

■ INTRODUCTION

RW1097 is a dot matrix LCD driver & controller LSI which is fabricated by low power CMOS technology. It can display 1line/2line/3line/4line/5line/6lines x 12 (16 x 16 dot format) with the CGROM, maximum 8192 16 x 16 fonts can be included (customized codes are available), and 72 (16x16 dot format) character can be self-created in CGRAM. Multiple-language supported. (Chinese, Japanese, Korean)

■ FEATURES

● Driver Output Circuits

- 192 segment outputs / 97 common outputs
- 192 segment outputs / 81 common outputs
- 192 segment outputs / 65 common outputs
- 192 segment outputs / 49 common outputs
- 192 segment outputs / 33 common outputs
- 192 segment outputs / 17 common outputs

● Internal Memory

- Character Generator ROM (CGROM): 2M bits (8192 character x 16 x 16 dots)
- Alphabetic Generator ROM (HCGROM): 16K bits (128 character x 16 x 8 dots)
- Character Generator RAM (CGRAM): 18K bits (72 characters x 16 x 16 dots)
- ICON RAMS (SEGRAM): 12 x 16 bits (192 icons max.)
- Display Data RAM (DDRAM): 72 x 16 bits (72 characters max.)

● On-chip Low Power Analog Circuit

- Logic power supply voltage range: **1.7 V to 3.6 V (VDD-VSS)**
- Boost power supply voltage range: **2.4 V to 3.6 V (VDD2-VSS)**
- Boost maximum voltage limited: **18.0 V (VOUT-VSS)**
- Liquid crystal drive power supply range: **3.3 V to 17.0 V (V0 – VSS)**
- Generation of intermediate LCD bias voltages
- Internal Voltage converter (X2,X3,X4,X5,X6,X7)
- Generation of LCD Supply voltage (external VOUT, V0, V1~V4 voltage supply is possible)
- Inductor type regulator circuit converter built-in
- On-chip electronic contrast control function (128 steps)
- Automatic power on reset
- Adjustment frame frequency is available highest possible frame frequency is 200Hz
- Wide range of operating temperatures: -40°C to +85°C degree

● Multi Language supported

- Chinese BIG5 Traditional Font
- Chinese GB Simplified Font
- Japanese JIS Font
- Japanese SJIS Font
- Korean KSC Font

Product	Font-Type
RW1097-0A-001	Chinese GB Simplified Character
RW1097-0B-002	Japanese JIS
RW1097-0C-003	Japanese SJIS

■ Pad Arrangement (COG)

Chip Size: 6357 um x 2447 um

Gold Bump Pitch:

PAD No.	Pitch
1~144	40 um (I/O)
145~193	30 um (com/seg)
194~385	30 um (com/seg)
386~434	30 um (com/seg)

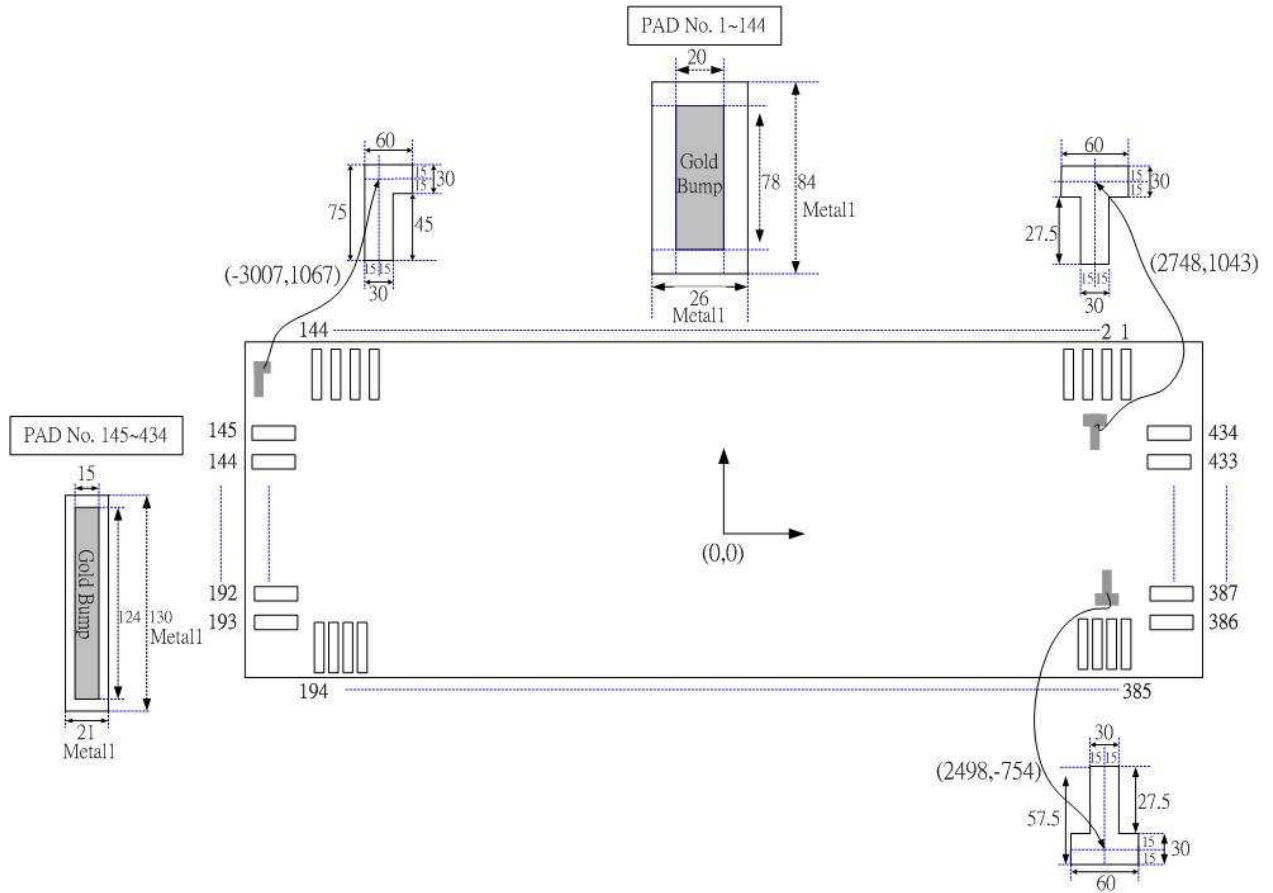
Gold Bump Size:

PAD No. 1 ~ 144: 20 (x) um x 78 (y) um

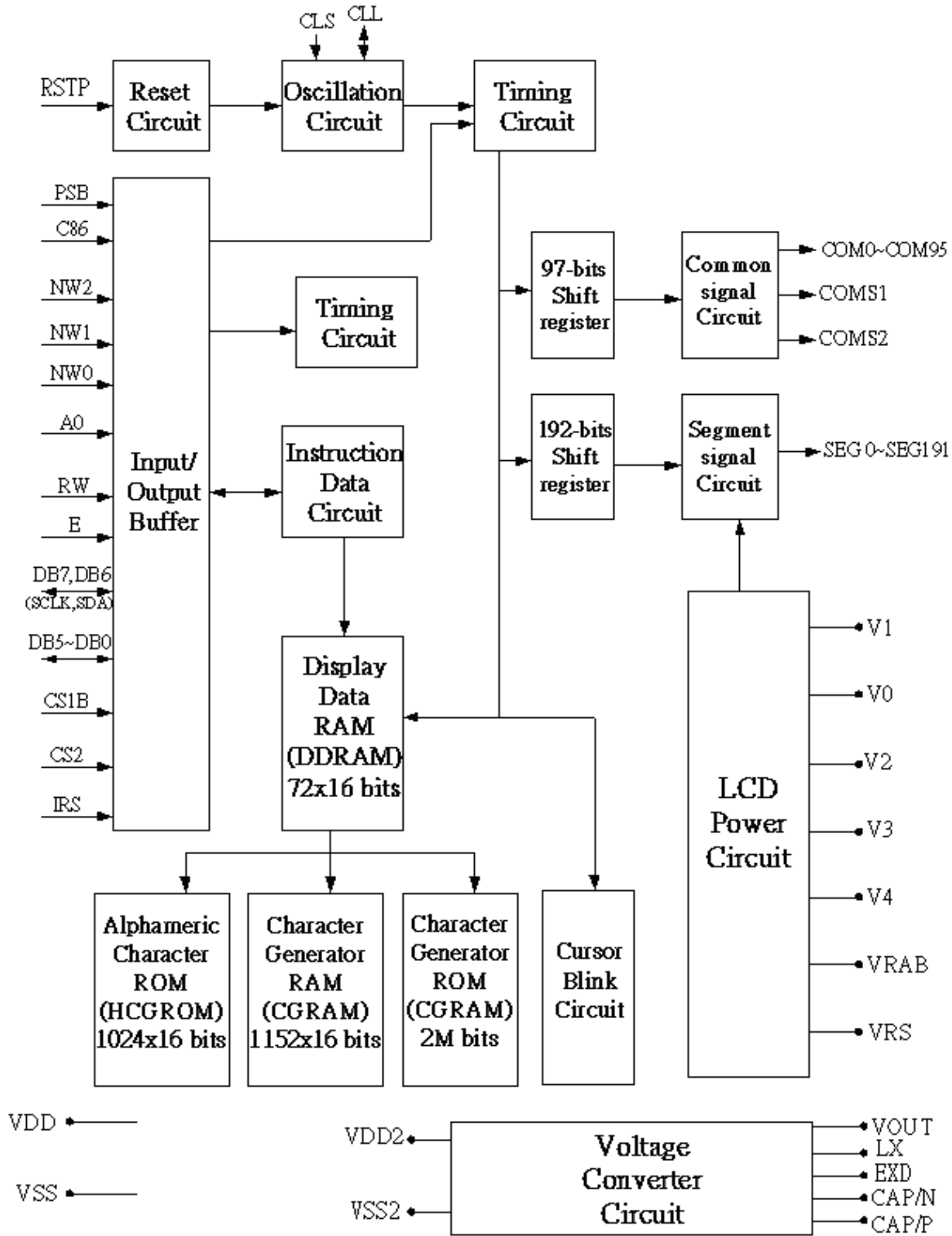
PAD No. 145 ~ 434: 15(x) um x 124(y) um

Gold Bump Height: 15 um (Typ)

Chip Thickness: 500 um



■ BLOCK DIAGRAM



■ PAD LOCATION (1/97 Duty, SHL=0,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/97 Duty, SHL=0,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	COM[31]	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	COM[30]	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	COM[29]	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	COM[28]	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	COM[27]	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	COM[26]	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	COM[25]	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	COM[24]	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	COM[23]	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	COM[22]	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	COM[21]	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	COM[20]	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	COM[19]	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	COM[18]	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	COM[17]	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	COM[16]	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[15]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[14]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[13]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[12]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[11]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[10]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[9]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[8]	-3064	-426	224	SEG[30]	-1965	-1109
145	COM[47]	-3064	744	185	COM[7]	-3064	-456	225	SEG[31]	-1935	-1109
146	COM[46]	-3064	714	186	COM[6]	-3064	-486	226	SEG[32]	-1905	-1109
147	COM[45]	-3064	684	187	COM[5]	-3064	-516	227	SEG[33]	-1875	-1109
148	COM[44]	-3064	654	188	COM[4]	-3064	-546	228	SEG[34]	-1845	-1109
149	COM[43]	-3064	624	189	COM[3]	-3064	-576	229	SEG[35]	-1815	-1109
150	COM[42]	-3064	594	190	COM[2]	-3064	-606	230	SEG[36]	-1785	-1109
151	COM[41]	-3064	564	191	COM[1]	-3064	-636	231	SEG[37]	-1755	-1109
152	COM[40]	-3064	534	192	COM[0]	-3064	-666	232	SEG[38]	-1725	-1109
153	COM[39]	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	COM[38]	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	COM[37]	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	COM[36]	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	COM[35]	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	COM[34]	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	COM[33]	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	COM[32]	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ PAD LOCATION (1/97 Duty, SHL=0,4-3)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/97 Duty, SHL=0,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[63]	3064	-246				
362	SEG[168]	2175	-1109	402	COM[64]	3064	-216				
363	SEG[169]	2205	-1109	403	COM[65]	3064	-186				
364	SEG[170]	2235	-1109	404	COM[66]	3064	-156				
365	SEG[171]	2265	-1109	405	COM[67]	3064	-126				
366	SEG[172]	2295	-1109	406	COM[68]	3064	-96				
367	SEG[173]	2325	-1109	407	COM[69]	3064	-66				
368	SEG[174]	2355	-1109	408	COM[70]	3064	-36				
369	SEG[175]	2385	-1109	409	COM[71]	3064	-6				
370	SEG[176]	2415	-1109	410	COM[72]	3064	24				
371	SEG[177]	2445	-1109	411	COM[73]	3064	54				
372	SEG[178]	2475	-1109	412	COM[74]	3064	84				
373	SEG[179]	2505	-1109	413	COM[75]	3064	114				
374	SEG[180]	2535	-1109	414	COM[76]	3064	144				
375	SEG[181]	2565	-1109	415	COM[77]	3064	174				
376	SEG[182]	2595	-1109	416	COM[78]	3064	204				
377	SEG[183]	2625	-1109	417	COM[79]	3064	234				
378	SEG[184]	2655	-1109	418	COM[80]	3064	264				
379	SEG[185]	2685	-1109	419	COM[81]	3064	294				
380	SEG[186]	2715	-1109	420	COM[82]	3064	324				
381	SEG[187]	2745	-1109	421	COM[83]	3064	354				
382	SEG[188]	2775	-1109	422	COM[84]	3064	384				
383	SEG[189]	2805	-1109	423	COM[85]	3064	414				
384	SEG[190]	2835	-1109	424	COM[86]	3064	444				
385	SEG[191]	2865	-1109	425	COM[87]	3064	474				
386	COM[48]	3064	-696	426	COM[88]	3064	504				
387	COM[49]	3064	-666	427	COM[89]	3064	534				
388	COM[50]	3064	-636	428	COM[90]	3064	564				
389	COM[51]	3064	-606	429	COM[91]	3064	594				
390	COM[52]	3064	-576	430	COM[92]	3064	624				
391	COM[53]	3064	-546	431	COM[93]	3064	654				
392	COM[54]	3064	-516	432	COM[94]	3064	684				
393	COM[55]	3064	-486	433	COM[95]	3064	714				
394	COM[56]	3064	-456	434	COMS2	3064	744				
395	COM[57]	3064	-426								
396	COM[58]	3064	-396								
397	COM[59]	3064	-366								
398	COM[60]	3064	-336								
399	COM[61]	3064	-306								
400	COM[62]	3064	-276								

■ PAD LOCATION (1/97 duty, SHL=1,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/97 duty, SHL=1,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	COM[64]	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	COM[65]	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	COM[66]	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	COM[67]	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	COM[68]	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	COM[69]	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	COM[70]	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	COM[71]	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	COM[72]	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	COM[73]	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	COM[74]	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	COM[75]	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	COM[76]	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	COM[77]	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	COM[78]	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	COM[79]	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[80]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[81]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[82]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[83]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[84]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[85]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[86]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[87]	-3064	-426	224	SEG[30]	-1965	-1109
145	COM[48]	-3064	744	185	COM[88]	-3064	-456	225	SEG[31]	-1935	-1109
146	COM[49]	-3064	714	186	COM[89]	-3064	-486	226	SEG[32]	-1905	-1109
147	COM[50]	-3064	684	187	COM[90]	-3064	-516	227	SEG[33]	-1875	-1109
148	COM[51]	-3064	654	188	COM[91]	-3064	-546	228	SEG[34]	-1845	-1109
149	COM[52]	-3064	624	189	COM[92]	-3064	-576	229	SEG[35]	-1815	-1109
150	COM[53]	-3064	594	190	COM[93]	-3064	-606	230	SEG[36]	-1785	-1109
151	COM[54]	-3064	564	191	COM[94]	-3064	-636	231	SEG[37]	-1755	-1109
152	COM[55]	-3064	534	192	COM[95]	-3064	-666	232	SEG[38]	-1725	-1109
153	COM[56]	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	COM[57]	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	COM[58]	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	COM[59]	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	COM[60]	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	COM[61]	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	COM[62]	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	COM[63]	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ PAD LOCATION (1/97 duty, SHL=1,4-3)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/97 duty, SHL=1,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[32]	3064	-246				
362	SEG[168]	2175	-1109	402	COM[31]	3064	-216				
363	SEG[169]	2205	-1109	403	COM[30]	3064	-186				
364	SEG[170]	2235	-1109	404	COM[29]	3064	-156				
365	SEG[171]	2265	-1109	405	COM[28]	3064	-126				
366	SEG[172]	2295	-1109	406	COM[27]	3064	-96				
367	SEG[173]	2325	-1109	407	COM[26]	3064	-66				
368	SEG[174]	2355	-1109	408	COM[25]	3064	-36				
369	SEG[175]	2385	-1109	409	COM[24]	3064	-6				
370	SEG[176]	2415	-1109	410	COM[23]	3064	24				
371	SEG[177]	2445	-1109	411	COM[22]	3064	54				
372	SEG[178]	2475	-1109	412	COM[21]	3064	84				
373	SEG[179]	2505	-1109	413	COM[20]	3064	114				
374	SEG[180]	2535	-1109	414	COM[19]	3064	144				
375	SEG[181]	2565	-1109	415	COM[18]	3064	174				
376	SEG[182]	2595	-1109	416	COM[17]	3064	204				
377	SEG[183]	2625	-1109	417	COM[16]	3064	234				
378	SEG[184]	2655	-1109	418	COM[15]	3064	264				
379	SEG[185]	2685	-1109	419	COM[14]	3064	294				
380	SEG[186]	2715	-1109	420	COM[13]	3064	324				
381	SEG[187]	2745	-1109	421	COM[12]	3064	354				
382	SEG[188]	2775	-1109	422	COM[11]	3064	384				
383	SEG[189]	2805	-1109	423	COM[10]	3064	414				
384	SEG[190]	2835	-1109	424	COM[9]	3064	444				
385	SEG[191]	2865	-1109	425	COM[8]	3064	474				
386	COM[47]	3064	-696	426	COM[7]	3064	504				
387	COM[46]	3064	-666	427	COM[6]	3064	534				
388	COM[45]	3064	-636	428	COM[5]	3064	564				
389	COM[44]	3064	-606	429	COM[4]	3064	594				
390	COM[43]	3064	-576	430	COM[3]	3064	624				
391	COM[42]	3064	-546	431	COM[2]	3064	654				
392	COM[41]	3064	-516	432	COM[1]	3064	684				
393	COM[40]	3064	-486	433	COM[0]	3064	714				
394	COM[39]	3064	-456	434	COMS2	3064	744				
395	COM[38]	3064	-426								
396	COM[37]	3064	-396								
397	COM[36]	3064	-366								
398	COM[35]	3064	-336								
399	COM[34]	3064	-306								
400	COM[33]	3064	-276								

■ PAD LOCATION (1/81 duty, SHL=0,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/81 duty, SHL=0,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	COM[31]	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	COM[30]	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	COM[29]	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	COM[28]	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	COM[27]	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	COM[26]	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	COM[25]	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	COM[24]	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	COM[23]	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	COM[22]	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	COM[21]	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	COM[20]	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	COM[19]	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	COM[18]	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	COM[17]	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	COM[16]	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[15]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[14]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[13]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[12]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[11]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[10]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[9]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[8]	-3064	-426	224	SEG[30]	-1965	-1109
145	NC]	-3064	744	185	COM[7]	-3064	-456	225	SEG[31]	-1935	-1109
146	NC	-3064	714	186	COM[6]	-3064	-486	226	SEG[32]	-1905	-1109
147	NC	-3064	684	187	COM[5]	-3064	-516	227	SEG[33]	-1875	-1109
148	NC	-3064	654	188	COM[4]	-3064	-546	228	SEG[34]	-1845	-1109
149	NC	-3064	624	189	COM[3]	-3064	-576	229	SEG[35]	-1815	-1109
150	NC	-3064	594	190	COM[2]	-3064	-606	230	SEG[36]	-1785	-1109
151	NC	-3064	564	191	COM[1]	-3064	-636	231	SEG[37]	-1755	-1109
152	NC	-3064	534	192	COM[0]	-3064	-666	232	SEG[38]	-1725	-1109
153	COM[39]	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	COM[38]	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	COM[37]	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	COM[36]	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	COM[35]	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	COM[34]	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	COM[33]	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	COM[32]	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ PAD LOCATION (1/81 duty, SHL=0,4-3)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/81 duty, SHL=0,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[55]	3064	-246				
362	SEG[168]	2175	-1109	402	COM[56]	3064	-216				
363	SEG[169]	2205	-1109	403	COM[57]	3064	-186				
364	SEG[170]	2235	-1109	404	COM[58]	3064	-156				
365	SEG[171]	2265	-1109	405	COM[59]	3064	-126				
366	SEG[172]	2295	-1109	406	COM[60]	3064	-96				
367	SEG[173]	2325	-1109	407	COM[61]	3064	-66				
368	SEG[174]	2355	-1109	408	COM[62]	3064	-36				
369	SEG[175]	2385	-1109	409	COM[63]	3064	-6				
370	SEG[176]	2415	-1109	410	COM[64]	3064	24				
371	SEG[177]	2445	-1109	411	COM[65]	3064	54				
372	SEG[178]	2475	-1109	412	COM[66]	3064	84				
373	SEG[179]	2505	-1109	413	COM[67]	3064	114				
374	SEG[180]	2535	-1109	414	COM[68]	3064	144				
375	SEG[181]	2565	-1109	415	COM[69]	3064	174				
376	SEG[182]	2595	-1109	416	COM[70]	3064	204				
377	SEG[183]	2625	-1109	417	COM[71]	3064	234				
378	SEG[184]	2655	-1109	418	COM[72]	3064	264				
379	SEG[185]	2685	-1109	419	COM[73]	3064	294				
380	SEG[186]	2715	-1109	420	COM[74]	3064	324				
381	SEG[187]	2745	-1109	421	COM[75]	3064	354				
382	SEG[188]	2775	-1109	422	COM[76]	3064	384				
383	SEG[189]	2805	-1109	423	COM[77]	3064	414				
384	SEG[190]	2835	-1109	424	COM[78]	3064	444				
385	SEG[191]	2865	-1109	425	COM[79]	3064	474				
386	COM[40]	3064	-696	426	NC	3064	504				
387	COM[41]	3064	-666	427	NC	3064	534				
388	COM[42]	3064	-636	428	NC	3064	564				
389	COM[43]	3064	-606	429	NC	3064	594				
390	COM[44]	3064	-576	430	NC	3064	624				
391	COM[45]	3064	-546	431	NC	3064	654				
392	COM[46]	3064	-516	432	NC	3064	684				
393	COM[47]	3064	-486	433	NC	3064	714				
394	COM[48]	3064	-456	434	COMS2	3064	744				
395	COM[49]	3064	-426								
396	COM[50]	3064	-396								
397	COM[51]	3064	-366								
398	COM[52]	3064	-336								
399	COM[53]	3064	-306								
400	COM[54]	3064	-276								

■ PAD LOCATION (1/81 duty, SHL=1,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/81 duty, SHL=1,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	COM[48]	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	COM[49]	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	COM[50]	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	COM[51]	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	COM[52]	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	COM[53]	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	COM[54]	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	COM[55]	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	COM[56]	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	COM[57]	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	COM[58]	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	COM[59]	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	COM[60]	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	COM[61]	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	COM[62]	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	COM[63]	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[64]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[65]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[66]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[67]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[68]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[69]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[70]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[71]	-3064	-426	224	SEG[30]	-1965	-1109
145	NC	-3064	744	185	COM[72]	-3064	-456	225	SEG[31]	-1935	-1109
146	NC	-3064	714	186	COM[73]	-3064	-486	226	SEG[32]	-1905	-1109
147	NC	-3064	684	187	COM[74]	-3064	-516	227	SEG[33]	-1875	-1109
148	NC	-3064	654	188	COM[75]	-3064	-546	228	SEG[34]	-1845	-1109
149	NC	-3064	624	189	COM[76]	-3064	-576	229	SEG[35]	-1815	-1109
150	NC	-3064	594	190	COM[77]	-3064	-606	230	SEG[36]	-1785	-1109
151	NC	-3064	564	191	COM[78]	-3064	-636	231	SEG[37]	-1755	-1109
152	NC	-3064	534	192	COM[79]	-3064	-666	232	SEG[38]	-1725	-1109
153	COM[40]	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	COM[41]	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	COM[42]	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	COM[43]	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	COM[44]	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	COM[45]	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	COM[46]	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	COM[47]	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ PAD LOCATION (1/81 duty, SHL=1,4-3)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/81 duty, SHL=1,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[24]	3064	-246				
362	SEG[168]	2175	-1109	402	COM[23]	3064	-216				
363	SEG[169]	2205	-1109	403	COM[22]	3064	-186				
364	SEG[170]	2235	-1109	404	COM[21]	3064	-156				
365	SEG[171]	2265	-1109	405	COM[20]	3064	-126				
366	SEG[172]	2295	-1109	406	COM[19]	3064	-96				
367	SEG[173]	2325	-1109	407	COM[18]	3064	-66				
368	SEG[174]	2355	-1109	408	COM[17]	3064	-36				
369	SEG[175]	2385	-1109	409	COM[16]	3064	-6				
370	SEG[176]	2415	-1109	410	COM[15]	3064	24				
371	SEG[177]	2445	-1109	411	COM[14]	3064	54				
372	SEG[178]	2475	-1109	412	COM[13]	3064	84				
373	SEG[179]	2505	-1109	413	COM[12]	3064	114				
374	SEG[180]	2535	-1109	414	COM[11]	3064	144				
375	SEG[181]	2565	-1109	415	COM[10]	3064	174				
376	SEG[182]	2595	-1109	416	COM[9]	3064	204				
377	SEG[183]	2625	-1109	417	COM[8]	3064	234				
378	SEG[184]	2655	-1109	418	COM[7]	3064	264				
379	SEG[185]	2685	-1109	419	COM[6]	3064	294				
380	SEG[186]	2715	-1109	420	COM[5]	3064	324				
381	SEG[187]	2745	-1109	421	COM[4]	3064	354				
382	SEG[188]	2775	-1109	422	COM[3]	3064	384				
383	SEG[189]	2805	-1109	423	COM[2]	3064	414				
384	SEG[190]	2835	-1109	424	COM[1]	3064	444				
385	SEG[191]	2865	-1109	425	COM[0]	3064	474				
386	COM[39]	3064	-696	426	NC	3064	504				
387	COM[38]	3064	-666	427	NC	3064	534				
388	COM[37]	3064	-636	428	NC	3064	564				
389	COM[36]	3064	-606	429	NC	3064	594				
390	COM[35]	3064	-576	430	NC	3064	624				
391	COM[34]	3064	-546	431	NC	3064	654				
392	COM[33]	3064	-516	432	NC	3064	684				
393	COM[32]	3064	-486	433	NC	3064	714				
394	COM[31]	3064	-456	434	COMS2	3064	744				
395	COM[30]	3064	-426								
396	COM[29]	3064	-396								
397	COM[28]	3064	-366								
398	COM[27]	3064	-336								
399	COM[26]	3064	-306								
400	COM[25]	3064	-276								

■ PAD LOCATION (1/65 duty, SHL=0,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/65 duty, SHL=0,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	COM[31]	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	COM[30]	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	COM[29]	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	COM[28]	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	COM[27]	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	COM[26]	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	COM[25]	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	COM[24]	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	COM[23]	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	COM[22]	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	COM[21]	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	COM[20]	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	COM[19]	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	COM[18]	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	COM[17]	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	COM[16]	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[15]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[14]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[13]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[12]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[11]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[10]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[9]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[8]	-3064	-426	224	SEG[30]	-1965	-1109
145	NC	-3064	744	185	COM[7]	-3064	-456	225	SEG[31]	-1935	-1109
146	NC	-3064	714	186	COM[6]	-3064	-486	226	SEG[32]	-1905	-1109
147	NC	-3064	684	187	COM[5]	-3064	-516	227	SEG[33]	-1875	-1109
148	NC	-3064	654	188	COM[4]	-3064	-546	228	SEG[34]	-1845	-1109
149	NC	-3064	624	189	COM[3]	-3064	-576	229	SEG[35]	-1815	-1109
150	NC	-3064	594	190	COM[2]	-3064	-606	230	SEG[36]	-1785	-1109
151	NC	-3064	564	191	COM[1]	-3064	-636	231	SEG[37]	-1755	-1109
152	NC	-3064	534	192	COM[0]	-3064	-666	232	SEG[38]	-1725	-1109
153	NC	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	NC	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	NC	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	NC	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	NC	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	NC	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	NC	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	NC	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ **PAD LOCATION (1/65 duty, SHL=0,4-3)**

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/65 duty, SHL=0,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[47]	3064	-246				
362	SEG[168]	2175	-1109	402	COM[48]	3064	-216				
363	SEG[169]	2205	-1109	403	COM[49]	3064	-186				
364	SEG[170]	2235	-1109	404	COM[50]	3064	-156				
365	SEG[171]	2265	-1109	405	COM[51]	3064	-126				
366	SEG[172]	2295	-1109	406	COM[52]	3064	-96				
367	SEG[173]	2325	-1109	407	COM[53]	3064	-66				
368	SEG[174]	2355	-1109	408	COM[54]	3064	-36				
369	SEG[175]	2385	-1109	409	COM[55]	3064	-6				
370	SEG[176]	2415	-1109	410	COM[56]	3064	24				
371	SEG[177]	2445	-1109	411	COM[57]	3064	54				
372	SEG[178]	2475	-1109	412	COM[58]	3064	84				
373	SEG[179]	2505	-1109	413	COM[59]	3064	114				
374	SEG[180]	2535	-1109	414	COM[60]	3064	144				
375	SEG[181]	2565	-1109	415	COM[61]	3064	174				
376	SEG[182]	2595	-1109	416	COM[62]	3064	204				
377	SEG[183]	2625	-1109	417	COM[63]	3064	234				
378	SEG[184]	2655	-1109	418	NC	3064	264				
379	SEG[185]	2685	-1109	419	NC	3064	294				
380	SEG[186]	2715	-1109	420	NC	3064	324				
381	SEG[187]	2745	-1109	421	NC	3064	354				
382	SEG[188]	2775	-1109	422	NC	3064	384				
383	SEG[189]	2805	-1109	423	NC	3064	414				
384	SEG[190]	2835	-1109	424	NC	3064	444				
385	SEG[191]	2865	-1109	425	NC	3064	474				
386	COM[32]	3064	-696	426	NC	3064	504				
387	COM[33]	3064	-666	427	NC	3064	534				
388	COM[34]	3064	-636	428	NC	3064	564				
389	COM[35]	3064	-606	429	NC	3064	594				
390	COM[36]	3064	-576	430	NC	3064	624				
391	COM[37]	3064	-546	431	NC	3064	654				
392	COM[38]	3064	-516	432	NC	3064	684				
393	COM[39]	3064	-486	433	NC	3064	714				
394	COM[40]	3064	-456	434	COMS2	3064	744				
395	COM[41]	3064	-426								
396	COM[42]	3064	-396								
397	COM[43]	3064	-366								
398	COM[44]	3064	-336								
399	COM[45]	3064	-306								
400	COM[46]	3064	-276								

■ PAD LOCATION (1/65 duty, SHL=1,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/65 duty, SHL=1,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	COM[32]	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	COM[33]	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	COM[34]	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	COM[35]	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	COM[36]	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	COM[37]	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	COM[38]	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	COM[39]	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	COM[40]	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	COM[41]	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	COM[42]	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	COM[43]	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	COM[44]	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	COM[45]	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	COM[46]	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	COM[47]	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[48]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[49]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[50]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[51]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[52]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[53]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[54]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[55]	-3064	-426	224	SEG[30]	-1965	-1109
145	NC	-3064	744	185	COM[56]	-3064	-456	225	SEG[31]	-1935	-1109
146	NC	-3064	714	186	COM[57]	-3064	-486	226	SEG[32]	-1905	-1109
147	NC	-3064	684	187	COM[58]	-3064	-516	227	SEG[33]	-1875	-1109
148	NC	-3064	654	188	COM[59]	-3064	-546	228	SEG[34]	-1845	-1109
149	NC	-3064	624	189	COM[60]	-3064	-576	229	SEG[35]	-1815	-1109
150	NC	-3064	594	190	COM[61]	-3064	-606	230	SEG[36]	-1785	-1109
151	NC	-3064	564	191	COM[62]	-3064	-636	231	SEG[37]	-1755	-1109
152	NC	-3064	534	192	COM[63]	-3064	-666	232	SEG[38]	-1725	-1109
153	NC	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	NC	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	NC	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	NC	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	NC	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	NC	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	NC	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	NC	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ PAD LOCATION (1/65 duty, SHL=1,4-3)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/65 duty, SHL=1,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[16]	3064	-246				
362	SEG[168]	2175	-1109	402	COM[15]	3064	-216				
363	SEG[169]	2205	-1109	403	COM[14]	3064	-186				
364	SEG[170]	2235	-1109	404	COM[13]	3064	-156				
365	SEG[171]	2265	-1109	405	COM[12]	3064	-126				
366	SEG[172]	2295	-1109	406	COM[11]	3064	-96				
367	SEG[173]	2325	-1109	407	COM[10]	3064	-66				
368	SEG[174]	2355	-1109	408	COM[9]	3064	-36				
369	SEG[175]	2385	-1109	409	COM[8]	3064	-6				
370	SEG[176]	2415	-1109	410	COM[7]	3064	24				
371	SEG[177]	2445	-1109	411	COM[6]	3064	54				
372	SEG[178]	2475	-1109	412	COM[5]	3064	84				
373	SEG[179]	2505	-1109	413	COM[4]	3064	114				
374	SEG[180]	2535	-1109	414	COM[3]	3064	144				
375	SEG[181]	2565	-1109	415	COM[2]	3064	174				
376	SEG[182]	2595	-1109	416	COM[1]	3064	204				
377	SEG[183]	2625	-1109	417	COM[0]	3064	234				
378	SEG[184]	2655	-1109	418	NC	3064	264				
379	SEG[185]	2685	-1109	419	NC	3064	294				
380	SEG[186]	2715	-1109	420	NC	3064	324				
381	SEG[187]	2745	-1109	421	NC	3064	354				
382	SEG[188]	2775	-1109	422	NC	3064	384				
383	SEG[189]	2805	-1109	423	NC	3064	414				
384	SEG[190]	2835	-1109	424	NC	3064	444				
385	SEG[191]	2865	-1109	425	NC	3064	474				
386	COM[31]	3064	-696	426	NC	3064	504				
387	COM[30]	3064	-666	427	NC	3064	534				
388	COM[29]	3064	-636	428	NC	3064	564				
389	COM[28]	3064	-606	429	NC	3064	594				
390	COM[27]	3064	-576	430	NC	3064	624				
391	COM[26]	3064	-546	431	NC	3064	654				
392	COM[25]	3064	-516	432	NC	3064	684				
393	COM[24]	3064	-486	433	NC	3064	714				
394	COM[23]	3064	-456	434	COMS2	3064	744				
395	COM[22]	3064	-426								
396	COM[21]	3064	-396								
397	COM[20]	3064	-366								
398	COM[19]	3064	-336								
399	COM[18]	3064	-306								
400	COM[17]	3064	-276								

■ PAD LOCATION (1/49 duty, SHL=0,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/49 duty, SHL=0,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	COM[31]	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	COM[30]	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	COM[29]	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	COM[28]	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	COM[27]	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	COM[26]	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	COM[25]	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	COM[24]	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	COM[23]	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	COM[22]	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	COM[21]	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	COM[20]	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	COM[19]	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	COM[18]	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	COM[17]	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	COM[16]	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[15]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[14]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[13]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[12]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[11]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[10]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[9]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[8]	-3064	-426	224	SEG[30]	-1965	-1109
145	COM[47]	-3064	744	185	COM[7]	-3064	-456	225	SEG[31]	-1935	-1109
146	COM[46]	-3064	714	186	COM[6]	-3064	-486	226	SEG[32]	-1905	-1109
147	COM[45]	-3064	684	187	COM[5]	-3064	-516	227	SEG[33]	-1875	-1109
148	COM[44]	-3064	654	188	COM[4]	-3064	-546	228	SEG[34]	-1845	-1109
149	COM[43]	-3064	624	189	COM[3]	-3064	-576	229	SEG[35]	-1815	-1109
150	COM[42]	-3064	594	190	COM[2]	-3064	-606	230	SEG[36]	-1785	-1109
151	COM[41]	-3064	564	191	COM[1]	-3064	-636	231	SEG[37]	-1755	-1109
152	COM[40]	-3064	534	192	COM[0]	-3064	-666	232	SEG[38]	-1725	-1109
153	COM[39]	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	COM[38]	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	COM[37]	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	COM[36]	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	COM[35]	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	COM[34]	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	COM[33]	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	COM[32]	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ PAD LOCATION (1/49 duty, SHL=0,4-3)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/49 duty, SHL=0,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[15]	3064	-246				
362	SEG[168]	2175	-1109	402	COM[16]	3064	-216				
363	SEG[169]	2205	-1109	403	COM[17]	3064	-186				
364	SEG[170]	2235	-1109	404	COM[18]	3064	-156				
365	SEG[171]	2265	-1109	405	COM[19]	3064	-126				
366	SEG[172]	2295	-1109	406	COM[20]	3064	-96				
367	SEG[173]	2325	-1109	407	COM[21]	3064	-66				
368	SEG[174]	2355	-1109	408	COM[22]	3064	-36				
369	SEG[175]	2385	-1109	409	COM[23]	3064	-6				
370	SEG[176]	2415	-1109	410	COM[24]	3064	24				
371	SEG[177]	2445	-1109	411	COM[25]	3064	54				
372	SEG[178]	2475	-1109	412	COM[26]	3064	84				
373	SEG[179]	2505	-1109	413	COM[27]	3064	114				
374	SEG[180]	2535	-1109	414	COM[28]	3064	144				
375	SEG[181]	2565	-1109	415	COM[29]	3064	174				
376	SEG[182]	2595	-1109	416	COM[30]	3064	204				
377	SEG[183]	2625	-1109	417	COM[31]	3064	234				
378	SEG[184]	2655	-1109	418	COM[32]	3064	264				
379	SEG[185]	2685	-1109	419	COM[33]	3064	294				
380	SEG[186]	2715	-1109	420	COM[34]	3064	324				
381	SEG[187]	2745	-1109	421	COM[35]	3064	354				
382	SEG[188]	2775	-1109	422	COM[36]	3064	384				
383	SEG[189]	2805	-1109	423	COM[37]	3064	414				
384	SEG[190]	2835	-1109	424	COM[38]	3064	444				
385	SEG[191]	2865	-1109	425	COM[39]	3064	474				
386	COM[0]	3064	-696	426	COM[40]	3064	504				
387	COM[1]	3064	-666	427	COM[41]	3064	534				
388	COM[2]	3064	-636	428	COM[42]	3064	564				
389	COM[3]	3064	-606	429	COM[43]	3064	594				
390	COM[4]	3064	-576	430	COM[44]	3064	624				
391	COM[5]	3064	-546	431	COM[45]	3064	654				
392	COM[6]	3064	-516	432	COM[46]	3064	684				
393	COM[7]	3064	-486	433	COM[47]	3064	714				
394	COM[8]	3064	-456	434	COMS2	3064	744				
395	COM[9]	3064	-426								
396	COM[10]	3064	-396								
397	COM[11]	3064	-366								
398	COM[12]	3064	-336								
399	COM[13]	3064	-306								
400	COM[14]	3064	-276								

■ PAD LOCATION (1/49 duty, SHL=1,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/49 duty, SHL=1,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	COM[16]	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	COM[17]	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	COM[18]	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	COM[19]	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	COM[20]	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	COM[21]	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	COM[22]	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	COM[23]	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	COM[24]	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	COM[25]	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	COM[26]	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	COM[27]	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	COM[28]	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	COM[29]	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	COM[30]	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	COM[31]	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[32]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[33]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[34]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[35]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[36]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[37]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[38]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[39]	-3064	-426	224	SEG[30]	-1965	-1109
145	COM[0]	-3064	744	185	COM[40]	-3064	-456	225	SEG[31]	-1935	-1109
146	COM[1]	-3064	714	186	COM[41]	-3064	-486	226	SEG[32]	-1905	-1109
147	COM[2]	-3064	684	187	COM[42]	-3064	-516	227	SEG[33]	-1875	-1109
148	COM[3]	-3064	654	188	COM[43]	-3064	-546	228	SEG[34]	-1845	-1109
149	COM[4]	-3064	624	189	COM[44]	-3064	-576	229	SEG[35]	-1815	-1109
150	COM[5]	-3064	594	190	COM[45]	-3064	-606	230	SEG[36]	-1785	-1109
151	COM[6]	-3064	564	191	COM[46]	-3064	-636	231	SEG[37]	-1755	-1109
152	COM[7]	-3064	534	192	COM[47]	-3064	-666	232	SEG[38]	-1725	-1109
153	COM[8]	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	COM[9]	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	COM[10]	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	COM[11]	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	COM[12]	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	COM[13]	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	COM[14]	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	COM[15]	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ PAD LOCATION (1/49 duty, SHL=1,4-3)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/49 duty, SHL=1,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[32]	3064	-246				
362	SEG[168]	2175	-1109	402	COM[31]	3064	-216				
363	SEG[169]	2205	-1109	403	COM[30]	3064	-186				
364	SEG[170]	2235	-1109	404	COM[29]	3064	-156				
365	SEG[171]	2265	-1109	405	COM[28]	3064	-126				
366	SEG[172]	2295	-1109	406	COM[27]	3064	-96				
367	SEG[173]	2325	-1109	407	COM[26]	3064	-66				
368	SEG[174]	2355	-1109	408	COM[25]	3064	-36				
369	SEG[175]	2385	-1109	409	COM[24]	3064	-6				
370	SEG[176]	2415	-1109	410	COM[23]	3064	24				
371	SEG[177]	2445	-1109	411	COM[22]	3064	54				
372	SEG[178]	2475	-1109	412	COM[21]	3064	84				
373	SEG[179]	2505	-1109	413	COM[20]	3064	114				
374	SEG[180]	2535	-1109	414	COM[19]	3064	144				
375	SEG[181]	2565	-1109	415	COM[18]	3064	174				
376	SEG[182]	2595	-1109	416	COM[17]	3064	204				
377	SEG[183]	2625	-1109	417	COM[16]	3064	234				
378	SEG[184]	2655	-1109	418	COM[15]	3064	264				
379	SEG[185]	2685	-1109	419	COM[14]	3064	294				
380	SEG[186]	2715	-1109	420	COM[13]	3064	324				
381	SEG[187]	2745	-1109	421	COM[12]	3064	354				
382	SEG[188]	2775	-1109	422	COM[11]	3064	384				
383	SEG[189]	2805	-1109	423	COM[10]	3064	414				
384	SEG[190]	2835	-1109	424	COM[9]	3064	444				
385	SEG[191]	2865	-1109	425	COM[8]	3064	474				
386	COM[47]	3064	-696	426	COM[7]	3064	504				
387	COM[46]	3064	-666	427	COM[6]	3064	534				
388	COM[45]	3064	-636	428	COM[5]	3064	564				
389	COM[44]	3064	-606	429	COM[4]	3064	594				
390	COM[43]	3064	-576	430	COM[3]	3064	624				
391	COM[42]	3064	-546	431	COM[2]	3064	654				
392	COM[41]	3064	-516	432	COM[1]	3064	684				
393	COM[40]	3064	-486	433	COM[0]	3064	714				
394	COM[39]	3064	-456	434	COMS2	3064	744				
395	COM[38]	3064	-426								
396	COM[37]	3064	-396								
397	COM[36]	3064	-366								
398	COM[35]	3064	-336								
399	COM[34]	3064	-306								
400	COM[33]	3064	-276								

■ PAD LOCATION (1/33 duty, SHL=0,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/33 duty, SHL=0,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	COM[31]	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	COM[30]	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	COM[29]	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	COM[28]	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	COM[27]	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	COM[26]	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	COM[25]	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	COM[24]	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	COM[23]	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	COM[22]	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	COM[21]	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	COM[20]	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	COM[19]	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	COM[18]	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	COM[17]	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	COM[16]	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[15]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[14]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[13]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[12]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[11]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[10]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[9]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[8]	-3064	-426	224	SEG[30]	-1965	-1109
145	NC	-3064	744	185	COM[7]	-3064	-456	225	SEG[31]	-1935	-1109
146	NC	-3064	714	186	COM[6]	-3064	-486	226	SEG[32]	-1905	-1109
147	NC	-3064	684	187	COM[5]	-3064	-516	227	SEG[33]	-1875	-1109
148	NC	-3064	654	188	COM[4]	-3064	-546	228	SEG[34]	-1845	-1109
149	NC	-3064	624	189	COM[3]	-3064	-576	229	SEG[35]	-1815	-1109
150	NC	-3064	594	190	COM[2]	-3064	-606	230	SEG[36]	-1785	-1109
151	NC	-3064	564	191	COM[1]	-3064	-636	231	SEG[37]	-1755	-1109
152	NC	-3064	534	192	COM[0]	-3064	-666	232	SEG[38]	-1725	-1109
153	NC	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	NC	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	NC	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	NC	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	NC	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	NC	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	NC	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	NC	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ PAD LOCATION (1/33 duty, SHL=0,4-3)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/33 duty, SHL=0,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[15]	3064	-246				
362	SEG[168]	2175	-1109	402	COM[16]	3064	-216				
363	SEG[169]	2205	-1109	403	COM[17]	3064	-186				
364	SEG[170]	2235	-1109	404	COM[18]	3064	-156				
365	SEG[171]	2265	-1109	405	COM[19]	3064	-126				
366	SEG[172]	2295	-1109	406	COM[20]	3064	-96				
367	SEG[173]	2325	-1109	407	COM[21]	3064	-66				
368	SEG[174]	2355	-1109	408	COM[22]	3064	-36				
369	SEG[175]	2385	-1109	409	COM[23]	3064	-6				
370	SEG[176]	2415	-1109	410	COM[24]	3064	24				
371	SEG[177]	2445	-1109	411	COM[25]	3064	54				
372	SEG[178]	2475	-1109	412	COM[26]	3064	84				
373	SEG[179]	2505	-1109	413	COM[27]	3064	114				
374	SEG[180]	2535	-1109	414	COM[28]	3064	144				
375	SEG[181]	2565	-1109	415	COM[29]	3064	174				
376	SEG[182]	2595	-1109	416	COM[30]	3064	204				
377	SEG[183]	2625	-1109	417	COM[31]	3064	234				
378	SEG[184]	2655	-1109	418	NC	3064	264				
379	SEG[185]	2685	-1109	419	NC	3064	294				
380	SEG[186]	2715	-1109	420	NC	3064	324				
381	SEG[187]	2745	-1109	421	NC	3064	354				
382	SEG[188]	2775	-1109	422	NC	3064	384				
383	SEG[189]	2805	-1109	423	NC	3064	414				
384	SEG[190]	2835	-1109	424	NC	3064	444				
385	SEG[191]	2865	-1109	425	NC	3064	474				
386	COM[0]	3064	-696	426	NC	3064	504				
387	COM[1]	3064	-666	427	NC	3064	534				
388	COM[2]	3064	-636	428	NC	3064	564				
389	COM[3]	3064	-606	429	NC	3064	594				
390	COM[4]	3064	-576	430	NC	3064	624				
391	COM[5]	3064	-546	431	NC	3064	654				
392	COM[6]	3064	-516	432	NC	3064	684				
393	COM[7]	3064	-486	433	NC	3064	714				
394	COM[8]	3064	-456	434	COMS2	3064	744				
395	COM[9]	3064	-426								
396	COM[10]	3064	-396								
397	COM[11]	3064	-366								
398	COM[12]	3064	-336								
399	COM[13]	3064	-306								
400	COM[14]	3064	-276								

■ PAD LOCATION (1/33 duty, SHL=1,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/33 duty, SHL=1,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	COM[0]	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	COM[1]	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	COM[2]	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	COM[3]	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	COM[4]	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	COM[5]	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	COM[6]	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	COM[7]	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	COM[8]	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	COM[9]	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	COM[10]	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	COM[11]	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	COM[12]	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	COM[13]	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	COM[14]	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	COM[15]	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[16]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[17]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[18]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[19]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[20]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[21]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[22]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[23]	-3064	-426	224	SEG[30]	-1965	-1109
145	NC	-3064	744	185	COM[24]	-3064	-456	225	SEG[31]	-1935	-1109
146	NC	-3064	714	186	COM[25]	-3064	-486	226	SEG[32]	-1905	-1109
147	NC	-3064	684	187	COM[26]	-3064	-516	227	SEG[33]	-1875	-1109
148	NC	-3064	654	188	COM[27]	-3064	-546	228	SEG[34]	-1845	-1109
149	NC	-3064	624	189	COM[28]	-3064	-576	229	SEG[35]	-1815	-1109
150	NC	-3064	594	190	COM[29]	-3064	-606	230	SEG[36]	-1785	-1109
151	NC	-3064	564	191	COM[30]	-3064	-636	231	SEG[37]	-1755	-1109
152	NC	-3064	534	192	COM[31]	-3064	-666	232	SEG[38]	-1725	-1109
153	NC	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	NC	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	NC	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	NC	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	NC	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	NC	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	NC	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	NC	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ PAD LOCATION (1/33 duty, SHL=1,4-3)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/33 duty, SHL=1,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[16]	3064	-246				
362	SEG[168]	2175	-1109	402	COM[15]	3064	-216				
363	SEG[169]	2205	-1109	403	COM[14]	3064	-186				
364	SEG[170]	2235	-1109	404	COM[13]	3064	-156				
365	SEG[171]	2265	-1109	405	COM[12]	3064	-126				
366	SEG[172]	2295	-1109	406	COM[11]	3064	-96				
367	SEG[173]	2325	-1109	407	COM[10]	3064	-66				
368	SEG[174]	2355	-1109	408	COM[9]	3064	-36				
369	SEG[175]	2385	-1109	409	COM[8]	3064	-6				
370	SEG[176]	2415	-1109	410	COM[7]	3064	24				
371	SEG[177]	2445	-1109	411	COM[6]	3064	54				
372	SEG[178]	2475	-1109	412	COM[5]	3064	84				
373	SEG[179]	2505	-1109	413	COM[4]	3064	114				
374	SEG[180]	2535	-1109	414	COM[3]	3064	144				
375	SEG[181]	2565	-1109	415	COM[2]	3064	174				
376	SEG[182]	2595	-1109	416	COM[1]	3064	204				
377	SEG[183]	2625	-1109	417	COM[0]	3064	234				
378	SEG[184]	2655	-1109	418	NC	3064	264				
379	SEG[185]	2685	-1109	419	NC	3064	294				
380	SEG[186]	2715	-1109	420	NC	3064	324				
381	SEG[187]	2745	-1109	421	NC	3064	354				
382	SEG[188]	2775	-1109	422	NC	3064	384				
383	SEG[189]	2805	-1109	423	NC	3064	414				
384	SEG[190]	2835	-1109	424	NC	3064	444				
385	SEG[191]	2865	-1109	425	NC	3064	474				
386	COM[31]	3064	-696	426	NC	3064	504				
387	COM[30]	3064	-666	427	NC	3064	534				
388	COM[29]	3064	-636	428	NC	3064	564				
389	COM[28]	3064	-606	429	NC	3064	594				
390	COM[27]	3064	-576	430	NC	3064	624				
391	COM[26]	3064	-546	431	NC	3064	654				
392	COM[25]	3064	-516	432	NC	3064	684				
393	COM[24]	3064	-486	433	NC	3064	714				
394	COM[23]	3064	-456	434	COMS2	3064	744				
395	COM[22]	3064	-426								
396	COM[21]	3064	-396								
397	COM[20]	3064	-366								
398	COM[19]	3064	-336								
399	COM[18]	3064	-306								
400	COM[17]	3064	-276								

■ PAD LOCATION (1/17 duty, SHL=0,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/17 duty, SHL=0,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	NC	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	NC	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	NC	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	NC	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	NC	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	NC	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	NC	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	NC	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	NC	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	NC	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	NC	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	NC	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	NC	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	NC	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	NC	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	NC	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[15]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[14]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[13]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[12]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[11]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[10]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[9]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[8]	-3064	-426	224	SEG[30]	-1965	-1109
145	NC	-3064	744	185	COM[7]	-3064	-456	225	SEG[31]	-1935	-1109
146	NC	-3064	714	186	COM[6]	-3064	-486	226	SEG[32]	-1905	-1109
147	NC	-3064	684	187	COM[5]	-3064	-516	227	SEG[33]	-1875	-1109
148	NC	-3064	654	188	COM[4]	-3064	-546	228	SEG[34]	-1845	-1109
149	NC	-3064	624	189	COM[3]	-3064	-576	229	SEG[35]	-1815	-1109
150	NC	-3064	594	190	COM[2]	-3064	-606	230	SEG[36]	-1785	-1109
151	NC	-3064	564	191	COM[1]	-3064	-636	231	SEG[37]	-1755	-1109
152	NC	-3064	534	192	COM[0]	-3064	-666	232	SEG[38]	-1725	-1109
153	NC	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	NC	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	NC	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	NC	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	NC	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	NC	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	NC	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	NC	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ PAD LOCATION (1/17 duty, SHL=0,4-3)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/17 duty, SHL=0,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[15]	3064	-246				
362	SEG[168]	2175	-1109	402	NC	3064	-216				
363	SEG[169]	2205	-1109	403	NC	3064	-186				
364	SEG[170]	2235	-1109	404	NC	3064	-156				
365	SEG[171]	2265	-1109	405	NC	3064	-126				
366	SEG[172]	2295	-1109	406	NC	3064	-96				
367	SEG[173]	2325	-1109	407	NC	3064	-66				
368	SEG[174]	2355	-1109	408	NC	3064	-36				
369	SEG[175]	2385	-1109	409	NC	3064	-6				
370	SEG[176]	2415	-1109	410	NC	3064	24				
371	SEG[177]	2445	-1109	411	NC	3064	54				
372	SEG[178]	2475	-1109	412	NC	3064	84				
373	SEG[179]	2505	-1109	413	NC	3064	114				
374	SEG[180]	2535	-1109	414	NC	3064	144				
375	SEG[181]	2565	-1109	415	NC	3064	174				
376	SEG[182]	2595	-1109	416	NC	3064	204				
377	SEG[183]	2625	-1109	417	NC	3064	234				
378	SEG[184]	2655	-1109	418	NC	3064	264				
379	SEG[185]	2685	-1109	419	NC	3064	294				
380	SEG[186]	2715	-1109	420	NC	3064	324				
381	SEG[187]	2745	-1109	421	NC	3064	354				
382	SEG[188]	2775	-1109	422	NC	3064	384				
383	SEG[189]	2805	-1109	423	NC	3064	414				
384	SEG[190]	2835	-1109	424	NC	3064	444				
385	SEG[191]	2865	-1109	425	NC	3064	474				
386	COM[0]	3064	-696	426	NC	3064	504				
387	COM[1]	3064	-666	427	NC	3064	534				
388	COM[2]	3064	-636	428	NC	3064	564				
389	COM[3]	3064	-606	429	NC	3064	594				
390	COM[4]	3064	-576	430	NC	3064	624				
391	COM[5]	3064	-546	431	NC	3064	654				
392	COM[6]	3064	-516	432	NC	3064	684				
393	COM[7]	3064	-486	433	NC	3064	714				
394	COM[8]	3064	-456	434	COMS2	3064	744				
395	COM[9]	3064	-426								
396	COM[10]	3064	-396								
397	COM[11]	3064	-366								
398	COM[12]	3064	-336								
399	COM[13]	3064	-306								
400	COM[14]	3064	-276								

■ PAD LOCATION (1/17 duty, SHL=1,4-1)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
1	NC	2868	1132	41	EXD	1264	1132	81	D4	-336	1132
2	NC	2828	1132	42	VSS	1224	1132	82	D5	-376	1132
3	NC	2788	1132	43	VSS	1184	1132	83	D6	-416	1132
4	NC	2748	1132	44	VSS2	1144	1132	84	D7	-456	1132
5	NC	2708	1132	45	VSS2	1104	1132	85	VSS	-496	1132
6	NC	2668	1132	46	VSS2	1064	1132	86	CLS	-536	1132
7	NC	2628	1132	47	VSS2	1024	1132	87	VDD	-576	1132
8	NC	2588	1132	48	VSS2	984	1132	88	C86	-616	1132
9	NC	2548	1132	49	VSS2	944	1132	89	VSS	-656	1132
10	CAP6P	2508	1132	50	VDD2	904	1132	90	PSB	-696	1132
11	CAP6P	2468	1132	51	VDD2	864	1132	91	VDD	-736	1132
12	CAP2N	2428	1132	52	VDD2	824	1132	92	IRS	-776	1132
13	CAP2N	2388	1132	53	VDD2	784	1132	93	VSS	-816	1132
14	CAP4P	2348	1132	54	VDD2	744	1132	94	NW0	-856	1132
15	CAP4P	2308	1132	55	VDD2	704	1132	95	VDD	-896	1132
16	CAP2N	2268	1132	56	VDD2	664	1132	96	NW1	-936	1132
17	CAP2N	2228	1132	57	VDD2	624	1132	97	VSS	-976	1132
18	CAP2P	2188	1132	58	VDD	584	1132	98	NW2	-1016	1132
19	CAP2P	2148	1132	59	VDD	544	1132	99	VDD	-1056	1132
20	CAP1P	2108	1132	60	VDD	504	1132	100	VSS	-1096	1132
21	CAP1P	2068	1132	61	VDD	464	1132	101	VRS	-1136	1132
22	CAP1N	2028	1132	62	VDD	424	1132	102	VDD2	-1176	1132
23	CAP1N	1988	1132	63	VDD	384	1132	103	V4	-1220	1132
24	CAP3P	1948	1132	64	VDD	344	1132	104	V4	-1260	1132
25	CAP3P	1908	1132	65	VDD	304	1132	105	V3	-1300	1132
26	CAP1N	1868	1132	66	CLL	264	1132	106	V3	-1340	1132
27	CAP1N	1828	1132	67	VSS	224	1132	107	V2	-1380	1132
28	CAP5P	1788	1132	68	CS1B	184	1132	108	V2	-1420	1132
29	CAP5P	1748	1132	69	CS2	144	1132	109	V1	-1460	1132
30	VOUT	1708	1132	70	VDD	104	1132	110	V1	-1500	1132
31	VOUT	1668	1132	71	RSTP	64	1132	111	V0	-1540	1132
32	VOUT	1628	1132	72	A0	24	1132	112	V0	-1580	1132
33	VOUT	1588	1132	73	VSS	-16	1132	113	V0	-1620	1132
34	VOUT	1548	1132	74	RW	-56	1132	114	V0	-1660	1132
35	VOUT	1508	1132	75	E	-96	1132	115	V0	-1700	1132
36	VOUT	1468	1132	76	VDD	-136	1132	116	V0	-1740	1132
37	VOUT	1428	1132	77	D0	-176	1132	117	VRAB	-1780	1132
38	LX	1388	1132	78	D1	-216	1132	118	VDD	-1824	1132
39	VDD	1344	1132	79	D2	-256	1132	119	T[0]	-1868	1132
40	EXD	1304	1132	80	D3	-296	1132	120	T[1]	-1914	1132

■ PAD LOCATION (1/17 duty, SHL=1,4-2)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
121	T[2]	-1955	1132	161	NC	-3064	264	201	SEG[7]	-2655	-1109
122	T[3]	-1996	1132	162	NC	-3064	234	202	SEG[8]	-2625	-1109
123	T[4]	-2037	1132	163	NC	-3064	204	203	SEG[9]	-2595	-1109
124	T[5]	-2078	1132	164	NC	-3064	174	204	SEG[10]	-2565	-1109
125	T[6]	-2119	1132	165	NC	-3064	144	205	SEG[11]	-2535	-1109
126	T[7]	-2160	1132	166	NC	-3064	114	206	SEG[12]	-2505	-1109
127	T[8]	-2201	1132	167	NC	-3064	84	207	SEG[13]	-2475	-1109
128	T[9]	-2242	1132	168	NC	-3064	54	208	SEG[14]	-2445	-1109
129	T[10]	-2283	1132	169	NC	-3064	24	209	SEG[15]	-2415	-1109
130	T[11]	-2324	1132	170	NC	-3064	-6	210	SEG[16]	-2385	-1109
131	NC	-2364	1132	171	NC	-3064	-36	211	SEG[17]	-2355	-1109
132	NC	-2404	1132	172	NC	-3064	-66	212	SEG[18]	-2325	-1109
133	NC	-2444	1132	173	NC	-3064	-96	213	SEG[19]	-2295	-1109
134	NC	-2484	1132	174	NC	-3064	-126	214	SEG[20]	-2265	-1109
135	NC	-2524	1132	175	NC	-3064	-156	215	SEG[21]	-2235	-1109
136	NC	-2564	1132	176	NC	-3064	-186	216	SEG[22]	-2205	-1109
137	NC	-2604	1132	177	COM[0]	-3064	-216	217	SEG[23]	-2175	-1109
138	NC	-2644	1132	178	COM[1]	-3064	-246	218	SEG[24]	-2145	-1109
139	NC	-2684	1132	179	COM[2]	-3064	-276	219	SEG[25]	-2115	-1109
140	NC	-2724	1132	180	COM[3]	-3064	-306	220	SEG[26]	-2085	-1109
141	NC	-2764	1132	181	COM[4]	-3064	-336	221	SEG[27]	-2055	-1109
142	NC	-2804	1132	182	COM[5]	-3064	-366	222	SEG[28]	-2025	-1109
143	NC	-2844	1132	183	COM[6]	-3064	-396	223	SEG[29]	-1995	-1109
144	NC	-2884	1132	184	COM[7]	-3064	-426	224	SEG[30]	-1965	-1109
145	NC	-3064	744	185	COM[8]	-3064	-456	225	SEG[31]	-1935	-1109
146	NC	-3064	714	186	COM[9]	-3064	-486	226	SEG[32]	-1905	-1109
147	NC	-3064	684	187	COM[10]	-3064	-516	227	SEG[33]	-1875	-1109
148	NC	-3064	654	188	COM[11]	-3064	-546	228	SEG[34]	-1845	-1109
149	NC	-3064	624	189	COM[12]	-3064	-576	229	SEG[35]	-1815	-1109
150	NC	-3064	594	190	COM[13]	-3064	-606	230	SEG[36]	-1785	-1109
151	NC	-3064	564	191	COM[14]	-3064	-636	231	SEG[37]	-1755	-1109
152	NC	-3064	534	192	COM[15]	-3064	-666	232	SEG[38]	-1725	-1109
153	NC	-3064	504	193	COMS1	-3064	-696	233	SEG[39]	-1695	-1109
154	NC	-3064	474	194	SEG[0]	-2865	-1109	234	SEG[40]	-1665	-1109
155	NC	-3064	444	195	SEG[1]	-2835	-1109	235	SEG[41]	-1635	-1109
156	NC	-3064	414	196	SEG[2]	-2805	-1109	236	SEG[42]	-1605	-1109
157	NC	-3064	384	197	SEG[3]	-2775	-1109	237	SEG[43]	-1575	-1109
158	NC	-3064	354	198	SEG[4]	-2745	-1109	238	SEG[44]	-1545	-1109
159	NC	-3064	324	199	SEG[5]	-2715	-1109	239	SEG[45]	-1515	-1109
160	NC	-3064	294	200	SEG[6]	-2685	-1109	240	SEG[46]	-1485	-1109

■ PAD LOCATION (1/17 duty, SHL=1,4-3)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
241	SEG[47]	-1455	-1109	281	SEG[87]	-255	-1109	321	SEG[127]	945	-1109
242	SEG[48]	-1425	-1109	282	SEG[88]	-225	-1109	322	SEG[128]	975	-1109
243	SEG[49]	-1395	-1109	283	SEG[89]	-195	-1109	323	SEG[129]	1005	-1109
244	SEG[50]	-1365	-1109	284	SEG[90]	-165	-1109	324	SEG[130]	1035	-1109
245	SEG[51]	-1335	-1109	285	SEG[91]	-135	-1109	325	SEG[131]	1065	-1109
246	SEG[52]	-1305	-1109	286	SEG[92]	-105	-1109	326	SEG[132]	1095	-1109
247	SEG[53]	-1275	-1109	287	SEG[93]	-75	-1109	327	SEG[133]	1125	-1109
248	SEG[54]	-1245	-1109	288	SEG[94]	-45	-1109	328	SEG[134]	1155	-1109
249	SEG[55]	-1215	-1109	289	SEG[95]	-15	-1109	329	SEG[135]	1185	-1109
250	SEG[56]	-1185	-1109	290	SEG[96]	15	-1109	330	SEG[136]	1215	-1109
251	SEG[57]	-1155	-1109	291	SEG[97]	45	-1109	331	SEG[137]	1245	-1109
252	SEG[58]	-1125	-1109	292	SEG[98]	75	-1109	332	SEG[138]	1275	-1109
253	SEG[59]	-1095	-1109	293	SEG[99]	105	-1109	333	SEG[139]	1305	-1109
254	SEG[60]	-1065	-1109	294	SEG[100]	135	-1109	334	SEG[140]	1335	-1109
255	SEG[61]	-1035	-1109	295	SEG[101]	165	-1109	335	SEG[141]	1365	-1109
256	SEG[62]	-1005	-1109	296	SEG[102]	195	-1109	336	SEG[142]	1395	-1109
257	SEG[63]	-975	-1109	297	SEG[103]	225	-1109	337	SEG[143]	1425	-1109
258	SEG[64]	-945	-1109	298	SEG[104]	255	-1109	338	SEG[144]	1455	-1109
259	SEG[65]	-915	-1109	299	SEG[105]	285	-1109	339	SEG[145]	1485	-1109
260	SEG[66]	-885	-1109	300	SEG[106]	315	-1109	340	SEG[146]	1515	-1109
261	SEG[67]	-855	-1109	301	SEG[107]	345	-1109	341	SEG[147]	1545	-1109
262	SEG[68]	-825	-1109	302	SEG[108]	375	-1109	342	SEG[148]	1575	-1109
263	SEG[69]	-795	-1109	303	SEG[109]	405	-1109	343	SEG[149]	1605	-1109
264	SEG[70]	-765	-1109	304	SEG[110]	435	-1109	344	SEG[150]	1635	-1109
265	SEG[71]	-735	-1109	305	SEG[111]	465	-1109	345	SEG[151]	1665	-1109
266	SEG[72]	-705	-1109	306	SEG[112]	495	-1109	346	SEG[152]	1695	-1109
267	SEG[73]	-675	-1109	307	SEG[113]	525	-1109	347	SEG[153]	1725	-1109
268	SEG[74]	-645	-1109	308	SEG[114]	555	-1109	348	SEG[154]	1755	-1109
269	SEG[75]	-615	-1109	309	SEG[115]	585	-1109	349	SEG[155]	1785	-1109
270	SEG[76]	-585	-1109	310	SEG[116]	615	-1109	350	SEG[156]	1815	-1109
271	SEG[77]	-555	-1109	311	SEG[117]	645	-1109	351	SEG[157]	1845	-1109
272	SEG[78]	-525	-1109	312	SEG[118]	675	-1109	352	SEG[158]	1875	-1109
273	SEG[79]	-495	-1109	313	SEG[119]	705	-1109	353	SEG[159]	1905	-1109
274	SEG[80]	-465	-1109	314	SEG[120]	735	-1109	354	SEG[160]	1935	-1109
275	SEG[81]	-435	-1109	315	SEG[121]	765	-1109	355	SEG[161]	1965	-1109
276	SEG[82]	-405	-1109	316	SEG[122]	795	-1109	356	SEG[162]	1995	-1109
277	SEG[83]	-375	-1109	317	SEG[123]	825	-1109	357	SEG[163]	2025	-1109
278	SEG[84]	-345	-1109	318	SEG[124]	855	-1109	358	SEG[164]	2055	-1109
279	SEG[85]	-315	-1109	319	SEG[125]	885	-1109	359	SEG[165]	2085	-1109
280	SEG[86]	-285	-1109	320	SEG[126]	915	-1109	360	SEG[166]	2115	-1109

■ PAD LOCATION (1/17 duty, SHL=1,4-4)

Unit: (um)

PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y	PAD No.	PAD Name	X	Y
361	SEG[167]	2145	-1109	401	COM[0]	3064	-246				
362	SEG[168]	2175	-1109	402	NC	3064	-216				
363	SEG[169]	2205	-1109	403	NC	3064	-186				
364	SEG[170]	2235	-1109	404	NC	3064	-156				
365	SEG[171]	2265	-1109	405	NC	3064	-126				
366	SEG[172]	2295	-1109	406	NC	3064	-96				
367	SEG[173]	2325	-1109	407	NC	3064	-66				
368	SEG[174]	2355	-1109	408	NC	3064	-36				
369	SEG[175]	2385	-1109	409	NC	3064	-6				
370	SEG[176]	2415	-1109	410	NC	3064	24				
371	SEG[177]	2445	-1109	411	NC	3064	54				
372	SEG[178]	2475	-1109	412	NC	3064	84				
373	SEG[179]	2505	-1109	413	NC	3064	114				
374	SEG[180]	2535	-1109	414	NC	3064	144				
375	SEG[181]	2565	-1109	415	NC	3064	174				
376	SEG[182]	2595	-1109	416	NC	3064	204				
377	SEG[183]	2625	-1109	417	NC	3064	234				
378	SEG[184]	2655	-1109	418	NC	3064	264				
379	SEG[185]	2685	-1109	419	NC	3064	294				
380	SEG[186]	2715	-1109	420	NC	3064	324				
381	SEG[187]	2745	-1109	421	NC	3064	354				
382	SEG[188]	2775	-1109	422	NC	3064	384				
383	SEG[189]	2805	-1109	423	NC	3064	414				
384	SEG[190]	2835	-1109	424	NC	3064	444				
385	SEG[191]	2865	-1109	425	NC	3064	474				
386	COM[15]	3064	-696	426	NC	3064	504				
387	COM[14]	3064	-666	427	NC	3064	534				
388	COM[13]	3064	-636	428	NC	3064	564				
389	COM[12]	3064	-606	429	NC	3064	594				
390	COM[11]	3064	-576	430	NC	3064	624				
391	COM[10]	3064	-546	431	NC	3064	654				
392	COM[9]	3064	-516	432	NC	3064	684				
393	COM[8]	3064	-486	433	NC	3064	714				
394	COM[7]	3064	-456	434	COMS2	3064	744				
395	COM[6]	3064	-426								
396	COM[5]	3064	-396								
397	COM[4]	3064	-366								
398	COM[3]	3064	-336								
399	COM[2]	3064	-306								
400	COM[1]	3064	-276								

■ PIN DESCRIPTION

Pin Name	I/O	Description	No. of Pins																										
LCD driver outputs																													
SEG0 to SEG191	O	<p>LCD segment driver outputs This display data and the FRR signal control the output voltage of segment driver.</p> <table border="1"> <thead> <tr> <th rowspan="2">Display data</th> <th rowspan="2">FRR</th> <th colspan="2">Segment driver output voltage</th> </tr> <tr> <th>Normal display</th> <th>Reverse display</th> </tr> </thead> <tbody> <tr> <td>H</td> <td>H</td> <td>VLCD(V0)</td> <td>V₂</td> </tr> <tr> <td>H</td> <td>L</td> <td>V_{SS}</td> <td>V₃</td> </tr> <tr> <td>L</td> <td>H</td> <td>V₂</td> <td>VLCD(V0)</td> </tr> <tr> <td>L</td> <td>L</td> <td>V₃</td> <td>V_{SS}</td> </tr> <tr> <td colspan="2">Power save mode</td> <td>V_{SS}</td> <td>V_{SS}</td> </tr> </tbody> </table>	Display data	FRR	Segment driver output voltage		Normal display	Reverse display	H	H	VLCD(V0)	V ₂	H	L	V _{SS}	V ₃	L	H	V ₂	VLCD(V0)	L	L	V ₃	V _{SS}	Power save mode		V _{SS}	V _{SS}	192
Display data	FRR	Segment driver output voltage																											
		Normal display	Reverse display																										
H	H	VLCD(V0)	V ₂																										
H	L	V _{SS}	V ₃																										
L	H	V ₂	VLCD(V0)																										
L	L	V ₃	V _{SS}																										
Power save mode		V _{SS}	V _{SS}																										
COM0 to COM95	O	<p>LCD common driver outputs This internal scanning data and FRR signal control the output voltage of common driver.</p> <table border="1"> <thead> <tr> <th rowspan="2">Display data</th> <th rowspan="2">FRR</th> <th colspan="2">Common driver output voltage</th> </tr> <tr> <th>Normal display</th> <th>Reverse display</th> </tr> </thead> <tbody> <tr> <td>H</td> <td>H</td> <td colspan="2">V_{SS}</td> </tr> <tr> <td>H</td> <td>L</td> <td colspan="2">VLCD(V0)</td> </tr> <tr> <td>L</td> <td>H</td> <td colspan="2">V₁</td> </tr> <tr> <td>L</td> <td>L</td> <td colspan="2">V₄</td> </tr> <tr> <td colspan="2">Power save mode</td> <td colspan="2">V_{SS}</td> </tr> </tbody> </table>	Display data	FRR	Common driver output voltage		Normal display	Reverse display	H	H	V _{SS}		H	L	VLCD(V0)		L	H	V ₁		L	L	V ₄		Power save mode		V _{SS}		96
Display data	FRR	Common driver output voltage																											
		Normal display	Reverse display																										
H	H	V _{SS}																											
H	L	VLCD(V0)																											
L	H	V ₁																											
L	L	V ₄																											
Power save mode		V _{SS}																											
COMS1, COMS2	O	<p>Common output for the icons The output signals of two pins are same. When not used, this pin should be left open.</p>	2																										

Pin Name	I/O	Description	No. of Pins																												
LCD Driver Setting pins and signal output pins																															
PSB	I	Microprocessor interface select input pin PSB= "H ": parallel data input. PSB= "L ": serial data input. (3-line/4-line serial or IIC serial interface) When 4-line serial interface is applied, D0 to D5 are fixed to "H ", E and R/W are fixed to "H ". When 3-line serial interface is applied, D0 to D5 are fixed to " H ",E and R/W are fixed to " H ",A0 is fixed to "L"	1																												
C86	I	Input mode select <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>PSB</th> <th>C86</th> <th>Interface</th> </tr> </thead> <tbody> <tr> <td>" H "</td> <td>" H "</td> <td>6800-series 8 bit /4 bit parallel MPU interface</td> </tr> <tr> <td>" L "</td> <td>" H "</td> <td>3-SPI/4-SPI MPU interface</td> </tr> <tr> <td>" L "</td> <td>" L "</td> <td>IIC serial interface</td> </tr> </tbody> </table>	PSB	C86	Interface	" H "	" H "	6800-series 8 bit /4 bit parallel MPU interface	" L "	" H "	3-SPI/4-SPI MPU interface	" L "	" L "	IIC serial interface	1																
PSB	C86	Interface																													
" H "	" H "	6800-series 8 bit /4 bit parallel MPU interface																													
" L "	" H "	3-SPI/4-SPI MPU interface																													
" L "	" L "	IIC serial interface																													
CLL	I/O	Input/output. I/O selection ● CLS = "H" : Output ● CLS = "L" : Input	1																												
CLS	I	Oscillator select When the on-chip oscillator is used, this input must be connected to VDD. When the external clock input is used, this input must be connected to VSS. An external clock is connected to CLL pin.	1																												
IRS	I	This terminal selects the resistors for the V0 voltage level adjustment. IRS = "H": Use the internal resistors. IRS = "L": Do not use the internal resistors. The V0 voltage level is regulated by an external resistive voltage divider attached to the VRAB terminal	1																												
NW0, NW1, NW2	I	Use these pins can select duty mode: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>NW2</th> <th>NW1</th> <th>NW0</th> <th>Duty Select</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>1</td> <td>97 x 192</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>81 x 192</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>65 x 192</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>49 x 192</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>33 x 192</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>17 x 192</td> </tr> </tbody> </table>	NW2	NW1	NW0	Duty Select	1	0	1	97 x 192	1	0	0	81 x 192	0	1	1	65 x 192	0	1	0	49 x 192	0	0	1	33 x 192	0	0	0	17 x 192	3
NW2	NW1	NW0	Duty Select																												
1	0	1	97 x 192																												
1	0	0	81 x 192																												
0	1	1	65 x 192																												
0	1	0	49 x 192																												
0	0	1	33 x 192																												
0	0	0	17 x 192																												

Pin Name	I/O	Description	No. of Pins				
System Bus Connection Pins							
CS1B,CS2	I	Chip select input pins Data/instruction I/O is enabled only when CS1B is "L" and CS2 is "H". When chip select is non-active, DB0 to DB7 is high impedance.	2				
RSTP	I	Reset input pin When RSTP is "L", initialization is executed.	1				
A0 (RS)	I	It determines whether the data bits are data or a command. A0=" H ": Indicates that D0 to D7 are display data. A0=" L ": Indicates that D0 to D7 are control data. There is no A0 pin in IIC interface, so this pin can fix to " L "	1				
RW	I	Read/Write execution control pin <table border="1" data-bbox="635 815 1112 943"> <thead> <tr> <th>PIN</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>RW</td> <td>Read/Write control input pin RW=" H ": read RW=" L ": write</td> </tr> </tbody> </table> When in the serial interface must fixed to "H".	PIN	Description	RW	Read/Write control input pin RW=" H ": read RW=" L ": write	1
PIN	Description						
RW	Read/Write control input pin RW=" H ": read RW=" L ": write						
E	I	Read/Write execution control pin <table border="1" data-bbox="641 1010 1106 1261"> <thead> <tr> <th>PIN</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>Read/Write control input pin R/W=" H ": When E is "H", D0 to D7 are in an output status. R/W=" L ": The data on D0 to D7 are latched at the falling edge of the E signal.</td> </tr> </tbody> </table> When in the serial interface must fixed to "H".	PIN	Description	E	Read/Write control input pin R/W=" H ": When E is "H", D0 to D7 are in an output status. R/W=" L ": The data on D0 to D7 are latched at the falling edge of the E signal.	1
PIN	Description						
E	Read/Write control input pin R/W=" H ": When E is "H", D0 to D7 are in an output status. R/W=" L ": The data on D0 to D7 are latched at the falling edge of the E signal.						

<p>D5 to D0 D6/SDA/SCLK D7 /SI/SCL</p>	<p>I/O</p>	<p>When the Parallel interface is selected (PSB=" H " & C86= "H"): 8-bit interface 8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus. When chip select is not active, D0 to D7 is high impedance. (PSB=" H " & C86= "H"): 4-bit interface In 4-bit mode, D4 to D7 connect to microprocessor data bus, the D0 to D3 connect to high impedance.</p> <hr/> <p>When the serial interface is selected (PSB="L" & C86="H"):3/4-line SPI Interface D7: serial input data (SI) D6: serial input clock (SCLK) D5, D4, D3, D2, D1, D0: must fixed to "H".. When chip select is not active, D0 to D7 is high impedance. In 3-SPI interface, A0 pin must fixed to "L"</p> <hr/> <p>When the IIC serial interface is selected (PSB="L" & C86="L"): IIC Interface D0 is SA0 D1 is SA1 <u>SA1, SA0: Is slave address bit1 and bit0, must fixed to "H" or "L".</u> D2,D3 are SDA_OUT D4,D5,D6 are SDA_IN D7 is SCL D6(SDA_IN): serial input data SDA_OUT: serial data acknowledge output for the I²C interface. D7(SCL): serial clock input By connecting SDA_OUT to SDA_IN externally, the SDA line becomes fully 2-line interface compatible. Having the acknowledge output separated from the serial data line is advantageous in chip on glass (COG) applications. In COG application where the track resistance from the SDA_OUT pad to the system SDA line can be significant, a potential divider is generated by the bus pull-up resistor and the ITO track resistance. It is possible the during the acknowledge cycle the RW1097 will not be able to create a valid logic 0 level. By splitting the SDA_IN input from the SDA_OUT output the device could be used in a mode that ignores the acknowledge bit. In COG applications where the acknowledge cycle is required, it is necessary to minimize the track resistance from the SDA_OUT pad to the system SDA line to guarantee a valid low level. All Pad of SDA_IN, SDA_OUT must be connected together (SDA)</p>	<p>8</p>
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Power Supply Pins			
VSS	Power Supply	Digital Ground. The 2 supply rails VSS and VSS2 must be connected together at the FPC side	2
VSS2	Power Supply	Analog Ground The 2 supply rails VSS and VSS2 must be connected together at the FPC side	6
VDD	Power Supply	Digital Supply voltage. The 2 supply rails V _{DD} and V _{DD2} could be connected together. If Digital Option pin is high, must be this level.	8
VDD2	Power Supply	Power supply for DC/DC voltage converter The 2 supply rails V _{DD} and V _{DD2} could be connected together.	9
VOUT	O	DC/DC voltage converter. Connect a capacitor between this terminal and VSS.	8
CAP1P	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.	2
CAP1N	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1P terminal.	4
CAP2P	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2N terminal.	2
CAP2N	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2P terminal.	4
CAP3P	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.	2
CAP4P	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2N terminal.	2
CAP5P	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.	2
CAP6P	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2N terminal.	2
V0, V1, V2, V3, V4	Power Supply	This is a multi-level power supply for the liquid crystal. VOUT ≥ V0 ≥ V1 ≥ V2 ≥ V3 ≥ V4 ≥ VSS	14
VRS	Power Supply	Monitor Voltage Regulator level, must be left open.	1
VRAB	I	Output voltage regulator terminal. Provides the voltage between VSS and V0 through a resistive voltage divider. IRS = "L": the V0 voltage regulator internal resistors are not used. IRS = "H": the V0 voltage regulator internal resistors are used.	1
LX,EXD	I/O	Inductor type regulator pins	3
Test Pin			
Test[0]~Test[11]		For test used. Test[0]~Test[11] must floating	12

RW1097 I/O PIN ITO resistance Limitation

PIN Name	ITO Resister
C86 , PSB ,NW0,NW1,NW2, CLS,IRS	No Limitation
VDD, VDD2,VSS,VSS2, VOUT ,V0, VRAB,EXD,LX	<100Ω
V1 , V2 , V3 , V4 , CAP1P , CAP1N , CAP2P , CAP2N , CAP3P , CAP4P , CAP5P,CAP6P	<500Ω
CS1B ,CS2, E , RW , A0 , D0~D7	<1KΩ
RSTP	<10KΩ
TEST0...11	Floating

■ FUNCTION DESCRIPTION

● The MPU Interface

With the RW1097 chips data transfer are done through an 8-bit parallel data bus (DB0 to DB7) or through a serial data input (SI). Through selecting the PSB/C86 terminal polarity to the “H” or “L” it is possible to select either parallel data input or serial data input as shown in Table 1.

Table 1.

Interface	PSB	C86	CS1B	CS2	A0(RS)	E	RW	D7	D6	D5	D4	D3~D0
8-bit 6800	H	H	CS1B	CS2	A0	E	RW	D7	D6	D5~D0		
4-bit 6800	H	H	CS1B	CS2	A0	E	RW	D7	D6	D5	D4	H
4-SPI	L	H	CS1B	H	A0	H	H	SI	SCLK	H	H	H
3-SPI	L	H	CS1B	H	L	H	H	SI	SCLK	H	H	H
IIC	L	L	H	H	L	H	H	SCL	SDA_IN		D2~D3:SDA_OUT D1~ D0:SA1~SA0	

Parallel Interface:

Parallel bus are selected by PSB and C86 input, and 4-bit and 8-bit parallel bus is selected by IF bit in the instruction register.

During read or write operation, two 8-bit registers are used. One is data register (DR), the other is instruction register (IR). The data register (DR) is used as temporary data storage place for being written into or read from DDRAM/CGRAM/SEGRAM, target RAM is selected by RAM address setting instruction. Each internal operation, reading from or writing into RAM, is done automatically.

So to speak, after MPU reads DR data, the data in the next DDRAM/CGRAM/SEGRAM address is transferred into DR automatically. Also after MPU writes data to DR, the data in DR is transferred into DDRAM/CGRAM/SEGRAM automatically.

The Instruction register (IR) is used only to store instruction code transferred from MPU. MPU cannot use it to read instruction data.

RS	RW	Operation
0	0	Instruction write operation (MPU writes Instruction code into IR)
0	1	Read busy flag (DB7) and address counter (DB0 - DB6)
1	0	Data write operation (MPU writes data into DR)
1	1	Data read operation (MPU reads data from DR)

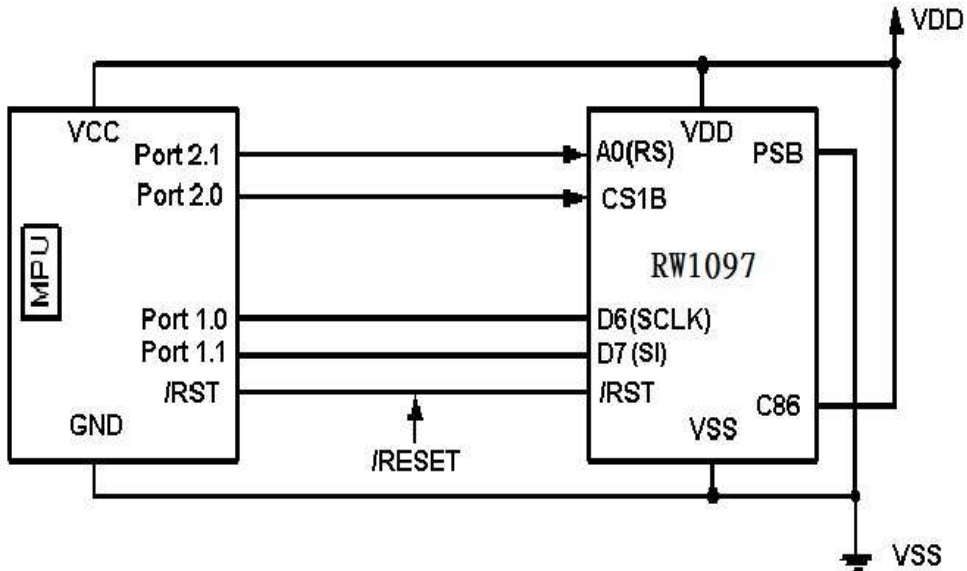
SPI Interface:

When the SPI interface has been selected (PSB="L",C86="H"),then it is possible to connect directly to an MPU through 4 pins serial interface configuration (A0 ,CS1B , SCLK , SI pin) or 3 pins serial interface (CS1B , SCLK , SI pin) configuration . Pins configuration is only difference between 4-SPI and 3-SPI.

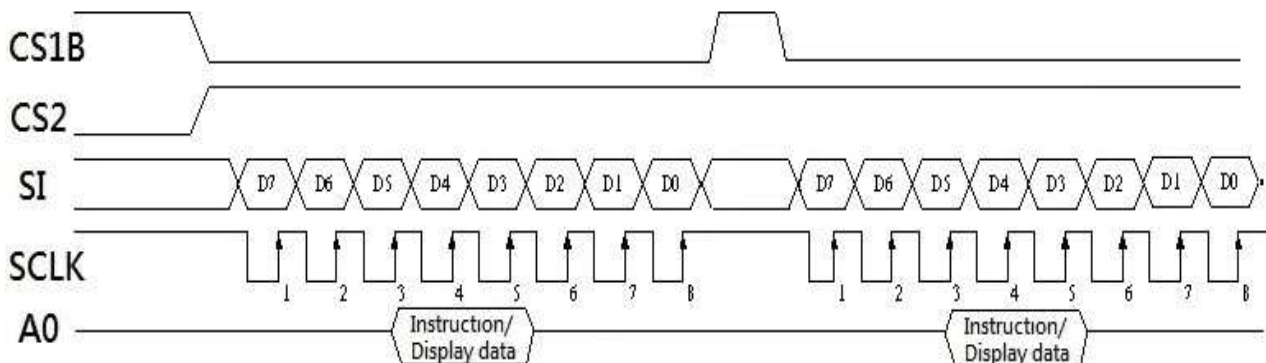
Interface	PSB	C86	CS1B	CS2	A0(RS)	E	RW	D7	D6	D5~D0
4SPI	L	H	CS1B	H	A0	H	H	SI	SCLK	H
3SPI	L	H	CS1B	H	L	H	H	SI	SCLK	H

The 4-SPI serial interface (PSB="L", C86="H")

When 4 pins serial interface configuration is used, A0 is used to realize incoming data is instruction/display data. A0 must be a certain state ("L" or "H") when chip is in active mode (CS1B="L", and CS2="H"). A0 can't be kept tri-state or floating when chip is in active mode. It should be fine if A0 is low while power up.



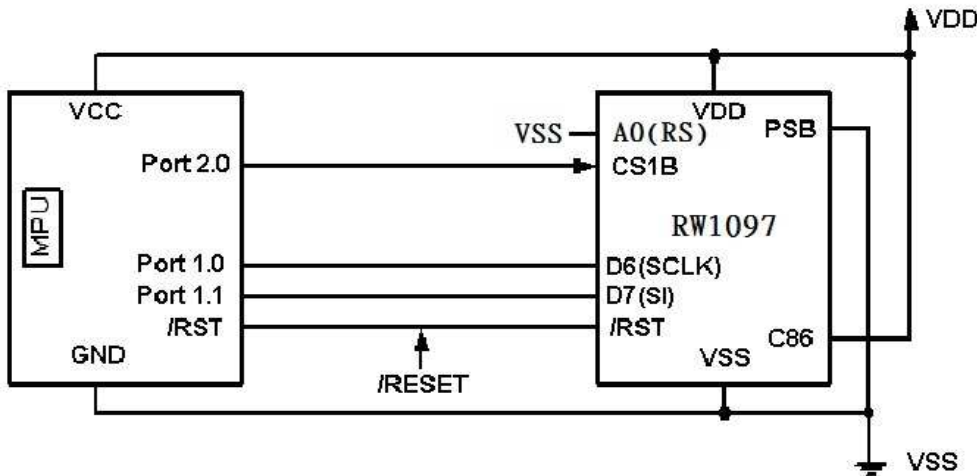
The 4-SPI example of timing sequence is shown below Figure 1.



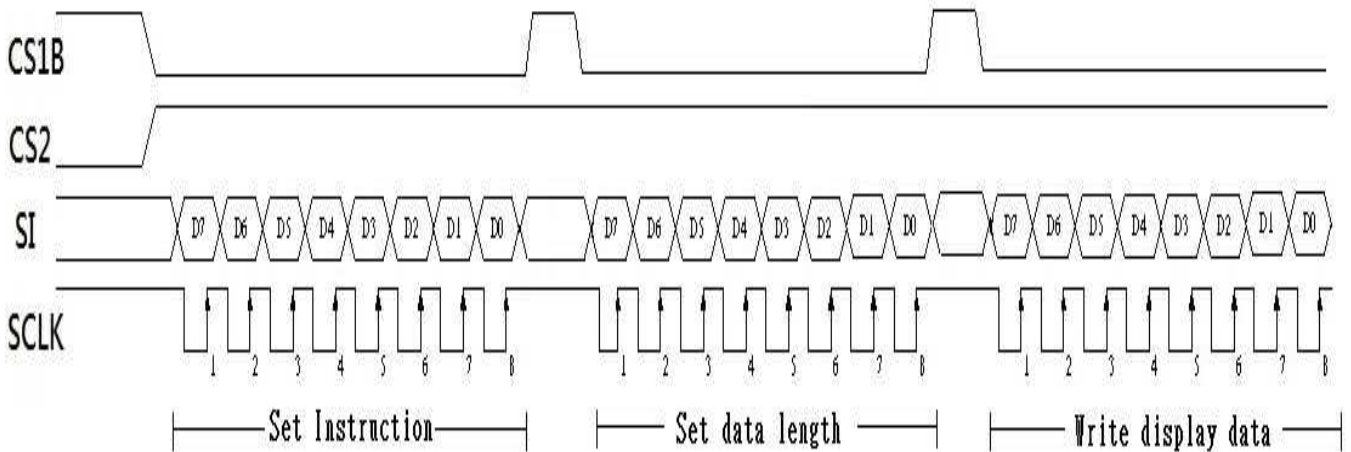
The 3-SPI serial interface (PSB="L", C86="H")

When 3 pins serial interface configuration is used, A0 must be kept "L" or connected to VSS. Data length instruction is used to realize incoming data is instruction/display data .IC will recognize the incoming data that after "Set Data length for 3-SPI instruction" as display data. User must set data length of the incoming data that after Data length instruction.

Interface	PSB	C86	CS1B	CS2	A0(RS)	E	RW	D7	D6	D5~D0
4-SPI	L	H	CS1B	H	A0	H	H	SI	SCLK	H
3-SPI	L	H	CS1B	H	L	H	H	SI	SCLK	H



The 3-SPI example of timing sequence is shown below figure2; data length instruction is followed by Display data set.



- * When the chip is not active, the shift registers and the counter are reset to their initial states.
- * **Reading is not possible while in serial interface mode (3-SPI,4-SPI and IIC interface).**
- * Caution is required on the SCLK signal when it comes to line-end reflections and external noise. We recommend that operation be rechecked on the actual equipment.

IIC Interface(PSB="L", C86="L")

The IIC interface receives and executes the commands sent via the IIC Interface. It also receives RAM data and sends it to the RAM. The IIC Interface is for bi-directional, two-line communication between different ICs or modules.

The two lines are a Serial Data line SDA and a Serial Clock line SCL. Both lines must be connected to a positive supply via a pull-up resistor. Data transfer may be initiated only when the bus is not busy.

BIT Transfer

One data bit is transferred during each clock pulse. The data on the SDA(DB6) line must remain stable during the HIGH period of the clock pulse because changes in

the data line at this time will be interpreted as a control signal. Bit transfer is illustrated in Figure 1.

START AND STOP CONDITIONS

Both data and clock lines remain HIGH when the bus is not busy. A HIGH-to-LOW transition of the data line, while the clock is HIGH is defined as the START condition (S).

A LOW-to-HIGH transition of the data line while the clock is HIGH is defined as the STOP condition (P). The START and STOP conditions are illustrated in Figure 2

SYSTEM CONFIGURATION

The system configuration is illustrated in Figure 3.

- Transmitter: the device, which sends the data to the bus.
- Receiver: the device, which receives the data from the bus.
- Master: the device, which initiates a transfer, generates clock signals and terminates a transfer.
- Slave: the device addressed by a master.

- Multi-Master: more than one master can attempt to control the bus at the same time without corrupting the message.
- Arbitration: procedure to ensure that, if more than one master simultaneously tries to control the bus, only one is allowed to do so and the message is not corrupted.
- Synchronization: procedure to synchronize the clock signals of two or more devices.

ACKNOWLEDGE

Each byte of eight bits is followed by an acknowledge bit. The acknowledge bit is a HIGH signal put on the bus by the transmitter during which time the master generates an extra acknowledge related clock pulse. A slave receiver which is addressed must generate an acknowledge after the reception of each byte. A master receiver must also generate an acknowledge after the reception of each byte that has been clocked out of the slave transmitter. The device that acknowledges must pull-down the SDA line during the acknowledge clock

pulse, so that the SDA line is stable LOW during the HIGH period of the acknowledge related clock pulse (set-up and hold times must be taken into consideration). A master receiver must signal an end-of-data to the transmitter by not generating an acknowledge on the last byte that has been clocked out of the slave. In this event the transmitter must leave the data line HIGH to enable the master to generate a STOP condition. Acknowledgement on the IIC Interface is illustrated in Figure 4.

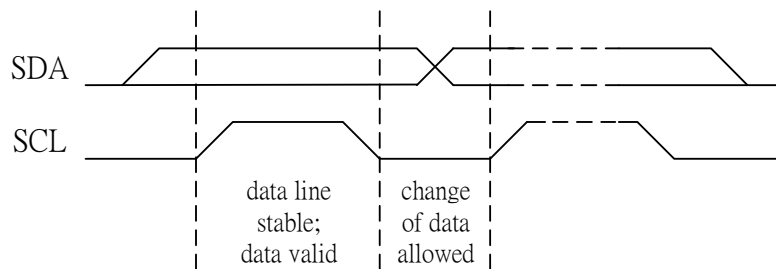


Figure 1 Bit transfer

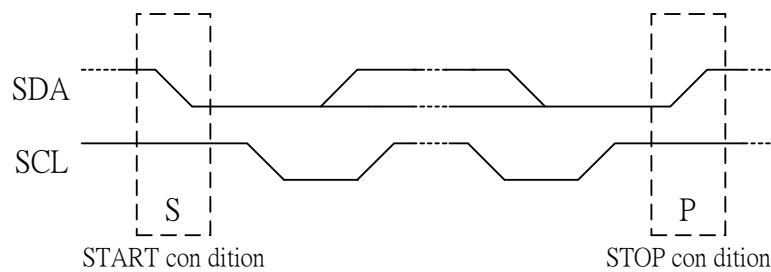


Figure 2 Definition of START and STOP conditions

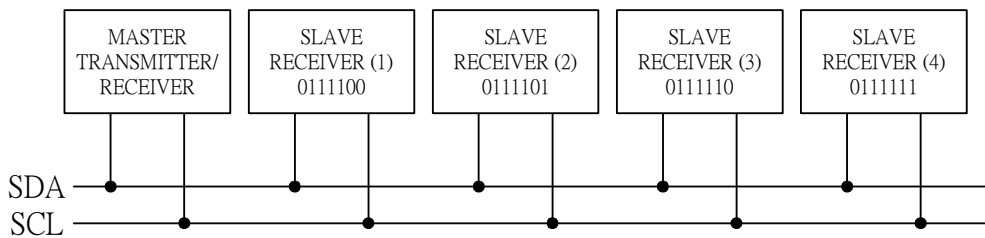


Figure 3 System configuration

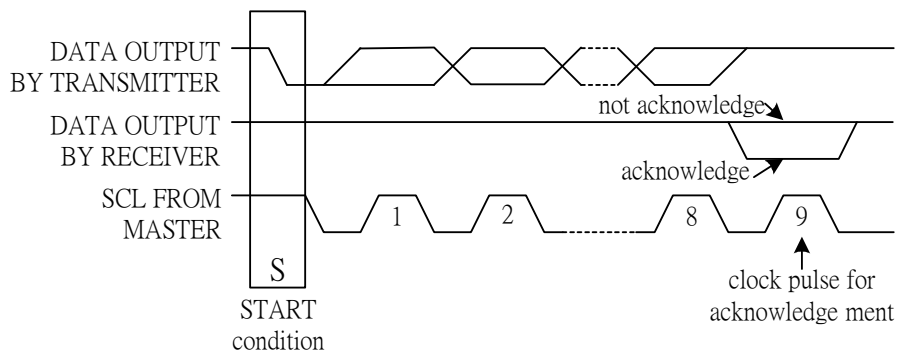


Figure 4 Acknowledgement on the 2-line Interface

IIC Interface Protocol

The RW1097 supports command, data write addressed slaves on the bus.
 Before any data is transmitted on the IIC Interface, the device, which should respond, is addressed first. Four 7-bit slave addresses (0111100, 0111101, 0111110 and 0111111)

are reserved for the RW1097. The least significant bit of the slave address is set by connecting the input (D0) SA0 and (D1) SA1 to either logic 0 (VSS) or logic 1 (VDD).
 The IIC Interface protocol is illustrated in Figure 5.

The sequence is initiated with a START condition (S) from the IIC Interface master, which is followed by the slave address. All slaves with the corresponding address acknowledge in parallel, all the others will ignore the IIC Interface transfer. After acknowledgement, one or more command words follow which define the status of the addressed slaves.

A command word consists of a control byte, which defines Co and A0, plus a data byte. The last control byte is tagged with a cleared most significant bit (i.e. the continuation bit Co). After a control byte with a cleared Co bit, only data bytes will follow. The state of the A0 bit defines whether the data byte is interpreted as a command or as RAM data. All addressed slaves on the bus also acknowledge the control and data bytes. After the last control byte, depending on the A0 bit setting; either a series of display data bytes or command data bytes may follow. If the A0 bit is set to logic 1, these display bytes are stored in the display RAM at the address specified by the data pointer. The data pointer is automatically updated and the data is directed to the intended RW1092 device. If the A0 bit of the last control byte is set to logic 0, these command bytes will be decoded and the setting of the device will be changed according to the received commands. Only the addressed slave makes the acknowledgement after each byte. At the end of the transmission the IIC INTERFACE-bus master issues a STOP condition (P).

Write Mode

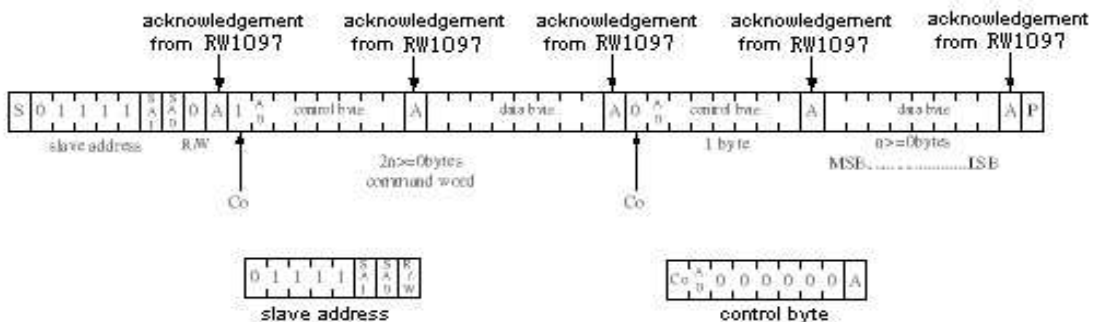


Figure 5 2-line Interface protocol

Co	0	Last control byte to be sent. Only a stream of data bytes is allowed to follow. This stream may only be terminated by a STOP or RE-START condition.
	1	Another control byte will follow the data byte unless a STOP or RE-START condition is received.

* Reading is not possible while in serial interface mode (3SPI, 4SPI and IIC interface).

- **The Chip Select**

The RW1097 have two chips select terminals: CS1B and CS2. The MPU interface or the serial is enable only when CS1B="L" and CS2="H".

When the chip select is inactive, DB0 to DB7 enter a high impedance state, and the A0, E and RW inputs are inactive. When the serial interface is selected, the shift register and the counter are reset.

- **BUSY FLAG (BF)**

When BF = "High", it indicates that the internal operation is being processed. So during this time the next instruction cannot be accepted. BF can be read, when A0 = Low and RW = High (Read Instruction Operation), through DB7 Before executing the next instruction, be sure that BF is not High.

- **Address counter (AC)**

Address counter (AC) is used for address pointer of DDRAM/SEGRAM. (AC) can be set by instruction and after data read or write to the memories (AC) will increase or decrease by 1 according to the setting in "entry mode set". When A0="0"and RW="1"and E="1" the value of (AC) will output to DB6~DB0.

- **CURSOR/BLINK CONTROL CIRCUIT**

It controls cursor/blink ON/OFF and black/white inversion at cursor position.

- **LCD DRIVER CIRCUIT**

LCD driver have 97 commons and 192 segments to drive the LCD panel.

Segment data from CGRAM /CGROM /HCGROM/SEGRAM are shifted into the 192 bits segment latches serially, and then it is stored to 192 bit shift latch. When each COM is selected by 97 bits common register, segment data also output through segment driver from 192 bits segment latch. Please refer below display duty mode:

1-line display mode, COM0-COM15 and COMS1/COMS2 have 1/17 duty.

2-line display mode, COM0-COM31 and COMS1/COMS2 have 1/33 duty.

3-line display mode, COM0-COM47 and COMS1/COMS2 have 1/49 duty.

4-line display mode, COM0-COM63 and COMS1/COMS2 have 1/65 duty.

5-line display mode, COM0-COM79 and COMS1/COMS2 have 1/81 duty.

6-line display mode, COM0-COM95 and COMS1/COMS2 have 1/97 duty.

● **16x16 character generation ROM (CGROM) and 8x16 half height ROM (HCGROM)**

RW1097 provides character generation ROM supporting 8192 sets 16 x 16 character fonts and 128 sets 8 x 16 alphanumeric characters. It supports multi languages application such as Chinese or Japanese or Korean and English. Two consecutive bytes are used to specify one 16x16 character or two 8x16 half-height characters. Character codes are written into DDRAM and the corresponding fonts are mapped from CGROM or HCGROM to the display drivers. Customized HCGROM data is acceptable.

HCGROM Font Data										HCGROM show in Display
b7-4 b3-0	0000	0001	0010	0011	0100	0101	0110	0111		
0000				0	@P	~	p			
0001			!	1	AQ	a	q			
0010		~	2	B	R	b	r			
0011		#	3	C	S	c	s			
0100		\$	4	D	T	d	t			
0101		%	5	E	U	e	u			
0110		&	6	F	V	f	v			
0111		'	7	G	W	g	w			
1000		(	8	H	X	h	x		
1001		)	9	I	Y	i	y		
1010		*	:	J	Z	j	z			
1011		+	:	K	[	k	{		
1100		,	<	L	\	l	|			
1101		-	=	M	]	m	}		
1110		.	>	N	^	n	~			
1111		/	?@	_	o	o	o	o	o	

Table 1.RW1097-0A-001 HCGROM Font Data

● **Character generation RAM (CGRAM)**

RW1097 provides RAM to support 72 sets 16x16 bits user-defined fonts. These user-defined characters are displayed the same ways as CGROM fonts through writing character font code A0A0H ~ A0AFH, A0B0H ~ A0BFH, A0C0H ~ A0CFH, A0D0H ~ A0DFH, A0E0H ~ A0E7H to DDRAM.

Table 2 Relationship between CGRAM Address and Display Pattern

DDRAM DATA (FONT CODE)								CGRAM ADDRESS (bit10~bit4)				CGRAM ADDRESS (bit3~bit0)				CGRAM DATA (High Byte)								CGRAM DATA (Low Byte)																														
B15~B8	B7	B6	B5	B4	B3	B2	B1	B0	A6	A5	A4	A3	A2	A1	A0	C3	C2	C1	C0	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0																			
10100000 (0XA0H)	10100000 (0XA0H)							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
															0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
															1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0		
															0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
															0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
															0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
															0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
															0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
															1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
															1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
															1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
															1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
															1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
															1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10100000 (0XA0H)	10100001 (0XA1H)							0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0														
														0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
														0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
														0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
														0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
														0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
														0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
														0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
														0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
														1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
														1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
														1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
														1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
														1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0														
1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0														
1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0														
10100000 (0XA0H)	:								:					:	user-defined font data																																							
10100000 (0XA0H)	11100111 (0XE7H)								1000111					0000 ∫ 1111	user-defined font data																																							

Note: 1. CGRAM address bit10~bit4 can be specified by set CGRAM address command, bit3~bit0 are not accessible by user.
2. CGRAM data for each address is 16 bits.

● **SEGRAM (SEGMENT ICON RAM)**

SEGRAM has segment control data and segment pattern data. There are 2 ICON pins (COMS1/COMS2) act as the COM line to display the icon SEGRAM data. The outputs of these 2 ICON pins are exactly the same.

Table 3. Relationship between SEGRAM Address and Display Pattern

SEGRAM Address				SEGRAM Data Display Pattern															
				High Byte								Low Byte							
A3	A2	A1	A0	D7	D6	D5	D4	D3	D2	D1	D0	D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	0	S0	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
0	0	0	1	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30	S31
0	0	1	0	S32	S33	S34	S35	S36	S37	S38	S39	S40	S41	S42	S43	S44	S45	S46	S47
0	0	1	1	S48	S49	S50	S51	S52	S53	S54	S55	S56	S57	S58	S59	S60	S61	S62	S63
0	1	0	0	S64	S65	S66	S67	S68	S69	S70	S71	S72	S73	S74	S75	S76	S77	S78	S79
0	1	0	1	S80	S81	S82	S83	S84	S85	S86	S87	S88	S89	S90	S91	S92	S93	S94	S95
0	1	1	0	S96	S97	S98	S99	S100	S101	S102	S103	S104	S105	S106	S107	S108	S109	S110	S111
0	1	1	1	S112	S113	S114	S115	S116	S117	S118	S119	S120	S121	S122	S123	S124	S125	S126	S127
1	0	0	0	S128	S129	S130	S131	S132	S133	S134	S135	S136	S137	S138	S139	S140	S141	S142	S143
1	0	0	1	S144	S145	S146	S147	S148	S149	S150	S151	S152	S153	S154	S155	S156	S157	S158	S159
1	0	1	0	S160	S161	S162	S163	S164	S165	S166	S167	S168	S169	S170	S171	S172	S173	S174	S175
1	0	1	1	S176	S177	S178	S179	S180	S181	S182	S183	S184	S185	S186	S187	S188	S189	S190	S191
1	1	0	0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1	1	0	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1	1	1	0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1	1	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

● **DISPLAY DATA RAM (DDRAM)**

There are 72x2 bytes for display data RAM area. Can store display data for 12 characters (16x16) by 6 lines. The 6 line data can be displayed at a time. Character codes stored in DDRAM point to the fonts specified by CGROM · HCGROM and CGRAM. RW1097 display half height HCGROM fonts, user-defined CGRAM fonts and full 16x16 CGROM fonts. Data codes A0A0H~A0AFH, A0B0H~A0BFH, A0C0H~A0CFH, A0D0H~A0DFH, A0E0H~A0E7H are for CGRAM user-defined fonts. Data codes 00H~7FH are for half height alpha numeric fonts. Data codes (A1A0~F7FF) are for Simplified Chinese GB code.

1. display HCGROM fonts : Write 2 bytes data to DDRAM to display two 8x16 fonts. Each byte represents 1 character font. The data of each byte is 00H~7FH.
2. display CGRAM fonts : Write 2 bytes data to DDRAM to display one 16x16 font. Only A0A0H~A0AFH, A0B0H~A0BFH, A0C0H~A0CFH, A0D0H~A0DFH, A0E0H~A0E7H are allowed.
3. display CGROM fonts : Write 2 bytes data to DDRAM to display one 16x16 font. A1A0H~F7FFH are for Simplified Chinese(GB) code.

Higher byte (D15~D8) are written first and then lower byte (D7~D0)

CGRAM and CGROM font code (16 bit) can be only displayed in the start position of each DDRAM address.(H + L), HCGROM (8 x 16) can be display either " H " or " L " byte in DDRAM area.

Table 4: Relationship between DDRAM Address and Display Pattern

		CGROM/CGRAM write correct																									
DDRAM Address		00H	01H	02H	03H	04H	05H	06H	07H	08H	09H	0AH	0BH														
1 st Line	Write data	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L										
	CGROM/HCGOM/CGRAM Data	\$	R	O	C	K	W	O	R	K	S	T	E	C	H	.											
2 nd Line	DDRAM Address	10H	11H	12H	13H	14H	15H	16H	17H	18H	19H	1AH	1BH														
	Write data	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L										
	CGROM/HCGOM/CGRAM Data	芯	能	科	技	股	份	有	限	公	司	!	@	CGROM/CGRAM write incorrect													
3 rd Line	DDRAM Address	20H	21H	22H	23H	24H	25H	26H	27H	28H	29H	2AH	2BH														
	Write data	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L										
	CGROM/HCGOM/CGRAM Data	C	U	S	T	O	M	E	R	W	I	N	!	(C)	(G)	(R)	(A)	(M)	CGROM/CGRAM write incorrect								
4 th Line	DDRAM Address	30H	31H	32H	33H	34H	35H	36H	37H	38H	39H	3AH	3BH														
	Write data	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L								
	CGROM/HCGOM/CGRAM Data	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X		
5 th Line	DDRAM Address	40H	41H	42H	43H	44H	45H	46H	47H	48H	49H	4AH	4BH														
	Write data	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L		
	CGROM/HCGOM/CGRAM Data	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f	g	h	i	j	k	l	m	n		
6 th Line	DDRAM Address	50H	51H	52H	53H	54H	55H	56H	57H	58H	59H	5AH	5BH														
	Write data	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L		
	CGROM/HCGOM/CGRAM Data	靶	把	耙	霸	卑	北	爸	白	柏	百	佰	拜	CGROM/CGRAM write incorrect													

CGROM/CGRAM
write correct

■ Power Supply Circuit

The Power Supply circuits generate the voltage levels necessary to drive liquid crystal driver circuits with low power consumption and the fewest components. There are voltage converter circuits, voltage regulator circuits, and voltage follower circuits. They are controlled by power control instruction.

Table 5 shows the referenced combinations in using Power Supply circuits.

Table 5 shows the referenced combinations in using Power Supply circuits.

User setup	Power Control set (VB VR VF)	Power Control set HEX code	VB circuit	VR circuit	VF circuit	VOUT	V0	V1 to V4
External power supply used	0 0 0	0x28H	OFF	OFF	OFF	External input	External input	External input
Only booster circuit used	1 0 0	0x2CH	ON	OFF	OFF	Internal	External input	External input
booster circuit and regulator circuit used	1 1 0	0x2EH	ON	ON	OFF	Internal	Internal	External input
Internal power supply circuit used	1 1 1	0x2FH	ON	ON	ON	Internal	Internal	Internal

◆ **Voltage Converter Circuits (Capacitor type booster circuit)**

Using the step-up voltage circuits equipped within the RW1097 chips it is possible to product a 2X,3X,4X,5X,6X or 7X step-up of the VSS – VDD2 voltage levels.

2X set-up: Connect capacitor C1 between C1N and C1P, between VSS and VOUT, leave C2N open and short between C2P, C3P, C4P C5P and C6P to VOUT.

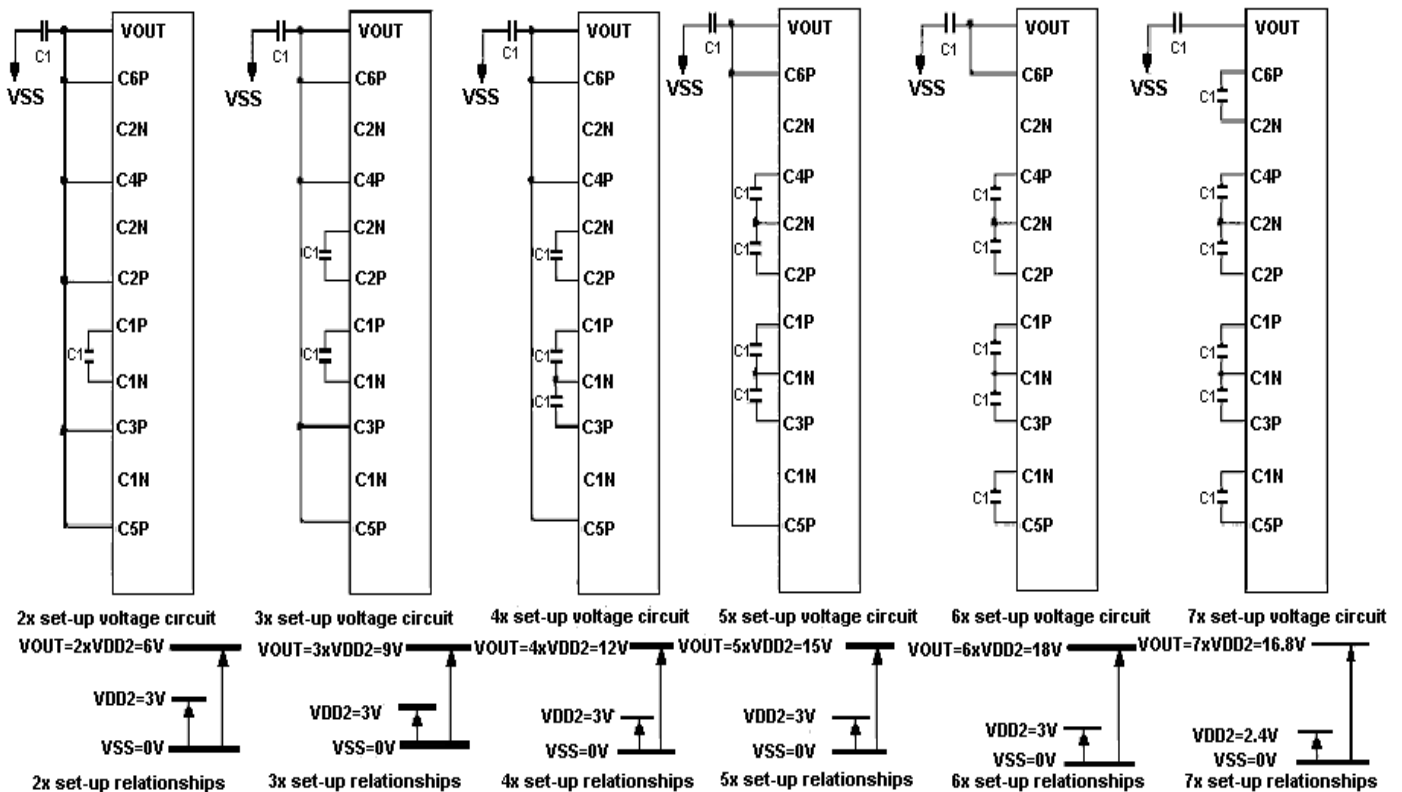
3X set-up: Connect capacitor C1 between C1N and C1P, between C2N and C2P, and between VSS and VOUT, and short between C3P, C4P C5P and C6P to VOUT.

4X set-up: Connect capacitor C1 between C1N and C1P, between C2N and C2P, between C1N and C3P, between VSS and VOUT, short between C4P ,C5P and C6P to VOUT.

5X set-up: Connect capacitor C1 between C1N and C1P, between C2N and C2P, between C1N and C3P, between C2N and C4P, and between VSS and VOUT, short between C5P and C6P to VOUT.

6X set-up: Connect capacitor C1 between C1N and C1P, between C2N and C2P, between C1N and C3P, between C2N and C4P, between C1N and C5P, and between VSS and VOUT, short C6P to VOUT.

7X set-up: Connect capacitor C1 between C1N and C1P, between C2N and C2P, between C1N and C3P, between C2N and C4P, between C1N and C5P, between C1N and C6P, and between VSS and VOUT.

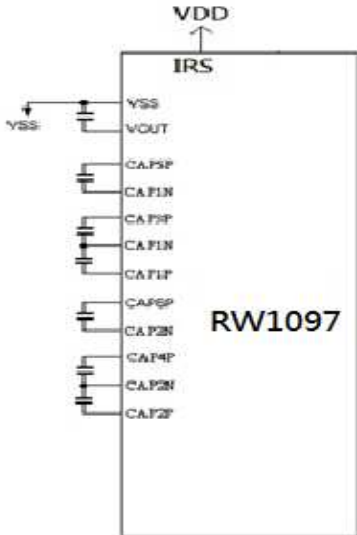


* The VDD2 voltage range must be set so that the VOUT terminal voltage does not exceed the absolute maximum rated value.

◆ **Capacitor type Booster Circuit Set-up by software**

By select DC-DC Set up (2X, 3X, 4X, 5X, 6X, 7X) commands, we could easily set the built-in capacitor type booster performance with suitable current consumption.

Booster Circuit is setting 7X



If booster circuits are setting 7X, the Select DC-DC Set-up command it can setting booster circuit to 2X~7X.

(24) Select DC-DC Set up

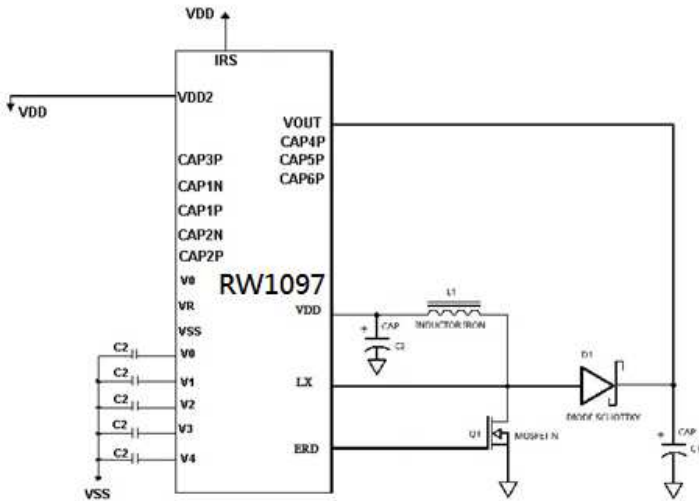
Instruction	RE1	RE2	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Select DC-DC Set up	1	1	0	0	0	0	1	0	0	DC2	DC1	DC0

Selects one of 7 DC-DC set up to reduce the power consumption by this instruction.

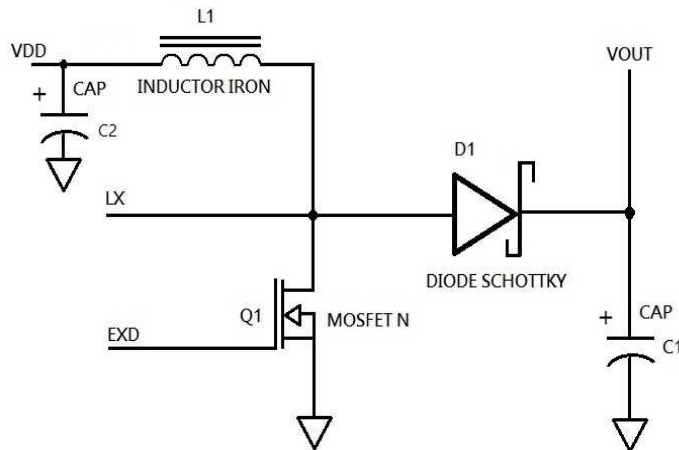
DC2	DC1	DC0	Selected DC-DC converter circuit
0	1	*	2 times boosting circuit
1	0	0	3 times boosting circuit (Default)
1	0	1	4 times boosting circuit
1	1	0	5 times boosting circuit
1	1	1	6 times boosting circuit
0	0	*	7 times boosting circuit

◆ **Inductor type regulator circuit setup:**

RW1097 has built-in a inductor type switching regulator as well, which can be selected by software.



Inductor Type Switching Regulator Circuit



- Q1:2N7002K**
- D1:1N5819**
- C1:1uF/25V~4.7uF/25V**
- C2:1uF/16V~10uF/16V**
- L1:2.2uH~10uH (IDC=80mA~100mA)**

◆ **Voltage Regulator Circuits**

The function of the internal Voltage Regulator circuits is to determine liquid crystal operating voltage, V0, by adjusting resistors, Ra and Rb, within the range of |V0| < |VOUT|. Because VOUT is the operating voltage of operational-amplifier circuits shown in Figure 1.,it is necessary to be applied internally or externally.

For the Eq. 1, we determine V0 by Ra, Rb and VEV. The Ra and Rb are connected internally or externally by IRS pin. And VEV called the voltage of electronic volume is determined by Eq. 2, where the parameter is the value selected by instruction, "Set Reference Voltage Register", within the range 0 to 63. VREF voltage at Ta= 25°C is shown in Table 6.

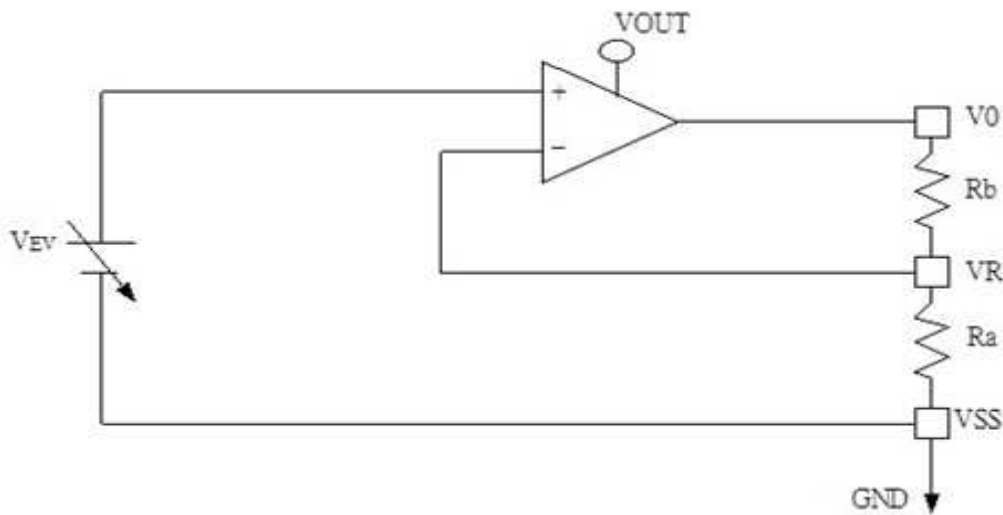


Figure 1. Internal Voltage Regulator Circuit

$$V0 = (1 + \frac{Rb}{Ra}) \times VEV [V] \text{ ----- (Eq. 1)}$$

$$VEV = (1 - \frac{(63 - \alpha)}{162}) \times VREF [V] \text{ ----- (Eq. 2)}$$

Table 6 VREF Voltage at Ta = 25°C

Temp. coefficient	VREF [V]
-0.125% / °C	2.1

In Case of Using Internal Resistors, Ra and Rb (IRS = "H")

When IRS pin is "H", resistor Ra is connected internally between VR pin and VSS, and Rb is connected between V0 and VR. We determine V0 by two instructions, "Select Regulator resistor " and "Select electronic volume register".

Table 7. Internal Rb / Ra Ratio depending on 3-bit Data (R2 R1 R0)

	3-bit data settings (R2 R1 R0)							
	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
1 + (Rb / Ra)	2.6	3.4	4.2	5.0	5.8	6.6	7.4	8.3

Figure 2. shows V0 voltage measured by adjusting internal regulator register ratio (Rb / Ra) and 6-bit electronic volume registers for each temperature coefficient at Ta = 25 °C.

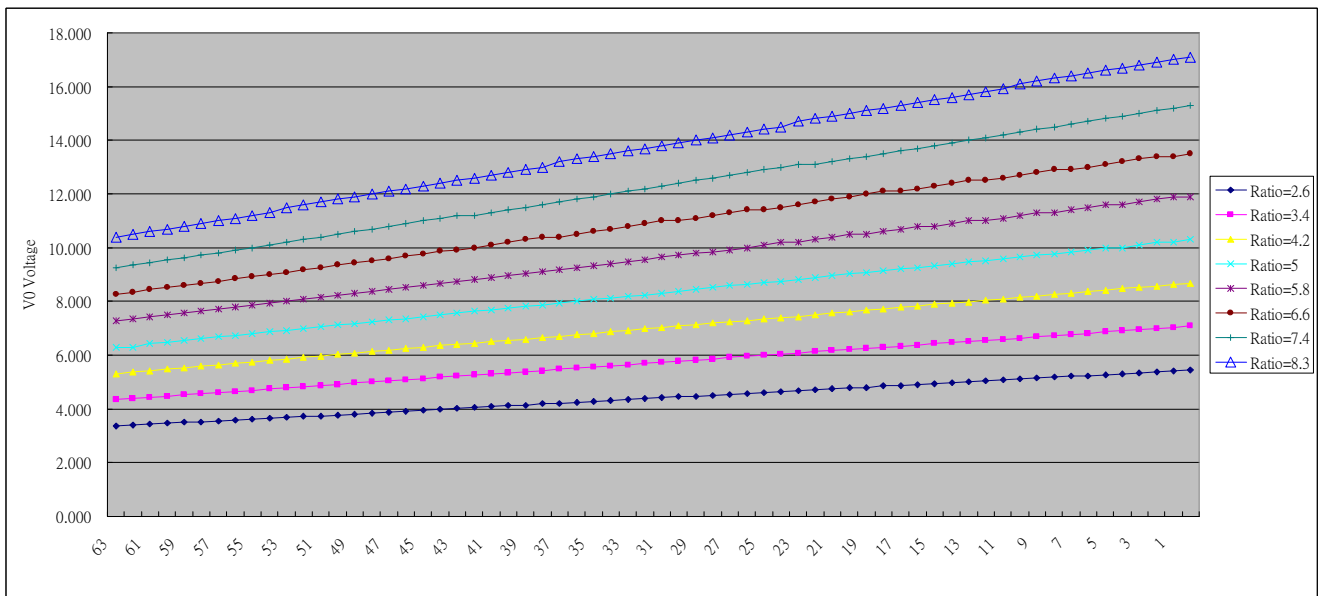


Figure 2. Electronic Volume register (α =0 to 63)

Table 8 Shows the Range of V0 depending on the above Requirements.

Table 8. The Range of V0

Ratio=000~111

	Electronic volume level (EV Value)				
	0x00H (α =63)	.....	.....	.....	0x3FH (α =0)
V0 voltage	3.3V	.....	.....	.....	17.0V

In Case of Using External Resistors, Ra and Rb (IRS = "L")

When IRS pin is "L", it is necessary to connect external regulator resistor Ra between VR and VSS, and Rb between V0 and VR.

Example: For the following requirements

1. LCD driver voltage, V0 = 10.0V.
2. 6-bit reference voltage register = (1, 0, 0, 0, 0, 0)
3. Maximum current flowing Ra, Rb = 1.5 uA

From Eq. 1

$$10 = \left(1 + \frac{R_b}{R_a}\right) \times V_{EV} \text{ [V]} \text{----- (Eq. 3)}$$

From Eq. 1

$$V_{EV} = \left(1 - \frac{(63-32)}{162}\right) \times 2.1 = 1.70 \text{ [V]} \text{----- (Eq. 4)}$$

From requirement 3

$$\frac{10}{R_a + R_b} = 1.6 \text{ [uA]} \text{----- (Eq. 5)}$$

From equations Eq.3,4 and 5

$$R_a = 1.06 \text{ [M ohms]}$$

$$R_b = 5.16 \text{ [M ohms]}$$

◆ **Voltage Follower Circuits**

V0 voltage (VLCD) is resistively divided into four voltage levels (V1, V2, V3 and V4), and those output impedance are converted by the Voltage Follower for increasing drive capability.

Table 9 shows the relationship between V1 to V4 level and each duty ratio.

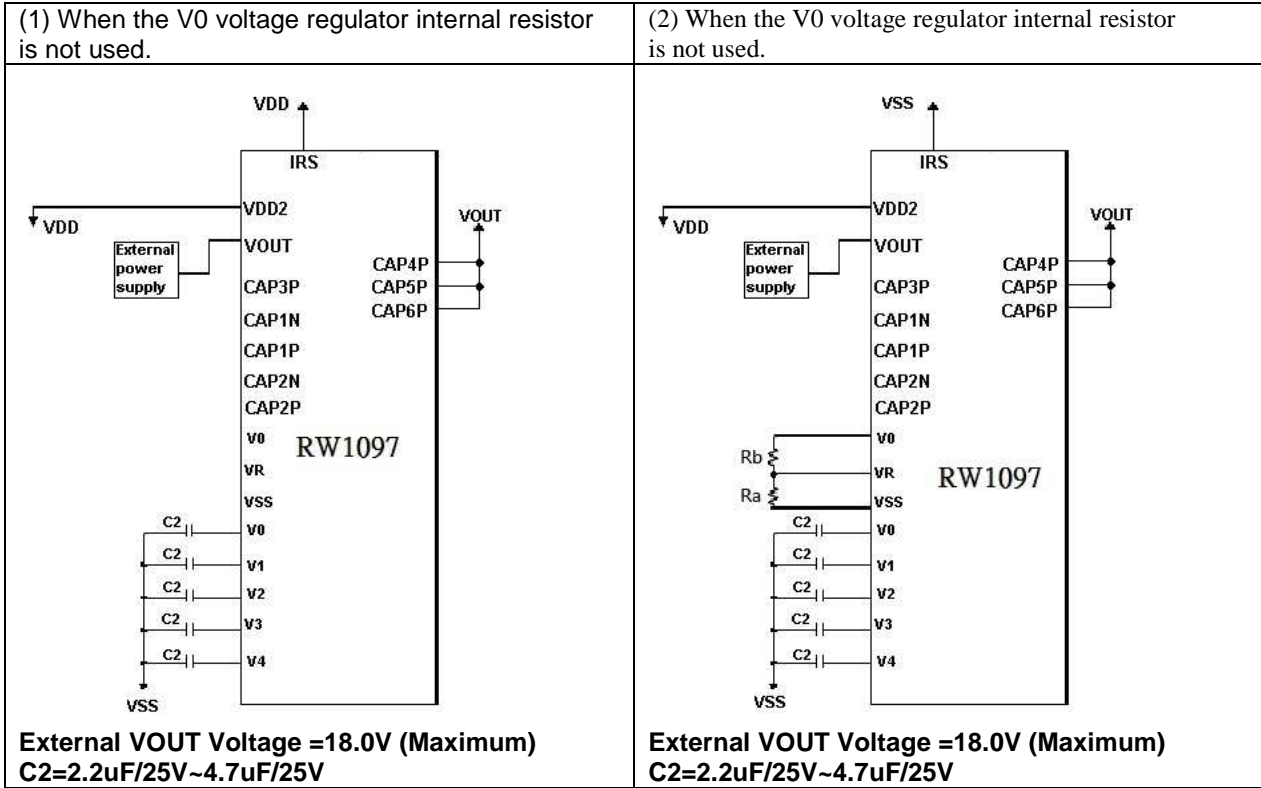
Table 9. The Relationship between V1 to V4 Level and Each Duty Ratio

LCD bias	V1	V2	V3	V4	Remarks
1/N	$(N-1)/N \times V0$	$(N-2)/N \times V0$	$2/N \times V0$	$1/N \times V0$	N = 5 to 11
1/N	$(N-1)/N \times V0$	$(N-2)/N \times V0$	$(N-2)/N \times V0$	$(N-3)/N \times V0$	N=4

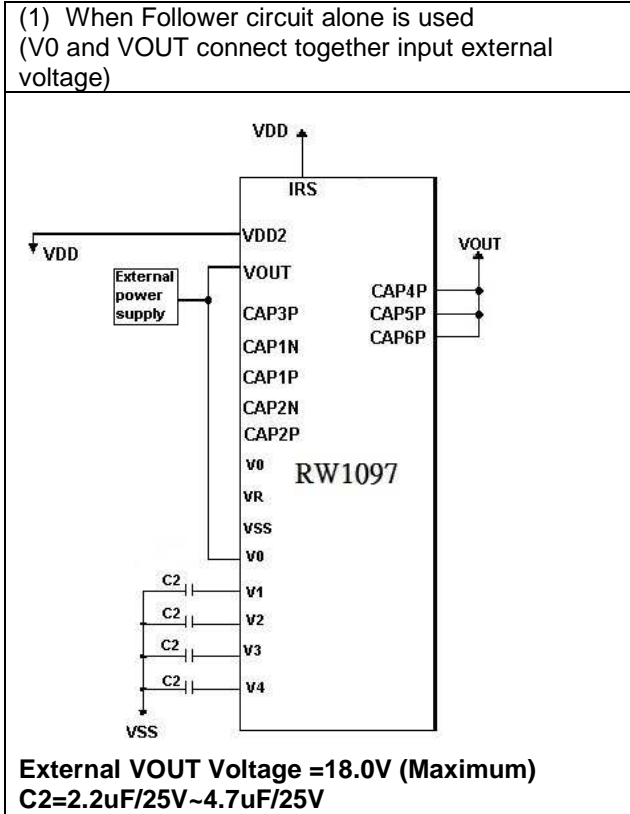
◆ **Follower voltage reference circuit:
Internal Booster:**

<p>(1) When the V0 voltage regulator internal resistor is used. (Example when VDD2= VDD, with 4x set-up)</p>	<p>(2) When the V0 voltage regulator internal resistor is not used. (Example when VDD2= VDD, with 4x set-up)</p>
<p>C1=2.2uF/25V~4.7uF/25V C2=2.2uF/25V~4.7uF/25V</p>	<p>C1=2.2uF/25V~4.7uF/25V C2=2.2uF/25V~4.7uF/25V</p>

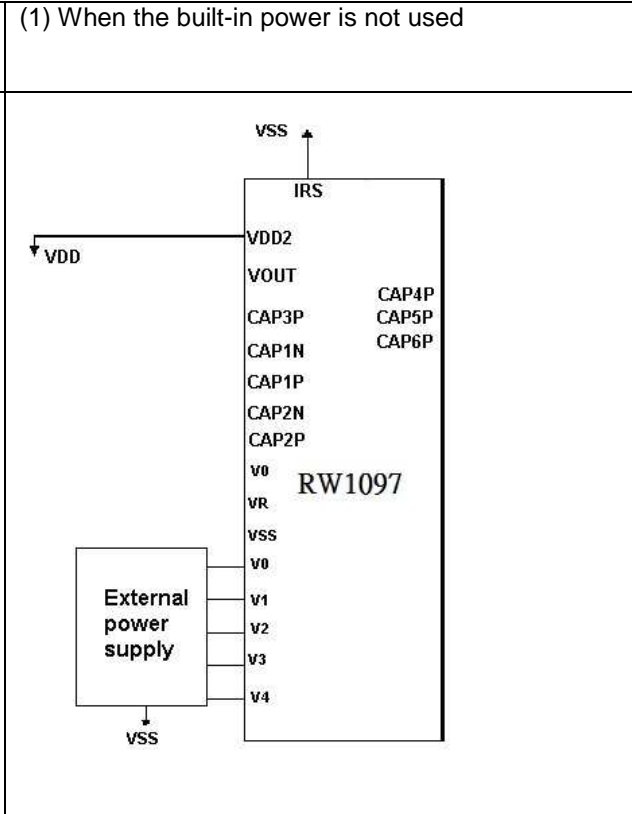
External Booster:



External Booster/Regulator:



External Bias:



■ RESET CIRCUIT

Setting RSTP to “L” can initialize internal function.

When RSTP becomes “L”, following procedure is occurred.

- (5) Entry Mode Set : I/D=1,S=0
- (6) Instruction Table Set: RE1,RE2=(0,0)
- (7) Function Set: IF=1,D=0,C=0,B=0
- (9) Set DDRAM Address: AC6,AC5,AC4,AC3,AC2,AC1,AC0 =(0,0,0,0,0,0,0)
- (10) Set SEGRAM Address: AC3, AC2, AC1, AC0 = (0, 0, 0, 0)
- (12) Power Down Mode: PD=0
- (13) COM and SEG Scan Direction Set: BID=0,SHL=0
- (14) Cursor Blink and Display Reverse Set : REV=0,B/W=0
- (15) Display Shift Set: DS6,DS5,DS4,DS3,DS2,DS1,DS0 =(0,0,0,0,0,0,0)
- (16) Set Data Length for 3-SPI: SD6,SD5,SD4,SD3,SD2,SD1,SD0=(0,0,0,0,0,0,0)
- (24) Select DC-DC Set up: DC2,DC1,DC0 = (1,1,0)
- (25) Select LCD Bias: BS2,BS1,BS0 = (1,0,1)
- (26) Select Regulator Resistor: R2,R1,R0 = (1,0,0)
- (27) Select Electronic Volume Register : EV5,EV4,EV3,EV2,EV1,EV0=(1,0,0,0,0,0)
- (28) Power Control Set: SWON=0; VB,VR,VF = (0, 0, 0)
- (29) Frame Frequency Adjustment: DFR3, DFR2, DFR1, DFR0= (0,0,0,0)
- (30) Double Frame Frequency: FRR*2=0

While RSTP is “L” or reset instruction is executed, no instruction except read status can be accepted, any instruction can be accepted. RSTP must be connected to the reset pin of the MPU, and initialize the MPU and this LSI at the same time. The initialization by RSTP is essential before used.

■ INSTRUCTION TABLE

RW1097 instruction Table 1 (RE1=0, RE2=0)

Instruction	RE1,RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description	Execution Time
(1) Read display data	X	1	1	Read data								Read data into DDRAM/CGRAM/SEGRAM	Reference page 86
(2) Write display data	X	1	0	Write data								Write data into DDRAM/CGRAM/SEGRAM	Reference page 86
(3) Clear Display	X	0	0	0	0	0	0	0	0	0	1	Write "20H" to DDRAM, and set DDRAM address to "00H" from AC	Reference page 86
(4) Return Home	0,0	0	0	0	0	0	0	0	0	1	X	Set DDRAM address to "00H" from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.	Reference page 86
(5) Entry Mode Set	0,0	0	0	0	0	0	0	0	1	I/D	S	Sets cursor move direction and specifies display shift. These operations are performed during write and read	Reference page 86
(6) Instruction Table Set	X	0	0	0	0	0	0	1	X	RE1	RE2	Set Instruction Table RE1,RE2=(0,0) , table 1 (default) RE1,RE2=(0,1) , table 2 RE1,RE2=(1,0) , table 3 RE1,RE2=(1,1) , table 4	Reference page 86
(7) Cursor or Display Shift Set	0,0	0	0	0	0	0	1	S/C	R/L	X	X	Cursor or display shift S/C="1": display shift S/C="0": cursor shift R/L="1": shift to right R/L="0": shift to left	Reference page 86
(8) Function Set	0,0	0	0	0	0	1	IF	D	C	B	X	Set Interface Data Length IF="1": 8-bit interface IF="0": 4-bit interface Set Display /Cursor/Blink On/OFF D="1": display on D="0": display off C="1": cursor on C="0": cursor off B="1": blink on B="0": blink off	Reference page 86
(9) Set DDRAM Address	0,0	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM address in address counter	Reference page 86
(10) Set SEGRAM Address	0,0	0	1	0	1	0	0	AC3	AC2	AC1	AC0	Set ICON RAM address in address counter	Reference page 86
(11) Read Busy Flag and Address	0,0	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Can know internal operation is ready or not by reading BF. The contents of address counter can also be read. BF="1": busy state BF="0": ready state	Reference page 86

RW1097 instruction Table 2 (RE1=0, RE2=1)

Instruction	RE1,RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description	Execution Time
(1) Read display data	X	1	1	Read data								Read data into DDRAM/CGRAM/SEGRAM	Reference page 86
(2) Write display data	X	1	0	Write data								Write data into DDRAM/CGRAM/SEGRAM	Reference page 86
(3) Clear Display	X	0	0	0	0	0	0	0	0	0	1	Write "20H" to DDRAM, and set DDRAM address to "00H" from AC	Reference page 86
(12) Power Down Mode	0,1	0	0	0	0	0	0	0	0	1	PD	Set power down mode bit. PD="1": power down mode enable PD="0": power down mode disable	Reference page 86
(13) COM and SEG Scan Direction Set	0,1	0	0	0	0	0	0	0	1	SHL	BID	Segment bi-direction function BID="1": SEG 191 --> SEG 0 BID="0": SEG 0--> SEG 191 Common scan direction SHL="1": reverse SHL="0": normal	Reference page 86
(6) Instruction Table Set	X	0	0	0	0	0	0	1	X	RE1	RE2	RE1,RE2=(0,0) , table 1(default) RE1,RE2=(0,1) , table 2 RE1,RE2=(1,0) , table 3 RE1,RE2=(1,1) , table 4	Reference page 86
(14) Cursor Blink and Display Reverser Set	0,1	0	0	0	0	1	0	0	0	REV	B/W	Assign black/write inverting of cursor REV="1": display reverse REV="0": display normal B/W="1": black/write inverting of cursor enable. B/W="0": black/write inverting of cursor disable.	Reference page 86
(15) Display Shift Set	0,1	0	0	0	1	DS6	DS5	DS4	DS3	DS2	DS1	Determine the line for display shift DS6="1/0": 6th line display shift enable/disable DS5="1/0": 5th line display shift enable/disable DS4="1/0": 4th line display shift enable/disable DS3="1/0": 3rd line display shift enable/disable DS2="1/0": 2nd line display shift enable/disable DS1="1/0": 1st line display shift enable/disable	Reference page 86
(16) Set Data Length for 3-SPI	0,1	0	0	1	SD6	SD5	SD4	SD3	SD2	SD1	SD0	Set data length for 3-line Serial Interface	Reference page 86

RW1097 instruction Table 3 (RE1=1, RE2=0)

Instruction	RE1,RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description	Execution Time
(1) Read display data	X	1	1	Read data								Read data into DDRAM/CGRAM/SEGRAM	Reference page 86
(2) Write display data	X	1	0	Write data								Write data into DDRAM/CGRAM/SEGRAM	Reference page 86
(3) Clear Display	X	0	0	0	0	0	0	0	0	0	1	Write "20H" to DDRAM, and set DDRAM address to "00 H" from AC	Reference page 86
(6) Instruction Table Set	X	0	0	0	0	0	0	1	X	RE1	RE2	RE1,RE2=(0,0) , table 1(default) RE1,RE2=(0,1) , table 2 RE1,RE2=(1,0) , table 3 RE1,RE2=(1,1) , table 4	Reference page 86
(17) Set HCGROM Code for Read Data Byte 1	1,0	0	0	0	0	1	0	AC7	AC6	AC5	AC4	high byte of HCGROM code for Read Data	Reference page 86
(18) Set HCGROM Code for Read Data Byte 0	1,0	0	0	0	0	1	1	AC3	AC2	AC1	AC0	low byte of HCGROM code for Read Data	Reference page 86
(19) Set CGROM Code for Read Data Byte 3	1,0	0	0	0	1	0	0	AC15	AC14	AC13	AC12	Set CGROM Code for Read Data Byte 3	Reference page 86
(20) Set CGROM Code for Read Data Byte 2	1,0	0	0	0	1	0	1	AC11	AC10	AC9	AC8	Set CGROM Code for Read Data Byte 2	Reference page 86
(21) Set CGROM Code for Read Data Byte 1	1,0	0	0	0	1	1	0	AC7	AC6	AC5	AC4	Set CGROM Code for Read Data Byte 1	Reference page 86
(22) Set CGROM Code for Read Data Byte 0	1,0	0	0	0	1	1	1	AC3	AC2	AC1	AC0	Set CGROM Code for Read Data Byte 0	Reference page 86
(23) Set CGRAM Address	1,0	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	set CGRAM address	Reference page 86

RW1097 instruction Table 4 (RE1=1, RE2=1)

Instruction	RE1,RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description	Execution Time
(1) Read display data	X	1	1	Read data								Read data into DDRAM/CGRAM/SEGRAM	Reference page 86
(2) Write display data	X	1	0	Write data								Write data into DDRAM/CGRAM/SEGRAM	Reference page 86
(3) Clear Display	X	0	0	0	0	0	0	0	0	0	1	Write "20H" to DDRAM, and set DDRAM address to "00H" from AC	Reference page 86
(6) Instruction Table Set	X	0	0	0	0	0	0	1	X	RE1	RE2	RE1,RE2=(0,0) , table 1(default) RE1,RE2=(0,1) , table 2 RE1,RE2=(1,0) , table 3 RE1,RE2=(1,1) , table 4	Reference page 86
(24) Select DC-DC Step up	1,1	0	0	0	0	1	0	0	DC2	DC1	DC0	Select the step-up of the internal voltage converter 00*:x7 01*:x2 100:x3 101:x4 110:x5 (default) 111:x6	Reference page 86
(25) Select LCD Bias	1,1	0	0	0	0	1	0	1	BS2	BS1	BS0	Select LCD bias 1/4 bias ~ 1/11 bias 000:1/4 bias 001:1/5 bias 010: 1/6 bias 011:1/7 bias 100: 1/8 bias 101:1/9 bias (default) 110:1/10 bias 111:1/11 bias	Reference page 86
(26) Select Regulator Resistor	1,1	0	0	0	0	1	1	0	R2	R1	R0	Select Internal resistance ratio of the regulator resistor default: 100	Reference page 86
(27) Select Electronic Volume Register	1,1	0	0	0	1	EV5	EV4	EV3	EV2	EV1	EV0	Set the V0 output voltage electronic volume register default: 100000	Reference page 86
(28) Power Control Set	1,1	0	0	1	0	0	0	SW ON	VB	VR	VF	control power circuit on/off default: OFF	Reference page 86
(29) Frame Frequency Adjustment	1,1	0	0	1	0	0	1	DFR 3	DFR 2	DFR 1	DFR 0	Adjustment Frame Frequency 0001(Slow) -->1111 (Fast) default:0000,	Reference page 86
(30) Double Frame Frequency	1,1	0	0	1	0	1	1	0	0	0	1	FRR*2=1: frame frequency *2 FRR*2=0: frame frequency normal	Reference page 86

Note:

1. When an MPU program with Busy Flag(DB7) checking is made, 1/2 FOSC (is necessary) for executing the next instruction by the " E " signal after the Busy Flag (DB7) goes to " Low ".
2. " X " Don't care

■ **Write data and Write command execution time for all duty**

VDD=3.0V~3.6V

Ta:25°C

Duty	Write command execution time	Clear Display command execution time	Write data execution time	Read data execution time
1/97	22 uS	1.98 mS	22 uS	22 uS
1/81	26 uS	2.38 mS	26 uS	26 uS
1/65	32 uS	2.98 mS	32 uS	32 uS
1/49	43 uS	3.97 mS	43 uS	43 uS
1/33	64 uS	5.95 mS	64 uS	64 uS
1/17	128 uS	11.9 mS	128 uS	128 uS

■ Description of Instruction

(1) Read display data

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Read display data	X	X	1	1	Read data							

Read data from internal RAM and alter the (Address Counter) by 1.

After address set to read (CGRAM/DDRAM/SEGRAM) a DUMMY READ is required.

There is no need to DUMMY READ for the following bytes unless a new address set instruction is issued.

(2) Write display data

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Write display data	X	X	1	0	Write data							

Write data to internal RAM and Alter the (Address Counter) by 1.

Each RAM address (CGRAM/DDRAM/SEGRAM...) must write 2 consecutive bytes for 16 bit data. After the second byte the address counter will add or subtract by 1 according to the entry mode set control bit.

(3) Clear Display

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Clear Display	0	0	X	X	0	0	0	0	0	0	0	1

Set DDRAM address counter (AC) to "00H". Cursor moves to origin. The content of DDRAM is not changed.

(4) Return Home

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Return Home	0	0	0	0	0	0	0	0	0	0	1	X

Set DDRAM address counter (AC) to "00H". Cursor moves to origin. The content of DDRAM is not changed.

(5) Entry Mode Set

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Entry Mode Set	0	0	0	0	0	0	0	0	0	1	I/D	S

Set the cursor/blink movement and display shift direction when doing write or read operation.

I/D: Increment/Decrease of DDRAM address (cursor or blink)

When I/D="1": cursor/blink moves right and DDRAM address is increased by 1.

When I/D="0": cursor/blink moves left and DDRAM address is decrease by 1

S: Shift of entire display

When DDRAM read (CGRAM read/write) operation or S="0", shift of entire display is not performed. If S="1" and DDRAM write operation, shift of entire display is performed according to I/D value (I/D="1": shift left, I/D="0": shift right)

S	I/D	Description
1	1	Entire display shift left by 1
1	0	Entire display shift right by 1

(6) Instruction Table Set

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Instruction Table Set	X	X	0	0	0	0	0	0	1	X	RE1	RE2

There are 4 instruction sets for RW1097, which can be assigned by setting RE1, RE2.

RE1	RE2	Instruction Table
0	0	Table 1
0	1	Table 2
1	0	Table 3
1	1	Table 4

(7) Cursor or Display Shift

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Cursor or Display Shift	0	0	0	0	0	0	0	1	S/C	R/L	X	X

Instruction to move the cursor shift entire display, the content of DDRAM is not changed.

S/C	R/L	Description	AC value
0	0	Cursor moves left by 1	AC=AC-1
0	1	Cursor moves right by 1	AC=AC+1
1	0	Display shift left by 1,cursor also follows to shift	AC=AC
1	1	Display shift right by 1,cursor also follows to shift	AC=AC

(8) Function Set

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Function Set	0	0	0	0	0	0	1	IF	D	C	B	X

IF: 4/8 bit interface control bit

When IF="1": 8-bit MPU bus interface.

When IF="0": 4-bit MPU bus interface.

D: Display ON/OFF control bit

When D="1": Display turn on

When D="0": Display turn off, but the display data is remained in DDRAM.

C: Cursor ON/OFF control bit

When C="1": Cursor turn on

When C="0": Cursor turn off

B: Display ON/OFF control bit

When B="1": Cursor position blink on. Then display data in cursor position will blink.

When B="0": Cursor position blink off.

(9) Set DDRAM Address

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Set DDRAM Address	0	0	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0

Set DDRAM address to address counter (AC, 7-bits), each address (CGRAM/DDRAM/SEGRAM.....) must write 2 consecutive bytes for 16 bits data. (High byte-> low byte) After the second byte the address counter will add or subtract by 1 according to the entry node set control bit.

1st line AC range (7-bit) is 00H~0BH

2nd line AC range (7-bit) is 10H~1BH

3rd line AC range (7-bit) is 20H~2BH

4th line AC range (7-bit) is 30H~3BH

5th line AC range (7-bit) is 40H~4BH

6th line AC range (7-bit) is 50H~5BH

(10) Set SEGRAM Address

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Set SEGRAM Address	0	0	0	0	0	1	0	0	AC3	AC2	AC1	AC0

Set DDRAM address to address counter (AC, 4-bits), each address (CGRAM/DDRAM/SEGRAM.....) must write 2 consecutive bytes for 16 bits data. (High byte-> low byte) After the second byte the address counter will add or subtract by 1 according to the entry node set control bit.

SEGRAM Address and Display Pattern

SEGRAM Address	SEGRAM Data Display Pattern															
	High Byte								Low Byte							
AC3 AC2 AC1 AC0	D7	D6	D5	D4	D3	D2	D1	D0	D7	D6	D5	D4	D3	D2	D1	D0
0 0 0 0	S0	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
0 0 0 1	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30	S31
0 0 1 0	S32	S33	S34	S35	S36	S37	S38	S39	S40	S41	S42	S43	S44	S45	S46	S47
0 0 1 1	S48	S49	S50	S51	S52	S53	S54	S55	S56	S57	S58	S59	S60	S61	S62	S63
0 1 0 0	S64	S65	S66	S67	S68	S69	S70	S71	S72	S73	S74	S75	S76	S77	S78	S79
0 1 0 1	S80	S81	S82	S83	S84	S85	S86	S87	S88	S89	S90	S91	S92	S93	S94	S95
0 1 1 0	S96	S97	S98	S99	S100	S101	S102	S103	S104	S105	S106	S107	S108	S109	S110	S111
0 1 1 1	S112	S113	S114	S115	S116	S117	S118	S119	S120	S121	S122	S123	S124	S125	S126	S127
1 0 0 0	S128	S129	S130	S131	S132	S133	S134	S135	S136	S137	S138	S139	S140	S141	S142	S143
1 0 0 1	S144	S145	S146	S147	S148	S149	S150	S151	S152	S153	S154	S155	S156	S157	S158	S159
1 0 1 0	S160	S161	S162	S163	S164	S165	S166	S167	S168	S169	S170	S171	S172	S173	S174	S175
1 0 1 1	S176	S177	S178	S179	S180	S181	S182	S183	S184	S185	S186	S187	S188	S189	S190	S191
1 1 0 0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1 1 0 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1 1 1 0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1 1 1 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

(11) Read Busy Flag and Address

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Read Busy Flag and Address	X	X	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0

Read busy flag (BF) can check whether internal operation is finished. At the same time the value of address counter.

(12) Power Down Mode

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Power Down Mode	0	1	0	0	0	0	0	0	0	0	1	PD

Power down mode enable bit set instruction

When PD="0": Power down mode becomes disabled.

When PD="1": Power down mode enable.

When power down is enable, it makes RW1097 suppress current consumption except the current needed for data storage by executing next

1. All COM/SEG output is VSS.
2. Turn off analog circuit.

This instruction can be used as power sleep mode.

(13) COM and SEG Scan Direction Select

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Display Control Set	0	1	0	0	0	0	0	0	0	1	SHL	BID

BID: Data Shift Direction of SEGMENT

When BID = "Low", segment data shift direction is set to normal order from SEG0 to SEG191

When BID = "High", segment data shift direction is set to reverse from SEG191 to SEG0.

By using this instruction, the efficiency of application board area can be raised.

SHL: COMMON scan reverse

When SHL = "Low": COMMON scan direction is set to normal order from COM0 to COMn

When SHL = "High": COMMON scan direction is set to reverse from COMn to COM0

- 6-line display, n=95,
- 5-line display, n=79,
- 4-line display, n=63,
- 3-line display, n=47,
- 2-line display, n=31,
- 1-line display, n=15

(14) Cursor Blink and Display Reverse Set

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Cursor Blink and Display Reverse Set	0	0	0	0	0	0	1	0	0	0	REV	B/W

B/W: Underscore cursor blinking enable bit

When B/W="1": underscore cursor blinking at the cursor position is set.

When B/W="0": underscore cursor blinking disable.

REV: Display reverse

When REV="1": Display reverse enable, all the display white dots become black and black dots become white.

When REV="0": Display reverse disable.

(15) Display Shift Set

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Display Shift Set	0	1	0	0	0	1	DS6	DS5	DS4	DS3	DS2	DS1

This instruction select shifted to be according to each line mode in display shift right/left instruction.

DS6~DS1 indicate each line to be shifted and each shift is performed individually in each line.

(16) Set Data Length for 3-SPI

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Set Data Length for 3-SPI	0	1	0	0	1	SD6	SD5	SD4	SD3	SD2	SD1	SD0

In 3line SPI mode, set data length command indicates the length of data which, are going to be received by RW1097. User should set data length before display data sent. The table 6 shows how SD bits set the data length.

Table 6. set data length according to SD bits

SD6	SD5	SD4	SD3	SD2	SD1	SD0	Function
0	0	0	0	0	0	0	Followed by 1 data write
0	0	0	0	0	0	1	Followed by 2data write
0	0	0	0	0	1	0	Followed by 3data write
0	0	0	0	0	1	1	Followed by 4 data write
:	:	:	:	:	:	:	:
1	1	1	1	1	1	1	Followed by 256 data write

(17) Set HCGROM Code for Read Data Byte 1

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Set HCGROM Code for Read Data Byte 1	1	0	0	0	0	0	1	0	HC7	HC6	HC5	HC4

(18) Set HCGROM Code for Read Data Byte 0

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Set HCGROM Code for Read Data Byte 0	1	0	0	0	0	0	1	1	HC3	HC2	HC1	HC0

Set HCGROM address by writing relative HCGROM code.

This instruction makes HCGROM data content available from read data command.

For example:

Reading the data content of character “A” in HCGROM (font code: 31H).

1. Set HCGROM address byte 1 to “3” (instruction code : 23 H).
2. Set HCGROM address byte 0 to “1” (instruction code: 31 H).
3. Read 16 consecutive bytes for 16 x 8 bits data.

(19) Set CGROM Code for Read Data Byte 3

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Set CGROM Address Byte 3	1	0	0	0	0	1	0	0	C15	C14	C13	C12

(20) Set CGROM Code for Read Data Byte 2

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Set CGROM Address Byte 2	1	0	0	0	0	1	0	1	C11	C10	C9	C8

(21) Set CGROM Code for Read Data Byte 1

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Set CGROM Address Byte 1	1	0	0	0	0	1	1	0	C7	C6	C5	C4

(22) Set CGROM Code for Read Data Byte 0

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Set CGROM Address Byte 0	1	0	0	0	0	1	1	1	C3	C2	C1	C0

Set CGROM address by writing relative CGROM code.

This instruction makes CGOM data content available from read data command

For example:

Reading the data content of character “芯” in CGROM (font code: D0BEH).

1. Set CGROM address byte 3 to “D” (instruction code: 4DH)
2. Set CGROM address byte 2 to “0” (instruction code: 50H)
3. Set CGROM address byte 1 to “B” (instruction code: 6BH)
4. Set CGROM address byte 0 to “E” (instruction code: 7EH)
5. Read 32 consecutive for 16 x 16-bit data (high byte -> low byte)

(23) Set CGRAM Address

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Set CGRAM Address Byte 1	1	0	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0

Set CGRAM address bit 10~ bit4 to address counter (AC,7-bit), Each address (CGRAM,DDRAM,SEGRAM) must write 2 consecutive bytes for 16 bit data (high byte->low byte) . After the second byte the address counter will add or subtract by 1 according to the entry mode set control bit.

RW1097 provides 72 sets 16x16 bit user defined characters area (CGRAM), user can only set to the initial address line of each character through Set CGRAM Address command.

(24) Select DC-DC Set up

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Select DC-DC Set up	1	1	0	0	0	0	1	0	0	DC2	DC1	DC0

Selects one of 7 DC-DC set up to reduce the power consumption by this instruction.

DC2	DC1	DC0	Selected DC-DC converter circuit
0	1	*	2 times boosting circuit
1	0	0	3 times boosting circuit
1	0	1	4 times boosting circuit
1	1	0	5 times boosting circuit(Default)
1	1	1	6 times boosting circuit
0	0	*	7 times boosting circuit

(25) Select LCD Bias

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Select LCD Bias	1	1	0	0	0	0	1	0	1	BS2	BS1	BS0

Select LCD bias ratio of the voltage required for driving the LCD.

BS2	BS1	BS0	LCD bias
0	0	0	1/4
0	0	1	1/5
0	1	0	1/6
0	1	1	1/7
1	0	0	1/8
1	0	1	1/9(Default)
1	1	0	1/10
1	1	1	1/11

(26) Select Regulator Resistor

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Select Regulator Resistor	1	1	0	0	0	0	1	1	0	R2	R1	R0

Select resistance ratio of the internal resistor used in the internal voltage regulator.

R2	R1	R0	$1+(Rb/Ra)$
0	0	0	2.6
0	0	1	3.4
0	1	0	4.2
0	1	1	5.0
1	0	0	5.8(Default)
1	0	1	6.6
1	1	0	7.4
1	1	1	8.3

(27) Select Electronic Volume Register

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Select Electronic Volume Register	1	1	0	0	0	1	EV5	EV4	EV3	EV2	EV1	EV0

This instruction contents of reference voltage register.

EV5	EV4	EV3	EV2	EV1	EV0	Reference voltage parameter (α)
0	0	0	0	0	0	63
0	0	0	0	0	1	62
:	:	:	:	:	:	:
1	0	0	0	0	0	31 (Default)
:	:	:	:	:	:	:
1	1	1	1	1	0	1
1	1	1	1	1	1	0

(28) Power Control Set

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Power Control Set	1	1	0	0	1	0	0	0	SWON	VB	VR	VF

Analog circuit booster, regulator, follower on/off control

VB=1: capacitor type booster on

VB=0: capacitor type booster off

VR=1: internal regulator on

VR=0: internal regulator off

VR=1: internal follower on

VR=0: internal follower off

SWON=1: switching regulator on

SWON=0: switching regulator off

RW1097 has built-in inductor type regulator circuit for big current drive application, when internal switching regulator is used, please combine with internal regulator command together. Do not turn on capacitor type and inductor type booster in the same time.

Inductor Type regulator Circuit ON/OFF:

Turn on the internal regulator (VR=1) and switching regulator on (SWON=1)

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Power Control Set	1	1	0	0	1	0	0	0	1 (SWON)	0 (VB)	1 (VR)	VF

(29) Frame Frequency Adjustment

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Frame Frequency Adjustment	1	1	0	0	1	0	0	1	DFR3	DFR2	DFR1	DFR0

DFR3~DFR0: Frame Frequency adjustment from 0000 (slow) ~ 1111 (fast)

Frame Frequency adjustment table: (+/- 15%)

DFR3	DFR2	DFR1	DFR0	Frame Frequency (Hz)					
				1/97 Duty	1/81 Duty	1/65 Duty	1/49 Duty	1/33 Duty	1/17 Duty
0	0	0	0	86(default)	79(default)	82(default)	85(default)	81(default)	78(default)
0	0	0	1	66	60	61	66	61	59
0	0	1	0	67	61	62	67	62	60
0	0	1	1	72	65	67	71	66	64
0	1	0	0	75	66	70	74	69	67
0	1	0	1	79	72	75	78	73	71
0	1	1	0	81	74	76	80	75	73
0	1	1	1	86	79	83	86	81	79
1	0	0	0	93	86	89	93	87	85
1	0	0	1	94	88	92	94	90	88
1	0	1	0	99	94	97	99	96	94
1	0	1	1	105	99	104	104	103	100
1	1	0	0	111	105	112	110	111	108
1	1	0	1	119	115	122	119	121	116
1	1	1	0	124	119	128	124	125	122
1	1	1	1	128	128	133	127	132	128

(30) Double Frame Frequency

Instruction	RE1	RE2	A0	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Double Frame Frequency	1	1	0	0	1	0	1	1	0	0	0	1
					0	0	FRR*2	0	0	0	0	0

FRR*2=1: frame frequency *2

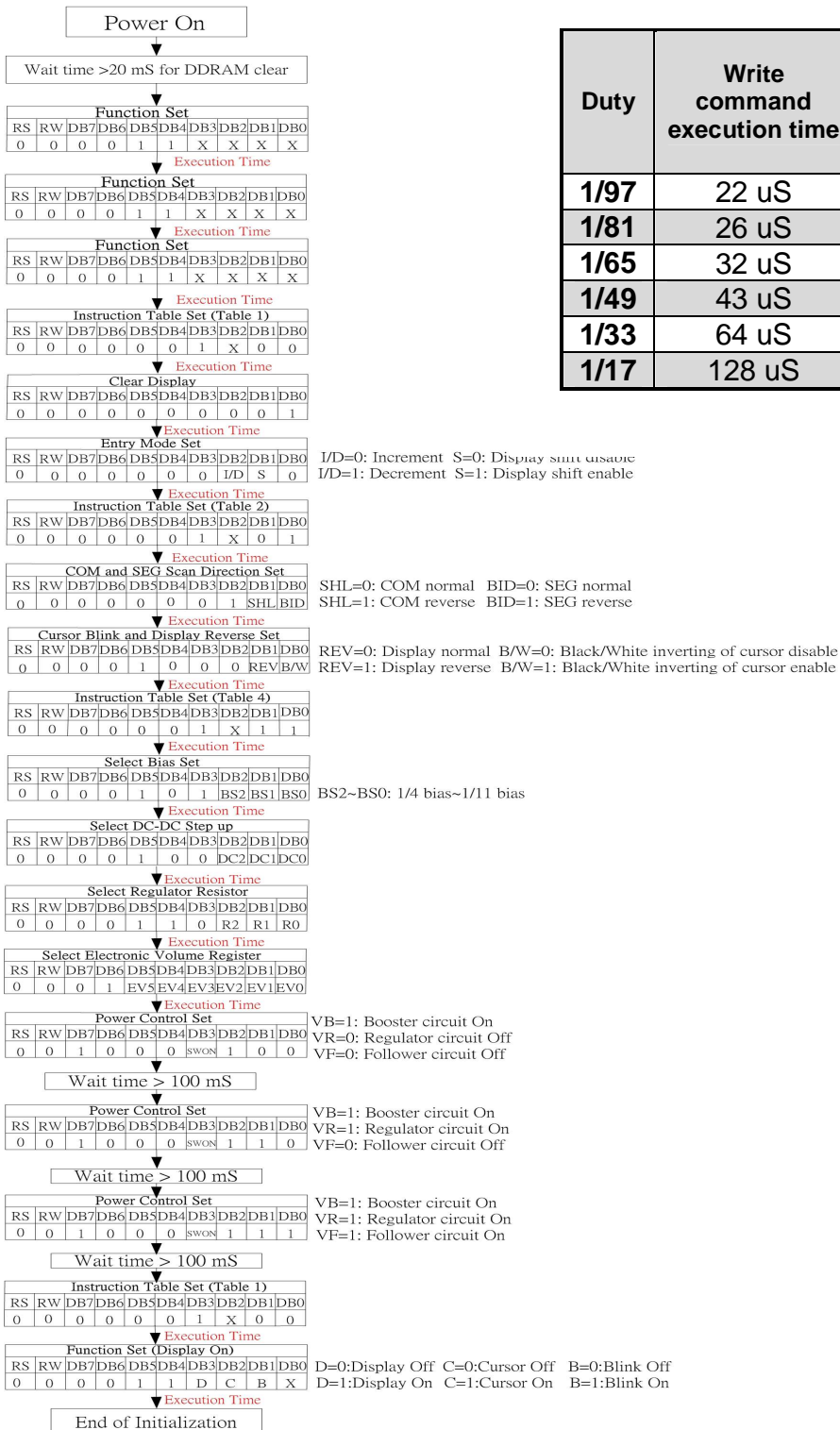
FRR*2=0: frame frequency normal

DFR3	DFR2	DFR1	DFR0	Double Frame Frequency (Hz)					
				1/97 Duty	1/81 Duty	1/65 Duty	1/49 Duty	1/33 Duty	1/17 Duty
0	0	0	0	172(default)	158(default)	164(default)	170(default)	162(default)	156(default)
0	0	0	1	132	120	122	132	122	118
0	0	1	0	134	122	124	134	124	120
0	0	1	1	144	130	134	142	132	128
0	1	0	0	150	132	140	148	138	134
0	1	0	1	158	144	150	156	146	142
0	1	1	0	162	148	152	160	150	146
0	1	1	1	172	158	166	172	162	158
1	0	0	0	186	172	178	186	172	170
1	0	0	1	188	176	184	188	180	176
1	0	1	0	198	188	194	198	192	188
1	0	1	1	210	198	208	208	206	200
1	1	0	0	222	210	224	220	222	216
1	1	0	1	238	230	244	238	242	232
1	1	1	0	248	128	256	248	250	244
1	1	1	1	256	256	266	254	264	256

■ LCD Initialization Setup

Note: After RW1097 is reset, the voltage level of the LCD driving output pins SEG and COM is VSS

➤ 8-bit Interface mode



Duty	Write command execution time	Clear Display command execution time
1/97	22 μ S	1.98 mS
1/81	26 μ S	2.38 mS
1/65	32 μ S	2.98 mS
1/49	43 μ S	3.97 mS
1/33	64 μ S	5.95 mS
1/17	128 μ S	11.9 mS

I/D=0: Increment S=0: Display shift disable
I/D=1: Decrement S=1: Display shift enable

SHL=0: COM normal BID=0: SEG normal
SHL=1: COM reverse BID=1: SEG reverse

REV=0: Display normal B/W=0: Black/White inverting of cursor disable
REV=1: Display reverse B/W=1: Black/White inverting of cursor enable

BS2~BS0: 1/4 bias~1/11 bias

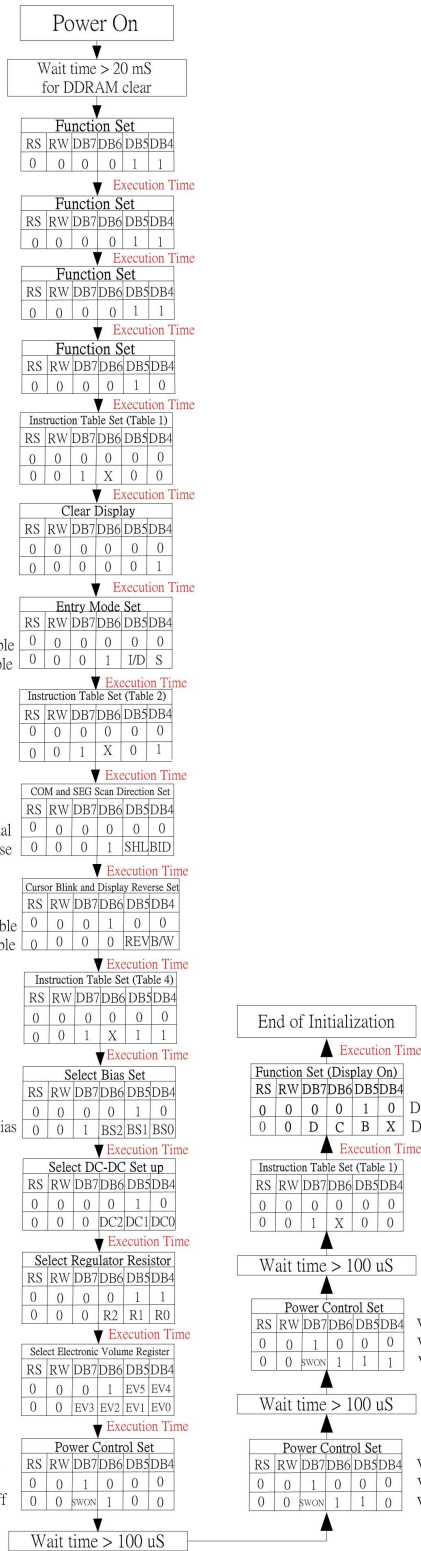
VB=1: Booster circuit On
VR=0: Regulator circuit Off
VF=0: Follower circuit Off

VB=1: Booster circuit On
VR=1: Regulator circuit On
VF=0: Follower circuit Off

VB=1: Booster circuit On
VR=1: Regulator circuit On
VF=1: Follower circuit On

D=0: Display Off C=0: Cursor Off B=0: Blink Off
D=1: Display On C=1: Cursor On B=1: Blink On

➤ 4-bit Interface mode:



Duty	Write command execution time	Clear Display command execution time
1/97	22 uS	1.98 mS
1/81	26 uS	2.38 mS
1/65	32 uS	2.98 mS
1/49	43 uS	3.97 mS
1/33	64 uS	5.95 mS
1/17	128 uS	11.9 mS

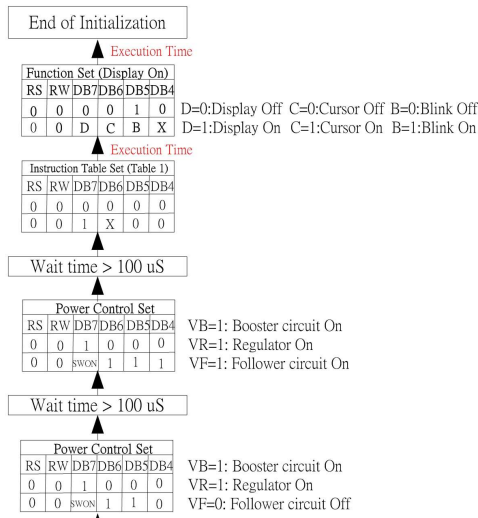
I/D=0: Increment S=0: Display shift disable
I/D=1: Decrement S=1: Display shift enable

SHL=0: COM normal BID=0: SEG normal
SHL=1: COM reverse BID=1: SEG reverse

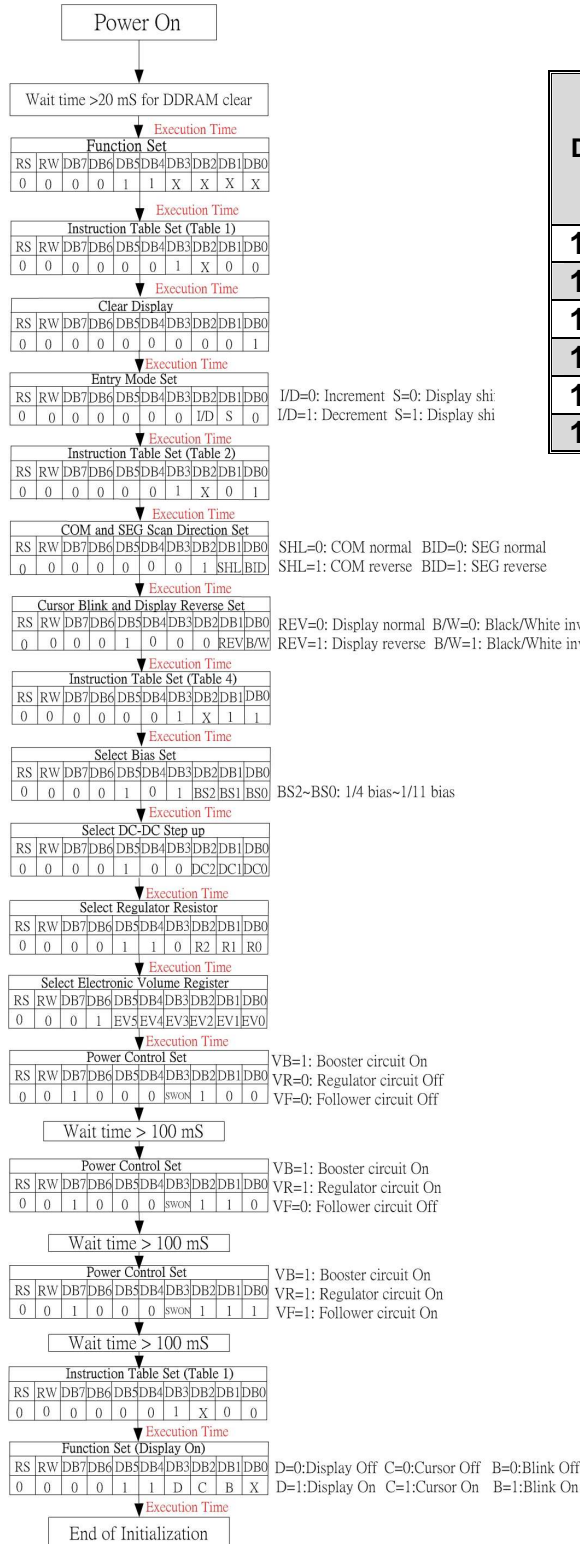
B/W=0: Black/White inverting of cursor disable
B/W=1: Black/White inverting of cursor enable

BS2~BS0: 1/4 bias~1/11 bias

VB=1: Booster circuit On
VR=0: Regulator Off
VF=0: Follower circuit Off



➤ 3/4-SPI and IIC Interface mode:



Duty	Write command execution time	Clear Display command execution time
1/97	22 μ S	1.98 mS
1/81	26 μ S	2.38 mS
1/65	32 μ S	2.98 mS
1/49	43 μ S	3.97 mS
1/33	64 μ S	5.95 mS
1/17	128 μ S	11.9 mS

■ Precautions on Turning off the Power

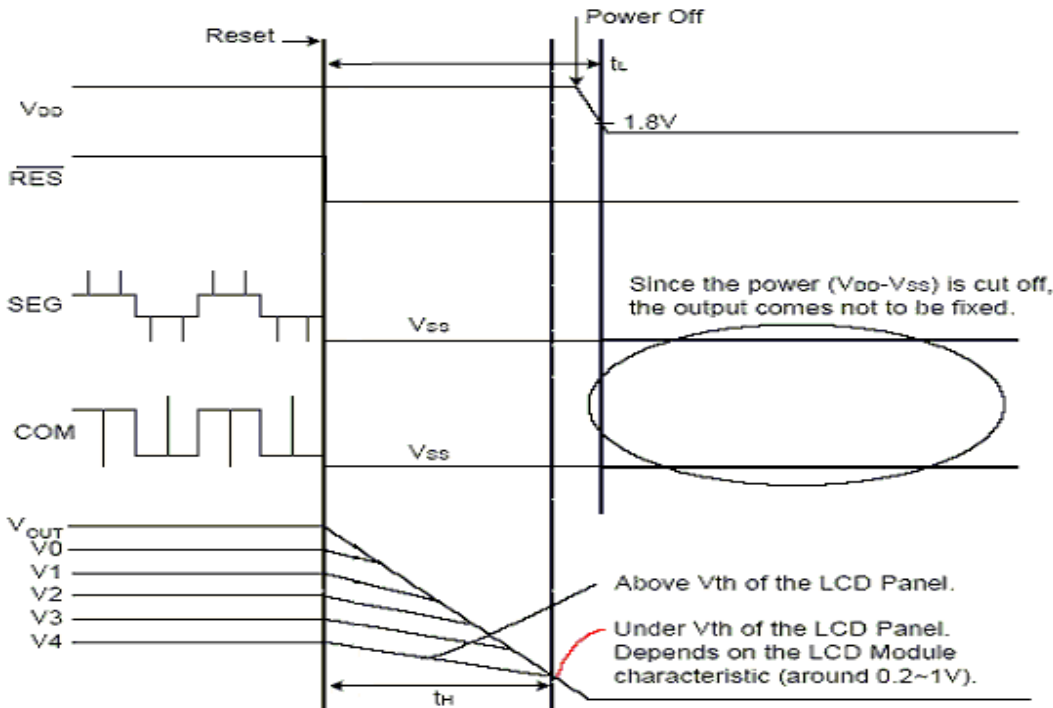
<Turning the power (VDD - VSS) off>

➤ **LCD Reset pin input "L"** (The LCD powers (VOUT, V0, V1~V4) are off.) → **Power OFF** (VDD - VSS)

- Observe $t_L > t_H$.
- When $t_L < t_H$, an irregular display may occur.

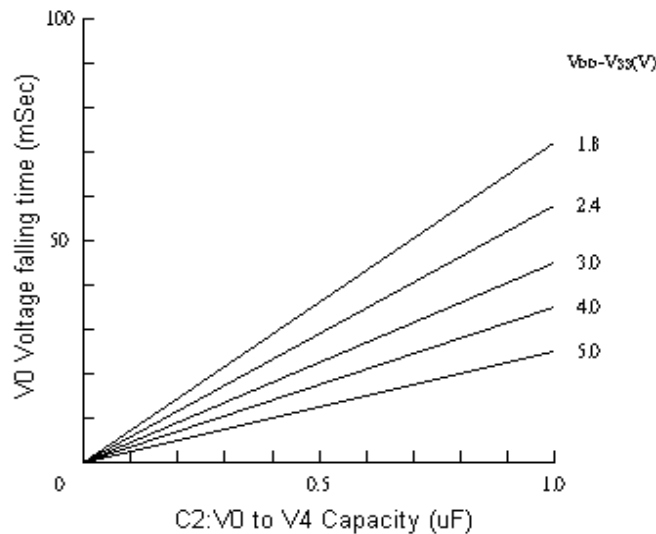
For t_L , make the power (VDD - VSS) falling characteristics longer or consider any other method.

t_H is determined according to the external capacity C2 (smoothing capacity of V4 to V0) and the driver's discharging capacity.



<Reference Data>

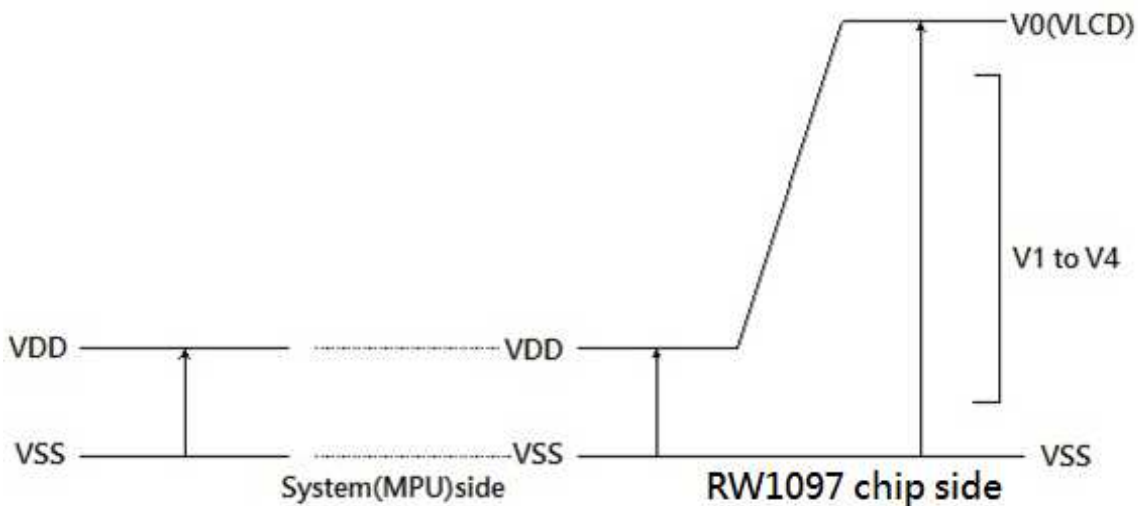
V0 voltage falling (discharge) time (t_H) after the process of operation → reset.



■ ABSOLUTE MAXIMUM RATINGS

In accordance with the Absolute Maximum Rating System; see notes 1 and 2.

Parameter		Symbol	Conditions	Unit
Power Supply Voltage		VDD	-0.3 ~ 5.0	V
Power supply voltage (VDD standard)		VDD2	-0.3 ~ 4.0	V
Power supply voltage (VDD standard)		V0, VOUT	-0.3 ~ 18.0	V
Power supply voltage (VDD standard)		V1, V2, V3, V4	V0 to -0.3	V
Operating temperature		TOPR	-40 to +85	°C
Storage temperature	Bare chip	TSTR	-55 to +125	°C



Notes

1. Stresses above those listed under Limiting Values may cause permanent damage to the device.
2. Parameters are valid over operating temperature range unless otherwise specified. All voltages are with respect to V_{SS} unless otherwise noted.
3. Insure that the voltage levels of V1, V2, V3, and V4 are always such that $V_{out} \geq V0 \geq V1 \geq V2 \geq V3 \geq V4 \geq V_{ss}$

■ DC CHARACTERISTICS

Unless otherwise specified, VSS = 0 V, VDD = 3.0 V ± 10%, Ta = -40 to 85°C

Item	Symbol	Condition	Rating			Units	Applicable Pin		
			Min.	Typ.	Max.				
Operating Voltage	VDD	For Digital Circuit Power	1.8	—	3.6	V	VSS		
Operating Voltage	VDD2	For Analog Circuit Power	2.4	—	3.6	V	VSS2		
High-level Input Voltage	VIHC		0.7 x VDD	—	VDD	V	*2		
Low-level Input Voltage	VILC		VSS	—	0.33 x VDD	V	*2		
High-level Output Voltage	VOHC		0.7 x VDD	—	VDD	V	*3		
Low-level Output Voltage	VOLC		VSS	—	0.33 x VDD	V	*3		
Input leakage current	ILI	VIN = VDD or VSS	-1.0	—	1.0	μA	*4		
Output leakage current	ILO	VIN = VDD or VSS	-3.0	—	3.0	μA	*5		
Liquid Crystal Driver ON Resistance	RON	Ta = 25°C (Relative To VSS)	V0 = 13.0 V	—	2.0	3.5	KΩ	SEGN COMn *6	
			V0 = 8.0 V	—	3.2	5.4			
Oscillator Frequency	Internal Oscillator	fOSC	1/97 duty	Ta = 25°C	—	1.53	1.55	MHz	*7
	External Input	fCL			—	1.53	1.55	MHz	OSC
	Frame frequency	fFRAME			—	75	85	Hz	FRR

Item	Symbol	Condition	Rating			Units	Applicable Pin	
			Min.	Typ.	Max.			
Internal Power	Input voltage	VDD	(Relative To VSS)	1.8	—	3.6	V	
	Input voltage	VDD2	(Relative To VSS2)	2.4	—	3.6	V	
	Supply Step-up output voltage Circuit	VOUT	(Relative To VSS)	4.8	—	18.0	V	VOUT
	Supply Regulator output voltage Circuit	V0	(Relative To VSS)	3.3	—	17.0	V	V0
	Base voltage	VRS	Ta = 25°C -0.05%/°C	2.07	2.1	2.13	V	

➤ Dynamic Consumption Current :

During Display, with the Internal Power Supply ON and Analog Circuit ON current consumed by total ICs

Test pattern	Symbol	Condition	Rating			Units	Notes
			Min.	Typ.	Max.		
Display Pattern SNOW	IVSS	VDD=VDD2= 2.4 V, VOUT-VSS=16.8V (Set booster 7X) V0 – VSS = 11.0 V 1/11 Bias	—	600	900	μA	*8
Power Save mode	IVSS	Ta = 25°C	—	0.01	2	μA	

Notes to the DC characteristics

1. The maximum possible V_{LCD} (V_0) voltage that may be generated is dependent on voltage, temperature and (display) load.
2. Internal clock.
3. Power Save mode. During power down all static currents are switched off.
4. If external V_{LCDIN} , the display load current is not transmitted to I_{DD} .
5. V_{OUT} external voltage applied to VLCDIN pin; VLCDIN disconnected from VLCDOUT (no connect)

References for items market with *

*1 While a broad range of operating voltages is guaranteed, performance cannot be guaranteed if there are sudden fluctuations to the voltage while the MPU is being accessed.

*2 The A0, D0 to D5, D6 (SI), D7 (SCL), XRD (E), XWR, (RW), CS1B, C86, OSC, PSB, XDOF, and RSTP terminals.

*3 The D0 to D7, and OSC terminals.

*4 The A0, XRD (E), XWR, (R/W), CS1B, C86, OSC, PSB, XDOF, and RSTP terminals.

*5 Applies when the D0 to D5, D6 (SI), D7 (SCL) terminals are in a high impedance state.

*6 These are the resistance values for when a 0.1 V voltage is applied between the output terminal SEGn or COMn and the various power supply terminals (V1, V2, V3, and V4). These are specified for the operating voltage range.

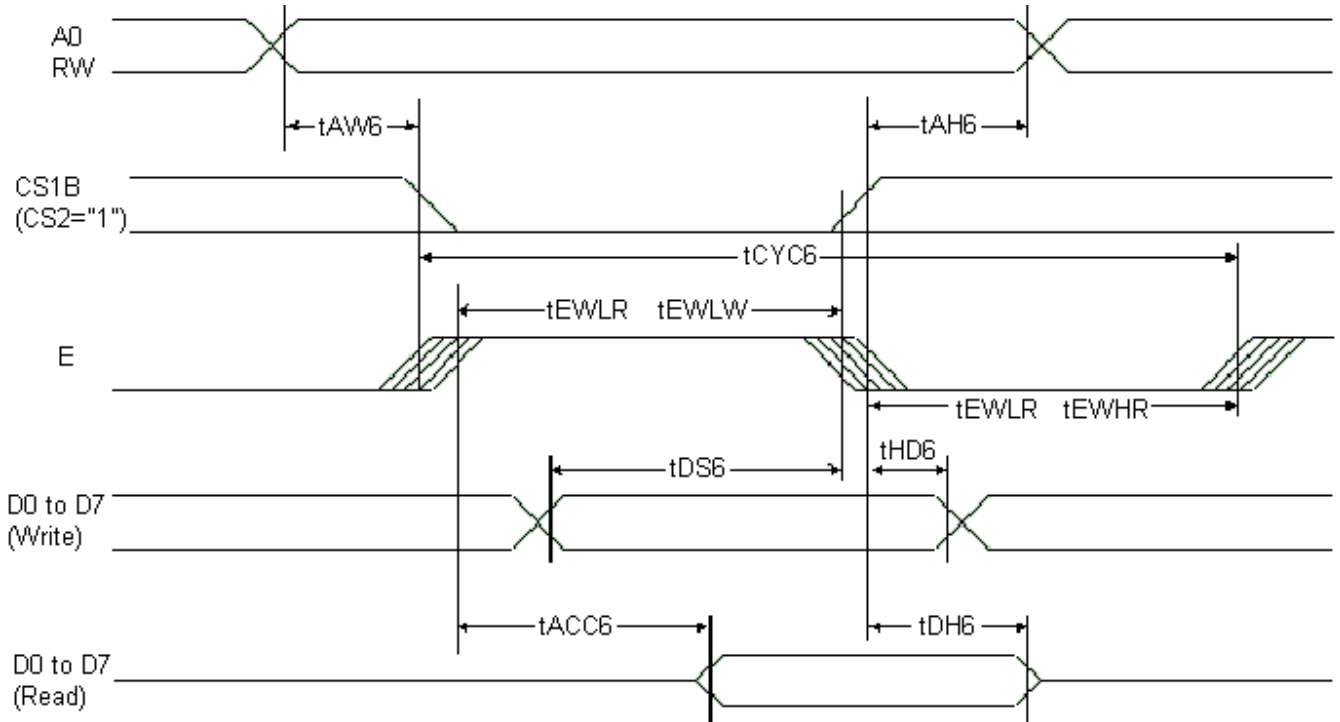
$R_{ON} = 0.1 \text{ V} / \Delta I$ (Where ΔI is the current that flows when 0.1 V is applied while the power supply is ON.)

*7 The relationship between the oscillator frequency and the frame rate frequency.

*8,9 It indicates the current consumed on ICs alone when the internal oscillator circuit and display are turned on.

■ TIMING CHARACTERISTICS

➤ 8bit and 4bit 6800 interface



(VDD = 3.3 V, Ta = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH6		0	—	ns
Address setup time		tAW6		0	—	
System cycle time		tCYC6		240	—	
Enable L pulse width (WRITE)	E	tEHLW		80	—	
Enable H pulse width (WRITE)		tEHLR		80	—	
Enable L pulse width (READ)	E	tEHLR		80	—	
Enable H pulse width (READ)		tEHLR		140	—	
WRITE Data setup time	D0 to D7	tDS6		40	—	
WRITE Address hold time		tDH6		0	—	
READ access time		tACC6	CL = 100 pF	—	70	
READ Output disable time		tOH6	CL = 100 pF	5	50	

(VDD = 2.7V , Ta =25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH6		0	—	ns
Address setup time		tAW6		0	—	
System cycle time		tCYC6		400	—	
Enable L pulse width (WRITE)	E	tEWLW		220	—	
Enable H pulse width (WRITE)		tEWHW		180	—	
Enable L pulse width (READ)	E	tEWLR		220	—	
Enable H pulse width (READ)		tEWHR		180	—	
WRITE Data setup time	D0 to D7	tDS6		40	—	
WRITE Address hold time		tDH6		0	—	
READ access time		tACC6	CL = 100 pF	—	140	
READ Output disable time		tOH6	CL = 100 pF	10	100	

Table 29

(VDD =1.8V , Ta =25°C)

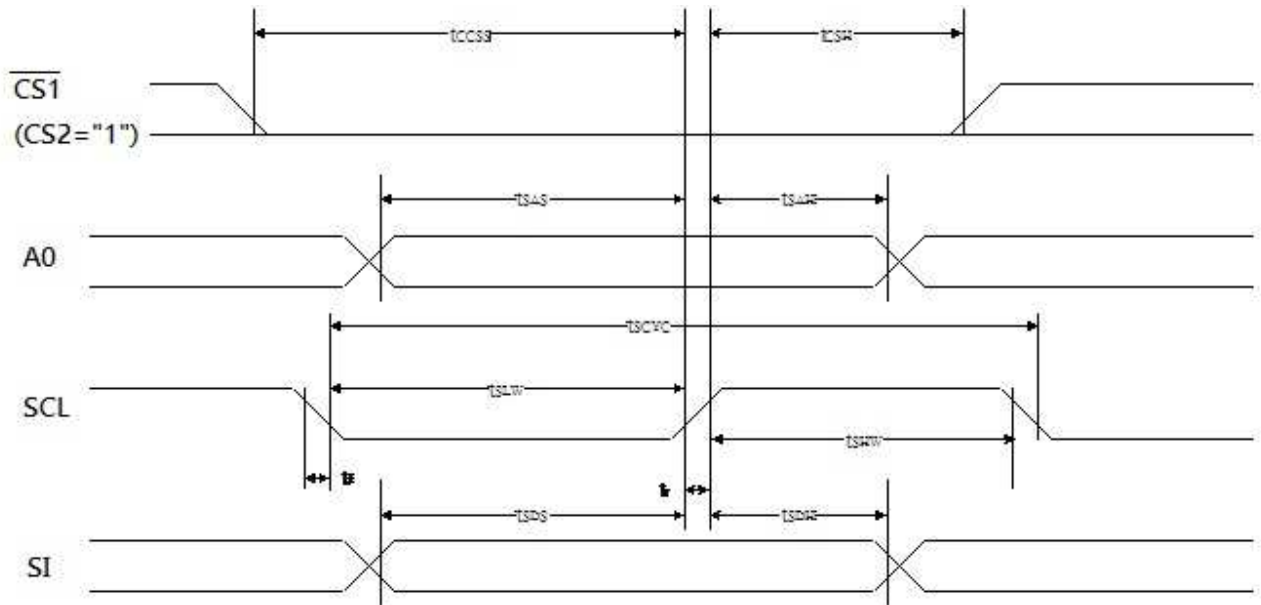
Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH6		0	—	ns
Address setup time		tAW6		0	—	
System cycle time		tCYC6		640	—	
Enable L pulse width (WRITE)	E	tEWLW		360	—	
Enable H pulse width (WRITE)		tEWHW		280	—	
Enable L pulse width (READ)	E	tEWLR		360	—	
Enable H pulse width (READ)		tEWHR		280	—	
WRITE Data setup time	D0 to D7	tDS6		80	—	
WRITE Address hold time		tDH6		0	—	
READ access time		tACC6	CL = 100 pF	—	240	
READ Output disable time		tOH6	CL = 100 pF	10	200	

*1 The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. When the system cycle time is extremely fast, $(tr + tf) \leq (tCYC6 - tEWLW - tEWHW)$ for $(tr + tf) \leq (tCYC6 - tEWLR - tEWHR)$ are specified.

*2 All timing is specified using 20% and 80% of VDD as the reference.

*3 tEWLW and tEWLR are specified as the overlap between CS1B being “L” and E.

➤ The Serial Interface (3/4-SPI interface)



(VDD = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	Tscyc		50	—	ns
SCL "H" pulse width		Tshw		25	—	
SCL "L" pulse width		TSLW		25	—	
Address setup time	A0	TSAS		20	—	
Address hold time		Tsah		10	—	
Data setup time	SI	Tsds		20	—	
Data hold time		TSDH		10	—	
CS-SCL time	CS	Tcss		20	—	
CS-SCL time		Tcsh		40	—	

(VDD = 2.7V , Ta = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	Tscyc		100	—	ns
SCL “H” pulse width		TSHW		50	—	
SCL “L” pulse width		TSLW		50	—	
Address setup time	A0	TSAS		30	—	
Address hold time		TSAH		20	—	
Data setup time	SI	TSDS		30	—	
Data hold time		TSDH		20	—	
CS-SCL time	CS	TCSS		30	—	
CS-SCL time		TCSH		60	—	

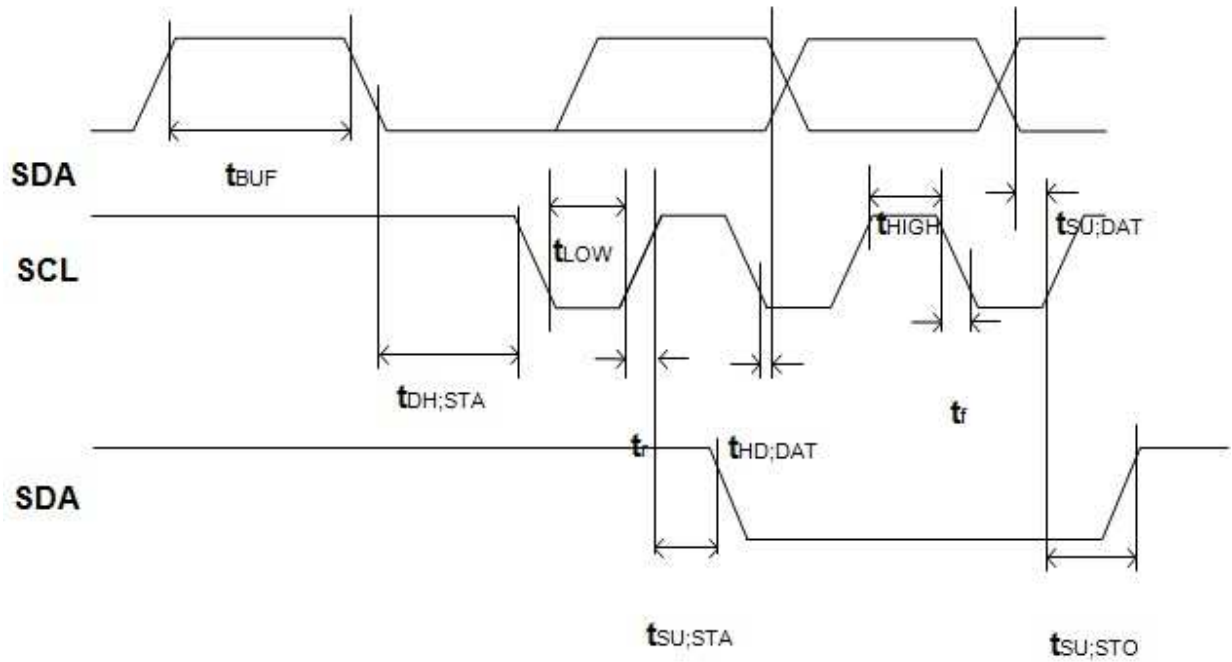
(VDD = 1.8V , Ta = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	TSCYC		200	—	ns
SCL “H” pulse width		TSHW		80	—	
SCL “L” pulse width		TSLW		80	—	
Address setup time	A0	TSAS		60	—	
Address hold time		TSAH		30	—	
Data setup time	SI	TSDS		60	—	
Data hold time		TSDH		30	—	
CS-SCL time	CS	TCSS		40	—	
CS-SCL time		TCSH		100	—	

*1 The input signal rise and fall time (tr, tf) are specified at 15 ns or less.

*2 All timing is specified using 20% and 80% of VDD as the standard.

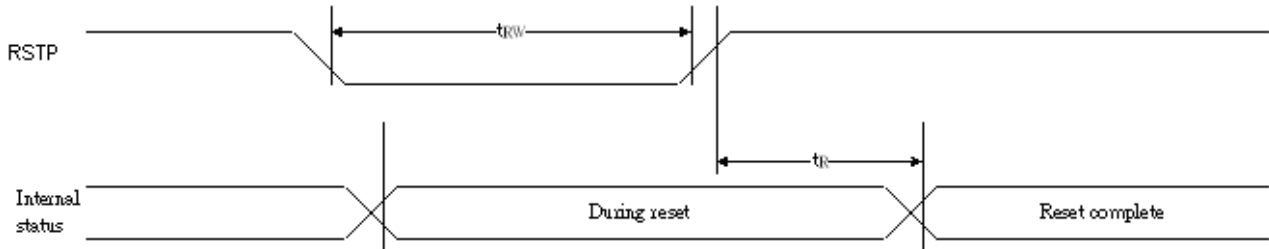
➤ The IIC Interface



(Ta = 25°C)

Item	Signal	Symbol	Condition	VDD=1.8 to 2.7V Rating		VDD=2.7 to 3.6V Rating		Units
				Min.	Max.	Min.	Max.	
SCL clock frequency	SCL	f_{SCLK}	—	DC	400	DC	400	KHz
SCL clock low period		t_{LOW}	—	1.3	—	1.3	—	us
SCL clock high period		t_{HIGH}	—	0.6	—	0.6	—	us
Data set-up time	SDA	$t_{SU:DAT}$	—	180	—	80	—	ns
Data hold time		$t_{HD:DAT}$	—	0	0.9	0	0.9	us
SCL,SDA rise time	SCL, SDA	t_r	—	$20+0.1C_b$	300	$20+0.1C_b$	300	ns
SCL,SDA fall time		t_f	—	$20+0.1C_b$	300	$20+0.1C_b$	300	
Capacitive load represent by each bus line		C_b	—	—	400	—	400	pf
Setup time for a repeated START condition	SDA	$t_{SU:STA}$	—	0.6	—	0.6	—	us
Start condition hold time		$t_{HD:STA}$	—	0.6	—	0.6	—	us
Setup time for STOP condition		$t_{SU:STO}$	—	0.6	—	0.6	—	us
Bus free time between a Stop and START condition	SCL	t_{BUF}	—	1.3	—	1.3	—	us

■ RESET TIMING



(VDD = 3.3V , Ta = -40 to 85°C)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		tR		—	—	1	us
Reset “L” pulse width	RESB	tRW		1	—	—	us

(VDD = 2.7V , Ta = -40 to 85°C)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		tR		—	—	1.5	us
Reset “L” pulse width	RESB	tRW		1.5	—	—	us

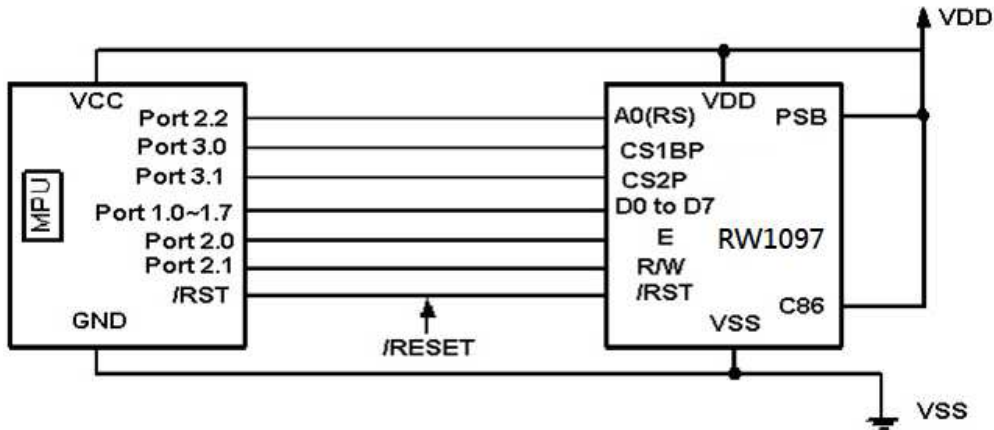
(VDD = 1.8V , Ta = -40 to 85°C)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		tR		—	—	2.0	us
Reset “L” pulse width	RESB	tRW		2.0	—	—	us

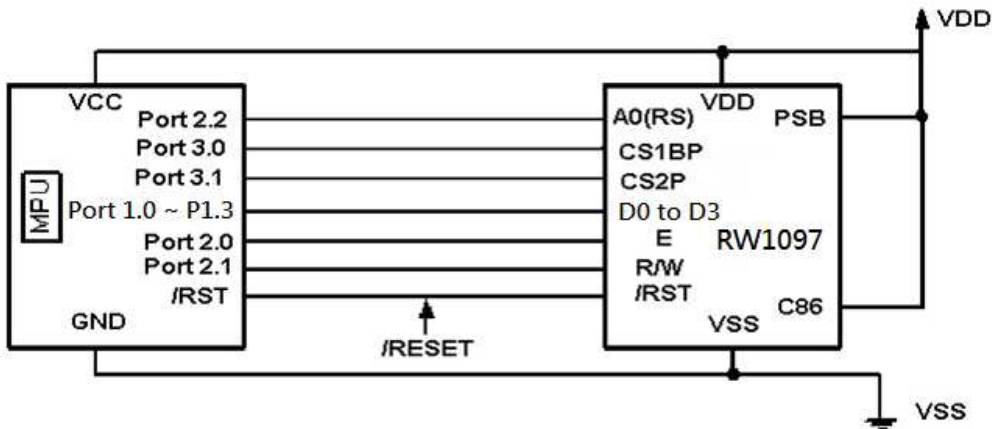
■ THE MPU INTERFACE (REFERENCE EXAMPLES)

The RW1097 Series can be connected to 6800 Series MPUs. Moreover, using the serial interface it is possible to operate the RW1097 series chips with fewer signal lines.

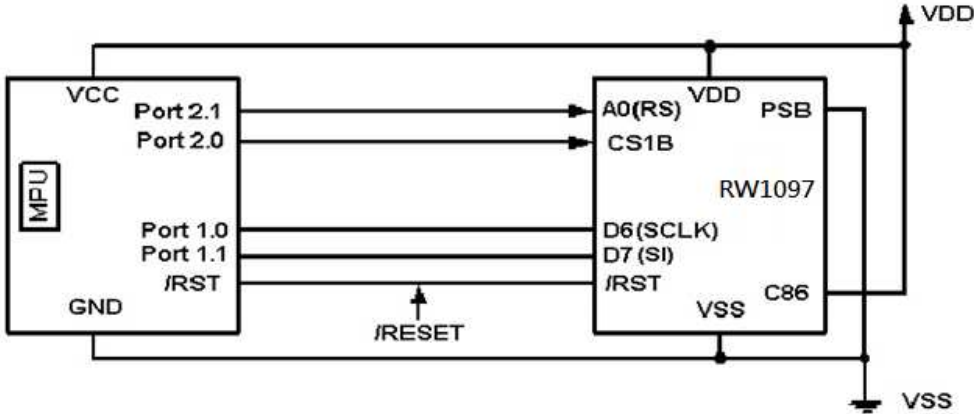
(1) 6800 Series MPU(PSB="H",C86="H") 8-bit data bus



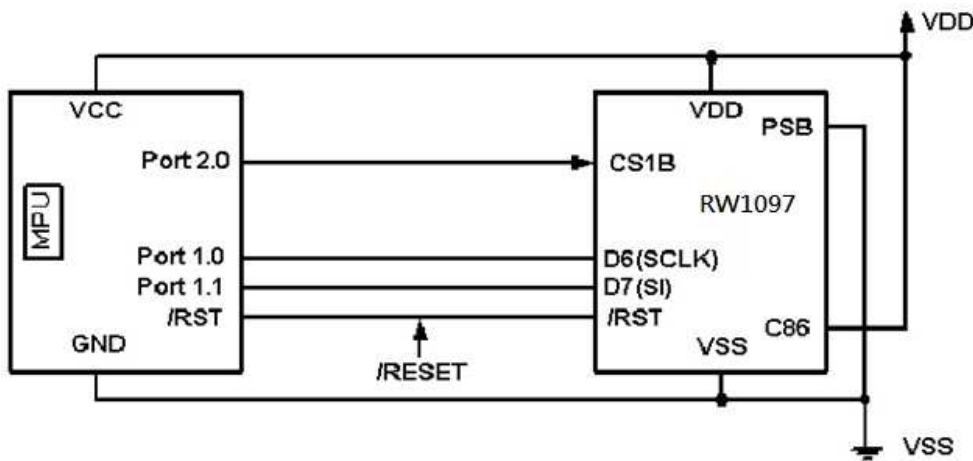
(2) 6800 Series MPU(PSB="H",C86="H") 4-bit data bus



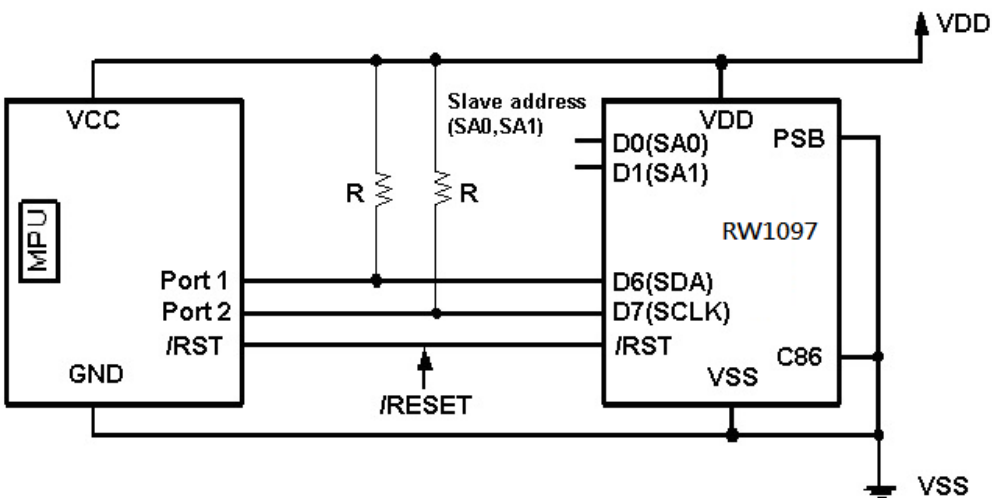
(3) 4-SPI Interface (PSB="L",C86="H")



(4) 3-SPI Interface (PSB="L",C86="H")



(5) IIC Interface (PSB="L",C86="L")



RW1097 Revision History		
Version	Date	Description
0.0	2015/04/02	Preliminary
0.1	2017/01/06	Add stander circuit for all duty Add adjustment frame frequency value for all duty. Add write command/data execution time for all duty Update dynamic consumption current Update instruction table Add Chinese GB Simplified Character font table Update Initialization setup for all interface

RW1097-0A-001 Chinese GB Simplified Character

Table A1A0 to B0C0 containing Chinese characters and symbols. Includes rows for punctuation, numbers, letters, and various symbols.

Table B0D0 to B9B0 containing Chinese characters. This section contains the main body of Chinese characters from the dot matrix controller.

BAC0 豪 毫 郝 好 耗 号 浩 呵 喝 荷 核 禾 和 何 合
 BAD0 盒 貉 阏 河 耗 号 浩 呵 喝 荷 核 禾 和 何 合
 BAE0 亨 横 衡 恒 洵 赫 褐 鹤 贺 黑 痕 很 喉 恨 侯
 BAF0 吼 厚 候 后 呼 乎 忽 虹 宏 弘 红 狐 糊 划
 BBA0 弧 虎 徊 怀 护 互 户 壶 胡 滑 画 划 疾 晃
 BBB0 话 槐 怀 淮 坏 欢 恒 蝗 还 昏 混 稽 积 活
 BBC0 焕 涣 幻 荒 悔 昏 混 稽 积 活 寐 晦 活 寐
 BBD0 恍 谎 会 获 肌 急 剂 佳 坚 监 拣 浆 嚼 叫 洁
 BBF0 秒 会 获 肌 急 剂 佳 坚 监 拣 浆 嚼 叫 洁
 BCA0 火 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BCB0 及 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BCC0 祭 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BCD0 夹 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BCE0 监 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BCF0 拣 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BDA0 健 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BDB0 奖 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BDC0 嚼 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BDD0 叫 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BDE0 洁 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BDF0 金 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BEA0 景 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BEB0 纠 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BEC0 拘 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BED0 距 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BEE0 距 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BEF0 攫 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BFA0 俊 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BFB0 堪 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BFC0 坷 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BFD0 峭 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BFE0 苦 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 BFF0 筐 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 COA0 馈 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 COB0 腊 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 COC0 览 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 COD0 佬 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 COE0 类 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 COF0 鲤 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C1A0 痢 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C1B0 帘 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C1C0 晾 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C1D0 列 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C1E0 拎 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C1F0 琉 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C2A0 隆 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C2B0 掳 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C2C0 吕 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C2D0 漆 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C2E0 锣 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C2F0 吗 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C3A0 冒 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C3B0 冒 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C3C0 美 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C3D0 眯 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C3E0 绵 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
 C3F0 灭 疾 济 加 简 健 奖 嚼 叫 洁 金 景 纠 拘 距
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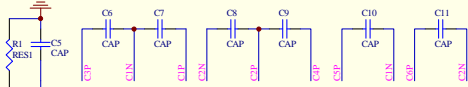
C4B0 陌 谋 牟 某 拇 牡 亩 姆 母 墓 暮 幕 募 慕 目
 C4C0 陌 谋 牟 某 拇 牡 亩 姆 母 墓 暮 幕 募 慕 目
 C4D0 陆 难 牧 拿 哪 那 那 那 那 那 那 那 那 那 那
 C4E0 男 泥 拟 挠 恼 脑 恼 恼 恼 恼 恼 恼 恼 恼 恼
 C5A0 酿 鸟 尿 你 你 你 你 你 你 你 你 你 你 你
 C5B0 虐 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔
 C5C0 虐 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔
 C5D0 虐 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔
 C5E0 虐 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔
 C5F0 虐 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔
 C6A0 虐 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔 疔
 C6B0 票 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏
 C6C0 评 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏
 C6D0 评 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏
 C6E0 评 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏
 C6F0 评 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏 屏
 C7A0 前 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜
 C7B0 前 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜
 C7C0 前 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜
 C7D0 前 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜
 C7E0 前 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜
 C7F0 前 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜 潜
 C8A0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 C8B0 劝 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 C8C0 劝 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 C8D0 劝 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 C8E0 劝 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 C8F0 劝 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 C9A0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 C9B0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 C9C0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 C9D0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 C9E0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 C9F0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CAA0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CAB0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CAC0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CAD0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CAE0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CAF0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CBA0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CBB0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CBC0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CBD0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CBE0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CBF0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CCA0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CCB0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CCC0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CCD0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CCE0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CCF0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CDA0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CDB0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CDC0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CDD0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CDE0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺
 CDF0 取 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺 缺

化 参 幌 贿 伙 集 伎 枷 斫 砢 蒋 娇 较 竭 斤 警 究 鞠 具 擢 刊 靠 肯 窟 匡 蜡 揽 老 肋 里 怜 量 料 吝 溜 炉 驴 李 逻 嘛 茂 每 孟 眠 蔑 寞

F5C0 趺 蹶 趺 跌 踰 跖 跖 跖 跖 跖 跖 跖 跖 跖 跖 跖
 F5D0 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳
 F5E0 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳
 F5F0 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳 踳
 F6A0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼
 F6B0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼
 F6C0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼
 F6D0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼
 F6E0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼
 F6F0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼
 F7A0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼
 F7B0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼
 F7C0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼
 F7D0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼
 F7E0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼
 F7F0 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼 裼

Booster Circuit

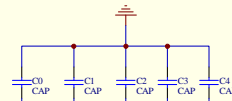
Booster circuit configured as 7X



CAP:2.2uF~4.7uF

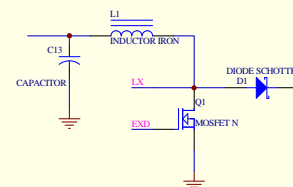
It is possible to select the boosting level 2X to 7X by using "Set DC-DC Set-up" instruction when external booster circuit is configured as 7X

Regulator/Follower Circuit



CAP:2.2uF~4.7uF

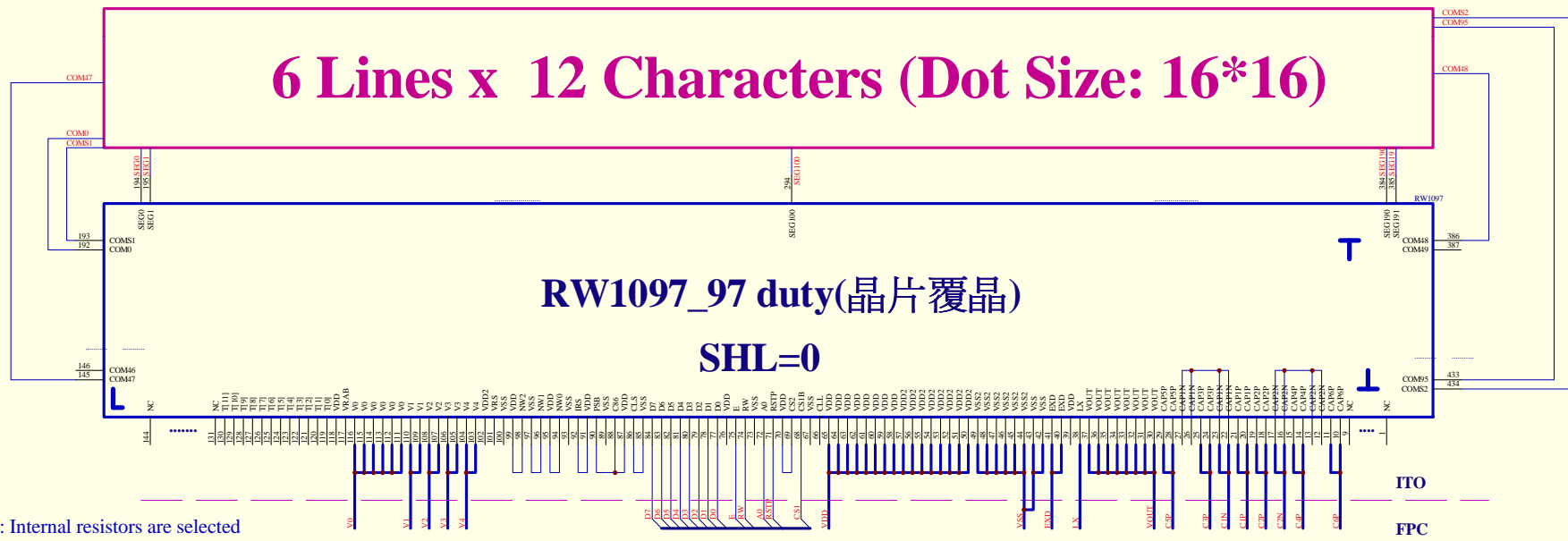
Inductor Type Regulator Circuit



Q1:2N7002K/BSS138
D1:1N5819
C12:1uF/25V~4.7uF/25V
C13:1uF/16V~10uF/16V
L1:2.2uH~10uH (IDC=80mA~100mA)

The capacitors of booster circuit must be removed when inductor type regulator circuit is used.

6 Lines x 12 Characters (Dot Size: 16*16)



RW107_97 duty(晶片覆晶)

SHL=0

IRS="H": Internal resistors are selected
CLS="H": Internal oscillator circuit is selected

Interface Selection

PSB	C86	Interface
0	0	IIC
0	1	3/4 SPI
1	1	4bit_6800
1	1	8bit_6800

←Now Setting

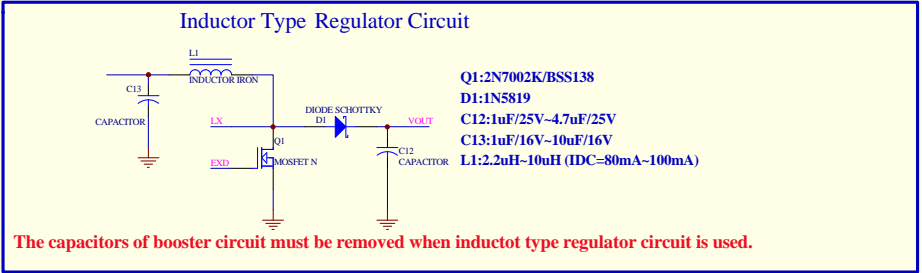
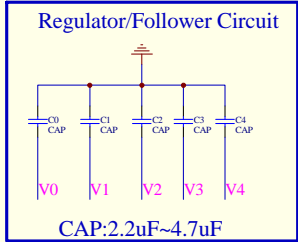
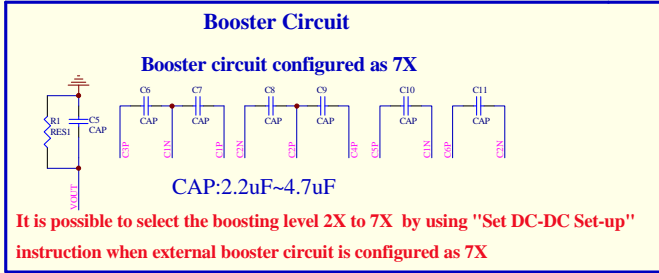
Duty Select

NW2	NW1	NW0	Duty Select
1	0	1	97
1	0	0	81
0	1	1	65
0	1	0	49
0	0	1	33
0	0	0	17

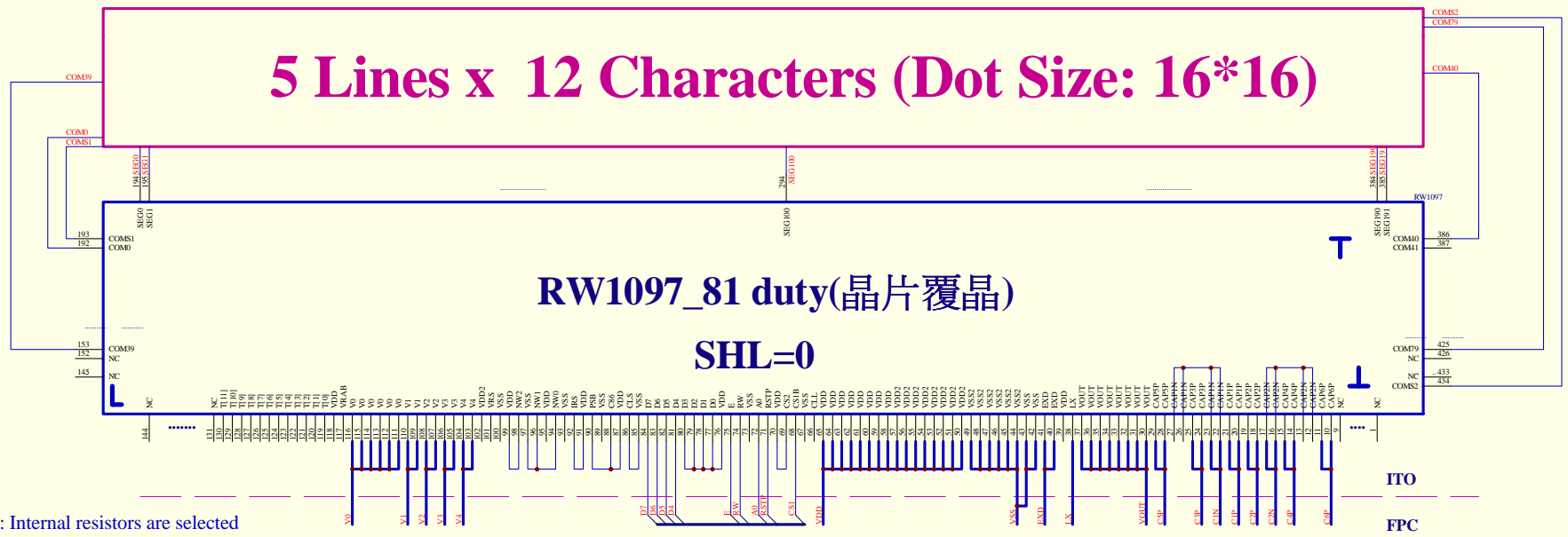
Interface selection pins **If use 3SPI interface the A0 pin must be connect to VSS**

Interface	CS1B	CS2	A0	E(XRD)	RW(XWR)	D7	D6	D5~D0
IIC	VDD/VSS	VDD	VSS	VDD	VDD	SCL	SDA	D2~D5 connect to D6 D0,D1 is Slave address
3SPI	CS1B	VDD	VSS	VDD	VDD	SI	SCLK	VDD
4SPI	CS1B	VDD	A0	VDD	VDD	SI	SCLK	VDD
4 bit 6800	CS1B	VDD	A0	E	RW	D0~D3 connect to VDD/VSS,D4~D7 connect to MCU		
8 bit 6800	CS1B	VDD	A0	E	RW	D7	D6	D5~D0

VSS and VSS2 must be connected together at FPC side



5 Lines x 12 Characters (Dot Size: 16*16)



IRS="H": Internal resistors are selected
 CLS="H": Internal oscillator circuit is selected

Interface Selection

PSB	C86	Interface
0	0	IIC
0	1	3/4 SPI
1	1	4bit_6800
1	1	8bit_6800

←Now Setting

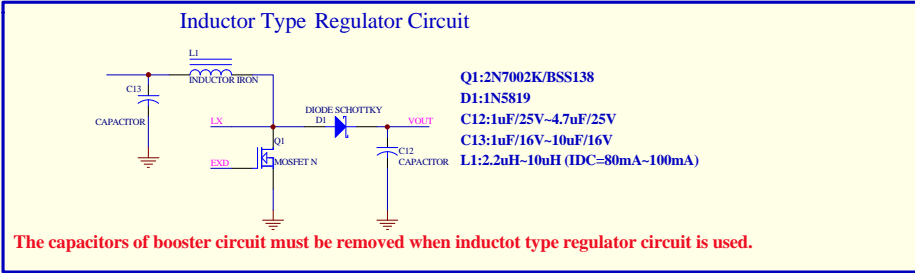
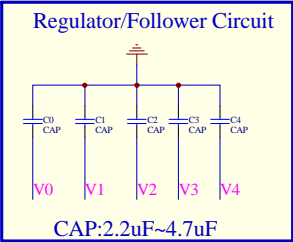
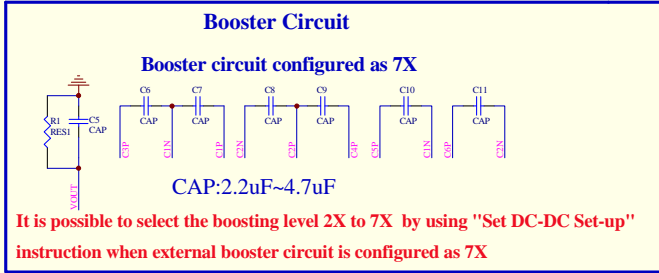
Duty Select

NW2	NW1	NW0	Duty Select
1	0	1	97
1	0	0	81
0	1	1	65
0	1	0	49
0	0	1	33
0	0	0	17

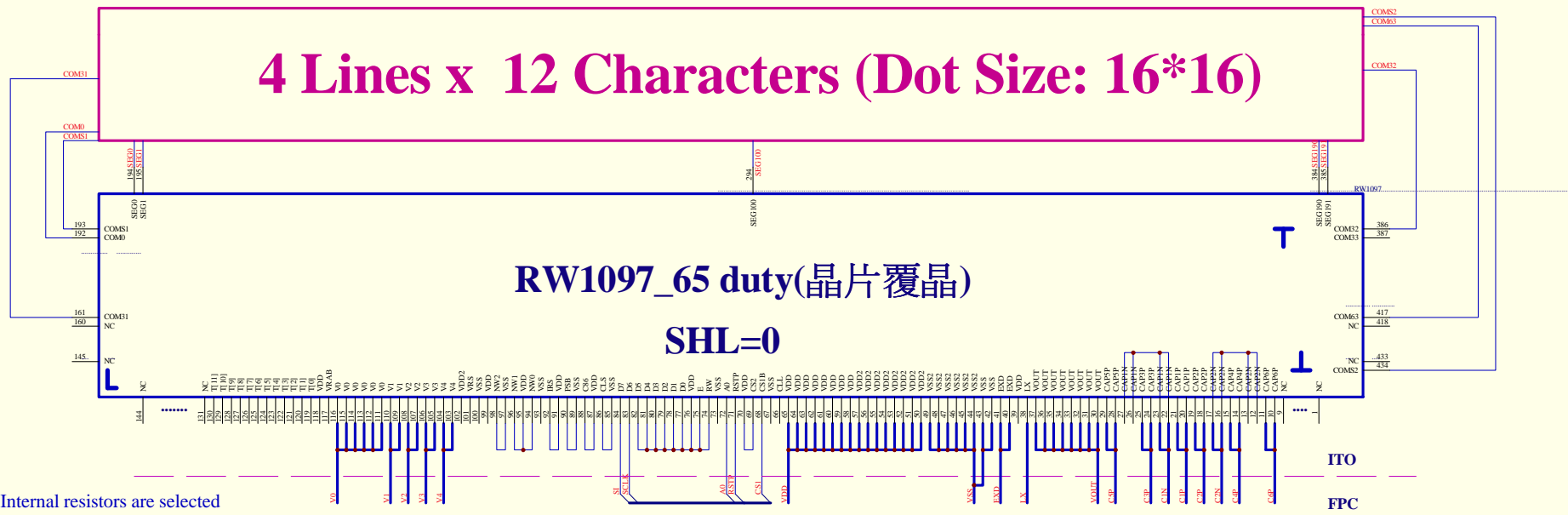
Interface selection pins **If use 3SPI interface the A0 pin must be connect to VSS**

Interface	CS1B	CS2	A0	E(XRD)	RW(XWR)	D7	D6	D5~D0
IIC	VDD/VSS	VDD	VSS	VDD	VDD	SCL	SDA	D2~D5 connect to D6 D0,D1 is Slave address
3SPI	CS1B	VDD	VSS	VDD	VDD	SI	SCLK	VDD
4SPI	CS1B	VDD	A0	VDD	VDD	SI	SCLK	VDD
4 bit 6800	CS1B	VDD	A0	E	RW	D0~D3 connect to VDD/VSS,D4~D7 connect to MCU		
8 bit 6800	CS1B	VDD	A0	E	RW	D7	D6	D5~D0

VSS and VSS2 must be connected together at FPC side



4 Lines x 12 Characters (Dot Size: 16*16)



IRS="H": Internal resistors are selected
 CLS="H": Internal oscillator circuit is selected

Interface Selection

PSB	C86	Interface
0	0	IIC
0	1	3/4 SPI
1	1	4bit_6800
1	1	8bit_6800

← Now Setting

Duty Select

NW2	NW1	NW0	Duty Select
1	0	1	97
1	0	0	81
0	1	1	65
0	1	0	49
0	0	1	33
0	0	0	17

Interface selection pins

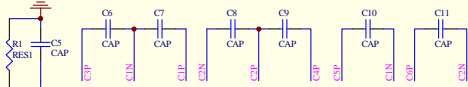
If use 3SPI interface the A0 pin must be connect to VSS

Interface	CS1B	CS2	A0	E(XRD)	RW(XWR)	D7	D6	D5~D0
IIC	VDD/VSS	VDD	VSS	VDD	VDD	SCL	SDA	D2~D5 connect to D6 D0,D1 is Slave address
3SPI	CS1B	VDD	VSS	VDD	VDD	SI	SCLK	VDD
4SPI	CS1B	VDD	A0	VDD	VDD	SI	SCLK	VDD
4 bit 6800	CS1B	VDD	A0	E	RW	D0~D3 connect to VDD/VSS, D4~D7 connect to MCU		
8 bit 6800	CS1B	VDD	A0	E	RW	D7	D6	D5~D0

VSS and VSS2 must be connected together at FPC side

Booster Circuit

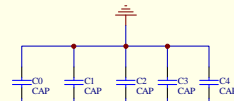
Booster circuit configured as 7X



CAP:2.2uF~4.7uF

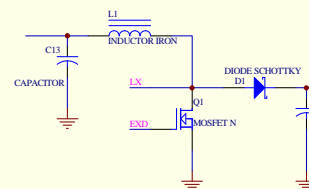
It is possible to select the boosting level 2X to 7X by using "Set DC-DC Set-up" instruction when external booster circuit is configured as 7X

Regulator/Follower Circuit



CAP:2.2uF~4.7uF

Inductor Type Regulator Circuit



Q1:2N7002K/BSS138
D1:1N5819
C12:1uF/25V~4.7uF/25V
C13:1uF/16V~10uF/16V
L1:2.2uH-10uH (IDC=80mA~100mA)

The capacitors of booster circuit must be removed when inductor type regulator circuit is used.

3 Lines x 12 Characters (Dot Size: 16*16)

RW1097_49 duty(晶片覆晶)

SHL=0

IRS="H": Internal resistors are selected
CLS="H": Internal oscillator circuit is selected

Interface Selection

PSB	C86	Interface
0	0	IIC
0	1	3/4 SPI
1	1	4bit_6800
1	1	8bit_6800

← Now Setting

Duty Select

NW2	NW1	NW0	Duty Select
1	0	1	97
1	0	0	81
0	1	1	65
0	1	0	49
0	0	1	33
0	0	0	17

Interface selection pins

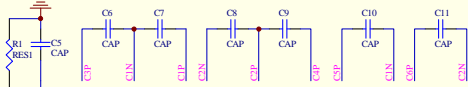
If use 3SPI interface the A0 pin must be connect to VSS

Interface	CS1B	CS2	A0	E(XRD)	RW(XWR)	D7	D6	D5~D0
IIC	VDD/VSS	VDD	VSS	VDD	VDD	SCL	SDA	D2~D5 connect to D6 D0,D1 is Slave address
3SPI	CS1B	VDD	VSS	VDD	VDD	SI	SCLK	VDD
4SPI	CS1B	VDD	A0	VDD	VDD	SI	SCLK	VDD
4 bit 6800	CS1B	VDD	A0	E	RW	D0~D3 connect to VDD/VSS,D4~D7 connect to MCU		
8 bit 6800	CS1B	VDD	A0	E	RW	D7	D6	D5~D0

VSS and VSS2 must be connected together at FPC side

Booster Circuit

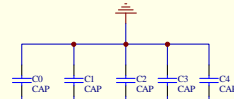
Booster circuit configured as 7X



CAP:2.2uF~4.7uF

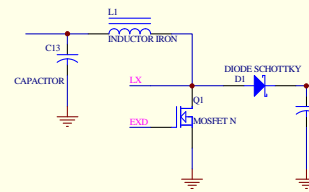
It is possible to select the boosting level 2X to 7X by using "Set DC-DC Set-up" instruction when external booster circuit is configured as 7X

Regulator/Follower Circuit



CAP:2.2uF~4.7uF

Inductor Type Regulator Circuit



Q1:2N7002K/BSS138
D1:1N5819
C12:1uF/25V~4.7uF/25V
C13:1uF/16V~10uF/16V
L1:2.2uH~10uH (IDC=80mA~100mA)

The capacitors of booster circuit must be removed when inductor type regulator circuit is used.

3 Lines x 12 Characters (Dot Size: 16*16)

RW1097_49 duty(晶片覆晶)

SHL=0

IRS="H": Internal resistors are selected
CLS="H": Internal oscillator circuit is selected

Interface Selection

PSB	C86	Interface
0	0	IIC
0	1	3/4 SPI
1	1	4bit_6800
1	1	8bit_6800

← Now Setting

Duty Select

NW2	NW1	NW0	Duty Select
1	0	1	97
1	0	0	81
0	1	1	65
0	1	0	49
0	0	1	33
0	0	0	17

Interface selection pins

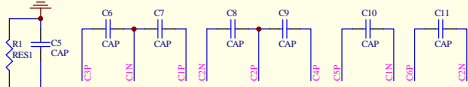
If use 3SPI interface the A0 pin must be connect to VSS

Interface	CS1B	CS2	A0	E(XRD)	RW(XWR)	D7	D6	D5~D0
IIC	VDD/VSS	VDD	VSS	VDD	VDD	SCL	SDA	D2~D5 connect to D6 D0,D1 is Slave address
3SPI	CS1B	VDD	VSS	VDD	VDD	SI	SCLK	VDD
4SPI	CS1B	VDD	A0	VDD	VDD	SI	SCLK	VDD
4 bit 6800	CS1B	VDD	A0	E	RW	D0~D3 connect to VDD/VSS,D4~D7 connect to MCU		
8 bit 6800	CS1B	VDD	A0	E	RW	D7	D6	D5~D0

VSS and VSS2 must be connected together at FPC side

Booster Circuit

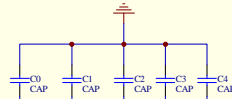
Booster circuit configured as 7X



CAP:2.2uF~4.7uF

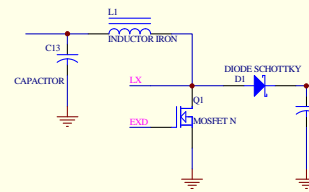
It is possible to select the boosting level 2X to 7X by using "Set DC-DC Set-up" instruction when external booster circuit is configured as 7X

Regulator/Follower Circuit



CAP:2.2uF~4.7uF

Inductor Type Regulator Circuit



Q1:2N7002K/BSS138
D1:1N5819
C12:1uF/25V~4.7uF/25V
C13:1uF/16V~10uF/16V
L1:2.2uH-10uH (IDC=80mA~100mA)

The capacitors of booster circuit must be removed when inductor type regulator circuit is used.

2 Lines x 12 Characters (Dot Size: 16*16)

RW1097_33 duty(晶片覆晶)

SHL=0

IRS="H": Internal resistors are selected
CLS="H": Internal oscillator circuit is selected

Interface Selection

PSB	C86	Interface
0	0	IIC
0	1	3/4 SPI
1	1	4bit_6800
1	1	8bit_6800

← Now Setting

Duty Select

NW2	NW1	NW0	Duty Select
1	0	1	97
1	0	0	81
0	1	1	65
0	1	0	49
0	0	1	33
0	0	0	17

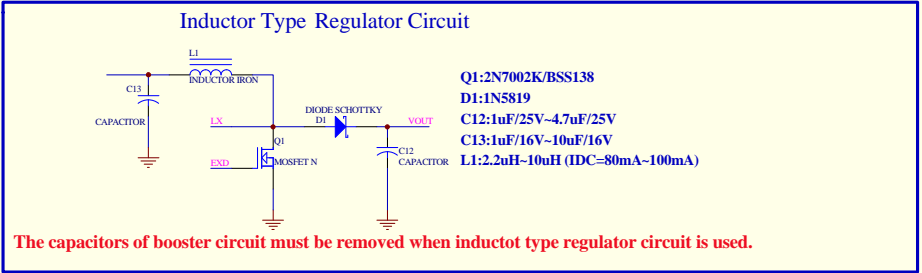
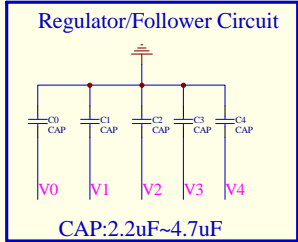
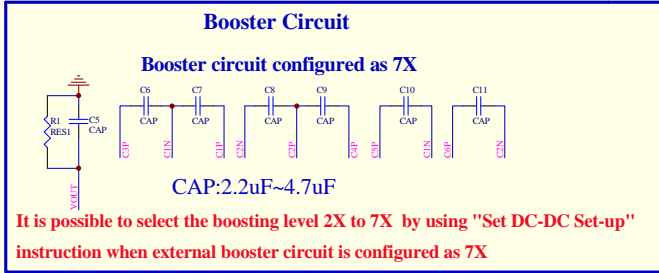
Interface selection pins

If use 3SPI interface the A0 pin must be connect to VSS

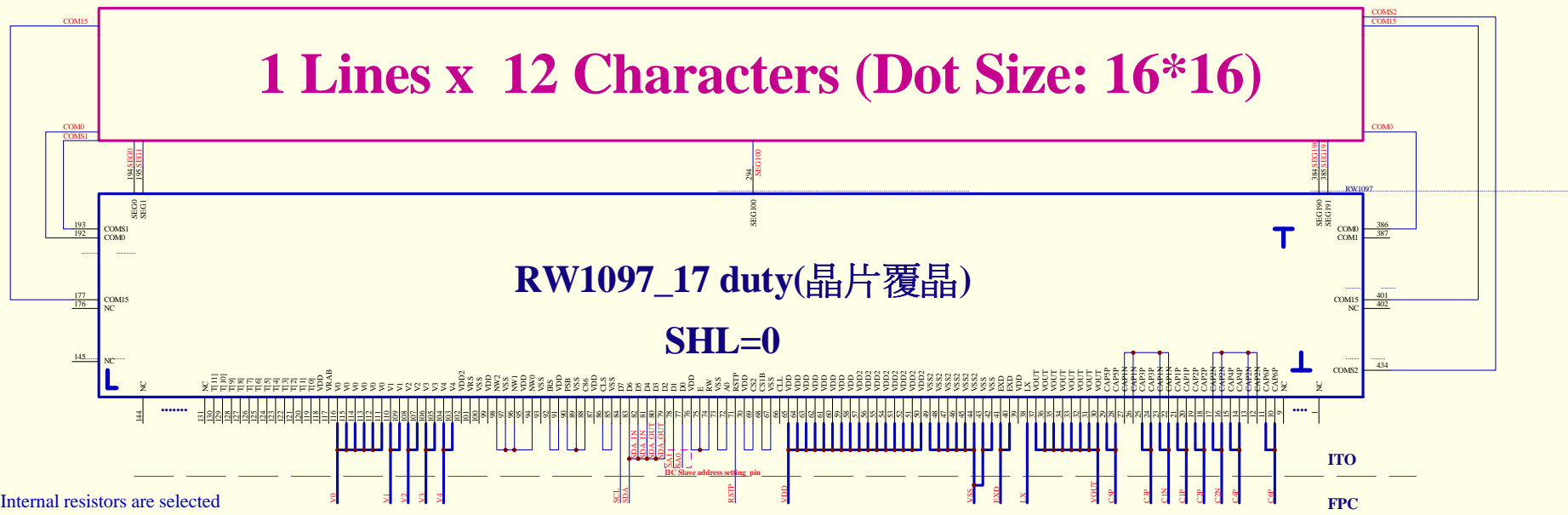
Interface	CS1B	CS2	A0	E(XRD)	RW(XWR)	D7	D6	D5~D0
IIC	VDD/VSS	VDD	VSS	VDD	VDD	SCL	SDA	D2~D5 connect to D6 D0,D1 is Slave address
3SPI	CS1B	VDD	VSS	VDD	VDD	SI	SCLK	VDD
4SPI	CS1B	VDD	A0	VDD	VDD	SI	SCLK	VDD
4 bit 6800	CS1B	VDD	A0	E	RW	D0~D3 connect to VDD/VSS,D4~D7 connect to MCU		
8 bit 6800	CS1B	VDD	A0	E	RW	D7	D6	D5~D0

SA1	SA0	Slave address
0	0	0x78
0	1	0x7a
1	0	0x7c
1	1	0x7e

VSS and VSS2 must be connected together at FPC side



1 Lines x 12 Characters (Dot Size: 16*16)



IRS="H": Internal resistors are selected
 CLS="H": Internal oscillator circuit is selected

PSB	C86	Interface
0	0	IIC
0	1	3/4 SPI
1	1	4bit_6800
1	1	8bit_6800

← Now Setting

Duty Select			
NW2	NW1	NW0	Duty Select
1	0	1	97
1	0	0	81
0	1	1	65
0	1	0	49
0	0	1	33
0	0	0	17

Interface	Interface selection pins						
	CS1B	CS2	A0	E(XRD)	RW(XWR)	D7	D6
IIC	VDD/VSS	VDD	VSS	VDD	VDD	SCL	SDA
3SPI	CS1B	VDD	VSS	VDD	VDD	SI	SCLK
4SPI	CS1B	VDD	A0	VDD	VDD	SI	SCLK
4 bit 6800	CS1B	VDD	A0	E	RW	D0~D3 connect to VDD/VSS, D4~D7 connect to MCU	
8 bit 6800	CS1B	VDD	A0	E	RW	D7	D6

If use 3SPI interface the A0 pin must be connect to VSS

SA1	SA0	Slave address
0	0	0x78
0	1	0x7a
1	0	0x7c
1	1	0x7e