	PROPRIETARY NOTE
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SPEC. NUMBER	PRODUCT GROUP TFT-LCD	Rev.P0	ISSUE DATE	PAGE 1 OF 23

TITLE : BP070WX1-300

Product Specification

Rev. P0

HEFEI BOE OPTOELECTRONICS TECHNOLOGY

REVISION HISTORY

| REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0		Initial Release	2013.03.14	聂竹华

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

BP070WX1-300 is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 7.0inch diagonally measured active area with WXGA resolutions (**800** horizontal by **1280** vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type.
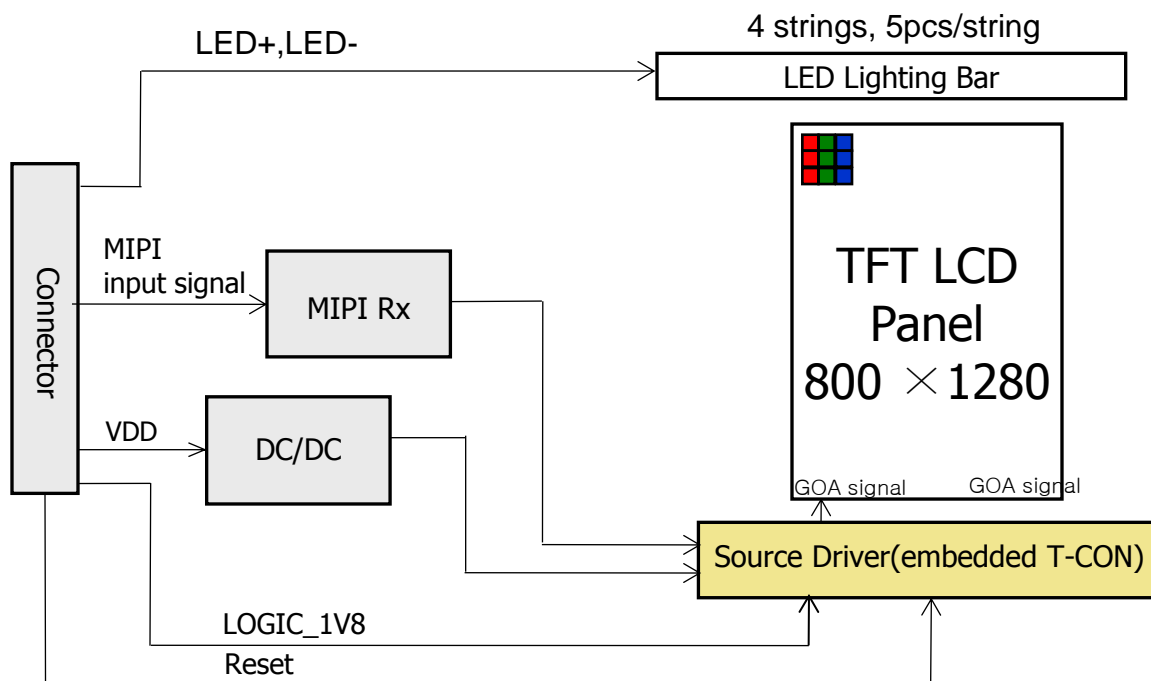
1.2 Features

- **4 lanes MIPI Interface**
- Thin and light weight
- Data enable signal mode
- 8-bit color depth, display 16.7M colors
- Low driving voltage and low power consumption
- RoHS Compliant

1.3General Specification

The followings are general specifications at the model BP070WX1-300. (listed in Table 1.)

< Table 1. General Specifications >

Parameter	Specification	Unit	Remarks
Active area	94.2(W) x 150.72(H)	mm	
Number of pixels	800(H) $\times$ 1280(V)	pixels	
Pixel pitch	39.25(H) $\times$ RGB $\times$ 117.75(V)	μm	
Pixel arrangement	Pixels RGB stripe arrangement		
Display colors	16.7M(8bits)	colors	
Display mode	Normally Black		
Outline Dimension	99.70(H) $\times$ 160.93(V) $\times$ 2.25 (body)	mm	Tolerance: $\pm$ 0.15 mm
Weight	70 g (typ.)	gram	Tolerance: $\pm$ 3.5 g
Power Consumption	P_D : 0.48(max.) P_{BL} : 1.02(max.) P_{total} : 1.5(max.)	Watt	Red Pattern
Surface Treatment	3H HC		

2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Absolute Maximum Ratings>   [VSS=GND=0V]

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-0.3	5.0	V	Note 1
Power Supply For LED	V_{LED}	-	3.0	V	
Operating Temperature	T_{OP}	-20	+60	℃	Note 2
Storage Temperature	T_{ST}	-20	+60	℃	

Notes :
1. Permanent damage to the device may occur if maximum values are exceeded functional operation should be restricted to the condition described under normal operating conditions.
2. Temperature and relative humidity range are shown in the figure below.
   95 % RH Max. (40 OC ≥ Ta)
   Maximum wet - bulb temperature at 39 OC or less. (Ta > 40 OC) No condensation.
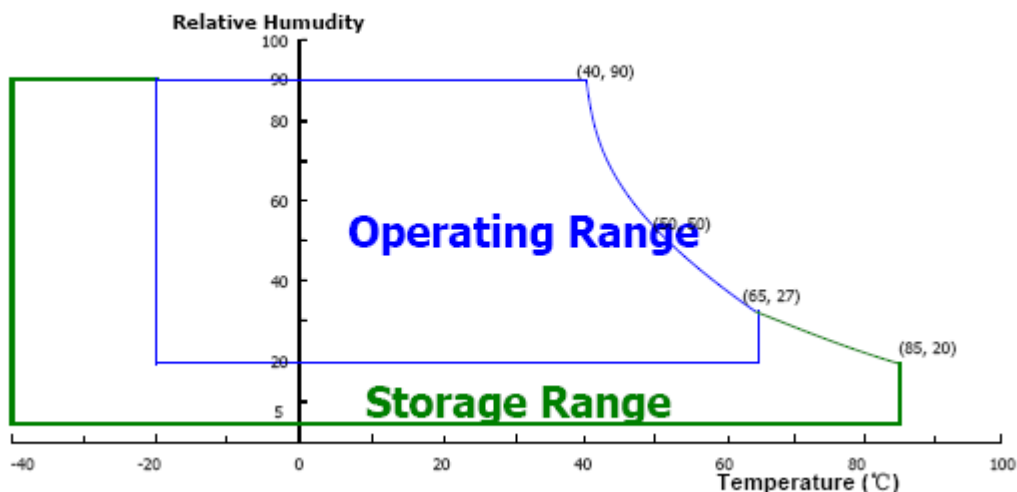
3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 3. Electrical specifications >   [Ta =25±2 ℃]

Parameter		Symbol	Values			Unit	Notes
			Min	Typ	Max		
Power Supply1 Input Voltage		VDD3V3	3	3.3	3.6	Vdc	1
Power Supply1 Ripple Voltage		VRP	0	300	360	mV	
Power Supply1 Current		IVDD3V3	90	125	137	mA	
Power Supply2 Input Voltage		LOGIC1V8	1.7	1.8	1.9	Vdc	
Power Supply2 Current		I_LOGIC1V8	14	15	16	mA	
Power Consumption	@VDD3V3	P_VDD3V3	300.0	415.0	450.0	mWatt	
	@LOGIC1V8	P_LOGIC1V8	25.2	27.0	28.8	mWatt	
	LOGIC TOTAL	P_TOTAL	325.2	442.0	478.8	mWatt	
Rush current		IRUSH	-	0.7	1	A	2

Notes :   1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VDD=3.3V, Frame rate f_V=60Hz and
Clock frequency = 68.4MHz. Test pattern of power supply current is : Typ. and Max. @Red Pattern
2. The duration of rush current is about 2ms and rising time of Power input is 1ms(min)

3.2 Recommended Driving Condition for Backlight

< Table 4. Electrical specifications for Backlight >

Items	Symbol	Min	Typ	Max	Unit	Remark
Forward Current	IF	-	68	-	mA	20LEDs (5LED Serial, 4 LED Parallel)
Forward Voltage	VF	14	14.5	15	V	20LEDs (5LED Serial, 4 LED Parallel)
Backlight Power Consumption	-	952	986	1020	mW	20LEDs (5LED Serial, 4 LED Parallel)
Operating Life Time	-	20000		-	Hrs	IF = 20mA Note 3

Note1: The LED driving condition is defined for each LED module (5 LED Serial, 4 LED Parallel). For
each LED: IF (1/4) =17mA, VF (1/3) =3.0V

Note2: Under LCM operating, the stable forward current should be inputted. And forward voltage is
for reference only.

Note3: IF is defined for one channel LED. Optical performance should be evaluated at Ta=25℃ only
If LED is driven by high current, high ambient temperature & humidity condition. The life
time of LED will be reduced. Operating life means brightness goes down to 50% initial
brightness. Typical operating life time is estimated data.
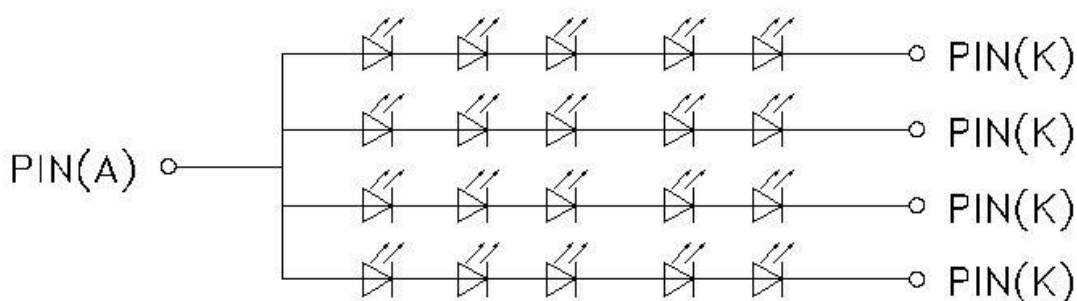
3.3 LED Driver

- With LED Driver on Customer System , We only have one connector on FPC .

# 4.0 INTERFACE CONNECTION

- 4.1   Module Input Signal & Power
- FPC Signal interface : 34 Pin.

< Table 5. LCM Module Input Connector Pin Configuration >

| Pin No	Symbol	I/O	Description	Remark
1	VLED	P	LED Anode	
2	VLED	P	LED Anode	
3	VLED	P	LED Anode	
4	VLED	P	LED Anode	
5	FB1	P	LED Cathode	
6	FB2	P	LED Cathode	
7	FB3	P	LED Cathode	
8	FB4	P	LED Cathode	
9	CABC	O	CABC PWM signal output	
10	RESET	I	Reset signal to LCD	
11	VPP	P	NC	Internal use only
12	GND	P	Ground	
13	MIPI 2P	I	MIPI differential data2 input plus	
14	GND	P	Ground	
15	MIPI 2N	I	MIPI differential data2 input minus	
16	MIPI 1P	I	MIPI differential data1 input plus	
17	GND	P	Ground	
18	MIPI 1N	I	MIPI differential data1 input minus	
19	MIPI CLKP	I	MIPI differential clock input plus	
20	GND	P	Ground	
21	MIPI CLKN	I	MIPI differential clock input minus	
22	MIPI 0P	I	MIPI differential data0 input plus	
23	GND	P	Ground	
24	MIPI 0N	I	MIPI differential data0 input minus	
25	NC	-	NC	
26	GND	P	Ground	
27	LOGIC_1V8	P	1.8V logic signal to LCD	
28	MIPI 3P	I	MIPI differential data3 input plus	
29	VDD3V3	P	3.3V power input to LCD	
30	MIPI 3N	I	MIPI differential data3 input minus	
31	VDD3V3	P	3.3V power input to LCD	
32	GND	P	Ground	
33	VDD3V3	P	3.3V power input to LCD	
34	VGH	O	VGH	Only for detecting the VGH voltage
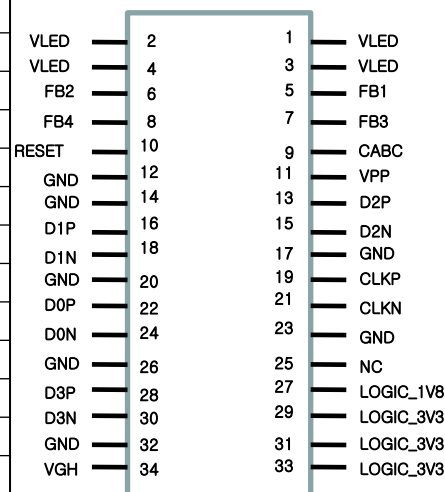
5. Electrical Specification

5.1 Timing Parameters

Parameter	Symbol	Min	Typ	Max	Unit	Condition
MIPI digital operation current	I_{VCCIF}	14	15	16	mA	-
MIPI digital stand-by current	$I_{VCCIFST}$	-	200	-	uA	-
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_{CMRXDC}	155	-	330	mV	
Differential input impedance	Z_{ID}	80	100	125	Ω	
HS transmit differential voltage($V_{OD}=V_{DP}-V_{DN}$)	$|V_{OD}|$	85	200	250	mV	
MIPI Characteristics for Low Power Receiver						
Pad signal voltage range	V_I	-50	-	1350	mV	
Ground shift	V_{GNDSH}	-50	-	50	mV	
Output low level	V_{OL}	-150	-	150	mV	
Output high level	V_{OH}	1.1	1.2	1.3	V	
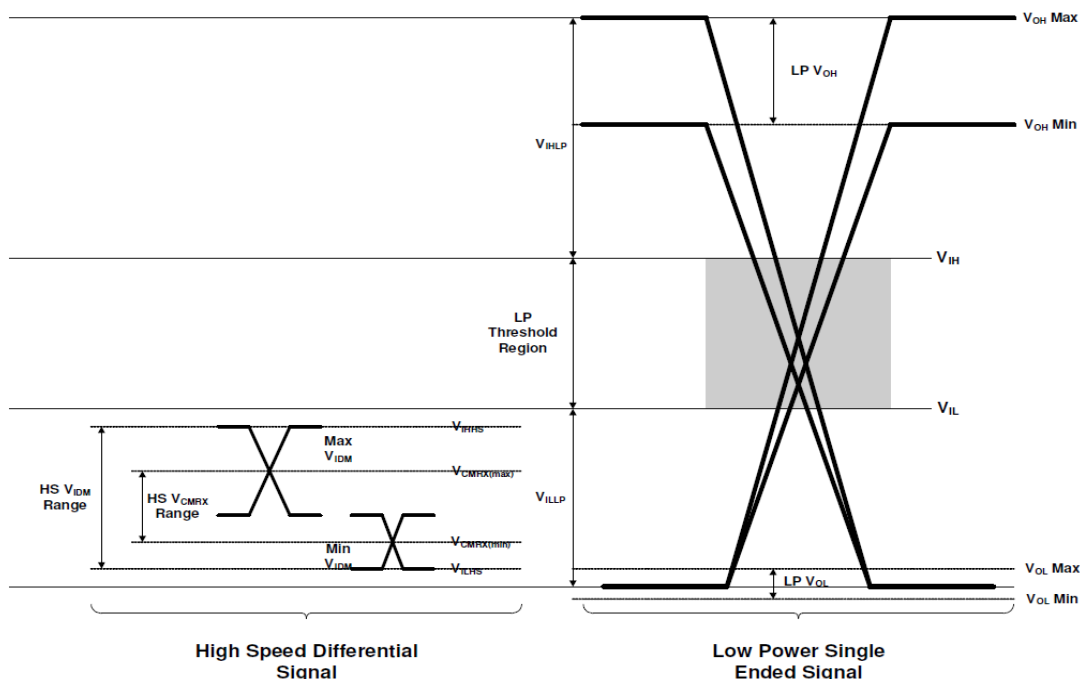
5.2 MIPI Timing Parameter

Item	Symbol	Min	Typ	Max	Unit	Remarks
Pixel CLK	Tpixclk		68.43		MHz	-
MIPI CLK	Period	4	4.44	4.8	ns	-
	Frequency	208	225	250	MHz	-
Hsync	Period	16			Tpixclk	-
	Frequency		77.76		KHz	-
Vsync	Period	4			Line	-
	Frequency		60	-	Hz	-
Horizontal Active Display Term rgb vporch 8 4 4 rgb hporch 16 48 16	HAdr		800	-	Tpixclk	-
	HBP	48			Tpixclk	-
	HFP	16			Tpixclk	-
	Total		880		Tpixclk	-
Vertical Active Display Term	Vadr		1280	-	Line	-
	VBP	4			Line	-
	VFP	8			Line	-
	Total		1296		Line	-
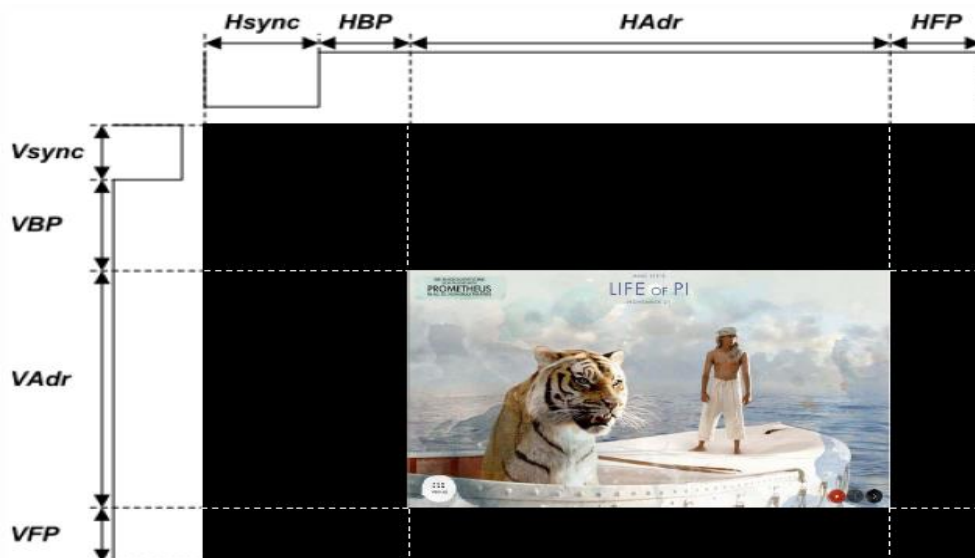
5.3. Power Sequence
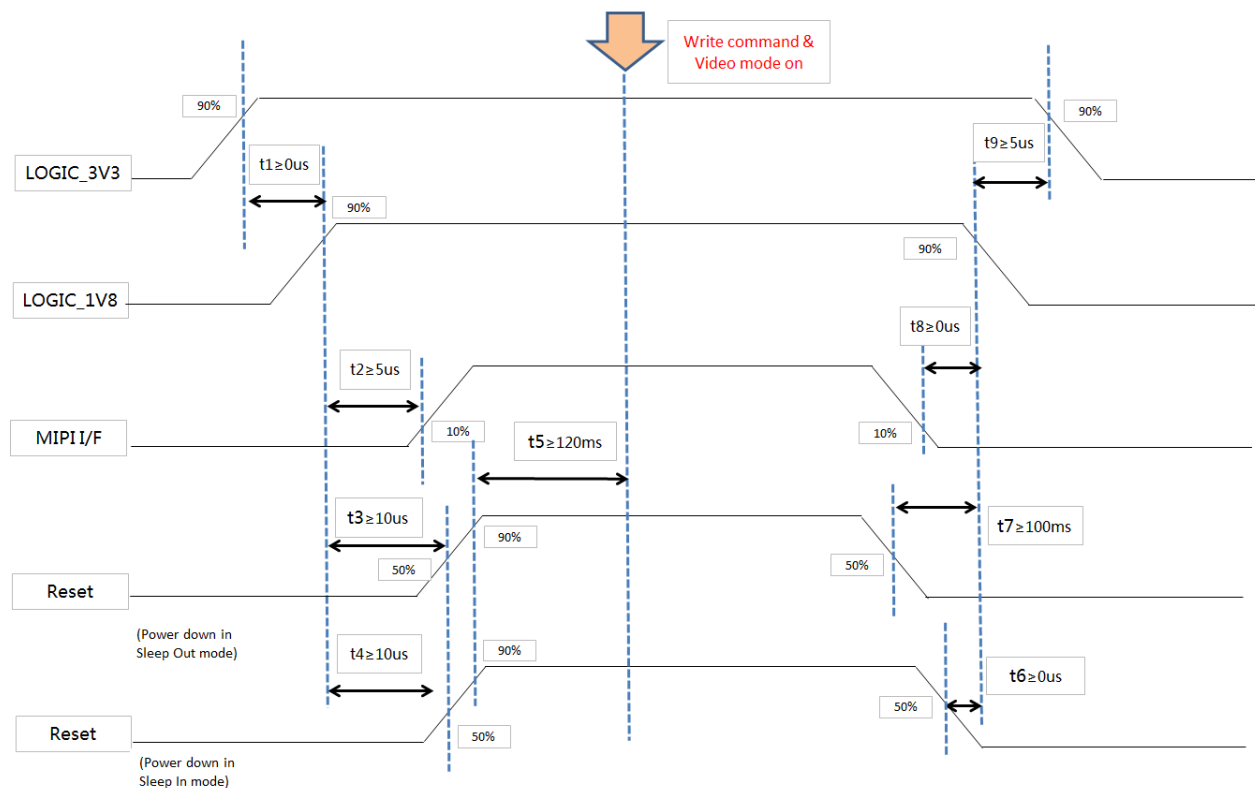
Notes:
1.   When the power supply VDD3V3 is 0V, keep the level of input signals on the low or keep high impedance.
2.   Do not keep the interface signal high impedance when power is on.
     Back Light must be turn on after power for logic and interface signal are valid.

6.0 OPTICAL SPECIFICATIONS

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (CA-310、BM-5A) 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°. We refer to $\theta_{\varnothing=0}$ (=θ_3) as the 3 o'clock direction (the "right"), $\theta_{\varnothing=90}$ (= θ_{12}) as the 12 o'clock direction ("upward"), $\theta_{\varnothing=180}$ (= θ_9) as the 9 o'clock direction ("left") and $\theta_{\varnothing=270}$(= θ_6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The measurement shall be executed after 30 minutes warm-up period. VDD shall be 3.3V +/-10% at 25°C. Optimum viewing angle direction is 6 'clock.

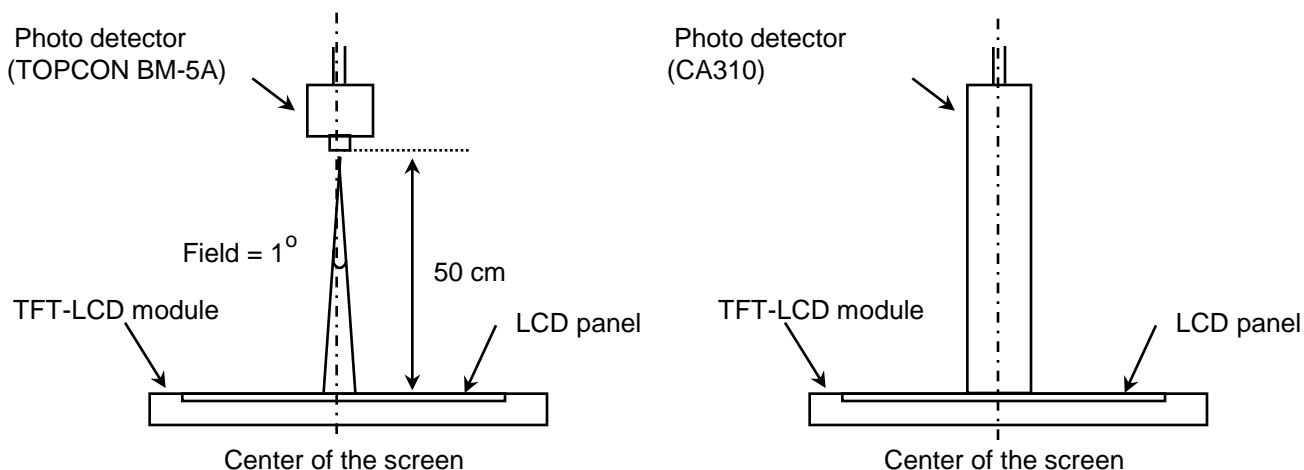| Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Θ_3	CR > 10	80	89	-	Deg.	Note 1
		Θ_9		80	89	-	Deg.	
	Vertical	Θ_{12}		80	89	-	Deg.	
		Θ_6		80	89	-	Deg.	
Color Gamut				45	50	55	%	-
Contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle	700	900	1100		Note 2
Luminance of White		Y_w		360	450	540	cd/m²	Note 3
White luminance uniformity		ΔY9		80	85	-	%	Note 4
White Balance	CCT			6450	6950	7650	K	Note 5
	Δuv			-0.005	0.0025	0.01	-	
Reproduction of color	Red	R_x		TYP. - 0.02	0.603	TYP. + 0.02		Note 6
		R_y			0.345			
	Green	G_x		TYP. - 0.03	0.325	TYP. + 0.03		
		G_y			0.563			
	Blue	B_x		TYP. - 0.02	0.154	TYP. + 0.02		
		B_y			0.117			
Response Time		T_g		-	30	50	ms	Note 7
Gamma Scale				2.2	2.4	2.6		

Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles 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 FIGURE 1).

2. Contrast measurements shall be made at viewing angle of Θ= 0 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 FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR= \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$
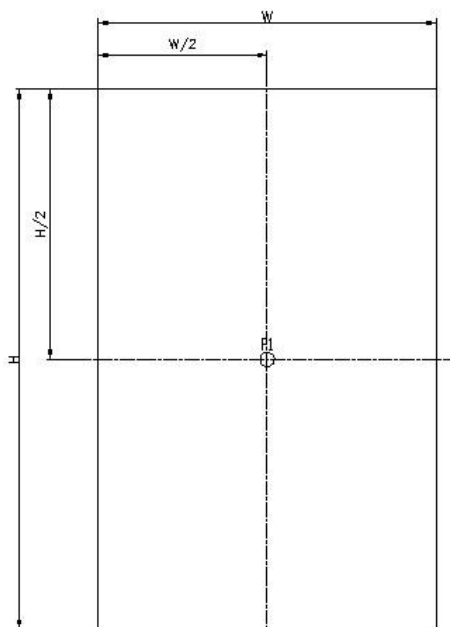
3. Center Luminance of white is defined as luminance values of 1point average across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display. The luminance is measured by CA310 when the LED current is set at 17mA （FIGURE 2）.

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4. The White luminance uniformity on LCD surface is then expressed as : ΔY = Minimum Luminance of 9points / Maximum Luminance of 9points (see FIGURE 3).

5. The color chromaticity coordinates specified in Table 5 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 panel.

6.The color chromaticity coordinates specified in Table 4. 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 panel.

7. The electro-optical response time measurements shall be made as FIGURE 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 Td （see FIGURE 4）.

Figure 1. Measurement Set Up

Photo detector (TOPCON BM-5A)

Photo detector (CA310)

Field = 1°

50 cm

TFT-LCD module

LCD panel

TFT-LCD module

LCD panel

Center of the screen

Center of the screen

View angel range measurement setup   Luminance , uniformity and color measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (Center point)


W

W/2

H/2

H

P1

Center Luminance of white is defined as luminance values of center point across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

Figure 3. Uniformity Measurement Locations (9 points)
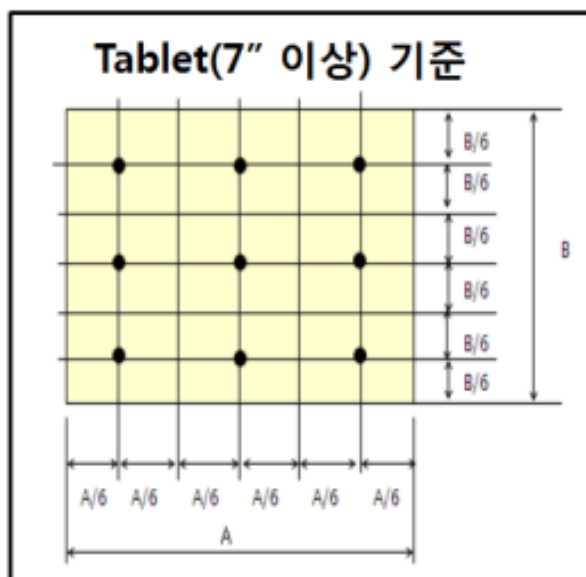
The White luminance uniformity on LCD surface is then expressed as : ΔY9= Minimum Luminance of five points / Maximum Luminance of five points (see FIGURE 3)

Figure 4. Response Time Testing
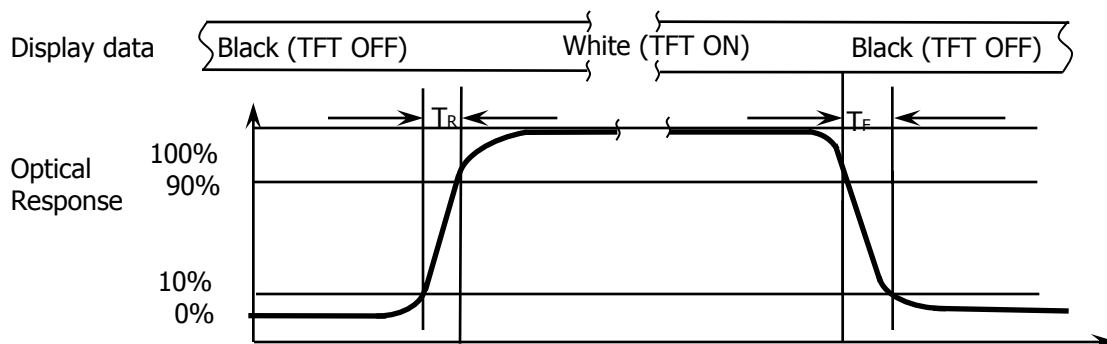
The electro-optical response time measurements shall be made as shown in FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr and 90% to 10% is Td.

7.0 MECHANICAL CHARACTERISTICS

7.1 Dimensional Requirements

FIGURE 4 (located in Appendix) shows mechanical outlines for the model BA070WS1-200. Other parameters are shown in Table 12.

<Table 12. Dimensional Parameters>

Parameter	Specification	Unit
Dimensional outline	162.45(V) $\times$ 101.22(H) $\times$ 2.25 (body) (typ.)	mm
Weight	67 (typ.)	gram
Active area	94.2(W) x 150.72(H)	mm
Pixel pitch	0.11775(H) $\times$ 0.11775(V)	mm
Number of pixels	800(H) $\times$ 1280(V) (1 pixel = R + G + B dots)	pixels
Back-light	3806,20ea	–

7.2 Mounting
See FIGURE 6. (shown in Appendix)

7.3 Surface Treatment of Polarizer.
The surface treatment of the CF POL is 3H HC.

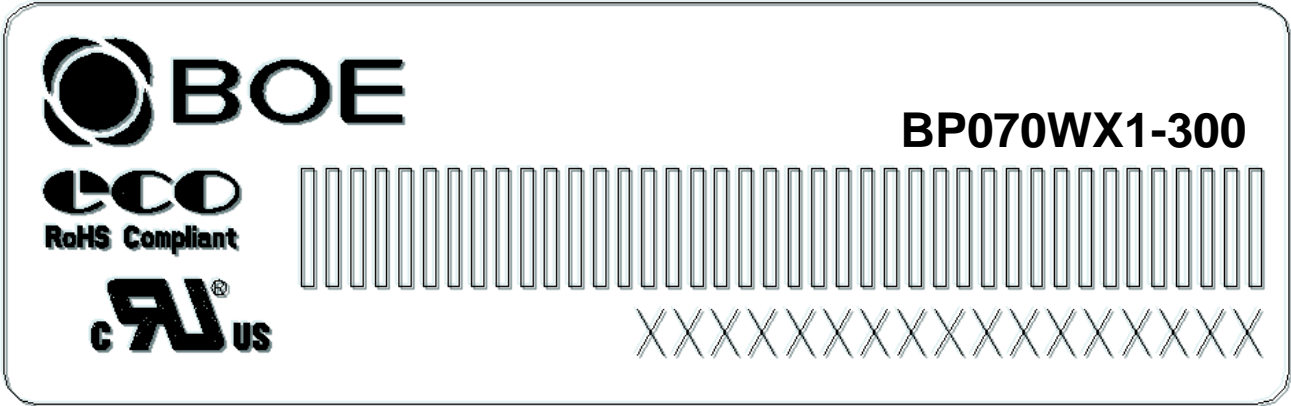## 8.0 RELIABLITY TEST

The Reliability test items and its conditions are shown in below.

<Table 13. Reliability Test Parameters >

No	Test Items	Conditions
1	High temperature storage test	Ta = 85 ℃, 24 hrs
2	Low temperature storage test	Ta = -40℃, 24 hrs
3	High temperature & high humidity operation test	Ta = 60 ℃, 90%RH, 96 hrs
4	High temperature operation test	Ta = 60 ℃, 24 hrs
5	Low temperature operation test	Ta = -20℃, 24 hrs
6	8585 Test	Ta = 85℃, 85%RH, 120 hrs
7	Accelerated life test	Ta = -10℃ ↔ 65℃, 93%RH, 5cycle
8	Thermal shock	Ta = -40℃ ↔ 85 ℃ (2 hrs), 30 cycle
9	Image Sticking test	5*8 Chess, Aging 1hr, Ta= 60℃(5min Level)
10	Cold bubble test	Ta= -20℃, 5 times dropping (height of 10cm) iron ball(5.4g, φ11.0)
11	Vibration test (non-operating)	Packing Vibration: 0.015Grms, 5~200Hz: -6db/oct, 200~500Hz Random X, Y, Z per 2 hrs

9.0 Product Serial Number

Type designation

No 1. Control Number

No 2. Rank / Grade

No 3. Line classification

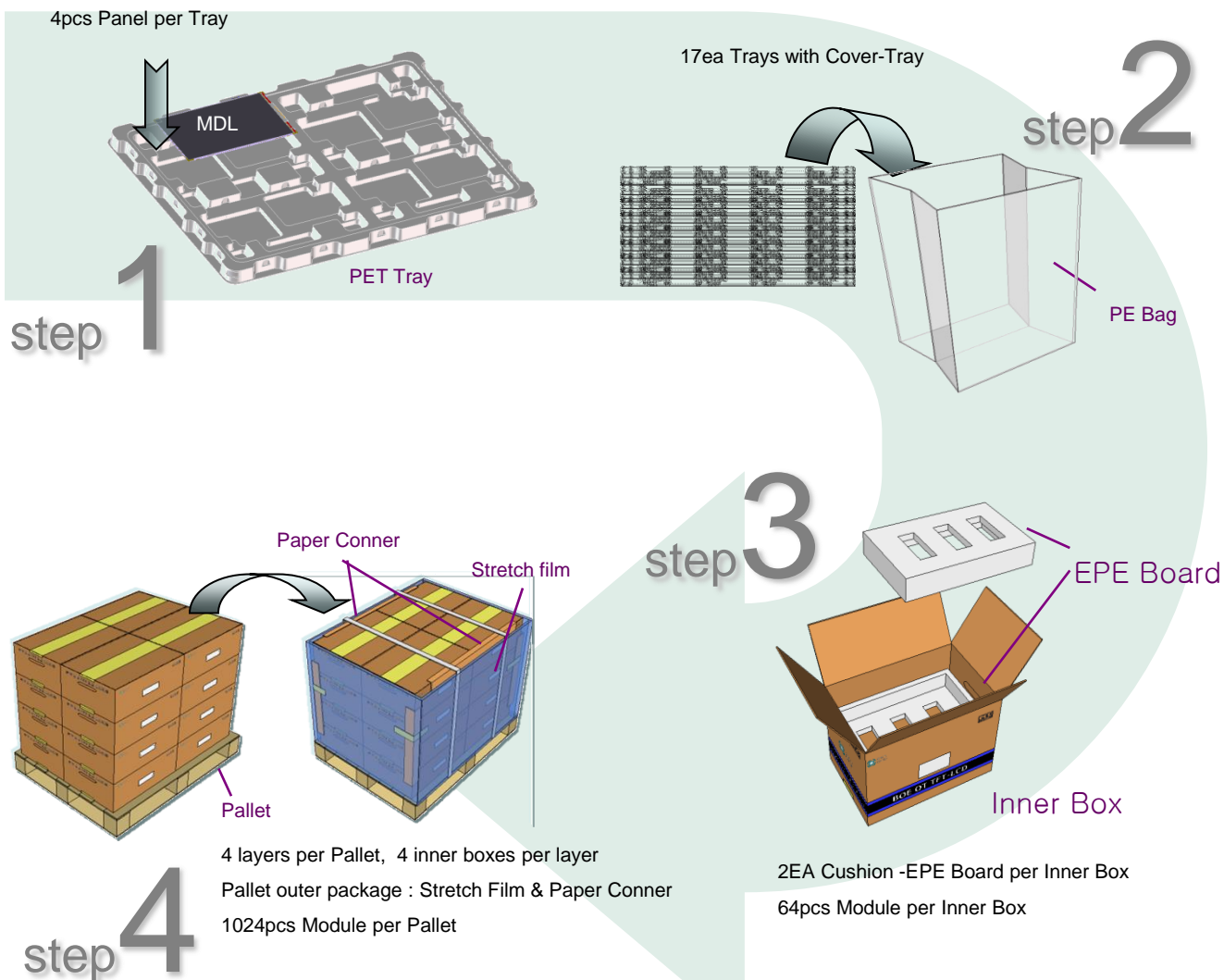No 4. Year (10 : 2010, 11: 2011, …)

No 5. Month (1, 2, 3, …, 9, X, Y, Z)

No 6. Product Identification (FG)

No 7. Serial Number

10.0 Packing Form

10.1. Description of packing procedure

4pcs Panel per Tray

MDL

PET Tray

step 1

17ea Trays with Cover-Tray

step 2

PE Bag

step 3

EPE Board

Inner Box

2EA Cushion -EPE Board per Inner Box

64pcs Module per Inner Box

Paper Conner

Stretch film

Pallet

4 layers per Pallet, 4 inner boxes per layer

Pallet outer package : Stretch Film & Paper Conner

1024pcs Module per Pallet

step 4

※ Standard packing dimensions is 520×420×252mm, it would be observed strictly.

10.2 Label

(1) Product label

BOE
eco RoHS Compliant
cULus

BP070WX1-300

GH96-07185A   XXXXXXXXXXXXXXXX

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码	4	F	P	3	1	2	7	3	8	0	0	0	0	1	E	E	J
描述	GBN代码		等级	B3	年份		月	FG Code后四位				序列号					

(2) Box label

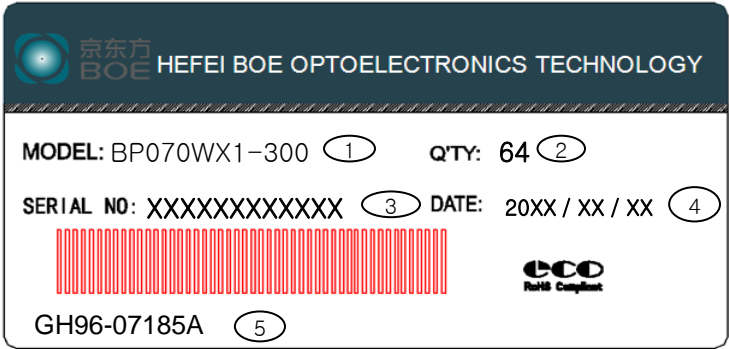Label Size: 510mmL×410mmW×252mmH
Contents
Model: BP070WX1-300
Q`ty: 64pcs Module Q`ty in one box
Serial No.: Box Serial No. See next figure for detail description.
Date: Packing Date
Internal use of Product

京东方 **BOE** HEFEI BOE OPTOELECTRONICS TECHNOLOGY

MODEL: BP070WX1-300 ①   Q'TY: 64 ②

SERIAL NO: XXXXXXXXXXXX ③   DATE: 20XX / XX / XX ④

eco RoHS Compliant

GH96-07185A ⑤

Remark：
1. **FG-CODE**
2. **Box 产品数量**
3. **Box ID, 编码规则如下**
4. **Box Packing 日期**
5. **产品物料号**

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13
代码	4	J	P	3	1	2	7	0	0	0	1	H	D
描述	GBN代码		等级	B3	年份		月	Rev	序列号				

11.0 HANDLING & CAUTIONS

(1) Cautions when taking out the module
  • Pick the pouch only, when taking out module from a shipping package.
(2) Cautions for handling the module
  • As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
  • As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
  • As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
  • Do not pull the interface connector in or out while the LCD module is operating.
  • Put the module display side down on a flat horizontal plane.
  • Handle connectors and cables with care.
(3) Cautions for the operation
  • When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
  • Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
(4) Cautions for the atmosphere
  • Dew drop atmosphere should be avoided.
  • Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.
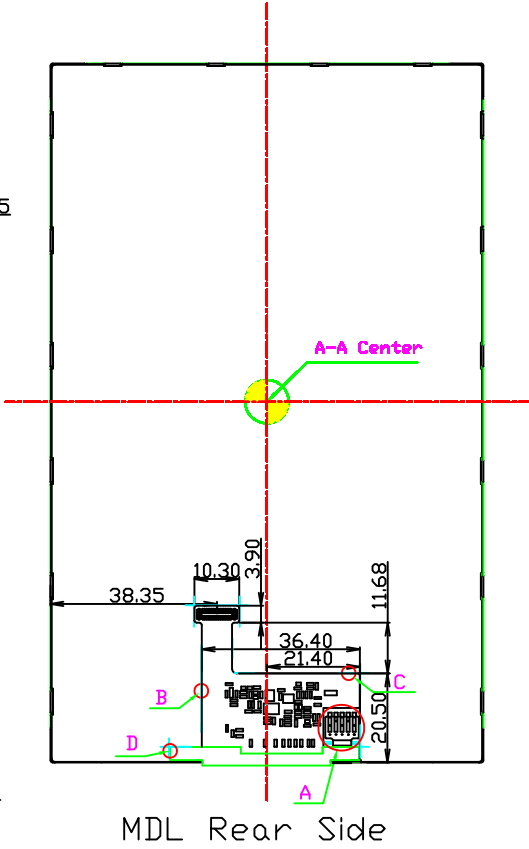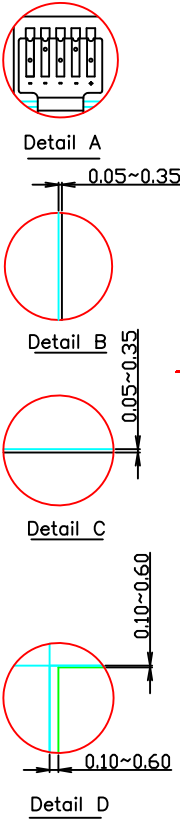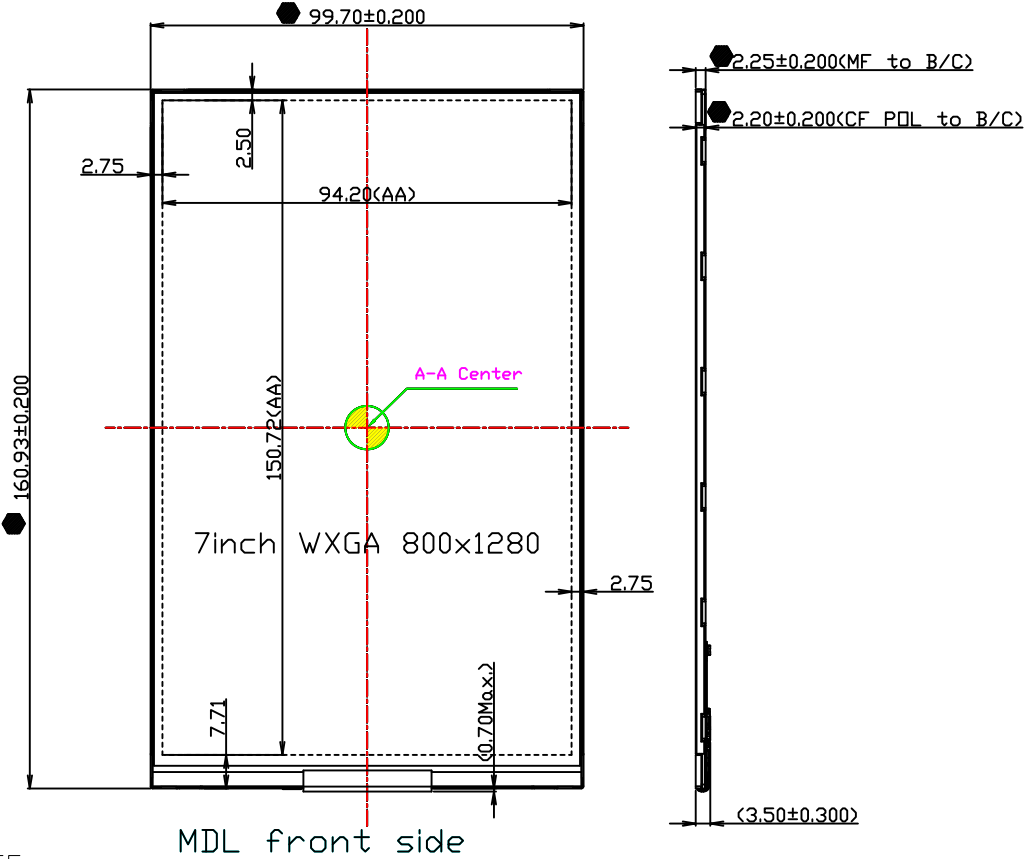(5) Cautions for the module characteristics
  • Do not apply fixed pattern data signal to the LCD module at product aging.
  • Applying fixed pattern for a long time may cause image sticking.
(6) Other cautions
  • Do not disassemble and/or re-assemble LCD module.
  • Do not re-adjust variable resistor or switch etc.
  • When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

ZONE	LTR	ECO NO.	REVISION	DATE	APP'L
			REV.0	20140301	PARK JINMOO

99.70±0.200

2.25±0.200(MF to B/C)

2.20±0.200(CF POL to B/C)

2.50

2.75

94.20(AA)

Detail A

0.05~0.35

160.93±0.200

150.72(AA)

A-A Center

Detail B

0.05~0.35

A-A Center

7inch WXGA 800x1280

2.75

Detail C

0.10~0.60

7.71

(0.70Max.)

MDL front side

(3.50±0.300)

0.10~0.60

Detail D

38.35

10.30 3.90

11.68

36.40

21.40

20.50

B

C

D

A

MDL Rear Side

NOTE

1.IMPORTANT CPK DIMENTIONS:●
2.Halogen Free & RoHS & REACH .
3.LED BAR SCHEMATIC MAP, ILED=17mA,VLED=3.0V max.
4.Backcover SUS Close Type, BURR ≤ 0.03mm.
5.Panel Thickness(TFT+CF+TFT Pol+CF Pol): 0.895mm±0.030mm.
6.Panel & Mold Frame Height Gap: 0.05mm.
7.FPC & IC Cover tape attach torlerance is between attach mark
   on Backcover and FPC or IC cover tape.

REF. DESC.	SUB PART NO.	DESCRIPTION	MATERIAL	COLOR/FINISH	QT'Y	REMARKS
DRAWN BY	CHECKED BY	APPROVED BY	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN (mm)(INCHES) TOLERANCES ARE:	ANGLE 3rd	TITLE BP070WXI-300 MDL OUTLINE	REV
HE HONGCHAO	CHEN SHOUNIAN	PARK JINMOO	LINEAR ANGLES ± SEE TABLE ± °			0
20140228	20140301	20140301	RADII UNLESS NOTED. ±	SCALE 1/1		
			MDL BP070WXI-300	SIZE A2		SHEET 1/1
			REF REV.0			