1. Introduction

This document reports on the WARM FUNCTIONAL TESTS carried out on the SPIRE Flight Instrument Model in the FM IST test campaign to verify the correct functioning of each of its subsystems before cool down. The Herschel cryostat chamber was at ambient pressure and temperature.

1.1 Scope

To judge the success or failure of a warm functional test by checking that:

- The telecommand sequence generated for a particular functional test is correctly received and executed on board by the SPIRE DPU.
- No error/event reports or command failures are generated during the execution of these commands.
- Telemetry is generated by the instrument as a result of telemetry requests to its different subunits.
- Particular telemetry parameters for each functional test change in an expected manner.
- Success criterion/criteria (specified in this document) is/are met.

1.2 Reference Documents

Ref	Document	Name	Version/Issue Nb.
RD01	SPIRE-RAL-DOC-001652	SPIRE Functional Tests Specification	Issue 1.4
RD02	SPIRE-RAL-DOC-001630	SPIRE EGSE-ILT Start-Up Procedures	Issue 0.7
RD03	SPIRE-RAL-PRC-002222	DRCU Switch ON Procedure	Issue 1.0
RD04	SPIRE-RAL-PRJ-001078	SPIRE Data ICD	Issue 2.1
RD05	Sap-SPIRE-CCa-076-02	DRCU/DPU Interface Control Document	Issue 1.2
RD06	LAM.PJT.SPI.NOT.011011	MCU/DPU Command List ICD	Issue 5.0
RD07	SPIRE-IFS-PRJ-001391	SPIRE OBS User Manual	Issue 2.2
RD08	SPIRE-IFS-PRJ-000650	SPIRE DPU Interface Control Document	Issue 1.1
RD09	SPIRE-RAL-PRC-002841	SPIRE I-EGSE Setup Procedure	Issue 2.1

1.3 Change Record

Document	Change date	Changes
Issue 1.0	26th Sept 2007	First version

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2. Functional Tests Configuration

2.1 SPIRE Instrument Configuration (REDUNDANT)

SPIRE FPU:

- FPU in tank
- Cryo-harness connected to FPU
- DRCU to Cryostat harnesses connected (Grounding pins not connected)
- DRCU-DPU Harness connected
- Cryostat open

2.2 Software Configuration (REDUNDANT)

The current EGSE software configuration for the REDUNDANT side tests:

EGSE component	Version/Build number	Comment
SCOS2000	SCOS2.3e Patch 5	SCOS archives IST_FM1 under /data/SPIRE/hfiles and /data/SPIRE/TMD SCOS MIB is FM_2.2.G6_PR_
CDMS Simulator	v2.5	NA
HCSS	#1206	
QLA	3.3 Build #555	
QLA scripts	Latest CVS versions	
Test Control scripts		CCS Handler scripts CVS v1.3
CUS Scripts		Mission config fm_ist_wft_config_redundant2 (called redundant2 for parity with prime)
Versant	7.0.0.1	
TFCS		NA
TFTS		NA

2.3 EGSE Configuration Checks

To check for the success of failure of a functional test, the real time telemetry of the instrument has to be monitored. The following applications must be running to do so. Before the test sequence starts, make the following checks:

Workstation	EGSE component	Status	Check	Comments
hspireegse	EGSE Router	Started	✔	Running
hspireegse	EGSE Gateway	Started	✔	Running
hspireegse	Pipe GW	Started	✔	Running

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spireqla	Telemetry Ingestion	Started	✔	Running
spireqla	Packet Display	Started	✔	Running
spireqla	CCS Handler Server	Started	✔	Running
spires2k	SCOS2000	Started	✔	Running
spireqla	QLA	Started	✔	Running

The following checks were performed to verify the correct initial instrument configuration for the tests.

Step#	Action	Comments	Check
1.	In SCOS open **DPU_AND_OBS_PARAMETERS display** Check if : TM2N is incrementing by one @1Hz. TM1N is incrementing by one @0.5Hz. - If they are, go to step 5. - If they are not, go to step 2.	**Both TM1N and TM2N are incrementing at their nominal rates. Will go to step 5.** **DPUM15V=-15.64V** **DPUP15V =15.29V** **DPUTEMP = 301K**	✔
2.	In SCOS open **SCU PARAMETERS display** - If SCUP5V/P9V/M9V are jittering and **BIAS_PARAMETERS display** - If BIASTEMP show ambient temperature, the DRCU is ON.Go to step 6. - If DRCU is not ON, refer to RD03 on how to start up the DRCU.	**ALL SCU VOLTAGES LOOKING GOOD.** SCUP5V = 5.2283V SCUP9V =9.09V SCUM9V = -9.1V **ALL BIAS VOLTAGES LOOKING GOOD.** BIASP5V = 5.17V BIASP9V = 9.01V BIASM9V= -9.07V BIASTEMP=295.6K	✔
3.	**In SCOS open** DPU_AND_OBS_PARAMETERS display **and check that the MODE housekeeping parameter is DRCU_ON.**	**MODE (RAW)= 0x100** **MODE (ENG) = DRCU_ON**	✔

Table 1. Initial configuration check

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3. Test procedure

The following two sections describe general pass/fail criteria (Section 3.1), the general test procedure layout (Section 3.1) and the detailed procedure for each functional test (Section 3.2).

3.1 General Pass/Fail Criteria

The general criterion for declaring a single test failed is the repeated failure of 2 consecutive runs of this test. In that case the functional test procedure should be aborted and the overall functional testing declared FAILED.
In the case of a 'first run' failure followed by a successful execution a third run of the same test should be performed and in the unlikely event of this third run being a failure the test procedure should be also aborted and the overall functional testing declared FAILED, as this would imply a not reliable operability of the instrument.
As a general remark ANY failure should be closely analyzed.

4. Detailed Test Results on REDUNDANT instrument.

The following is a detailed (test by test) procedure including the steps performed on each test and the results obtained.

Step#	Action	Comments
0	Open **SCU PARAMETERS** display on SCOS Alpha Numeric Displays.	

4.1 FUNC-SCU-01: SCU Science Generation Check

Test Id:	**FUNC-SCU-01: SCU Science Generation Check**
Initial Configuration:	**DRCU_ON**
Final Configuration:	**DRCU_ON**
Success Criteria:	Test passed if : 1. Two SCU Nominal Science Report telemetry packets are received on QLA with the following characteristics: <table><tr><td>APID</td><td>Type</td><td>Subtype</td><td>SID</td><td>FrameID</td><td>Frame length</td></tr><tr><td>0x509</td><td>21</td><td>1</td><td>0xA20</td><td>0x20</td><td>0x1E</td></tr></table> 2. The frame time difference between consecutive SCU frames within these packets corresponds to the sampling rate. Nominal SCU sampling rate is 80Hz ➔ Δt = 12.5 ms 3. The SPIRE HK parameter SCUFRAMECNT increments by 31. 4. No events are generated during the frame generation. QLA to give go ahead.

Test Procedure:

Step#	Action	Comments
1	Write the initial value of SCUFRAMECNT parameter located in SCU PARAMETERS display and the initial value of TM1N located in DPU_AND-OBS_PARAMETERS display.	SCUFRAMECNT = 0
2	Run QLA script FUNC-SCU-01.py on QLA console.	
3	Run FUNC-SCU-01 test procedure from the CCS	
4	Write the final value of SCUFRAMECNT and TM1N.	SCUFRAMECNT = 31
5	Contingency: If test fails repeat steps 1 to 4.	

Test Log:

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Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-01	**SCUFRAMECNT TM5N**	**n/ n+ 31 0x3FFF/1**	0/ 31 0x3FFF/1	31	Success

Start time @: 12:10
OBSID: 0xb0000228

QLA produces QLA-SCU-01_B0000228.txt file:

```
***********************************************************************
SCU: OBSID = B0000228, BBTYPE = 0x8000, APID = 0x509, SID  = 0xa20
_____
Parameter      Initial    Final     Increment Expect Incre. Packet Chars.

SCUFRAMECNT    0          31        31        31             Packet type = 0x15
TM5N           16383      1         2         2              subtype = 0x1
FrameTime      12.4960    12.4992                            Frame ID  = 0x20
                                                             Frame Len = 0x1E
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 12.49792 ms
sigma = 0.00163 ms
```

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4.2 FUNC-SCU-03: SCU DC Thermometry Check

Test Id:	**FUNC-SCU-03: SCU DC Thermometry Check**
Initial Configuration:	**DRCU_ON**
Final Configuration:	**DRCU_ON** + DC thermometry ON
Success Criteria:	Test passed if all FPU DC thermometry sensors show temperature values indicating a correct functioning of the sensor, not open/short-circuited. If ANY reading is anomalous check RAW sensor reading. **Open Circuit Criterion:** RAW reading in the range [0, -100] **Short Circuit Criterion:** RAW reading of -32768 **Note:** For some parameters the calibration curve above 75K has only 2 points, thus the linearly interpolated temperature reading given by SCOS is usually not correct at T > 75K.

Test Procedure:

Step#	Action	Comments
1	Run FUNC-SCU-03 test procedure from the CCS	
2	When the test is finished Write the current value of SCUTEMPSTAT and the RAW/converted values of the 16 FPU temperatures located in SCU PARAMETERS display.	
3	Contingency: If test fails execute SCU_OFF procedure from the CCS and then repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-03	**SCUTEMPSTAT**	**0/0xFFFF**	**0/0xFFFF**	**N/A**	Success

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Start time @: 12:13
OBSID: 0xb0000229

Comments: All RAW SCU DC temperatures are 32768 except EMCFILTTEMP which is ~35718

QLA script produced the file FUNC-SCU-03_B0000229.txt:

```
SCU-03 Thermometry Check
OBSID = 0xb0000229

PUMPHTRTEMP  50.09    32768
PUMPHSTEMP   36.42    32768
EVAPHSTMP    39.25    32768
SHUNTTEMP    18.05    32768
EMCFILTMP    288.34   35718
SL0TEMP      19.89    32768
PL0TEMP      22.52    32768
OPTTEMP      141.72   32768
BAFTEMP      160.50   32768
BSMIFTEMP    110.81   32768
SCAL2TEMP    166.07   32768
SCAL4TEMP    141.47   32768
SCALTEMP     83.15    32768
SMECIFTEMP   133.33   32768
SMECTEMP     27.28    32768
BSMTEMP      13.13    32768
```

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4.3 FUNC-SCU-06: SCU AC Thermometry Check

Test Id:	**FUNC-SCU-06: SCU AC Thermometry Check**
Initial Configuration:	**DRCU_ON** + DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON
Success Criteria:	Test passed if SUBKSTAT parameter went from 0 to 1. **Open Circuit Criterion:** RAW reading in the range 0 -100 **Short Circuit Criterion:** RAW reading of -32768

Test Procedure:

Step#	Action	Comments
1	Run FUNC-SCU-06 test procedure from the HCSS Test Procedure window on TOPE.	
2	When the test is finished Write the current value of SUBKSTAT located in SCU PARAMETERS display. Also write down the RAW value of the SUBKTEMP parameter.	
3	Contingency: If test fails : Send manual command: SEND_DRCU_COMMAND Parameter1 = 0xA0860000 Parameter2 = 0 Then repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-06	**SUBKSTAT**	**0/1**	0/1	**N/A**	Success

Start time @: 12:16
OBSID: 0xb000022a
Comments: OK

SUBKTEMP:
Before: RAW = 32767
After : RAW = 32767

<mark>**No change in the RAW value before and after SCU AC Therm switch-on**</mark>

QLA output file:

```
SCU-06
Start time @: 26-Sep 12:17:04
End time @: 26-Sep 12:17:18
OBSID: 0xB000022A

SUBKSTAT:
Start value: 0x0
End value: 0x1

SUBKTEMP
RAW value before: 32767

RAW value after: 32767
Converted after: 54689 mK
```

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4.4 FUNC-SCU-02: SCU Nominal Science Contents Check

Test Id:	FUNC-SCU-02: SCU Nominal Science Contents Check
Initial Configuration:	DRCU_ON + AC/DC thermometry ON
Final Configuration:	DRCU_ON + AC/DC thermometry ON
Success Criteria:	Test passed if : 1. Parameters in the SCU Nominal science packets and the same parameters in the Nominal HK packet have similar RAW values to within ±10 units. 2. The SPIRE HK parameter SCUFRAMECNT located in SCU PARAMETERS display increments by 31. 3. No events are generated during the frame generation. QLA to give the go ahead.

Test Procedure:

Step#	Action	Comments
1	Write the current value of SCUFRAMECNT located in SCU PARAMETERS display.	
2	Run QLA script FUNC-SCU-02.py on QLA console.	
3	Run FUNC-SCU-02 test procedure from the CCS	
4	When the test is finished Write the current value of SCUFRAMECNT.	
5	Contingency: If test fails repeat steps 1 to 4.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-02	SCUFRAMECNT TM5N	n+31/n+62 1/3	31/62 1/3	31	Success

Start time @: 12:25
OBSID: 0xb000022b

Comments: OK

All SCU parameters within the Nominal HK and the Nominal SCU Science Report agree.

QLA produces QLA-SCU-02_B000022B.txt file:

```
FUNC-SCU-02 version: 1.5

Housekeeping @  Wed Sep 26 12:26:30 UTC 2007
SCU Science @ Wed Sep 26 12:26:22 UTC 2007

 Name          HSK value  SCU value   Equal (within 10 raw units)?
TCHTRV         18.0       20.0        True
PCALCURR       9.0        9.0         True
SCAL4CURR      10.0       10.0        True
SCAL2CURR      10.0       10.0        True
PCALV          13.0       11.0        True
SCAL4V         10.0       10.0        True
SCAL2V         10.0       10.0        True
PUMPHTRTEMP    32768.0    32768.0     True
PUMPHSTEMP     32768.0    32768.0     True
EVAPHSTEMP     32768.0    32768.0     True
SHUNTTEMP      32768.0    32768.0     True
EMCFILTEMP     35716.0    35712.0     True
SL0TEMP        32768.0    32768.0     True
PL0TEMP        32768.0    32768.0     True
OPTTEMP        32768.0    32768.0     True
BAFTEMP        32768.0    32768.0     True
BSMIFTEMP      32768.0    32768.0     True
SCAL2TEMP      32768.0    32768.0     True
SCAL4TEMP      32768.0    32768.0     True
SCALTEMP       32768.0    32768.0     True
SMECIFTEMP     32768.0    32768.0     True
SMECTEMP       32768.0    32768.0     True
BSMTEMP        32768.0    32768.0     True
SUBKTEMP       32767.0    32767.0     True
```

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4.5 FUNC-SCU-04: Photometer Calibration Check

Test Id:	FUNC-SCU-04: Photometer Calibration Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON
Success Criteria:	Test passed if PCALCURR/PCALV SCU HK parameters show the following values: • PCALCURR HK parameter which shows the measured PCAL current is ~ 0.1 mA. • PCALV HK parameter which shows the measured PCAL voltage is ~ 0.02V

Test Procedure:

Step#	Action	Comments
1	Write the current value of PCALV and PCALCURR located in SCU PARAMETERS display.	
2	Run FUNC-SCU-04 test procedure from the CCS	
3	While the test is running Write the values of PCALV and PCALCURR.	
4	Contingency: If test fails repeat steps 1 to 3.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/During test	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-04	**PCALCURR** **PCALV**	**0/0.1mA** **0/0.02V**	0 / 0.1 mA 0 / 0.02 V	**N/A**	Success

Start time @: 12:29
OBSID: 0xb000022c

Comments:

Test Successful

4.6 FUNC-SCU-05: Spectrometer Calibration Check

Test Id:	FUNC-SCU-05: Spectrometer Calibration Check

Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON
Success Criteria:	Test passed if : • SCAL2CURR ,SCAL4CURR HK parameters which show the measured current read ~ 0.1 mA • SCAL2V,SCAL4V parameters which show the measured voltage read ~ 0.05V.

Test Procedure

Step#	Action	Comments
1	Write the current value of SCAL2V ,SCAL2CURR,SCAL4V,SCAL4CURR located in SCU PARAMETERS display.	
2	Run FUNC-SCU-05 test procedure from the CCS	
3	While the test is running write the values of SCAL2V ,SCAL2CURR, SCAL4V,SCAL4CURR.	
4	Contingency: If test fails repeat steps 1 to 3.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/During test	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-05	**SCAL4CURR** **SCAL4V** **SCAL2CURR** **SCAL2V**	**0/0.1mA** **0/0.05V** **0/0.1mA** **0/0.05V**	0 / 0.1 mA 0 / 0.05 V 0 / 0.1 mA 0 / 0.05 V	**N/A**	Success

Start time @: 12:31
OBSID: 0xb000022d

Comments:

Test Successful

4.7 FUNC-SCU-07: SCU Cooler Heater Check

Test Id:	**FUNC-SCU-07: SCU Cooler Heater Check**

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Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON
Success Criteria:	Test passed if during the execution of the test the following SCU HK parameters give correspondent readings of:

SCU HK parameter	RAW	Converted
SPHSV	**~12715**	**~323mV**
EVHSV	**~12715**	**~323mV**
SPHTRV	**~14390**	**~ 8 V**

Test Procedure:

Step#	Action	Comments
1	Run FUNC-SCU-07 test procedure from the CCS.	Pending
2	While the test is running Write the values of current values of SPHSV, EVHSV, SPHTRV located in SCU PARAMETERS display. (RAW and CONVERTED)	
3	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/During test	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-07	**SPHSV** **EVHSV** **SPHTRV**	**0/ ~ 323 mV** **0/ ~ 323 mV** **0/ ~ 8 V**	0.1554 / 324.2 mV 0.1554 / 325.2 mV 0.0042 / 8.85 V	**N/A**	Success

Start time @: 12:34
OBSID: 0xb000022e

Comments:

Test Successful

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4.8 FUNC-SCU-08: SCU Test Pattern Check

Test Id:	FUNC-SCU-08: SCU Test Pattern Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON
Success Criteria:	Test passed if : 1. Two SCU Diagnostic Science Report telemetry packets are received with the following characteristics:

APID	Type	Subtype	SID	FrameID	Frame length
0x509	21	3	0x1121	0x21	0x1E

2. The SCU Test Pattern agrees with the reference test pattern.
QLA to give go ahead.

Test Procedure:

Step#	Action	Comments
1	Write the current values of SCUFRAMECNT located in SCU PARAMETERS display.	
2	Run QLA script FUNC-SCU-08.py on QLA console.	
3	Run FUNC-SCU-08 test procedure from the CCS	
4	When the test is finished Write the current value of SCUFRAMECNT.	
5	Contingency: If test fails repeat steps 1 to 4.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-08	**SCUFRAMECNT and SCU test pattern frame parameters**	**n+62/n+93**	62/93	31	Success

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Start time @: 12:37
OBSID: 0xb000022f

Comments: TM5N 3 -> 5
Test Pattern OK

QLA has written file FUNC-SCU-08_B000022F_8A07.txt:

```
SCU Test Pattern @ Wed Sep 26 13:39:05 BST 2007
 ..compared with data from SCU Test Pattern @ Wed Mar 14 14:07:43 GMT 2007, OBSID=0x300125B3

Name              New Value[0]      New Value[20]     Comp Value[0]              Comp Value[20]
SCUTSTOBSID       0xB000022F        0x0               0x300125B3                 0x0
SCUTSTBBID        0x8A070001        0x0               0x8A070001        --> OK   0x0               --> OK
SCUTSTBLKLEN      30.0              30.0              30.0              --> OK   30.0              --> OK
SCUTSTFRAMEID     33.0              33.0              33.0              --> OK   33.0              --> OK
SCUTST001         43690.0           31181.0           43690.0           --> OK   31181.0           --> OK
SCUTST002         21844.0           62363.0           21844.0           --> OK   62363.0           --> OK
SCUTST003         43688.0           59190.0           43688.0           --> OK   59190.0           --> OK
SCUTST004         21840.0           52844.0           21840.0           --> OK   52844.0           --> OK
SCUTST005         43680.0           40153.0           43680.0           --> OK   40153.0           --> OK
SCUTST006         21825.0           14771.0           21825.0           --> OK   14771.0           --> OK
SCUTST007         43650.0           29543.0           43650.0           --> OK   29543.0           --> OK
SCUTST008         21765.0           59086.0           21765.0           --> OK   59086.0           --> OK
SCUTST009         43530.0           52637.0           43530.0           --> OK   52637.0           --> OK
SCUTST010         21524.0           39739.0           21524.0           --> OK   39739.0           --> OK
SCUTST011         43048.0           13943.0           43048.0           --> OK   13943.0           --> OK
SCUTST012         20560.0           27887.0           20560.0           --> OK   27887.0           --> OK
SCUTST013         41120.0           55774.0           41120.0           --> OK   55774.0           --> OK
SCUTST014         16705.0           46012.0           16705.0           --> OK   46012.0           --> OK
SCUTST015         33411.0           26489.0           33411.0           --> OK   26489.0           --> OK
SCUTST016         1287.0            52978.0           1287.0            --> OK   52978.0           --> OK
SCUTST017         2574.0            40420.0           2574.0            --> OK   40420.0           --> OK
SCUTST018         5149.0            15304.0           5149.0            --> OK   15304.0           --> OK
SCUTST019         10298.0           30608.0           10298.0           --> OK   30608.0           --> OK
SCUTST020         20597.0           61216.0           20597.0           --> OK   61216.0           --> OK
SCUTST021         41194.0           56896.0           41194.0           --> OK   56896.0           --> OK
SCUTST022         16852.0           48257.0           16852.0           --> OK   48257.0           --> OK
SCUTST023         33705.0           30978.0           33705.0           --> OK   30978.0           --> OK
SCUTST024         1874.0            61956.0           1874.0            --> OK   61956.0           --> OK
SCUTSTADCFLGS     0.0               0.0               0.0               --> OK   0.0               --> OK
SCUTSTFRAMETIME   4063009.0         4141121.0         4284236.0                  4362348.0
SCUTSTCHECKWORD   40153.0           47874.0           15560.0                    6994.0
```

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Step#	Action	Comments
0	Open **MCU_PARAMETERS** display on SCOS Alpha Numeric Displays.	

4.9 FUNC-MCU-01: MCU Boot Check

Test Id:	**FUNC-MCU-01: MCU Boot Check**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON
Success Criteria:	Test passed if: 1. MCU boots. 2. MCU voltages show expected values. 3. MAC, SMEC and BSM board temperatures shows ambient temperature.

Test Procedure:

Step#	Action	Comments
1	Run **FUNC-MCU-01** test procedure from the CCS	
2	When procedure is finished Write the values of the MCU voltages.	
3	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-MCU-01	**MCUP5V** **MCUP15V** **MCUP14V** **MCUM14V** **MCUM15V** **MCUMACTEMP** **MCUSMECTEMP** **MCUBSMTEMP**	**N/A/ ~ 5V** **N/A / ~15V** **N/A / ~ 14V** **N/A / ~ -14V** **N/A / ~ -15V** **N/A / ~ 300K** **N/A / ~ 300K** **N/A / ~ 300K**	- / 5.00V - / 15.50V - / 14.13V - / -14.50 V - / -15.61 V - / 293.6K - / 297.8K - / 297.6 K	**N/A**	Success

Start time @: 12:40
OBSID: 0xb0000230

Comments:

MCUBITSTAT went from 0 to 1 as expected

Test Successful

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4.10 FUNC-MCU-02: MCU Nominal Frame Generation Check

Test Id:	FUNC-MCU-02: MCU Nominal Frame Generation Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON
Success Criteria:	Test passed if : 1. MCU produces each type of the frames requested and with the following characteristics.

Frame	APID	Type	Subtype	SID	FrameID	Frame length
Eng.	**0x509**	**21**	**3**	**0x814**	**0x14**	**0x15**
BSM	**0x509**	**21**	**1**	**0x612**	**0x12**	**0xD**
SMEC	**0x509**	**21**	**1**	**0x410**	**0x10**	**0xC**
BSM +SMEC						

2. No events are generated during the different frames generation.

Test Procedure:

Step#	Action	Comments
1	Write the current value of MCUFRAMECNT located in MCU_PARAMETERS display	
2	Run QLA script FUNC-MCU-02.py on QLA console.	
3	Run FUNC-MCU-02 test procedure from the CCS	
4	When test is finished Write the current value of MCUFRAMECNT.	
5	Contingency: If test fails repeat steps 1 to 4.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-MCU-02	**MCUFRAMECNT**	**0/ ~ 6600**	0 / 6491		Success

Start time @: 12:44
OBSID: 0xb0000231

QLA generated file QLA-MCU-02_B0000231.txt :

```
***************************************************************************
MCUENG: OBSID = B0000231, BBTYPE = 0x8901, APID = 0x509, SID  = 0x814
_____
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

MCUFRAMECNT     0          608       608       609         Packet type = 0x15
TM5N            5          32        27        27          subtype = 0x3
FrameTime       16.4223    16.4225                         Frame ID  = 0x14
                                                           Frame Len = 0x15
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 16.42262 ms
sigma = 0.00114 ms



***************************************************************************
BSM: OBSID = B0000231, BBTYPE = 0x8903, APID = 0x509, SID  = 0x612
_____
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

MCUFRAMECNT     608        1249      641       609         Packet type = 0x15
TM5N            32         49        17        17          subtype = 0x1
FrameTime       15.5809    15.5809                         Frame ID  = 0x12
                                                           Frame Len = 0xD
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 15.58044 ms
sigma = 0.00102 ms



***************************************************************************
SMEC: OBSID = B0000231, BBTYPE = 0x8902, APID = 0x509, SID  = 0x410
_____
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

MCUFRAMECNT     1249       3623      2374      2375        Packet type = 0x15
TM5N            49         107       58        58          subtype = 0x1
FrameTime       4.2112     4.2112                          Frame ID  = 0x10
                                                           Frame Len = 0xC
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 4.21093 ms
sigma = 0.00089 ms



***************************************************************************
SMEC+BSM: OBSID = B0000231, BBTYPE = 0x8904, APID = 0x509, SID  = 0x410
_____
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

MCUFRAMECNT      3623      6491      2868      2850        Packet type = 0x15
TM5N             107       178       71        71          subtype = 0x1
FrameTime SMEC   4.2112    4.2112                          Frame ID = 0x10, Len = 0xC
FrameTime BSM    20.2143   20.2112                         Frame ID = 0x12, Len = 0xD

STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 10.74002 ms (SMEC), 20.21247 ms (BSM)
sigma = 323.23943 ms (SMEC), 0.00157 ms (BSM)
```

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4.11 FUNC-MCU-03: MCU Nominal Science Contents Check

Test Id:	FUNC-MCU-03: MCU Nominal Contents Check						
Initial Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON						
Final Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON						
Success Criteria:	Test passed if : 1. MCU produces 99 frames of each type of frames requested with the following characteristics:						
	Frame	APID	Type	Subtype	SID	FrameID	Frame length
	Eng.	**0x509**	**21**	**3**	**0x814**	**0x14**	**0x15**
	BSM	**0x509**	**21**	**1**	**0x612**	**0x12**	**0xD**
	SMEC	**0x509**	**21**	**1**	**0x410**	**0x10**	**0xC**
	BSM +SMEC						
	2. No events are generated during the different frames generation. 3. QLA analysis results are correct. QLA to give go ahead.						

Test Procedure:

Step#	Action	Comments
1	Write the current value of MCUFRAMECNT located MCU_PARAMETERS display.	
2	Run QLA script FUNC-MCU-03.py on QLA console.	
3	Run FUNC-MCU-03 test procedure from the CCS	
4	When test is finished Write the current value of MCUFRAMECNT	
5	Contingency: If test fails repeat steps 1 to 4.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-MCU-03	**MCUFRAMECNT**	**n/ n+297** **n~6600**	6491 / 6788	297	Success

Start time @: 12:50
OBSID: 0xb0000232

Produced 99 frames instead of 100 as expected for each type of MCU frame


```
QLA produced three files: QLA-MCU-03_B0000232_8901.txt (SMEC), QLA-MCU-03_
B0000232_8902.txt (MCU Eng) and QLA-MCU-03_ B0000232_8903.txt (BSM).

Housekeeping Wed Sep 26 12:51:13 UTC 2007
Science Wed Sep 26 12:51:13 UTC 2007
Name            HK before    Science     HK after      Equal (within 10%)?
SMECENCSIG1     12384.0      12386.0     12384.0       True
SMECENCSIG2     20013.0      20016.0     20019.0       True
SMECLVDTDCSIG   32758.0      32756.0     32756.0       True
SMECLVDTACSIG   29381.0      29380.0     29381.0       True
SMECMOTORCURR   32770.0      32773.0     32772.0       True
SMECMOTORVOLT   33764.0      33759.0     33759.0       True
CHOPSENSSIG     32758.0      32759.0     32758.0       True
CHOPMOTORCURR   32767.0      32770.0     32769.0       True
CHOPMOTORVOLT   33175.0      33172.0     33170.0       True
JIGGSENSSIG     32766.0      32767.0     32761.0       True
JIGGMOTORCURR   32769.0      32769.0     32768.0       True
JIGGMOTORVOLT   33247.0      33245.0     33249.0       True


Housekeeping Wed Sep 26 12:51:30 UTC 2007
Science Wed Sep 26 12:51:30 UTC 2007
Name            HK before    Science     HK after      Equal (within 10%)?
SMECENCPOSN     0.0          0.0         0.0           True
SMECENCFINEPOSN 0.0          0.0         0.0           True
SMECLVDTDCSIG   32758.0      32757.0     32758.0       True
SMECMOTORBEMF   994.0        993.0       993.0         True


Housekeeping Wed Sep 26 12:51:46 UTC 2007
Science Wed Sep 26 12:51:46 UTC 2007
Name            HK before    Science     HK after      Equal (within 10%)?
CHOPSENSSIG     32757.0      32760.0     32759.0       True
CHOPDACVAL      32768.0      32768.0     32768.0       True
CHOPMOTORVOLT   33172.0      33171.0     33169.0       True
JIGGSENSSIG     32766.0      32763.0     32762.0       True
JIGGDACVAL      32768.0      32768.0     32768.0       True
JIGGMOTORVOLT   33250.0      33247.0     33252.0       True
```


No discrepancies between HK and science parameter values.

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4.12 FUNC-MCU-04: MCU Test Pattern Check

Test Id:	FUNC-MCU-04: MCU Test Pattern Check						
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON						
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON						
Success Criteria:	Test passed if: 1. MCU produces 100 frames of Test Pattern with the following characteristics:						
	Frame	APID	Type	Subtype	SID	FrameID	Frame length
	Test	**0x509**	**21**	**3**	**0x915**	**0x15**	**0x15**
	2. MCU Test pattern produced is the same as the previous time this test was run. QLA to give go ahead.						

Test Procedure:

Step#	Action	Comments
1	Write the current value of MCUFRAMECNT located in MCU_PARAMETERS display.	
2	Run QLA script FUNC-MCU-04.py on QLA console.	
3	On Lincoln run FUNC-MCU-04 test procedure from the CCS	
4	When test is finished Write the current value of MCUFRAMECNT	
5	Contingency: If test fails repeat steps 1 to 4.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-MCU-04	**MCUFRAMECNT**	**m/ m+99** **m~6600**	6788 / 6887	99	Success

Start time @: 12:54
OBSID: 0xb0000233

Comments:

Produced 99 frames instead of 100 – this is expected.

QLA has generated file QLA-MCU-04_ B0000233_8905.txt:


```
MCU Test Pattern @ Wed Sep 26 12:55:48 UTC 2007
 ..compared with data from MCU Test Pattern @ Wed Mar 14 14:31:00 GMT 2007, OBSID=0x300125B9

Name               New Value[0]     New Value[20]    Comp Value[0]          Comp Value[20]
MCUTSTOBSID        0xB0000233       0x0              0x300125B9             0x0
MCUTSTBBID         0x89050001       0x0              0x89050001    --> OK   0x0            --> OK
MCUTSTBLKLEN       21.0             21.0             21.0          --> OK   21.0           --> OK
MCUTSTFRAMEID      21.0             21.0             21.0          --> OK   21.0           --> OK
MCUTSTACQTIME      4067499.0        4170272.0        3994451.0              4097224.0
MCUTST001          21845.0          21845.0          21845.0       --> OK   21845.0        --> OK
MCUTST002          43690.0          43690.0          43690.0       --> OK   43690.0        --> OK
MCUTST003          21844.0          21844.0          21844.0       --> OK   21844.0        --> OK
MCUTST004          43688.0          43688.0          43688.0       --> OK   43688.0        --> OK
MCUTST005          21840.0          21840.0          21840.0       --> OK   21840.0        --> OK
MCUTST006          43680.0          43680.0          43680.0       --> OK   43680.0        --> OK
MCUTST007          21825.0          21825.0          21825.0       --> OK   21825.0        --> OK
MCUTST008          43650.0          43650.0          43650.0       --> OK   43650.0        --> OK
MCUTST009          21765.0          21765.0          21765.0       --> OK   21765.0        --> OK
MCUTST010          43530.0          43530.0          43530.0       --> OK   43530.0        --> OK
MCUTST011          21524.0          21524.0          21524.0       --> OK   21524.0        --> OK
MCUTST012          43048.0          43048.0          43048.0       --> OK   43048.0        --> OK
MCUTST013          20560.0          20560.0          20560.0       --> OK   20560.0        --> OK
MCUTST014          41120.0          41120.0          41120.0       --> OK   41120.0        --> OK
MCUTSTTTIME        4067973.0        4170746.0        3994925.0              4097699.0
MCUTSTCHECKWORD    61917.0          61993.0          62861.0                61848.0
```


Comparison successful

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Step#	Action	Comments
0	Open **CHOP & JIGGLE PARAMETERS displays** on SCOS Alpha Numeric Displays.	

4.13 FUNC-BSM-01: BSM Chop/Jiggle Sensor Check

Test Id:	FUNC-BSM-01: BSM Chop/Jiggle Sensor Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Success Criteria:	Test passed if: 1. CHOPSENSPWR HK parameter goes from 0 to 1 2. CHOPDACVAL HK parameter stays at or goes to 0x8000 3. CHOPSENSIG HK parameter shows variation from off to on 4. JIGGSENSPWR HK parameter goes from 0 to 1 5. JIGGDACVAL parameter stays at or goes to 0x8000 6. JIGGSENSSIG HK parameter shows variation from off to on

Test Procedure

Step#	Action	Comments
1	On QLA bring up a time series display of the following HK parameters: CHOPSENSPWR CHOPDACVAL CHOPSENSIG JIGGSENSPWR JIGGDACVAL JIGGSENSSIG	
2	Run FUNC-BSM-01 test procedure from the CCS	
3	When the test is finished record all the Key parameters noted below	
	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-01	**CHOPSENSPWR** **CHOPLOOPMODE** **CHOPDACVAL** **CHOPFFGAIN** **CHOPSENSSIG** **JIGGSENSPWR** **JIGGLOOPMODE** **JIGGDACVAL** **JIGGFFGAIN** **JIGGSENSSIG**	**0/1** **3/3** **0x8000/0x8000** **0xBEB/0x770** **~0x8000/0x9500** **0/1** **3/3** **0x8000/0x8000** **0xBEB/0xF6E** **~0x8000/~0x8EFA**	0/1 3/3 0x8000/0x8000 0xBEB/0x770 ~0x7FF7/~0x943D 0/1 3/3 0x8000/0x8000 0xBEB/0xF6E 0x7FF2/~0x8C43	**N/A**	<mark>Success</mark>

Start time @: 12:56
OBSID: 0xb0000234

Comments:

The BSM was switched ON correctly. The Chop and Jiggle FF gains are consistent with the latest BSMNominalSettings.txt table in the CUS.

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4.14 FUNC-BSM-02C: BSM Chop Sensor Polarity Check

Test Id:	FUNC-BSM-02C: BSM Chop Sensor Polarity Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Success Criteria:	Test passed if the chop sensor signal evolves in the same way as the positions set.(i.e if (pos1 > pos2 ➔ sig1 > sig2)

Test Procedure:

Step#	Action	Comments
1	On QLA open up a time series display of HK parameter CHOPDACVAL and CHOPSENSSIG	
2	Run FUNC-BSM-02C test procedure from the CCS	
3	Contingency: If test fails repeat steps 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-02C	**CHOPDACVAL CHOPSENSSIG**		See below	**N/A**	Success

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Start time @: 12:59
OBSID: 0xb0000235

Comments:

The BSM moved along the chop axis in the same direction as expected.

4.15 FUNC-BSM-02J: BSM Jiggle Sensor Polarity Check

Test Id:	**FUNC-BSM-02J: BSM Jiggle Sensor Polarity Check**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Success Criteria:	Test passed if the jiggle sensor signal evolves in the same way as the positions set.(i.e if (pos1 > pos2 ➔ sig1 > sig2)

Test Procedure:

Step#	Action	Comments
1	On QLA open up a time series display of HK parameter JIGGDACVAL and JIGGSENSSIG	
2	Run FUNC-BSM-02J test procedure from the CCS	
3	Contingency: If test fails repeat steps 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-02J	**JIGGDACVAL JIGGSENSSIG**		See below	**N/A**	Success

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Start time @: 13:02
OBSID: 0xb0000236

Comments:

The BSM moved along the jiggle axis in the same direction as expected.
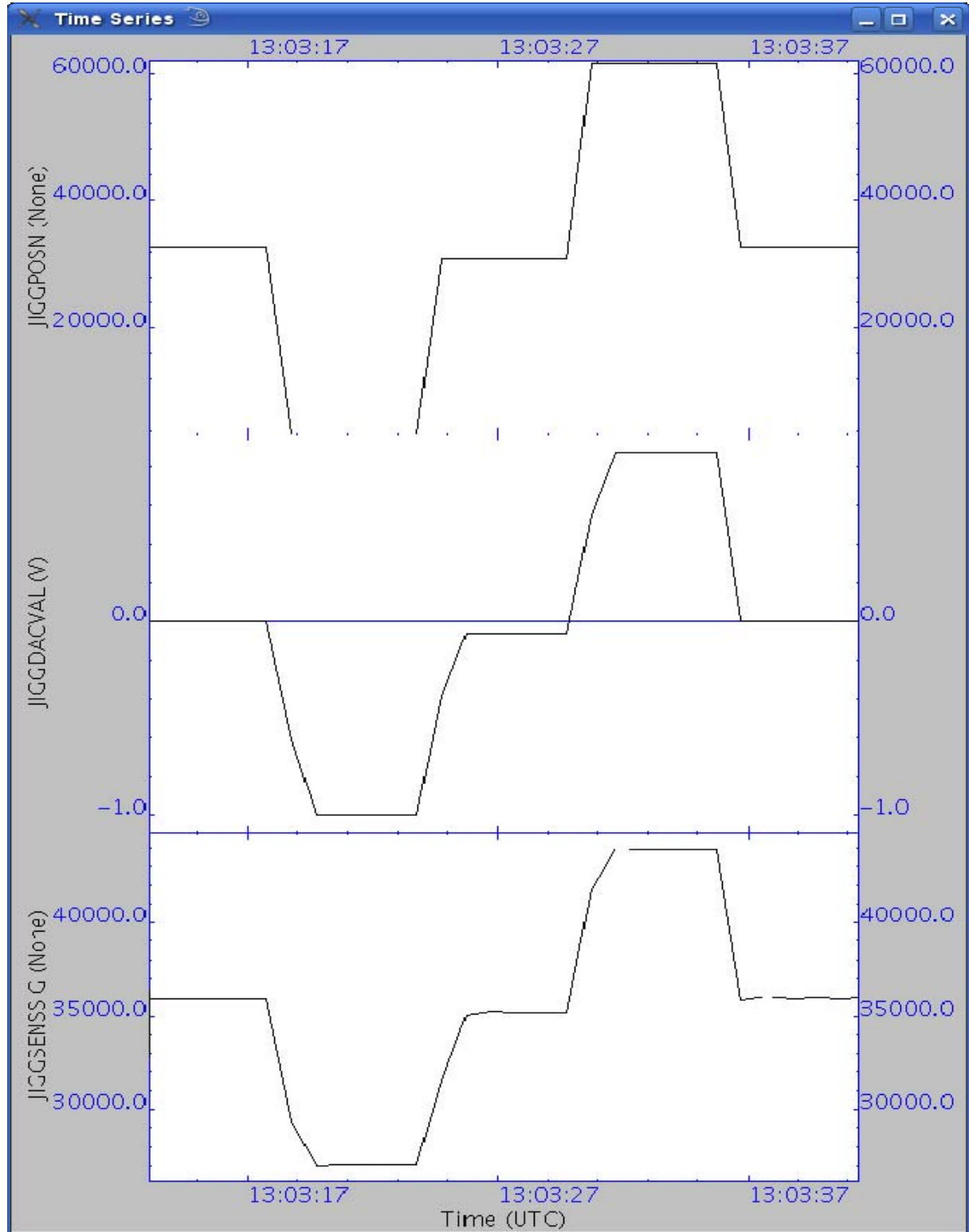
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4.16 FUNC-BSM-03: BSM Open Loop Dynamics Check

Test Id:	**FUNC-BSM-03: BSM Open Loop Dynamics Test**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Success Criteria:	Test passed if the chop sensor signal evolves in the same way as the positions set.(i.e if (pos1 > pos2 ➔ sig1 > sig2) for each jiggle position. **Note:** During warm tests the voltages on both chop and jiggle motors are likely to be saturated (CHOP/JIGGMOTORVOLT RAW values of ~ 0xFFFF) due to the high resistance of the motor coil at ambient temperature.

Test Procedure

Step#	Action	Comments
1	On QLA open up a time series display of HK parameters: CHOPPOSN CHOPDACVAL CHOPMOTORCURR CHOPSENSSIG CHOPMOTORVOLT JIGGPOSN JIGGDACVAL JIGGMOTORCURR JIGGSENSSIG JIGGMOTORVOLT	
2	Run FUNC-BSM-03 test procedure from the CCS	
3	Contingency: If test fails repeat step 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result	
FUNC-BSM-03				N/A	Success	

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Start time @: 13:07
OBSID: 0xb0000237

Comments: The chop & jiggle parameters in the CUS script are (not the same as for ILT):

Chop Start/End/Step: 0x7000/0x9000/0x1000 delay 2s
Jigg Start/End/Step 0x0000/0x1000/0xf000 delay 5s

MCUFRAMECNT: 6887 -> 8713

Jiggle position as given by senssig shows going to position then coming back as the chop position is stepped. This is due to the coupling between the axes.
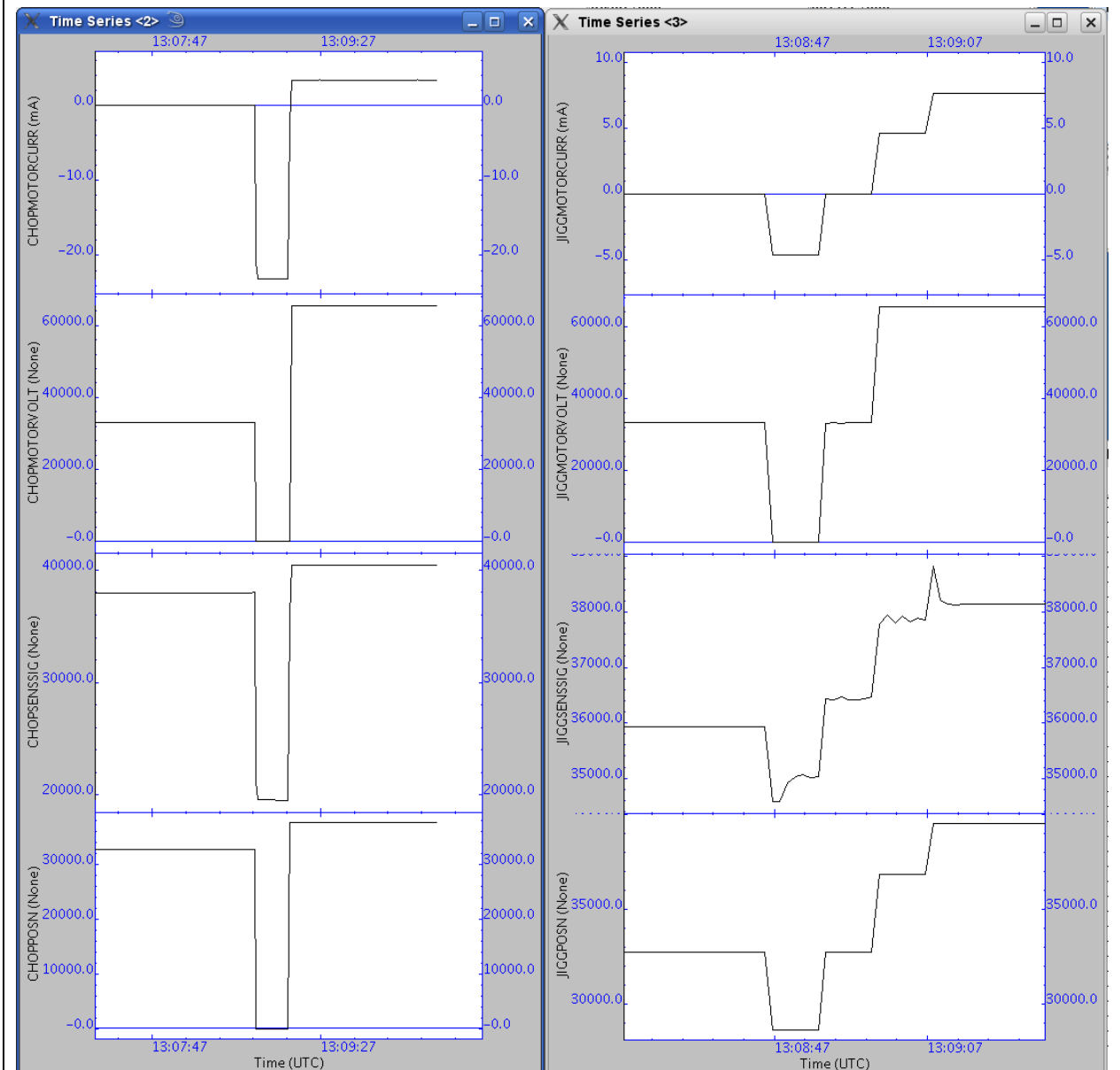
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4.17 FUNC-BSM-05A: BSM Open Loop Chop Test

Test Id:	FUNC-BSM-05A: Open Loop Chop Test
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Success Criteria:	**Note:** The purpose of this test is to check the correctness of the BSM open loop chop test

Test Procedure

Step#	Action	Comments
1	On QLA open up a time series display of HK parameters: BSMCHOPSENSSIG BSMCHOPMOTORCURR BSMCHOPMOTORVOLT BSMJIGGSENSSIG BSMJIGGMOTORCURR BSMJIGGMOTORVOLT	
2	Run FUNC-BSM-05A test procedure from the CCS	
3	Contingency: None contemplated.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-05A				N/A	Success

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Start time @: 13:10
OBSID: 0xb0000238

Comments:

Input Parameter	Value
Frame rate	125 Hz
On source chop	0xa000
On source jiggle	0x8000
Off source chop	0x8000
Off source chop	0x8000
Number of cycles	50
Chop cycle period	500000 (us)
DCU frame type	0
Number of DCU frame per half cycle	4
DCU delay to start sampling	34959 (us)
Number of BSM samples	31 = continuous sampling

QLA plot:
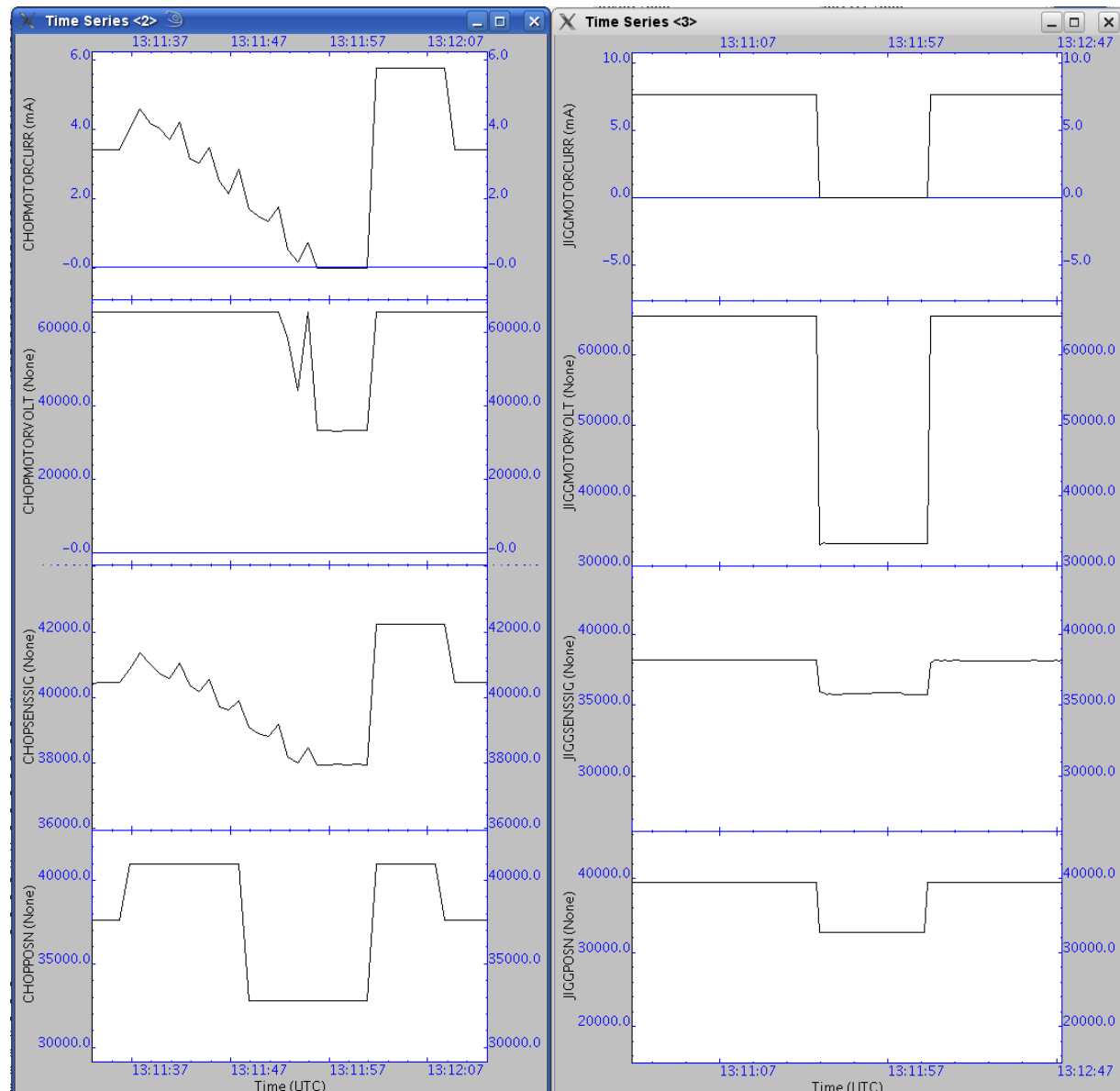
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4.18 FUNC-BSM-05B: BSM Closed Loop Chop Test

Test Id:	**FUNC-BSM-05B: BSM Closed Loop Chop Test**
Initial Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Final Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Success Criteria:	Note: The purpose of this test is to check the correctness of the BSM close loop initialisation procedure and the default PID parameters If the dynamical behaviour of the BSM during chopping with these PID parameters is close or within requirements this indicates that the PID parameters used can be applied to cold testing with certain adjustment. If NOT these indicates that the PID parameters need further tuning **BUT NOT TO BE DONE DURING THESE TEST.** In any case the success/fail criteria are NOT applicable for this test.

Test Procedure

Step#	Action	Comments
1	On QLA open up a time series display of HK parameters: BSMCHOPSENSSIG BSMCHOPMOTORCURR BSMCHOPMOTORVOLT BSMJIGGSENSSIG BSMJIGGMOTORCURR BSMJIGGMOTORVOLT	

Test Log:

| Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-05B				**N/A**	**N/A**

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Comments:

13:13 BSM_INIT
OBSID:0xb0000239
CHOPLOOPMODE 3 to 1
JIGGLOOPMODE 3 to 1

13:14 BSM-05B
OBSID:0xb000023a

Input Parameter	Value
Frame rate	125 Hz
On source chop	0xb600
On source jiggle	0x9a60
Off source chop	0x6a28
Off source jiggle	0x9a60
Number of cycles	50
Chop cycle period	500000 (us)
DCU frame type	0
Number of DCU frame per half cycle	4
DCU delay to start sampling	34959 (us)
Number of BSM samples	31 = continuous sampling

Plots from QLA for 0xb000023a:
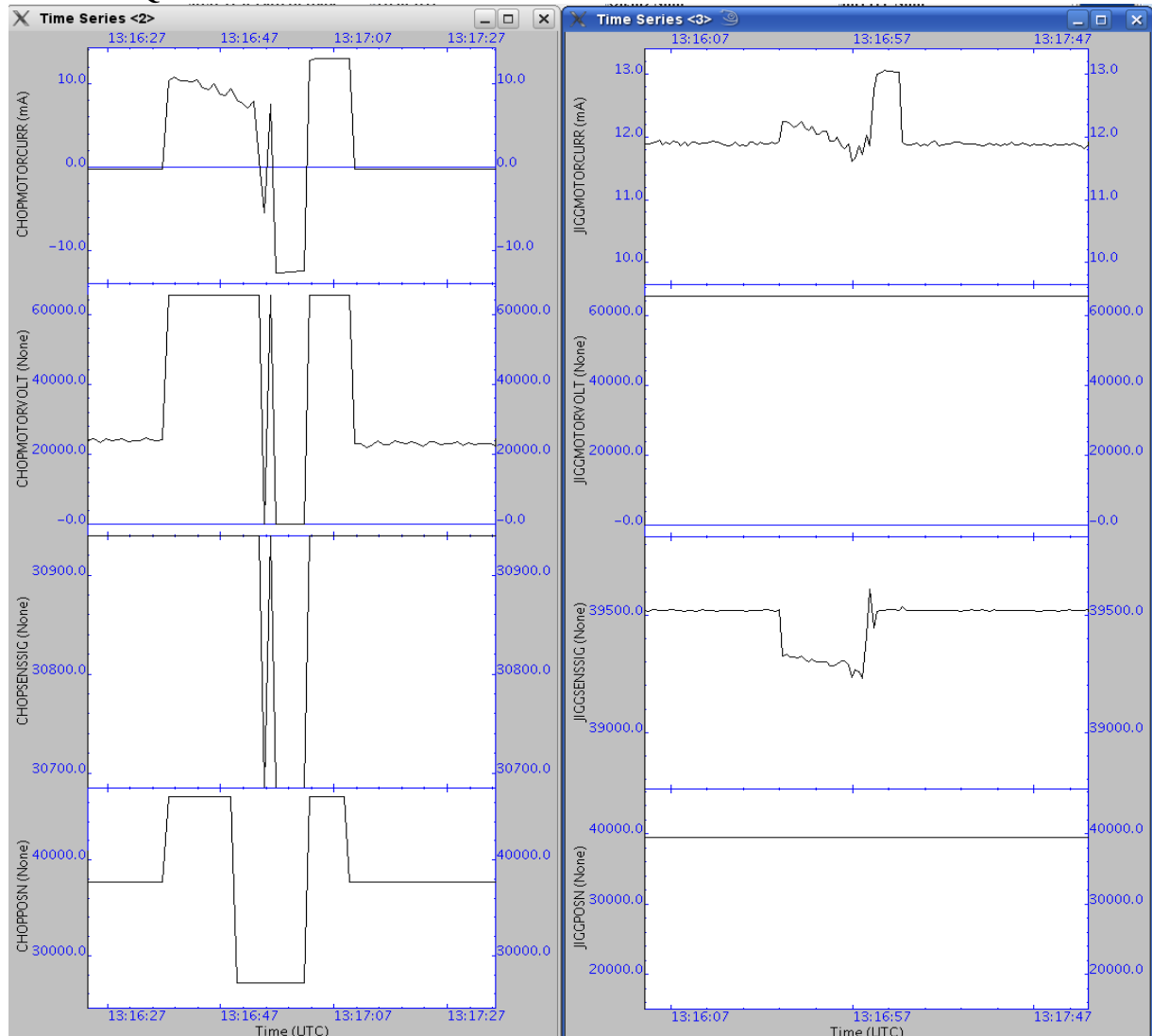
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4.19 FUNC-BSM-06: BSM Operational Mode Check

Test Id:	**FUNC-BSM-05B: BSM Operational Mode Check**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Success Criteria:	**Note:** The purpose of this test is to check the operational behaviour of the BSM in closed loop.

Test Procedure

Step#	Action	Comments
1	On QLA open up a time series display of HK parameters: BSMCHOPSENSSIG BSMCHOPMOTORCURR BSMCHOPMOTORVOLT BSMJIGGSENSSIG BSMJIGGMOTORCURR BSMJIGGMOTORVOLT	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-06				**N/A**	Success

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Start time @: 13:18
OBSID:0xb000023b
Comments:
CUS input parameters:

Input Parameter	Value
Frame rate	125 Hz
On source chop	0x5279
On source jiggle	0x8D00
Off source chop	0xAD87
Off source chop	0x8D00
Number of cycles	50
Chop cycle period	500000 (us)
DCU frame type	0
Number of DCU frame per half cycle	4
DCU delay to start sampling	34959 (us)
Number of BSM samples	65535 = continuous sampling

Output from QLA script for BSM-06:
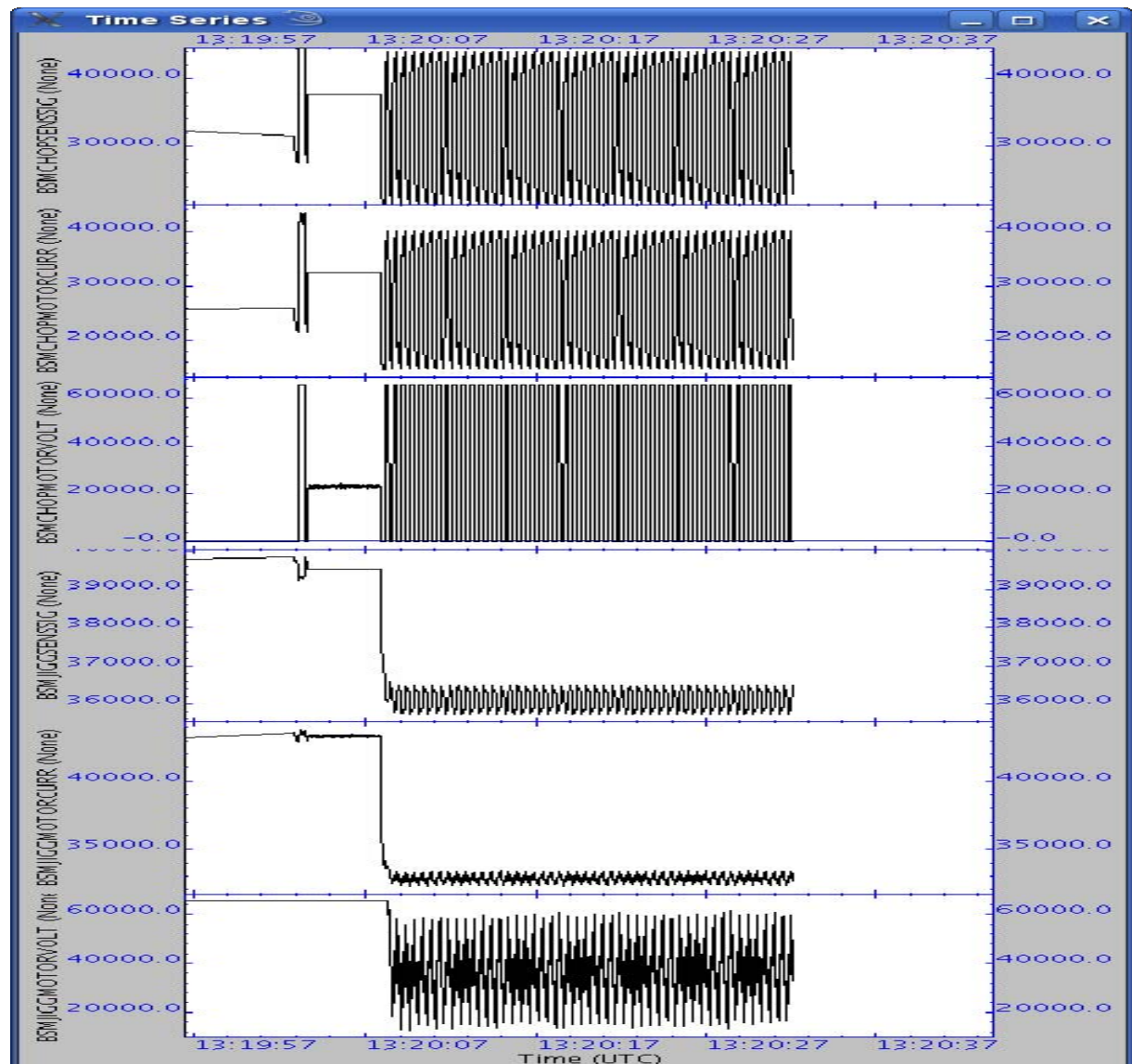
BSM_OFF:

Start time @: 13:27

OBSID:0xb000023c

CHOP/JIGGLOOPMODE 1 to 3

CHOP/JIGGSENSPWR: 1 to 0

Step#	Action	Comments
0	Open **DCU PARAMETERS** SCOS Alpha Numeric Display	

4.20 FUNC-DCU-01: DCU Nominal Science Packet Generation Check

Test Id:	FUNC-DCU-01: DCU Nominal Science Packet Generation Check						
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON						
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON						
Success Criteria:	Test passed if:						

Test passed if:
  1. DCU produces each type of DCU nominal science frame with the following characteristics.

APID	Type	S.type	SID	Frame ID	Frame type	Nb. Of frames	Nb. of pkts.
0x505	**21**	**1**	**0x200**	**0**	**PF**	**100**	**100**
0x507	**21**	**1**	**0x201**	**1**	**SF**	**100**	**17**
0x505	**21**	**2**	**0x102**	**2**	**PSW**	**100**	**34**
0x505	**21**	**2**	**0x103**	**3**	**PMW**	**100**	**25**
0x505	**21**	**2**	**0x104**	**4**	**PLW**	**100**	**12**
0x507	**21**	**2**	**0x105**	**5**	**SSW**	**100**	**12**

	0x507	21	2	0x106	6	SLW	100	7	

2. The frame time difference between consecutive DCU frames of each type corresponds to the sampling rate.
Photometer Sampling rate is 15.3Hz → $\Delta t \sim 65.5$ ms
Spectrometer Sampling rate is 80Hz → $\Delta t = 12.5$ ms
3. The SPIRE HK parameter DCUFRAMECNT increments by 700.
4. No events are generated during the frames generation.

Test Procedure:

Step#	Action	Comments
1	Write the current value of DCUFRAMECNT located d in DCU PARAMETERS AND	
2	Run FUNC-DCU-01 test procedure from the CCS	
3	Write the current value of DCUFRAMECNT located d in DCU PARAMETERS AND	
4	Contingency: If test fails repeat steps 1 to 3.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-01	**DCUFRAMECNT**	**n/n+700 n depends on the BSM chop operations on FUNC-BSM-05A/05B/06**	1200 / 1900	700	Success

Start time @: 13:41
OBSID:0xb000023d

Comments: CCS cannot carry out step 2 of the DCU-01 as they cannot see science packets on their system in the new version

QLA created file QLA-DCU-01_B000023D.txt:

```
***********************************************************************

***********************************************************************
PHOTF: OBSID = B000023D, BBTYPE = 0x8800, APID = 0x505, SID  = 0x200
_____
Parameter       Initial    Final      Increment Expect Incre. Packet Chars.

DCUFRAMECNT     1200       1300       100       100            Packet type = 0x15
TM3N            1199       1299       100       100            subtype = 0x1
FrameTime       65.2288    65.2256                             Frame ID  = 0x0
                                                               Frame Len = 0x126
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 65.22713 ms
sigma = 0.00161 ms
```

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```
*************************************************************************
PHOTSW: OBSID = B000023D, BBTYPE = 0x8802, APID = 0x505, SID  = 0x102
_____
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT     1300       1400       100       100            Packet type = 0x15
TM3N            1299       1333       34        34             subtype = 0x2
FrameTime       65.2256    65.2256                            Frame ID  = 0x2
                                                              Frame Len = 0x96
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 65.22713 ms
sigma = 0.00161 ms


*************************************************************************
PHOTMW: OBSID = B000023D, BBTYPE = 0x8803, APID = 0x505, SID  = 0x103
_____
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT     1400       1500       100       100            Packet type = 0x15
TM3N            1333       1358       25        25             subtype = 0x2
FrameTime       65.2256    65.2256                            Frame ID  = 0x3
                                                              Frame Len = 0x66
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 65.22711 ms
sigma = 0.00161 ms


*************************************************************************
PHOTLW: OBSID = B000023D, BBTYPE = 0x8804, APID = 0x505, SID  = 0x104
_____
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT     1500       1600       100       100            Packet type = 0x15
TM3N            1358       1370       12        12             subtype = 0x2
FrameTime       65.2288    65.2288                            Frame ID  = 0x4
                                                              Frame Len = 0x36
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 65.22714 ms
sigma = 0.00161 ms


*************************************************************************
SPECF: OBSID = B000023D, BBTYPE = 0x8801, APID = 0x507, SID  = 0x201
_____
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT     1600       1700       100       100            Packet type = 0x15
TM4N            16383      16         16        17             subtype = 0x1
FrameTime       12.4928    12.4928                            Frame ID  = 0x1
                                                              Frame Len = 0x4E
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 12.49250 ms
sigma = 0.00095 ms


*************************************************************************
SPECSW: OBSID = B000023D, BBTYPE = 0x8805, APID = 0x507, SID  = 0x105
_____
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT     1700       1800       100       100            Packet type = 0x15
TM4N            16         28         12        12             subtype = 0x2
FrameTime       12.4896    12.4928                            Frame ID  = 0x5
                                                              Frame Len = 0x36
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
```

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```
mean  = 12.49248 ms
sigma = 0.00097 ms



************************************************************************
SPECLW: OBSID = B000023D, BBTYPE = 0x8806, APID = 0x507, SID  = 0x106

_____
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT     1800       1900      100        100            Packet type = 0x15
TM4N            28         35        7          7              subtype = 0x2
FrameTime       12.4928    12.4928                             Frame ID  = 0x6
                                                               Frame Len = 0x1E
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 12.49248 ms
sigma = 0.00098 ms
```

4.21 FUNC-DCU-02: DCU High Speed Link Check

Test Id:	**FUNC-DCU-02: DCU High Speed Link Check**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON
Success Criteria:	Test passed if DCUFRAMECNT goes from 700 to 1400 and the frametime difference between consecutive frames computed by QLA script is in agreement with the expected differences based on commanded sampling rate: 1. Photometer Sampling rate is 15.3Hz $\rightarrow$ $\Delta t \sim 65.5$ ms 2. Spectrometer Sampling rate is 80Hz $\rightarrow$ $\Delta t = 12.5$ ms

Test Procedure:

Step#	Action	Comments
1	Write the current value of DCUFRAMECNT located d in DCU PARAMETERS AND	
2	Run QLA script FUNC-DCU-02.py on QLA console.	
3	Run FUNC-DCU-02 test procedure from the CCS	
4	Write the current value of DCUFRAMECNT located d in DCU PARAMETERS AND	
5	Contingency: If test fails repeat steps 1 to 4.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-02	**DCUFRAMECNT**	**m/m+700**	1900 / 2600	700	Success

Start time @: 13:44
OBSID:0xb000023e

Comments:

QLA script produced 7 files, QLA-DCU-02_B000023E_800<n>.txt – where n=0 to 6

Contents of QLA created files show sampling times to be consistent with CUS input parameters entered for sampling frequencies of photometer ~15.3Hz ($\Delta t \sim 65.5$ ms) **and spectrometer 80Hz** $\Delta t \sim$ 12.5 ms**.**

4.22 FUNC-DCU-03: DCU Test Pattern Check

Test Id:	**FUNC-DCU-03: DCU Test Pattern Check**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON
Success Criteria:	Test passed if :
	1. DCU produces 100 frames of Full Photometer Test Pattern and 100 frame of Full Spectrometer Test Pattern test.
	2. QLA analysis shows that phot/spec test patterns are the same as the reference phot/spec test patterns.

Test Procedure:

Step#	Action	Comments
1	Write the current value of DCUFRAMECNT located d in DCU PARAMETERS AND	
2	Run QLA script FUNC-DCU-03.py on QLA console.	
3	Run FUNC-DCU-03 test procedure from the CCS	
4	Write the current value of DCUFRAMECNT located d in DCU PARAMETERS AND	
5	Contingency: If test fails repeat steps 1 to 4.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-03	**DCUFRAMECNT**	**j/j+200**	2600 / 2800	200	**Success for PF Failure for SF**

Start time @: 13:50
OBSID:0xb000023f

Comments:

File produced by QLA:
        QLA-DCU-03_B000023F_8807.txt – DCU Photometer Test Pattern
Test pattern file show agreement with reference DCU test pattern file

No SF Test pattern data produced.

No SF Test pattern data produced. Problem traced to missing DCU frame generation command in the script – compliant with AVM (DRCU simulator) but not for the FM DRCU. Raised SPIRE system problem report SPR-0623 on CUS script.

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4.23 FUNC-DCU-04-PHOT: Photometer LIAs Check

Test Id:	**FUNC-DCU-04P: Photometer LIAs Check**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Photometer LIAs ON
Success Criteria:	Test passed if : 1. SCUDCDCSTAT parameter goes from 4 to 5. 2. Photometer LIA card voltages are showing correct readings of +5V,+9V,-9V. 3. Photometer LIA temperatures show an increase indicating that they are ON.

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a time series display of the HK parameters: PLIAP5V PLIAP9V PLIAM9V LIAP1/2/3/4/5/6/7/8/9TEMP	
2	Run FUNC-DCU-04-PHOT test procedure from the CCS	
5	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-04-PHOT	**SCUDCDCSTAT** **PLIAP5V** **PLIAP9V** **PLIAM9V** **LIAP1TEMP to** **LIAP9TEMP**	**4/5** **0/~ +5V** **0/~+11V** **0/~-11V** **N/A/ [290-300]K**	4/5 0/+5.24V 0/+11.59V 0/-11.58V ~295/warming up		Success

Start time @: 13:58
OBSID:0xb0000240

Comments: PLIABITSTAT 0 to 1
Photometer LIAs switched on OK
Output plot from QLA script:

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4.24 FUNC-DCU-11-PHOT: Photometer BDAs Switch ON Check

Test Id:	FUNC-DCU-11-PHOT: Photometer BDAs Switch ON Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ Photometer LIAs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ Photometer LIAs ON + Photometer BIAS ON +Photometer JFETs ON
Success Criteria:	Test passed if Photometer JFET source and drain voltages are as commanded: 1. PSWJFETVSS1/2/3/4/5/6 2. PMLWJFETVSS1/2/3/ 3. PSWJFETSTAT = 0x3F 4. PMLWJFETSTAT = 0x7F

Test Procedure:

Step#	Action	Comments
1	Run FUNC-DCU-11-PHOT test procedure	
2	After the test Write the values RAW and converted values of: PSWJFETSTAT,PMLWJFETSTAT, PSWJFET1/2/3/4/5/6V PMWJFET1/2/3/4V PLWJFET1/2V located in DCU PARAMETERS AND	
3	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-11P	**PSWJFETSTAT** **PMLWJFETSTAT** **PSWJFET1/2/3/4/5/6V** **PMWJFET1/2/3/4V** **PLWJFET1/2V**	**0/0x3f** **0/0x7f** **0V/~-1.5V** **0V/~-1.5V** **0V/~-1.5V**	0/0x03f 0/0x07f See comments	**N/A**	Pass

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Start time @: 14:02
End time @:
OBSID:0xb0000241

Comments:

The Vss values for the JFETs were the ones optimised during the PFM5 cold test campaign, i.e.

PSWJFET1V: -1.68V
PSWJFET2V: -1.59V
PSWJFET3V: -1.59V
PSWJFET4V: -1.68V
PSWJFET5V: -1.78V
PSWJFET6V: -1.68V

PMWJFET1V: -1.68V
PMWJFET2V: -1.88V
PMWJFET3V: -1.59V
PMWJFET4V: -1.88V

PLWJFET1V: -1.78V
PLWJFET2V: -1.59V

TCJFETV: -1.49V

The PSW, PMW and PLW arrays on QLA are all black because the bias amplitudes are not nominal at switch. DCU data were generated.

4.25 FUNC-DCU-13-PHOT: Photometer BDAs Integrity Check

Test Id:	FUNC-DCU-13P: Photometer BDAs Integrity Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ Photometer LIAs ON + Photometer BIAS ON +Photometer JFETs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ Photometer LIAs ON + Photometer BIAS ON +Photometer JFETs ON
Success Criteria:	Test passed if : The photometer detectors show a small linear variation on the output voltage when different bias is applied through the load curve.

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a time series display of a couple of pixels on each of the photometer BDAs	
2	Run FUNC-DCU-13-PHOT test procedure from the CCS	
3	Contingency: If test fails repeat step 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-13-PHOT				N/A	<mark>Partial success</mark>

Start time @: 14:07
End time @:
OBSID:0xb0000242

Comments:

Bias Freq is ~200Hz
<mark>**Science TM seen on Packet Display ~30-45 seconds before the QLA Photometer Displays – may or may not be a problem**</mark>

<mark>**All the BDA phases were wrongly set to 0 in the script.**
The defaults in the CUS script need to be changed – no change necessary in the CCS script.
Raised SPIRE system change report SCR-0621 on CUS scripts.</mark>

QLA load curve plots in Annexe 2.

Array	Dead Pixels (TBC)
PSW	R1, G8, and C12
PMW	R1
PLW	R1

Photometer detector settings at the end of the test:

Bias F: ~197.3 Hz
Samp F: 15.1 Hz
Phases: all zero
Biases are 31mV,
TC BIAS: ~61mV

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4.26 **FUNC-DCU-14-PHOT: Photometer BDAs Noise Check**

Test Id:	FUNC-DCU-14-PHOT: Photometer BDAs Noise Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Photometer LIAs ON + Photometer BIAS ON + Photometer JFETs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Photometer LIAs ON + Photometer BIAS ON + Photometer JFETs ON
Success Criteria:	Test passed if : The Photometer detectors don't show excess noise.

Test Procedure:

Step#	Action	Comments
1	Run FUNC-DCU-14-PHOT test procedure from the CCS	
2	Contingency: If test fails repeat step 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-14-PHOT				N/A	Partial success

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Start time @: 14:25
OBSID:0xb0000243

Comments:

Detectors settings:
Bias frequency: 197.3Hz
Sampling frequency: 15.1 Hz
PSW phase: 0 deg
PMW phase: 0 deg
PLW phase: 0 deg
PSW bias : ~ 31mV
PMW bias : ~ 31mV
PLW bias : ~ 31mV
TC bias : ~ 61 mV

Duration of test: 5 minutes

Bias Freq settings at the end of test are not nominal

Post Test Comments: At the end of FUNC-DCU-13-PHOT the detector settings should have been set to nominal. But due to an error in the CUS script the phases remained zero and the bias & sampling frequencies remained non-nominal. Symptom of SCR-0621.

Switched off the Photometer:
PDET_OFF: 0xb0000244

Start time @: 14:30

4.27 FUNC-DCU-04-SPEC: Spectrometer LIAs Check

Test Id:	FUNC-DCU-04-SPEC: Spectrometer LIAs Check
Initial Configuration:	DRCU_ON + AC/DC thermometry ON+MCU ON
Final Configuration:	DRCU_ON + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON
Success Criteria:	Test passed if : 1. SCUDCDCSTAT parameter goes from 4 to 6. 2. Spectrometer LIA card voltages are showing correct readings of +5V,+9V,-9V. 3. Spectrometer LIA temperatures show an increase indicating that they are ON.

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a time series display of the HK parameters: SLIAP5V SLIAP9V SLIAM9V LIAS1/2/3TEMP	
2	Run FUNC-DCU-04-SPEC test procedure from the CCS	
5	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-04-SPEC	SCUDCDCSTAT SLIAP5V SLIAP9V SLIAM9V LIAS1/2/3TEMP	4/6 0/~ +5V 0/~+11V 0/~-11V N/A/ [290-300]K	4/6 0.11 / 5.25 0.016/ 11.59 0.016/-11.57 /~297K warming up		Success

Start time @: 14:33
OBSID:0xb0000245

Comments: SLIABITSTAT 0 to 1
Spectrometer LIAs switched ON correctly

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4.28 FUNC-DCU-11-SPEC: Spectrometer BDAs Switch On Check

Test Id:	FUNC-DCU-11-SPEC: Spectrometer BDAs Switch On Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON + Spectrometer BIAS ON + Spectrometer JFETs ON
Success Criteria:	Test passed if SCUDCDCSTAT goes from 4 to 6, Spectrometer LIAs voltages are correct and SJFET voltages are also correct.

Test Procedure:

Step#	Action	Comments
1	Run FUNC-DCU-11-SPEC test procedure from the CCS	
2	After the test Write the values RAW and converted values of: LIASTAT SLIAP5V, SLIAP9V, SLIAM9V, SSWJFETSTAT,SLWJFETSTAT, SSWJFET1V,SLWJFET2V located in DCU PARAMETERS AND	
3	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-11-SPEC	**SCUDCDCSTAT** **LIASTAT** **SLIAP5V** **SLIAP9V** **SLIAM9V** **SPECJFETSTAT** **SSWJFET1/2V** **SLWJFET1/2V**	**6/6** **0/0** **0V/ ~ 5V** **0V/~11V** **0V/-11V** **0/0x7** **0V/~-1.5V** **0V/~-1.5V**	6/6 0/0 /5.25 /11.59 /-11.59 0/0x7 See comments below	**N/A**	<mark>Success</mark>

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Start time @: 14:41
OBSID:0xb0000246

Comments:
The Vss values for the JFETs were the ones optimised during the PFM5 cold test campaign, i.e.

SSWJFET1V: -1.68V
SSWJFET2V: -2.07V
SLWJFET1V: -1.59V

DCU data were generated

Notes:
SSW: D5 & R1 at one level and step to another level after JFET switch on.

SLW: R1 starts at one level and step to another level after JFET switch on.

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4.29 FUNC-DCU-13-SPEC: Spectrometer BDAs Integrity Check

Test Id:	FUNC-DCU-13-SPEC: Spectrometer BDAs Integrity Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON + Spectrometer BIAS ON + Spectrometer JFETs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON + Spectrometer BIAS ON + Spectrometer JFETs ON
Success Criteria:	Test passed if : The spectrometer detectors show a small linear variation on the output voltage when different bias is applied through the load curve.

Test Procedure:

Step#	Action	Comments
1	Run FUNC-DCU-13-SPEC test procedure from the CCS	
2	Contingency: If test fails repeat step 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-13-SPEC				N/A	Partial success

Start time @: 14:48
OBSID:0xb0000247

Comments: All the BDA phases were wrongly set to 0 in the script.

The Bias and Sampling frequencies appear to be those for the Photometer – the defaults in the CUS script need to be changed. No change necessary in the CCS script.

SSW D5 & R1 show different behaviour than the rest of the pixels.
SLW R1 shows different behaviour than the rest of the pixels.

Generally all (SSW/SLW) pixels looking responsive. See Annexe 2 for detailed results.

CCS again reported TC Ack problems for a Set BBID and a DRCU command – seems to be a sync problem on the CCS (TBC).
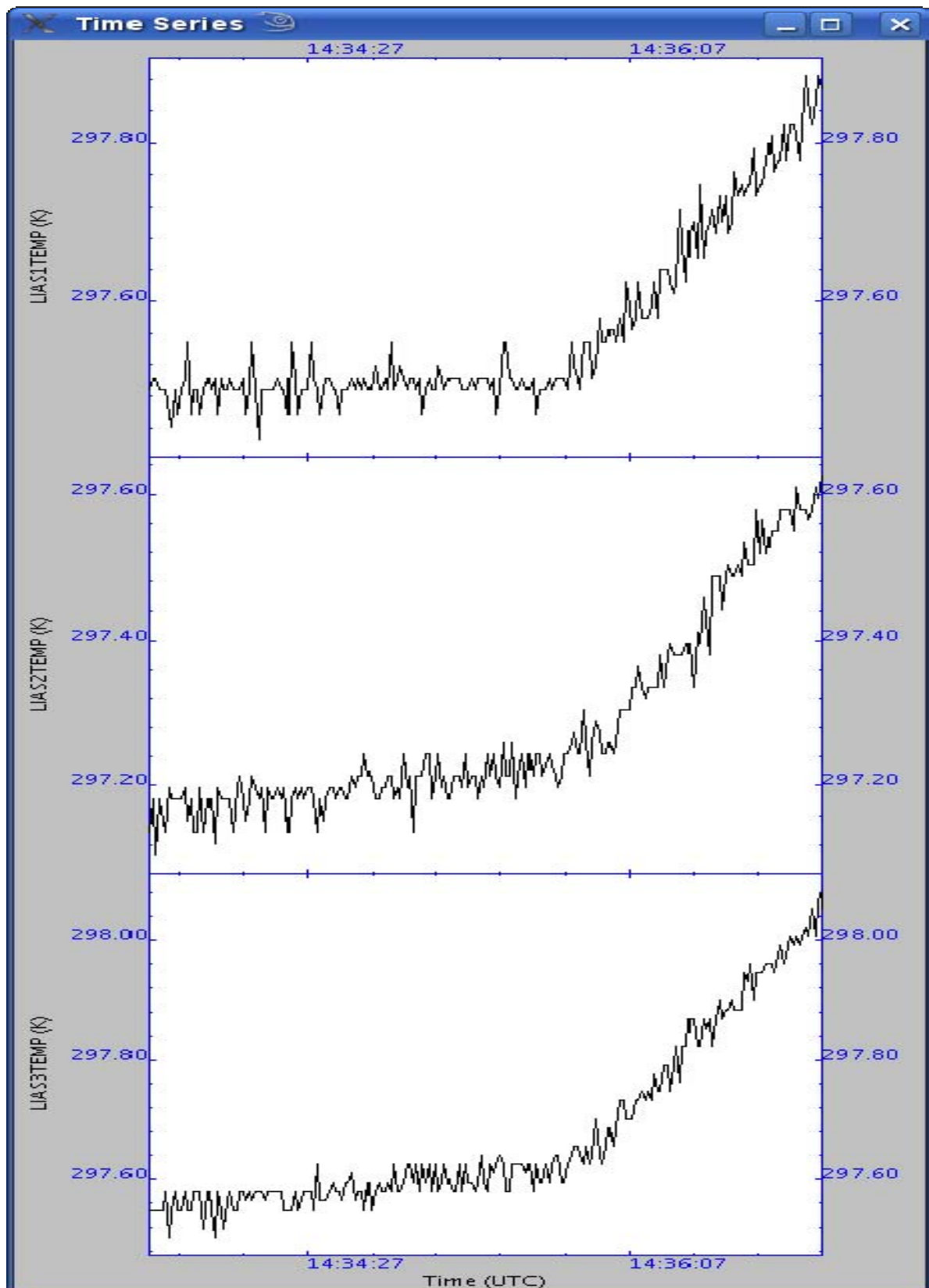
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4.30 FUNC-DCU-14-SPEC: Spectrometer BDAs Noise Check

Test Id:	**FUNC-DCU-14S: Spectrometer BDAs Noise Check**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON + Spectrometer BIAS ON + Spectrometer JFETs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON + Spectrometer BIAS ON + Spectrometer JFETs ON
Success Criteria:	Test passed if : The spectrometer detectors show a signal with some noise.

Test Procedure:

Step#	Action	Comments
1	Run FUNC-DCU-14-SPEC test procedure from the CCS	
2	Contingency: If test fails repeat step 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-14-SPEC				N/A	Partial success

Start time @: 15:12
OBSID:0xb0000248

Comments: All the BDA phases were wrongly set to 0 in the previous script.

Test run in order to collect noise data at nominal spectrometer settings:
       Array: SF
       Bias frequency: 160 Hz
       Sampling frequency: 80 Hz
       SSW phase shift: 0.0 deg
       SLW phase shift: 0.0 deg

Duration of test: 5 minutes

Switched off the Spectrometer:
SDET_OFF: 0xb0000249
Start time @: 15:19

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4.31 FUNC-SMEC-01: SMEC Encoder and LVDT Check

Test Id:	**FUNC-SMEC-01: SMEC Encoder and LVDT Check**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON+ SMEC ON (open loop)
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON+ SMEC ON (open loop)
Success Criteria:	Test passed if : 1. SMECENCPWR HK parameter changes from 0 to 6. 2. SMEC encoder signals 1 and 2 show variation when encoder is switched ON. 3. SMEC LVDT is switched ON. 4. SMEC LVDT DC and AC signals show variation when LVDT is switched ON.

Test Procedure:

Step#	Action	Comments
0	Open **SMEC PARAMETERS display** on SCOS Alpha Numeric Displays.	
1	On QLA bring up a display of the following HK parameters: SMECENCPWR SMECENCSIG1AMP SMECENCSIG2AMP SMECLVDTDCSIG SMECLVDTACSIG	
2	Run FUNC-SMEC-01 test procedure from the CCS	
	Contingency: If test fails repeat steps 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/ After	Actual Value Before/After	Nb. of frames received	Test Result	
FUNC-SMEC-01	**SMECENCPWR** **SMECLVDTPWR** **SMECENCSIG1** **SMECENCSIG1AMP** **SMECENCSIG1OFF** **SMECENCSIG2** **SMECENCSIG2AMP** **SMECENCSIG2OFF**	**0/6** **0/1** **Changes** **0/0** **-/0x38A4** **Changes** **0/0** **-/0x5BCC**	0/6 0/1 0x3065/~0x3700 0/0 0xCE20/0x38A4 0x4E30/~5B70 0/0 0xCE20/0x5BCC	N/A	Success	

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Start time @: 15:22
OBSID:0xb000024a

Comments:

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4.32 FUNC-SMEC-03: SMEC Encoder Levels Check

Test Id:	FUNC-SMEC-03: SMEC Encoder Levels Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON+ SMEC ON (open loop)
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON+ SMEC ON (open loop)
Success Criteria:	Test passed if: SMEC encoder signals 1 and 2 show a variation on their amplitudes from one LED illumination level to another.

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a time series display of the following Nominal HK parameters: SMECENCSIG1 SMECENCSIG2	
2	Run FUNC-SMEC-03 test procedure from the CCS	
3	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SMEC-03	**SMECENCSIG1 SMECENCSIG2**	**Signals change with LED levels**	See below		Success

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Start time @: 15:26
OBSID:0xb000024b

Comments:

SMECENCPWR was 6 initially, increased to 7 and then back to 6. Should have stepped from 4 to 6 as for ILT WFTs. CUS script defaults have to be changed but no change in the CCS script.

LED Level	SMECENCSIG1	SMECENCSIG2
6	~0x364E	~0x5B86
7	~0x40F3	~0x6DF9

SMEC_OFF:
Start time @: 15:31
OBSID: 0xb000024c

MCU_OFF:
Start time @: 15:32
OBSID: 0xb000024d

MCU Dead TM(5,4) event report received – expected. Puts SPIRE in SAFE mode

SCU_OFF:
Start time @: 15:33
OBSID: 0xb000024e

DRCU_OFF:
Start time @: 15:37
OBSID: 0xb000024f

The OBSID does not get reset to 0xb0000000

DPU_OFF:
Start time @: 15:43

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4.33 FUNC-SMEC-02A: SMEC Open Launch Latch

Test Id:	**FUNC-SMEC-02A: SMEC Open Launch Latch**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + SMEC ON SMEC Latched
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + SMEC ON SMEC Unlatched
Success Criteria:	Test passed if : Prior to un-latching the resistance across pins 7 and 8 of the launch latch is ~ 368 Ohms. After un-latching the resistance is 483 Ohms. **Note:** These resistance values were recorded for the CQM SMEC model, for the flight SMEC, these values are expected to vary.

Step#	Action	Comments
1	Measure the resistance across pins 7 and 8 of the launch latch.	This step is not applicable anymore
2	Run FUNC-SMEC-02A test procedure from the CCS	
3	Measure the resistance across pins 7 and 8 of the launch latch.	
4	Contingency: If test fails repeat steps 1.	

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SMEC-02A				N/A	Not done

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Start time:
OBSID:

Test to be performed later as the SMEC will not be unlatched while the Herschel Cryostat is vertical.
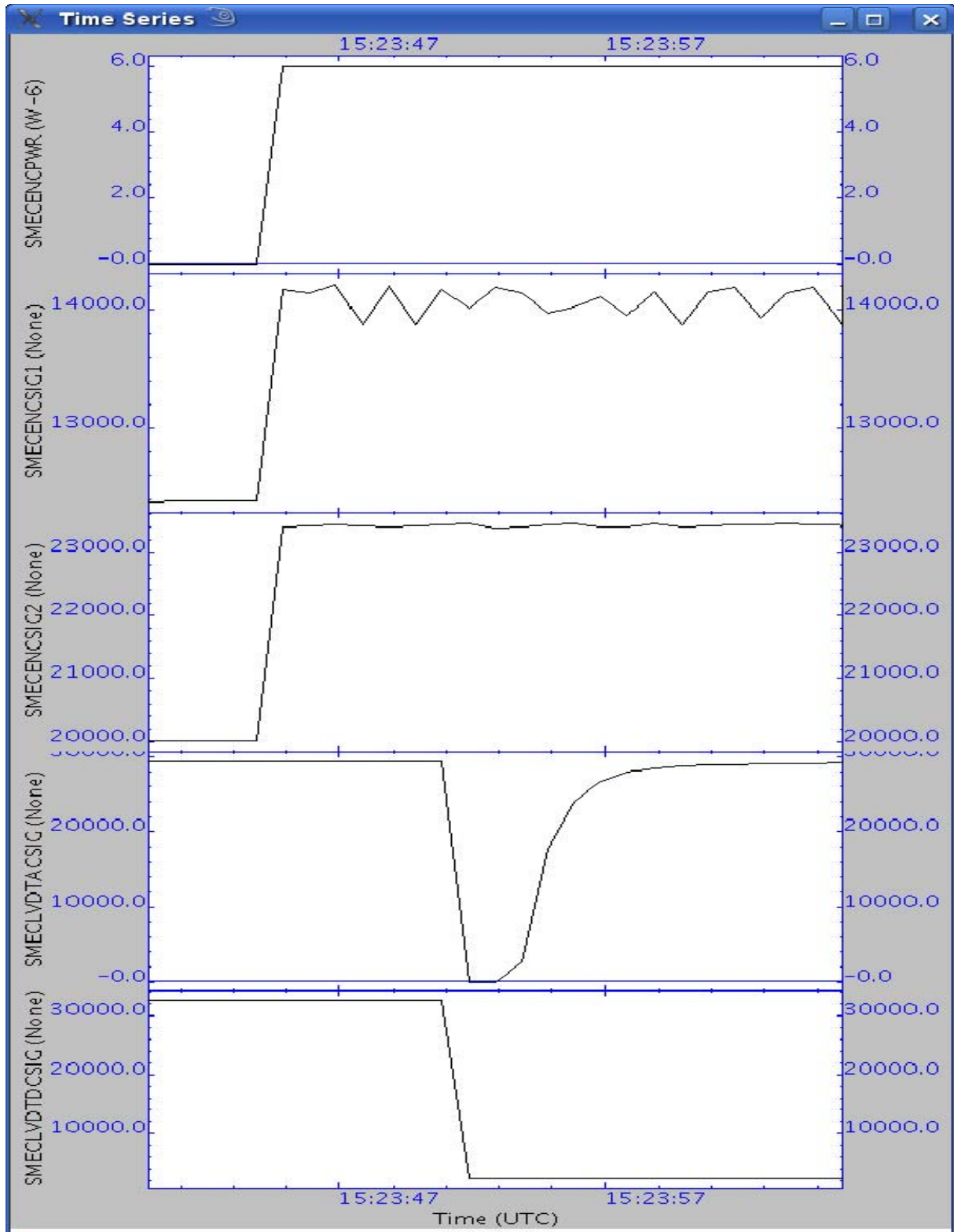
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4.34 FUNC-SMEC-04A: SMEC Open Loop Position Check

Test Id:	**FUNC-SMEC-04A: SMEC Open Loop Position Check**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ SMEC ON (open loop) **UNLATCHED**
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ SMEC ON (open loop) **UNLATCHED**
Success Criteria:	Test passed if the SMEC parameters show variation indicating that the mechanism has moved.

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a time series display of the following Nominal HK parameters: SMECENCSIG1 SMECENCSIG2 SMECLVDTDCSIG SMECLVDTACSIG SMECMOTORCURR	
2	Run FUNC-SMEC-04a test procedure from the CCS	
3	Contingency: If test fails repeat steps 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SMEC-04A	**SMECLVDTDCSIG**				**Not done**

Start time @:
OBSID:

Comments: Test to be performed later as the SMEC will not be unlatched while the Herschel Cryostat is vertical.

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4.35 FUNC-SMEC-09: SMEC Open Loop Scan Check

Test Id:	FUNC-SMEC-09: SMEC Open Loop Scan Check
Test Purpose:	SMEC Open Loop Scan Test.
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ SMEC ON (open loop)
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ SMEC ON (open loop)
Success Criteria:	Test passed if SMECLVDTDCSIG parameter shows a variation according to the different position of the SMEC along the scan.

Test Procedure:

Step#	Action
1	**On QLA bring up a time series display of the following SMEC nominal science parameters:** SMECENCSIG1 SMECENCSIG2 SMECLVDTDCSIG SMECLVDTACSIG SMECMOTORCURR
2	**Run FUNC-SMEC-09 test procedure from the CCS**
3	Contingency: If test fails repeat steps 1.

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
FUNC-SMEC-09	**All above mentioned in step 2**	N/A	N/A	N/A	Not done

Start time @:
OBSID:

Comments:

Test to be performed later as the SMEC will not be unlatched while the Herschel Cryostat is vertical.

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Step#	Action	Comments
0	Execute SMEC_INIT	Test to be performed later as the SMEC will not be unlatched while the Herschel Cryostat is vertical.

4.36 FUNC-SMEC-07: SMEC Closed Loop Scan Test

Test Id:	FUNC-SMEC-07: SMEC Closed Loop Scan Test
Test Purpose:	SMEC Close Loop Scan Test.
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ SMEC ON (close loop)
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ SMEC ON (close loop)
Success Criteria:	Test passed if: SMECENCPOS HK parameter shows identical values as those of the SMECTRAJPOSN HK parameter during the scan.

Test Procedure:

Step#	Action
1	**On QLA bring up a time series display of the following SMEC nominal science parameters:** SMECENCSIG1 SMECENCSIG2 SMECLVDTDCSIG SMECLVDTACSIG SMECMOTORCURR
2	**Run FUNC-SMEC-07 test procedure from the CCS**
3	Contingency: If test fails repeat steps 1.

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
FUNC-SMEC-07	**All above mentioned in step 1**	**N/A**	**N/A**	**N/A**	**Not done**

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Start time @:
OBSID:
Comments:

Test to be performed later as the SMEC will not be unlatched while the Herschel Cryostat is vertical.

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4.37 FUNC-SMEC-02B: SMEC Close Launch Latch

Test Id:	**FUNC-SMEC-02B: SMEC Close Launch Latch**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + SMEC ON SMEC Unlatched
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + SMEC ON SMEC Latched
Success Criteria:	Test passed if : Prior to un-latching the resistance across pins 7 and 8 of the launch latch is ~ 368 Ohms. After un-latching the resistance is 483 Ohms. **Note:** These resistance values were recorded for the CQM SMEC model, for the flight SMEC, these values are expected to vary.

Step#	Action	Comments
1	Measure the resistance across pins 7 and 8 of the launch latch.	This step is not applicable anymore
2	Run FUNC-SMEC-02B test procedure from the CCS	
3	Measure the resistance across pins 7 and 8 of the launch latch.	
4	Contingency: If test fails repeat steps 1.	

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SMEC-02B				N/A	Not done

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Start time:
OBSID:

Test to be performed later as the SMEC will not be latched or unlatched while the Herschel Cryostat is vertical.

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4.38 FUNC-SMEC-04A: SMEC Open Loop Position Check

Test Id:	FUNC-SMEC-04A: SMEC Open Loop Position Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ SMEC ON (open loop) **LATCHED**
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ SMEC ON (open loop) **LATCHED**
Success Criteria:	Test passed if only the SMECMOTORCURR shows a variation meaning that the mechanism has not moved.

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a time series display of the following Nominal HK parameters: SMECENCSIG1 SMECENCSIG2 SMECLVDTDCSIG SMECLVDTACSIG SMECMOTORCURR	
2	Run FUNC-SMEC-04a test procedure from the CCS	
3	Contingency: If test fails repeat steps 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SMEC-04A					**Not done**

Start time @:
OBSID:

Comments: Test to be performed later as the SMEC will not be unlatched while the Herschel Cryostat is vertical.

Step#	Action	Comments

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5. ANNEXE 1 (DCU TEST PATTERN DATA)

```
DCU Test Pattern @ Wed Sep 26 13:52:13 UTC 2007
 ..compared with data from DCU Test Pattern @ Wed Mar 14 16:40:00 GMT 2007, OBSID=0x300125CC

Name               New Value[0]      New Value[20]     Comp Value[0]             Comp Value[20]
PHOTFTSTOBSID      0xB000023F        0xB000023F        0x300125CC                0x300125CC
PHOTFTSTBBID       0x88070001        0x88070001        0x88070001     --> OK     0x88070001     --> OK
PHOTFTSTBLKLEN     294.0             294.0             294.0          --> OK     294.0          --> OK
PHOTFTSTFRAMEID    9.0               9.0               9.0            --> OK     9.0            --> OK
PHOTFTST001        6583.0            6583.0            6583.0         --> OK     6583.0         --> OK
PHOTFTST002        43658.0           43658.0           43658.0        --> OK     43658.0        --> OK
PHOTFTST003        31282.0           31282.0           31282.0        --> OK     31282.0        --> OK
PHOTFTST004        11751.0           11751.0           11751.0        --> OK     11751.0        --> OK
PHOTFTST005        57605.0           57605.0           57605.0        --> OK     57605.0        --> OK
PHOTFTST006        49072.0           49072.0           49072.0        --> OK     49072.0        --> OK
PHOTFTST007        62379.0           62379.0           62379.0        --> OK     62379.0        --> OK
PHOTFTST008        64232.0           64232.0           64232.0        --> OK     64232.0        --> OK
PHOTFTST009        59411.0           59411.0           59411.0        --> OK     59411.0        --> OK
PHOTFTST010        30336.0           30336.0           30336.0        --> OK     30336.0        --> OK
PHOTFTST011        12708.0           12708.0           12708.0        --> OK     12708.0        --> OK
PHOTFTST012        46417.0           46417.0           46417.0        --> OK     46417.0        --> OK
PHOTFTST013        23180.0           23180.0           23180.0        --> OK     23180.0        --> OK
PHOTFTST014        36145.0           36145.0           36145.0        --> OK     36145.0        --> OK
PHOTFTST015        53988.0           53988.0           53988.0        --> OK     53988.0        --> OK
PHOTFTST016        33600.0           33600.0           33600.0        --> OK     33600.0        --> OK
PHOTFTST017        23231.0           23231.0           23231.0        --> OK     23231.0        --> OK
PHOTFTST018        30274.0           30274.0           30274.0        --> OK     30274.0        --> OK
PHOTFTST019        6511.0            6511.0            6511.0         --> OK     6511.0         --> OK
PHOTFTST020        8525.0            8525.0            8525.0         --> OK     8525.0         --> OK
PHOTFTST021        18259.0           18259.0           18259.0        --> OK     18259.0        --> OK
PHOTFTST022        51785.0           51785.0           51785.0        --> OK     51785.0        --> OK
PHOTFTST023        15948.0           15948.0           15948.0        --> OK     15948.0        --> OK
PHOTFTST024        22314.0           22314.0           22314.0        --> OK     22314.0        --> OK
PHOTFTST025        57134.0           57134.0           57134.0        --> OK     57134.0        --> OK
PHOTFTST026        47888.0           47888.0           47888.0        --> OK     47888.0        --> OK
PHOTFTST027        65530.0           65530.0           65530.0        --> OK     65530.0        --> OK
PHOTFTST028        21501.0           21501.0           21501.0        --> OK     21501.0        --> OK
PHOTFTST029        27118.0           27118.0           27118.0        --> OK     27118.0        --> OK
PHOTFTST030        50068.0           50068.0           50068.0        --> OK     50068.0        --> OK
PHOTFTST031        20490.0           20490.0           20490.0        --> OK     20490.0        --> OK
PHOTFTST032        26130.0           26130.0           26130.0        --> OK     26130.0        --> OK
PHOTFTST033        50919.0           50919.0           50919.0        --> OK     50919.0        --> OK
PHOTFTST034        16297.0           16297.0           16297.0        --> OK     16297.0        --> OK
PHOTFTST035        13170.0           13170.0           13170.0        --> OK     13170.0        --> OK
PHOTFTST036        48409.0           48409.0           48409.0        --> OK     48409.0        --> OK
PHOTFTST037        32768.0           32768.0           32768.0        --> OK     32768.0        --> OK
PHOTFTST038        53942.0           53942.0           53942.0        --> OK     53942.0        --> OK
PHOTFTST039        8756.0            8756.0            8756.0         --> OK     8756.0         --> OK
PHOTFTST040        11023.0           11023.0           11023.0        --> OK     11023.0        --> OK
PHOTFTST041        53978.0           53978.0           53978.0        --> OK     53978.0        --> OK
PHOTFTST042        25474.0           25474.0           25474.0        --> OK     25474.0        --> OK
PHOTFTST043        6027.0            6027.0            6027.0         --> OK     6027.0         --> OK
PHOTFTST044        17966.0           17966.0           17966.0        --> OK     17966.0        --> OK
PHOTFTST045        57084.0           57084.0           57084.0        --> OK     57084.0        --> OK
PHOTFTST046        27297.0           27297.0           27297.0        --> OK     27297.0        --> OK
PHOTFTST047        18407.0           18407.0           18407.0        --> OK     18407.0        --> OK
PHOTFTST048        55003.0           55003.0           55003.0        --> OK     55003.0        --> OK
PHOTFTST049        30471.0           30471.0           30471.0        --> OK     30471.0        --> OK
PHOTFTST050        779.0             779.0             779.0          --> OK     779.0          --> OK
PHOTFTST051        20944.0           20944.0           20944.0        --> OK     20944.0        --> OK
PHOTFTST052        40139.0           40139.0           40139.0        --> OK     40139.0        --> OK
PHOTFTST053        60700.0           60700.0           60700.0        --> OK     60700.0        --> OK
PHOTFTST054        62268.0           62268.0           62268.0        --> OK     62268.0        --> OK
PHOTFTST055        23214.0           23214.0           23214.0        --> OK     23214.0        --> OK
PHOTFTST056        8339.0            8339.0            8339.0         --> OK     8339.0         --> OK
PHOTFTST057        24553.0           24553.0           24553.0        --> OK     24553.0        --> OK
PHOTFTST058        16566.0           16566.0           16566.0        --> OK     16566.0        --> OK
PHOTFTST059        7195.0            7195.0            7195.0         --> OK     7195.0         --> OK
PHOTFTST060        47643.0           47643.0           47643.0        --> OK     47643.0        --> OK
PHOTFTST061        53034.0           53034.0           53034.0        --> OK     53034.0        --> OK
PHOTFTST062        37609.0           37609.0           37609.0        --> OK     37609.0        --> OK
PHOTFTST063        164.0             164.0             164.0          --> OK     164.0          --> OK
PHOTFTST064        61230.0           61230.0           61230.0        --> OK     61230.0        --> OK
PHOTFTST065        34962.0           34962.0           34962.0        --> OK     34962.0        --> OK
PHOTFTST066        10260.0           10260.0           10260.0        --> OK     10260.0        --> OK
PHOTFTST067        51202.0           51202.0           51202.0        --> OK     51202.0        --> OK
PHOTFTST068        64935.0           64935.0           64935.0        --> OK     64935.0        --> OK
PHOTFTST069        61109.0           61109.0           61109.0        --> OK     61109.0        --> OK
PHOTFTST070        19438.0           19438.0           19438.0        --> OK     19438.0        --> OK
PHOTFTST071        23583.0           23583.0           23583.0        --> OK     23583.0        --> OK
PHOTFTST072        37954.0           37954.0           37954.0        --> OK     37954.0        --> OK
```

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PHOTFTST073     60837.0       60837.0       60837.0     --> OK   60837.0     --> OK
PHOTFTST074     62495.0       62495.0       62495.0     --> OK   62495.0     --> OK
PHOTFTST075     11713.0       11713.0       11713.0     --> OK   11713.0     --> OK
PHOTFTST076      8569.0        8569.0        8569.0     --> OK    8569.0     --> OK
PHOTFTST077      8988.0        8988.0        8988.0     --> OK    8988.0     --> OK
PHOTFTST078     56539.0       56539.0       56539.0     --> OK   56539.0     --> OK
PHOTFTST079     55979.0       55979.0       55979.0     --> OK   55979.0     --> OK
PHOTFTST080     49916.0       49916.0       49916.0     --> OK   49916.0     --> OK
PHOTFTST081     26072.0       26072.0       26072.0     --> OK   26072.0     --> OK
PHOTFTST082     14603.0       14603.0       14603.0     --> OK   14603.0     --> OK
PHOTFTST083       648.0         648.0         648.0     --> OK     648.0     --> OK
PHOTFTST084     49411.0       49411.0       49411.0     --> OK   49411.0     --> OK
PHOTFTST085     27115.0       27115.0       27115.0     --> OK   27115.0     --> OK
PHOTFTST086     62285.0       62285.0       62285.0     --> OK   62285.0     --> OK
PHOTFTST087      1475.0        1475.0        1475.0     --> OK    1475.0     --> OK
PHOTFTST088     26739.0       26739.0       26739.0     --> OK   26739.0     --> OK
PHOTFTST089     17700.0       17700.0       17700.0     --> OK   17700.0     --> OK
PHOTFTST090      7670.0        7670.0        7670.0     --> OK    7670.0     --> OK
PHOTFTST091     45570.0       45570.0       45570.0     --> OK   45570.0     --> OK
PHOTFTST092     36446.0       36446.0       36446.0     --> OK   36446.0     --> OK
PHOTFTST093     32851.0       32851.0       32851.0     --> OK   32851.0     --> OK
PHOTFTST094        76.0          76.0          76.0     --> OK      76.0     --> OK
PHOTFTST095     59353.0       59353.0       59353.0     --> OK   59353.0     --> OK
PHOTFTST096     14681.0       14681.0       14681.0     --> OK   14681.0     --> OK
PHOTFTST097     45993.0       45993.0       45993.0     --> OK   45993.0     --> OK
PHOTFTST098      3039.0        3039.0        3039.0     --> OK    3039.0     --> OK
PHOTFTST099     21485.0       21485.0       21485.0     --> OK   21485.0     --> OK
PHOTFTST100     58423.0       58423.0       58423.0     --> OK   58423.0     --> OK
PHOTFTST101     49530.0       49530.0       49530.0     --> OK   49530.0     --> OK
PHOTFTST102     59672.0       59672.0       59672.0     --> OK   59672.0     --> OK
PHOTFTST103     39150.0       39150.0       39150.0     --> OK   39150.0     --> OK
PHOTFTST104     61616.0       61616.0       61616.0     --> OK   61616.0     --> OK
PHOTFTST105      6295.0        6295.0        6295.0     --> OK    6295.0     --> OK
PHOTFTST106     30262.0       30262.0       30262.0     --> OK   30262.0     --> OK
PHOTFTST107     20736.0       20736.0       20736.0     --> OK   20736.0     --> OK
PHOTFTST108     15460.0       15460.0       15460.0     --> OK   15460.0     --> OK
PHOTFTST109     62270.0       62270.0       62270.0     --> OK   62270.0     --> OK
PHOTFTST110     42095.0       42095.0       42095.0     --> OK   42095.0     --> OK
PHOTFTST111     43075.0       43075.0       43075.0     --> OK   43075.0     --> OK
PHOTFTST112     61472.0       61472.0       61472.0     --> OK   61472.0     --> OK
PHOTFTST113     25519.0       25519.0       25519.0     --> OK   25519.0     --> OK
PHOTFTST114       423.0         423.0         423.0     --> OK     423.0     --> OK
PHOTFTST115     13689.0       13689.0       13689.0     --> OK   13689.0     --> OK
PHOTFTST116     57692.0       57692.0       57692.0     --> OK   57692.0     --> OK
PHOTFTST117     35227.0       35227.0       35227.0     --> OK   35227.0     --> OK
PHOTFTST118     40405.0       40405.0       40405.0     --> OK   40405.0     --> OK
PHOTFTST119     33222.0       33222.0       33222.0     --> OK   33222.0     --> OK
PHOTFTST120     25871.0       25871.0       25871.0     --> OK   25871.0     --> OK
PHOTFTST121     35174.0       35174.0       35174.0     --> OK   35174.0     --> OK
PHOTFTST122     49587.0       49587.0       49587.0     --> OK   49587.0     --> OK
PHOTFTST123     60595.0       60595.0       60595.0     --> OK   60595.0     --> OK
PHOTFTST124     58121.0       58121.0       58121.0     --> OK   58121.0     --> OK
PHOTFTST125     39089.0       39089.0       39089.0     --> OK   39089.0     --> OK
PHOTFTST126     40086.0       40086.0       40086.0     --> OK   40086.0     --> OK
PHOTFTST127     61336.0       61336.0       61336.0     --> OK   61336.0     --> OK
PHOTFTST128     36067.0       36067.0       36067.0     --> OK   36067.0     --> OK
PHOTFTST129     15197.0       15197.0       15197.0     --> OK   15197.0     --> OK
PHOTFTST130     54572.0       54572.0       54572.0     --> OK   54572.0     --> OK
PHOTFTST131      3320.0        3320.0        3320.0     --> OK    3320.0     --> OK
PHOTFTST132     23946.0       23946.0       23946.0     --> OK   23946.0     --> OK
PHOTFTST133     62588.0       62588.0       62588.0     --> OK   62588.0     --> OK
PHOTFTST134     33562.0       33562.0       33562.0     --> OK   33562.0     --> OK
PHOTFTST135     58279.0       58279.0       58279.0     --> OK   58279.0     --> OK
PHOTFTST136     63609.0       63609.0       63609.0     --> OK   63609.0     --> OK
PHOTFTST137     13326.0       13326.0       13326.0     --> OK   13326.0     --> OK
PHOTFTST138     31406.0       31406.0       31406.0     --> OK   31406.0     --> OK
PHOTFTST139     30437.0       30437.0       30437.0     --> OK   30437.0     --> OK
PHOTFTST140     50814.0       50814.0       50814.0     --> OK   50814.0     --> OK
PHOTFTST141     61182.0       61182.0       61182.0     --> OK   61182.0     --> OK
PHOTFTST142     16832.0       16832.0       16832.0     --> OK   16832.0     --> OK
PHOTFTST143     47199.0       47199.0       47199.0     --> OK   47199.0     --> OK
PHOTFTST144       269.0         269.0         269.0     --> OK     269.0     --> OK
PHOTFTST145      4261.0        4261.0        4261.0     --> OK    4261.0     --> OK
PHOTFTST146     62990.0       62990.0       62990.0     --> OK   62990.0     --> OK
PHOTFTST147     43420.0       43420.0       43420.0     --> OK   43420.0     --> OK
PHOTFTST148     14880.0       14880.0       14880.0     --> OK   14880.0     --> OK
PHOTFTST149     50504.0       50504.0       50504.0     --> OK   50504.0     --> OK
PHOTFTST150     22549.0       22549.0       22549.0     --> OK   22549.0     --> OK
PHOTFTST151     44210.0       44210.0       44210.0     --> OK   44210.0     --> OK
PHOTFTST152     64905.0       64905.0       64905.0     --> OK   64905.0     --> OK
PHOTFTST153     61431.0       61431.0       61431.0     --> OK   61431.0     --> OK
PHOTFTST154     62465.0       62465.0       62465.0     --> OK   62465.0     --> OK
PHOTFTST155     61851.0       61851.0       61851.0     --> OK   61851.0     --> OK
PHOTFTST156     39333.0       39333.0       39333.0     --> OK   39333.0     --> OK
PHOTFTST157     45823.0       45823.0       45823.0     --> OK   45823.0     --> OK
PHOTFTST158     53816.0       53816.0       53816.0     --> OK   53816.0     --> OK
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PHOTFTST159	60710.0	60710.0	60710.0	--> OK	60710.0 --> OK
PHOTFTST160	34378.0	34378.0	34378.0	--> OK	34378.0 --> OK
PHOTFTST161	25724.0	25724.0	25724.0	--> OK	25724.0 --> OK
PHOTFTST162	60897.0	60897.0	60897.0	--> OK	60897.0 --> OK
PHOTFTST163	12140.0	12140.0	12140.0	--> OK	12140.0 --> OK
PHOTFTST164	14299.0	14299.0	14299.0	--> OK	14299.0 --> OK
PHOTFTST165	6883.0	6883.0	6883.0	--> OK	6883.0 --> OK
PHOTFTST166	20030.0	20030.0	20030.0	--> OK	20030.0 --> OK
PHOTFTST167	4598.0	4598.0	4598.0	--> OK	4598.0 --> OK
PHOTFTST168	7984.0	7984.0	7984.0	--> OK	7984.0 --> OK
PHOTFTST169	17054.0	17054.0	17054.0	--> OK	17054.0 --> OK
PHOTFTST170	22076.0	22076.0	22076.0	--> OK	22076.0 --> OK
PHOTFTST171	49498.0	49498.0	49498.0	--> OK	49498.0 --> OK
PHOTFTST172	3680.0	3680.0	3680.0	--> OK	3680.0 --> OK
PHOTFTST173	40243.0	40243.0	40243.0	--> OK	40243.0 --> OK
PHOTFTST174	40825.0	40825.0	40825.0	--> OK	40825.0 --> OK
PHOTFTST175	58735.0	58735.0	58735.0	--> OK	58735.0 --> OK
PHOTFTST176	6296.0	6296.0	6296.0	--> OK	6296.0 --> OK
PHOTFTST177	44890.0	44890.0	44890.0	--> OK	44890.0 --> OK
PHOTFTST178	11975.0	11975.0	11975.0	--> OK	11975.0 --> OK
PHOTFTST179	42645.0	42645.0	42645.0	--> OK	42645.0 --> OK
PHOTFTST180	51549.0	51549.0	51549.0	--> OK	51549.0 --> OK
PHOTFTST181	7571.0	7571.0	7571.0	--> OK	7571.0 --> OK
PHOTFTST182	14165.0	14165.0	14165.0	--> OK	14165.0 --> OK
PHOTFTST183	54769.0	54769.0	54769.0	--> OK	54769.0 --> OK
PHOTFTST184	58235.0	58235.0	58235.0	--> OK	58235.0 --> OK
PHOTFTST185	13602.0	13602.0	13602.0	--> OK	13602.0 --> OK
PHOTFTST186	6350.0	6350.0	6350.0	--> OK	6350.0 --> OK
PHOTFTST187	28469.0	28469.0	28469.0	--> OK	28469.0 --> OK
PHOTFTST188	16254.0	16254.0	16254.0	--> OK	16254.0 --> OK
PHOTFTST189	18355.0	18355.0	18355.0	--> OK	18355.0 --> OK
PHOTFTST190	32290.0	32290.0	32290.0	--> OK	32290.0 --> OK
PHOTFTST191	10077.0	10077.0	10077.0	--> OK	10077.0 --> OK
PHOTFTST192	22612.0	22612.0	22612.0	--> OK	22612.0 --> OK
PHOTFTST193	62886.0	62886.0	62886.0	--> OK	62886.0 --> OK
PHOTFTST194	31171.0	31171.0	31171.0	--> OK	31171.0 --> OK
PHOTFTST195	30969.0	30969.0	30969.0	--> OK	30969.0 --> OK
PHOTFTST196	52642.0	52642.0	52642.0	--> OK	52642.0 --> OK
PHOTFTST197	20461.0	20461.0	20461.0	--> OK	20461.0 --> OK
PHOTFTST198	26959.0	26959.0	26959.0	--> OK	26959.0 --> OK
PHOTFTST199	58181.0	58181.0	58181.0	--> OK	58181.0 --> OK
PHOTFTST200	1736.0	1736.0	1736.0	--> OK	1736.0 --> OK
PHOTFTST201	42447.0	42447.0	42447.0	--> OK	42447.0 --> OK
PHOTFTST202	55791.0	55791.0	55791.0	--> OK	55791.0 --> OK
PHOTFTST203	52325.0	52325.0	52325.0	--> OK	52325.0 --> OK
PHOTFTST204	16702.0	16702.0	16702.0	--> OK	16702.0 --> OK
PHOTFTST205	34421.0	34421.0	34421.0	--> OK	34421.0 --> OK
PHOTFTST206	41152.0	41152.0	41152.0	--> OK	41152.0 --> OK
PHOTFTST207	40213.0	40213.0	40213.0	--> OK	40213.0 --> OK
PHOTFTST208	42863.0	42863.0	42863.0	--> OK	42863.0 --> OK
PHOTFTST209	33552.0	33552.0	33552.0	--> OK	33552.0 --> OK
PHOTFTST210	27975.0	27975.0	27975.0	--> OK	27975.0 --> OK
PHOTFTST211	21482.0	21482.0	21482.0	--> OK	21482.0 --> OK
PHOTFTST212	40500.0	40500.0	40500.0	--> OK	40500.0 --> OK
PHOTFTST213	7267.0	7267.0	7267.0	--> OK	7267.0 --> OK
PHOTFTST214	19270.0	19270.0	19270.0	--> OK	19270.0 --> OK
PHOTFTST215	57569.0	57569.0	57569.0	--> OK	57569.0 --> OK
PHOTFTST216	42411.0	42411.0	42411.0	--> OK	42411.0 --> OK
PHOTFTST217	54772.0	54772.0	54772.0	--> OK	54772.0 --> OK
PHOTFTST218	54178.0	54178.0	54178.0	--> OK	54178.0 --> OK
PHOTFTST219	24811.0	24811.0	24811.0	--> OK	24811.0 --> OK
PHOTFTST220	5807.0	5807.0	5807.0	--> OK	5807.0 --> OK
PHOTFTST221	23635.0	23635.0	23635.0	--> OK	23635.0 --> OK
PHOTFTST222	58479.0	58479.0	58479.0	--> OK	58479.0 --> OK
PHOTFTST223	54524.0	54524.0	54524.0	--> OK	54524.0 --> OK
PHOTFTST224	49934.0	49934.0	49934.0	--> OK	49934.0 --> OK
PHOTFTST225	55320.0	55320.0	55320.0	--> OK	55320.0 --> OK
PHOTFTST226	54244.0	54244.0	54244.0	--> OK	54244.0 --> OK
PHOTFTST227	43319.0	43319.0	43319.0	--> OK	43319.0 --> OK
PHOTFTST228	33893.0	33893.0	33893.0	--> OK	33893.0 --> OK
PHOTFTST229	14361.0	14361.0	14361.0	--> OK	14361.0 --> OK
PHOTFTST230	49700.0	49700.0	49700.0	--> OK	49700.0 --> OK
PHOTFTST231	26066.0	26066.0	26066.0	--> OK	26066.0 --> OK
PHOTFTST232	22713.0	22713.0	22713.0	--> OK	22713.0 --> OK
PHOTFTST233	43291.0	43291.0	43291.0	--> OK	43291.0 --> OK
PHOTFTST234	56769.0	56769.0	56769.0	--> OK	56769.0 --> OK
PHOTFTST235	3878.0	3878.0	3878.0	--> OK	3878.0 --> OK
PHOTFTST236	17774.0	17774.0	17774.0	--> OK	17774.0 --> OK
PHOTFTST237	9052.0	9052.0	9052.0	--> OK	9052.0 --> OK
PHOTFTST238	4650.0	4650.0	4650.0	--> OK	4650.0 --> OK
PHOTFTST239	53520.0	53520.0	53520.0	--> OK	53520.0 --> OK
PHOTFTST240	7534.0	7534.0	7534.0	--> OK	7534.0 --> OK
PHOTFTST241	39702.0	39702.0	39702.0	--> OK	39702.0 --> OK
PHOTFTST242	53314.0	53314.0	53314.0	--> OK	53314.0 --> OK
PHOTFTST243	21275.0	21275.0	21275.0	--> OK	21275.0 --> OK
PHOTFTST244	31886.0	31886.0	31886.0	--> OK	31886.0 --> OK

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PHOTFTST245      17396.0        17396.0        17396.0      --> OK   17396.0      --> OK
PHOTFTST246      9667.0         9667.0         9667.0       --> OK   9667.0       --> OK
PHOTFTST247      19008.0        19008.0        19008.0      --> OK   19008.0      --> OK
PHOTFTST248      56499.0        56499.0        56499.0      --> OK   56499.0      --> OK
PHOTFTST249      4661.0         4661.0         4661.0       --> OK   4661.0       --> OK
PHOTFTST250      61401.0        61401.0        61401.0      --> OK   61401.0      --> OK
PHOTFTST251      57818.0        57818.0        57818.0      --> OK   57818.0      --> OK
PHOTFTST252      20084.0        20084.0        20084.0      --> OK   20084.0      --> OK
PHOTFTST253      5075.0         5075.0         5075.0       --> OK   5075.0       --> OK
PHOTFTST254      48920.0        48920.0        48920.0      --> OK   48920.0      --> OK
PHOTFTST255      20309.0        20309.0        20309.0      --> OK   20309.0      --> OK
PHOTFTST256      51969.0        51969.0        51969.0      --> OK   51969.0      --> OK
PHOTFTST257      20797.0        20797.0        20797.0      --> OK   20797.0      --> OK
PHOTFTST258      13073.0        13073.0        13073.0      --> OK   13073.0      --> OK
PHOTFTST259      33415.0        33415.0        33415.0      --> OK   33415.0      --> OK
PHOTFTST260      17118.0        17118.0        17118.0      --> OK   17118.0      --> OK
PHOTFTST261      46469.0        46469.0        46469.0      --> OK   46469.0      --> OK
PHOTFTST262      51937.0        51937.0        51937.0      --> OK   51937.0      --> OK
PHOTFTST263      33458.0        33458.0        33458.0      --> OK   33458.0      --> OK
PHOTFTST264      26307.0        26307.0        26307.0      --> OK   26307.0      --> OK
PHOTFTST265      59263.0        59263.0        59263.0      --> OK   59263.0      --> OK
PHOTFTST266      40109.0        40109.0        40109.0      --> OK   40109.0      --> OK
PHOTFTST267      45776.0        45776.0        45776.0      --> OK   45776.0      --> OK
PHOTFTST268      25643.0        25643.0        25643.0      --> OK   25643.0      --> OK
PHOTFTST269      5793.0         5793.0         5793.0       --> OK   5793.0       --> OK
PHOTFTST270      64288.0        64288.0        64288.0      --> OK   64288.0      --> OK
PHOTFTST271      24157.0        24157.0        24157.0      --> OK   24157.0      --> OK
PHOTFTST272      26592.0        26592.0        26592.0      --> OK   26592.0      --> OK
PHOTFTST273      31527.0        31527.0        31527.0      --> OK   31527.0      --> OK
PHOTFTST274      54598.0        54598.0        54598.0      --> OK   54598.0      --> OK
PHOTFTST275      39117.0        39117.0        39117.0      --> OK   39117.0      --> OK
PHOTFTST276      63615.0        63615.0        63615.0      --> OK   63615.0      --> OK
PHOTFTST277      53746.0        53746.0        53746.0      --> OK   53746.0      --> OK
PHOTFTST278      58335.0        58335.0        58335.0      --> OK   58335.0      --> OK
PHOTFTST279      16933.0        16933.0        16933.0      --> OK   16933.0      --> OK
PHOTFTST280      7109.0         7109.0         7109.0       --> OK   7109.0       --> OK
PHOTFTST281      16101.0        16101.0        16101.0      --> OK   16101.0      --> OK
PHOTFTST282      41909.0        41909.0        41909.0      --> OK   41909.0      --> OK
PHOTFTST283      43695.0        43695.0        43695.0      --> OK   43695.0      --> OK
PHOTFTST284      36126.0        36126.0        36126.0      --> OK   36126.0      --> OK
PHOTFTST285      32243.0        32243.0        32243.0      --> OK   32243.0      --> OK
PHOTFTST286      30919.0        30919.0        30919.0      --> OK   30919.0      --> OK
PHOTFTST287      28974.0        28974.0        28974.0      --> OK   28974.0      --> OK
PHOTFTST288      62188.0        62188.0        62188.0      --> OK   62188.0      --> OK
PHOTFTSTADCFLGS   0.0            0.0            0.0         --> OK   0.0          --> OK
PHOTFTSTFRAMETIME 8440290.0      8847959.0      1.0253174E7  <--BAD  1.0589166E7  <--BAD
PHOTFTSTCHECKWORD 12671.0        64205.0        35831.0              27474.0
```

Note that the frame values indicated "BAD" are actually expected to be different from test to test, i.e. frame time, check word and observation identifier, etc.

6. ANNEXE 2 (RESULTS OF LOAD CURVES)

The following graphs (1-12) show the response of the 288 Photometer detectors to the input voltage during the Load Curve (FUNC-DCU-13). The graph (13) shows the response of the 3 PTC channels to the input voltage during the Load Curve. The graphs (14-16) show the spectrometer 78 detectors output voltage during the load curve performed on the spectrometer side. These plots are for OBSIDs B0000242 for photometer and B0000247 for spectrometer. For all the photometer load curves the first anomalous point has been removed from the plots.

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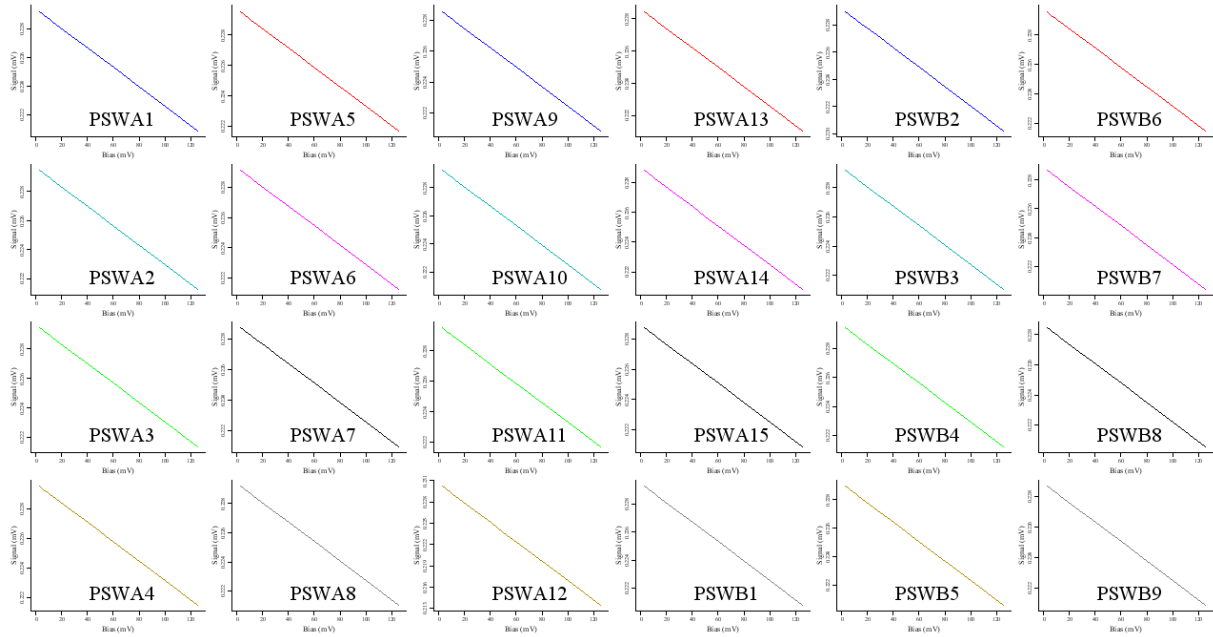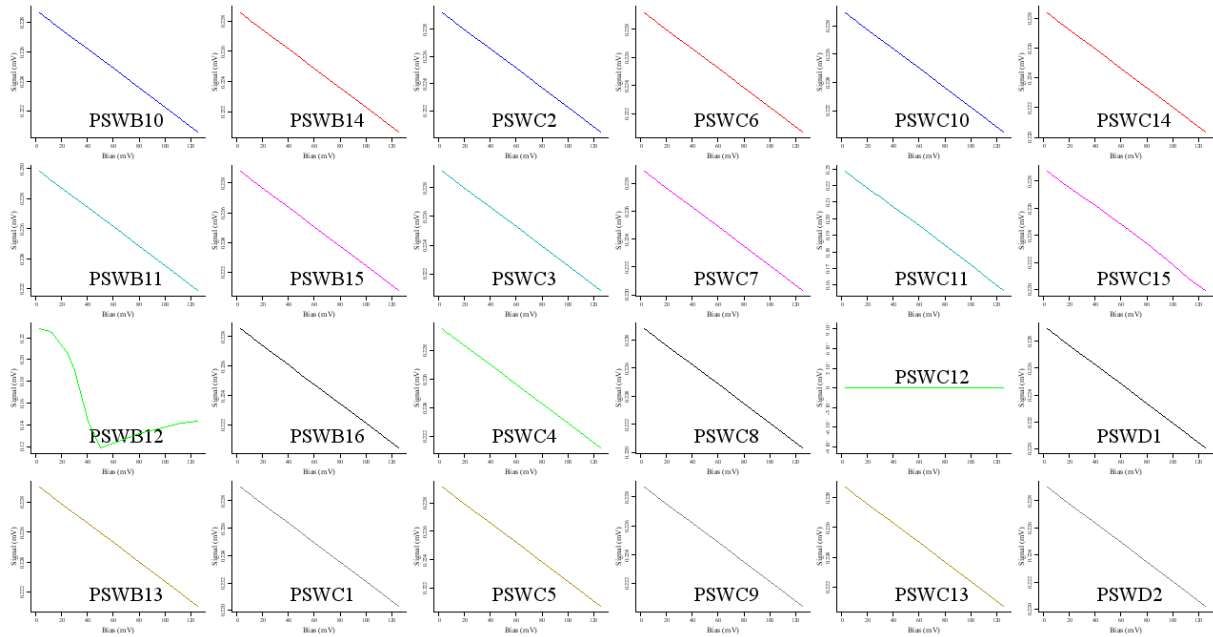
Figure 1. PSW Detectors (1)

Figure 2. PSW Detectors (2)
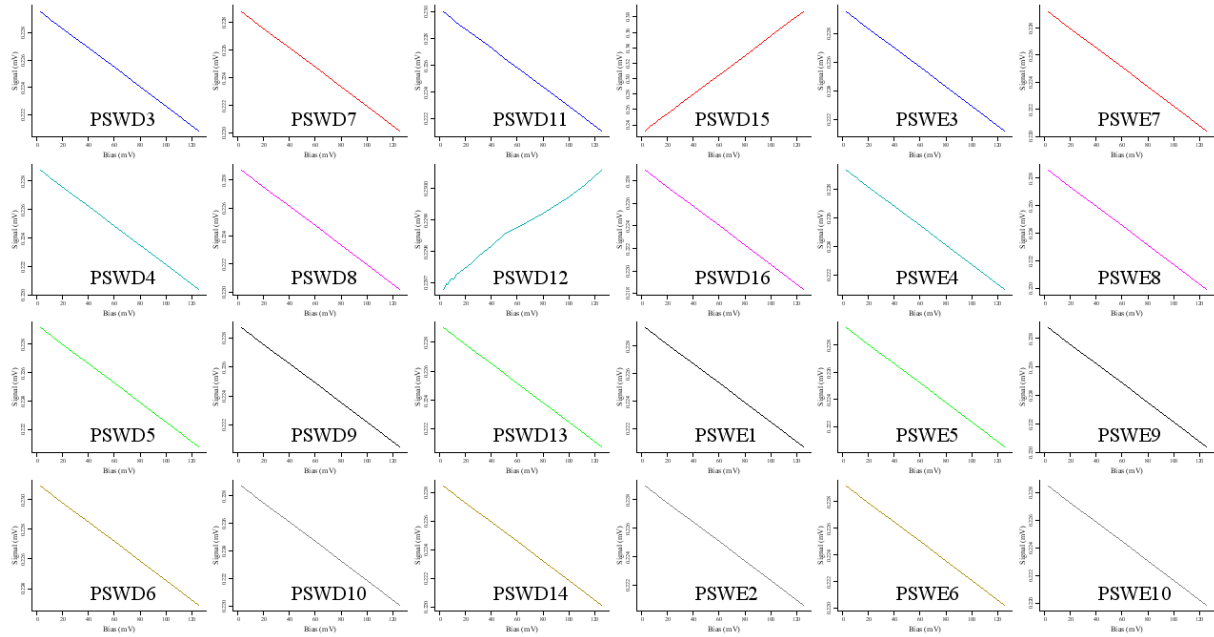
Figure 3. PSW Detectors (3)
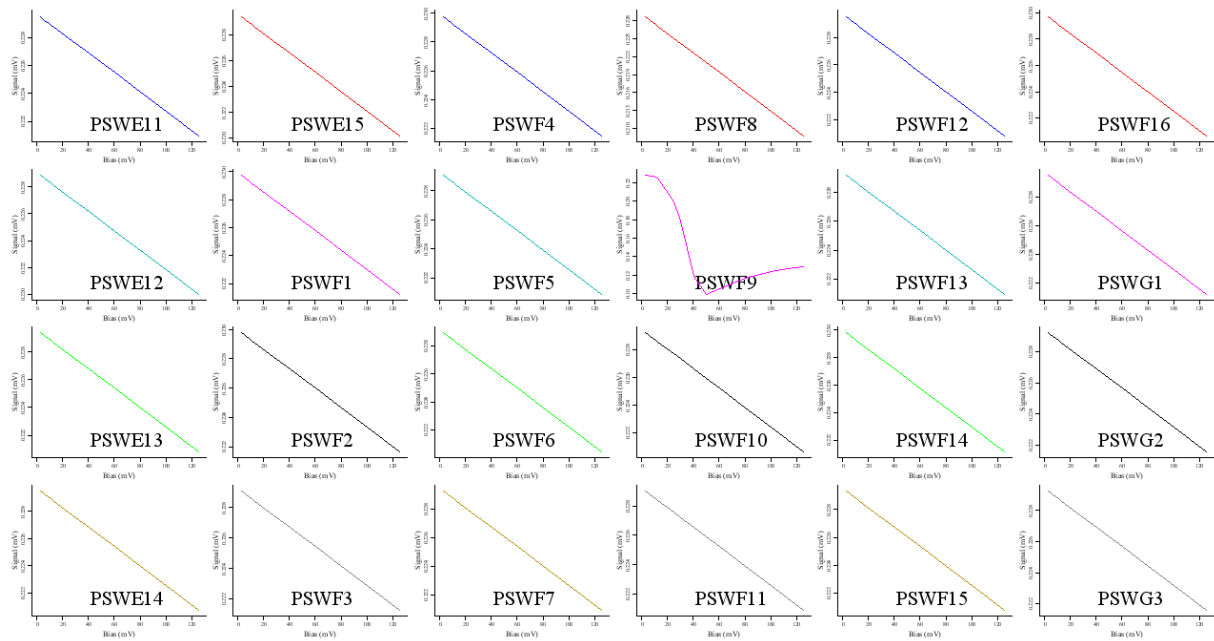
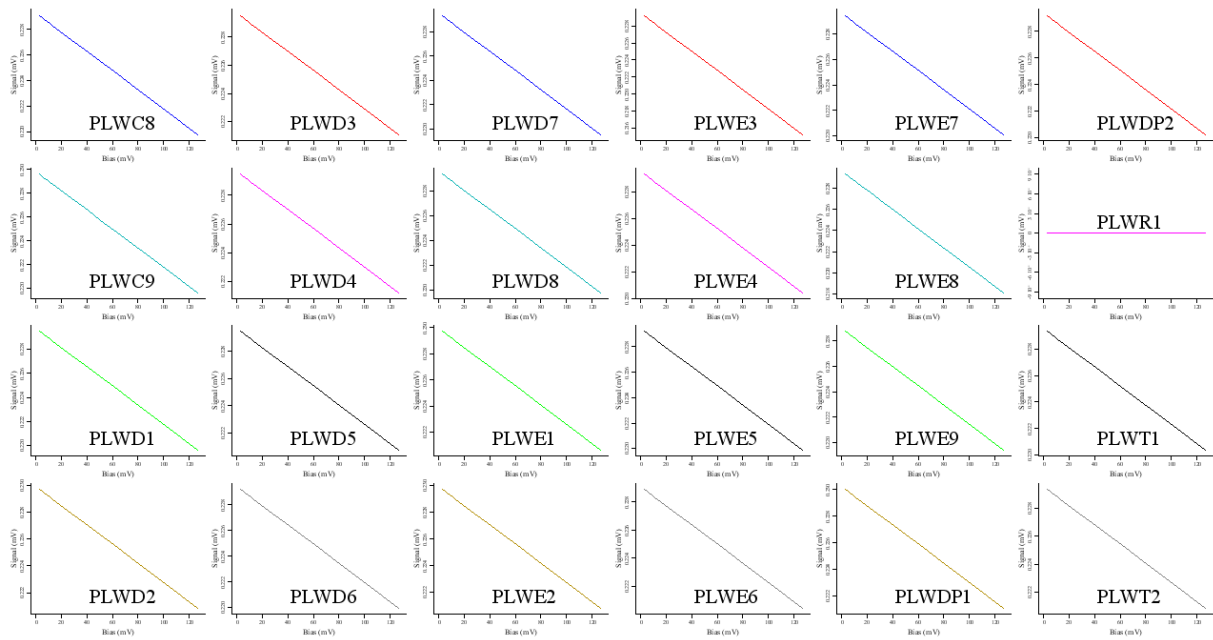
Figure 4. PSW Detectors (4)
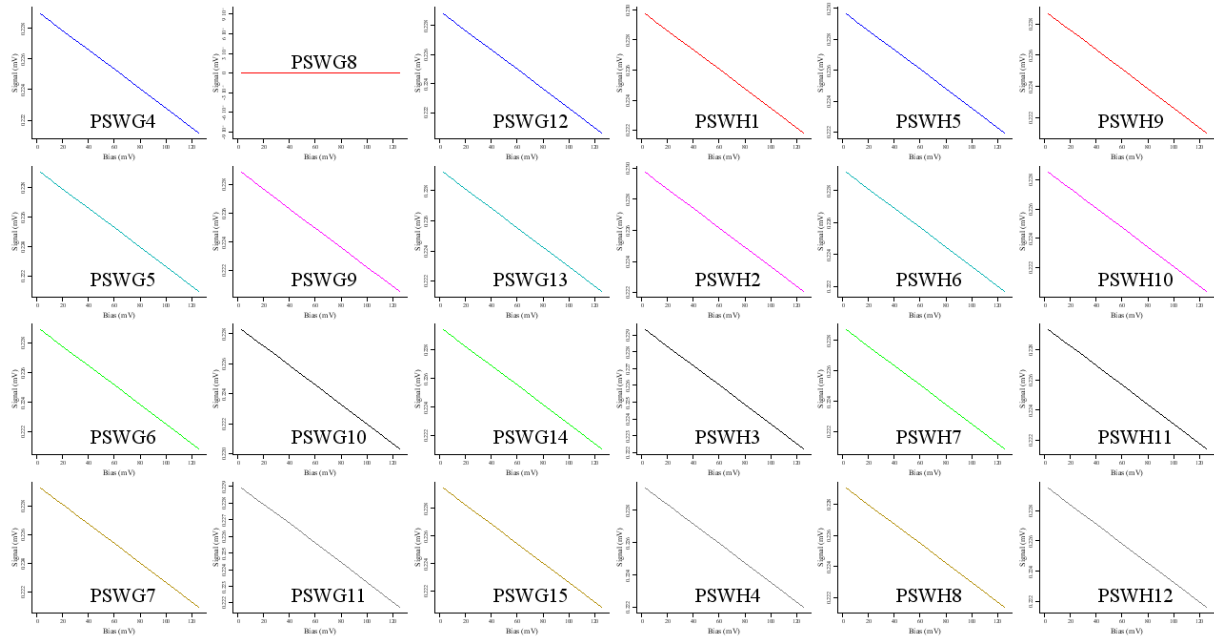
Figure 5. PSW Detectors (5)
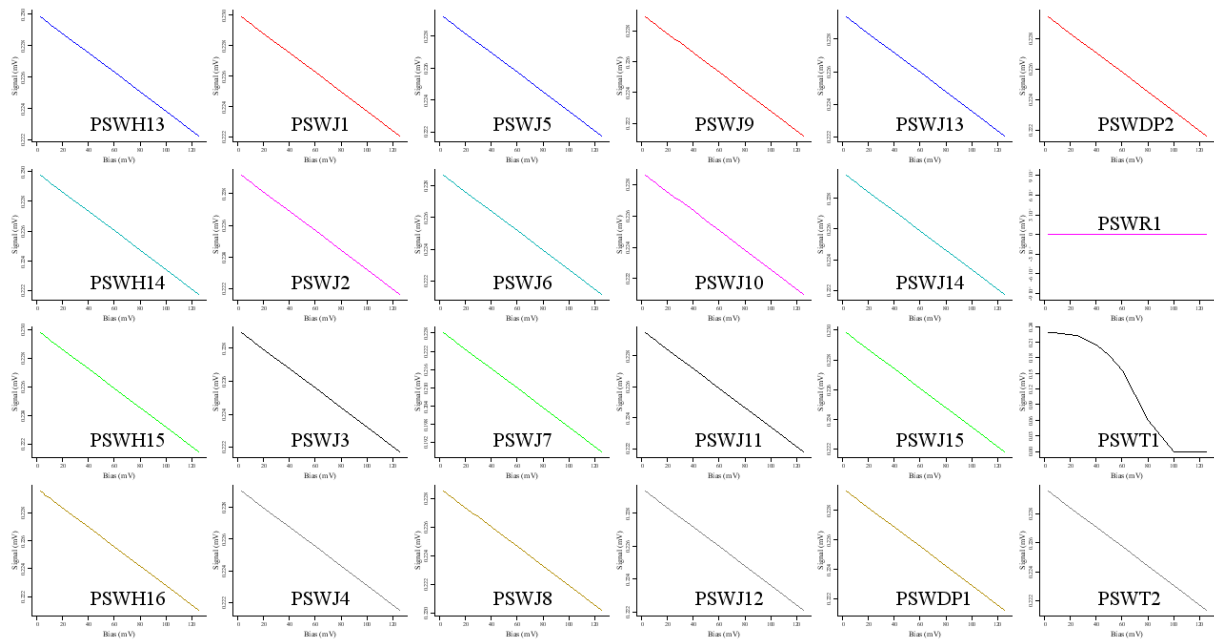
Figure 6. PSW Detectors (6)

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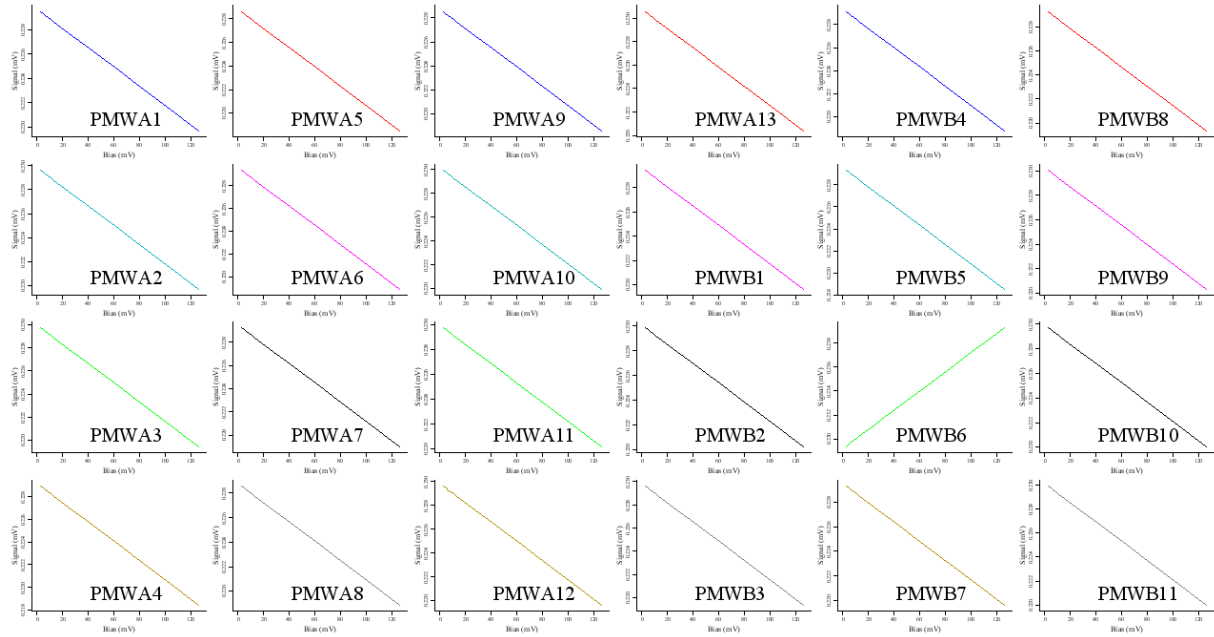
Figure 7. PMW Detectors (1)
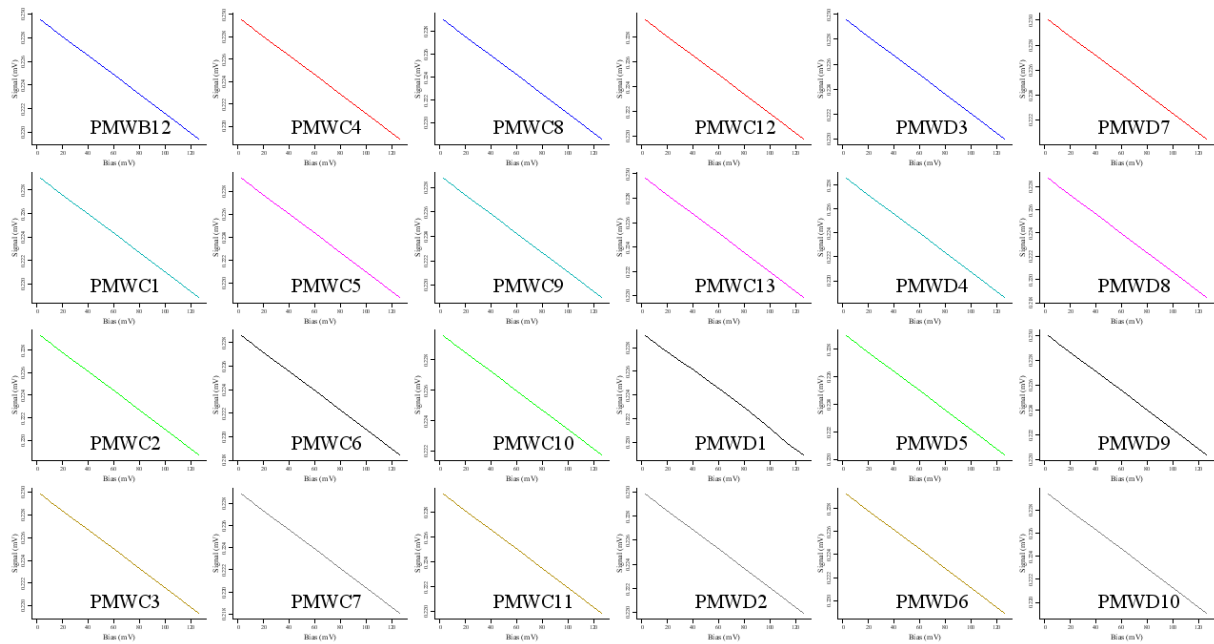
Figure 8. PMW Detectors (2)
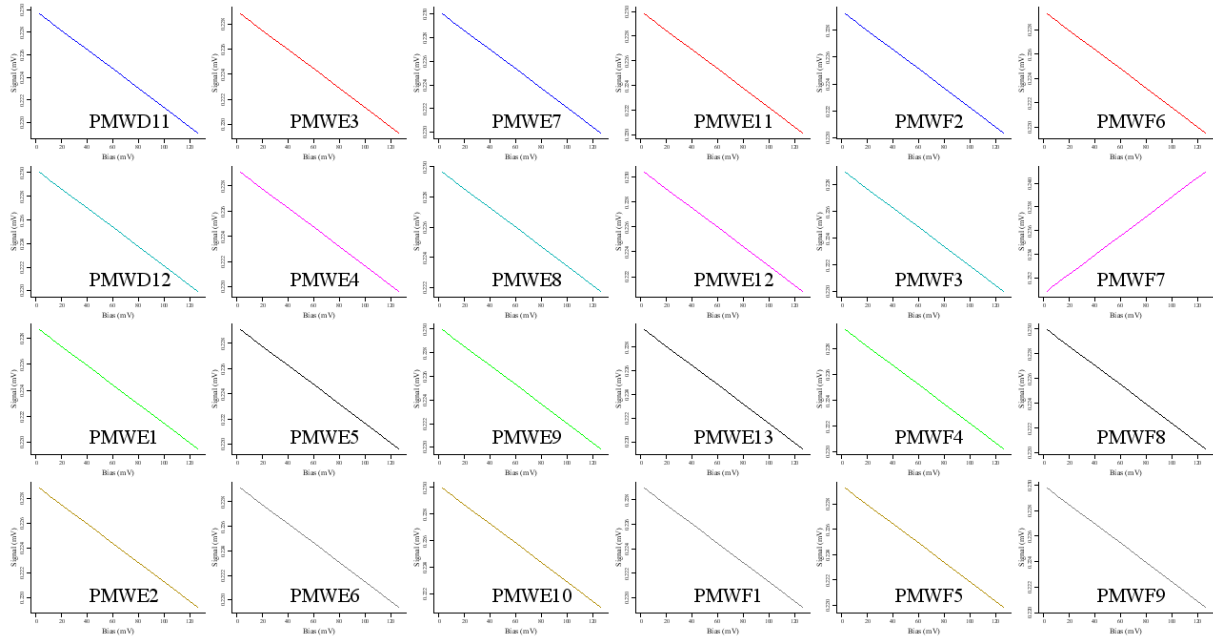
Figure 9. PMW Detectors (3)
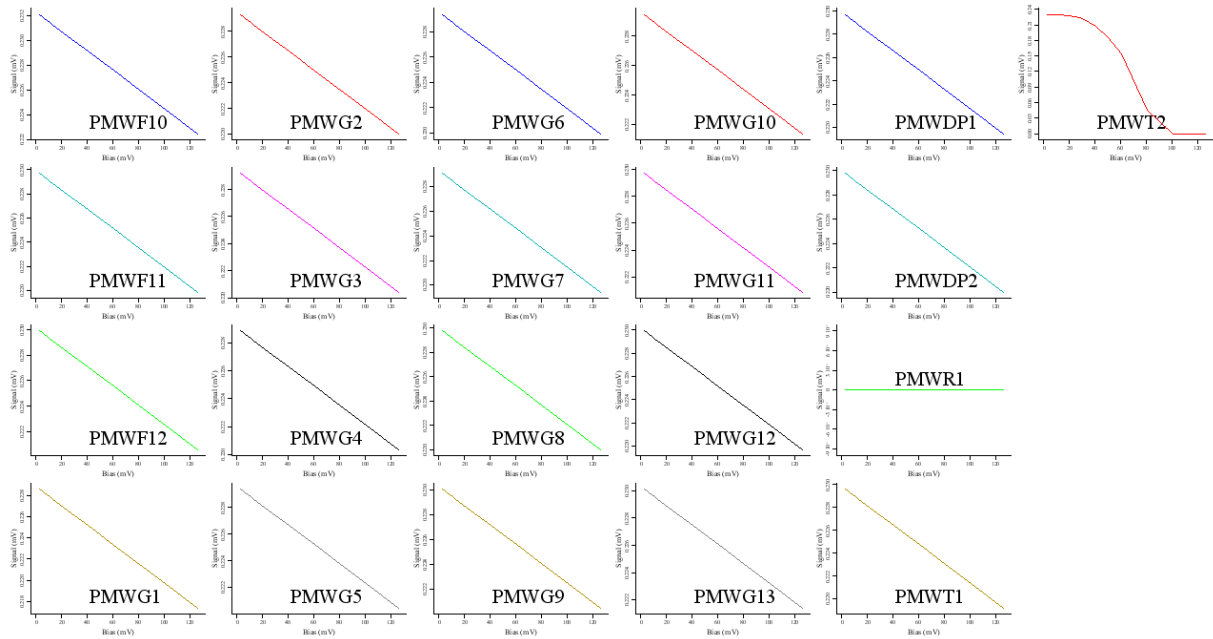
Figure 10. PMW Detectors (4)
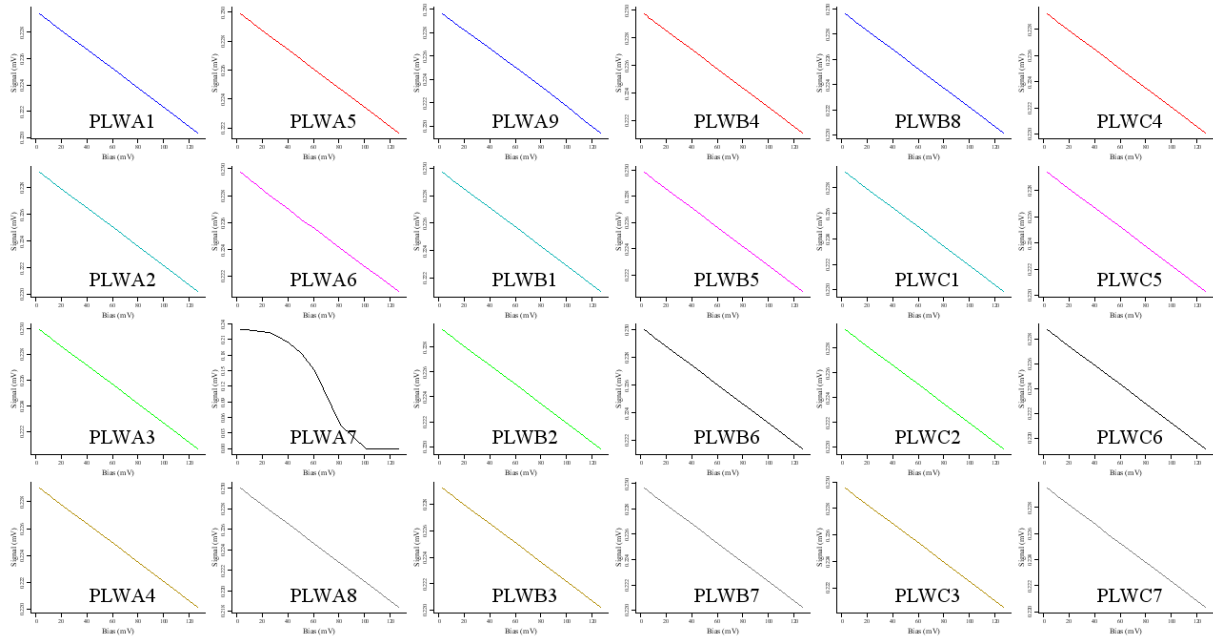
Figure 11. PLW Detectors (1)

Figure 12. PLW Detectors (2)
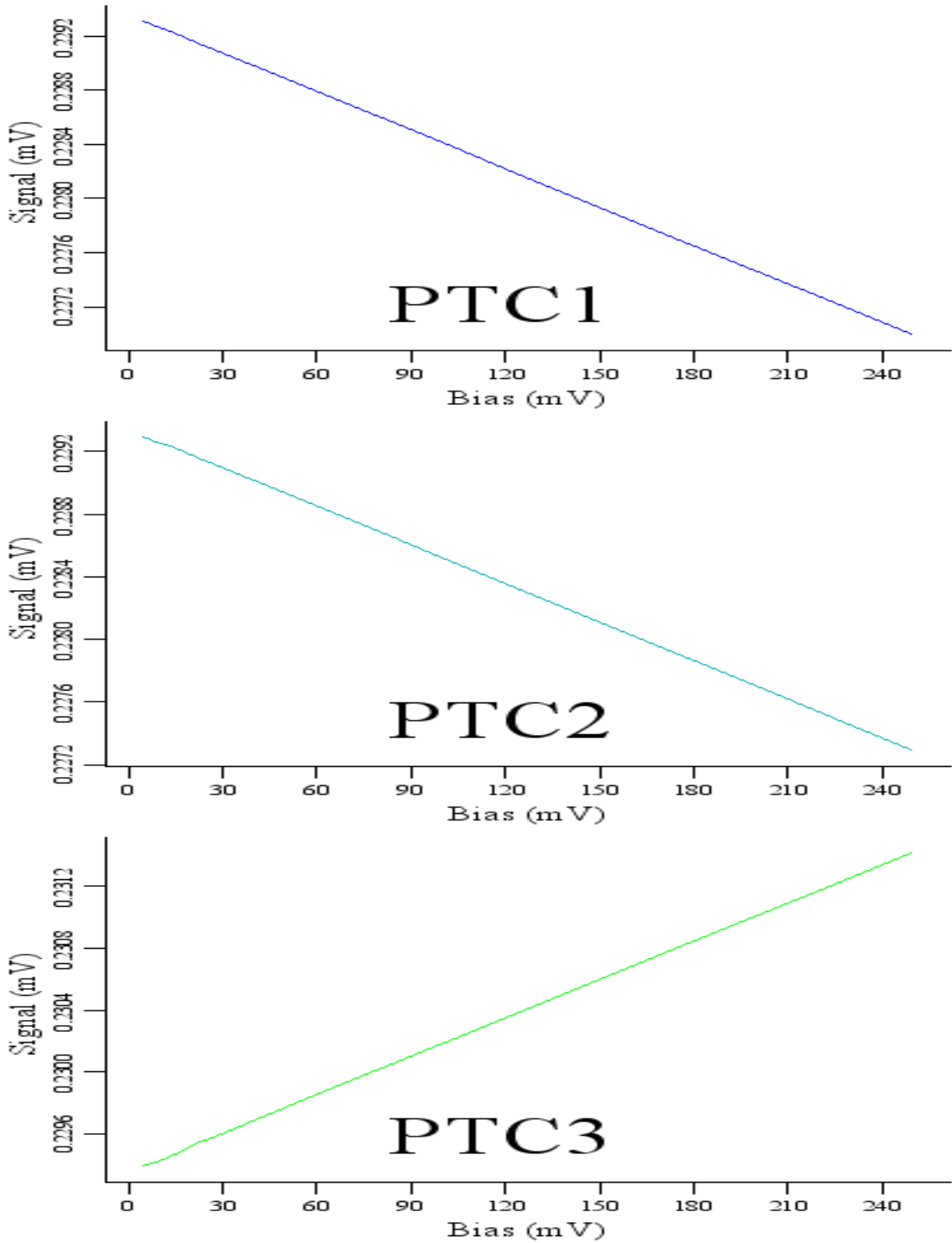
Figure 13. PTC Detectors (1)

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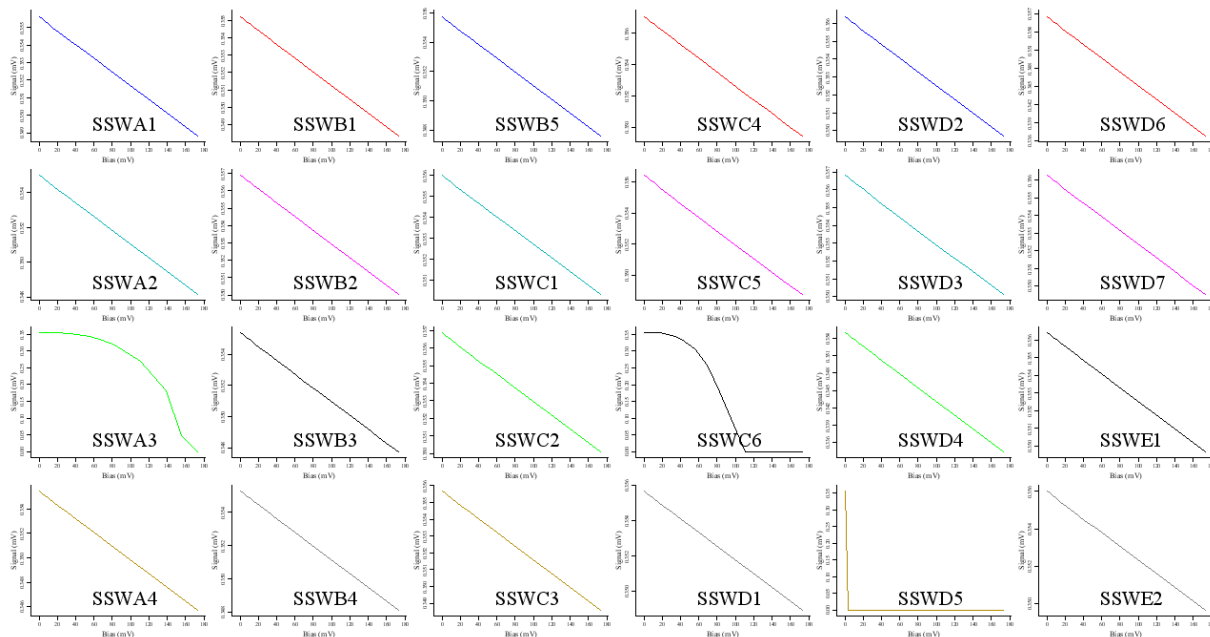Redundant Side
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Figure 14. SSW Detectors (1)
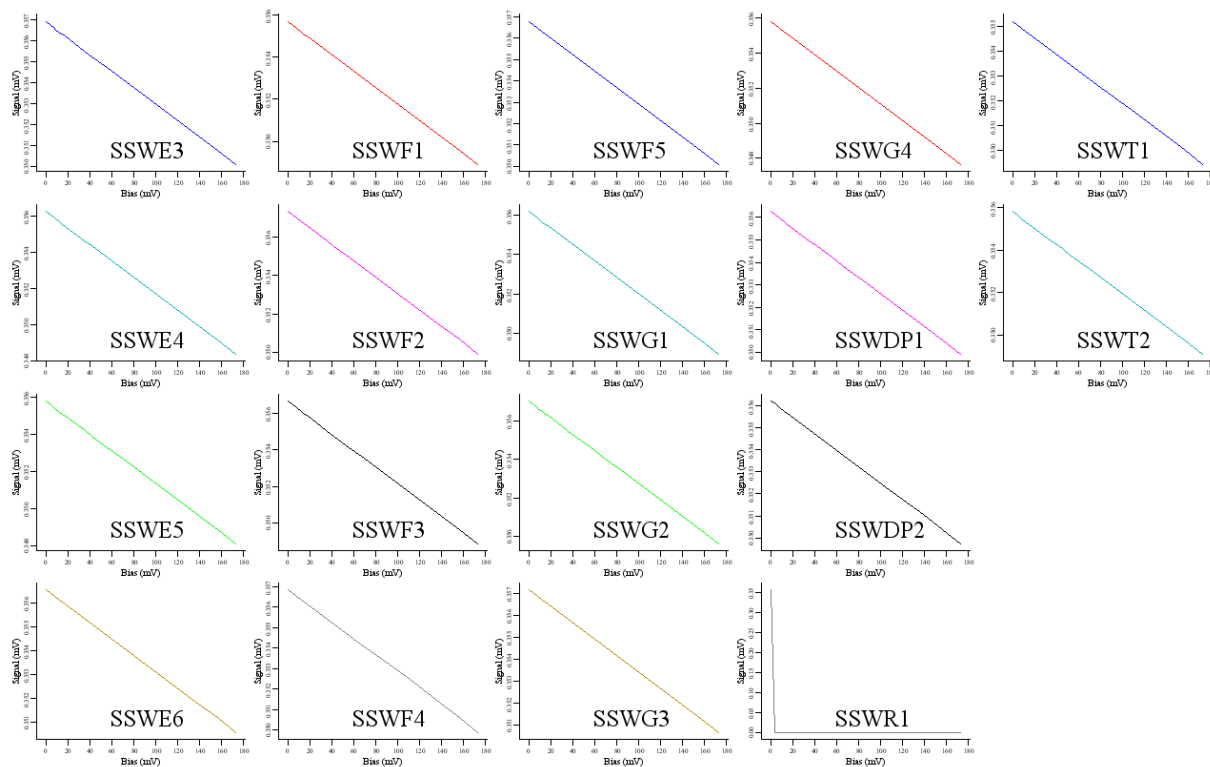
Figure 135. SSW Detectors (2)

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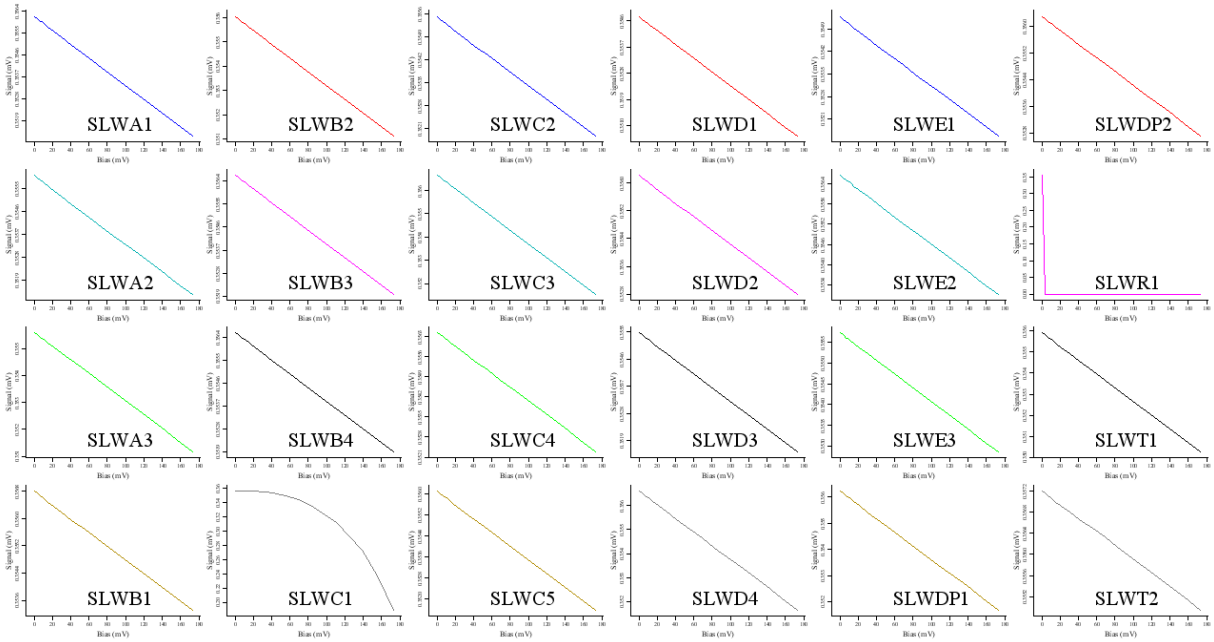| Ref: | SPIRE-RAL-REP-002968 |
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Figure 146. SLW Detectors (1)