Shenzhen Leadtek Electronics Co.,Ltd

PRODUCT SPECIFICATION

TFT-LCD MODULE

Module No：LTK123FHCLM17-V2

☑ Preliminary Specification

☐ Approval Specification

Designed by	Checked by	Approved by
		

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.

Revision History

Version	Contents	Date	Note
V0	New	2023.07.05	
V1	Optimize the display	2023.08.12	
V2	Modify the backlight brightness as wall as drive parameters	2023.10.15	

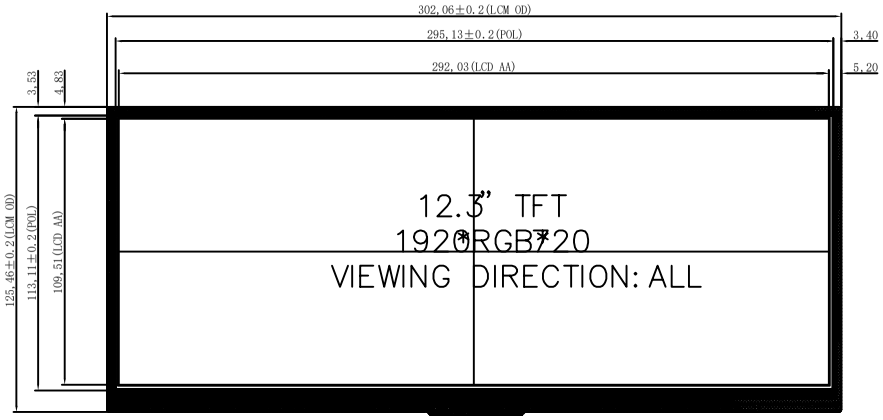
1. General Specifications

No.	Item	Specification	Remark
1	LCD size	12.3 inch	
2	Driver element	a-Si TFT active matrix	
3	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	LCM Module size	302.06（W) ×125.46(H) ×6.56(D) mm	Note
8	View direction	ALL	
9	Color arrangement	RGB-stripe	
10	Interface	LVDS	
11	Lcm power consumption	（10.80）	W
12	Driver IC	HX82102-A+HX8692-A*2	
13	Weight	TBD	
14	Surface treatment	HC(Glare)	

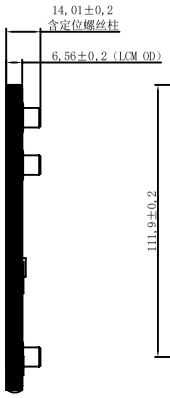
Note 1: Refer to Mechanical Drawing.

1.1 Mechanical Drawing

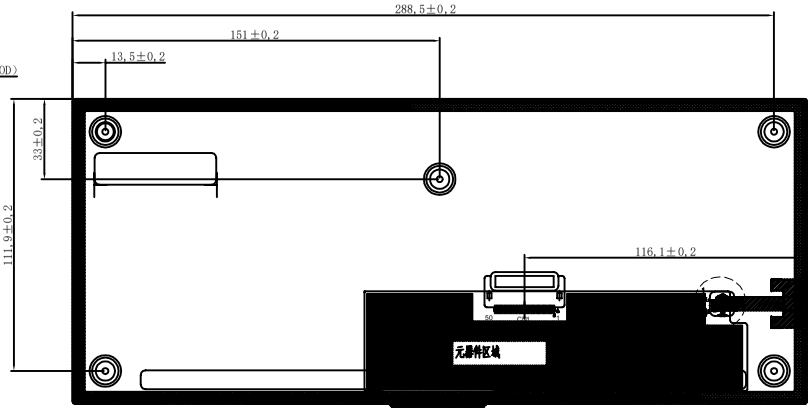
FrontView



Side View

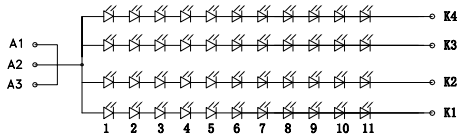


Back View



PIN	Definition	PIN	Definition
1	GND	26	ERXCLKIN-
2	NC/BIST	27	ERXCLKIN+
3	VCC	28	ERXIN3-
4	VCC	29	ERXIN3+
5	GND	30	GND
6	GND	31	FAULT
7	NC	32	RESET
8	NC	33	STBYB
9	GND	34	NC
10	ORXIN0-	35	NC
11	ORXIN0+	36	NC
12	ORXIN1-	37	NC
13	ORXIN1+	38	GND
14	ORXIN2-	39	GND
15	ORXIN2+	40	NC
16	ORXCLKIN-	41	LEDA
17	ORXCLKIN+	42	LEDA
18	ORXIN3-	43	LEDA
19	ORXIN3+	44	NC
20	ERXIN0-	45	LEDK
21	ERXIN0+	46	LEDK
22	ERXIN1-	47	LEDK
23	ERXIN1+	48	LEDK
24	ERXIN2-	49	NTC A
25	ERXIN2+	50	NTC K

Notes:
1. Display : 12.3", TFT
2. Resolution: 1920xRGBx720
3. LCD Viewing Direction: ALL,
4. Drive IC:HX82102-A+HX8692-A
5. Display Mode: Normally Black/Transmissive
6. LCM Bringhtness：1200cd/㎡(TYP)
   LCM+CTP Bringhtness：1000cd/㎡(TYP),uniformity≥80%
7. unmark Tolerance:±0.2 ②
8. OPERATING TEMP: -30° C~ +85° C
9. STORAGE TEMP: -40° C~ +90° C
10. Requirements on Environmental Protection: ROHS



If= 440 mA, Vf= 33 V(typ)
②

REV	DESCRIPTION	DATE	NAME
②	Modify the backlight brightness as well as drive parameters	2023.09.14	JACK
①	Optimize the display	2023.07.20	IAN
⓪	NEW	2023.07.03	IAN

LEADTEK COMPANY LIMITED

SCALE:1/1	UNIT:mm	PAGE:1/1		Approve	Check	Drawn
Part No:	LTK123FHCLM17		VER:V2	IAN	JONA	JACK
Customer No:						

2. 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	GND	P	Ground	
7	NC	---	No connect	
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 connect	
35	NC	I	No connect	
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).

3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	VCC	-0.3	4.0	V	TA=25℃
Operation Temperature	T_{OP}	-30	85	℃	
Storage Temperature	T_{ST}	-40	90	℃	

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.

3.2. Typical Operation Conditions

Test condition: GND=0V, T_A=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_{IH}	0.7 VCC	-	VCC	V	
Low Level Input Voltage	V_{IL}	0	-	0.3 VCC	V	

3.3. Current Consumption

3.3.1 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	

3.3.2 Current for LED Driver

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_L	31.9	33	-	V	Note 1
Crrent for LED Backlight	I_L	-	440	-	mA	
BL Power Consumption	BL	-	10.80	-	W	
LED life time	-	-	-	50000	Hrs	Note 2
LCM_Brightness	Lv	-	1200	-	Nits	@CA310

Note1: V_L=33V, I_L=440mA (Backlight circuit:11series connection, 4 parallel connection), the ambient temperature is 25℃.

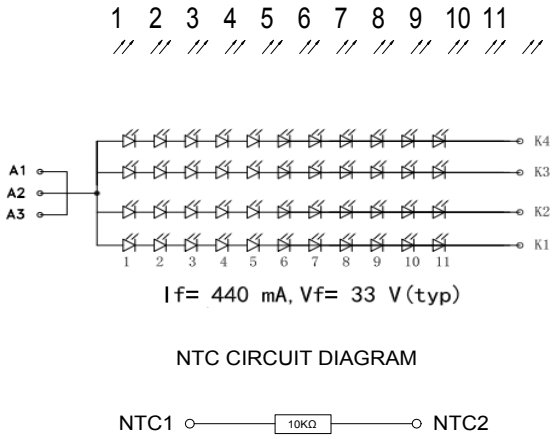


Fig. 3-1 LED test circuit diagram

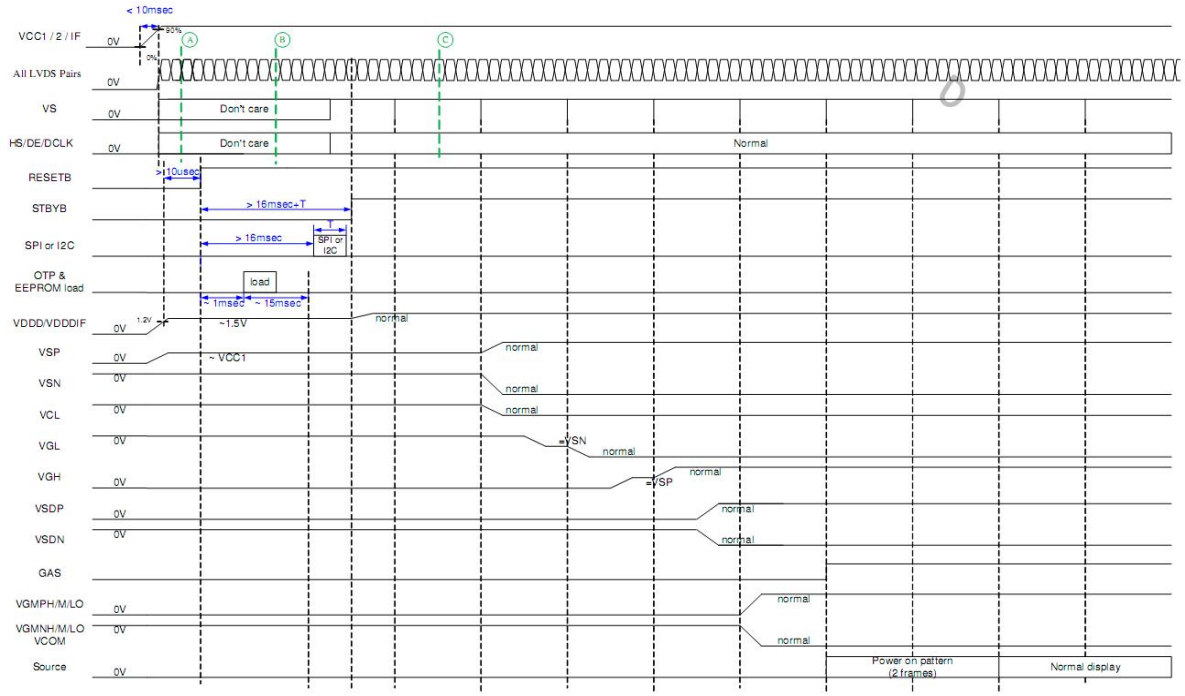
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and 1/2 rated current. The LED lifetime could be decreased if operating I_L is larger than 320 mA.

3.3.3 Backlight NTC Resistor

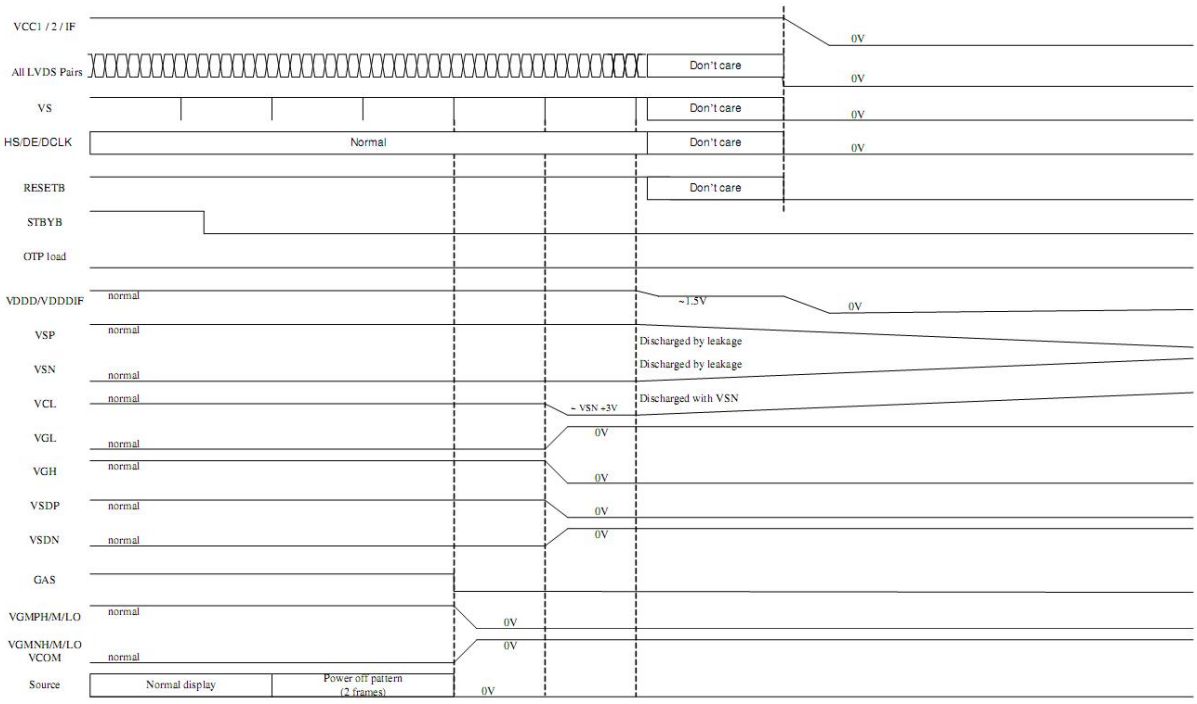
Murata NTC Specification NCP15XH103F03RC			
R25 10k ohm +/- 1%			
B(25/50) 3380K +/-1%			
TEMP.	R-low	R-center	R-high
(deg.C)	(k ohm)	(k ohm)	(k ohm)
-40	188.0202	195.652	203.5731
-35	142.7877	148.171	153.7418
-30	109.5221	113.3471	117.294
-25	84.8227	87.5588	90.3741
-20	66.2694	68.2367	70.2554
-15	52.2283	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

3.4. Power Sequence

a. Power on:



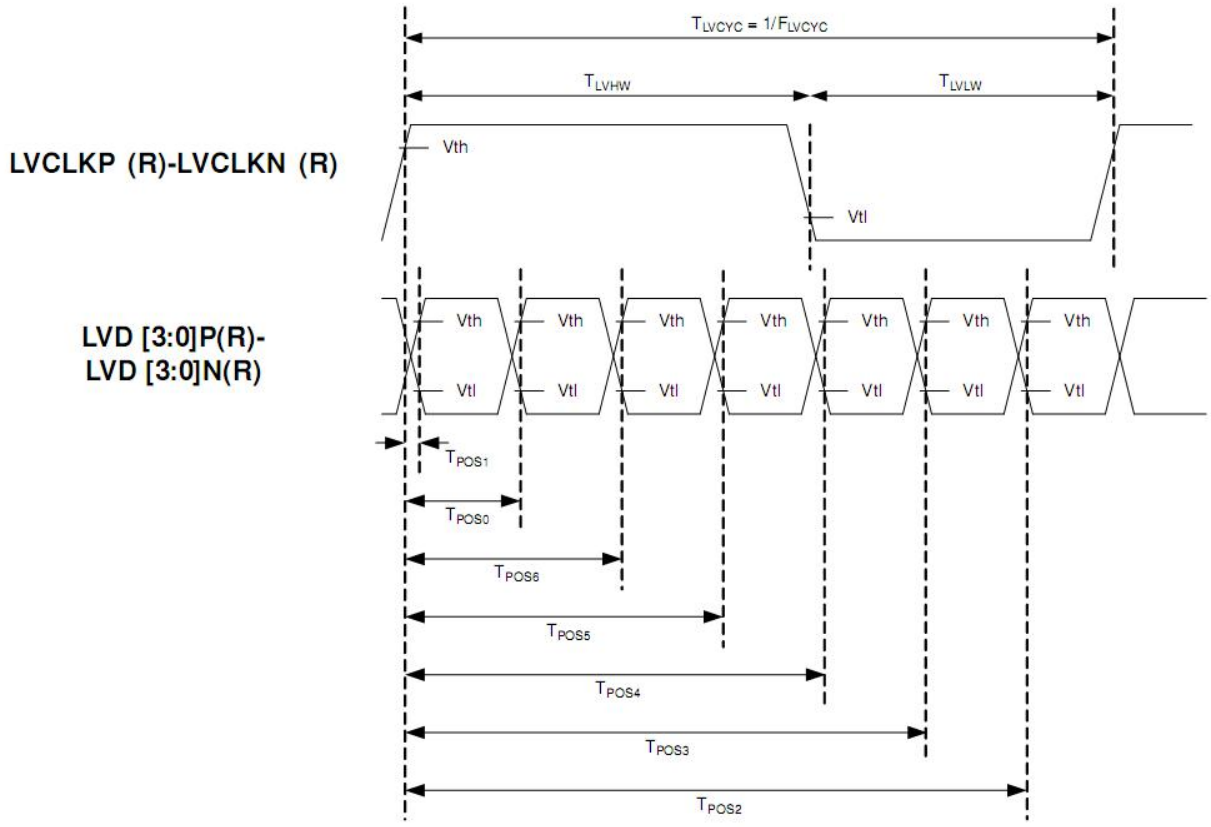
b. Power off



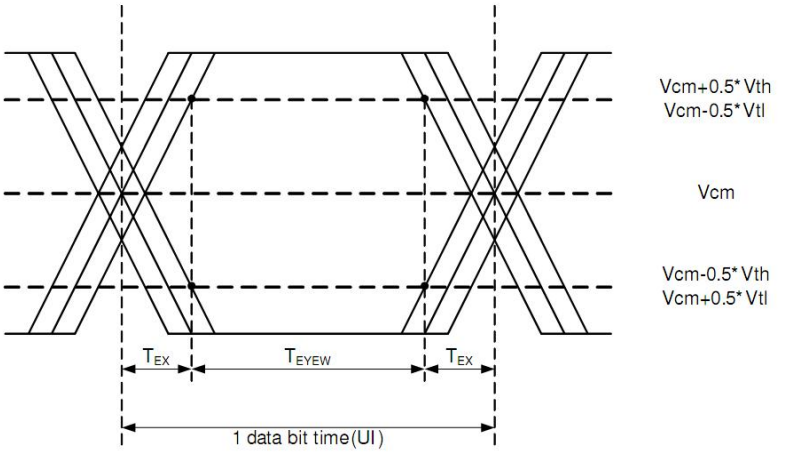
3.5. LVDS Signal Timing Characteristics

3.5.1. AC Electrical Characteristics

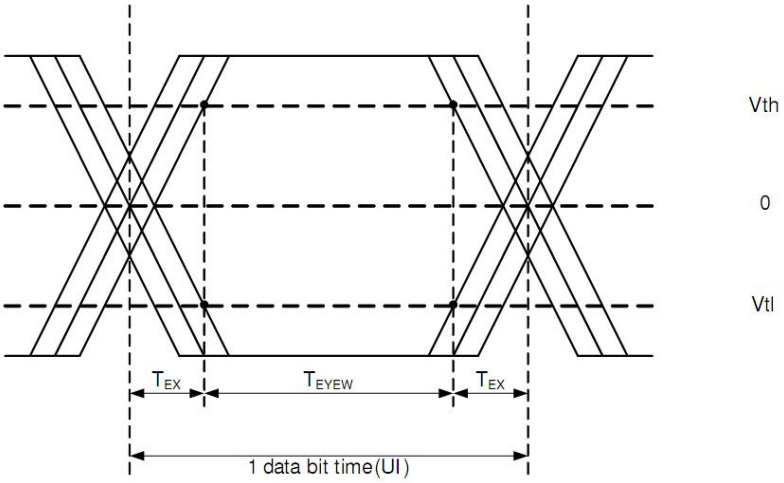
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Clock frequency	F_{LVCYC}	20	-	85	MHz
Clock period	T_{LVCYC}	11.76	-	-	ns
1 data bit time	UI	-	1/7	-	T_{LVCYC}
Clock hight time	T_{LVCH}	3.9	4	4.1	UI
Clock low time	T_{LVCL}	2.9	3	3.1	UI
Position 1	T_{POS1}	-0.2	0	0.2	UI
Position 0	T_{POS0}	0.8	1	1.2	UI
Position 6	T_{POS6}	1.8	2	2.2	UI
Position 5	T_{POS5}	2.8	3	3.2	UI
Position 4	T_{POS4}	3.8	4	4.2	UI
Position 3	T_{POS3}	4.8	5	5.2	UI
Position 2	T_{POS2}	5.8	6	6.2	UI
Input eye width	T_{EYEW}	0.6	-	-	UI
Input eye border	T_{EX}	-	-	0.2	UI
LVDS wake up time	T_{ENLVDS}	-	-	150	us



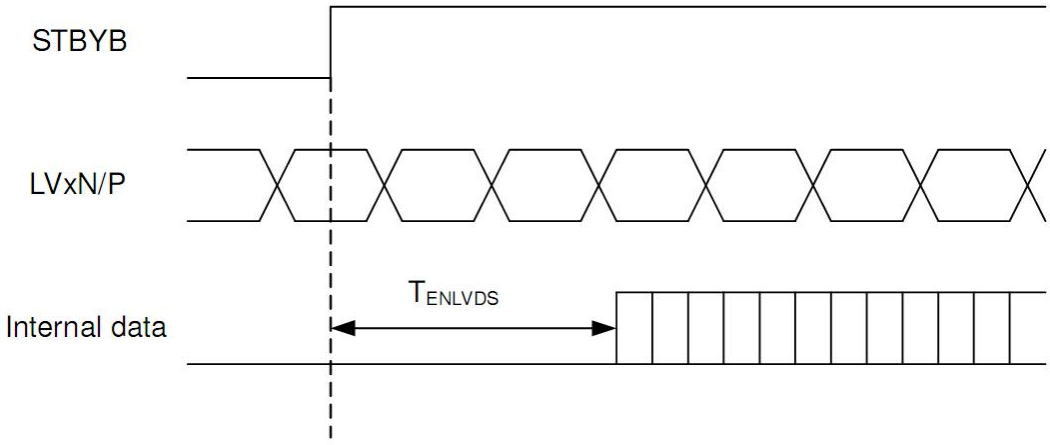
Single-ended:
LVD[3:0]P,
LVD[3:0]N



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



LVDS input eye diagram



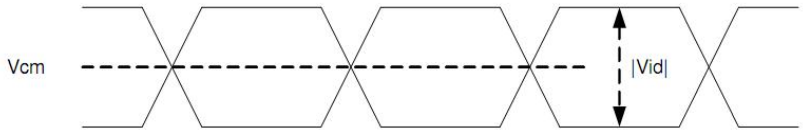
The LVDS receiver can support spread spectrum clock (SSC) .Limitation is listed as below.

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max	
Modulation Frequency	SSC_{MF}	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_{MR}	LVDS clock frequency + SSCMR in the range of 20MHZ~85Mhz	-	-	±3	%

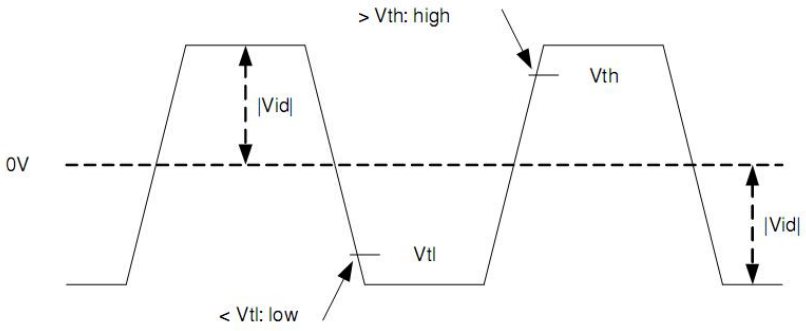
3.5.2. DC Electrical Characteristics

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Differential input high Threshold voltage	Vth	Vcm=1.2V	-	-	+0.1	V
Differential input low threshold voltage	Vtl	-	-0.1	-	-	V
Differential input common Mode voltage	V_{CM}	-	1	1.2	$1.7-\|V_{id}\|/2$	V
LVDS input voltage	V_{INLV}	-	0.7		1.7	V
Differential input voltage	|Vid|	-	0.1	-	0.6	V
Differential input leakage Current	Ilvleak	-	-10	-	+10	μA

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



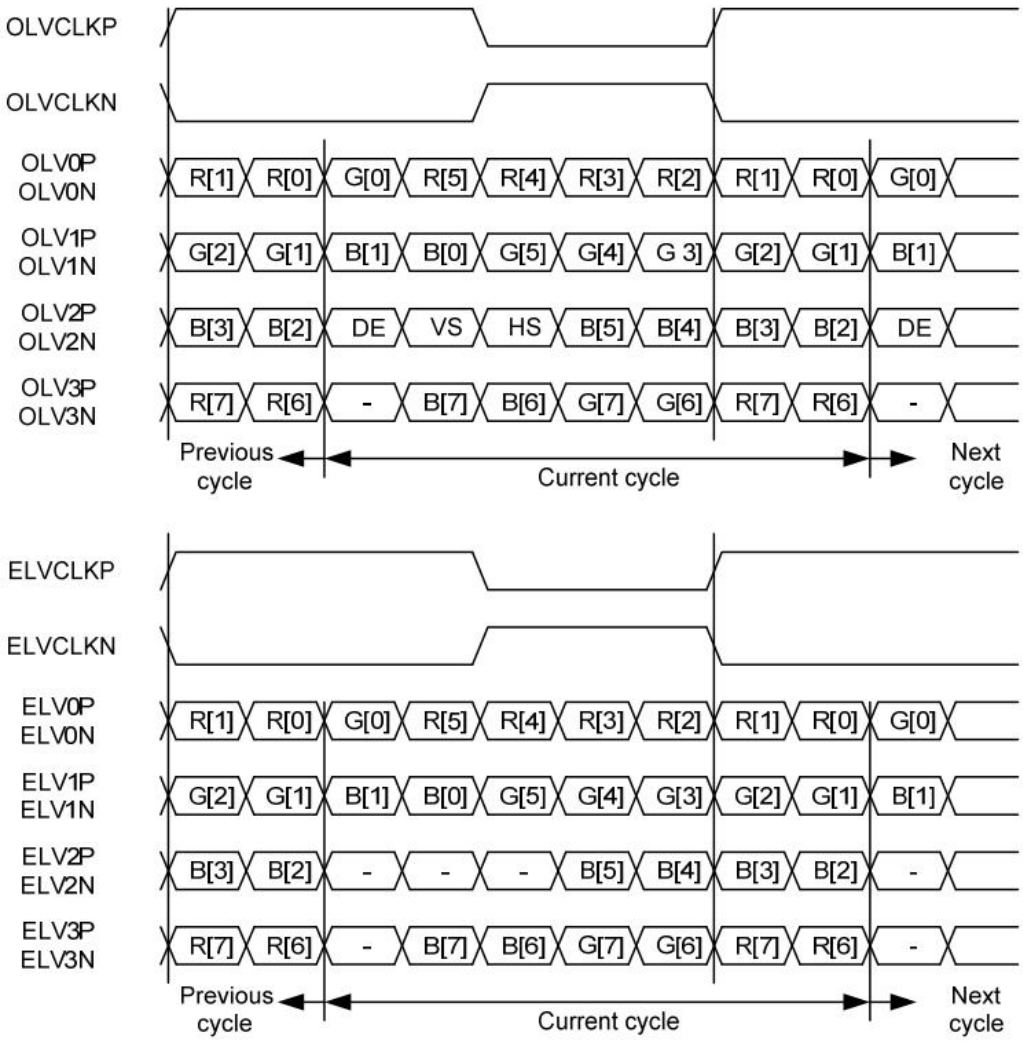
Differential:
LVCLKP(R)-LVCLKN(R),
LVD[3:0]P(R)-
LVD[3:0]N(R)



3.5.3. 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	tvpw	1	3	20	H	
Vsync back porch	tvbp	2	5	255	H	
Vsync front porch	tvfp	5	8	260	H	

3.5.4. LVDS Data Input Format



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

4. Optical Specifications

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Response time	Tr+Tf	θ= 0°	-		22	ms	Note 1
Contrast ratio	CR	θ= 0°	1100	1300	-		Note 2
Viewing angle	Top	CR≧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	θ= 0°	-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	θ= 0◦	-	-	2%	%	Note 6,7
Transmittance	Trans	θ= 0◦	2.89	3.4	-	%	

Note 1: Definition of viewing angle range

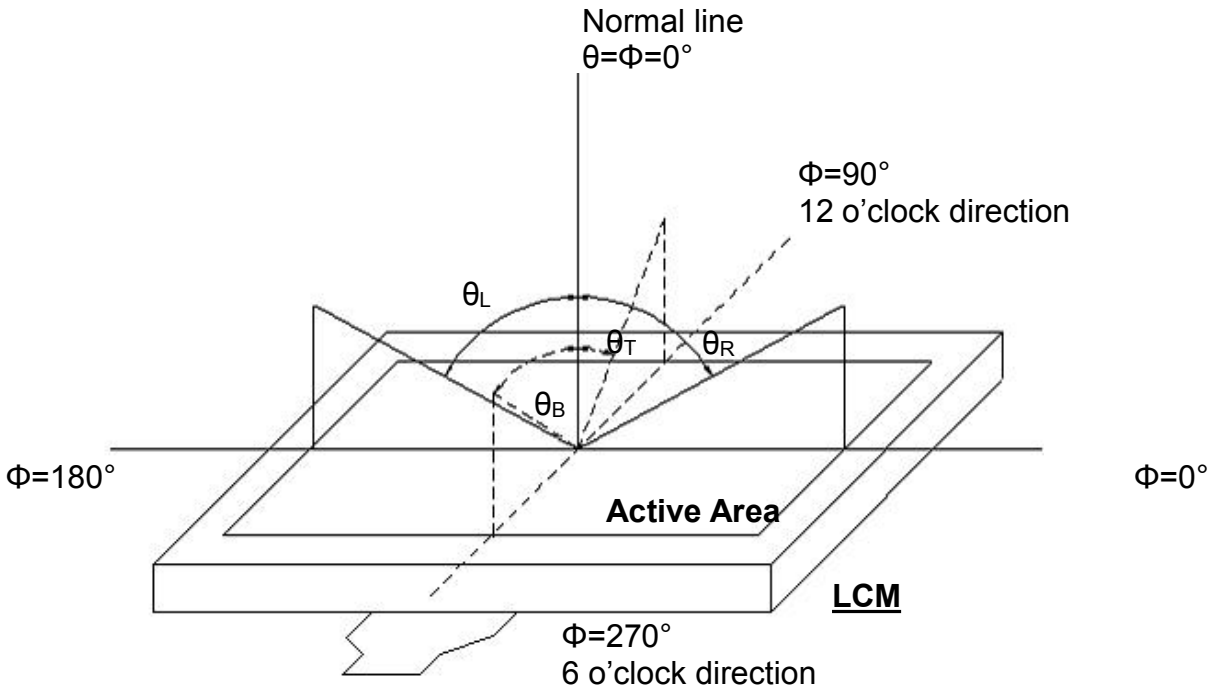


Fig. 4-2 Definition of viewing angle

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.

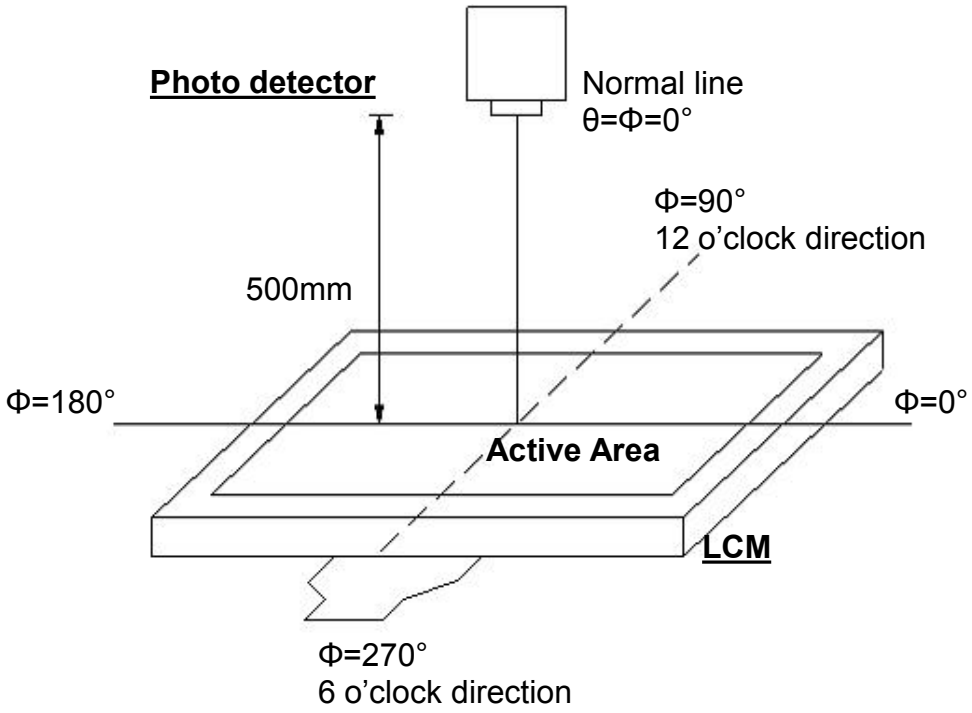


Fig. 4-3 Optical measurement system setup

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%.

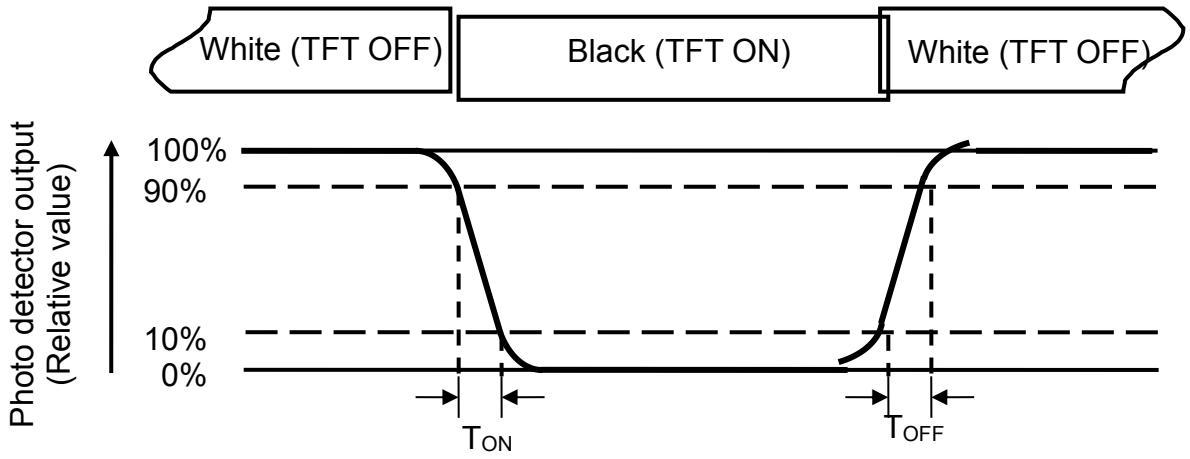


Fig. 4- 4 Definition of response time

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=320mA .

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.

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

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

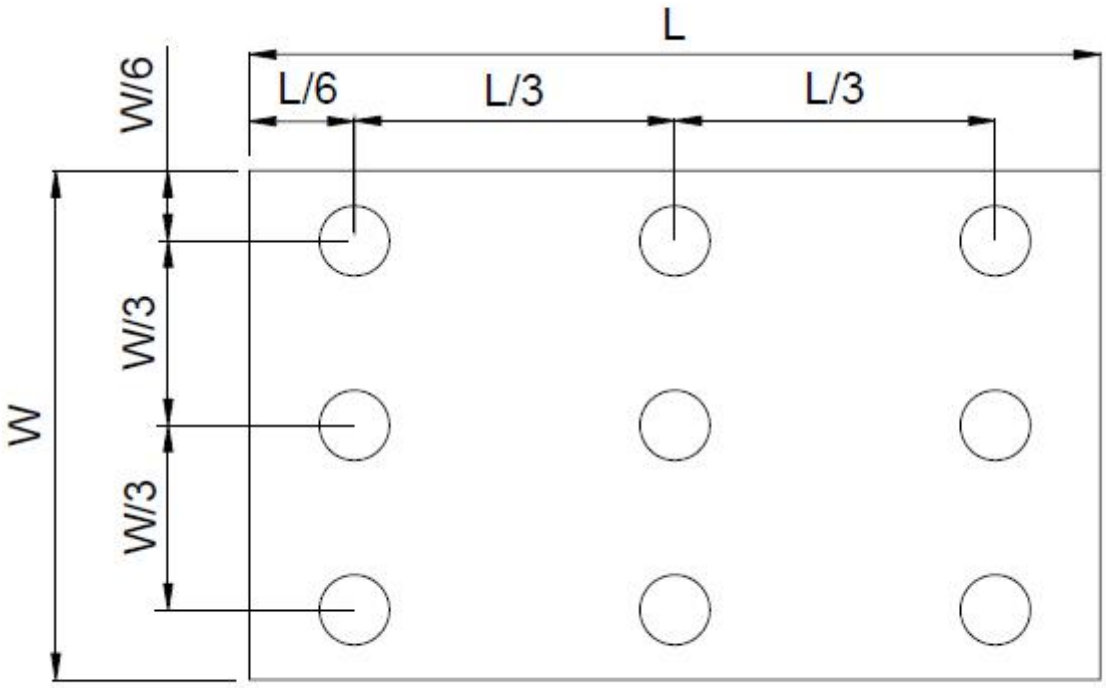


Fig. 4-4 Definition of measuring points

B_{MAX}: The measured maximum luminance of all measurement position.
B_{MIN}: The measured minimum luminance of all measurement position.

5. Reliability Test Items

Item	Test Conditions	Criterion
High Temperature Storage	Ta = 90℃ 120hrs	A,B,C,D,E
Low Temperature Storage	Ta = -40℃ 120hrs	A,B,C,D,E
High Temperature Operation	Ts = 85℃ 120hrs	A,B,C,D,E
Low Temperature Operation	Ta =-30℃ 120hrs	A,B,C,D,E
Operate at High Temperature and Humidity	+60℃, 90%RH 120hrs	A,B,C,D,E
Thermal Shock （Non operation）	-20℃/30 min ~ +70℃/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

6. Package Drawing

TBD

7. General Precautions

7.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

7.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

7.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

7.4. Storage

1. Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

7.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

LEADTEK DISPLAY

深圳市丽台电子有限公司

Shenzhen Leadtek Electronics Co.,Ltd

Quality inspection standards

品质允收标准

MODEL No. / 产品型号： **Applies 12.3 inches or more TFT-LCD**
Panel UPDATED DATE / 生效日期： **2022-05-20**
VERSION / 版 本： **A0**
Customer Signature/客户签字： _____

RECORD OF REVISION/修订履历：

Version 版本	Revision Record 修订内容	Compile 修订者	Date of Revision 修订日期
V0	首发/Starting	Green	2022.05.20

1.Scope 1适用范围

This document shall be applied to 10 inches or more TFT-LCD Panel.

本文件适用于10 寸及以上 TFT-LCD Panel.

2.Inspection and Environment onditions/检查条件与环境

2. 1 Inspection Conditions 检查条件:

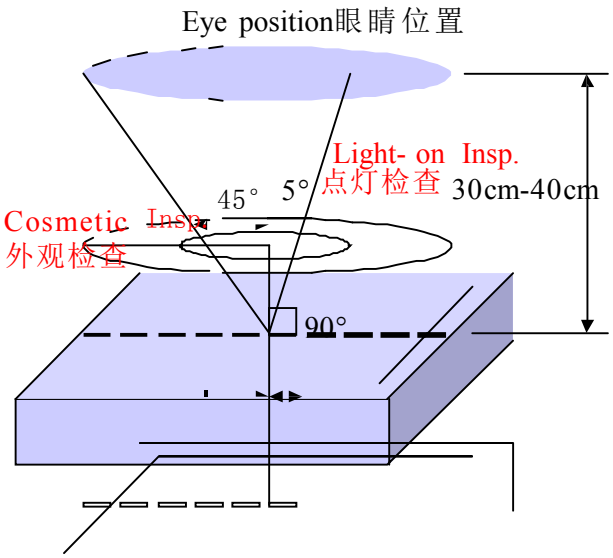
(1) Inspection Distance检测距离: 35 cm±5cm

(2) Each picture /每个画面：2~3 secs/秒，Cosmetic Inspection/外观10~12 secs/秒

(3) View Angle观看角度:

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垂直于液晶显示表面)

2.2 Environment Conditions环境条件:

Ambient Temperature 温度		25℃±5℃
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) Lot Size ： Quantity of shipment lot per model/.

批量：单次运送单一机型数量

(2) Sampling Method ：
抽样方法：

Sampling Plan 抽样计划		GB2828/2003
		Normal Inspection, Single Sampling 正常检验、单次抽样
		Geneal II Inspection 普通二级
AQL	Major Defect 主要缺点	0.25
	Minor Defect 次要缺点	0.65

(3) The classification of Major(MA) and Minor(MI) defects is shown as 3. Inspection Criteria.
主缺(MA)及次缺(MI)定义于”3.检查标准”

3.Terms and Definitions/术语和定义

3.1 Classification of defects缺陷的分类:

Major defects: 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.

主要缺陷：会导致产品功能失效或减少产品可用性的缺陷。

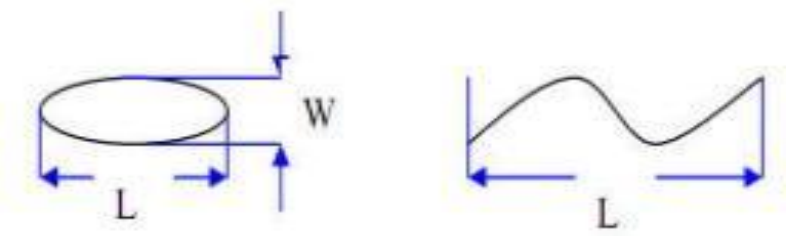
Minor defects: A minor defect either is a defect that is not likely to reduce materially the usability of the product for its intended purpose, or is a departure from an established having little bearing on the effective use or operation of the product.

次要缺陷：不会导致产品功能失效，不会减少产品的有效使用和操作。

3.2 Extraneous substances that can be wiped out ,like Finger point,Particles are not cnsidered 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) 。

3.3 Defects on the Black Matraix(outside ofActive Area) are not considered as a defect . BM 区域 (AA 区以外) 的缺陷不视为缺陷。

3.4 Size of circular defect,is defined by diameter”D” 。The defect average diameter D=1/2(W+L) 圆形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)



3.5 When defect size L≥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≥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。 3.6 3.6 Mura criteria :judged by ND filter6%,and can't be seen under at ND filter 6% .

3.6 MURA 判断标准：使用 ND6%判定，且透过 ND6% ，遮住不可见.

3.7 Dot defect is defind as the defective area of the dot is larger than 50% of the dot area and is visible through 6% ND filter

DOT 定义为点缺陷面积大于 50% DOT 面积, 且透过 ND6%遮住是可见的.

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

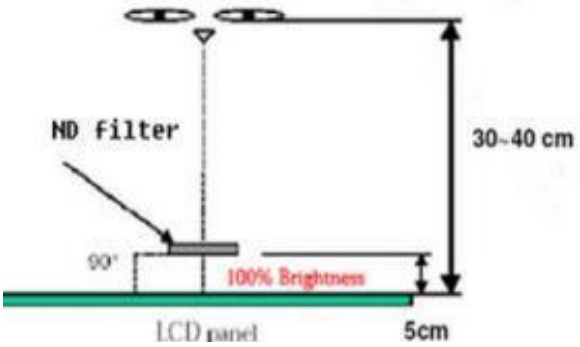
1/2 面积的子像素定义绘图：1 / 2 面积的子像素可以定义为如下一个或多个特定形状图：

3.8 A dot defect that is smaller than the defined dot defect will be treated as small bright dot. 细碎亮点：小于"DOT 定义"的点缺陷视为细碎亮点。

I 区与 O 区比例：1：2：1

3.9 Inspection method of ND Filter - holding ND filter in front of the panel around 5cm and examine the panel from 35±5 cm in the front view for 2~3 second.

ND 卡的检查方法：在面板上方大约 5CM 处握住 ND 卡，眼睛距离面板 30-40CM ，通过 2~3 秒观察。



4. Inspection Criteria 检验标准

4.1 Appearance Inspection specification 外观检查规格:

Judge area 区域	Judge item 项目	Specification inspection 检查规格	Judge criterion	
			Major	Minor
Silicone 硅胶	Silicone spread 硅胶涂布	The height can't over C/F , color filter , or gomu 高度不能过超 C/F		MI
	Silicone residue 硅胶残余	Can't cover polarizer, FPC …etc. 不能覆盖 POL, FPC 等		MI
LCD 玻璃	Wire(on Array) 线路	No damage 不能损伤	MA	
	Edge 边缘	No extended crack 不可有延伸性裂纹	MA	
PCBA Connector FPC/ FFC	Appearance 外观	Scratch or damage result in copper expose is not allowed 划伤或损伤不允许导致出现露铜		MI
	Component 零件	No damage 不能损伤	MA	
	Connection status 连接状况	Need correct connection 需要正确连接	MA	
	Broken 破裂	Not allowable 不允许	MA	
	Folding sign 对位记号折叠	Not allowable 不允许	MA	
POL 偏光片	Scract on the polarizer 偏光片划伤	1.W≤0.10mm; L≤5mm, Ignore (忽略)		MI
		2.0.10mm<W≦0.20mm ; L≤5mm ; N≤4 ; DS≥10mm		
		3.0. 20mm＜W; 5mm＜ L , Not allowable不允许		

Judge area 区域	Judge item 项目	Specification inspection 检查规格	Judge criterion	
			Major	Minor
POL 偏光片	Dent on the polarizer 偏光片凹痕	1.D＜0. 30mm，Ignore（忽略）		MI
		2.0.30mm＜D≤0.50mm；N≤4；DS≥10mm		
		3.0.50mm＜D，Not allowable不允许		
	POL Linear bubble 线状气泡	1.W≤0.10mm；L≤5mm，Ignore（忽略）		MI
		2.0.10mm<W≦0.20mm ; L≤5mm ; N≤4 ; DS≥10mm		
		3.0. 20mm＜W；5mm＜ L，Not allowable不允许		
	POL dot bubble 点状气泡	1.D＜0. 30mm，Ignore（忽略）		MI
		2.0.30mm＜D≤0.50mm；N≤4；DS≥10mm		
		3.0.50mm＜D，Not allowable不允许		
	POL edge bubble 片边缘气泡	1. The display area is 1/2BM outside，Not allowable 显示区往外 1/2BM 区域内，不允许 2. The display area is outside the outer 1/2BM area，Not allowable 显示区往外1/2BM区域以外，不管控		MI

Judge area 区域	Judge item 项目	Specification inspection 检查规格	Judge criterion	
			Major	Minor
TP&CG	Foreign Material in spot shape 点状异物	1.D≤0.30mm；Ignored（忽略） 2.0.30mm＜D≤0.50mm；N≤4；DS≥10mm 3.D＞0.50mm；Not allowable不允许		MI
	Fisheye/bubbles 鱼眼/气泡	1.D≤0.30mm；Ignored（忽略） 2.0.30mm＜D≤0.50mm；N≤4；DS≥10mm 3.D＞0.50mm；Not allowable不允许		MI
	Scratches on the surface 表面划伤	1.W≤0.10mm；Ignored（忽略） 2.0.10mm<W≤0.20mm，L≤5mm；N≤4；DS≥10mm 3.W＞0.20mm，L＞5mm；Not allowable不允许		MI
	Collapse corner、Crash edge 崩角、崩边	Product front:/产品正面： collapse corners, collapsed edges are not allowed 崩角、崩边不允许； Product back/产品背面： X≤ 0.5 , Y≤0.5，Z≤1/2T；N≤4；DS≥10mm	MA	
	Printed fonts/LOGO 丝印/LOGO	Printed fonts/LOGO clarity、complete、content right 字体/LOGO丝印清晰、完整、内容正确		MI
	Broken 破损	Not allowable不允许	MA	
	Dirty surfaces 表面脏污	Dirt cannot be wiped， Not allowable 不可擦拭的脏污，不允许		MI
	IR hole IR孔	Black spots/黑点： W ≤0.15mm，N≤2，Not visible against a black background/黑色背景下不可见		MI
		IR hole Scratches： 1.W＜0.05mm，Ignored（忽略） （Dense points Not allowable 不允许密集）； 2.0.05mm＜W≤0.07mm；L≤2mm；N≤2； 3.W＞0.07mm，L＞2mm，Not allowable 不允许		MI

4.2 Electrical Inspection specification电性检查规格:

Item 项目	Judgment Criteria 判定标准	Judge criterion	
		Major	Minor
LCD Bright /Dark dot 玻璃亮点/暗点	1.D≦0. 30mm， Ignored（忽略），Not dense（不可密集） 2.0.30mm<D≦0.50mm ； N≦4 ； DS≥10mm 3.D＞0.50mm ，Not allowed/不允许		MI
Mura	Invisible through 6% ND filter，200~300Lux 透过ND6% 遮住 ， 目测不可见即为OK， 200~300Lux		MI
Small bright dot 细碎亮点	Not allowed if it can be observed through ND Filter6% 透过ND6%目测看得见，不允许		MI
ZBD Rate 玻璃亮点比率	90:10		MI
Light Leakage 漏光	Invisible through 6% ND filter，OK 透过ND6%遮住目测不可见即为OK If necessary,set up set up Limit Sample. 如果有必要，可制订限度样品		MI
Bubble in Cell (LC Bubble/Actice Area) CELL气泡 (AA区LCD气泡)	Eyes should not find it . 目视观察不可见，视为 OK	MA	

Item 项目	Judgment Criteria 判定标准	Judge criterion	
		Major	Minor
Foreign Material in spot shape 点状异物	1.D≦0.30mm， Ignored（忽略） 2.0.30mm<D≦0.50mm ； N≦4； DS≥10mm 3.D＞0.50mm ， Not allowable/不允许		MI
Foreign Material in line or spiral shape 线状异物	1.W≦0.10mm ， Ignored（忽略） 2. 0.10mm<W≦0.20mm ； L≤5mm ； N≦4 3.W＞0.20mm ； L＞5mm ， Not allowable/不允许		MI
White dot in back-light 白点	1.D≦0. 30mm，Ignored（忽略） 2.0.30mm<D≦0.50mm ； N≦4 ； DS≥10mm 3.D＞0.50mm ， Not allowed/不允许		MI
TP no touch 无触摸	Not allowable 不允许	MA	
Abnormal Disply 显示异常	Not Allowed 不允许	MA	
NO display 无显示	Not Allowed 不允许	MA	
Line Defect 缺线	Not Allowed 不允许	MA	
Angle of view error 视角错误	Not Allowed 不允许	MA	
Tect crostalk 不消失的残影	Not Allowed 不允许	MA	