



STA5200 CCD Test Report

SN31179

An STA5200 image sensor (SN31179, Lot 215075 Wafer 6 Die 4) was packaged and tested in fulfillment of subcontract 200040. The STA5200 has 10um x 20um pixels, with 4224 pixels horizontally and 1024 pixels vertically, for a total image area of 42.24mm x 20.48mm.

The sensor was mounted in a test cryostat and operated at -100C. A 532nm LED in an integrating sphere screen was used as the flat field illumination source for photon transfer curve and linearity tests. The sensor was connected to an STA Archon controller for testing, and operated at a 300kHz pixel rate. Testing was done in image mode (the devices are expected to bin vertically by 1024 in normal operation).

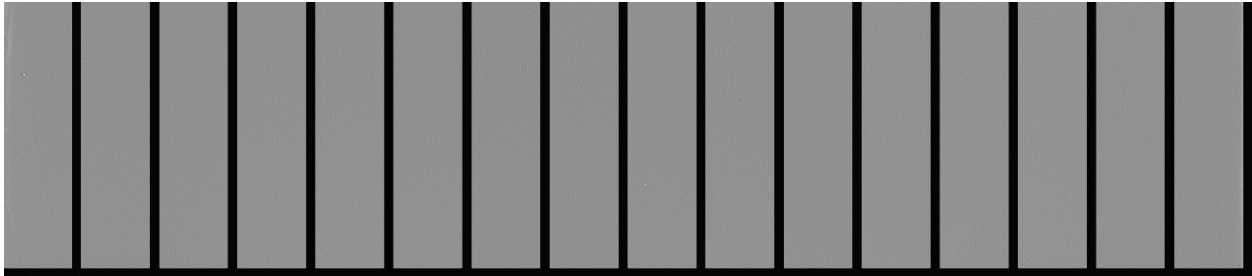
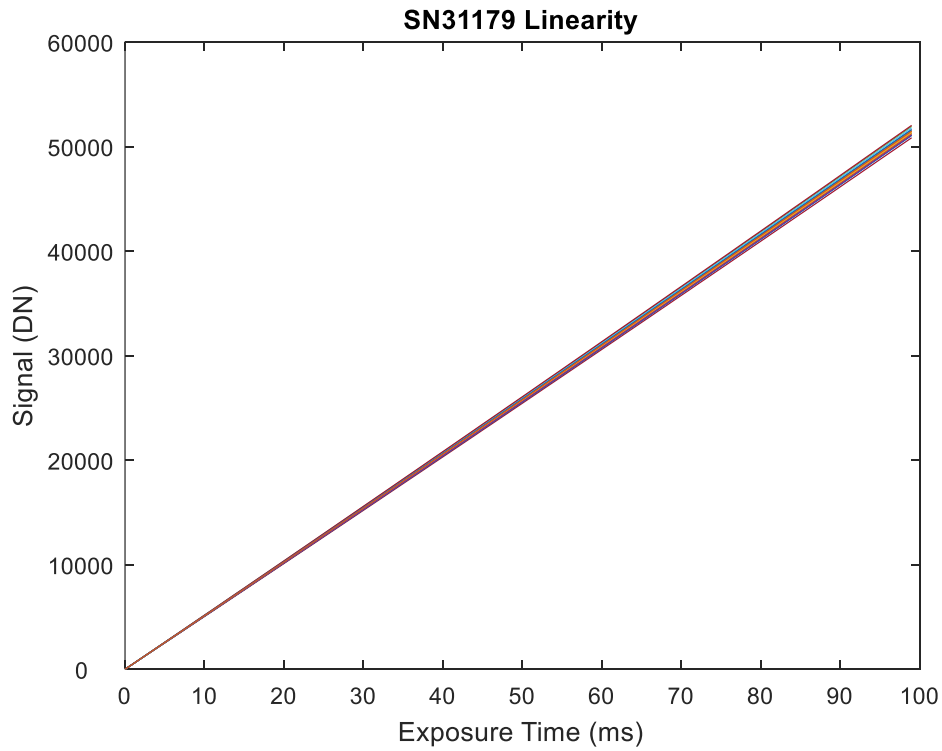


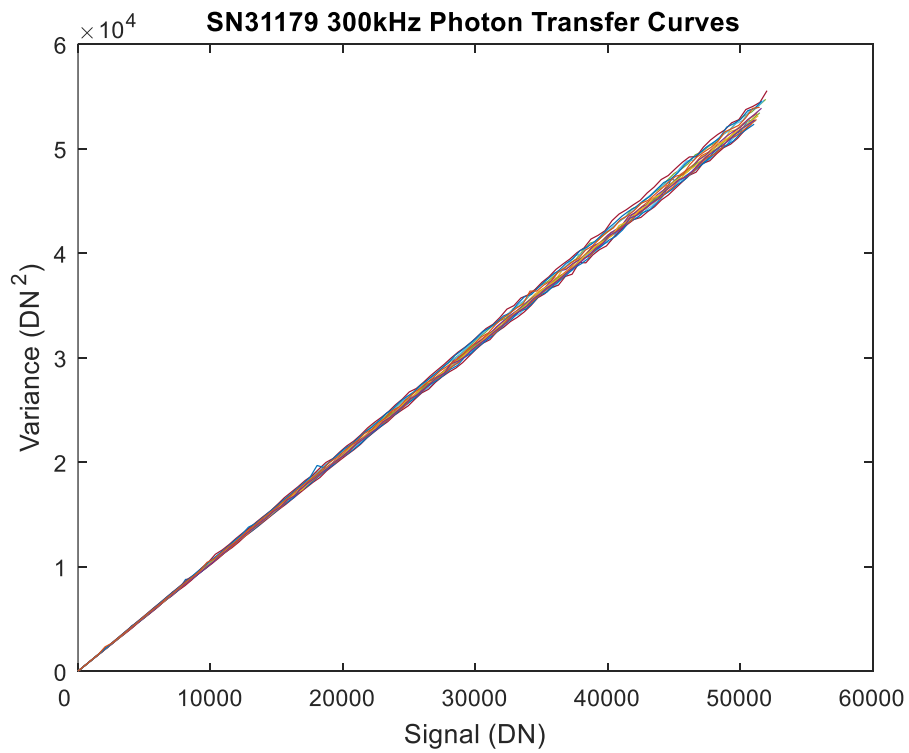
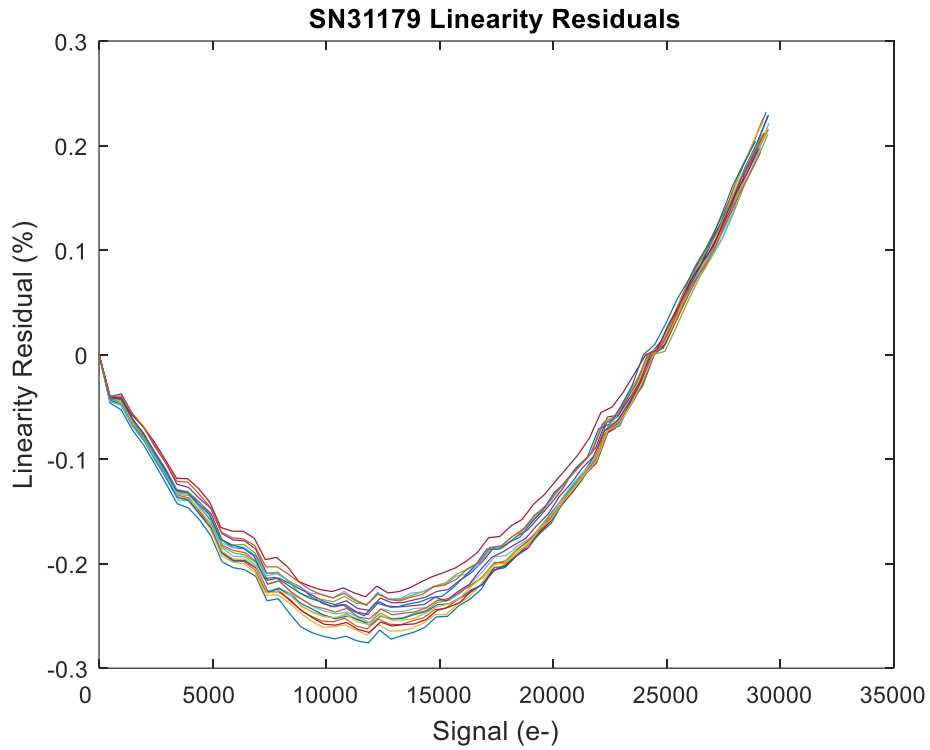
Figure 1: Sample flat field image



Results

Output	Gain (e- / DN)	Noise (e-)	Linearity
1	0.97	4.0	0.3%
2	0.96	3.9	0.3%
3	0.96	3.9	0.3%
4	0.96	3.9	0.2%
5	0.97	3.9	0.3%
6	0.97	4.0	0.3%
7	0.98	3.9	0.3%
8	0.98	3.9	0.3%
9	0.97	4.0	0.3%
10	0.97	3.9	0.3%
11	0.97	3.9	0.2%
12	0.95	3.9	0.2%
13	0.95	3.9	0.2%
14	0.94	3.9	0.2%
15	0.95	3.9	0.2%
16	0.96	4.0	0.2%

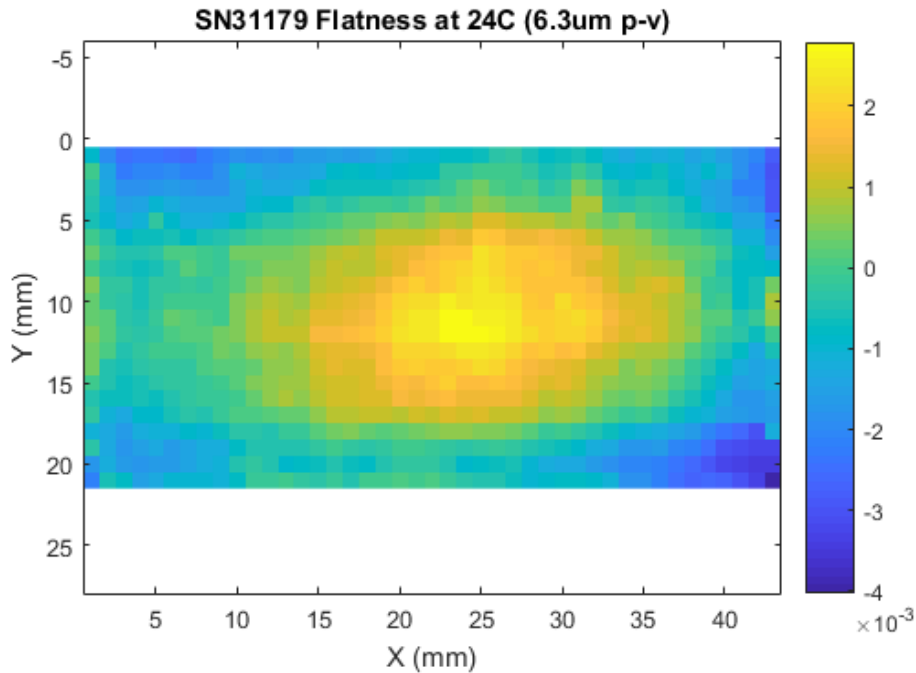






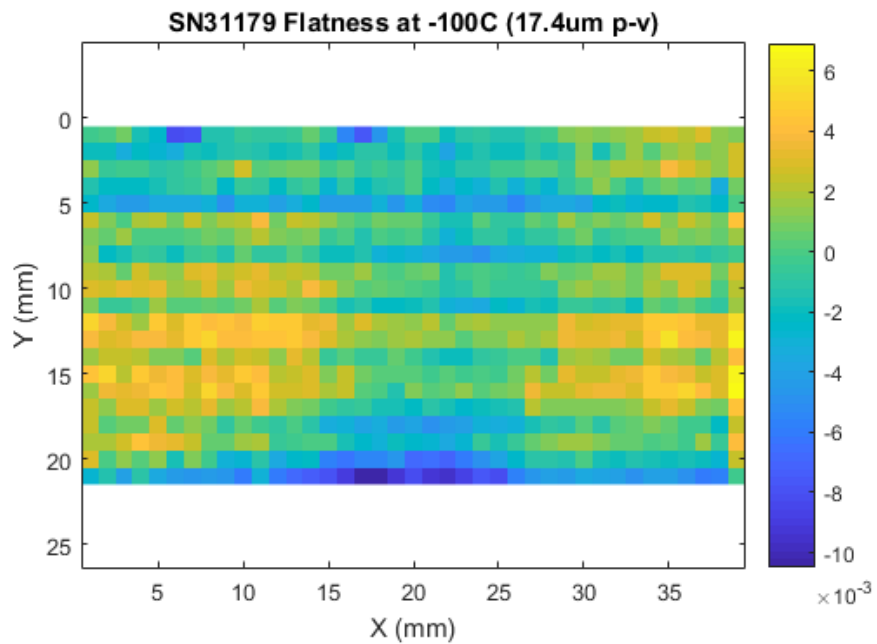
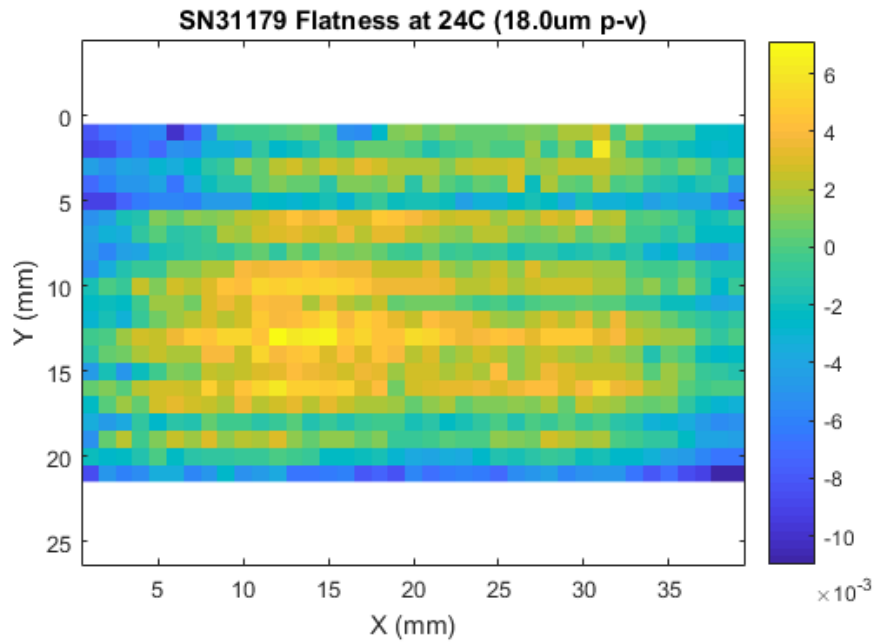
Specification	Requirement	Measured Performance
3. Pixel Size	10um x 20um	10um x 20um
4. Pixel Array	4096 by 1024	4224 x 1024
5. Parallel Shift Direction	Along 1024 pixel axis	Comply
6. CCD Output Performance	5e- at 300kHz, <25ke-	3.9 –4.0e-
7. Linearity 1ke- to 70ke-	<0.5%	+/-0.3%
8. Linearity 5e- to 1ke-	<1%	+/-0.3%
9. CTE Performance	Better then 0.99999	Vertical 1.000000 Horizontal 0.999997
10. Active Device Thickness	100um	100um
12. Controller Weight	<10kg	9kg
13. Digitized Image Signal	>= 15 bits	16 bits
14. Controller Full Frame Rate	>= 2Hz	0.8Hz
15. Controller Frame Rate	>= 200Hz	210Hz
16. CCD Dark Signal	< 1e-/pixel/second	0.02 e-/pixel/second
17. Sensor Flatness	3um	6.3um P-V
3.4 Full well	> 25ke-	> 50ke-

CCD flatness was measured using a Micro-Epsilon IFS2405-3 confocal displacement sensor, with the CCD assembly mounted to an X-Y stage.





CCD flatness was also measured in a cryostat using a Micro-Epsilon IFS2405-30 sensor, both at room temperature and at the target -100C temperature. The longer working distance sensor and passing the beam through the cryostat window both add additional errors to the measurement, but the results show no major change in flatness after cooling.





The alignment of the CCD to the nominal axis of rotation was measured using a Micro-Epsilon IFS2405-30. Z distances from the CCD corners (red dots) to the mounting plate (green dots) were measured, followed by measuring from the mounting plate to the base plate (yellow dots). The net distance from the top of the base plate to the CCD was then calculated, yielding the following:

Corner	Z Distance (um)
Top Left	-37.3
Top Right	30.0
Bottom Left	-35.7
Bottom Right	-27.8

