



NIRSpec Technical Note NTN-2013-XXX

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Analysis in support to NCR 1602. ASIC μ code 7 troubleshooting

Abstract:

We present a preliminary analysis of the different performance of the NIRSpec DS during the calibration campaign FM2-B with two different version of the ASIC μ code [Restricted].

1 INTRODUCTION

As previously reported in support of the early troubleshooting associated with NIRSpec NCR 1602, the data acquired during the early phases of calibration campaign FM2-B with the newly released ASIC μ code 7.0 showed bias and CDS noise levels not in line with the value measured during the previous calibration campaign FM2-A with the μ code 6. The new values indicated that the tuning of the DS was not the same as during FM2.

For the purpose of comparing data acquired during FM2-B with different μ code versions and personality files we identify the following phases:

Phase 1 μ code 7 :from the cool down until the discovery of the non compliance.

Phase 2 μ code 7 : first attempt to restore the DS tuning. Version 10 of the personality for the operational temperature of 36K were uploaded but did not produce any noticeable variation.

Phase 3 μ code 6 : this phase represents the bulk of the campaign and it was carried out in the same configuration used during FM2-A.

Phase 4 μ code 7 : At the end of the calibration campaign it was realized that the data acquired with μ code 7 were readout in un-buffered mode which is not the default NIRSpec setting. Once the appropriate register was corrected, the data acquired with μ code 7, personality file version 10 and in buffered mode showed bias and CDS noise values much more similar to the one obtained with μ code 6. The only noticeable difference remaining in data acquired during phase 4 is the bias level for SCA491, still 9-10K DN above the level measured with μ code 6. In this phase we have acquired a minimal set of data to verify gain and noise.

Phase 5 μ code 7 : A final attempt to adjust the DS tuning was done adjusting the register 602B in the ASIC. Only one exposure was acquired with this setting. Subsequently red limits have precluded additional troubleshooting and exposure acquisition.

In summary:

- **Phase 1** – Fresh upload of μ code 7 at the beginning of FM2-B
From NID:13512 to NID: 13721
- **Phase 2** - μ code 7 with version 10 of personality file for 36.0 K
From NID 13722 (lost due to space wire connection droppage) to NID 13774
- **Phase 3:** μ code 6 from NID: 13775 to NID: 14509 (full performance verification campaign)
- **Phase 4:** μ code 7 with version 10 of personality file for 36K and NIRSpec standard buffered mode
from NID 14510 [DET-UCODE-QUICK]to NID 14521 [GWA-G140M-CO-18]
- **Phase 5:** as phase 4 but with an adjustment to Register 602 B
only 1 exposure available NID: 14522 [NCR1602-Check]

2 COMPARISON OF BIAS LEVEL AND CDS NOISE

The most striking differences between the initial condition in phase-1 and FM2-A were the level of the reference pixels and the CDS noise measured in the reference pixel area. The tables below highlight the difference in the top reference pixels, but similar behaviour is seen in the bottom reference pixels and in the active area of the SCAs.

Table 1 and table 2 show the mean value in the reference pixels in the first frame of exposures acquired in different phases. No distinction between even and odd columns was made. The buffered mode introduced in phase-4 brought back the reference pixels to the same value seen with μ code 6 for SCA492 but it has only reduced it for SCA491, which still showed 9k-10K more counts than with μ code 6.

Table 1. Top reference pixel average values [DN] for SCA491 for the four outputs in different phases. The number between brackets indicates the number of exposures used for the average. The two columns with a darker background highlight the data acquired with μ code 6.

| SCA 491 | FM2 A [>100] | FM2B | | | | |
|-----------|-----------------|----------------|----------------|-----------------|-----------------|----------------|
| | | Phase 1 [8] | Phase2 [18] | Phase 3 [59] | Phase 4 [10] | Phase 5 [1] |
| Output #1 | 16036 | 39402 | 38005 | 16094 | 25380 | 25463 |
| Output #2 | 15176 | 39360 | 37934 | 15259 | 24537 | 24566 |
| Output #3 | 16071 | 39576 | 38164 | 16139 | 25411 | 25474 |
| Output #4 | 14970 | 39621 | 38212 | 14993 | 24229 | 24290 |

Table 2. Same as Table 1 but for SCA 492

| SCA 492 | FM2 A [>100] | FM2B | | | | |
|-----------|-----------------|----------------|----------------|-----------------|-----------------|----------------|
| | | Phase 1 [8] | Phase2 [18] | Phase 3 [59] | Phase 4 [10] | Phase 5 [1] |
| Output #1 | 11413 | 22329 | 21262 | 11506 | 11762 | 11694 |
| Output #2 | 10501 | 22136 | 21064 | 10567 | 10744 | 10725 |
| Output #3 | 11444 | 22664 | 21647 | 11515 | 11669 | 11662 |
| Output #4 | 12114 | 22675 | 23589 | 12137 | 12321 | 12259 |

Table 3 and table 4 show the CDS noise (in DN) measured in the top reference pixels using the first two frames of each exposure. The buffered mode introduced in phase-4 has brought back the CDS noise value to the same value seen with microcode 6 for both SCAs.

Table 3. CDS noise (in DN) measured in the top reference pixels of SCA491 for the four outputs in different phases. The number between brackets indicates the number of exposures used for the average. The two columns with a darker background highlight the data acquired with μ code 6.

| SCA 491 | FM2 A [>100] | FM2B | | | | |
|-----------|-----------------|----------------|----------------|-----------------|-----------------|----------------|
| | | Phase 1 [8] | Phase2 [18] | Phase 3 [59] | Phase 4 [10] | Phase 5 [1] |
| Output #1 | 10.45 | 7.54 | 7.55 | 10.43 | 10.39 | 10.39 |
| Output #2 | 10.78 | 7.69 | 7.60 | 10.72 | 10.63 | 11.19 |
| Output #3 | 10.85 | 7.87 | 7.79 | 10.72 | 10.28 | 11.36 |
| Output #4 | 11.06 | 7.69 | 7.71 | 10.86 | 10.83 | 10.68 |

Table 4. Same as Table 1 but for SCA 492

| SCA 492 | FM2 A [>100] | FM2B | | | | |
|-----------|-----------------|----------------|----------------|-----------------|-----------------|----------------|
| | | Phase 1 [8] | Phase2 [18] | Phase 3 [59] | Phase 4 [10] | Phase 5 [1] |
| Output #1 | 10.63 | 7.64 | 7.68 | 10.70 | 11.00 | 10.53 |
| Output #2 | 11.09 | 8.06 | 7.92 | 11.16 | 11.63 | 11.08 |
| Output #3 | 10.89 | 7.89 | 7.91 | 10.96 | 10.95 | 11.06 |
| Output #4 | 10.63 | 7.78 | 7.97 | 10.65 | 10.56 | 10.48 |

3 COMPARISON OF PIXEL VALUE DISTRIBUTIONS

The quick look analysis performed after the acquisition of each exposure produce the histogram of the four outputs of the first frame.

Data acquired during phase 1 and 2 (μ code 7 unbuffered mode) showed distributions very different from those observed from the data acquired with μ code 6. The buffered mode, re-introduced in phase 4 and 5 (μ code 7) shows the same distribution seen with μ code 6.

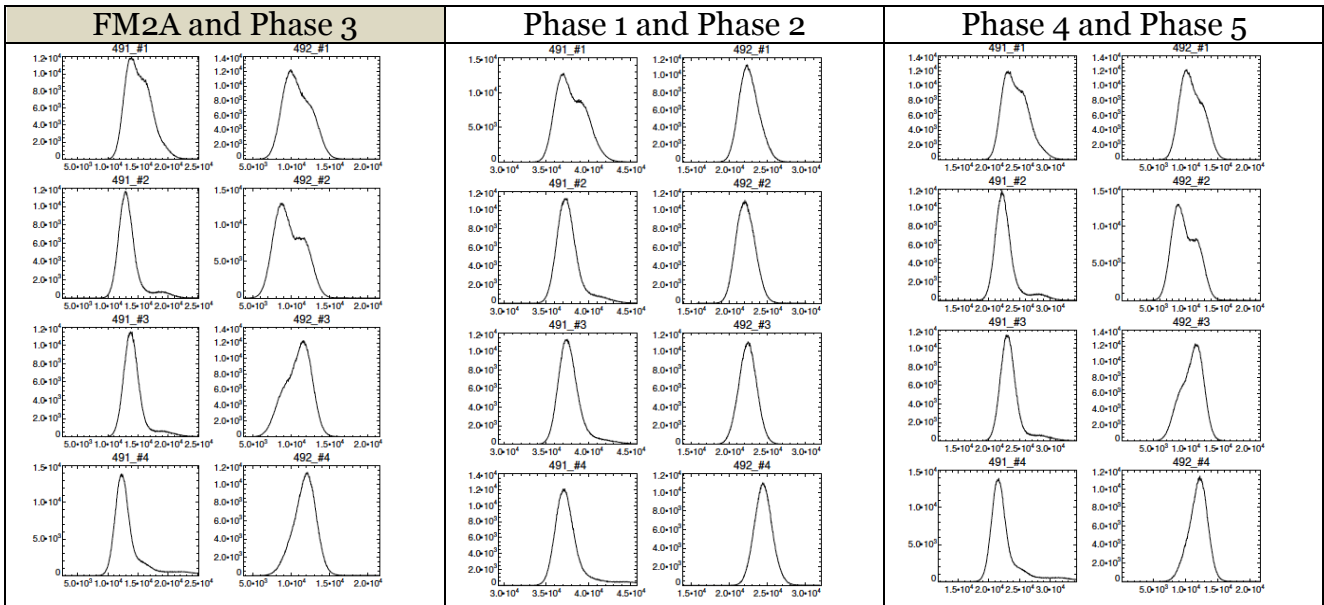


Figure 1. Comparison of pixel value distributions in each output of the first frame of dark exposures acquired in different phases. Phases showing similar results have been grouped together. The first column shows the typical distributions observed with μ code 6.

4 GAIN MEASUREMENT

The difference in CDS noise measured during phase-1 and phase-2 pointed to a potential gain mismatch. At the end of the campaign, when μ code 7 was re-tested in buffered mode we acquired a set of exposure for the measurement of an average gain. Table 5 and Figure 2 show that the gain measured during FM2-B with both versions of the microcode are very similar to the one measured during FM2-A. We do not have suitable data to measure the gain during Phase-1 and Phase-2 when μ code 7 was paired with un-buffered readout mode and the CDS noise was significantly lower than expected.

Table 5. Mean conversion gain measured during FM2B with the two versions of the microcode. For comparison gain of 1.47 e-/DN and 1.37e-/DN were measured during FM2-A.

| Gain e-/DN | Phase-3 (μcode 6) | Phase-4 (μcode 7) |
|------------|-------------------|-------------------|
| SCA 491 | 1.42 | 1.49 |
| SCA 492 | 1.34 | 1.35 |

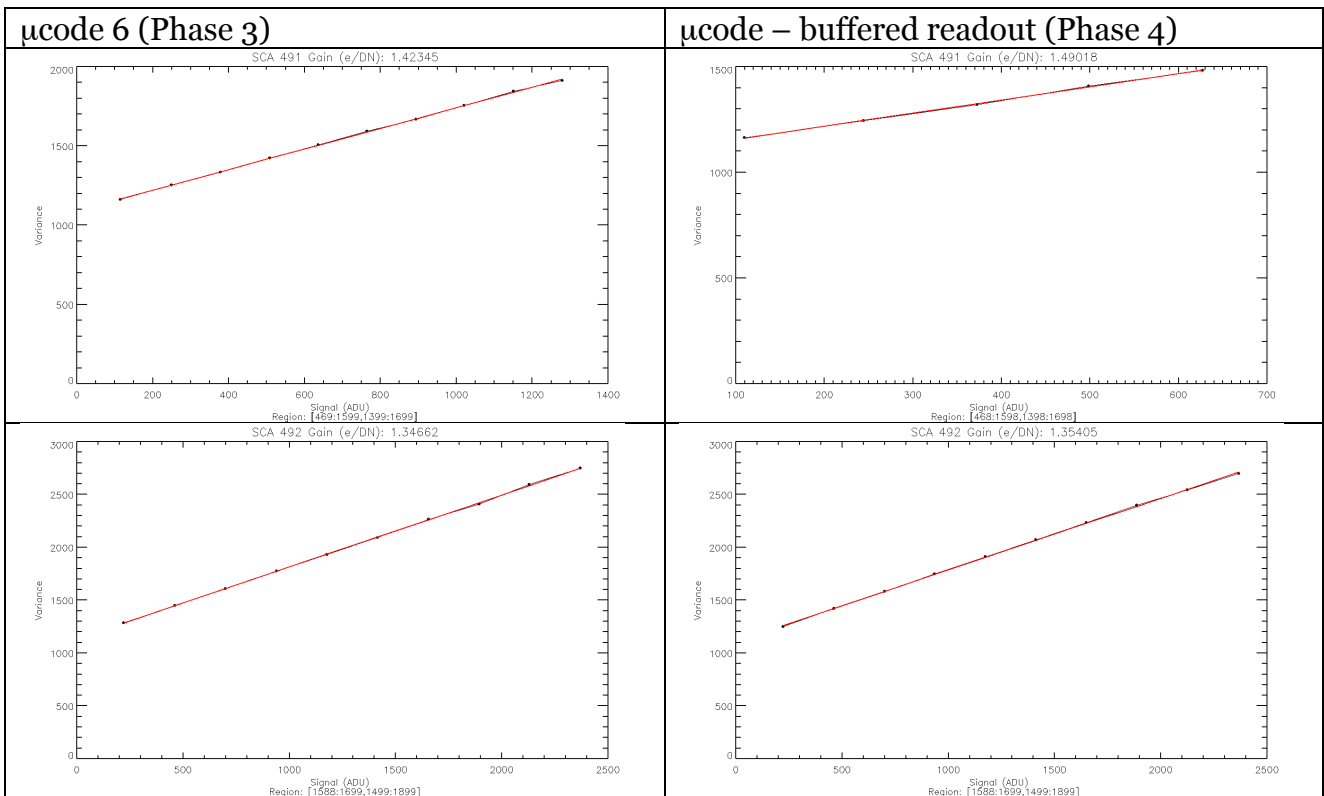


Figure 2. Photon transfer test for the measurement of the gain during FM2-B with the two different versions of the ASIC microcode.

5 PIXEL VALUE DISTRIBUTION AFTER REFERENCE PIXEL CORRECTION

We have created a super bias with the available dark exposures acquired during phase 3 (μcode 6) and phase 4 (μcode 7 buffered mode). Despite the residual difference in the

reference pixel values seen in SCA491 the distribution of the pixel values in the active region of the SCA is almost identical.

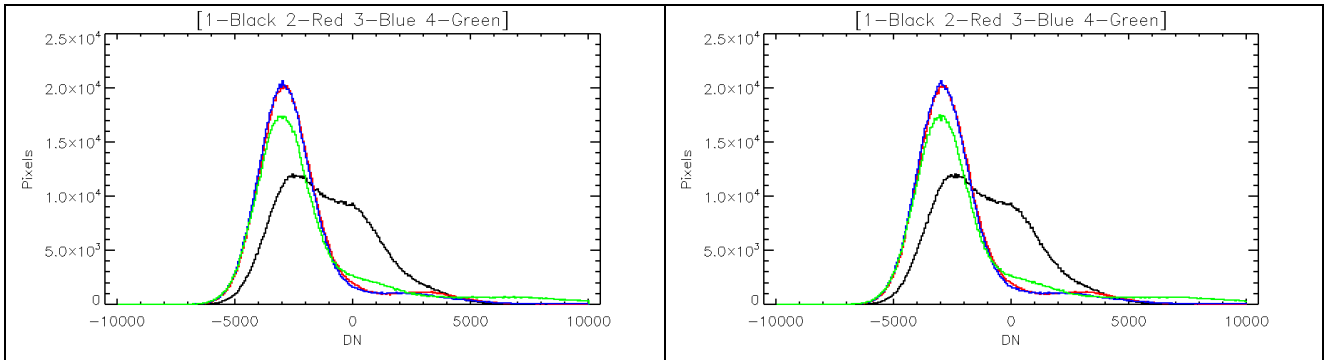


Figure 3. Pixel value distribution for the four outputs of SCA491 after reference pixel subtraction, with μ code 6 [Left] and μ code 7 and buffered readout mode [Right]. The four outputs are identified with different colours [1- Black, 2-Red, 3- Blue, 4-Green]

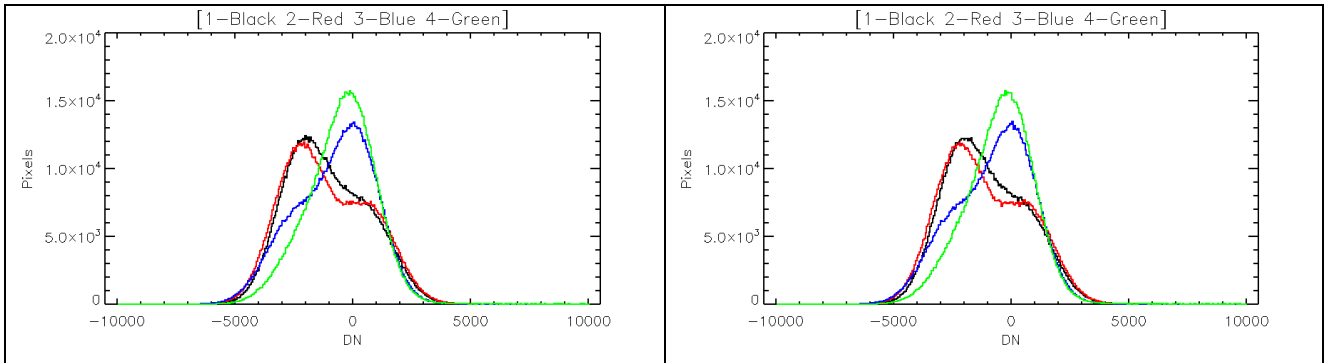


Figure 4. Same as Figure 3 for SCA492.

6 PRELIMINARY CONCLUSIONS

The new version of the ASIC mcode does not yet replicate the full performance seen with version 6. While the fixes applied during the calibration campaign seemed to have restored most of the tuning for SCA 492, the reference pixel level for SCA491 is still significantly higher, reducing the dynamic range.

Further analysis on existing data is needed to verify other potential differences between the two versions of the mcode.

FM2B has shown that the regression testing of new versions of the mcode does not yet take into account settings specific to each SI. It is recommended that DCL investigate the difference between the two versions of the microcode to minimize the impact of future

testing at ISIM level when even more advanced versions of the ASIC microcode will likely be used.

7 APPENDIX

For a more comprehensive comparison between data acquired in the different phases, we selected one exposure for each phase and provided the quick look report. The relative phase is indicated in red on the top right corner of the first page of each report.

```

NRSDET-DARK-SHORT-13_5_491_SE_2013-01-30T1248m23
NRSDET-DARK-SHORT-13_5_492_SE_2013-01-30T1245m47
OBS_ID : DET-DARK-SHORT-13
DATE_OBS : 2013-01-30 TIME_OBS : 12:30:25.744
NGROUP : 88 NFRAME : 1
NINT : 1
EXPTIME : 944.83488 INTNAME : 944.83488
TGROUP : 10.736760 TFRAME : 10.736760
MAXIS1 : 2048 MAXIS2 : 2048
REFPIXELS : 1 T: 4 B: 4 L: 4 R: 4
ASIC #1 5556 ASIC #2 5556
CONE_1: 5556 CONE_2: 0
COL_0: 0 COL_1: 0
ROW_0: 0 ROW_1: 0
RESET_12 2.2 2.2
FWA : OPAQUE
GWA : G140H
MSA : CLOSED
CLS_LAMP : * OGSE *
CLS_MODE : ON
SHUTTER : CLOSE
ATTENUATION: CLOSE
ARGON: 0.00000
ROSS_CONF: OFF
ROSS_LAMP: Stop TC
OPMODE : OPEN_LOOP_MODE
SYNINDEX : PHM
PHM_Z_POS : 0.00000006+000
SOURCE : NO_LAMP
CURR : UNKNOWN
VOLT : UNKNOWN
* RMA *
STEP : -4.3600000e+002
MICRON : -2.4382117e+002
HALL_POS : 0
* TEMP [K] *
FPA : 3.8552692e+001
ASIC-1 : 3.9069080e+001
ASIC-2 : 3.9138064e+001
T_BP1 : 3.8763025e+001
T_BP2 : 3.9382663e+001
T_BP3 : 3.9179123e+001
T_BP4 : 3.9229237e+001
A1_DSUB_V : 0.63481857 A2_DSUB_V : 0.64984684
A1_DSUB_I : -52.425861 A2_DSUB_I : 11.284610
  
```

REFERENCE PIXELS

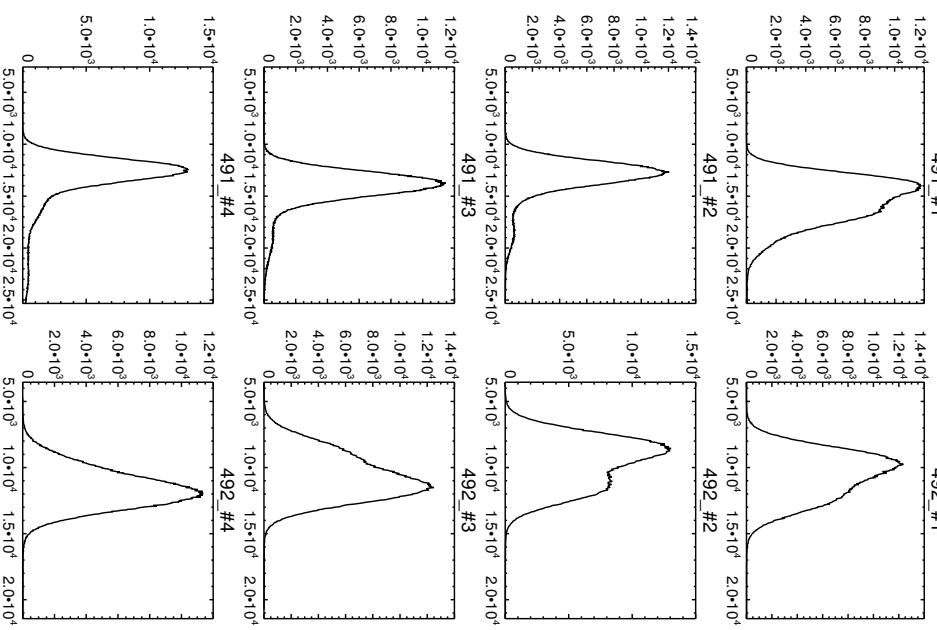
| Top | Bottom | Left | Right |
|-----------------|-----------------|-----------------|-----------------|
| #1 even 16123.3 | #1 even 16406.4 | #1 even 16605.4 | #1 even 15216.6 |
| #2 odd 15446.5 | #2 odd 16212.6 | #2 odd 15748.5 | #2 odd 18212.6 |
| #3 even 16504.1 | #3 even 17171.0 | #3 even 16523.4 | #3 even 15656.4 |
| #4 odd 15065.9 | #4 odd 15065.9 | #4 odd 15535.8 | #4 odd 15065.9 |

CDS [#1-#0]

| MEAN SIGNAL | NOISE -Ref Pix |
|-------------|-------------------|
| #1 -3.25991 | #1 Bottom 10.5325 |
| #2 -2.26256 | #2 Bottom 10.6185 |
| #3 -1.21363 | #3 Bottom 10.4446 |
| #4 2.55160 | #4 Bottom 10.3945 |

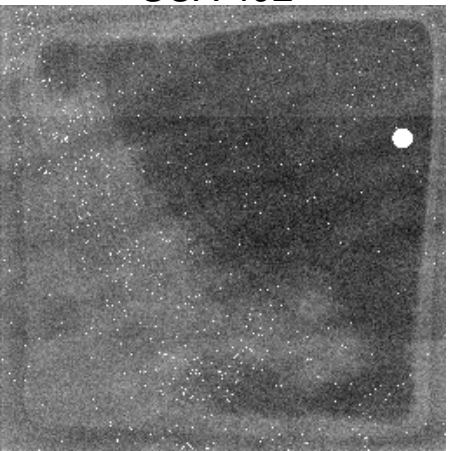
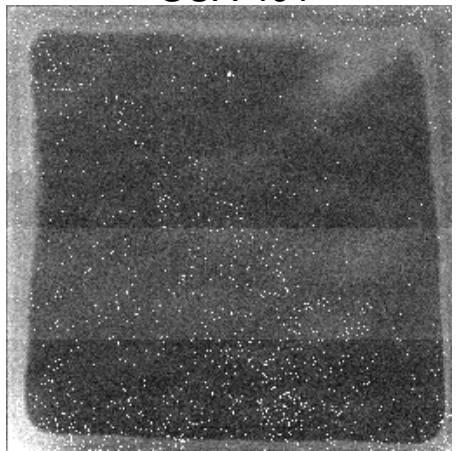
SCA 491

SCA 492



SCA 491

SCA 492



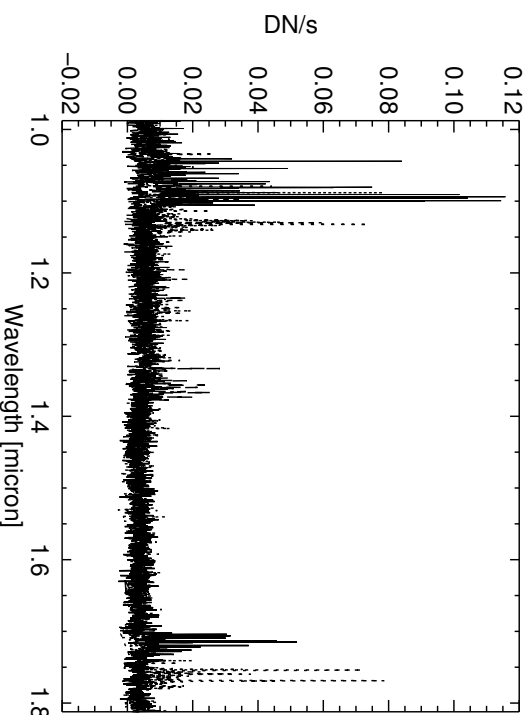
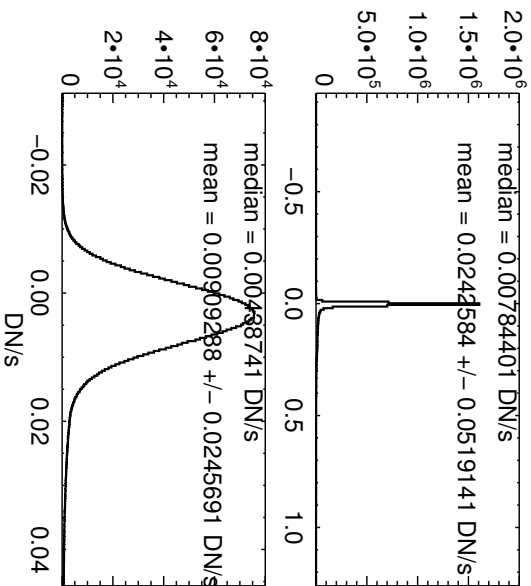
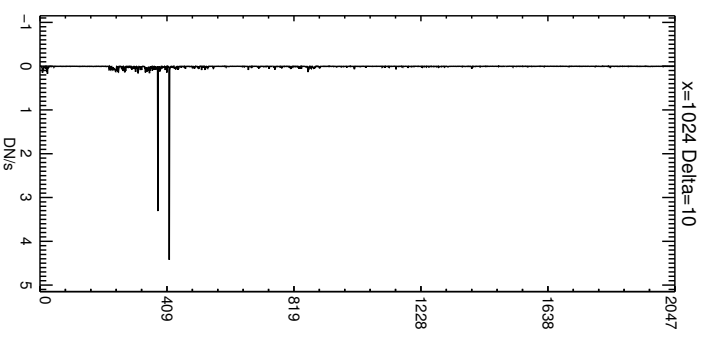
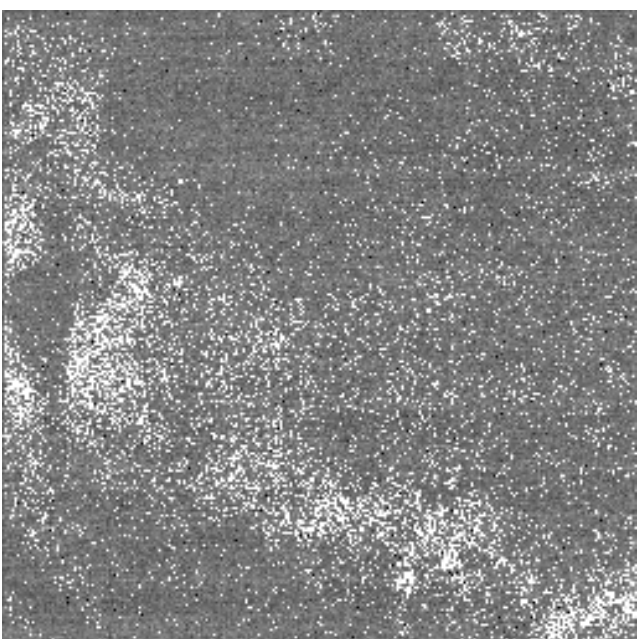
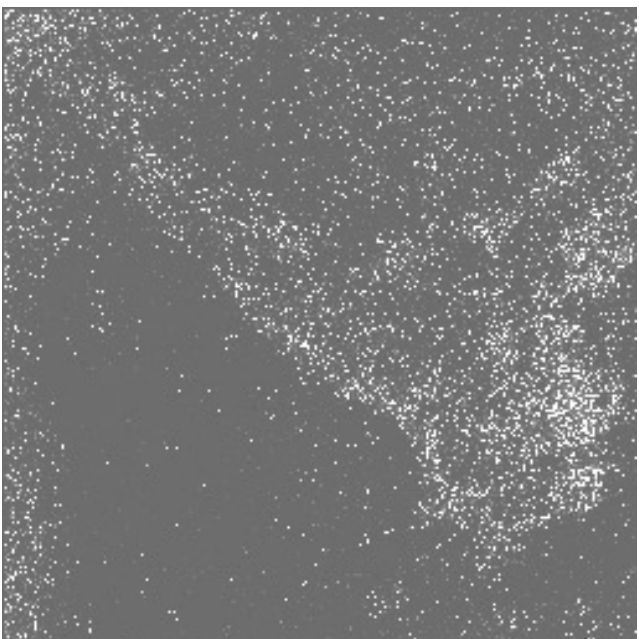
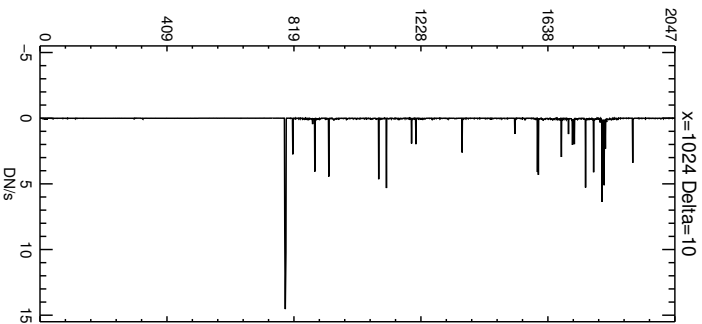
Mean: 13670.7
 Median: 13371.0
 Sigma: 1848.54
 Min: 0
 Max: 65535
 % Sat: 0.013
 % Zero: 0.000

Mean: 10542.4
 Median: 10657.0
 Sigma: 1797.05
 Min: 0
 Max: 65535
 % Sat: 0.134
 % Zero: 0.000

IMSTAT

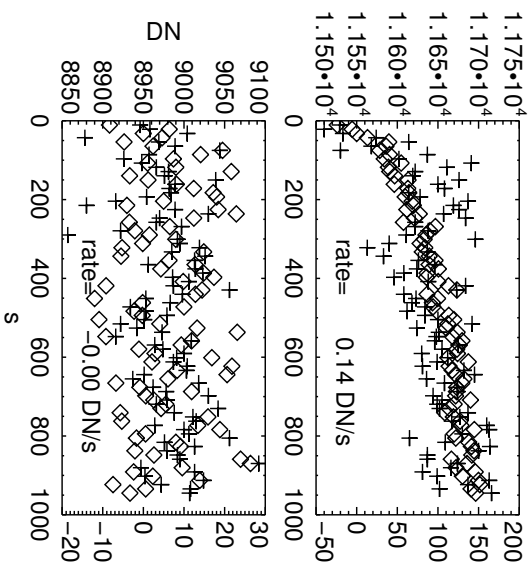
SCA 491

SCA 492



pix = [1089,1255]

pix = [989,1415]
DN



FM2B-Phase 1

13702

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 NINT : 1
 EXPTIME : 944.83488 INTTIME : 944.83488
 TGROUP : 10.736760 TFRAME : 10.736760
 NAXIS1 : 2048 NAXIS2 : 2048
 REFPixels : 1 T : 4 B : 4 L : 4 R : 4

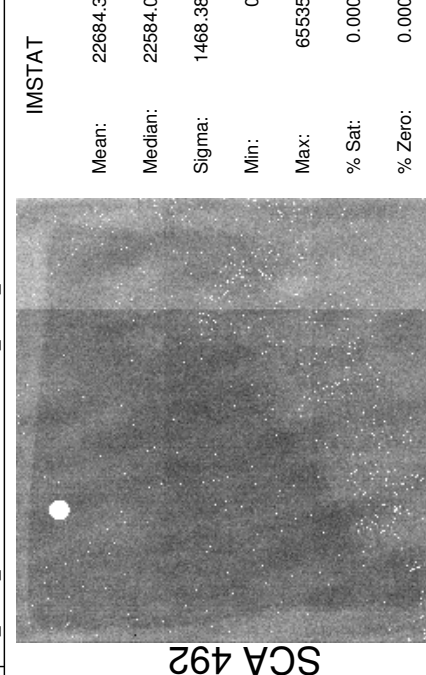
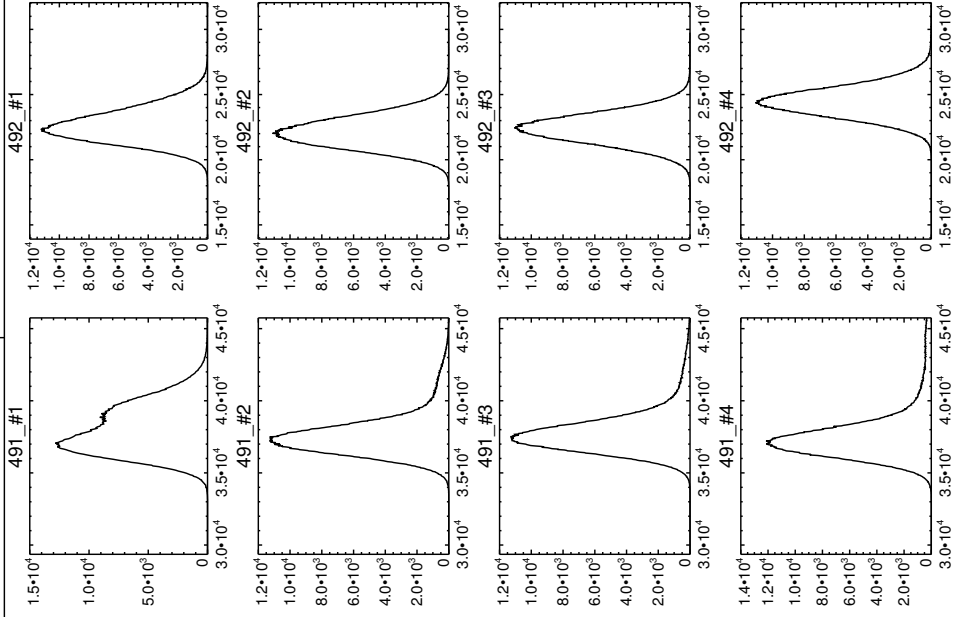
ASIC #1 : 5556 ASIC #2 : 5556
 CLS_LAMP : * OCSE *
 CLS_MODE :
 SHUTTER : CLOSE
 ATTENUATION : 0.00000
 ARGON : OFF
 RCSS_CONF : Stop TC
 RCSS_LAMP : OFF
 OPMode : OPEN_LOOP_MODE
 SYSINDEX : PHM
 PHM_Z_POS : 0.00000000e+000

SOURCE : * CAA *
 CURR : NO_LAMP
 VOLT : UNKNOWN
 * RMA *
 STEP : 0.0000000e+000
 MICRON : -2.0490876e+001
 HALL_POS : 0
 A1_DSUB_V : 0.54064726 A2_DSUB_V : 0.62986168
 A1_DSUB_I : -43.401619 A2_DSUB_I : -2.7576845

* TEMP [K] *

FPA : 3.855504e+001
 ASIC-1 : 3.9119866e+001
 ASIC-2 : 3.9192082e+001
 T_BP1 : 3.7537678e+001
 T_BP2 : 3.8620922e+001
 T_BP3 : 3.8215898e+001
 T_BP4 : 3.8402204e+001

| | Mean | Sigma | Mean | Sigma |
|---------|---------|---------|---------|---------|
| #1 even | 39369.0 | 966.419 | 22218.5 | 907.122 |
| #1 odd | 39437.5 | 940.721 | 22555.1 | 904.332 |
| #2 even | 39396.3 | 892.173 | 22104.5 | 832.249 |
| #2 odd | 39335.2 | 905.449 | 22250.4 | 844.949 |
| #3 even | 39764.7 | 863.909 | 22697.2 | 866.367 |
| #3 odd | 39362.2 | 834.599 | 22735.6 | 889.806 |
| #4 even | 39574.4 | 1017.62 | 24854.5 | 931.583 |
| #4 odd | 39730.6 | 1046.13 | 24912.1 | 924.228 |
| #1 even | 38887.7 | 100.94 | 22589.0 | 1027.35 |
| #1 odd | 38932.6 | 1005.67 | 22922.6 | 997.227 |
| #2 even | 39326.1 | 819.796 | 22371.5 | 960.026 |
| #2 odd | 39241.8 | 878.163 | 22493.6 | 960.360 |
| #3 even | 39820.1 | 850.553 | 22684.7 | 820.605 |
| #3 odd | 39467.7 | 897.856 | 22776.4 | 822.198 |
| #4 even | 39456.3 | 995.587 | 24605.9 | 823.908 |
| #4 odd | 39600.5 | 1010.67 | 24655.1 | 851.122 |
| Left | 39707.6 | 952.044 | 22823.4 | 1019.55 |
| Right | 40124.2 | 994.074 | 24724.0 | 1077.76 |



| | Mean | Sigma |
|---------|---------|-------|
| Mean: | 22684.3 | |
| Median: | 22584.0 | |
| Sigma: | 1468.38 | |
| Min: | 0 | |
| Max: | 65535 | |
| % Sat: | 0.000 | |
| % Zero: | 0.000 | |

| | Mean | Sigma | Mean | Sigma |
|-----------|---------|---------|---------|---------|
| #1 Top | 39369.0 | 966.419 | 22218.5 | 907.122 |
| #1 Bottom | 39437.5 | 940.721 | 22555.1 | 904.332 |
| #2 Top | 39396.3 | 892.173 | 22104.5 | 832.249 |
| #2 Bottom | 39335.2 | 905.449 | 22250.4 | 844.949 |
| #3 Top | 39764.7 | 863.909 | 22697.2 | 866.367 |
| #3 Bottom | 39362.2 | 834.599 | 22735.6 | 889.806 |
| #4 Top | 39574.4 | 1017.62 | 24854.5 | 931.583 |
| #4 Bottom | 39730.6 | 1046.13 | 24912.1 | 924.228 |
| Left | 38887.7 | 100.94 | 22589.0 | 1027.35 |
| Right | 40124.2 | 994.074 | 24724.0 | 1077.76 |

| | Mean | Sigma | Mean | Sigma |
|-----------|----------|-------|----------|-------|
| #1 Top | 7.81688 | | 8.19674 | |
| #1 Bottom | 7.70866 | | 7.85174 | |
| #2 Top | 7.81686 | | 8.39911 | |
| #2 Bottom | 7.68446 | | 7.65334 | |
| #3 Top | 8.33354 | | 7.89654 | |
| #3 Bottom | 8.33892 | | 8.79061 | |
| #4 Top | 8.05646 | | 7.99408 | |
| #4 Bottom | 7.90438 | | 7.96166 | |
| Left | -3.35932 | | 0.563816 | |
| Right | 0.810351 | | 1.23306 | |
| Top | -1.17116 | | 3.88654 | |
| Bottom | 0.402393 | | 1.97169 | |

| | Mean | Sigma |
|---------|---------|-------|
| Mean: | 37470.9 | |
| Median: | 37296.0 | |
| Sigma: | 1345.04 | |
| Min: | 0 | |
| Max: | 65535 | |
| % Sat: | 0.034 | |
| % Zero: | 0.000 | |

| | Mean | Sigma |
|---------|---------|-------|
| Mean: | 22684.3 | |
| Median: | 22584.0 | |
| Sigma: | 1468.38 | |
| Min: | 0 | |
| Max: | 65535 | |
| % Sat: | 0.000 | |
| % Zero: | 0.000 | |

CDS [#1-#0]

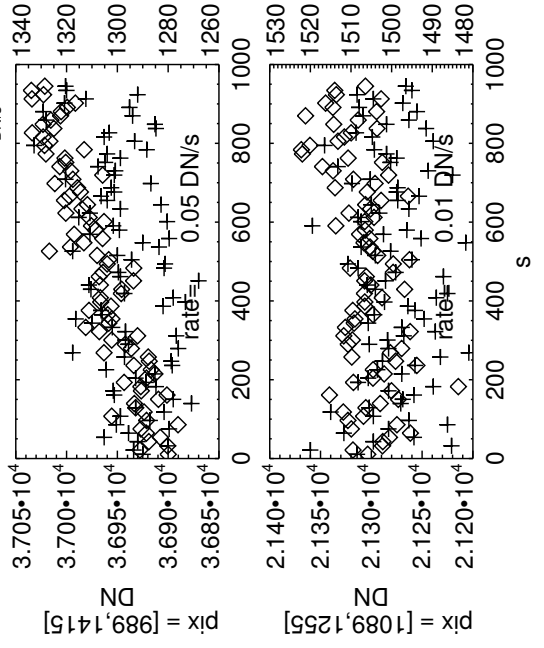
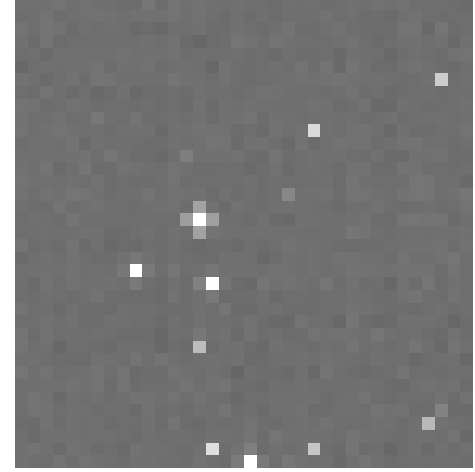
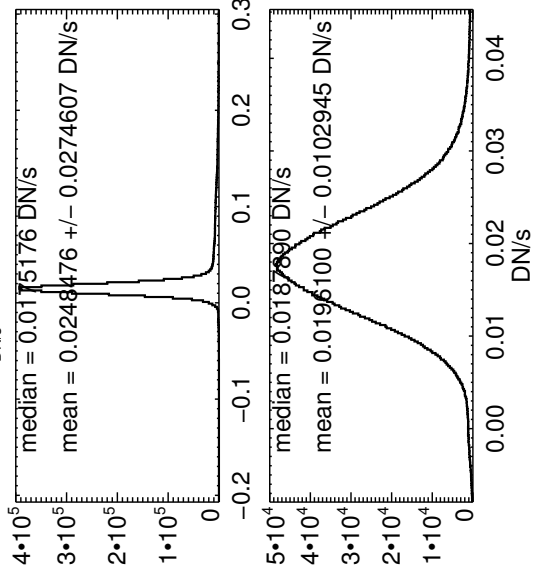
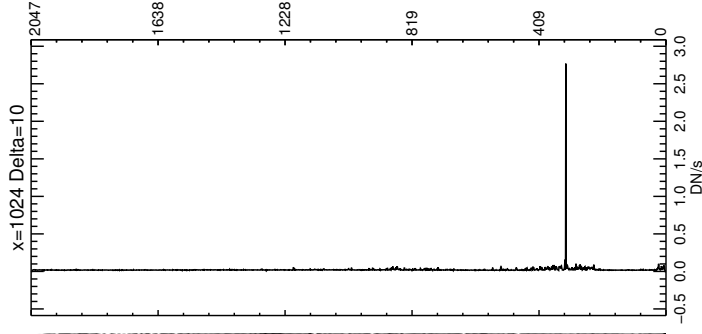
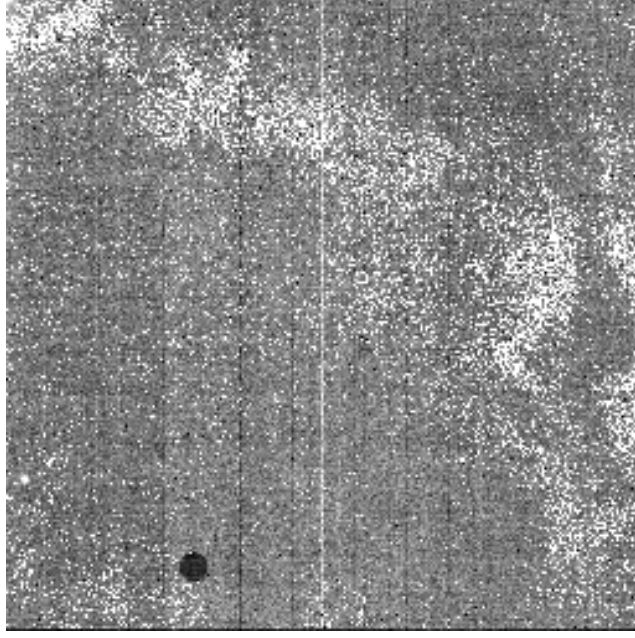
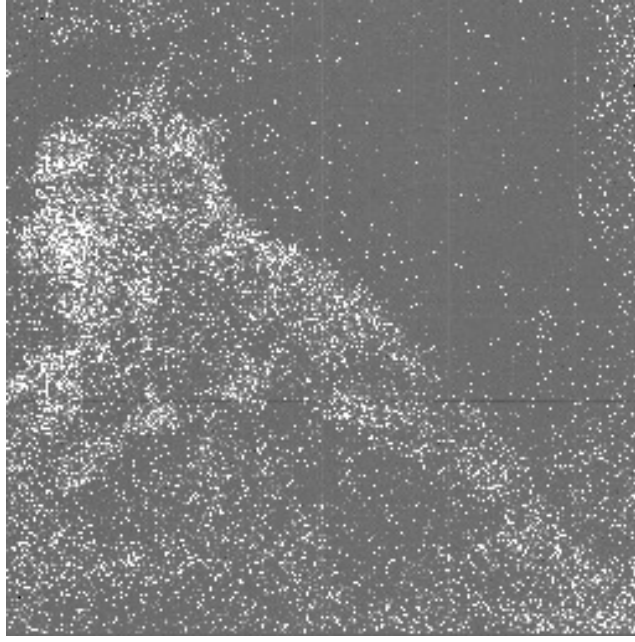
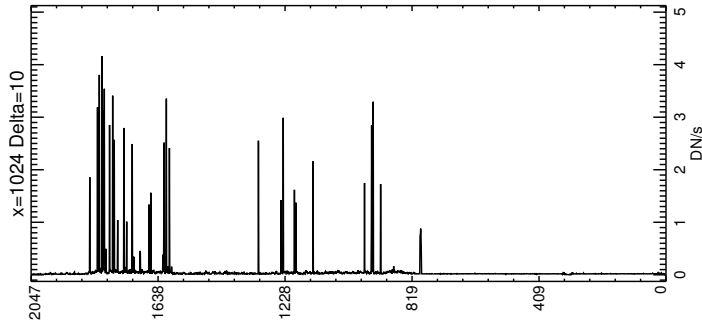
REFERENCE PIXELS

NOISE Top Pix

MEAN SIGNAL

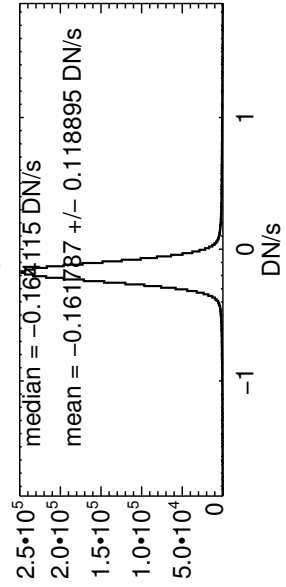
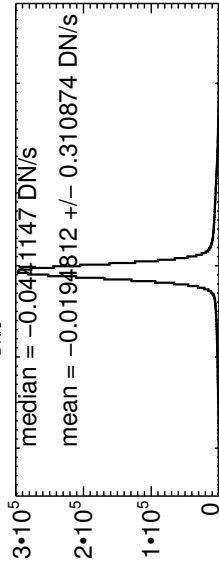
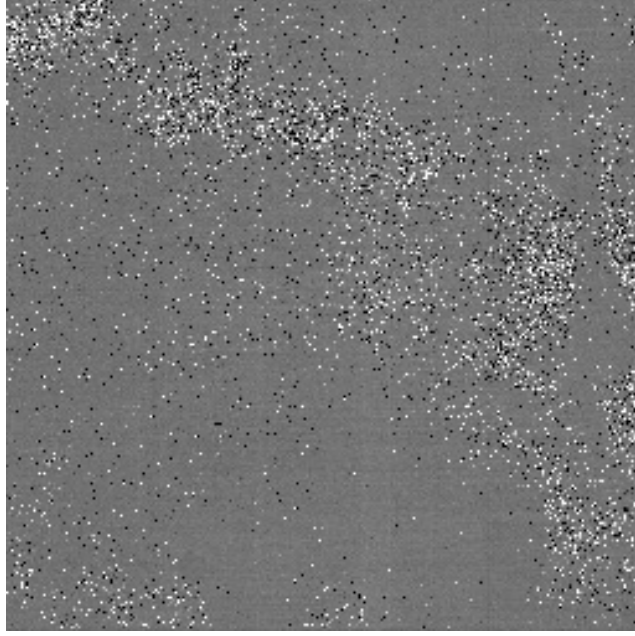
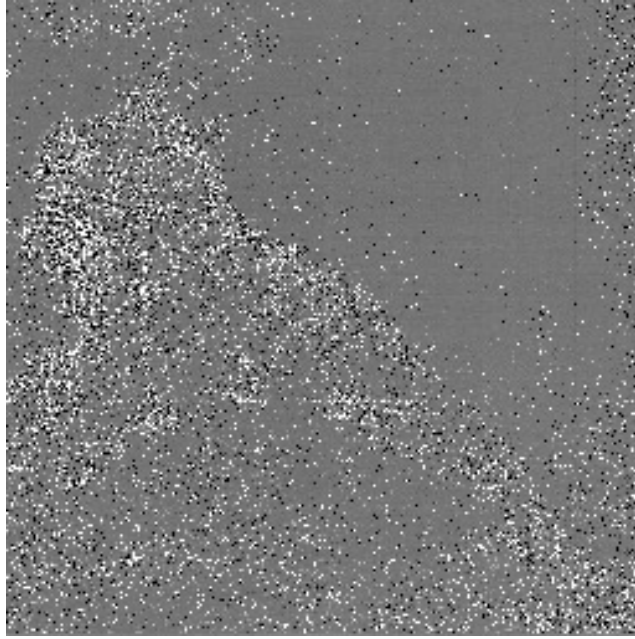
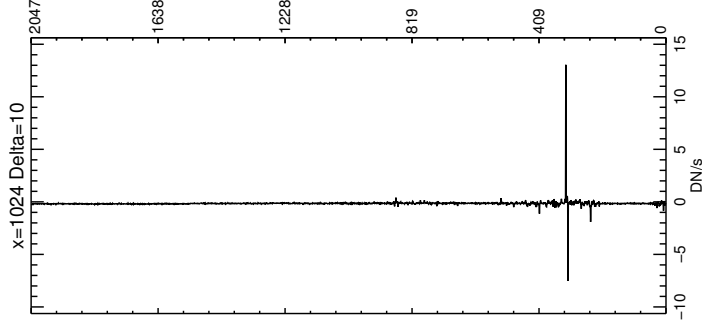
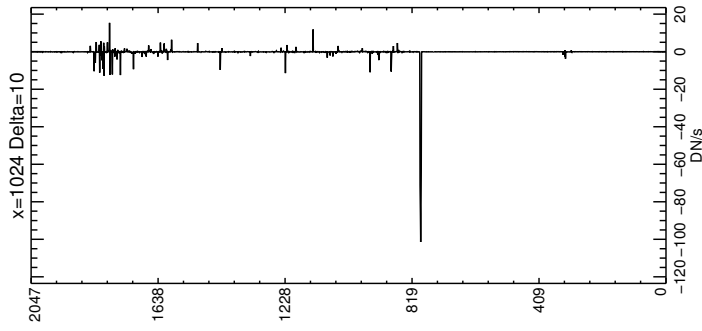
SCA 491

SCA 492

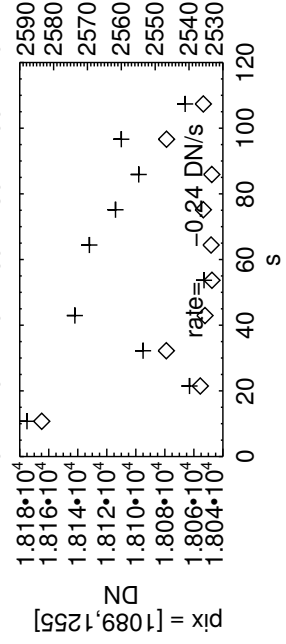
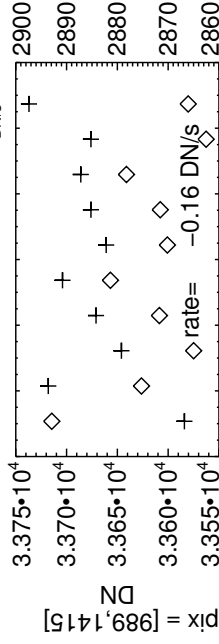


SCA 491

SCA 492



No slit spectra available



FM2-B Phase 3

13809

NRS_PREP-DET-DARK-SHORT-04_1_13809_JW1_jlab85_20130803T021020_20130803T022646/

NID=13809

* TEMP [K] *

SOURCE : NO_LAMP *
 CURR : UNKNOWN
 VOLT : UNKNOWN
 * RMA *
 STEP : 0.0000000e+000
 MICRON : -2.0490876e+001
 HALL_POS : 0

FPA : 3.8602230e+001
 ASIC-1 : 3.9279613e+001
 ASIC-2 : 3.9412935e+001
 T_BP1 : 3.2917014e+001
 T_BP2 : 3.8065060e+001
 T_BP3 : 4.2453124e+001
 T_BP4 : 4.1167101e+001

A1_DSUB_V : 0.63391264 A2_DSUB_V : 0.64940100
 A1_DSUB_I : -52.736378 A2_DSUB_I : 9.9244595

* CAA *
 NO_LAMP :
 UNKNOWN :
 UNKNOWN :
 * RMA *
 0.0000000e+000 :
 -2.0490876e+001 :
 0

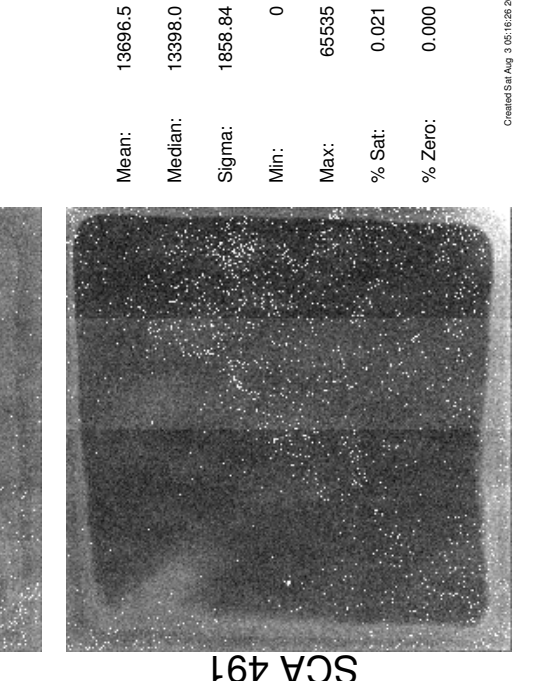
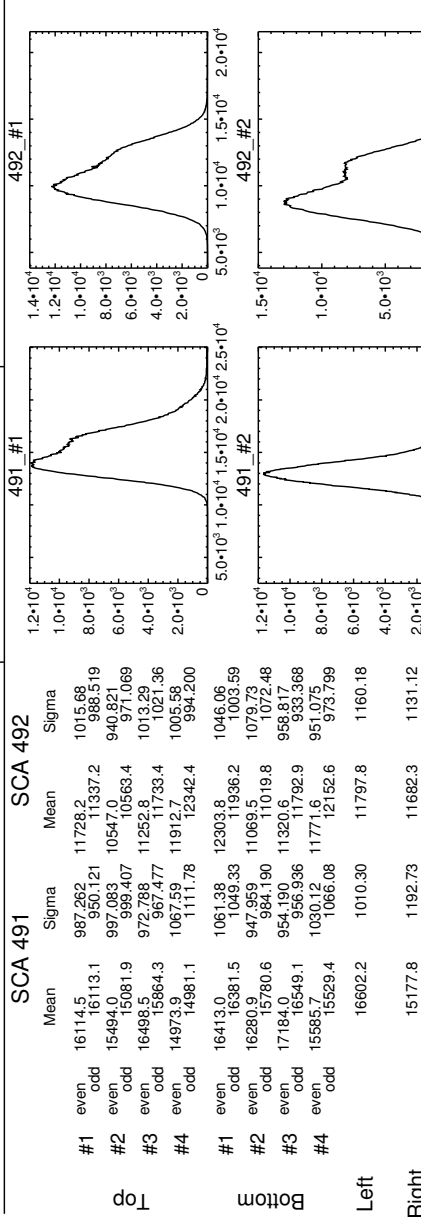
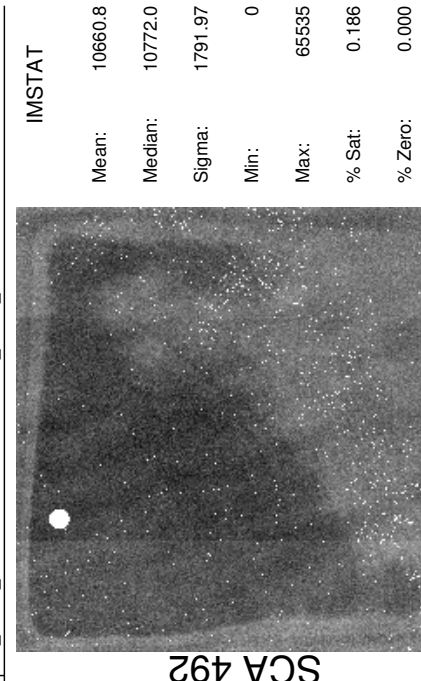
CLS_LAMP :
 CLS_MODE :
 SHUTTER :
 ATTENUATION :
 ARGON :
 RCSS_CONF :
 RCSS_LAMP :

* OCSE *
 OFF_NO_CURRENT :
 CLOSE :
 0.00000 :
 OFF :
 Stop TC :
 OFF

OPMODE : OPEN_LOOP_MODE
 SYSINDEX : PHM
 PHM_Z_POS : 0.0000000e+000

ASIC #1 : 5556
 ASIC #2 : 5556
 CONF 1 :
 CONF 2 :
 COL_0 :
 ROW_0 :
 RESET 1,2 : 2,2 2,2

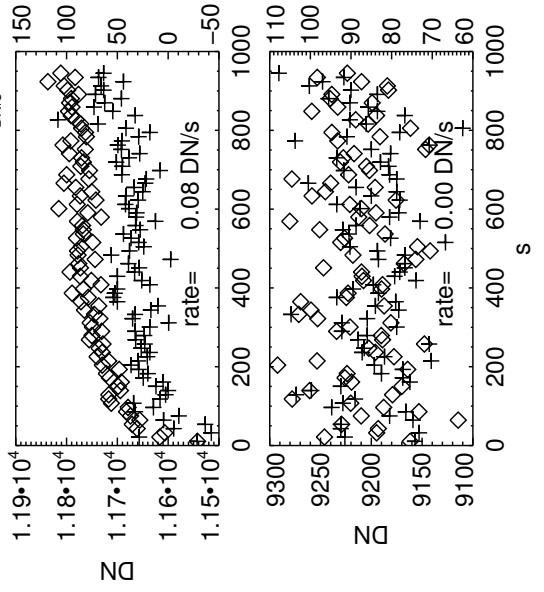
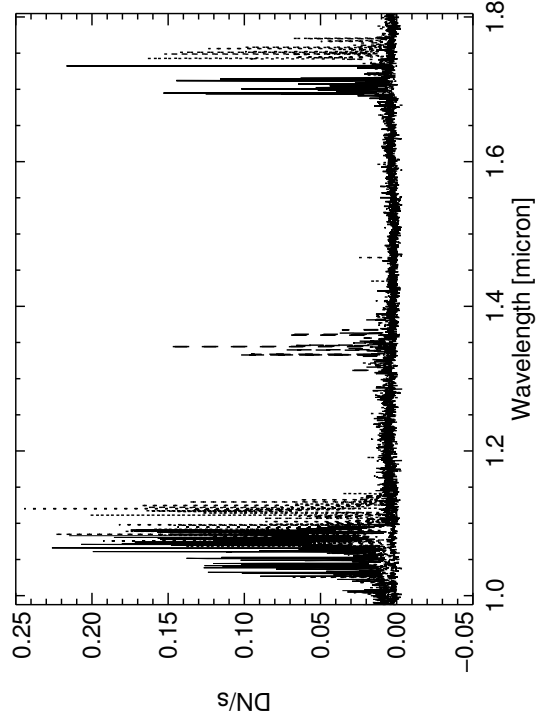
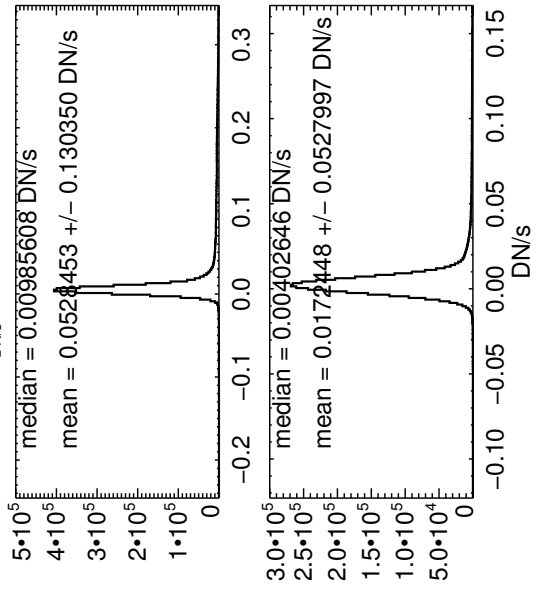
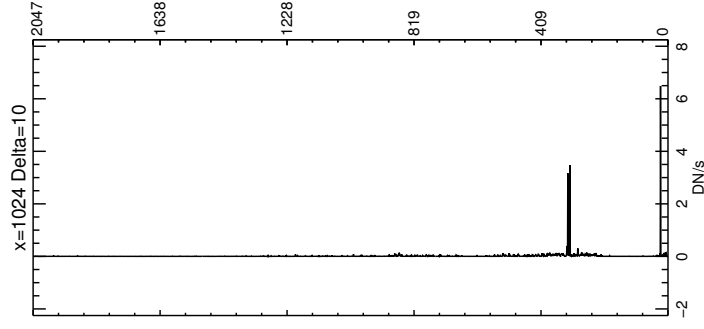
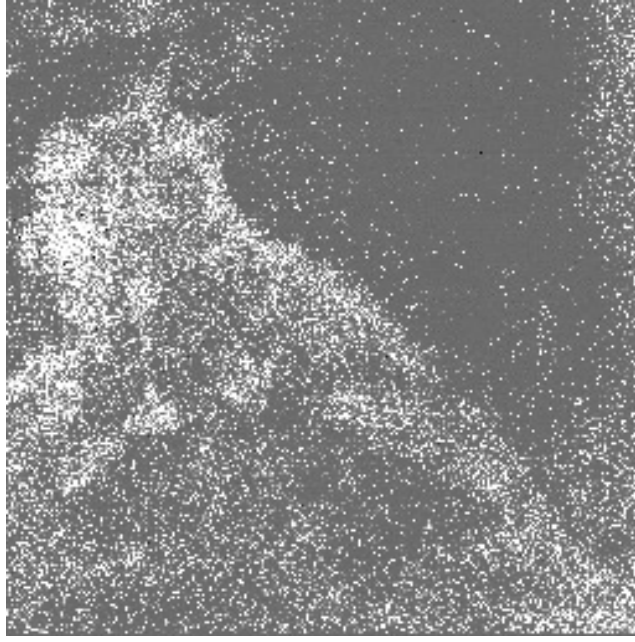
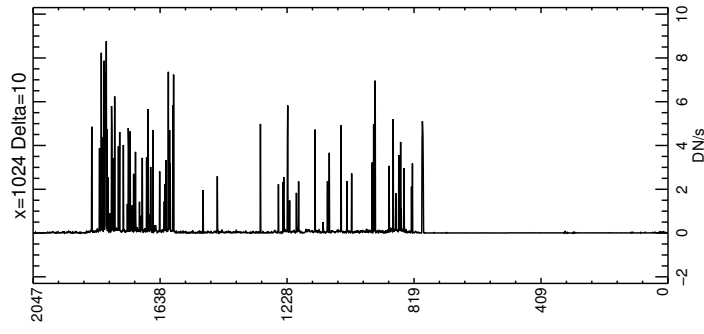
FWA : OPAQUE
 GWA : G140H
 MSA :



| Channel | Mean | Sigma | DN |
|---------|---------|---------|---------|
| SCA 491 | 16114.5 | 987.262 | 10.7677 |
| SCA 492 | 11728.2 | 1015.68 | 10.8832 |
| SCA 491 | 16381.5 | 1049.33 | 10.8224 |
| SCA 492 | 11936.2 | 1003.59 | 11.6262 |
| SCA 491 | 16280.9 | 947.959 | 11.2225 |
| SCA 492 | 11019.8 | 984.190 | 11.1906 |
| SCA 491 | 17184.0 | 954.190 | 11.4924 |
| SCA 492 | 11792.9 | 933.368 | 11.6062 |
| SCA 491 | 15585.7 | 1030.12 | 10.8601 |
| SCA 492 | 12152.6 | 973.799 | 10.9981 |
| SCA 491 | 16602.2 | 1010.30 | 11.3149 |
| SCA 492 | 11797.8 | 1160.18 | |
| SCA 491 | 15177.8 | 1192.73 | 11682.3 |
| SCA 492 | 1131.12 | | |

SCA 491

SCA 492



FM2-B Phase 4

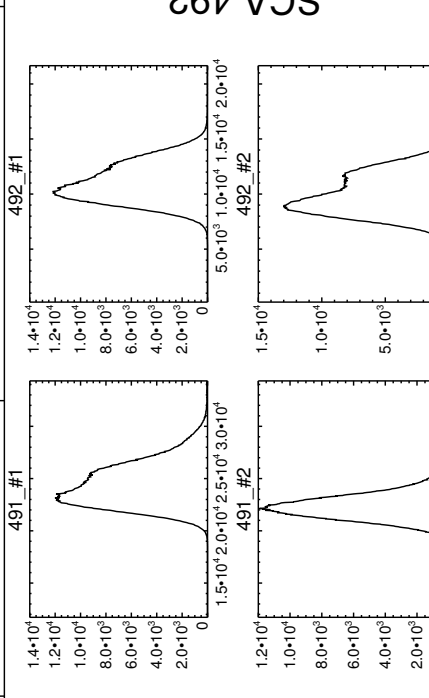
NRS_DET_UCODE7-CO-01_1_14511_JW1_jlab85_20130808T095311_20130808T100943/

14511

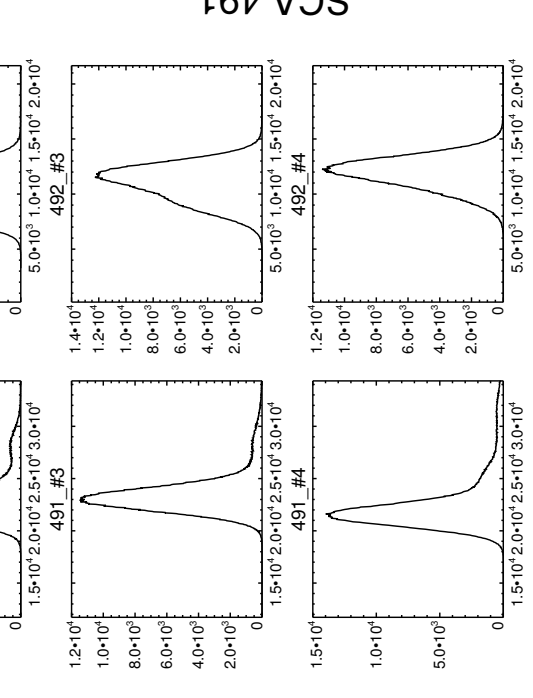
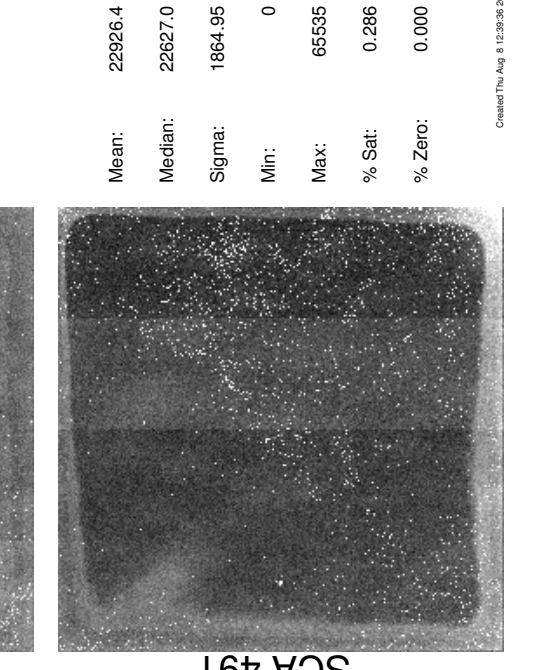
NID=14511

| | | | | | |
|--|--|-----------------------------|--|-------------------------|--|
| NRSDET_UCODE7-CO-01_1_491_SE_2013-08-08T10h11m01 | | * CAA * | | * TEMP [K] * | |
| NRSDET_UCODE7-CO-01_1_492_SE_2013-08-08T10h16m02 | | NO_LAMP | | FPA : 3.8601722e+001 | |
| OBS_ID : DET_UCODE7-CO-01 | | UNKNOWN | | ASIC-1 : 3.9277957e+001 | |
| DATE_OBS : 2013-08-08 | | UNKNOWN | | ASIC-2 : 3.9419221e+001 | |
| NGROUP : 88 | | * RMA * | | T_BP1 : 3.9053717e+001 | |
| NINT : 1 | | -3.9700000e+002 | | T_BP2 : 3.9773822e+001 | |
| EXPTIME : 944.83488 | | -2.2386301e+002 | | T_BP3 : 3.9543597e+001 | |
| TGROUP : 10.736760 | | 0 | | T_BP4 : 3.9575017e+001 | |
| NAXIS1 : 2048 | | OPMODE : OPEN_LOOP_MODE | | A1_DSUB_V : 0.65252800 | |
| REFPIXELS : 1 T : 4 B : 4 L : 4 R : 4 | | SYSINDEX : FSM | | A1_DSUB_I : -43.274256 | |
| | | PHM_Z_POS : -2.3631760e+001 | | A2_DSUB_V : 0.65252800 | |
| | | | | A2_DSUB_I : -2.2762804 | |

| | | | | | | | |
|----------------|--|----------------|--|----------------|--|---------|--|
| SOURCES : 5556 | | ASIC #1 : 5556 | | ASIC #2 : 5556 | | ON | |
| CURR : 0 | | CONF 1 : | | CLS_LAMP : | | CLOSE | |
| VOLT : 0 | | CONF 2 : | | SHUTTER : | | CLOSE | |
| STEP : 0 | | COL_0 : | | ATTENUATION : | | 0.00000 | |
| MICRON : 0 | | ROW_0 : | | ARGON : | | OFF | |
| HALL_POS : 0 | | RESET 1,2 : | | RCSS_CONF : | | Stop TC | |
| | | FWA : | | OPAQUE | | OFF | |
| | | GWA : | | G140H | | | |
| | | MSA : | | | | | |



| | Mean | Sigma | Mean | Sigma |
|---------|---------|---------|---------|---------|
| #1 even | 25334.4 | 991.514 | 11943.3 | 1011.31 |
| #1 odd | 25345.5 | 952.335 | 11554.3 | 985.482 |
| #2 even | 24724.4 | 1000.43 | 10898.6 | 940.232 |
| #2 odd | 24313.3 | 1000.07 | 10739.4 | 966.665 |
| #3 even | 25728.4 | 973.141 | 11419.1 | 1006.34 |
| #3 odd | 25100.5 | 970.941 | 11899.6 | 1011.76 |
| #4 even | 24188.4 | 1073.82 | 12071.6 | 1002.32 |
| #4 odd | 24194.2 | 1110.20 | 12487.8 | 992.922 |
| #1 even | 25602.0 | 1064.18 | 12495.7 | 1044.91 |
| #1 odd | 25584.0 | 1048.06 | 12132.8 | 1003.47 |
| #2 even | 25494.5 | 951.850 | 11215.5 | 1073.09 |
| #2 odd | 24997.3 | 981.519 | 11195.1 | 1067.31 |
| #3 even | 26396.0 | 956.937 | 11481.0 | 960.808 |
| #3 odd | 25169.7 | 957.006 | 11956.2 | 928.400 |
| #4 even | 24778.1 | 1030.73 | 11925.0 | 948.245 |
| #4 odd | 24725.5 | 1065.54 | 12295.7 | 973.156 |
| Left | 25835.5 | 1009.31 | 12011.2 | 1156.34 |
| Right | 24389.9 | 1190.81 | 11834.5 | 1125.87 |



| | Mean | Sigma | Mean | Sigma |
|-----------|---------|---------|---------|---------|
| #1 Top | 10.4175 | 11.2285 | 1.41625 | 1.22148 |
| #1 Bottom | 11.5862 | 10.8251 | 1.35254 | 2.44912 |
| #2 Top | 10.5687 | 12.3573 | 3.12035 | 2.90509 |
| #2 Bottom | 11.4657 | 11.1014 | | |
| #3 Top | 10.2330 | 11.0160 | | |
| #3 Bottom | 11.3468 | 11.1117 | | |
| #4 Top | 11.0258 | 10.8451 | | |
| #4 Bottom | 11.7766 | 10.6160 | | |

REFERENCE PIXELS

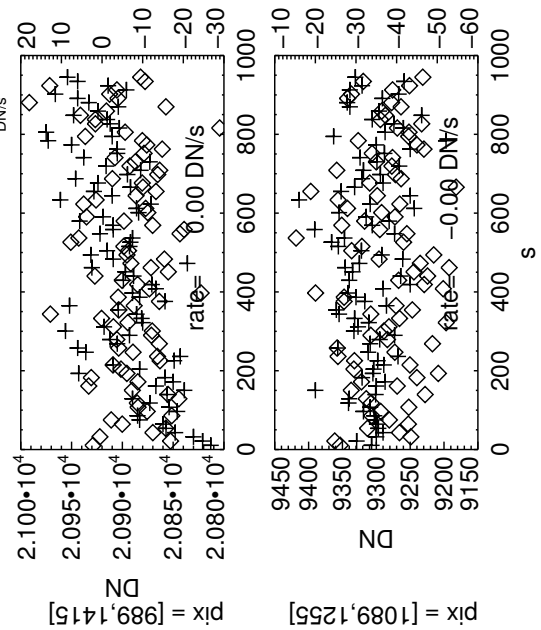
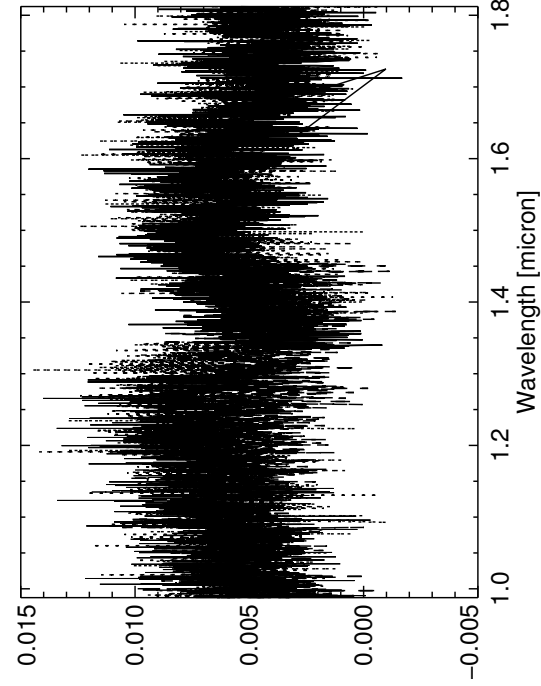
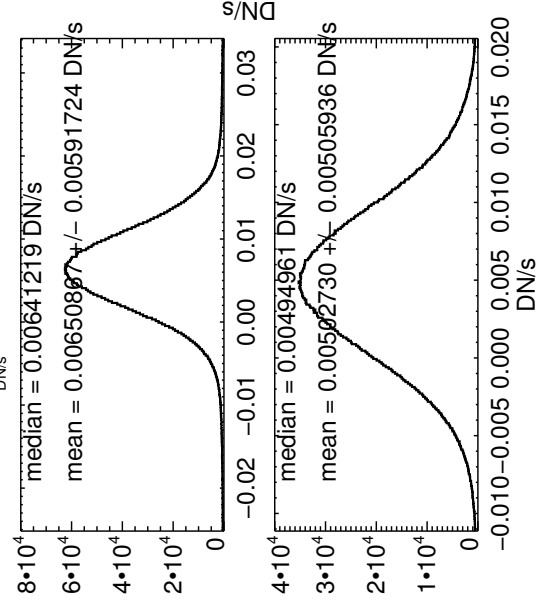
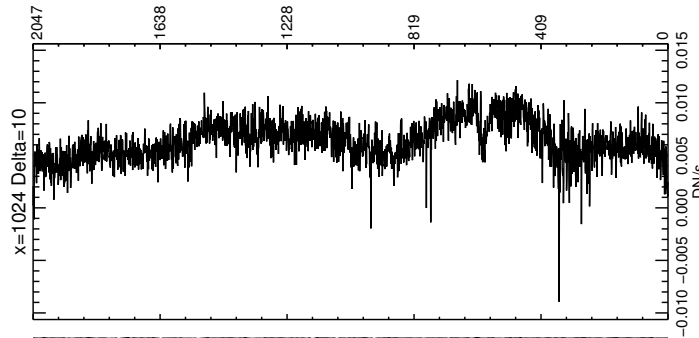
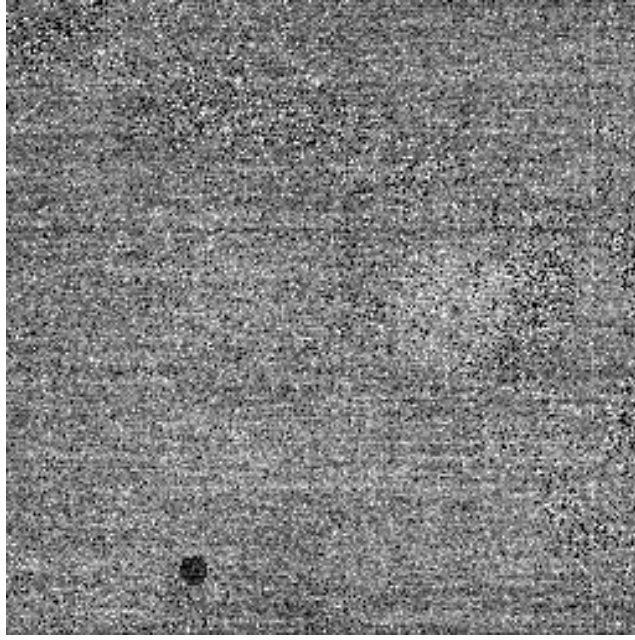
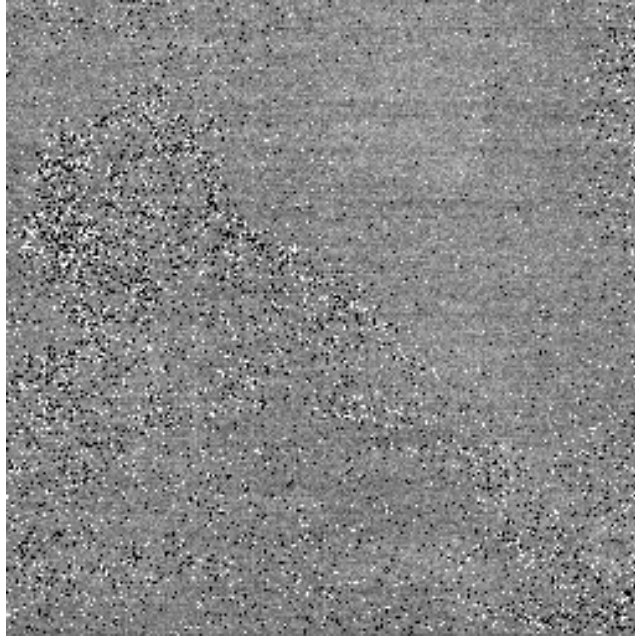
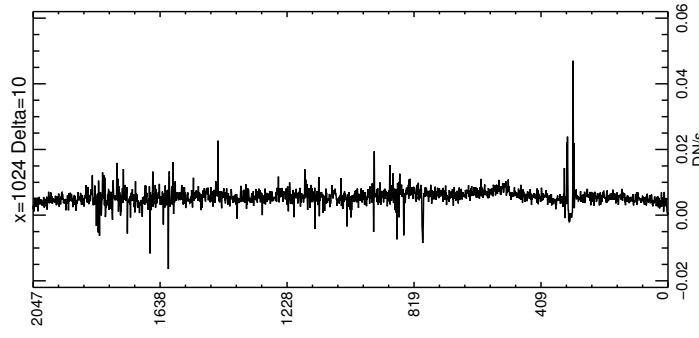
CDS [#1-#0]

NOISE Top Pix

MEAN SIGNAL

SCA 491

SCA 492



FM2-B Phase 5

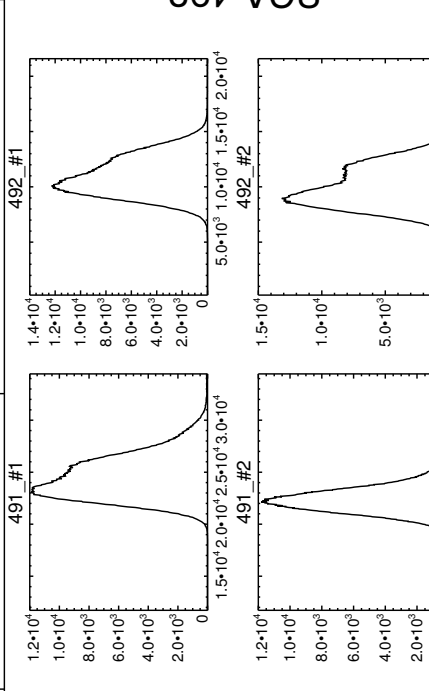
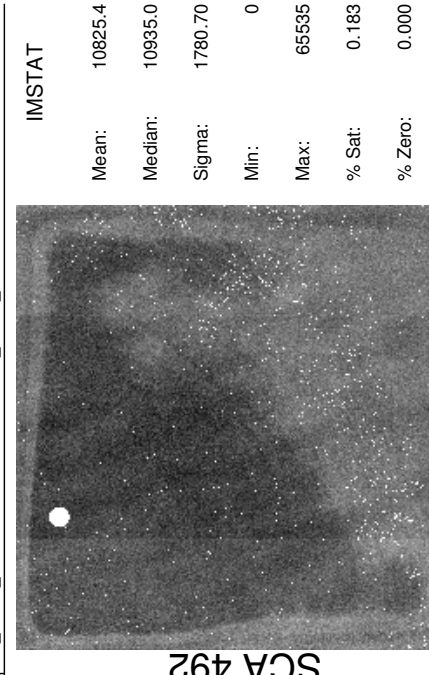
14522

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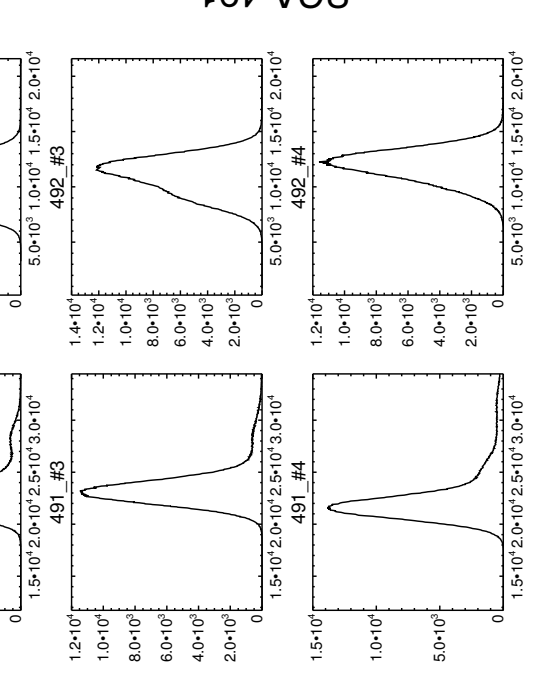
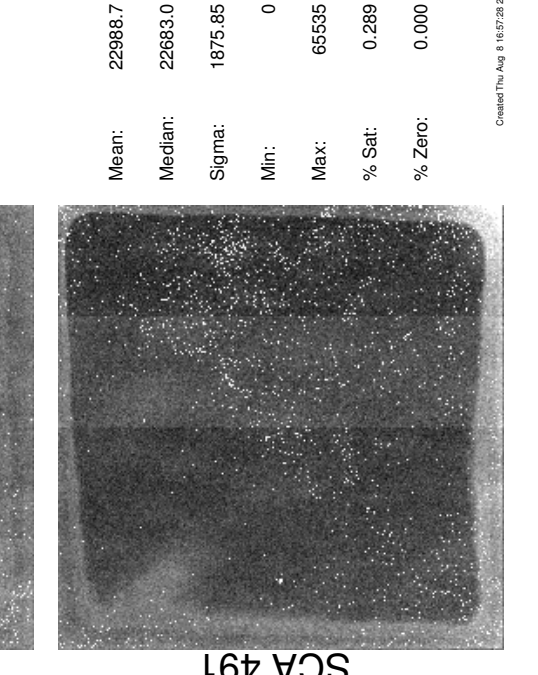
* TEMP [K] *
 FPA : 3.8602230e+001
 ASIC-1 : 3.9332630e+001
 ASIC-2 : 3.9488394e+001
 T_BP1 : 3.8998451e+001
 T_BP2 : 3.9737198e+001
 T_BP3 : 3.9532646e+001
 T_BP4 : 3.9547720e+001

SOURCE : NO_LAMP *
 CURR : UNKNOWN
 VOLT : UNKNOWN
 * RMA *
 STEP : -3.9700000e+002
 MICRON : -2.2386301e+002
 HALL_POS : 0

A1_DSUB_V : 0.56139023 A2_DSUB_V : 0.65165702
 A1_DSUB_I : -42.931412 A2_DSUB_I : -2.3349176



| ASIC #1 | ASIC #2 | CLAS_LAMP | OGSE * |
|---------|-----------|--------------|----------------------------|
| 5556 | 5556 | ON | |
| CONF 1: | CONF 2: | CLS_MODE : | CLS_LOOP_MODE |
| 0 | 0 | SHUTTER : | OPEN_LOOP_MODE |
| 0 | 0 | ATTENUATION: | PHM |
| 0 | 0 | ARGON: | PHM_Z_POS : 0.0000000e+000 |
| 2.2 | 2.2 | RCSS_CONF: | |
| 2.2 | 2.2 | RCSS_LAMP: | |
| FWA : | OPAQUE | OPMODE : | |
| GWA : | G140M | SYNINDEX : | |
| MSA : | SPCB-GD-A | | |



| Mean | Sigma | Mean | Sigma |
|---------|---------|---------|----------|
| 25459.0 | 985.297 | 11884.7 | 1006.99 |
| 25468.1 | 949.408 | 11503.3 | 985.919 |
| 24773.3 | 1000.94 | 10703.4 | 939.784 |
| 24358.8 | 1000.52 | 10746.1 | 966.749 |
| 25792.7 | 971.371 | 11420.5 | 1008.919 |
| 25154.7 | 960.270 | 11903.9 | 1016.64 |
| 24290.1 | 1069.94 | 12055.0 | 1002.49 |
| 24290.0 | 1106.33 | 12463.3 | 990.665 |
| 25728.8 | 1061.76 | 12455.9 | 1044.49 |
| 25709.8 | 1047.97 | 12094.7 | 1007.06 |
| 25546.9 | 950.405 | 11234.8 | 1073.39 |
| 25041.0 | 982.898 | 11214.6 | 1067.03 |
| 26470.3 | 955.196 | 11497.4 | 960.766 |
| 25688.5 | 955.018 | 11969.7 | 928.613 |
| 24883.6 | 1028.56 | 11917.2 | 947.126 |
| 24821.2 | 1059.04 | 12277.3 | 971.439 |
| 25935.8 | 1010.35 | 11965.3 | 1156.52 |
| 24468.7 | 1190.66 | 11816.8 | 1123.47 |

| Top | Bottom | Left | Right |
|---------|--------|---------|--------|
| #1 even | #1 odd | #1 even | #1 odd |
| #2 even | #2 odd | #2 even | #2 odd |
| #3 even | #3 odd | #3 even | #3 odd |
| #4 even | #4 odd | #4 even | #4 odd |

NOISE Top Pix

MEAN SIGNAL

| Top | Bottom |
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| #3 | #3 |
| #4 | #4 |

| Top | Bottom |
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| Top | Bottom |
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| #2 | #2 |
| #3 | #3 |
| #4 | #4 |

| Top | Bottom |
|-----|--------|
| #1 | #1 |
| #2 | #2 |
| #3 | #3 |
| #4 | #4 |

| Top | Bottom |
|-----|--------|
| #1 | #1 |
| #2 | #2 |
| #3 | #3 |
| #4 | #4 |

| Top | Bottom |
|-----|--------|
| #1 | #1 |
| #2 | #2 |
| #3 | #3 |
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| Top | Bottom |
|-----|--------|
| #1 | #1 |
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| Top | Bottom |
|-----|--------|
| #1 | #1 |
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| #3 | #3 |
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| Top | Bottom |
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| Top | Bottom |
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| #1 | #1 |
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