

2013-12-12 CSPAD DSD Alignment

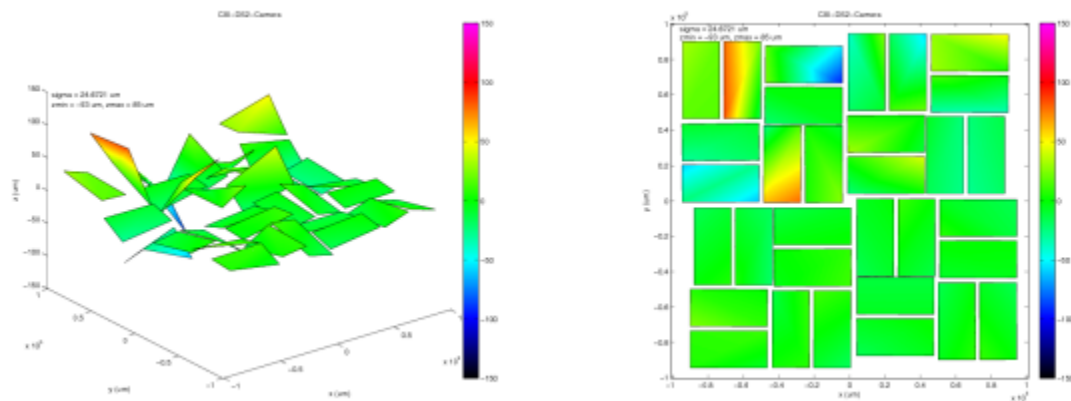
Content

- [Content](#)
- [Optical measurement](#)
- [Quality check](#)
 - [Evaluated parameters](#)
 - [Quality check summary table](#)
- [Geometry parameters](#)

Optical measurement

- [2013-12-12-CSPAD-CXI-DSD-Metrology.xlsx](#)- file from Gabriel Blaj
- [2013-12-12-CSPAD-CXI-DSD-Metrology.txt](#) - text version of this file.

Plots from Gabriel Blaj:



Quality check

Evaluated parameters

We calculate

S1 - 1st short side length of 2x1

S2 - 2nd short side length of 2x1

L1 - 1st long side length of 2x1

L2 - 2nd long side length of 2x1

D1 - 1st diagonal of 2x1 between corners 1 and 3

D2 - 2nd diagonal of 2x1 between corners 2 and 4

dS and dL are the deviations of the 1st and 2nd corner along the short and long sides, respectively. The sign of all dS are chosen in order to provide correct sign for the tilt angle (the same direction for all 2x1 sensors).

<dS/L> - the tilt angle of 2x1 averaged over two sides in radians.

angle(deg) - the same angle in degrees.

dD = D1 - D2

d(dS) = dS1 - dS2

d(dL) = dL1 - dL2

dz3(um) - signed distance from 2x1 sensor plane and corner 3, where the 2x1 sensor plane contains the corner points p1, p2, and p4. This plane is defined by the vectors v21=p2-p1, v41=p4-p1, and their orthogonal vector

$$\text{vort} = [\text{v21} \times \text{v41}].$$

Scalar product with normalization defines the distance from point 3 to the 2x1 plane containing 3 other points:

$$\text{dz3} = (\text{v31} \cdot \text{vort}) / |\text{vort}|.$$

Everything, excluding <dS/L> and angle(deg), are in micrometers.

pair: D2	S1 d(DS)	S2 d(dL)	dS1 dz3(um)	dS2	L1	L2	dL1	dL2	<dS/L>	angle(deg)	D1
Quad 0											
pair: 0	20919	20917	-100	-102	43553	43543	38	28	-0.00232	-0.13289	48297
48325	-28	2	10	24.999							
pair: 1	20914	20903	161	150	43546	43538	-74	-82	0.00357	0.20462	48299
48305	-6	11	8	-35.011							
pair: 2	20905	20916	362	351	43557	43528	202	173	0.00819	0.46910	48319
48290	29	11	29	-11.023							
pair: 3	20894	20904	113	103	43547	43563	68	84	0.00248	0.14207	48331
48287	44	10	-16	68.070							
pair: 4	20912	20909	-3	-6	43543	43550	6	13	-0.00010	-0.00592	48313
48300	13	3	-7	40.995							
pair: 5	20914	20911	35	32	43541	43549	-19	-11	0.00077	0.04408	48307
48305	2	3	-8	-10.994							
pair: 6	20913	20917	-141	-145	43545	43537	-62	-70	-0.00328	-0.18817	48306
48301	5	4	8	45.977							
pair: 7	20912	20914	-117	-119	43552	43546	-49	-55	-0.00271	-0.15525	48314
48306	8	2	6	-17.005							
Quad 1											
pair: 0	20921	20913	52	44	43554	43544	-28	-38	0.00110	0.06315	48302
48320	-18	8	10	-38.995							
pair: 1	20917	20899	9	-9	43552	43549	-3	-6	-0.00000	-0.00000	48305
48313	-8	18	3	-14.040							
pair: 2	20903	20904	-73	-74	43538	43535	-30	-33	-0.00169	-0.09673	48298
48291	7	1	3	46.002							
pair: 3	20908	20913	-54	-59	43548	43538	-14	-24	-0.00130	-0.07435	48311
48296	15	5	10	-53.992							
pair: 4	20895	20906	-231	-220	43539	43545	113	119	-0.00518	-0.29673	48306
48292	14	-11	-6	13.037							
pair: 5	20904	20910	-219	-213	43537	43554	99	116	-0.00496	-0.28421	48308
48301	7	-6	-17	-48.989							
pair: 6	20904	20896	-137	-129	43543	43525	-55	-73	-0.00306	-0.17504	48291
48291	0	-8	18	-1.025							
pair: 7	20906	20904	-105	-103	43547	43544	-42	-45	-0.00239	-0.13684	48309
48297	12	-2	3	6.996							
Quad 2											
pair: 0	20898	20907	-48	-39	43539	43543	18	22	-0.00100	-0.05724	48297
48299	-2	-9	-4	-4.004							
pair: 1	20908	20903	149	144	43546	43543	-65	-68	0.00336	0.19276	48306
48299	7	5	3	-1.003							
pair: 2	20903	20906	-35	-38	43535	43536	-13	-12	-0.00084	-0.04804	48298
48289	9	3	-1	-3.999							
pair: 3	20894	20903	6	-3	43539	43535	1	-3	0.00003	0.00197	48291
48294	-3	9	4	10.015							
pair: 4	20898	20908	98	108	43541	43542	-5				

pair: 0	20910	20907	130	127	43544	43543	-63	-64	0.00295	0.16908	48301
48305	-4	3	1	6.002							
pair: 1	20910	20901	-9	-18	43556	43544	9	-3	-0.00031	-0.01776	48304
48310	-6	9	12	-4.012							
pair: 2	20897	20909	34	22	43539	43539	16	16	0.00064	0.03685	48299
48294	5	12	0	-17.990							
pair: 3	20902	20902	-55	-55	43538	43541	-29	-26	-0.00126	-0.07238	48295
48297	-2	0	-3	-3.006							
pair: 4	20907	20903	-144	-148	43544	43539	70	65	-0.00335	-0.19212	48297
48302	-5	4	5	-11.007							
pair: 5	20909	20908	-46	-47	43539	43547	20	28	-0.00107	-0.06119	48304
48301	3	1	-8	-14.983							
pair: 6	20909	20906	-44	-41	43541	43537	-17	-21	-0.00098	-0.05593	48300
48297	3	-3	4	-0.001							
pair: 7	20907	20910	-29	-32	43549	43543	-9	-15	-0.00070	-0.04013	48307
48303	4	3	6	-15.985							

Summary for quality check

- Most of x-y measurements are within 10um precision
- Maximal deviation in Z is 68 um
- 2x1 angles are in the range from -0.30 to 0.47 degree

Geometry parameters

✓ center/0-end.data (pixel)

198.00	197.73	310.27	97.79	629.31	629.34	710.69	498.12
198.34	198.09	310.62	98.23	628.10	629.40	712.32	499.68
197.83	197.78	308.72	96.45	627.78	627.34	710.35	497.33
198.21	198.14	310.38	98.07	629.26	629.87	712.20	499.92
309.06	95.84	626.48	625.92	514.60	727.14	198.40	199.58
307.47	95.15	625.03	625.74	512.14	724.54	197.55	198.37
308.64	95.77	625.29	625.88	515.59	728.23	199.09	200.24
307.33	95.05	624.08	624.66	514.08	726.79	198.05	198.45
0.86	0.25	1.13	0.59	1.91	2.09	0.86	0.73
0.64	0.55	0.81	0.58	1.07	1.58	0.92	0.71
0.17	0.15	0.23	0.01	0.51	0.49	0.59	0.38
0.07	0.26	-0.16	-0.60	0.67	0.33	1.11	0.65

or the same in um:

21764	21734	34105	10749	69174	69177	78119	54753
21801	21773	34143	10797	69040	69183	78298	54925
21745	21739	33934	10601	69005	68957	78081	54666
21787	21779	34116	10779	69167	69235	78284	54951
33972	10534	68862	68801	56564	79926	21808	21938
33797	10458	68703	68781	56294	79641	21714	21804
33926	10527	68732	68797	56673	80046	21884	22010
33782	10448	68598	68662	56507	79888	21770	21813
94	27	124	65	209	229	95	80
70	60	89	64	117	173	101	77
19	16	25	1	56	54	65	42
7	29	-17	-66	73	36	122	71

✓ tilt/0-end.data (degree)

-0.13289	0.20462	0.46910	0.14207	-0.00592	0.04408	-0.18817	-0.15525
0.06315	-0.00000	-0.09673	-0.07435	-0.29673	-0.28421	-0.17504	-0.13684
-0.05724	0.19276	-0.04804	0.00197	0.13554	0.22173	0.15463	-0.02434
0.16908	-0.01776	0.03685	-0.07238	-0.19212	-0.06119	-0.05593	-0.04013

➔ offset/0-end.data

0	0	820	820
0	820	820	0
0	0	0	0

➔ offset_corr/0-end.data

0	0	0	0
0	0	0	0
0	0	0	0

➔ marg_gap_shift/0-end.data

15	40	2	25
15	40	2	25
0	0	0	0