

## *Advance Information*

# **SSD1882 MLA ROW (COMMON) DRIVER** **CMOS**

The SSD1882 is an MLA (Multi Line Addressing) common driver equipped with 240 triple-value low resistance outputs. Combining with the SSD1730 MLA power chip and the SSD1870 column driver, an MLA LCD module system having high picture quality, high speed responses and low power consumption can be produced. SSD1882 can be configured as 200 outputs or 240 outputs.

## **FEATURES**

- 4-line MLA driving scheme
- Power supply to logic system, 2.7V - 5.5V
- LCD drive voltage, 14V - 30V
- 200 or 240 common outputs
- 1/2P and 1P operation mode
- Adjustable LCD power source offset bias
- Non-biased display off function
- Pin selectable output shift direction
- Cascade supported
- Available in TAB (Tape Automated Bonding) and Gold Bump die package

## **ORDERING INFORMATION**

<b>Ordering Part Number</b>	<b>Package Form</b>
SSD1882Z	GOLD BUMP DIE
SSD1882T1R	TAB

This document contains information on a new product. Specifications and information herein are subject to change without notice.  
IC manufactured under Motif license including U.S. Patent No. 5,420,604

# BLOCK DIAGRAM

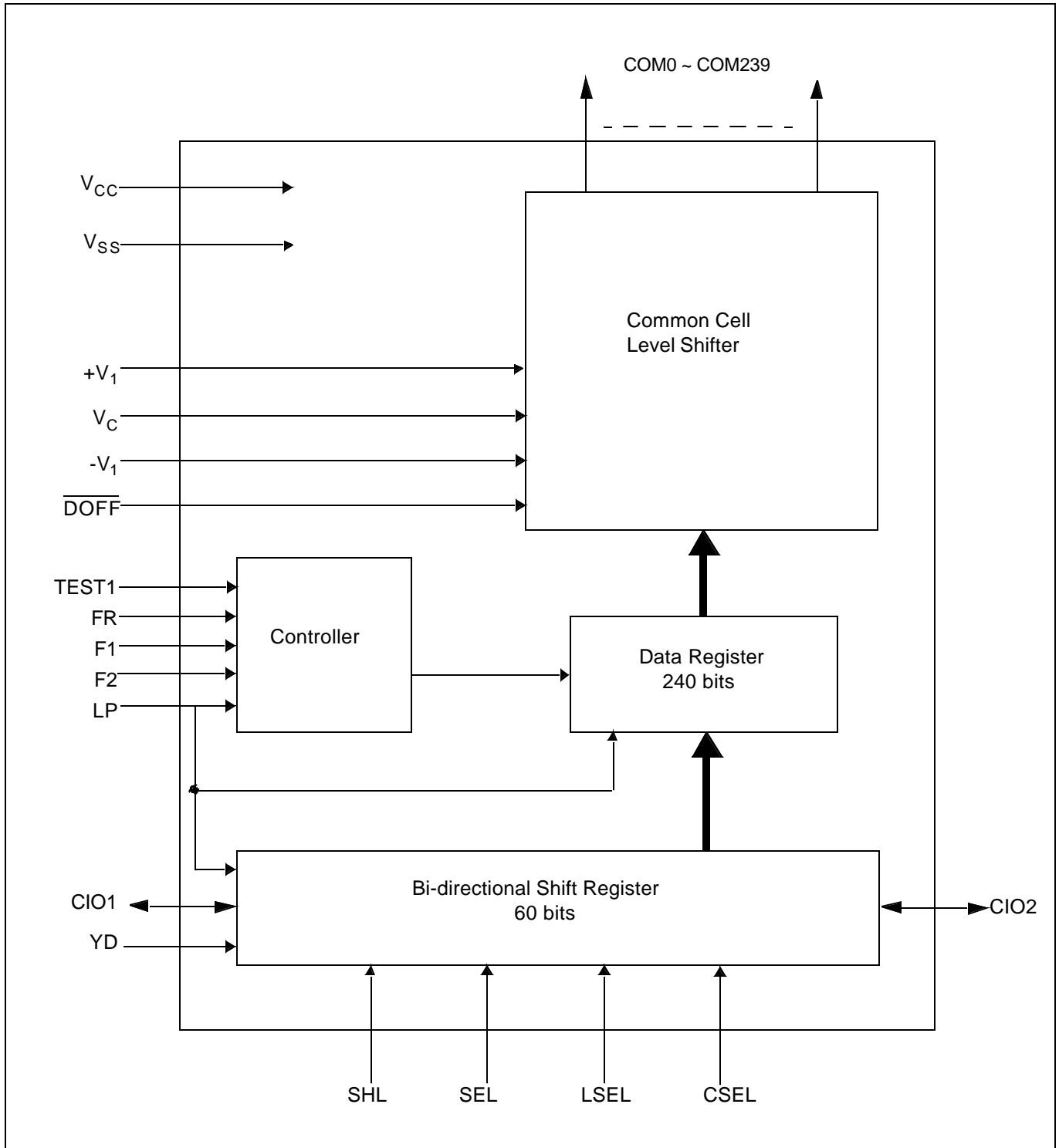
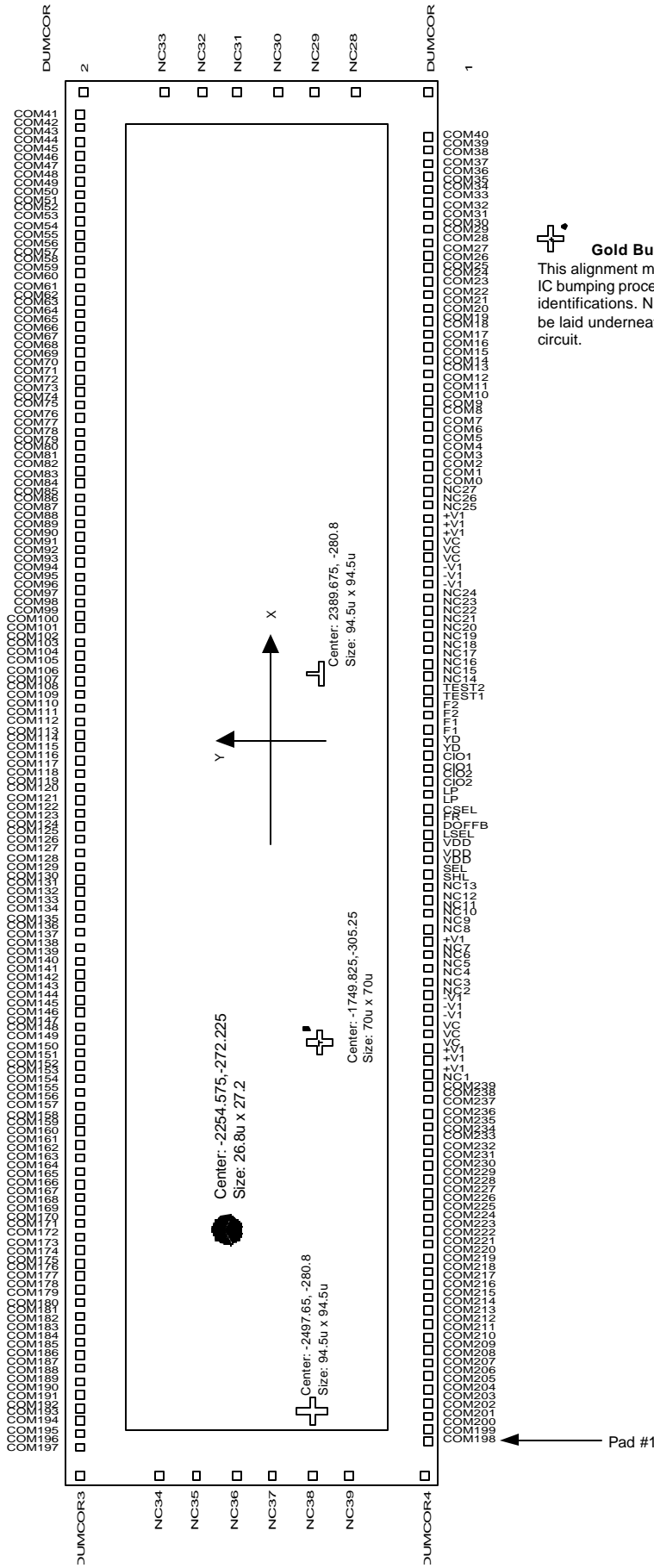



Figure 1 Block Diagram

# SSD1882Z Die Pin Assignment



 **Gold Bump Alignment Mark**  
 This alignment mark contains gold bump for IC bumping process alignment and IC identifications. No conductive tracks should be laid underneath this mark to avoid short circuit.

## SSD1882Z Die Pad Coordinates

PAD #	PIN NAME	X-POS	Y-POS
1	COM198	-7893.6	-526.55
2	COM199	-7792.401	-526.55
3	COM200	-7691.2	-526.55
4	COM201	-7590	-526.55
5	COM202	-7488.799	-526.55
6	COM203	-7387.6	-526.55
7	COM204	-7286.401	-526.55
8	COM205	-7185.2	-526.55
9	COM206	-7084	-526.55
10	COM207	-6982.799	-526.55
11	COM208	-6881.6	-526.55
12	COM209	-6780.401	-526.55
13	COM210	-6679.2	-526.55
14	COM211	-6578	-526.55
15	COM212	-6476.799	-526.55
16	COM213	-6375.6	-526.55
17	COM214	-6274.401	-526.55
18	COM215	-6173.2	-526.55
19	COM216	-6072	-526.55
20	COM217	-5970.799	-526.55
21	COM218	-5869.6	-526.55
22	COM219	-5768.401	-526.55
23	COM220	-5667.2	-526.55
24	COM221	-5566	-526.55
25	COM222	-5464.799	-526.55
26	COM223	-5363.6	-526.55
27	COM224	-5262.401	-526.55
28	COM225	-5161.2	-526.55
29	COM226	-5060	-526.55
30	COM227	-4958.799	-526.55
31	COM228	-4857.6	-526.55
32	COM229	-4756.401	-526.55
33	COM230	-4655.2	-526.55
34	COM231	-4554	-526.55
35	COM232	-4452.799	-526.55
36	COM233	-4351.6	-526.55
37	COM234	-4250.401	-526.55
38	COM235	-4149.2	-526.55
39	COM236	-4048	-526.55
40	COM237	-3946.799	-526.55
41	COM238	-3845.6	-526.55
42	COM239	-3744.401	-526.55
43	NC1	-3643.2	-526.55
44	+V1	-3542	-526.55
45	+V1	-3440.8	-526.55
46	+V1	-3339.6	-526.55
47	VC	-3238.4	-526.55
48	VC	-3137.2	-526.55
49	VC	-3036	-526.55
50	-V1	-2934.8	-526.55
51	-V1	-2833.6	-526.55
52	-V1	-2732.4	-526.55
53	NC2	-2631.2	-526.55
54	NC3	-2530	-526.55
55	NC4	-2428.8	-526.55
56	NC5	-2327.6	-526.55
57	NC6	-2226.4	-526.55
58	NC7	-2125.2	-526.55
59	+V1	-2024	-526.55
60	NC8	-1922.8	-526.55

PAD #	PIN NAME	X-POS	Y-POS
61	NC9	-1821.6	-526.55
62	NC10	-1720.4	-526.55
63	NC11	-1619.2	-526.55
64	NC12	-1518	-526.55
65	NC13	-1416.8	-526.55
66	SHL	-1315.6	-526.55
67	SEL	-1214.4	-526.55
68	VCC	-1113.2	-526.55
69	VCC	-1012	-526.55
70	VCC	-910.8	-526.55
71	LSEL	-809.6	-526.55
72	<u>DOFF</u>	-708.4	-526.55
73	FR	-607.2	-526.55
74	CSEL	-506	-526.55
75	LP	-404.8	-526.55
76	LP	-303.6	-526.55
77	CIO2	-202.4	-526.55
78	CIO2	-101.2	-526.55
79	CIO1	0	-526.55
80	CIO1	101.2	-526.55
81	YD	202.4	-526.55
82	YD	303.6	-526.55
83	F1	404.8	-526.55
84	F1	506	-526.55
85	F2	607.2	-526.55
86	F2	708.4	-526.55
87	TEST1	809.6	-526.55
88	TEST2	910.8	-526.55
89	NC14	1012	-526.55
90	NC15	1113.2	-526.55
91	NC16	1214.4	-526.55
92	NC17	1315.6	-526.55
93	NC18	1518	-526.55
94	NC19	1720.4	-526.55
95	NC20	1922.8	-526.55
96	NC21	2125.2	-526.55
97	NC22	2226.4	-526.55
98	NC23	2327.6	-526.55
99	NC24	2428.8	-526.55
100	-V1	2530	-526.55
101	-V1	2631.2	-526.55
102	-V1	2732.4	-526.55
103	VC	2833.6	-526.55
104	VC	2934.8	-526.55
105	VC	3036	-526.55
106	+V1	3137.2	-526.55
107	+V1	3238.4	-526.55
108	+V1	3339.6	-526.55
109	NC25	3440.8	-526.55
110	NC26	3592.6	-526.55
111	NC27	3693.8	-526.55
112	COM0	3845.6	-526.55
113	COM1	3946.8	-526.55
114	COM2	4048	-526.55
115	COM3	4149.2	-526.55
116	COM4	4250.4	-526.55
117	COM5	4351.6	-526.55
118	COM6	4452.8	-526.55
119	COM7	4554	-526.55
120	COM8	4655.200	-526.550

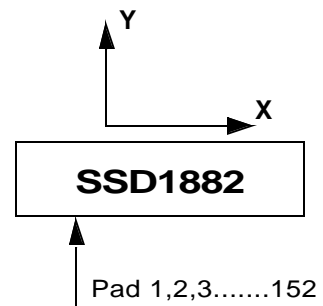
PAD #	PIN NAME	X-POS	Y-POS
121	COM9	4756.400	-526.550
122	COM10	4857.600	-526.550
123	COM11	4958.800	-526.550
124	COM12	5060.000	-526.550
125	COM13	5161.200	-526.550
126	COM14	5262.400	-526.550
127	COM15	5363.600	-526.550
128	COM16	5464.800	-526.550
129	COM17	5566.000	-526.550
130	COM18	5667.200	-526.550
131	COM19	5768.400	-526.550
132	COM20	5869.600	-526.550
133	COM21	5970.800	-526.550
134	COM22	6072.000	-526.550
135	COM23	6173.200	-526.550
136	COM24	6274.400	-526.550
137	COM25	6375.600	-526.550
138	COM26	6476.800	-526.550
139	COM27	6578.000	-526.550
140	COM28	6679.200	-526.550
141	COM29	6780.400	-526.550
142	COM30	6881.600	-526.550
143	COM31	6982.800	-526.550
144	COM32	7084.000	-526.550
145	COM33	7185.200	-526.550
146	COM34	7286.400	-526.550
147	COM35	7387.600	-526.550
148	COM36	7488.800	-526.550
149	COM37	7590.000	-526.550
150	COM38	7691.200	-526.550
151	COM39	7792.400	-526.550
152	COM40	7893.600	-526.550
153	DUMCOR1	8090.250	-526.550
154	NC28	8090.250	-308.200
155	NC29	8090.250	-207.000
156	NC30	8090.250	-105.800
157	NC31	8090.250	105.800
158	NC32	8090.250	207.000
159	NC33	8090.250	308.200
160	DUMCOR2	8090.250	526.550
161	COM41	7893.600	526.550
162	COM42	7792.400	526.550
163	COM43	7691.200	526.550
164	COM44	7590.000	526.550
165	COM45	7488.800	526.550
166	COM46	7387.600	526.550
167	COM47	7286.400	526.550
168	COM48	7185.200	526.550
169	COM49	7084.000	526.550
170	COM50	6982.800	526.550
171	COM51	6881.600	526.550
172	COM52	6780.400	526.550
173	COM53	6679.200	526.550
174	COM54	6578.000	526.550
175	COM55	6476.800	526.550
176	COM56	6375.600	526.550
177	COM57	6274.400	526.550
178	COM58	6173.200	526.550
179	COM59	6072.000	526.550
180	COM60	5970.800	526.550

PAD #	PIN NAME	X-POS	Y-POS
181	COM61	5869.600	526.550
182	COM62	5768.400	526.550
183	COM63	5667.200	526.550
184	COM64	5566.000	526.550
185	COM65	5464.800	526.550
186	COM66	5363.600	526.550
187	COM67	5262.400	526.550
188	COM68	5161.200	526.550
189	COM69	5060.000	526.550
190	COM70	4958.800	526.550
191	COM71	4857.600	526.550
192	COM72	4756.400	526.550
193	COM73	4655.200	526.550
194	COM74	4554.000	526.550
195	COM75	4452.800	526.550
196	COM76	4351.600	526.550
197	COM77	4250.400	526.550
198	COM78	4149.200	526.550
199	COM79	4048.000	526.550
200	COM80	3946.800	526.550
201	COM81	3845.600	526.550
202	COM82	3744.400	526.550
203	COM83	3643.200	526.550
204	COM84	3542.001	526.550
205	COM85	3440.800	526.550
206	COM86	3339.600	526.550
207	COM87	3238.399	526.550
208	COM88	3137.200	526.550
209	COM89	3036.001	526.550
210	COM90	2934.800	526.550
211	COM91	2833.600	526.550
212	COM92	2732.399	526.550
213	COM93	2631.200	526.550
214	COM94	2530.001	526.550
215	COM95	2428.800	526.550
216	COM96	2327.600	526.550
217	COM97	2226.399	526.550
218	COM98	2125.200	526.550
219	COM99	2024.001	526.550
220	COM100	1922.800	526.550
221	COM101	1821.600	526.550
222	COM102	1720.399	526.550
223	COM103	1619.200	526.550
224	COM104	1518.001	526.550
225	COM105	1416.800	526.550
226	COM106	1315.600	526.550
227	COM107	1214.399	526.550
228	COM108	1113.200	526.550
229	COM109	1012.001	526.550
230	COM110	910.800	526.550
231	COM111	809.600	526.550
232	COM112	708.399	526.550
233	COM113	607.200	526.550
234	COM114	506.001	526.550
235	COM115	404.800	526.550
236	COM116	303.600	526.550
237	COM117	202.399	526.550
238	COM118	101.200	526.550
239	COM119	0.001	526.550
240	COM120	-101.200	526.550

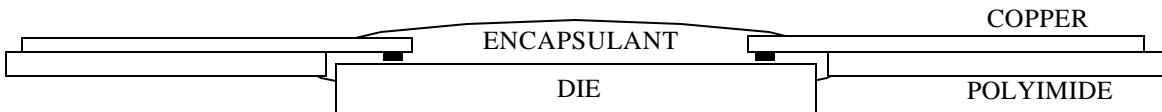
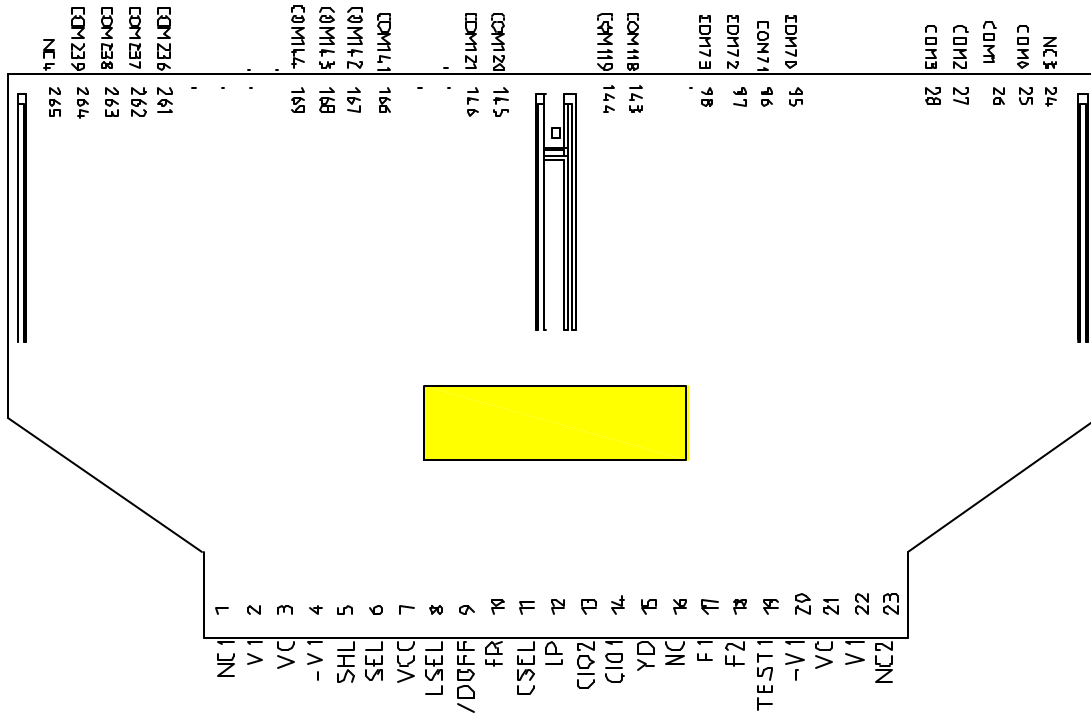
PAD #	PIN NAME	X-POS	Y-POS
241	COM121	-202.400	526.550
242	COM122	-303.601	526.550
243	COM123	-404.800	526.550
244	COM124	-505.999	526.550
245	COM125	-607.200	526.550
246	COM126	-708.400	526.550
247	COM127	-809.601	526.550
248	COM128	-910.800	526.550
249	COM129	-1011.999	526.550
250	COM130	-1113.200	526.550
251	COM131	-1214.400	526.550
252	COM132	-1315.601	526.550
253	COM133	-1416.800	526.550
254	COM134	-1517.999	526.550
255	COM135	-1619.200	526.550
256	COM136	-1720.400	526.550
257	COM137	-1821.601	526.550
258	COM138	-1922.800	526.550
259	COM139	-2023.999	526.550
260	COM140	-2125.200	526.550
261	COM141	-2226.400	526.550
262	COM142	-2327.601	526.550
263	COM143	-2428.800	526.550
264	COM144	-2529.999	526.550
265	COM145	-2631.200	526.550
266	COM146	-2732.400	526.550
267	COM147	-2833.601	526.550
268	COM148	-2934.800	526.550
269	COM149	-3035.999	526.550
270	COM150	-3137.200	526.550
271	COM151	-3238.400	526.550
272	COM152	-3339.601	526.550
273	COM153	-3440.800	526.550
274	COM154	-3541.999	526.550
275	COM155	-3643.200	526.550
276	COM156	-3744.400	526.550
277	COM157	-3845.601	526.550
278	COM158	-3946.800	526.550
279	COM159	-4047.999	526.550
280	COM160	-4149.200	526.550
281	COM161	-4250.400	526.550
282	COM162	-4351.601	526.550
283	COM163	-4452.800	526.550
284	COM164	-4553.999	526.550
285	COM165	-4655.200	526.550
286	COM166	-4756.400	526.550
287	COM167	-4857.601	526.550
288	COM168	-4958.800	526.550
289	COM169	-5059.999	526.550
290	COM170	-5161.200	526.550
291	COM171	-5262.400	526.550
292	COM172	-5363.601	526.550
293	COM173	-5464.800	526.550
294	COM174	-5565.999	526.550
295	COM175	-5667.200	526.550
296	COM176	-5768.400	526.550
297	COM177	-5869.601	526.550
298	COM178	-5970.800	526.550
299	COM179	-6071.999	526.550
300	COM180	-6173.200	526.550

PAD #	PIN NAME	X-POS	Y-POS
301	COM181	-6274.400	526.550
302	COM182	-6375.601	526.550
303	COM183	-6476.800	526.550
304	COM184	-6577.999	526.550
305	COM185	-6679.200	526.550
306	COM186	-6780.400	526.550
307	COM187	-6881.601	526.550
308	COM188	-6982.800	526.550
309	COM189	-7083.999	526.550
310	COM190	-7185.200	526.550
311	COM191	-7286.400	526.550
312	COM192	-7387.601	526.550
313	COM193	-7488.800	526.550
314	COM194	-7589.999	526.550
315	COM195	-7691.200	526.550
316	COM196	-7792.400	526.550
317	COM197	-7893.601	526.550
318	DUMCOR3	-8090.250	526.550
319	NC34	-8090.250	308.200
320	NC35	-8090.250	207.000
321	NC36	-8090.250	105.800
322	NC37	-8090.250	-105.800
323	NC38	-8090.250	-207.000
324	NC39	-8090.250	-308.200
325	DUMCOR4	-8090.250	-526.550

Bump Size: All Pads 60.2um x 60.2um  
Die size:16634.1um x 1549.2um



# SSD1882T1R PIN ASSIGNMENT (COPPER VIEW)



**Normal Design TAB**

SSD1882T1R Pin Assignment Table

TAB Pin #	Signal Name	TAB Pin #	Signal Name	TAB Pin #	Signal Name	TAB Pin #	Signal Name	TAB Pin #	Signal Name
1	NC1	61	COM36	121	COM96	181	COM156	241	COM216
2	+V1	62	COM37	122	COM97	182	COM157	242	COM217
3	VC	63	COM38	123	COM98	183	COM158	243	COM218
4	-V1	64	COM39	124	COM99	184	COM159	244	COM219
5	SHL	65	COM40	125	COM100	185	COM160	245	COM220
6	SEL	66	COM41	126	COM101	186	COM161	246	COM221
7	VCC	67	COM42	127	COM102	187	COM162	247	COM222
8	LSEL	68	COM43	128	COM103	188	COM163	248	COM223
9	DOFF	69	COM44	129	COM104	189	COM164	249	COM224
10	FR	70	COM45	130	COM105	190	COM165	250	COM225
11	CSEL	71	COM46	131	COM106	191	COM166	251	COM226
12	LP	72	COM47	132	COM107	192	COM167	252	COM227
13	CIO2	73	COM48	133	COM108	193	COM168	253	COM228
14	CIO1	74	COM49	134	COM109	194	COM169	254	COM229
15	YD	75	COM50	135	COM110	195	COM170	255	COM230
16	DUMMY	76	COM51	136	COM111	196	COM171	256	COM231
17	F1	77	COM52	137	COM112	197	COM172	257	COM232
18	F2	78	COM53	138	COM113	198	COM173	258	COM233
19	TEST1	79	COM54	139	COM114	199	COM174	259	COM234
20	-V1	80	COM55	140	COM115	200	COM175	260	COM235
21	VC	81	COM56	141	COM116	201	COM176	261	COM236
22	+V1	82	COM57	142	COM117	202	COM177	262	COM237
23	NC2	83	COM58	143	COM118	203	COM178	263	COM238
24	NC3	84	COM59	144	COM119	204	COM179	264	COM239
25	COM0	85	COM60	145	COM120	205	COM180	265	NC4
26	COM1	86	COM61	146	COM121	206	COM181		
27	COM2	87	COM62	147	COM122	207	COM182		
28	COM3	88	COM63	148	COM123	208	COM183		
29	COM4	89	COM64	149	COM124	209	COM184		
30	COM5	90	COM65	150	COM125	210	COM185		
31	COM6	91	COM66	151	COM126	211	COM186		
32	COM7	92	COM67	152	COM127	212	COM187		
33	COM8	93	COM68	153	COM128	213	COM188		
34	COM9	94	COM69	154	COM129	214	COM189		
35	COM10	95	COM70	155	COM130	215	COM190		
36	COM11	96	COM71	156	COM131	216	COM191		
37	COM12	97	COM72	157	COM132	217	COM192		
38	COM13	98	COM73	158	COM133	218	COM193		
39	COM14	99	COM74	159	COM134	219	COM194		
40	COM15	100	COM75	160	COM135	220	COM195		
41	COM16	101	COM76	161	COM136	221	COM196		
42	COM17	102	COM77	162	COM137	222	COM197		
43	COM18	103	COM78	163	COM138	223	COM198		
44	COM19	104	COM79	164	COM139	224	COM199		
45	COM20	105	COM80	165	COM140	225	COM200		
46	COM21	106	COM81	166	COM141	226	COM201		
47	COM22	107	COM82	167	COM142	227	COM202		
48	COM23	108	COM83	168	COM143	228	COM203		
49	COM24	109	COM84	169	COM144	229	COM204		
50	COM25	110	COM85	170	COM145	230	COM205		
51	COM26	111	COM86	171	COM146	231	COM206		
52	COM27	112	COM87	172	COM147	232	COM207		
53	COM28	113	COM88	173	COM148	233	COM208		
54	COM29	114	COM89	174	COM149	234	COM209		
55	COM30	115	COM90	175	COM150	235	COM210		
56	COM31	116	COM91	176	COM151	236	COM211		
57	COM32	117	COM92	177	COM152	237	COM212		
58	COM33	118	COM93	178	COM153	238	COM213		
59	COM34	119	COM94	179	COM154	239	COM214		
60	COM35	120	COM95	180	COM155	240	COM215		

# PIN DESCRIPTIONS

## VCC, +V<sub>1</sub>, V<sub>C</sub>, -V<sub>1</sub> (Power Pin)

VCC is the power supply pin to the logic system. The voltage range is 2.7V to 5.5V with respect to the -V<sub>1</sub> pin. +V<sub>1</sub>, V<sub>C</sub> and -V<sub>1</sub> are power supply pins to the LCD driving system. Their relationship is  $+V_1 \geq V_C \geq VCC \geq -V_1$ .

## YD (Input Pin)

This input pin is used as a signal to start a frame and to reset the column address for writing. (Refer to Note 1)

## LP (Input Pin)

This is an input pin for display data latch clock. The display data is latched at the falling edge of LP. (Refer to Note 1)

## FR (Input Pin)

This is an input pin and is used to change the LCD driving waveform polarity. If power chip SSD1730 is used, the output FR from the power chip should be connected to the FR pin of the row driver. (Refer to Note 1)

## F1, F2 (Input Pin)

These are input pins and are used as driver pattern select signals. These two signals are generated by a column driver. If a display system is formed by the column driver SSD1870 and the row driver SSD1882, outputs F10 and F20 from the column driver should be connected to F1 and F2 of the row driver respectively. (Refer to Note 1)

## $\overline{\text{DOFF}}$ (Input Pin)

This is an input pin and is used to control the display. When it is set at "L" level, all common outputs are forced to V<sub>C</sub> level and the LC display will be forced to blank, however, the contents of the latches are maintained. In normal display operation, it is set to "H" level. (Refer to Note 1)

## SEL (Input Pin)

SSD1882 can be configured as 200 or 240 common outputs depending on the logic level of input pin SEL.

When SEL is set at "L" level, 240 outputs are chosen and COM0 to COM239 will be used. When SEL is set at "H" level, 200 outputs are chosen and only COM20 to COM219 will be used.

## CIO1, CIO2 (I/O Pin)

These are I/O pins and they can be configured as an input or an output by the signal SHL. When SHL is set at "L" level, CIO1 is input and CIO2 is output. When SHL is set at "H" level, CIO1 is output and CIO2 is input. The output transition occurs on the falling edge of LP. (Refer to Note 1)

## SHL (Input Pin)

This is an input pin and is used to select the output shift direction and to configure CIO1 and CIO2. The following table shows the relationship between SEL, SHL, CIO1, CIO2 and the output shift direction.

SEL = L (240 common outputs)			
SHL	Output Shift Direction	CIO1	CIO2
L	COM0 -----> COM239	Input	Output
H	COM239 -----> COM0	Output	Input
SEL = H (200 common outputs)			
SHL	Output Shift Direction	CIO1	CIO2
L	COM20 -----> COM219	Input	Output
H	COM219 -----> COM20	Output	Input

## LSEL (Input Pin)

This is an input pin to select 1P Operation or 1/2P Operation. That can cope with different LCD having different response time.

When LSEL is set at "L" level, 1P Normal Operation is selected. When LSEL is set at "H" level, 1/2P Operation is selected.

## CSEL (Input Pin)

This is a chip select signal input. When only one common driver is used, CSEL should be set at "L" level. When multiple common drivers are used, CSEL of the leading chip must be tied to "L" level and that of other chips must be tied to "H" level.

## TEST1 (Input Pin)

This is a reserved pin and it must be set at "L" level in the normal operation.

## TEST2 (Input Pin, only exists on gold-bumped die)

This is a reserved pin and it must be set at "L" level in the normal operation.

## COM0-COM239 (Output Pin)

These are output pins and provide common driving signals to the LCD panel. Output transition occurs at the falling edge of LP.

Note 1 : If an MLA LCD system is formed by SSD1882 row driver, SSD1870 column driver and SSD1730 power chip, 1nF capacitor is necessary for capacitor coupling between SSD1882 and SSD1870 signals. Refer to the Application example for circuit connection.



# FUNCTIONAL BLOCK DESCRIPTIONS

## Controller and Data Register

Based on the input signal of FR, F1, F2 and LP, this Controller will generate signals to control the Data Register. Then, the Data Register will latch the data to the Common Cell Level Shifter according to the signals from the Controller and the data from the Shift Register. The data is latched to the Common Cell Level Shifter at the falling edge of LP.

## Bi-directional Shift Register

This Shift Register shifts the input signals YD and CIO input according to the setting of SHL, SEL, LSEL and CSEL. When SHL is set at "L" level, CIO1 is input and CIO2 is output. When SHL is set at "H" level, CIO1 is output and CIO2 is input. The output transition occurs on the falling edge of LP.

## Common Cell Level Shifter

This is a level interface circuit which converts the signal voltage level from a logic system level to the LCD driver system voltage level. When  $\overline{\text{DOFF}}$  is at "L" level, all common output voltage will be at VC level. When  $\overline{\text{DOFF}}$  is at "H" level, the common output voltage will be changed according to the status of input signals of FR, F1 and F2. Table 1 and Table 2 show the relationship between the common output voltage values and the input signals FR, F1 and F2.

When  $\overline{\text{DOFF}} = \text{H}$  and  $\text{FR} = \text{L}$

F1	1	0	1	0
F2	1	1	0	0
line r	+V1	+V1	-V1	+V1
line (r + 1)	-V1	+V1	+V1	+V1
line (r + 2)	+V1	-V1	+V1	+V1
line (r + 3)	+V1	+V1	+V1	-V1

When  $\overline{\text{DOFF}} = \text{H}$  and  $\text{FR} = \text{H}$

F1	1	0	1	0
F2	1	1	0	0
line r	-V1	-V1	+V1	-V1
line (r + 1)	+V1	-V1	-V1	-V1
line (r + 2)	-V1	+V1	-V1	-V1
line (r + 3)	-V1	-V1	-V1	+V1

Table 1: Relationship between COM voltage and F1 & F2 when  $\text{FR} = \text{L}$

Table 2: Relationship between COM voltage and F1 & F2 when  $\text{FR} = \text{H}$

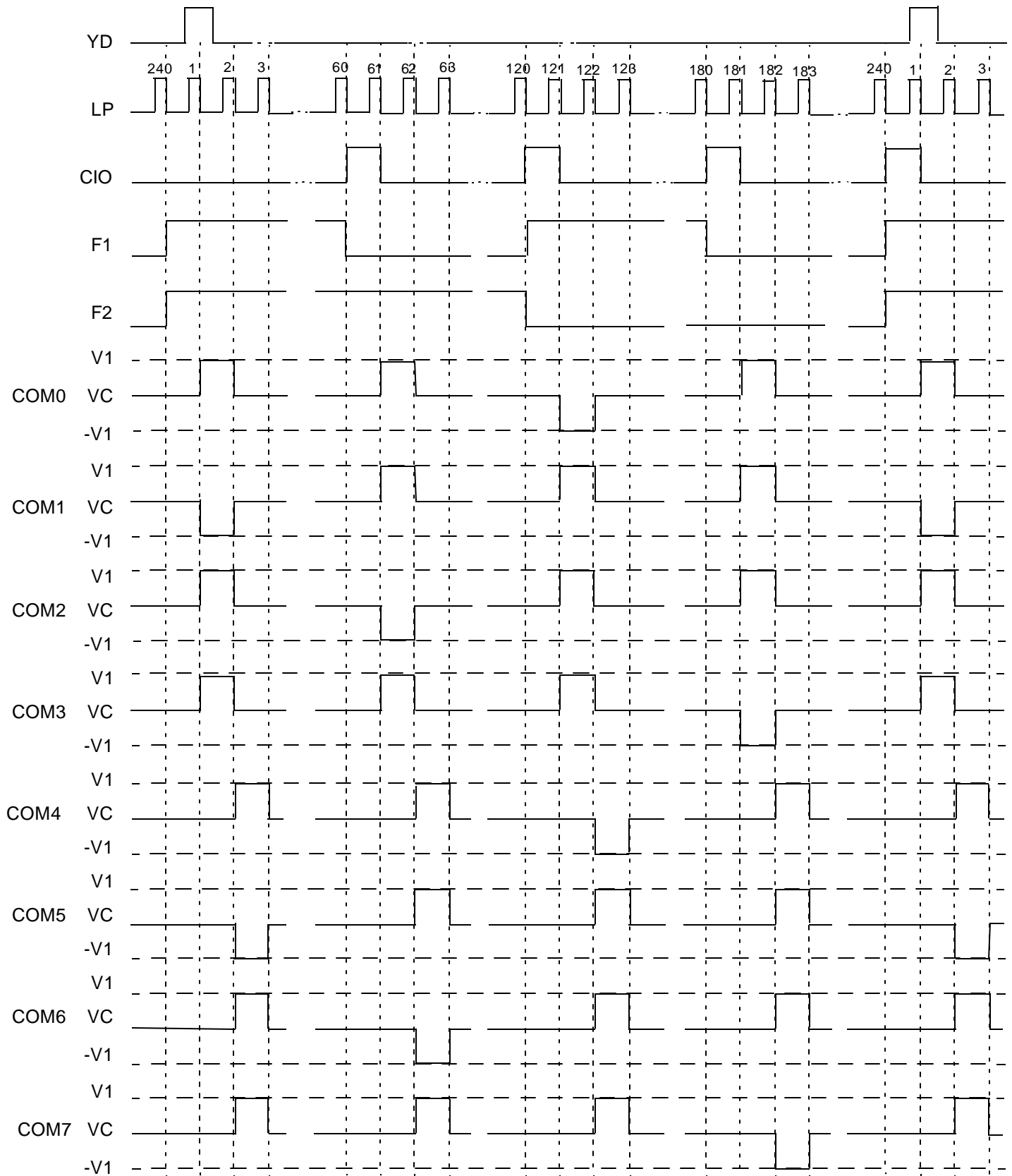
Table 3 shows the relationship between line# and Common.

Line#	Formula	Common
r	Multiples of 4	0, 4, 8, 12, ... , 228, 232, 236
r + 1	1 + multiples of 4	1, 5, 9, 13, ... , 229, 233, 237
r + 2	2 + multiples of 4	2, 6, 10, 14, ... , 230, 234, 238
r + 3	3 + multiples of 4	3, 7, 11, 15, ... , 231, 235, 239

Table 3: Relationship between Line# and Common

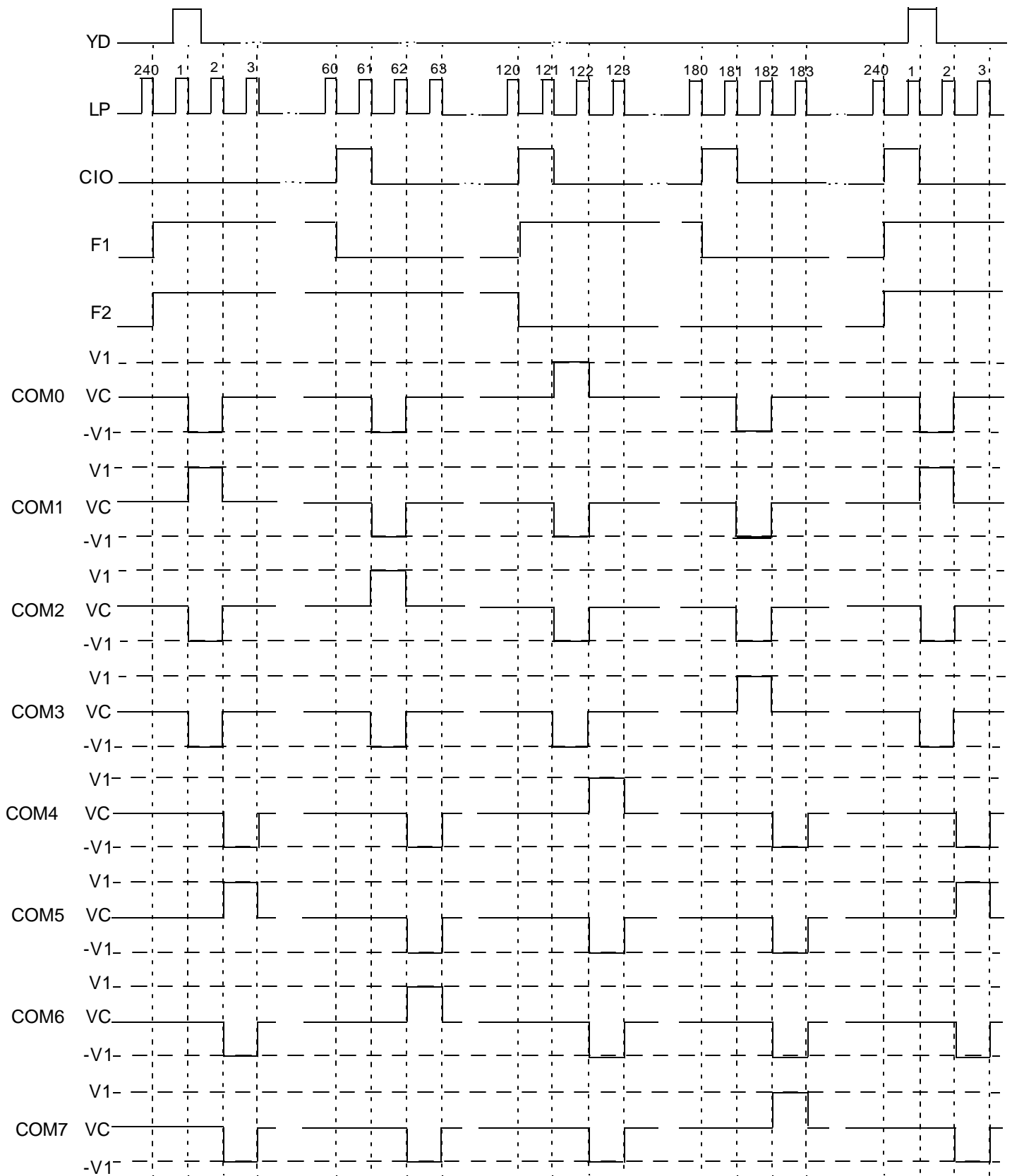
**Timing diagram for 1/240 duty and 1P operation ( $\overline{\text{DOFF}} = \text{H}$  and  $\text{FR} = \text{L}$ )**

This diagram is only for reference. Below diagram is at the conditions of  $\text{SHL} = \text{L}$ ,  $\text{SEL} = \text{L}$ ,  $\text{LSEL} = \text{L}$ ,  $\text{CSEL} = \text{L}$



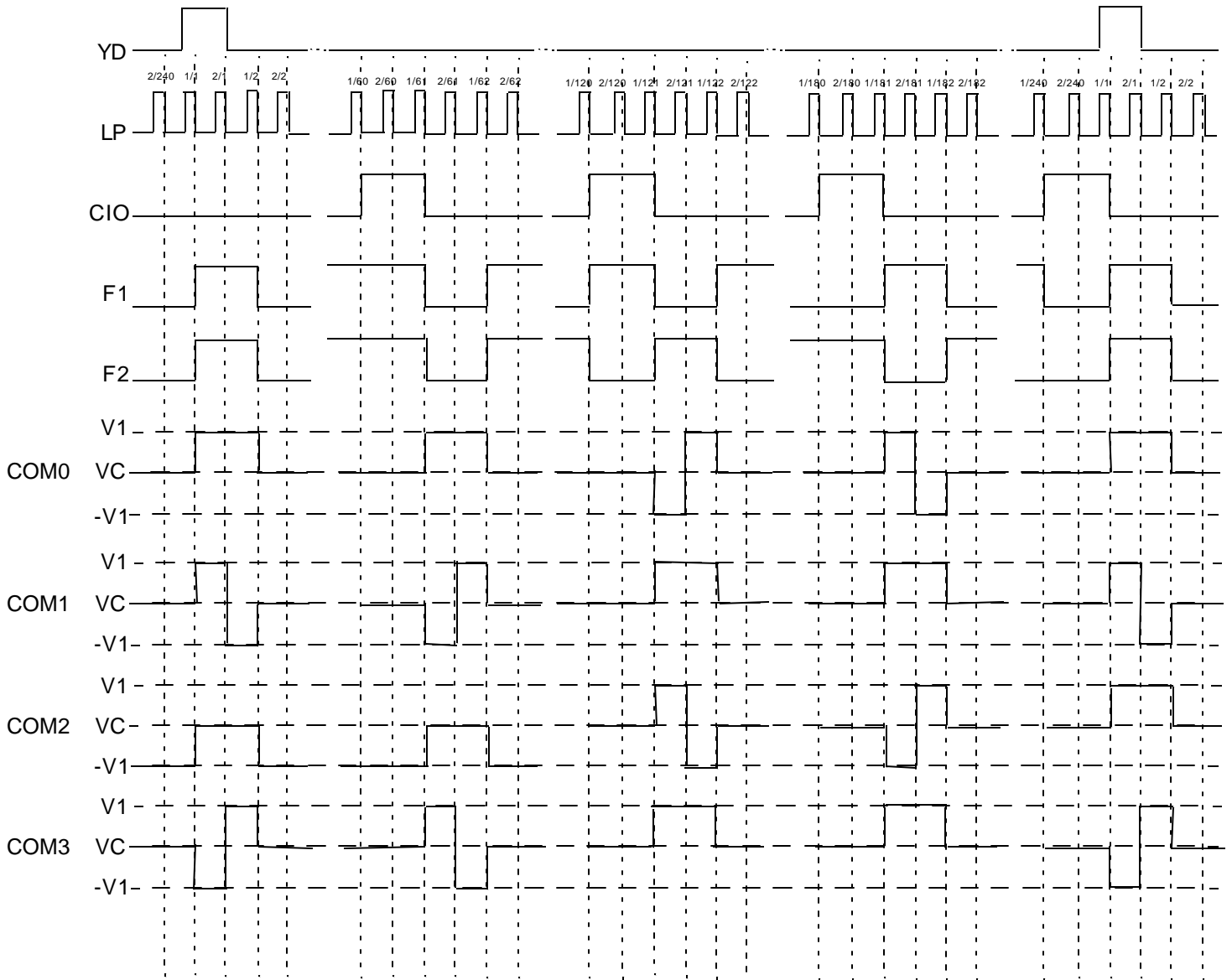
**Timing diagram for 1/240 duty and 1P operation ( $\overline{\text{DOFF}} = \text{H}$  and  $\text{FR} = \text{H}$ )**

This diagram is only for reference. Below diagram is at the conditions of  $\text{SHL} = \text{L}$ ,  $\text{SEL} = \text{L}$ ,  $\text{LSEL} = \text{L}$ ,  $\text{CSEL} = \text{L}$



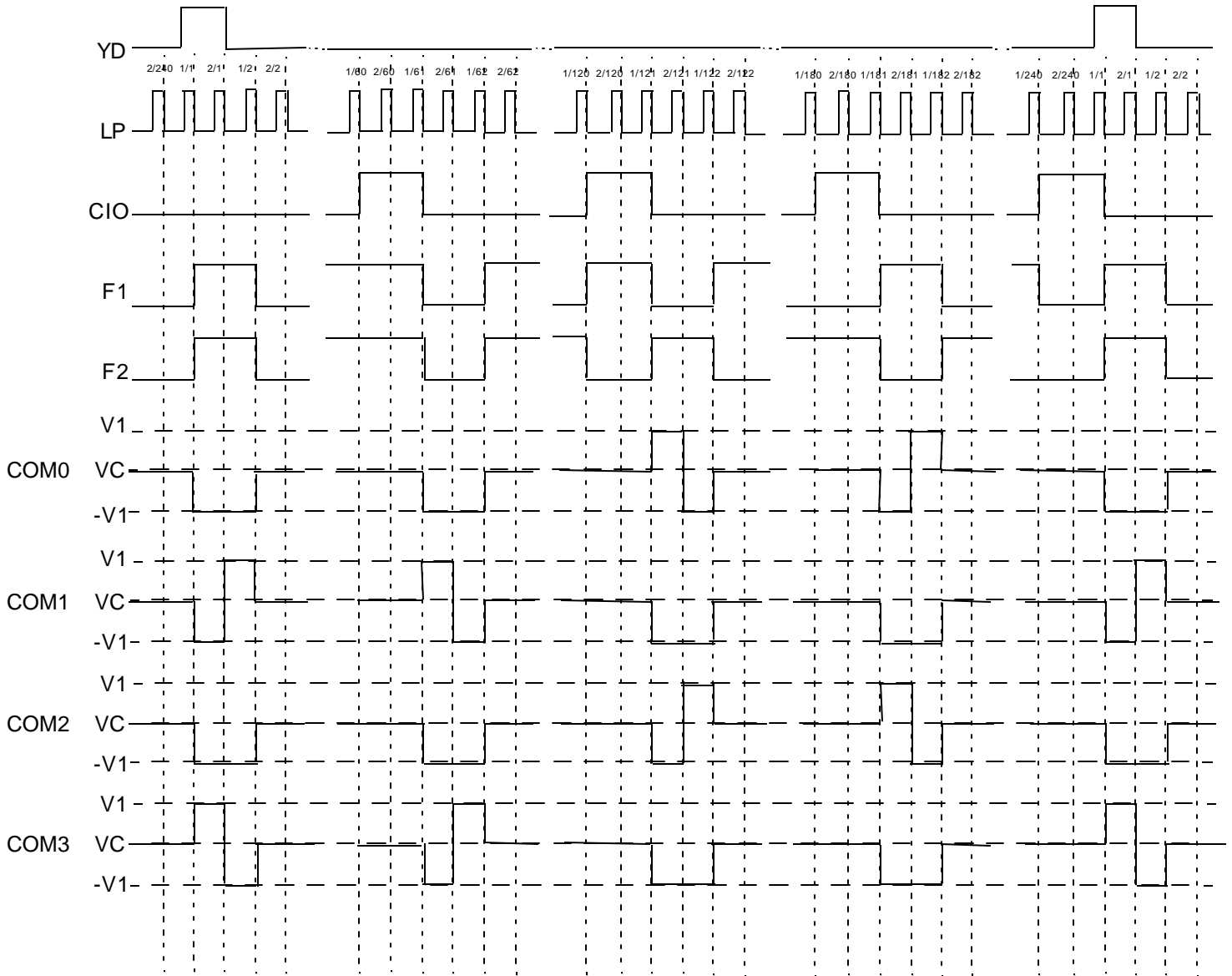
**Timing diagram for 1/240 duty and 1/2P operation ( $\overline{\text{DOFF}} = \text{H}$  and  $\text{FR} = \text{L}$ )**

This diagram is only for reference. Below diagram is at the conditions of  $\text{SHL} = \text{L}$ ,  $\text{SEL} = \text{L}$ ,  $\text{LSEL} = \text{H}$ ,  $\text{CSEL} = \text{L}$



**Timing diagram for 1/240 duty and 1/2P operation ( $\overline{\text{DOFF}} = \text{H}$  and  $\text{FR} = \text{H}$ )**

This diagram is only for reference. Below diagram is at the conditions of  $\text{SHL} = \text{L}$ ,  $\text{SEL} = \text{L}$ ,  $\text{LSEL} = \text{H}$ ,  $\text{CSEL} = \text{L}$



# MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}$	Power Voltage	$-V_1$ to $-V_1 + 5.5$	V
$V_1$		$-V_1$ to $-V_1 + 30.0$	V
$V_{IN}$	Input Voltage	$-V_1$ to $-V_1 + 5.5$	V
$V_o$	Output Voltage	$-V_1$ to $-V_1 + 5.5$	V
I	Output current at CIO	20	mA
$T_A$	Operating temperature	-30 to +85	°C
$T_{stg}$	Storage temperature	-65 to +150	°C

Maximum ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the limits shown in the DC characteristics section and the relationship between  $V_1$ ,  $V_C$  and  $-V_1$  must be  $+V_1 \geq V_C \geq V_{CC} \geq -V_1$ . All voltages are referenced to  $-V_1 = 0V$ .

This device contains circuitry to protect the inputs against damage due to high static voltages of electric fields; however, it is advised that normal precautions to be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit. All dummy pins and NC pins must be left open & unconnected. Don't group the dummy pins or the NC pins together. The device may be light sensitive. Caution should be taken to avoid exposure of this device to any light source during normal operation. This device is not radiation protected.

# DC CHARACTERISTICS

$-V_1 = 0.0V$ ,  $V_{CC} = 5.0V$ ,  $T_A = 25^\circ C$

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
$V_{CC}$	Power supply voltage		2.7	5.0	5.5	V
$+V_1$	Power supply voltage	$-V_1 = 0.0$ , $V_{CC} = 5.0V$	8.0	--	30.0	V
$V_C$			--	$+V_1/2$	--	V
$I_{DP1}$	Current drain from Pin $V_{CC}$	$V_{CC}=5.0V$ , $V_{IN}=V_{CC}$ , $V_{IL}=-V_1$ , freq of LP=14.4kHz and freq of FR=70Hz, no loading	--	5	25	$\mu A$
$I_{DP2}$	Current drain from Pin $+V_1$	$+V_1=30V$ , $V_C=+V_1/2$ , $-V_1=0.0V$ , $V_{CC}=5.0V$ , $V_{IN}=V_{CC}$ , $V_{IL}=-V_1$ , freq of LP=14.4kHz and freq of FR=70Hz, no loading	--	35	100	$\mu A$
$I_{SB}$	Static current drain from Pin $V_{CC}$	$+V_1 = 14.0V$ to $40.0V$ , $V_{IN} = V_{CC}$ , $V_{IL} = -V_1$	--	1	3	$\mu A$
$V_{IH}$	Input High voltage at pins: CIO1, CIO2, SHL, SEL, LSEL, CSEL, FR, YD, LP, F1, F2, TEST1 & DOFF	$V_{CC} = 2.7V$ to $5.5V$	$0.8 \times V_{CC}$	--	--	V
$V_{IL}$	Input Low voltage at pins: CIO1, CIO2, SHL, SEL, LSEL, CSEL, FR, YD, LP, F1, F2, TEST1 & DOFF		--	--	$0.2 \times V_{CC}$	V
$V_{OH}$	Output High voltage at pins: CIO1 & CIO2	$V_{CC} = 2.7V$ to $5.5V$ , $I_{OH} = -0.3mA$	$V_{CC}-0.4$	--	--	V
$V_{OL}$	Output Low voltage at pins: CIO1 & CIO2	$V_{CC} = 2.7V$ to $5.5V$ , $I_{OL} = 0.3mA$	--	--	0.4	V
$I_{L1}$	Input leakage current at pins: SHL, SEL, LSEL, CSEL, FR, YD, LP, F1, F2, TEST1 & DOFF		--	--	2	$\mu A$
$I_{L2}$	I/O leakage current at pins: CIO1 & CIO2		--	--	5	$\mu A$
$R_{Out}$	Output resistance of pins: COM0 - COM239	$-V_1 = 0.0$ , $V_{CC} = 5.0V$	--	--	1000	$\Omega$

# AC CHARACTERISTICS

## Input Timing Characteristics

$-V_I = 0.0V$ ,  $V_{CC} = 5.0V$ ,  $T_A = 25^\circ C$

Symbol	Parameter	Min	Typ	Max	Unit
$t_{LPcyc}$	LP period	500	--	--	ns
$t_{LPHi}$	LP pulse width (High level)	55	--	--	ns
$t_{LPLo}$	LP pulse width (Low level)	330	--	--	ns
$t_{YDs}$	YD, CIO setup time	100	--	--	ns
$t_{YDh}$	YD, CIO hold time	40	--	--	ns
$t_{YDset}$	YD, CIO setup time	80	--	--	ns
$t_{F12s}$	F1, F2 setup time	100	--	--	ns
$t_{F12h}$	F1, F2 hold time	40	--	--	us
$t_{FRs}$	FR setup time	100	--	--	ns
$t_{FRh}$	FR hold time	40	--	--	ns
$t_r$	Input signal rise time	--	--	50	ns
$t_f$	Input signal fall time	--	--	50	ns

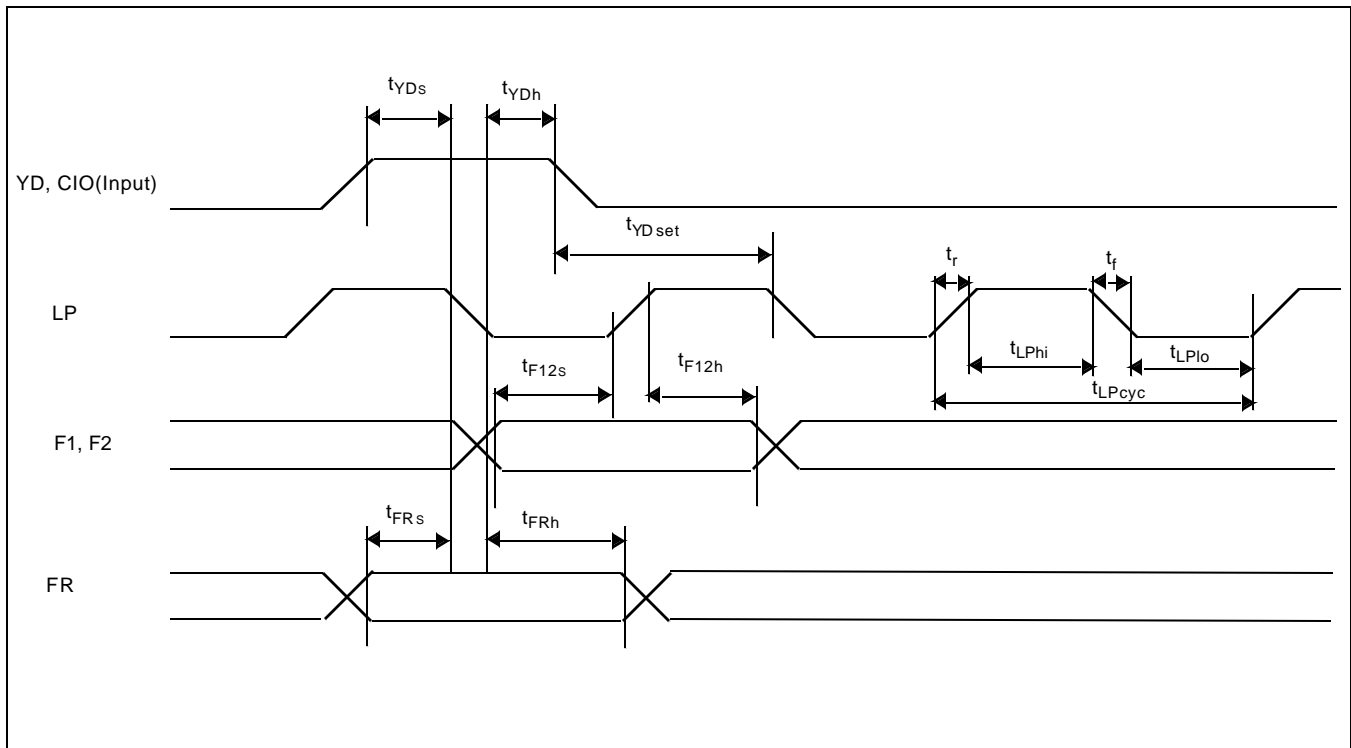


Figure 2 Input Timing Characteristics



## Output Timing Characteristics

$-V_1 = 0.0V, V_{CC} = 5.0V, T_A = 25^\circ C$

Symbol	Parameter	Min	Typ	Max	Unit
$t_{COMd1}$	Delay time from LP to COM	--	--	300	ns
$t_{COMd2}$	Delay time from $\overline{DOFF}$ to COM	--	--	350	ns
$t_{CIOd}$	Delay time from LP to CIO output	--	--	700	ns

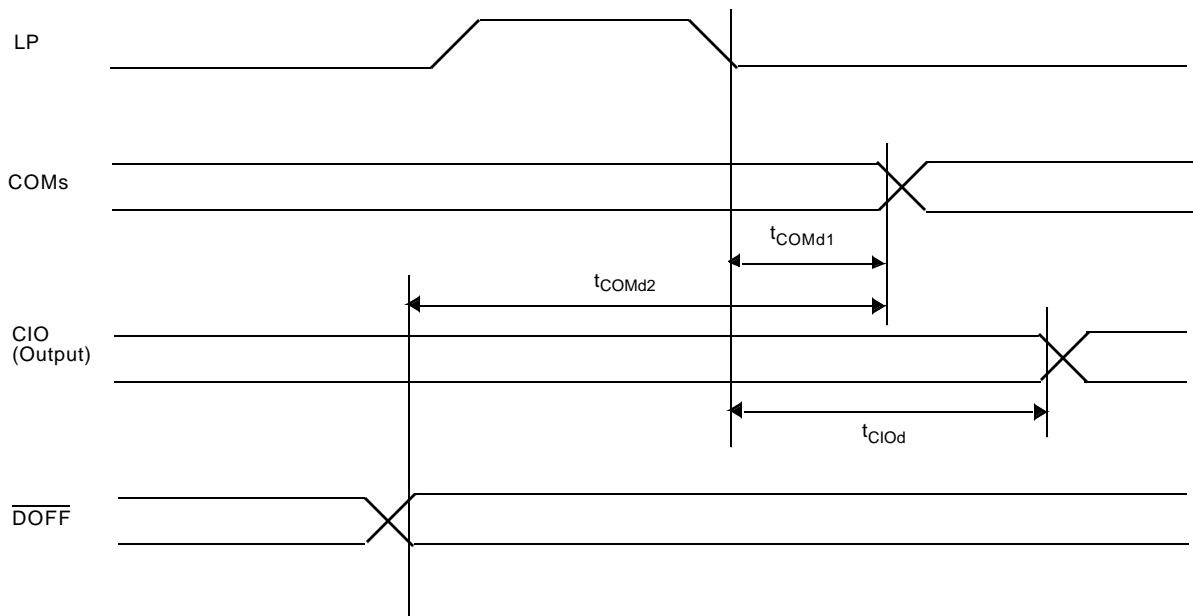
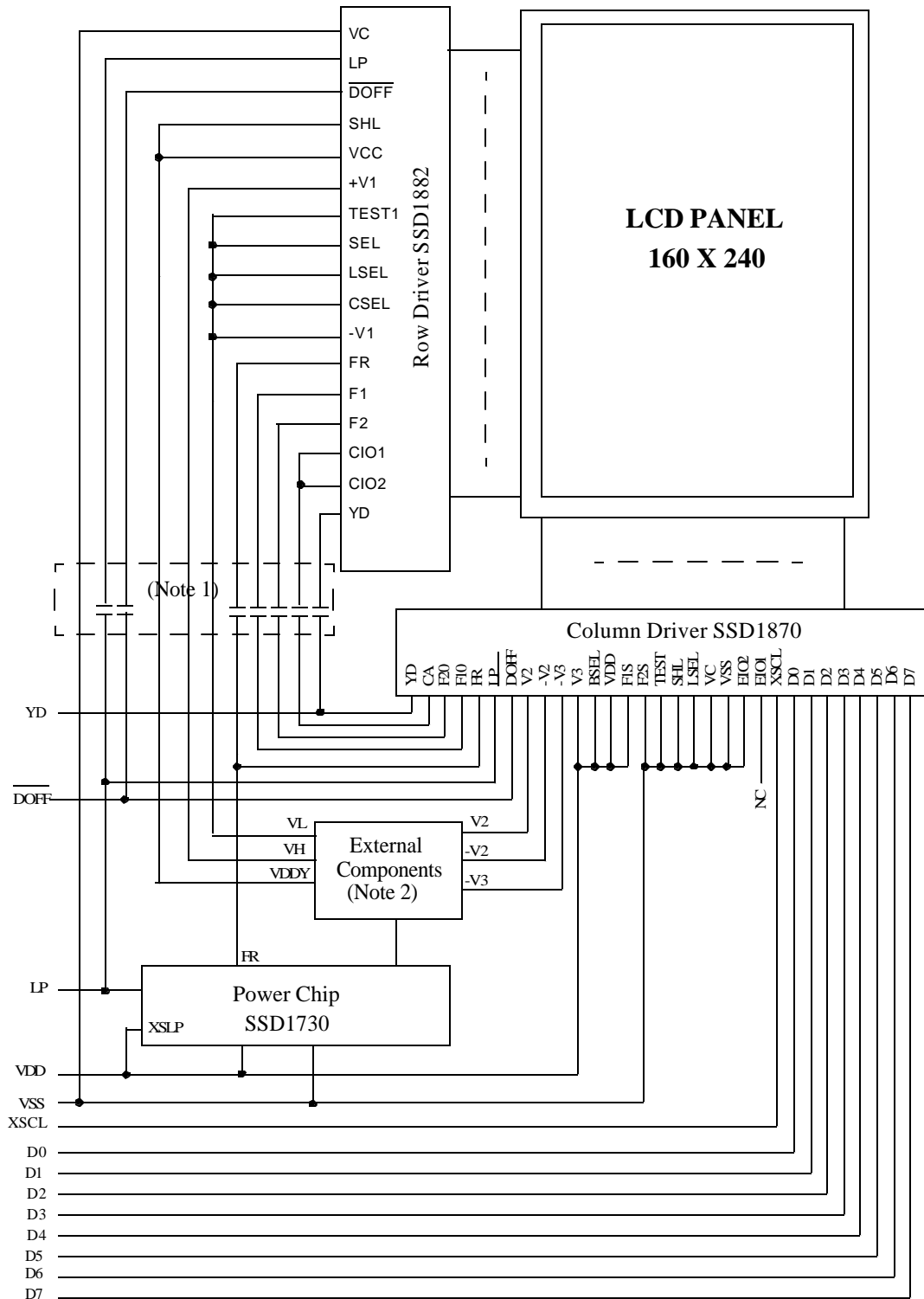


Figure 3 Output Timing Characteristics

# Application Example -- 160 X 240 LCD System

Below figure shows an example of a 160 x 240 LCD system with using the Power Chip SSD1730, the Row Driver SSD1882 and the Column Driver SSD1870. In order to operate the system, power source is applied to  $V_{DD}$  &  $V_{SS}$  and a controller is used to issue signals to  $\overline{DOFF}$ , YD, LP, XSCL and data bus D0-D7.

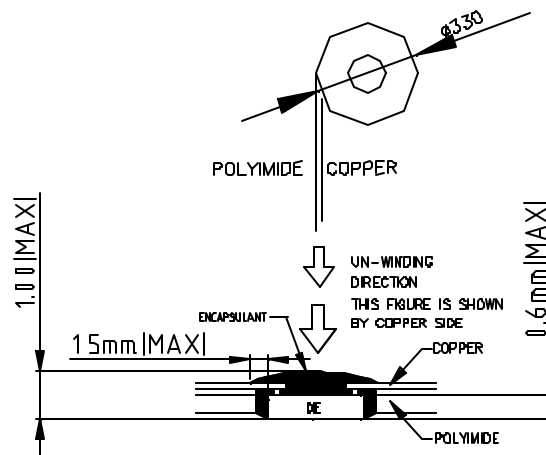
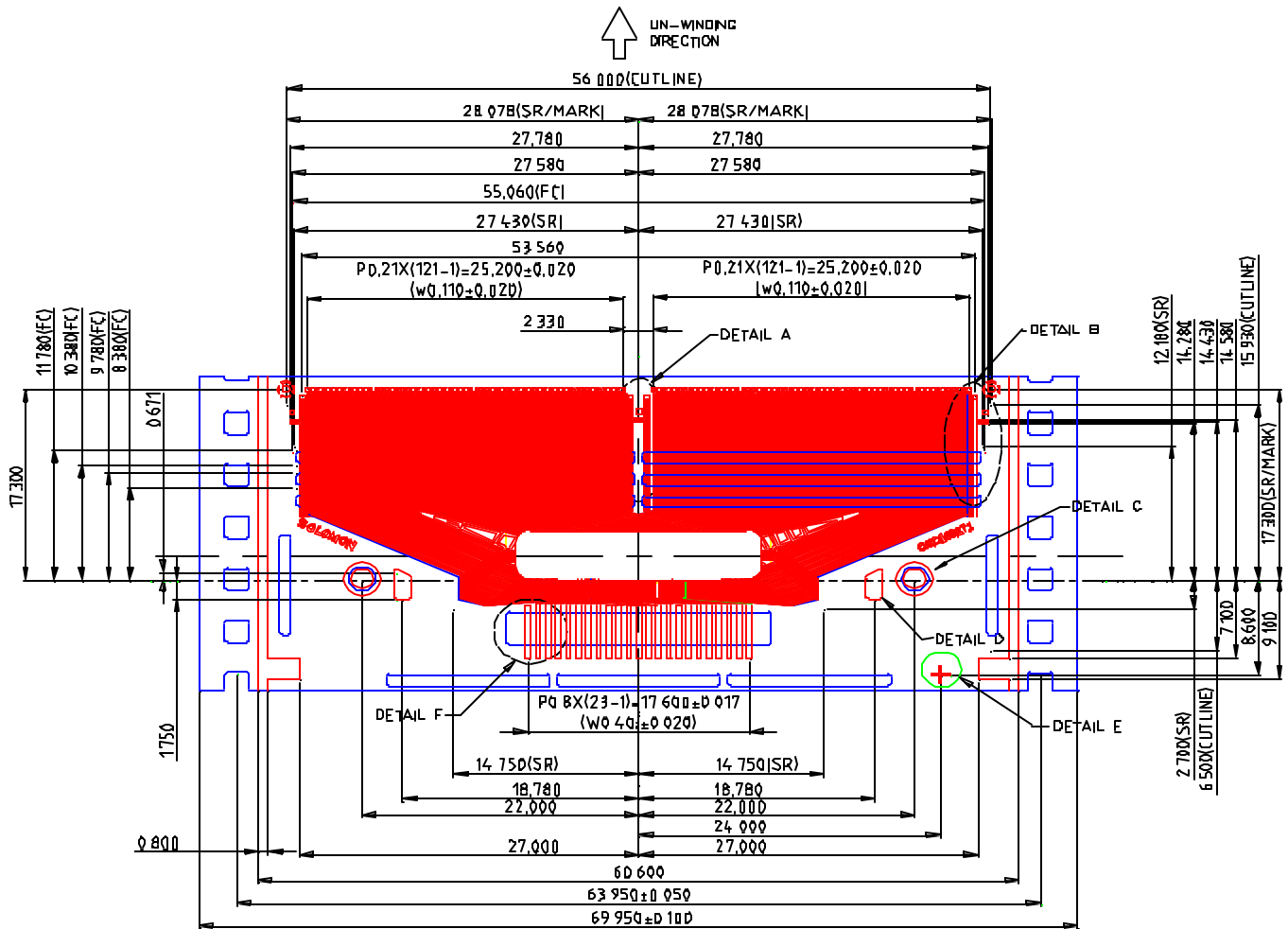


Note 1 : 1nF capacitor is necessary for capacitor coupling.

Note 2 : Refer to the application circuit in the SSD1730 power chip specification.

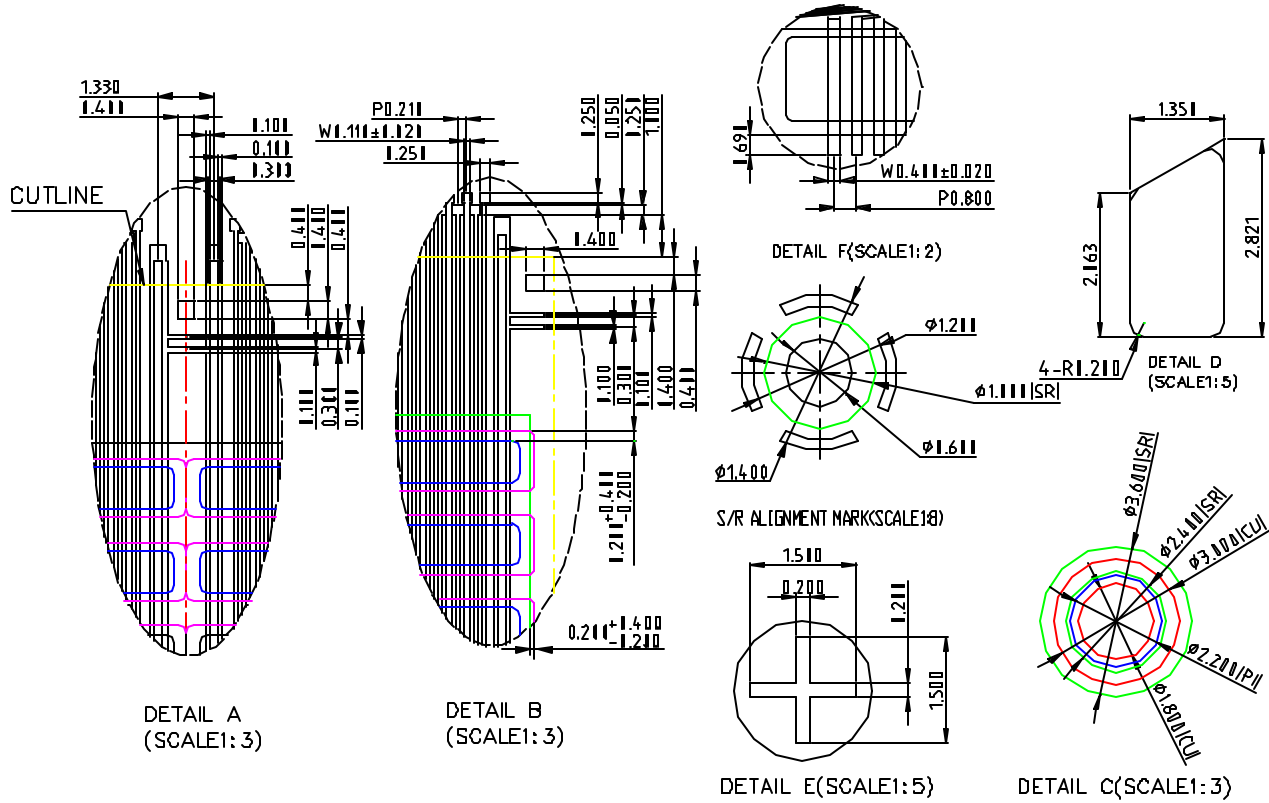
# PACKAGE DIMENSIONS

## SSD1882T1R TAB Package Dimension - 1



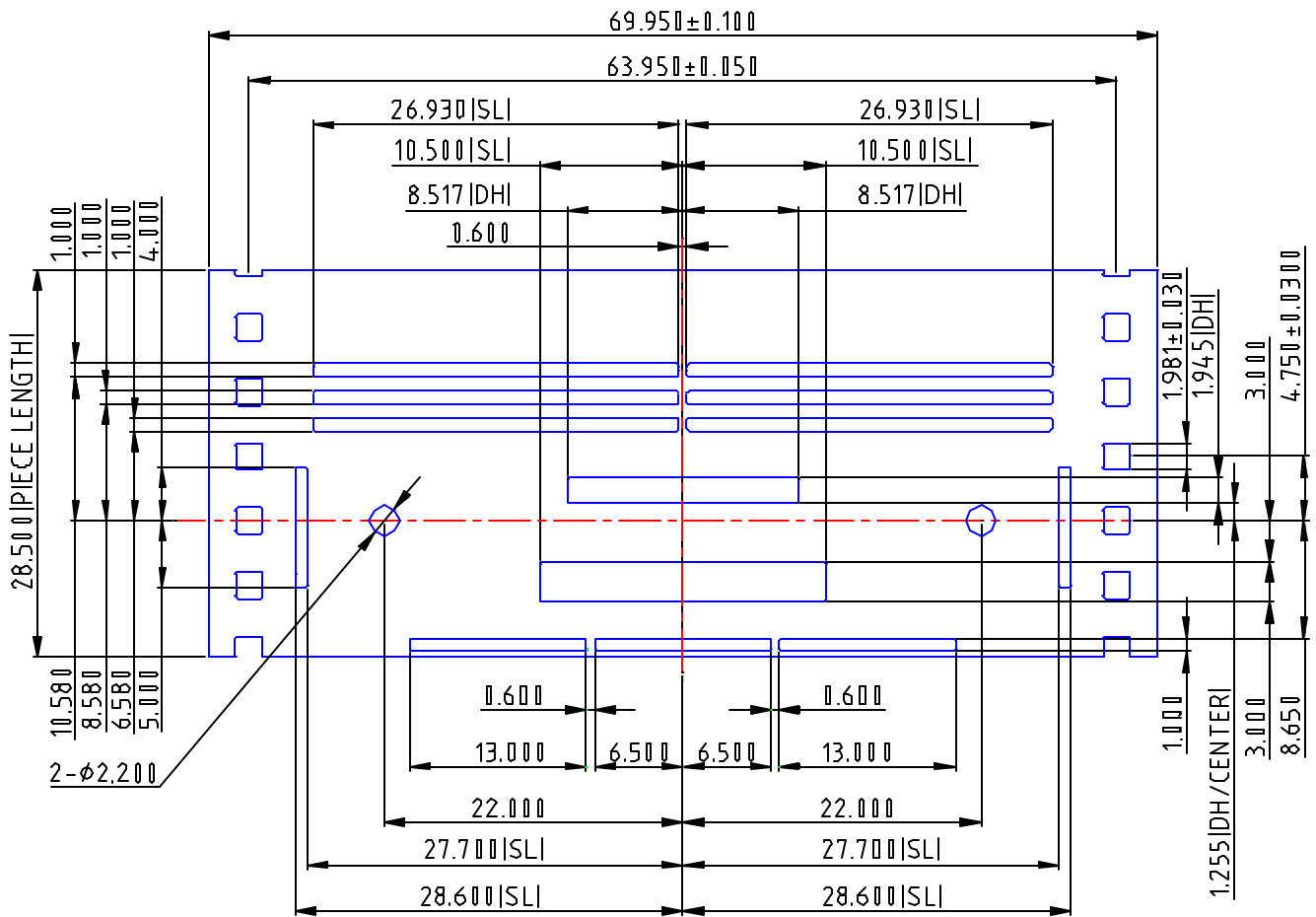
# PACKAGE DIMENSIONS

SSD1882T1R  
TAB Package Dimension - 2



# PACKAGE DIMENSIONS

SSD1882T1R  
TAB Package Dimension - 3



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