Customer Approval Specification

To:

Product Name: C039SWP6-0

Document Issue Date: 2016/01/13

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

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.

FQ-7-30-0-009-03D

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	2/23
Document No.		Issue date	2016/01/13	Revision	00

Revision	Date	Page	Old Description	New Description	Remark
V00	2014/12/10	-	-	First issued.	-

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	3/23
Document No.		Issue date 2016/01/13	Revision	00

CONTENTS

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	4/23
Document No.		Issue date 2016/01/13	Revision	00

1 General Descriptions

1.1 Introduction

The C039SWP6-0 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) Single Chip and Sub Chips that uses amorphous silicon TFT as a switching device. This TFT LCD panel has a 3.97 inch diagonally measured active display area with WVGA resolution (480 horizontal by 800 vertical pixels array).

1.2 Features

■ 3.97" TFT-LCD Panel
■ Supported WVGA Resolution
■ Compatible with RoHS Standard

1.3 General Characteristics

Table 1 General Characteristics

Item	Specification	Unit	Note
Outline Dimension (H x V x D)	55.24 (Typ.) x 93.90 (Typ.) x 0.80 (Typ.)	mm	Single Chip
Active Area (H x V)	51.84 x 86.40	mm	Single Chip
Number of Pixels (H x V)	480 x 800	-	Single Chip
Pixel Size (H x V)	0.108 x 0.108	mm	Single Chip
Pixel Arrangement	R.G.B Stripe	mm	Single Chip
Display Type	Transmissive	-	-
Display Mode	TN, Normally White	-	-
Cell Thickness	CF: 0.4±0.04	mm	-
	TFT: 0.4±0.04		
Driver IC(Recommendation)	ILI9806E/HX8379A	-	-
Weight	590(Max.)	g	SubA 49Chip
	416(Max.)	g	SubB 35Chip
	550(Max.)	g	SubC 42Chip
	358(Max.)	g	SubD 30Chip

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	5/23
Document No.		Issue date 2016/01/13	Revision	00

2 Absolute Maximum Ratings

Table 2 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
LC Operating Voltage (Ta = 25℃)	V_{OP}	-4.5	4.5	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

Table 3 Power Supply Voltage

No.	Item	Min.	Typ.	Max.	Unit
1	Vcom voltage	-	-1.7	-	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.

4 Optical Characteristics

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	6/23
Document No.		Issue date 2016/01/13	Revision	00

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

Table 4 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Transmittance	-		3.51	3.90	-	%	(1),(5),(6),(7),(8)
Contrast Ratio	Center		560	700	-	-	(1),(3),(6)(7),(8)
Response Time	Rising + Falling		-	20	30	ms	(1),(4),(6),(7),(8)
CF Color Chromaticity (CIE1931)	Red x		Typ. -0.03	0.647	Typ. +0.03	-	Base on C-Light
	Red y			0.329		-	
	Green x			0.277		-	
	Green y			0.549		-	
	Blue x			0.134		-	
	Blue y			0.123		-	
	White x			0.295		-	
	White y			0.325		-	
NTSC	CIE1931		58	60	-	%	(1),(6),(7),(8)
Viewing Angle (CR>10)	Horizontal	θ_{x+}	60	70	-	degree	(1),(2),(6),(7),(8) Viewing Angle base on using EWV Polarizer Reference only
		θ_{x-}	60	70	-		
	Vertical	θ_{y+}	60	70	-		
		θ_{y-}	50	60	-		
Viewing Direction	12 O'clock						(2),(9)

IVO InfoVision Optoelectronics（Kunshan）Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	7/23
Document No.		Issue date	2016/01/13	Revision	00

Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature(25℃) 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.

LCD Module

LCD Panel

Center of the Screen

Photo Meter (DMS 1140)

Light Shield Room

*Ambient Luminance<2lux

*Ambient   Temperature

25+/-3degC

180 mm
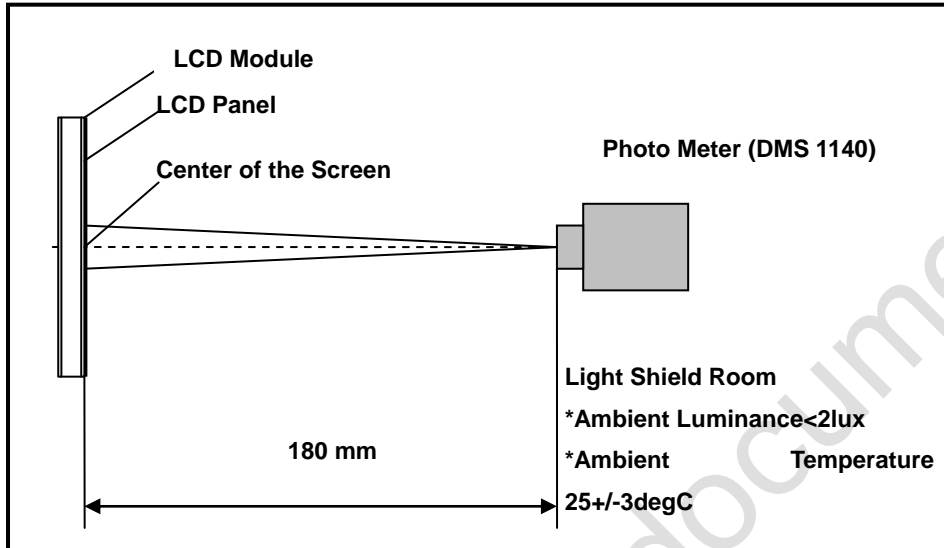
Figure 1 Measurement Setup

Note (2) Definition of Viewing Angle

Nomal
θx=θy=0°

θy+=90°
12 o'clock direction

y+

θy+

θy-

θx-

θx+

θx-=90°

θx+=90°

x-

x+

Driver IC

y-

6 o'clock
θy-=90°
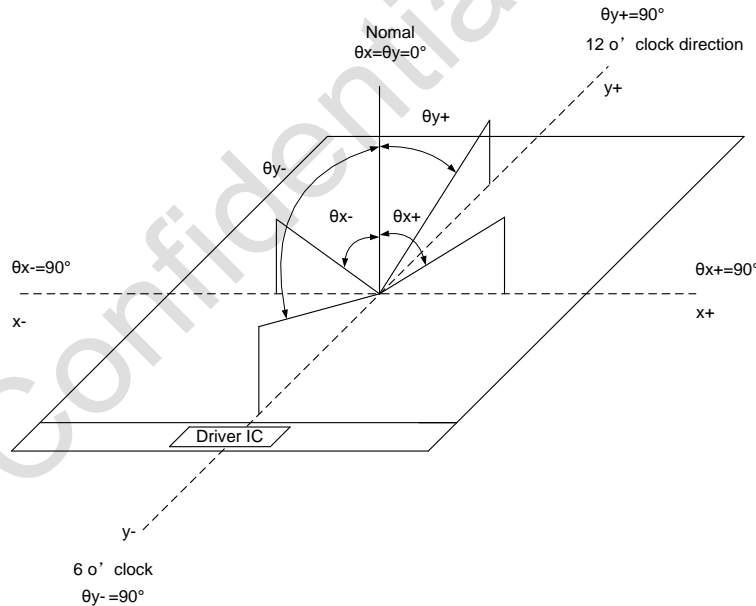
Figure 2 Definition of Viewing Angle

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

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	8/23
Document No.		Issue date	2016/01/13	Revision	00

White(TFT OFF) | Black | (TFT ON) | White(TFT OFF)
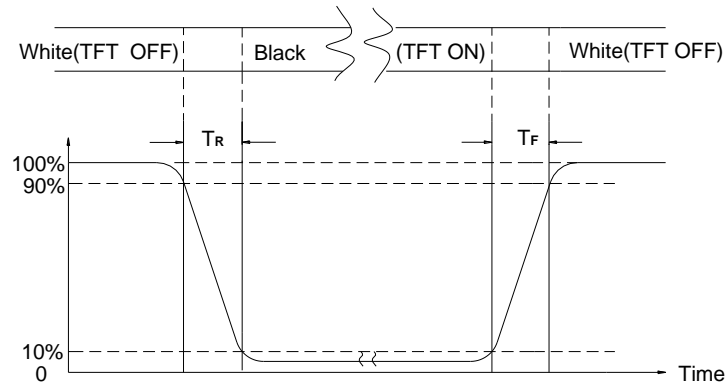
T_R T_F

100%
90%

10%
0   Time

Figure 3 Definition of Response Time

Note (5) Definition of Transmittance

$$\text{Transmittance} = \frac{\text{Center Luminance of LCD}}{\text{Center Luminance of Back Light}} \times 100\%$$

Note (6) Light source is the BLU which is supplied by IVO
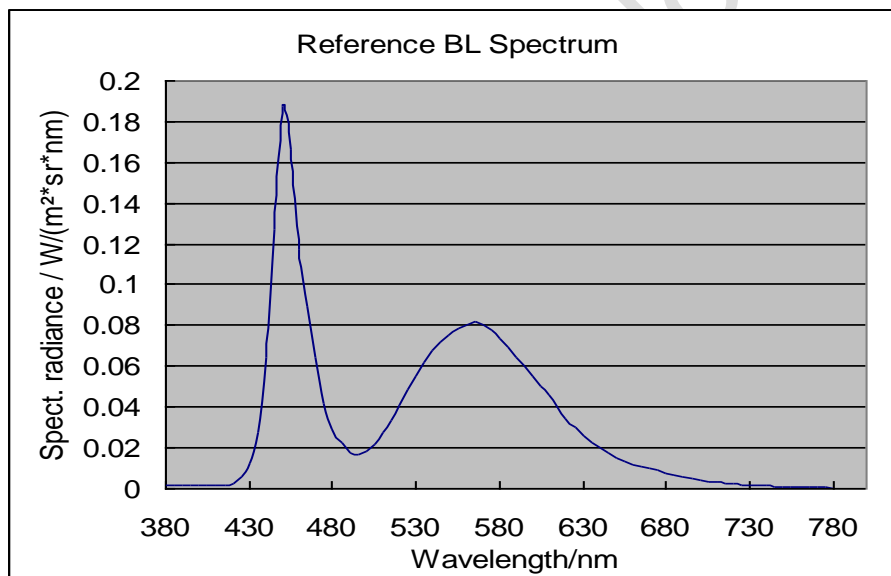
Figure 4 Back Light Spectrum

Note (7) The EWV polarizer type: SAPO/CF, SAPO/Array.
Note (8) All optical data based on IVO given polarizer & Backlight& testing machine in this document.

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification	Page No.	9/23
Document No.		Issue date	2016/01/13	Revision	00

Note (9) Rubbing Direction
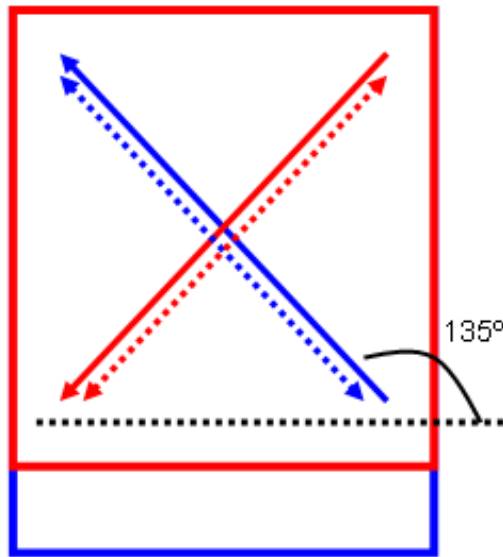
Figure 5 View form CF Film side

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	10/23
Document No.		Issue date	2016/01/13	Revision	00

5 Pixel Format

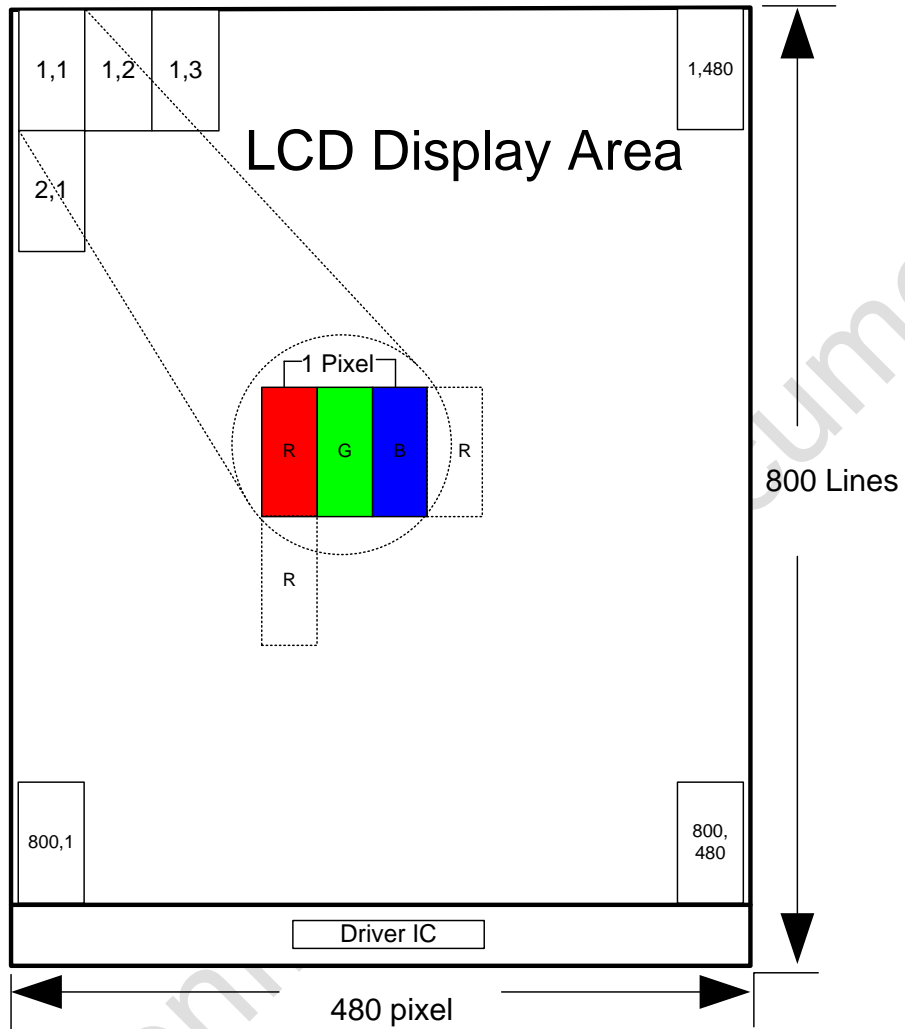The figure shows the relationship of the input signals and LCD panel pixel format.

Figure 6 Pixel Format

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	11/23
Document No.		Issue date	2016/01/13	Revision	00

6　Outline Size

6.1 Outline Size of Single Chip

Unit: mm
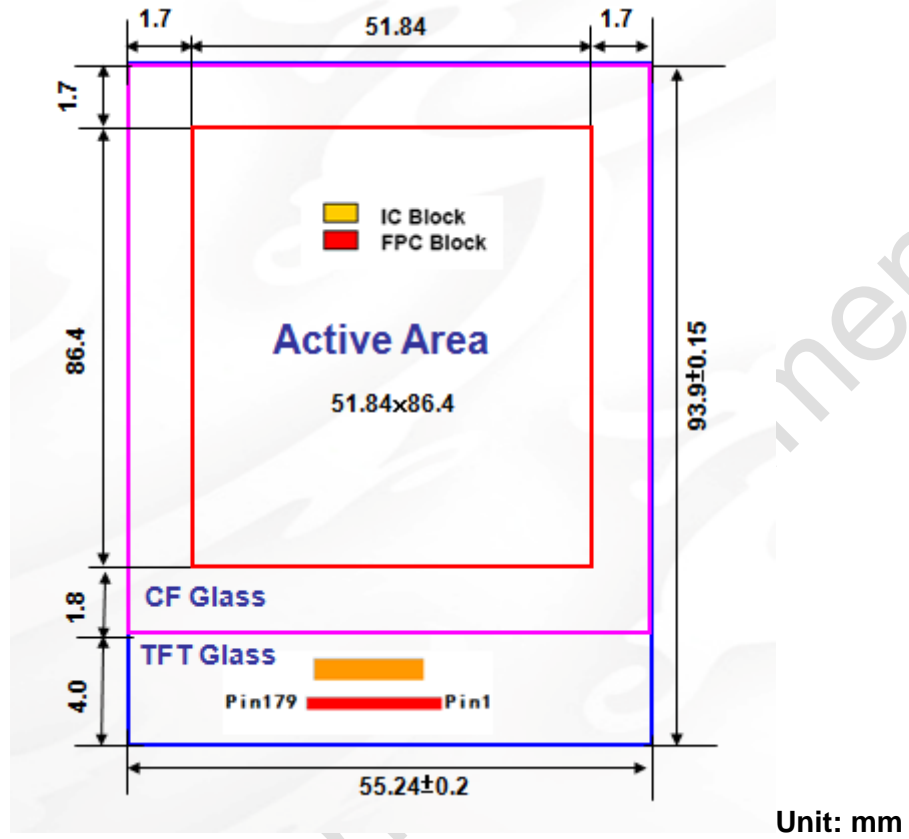
Figure 7 Outline Size of Single Chip

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	12/23
Document No.		Issue date	2016/01/13	Revision	00

6.2 IC / FPC Position Size On Cell
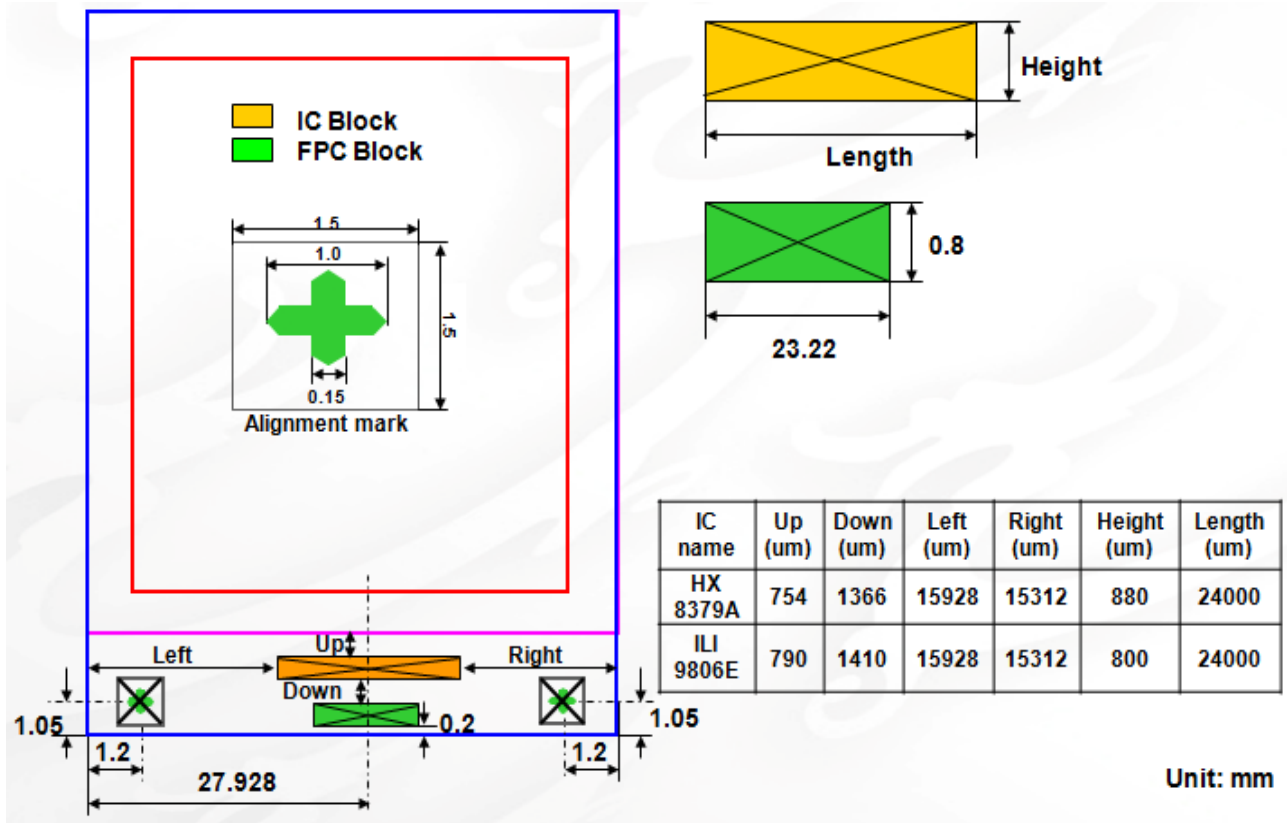
Figure 8 IC Position Information

IC name	Up (um)	Down (um)	Left (um)	Right (um)	Height (um)	Length (um)
HX 8379A	754	1366	15928	15312	880	24000
ILI 9806E	790	1410	15928	15312	800	24000

Unit: mm
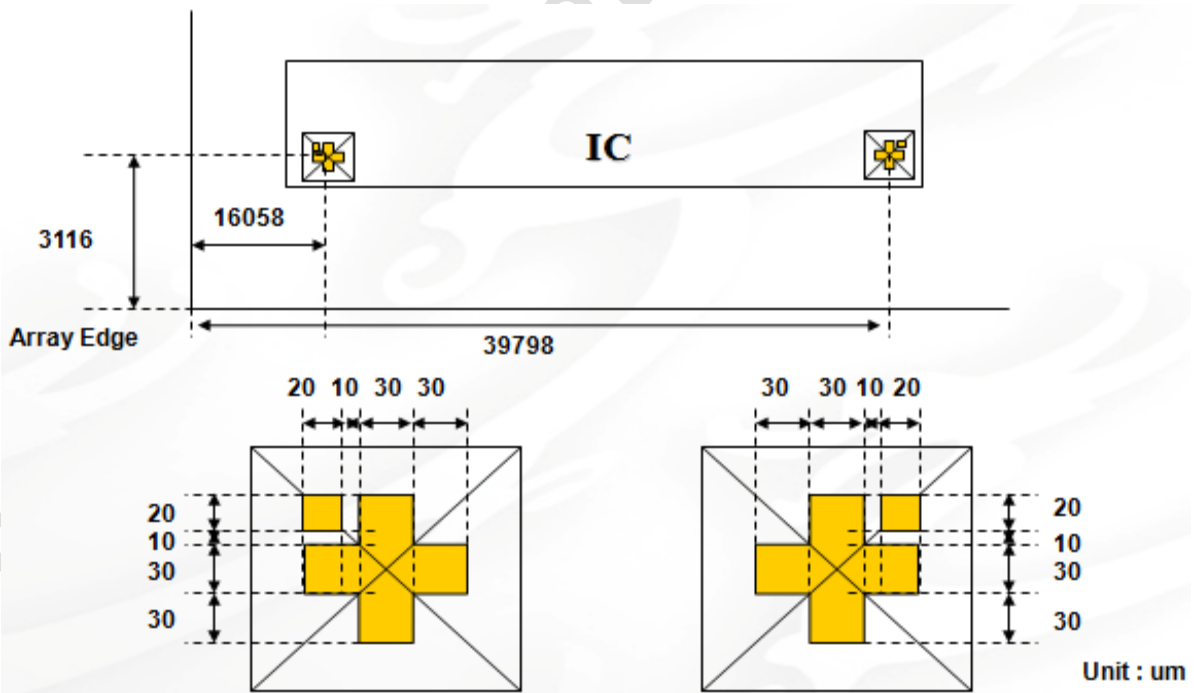
Figure 9 IC Mark Position Information

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	13/23
Document No.		Issue date 2016/01/13	Revision	00

Figure 10 FPC Position Information

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	14/23
Document No.		Issue date	2016/01/13	Revision	00

6.3 Outline Size of Sub sheet and Cut Mark

Sub A size:397.705*669.3mm

Sub B size:279.875*669.3mm

Sub C size:397.705*575.4mm

Sub D size:279.875*575.4mm

Unit: mm

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.
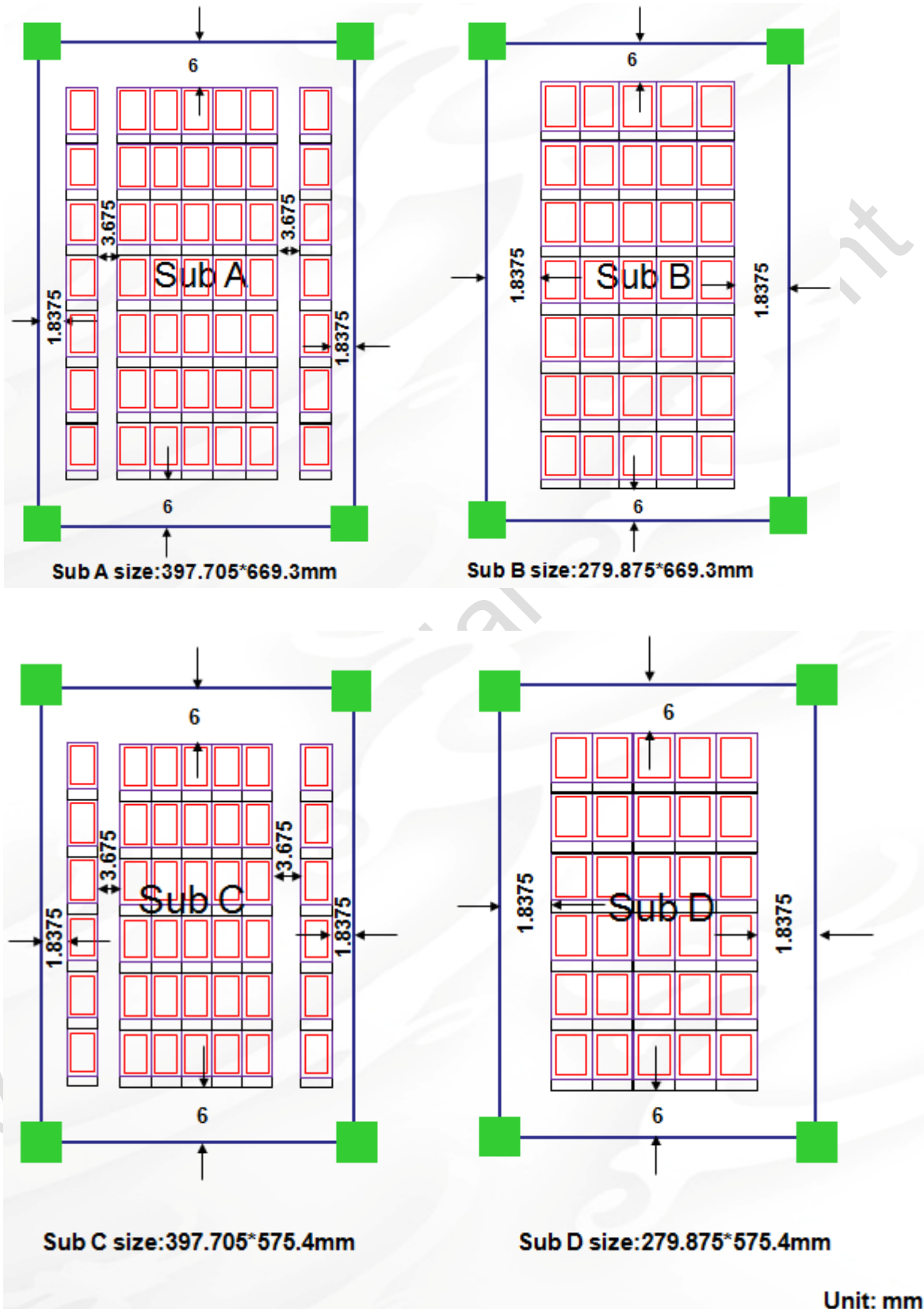
Document Title	C039SWP6-0 Cell Product Specification		Page No.	15/23
Document No.		Issue date 2016/01/13	Revision	00

Array Glass Cut Mark and Size

CF Glass Cut Mark and Size

Unit:mm
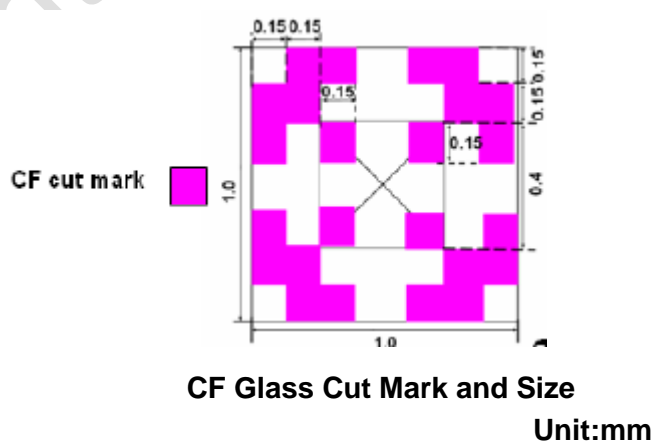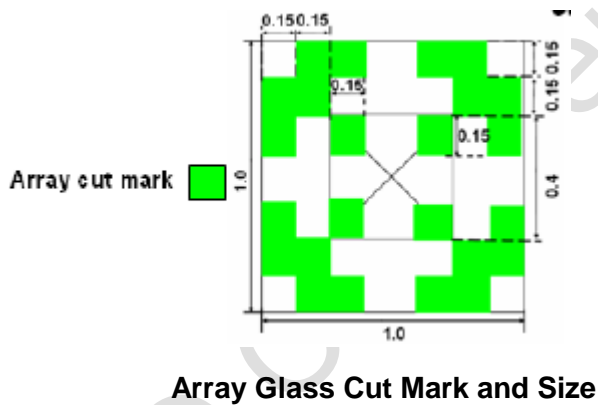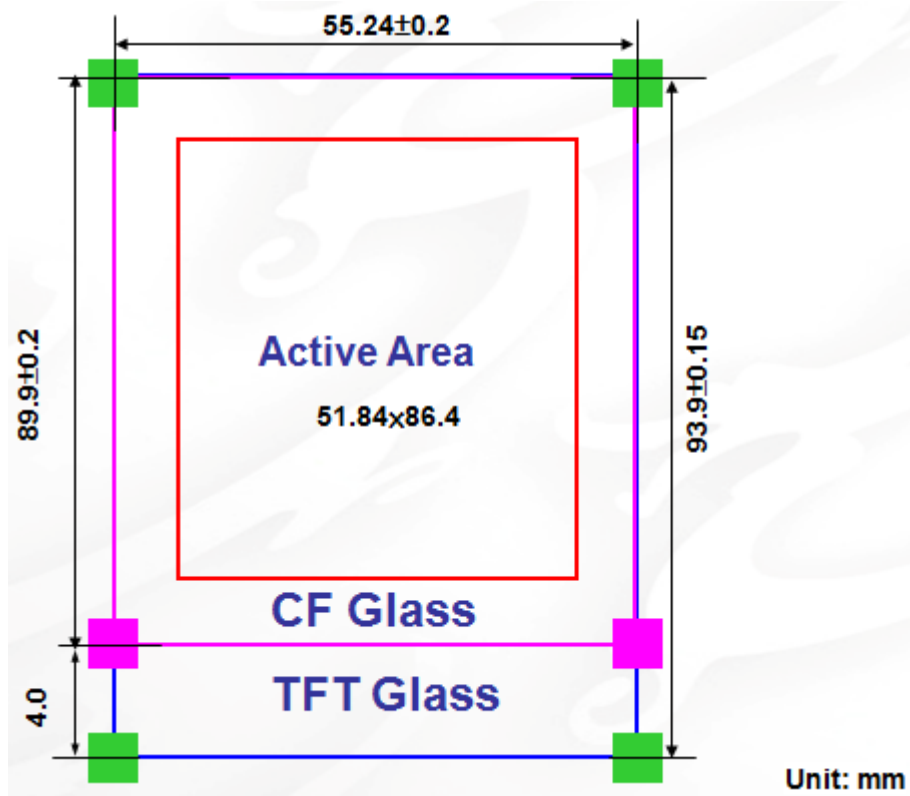
Figure 11 Sub Sheet and Cut Mark

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	16/23
Document No.		Issue date	2016/01/13	Revision	00

7   Cell Light-On Information

7.1 Cell Light-On Test Pad Drawing
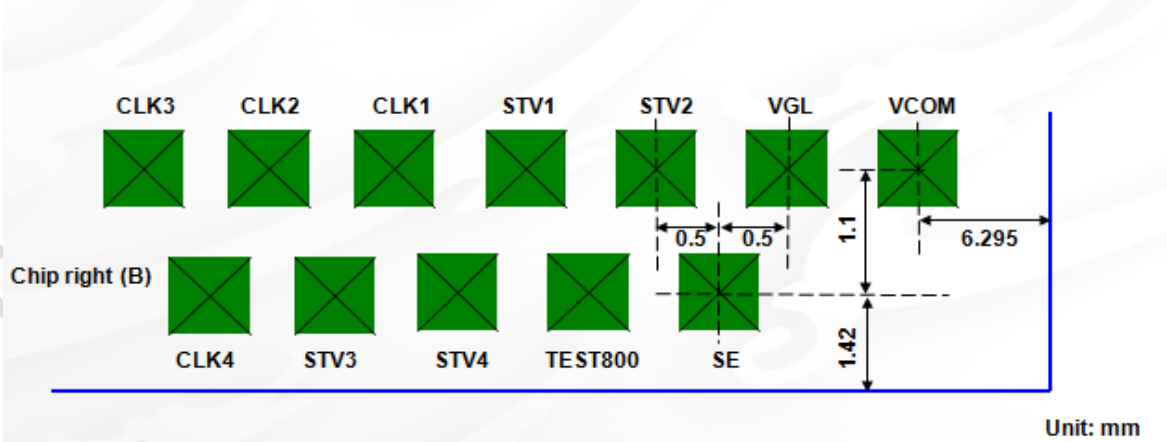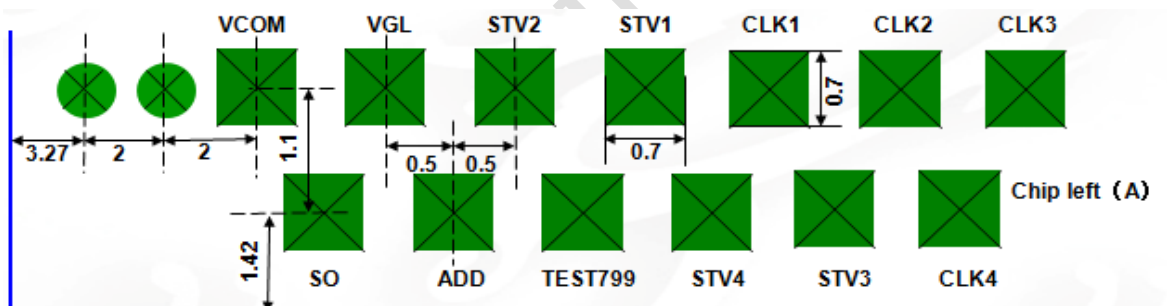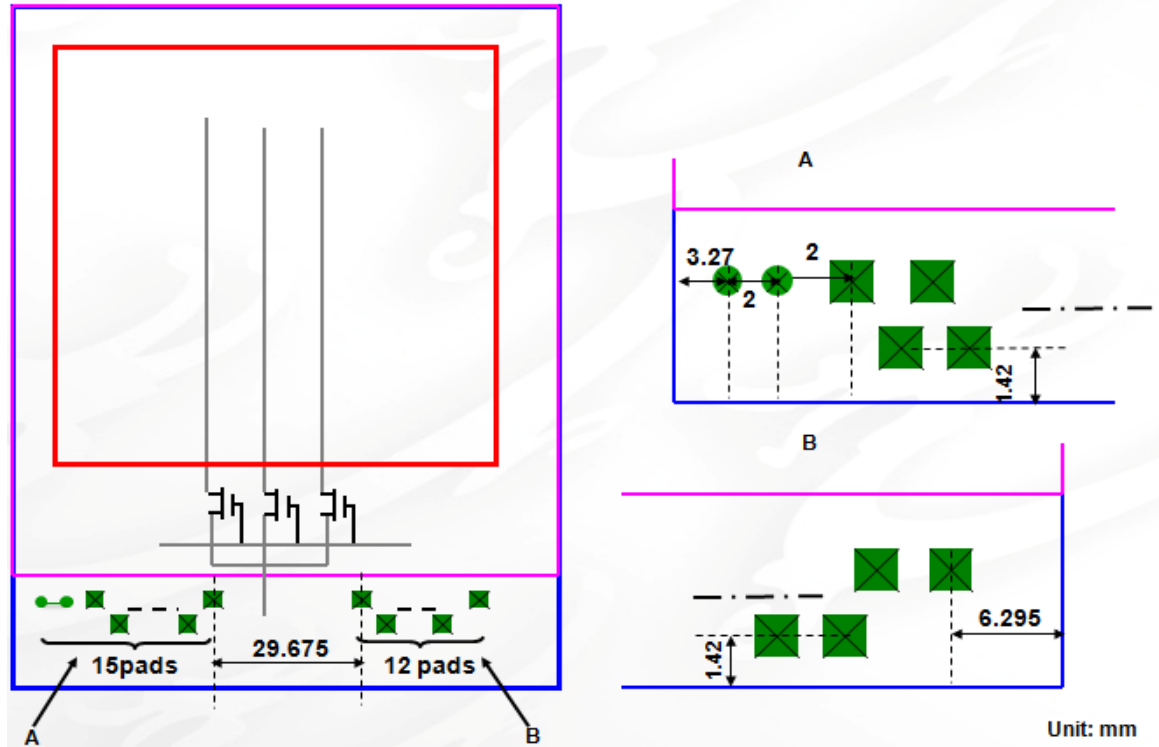
Figure 12 Cell Light-On Test Pad Drawing

InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	17/23
Document No.		Issue date 2016/01/13	Revision	00

7.2 Cell Light-On Test
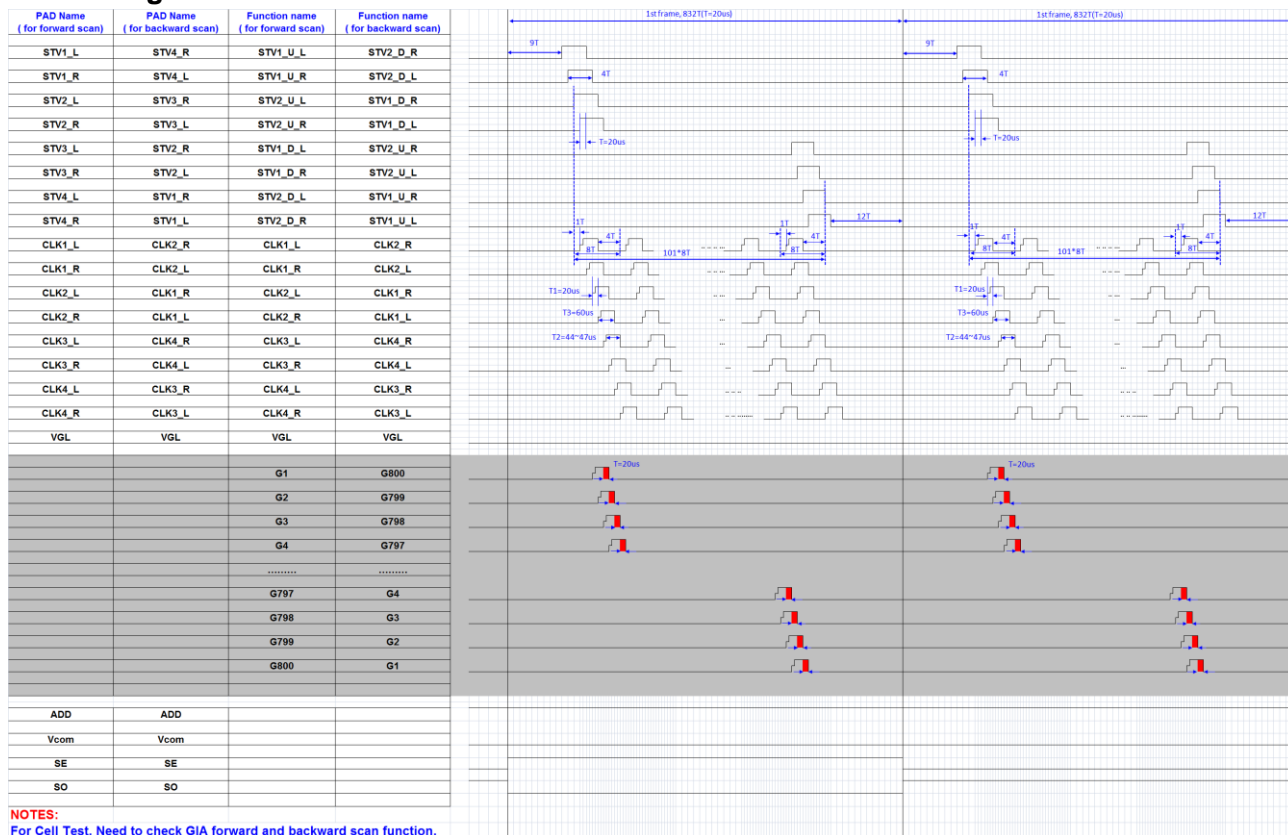
Figure 13 Cell Light-On Test Waveform

Table 5 Voltage For Cell Test

Item	Black	Gray	White
VGH	15V		
VGL	-10V		
Vcom	-1.7V		
ADD	17~25V		
SO VDH	4.5V	2.2V	0.2V
SO VDL	-4.5V	-2.2V	-0.2V
SE VDH	4.5V	2.2V	0.2V
SE VDL	-4.5V	-2.2V	-0.2V

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	18/23
Document No.		Issue date	2016/01/13 Revision	00

7.3 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		

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	19/23
Document No.		Issue date	2016/01/13	Revision	00

8 Reliability Condition

Table 6 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.

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	20/23
Document No.		Issue date	2016/01/13	Revision	00

9 IVO Recommended Cell Packaging
9.1 30&35 Chip Package
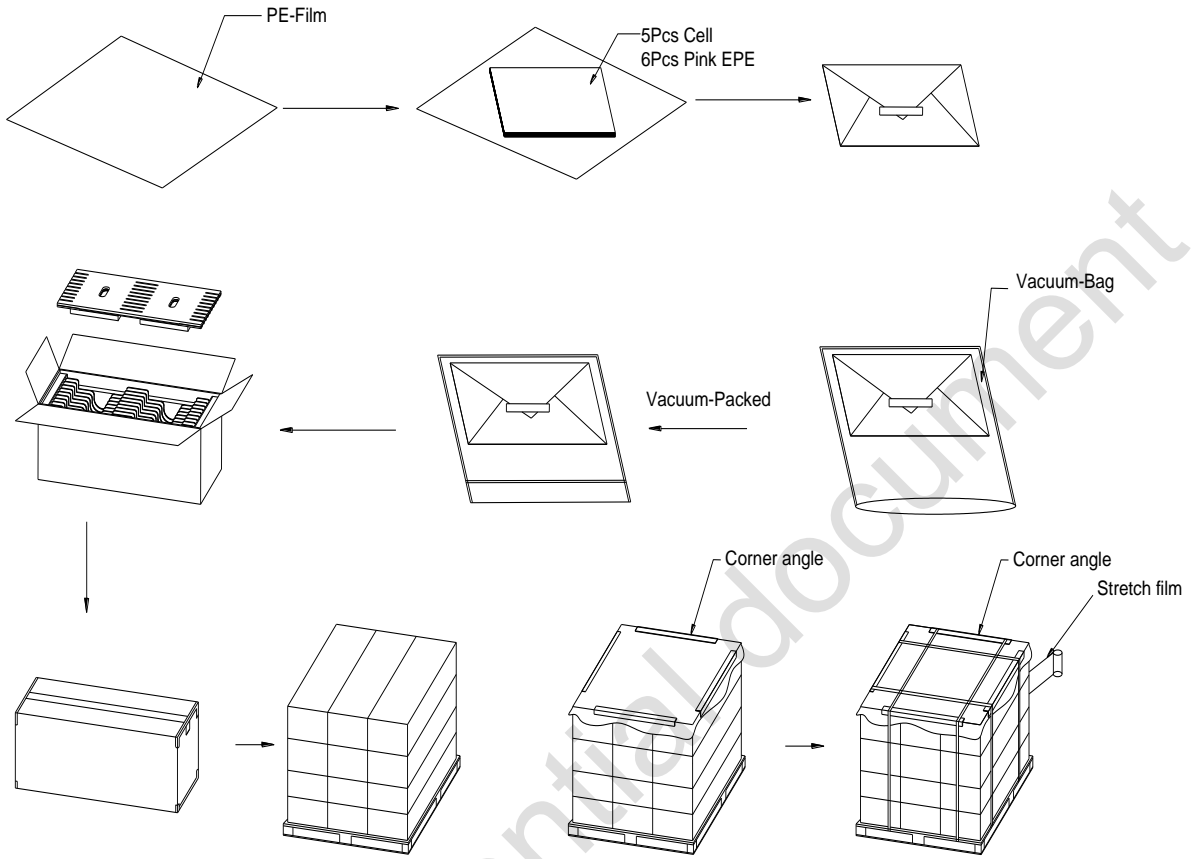
Figure 14 IVO Recommended Cell Packaging

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	21/23
Document No.		Issue date	2016/01/13	Revision	00

9.2 42 & 49 Chip Package30&35 Chip Package
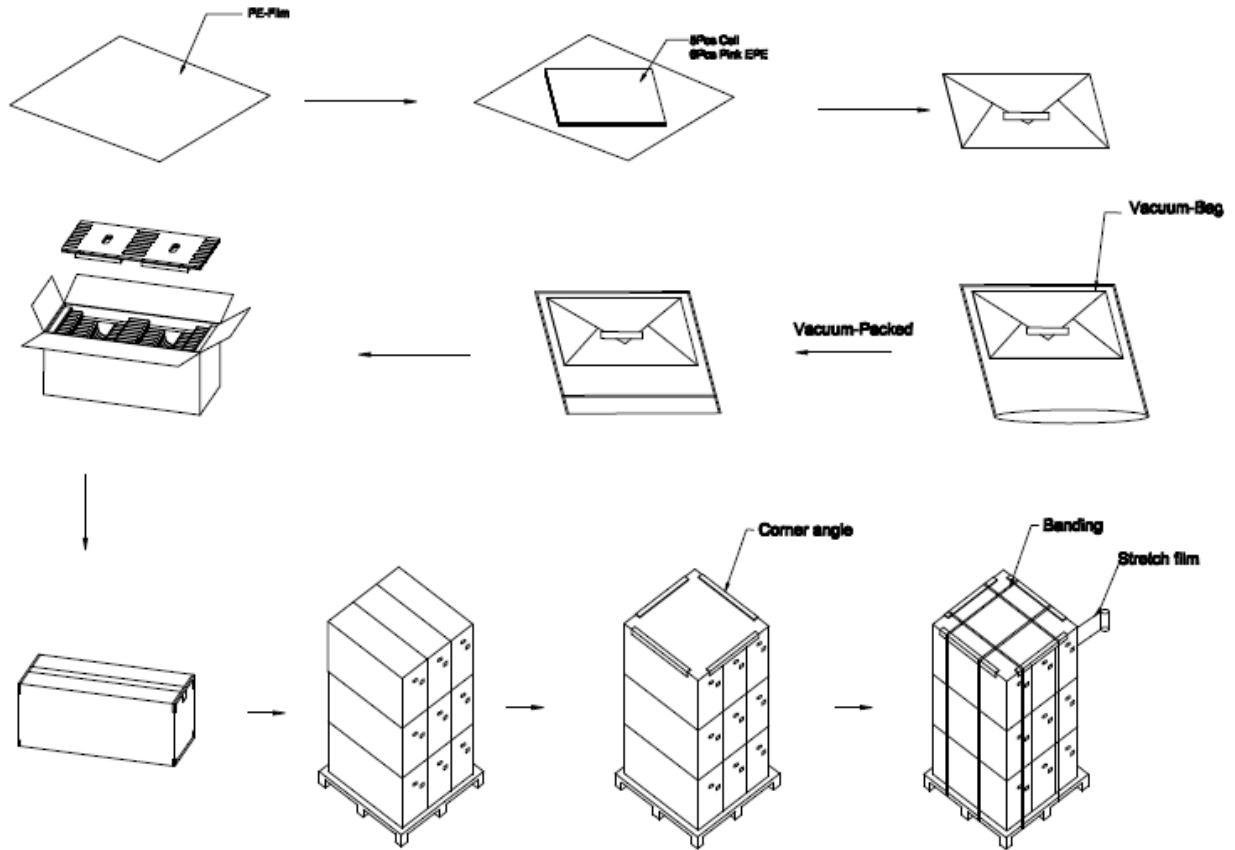
Figure 15 IVO Recommended Cell Packaging

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	22/23
Document No.		Issue date 2016/01/13	Revision	00

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

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	C039SWP6-0 Cell Product Specification		Page No.	23/23
Document No.		Issue date	2016/01/13	Revision	00

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.