



SHENZHEN APTUS TECHNOLOGY CO., LIMITED

PRODUCT SPECIFICATION

5.96" FB MONO TFT-LCD (FOG)

MODEL NAME: RV059FBB-N80

DOC VERSION:

TOTAL PAGES: 18

DATE: 2020.5.13

FOR CUSTOMER	
CUSTOMER APPROVED	

NOTE: THE CONTENT OF THIS SPECIFICATION IS SUBJECT TO CHANGE WITHOUT NOTICE.

ALL RIGHTS STRICTLY RESERVED. ANY PORTION OF THIS PATER SHALL NOT BE REPRODUCED, COPIED, OR TRANSFORMED TO ANY OTHER FORMS WITHOUT PERMISSION FROM APTUS INTERNATIONAL CO., LIMITED.



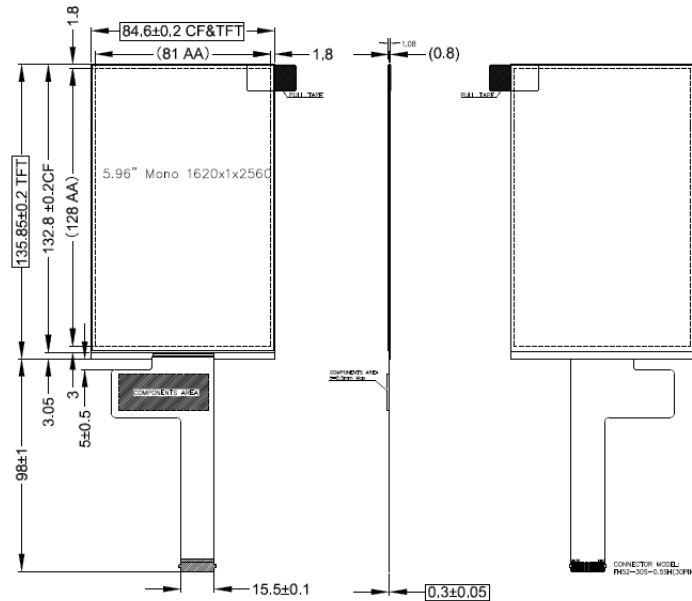
CONTENT LIST

Cover -----	1
Content List-----	2
Record Of Revisions-----	3
1. General Description-----	4
2. Electrical Specifications-----	6
3. Optical Specifications-----	7
4. Mechanical Characteristics-----	9
5. Data IC PAD&FPC Pin Assignment-----	10
6. Reliability Test -----	11
7. Appendix -----	12
8. Packing Method -----	14
9. Product ID Rule-----	15
10. Handling & Cautions -----	16
11. Applicable Scope -----	18

1.0 GENERAL DESCRIPTION

1.1 Introduction

RV059FBB-N80 is a MONO active matrix TFT-LCD Panel using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. It is a transmissive type display operating in the normal black. This TFT-LCD has a 5.96 inch diagonally measured active area with 1620 Horizontal by 2560 Vertical pixel array.



1.2 Features

- Single Pixle 0.05mm
- Thin and light weight
- High luminance and contrast ratio, low reflection and wide viewing angle
- RoHS Compliant

1.3 Application

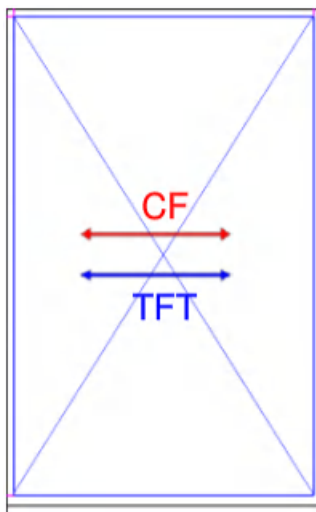
- 3D Printer

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

Parameter	Specification	Unit	Remark
Active Area	81(H) × 128(V)	mm	
Number of Pixels	1620(H) × 2560(V)	pixels	
Pixel Pitch	50(H) × 50(V)	um	
Pixel Arrangement	WB Vertical stripe		
Display Colors		colors	
Color Gamut	MONO		
Display Mode	Normally black, Transmissive mode		
Dimensional Outline	84.6(H) × 135.85(V) × 1.08(D)	mm	FOG
Viewing Direction (Human Eye)	U/D/L/R Min. 80/80/80/80	°	Note 1,2,3

Note:

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



2.0 ELECTRICAL SPECIFICATION

2.1 Absolute Maximum Ratings

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. Make sure all the design characteristics are adequate before the panel is initialed. All the measurements should be operated with driver IC and experimental FPC mounted.

Parameter	Symbol	Min	Max	Unit	Remark
LC Operating Voltage *1)	V _{op}	5.2	5.8	V	Ta = 25℃
Operating Temperature	T _{OP}	0	+70	℃	
Storage Temperature	T _{ST}	-10	+80	℃	
Operating Ambient Humidity *2)	H _{op}	10	*3)	%RH	*3)
Storage Humidity	H _{st}	10	*3)	%RH	*3)

Note:

[VSS = GND = 0V]

*1) Liquid Crystal driving voltage

Due to the characteristics of LC Material, this voltage varies with environmental temperature.

*2) Temp≤60℃ 90% RH MAX

*3) Non-condensation

2.2 Electrical Characteristics

Parameter	Symbol	Value	Unit	Remark
		Reference		
TFT Gate ON Voltage	V _{GH}	12~18	V	Note1
TFT Gate OFF Voltage	V _{GL}	-11~-8	V	Note2
TFT Common Electrode Voltage	V _{COM}	-3.5~0	V	Note3
TFT Kick-Back Voltage Max	ΔV _p Max	0.2~0.8	V	
TFT Kick-Back Voltage Min	ΔV _p Min	0.3~0.9	V	

Note:

1. V_{GH} is TFT Gate operating voltage.

2. V_{GL} is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuate with same phase as Vcom, the storage capacitance structure of the product is storage on common.

3. V_{com} must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc.,

We just kindly recommend the setting-voltages the reference value.

In order to get the optimized display quality, the setting-voltage should be changed according to customer's developing condition. (The display quality could be changed by customer's setting -voltage.)

3.0 OPTICAL SPECIFICATIONS

3.1 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.

3.2 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	80				Note 1
		Θ9		80				
	Vertical	Θ12		80				
		Θ6		80				
Contrast Ratio		CR	Θ= 0°	400	800			Note 2
Transmittance		T(%)	Θ= 0°	5.45	6.4			Note 3
Response Time		Tr+Tf	Θ= 0°		35	40	ms	Note 5

Note:

- 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.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. (See FIG. 2) Luminance Contrast Ratio (CR) is defined mathematically.

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

- Transmittance is the value based on UV405nm
- 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 C/F. Measurement condition is C - light source & Halogen Lamp
- The electro-optical response time measurements shall be made as FIG.3 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.

Figure 1. The definition of V_{th} & V_{sat}

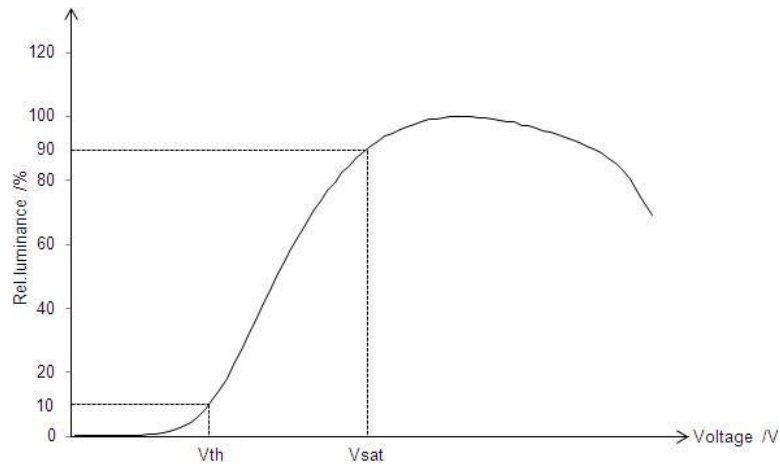


Figure 2. Measurement Set Up

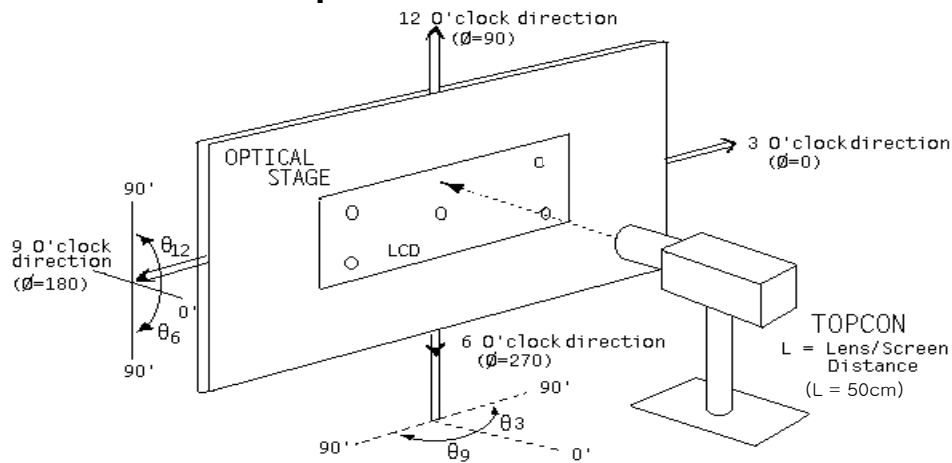
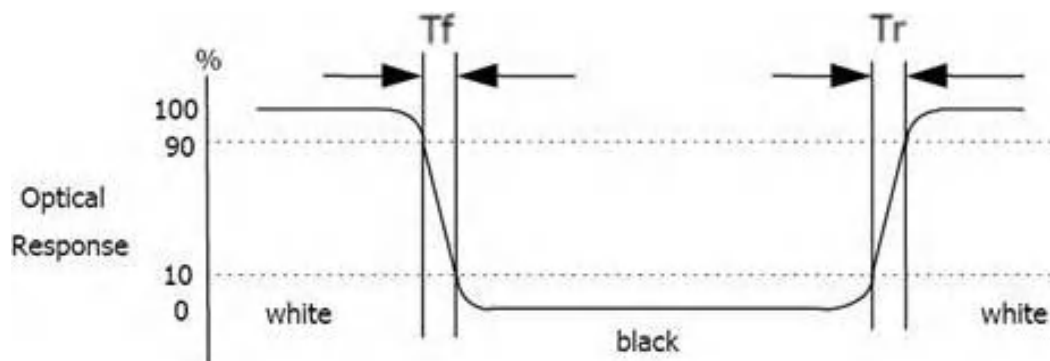


Figure 3. Response Time Testing



4.0 Mechanical Characteristics

4.1 Dimensional Requirements (H: horizontal length, V: Vertical length)

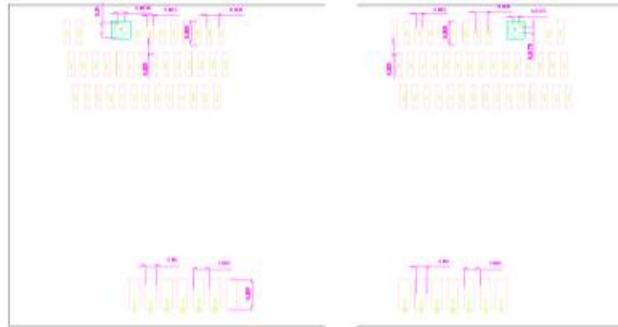
Parameter	Specification	Unit	Remark
Panel size	84.6(H) × 135.85(V)	mm	
CF size	84.6(H) × 132.8(V)	mm	
Active area	81.0(H) × 128.0(V)	mm	
Number of pixels	1620(H) × 2560(V)	pixels	
Pixel pitch	50(H) × 50(V)	um	
Pixel arrangement	WB Vertical stripe		
COG pad area	3.85	mm	
D-IC to FPC distance	0.725	mm	Note
D-IC width	0.895	mm	
D-IC to CF edge	0.63	mm	
FPC width	0.65	mm	
FPC to Glass edge	0.15	mm	
Seal Area(L/R/U/D)	1.8/1.8/1.8/3.0	mm	
Dimensional outline	84.6(H) × 135.85(V) × 1.08(D)	mm	FOG
Display mode	Normally Black		

Note:

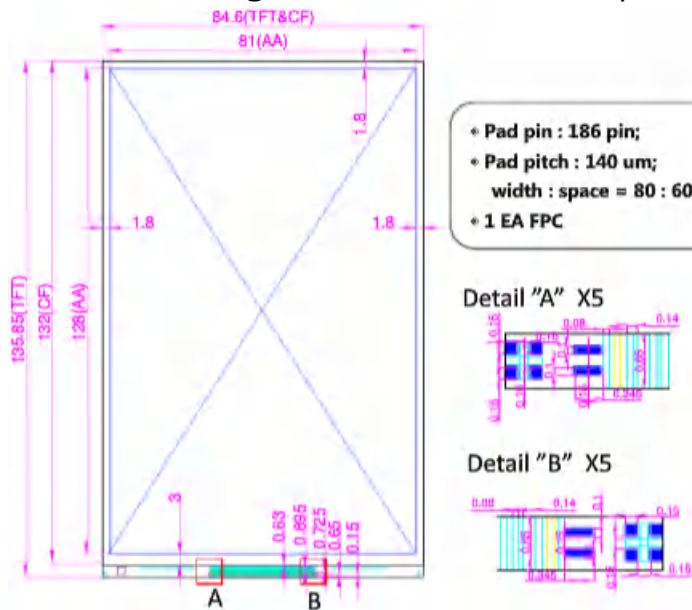
The size specified is calculated by IC-driver HX8252A

5.0 Data IC PAD & FPC Pin Assignment

5.1 Data IC One D-IC (unit: mm if unspecified)



5.2 FPC Pin Assignment (unit: mm if unspecified)



1	RAWBY	26	VC	85	6P02	143	VS04V
3	NE1	26	VC	85	6P02	143	VS04V
3	NE1	26	VSD	87	LANE1	144	VS04V
4	NE2	31	VSD	88	LANE1	145	VS04V
5	SD0	33	VSD	89	IE_0A	146	DIP
6	SD0	33	VSD	90	PH07	147	DIP
7	VSD4	34	VSD	91	LANE1	148	DIP
8	VSD4	35	VSD	92	LANE1	149	DIP
9	VSD4	36	VSD	93	PARA0	150	VS04V
10	VSD4	37	VSD	94	PARA0	151	DIP
11	VSD4	38	VSD	95	LANE1	152	DIP
12	VSD	39	VSD	96	LANE1	153	DIP
13	VSD	40	VSD	97	SD0	154	DIP
14	C_VSD_01	41	VSD	98	VC	155	VS04V
15	C_VSD_02	42	VSD	99	SD0	156	DIP
16	C_VSD_03	43	VSD	100	VSD	157	DIP
17	C_VSD_04	44	VSD	101	VSD	158	DIP
18	VSD	45	VSD	102	PARA0	159	VS04V
19	VSD	46	VSD	103	VC	160	VS04V
20	C_VSD_05	47	VSD	104	VSD	161	DIP
21	C_VSD_06	48	VSD	105	VSD	162	DIP
22	C_VSD_07	49	VSD	106	VSD	163	DIP
23	C_VSD_08	50	VSD	107	VSD	164	DIP
24	C_VSD_09	51	VSD	108	VSD	165	VS04V
25	C_VSD_10	52	VSD	109	VSD	166	DIP
26	C_VSD_11	53	VSD	110	VSD	167	DIP
27	C_VSD_12	54	VSD	111	VSD	168	DIP
28	VSD	55	VSD	112	VSD	169	VS04V
29	VSD	56	VSD	113	VSD	170	VS04V
30	VSD	57	VSD	114	VSD	171	VS04V
31	VSD	58	VSD	115	VSD	172	VS04V
32	VSD	59	VSD	116	VSD	173	VS04V
33	VSD	60	VSD	117	VSD	174	VS04V
34	VSD	61	VSD	118	VSD	175	VS04V
35	VSD	62	VSD	119	VSD	176	VS04V
36	VSD	63	VSD	120	VSD	177	VS04V
37	VSD	64	VSD	121	VSD	178	VS04V
38	VSD	65	VSD	122	VSD	179	VS04V
39	VSD	66	VSD	123	VSD	180	VS04V
40	VSD	67	VSD	124	VSD	181	DIP
41	VSD	68	VSD	125	VSD	182	DIP
42	VSD	69	VSD	126	VSD	183	DIP
43	VSD	70	VSD	127	VSD	184	VS04V
44	VSD	71	VSD	128	VSD	185	VS04V
45	C_VSD_13	60	VSD	129	VSD	186	DIP
46	C_VSD_14	61	VSD	130	VSD	187	DIP
47	C_VSD_15	62	VSD	131	VSD	188	DIP
48	VSD	63	VSD	132	VSD	189	VS04V

Notes:

*1) SW must be connected to VGL

6.0 RELIABILITY TEST

NO	Test Item	Test Condition	Duration
1	High temperature, high humidity operation test(THO)	60℃, 90%	240hr
2	Low temperature operation test(LTO)	0 ℃	240hr
3	High temperature operation test(HTO)	70 ℃	240hr
4	High temperature storage test(HTS)	80℃	240hr
5	Low temperature storage test(LTS)	-10℃	240hr
6	Thermal shock test	-30 ℃ →80 ℃	100hr
	(TST)	(Per 30min)	
7	Vibration	5-200Hz,0.015 psd 200-500,-6db/octave, X/Y/Z each axis 2hrs, total 6hrs	-

7.0 APPENDIX

Figure 4. FOG Outline Dimension (unit: mm)

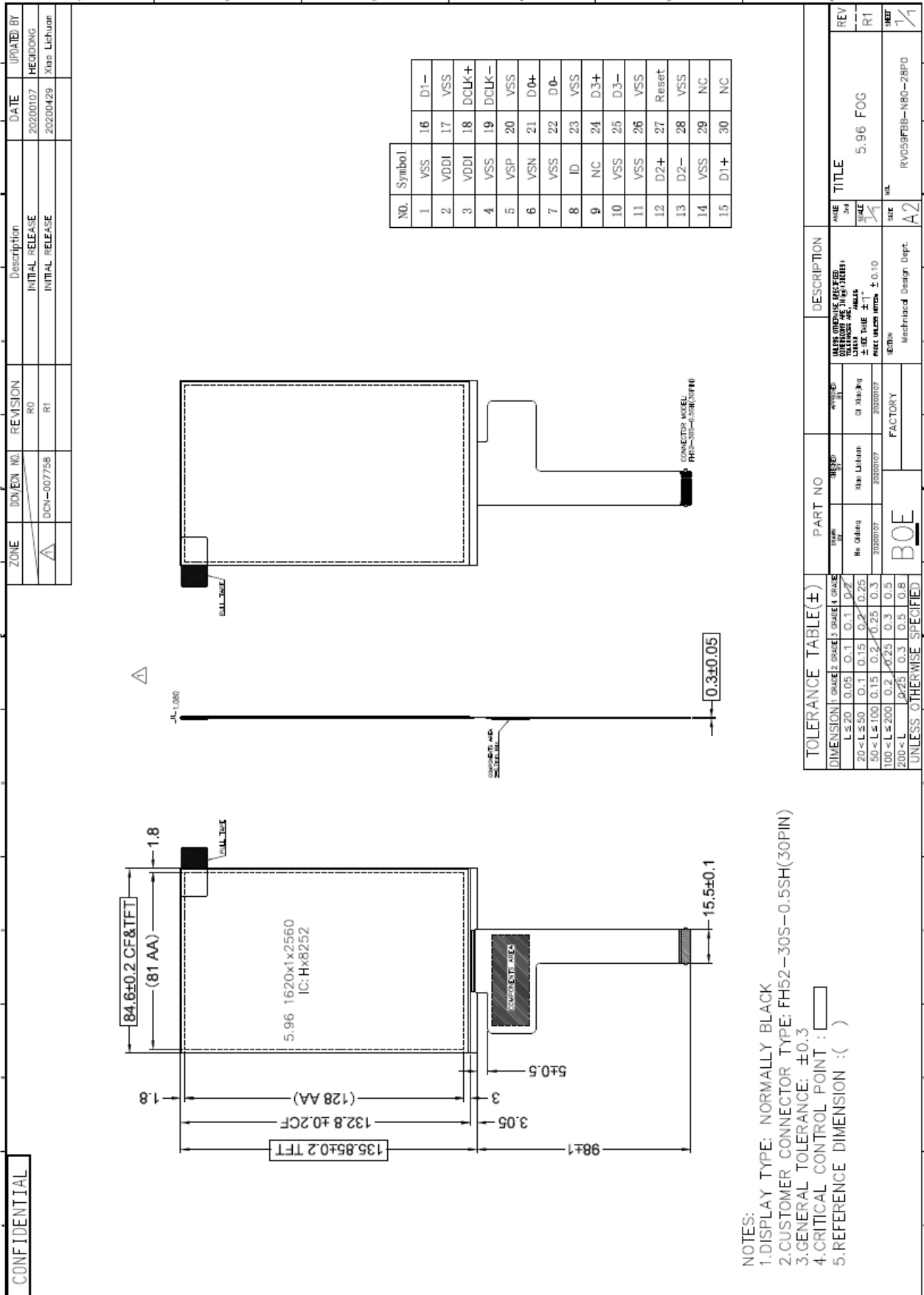
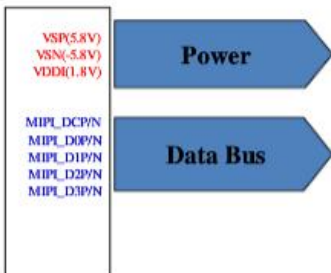
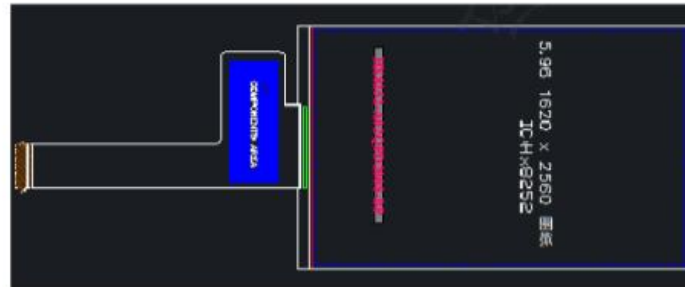


Figure 5. FOG Block Diagram

User Connection
(30 Pin ZIF Connector)



Cell



Input Signal: MIPI DSI Four-lane interface

Connector : 无 Customer connector(FH52-30S-0.5SH, ZIF)

测试 BLU : V_mA (TBD)

Figure 6. Timing and Voltage

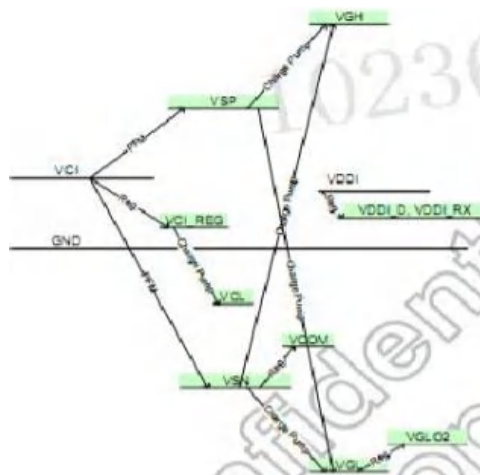


Figure 7. Power ON Sequence

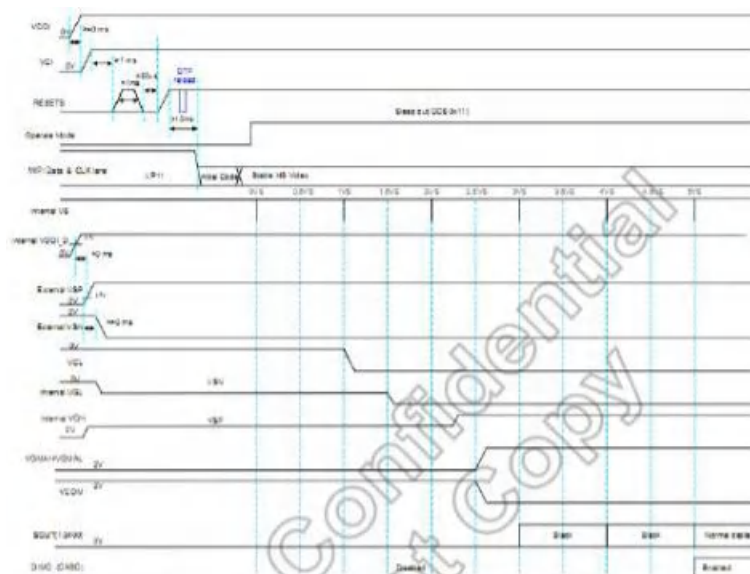
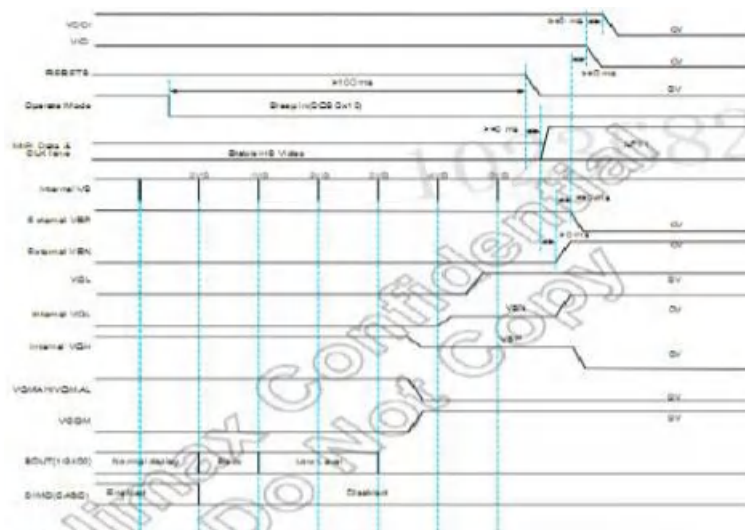
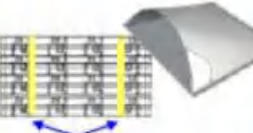
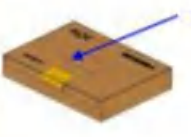


Figure 8. Power OFF Sequence



8.0 PACKING

8.1 Packing Process

将FOG放入到Tray中,产品上面贴EPE PAD. 2 ea FOG/2 ea PAD/Tray	将Tray叠码8层, 然后加放1个空Tray作衬(临时堆叠), 用橡皮筋平行于Tray的宽边方向捆紧牢固。 16ea FOG/16ea PAD/9Tray	将9层 Tray放入一个Shielding Bag中, 并抽真空。 16 FOG/1 Inner Box	将抽真空后的Tray然后放入Box中。 16 FOG/1 Inner Box
 Step 1	 Step 2	 Step 3	 Step 4
用耐撕胶布为Inner Box进行封箱, 并在Box的Mark处粘贴面向示标。 16 FOG/1 Inner Box	将封好的Inner Box装入Outer Box. 6 Inner Box/1 Outer Box	采用“H”形封箱方式, 对Box进行封箱, 并在Box的Mark处粘贴面向示标。 96 FOG/1 Outer Box	将1. Dual Cover放置于Pallet上, Outer Box按“田”字型, 放置于Dual Cover上。 16 Paper Box/1 Pallet
 Step 5	 Step 6	 Step 7	 Step 8

9.0 Product ID Rule

RV059FBB – N80

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① <Application area> ② <Mode> ③ <Size> ④ <Resolution>

Code	Description	Code	Description	Code	Description	Code	Description
R	3D Printer	V	ADS-a Si	059	5.96"	FB	无具体分辨率
H	TV	S	ADS-LTPS	050	5.0"	WQ	WQVGA
A	Automotive	T	TN-a Si	060	6.0"	LC	LQCIF

⑤ <Production type> ⑥ <Product state> ⑦ <Product THK> ⑧ <Product Rev>

Code	Description	Code	Description	Code	Description	Code	Description
B	FOGA	N	Normal	8	0.8mm	0	First Mode
A	Array	E	In cell touch	5	0.5mm	1	Second Mode
E	Cell	A	Add on touch	6	0.6mm	2	Third Mode

10.0 Handling & Cautions

10.1 Mounting Method

- The panel of the LCD consists of two thin glasses with polarizer which easily get damaged. So extreme care should be taken when handling the LCD.
- Excessive stress or pressure on the glass of the LCD should be avoided. Care must be taken to insure that no torsional or compressive forces are applied to the LCD unit when it is mounted.
- If the customer's set presses the main parts of the LCD, the LCD may show the abnormal display. But this phenomenon does not mean the malfunction of the LCD 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 LCD module with the specified mounting parts.

10.2 Caution of LCD Handling and Cleaning

- Since the LCD 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 LCD's surface with wipe lightly.
-IPA (Isopropyl Alcohol), Ethyl Alcohol, Tri-chloro, tri-florothane.
- Do not wipe the LCD'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 LCD be handled with soft gloves during assembly, etc.
The polarizer on the LCD's surface are vulnerable to scratch and thus to be damaged by shape particles.
- Do not drop water or any chemicals onto the LCD's surface.
- A protective film is supplied on the LCD and should be left in place until the LCD 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.
- Handle FPC with care.

10.3 Caution Against Static Charge

- The LCD modules 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 LCD, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

10.4 Caution For Operation

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

10.5 Packaging

- Modules use LCD 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.

10.6 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 LCD'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 LCD near organic solvents or corrosive gasses.
- Keep the LCD safe from vibration, shock and pressure.
- Black or white air-bubbles may be produced if the LCD is stored for long time in the lower temperature or mechanical shocks are applied onto the LCD.
- 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 LCD in the packaging situation when it was delivered.

10.7 Safety

- For the crash damaged or unnecessary LCD, 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 LCD 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.

11.0 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.