

# Shenzhen Leadtek Electronics Co.,Ltd

## PRODUCT SPECIFICATION

### TFT-LCD MODULE

**Module No:** LTK123FHCLM17-V4

Preliminary Specification

Approval Specification

Designed by	Checked by	Approved by
<i>jona</i>	<i>tom</i>	<i>lan</i>

### Final Approval by Customer

Approved by	Comment

※The specification of "TBD" should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.



## 2. General Specifications

No.	Item	Specification	Remark
1	LCD size	12.3 inch	
2	Driver element	a-Si TFT active matrix	
3	Display Resolution	1920RGB (W) x 720(H)	
4	Display mode	Normally Black	
5	Dot pitch	0.1520 (W) x 0.1520(H)	
6	Active area	292.03(W) x 109.51(H)	mm
7	Module size	302.06(W) × 125.46(H) × 6.94(D) mm	Note
8	View direction	ALL	
9	Color arrangement	RGB-stripe	
10	Interface	LVDS	
11	Driver IC	HX82102-A+HX8692-A*2	
12	Weight	TBD	
13	Surface treatment	HC( Glare)	

Note 1: Refer to Mechanical Drawing.

## 3. Mechanical Drawing



## 4. Pin Assignment

LCM- Connector is used for the module electronics interface. The recommended model is FH52 E – 50 (25) S B – 0.5 SH (##)manufactured by Aorara.

Pin No.	Symbol	I/O	Function	Remark
1	GND	P	Ground	
2	BIST/NC	---	No connect	
3	VCC	P	Main Power Supply	
4	VCC	P	Main Power Supply	
5	GND	P	Ground	
6	NC	P	No connect	
7	NC	---	No connector(Serial interface OTP Power)	
8	NC	---	No connect	
9	GND	P	Ground	
10	ORXIN0-	I	Odd pixel negative LVDS differential data input(O0-)	
11	ORXIN0+	I	Odd pixel positive LVDS differential data input(O0+)	
12	ORXIN1-	I	Odd pixel negative LVDS differential data input(O1-)	
13	ORXIN1+	I	Odd pixel positive LVDS differential data input(O1+)	
14	ORXIN2-	I	Odd pixel negative LVDS differential data input(O2-)	
15	ORXIN2+	I	Odd pixel positive LVDS differential data input(O2+)	
16	ORXCLKIN-	I	Odd pixel negative LVDS differential CLK input(OCLK-)	
17	ORXCLKIN+	I	Odd pixel positive LVDS differential CLK input(OCLK+)	
18	ORXIN3-	I	Odd pixel negative LVDS differential data input(O3-)	
19	ORXIN3+	I	Odd pixel positive LVDS differential data input(O3+)	
20	ERXIN0-	I	Even pixel negative LVDS differential data input(E0-)	
21	ERXIN0+	I	Even pixel positive LVDS differential data input(E0+)	
22	ERXIN1-	I	Even pixel negative LVDS differential data input(E1-)	
23	ERXIN1+	I	Even pixel positive LVDS differential data input(E1+)	
24	ERXIN2-	I	Even pixel negative LVDS differential data input(E2-)	

25	ERXIN2+	I	Even pixel positive LVDS differential data input(E2+)	
26	ERXCLKIN-	I	Even pixel negative LVDS differential CLK input(ECLK-)	
27	ERXCLKIN+	I	Even pixel positive LVDS differential CLK input(ECLK+)	
28	ERXIN3-	I	Even pixel negative LVDS differential data input(E3-)	
29	ERXIN3+	I	Even pixel positive LVDS differential data input(E3+)	
30	GND	P	Ground	
31	FAULT	---	FAULT signal output(normal=H, abnormal=L)	
32	RESETB	I	Global reset pin, active low.	
33	STBYB	I	Standby mode setting pin, active low.	
34	NC	I	No connector (I2C otp interface I2C_SDA)	
35	NC	I	No connector ( I2C otp interface I2C_SCL)	
36	NC	I	No connect	
37	NC	I	No connect	
38	GND	P	Ground	
39	GND	P	Ground	
40	NC	-I	No connect	
41	LEDA	P	LED ANODE (A)	
42	LEDA	P	LED ANODE (A)	
43	LEDA	P	LED ANODE (A)	
44	NC	I	No connect	
45	LEDK1	P	LED CATHODE(K1)	
46	LEDK2	P	LED CATHODE(K2)	
47	LEDK3	P	LED CATHODE(K3)	
48	LEDK4	P	LED CATHODE(K4)	
49	NTC_A	P	NTC ANODE	
50	NTC_K	P	NTC CATHODE	

I: input; O: output; P: Power or Ground(0V).

## 5. Operation Specifications

### 5.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	VCC	-0.3	4.0	V	TA=25°C
Operation Temperature	T <sub>OP</sub>	-30	85	°C	
Storage Temperature	T <sub>ST</sub>	-40	90	°C	

Note1 : The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

### 5.2. Typical Operation Conditions

Test condition: GND=0V, TA=25 °C

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Digital Operating voltage	VCC	3.0	3.3	3.6	V	
High Level Input Voltage	V <sub>IH</sub>	0.7 VCC	-	VCC	V	
Low Level Input Voltage	V <sub>IL</sub>	0	-	0.3 VCC	V	

## 5.3. Current Consumption

### 5.3.1 Current for LCD Driver

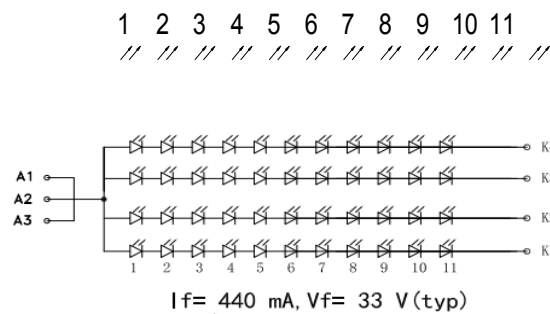
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
	Ivcc	-	120	250	mA	VCC=3.3V
Total Power Consumption	LCD	-	0.396		W	

### 5.3.2 Current for LED Driver

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	$V_L$	31.9	33	-	V	Note 1
Current for LED Backlight	$I_L$	-	440	-	mA	
BL Power Consumption	BL	-	10.80	-	W	
LED life time	-	50,000	-	-	Hrs	Note 2

Note1:  $V_L=33V$ ,  $I_L=440mA$  (Backlight circuit:11series connection, 4 parallel connection), the ambient temperature is  $25^{\circ}C$ .

#### LED CIRCUIT DIAGRAM



#### NTC CIRCUIT DIAGRAM

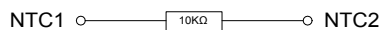


Fig. 3-1 LED test circuit diagram

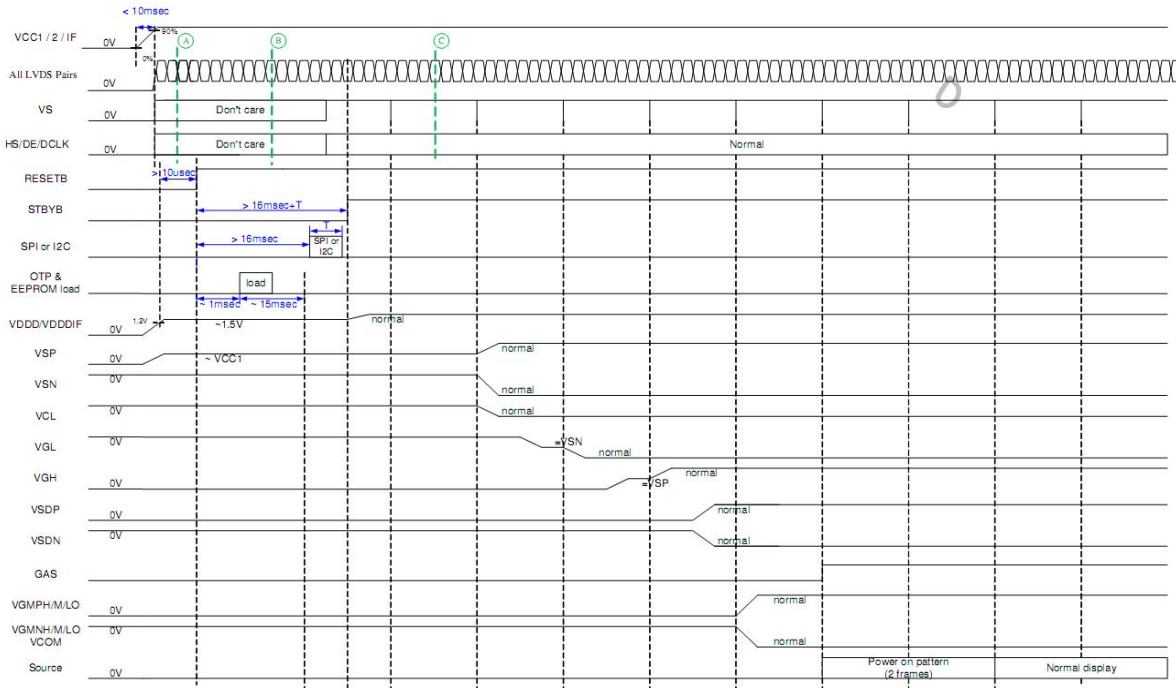
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at  $T_a=25^{\circ}C$  and 1/2 rated current. The LED lifetime could be decreased if operating  $I_L$  is larger than 320 mA.

### 5.3.3 Backlight NTC Resistor

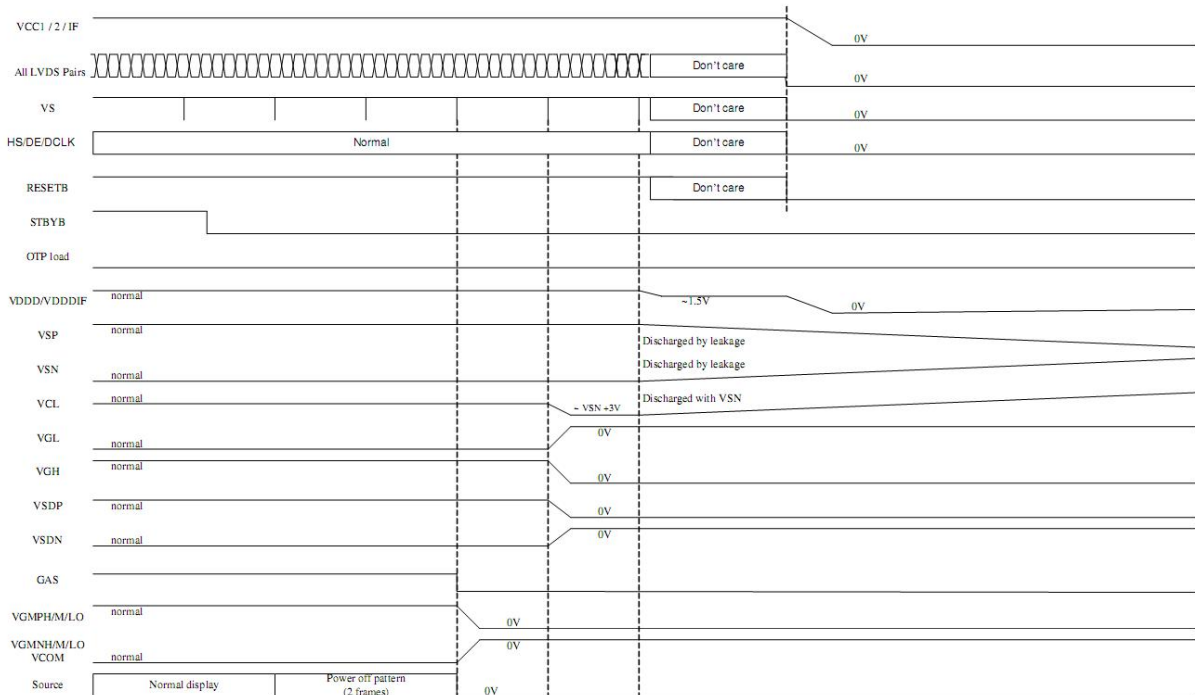
Murata NTC Specification NCP15XH103F03RC			
R25 10k ohm +/- 1%			
B(25/50) 3380K +/-1%			
TEMP. (deg. C)	R-low (k ohm)	R-center (k ohm)	R-high (k ohm)
-40	188.0202	195.652	203.5731
-35	142.7877	148.171	153.7418
-30	109.5221	113.3471	117.294
-25	84.8227	87.5588	90.3741
-20	66.2694	68.2367	70.2554
-15	52.2283	53.6496	55.104
-10	41.4765	42.5062	43.557
-5	33.1462	33.8922	34.6515
0	26.678	27.2186	27.7675
5	21.6294	22.0211	22.4175
10	17.643	17.9255	18.2107
15	14.4712	14.6735	14.8772
20	11.9371	12.0805	12.2244
25	9.9	10	10.1
30	8.2162	8.3145	8.4132
35	6.8534	6.9479	7.043
40	5.7443	5.8336	5.9238
45	4.8333	4.9169	5.0015
50	4.0833	4.1609	4.2395
55	3.4634	3.535	3.6076
60	2.9486	3.0143	3.0812
65	2.5259	2.5861	2.6476
70	2.1724	2.2275	2.2839
75	1.8741	1.9245	1.9761
80	1.6225	1.6685	1.7157
85	1.4101	1.4521	1.4952
90	1.2296	1.268	1.3074
95	1.0746	1.1096	1.1456
100	0.9419	0.9738	1.0067
105	0.8288	0.858	0.8881
110	0.7313	0.758	0.7856
115	0.6471	0.6715	0.6968
120	0.574	0.5964	0.6196
125	0.5106	0.5311	0.5524

# 5.4. Power Sequence

## a. Power on:



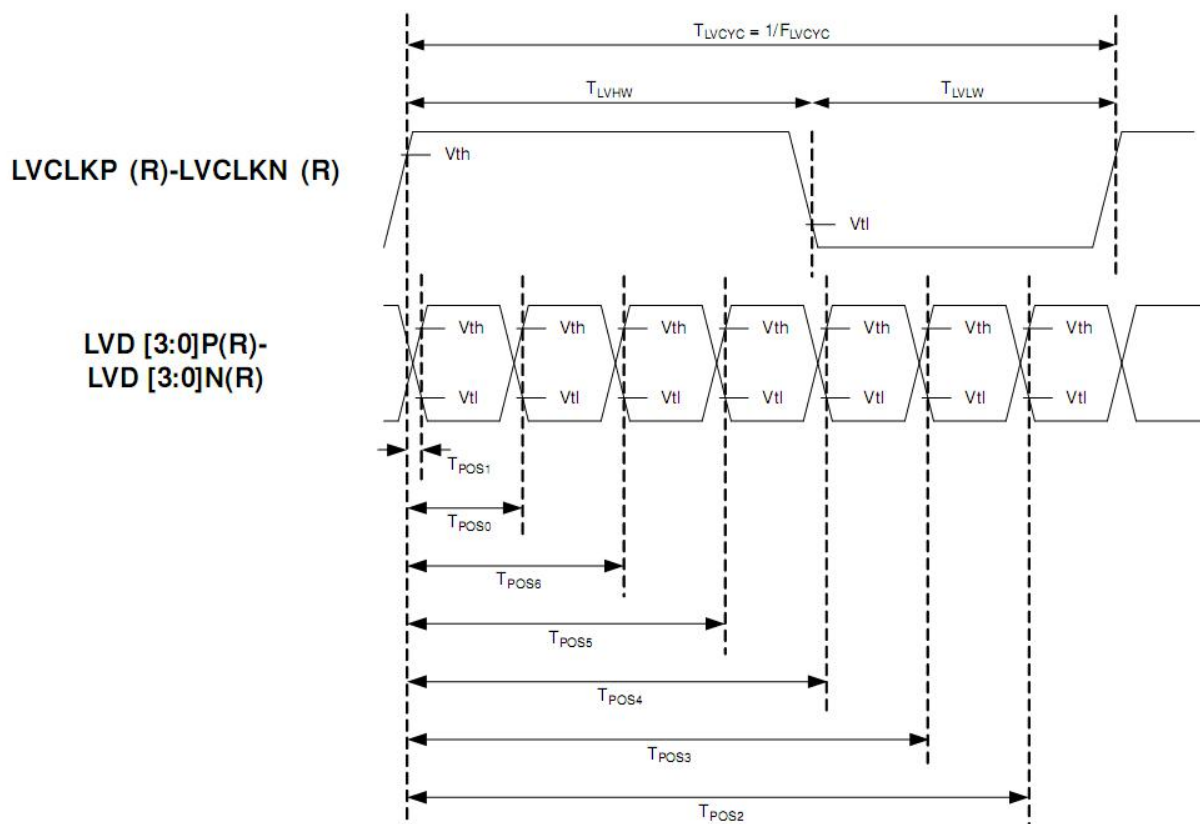
## b. Power off



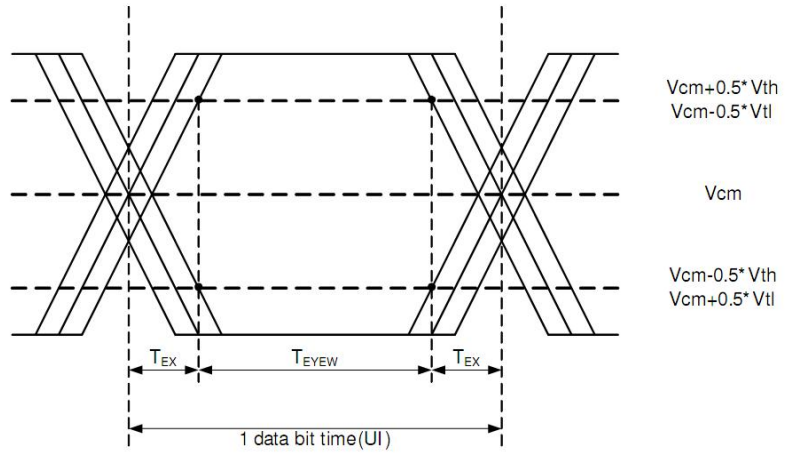
## 5.5. LVDS Signal Timing Characteristics

### 5.5.1. AC Electrical Characteristics

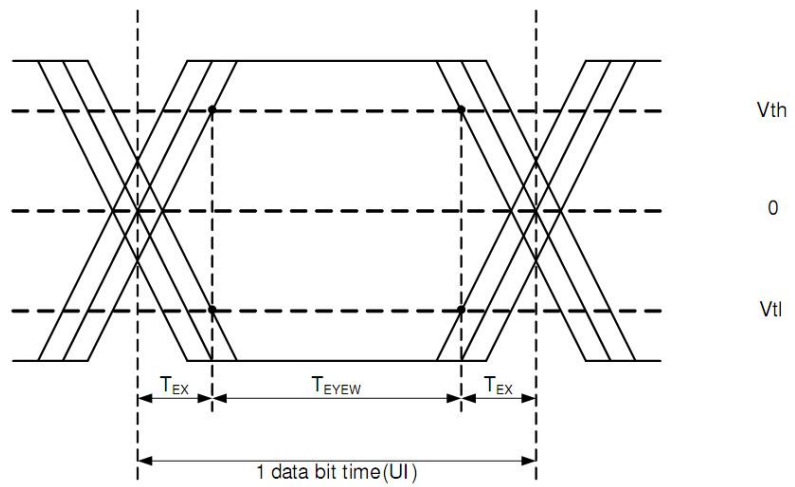
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Clock frequency	FLVCYC	20	-	85	MHz
Clock period	TLVCYC	11.76	-	-	ns
1 data bit time	UI	-	1/7	-	TLVCYC
Clock high time	TLVCH	3.9	4	4.1	UI
Clock low time	TLVCL	2.9	3	3.1	UI
Position 1	TPOS1	-0.2	0	0.2	UI
Position 0	TPOS0	0.8	1	1.2	UI
Position 6	TPOS6	1.8	2	2.2	UI
Position 5	TPOS5	2.8	3	3.2	UI
Position 4	TPOS4	3.8	4	4.2	UI
Position 3	TPOS3	4.8	5	5.2	UI
Position 2	TPOS2	5.8	6	6.2	UI
Input eye width	TEYEW	0.6	-	-	UI
Input eye border	TEX	-	-	0.2	UI
LVDS wake up time	TENLVDS	-	-	150	us



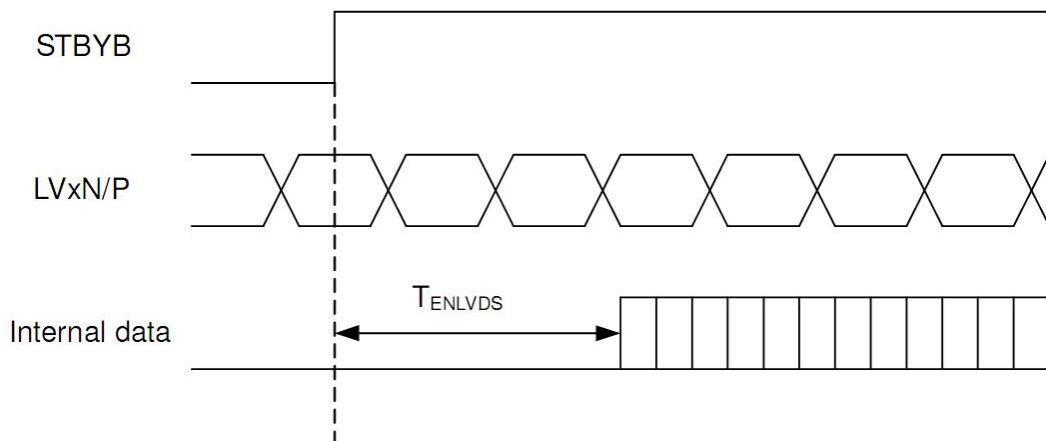
**Single-ended:  
LVD [3:0]P,  
LVD [3:0]N**



**Differential:  
LVD [3:0]P-LVD [3:0]N**



LVDS input eye diagram



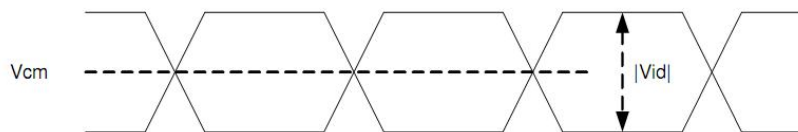
The LVDS receiver can support spread spectrum clock (SSC). Limitation is listed as below.

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max	
Modulation Frequency	SSC <sub>MF</sub>	LVDS clock frequency center at 80MHz	-	-	200	KHz
		LVDS clock frequency center at 60MHz	-	-	150	KHz
		LVDS clock frequency center at 40MHz	-	-	100	KHz
		LVDS clock frequency center at 20MHz	-	-	50	KHz
Modulation Rate	SSC <sub>MR</sub>	LVDS clock frequency + SSCMR in the range of 20MHz~85MHz	-	-	±3	%

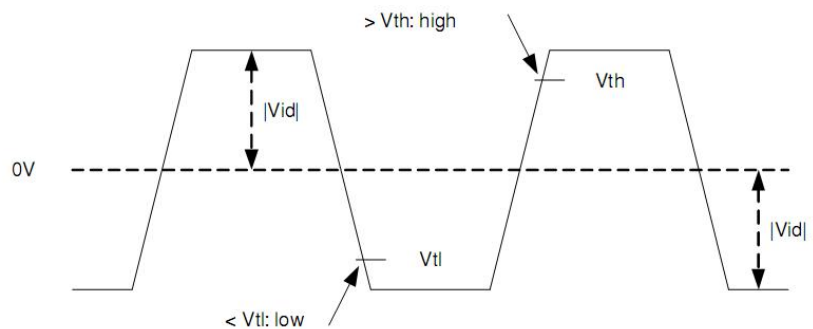
## 5.5.2. DC Electrical Characteristics

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Differential input high Threshold voltage	V <sub>th</sub>	V <sub>cm</sub> =1.2V	-	-	+0.1	V
Differential input low threshold voltage	V <sub>tl</sub>	-	-0.1	-	-	V
Differential input common Mode voltage	V <sub>CM</sub>	-	1	1.2	1.7- V <sub>id</sub>  /2	V
LVDS input voltage	V <sub>INLV</sub>	-	0.7	-	1.7	V
Differential input voltage	V <sub>id</sub>	-	0.1	-	0.6	V
Differential input leakage Current	I <sub>lvleak</sub>	-	-10	-	+10	μA

**Single-ended:**  
 LVCLKP(R),  
 LVCLKN(R),  
 LVD[3:0]P(R),  
 LVD[3:0]N(R)



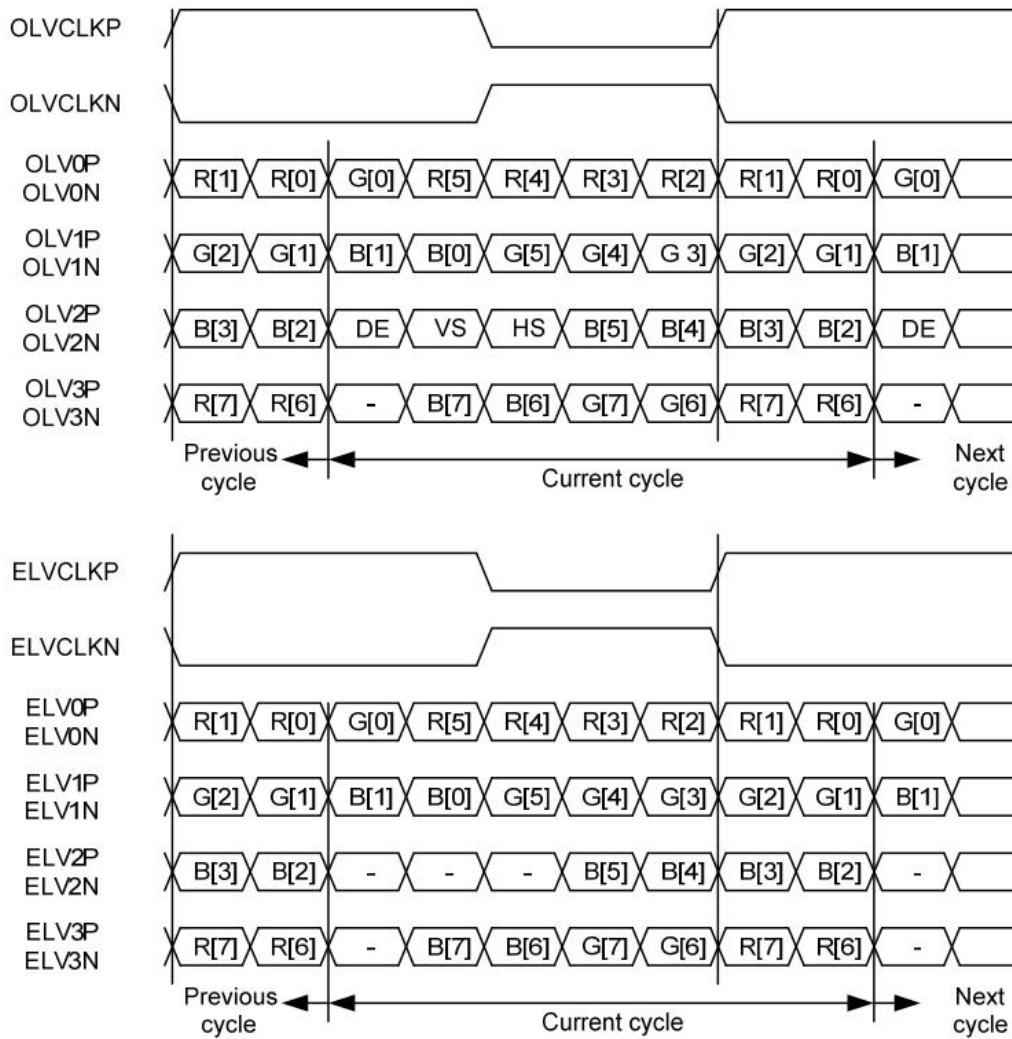
**Differential:**  
 LVCLKP(R)-LVCLKN(R),  
 LVD[3:0]P(R)-  
 LVD[3:0]N(R)



### 5.5.3. Timing Controller

Item	Symbol	1920xRGBx720 (Two Port)			Unit	Remark
		Min.	Typ.	Max.		
DCLK frequency	Fclk	43.1	44.1	70.1	MHz	Frame rate =60Hz
Hsync period time	Th	1002			DCLK	
Horizontal valid data	thd	1920			DCLK	
Hsync pulse Width	thpw	10	12	255	DCLK	
Hsync back porch	thbp	5	16	255	DCLK	
Hsync front porch	thfp	24	26	260	DCLK	
Vsync period time	Tv	733			H	
Vertical valid data	tvd	720			H	
Vsync pulse width	tpw	1	3	20	H	
Vsync back porch	tvbp	2	5	255	H	
Vsync front porch	tvfp	5	8	260	H	

### 5.5.4. LVDS Data Input Format



2-port LVDS signals, VESA format, 8-bit mode

## 6. Optical Specifications

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Response time	Tr+Tf	$\theta = 0^\circ$	-		22	ms	Note 1
Contrast ratio	CR	$\theta = 0^\circ$	1100	1300	-		Note 2
Viewing angle	Top	$CR \geq 10$	-	80	-	deg.	Note 3
	Bottom		-	80	-		
	Left		-	80	-		
	Right		-	80	-		
Color chromaticity (CF only with OC, light source is C light, CIE 1931)	Wx	$\theta = 0^\circ$	-0.015	0.309	+0.015	CIE	Note 4 Note 5
	Wy			0.332			
	Rx			0.639			
	Ry			0.232			
	Gx			0.286			
	Gy			0.622			
	Bx			0.135			
	By			0.106			
Color Gamut (CF only, Base on C Light)	NTSC	CIE1931	-	72	-	%	
Cross talk	Ct	$\theta = 0^\circ$	-	-	2%	%	Note 6,7
Transmittance	Trans	$\theta = 0^\circ$	2.89	3.4	-	%	

Note 1: Definition of viewing angle range

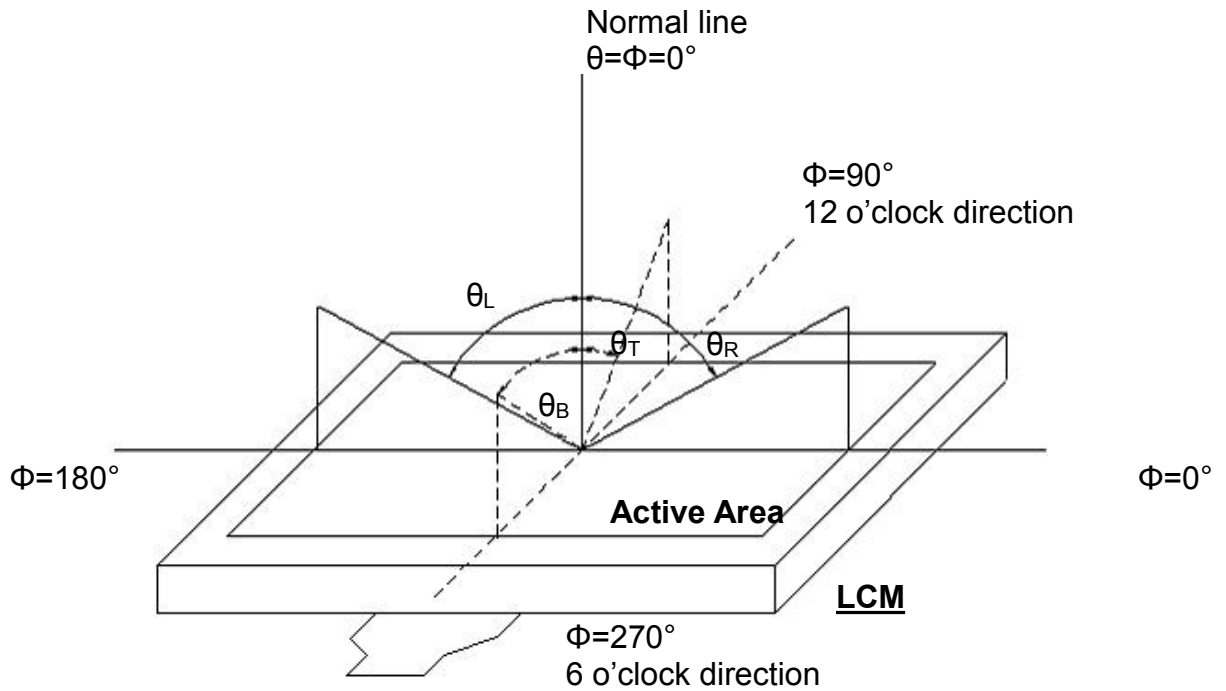


Fig. 4-2 Definition of viewing angle

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.) or CA-210.

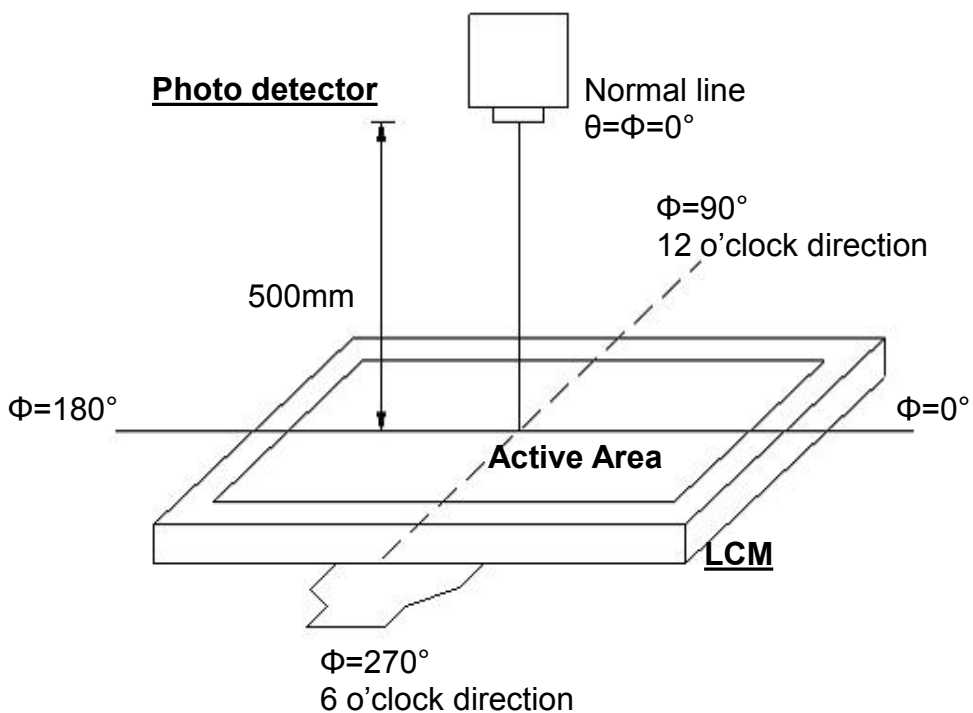


Fig. 4-3 Optical measurement system setup

**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 ( $T_{ON}$ ) 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%.

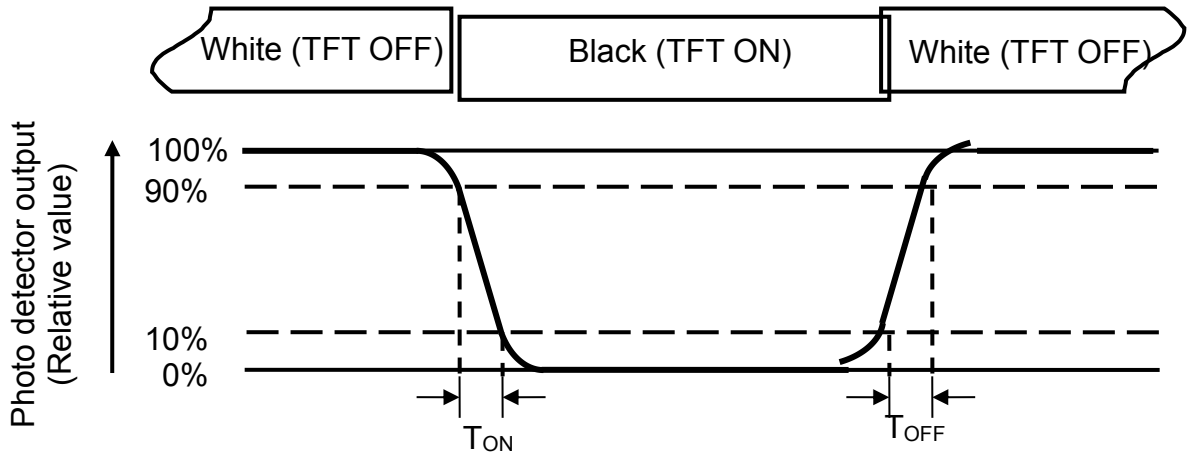


Fig. 4-4 Definition of response time

**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  $I_L=320\text{mA}$ .

**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.

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

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

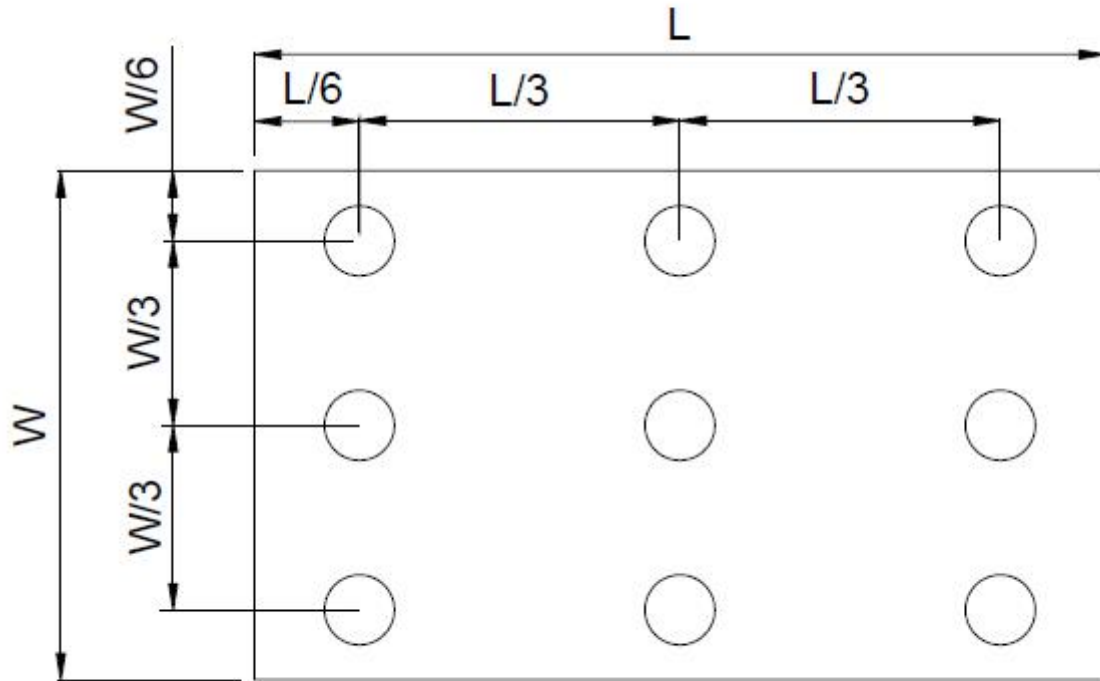


Fig. 4-4 Definition of measuring points

B<sub>MAX</sub>: The measured maximum luminance of all measurement position.

B<sub>MIN</sub>: The measured minimum luminance of all measurement position.

## 7. Reliability Test Items

Item	Test Conditions	Criterion
High Temperature Storage	Ta = 90°C                      120hrs	A,B,C,D,E
Low Temperature Storage	Ta = -40°C                      120hrs	A,B,C,D,E
High Temperature Operation	Ts = 85°C                      120hrs	A,B,C,D,E
Low Temperature Operation	Ta =-30°C                      120hrs	A,B,C,D,E
Operate at High Temperature and Humidity	+60°C , 90%RH                      120hrs	A,B,C,D,E
Thermal Shock (Non operation)	-20°C/30 min ~ +70°C/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	A,B,C,D,E
Vibration Test	Sweep:10Hz~55Hz~10Hz 2G 2 hours for each direction of X. Y. Z. (6 hours for total)	A,B,C,D,E
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	A,B,C,D,E
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	A,B,C,D,E
Electro Static Discharge	Contact=+/-8KV, Air=+/-15KV,(R=330R,C=150pF), 1 sec,9point, 10times/point;	A,B,C,D,E

※Criterion:

A.LCM each function is OK,.

B.LCM appearance inspection without abnormalities (Including scratch, damage, corrosion and serious deformation)

C.LCM brightness above the Min. value of Spec.

D. Luminance uniformity above the Min. value of Spec.

E. Color chromaticity within tolerance range

## 8.0 General Precaution

### 8.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

### 8.2 Assembly Precaution

- 1、 Please use the mounting hole on the module side in installing and do not bending or wrenching LCD in assembling. And please do not drop, bend or twist LCD module in handling.
- 2、 Please design display housing in accordance with the following guide lines.
- 3、 Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.
- 4、 Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. The clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.
- 5、 Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands. (Polarizer film, surface of LCD panel is easy to be flawed.)
- 6、 Please do not press any parts on the rear side such as source IC, gate IC, and FPC during handling LCD module. If pressing rear part is unavoidable, handle the LCD module with care not to damage them.
- 7、 Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.
- 8、 Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change. 11.2.7 Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

### 8.3 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. Leadtek does not warrant the module, if customers disassemble or modify the module.

### 8.4 Breakage of LCD Panel

- 1、 If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.
- 2、 If liquid crystal contacts mouth or eyes, rinse out with water immediately.
- 3、 If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
- 4、 Handle carefully with chips of glass that may cause injury, when the glass is broken.

## 8.5 Absolute Maximum Ratings and Power Protection Circuit

- 1、 Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.
- 2、 Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
- 3、 It's recommended employing protection circuit for power supply.

### 11.6 Operation

- 1、 Do not touch, push or rub the polarizer with anything harder than HB pencil lead. Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.
- 2、 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.
- 3、 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.
- 4、 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

## 8.6 Static Electricity

- 1、 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.
- 2、 Because LCD module uses CMOS-IC on TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge.
- 3、 Persons who handle the module should be grounded through adequate methods.

## 8.7 Disposal

When disposing LCD module, obey the local environmental regulations.

## 8.8 OTHERS

- 1、 A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight land strong UV rays.
- 2、 Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.
- 3、 For the packaging box, please pay attention to the followings:
- 4、 Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.
- 5、 Please do not pile them up more than 6 boxes. (They are not designed so.) And please do not turn over.
- 6、 Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
- 7、 Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)

## 9.0 Packing form-TBD



## 1.Scope of application /适用范围.

This document shall be applied to more than 10.0 inches touch display screen.

本文件适用于5.5~10.0 寸触摸显示屏.

## 2.Inspection conditions and environment /检验条件与环境.

### 2.1 Inspection Conditions /检验条件:

(1) Inspection Distance /检测距离: 35cm ±5cm.

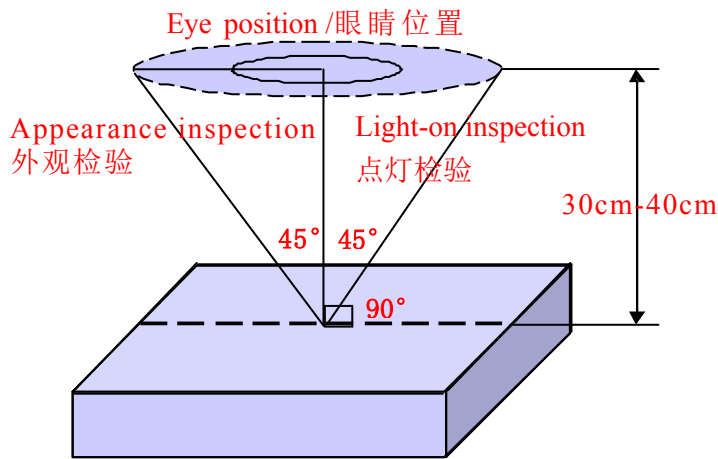
(2) Check time /检验时间:

Displays performance test /功能测试: 3~5S /Image, Cosmetic Inspection /外观检验:12~15S.

(3) Check the viewing angle /检验视角:

Light-on Inspection Angle /点灯检验角度: ±45°.

Cosmetic Inspection Angle /外观检验角度: ±45°.



(Perpendicular to LCD panel surface /垂直于LCD表面)

### 2.2 Inspection environment /检验环境:

Ambient Temperature 温度		25°C±5°C
Ambient Humidity 湿度		55±5%RH
Ambient Illumination 亮度	Cosmetic Inspection 外观检验	800-1000 Lux
	Functional Inspection 点灯检验	200~300Lux

### 2.3 Sampling Conditions /抽样条件:

(1) Quantity to be inspected /批量: Quantity of shipment lot per model /单次运送单一型号数量.

## (2) Sampling method /抽样方法:

Sampling Plan /抽样计划		GB/T 2828.1- 2003
		Normal Inspection , Single Sampling 正常检验、单次抽样
		General inspection level: II 一般检验水平: 二级
AQL	Major Defect /主要缺陷	0.65
	Minor Defect /次要缺陷	1.0

(3) The classification of Major(MA) and Minor(MI) defects is shown as “3.1 Classification of defects” .  
主缺(MA)及次缺(MI)定义于”3.1缺陷分类”.

## 3.Terms And Definitions /术语和定义

## 3.1 Classification of defects / 缺陷分类 :

## (1) Major defects /主要缺陷:

A major defect is a defect that is likely to result in failure, or to reduce materially the usability of the product for its intended purpose .

可导致产品功能失效或减少产品可用性的缺陷.

## (2) Minor defects /次要缺陷:

It will not cause the product to fail and reduce the defects in the effective use and operation of the product.

不会导致产品功能失效和减少产品的有效使用与操作的缺陷.

## 3.2 Point defects /点状缺陷:

The size of the point defect is defined by the diameter D, and the average diameter of the defect is

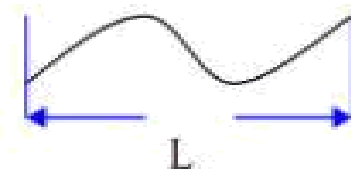
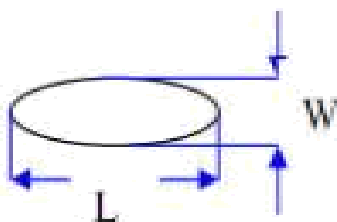
$$D=1/2 (W+L) .$$

点状缺陷的大小是由直径 D 定义的, 缺陷的平均直径  $D=1/2(W+L)$ .

## 3.3 Linear defects /线状缺陷:

When defect size  $L \geq 2W$ , the defect count as liner type defect. Size of linear defect is defined by length ( L) and the maximum width (W).

当缺陷尺寸  $L \geq 2W$  时, 被视为线状缺陷, 线状缺陷是由长度 (L) 和最大宽度 (W) 定义的.



### 3.4 LCD sub-pixel dot /LCD子像素点

(1) Definition /定义 : The point defect area is greater than 50% of the LCD sub-pixel area, and is visible through ND5% filter masking .

子像素点缺陷面积大于 50% LCD子像素面积, 且透过 ND5%遮盖是可见的.

(2) The drawing of 1/2 area sub-pixel definition / 1/2 面积的子像素定义绘图:

The 1/2 area sub-pixel can be defined as below one or more of specific shapes

1/2 面积的子像素可以定义为如下一个或多个特定形状图:



### 3.5 Small bright dot /细碎亮点 :

Point defects smaller than "LCD sub-pixels" /小于“LCD子像素点”的点缺陷.

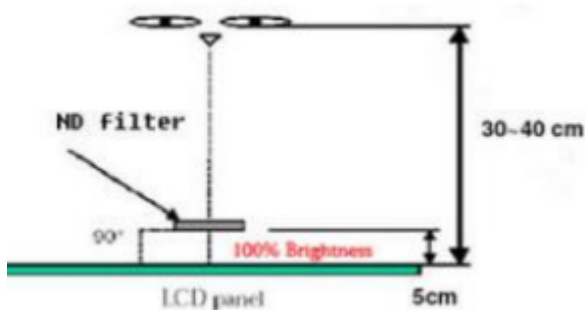
(Ratio of Zone I to Zone O /I 区与 O 区比例: 1: 2: 1)



### 3.6 ND filter inspection method /ND卡的检验方法:

Hold the ND filter about 5cm above the display area, with your eyes 30-40cm away from the panel, and observe for 2~3 seconds.

在显示区域上方大约 5cm 处握住 ND 卡, 眼睛距离面板 30-40cm, 观察2~3 秒.



3.7 Any FPC surface problems that do not leak copper on the surface and do not cause functional failure are acceptable.

任何 FPC 表面问题, 表面未露铜和不造成功能失效是可以接受.

3.8 Extraneous substances that can be wiped out , like Finger point,Particles are not considered as a defect .

可以被擦拭干净的表面物质不视为缺陷 (如手指印, 尘粒) .

3.9 Defects that can be covered by the material and are not visible in appearance are not considered defects.

能被物料覆盖，外观不可见的缺陷不视为缺陷。

3.10 Panel damage /面板损伤:

Glass damage outside the AA display area that does not affect the effective wiring is acceptable.

AA 显示区域以外的玻璃损伤，不影响有效线路是可以接受的。

3.11 Issues not specified or defined in this acceptance standard shall be handled through friendly negotiation between the two parties.

本允收标准中未规定或定义的问题，双方友好协商处理。

## 4. Inspection standards /检验标准

### 4.1 Structural Dimensions /结构尺寸规格

Serial Number 序号	Measurement items /测量项目		Specification /规格	Remark /备注
	名称 /Name	Unit /单位	Tolerance /公差	
1	Outside dimension: Length 尺寸: 长	mm /毫米	0.15mm~0.30mm	Please refer to the product specification for detailed dimensions and tolerances 详细的尺寸规格和公差请参考产品规格书
2	Outside dimension: Width 尺寸: 宽	mm /毫米	0.15mm~0.30mm	
3	Outside dimension: Thickness 尺寸: 高	mm /毫米	0.30mm~0.50mm	

### 4.2 Appearance Inspection Specification /外观检验规格

(D : diameter, W : width, L : length, N : quantity, DS : spacing)

Inspection area 检验区域	Inspection items 检验项目	Inspection specifications 检验规格	Defect category 缺陷类别	
Glass 玻璃	Wire(on Array) 线路	Can't be damaged 不能损伤	MA	
	Chipping/corner breaking 崩边/破角	Can't affect the effective lines and functions 不能影响有效线路和功能	MA	
	Edge 边缘	There must be no extensional cracks 不可有延伸性裂纹	MA	
Silicone 硅胶	Silicone coating 硅胶涂布	The height must not exceed the LCD CF surface 高度不能超过LCD CF面		MI
	Glue overflow 溢胶	Can't cover FPC, POL, etc 不能覆盖到FPC、POL等		MI

Inspection area 检验区域	Inspection items 检验项目	Inspection specifications 检验规格	Defect category 缺陷类别	
PCBA  FPC  Connector 连接器	Appearance 外观	Scratches or injuries are not allowed to cause copper exposure 划伤或损伤不允许表面出现露铜		MI
	Component 元器件	Can't be damaged and lack 不能损伤和缺少	MA	
	Goldfinger oxidation 金手指氧化	Not allowed 不允许		MI
	Connection status 连接状况	The connection must be accurate and stable 必须准确稳定连接	MA	
	Break 破裂	Not allowed 不允许	MA	
	Soldering,: false soldering/tinning/tin beads 假焊/连锡/锡珠	Not allowed 不允许	MA	
POL 偏光片	Scratches 划伤	1. $W \leq 0.10\text{mm}$ ; $L \leq 5\text{mm}$ , Ignore (忽略) 2. $0.10\text{mm} < W \leq 0.15\text{mm}$ ; $L \leq 5\text{mm}$ ; $N \leq 5$ ; $DS \geq 10\text{mm}$ 3. $0.15\text{mm} < W$ ; $5\text{mm} < L$ , Not allowable (不允许)		MI
	Dent 凹凸印	1. $D \leq 0.25\text{mm}$ , Ignore (忽略) 2. $0.25\text{mm} < D \leq 0.50\text{mm}$ ; $N \leq 5$ ; $DS \geq 10\text{mm}$ 3. $0.50\text{mm} < D$ , Not allowable (不允许)		MI
	Bubbles 气泡	1. $D \leq 0.25\text{mm}$ , Ignore (忽略) 2. $0.25\text{mm} < D \leq 0.50\text{mm}$ ; $N \leq 5$ ; $DS \geq 10\text{mm}$ 3. $0.50\text{mm} < D$ , Not allowable (不允许)		MI
	Point defects 点状不良	1. $D \leq 0.25\text{mm}$ , Ignore (忽略) 2. $0.25\text{mm} < D \leq 0.50\text{mm}$ ; $N \leq 5$ ; $DS \geq 10\text{mm}$ 3. $0.50\text{mm} < D$ , Not allowable (不允许)		MI
	Edge bubbles 边缘气泡	1. Within 1/2BM of the display area, it is not allowed 显示区往外 1/2BM 区域内, 不允许 2. The display area is 1/2 outside the BM area, and it is not controlled 显示区往外 1/2BM 区域以外, 不管控		MI
	Dirty/watermarked 脏污/水印	No dirt/water lines/finger marks are allowed, and must be wiped clean 不允许有脏污/水印/手指印, 须擦拭干净方可		MI
	Warping 起翘	Not allowed 不允许		MI
	Attaching offset 贴偏	It is necessary to completely cover the display area outward, within the 1/2BM area, or without leaking POL edges after TP is attached 需完整覆盖显示区往外、1/2BM 区以内或贴合 TP 后不会出现漏偏光片边缘		MI
Mixture 混料	Mixing different types of POL or not using POL as required by the BOM, not allowed 不允许混贴不同型号的 POL 或未按 BOM 要求使用 POL	MA		

Inspection area 检验区域	Inspection items 检验项目	Inspection specifications 检验规格	Defect category 缺陷类别	
TP&CG	Point defects 点状不良	1. $D \leq 0.25\text{mm}$ , Ignore (忽略) 2. $0.25\text{mm} < D \leq 0.50\text{mm}$ ; $N \leq 5$ ; $DS \geq 10\text{mm}$ 3. $0.50\text{mm} < D$ , Not allowable (不允许)		MI
	Scratches 划伤	1. $W \leq 0.10\text{mm}$ ; $L \leq 5\text{mm}$ , Ignore (忽略) 2. $0.10\text{mm} < W \leq 0.15\text{mm}$ ; $L \leq 5\text{mm}$ ; $N \leq 5$ ; $DS \geq 10\text{mm}$ 3. $0.15\text{mm} < W$ ; $5\text{mm} < L$ , Not allowable (不允许) 4. There is a feeling scratch, Not allowable 有感划伤, 不允许		MI
	Edges and corners cracked 崩角/崩边	1. Product front / 产品正面: Edge and corner chipping is not allowed 崩角、崩边不允许 2. Product back / 产品背面: $X \leq 0.5$ , $Y \leq 0.5$ , $Z \leq 1/2T$ ; $N \leq 5$ ; $DS \geq 10\text{mm}$		MI
	Silk screen 丝印	The silk screen is clear, complete and correct 丝印清晰、完整、内容正确		MI
	Dirty 脏污	Non-wipeable dirt, not allowed 不可擦拭的脏污, 不允许		MI
	Broken 破损	Not allowable 不允许	MA	
	Ink color aberration 油墨色差	$\Delta E > 1$ , Not allowable (不允许)		MI
	Cover pinholes 针孔	1. $D \leq 0.20\text{mm}$ , $N \leq 5$ , $DS \geq 10\text{mm}$ , allowable 2. $D > 0.20\text{mm}$ , intensive pinholes (密集型针孔), Not allowable (不允许)		MI
	IR holes IR孔	Dirt, deviation, color difference, etc. are not allowed 不允许脏污、偏位、色差等		MI
BL 背光	Backlight separation 背光分离	Not allowable 不允许		MI
	Deformation of rubber iron and rubber frame 胶铁、胶框变形	Use the plug gauge 0.3mm on the flat surface and can snap in and judge NG 在平面上使用塞规0.3mm卡翘曲位置, 能卡进判定NG		MI
	The iron frame is oxidized and not tightened 铁框氧化、卡不紧	Not allowable 不允许		MI
	Backlight sticky solder beads, glue, etc 背面粘锡珠、残胶等	Not allowable 不允许		MI
	Inkjet coding, Barcode, QR code 喷码/条码/二维码	The Inkjet coding is clear and complete, the barcode and QR code can be scanned normally, and the content and format match 喷码清晰完整、条码和二维码可正常扫描, 内容和格式相符		MI
	Accessories (protective film, double-sided tape, insulating adhesive, etc.) 辅料(保护膜、双面胶、绝缘胶等)	Defects such as missing pastes, sticking deviations, defects, and fractures are not allowed 不允许有漏贴、贴偏、残缺、断裂等缺陷		MI

## 4.3 Electrical test specifications /电性检查规格

( D : diameter, W : width, L : length, N : quantity, DS : spacing )

Inspection items 检验项目	Inspection specifications 检验规格	Defect category 缺陷类别	
Glass bright spots/dark spots 玻璃亮点/暗点	1. $D \leq 0.25\text{mm}$ , Ignore (忽略) 2. $0.25\text{mm} < D \leq 0.50\text{mm}$ ; $N \leq 5$ ; $DS \geq 10\text{mm}$ 3. $0.50\text{mm} < D$ , Not allowable (不允许)		MI
Mura	Use ND5% filter masking, visual invisibility is OK, 200~300Lux 使用ND5%遮盖, 目视不可见即为OK, 200~300Lux		MI
Small bright dot 细碎亮点	Use ND5% filter masking, visual invisibility is OK 使用ND5%遮盖, 目视不可见即为OK		MI
Light leakage 漏光	1. Use ND5% filter masking, visual invisibility is OK 使用ND5%遮盖, 目视不可见即为OK 2. If necessary, sign off on the sample 必要时, 签限定样		MI
Backlight black/white dots 背光黑点/白点	1. $D \leq 0.25\text{mm}$ , Ignore (忽略) 2. $0.25\text{mm} < D \leq 0.50\text{mm}$ ; $N \leq 5$ ; $DS \geq 10\text{mm}$ 3. $0.50\text{mm} < D$ , Not allowable (不允许)		MI
Linear foreign bodies 线状异物 (异物毛丝等)	1. $W \leq 0.10\text{mm}$ ; $L \leq 5\text{mm}$ , Ignore (忽略) 2. $0.10\text{mm} < W \leq 0.15\text{mm}$ ; $L \leq 5\text{mm}$ ; $N \leq 5$ ; $DS \geq 10\text{mm}$ 3. $0.15\text{mm} < W$ ; $5\text{mm} < L$ , Not allowable (不允许)		MI
Black/White Print 黑印/白印	Use ND5% filter masking, visual invisibility is OK 使用ND5%遮盖, 目视不可见即为OK		MI
The display is uneven 显示不均匀	Use ND5% filter masking, visual invisibility is OK 使用ND5%遮盖, 目视不可见即为OK		MI
The brightness is uneven 亮度不均匀	Brightness uniformity $< 85.0\%$ , Not allowable 亮度均匀性 $< 85.0\%$ , 不允许		MI
Displacement of the membrane 膜材移位	Not allowable 不允许		MI
Interference pattern/Newtonian pattern 干涉纹/牛顿纹	Not allowable 不允许		MI
Display abnormal 显示异常	Not allowable 不允许	MA	
No display 无显示	Not allowable 不允许	MA	
Line/Missing Drawing 线条/缺画	Not allowable 不允许	MA	
Splash screen 闪屏	Not allowable 不允许	MA	
LCD grid LCD网格	Not allowable 不允许	MA	
Afterimage 残影	Not allowable 不允许	MA	
Wrong viewing angle 视角错误	Not allowable 不允许	MA	
No touch 无触摸	Not allowable 不允许	MA	
Touch the jump point 触摸跳点	Not allowable 不允许	MA	
Not sensitive 触摸不灵敏	Not allowable 不允许	MA	