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SPEC. NUMBER

PRODUCT GROUP

Rev. P0

ISSUE DATE

PAGE

TFT-LCD

1 OF 27

AT070WSM-NW1-3800(3G00)

Product Specification Rev. P0

HEFEI BOE OPTOELECTRONICS TECHNOLOGY



PRODUCT GROUP

REV

ISSUE DATE

TFT- LCD PRODUCT

P0

2015.02.28

SPEC. NUMBER

SPEC. TITLE

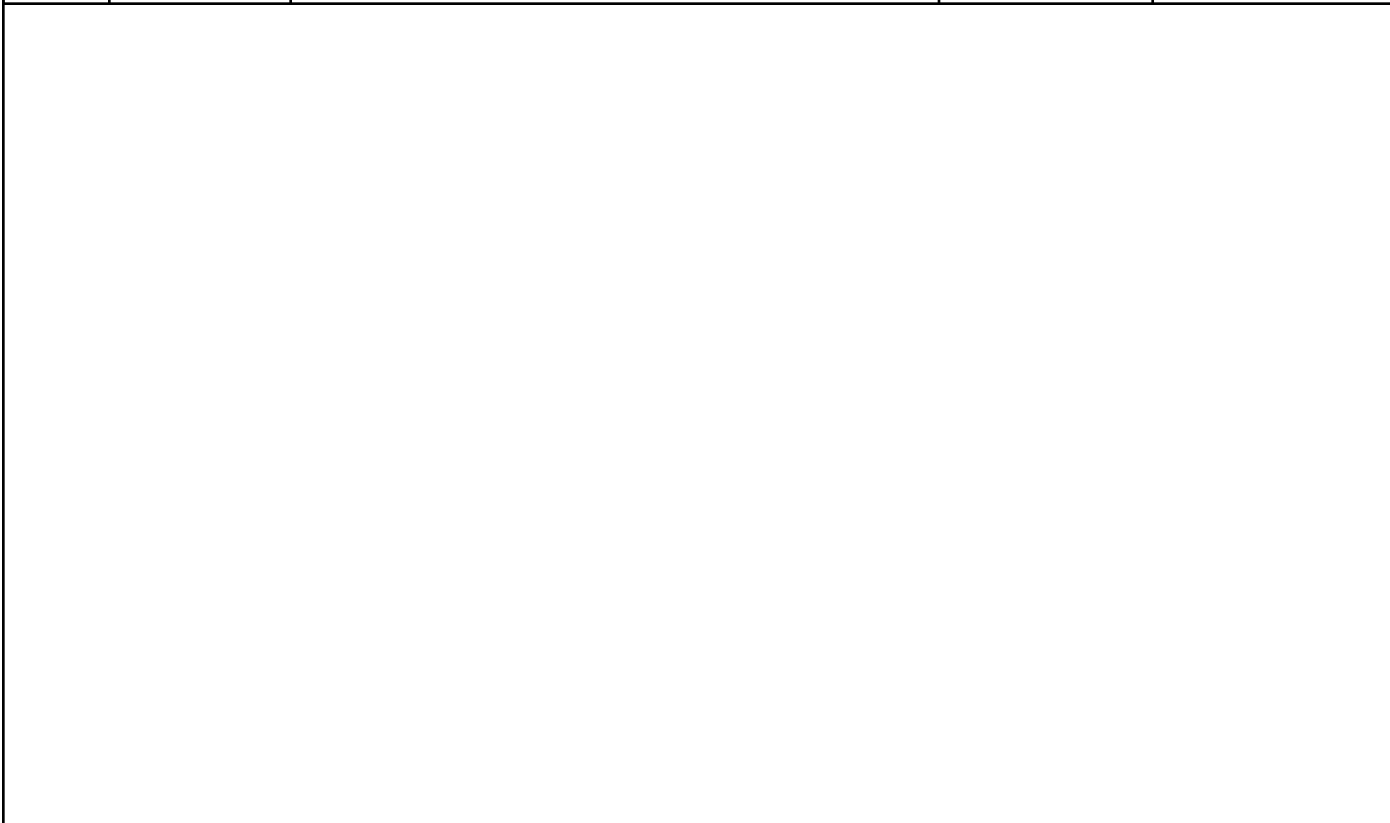
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AT070WSM-NW1-3800(3G00) Product Specification

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REVISION HISTORY

REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
0		Initial Release	2015.02.28	杨怀伟



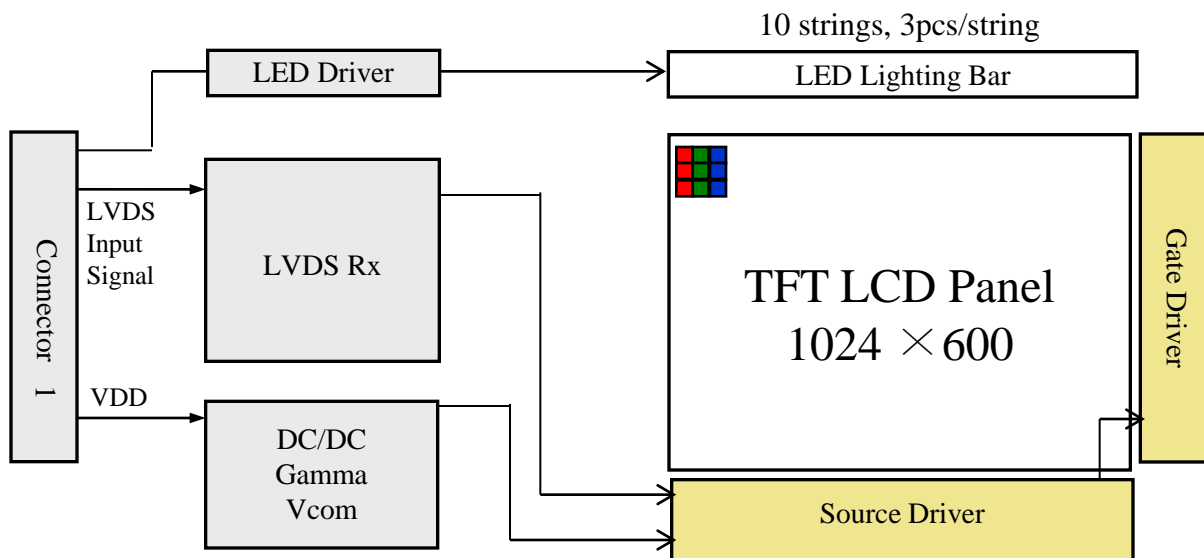
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1.0 GENERAL DESCRIPTION

1.1 Introduction

AT070WSM-NW1-3800(3G00) 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 WSVGA resolutions (1024 horizontal by 600 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

- 1 Channel LVDS Interface with 1 pixel / clock
- Data enable signal mode
- 6-bit Hi-FRC color depth, display 16.7M colors
- Low driving voltage and low power consumption
- RoHS Compliant

1.3 Application

- Vehicle Device

1.4 General Specification

The followings are general specifications at the model AT070WSM-NW1-3800(3G00)
(listed in Table 1.)

< Table 1. General Specifications >

Parameter	Specification	Unit	Remarks
Active area	154.2144(H) × 85.92(V)	mm	
Number of pixels	1024(H) × 600(V)	pixel s	
Pixel pitch	50.2(H) × RGB × 143.2(V)	μm	
Pixel arrangement	Pixels RGB stripe arrangement		
Display colors	16.7M(6bits + Hi FRC)	color s	
Display mode	Transmission mode, Normally White		
Outline Dimension	164.9(H) × 100(V) × 4.8(body) (typ.)	mm	±0.3mm
Weight	150 (max.)	gram	
Power Consumption	P_D : 0.25(max.)	Watt	Black Pattern
	P_{BL} : 2.1(max.)		
	P_{Total} : 2.5(max.)		
Surface Treatment	AG25(Front Polarizer) Clear(Rear Polarizer)		

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. LCD Module Electrical Specifications >

[VSS=GND=0V]

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-0.3	4.1	V	Note 1
Power Supply For LED	V_{LED}	-	10.5	V	
Operating Temperature	T_{OP}	-20	+70	°C	Note 2
Storage Temperature	T_{ST}	-30	+80	°C	

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. ($40\text{ }^{\circ}\text{C} \geq T_a$)

Maximum wet - bulb temperature at $39\text{ }^{\circ}\text{C}$ or less. ($T_a > 40\text{ }^{\circ}\text{C}$) No condensation.

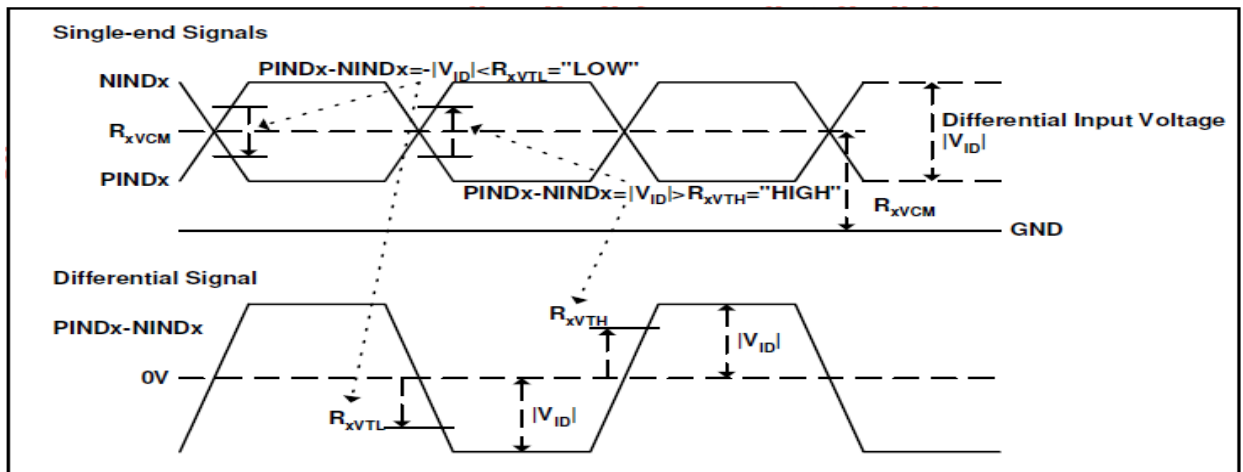
3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 3. LCD Module Electrical Specifications >

[Ta = 25 ± 2 °C]

Parameter	Symbol	Values			Unit	Notes	
		Min	Typ	Max			
Power Supply Input Voltage	VDD	3	3.3	3.6	Vdc		
Power Supply Ripple Voltage	VRP			300	mV		
Power Consumption	PDD		0.21	0.25	Watt	1,2	
Rush current	IRUSH	-	-	1	A		
LVDS Interface	Differential Input High Threshold Voltage	VLVTH	100		300	mV	
	Differential Input Low Threshold Voltage	VLVTL	-300		-100	mV	
	Common Input Voltage	VLVC	Vid /2	1.2	VDD-1.2	V	
	Differential input voltage	Vid	0.2	-	0.6		
CMOS Interface	Input High Threshold Voltage	VIH	2.6	-	3.3	V	
	Input Low Threshold Voltage	VIL	0	-	0.8	V	



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 $f_v=60\text{Hz}$ and Clock frequency = 51.24MHz. Test Pattern of power supply current is Black.

2. The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

3.2 Panel Electrical Specifications

< Table 4.Panel Electrical specifications >

Parameter	Symbol	Value			Unit	Remarks
		MIN	Typ	MAX		
Digital Voltage	VDD	3.0	3.3	3.6	V	
Analog Voltage	AVDD	9.4	9.6	9.8	V	
TFT Gate ON Voltage	VGH	17	18	19	V	VGH-VG L<=40V
TFT Gate OFF Voltage	VGL	-5	-6	-7	V	
TFT Common Electrode Voltage	VCOML	3	3.5	4	V	

Notes :

1. VGH is TFT Gate operating voltage.
2. VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuates with same phase as Vcom.
3. Vcom must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc..
4. The value is just the reference value. The customer can optimize the setting value by the different D-IC.

3.3 LED Driver

- With LED Driver on Customer System , We only have two Pads on FPC .

3.4 Backlight unit

< Table 5. Backlight Unit Specifications >

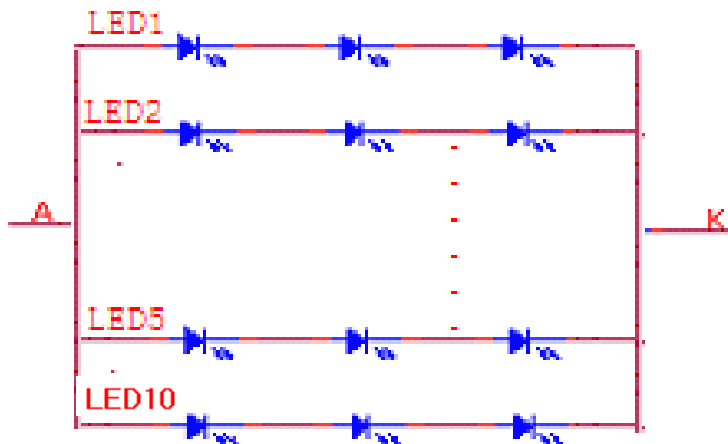
[Ta =25±2 °C]

Items	Symbol	Min	Typ	Max	Unit	Remark
Forward Current	I_F	-	200	-	mA	30LEDs (3LED Serial, 10LED Paralle l)
Forward Voltage	V_F	-	9.9	10.5	V	
Backlight Power Consumption	-	-	-	2.1	W	
Operating Life Time	-	-	15000	--	Hrs	$I_F = 20mA$ Note 3

Note1: The LED driving condition is defined for each LED module (3 LED Serial, 10 LED Parallel). For each LED: $I_F (1/10) = 20mA$, $V_F (1/3) = 3.3V$

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

Note3: I_F is defined for one channel LED. Optical performance should be evaluated at $T_a = 25^\circ C$ 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.



4.0 INTERFACE CONNECTION

4.1 Module Input Signal & Power

- LVDS Signal interface : 40Pin. The recommended model is FH12A-40S-0.5SH

< Table 6. LCM Module Input Connector Pin Configuration >

Pin No.	Symbol	I/O	Description	Remark
1	VCOM	P	Common voltage	
2	DVDD	P	Power Supply, 3.3V	
3	DVDD	P	Power Supply, 3.3V	
4	NC	-	NC	
5	Reset	I	Global reset pin	Note 2
6	STBYB	I	Stand by mode , Normally pulled high	Note 3
7	GND	P	Ground	
8	RXIN0-	I	-LVDS Differential Data input	
9	RXIN0+	I	+LVDS Differential Data input	
10	GND	P	Ground	
11	RXIN1-	I	-LVDS Differential Data input	
12	RXIN1+	I	+LVDS Differential Data input	
13	GND	P	Ground	
14	RXIN2-	I	-LVDS Differential Data input	
15	RXIN2+	I	+LVDS Differential Data input	
16	GND	P	Ground	
17	CLKIN-	I	-LVDS Differential CLK input	
18	CLKIN+	I	+LVDS Differential CLK input	
19	GND	P	Ground	
20	RXIN3-	I	-LVDS Differential Data input	
21	RXIN3+	I	+LVDS Differential Data input	
22	GND	P	Ground	
23	NC	-	NC	
24	NC	-	NC	
25	GND	P	Ground	
26	NC	-	NC	
27	DIMO	O	Backlight CABC controller signal output	Note 4
28	SELB	I	6bit/8bit mode select	Note 5
29	AVDD	P	Power for analog circuit, Typ. 9.6V	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	SHLR	I	Horizontal inversion	
34	UPDN	I	Vertical inversion	
35	VGL	P	Negative power for TFT, Typ. -6V	
36	CABCEN1	I	CABC H/W enable	Note 6
37	CABCEN0	I	CABC H/W enable	
38	VGH	P	Positive power for TFT, Typ. 18V	
39	LED+	P	LED Anode	
40	LED+	P	LED Anode	

Note.1

I/O definition : I---Input ; O---Output ; P---Power/Ground

Note.2

Suggest to connection with an RC reset circuit for stability , Normally pull high . (R=10K , C=0.1uF)

Note 3

-STBYB="H (3.3V)": normal operation ;

-STBYB="L (GND)": timing controller, source driver will turn off, all output are High-Z

Note.4

-DIMO = "(GND)" : Turn off external backlight controller

-DIMO = "H (3.3V)" : Logical control signal to turn on external backlight controller

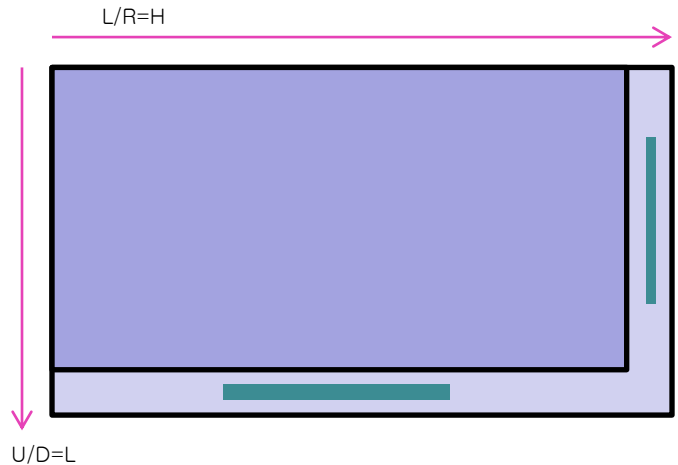
NOTE : If CABC OFF , DIMO = DIMI . Else DIMO is controlled by CABC

Note.5

-SELB="H (3.3V)": 6 bit ;

-SELB="L (GND)": 8 bit ;

Scan Control Input		Scanning direction
L/R	U/D	
VDD	GND	Up to Down, Left to Right
GND	GND	Up to Down, Right to Left
VDD	VDD	Down to Up, Left to Right
GND	VDD	Down to Up, Right to Left



Note.6

-When CABC_EN="00", CABC OFF. (Default mode)

-When CABC_EN="01", User interface Image.

-When CABC_EN="10", Still Picture.

-When CABC_EN="11", Moving Image.

5.0 SIGNAL TIMING SPECIFICATIONS

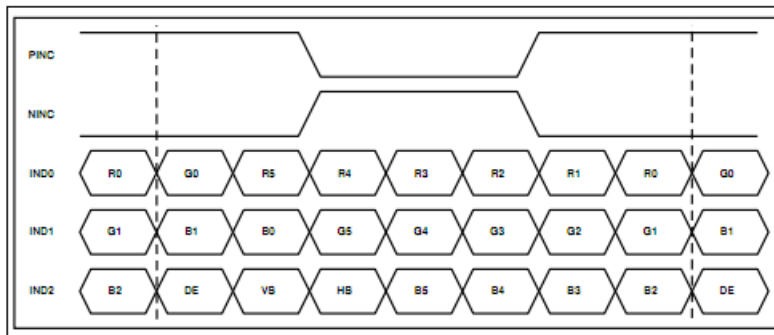
5.1 Timing Parameters (DE only mode)

< Table 7. Timing Table >

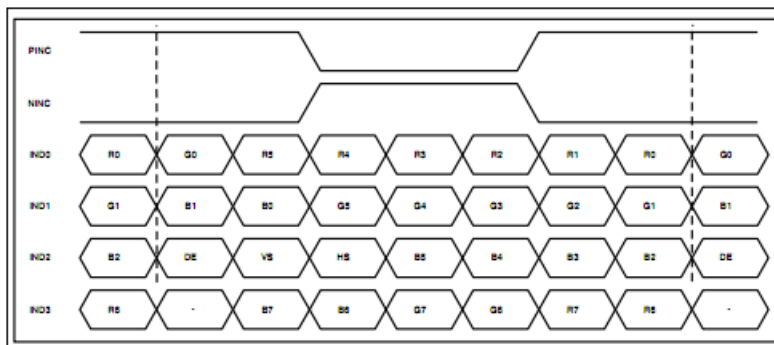
ITEM	Symbol	Min	Typ	Max	Unit	Note
CLK	Period	t_{CLK}	14.9	19.5	24.5	ns
	Frequency	-	40.8	51.2	67.2	MHz
Hsync	Period	t_{HP}	1114	1344	1400	t_{CLK}
	Frequency	f_H	36.4	38.1	43.2	KHz
Vsync	Period	t_{VP}	610	635	800	t_{HP}
	Frequency	f_V	-	60	-	Hz
Horizontal Active Display Term	Valid	t_{HV}	-	1024	-	t_{CLK}
	Total	t_{HP}	1114	1344	1400	t_{CLK}
Vertical Active Display Term	Valid	t_{VV}	-	600	-	t_{HP}
	Total	t_{VP}	610	635	800	t_{HP}

Notes: This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

6bit LVDS input (HSD='H')



8-bit LVDS input (HSD='L')

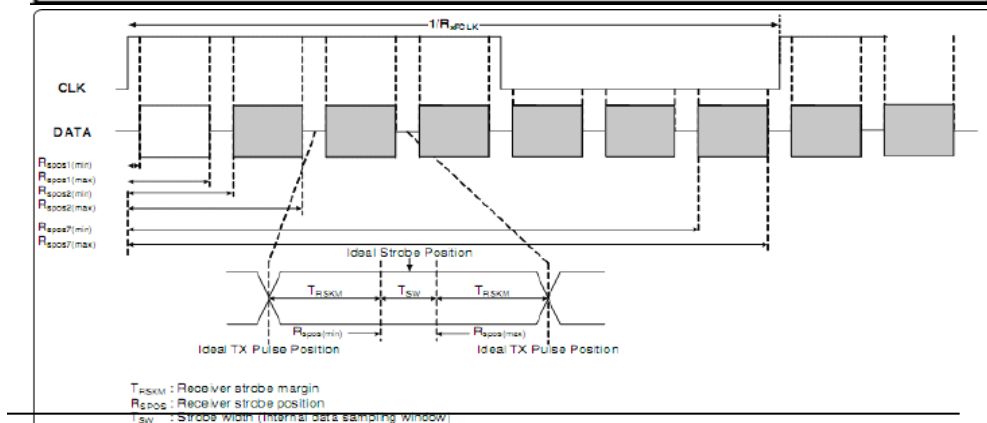
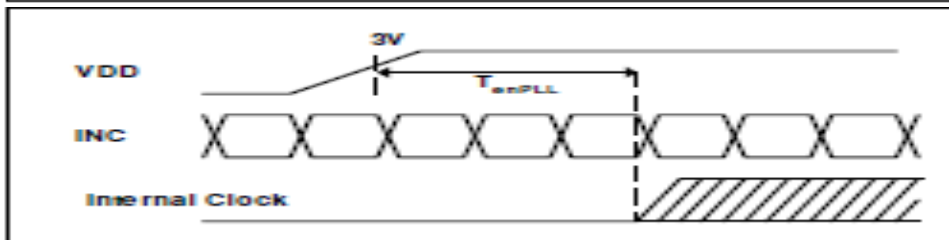
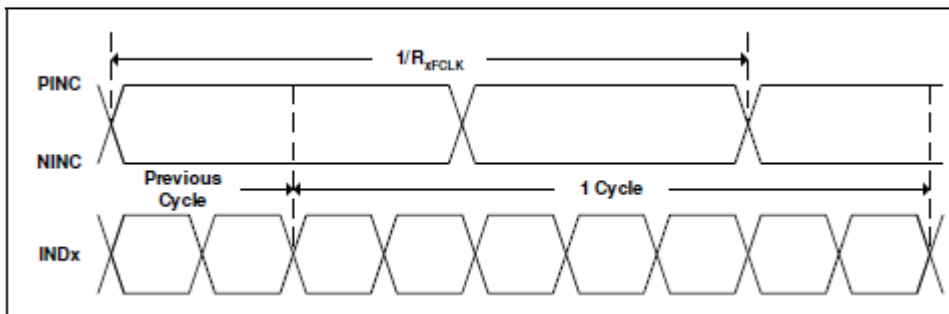


5.2 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter is shown in Table 8.

Table 8 . AC Electrical Characteristics

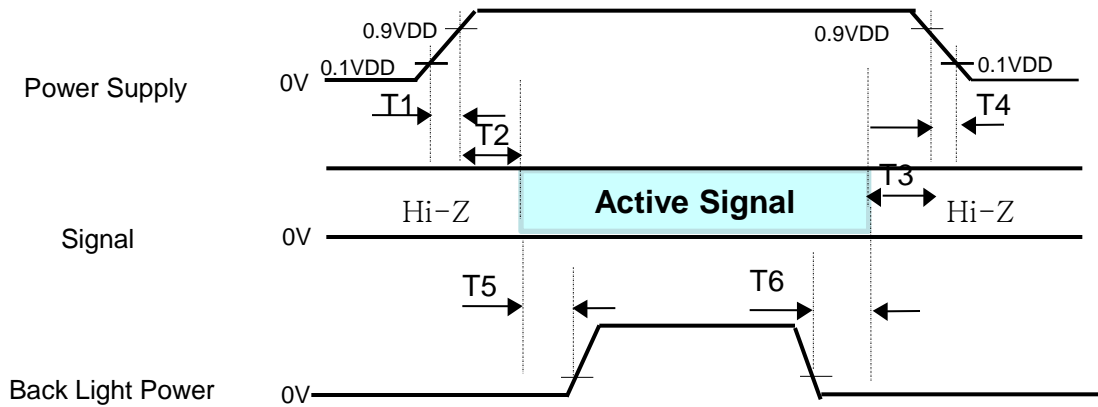
Parameters	Symbols	Min	Typ	Max	Unit	Condition
Clock frequency	RxFCLK	40.8	51.2	67.2	MHz	
Input data skew margin	TRSKM	500	-	-	ps	VID =400mV RxVCM=1.2V RxFCLK=71MHz
Clock high time	TLVCH	-	$4/(7 \cdot RxFCLK)$		ns	
Clock low time	TLVCL		$3/(7 \cdot RxFCLK)$		ns	
PLL wake-up time	TenPLL			150	us	



5.3 Input Signals, Basic Display Colors & Gray Scale Of Colors

Color & Gray Scale		Input Data Signal																						
		Red Data								Green Data								Blue Data						
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	△	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	△	↑								↑								↑						
	▽	↓								↓								↓						
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
	△	↑								↑								↑						
	▽	↓								↓								↓						
	Brighter	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
	△	↑								↑								↑						
	▽	↓								↓								↓						
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of White	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	△	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	
	△	↑								↑								↑						
	▽	↓								↓								↓						
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	▽	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

5.4 Power Sequence



- $0.5\text{ms} \leq T1 \leq 10\text{ms}$
- $0\text{ms} \leq T2$
- $0\text{ms} \leq T3$
- $0\text{ms} \leq T4 \leq 10\text{ms}$
- $100\text{ms} \leq T5 \leq 300\text{ms}$
- $100\text{ms} \leq T6 \leq 300\text{ms}$

Notes:

1. When the power supply VDD 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 = $25 \pm 2^\circ\text{C}$) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) 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 $\theta_{\Phi=0}$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta_{\Phi=90}$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta_{\Phi=180}$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta_{\Phi=270}$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and/or Φ , 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 12.0V +/-10% at 25°C . Gray scale reversal occur in 6 o'clock direction. Optimum viewing angle direction is 12 o'clock,

[VDD = 3.3V, Frame rate = 60Hz, $T_a = 25 \pm 2^\circ\text{C}$]

< Table 9. Optical Specifications >

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Θ_3	CR > 10	70	80	-	Deg.	Note 1
		Θ_9		70	80	-	Deg.	
	Vertical	Θ_{12}		50	60	-	Deg.	
		Θ_6		60	70	-	Deg.	
Color Gamut		-	-	45	50	-	%	NTSC
Contrast ratio		CR	$\Theta = 0^\circ$ (Center) Normal Viewing Angle	600	800	-	-	Note 2
Luminance of White		Y_w		-	500	-	-	Note 3
White luminance uniformity		ΔY_9		70	75	-	-	Note 4
Reproduction of color	White	W_x		TYP. - 0.05	TYP. + 0.05	0.310	-	Note 5
		W_y	0.330			-		
	Red	R_x	0.590			-		
		R_y	0.350			-		
	Green	G_x	0.350			-		
		G_y	0.590			-		
	Blue	B_x	0.155			-		
		B_y	0.135			-		
Response Time		T_g	-	25	40	Ms	Note 6	
Gamma Scale								

Note :

1. 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.
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 FIGURE 1 shown in Appendix) 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 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.
4. The White luminance uniformity on LCD surface is then expressed as : $\Delta Y = \text{Minimum Luminance of 9 points} / \text{Maximum Luminance of 9 points}$. (see FIGURE 2 and FIGURE 3).
5. 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.
6. The electro-optical response time measurements shall be made as FIGURE 3 shown in Appendix by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_d , and 90% to 10% is T_r .

7.0 MECHANICAL CHARACTERISTICS

7.1 Dimensional Requirements

FIGURE 4/5 (located in Appendix) shows mechanical outlines for the model BAT070WSM-NW 1-3800(3G00).

Other parameters are shown in Table 10.

<Table 10. Dimensional Parameters>

Parameter	Specification	Unit
Dimensional outline	164.9(H) × 100(V) × 4.8 (typ.)	mm
Weight	150(Max.)	gram
Active area	154.2144(H) × 85.92(V)	mm
Pixel pitch	50.2(H) × RGB × 143.2(V)	μm
Number of pixels	1024(H) × 600(V) (1 pixel = R + G + B dots)	pixels
Back-light	LED	

7.2 AG and Polarizer Hardness.

The surface of the LCD has an AG coating to minimize reflection and a coating to reduce scratching.

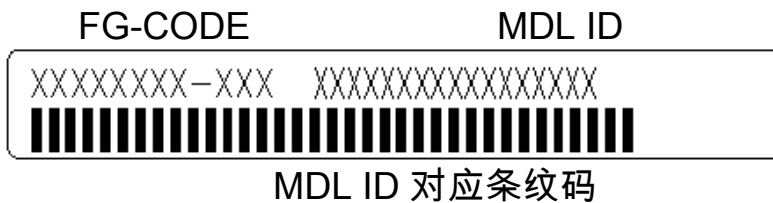
8.0 RELIABILITY TEST

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

<Table 11. Reliability Test Parameters >

No	Test Items	Conditions
1	High temperature storage test	Ta = 80 °C, 240 hrs
2	Low temperature storage test	Ta = -30°C, 240 hrs
3	High temperature & high humidity operation test	Ta = 60 °C, 90%RH, 240hrs
4	High temperature operation test	Ta = 70 °C, 240hrs
5	Low temperature operation test	Ta = -20°C, 240hrs
6	Thermal shock	Ta = -30°C ↔ 80 °C (0.5 hr), 100 cycle
7	Image Sticking	25°C ± 2°C, 4hr, Image Sticking pattern, Mid-gray pattern inspection, Recovery Time : 5min
8	Shock (Non-Operation)	100G,6ms, ± X, ± Y, ± Z,3times for each direction
9	Vibration (Non-Operation)	5-200Hz,1.47G,Random XY ± Z,30min
10	Electro-static discharge test	Contact mode : 150pf, 330Ω, ±4KV Air mode : 150pf, 330Ω, ±6KV

9.0 Product Serial Number



1. 产品标签尺寸: 35mm × 6mm

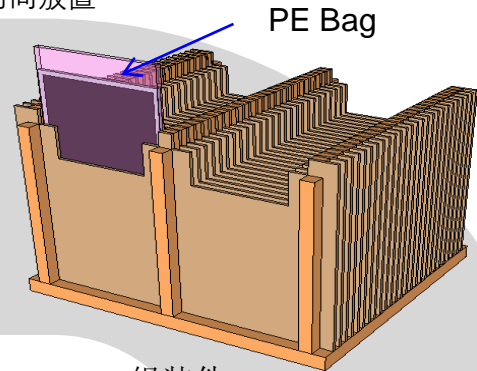
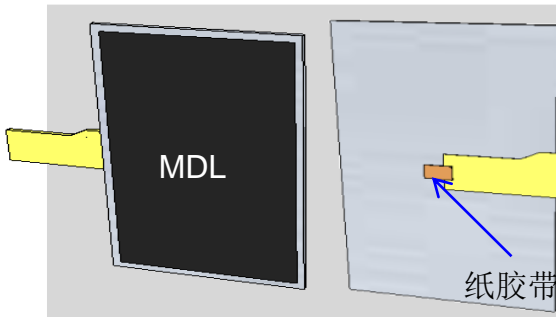
2. MDL ID 编码规则如下

序号号	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					

10.0 PACKING INFORMATION

- 将 MDL FPC 反折到背板
并用纸胶带贴附

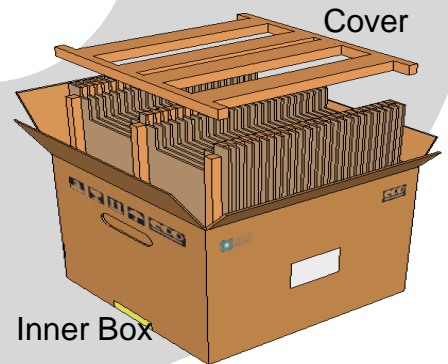
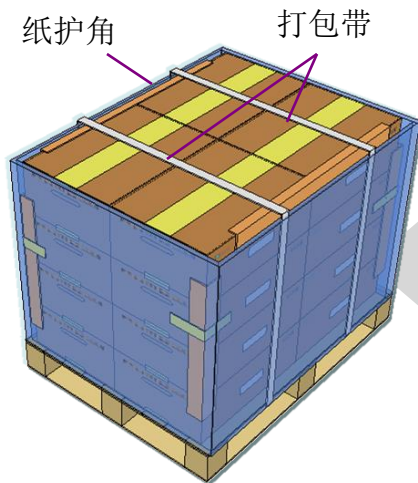
- 将MDL 放入PE Bag，袋口反折后竖向插入组装件
- MDL 同向放置



组装件

- 每个Pallet上放4层, Box1层4箱, 共计16ea Box
- Pallet 打包带&缠膜包装
- 容量: 1088pcs/Pallet

- 将组装件放入纸箱
- 将盖子扣合
- 容量 : 68pcs/Inner Box



- Box Dimension: 510mm(W) x 410mm(D) x 252mm(H)
- Package Quantity in one Box: 68pcs MDL/Box
- Total Weight: 13Kg

10.2 Box label

- Label Size : 115 mm (L) × 55 mm (W)

- Contents

Model : AT070WSM-NW1

Q`ty : XX Module in one box.

Serial No. : Box Serial No. See next page for detail description.

Date : Packing Date

FG Code : FG Code of Product

京东方
BOE
HEFEI BOE OPTOELECTRONICS
Technology Co., LTD

MODEL: XXXXXXXX-XXX ① Q'TY: XX ②

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

SBA025J

XXXX ⑤

1. **FG-CODE**
2. **Box 产品数量**
3. **Box ID, 编码规则如下**
4. **Box Packing 日期**
5. **FG-CODE 后四位**

序号号	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.

12.0 APPENDIX

Figure 1. Measurement Set Up

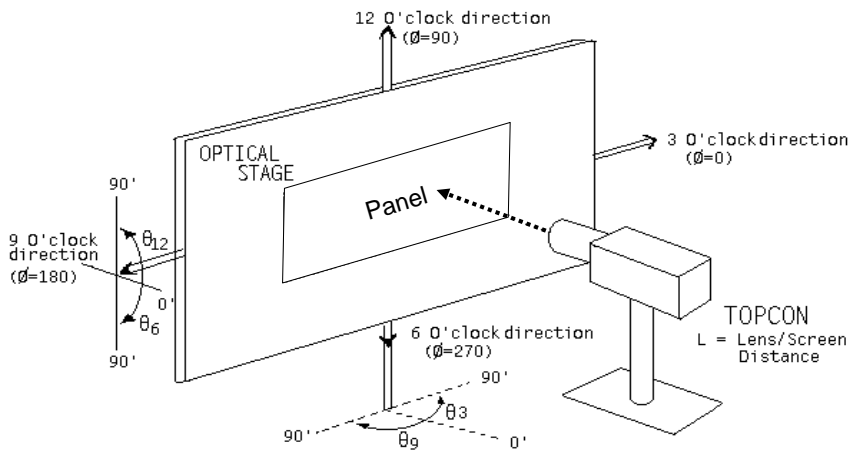
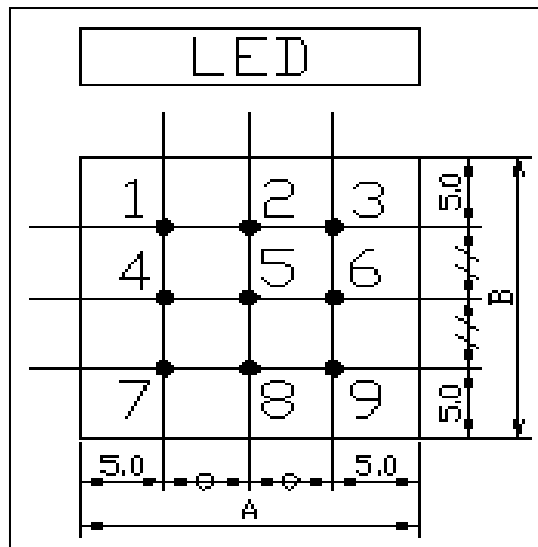


Figure 2. White Luminance and Uniformity Measurement Locations (9 points)



Center Luminance of white is defined as luminance values of center 9 points 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. Response Time Testing

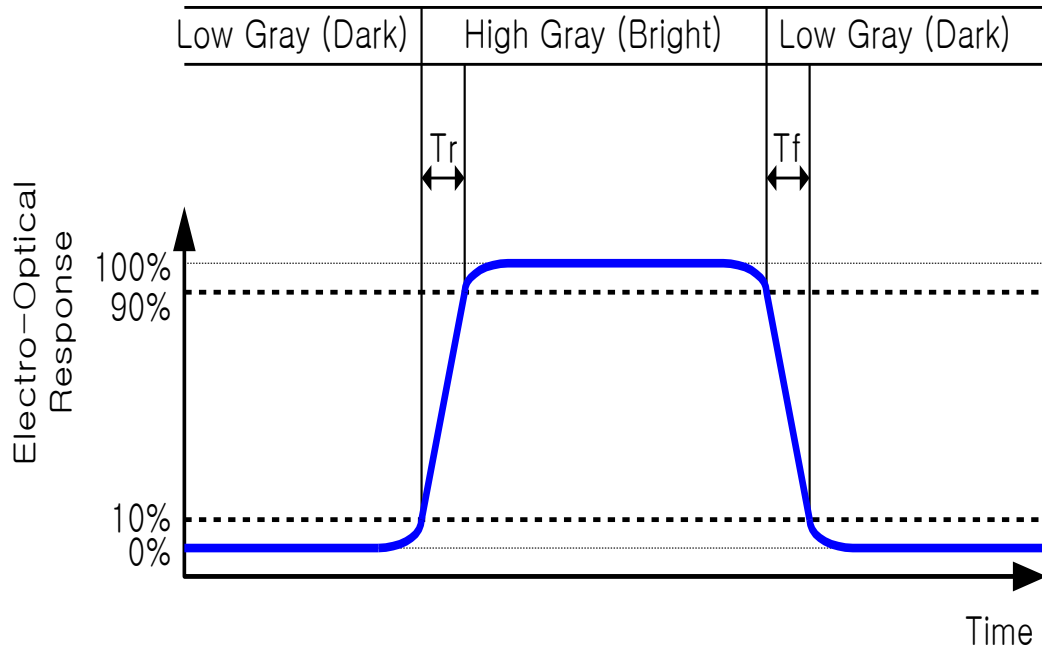


Figure 4. TFT-LCD Module Outline Dimensions (Front view)

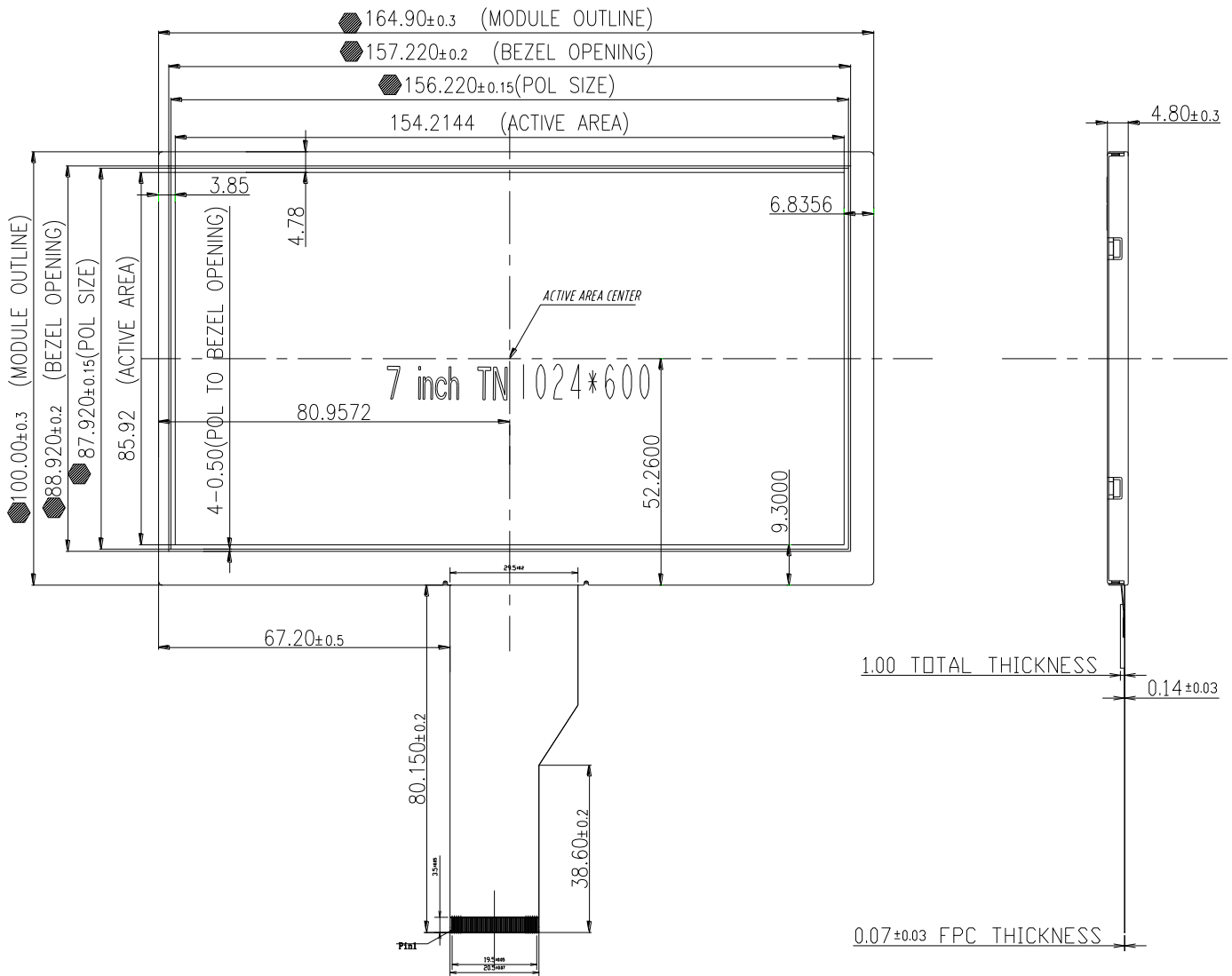


Figure 5. TFT-LCD Module Outline Dimensions (Rear view)

