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	27th Sept 2007	First version

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2. Functional Tests Configuration

2.1 SPIRE Instrument Configuration (PRIME)

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 (PRIME)

The current EGSE software configuration for the PRIME 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_prime2
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
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=-15.89V** **DPUTEMP = 300K**	✓
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 = 5.24V SCUP9V =9.09V SCUM9V = -9.08V **ALL BIAS VOLTAGES LOOKING GOOD.** BIASP5V = 5.18V BIASP9V = 8.99V BIASM9V= -9.05V BIASTEMP=294.7K	✓
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

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 PRIME 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:

APID	Type	Subtype	SID	FrameID	Frame length
0x508	21	1	0xA20	0x20	0x1E

2. The frame time difference between consecutive SCU frames within these packets corresponds to the sampling rate. Nominal SCU sampling rate is 80Hz ➔ $\Delta t = 12.5$ 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:

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 @: 06:08
OBSID: 0xb00001fc

QLA produced QLA-SCU-01_B00001FC.txt file:

```
**************************************************************************
SCU: OBSID = B00001FC, BBTYPE = 0x8000, APID = 0x508, 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  = 12.49793 ms
sigma = 0.00164 ms
```

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 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**

Start time @: 06:12
OBSID:0xb00001fd
Comments: All RAW SCU DC temperatures are 32768 except EMCFILTTEMP which is 35671

QLA script produced the file FUNC-SCU-03_B00001FD.txt:

```
SCU-03 Thermometry Check
OBSID = 0xb00001fd

PUMPHTRTEMP  54.11   32768
PUMPHSTEMP   37.26   32768
EVAPHSTMP    36.90   32768
SHUNTTEMP    18.71   32768
EMCFILTMP    287.11  35671
SL0TEMP      19.72   32768
PL0TEMP      20.33   32768
OPTTEMP      154.06  32768
BAFTEMP      181.37  32768
BSMIFTEMP    98.86   32768
SCAL2TEMP    161.08  32768
SCAL4TEMP    156.52  32768
SCALTEMP     83.34   32768
SMECIFTEMP   137.97  32768
SMECTEMP     26.54   32768
BSMTEMP      12.80   32768
```

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 CCS.	
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	
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 @: 06:20
OBSID:0xb00001fe
Comments: OK

SUBKTEMP:
Before: RAW = 32756
After : RAW = 32747-32749

QLA output file:

```
SCU-06
Start time @: 26-Sep 06:20:03
End time @: 26-Sep 06:20:17
OBSID: 0xB00001FE

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

SUBKTEMP
RAW value before: 32757

RAW value after: 32749
Converted after: 271248 mK
```

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 @: 06:26
OBSID: 0xb00001ff

Comments:

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

QLA produced QLA-SCU-02_B00001FF.txt file:

```
FUNC-SCU-02 version: 1.5

Housekeeping @  Wed Sep 26 06:26:47 UTC 2007
SCU Science @ Wed Sep 26 06:26:43 UTC 2007

 Name           HSK value  SCU value     Equal (within 10 raw units)?
TCHTRV          21.0       20.0          True
PCALCURR        10.0       10.0          True
SCAL4CURR       10.0       11.0          True
SCAL2CURR       11.0       12.0          True
PCALV           11.0       11.0          True
SCAL4V          11.0       11.0          True
SCAL2V          11.0       11.0          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      35670.0    35667.0       True
SL0TEMP         32768.0    32768.0       True
PL0TEMP         32768.0    32768.0       True
OPTTEMP         32768.0    34679.0       False
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        32747.0    32747.0       True
```

OPTTEMP, the highlighted thermometry channel, showed the same discrepancy on the prime side in ILT between the nominal HK and SCU science packet values. The channel is noisy and the instantaneous HK and science values can differ by as much as ~300 raw units.

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 / 0.1013 mA 0 / 0.0217 V	**N/A**	**Success**

Start time @: 07:33
OBSID:0xB0000200

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 / 0.1016 mA 0 / 0.0509 V 0 / 0.1014 mA 0 / 0.05 V	**N/A**	**Success**

Start time @: 06:37
OBSID:0xb0000201
Comments:

Test Successful

4.7 FUNC-SCU-07: SCU Cooler Heater Check

Test Id:	**FUNC-SCU-07: SCU Cooler Heater Check**
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 / 324.59mV 0.1554 / 324.3 mV 0.0042 / 8.8552 V	**N/A**	Success

Start time @: 06:40

OBSID:0xb0000162
Comments: The SFT script, rather than the WFT script, for SCU-07 was run from the CCS by mistake.
It means we have two 0xb0000162 OBSIDs in the DB

The WFT was run next.

Start time @: 06:46
OBSID:0xb0000202
Comments: The WFT script was run this time

SPHSV 324.59mV
EVHSV 324.3 mV
SPHTRV 8.8552 V

Test Successful

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** 0x508 | 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**

Start time @: 06:53
OBSID:0xb0000203

Comments: TM5N 3 -> 5

QLA has written file FUNC-SCU-08_B0000203_8A07.txt:

SCU Test Pattern @ Wed Sep 26 06:53:09 UTC 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	0xB0000203	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	4063019.0	4141131.0	4284236.0		4362348.0	
SCUTSTCHECKWORD	40147.0	47880.0	15560.0		6994.0	

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**	- / 5.01V - / 15.54V - / 14.15V - / -14.47 V - / -15.63 V - / 291.26K - / 296.25K - / 296.0 K	**N/A**	**Success**

Start time @: 06:58
OBSID:0xb0000204

Comments:

MCUBITSTAT went from 0 to 1 as expected

Test Successful

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.	**0x508**	**21**	**3**	**0x814**	**0x14**	**0x15**
BSM	**0x508**	**21**	**1**	**0x612**	**0x12**	**0xD**
SMEC	**0x508**	**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 @: 07:02
OBSID:0xb0000205

QLA generated file QLA-MCU-02_B0000205.txt :

```
**************************************************************************
MCUENG: OBSID = B0000205, BBTYPE = 0x8901, APID = 0x508, 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      16.4225    16.4225                            Frame ID  = 0x14
                                                             Frame Len = 0x15
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 16.42245 ms
sigma = 0.00101 ms


**************************************************************************
BSM: OBSID = B0000205, BBTYPE = 0x8903, APID = 0x508, 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      15.5778    15.5809                            Frame ID  = 0x12
                                                             Frame Len = 0xD
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 15.58028 ms
sigma = 0.00119 ms


**************************************************************************
SMEC: OBSID = B0000205, BBTYPE = 0x8902, APID = 0x508, 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  = 4.21089 ms
sigma = 0.00095 ms


**************************************************************************
SMEC+BSM: OBSID = B0000205, BBTYPE = 0x8904, APID = 0x508, 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  20.2146  20.2143                              Frame ID = 0x12, Len = 0xD

STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 10.74008 ms (SMEC), 20.21226 ms (BSM)
sigma = 323.24453 ms (SMEC), 0.00151 ms (BSM)
```

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: 2. No events are generated during the different frames generation. 3. QLA analysis results are correct. QLA to give go ahead.

Frame	APID	Type	Subtype	SID	FrameID	Frame length
Eng.	**0x508**	**21**	**3**	**0x814**	**0x14**	**0x15**
BSM	**0x508**	**21**	**1**	**0x612**	**0x12**	**0xD**
SMEC	**0x508**	**21**	**1**	**0x410**	**0x10**	**0xC**
BSM +SMEC						

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 @: 07:08
OBSID:0xb0000206

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

QLA produced three files: QLA-MCU-03_B0000206_8901.txt (SMEC), QLA-MCU-03_ B0000206_8902.txt (MCU Eng) and QLA-MCU-03_ B0000206_8903.txt (BSM).

No discrepancies between HK and science parameter values.

Housekeeping Wed Sep 26 07:09:23 UTC 2007
Science Wed Sep 26 07:09:23 UTC 2007

Name	HK before	Science	HK after	Equal (within 10%)?
SMECENCSIG1	12406.0	12408.0	12404.0	True
SMECENCSIG2	20072.0	20072.0	20071.0	True
SMECLVDTDCSIG	32758.0	32760.0	32758.0	True
SMECLVDTACSIG	27347.0	27346.0	27346.0	True
SMECMOTORCURR	32776.0	32776.0	32774.0	True
SMECMOTORVOLT	34538.0	34539.0	34542.0	True
CHOPSENSSIG	32765.0	32764.0	32765.0	True
CHOPMOTORCURR	32776.0	32776.0	32776.0	True
CHOPMOTORVOLT	33649.0	33643.0	33652.0	True
JIGGSENSSIG	32754.0	32753.0	32753.0	True
JIGGMOTORCURR	32774.0	32775.0	32772.0	True
JIGGMOTORVOLT	33364.0	33369.0	33364.0	True

Housekeeping Wed Sep 26 07:09:40 UTC 2007
Science Wed Sep 26 07:09:40 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	32760.0	32758.0	True
SMECMOTORBEMF	1772.0	1769.0	1771.0	True

Housekeeping Wed Sep 26 07:09:55 UTC 2007
Science Wed Sep 26 07:09:55 UTC 2007

Name	HK before	Science	HK after	Equal (within 10%)?
CHOPSENSSIG	32763.0	32766.0	32765.0	True
CHOPDACVAL	32768.0	32768.0	32768.0	True
CHOPMOTORVOLT	33645.0	33644.0	33645.0	True
JIGGSENSSIG	32756.0	32756.0	32754.0	True
JIGGDACVAL	32768.0	32768.0	32768.0	True
JIGGMOTORVOLT	33360.0	33361.0	33371.0	True

No discrepancies between HK and science parameter values.

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: 2. MCU Test pattern produced is the same as the previous time this test was run. QLA to give go ahead.

Frame	APID	Type	Subtype	SID	FrameID	Frame length
Test	**0x508**	**21**	**3**	**0x915**	**0x15**	**0x15**

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 @: 07:13
OBSID:0xb0000207

Comments:

Produced 99 frames instead of 100 as expected.

QLA generated file QLA-MCU-04_ B0000207_8905.txt:

```
MCU Test Pattern @ Wed Sep 26 07:13:19 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        0xB0000207         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      3755035.0          3857807.0          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        3755509.0          3858281.0          3994925.0                4097699.0
MCUTSTCHECKWORD    61981.0            61717.0            62861.0                  61848.0
```

Comparison successful

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/0x700** **~0x8000** **0/1** **3/3** **0x8000/0x8000** **0xBEB/0xF6E** **~0x8000/?**	0/1 3/3 0x8000/0x8000 0xBEB/0x770 ~0x7FFD/~0x8EE8 0/1 3/3 0x8000/0x8000 0xBEB/0xF6E 0x7FF2/~ 0x8EFA	N/A	**Success**

Start time @: 07:18
OBSID:0xb0000208

Comments:

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

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:

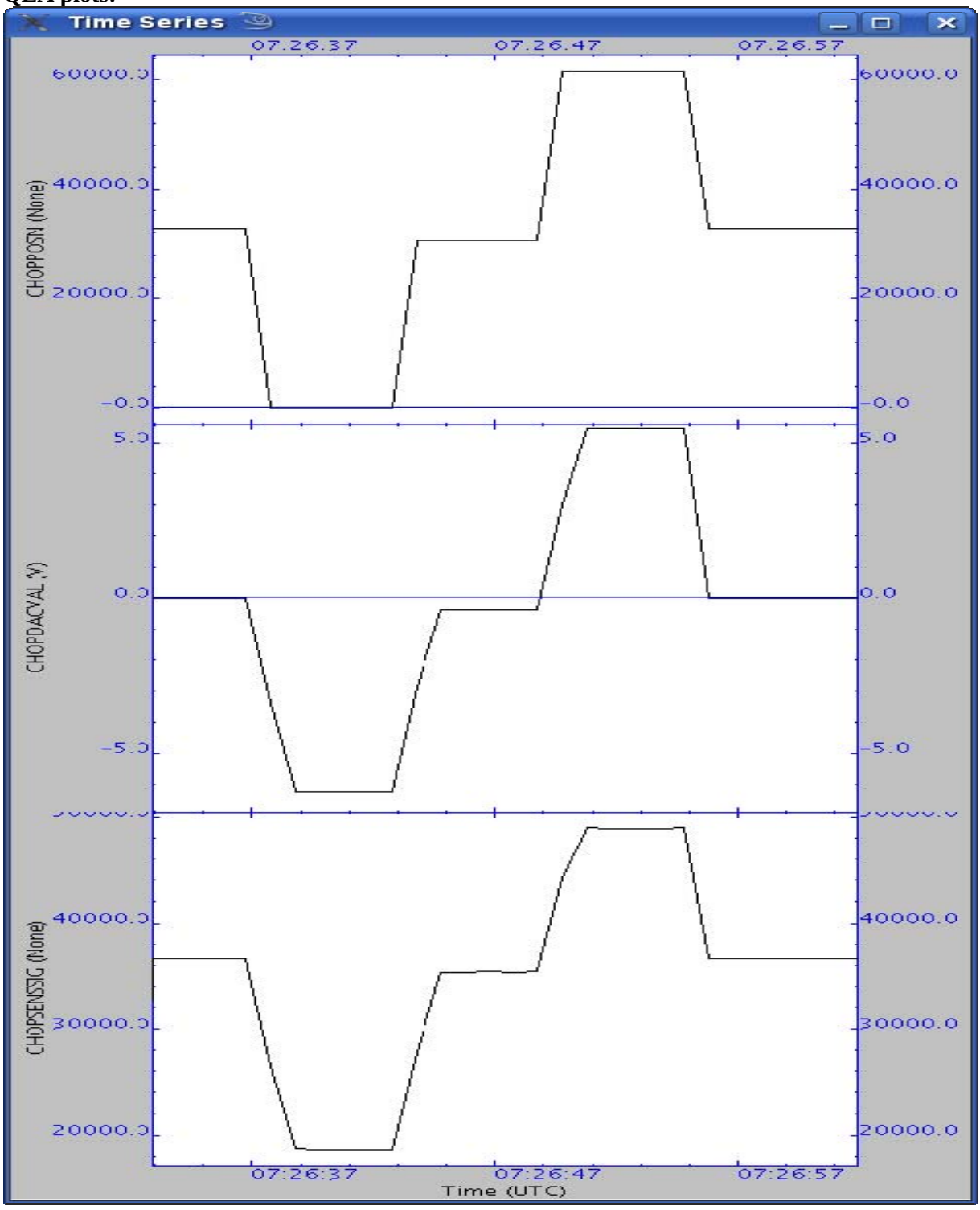
Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-02C	**CHOPDACVAL** **CHOPSENSSIG**		See below	**N/A**	**Success**

Start time @: 07:25
OBSID:0xb0000209

Comments:

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

QLA plots:



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:

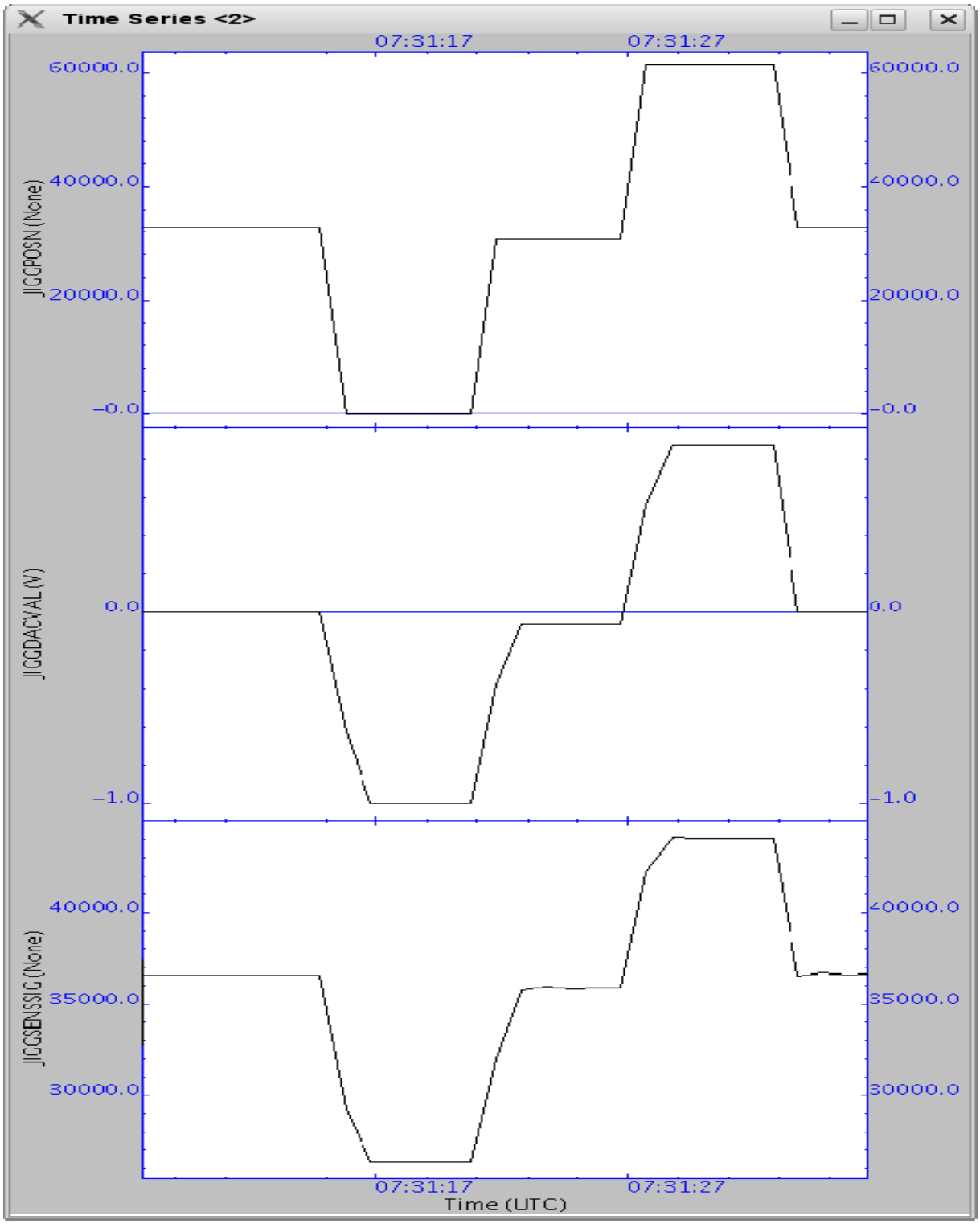
Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-02J	**JIGGDACVAL JIGGSENSSIG**		See below	**N/A**	**Success**

Start time @: 07:29
OBSID:0xb000020a

Comments:

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

QLA plots:



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**

Start time @: 07:35

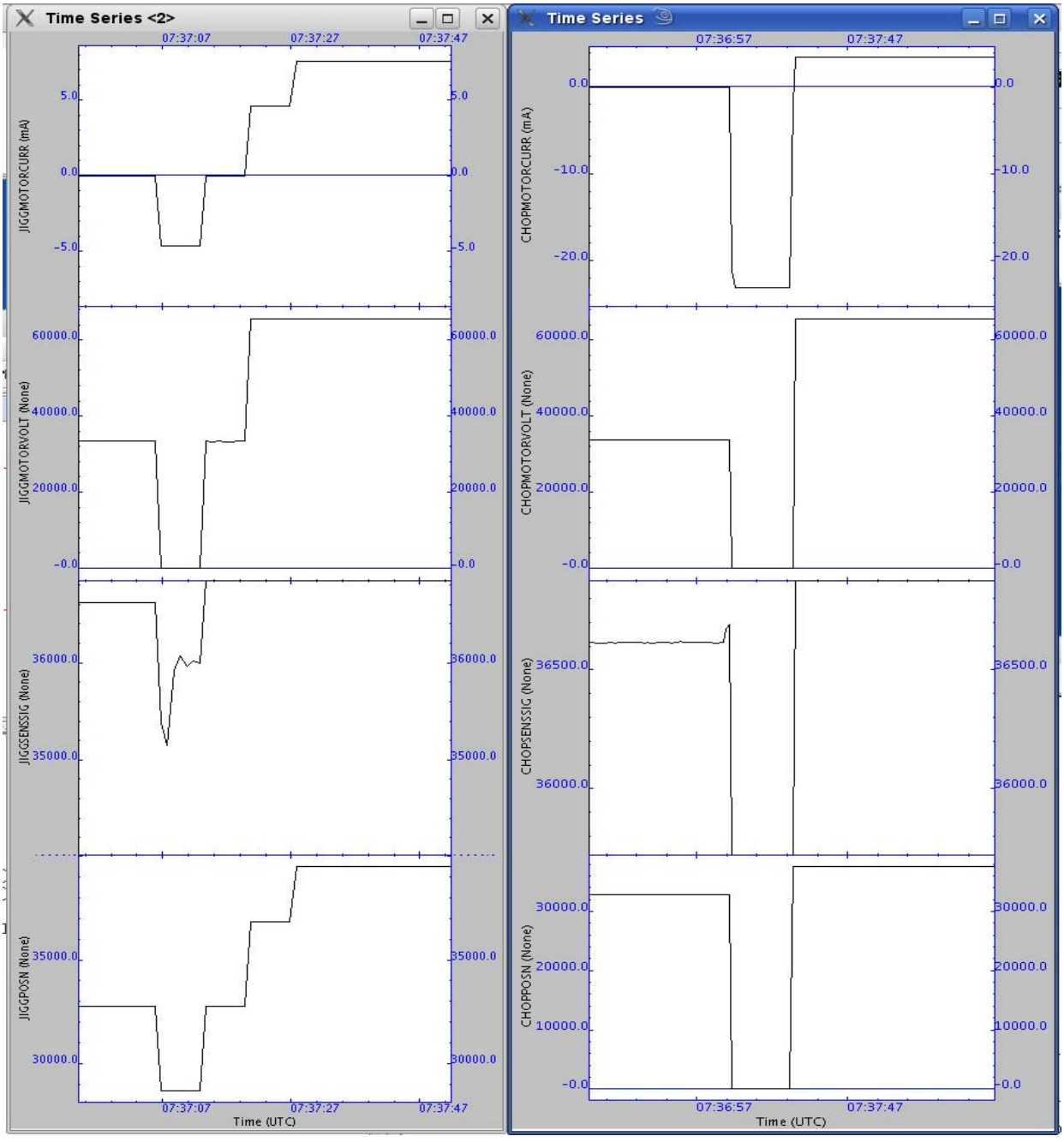
OBSID:0xb000020b

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.



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
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open
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:

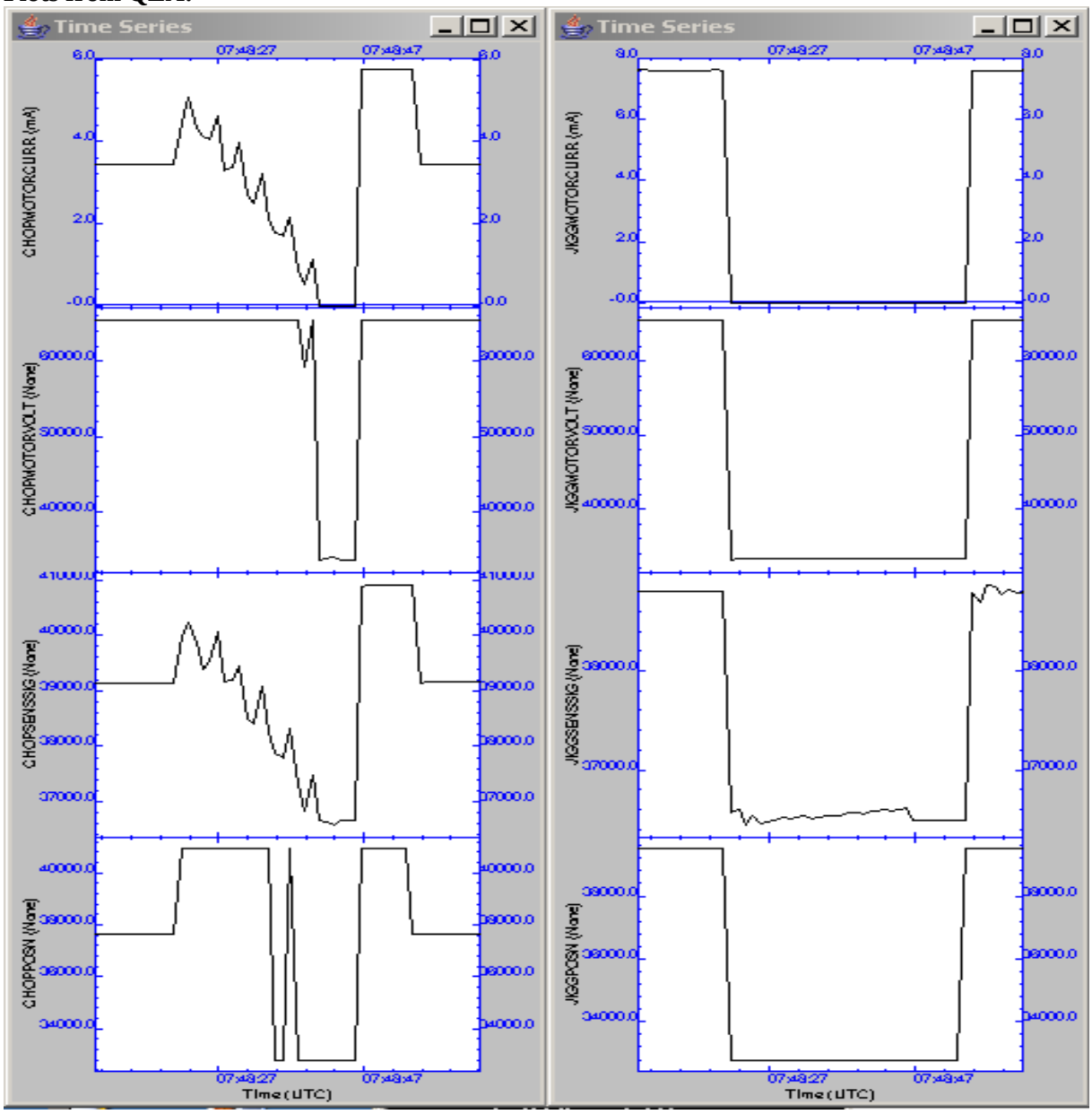
Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-05A				**N/A**	**Success**

Start time @: 07:46
OBSID:0xb000020c

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

Plots from QLA:



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
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open
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**	**Success**

Start time @: 07:53
OBSID:0xb000020d

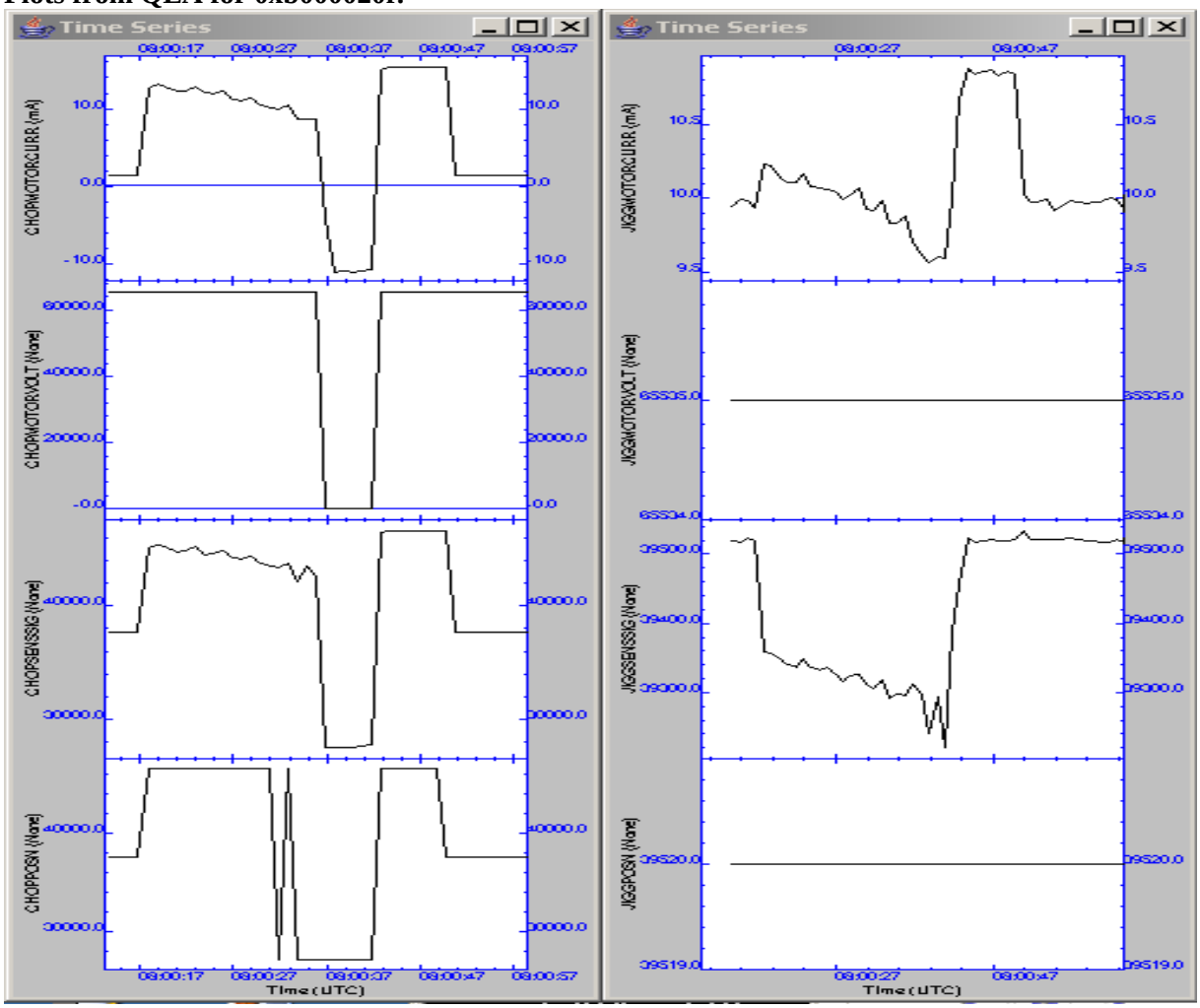
Comments:
The CCS did not run BSM_INIT before running BSM-05B

07:57 BSM_INIT
OBSID:0xb000020e
CHOPLOOPMODE 3 to 1
JIGGLOOPMODE 3 to 1

07:59 BSM-05B
OBSID:0xb000020f

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 0xb000020f:



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
Final Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON + BSM ON (open
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:

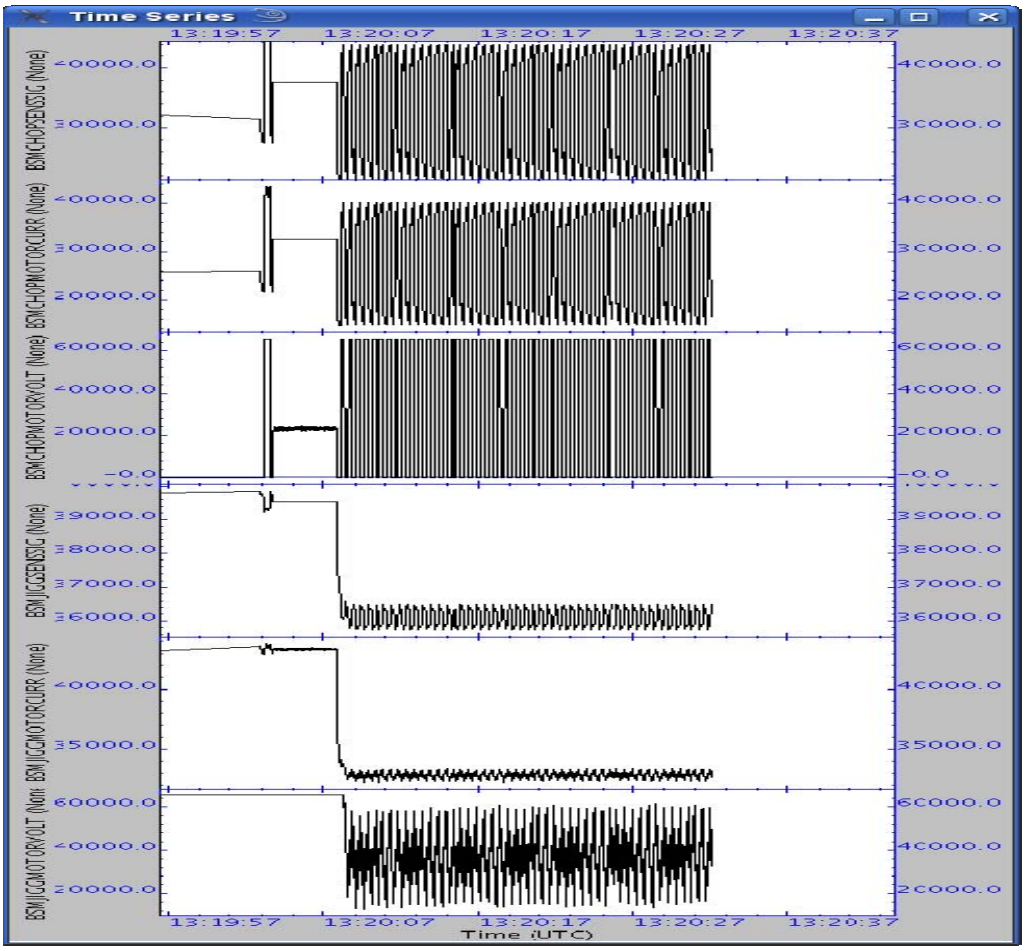
Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-06				N/A	Success

Start time @: 08:04
OBSID:0xb0000210

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:



CCS report an unknown TM(21,4) packet for APID 0x1288 08:06:06.

Events during this test:

1) ERROR_FIFO_MCU_FID_ID – wrong frame ID for MCU frame error event

Wed Sep 26 08:05:33 UTC 2007 0d00 ddb7 001d 0005 0100 5d8c 716e 5690 2579 5105 b000 0210 8110 0001 0183 0042 0001 3715

2) ERROR_FIFO_DCU_FLEN_PSW_ID – wrong frame length for a PSW DCU frame event

Wed Sep 26 08:05:33 UTC 2007 0d00 ddb8 001f 0005 0100 5d8c 716e 5a20 2542 5106 b000 0210 8110 0001 0184 0042 0012 000d 70ab

3) ERROR_FIFO_MCU_FID_ID – wrong frame ID for MCU frame clear event

Wed Sep 26 08:05:39 UTC 2007 0d00 ddbc 001d 0005 0100 5d8c 7174 0886 a579 5105 b000 0210 8110 0001 0185 0012 0001 08d1

4) NO_DCU_RES _DCU response error and clear events

Wed Sep 26 08:05:50 UTC 2007 0d00 ddc3 001d 0005 0100 5d8c 717f 5761 0520 510e b000 0210 8110 0001 0186 8c36 0000 c32b

Wed Sep 26 08:05:50 UTC 2007 0d00 ddc4 001d 0005 0100 5d8c 717f 5a5c 8520 510e b000 0210 8110 0001 0187 8c36 0000 1cc6

Post Test Comments: The unknown TM(21,4) packets seen by the CCS were later discovered to be MCU transparent mode science data packets. Transparent packets are generated by the DPU whenever it reports DRCU frame id, length or checksum errors.

- **The definitions of these transparent packets are missing in the SPIRE Data ICD and the MIB (SPIRE system problem report SPR-0619 raised).**
- **The DRCU frame and response errors are being tracked through NCR HR-SP-RAL-NCR-174.**

BSM_OFF:

Start time @: 08:13

OBSID: 0xb0000211

CHOP/JIGGLOPPMODE 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: 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.
0x504	**21**	**1**	**0x200**	**0**	**PF**	**100**	**100**
0x506	**21**	**1**	**0x201**	**1**	**SF**	**100**	**17**
0x504	**21**	**2**	**0x102**	**2**	**PSW**	**100**	**34**
0x504	**21**	**2**	**0x103**	**3**	**PMW**	**100**	**25**
0x504	**21**	**2**	**0x104**	**4**	**PLW**	**100**	**12**
0x506	**21**	**2**	**0x105**	**5**	**SSW**	**100**	**12**
0x506	**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-06**	1600 / 2300	700	**Success**

Start time @: 08:29
OBSID:0xb0000212
Comments: CCS cannot carry out step 2 of the DCU-01 as they cannot see science packets on their system in the new version

Events recd during test:

```
Wed Sep 26 08:29:52 UTC 2007 0d00 e137 0027 0005 0100 5d8c 7721 a73a 0512 5117 b000
0000 8000 0000 019a 5d8c 771f a731 81f9 8095 80c8 5549 bb16
Wed Sep 26 08:31:36 UTC 2007 0d00 e206 001f 0005 0100 5d8c 7789 73fb a542 5106 b000
0212 8802 0001 01aa 0002 0096 0096 b4c2
```

QLA created file QLA-DCU-01_B0000212.txt:

```
**************************************************************************
PHOTF: OBSID = B0000212, BBTYPE = 0x8800, APID = 0x504, SID  = 0x200
_____________________________________________________________________________
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT     1600       1700       100        100          Packet type = 0x15
TM3N            1599       1699       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  = 65.22795 ms
sigma = 0.00142 ms


**************************************************************************
PHOTSW: OBSID = B0000212, BBTYPE = 0x8802, APID = 0x504, SID  = 0x102
_____________________________________________________________________________
Parameter       Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT     1700       1800       100        100          Packet type = 0x15
TM3N            1699       1733       34         34           subtype = 0x2
FrameTime       65.2256    65.2288                            Frame ID  = 0x2
                                                              Frame Len = 0x96
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
```

```
mean  = 65.22795 ms
sigma = 0.00142 ms


************************************************************************
PHOTMW: OBSID = B0000212, BBTYPE = 0x8803, APID = 0x504, SID  = 0x103
________________________________________________________________________
Parameter      Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT    1800       1900       100        100          Packet type = 0x15
TM3N           1733       1758       25         25           subtype = 0x2
FrameTime      65.2288    65.2288                            Frame ID  = 0x3
                                                             Frame Len = 0x66
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 65.22796 ms
sigma = 0.00142 ms


************************************************************************
PHOTLW: OBSID = B0000212, BBTYPE = 0x8804, APID = 0x504, SID  = 0x104
________________________________________________________________________
Parameter      Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT    1900       2000       100        100          Packet type = 0x15
TM3N           1758       1770       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  = 65.22797 ms
sigma = 0.00141 ms


************************************************************************
SPECF: OBSID = B0000212, BBTYPE = 0x8801, APID = 0x506, SID  = 0x201
________________________________________________________________________
Parameter      Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT    2000       2100       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  = 12.49263 ms
sigma = 0.00073 ms


************************************************************************
SPECSW: OBSID = B0000212, BBTYPE = 0x8805, APID = 0x506, SID  = 0x105
________________________________________________________________________
Parameter      Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT    2100       2200       100        100          Packet type = 0x15
TM4N           16         28         12         12           subtype = 0x2
FrameTime      12.4928    12.4928                            Frame ID  = 0x5
                                                             Frame Len = 0x36
STATISTICS ON TIME BETWEEN RECEPTION OF 2 CONSECUTIVE FRAMES:
mean  = 12.49262 ms
sigma = 0.00076 ms


************************************************************************
SPECLW: OBSID = B0000212, BBTYPE = 0x8806, APID = 0x506, SID  = 0x106
________________________________________________________________________
Parameter      Initial    Final     Increment Expect Incre. Packet Chars.

DCUFRAMECNT    2200       2300       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  = 12.49264 ms
sigma = 0.00071 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 → Δt ~ 65.5 ms 2. Spectrometer Sampling rate is 80Hz → Δt = 12.5 ms

Test Procedure:

Step#	Action	Comments
1	Write the current value of DCUFRAMECNT located d in DCU	
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+1400**	2300 / 3000	700	**Success**

Start time @: 08:36
OBSID: 0xb0000213

Comments:

QLA script produced 7 files, QLA-DCU-02_B0000213_800<n>.txt – where n=0 to 6

Contents of QLA created files show sampling times to be consistent with 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	
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**	3000 / 3100	100	**Success for PF** **Failure for SF**

Start time @: 08:41
OBSID: 0xb0000214

Comments:

File produced by QLA:
QLA-DCU-03_B0000214_8807.txt – DCU Photometer Test Pattern
Test pattern file shows agreement with reference DCU test pattern file – see Annexe 1

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.

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:

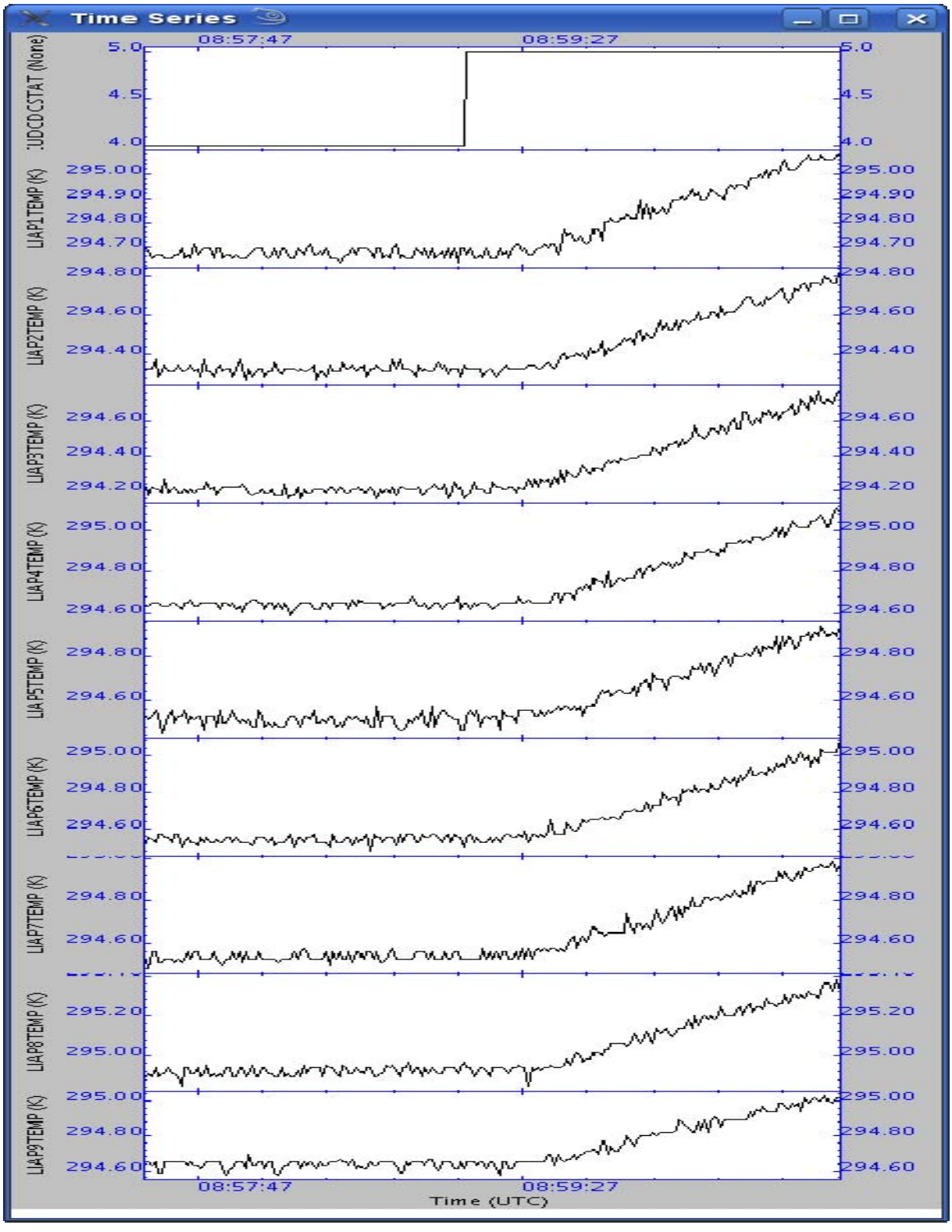
Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-04-PHOT	**SCUDCDCSTAT** **PLIAP5V** **PLIAP9V** **PLIAM9V** **LIAP1TEMP to LIAP9TEMP**	**4/5** **0/~ +5V** **0/~+11V** **0/~-11V** **N/A/ [290-300]K**	**4/5** 0/+5.23V 0/+11.58V 0/-11.58V ~294/warming up		**Success**

Start time @: 08:57
OBSID: 0xb0000215

Comments: PLIABITSTAT 0 to 1

Photometer LIAs switched on OK

Output plot from QLA script:



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. PMLWJFETVSS1/2/3/4 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**

Start time @: 09:05
OBSID: 0xb0000216

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**	**Partial success**

Start time @: 09:14
OBSID: 0xb0000217

Comments:

Science TM seen on Packet Display well before QLA Photometer Array Displays – may or may not be a problem

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.

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

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

Start time @: 09:37
OBSID: 0xb0000218

Detectors settings:
Bias frequency: 197.3Hz
Sampling frequency: 15.1 Hz
PSW phase: 0.0 deg
PMW phase: 0.0 deg
PLW phase: 0.0 deg
PSW bias : ~ 31mV
PMW bias : ~ 31mV
PLW bias : ~ 31mV
TC bias : ~ 127.6 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: 0xb0000219

Start time @: 09:48

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.	

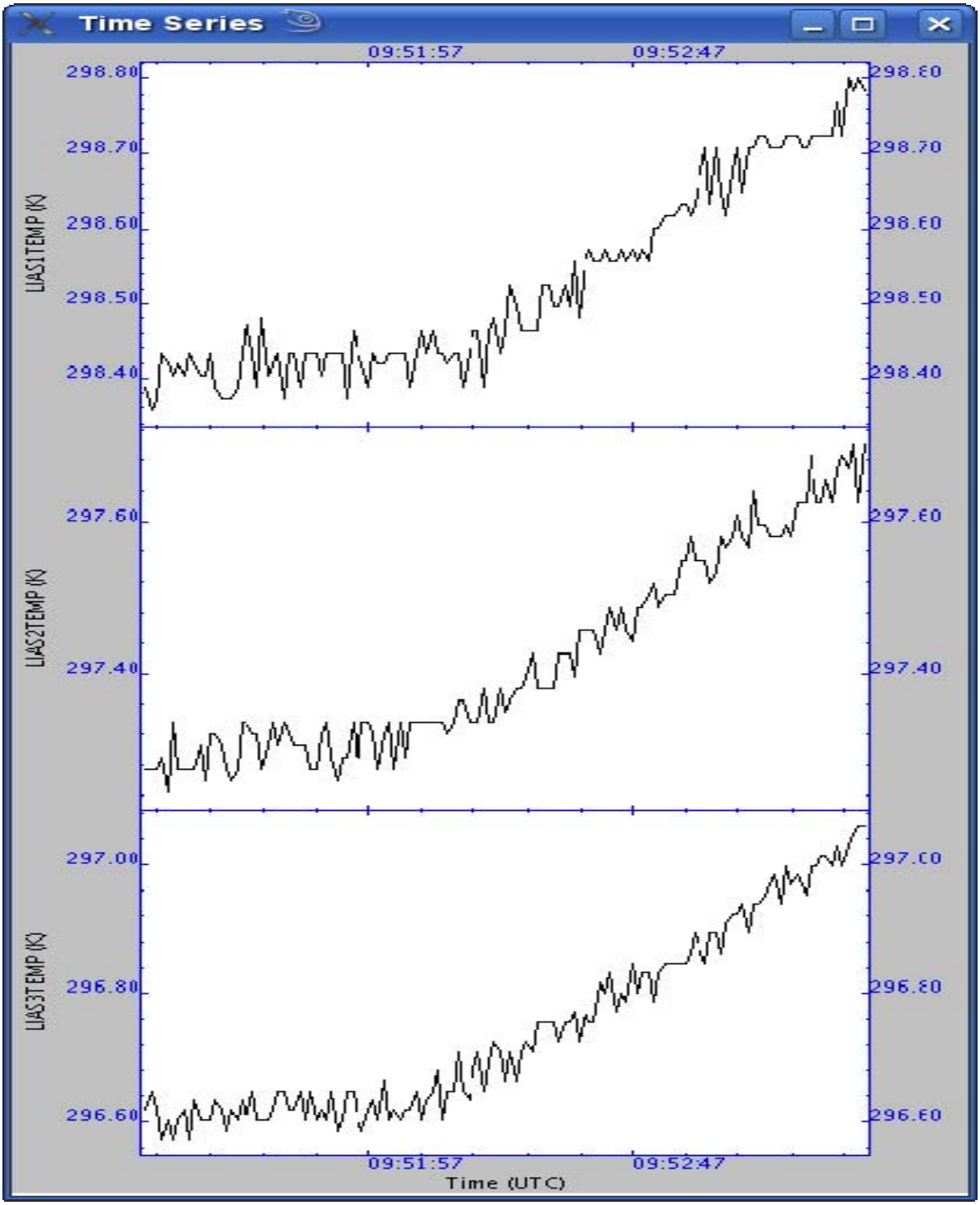
Test Log:

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** **LIA1/2/3TEMP**	**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/-11.56 /~297-298K warming up		**Success**

Start time @: 09:51
End time @:
OBSID: 0xb000021A

Comments: SLIABITSTAT 0 to 1

Spectrometer LIAs switched ON correctly



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, SLIAN9V, 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**	**Success**

Start time @: 09:57
OBSID: 0xb000021b

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

Notes:
SSW: D5 unresponsive
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

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 @: 09:57
OBSID: 0xb000021c

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 shows different behaviour than the rest of the pixels.
Generally all (SSW/SLW) pixels looking responsive. See Annexe 2 for detailed results.

CCS reported TC Ack problems for a Set BBID and a DRCU command – seems to be a sync problem on the CCS (TBC).

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 @: 10:22
OBSID: 0xb000021d

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: 0xb000021e
Start time @: 10:29

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:

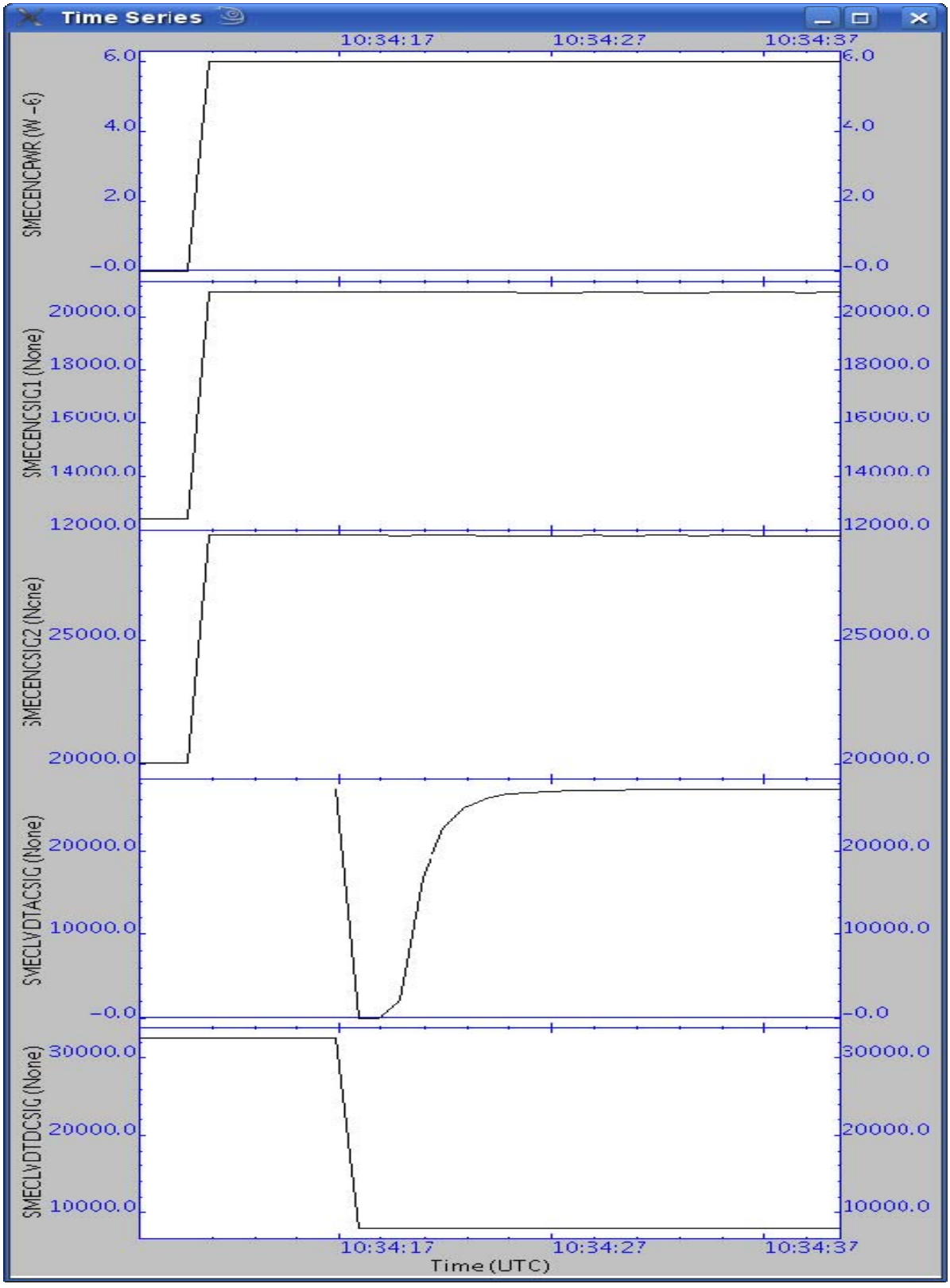
Step#	Action	Comments
0	Open **SMEC PARAMETERS display** on SCOS Alpha Numeric Displays.	
1	On QLA bring up a display of the following HK parameters: SMECENCPWR SMECENCSIG1AMP SMECENCSIG2AMP SMECLVDTDCSIG SMECLVDTACSIG	
2	Run FUNC-SMEC-01 test procedure from the CCS	
	Contingency: If test fails repeat 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** **-/0x57E4** **Changes** **0/0** **-/0x6D60**	0/6 0/1 ~0x307C/~0x51C0 0/0 0xCE20/0x57E4 ~0x4E6B/~0x7245 0/0 0xCE20/0x6D60	**N/A**	**Success**

Start time @: 10:33
OBSID: 0xb000021f

Comments:



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**

Start time @: 10:37
OBSID: 0xb0000220

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	~0x51B0	~0x7237
7	~0x7D35	~0x9D81

SMEC_OFF:
Start time @: 10:44
OBSID: 0xb0000221

MCU_OFF:
Start time @: 10:46
OBSID: 0xb0000222

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

SCU_OFF:
Start time @: 10:48
OBSID: 0xb0000223

DRCU_OFF:
Start time @: 10:52
OBSID: 0xb0000223

The OBSID does not get reset to 0xb0000000

DPU_OFF:
Start time @: 11:00

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

Start time:
OBSID:

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

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					**Not done**

Start time @:
OBSID:

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

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.

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**

Start time @:
OBSID:
Comments:

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

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**

Start time:
OBSID:

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

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 only if the SMECMOTORCURR shows a variation indicating 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.

5. ANNEXE 1 (DCU TEST PATTERN DATA)

DCU Test Pattern @ Wed Sep 26 08:43:57 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	0xB0000214	0xB0000214	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
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
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
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	8206034.0	8613709.0	1.0253174E7	<--BAD	1.0589166E7	<--BAD
PHOTFTSTCHECKWORD	52914.0	38867.0	35831.0		27474.0	
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 B0000217 for photometer and B000021C for spectrometer. For all the photometer load curves the first anomalous point has been removed from the plots.

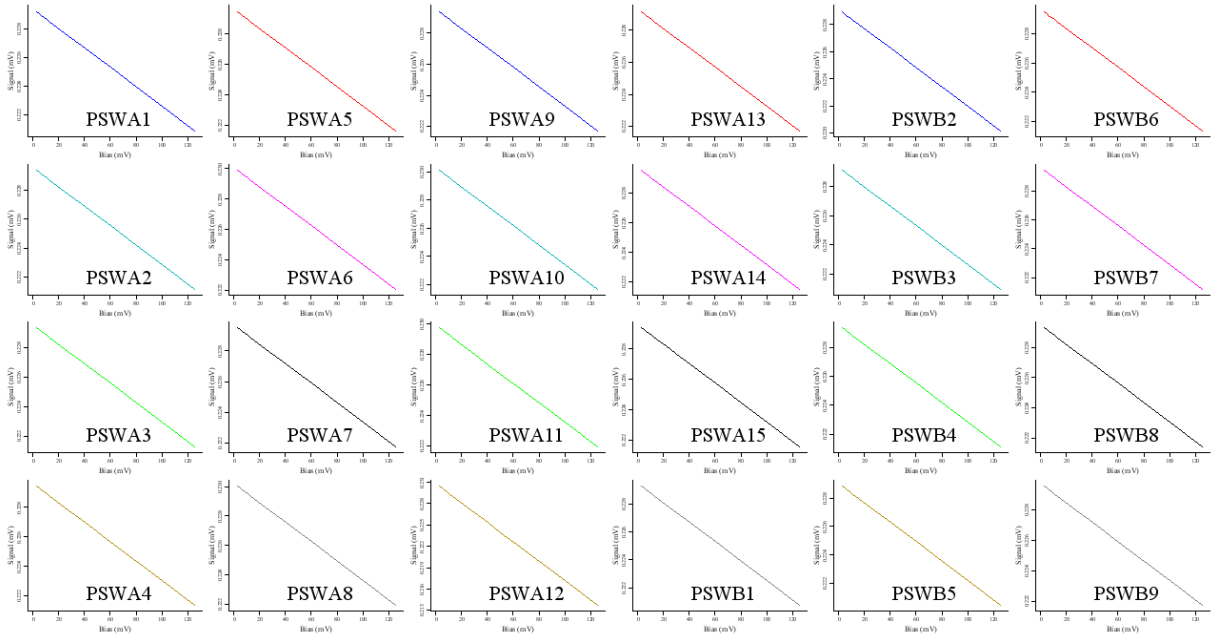


Figure 1. PSW Detectors (1)

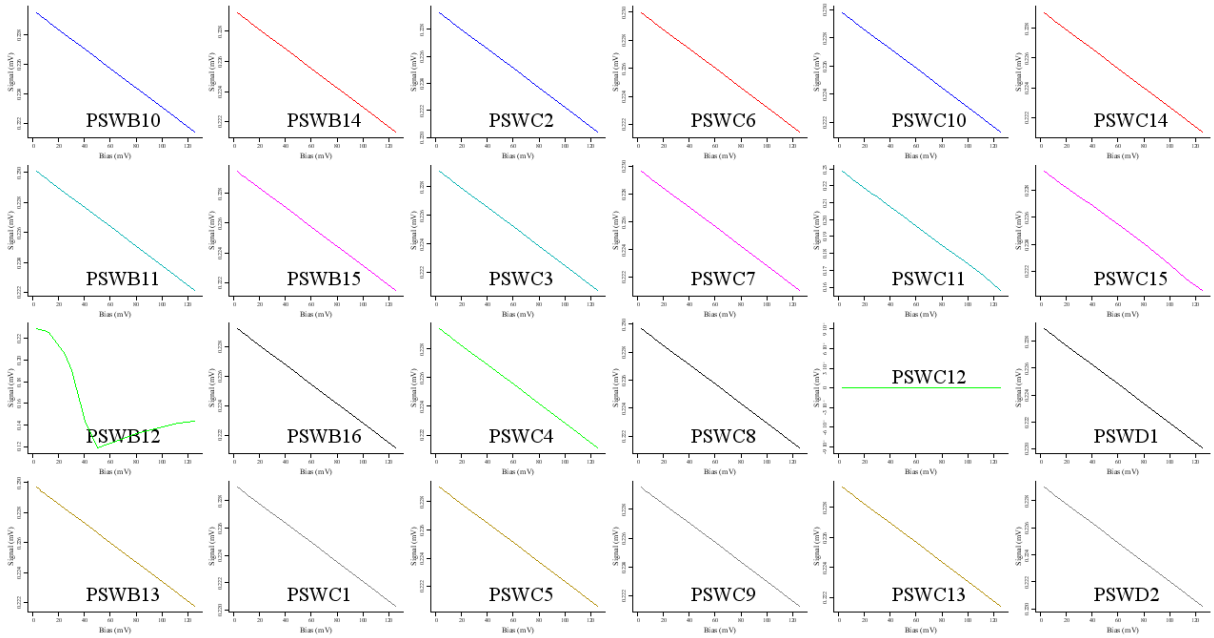


Figure 2. PSW Detectors (2)

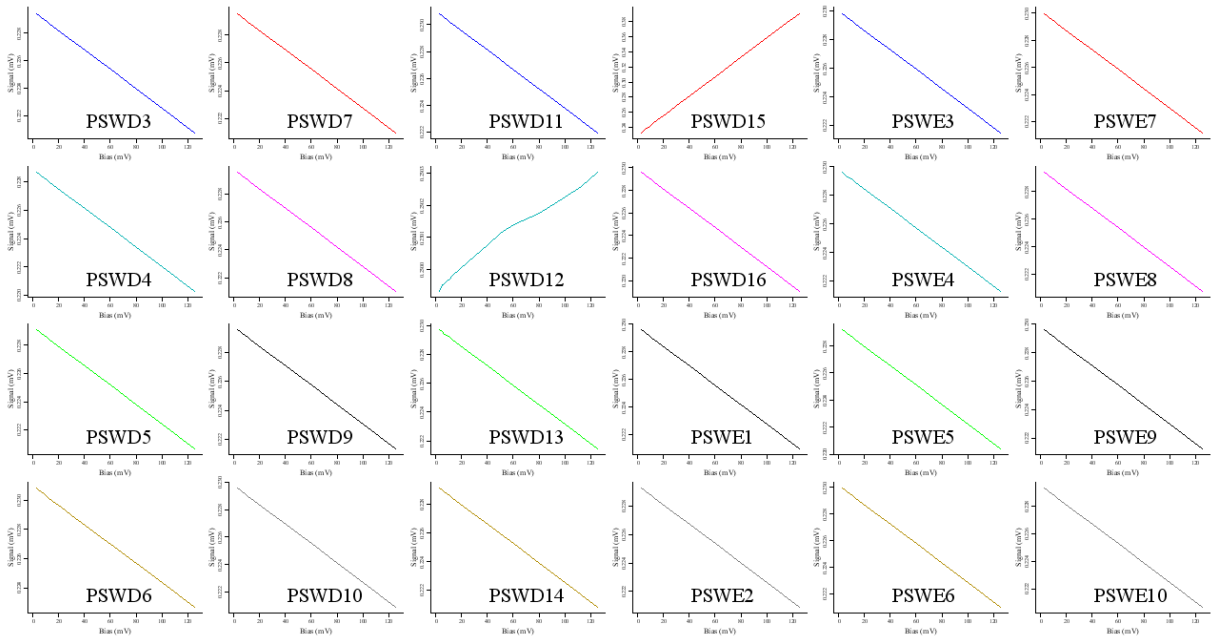


Figure 3. PSW Detectors (3)

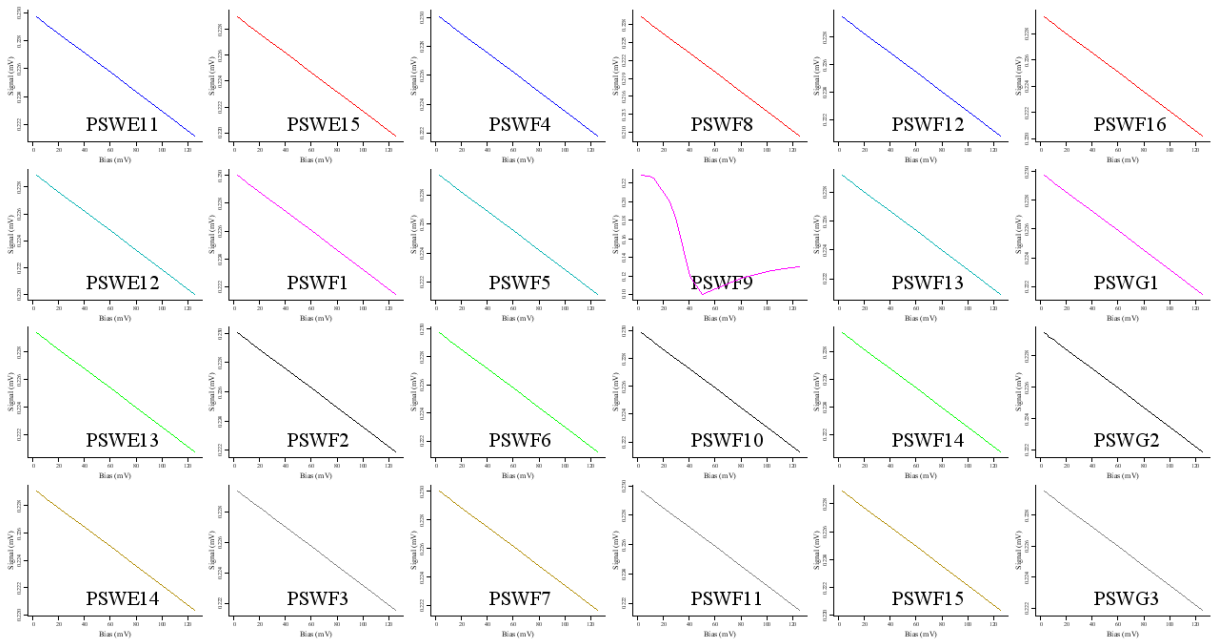


Figure 4. PSW Detectors (4)

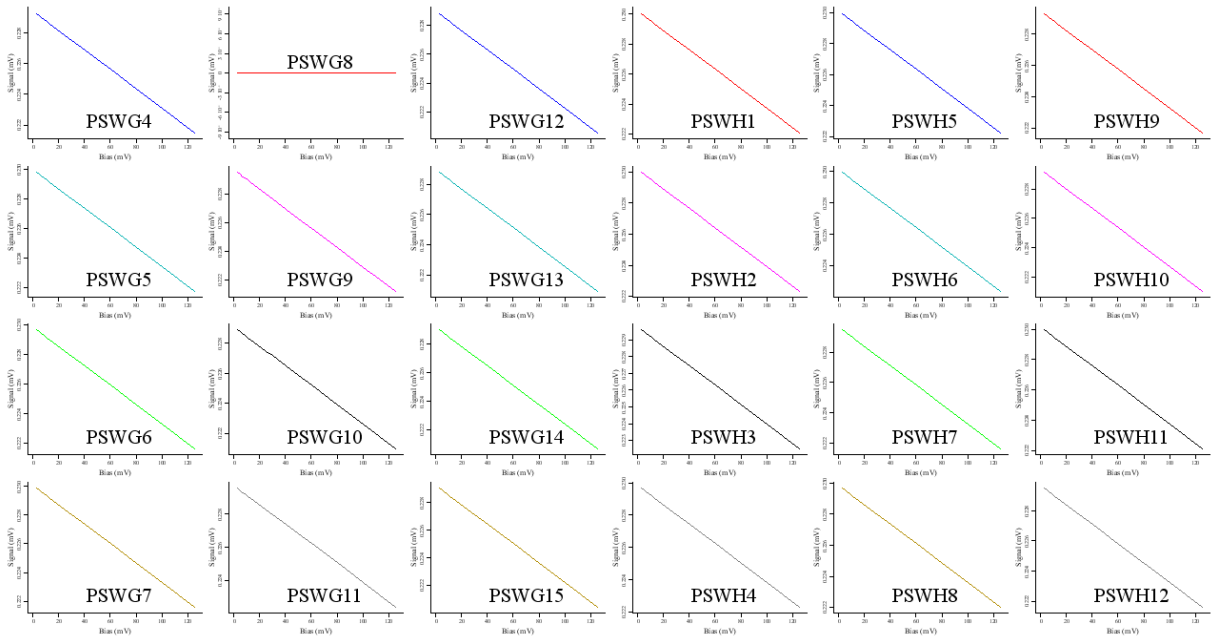


Figure 5. PSW Detectors (5)

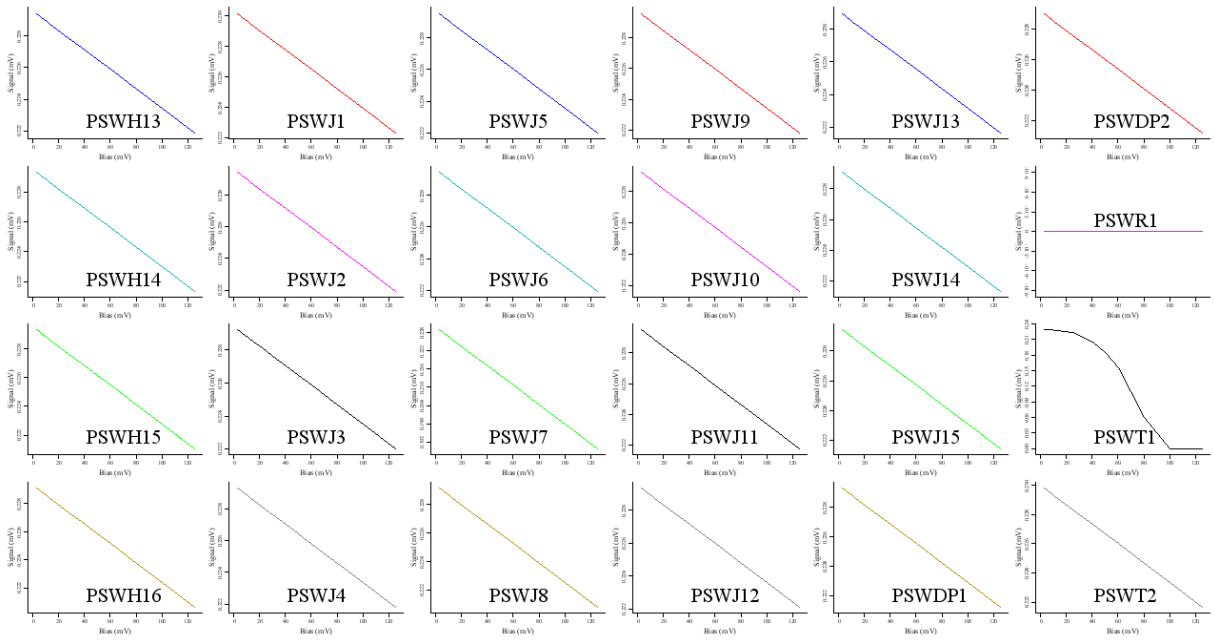


Figure 6. PSW Detectors (6)

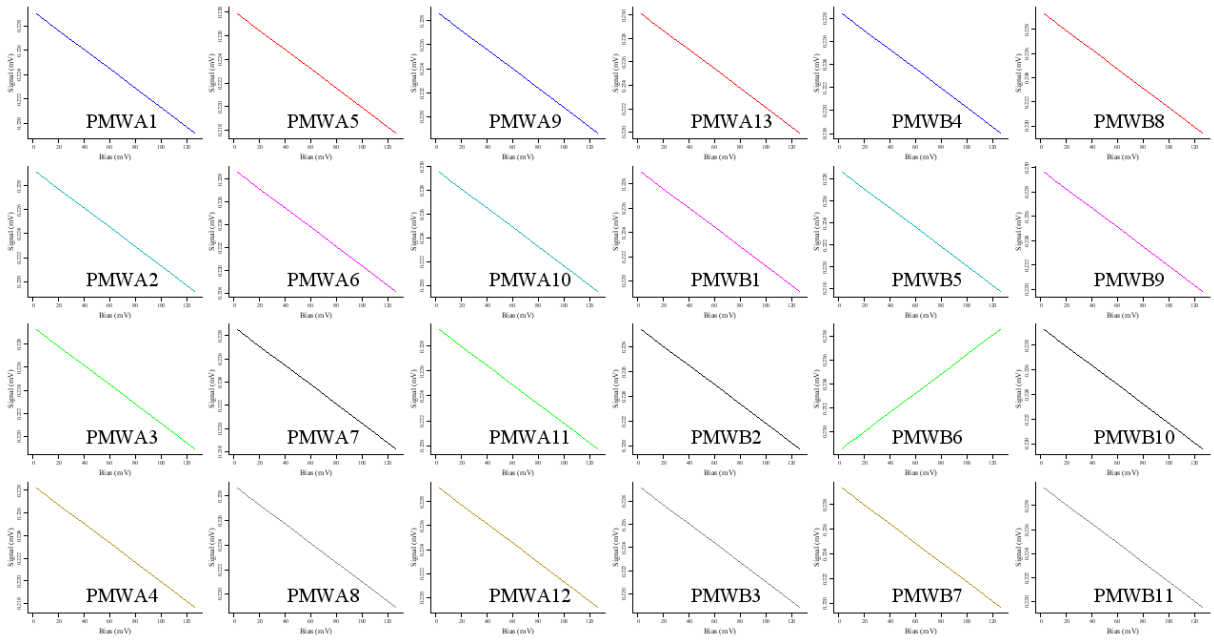


Figure 7. PMW Detectors (1)

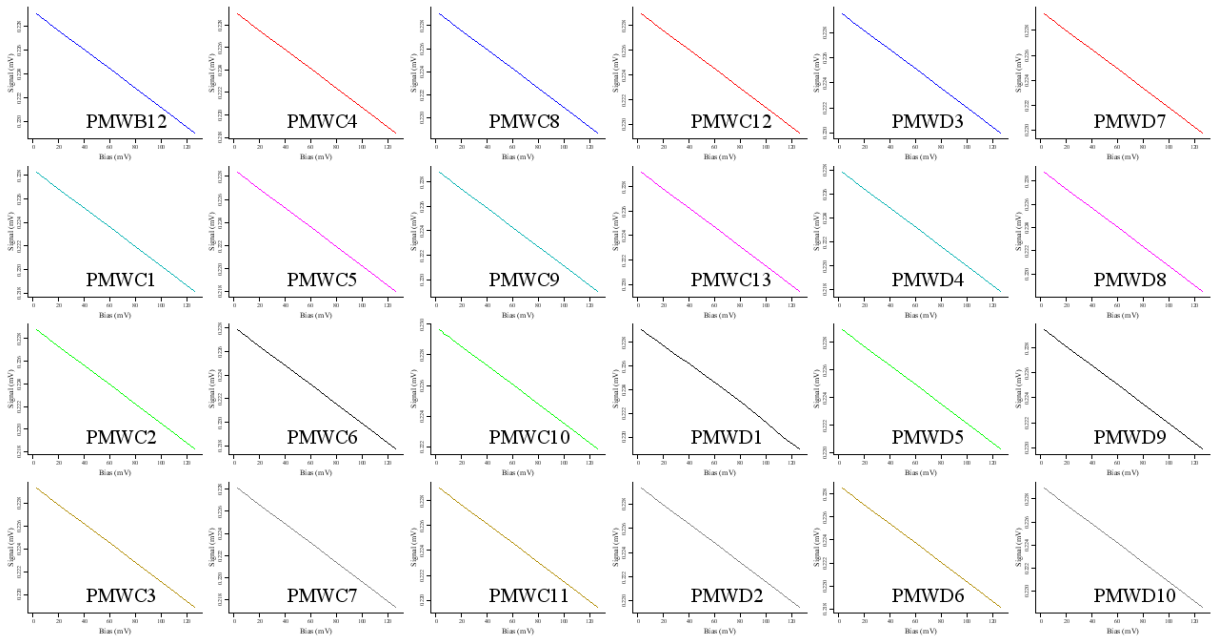


Figure 8. PMW Detectors (2)

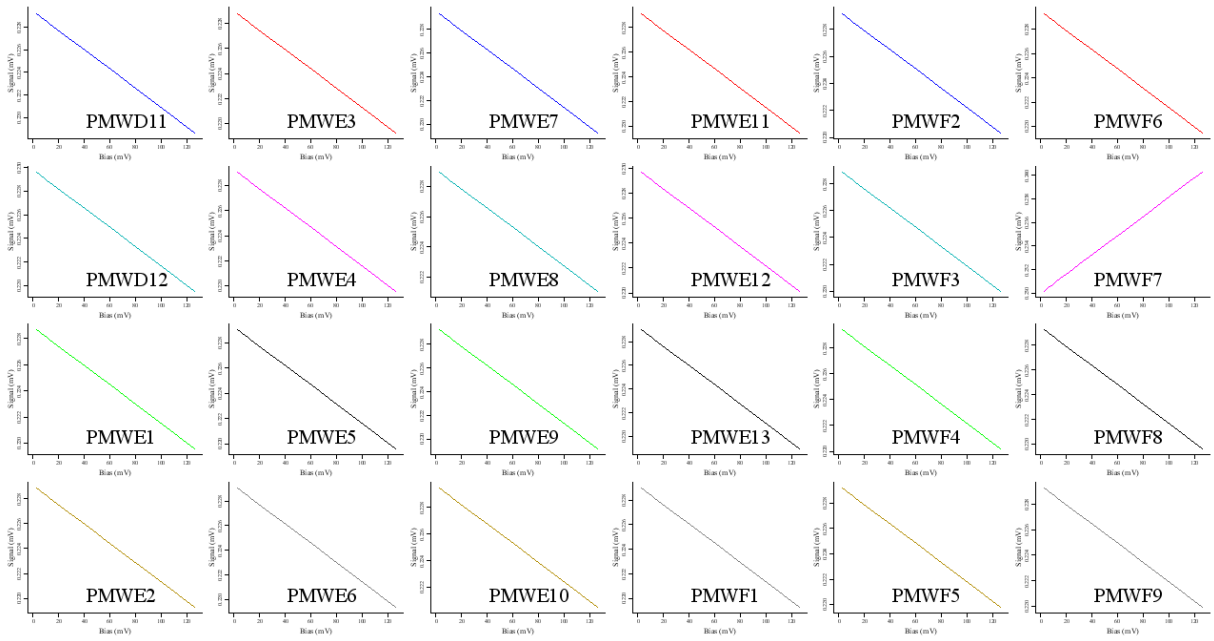


Figure 9. PMW Detectors (3)

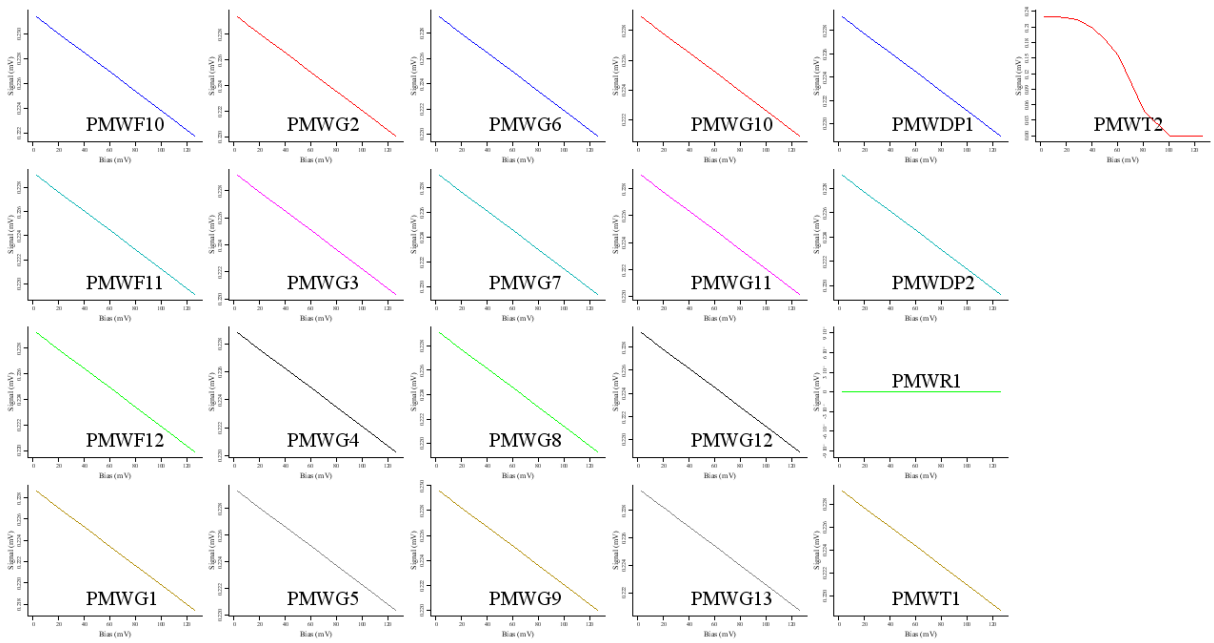


Figure 10. PMW Detectors (4)

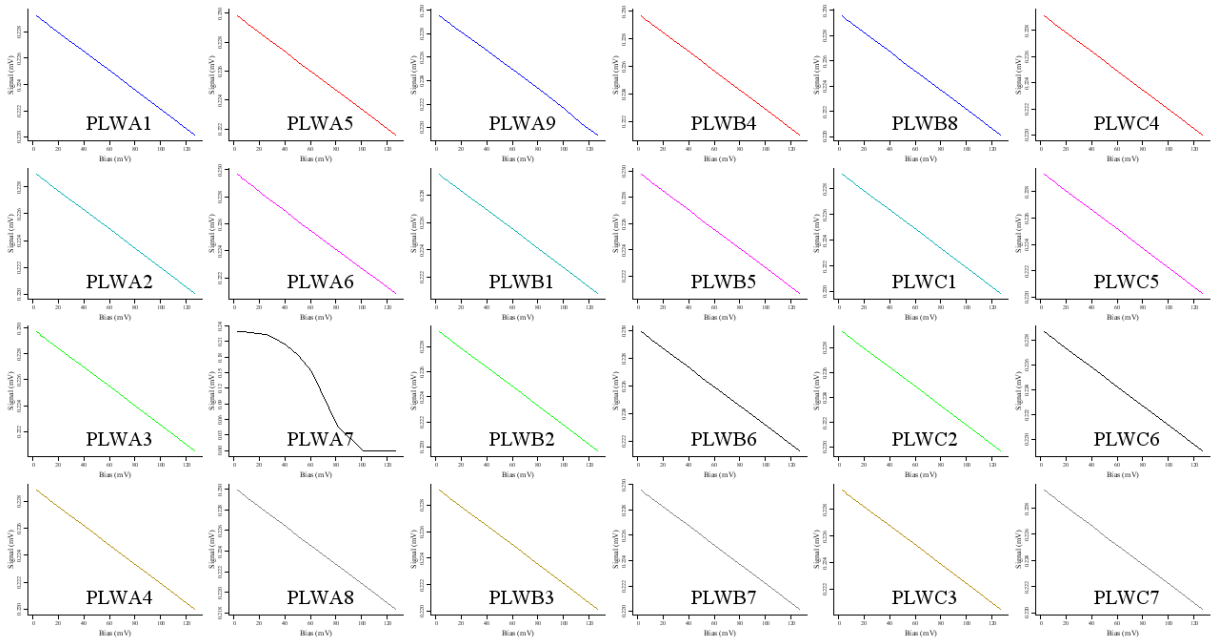


Figure 11. PLW Detectors (1)

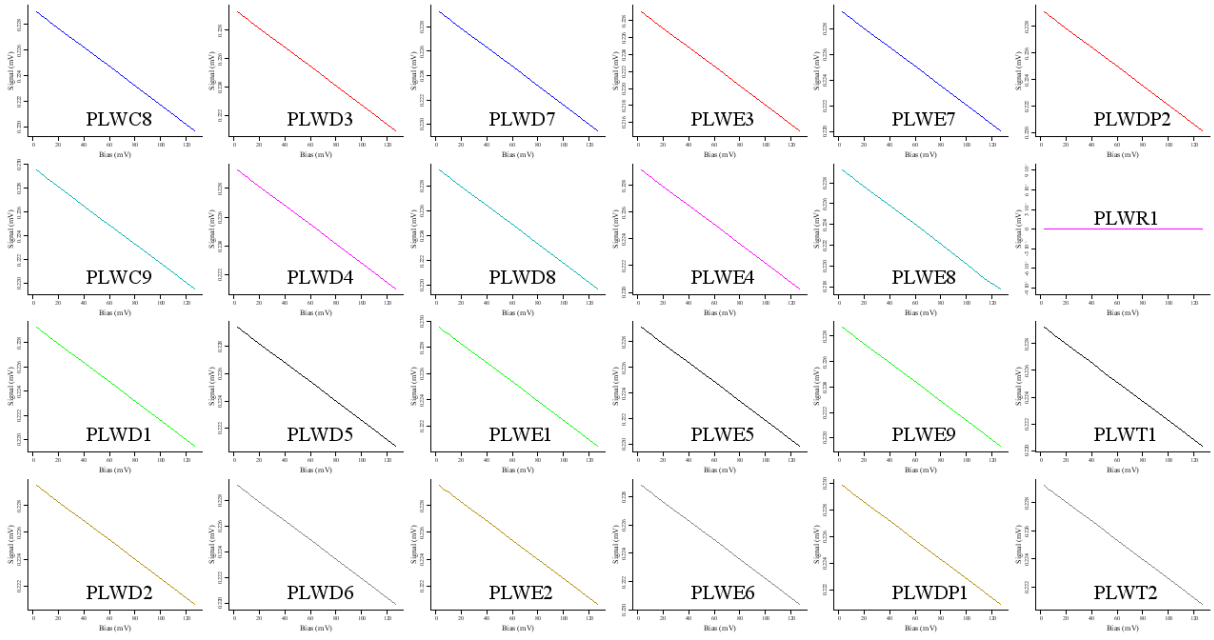


Figure 12. PLW Detectors (2)

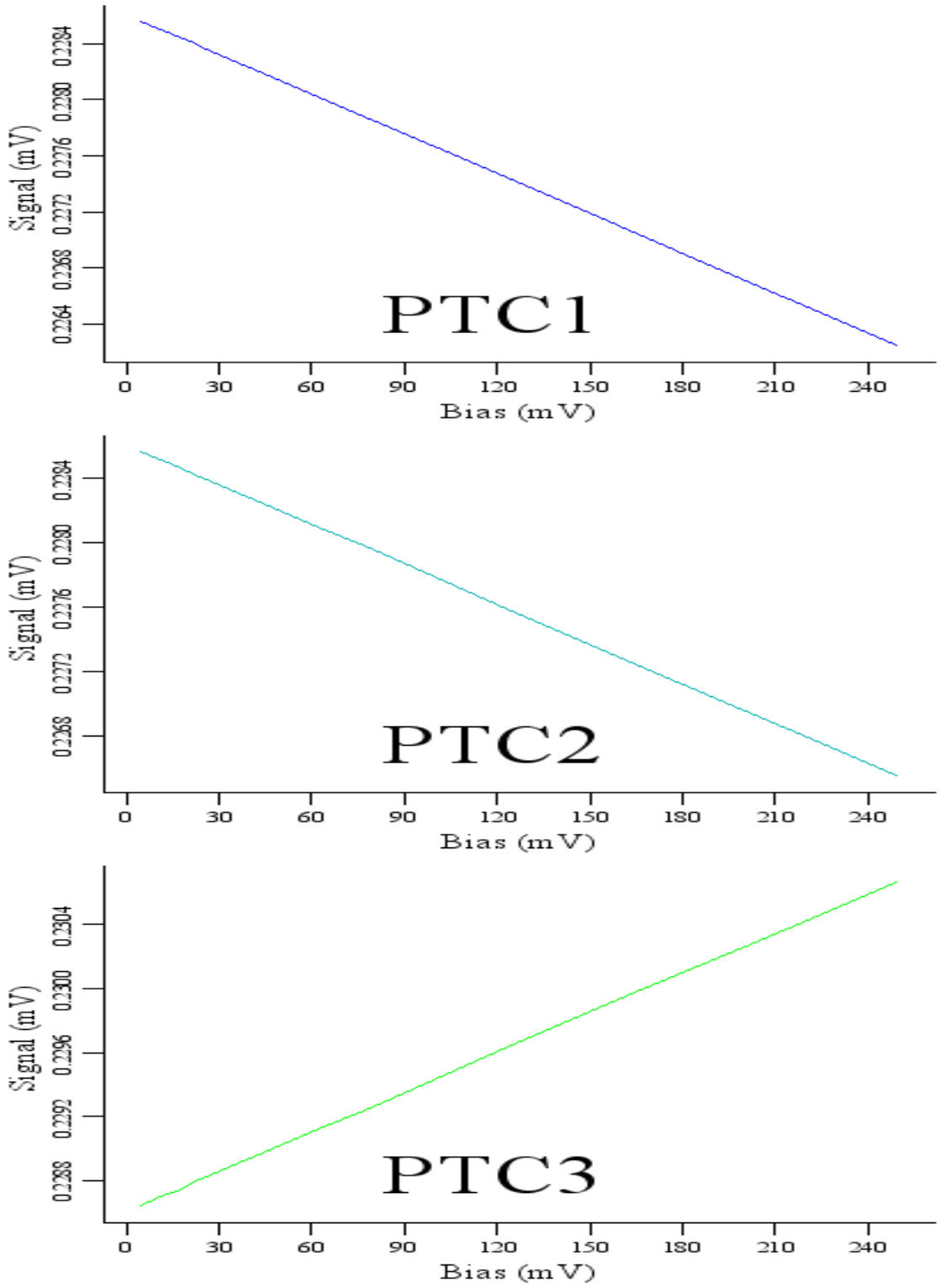


Figure 13. PTC Detectors (1)

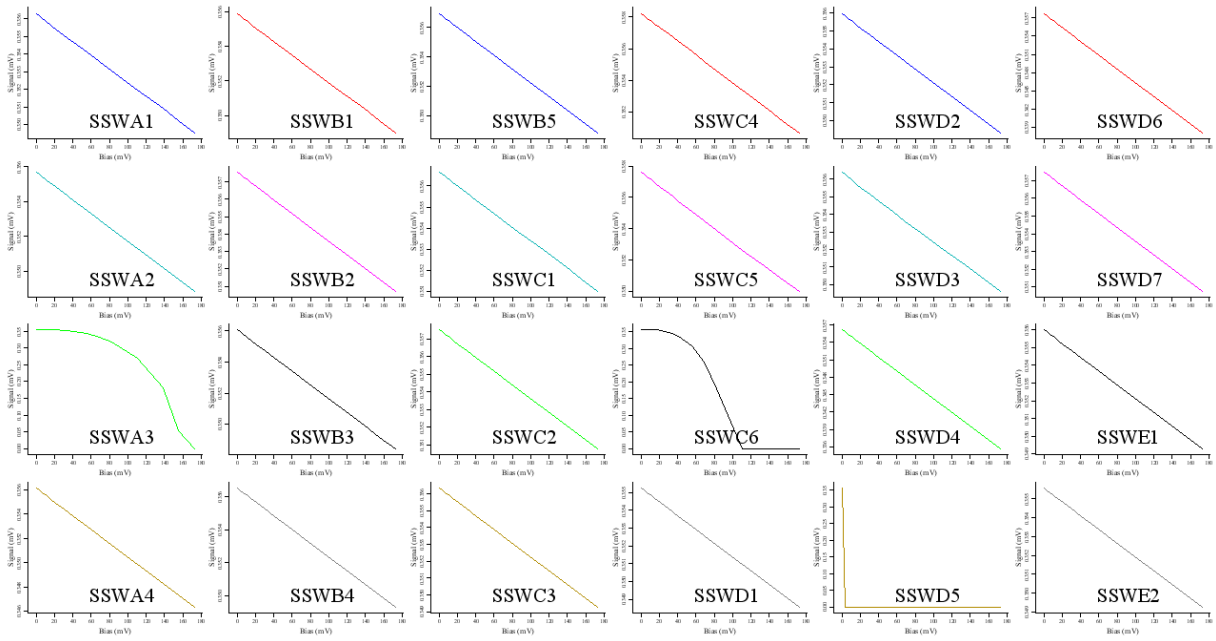


Figure 14. SSW Detectors (1)

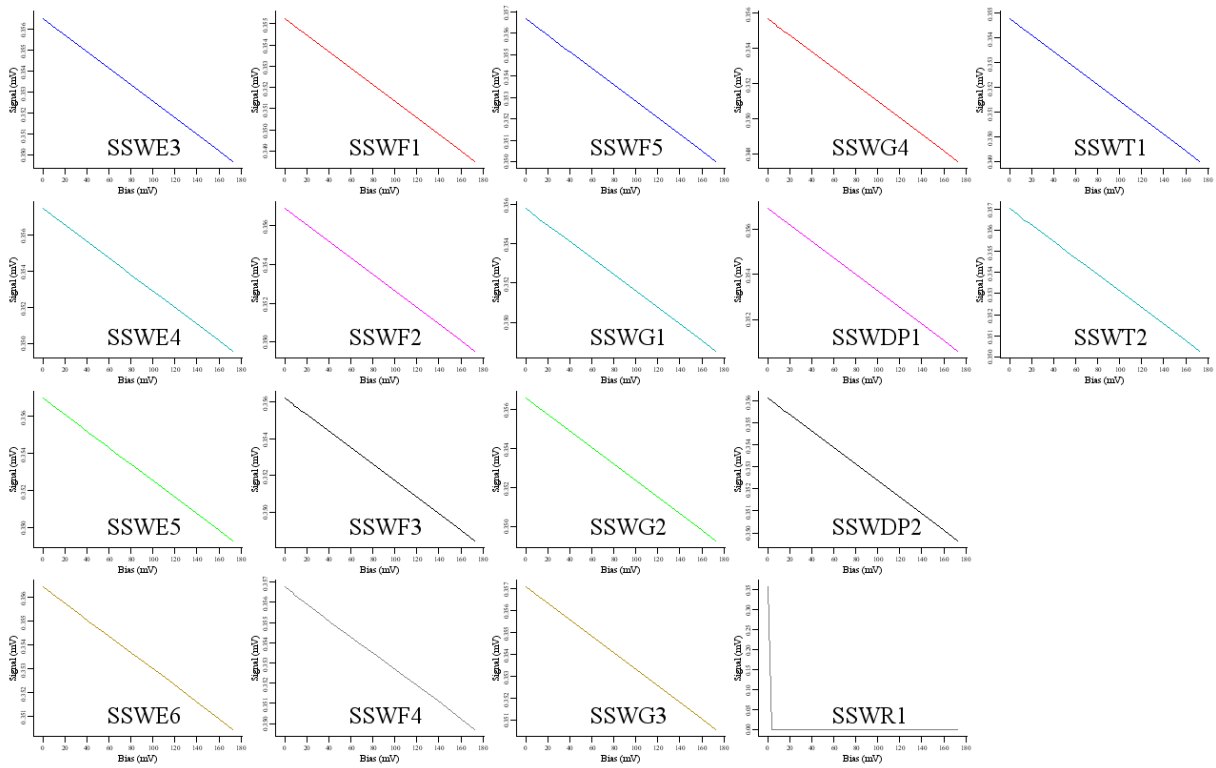


Figure 135. SSW Detectors (2)

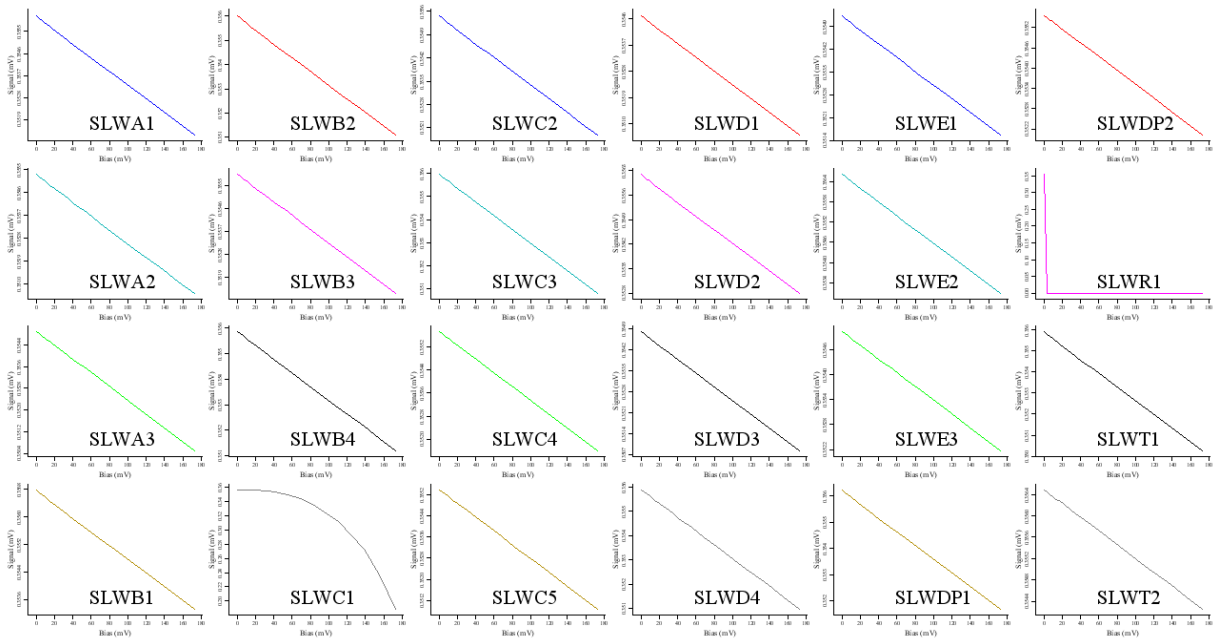


Figure 146. SLW Detectors (1)