



# ***PALM TECHNOLOGY CO., LTD.***

***The LCD(M) Specialist***

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PART NO. : PP0758048BWR-A101

FOR MESSRS. : \_\_\_\_\_

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# 1. General Description

## 1.1 Introduction

PP0758048BWR-A101 is an Active Matrix Electrophoretic Paper Display(EPD) module.

This EPD has a 7.5 inch diagonally measured active area with resolution (800x480 pixels).

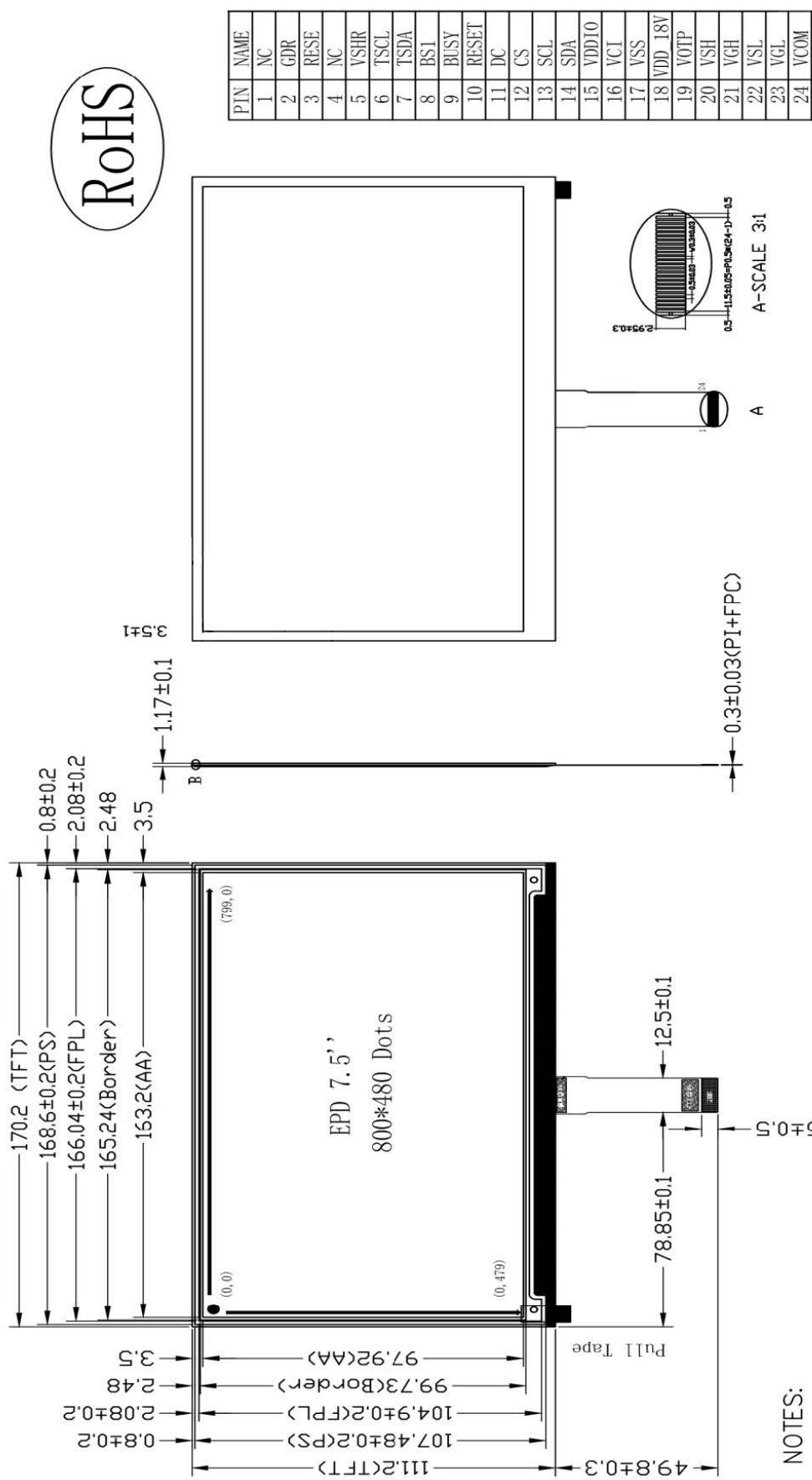
Due to its bi-stable nature, the EPD mode requires very little power to update and needs no power to maintain an image.

Customers use passive matrix display design to match the peripheral configuration circuit recommended by EPD. Note that the incorrect resolution of the pattern shake algorithm. Will affect the correctness of the EPD screen brushing pattern.

## 1.2 Features:

| No. | Item                  | Specification                                            |
|-----|-----------------------|----------------------------------------------------------|
| 1   | Panel Size            | 7.5" inch                                                |
| 2   | Number of Pixels      | 800(H)x480(V)                                            |
| 3   | Panel Size            | 170.2(H)x111.2(V) ×1.17(D) mm                            |
| 4   | Border                | 165.24(H)x99.74(V) mm                                    |
| 5   | Active Area           | 163.2(H)x97.92(V) mm                                     |
| 6   | Pixel Pitch           | 204(H)x204(V) um                                         |
| 7   | PPI                   | 124                                                      |
| 8   | Display Colors        | 3-Color(Black/White/Red)                                 |
| 9   | Display Mode          | Electrophoretic Bitmap Display                           |
| 10  | Interface             | 3-wire SPI / 4-wire SPI                                  |
| 11  | Driver IC             | JD79686AB                                                |
| 12  | Bi-stable state       | No power supply is required for the end of image refresh |
| 13  | Operation Temperature | 0°C ~ +40°C                                              |
| 14  | Storage Temperature   | -25°C ~ +60°C                                            |
| 15  | Weight                | 40.8g ±0.2g                                              |

2. Mechanical Specificati



### 3. Pin Description

| Pin No. | Pin Symbol | Type | Connect to                  | Function                                                                                                     |
|---------|------------|------|-----------------------------|--------------------------------------------------------------------------------------------------------------|
| 1       | NC         | NC   |                             | No connect.                                                                                                  |
| 2       | GDR        | O    | Power MOSFET driver control | This pin is N-Channel MOSFET gate driver control pin. (Note1)                                                |
| 3       | RESE       | I    | Booster control input       | This pin is Current sense input pin for the control Loop. (Note1)                                            |
| 4       | NC         | -    |                             | No connect.                                                                                                  |
| 5       | VSHR       | C    | Stabilizing capacitor       | This pin is Positive Source driving voltage. (Note2)                                                         |
| 6       | TSCL       | O    | Temperature sensor SCL      | These pin is IIC interface to digital temperature sensor.<br>If not used Please connect to GND.              |
| 7       | TSDA       | I/O  | Temperature sensor SDA      |                                                                                                              |
| 8       | BS1        | I    | VDDIO/VSS                   | This pin is for selecting 3-wire or 4-wire SPI bus.<br>BS1=H,3-wire (9-bit) SPI<br>BS1=L,4-wire SPI          |
| 9       | BUSY       | O    | MCU                         | This pin is Busy state output pin.<br>BUSY=L, the chip is busy state;<br>BUSY=H, the chip is not busy state. |
| 10      | RESET      | I    | MCU                         | This pin is reset signal input, Active LOW.                                                                  |
| 11      | DC         | I    | MCU                         | This pin is Data/Command control pin.                                                                        |
| 12      | CS         | I    | MCU                         | This pin is the chip select input.<br>CS=H, chip is not selected;<br>CS=L, chip is selected.                 |
| 13      | SCL        | I    | MCU                         | This pin is serial clock pin for interface.                                                                  |
| 14      | SDA        | I/O  | MCU                         | This pin is serial data in for interface.                                                                    |
| 15      | VDDIO      | P    | Power Supply                | Power input pin for the chip(3.0V)                                                                           |
| 16      | VCI        | P    | Power Supply                | Power input pin for the chip(3.0V)                                                                           |
| 17      | VSS        | P    | Power Ground                | Power Ground.                                                                                                |
| 18      | VDDD       | P    | Capacitor                   | Core logic power pin, VDDD can be regulated internally from VCI.                                             |
| 19      | VPP        | P    | Open                        | Power supply for OTP Programming.<br>Customer not used, please Open.                                         |
| 20      | VSH        | C    | Capacitor                   | This pin is Positive Source driving voltage. (Note2)                                                         |
| 21      | VGH        | C    | Capacitor                   | This pin is Positive Gate driving voltage. (Note1)                                                           |
| 22      | VSL        | C    | Capacitor                   | This pin is Negative Source driving voltage. (Note2)                                                         |
| 23      | VGL        | C    | Capacitor                   | This pin is Negative Gate driving voltage. (Note1)                                                           |
| 24      | VCOM       | C    | Capacitor                   | This pin is VCOM driving voltage. (Note3)                                                                    |

#### Type:

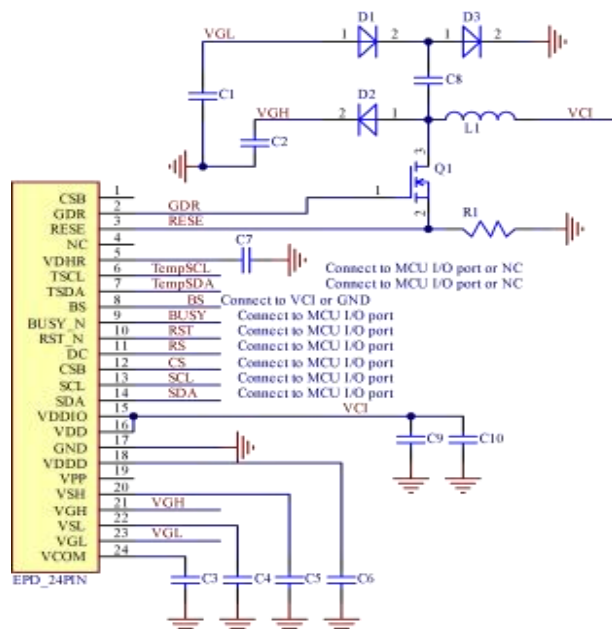
|               |                   |                                     |
|---------------|-------------------|-------------------------------------|
| I = Input     | O = Output        | I/O = Bi-directional (input/output) |
| P = Power pin | C = Capacitor PIN | NC= Not connected                   |

## Function:

Note 1: VGH, VGL Generation, connect a stabilizing capacitor to VSS.

Note 2: VSH, VSHR, VSL Generation, connect a stabilizing capacitor to VSS.

Note 3: VCOM Generation, connect a stabilizing capacitor to VSS.



## 4. REFERENCE CIRCUIT

| Part Name    | Value     | Requirements/Reference Part                                                                                                                                  |
|--------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C3~C7,C9,C10 | 1uF/25V   | 0603;X5R/X7R, Voltage Rating: $\geq 25V$                                                                                                                     |
| C8           | 1uF/50V   | 0603; X5R/X7R; Voltage Rating: $\geq 50V$                                                                                                                    |
| C1, C2       | 4.7uF/50V | 0805; X5R/X7R; Voltage Rating: $\geq 50V$                                                                                                                    |
| R1           | 2.2 ohm   | 0603; 1% variation; $\geq 0.05W$ ;                                                                                                                           |
| D1—D3        | Diode     | MBR0530, 1)Reverse DC voltage $\geq 30V$ 2) Forward current $\geq 500mA$ 3)Forward voltage $\leq 430mV$                                                      |
| Q1           | NMOS      | Si1308EDL、 Si1304BDL, 1)Drain-source break volatage $\geq 30V$ 2)Gate-source threshold voltage $\leq 1.5V$ 3)Drain-source on-state resistance $< 400m\Omega$ |
| L1           | 47uH      | CDRH2D18 / LDNP-470NC, 1)Maximum DC current $\sim 420mA$ 2)Maximum DC resistance $\sim 650m\Omega$                                                           |

## 5. Electrical Characteristics

The following specifications apply for: VCI=3.0V, T=25°C

### 5.1 Model No: PP0758048BWR-A101

| Parameter                | Symbol         | Min. | Typ. | Max. | Unit | Conditions                    |
|--------------------------|----------------|------|------|------|------|-------------------------------|
| Digital Supply Voltage 1 | VDDIO          | 2.3  | 3.0  | 3.6  | V    | Working voltage               |
| Digital Supply Voltage 2 | VCI            | 2.3  | 3.0  | 3.6  | V    | Working voltage               |
| I-mean                   | Iavg           | -    |      | -    | mA   | VCI=3.0V<br>Hold Refresh Time |
| I-peak                   | I <sub>p</sub> | -    |      |      | mA   | VCI=3.0V<br>Hold 10us         |
| I-deep sleep             | I              | -    | 1.0  | 2.0  | uA   | T=25°C                        |
| Refresh Time             | t              | -    | 14   | 30   | s    | T=25°C                        |
| Power consumption        | -              | -    |      | -    | mw   | Refresh pattern process       |

## 6. MCU SERIAL Peripheral Interface

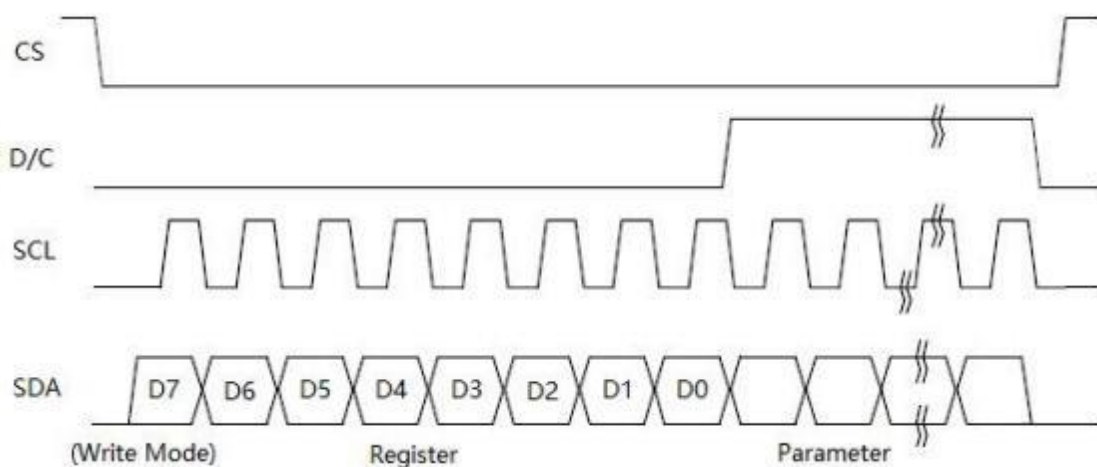
### 6.1 Agreement for 4-wire SPI

| Function      | SCL | SDA         | DC | CS |
|---------------|-----|-------------|----|----|
| Write command | ↑   | Command bit | L  | L  |
| Write data    | ↑   | Data bit    | H  | L  |

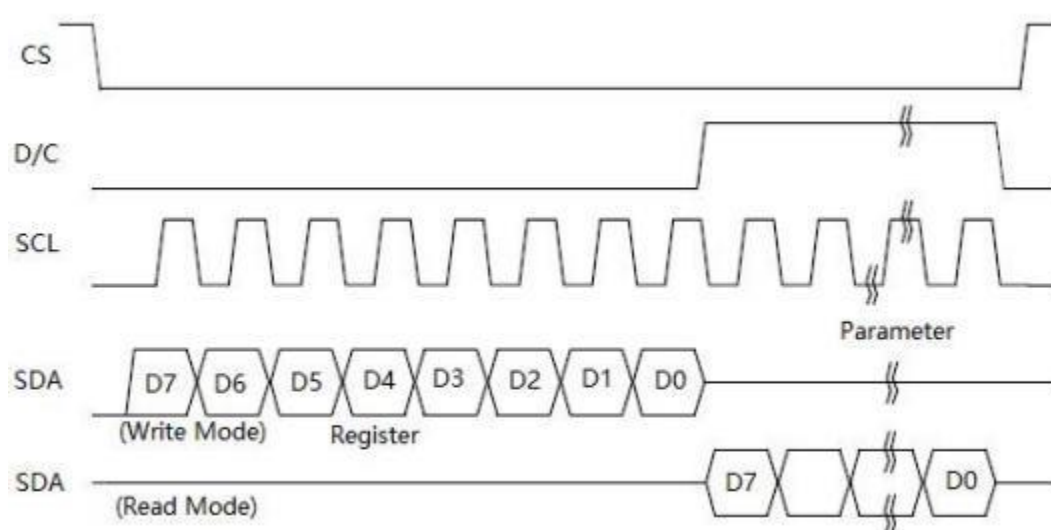
Note: L is connected to VSS ; H is connected to VCI(3.0V)

“↑” stands for rising edge of signal

Write Command/Data Sequence diagram:



Read Data Sequence diagram:



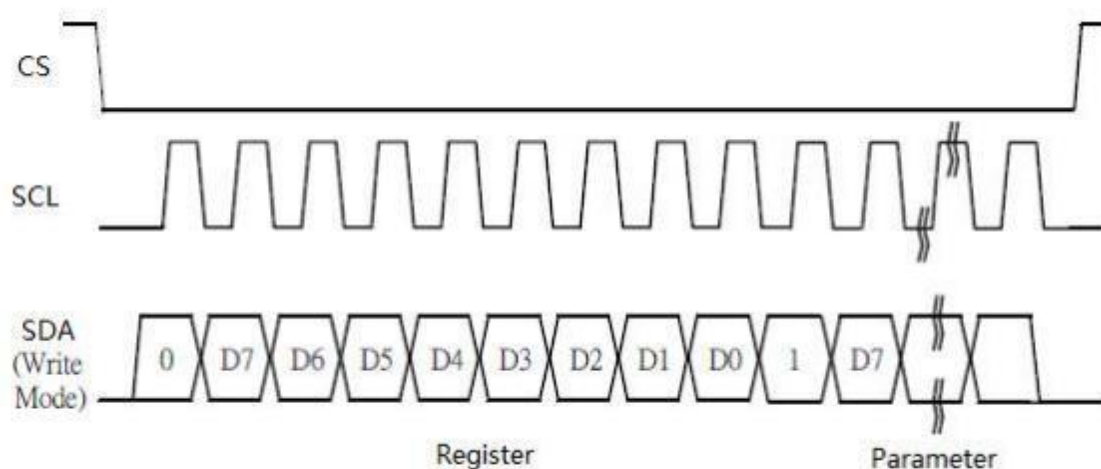
## 6.2 Agreement for 3-wire SPI

| Function      | SCL | SDA         | DC      | CS |
|---------------|-----|-------------|---------|----|
| Write command | ↑   | Command bit | Tie LOW | L  |
| Write data    | ↑   | Data bit    | Tie LOW | L  |

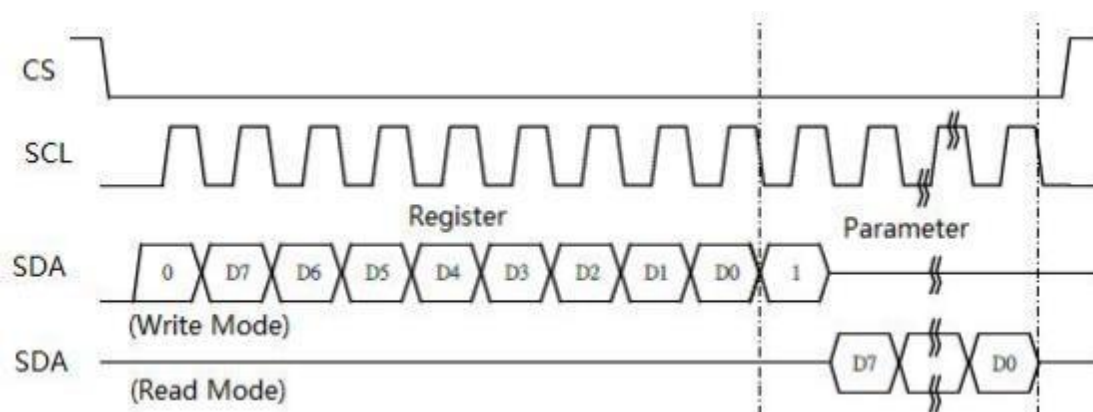
Note: L is connected to VSS

“↑” stands for rising edge of signal

Write Command/Data Sequence diagram:



Read Data Sequence diagram:



## 7. Reliability TEST

| Test Item |                                          | Test Condition                                                                                                                                                                                                                              |
|-----------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1         | Low Temperature Operation                | Ta=0°C; 500hrs                                                                                                                                                                                                                              |
| 2         | High Temperature Low Humidity Operation  | Ta=40°C,RH=35%; 500hrs                                                                                                                                                                                                                      |
| 3         | High Temperature High Humidity Operation | Ta=40°C,RH=90%; 500hrs                                                                                                                                                                                                                      |
| 4         | Low Temperature Storage                  | Ta=-25°C, 500hrs                                                                                                                                                                                                                            |
| 5         | High Temperature High Humidity Storage   | Ta=50°C,RH=90%; 500hrs                                                                                                                                                                                                                      |
| 6         | High Temperature High Humidity Storage   | Ta=60°C, RH=80%,500hrs                                                                                                                                                                                                                      |
| 7         | Temperature Cycle                        | -25°C(0.5h) ~ 60°C(0.5h) / 50 cycles<br>Test in white pattern                                                                                                                                                                               |
| 8         | Package Vibration                        | 1.04 G, Frequency:10~500Hz Direction: X, Y, Z<br>Duration: 1 hrs in each direction                                                                                                                                                          |
| 9         | Package Drop Impact                      | Drop from height of 122 cm on Concrete surface<br>Drop sequence: 1 corner 3 edges,<br>6 face One drop for each                                                                                                                              |
| 10        | ESD Gun                                  | Air ±15 KV; Contact ±8 KV<br>(Test finished product shell, not display only)<br>Air ±8 KV; Contact ±6 KV<br>(Naked EPD display, no including IC and FPC area)<br>Air ±4 KV; Contact ±2 KV<br>(Naked EPD display, including IC and FPC area) |

Note: Put in normal temperature for 1 hour after test finished, display performance is ok

## 8. Quality Assurance

### 8.1 Inspection Standard

8.1.1 inspection tools: magnifying glass, dot-line gauge.

8.1.2 Inspection conditions and environment:

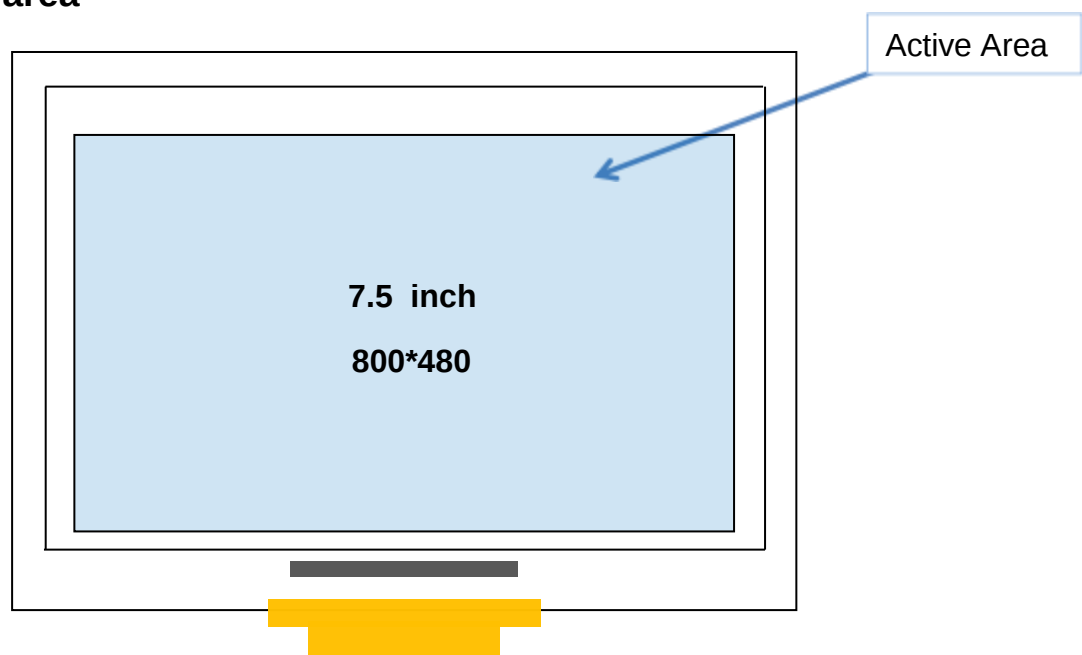
8.1.3 Detection distance:  $30 \pm 5$  cm, angle normal plus or minus  $50^\circ - 70^\circ$

8.1.4 Ambient temperature:  $23 \pm 3^\circ\text{C}$

8.1.5 humidity:  $60 \pm 10\%\text{RH}$ :

8.1.6 Inspection Illumination: 800~1200Lux

### 8.2 Display area



### 8.3 Operational attention

EPD display module is sensitive to static electricity. Dismantling the display module may break the glass, damage the display surface easily, cause permanent damage and invalidate the warranty agreement. Please follow the common precautions for handling fragile electronic components.

8.3.1 Storage temperature requirements: ambient temperature- $25^\circ\text{C} \leq t \leq 45^\circ\text{C}$  . After opening the package, EPD products must be stored in an environment of temperature  $< 30^\circ\text{C}$  and humidity  $< 60\%$ .

- 8.3.2 When receiving the goods, please handle with care, please check the integrity of the package carefully, please check the package and the inner package tray for obvious damage.
- 8.3.3 Do not open the screen for a long time in the following situations: 1 the display screen is abnormal, 2 the heat dissipation condition is not good, and 3 the circuit of the control system is unstable. The screen body or power supply line and front-end power supply switch should be checked in time.
- 8.3.4 The conductive part of the EPD module screen without structural protection
- 8.3.5 To clean the surface of the module, please use a soft brush to remove dust and gently brush it with alcohol. Do not use any corrosive liquid to clean the surface of the EPD module, otherwise the surface of the EPD screen may be damaged.
- 8.3.6 If short circuit, scorch, disconnection and other abnormal conditions are found in use, you should not repeatedly turn on the power test, but need to find a professional for maintenance.

## 9. Caution

EPD module screen, please check it out of the box within 8 hours after receipt of the goods. The damage caused by non-human factors has not been assembled, and it is still under Warranty.

EPD module screen after assembly, resulting in surface damage, structural damage damage, this product is not within the scope of warranty.