

DOCUMENT NUMBER AND REVISION
VL-FS-COG-T919F3990-L1 REV.A
(COG-T919F3990)

DOCUMENT TITLE:
SPECIFICATION
OF
LCD MODULE TYPE

CUSTOMER	
CUSTOMER PART NO.	
MODEL NUMBER	COG-T919F3990-L1
CUSTOMER APPROVAL	
DATE	

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**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

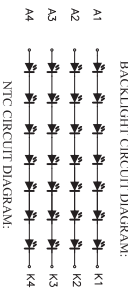
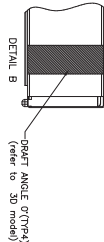
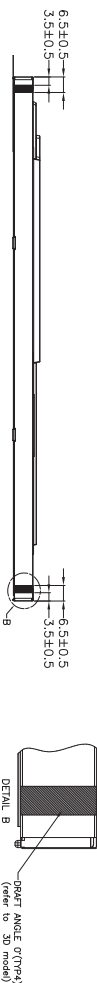
2. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

(H: Horizontal; V: Vertical)

Table 1

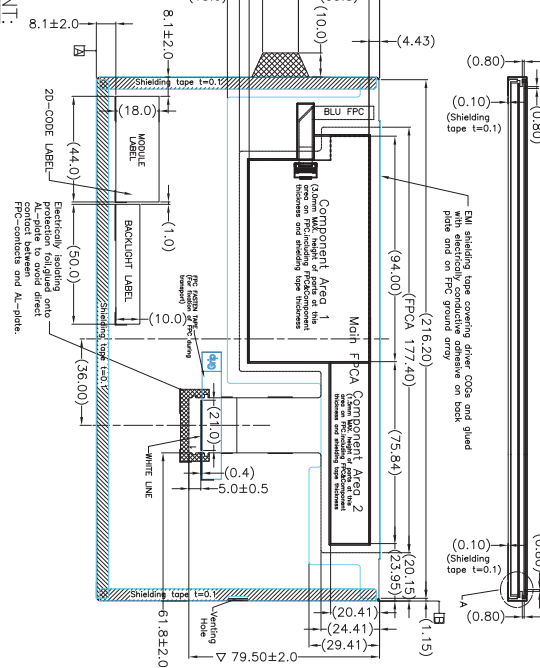
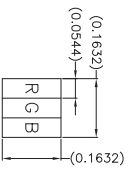
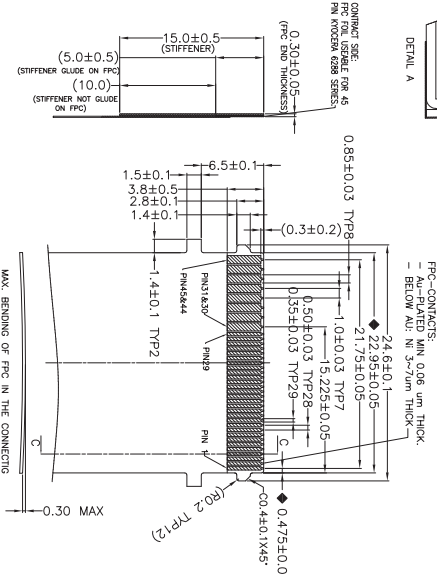
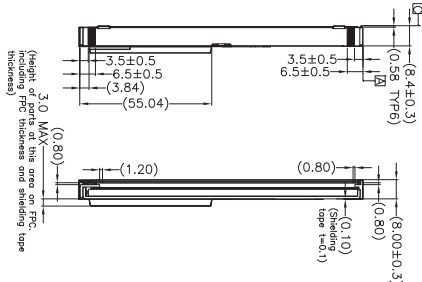
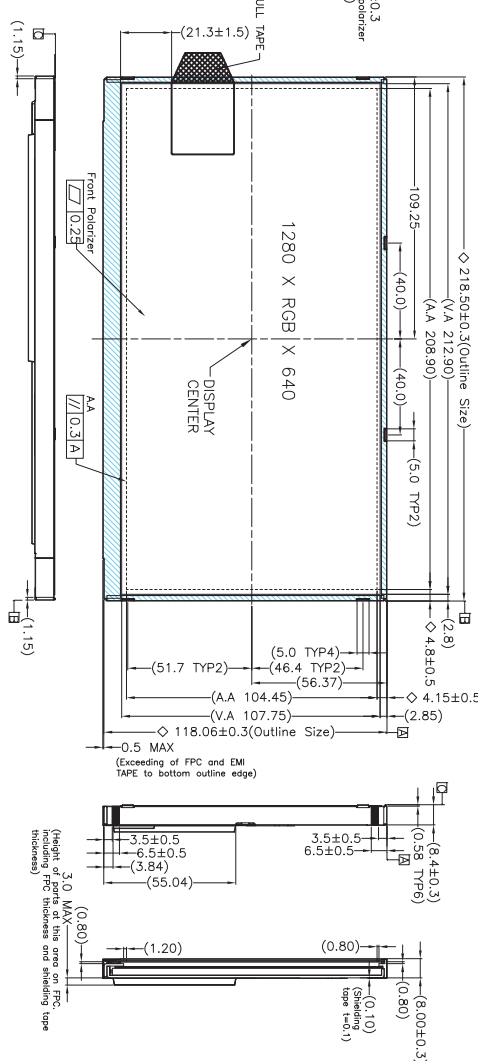
Parameters		Specifications	Unit
Outline dimensions		218.5 (H) x 118.06 (V) x 8.4 (D) (Exclude FPCs & component height)	mm
Color TFT 1280 x RGB x 640	Visible area	212.9(H) x 107.75 (V)	mm
	Active area	208.9 (H) x 104.45 (V)	mm
	Display format	HD (1280 x RGB x 640)	dots
	Color configuration	Horizontal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



NTC P/N: NCP18XN1030R5B



ISSUE	AMENDMENT	DATE



PIN ASSIGNMENT:

1	2	3	4	5	6	7	8	9	10
OTP	SDA	SCIX	/CS	VCC	VCC	GND	GND	DO_N	DO_P
11	12	13	14	15	16	17	18	19	20
GND	D1_N	D1_P	GND	D2_N	D2_P	GND	CLK_N	CLK_P	GND
21	22	23	24	25	26	27	28	29	30
D3_N	D3_P	GND	VSVMC	DISP_ON	DU	LR	NTC2	NTC1	C4
31	32	33	34	35	36	37	38	39	40
C4	A4	A4	A4	C3	A3	A3	C2	C2	A2
41	42	43	44	45					
A2	C1	C1	A1	A1					

NOTES:

1. (.) : REFERENCE DIMENSION
2. CONFORMITY WITH ROHS AND HALOGEN FREE
3. CPK CONTROL POINT: CRITICAL DIMENSION (CPK) >= 1.33;
4. CPK CONTROL POINT: CRITICAL DIMENSION (CPK) <= 1.33;

TITLE: SPECIFICATION OF MODULE			
PROJECT NO.: COG-1919F3990-L1			
CUSTOMER REF:			
TOLERANCE UNLESS OTHERWISE SPECIFIED: X.X ±0.3		FINISH: N/A	
DIMENSIONS IN MM		SCALE: NOT TO SCALE	
MATERIAL: N/A		OVERALL THK: N/A	
THIRD ANGLE PROJECTION			
DRAWN: SHI YONG CHAO		SIGN	
CHECKED: WEN YU MING		DATE	
APPROVED: THOMAS IP			
ITEM NO.: COG-1919F3990-L1			
DESCRIPTION: COG-1919F3990-L1 SPEC.			
FILE NO.: COG-1919F3990-L1 R-20170720A REV: 1			
SHEET 1 OF 1			

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

<i>Requ re. Ref.</i>	Parameter		Symb ol	Extreme Ratings		Unit	Remarks
				Min.	Max		
4.1	Data signal voltage LVDS			-0.2	VCC + 0.3	V	TXout_,TXCLKOU T_ to AGND
4.2	Logic supply voltage	3.3V	VCC	-0.2	+3.96	V	Logic supply voltage
4.3	Operating temperature	ambient temperature	T _A	-30	+80	°C	
4.4	Storage temperature	ambient temperature	T _b	-40	+85	°C	

Notes:

Ref. 4.3 – 4.4

Operating temperature between Ta: -30°C to < Ta: -20°C does not require the full optical performance of the LCD, but no damage of the display function will occur.

The supplier has to define restrictions and limitations of the optical performance if necessary.

5. Electrical Specifications

5.1 Block Diagram

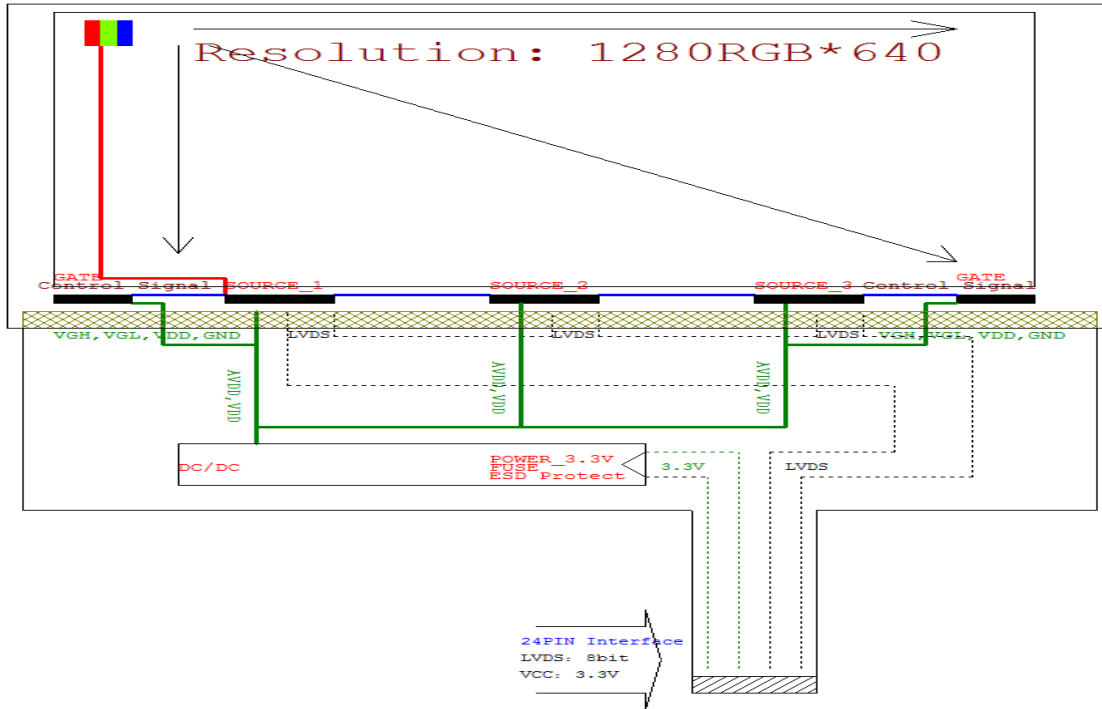


Figure 2: Block Diagram

5.2 Typical Electrical Characteristics

At Ta = -30°C to +80°C, GND=0V, VCC= 3.3V, VCI= 3.3V

Table 4

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	VDD	3.0	3.3	3.6	V
Power supply current for IDD	IDD (Note 2)	-	160	-	mA
Driver input high signal voltage	VIH	0.7*VCC	-	VCC	V
Driver input low signal voltage	VIL	GND		0.3*VCC	
LED Life Time (50%)	(Note 3)	20000	-	-	hrs

Note 1: There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.

Note 2: If Vcc and VCI are connected to different power sources, during power on, Vcc should be applied before VCI; while during power off, VCI should be disconnected before Vcc.

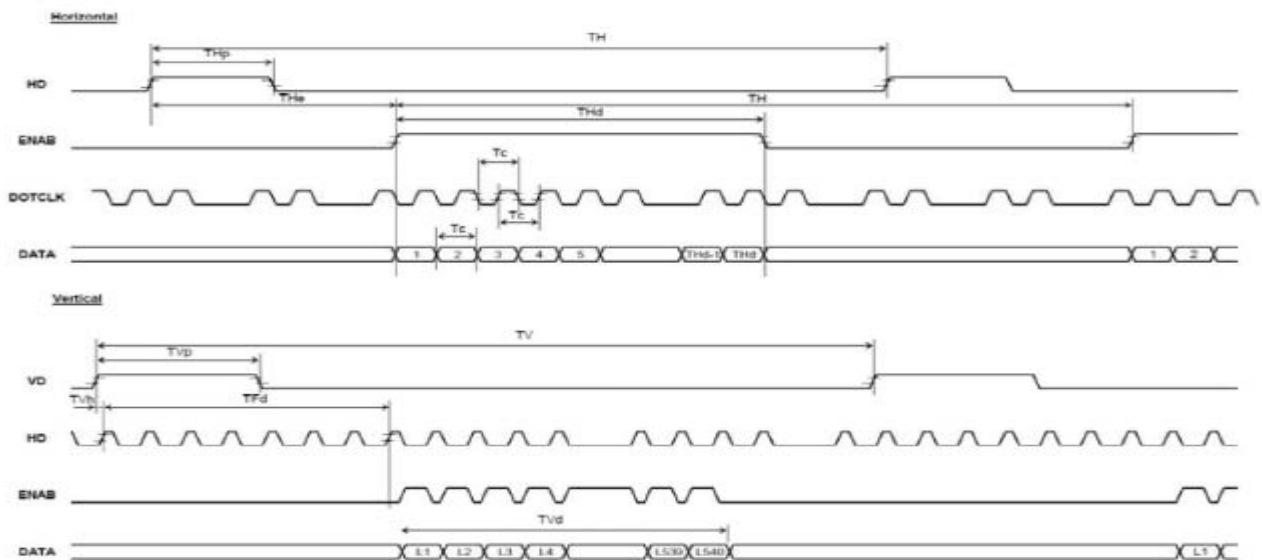
Turning on/off Vcc and VCI at the same time is also okay.

5.1 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	



6. Optical Characteristics

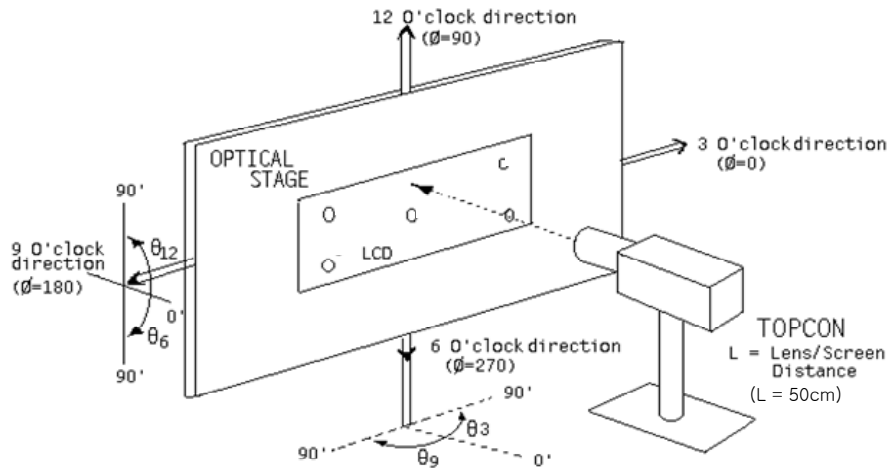
Conditions unless specified otherwise:

- $T_a = 25^{\circ}\text{C}$
- 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			800	-	-	cd/m2		
CR	Ta=25°C			600	-	-	-	(Note 1)	
Luminance homogeneity / White(VESA 9-point)	h = 0° v = 0°			80%	-	-	-	(Note 2)	
Chromaticity	White	xw		x (0.305±0.03)					
		yw		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	TR+TF		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 $\theta=0^{\circ}$ 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.

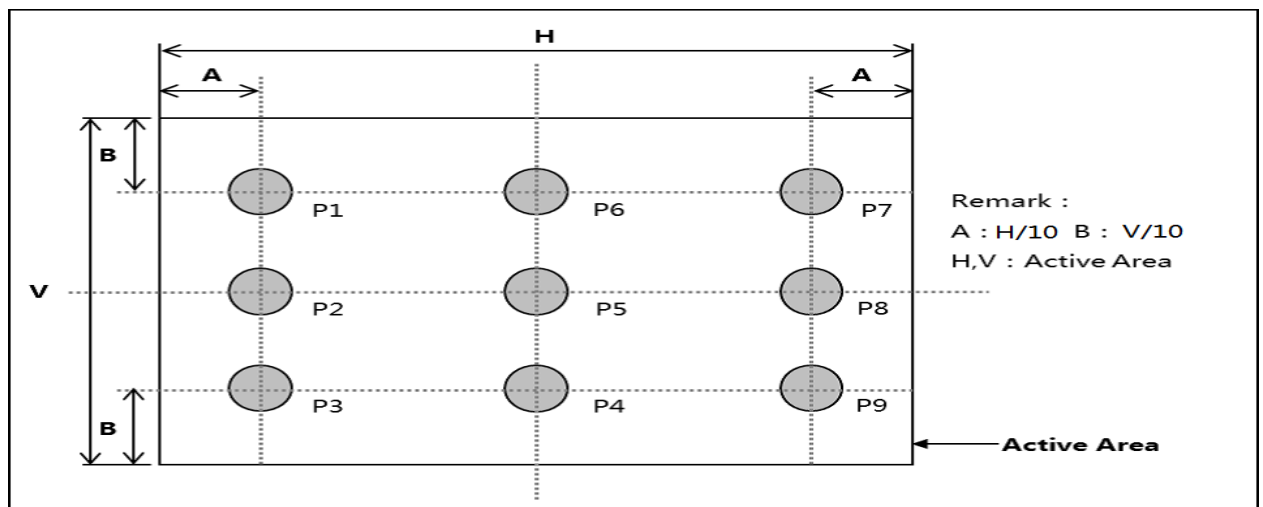


Luminance Contrast Ratio (CR) is defined mathematically.

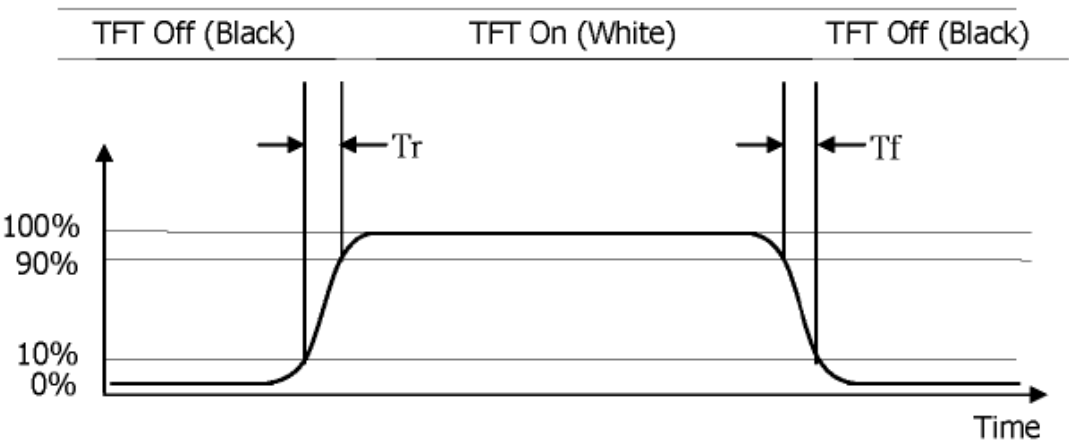
$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

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

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

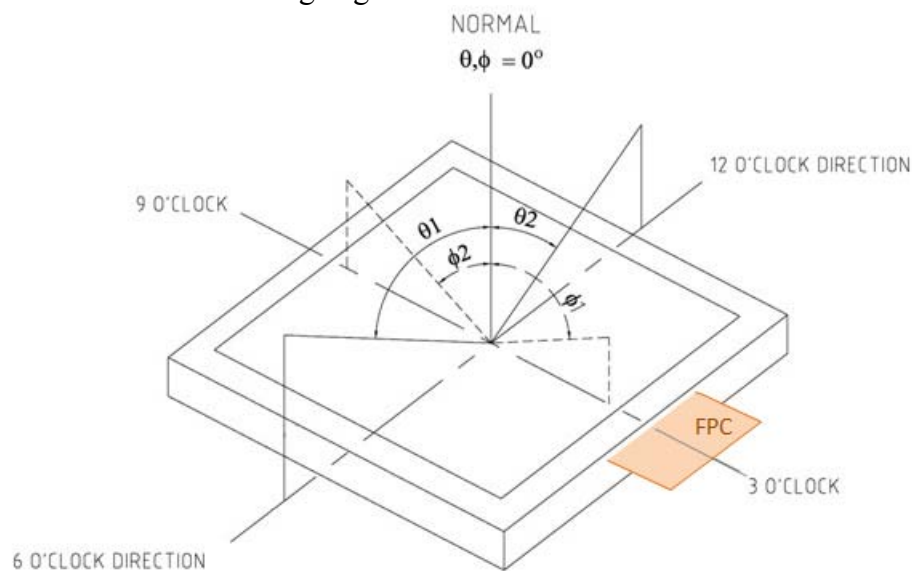


Note 3: The electro-optical response time measurements shall be made as follow charctor by switching the “data” input signal OFF and ON. The times needed for the luminance to change from 10% to 90% s T_r , and 90% to 10% is T_f .



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	+85°C / 240 hrs	
2	Low Temperature Storage	LST	-40°C / 240 hrs	
3	High Temperature Operating ^(Note)	HOT	+80°C / 240 hrs	
4	Low Temperature Operating	LOT	-30°C / 240 hrs	
5	Accelerated Humidity Test Operating	AHTO	+60°C / 90% RH / 240 hrs	
6	Temperature Shock Test	TST	-30°C <> +80°C, 30min/5min/30min, 100cycles Non-Operating	
7	UV exposure resistance	UV	1KW Xenon / 100 hrs Power off.	

Note 1: LCD panel surface temperature should not exceed 85°C.

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		Not operating
Machine model	R = 0Ω, C = 200pF, ±200V to I/O pins		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

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)

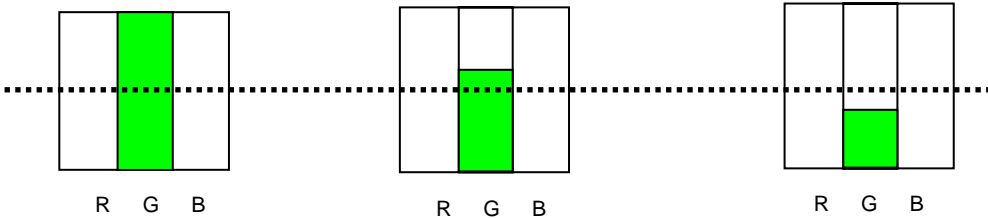
NA

8.6. DEFINITIONS (定义)

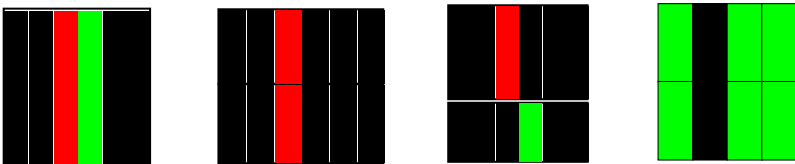
8.6.1 Dot Defect

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。

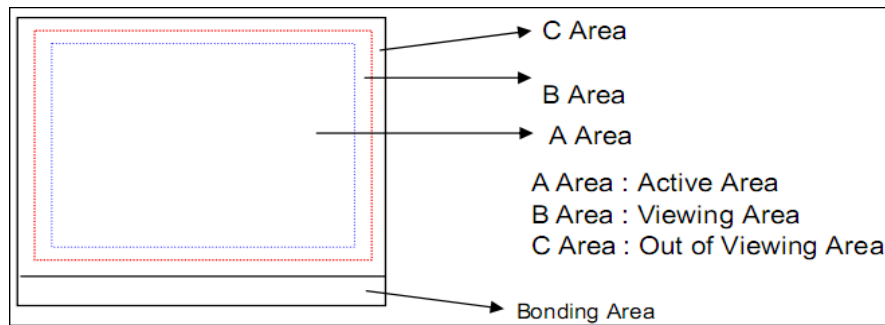


8.6.3 LCM 检查区域定义如下：

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: $23 \pm 2^{\circ}\text{C}$

humidity: $65 \pm 20\% \text{RH}$

LUX(照度) : $\leq 30 \text{ LUX}$ (light in inspection item 点灯检查项目)

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

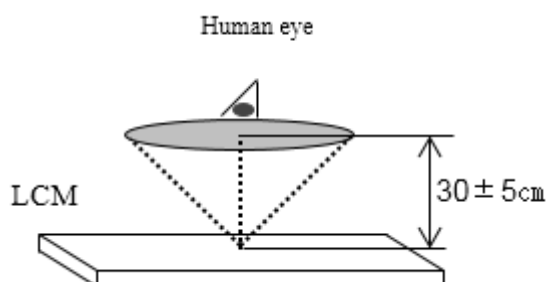
Remark: the jig check by the month 检查照度生技与 PQE 均每个月检查 一次。

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: $30 \pm 5 \text{CM}$ from panel surface (检查时离 PANEL 表面 $30 \pm 5 \text{CM}$)

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 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。					







8.9 Cosmetic inspection spec 外观检验规格


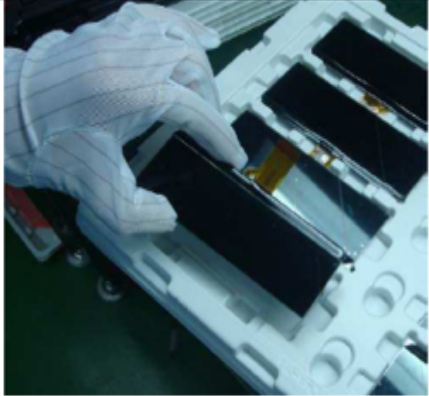
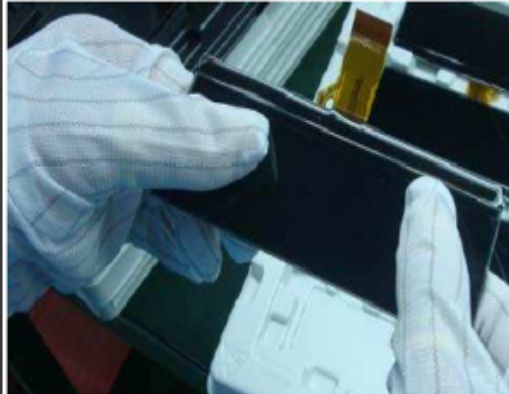
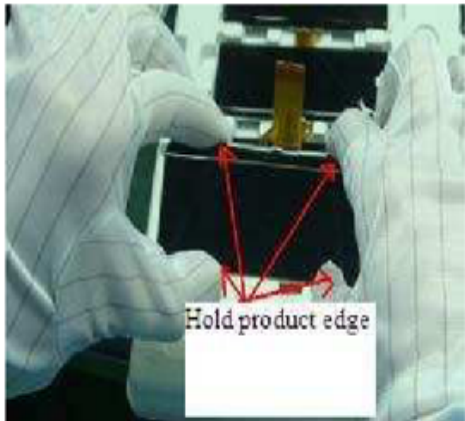
检查 Item	spec 判定标准	Remark
Blu dirty / adhesive residue/scratch / dent 背板脏物/残胶/刮伤/凹凸点	Ignore	
Tape scratch/broken/ Wrinkle/dent/shift 黑胶带划伤/破损/褶皱/凹凸/歪斜	Ignore	
2D barcode	no broken on 2D area but barcode is agree, unclear and readable is agree 标签非二维码区破损划伤允许，二维码模糊但扫描器可正确读取允许	
POL	AA cover is ok. the phenomenon 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

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

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

9.1 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 dirt. Please avoid electrostatic charge build-up when peeling off the laminator.

9.2 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.

9.3 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.

9.4 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.