Himax

DATA SHEET

(DOC No. HX8218-C01-DS)

HX8218-C01

960CH TFT LCD Source Driver
with TCON

Version 04 October, 2006

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

1. General Description

HX8218-C01 is a 960 channel output source driver with TCON and DAC. The input interface can receive digital 8-bit serial/24-bit parallel RGB, or CCIR601/656 input signals and digital control timing signals. The DAC supports transferring digital RGB data to analog RGB data for the internal source driver. The TCON generates the 960x240 resolution timing to source driver and gate driver.

The source driver implements 2 groups of sample and hold circuits. While sampling video signals, the previously sampled data can be outputted synchronously through driver output channels. And simultaneous or sequential sampling can be chosen for matching the pixel array type.

The TCON provides horizontal and vertical control timing to source and gate drivers. With DAC and operational amplifiers, the gamma correction can be performed and digital data is converted to analog signal and then sent to source driver.

2. Features

TCON

- Support display resolution 960x240.
- Support digital 8-bits serial/24-bits parallel RGB and CCIR601/656 input mode.
- Support two types of panel group.
- Operation frequency: 30 MHz max.
- Support NTSC/PAL TV system.
- Support Full and Side-Black in CCIR601/656 input mode.
- OSD overlay supported in CCIR601/656 input mode.
- Line inversion driving scheme.
- Provide source and gate drivers control timing.
- Provide flip and mirror scan control.
- Operation Voltage Level 3V to 3.6V.

Source Driver

- 5V analog power supply.
- Dynamic output range: 0.1 to 4.9V.
- Voltage deviation of outputs: ±20mV.
- 960 channels output source driver for TFT LCD panel.
- Applicable to stripe and delta pattern color filter.
- Simultaneous or sequential sampling is selectable as matching pixel array type.
- Include 2 lines of sample and hold circuit.
- Right and left shift capability.
- LCD power: 3.8 to 5.5V.

DAC

- Support 8 bits Digital Data Input (RGB), and output the analog RGB.
- 5V Operation voltage.

Package

- Bare chip with gold bumper for COG solution.

3. Block Diagram

3.1 Whole chip block diagram

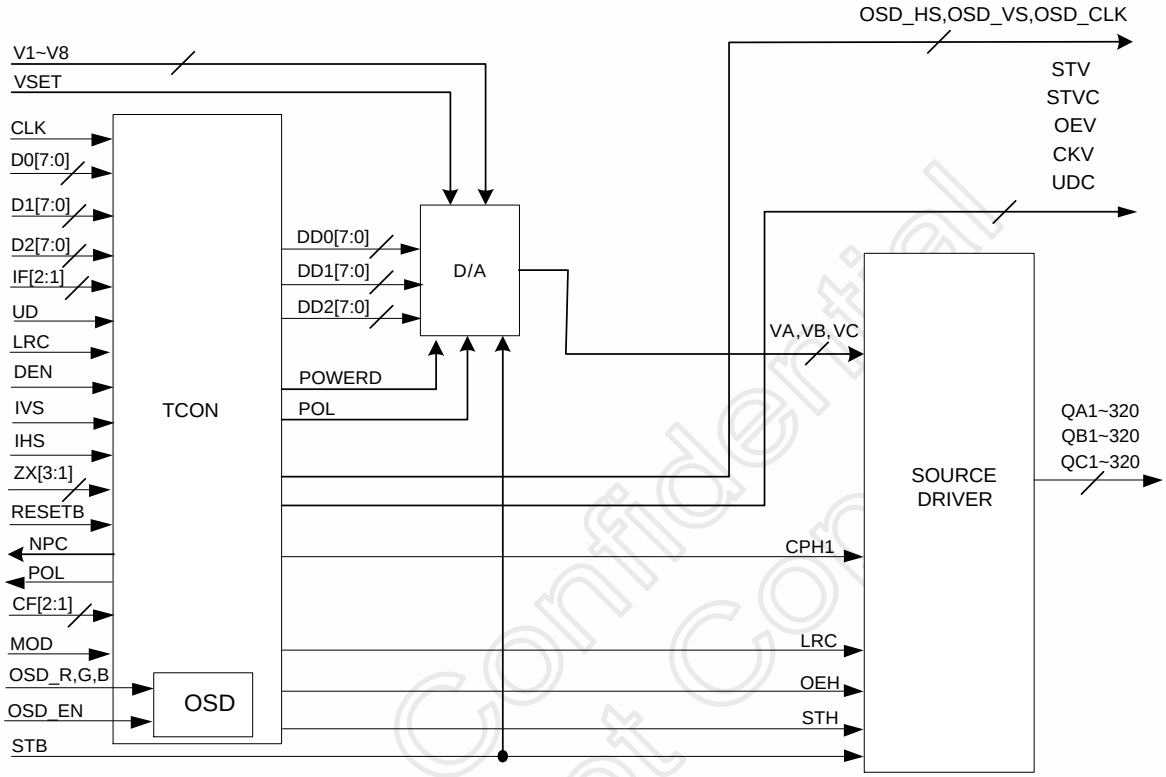


Figure 3. 1 Whole chip block diagram

3.2 Timing controller block diagram

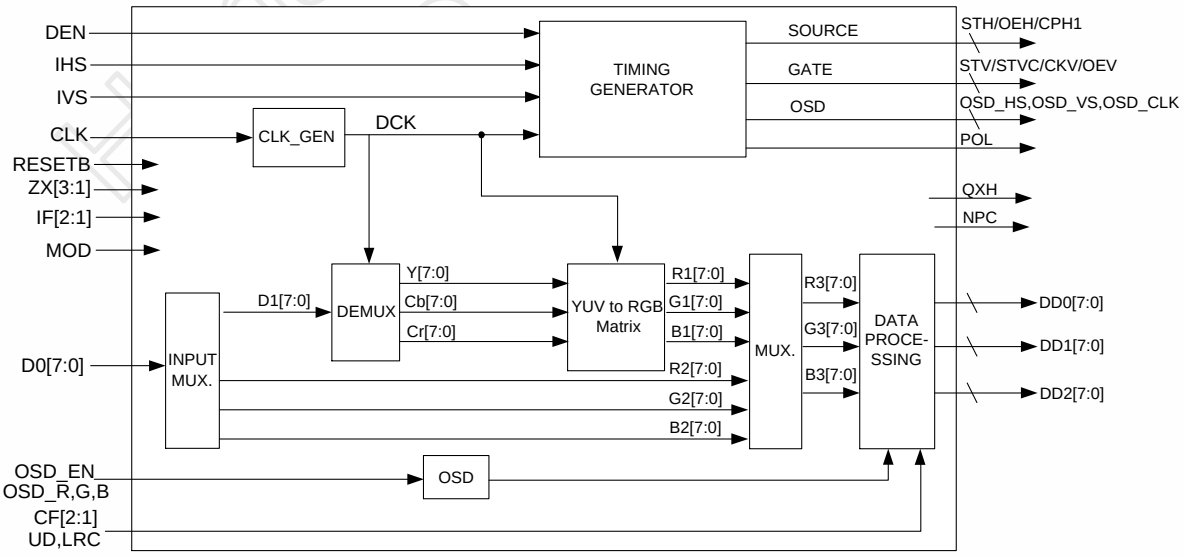


Figure 3. 2 Timing controller block diagram

3.3 Source driver block diagram

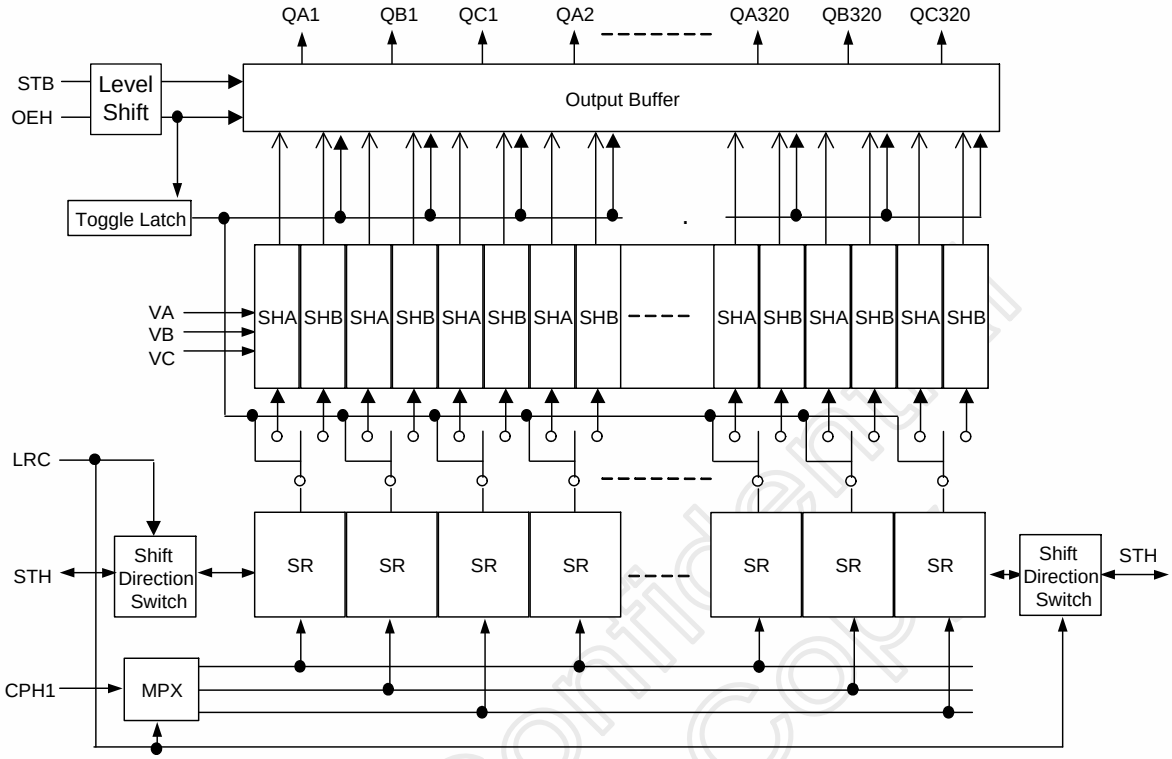


Figure 3. 3 Source driver block diagram

4. Pin description

Pin name	I/O	Description
CLK	I	Clock signal. Latching data at the rising edge.
D07~D00 D17~D10 D27~D20	I	Digital data input. DX0 is LSB and DX7 is MSB. 1. If parallel RGB input mode is used, D0X, D1X, and D2X indicate R, G, and B data in turn. 2. If serial RGB or CCIR601/656 input mode is selected, only D07~D00 are used, and others short to GND.
IHS	I	Horizontal sync input in digital RGB mode. Or HREF input in CCIR601 mode. (Short to GND if not used)
IVS	I	Vertical sync input in digital RGB mode. Or V123 input in CCIR601 mode. (Short to GND if not used)
DEN	I	Input data enable control. Normally pull low.
LRC	I	The shift direction of device internal shift register is controlled by this pin as shown below: LRC=H: STH à OUT1 à • • • à OUT960 à STHO LRC=L: STH à OUT960 à • • • à OUT1 à STHO
POL	O	Polarity select for the line inversion control signal. When POL=L, output voltage is negative polarity. When POL=H, output voltage is positive polarity.
STB	I	Standby mode control. Normally pull high. When STB=L, source driver and DAC are off. All outputs are shorted to VSS. When STB=H, source driver and DAC are on.
RESETB	I	Hardware global reset. Low active. Normally pull high.
NPC	O	NTSC or PAL mode auto detection result. When NPC=H, NTSC mode is selected. When NPC=L, PAL mode is selected.
UD	I	Up/down scan setting. When UD=H, reverse scan. When UD=L, normal scan.
V1~V8	I	Gamma correction voltage for DAC.
VSET	I	Gamma correction voltage is set internally or externally. Normally pull high. VSET=L, internally. VSET=H, externally.
IF1, IF2	I	Control the input data format. IF2, IF1 / Input data format L, L (default) / Serial RGB L, H / Parallel RGB H, L / CCIR601 H, H / CCIR656
CF1	I	Define the input data sequence in serial RGB mode. Please reference section5.5. Only effective when MOD=L. Normally pull low.
CF2	I	Define the used delta type color filter. Please reference section5.5. Only effective if MOD=L. Normally pull low.
MOD	I	Define the color filter type. Normally pull low. When MOD=L, delta type. When MOD=H, stripe type.
ZX1~3	I	Zoom in/out modes setting pin. Zoom function is only active in CCIR601/656 input mode. Normally pull high. Reference 5.7.

Pin name	I/O	Description
QXH	O	Reference signal for video decoder to arrange data sequence in serial RGB in PAL mode.
CKV	O	Gate driver clock.
OEV	O	Enable output control of gate driver.
STV	O	Start pulse for gate driver. When UD=L, STV is output. When UD=H, STV is Hi-Z.
STVC	O	Start pulse for gate driver. When UD=L, STVC is Hi-Z. When UD=H, STVC is output.
OSD_HS	O	OSD Hsync output.
OSD_VS	O	OSD Vsync output.
OSD_CLK	O	OSD clock output.
OSD_R	I	OSD red data input. Normally pull low.
OSD_G	I	OSD green data input. Normally pull low.
OSD_B	I	OSD blue data input. Normally pull low.
OSD_EN	I	OSD enable input. Normally pull low.
VDD	I	Analog power. 4.5V to 5.5V.
VSS	I	Analog ground.
VCC	I	Digital power. 3V to 3.6V.
GND	I	Digital ground.
QA1~320 QB1~320 QC1~320	O	Output driver signal.
SPCK	I	Serial port Clock. Normally pull high.
SPDA	I/O	Serial port Data input/output.
SPENA	I	Serial port Data Enable Signal. Normally pull high.
UDC	O	Reverse of UD.
UDP	O	Internal link to UD.
TP[13:0]	I/O	Test pins. They must be open.
PASSR11 PASSR12	-	Link together internally.
PASSR21 PASSR22	-	Link together internally.
PASSR31 PASSR32	-	Link together internally.
PASSR41 PASSR42	-	Link together internally.
PASSR51 PASSR52	-	Link together internally.
PASSL11 PASSL12	-	Link together internally.
PASSL21 PASSL22	-	Link together internally.
PASSL31 PASSL32	-	Link together internally.
PASSL41 PASSL42	-	Link together internally.
PASSL51 PASSL52	-	Link together internally.

5. Operation description

5.1 Relationship between input data and output channels

- Source Driver

LRC	first					→			last	
H	QA1	QB1	QC1	QA2	• • •	• • •	• • •	QA320	QB320	QC320

LRC	last					←			first	
L	QA1	QB1	QC1	QA2	• • •	• • •	• • •	QA320	QB320	QC320

Table 5. 1 Relationship between input data and output channels

5.2 Relationship between gamma correction and output voltage

The 8 gamma correction reference voltages can be set externally or generated internally. If VSET=H, the gamma correction voltage is generated externally. If you want to set these voltages internally, set VSET=L and the default voltage is as below table based on VDD(5V) and VSS(0V). According to the different VDD and VSS, these 8 gamma correction reference voltages will be varied.

	V1	V2	V3	V4	V5	V6	V7	V8
Default voltage (V)	4.45	3.435	2.854	2.540	2.301	2.090	1.818	0.55

Table 5. 2 Relationship between gamma correction and output voltage

Gamma correction characteristic curve

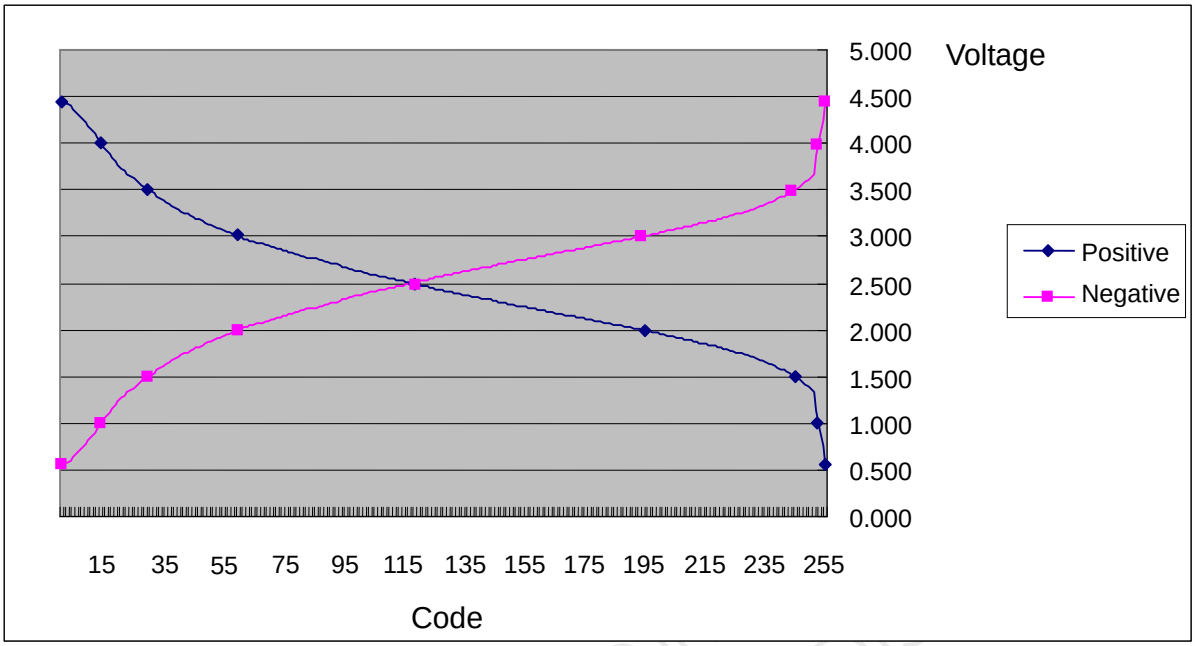


Figure 5. 1 Gamma correction characteristic curve

Relationship between input data and output voltage

Data	Positive polarity output voltage		Ω
00H	VP0	V1	71
01H	VP1	V2 + (V1-V2) x 3832/3903	71
02H	VP2	V2 + (V1-V2) x 3761/3903	71
03H	VP3	V2 + (V1-V2) x 3690/3903	128
04H	VP4	V2 + (V1-V2) x 3562/3903	128
05H	VP5	V2 + (V1-V2) x 3434/3903	128
06H	VP6	V2 + (V1-V2) x 3306/3903	128
07H	VP7	V2 + (V1-V2) x 3178/3903	148
08H	VP8	V2 + (V1-V2) x 3030/3903	148
09H	VP9	V2 + (V1-V2) x 2882/3903	148
0AH	VP10	V2 + (V1-V2) x 2734/3903	148
0BH	VP11	V2 + (V1-V2) x 2586/3903	183
0CH	VP12	V2 + (V1-V2) x 2403/3903	183
0DH	VP13	V2 + (V1-V2) x 2220/3903	183
0EH	VP14	V2 + (V1-V2) x 2037/3903	183
0FH	VP15	V2 + (V1-V2) x 1854/3903	148
10H	VP16	V2 + (V1-V2) x 1706/3903	148
11H	VP17	V2 + (V1-V2) x 1558/3903	148
12H	VP18	V2 + (V1-V2) x 1410/3903	148
13H	VP19	V2 + (V1-V2) x 1262/3903	115
14H	VP20	V2 + (V1-V2) x 1147/3903	115
15H	VP21	V2 + (V1-V2) x 1032/3903	115
16H	VP22	V2 + (V1-V2) x 917/3903	115
17H	VP23	V2 + (V1-V2) x 802/3903	90
18H	VP24	V2 + (V1-V2) x 712/3903	90
19H	VP25	V2 + (V1-V2) x 622/3903	90
1AH	VP26	V2 + (V1-V2) x 532/3903	90
1BH	VP27	V2 + (V1-V2) x 442/3903	87
1CH	VP28	V2 + (V1-V2) x 355/3903	87
1DH	VP29	V2 + (V1-V2) x 268/3903	87
1EH	VP30	V2 + (V1-V2) x 181/3903	87
1FH	VP31	V2 + (V1-V2) x 94/3903	94
20H	VP32	V2	94
21H	VP33	V3 + (V2-V3) x 2142/2236	94
22H	VP34	V3 + (V2-V3) x 2048/2236	94
23H	VP35	V3 + (V2-V3) x 1954/2236	75
24H	VP36	V3 + (V2-V3) x 1879/2236	75
25H	VP37	V3 + (V2-V3) x 1804/2236	75
26H	VP38	V3 + (V2-V3) x 1729/2236	75
27H	VP39	V3 + (V2-V3) x 1654/2236	57
28H	VP40	V3 + (V2-V3) x 1597/2236	57
29H	VP41	V3 + (V2-V3) x 1540/2236	57
2AH	VP42	V3 + (V2-V3) x 1483/2236	57
2BH	VP43	V3 + (V2-V3) x 1426/2236	54
2CH	VP44	V3 + (V2-V3) x 1372/2236	54
2DH	VP45	V3 + (V2-V3) x 1318/2236	54
2EH	VP46	V3 + (V2-V3) x 1264/2236	54
2FH	VP47	V3 + (V2-V3) x 1210/2236	62
30H	VP48	V3 + (V2-V3) x 1148/2236	62
31H	VP49	V3 + (V2-V3) x 1086/2236	63
32H	VP50	V3 + (V2-V3) x 1023/2236	62
33H	VP51	V3 + (V2-V3) x 961/2236	48
34H	VP52	V3 + (V2-V3) x 913/2236	48
35H	VP53	V3 + (V2-V3) x 865/2236	48
36H	VP54	V3 + (V2-V3) x 817/2236	48
37H	VP55	V3 + (V2-V3) x 769/2236	48
38H	VP56	V3 + (V2-V3) x 721/2236	48
39H	VP57	V3 + (V2-V3) x 673/2236	48
3AH	VP58	V3 + (V2-V3) x 625/2236	48
3BH	VP59	V3 + (V2-V3) x 577/2236	48
3CH	VP60	V3 + (V2-V3) x 529/2236	48
3DH	VP61	V3 + (V2-V3) x 481/2236	48
3EH	VP62	V3 + (V2-V3) x 433/2236	48
3FH	VP63	V3 + (V2-V3) x 385/2236	33
40H	VP64	V3 + (V2-V3) x 352/2236	33

Data	Negative polarity output voltage		Ω
00H	VN0	V8	71
01H	VN1	V8 + (V7-V8) x 71/4875	71
02H	VN2	V8 + (V7-V8) x 142/4875	71
03H	VN3	V8 + (V7-V8) x 213/4875	128
04H	VN4	V8 + (V7-V8) x 341/4875	128
05H	VN5	V8 + (V7-V8) x 469/4875	128
06H	VN6	V8 + (V7-V8) x 597/4875	128
07H	VN7	V8 + (V7-V8) x 725/4875	148
08H	VN8	V8 + (V7-V8) x 873/4875	148
09H	VN9	V8 + (V7-V8) x 1021/4875	148
0AH	VN10	V8 + (V7-V8) x 1169/4875	148
0BH	VN11	V8 + (V7-V8) x 1317/4875	183
0CH	VN12	V8 + (V7-V8) x 1500/4875	183
0DH	VN13	V8 + (V7-V8) x 1683/4875	183
0EH	VN14	V8 + (V7-V8) x 1866/4875	183
0FH	VN15	V8 + (V7-V8) x 2049/4875	148
10H	VN16	V8 + (V7-V8) x 2197/4875	148
11H	VN17	V8 + (V7-V8) x 2345/4875	148
12H	VN18	V8 + (V7-V8) x 2493/4875	148
13H	VN19	V8 + (V7-V8) x 2641/4875	115
14H	VN20	V8 + (V7-V8) x 2756/4875	115
15H	VN21	V8 + (V7-V8) x 2871/4875	115
16H	VN22	V8 + (V7-V8) x 2986/4875	115
17H	VN23	V8 + (V7-V8) x 3101/4875	90
18H	VN24	V8 + (V7-V8) x 3191/4875	90
19H	VN25	V8 + (V7-V8) x 3281/4875	90
1AH	VN26	V8 + (V7-V8) x 3371/4875	90
1BH	VN27	V8 + (V7-V8) x 3461/4875	87
1CH	VN28	V8 + (V7-V8) x 3548/4875	87
1DH	VN29	V8 + (V7-V8) x 3635/4875	87
1EH	VN30	V8 + (V7-V8) x 3722/4875	87
1FH	VN31	V8 + (V7-V8) x 3809/4875	94
20H	VN32	V8 + (V7-V8) x 3903/4875	94
21H	VN33	V8 + (V7-V8) x 3997/4875	94
22H	VN34	V8 + (V7-V8) x 4091/4875	94
23H	VN35	V8 + (V7-V8) x 4185/4875	75
24H	VN36	V8 + (V7-V8) x 4260/4875	75
25H	VN37	V8 + (V7-V8) x 4335/4875	75
26H	VN38	V8 + (V7-V8) x 4410/4875	75
27H	VN39	V8 + (V7-V8) x 4485/4875	57
28H	VN40	V8 + (V7-V8) x 4542/4875	57
29H	VN41	V8 + (V7-V8) x 4599/4875	57
2AH	VN42	V8 + (V7-V8) x 4656/4875	57
2BH	VN43	V8 + (V7-V8) x 4713/4875	54
2CH	VN44	V8 + (V7-V8) x 4767/4875	54
2DH	VN45	V8 + (V7-V8) x 4821/4875	54
2EH	VN46	V7	54
2FH	VN47	V7 + (V6-V7) x 54/1045	62
30H	VN48	V7 + (V6-V7) x 116/1045	62
31H	VN49	V7 + (V6-V7) x 178/1045	63
32H	VN50	V7 + (V6-V7) x 241/1045	62
33H	VN51	V7 + (V6-V7) x 303/1045	48
34H	VN52	V7 + (V6-V7) x 351/1045	48
35H	VN53	V7 + (V6-V7) x 399/1045	48
36H	VN54	V7 + (V6-V7) x 447/1045	48
37H	VN55	V7 + (V6-V7) x 495/1045	48
38H	VN56	V7 + (V6-V7) x 543/1045	48
39H	VN57	V7 + (V6-V7) x 591/1045	48
3AH	VN58	V7 + (V6-V7) x 639/1045	48
3BH	VN59	V7 + (V6-V7) x 687/1045	48
3CH	VN60	V7 + (V6-V7) x 735/1045	48
3DH	VN61	V7 + (V6-V7) x 783/1045	48
3EH	VN62	V7 + (V6-V7) x 831/1045	48
3FH	VN63	V7 + (V6-V7) x 879/1045	33
40H	VN64	V7 + (V6-V7) x 912/1045	33

Data	Positive polarity output voltage		Ω	Data	Negative polarity output voltage		Ω
41H	VP65	V3 + (V2-V3) x 319/2236	33	41H	VN65	V7 + (V6-V7) x 945/1045	33
42H	VP66	V3 + (V2-V3) x 286/2236	33	42H	VN66	V7 + (V6-V7) x 978/1045	33
43H	VP67	V3 + (V2-V3) x 253/2236	34	43H	VN67	V7 + (V6-V7) x 1011/1045	34
44H	VP68	V3 + (V2-V3) x 219/2236	34	44H	VN68	V6	34
45H	VP69	V3 + (V2-V3) x 185/2236	34	45H	VN69	V6 + (V5-V6) x 34/810	34
46H	VP70	V3 + (V2-V3) x 151/2236	34	46H	VN70	V6 + (V5-V6) x 68/810	34
47H	VP71	V3 + (V2-V3) x 117/2236	39	47H	VN71	V6 + (V5-V6) x 102/810	39
48H	VP72	V3 + (V2-V3) x 78/2236	39	48H	VN72	V6 + (V5-V6) x 141/810	39
49H	VP73	V3 + (V2-V3) x 39/2236	39	49H	VN73	V6 + (V5-V6) x 180/810	39
4AH	VP74	V3	39	4AH	VN74	V6 + (V5-V6) x 219/810	39
4BH	VP75	V4 + (V3-V4) x 1153/1192	42	4BH	VN75	V6 + (V5-V6) x 258/810	42
4CH	VP76	V4 + (V3-V4) x 1111/1192	42	4CH	VN76	V6 + (V5-V6) x 300/810	42
4DH	VP77	V4 + (V3-V4) x 1069/1192	42	4DH	VN77	V6 + (V5-V6) x 342/810	42
4EH	VP68	V4 + (V3-V4) x 1027/1192	42	4EH	VN68	V6 + (V5-V6) x 384/810	42
4FH	VP79	V4 + (V3-V4) x 985/1192	26	4FH	VN79	V6 + (V5-V6) x 426/810	26
50H	VP80	V4 + (V3-V4) x 959/1192	26	50H	VN80	V6 + (V5-V6) x 452/810	26
51H	VP81	V4 + (V3-V4) x 933/1192	26	51H	VN81	V6 + (V5-V6) x 478/810	26
52H	VP82	V4 + (V3-V4) x 907/1192	26	52H	VN82	V6 + (V5-V6) x 504/810	26
53H	VP83	V4 + (V3-V4) x 881/1192	25	53H	VN83	V6 + (V5-V6) x 530/810	25
54H	VP84	V4 + (V3-V4) x 856/1192	25	54H	VN84	V6 + (V5-V6) x 555/810	25
55H	VP85	V4 + (V3-V4) x 831/1192	25	55H	VN85	V6 + (V5-V6) x 580/810	25
56H	VP86	V4 + (V3-V4) x 806/1192	25	56H	VN86	V6 + (V5-V6) x 605/810	25
57H	VP87	V4 + (V3-V4) x 781/1192	35	57H	VN87	V6 + (V5-V6) x 630/810	35
58H	VP88	V4 + (V3-V4) x 746/1192	35	58H	VN88	V6 + (V5-V6) x 665/810	35
59H	VP89	V4 + (V3-V4) x 711/1192	35	59H	VN89	V6 + (V5-V6) x 700/810	35
5AH	VP90	V4 + (V3-V4) x 676/1192	35	5AH	VN90	V6 + (V5-V6) x 735/810	35
5BH	VP91	V4 + (V3-V4) x 641/1192	40	5BH	VN91	V6 + (V5-V6) x 770/810	40
5CH	VP92	V4 + (V3-V4) x 601/1192	40	5CH	VN92	V5	40
5DH	VP93	V4 + (V3-V4) x 561/1192	40	5DH	VN93	V5 + (V4-V5) x 40/919	40
5EH	VP94	V4 + (V3-V4) x 521/1192	40	5EH	VN94	V5 + (V4-V5) x 80/919	40
5FH	VP95	V4 + (V3-V4) x 481/1192	37	5FH	VN95	V5 + (V4-V5) x 120/919	37
60H	VP96	V4 + (V3-V4) x 444/1192	37	60H	VN96	V5 + (V4-V5) x 157/919	37
61H	VP97	V4 + (V3-V4) x 407/1192	37	61H	VN97	V5 + (V4-V5) x 194/919	37
62H	VP98	V4 + (V3-V4) x 369/1192	37	62H	VN98	V5 + (V4-V5) x 231/919	37
63H	VP99	V4 + (V3-V4) x 332/1192	32	63H	VN99	V5 + (V4-V5) x 268/919	32
64H	VP100	V4 + (V3-V4) x 300/1192	32	64H	VN100	V5 + (V4-V5) x 300/919	32
65H	VP101	V4 + (V3-V4) x 268/1192	32	65H	VN101	V5 + (V4-V5) x 332/919	32
66H	VP102	V4 + (V3-V4) x 236/1192	32	66H	VN102	V5 + (V4-V5) x 364/919	32
67H	VP103	V4 + (V3-V4) x 204/1192	24	67H	VN103	V5 + (V4-V5) x 396/919	24
68H	VP104	V4 + (V3-V4) x 180/1192	24	68H	VN104	V5 + (V4-V5) x 420/919	24
69H	VP105	V4 + (V3-V4) x 156/1192	24	69H	VN105	V5 + (V4-V5) x 444/919	24
6AH	VP106	V4 + (V3-V4) x 132/1192	24	6AH	VN106	V5 + (V4-V5) x 468/919	24
6BH	VP107	V4 + (V3-V4) x 108/1192	27	6BH	VN107	V5 + (V4-V5) x 492/919	27
6CH	VP108	V4 + (V3-V4) x 81/1192	27	6CH	VN108	V5 + (V4-V5) x 519/919	27
6DH	VP109	V4 + (V3-V4) x 54/1192	27	6DH	VN109	V5 + (V4-V5) x 546/919	27
6EH	VP110	V4 + (V3-V4) x 27/1192	27	6EH	VN110	V5 + (V4-V5) x 573/919	27
6FH	VP111	V4	28	6FH	VN111	V5 + (V4-V5) x 600/919	28
70H	VP112	V5 + (V4-V5) x 909/937	28	70H	VN112	V5 + (V4-V5) x 628/919	28
71H	VP113	V5 + (V4-V5) x 881/937	28	71H	VN113	V5 + (V4-V5) x 656/919	28
72H	VP114	V5 + (V4-V5) x 853/937	28	72H	VN114	V5 + (V4-V5) x 684/919	28
73H	VP115	V5 + (V4-V5) x 825/937	30	73H	VN115	V5 + (V4-V5) x 712/919	30
74H	VP116	V5 + (V4-V5) x 795/937	30	74H	VN116	V5 + (V4-V5) x 742/919	30
75H	VP117	V5 + (V4-V5) x 765/937	30	75H	VN117	V5 + (V4-V5) x 772/919	30
76H	VP118	V5 + (V4-V5) x 735/937	30	76H	VN118	V5 + (V4-V5) x 802/919	30
77H	VP119	V5 + (V4-V5) x 705/937	29	77H	VN119	V5 + (V4-V5) x 832/919	29
78H	VP120	V5 + (V4-V5) x 676/937	29	78H	VN120	V5 + (V4-V5) x 861/919	29
79H	VP121	V5 + (V4-V5) x 647/937	29	79H	VN121	V5 + (V4-V5) x 890/919	29
7AH	VP122	V5 + (V4-V5) x 618/937	29	7AH	VN122	V4	29
7BH	VP123	V5 + (V4-V5) x 589/937	26	7BH	VN123	V4 + (V3-V4) x 29/1209	26
7CH	VP124	V5 + (V4-V5) x 563/937	26	7CH	VN124	V4 + (V3-V4) x 55/1209	26
7DH	VP125	V5 + (V4-V5) x 537/937	26	7DH	VN125	V4 + (V3-V4) x 81/1209	26
7EH	VP126	V5 + (V4-V5) x 511/937	26	7EH	VN126	V4 + (V3-V4) x 107/1209	26
7FH	VP127	V5 + (V4-V5) x 485/937	27	7FH	VN127	V4 + (V3-V4) x 133/1209	27
80H	VP128	V5 + (V4-V5) x 458/937	27	80H	VN128	V4 + (V3-V4) x 160/1209	27

Data	Positive polarity output voltage		Ω
81H	VP129	V5 + (V4-V5) x 431/937	27
82H	VP130	V5 + (V4-V5) x 404/937	27
83H	VP131	V5 + (V4-V5) x 377/937	30
84H	VP132	V5 + (V4-V5) x 347/937	30
85H	VP133	V5 + (V4-V5) x 317/937	30
86H	VP134	V5 + (V4-V5) x 287/937	30
87H	VP135	V5 + (V4-V5) x 257/937	23
88H	VP136	V5 + (V4-V5) x 234/937	23
89H	VP137	V5 + (V4-V5) x 211/937	23
8AH	VP138	V5 + (V4-V5) x 188/937	23
8BH	VP139	V5 + (V4-V5) x 165/937	21
8CH	VP140	V5 + (V4-V5) x 144/937	21
8DH	VP141	V5 + (V4-V5) x 123/937	21
8EH	VP142	V5 + (V4-V5) x 102/937	21
8FH	VP143	V5 + (V4-V5) x 81/937	27
90H	VP144	V5 + (V4-V5) x 54/937	27
91H	VP145	V5 + (V4-V5) x 27/937	27
92H	VP146	V5	27
93H	VP147	V6 + (V5-V6) x 776/803	25
94H	VP148	V6 + (V5-V6) x 751/803	25
95H	VP149	V6 + (V5-V6) x 726/803	25
96H	VP150	V6 + (V5-V6) x 701/803	25
97H	VP151	V6 + (V5-V6) x 676/803	24
98H	VP152	V6 + (V5-V6) x 652/803	24
99H	VP153	V6 + (V5-V6) x 628/803	24
9AH	VP154	V6 + (V5-V6) x 604/803	24
9BH	VP155	V6 + (V5-V6) x 580/803	23
9CH	VP156	V6 + (V5-V6) x 557/803	23
9DH	VP157	V6 + (V5-V6) x 534/803	23
9EH	VP158	V6 + (V5-V6) x 511/803	23
9FH	VP159	V6 + (V5-V6) x 488/803	26
A0H	VP160	V6 + (V5-V6) x 462/803	26
A1H	VP161	V6 + (V5-V6) x 436/803	26
A2H	VP162	V6 + (V5-V6) x 410/803	26
A3H	VP163	V6 + (V5-V6) x 384/803	24
A4H	VP164	V6 + (V5-V6) x 360/803	24
A5H	VP165	V6 + (V5-V6) x 336/803	24
A6H	VP166	V6 + (V5-V6) x 312/803	24
A7H	VP167	V6 + (V5-V6) x 288/803	19
A8H	VP168	V6 + (V5-V6) x 269/803	19
A9H	VP169	V6 + (V5-V6) x 250/803	19
AAH	VP170	V6 + (V5-V6) x 231/803	19
ABH	VP171	V6 + (V5-V6) x 212/803	28
ACH	VP172	V6 + (V5-V6) x 184/803	28
ADH	VP173	V6 + (V5-V6) x 156/803	28
AEH	VP174	V6 + (V5-V6) x 128/803	28
AFH	VP175	V6 + (V5-V6) x 100/803	25
B0H	VP176	V6 + (V5-V6) x 75/803	25
B1H	VP177	V6 + (V5-V6) x 50/803	25
B2H	VP178	V6 + (V5-V6) x 25/803	25
B3H	VP179	V6	22
B4H	VP180	V7 + (V6-V7) x 998/1020	22
B5H	VP181	V7 + (V6-V7) x 976/1020	22
B6H	VP182	V7 + (V6-V7) x 954/1020	22
B7H	VP183	V7 + (V6-V7) x 932/1020	24
B8H	VP184	V7 + (V6-V7) x 908/1020	24
B9H	VP185	V7 + (V6-V7) x 884/1020	24
BAH	VP186	V7 + (V6-V7) x 860/1020	24
BBH	VP187	V7 + (V6-V7) x 836/1020	22
BCH	VP188	V7 + (V6-V7) x 814/1020	22
BDH	VP189	V7 + (V6-V7) x 792/1020	22
BEH	VP190	V7 + (V6-V7) x 770/1020	22
BFH	VP191	V7 + (V6-V7) x 748/1020	24

Data	Negative polarity output voltage		Ω
81H	VN129	V4 + (V3-V4) x 187/1209	27
82H	VN130	V4 + (V3-V4) x 214/1209	27
83H	VN131	V4 + (V3-V4) x 241/1209	30
84H	VN132	V4 + (V3-V4) x 271/1209	30
85H	VN133	V4 + (V3-V4) x 301/1209	30
86H	VN134	V4 + (V3-V4) x 331/1209	30
87H	VN135	V4 + (V3-V4) x 361/1209	23
88H	VN136	V4 + (V3-V4) x 384/1209	23
89H	VN137	V4 + (V3-V4) x 407/1209	23
8AH	VN138	V4 + (V3-V4) x 430/1209	23
8BH	VN139	V4 + (V3-V4) x 453/1209	21
8CH	VN140	V4 + (V3-V4) x 474/1209	21
8DH	VN141	V4 + (V3-V4) x 495/1209	21
8EH	VN142	V4 + (V3-V4) x 516/1209	21
8FH	VN143	V4 + (V3-V4) x 537/1209	27
90H	VN144	V4 + (V3-V4) x 564/1209	27
91H	VN145	V4 + (V3-V4) x 591/1209	27
92H	VN146	V4 + (V3-V4) x 618/1209	27
93H	VN147	V4 + (V3-V4) x 645/1209	25
94H	VN148	V4 + (V3-V4) x 670/1209	25
95H	VN149	V4 + (V3-V4) x 695/1209	25
96H	VN150	V4 + (V3-V4) x 720/1209	25
97H	VN151	V4 + (V3-V4) x 745/1209	24
98H	VN152	V4 + (V3-V4) x 769/1209	24
99H	VN153	V4 + (V3-V4) x 793/1209	24
9AH	VN154	V4 + (V3-V4) x 817/1209	24
9BH	VN155	V4 + (V3-V4) x 841/1209	23
9CH	VN156	V4 + (V3-V4) x 864/1209	23
9DH	VN157	V4 + (V3-V4) x 887/1209	23
9EH	VN158	V4 + (V3-V4) x 910/1209	23
9FH	VN159	V4 + (V3-V4) x 933/1209	26
A0H	VN160	V4 + (V3-V4) x 959/1209	26
A1H	VN161	V4 + (V3-V4) x 985/1209	26
A2H	VN162	V4 + (V3-V4) x 1011/1209	26
A3H	VN163	V4 + (V3-V4) x 1037/1209	24
A4H	VN164	V4 + (V3-V4) x 1061/1209	24
A5H	VN165	V4 + (V3-V4) x 1085/1209	24
A6H	VN166	V4 + (V3-V4) x 1109/1209	24
A7H	VN167	V4 + (V3-V4) x 1133/1209	19
A8H	VN168	V4 + (V3-V4) x 1152/1209	19
A9H	VN169	V4 + (V3-V4) x 1171/1209	19
AAH	VN170	V4 + (V3-V4) x 1190/1209	19
ABH	VN171	V3	28
ACH	VN172	V3 + (V2-V3) x 28/2197	28
ADH	VN173	V3 + (V2-V3) x 56/2197	28
AEH	VN174	V3 + (V2-V3) x 84/2197	28
AFH	VN175	V3 + (V2-V3) x 112/2197	25
B0H	VN176	V3 + (V2-V3) x 137/2197	25
B1H	VN177	V3 + (V2-V3) x 162/2197	25
B2H	VN178	V3 + (V2-V3) x 187/2197	25
B3H	VN179	V3 + (V2-V3) x 212/2197	22
B4H	VN180	V3 + (V2-V3) x 234/2197	22
B5H	VN181	V3 + (V2-V3) x 256/2197	22
B6H	VN182	V3 + (V2-V3) x 278/2197	22
B7H	VN183	V3 + (V2-V3) x 300/2197	24
B8H	VN184	V3 + (V2-V3) x 324/2197	24
B9H	VN185	V3 + (V2-V3) x 348/2197	24
BAH	VN186	V3 + (V2-V3) x 372/2197	24
BBH	VN187	V3 + (V2-V3) x 396/2197	22
BCH	VN188	V3 + (V2-V3) x 418/2197	22
BDH	VN189	V3 + (V2-V3) x 440/2197	22
BEH	VN190	V3 + (V2-V3) x 462/2197	22
BFH	VN191	V3 + (V2-V3) x 484/2197	24

Data	Positive polarity output voltage		Ω
C0H	VP192	V7 + (V6-V7) x 724/1020	24
C1H	VP193	V7 + (V6-V7) x 700/1020	24
C2H	VP194	V7 + (V6-V7) x 676/1020	24
C3H	VP195	V7 + (V6-V7) x 652/1020	22
C4H	VP196	V7 + (V6-V7) x 630/1020	22
C5H	VP197	V7 + (V6-V7) x 608/1020	22
C6H	VP198	V7 + (V6-V7) x 586/1020	22
C7H	VP199	V7 + (V6-V7) x 564/1020	24
C8H	VP200	V7 + (V6-V7) x 540/1020	24
C9H	VP201	V7 + (V6-V7) x 516/1020	24
CAH	VP202	V7 + (V6-V7) x 492/1020	24
CBH	VP203	V7 + (V6-V7) x 468/1020	28
CCH	VP204	V7 + (V6-V7) x 440/1020	28
CDH	VP205	V7 + (V6-V7) x 412/1020	28
CEH	VP206	V7 + (V6-V7) x 384/1020	28
CFH	VP207	V7 + (V6-V7) x 356/1020	31
D0H	VP208	V7 + (V6-V7) x 325/1020	31
D1H	VP209	V7 + (V6-V7) x 294/1020	31
D2H	VP210	V7 + (V6-V7) x 263/1020	31
D3H	VP211	V7 + (V6-V7) x 232/1020	29
D4H	VP212	V7 + (V6-V7) x 203/1020	29
D5H	VP213	V7 + (V6-V7) x 174/1020	29
D6H	VP214	V7 + (V6-V7) x 145/1020	29
D7H	VP215	V7 + (V6-V7) x 116/1020	29
D8H	VP216	V7 + (V6-V7) x 87/1020	29
D9H	VP217	V7 + (V6-V7) x 58/1020	29
DAH	VP218	V7 + (V6-V7) x 29/1020	29
DBH	VP219	V7	36
DCH	VP220	V8 + (V7-V8) x 4839/4875	36
DDH	VP221	V8 + (V7-V8) x 4803/4875	36
DEH	VP222	V8 + (V7-V8) x 4767/4875	36
DFH	VP223	V8 + (V7-V8) x 4731/4875	32
E0H	VP224	V8 + (V7-V8) x 4699/4875	32
E1H	VP225	V8 + (V7-V8) x 4667/4875	32
E2H	VP226	V8 + (V7-V8) x 4635/4875	32
E3H	VP227	V8 + (V7-V8) x 4603/4875	40
E4H	VP228	V8 + (V7-V8) x 4563/4875	40
E5H	VP229	V8 + (V7-V8) x 4523/4875	40
E6H	VP230	V8 + (V7-V8) x 4483/4875	40
E7H	VP231	V8 + (V7-V8) x 4443/4875	50
E8H	VP232	V8 + (V7-V8) x 4393/4875	50
E9H	VP233	V8 + (V7-V8) x 4343/4875	50
EAH	VP234	V8 + (V7-V8) x 4293/4875	50
EBH	VP235	V8 + (V7-V8) x 4243/4875	52
ECH	VP236	V8 + (V7-V8) x 4191/4875	52
EDH	VP237	V8 + (V7-V8) x 4139/4875	52
EEH	VP238	V8 + (V7-V8) x 4087/4875	52
EFH	VP239	V8 + (V7-V8) x 4035/4875	63
F0H	VP240	V8 + (V7-V8) x 3972/4875	62
F1H	VP241	V8 + (V7-V8) x 3910/4875	63
F2H	VP242	V8 + (V7-V8) x 3847/4875	63
F3H	VP243	V8 + (V7-V8) x 3784/4875	82
F4H	VP244	V8 + (V7-V8) x 3702/4875	82
F5H	VP245	V8 + (V7-V8) x 3620/4875	82
F6H	VP246	V8 + (V7-V8) x 3538/4875	82
F7H	VP247	V8 + (V7-V8) x 3456/4875	104
F8H	VP248	V8 + (V7-V8) x 3352/4875	104
F9H	VP249	V8 + (V7-V8) x 3248/4875	104
FAH	VP250	V8 + (V7-V8) x 3144/4875	104
FBH	VP251	V8 + (V7-V8) x 3040/4875	760
FCH	VP252	V8 + (V7-V8) x 2280/4875	760
FDH	VP253	V8 + (V7-V8) x 1520/4875	760
FEH	VP254	V8 + (V7-V8) x 760/4875	760
FFH	VP255	V8	0

Data	Negative polarity output voltage		Ω
C0H	VN192	V3 + (V2-V3) x 508/2197	24
C1H	VN193	V3 + (V2-V3) x 532/2197	24
C2H	VN194	V3 + (V2-V3) x 556/2197	24
C3H	VN195	V3 + (V2-V3) x 580/2197	22
C4H	VN196	V3 + (V2-V3) x 602/2197	22
C5H	VN197	V3 + (V2-V3) x 624/2197	22
C6H	VN198	V3 + (V2-V3) x 646/2197	22
C7H	VN199	V3 + (V2-V3) x 668/2197	24
C8H	VN200	V3 + (V2-V3) x 692/2197	24
C9H	VN201	V3 + (V2-V3) x 716/2197	24
CAH	VN202	V3 + (V2-V3) x 740/2197	24
CBH	VN203	V3 + (V2-V3) x 764/2197	28
CCH	VN204	V3 + (V2-V3) x 792/2197	28
CDH	VN205	V3 + (V2-V3) x 820/2197	28
CEH	VN206	V3 + (V2-V3) x 848/2197	28
CFH	VN207	V3 + (V2-V3) x 876/2197	31
D0H	VN208	V3 + (V2-V3) x 907/2197	31
D1H	VN209	V3 + (V2-V3) x 938/2197	31
D2H	VN210	V3 + (V2-V3) x 969/2197	31
D3H	VN211	V3 + (V2-V3) x 1000/2197	29
D4H	VN212	V3 + (V2-V3) x 1029/2197	29
D5H	VN213	V3 + (V2-V3) x 1058/2197	29
D6H	VN214	V3 + (V2-V3) x 1087/2197	29
D7H	VN215	V3 + (V2-V3) x 1116/2197	29
D8H	VN216	V3 + (V2-V3) x 1145/2197	29
D9H	VN217	V3 + (V2-V3) x 1174/2197	29
DAH	VN218	V3 + (V2-V3) x 1203/2197	29
DBH	VN219	V3 + (V2-V3) x 1232/2197	36
DCH	VN220	V3 + (V2-V3) x 1268/2197	36
DDH	VN221	V3 + (V2-V3) x 1304/2197	36
DEH	VN222	V3 + (V2-V3) x 1340/2197	36
DFH	VN223	V3 + (V2-V3) x 1376/2197	32
E0H	VN224	V3 + (V2-V3) x 1408/2197	32
E1H	VN225	V3 + (V2-V3) x 1440/2197	32
E2H	VN226	V3 + (V2-V3) x 1472/2197	32
E3H	VN227	V3 + (V2-V3) x 1504/2197	40
E4H	VN228	V3 + (V2-V3) x 1544/2197	40
E5H	VN229	V3 + (V2-V3) x 1584/2197	40
E6H	VN230	V3 + (V2-V3) x 1624/2197	40
E7H	VN231	V3 + (V2-V3) x 1664/2197	50
E8H	VN232	V3 + (V2-V3) x 1714/2197	50
E9H	VN233	V3 + (V2-V3) x 1764/2197	50
EAH	VN234	V3 + (V2-V3) x 1814/2197	50
EBH	VN235	V3 + (V2-V3) x 1864/2197	52
ECH	VN236	V3 + (V2-V3) x 1916/2197	52
EDH	VN237	V3 + (V2-V3) x 1968/2197	52
EEH	VN238	V3 + (V2-V3) x 2020/2197	52
EFH	VN239	V3 + (V2-V3) x 2072/2197	63
F0H	VN240	V3 + (V2-V3) x 2135/2197	62
F1H	VN241	V2	63
F2H	VN242	V2 + (V1-V2) x 63/3910	63
F3H	VN243	V2 + (V1-V2) x 126/3910	82
F4H	VN244	V2 + (V1-V2) x 208/3910	82
F5H	VN245	V2 + (V1-V2) x 290/3910	82
F6H	VN246	V2 + (V1-V2) x 372/3910	82
F7H	VN247	V2 + (V1-V2) x 454/3910	104
F8H	VN248	V2 + (V1-V2) x 558/3910	104
F9H	VN249	V2 + (V1-V2) x 662/3910	104
FAH	VN250	V2 + (V1-V2) x 766/3910	104
FBH	VN251	V2 + (V1-V2) x 870/3910	760
FCH	VN252	V2 + (V1-V2) x 1630/3910	760
FDH	VN253	V2 + (V1-V2) x 2390/3910	760
FEH	VN254	V2 + (V1-V2) x 3150/3910	760
FFH	VN255	V1	0

5.3 Digital RGB data input format

For digital RGB input data format, both SYNC mode and DE mode are supported. If DEN signal is fixed low, SYNC mode is used. Otherwise, DE mode is used. The zoom and OSD function is not supported in digital serial/parallel RGB mode.

5.4 NTSC/PAL mode auto detection

For NTSC/PAL mode setting, the auto-detection function is implemented. You don't have to define this setting and can use NPC pin to monitor detection result.

5.5 Input data sequence and color filter type

- CF1 defines the input data sequence in serial digital RGB mode as following tables.

n CF1=L

Scan direction	UD	Low	Low	High	High
Shift direction	LRC	High	Low	High	Low
Data sequence	Odd line	RGB	BGR	BRG	GRB
	Even line	BRG	GRB	RGB	BGR

Table 5. 3 Input data sequence in serial digital RGB mode (CF=L)

n CF1=H

Scan direction	UD	Low	Low	High	High
Shift direction	LRC	High	Low	High	Low
Data sequence	Odd line	RGB	BGR	GBR	RBG
	Even line	GBR	RBG	RGB	BGR

Table 5. 4 Input data sequence in serial digital RGB mode (CF=H)

For the color filter type, set MOD=H for stripe type and the CF1&CF2 definition will have no meaning. Set MOD=L for delta color filter and CF2 defines which kind of delta type color filter is used.

n CF2=L, delta type 1

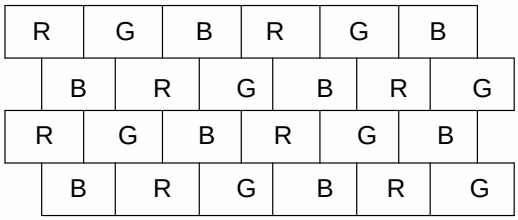


Figure 5. 2 Delta color filter type 1 (CF2=L)

n CF2=H, delta type 2

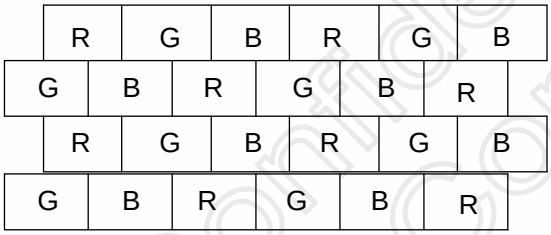


Figure 5. 3 Delta color filter type 2 (CF2=H)

5.6 Zoom in/out display mode setting

The zoom in/out function is only supported in CCIR601/656 input mode. In serial or parallel RGB input mode, this function is disabled.

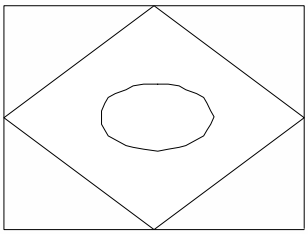
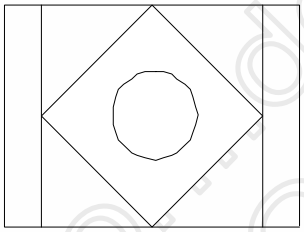
Display Mode	ZX1	ZX2	ZX3	Display characteristics (4:3 aspect-ratio input signal)	Note
Full	H	H	H		Input video signals are displayed on full screen.
Normal	L	L	H		Input video signals (4:3) are displayed on central 75% screen.

Figure 5. 4 Zoom in/out display mode setting

5.7 SPI Register Description

- Register R0

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	reserved	STHD1	STHD0	STHP4	STHP3	STHP2	STHP1	STHP0
Default	0	0	0	0	0	0	0	0

Table 5. 5 Register R0 setting

STHD [1:0]: adjust start pulse position by dot. (RGB mode only)

STHD1	STHD0	STH position adjust by dot
1	1	-1
1	0	-2
0	0	0
0	1	+1

Table 5. 6 Adjust start pulse position by dot

STHP [4:0]: adjust start pulse position by pixel

STHP4	STHP3	STHP2	STHP1	STHP0	STH position adjust by pixel
1	1	1	1	1	-1
1	1	1	1	0	-2
1	1	1	0	1	-3
1	1	1	0	0	-4
1	1	0	1	1	-5
1	1	0	1	0	-6
1	1	0	0	1	-7
1	1	0	0	0	-8
1	0	1	1	1	-9
1	0	1	1	0	-10
1	0	1	0	1	-11
1	0	1	0	0	-12
1	0	0	1	1	-13
1	0	0	1	0	-14
1	0	0	0	1	-15
1	0	0	0	0	-16
0	0	0	0	0	0
0	0	0	0	1	+1
0	0	0	1	0	+2
0	0	0	1	1	+3
0	0	1	0	0	+4
0	0	1	0	1	+5
0	0	1	1	0	+6
0	0	1	1	1	+7
0	1	0	0	0	+8
0	1	0	0	1	+9
0	1	0	1	0	+10
0	1	0	1	1	+11
0	1	1	0	0	+12
0	1	1	0	1	+13
0	1	1	1	0	+14
0	1	1	1	1	+15

Table 5. 7 Adjust start pulse position by pixel

- Register R1

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	STVP3	STVP2	STVP1	STVP0	STVNT1	STVNT0	STVPAL1	STVPAL0
Default	0	0	0	0	0	0	0	0

Table 5. 8 Register R1 setting

STVP [3:0]: adjust first line position by line

STVP3	STVP2	STVP1	STVP0	STV position adjust by line
1	1	1	1	-1
1	1	1	0	-2
1	1	0	1	-3
1	1	0	0	-4
1	0	1	1	-5
1	0	1	0	-6
1	0	0	1	-7
1	0	0	0	-8
0	0	0	0	0
0	0	0	1	+1
0	0	1	0	+2
0	0	1	1	+3
0	1	0	0	+4
0	1	0	1	+5
0	1	1	0	+6
0	1	1	1	+7

Table 5. 9 Adjust first line position by line

STVNT[1:0]: Adjust the relationship of first line of active video in Odd/Even Field in NTSC mode.

00: The first line of active video in Even Field = The first line of active video in Odd Field

01: The first line of active video in Even Field = The first line of active video in Odd Field + 1

10: No Use

11: The first line of active video in Even Field = The first line of active video in Odd Field - 1

STVPAL[1:0]: Adjust the relationship of first line of active video in Odd/Even Field in PAL mode.

00: The first line of active video in Even Field = The first line of active video in Odd Field

01: The first line of active video in Even Field = The first line of active video in Odd Field + 1

l Register R2

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	LPF	RGBVPOL	OEHCTL	OVER	VS_POL	HS_POL	NPC_IN	NPC_SET
Default	1	0	1	0	1	0	1	0

Table 5. 10 Register R2 setting

LPF: Low pass filter function enable/disable in CCIR656/CCIR601 mode
LPF=”L”, Low pass filer function disable
LPF=”H”, Low pass filer function enable

RGBVPOL: RGB mode VS polarity setting
RGBVPOL =”L”, negative polarity.
RGBVPOL =”H”, positive polarity

OEHCTL: OEH signal control in PAL mode

OVER: Sets display period in ITU-R BT. 656 or 601 modes.
0 => 50.3us of active data is displayed on the panel.
1 => 53.3 us of active data is displayed on the panel.

VS_POL: CCIR601 VS polarity setting.
VS_POL=L, negative polarity.
VS_POL=H, positive polarity.

HS_POL: HS polarity setting.
HS_POL=L, negative polarity.
HS_POL=H, positive polarity.

NPC_IN: Define the NTSC/PAL mode by SPI.
NPC_IN=L, PAL.
NPC_IN=H, NTSC.

NPC_SET: Set the NTSC/PAL auto detection or define by NPC_IN.
NPC_SET=L, auto detection.
NPC_SET=H, define by NPC_IN.

l Register R3

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	AUTO_DP	DISP_ON	A_TIME1	A_TIME0	reserved	POL_OUT	DE_POL	DE_SEL
Default	1	0	0	1	0	0	0	0

Table 5. 11 Register R3 setting

AUTO_DP: When power on, select black image display time decided by A_TIME (bit5, 4) or DISP_ON (bit6).
AUTO_DP =”L”, Black image display time decided by DISP_ON (bit6).
AUTO_DP =”H”, Black image display time decided by A_TIME(bit5, 4).

DISP_ON: When AUTO_DP (bit7) = ”L”, and DISP_ON = ”H”, black image display off, then display normal image.

A_TIME: When AUTO_DP(bit7) = ”H”, the black image display time is decided by A_TIME
00: black image display time is 0.166s (10 fields)
01: black image display time is 0.332s (20 fields)
10: black image display time is 0.664s (40 fields)
11: black image display time is 1.328s (80 fields)

POL_OUT: POL phase select
POL_OUT=L, POL and VCOM are in phase.
POL_OUT=H, POL and VCOM are reverse.

DE_POL: DE signal polarity setting.
When DE_SEL=L:
DE_POL =L, positive polarity.
DE_POL =H, negative polarity.
When DE_SEL=H:
DE_POL =L, negative polarity.
DE_POL =H, positive polarity.

DE_SEL: DE mode select.
DE_SEL=L, DE signal with HS and VS signal
DE_SEL=H, DE signal only

5.8 Power ON/OFF sequence

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

Power ON: VCC, GND **à** VDD, VSS **à** V1 to V8
Power OFF: V1 to V8 **à** VDD, VSS **à** VCC, GND

5.9 Power ON Control

HX8218-C01 has a power ON sequence control function. There are two kinds of the mode. One is Auto mode, and another is Manual Mode.

Auto Mode: When power is ON, black data is outputted for 20-frames (default value) first, from the falling edge of the following Vsync signal.
It can be defined in Register R3 A_TIME1(bit5) and A_TIME0(bit4) when AUTO_DP(bit7) = ”H”

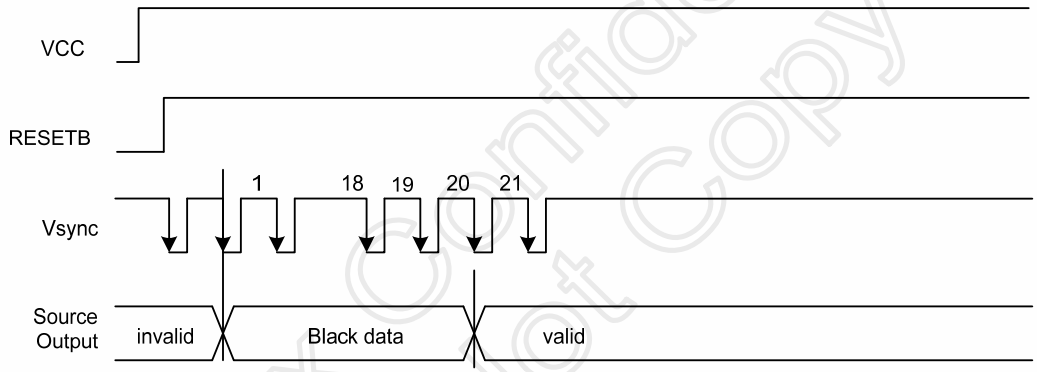


Figure 5. 5 Power on control for Auto Mode

Manual Mode: When power is ON, you should set the Register R3 AUTO_DP(bit7) = ”L” to stay at the manual mode. Black data is outputted until the DISP_ON(bit 6) = H then display the normal image.

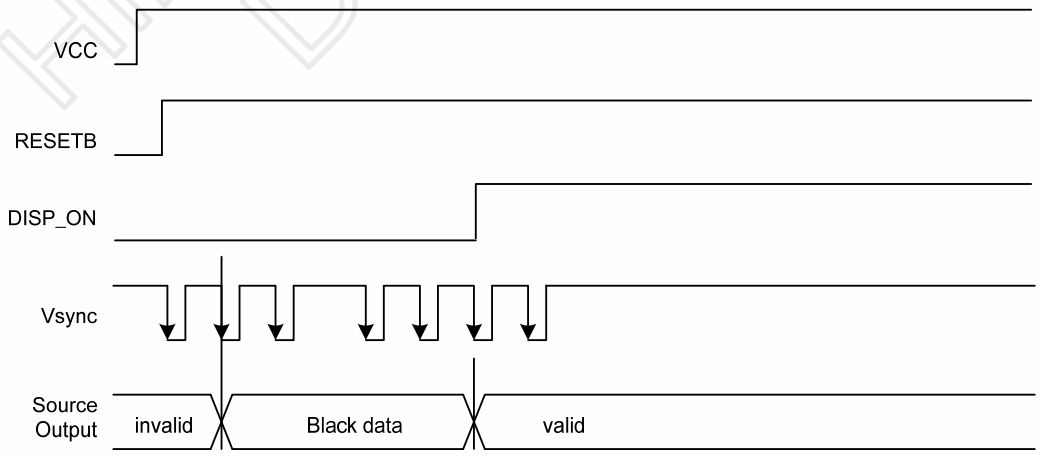


Figure 5. 6 Power on control for Manual Mode

5.10 Standby ON/OFF Control

HX8218-C01 has a power ON/OFF sequence control function. When STB pin is pulled L, blank data is outputted for 5-frames first, from the falling edge of the following VSYNC signal. The blank data would be gray level 255 for normally white LC.

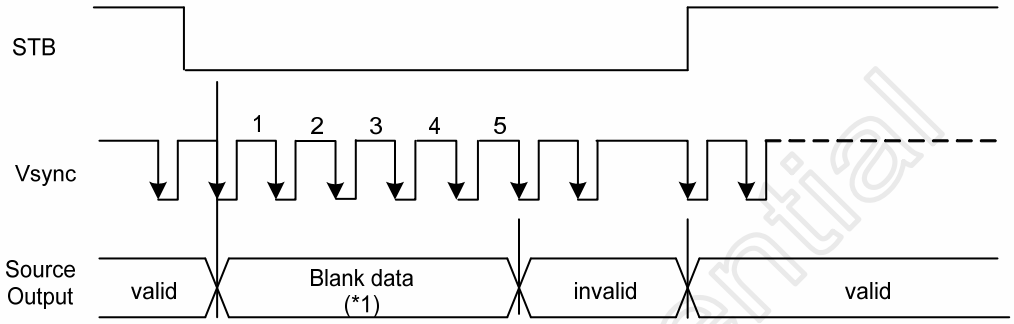


Figure 5. 7 Standby ON/OFF Control

6. DC Characteristics

6.1 Absolute Maximum Rating (GND=VSS=0V)

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Power supply voltage 1	VCC	-0.3	-	+7.0	V
Power supply voltage 2	VDD	-0.3	-	+7.0	V
Logic Output Voltage	V_{OUT}	-0.3	-	+7.0	V
Input voltage	Vin	-0.3	-	VDD+0.3	V
Operation temperature	T_{OPR}	-40	-	+85	℃
Storage temperature	T_{STG}	-55	-	+125	℃

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

6.2 DC Electrical Characteristics (GND=VSS=0V, TA=25℃)

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Power supply voltage	VCC	3	3.3	3.6	V	-
Power supply voltage	VDD	3.8	5	5.5	V	-
Low level input voltage	V_{IL}	0	-	0.3VCC	V	-
High level input voltage	V_{IH}	0.7VCC	-	VCC	V	-
Output low voltage	V_{OL}	0	-	0.2VCC	V	I_{OL}=400μA
Output high voltage	V_{OH}	0.8VCC	-	VCC	V	I_{OH}=-400μA
Input leakage current	I_{IN}	-1	-	+1	μA	No pull up or pull down.
Output voltage deviation	V_{VD}	-	±20	-	mV	QA/QB/QC1 ~ 320, V_{IN}=0.1~4.9V,
DC offset	V_{OS}	-	-	±20	mV	QA/QB/QC1 ~ 320, V_{IN}=0.1~4.9V,
Output leakage current	I_O	-1	-	+1	μA	QA/QB/QC1 ~ 320 at high impedance
Pull high resistance	R_H	150	200	250	kΩ	RESETB,STB,ZX1~3, VSET
Pull low resistance	R_L	150	200	250	kΩ	DEN,IF[2:1],MOD, CF[2:1],Dx[7:0], OSD_R,OSD_G, OSD_B,OSD_EN
Output current	I_{OH}	20	40	-	μA	QA/QB/QC1 ~ 320, V_O =4.9V vs. 4.0V, VDD=5V
Output current	I_{OL}	20	40	-	μA	QA/QB/QC1 ~ 320, Vo=0.1V vs. 1.0V, VDD=5V
Analog operating current	I_{DD}	-	-	6	mA	f_{CLK}=27MHz, f_{IHS}=15.7KHz, VDD=5V, CL=60pF
Digital operating current	I_{CC}	-	-	11	mA	f_{CLK}=27MHz, f_{IHS}=15.7KHz, VCC=3.3V
Analog standby current	I_{VDD}	-	-	2	mA	All LCD outputs are High-Z.
Digital standby current	I_{VCC}	-	16	50	μA	All inputs are stopped and outputs are High-Z.

7. AC Characteristics

7.1 Input signal characteristics

7.1.1 Digital Serial RGB interface (960x240 resolution)

PARAMETER		Symbol	Spec.			Unit
			Min.	Typ.	Max.	
CLK period		T_{OSC}	-	52	-	ns
Data setup time		T_{SU}	12	-	-	ns
Data hold time		T_{HD}	12	-	-	ns
IHS period		T_H	-	1224	-	T_{OSC}
IHS pulse width		T_{HS}	5	90	-	T_{OSC}
IHS setup time		T_{Cr}	12	-	-	ns
IHS hold time		T_{Cf}	12	-	-	ns
IVS pulse width		T_{VS}	1	3	5	T_H
IVS setup time		T_{Vr}	12	-	-	ns
IVS hold time		T_{Vf}	12	-	-	ns
IVS-DEN time	NTSC	T_{VSE}	-	18	-	T_H
	PAL	T_{VSE}	-	26	-	T_H
IHS-DEN time		T_{HE}	108	204	264	T_{OSC}
DEN pulse width		T_{EP}	-	960	-	T_{OSC}
DEN-STH time		T_{DES}	-	3	-	T_{OSC}
IVS period	NTSC	-	-	262.5	-	T_H
	PAL	-	-	312.5	-	T_H

Note: When SYNC mode is used, 1st data start from 204th CLK after IHS falling

7.1.2 Digital Parallel RGB interface (960x240 resolution)

PARAMETER		Symbol	Spec.			Unit
			Min.	Typ.	Max.	
CLK period		T_{OSC}	-	156	-	ns
Data setup time		T_{SU}	12	-	-	ns
Data hold time		T_{HD}	12	-	-	ns
IHS period		T_H	-	408	-	T_{OSC}
IHS pulse width		T_{HS}	5	30	-	T_{OSC}
IHS setup time		T_{Cr}	12	-	-	ns
IHS hold time		T_{Cf}	12	-	-	ns
IVS pulse width		T_{VS}	1	3	5	T_H
IVS setup time		T_{Vr}	12	-	-	ns
IVS hold time		T_{Vf}	12	-	-	ns
IVS-DEN time	NTSC	T_{VSE}	-	18	-	T_H
	PAL	T_{VSE}	-	26	-	T_H
IHS-DEN time		T_{HE}	36	68	88	T_{OSC}
DEN pulse width		T_{EP}	-	320	-	T_{OSC}
DEN-STH time		T_{DES}	-	1	-	T_{OSC}
IVS period	NTSC	-	-	262.5	-	T_H
	PAL	-	-	312.5	-	T_H

Note: When SYNC mode is used, 1st data start from 68th CLK after IHS falling.

7.1.3 CCIR601/656 Interface

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLK period	T_{OSC}	-	37	-	ns
Data setup time	T_{SU}	12	-	-	ns
Data hold time	T_{HD}	12	-	-	ns
IVS falling to IHS rising time for odd field	T_{HVO}	1	-	-	T_{OSC}
IVS falling to IHS falling time for even field	T_{HVE}	1	-	-	T_{OSC}

7.1.4 Hardware reset timing

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
RESETB low pulse width	T_{RSB}	10	-	-	μs
STB to Vsync Setup Time	T_{STB}	20	-	-	ns

7.2 Output signal characteristics for digital input signal

PARAMETER		Symbol	Spec.			Unit
			Min.	Typ.	Max.	
Rising time		T_r	-	-	10	ns
Falling time		T_f	-	-	10	ns
Internal STH setup time		T_{SUS}	12	-	-	ns
Internal STH hold time		T_{HDS}	12	-	-	ns
Internal data setup time		T_{SUD}	60	-	-	ns
Internal data hold time		T_{HDD}	40	-	-	ns
OEH pulse width		T_{OEH}	-	1248	-	ns
OEV pulse width		T_{OEV}	-	4992	-	ns
CKV pulse width		T_{CKV}	-	3744	-	ns
IHS-OEH time		T_1	-	4368	-	ns
IHS-CKV time		T_2	-	2496	-	ns
IHS-OEV time		T_3	-	624	-	ns
IHS-POL time		T_4	-	4368	-	ns
STV setup time		T_{SUV}	-	1872	-	ns
STV pulse width		T_{STV}	-	1	-	T_H
IVS-STV time	NTSC	T_{VS1}	-	19	-	T_H
	PAL	T_{VS1}	-	27	-	T_H
OEH-STV time		T_{OES}	-	2	-	T_H
Output settling time		T_{ST}	-	12	20	μs

8. Waveform

8.1 Timing Controller Timing Chart

8.1.1 Clock and Data waveforms

- CCIR601 (HS_POL=L in Register R2)

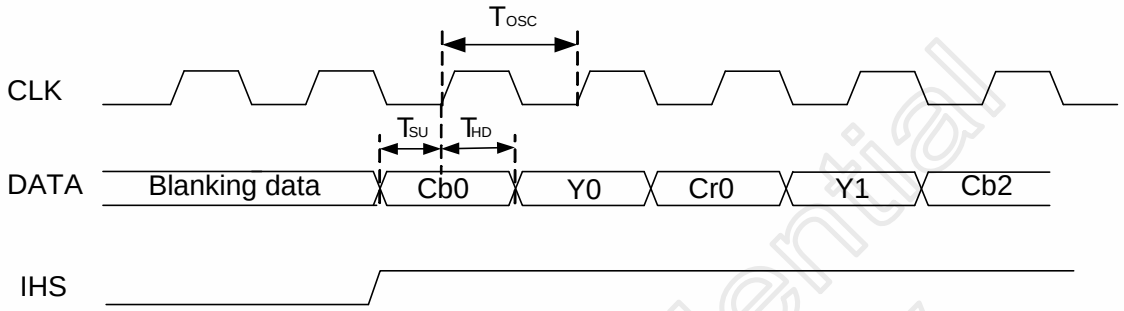


Figure 8. 1 CLK, DATA and IHS waveforms in CCIR601

- CCIR656

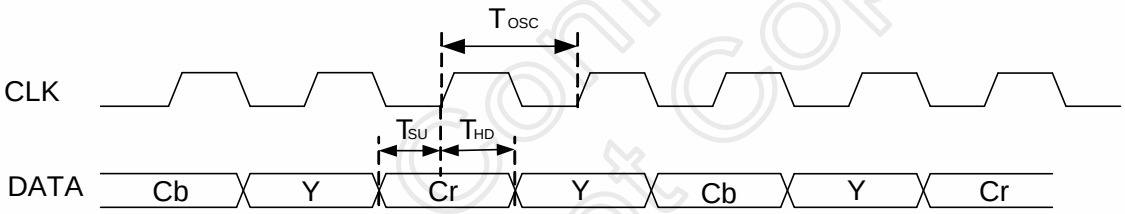


Figure 8. 2 CLK and DATA waveforms in CCIR656

- Digital Serial RGB

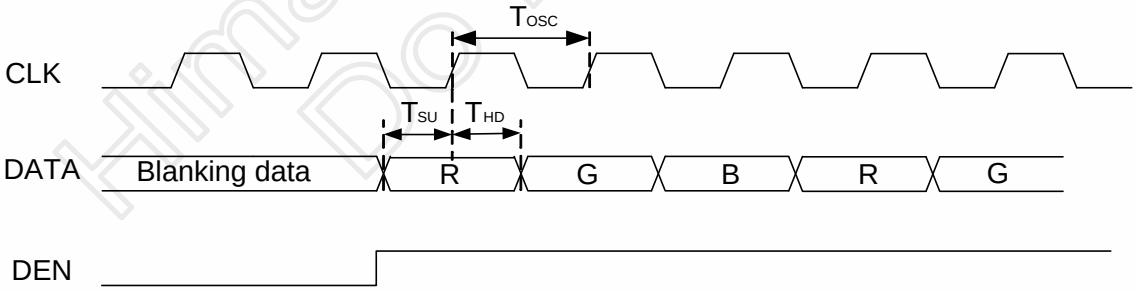


Figure 8. 3 CLK, DATA and DEN waveforms in Digital Serial RGB

Digital Parallel RGB

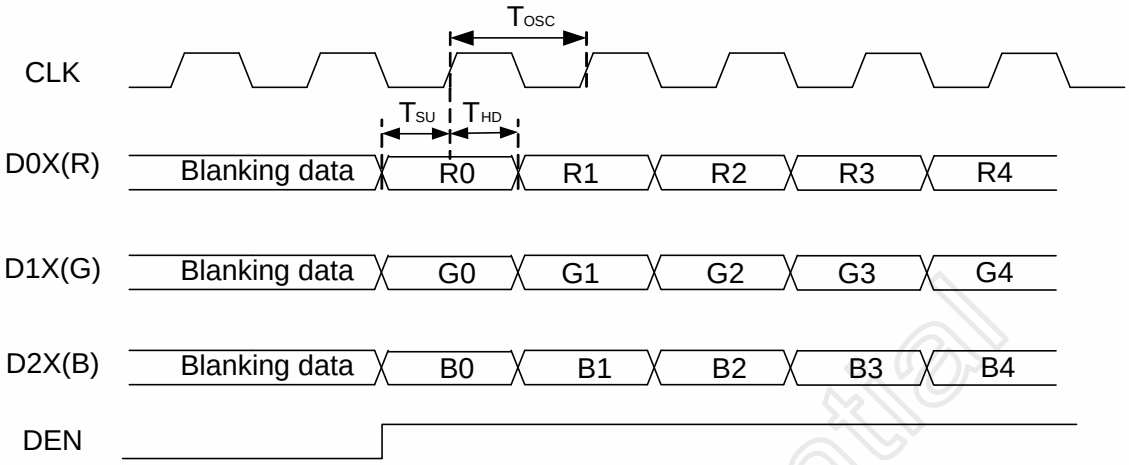


Figure 8. 4 CLK, DATA and DEN waveforms in Digital Parallel RGB

Standby ON/OFF Control

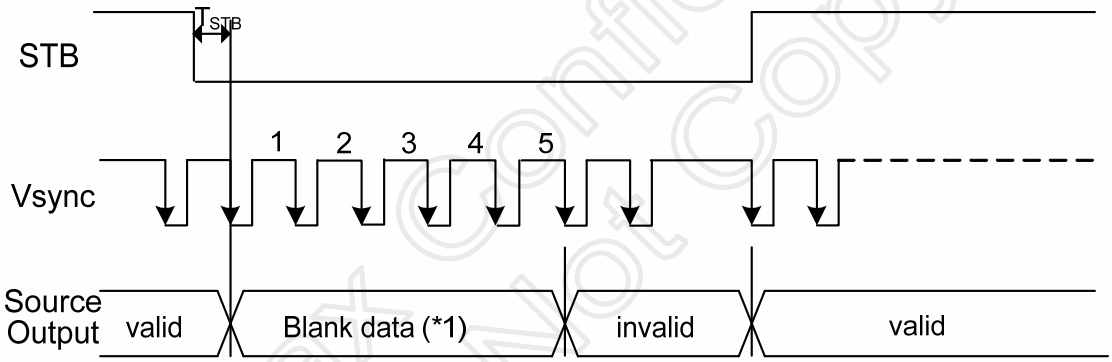


Figure 8. 5 STB, VSYNC and Source Output waveforms in Standby ON/OFF Control

8.1.2 Clock and Sync waveforms

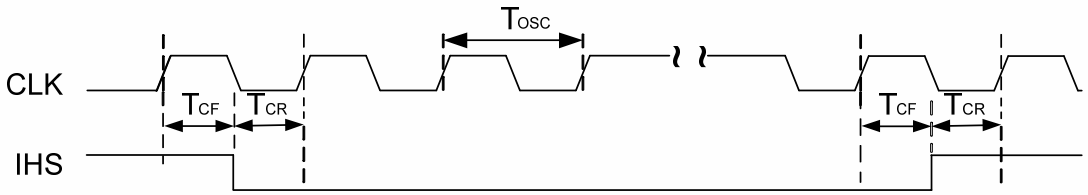


Figure 8. 6 CLK and IHS timing waveform

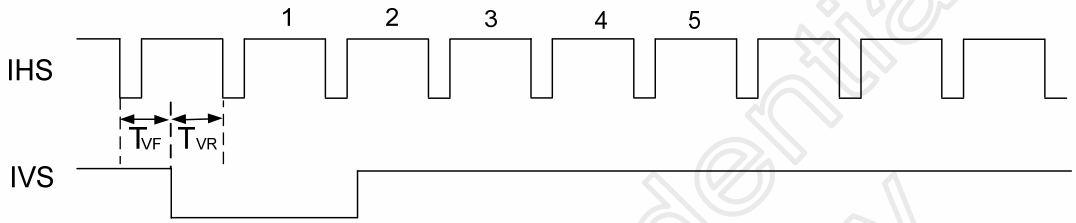


Figure 8. 7 IHS and IVS timing waveforms

8.1.3 Digital RGB timing waveform

8.1.3.1 DE Only Mode

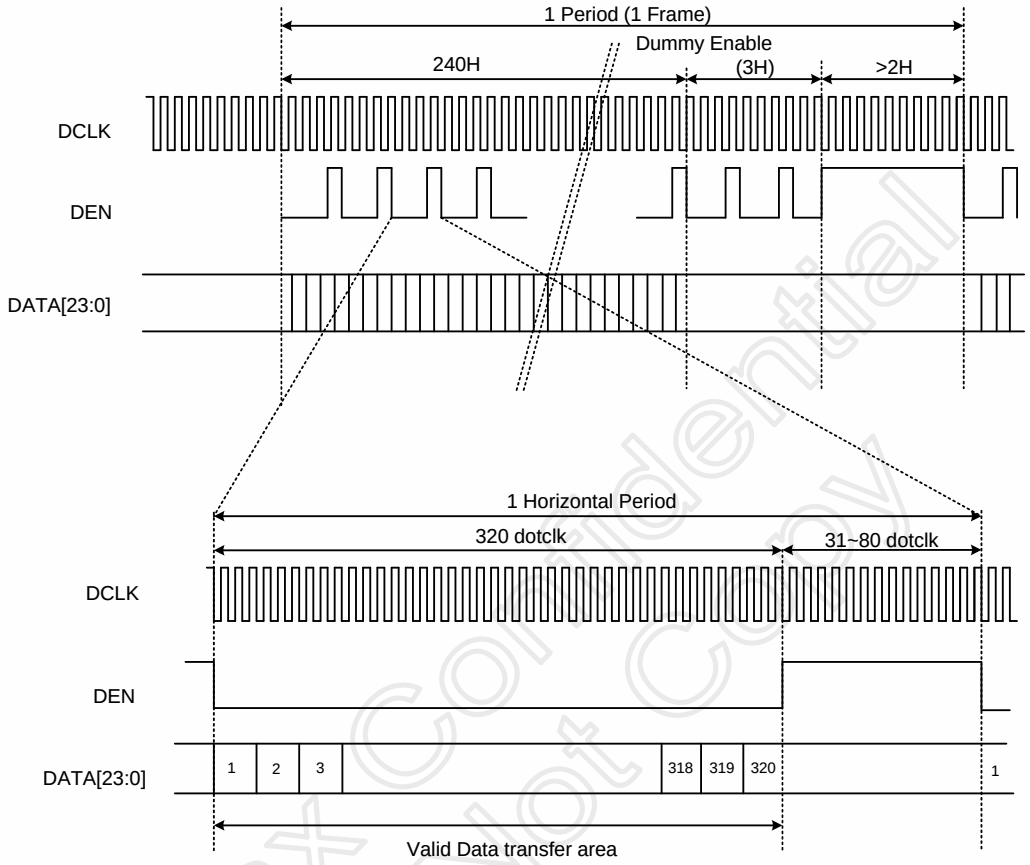


Figure 8. 8 CLK, ENABLE and DATA timing waveforms

8.1.3.2 IHS and horizontal control timing waveforms

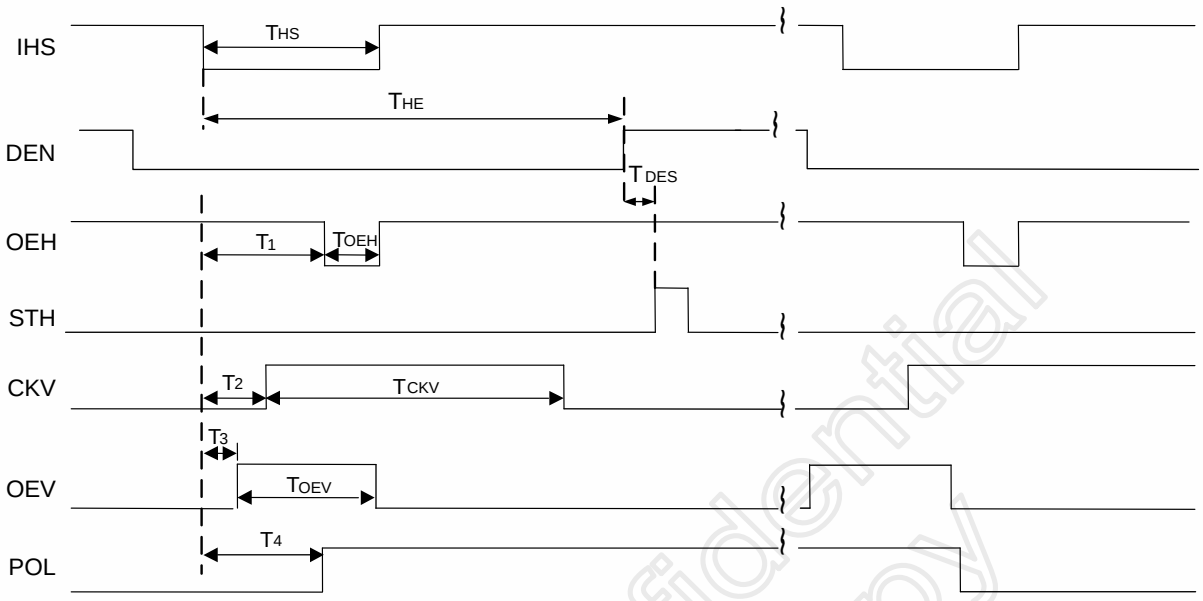


Figure 8. 9 IHS and horizontal control timing waveforms

8.1.3.3 IHS and vertical shift clock timing waveforms

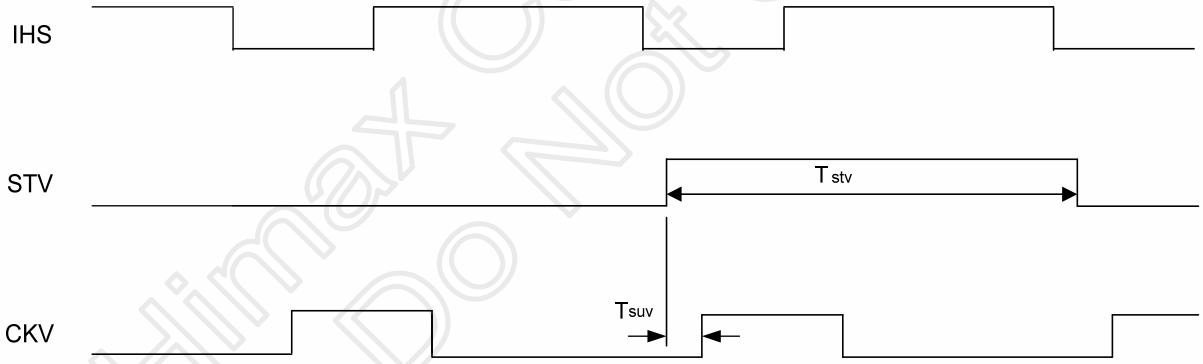


Figure 8. 10 IHS and vertical shift clock timing waveforms

8.1.3.4 IHS and vertical control timing waveforms

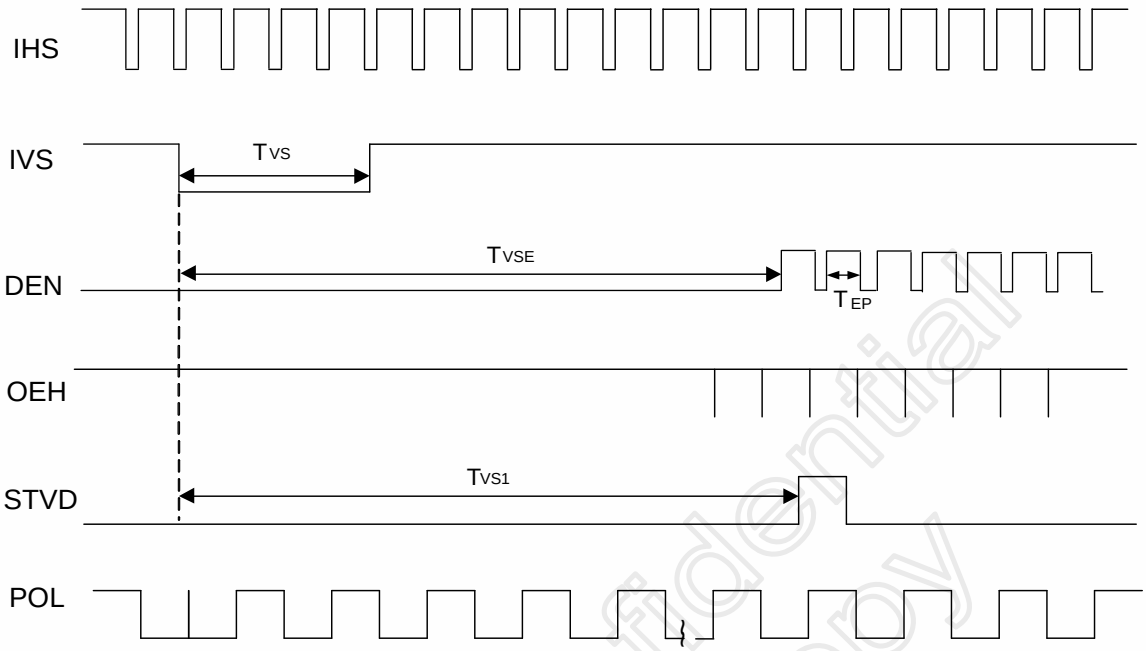


Figure 8. 11 IHS and vertical control timing waveforms

8.1.4 CCIR601 timing waveform VS_POL=H, HS_POL=L in Register R2)

8.1.4.1 IHS and IVS timing

- Odd field

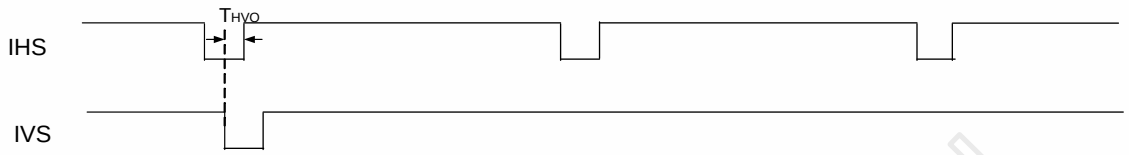


Figure 8. 12 IHS and IVS waveforms in odd field

- Even field

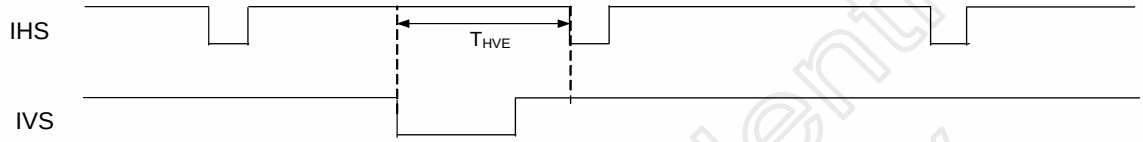


Figure 8. 13 IHS and IVS waveforms in even field

8.1.4.2 IHS and IVS timing

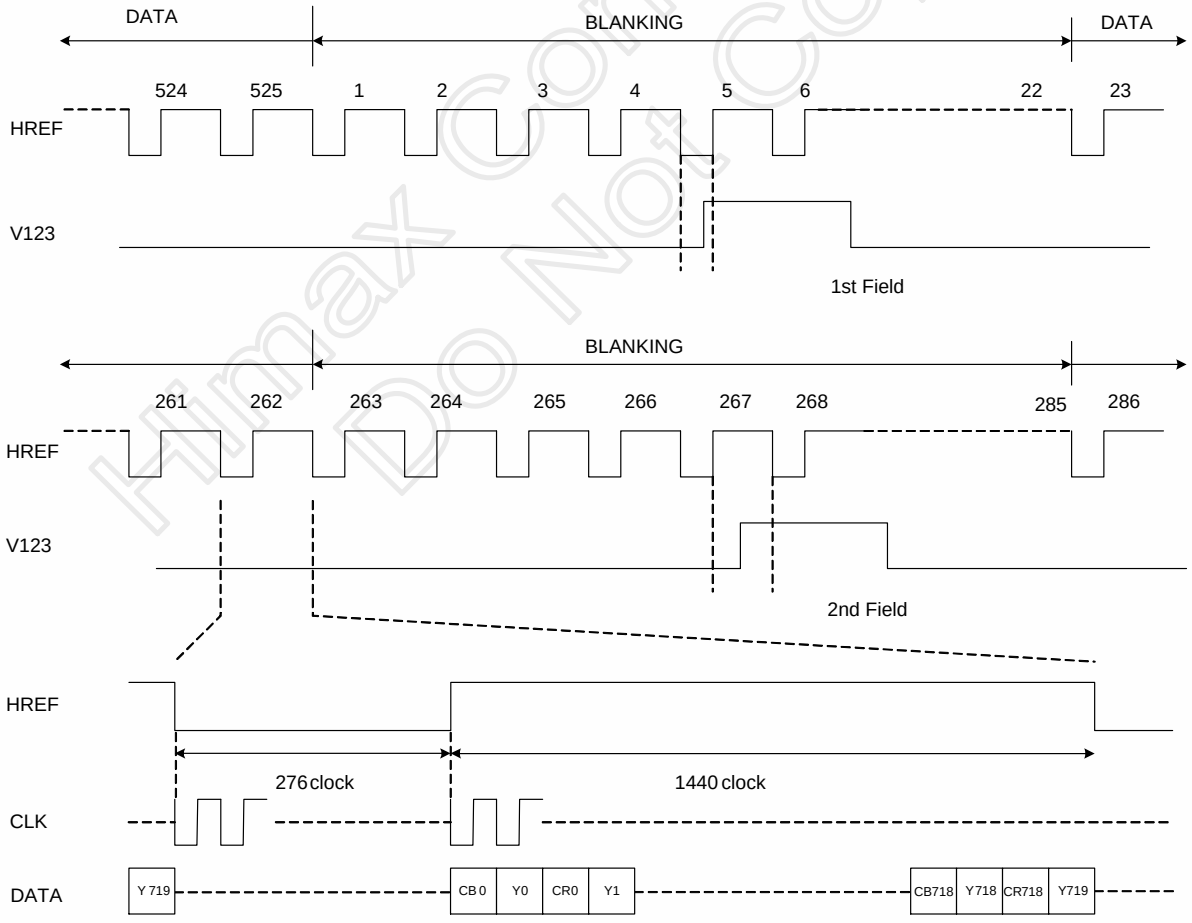


Figure 8. 14 ITU-R BT. 601 NTSC Input Timing

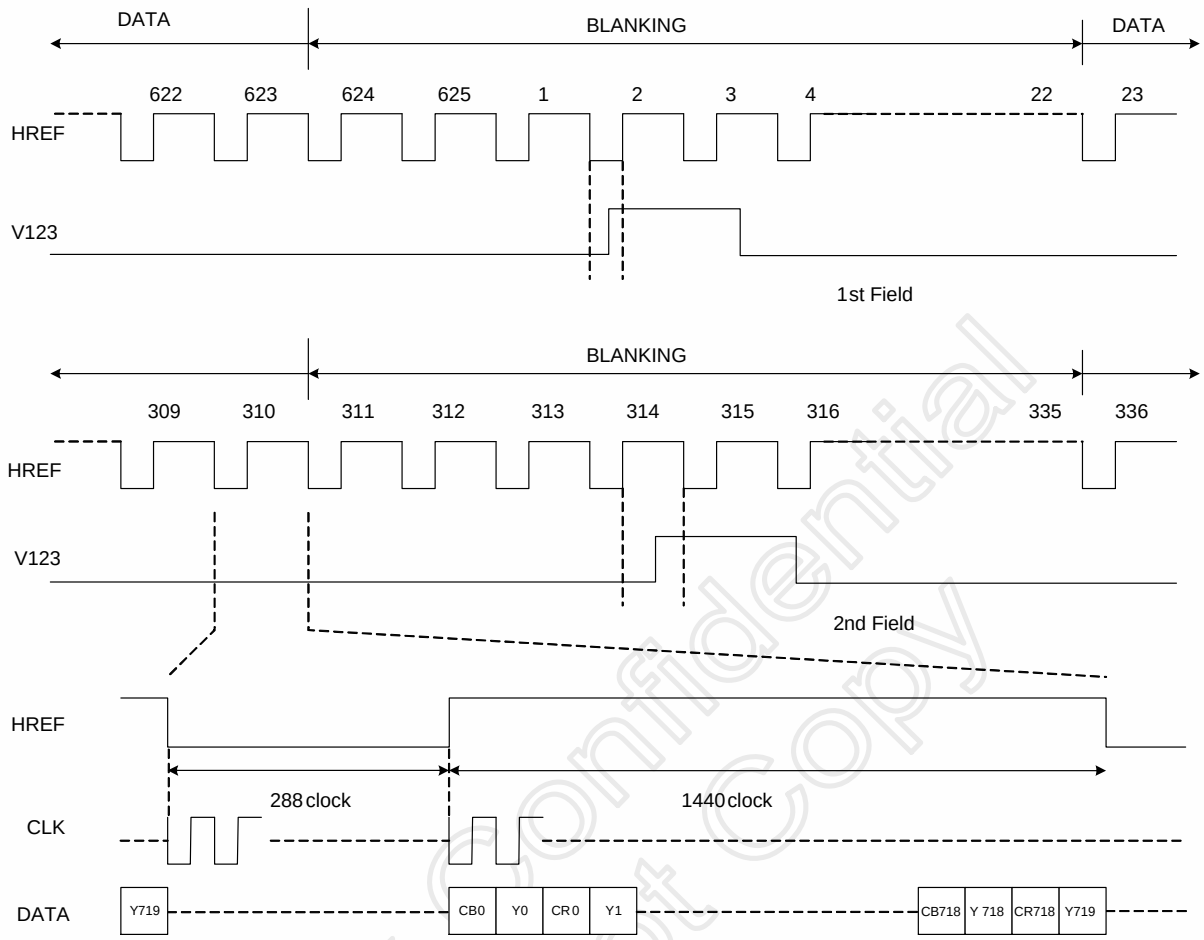


Figure 8. 15 ITU-R BT. 601 PAL Input Timing

8.2 Source Driver Timing Chart

8.2.1 Clock and Start Pulse timing waveforms

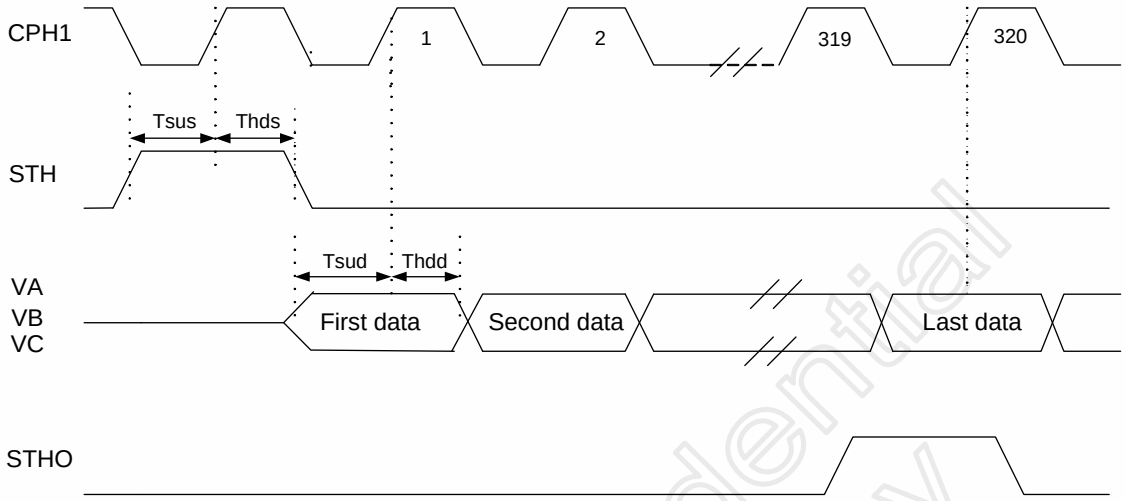


Figure 8. 16 Clock and Start Pulse timing waveforms

8.2.2 OEH and Data Output timing waveforms

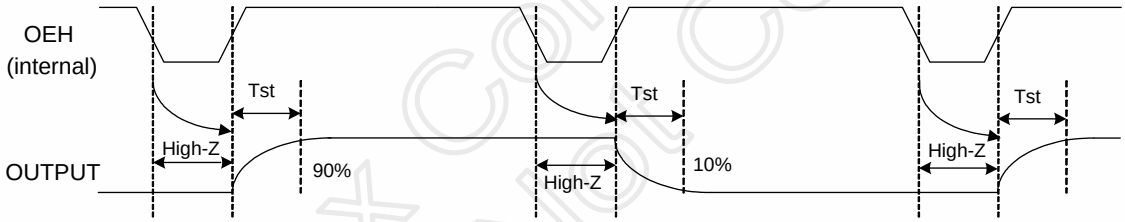


Figure 8. 17 OEH and Data Output timing waveforms

9. SPI timing characteristics

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
SPCK period	T_{CK}	60	-	-	ns
SPCK high width	T_{CKH}	30	-	-	ns
SPCK low width	T_{CKL}	30	-	-	ns
Data setup time	T_{SU1}	12	-	-	ns
Data hold time	T_{HD1}	12	-	-	ns
SPENA to SPCK setup time	T_{CS}	20	-	-	ns
SPENA to SPDA hold time	T_{CE}	20	-	-	ns
SPENA high pulse width	T_{CD}	50	-	-	ns
SPDA output latency	T_{CR}	-	1/2	-	T_{CK}

- SPI read timing

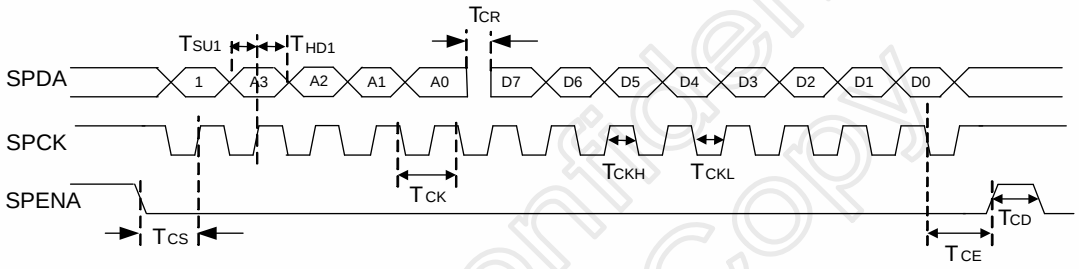


Figure 9. 1 SPI read timing

- SPI write timing

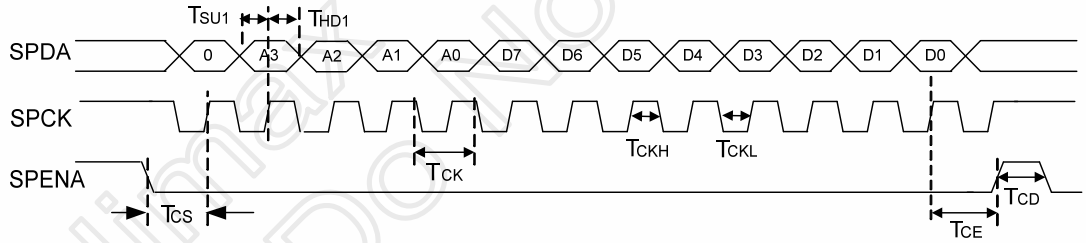
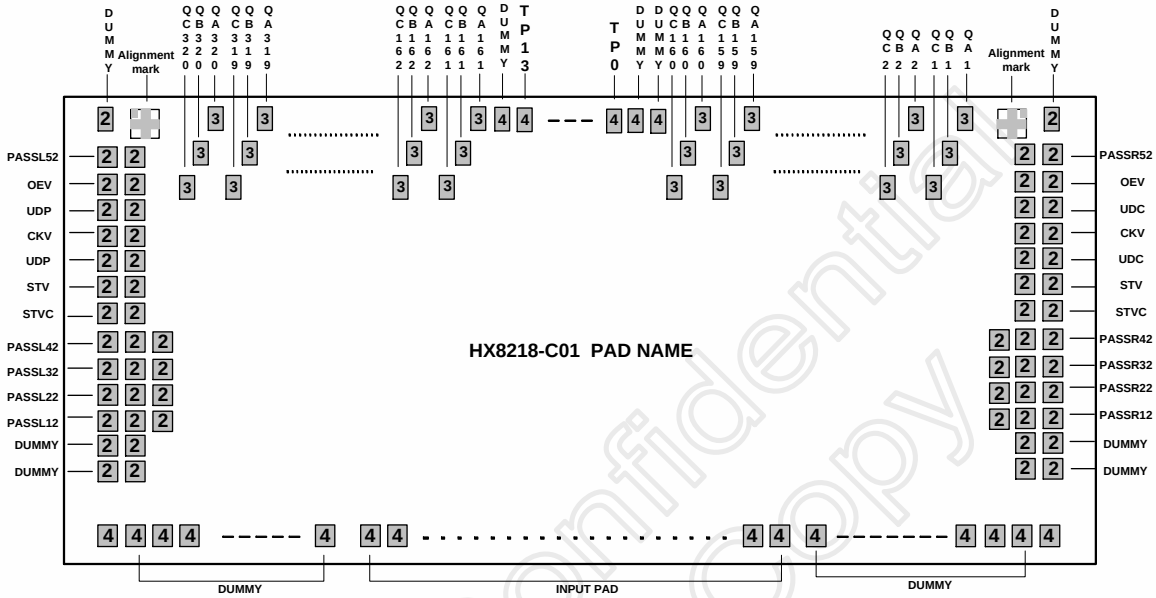
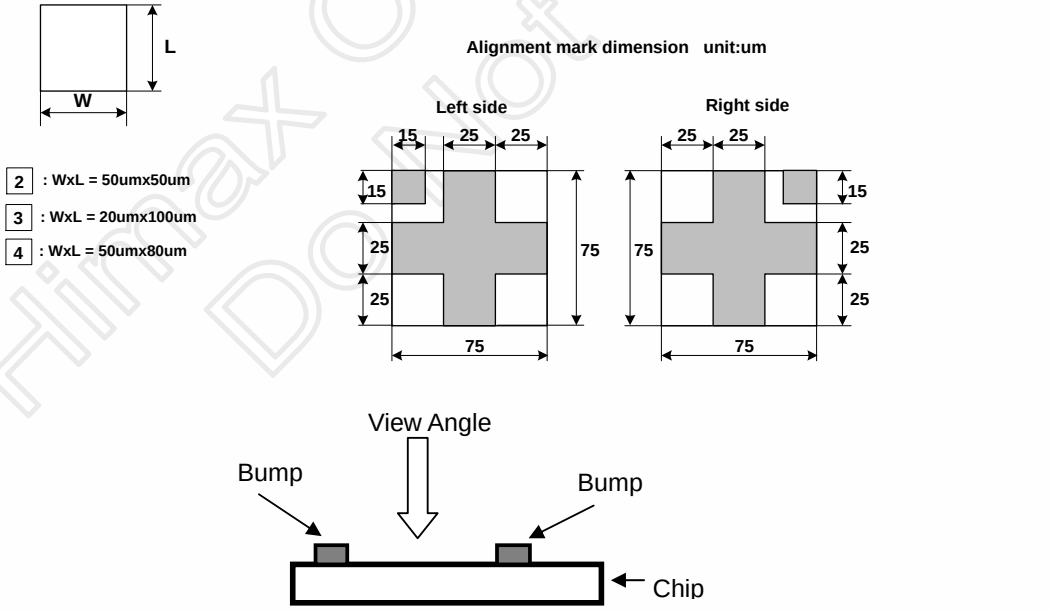


Figure 9. 2 SPI write timing

10. Bump Mask Information

- Chip size: 23533 μm x 1396 μm
- Bump height: 15 μm ± 3 μm
- Bump hardness: 60 H_V ± 15 H_V





The figure of "View Angle"

Figure 10. 1 Pad name and size information

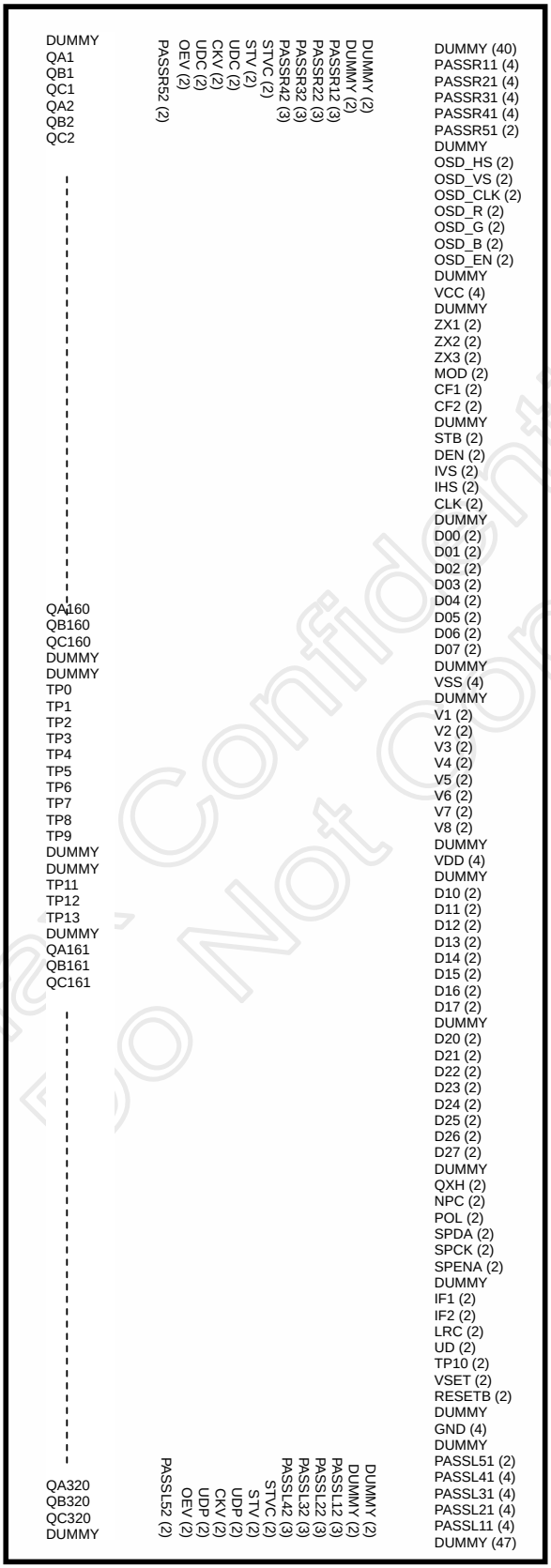


Figure 10. 2 Pin assignments

PAD Coordinate

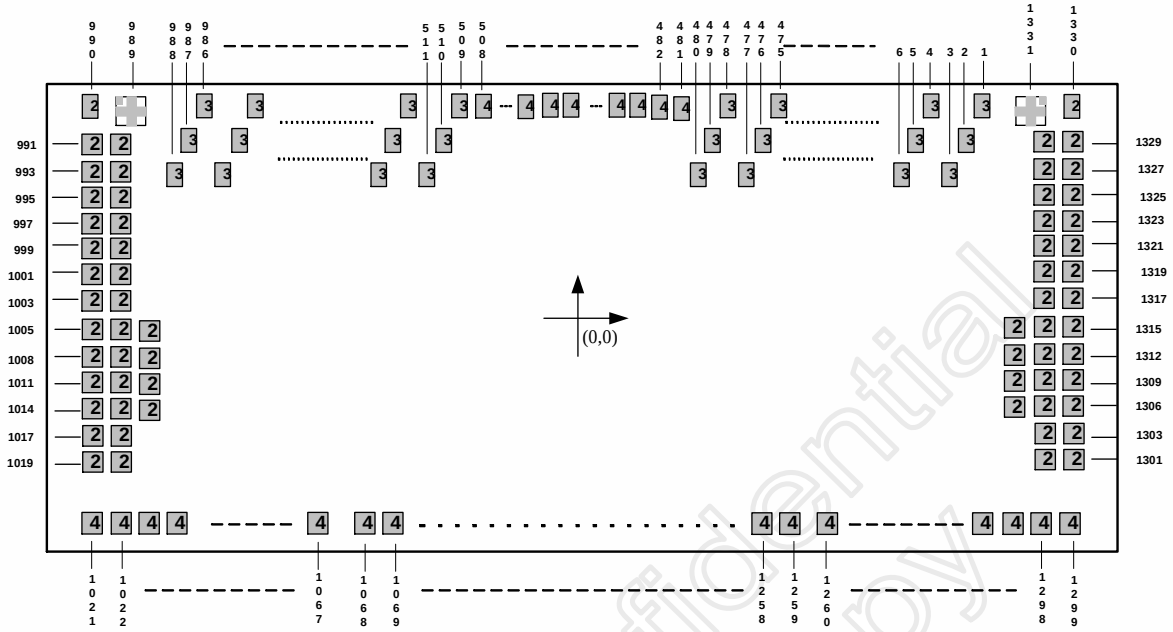
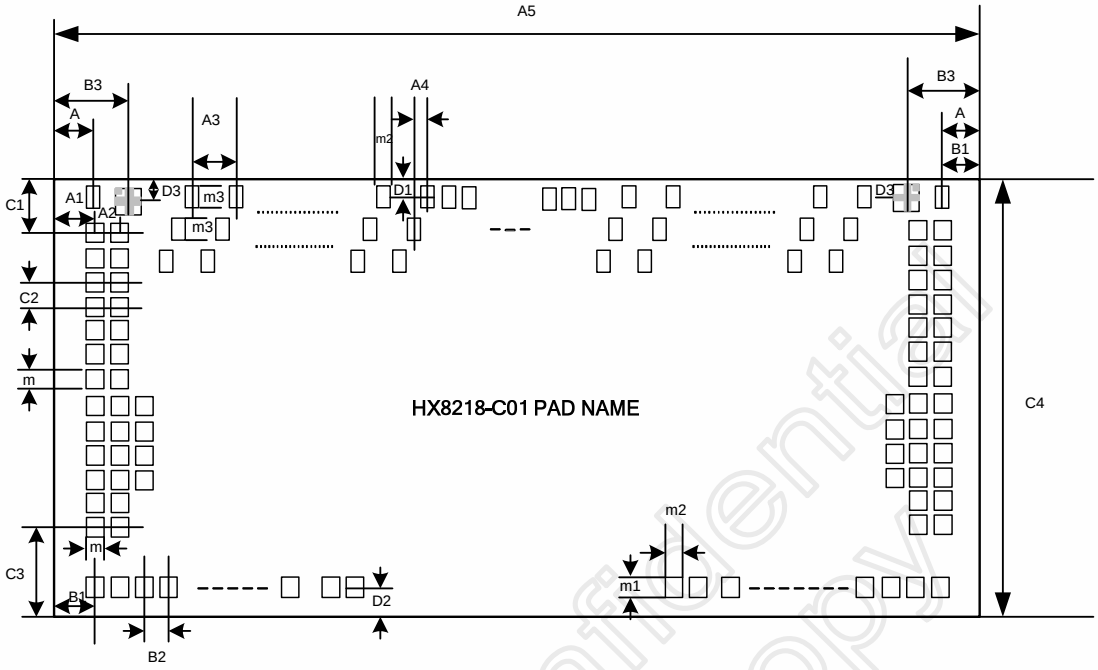


Figure 10. 3 PAD coordinate

Bump Outline Dimensions



Symbol	Dimensions in um
A	90
A1	90
A2	70
A3	60
A4	20
A5	23533
B1	90
B2	86
B3	177.5
C1	182

Symbol	Dimensions in um
C2	80
C3	254
C4	1396
D1	115
D2	105
D3	107.5
m	50
m1	80
m2	50
m3	100

Figure 10. 4 Bump Outline Dimensions

No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y
1	QA1	11451.8	583	61	QA21	10251.8	583	121	QA41	9051.8	583
2	QB1	11431.8	453	62	QB21	10231.8	453	122	QB41	9031.8	453
3	QC1	11411.8	323	63	QC21	10211.8	323	123	QC41	9011.8	323
4	QA2	11391.8	583	64	QA22	10191.8	583	124	QA42	8991.8	583
5	QB2	11371.8	453	65	QB22	10171.8	453	125	QB42	8971.8	453
6	QC2	11351.8	323	66	QC22	10151.8	323	126	QC42	8951.8	323
7	QA3	11331.8	583	67	QA23	10131.8	583	127	QA43	8931.8	583
8	QB3	11311.8	453	68	QB23	10111.8	453	128	QB43	8911.8	453
9	QC3	11291.8	323	69	QC23	10091.8	323	129	QC43	8891.8	323
10	QA4	11271.8	583	70	QA24	10071.8	583	130	QA44	8871.8	583
11	QB4	11251.8	453	71	QB24	10051.8	453	131	QB44	8851.8	453
12	QC4	11231.8	323	72	QC24	10031.8	323	132	QC44	8831.8	323
13	QA5	11211.8	583	73	QA25	10011.8	583	133	QA45	8811.8	583
14	QB5	11191.8	453	74	QB25	9991.8	453	134	QB45	8791.8	453
15	QC5	11171.8	323	75	QC25	9971.8	323	135	QC45	8771.8	323
16	QA6	11151.8	583	76	QA26	9951.8	583	136	QA46	8751.8	583
17	QB6	11131.8	453	77	QB26	9931.8	453	137	QB46	8731.8	453
18	QC6	11111.8	323	78	QC26	9911.8	323	138	QC46	8711.8	323
19	QA7	11091.8	583	79	QA27	9891.8	583	139	QA47	8691.8	583
20	QB7	11071.8	453	80	QB27	9871.8	453	140	QB47	8671.8	453
21	QC7	11051.8	323	81	QC27	9851.8	323	141	QC47	8651.8	323
22	QA8	11031.8	583	82	QA28	9831.8	583	142	QA48	8631.8	583
23	QB8	11011.8	453	83	QB28	9811.8	453	143	QB48	8611.8	453
24	QC8	10991.8	323	84	QC28	9791.8	323	144	QC48	8591.8	323
25	QA9	10971.8	583	85	QA29	9771.8	583	145	QA49	8571.8	583
26	QB9	10951.8	453	86	QB29	9751.8	453	146	QB49	8551.8	453
27	QC9	10931.8	323	87	QC29	9731.8	323	147	QC49	8531.8	323
28	QA10	10911.8	583	88	QA30	9711.8	583	148	QA50	8511.8	583
29	QB10	10891.8	453	89	QB30	9691.8	453	149	QB50	8491.8	453
30	QC10	10871.8	323	90	QC30	9671.8	323	150	QC50	8471.8	323
31	QA11	10851.8	583	91	QA31	9651.8	583	151	QA51	8451.8	583
32	QB11	10831.8	453	92	QB31	9631.8	453	152	QB51	8431.8	453
33	QC11	10811.8	323	93	QC31	9611.8	323	153	QC51	8411.8	323
34	QA12	10791.8	583	94	QA32	9591.8	583	154	QA52	8391.8	583
35	QB12	10771.8	453	95	QB32	9571.8	453	155	QB52	8371.8	453
36	QC12	10751.8	323	96	QC32	9551.8	323	156	QC52	8351.8	323
37	QA13	10731.8	583	97	QA33	9531.8	583	157	QA53	8331.8	583
38	QB13	10711.8	453	98	QB33	9511.8	453	158	QB53	8311.8	453
39	QC13	10691.8	323	99	QC33	9491.8	323	159	QC53	8291.8	323
40	QA14	10671.8	583	100	QA34	9471.8	583	160	QA54	8271.8	583
41	QB14	10651.8	453	101	QB34	9451.8	453	161	QB54	8251.8	453
42	QC14	10631.8	323	102	QC34	9431.8	323	162	QC54	8231.8	323
43	QA15	10611.8	583	103	QA35	9411.8	583	163	QA55	8211.8	583
44	QB15	10591.8	453	104	QB35	9391.8	453	164	QB55	8191.8	453
45	QC15	10571.8	323	105	QC35	9371.8	323	165	QC55	8171.8	323
46	QA16	10551.8	583	106	QA36	9351.8	583	166	QA56	8151.8	583
47	QB16	10531.8	453	107	QB36	9331.8	453	167	QB56	8131.8	453
48	QC16	10511.8	323	108	QC36	9311.8	323	168	QC56	8111.8	323
49	QA17	10491.8	583	109	QA37	9291.8	583	169	QA57	8091.8	583
50	QB17	10471.8	453	110	QB37	9271.8	453	170	QB57	8071.8	453
51	QC17	10451.8	323	111	QC37	9251.8	323	171	QC57	8051.8	323
52	QA18	10431.8	583	112	QA38	9231.8	583	172	QA58	8031.8	583
53	QB18	10411.8	453	113	QB38	9211.8	453	173	QB58	8011.8	453
54	QC18	10391.8	323	114	QC38	9191.8	323	174	QC58	7991.8	323
55	QA19	10371.8	583	115	QA39	9171.8	583	175	QA59	7971.8	583
56	QB19	10351.8	453	116	QB39	9151.8	453	176	QB59	7951.8	453
57	QC19	10331.8	323	117	QC39	9131.8	323	177	QC59	7931.8	323
58	QA20	10311.8	583	118	QA40	9111.8	583	178	QA60	7911.8	583
59	QB20	10291.8	453	119	QB40	9091.8	453	179	QB60	7891.8	453
60	QC20	10271.8	323	120	QC40	9071.8	323	180	QC60	7871.8	323

No.	Name	X	Y
181	QA61	7851.8	583
182	QB61	7831.8	453
183	QC61	7811.8	323
184	QA62	7791.8	583
185	QB62	7771.8	453
186	QC62	7751.8	323
187	QA63	7731.8	583
188	QB63	7711.8	453
189	QC63	7691.8	323
190	QA64	7671.8	583
191	QB64	7651.8	453
192	QC64	7631.8	323
193	QA65	7611.8	583
194	QB65	7591.8	453
195	QC65	7571.8	323
196	QA66	7551.8	583
197	QB66	7531.8	453
198	QC66	7511.8	323
199	QA67	7491.8	583
200	QB67	7471.8	453
201	QC67	7451.8	323
202	QA68	7431.8	583
203	QB68	7411.8	453
204	QC68	7391.8	323
205	QA69	7371.8	583
206	QB69	7351.8	453
207	QC69	7331.8	323
208	QA70	7311.8	583
209	QB70	7291.8	453
210	QC70	7271.8	323
211	QA71	7251.8	583
212	QB71	7231.8	453
213	QC71	7211.8	323
214	QA72	7191.8	583
215	QB72	7171.8	453
216	QC72	7151.8	323
217	QA73	7131.8	583
218	QB73	7111.8	453
219	QC73	7091.8	323
220	QA74	7071.8	583
221	QB74	7051.8	453
222	QC74	7031.8	323
223	QA75	7011.8	583
224	QB75	6991.8	453
225	QC75	6971.8	323
226	QA76	6951.8	583
227	QB76	6931.8	453
228	QC76	6911.8	323
229	QA77	6891.8	583
230	QB77	6871.8	453
231	QC77	6851.8	323
232	QA78	6831.8	583
233	QB78	6811.8	453
234	QC78	6791.8	323
235	QA79	6771.8	583
236	QB79	6751.8	453
237	QC79	6731.8	323
238	QA80	6711.8	583
239	QB80	6691.8	453
240	QC80	6671.8	323

No.	Name	X	Y
241	QA81	6651.8	583
242	QB81	6631.8	453
243	QC81	6611.8	323
244	QA82	6591.8	583
245	QB82	6571.8	453
246	QC82	6551.8	323
247	QA83	6531.8	583
248	QB83	6511.8	453
249	QC83	6491.8	323
250	QA84	6471.8	583
251	QB84	6451.8	453
252	QC84	6431.8	323
253	QA85	6411.8	583
254	QB85	6391.8	453
255	QC85	6371.8	323
256	QA86	6351.8	583
257	QB86	6331.8	453
258	QC86	6311.8	323
259	QA87	6291.8	583
260	QB87	6271.8	453
261	QC87	6251.8	323
262	QA88	6231.8	583
263	QB88	6211.8	453
264	QC88	6191.8	323
265	QA89	6171.8	583
266	QB89	6151.8	453
267	QC89	6131.8	323
268	QA90	6111.8	583
269	QB90	6091.8	453
270	QC90	6071.8	323
271	QA91	6051.8	583
272	QB91	6031.8	453
273	QC91	6011.8	323
274	QA92	5991.8	583
275	QB92	5971.8	453
276	QC92	5951.8	323
277	QA93	5931.8	583
278	QB93	5911.8	453
279	QC93	5891.8	323
280	QA94	5871.8	583
281	QB94	5851.8	453
282	QC94	5831.8	323
283	QA95	5811.8	583
284	QB95	5791.8	453
285	QC95	5771.8	323
286	QA96	5751.8	583
287	QB96	5731.8	453
288	QC96	5711.8	323
289	QA97	5691.8	583
290	QB97	5671.8	453
291	QC97	5651.8	323
292	QA98	5631.8	583
293	QB98	5611.8	453
294	QC98	5591.8	323
295	QA99	5571.8	583
296	QB99	5551.8	453
297	QC99	5531.8	323
298	QA100	5511.8	583
299	QB100	5491.8	453
300	QC100	5471.8	323

No.	Name	X	Y
301	QA101	5451.8	583
302	QB101	5431.8	453
303	QC101	5411.8	323
304	QA102	5391.8	583
305	QB102	5371.8	453
306	QC102	5351.8	323
307	QA103	5331.8	583
308	QB103	5311.8	453
309	QC103	5291.8	323
310	QA104	5271.8	583
311	QB104	5251.8	453
312	QC104	5231.8	323
313	QA105	5211.8	583
314	QB105	5191.8	453
315	QC105	5171.8	323
316	QA106	5151.8	583
317	QB106	5131.8	453
318	QC106	5111.8	323
319	QA107	5091.8	583
320	QB107	5071.8	453
321	QC107	5051.8	323
322	QA108	5031.8	583
323	QB108	5011.8	453
324	QC108	4991.8	323
325	QA109	4971.8	583
326	QB109	4951.8	453
327	QC109	4931.8	323
328	QA110	4911.8	583
329	QB110	4891.8	453
330	QC110	4871.8	323
331	QA111	4851.8	583
332	QB111	4831.8	453
333	QC111	4811.8	323
334	QA112	4791.8	583
335	QB112	4771.8	453
336	QC112	4751.8	323
337	QA113	4731.8	583
338	QB113	4711.8	453
339	QC113	4691.8	323
340	QA114	4671.8	583
341	QB114	4651.8	453
342	QC114	4631.8	323
343	QA115	4611.8	583
344	QB115	4591.8	453
345	QC115	4571.8	323
346	QA116	4551.8	583
347	QB116	4531.8	453
348	QC116	4511.8	323
349	QA117	4491.8	583
350	QB117	4471.8	453
351	QC117	4451.8	323
352	QA118	4431.8	583
353	QB118	4411.8	453
354	QC118	4391.8	323
355	QA119	4371.8	583
356	QB119	4351.8	453
357	QC119	4331.8	323
358	QA120	4311.8	583
359	QB120	4291.8	453
360	QC120	4271.8	323

No.	Name	X	Y
361	QA121	4251.8	583
362	QB121	4231.8	453
363	QC121	4211.8	323
364	QA122	4191.8	583
365	QB122	4171.8	453
366	QC122	4151.8	323
367	QA123	4131.8	583
368	QB123	4111.8	453
369	QC123	4091.8	323
370	QA124	4071.8	583
371	QB124	4051.8	453
372	QC124	4031.8	323
373	QA125	4011.8	583
374	QB125	3991.8	453
375	QC125	3971.8	323
376	QA126	3951.8	583
377	QB126	3931.8	453
378	QC126	3911.8	323
379	QA127	3891.8	583
380	QB127	3871.8	453
381	QC127	3851.8	323
382	QA128	3831.8	583
383	QB128	3811.8	453
384	QC128	3791.8	323
385	QA129	3771.8	583
386	QB129	3751.8	453
387	QC129	3731.8	323
388	QA130	3711.8	583
389	QB130	3691.8	453
390	QC130	3671.8	323
391	QA131	3651.8	583
392	QB131	3631.8	453
393	QC131	3611.8	323
394	QA132	3591.8	583
395	QB132	3571.8	453
396	QC132	3551.8	323
397	QA133	3531.8	583
398	QB133	3511.8	453
399	QC133	3491.8	323
400	QA134	3471.8	583
401	QB134	3451.8	453
402	QC134	3431.8	323
403	QA135	3411.8	583
404	QB135	3391.8	453
405	QC135	3371.8	323
406	QA136	3351.8	583
407	QB136	3331.8	453
408	QC136	3311.8	323
409	QA137	3291.8	583
410	QB137	3271.8	453
411	QC137	3251.8	323
412	QA138	3231.8	583
413	QB138	3211.8	453
414	QC138	3191.8	323
415	QA139	3171.8	583
416	QB139	3151.8	453
417	QC139	3131.8	323
418	QA140	3111.8	583
419	QB140	3091.8	453
420	QC140	3071.8	323
421	QA141	3051.8	583
422	QB141	3031.8	453
423	QC141	3011.8	323
424	QA142	2991.8	583
425	QB142	2971.8	453
426	QC142	2951.8	323
427	QA143	2931.8	583
428	QB143	2911.8	453
429	QC143	2891.8	323
430	QA144	2871.8	583
431	QB144	2851.8	453
432	QC144	2831.8	323
433	QA145	2811.8	583
434	QB145	2791.8	453
435	QC145	2771.8	323
436	QA146	2751.8	583
437	QB146	2731.8	453
438	QC146	2711.8	323
439	QA147	2691.8	583
440	QB147	2671.8	453
441	QC147	2651.8	323
442	QA148	2631.8	583
443	QB148	2611.8	453
444	QC148	2591.8	323
445	QA149	2571.8	583
446	QB149	2551.8	453
447	QC149	2531.8	323
448	QA150	2511.8	583
449	QB150	2491.8	453
450	QC150	2471.8	323
451	QA151	2451.8	583
452	QB151	2431.8	453
453	QC151	2411.8	323
454	QA152	2391.8	583
455	QB152	2371.8	453
456	QC152	2351.8	323
457	QA153	2331.8	583
458	QB153	2311.8	453
459	QC153	2291.8	323
460	QA154	2271.8	583
461	QB154	2251.8	453
462	QC154	2231.8	323
463	QA155	2211.8	583
464	QB155	2191.8	453
465	QC155	2171.8	323
466	QA156	2151.8	583
467	QB156	2131.8	453
468	QC156	2111.8	323
469	QA157	2091.8	583
470	QB157	2071.8	453
471	QC157	2051.8	323
472	QA158	2031.8	583
473	QB158	2011.8	453
474	QC158	1991.8	323
475	QA159	1971.8	583
476	QB159	1951.8	453
477	QC159	1931.8	323
478	QA160	1911.8	583
479	QB160	1891.8	453
480	QC160	1871.8	323
481	DUMMY	1746.6	593
482	DUMMY	1660.6	593
483	TP0	1440.6	593
484	TP0	1370.6	593
485	TP1	1155.6	593
486	TP1	1085.6	593
487	TP2	870.6	593
488	TP2	800.6	593
489	TP3	585.6	593
490	TP3	515.6	593
491	TP4	300.6	593
492	TP4	230.6	593
493	TP5	15.6	593
494	TP5	-54.4	593
495	TP6	-269.4	593
496	TP6	-339.4	593
497	TP7	-554.4	593
498	TP7	-624.4	593
499	TP8	-839.4	593
500	TP8	-909.4	593
501	TP9	-1124.4	593
502	TP9	-1194.4	593
503	DUMMY	-1296.4	593
504	DUMMY	-1382.4	593
505	TP11	-1468.4	593
506	TP12	-1554.4	593
507	TP13	-1640.4	593
508	DUMMY	-1726.4	593
509	QA161	-1866.55	583
510	QB161	-1886.55	453
511	QC161	-1906.55	323
512	QA162	-1926.55	583
513	QB162	-1946.55	453
514	QC162	-1966.55	323
515	QA163	-1986.55	583
516	QB163	-2006.55	453
517	QC163	-2026.55	323
518	QA164	-2046.55	583
519	QB164	-2066.55	453
520	QC164	-2086.55	323
521	QA165	-2106.55	583
522	QB165	-2126.55	453
523	QC165	-2146.55	323
524	QA166	-2166.55	583
525	QB166	-2186.55	453
526	QC166	-2206.55	323
527	QA167	-2226.55	583
528	QB167	-2246.55	453
529	QC167	-2266.55	323
530	QA168	-2286.55	583
531	QB168	-2306.55	453
532	QC168	-2326.55	323
533	QA169	-2346.55	583
534	QB169	-2366.55	453
535	QC169	-2386.55	323
536	QA170	-2406.55	583
537	QB170	-2426.55	453
538	QC170	-2446.55	323
539	QA171	-2466.55	583
540	QB171	-2486.55	453

No.	Name	X	Y
541	QC171	-2506.55	323
542	QA172	-2526.55	583
543	QB172	-2546.55	453
544	QC172	-2566.55	323
545	QA173	-2586.55	583
546	QB173	-2606.55	453
547	QC173	-2626.55	323
548	QA174	-2646.55	583
549	QB174	-2666.55	453
550	QC174	-2686.55	323
551	QA175	-2706.55	583
552	QB175	-2726.55	453
553	QC175	-2746.55	323
554	QA176	-2766.55	583
555	QB176	-2786.55	453
556	QC176	-2806.55	323
557	QA177	-2826.55	583
558	QB177	-2846.55	453
559	QC177	-2866.55	323
560	QA178	-2886.55	583
561	QB178	-2906.55	453
562	QC178	-2926.55	323
563	QA179	-2946.55	583
564	QB179	-2966.55	453
565	QC179	-2986.55	323
566	QA180	-3006.55	583
567	QB180	-3026.55	453
568	QC180	-3046.55	323
569	QA181	-3066.55	583
570	QB181	-3086.55	453
571	QC181	-3106.55	323
572	QA182	-3126.55	583
573	QB182	-3146.55	453
574	QC182	-3166.55	323
575	QA183	-3186.55	583
576	QB183	-3206.55	453
577	QC183	-3226.55	323
578	QA184	-3246.55	583
579	QB184	-3266.55	453
580	QC184	-3286.55	323
581	QA185	-3306.55	583
582	QB185	-3326.55	453
583	QC185	-3346.55	323
584	QA186	-3366.55	583
585	QB186	-3386.55	453
586	QC186	-3406.55	323
587	QA187	-3426.55	583
588	QB187	-3446.55	453
589	QC187	-3466.55	323
590	QA188	-3486.55	583
591	QB188	-3506.55	453
592	QC188	-3526.55	323
593	QA189	-3546.55	583
594	QB189	-3566.55	453
595	QC189	-3586.55	323
596	QA190	-3606.55	583
597	QB190	-3626.55	453
598	QC190	-3646.55	323
599	QA191	-3666.55	583
600	QB191	-3686.55	453

No.	Name	X	Y
601	QC191	-3706.55	323
602	QA192	-3726.55	583
603	QB192	-3746.55	453
604	QC192	-3766.55	323
605	QA193	-3786.55	583
606	QB193	-3806.55	453
607	QC193	-3826.55	323
608	QA194	-3846.55	583
609	QB194	-3866.55	453
610	QC194	-3886.55	323
611	QA195	-3906.55	583
612	QB195	-3926.55	453
613	QC195	-3946.55	323
614	QA196	-3966.55	583
615	QB196	-3986.55	453
616	QC196	-4006.55	323
617	QA197	-4026.55	583
618	QB197	-4046.55	453
619	QC197	-4066.55	323
620	QA198	-4086.55	583
621	QB198	-4106.55	453
622	QC198	-4126.55	323
623	QA199	-4146.55	583
624	QB199	-4166.55	453
625	QC199	-4186.55	323
626	QA200	-4206.55	583
627	QB200	-4226.55	453
628	QC200	-4246.55	323
629	QA201	-4266.55	583
630	QB201	-4286.55	453
631	QC201	-4306.55	323
632	QA202	-4326.55	583
633	QB202	-4346.55	453
634	QC202	-4366.55	323
635	QA203	-4386.55	583
636	QB203	-4406.55	453
637	QC203	-4426.55	323
638	QA204	-4446.55	583
639	QB204	-4466.55	453
640	QC204	-4486.55	323
641	QA205	-4506.55	583
642	QB205	-4526.55	453
643	QC205	-4546.55	323
644	QA206	-4566.55	583
645	QB206	-4586.55	453
646	QC206	-4606.55	323
647	QA207	-4626.55	583
648	QB207	-4646.55	453
649	QC207	-4666.55	323
650	QA208	-4686.55	583
651	QB208	-4706.55	453
652	QC208	-4726.55	323
653	QA209	-4746.55	583
654	QB209	-4766.55	453
655	QC209	-4786.55	323
656	QA210	-4806.55	583
657	QB210	-4826.55	453
658	QC210	-4846.55	323
659	QA211	-4866.55	583
660	QB211	-4886.55	453

No.	Name	X	Y
661	QC211	-4906.55	323
662	QA212	-4926.55	583
663	QB212	-4946.55	453
664	QC212	-4966.55	323
665	QA213	-4986.55	583
666	QB213	-5006.55	453
667	QC213	-5026.55	323
668	QA214	-5046.55	583
669	QB214	-5066.55	453
670	QC214	-5086.55	323
671	QA215	-5106.55	583
672	QB215	-5126.55	453
673	QC215	-5146.55	323
674	QA216	-5166.55	583
675	QB216	-5186.55	453
676	QC216	-5206.55	323
677	QA217	-5226.55	583
678	QB217	-5246.55	453
679	QC217	-5266.55	323
680	QA218	-5286.55	583
681	QB218	-5306.55	453
682	QC218	-5326.55	323
683	QA219	-5346.55	583
684	QB219	-5366.55	453
685	QC219	-5386.55	323
686	QA220	-5406.55	583
687	QB220	-5426.55	453
688	QC220	-5446.55	323
689	QA221	-5466.55	583
690	QB221	-5486.55	453
691	QC221	-5506.55	323
692	QA222	-5526.55	583
693	QB222	-5546.55	453
694	QC222	-5566.55	323
695	QA223	-5586.55	583
696	QB223	-5606.55	453
697	QC223	-5626.55	323
698	QA224	-5646.55	583
699	QB224	-5666.55	453
700	QC224	-5686.55	323
701	QA225	-5706.55	583
702	QB225	-5726.55	453
703	QC225	-5746.55	323
704	QA226	-5766.55	583
705	QB226	-5786.55	453
706	QC226	-5806.55	323
707	QA227	-5826.55	583
708	QB227	-5846.55	453
709	QC227	-5866.55	323
710	QA228	-5886.55	583
711	QB228	-5906.55	453
712	QC228	-5926.55	323
713	QA229	-5946.55	583
714	QB229	-5966.55	453
715	QC229	-5986.55	323
716	QA230	-6006.55	583
717	QB230	-6026.55	453
718	QC230	-6046.55	323
719	QA231	-6066.55	583
720	QB231	-6086.55	453

No.	Name	X	Y
721	QC231	-6106.55	323
722	QA232	-6126.55	583
723	QB232	-6146.55	453
724	QC232	-6166.55	323
725	QA233	-6186.55	583
726	QB233	-6206.55	453
727	QC233	-6226.55	323
728	QA234	-6246.55	583
729	QB234	-6266.55	453
730	QC234	-6286.55	323
731	QA235	-6306.55	583
732	QB235	-6326.55	453
733	QC235	-6346.55	323
734	QA236	-6366.55	583
735	QB236	-6386.55	453
736	QC236	-6406.55	323
737	QA237	-6426.55	583
738	QB237	-6446.55	453
739	QC237	-6466.55	323
740	QA238	-6486.55	583
741	QB238	-6506.55	453
742	QC238	-6526.55	323
743	QA239	-6546.55	583
744	QB239	-6566.55	453
745	QC239	-6586.55	323
746	QA240	-6606.55	583
747	QB240	-6626.55	453
748	QC240	-6646.55	323
749	QA241	-6666.55	583
750	QB241	-6686.55	453
751	QC241	-6706.55	323
752	QA242	-6726.55	583
753	QB242	-6746.55	453
754	QC242	-6766.55	323
755	QA243	-6786.55	583
756	QB243	-6806.55	453
757	QC243	-6826.55	323
758	QA244	-6846.55	583
759	QB244	-6866.55	453
760	QC244	-6886.55	323
761	QA245	-6906.55	583
762	QB245	-6926.55	453
763	QC245	-6946.55	323
764	QA246	-6966.55	583
765	QB246	-6986.55	453
766	QC246	-7006.55	323
767	QA247	-7026.55	583
768	QB247	-7046.55	453
769	QC247	-7066.55	323
770	QA248	-7086.55	583
771	QB248	-7106.55	453
772	QC248	-7126.55	323
773	QA249	-7146.55	583
774	QB249	-7166.55	453
775	QC249	-7186.55	323
776	QA250	-7206.55	583
777	QB250	-7226.55	453
778	QC250	-7246.55	323
779	QA251	-7266.55	583
780	QB251	-7286.55	453

No.	Name	X	Y
781	QC251	-7306.55	323
782	QA252	-7326.55	583
783	QB252	-7346.55	453
784	QC252	-7366.55	323
785	QA253	-7386.55	583
786	QB253	-7406.55	453
787	QC253	-7426.55	323
788	QA254	-7446.55	583
789	QB254	-7466.55	453
790	QC254	-7486.55	323
791	QA255	-7506.55	583
792	QB255	-7526.55	453
793	QC255	-7546.55	323
794	QA256	-7566.55	583
795	QB256	-7586.55	453
796	QC256	-7606.55	323
797	QA257	-7626.55	583
798	QB257	-7646.55	453
799	QC257	-7666.55	323
800	QA258	-7686.55	583
801	QB258	-7706.55	453
802	QC258	-7726.55	323
803	QA259	-7746.55	583
804	QB259	-7766.55	453
805	QC259	-7786.55	323
806	QA260	-7806.55	583
807	QB260	-7826.55	453
808	QC260	-7846.55	323
809	QA261	-7866.55	583
810	QB261	-7886.55	453
811	QC261	-7906.55	323
812	QA262	-7926.55	583
813	QB262	-7946.55	453
814	QC262	-7966.55	323
815	QA263	-7986.55	583
816	QB263	-8006.55	453
817	QC263	-8026.55	323
818	QA264	-8046.55	583
819	QB264	-8066.55	453
820	QC264	-8086.55	323
821	QA265	-8106.55	583
822	QB265	-8126.55	453
823	QC265	-8146.55	323
824	QA266	-8166.55	583
825	QB266	-8186.55	453
826	QC266	-8206.55	323
827	QA267	-8226.55	583
828	QB267	-8246.55	453
829	QC267	-8266.55	323
830	QA268	-8286.55	583
831	QB268	-8306.55	453
832	QC268	-8326.55	323
833	QA269	-8346.55	583
834	QB269	-8366.55	453
835	QC269	-8386.55	323
836	QA270	-8406.55	583
837	QB270	-8426.55	453
838	QC270	-8446.55	323
839	QA271	-8466.55	583
840	QB271	-8486.55	453

No.	Name	X	Y
841	QC271	-8506.55	323
842	QA272	-8526.55	583
843	QB272	-8546.55	453
844	QC272	-8566.55	323
845	QA273	-8586.55	583
846	QB273	-8606.55	453
847	QC273	-8626.55	323
848	QA274	-8646.55	583
849	QB274	-8666.55	453
850	QC274	-8686.55	323
851	QA275	-8706.55	583
852	QB275	-8726.55	453
853	QC275	-8746.55	323
854	QA276	-8766.55	583
855	QB276	-8786.55	453
856	QC276	-8806.55	323
857	QA277	-8826.55	583
858	QB277	-8846.55	453
859	QC277	-8866.55	323
860	QA278	-8886.55	583
861	QB278	-8906.55	453
862	QC278	-8926.55	323
863	QA279	-8946.55	583
864	QB279	-8966.55	453
865	QC279	-8986.55	323
866	QA280	-9006.55	583
867	QB280	-9026.55	453
868	QC280	-9046.55	323
869	QA281	-9066.55	583
870	QB281	-9086.55	453
871	QC281	-9106.55	323
872	QA282	-9126.55	583
873	QB282	-9146.55	453
874	QC282	-9166.55	323
875	QA283	-9186.55	583
876	QB283	-9206.55	453
877	QC283	-9226.55	323
878	QA284	-9246.55	583
879	QB284	-9266.55	453
880	QC284	-9286.55	323
881	QA285	-9306.55	583
882	QB285	-9326.55	453
883	QC285	-9346.55	323
884	QA286	-9366.55	583
885	QB286	-9386.55	453
886	QC286	-9406.55	323
887	QA287	-9426.55	583
888	QB287	-9446.55	453
889	QC287	-9466.55	323
890	QA288	-9486.55	583
891	QB288	-9506.55	453
892	QC288	-9526.55	323
893	QA289	-9546.55	583
894	QB289	-9566.55	453
895	QC289	-9586.55	323
896	QA290	-9606.55	583
897	QB290	-9626.55	453
898	QC290	-9646.55	323
899	QA291	-9666.55	583
900	QB291	-9686.55	453

No.	Name	X	Y
901	QC291	-9706.55	323
902	QA292	-9726.55	583
903	QB292	-9746.55	453
904	QC292	-9766.55	323
905	QA293	-9786.55	583
906	QB293	-9806.55	453
907	QC293	-9826.55	323
908	QA294	-9846.55	583
909	QB294	-9866.55	453
910	QC294	-9886.55	323
911	QA295	-9906.55	583
912	QB295	-9926.55	453
913	QC295	-9946.55	323
914	QA296	-9966.55	583
915	QB296	-9986.55	453
916	QC296	-10006.55	323
917	QA297	-10026.55	583
918	QB297	-10046.55	453
919	QC297	-10066.55	323
920	QA298	-10086.55	583
921	QB298	-10106.55	453
922	QC298	-10126.55	323
923	QA299	-10146.55	583
924	QB299	-10166.55	453
925	QC299	-10186.55	323
926	QA300	-10206.55	583
927	QB300	-10226.55	453
928	QC300	-10246.55	323
929	QA301	-10266.55	583
930	QB301	-10286.55	453
931	QC301	-10306.55	323
932	QA302	-10326.55	583
933	QB302	-10346.55	453
934	QC302	-10366.55	323
935	QA303	-10386.55	583
936	QB303	-10406.55	453
937	QC303	-10426.55	323
938	QA304	-10446.55	583
939	QB304	-10466.55	453
940	QC304	-10486.55	323
941	QA305	-10506.55	583
942	QB305	-10526.55	453
943	QC305	-10546.55	323
944	QA306	-10566.55	583
945	QB306	-10586.55	453
946	QC306	-10606.55	323
947	QA307	-10626.55	583
948	QB307	-10646.55	453
949	QC307	-10666.55	323
950	QA308	-10686.55	583
951	QB308	-10706.55	453
952	QC308	-10726.55	323
953	QA309	-10746.55	583
954	QB309	-10766.55	453
955	QC309	-10786.55	323
956	QA310	-10806.55	583
957	QB310	-10826.55	453
958	QC310	-10846.55	323
959	QA311	-10866.55	583
960	QB311	-10886.55	453

No.	Name	X	Y
961	QC311	-10906.55	323
962	QA312	-10926.55	583
963	QB312	-10946.55	453
964	QC312	-10966.55	323
965	QA313	-10986.55	583
966	QB313	-11006.55	453
967	QC313	-11026.55	323
968	QA314	-11046.55	583
969	QB314	-11066.55	453
970	QC314	-11086.55	323
971	QA315	-11106.55	583
972	QB315	-11126.55	453
973	QC315	-11146.55	323
974	QA316	-11166.55	583
975	QB316	-11186.55	453
976	QC316	-11206.55	323
977	QA317	-11226.55	583
978	QB317	-11246.55	453
979	QC317	-11266.55	323
980	QA318	-11286.55	583
981	QB318	-11306.55	453
982	QC318	-11326.55	323
983	QA319	-11346.55	583
984	QB319	-11366.55	453
985	QC319	-11386.55	323
986	QA320	-11406.55	583
987	QB320	-11426.55	453
988	QC320	-11446.55	323
989	L alignment	-11589	590.5
990	DUMMY	-11676.5	608
991	PASSL52	-11676.5	516
992	PASSL52	-11606.5	516
993	OEV	-11676.5	436
994	OEV	-11606.5	436
995	UDP	-11676.5	356
996	UDP	-11606.5	356
997	CKV	-11676.5	276
998	CKV	-11606.5	276
999	UDP	-11676.5	196
1000	UDP	-11606.5	196
1001	STV	-11676.5	116
1002	STV	-11606.5	116
1003	STVC	-11676.5	36
1004	STVC	-11606.5	36
1005	PASSL42	-11676.5	-44
1006	PASSL42	-11606.5	-44
1007	PASSL42	-11536.5	-44
1008	PASSL32	-11676.5	-124
1009	PASSL32	-11606.5	-124
1010	PASSL32	-11536.5	-124
1011	PASSL22	-11676.5	-204
1012	PASSL22	-11606.5	-204
1013	PASSL22	-11536.5	-204
1014	PASSL12	-11676.5	-284
1015	PASSL12	-11606.5	-284
1016	PASSL12	-11536.5	-284
1017	DUMMY	-11676.5	-364
1018	DUMMY	-11606.5	-364
1019	DUMMY	-11676.5	-444
1020	DUMMY	-11606.5	-444

No.	Name	X	Y
1021	DUMMY	-11676.5	-593
1022	DUMMY	-11590.45	-593
1023	DUMMY	-11504.45	-593
1024	DUMMY	-11418.45	-593
1025	DUMMY	-11332.45	-593
1026	DUMMY	-11246.45	-593
1027	DUMMY	-11160.45	-593
1028	DUMMY	-11074.45	-593
1029	DUMMY	-10988.45	-593
1030	DUMMY	-10902.45	-593
1031	DUMMY	-10816.45	-593
1032	DUMMY	-10730.45	-593
1033	DUMMY	-10644.45	-593
1034	DUMMY	-10558.45	-593
1035	DUMMY	-10472.45	-593
1036	DUMMY	-10386.45	-593
1037	DUMMY	-10300.45	-593
1038	DUMMY	-10214.45	-593
1039	DUMMY	-10128.45	-593
1040	DUMMY	-10042.45	-593
1041	DUMMY	-9956.45	-593
1042	DUMMY	-9870.45	-593
1043	DUMMY	-9784.45	-593
1044	DUMMY	-9698.45	-593
1045	DUMMY	-9612.45	-593
1046	DUMMY	-9526.45	-593
1047	DUMMY	-9440.45	-593
1048	DUMMY	-9354.45	-593
1049	DUMMY	-9268.45	-593
1050	DUMMY	-9182.45	-593
1051	DUMMY	-9096.45	-593
1052	DUMMY	-9010.45	-593
1053	DUMMY	-8924.45	-593
1054	DUMMY	-8838.45	-593
1055	DUMMY	-8752.45	-593
1056	DUMMY	-8666.45	-593
1057	DUMMY	-8580.45	-593
1058	DUMMY	-8494.45	-593
1059	DUMMY	-8408.45	-593
1060	DUMMY	-8322.45	-593
1061	DUMMY	-8236.45	-593
1062	DUMMY	-8150.45	-593
1063	DUMMY	-8064.45	-593
1064	DUMMY	-7978.45	-593
1065	DUMMY	-7892.45	-593
1066	DUMMY	-7806.45	-593
1067	DUMMY	-7720.45	-593
1068	PASSL11	-7634.45	-593
1069	PASSL11	-7564.45	-593
1070	PASSL11	-7494.45	-593
1071	PASSL11	-7424.45	-593
1072	PASSL21	-7338.45	-593
1073	PASSL21	-7268.45	-593
1074	PASSL21	-7198.45	-593
1075	PASSL21	-7128.45	-593
1076	PASSL31	-7042.45	-593
1077	PASSL31	-6972.45	-593
1078	PASSL31	-6902.45	-593
1079	PASSL31	-6832.45	-593
1080	PASSL41	-6746.45	-593

No.	Name	X	Y
1081	PASSL41	-6676.45	-593
1082	PASSL41	-6606.45	-593
1083	PASSL41	-6536.45	-593
1084	PASSL51	-6450.45	-593
1085	PASSL51	-6380.45	-593
1086	DUMMY	-6294.45	-593
1087	GND	-6208.45	-593
1088	GND	-6138.45	-593
1089	GND	-6068.45	-593
1090	GND	-5998.45	-593
1091	DUMMY	-5912.45	-593
1092	RESETB	-5826.45	-593
1093	RESETB	-5756.45	-593
1094	VSET	-5670.45	-593
1095	VSET	-5600.45	-593
1096	TP10	-5514.45	-593
1097	TP10	-5444.45	-593
1098	UD	-5269.45	-593
1099	UD	-5199.45	-593
1100	LRC	-5113.45	-593
1101	LRC	-5043.45	-593
1102	IF2	-4957.45	-593
1103	IF2	-4887.45	-593
1104	IF1	-4801.45	-593
1105	IF1	-4731.45	-593
1106	DUMMY	-4645.45	-593
1107	SPENA	-4559.45	-593
1108	SPENA	-4489.45	-593
1109	SPCK	-4403.45	-593
1110	SPCK	-4333.45	-593
1111	SPDA	-4247.45	-593
1112	SPDA	-4177.45	-593
1113	POL	-3947.45	-593
1114	POL	-3877.45	-593
1115	NPC	-3662.45	-593
1116	NPC	-3592.45	-593
1117	QXH	-3377.45	-593
1118	QXH	-3307.45	-593
1119	DUMMY	-3092.45	-593
1120	D27	-3006.45	-593
1121	D27	-2936.45	-593
1122	D26	-2850.45	-593
1123	D26	-2780.45	-593
1124	D25	-2694.45	-593
1125	D25	-2624.45	-593
1126	D24	-2538.45	-593
1127	D24	-2468.45	-593
1128	D23	-2382.45	-593
1129	D23	-2312.45	-593
1130	D22	-2226.45	-593
1131	D22	-2156.45	-593
1132	D21	-2070.45	-593
1133	D21	-2000.45	-593
1134	D20	-1914.45	-593
1135	D20	-1844.45	-593
1136	DUMMY	-1758.45	-593
1137	D17	-1672.45	-593
1138	D17	-1602.45	-593
1139	D16	-1516.45	-593
1140	D16	-1446.45	-593

No.	Name	X	Y
1141	D15	-1360.45	-593
1142	D15	-1290.45	-593
1143	D14	-1204.45	-593
1144	D14	-1134.45	-593
1145	D13	-1048.45	-593
1146	D13	-978.45	-593
1147	D12	-892.45	-593
1148	D12	-822.45	-593
1149	D11	-736.45	-593
1150	D11	-666.45	-593
1151	D10	-580.45	-593
1152	D10	-510.45	-593
1153	DUMMY	-424.45	-593
1154	VDD	-338.45	-593
1155	VDD	-268.45	-593
1156	VDD	-198.45	-593
1157	VDD	-128.45	-593
1158	DUMMY	-42.45	-593
1159	V8	43.55	-593
1160	V8	113.55	-593
1161	V7	199.55	-593
1162	V7	269.55	-593
1163	V6	355.55	-593
1164	V6	425.55	-593
1165	V5	511.55	-593
1166	V5	581.55	-593
1167	V4	667.55	-593
1168	V4	737.55	-593
1169	V3	823.55	-593
1170	V3	893.55	-593
1171	V2	979.55	-593
1172	V2	1049.55	-593
1173	V1	1135.55	-593
1174	V1	1205.55	-593
1175	DUMMY	1291.55	-593
1176	VSS	1377.55	-593
1177	VSS	1447.55	-593
1178	VSS	1517.55	-593
1179	VSS	1587.55	-593
1180	DUMMY	1673.55	-593
1181	D07	1759.55	-593
1182	D07	1829.55	-593
1183	D06	1915.55	-593
1184	D06	1985.55	-593
1185	D05	2071.55	-593
1186	D05	2141.55	-593
1187	D04	2227.55	-593
1188	D04	2297.55	-593
1189	D03	2383.55	-593
1190	D03	2453.55	-593
1191	D02	2539.55	-593
1192	D02	2609.55	-593
1193	D01	2695.55	-593
1194	D01	2765.55	-593
1195	D00	2851.55	-593
1196	D00	2921.55	-593
1197	DUMMY	3007.55	-593
1198	CLK	3093.55	-593
1199	CLK	3163.55	-593
1200	IHS	3249.55	-593

No.	Name	X	Y
1201	IHS	3319.55	-593
1202	IVS	3405.55	-593
1203	IVS	3475.55	-593
1204	DEN	3561.55	-593
1205	DEN	3631.55	-593
1206	STB	3717.55	-593
1207	STB	3787.55	-593
1208	DUMMY	3873.55	-593
1209	CF2	3959.55	-593
1210	CF2	4029.55	-593
1211	CF1	4115.55	-593
1212	CF1	4185.55	-593
1213	MOD	4271.55	-593
1214	MOD	4341.55	-593
1215	ZX3	4427.55	-593
1216	ZX3	4497.55	-593
1217	ZX2	4583.55	-593
1218	ZX2	4653.55	-593
1219	ZX1	4739.55	-593
1220	ZX1	4809.55	-593
1221	DUMMY	4895.55	-593
1222	VCC	4981.55	-593
1223	VCC	5051.55	-593
1224	VCC	5121.55	-593
1225	VCC	5191.55	-593
1226	DUMMY	5277.55	-593
1227	OSD_EN	5363.55	-593
1228	OSD_EN	5433.55	-593
1229	OSD_B	5519.55	-593
1230	OSD_B	5589.55	-593
1231	OSD_G	5675.55	-593
1232	OSD_G	5745.55	-593
1233	OSD_R	5831.55	-593
1234	OSD_R	5901.55	-593
1235	OSD_CLK	5987.55	-593
1236	OSD_CLK	6057.55	-593
1237	OSD_VS	6272.55	-593
1238	OSD_VS	6342.55	-593
1239	OSD_HS	6557.55	-593
1240	OSD_HS	6627.55	-593
1241	DUMMY	6842.55	-593
1242	PASSR51	6928.55	-593
1243	PASSR51	6998.55	-593
1244	PASSR41	7084.55	-593
1245	PASSR41	7154.55	-593
1246	PASSR41	7224.55	-593
1247	PASSR41	7294.55	-593
1248	PASSR31	7380.55	-593
1249	PASSR31	7450.55	-593
1250	PASSR31	7520.55	-593
1251	PASSR31	7590.55	-593
1252	PASSR21	7676.55	-593
1253	PASSR21	7746.55	-593
1254	PASSR21	7816.55	-593
1255	PASSR21	7886.55	-593
1256	PASSR11	7972.55	-593
1257	PASSR11	8042.55	-593
1258	PASSR11	8112.55	-593
1259	PASSR11	8182.55	-593
1260	DUMMY	8268.55	-593

No.	Name	X	Y
1261	DUMMY	8354.55	-593
1262	DUMMY	8440.55	-593
1263	DUMMY	8526.55	-593
1264	DUMMY	8612.55	-593
1265	DUMMY	8698.55	-593
1266	DUMMY	8784.55	-593
1267	DUMMY	8870.55	-593
1268	DUMMY	8956.55	-593
1269	DUMMY	9042.55	-593
1270	DUMMY	9128.55	-593
1271	DUMMY	9214.55	-593
1272	DUMMY	9300.55	-593
1273	DUMMY	9386.55	-593
1274	DUMMY	9472.55	-593
1275	DUMMY	9558.55	-593
1276	DUMMY	9644.55	-593
1277	DUMMY	9730.55	-593
1278	DUMMY	9816.55	-593
1279	DUMMY	9902.55	-593
1280	DUMMY	9988.55	-593
1281	DUMMY	10074.55	-593
1282	DUMMY	10160.55	-593
1283	DUMMY	10246.55	-593
1284	DUMMY	10332.55	-593
1285	DUMMY	10418.55	-593
1286	DUMMY	10504.55	-593
1287	DUMMY	10590.55	-593
1288	DUMMY	10676.55	-593
1289	DUMMY	10762.55	-593
1290	DUMMY	10848.55	-593
1291	DUMMY	10934.55	-593
1292	DUMMY	11020.55	-593
1293	DUMMY	11106.55	-593
1294	DUMMY	11192.55	-593
1295	DUMMY	11278.55	-593
1296	DUMMY	11364.55	-593
1297	DUMMY	11450.55	-593
1298	DUMMY	11536.55	-593
1299	DUMMY	11676.5	-593
1300	DUMMY	11606.5	-444
1301	DUMMY	11676.5	-444
1302	DUMMY	11606.5	-364
1303	DUMMY	11676.5	-364
1304	PASSR12	11536.5	-284
1305	PASSR12	11606.5	-284
1306	PASSR12	11676.5	-284
1307	PASSR22	11536.5	-204
1308	PASSR22	11606.5	-204
1309	PASSR22	11676.5	-204
1310	PASSR32	11536.5	-124
1311	PASSR32	11606.5	-124
1312	PASSR32	11676.5	-124
1313	PASSR42	11536.5	-44
1314	PASSR42	11606.5	-44
1315	PASSR42	11676.5	-44
1316	STVC	11606.5	36
1317	STVC	11676.5	36
1318	STV	11606.5	116
1319	STV	11676.5	116
1320	UDC	11606.5	196

No.	Name	X	Y
1321	UDC	11676.5	196
1322	CKV	11606.5	276
1323	CKV	11676.5	276
1324	UDC	11606.5	356
1325	UDC	11676.5	356
1326	OEV	11606.5	436
1327	OEV	11676.5	436
1328	PASSR52	11606.5	516
1329	PASSR52	11676.5	516
1330	DUMMY	11676.5	608
1331	R alignment	11589	590.5

11. Ordering Information

PART NO.	PACKAGE TYPE
HX8218-C010PDxxx	PD : mean COG xxx : mean chip thickness (μm) , (default 400μm)

12. Revision History

Version	EFF.DATE	DESCRIPTION OF CHANGES
01	2005/11/17	New setup
02	2006/02/06	Update the gamma table
	2006/04/10	Revised Operation temperature
03	2006/07/20	Update the resistor value of the gamma table
04	2006/10/09	All pages Remove 'preliminary' wording from the data sheet. Page 38 Add "Bump Outline Dimensions".