深圳市新盟辉光电有限公司

Shenzhen Xinmeng Hui Photoelectric Co. Ltd

MODEL NO.:XMH919BHDIM

CUSTOMER	**VISTEON ELECTRONICS SHANGHAI**
CUSTOMER PART NO.	
MODEL NUMBER	**COG-T919F3990-L1**
CUSTOMER APPROVAL	
DATE	

DEPARTMENT	NAME	SIGNATURE	DATE
PREPARED BY	Tang arthur		
CHECKED BY	Ji bin Li liang Song suimang		
APPROVED BY	Thomas Ip Li Tian ma		
QUALITY	Tse Thomas		

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VARITRONIX LIMITED

Specification
of
LCD Module Type
Model No.: COG-T919F3990-L1

1. General Description

- 9.19", 18:9 diagonal, Landscape (rotated portrait), HD, normally black, FFS based technology, transmissive, amorphous silicon TFT LCD module with single chip (COG) driver
- Display Resolution: 1280 x RGB x 640
- Viewing angle (U/D/L/R): 80/80/80/80(CR≥10)
- Display up to 16.7M
- Compatible with LVDS interface
- AG surface polarizer.
- Front Polarizer : linear
- Rear Polarizer : linear with compensation film
- Display compatible with polarized sunglass
- 45-pin FPC connection

2. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.
(H: Horizontal; V: Vertical)

Table 1

Parameters		Specifications	Unit
Outline dimensions		218.5 (H) x 118.06 (V) x 8.4 (D) (Exclude FPCs & component height)	mm
Color TFT 1280 x RGB x 640	Visible area	212.9(H) x 107.75 (V)	mm
	Active area	208.9 (H) x 104.45 (V)	mm
	Display format	HD (1280 x RGB x 640)	dots
	Color configuration	Horizontal RGB stripes	-
	Dot pitch	0.163 (H) x 0.163 (V)	mm
Backlight		LED	
Weight		Typ 260 max 286	g

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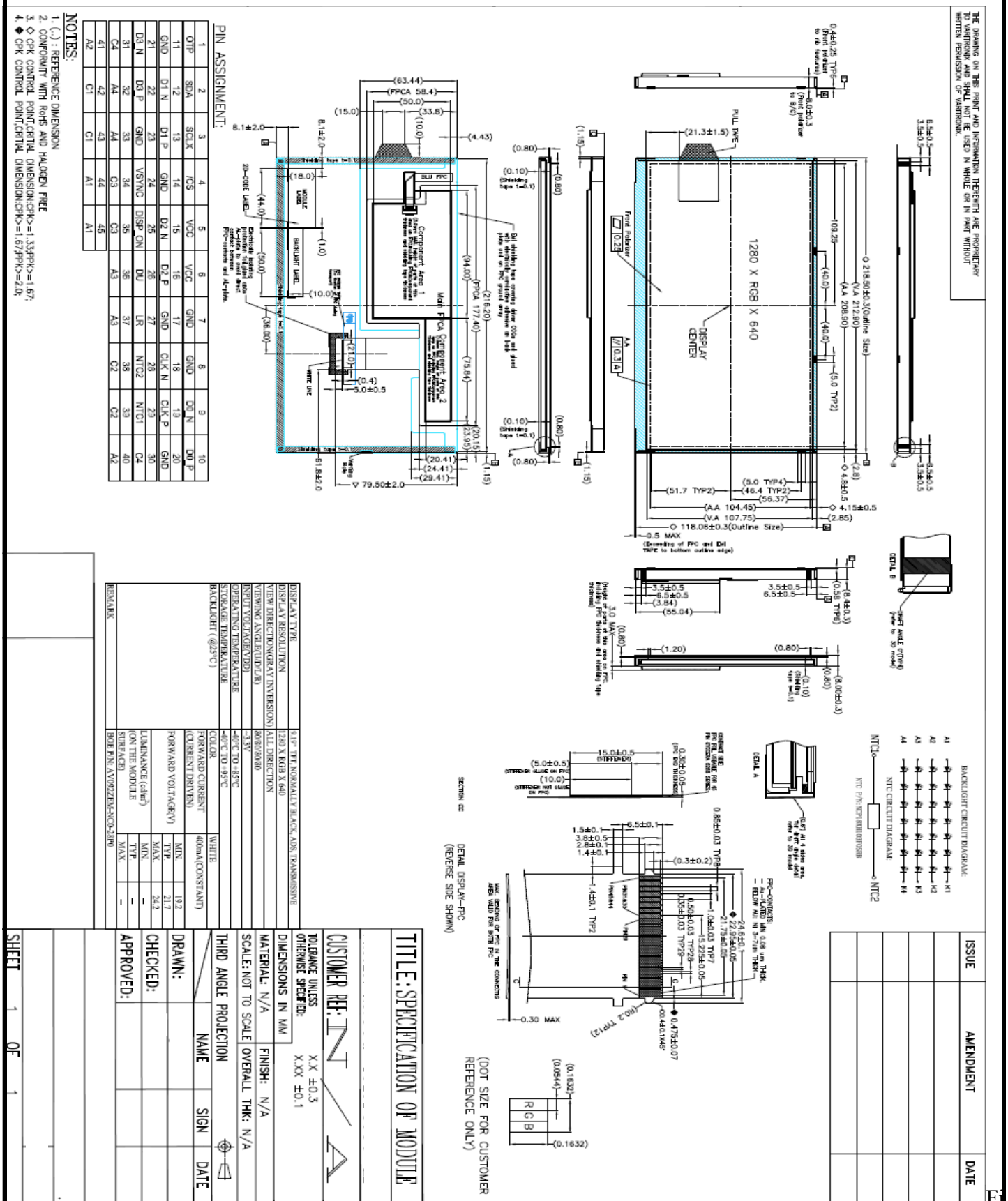


Figure 1: Module Mechanical Specification Drawing

3. Interface Signals

Table 2: Pin Assignment

Pin	Symbol	Description
45	A1	Backlight Anode 1
44	A1	Backlight Anode 1
43	C1	Backlight Cathode 1
42	C1	Backlight Cathode 1
41	A2	Backlight Anode 2
40	A2	Backlight Anode 2
39	C2	Backlight Cathode 2
38	C2	Backlight Cathode 2
37	A3	Backlight Anode 3
36	A3	Backlight Anode 3
35	C3	Backlight Cathode 3
34	C3	Backlight Cathode 3
33	A4	Backlight Anode 4
32	A4	Backlight Anode 4
31	C4	Backlight Cathode 4
30	C4	Backlight Cathode 4
29	NTC1	Temperature Sensor Pin1
28	NTC2	Temperature Sensor Pin1
27	LR	Vertically Inverted
26	DU	Horizontally Inverted
25	DISP_ON	Display on/off(Black display)
24	VSYNC	Vsync F/B(feedback signal of Vsync)
23	GND	Ground
22	D3_P	LVDS data 3+
21	D3_N	LVDS data 3-
20	GND	Ground
19	CLK_P	LVDS clock +
18	CLK_N	LVDS clock-
17	GND	Ground
16	D2_P	LVDS data 2+
15	D2_N	LVDS data 2-
14	GND	Ground
13	D1_P	LVDS data 1+
12	D1_N	LVDS data 1-
11	GND	Ground
10	D0_P	LVDS data 0+
9	D0_N	LVDS data 0-
8	GND	Ground
7	GND	Ground
6	VCC	Power supply (3.3V)
5	VCC	Power supply (3.3V)
4	CS	SPI chip select(VCC if unused; with pullup)
3	SCLK	SPI serial clock(GND if unused)
2	SDA	SPI output(GND if unused)
1	OTP	Internal OTP used(NC if unused)

4. Absolute Maximum Ratings

The product or its functions may subject to permanent damage if it's stressed beyond those absolute maximum ratings list below. Exposure to absolute maximum rating conditions for extended periods may affect display module reliability.

Table 3: Absolute Maximum Ratings & Environmental Conditions

Item	Symbol	Min.	Max.	Unit
Digital power supply	V_{CC}	-0.3	+4.0	V
Analog power supply	V_{CI}	-0.3	+4.0	V
Relative Humidity (at 60°C, Note 3)	RH		90	%
Operating Temperature (Note 2)	T_{opr}	-30	+85	°C
Storage Temperature (Note 4)	T_{stg}	-40	+90	°C

Note 1: GND=0V.

Note 2: Panel surface temperature should not exceed 85°C.

Note 3: No condensation allowed under any condition.

Note 4: Storage @ -40˚C will not create permanent damage to the TFT.

5. Electrical Specifications

5.1 Block Diagram

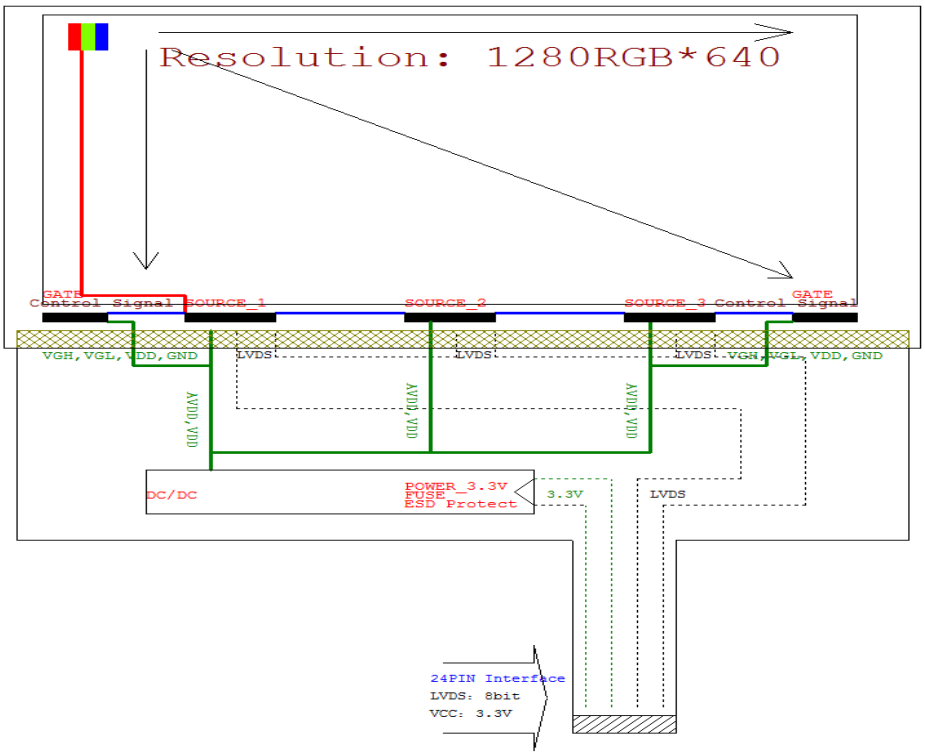


Figure 2: Block Diagram

5.2 Typical Electrical Characteristics

Requir. Ref.	Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit	Remarks
1	Power Supply Voltage	V_{CC}		3.0	3.3	3.6	V	
2	Power Supply Current	I_{CC}	White pattern	–	160	350	mA	Note 4-5-1
3	Power Consumption	P_{CC}		–	0.528	1.3	W	
4	Inrush Current	I_{RUSH}		–	–	1.5	A	For reference, Note 4-5-2
5	Input Signal Voltage	V_H	HVR, PDC, Bit_Sel	0.7 V_{CC}	–	V_{CC}	V	Note 4-5-3
6	Input Signal Voltage	V_L		0	–	0.3 V_{CC}	V	
7	Permissive input ripple	V_{RF}		–	–	200	mV_{PP}	

Table 3-10 Supply voltage and current

Note 4-5-1 The specified current and power consumption are measured at V_{CC}=3.3V, T_A=25 ± 2°C, f_V=60Hz, white pattern)

Note 4-5-2 For reference: The duration of rush current is about 2ms, rising time of power input is minimum 0.5ms (V_{CC}=3.3V, T_A=25 +/-2°C, f_V=60Hz)

Note 4-5-3 The recommended operating conditions show the ranges in which the device can operate normally. Operation beyond the limit of the recommended operation conditions is not assured, even though operating conditions are within the limit of the maximum ratings.

5.3 Timing Characteristics

5.3.1 Interface timing (1280*640/64HZ)(LVDS)

Display timing needs to be flexible as it has to work with different headunits and different timings accordingly.

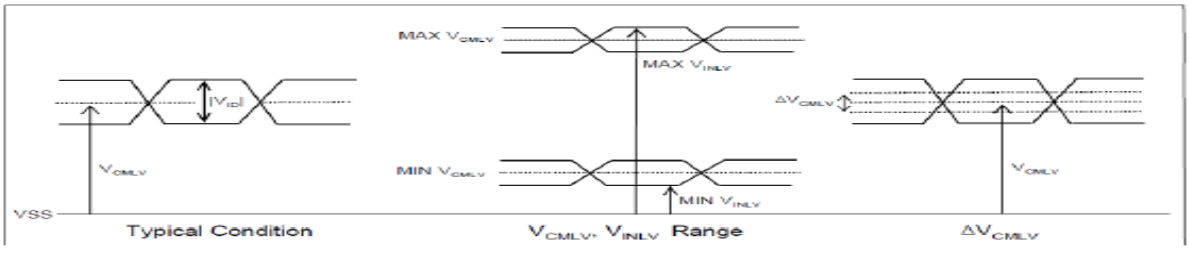
Requir. Ref.	Item	Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
1	DotClk	Frequency	$1/T_C$	50.86	61.34	70.78	MHz	
2	Horizontal	Period Area	T_H	1304	1420	1536	DotClk	
3	Horizontal	Blanking Area	T_{HB}	24	140	256	DotClk	
4	Horizontal	Display Area	T_{HD}	1280	1280	1280	DotClk	
5	Vertical	Period Area	T_V	650	720	768	lines	
6	Vertical	Blanking Area	T_{VB}	10	80	126	lines	
7	Vertical	Display Area	T_{VD}	640	640	640	lines	

Table 3-12 Timing

5.3.2 LVDS Interface DC Characteristic

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Differential input high threshold	V_{THLV}	-	-	50	mV	V_{CMLV} = 1.2 V
Differential input low threshold	V_{TLLV}	-50	-	-	mV	V_{CMLV} = 1.2 V
LVDS common mode voltage	V_{CMLV}	1.0	1.2	1.5	V	
LVDS input voltage	V_{INLV}	0.7	-	1.8	V	
ΔLVDS common mode voltage	ΔV_{CMLV}	No limit	mV	1 V < V_{CMLV} < 1.5 V		
ΔLVDS common mode voltage	ΔV_{CMLV}	-	-	250	mV	V_{CMLV} ≤ 1 V or V_{CMLV} ≥ 1.5 V
Differential input voltage	$\|V_{ID}\|$	350	450	600	mV	
Input current	I_{INLV}	-	-	±20	μA	
LVDS internal termination resistor	R_{TERMLV}	80	100	120	Ω	

(V_{DD_IF}=V_{DD}=3.0V to 3.6V, V_{DDA} = 8V to 13.5V, $GND_{\_IF}$=GND=GND_A=0V, T_A=-40℃ to 85℃)



6. Optical Characteristics

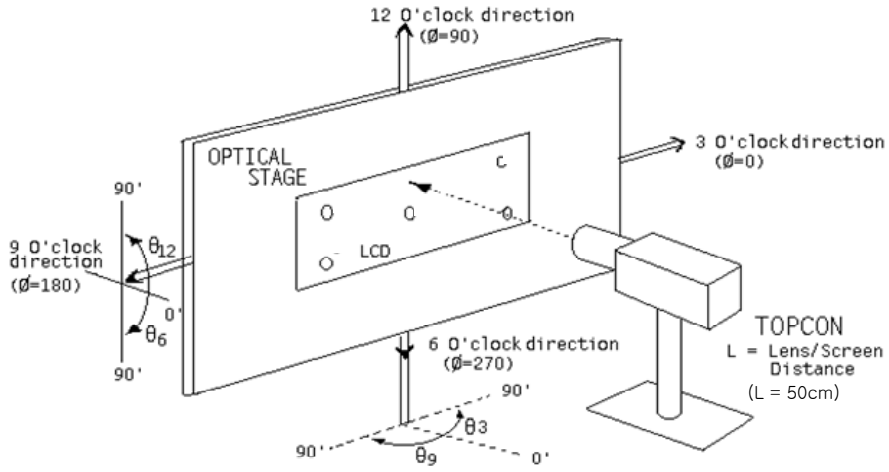
Conditions unless specified otherwise:

- Ta = 25°C
- Supply voltage = 3.3 volts
- Elapsed time from switch on is greater than 30 minutes
- RGB, white and black test patterns only
- Factory settings
- Brightness = 100% unless specified
- Measurements are conducted at ambient temperature and perpendicular unless specified

Table 7

Items	Condition				Min.	Typ.	Max.	Unit	Note
Luminance	Ta=25°C				1100	-	-	cd/m2	
CR	Ta=25°C				600	-	-	-	(Note 1)
Luminance homogeneity / White(VESA 9-point)	h = 0° v = 0°				80%	-	-	-	(Note 2)
Chromaticity	White		x_W		x（0.305±0.03）				
			y_W		Y（0.327±0.035）				
	Red		λ		λ=621±7nm				
			sat		min 80%				
	Green		λ		λ=546±5nm				
			sat		min 75%				
	Blue		λ		λ=467±5nm				
			sat		min 89%				
Response Time	T_R+T_F		Ta= 25°C	Viewing normal angle θ=ϕ=0°	-	-	35	ms	(Note 3)
			Ta= -20°C			-	200		
			Ta= -30°C			-	500		
Viewing angle	12’	θ2	Ta=25°C	Center CR≥10	-	80	-	deg.	(Note 4)
	6’	θ1			-	80	-		
	9’	ϕ2			-	80	-		
	3’	ϕ1			-	80	-		

Note 1: Contrast measurements shall be made at viewing angle of θ=0° and at the center of the LCD surface by using optical facility. Luminance shall be measured with all pixels in the view field set first
to white, then to the dark (black) state.

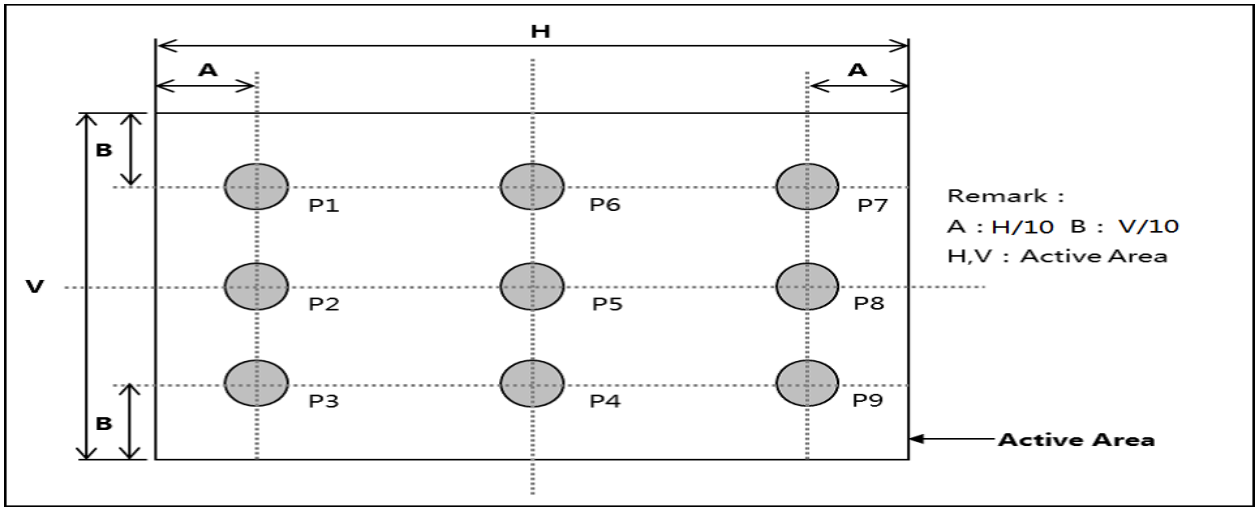


Luminace Contrast Ratio (CR) is defined mathematically.

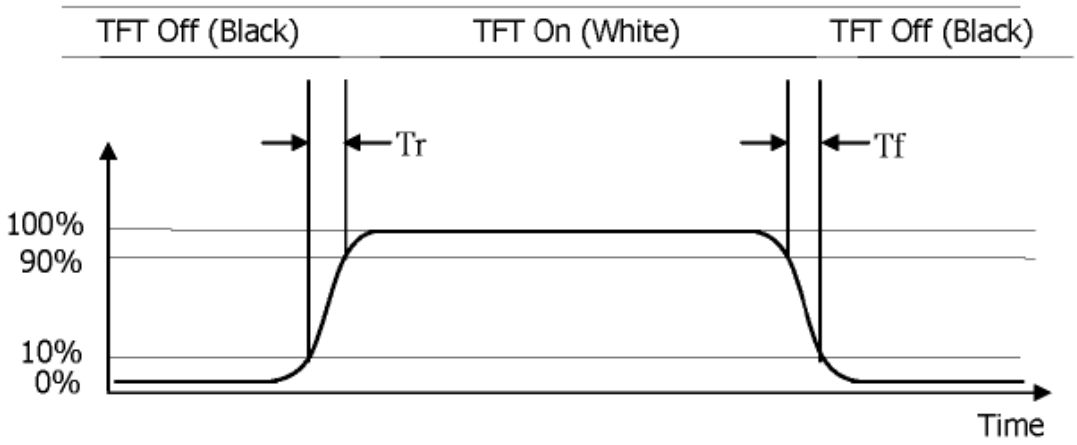
$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

Note 2: The White luminance uniformity on LCD surface is measured per VESA standard over 9 points and is then expressed as

$$\text{Uniformity } \Delta Y = \frac{\text{Minimum Luminance of 9 points}}{\text{Maximum Luminance of 9 points}} \times 100\ (\%)$$

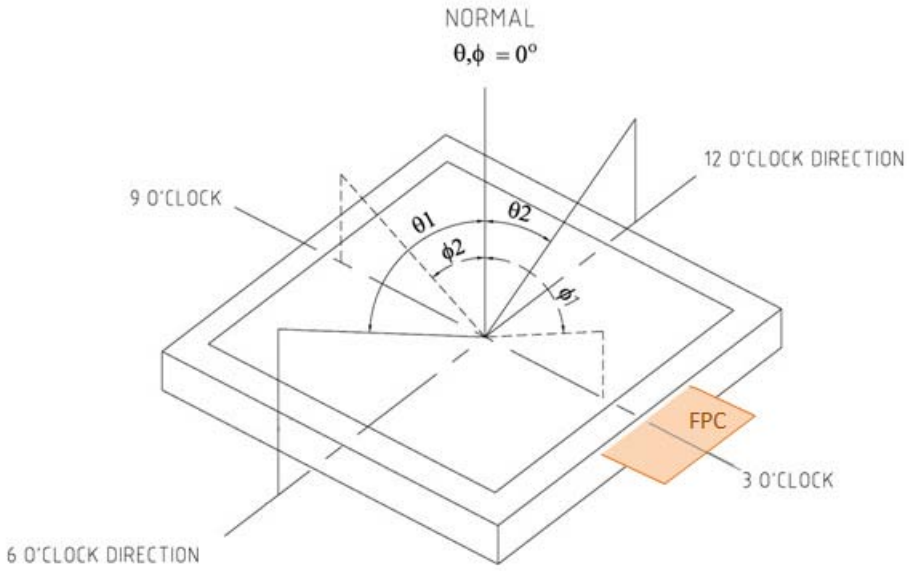


Note 3: The electro-optical response time measurements shall be made as 错误!未找到引用源。12 by switching the “data” input signal OFF and ON. The times needed for the luminance to change from 10% to 90% s T_r, and 90% to 10% is T_f.



Response Time Testing

Note 4: The definitions of viewing angle.



viewing Figure

7. Reliability Tests / Environmental

7.1 Reliability Test Conditions

Table 8: List of Reliability Tests

Test		Symbol	Condition	Reference
1	High Temperature Storage	HST	+80°C / 240 hrs	IEC 60068-2-2 Bb
2	Low Temperature Storage	LST	-30°C / 240 hrs	IEC 60068-2-1 Ab
3	High Temperature Operating (Note)	HOT	+75°C / 240 hrs	IEC 60068-2-2 Bb
4	Low Temperature Operating	LOT	-20°C / 240 hrs	IEC 60068-2-1 Ab
5	Accelerated Humidity Test Operating	AHTO	+60°C / 90% RH / 240 hrs	IEC60068-2-78 Cab
6	Temperature Shock Test	TST	-30°C <> +80°C, 30min/5min/30min,100cycles Non-Operating	IEC 60068-2-14Na
7	UV exposure resistance	UV	1KW Xenon / 100 hrs Power off.	IEC 60068-2-5 Sa

Note 1: LCD panel surface temperature should not exceed 80ºC.

Note 2: For module internal structure robustness test purpose only. Customer application cluster design should take care of overall mounting robustness with display module.

7.2 Electrostatic Discharge (ESD)

Table 9: ESD Test Conditions

Test	Condition	Method	Remark
Human body model	R = 330Ω, C = 150pF, • Air discharge: ±2 KV to display surface	IEC61000-4-2	Not operating
Machine model	R = 0Ω, C = 200pF, ±200V to I/O pins	MIL-STD-883, method 3015	Not operating

Note 1: The TFT-LCD panel and IC on module are sensitive to electrostatic discharge; please make sure equipments and operators are properly ground before and during handling

Note 2: As different customer application have different interfacing designs and assembly processes, the display module has no ESD protection circuitry. Customer is required to take special care on ESD level control in the assembly and test processes.

8. Quality Requirements（IIS）

8.1. PURPOSE（目的）

The SPEC defined the IIS of TFT-LCD MODULE B Grade，the process include SQC & FQC &OQA & RETEST

8.2. SCOPE （适用范围）

The IIS Using the inspection stations of CD MODULE LINE B Grade。

8.3. REFERENCE DOCUMENTS (参考文件)

NA

8.4. EQUIPMENTS & MATERIALS (设备及原料)

8.4.1 MATERIALS

8.4.1.1 Production

8.4.1.2 Light on jig check list(点灯检查资材&供给)

8.4.1.2.1 Light on cable

8.4.1.2.2 LOUPE ocular lens，即放大镜，用于观察某些微小不良。

8.4.1.2.3 FLICKER tuning pen 用于 LCM 驱动 PCB VCOM 模拟调节的工具。

8.4.1.2.4 SPOT GAUGE 点规，即对比卡，用于对某些微小不良的尺寸测量。

8.4.1.2.5 ND FILTER 中性密度滤光镜，减小光的强度，利于对一些不良浓度的进行观察和衡量。

8.4.1.2.6Limit Sample(限度样本) 为便于 LCM 的不良级别判定提供可比较的 LCM 样本。

8.5. SAFETY (安全守则)

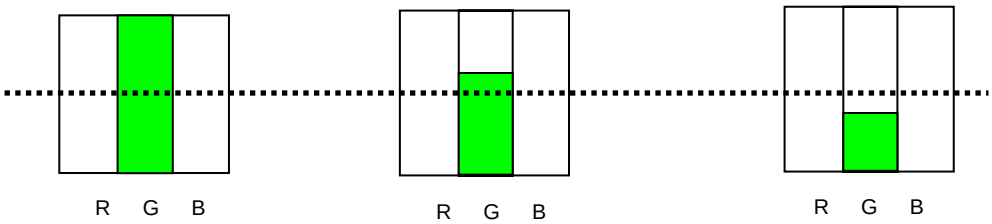
NA

8.6. DEFINITIONS (定义)

8.6.1 Dot Defect

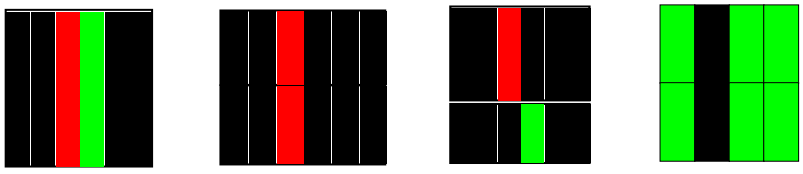
Dot defect：Whole Dot bright or dark，over 1/2 dot as dot defect judge，not exceed 1/2 as foreign material judge

发亮或暗的不良称为 Dot Defect，满 1/2 Dot 的不良按 Dot Defect 判定，未满 1/2 Dot 按 FM 判定。



8.6.2 2S/3S The two or three dots defect include bright dot or dark dot where the location is left and right joint dots or up and down joint dots or not joint dots or sharing an angle or sharing a line

左右、上下或斜对角相邻的两/三个亮点或暗点。Dot 共角或共边。

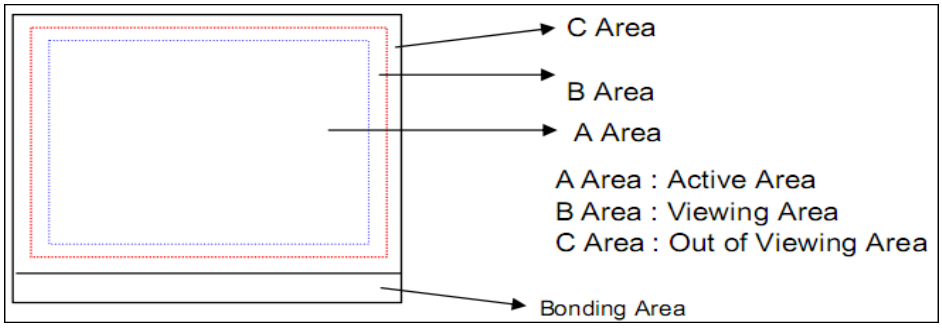


8.6.3 LCM 检查区域定义如下：

A area ：AA area，display area 可视区域，即装配后，在整机中屏幕可以被看到的区域

B area : between the AA area and frame 视区以外边框以内的部分

C area：outside of the frame 边框以外的部分



8.7. PROCEDURE (程序)

8.7.1 Inspection environment 检查环境

Temperture:23±2℃

humidity:65±20%RH

LUX(照度) : ≤30 LUX (light in inspection item 点灯检查项目)

500-1000 LUX (cosmetic inspection 外观检查项目)

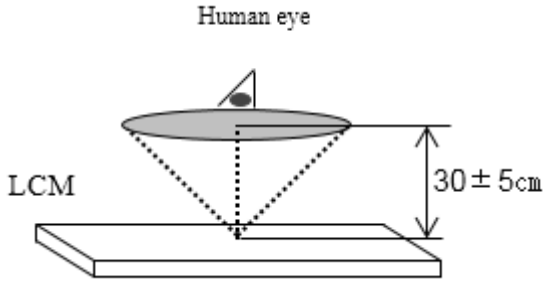
Remark: the jig check by the month 检查照度生技与 PQE 均每个月检查 一次。

8.7.2 inspection area and distance 检查范围及检查距离

8.7.2.1 Area 范围: inside of tape and around the panel （Panel 四周 Tape 以内区域）.

8.7.2.2 Distance: 30±5CM from panel surface（检查时离 PANEL 表面 30±5CM）

8.7.2.3 Angle 视角: 以 PANEL 中心为基准, 上下 60°,左右 60°的立体角



8.7.2.4 检查方法：点灯检查项从屏幕的左上角开始到右下角结束，目光“Z”字形扫过屏幕进行检查。检查时注意上下左右视角的变化（必要时偏头进行观察）

8.8.适用型号及设置

产品型号	视角
all	依据产品 spec

8.9.适用型号及测试程序/夹具

适用型号	Test Pattern	测试程序	测试设备	测试机架	测试线
all	Reference TS 对应型号 TS	H72 or H10 Tester 测试程序	H72/H10	对应型号测试架	Copper wire 铜线

8.10・点灯 Pattern

Test Step	Criteria	Pattern
STEP1 Visual inspection on black pattern for mura, galaxy, cosmetic Pixe,Zara,Cell & POL 异物和划伤等检查 漏光、COG Mura 及其他 Mura 检查	: 见 11 Visual Inspection Spec	Black
STEP2: Visual inspection on 127th gray pattern L127 灰阶画面外观检查	画面不均匀 1%ND 可遮	L127 Gray
STEP3: Visual inspection on 255th gray pattern L255 灰阶画面外观检查	见 11 Visual Inspection Spec	L255 Gray
STEP4: Visual inspection on red pattern for x and y line defects and dot defects 红色画面外观检查，着重看 xy 线不良和点不良	见 11 Visual Inspection Spec	Red
STEP5: Visual inspection on blue pattern for x and y line defects and dot defects 红色画面外观检查，着重看 xy 线不良和点不良	见 11 Visual Inspection Spec	Blue
STEP6: Visual inspection on green pattern for x and y line defects and dot defects 红色画面外观检查，着重看 xy 线不良和点不良	见 11 Visual Inspection Spec	Green
STEP7: Visual inspection on RGB H-Gray RGB H-Gray 灰阶画面外观检查	清晰分辨彩条和灰条.	RGB H-Gray
STEP8: Visual inspection on RGB H-Gray pattern RGB V-Gray 灰阶画面外观检查	1%ND 可遮	

		RGB V-Gray
STEP9: Visual inspection on W_Gray pattern 灰阶过度画面检查	1%ND 可遮	 W_GRAY
STEP10: Visual inspection on crosstalk pattern Crosstalk 图外观检查	crosstalk（<5%）。	 Crosstalk
STEP11: Power on Trim VCOM to optimized value by VR first Visual inspection on flicker pattern for flicker 通过可调电阻调整 VCOM，使闪动值最小。闪动图外观检查，着重看画面闪动	- Flicker Value < 25%	 Flicker
STEP12: Visual inspection on Bitmap pattern 图片检查	Any abnormal performance 任何显示异常	 picture
STEP13: Unload half module 卸除模块	确保 H72 PG 手动关闭电源后才卸除模块	

8.11. Defect inspection spec(画检检验规格)

Item		description	Inspection spec			type
			A Area	B Area	C Area	
Inspection Content 检查内容	Foreign material/ /POL dent /pol scratch/Glass dent/bubble/AA scratch /press mark	dot	D<0.4mm，Ignore 0.4mm≤D≤0.5mm，N≤3 0.5mm<D≤0.6mm，N≤1 D>0.6mm，N≤0 S≥5mm		Ignore	minor
		lines	W≤0.1mm，L≤3mm，N≤2 W>0.1mm，L>3mm，N≤0 S≥5mm		Ignore	minor
	Dot defects	Bright dot	N≤3（no judge on alignment patte 对位画面不作判定）		Ignore	minor
		Dark dot	N≤5		Ignore	
		Bright dot+ dark dot	N≤5		Ignore	

	Line defect	Bright lines/ dark lines	NO	Ignore	
	Display abnormal		NO	Ignore	
	Mura	ND Filter	1%	Ignore	
	Light leak	ND Filter	1%	Ignore	
Remark	异物、点、线类不良无特殊说明的，均使用比对卡，单眼 90°，距离 10-20cm 进行判定。如判定存在争议，使用比对卡加目镜测量判定。				

8.12Cosmetic inspection spec 外观检验规格

检查 Item	spec 判定标准	Remark
Blu dirty / adhesive residue/scratch / dent 背板脏物/残胶/刮伤/凹凸点	Ignore	
Tape scratch/broken/ Wrinkle/dent/shift 黑胶带划伤/破损/褶皱/凹凸/歪斜	Ignore	
2D barcode	no broken on 2D area but barcode is agree，unclear and readable is agree 标签非二维码区破损划伤允许，二维码模糊但扫描器可正确读取允许	
POL	AA cover is ok。the phenomenon of wrinkle or adhesive residue and glue less or overflow at outside the AA are no ignore 完全盖住显示区即可，显示区外（翘起/胶纹/缺胶）忽略，	
Protect Film	No broken，other defects ignore 保护膜破损不可以，其他忽略	
FPC	No broken，no FPC wrinkle severe，no connector scratch，other defect Ignore 破损，死折不可以， Connector 金手指划伤不可以，其他忽略	

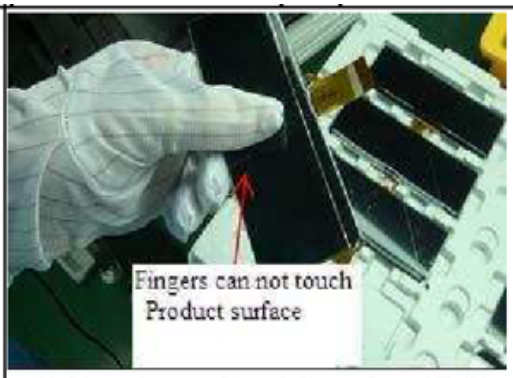
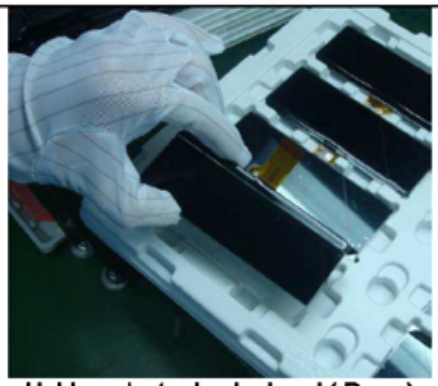
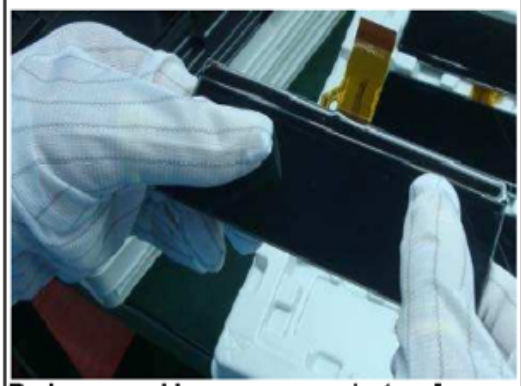
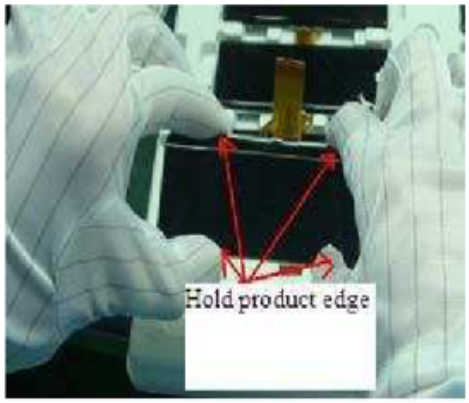
9. Handling Cautions

9.1 Packing removal and handling requirement

深圳市新盟辉光电有限公司

Shenzhen Xinmeng Hui Photoelectric Co. Ltd

Requirement	Wrong	Correct
Get one package each times & hold the package by both hands with proper ESD shielding	 Hold the modules by one hand and without proper ESD shielding (Fail)	 Hold the modules by both hands (Pass)
Prohibit to stack inner package over 3 layers	 Over 3 layers (Fail)	 Not exceed 3 layers (Pass)
Total packing tray height must within 40 cm	 Over 40 cm (Fail)	 Lower than 40 cm (Pass)

Requirement	Wrong	Correct
Prohibit to touch product surface by fingers	 Hold product and touch its surface (Fail)	 Hold product edge by hand (Pass)
During assembly, prohibit to press on product surface by fingers, Must hold the product edges by both hands	 During assembly, press on product surface (Fail)	 During assembly, use both hands to hold Product edge only (Pass)

9.2 Mounting of module

- Please power off the display module before it is disconnected or connected to the application.
- If the connection to the application is not good, following problems may result.
  1. Significant noise on signals between display module and application
  2. Unstable display performance
  3. Parts on the module will be heat up or damaged
- The polarizer is made of soft material and is susceptible to flaw. The display must be handled with care.
- Protective film (Laminator) is applied on surface for protection against scratches and dirts. Please avoid electrostatic charge build-up when peeling off the laminator.

9.3 Precautions in Mounting

- When metal part of the TFT-LCD module (shielding lid and rear case) is soiled, wipe it with soft dry cloth.
- Wipe off water drops or finger grease immediately when found. Prolonged contact with water may cause discoloration or spots.
- The TFT-LCD panel module contains glass which breaks or cracks easily if dropped or bumped on hard surface. Please handle with care.
- The TFT-LCD panel and IC on module are sensitive to electrostatic discharge; please make sure equipments and operators are properly ground before and during handling.

9.4 Adjusting module

- Adjusting volumes on the rear face of the module have been set to its optimal before shipment. Therefore, do not change any adjusted values. If adjusted values are changed, the display may not perform to specification.

9.5 Others

- Do not expose the module to direct sunlight or intensive ultraviolet rays for prolonged hours
- Store the module at room temperature condition.
- If LCD panel breaks, liquid crystal may escape from the panel. Avoid bringing it to eyes or mouth contact. When liquid crystal sticks on hands, clothes or feet, wash it out immediately with soap.
- Observe all other precautionary requirements as in handling general electronic components.
- Please adjust the voltage of common electrode as materials of attachment by 1 module.
- Do not expose the display module to harmful gases such as acid and alkali gasses, which will corrode electronic components.
- Do not disassemble the display module because it can cause permanent damage and will void the warranty agreement.

10. Definitions

Data sheet status	
Objective Specification	This data sheet contains target or goal specifications for product development.
Preliminary Specification	This data sheet contains preliminary data; supplementary data may be published later.
Product Specification	This data sheet contains final product specification.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating. Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operating of the device at these or any other conditions above those given in the Characteristics sections of the specification is not implied. Expose to limiting values for extended periods may affect device reliability. Device is functional within the limiting conditions doesn't imply the same performance over the covered conditions, customer is required to decide the best range for the final applications.	

11. Life Support Applications

These products are not designed for use in life saving appliances, devices or systems where malfunctioning of these products can reasonably be expected to result in personal injury. Customers using or selling these products for use in such applications do so at their own risk and agree full non liability of Varitronix Limited for any damages or losses resulting from such improper use or sale