



# DATA SHEET

( DOC No. HX8232-A-DS )

## HX8232-A

804/768/720/642CH TFT LCD

Source Driver

*Version 05 June, 2006*

# >> HX8232-A

804/768/720/642CH TFT LCD  
Source Driver



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

**Version 05**

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## 1. General Description

The HX8232-A is a 804/768/720/642 channels output selectable source driver with TTL interface for color TFT LCD panels. The dot inversion is suggested on application. A wide range supply voltage and small output deviation are designed in this chip to get better performance. This chip also supplies 14 sections of voltage-reference select for gamma correction. And the power dissipation on the gamma correction resistors is also concerned, that makes this chip more suitable for middle or small size of color TFT LCD panels.

## 2. Features

- 804/768/720/642 channels output selectable source driver for TFT LCD panel
- Dynamic output range: 0.1V to AVDD - 0.1V
- Input 6-bit by 3 dots per clock
- Capable of output 64 gray scales
- $V_{\gamma 1}$  to  $V_{\gamma 14}$  for adjusting gamma correction
- Applicable dot inversion driving method
- Incorporate input data inversion function to reduce power dissipation and EMI
- Pre-charge less output buffer
- Polarity inversion output to each channel
- Right or left shift data input selectable
- Typical operating frequency: 40MHz
- 2.7V to 3.6V logic supply voltage
- 6.5V to 13.5V LCD driver supply voltage
- Bare chip with gold bumper for COG solution

### 3. Block Diagram

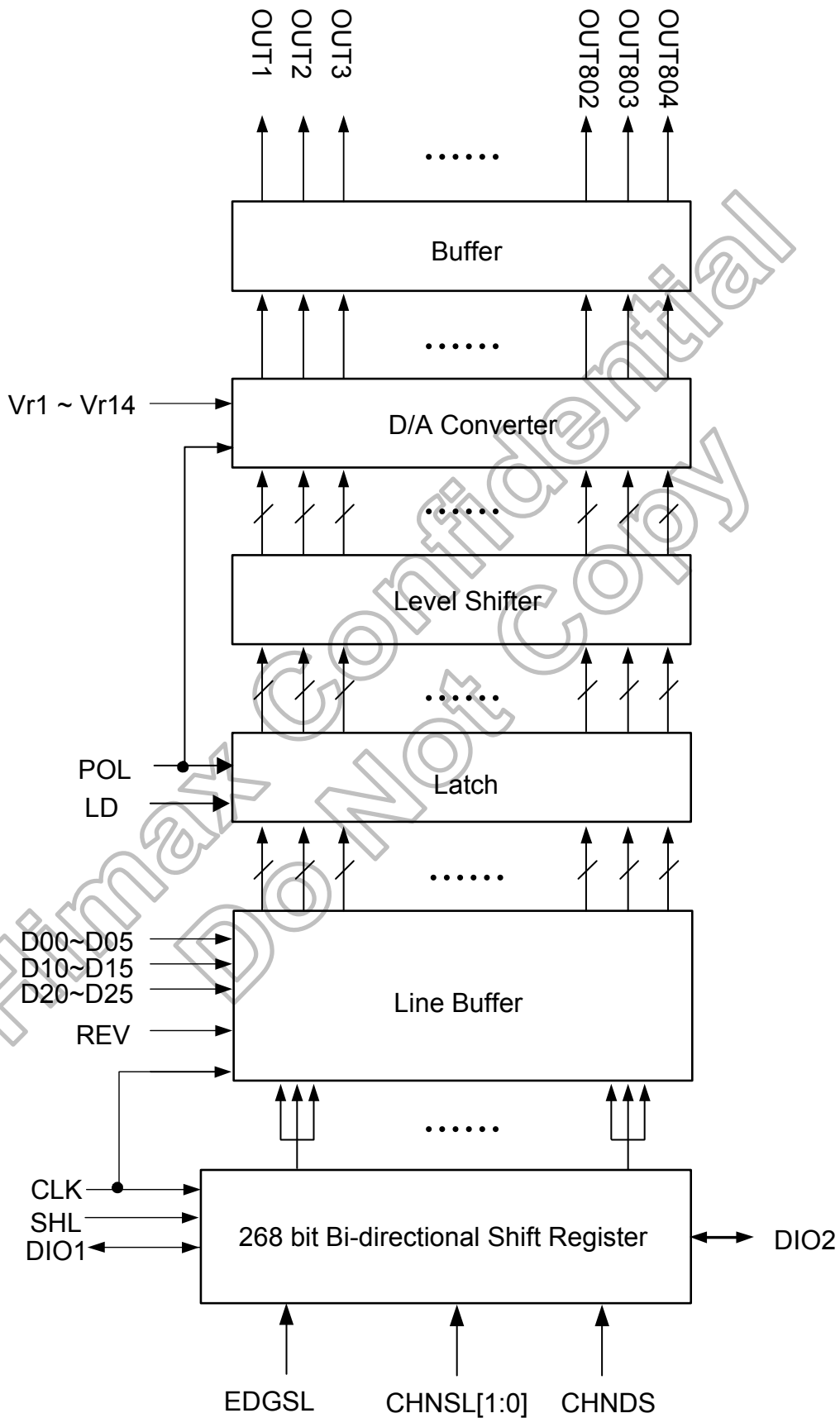


Figure 3. 1 Block diagram

## 4. Pin Description

Pin name	I/O	Function	Description
CLK	In	Shift clock input	The display data is stored to the internal data register at the rising edge of CLK.
D00~D05 D10~D15 D20~D25	In	Display data input	The display data is input in 6-bit × 3 dots per CLK clock. For each input dot, Dx0 is LSB and Dx5 is MSB.
DIO1	I/O	Start pulse input/output	When SHL=H, DIO1 is used for start pulse input. When SHL=L, DIO1 is used for start pulse output.
DIO2	I/O	Start pulse input/output	When SHL=H, DIO2 is used for start pulse output. When SHL=L, DIO2 is used for start pulse input.
SHL	In	Shift direction control input	The shift direction of device internal shift register is controlled by this pin as shown below: SHL=H: DIO1→OUT1→...→OUT804→DIO2 SHL=L: DIO2→OUT804→...→OUT1→DIO1
LD	In	Latch input	The contents of the data register are transferred to the latch circuit at the rising edge of LD. Then the gray scale voltage is output from the device at the falling edge of LD. For normal operation, it is required to input one LD per horizontal display line.
POL	In	Polarity inverting input	When POL=L, use $V_{\gamma 1}$ to $V_{\gamma 7}$ for $OUT_{2n-1}$ and $V_{\gamma 8}$ to $V_{\gamma 14}$ for $OUT_{2n}$ as reference voltage. When POL=H, use $V_{\gamma 8}$ to $V_{\gamma 14}$ for $OUT_{2n-1}$ and $V_{\gamma 1}$ to $V_{\gamma 7}$ for $OUT_{2n}$ as reference voltage.
REV	In	Data inversion input	The REV signal controls data inversion internally to the driver. Display data is inverted when REV=H. Display data is not inverted when REV=L.
AVDD	In	Analog power supply	6.5V to 13.5V
AVSS	In	Analog ground	Ground for analog circuit
VCC	In	Digital power supply	2.7V to 3.6V
GND	In	Digital ground	Ground for digital circuit
OUT1 ~ OUT804	Out	Driver output	Output terminal for D/A converted 64-level gray scales analog voltage. They are used to drive the source line of TFT LCD panel.
$V_{\gamma 1} \sim V_{\gamma 14}$	In	$\gamma$ correction reference voltage	These $\gamma$ correction reference voltages must be input from external via operational amplifier. When a dot is driven by positive polarity, D/A converter refers to $V_{\gamma 1} \sim V_{\gamma 7}$ . When a dot is driven by negative polarity, D/A converter refers to $V_{\gamma 8} \sim V_{\gamma 14}$ . To ensure the correct analog voltage is output from D/A converter, the $V_{\gamma 1} \sim V_{\gamma 14}$ must be stable before D/A conversion. $AVDD > V_{\gamma 1} > V_{\gamma 2} > V_{\gamma 3} > V_{\gamma 4} > V_{\gamma 5} > V_{\gamma 6} > V_{\gamma 7} > V_{\gamma 8} > V_{\gamma 9} > V_{\gamma 10} > V_{\gamma 11} > V_{\gamma 12} > V_{\gamma 13} > V_{\gamma 14} > AVSS$ .

Pin name	I/O	Function	Description																				
CHNSL [1:0]	In	Channel number select input	Output channel selection, default CHNSL1=H, CHNSL0=H.																				
			<table border="1"> <thead> <tr> <th>Output channel</th> <th>Disable channel</th> <th>CHNSL1</th> <th>CHNSL0</th> </tr> </thead> <tbody> <tr> <td>804</td> <td>-</td> <td>H</td> <td>H</td> </tr> <tr> <td>768</td> <td>385~420</td> <td>L</td> <td>L</td> </tr> <tr> <td>720</td> <td>361~444</td> <td>H</td> <td>L</td> </tr> <tr> <td>642</td> <td>322~483</td> <td>L</td> <td>H</td> </tr> </tbody> </table>	Output channel	Disable channel	CHNSL1	CHNSL0	804	-	H	H	768	385~420	L	L	720	361~444	H	L	642	322~483	L	H
			Output channel	Disable channel	CHNSL1	CHNSL0																	
			804	-	H	H																	
			768	385~420	L	L																	
720	361~444	H	L																				
642	322~483	L	H																				
CHNDS	In	Channel number disable input	Additional disable channel selection for 642/804 channel mode only, default CHNDS=L.																				
			<table border="1"> <thead> <tr> <th>Channel mode</th> <th>Output channel</th> <th>Additional Disable channel</th> <th>CHNDS</th> </tr> </thead> <tbody> <tr> <td>804</td> <td>792</td> <td>793~804</td> <td>H</td> </tr> <tr> <td>768</td> <td>768</td> <td>-</td> <td>X</td> </tr> <tr> <td>720</td> <td>720</td> <td>-</td> <td>X</td> </tr> <tr> <td>642</td> <td>636</td> <td>799~804</td> <td>H</td> </tr> </tbody> </table>	Channel mode	Output channel	Additional Disable channel	CHNDS	804	792	793~804	H	768	768	-	X	720	720	-	X	642	636	799~804	H
			Channel mode	Output channel	Additional Disable channel	CHNDS																	
			804	792	793~804	H																	
			768	768	-	X																	
720	720	-	X																				
642	636	799~804	H																				
EDGSL	In	Clock edge select input	Define clock edge select input, default EDGSL=L.																				
			<table border="1"> <tbody> <tr> <td>EDGSL=L</td> <td>Latch data by rising edge of clock</td> </tr> <tr> <td>EDGSL=H</td> <td>Latch data by rising and falling edges of clock</td> </tr> </tbody> </table>	EDGSL=L	Latch data by rising edge of clock	EDGSL=H	Latch data by rising and falling edges of clock																
EDGSL=L	Latch data by rising edge of clock																						
EDGSL=H	Latch data by rising and falling edges of clock																						
PASS1 PASS2	In	-	Path pads.																				
DUM0 ~ DUM21	In	-	Dummy pins, no connected.																				

## 5. Operation Description

### 5.1 Power on/off sequence

This IC is a high-voltage LCD driver, so may be damaged by a large current flow when an incorrect power sequence is used. The recommended sequence should be: digital power (VCC&GND) logic signals, analog power (AVDD&AVSS) Gamma correction reference voltage ( $V_{\gamma 1} \sim V_{\gamma 14}$ ). Reverse this sequence to shut down, or turn off all signals and power simultaneously.

### 5.2 Start pulse input

The device start pulse input pin DIO1 or DIO2 is sensed at CLK raising edge. If the start pulse signal goes high, the HX8232-A is enabled to latch input data into its internal line buffer starting from the first CLK rising edge after start pulse signal goes low. The minimum pulse width of start pulse input is one CLK period.

### 5.3 Data input

The HX8232-A immediately starts to latch input data into its line buffer if a valid start pulse is input as described above. A total 804//792/768/720/642/636 (controlled by CHNSL[1:0] and CHNDS) 6-bit input data are latched at the 268/264/256/240/214/212 continuous CLK rising edge followed the start pulse falling edge. A start pulse output signal with one CLK period pulse width is generated at the 268th/264th/256th/240th/214th/212th CLK rising edge followed the start pulse falling edge. This start pulse output signal becomes the start pulse input signal of next cascaded source driver device.

### 5.4 Cascade connection

The HX8232-A is capable to be cascaded expansion for various kinds of panel resolution application. Cascade connection is achieved by using DIO1 and DIO2 start pulse input/output pins. The signal direction of start pulse DIO1 and DIO2 is as below.

SHL	DIO1	DIO2
H	Input	output
L	Output	input

When SHL=H, the DIO1 input of the first stage source driver comes from timing controller. The DIO2 output of the first stage source driver must connect to the DIO1 input of the second stage source driver, the DIO2 output of the second stage source driver must connect to the DIO1 input of the third stage source driver, ... and so on.

### 5.5 Relationship between input data and output pin

Input data format: 6-bit RGB (3 dots per CLK)  
 Input data width: 18 bits with Dx5 is MSB and Dx0 is LSB

SHL	first					→	last				
	D00~D05	D10~D15	D20~D25	D00~D05	...		...	...	D00~D05	D10~D15	D20~D25
H	OUT1	OUT2	OUT3	OUT4	...	...	...	OUT802	OUT803	OUT804	

SHL	last					←	First				
	D00~D05	D10~D15	D20~D25	D00~D05	...		...	...	D00~D05	D10~D15	D20~D25
L	OUT1	OUT2	OUT3	OUT4	...	...	...	OUT802	OUT803	OUT804	

### 5.6 Relationship between input data and output voltage

The output voltage is determined by the 6-bit digital input data, and the  $V_{\gamma 1} \sim V_{\gamma 14}$  gamma correction reference voltage inputs.

$\gamma$  correction characteristic curve:

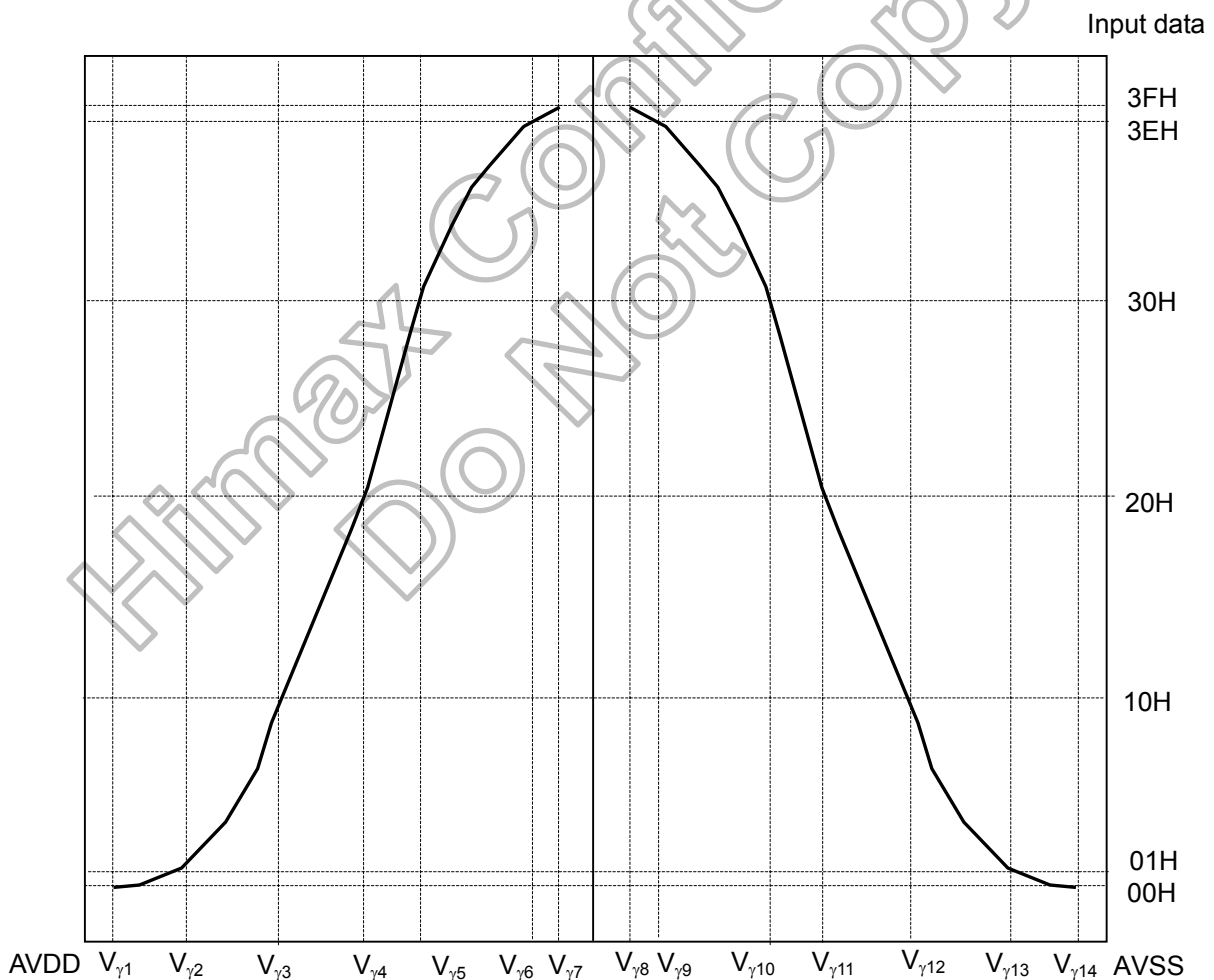
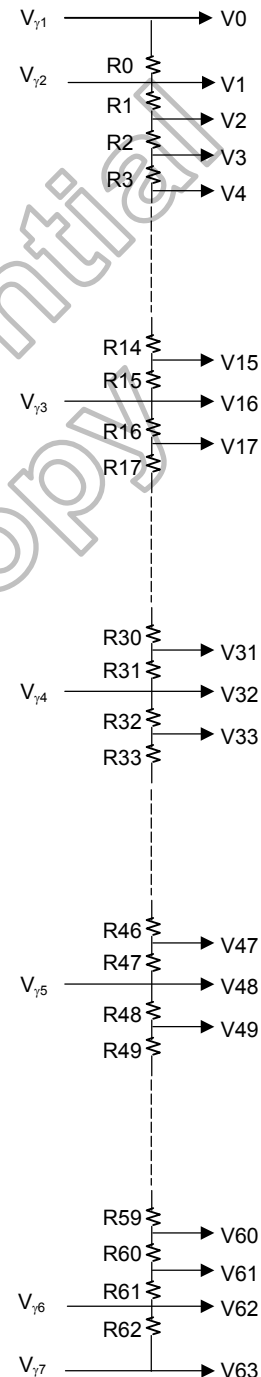


Figure 5. 2 Gamma correction characteristic curve

Relationship between input data and output voltage for positive polarity:

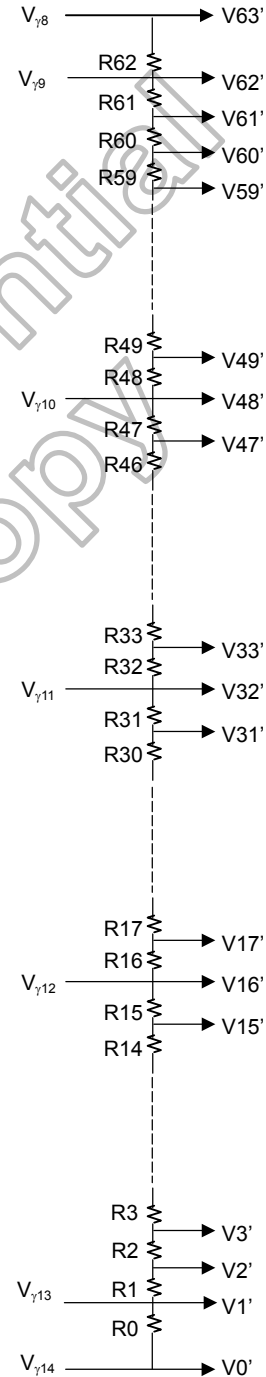
Data	Output Voltage		Rn	
00H	V0	$V_{i1}$	R0	6.4
01H	V1	$V_{i2}$	R1	6
02H	V2	$V_{i3} + (V_{i2} - V_{i3}) \times 52 / 58$	R2	5.6
03H	V3	$V_{i3} + (V_{i2} - V_{i3}) \times 46.4 / 58$	R3	5.2
04H	V4	$V_{i3} + (V_{i2} - V_{i3}) \times 41.2 / 58$	R4	4.8
05H	V5	$V_{i3} + (V_{i2} - V_{i3}) \times 36.4 / 58$	R5	4.4
06H	V6	$V_{i3} + (V_{i2} - V_{i3}) \times 32 / 58$	R6	4.4
07H	V7	$V_{i3} + (V_{i2} - V_{i3}) \times 27.6 / 58$	R7	4
08H	V8	$V_{i3} + (V_{i2} - V_{i3}) \times 23.6 / 58$	R8	4
09H	V9	$V_{i3} + (V_{i2} - V_{i3}) \times 19.6 / 58$	R9	3.2
0AH	V10	$V_{i3} + (V_{i2} - V_{i3}) \times 16.4 / 58$	R10	3.2
0BH	V11	$V_{i3} + (V_{i2} - V_{i3}) \times 13.2 / 58$	R11	2.8
0CH	V12	$V_{i3} + (V_{i2} - V_{i3}) \times 10.4 / 58$	R12	2.8
0DH	V13	$V_{i3} + (V_{i2} - V_{i3}) \times 7.6 / 58$	R13	2.8
0EH	V14	$V_{i3} + (V_{i2} - V_{i3}) \times 4.8 / 58$	R14	2.4
0FH	V15	$V_{i3} + (V_{i2} - V_{i3}) \times 2.4 / 58$	R15	2.4
10H	V16	$V_{i3}$	R16	2.4
11H	V17	$V_{i4} + (V_{i3} - V_{i4}) \times 19.6 / 22$	R17	2
12H	V18	$V_{i4} + (V_{i3} - V_{i4}) \times 17.6 / 22$	R18	2
13H	V19	$V_{i4} + (V_{i3} - V_{i4}) \times 15.6 / 22$	R19	2
14H	V20	$V_{i4} + (V_{i3} - V_{i4}) \times 13.6 / 22$	R20	1.6
15H	V21	$V_{i4} + (V_{i3} - V_{i4}) \times 12 / 22$	R21	1.6
16H	V22	$V_{i4} + (V_{i3} - V_{i4}) \times 10.4 / 22$	R22	1.6
17H	V23	$V_{i4} + (V_{i3} - V_{i4}) \times 8.8 / 22$	R23	1.2
18H	V24	$V_{i4} + (V_{i3} - V_{i4}) \times 7.6 / 22$	R24	1.2
19H	V25	$V_{i4} + (V_{i3} - V_{i4}) \times 6.4 / 22$	R25	1.2
1AH	V26	$V_{i4} + (V_{i3} - V_{i4}) \times 5.2 / 22$	R26	1.2
1BH	V27	$V_{i4} + (V_{i3} - V_{i4}) \times 4 / 22$	R27	0.8
1CH	V28	$V_{i4} + (V_{i3} - V_{i4}) \times 3.2 / 22$	R28	0.8
1DH	V29	$V_{i4} + (V_{i3} - V_{i4}) \times 2.4 / 22$	R29	0.8
1EH	V30	$V_{i4} + (V_{i3} - V_{i4}) \times 1.6 / 22$	R30	0.8
1FH	V31	$V_{i4} + (V_{i3} - V_{i4}) \times 0.8 / 22$	R31	0.8
20H	V32	$V_{i4}$	R32	0.8
21H	V33	$V_{i5} + (V_{i4} - V_{i5}) \times 12 / 12.8$	R33	0.8
22H	V34	$V_{i5} + (V_{i4} - V_{i5}) \times 11.2 / 12.8$	R34	0.8
23H	V35	$V_{i5} + (V_{i4} - V_{i5}) \times 10.4 / 12.8$	R35	0.8
24H	V36	$V_{i5} + (V_{i4} - V_{i5}) \times 9.6 / 12.8$	R36	0.8
25H	V37	$V_{i5} + (V_{i4} - V_{i5}) \times 8.8 / 12.8$	R37	0.8
26H	V38	$V_{i5} + (V_{i4} - V_{i5}) \times 8 / 12.8$	R38	0.8
27H	V39	$V_{i5} + (V_{i4} - V_{i5}) \times 7.2 / 12.8$	R39	0.8
28H	V40	$V_{i5} + (V_{i4} - V_{i5}) \times 6.4 / 12.8$	R40	0.8
29H	V41	$V_{i5} + (V_{i4} - V_{i5}) \times 5.6 / 12.8$	R41	0.8
2AH	V42	$V_{i5} + (V_{i4} - V_{i5}) \times 4.8 / 12.8$	R42	0.8
2BH	V43	$V_{i5} + (V_{i4} - V_{i5}) \times 4 / 12.8$	R43	0.8
2CH	V44	$V_{i5} + (V_{i4} - V_{i5}) \times 3.2 / 12.8$	R44	0.8
2DH	V45	$V_{i5} + (V_{i4} - V_{i5}) \times 2.4 / 12.8$	R45	0.8
2EH	V46	$V_{i5} + (V_{i4} - V_{i5}) \times 1.6 / 12.8$	R46	0.8
2FH	V47	$V_{i5} + (V_{i4} - V_{i5}) \times 0.8 / 12.8$	R47	0.8
30H	V48	$V_{i5}$	R48	0.8
31H	V49	$V_{i6} + (V_{i5} - V_{i6}) \times 20.4 / 21.2$	R49	0.8
32H	V50	$V_{i6} + (V_{i5} - V_{i6}) \times 19.6 / 21.2$	R50	0.8
33H	V51	$V_{i6} + (V_{i5} - V_{i6}) \times 18.8 / 21.2$	R51	0.8
34H	V52	$V_{i6} + (V_{i5} - V_{i6}) \times 18 / 21.2$	R52	0.8
35H	V53	$V_{i6} + (V_{i5} - V_{i6}) \times 17.2 / 21.2$	R53	1.2
36H	V54	$V_{i6} + (V_{i5} - V_{i6}) \times 16 / 21.2$	R54	1.2
37H	V55	$V_{i6} + (V_{i5} - V_{i6}) \times 14.8 / 21.2$	R55	1.2
38H	V56	$V_{i6} + (V_{i5} - V_{i6}) \times 13.6 / 21.2$	R56	1.6
39H	V57	$V_{i6} + (V_{i5} - V_{i6}) \times 12 / 21.2$	R57	1.6
3AH	V58	$V_{i6} + (V_{i5} - V_{i6}) \times 10.4 / 21.2$	R58	2
3BH	V59	$V_{i6} + (V_{i5} - V_{i6}) \times 8.4 / 21.2$	R59	2
3CH	V60	$V_{i6} + (V_{i5} - V_{i6}) \times 6.4 / 21.2$	R60	2.4
3DH	V61	$V_{i6} + (V_{i5} - V_{i6}) \times 4 / 21.2$	R61	4
3EH	V62	$V_{i6}$	R62	6.4
3FH	V63	$V_{i7}$	Total	126.8





Relationship between input data and output voltage for negative polarity:

Data	Output Voltage		Rn	
00H	V0'	$V_{\gamma14}$	R0	6.4
01H	V1'	$V_{\gamma13}$	R1	6
02H	V2'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 6 / 58$	R2	5.6
03H	V3'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 11.6 / 58$	R3	5.2
04H	V4'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 16.8 / 58$	R4	4.8
05H	V5'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 21.6 / 58$	R5	4.4
06H	V6'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 26 / 58$	R6	4.4
07H	V7'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 30.4 / 58$	R7	4
08H	V8'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 34.4 / 58$	R8	4
09H	V9'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 38.4 / 58$	R9	3.2
0AH	V10'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 41.6 / 58$	R10	3.2
0BH	V11'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 44.8 / 58$	R11	2.8
0CH	V12'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 47.6 / 58$	R12	2.8
0DH	V13'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 50.4 / 58$	R13	2.8
0EH	V14'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 53.2 / 58$	R14	2.4
0FH	V15'	$V_{\gamma13} + (V_{\gamma12} - V_{\gamma13}) \times 55.6 / 58$	R15	2.4
10H	V16'	$V_{\gamma12}$	R16	2.4
11H	V17'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 2.4 / 22$	R17	2
12H	V18'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 4.4 / 22$	R18	2
13H	V19'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 6.4 / 22$	R19	2
14H	V20'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 8.4 / 22$	R20	1.6
15H	V21'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 10 / 22$	R21	1.6
16H	V22'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 11.6 / 22$	R22	1.6
17H	V23'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 13.2 / 22$	R23	1.2
18H	V24'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 14.4 / 22$	R24	1.2
19H	V25'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 15.6 / 22$	R25	1.2
1AH	V26'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 16.8 / 22$	R26	1.2
1BH	V27'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 18 / 22$	R27	0.8
1CH	V28'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 18.8 / 22$	R28	0.8
1DH	V29'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 19.6 / 22$	R29	0.8
1EH	V30'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 20.4 / 22$	R30	0.8
1FH	V31'	$V_{\gamma12} + (V_{\gamma11} - V_{\gamma12}) \times 21.2 / 22$	R31	0.8
20H	V32'	$V_{\gamma11}$	R32	0.8
21H	V33'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 0.8 / 12.8$	R33	0.8
22H	V34'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 1.6 / 12.8$	R34	0.8
23H	V35'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 2.4 / 12.8$	R35	0.8
24H	V36'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 3.2 / 12.8$	R36	0.8
25H	V37'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 4 / 12.8$	R37	0.8
26H	V38'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 4.8 / 12.8$	R38	0.8
27H	V39'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 5.6 / 12.8$	R39	0.8
28H	V40'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 6.4 / 12.8$	R40	0.8
29H	V41'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 7.2 / 12.8$	R41	0.8
2AH	V42'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 8 / 12.8$	R42	0.8
2BH	V43'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 8.8 / 12.8$	R43	0.8
2CH	V44'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 9.6 / 12.8$	R44	0.8
2DH	V45'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 10.4 / 12.8$	R45	0.8
2EH	V46'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 11.2 / 12.8$	R46	0.8
2FH	V47'	$V_{\gamma11} + (V_{\gamma10} - V_{\gamma11}) \times 12 / 12.8$	R47	0.8
30H	V48'	$V_{\gamma10}$	R48	0.8
31H	V49'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 0.8 / 21.2$	R49	0.8
32H	V50'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 1.6 / 21.2$	R50	0.8
33H	V51'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 2.4 / 21.2$	R51	0.8
34H	V52'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 3.2 / 21.2$	R52	0.8
35H	V53'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 4 / 21.2$	R53	1.2
36H	V54'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 5.2 / 21.2$	R54	1.2
37H	V55'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 6.4 / 21.2$	R55	1.2
38H	V56'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 7.6 / 21.2$	R56	1.6
39H	V57'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 9.2 / 21.2$	R57	1.6
3AH	V58'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 10.8 / 21.2$	R58	2
3BH	V59'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 12.8 / 21.2$	R59	2
3CH	V60'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 14.8 / 21.2$	R60	2.4
3DH	V61'	$V_{\gamma10} + (V_{\gamma9} - V_{\gamma10}) \times 17.2 / 21.2$	R61	4
3EH	V62'	$V_{\gamma9}$	R62	6.4
3FH	V63'	$V_{\gamma8}$	Total	126.8



## 6. Absolute Maximum Rating<sup>(1)</sup>

Digital supply voltage, VCC	-0.5V to 5V
Analog supply voltage, AVDD	-0.5V to 13.5V
Supply voltage, $V_{\gamma 1} \sim V_{\gamma 7}$	0.4AVDD ~ AVDD + 0.3V
Supply voltage, $V_{\gamma 8} \sim V_{\gamma 14}$	-0.3V ~ 0.6AVDD
Digital input voltage	-0.5V to VCC + 0.5V
Output voltage, DIO1 & DIO2	-0.5V to VCC + 0.5V
Output voltage, OUT1~OUT804	-0.5V to AVDD + 0.5V
Storage temperature	-55°C to 125°C
Operating temperature	-30°C to 85°C

**Note:** (1) Stresses above those listed under "Absolute Maximum Rating" may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### DC Electrical Characteristics

(VCC=2.7 to 3.6V, AVDD=6.5 to 13.5V, AVSS=GND=0V, TA=25°C)

(For the digital circuit)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply Voltage	VCC	2.7	3.3	3.6	V	Digital power
Low Level Input Voltage	$V_{IL}$	0	-	0.3xVcc	V	For the digital circuit
High Level Input Voltage	$V_{IH}$	0.7xVcc	-	Vcc	V	For the digital circuit
High Level Output Voltage	$V_{OH}$	Vcc-0.4	-	-	V	DIO1, DIO2, $I_{OH}=1mA$
Low Level Output Voltage	$V_{OL}$	GND	-	GND+0.4	V	DIO1, DIO2, $I_{OL}=-1mA$
Input Leakage Current	$I_I$	-	-	±1	µA	For the digital circuit
Digital Stand-by Current	$I_{ST}$	-	10	50	µA	All operating is stopped
Digital Operating Current	$I_{CC}$	-	1.3	1.6	mA	$F_{CLK}=40MHz$ $F_{LD}=50KHz$ VCC=3.3V in black pattern
Pull low/ high resistor	$R_I$	150	300	-	kΩ	Digital signal

(For the analog circuit)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply Voltage	AVDD	6.5	8.4	13.5	V	For the analog circuit power
Input level of $V_{\gamma 1} \sim V_{\gamma 7}$	$V_{REF}$	0.4AVDD	-	AVDD-0.1	V	Gamma correction voltage
Input level of $V_{\gamma 8} \sim V_{\gamma 14}$	$V_{REF}$	0.1	-	0.6AVDD	V	Gamma correction voltage
Output Voltage deviation	$V_{OD}$	-	-	$\pm 20$	mV	-
Voltage Output Offset between Chips	$V_{OC}$	-	-	$\pm 15$	mV	-
Dynamic Range of Output	$V_{DR}$	0.1	-	AVDD-0.1	V	OUT1~OUT804
Sinking Current of Outputs	$I_{OL}$	$-80$	-	-	$\mu A$	OUT1~OUT804; AVDD=10V $V_o=0.1V$ vs. 1.0V
Driving Current of Outputs	$I_{OH}$	$80$	-	-	$\mu A$	OUT1~OUT804; AVDD=10V $V_o=9.9V$ vs. 9.0V
Impedance of Gamma Correction	$R_i$	0.8*Rn	1.1*Rn	1.4*Rn	$\Omega$	Rn: Internal gamma resistor
Analog Stand-by Current	$I_{SC}$	-	2.6	3.0	mA	No load, AVDD=8.4V and all operating is stopped
Analog Operating Current	$I_{OC}$	-	16	18.0	mA	$F_{CLK}=40MHz$ $F_{LD}=50KHz$ AVDD=8.4V $V_{\gamma 1}=8V$ $V_{\gamma 14}=0.4V$ in black pattern

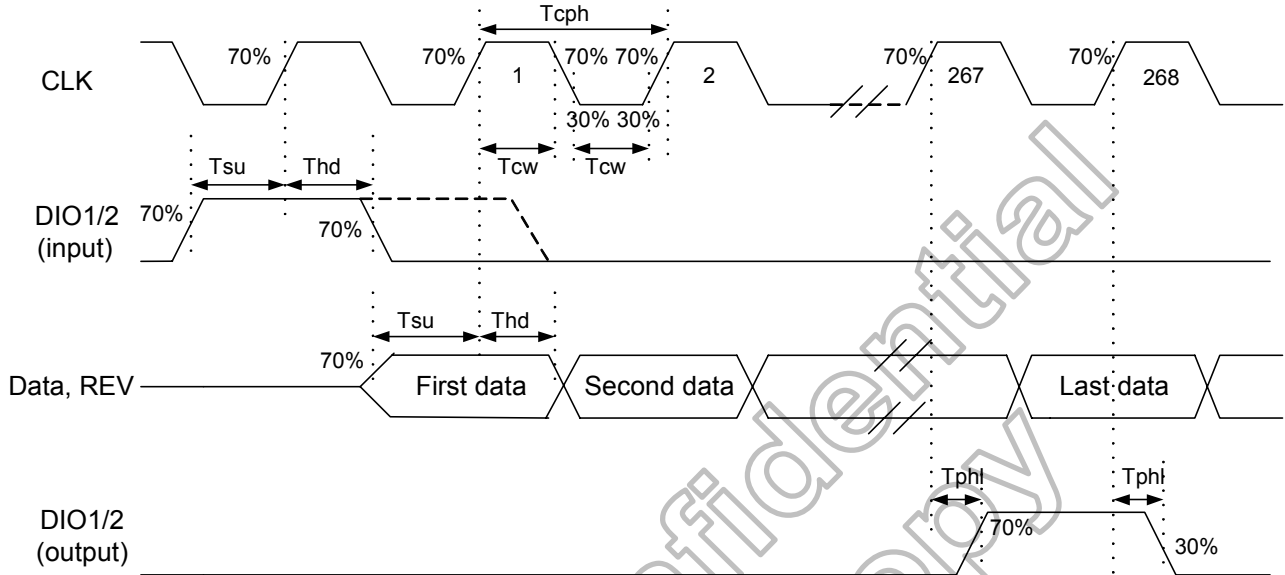
**AC Electrical Characteristics (VCC=3.3V, AVDD=8.4V, AVSS=GND=0V, TA=25°C)**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK frequency	Fclk	-	40	47	MHz	-
CLK pulse width	Tcw	6	-	-	ns	-
Data set-up time	Tsu	4	-	-	ns	D00~D55, REV and DIO1/2 to CLK
Data hold time	Thd	2	-	-	ns	D00~D55, REV and DIO1/2 to CLK
Propagation delay of DIO2/1	Tphl	6	10	15	ns	CL=25pF ( Output )
Time that the last data to LD	Tld	1	-	-	Tcph	-
Pulse width of LD	Twld	2	-	-	Tcph	-
Time that LD to DIO1/2	Tlds	5	-	-	Tcph	-
POL set-up time	Tpsu	6	-	-	ns	POL to LD
POL hold time	Tphd	6	-	-	ns	POL to LD
Output stable time	Tst	-	-	12	us	10% or 90% target voltage, CL=60pF, R=2k $\Omega$

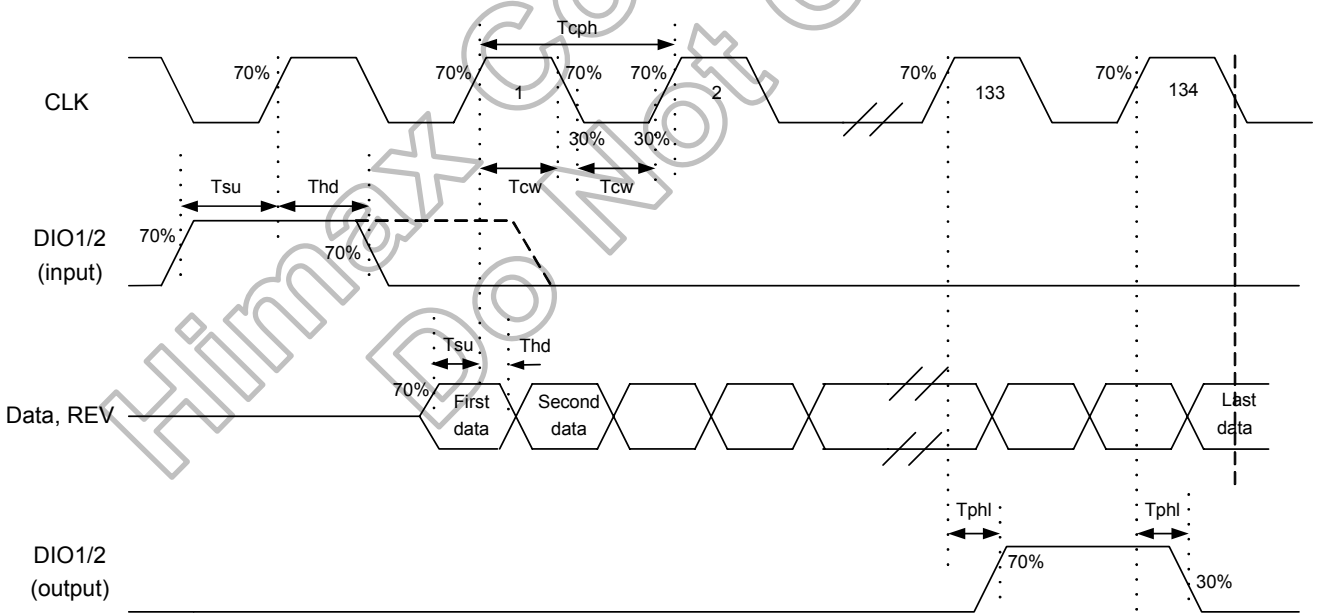
**Timing Waveforms**

■ **Timing diagram 1 (Default CHNSL1=H, CHNSL0=H, CHNDS=L)**

- EDGSL=L or open



- EDGSL=H



**Figure 6. 1 Timing diagram 1**

■ Timing diagram 2

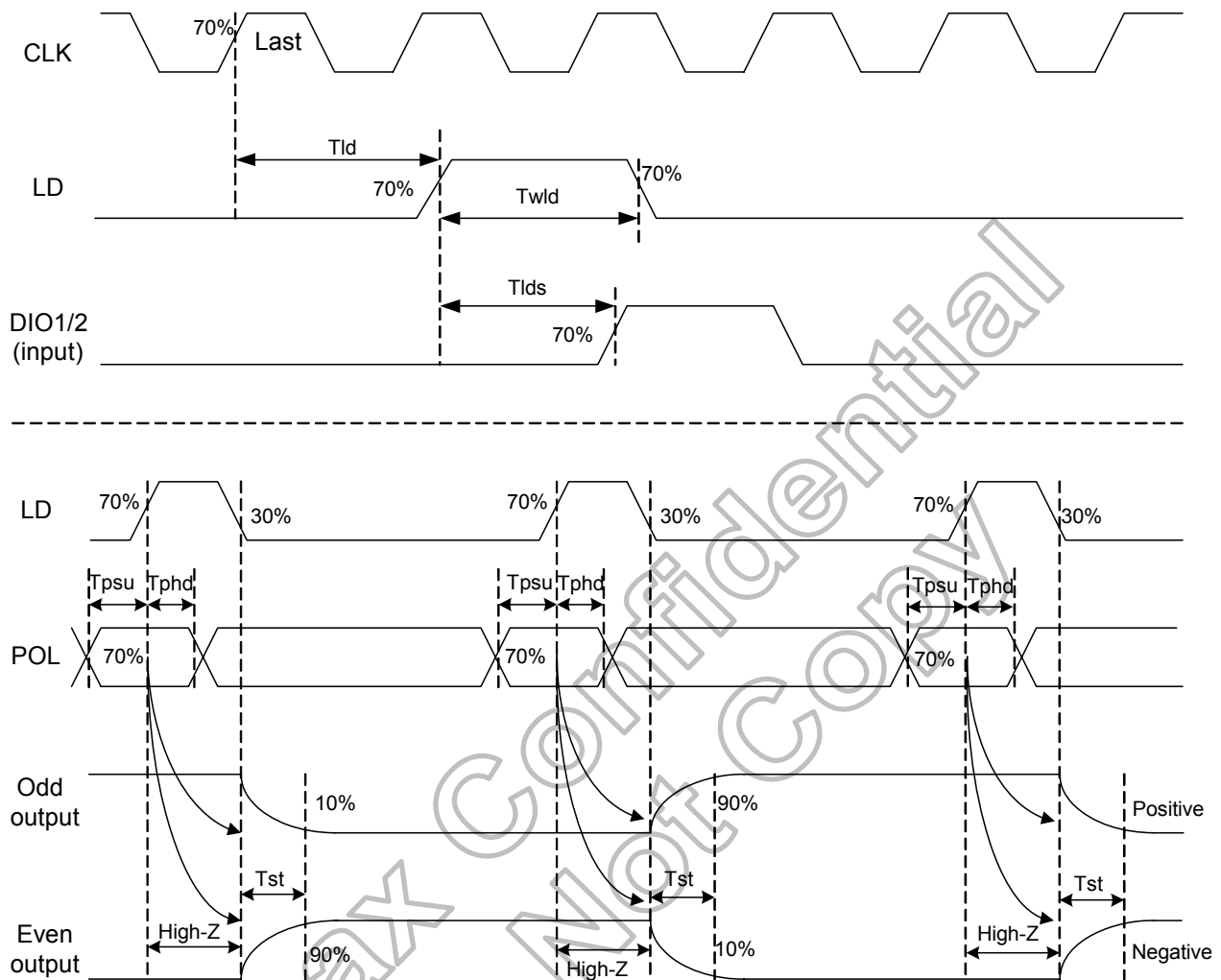


Figure 6. 2 Timing diagram 2

Output load condition

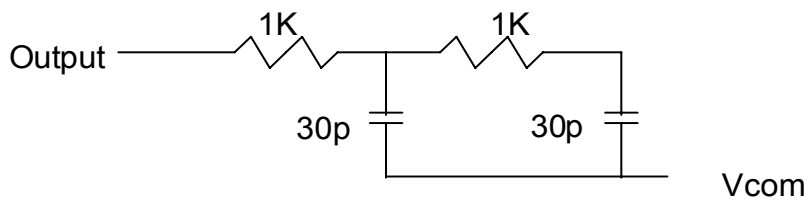


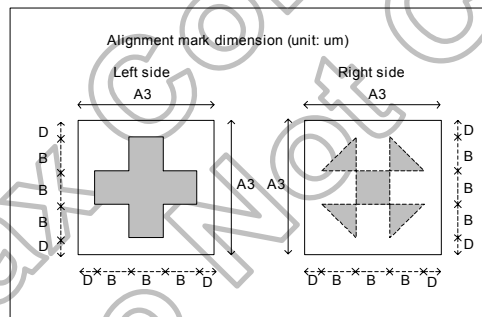
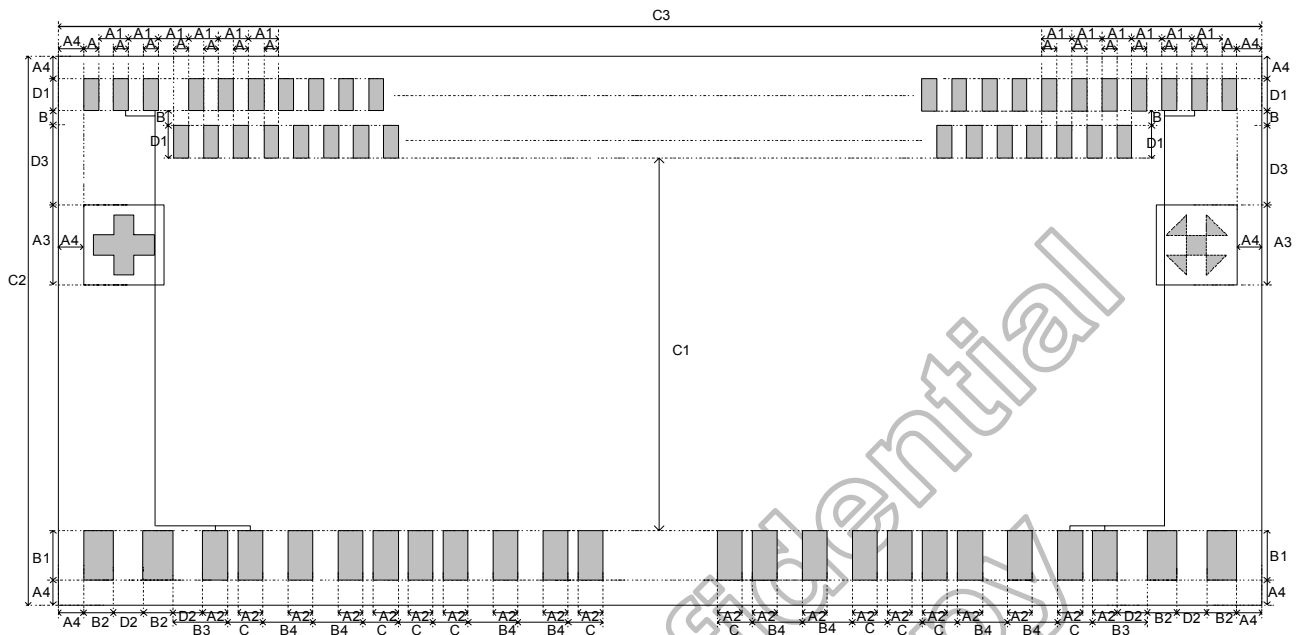
Figure 6. 3 Output load condition

## 7. Pin Assignment (IC face view)

DUM0 (2)		DUM21 (1)
PASS1 (2)	—————	PASS1 (2)
DUM1 (1)		DUM20 (1)
DIO2 (4)		OUT804
DUM2 (1)		OUT803
AVDD (8)		OUT802
CHNSL0 (3)		OUT801
CHNSL1 (3)		
GND (6)		
CHNDS (1)		
VCC (6)		
DUM3 (1)		
POL (4)		
DUM4 (1)		
REV (4)		
DUM5 (1)		
LD (4)		
DUM6 (1)		
D25 (3)		
D24 (3)		
D23 (3)		
D22 (3)		
D21 (3)		
D20 (3)		
DUM7 (1)		
AVSS (8)		
DUM8 (1)		
Vr14 (4)		
Vr13 (4)		
Vr12 (4)		
Vr11 (4)		
Vr10 (4)		
Vr9 (4)		
Vr8 (4)		
Vr7 (4)		
Vr6 (4)		
Vr5 (4)		
Vr4 (4)		
Vr3 (4)		
Vr2 (4)		
Vr1 (4)		
DUM9 (1)		
AVDD (8)		
DUM10 (1)		
D15 (3)		
D14 (3)		
D13 (3)		
D12 (3)		
D11 (3)		
D10 (3)		
D05 (3)		
D04 (3)		
D03 (3)		
D02 (3)		
D01 (3)		
D00 (3)		
DUM11 (1)		
SHL (2)		
CLK (4)		
EDGSL (2)		
DUM12 (1)		
VCC (6)		
DUM13 (1)		
GND (6)		
DUM14 (1)		OUT4
AVSS (8)		OUT3
DUM15 (1)		OUT2
DIO1 (4)		OUT1
DUM16 (1)		DUM19 (1)
PASS2 (2)	—————	PASS2 (2)
DUM17 (2)		DUM18 (1)

Figure 7. 1 Pin assignment

### 8. Chip Outline Dimensions (Bump Size)



Symbol	Dimension (um)
A	22
A1	44
A2	58
A3	120
A4	65
B	30
B1	103
B2	46
B3	86.5

Symbol	Dimension (um)
B4	94
C	74
C1	717
C2	1170 (max.)
C3	18126 (max.)
D	15
D1	95
D2	28.5
D3	180

Figure 8. 1 Chip outline dimensions

### 8.1 Bump center coordinate

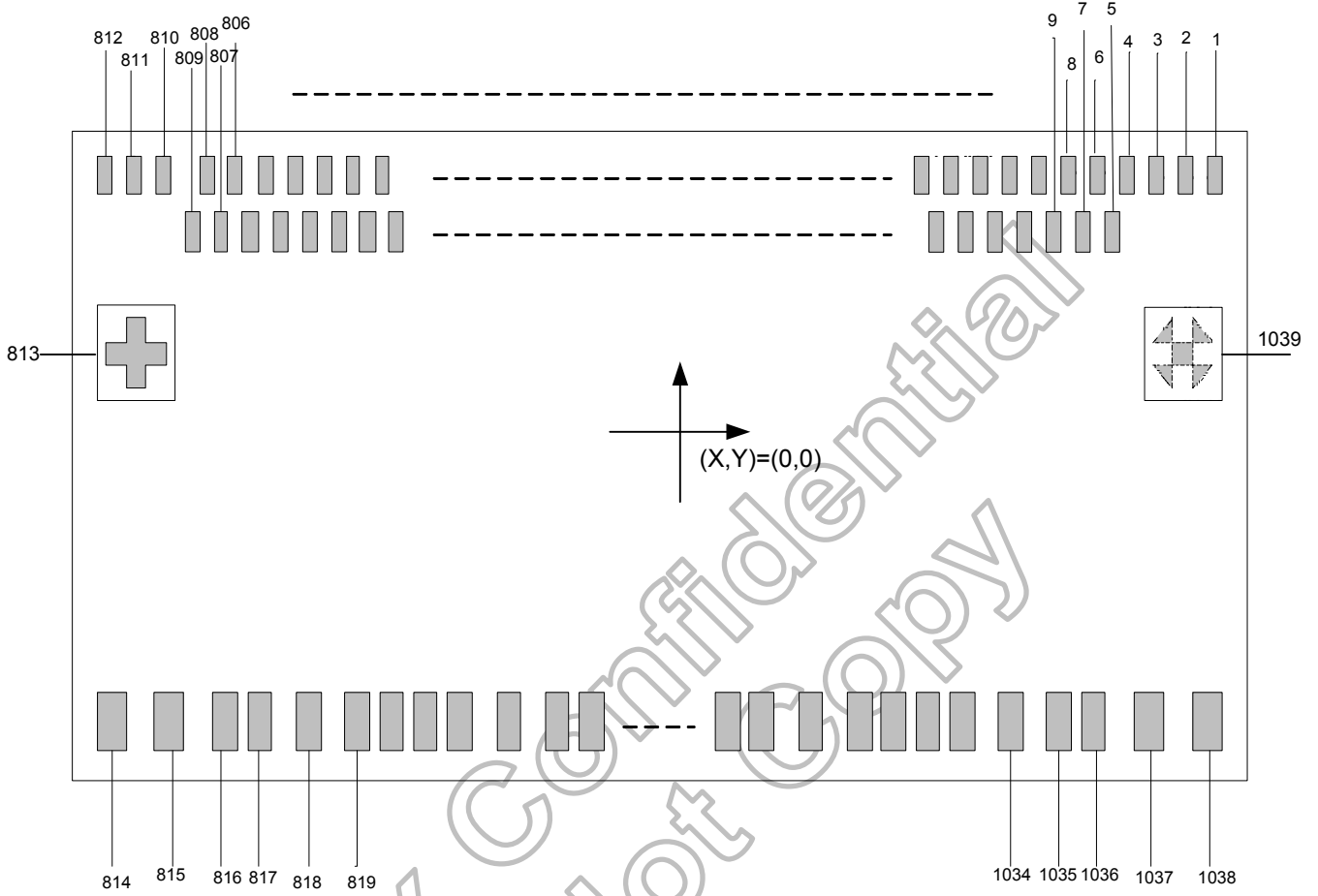


Figure 8. 2 Bump center coordinate



No.	Name	X	Y	Bump size(μm)
1	DUM18	8987	472.5	22x95
2	PASS2	8943	472.5	22x95
3	PASS2	8899	472.5	22x95
4	DUM19	8855	472.5	22x95
5	OUT1	8833	347.5	22x95
6	OUT2	8811	472.5	22x95
7	OUT3	8789	347.5	22x95
8	OUT4	8767	472.5	22x95
9	OUT5	8745	347.5	22x95
10	OUT6	8723	472.5	22x95
11	OUT7	8701	347.5	22x95
12	OUT8	8679	472.5	22x95
13	OUT9	8657	347.5	22x95
14	OUT10	8635	472.5	22x95
15	OUT11	8613	347.5	22x95
16	OUT12	8591	472.5	22x95
17	OUT13	8569	347.5	22x95
18	OUT14	8547	472.5	22x95
19	OUT15	8525	347.5	22x95
20	OUT16	8503	472.5	22x95
21	OUT17	8481	347.5	22x95
22	OUT18	8459	472.5	22x95
23	OUT19	8437	347.5	22x95
24	OUT20	8415	472.5	22x95
25	OUT21	8393	347.5	22x95
26	OUT22	8371	472.5	22x95
27	OUT23	8349	347.5	22x95
28	OUT24	8327	472.5	22x95
29	OUT25	8305	347.5	22x95
30	OUT26	8283	472.5	22x95
31	OUT27	8261	347.5	22x95
32	OUT28	8239	472.5	22x95
33	OUT29	8217	347.5	22x95
34	OUT30	8195	472.5	22x95
35	OUT31	8173	347.5	22x95
36	OUT32	8151	472.5	22x95
37	OUT33	8129	347.5	22x95
38	OUT34	8107	472.5	22x95
39	OUT35	8085	347.5	22x95
40	OUT36	8063	472.5	22x95
41	OUT37	8041	347.5	22x95
42	OUT38	8019	472.5	22x95
43	OUT39	7997	347.5	22x95
44	OUT40	7975	472.5	22x95
45	OUT41	7953	347.5	22x95
46	OUT42	7931	472.5	22x95
47	OUT43	7909	347.5	22x95
48	OUT44	7887	472.5	22x95
49	OUT45	7865	347.5	22x95
50	OUT46	7843	472.5	22x95

No.	Name	X	Y	Bump size(μm)
51	OUT47	7821	347.5	22x95
52	OUT48	7799	472.5	22x95
53	OUT49	7777	347.5	22x95
54	OUT50	7755	472.5	22x95
55	OUT51	7733	347.5	22x95
56	OUT52	7711	472.5	22x95
57	OUT53	7689	347.5	22x95
58	OUT54	7667	472.5	22x95
59	OUT55	7645	347.5	22x95
60	OUT56	7623	472.5	22x95
61	OUT57	7601	347.5	22x95
62	OUT58	7579	472.5	22x95
63	OUT59	7557	347.5	22x95
64	OUT60	7535	472.5	22x95
65	OUT61	7513	347.5	22x95
66	OUT62	7491	472.5	22x95
67	OUT63	7469	347.5	22x95
68	OUT64	7447	472.5	22x95
69	OUT65	7425	347.5	22x95
70	OUT66	7403	472.5	22x95
71	OUT67	7381	347.5	22x95
72	OUT68	7359	472.5	22x95
73	OUT69	7337	347.5	22x95
74	OUT70	7315	472.5	22x95
75	OUT71	7293	347.5	22x95
76	OUT72	7271	472.5	22x95
77	OUT73	7249	347.5	22x95
78	OUT74	7227	472.5	22x95
79	OUT75	7205	347.5	22x95
80	OUT76	7183	472.5	22x95
81	OUT77	7161	347.5	22x95
82	OUT78	7139	472.5	22x95
83	OUT79	7117	347.5	22x95
84	OUT80	7095	472.5	22x95
85	OUT81	7073	347.5	22x95
86	OUT82	7051	472.5	22x95
87	OUT83	7029	347.5	22x95
88	OUT84	7007	472.5	22x95
89	OUT85	6985	347.5	22x95
90	OUT86	6963	472.5	22x95
91	OUT87	6941	347.5	22x95
92	OUT88	6919	472.5	22x95
93	OUT89	6897	347.5	22x95
94	OUT90	6875	472.5	22x95
95	OUT91	6853	347.5	22x95
96	OUT92	6831	472.5	22x95
97	OUT93	6809	347.5	22x95
98	OUT94	6787	472.5	22x95
99	OUT95	6765	347.5	22x95
100	OUT96	6743	472.5	22x95

No.	Name	X	Y	Bump size(μm)
101	OUT97	6721	347.5	22x95
102	OUT98	6699	472.5	22x95
103	OUT99	6677	347.5	22x95
104	OUT100	6655	472.5	22x95
105	OUT101	6633	347.5	22x95
106	OUT102	6611	472.5	22x95
107	OUT103	6589	347.5	22x95
108	OUT104	6567	472.5	22x95
109	OUT105	6545	347.5	22x95
110	OUT106	6523	472.5	22x95
111	OUT107	6501	347.5	22x95
112	OUT108	6479	472.5	22x95
113	OUT109	6457	347.5	22x95
114	OUT110	6435	472.5	22x95
115	OUT111	6413	347.5	22x95
116	OUT112	6391	472.5	22x95
117	OUT113	6369	347.5	22x95
118	OUT114	6347	472.5	22x95
119	OUT115	6325	347.5	22x95
120	OUT116	6303	472.5	22x95
121	OUT117	6281	347.5	22x95
122	OUT118	6259	472.5	22x95
123	OUT119	6237	347.5	22x95
124	OUT120	6215	472.5	22x95
125	OUT121	6193	347.5	22x95
126	OUT122	6171	472.5	22x95
127	OUT123	6149	347.5	22x95
128	OUT124	6127	472.5	22x95
129	OUT125	6105	347.5	22x95
130	OUT126	6083	472.5	22x95
131	OUT127	6061	347.5	22x95
132	OUT128	6039	472.5	22x95
133	OUT129	6017	347.5	22x95
134	OUT130	5995	472.5	22x95
135	OUT131	5973	347.5	22x95
136	OUT132	5951	472.5	22x95
137	OUT133	5929	347.5	22x95
138	OUT134	5907	472.5	22x95
139	OUT135	5885	347.5	22x95
140	OUT136	5863	472.5	22x95
141	OUT137	5841	347.5	22x95
142	OUT138	5819	472.5	22x95
143	OUT139	5797	347.5	22x95
144	OUT140	5775	472.5	22x95
145	OUT141	5753	347.5	22x95
146	OUT142	5731	472.5	22x95
147	OUT143	5709	347.5	22x95
148	OUT144	5687	472.5	22x95
149	OUT145	5665	347.5	22x95
150	OUT146	5643	472.5	22x95

No.	Name	X	Y	Bump size(μm)
151	OUT147	5621	347.5	22x95
152	OUT148	5599	472.5	22x95
153	OUT149	5577	347.5	22x95
154	OUT150	5555	472.5	22x95
155	OUT151	5533	347.5	22x95
156	OUT152	5511	472.5	22x95
157	OUT153	5489	347.5	22x95
158	OUT154	5467	472.5	22x95
159	OUT155	5445	347.5	22x95
160	OUT156	5423	472.5	22x95
161	OUT157	5401	347.5	22x95
162	OUT158	5379	472.5	22x95
163	OUT159	5357	347.5	22x95
164	OUT160	5335	472.5	22x95
165	OUT161	5313	347.5	22x95
166	OUT162	5291	472.5	22x95
167	OUT163	5269	347.5	22x95
168	OUT164	5247	472.5	22x95
169	OUT165	5225	347.5	22x95
170	OUT166	5203	472.5	22x95
171	OUT167	5181	347.5	22x95
172	OUT168	5159	472.5	22x95
173	OUT169	5137	347.5	22x95
174	OUT170	5115	472.5	22x95
175	OUT171	5093	347.5	22x95
176	OUT172	5071	472.5	22x95
177	OUT173	5049	347.5	22x95
178	OUT174	5027	472.5	22x95
179	OUT175	5005	347.5	22x95
180	OUT176	4983	472.5	22x95
181	OUT177	4961	347.5	22x95
182	OUT178	4939	472.5	22x95
183	OUT179	4917	347.5	22x95
184	OUT180	4895	472.5	22x95
185	OUT181	4873	347.5	22x95
186	OUT182	4851	472.5	22x95
187	OUT183	4829	347.5	22x95
188	OUT184	4807	472.5	22x95
189	OUT185	4785	347.5	22x95
190	OUT186	4763	472.5	22x95
191	OUT187	4741	347.5	22x95
192	OUT188	4719	472.5	22x95
193	OUT189	4697	347.5	22x95
194	OUT190	4675	472.5	22x95
195	OUT191	4653	347.5	22x95
196	OUT192	4631	472.5	22x95
197	OUT193	4609	347.5	22x95
198	OUT194	4587	472.5	22x95
199	OUT195	4565	347.5	22x95
200	OUT196	4543	472.5	22x95

No.	Name	X	Y	Bump size(μm)
201	OUT197	4521	347.5	22x95
202	OUT198	4499	472.5	22x95
203	OUT199	4477	347.5	22x95
204	OUT200	4455	472.5	22x95
205	OUT201	4433	347.5	22x95
206	OUT202	4411	472.5	22x95
207	OUT203	4389	347.5	22x95
208	OUT204	4367	472.5	22x95
209	OUT205	4345	347.5	22x95
210	OUT206	4323	472.5	22x95
211	OUT207	4301	347.5	22x95
212	OUT208	4279	472.5	22x95
213	OUT209	4257	347.5	22x95
214	OUT210	4235	472.5	22x95
215	OUT211	4213	347.5	22x95
216	OUT212	4191	472.5	22x95
217	OUT213	4169	347.5	22x95
218	OUT214	4147	472.5	22x95
219	OUT215	4125	347.5	22x95
220	OUT216	4103	472.5	22x95
221	OUT217	4081	347.5	22x95
222	OUT218	4059	472.5	22x95
223	OUT219	4037	347.5	22x95
224	OUT220	4015	472.5	22x95
225	OUT221	3993	347.5	22x95
226	OUT222	3971	472.5	22x95
227	OUT223	3949	347.5	22x95
228	OUT224	3927	472.5	22x95
229	OUT225	3905	347.5	22x95
230	OUT226	3883	472.5	22x95
231	OUT227	3861	347.5	22x95
232	OUT228	3839	472.5	22x95
233	OUT229	3817	347.5	22x95
234	OUT230	3795	472.5	22x95
235	OUT231	3773	347.5	22x95
236	OUT232	3751	472.5	22x95
237	OUT233	3729	347.5	22x95
238	OUT234	3707	472.5	22x95
239	OUT235	3685	347.5	22x95
240	OUT236	3663	472.5	22x95
241	OUT237	3641	347.5	22x95
242	OUT238	3619	472.5	22x95
243	OUT239	3597	347.5	22x95
244	OUT240	3575	472.5	22x95
245	OUT241	3553	347.5	22x95
246	OUT242	3531	472.5	22x95
247	OUT243	3509	347.5	22x95
248	OUT244	3487	472.5	22x95
249	OUT245	3465	347.5	22x95
250	OUT246	3443	472.5	22x95

No.	Name	X	Y	Bump size(μm)
251	OUT247	3421	347.5	22x95
252	OUT248	3399	472.5	22x95
253	OUT249	3377	347.5	22x95
254	OUT250	3355	472.5	22x95
255	OUT251	3333	347.5	22x95
256	OUT252	3311	472.5	22x95
257	OUT253	3289	347.5	22x95
258	OUT254	3267	472.5	22x95
259	OUT255	3245	347.5	22x95
260	OUT256	3223	472.5	22x95
261	OUT257	3201	347.5	22x95
262	OUT258	3179	472.5	22x95
263	OUT259	3157	347.5	22x95
264	OUT260	3135	472.5	22x95
265	OUT261	3113	347.5	22x95
266	OUT262	3091	472.5	22x95
267	OUT263	3069	347.5	22x95
268	OUT264	3047	472.5	22x95
269	OUT265	3025	347.5	22x95
270	OUT266	3003	472.5	22x95
271	OUT267	2981	347.5	22x95
272	OUT268	2959	472.5	22x95
273	OUT269	2937	347.5	22x95
274	OUT270	2915	472.5	22x95
275	OUT271	2893	347.5	22x95
276	OUT272	2871	472.5	22x95
277	OUT273	2849	347.5	22x95
278	OUT274	2827	472.5	22x95
279	OUT275	2805	347.5	22x95
280	OUT276	2783	472.5	22x95
281	OUT277	2761	347.5	22x95
282	OUT278	2739	472.5	22x95
283	OUT279	2717	347.5	22x95
284	OUT280	2695	472.5	22x95
285	OUT281	2673	347.5	22x95
286	OUT282	2651	472.5	22x95
287	OUT283	2629	347.5	22x95
288	OUT284	2607	472.5	22x95
289	OUT285	2585	347.5	22x95
290	OUT286	2563	472.5	22x95
291	OUT287	2541	347.5	22x95
292	OUT288	2519	472.5	22x95
293	OUT289	2497	347.5	22x95
294	OUT290	2475	472.5	22x95
295	OUT291	2453	347.5	22x95
296	OUT292	2431	472.5	22x95
297	OUT293	2409	347.5	22x95
298	OUT294	2387	472.5	22x95
299	OUT295	2365	347.5	22x95
300	OUT296	2343	472.5	22x95

No.	Name	X	Y	Bump size(μm)
301	OUT297	2321	347.5	22x95
302	OUT298	2299	472.5	22x95
303	OUT299	2277	347.5	22x95
304	OUT300	2255	472.5	22x95
305	OUT301	2233	347.5	22x95
306	OUT302	2211	472.5	22x95
307	OUT303	2189	347.5	22x95
308	OUT304	2167	472.5	22x95
309	OUT305	2145	347.5	22x95
310	OUT306	2123	472.5	22x95
311	OUT307	2101	347.5	22x95
312	OUT308	2079	472.5	22x95
313	OUT309	2057	347.5	22x95
314	OUT310	2035	472.5	22x95
315	OUT311	2013	347.5	22x95
316	OUT312	1991	472.5	22x95
317	OUT313	1969	347.5	22x95
318	OUT314	1947	472.5	22x95
319	OUT315	1925	347.5	22x95
320	OUT316	1903	472.5	22x95
321	OUT317	1881	347.5	22x95
322	OUT318	1859	472.5	22x95
323	OUT319	1837	347.5	22x95
324	OUT320	1815	472.5	22x95
325	OUT321	1793	347.5	22x95
326	OUT322	1771	472.5	22x95
327	OUT323	1749	347.5	22x95
328	OUT324	1727	472.5	22x95
329	OUT325	1705	347.5	22x95
330	OUT326	1683	472.5	22x95
331	OUT327	1661	347.5	22x95
332	OUT328	1639	472.5	22x95
333	OUT329	1617	347.5	22x95
334	OUT330	1595	472.5	22x95
335	OUT331	1573	347.5	22x95
336	OUT332	1551	472.5	22x95
337	OUT333	1529	347.5	22x95
338	OUT334	1507	472.5	22x95
339	OUT335	1485	347.5	22x95
340	OUT336	1463	472.5	22x95
341	OUT337	1441	347.5	22x95
342	OUT338	1419	472.5	22x95
343	OUT339	1397	347.5	22x95
344	OUT340	1375	472.5	22x95
345	OUT341	1353	347.5	22x95
346	OUT342	1331	472.5	22x95
347	OUT343	1309	347.5	22x95
348	OUT344	1287	472.5	22x95
349	OUT345	1265	347.5	22x95
350	OUT346	1243	472.5	22x95

No.	Name	X	Y	Bump size(μm)
351	OUT347	1221	347.5	22x95
352	OUT348	1199	472.5	22x95
353	OUT349	1177	347.5	22x95
354	OUT350	1155	472.5	22x95
355	OUT351	1133	347.5	22x95
356	OUT352	1111	472.5	22x95
357	OUT353	1089	347.5	22x95
358	OUT354	1067	472.5	22x95
359	OUT355	1045	347.5	22x95
360	OUT356	1023	472.5	22x95
361	OUT357	1001	347.5	22x95
362	OUT358	979	472.5	22x95
363	OUT359	957	347.5	22x95
364	OUT360	935	472.5	22x95
365	OUT361	913	347.5	22x95
366	OUT362	891	472.5	22x95
367	OUT363	869	347.5	22x95
368	OUT364	847	472.5	22x95
369	OUT365	825	347.5	22x95
370	OUT366	803	472.5	22x95
371	OUT367	781	347.5	22x95
372	OUT368	759	472.5	22x95
373	OUT369	737	347.5	22x95
374	OUT370	715	472.5	22x95
375	OUT371	693	347.5	22x95
376	OUT372	671	472.5	22x95
377	OUT373	649	347.5	22x95
378	OUT374	627	472.5	22x95
379	OUT375	605	347.5	22x95
380	OUT376	583	472.5	22x95
381	OUT377	561	347.5	22x95
382	OUT378	539	472.5	22x95
383	OUT379	517	347.5	22x95
384	OUT380	495	472.5	22x95
385	OUT381	473	347.5	22x95
386	OUT382	451	472.5	22x95
387	OUT383	429	347.5	22x95
388	OUT384	407	472.5	22x95
389	OUT385	385	347.5	22x95
390	OUT386	363	472.5	22x95
391	OUT387	341	347.5	22x95
392	OUT388	319	472.5	22x95
393	OUT389	297	347.5	22x95
394	OUT390	275	472.5	22x95
395	OUT391	253	347.5	22x95
396	OUT392	231	472.5	22x95
397	OUT393	209	347.5	22x95
398	OUT394	187	472.5	22x95
399	OUT395	165	347.5	22x95
400	OUT396	143	472.5	22x95

No.	Name	X	Y	Bump size(μm)
401	OUT397	121	347.5	22x95
402	OUT398	99	472.5	22x95
403	OUT399	77	347.5	22x95
404	OUT400	55	472.5	22x95
405	OUT401	33	347.5	22x95
406	OUT402	11	472.5	22x95
407	OUT403	-11	347.5	22x95
408	OUT404	-33	472.5	22x95
409	OUT405	-55	347.5	22x95
410	OUT406	-77	472.5	22x95
411	OUT407	-99	347.5	22x95
412	OUT408	-121	472.5	22x95
413	OUT409	-143	347.5	22x95
414	OUT410	-165	472.5	22x95
415	OUT411	-187	347.5	22x95
416	OUT412	-209	472.5	22x95
417	OUT413	-231	347.5	22x95
418	OUT414	-253	472.5	22x95
419	OUT415	-275	347.5	22x95
420	OUT416	-297	472.5	22x95
421	OUT417	-319	347.5	22x95
422	OUT418	-341	472.5	22x95
423	OUT419	-363	347.5	22x95
424	OUT420	-385	472.5	22x95
425	OUT421	-407	347.5	22x95
426	OUT422	-429	472.5	22x95
427	OUT423	-451	347.5	22x95
428	OUT424	-473	472.5	22x95
429	OUT425	-495	347.5	22x95
430	OUT426	-517	472.5	22x95
431	OUT427	-539	347.5	22x95
432	OUT428	-561	472.5	22x95
433	OUT429	-583	347.5	22x95
434	OUT430	-605	472.5	22x95
435	OUT431	-627	347.5	22x95
436	OUT432	-649	472.5	22x95
437	OUT433	-671	347.5	22x95
438	OUT434	-693	472.5	22x95
439	OUT435	-715	347.5	22x95
440	OUT436	-737	472.5	22x95
441	OUT437	-759	347.5	22x95
442	OUT438	-781	472.5	22x95
443	OUT439	-803	347.5	22x95
444	OUT440	-825	472.5	22x95
445	OUT441	-847	347.5	22x95
446	OUT442	-869	472.5	22x95
447	OUT443	-891	347.5	22x95
448	OUT444	-913	472.5	22x95
449	OUT445	-935	347.5	22x95
450	OUT446	-957	472.5	22x95

No.	Name	X	Y	Bump size(μm)
451	OUT447	-979	347.5	22x95
452	OUT448	-1001	472.5	22x95
453	OUT449	-1023	347.5	22x95
454	OUT450	-1045	472.5	22x95
455	OUT451	-1067	347.5	22x95
456	OUT452	-1089	472.5	22x95
457	OUT453	-1111	347.5	22x95
458	OUT454	-1133	472.5	22x95
459	OUT455	-1155	347.5	22x95
460	OUT456	-1177	472.5	22x95
461	OUT457	-1199	347.5	22x95
462	OUT458	-1221	472.5	22x95
463	OUT459	-1243	347.5	22x95
464	OUT460	-1265	472.5	22x95
465	OUT461	-1287	347.5	22x95
466	OUT462	-1309	472.5	22x95
467	OUT463	-1331	347.5	22x95
468	OUT464	-1353	472.5	22x95
469	OUT465	-1375	347.5	22x95
470	OUT466	-1397	472.5	22x95
471	OUT467	-1419	347.5	22x95
472	OUT468	-1441	472.5	22x95
473	OUT469	-1463	347.5	22x95
474	OUT470	-1485	472.5	22x95
475	OUT471	-1507	347.5	22x95
476	OUT472	-1529	472.5	22x95
477	OUT473	-1551	347.5	22x95
478	OUT474	-1573	472.5	22x95
479	OUT475	-1595	347.5	22x95
480	OUT476	-1617	472.5	22x95
481	OUT477	-1639	347.5	22x95
482	OUT478	-1661	472.5	22x95
483	OUT479	-1683	347.5	22x95
484	OUT480	-1705	472.5	22x95
485	OUT481	-1727	347.5	22x95
486	OUT482	-1749	472.5	22x95
487	OUT483	-1771	347.5	22x95
488	OUT484	-1793	472.5	22x95
489	OUT485	-1815	347.5	22x95
490	OUT486	-1837	472.5	22x95
491	OUT487	-1859	347.5	22x95
492	OUT488	-1881	472.5	22x95
493	OUT489	-1903	347.5	22x95
494	OUT490	-1925	472.5	22x95
495	OUT491	-1947	347.5	22x95
496	OUT492	-1969	472.5	22x95
497	OUT493	-1991	347.5	22x95
498	OUT494	-2013	472.5	22x95
499	OUT495	-2035	347.5	22x95
500	OUT496	-2057	472.5	22x95

No.	Name	X	Y	Bump size(μm)
501	OUT497	-2079	347.5	22x95
502	OUT498	-2101	472.5	22x95
503	OUT499	-2123	347.5	22x95
504	OUT500	-2145	472.5	22x95
505	OUT501	-2167	347.5	22x95
506	OUT502	-2189	472.5	22x95
507	OUT503	-2211	347.5	22x95
508	OUT504	-2233	472.5	22x95
509	OUT505	-2255	347.5	22x95
510	OUT506	-2277	472.5	22x95
511	OUT507	-2299	347.5	22x95
512	OUT508	-2321	472.5	22x95
513	OUT509	-2343	347.5	22x95
514	OUT510	-2365	472.5	22x95
515	OUT511	-2387	347.5	22x95
516	OUT512	-2409	472.5	22x95
517	OUT513	-2431	347.5	22x95
518	OUT514	-2453	472.5	22x95
519	OUT515	-2475	347.5	22x95
520	OUT516	-2497	472.5	22x95
521	OUT517	-2519	347.5	22x95
522	OUT518	-2541	472.5	22x95
523	OUT519	-2563	347.5	22x95
524	OUT520	-2585	472.5	22x95
525	OUT521	-2607	347.5	22x95
526	OUT522	-2629	472.5	22x95
527	OUT523	-2651	347.5	22x95
528	OUT524	-2673	472.5	22x95
529	OUT525	-2695	347.5	22x95
530	OUT526	-2717	472.5	22x95
531	OUT527	-2739	347.5	22x95
532	OUT528	-2761	472.5	22x95
533	OUT529	-2783	347.5	22x95
534	OUT530	-2805	472.5	22x95
535	OUT531	-2827	347.5	22x95
536	OUT532	-2849	472.5	22x95
537	OUT533	-2871	347.5	22x95
538	OUT534	-2893	472.5	22x95
539	OUT535	-2915	347.5	22x95
540	OUT536	-2937	472.5	22x95
541	OUT537	-2959	347.5	22x95
542	OUT538	-2981	472.5	22x95
543	OUT539	-3003	347.5	22x95
544	OUT540	-3025	472.5	22x95
545	OUT541	-3047	347.5	22x95
546	OUT542	-3069	472.5	22x95
547	OUT543	-3091	347.5	22x95
548	OUT544	-3113	472.5	22x95
549	OUT545	-3135	347.5	22x95
550	OUT546	-3157	472.5	22x95

No.	Name	X	Y	Bump size(μm)
551	OUT547	-3179	347.5	22x95
552	OUT548	-3201	472.5	22x95
553	OUT549	-3223	347.5	22x95
554	OUT550	-3245	472.5	22x95
555	OUT551	-3267	347.5	22x95
556	OUT552	-3289	472.5	22x95
557	OUT553	-3311	347.5	22x95
558	OUT554	-3333	472.5	22x95
559	OUT555	-3355	347.5	22x95
560	OUT556	-3377	472.5	22x95
561	OUT557	-3399	347.5	22x95
562	OUT558	-3421	472.5	22x95
563	OUT559	-3443	347.5	22x95
564	OUT560	-3465	472.5	22x95
565	OUT561	-3487	347.5	22x95
566	OUT562	-3509	472.5	22x95
567	OUT563	-3531	347.5	22x95
568	OUT564	-3553	472.5	22x95
569	OUT565	-3575	347.5	22x95
570	OUT566	-3597	472.5	22x95
571	OUT567	-3619	347.5	22x95
572	OUT568	-3641	472.5	22x95
573	OUT569	-3663	347.5	22x95
574	OUT570	-3685	472.5	22x95
575	OUT571	-3707	347.5	22x95
576	OUT572	-3729	472.5	22x95
577	OUT573	-3751	347.5	22x95
578	OUT574	-3773	472.5	22x95
579	OUT575	-3795	347.5	22x95
580	OUT576	-3817	472.5	22x95
581	OUT577	-3839	347.5	22x95
582	OUT578	-3861	472.5	22x95
583	OUT579	-3883	347.5	22x95
584	OUT580	-3905	472.5	22x95
585	OUT581	-3927	347.5	22x95
586	OUT582	-3949	472.5	22x95
587	OUT583	-3971	347.5	22x95
588	OUT584	-3993	472.5	22x95
589	OUT585	-4015	347.5	22x95
590	OUT586	-4037	472.5	22x95
591	OUT587	-4059	347.5	22x95
592	OUT588	-4081	472.5	22x95
593	OUT589	-4103	347.5	22x95
594	OUT590	-4125	472.5	22x95
595	OUT591	-4147	347.5	22x95
596	OUT592	-4169	472.5	22x95
597	OUT593	-4191	347.5	22x95
598	OUT594	-4213	472.5	22x95
599	OUT595	-4235	347.5	22x95
600	OUT596	-4257	472.5	22x95

No.	Name	X	Y	Bump size(μm)
601	OUT597	-4279	347.5	22x95
602	OUT598	-4301	472.5	22x95
603	OUT599	-4323	347.5	22x95
604	OUT600	-4345	472.5	22x95
605	OUT601	-4367	347.5	22x95
606	OUT602	-4389	472.5	22x95
607	OUT603	-4411	347.5	22x95
608	OUT604	-4433	472.5	22x95
609	OUT605	-4455	347.5	22x95
610	OUT606	-4477	472.5	22x95
611	OUT607	-4499	347.5	22x95
612	OUT608	-4521	472.5	22x95
613	OUT609	-4543	347.5	22x95
614	OUT610	-4565	472.5	22x95
615	OUT611	-4587	347.5	22x95
616	OUT612	-4609	472.5	22x95
617	OUT613	-4631	347.5	22x95
618	OUT614	-4653	472.5	22x95
619	OUT615	-4675	347.5	22x95
620	OUT616	-4697	472.5	22x95
621	OUT617	-4719	347.5	22x95
622	OUT618	-4741	472.5	22x95
623	OUT619	-4763	347.5	22x95
624	OUT620	-4785	472.5	22x95
625	OUT621	-4807	347.5	22x95
626	OUT622	-4829	472.5	22x95
627	OUT623	-4851	347.5	22x95
628	OUT624	-4873	472.5	22x95
629	OUT625	-4895	347.5	22x95
630	OUT626	-4917	472.5	22x95
631	OUT627	-4939	347.5	22x95
632	OUT628	-4961	472.5	22x95
633	OUT629	-4983	347.5	22x95
634	OUT630	-5005	472.5	22x95
635	OUT631	-5027	347.5	22x95
636	OUT632	-5049	472.5	22x95
637	OUT633	-5071	347.5	22x95
638	OUT634	-5093	472.5	22x95
639	OUT635	-5115	347.5	22x95
640	OUT636	-5137	472.5	22x95
641	OUT637	-5159	347.5	22x95
642	OUT638	-5181	472.5	22x95
643	OUT639	-5203	347.5	22x95
644	OUT640	-5225	472.5	22x95
645	OUT641	-5247	347.5	22x95
646	OUT642	-5269	472.5	22x95
647	OUT643	-5291	347.5	22x95
648	OUT644	-5313	472.5	22x95
649	OUT645	-5335	347.5	22x95
650	OUT646	-5357	472.5	22x95

No.	Name	X	Y	Bump size(μm)
651	OUT647	-5379	347.5	22x95
652	OUT648	-5401	472.5	22x95
653	OUT649	-5423	347.5	22x95
654	OUT650	-5445	472.5	22x95
655	OUT651	-5467	347.5	22x95
656	OUT652	-5489	472.5	22x95
657	OUT653	-5511	347.5	22x95
658	OUT654	-5533	472.5	22x95
659	OUT655	-5555	347.5	22x95
660	OUT656	-5577	472.5	22x95
661	OUT657	-5599	347.5	22x95
662	OUT658	-5621	472.5	22x95
663	OUT659	-5643	347.5	22x95
664	OUT660	-5665	472.5	22x95
665	OUT661	-5687	347.5	22x95
666	OUT662	-5709	472.5	22x95
667	OUT663	-5731	347.5	22x95
668	OUT664	-5753	472.5	22x95
669	OUT665	-5775	347.5	22x95
670	OUT666	-5797	472.5	22x95
671	OUT667	-5819	347.5	22x95
672	OUT668	-5841	472.5	22x95
673	OUT669	-5863	347.5	22x95
674	OUT670	-5885	472.5	22x95
675	OUT671	-5907	347.5	22x95
676	OUT672	-5929	472.5	22x95
677	OUT673	-5951	347.5	22x95
678	OUT674	-5973	472.5	22x95
679	OUT675	-5995	347.5	22x95
680	OUT676	-6017	472.5	22x95
681	OUT677	-6039	347.5	22x95
682	OUT678	-6061	472.5	22x95
683	OUT679	-6083	347.5	22x95
684	OUT680	-6105	472.5	22x95
685	OUT681	-6127	347.5	22x95
686	OUT682	-6149	472.5	22x95
687	OUT683	-6171	347.5	22x95
688	OUT684	-6193	472.5	22x95
689	OUT685	-6215	347.5	22x95
690	OUT686	-6237	472.5	22x95
691	OUT687	-6259	347.5	22x95
692	OUT688	-6281	472.5	22x95
693	OUT689	-6303	347.5	22x95
694	OUT690	-6325	472.5	22x95
695	OUT691	-6347	347.5	22x95
696	OUT692	-6369	472.5	22x95
697	OUT693	-6391	347.5	22x95
698	OUT694	-6413	472.5	22x95
699	OUT695	-6435	347.5	22x95
700	OUT696	-6457	472.5	22x95

No.	Name	X	Y	Bump size(μm)
701	OUT697	-6479	347.5	22x95
702	OUT698	-6501	472.5	22x95
703	OUT699	-6523	347.5	22x95
704	OUT700	-6545	472.5	22x95
705	OUT701	-6567	347.5	22x95
706	OUT702	-6589	472.5	22x95
707	OUT703	-6611	347.5	22x95
708	OUT704	-6633	472.5	22x95
709	OUT705	-6655	347.5	22x95
710	OUT706	-6677	472.5	22x95
711	OUT707	-6699	347.5	22x95
712	OUT708	-6721	472.5	22x95
713	OUT709	-6743	347.5	22x95
714	OUT710	-6765	472.5	22x95
715	OUT711	-6787	347.5	22x95
716	OUT712	-6809	472.5	22x95
717	OUT713	-6831	347.5	22x95
718	OUT714	-6853	472.5	22x95
719	OUT715	-6875	347.5	22x95
720	OUT716	-6897	472.5	22x95
721	OUT717	-6919	347.5	22x95
722	OUT718	-6941	472.5	22x95
723	OUT719	-6963	347.5	22x95
724	OUT720	-6985	472.5	22x95
725	OUT721	-7007	347.5	22x95
726	OUT722	-7029	472.5	22x95
727	OUT723	-7051	347.5	22x95
728	OUT724	-7073	472.5	22x95
729	OUT725	-7095	347.5	22x95
730	OUT726	-7117	472.5	22x95
731	OUT727	-7139	347.5	22x95
732	OUT728	-7161	472.5	22x95
733	OUT729	-7183	347.5	22x95
734	OUT730	-7205	472.5	22x95
735	OUT731	-7227	347.5	22x95
736	OUT732	-7249	472.5	22x95
737	OUT733	-7271	347.5	22x95
738	OUT734	-7293	472.5	22x95
739	OUT735	-7315	347.5	22x95
740	OUT736	-7337	472.5	22x95
741	OUT737	-7359	347.5	22x95
742	OUT738	-7381	472.5	22x95
743	OUT739	-7403	347.5	22x95
744	OUT740	-7425	472.5	22x95
745	OUT741	-7447	347.5	22x95
746	OUT742	-7469	472.5	22x95
747	OUT743	-7491	347.5	22x95
748	OUT744	-7513	472.5	22x95
749	OUT745	-7535	347.5	22x95
750	OUT746	-7557	472.5	22x95

No.	Name	X	Y	Bump size(μm)
751	OUT747	-7579	347.5	22x95
752	OUT748	-7601	472.5	22x95
753	OUT749	-7623	347.5	22x95
754	OUT750	-7645	472.5	22x95
755	OUT751	-7667	347.5	22x95
756	OUT752	-7689	472.5	22x95
757	OUT753	-7711	347.5	22x95
758	OUT754	-7733	472.5	22x95
759	OUT755	-7755	347.5	22x95
760	OUT756	-7777	472.5	22x95
761	OUT757	-7799	347.5	22x95
762	OUT758	-7821	472.5	22x95
763	OUT759	-7843	347.5	22x95
764	OUT760	-7865	472.5	22x95
765	OUT761	-7887	347.5	22x95
766	OUT762	-7909	472.5	22x95
767	OUT763	-7931	347.5	22x95
768	OUT764	-7953	472.5	22x95
769	OUT765	-7975	347.5	22x95
770	OUT766	-7997	472.5	22x95
771	OUT767	-8019	347.5	22x95
772	OUT768	-8041	472.5	22x95
773	OUT769	-8063	347.5	22x95
774	OUT770	-8085	472.5	22x95
775	OUT771	-8107	347.5	22x95
776	OUT772	-8129	472.5	22x95
777	OUT773	-8151	347.5	22x95
778	OUT774	-8173	472.5	22x95
779	OUT775	-8195	347.5	22x95
780	OUT776	-8217	472.5	22x95
781	OUT777	-8239	347.5	22x95
782	OUT778	-8261	472.5	22x95
783	OUT779	-8283	347.5	22x95
784	OUT780	-8305	472.5	22x95
785	OUT781	-8327	347.5	22x95
786	OUT782	-8349	472.5	22x95
787	OUT783	-8371	347.5	22x95
788	OUT784	-8393	472.5	22x95
789	OUT785	-8415	347.5	22x95
790	OUT786	-8437	472.5	22x95
791	OUT787	-8459	347.5	22x95
792	OUT788	-8481	472.5	22x95
793	OUT789	-8503	347.5	22x95
794	OUT790	-8525	472.5	22x95
795	OUT791	-8547	347.5	22x95
796	OUT792	-8569	472.5	22x95
797	OUT793	-8591	347.5	22x95
798	OUT794	-8613	472.5	22x95
799	OUT795	-8635	347.5	22x95
800	OUT796	-8657	472.5	22x95



No.	Name	X	Y	Bump size(μm)
801	OUT797	-8679	347.5	22x95
802	OUT798	-8701	472.5	22x95
803	OUT799	-8723	347.5	22x95
804	OUT800	-8745	472.5	22x95
805	OUT801	-8767	347.5	22x95
806	OUT802	-8789	472.5	22x95
807	OUT803	-8811	347.5	22x95
808	OUT804	-8833	472.5	22x95
809	DUM20	-8855	347.5	22x95
810	PASS1	-8899	472.5	22x95
811	PASS1	-8943	472.5	22x95
812	DUM21	-8987	472.5	22x95
813	Alignment Mark_L	-8938	155	
814	DUM0	-8975	-468.5	46x103
815	DUM0	-8900.5	-468.5	46x103
816	PASS1	-8820	-468.5	58x103
817	PASS1	-8746	-468.5	58x103
818	DUM1	-8652	-468.5	58x103
819	DIO2	-8558	-468.5	58x103
820	DIO2	-8484	-468.5	58x103
821	DIO2	-8410	-468.5	58x103
822	DIO2	-8336	-468.5	58x103
823	DUM2	-8242	-468.5	58x103
824	AVDD	-8148	-468.5	58x103
825	AVDD	-8074	-468.5	58x103
826	AVDD	-8000	-468.5	58x103
827	AVDD	-7926	-468.5	58x103
828	AVDD	-7852	-468.5	58x103
829	AVDD	-7778	-468.5	58x103
830	AVDD	-7704	-468.5	58x103
831	AVDD	-7630	-468.5	58x103
832	CHNSL0	-7536	-468.5	58x103
833	CHNSL0	-7462	-468.5	58x103
834	CHNSL0	-7388	-468.5	58x103
835	CHNSL1	-7294	-468.5	58x103
836	CHNSL1	-7220	-468.5	58x103
837	CHNSL1	-7146	-468.5	58x103
838	GND	-7052	-468.5	58x103
839	GND	-6978	-468.5	58x103
840	GND	-6904	-468.5	58x103
841	GND	-6830	-468.5	58x103
842	GND	-6756	-468.5	58x103
843	GND	-6682	-468.5	58x103
844	CHNDS	-6588	-468.5	58x103
845	VCC	-6494	-468.5	58x103
846	VCC	-6420	-468.5	58x103
847	VCC	-6346	-468.5	58x103
848	VCC	-6272	-468.5	58x103
849	VCC	-6198	-468.5	58x103
850	VCC	-6124	-468.5	58x103

No.	Name	X	Y	Bump size(μm)
851	DUM3	-6030	-468.5	58x103
852	POL	-5936	-468.5	58x103
853	POL	-5862	-468.5	58x103
854	POL	-5788	-468.5	58x103
855	POL	-5714	-468.5	58x103
856	DUM4	-5620	-468.5	58x103
857	REV	-5526	-468.5	58x103
858	REV	-5452	-468.5	58x103
859	REV	-5378	-468.5	58x103
860	REV	-5304	-468.5	58x103
861	DUM5	-5210	-468.5	58x103
862	LD	-5116	-468.5	58x103
863	LD	-5042	-468.5	58x103
864	LD	-4968	-468.5	58x103
865	LD	-4894	-468.5	58x103
866	DUM6	-4800	-468.5	58x103
867	D25	-4706	-468.5	58x103
868	D25	-4632	-468.5	58x103
869	D25	-4558	-468.5	58x103
870	D24	-4464	-468.5	58x103
871	D24	-4390	-468.5	58x103
872	D24	-4316	-468.5	58x103
873	D23	-4222	-468.5	58x103
874	D23	-4148	-468.5	58x103
875	D23	-4074	-468.5	58x103
876	D22	-3980	-468.5	58x103
877	D22	-3906	-468.5	58x103
878	D22	-3832	-468.5	58x103
879	D21	-3738	-468.5	58x103
880	D21	-3664	-468.5	58x103
881	D21	-3590	-468.5	58x103
882	D20	-3496	-468.5	58x103
883	D20	-3422	-468.5	58x103
884	D20	-3348	-468.5	58x103
885	DUM7	-3254	-468.5	58x103
886	AVSS	-3160	-468.5	58x103
887	AVSS	-3086	-468.5	58x103
888	AVSS	-3012	-468.5	58x103
889	AVSS	-2938	-468.5	58x103
890	AVSS	-2864	-468.5	58x103
891	AVSS	-2790	-468.5	58x103
892	AVSS	-2716	-468.5	58x103
893	AVSS	-2642	-468.5	58x103
894	DUM8	-2548	-468.5	58x103
895	V14	-2454	-468.5	58x103
896	V14	-2380	-468.5	58x103
897	V14	-2306	-468.5	58x103
898	V14	-2232	-468.5	58x103
899	V13	-2138	-468.5	58x103
900	V13	-2064	-468.5	58x103

No.	Name	X	Y	Bump size(μm)
901	V13	-1990	-468.5	58x103
902	V13	-1916	-468.5	58x103
903	V12	-1822	-468.5	58x103
904	V12	-1748	-468.5	58x103
905	V12	-1674	-468.5	58x103
906	V12	-1600	-468.5	58x103
907	V11	-1506	-468.5	58x103
908	V11	-1432	-468.5	58x103
909	V11	-1358	-468.5	58x103
910	V11	-1284	-468.5	58x103
911	V10	-1190	-468.5	58x103
912	V10	-1116	-468.5	58x103
913	V10	-1042	-468.5	58x103
914	V10	-968	-468.5	58x103
915	V9	-874	-468.5	58x103
916	V9	-800	-468.5	58x103
917	V9	-726	-468.5	58x103
918	V9	-652	-468.5	58x103
919	V8	-558	-468.5	58x103
920	V8	-484	-468.5	58x103
921	V8	-410	-468.5	58x103
922	V8	-336	-468.5	58x103
923	V7	-242	-468.5	58x103
924	V7	-168	-468.5	58x103
925	V7	-94	-468.5	58x103
926	V7	-20	-468.5	58x103
927	V6	74	-468.5	58x103
928	V6	148	-468.5	58x103
929	V6	222	-468.5	58x103
930	V6	296	-468.5	58x103
931	V5	390	-468.5	58x103
932	V5	464	-468.5	58x103
933	V5	538	-468.5	58x103
934	V5	612	-468.5	58x103
935	V4	706	-468.5	58x103
936	V4	780	-468.5	58x103
937	V4	854	-468.5	58x103
938	V4	928	-468.5	58x103
939	V3	1022	-468.5	58x103
940	V3	1096	-468.5	58x103
941	V3	1170	-468.5	58x103
942	V3	1244	-468.5	58x103
943	V2	1338	-468.5	58x103
944	V2	1412	-468.5	58x103
945	V2	1486	-468.5	58x103
946	V2	1560	-468.5	58x103
947	V1	1654	-468.5	58x103
948	V1	1728	-468.5	58x103
949	V1	1802	-468.5	58x103
950	V1	1876	-468.5	58x103

No.	Name	X	Y	Bump size(μm)
951	DUM9	1970	-468.5	58x103
952	AVDD	2064	-468.5	58x103
953	AVDD	2138	-468.5	58x103
954	AVDD	2212	-468.5	58x103
955	AVDD	2286	-468.5	58x103
956	AVDD	2360	-468.5	58x103
957	AVDD	2434	-468.5	58x103
958	AVDD	2508	-468.5	58x103
959	AVDD	2582	-468.5	58x103
960	DUM10	2676	-468.5	58x103
961	D15	2770	-468.5	58x103
962	D15	2844	-468.5	58x103
963	D15	2918	-468.5	58x103
964	D14	3012	-468.5	58x103
965	D14	3086	-468.5	58x103
966	D14	3160	-468.5	58x103
967	D13	3254	-468.5	58x103
968	D13	3328	-468.5	58x103
969	D13	3402	-468.5	58x103
970	D12	3496	-468.5	58x103
971	D12	3570	-468.5	58x103
972	D12	3644	-468.5	58x103
973	D11	3738	-468.5	58x103
974	D11	3812	-468.5	58x103
975	D11	3886	-468.5	58x103
976	D10	3980	-468.5	58x103
977	D10	4054	-468.5	58x103
978	D10	4128	-468.5	58x103
979	D05	4222	-468.5	58x103
980	D05	4296	-468.5	58x103
981	D05	4370	-468.5	58x103
982	D04	4464	-468.5	58x103
983	D04	4538	-468.5	58x103
984	D04	4612	-468.5	58x103
985	D03	4706	-468.5	58x103
986	D03	4780	-468.5	58x103
987	D03	4854	-468.5	58x103
988	D02	4948	-468.5	58x103
989	D02	5022	-468.5	58x103
990	D02	5096	-468.5	58x103
991	D01	5190	-468.5	58x103
992	D01	5264	-468.5	58x103
993	D01	5338	-468.5	58x103
994	D00	5432	-468.5	58x103
995	D00	5506	-468.5	58x103
996	D00	5580	-468.5	58x103
997	DUM11	5674	-468.5	58x103
998	SHL	5768	-468.5	58x103
999	SHL	5842	-468.5	58x103
1000	CLK	5936	-468.5	58x103

No.	Name	X	Y	Bump size(μm)
1001	CLK	6010	-468.5	58x103
1002	CLK	6084	-468.5	58x103
1003	CLK	6158	-468.5	58x103
1004	EDGSL	6252	-468.5	58x103
1005	EDGSL	6326	-468.5	58x103
1006	DUM12	6420	-468.5	58x103
1007	VCC	6514	-468.5	58x103
1008	VCC	6588	-468.5	58x103
1009	VCC	6662	-468.5	58x103
1010	VCC	6736	-468.5	58x103
1011	VCC	6810	-468.5	58x103
1012	VCC	6884	-468.5	58x103
1013	DUM13	6978	-468.5	58x103
1014	GND	7072	-468.5	58x103
1015	GND	7146	-468.5	58x103
1016	GND	7220	-468.5	58x103
1017	GND	7294	-468.5	58x103
1018	GND	7368	-468.5	58x103
1019	GND	7442	-468.5	58x103
1020	DUM14	7536	-468.5	58x103
1021	AVSS	7630	-468.5	58x103
1022	AVSS	7704	-468.5	58x103
1023	AVSS	7778	-468.5	58x103
1024	AVSS	7852	-468.5	58x103
1025	AVSS	7926	-468.5	58x103
1026	AVSS	8000	-468.5	58x103
1027	AVSS	8074	-468.5	58x103
1028	AVSS	8148	-468.5	58x103
1029	DUM15	8242	-468.5	58x103
1030	DIO1	8336	-468.5	58x103
1031	DIO1	8410	-468.5	58x103
1032	DIO1	8484	-468.5	58x103
1033	DIO1	8558	-468.5	58x103
1034	DUM16	8652	-468.5	58x103
1035	PASS2	8746	-468.5	58x103
1036	PASS2	8820	-468.5	58x103
1037	DUM17	8900.5	-468.5	46x103
1038	DUM17	8975	-468.5	46x103
1039	Alignment_ Mark_R	8938	155	

## 9. Ordering Information

PART NO.	PACKAGE TYPE
HX8232-A000PDxxx	PD : mean COG xxx : mean chip thickness ( $\mu\text{m}$ ) , (default 400 $\mu\text{m}$ )

## 10. Revision History

Version	EFF.DATE	DESCRIPTION OF CHANGES
01	2005/09/09	New setup
02	2005/09/16	Increase bump center coordinate
03	2005/12/30	Page 3~4 Revise Pin Description. Page 5 Revise section 5.3. Page 7~8 Revise gamma table. Page 9 Digital Operating Current. Page 10 Analog Stand-by and Operating Current.
04	2006/03/29	Page 4 Revise EDGSL pin description
05	2006/06/13	All pages Remove 'preliminary' wording from the data sheet.