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Specification For 10.2"EPD

Model NO.: HINK-E102A24

Product VER: A0

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
王曉斌	文海	王浩



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Version	Content	Date	Producer
A0	New release	2025/7/25	WXB



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1. General Description

E102A24 is an Active Matrix Electrophoretic Display (AMEPD), with interface and a reference system design. The 10.2" active area contains 960×640 pixels, and has 2-bit B/W/R/Y full display capabilities. An integrated circuit contains gate buffer, source buffer, interface, timing control logic, oscillator, DC-DC, SRAM, LUT, VCOM and border are supplied with each panel.

2. Features

- 960*640 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
- 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. Application

Electronic Shelf Label System

4. Mechanical Specifications

Parameter	Specifications	Unit	Remark
Screen Size	10.2	Inch	
Display Resolution	640(H)×960(V)	Pixel	Dpi:113
Active Area	215.52(H)×143.68(V)	mm	
Pixel Pitch	0.2245×0.2245	mm	
Outline Dimension	224(H)×157 (V) ×0.9(D)	mm	
Weight	60±0.2	g	



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6. Input/output Terminals

Pin #	Single	Description	Remark
1	NC	No connection and do not connect with other NC pins	Keep Open
2	GDR	N-Channel MOSFET Gate Drive Control	
3	RESE	Current Sense Input for the Control Loop	
4	NC	No connection and do not connect with other NC pins e	Keep Open
5	VSH2	Positive Source driving voltage	
6	GND		
7	GND		
8	BS1	Bus selection pin	Note 6-5
9	BUSY	Busy state output pin	Note 6-4
10	RES #	Reset	Note 6-3
11	D/C #	Data /Command control pin	Note 6-2
12	CS #	Chip Select input pin	Note 6-1
13	SCL	serial clock pin (SPI)	
14	SDA	serial data pin (SPI)	
15	VDDIO	Power for interface logic pins	
16	VCI	Power Supply pin for the chip	
17	VSS	Ground	
18	VDD	Core logic power pin	
19	VPP	Power Supply for OTP Programming	
20	VSH1	Positive Source driving voltage	
21	VGH	Power Supply pin for Positive Gate driving voltage and VSH	
22	VSL	Negative Source driving voltage	
23	VGL	Power Supply pin for Negative Gate driving voltage, VCOM and VSL	
24	VCOM	VCOM driving voltage	



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Note 6-1: This pin (CS#) is the chip select input connecting to the MCU. The chip is enabled for MCU communication: only when CS# is pulled LOW.

Note 6-2: This pin (D/C#) 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.

Note 6-3: This pin (RES#) is reset signal input. The Reset is active low.

Note 6-4: This pin (BUSY) is Busy state output pin. When Busy is Low ,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 Low when the driver IC is working such as:

- Outputting display waveform; or
- Communicating with digital temperature sensor

Note 6-5: This pin (BS1) 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.

6.Note 6-6: We had made Pin 6 and Pin 7 on FPC to be ground.



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7. Reference Circuit

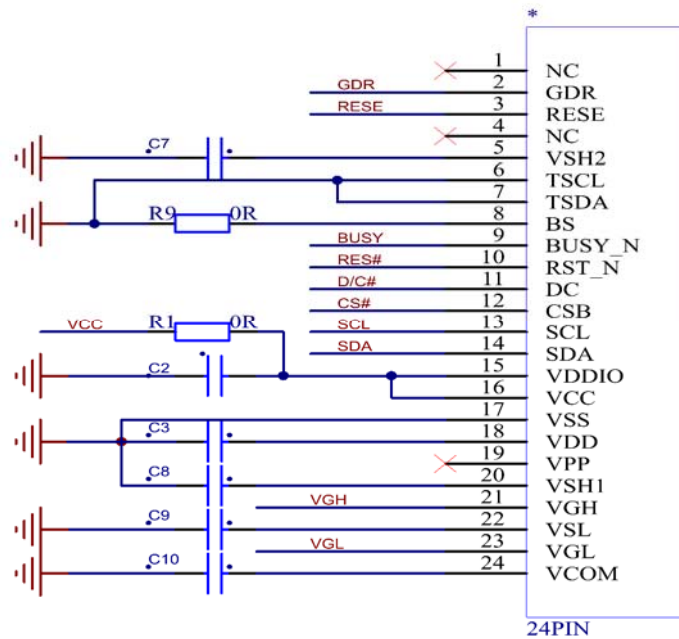


Figure. 9-1

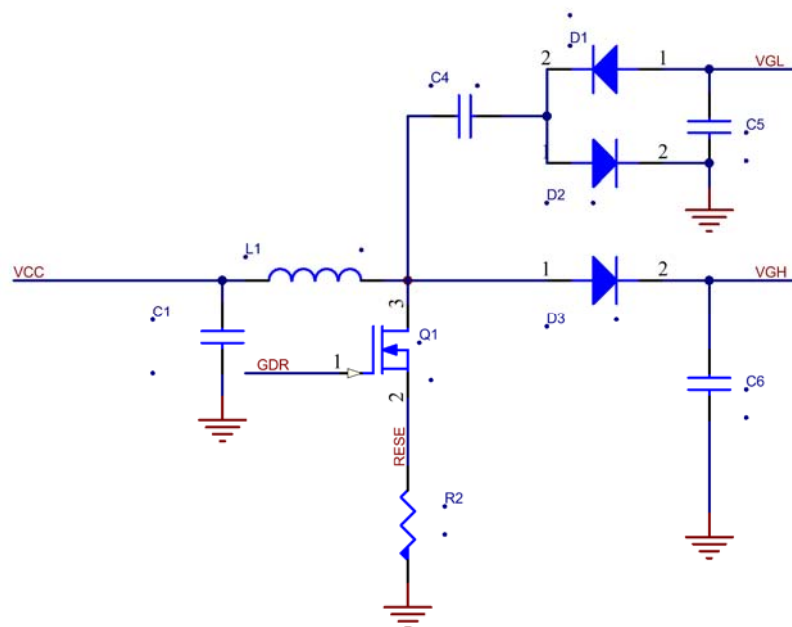


Figure. 9-2



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Part Name	Value/Type	Requirement/Reference Part
C1—C3	1uF	0603; X5R/X7R; Voltage Rating: 25V
C4-C10	4.7uF	0805; X5R/X7R; Voltage Rating: 25V
D1—D3	Diode	MBR0530 1) Reverse DC voltage $\geq$ 30V 2) $I_o \geq 500\text{mA}$ 3) Forward voltage $\leq$ 430mV
R2	2.2 Ω	0805: 1% variation
Q1	NMOS	Si1304BDL/NX3008NBK 1) Drain-Source breakdown voltage $\geq$ 30V 2) $V_{gs(th)} = 0.9$ (Typ) , 1.3V (Max) 3) $R_{ds on} \leq 2.1\Omega$ & $V_{gs} = 2.5\text{V}$
L1	47uH	CDRH2D18/LDNP-470NC $I_o = 500$ (Max)
CON24Pin	0.5mm ZIF Socket	24Pins, 0.5mm pitch



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8. Absolute Maximum Rating

Symbol	Parameter	Rating	Unit	Humidity	Unit	Note
V _{DD}	Logic supply voltage	-0.3 to +6.0	V	-	-	
T _{OPR}	Operation temperature range	0 to 40	°C	45 to 70	%	
T _{ttg}	Transportation temperature range	-25 to 50	°C	45 to 70	-	Note 11-2
T _{stg}	Storage condition	-25 to 50	°C	45 to 70	%	Maximum storage time: 5 years

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: T_{ttg} is the transportation condition, the transport time is within 10 days for -25°C~0°C or 50°C~60°C

Note 8-4: The single pixel effect under the condition of above 35 degree cannot be guaranteed, Normal use is recommended to refresh every 24 hours;

Note 8-5: Due to the nature of FPL, we will not control the display effect of white characters on yellow and yellow characters on white.

9. DC Characteristics

The following specifications apply for: V_{SS}=0V, V_{DD}=3.0V, T_{OPR}=25°C

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V _{DD}	VDD operation voltage	-	2.5	3.0	3.6	V
V _{IH}	High level input voltage	-	0.7xV _{IO}	-	V _{IO}	V
V _{IL}	Low level input voltage	-	GND	-	0.3xV _{DD}	V
V _{OH}	High level output voltage	I _{OH} = 400μA	V _{IO} -0.4	-	-	V
V _{OL}	Low level output voltage	I _{OL} = -400μA	GND	-	GND+0.4	V
I _{update}	Module operating current	-	-	23	-	mA
I _{sleep}	Deep sleep mode	V _{CI} =3.3V	-	-	5	μA

- 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



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10. Power Consumption (Price tag screen)

Parameter	Symbol	Conditions	TYP	Max	Unit	Remark
Panel power consumption during update	-	25°C	-	800	mAs	-
Deep sleep mode	-	25°C	-	5	uA	-

mAs=update average current×update time

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



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11.2. Optical characteristics

T=25°C ,VDD=3.3V

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP.	MAX	UNIT	Note
R	Reflectance	White	30	35	-	%	Note 15-1
Gn	2Grey Level	-	-	$KS+(WS-KS) \times n(m-1)$	-	L*	-
CR	Contrast Ratio	-	-	10	-	-	-
KS	Black State L* value	-	-	9	14	-	Note 15-1
	Black State a* value	-	-	-	7	-	Note 15-1
WS	White State L* value	-	60	65	-	-	Note 15-1
	White State b* value	-	-	2	3	-	Note 15-1
RS	Red State L* value	Red	23	26	29	-	Note 15-1
	Red State a* value	Red	37	40	-	-	Note 15-1
YS	Yellow State L* value	Yellow	56	58	66	-	Note 15-1
	Yellow State b* value	Yellow	60	68	-	-	Note 15-1
Panel	Image Update	Storage and transportation	-	Update the white screen	-	-	-
	Update Time	Operation	-	Suggest Updated once a day	-	-	-

WS : White state, KS : Black State,

Note 15-1 : Luminance meter : i - One Pro Spectrophotometer

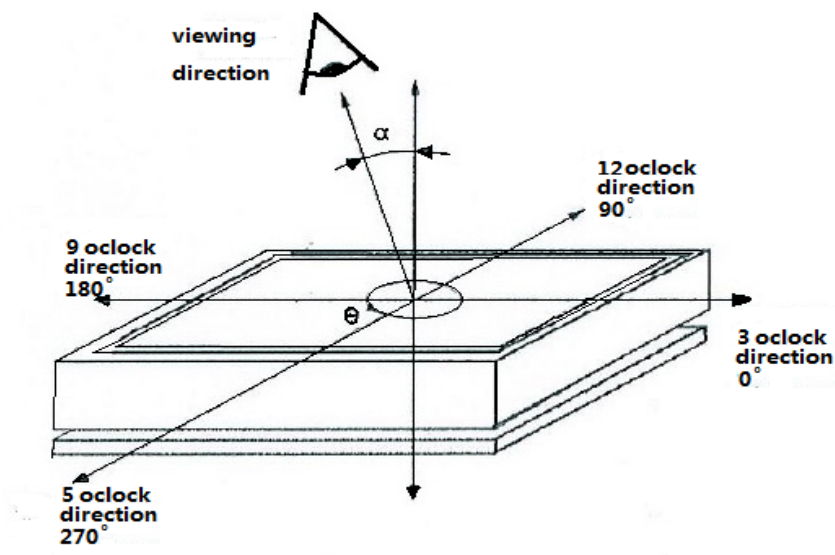
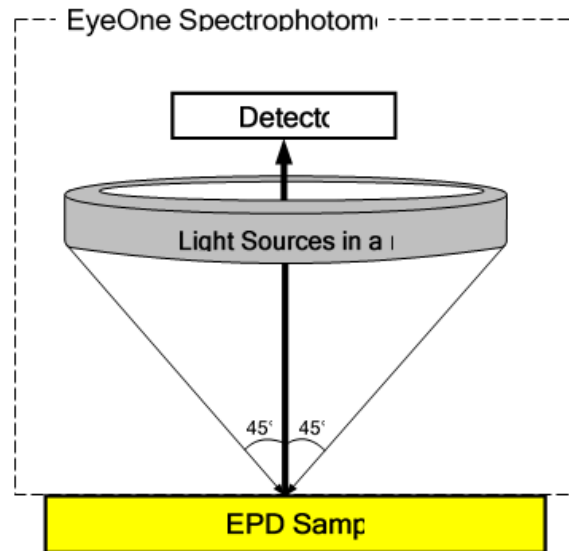


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11.2 Definition of contrast ratio

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

$$CR = Rl/Rd$$





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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.

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 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 there is dust on the surface, gently wipe it with absorbent cotton or a dust-free cloth. It is recommended to use anhydrous ethanol



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to clean the adhesive used to attach 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	
2	Low-Temperature Operation	T = 0°C for 240 hrs	
3	High-Temperature Storage	T=50°C RH=35%RH For 240Hrs	Test in white pattern
4	Low-Temperature Storage	T = -25°C for 240 hrs	Test in white pattern
5	High Temperature, High-Humidity Operation	T=40°C, RH=90%RH, For 168Hrs	
6	High Temperature, High-Humidity Storage	T=50°C, RH=90%RH, For 240Hrs	Test in white pattern
7	Temperature Cycle	-25°C(30min)~60°C(30min), 100 Cycle	Test in white pattern
8	Package Vibration	1.04G,Frequency : 20~200Hz Direction : X,Y,Z Duration: 30 minutes in each direction	Full packed for shipment
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
10	UV exposure Resistance	765 W/m² for 168hrs,40°C	
11	Electrostatic Discharge(no-operation)	(Machine model) : +/-200v, 0Ω,200PF	

Actual EMC level to be measured on customer application.

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

Note2: Operation is black/white pattern , hold time is 150S.

Note3: Keep testing after 2 hours placing at 20°C-25°C.

13.2 Product life time

The EPD Module is designed for a 3 -year life-time with 25 °C/50%RH operation assumption. Reliability estimation testing with accelerated life-time theory would be demonstrated to provide confidence of EPD lifetime.

13.3 Product warranty

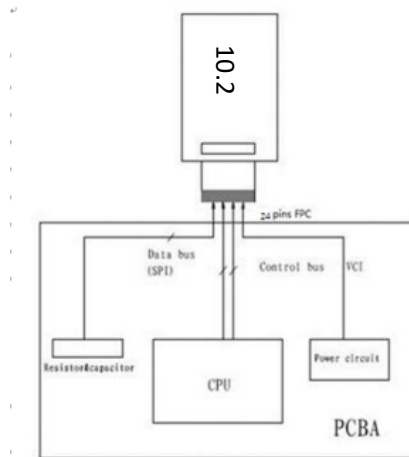
Warranty conditions have to be negotiated between Xingtai and individual customers.

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



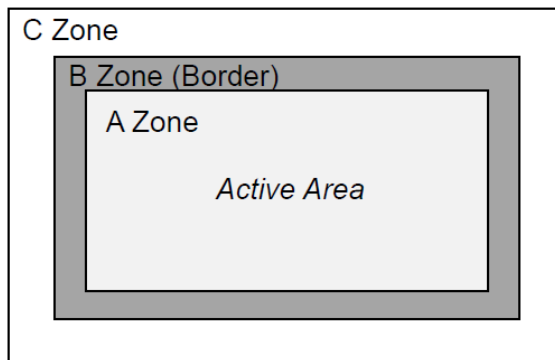
15. Shipment inspection specification

15.1 Zone Definition

A Zone: Active Area

B Zone: Border Area

C Zone: From B Zone edge to panel edge



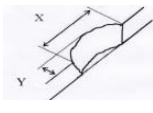
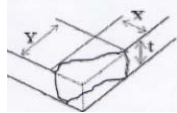
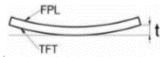
15.2 Line/Spot defect size





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15.3 Point and line standard

Shipment Inspection Standard						
Equipment: Electrical test fixture, Point gauge						
Outline dimension	224(H)×157 (V) ×0.9(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≤0.45 mm		Ignore	Ignore	
		0.45 mm<D≤0.6 mm		N≤4	Ignore	
		0.6 mm<D≤0.8 mm		N≤2	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≤0.1 mm		Ignore	Ignore	
		2mm<L≤9.0mm, 0.1<W≤0.2mm,		N≤2	Ignore	
		L>9.0 mm, W>0.2 mm		Not Allow	Ignore	
PS Bubble	Visual/Film card	D≤0.4mm		Ignore	Ignore	
		0.4mm≤D≤0.6mm		N≤4	Ignore	
		D>0.6 mm		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	For 1.54~7.5inch, T≤2mm; For above 7.5inch, T≤3mm					
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					



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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: ABBBBBBBBBFFCCCDDDEEEEGHIJKLL

- 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: 8 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.

