TFT-LCD CELL SPECIFICATION

Module Name: PH045NA-01B

Version: 3.0

（ ）Preliminary Specification
(●) Final Specification

Customer:

Approved by **Signature**

Name / Title

Note

Approved by	Checked by	Prepared by
Len	Eason	吳習征

REVISION STATUS

Revision	Description	Page	Revision Date
1.0	First edition issued	---	2013-08-19
2.0	Add ILI9806C Pin Assignment	8	3013-08-27
3.0	Update Optical spec.	22	2014-01-07

Contents

1. General Specification

(1) Overview

The PH045NA-01A is a 4.46-inch wide LCD cell with thin film transistors as active elements and contains 480(H) X 854(V) pixels. Each pixel is divided into red, green and blue dot, which are arranged in vertical stripe. The cell is normally white mode, and can be applied to the transmission type display. Backlight unit (BLU) and circuit board for the cell are not built in.

(2) Application

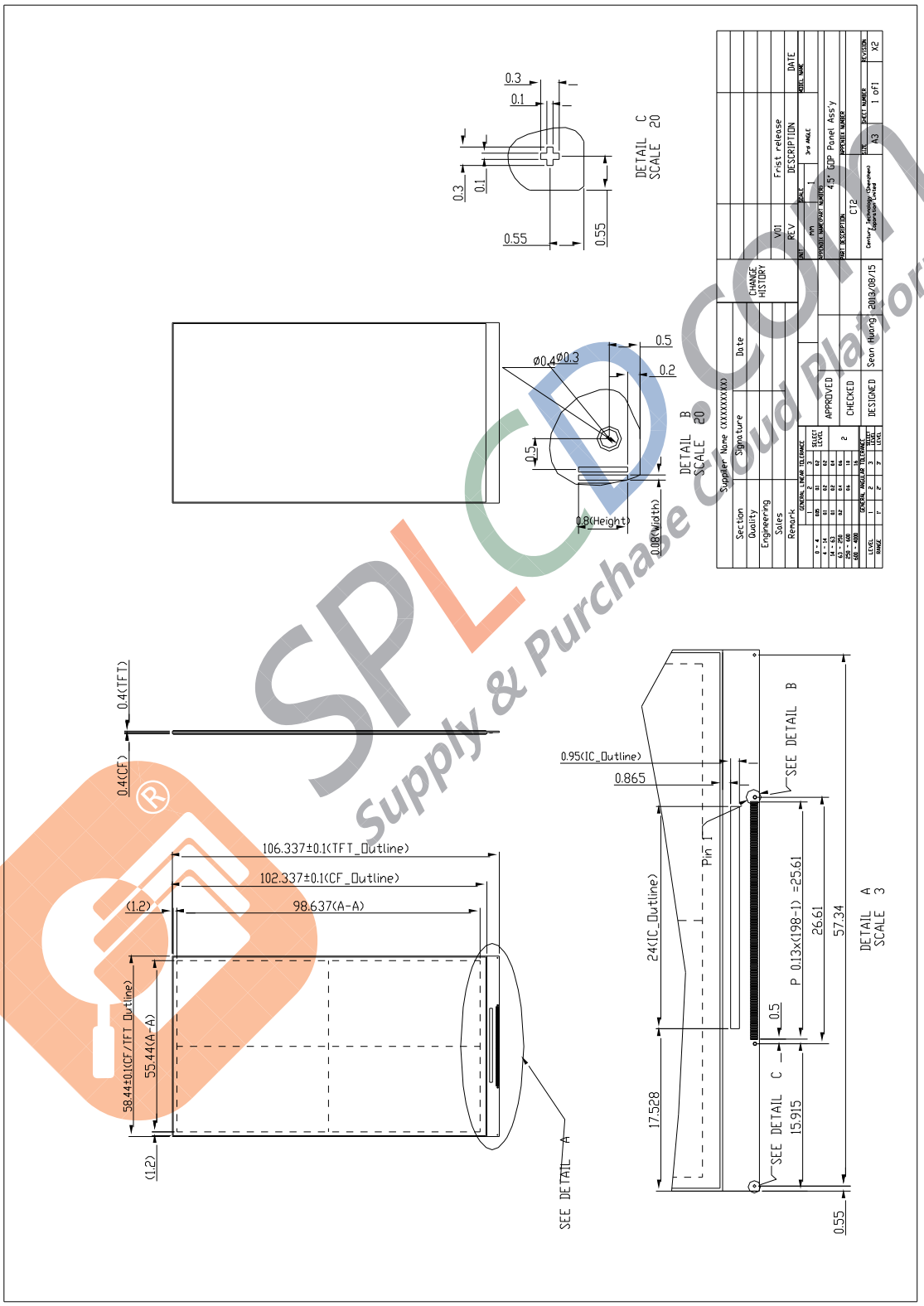
LCD monitor on mobile phone.

(3) General Specification

No.	Item		Specification	unit
1	Glass thickness	TFT	0.4	mm
		CF	0.4	
2	Shipping mode		ODF cut	-
3	Shipping size		Typ1：586.685 x 429.080 Typ2：579.585 x 419.240	mm
4	Panel outline dimension		58.44 (H)x 106.337 (V)	mm
5	Screen size		4.46” diagonal	inch
6	Active Area		55.44 (H) x 98.637 (V)	mm
7	Resolution		480 RGB x 854	pixel
8	Pixel driving element		a-Si TFT	-
9	Pixel pitch		0.0385 x 0.1155	mm
10	Pixel arrangement		RGB-stripe	-
10	View direction (Gray inversion)		12 o'clock	-
11	Driver IC		OTM8018B -C11/ ILI9806C	-
12	Weight without POL		468.1±10%	g

2. Dimension

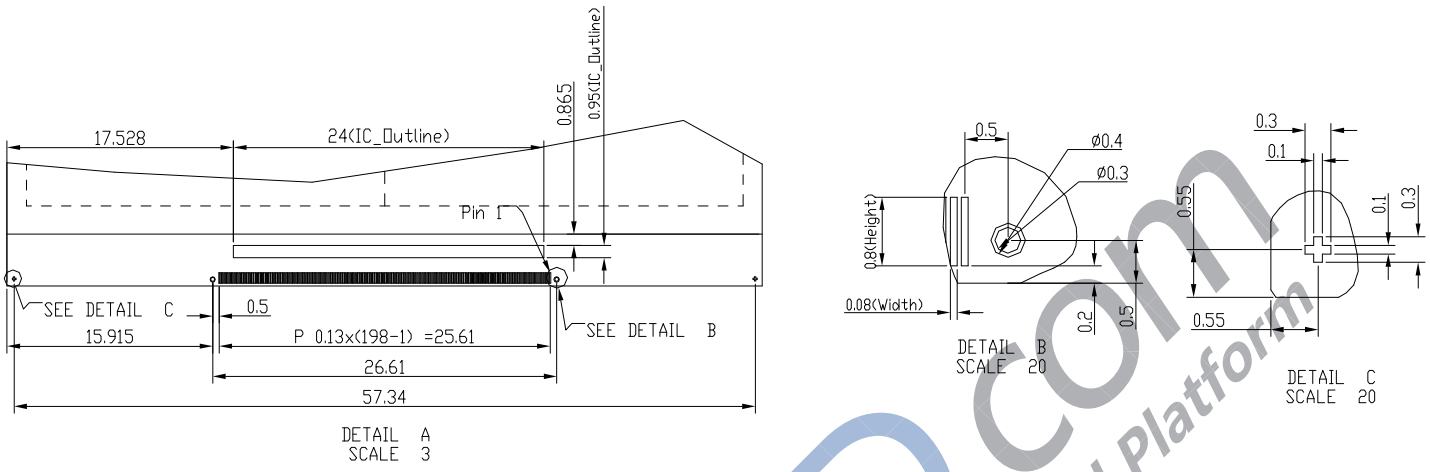
2.1 Outline dimension



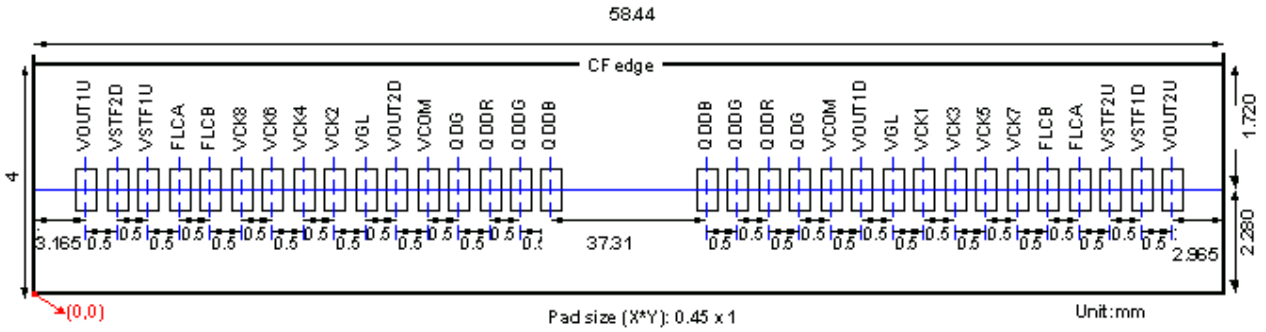
Note: 1. View direction for normal TN is the same as direction of gray inversion.

2. Cutting precision should be controlled within±150um.

2.2 FPC detail



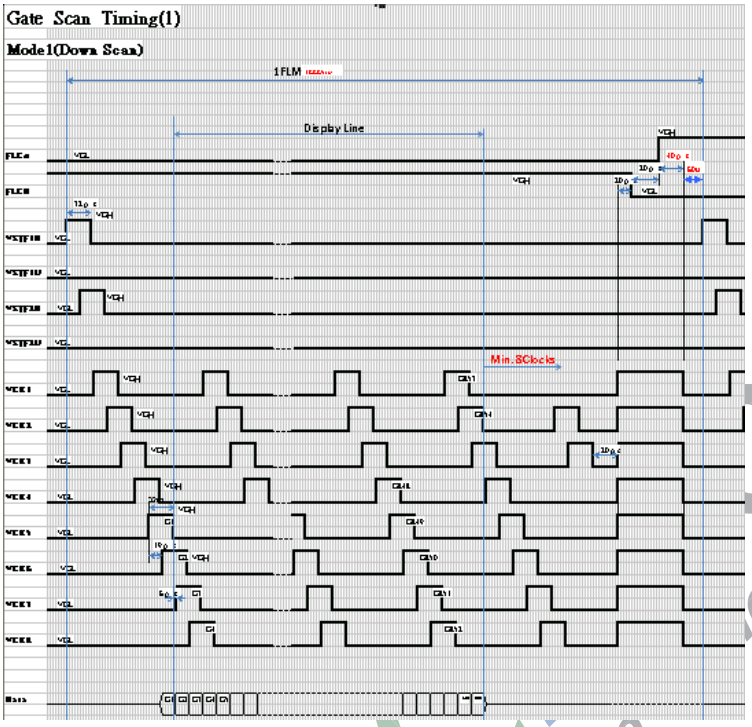
2.3 Test Pad



PAD NO.	PAD Name	X	Y
1	VOUT1U	3.165	2.280
2	VSTF2D	3.665	2.280
3	VSTF1U	4.165	2.280
4	FLCA	4.665	2.280
5	FLCB	5.165	2.280
6	VCK8	5.665	2.280
7	VCK6	6.165	2.280
8	VCK4	6.665	2.280
9	VCK2	7.165	2.280
10	VGL	7.665	2.280
11	VOUT2D	8.165	2.280
12	VCOM	8.665	2.280
13	QDG	9.165	2.280
14	QDDR	9.665	2.280
15	QDDG	10.165	2.280
16	QDDB	10.665	2.280

PAD NO.	PAD Name	X	Y
17	QDDB	47.975	2.280
18	QDDG	48.475	2.280
19	QDDR	48.975	2.280
20	QDG	49.475	2.280
21	VCOM	49.975	2.280
22	VOUT1D	50.475	2.280
23	VGL	50.975	2.280
24	VCK1	51.475	2.280
25	VCK3	51.975	2.280
26	VCK5	52.475	2.280
27	VCK7	52.975	2.280
28	FLCB	53.475	2.280
29	FLCA	53.975	2.280
30	VSTF2U	54.475	2.280
31	VSTF1D	54.975	2.280
32	VOUT2U	55.475	2.280

2.3.1 Timing



3. Pin Assignment

	Driver IC			FPC				note
	ILI9806C		OTM8018B	ILI9806C		OTM8018B		
Pad No	Pad Name	Pad No	Pad Name	Pinout Name	Pinout Number	Pinout Name	Pinout Number	
				DUMMY	1	DUMMY	1	
				IPSGND	2	IPSGND	2	Connect to Ground on FPC
				VCOMR	3	VCOMR	3	Connect to VCOM on FPC
				VOUT2U	4	VOUT2U	4	
				VGL	5	VGL	5	Connect to VGL on FPC
				VOUT1D	6	VOUT1D	6	
				VCOMR	7	VCOMR	7	Connect to VCOM on FPC
1	VSSIDUM0							
2	VSSIDUM0	1	VSS					
3	VSSIDUM1	2	VSS					
4	PADA1	3	PADA1					
5	PADB1	4	PADB1					
				DUMMY	8	DUMMY	8	
				DUMMY	9	DUMMY	9	
6	VCOM_L	5	VCOM	VCOM	10	VCOM	10	
7	VCOM_L	6	VCOM					
8	VCOM_L	7	VCOM					
9	VCOM_L	8	VCOM					
10	VCOM_L	9	VCOM					
11	CONTACT1A	10	CONTACT1					
12	CONTACT1B	11	CONTACT1					
13	VPP	12	MTP_PWR	VPP	11	MTP_PWR	11	
14	VPP	13	MTP_PWR					
15	VPP	14	MTP_PWR					
16	VPP	15	MTP_PWR					
17	VPP	16	MTP_PWR					
18	VGL	17	VGL	VGL	12	VGL	12	
19	VGL	18	VGL					
20	VGLO_L	19	VGL		13		13	
21	VGLO_L	20	VGL					
22	LVGL_L	21	VGL_REG1	LVGL_L	14	VGL_REG1	14	
23	LVGL_L	22	VGL_REG1					
24	VRGH_L	23	VRGH	VRGH	15	VRGH	15	
25	VRGH_L	24	VRGH					

26	VCL	25	VCL	VCL	16	VCL	16	
27	VCL	26	VCL					
28	VCL	27	VCL					
29	VCL	28	VCL					
30	VREF_PWR	29	VREF	VREF_PWR	17	VREF	17	
31	VREF_PWR	30	VREF					
32	VREF_PWR	31	VREF					
33	VREF_PWR	32	VREF					
34	VSSA	33	VSSA	VSSA	18	VSSA	18	
35	VSSA	34	VSSA					
36	VSSA	35	VSSA					
37	VSSA	36	VSSA					
38	VDDA	37	VDD	VDDA	19	VDD	19	
39	VDDA	38	VDD					
40	VDDA	39	VDD					
41	VDDA	40	VDD					
42	VDDR	41	VDD		20		20	
43	VDDR	42	VDD					
44	VDDR	43	VDD					
45	VDDR	44	VDD					
46	VSSR	45	VSS	VSS	21	VSS	21	
47	VSSR	46	VSS					
48	VSSR	47	VSS					
49	VSSR	48	VSS					
50	TEST[0]	49	TEST0					
51	TEST[1]	50	TEST1					
52	TEST[2]	51	TEST2					
53	TEST[3]	52	TEST3					
54	VDD_DET	53	VDD	VDD_DET	22	VDD	22	
55	EXB2T	54	DIOPWR	EXB2T	23	DIOPWR	23	
56	EXB2T	55	DIOPWR					
57	VGSN_PAD	56	VGSN	VGSN	24	VGSN	24	
58	VGSN_PAD	57	VGSN					
59	VGSP_PAD	58	VGSP	VGSP	25	VGSP	25	
60	VGMN_PAD	59	VGMN	VGMN	26	VGMN	26	
61	VGMN_PAD	60	VGMN					
62	VGMP_PAD	61	VGMP	VGMP	27	VGMP	27	
63	GND	62	VSS	VSS	28	VSS	28	
64	GND	63	VSS					
65	GND	64	VSS					

66	VDD	65	VDD_18V	VDD	29	VDD_18V	29	
67	VDD	66	VDD_19V					
68	VDD	67	VDD_20V					
69	VDDB	68	VDD					
70	VDDB	69	VDD					
71	VDDB	70	VDD					
72	VCL	71	VCL	VCL	30	VCL	30	
73	VCL	72	VCL					
74	VCL	73	VCL					
75	VCL	74	VCL		31		31	
76	VCL	75	VCL					
77	VCL	76	VCL					
78	AVSS	77	VSSA	AVSS	32	VSSA	32	
79	AVSS	78	VSSA					
80	AVSS	79	VSSA					
81	VDDI	80	VDDIO					
82	LANSEL	81	LANSEL	LANSEL	33	LANSEL	33	
83	DSWAP	82	DSWAP	DSWAP	34	DSWAP	34	
84	PSWAP	83	PSWAP	PSWAP	35	PSWAP	35	
85	VSSI	84	VSSI_OPT1					
86	T_DSTB_SEL	85	DSTB_SEL	T_DSTB_SEL	36	T_DSTB_SEL	36	
87	NBWSEL	86	NBWSEL					
88	VGSW3	87	VGSW3					
89	VGSW2	88	VGSW2					
90	VGSW1	89	VGSW1					
91	VGSW0	90	VGSW0					
92	VDDI	91	VDDIO					
93	RGBBP	92	I2C_SA1	RGBBP	37	I2C_SA1	37	
94	I2C_SA0	93	I2C_SA0	I2C_SA0	38	I2C_SA0	38	
95	IM3	94	IM3	IM3	39	IM3	39	
96	IM2	95	IM2	IM2	40	IM2	40	
97	IM1	96	IM1	IM1	41	IM1	41	
98	IM0	97	IM0	IM0	42	IM0	42	
99	GPO3	98	GPO3					
100	GPO2	99	GPO2					
101	GPO1	100	GPO1					
102	GPO0	101	GPO0					
103	EXB1T	102	EXB1T	EXB1T	43	EXB1T	43	
104	TE_L	103	TE_L	TE_L	44	T_TE_L	44	
105	VSEL	104	VSEL	VSEL	45	T_VSEL	45	

106	SDO	105	SDO	SDO	46	SDO	46	
107	SDI	106	SDI	SDI	47	SDI	47	
108	DCX	107	DCX	DCX	48	DCX	48	
109	WRX	108	WRX	WRX	49	WRX	49	
110	RDX	109	RDX	RDX	50	RDX	50	
111	CSX	110	CSX	CSX	51	CSX	51	
112	RESX	111	RESX	RESX	52	RESX	52	
113	VSSI	112	VSS	VSS	53	VSS	53	
114	VSSI	113	VSS					
115	VSSI	114	VSS					
116	VDDI	115	VDDIO	VDDI	54	VDDIO	54	
117	VDDI	116	VDDIO					
118	VDDI	117	VDDIO					
119	DB[23]	118	D23	DB[23]	55	D23	55	
120	DB[22]	119	D22	DB[22]	56	D22	56	
121	DB[21]	120	D21	DB[21]	57	D21	57	
122	DB[20]	121	D20	DB[20]	58	D20	58	
123	DB[19]	122	D19	DB[19]	59	D19	59	
124	DB[18]	123	D18	DB[18]	60	D18	60	
125	DB[17]	124	D17	DB[17]	61	D17	61	
126	DB[16]	125	D16	DB[16]	62	D16	62	
127	DB[15]	126	D15	DB[15]	63	D15	63	
128	DB[14]	127	D14	DB[14]	64	D14	64	
129	DB[13]	128	D13	DB[13]	65	D13	65	
130	DB[12]	129	D12	DB[12]	66	D12	66	
131	DB[11]	130	D11	DB[11]	67	D11	67	
132	DB[10]	131	D10	DB[10]	68	D10	68	
133	DB[9]	132	D9	DB[9]	69	D9	69	
134	DB[8]	133	D8	DB[8]	70	D8	70	
135	DB[7]	134	D7	DB[7]	71	D7	71	
136	DB[6]	135	D6	DB[6]	72	D6	72	
137	DB[5]	136	D5	DB[5]	73	D5	73	
138	DB[4]	137	D4	DB[4]	74	D4	74	
139	DB[3]	138	D3	DB[3]	75	D3	75	
140	DB[2]	139	D2	DB[2]	76	D2	76	
141	DB[1]	140	D1	DB[1]	77	D1	77	
142	DB[0]	141	D0	DB[0]	78	D0	78	
143	DE	142	DE	DE	79	DE	79	
144	PCLK	143	PCLK	PCLK	80	PCLK	80	
145	HS	144	HS	HS	81	HS	81	

146	VS	145	VS	VS	82	VS	82	
147	LEDPWM	146	LEDPWM	LEDPWM	83	LEDPWM	83	
148	LEDON	147	LEDON	LEDON	84	LEDON	84	
149	KBBC	148	KBBC					
150	ERR	149	ERR	ERR	85	ERR	85	
151	VDDI	150	VDDIO	VDDI	86	VDDIO	86	
152	VDDI	151	VDDIO					
153	VDDI	152	VDDIO					
154	GND	153	VSS	VSS	87	VSS	87	
155	GND	154	VSS					
156	GND	155	VSS					
157	AVDD	156	VDDA	AVDD	88	VDDA	88	
158	AVDD	157	VDDA					
159	AVDD	158	VDDA					
160	AVDD	159	VDDA					
161	AVSS	160	VSSA	AVSS	89	VSSA	89	
162	AVSS	161	VSSA					
163	AVSS	162	VSSA					
164	AVSS	163	VSSA					
165	AVEE	164	NVDDA	AVEE	90	NVDDA	90	
166	AVEE	165	NVDDA					
167	AVEE	166	NVDDA					
168	AVEE	167	NVDDA					
169	AVEE	168	NVDDA					
170	VDDA1	169	VCC	VDDA1	91	VCC	91	
171	VDDA1	170	VCC					
172	VDDA1	171	VCC					
173	VDDA1	172	VCC					
174	GND	173	VSS	VSS	92	VSS	92	
175	GND	174	VSS					
176	GND	175	VSS					
177	GND	176	VSS					
178	VDD	177	VDD_18V	VDD	93	VDD_18V	93	
179	VDD	178	VDD_19V					
180	VDD	179	VDD_20V					
181	VDD	180	VDD_21V					
182	VSSAM	181	LVDSVSS	VSSAM	94	LVDSVSS	94	
183	VSSAM	182	LVDSVSS					
184	VSSAM	183	LVDSVSS					
185	VSSAM	184	LVDSVSS					
186	VSSAM	185	LVDSVSS					

187	HS_D1P	186	D1_P	HS_D1P	95	D1_P	95	
188	HS_D1P	187	D1_P					
189	HS_D1P	188	D1_P		96		96	
190	HS_D1P	189	D1_P					
191	HS_D1N	190	D1_N	HS_D1N	97	D1_N	97	
192	HS_D1N	191	D1_N					
193	HS_D1N	192	D1_N		98		98	
194	HS_D1N	193	D1_N					
195	VSSAM	194	LVDSVSS	VSSAM	99	LVDSVSS	99	
196	VSSAM	195	LVDSVSS					
197	HS_CP	196	CLK_P	HS_CP	100	CLK_P	100	
198	HS_CP	197	CLK_P					
199	HS_CP	198	CLK_P		101		101	
200	HS_CP	199	CLK_P					
201	HS_CN	200	CLK_N	HS_CN	102	CLK_N	102	
202	HS_CN	201	CLK_N					
203	HS_CN	202	CLK_N		103		103	
204	HS_CN	203	CLK_N					
205	VSSAM	204	LVDSVSS	VSSAM	104	LVDSVSS	104	
206	VSSAM	205	LVDSVSS					
207	HS_D0P	206	D0_P	HS_D0P	105	D0_P	105	
208	HS_D0P	207	D0_P					
209	HS_D0P	208	D0_P		106		106	
210	HS_D0P	209	D0_P					
211	HS_D0N	210	D0_N	HS_D0N	107	D0_N	107	
212	HS_D0N	211	D0_N					
213	HS_D0N	212	D0_N		108		108	
214	HS_D0N	213	D0_N					
215	VSSAM	214	LVDSVSS	VSSAM	109	LVDSVSS	109	
216	VSSAM	215	LVDSVSS					
217	MVDDL	216	VDDP	MVDDL	110	VDDP	110	
218	MVDDL	217	VDDP		111		111	
219	MVDDL	218	VDDP					
220	MVDDA	219	LVDSVDD	MVDDA	112	LVDSVDD	112	
221	MVDDA	220	LVDSVDD		113		113	
222	MVDDA	221	LVDSVDD					
223	VDDAM	222	VDDAM	VDDAM	114	VDDAM	114	
224	VDDAM	223	VDDAM					
225	VDDAM	224	VDDAM					
226	VDDAM	225	VDDAM					
227	VDDAM	226	VDDAM					

228	VDDR1	227	VDD					
229	VDDR1	228	VDD					
230	VDDR1	229	VDD					
231	OSC_TEST	230	OSC_TEST					
232	T_DUMMY	231	TE					
233	VSSR1	232	VSS	VSS	115	VSS	115	
234	VSSR1	233	VSS					
235	VSSR1	234	VSS					
236	VSSR1	235	VSS					
237	NVCORE	236	VREFCP	NVCORE	116	VREFCP	116	
238	NVCORE	237	VREFCP					
239	VRGH	238	VRGH_DMY	VRGH	117	VRGH_DMY	117	
240	VRGH	239	VRGH_DMY					
241	EXTP	240	EXTP	EXTP	118	EXTP	118	
242	EXTP	241	EXTP					
243	CSP	242	CSP	CSP	119	CSP	119	
244	CSP	243	CSP					
245	EXTN	244	EXTN	EXTN	120	EXTN	120	
246	EXTN	245	EXTN					
247	CSN	246	CSN	CSN	121	CSN	121	
248	CSN	247	CSN					
249	VDDB	248	VDD	VDDB	122	VDD	122	
250	VDDB	249	VDD					
251	VDDB	250	VDD					
252	VDDB	251	VDD					
253	VDDB	252	VDD					
254	VDDB	253	VDD					
255	VSSB	254	VSS	VSS	123	VSS	123	
256	VSSB	255	VSS					
257	VSSB	256	VSS					
258	VSSB	257	VSS					
259	VSSB	258	VSS					
260	VSSB	259	VSS					
261	C11P	260	C11P	C11P	124	C11P	124	
262	C11P	261	C11P		125		125	
263	C11P	262	C11P					
264	C11N	263	C11N	C11N	126	C11N	126	
265	C11N	264	C11N		127		127	
266	C11N	265	C11N					
267	C12P	266	C12P	C12P	128	C12P	128	
268	C12P	267	C12P		129		129	
269	C12P	268	C12P					

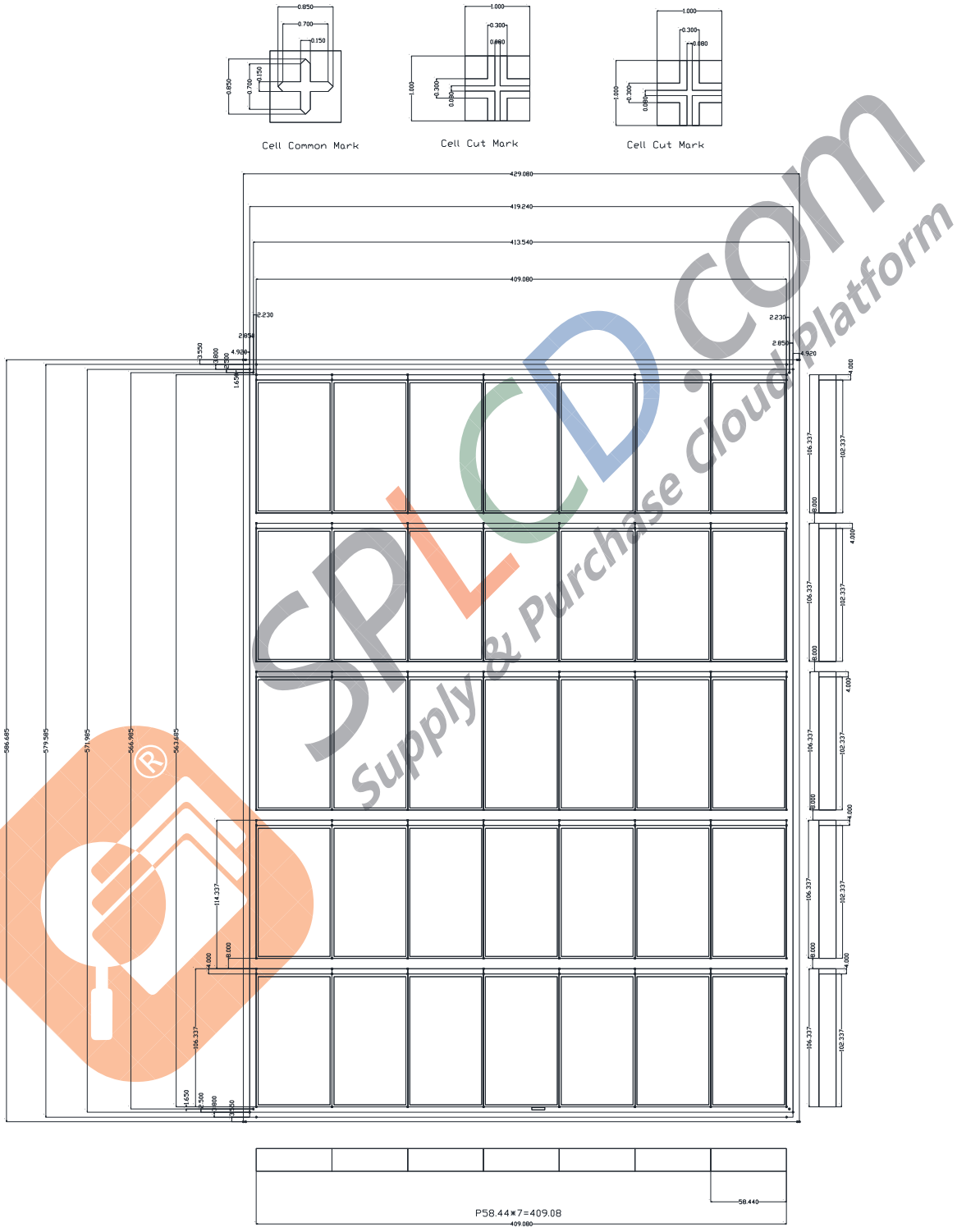
270	C12N	269	C12N	C12N	130	C12N	130	
271	C12N	270	C12N		131		131	
272	C12N	271	C12N					
273	C13N	272	C13P	C13P	132	C13P	132	ILI9806C C13N/P can change
274	C13N	273	C13P		133		133	
275	C13N	274	C13P					
276	C13P	275	C13N	C13N	134	C13N	134	ILI9806C C13N/P can change
277	C13P	276	C13N		135		135	
278	C13P	277	C13N					
279	C14P	278	C14P	C14P	136	C14P	136	
280	C14P	279	C14P		137		137	
281	C14P	280	C14P					
282	C14N	281	C14N	C14N	138	C14N	138	
283	C14N	282	C14N		139		139	
284	C14N	283	C14N					
285	AVDD	284	VDDA	AVDD	140	VDDA	140	
286	AVDD	285	VDDA					
287	AVDD	286	VDDA					
288	AVDD	287	VDDA					
289	AVSS	288	VSS	VSS	141	VSS	141	
290	AVSS	289	VSS					
291	AVSS	290	VSSA					
292	AVSS	291	VSSA					
293	AVSS	292	VSSA					
294	AVEE	293	NVDDA	AVEE	142	NVDDA	142	
295	AVEE	294	NVDDA					
296	AVEE	295	NVDDA					
297	AVEE	296	NVDDA					
298	AVEE	297	NVDDA					
299	AVEE	298	NVDDA					
300	C21P	299	C21P	C21P	143	C21P	143	
301	C21P	300	C21P		144		144	
302	C21P	301	C21P					
303	C21N	302	C21N	C21N	145	C21N	145	
304	C21N	303	C21N		146		146	
305	C21N	304	C21N					
306	C22P	305	C22P	C22P	147	C22P	147	
307	C22P	306	C22P		148		148	
308	C22P	307	C22P					
309	C22N	308	C22N	C22N	149	C22N	149	
310	C22N	309	C22N		150		150	
311	C22N	310	C22N					

312	C23P	311	C23P	C23P	151	C23P	151	
313	C23P	312	C23P		152		152	
314	C23P	313	C23P					
315	C23N	314	C23N	C23N	153	C23N	153	
316	C23N	315	C23N		154		154	
317	C23N	316	C23N					
318	C24P	317	C24P	C24P	155	C24P	155	
319	C24P	318	C24P		156		156	
320	C24P	319	C24P					
321	C24N	320	C24N	C24N	157	C24N	157	
322	C24N	321	C24N		158		158	
323	C24N	322	C24N					
324	VDDB	323	VDD	VDDB	159	VDD	159	
325	VDDB	324	VDD					
326	VDDB	325	VDD					
327	VDDB	326	VDD					
328	VDDB	327	VDD					
329	VCL	328	VCL	VCL	160	VCL	160	
330	VCL	329	VCL					
331	VCL	330	VCL					
332	VCL	331	VCL					
333	VCL	332	VCL					
334	VCL	333	VCL					
335	VCL	334	VCL					
336	AVSS	335	VSSA	AVSS	161	VSSA	161	
337	AVSS	336	VSSA					
338	AVSS	337	VSSA					
339	VSSB	338	VSS	VSSB	162	VSS	162	
340	VSSB	339	VSS					
341	VSSB	340	VSS					
342	VSSB	341	VSS					
343	C31P	342	C31P	C31P	163	C31P	163	
344	C31P	343	C31P		164		164	
345	C31P	344	C31P					
346	C31N	345	C31N	C31N	165	C31N	165	
347	C31N	346	C31N		166		166	
348	C31N	347	C31N					
349	C32N	348	C32P	C32P	167	C32P	167	ILI9806C C32N/P can change
350	C32N	349	C32P		168		168	
351	C32N	350	C32P					

352	C32P	351	C32N	C32N	169	C32N	169	ILI9806C C32N/P can change
353	C32P	352	C32N		170		170	
354	C32P	353	C32N					
355	VDD	354	VDD_18V	VDD	171	VDD_18V	171	
356	VDD	355	VDD_18V					
357	VDD	356	VDD_18V					
358	GND	357	VSS	VSS	172	VSS	172	
359	GND	358	VSS					
360	GND	359	VSS					
361	C41P	360	C41P	C41P	173	C41P	173	
362	C41P	361	C41P		174		174	
363	C41N	362	C41N	C41N	175	C41N	175	
364	C41N	363	C41N		176		176	
365	VGH	364	VGH	VGH	177	VGH	177	
366	VGH	365	VGH					
367	VGHO	366	VGHO					
368	VGHO	367	VGHO					
369	VRGH_R	368	VRGH	VRGH	178	VRGH	178	
370	VRGH_R	369	VRGH					
371	C51P	370	C51P	C51P	179	C51P	179	
372	C51P	371	C51P		180		180	
373	C51N	372	C51N	C51N	181	C51N	181	
374	C51N	373	C51N		182		182	
375	LVGL_R	374	VGL_REG	LVGL_R	183	VGL_REG	183	
376	LVGL_R	375	VGL_REG					
377	VGLO_R	376	VGL	VGL	184	VGL	184	
378	VGLO_R	377	VGL					
379	VGLX	378	VGL		185	VGL	185	
380	VGLX	379	VGL					
381	VGL	380	VGL		186	VGL	186	
382	VGL	381	VGL					
383	TEST4	382	TEST4					
384	TEST5	383	TEST5					
385	TEST6	384	TEST6					
386	TEST7	385	TEST7					
387	CONTACT2A	386	CONTACT2					
388	CONTACT2B	387	CONTACT2					
389	VCOM_R	388	VCOM	VCOM	187	VCOM	187	
390	VCOM_R	389	VCOM					
391	VCOM_R	390	VCOM					
392	VCOM_R	391	VCOM		188		188	
393	VCOM_R	392	VCOM					

				DUMMY	189	DUMMY	189	
					190		190	
394	PADA2	393	PADA2					
395	PADB2	394	PADB2					
396	VSSIDUM2	395	VSS					
397	VSSIDUM3	396	VSS					
398	VSSIDUM3							
				QDG	191	QDG	191	Connect to VGL on FPC
				VCOML	192	VCOML	192	Connect to VCOM on FPC
				VOUT2D	193	VOUT2D	193	
				VGL	194	VGL	194	Connect to VGL on FPC
				VOUT1U	195	VOUT1U	195	
				VCOML	196	VCOML	196	Connect to VCOM on FPC
				IPSGND	197	IPSGND	197	Connect to Ground on FPC
				DUMMY	198	DUMMY	198	

4. Cell Scribe layout



5. Electrical specification

Item	Symbol	Values			Unit
		Min	Type.	Max	
TFT Operation Frame rate	Hz	50	60	70	Hz
TFT common electrode voltage	VCOM	-3.18	-	0	V
TFT gate on voltage	VGH	13	15	18	V
TFT gate off voltage	VGL	-10	-9	-8	V

Note 1:

VCOM value should be adjusted by different condition to optimize Flicker Value.

Note 2:

VGH and VGL are the operating voltages of TFT gate.

6. Optical specifications

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Response time (By Quick)	Tr+Tf	θ= 0°	-	16	32	ms	Note 5
Contrast ratio	CR	θ= 0°	600	800	-		Note 2,6
Viewing angle	Top	CR≧10	-	65	-	deg.	Note 2,6,7
	Bottom	CR≧10	-	60	-		
	Left	CR≧10	-	70	-		
	Right	CR≧10	-	70	-		
Color chromaticity (CF only with ITO, light source is C light, CIE 1931)	Wx	θ= 0°	-0.015	0.304	+0.015		Note 3
	Wy			0.340			
	Rx			0.646			
	Ry			0.335			
	Gx			0.317			
	Gy			0.583			
	Bx			0.141			
	By			0.157			
NTSC (CF only, Base on C Light)			55	58	-	%	Note 3
Cross talk	Ct		-	-	2	%	Note 9
Transmittance	Trans		3.9	4.6	-	%	Note 4

Note 1: Ambient temperature = 25°C.

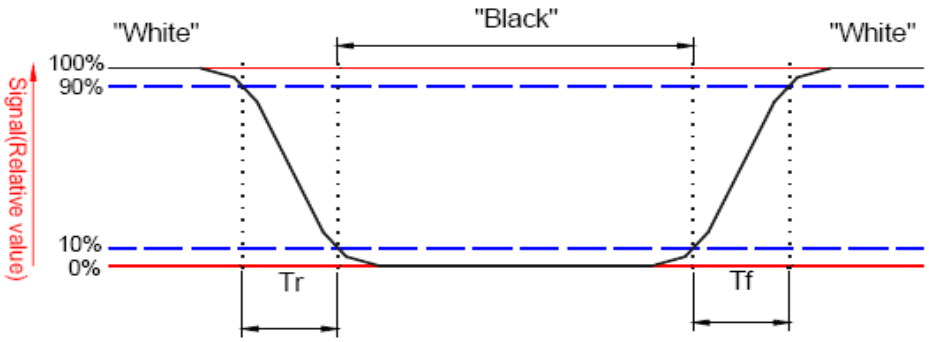
Note 2: To be measured with a viewing cone of 2°by Topcon luminance meter BM-5A.

Note 3: To be measured with Otsuta chromaticity meter LCF-2100M, CF only measure under C light simulation.

Note 4: CTC shipping status is cell without polarizer. Transmittance of Specification is cell with EWV polarizer. The tolerance of Transmittance is ±10%.

Note 5: Definition of response time:

The output signals of TRD-100 are measured when the input signals are changed to “White” (falling time) and from “White” to “Black” (rising time), respectively. The interval is between the 10% and 90% of amplitudes. Refer to figure as below.

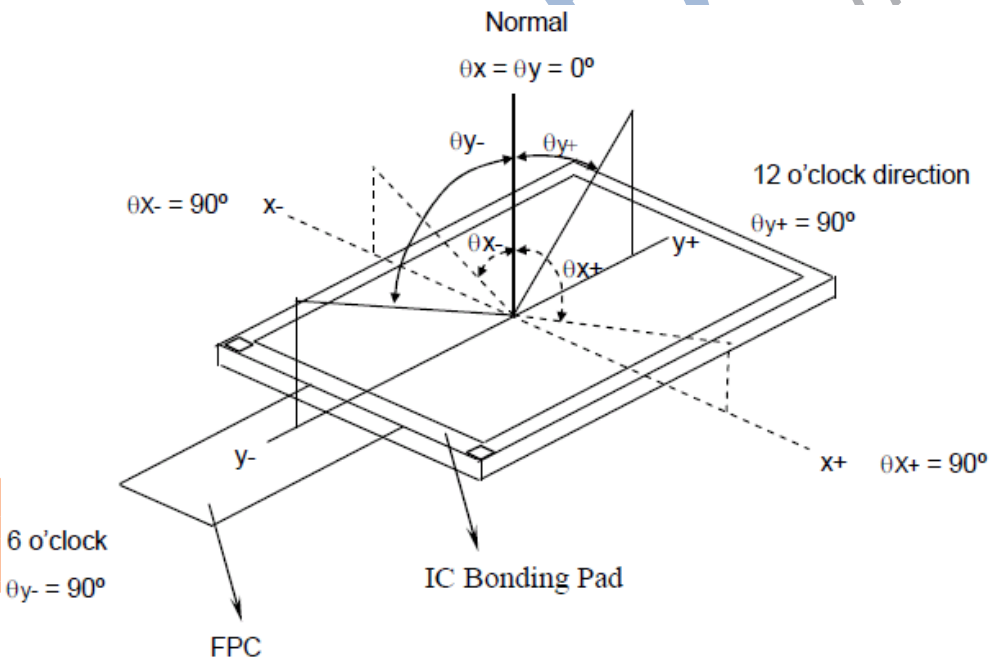


Note 6: Definition of contrast ratio:

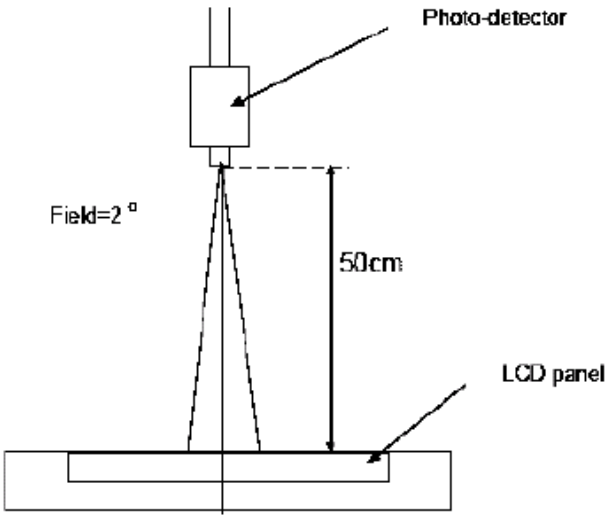
Contrast ratio is calculated by the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

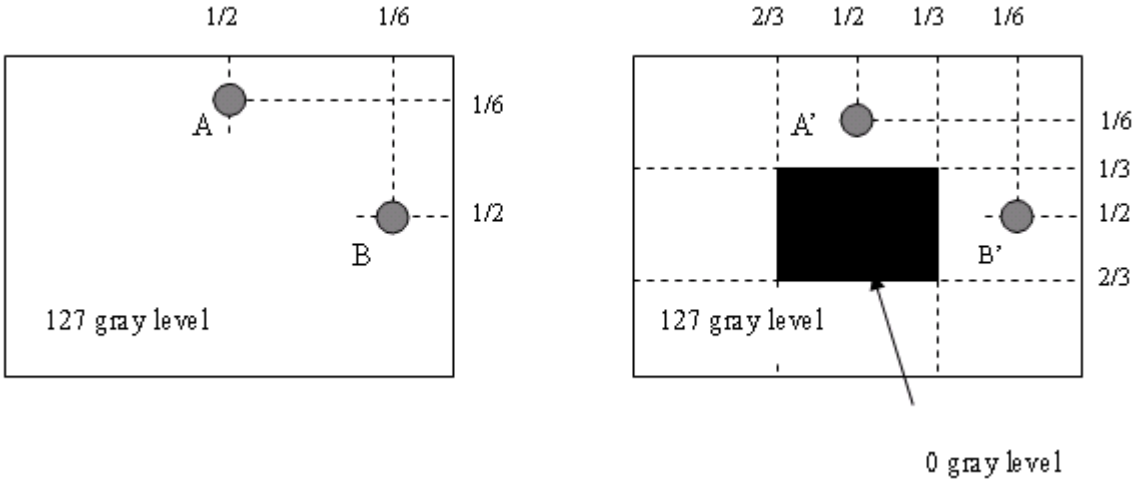
Note 7: Definition of viewing angle



Note 8: Optical characteristic measurement setup.



Note 9:



l LA-LA' l / LA x 100%= 3% max., LA and LA' are brightness at location A and A'.
l LB-LB' l / LB x 100%= 3% max., LB and LB' are brightness at location B and B'.

7. Reliability Test Items

Test Item	Test Condition	Judgment	Remark
High Temp. Storage	80℃, 240Hrs, Storage	Note 1	Note 2 Note 3 Note 4
Low Temp. Storage	-30°C, 240Hrs, Storage	Note 1	
High Temp. Operation	70°C, 240Hrs, Operating	Note 1	
Low Temp Operation	-15°C, 240Hrs, Operating	Note 1	
High Temp& Hum Operation	60℃,90%RH,Operating,240Hrs	Note 1	
Thermal Shock Storage	-30℃(0.5hr)<->80℃(0.5hr),100cycle	Note 1	

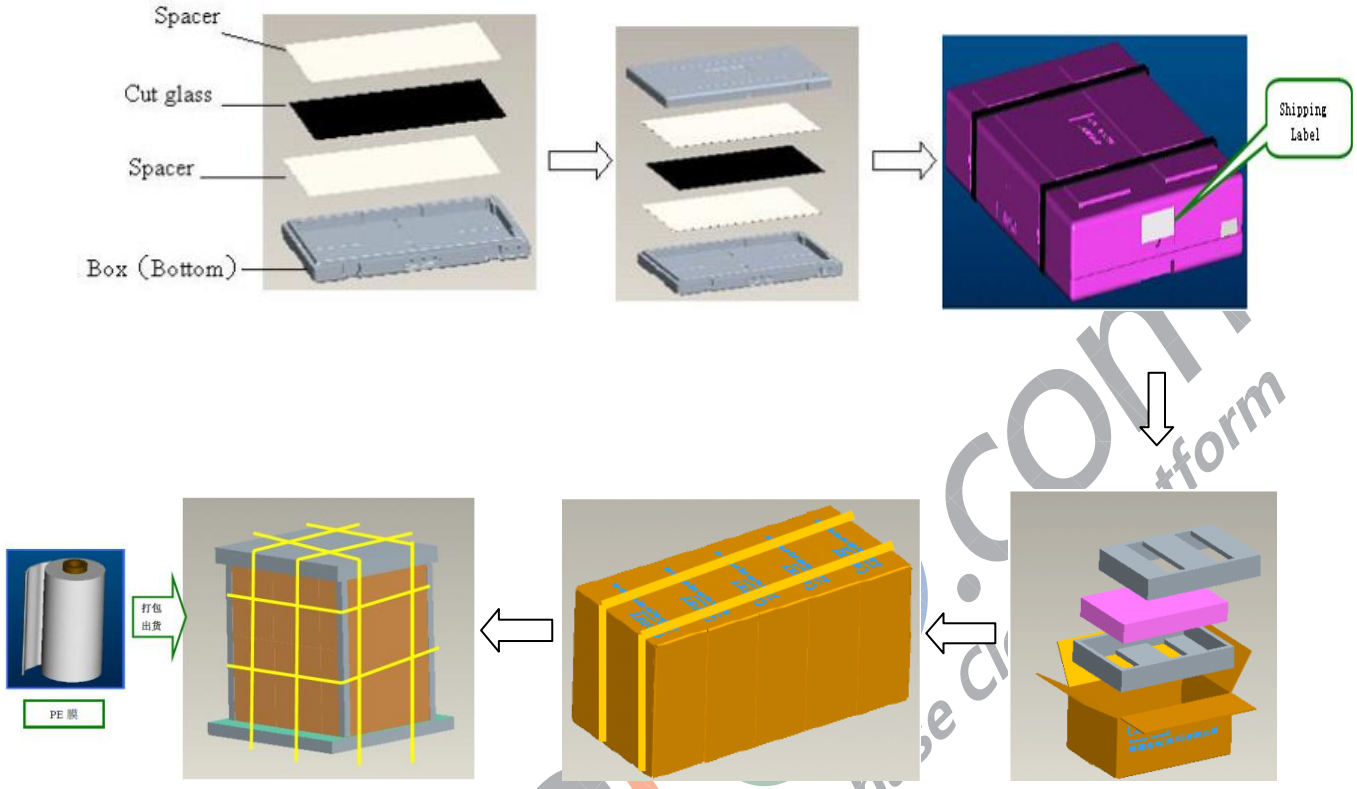
Note1: Pass: Normal display image with no obvious non-uniformity and no line defect.
Fail: No display image, obvious non-uniformity, or line defects.

Note2: All tests above are practiced at module type.

Note3: All the cosmetic specification is judged before the reliability stress. Only a single item of these tests shall be executed on a single panel , no more one test item shall be executed on a single panel.

Note4: Evaluation should be tested after storage at room temperature for two hours.

8. Packing Form

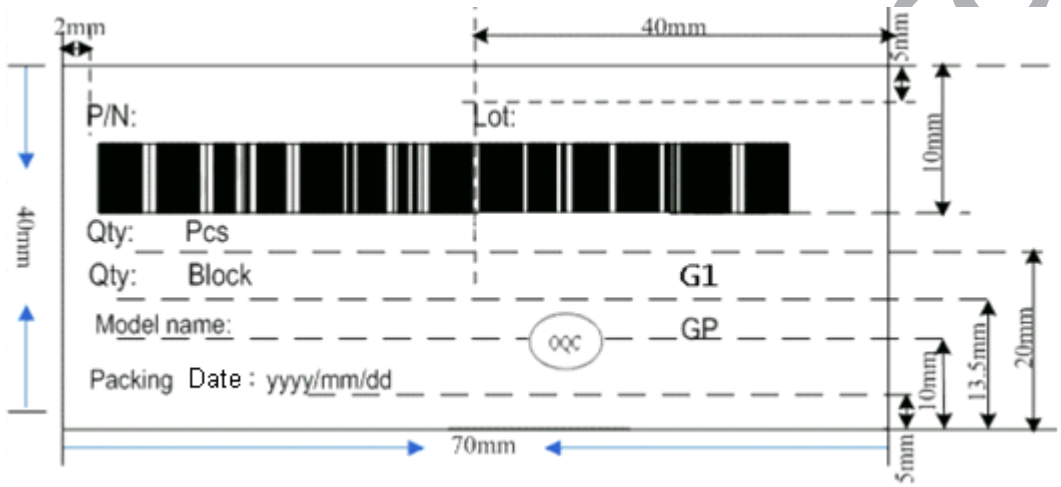


4.5 齐边			
名 称	规 格(mm)	料 号	单位用量(pcs)
DPBOX(set)	691mm*519mm*98mm	D30300530	1
魔术毡	1500mm*25mm	D50400030	2
SPACER	587mm*430mm*1mm	D40700220	17
纸箱	758mm*586mm*180mm	D51500250	1
EPE 泡棉	696mm*524mm*50mm	D51400920	2
注：每箱装 16pcs panel			

4.5 非齐边			
名 称	规 格(mm)	料 号	单位用量(pcs)
DPBOX(set)	684mm*509mm*98mm	D30300540	1
魔术毡	1500mm*25mm	D50400030	2
SPACER	580mm*420mm*1mm	D40700230	17
纸箱	758mm*586mm*180mm	D51500250	1
EPE 泡棉	690mm*514mm*50mm	D51400930	2
注：每箱装 16pcs panel			

名　称	规 格(mm)	料　号	单位用量(pcs) 每栈板
栈板	1100*1100mm	D51300030	1
塑膠地盖	1095*1095mm	D40700080	1
紙天盖	1085*1085mm	D51400070	1
产品（DPBOX）	---	----	10
角纸	1050*50*50mm（90 度角）	D51400760	4

Shipping Label



Serial ID includes the information as below:

1.P/N：Part No.

2.LOT：Box No.

3.Qty：Block Quantity in the box.

4.GP：Green Product

5.Model name：PH045NA-01B

6.Packing Date：YYYY.MM.DD hh.mm.ss

9. Absolute Maximum Ratings

1) Storage condition: With shipping package
2) Storage temperature range: 25±5℃
3) Storage humidity range: 50±10% RH
4) Suggesting Shelf life: 30 days

10. Safety

(1) Sharp Edge Requirements

There will be no sharp edges or corners on the cell that could cause injury.

(2) Materials

There will be no carcinogenic materials used anywhere in the cell. If toxic materials are used, they will be reviewed and approved by the responsible CTC Toxicologist.

(3) Electrostatic Protection

LCD product is vulnerable to Electrostatic Discharge. Persons who handle the LCD should be grounded through proper methods.

11. Display quality

The display quality of the color TFT-LCD module should be in compliance with the CTC's Incoming Inspection Standard.