



Chunghwa Picture Tubes, Ltd.

Product Tentative Specification

To :

Date :

TFT LCD

CLAF024GS21X0

ACCEPTED BY : V0.0
(Tentative)

APPROVED BY	CHECKED BY	PREPARED BY

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REVISION STATUS

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1. OVERVIEW

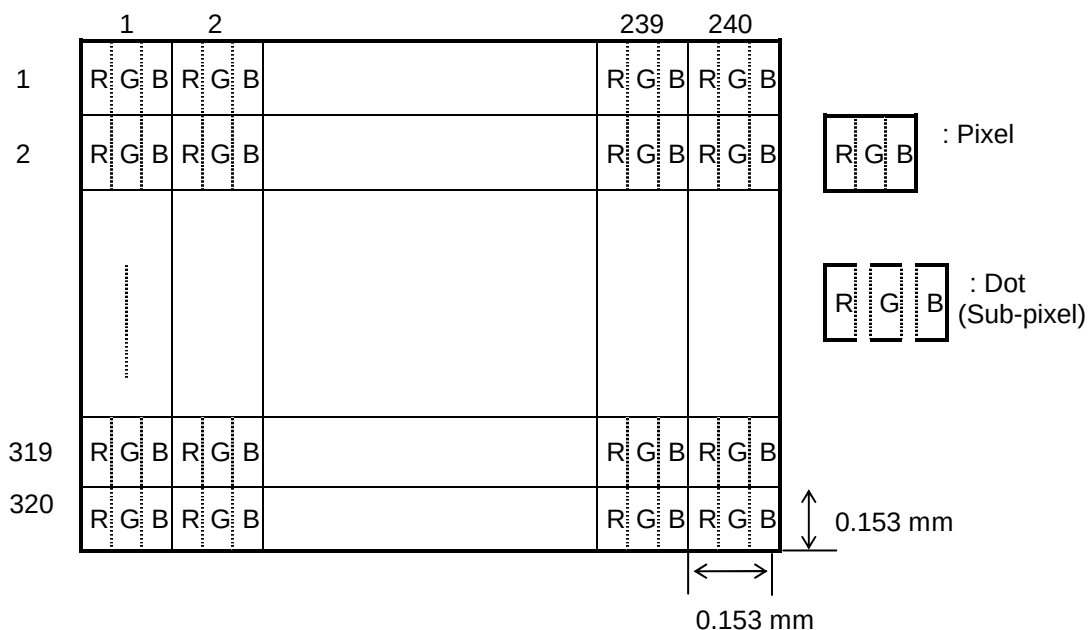
CPT **CLAF024GS21X0** is a cell product after LC injected. This is 3:4 aspect ratio panels for the high end mobile phone application.

The 2.4" screen produces a high resolution image that is composed of 76,800 (240×320) pixel elements in a stripe arrangement.

General specifications are summarized in the following table:

ITEM	SPECIFICATION
Panel Size	2.4" inch
Display Area (mm)	36.72(H) x 48.96(V)
CF glass dimension	41.10(H) x 53.20(V) x 0.3(Thickness)
TFT glass dimension	41.10(H) x 57.10 (V) x 0.3(Thickness)
Number of Pixels	240(H) x 3(RGB) x 320(V)
Pixel Pitch (mm)	0.153(H) x 0.153(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	normally black VA+Transflective
Driving Method	TFT active matrix
Viewing Direction	ALL
Suggesting IC	ILI9325
Weight	TBD

LCD Cell Drawing (Note 1)



The LCD Products listed on this document are not suitable for use of aerospace equipment, submarine cables, nuclear reactor control system and life support systems. If customers intend to use these LCD products for above application or not listed in "Standard" as follows, please contact our sales people in advance.

2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Remark
Operating Ambient Temperature	T_{OP}	-20	+70	°C	
Operating Ambient Humidity	H_{OP}	10	90	% (RH)	
Storage Temperature	T_{STG}	-30	+80	°C	
Storage Humidity	H_{STG}	10	90	% (RH)	

Note 1. The absolute maximum ratings are the values that must not be exceeded at any time for this product. It is not allowed for any of these ratings to be exceeded. Should a product be used with any of the absolute maximum ratings exceeded, the characteristics of the product may not be recovered, or in an extreme case, the product may be permanently destroyed.

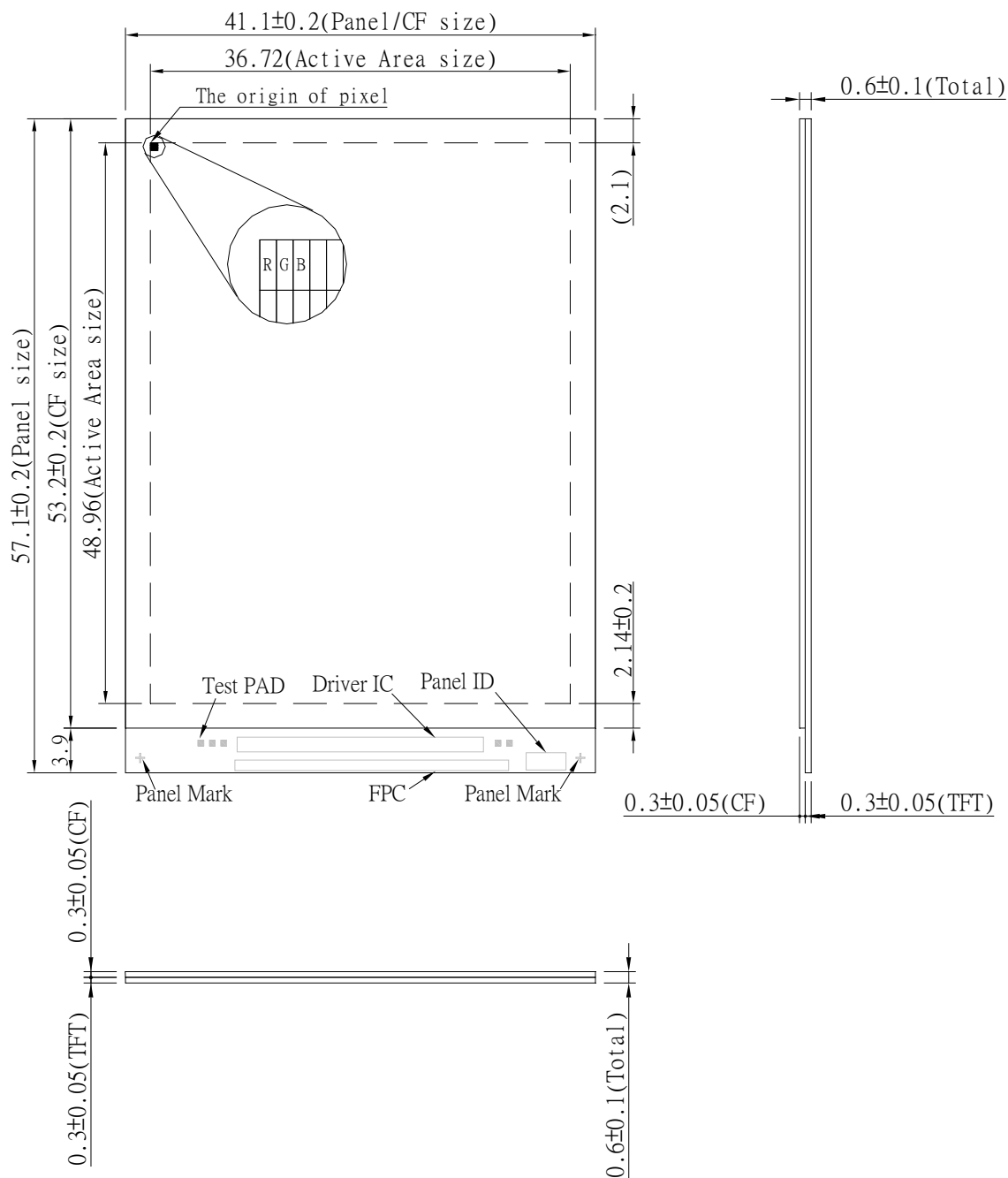
Therefore, when designing a system incorporating the product, make sure that adequate attentions be paid to the variations in the supply voltages, the characteristics of parts that are connected, surges in the input and output lines, and the ambient temperatures.

Note 2. This specification applies after the driver IC mounting and the FPC mounting. (This specification isn't applicable at time of driver IC un-mounting and FPC un-mounting.)

LCD should keep the condition that dew doesn't storage in case of driver IC un-mounting and FPC un-mounting. Dew may break the LCD. Especially part is very weak for dew.

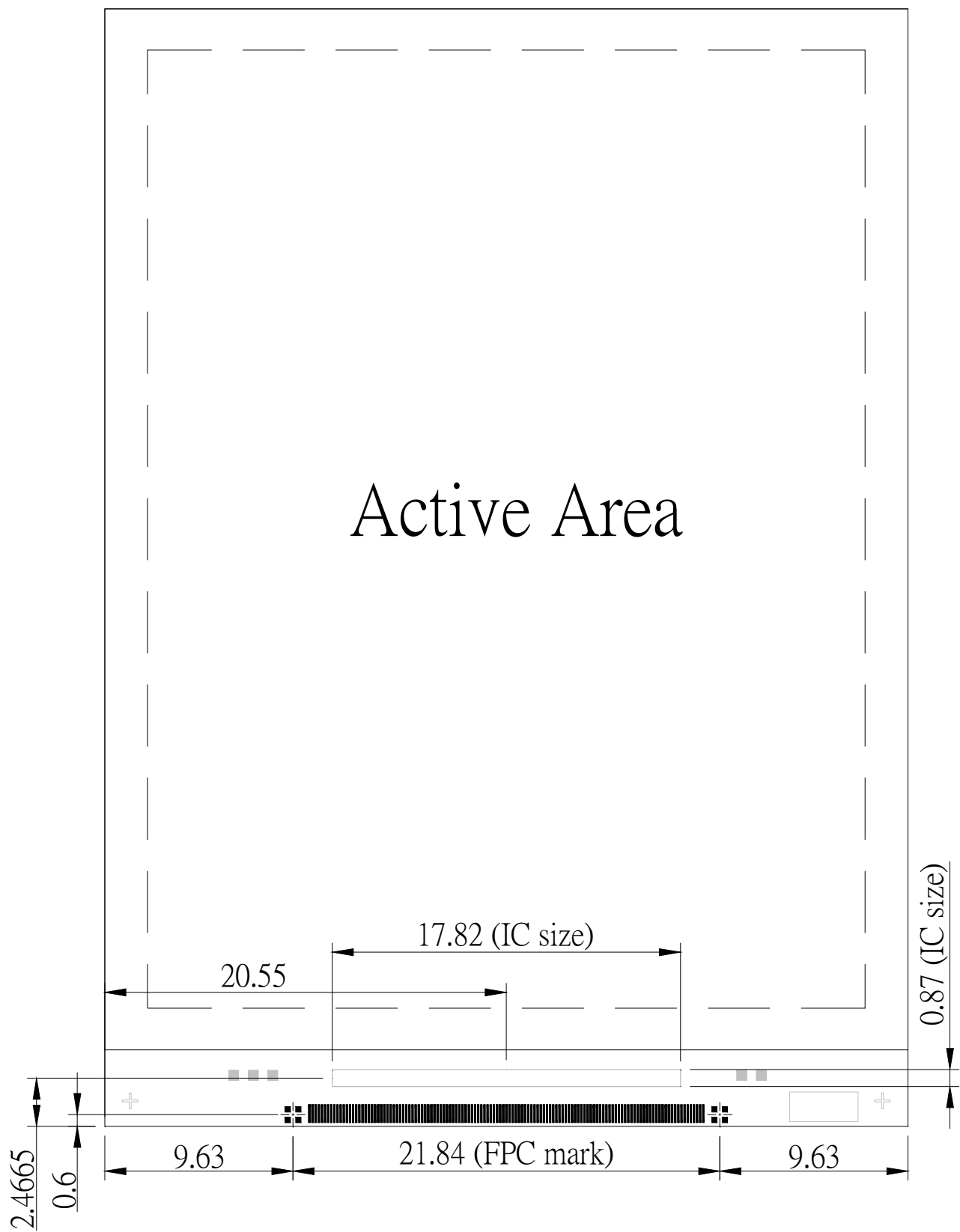
3.1 Outline Dimension

(unit: mm)



3.2 IC & FPC Pad

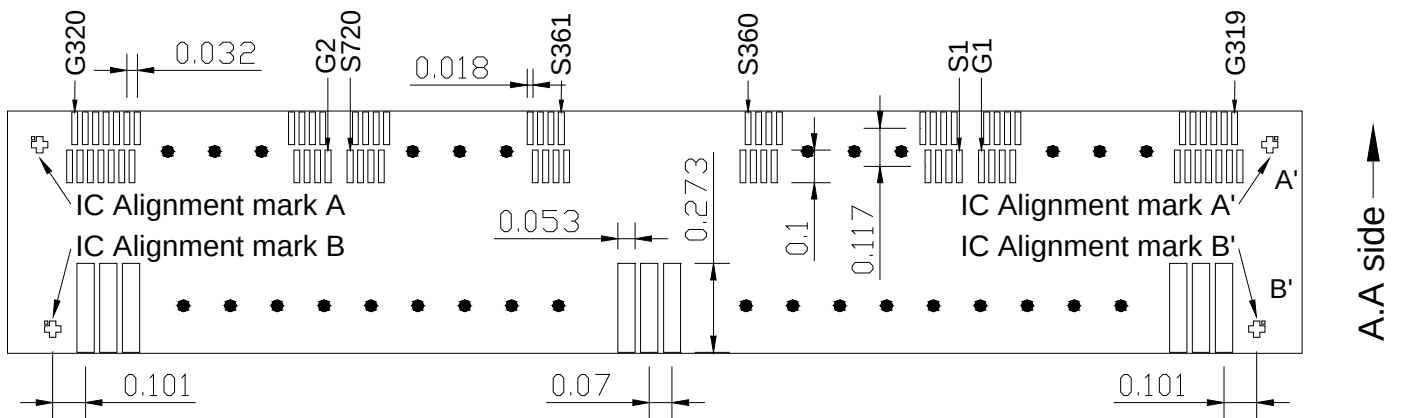
(unit: mm)



Note1. Color Filter is uper side , TFT is bottom side
Note2. This IC size for ILI9325.

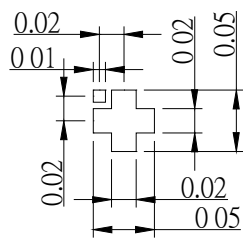
3.2.1 IC Pad

(unit = mm)

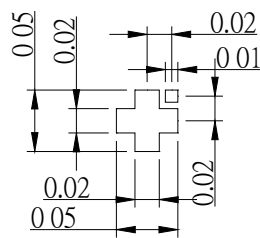


IC Dimension detail for HX8347A , ILI9325 , SPFD5408B and NT39116

3.2.2 Driver IC Block Position on the glass



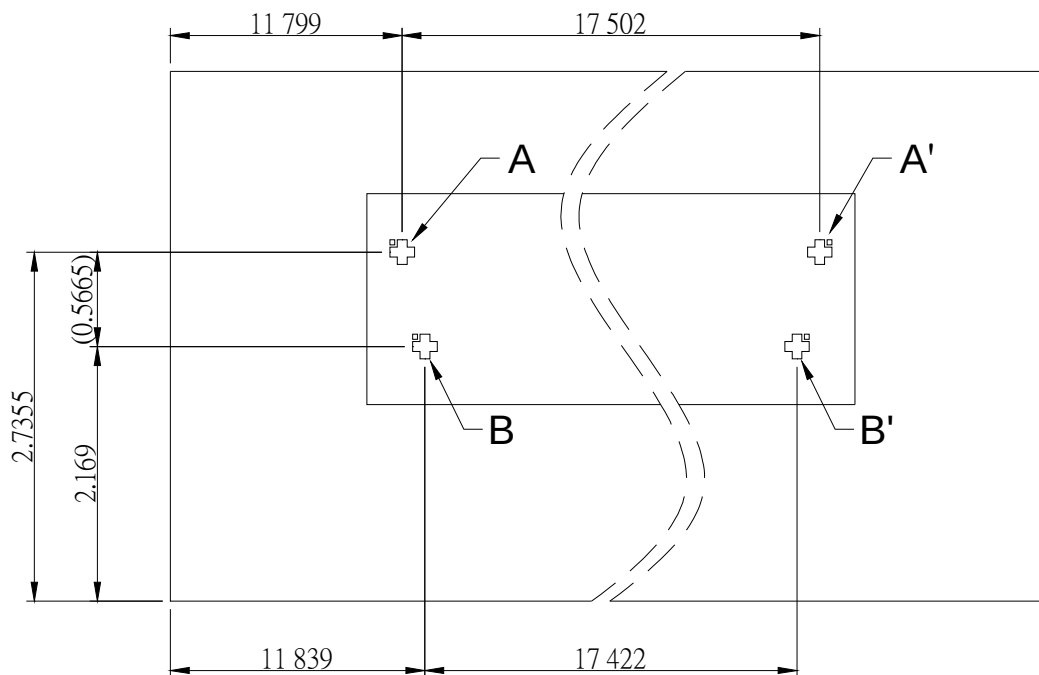
A & B detail



A' & B' detail

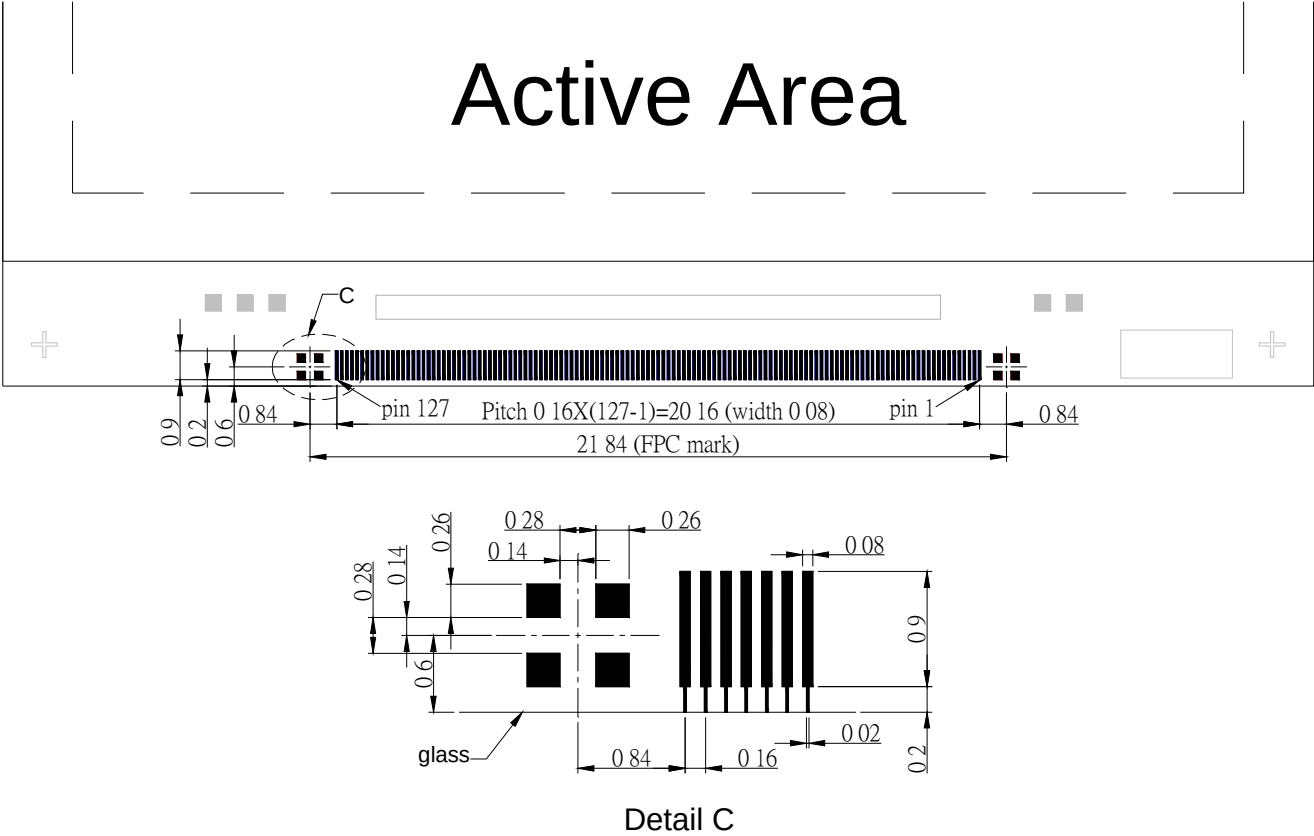
A, A' : HX8347A & ILI9325 & SPFD5408B

B, B' : NT39116



3.2.3 FPC Pad

(unit = mm)

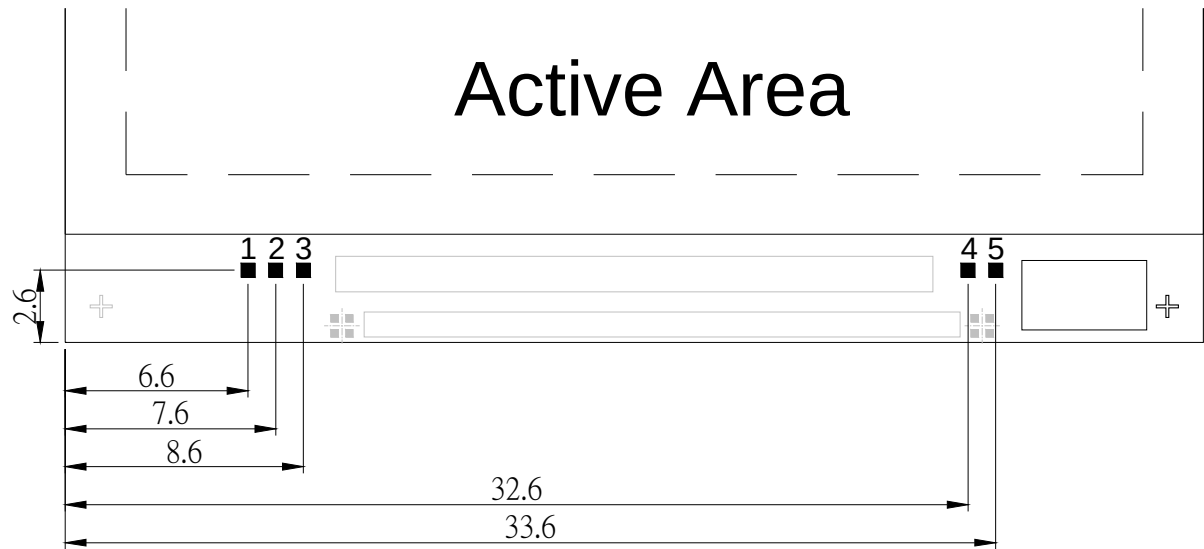


3.2.4 FPC Pin Assignment(ILITEK ILI9325)

Pin NO.	SYMBOL	Pin NO.	SYMBOL	Pin NO.	SYMBOL
1	VCOM	51	FMARK	101	C11-
2	VGL	52	TS6	102	C11+
3	DUMMY	53	TS2	103	C11+
4	DYMMY	54	TS1	104	C11+
5	DUMMY	55	DUMMY2	105	VGL
6	TEST1	56	IOVCC	106	VGL
7	IOGNDDUM	57	IOVCC	107	VGL
8	TESTO1	58	VDDD	108	GND
9	TESTO2	59	VDDD	109	GND
10	TESTO3	60	VDDD	110	VGH
11	IM0/ID	61	VDDD	111	VGH
12	IM1	62	VDDD	112	C13-
13	IM2	63	DUMMY3	113	C13-
14	IM3	64	GND	114	C13+
15	TEST2	65	GND	115	C13+
16	TESTO5	66	GND	116	C21-
17	TESTO7	67	VGS	117	C21-
18	TESTO9	68	VGS	118	C21+
19	nRESET	69	GND	119	C21+
20	VSNC	70	GND	120	C22-
21	HSYNC	71	GND	121	C22-
22	DOTCLK	72	GND	122	C22+
23	ENABLE	73	VCOM	123	C22+
24	DB17	74	VCOM	124	VCOM
25	DB16	75	VCOM	125	VGL
26	DB15	76	VCOMH	126	VGL
27	DB14	77	VCOMH	127	VCOM
28	DB13	78	VCOML		
29	DB12	79	VCOML		
30	DB11	80	VREG1OUT		
31	DB10	81	VREG1OUT		
32	DB9	82	DUMMY8		
33	DB8	83	VCL		
34	TEST3	84	VCL		
35	DB7	85	DDVDH		
36	DB6	86	DDVDH		
37	DB5	87	VCI1		
38	DB4	88	VCI1		
39	DB3	89	VCI		
40	DB2	90	VCI		
41	DB1	91	VCI		
42	DB0	92	VCI		
43	SDO	93	VCI		
44	SDI	94	VCI		
45	nRD	95	C12-		
46	nWR/SCL	96	C12-		
47	RS	97	C12+		
48	nCS	98	C12+		
49	TESTO14	99	C11-		
50	TESTO15	100	C11-		

3.3 Panel check pad in panel

(unit = mm)



Panel Test			Note
TEST PAD SIZE	500 x 500um		
TEST PAD NAME	1	G_O	
	2	Vcom	
	3	D_O	
	4	G_E	
	5	D_E	

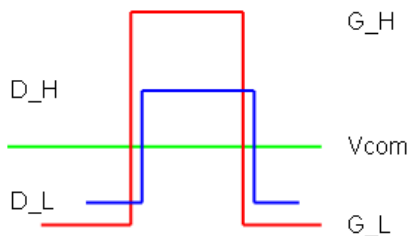
3.3.1 Cell test light waveform

EZ-Panel Testing Signal~2G2D1C

Frame	G_ODD	G_EVEN	D_ODD	D_EVEN	Vcom
White (W)	H	H	L	L	DC/GND
Black (BK)	H	H	H	H	DC/GND
Gray (GY)	H	H	Gray	Gray	DC/GND
Scan Line ODD (ZO)	H	L	H	H	DC/GND
Scan Line EVEN (ZE)	L	H	H	H	DC/GND
Data Line ODD (SO)	H	H	H	L	DC/GND
Data Line EVEN (SE)	H	H	L	H	DC/GND

Display Mode: TN, Normally White

Every Frame stay >2sec.

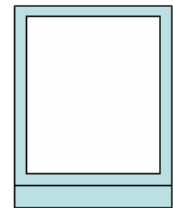


Ex. LC=5V, Vcom=0V

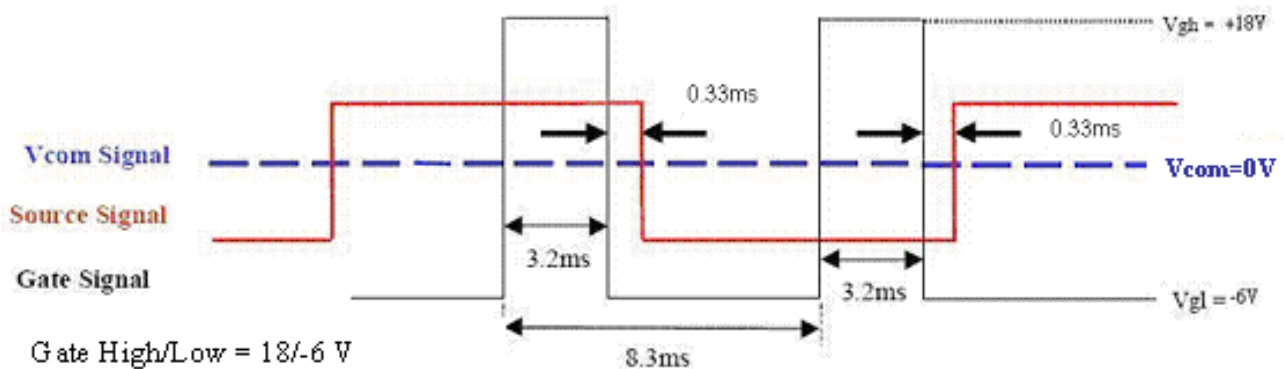
Data H=+/-5V, Data L=0V, Data Gray=+/-3V

Gate H=18V above, Gate L=-6V

Just suggestion!



3.3.2 Timing



Gate High/Low = 18/-6 V

LC = 5V

Then V com = 0V DC

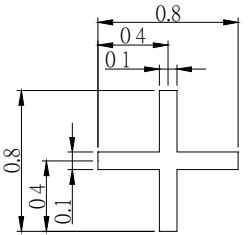
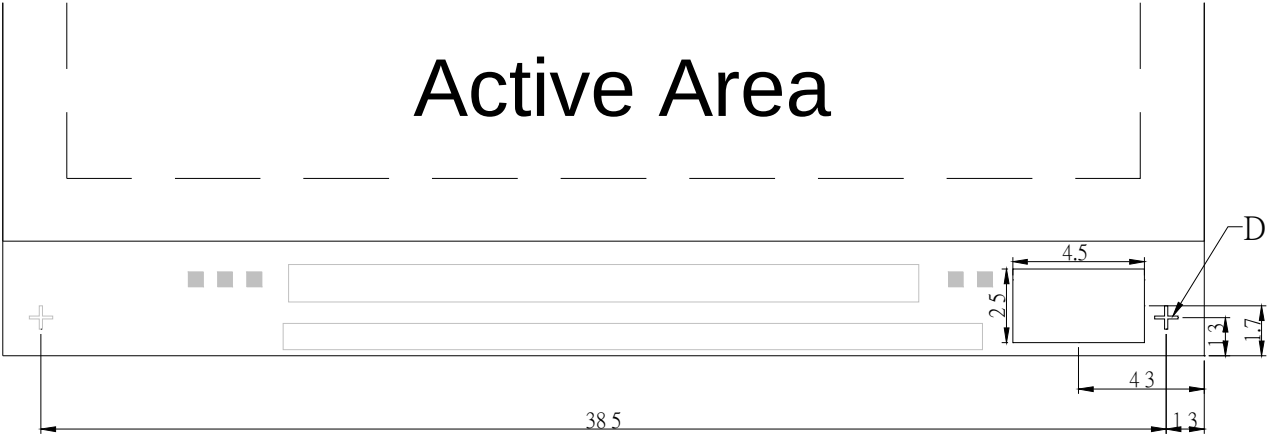
Data High/Low = V com $\pm$ 5V

Data freq.= 60Hz

G freq. = 120Hz

3.4 Panel ID pad (ODF)

(unit = mm)



Detail D

4. CELL PROCESS RULES

Item	Specification
Cell gap	3.4±0.2um
Assembly precision	±4um

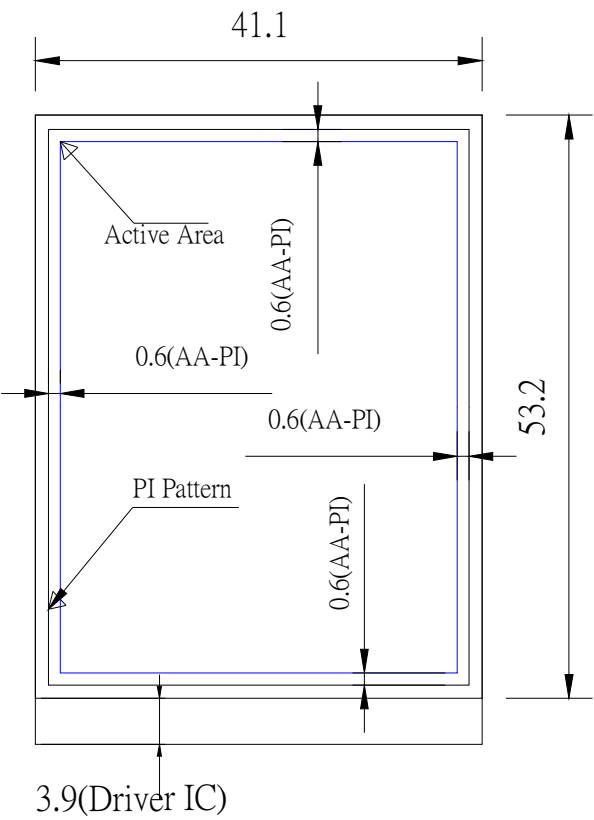
4.1 Rubbing Direction

(unit = mm)

NO Rubbing. (VA MODE)

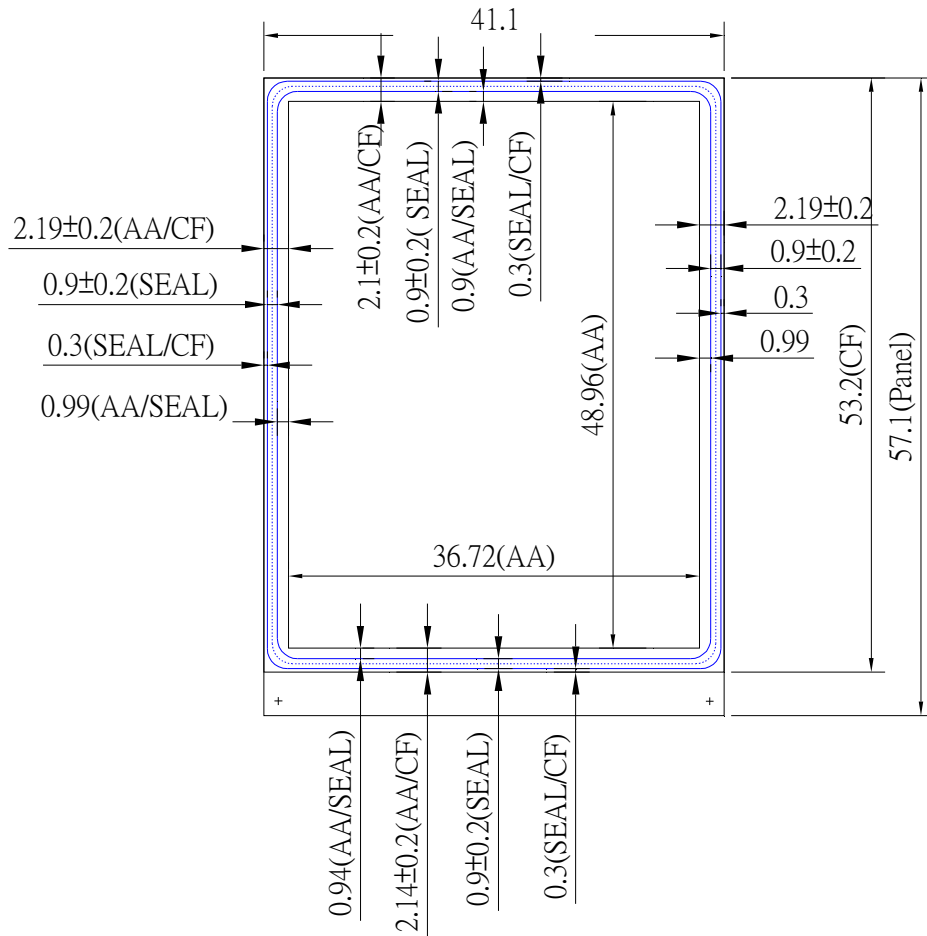
4.2 PI pattern (ODF)

(unit = mm)



4.3 Seal Pattern (ODF)

(unit = mm)



Note:

With ODF Process , Seal Junction Length=15mm(max.) And Width=0.9±(+0.6~-0.4)mm , Base On Not Influence Cutting Process And Panel Rank.

5. OPTICAL SPECIFICATION

5.1 Reflective mode (Not driving the Back Light condition)

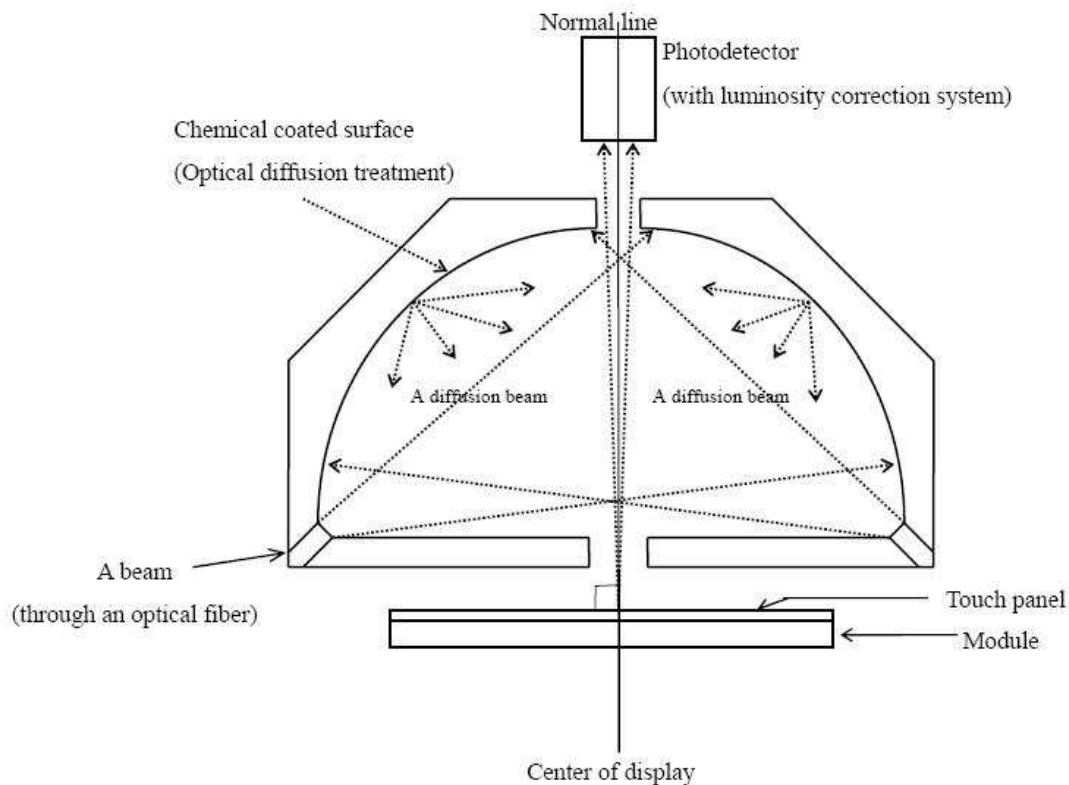
(Using CPT LC+ Rear Polarizer with APCF+Diffusion light source, reference only)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Reflection Ratio		R	$\theta = \phi = 0^\circ$	2.0	2.2		%	Note 1
Reflective Contrast Ratio		CR	$\theta = 0^\circ$	2	10		--	Note 2
Reflective Viewing Angle	Vertical	$\theta * 2)$	$CR \geq 2$	--	60	-	Degree	Note 3
				--	-60	-		
	Horizontal	$\phi * 2)$		--	60	-		
				--	-60	-		
Color Filter Chromaticity	NTSC			1	3		%	Note 4

*Ambient condition : $25^\circ\text{C} \pm 2^\circ\text{C}$, $60 \pm 10\% \text{RH}$, under 10 Lux in the darkroom .

*Measure device : DMS 803 .

*The Measuring method of the optical characteristics is shown by the following figure.



5.2 Transmissive mode (Driving the Back Light condition)

(Using CPT LC+ Rear Polarizer with APCF+Corresponding Backlight, reference only)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Transmittance		T		3.5	4.1		%	Note 5
Contrast Ratio		CR	$\theta = 0^{\circ}$	300	450	-	--	Note 6
Response Time		Tr+Tf	$\theta = 0^{\circ}$	-	25	35	ms	Note 7
Viewing Angle	Vertical	θ *2)	$CR \geq 10$	--	130	-	Degree	Note 8
				--		-		
	Horizontal	ϕ *2)		--	130	-		
				--		-		
Color Filter Chromacici ty	White	x y	$\theta = \phi = 0^{\circ}$	0.265	0.305	0.345	Note 9	
				0.294	0.334	0.374		
	Red	x y	$\theta = \phi = 0^{\circ}$	0.627	0.667	0.707		
				0.289	0.329	0.369		
	Green	x y	$\theta = \phi = 0^{\circ}$	0.237	0.277	0.317		
				0.573	0.613	0.653		
	Blue	x y	$\theta = \phi = 0^{\circ}$	0.094	0.134	0.174		
				0.057	0.097	0.137		
NTSC				54.9	61	-	%	

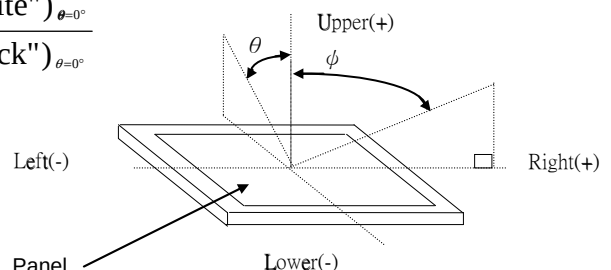
*Ambient condition : $25^\circ\text{C} \pm 2^\circ\text{C}$, $60 \pm 10\% \text{RH}$, under 10 Lunx in the darkroom °*Measure device : EZContrast X88DC(ELDIM) for viewing angle item ;
DMS 803 for the others °

Note 1. Using the diffuse illumination measurement system of DMS 803 with a D65 illuminant source, the definition of Reflection Ratio is :

$$\Rightarrow \frac{(\text{measured optical output of panel displaying "white"}) \times (\text{reflectance factor of reflectance standard})}{(\text{measured optical output of reflectance standard})}$$

Note 2. Using the diffuse illumination measurement system of DMS 803 with a D65 illuminant source, the definition of Reflective Contrast Ratio is :

$$\Rightarrow \frac{(\text{measured optical output of panel displaying "white"})_{\theta=0^\circ}}{(\text{measured optical output of panel displaying "black"})_{\theta=0^\circ}}$$



Note 3. Using the diffuse illumination measurement system of DMS 803 with a D65 illuminant source, the definition of Reflective Viewing Angle :

$$\Rightarrow \frac{(\text{measured optical output of panel displaying "white"})_{\theta, \phi}}{(\text{measured optical output of panel displaying "black"})_{\theta, \phi}}$$

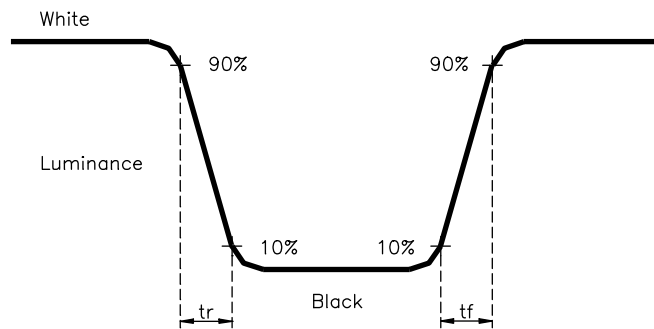
Note 4. Illumination Light Source: D65 light source.

Note 5. Back light without DBEF film ◦

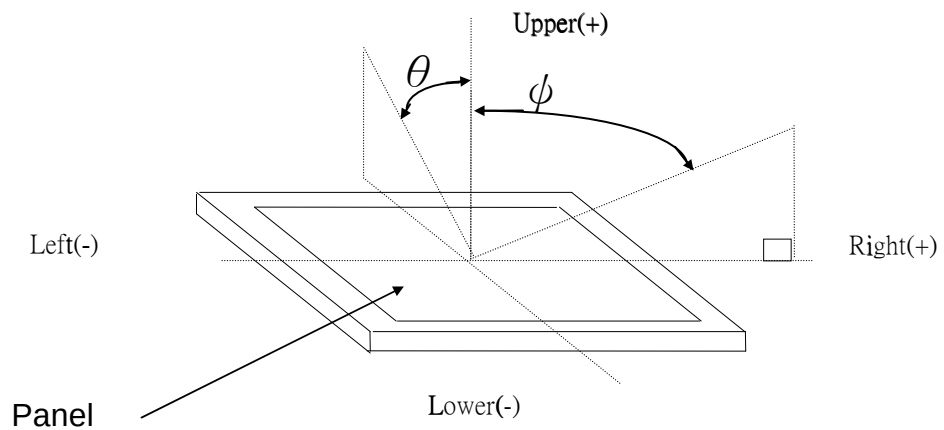
Note 6. Definition of Contrast Ratio :

$$CR = \text{White Luminance (ON)} / \text{Black Luminance (OFF)}$$

Note 7. Definition of response time : The response time is defined as the time interval between the 10% and 90% amplitudes.



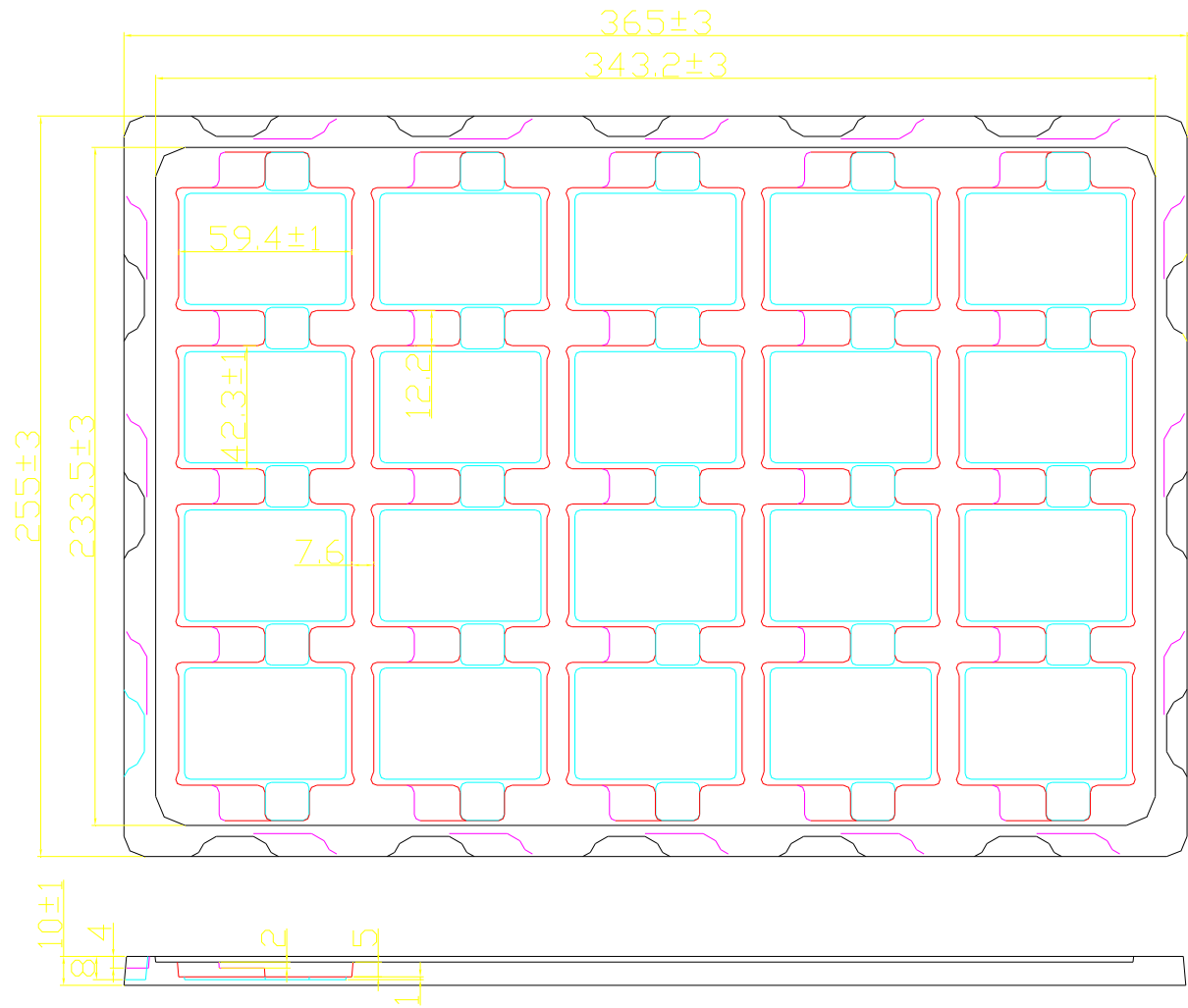
Note 8. Definition of view angle(θ , ψ) :



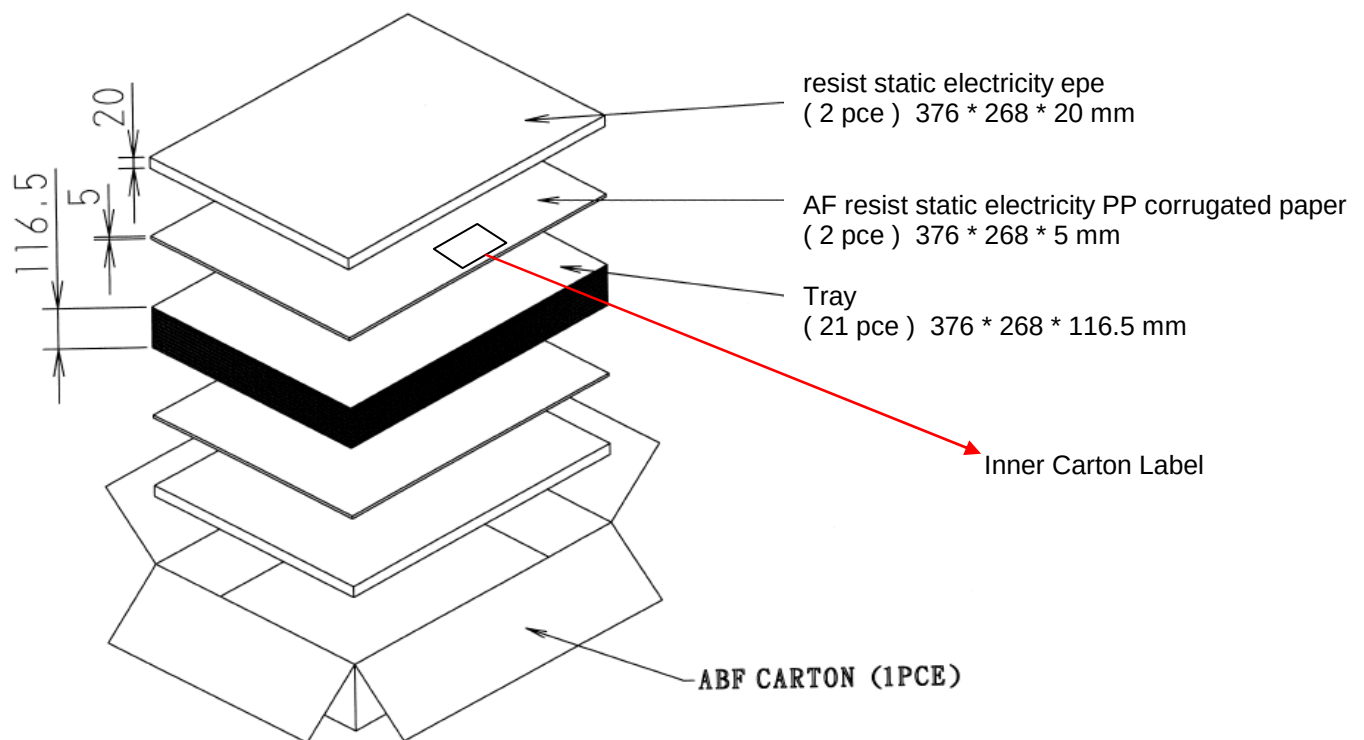
Note 9. Illumination Light Source: C light source.

6. PACKAGE FORM

6.1 Tray Drawing



6.2 Packing Method



6.3 Piling Pallet Method

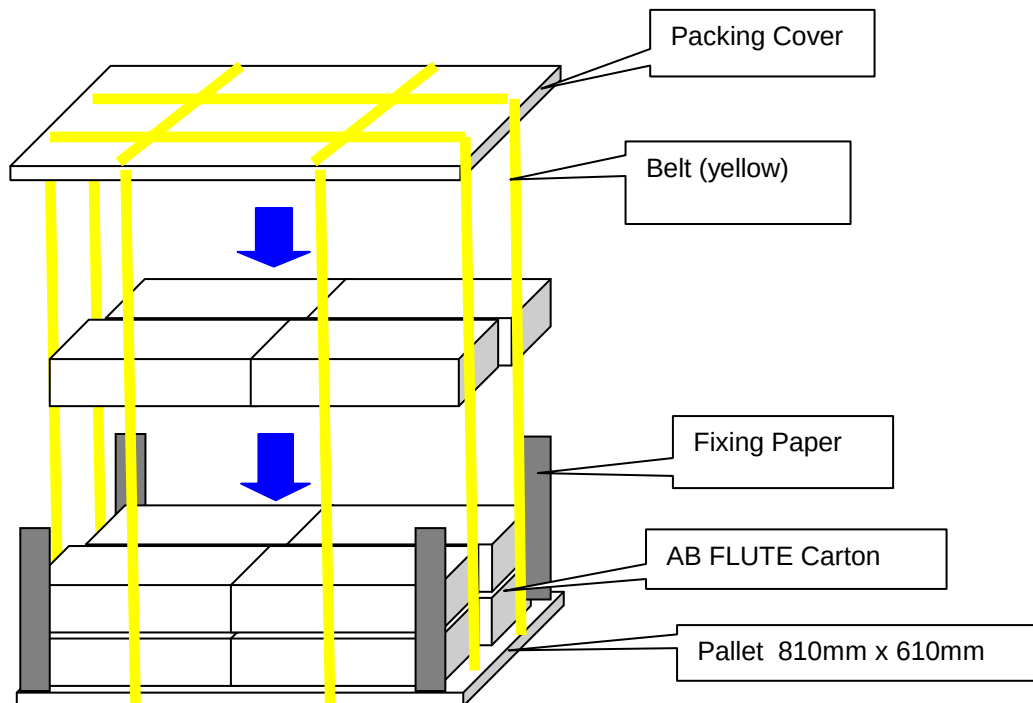
Pile up pallet : First place a cover on the pallet and choose one of the pallets piling method according to freight quantity.

- Small Pallet (Freight ≤ 24 Cartons): 4 Cartons per layer with 3 layers the highest.
One pallet contains 12 cartons.
- Large Pallet (Freight > 24 Cartons): 11 Cartons per layer with 5 layers the highest.
One pallet contains 55 cartons.

Note1. If the layer is not full, please fill up the layer with empty carton to make it fixed.

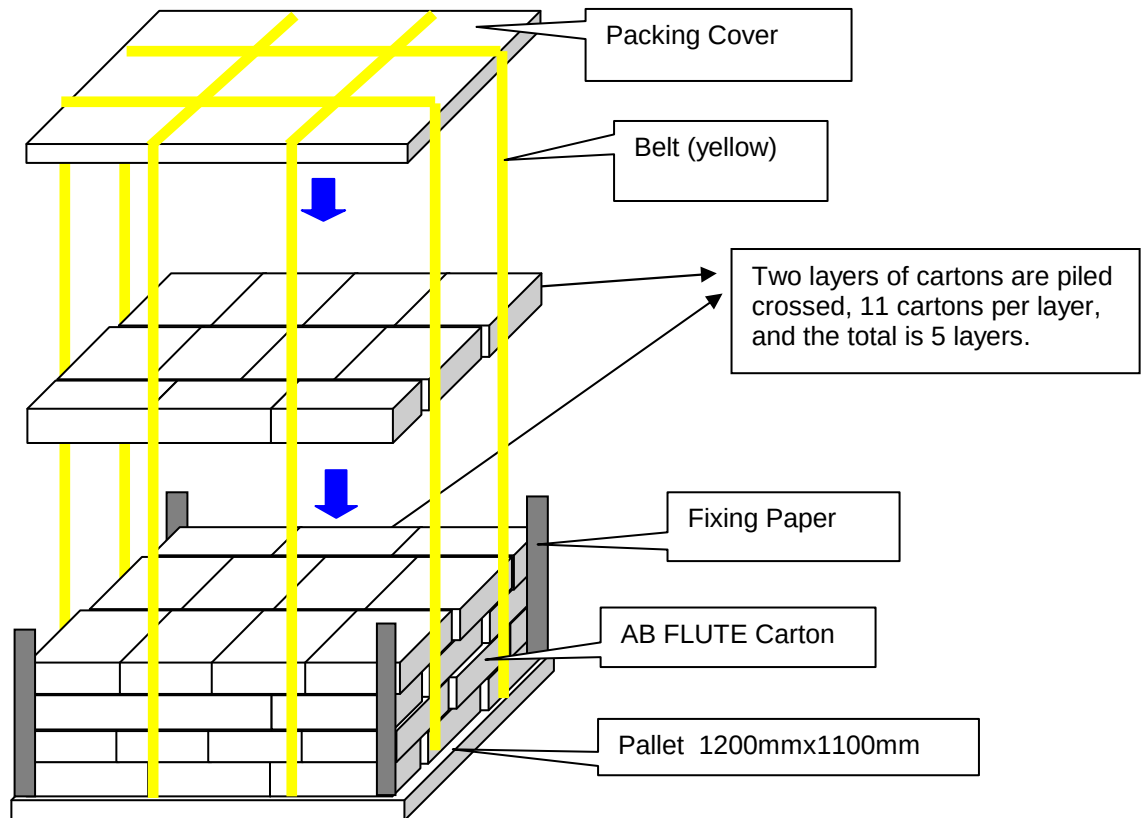
6.3.1 Pallet Composing of Unfolding Drawing

- Small Pallet Structure



Note1. Packing cover: 810 $\pm$ 5mm x 610 $\pm$ 5mm x 130 $\pm$ 5mm

- Large Pallet Structure



Note1. Packing cover:1200±5mmx1100±5mmx130±5mm