Production Specification
Model: FB070EFP401-A

Customer:_____

Approved by:_____

Approved By	ASSEMBLY LCD TV Division	
Checked by	R&D DEPT.	QA Dept
Reviewed		

REVISION STATUS

Revision	Description	Page	Revision Date
1.0	First Revision	---	2015-08-03

Contents	Page

| | |

1.0 GENERAL DESCRIPTION

1.1 Introduction

The model FB070EFP401-A is 7” color TFT-LCD (Thin Film Transistor Liquid Crystal Display) full cell product (after LC injected).The 7" screen produces 1024(×RGB) ×600 resolution image. By applying R.G.B. input signal, full color images are displayed.

1.2 Features

- 7.0 inch(16:9 diagonal) configuration.
- Compatible with NTSC & PAL system
- RoHS design

1.3 Applications

- Mobile NB
- MID
- Display terminal for AV application

1.4 General information

Item	Specification	Unit
Screen Size	7.0 inches	Diagonal
Number of Pixel	1024(H) x 3(RGB) x 600(V)	Pixels
Display area	154.2144(H) x 85.92(V)	mm
Outline Dimension	164.80 x 100.0 x 3.50(Typ)	mm
Display mode	Normally Black	--
Pixel arrangement	RGB Vertical stripe	--
Pixel pitch	0.15(H) ×0.15(V)	mm
Back-light	LED Side-light type	--
Surface treatment	Antiglare, Hard-Coating (3H)	--

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	164.60	164.80	165.00	mm
	Vertical (V)	99.80	100.0	100.20	mm
	Depth (D)	3.40	3.50	3.70	mm
Weight		--	120	150	g

1.6 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Power Supply Voltage For LCD	DVDD	1.71	1.8	1.89	V	
Analog Power Supply Voltage	AVDD	8.0	--	13.5	V	调整对比度， 调大颜色变深，调小颜色变浅
Gate On Power Supply Voltage	VGH	7	--	35	V	
Gate Off Power Supply Voltage	VGL	-10	--	-3	V	
Power supply voltage	VCC	2.3	3.3	3.6	V	
Common Power Supply Voltage	VCOM	3.0	3.5	4.2	V	Note 1
Operation frequency	FCLK	--	--	200	KHZ	
Digital supply voltage	VDD	1.71	1.8	1.89	V	
MIPI supply voltage	VDD_IF	1.71	1.8	1.89	V	

Note 1: Please adjust VCOM to make the flicker level be minimum. Typ VCOM 电压值只做参考,具体以实际效果为准（根据FLICKER 状态可调整）

2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T_{STG}	-20	70	°C	
Operating temperature	T_{OPR}	-10	60	°C	

Note: If users use the product out off the environmental operation range(temperature and humidity), it will have visual quality concerns.

3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min	Type	Max	Unit	Note
White luminance (Center)		YL	Θ=0 Normal Viewing Angle	300	350	400	nits	(1)(4)(6)
Response time		$T_{r+}T_f$		--	25	40	msec	(1)(3)
NTSC				45	50	--	%	
Contrast ratio		CR		600	800	--	--	(1)(2)
Color Chromaticity (CIE 1931)	white	Wx		0.260	0.310	0.360		(1)(4)
		Wy		0.280	0.330	0.380		
Viewing Angle	Hor.	ΘL	CR≥10	80	85	--		(1)(4)
		ΘR		80	85	--		
	Ver.	ΘU		80	85	--		
		ΘD		80	85	--		
Brightness uniformity		B_{UNI}	Θ=0	70	80	--	%	(5)
Optima View Direction		ALL VIEW						

1)，客户签样亮度±10% = 大货亮度,小于10%视为不良。

2)，大货同一批次色调一致的情况下（目视同为冷色或暖色）与客户签样相比，X色坐标相差±0.015,Y色坐标相差±0.02以内视为正常OK品。

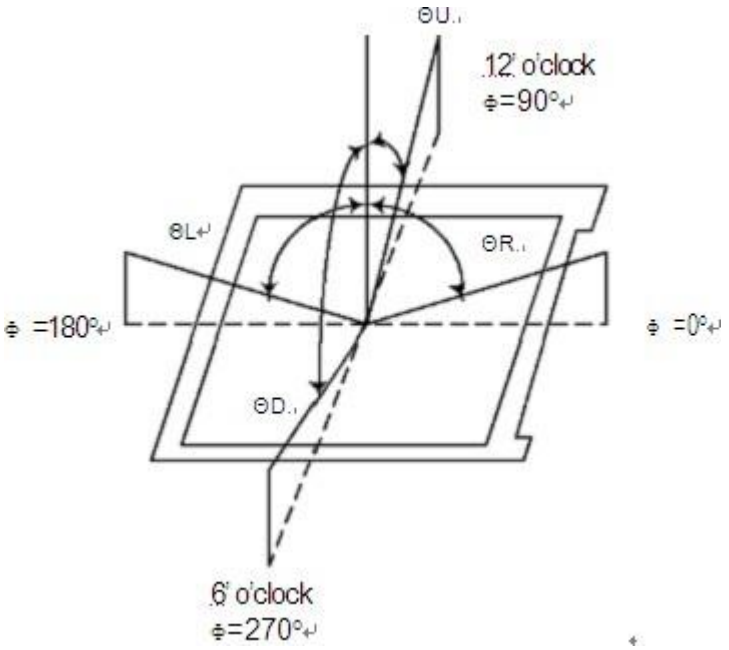
3.2 Measuring Condition

- Measuring surrounding: dark room
- LED current IL: 180mA
- Ambient temperature: 25±2°C
- 30min. warm-up time

3.3 Measuring Equipment

- BM-7 optical characteristics.
- Measuring spot size: 20 ~ 21mm

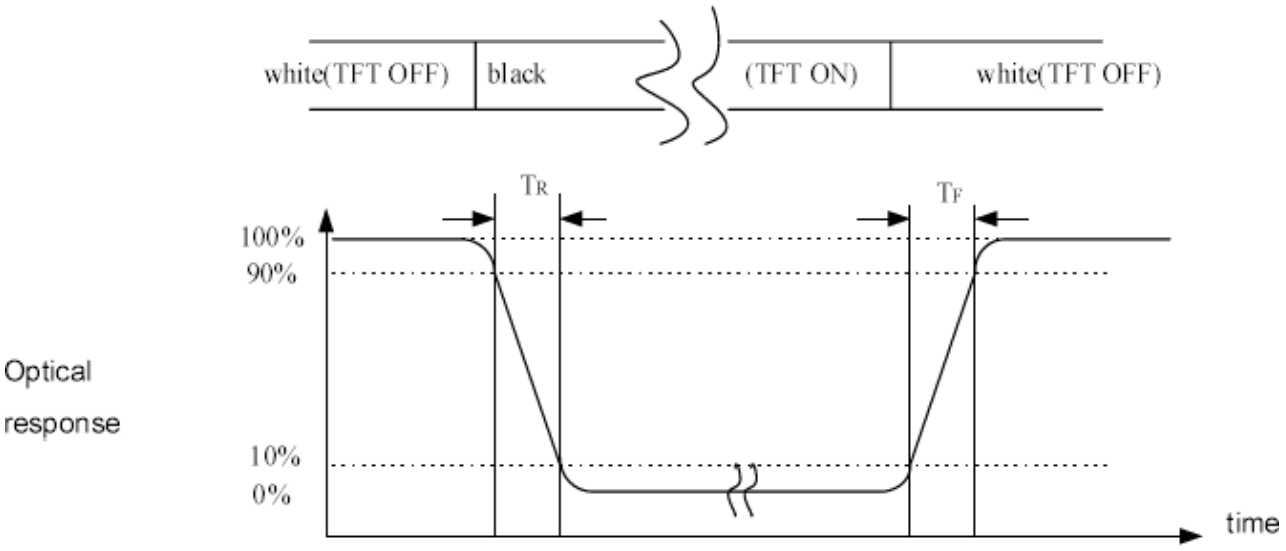
Note (1) Definition of Viewing Angle



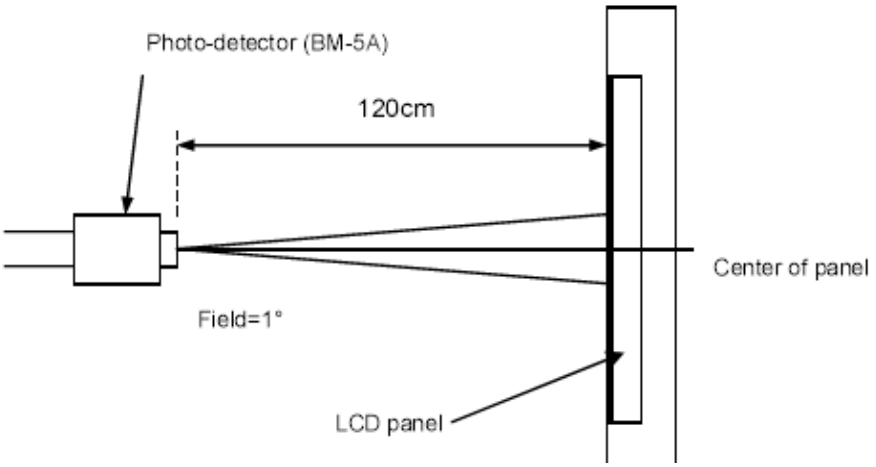
Note (2) Definition of Contrast Ratio(CR):
Measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

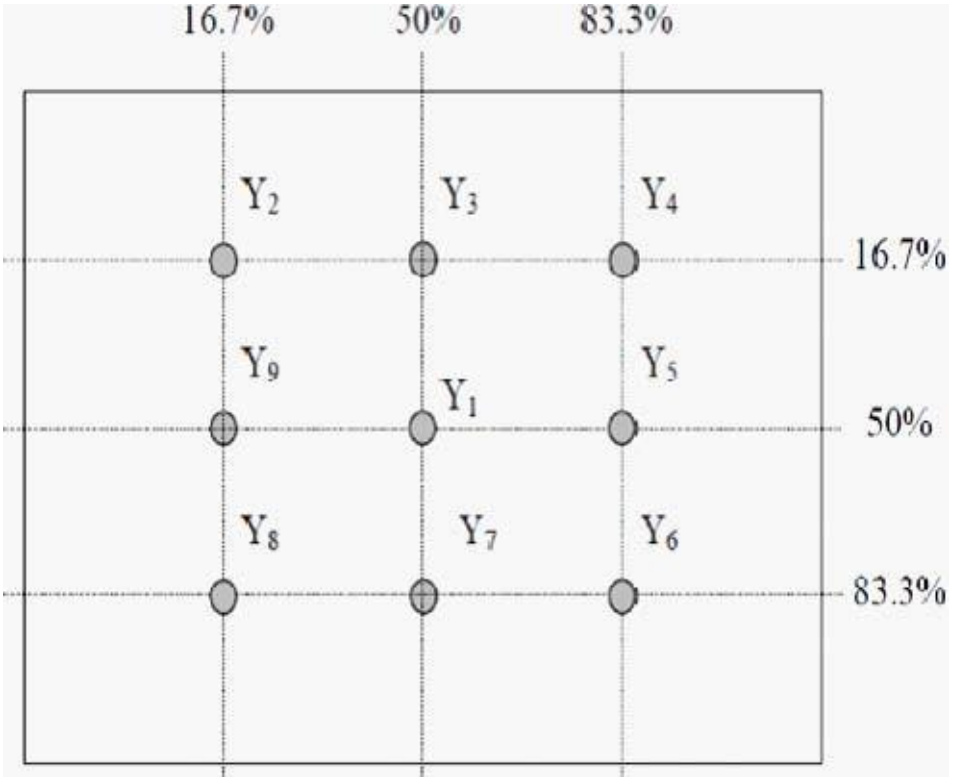
Note (3) Definition of Response Time: Sum of TR and TF



Note (4) Definition of optical measurement setup



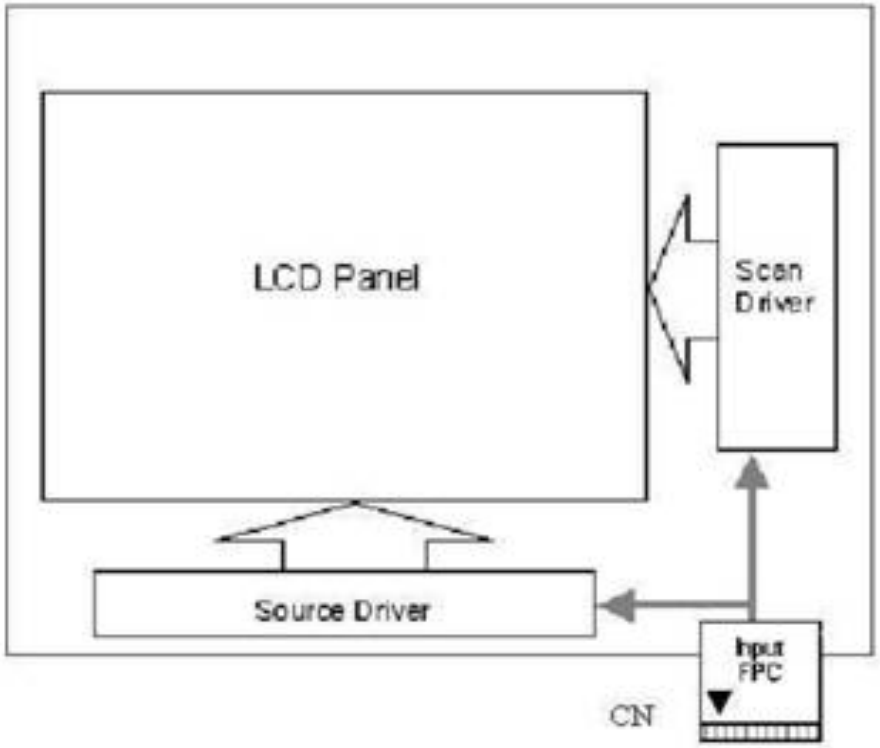
Note (5) Definition of brightness uniformity



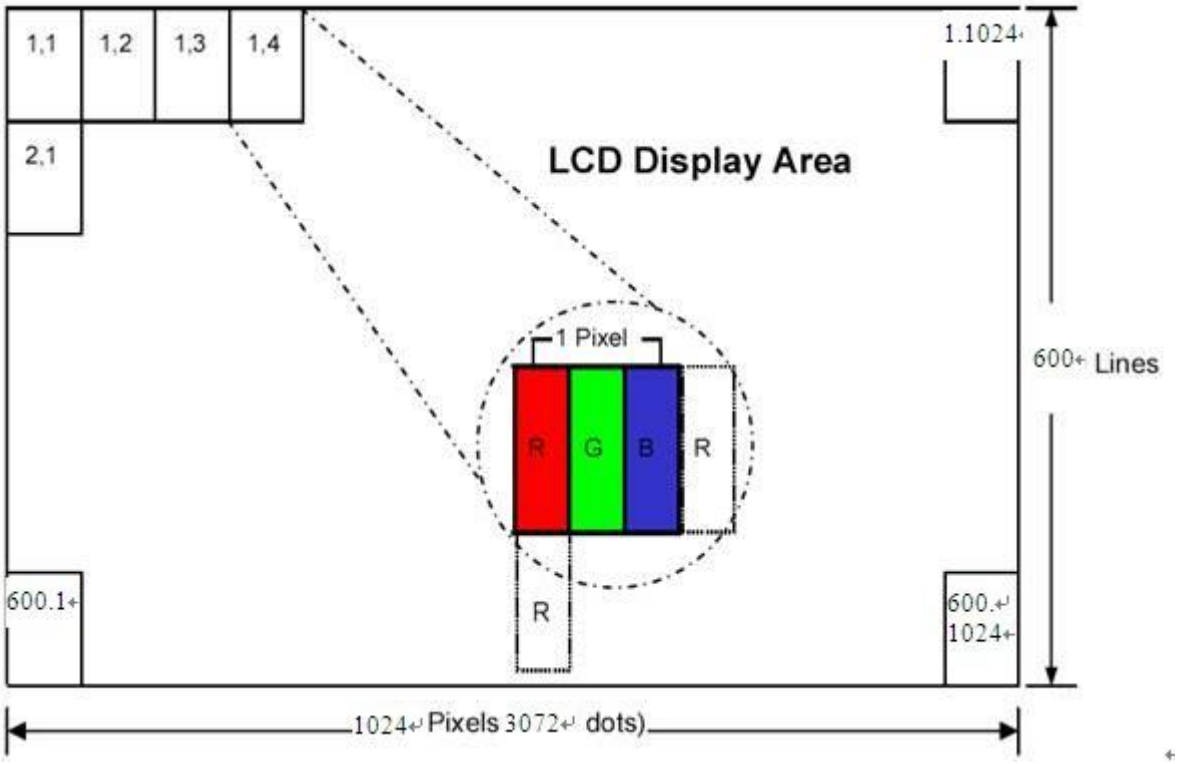
$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\ \%$$

4.0 BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 Pixel Format



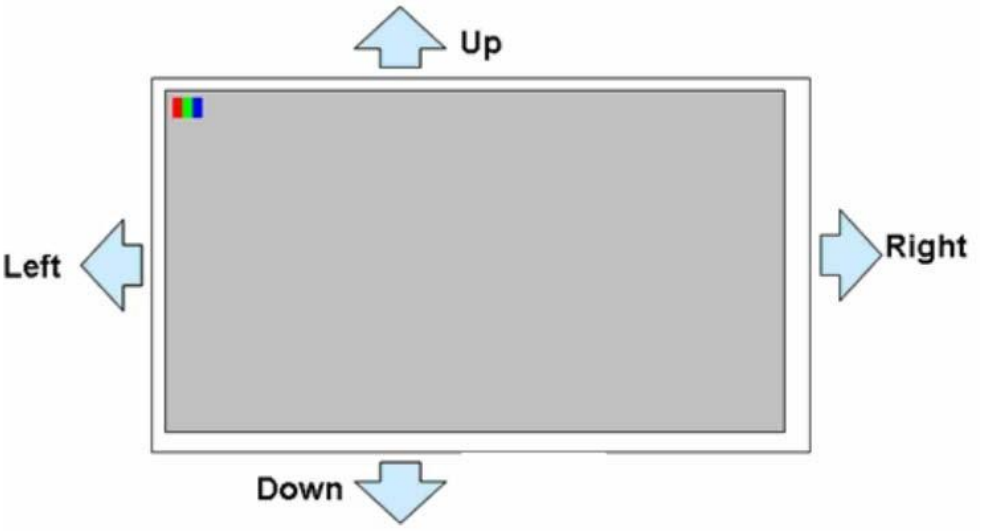
5.0 INTERFACE PIN CONNECTION

5.1 TFT LCD Module(FB070EFP401-A)

Pin No.	Symbol	Functional	Notes
1	LED+	Back light LED+	
2	LED+	Back light LED+	
3	LCD_VGH	Gate ON Voltage	
4	LCD_VGL	Gate OFF Voltage	
5	UPDN	Gate up or down scan control	
6	SHLR	Source right or left sequence control	
7	LED-	Back light LED-	
8	LED-	Back light LED-	
9	AVDD	Power for Analog Circuit	
10	GND	Ground	
11	MIPI_TDP3	MIPI data input	
12	MIPI_TDN3	MIPI data input	
13	GND	Ground	
14	MIPI_TDP2	MIPI data input	
15	MIPI_TDN2	MIPI data input	
16	GND	Ground	
17	MIPI_TDP	MIPI clock input	
18	MIPI_TDN	MIPI clock input	
19	GND	Ground	
20	MIPI_TDP1	MIPI data input	
21	MIPI_TDN1	MIPI data input	
22	GND	Ground	
23	MIPI_TDP0	MIPI data input	
24	MIPI_TDN0	MIPI data input	
25	GND	Ground	
26	STBYB	Standby mode, Normally pulled high	
27	RESET	Global reset pin	
28	VDD	Power supply for digital circuits	
29	VDD	Power supply for digital circuits	
30	VCOM	Common voltage	

Note 1: SHLR: left or right setting
UPDN: up or down setting

UPDN	SHLR	FUNCTION
DVDD	GND	Left→Right，Up→Down(default)
GND	GND	Right→Left，Up→Down
DVDD	DVDD	Left→Right，Down→Up
GND	DVDD	Right→Left，Down→Up



5.2 Back-Light Unit

The backlight system is an edge-lighting type with 27 LED 3*9.（

The characteristics of the LED are shown in the following tables.

Item	Symbol	Min	Typ	Max	Unit	Note
LED current	IL	170	180	-	mA	
LED voltage	VL	9.0	9.6	10.5	V	
Operating LED life time	Hr	15000	-	-	Hour	(1)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 ℃，typical IL value indicated in the above table and the fL=50k Hz until the brightness becomes less than 50%.

6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Power Supply Voltage For LCD	DVDD	1.71	1.8	1.89	V	
Analog Power Supply Voltage	AVDD	8.0	9.6	13.5	V	调整对比度， 调大颜色变深，调小颜色变浅
Gate On Power Supply Voltage	VGH	7	18	35	V	
Gate Off Power Supply Voltage	VGL	-10	-6	-3	V	
Power supply voltage	VCC	2.3	3.2	3.6	V	
Common Power Supply Voltage	VCOM	3.0	3.5	4.2	V	Note 1
Operation frequency	FCLK	--	--	200	KHZ	
Digital supply voltage	VDD	1.71	1.8	1.89	V	
MIPI supply voltage	VDD_IF	1.71	1.8	1.89	V	

Note 1: **Please adjust VCOM to make the flicker level be minimum. Typ VCOM 电压值只做参考, 具体以实际效果为准（根据FLICKER 状态可调整）**

6.2 Input Timing Table(For 1024RGB x 600 panel)

DE mode

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	40.8	51.2	67.2	Mhz
Horizontal display area	thd		1024		DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	Tvd		600		H
VSYNC period time	Tv	610	635	800	H
VSYNC blanking	Tvb+Tvfp	10	35	200	H

HV mode
Horizontal input timing

Parameter		Symbol	Value			Unit
Horizontal display area		thd		1024		DCLK
DCLK frequency@ Frame rate=60hz		fclk	Min.	Typ.	Max.	
			44.9	51.2	63	Mhz
1 Horizontal Line		th	1200	1344	1400	DCLK
HSYNC pulse width	Min.	thpw		1		
	Typ.			—		
	Max.			140		
HSYNC blanking		thb	160	160	160	
HSYNC front porch		thfp	16	160	216	

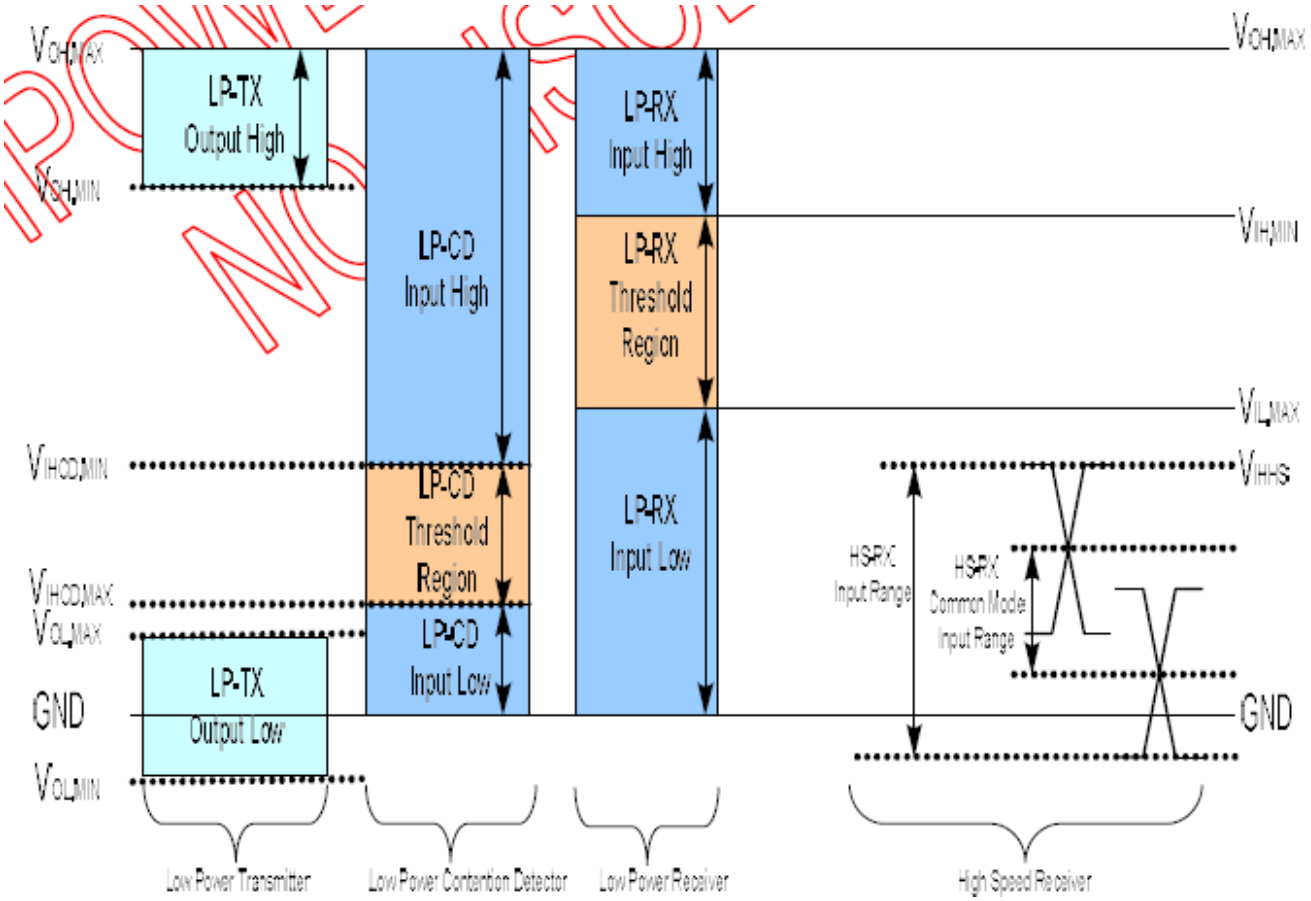
HV mode
Vertical input timing

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd		600		H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tvpw	1	—	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H

6.3 MIPI Interface DC Characteristic

(VDD=VDD_IF=1.8V,AVDD=8 to 13.5V,GND=AGND=GND_IF=0V,TA=-20℃ to 85℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit
MIPI Characteristics for High Speed Receiver					
Single-ended input low voltage	V_{ILHS}	-40	-	-	mV
Single-ended input high voltage	V_{IHHS}	-	-	460	mV
Common-mode voltage	V_{CDRXDC}	70	-	330	mV
Differential input impedance	Z_{ID}		100		ohm
HS transmit differential voltage(VOD=VDP-VDN)	$\|V_{OD}\|$	140	200	250	mV
MIPI Characteristics for Low Power Mode					
Pad signal voltage range	V_I	-50		1350	mV
Ground shift	V_{GNDSH}	-50	-	50	mV
Logic 0 input threshold	V_{IL}	0	-	550	mV
Logic 1 input threshold	V_{IH}	880	-	1350	mV
Input hysteresis	V_{HYST}	25	-	-	mV
Output low level	V_{OL}	-50	-	50	mV
Output high level	V_{OH}	1.1	1.2	1.3	V
Output impedance of Low Power Transmitter	Z_{OLP}	80	100	125	ohm
Logic 0 contention threshold	$V_{ILCD,MAX}$	-	-	200	mV
Logic 0 contention threshold	$V_{IHCD,MIN}$	450	-	-	mV



6.4 Power Block DC Characteristic

(VDD=VDD_IF=1.8V, AVDD=8 to 13.5V, GND=AGND=GND_IF=0V,TA=-20 to +85℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Base drive current for PWM	IDRV	-	-	60	mA	DRVA =0.7V
DRV output voltage for PWM	VDRV	0	-	VDD	V	
Feedback voltage for PWM	VFB	1.1	1.2	1.3	V	
Duty cycle maximum	Dmax	-	-	85	%	
VCOM buffer input voltage	VCOMI	1	-	AVDD	V	
VCOM buffer output voltage	VCOMO	VCOMI-0.2	VCOMI	VCOMI+0.2	V	
VCOM buffer output current	IVCOM	-	-	10	mA	VCOMO=5V vs 4.9V

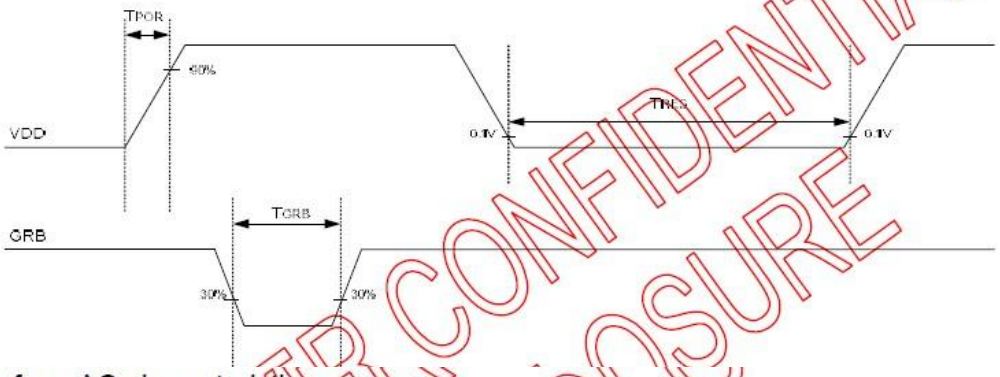
6.5 AC ELECTRICAL CHARACTERISTIC

6.5.1. Basic AC Characteristic

(VDD=VDD_IF=1.8V, AVDD=8 to 13.5V, GND=AGND=GND_IF=0V,TA=-20 to +85℃)

VDD/GRB AC characteristic

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
VDD power slew rate	T_{POR}	-	-	20	ms	From 0 to 90% VDD
GRB active pulse width	T_{GRB}	1	-	-	ms	VDD=VDD_IF= 1.8V
VDD resettle time	T_{RES}	1	-	-	s	



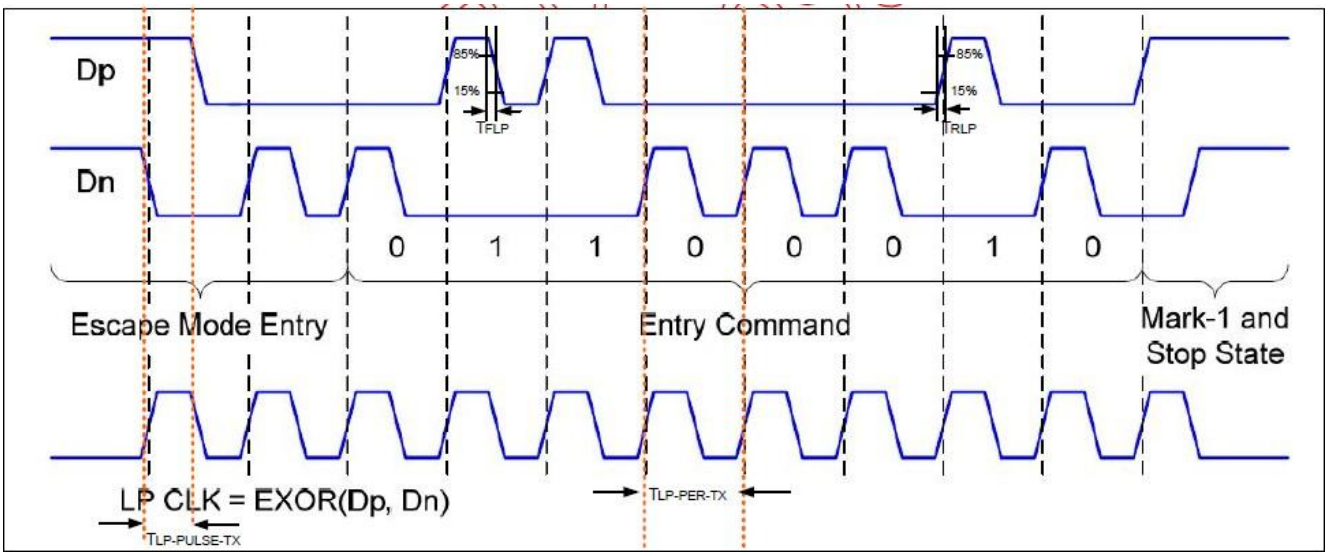
3-wire interface AC characteristic:

Parameter	Symbol	Min.	Typ.	Max.	Unit
CSB falling to SCL rising time	T_{SCL}	200	-	-	ns
SCL pulse high period	T_{ICWH}	100	-	-	ns
SCL pulse low period	T_{ICWL}	100	-	-	ns
SCL pulse width	T_{ICWP}	250	-	-	ns
SDA data input setup time	T_{ISU}	100	-	-	ns
SDA data input hold time	T_{IHD}	100	-	-	ns
SCL to CSB rising time	T_{ISC}	250	-	-	ns
CSB rising to failing time	T_{ICD}	1	-	-	us

6.5.2 MIPI AC Characteristic

LP Transmitter AC Specification

Parameter		Symbol	Min	Typ	Max	Units	Notes
15%~85% rising time and falling time		T_{RLP} /T_{FLP}	-	-	25	ns	-
30%~85% rising time and falling time		T_{REOT}	-	-	35	ns	-
Pulse width of LP exclusive-OR clock	First LP EXOR clock pulse after STOP state or Last pulse before stop state	$T_{LP-PULSE-TX}$	40	-	-	ns	-
	All other pulses		20	-	-	ns	-
Period of the LP EXOR clock		$T_{LP-PER-TX}$	90	-	-	mV/ns	-
Slew Rate @C_{LOAD} =0pF		$\delta V/\delta t_{SR}$	30	-	500	mV/ns	-
Slew Rate @C_{LOAD} =5pF			30	-	200	mV/ns	-
Slew Rate @C_{LOAD} =20pF			30	-	150	mV/ns	-
Slew Rate @C_{LOAD} =70pF			30	-	100	mV/ns	-
Load Capacitance		T_{RLP}	-	-	70	pF	-


Dp
Dn
85%
15%
TFLP
85%
15%
TRLP
0 1 1 0 0 0 1 0
Escape Mode Entry
Entry Command
Mark-1 and
Stop State
LP CLK = EXOR(Dp, Dn)
TLP-PULSE-TX
TLP-PER-TX

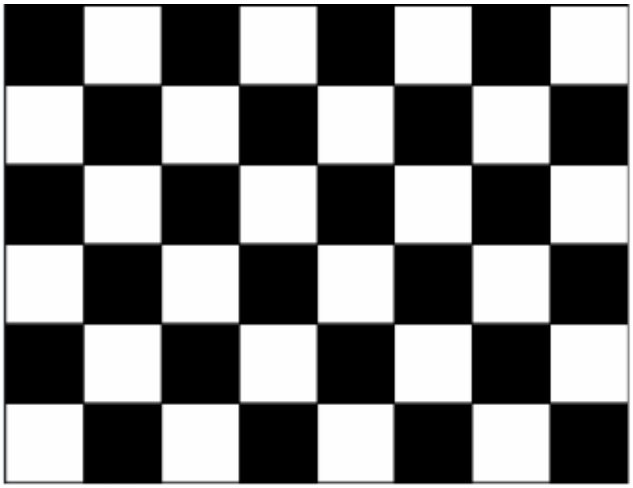
7.0 RELIABILITY TEST ITEMS

No.	Item	Conditions	Notes
1	High Temperature Storage	Ta=+70℃, 240hrs	
2	Low Temperature Storage	Ta=-20℃, 240hrs	
3	High Temperature Operation	Ta=+60℃, 240hrs	
4	Low Temperature Operation	Ta=-10℃, 240hrs	
5	High Temperature and High Humidity(operation)	Ta=+60℃, 90%RH 240hrs	

Note 1: LCD glass and metal bezel

Note 2: IF connector pins

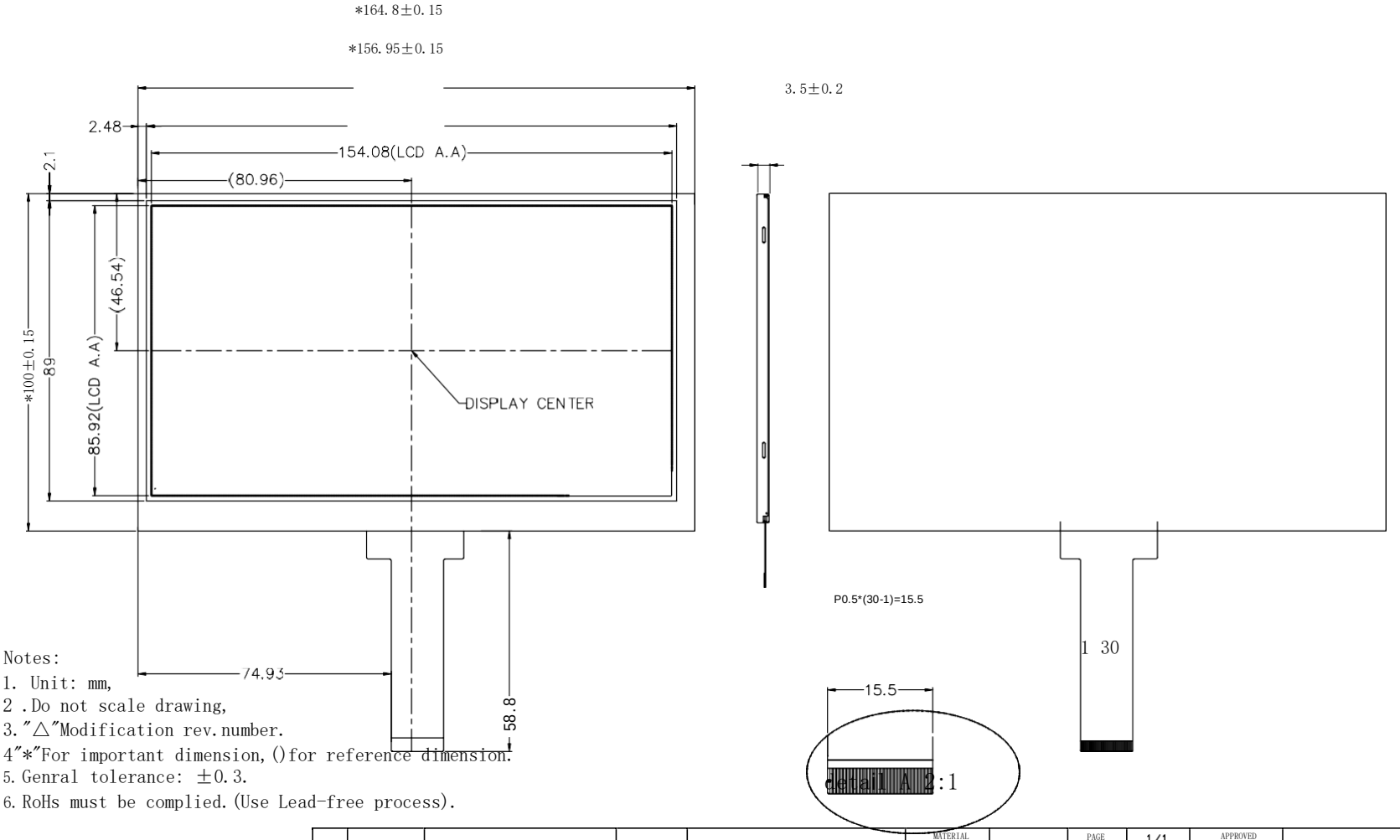
Note 3: Operation with test pattern sustained for 4hrs, then change to gray pattern immediately.



(a) Test Pattern (chess board Pattern)

(b) Gray Pattern

8.0 OUTLINE DIMENSION



Notes:
1. Unit: mm,
2 .Do not scale drawing,
3."△"Modification rev.number.
4"*"For important dimension,()for reference dimension.
5.Genral tolerance: ±0.3.
6.RoHs must be complied.(Use Lead-free process).

REV 修改	DATE 日期	DESCRIPTION 修改内容	REVISER 修改者	MODEL NO. 模组号	FB070EFP401-A	MATERIAL 材料		PAGE 页次	1/1	APPROVED 承认	
						EDITION 版本号		第三视角		CHECK 核对	
				PART NO. 料号		DATE 日期	20190505			DESIGNED 设计者	DSR

9.0 BOM LIST

NO	名称	规格(mm)	供应商	备注
1	FOG	162.50*95.80*1.39	ZX	
2	UP BEZEL	164.00*97.00*2.45	ZY	
3	HOU	163.70*98.80*2.20	HY	
4	LGP	158.28*94.52*0.60	HY	
5	DOWN BEZEL	163.10*96.40*2.20	ZY	
6	REF	163.30*98.40*0.10	JY	
7	DIFF	162.68*88.52*0.10	JY	
8	DOWN BEF	162.68*88.52*0.10	JY	
9	UP BEF	162.68*88.52*0.11	JY	
10	LED	3.8*1.0*0.6	JDY	
11	PCB	156.5*3.65*0.20	SX	
12	FPC	26.45*8.00*0.13	WN	

10.0 LOT MARK

10.1 Location of Lot Mark

(1) Location: The label is attached to the backside of the LCD module.

(2) Detail of the Mark: as attached below.

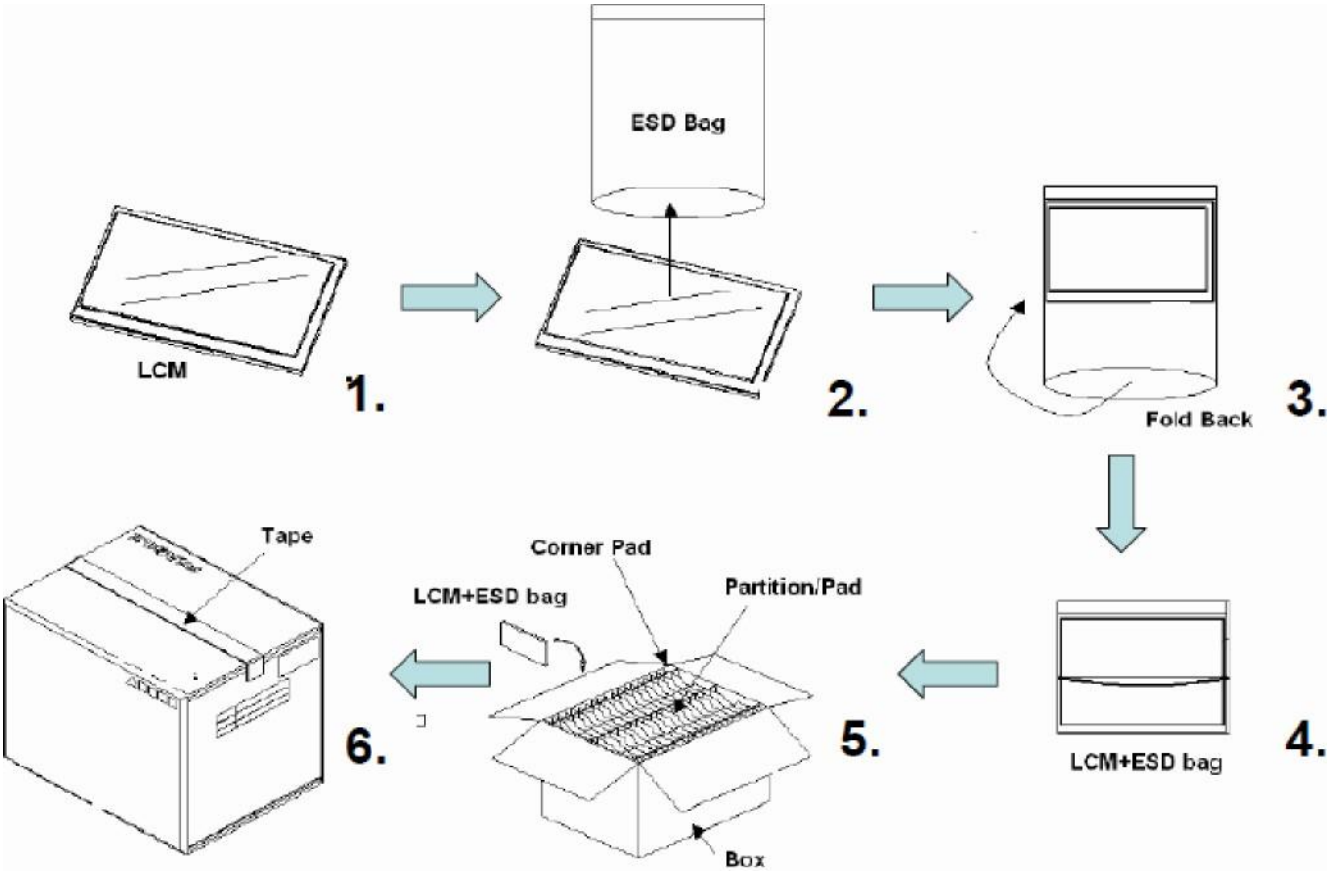
(3) This is subject to change without prior notice.

11.0 PACKAGE SPECIFICATION

11.1 Packing form

LCM Model	LCM Qty. in the box	Inner Box Size (mm)	Note
FB070EFP401-A	80 pcs/box	460±5 x 360±5 x 175±5	

11.2 Packing assembly drawings



Items	Material	Notice
Box	Corrugated Paper Board	AB Flute
Partition/Pad	Corrugated Paper Board	B Flute
Corner Pad	Corrugated Paper Board	AB Flute
ESD bag	PE	

12.0 GENERAL PRECAUTION

12.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

12.2 Assembly Precaution

12.2.1 Please use the mounting hole on the module side in installing and do not bending or wrenching LCD in assembling. And please do not drop, bend or twist LCD module in handling.

12.2.2. Please design display housing in accordance with the following guide lines.

12.2.2.1 Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.

12.2.2.2 Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. The clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.

12.2.3 Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands.(Polarizer film, surface of LCD panel is easy to be flawed.)

12.2.4 Please do not press any parts on the rear side such as source IC, gate IC, and FPC during handling LCD module, If pressing rear part is unavoidable, handle the LCD module with care not to damage them.

12.2.5 Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.

12.2.6 Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change.

12.2.7 Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

12.3 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. Century does not warrant the module, if customers disassemble or modify the module.

12.4 Breakage of LCD Panel

12.4.1. If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

12.4.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.

12.4.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

12.4.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

12.5 Absolute Maximum Ratings and Power Protection Circuit

12.5.1. Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

12.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

12.5.3. It's recommended to employ protection circuit for power supply.

12.6 Operation

12.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

12.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

12.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

12.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

12.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

12.7 Static Electricity

12.7.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

12.7.2. Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge.

12.7.3 Persons who handle the module should be grounded through adequate methods.

12.8 Disposal

When disposing LCD module, obey the local environmental regulations.

12.9 Others

12.9.1 A strong incident light into LCD panel might cause display characteristics' changing inferior because of Polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight Land Strong UV rays.

12.9.2 Please pay attention to a panel side of LCD module not to contact with other materials in pressing it alone.

12.9.3 For the packaging box, please pay attention to the followings:

12.9.3.1 Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.

12.9.3.2 Please do not pile them up more than 6 boxes(They are not designed so) And please do not turn over.

12.9.3.3 Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.

12.9.3.4 Packing box and inner case for LCDs are made of cardboard, So please pay attention not to get them wet(Such like keeping them in high humidity or wet place can occur getting them wet.)