DATA SHEET

(DOC No. HX8678-A-DS)

HX8678-A

480/320CH TFT Gate Driver

Preliminary version 01 July, 2006

Himax Technologies, Inc.
http://www.himax.com.tw

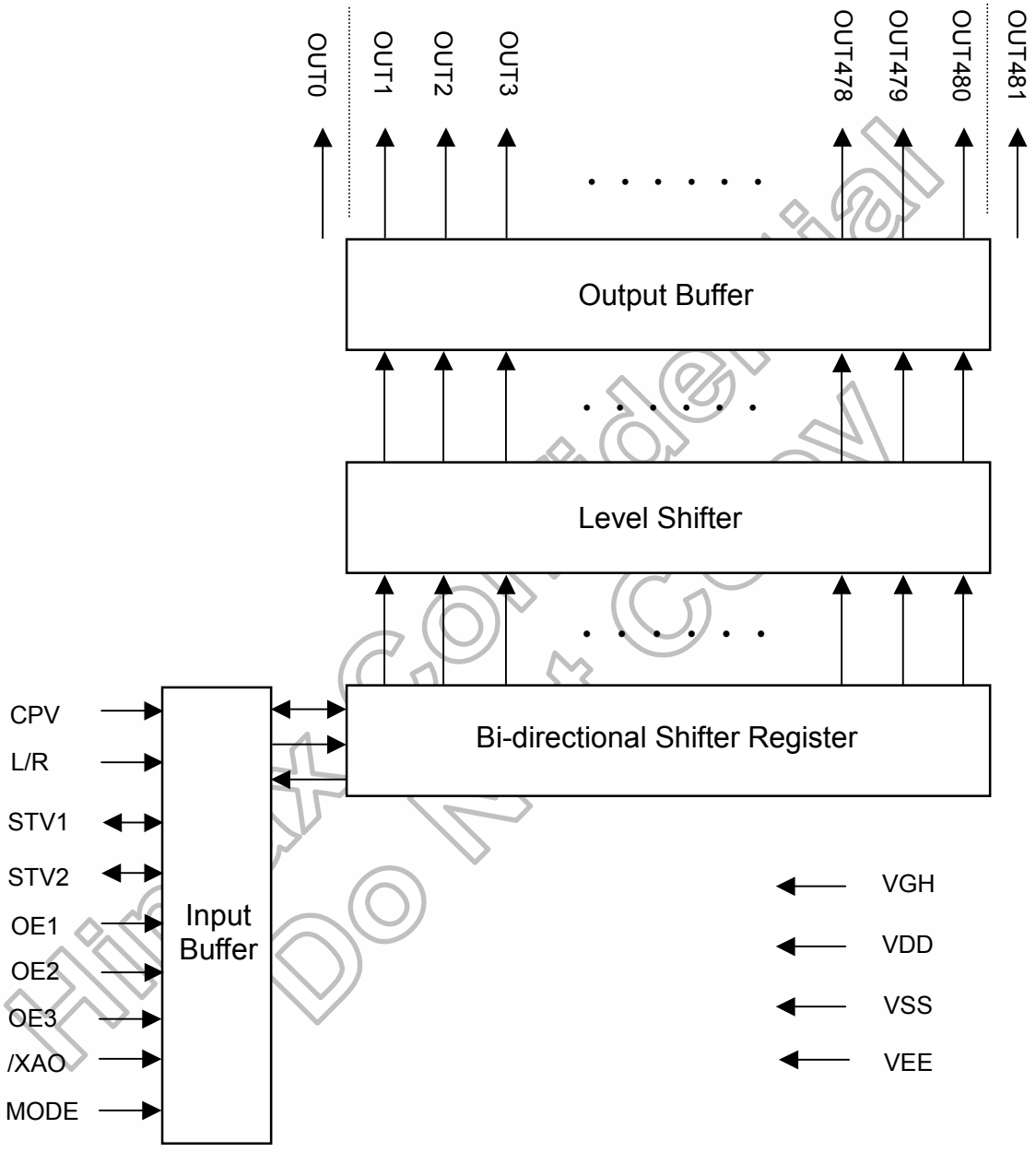
1. General Description

The HX8678-A is a 480/320 channels output gate driver used for driving the gate electrode of TFT LCD panel. It is designed for 2-level output with maximum +40V output driving voltage.

2. Features

- 2-level output gate driver for TFT LCD panel
- 480/320 channels output selectable gate driver with 2 dummy output
- Maximum +40V output driving voltage
- Bi-directional data shift capability
- 200KHz maximum operation frequency
- High voltage CMOS process technology
- COG/COF package

3. Block Diagram



Note:
OUT0 and OUT481 are LCD panel auxiliary pins, these pins always output VEE level.

4. Pin Description

<table>
<tr><th>Pin name</th><th>I/O</th><th>Function</th><th>Description</th></tr>
<tr><td>CPV</td><td>In</td><td>Shift clock input</td><td>This is the clock input for chip internal shift register. Data is shifted at each rising edge of this clock.</td></tr>
<tr><td>L/R</td><td>In</td><td>Shift direction control pin</td><td>This pin controls the output shifting direction as listed below.
L/R =H:STV1→OUT1→OUT2→ • • • →OUT480→STV2
L/R =L:STV2→OUT480→ • • • →OUT2→OUT1→STV1</td></tr>
<tr><td>STV1
STV2</td><td>I/O</td><td>Start pulse input/output pin</td><td>These two pins are the device start pulse input or output pin. The function of these two pins depends on the status of L/R pin.
<table>
<tr><td></td><td>STV1</td><td>STV2</td></tr>
<tr><td>L/R=H</td><td>input</td><td>output</td></tr>
<tr><td>L/R=L</td><td>output</td><td>input</td></tr>
</table></td></tr>
<tr><td>OE1
OE2
OE3</td><td>In</td><td>Output enable control</td><td>These three pins are used to control the driver output. When OE1 ~ OE3 input are H, driver output is fixed to VEE regardless CPV. However, the internal shift register is not cleared even if OE1 ~ OE3 input are inactive.</td></tr>
<tr><td>/XAO</td><td>In</td><td>Output all-on control</td><td>When /XAO input pin is L, all the output pins are forced to VGH level. Note that this pin has higher priority than OE. Also it has an internal pull high resistor, keep it to VDD is preferred when unused. The chip internal shift register is not cleared when /XAO input is active.</td></tr>
<tr><td>MODE</td><td>In</td><td>Output Channel number selection</td><td>They is the output channel number selection pin:
<table>
<tr><td>MODE</td><td>Output</td></tr>
<tr><td>L</td><td>320 channels</td></tr>
<tr><td>H</td><td>480 channels</td></tr>
</table></td></tr>
<tr><td>OUT1
~
OUT480</td><td>Out</td><td>Driver output pins for driving gate electrode of LCD</td><td>The output voltage is either VGH or VEE for driving the gate electrode of TFT LCD panel depending on the data stored in shift register and the state of OE.</td></tr>
<tr><td>OUT0
OUT481</td><td>Out</td><td>Auxiliary pins</td><td>LCD panel auxiliary pins, these pins always output VEE level.</td></tr>
<tr><td>VGH</td><td>In</td><td>Power supply</td><td>Power supply for LCM drive output High</td></tr>
<tr><td>VDD</td><td>In</td><td>Power supply</td><td>Digital power</td></tr>
<tr><td>VSS</td><td>In</td><td>Power supply</td><td>Digital ground</td></tr>
<tr><td>VEE</td><td>In</td><td>Power supply</td><td>Power supply for LCM drive output low.</td></tr>
<tr><td>PATH</td><td>In</td><td>Internal link</td><td>Linked together internal.</td></tr>
</table>

5. Function Description

5.1 Device operation

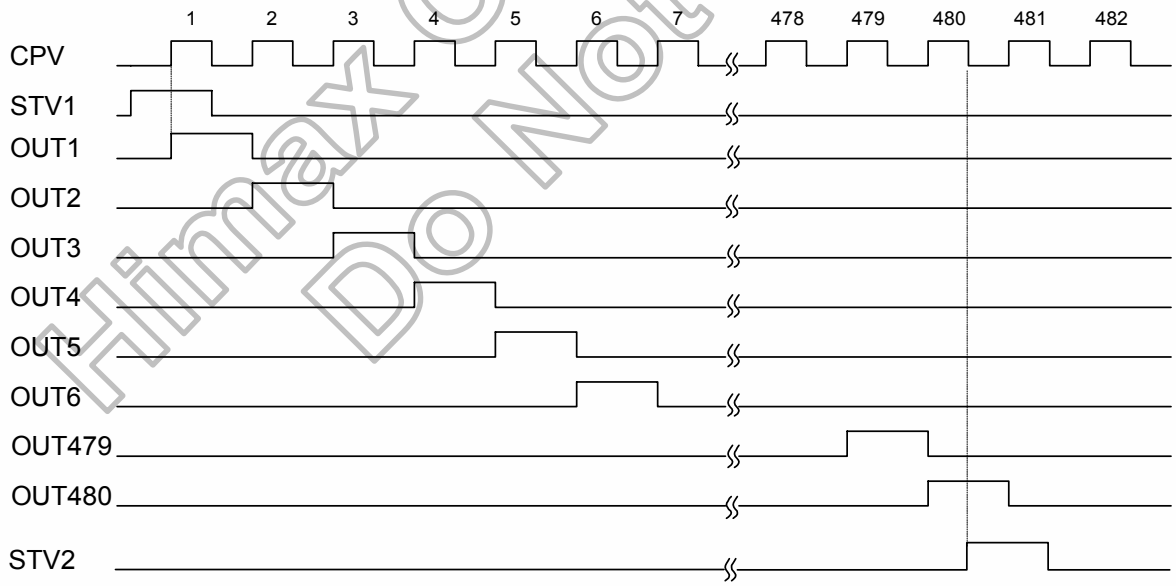
In the condition of MODE=H & L/R=H, the STV1 start pulse input is sensed at the rising edge of CPV and stored in the first stage of shift register, which causes the first scan signal is outputted from the OUT1 output pin. While stored data is transferred to the next stage shift register at the rising edge of next CPV, new data of STV1 is sensed and stored simultaneously.

The output pin (OUT1 to OUT480) supplies VGH voltage or VEE voltage to the LCD panel depending on the data stored in the shift register. For normal operation, a VGH voltage is outputted one by one from OUT1 to OUT480 in sync with CPV pulse.

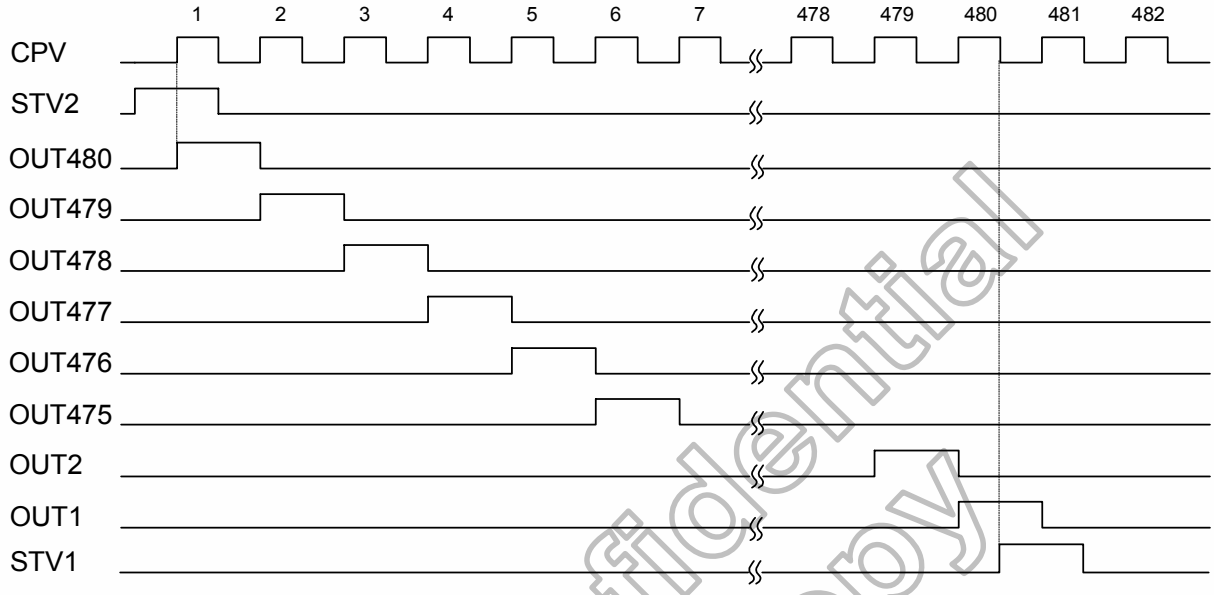
After 480 CPV rising edge are past, the STV2 goes up to high level at the 480th falling edge of CPV and goes down to low level at the 481st falling edge of CPV. This STV2 output signal becomes the STV1 start pulse input of next cascaded gate driver device.

During any H state of OE, the corresponding output channels are forced to VEE level regardless of CPV. The channel output returns to normal status as soon as OE go back to L.

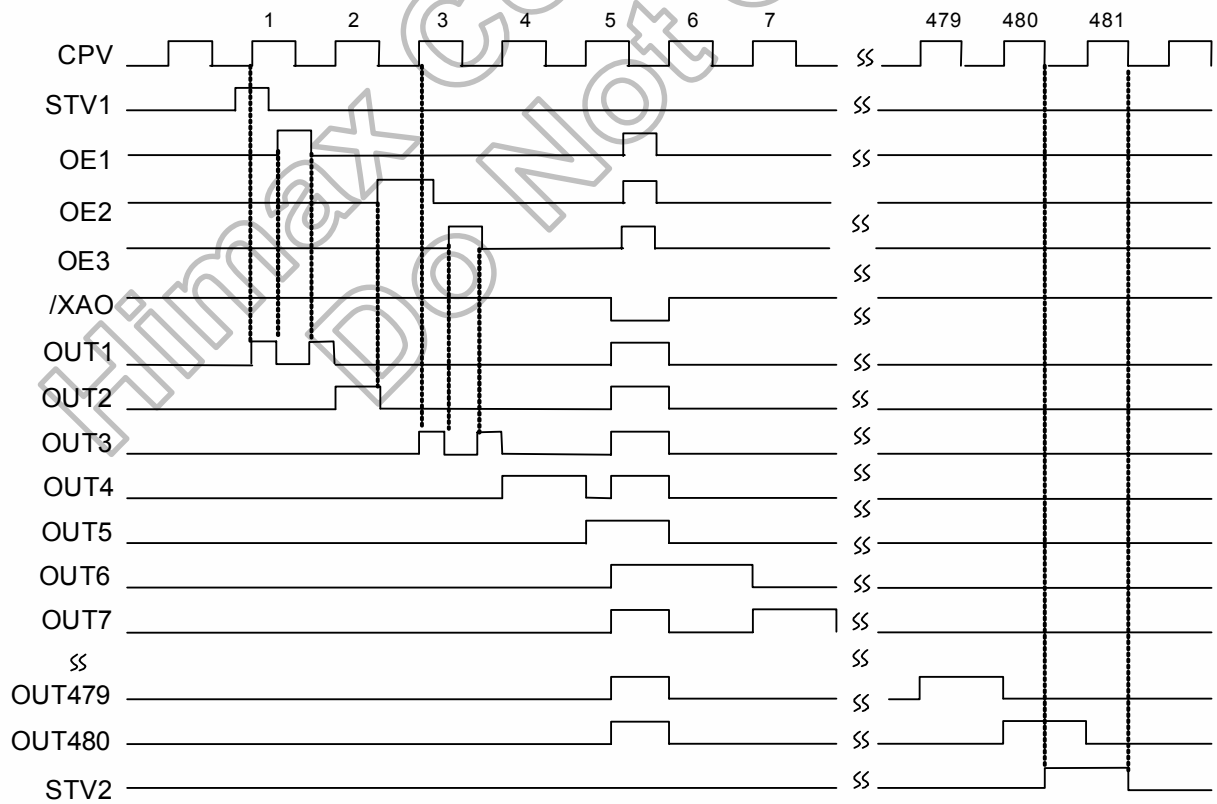
Example of input/output timing (MODE=H, L/R=H)



Example of input/output timing (MODE=H, L/R=L)



Example of input/output timing (MODE=H, L/R=H with OE & /XAO)



5.2 Relationship among L/R, and STV1/STV2

L/R	Start pulse		Data transfer direction
	Input	Output	
H	STV1	STV2	OUT1→OUT2→OUT3→ ・・・→OUT480
L	STV2	STV1	OUT480→OUT479→OUT478→ ・・・→OUT1

5.3 Output channel mode

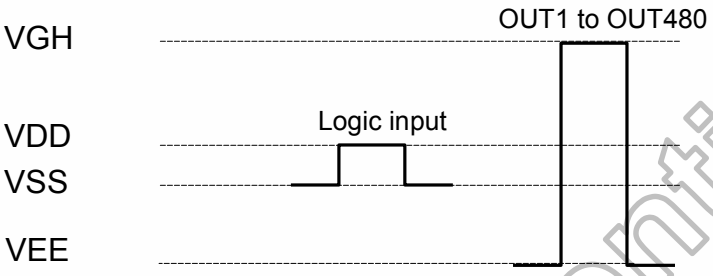
Output channel number is selectable between 480/320 by MODE pin. The following table explains MODE vs. output channel and OE[1:3] vs. output channel. The disable output that is fixed to VEE must be kept open.

Output Channel	MODE=L		MODE=H	
	320CH	Output control	480CH	Output control
OUT1	1st	OE1	1st	OE1
OUT2	2nd	OE2	2nd	OE2
OUT3	3rd	OE3	3rd	OE3
:	:	:	:	:
OUT160	160th	OE1	160th	OE1
OUT161	Fix to VEE	:	161st	OE2
OUT162	Fix to VEE	:	162nd	OE3
OUT163	Fix to VEE	:	163rd	OE1
:	:	:	:	:
OUT201	Fix to VEE	:	201st	OE3
OUT202	Fix to VEE	:	202nd	OE1
OUT203	Fix to VEE	:	203rd	OE2
OUT204	Fix to VEE	:	204th	OE3
:	:	:	:	:
OUT279	Fix to VEE	:	279th	OE3
OUT280	Fix to VEE	:	280th	OE1
OUT281	Fix to VEE	:	281st	OE2
OUT282	Fix to VEE	:	282nd	OE3
:	:	:	:	:
OUT320	Fix to VEE	:	320th	OE2
OUT321	161st	OE2	321st	OE3
OUT322	162nd	OE3	322nd	OE1
OUT323	163rd	OE1	323rd	OE2
:	:	:	:	:
OUT479	319th	OE1	479th	OE2
OUT480	320th	OE2	480th	OE3

5.4 Device power supply

The HX8678-A must be used by the following conditions.
VGH - VEE = 40V (max.)
VGH – VSS = 7 ~ 35V

Example:

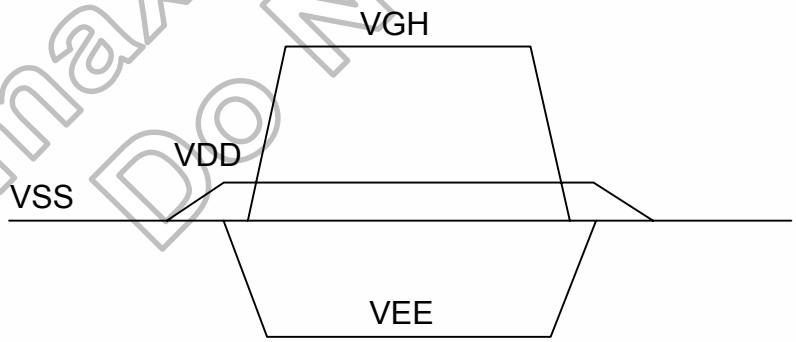


The input signal level of CPV, L/R, OE, STV1 and STV2 have to swing between VDD and VSS. The signal output level of start pulse (STV1 or STV2) to the next stage cascaded device is VDD for H and VSS for L.

5.5 Power ON/OFF sequence

To prevent the device damage from latch up, the power ON/OFF sequence shown below must be followed.

When power on: VDD→VEE→VGH
When power off: VGH→VEE→VDD



6. DC Characteristics

6.1 Absolute Maximum Rating (VSS=0V)

Parameter	Symbol	Rating			Unit
Power supply voltage (1)	VGH	-0.3	to	+42.0	V
Power supply voltage (2)	VDD	-0.3	to	+7.0	V
Power supply voltage (3)	VEE	VGH-42	to	+0.3	V
Input voltage	V_{IN}	-0.3	to	VDD+0.3	V
Storage temperature	T_{STG}	-55	to	+125	℃

Note:
(1)All of the voltages listed above are with respective to VSS=0V.
(2)Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above.

6.2 Recommended Operating Conditions (VSS=0V)

Parameter	Symbol	Rating			Unit
		Min.	Typ.	Max.	
Power supply voltage (1)	VGH	7	-	VEE+40	V
Power supply voltage (2)	VDD	2.3	3.3	5.5	V
Power supply voltage (3)	VEE	-20	-	-5	V
Power supply voltage (4)	VGH -VEE	12	-	40	V
Operation frequency	F_{CPV}	-	-	200	KHz
Operation temperature	Ta	-40	-	+95	℃

6.3 Electrical Characteristics (VSS=0V)

Parameter	Symbol	Condition	Rating			Unit	Application pin
			Min.	Typ.	Max.		
Input H voltage	V_{IH}	-	0.7VDD	-	VDD	V	All input
Input L voltage	V_{IL}	-	VSS	-	0.3VDD		All input
Output H voltage	V_{OH}	I_{OH}= 40μA	VDD-0.4	-	VDD		STV1,2
Output L voltage	V_{OL}	I_{OL}= 40μA	VSS	-	VSS+0.4		STV1,2
Output H resistance	R_{OH}	V_{OUT}= VGH -0.5V	-	-	1000	Ω	OUT0 ~ OUT481
Output L resistance	R_{OL}	V_{OUT}= VEE+0.5V	-	-	1000	Ω	OUT0 ~ OUT481
Input leakage current	I_{IN}	-	-5.0	-	+5.0	μA	Note(2)
Pull high resistance	R_{PU}	V_{IN}=VSS	40	-	200	kΩ	/XAO
VGH Power consumption	I_{VGH}	Note(1)	-	-	100	μA	-
VDD Power consumption	I_{VDD}		-	-	100		-

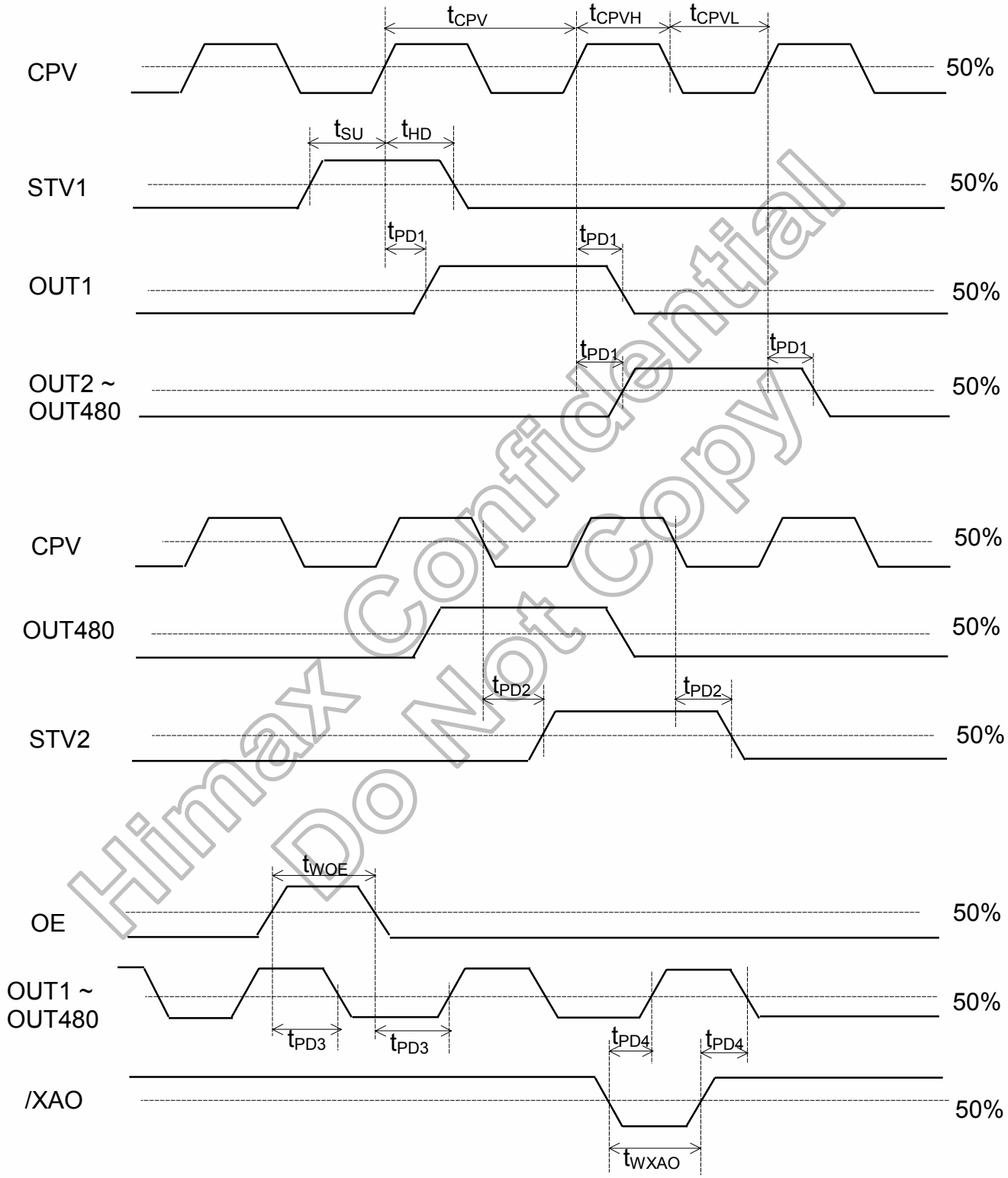
Note:
(1)Power consumption with the following condition:
Output no load, VGH =20V, VEE = -8V, VDD =3.0V, V_{IH}=VDD, V_{IL}=VSS, F_{CPV}=50KHz, OE =V_{IL}, /XAO=V_{IH}.
(2)All input except /XAO

7. AC Characteristics

Parameter	Symbol	Condition	Spec			Unit
			Min.	Typ.	Max.	
CPV period	t_{CPV}	-	5	-	-	μs
CPV pulse width	t_{CPVH}, t_{CPVL}	50% duty cycle	2.5	-	-	
OE pulse width	t_{WOE}	-	1	-	-	
/XAO pulse width	t_{WXAO}	-	10	-	-	
Data setup time	t_{SU}	-	0.7	-	-	
Data hold time	t_{HD}	-	0.7	-	-	
CPV to output delay time	t_{PD1}	CL=300pF	-	-	1	
Start pulse output delay time	t_{PD2}	CL=30pF	-	-	0.8	
OE to output delay time	t_{PD3}	CL=300pF	-	-	0.8	
/XAO to output delay time	t_{PD4}	CL=300pF	-	-	10	

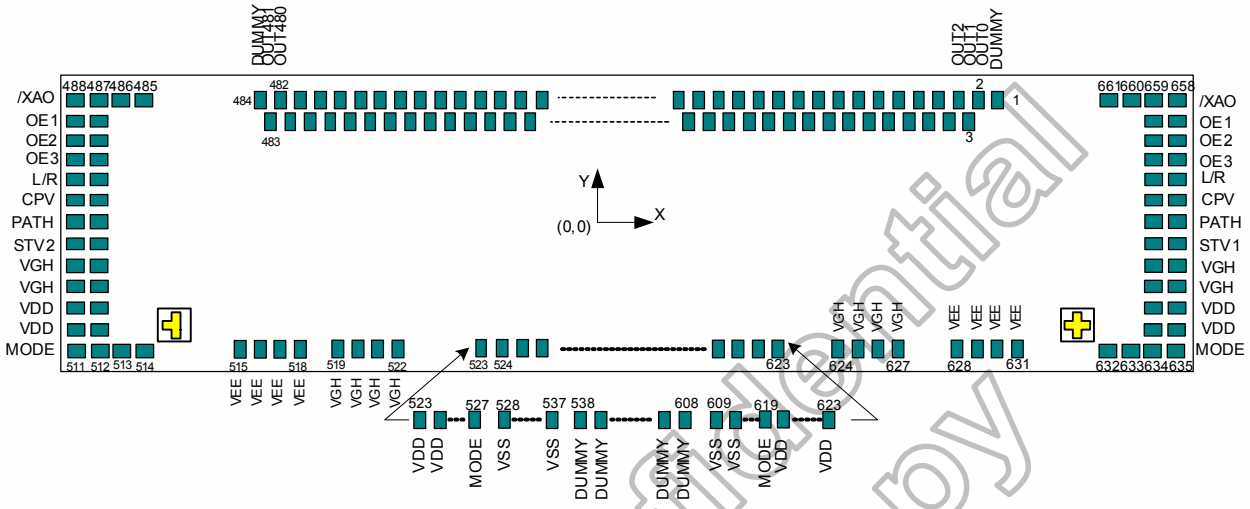
Note:
(1)The measurement point for all of above signals is at 50% of input/output amplitude.

8. Waveform



9. Pad Coordinate

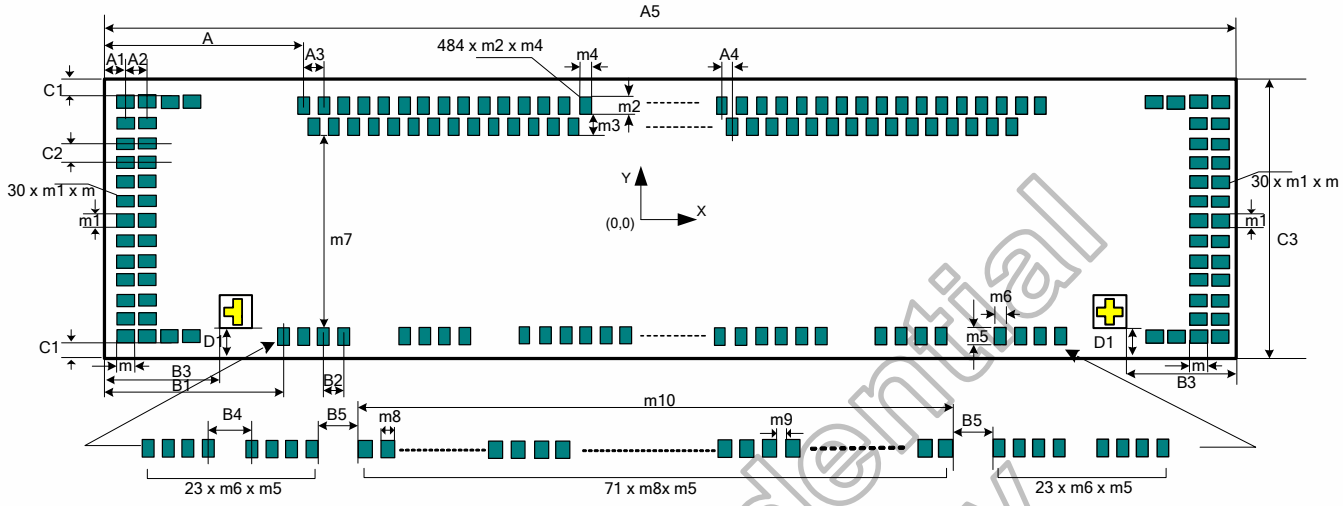
9.1 HX8678-A Gate Driver Bump Location



View from bump side

Chip size: 13530μm x 1047μm (scribe line included)
Scribe line: 100μm

9.2 Bump Outline Dimensions



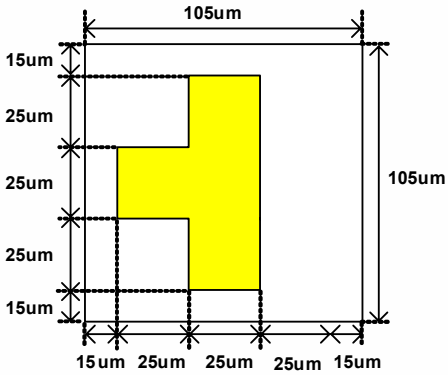
Symbol	Dimensions in μm
A	715
A1	75
A2	65
A3	50
A4	25
A5	13530
B1	671
B2	52
B3	445
B4	80
B5	40.5
C1	75
C2	71

Symbol	Dimensions in μm
C3	1047
D1	110
m	50
m1	45
m2	84
m3	119
m4	25
m5	85
m6	40
m7	609
m8	105
m9	30
m10	9555

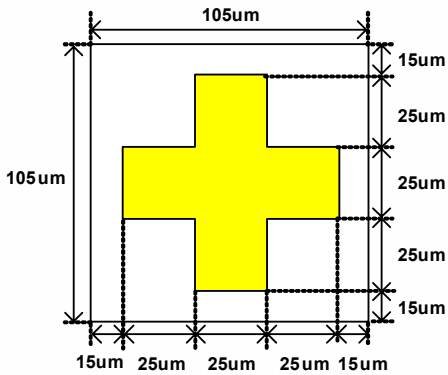
(Scribe line included)

9.3 Alignment Mark

Left



Right



9.4 Bump Center Coordinate

No.	Name	X	Y	Bump size(μm)
1	DUMMY	6050	406.5	25 x 84
2	OUT0	6000	406.5	25 x 84
3	OUT1	5975	287.5	25 x 84
4	OUT2	5950	406.5	25 x 84
5	OUT3	5925	287.5	25 x 84
6	OUT4	5900	406.5	25 x 84
7	OUT5	5875	287.5	25 x 84
8	OUT6	5850	406.5	25 x 84
9	OUT7	5825	287.5	25 x 84
10	OUT8	5800	406.5	25 x 84
11	OUT9	5775	287.5	25 x 84
12	OUT10	5750	406.5	25 x 84
13	OUT11	5725	287.5	25 x 84
14	OUT12	5700	406.5	25 x 84
15	OUT13	5675	287.5	25 x 84
16	OUT14	5650	406.5	25 x 84
17	OUT15	5625	287.5	25 x 84
18	OUT16	5600	406.5	25 x 84
19	OUT17	5575	287.5	25 x 84
20	OUT18	5550	406.5	25 x 84
21	OUT19	5525	287.5	25 x 84
22	OUT20	5500	406.5	25 x 84
23	OUT21	5475	287.5	25 x 84
24	OUT22	5450	406.5	25 x 84
25	OUT23	5425	287.5	25 x 84
26	OUT24	5400	406.5	25 x 84
27	OUT25	5375	287.5	25 x 84
28	OUT26	5350	406.5	25 x 84
29	OUT27	5325	287.5	25 x 84
30	OUT28	5300	406.5	25 x 84
31	OUT29	5275	287.5	25 x 84
32	OUT30	5250	406.5	25 x 84
33	OUT31	5225	287.5	25 x 84
34	OUT32	5200	406.5	25 x 84
35	OUT33	5175	287.5	25 x 84
36	OUT34	5150	406.5	25 x 84
37	OUT35	5125	287.5	25 x 84
38	OUT36	5100	406.5	25 x 84
39	OUT37	5075	287.5	25 x 84
40	OUT38	5050	406.5	25 x 84
41	OUT39	5025	287.5	25 x 84
42	OUT40	5000	406.5	25 x 84
43	OUT41	4975	287.5	25 x 84
44	OUT42	4950	406.5	25 x 84
45	OUT43	4925	287.5	25 x 84
46	OUT44	4900	406.5	25 x 84
47	OUT45	4875	287.5	25 x 84
48	OUT46	4850	406.5	25 x 84
49	OUT47	4825	287.5	25 x 84
50	OUT48	4800	406.5	25 x 84
51	OUT49	4775	287.5	25 x 84
52	OUT50	4750	406.5	25 x 84
53	OUT51	4725	287.5	25 x 84
54	OUT52	4700	406.5	25 x 84
55	OUT53	4675	287.5	25 x 84
56	OUT54	4650	406.5	25 x 84
57	OUT55	4625	287.5	25 x 84
58	OUT56	4600	406.5	25 x 84
59	OUT57	4575	287.5	25 x 84
60	OUT58	4550	406.5	25 x 84

No.	Name	X	Y	Bump size(μm)
61	OUT59	4525	287.5	25 x 84
62	OUT60	4500	406.5	25 x 84
63	OUT61	4475	287.5	25 x 84
64	OUT62	4450	406.5	25 x 84
65	OUT63	4425	287.5	25 x 84
66	OUT64	4400	406.5	25 x 84
67	OUT65	4375	287.5	25 x 84
68	OUT66	4350	406.5	25 x 84
69	OUT67	4325	287.5	25 x 84
70	OUT68	4300	406.5	25 x 84
71	OUT69	4275	287.5	25 x 84
72	OUT70	4250	406.5	25 x 84
73	OUT71	4225	287.5	25 x 84
74	OUT72	4200	406.5	25 x 84
75	OUT73	4175	287.5	25 x 84
76	OUT74	4150	406.5	25 x 84
77	OUT75	4125	287.5	25 x 84
78	OUT76	4100	406.5	25 x 84
79	OUT77	4075	287.5	25 x 84
80	OUT78	4050	406.5	25 x 84
81	OUT79	4025	287.5	25 x 84
82	OUT80	4000	406.5	25 x 84
83	OUT81	3975	287.5	25 x 84
84	OUT82	3950	406.5	25 x 84
85	OUT83	3925	287.5	25 x 84
86	OUT84	3900	406.5	25 x 84
87	OUT85	3875	287.5	25 x 84
88	OUT86	3850	406.5	25 x 84
89	OUT87	3825	287.5	25 x 84
90	OUT88	3800	406.5	25 x 84
91	OUT89	3775	287.5	25 x 84
92	OUT90	3750	406.5	25 x 84
93	OUT91	3725	287.5	25 x 84
94	OUT92	3700	406.5	25 x 84
95	OUT93	3675	287.5	25 x 84
96	OUT94	3650	406.5	25 x 84
97	OUT95	3625	287.5	25 x 84
98	OUT96	3600	406.5	25 x 84
99	OUT97	3575	287.5	25 x 84
100	OUT98	3550	406.5	25 x 84
101	OUT99	3525	287.5	25 x 84
102	OUT100	3500	406.5	25 x 84
103	OUT101	3475	287.5	25 x 84
104	OUT102	3450	406.5	25 x 84
105	OUT103	3425	287.5	25 x 84
106	OUT104	3400	406.5	25 x 84
107	OUT105	3375	287.5	25 x 84
108	OUT106	3350	406.5	25 x 84
109	OUT107	3325	287.5	25 x 84
110	OUT108	3300	406.5	25 x 84
111	OUT109	3275	287.5	25 x 84
112	OUT110	3250	406.5	25 x 84
113	OUT111	3225	287.5	25 x 84
114	OUT112	3200	406.5	25 x 84
115	OUT113	3175	287.5	25 x 84
116	OUT114	3150	406.5	25 x 84
117	OUT115	3125	287.5	25 x 84
118	OUT116	3100	406.5	25 x 84
119	OUT117	3075	287.5	25 x 84
120	OUT118	3050	406.5	25 x 84

No.	Name	X	Y	Bump size(μm)
121	OUT119	3025	287.5	25 x 84
122	OUT120	3000	406.5	25 x 84
123	OUT121	2975	287.5	25 x 84
124	OUT122	2950	406.5	25 x 84
125	OUT123	2925	287.5	25 x 84
126	OUT124	2900	406.5	25 x 84
127	OUT125	2875	287.5	25 x 84
128	OUT126	2850	406.5	25 x 84
129	OUT127	2825	287.5	25 x 84
130	OUT128	2800	406.5	25 x 84
131	OUT129	2775	287.5	25 x 84
132	OUT130	2750	406.5	25 x 84
133	OUT131	2725	287.5	25 x 84
134	OUT132	2700	406.5	25 x 84
135	OUT133	2675	287.5	25 x 84
136	OUT134	2650	406.5	25 x 84
137	OUT135	2625	287.5	25 x 84
138	OUT136	2600	406.5	25 x 84
139	OUT137	2575	287.5	25 x 84
140	OUT138	2550	406.5	25 x 84
141	OUT139	2525	287.5	25 x 84
142	OUT140	2500	406.5	25 x 84
143	OUT141	2475	287.5	25 x 84
144	OUT142	2450	406.5	25 x 84
145	OUT143	2425	287.5	25 x 84
146	OUT144	2400	406.5	25 x 84
147	OUT145	2375	287.5	25 x 84
148	OUT146	2350	406.5	25 x 84
149	OUT147	2325	287.5	25 x 84
150	OUT148	2300	406.5	25 x 84
151	OUT149	2275	287.5	25 x 84
152	OUT150	2250	406.5	25 x 84
153	OUT151	2225	287.5	25 x 84
154	OUT152	2200	406.5	25 x 84
155	OUT153	2175	287.5	25 x 84
156	OUT154	2150	406.5	25 x 84
157	OUT155	2125	287.5	25 x 84
158	OUT156	2100	406.5	25 x 84
159	OUT157	2075	287.5	25 x 84
160	OUT158	2050	406.5	25 x 84
161	OUT159	2025	287.5	25 x 84
162	OUT160	2000	406.5	25 x 84
163	OUT161	1975	287.5	25 x 84
164	OUT162	1950	406.5	25 x 84
165	OUT163	1925	287.5	25 x 84
166	OUT164	1900	406.5	25 x 84
167	OUT165	1875	287.5	25 x 84
168	OUT166	1850	406.5	25 x 84
169	OUT167	1825	287.5	25 x 84
170	OUT168	1800	406.5	25 x 84
171	OUT169	1775	287.5	25 x 84
172	OUT170	1750	406.5	25 x 84
173	OUT171	1725	287.5	25 x 84
174	OUT172	1700	406.5	25 x 84
175	OUT173	1675	287.5	25 x 84
176	OUT174	1650	406.5	25 x 84
177	OUT175	1625	287.5	25 x 84
178	OUT176	1600	406.5	25 x 84
179	OUT177	1575	287.5	25 x 84
180	OUT178	1550	406.5	25 x 84

No.	Name	X	Y	Bump size(μm)
181	OUT179	1525	287.5	25 x 84
182	OUT180	1500	406.5	25 x 84
183	OUT181	1475	287.5	25 x 84
184	OUT182	1450	406.5	25 x 84
185	OUT183	1425	287.5	25 x 84
186	OUT184	1400	406.5	25 x 84
187	OUT185	1375	287.5	25 x 84
188	OUT186	1350	406.5	25 x 84
189	OUT187	1325	287.5	25 x 84
190	OUT188	1300	406.5	25 x 84
191	OUT189	1275	287.5	25 x 84
192	OUT190	1250	406.5	25 x 84
193	OUT191	1225	287.5	25 x 84
194	OUT192	1200	406.5	25 x 84
195	OUT193	1175	287.5	25 x 84
196	OUT194	1150	406.5	25 x 84
197	OUT195	1125	287.5	25 x 84
198	OUT196	1100	406.5	25 x 84
199	OUT197	1075	287.5	25 x 84
200	OUT198	1050	406.5	25 x 84
201	OUT199	1025	287.5	25 x 84
202	OUT200	1000	406.5	25 x 84
203	OUT201	975	287.5	25 x 84
204	OUT202	950	406.5	25 x 84
205	OUT203	925	287.5	25 x 84
206	OUT204	900	406.5	25 x 84
207	OUT205	875	287.5	25 x 84
208	OUT206	850	406.5	25 x 84
209	OUT207	825	287.5	25 x 84
210	OUT208	800	406.5	25 x 84
211	OUT209	775	287.5	25 x 84
212	OUT210	750	406.5	25 x 84
213	OUT211	725	287.5	25 x 84
214	OUT212	700	406.5	25 x 84
215	OUT213	675	287.5	25 x 84
216	OUT214	650	406.5	25 x 84
217	OUT215	625	287.5	25 x 84
218	OUT216	600	406.5	25 x 84
219	OUT217	575	287.5	25 x 84
220	OUT218	550	406.5	25 x 84
221	OUT219	525	287.5	25 x 84
222	OUT220	500	406.5	25 x 84
223	OUT221	475	287.5	25 x 84
224	OUT222	450	406.5	25 x 84
225	OUT223	425	287.5	25 x 84
226	OUT224	400	406.5	25 x 84
227	OUT225	375	287.5	25 x 84
228	OUT226	350	406.5	25 x 84
229	OUT227	325	287.5	25 x 84
230	OUT228	300	406.5	25 x 84
231	OUT229	275	287.5	25 x 84
232	OUT230	250	406.5	25 x 84
233	OUT231	225	287.5	25 x 84
234	OUT232	200	406.5	25 x 84
235	OUT233	175	287.5	25 x 84
236	OUT234	150	406.5	25 x 84
237	OUT235	125	287.5	25 x 84
238	OUT236	100	406.5	25 x 84
239	OUT237	75	287.5	25 x 84
240	OUT238	50	406.5	25 x 84

No.	Name	X	Y	Bump size(μm)
241	OUT239	25	287.5	25 x 84
242	OUT240	0	406.5	25 x 84
243	OUT241	-25	287.5	25 x 84
244	OUT242	-50	406.5	25 x 84
245	OUT243	-75	287.5	25 x 84
246	OUT244	-100	406.5	25 x 84
247	OUT245	-125	287.5	25 x 84
248	OUT246	-150	406.5	25 x 84
249	OUT247	-175	287.5	25 x 84
250	OUT248	-200	406.5	25 x 84
251	OUT249	-225	287.5	25 x 84
252	OUT250	-250	406.5	25 x 84
253	OUT251	-275	287.5	25 x 84
254	OUT252	-300	406.5	25 x 84
255	OUT253	-325	287.5	25 x 84
256	OUT254	-350	406.5	25 x 84
257	OUT255	-375	287.5	25 x 84
258	OUT256	-400	406.5	25 x 84
259	OUT257	-425	287.5	25 x 84
260	OUT258	-450	406.5	25 x 84
261	OUT259	-475	287.5	25 x 84
262	OUT260	-500	406.5	25 x 84
263	OUT261	-525	287.5	25 x 84
264	OUT262	-550	406.5	25 x 84
265	OUT263	-575	287.5	25 x 84
266	OUT264	-600	406.5	25 x 84
267	OUT265	-625	287.5	25 x 84
268	OUT266	-650	406.5	25 x 84
269	OUT267	-675	287.5	25 x 84
270	OUT268	-700	406.5	25 x 84
271	OUT269	-725	287.5	25 x 84
272	OUT270	-750	406.5	25 x 84
273	OUT271	-775	287.5	25 x 84
274	OUT272	-800	406.5	25 x 84
275	OUT273	-825	287.5	25 x 84
276	OUT274	-850	406.5	25 x 84
277	OUT275	-875	287.5	25 x 84
278	OUT276	-900	406.5	25 x 84
279	OUT277	-925	287.5	25 x 84
280	OUT278	-950	406.5	25 x 84
281	OUT279	-975	287.5	25 x 84
282	OUT280	-1000	406.5	25 x 84
283	OUT281	-1025	287.5	25 x 84
284	OUT282	-1050	406.5	25 x 84
285	OUT283	-1075	287.5	25 x 84
286	OUT284	-1100	406.5	25 x 84
287	OUT285	-1125	287.5	25 x 84
288	OUT286	-1150	406.5	25 x 84
289	OUT287	-1175	287.5	25 x 84
290	OUT288	-1200	406.5	25 x 84
291	OUT289	-1225	287.5	25 x 84
292	OUT290	-1250	406.5	25 x 84
293	OUT291	-1275	287.5	25 x 84
294	OUT292	-1300	406.5	25 x 84
295	OUT293	-1325	287.5	25 x 84
296	OUT294	-1350	406.5	25 x 84
297	OUT295	-1375	287.5	25 x 84
298	OUT296	-1400	406.5	25 x 84
299	OUT297	-1425	287.5	25 x 84
300	OUT298	-1450	406.5	25 x 84

No.	Name	X	Y	Bump size(μm)
301	OUT299	-1475	287.5	25 x 84
302	OUT300	-1500	406.5	25 x 84
303	OUT301	-1525	287.5	25 x 84
304	OUT302	-1550	406.5	25 x 84
305	OUT303	-1575	287.5	25 x 84
306	OUT304	-1600	406.5	25 x 84
307	OUT305	-1625	287.5	25 x 84
308	OUT306	-1650	406.5	25 x 84
309	OUT307	-1675	287.5	25 x 84
310	OUT308	-1700	406.5	25 x 84
311	OUT309	-1725	287.5	25 x 84
312	OUT310	-1750	406.5	25 x 84
313	OUT311	-1775	287.5	25 x 84
314	OUT312	-1800	406.5	25 x 84
315	OUT313	-1825	287.5	25 x 84
316	OUT314	-1850	406.5	25 x 84
317	OUT315	-1875	287.5	25 x 84
318	OUT316	-1900	406.5	25 x 84
319	OUT317	-1925	287.5	25 x 84
320	OUT318	-1950	406.5	25 x 84
321	OUT319	-1975	287.5	25 x 84
322	OUT320	-2000	406.5	25 x 84
323	OUT321	-2025	287.5	25 x 84
324	OUT322	-2050	406.5	25 x 84
325	OUT323	-2075	287.5	25 x 84
326	OUT324	-2100	406.5	25 x 84
327	OUT325	-2125	287.5	25 x 84
328	OUT326	-2150	406.5	25 x 84
329	OUT327	-2175	287.5	25 x 84
330	OUT328	-2200	406.5	25 x 84
331	OUT329	-2225	287.5	25 x 84
332	OUT330	-2250	406.5	25 x 84
333	OUT331	-2275	287.5	25 x 84
334	OUT332	-2300	406.5	25 x 84
335	OUT333	-2325	287.5	25 x 84
336	OUT334	-2350	406.5	25 x 84
337	OUT335	-2375	287.5	25 x 84
338	OUT336	-2400	406.5	25 x 84
339	OUT337	-2425	287.5	25 x 84
340	OUT338	-2450	406.5	25 x 84
341	OUT339	-2475	287.5	25 x 84
342	OUT340	-2500	406.5	25 x 84
343	OUT341	-2525	287.5	25 x 84
344	OUT342	-2550	406.5	25 x 84
345	OUT343	-2575	287.5	25 x 84
346	OUT344	-2600	406.5	25 x 84
347	OUT345	-2625	287.5	25 x 84
348	OUT346	-2650	406.5	25 x 84
349	OUT347	-2675	287.5	25 x 84
350	OUT348	-2700	406.5	25 x 84
351	OUT349	-2725	287.5	25 x 84
352	OUT350	-2750	406.5	25 x 84
353	OUT351	-2775	287.5	25 x 84
354	OUT352	-2800	406.5	25 x 84
355	OUT353	-2825	287.5	25 x 84
356	OUT354	-2850	406.5	25 x 84
357	OUT355	-2875	287.5	25 x 84
358	OUT356	-2900	406.5	25 x 84
359	OUT357	-2925	287.5	25 x 84
360	OUT358	-2950	406.5	25 x 84

No.	Name	X	Y	Bump size(μm)
361	OUT359	-2975	287.5	25 x 84
362	OUT360	-3000	406.5	25 x 84
363	OUT361	-3025	287.5	25 x 84
364	OUT362	-3050	406.5	25 x 84
365	OUT363	-3075	287.5	25 x 84
366	OUT364	-3100	406.5	25 x 84
367	OUT365	-3125	287.5	25 x 84
368	OUT366	-3150	406.5	25 x 84
369	OUT367	-3175	287.5	25 x 84
370	OUT368	-3200	406.5	25 x 84
371	OUT369	-3225	287.5	25 x 84
372	OUT370	-3250	406.5	25 x 84
373	OUT371	-3275	287.5	25 x 84
374	OUT372	-3300	406.5	25 x 84
375	OUT373	-3325	287.5	25 x 84
376	OUT374	-3350	406.5	25 x 84
377	OUT375	-3375	287.5	25 x 84
378	OUT376	-3400	406.5	25 x 84
379	OUT377	-3425	287.5	25 x 84
380	OUT378	-3450	406.5	25 x 84
381	OUT379	-3475	287.5	25 x 84
382	OUT380	-3500	406.5	25 x 84
383	OUT381	-3525	287.5	25 x 84
384	OUT382	-3550	406.5	25 x 84
385	OUT383	-3575	287.5	25 x 84
386	OUT384	-3600	406.5	25 x 84
387	OUT385	-3625	287.5	25 x 84
388	OUT386	-3650	406.5	25 x 84
389	OUT387	-3675	287.5	25 x 84
390	OUT388	-3700	406.5	25 x 84
391	OUT389	-3725	287.5	25 x 84
392	OUT390	-3750	406.5	25 x 84
393	OUT391	-3775	287.5	25 x 84
394	OUT392	-3800	406.5	25 x 84
395	OUT393	-3825	287.5	25 x 84
396	OUT394	-3850	406.5	25 x 84
397	OUT395	-3875	287.5	25 x 84
398	OUT396	-3900	406.5	25 x 84
399	OUT397	-3925	287.5	25 x 84
400	OUT398	-3950	406.5	25 x 84
401	OUT399	-3975	287.5	25 x 84
402	OUT400	-4000	406.5	25 x 84
403	OUT401	-4025	287.5	25 x 84
404	OUT402	-4050	406.5	25 x 84
405	OUT403	-4075	287.5	25 x 84
406	OUT404	-4100	406.5	25 x 84
407	OUT405	-4125	287.5	25 x 84
408	OUT406	-4150	406.5	25 x 84
409	OUT407	-4175	287.5	25 x 84
410	OUT408	-4200	406.5	25 x 84
411	OUT409	-4225	287.5	25 x 84
412	OUT410	-4250	406.5	25 x 84
413	OUT411	-4275	287.5	25 x 84
414	OUT412	-4300	406.5	25 x 84
415	OUT413	-4325	287.5	25 x 84
416	OUT414	-4350	406.5	25 x 84
417	OUT415	-4375	287.5	25 x 84
418	OUT416	-4400	406.5	25 x 84
419	OUT417	-4425	287.5	25 x 84
420	OUT418	-4450	406.5	25 x 84

No.	Name	X	Y	Bump size(μm)
421	OUT419	-4475	287.5	25 x 84
422	OUT420	-4500	406.5	25 x 84
423	OUT421	-4525	287.5	25 x 84
424	OUT422	-4550	406.5	25 x 84
425	OUT423	-4575	287.5	25 x 84
426	OUT424	-4600	406.5	25 x 84
427	OUT425	-4625	287.5	25 x 84
428	OUT426	-4650	406.5	25 x 84
429	OUT427	-4675	287.5	25 x 84
430	OUT428	-4700	406.5	25 x 84
431	OUT429	-4725	287.5	25 x 84
432	OUT430	-4750	406.5	25 x 84
433	OUT431	-4775	287.5	25 x 84
434	OUT432	-4800	406.5	25 x 84
435	OUT433	-4825	287.5	25 x 84
436	OUT434	-4850	406.5	25 x 84
437	OUT435	-4875	287.5	25 x 84
438	OUT436	-4900	406.5	25 x 84
439	OUT437	-4925	287.5	25 x 84
440	OUT438	-4950	406.5	25 x 84
441	OUT439	-4975	287.5	25 x 84
442	OUT440	-5000	406.5	25 x 84
443	OUT441	-5025	287.5	25 x 84
444	OUT442	-5050	406.5	25 x 84
445	OUT443	-5075	287.5	25 x 84
446	OUT444	-5100	406.5	25 x 84
447	OUT445	-5125	287.5	25 x 84
448	OUT446	-5150	406.5	25 x 84
449	OUT447	-5175	287.5	25 x 84
450	OUT448	-5200	406.5	25 x 84
451	OUT449	-5225	287.5	25 x 84
452	OUT450	-5250	406.5	25 x 84
453	OUT451	-5275	287.5	25 x 84
454	OUT452	-5300	406.5	25 x 84
455	OUT453	-5325	287.5	25 x 84
456	OUT454	-5350	406.5	25 x 84
457	OUT455	-5375	287.5	25 x 84
458	OUT456	-5400	406.5	25 x 84
459	OUT457	-5425	287.5	25 x 84
460	OUT458	-5450	406.5	25 x 84
461	OUT459	-5475	287.5	25 x 84
462	OUT460	-5500	406.5	25 x 84
463	OUT461	-5525	287.5	25 x 84
464	OUT462	-5550	406.5	25 x 84
465	OUT463	-5575	287.5	25 x 84
466	OUT464	-5600	406.5	25 x 84
467	OUT465	-5625	287.5	25 x 84
468	OUT466	-5650	406.5	25 x 84
469	OUT467	-5675	287.5	25 x 84
470	OUT468	-5700	406.5	25 x 84
471	OUT469	-5725	287.5	25 x 84
472	OUT470	-5750	406.5	25 x 84
473	OUT471	-5775	287.5	25 x 84
474	OUT472	-5800	406.5	25 x 84
475	OUT473	-5825	287.5	25 x 84
476	OUT474	-5850	406.5	25 x 84
477	OUT475	-5875	287.5	25 x 84
478	OUT476	-5900	406.5	25 x 84
479	OUT477	-5925	287.5	25 x 84
480	OUT478	-5950	406.5	25 x 84

No.	Name	X	Y	Bump size(μm)
481	OUT479	-5975	287.5	25 x 84
482	OUT480	-6000	406.5	25 x 84
483	OUT481	-6025	287.5	25 x 84
484	DUMMY	-6050	406.5	25 x 84
485	/XAO	-6470	426	50 x 45
486	/XAO	-6535	426	50 x 45
487	/XAO	-6600	426	50 x 45
488	/XAO	-6665	426	50 x 45
489	OE1	-6600	355	50 x 45
490	OE1	-6665	355	50 x 45
491	OE2	-6600	284	50 x 45
492	OE2	-6665	284	50 x 45
493	OE3	-6600	213	50 x 45
494	OE3	-6665	213	50 x 45
495	L/R	-6600	142	50 x 45
496	L/R	-6665	142	50 x 45
497	CPV	-6600	71	50 x 45
498	CPV	-6665	71	50 x 45
499	PASS	-6600	0	50 x 45
500	PASS	-6665	0	50 x 45
501	STV2	-6600	-71	50 x 45
502	STV2	-6665	-71	50 x 45
503	VGH	-6600	-142	50 x 45
504	VGH	-6665	-142	50 x 45
505	VGH	-6600	-213	50 x 45
506	VGH	-6665	-213	50 x 45
507	VDD	-6600	-284	50 x 45
508	VDD	-6665	-284	50 x 45
509	VDD	-6600	-355	50 x 45
510	VDD	-6665	-355	50 x 45
511	MODE	-6470	-426	50 x 45
512	MODE	-6535	-426	50 x 45
513	MODE	-6600	-426	50 x 45
514	MODE	-6665	-426	50 x 45
515	VEE	-6094	-406	40 x 85
516	VEE	-6042	-406	40 x 85
517	VEE	-5990	-406	40 x 85
518	VEE	-5938	-406	40 x 85
519	VGH	-5858	-406	40 x 85
520	VGH	-5806	-406	40 x 85
521	VGH	-5754	-406	40 x 85
522	VGH	-5702	-406	40 x 85
523	VDD	-5622	-406	40 x 85
524	VDD	-5570	-406	40 x 85
525	VDD	-5518	-406	40 x 85
526	VDD	-5466	-406	40 x 85
527	MODE	-5386	-406	40 x 85
528	VSS	-5306	-406	40 x 85
529	VSS	-5254	-406	40 x 85
530	VSS	-5202	-406	40 x 85
531	VSS	-5150	-406	40 x 85
532	VSS	-5098	-406	40 x 85
533	VSS	-5046	-406	40 x 85
534	VSS	-4994	-406	40 x 85
535	VSS	-4942	-406	40 x 85
536	VSS	-4890	-406	40 x 85
537	VSS	-4838	-406	40 x 85
538	DUMMY	-4725	-406	105 x 85
539	DUMMY	-4590	-406	105 x 85
540	DUMMY	-4455	-406	105 x 85

No.	Name	X	Y	Bump size(μm)
541	DUMMY	-4320	-406	105 x 85
542	DUMMY	-4185	-406	105 x 85
543	DUMMY	-4050	-406	105 x 85
544	DUMMY	-3915	-406	105 x 85
545	DUMMY	-3780	-406	105 x 85
546	DUMMY	-3645	-406	105 x 85
547	DUMMY	-3510	-406	105 x 85
548	DUMMY	-3375	-406	105 x 85
549	DUMMY	-3240	-406	105 x 85
550	DUMMY	-3105	-406	105 x 85
551	DUMMY	-2970	-406	105 x 85
552	DUMMY	-2835	-406	105 x 85
553	DUMMY	-2700	-406	105 x 85
554	DUMMY	-2565	-406	105 x 85
555	DUMMY	-2430	-406	105 x 85
556	DUMMY	-2295	-406	105 x 85
557	DUMMY	-2160	-406	105 x 85
558	DUMMY	-2025	-406	105 x 85
559	DUMMY	-1890	-406	105 x 85
560	DUMMY	-1755	-406	105 x 85
561	DUMMY	-1620	-406	105 x 85
562	DUMMY	-1485	-406	105 x 85
563	DUMMY	-1350	-406	105 x 85
564	DUMMY	-1215	-406	105 x 85
565	DUMMY	-1080	-406	105 x 85
566	DUMMY	-945	-406	105 x 85
567	DUMMY	-810	-406	105 x 85
568	DUMMY	-675	-406	105 x 85
569	DUMMY	-540	-406	105 x 85
570	DUMMY	-405	-406	105 x 85
571	DUMMY	-270	-406	105 x 85
572	DUMMY	-135	-406	105 x 85
573	DUMMY	0	-406	105 x 85
574	DUMMY	135	-406	105 x 85
575	DUMMY	270	-406	105 x 85
576	DUMMY	405	-406	105 x 85
577	DUMMY	540	-406	105 x 85
578	DUMMY	675	-406	105 x 85
579	DUMMY	810	-406	105 x 85
580	DUMMY	945	-406	105 x 85
581	DUMMY	1080	-406	105 x 85
582	DUMMY	1215	-406	105 x 85
583	DUMMY	1350	-406	105 x 85
584	DUMMY	1485	-406	105 x 85
585	DUMMY	1620	-406	105 x 85
586	DUMMY	1755	-406	105 x 85
587	DUMMY	1890	-406	105 x 85
588	DUMMY	2025	-406	105 x 85
589	DUMMY	2160	-406	105 x 85
590	DUMMY	2295	-406	105 x 85
591	DUMMY	2430	-406	105 x 85
592	DUMMY	2565	-406	105 x 85
593	DUMMY	2700	-406	105 x 85
594	DUMMY	2835	-406	105 x 85
595	DUMMY	2970	-406	105 x 85
596	DUMMY	3105	-406	105 x 85
597	DUMMY	3240	-406	105 x 85
598	DUMMY	3375	-406	105 x 85
599	DUMMY	3510	-406	105 x 85
600	DUMMY	3645	-406	105 x 85

No.	Name	X	Y	Bump size(μm)
601	DUMMY	3780	-406	105 x 85
602	DUMMY	3915	-406	105 x 85
603	DUMMY	4050	-406	105 x 85
604	DUMMY	4185	-406	105 x 85
605	DUMMY	4320	-406	105 x 85
606	DUMMY	4455	-406	105 x 85
607	DUMMY	4590	-406	105 x 85
608	DUMMY	4725	-406	105 x 85
609	VSS	4838	-406	40 x 85
610	VSS	4890	-406	40 x 85
611	VSS	4942	-406	40 x 85
612	VSS	4994	-406	40 x 85
613	VSS	5046	-406	40 x 85
614	VSS	5098	-406	40 x 85
615	VSS	5150	-406	40 x 85
616	VSS	5202	-406	40 x 85
617	VSS	5254	-406	40 x 85
618	VSS	5306	-406	40 x 85
619	MODE	5386	-406	40 x 85
620	VDD	5466	-406	40 x 85
621	VDD	5518	-406	40 x 85
622	VDD	5570	-406	40 x 85
623	VDD	5622	-406	40 x 85
624	VGH	5702	-406	40 x 85
625	VGH	5754	-406	40 x 85
626	VGH	5806	-406	40 x 85
627	VGH	5858	-406	40 x 85
628	VEE	5938	-406	40 x 85
629	VEE	5990	-406	40 x 85
630	VEE	6042	-406	40 x 85
631	VEE	6094	-406	40 x 85

No.	Name	X	Y	Bump size(μm)
632	MODE	6470	-426	50 x 45
633	MODE	6535	-426	50 x 45
634	MODE	6600	-426	50 x 45
635	MODE	6665	-426	50 x 45
636	VDD	6600	-355	50 x 45
637	VDD	6665	-355	50 x 45
638	VDD	6600	-284	50 x 45
639	VDD	6665	-284	50 x 45
640	VGH	6600	-213	50 x 45
641	VGH	6665	-213	50 x 45
642	VGH	6600	-142	50 x 45
643	VGH	6665	-142	50 x 45
644	STV1	6600	-71	50 x 45
645	STV1	6665	-71	50 x 45
646	PASS	6600	0	50 x 45
647	PASS	6665	0	50 x 45
648	CPV	6600	71	50 x 45
649	CPV	6665	71	50 x 45
650	L/R	6600	142	50 x 45
651	L/R	6665	142	50 x 45
652	OE3	6600	213	50 x 45
653	OE3	6665	213	50 x 45
654	OE2	6600	284	50 x 45
655	OE2	6665	284	50 x 45
656	OE1	6600	355	50 x 45
657	OE1	6665	355	50 x 45
658	/XAO	6470	426	50 x 45
659	/XAO	6535	426	50 x 45
660	/XAO	6600	426	50 x 45
661	/XAO	6665	426	50 x 45

9.5 Alignment Mark center coordinate

Name	X	Y
L_AMK	-6267.5	-361
R_AMK	6267.5	-361

10. Ordering Information

Part NO.	Package
HX8678-A000PDxxx	PD: mean COG xxx: mean chip thickness (μm) , (default 400 μm)

11. Revision History

Version	EFF.DATE	DESCRIPTION OF CHANGES
01	2006/05/11	New setup
	2006/05/23	Page 11 Revise chip size. Page 12 Revise bmmp outline dimensions.
	2006/07/05	Page 11~12 Revise the drawing of alignment mark.