DATA SHEET

(DOC No. HX8660-A-DS)

HX8660-A

240 Channel TFT Gate Driver

Version 01 March, 2006

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

1. General Description

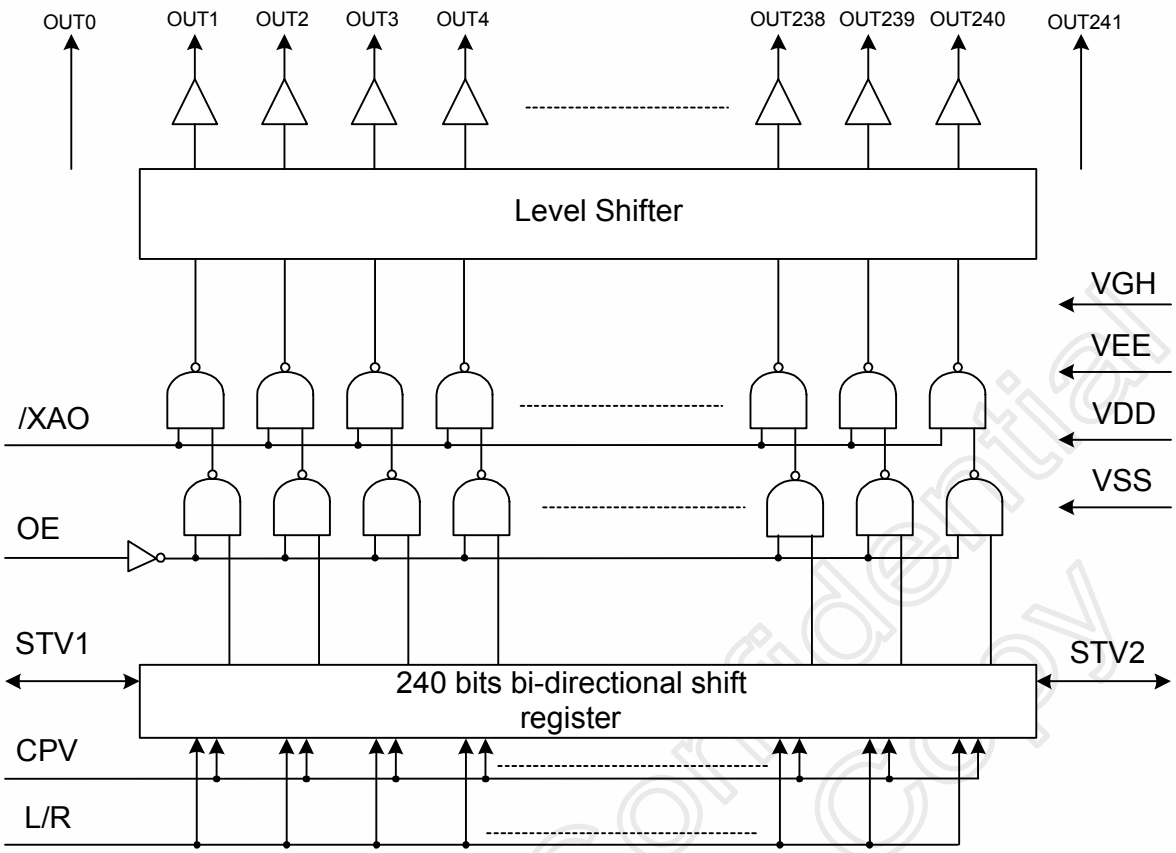
The HX8660-A is a 240 channel outputs gate driver used for driving the gate electrode of TFT LCD panel. It is designed for 2-level output with maximum +40V output driving voltage. This device is applicable for a wide range of panel resolution including VGA and UXGA.

2. Features

- 2-level output gate driver for TFT LCD panel
- 240 channel outputs + 2 pins fixed to VEE
- Maximum +40V output driving voltage
- Bi-directional data shift capability
- 200KHz maximum operation frequency
- 2.7V to 5.5V power supply voltage range
- High voltage CMOS process technology
- COG package
- Possible applications:

Panel type	Resolution	Piece per panel
VGA	640 × 480	2
UXGA	1600 × 1200	5
	1920 × 1440	6

3. Block Diagram



4. Pin Description

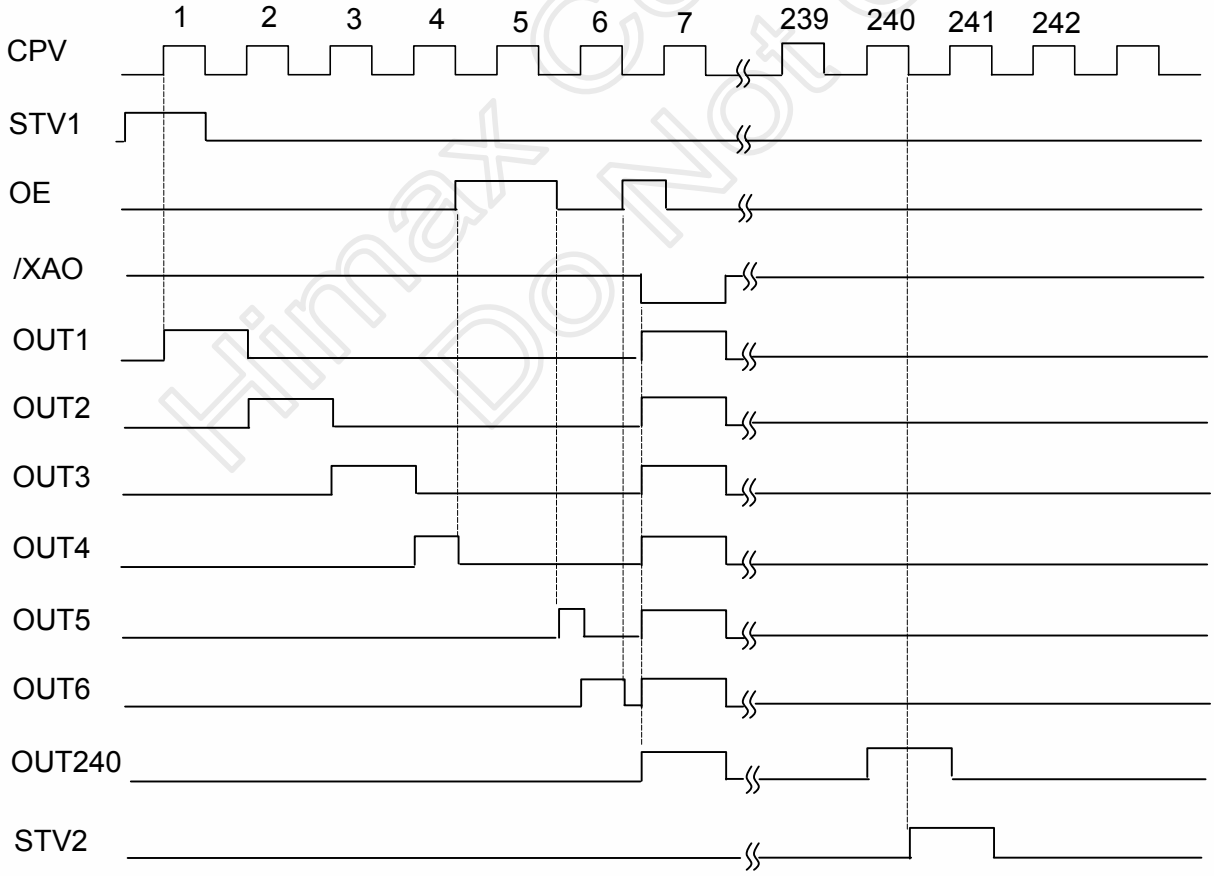
<table>
<tr><th>Pin name</th><th>I/O</th><th>Function</th><th>Description</th></tr>
<tr><td>CPV</td><td>In</td><td>Shift clock input</td><td>This is the clock input for chip internal shift register. Data is shifted at each rising edge of this clock.</td></tr>
<tr><td>L/R</td><td>In</td><td>Shift direction control pin</td><td>This pin controls the output shifting direction as listed below.
L/R = H,STV1→OUT1→OUT2→ • • • →OUT240→STV2
L/R = L,STV1←OUT1←OUT2← • • • ←OUT240←STV2</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>OE</td><td>In</td><td>Output enable control</td><td>This pin is used to control the channel output. When OE input is high, driver output is fixed to VEE level regardless CPV. However, the internal shift register is not cleared even if OE input is inactive.</td></tr>
<tr><td>/XAO</td><td>In</td><td>Output all high</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>OUT1
~
OUT240</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,
OUT241</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>LCD driver negative power supply.</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 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 OUT240) 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 OUT240 in sync with CPV pulse.
After 240 CPV rising edge are past, the STV2 goes up to high level at the 240th falling edge of CPV and goes down to low level at the 241st 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.
During any L state of /XAO, all the output channels are forced to VGH regardless of CPV and OE. The channel output returns to normal status as soon as /XAO goes back to H.

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



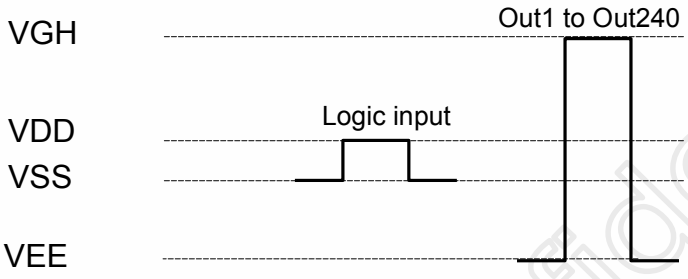
5.2 Relationship among L/R, and STV1/STV2

L/R	Start pulse		Data transfer direction
	Input	Output	
H	STV1	STV2	OUT1→OUT2→OUT3→ ・・・→OUT240
L	STV2	STV1	OUT240→OUT239→OUT238→ ・・・→OUT1

5.3 Device power supply

The HX8660-A must be used by the following conditions.
VGH - VEE = 40V (max.)

Example:

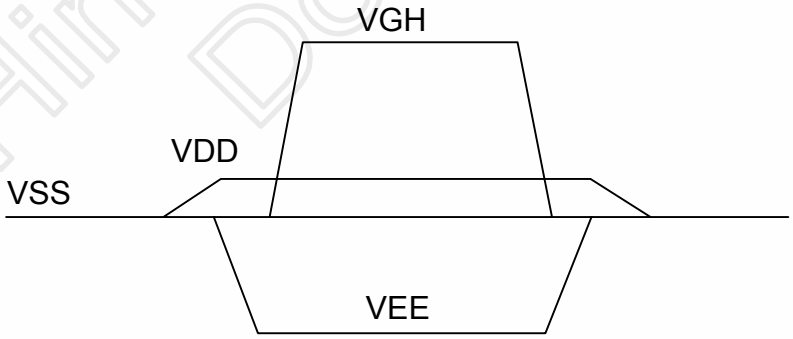


The input signal level of CPV, L/R, OE, STV1, /XAO and STV2 have to swing between VDD and VSS. The signal output level of start pulse (STV1 or STV2) to the next stage cascaded device is VDD for H and VSS for L.

5.4 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)	VDD	-0.3	to	+7.0	V
Power supply voltage (2)	VGH	-0.3	to	+32.0	V
Power supply voltage (3)	VEE	-22.0	to	+0.3	V
Power supply voltage (4)	VGH-VEE	-0.3	to	+45.0	V
Input voltage	V_{IN}	-0.3	to	VDD+0.3	V
Operation temperature	T_{OPR}	-40	to	+90	℃
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)	VDD	2.7	3.3	5.5	V
Power supply voltage (2)	VGH	7	-	VEE+40	V
Power supply voltage (3)	VEE	-20	-	-5	V
Power supply voltage (4)	VGH-VEE	12	-	40	V
Power supply voltage (5)	VDD-VEE	6	-	-	V
Operation frequency	F_{CPV}	-	-	200	KHz
Operation temperature	Ta	-40	-	+90	℃

6.3 DC 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}=200μA	VDD-0.3	-	VDD		STV1,2
Output L voltage	V_{OL}	I_{OL}=200μA	VSS	-	VSS+0.3		STV1,2
Output H resistance	R_{OH}	V_{OUT} = VGH-0.5V	-	-	1000	Ω	OUT1 ~ OUT240
Output L resistance	R_{OL}	V_{OUT} = VEE+0.5V	-	-	1000	Ω	OUT1 ~ OUT240
Input leakage current	I_{IN}	-	-1.0	-	+1.0	μA	Note(2)
Pull high resistance	R_{PU}	-	30	-	200	kΩ	/XAO
VGH Power consumption	I_{VGH}	Note(1)	-	-	100	μA	-
VEE Power consumption	I_{VEE}		-	-	-100		-
VDD Power consumption	I_{VDD}		-	-	50		-

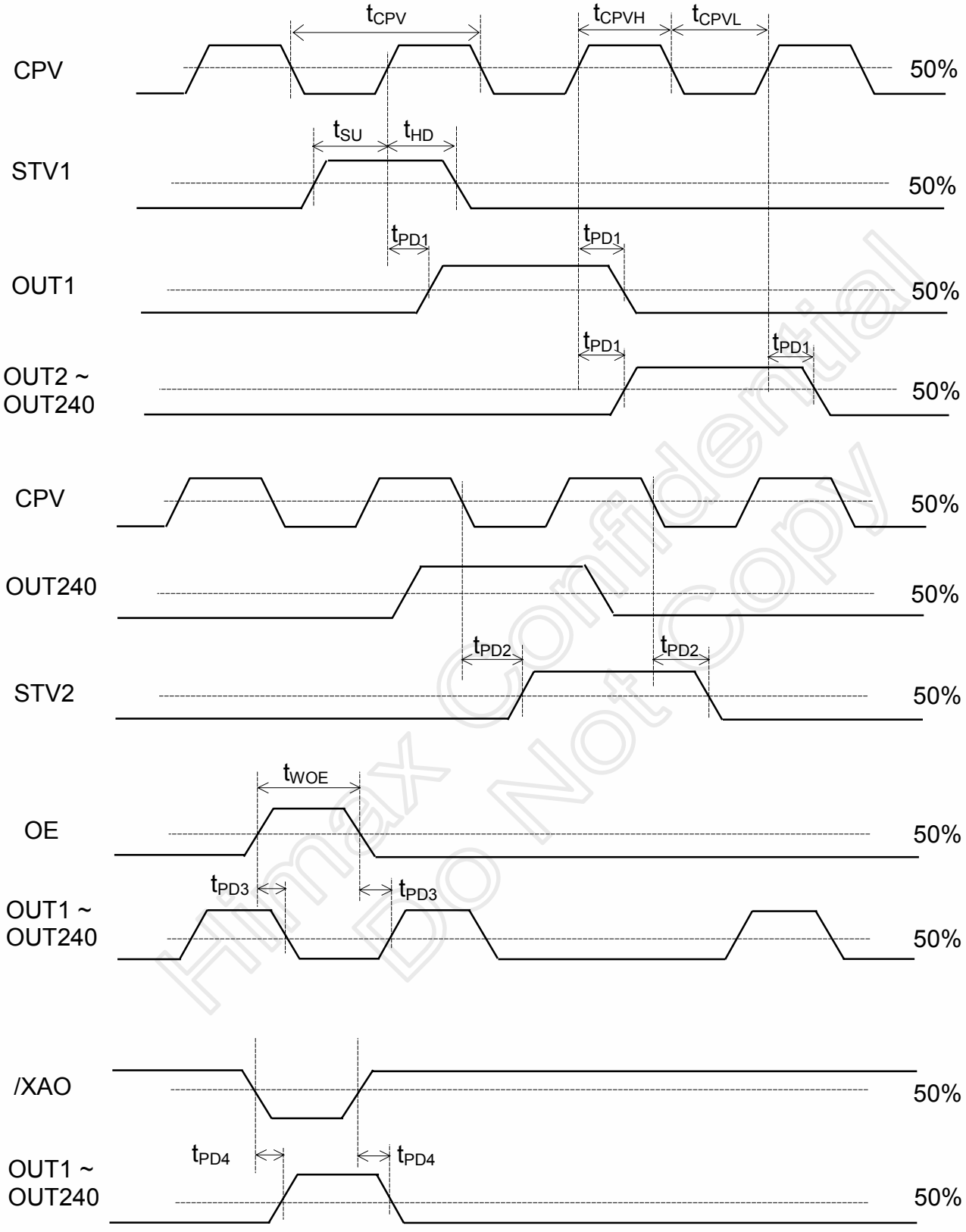
Note:
(1)Power consumption with the following condition:
Output no load, VGH=20V, VEE=-10V, VDD=3.3V, F_{CPV}=20KHz, OE =V_{IL}.
(2)All input except /XAO

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	-	-	
Data setup time	t_{SU}	-	0.2	-	-	
Data hold time	t_{HD}	-	0.3	-	-	
CPV to output delay time	t_{PD1}	CL=220pF	-	-	0.9	
Start pulse output delay time	t_{PD2}	CL=20pF	-	-	0.5	
OE to output delay time	t_{PD3}	CL=220pF	-	-	0.8	
/XAO to output delay time	t_{PD4}	CL=220pF	-	-	10	

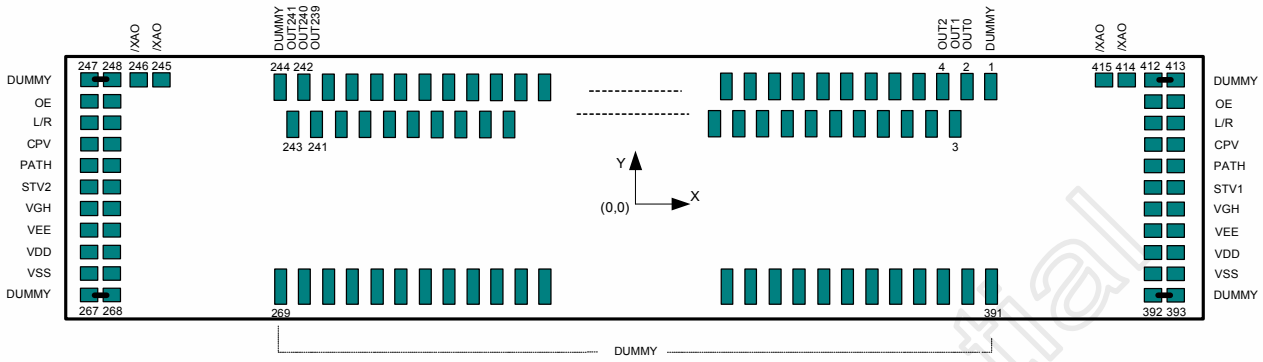
Note:
(1)Test condition: Ta=25℃, VGH=25V, VEE=-15V, VDD=3.3V

8. Waveform



9. Pad Coordinate

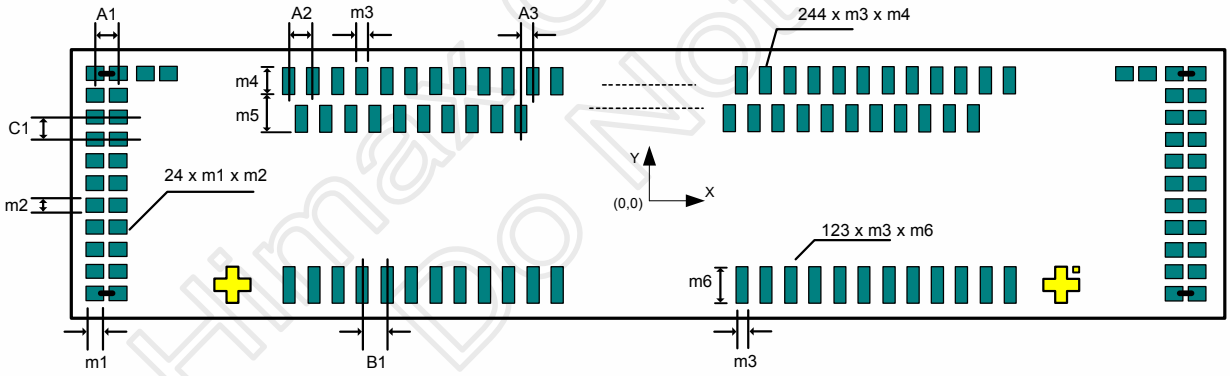
9.1 HX8660-A 240 channels Gate Driver Bump Location



View from bump side

Chip size: 8402μm x 900μm (scribe line included)
Bump height: within lot 15μm ± 3μm
Bump height deviation: within wafer <4um
Bump height deviation: within chip <2um
Bump height roughness deviation: within bump <2um (include Rim)
Bump hardness: 60Hv ± 15Hv
Scribe line width: 100μm

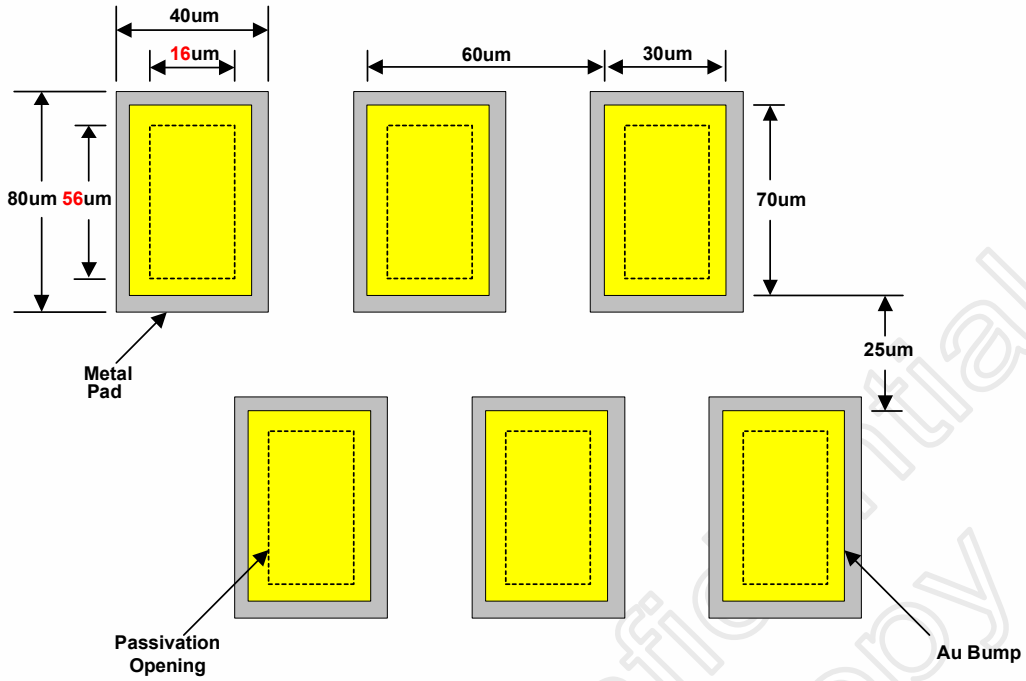
9.2 Bump Outline Dimensions



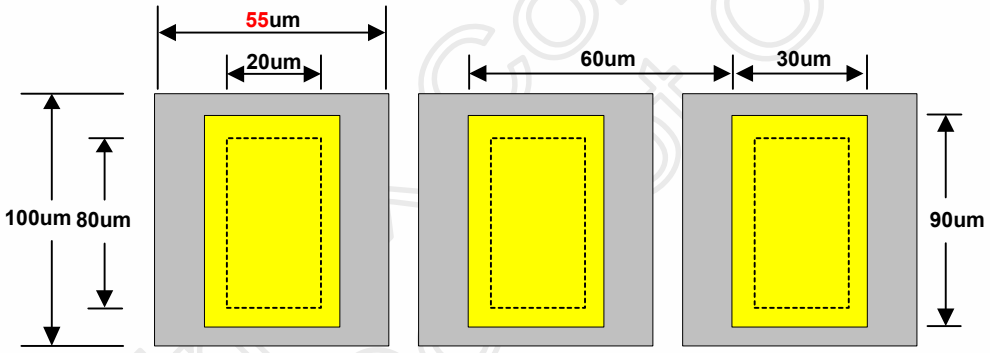
Symbol	Dimensions in μm
A1	72
A2	60
A3	30
B1	60
C1	70.5
m1	50
m2	45
m3	30
m4	70
m5	95
m6	90

9.3 BUMP SIZE

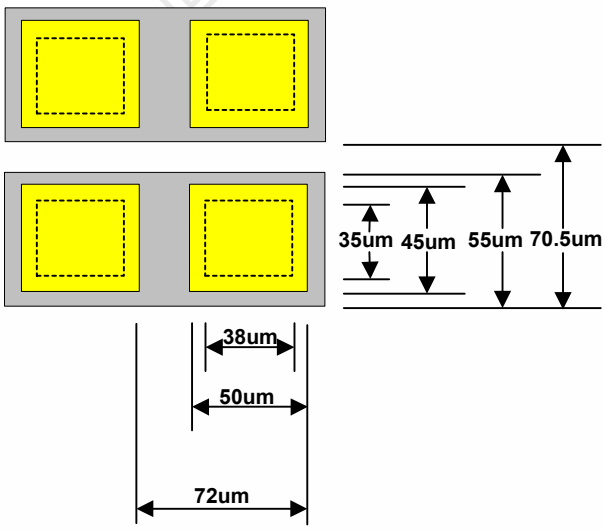
Top Bump



Bottom Bump

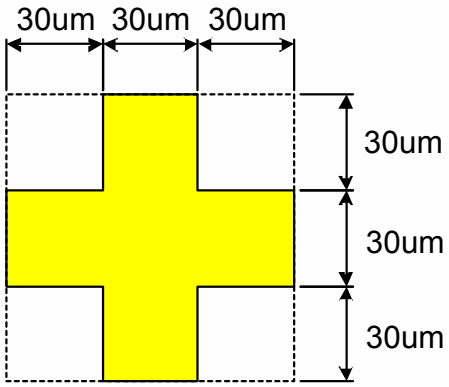


Side Bump

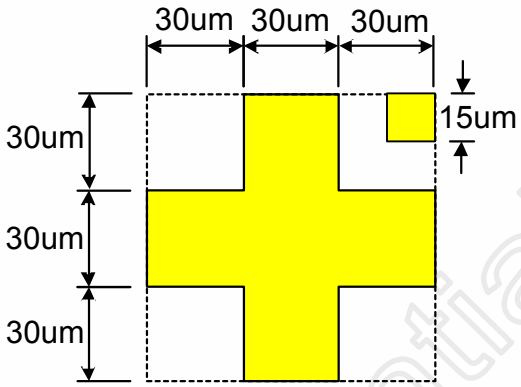


9.4 Alignment Mark

[Left side]



[Right side]



9.5 Bump center coordinate

(Unit: μm)

No.	Name	X	Y	Bump size
1	DUMMY	3675	340	30x70
2	OUT0	3615	340	30x70
3	OUT1	3585	245	30x70
4	OUT2	3555	340	30x70
5	OUT3	3525	245	30x70
6	OUT4	3495	340	30x70
7	OUT5	3465	245	30x70
8	OUT6	3435	340	30x70
9	OUT7	3405	245	30x70
10	OUT8	3375	340	30x70
11	OUT9	3345	245	30x70
12	OUT10	3315	340	30x70
13	OUT11	3285	245	30x70
14	OUT12	3255	340	30x70
15	OUT13	3225	245	30x70
16	OUT14	3195	340	30x70
17	OUT15	3165	245	30x70
18	OUT16	3135	340	30x70
19	OUT17	3105	245	30x70
20	OUT18	3075	340	30x70
21	OUT19	3045	245	30x70
22	OUT20	3015	340	30x70
23	OUT21	2985	245	30x70
24	OUT22	2955	340	30x70
25	OUT23	2925	245	30x70
26	OUT24	2895	340	30x70
27	OUT25	2865	245	30x70
28	OUT26	2835	340	30x70
29	OUT27	2805	245	30x70
30	OUT28	2775	340	30x70
31	OUT29	2745	245	30x70
32	OUT30	2715	340	30x70
33	OUT31	2685	245	30x70
34	OUT32	2655	340	30x70
35	OUT33	2625	245	30x70
36	OUT34	2595	340	30x70
37	OUT35	2565	245	30x70
38	OUT36	2535	340	30x70
39	OUT37	2505	245	30x70
40	OUT38	2475	340	30x70
41	OUT39	2445	245	30x70
42	OUT40	2415	340	30x70
43	OUT41	2385	245	30x70
44	OUT42	2355	340	30x70
45	OUT43	2325	245	30x70
46	OUT44	2295	340	30x70
47	OUT45	2265	245	30x70
48	OUT46	2235	340	30x70
49	OUT47	2205	245	30x70
50	OUT48	2175	340	30x70

No.	Name	X	Y	Bump size
51	OUT49	2145	245	30x70
52	OUT50	2115	340	30x70
53	OUT51	2085	245	30x70
54	OUT52	2055	340	30x70
55	OUT53	2025	245	30x70
56	OUT54	1995	340	30x70
57	OUT55	1965	245	30x70
58	OUT56	1935	340	30x70
59	OUT57	1905	245	30x70
60	OUT58	1875	340	30x70
61	OUT59	1845	245	30x70
62	OUT60	1815	340	30x70
63	OUT61	1785	245	30x70
64	OUT62	1755	340	30x70
65	OUT63	1725	245	30x70
66	OUT64	1695	340	30x70
67	OUT65	1665	245	30x70
68	OUT66	1635	340	30x70
69	OUT67	1605	245	30x70
70	OUT68	1575	340	30x70
71	OUT69	1545	245	30x70
72	OUT70	1515	340	30x70
73	OUT71	1485	245	30x70
74	OUT72	1455	340	30x70
75	OUT73	1425	245	30x70
76	OUT74	1395	340	30x70
77	OUT75	1365	245	30x70
78	OUT76	1335	340	30x70
79	OUT77	1305	245	30x70
80	OUT78	1275	340	30x70
81	OUT79	1245	245	30x70
82	OUT80	1215	340	30x70
83	OUT81	1185	245	30x70
84	OUT82	1155	340	30x70
85	OUT83	1125	245	30x70
86	OUT84	1095	340	30x70
87	OUT85	1065	245	30x70
88	OUT86	1035	340	30x70
89	OUT87	1005	245	30x70
90	OUT88	975	340	30x70
91	OUT89	945	245	30x70
92	OUT90	915	340	30x70
93	OUT91	885	245	30x70
94	OUT92	855	340	30x70
95	OUT93	825	245	30x70
96	OUT94	795	340	30x70
97	OUT95	765	245	30x70
98	OUT96	735	340	30x70
99	OUT97	705	245	30x70
100	OUT98	675	340	30x70

No.	Name	X	Y	Bump size
101	OUT99	645	245	30x70
102	OUT100	615	340	30x70
103	OUT101	585	245	30x70
104	OUT102	555	340	30x70
105	OUT103	525	245	30x70
106	OUT104	495	340	30x70
107	OUT105	465	245	30x70
108	OUT106	435	340	30x70
109	OUT107	405	245	30x70
110	OUT108	375	340	30x70
111	OUT109	345	245	30x70
112	OUT110	315	340	30x70
113	OUT111	285	245	30x70
114	OUT112	255	340	30x70
115	OUT113	225	245	30x70
116	OUT114	195	340	30x70
117	OUT115	165	245	30x70
118	OUT116	135	340	30x70
119	OUT117	105	245	30x70
120	OUT118	75	340	30x70
121	OUT119	45	245	30x70
122	OUT120	15	340	30x70
123	OUT121	-15	245	30x70
124	OUT122	-45	340	30x70
125	OUT123	-75	245	30x70
126	OUT124	-105	340	30x70
127	OUT125	-135	245	30x70
128	OUT126	-165	340	30x70
129	OUT127	-195	245	30x70
130	OUT128	-225	340	30x70
131	OUT129	-255	245	30x70
132	OUT130	-285	340	30x70
133	OUT131	-315	245	30x70
134	OUT132	-345	340	30x70
135	OUT133	-375	245	30x70
136	OUT134	-405	340	30x70
137	OUT135	-435	245	30x70
138	OUT136	-465	340	30x70
139	OUT137	-495	245	30x70
140	OUT138	-525	340	30x70
141	OUT139	-555	245	30x70
142	OUT140	-585	340	30x70
143	OUT141	-615	245	30x70
144	OUT142	-645	340	30x70
145	OUT143	-675	245	30x70
146	OUT144	-705	340	30x70
147	OUT145	-735	245	30x70
148	OUT146	-765	340	30x70
149	OUT147	-795	245	30x70
150	OUT148	-825	340	30x70

No.	Name	X	Y	Bump size
151	OUT149	-855	245	30x70
152	OUT150	-885	340	30x70
153	OUT151	-915	245	30x70
154	OUT152	-945	340	30x70
155	OUT153	-975	245	30x70
156	OUT154	-1005	340	30x70
157	OUT155	-1035	245	30x70
158	OUT156	-1065	340	30x70
159	OUT157	-1095	245	30x70
160	OUT158	-1125	340	30x70
161	OUT159	-1155	245	30x70
162	OUT160	-1185	340	30x70
163	OUT161	-1215	245	30x70
164	OUT162	-1245	340	30x70
165	OUT163	-1275	245	30x70
166	OUT164	-1305	340	30x70
167	OUT165	-1335	245	30x70
168	OUT166	-1365	340	30x70
169	OUT167	-1395	245	30x70
170	OUT168	-1425	340	30x70
171	OUT169	-1455	245	30x70
172	OUT170	-1485	340	30x70
173	OUT171	-1515	245	30x70
174	OUT172	-1545	340	30x70
175	OUT173	-1575	245	30x70
176	OUT174	-1605	340	30x70
177	OUT175	-1635	245	30x70
178	OUT176	-1665	340	30x70
179	OUT177	-1695	245	30x70
180	OUT178	-1725	340	30x70
181	OUT179	-1755	245	30x70
182	OUT180	-1785	340	30x70
183	OUT181	-1815	245	30x70
184	OUT182	-1845	340	30x70
185	OUT183	-1875	245	30x70
186	OUT184	-1905	340	30x70
187	OUT185	-1935	245	30x70
188	OUT186	-1965	340	30x70
189	OUT187	-1995	245	30x70
190	OUT188	-2025	340	30x70
191	OUT189	-2055	245	30x70
192	OUT190	-2085	340	30x70
193	OUT191	-2115	245	30x70
194	OUT192	-2145	340	30x70
195	OUT193	-2175	245	30x70
196	OUT194	-2205	340	30x70
197	OUT195	-2235	245	30x70
198	OUT196	-2265	340	30x70
199	OUT197	-2295	245	30x70
200	OUT198	-2325	340	30x70

No.	Name	X	Y	Bump size
201	OUT199	-2355	245	30x70
202	OUT200	-2385	340	30x70
203	OUT201	-2415	245	30x70
204	OUT202	-2445	340	30x70
205	OUT203	-2475	245	30x70
206	OUT204	-2505	340	30x70
207	OUT205	-2535	245	30x70
208	OUT206	-2565	340	30x70
209	OUT207	-2595	245	30x70
210	OUT208	-2625	340	30x70
211	OUT209	-2655	245	30x70
212	OUT210	-2685	340	30x70
213	OUT211	-2715	245	30x70
214	OUT212	-2745	340	30x70
215	OUT213	-2775	245	30x70
216	OUT214	-2805	340	30x70
217	OUT215	-2835	245	30x70
218	OUT216	-2865	340	30x70
219	OUT217	-2895	245	30x70
220	OUT218	-2925	340	30x70
221	OUT219	-2955	245	30x70
222	OUT220	-2985	340	30x70
223	OUT221	-3015	245	30x70
224	OUT222	-3045	340	30x70
225	OUT223	-3075	245	30x70
226	OUT224	-3105	340	30x70
227	OUT225	-3135	245	30x70
228	OUT226	-3165	340	30x70
229	OUT227	-3195	245	30x70
230	OUT228	-3225	340	30x70
231	OUT229	-3255	245	30x70
232	OUT230	-3285	340	30x70
233	OUT231	-3315	245	30x70
234	OUT232	-3345	340	30x70
235	OUT233	-3375	245	30x70
236	OUT234	-3405	340	30x70
237	OUT235	-3435	245	30x70
238	OUT236	-3465	340	30x70
239	OUT237	-3495	245	30x70
240	OUT238	-3525	340	30x70
241	OUT239	-3555	245	30x70
242	OUT240	-3585	340	30x70
243	OUT241	-3615	245	30x70
244	DUMMY	-3645	340	30x70
245	/XAO	-3946	352.5	50x45
246	/XAO	-3874	352.5	50x45
247	DUMMY	-4100	352.5	50x45
248	DUMMY	-4028	352.5	50x45
249	OE	-4100	282	50x45
250	OE	-4028	282	50x45

No.	Name	X	Y	Bump size
251	I/R	-4100	211.5	50x45
252	L/R	-4028	211.5	50x45
253	CPV	-4100	141	50x45
254	CPV	-4028	141	50x45
255	PATH	-4100	70.5	50x45
256	PATH	-4028	70.5	50x45
257	STV2	-4100	0	50x45
258	STV2	-4028	0	50x45
259	VGH	-4100	-70.5	50x45
260	VGH	-4028	-70.5	50x45
261	VEE	-4100	-141	50x45
262	VEE	-4028	-141	50x45
263	VDD	-4100	-211.5	50x45
264	VDD	-4028	-211.5	50x45
265	VSS	-4100	-282	50x45
266	VSS	-4028	-282	50x45
267	DUMMY	-4100	-352.5	50x45
268	DUMMY	-4028	-352.5	50x45
269	DUMMY	-3645	-330	30x90
270	DUMMY	-3585	-330	30x90
271	DUMMY	-3525	-330	30x90
272	DUMMY	-3465	-330	30x90
273	DUMMY	-3405	-330	30x90
274	DUMMY	-3345	-330	30x90
275	DUMMY	-3285	-330	30x90
276	DUMMY	-3225	-330	30x90
277	DUMMY	-3165	-330	30x90
278	DUMMY	-3105	-330	30x90
279	DUMMY	-3045	-330	30x90
280	DUMMY	-2985	-330	30x90
281	DUMMY	-2925	-330	30x90
282	DUMMY	-2865	-330	30x90
283	DUMMY	-2805	-330	30x90
284	DUMMY	-2745	-330	30x90
285	DUMMY	-2685	-330	30x90
286	DUMMY	-2625	-330	30x90
287	DUMMY	-2565	-330	30x90
288	DUMMY	-2505	-330	30x90
289	DUMMY	-2445	-330	30x90
290	DUMMY	-2385	-330	30x90
291	DUMMY	-2325	-330	30x90
292	DUMMY	-2265	-330	30x90
293	DUMMY	-2205	-330	30x90
294	DUMMY	-2145	-330	30x90
295	DUMMY	-2085	-330	30x90
296	DUMMY	-2025	-330	30x90
297	DUMMY	-1965	-330	30x90
298	DUMMY	-1905	-330	30x90
299	DUMMY	-1845	-330	30x90
300	DUMMY	-1785	-330	30x90

No.	Name	X	Y	Bump size
301	DUMMY	-1725	-330	30x90
302	DUMMY	-1665	-330	30x90
303	DUMMY	-1605	-330	30x90
304	DUMMY	-1545	-330	30x90
305	DUMMY	-1485	-330	30x90
306	DUMMY	-1425	-330	30x90
307	DUMMY	-1365	-330	30x90
308	DUMMY	-1305	-330	30x90
309	DUMMY	-1245	-330	30x90
310	DUMMY	-1185	-330	30x90
311	DUMMY	-1125	-330	30x90
312	DUMMY	-1065	-330	30x90
313	DUMMY	-1005	-330	30x90
314	DUMMY	-945	-330	30x90
315	DUMMY	-885	-330	30x90
316	DUMMY	-825	-330	30x90
317	DUMMY	-765	-330	30x90
318	DUMMY	-705	-330	30x90
319	DUMMY	-645	-330	30x90
320	DUMMY	-585	-330	30x90
321	DUMMY	-525	-330	30x90
322	DUMMY	-465	-330	30x90
323	DUMMY	-405	-330	30x90
324	DUMMY	-345	-330	30x90
325	DUMMY	-285	-330	30x90
326	DUMMY	-225	-330	30x90
327	DUMMY	-165	-330	30x90
328	DUMMY	-105	-330	30x90
329	DUMMY	-45	-330	30x90
330	DUMMY	15	-330	30x90
331	DUMMY	75	-330	30x90
332	DUMMY	135	-330	30x90
333	DUMMY	195	-330	30x90
334	DUMMY	255	-330	30x90
335	DUMMY	315	-330	30x90
336	DUMMY	375	-330	30x90
337	DUMMY	435	-330	30x90
338	DUMMY	495	-330	30x90
339	DUMMY	555	-330	30x90
340	DUMMY	615	-330	30x90
341	DUMMY	675	-330	30x90
342	DUMMY	735	-330	30x90
343	DUMMY	795	-330	30x90
344	DUMMY	855	-330	30x90
345	DUMMY	915	-330	30x90
346	DUMMY	975	-330	30x90
347	DUMMY	1035	-330	30x90
348	DUMMY	1095	-330	30x90
349	DUMMY	1155	-330	30x90
350	DUMMY	1215	-330	30x90

No.	Name	X	Y	Bump size
351	DUMMY	1275	-330	30x90
352	DUMMY	1335	-330	30x90
353	DUMMY	1395	-330	30x90
354	DUMMY	1455	-330	30x90
355	DUMMY	1515	-330	30x90
356	DUMMY	1575	-330	30x90
357	DUMMY	1635	-330	30x90
358	DUMMY	1695	-330	30x90
359	DUMMY	1755	-330	30x90
360	DUMMY	1815	-330	30x90
361	DUMMY	1875	-330	30x90
362	DUMMY	1935	-330	30x90
363	DUMMY	1995	-330	30x90
364	DUMMY	2055	-330	30x90
365	DUMMY	2115	-330	30x90
366	DUMMY	2175	-330	30x90
367	DUMMY	2235	-330	30x90
368	DUMMY	2295	-330	30x90
369	DUMMY	2355	-330	30x90
370	DUMMY	2415	-330	30x90
371	DUMMY	2475	-330	30x90
372	DUMMY	2535	-330	30x90
373	DUMMY	2595	-330	30x90
374	DUMMY	2655	-330	30x90
375	DUMMY	2715	-330	30x90
376	DUMMY	2775	-330	30x90
377	DUMMY	2835	-330	30x90
378	DUMMY	2895	-330	30x90
379	DUMMY	2955	-330	30x90
380	DUMMY	3015	-330	30x90
381	DUMMY	3075	-330	30x90
382	DUMMY	3135	-330	30x90
383	DUMMY	3195	-330	30x90
384	DUMMY	3255	-330	30x90
385	DUMMY	3315	-330	30x90
386	DUMMY	3375	-330	30x90
387	DUMMY	3435	-330	30x90
388	DUMMY	3495	-330	30x90
389	DUMMY	3555	-330	30x90
390	DUMMY	3615	-330	30x90
391	DUMMY	3675	-330	30x90
392	DUMMY	4028	-352.5	50x45
393	DUMMY	4100	-352.5	50x45
394	VSS	4028	-282	50x45
395	VSS	4100	-282	50x45
396	VDD	4028	-211.5	50x45
397	VDD	4100	-211.5	50x45
398	VEE	4028	-141	50x45
399	VEE	4100	-141	50x45
400	VGH	4028	-70.5	50x45

No.	Name	X	Y	Bump size
401	VGH	4100	-70.5	50x45
402	STV1	4028	0	50x45
403	STV1	4100	0	50x45
404	PATH	4028	70.5	50x45
405	PATH	4100	70.5	50x45
406	CPV	4028	141	50x45
407	CPV	4100	141	50x45
408	L/R	4028	211.5	50x45
409	L/R	4100	211.5	50x45
410	OE	4028	282	50x45
411	OE	4100	282	50x45
412	DUMM	4028	352.5	50x45
413	DUMM	4100	352.5	50x45
414	/XAO	3874	352.5	50x45
415	/XAO	3946	352.5	50x45

9.6 Alignment Mark center coordinate

Name	X	Y
L_AMK	-3775	-321
R_AMK	3775	-321

10. Ordering Information

Part NO.	Package
HX8660-A PDxxx	PD : mean COG xxx : mean chip thickness (μm) , (default 400 μm)

11. Revision History

Version	EFF.DATE	DESCRIPTION OF CHANGES
01	2005/11/30	New setup
	2005/12/21	1. Revise chip size in page9 2. Revise alignment mark in page11 3. Revise **9.5 Bump center coordinate** 4. Revise **9.6 Alignment Mark center coordinate**
	2006/3/07	1. Revise dummy pad bump in page9.
	2006/5/26	1. Revise operation temperature to -40 ~ 90℃ in page6