V1.0	2022-05-28	First release	Mo Cong

1 General Specifications

Feature		Spec
Display Spec.	Size	7.0 inch
	Resolution	800(RGB)x480
	Interface	RGB 24 bit
	Color Depth	16.7M
	Technology Type	a-Si IPS
	Pixel pitch(mm)	
	Pixel Configuration	R.G.B Vertical Stripe
	Display Mode	Normal black
	Surface Treatment	Glare
	Viewing Direction	ALL
	Gray Scale Inversion Direction	
Mechanical Characteristics	LCM (W x H x D) (mm)	165*104*5.5
	Active Area(mm)	152.40x91.44
	Driver IC	RM53051+RM57450
	With /Without TP	Without TP
	Weight (g)	TBD
	LED Numbers	21 LEDs

Note 1: Requirements on Environmental Protection: RoHS

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

Note 3: The main FPC and plastic frame can fulfill UL94-V0

Note 4: Detailed information is provided with Sitronix (code GVDD)

2 Input/Output Terminals

2.1 Pin Assignment (40PIN)

Pin No.	Symbol	I/O	function	Remarks
1	V _{LED+}	P	Power supply for LED Drive	
2	V _{LED+}	P	Power supply for LED Drive	
3	ADJ	I	Adjust the led brightness with PWM Pulse	
4	GND ₋	P	Ground for LED circuit	
5	GND	P	Ground for LED circuit	
6	V _{CC}	P	Power supply for digital circuit	
7	V _{CC}	P	Power supply for digital circuit	
8	MODE	I	DE/HV mode select	
9	DE	I	DATA INPUT Enable	
10	VS	I	VERTICAL SYNC INPUT	
11	HS	I	Horizontal Sync Input	
12	GND	P	Power ground	
13	B5	I	Blue data	
14	B4	I	Blue data	
15	B3	I	Blue data	
16	GND	P	Power ground	
17	B2	I	Blue data	
18	B1	I	Blue data	
19	B0	I	Blue data(LSB)	
20	GND	P	Power ground	
21	G5	I	Green data(MSB)	
22	G4	I	Green data	
23	G3	I	Green data	
24	GND	P	Power ground	
25	G2	I	Green data	
26	G1	I	Green data	
27	G0	I	Green data(LSB)	
28	GND	P	Power ground	
29	R5	I	RED data(MSB)	
30	R4	I	RED data	
31	R3	I	RED data	
32	GND	P	Power ground	
33	R2	I	RED data	
34	R1	I	RED data	
35	R0	I	RED data(LSB)	
36	GND	P	Power ground	
37	DCLK	I	Sample clock	
38	GND	P	Power ground	
39	L/R	I	Left/right selection	
40	U/D	I	Up/down selection	

3 Absolute Maximum Ratings

3.1 Driving TFT LCD Panel

Ta =25°C

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	AVDD	-0.5	15	V	
Back Light Forward Current	ILED		140	mA	For each LED
Operating Temperature	Top	-20	70	°C	
Storage Temperature	Tst	-30	80	°C	
Relative Humidity Note1	RH	--	90	%	Note2
Absolute Humidity	AH	--	≤70	g/m ³	Ta>70°C

Note1: Ta means the ambient temperature.

It is necessary to limit the relative humidity to the specified temperature range.
Condensation on the module is not allowed.

Note2: Ta ≤ 60 °C: 90% RH MAX (96HRS MAX)

Ta ≤ 60 °C: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90%RH AT 60 °C (96HRS MAX)

Table 3.1 absolute maximum rating

4 Electrical Characteristics

4.1 Driving TFT LCD Panel

GND=0V, Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage	VDD	2.9	3.3	3.6	V	
Input Signal Voltage	Low Level	VIL	0	—	0.3* VDD	V
	High Level	VIH	0.7* VDD	—	VDD	V
Output Signal Voltage	Low Level (VOL)	IOL=+1.0mA	GND	—	GND+0.4	V
	High Level (VOH)	IOH=-1.0mA	VDD-0.4	—	-	V
(Panel+LSI) Power Consumption	Black Mode (70Hz)		—		mW	
	Standby Mode		—		uA	
	Mode off		—		uA	Note2

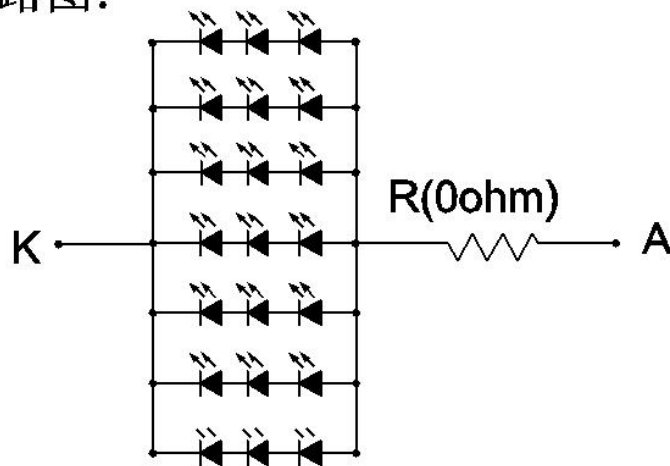
Table 4.1 LCD module electrical characteristics

Note2: Only provide the VDD,no any data code was sent to display drive IC.

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF	—	140	--	mA	Note 4
Forward Current Voltage	VF	8.4	9.0	9.9	V	Note 1,2
Backlight Power Consumption	WBL	—	1260	---	mW	For total LEDs
LED lifetime	L	—	30000	—	Hours	Note1,2,3,4

Table 4.2 Backlight Unit electrical characteristics

1. LED电路图:



BL CIRCUIT DIAGRAM)

 $I=20*7=140mA$ $Vf=8.4-9.0-9.9V$

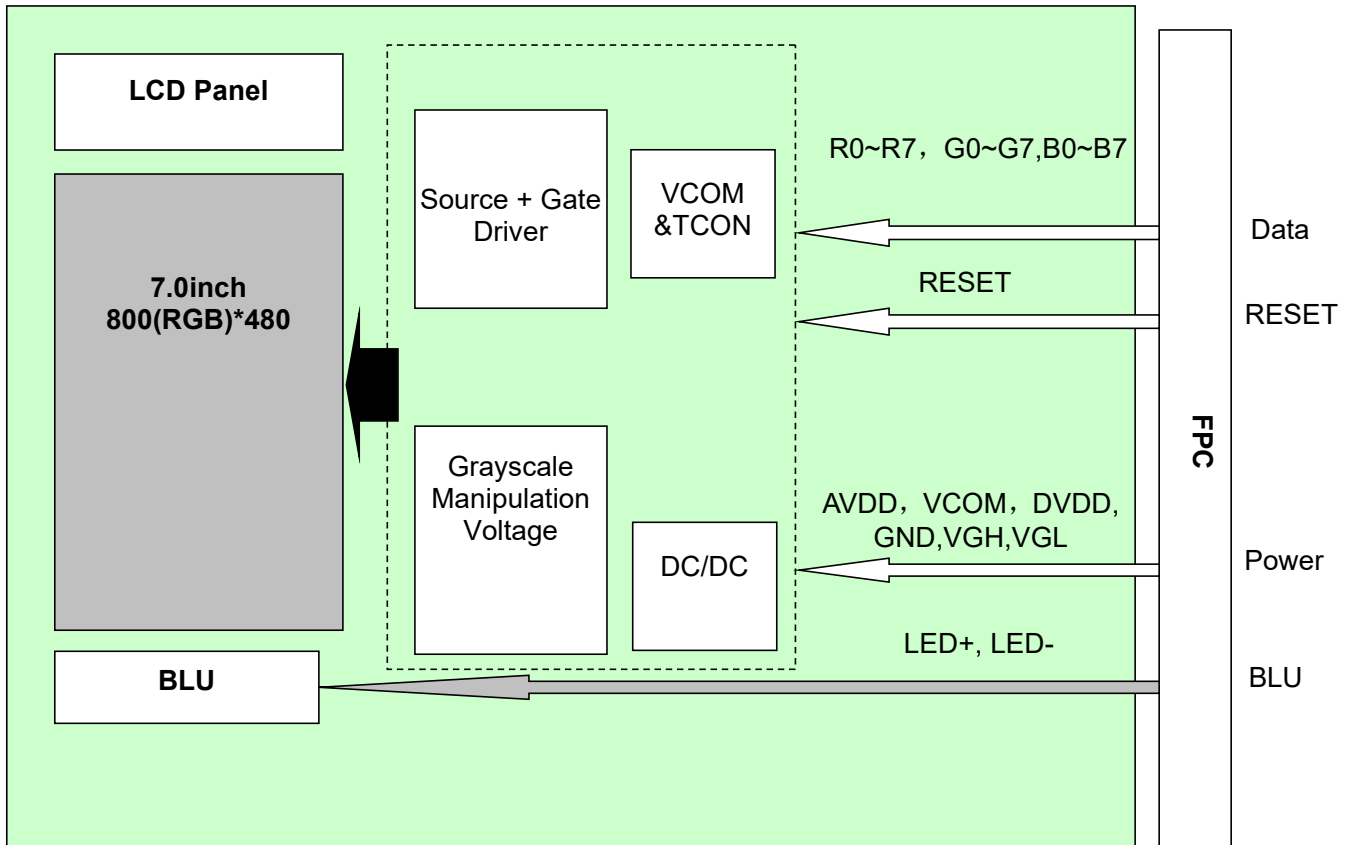
Note1: The LED driving condition is defined for each LED module (3 LED Serial, 7 LED Parallel).

Note2: Under LCM operating, the stable forward current should be inputted. And forward voltage is for reference only.

Note3: Optical performance should be evaluated at Ta=25°C only 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. At the same time the luminance of Backlight would decrease under the high temperature.

Note4: The LED driving condition is defined for each LED module.

4.2 Block Diagram

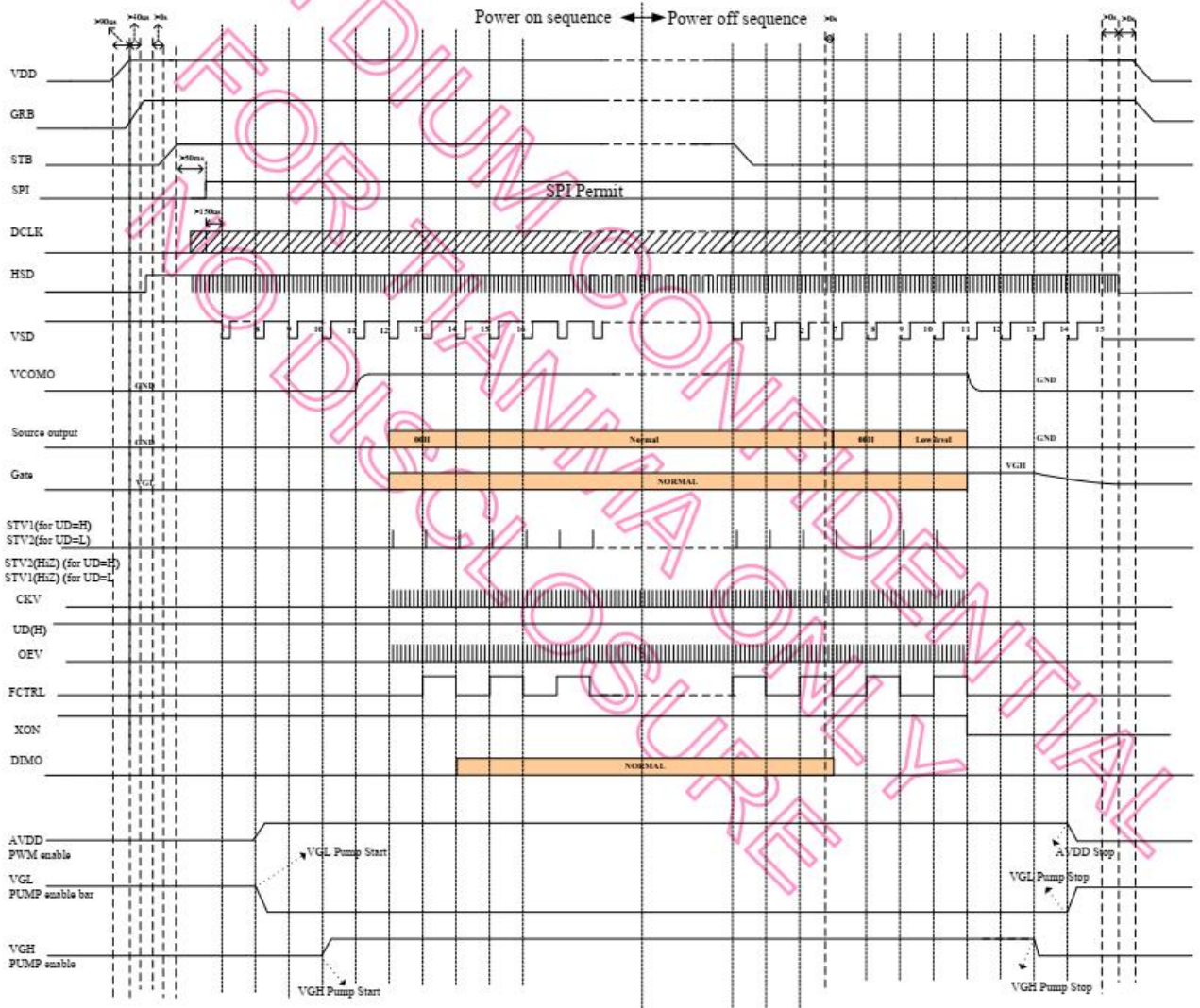


5 Timing Chart

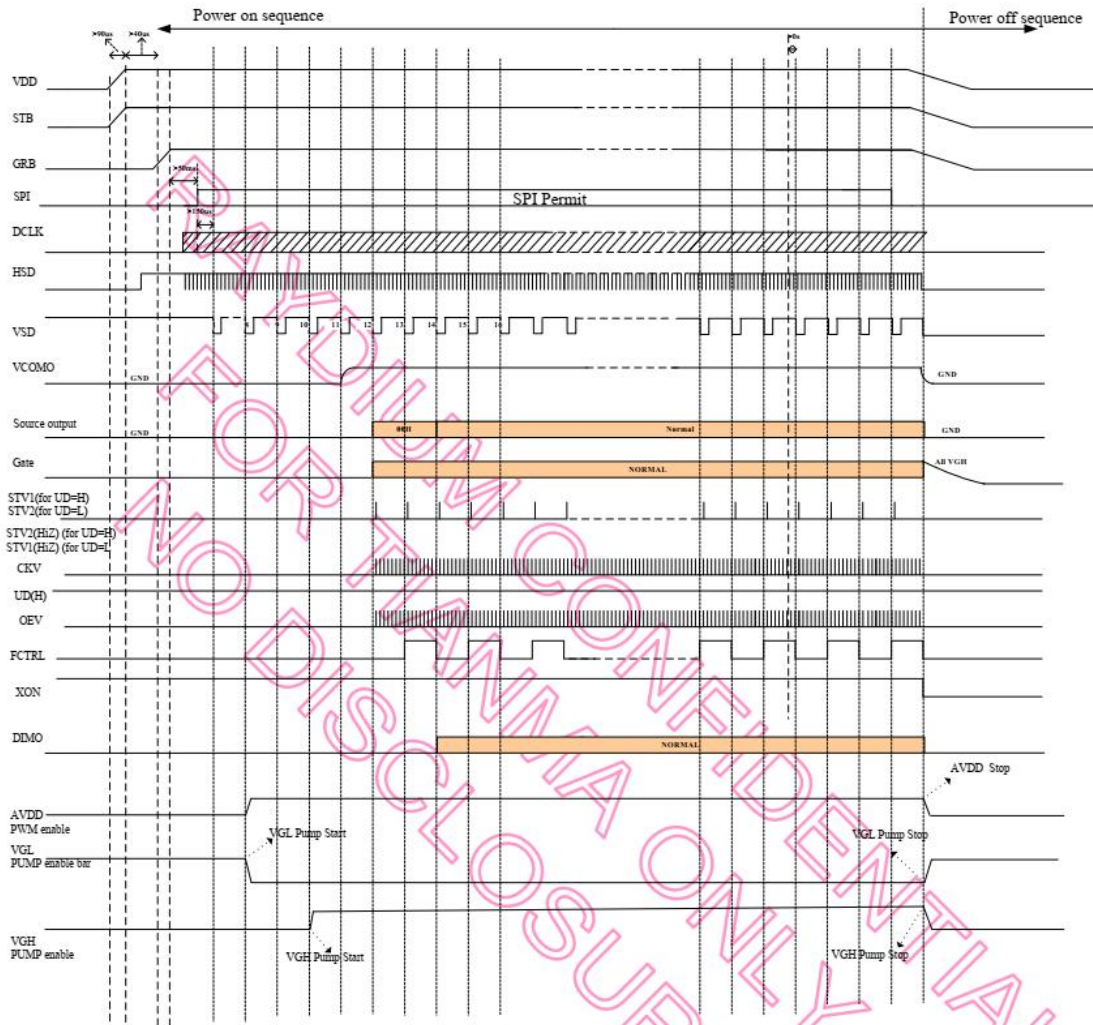
5.1 INTERFACE TIMING

Note: Please refer to RM53051 data sheet for more details.

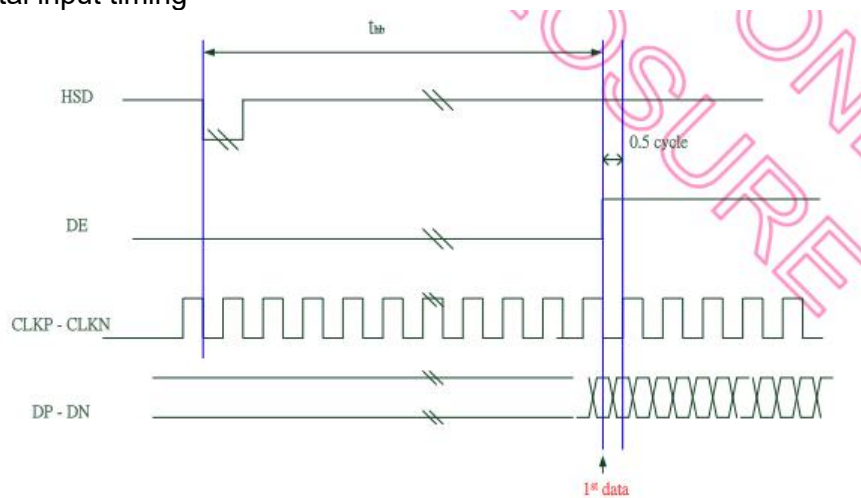
5.1.1 Power - On / off Timing Sequence(STBYB Active)



5.1.2 Power - On / off Timing Sequence(STBYB Fixed to VDD)

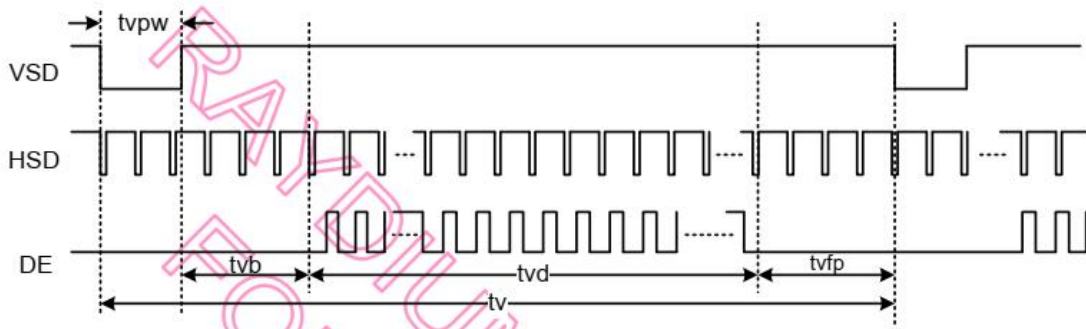


5.2 RSDS(with HV or DE) with TCON mode timing diagram Horizontal input timing

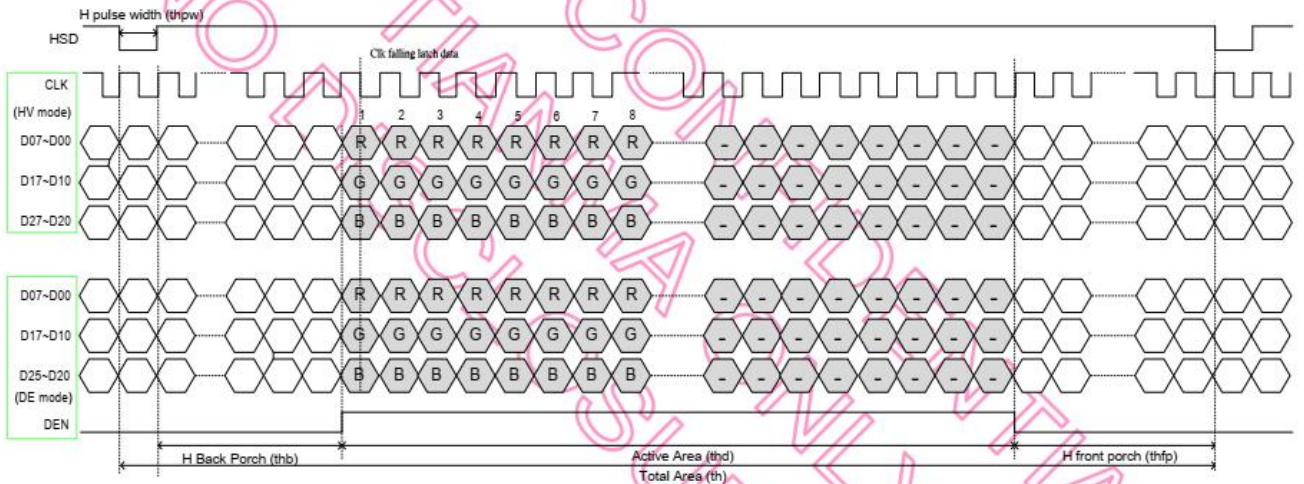


5.3 TTL (with HV or DE) with TCON mode timing diagram

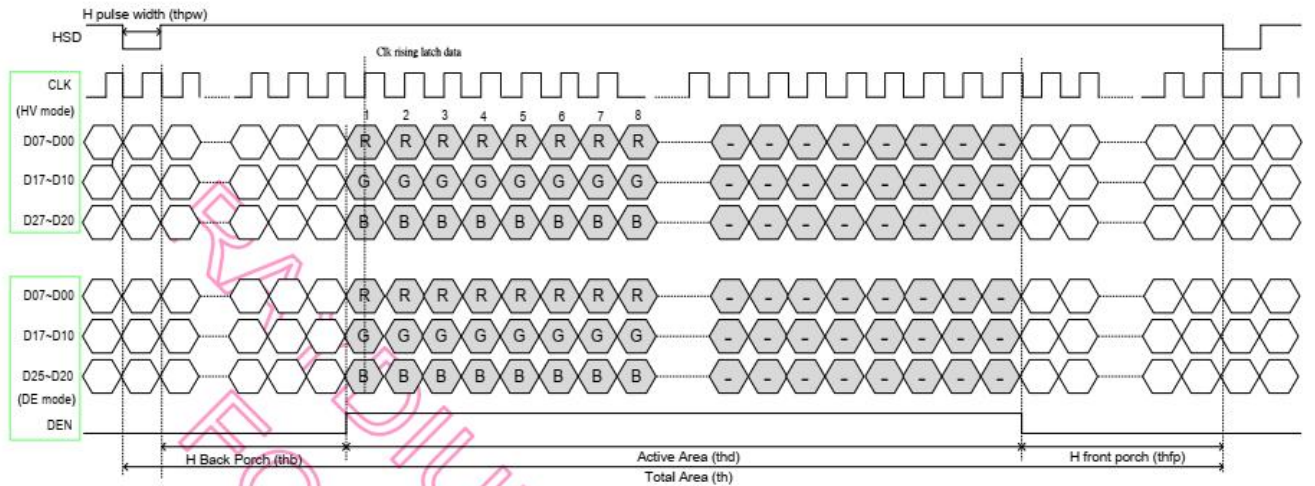
Vertical input timing



Horizontal input timing when CLKPOL = LO:



when CLKPOL = HI:



6 Optical Characteristics

Ta=25°C

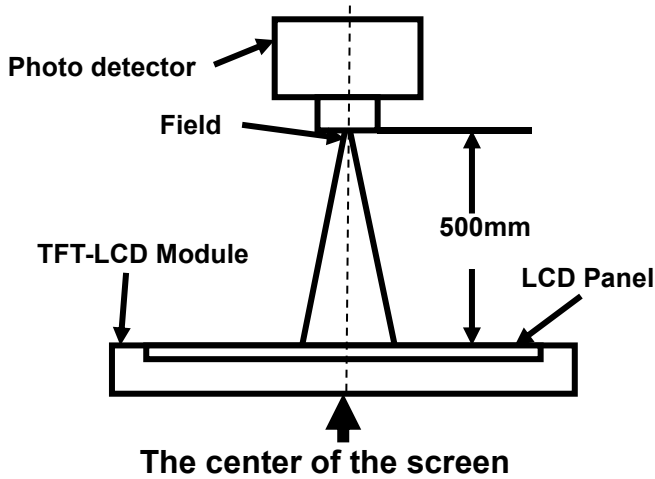
Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	θT	CR \geq 10		85	-	Degree	Note2,3,8
	θB			85	-		
	θL			85	-		
	θR			85	-		
Contrast Ratio	CR	$\theta=0^\circ$	500	600	-		Note 3
Response Time	T _{ON}	25°C	-	25	50	ms	Note 4
	T _{OFF}						
Chromaticity	White	x	Backlight is on				Note 1,5
		y					
	Red	x					Note 1,5
		y					
	Green	x					Note 1,5
		y					
	Blue	x					Note 1,5
		y					
Uniformity	U		70	80	-	%	Note 6
NTSC					-	%	Note 5
Luminance	L		300	350	-	cd/m ²	Note 7

Test Conditions:

1. I_F= 40mA, and the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

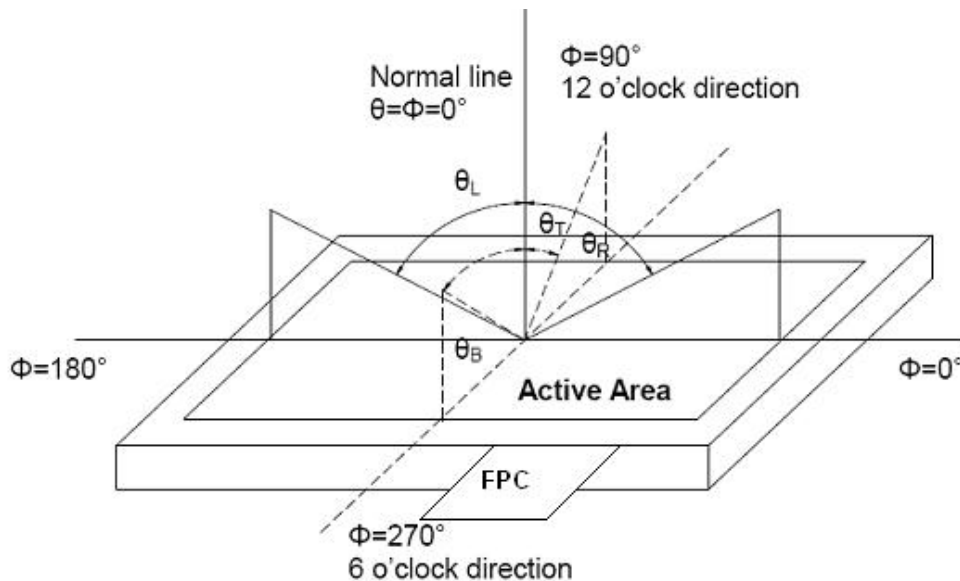
Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD.



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

“White state “: The state is that the LCD should drive by V_{white} .

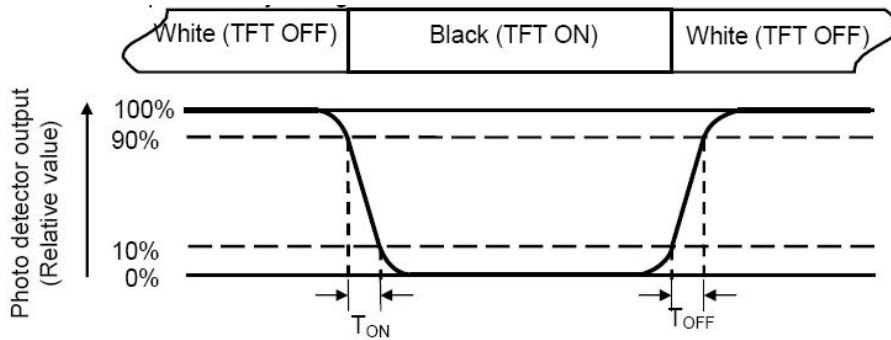
“Black state”: The state is that the LCD should drive by V_{black} .

V_{white} : TBD V V_{black} : TBD V.

Note 4: 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%.



Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (U)} = L_{\min} / L_{\max}$$

L-----Active area length W----- Active area width

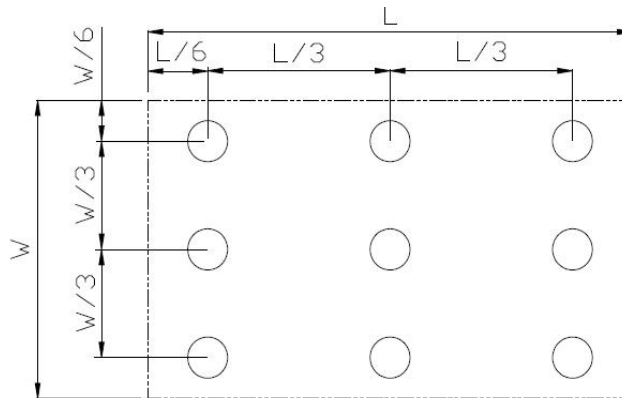


Fig. 2

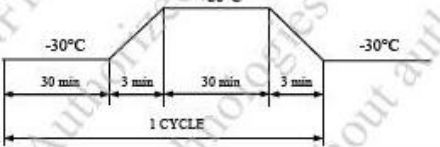
L_{\max} : The measured Maximum luminance of all measurement position.

L_{\min} : The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

7 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts=+70°C, 240hrs	Note1 IEC60068-2-1,GB2423.2
2	Low Temperature Operation	Ta=-20°C, 240hrs	IEC60068-2-1 GB2423.1
3	High Temperature Storage	Ta=+80°C, 240hrs	IEC60068-2-1 GB2423.2
4	Low Temperature Storage	Ta=-30°C, 240hrs	IEC60068-2-1 GB2423.1
5	High Temperature & High Humidity Storage	Ta=+60°C, 90% RH 240 hours	Note2 IEC60068-2-78 GB/T2423.3
6	Thermal Shock (Non-operation)	-30°C 30 min~+80°C 30 min, Change time:5min, 10 Cycles 	Start with cold temperature, End with high temperature, IEC60068-2-14,GB2423.22
7	Electro Static Discharge (Operation)	C=150pF, R=330Ω · 5points/panel Air:±12KV, 5times; Contact:±8KV, 5 times; (Environment: 15°C ~ 35°C, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2
8	Package Drop Test	Height:80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8

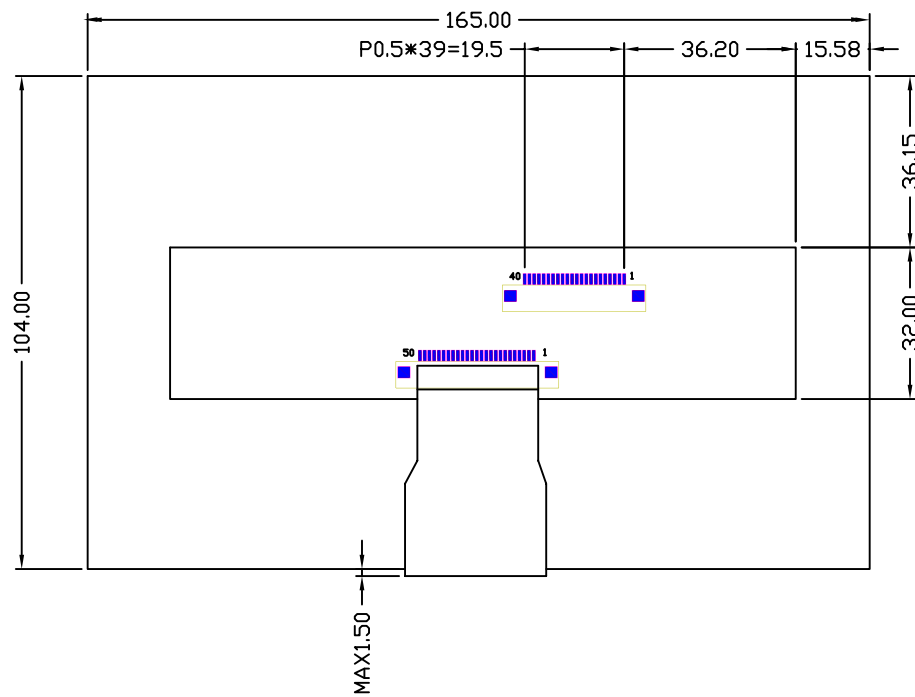
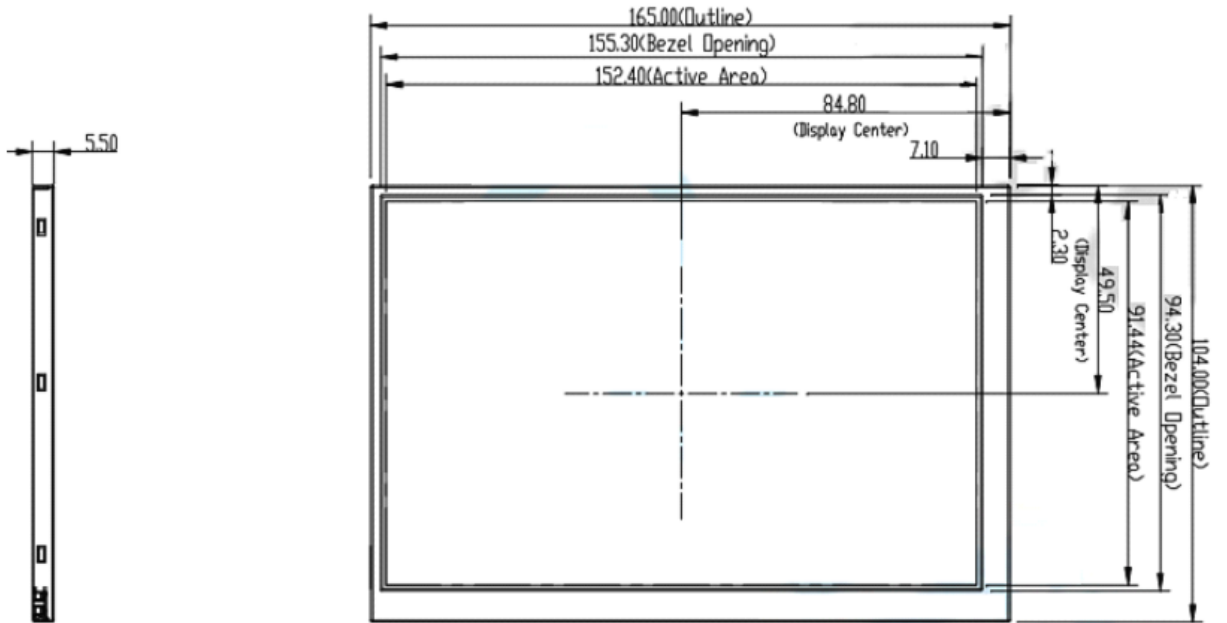
Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

Note3: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note 4: 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.

8 Drawing
8.1 Mechanical Drawing



9 Packing Drawing

9.1 Packing

TBD

10 Inspection Criteria

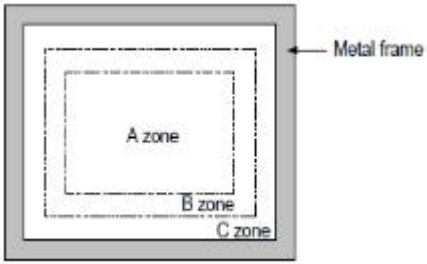
10.1 Inspection conditions 检查条件

- Inspection direction should be perpendicular to display surface within the viewing angle as per signed specification.
检查时的目视方向需要在视角范围规格内垂直于产品表面。
- In case there is a specific need to perform an Incoming Quality inspection Customer will follow rules herein after.
- If the need for incoming inspection, sampling plan and the way of sampling need according to GB/T2828.1-2012 standard normal inspection, a sampling plan II level sampling inspection level;
- AQL Definition,AQL Function =0.4; AQL Appearance=0.65
- 如果需要来进行来料检查, 则抽样计划和抽样方式需要依据GB/T2828.1-2012标准正常检验, 一次抽样方案II级检验水平抽检;
- AQL 定义: AQL电性=0.4 ; AQL外观=0.65
- 亮室条件: 光照度通常在700 Lux~1200lux之间检测Bright room condition:the illumination usually was checked between 700 lux~1200lux.
- 暗室条件:光照度通常在100 Lux以下检测Darkroom condition:the illumination usually was checked under 100 Lux.
- Ambient Temperature: 23± 3°C
环境温度: 23± 3°C
- The distance between inspector's eyes & product surface should be from 30±5cm maximum in all directions.
检查者的眼睛与产品表面的距离在任何方向检查时都应该保持在30±5cm 。
- Time for cosmetic inspection is limited to 10 seconds for the screen and 10 seconds for other area. This does not include functional check.
检查外观时, 检查时间应该控制在显示屏内10秒钟, 产品的其他位置10秒钟。这不包括功能检查。
- Functional test must be made by using a specific jig provided by supplier
功能检查必须使用供应商提供的专门的治具。


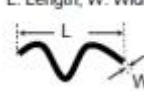
10.2 Definitions 定义

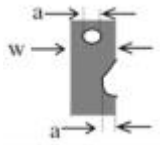
Definition of areas 区域的定义

- | | |
|---|---------------------|
| A is the Active Area of the display (dot area). | A区, 指产品的显示区域 (点阵区域) |
| B is the Viewing Area. | B区, 指可视区域 |
| C is the Area between B zone and metal frame. | C区, B区与铁框之间的区域 |



10.3 Quality Inspection Criteria 品质判定标准

Defect	Criteria						
不良项目	判定标准						
Spot 点状不良		Size (mm) 尺寸	Acceptable Qty 接受个数		$\phi = (L+W)/2$ L: Length, W: Width 		
			Zone 区域				
			A	B & C			
		$\Phi \leq 0.15$	Ignore 不计	Ignore 不计			
		$0.15 < \Phi \leq 0.3$	2				
$\Phi > 0.3$	None 不允许						
Total合计	2*	* No include $\Phi \leq 0.15$ 不计 $\Phi \leq 0.15$ 的点					
Dirt spot(s), Polarizer Bubble、concavo-convex spot & stab spot and all Spot defects. 指脏点、偏光片气泡、凹凸点、刺伤点等所有点状不良 * Distance between 2 defects should be more than 10 mm apart. 两个不良点之间的距离需要大于10mm							
Linear 线状不良		Size (mm)尺寸		Acceptable Qty 接受个数		L: Length, W: Width 	
		L长	W宽	Zone区域			
				A	B & C		
		Any 任意		$W \leq 0.03$	Ignore 不计		Ignore 不计
		$L < 5.0$	And 且	$0.03 < W \leq 0.05$	3		
$L \leq 5.0$	And 且	$0.05 < W \leq 0.08$	2				

		L>5.0	Or 或	0.08<W	None 不允许		
		Total合计			5		
		Linear scratch, linear foreign material (fiber ...), dirt line. 线状划伤, 线状异物(纤维等), 脏线等 * Distance between 2 defects should be more than 10 mm apart. 两个不良点之间的距离需要大于10mm					
FPC		Default 不良类型			Judgement		
		Open Circuit 断线			不允许		
		Dent Or Pinhole (W=circuitry width)	a≤W/3		允许		
		凹点或针孔 (W=宽度)	a>w/3		不允许		
		Oxidation 氧化			不允许		
		Copper peeling 露铜			不允许		
Connection 连接部位	<p><u>Number of connection/disconnection</u>: After 10 connection/disconnection, the FPC can be inserted a new time with full electrical connection and no visible damage else <u>Rejected</u></p> <p><u>多次插拔测试</u>: 在插拔10次之后, FPC再一次重新插入时应保持完整的电性连通性以及不存在可见的不良, 否则判定NG</p> <p><u>Traction on FPC</u>: Stick a 0.1kg weight on display, and then hold display by FPC during 10 minutes. display must stay fully functional with any visible damage marks else <u>Rejected</u></p> <p><u>FPC牵拉测试</u>: 在LCD上施加0.1kg的重量, 并牵拉FPC保持10分钟, 显示应该仍保持完整的功能以及不存在可见的不良, 否则判定NG</p> <p><u>Bending of FPC</u>: display with its FPC is placed horizontally on a table. Fold the FPC from its middle (180° to 0°) then unfold it (180 to 0°). FPC is folded with a 0 mm radius. Perform this test 3 times. Display must be fully functional with no micro crack on tracks else <u>Rejected</u></p> <p><u>FPC弯折测试</u>: 将模组水平放置在桌面上, 弯折FPC从0度到180度, 再从180度恢复到0度, FPC弯折时的弯曲半径为0mm。</p> <p>如此弯折3次后, 显示应该仍保持完整的功能以及不存在可见的不良, 否则判定NG</p>						

Glass Cracks 玻璃裂	 <p>no glass cracks, if this defect is present, the display is <u>Rejected</u></p> <p>不允许存在玻璃裂, 否则判定为NG</p>
PCB PCB板	<p>No distortion, no oxidation or no contamination on PCB else <u>Rejected</u></p> <p>不允许变形, 不允许出现氧化或其他异物, 否则判定NG</p>
Newton Rings 牛顿环	<p>No Newton Rings (visible with or without backlight) else <u>Rejected</u></p> <p>不允许有牛顿环 (点亮/不点亮背光可见), 否则判定NG</p>
Mura irregular luminosity variation MURA不规则的亮度变化	<p>Mura is a typical vision defect of display panel, appearing as local lightness variation with low contrast and blurry contour</p> <p>By 6% ND Filter,if still visible, <u>Rejected</u></p> <p>Mura是一种典型的显示面板视觉缺陷, 表现为局部亮度变化, 对比度低, 轮廓模糊</p> <p>使用6%的ND Filter进行检查, 如果依然可见, 则判定为NG</p>
No function or No display 不工作或者无显示	 <p>if this defect is present, the display is <u>Rejected</u></p> <p>如出现此现象, 判定NG</p>
Missing vertical or horizontal Line / segment 缺竖线或者横线	 <p>if this defect is present, the display is <u>Rejected</u></p> <p>如出现此现象, 判定NG</p>
Darker or lighter vertical / horizontal Line / segment 暗/亮竖线或横线	 <p>if this defect is present, the display is <u>Rejected</u></p> <p>如出现此现象, 判定NG</p>
Abnormal display If visible 显示异常 肉眼可见	<p>If below phenomena is present, <u>rejected</u> 如出现以下的现象, 判为 NG</p> <p>Display defect, Irregular function of display (no light or with apparent waves) 显示异常 (不点亮或者有波纹)</p> <p>Signal Error, Signal errors manifested through colour irregularities, interference, shadows, slow screen reaction and others 信号错误, 导致显示颜色出现不规则, 干涉, 影子, 显示反应慢等</p> <p>H-Block Horizontal block permanently lighted or dark (incl. colours) 出现永久性的水平区域性发暗 (包括颜色错误)</p> <p>H-Line Horizontal line permanently lighted or dark (incl. colours) 出现永久性的水平线条性发暗 (包括颜色错误)</p> <p>V-Block Vertical block permanently lighted or dark (incl. colours) 出现永久性的垂直区域性发暗 (包括颜色错误)</p> <p>V-Line Vertical line permanently lighted or dark (incl. colours) 出现永久性的垂直线条性发暗 (包括颜色错误)</p> <p>Bright or Dark Halo effect 出现亮或暗的环状不良</p>
Bright / Dark Point 亮/暗点	<p>$\Phi \leq 0.15\text{mm}$ 不计; $0.15 < \Phi \leq 0.25$ 允许数: 2; $\Phi > 0.25\text{mm}$ 不允许</p> <p>$\Phi \leq 0.15\text{mm}$ neglected; $0.15 < \Phi \leq 0.25$ allow 2 defect; $\Phi > 0.25\text{mm}$ not allowed</p>

Backlight 背光	<p>If there is no Backlight or Dark Backlight, the display is <u>Rejected</u>.</p> <p>如果背光不亮或者背光发暗, 判定NG</p> <p>Backlight is not homogeneous <u>Rejected</u>.By 6% ND Filter,if still visible, <u>Rejected</u></p> <p>背光不均匀, 使用6%的ND Filter进行检查, 如果依然可见, 则判定为NG</p>
Mechanical issue 结构问题	<p>If the display is Out of tolerance of mechanical drawing, the display is <u>Rejected</u></p> <p>如果产品尺寸超出图纸公差, 判定NG</p>
Electrical characteristics 电气特性	<p>If electrical characteristics are out of tolerance of specification, the display is <u>Rejected</u></p> <p>如果产品的电气特性超出规格公差, 判定NG</p>
Optical characteristics 光学特性	<p>If optical characteristics are out of tolerance of specification, the display is <u>Rejected</u></p> <p>如果光学特性超出公差, 判定NG</p>
Identification / marking 标识、标记	<p>If specified in drawing or specification, and if there is Illegible / wrong / double or no marking / label, the display is <u>Rejected</u></p> <p>如果图纸或规格书有指定, 但标识标记模糊、错误、多出或者缺失, 则判定NG</p>
Cosmetic Defects unlisted 未列出的其他外观缺陷	<p>All other defect related with cosmetic (painting...) follow drawing or set up limit sample, if not-conformance, <u>Rejected</u></p> <p>其他所有的外观缺陷, 比如印刷等, 参考图纸或者设立限度样品, 如果与之不符, 则判定NG</p>