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Specification for 1.69"EPD

Model NO.: T0169A06

Product VER: A1

Customer Approval

Customer	
Approval By	
Date Of Approval	

It will be agreed by the receiver, if not sign back the Specification within 15days.

Prepared By	Checked By	Approval By
周涛涛	文涛	文涛



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Version	Content	Date	Producer
A0	New release	2026/07/20	Leslie
A1	Update Power Consumption	2026/08/07	Leslie



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1. General Description

T0169A06 is a reflective electrophoretic E Ink® Spectra 6 technology display module based on active matrix TFT substrate. It has 1.69" active area with 400 x 400 pixels. The display is capable to display images at Black/White/Red/Yellow/Blue/Green depending on the display controller and the associated waveform file it used.

2. Features

- 400*400 pixels display
- High contrast
- High reflectance
- Ultra wide viewing angle
- Ultra low power consumption
- Pure reflective mode
- Bi-stable display
- Commercial temperature range
- Landscape, portrait modes
- Hard-coat antiglare display surface
- Ultra Low current deep sleep mode
- On chip display RAM
- Low voltage detect for supply voltage
- High voltage ready detect for driving voltage
- Internal temperature sensor
- Waveform stored in On-chip OTP
- 10-byte OTP space for module identification
- Serial peripheral interface available
- On-chip oscillator
- On-chip booster and regulator control for generating VCOM, Gate and Source driving voltage
- I2C signal master interface to read external temperature sensor/ built-in temperature sensor

3. Typical Application

IOT System



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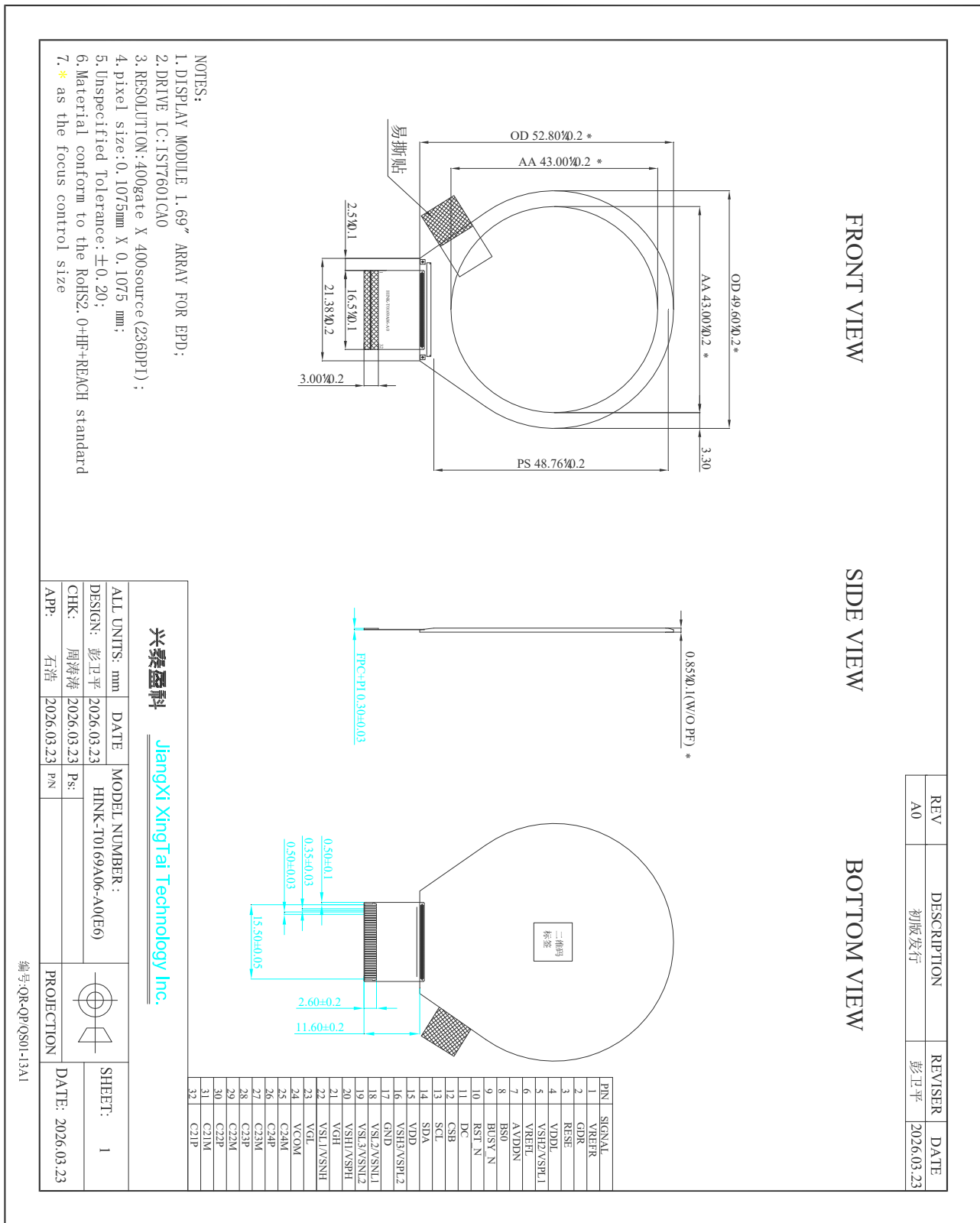
4. Mechanical Specifications

Parameter	Specifications	Unit	Remark
Screen Size	1.69	Inch	
Display Resolution	400(H) x 400(V)	Pixel	Dpi:236ppi
Active Area	43 (H) x 43 (V)	mm	
Pixel Pitch	0.1075 x 0.1075	mm	
Pixel Configuration	Square		
Outline Dimension	52.8 (H) x 49.6 (V) x 0.85(D)	mm	Without masking film
Weight	9 ± 3	g	



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5. Mechanical Drawing of EPD module





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6.Input/output Terminals

Pin #	Single	Description	Remark
1	VREFR	Digital power	
2	GDR	N-MOS gate control, for booster circuit output.	
3	RESE	Current sense input for control loop	
4	VDDL	Digital power	
5	VSH2/VSPL1	Positive source driver Voltage	
6	VREFL	Digital power	
7	AVDDN	Charge Pump voltage	
8	BS0	Bus Selection. Select 3-wire / 4-wire SPI interface. L: 4-wire interface. H: 3-wire interface.	Note 6-5
9	BUSY	Driver busy flag. L: Driver is Busy. H: Host side can send command/data to driver	Note 6-4
10	RST_N	Global reset pin	Note 6-3
11	DC	Serial communication Command/Data input	Note 6-2
12	CSB	Serial communication chip select.	Note 6-1
13	SCL	Serial communication clock input	
14	SDA	Serial communication data input/output	
15	VDD	Digital power	
16	VSH3/VSPL2	Positive source driver Voltage	
17	GND		
18	VSL2/VSNL1	Negative source driver voltage	
19	VSL3/VSNL2	Negative source driver voltage	
20	VSH1/VSPH	Positive source driver Voltage	
21	VGH	Positive Gate driving voltage	
22	VSL1/VSNH	Negative source driver voltage	
23	VGL	Negative Gate voltage.	
24	VCOM	VCOM output	
25	C24M	Digital power	
26	C24P	Digital power	
27	C23M	Digital power	
28	C23P	Digital power	
29	C22M	Digital power	
30	C22P	Digital power	
31	C21M	Digital power	
32	C21P	Digital power	



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1. Note 6-1: This pin (CSB) is the chip select input connecting to the MCU. The chip is enabled for MCU communication: only when CSB is pulled LOW.
2. Note 6-2: This pin (DC) is Data/Command control pin connecting to the MCU. When the pin is pulled HIGH, the data will be interpreted as data. When the pin is pulled LOW, the data will be interpreted as command.
3. Note 6-3: This pin (RST_N) is reset signal input. The Reset is active low.
4. Note 6-4: This pin (BUSY_N) is busy state output pin. When Busy is High, the operation of chip should not be interrupted and any commands should not be issued to the module. The driver IC will put Busy pin High when the driver IC is working such as: Outputting display waveform; Communicating with digital temperature sensor
5. Note 6-5: This pin (BS) is for 3-line SPI or 4-line SPI selection. When it is "Low", 4-line SPI is selected. When it is "High", 3-line SPI (9 bits SPI) is selected.



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7.Reference Circuit

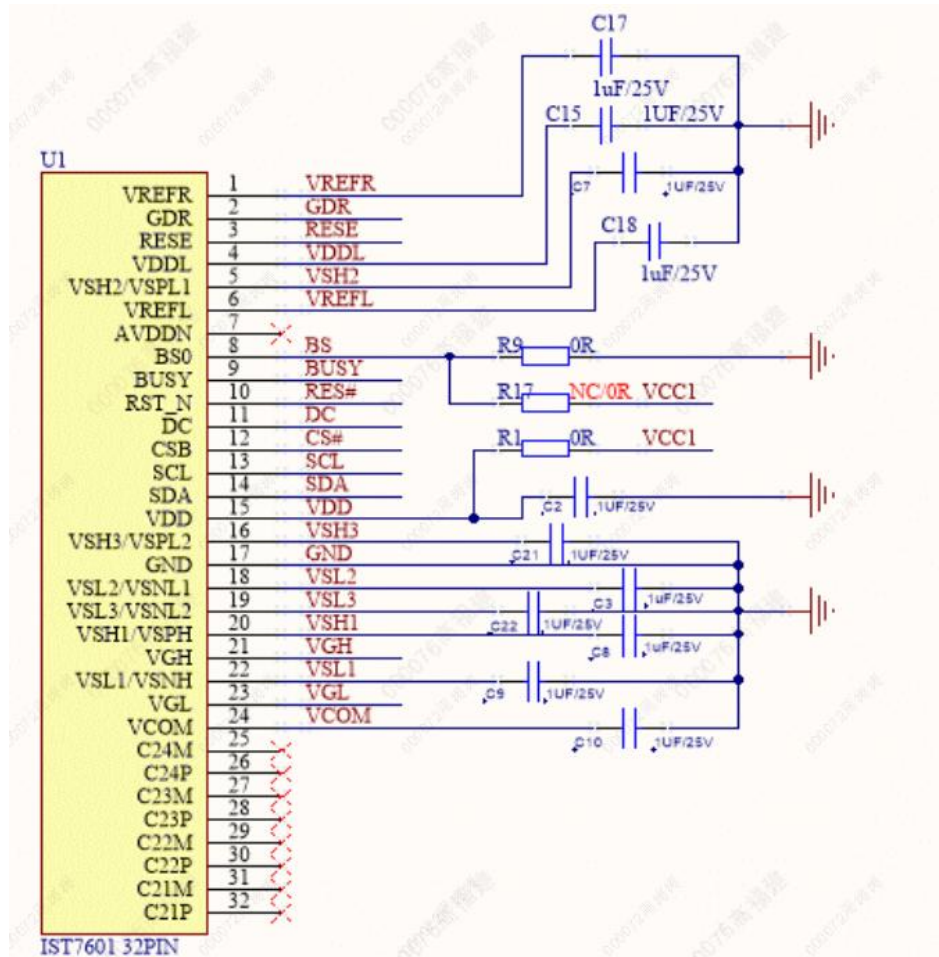


Figure. 7-1



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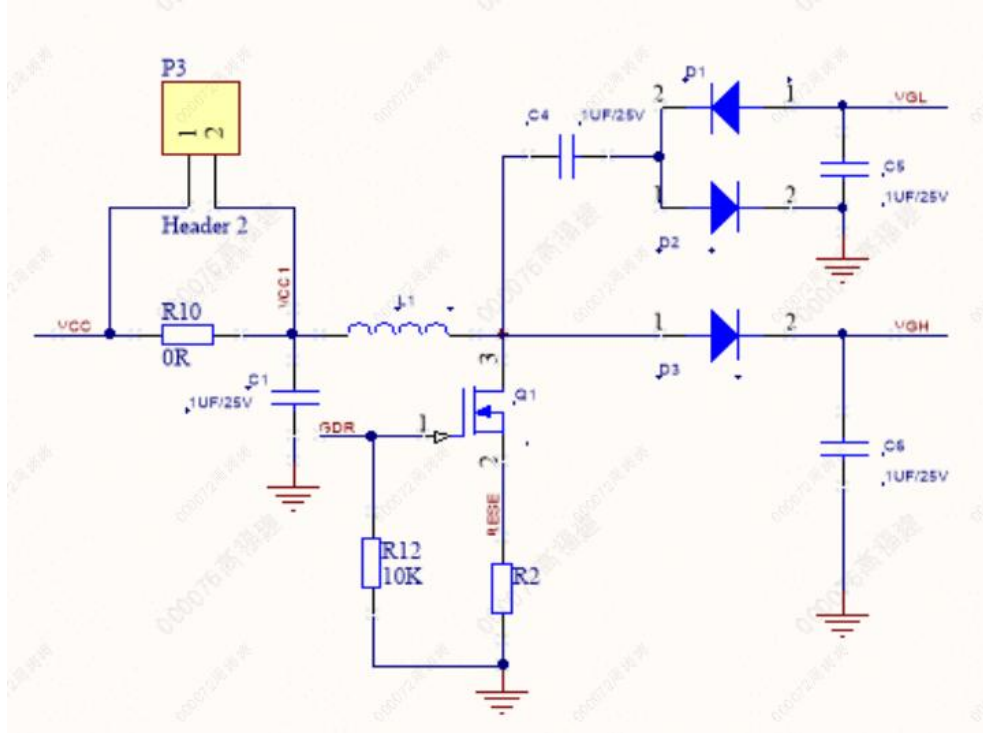


Figure. 7-2

Part Name	Value	IST7163 /Reference Part
C1-C4 C5-C6 C7-C10 C15、C17、 C18 C21-C22	1uF	0603;X5R;Voltage Rating: 25V
D1-D3	MBR0530	1)Reverse DC voltage $\geq 30V$ 2) $I_o \geq 500mA$ 3)Forward voltage $\leq 430mV$
R2	0.47 Ω :	0603: 1% variation
Q1	MOS	1) Si1304BDL/NX3008NBK: Drain-Source breakdown voltage $\geq 30V$ 2) $V_{gs(th)} = 0.9V$ (Typ), 1.3V (Max) 3) $R_{ds\ on} \leq 2.1\Omega$ @ $V_{gs} = 2.5V$
L1	47uH	NRH3010T100MN/NRH3010T470MN



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8. ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Rating	Unit	Humidity	Unit	Note
Logic Supply voltage	VCC,VDDIO	-0.5~6.0	V	45~70	%RH	Note 8-1
Operation temperature range	TOPR	0~50	°C	45~70	%RH	
Storage temperature range	TSTG	-25~60	°C	45~70	%RH	Note 8-2
Transportation temperature range	TTTG	-25~60	°C	45~70	%RH	Note 8-3
GND	Ground	-	-		-	Connect to Ground

Note 8-1: We guarantee the single pixel display quality for 0-35°C, but we only guarantee the barcode readable for 35-40°C. Normal use is recommended to refresh every 24 hours.

Note 8-2: Maximum ratings are those values beyond which damages to the device may occur. Functional operation should be restricted to the limits in the Electrical Characteristics chapter.

Note 8-3: Tttg is the transportation condition, the transport time is within 10 days for -25°C~0°C or 50°C~60°C.

Note 8-4: When the four-color product is stored. The display screen should be kept white and face up. We suggest that the full black and full white picture could be added to clear the screen after the module is refreshed for a long time, the display effect would be better.

Note 8-5: Due to the nature of FPL, we will not control the display effect of yellow and white characters on white and yellow characters on white. We don't guarantee the display effects of these ten font colors: white background with yellow, white background with green, blue background with yellow, blue background with green, yellow background with white, yellow background with blue, yellow background with green, green background with white, green background with yellow, and green background with blue.

Note 8-6: No guarantee for optical and afterimage effects below 15 degrees;



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9. DC Characteristics

The following specifications apply for: VSS=0V, VDD=3.0V, TOPR=25°C

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
VDD	VDD operation voltage	-	2.4	3.0	3.6	V
VIH	High level input voltage	-	0.7xVIO	-	VIO	V
VIL	Low level input voltage	-	GND	-	0.3xVDD	V
VOH	High level output voltage	IOH = 400μA	VIO-0.4	-	-	V
VOL	Low level output voltage	IOL = -400μA	GND	-	GND+0.4	V
Iupdate	Module operating current	-	-	TBD	-	mA
Isleep	Deep sleep mode	VCI=3.3V	-	-	5	uA

- The Typical power consumption is measured using associated 25°C waveform with following pattern transition: from horizontal scan pattern to vertical scan pattern.

(Note 12-)

- The listed electrical/optical characteristics are only guaranteed under the controller & waveform provided by XingTai.

Note 12-1

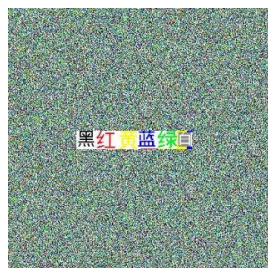
The Typical power consumption

10. Power Consumption (Price tag screen)

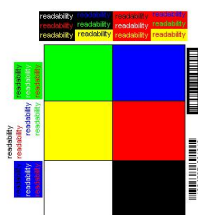
Parameter	Symbol	Conditions	TYP	Max	Unit	Remark
Panel power consumption during update (Reload screen)	-	25°C	200		mAs	-
Panel power consumption during update (Font screen)	-	25°C	180		mAs	-
Deep sleep mode	-	25°C	/	5	uA	-

mAs=update average current×update time

Reload screen



Font screen





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11. Optical characteristics

11.1 Optical Measurement Conditions

Item	Symbol	Value	Unit	Note
Ambient Temperature	Ta	25±2	°C	Indoor testing
Ambient Humidity	Ha	50±5	%RH	-
Supply Voltage	VCC, VDDIO	3.0	V	-
illuminance	-	800~1300	Lux	

Note 11-1: Image is updated with above condition

11.2. Optical characteristics

E6 (EPD) waveform tuning Optical standard												
Temperature (°C)	0~4	5~9	10~14	15~19	20~24	25~29	30~34	35~39	40~44	45~50	ΔE 2000 标准	1A1B残影标准
White State	TYP L*	66.5	66.5	66.5	66.5	66.5	66.5	66.5	66	65	≤6	≤2
	TYP a*	-4	-4	-4	-4	-4	-4	-4	-4	-4		
	TYP b*	-2	-2	-2	-2	-2	-2	-2	-2	-2		
Dark State	TYP L*	10	10	10	10	10	10	10	10	10	≤6	≤3
	TYP a*	10	10	10	10	10	10	10	10	10		
	TYP b*	-13	-12	-12	-12	-12	-12	-12	-12	-12		
Red State	TYP L*	25	25	25	25	26	26	25	25	25	≤6	≤2
	TYP a*	39	40	40	40	41	41	40	40	40		
	TYP b*	29	30	30	30	30	30	30	30	30		
Yellow state	TYP L*	65	65	65	65	65	65	65	65	65	≤6	≤2
	TYP a*	-12	-12	-12	-12	-12	-12	-12	-12	-12		
	TYP b*	67.5	67.5	67.5	67.5	67.5	67.5	67.5	67.5	67.5		
Blue State	TYP L*	30	30	30	30	30	30	30	30	30	≤6	≤2
	TYP a*	6	6	6	6	6	6	6	6	5		
	TYP b*	-40	-40	-40	-40	-39	-39	-38	-36	-35		
Green State	TYP L*	34	34	34	34	35	35	35	35	33	≤8	≤3
	TYP a*	-19	-23	-23	-23	-24	-24	-24	-24	-23		
	TYP b*	7	7	7	7	7	7	7	7	7		

WS : White state, KS : Black State,

Note 12-1 : Luminance meter : i - One Pro Spectrophotometer

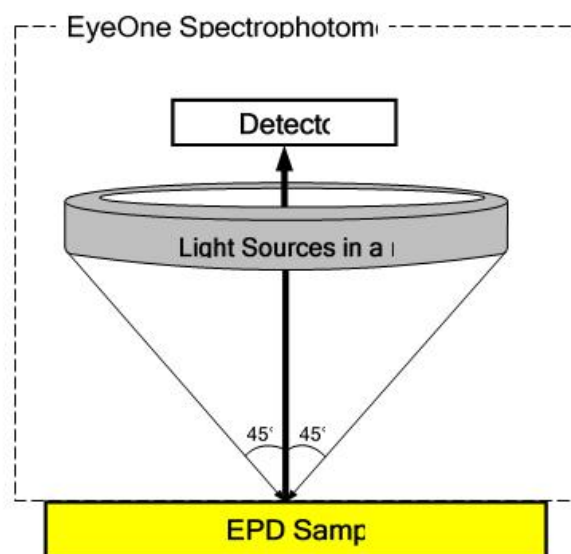
All temperature zones Update Time: ≤18S



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11.3 Definition of contrast ratio

The contrast ratio (CR) is the ratio between the reflectance in a full white area (Rl) and the reflectance in a dark area (Rd): Rl: white reflectance Rd: dark reflectance

$$CR = Rl/Rd$$


11.4 Reflection Ratio

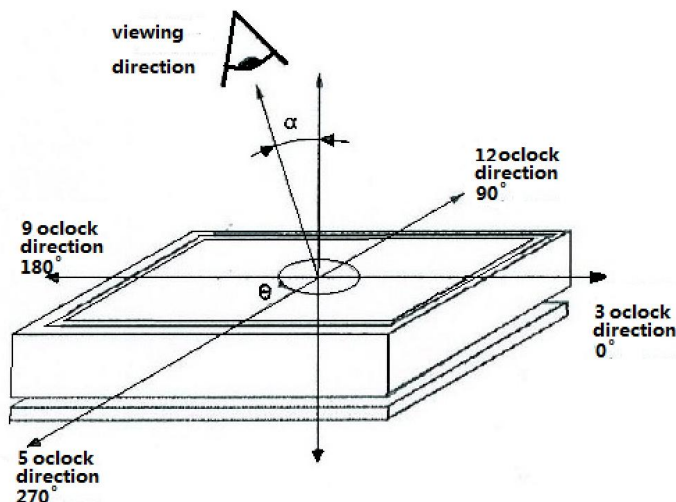
The reflection ratio is expressed as:

$R = \text{Reflectance Factor white board} \times (L_{\text{center}} / L_{\text{white board}})$

L_{center} is the luminance measured at center in a white area ($R=G=B=1$). $L_{\text{white board}}$ is the luminance of a standard white board. Both are measured with equivalent illumination source. The viewing angle shall be no more than 2 degrees.



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12. Handling Safety and Environmental Requirements

WARNING

The display module should be kept flat or fixed to a rigid, curved support with limited bending along the long axis. It should not be used for continual flexing and bending. Handle with care. Should the display break do not touch any material that leaks out. In case of contact with the leaked material then wash with water and soap.

CAUTION

The display module should not be exposed to harmful gases, such as acid and alkali gases, which corrode electronic components.

Disassembling the display module can cause permanent damage and invalidate the warranty agreements.

IPA solvent can only be applied on active area and the back of a glass. For the rest part, it is not allowed.

Observe general precautions that are common to handling delicate electronic components. The glass can break and front surfaces can easily be damaged. Moreover the display is sensitive to static electricity and other rough environmental conditions.

Mounting Precautions

(1) It's recommended that you consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module.

(2) It's recommended that you attach a transparent protective plate to the surface in order to protect the EPD. Transparent protective plate should have sufficient strength in order to resist external force.

(3) You should adopt radiation structure to satisfy the temperature specification.

(4) Acetic acid type and chlorine type materials for the cover case are not desirable because the former



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generates corrosive gas of attacking the PS at high temperature and the latter causes circuit break by electro-chemical reaction.			
(5) Do not touch, push or rub the exposed PS with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of PS for bare hand or greasy cloth. (Some cosmetics deteriorate the PS)			
(6) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach the PS. Do not use acetone, toluene and alcohol because they cause chemical damage to the PS.			
(7) Wipe off saliva or water drops as soon as possible. Their long time contact with PS causes deformations and color fading.			

Data sheet status	
Product specification	The data sheet contains final product specifications.

Limiting values
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.
Application information
Where application information is given, it is advisory and dose not form part of the specification.

Product Environmental certification
ROHS
REMARK
All The specifications listed in this document are guaranteed for module only. Post-assembled operation or component(s) may impact module performance or cause unexpected effect or damage and therefore listed specifications is not warranted after any Post-assembled operation.



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13. Reliability test

13.1 Reliability test items

	TEST	CONDITION	REMARK
1	High-Temperature Operation	T=40°C, RH=35%RH, For 240Hrs	Ongoing
2	Low-Temperature Operation	T = 0°C for 240 hrs	Ongoing
3	High-Temperature Storage	T=50°C RH=35%RH For 240Hrs	Test in white pattern Ongoing
4	Low-Temperature Storage	T = -25°C for 240 hrs	Test in white pattern Ongoing
5	High Temperature, High-Humidity Operation	T=40°C, RH=90%RH, For 168Hrs	Ongoing
6	High Temperature, High-Humidity Storage	T=50°C, RH=90%RH, For 240Hrs	Test in white pattern Ongoing
7	Temperature Cycle	-25°C(30min)~60°C(30min), 100 Cycle	Test in white pattern Ongoing
8	Package Vibration	1.04G,Frequency : 20~200Hz Direction : X,Y,Z Duration: 30 minutes in each direction	Full packed for shipment Ongoing
9	Package Drop Impact	Drop from height of 100 cm on Concrete surface Drop sequence:1 corner, 3edges, 6face One drop for each.	Full packed for shipment Ongoing
10	UV exposure Resistance	765 W/m ² for 168hrs,40°C	Ongoing
11	Electrostatic Discharge(no-operation)	(Machine model) :+/-200v, 0Ω,200PF	Ongoing

Actual EMC level to be measured on customer application.

Note1: Stay white pattern for storage and non-operation test.

Note2: Power off duration time is 150s

Note3: Continue testing after 2 hours at 20C~25C°C

Note4: Reliability verification of new products is ongoing, and this reliability condition is not considered as a final reliability result



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13.2 Product life time

The EPD Module is designed for a 2-year life-time with 25 °C/60%RH operation assumption. Reliability estimation testing with accelerated life-time theory would be demonstrated to provide confidence of EPD lifetime.

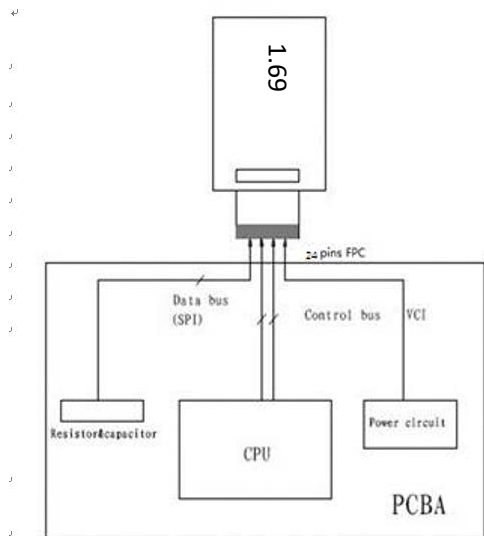
13.3 Product warranty

Warranty conditions have to be negotiated between Xingtai and individual customers. Xingtai provides 12+1(one month delivery time) months warranty for all products which are purchased from Xingtai.



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14. Block Diagram



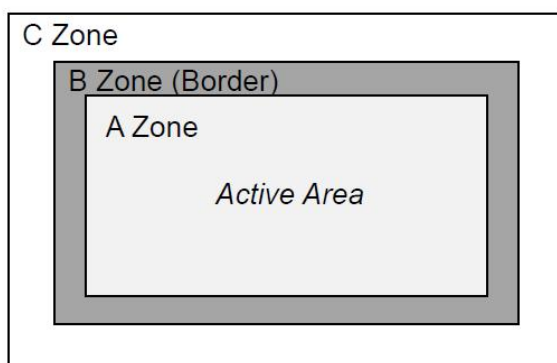
15. Shipment inspection specification

15.1 Zone Definition

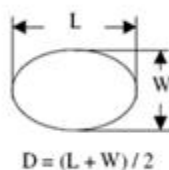
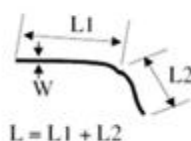
A Zone: Active Area

B Zone: Border Area

C Zone: From B Zone edge to panel edge



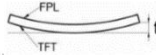
15.2 Line/Spot defect size





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15.3 Point and line standard

Shipment Inspection Standard						
Equipment: Electrical test fixture, Point gauge						
Outline dimension	52.8 (H) x 49.6 (V) x 0.85(D)	Unit: mm	Part-A	Active area	Part-B	Border area
Environment	Temperature	Humidity	illuminance	Distance	Time	Angle
	19℃~25℃	50±5%RH	800~1300Lux	300 mm	35Sec	45°
Defect type	Inspection method	Standard		Part-A	Part-B	
Spot	Electric Display	D≤0.25 mm		Ignore	Ignore	
		0.25 mm<D≤0.4 mm		N≤4	Ignore	
		D>0.4 mm		Not Allow	Ignore	
Display malfunction	Electric Display	Not Allow		Not Allow	Ignore	
Display error	Electric Display	Not Allow		Not Allow	Ignore	
Scratch or line defect(include dirt)	Visual/Film card	L≤2 mm,W≤0.2mm		Ignore	Ignore	
		2.0mm<L≤5.0mm,0.2<W≤0.3mm		N≤2	Ignore	
		L>5mm, W>0.3mm		Not Allow	Ignore	
PS Bubble	Visual/Film card	D≤0.2mm		Ignore	Ignore	
		0.2mm≤D≤0.35mm,		N≤4	Ignore	
		D>0.3 5mm		Not Allow	Ignore	
Corner /Edge chipping	Visual/Film card	X≤6mm,Y≤0.4mm, Do not affect the electrode circuit (Edge chipping)				
		X≤1mm,Y≤1mm, Do not affect the electrode circuit((Corner chipping)				
		Ignore				
						
TFT warping	T≤2mm 					
Remark	1.Cannot be defect & failure cause by appearance defect;					
	2.Cannot be larger size cause by appearance defect;					
	L=long W=wide D=point size N=Defects NO					
Mura	Refer to limit samples defined by E-INK					



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15.4 Barcode



What is the QR code after picture being scanned and read? It consist of 30 numbers and letters, here is explanation for it.

QR Code: ABBBBBBBBBBFFCCCDDDEEEEGHIJKLL

- ① A means Factory code, e.g.: H (HINK)
- ② BBBBBBBBBB refers to product model name, which is in consistent with specification part number. E.g.: E0213A189 or E0266A120; when the total code is less than 9, it would be added suffix with **. e.g.: E027A45** or E0154A78*
- ③ FF means production workshop
- ④ CCC means date of production
- ⑤ DDD means production batch
- ⑥ EEEE means FPL lot
- ⑦ G means MP/Sample/Trial/Repair
- ⑧ HIJ:(H——TFT;I——PS;J——EC Glue)
- ⑨ KK means IC type
- ⑩ LL means serial number



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16. Packing

Full carton: 12 pcs tray with products and 1 pcs empty tray.

Last carton: less 12pcs tray with products and 1 pcs empty tray. The packager will add the right amount of EPE to box so that the added EPE's height approximately close to the EPE height around the inside of the box.

