

Doc. Number:

- ☐ Tentative Specification
☐ Preliminary Specification
☒ Approval Specification

MODEL NO.:F013A07-601
2420S0130701G

Customer:

APPROVED BY

SIGNATURE

Name / Title

Note

Please return 1 copy for your confirmation with your signature and comments.

Approved By	Checked By	Prepared By
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REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver 0.0	2021/11/8	All	All	Cut spec for F013A07-601
Ver 2.0	2021/12/8	All	All	Product spec was changed to Ver. 2.0
Ver 2.0	2021/12/13	20	8.1	Update SUBSTRATE PACKAGE
Ver 2.1	2021/12/13	22	8.3	Update precaution to storage of LCD to Ver2.1

1.PURPOSE

The specification F013A07-601 is a 1.30" a-Si TFT Liquid Crystal Display ODF cell. The ODF cell has been designed by Innolux, and manufactured by Innolux under the agreement of customer. The a-Si TFT-LCD cell will be applied to a high transmittance operating in the normally black mode a-Si TFT-LCD product.

2.GENERAL RULES OF SINGLE PANEL

2.1 GENERAL SPECIFICATION

No.	Item		Specification	unit
1	Glass thickness	TFT	0.4	mm
		CF	0.4	
2	Shipping mode		Cut	-
3	Shipping size		356.4 (H)x 320.8 (V)x 0.8 (D)	mm
4	Panel outline dimension		25.8 (H)x 28.4 (V)x 0.8 (D)	mm
5	Active screen size		23.424 (H)x 23.424 (V)	mm
6	Resolution		128 RGB x 128	pixel
7	Pixel driving element		a-Si TFT	-
8	Sub pixel size		183 x 183	um
9	Pixel arrangement		RGB-stripe	-
10	View direction (Gray inversion)		Free	-
11	Cell gap		3.25 ± 0.2	um
12	Driver IC		ST7735SV *<Note>	-
13	Weight without POL		435.381 ± 10%	g
14	Scan method		Dual scan	-
15	Surface Coating		None	-

<Note> 1. Compatible IC : NV3023A / ILI9163V

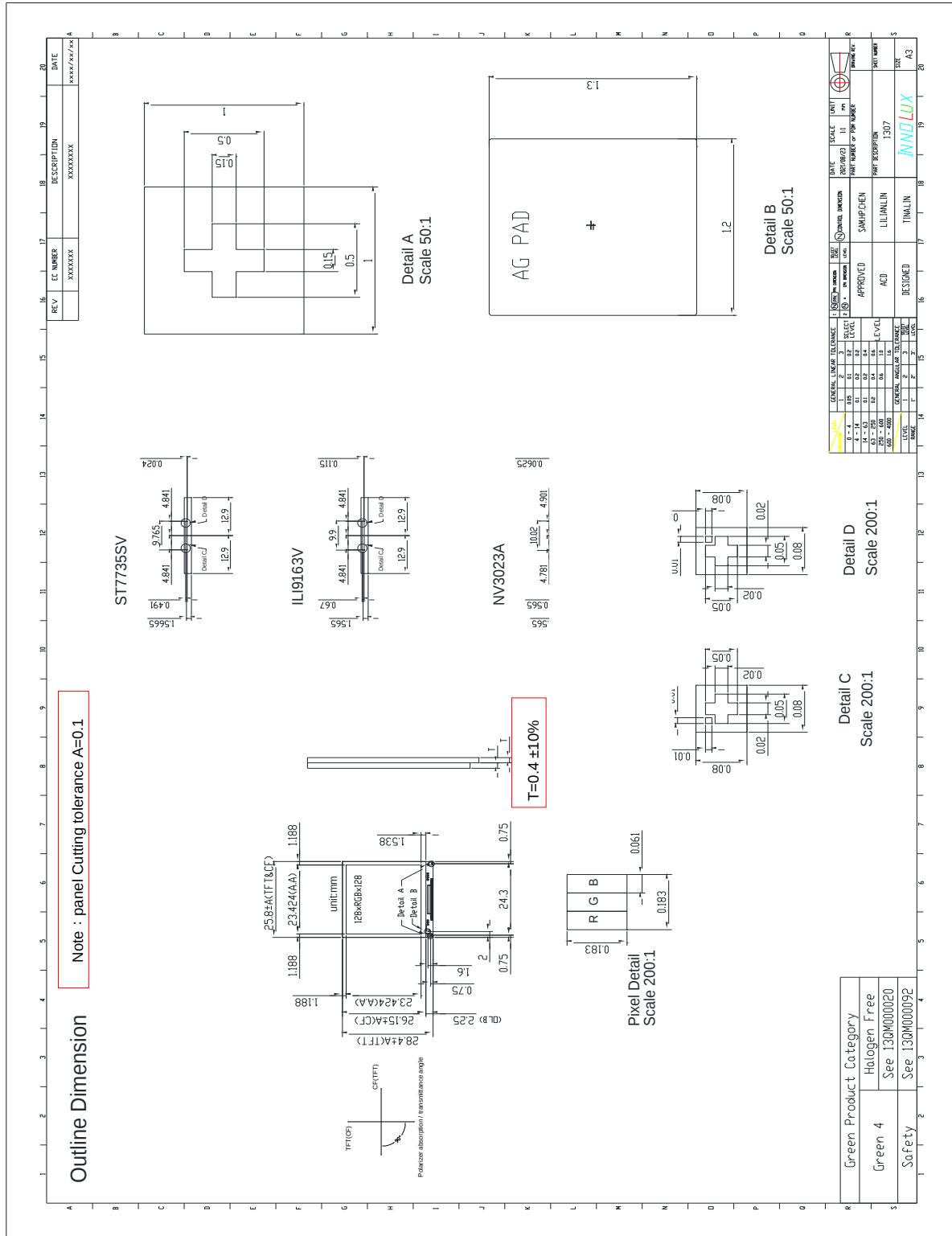
The other compatible IC are also considered for the design of pad locations.

2. Those compatible IC should be verified for panel performance. Please refer to the IC datasheet (AP note) respectively.

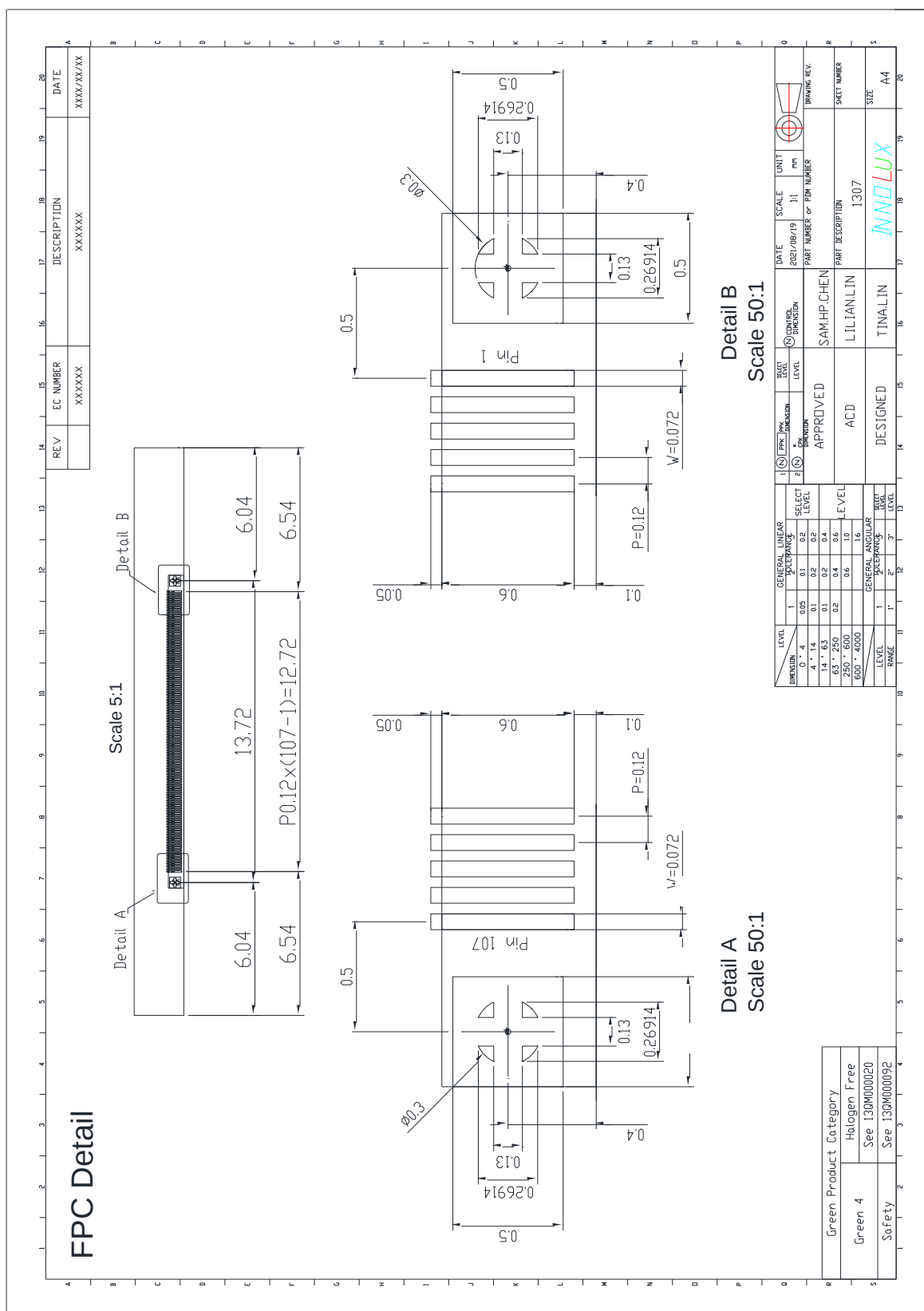
3. This model is designed by the driver IC with bumping compensation.

2.2 DIMENSION

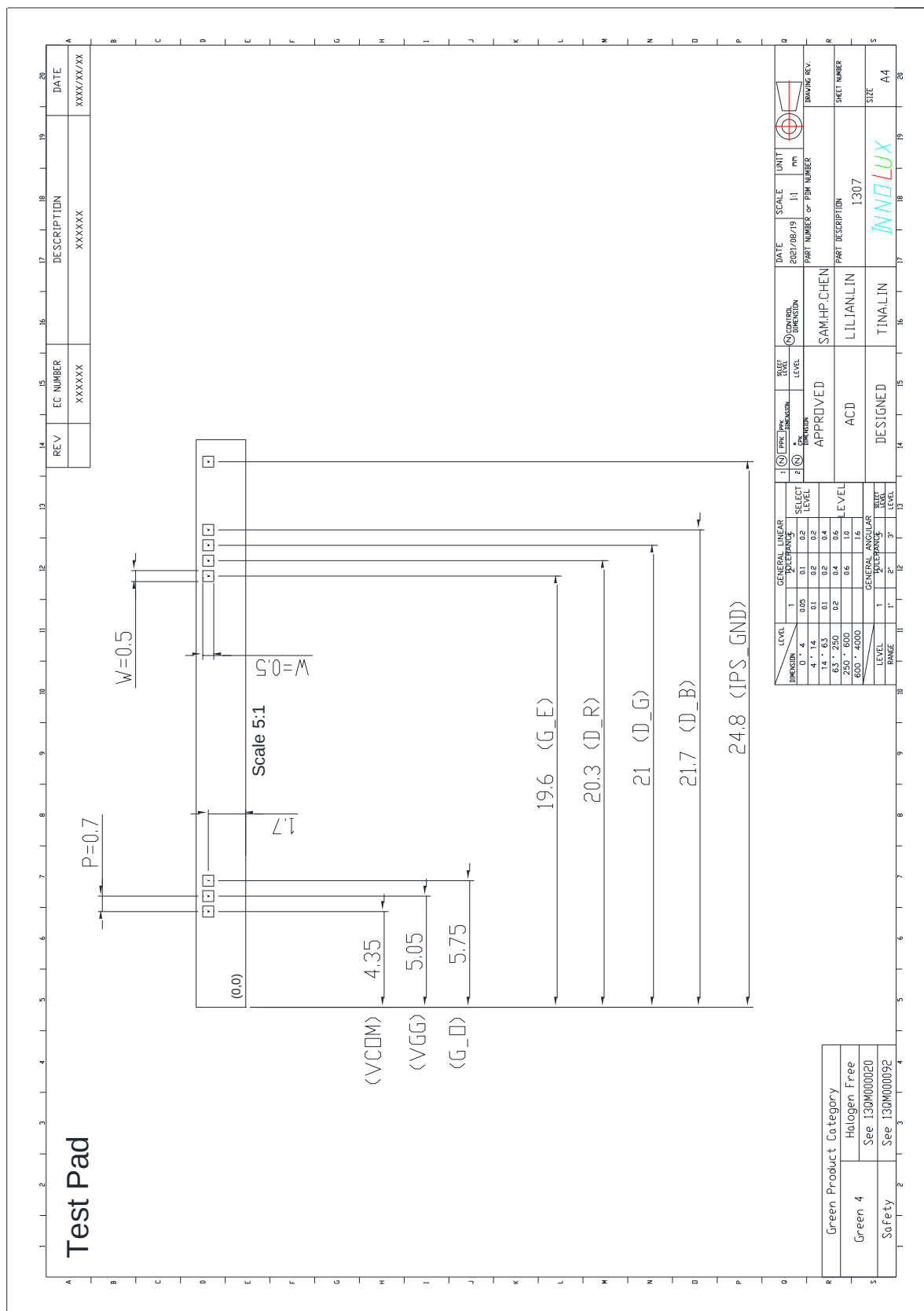
2.2.1 OUTLINE DIMENSION



2.2.2 FPC DETAIL



2.2.3 TEST PAD



3. PIN ASSIGNMENT

3.1 FPC/IC PIN ASSIGNMENT TABLE

IC information (bump up)				FPC information		
IC No.	Pad name	X	Y	Pad name	FPC No.	CKT
				Dummy	1	OPEN
				GND	2	IPS_GND
				GND	3	IPS_GND
				VCOM	4	VCOM
1	Dummy	-4750	-213.5	open		
2	VDDIO	-4700	-213.5	VDDIO	5	open
3	EXTC	-4650	-213.5	EXTC	6	open
4	DGNDO	-4600	-213.5	DGNDO	7	open
5	IM0	-4550	-213.5	IM0	8	open
6	VDDIO	-4500	-213.5	open		
7	IM1	-4450	-213.5	IM1	9	open
8	DGNDO	-4400	-213.5	open		
9	P68	-4350	-213.5	P68	10	open
10	VDDIO	-4300	-213.5	VDDIO	11	open
11	TEST1P	-4250	-213.5	TEST1P	12	open
12	DGNDO	-4200	-213.5	DGNDO	13	open
13	TEST2P	-4150	-213.5	TEST2P	14	open
14	VDDIO	-4100	-213.5	open		
15	SRGB	-4050	-213.5	SRGB	15	open
16	DGNDO	-4000	-213.5	open		
17	SMX	-3950	-213.5	SMX	16	open
18	VDDIO	-3900	-213.5	open		
19	SMY	-3850	-213.5	SMY	17	open
20	DGNDO	-3800	-213.5	open		
21	Dummy	-3750	-213.5	Dummy	18	open
22	VDDIO	-3700	-213.5	open		
23	Dummy	-3650	-213.5	Dummy	19	open
24	DGNDO	-3600	-213.5	open		
25	Dummy	-3550	-213.5	Dummy	20	open
26	VDDIO	-3500	-213.5	open		
27	Dummy	-3450	-213.5	Dummy	21	open
28	DGNDO	-3400	-213.5	open		
29	Dummy	-3350	-213.5	Dummy	22	open
30	VDDIO	-3300	-213.5	VDDIO	23	open
31	LCM	-3250	-213.5	LCM	24	open
32	DGNDO	-3200	-213.5	DGNDO	25	open
33	DUMMY	-3150	-213.5	DUMMY	26	open
34	VDDIO	-3100	-213.5	VDDIO	27	open

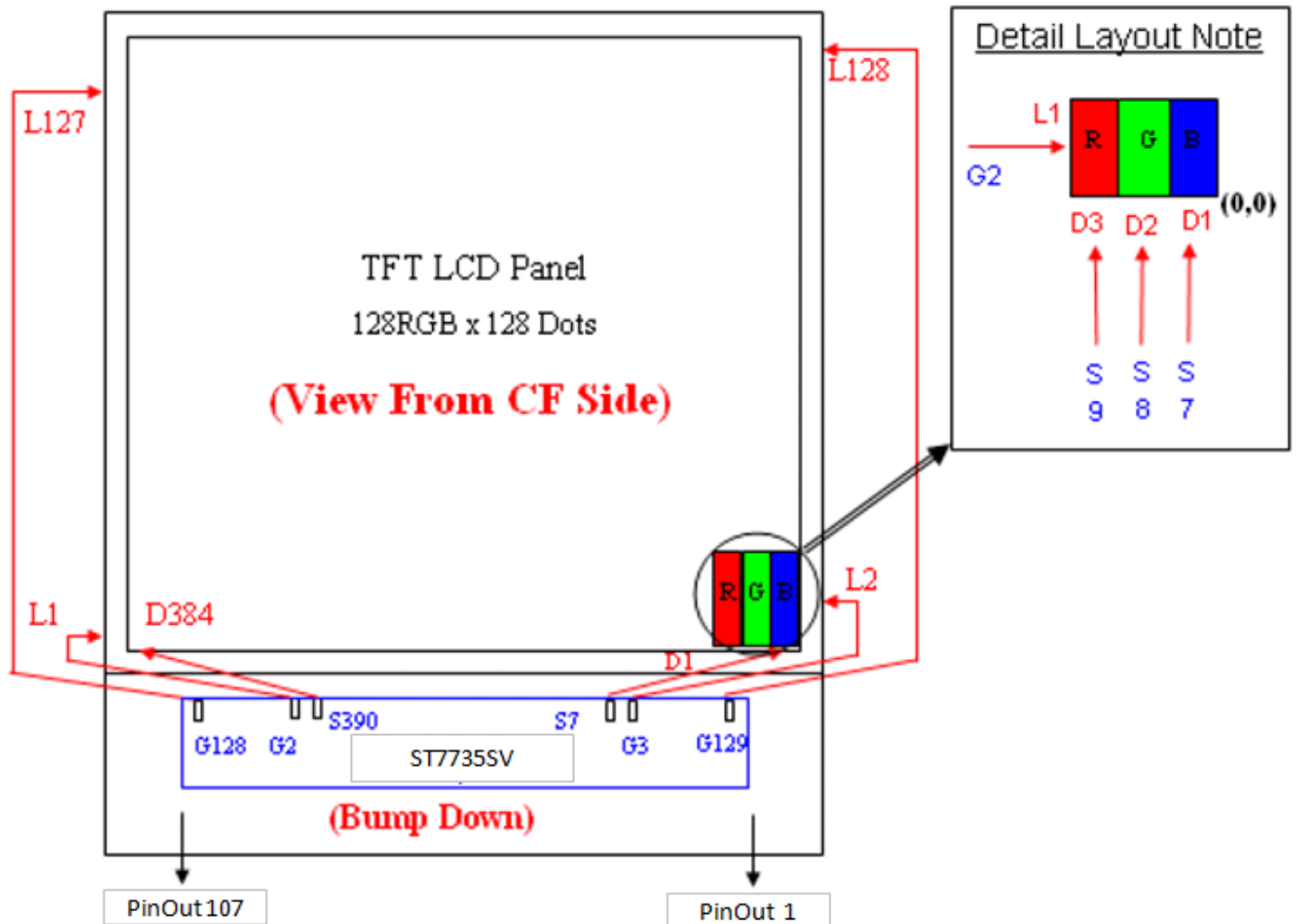
35	Dummy	-3050	-213.5	Dummy	28	open
36	DGNDO	-3000	-213.5	open		
37	GM1	-2950	-213.5	GM1	29	open
38	VDDIO	-2900	-213.5	open		
39	GM0	-2850	-213.5	GM0	30	open
40	DGNDO	-2800	-213.5	DGNDO	31	open
41	Dummy	-2750	-213.5	Dummy	32	open
42	GS	-2700	-213.5	GS	33	open
43	SPI4W	-2650	-213.5	SPI4W	34	open
44	VDDIO	-2600	-213.5	open		
45	TESTOP[8]	-2550	-213.5	open		
46	TESTOP[7]	-2500	-213.5	open		
47	TESTOP[6]	-2450	-213.5	open		
48	TESTOP[5]	-2400	-213.5	open		
49	TESTOP[4]	-2350	-213.5	open		
50	OSCP	-2300	-213.5	OSCP	35	open
51	VDD	-2250	-213.5	VDD	36	open
52	VDD	-2200	-213.5			
53	VDD	-2150	-213.5			
54	VDD	-2100	-213.5	VDD	37	open
55	VDD	-2050	-213.5			
56	VDD	-2000	-213.5			
57	AGND	-1950	-213.5	AGND	38	open
58	AGND	-1900	-213.5			
59	AGND	-1850	-213.5			
60	AGND	-1800	-213.5	AGND	39	open
61	AGND	-1750	-213.5			
62	AGND	-1700	-213.5			
63	RDX	-1630	-213.5	RDX	40	open
64	D_CX	-1570	-213.5	D_CX	41	open
65	TESEL	-1510	-213.5	TESEL	42	open
66	DGNDO	-1450	-213.5	DGNDO	43	open
67	D17	-1390	-213.5	D17	44	open
68	D16	-1330	-213.5	D16	45	open
69	D15	-1270	-213.5	D15	46	open
70	D14	-1210	-213.5	D14	47	open
71	D13	-1150	-213.5	D13	48	open
72	D12	-1090	-213.5	D12	49	open
73	D11	-1030	-213.5	D11	50	open
74	D10	-970	-213.5	D10	51	open
75	D9	-910	-213.5	D9	52	open
76	D8	-850	-213.5	D8	53	open

77	D1	-790	-213.5	D1	54	open
78	D3	-730	-213.5	D3	55	open
79	D5	-670	-213.5	D5	56	open
80	D7	-610	-213.5	D7	57	open
81	TE	-550	-213.5	TE	58	open
82	RESX	-490	-213.5	RESX	59	open
83	CSX	-430	-213.5	CSX	60	open
84	D6	-370	-213.5	D6	61	open
85	D4	-310	-213.5	D4	62	open
86	D2	-250	-213.5	D2	63	open
87	IM2	-190	-213.5	IM2	64	open
88	D0	-130	-213.5	D0	65	open
89	WRX	-70	-213.5	WRX	66	open
90	Dummy	0	-213.5	Dummy	67	open
91	Dummy	50	-213.5	Dummy	68	open
92	Dummy	100	-213.5	Dummy	69	open
93	Dummy	150	-213.5	Dummy	70	open
94	TESTOP[3]	200	-213.5	open		
95	TESTOP[2]	250	-213.5	open		
96	TESTOP[1]	300	-213.5	open		
97	DGND	350	-213.5	DGND	71	open
98	DGND	400	-213.5			
99	DGND	450	-213.5			
100	DGND	500	-213.5	DGND	72	open
101	DGND	550	-213.5			
102	DGND	600	-213.5			
103	VDDI	650	-213.5	VDDI	73	open
104	VDDI	700	-213.5			
105	VDDI	750	-213.5			
106	VDDI	800	-213.5	VDDI	74	open
107	VDDI	850	-213.5			
108	VDDI	900	-213.5			
109	VPP	950	-213.5	VPP	75	open
110	VPP	1000	-213.5			
111	VPP	1050	-213.5			
112	GVDD	1100	-213.5	GVDD	76	open
113	GVDD	1150	-213.5			
114	GVDD	1200	-213.5			
115	VCC	1250	-213.5	VCC	77	open
116	VCC	1300	-213.5			
117	VCC	1350	-213.5			
118	GVCL	1400	-213.5	GVCL	78	open

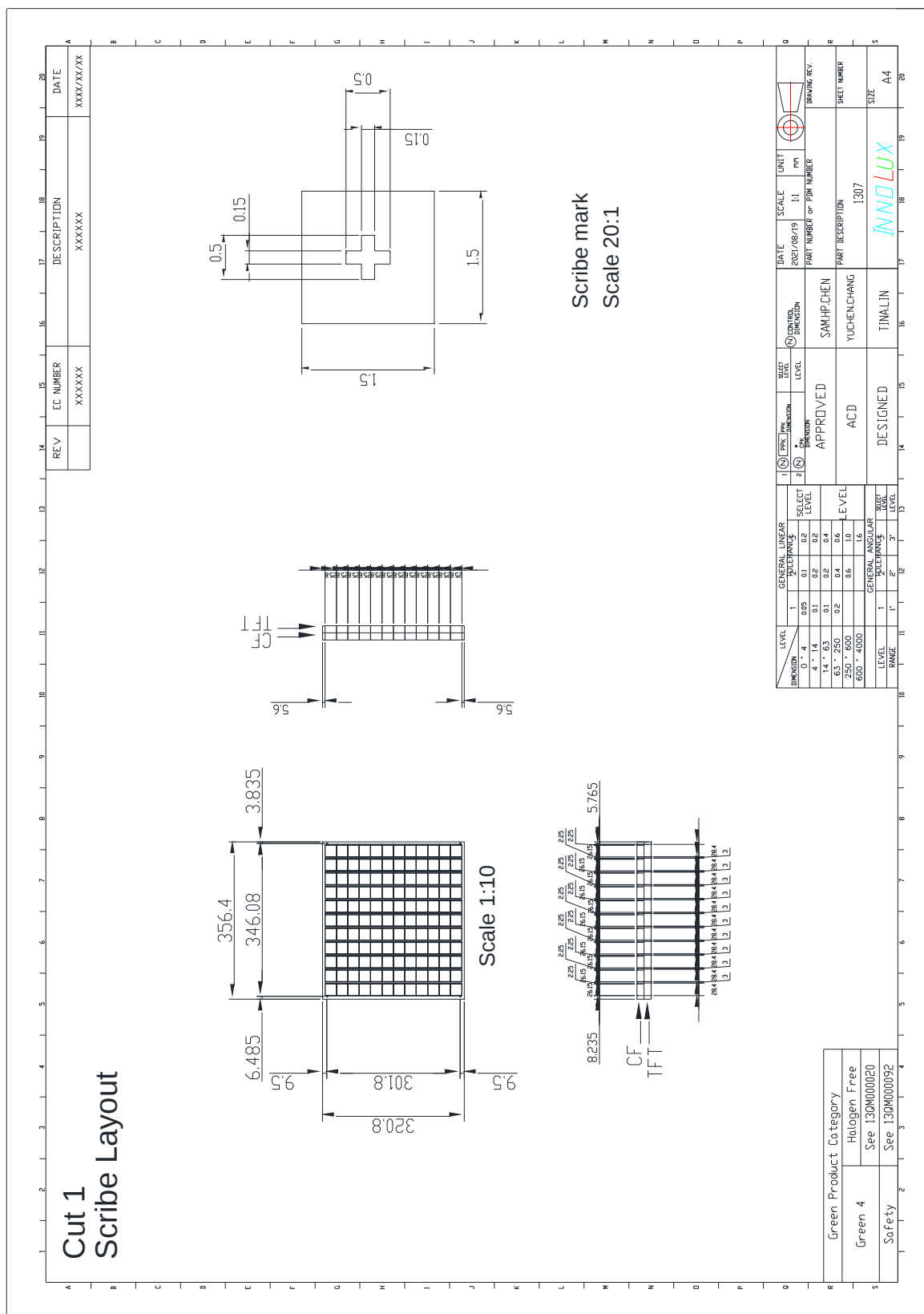
119	Dummy	1450	-213.5	open		
120	AVDD	1500	-213.5	AVDD	79	open
121	AVDD	1550	-213.5			
122	AVDD	1600	-213.5	AVDD	80	open
123	AVDD	1650	-213.5			
124	AVDD	1700	-213.5			
125	Dummy	1750	-213.5	Dummy	81	open
126	Dummy	1800	-213.5			
127	Dummy	1850	-213.5			
128	DummyR	1900	-213.5	DummyR	82	open
129	DummyR	1950	-213.5	DummyR	83	open
130	Dummy	2000	-213.5	Dummy	84	open
131	Dummy	2050	-213.5			
132	Dummy	2100	-213.5			
133	Dummy	2150	-213.5	Dummy	85	open
134	Dummy	2200	-213.5			
135	Dummy	2250	-213.5			
136	Dummy	2300	-213.5			
137	Dummy	2350	-213.5	Dummy	86	open
138	Dummy	2400	-213.5			
139	Dummy	2450	-213.5			
140	Dummy	2500	-213.5			
141	Dummy	2550	-213.5	Dummy	87	open
142	Dummy	2600	-213.5			
143	Dummy	2650	-213.5			
144	Dummy	2700	-213.5			
145	Dummy	2750	-213.5	AGND	88	open
146	AGND	2800	-213.5			
147	AGND	2850	-213.5			
148	AGND	2900	-213.5	AVCL	89	open
149	AVCL	2950	-213.5			
150	AVCL	3000	-213.5			
151	AVCL	3050	-213.5	Dummy	90	open
152	Dummy	3100	-213.5			
153	Dummy	3150	-213.5			
154	Dummy	3200	-213.5	Dummy	91	open
155	Dummy	3250	-213.5			
156	Dummy	3300	-213.5			
157	Dummy	3350	-213.5	Dummy	92	open
158	Dummy	3400	-213.5			
159	Dummy	3450	-213.5			
160	Dummy	3500	-213.5			

161	Dummy	3550	-213.5	Dummy	93	open
162	Dummy	3600	-213.5			
163	Dummy	3650	-213.5			
164	Dummy	3700	-213.5	Dummy	94	open
165	Dummy	3750	-213.5			
166	Dummy	3800	-213.5			
167	Dummy	3850	-213.5	Dummy	95	open
168	Dummy	3900	-213.5			
169	Dummy	3950	-213.5			
170	VGL	4000	-213.5	VGL	96	VGG
171	VGL	4050	-213.5			
172	VGL	4100	-213.5			
				DUMMY	97	open
173	VGH	4150	-213.5	VGH	98	open
174	Dummy	4200	-213.5			
175	Dummy	4250	-213.5			
176	Dummy	4300	-213.5	Dummy	99	open
177	Dummy	4350	-213.5			
178	Dummy	4400	-213.5			
179	VCL	4450	-213.5	VCL	100	open
180	VCL	4500	-213.5			
181	VCL	4550	-213.5			
182	VCOM	4600	-213.5	VCOM	101	VCOM
183	VCOM	4650	-213.5	VCOM	102	VCOM
184	VCOM	4700	-213.5	VCOM	103	VCOM
185	Dummy	4750	-213.5	open		
				VCOM	104	VCOM
				GND	105	IPS_GND
				GND	106	IPS_GND
				DUMMY	107	OPEN

3.2 SCHEMATIC PANEL LAYOUT



4. CELL SCRIBE



5.ELECTRICAL SPECIFICATION

Item	Symbol	Specification			Unit
		Min.	Typ.	Max.	
TFT gate on voltage	VGH	15.5	16	16.5	V
TFT gate on voltage	VGL	-12.5	-12	-11.5	V
TFT common electrode voltage	Vcom (DC)	-1.6	-0.8	-1.2	V

Note: (1) Vcom must be adjusted to optimize display quality: cross-talk, contrast ratio and etc.

(2) VGH is TFT gate operating voltage (acceptable variation: $\pm 0.5\text{v}$)

(3) VGL is TFT gate operating voltage (acceptable variation: $\pm 0.5\text{v}$)

(4) Environmental condition: 25 ± 5

(5) Reference waveform for panel light on is as below: (release after sample output)

IC : ST7735SV	Signal	Black	Gray64(25%)	GRAY128(50%)	Gray192(75%)	White
DATA (DR/DG/DB)	Vsh(V)	0.1	1.7	2.2	2.8	4.4
	Vsl(V)	-0.3	-1.9	-2.4	-3.0	-4.6

6.OPTICAL SPECIFICATION

Item		Symbol	Conditions	Specifications			Unit	Note	
				Min.	Typ.	Max.			
Transmittance (w/o APCF) (w/o Haze) (w/o WPA) (w/i C-Light)		T%	Viewing normal angle $\theta_x = \theta_y = 0^\circ$	5.97%	6.65%	--	-	All left side data are based on Innolux's following condition 1.LC : AAS 2.Light Source : C-Light 3.Polar based on Innolux's polarizer 4.Machine : DMS 900 5. Driving voltage (reference only): VLC dark = 0.2 V VLC white = 4.5 V 6. w/o WPA	
Contrast Ratio (w/o WPA)		CR		800	1000	--	--		
Response Time (w/o WPA)		T _{on} + T _{off}		--	35	40	ms		
Viewing Angle	Hor.	θ_{x+}	Center CR>10	80	--	--	deg		
		θ_{x-}		80	--	--			
	Ver.	θ_{y+}		80	--	--			
		θ_{y-}		80	--	--			
CF only Color Chromaticity (CIE 1931)	Red	Rx	Viewing normal angle $\theta_x = \theta_y = 0^\circ$	0.590	0.610	0.630	-	Final CF Chromaticity (w/i OC, without BS-Film) under C light	
		Ry		0.322	0.342	0.362	-		
	Green	Gx		0.285	0.305	0.325	-		
		Gy		0.525	0.545	0.565	-		
	Blue	Bx		0.116	0.136	0.156	-		
		By		0.118	0.138	0.158	-		
	White	Wx		0.288	0.308	0.328	-		
		Wy		0.322	0.342	0.362	-		
	Color Gamut				45	50	--		%

*Note (1)Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L_{255} / L_0

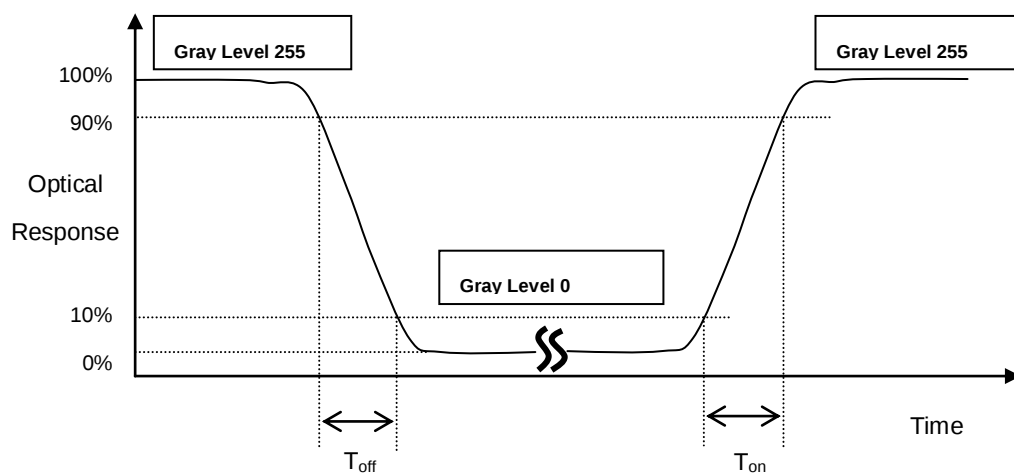
L_{255} : Luminance of gray level 255

L_0 : Luminance of gray level 0

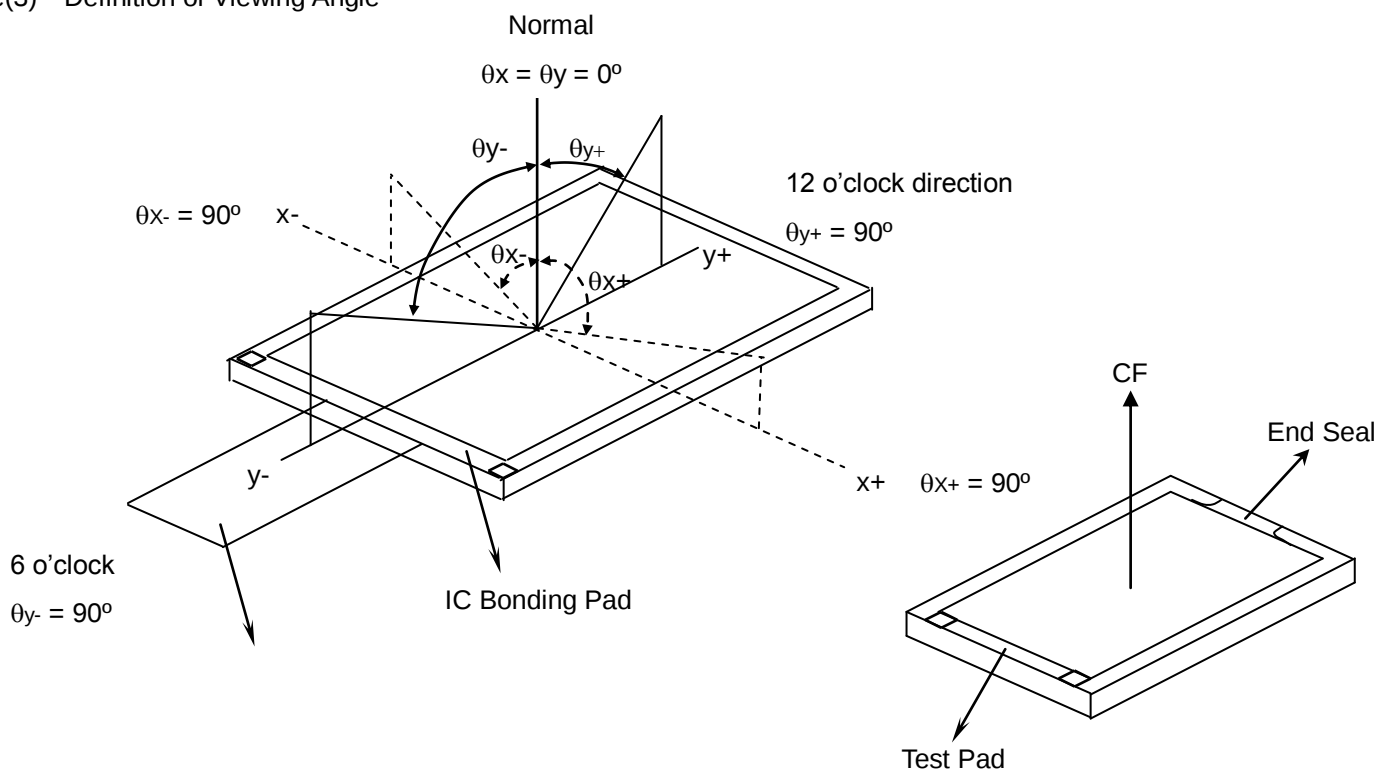
CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

*Note (2) Definition of Response Time (T_{on} , T_{off}):

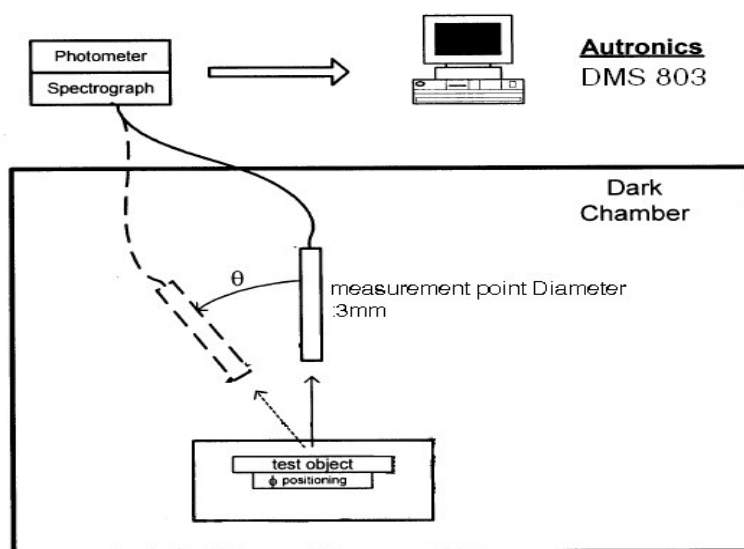


*Note(3) Definition of Viewing Angle

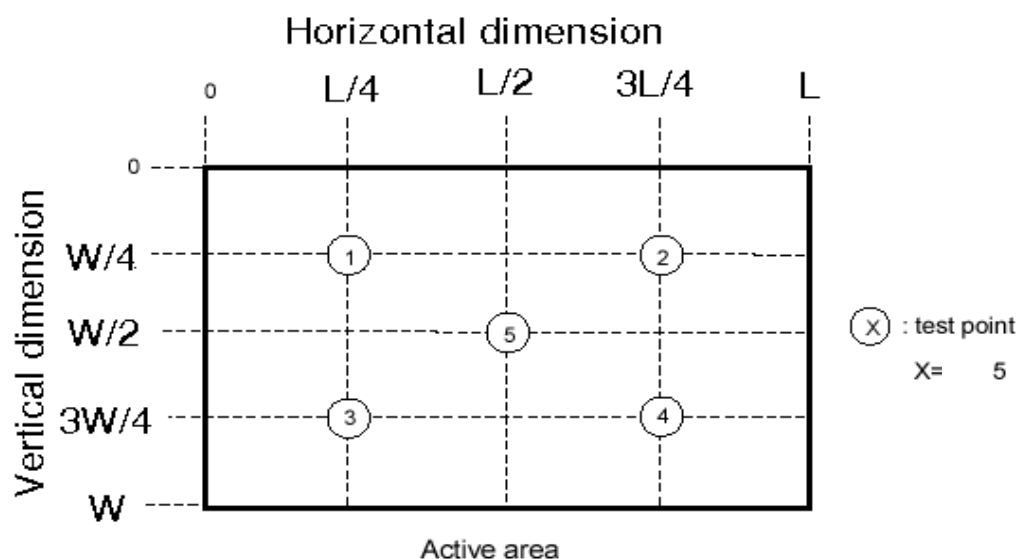


*Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



*Note (5)



7.RELIABILITY SPECIFICATION

No.	Test Item	Test Condition	Check Time
1	High Temp Storage	T= 80℃	240 hrs
2	Low Temp Storage	T= -30℃	240 hrs
3	High Temp Operation	T= 70℃	240 hrs
4	Low Temp Operation	T= -20℃	240 hrs
5	High Temp & High Humidity Operation	T=60℃ H=90%RH	240 hrs

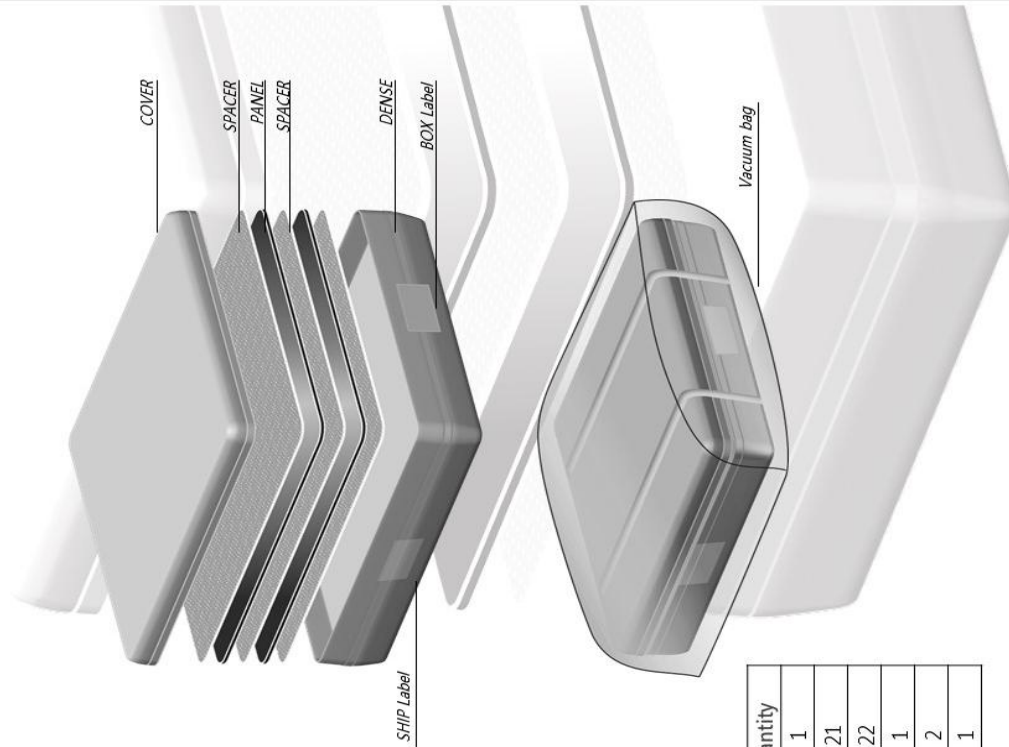
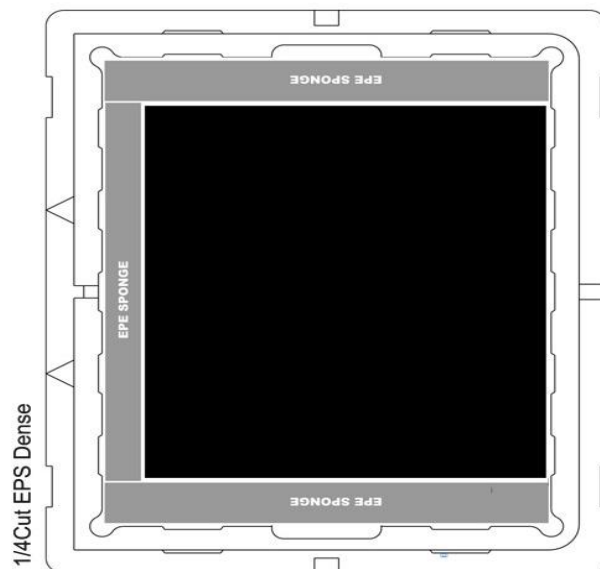
Note:

- (1) T : Ambient temperature
- (2) The test samples have recovery time need more than 2 hours at room temperature before the function check.
In the standard conditions, there is no abnormal display function occurred.
- (3) After the reliability test, the product only guarantees operation function, but don't guarantee all of the cosmetic specification.
- (4) Under no condensation of dew.

8. PACKAGE FORM

8.1 SUBSTRATE PACKAGE

Packing Drawing

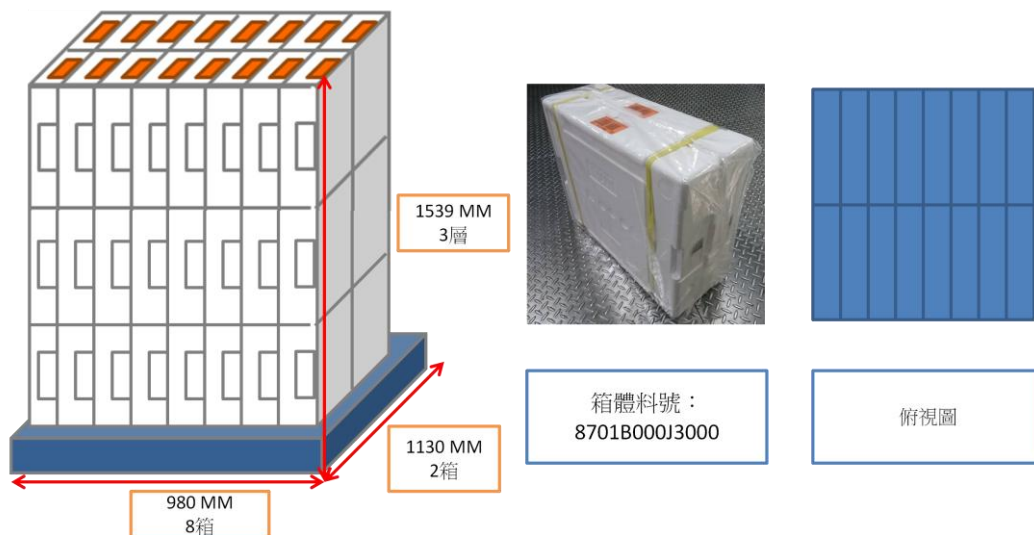


Material Instructions :

Material_Name	Material_No	Material_dimensions	Quantity
Densepack	8701B000J3000	552,463,109mm	1
Panel size & Full box	1307_1.3" IPS	356.4*320.8*0.8mm	21
EPE Spacer	8301B004L3000	364,330,1.1mm	22
EPE SPONGE 1	8301B004LZ000	370*30*45mm	1
EPE SPONGE 2	8301B0040N001	365,40,45mm	2
Vacuum Bag	8401B000LK000	Sio2,LLDPE,850,800,0.08mm	1

8.2 PALLET PACKAGE

T1_02F_裝載尺寸:1/4 CUT(白標朝前，三層堆疊)



外箱尺寸mm	單層堆疊	堆疊層數	總堆疊箱數	棧板材積mm	堆疊材積mm
552*463*109	16	3	48	1130*980*150	1130*980*1539

8.3 PRECAUTION TO STORAGE OF LCD

TFT-LCD cells should be stored in the Innolux shipping box and in a dark room where must be kept temperature at 5~30°C and humidity at 45%~75%RH.