

5.1" HD Product Specification Rev. P1

Customer Name : _____

Product Name : 5.1" HD 720 AMOLED

Model Name : BF051FBM-AK0-

Description : 5.1" HD (720×1520) 16M Color

| Proposed by | | | Customer's Approval |
|-------------|---------|----------|---------------------|
| Designed | Checked | Approved | |
| | | | |

Chengdu BOE Optoelectronics Technology CO., LTD



PRODUCT GROUP

REV.

ISSUE DATA

AMOLED - PRODUCT

P1

2018.12.24

Revision History

| Rev. | ECN No. | Description of Change | Date | Prepared |
|------|---------|-----------------------|------------|----------|
| P0 | - | Initial issue | 2018.04.16 | |
| P1 | | Revised | 2018.11.30 | |
| | | | | |
| | | | | |
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1. General Description

1-1. Introduction

BOE 5.1" HD is a color active matrix AMOLED module using Low Temperature Poly-silicon TFT's (Thin Film Transistors) as active switching devices. This module has a 5.1inch diagonally measured active area with HD resolutions (720horizontal by 1520vertical pixel arrays). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors.

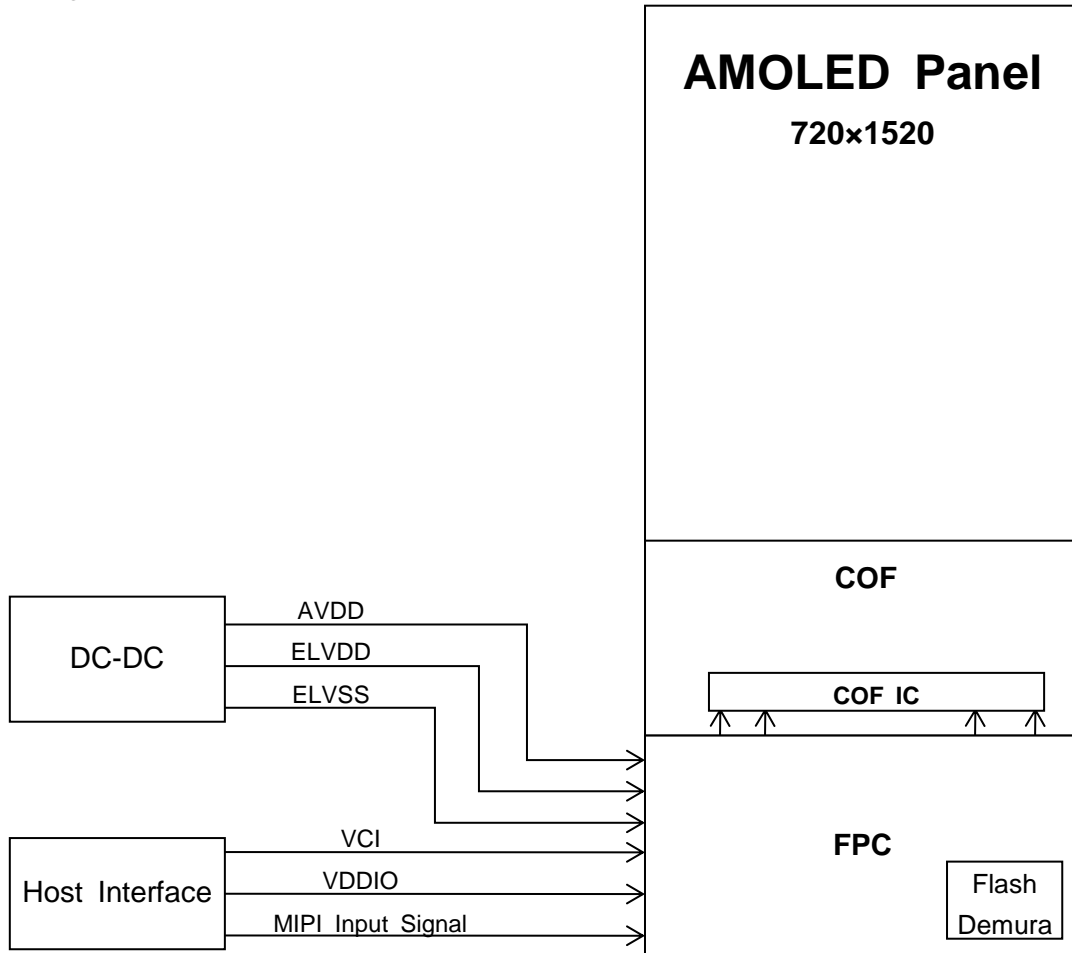


Figure 1

1-2. Features

- 1) AMOLED Display type with 3D Cover Glass
- 2) Display Format : 5.1" HD Real RGB : 720x1520
- 3) Interface : MIPI-DSI 4 lanes
- 4) Driver IC : RM69299
- 5) Polarizer : CPOL(with PSA)+Flexible Touch Sensor

1-3. Application

- Smart Mobile Phone

2. Specification

2-1. Panel Specification

Table 1

| Item | Specifications | Unit | Remark |
|-------------------|---------------------|------|--------|
| Panel outline | 57.604×120.564×0.13 | mm | |
| Number of dots | 720×1520 | | 19:9 |
| Active area | 55.404×116.964 | mm | |
| Diagonal Inch | 5.1inch | inch | |
| Pixel pitch | 76.95×76.95 | um | |
| Pixel Arrangement | Real RGB | | |

2-2. Mechanical Specification

Table 2

| Item | Specifications | Unit | Remark |
|-----------------|----------------|------|--------|
| MDL outline | 70.78×151.31 | mm | |
| View area | 55.99×117.56 | mm | |
| Weight | 25.12 | g | |
| Total Thickness | 1.343 | mm | |

3. Absolute Maximum Ratings

Table 3

| Item | Symbol | Min. | Max. | Unit | Note |
|-----------------------|--------|-------|-------|------|------|
| I/O Voltage | VDDIO | 1.62 | 1.98 | V | |
| Operation Voltage | VCI | 2.60 | 3.60 | V | |
| EL Driving Voltage | ELVDD | 4.40 | 4.80 | V | |
| | ELVSS | -5.00 | -1.40 | V | |
| Supply voltage (TSP) | VCC | 2.7 | 3.6 | V | |
| Operating temperature | Topr | -20 | 70 | °C | |
| Storage temperature | Tstg | -40 | 80 | °C | |

4. Electrical Characteristics

4-1 Power Consumption of Display Panel and Touch panel

Test Condition: Temp=25±2°C

Table 4 (Actual Value)

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark | | |
|-------------------------------|------------------|-----------------|-------|-------|-------|------|--------------------|--------------------------|--|
| ELVDD | ELVDD | - | 4.40 | 4.60 | 4.80 | V | | | |
| ELVSS | ELVSS | - | -5.0 | -2.40 | -1.40 | V | Controlled by DDIC | | |
| AVDD | AVDD | - | 5.40 | 6.70 | 7.60 | V | | | |
| VCI | VCI | - | 2.60 | 3.00 | 3.60 | V | | | |
| VDDIO | VDDIO | - | 1.62 | 1.80 | 1.98 | V | | | |
| Current Consumption (Display) | Display on mode | IC | VCI | 2.0 | 3.5 | 5.0 | mA | Full White | |
| | | | VDDIO | 19.5 | 22.0 | 28.0 | mA | | |
| | | | AVDD | 6 | 13.5 | 17.0 | mA | | |
| | Sleep in mode | Panel | EL | - | 147 | 164 | mA | Full White 886nit w/o CG | |
| | | | IC | VCI | - | 0.1 | 0.5 | mA | |
| | | | | VDDIO | - | 2.5 | 5.0 | mA | |
| AOD mode | IC | VCI | | 3.74 | 4.88 | mA | | | |
| | | VDDIO | | 17.49 | 20.90 | mA | | | |
| | | AVDD | | 37.62 | 45.12 | mA | | | |
| Actual Frame Frequency | F_{frm} | - | 65 | 67 | 69 | Hz | | | |
| Design Frame Frequency | F_{frm} | - | 59 | 60 | 61 | Hz | | | |
| Vin | Vin(DC DC Input) | White Mode L255 | - | - | - | mA | Vin=4v | | |
| | | | - | - | - | mA | Vin=3.7v | | |

Notes :

- The value is just the reference value. The customer may optimize the setting value.
- The current of Vin is just the reference value, because it depends on the efficiency of Power IC.
- IC Power Consumption $P_{IC}=V_{VDDIO} \cdot I_{VDDIO}+V_{VCI} \cdot I_{VCI}+V_{AVDD} \cdot I_{AVDD}$
 EL Power Consumption $P_{EL}=V_{ELVDD} \cdot I_{ELVDD}+V_{ELVSS} \cdot I_{ELVSS}$
 Total Power Consumption $P_{total}=P_{EL}+ P_{IC}$

4-2 Power Consumption of Display Panel and Touch panel

Power Supply: TSP_3.3V =3.0V, TSP_1.8V =1.8V, VCI_3.3V =3.3V, VDD_1.8V =1.8V, VLIN1=7.3V
 Report Rate:125Hz @ Display panel Frame Frequency = 60Hz

Table 5

| Work Mode | Item | Symbol | Value | | Unit | Remark |
|------------|---------------------|-----------|-------|----------------|------|-----------|
| | | | Typ | Measured Value | | |
| Sleep Mode | Current of TSP_1.8V | ITSP_1.8V | - | - | uA | |
| | Current of TSP_3.3V | ITSP_3.3V | 120 | 124 | uA | |
| Idle Mode | Current of TSP_1.8V | ITSP_1.8V | - | - | uA | |
| | Current of TSP_3.3V | ITSP_3.3V | 1.3 | 1 | mA | |
| No finger | Current of TSP_1.8V | ITSP_1.8V | - | - | mA | |
| | Current of TSP_3.3V | ITSP_3.3V | 15 | 13.9 | mA | active 模式 |
| 1 Finger | Current of TSP_1.8V | ITSP_1.8V | - | | mA | |
| | Current of TSP_3.3V | ITSP_3.3V | 15 | 14.1 | mA | |
| 5 Finger | Current of TSP_1.8V | ITSP_1.8V | - | | mA | |
| | Current of TSP_3.3V | ITSP_3.3V | 15 | 14.5 | mA | |
| 10 Finger | Current of TSP_1.8V | ITSP_1.8V | - | | mA | |
| | Current of TSP_3.3V | ITSP_3.3V | 15 | 15 | mA | |

5. Electro-optical Characteristics

5-1 Electro-optical Characteristics with CG

| Item | Symbol | Temp | Condition | Min. | Typ. | Max. | Unit | Note | |
|-------------------------|--------|------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|-------------------|----------------------------------------|-------------------------|
| Brightness | | 25°C | Normal (W L255) | 350 | 390 | - | Cd/m ² | Center Brightness | |
| Uniformity | | 25°C | | 75 | 85 | - | % | (1) | |
| Contrast ratio | K | 25°C | $\Phi=0^\circ, \theta=0^\circ$ | | 76000:1 | - | - | (2) Based on CA-310 (Probe 10 Φ) | |
| Color of CIE coordinate | White | x | 25°C | $\Phi=0^\circ, \theta=0^\circ$ CIE1931 | - | 0.292 | - | - | Color of CIE coordinate |
| | | y | | | - | 0.317 | - | - | |
| | Red | x | | | 0.654 | 0.679 | 0.704 | - | |
| | | y | | | 0.296 | 0.321 | 0.346 | - | |
| | Green | x | | | 0.210 | 0.260 | 0.310 | - | |
| | | y | | | 0.655 | 0.705 | 0.755 | - | |
| | Blue | x | | | 0.115 | 0.140 | 0.165 | - | |
| | | y | | | 0.022 | 0.047 | 0.072 | - | |
| Color Gamut | | 25°C | NTSC , CIE1931 | 90 | 100 | - | % | (3) | |
| White color shift | | 25°C | $\Phi=30^\circ, \theta=30^\circ$ | - | 4.0 | 4.9 | JNCD | | |
| Viewing Angle | | 25°C | Up/Down/Right/Left CR ratio ≥ 10 | 75 | 80 | - | deg | (4) | |
| Cross Talk | | 25°C | Background: gray127 | - | - | 2 | % | (5) | |
| Gamma | | 25°C | - | 2.0 | 2.2 | 2.4 | | | |
| Life time | | 25°C | Light on for 280 hrs. | Lc (Typ.): 95% $L_c = \frac{L_{W,280hr}}{L_{W,0hr}} + \left(1 - \frac{L_{B,280hr}}{L_{B,0hr}}\right)$ Lw (Brightness of W area) LB (Brightness of B area) | | | | (6) 390 Cd/m ² | |

5-2 Electro-optical Characteristics without CG

| Item | Symbol | Temp | Condition | Min. | Typ. | Max. | Unit | Note | |
|-------------------------|--------|------|-----------------|-------------------------------------------|-------|-------|-------------------|-------------------|-------------------------|
| Brightness | | 25°C | Normal (W L255) | 797 | 886 | - | Cd/m ² | Center Brightness | |
| Color of CIE coordinate | White | x | 25°C | $\Phi=0^\circ, \theta=0^\circ$ CIE1931 | 0.265 | 0.285 | 0.305 | - | Color of CIE coordinate |
| | | y | | | 0.290 | 0.310 | 0.330 | - | |

Notes :

(1) Uniformity Measuring Point: Typical luminance: based on different customers different requirements, for example 350 cd/m2, 380 cd/m2, 390 cd/m2 etc.

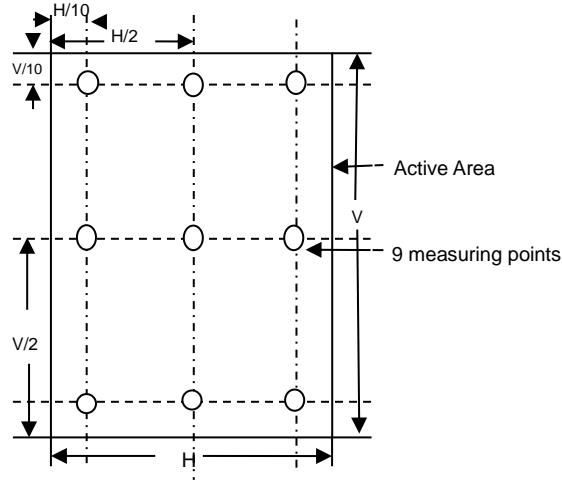


Figure 2. Uniformity Measuring Point

$$\text{Uniformity} = L_{\min} / L_{\max} \times 100\%$$

(2) Definition of contrast ratio(K)

$$CR = \frac{\text{Luminance When Display panel is at "White" state}}{\text{Luminance When Display panel is at "Black" state}}$$

(3) Definition of Color of CIE Coordinate and NTSC Ratio

The test condition is at 25°C and measured on the surface of Display panel module.

- Measurement equipment: CS2000 or similar equipment.
- The Color Coordinate (CIE 1931/CIE 1976) measure the center of active area of the module.

$$S = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$$

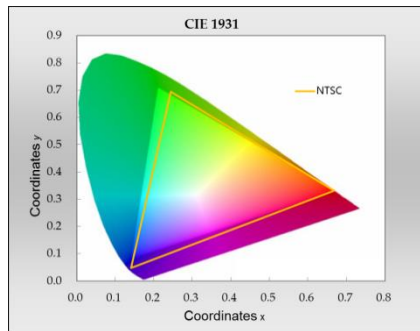


Figure 4. Color Coordinate

(4) Viewing Angle measuring system

Refer to the graph below marked by θ and Φ

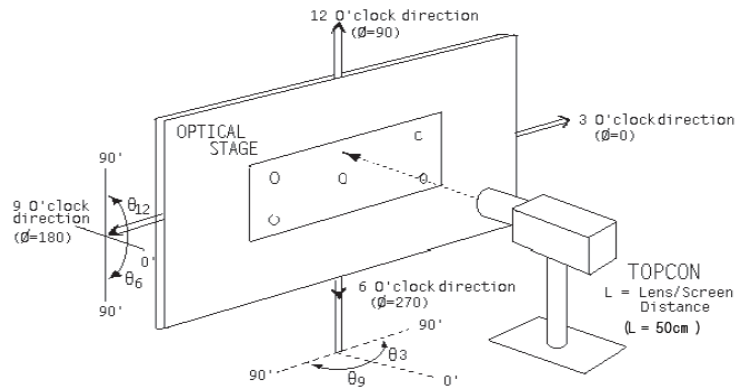


Figure 5. Viewing Angle measuring system

(5) Crosstalk measurement shall be done at the center of the different pattern and the result shall be calculated as follow formula.

- a. measure luminance at the center.
- b. calculate cross talk as below equation:

$$\text{Crosstalk}(V) = \max \left(\left| \frac{L_{V1} - L_{V2}}{L_{V2}} \right| \times 100, \left| \frac{L_{V3} - L_{V4}}{L_{V4}} \right| \times 100 \right)$$

$$\text{Crosstalk}(H) = \max \left(\left| \frac{L_{H1} - L_{H2}}{L_{H2}} \right| \times 100, \left| \frac{L_{H3} - L_{H4}}{L_{H4}} \right| \times 100 \right)$$

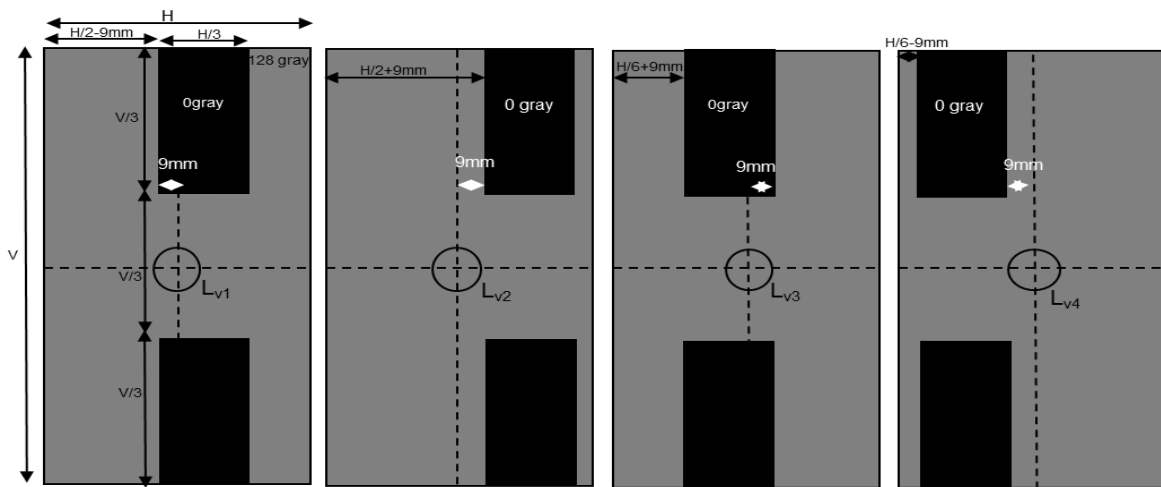


Figure 6. Vertical crosstalk measuring pattern

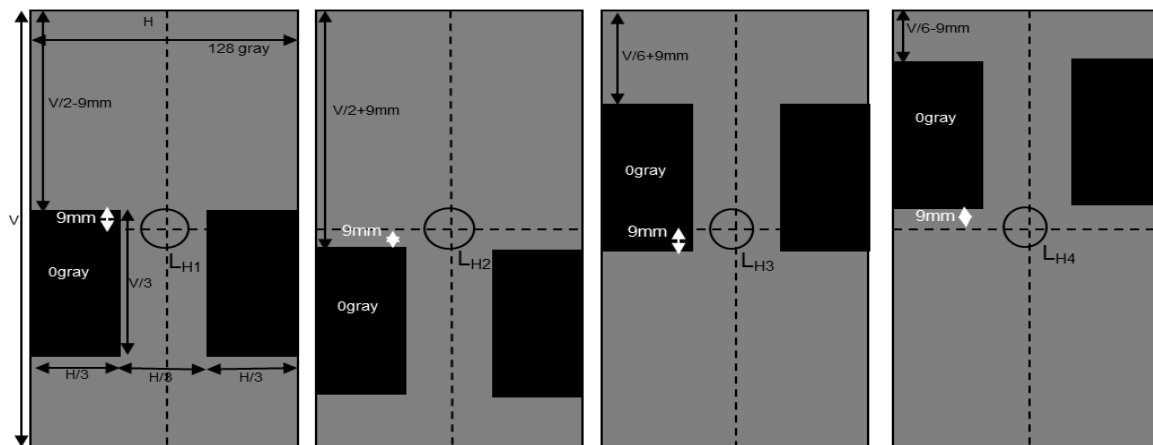


Figure 7. Horizontal crosstalk measuring pattern