PHOENIX DISPLAY INTERNATIONAL, INC.

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SPECIFICATION FOR LCD MODULE

CUSTOMER	
PART NUMBER	PDI097XGBH-01
DESCRIPTION	9.7" 1024 (RGB) * 768
VERSION	V1.0
ISSUE DATE	25-Jan-19

COMPANY ADDRESS:
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Revision History

Version	Contents	Date	Note

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1. Scope

This specification applies to the TFT LCD module which is designed and manufactured by LCM Factory.

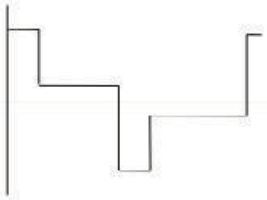
2. Normative Reference

GB/T4619-1996 《Liquid Crystal Display Test Method》 GB/T2424 Basic environmental Testing Procedures for Electric and Electronic Products.》 GB/T2423 《Basic Testing Procedures for Electric and Electronic Products》 IEC61747-1 《SIXTH PARTGB2828'2829-87《National Standard of PRC》

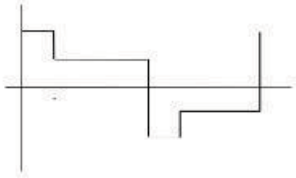
3. Definitions

3.1 Definitions of Vop

The definitions of threshold voltage Vth1, Vth2 the following typical waveforms are applied on liquid crystal by the method of equalized voltage for each duty and bias.



【 selected waveform 】



【 non-selected waveform 】

① Vth1: The voltage which the brightness of segment indicates 50% of saturated value on the conditions of selected waveform (f=80Hz, Φ=10°θ=270°at 25℃)

② Vth2: The voltage which the brightness of segment indicates 50% of saturated value on the conditions of non-selected waveform (f=80Hz, Φ=10°θ=270°at 25℃)

③ Vop: (Vth1(50%)+Vth2(50%))/2 (f=80Hz, Φ=10°θ=270°at 25℃)

3.2 Definition of Response Time Tr, Td

①Tr: The time required which the brightness of segment becomes 10% from 100% when waveform is switched to selected one from non-selected one. (f=80Hz,Φ=10°θ=270°at 25℃)

②Td: The time required which the brightness of segment becomes 90% from 10% when waveform is switched to selected one from selected one. (f=80Hz, Φ=10°θ=270°at 25℃)

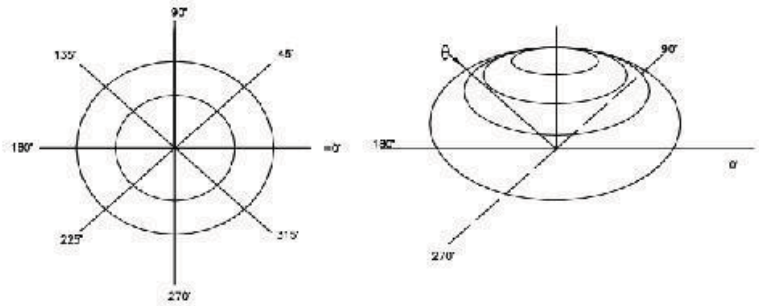
3.3 Definition of Contrast Ratio Cr

Cr=A/B

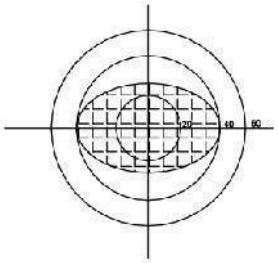
① A: Segments brightness in case of non-selected waveform

② B: Segments brightness in case of selected waveform

3.4 Definition of Angle and Viewing Range



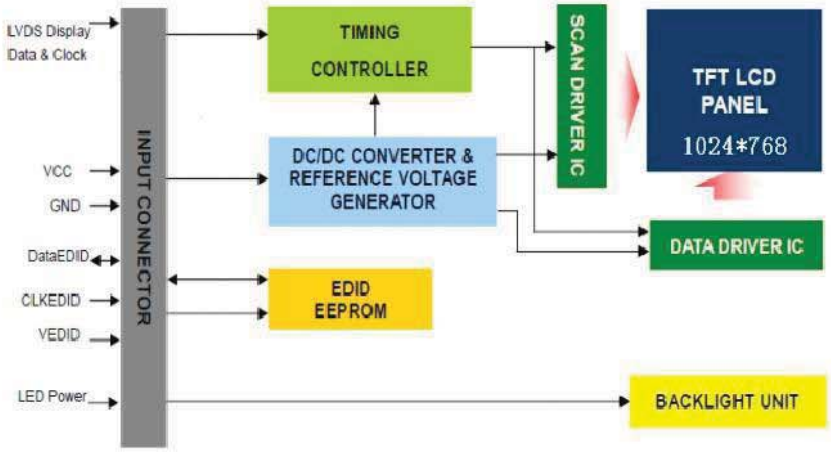
Angular Graph: Contrast Ratio



Such as:
Viewing Angle Range:
80(Cr>2) Horizontal
70(Cr>2) Vertical

4. Functional Block Diagram

The following diagram shows the functional block of the 9.7 inches wide Color TFT/LCD 30 Pin (One CH/connector Module)



5. Technology Specifications

5.1 Features

This single-display module is suitable for use in MID、Digital AV products. The LCD adopts one backlight with High brightness 36-lamps white LED. Construction: 9.7" a-Si color TFT-LCD, White LED backlight, FPC.

5.2 General Specifications

No.	Item	Specification
1	LCD	9.7 size
2	Resolution	1024(RGB)x768
3	Display mode	Normally white, Tran missive
4	Pixel pitch	0.192(H)X0.192(V) mm

5	Active area	196.608 (H)X147.456 (V) mm
6	Module size	210.2(W)X164.2(H)X2.85(Type)(D) mm
7	Pixel arrangement	RGB-stripe
8	Interface	1 channel LVDS
9	Backlight	power
10	Panel	power
11	Weight	TBD

5.3Interface Pin Connection

Pin No.	Symbol	Function
1	GND	Power ground
2	AVDD	Power for LED backlight (Anode)
3	AVDD	No connection
4	VEDID	Power for LED backlight (Cathode)
5	NC	No Connection (Reserve)
6	SCL	Common Voltage
7	SDA	Digital Power
8	D0N	-LVDS differential data input(R0-R5,G0)
9	D0P	+LVDS differential data input(R0-R5,G0)
10	GND	Ground
11	D1N	-LVDS differential data input(G1-R5,B0-B1)
12	D1P	+LVDS differential data input(G1-R5,B0-B1)
13	GND	Ground
14	D2N -	-LVDS differential data input(B2-B5,HS,VS,DE)
15	D2P	+LVDS differential data input(B2-B5,HS,VS,DE)
16	GND	Ground
17	LVCN	- LVDS differential clock input
18	LVCP	+LVDS differential clock input
19	GND	Ground
20	NC-	No connection
21	LED-A	Power for LED backlight (Anode)
22	LED-A	Power for LED backlight (Anode)
23	NC	No connection
24	LED-K1	Power for LED backlight (Calgode)

25	LED-K2	Power for LED backlight (Catgode)
26	LED-K3	Power for LED backlight (Catgode)
27	LED-K4	Power for LED backlight (Catgode)
28	LED-K5	Power for LED backlight (Catgode)
29	LED-K6	Power for LED backlight (Catgode)
30	BIST	Normal Operation/BIST pattern select.Normally pull lo. When BISt=H,BIST(CLK input is not needed),When BIST=L,Normal Operation(Default)

5.4 Absolute Max. Rating

Item	Symbol	Min	Max	Unit	Conditions
Digital supply voltage	DVDD	-0.3	5	V	
TFT gate on voltage	VGH	-0.3	20	V	
TFT gate of voltage	VGL	-20	0.3	V	
Analog power supply voltage	AVDD	6.5	13.5	V	
Operation Temperature	TOP	-10	60	℃	

5.5 Typical Operation Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Digital Supply Voltage	DVDD	3.0	3.3	3.6	V	
TFT Gate on voltage	VGH	18	19	20	V	
TFT Gate off voltage	VGL	-11	-100	-9	V	
TFT Common electrode voltage	VCOM	2.94	3.44	3.94	V	
Analog power supply voltage	AVDD	8.63	8.9	9.16	V	

5.6 Back-light Unit

PARAMETER	SyuL	Min	Typ	Max	Unit	Test condition	note
LED Current	IF	110	120	130	mA		
LED Voltage (Total)	VF	--	18-19	--	V		
Life Time	LBL	--	10000	--	Hr	I^120mA	

Color	White						
Output PWM frequency	FPWM	100	200	20K	Hz		
Duty ratio	--	5	--	100	%		

(1) Permanent damage may occur to the LCD module if beyond this specification. Functional

Should be restricted to the conditions described under normal operating conditions.

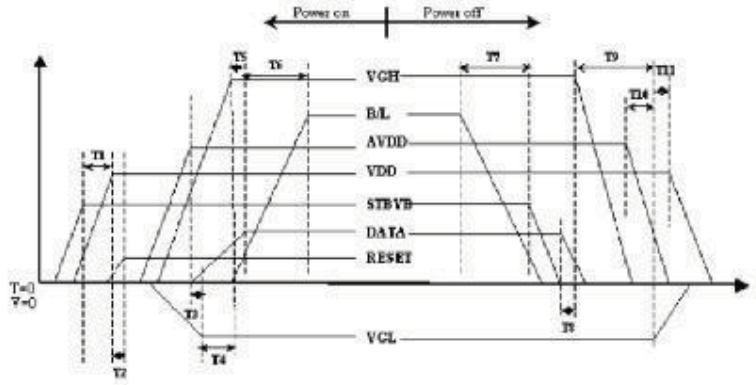
(2) Ta=25±2T:

(3) Test condition: LED Current 120mA

5.7 Power Sequence

VDD power and LED on/off sequence is as follows. Interface signals are also shown in the

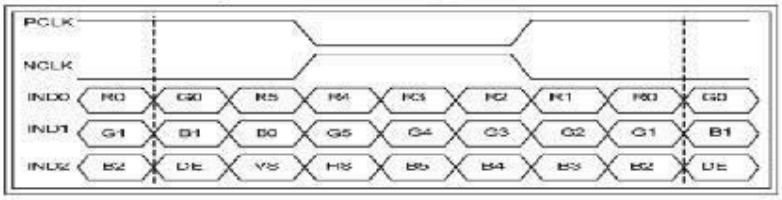
Chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



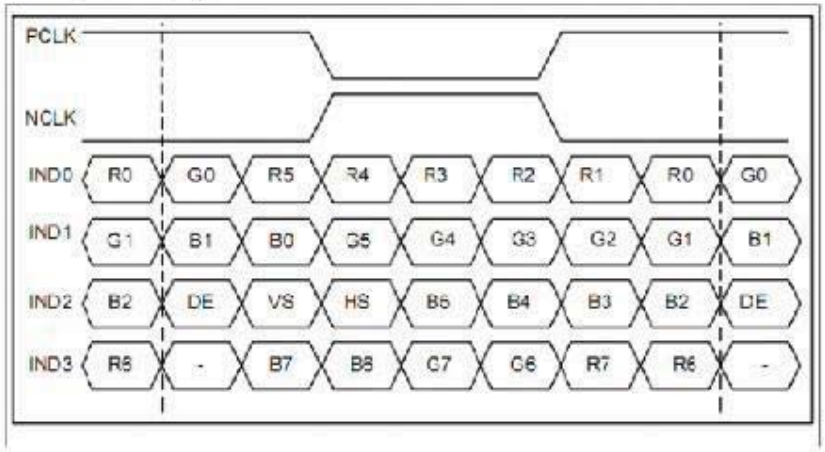
Item	Min.	Typ.	Max.	Unit
T1	0	--	--	ms
T2	50	--	--	ms
T3	5	--	--	ms
T4	10	--	--	ms
T5	20	--	--	ms
T6	50	--	--	ms
T7	20	--	--	ms
T8	10	--	--	ms
T9	20	--	--	ms
T10	10	--	--	ms
T11	20	--	--	ms

5.8 Timing Conditions

5.8.1 6bit LVDS input



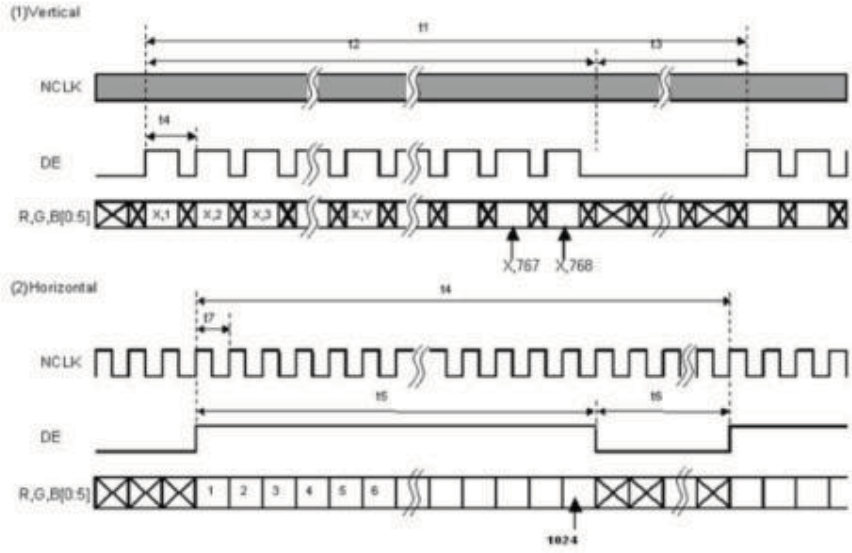
5.8.2 8Bit LVDS Input



5.8.3 The input data format: (only for DE Mode)

Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	--	55	60	65	Hz
Frame Period	t1	793	806	819	line
Vertical Display Time	t2	768	768	768	line
Vertical Blanking Time	t3	25	38	51	line
1 Line Scanning Time	t4	1304	1344	1384	clock
Horizontal Display Time	t5	1024	1024	1024	clock
Horizontal Blanking Time	t6	280	320	360	clock
Clock Rate	t7	55	65	75	MHz

Timing Diagram of Interface Signal



5.9 Optical specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR> 10)	θL	Φ=180°(9 o'clock)		70		degree	
	θr	Φ=0°(3 o'clock)		80			
	θt	Φ=90°(12 o'clock)		80			
	θb	Φ=270°(6 o'clock)		80			
Response time Rise+Fall	Trt	Normal θ=Φ=0°		20	25	msec	
Contrast ratio	CR			500			
Color chromaticity	Wx		0.28	0.31	0.34		
	Wy		0.28	0.33	0.38		
Luminance	L			280			
Luminance uniformity	Yu		70	75		%	

Note 1: Definition of viewing angle range

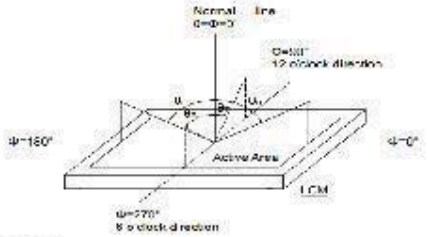


Fig. 4-1 Definition of viewing angle

Note 2: 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. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm ,Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

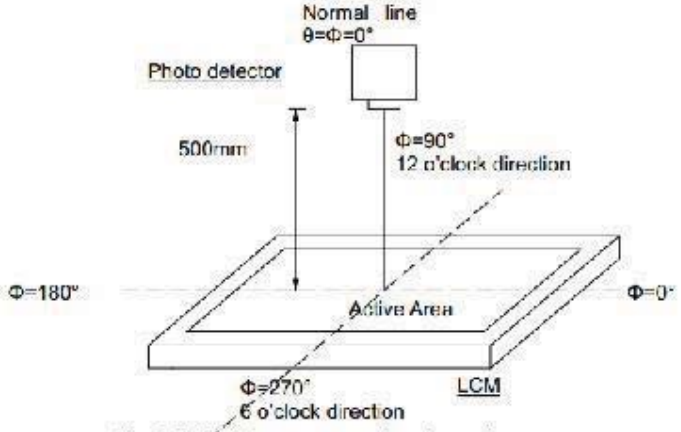


Fig. 4-2 Optical measurement system setup

Note 3: 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%.

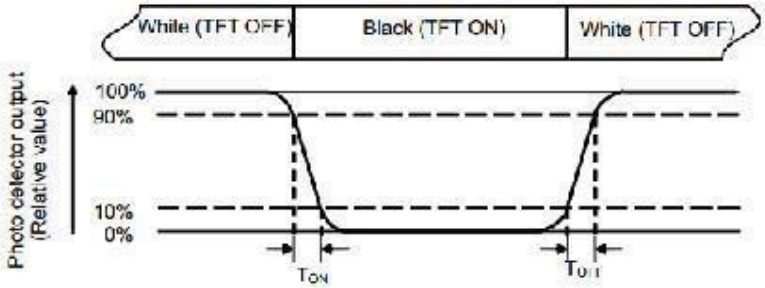


Fig. 4- 3 Definition of response time

Note 4: Definition of contrast ratio

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

Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is I_{LED}=140mA.

Note 7: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$\textit{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$

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

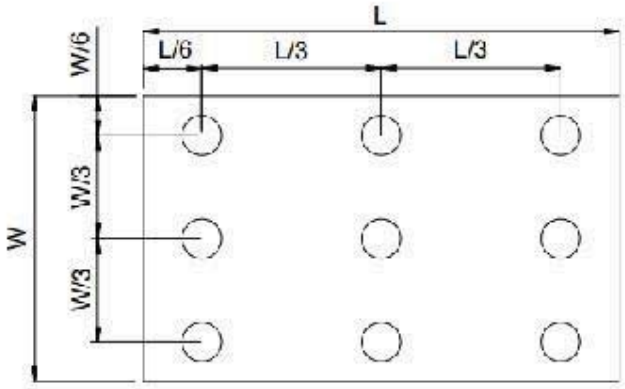
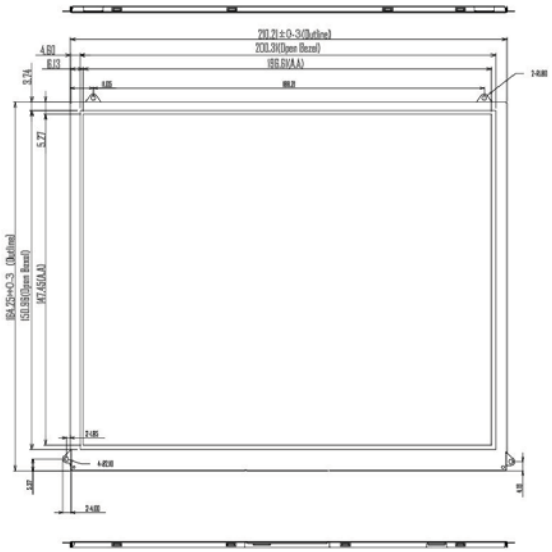


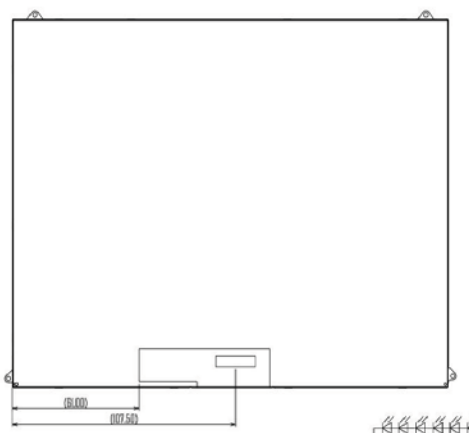
Fig. 4- 4 Definition of measuring points

B_{max}: The measured maximum luminance of all measurement position.
B_{min}: The measured minimum luminance of all measurement position.

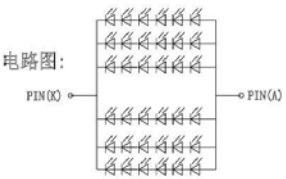
ISSUE	AMENDMENT	DATE
A	NEW ISSUE	2017-8-23







电路图:



LED: 6*6= 36 Pcs

Notes:

1. RoHS must be complied.
2. A Modification rev.number
3. Draft angle 1.5° :
4. ( ) reference dimension, ☆ :critical dimension
5. All radii without dimension R0.3, Unspecified Tolerances is: ±0.20mm

Electrical-Optical Characteristics(Ta=25° C):

	Iten	Symbol	min.	typ.	max.	Unit	Condition
Main screen	BL Luminance	Lv	250	280	-----	cd/m²	If=120 mA
	Uniformity	Avg	75	80		%	
	BL Colour Coordinate	X	0.260	0.290	0.320		
		Y	0.280	0.310	0.340		
Sub screen	Luminance	Lv	-----			cd/m²	
	Uniformity	Avg	---			%	
	Colour Coordinate	X	---	---	---		
		Y	---	---	---		
Forward Voltage		Vf	18.0	19.2	20.4	V	

•Operating Temperature:-20~+70° C •Storage Temperature:-30~+80° C

BACKLIGHT NO.:	
CUSTOMER'S NO.:	----
SHEET: 1 of 1	FIRST ANGLE PROJECTION / UNIT: mm
DESIGN:	Wangdefu/2017-8-24
CHECKED:	----
COUNTERSIGN:	----
APPROVED:	Liweining/2017-8-24
DRAWING No:	REV A0

CP-16071301

SUBJECT 主题：TFT模组（　　）检验标准	EFFECTIVE DATE 生效日期：	NO 编码：AINFULL-001
	PAGE OF 页次：第1页　共5页	REV 版本：A

修改登记表

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会签记录

会签单位	总经办	稽核部	行政人事部	商务部	研发部	仓储部	工程部	品质部	采购部	计划部	生产部	财务部
签名												

Website:www.tslcd.com/www.lcdlcm.com Email:tslcd@tslcd.com

SUBJECT 主题：TFT模组（CPT）检验标准	EFFECTIVE DATE 生效日期：2014.03.22	NO 编码 :AINFULL-001
	PAGE OF 页次：第2页 共5页	REV 版本：A

1. 目的

A 明确模组的检验标准，防止不良品流入客户端。

B 便于与客户沟通。

2. 适用范围

适用于本公司所有 LCD 屏的背光模组。

3. 检验条件与环境

3.1 检验环境条件(Enplanation):

A 温度：23±5 ℃；

B 湿度：55±10%RH

C 外观检查光照：光照约300--500Lux;

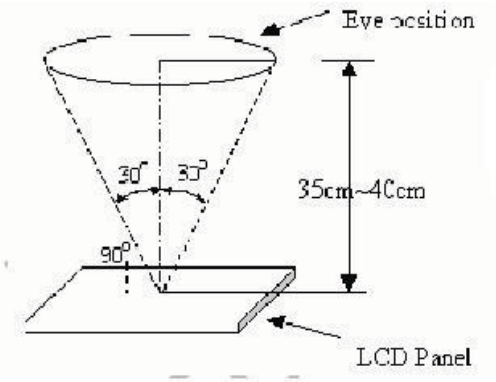
D 点亮检查光照：光照约200--250Lux;

3.2 检测条件：

A 目视距离：35-40cm

B 外观检验角度：±30°；

C 点亮检验角度：±30°。



3.3 抽样条件

A. 批量：单次运送的单一机种之数量；

B. 抽样计划: MIL-STD-105E 的一般检验水准Ⅱ级，正常检验、单次抽样。

AQL: 主要缺点（Maj）0.65，次要缺点（Min）1.5；

(注：客户特殊要求除外)。

3.4 主要缺陷和次要缺陷的分类如下：

3.4.1主要缺陷(Maj)：主要缺陷是指造成产品丧失使用性能的缺陷。如下：

A. 显示异常：产品不能正常显示；

B. 线缺陷；

C. 整个模组有严重的变形或者损坏；

D. 玻璃破片；

3.4.2 次要缺陷(Min)：次要缺陷是指不造成产品使用性能丧失的缺陷或难以发现的外观缺陷（不影响使用）。