

Raydium

RM68040 Engineering Specification

262,144-color, 320 RGB x 480 dots graphics liquid crystal controller driver for
Amorphous-Silicon TFT Panel

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1. General Description

The RM68040 is a single-chip liquid crystal controller driver LSI for a-Si TFT panel, comprising 345,600 bytes RAM for a maximum 320RGB x 480 dots graphics display, source driver, gate driver and power supply circuit. For efficient data transfer, the RM68040 supports high-speed interface via 8-/9-/16-/18-bit ports as system interface (DBI) to the microcomputer. As moving picture interface, the RM68040 supports RGB (DPI) interface (VSYNC, HSYNC, DOTCLK, DE, and DB17-0).

Also, the RM68040 incorporates step-up circuit and voltage follower circuit to generate TFT liquid crystal panel drive voltages.

The RM68040's power management functions such as 8-color display and power operation mode such as deep standby mode and sleep mode make this LSI a perfect driver for the medium or small sized portable products with color display systems such as digital cellular phones or hand-held devices with outstanding battery consistency.

2. Features

- A single-chip controller driver incorporating a gate circuit and a power supply circuit for a maximum 320 RGB x 480 dots graphics display on amorphous TFT panel in 262k colors
- System interface
 - (1). High-speed interface via 8-, 9-, 16-, 18-bit parallel ports (DBI, Type B)
 - (2). Clock synchronous serial interface (SPI, DBI Type C)
- Moving picture display interface
 - (1). 16-, 18-bit RGB interface (DPI)
- Window address function to specify a rectangular area writing data in the internal RAM
- Abundant color display and drawing functions
 - (1). Programmable γ -correction function for 262k-color display
 - (2). Partial display function
- Low power consumption architecture
 - (1). Deep standby mode
 - (2). Sleep mode
 - (3). 8-color display function
- Input power supply voltages:
 - IOVCC = 1.65V~3.3V (interface I/O power supply)
 - VCI = 2.5V~3.3V (liquid crystal analog circuit power supply)
- Incorporates a liquid crystal drive power supply circuit
 - (1). Source driver liquid crystal drive/VCOM power supply: $DDVDH-GND = 4.5V \sim 6.0V$
 $VCL-GND = -VCI1 (-1.75V \sim -3.3V)$
 $VCI-VCL \leq 6.0V$
 - (2). Gate drive power supply: $VGH-GND = 10.0V \sim 18V$
 $VGL-GND = -5V \sim -12.5V$
 $VGH-VGL \leq 32V$

(3). VCOM drive (VCOM power supply): $V_{COMH} = 3.0V \sim (DDVDH-0.5)V$

$V_{COML} = (V_{CL}+0.5V) \sim 0V$

$V_{COMH}-V_{COML}$ amplitude $\leq 6.0V$

- Liquid crystal power supply startup sequencer
- 345,600-byte internal RAM
- Single-chip solution for COG module with the arrangement of gate circuits on both sides of the glass substrate
- Internal NVM: VCOM level adjustment, ID

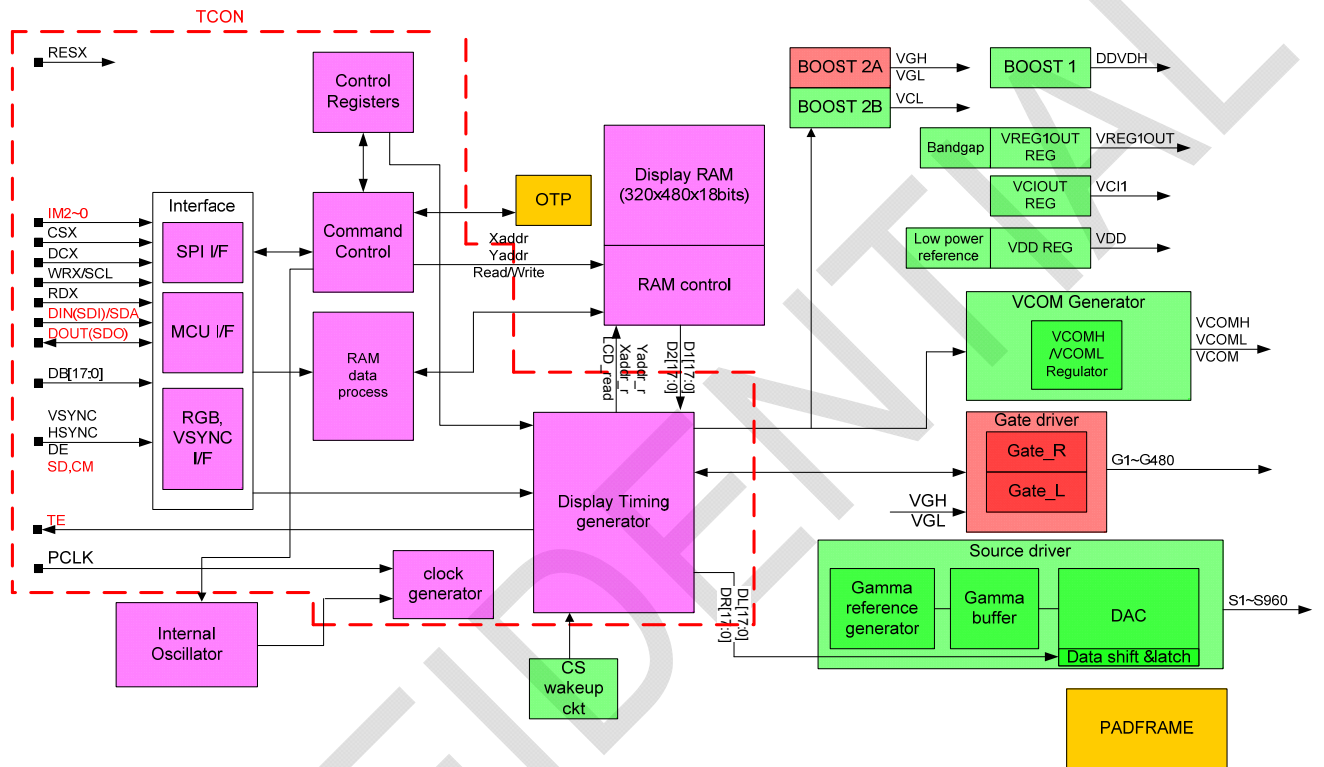
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Table 1 Power Supply Specifications

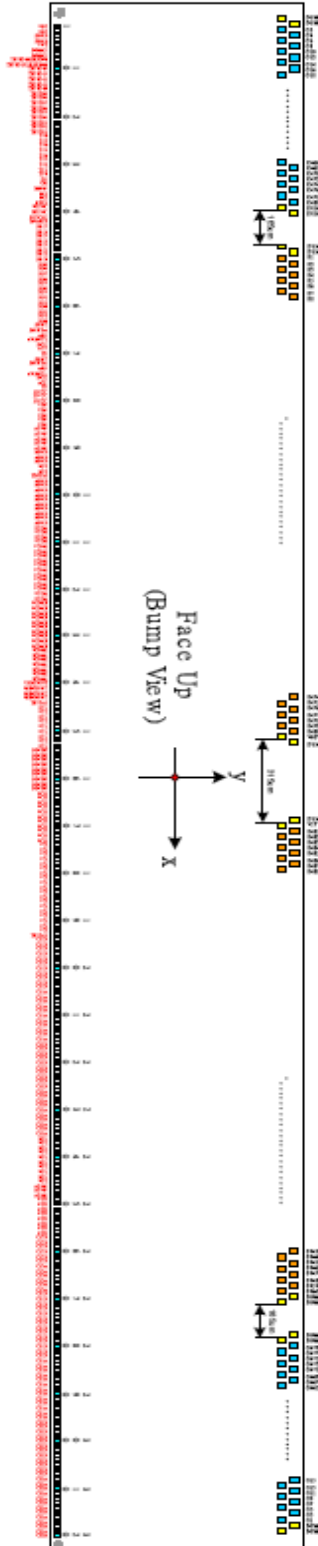
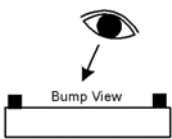
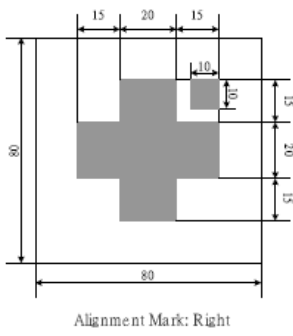
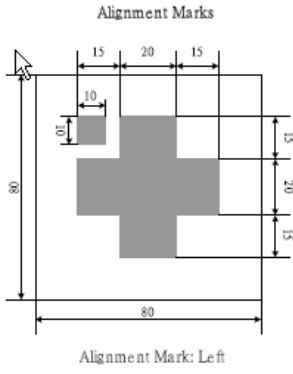
No.	Item	RM68040	
1	TFT data lines	960 output	
2	TFT gate lines	480 output	
3	TFT display storage capacitance	Cst only (Common VCOM)	
4	Liquid crystal drive output	S1~S960	V0~V63 grayscales
		G1~G480	VGH-VGL
		VCOM	Change VCOMH-VCOML amplitude with electronic volume
5	Input voltage	IOVCC (interface voltage)	1.65V~3.30V Power supply to IM0-2, RESX, DB17-0, RDX, DIN/SDA, DOUT, WRX/SCL, D/CX, CSX, VSYNC, HSYNC, DOTCLK, DE, TE, SD, CM.
		VCI (liquid crystal drive power supply voltage)	2.50V~3.30V
6	Liquid crystal drive voltages	DDVDH	4.5V ~ 6.0V
		VGH	10.0V ~ 18V
		VGL	-5V ~ -12.5V
		VGH-VGL	Max. 32.0V
		VCL	-1.75V ~ -3.3V
		VCI-VCL	Max. 6.0V
7	Internal step-up circuits	VLOUT1 (DDVDH)	VC11x2
		VLOUT2 (VGH)	VC11x4, x5, x6
		VLOUT3 (VGL)	VC11x-3, -4, -5
		VCL	VC11x-1

3. Block Diagram

Figure 1 Block Diagram



4. Pin Diagram



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- Chip size: 22.85 mm x 1.02 mm (Include sealing and scribe line)
- Chip thickness: 300 um (typ.)
- PAD coordinates: PAD center
- PAD coordinates origin: Chip center
- Bump size
 - (1). 15um x 120um: Gate:G1~G480, Source:S1~S960
 - (2). 50um x 80um: Input Pads
- Au bump pitch: See PAD coordinates table
- Au bump height: 15um (typ.)
- No. in the figure corresponds to No. in the PAD coordinates table
- Alignment mark

Alignment mark shape	X	Y
Type A	-11300	-400
	11300	-400

Pad Coordinate (Unit: um)

No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y
1	VPC	-11165	-409	51	DB9	-7665	-409	101	AGND	-4165	-409	151	VCL	-665	-409	201	C11B	2835	-409
2	VPG	-11095	-409	52	DB8	-7595	-409	102	AGND	-4095	-409	152	VCL	-595	-409	202	C11B	2905	-409
3	DGND	-11025	-409	53	DB7	-7525	-409	103	AGND	-4025	-409	153	VCL	-525	-409	203	C11B	2975	-409
4	DGND	-10955	-409	54	DB6	-7455	-409	104	AGND	-3955	-409	154	DDVDH	-455	-409	204	C11B	3045	-409
5	YWT	-10885	-409	55	DB5	-7385	-409	105	AGND	-3885	-409	155	DDVDH	-385	-409	205	C11A	3115	-409
6	DUMMY	-10815	-409	56	DB4	-7315	-409	106	AGND	-3815	-409	156	DDVDH	-315	-409	206	C11A	3185	-409
7	DUMMY	-10745	-409	57	DB3	-7245	-409	107	VCOM	-3745	-409	157	DDVDH	-245	-409	207	C11A	3255	-409
8	TESTO16	-10675	-409	58	DB2	-7175	-409	108	VCOM	-3675	-409	158	DDVDH	-175	-409	208	C11A	3325	-409
9	TESTO15	-10605	-409	59	DB1	-7105	-409	109	VCOM	-3605	-409	159	DDVDH	-105	-409	209	C11A	3395	-409
10	TESTO14	-10535	-409	60	DB0	-7035	-409	110	VCOM	-3535	-409	160	DDVDH	-35	-409	210	C11A	3465	-409
11	TESTO13	-10465	-409	61	DOU1	-6965	-409	111	VCOM	-3465	-409	161	DDVDH	35	-409	211	C11A	3535	-409
12	TESTO12	-10395	-409	62	DIN/SDA	-6895	-409	112	VCOM	-3395	-409	162	DDVDH	105	-409	212	C11A	3605	-409
13	TESTO11	-10325	-409	63	RDX	-6825	-409	113	VCOM	-3325	-409	163	VCI1	175	-409	213	C11A	3675	-409
14	TESTO10	-10255	-409	64	WRX/SCI	-6755	-409	114	VCOM	-3255	-409	164	VCI1	245	-409	214	C11A	3745	-409
15	TESTO9	-10185	-409	65	D/CX	-6685	-409	115	VCOM	-3185	-409	165	VCI1	315	-409	215	C11A	3815	-409
16	TESTO8	-10115	-409	66	CSX	-6615	-409	116	VCOM	-3115	-409	166	VCI1	385	-409	216	C12B	3885	-409
17	TESTO7	-10045	-409	67	TE	-6545	-409	117	VCOM	-3045	-409	167	VCI1	455	-409	217	C12B	3955	-409
18	TESTO6	-9975	-409	68	IOVCC	-6475	-409	118	VCOM	-2975	-409	168	VCI1	525	-409	218	C12B	4025	-409
19	TESTO5	-9905	-409	69	IOVCC	-6405	-409	119	VCOM	-2905	-409	169	VCI1	595	-409	219	C12B	4095	-409
20	TESTO4	-9835	-409	70	IOVCC	-6335	-409	120	VCOM	-2835	-409	170	VCI1	665	-409	220	C12B	4165	-409
21	TESTO3	-9765	-409	71	IOVCC	-6265	-409	121	VCOM	-2765	-409	171	VCI1	735	-409	221	C12B	4235	-409
22	TESTO2	-9695	-409	72	IOVCC	-6195	-409	122	VCOM	-2695	-409	172	VCI1	805	-409	222	C12B	4305	-409
23	TESTO1	-9625	-409	73	IOVCC	-6125	-409	123	VCOMH	-2625	-409	173	VCI1	875	-409	223	C12B	4375	-409
24	TS8	-9555	-409	74	IOVCC	-6055	-409	124	VCOMH	-2555	-409	174	VCI	945	-409	224	C12B	4445	-409
25	TS7	-9485	-409	75	VDD	-5985	-409	125	VCOMH	-2485	-409	175	VCI	1015	-409	225	C12B	4515	-409
26	TS6	-9415	-409	76	VDD	-5915	-409	126	VCOMH	-2415	-409	176	VCI	1085	-409	226	C12A	4585	-409
27	TS5	-9345	-409	77	VDD	-5845	-409	127	VCOMH	-2345	-409	177	VCI	1155	-409	227	C12A	4655	-409
28	TS4	-9275	-409	78	VDD	-5775	-409	128	VCOMH	-2275	-409	178	VCI	1225	-409	228	C12A	4725	-409
29	TS3	-9205	-409	79	VDD	-5705	-409	129	VCOMH	-2205	-409	179	VCI	1295	-409	229	C12A	4795	-409
30	TS2	-9135	-409	80	VDD	-5635	-409	130	VCOMH	-2135	-409	180	VCI	1365	-409	230	C12A	4865	-409
31	TS1	-9065	-409	81	VDD	-5565	-409	131	VCOMH	-2065	-409	181	VCI	1435	-409	231	C12A	4935	-409
32	TS0	-8995	-409	82	VDD	-5495	-409	132	VCOMH	-1995	-409	182	VCI	1505	-409	232	C12A	5005	-409
33	SD	-8925	-409	83	VDD	-5425	-409	133	VCOML	-1925	-409	183	VCI	1575	-409	233	C12A	5075	-409
34	CM	-8855	-409	84	VDD	-5355	-409	134	VCOML	-1855	-409	184	VCI	1645	-409	234	C12A	5145	-409
35	IM0/ID	-8785	-409	85	VDD	-5285	-409	135	VCOML	-1785	-409	185	VCI	1715	-409	235	C12A	5215	-409
36	IM1	-8715	-409	86	AGND	-5215	-409	136	VCOML	-1715	-409	186	VCI	1785	-409	236	VGL	5285	-409
37	IM2	-8645	-409	87	AGND	-5145	-409	137	VCOML	-1645	-409	187	VCI	1855	-409	237	VGL	5355	-409
38	RESX	-8575	-409	88	AGND	-5075	-409	138	VCOML	-1575	-409	188	VCI	1925	-409	238	VGL	5425	-409
39	YSYNC	-8505	-409	89	AGND	-5005	-409	139	VCOML	-1505	-409	189	VCI	1995	-409	239	VGL	5495	-409
40	HSYNC	-8435	-409	90	AGND	-4935	-409	140	VREG101	-1435	-409	190	VCI	2065	-409	240	VGL	5565	-409
41	CLK	-8365	-409	91	AGND	-4865	-409	141	VREG201	-1365	-409	191	VCI	2135	-409	241	VGL	5635	-409
42	DE	-8295	-409	92	AGND	-4795	-409	142	VREG301	-1295	-409	192	VCI	2205	-409	242	VGL	5705	-409
43	DB17	-8225	-409	93	AGND	-4725	-409	143	VREG401	-1225	-409	193	TESTA3	2275	-409	243	VGL	5775	-409
44	DB16	-8155	-409	94	VGS	-4655	-409	144	TESTA2	-1155	-409	194	C11B	2345	-409	244	VGL	5845	-409
45	DB15	-8085	-409	95	VGS	-4585	-409	145	VCL	-1085	-409	195	C11B	2415	-409	245	VGL	5915	-409
46	DB14	-8015	-409	96	TESTA1	-4515	-409	146	VCL	-1015	-409	196	C11B	2485	-409	246	AGND	5985	-409
47	DB13	-7945	-409	97	AGND	-4445	-409	147	VCL	-945	-409	197	C11B	2555	-409	247	AGND	6055	-409
48	DB12	-7875	-409	98	AGND	-4375	-409	148	VCL	-875	-409	198	C11B	2625	-409	248	AGND	6125	-409
49	DB11	-7805	-409	99	AGND	-4305	-409	149	VCL	-805	-409	199	C11B	2695	-409	249	VGH	6195	-409
50	DB10	-7735	-409	100	AGND	-4235	-409	150	VCL	-735	-409	200	C11B	2765	-409	250	VGH	6265	-409

No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y
251	VGH	6335	-409	301	C22B	9835	-409	351	G57	10755	244	401	G157	10005	244	451	G257	9255	244
252	VGH	6405	-409	302	C22B	9905	-409	352	G59	10740	389	402	G159	9990	389	452	G259	9240	389
253	VGH	6475	-409	303	C22B	9975	-409	353	G61	10725	244	403	G161	9975	244	453	G261	9225	244
254	VGH	6545	-409	304	C22B	10045	-409	354	G63	10710	389	404	G163	9960	389	454	G263	9210	389
255	VGH	6615	-409	305	C22B	10115	-409	355	G65	10695	244	405	G165	9945	244	455	G265	9195	244
256	VGH	6685	-409	306	C22B	10185	-409	356	G67	10680	389	406	G167	9930	389	456	G267	9180	389
257	C13B	6755	-409	307	C22B	10255	-409	357	G69	10665	244	407	G169	9915	244	457	G269	9165	244
258	C13B	6825	-409	308	C22A	10325	-409	358	G71	10650	389	408	G171	9900	389	458	G271	9150	389
259	C13B	6895	-409	309	C22A	10395	-409	359	G73	10635	244	409	G173	9885	244	459	G273	9135	244
260	C13B	6965	-409	310	C22A	10465	-409	360	G75	10620	389	410	G175	9870	389	460	G275	9120	389
261	C13B	7035	-409	311	C22A	10535	-409	361	G77	10605	244	411	G177	9855	244	461	G277	9105	244
262	C13B	7105	-409	312	C22A	10605	-409	362	G79	10590	389	412	G179	9840	389	462	G279	9090	389
263	C13A	7175	-409	313	C22A	10675	-409	363	G81	10575	244	413	G181	9825	244	463	G281	9075	244
264	C13A	7245	-409	314	C22A	10745	-409	364	G83	10560	389	414	G183	9810	389	464	G283	9060	389
265	C13A	7315	-409	315	C22A	10815	-409	365	G85	10545	244	415	G185	9795	244	465	G285	9045	244
266	C13A	7385	-409	316	C22A	10885	-409	366	G87	10530	389	416	G187	9780	389	466	G287	9030	389
267	C13A	7455	-409	317	C22A	10955	-409	367	G89	10515	244	417	G189	9765	244	467	G289	9015	244
268	C13A	7525	-409	318	C22A	11025	-409	368	G91	10500	389	418	G191	9750	389	468	G291	9000	389
269	C21B	7595	-409	319	C22A	11095	-409	369	G93	10485	244	419	G193	9735	244	469	G293	8985	244
270	C21B	7665	-409	320	C22A	11165	-409	370	G95	10470	389	420	G195	9720	389	470	G295	8970	389
271	C21B	7735	-409	321	DUMMY	11205	244	371	G97	10455	244	421	G197	9705	244	471	G297	8955	244
272	C21B	7805	-409	322	DUMMY	11190	389	372	G99	10440	389	422	G199	9690	389	472	G299	8940	389
273	C21B	7875	-409	323	G1	11175	244	373	G101	10425	244	423	G201	9675	244	473	G301	8925	244
274	C21B	7945	-409	324	G3	11160	389	374	G103	10410	389	424	G203	9660	389	474	G303	8910	389
275	C21B	8015	-409	325	G5	11145	244	375	G105	10395	244	425	G205	9645	244	475	G305	8895	244
276	C21B	8085	-409	326	G7	11130	389	376	G107	10380	389	426	G207	9630	389	476	G307	8880	389
277	C21B	8155	-409	327	G9	11115	244	377	G109	10365	244	427	G209	9615	244	477	G309	8865	244
278	C21B	8225	-409	328	G11	11100	389	378	G111	10350	389	428	G211	9600	389	478	G311	8850	389
279	C21B	8295	-409	329	G13	11085	244	379	G113	10335	244	429	G213	9585	244	479	G313	8835	244
280	C21B	8365	-409	330	G15	11070	389	380	G115	10320	389	430	G215	9570	389	480	G315	8820	389
281	C21B	8435	-409	331	G17	11055	244	381	G117	10305	244	431	G217	9555	244	481	G317	8805	244
282	C21B	8505	-409	332	G19	11040	389	382	G119	10290	389	432	G219	9540	389	482	G319	8790	389
283	C21A	8575	-409	333	G21	11025	244	383	G121	10275	244	433	G221	9525	244	483	G321	8775	244
284	C21A	8645	-409	334	G23	11010	389	384	G123	10260	389	434	G223	9510	389	484	G323	8760	389
285	C21A	8715	-409	335	G25	10995	244	385	G125	10245	244	435	G225	9495	244	485	G325	8745	244
286	C21A	8785	-409	336	G27	10980	389	386	G127	10230	389	436	G227	9480	389	486	G327	8730	389
287	C21A	8855	-409	337	G29	10965	244	387	G129	10215	244	437	G229	9465	244	487	G329	8715	244
288	C21A	8925	-409	338	G31	10950	389	388	G131	10200	389	438	G231	9450	389	488	G331	8700	389
289	C21A	8995	-409	339	G33	10935	244	389	G133	10185	244	439	G233	9435	244	489	G333	8685	244
290	C21A	9065	-409	340	G35	10920	389	390	G135	10170	389	440	G235	9420	389	490	G335	8670	389
291	C21A	9135	-409	341	G37	10905	244	391	G137	10155	244	441	G237	9405	244	491	G337	8655	244
292	C21A	9205	-409	342	G39	10890	389	392	G139	10140	389	442	G239	9390	389	492	G339	8640	389
293	C21A	9275	-409	343	G41	10875	244	393	G141	10125	244	443	G241	9375	244	493	G341	8625	244
294	C21A	9345	-409	344	G43	10860	389	394	G143	10110	389	444	G243	9360	389	494	G343	8610	389
295	C21A	9415	-409	345	G45	10845	244	395	G145	10095	244	445	G245	9345	244	495	G345	8595	244
296	C22B	9485	-409	346	G47	10830	389	396	G147	10080	389	446	G247	9330	389	496	G347	8580	389
297	C22B	9555	-409	347	G49	10815	244	397	G149	10065	244	447	G249	9315	244	497	G349	8565	244
298	C22B	9625	-409	348	G51	10800	389	398	G151	10050	389	448	G251	9300	389	498	G351	8550	389
299	C22B	9695	-409	349	G53	10785	244	399	G153	10035	244	449	G253	9285	244	499	G353	8535	244
300	C22B	9765	-409	350	G55	10770	389	400	G155	10020	389	450	G255	9270	389	500	G355	8520	389

No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y
501	G357	B505	244	551	G457	7755	244	601	S926	6855	244	651	S876	6105	244	701	S826	5355	244
502	G359	B490	389	552	G459	7740	389	602	S925	6840	389	652	S875	6090	389	702	S825	5340	389
503	G361	B475	244	553	G461	7725	244	603	S924	6825	244	653	S874	6075	244	703	S824	5325	244
504	G363	B460	389	554	G463	7710	389	604	S923	6810	389	654	S873	6060	389	704	S823	5310	389
505	G365	B445	244	555	G465	7695	244	605	S922	6795	244	655	S872	6045	244	705	S822	5295	244
506	G367	B430	389	556	G467	7680	389	606	S921	6780	389	656	S871	6030	389	706	S821	5280	389
507	G369	B415	244	557	G469	7665	244	607	S920	6765	244	657	S870	6015	244	707	S820	5265	244
508	G371	B400	389	558	G471	7650	389	608	S919	6750	389	658	S869	6000	389	708	S819	5250	389
509	G373	B385	244	559	G473	7635	244	609	S918	6735	244	659	S868	5985	244	709	S818	5235	244
510	G375	B370	389	560	G475	7620	389	610	S917	6720	389	660	S867	5970	389	710	S817	5220	389
511	G377	B355	244	561	G477	7605	244	611	S916	6705	244	661	S866	5955	244	711	S816	5205	244
512	G379	B340	389	562	G479	7590	389	612	S915	6690	389	662	S865	5940	389	712	S815	5190	389
513	G381	B325	244	563	DUMMY	7575	244	613	S914	6675	244	663	S864	5925	244	713	S814	5175	244
514	G383	B310	389	564	DUMMY	7560	389	614	S913	6660	389	664	S863	5910	389	714	S813	5160	389
515	G385	B295	244	565	DUMMY	7395	244	615	S912	6645	244	665	S862	5895	244	715	S812	5145	244
516	G387	B280	389	566	DUMMY	7380	389	616	S911	6630	389	666	S861	5880	389	716	S811	5130	389
517	G389	B265	244	567	S960	7365	244	617	S910	6615	244	667	S860	5865	244	717	S810	5115	244
518	G391	B250	389	568	S959	7350	389	618	S909	6600	389	668	S859	5850	389	718	S809	5100	389
519	G393	B235	244	569	S958	7335	244	619	S908	6585	244	669	S858	5835	244	719	S808	5085	244
520	G395	B220	389	570	S957	7320	389	620	S907	6570	389	670	S857	5820	389	720	S807	5070	389
521	G397	B205	244	571	S956	7305	244	621	S906	6555	244	671	S856	5805	244	721	S806	5055	244
522	G399	B190	389	572	S955	7290	389	622	S905	6540	389	672	S855	5790	389	722	S805	5040	389
523	G401	B175	244	573	S954	7275	244	623	S904	6525	244	673	S854	5775	244	723	S804	5025	244
524	G403	B160	389	574	S953	7260	389	624	S903	6510	389	674	S853	5760	389	724	S803	5010	389
525	G405	B145	244	575	S952	7245	244	625	S902	6495	244	675	S852	5745	244	725	S802	4995	244
526	G407	B130	389	576	S951	7230	389	626	S901	6480	389	676	S851	5730	389	726	S801	4980	389
527	G409	B115	244	577	S950	7215	244	627	S900	6465	244	677	S850	5715	244	727	S800	4965	244
528	G411	B100	389	578	S949	7200	389	628	S899	6450	389	678	S849	5700	389	728	S799	4950	389
529	G413	B085	244	579	S948	7185	244	629	S898	6435	244	679	S848	5685	244	729	S798	4935	244
530	G415	B070	389	580	S947	7170	389	630	S897	6420	389	680	S847	5670	389	730	S797	4920	389
531	G417	B055	244	581	S946	7155	244	631	S896	6405	244	681	S846	5655	244	731	S796	4905	244
532	G419	B040	389	582	S945	7140	389	632	S895	6390	389	682	S845	5640	389	732	S795	4890	389
533	G421	B025	244	583	S944	7125	244	633	S894	6375	244	683	S844	5625	244	733	S794	4875	244
534	G423	B010	389	584	S943	7110	389	634	S893	6360	389	684	S843	5610	389	734	S793	4860	389
535	G425	7995	244	585	S942	7095	244	635	S892	6345	244	685	S842	5595	244	735	S792	4845	244
536	G427	7980	389	586	S941	7080	389	636	S891	6330	389	686	S841	5580	389	736	S791	4830	389
537	G429	7965	244	587	S940	7065	244	637	S890	6315	244	687	S840	5565	244	737	S790	4815	244
538	G431	7950	389	588	S939	7050	389	638	S889	6300	389	688	S839	5550	389	738	S789	4800	389
539	G433	7935	244	589	S938	7035	244	639	S888	6285	244	689	S838	5535	244	739	S788	4785	244
540	G435	7920	389	590	S937	7020	389	640	S887	6270	389	690	S837	5520	389	740	S787	4770	389
541	G437	7905	244	591	S936	7005	244	641	S886	6255	244	691	S836	5505	244	741	S786	4755	244
542	G439	7890	389	592	S935	6990	389	642	S885	6240	389	692	S835	5490	389	742	S785	4740	389
543	G441	7875	244	593	S934	6975	244	643	S884	6225	244	693	S834	5475	244	743	S784	4725	244
544	G443	7860	389	594	S933	6960	389	644	S883	6210	389	694	S833	5460	389	744	S783	4710	389
545	G445	7845	244	595	S932	6945	244	645	S882	6195	244	695	S832	5445	244	745	S782	4695	244
546	G447	7830	389	596	S931	6930	389	646	S881	6180	389	696	S831	5430	389	746	S781	4680	389
547	G449	7815	244	597	S930	6915	244	647	S880	6165	244	697	S830	5415	244	747	S780	4665	244
548	G451	7800	389	598	S929	6900	389	648	S879	6150	389	698	S829	5400	389	748	S779	4650	389
549	G453	7785	244	599	S928	6885	244	649	S878	6135	244	699	S828	5385	244	749	S778	4635	244
550	G455	7770	389	600	S927	6870	389	650	S877	6120	389	700	S827	5370	389	750	S777	4620	389

No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y
751	S776	4605	244	801	S726	3855	244	851	S676	3105	244	901	S626	2355	244	951	S576	1605	244
752	S775	4590	389	802	S725	3840	389	852	S675	3090	389	902	S625	2340	389	952	S575	1590	389
753	S774	4575	244	803	S724	3825	244	853	S674	3075	244	903	S624	2325	244	953	S574	1575	244
754	S773	4560	389	804	S723	3810	389	854	S673	3060	389	904	S623	2310	389	954	S573	1560	389
755	S772	4545	244	805	S722	3795	244	855	S672	3045	244	905	S622	2295	244	955	S572	1545	244
756	S771	4530	389	806	S721	3780	389	856	S671	3030	389	906	S621	2280	389	956	S571	1530	389
757	S770	4515	244	807	S720	3765	244	857	S670	3015	244	907	S620	2265	244	957	S570	1515	244
758	S769	4500	389	808	S719	3750	389	858	S669	3000	389	908	S619	2250	389	958	S569	1500	389
759	S768	4485	244	809	S718	3735	244	859	S668	2985	244	909	S618	2235	244	959	S568	1485	244
760	S767	4470	389	810	S717	3720	389	860	S667	2970	389	910	S617	2220	389	960	S567	1470	389
761	S766	4455	244	811	S716	3705	244	861	S666	2955	244	911	S616	2205	244	961	S566	1455	244
762	S765	4440	389	812	S715	3690	389	862	S665	2940	389	912	S615	2190	389	962	S565	1440	389
763	S764	4425	244	813	S714	3675	244	863	S664	2925	244	913	S614	2175	244	963	S564	1425	244
764	S763	4410	389	814	S713	3660	389	864	S663	2910	389	914	S613	2160	389	964	S563	1410	389
765	S762	4395	244	815	S712	3645	244	865	S662	2895	244	915	S612	2145	244	965	S562	1395	244
766	S761	4380	389	816	S711	3630	389	866	S661	2880	389	916	S611	2130	389	966	S561	1380	389
767	S760	4365	244	817	S710	3615	244	867	S660	2865	244	917	S610	2115	244	967	S560	1365	244
768	S759	4350	389	818	S709	3600	389	868	S659	2850	389	918	S609	2100	389	968	S559	1350	389
769	S758	4335	244	819	S708	3585	244	869	S658	2835	244	919	S608	2085	244	969	S558	1335	244
770	S757	4320	389	820	S707	3570	389	870	S657	2820	389	920	S607	2070	389	970	S557	1320	389
771	S756	4305	244	821	S706	3555	244	871	S656	2805	244	921	S606	2055	244	971	S556	1305	244
772	S755	4290	389	822	S705	3540	389	872	S655	2790	389	922	S605	2040	389	972	S555	1290	389
773	S754	4275	244	823	S704	3525	244	873	S654	2775	244	923	S604	2025	244	973	S554	1275	244
774	S753	4260	389	824	S703	3510	389	874	S653	2760	389	924	S603	2010	389	974	S553	1260	389
775	S752	4245	244	825	S702	3495	244	875	S652	2745	244	925	S602	1995	244	975	S552	1245	244
776	S751	4230	389	826	S701	3480	389	876	S651	2730	389	926	S601	1980	389	976	S551	1230	389
777	S750	4215	244	827	S700	3465	244	877	S650	2715	244	927	S600	1965	244	977	S550	1215	244
778	S749	4200	389	828	S699	3450	389	878	S649	2700	389	928	S599	1950	389	978	S549	1200	389
779	S748	4185	244	829	S698	3435	244	879	S648	2685	244	929	S598	1935	244	979	S548	1185	244
780	S747	4170	389	830	S697	3420	389	880	S647	2670	389	930	S597	1920	389	980	S547	1170	389
781	S746	4155	244	831	S696	3405	244	881	S646	2655	244	931	S596	1905	244	981	S546	1155	244
782	S745	4140	389	832	S695	3390	389	882	S645	2640	389	932	S595	1890	389	982	S545	1140	389
783	S744	4125	244	833	S694	3375	244	883	S644	2625	244	933	S594	1875	244	983	S544	1125	244
784	S743	4110	389	834	S693	3360	389	884	S643	2610	389	934	S593	1860	389	984	S543	1110	389
785	S742	4095	244	835	S692	3345	244	885	S642	2595	244	935	S592	1845	244	985	S542	1095	244
786	S741	4080	389	836	S691	3330	389	886	S641	2580	389	936	S591	1830	389	986	S541	1080	389
787	S740	4065	244	837	S690	3315	244	887	S640	2565	244	937	S590	1815	244	987	S540	1065	244
788	S739	4050	389	838	S689	3300	389	888	S639	2550	389	938	S589	1800	389	988	S539	1050	389
789	S738	4035	244	839	S688	3285	244	889	S638	2535	244	939	S588	1785	244	989	S538	1035	244
790	S737	4020	389	840	S687	3270	389	890	S637	2520	389	940	S587	1770	389	990	S537	1020	389
791	S736	4005	244	841	S686	3255	244	891	S636	2505	244	941	S586	1755	244	991	S536	1005	244
792	S735	3990	389	842	S685	3240	389	892	S635	2490	389	942	S585	1740	389	992	S535	990	389
793	S734	3975	244	843	S684	3225	244	893	S634	2475	244	943	S584	1725	244	993	S534	975	244
794	S733	3960	389	844	S683	3210	389	894	S633	2460	389	944	S583	1710	389	994	S533	960	389
795	S732	3945	244	845	S682	3195	244	895	S632	2445	244	945	S582	1695	244	995	S532	945	244
796	S731	3930	389	846	S681	3180	389	896	S631	2430	389	946	S581	1680	389	996	S531	930	389
797	S730	3915	244	847	S680	3165	244	897	S630	2415	244	947	S580	1665	244	997	S530	915	244
798	S729	3900	389	848	S679	3150	389	898	S629	2400	389	948	S579	1650	389	998	S529	900	389
799	S728	3885	244	849	S678	3135	244	899	S628	2385	244	949	S578	1635	244	999	S528	885	244
800	S727	3870	389	850	S677	3120	389	900	S627	2370	389	950	S577	1620	389	1000	S527	870	389

No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y
1001	S526	855	244	1051	S480	-180	389	1101	S430	-930	389	1151	S380	-1680	389	1201	S330	-2430	389
1002	S525	840	389	1052	S479	-195	244	1102	S429	-945	244	1152	S379	-1695	244	1202	S329	-2445	244
1003	S524	825	244	1053	S478	-210	389	1103	S428	-960	389	1153	S378	-1710	389	1203	S328	-2460	389
1004	S523	810	389	1054	S477	-225	244	1104	S427	-975	244	1154	S377	-1725	244	1204	S327	-2475	244
1005	S522	795	244	1055	S476	-240	389	1105	S426	-990	389	1155	S376	-1740	389	1205	S326	-2490	389
1006	S521	780	389	1056	S475	-255	244	1106	S425	-1005	244	1156	S375	-1755	244	1206	S325	-2505	244
1007	S520	765	244	1057	S474	-270	389	1107	S424	-1020	389	1157	S374	-1770	389	1207	S324	-2520	389
1008	S519	750	389	1058	S473	-285	244	1108	S423	-1035	244	1158	S373	-1785	244	1208	S323	-2535	244
1009	S518	735	244	1059	S472	-300	389	1109	S422	-1050	389	1159	S372	-1800	389	1209	S322	-2550	389
1010	S517	720	389	1060	S471	-315	244	1110	S421	-1065	244	1160	S371	-1815	244	1210	S321	-2565	244
1011	S516	705	244	1061	S470	-330	389	1111	S420	-1080	389	1161	S370	-1830	389	1211	S320	-2580	389
1012	S515	690	389	1062	S469	-345	244	1112	S419	-1095	244	1162	S369	-1845	244	1212	S319	-2595	244
1013	S514	675	244	1063	S468	-360	389	1113	S418	-1110	389	1163	S368	-1860	389	1213	S318	-2610	389
1014	S513	660	389	1064	S467	-375	244	1114	S417	-1125	244	1164	S367	-1875	244	1214	S317	-2625	244
1015	S512	645	244	1065	S466	-390	389	1115	S416	-1140	389	1165	S366	-1890	389	1215	S316	-2640	389
1016	S511	630	389	1066	S465	-405	244	1116	S415	-1155	244	1166	S365	-1905	244	1216	S315	-2655	244
1017	S510	615	244	1067	S464	-420	389	1117	S414	-1170	389	1167	S364	-1920	389	1217	S314	-2670	389
1018	S509	600	389	1068	S463	-435	244	1118	S413	-1185	244	1168	S363	-1935	244	1218	S313	-2685	244
1019	S508	585	244	1069	S462	-450	389	1119	S412	-1200	389	1169	S362	-1950	389	1219	S312	-2700	389
1020	S507	570	389	1070	S461	-465	244	1120	S411	-1215	244	1170	S361	-1965	244	1220	S311	-2715	244
1021	S506	555	244	1071	S460	-480	389	1121	S410	-1230	389	1171	S360	-1980	389	1221	S310	-2730	389
1022	S505	540	389	1072	S459	-495	244	1122	S409	-1245	244	1172	S359	-1995	244	1222	S309	-2745	244
1023	S504	525	244	1073	S458	-510	389	1123	S408	-1260	389	1173	S358	-2010	389	1223	S308	-2760	389
1024	S503	510	389	1074	S457	-525	244	1124	S407	-1275	244	1174	S357	-2025	244	1224	S307	-2775	244
1025	S502	495	244	1075	S456	-540	389	1125	S406	-1290	389	1175	S356	-2040	389	1225	S306	-2790	389
1026	S501	480	389	1076	S455	-555	244	1126	S405	-1305	244	1176	S355	-2055	244	1226	S305	-2805	244
1027	S500	465	244	1077	S454	-570	389	1127	S404	-1320	389	1177	S354	-2070	389	1227	S304	-2820	389
1028	S499	450	389	1078	S453	-585	244	1128	S403	-1335	244	1178	S353	-2085	244	1228	S303	-2835	244
1029	S498	435	244	1079	S452	-600	389	1129	S402	-1350	389	1179	S352	-2100	389	1229	S302	-2850	389
1030	S497	420	389	1080	S451	-615	244	1130	S401	-1365	244	1180	S351	-2115	244	1230	S301	-2865	244
1031	S496	405	244	1081	S450	-630	389	1131	S400	-1380	389	1181	S350	-2130	389	1231	S300	-2880	389
1032	S495	390	389	1082	S449	-645	244	1132	S399	-1395	244	1182	S349	-2145	244	1232	S299	-2895	244
1033	S494	375	244	1083	S448	-660	389	1133	S398	-1410	389	1183	S348	-2160	389	1233	S298	-2910	389
1034	S493	360	389	1084	S447	-675	244	1134	S397	-1425	244	1184	S347	-2175	244	1234	S297	-2925	244
1035	S492	345	244	1085	S446	-690	389	1135	S396	-1440	389	1185	S346	-2190	389	1235	S296	-2940	389
1036	S491	330	389	1086	S445	-705	244	1136	S395	-1455	244	1186	S345	-2205	244	1236	S295	-2955	244
1037	S490	315	244	1087	S444	-720	389	1137	S394	-1470	389	1187	S344	-2220	389	1237	S294	-2970	389
1038	S489	300	389	1088	S443	-735	244	1138	S393	-1485	244	1188	S343	-2235	244	1238	S293	-2985	244
1039	S488	285	244	1089	S442	-750	389	1139	S392	-1500	389	1189	S342	-2250	389	1239	S292	-3000	389
1040	S487	270	389	1090	S441	-765	244	1140	S391	-1515	244	1190	S341	-2265	244	1240	S291	-3015	244
1041	S486	255	244	1091	S440	-780	389	1141	S390	-1530	389	1191	S340	-2280	389	1241	S290	-3030	389
1042	S485	240	389	1092	S439	-795	244	1142	S389	-1545	244	1192	S339	-2295	244	1242	S289	-3045	244
1043	S484	225	244	1093	S438	-810	389	1143	S388	-1560	389	1193	S338	-2310	389	1243	S288	-3060	389
1044	S483	210	389	1094	S437	-825	244	1144	S387	-1575	244	1194	S337	-2325	244	1244	S287	-3075	244
1045	S482	195	244	1095	S436	-840	389	1145	S386	-1590	389	1195	S336	-2340	389	1245	S286	-3090	389
1046	S481	180	389	1096	S435	-855	244	1146	S385	-1605	244	1196	S335	-2355	244	1246	S285	-3105	244
1047	V1T	165	244	1097	S434	-870	389	1147	S384	-1620	389	1197	S334	-2370	389	1247	S284	-3120	389
1048	DUMMY	150	389	1098	S433	-885	244	1148	S383	-1635	244	1198	S333	-2385	244	1248	S283	-3135	244
1049	DUMMY	-150	389	1099	S432	-900	389	1149	S382	-1650	389	1199	S332	-2400	389	1249	S282	-3150	389
1050	V62T	-165	244	1100	S431	-915	244	1150	S381	-1665	244	1200	S331	-2415	244	1250	S281	-3165	244

No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y
1251	S280	-3180	389	1301	S230	-3930	389	1351	S180	-4680	389	1401	S130	-5430	389	1451	S80	-6180	389
1252	S279	-3195	244	1302	S229	-3945	244	1352	S179	-4695	244	1402	S129	-5445	244	1452	S79	-6195	244
1253	S278	-3210	389	1303	S228	-3960	389	1353	S178	-4710	389	1403	S128	-5460	389	1453	S78	-6210	389
1254	S277	-3225	244	1304	S227	-3975	244	1354	S177	-4725	244	1404	S127	-5475	244	1454	S77	-6225	244
1255	S276	-3240	389	1305	S226	-3990	389	1355	S176	-4740	389	1405	S126	-5490	389	1455	S76	-6240	389
1256	S275	-3255	244	1306	S225	-4005	244	1356	S175	-4755	244	1406	S125	-5505	244	1456	S75	-6255	244
1257	S274	-3270	389	1307	S224	-4020	389	1357	S174	-4770	389	1407	S124	-5520	389	1457	S74	-6270	389
1258	S273	-3285	244	1308	S223	-4035	244	1358	S173	-4785	244	1408	S123	-5535	244	1458	S73	-6285	244
1259	S272	-3300	389	1309	S222	-4050	389	1359	S172	-4800	389	1409	S122	-5550	389	1459	S72	-6300	389
1260	S271	-3315	244	1310	S221	-4065	244	1360	S171	-4815	244	1410	S121	-5565	244	1460	S71	-6315	244
1261	S270	-3330	389	1311	S220	-4080	389	1361	S170	-4830	389	1411	S120	-5580	389	1461	S70	-6330	389
1262	S269	-3345	244	1312	S219	-4095	244	1362	S169	-4845	244	1412	S119	-5595	244	1462	S69	-6345	244
1263	S268	-3360	389	1313	S218	-4110	389	1363	S168	-4860	389	1413	S118	-5610	389	1463	S68	-6360	389
1264	S267	-3375	244	1314	S217	-4125	244	1364	S167	-4875	244	1414	S117	-5625	244	1464	S67	-6375	244
1265	S266	-3390	389	1315	S216	-4140	389	1365	S166	-4890	389	1415	S116	-5640	389	1465	S66	-6390	389
1266	S265	-3405	244	1316	S215	-4155	244	1366	S165	-4905	244	1416	S115	-5655	244	1466	S65	-6405	244
1267	S264	-3420	389	1317	S214	-4170	389	1367	S164	-4920	389	1417	S114	-5670	389	1467	S64	-6420	389
1268	S263	-3435	244	1318	S213	-4185	244	1368	S163	-4935	244	1418	S113	-5685	244	1468	S63	-6435	244
1269	S262	-3450	389	1319	S212	-4200	389	1369	S162	-4950	389	1419	S112	-5700	389	1469	S62	-6450	389
1270	S261	-3465	244	1320	S211	-4215	244	1370	S161	-4965	244	1420	S111	-5715	244	1470	S61	-6465	244
1271	S260	-3480	389	1321	S210	-4230	389	1371	S160	-4980	389	1421	S110	-5730	389	1471	S60	-6480	389
1272	S259	-3495	244	1322	S209	-4245	244	1372	S159	-4995	244	1422	S109	-5745	244	1472	S59	-6495	244
1273	S258	-3510	389	1323	S208	-4260	389	1373	S158	-5010	389	1423	S108	-5760	389	1473	S58	-6510	389
1274	S257	-3525	244	1324	S207	-4275	244	1374	S157	-5025	244	1424	S107	-5775	244	1474	S57	-6525	244
1275	S256	-3540	389	1325	S206	-4290	389	1375	S156	-5040	389	1425	S106	-5790	389	1475	S56	-6540	389
1276	S255	-3555	244	1326	S205	-4305	244	1376	S155	-5055	244	1426	S105	-5805	244	1476	S55	-6555	244
1277	S254	-3570	389	1327	S204	-4320	389	1377	S154	-5070	389	1427	S104	-5820	389	1477	S54	-6570	389
1278	S253	-3585	244	1328	S203	-4335	244	1378	S153	-5085	244	1428	S103	-5835	244	1478	S53	-6585	244
1279	S252	-3600	389	1329	S202	-4350	389	1379	S152	-5100	389	1429	S102	-5850	389	1479	S52	-6600	389
1280	S251	-3615	244	1330	S201	-4365	244	1380	S151	-5115	244	1430	S101	-5865	244	1480	S51	-6615	244
1281	S250	-3630	389	1331	S200	-4380	389	1381	S150	-5130	389	1431	S100	-5880	389	1481	S50	-6630	389
1282	S249	-3645	244	1332	S199	-4395	244	1382	S149	-5145	244	1432	S99	-5895	244	1482	S49	-6645	244
1283	S248	-3660	389	1333	S198	-4410	389	1383	S148	-5160	389	1433	S98	-5910	389	1483	S48	-6660	389
1284	S247	-3675	244	1334	S197	-4425	244	1384	S147	-5175	244	1434	S97	-5925	244	1484	S47	-6675	244
1285	S246	-3690	389	1335	S196	-4440	389	1385	S146	-5190	389	1435	S96	-5940	389	1485	S46	-6690	389
1286	S245	-3705	244	1336	S195	-4455	244	1386	S145	-5205	244	1436	S95	-5955	244	1486	S45	-6705	244
1287	S244	-3720	389	1337	S194	-4470	389	1387	S144	-5220	389	1437	S94	-5970	389	1487	S44	-6720	389
1288	S243	-3735	244	1338	S193	-4485	244	1388	S143	-5235	244	1438	S93	-5985	244	1488	S43	-6735	244
1289	S242	-3750	389	1339	S192	-4500	389	1389	S142	-5250	389	1439	S92	-6000	389	1489	S42	-6750	389
1290	S241	-3765	244	1340	S191	-4515	244	1390	S141	-5265	244	1440	S91	-6015	244	1490	S41	-6765	244
1291	S240	-3780	389	1341	S190	-4530	389	1391	S140	-5280	389	1441	S90	-6030	389	1491	S40	-6780	389
1292	S239	-3795	244	1342	S189	-4545	244	1392	S139	-5295	244	1442	S89	-6045	244	1492	S39	-6795	244
1293	S238	-3810	389	1343	S188	-4560	389	1393	S138	-5310	389	1443	S88	-6060	389	1493	S38	-6810	389
1294	S237	-3825	244	1344	S187	-4575	244	1394	S137	-5325	244	1444	S87	-6075	244	1494	S37	-6825	244
1295	S236	-3840	389	1345	S186	-4590	389	1395	S136	-5340	389	1445	S86	-6090	389	1495	S36	-6840	389
1296	S235	-3855	244	1346	S185	-4605	244	1396	S135	-5355	244	1446	S85	-6105	244	1496	S35	-6855	244
1297	S234	-3870	389	1347	S184	-4620	389	1397	S134	-5370	389	1447	S84	-6120	389	1497	S34	-6870	389
1298	S233	-3885	244	1348	S183	-4635	244	1398	S133	-5385	244	1448	S83	-6135	244	1498	S33	-6885	244
1299	S232	-3900	389	1349	S182	-4650	389	1399	S132	-5400	389	1449	S82	-6150	389	1499	S32	-6900	389
1300	S231	-3915	244	1350	S181	-4665	244	1400	S131	-5415	244	1450	S81	-6165	244	1500	S31	-6915	244

No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y
1501	S30	-6930	389	1551	G448	-7830	389	1601	G348	-8580	389	1651	G248	-9330	389	1701	G148	-10080	389
1502	S29	-6945	244	1552	G446	-7845	244	1602	G346	-8595	244	1652	G246	-9345	244	1702	G146	-10095	244
1503	S28	-6960	389	1553	G444	-7860	389	1603	G344	-8610	389	1653	G244	-9360	389	1703	G144	-10110	389
1504	S27	-6975	244	1554	G442	-7875	244	1604	G342	-8625	244	1654	G242	-9375	244	1704	G142	-10125	244
1505	S26	-6990	389	1555	G440	-7890	389	1605	G340	-8640	389	1655	G240	-9390	389	1705	G140	-10140	389
1506	S25	-7005	244	1556	G438	-7905	244	1606	G338	-8655	244	1656	G238	-9405	244	1706	G138	-10155	244
1507	S24	-7020	389	1557	G436	-7920	389	1607	G336	-8670	389	1657	G236	-9420	389	1707	G136	-10170	389
1508	S23	-7035	244	1558	G434	-7935	244	1608	G334	-8685	244	1658	G234	-9435	244	1708	G134	-10185	244
1509	S22	-7050	389	1559	G432	-7950	389	1609	G332	-8700	389	1659	G232	-9450	389	1709	G132	-10200	389
1510	S21	-7065	244	1560	G430	-7965	244	1610	G330	-8715	244	1660	G230	-9465	244	1710	G130	-10215	244
1511	S20	-7080	389	1561	G428	-7980	389	1611	G328	-8730	389	1661	G228	-9480	389	1711	G128	-10230	389
1512	S19	-7095	244	1562	G426	-7995	244	1612	G326	-8745	244	1662	G226	-9495	244	1712	G126	-10245	244
1513	S18	-7110	389	1563	G424	-8010	389	1613	G324	-8760	389	1663	G224	-9510	389	1713	G124	-10260	389
1514	S17	-7125	244	1564	G422	-8025	244	1614	G322	-8775	244	1664	G222	-9525	244	1714	G122	-10275	244
1515	S16	-7140	389	1565	G420	-8040	389	1615	G320	-8790	389	1665	G220	-9540	389	1715	G120	-10290	389
1516	S15	-7155	244	1566	G418	-8055	244	1616	G318	-8805	244	1666	G218	-9555	244	1716	G118	-10305	244
1517	S14	-7170	389	1567	G416	-8070	389	1617	G316	-8820	389	1667	G216	-9570	389	1717	G116	-10320	389
1518	S13	-7185	244	1568	G414	-8085	244	1618	G314	-8835	244	1668	G214	-9585	244	1718	G114	-10335	244
1519	S12	-7200	389	1569	G412	-8100	389	1619	G312	-8850	389	1669	G212	-9600	389	1719	G112	-10350	389
1520	S11	-7215	244	1570	G410	-8115	244	1620	G310	-8865	244	1670	G210	-9615	244	1720	G110	-10365	244
1521	S10	-7230	389	1571	G408	-8130	389	1621	G308	-8880	389	1671	G208	-9630	389	1721	G108	-10380	389
1522	S9	-7245	244	1572	G406	-8145	244	1622	G306	-8895	244	1672	G206	-9645	244	1722	G106	-10395	244
1523	S8	-7260	389	1573	G404	-8160	389	1623	G304	-8910	389	1673	G204	-9660	389	1723	G104	-10410	389
1524	S7	-7275	244	1574	G402	-8175	244	1624	G302	-8925	244	1674	G202	-9675	244	1724	G102	-10425	244
1525	S6	-7290	389	1575	G400	-8190	389	1625	G300	-8940	389	1675	G200	-9690	389	1725	G100	-10440	389
1526	S5	-7305	244	1576	G398	-8205	244	1626	G298	-8955	244	1676	G198	-9705	244	1726	G98	-10455	244
1527	S4	-7320	389	1577	G396	-8220	389	1627	G296	-8970	389	1677	G196	-9720	389	1727	G96	-10470	389
1528	S3	-7335	244	1578	G394	-8235	244	1628	G294	-8985	244	1678	G194	-9735	244	1728	G94	-10485	244
1529	S2	-7350	389	1579	G392	-8250	389	1629	G292	-9000	389	1679	G192	-9750	389	1729	G92	-10500	389
1530	S1	-7365	244	1580	G390	-8265	244	1630	G290	-9015	244	1680	G190	-9765	244	1730	G90	-10515	244
1531	DUMMY	-7380	389	1581	G388	-8280	389	1631	G288	-9030	389	1681	G188	-9780	389	1731	G88	-10530	389
1532	DUMMY	-7395	244	1582	G386	-8295	244	1632	G286	-9045	244	1682	G186	-9795	244	1732	G86	-10545	244
1533	DUMMY	-7560	389	1583	G384	-8310	389	1633	G284	-9060	389	1683	G184	-9810	389	1733	G84	-10560	389
1534	DUMMY	-7575	244	1584	G382	-8325	244	1634	G282	-9075	244	1684	G182	-9825	244	1734	G82	-10575	244
1535	G480	-7590	389	1585	G380	-8340	389	1635	G280	-9090	389	1685	G180	-9840	389	1735	G80	-10590	389
1536	G478	-7605	244	1586	G378	-8355	244	1636	G278	-9105	244	1686	G178	-9855	244	1736	G78	-10605	244
1537	G476	-7620	389	1587	G376	-8370	389	1637	G276	-9120	389	1687	G176	-9870	389	1737	G76	-10620	389
1538	G474	-7635	244	1588	G374	-8385	244	1638	G274	-9135	244	1688	G174	-9885	244	1738	G74	-10635	244
1539	G472	-7650	389	1589	G372	-8400	389	1639	G272	-9150	389	1689	G172	-9900	389	1739	G72	-10650	389
1540	G470	-7665	244	1590	G370	-8415	244	1640	G270	-9165	244	1690	G170	-9915	244	1740	G70	-10665	244
1541	G468	-7680	389	1591	G368	-8430	389	1641	G268	-9180	389	1691	G168	-9930	389	1741	G68	-10680	389
1542	G466	-7695	244	1592	G366	-8445	244	1642	G266	-9195	244	1692	G166	-9945	244	1742	G66	-10695	244
1543	G464	-7710	389	1593	G364	-8460	389	1643	G264	-9210	389	1693	G164	-9960	389	1743	G64	-10710	389
1544	G462	-7725	244	1594	G362	-8475	244	1644	G262	-9225	244	1694	G162	-9975	244	1744	G62	-10725	244
1545	G460	-7740	389	1595	G360	-8490	389	1645	G260	-9240	389	1695	G160	-9990	389	1745	G60	-10740	389
1546	G458	-7755	244	1596	G358	-8505	244	1646	G258	-9255	244	1696	G158	-10005	244	1746	G58	-10755	244
1547	G456	-7770	389	1597	G356	-8520	389	1647	G256	-9270	389	1697	G156	-10020	389	1747	G56	-10770	389
1548	G454	-7785	244	1598	G354	-8535	244	1648	G254	-9285	244	1698	G154	-10035	244	1748	G54	-10785	244
1549	G452	-7800	389	1599	G352	-8550	389	1649	G252	-9300	389	1699	G152	-10050	389	1749	G52	-10800	389
1550	G450	-7815	244	1600	G350	-8565	244	1650	G250	-9315	244	1700	G150	-10065	244	1750	G50	-10815	244

Raydium

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文件英文名稱 Document English Title : RM68040 Engineering Specification

No.	Name	X	Y
1751	G48	-10830	389
1752	G46	-10845	244
1753	G44	-10860	389
1754	G42	-10875	244
1755	G40	-10890	389
1756	G38	-10905	244
1757	G36	-10920	389
1758	G34	-10935	244
1759	G32	-10950	389
1760	G30	-10965	244
1761	G28	-10980	389
1762	G26	-10995	244
1763	G24	-11010	389
1764	G22	-11025	244
1765	G20	-11040	389
1766	G18	-11055	244
1767	G16	-11070	389
1768	G14	-11085	244
1769	G12	-11100	389
1770	G10	-11115	244
1771	G8	-11130	389
1772	G6	-11145	244
1773	G4	-11160	389
1774	G2	-11175	244
1775	DUMMY	-11190	389
1776	DUMMY	-11205	244
Alignment	Left	-11300	-400
Alignment	Right	11300	-400

Pin Function

Table 2 Interface

Signal	I/O	Function	When not in use																																																
IM2-0	I	Select MPU interface mode.	-																																																
		<table border="1"> <thead> <tr> <th>IM2</th> <th>IM1</th> <th>IM0/ ID</th> <th>Interface Mode</th> <th>DB Pin</th> <th>Colors</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>DBI 18-bit interface</td> <td>DB17-0</td> <td>262K</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>DBI 9-bit interface</td> <td>DB8-0</td> <td>262K</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>DBI 16-bit interface</td> <td>DB15-0</td> <td>65K/262K</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>DBI 8-bit interface</td> <td>DB7-0</td> <td>65K/262K</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>DBI Type C 9-bit</td> <td>DIN,DOUT</td> <td>8/262K</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>Setting disabled</td> <td>-</td> <td>-</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>DBI Type C 8-bit</td> <td>DIN,DOUT</td> <td>8/262K</td> </tr> </tbody> </table>		IM2	IM1	IM0/ ID	Interface Mode	DB Pin	Colors	0	0	0	DBI 18-bit interface	DB17-0	262K	0	0	1	DBI 9-bit interface	DB8-0	262K	0	1	0	DBI 16-bit interface	DB15-0	65K/262K	0	1	1	DBI 8-bit interface	DB7-0	65K/262K	1	0	1	DBI Type C 9-bit	DIN,DOUT	8/262K	1	1	0	Setting disabled	-	-	1	1	1	DBI Type C 8-bit	DIN,DOUT	8/262K
		IM2		IM1	IM0/ ID	Interface Mode	DB Pin	Colors																																											
		0		0	0	DBI 18-bit interface	DB17-0	262K																																											
		0		0	1	DBI 9-bit interface	DB8-0	262K																																											
		0		1	0	DBI 16-bit interface	DB15-0	65K/262K																																											
		0		1	1	DBI 8-bit interface	DB7-0	65K/262K																																											
		1		0	1	DBI Type C 9-bit	DIN,DOUT	8/262K																																											
1	1	0	Setting disabled	-	-																																														
1	1	1	DBI Type C 8-bit	DIN,DOUT	8/262K																																														
CSX	I	Chip select signal. Amplitude: IOVCC-IOGND Low: the chip is selected and accessible High: the chip is not selected and not accessible.	IOVCC																																																
D/CX	I	Register select signal. Amplitude: IOVCC-IOGND Low: command data High: parameter or display data Fix to GND when not in use	IOGND																																																
WRX/SCL	I	Write strobe signal in DBI interface operation and enables write operation when WRX is low. Synchronous clock signal (SCL) in serial interface operation. Amplitude: IOVCC-IOGND	IOVCC																																																
RDX	I	Read strobe signal in DBI interface operation and enables read operation when RDX is low. Amplitude: IOVCC-IOGND	IOVCC																																																
DIN/SDA	I/O	Serial data pin in serial interface operation. Amplitude: IOVCC-IOGND	IOGND																																																
DOUT	O	Serial data output pin in serial interface operation. Amplitude: IOVCC-IOGND	Open																																																
DB0-DB17	I/O	18-bit parallel bi-directional data bus for DBI interface operation. Amplitude: IOVCC-IOGND. Unused pins are fixed to GND level.	IOGND																																																
DE	I	Data enable signal for DPI interface. Amplitude: IOVCC-IOGND.	IOGND																																																
VSYNC	I	Frame synchronous signal for DPI interface..	IOGND																																																

		Amplitude: IOVCC-IOGND.	
HSYNC	I	Line synchronous signal for DPI interface. Amplitude: IOVCC-IOGND.	IOGND
PCLK	I	Dot clock signal for DBI interface. Amplitude: IOVCC-IOGND.	IOGND
TE	O	Tearing effect output pin to synchronies MCU to frame writing, activated by S/W command. When this pin is not activated, this pin is low. (Amplitude: IOVCC-IOGND).	Open
RESX	I	Reset signal. Initializes the chip when it is low. Make sure to execute a power-on reset when turning on power supply. Amplitude: IOVCC-IOGND.	
SD	I	Control pin to shut down display, only used in the DPI interface mode. 0: Normal display, 1: Power shut down. Amplitude: IOVCC-IOGND.	
CM	I	Control pin for switching between normal color and reduced color mode, only used in the DPI interface mode. 0: Normal display color, 1: 8-color mode. Amplitude: IOVCC-IOGND.	

Table 3 Power supply

Signal	I/O	Function	When not in use
DGND AGND	P	Power ground pin: GND = 0V.	-
IOVCC	P	Power supply to the interface pins: RESX, CSX, WRX, RDX, D/CX, DB17-0, VSYNC, HSYNC, PCLK, DE. IOVCC = 1.65V ~ 3.3V. VCC ≥ IOVCC. In case of COG, connect to VCC on the FPC if IOVCC=VCC, to prevent noise.	-
VDD	O	Internal logic regulator output, which is used as the power supply to internal logic. Connect a stabilizing capacitor.	-
VPG	P	Power supply pin for the NV memory programming.	-

Table 4 Step-up circuit

Signal	I/O	Function	When not in use
VCI	I	Power supply to the liquid crystal power supply analog circuit. Connect to an external power supply of 2.5V ~ 3.3V.	-
VCI1	I/O	An internal reference voltage for the step-up circuit1.The amplitude between VCI and DGND is determined by the VC[2:0] bits. Make sure to set the VCI1 voltage so that the VLOUT1, VLOUT2 and VLOUT3 voltages are set within the respective specification.	-
DDVDH	I	Power supply for the source driver liquid crystal drive unit and VCOM drive. Connect to VLOUT1. DDVDH = 4.5V ~ 6.0V	-
VGH	I	Liquid crystal drive power supply. Connect to VLOUT2.	-
VGL	I	Liquid crystal drive power supply. Connect to VLOUT3.	-
VCL	O	VCOML drive power supply. Make sure to connect to stabilizing capacitor. VCL = -1.75V ~ -3.3V	-
C11+, C11- C12+, C12-	I O	Capacitor connection pins for the step-up circuit 1.	-
C13+, C13- C21+, C21- C22+, C22-	I O	Capacitor connection pins for the step-up circuit 2.	-
VREG1 OUT	O	Output voltage generated from the reference voltage. The voltage level is set with the VRH bits. VREG1OUT is (1) a source driver grayscale reference voltage, (2)VcomH level reference voltage, and (3) Vcom amplitude reference voltage. Connect to a stabilizing capacitor. VREG1OUT = 3.0 ~(DDVDH – 0.5)V.	Open

Table 5 LCD drive

Signal	I/O	Function	When not in use
VCOM	O	Power supply to TFT panel's common electrode. VCOM alternates between VCOMH and VCOML. The alternating cycle is set by internal register.	Open
VCOMH	O	The High level of VCOM amplitude. Connect to a stabilizing capacitor.	Open
VCOML	O	The Low level of VCOM amplitude. Adjust the VCOML level with the VDV bits. Make sure to connect to stabilizing capacitor.	Open
VGS	I	Reference level for the grayscale voltage generating circuit. The VGS level can be changed by connecting to an external resistor.	-
S1~S960	O	Source driver output signals	Open
G1~G480	O	Gate line output signals. VGH: gate line select level VGL: gate line non-select level	Open

Table 6 Others (test, dummy pins)

Signal	I/O	Function	When not in use
DUMMY	-	Dummy pads. Leave these pins as open.	-
TEST01-16	O	Test pins. Leave them open.	Open
TEST1, 2, 3	I	Test pins (internal pull low). Connect to GND or leave these pins as open.	I0GND
TS8-0	I	Test pins (internal pull low). Leave them open.	Open

5. Bump Arrangement

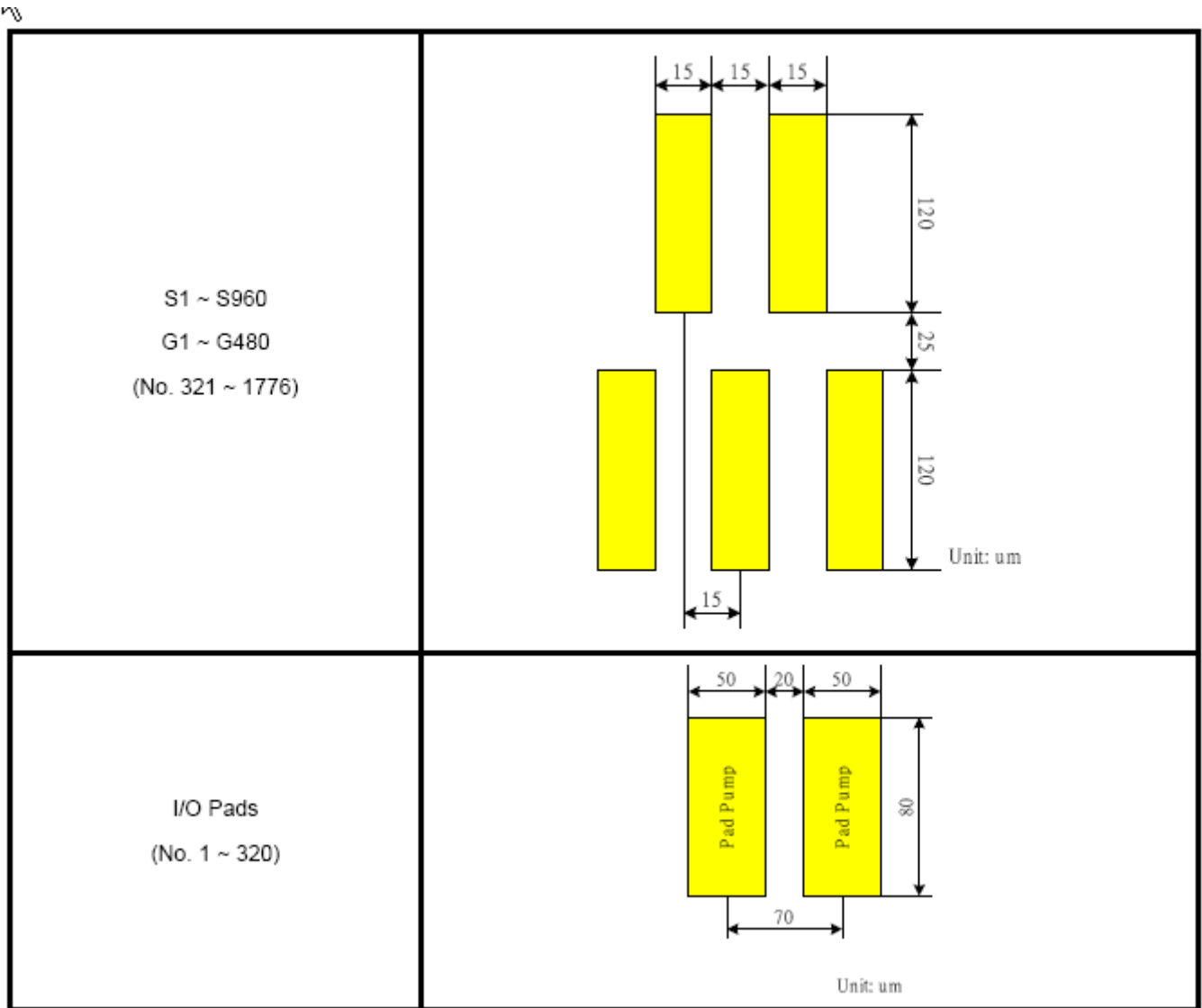


Figure 2 Bump Arrangement