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DOCUMENT NUMBER AND REVISION

VL-FS-COG-VLSZT020-01 REV. C**(COG-VLSZT020-01)**

DOCUMENT TITLE:

**SPECIFICATION
OF
LCD MODULE TYPE**

CUSTOMER	通用版（12.8INCH）
CUSTOMER REFERENCE NO.	NA
MODEL NUMBER	COG-VLSZT020-01
CUSTOMER APPROVAL	
DATE	

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A	A	2017.11.29	First Release	ZHU YANG NA	SUN PAI
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1. General Description

1.1 Introduction

This LCD-Module is a color active matrix TFT-LCD Panel using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This model is composed of a TFT-LCD Panel, a driving circuit and a back light system. It is a transmissive type display operating in the normal black. This TFT-LCD has a 12.8 inch diagonally measured active area with FHD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into Red, Green, Blue dots which are arranged in 2 domain stripe and this panel can display 16.7M colors.

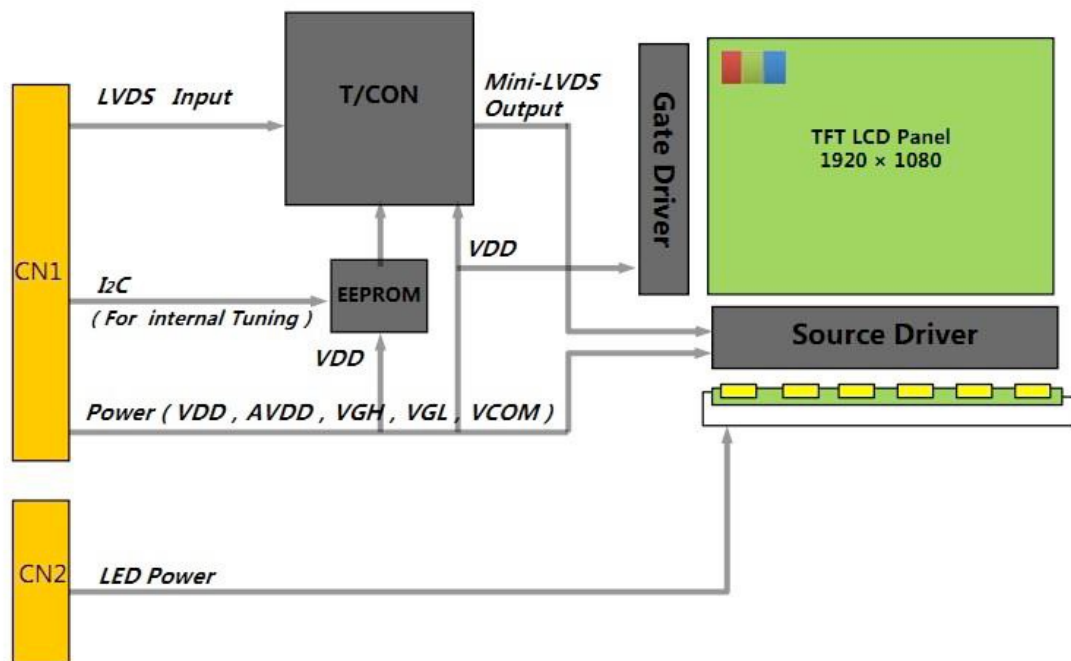


Figure1: Block Diagram

1.2 Features

- 0.5t Glass (Single)
- High luminance and contrast ratio, low reflection and wide viewing angle
- Module Design
- RoHS Compliant

1.3 Application

- Automotive

1.4 General Specifications (H: horizontal length, V: vertical length)

Table1: General Specification

Parameter	Specification	Unit	Remark
Active Area	283.392(W) × 159.408(H)	mm	
Number of Pixels	1920RGB × 1080	pixels	
Pixel Pitch	49.2(H) × 147.6(V)	um	
Pixel Arrangement	RGB 2domain stripe		
Display Colors	16.7 M	colors	
Color Gamut	70%(typ.)		
Display Mode	Normally Black, Transmissive mode		
Dimensional Outline	299.8 (H) x 179.0 (V) x 11.05(D)	mm	MDL(Including FPC)
Viewing Direction (Human Eye)	U/D/L/R free viewing direction		Note 1,2
D-IC	Source:HX8255-A-LT×4 Gate: HX8677-G-LT×2		
Weight	525	gram	

Note:

1. At the U/D/L/R direction, the viewing angle is same;
2. The TFT and CF Align Direction;

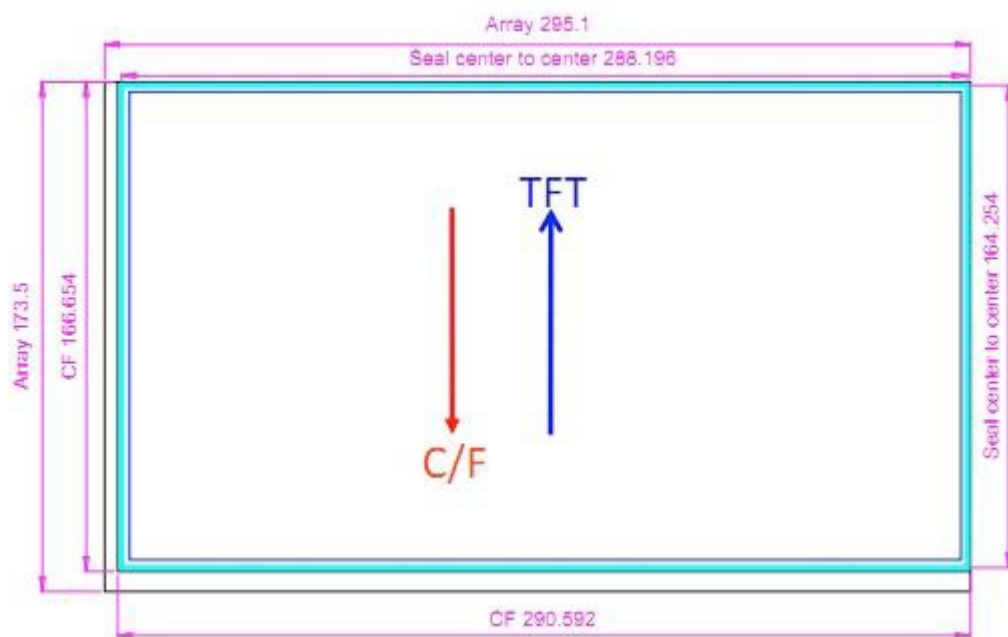


Figure 2:The TFT and CF Align Direction

- 3.LCM weight tolerance: ± 5%

2. Absolute Maximum Ratings

The absolute maximum ratings are list on table as follows. When used out of the absolute maximum ratings, the LSI may be permanently damaged. Using the LSI within the following electrical characteristics limit is strongly recommended for normal operation. If these electrical characteristic conditions are exceeded during normal operation, the LSI will malfunction and cause poor reliability.

Table 2: Environment Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power Supply voltage	VCC	3.0~3.6	V
Operating temperature range	TOPR	-30 ~ 85	°C
Storage Temperature range	TSTG	-40 ~ 90	°C

Note:

If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

3. Electrical Specifications

3.1 Electrical Specifications

Table 3: Electrical Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Power Supply Voltage	VCC	3	3.3	3.6	V	Note1
Power Supply Current	IVCC	120	135	150	mA	
Analog Voltage	AVDD	11.4	11.6	11.8	V	
Analog Current	IAVDD	60	70.44	80	mA	
Low Level Input Voltage	VGL	-8.8	-9	-9.2	V	
Low Level Input Current	IVGL	-	0.46	0.6	mA	
High Level Input Voltage	VGH	21.5	22	22.5	V	
Low Level Input Current	IVGH	-	0.45	0.6	mA	
Power Consumption	PD	1.1	1.28	1.5	W	Note2
	P _{BL}	9.072	10.08	11.424	W	
	P _{total}	10.172	11.36	12.924	W	

Note:

- The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V 60Hz at 25°C.
 - Typ : Picture pattern
 - Max : Skip 2 dot 255 pattern
- Frame rate=60HZ, Typ. Pattern: White pattern 25°C.

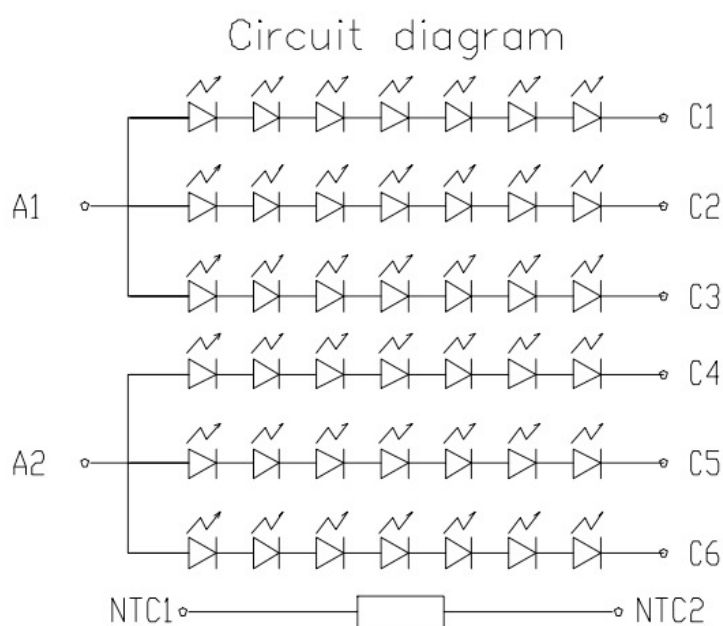
3.2 Backlight unit

Table 4: Backlight Driving Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Remark
LED Forward Voltage	VFLED	18.9	21	23.8	V	-
LED Forward Current	IFLED		480		mA	Current Driven
LED Power Consumption	PLED	9.072	10.08	11.424	W	Note 1
LED Life time	Hrs	30000				Note 2

Note:

1. Calculator Value for reference $I_{LED} \times V_{LED} \times LED \text{ Quantity} = P_{LED}$.
2. The LED Life-time was defined as the estimated time to 50% degradation of initial luminous.
3. V_{FLED} and I_{FLED} are total LED's condition.



LED:NICHIA NSSW157DT
NTC:NCP18XH103F0SRB

4. Interface Connection

4.1 The LCD Module Electrical Interface Connection

The Recommended connector is FH28K-60S-0.5SH (HRS)

The connector interface pin assignments are listed in Table 5.

Table 5: Pin Assignments for the LCD Connector

Pin No.	Symbol	Description	Remark
1	VCC	Power supply for logic	
2	VCC	Power supply for logic	
3	NC	Not Connected	
4	VGH	High level supply for gate	
5	NC	Not connected	
6	VGL	Low level supply for gate	
7	NC	Not connected	
8	AVDD	Power supply for analog	
9	AVDD	Power supply for analog	
10	NC	Not Connected	
11	ID1(GND)	ID1 pin ,GND level	
12	GND	Ground	
13	RX00-	LVDS Receiver Signal(-)	
14	RX00+	LVDS Receiver Signal(+)	
15	GND	Ground	
16	RX01-	LVDS Receiver Signal(-)	
17	RX01+	LVDS Receiver Signal(+)	
18	GND	Ground	
19	RX02-	LVDS Receiver Signal(-)	
20	RX02+	LVDS Receiver Signal(+)	
21	GND	Ground	
22	RXOC-	LVDS Receiver Clock Signal(-)	
23	RXOC+	LVDS Receiver Clock Signal(+)	
24	GND	Ground	
25	RX03-	LVDS Receiver Signal(-)	
26	RX03+	LVDS Receiver Signal(+)	
27	GND	Ground	
28	RXE0-	LVDS Receiver Signal(-)	
29	RXE0+	LVDS Receiver Signal(+)	
30	GND	Ground	
31	RXE1-	LVDS Receiver Signal(-)	
32	RXE1+	LVDS Receiver Signal(+)	
33	GND	Ground	
34	RXE2-	LVDS Receiver Signal(-)	
35	RXE2+	LVDS Receiver Signal(+)	
36	GND	Ground	
37	RXEC-	LVDS Receiver Clock Signal(-)	
38	RXEC+	LVDS Receiver Clock Signal(+)	

39	GND	Ground	
40	RXE3-	LVDS Receiver Signal(-)	
41	RXE3+	LVDS Receiver Signal(+)	
42	GND	Ground	
43	NC	Not connected	
44	NC	Not connected	
45	ID2(GND)	ID2 pin , GND level	
46	NC	Not connected	
47	SCL	Not connected if not use	
48	SDA	Not connected if not use	
49	NC	Not connected	
50	NC	Not connected	
51	A2+	Power supply for Backlight	
52	A1+	Power supply for Backlight	
53	TH-	Thermal sensor-	
54	TH+	Thermal sensor+	
55	K6-	Feedback Current of Channel 6	
56	K5-	Feedback Current of Channel 5	
57	K4-	Feedback Current of Channel 4	
58	K3-	Feedback Current of Channel 3	
59	K2-	Feedback Current of Channel 2	
60	K1-	Feedback Current of Channel 1	

5. LVDS Signal Electrical Characteristics

5.1 LVDS Signal Electrical Characteristics.

(VCC=3.0 to 3.6V, AVDD=11.4 to 11.8V, GND=0V, TA=-30℃ ~+85℃)

Table 6: LVDS Signal Electrical Characteristics

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Differential input high threshold voltage	VTH	-	-	+0.1	V	RXVCM=1.2V
Differential input low threshold voltage	VTL	-0.1	-	-	V	
Differential input common Mode voltage	VIC	0.7	1.2	1.6	V	-
Differential input voltage	VID	0.1	0.2	0.6	V	-

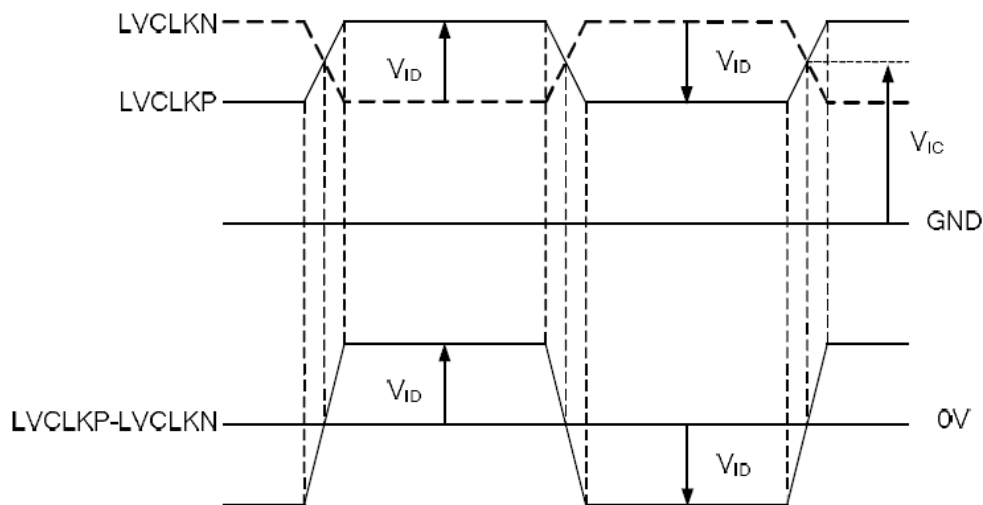


Figure 3: LVDS Signal Electrical Characteristics

5.2 LVDS Signal Timing

Table 7: LVDS Signal Timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency	RxFCLK	-	72.6	-	MHz	
Horizontal Display Area	thd	1920				
HS Period	th	-	2200	-	DCLK	
HS Blanking	Thb+thfp	-	280	-	DCLK	
Vertical Display Area	tvd	1080				
VS Period	tv	-	1100	-	TH	
VS Blanking	Tvbp+tvfp	-	20	-	TH	
Input data skew margin	TRSKM	-600	-	600	ps	VID =400mV RxVCM=1.2V RxFCLK=65.5MHz

5.3 LVDS Input Signal Format

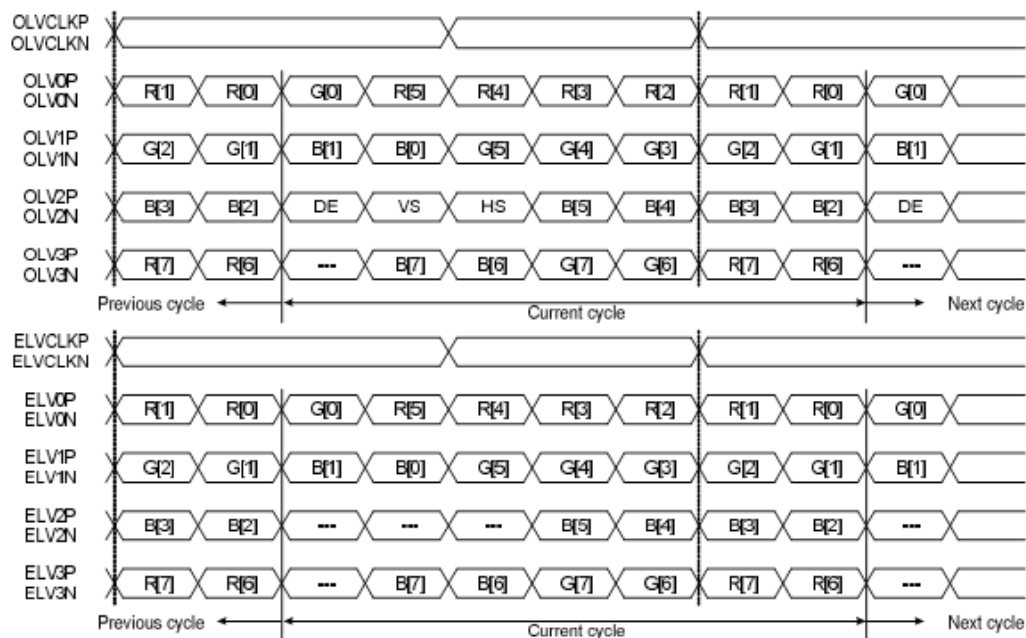


Figure 4: LVDS Input Signal Format

6. Power ON/OFF Sequence

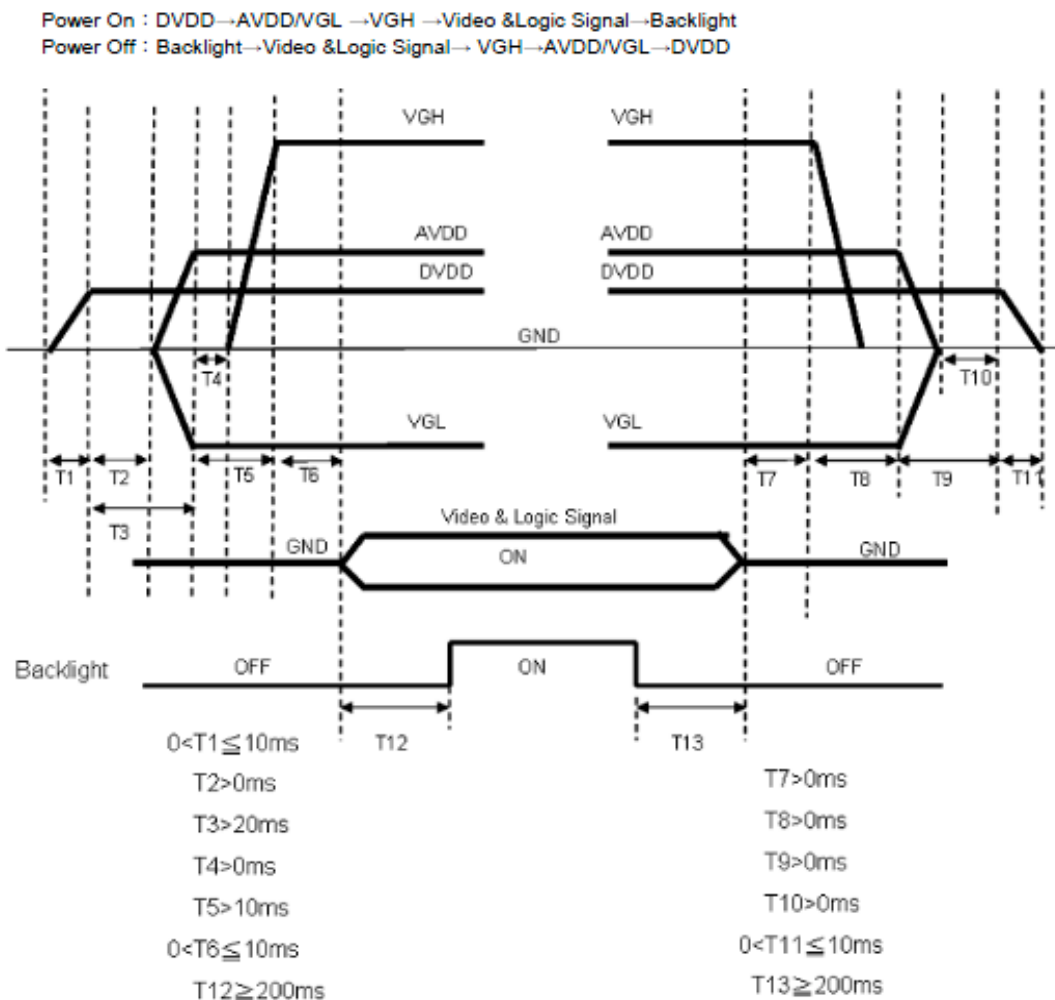


Figure 5: Power on/off sequence

7. Optical Specifications

7.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = $25 \pm 2^\circ\text{C}$) with the equipment of Luminance meter system (Topcon SR-UL1R and Westar TRD-100A) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0° . The center of the measuring spot on the Display surface shall stay fixed.

The backlight should be operating for 30 minutes prior to measurement.

Table 8: Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Threshold Voltage		Vsat		4.1	4.3	4.5	V	Fig.1
		Vth		1.6	1.8	2.0	V	
Viewing Angle	Horizontal	Θ3	CR>10	70	85		°	Note 1
		Θ9		70	85		°	
	Vertical	Θ12		70	85		°	
		Θ6		70	85		°	
Contrast Ratio		CR	Θ= 0°	900	1000			Note 2
Luminance		cd/m2	Θ= 0°	600	700		nit	Note 3
Uniformity		%	Θ= 0°	75%				Note 4
NTSC		%	Θ= 0°	65	70			
Reproduction Of color	Red	Rx	Θ= 0°	0.607	0.637	0.667		Note 5 * Module
		Ry		0.313	0.343	0.373		
	Green	Gx		0.296	0.326	0.356		
		Gy		0.590	0.620	0.650		
	Blue	Bx		0.121	0.151	0.181		
		By		0.052	0.082	0.112		
White		Wx	Θ= 0°	0.27	0.31	0.35		
		Wy		0.29	0.33	0.37		
Response Time		Tr+Tf	Θ= 0°		30	40	ms	Note 6
Image Sticking		LEVEL				3		Note 7

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIG.6).
2. Contrast measurements shall be made at viewing angle of $\Theta = 0^\circ$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the

dark (black) state. Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Surface luminance is the center point across the LCD surface 50cm from the surface with all pixels displaying white. This measurement shall be taken at the locations shown in FIG. 7
4. Uniformity measurement shall be taken at the locations shown in FIG. 7&8, for a total of the measurements per display, measure surface luminance of these nine points across the LCD surface 50cm from the surface with all pixels displaying white.

$$\text{Uniformity} = \frac{\text{Min Luminance of 9 points}}{\text{Max Luminance of 9 points}} \times 100\%$$

5. The color chromaticity coordinates specified in Table1 shall be calculated from The spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the Module.
6. The electro-optical response time measurements shall be made as FIG.9 by switching the “data” input signal ON and OFF.
The times needed for the luminance to change from 10% to 90% is Tr and 90% to 10% is Tf.
7. 60degC, 1hr, <Level3. Test pattern: Chess, Inspection pattern: 50% grey. within 5 minutes disappear

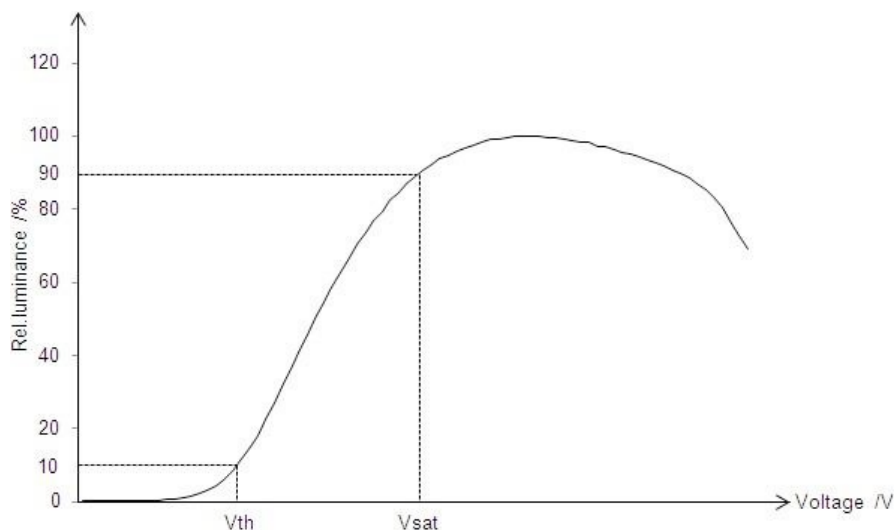


Figure 6: The definition of Vth & Vsat

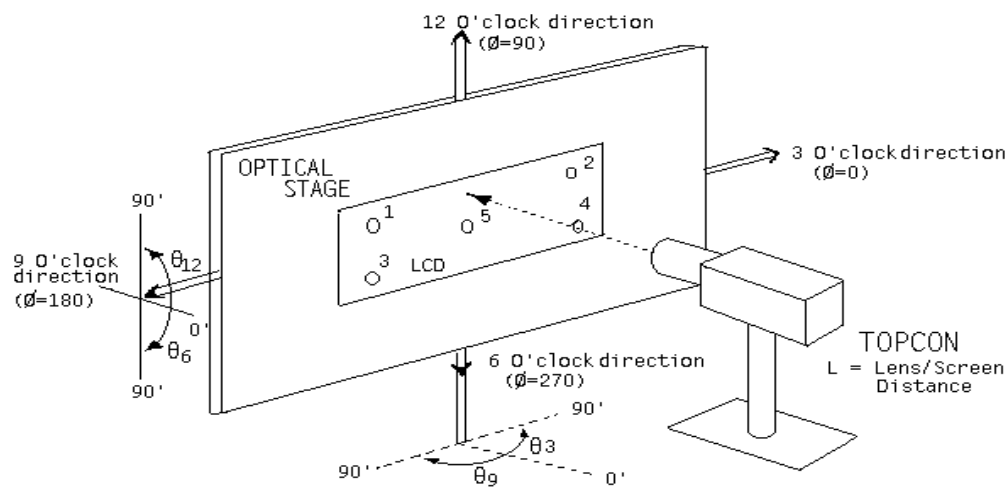


Figure 7: Measurement Set Up

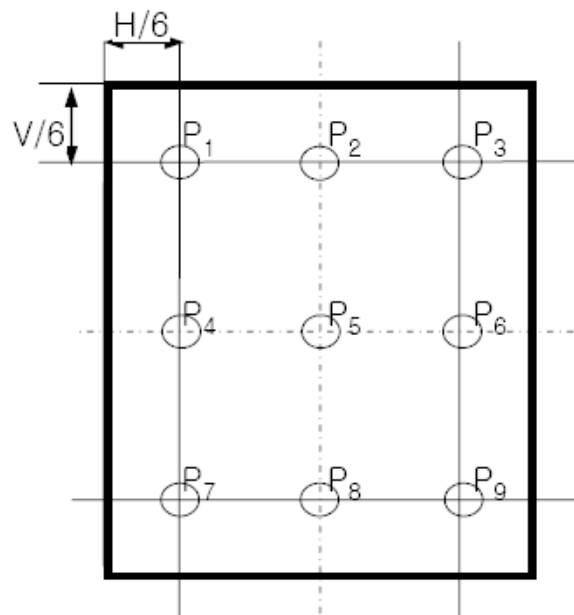


Figure 8: Uniformity Measurement Locations

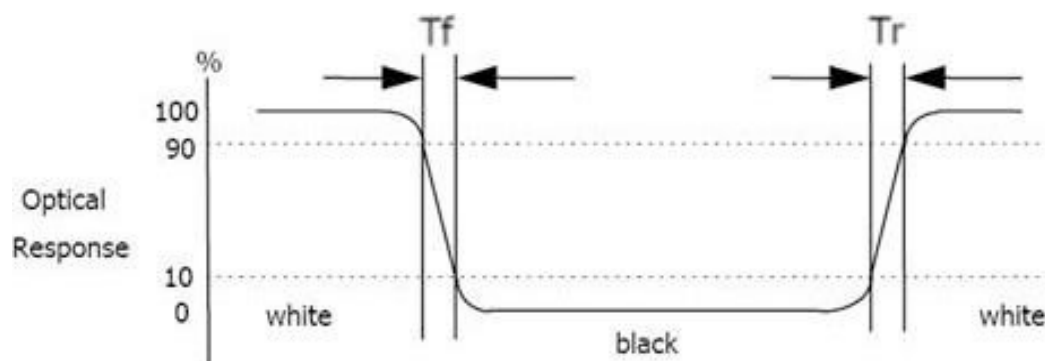


Figure 9: Response Time Testing

8. Mechanical Characteristics

8.1 Dimension Requirements for LCD Part

Mechanical outlines for the panel (H: horizontal length, V: Vertical length)

Table 9: Dimension Requirements for LCD Part

Parameter	Specification	Unit	Remark
Panel size	295.1(W) × 173.5(H)	mm	
CF size	290.596(W) × 166.654(H)	mm	
Active area	283.392(W) × 159.408(H)	mm	
Number of pixels	1920RGB × 1080	pixels	
	(1 pixel = R + G + B dots)		
Pixel pitch	49.2 × 147.6	um	
Pixel arrangement	RGB 2 domain Stripe		
Panel ID	1.6 × 10	mm	
COG pad area(G/S)	4.504/6.846	mm	
D-IC to FPC distance	2	mm	Source
D-IC width(G/S)	0.59/ 1	mm	
D-IC to CF edge(G/S)	2.714/ 2.446	mm	
FPC to Glass edge	0.3	mm	Source
FPC width	1.1	mm	Source
Seal Area (U/D/L/R)	4/3.246/3.204/4	mm	
Dimensional Outline	299.8 (H) x 179.0 (V) x 11.05(D)	mm	MDL(Including FPC)
Display mode	Normally Black		

Note:

1. Source pad down
2. The size specified is calculated by IC–driver Source: HX8255-A-LT, Gate: HX8677-G-LT, the size maybe changed if customer use other IC.

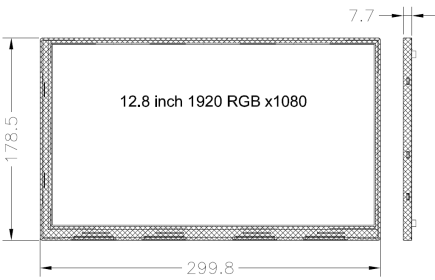
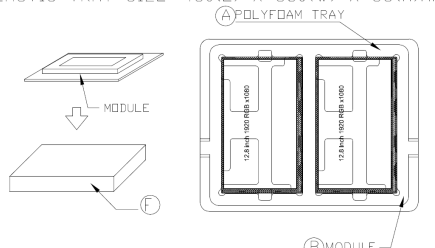
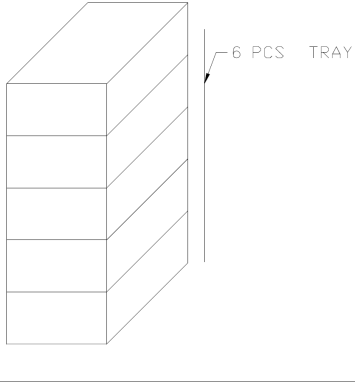
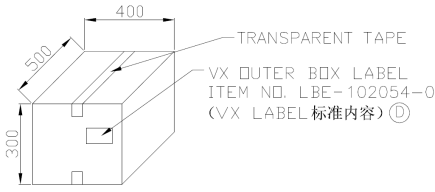
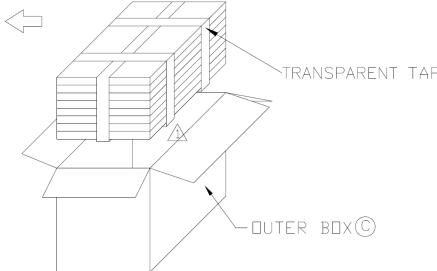
Figure 10: Module Specification:

9. Reliability Test

Table 10: RELIABILITY TEST

NO.	Test Item	Test Condition	Duration	Sample Qty
1	Low temperature operation test(LTO)	-30℃	240hrs	2PCS
2	High temperature operation test(HTO)	85℃	240hrs	2PCS
3	High temperature storage test(HTS)	90℃	240hrs	2PCS
4	Low temperature storage test(LTS)	-40℃	240hrs	2PCS
5	Thermal shock test (TST)	-40℃ (30min) à 85℃ (30min)	100cycle	2PCS
6	Accelerated Humidity Test Operating	60℃ 90%	240hrs	2PCS
7	ESD	150pF 330 Ω ±15KV(air)/± 8KV(Contact)200pF 0 Ω ±200V(Contact)		2PCS

10. Packing Method

CONFIGURATION :		REV	AMENDMENT		DATE	
MS:COG-VLSZT020-01 R2-20180222A		Δ	DEL PE FOAM SHEET		2018.3.29	
						
POLYFOAM TRAY ONE TRAY FOR 2 PCS MODULE ITEM NO: PLT-17346CDWA-01 MATERIAL : ANTI-STATIC STYRDFOAM PLASTIC TRAY SIZE: 480(L) X 380(W) X 53(H)mm		1. 2 PCS/TRAY X 5 TRAYS/OUTER BOX = 10 PCS/OUTER BOX. 2. EMPTY TRAY ADD ON TOP FOR ANTI-STATIC PURPOSE. (最上层吸塑盒为空盒)				
						
OUTER BOX ITEM NO: CTN-197158118K		OUTER BOX				
						
TITLE: PACKING DRAWING		BOE VARITRONIX LIMITED				
3rd ANGLE PROJECTION	UNIT	SCALE				
	mm	NOT TO SCALE				
DRAWN	XU YANWEN	SIGN	DATE	MODEL:	REV	DATE
CHECKED	LIU NANCY			COG-VLSZT020-01	0	2017.12.26
CHECKED	ZHAO ALISA			DRAWING NO.:	1	2018.3.21
APPROVED	TONY CAO			PD-COG-VLSZT020-01 R1-20180321A	SHEET 1 OF 1	

11. Inspection Criteria

A: 来料检查基准

1.0 介绍

1.1. 适用范围

此基准适用于 精电(河源)显示技术有限公司（以下简称“供应商”）供应的TFT-LCD 产品；

1.2. 来料检查权利

购买者需要在交货日期之后的 20 天内（检查）对产品进行检查，检查结果需要共享给供应商；

购买者客户依据合理的程序，在检查期内拒绝该检查Lot 入库，检查型号须与IIS一致；

购买者如果没有在规定检查期限内反馈检查结果，那么将会被认为是接收了此批产品，无权再Reject；

1.3. 操作说明

1.3.1 放置方法

- 避免在LCD的表面施加太大的压力，确保在放置产品时对其施加过大的压力及扭曲力；
- 确保一个合适的放置角度，参考基准中的目视角度范围；
- 使用规定的安装部件去安装1个LCDModule；

1.3.2 LCD 操作和清洗的注意事项

- 产品表面的偏光片是有机物质构成，要小心避免化学品接触到偏光片导致变质；
- 不要使用硬的材料擦拭LCD表面以免损伤偏光片或者其他部位；禁止使用以下的溶剂：
-水、酮、芳香剂
- 偏光片容易受到划伤，甚至于被表面锋利的异物损伤；
- 不要将水或者其他化学物质残留在LCD表面；

1.3.3 静电防止注意事项

- 该 LCD modules 使用的C-MOS LSI 驱动，所有的输入终端都需要连接到 Vdd 或者 Vss，并且身体2作业区域需要接地以防止静电；
- 避免工作时穿着化纤材质的衣物，我们推荐棉布材质或者其他导电纤维材质的衣物；
- 接触产品时，需要佩戴防静电材质的手套；同时必须佩戴接地的手环与静电鞋；

1.3.4 作业注意事项

- 必须在规定的电压范围内驱动LCD，否则过高的电压会导致 LCD 寿命减少；同时，直流型号会通过一个电化学反应使LCD性能退化，所以需要避免直流信号；

- 不要在电源打开的情况下连接或断开LCD与设备；
- 在高温高湿的异常情况下不要使用LCD；
- 当温度急剧的起伏时(热到冷或冷到热)LCD可能会受影响；特别是当温度从冷到热急剧变化时，偏光片和LCD的功能可能会受到影响；
- 在低于正常运行温度范围的低温下，产品的响应时间会受到急剧的延迟，另一方面在高于正常运行温度的高温下，产品的显示变暗；但是，这些现象并不是说产品出现故障或失效；一旦温度恢复到正常范围，LCD会回到正常的显示运行状态；
- 不要长时间的显示一个固定画面，因为基于LCD的结构可能会导致图像残留现象；
- ESD会损伤产品，请确认作业者有效地佩戴防静电手套，同时工作台及装置在作业时也需要有效地接地（或其他静电保护措施）
- 为了避免机械撞击，请在移动产品时使用VX提供的Tray 盘；

2.0 Generals

2.1. 抽样规则

2.1.1. 致命缺陷与严重缺陷

按照C=0的抽样计划

2.1.2. 次要及轻微缺陷

按GB/T 2828.1-2003 Level II: AQL=0.65%

2.2. 检查环境

2.2.1. 检查环境条件：

a.室温：25±5度

b.湿度：65 ± 10% RH

c.检查环境亮度：

白色日光灯亮度-- 800~1000Lux(功能检查: 200-500Lux)

2.2.2. 检查距离

产品和检查者眼睛之间的距离30~40cm

2.2.3. 检查角度

在产品的正面进行检查，样品的所有检查角度应该在以垂直线为中心45°范围内.

2.2.4. 检查区域：

显示区域（Active区域）

2.3. 术语

2.3.1 黑/白点

显示为黑色/白色的点

这类不良的大小和亮度不会随着对比度的变化而变化；

2.3.2.亮/暗线

显示时明亮/暗色的线，纵向的、横向的、或者是交叉的；.

2.2.3.亮点

显示区域显示时可见的明亮的点（sub-pixels），并且在黑画面透过5%ND过滤器可见；

2.3.4. 暗点

显示区域显示时在R/G/B色Pattern可见的暗色的点(sub-pixels)

2.3.5. 视觉检查

在通电状态下对产品进行检查

2.3.6. 外观检查

在未通电状态下对产品进行外部检查；

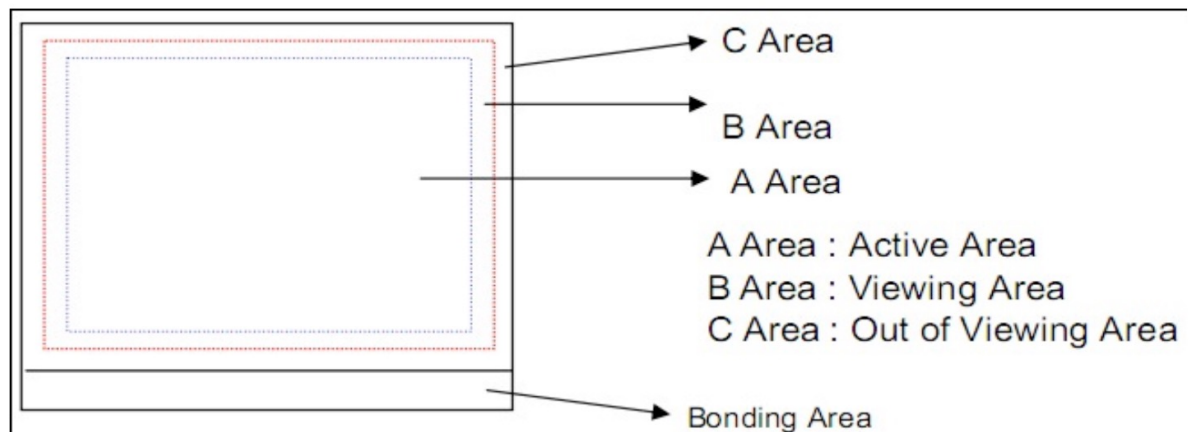
3.0 检查标准

单位: mm

项目		详情	检查标准		程度
			A Area& B Area	C	
外观检查	异物/表面压痕/刺伤/划伤等	点状	$D \leq 0.20$, Ignore; $D \geq 0.35$, $N \leq 0$ $0.20 < D \leq 0.35$, $N \leq 4$ 距离 $\geq 10\text{mm}$ (1 平方厘米内 $N \geq 3$ 的群状点不允许)	忽略	次要
		线状	$0.1 < W \leq 0.2\text{mm}$, $0.5 \leq L \leq 5$, $N \leq 3$ 距离 $\geq 10\text{mm}$ 其它参照点基准		
	指纹印/脏污等	不可擦拭	Panel 表面反光可见即 NG	忽略	次要
		可擦拭	只接受面积在5%以内	←	次要
	硬划伤		参照度样本	忽略	次要
	变形等		影响组装即 NG	←	次要
	偏光片贴歪, 偏移		凸出玻璃边, 未覆盖到框线	←	次要
视觉 (功能5检查)	异物/压痕	点状	$D \leq 0.20$, Ignore; $D \geq 0.35$, $N \leq 0$ $0.20 < D \leq 0.35$, $N \leq 4$ 距离 $\geq 10\text{mm}$ (1 平方厘米内 $N \geq 3$ 的群状点不允许)	忽略	次要
		线状	$0.1 < W \leq 0.2\text{mm}$, $0.5 \leq L \leq 5$, $N \leq 3$ 距离 $\geq 10\text{mm}$ 其它参照点基准 (1 平方厘米内 $N \geq 3$ 的群状点不允许)		
	像素不良	亮点	$N \leq 0$	忽略	主要
		暗点	$N \leq 3$ 距离 $\geq 10\text{mm}$		
		亮点+暗点	$N \leq 3$ 距离 $\geq 10\text{mm}$		
	线不良	亮线/暗线	不可有		
	异显	白屏/黑屏/灰阶异显等	不可有	忽略	主要
	漏光/白斑/显示不均/满天星		使用5% ND filter检查, 以不穿透ND filter为接收限度 距离 $\geq 50\text{cm}$		

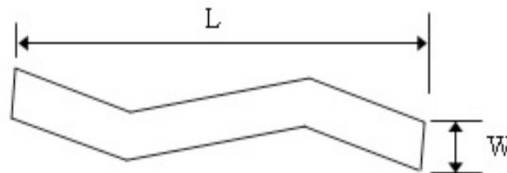
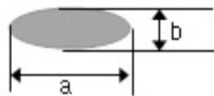
Remark: 所有不良的判定都是基于贴 POL 后的产品.

Note 1) 区域定义



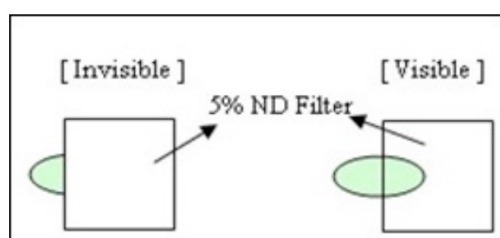
Note 2) D = Diameter, L = Length, W = Width, N = Number

$$D = (a + b) / 2$$



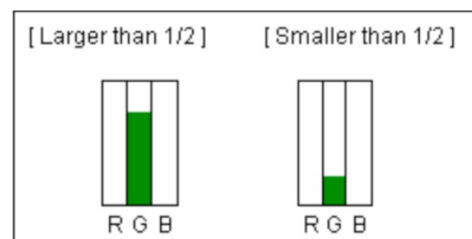
Note 3) 对于像素不良, Dot 表示一个亚像素. Dot 不良实际大小应该超过亚像素的1/2;

如果Dot 尺寸小于亚像素的1/2 或者透过5%ND 过滤器不可见的话, 不能算作1 个Dot 不良;



"No dot defect"
(=ignored)

"1 dot defect"
(=counted)



"1 dot defect"
(=counted)

"No dot defect"
(=ignored)

B :售后服务流程

为了更好地为客户提供服务，VX会按照以下的售后产品质量服务流程进行：

- 1.0. VX需要根据客户的P/O将对应的产品发送到客户指定的地方.
- 2.0. 检查基准需要由VX提供，客户承认后生效；检查与不良判定应该按照双方共同同意的基准执行.
- 3.0. 为了及时了解产品的品质情况并进行有效的服务，客户的QA部门需要给VX的CS部门发送质量周报.
- 4.0.. 对于客户特别的品质需求,VX应该与客户进行合作协商；
- 5.0. 在双方都认可了之后，VX需要对导致品质问题的不良产品负责；
- 6.0.. 客户应该根据说明使用LCD产品，VX不会对因违反使用说明而导致的不良产品负责；
- 7.0. 双方应该遵循友好合作的原则处理品质问题，在责任归属上不明确的不良品需要双方协商处理；
- 8.0.. 产品的售后服务期限为交货日期之后的12个月；

12. Handling & Cautions

12.1 Mounting Method

- The panel of the LCM consists of two thin glasses with polarizer which easily get damaged.
So extreme care should be taken when handling the LCM.
- Excessive stress or pressure on the glass of the LCM should be avoided. Care must be taken to insure that no torsional or compressive forces are applied to the LCM unit when it is mounted.
- If the customer's set presses the main parts of the LCM, the LCM may show the abnormal display. But this phenomenon does not mean the malfunction of the LCM and should be pressed by the way of mutual agreement.
- To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- Mount a LCM with the specified mounting parts.

12.2 Caution of LCM Handling and Cleaning

- Since the LCM is made of glass, do not apply strong mechanical impact or static load onto it.
Handling with care since shock, vibration, and careless handling may seriously affect the product. If it falls from a high place or receives a strong shock, the glass maybe broken.
- The polarizer on the surface of panel are made from organic substances. Be very careful for chemicals not to touch the polarizer or it leads the polarizer to be deteriorated.
- If the use of a chemical is unavoidable, use soft cloth with solvent recommended below to clean the LCM's surface with wipe lightly.
-IPA (Isopropyl Alcohol), Ethyl Alcohol, Trichlorotrifluoroethane.
- Do not wipe the LCM's surface with dry or hard materials that will damage the polarizer and others. Do not use the following solvent
-Water, acetone, Aromatics.
- It is recommended that the LCM be handled with soft gloves during assembly, etc.
The polarizer on the LCM's surface are vulnerable to scratch and thus to be damaged by shape particles.
- Do not drop water or any chemicals onto the LCM's surface.
- A protective film is supplied on the LCM and should be left in place until the LCM is required for operation.
- The ITO pad area needs special careful caution because it could be easily corroded. Do not contact the ITO pad area with HCFC, Soldering flux, Chlorine, Sulfur, saliva or fingerprint. To prevent from the ITO corrosion, customers are recommended that the ITO area would be covered by UV or silicon.
- Please handle FPC with care.

12.3 Caution Against Static Charge

- The LCM use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.
- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, if possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- In handling the LCM, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

12.4 Caution For Operation

- It is indispensable to drive the LCM within the specified voltage limit since the higher voltage than the limit causes LCM's life shorter. An electro-chemical reaction due to DC causes undesirable deterioration of the LCM so that the use of DC drive should avoid.
- Do not connect or disconnect the LCM to or from the system when power is on.
- Never use the LCM under abnormal conditions of high temperature and high humidity.
- When expose to drastic fluctuation of temperature(hot to cold or cold to hot), the LCM may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCM's surface which may affect the operation of the polarizer on the LCM.
- Response time will be extremely delay at lower temperature than the operating temperature range and on the other hand LCM may turn black at temperature above its operational range. However those phenomenon do not mean malfunction or out of order with the LCM. The LCM will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.
- Do not display the fixed pattern for a long time because it may develop image sticking due to the LCM structure. If the screen is displayed with fixed pattern, use a screen saver.

12.5 Packaging

- Modules use LCM element, and must be treated as such.
 - Avoid intense shock and falls from a height.
 - To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity for long periods.

12.6 Storage

- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Relative humidity of the environment should therefore be kept below 60%RH.
- Original protective film should be used on LCM's surface (polarizer). Adhesive type protective film should be avoided, because it may change color and/or properties of the polarizer.
- Do not store the LCM near organic solvents or corrosive gasses.
- Keep the LCM safe from vibration, shock and pressure.
- Black or white air-bubbles may be produced if the LCM is stored for long time in the lower temperature or mechanical shocks are applied onto the LCM.
- In the case of storing for a long period of time for the purpose or replacement use, the following ways are recommended.
 - Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.
 - Store in a dark place where neither exposure to direct sunlight nor light is.
 - Keep temperature in the specified storage temperature range.
 - Store with no touch on polarizer surface by the anything else. If possible, store the LCM in the packaging situation LCM when it was delivered.

12.7 Safety

- For the crash damaged or unnecessary LCM, it is recommended to wash off liquid crystal by either of solvents such as acetone and ethanol and should be burned up later.
- In the case of LCM is broken, watch out whether liquid crystal leaks out or not. If your hands touch the liquid crystal, wash your hands cleanly with water and soap as soon as possible.
- If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then drink a lot of water and induce vomiting, and then, consult a physician.
- If the liquid crystal get in your eyes, flush your eyes with running water for at least fifteen minutes.
- If the liquid crystal touches your skin or clothes, remove it and wash the affected part of your skin or clothes with soap and running water.

13.Applicable Scope

- This product specification only applies to the products manufactured and sold by our company.
- Any specification, quality etc. about other parts mentioned in this product spec are no concern of our company.