Customer Approved Specification

To:

Product Name: C045SWY2-2

Document Issue Date: 2019/6/27

Customer	InfoVision Optoelectronics
SIGNATURE _____ _____ _____ Please return 1 copy for your confirmation with your signature and comments.	**SIGNATURE** **REVIEWED BY** **QA** _____ **PREPARED BY** **FAE** _____

Note: 1. Please contact InfoVision Company. before designing your product based on this product.
2. The information contained herein is presented merely to indicate the characteristics and performance of our products. No responsibility is assumed by IVO for any intellectual property claims or other problems that may result from application based on the module described herein.

Revision	Date	Page	Old Description	New Description	Remark
00	2019/6/27	All	-	First issued.	-

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1 General Descriptions

1.1 Introduction

The C045SWY2-2 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) single chip and sub chips that use amorphous silicon TFT as a switching device. This TFT LCD panel has a 4.5 inch diagonally measured active display area with FWVGA resolution (480 horizontal by 854 vertical pixels array).

1.2 Features

- 4.5” TFT-LCD Panel
- Supported FWVGA Resolution
- Compatible with ROHS Standard

1.3 General Characteristics

Item	Specification	Unit	Note
Outline Dimension (H x V x D)	58.24 (Typ.)x105.86(Typ.)x0.8(Typ.)	mm	Single Chip
Active Area (H x V)	55.44 x 98.64	mm	Single Chip
Number of Pixels (H x V)	480x3(RGB) x 854	-	Single Chip
Pixel Size (H x V)	0.1155x0.1155	mm	Single Chip
Pixel Arrangement	RGB_Stripe	-	-
Display Type	Transmissive	-	-
Display Mode	Normally Black	-	-
Cell Thickness	CF: 0.4±0.03	mm	-
	TFT: 0.4±0.03		
Driver IC(Recommendation)	OTM8018B & ILI9806E	-	-
Weight	6.09(Typ.)	g	Single Chip
	230.76(Typ.)	g	Sub Chips

2 Absolute Maximum Ratings

Table 1 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
LC Operating Voltage (Ta = 25℃)	V_{OP}	-	5	V	(1),(2),(3),(4)
Operating Temperature	T_{OP}	-20	70	℃	
Operating Humidity	H_{OP}	10	80	%RH	
Storage Temperature	T_{ST}	-30	80	℃	
Storage Humidity	H_{ST}	10	90	%RH	

Note (1) Liquid Crystal driving voltage due to the characteristics of LC Material, this voltage varies with environmental temperature.

Note (2) Maximum Wet-Bulb should be 39 ℃. No condensation.

Note (3) When you apply the LCD panel for OA system. Please make sure to keep the temperature of LCD panel is less than 70℃

Note (4) Temp. ＞60℃ , Absolute humidity shall be less than 90% RH at 60℃.

3 Electrical Specifacations

No.	Item	Min.	Typ.	Max.	Unit
1	Vcom voltage	-	-0.59	-	V
2	Frame rate	55	60	65	Hz
3	Vgh voltage	14	15	16	V
4	Vgl voltage	-11	-10	-9	V

Note (1) VGH is TFT gate operating voltage

Note (2) VGL is TFT gate operating voltage

Note (3) Vcom must be adjusted to optimize display quality: Crosstalk, Contrast Ratio etc.

Note (4) Environmental condition: 25±5 ºC

Note (5) We just kindly recommend the setting-voltage as the reference value. In order to get the optimized display quality, the setting-voltage should be changed as based on customer's developing condition.

Note (6) It is necessary to fine tune Vcom and implement OTP for each Panel cell in order to get best performance.

4 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes.

Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Transmittance	-		4.0	4.4	-	%	(1),(5),(6),(7),(8)
Contrast Ratio	Center		800	1000	-	-	(1),(3),(6)(7),(8)
Response Time	Rising + Falling		-	35	-	ms	(1),(4),(6),(7),(8)
CF Color Chromaticity (CIE1931)	Red x		Typ. -0.03	0.659	Typ. +0.03	-	Under C-light
	Red y			0.323		-	
	Green x			0.284		-	
	Green y			0.585		-	
	Blue x			0.133		-	
	Blue y			0.096		-	
	White x			0.325		-	
	White y			0.367		-	
NTSC	CIE1931		65	70	-	%	(1),(6),(7),(8)
Viewing Angle （CR>10）	Horizontal	θ_L	80	85	-	degree	(1),(2),(6),(7),(8) Viewing Angle base on using Normal Polarizer (Reference only)
		θ_R	80	85	-		
	Vertical	θ_T	80	85	-		
		θ_B	80	85	-		

Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature(25°C) for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

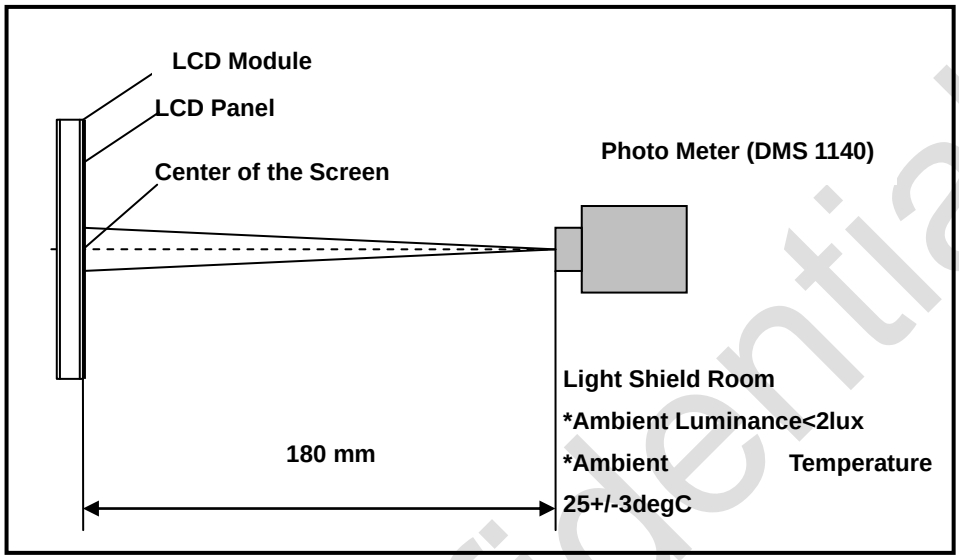


Figure 1 Measurement Setup

Note (2) Definition of Viewing Angle

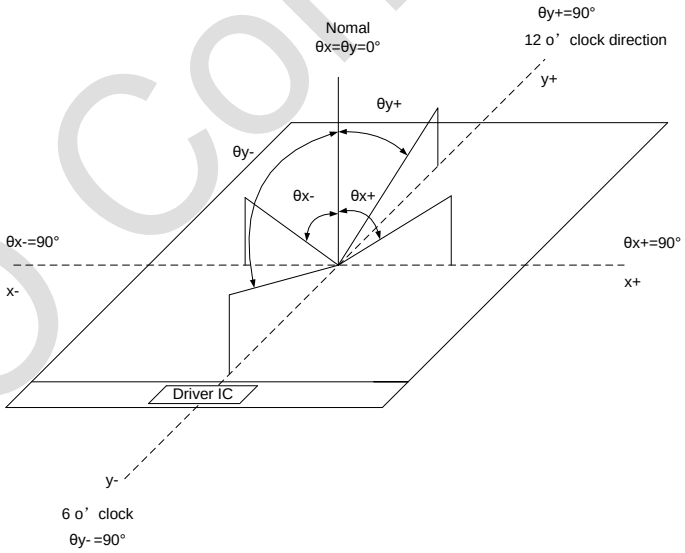


Figure 2 Definition of Viewing Angle

Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255, L0: Luminance of gray level 0

Note (4) Definition of Response Time

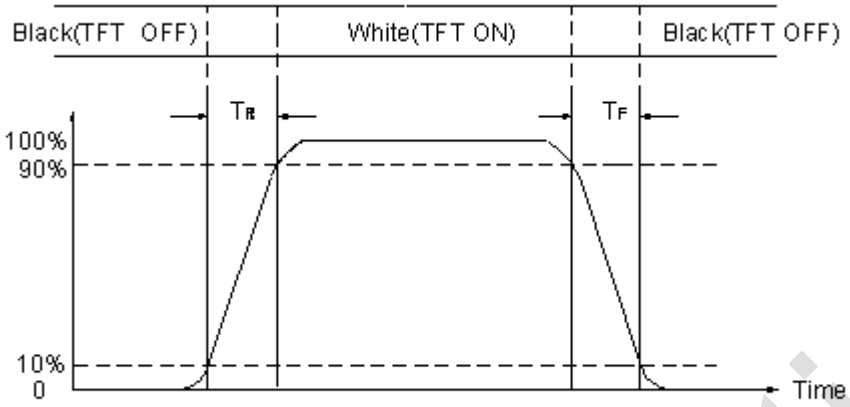


Figure 3 Definition of Response Time

Note (5) Definition of Transmittance

$$\text{Transmittance} = \frac{\text{Center Luminance of LCD}}{\text{Center Luminance of C-Light}} \text{ X100\%}$$

Note (6) C-light Spectrum

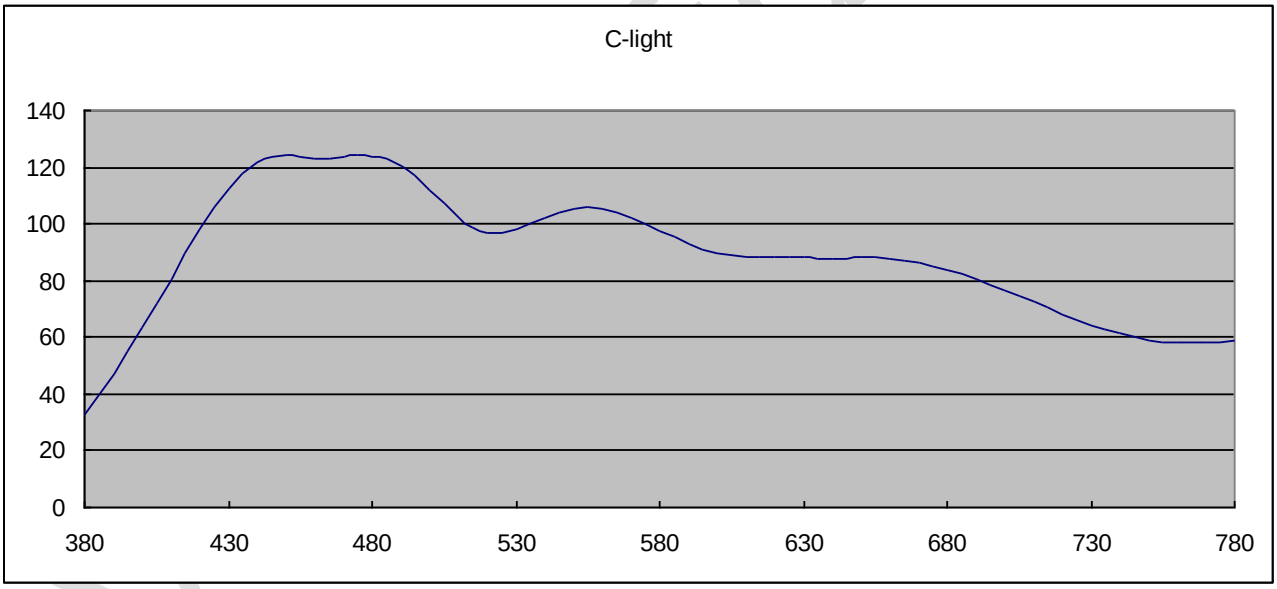


Figure 4 C-Light Spectrum

Note (7) The polarizer type: SUNNYPOL /Normal/CF, SUNNYPOL /Normal/Array.

Note (8) All optical data based on IVO given polarizer & C-Light& testing machine in this document.

Note (9) Rubbing Direction

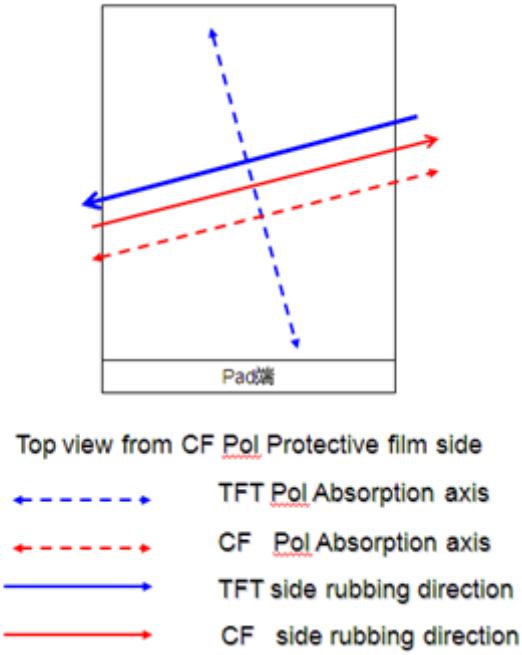


Figure 5 View form CF film side

Item	Specification
Rubbing Direction	7degree

5 Pixel Format

The figure shows the relationship of the input signals and LCD panel pixel format.

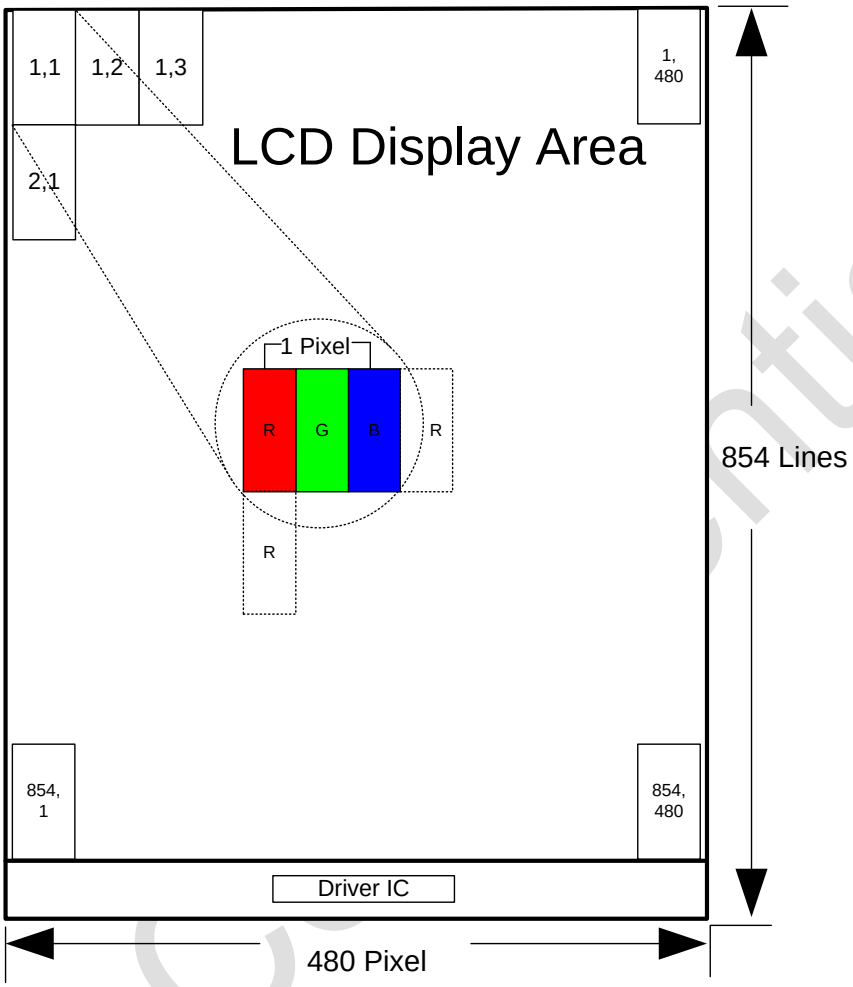


Figure 6 Pixel Format

6 Cell Outline Size

6.1 Outline Size of Single Chip

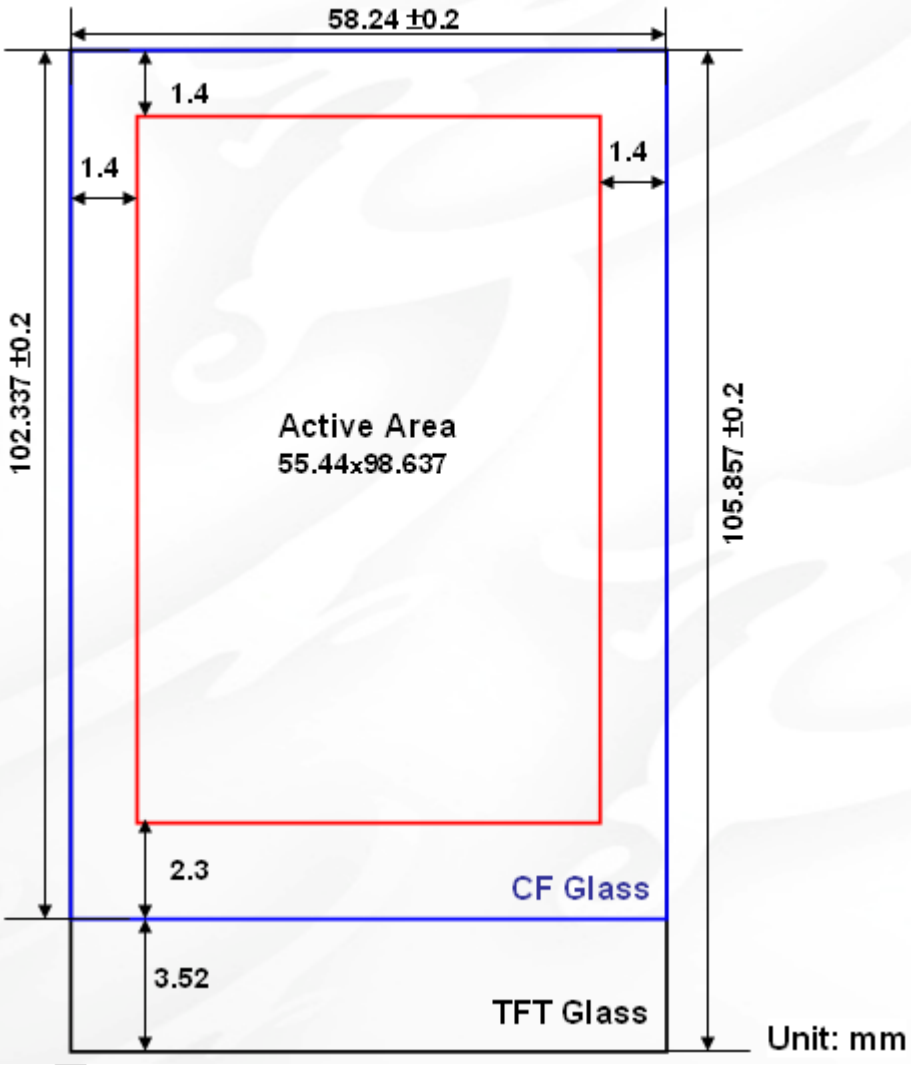
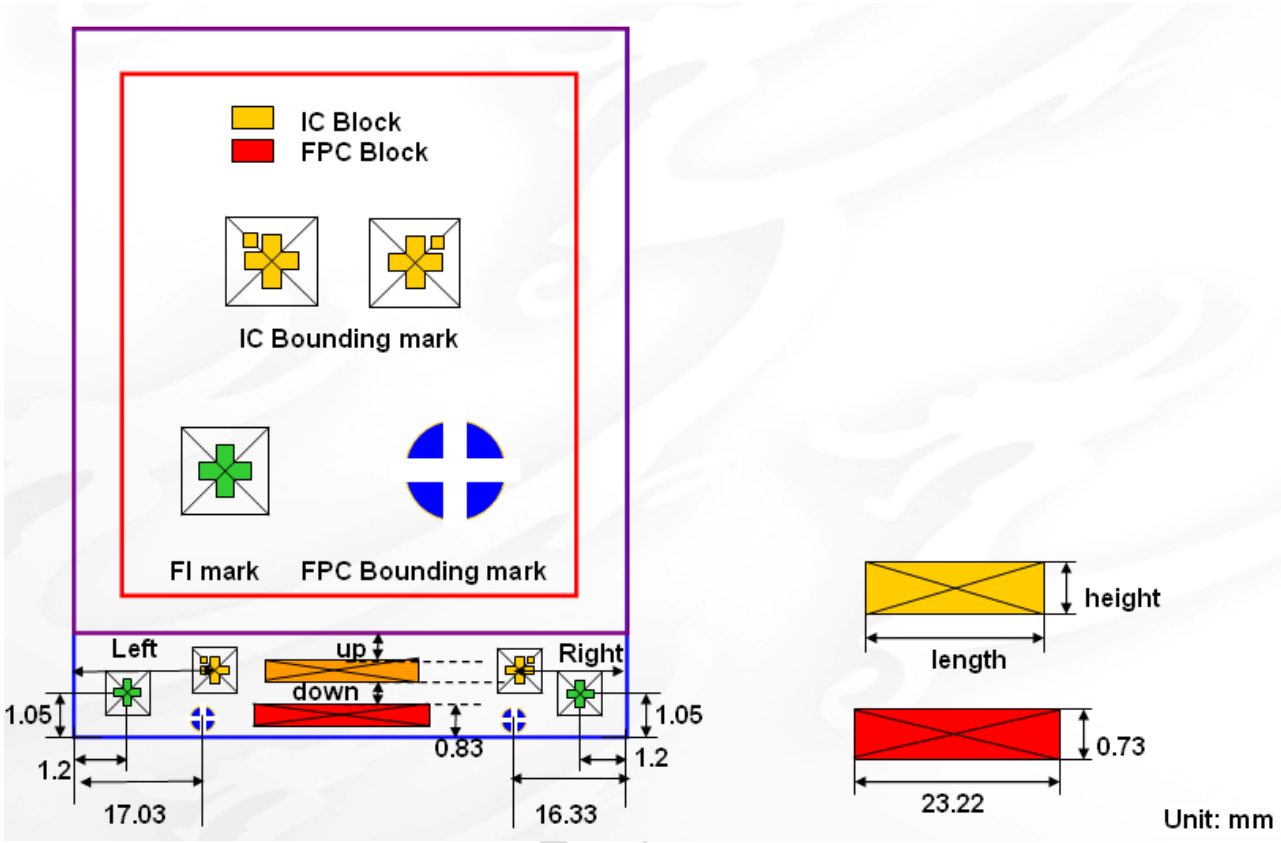


Figure 7 Outline Size of Single Chip

6.2 IC/ FPC Position on Cell



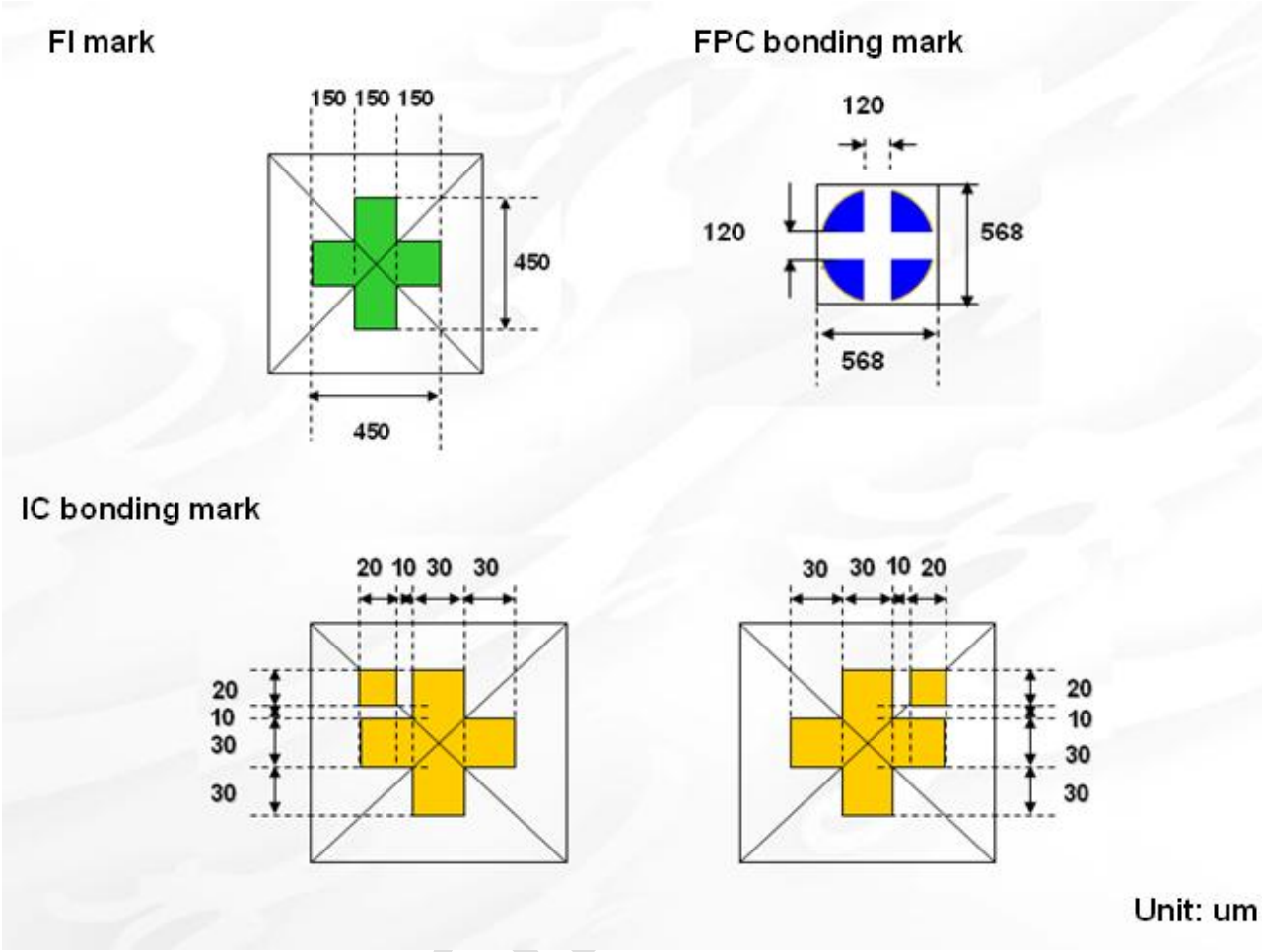


Figure 8 IC/FPC Position

Table 3 IC Position

IC Name	Up(um)	Down(um)	Left(um)	Right(um)	Height(um)	Length(um)
OTM8018B	524	1216	17600	16900	950	24000
ILI9806E	559	1331	17600	16900	800	24000

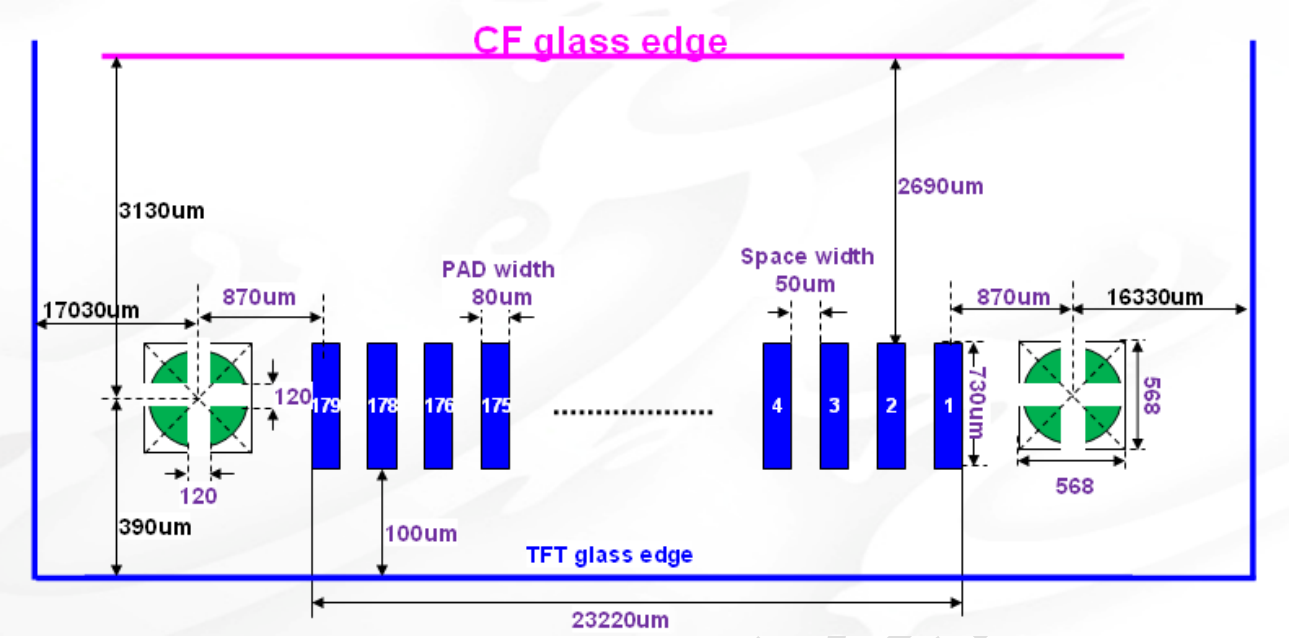


Figure9 FPC Pad Information

6.3 The Distance Between silver paste and Bonding area

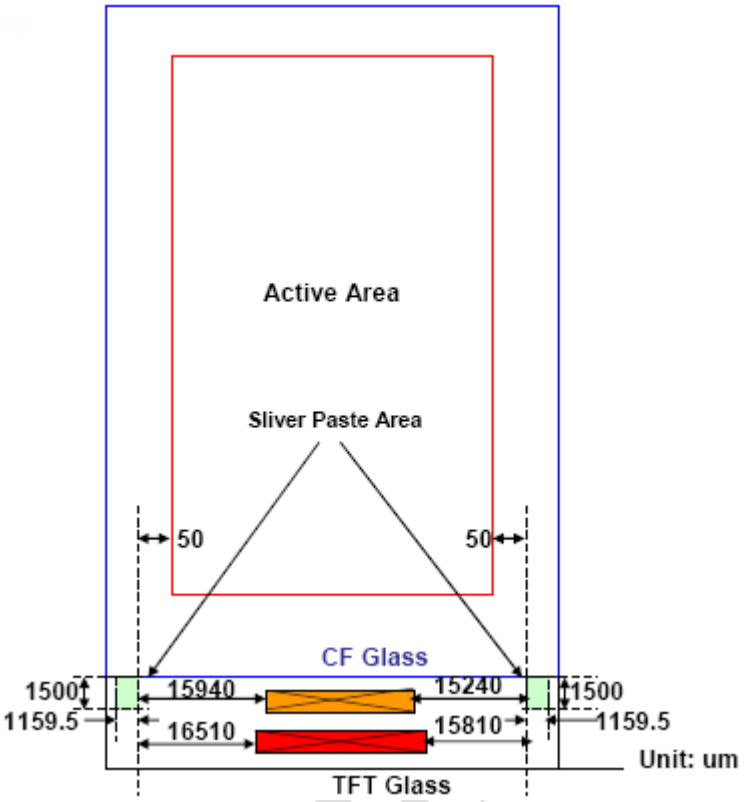
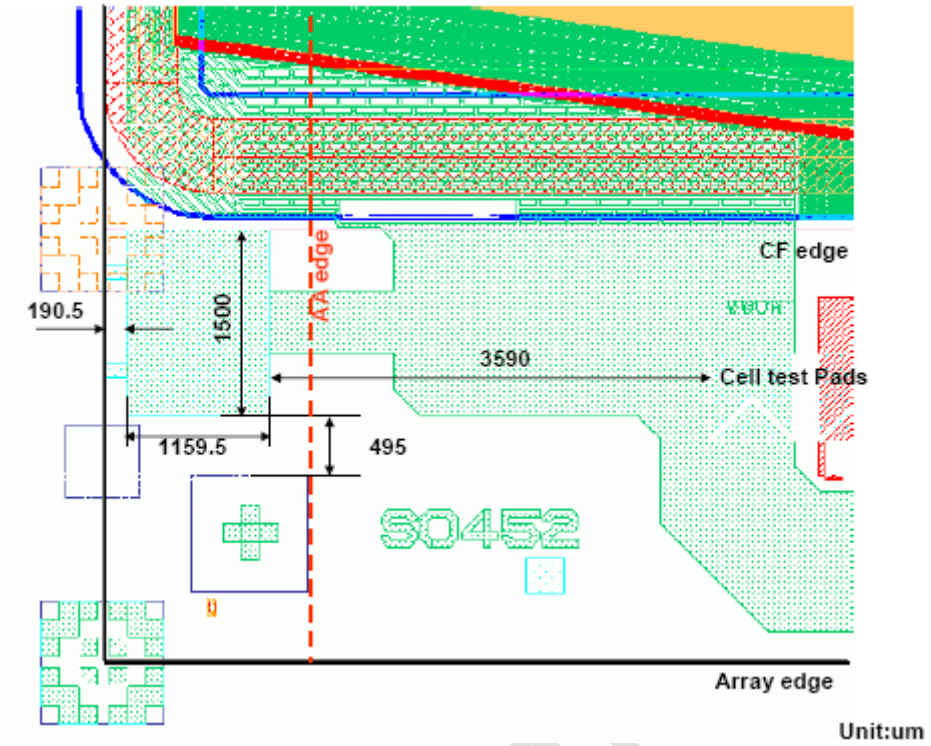
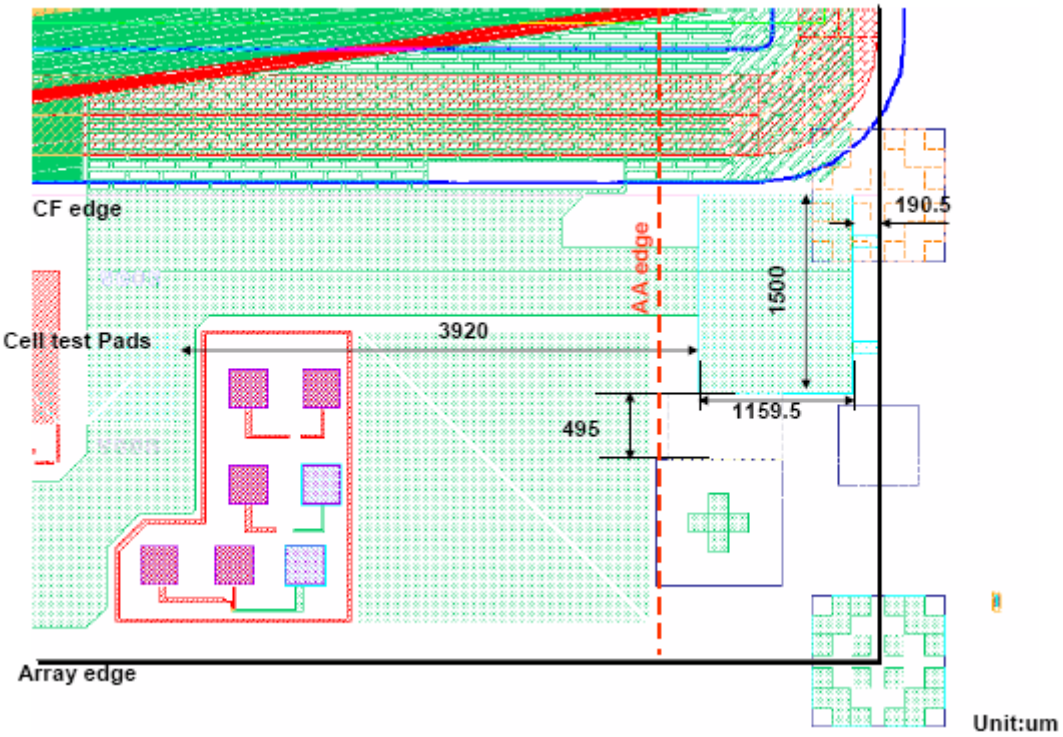


Figure10 Silver Paster to Bonding Area

6.4 The silver paste to the pad or Bonding Mark



Left



Right

Figure11 Silver Paster to the Pad or Bonding mark

6.5 Outline Size of Sub 18 Chips

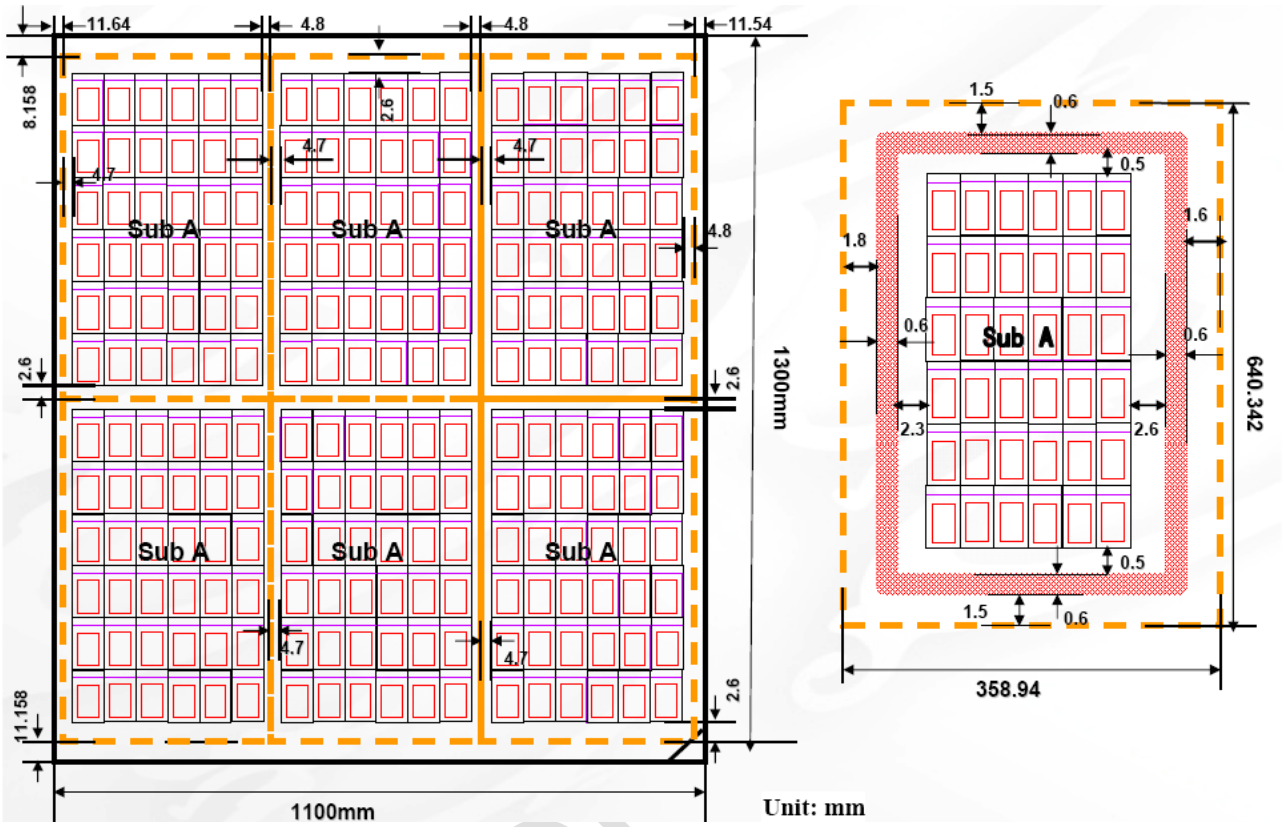


Figure 12 Sub 18 Chips

7 Cell Light-On Information

7.1 Cell Light-On Test Pad Drawing

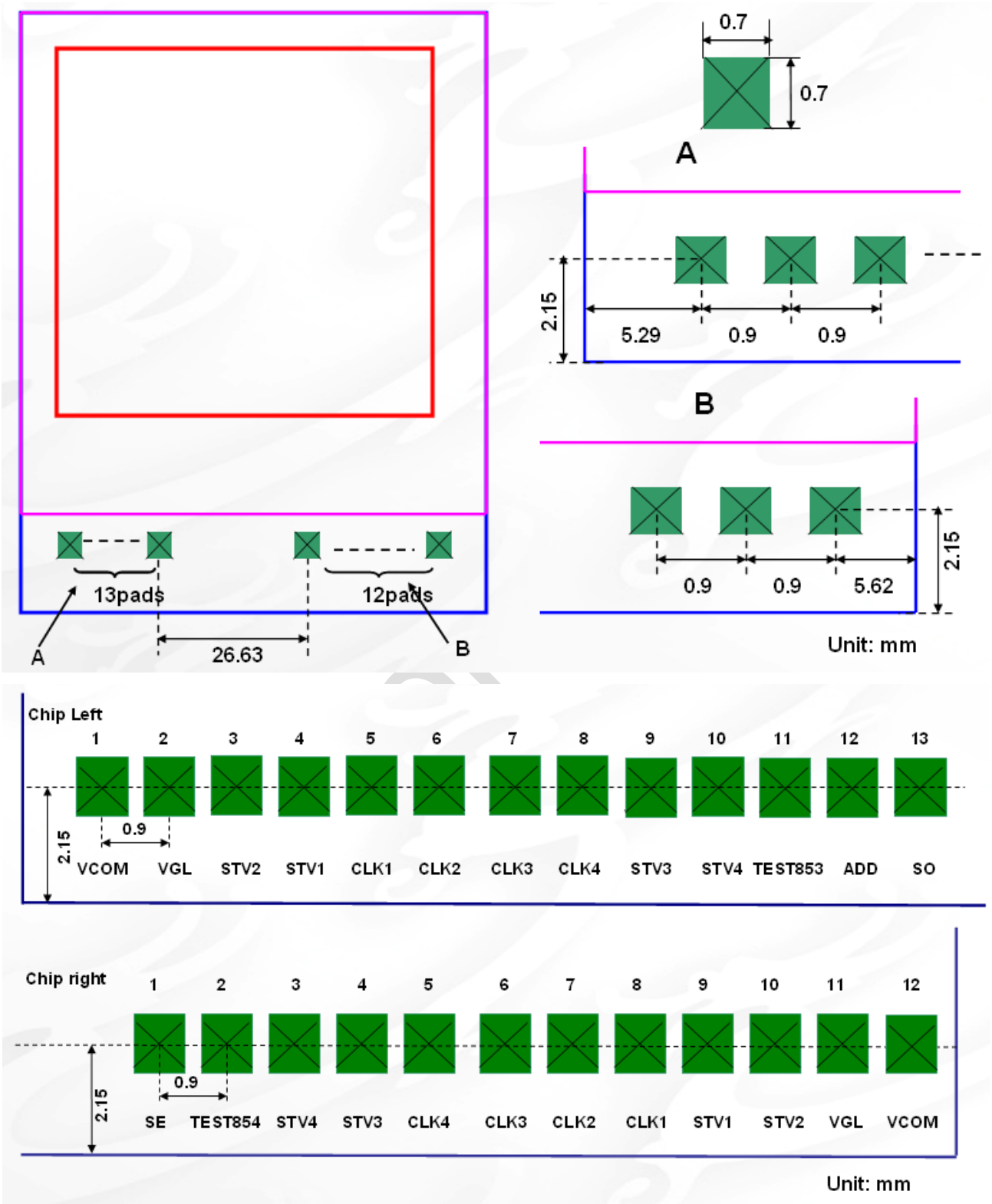


Figure 13 Cell Light-On Test Pad Drawing

7.2 Cell Light-On Test Waveform

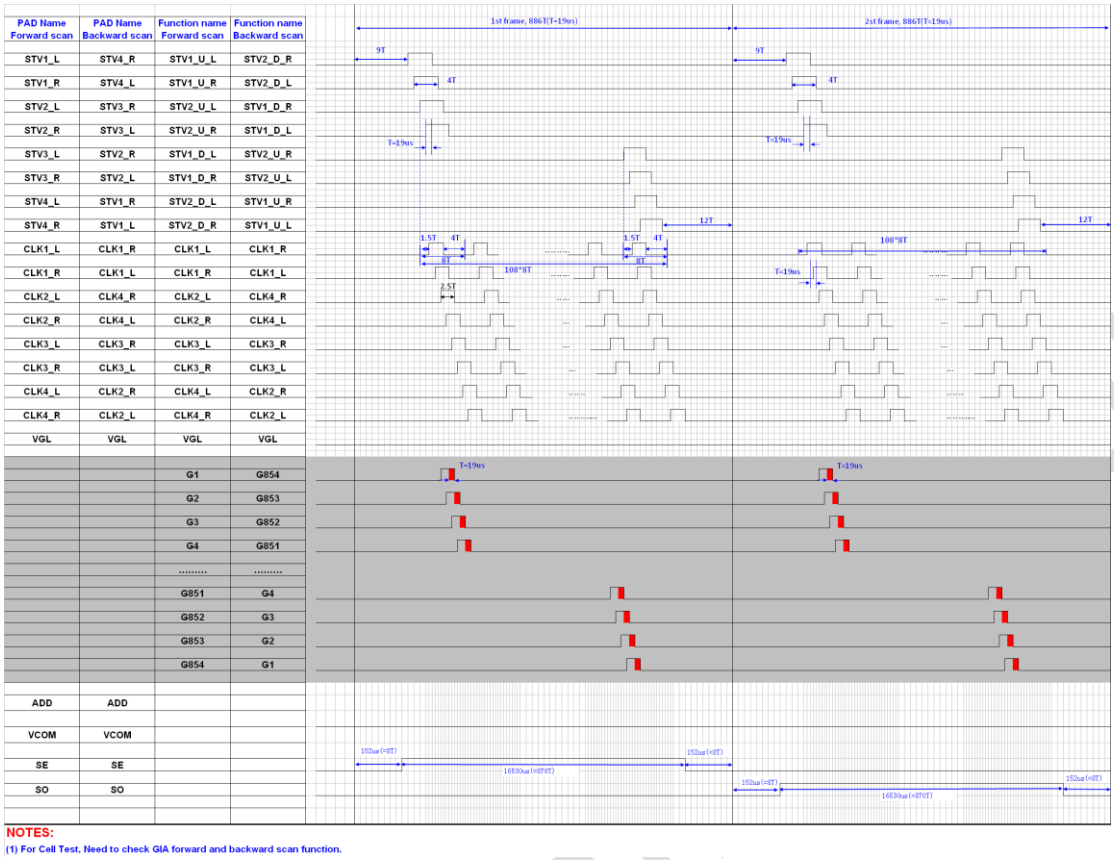


Figure14 Cell Light-On Test Waveform

Table 4 Voltage for Cell Test

Item	Black	Gray	White
VGH	15V		
VGL	-10V		
Vcom	-0.59V		
ADD	17~25V		
SO VDH	0.2V	2.4V	5V
SO VDL	-0.2V	-2.4V	-5V
SE VDH	0.2V	2.4V	5V
SE VDL	-0.2V	-2.4V	-5V

7.3 FPC Pin Assignment

Table 5 FPC Pin Assignment

Pin NO.	Pin Define	Pin NO.	Pin Define	Pin NO.	Pin Define	Pin NO.	Pin Define
1	DUMMY	46	VSSI	91	VSSAM	136	C21P
2	DUMMY	47	VDDI	92	HSSI_CLK_P	137	C21N
3	VCOMOUT	48	D23	93	HSSI_CLK_P	138	C21N
4	MTP_PWR	49	D22	94	HSSI_CLK_N	139	C22P
5	VGLX	50	D21	95	HSSI_CLK_N	140	C22P
6	VGLO	51	D20	96	VSSAM	141	C22N
7	VGL_REG	52	D19	97	HSSI_D0_P	142	C22N
8	VCL	53	D18	98	HSSI_D0_P	143	C23P
9	VREF_PWR	54	D17	99	HSSI_D0_N	144	C23P
10	VSSA	55	D16	100	HSSI_D0_N	145	C23N
11	VDDA	56	D15	101	VSSAM	146	C23N
12	VDDR	57	D14	102	MVDDL	147	C24P
13	VSSR	58	D13	103	MVDDL	148	C24P
14	VDD_DET	59	D12	104	MVDDA	149	C24N
15	DIOPWR	60	D11	105	MVDDA	150	C24N
16	VGSN	61	D10	106	VDDAM	151	VDDB
17	VGSP	62	D9	107	VDDR	152	VCL
18	VGMN	63	D8	108	VSSR	153	AVSS
19	VGMP	64	D7	109	VREFCP	154	VSSB
20	DVSS	65	D6	110	EXTP	155	C31P
21	DVDD	66	D5	111	CSP	156	C31P
22	VDDB	67	D4	112	EXTN	157	C31N
23	VCL	68	D3	113	CSN	158	C31N
24	AVSS	69	D2	114	VDDB	159	C32P
25	LANSEL	70	D1	115	VSSB	160	C32P
26	DSWAP	71	D0	116	C11P	161	C32N
27	PSWAP	72	DE	117	C11P	162	C32N
28	DSTB_SEL	73	PCLK	118	C11N	163	DVDD
29	NBWSEL	74	HS	119	C11N	164	DVSS
30	RGBBP	75	VS	120	C12P	165	C41P
31	I2C_SA0	76	LEDPWM	121	C12P	166	C41P
32	IM3	77	LEDON	122	C12N	167	C41N
33	IM2	78	VDDI	123	C12N	168	C41N
34	IM1	79	VSSI	124	C13P	169	VGH
35	IM0	80	AVDD	125	C13P	170	C51P
36	EXB1T	81	AVSS	126	C13N	171	C51P
37	TE	82	AVEE	127	C13N	172	C51N
38	VSEL	83	VDDA	128	C14P	173	C51N
39	SDO	84	DVSS	129	C14P	174	VGL_REG
40	SDI	85	DVDD	130	C14N	175	VGLO
41	DCX	86	VSSAM	131	C14N	176	VGL
42	WRX	87	HSSI_D1_P	132	AVDD	177	VCOMOUT
43	RDX	88	HSSI_D1_P	133	AVSS	178	DUMMY
44	CSX	89	HSSI_D1_N	134	AVEE	179	DUMMY
45	RESX	90	HSSI_D1_N	135	C21P		

8 Reliability Condition

Item	Condition
High Temperature Operating Test	70℃, 240 hours
Low Temperature Operating Test	-20℃, 240 hours
High Temperature Storage Test	80℃, 240 hours
Low Temperature Storage Test	-30℃, 240 hours
High Temperature/High Humidity Operating Test	60℃, 90%RH, 240 hours

Note (1) All tests above are practiced at module type.
Note (2) There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.
Note (3) Result Evaluation Criteria: TFT- LCD Panel should be at room temperature for 2 hours when the display quality test is over. There should be no particular change which might affect the practical display function and the display quality test should be conducted under normal operating condition.

9 IVO Recommended Cell Packaging

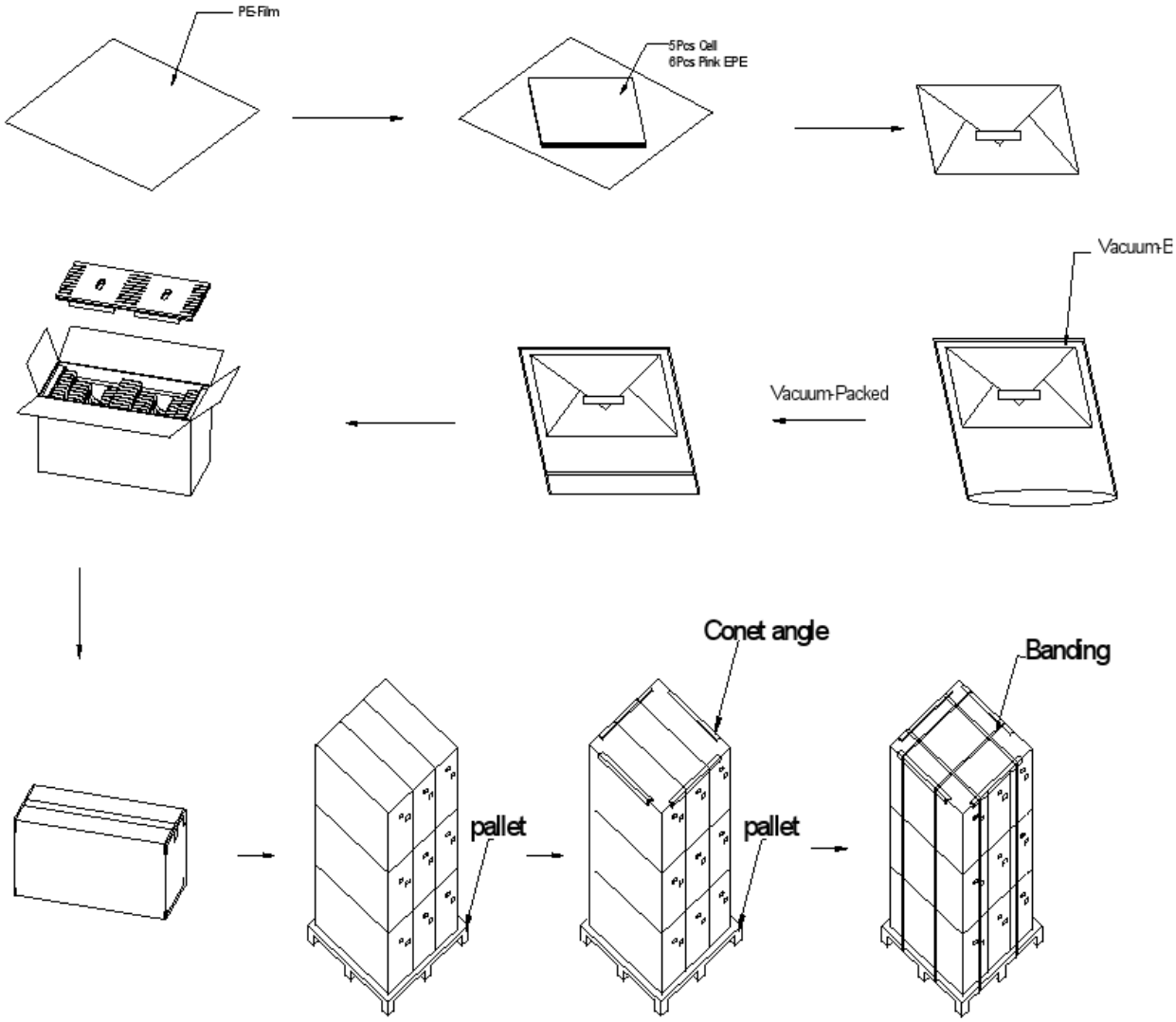


Figure 15 IVO Recommended Cell Packaging

10 General Precaution

10.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

10.2 Handling Precaution

(1) Since the LCD panel is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration, and careless handling may seriously affect the product. If it fall a high place or receives a strong shock, the glass maybe broken.

(2) Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD for incoming inspection or assembly.

(3) When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

(4) Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

(5) When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

10.3 Storage Precaution

(1) Please do not leave cell in the environment of high humidity and high temperature for long time.

(2) IVO suggests to assembly the panel to LCD module in one month after cut into single chip.

(3) The cell should be stored in a dark place .Store in an ambient temperature of 5°C to 45°C,and in a relative humidity of 40%RH to 60%RH.Don’t expose to sunlight or fluorescent light.

(4) Storage in a clean environment, free from dust, active gas, and solvent.

(5) Store in anti-static electricity container.

(6) Store without any physical load.

10.4 Caution For Operation

(1) The polarizer on the surface of panel are made from organic substance. Be very careful for chemicals not to touch the polarizer or it leads the polarizer to be deteriorated.

(2) Dot drop water or any chemicals onto the LCD panel surface.

(3) Please do not leave LCD panel in the environment of high humidity and high temperature for a long time.

(4) Do not connect or disconnect the LCD panel to or from the system when power is on.

(5) When expose to drastic fluctuation of temperature(hot to cold or cold to hot），the LCD panel may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCD panel surface which may affect the operation of the polarizer and the LCD panel.

(6) Do not display the fixed pattern for a long time because it may develop image sticking due to the LCD panel structure.

(7) The temperature of baking should be under 85℃.

10.5 Static Electricity

(1) Protection film must remove very slowly from the surface of LCD panel to prevent from electrostatic occurrence if the LCD panel attaches a polarizer.

(2) Because TFT-LCD panel is very weak to electrostatic discharge, please be careful with electrostatic discharge. Persons who handle the LCD panel should be grounded through adequate methods.

10.6 Safety

(1) For the crash damaged or unnecessary LCD panel, it is recommended to wash off liquid crystal
by either of solvents such as acetone and ethanol an should be burned up later.

(2) In the case the LCD panel is broken, watch out whether liquid crystal leaks out or not. If your hands touch the liquid crystal, wash your hands cleanly with water an soap as soon as possible.

(3) If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then drink a lot of water and induce vomiting, and then, consult a physician.

(4) If the liquid crystal should get in your eyes, flush your eyes with running water for at least fifteen minutes.

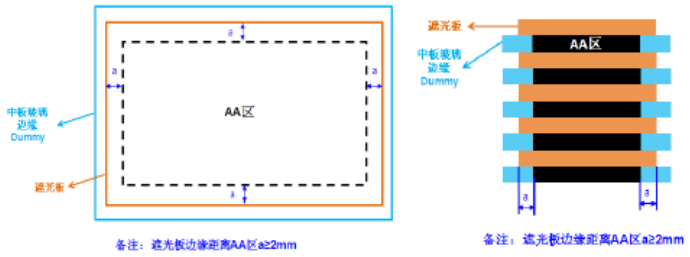
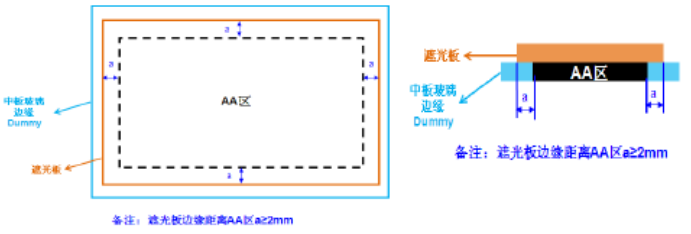
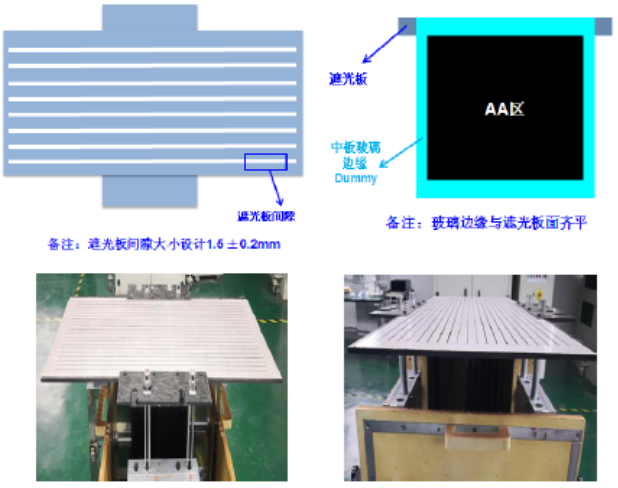
(5) If the liquid crystal touches your skin or clothes, remove it and wash the affected part of your skin or clothes with soap and running water.

10.7 Disposal

When disposing LCD panel, obey the local environmental regulations.

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co., LTD.

薄化制程生产标准说明表
Slimming Process Instruction

	UV固化方式		遮光板设计	作业标准
UV固化制程	水平固化	箱式固化		1、将中板玻璃进行叠片，叠放层数≤5层 2、遮光板变形不可有，遮光板需紧贴玻璃表面，玻璃有效区需完全遮盖，遮光板边缘距离AA区a≥2mm 3、中板玻璃边缘进行UV封胶，渗胶量≥1mm 4、将产品缓慢推进固化炉固化 5、固化期间玻璃表面温度＜70℃
		传动固化		1、将中板玻璃进行叠片，叠放层数1层 2、遮光板变形不可有，遮光板需紧贴玻璃表面，玻璃有效区需完全遮盖，遮光板边缘距离AA区a≥2mm 3、中板玻璃边缘进行UV封胶，渗胶量≥1mm 4、将产品平稳放入传送带 5、固化期间玻璃表面温度＜70℃
	垂直固化			1、将中板玻璃垂直插入封胶架 2、中板玻璃边缘进行UV封胶，渗胶量≥1mm 3、遮光板变形不可有，将中板玻璃均匀卡入遮光板间隙中(遮光板间隙大小设计1.5 ± 0.2mm)，玻璃边缘与遮光板面齐平 4、中板玻璃有效区需完全遮盖，不可漏光 5、将产品缓慢推进固化炉固化 6、固化期间玻璃表面温度＜70℃

研磨	尺寸	研磨实测压力管控	研磨时间管控
	≤7"	≤60g/cm^2	≤6min/面
	＞7"	≤50g/cm^2	≤3min/面