APPROVED SPECIFICATION

Module: 3.7 inch for EPD(B/W/R/Y)

MODEL No: PV3724041601A

CUSTOMER		
PREPARED BY	CHECKED BY	APPROVED BY

APPROVED			
PREPARED BY	CHECKED BY	DESIGNED BY	QUALITY BY

REVISION HISTORY

Version	Revise Date	Page	Content	Modified by
1.0	2023.10.15	12	First Issued	R&D
2.0	2024.04.09	4,7,8	Revision Parameter	R&D

TABLE OF CONTENTS

1. General Description

1.1 Introduction

PV3724041601A is an Active Matrix Electrophoretic Paper Display(EPD) module.

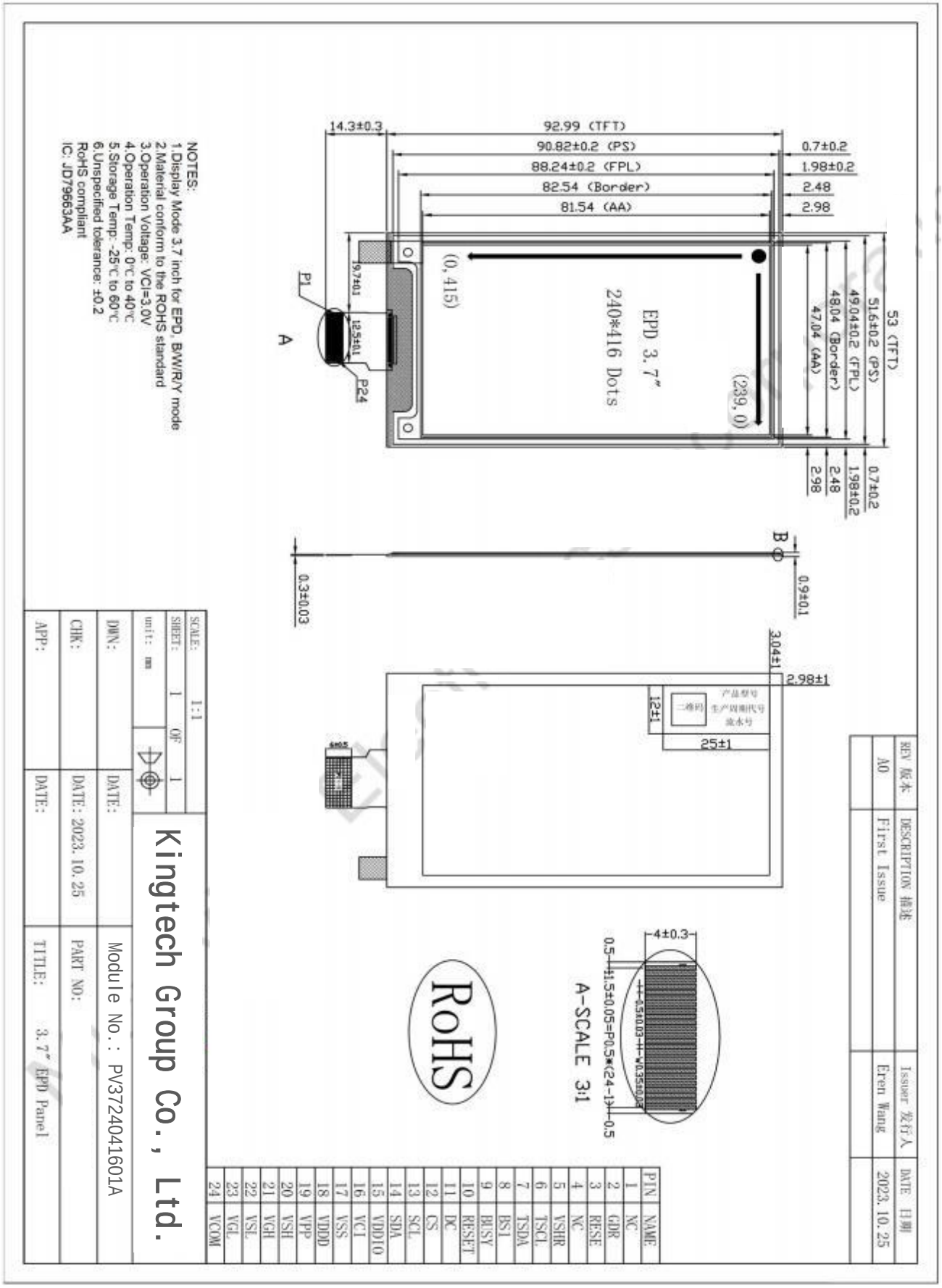
This EPD has a 3.7 inch diagonally measured active area with resolution (240x416 pixels). Due to its bi-stable nature, the EPD mode requires very little power to update and needs no power to maintain an image.

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	3.7” inch
2	Number of Pixels	240(H)x416(V)
3	Panel Size	53(H)x92.99(V) ×0.9(D) mm
4	Border	48.04(H)x82.54(V) mm
5	Active Area	47.04(H)x81.536(V) mm
6	Pixel Pitch	196(H)x196(V) um
7	PPI	130
8	Display Colors	4-Color(Black/White/Red/Yellow)
9	Display Mode	Electrophoretic Bitmap Display
10	Interface	3-wire SPI / 4-wire SPI
11	Driver IC	JD79663AA
12	Bi-stable state	No power supply is required for the end of image refresh
13	Operation Temperature	0℃ ~ +40℃
14	Storage Temperature	-25℃ ~ +60℃
15	Weight	8.9g ±0.2g

2. Mechanical Specification



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. 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. BS1=H,3-wire (9-bit) SPI BS1=L,4-wire SPI
9	BUSY	O	MCU	This pin is Busy state output pin. BUSY=L, the chip is busy state; 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. CS=H, chip is not selected; 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. 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:

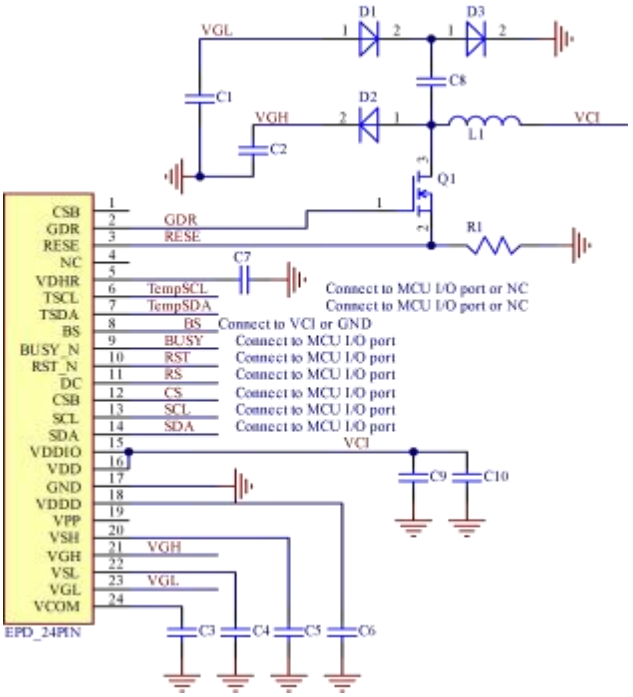
I = Input	O = Output	I/O = Bi-directional (input/output)
P = Power pin	C = Capacitor PIN	NC= Not connected

Function:

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

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

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



4. REFERENCE CIRCUIT

Part Name	Value	Requirements/Reference Part
C3~C8,C10	1uF/25V	X5R/X7R, Voltage Rating: >=25V
C1,C2	1uF/50V	0603/0805; X5R/X7R; Voltage Rating: >=50V
C9	0.1 uF/25V	0603/0805; X5R/X7R; Voltage Rating: >=25V
R1	2.2 ohm	0603/0805; 1% variation; ≥0.05W;
D1—D3	Diode	MBR0530,1)Reverse DC voltage 30V 2)Io 500mA 3)Forward voltage<430mV
Q1	NMOS	Si1304BDL/NX3008NBK, 1)Drain-Source breakdown voltage 30V 2)Vgs(th)=0.9V(typ),1.3V(max) 3)Rds on<2.1 ohm @Vgs=2.5V
L1	47uH	Taiyo Yuden NR4018T470M,DCR<0.5 ohm， Isat>=1.2A @25℃

5. Electrical Characteristics

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

5.1 Model No: M370SC4E2401A

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	-	14	-	mA	VCI=3.0V Hold Refresh Time
I-peak	Ip	-	150	-	mA	VCI=3.0V Hold 10us
I-deep sleep	I	-	1.0	2.0	uA	T=25℃
Refresh Time	t	-	14	42	s	T=25℃
Power consumption	-	-	42	-	mw	Refresh pattern process

6. MCU SERIAL Peripheral Interface

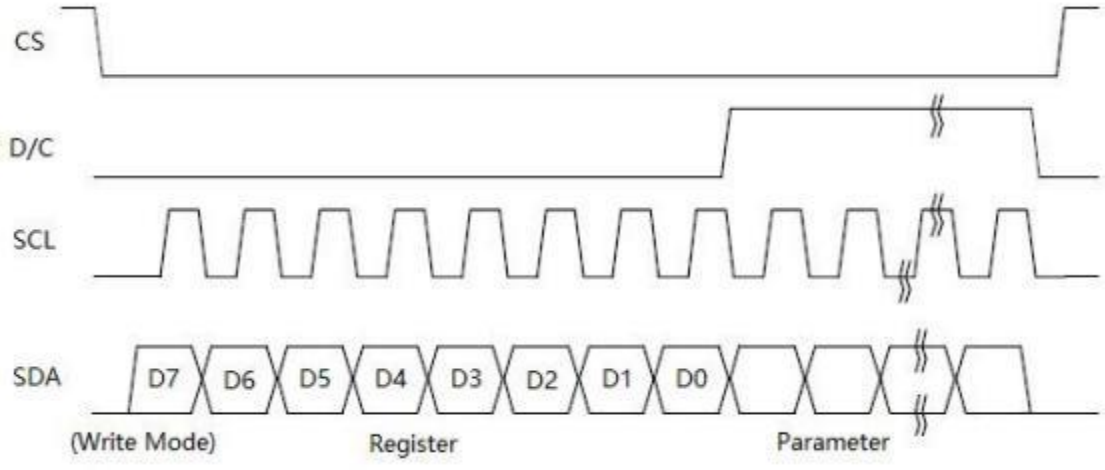
6.1 Agreement for 4-wire SPI

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

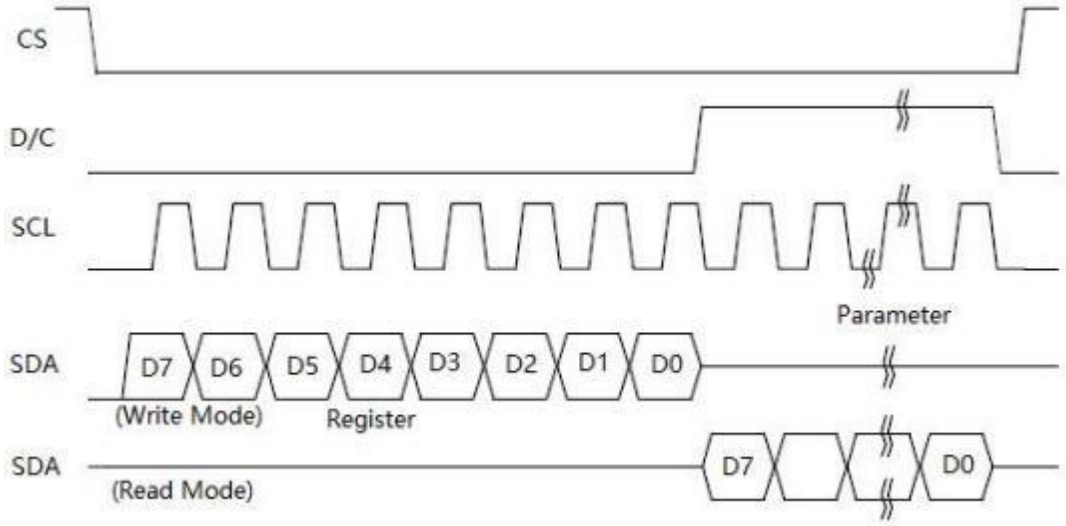
Note: L is connected to VSS ； H is connected to VCI(3.0V)

"↑" stands for rising edge of signal

Write Command/Data Sequence diagram:



Read Data Sequence diagram:



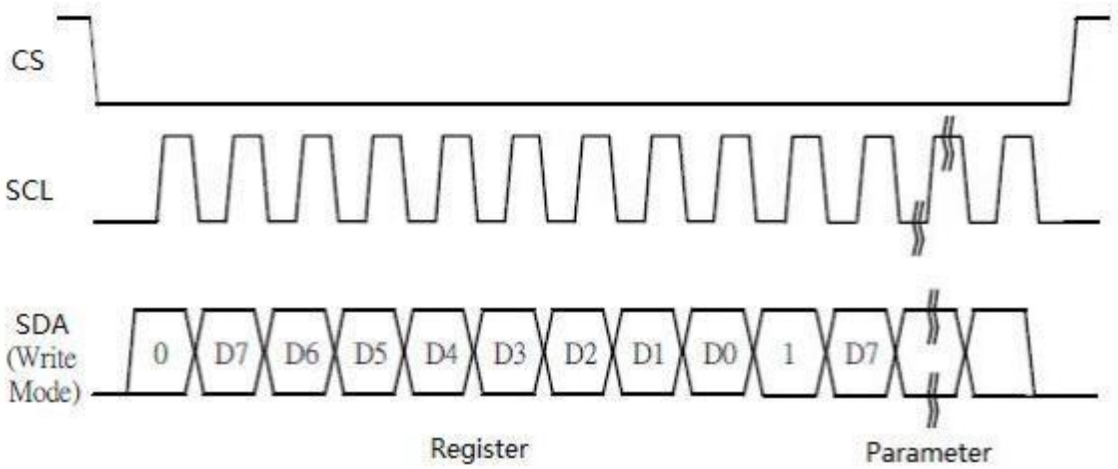
6.2 Agreement for 3-wire SPI

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

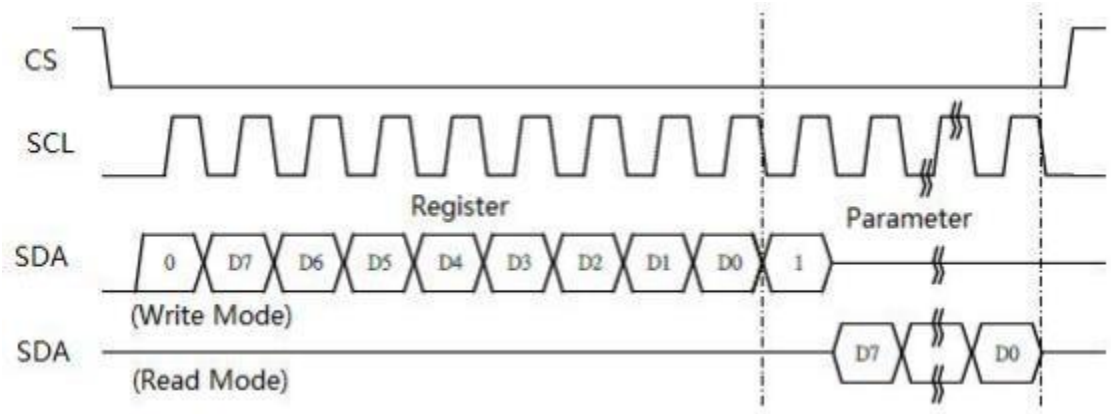
Note: L is connected to VSS

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

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

8.1.2 Inspection conditions and environment:

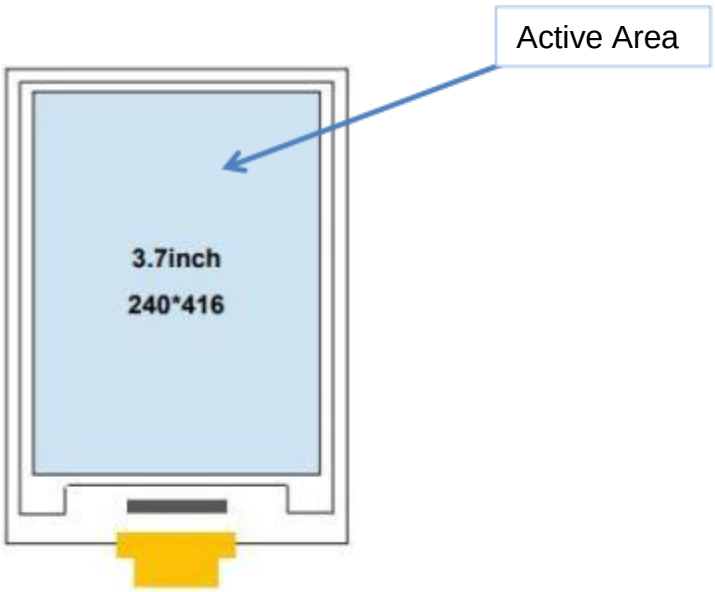
8.1.3 Detection distance: 30± 5 cm, angle normal plus or minus 50 °-70 °

8.1.4 Ambient temperature: 23 ±3 ℃

8.1.5 humidity: 60 ±10%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 ℃ ≤ t ≤ 40 ℃. After opening the package, EPD products must be stored in an environment of temperature < 30 ℃ 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.

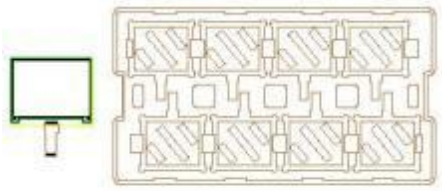
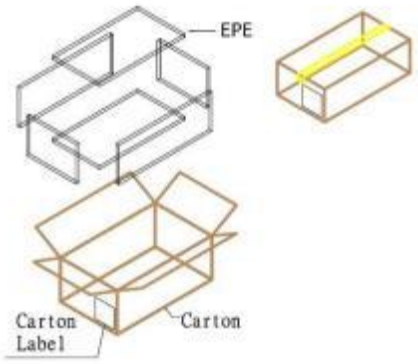
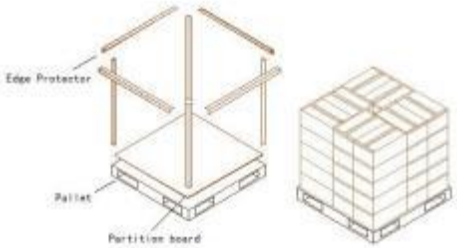
8.3.3 Do not open the screen for a long time in the following situations: 1 the display screen is abnormal, 2 the heat dissipation condition is not good, and 3 the circuit of the control system is unstable. The screen body or power supply line and front-end power supply switch should be checked in time.

8.3.4 The conductive part of the EPD module screen without structural protection should not be attached to conductive metal or used in a low-dust environment as far as possible, otherwise it will cause damage to the display effect and circuit.

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.Packing Method

1. Place the finished product flat in the Tray with PS facing up and FPC in the same direction. The number of products placed is 12 tablets	2. When stacking trays, pay attention to the left and right directions of the upper and lower trays. There are 17+2 empty Tray trays, and 2 pieces of desiccant need to be placed on the top	3. Put the stacked Tray into the vacuum electrostatic bag, then fold the bag, tighten the vacuum seal at both ends of the bag mouth (the electrostatic bag should be cut flat with the upper Tray after packaging, and the Tray must be firmly covered in the bag)
		
4. Before and after the inner packing, the buffer foam should be placed below, and then the vacuum sealed electrostatic bag of finished products should be paved, and the top layer should be placed with a piece of buffer foam	5. Place the corrugated cardboard on top of the wooden pallet and secure the corrugated cardboard to the wooden pallet with large staples.	6. The carton is placed on the pallet with the label facing outward, and each layer is rotated 90 degrees in any direction. There are 8 cases in each layer of five layers of packaging, a total of 5 layers (40 cases).
		

Size of pallet: 1150*1150*1100 mm

Quantity of products per pallet: 12*17*40 =8160pcs

10.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.