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 in the horizontal configuration (+Y axis pointing upwards) at ambient pressure and temperature. This configuration was necessary in order to perform all the tests which involve unlatching or moving the SMEC. These tests were performed on 23rd October 2007.

Due to time constraints only the SMEC tests and the Photometer and Spectrometer load curve tests were possible. SMEC tests were performed first, followed by the Photometer and Spectrometer load curves.

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	24th Oct 2007	First version

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2. Functional Tests Configuration

2.1 SPIRE Instrument Configuration (REDUNDANT)

SPIRE FPU:

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

2.2 Software Configuration (REDUNDANT)

The current EGSE software configuration for the REDUNDANT side tests:

EGSE component	Version/Build number	Comment
SCOS2000	SCOS2.3e Patch 5	SCOS archives IST_FM1 under /data/SPIRE/hfiles and /data/SPIRE/TMD SCOS MIB is FM_2.2.G6_PR_
CDMS Simulator	v2.5	NA
HCSS	#1206	
QLA	3.3 Build #555	
QLA scripts	Latest CVS versions	
Test Control scripts		CCS Handler scripts CVS v1.4
CUS Scripts		Mission config fm_ist_wft_config_redundant4 (called redundant4 for parity with prime)
Versant	7.0.0.1	
TFCS		NA
TFTS		NA

2.3 EGSE Configuration Checks

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

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

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

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

Step#	Action	Comments	Check
1.	In SCOS open **DPU_AND_OBS_PARAMETERS display** Check if : TM2N is incrementing by one @1Hz. TM1N is incrementing by one @0.5Hz. - If they are, go to step 5. - If they are not, go to step 2.	**Both TM1N and TM2N are incrementing at their nominal rates.** **Will go to step 5.** **DPUM15V=-15.64V** **DPUP15V =15.29V** **DPUTEMP = 296.59K**	✓
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 = 5.2271V SCUP9V =9.09V SCUM9V = -9.1V **ALL BIAS VOLTAGES LOOKING GOOD.** BIASP5V = 5.17V BIASP9V = 9.01V BIASM9V= -9.07V BIASTEMP=293.18K	✓
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 REDUNDANT instrument.

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

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

4.1 FUNC-SCU-01: SCU Science Generation Check

Test Id:	**FUNC-SCU-01: SCU Science Generation Check**
Initial Configuration:	**DRCU_ON**
Final Configuration:	**DRCU_ON**
Success Criteria:	Test passed if : 1. Two SCU Nominal Science Report telemetry packets are received on QLA with the following characteristics:

APID	Type	Subtype	SID	FrameID	Frame length
0x509	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**			**Not done**

Start time:
OBSID:

CUS Input Default Parameters:
scuframes = 0x1F – Number of SCU frames to generate

Comments:

4.2 FUNC-SCU-03: SCU DC Thermometry Check

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

Test Procedure:

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-03	**SCUTEMPSTAT**	**0/0xFFFF**		**N/A**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters:
dcparam = 0xFFFF – Switch on all 16 SCU DC thermometry channels

Comments:

4.3 FUNC-SCU-06: SCU AC Thermometry Check

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

Test Procedure:

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-06	**SUBKSTAT**	**0/1**		**N/A**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters:
acparam = 0x1 – Switch on SCU AC thermometry channel (SUBKTEMP)

Comments: OK

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**			**Not done**

Start time:
OBSID:

CUS Input Default Parameters:
scuframes = 0x1F – Number of SCU frames to generate

Comments:

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**		**N/A**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters:
pcalbias = 0.1mA – PCAL current

Comments:

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**		**N/A**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters:
scal4bias = 0.1mA – SCAL4 current
scal2bias = 0.1mA – SCAL2 current

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**		**N/A**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters:

evaphs = 0.804mA – Evaporator heat switch current
pumphs = 0.804mA – Sorption pump heat switch current
pumpht = 21.85mA – Sorption pump heater current

Comments:

4.8 FUNC-SCU-08: SCU Test Pattern Check

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

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

2. The SCU Test Pattern agrees with the reference test pattern.

QLA to give go ahead.

Test Procedure:

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-08	**SCUFRAMECNT and SCU test pattern frame parameters**	**n+62/n+93**			Not done

Start time:
OBSID:

CUS Input Default Parameters:
scuframes = 0x1F – Number of SCU frames to generate

Comments:

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

4.9 FUNC-MCU-01: MCU Boot Check

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

Test Procedure:

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-MCU-01	**MCUP5V** **MCUP15V** **MCUP14V** **MCUM14V** **MCUM15V** **MCUMACTEMP** **MCUSMECTEMP** **MCUBSMTEMP**	**N/A/ ~ 5V** **N/A / ~15V** **N/A / ~ 14V** **N/A / ~ -14V** **N/A / ~ -15V** **N/A / ~ 300K** **N/A / ~ 300K** **N/A / ~ 300K**	- / 5.00V - / 15.50V - / 14.13V - / -14.50 V - / -15.61 V - / 291.6K - / 295.4K - / 295.1 K	**N/A**	**Success**

Start time: 07:37
OBSID: 0xb00002ee

CUS Input Default Parameters: None

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.	**0x509**	**21**	**3**	**0x814**	**0x14**	**0x15**
BSM	**0x509**	**21**	**1**	**0x612**	**0x12**	**0xD**
SMEC	**0x509**	**21**	**1**	**0x410**	**0x10**	**0xC**
BSM +SMEC						

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

Test Procedure:

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-MCU-02	**MCUFRAMECNT**	**0/ ~ 6600**			**Not done**

Start time:
OBSID:

CUS Input Default Parameters:

f_eng_frames = 64.1Hz – MCU Eng frame generation frequency
f_smec_frames = 250.0Hz – SMEC frame generation frequency
f_bsm_frames = 64.1Hz – BSM frame generation frequency
f_bsmsmec_bsm = 50.0Hz – BSM frame generation frequency for BSM+SMEC
f_bsmsmec_smec = 250.0Hz – SMEC frame generation frequency for BSM+SMEC
ftime = 10 – Time for continuous frame generation for each frame type

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

Test Id:	**FUNC-MCU-03: MCU Nominal Contents Check**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON
Success Criteria:	Test passed if : 1. MCU produces 99 frames of each type of frames requested with the following characteristics:

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

2. No events are generated during the different frames generation.
3. QLA analysis results are correct.

QLA to give go ahead.

Test Procedure:

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-MCU-03	**MCUFRAMECNT**	**n/ n+297** **n~6600**			**Not done**

Start time:
OBSID:

CUS Input Default Parameters:

n_eng_frames = 100 – Number of MCU Eng frames
f_eng_frames = 64.1Hz – MCU Eng frame generation frequency
n_smec_frames = 100 – Number of SMEC frames
f_smec_frames = 250.0Hz – SMEC frame generation frequency
n_bsm_frames = 100 – Number of BSM frames
f_bsm_frames = 64.1Hz – BSM frame generation frequency
ftime = 10 – Time for continuous frame generation for each frame type (Parameter NA)

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	**0x509**	**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	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**			**Not done**

Start time:
OBSID:

CUS Input Default Parameters:
n_test_frames = 100 – Number of MCU Test Pattern frames
f_test_frames = 64.1Hz – MCU Test Pattern frame generation frequency

Comments:

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

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

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

Test Procedure

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-01	**CHOPSENSPWR** **CHOPLOOPMODE** **CHOPDACVAL** **CHOPFFGAIN** **CHOPSENSSIG** **JIGGSENSPWR** **JIGGLOOPMODE** **JIGGDACVAL** **JIGGFFGAIN** **JIGGSENSSIG**	**0/1** **3/3** **0x8000/0x8000** **0xBEB/0x770** **~0x8000/0x9500** **0/1** **3/3** **0x8000/0x8000** **0xBEB/0xF6E** **~0x8000/~0x8EFA**		**N/A**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters: None

Comments:

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**			**N/A**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters: None

Comments:

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**			**N/A**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters: None

Comments:

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**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters:

string frametype = "BSM"; // Specifies MCU frame type
double framerate = 64.0; // Specifies the frame rate
int j_start = 0x4000; // RAW jiggle target start position
int j_end = 0xc000; // RAW jiggle target end position
int j_step = 0x4000; // RAW jiggle target step in position
int j_delay = 2; // Time at each jiggle target position in seconds
int c_start = 0x3000; // RAW chop target start position
int c_end = 0xf000; // RAW chop target end position
int c_step = 0x1000; // RAW chop target step in position
int c_delay = 5; // Time at each chop target position in seconds

Comments:

4.17 FUNC-BSM-05A: BSM Open Loop Chop Test

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

Test Procedure

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-05A				**N/A**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters:

string frametype = "BSM"; // Specifies MCU frame type
double framerate = 125.0; // Specifies the frame rate
int on_source_chop = 0xa000; // On source chop position
int on_source_jiggle = 0x8000; // On source jiggle position
int off_source_chop = 0x8000; // Off source chop position
int off_source_jiggle = 0x8000; // Off source jiggle position
int ncycles = 50; //Number of chop cycles
int chop_period = 500000; //period of chop cycles in microsec
int dcumode = 0; //Data type
int dcusample = 4; //Number of DCU samples per chop position
int dcudelay = 34959; //Dealy to start sampling the DCU
int bsmsample = 31; //Number of BSM samples per position

Comments:

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

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

Test Procedure

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-05B	**CHOPLOOPMODE** **JIGGLOOPMODE**	**3/1** **3/1**		**N/A**	**Not done**

BSM_INIT
Start time:
OBSID:

BSM-05B
Start time:
OBSID:

CUS Input Default Parameters:

```
string frametype = "BSM"; // Specifies MCU frame type
double framerate = 125.0; // Specifies the frame rate
int on_source_chop = 0xb600; // On source chop position
int on_source_jiggle = 0x9a60; // On source jiggle position
int off_source_chop = 0x6a28; // Off source chop position
int off_source_jiggle = 0x9a60; // Off source jiggle position
int ncycles = 50; //Number of chop cycles
int chop_period = 500000; //period of chop cycles in microsec
int dcumode = 0; //Data type
int dcusample = 4; //Number of DCU samples per chop position
int dcudelay = 34959; //Dealy to start sampling the DCU
int bsmsample = 31; //Number of BSM samples per position
```

4.19 FUNC-BSM-06: BSM Operational Mode Check

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

Test Procedure

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-06				**N/A**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters:

string frametype = "BSM"; // Specifyes MCU frame type]
double framerate = 125.0; // Specifies the frame rate
int on_source_chop = 0x5279; // On source chop position
int on_source_jiggle = 0x8d00; // On source jiggle position
int off_source_chop = 0xad87; // Off source chop position
int off_source_jiggle = 0x8d00; // Off source jiggle position
int ncycles = 50; //Number of chop cycles
int chop_period = 500000; //period of chop cycles in microsec
int dcumode = 0; //Data type
int dcusample = 4; //Number of DCU samples per chop position
int dcudelay = 34959; //Dealy to start sampling the DCU
int bsmsample = 65535; //Number of BSM samples per position

Comments:

BSM_OFF:

Start time:

OBSID:

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.
0x505	**21**	**1**	**0x200**	**0**	**PF**	**100**	**100**
0x507	**21**	**1**	**0x201**	**1**	**SF**	**100**	**17**
0x505	**21**	**2**	**0x102**	**2**	**PSW**	**100**	**34**
0x505	**21**	**2**	**0x103**	**3**	**PMW**	**100**	**25**
0x505	**21**	**2**	**0x104**	**4**	**PLW**	**100**	**12**
0x507	**21**	**2**	**0x105**	**5**	**SSW**	**100**	**12**
0x507	**21**	**2**	**0x106**	**6**	**SLW**	**100**	**7**

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

Test Procedure:

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result

FUNC-DCU-01	**DCUFRAMECNT**	**n/n+700 n depends on the BSM chop operations on FUNC-BSM-05A/05B/06**			**Not done**

Start time:
OBSID:

CUS Input Default Parameters:

double photbiasfreq = 130.0;
double photsampfreq = 18.0;
double specbiasfreq = 160.0;
double specsampfreq = 80.0;
int frames = 100;

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

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-02	**DCUFRAMECNT**	**m/m+700**			**Not done**

Start time:
OBSID:

CUS Input Default Parameters:

double photbiasfreq = 200.0;
double photsampfreq = 15.3;
double specbiasfreq = 160.0;
double specsampfreq = 80.0;
int frames = 100;

Comments:

4.22 FUNC-DCU-03: DCU Test Pattern Check

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

Test Procedure:

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-03	**DCUFRAMECNT**	**j/j+200**			**Not done**

Start time:
OBSID:

CUS Input Default Parameters:

double photbiasfreq = 200.0;
double photsampfreq = 15.3;
double specbiasfreq = 160.0;
double specsampfreq = 80.0;
int phase = 0;
int frames = 100;

Comments:

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

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

Test Procedure:

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-04-PHOT	**SCUDCDCSTAT** **PLIAP5V** **PLIAP9V** **PLIAM9V** **LIAP1TEMP to LIAP9TEMP**	**4/5** **0/~ +5V** **0/~+11V** **0/~-11V** **N/A/ [290-300]K**	**4/5** 0/+5.24V 0/+11.59V 0/-11.58V ~293/warming up		**Success**

Start time: 08:54
OBSID:0xb00002fb

CUS Input Default Parameters:
int mcu_status = 1; //default 0 = off, 1= on

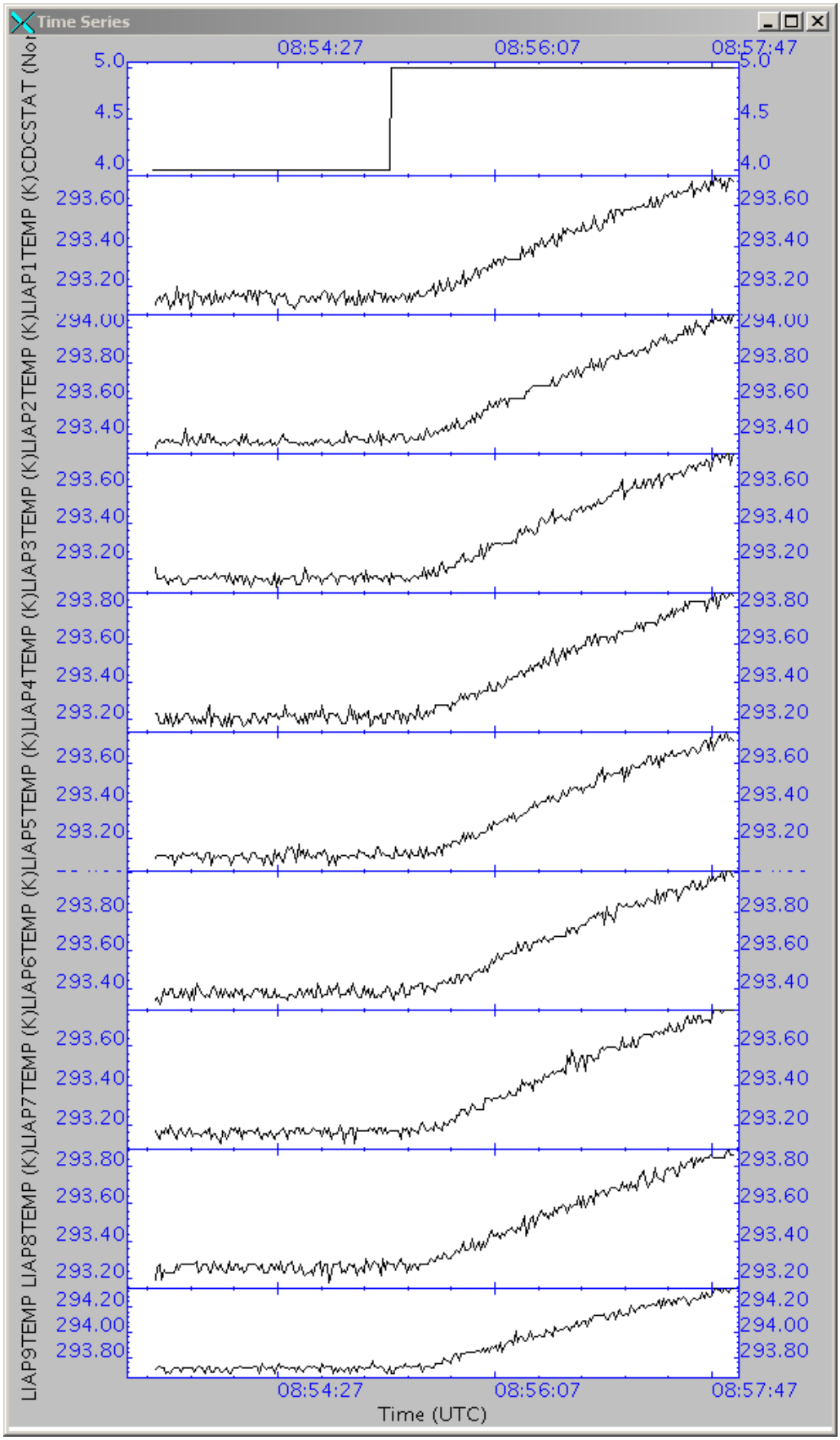
Comments: PLIABITSTAT 0 to 1
Photometer LIAs switched on OK
Output file from QLA script:

```
DCU-04-phot
Start time @: 24-Oct 08:55:10
End time @: 24-Oct 08:55:23
OBSID: 0xB00002FB

PLIABITSTAT:
Start value: OFF
End value: 1.0

                 Before/After
SCUDCDCSTAT     4/5
PLIAP5V         0.01/5.24 V
PLIAP9V         0.01/11.59 V
PLIAM9V         0.01/-11.58 V
```

QLA plots below for Phot LIA temperatures


Time Series
08:54:27
08:56:07
08:57:47
LIAP9TEMP LIAP8TEMP (K)LIAP7TEMP (K)LIAP6TEMP (K)LIAP5TEMP (K)LIAP4TEMP (K)LIAP3TEMP (K)LIAP2TEMP (K)LIAP1TEMP (K)CDCSTAT (No
Time (UTC)

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

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

Test Procedure:

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

Test Log:

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

Start time: 08:57
OBSID:0xb00002fc
CUS Input Default Parameters:

int heater_V = 0; // Specifies if the heater is to be switched ON or not
string array = "PF"; //default array to switch ON

Comments:
The Vss values were the ~ -1.5V, as agreed with SPIRE instrument team, i.e.

PSWJFET1V: -1.47V
PSWJFET2V: -1.47V
PSWJFET3V: -1.47V
PSWJFET4V: -1.47V
PSWJFET5V: -1.47V
PSWJFET6V: -1.47V

PMWJFET1V: -1.47V
PMWJFET2V: -1.47V
PMWJFET3V: -1.47V
PMWJFET4V: -1.47V

PLWJFET1V: -1.47V
PLWJFET2V: -1.47V

TCJFETV: -1.47V

The PSW, PMW and PLW arrays on QLA are all OK
DCU data were generated for ~1min after JFET switch on.
QLA produced output file FUNC-DCU-11p_B00002FC.txt:

```
DCU-11-phot
Start time @: 24-Oct 08:58:36
End time @: 24-Oct 09:00:23
OBSID: 0xB00002FC

PLIABITSTAT:
Start value: 0x0
End value: 0x4C

                 Before/After
PSWJFETSTAT     0x0/0x3F
PMLWJFETSTAT    0x0/0x7F

PSWJFET1V       -0.00/-1.49 V
PSWJFET2V       -0.00/-1.49 V
PSWJFET3V       -0.00/-1.49 V
PSWJFET4V       -0.00/-1.49 V
PSWJFET5V       -0.00/-1.49 V
PSWJFET6V       -0.00/-1.49 V

PMWJFET1V       -0.00/-1.49 V
PMWJFET2V       -0.00/-1.49 V
PMWJFET3V       -0.00/-1.49 V
PMWJFET4V       -0.00/-1.49 V

PLWJFET1V       -0.00/-1.49 V
PLWJFET2V       -0.00/-1.49 V

TCJFETV         0.00/-1.49 V
```

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**	**Success**

Start time: 09:01
OBSID:0xb00002fd

CUS Input Default Parameters:

string dcumode = "PF"; // Specifies array in which to perform LC
int mclkdiv = 0x95; // Master clock divisor ,which specifies bias freq
int biasdiv = 0x6; // Sampling divisor ,which specifies sampling rate
int psw_phase = 0x80; // PSW demod phase
int pmw_phase = 0x80; // PMW demod phase
int plw_phase = 0x80; // PLW demod phase
int ftime = 10; // Time at each bias level

Comments:
– Took ~2 minutes to receive all the TC stream from the I-EGSE from the start of execution from the CCS

- Most pixels look better than or same as for PFM5 ILT, except PSW-D15 and PTC3 which appear to have their polarity reversed. NCR already raised.

QLA load curve plots in Annexe 1.

No time left to do noise test.

PDET_OFF
Start time: 09:15
OBSID:0xb00002fE

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**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters:
string dcumode = "PF"; //Array
int ftime = 120; //time

Comments: Not done

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

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

Test Procedure:

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

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-04-SPEC	**SCUDCDCSTAT** **SLIAP5V** **SLIAP9V** **SLIAM9V** **LIAS1/2/3TEMP**	**4/6** **0/~ +5V** **0/~+11V** **0/~-11V** **N/A/ [290-300]K**	4/6 0.11 / **5.25** 0.016/ 11.59 0.016/-11.57 /~295K warming up		**Success**

Start time: 09:17
OBSID:0xb00002ff

CUS Input Default Parameters:
int mcu_status = 1; //default 0 = off, 1= on

Comments: SLIABITSTAT 0 to 1
Spectrometer LIAs switched ON correctly

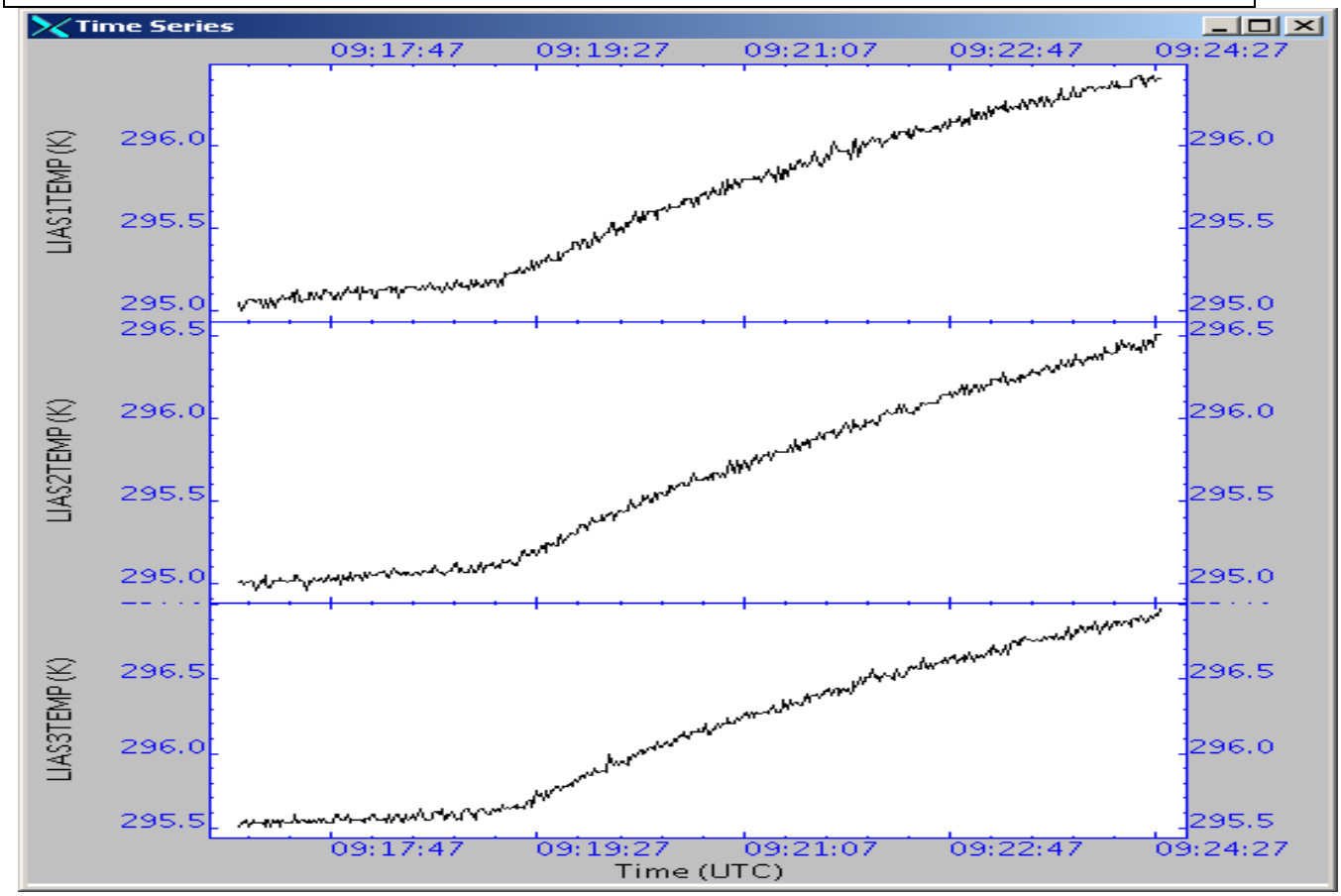
Output file FUNC-DCU-04s_B00002FF.txt from QLA script:

```
DCU-04-spec
Start time @: 24-Oct 09:18:42
End time @: 24-Oct 09:18:56
OBSID: 0xB00002FF

SLIABITSTAT:
Start value: OFF
End value: 1.0

                  Before/After
SCUDCDCSTAT      4/6
SLIAP5V          0.01/5.25 V
SLIAP9V          0.01/11.59 V
SLIAM9V          0.01/-11.57 V
```

QLA plots below for Spec LIA temperatures



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

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

Test Procedure:

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

Test Log:

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

Start time: 09:20
OBSID:0xb0000300

CUS Input Default Parameters:

int heater_V = 0; // Specifies if the heater is to be switched ON or not
string array = "SF"; //default array to switch ON

Comments:
The Vss values were the ~ -1.5V, as agreed with SPIRE instrument team, i.e.

SSWJFET1V: -1.47V
SSWJFET2V: -1.47V
SLWJFET1V: -1.47V

DCU data were generated
The PSW, PMW and PLW arrays on QLA are all OK
QLA produced file FUNC-DCU-11s_B00002D6.txt:

```
DCU-11-spec
Start time @: 24-Oct 09:21:32
End time @: 24-Oct 09:23:13
OBSID: 0xB0000300

SLIABITSTAT:
Start value: 0x1
End value: 0x1

                 Before/After
SCUDCDCSTAT     0x6/0x6
LIASTAT         0x0/0x0
SLIAP5V         5.25/5.25 V
SLIAP9V         11.59/11.59 V
SLIAM9V         -11.57/-11.57 V
SPECJFETSTAT    0x0/0x7
SSWJFET1V       -0.00/-1.49 V
SSWJFET2V       -0.00/-1.49 V
SLWJFET1V       -0.00/-1.49 V
```

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	Success

Start time: 09:23
OBSID: 0xb0000301

CUS Input Default Parameters:

string dcumode = "SF"; //DCU data mode
int mclkdiv = 0x79; //Master clock divisor
int biasdiv = 0x1; // Bias divisor
int ssw_phase = 0x80; // SSW demod phase
int slw_phase = 0x80; // SLW demod phase
int ftime = 10; // Time at each bias level

Comments

Generally all (SSW/SLW) pixels looking responsive. See Annexe 1 for detailed results.

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**	**Not done**

Start time:
OBSID:

CUS Input Default Parameters:
string dcumode = "PF"; //Array
int ftime = 120; //time

Comments: No time left to do noise test.

Switched off the Spectrometer:
SDET_OFF
Start time: 09:37
OBSID: 0xb0000302

MCU_OFF:
OBSID: 0xb0000303
Start time:09:39

SCU thermometry was not switched on so need to switch it off.

DRCU_OFF:
OBSID: 0xb0000304
Start time:09:40

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

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

Test Procedure:

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

Test Log:

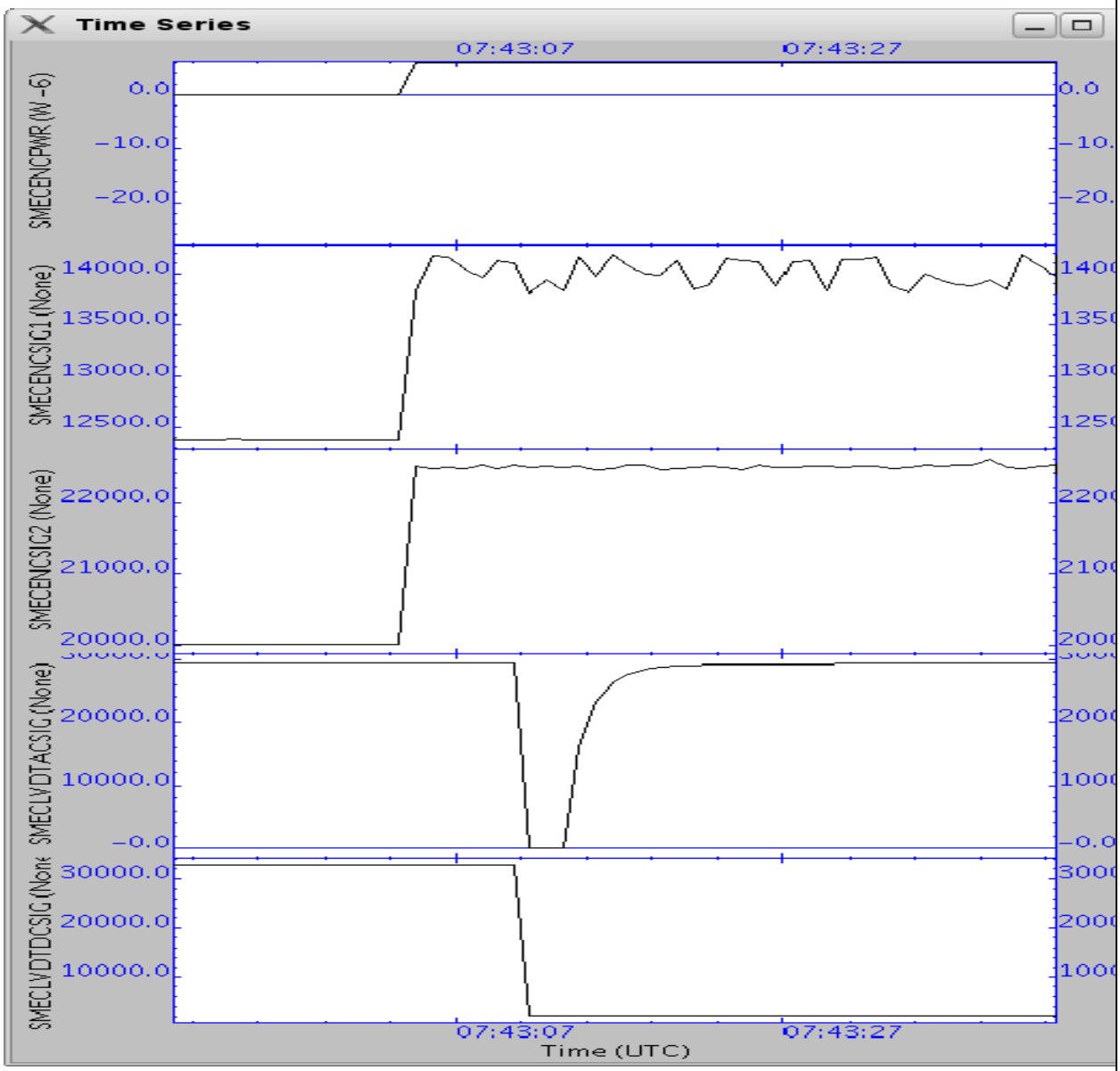
Test Id	Key Parameter(s)	Expected Value Before/ After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SMEC-01	**SMECENCPWR** **SMECLVDTPWR** **SMECENCSIG1** **SMECENCSIG1AMP** **SMECENCSIG1OFF** **SMECENCSIG2** **SMECENCSIG2AMP** **SMECENCSIG2OFF**	**0/6** **0/1** **Changes** **0/0** **-/0x38A4** **Changes** **0/0** **-/0x5BCC**	0/6 0/1 0x3061/~0x3767 0/0 0xCE20/0x38A4 0x4E2C/~57AF 0/0 0xCE20/0x5BCC	**N/A**	Success

Start time: 07:41
OBSID:0xb00002ef

CUS Input Default Parameters:

string smec_temp = "warm"; //(cold/warm) Used to specify the encoder power level

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**

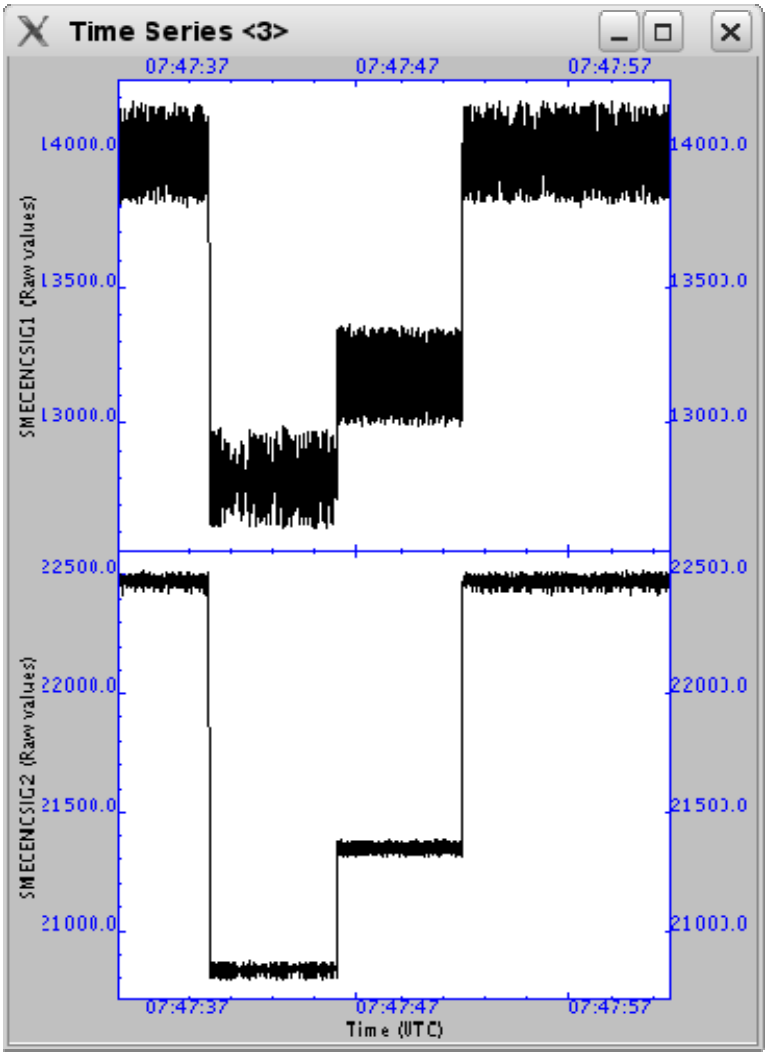
Start time: 07:46
OBSID:0xb00002f0
CUS Input Default Parameters:

string frametype = "ENG"; // Specifies MCU frame type
double framerate = 64.0; // Specifies the frame rate
int framenumber = 0xffff; // Frame number
int level_init = 6; //
int level_start = 4;
int level_end = 6;
int level_step = 1;
int led_delay = 5; // Time at each level in seconds

Comments:

LED Level	SMECENCSIG1	SMECENCSIG2
4	~12800	~20800
5	~13200	~21300
6	~14000	~22400

The QLA plot does not show the SMEC encoder power level, only the encoder signals 1 & 2.



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**	**Success**

Start time:
OBSID:

CUS Input Default Parameters:
string ltch = "latch"; // Command SMEC to unlatch

Comments: Test performed manually

07:52 - Set the FF offset to 0x7000: 0x90557000 SMECMOTORCURR goes from 0 to ~-10+/-1 mA

07:55 – Open the SMEC latch 0x90430002

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:

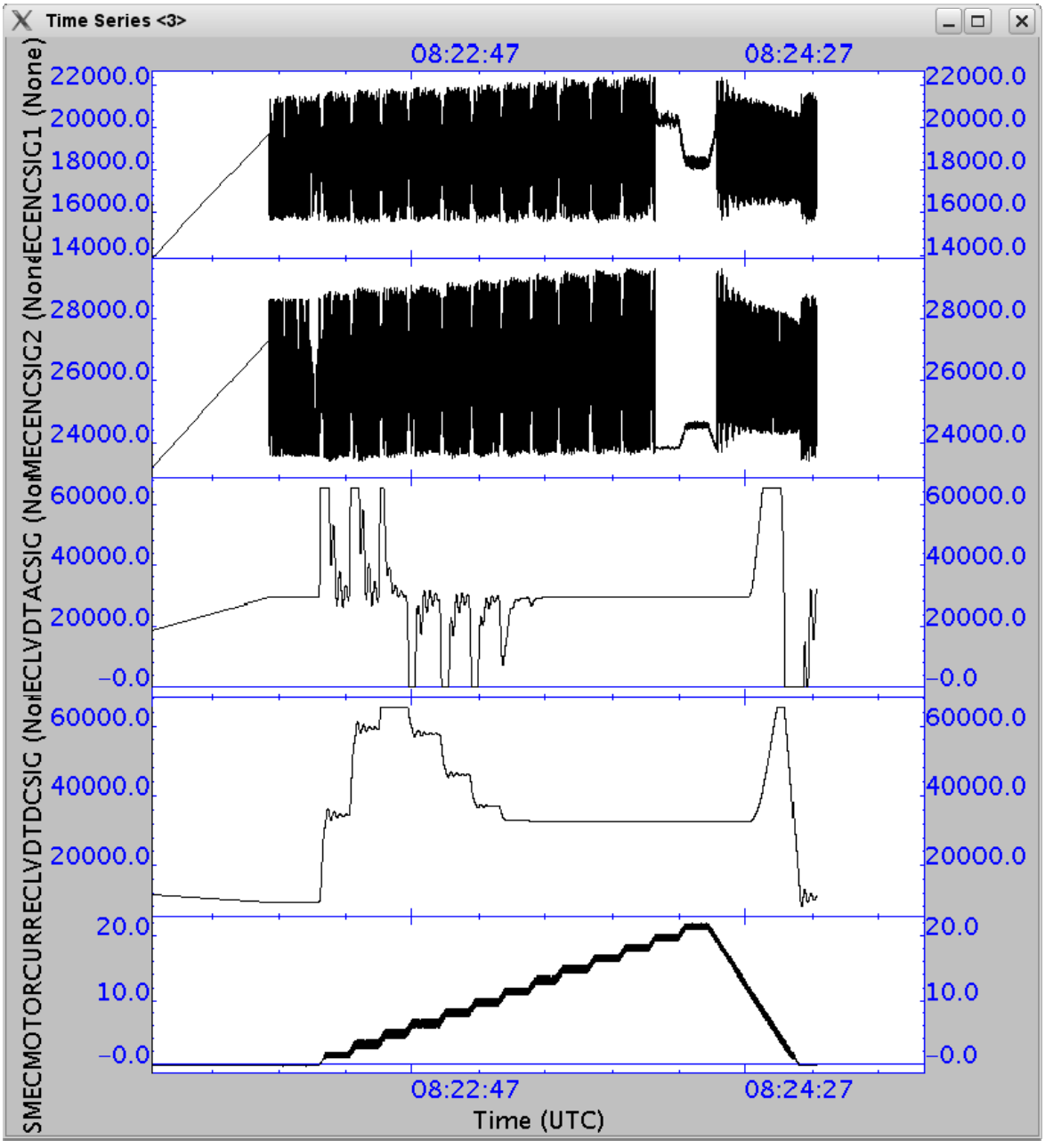
Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SMEC-04A					**Success**

Start time: 07:57
OBSID: 0xb00002f1

CUS Input Default Parameters:

string smec_temp = "warm"; //(cold/warm) Used to specify the encoder power level
string frametype = "ENG"; // Specifies MCU frame type
double framerate = 64.0; // Specifies the frame rate
int scan_start = 1000 in [0,39900]; // Step look scan starting point (um)
int scan_end = 15000 in [0,39900]; // Step look scan ending point (um)
int scan_step = 1000 in [0,39900]; // Step look scan step size (um)
int scan_fspeed = 500 in [0,2000]; // Scan forward speed (um/s)
int scan_rspeed = 500 in [0,2000]; // Scan fly back speed (um/s)
int ftime = 5; // Time at each target position in seconds

Comments: The SMEC moved as expected but the encoder signals amplitudes became very small for high motor current.



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:

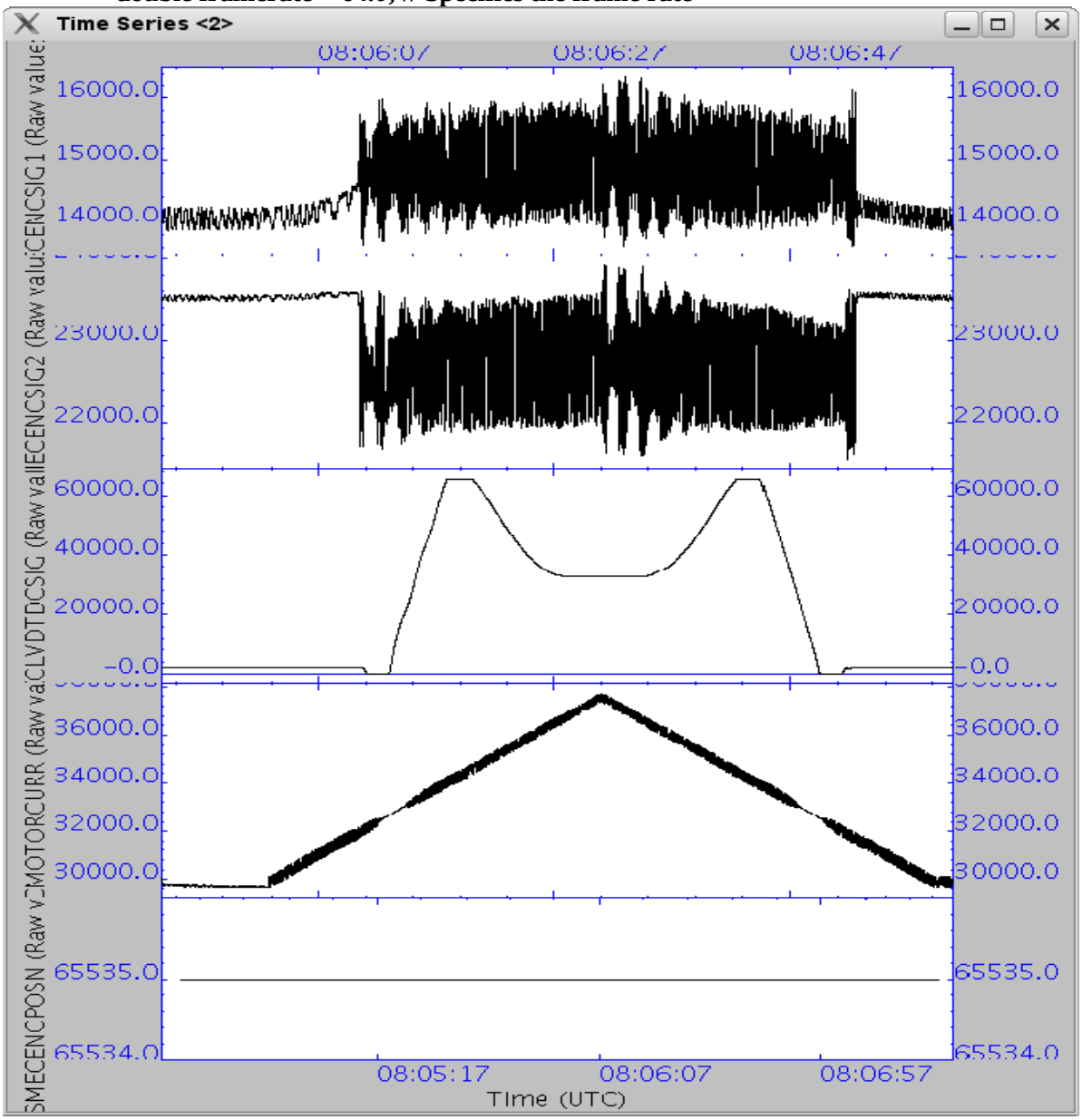
Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
FUNC-SMEC-09	**All above mentioned in step 2**	**N/A**	**N/A**	**N/A**	**Success**

SMEC encoder Sig1 & Sig2 offsets were 13523 and 22662 respectively. It was decided not to reset them as they did not appear to be significantly different from the encoder signals 1 & 2.

Start time: 08:04
OBSID: 0xb00002f2

CUS Input Default Parameters:

string smec_temp = "warm"; //(cold/warm) Used to specify the encoder power level
int scan_start = 1000 in [0,39900]; //Scan starting point (um)
int scan_end = 15000 in [0,39900]; //Scan ending point (um)
int scan_fspeed = 500 in [0,2000]; //Scan forward speed (um/s)
int scan_rspeed = 500 in [0,2000]; //Scan reverse speed (um/s)
int nscans = 2 in [2,65535]; //Number of scans (has to be even)
double framerate = 64.0; // Specifies the frame rate



Comments:
Test OK - as for prime side

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	**Fail**

First run SMEC_INIT:

Start time: 08:09
OBSID: 0xb00002f3

CUS Input Default Parameters:
string smec_temp = "warm"; // (cold/warm) Used to specify the PID values

Comments: SMECLOOPMODE should change from 6 to 1.

SMEC_07:
Start time: 08:11
OBSID: 0xb00002f4

CUS Input Default Parameters:
string smec_temp = "warm"; //(cold/warm) Used to specify the encoder power level
int scan_start = 1000 in [0,39900]; //Scan starting point (um)
int scan_end = 15000 in [0,39900]; //Scan ending point (um)
int scan_fspeed = 200 in [0,2000]; //Scan forward speed (um/s)
int scan_rspeed = 200 in [0,2000]; //Scan reverse speed (um/s)
int nscans = 2 in [2,65535]; //Number of scans (has to be even)
double framerate = 64.0; // Specifies the frame rate

Comments: The loop opened while scanning. NCR HP-112000-ASED-NC-3733 has been raised.

(Post Test Comment: The mean encoder signals 1 and 2 were 14600 and 22600 respectively. In retrospect not resetting the encoder Sig1 offset 1 was a mistake!)

08:19 - Increased encoder power level from 6 to 7: 0x90400007

Run SMEC-04A again to find encoder signals 1 &2
FUNC-SMEC-04A-R:
Start time: 08:20
OBSID: 0xb00002f5

Mean encoder Sigs 1 & 2 are: ~18800 & ~26400 respectively
0x4970 & 0x6720

08:27: Set the SMEC encoder Sig1 & 2 offsets:
0x90584970
0x905a6720

Run open loop SMEC scan again
FUNC-SMEC-09-R:
Start time: 08:28
OBSID: 0xb00002f6

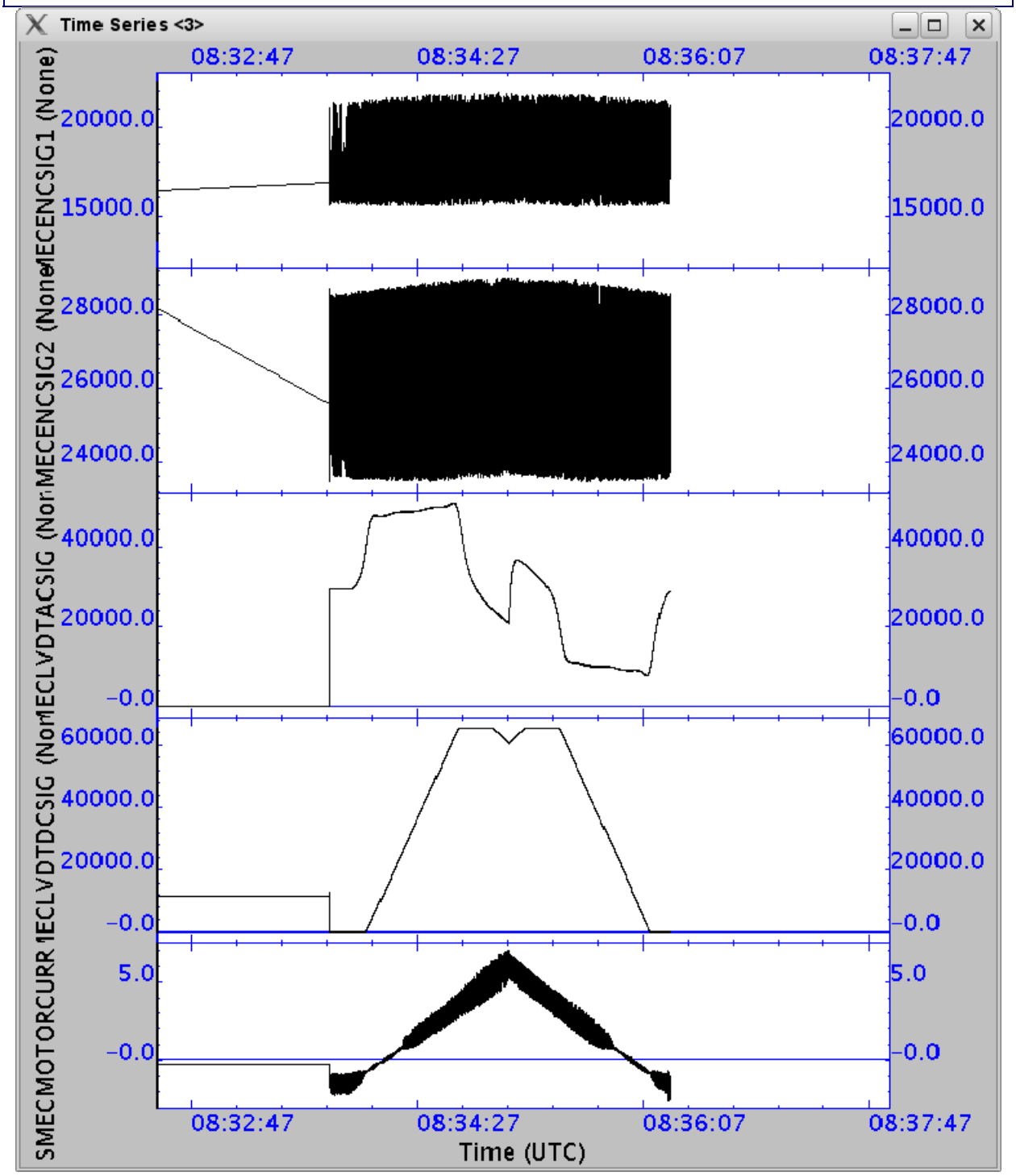
Encoder signal amplitudes decreased significantly in the middle of the scan.

Initialise the SMEC again
SMEC_INIT:
Start time: 08:30
OBSID: 0xb00002f7

FUNC-SMEC-07:
Start time: 08:32
OBSID: 0xb00002f8

Stayed in closed loop.

QLA plot below shows the SMEC scanning in closed loop.



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**	

Start time:
OBSID:

CUS Input Default Parameters:
string ltch = "latch"; // Command SMEC to unlatch

Comments: Test performed manually to by-pass OBS implementation problems of the SMEC Latch/Unlatch commands.

Put the SMEC in open loop and stop trajectory generation:

08:40
0x90440006
0x90490000

08:43 Set SMEC FF offset to 0x6000
0x90556000 – SMECFFOFFSET goes from 0x7000 to 0x6000
SMECMOTORCURR goes to ~-19+/-1mA

08:44 Engage the SMEC latch
0x90430001 – No TM parameter can be monitored

After engaging the SMEC latch an attempt is now made to move the SMEC to see if the SMEC is truly latched.

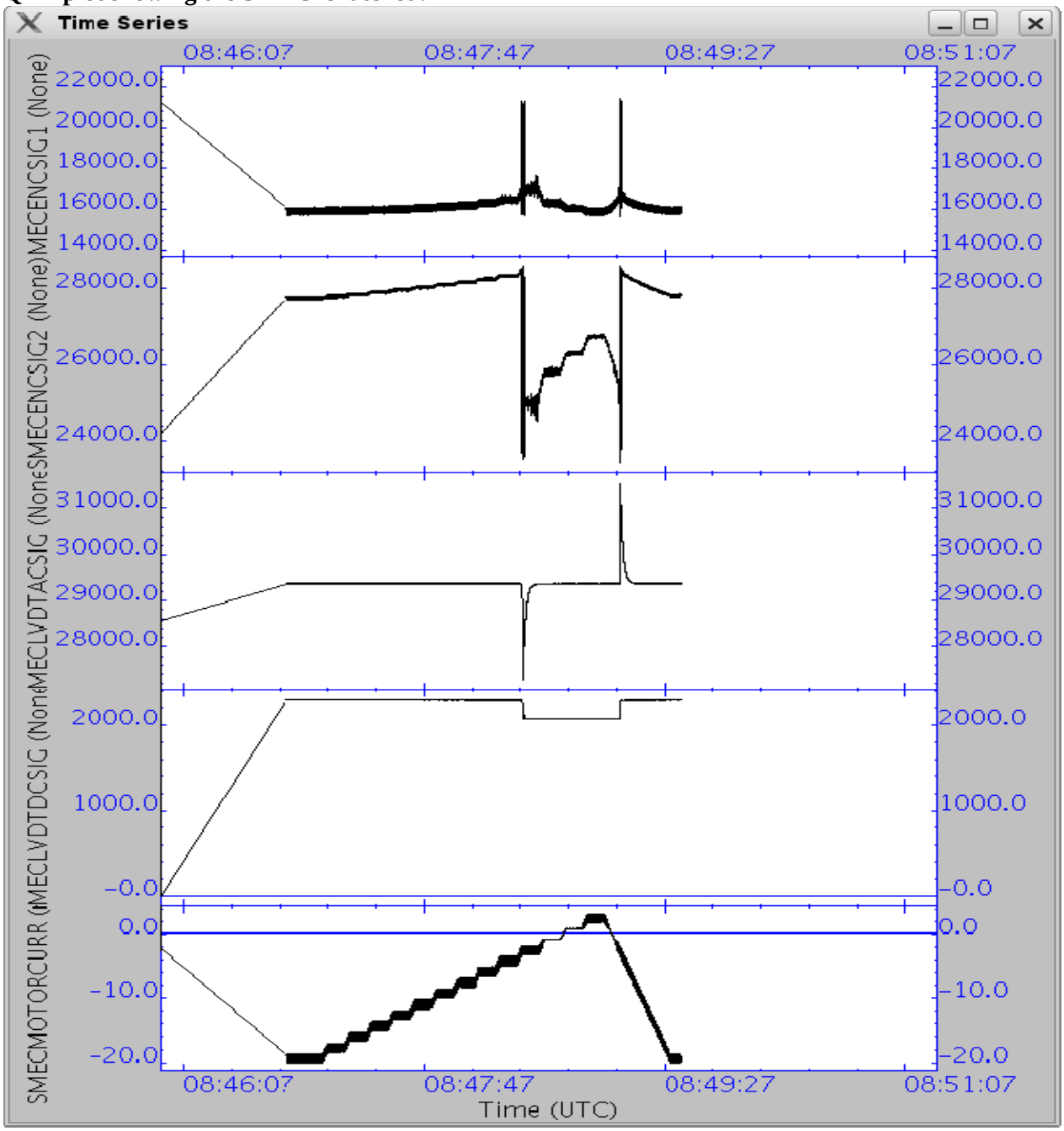
FUNC-SMEC-04A-R: Test to see if the SMEC is really latched.
Start time: 08:45
OBSID: 0xb00002f9

The SMEC looks to be latched, as shown by the QLA plot below.

SMEC tests completed.

SMEC_OFF:
Start time: 08:52
OBSID: 0xb00002fA

QLA plot showing the SMEC is latched:



5. ANNEXE 1 (RESULTS OF LOAD CURVES)

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

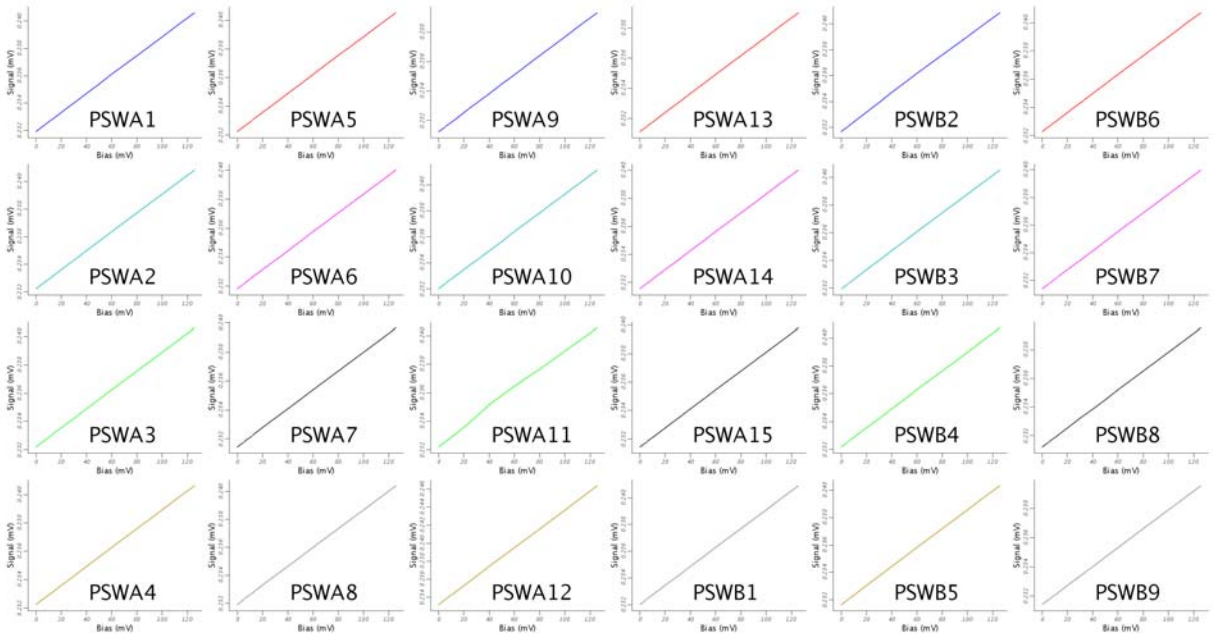


Figure 1. PSW Detectors (1)

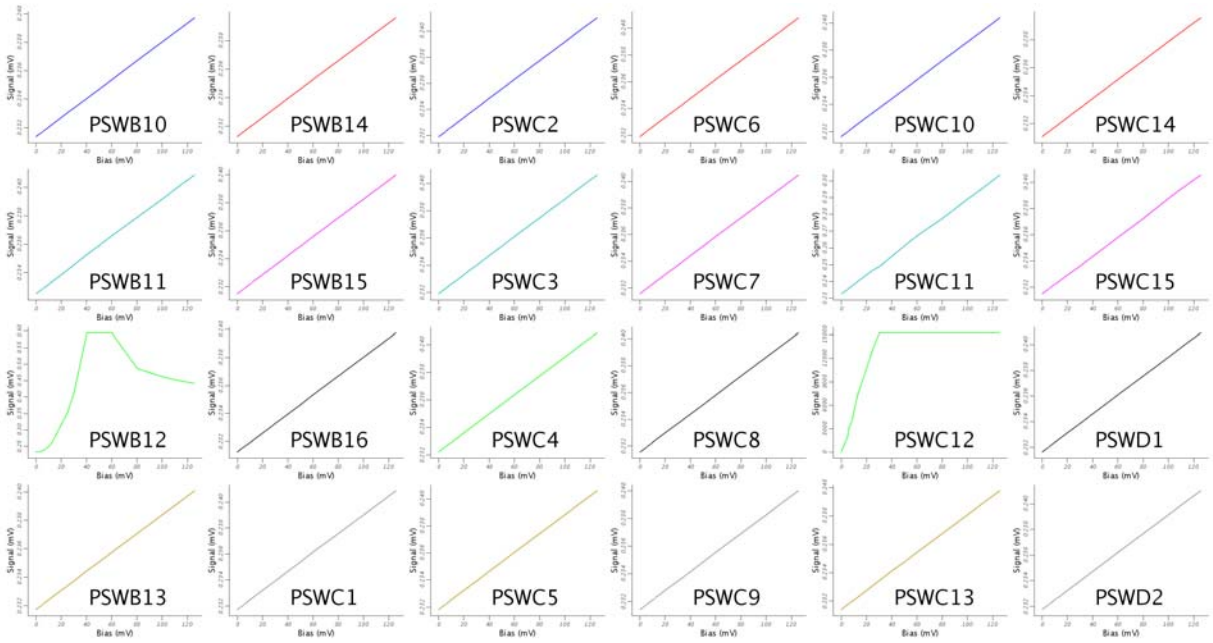


Figure 2. PSW Detectors (2)

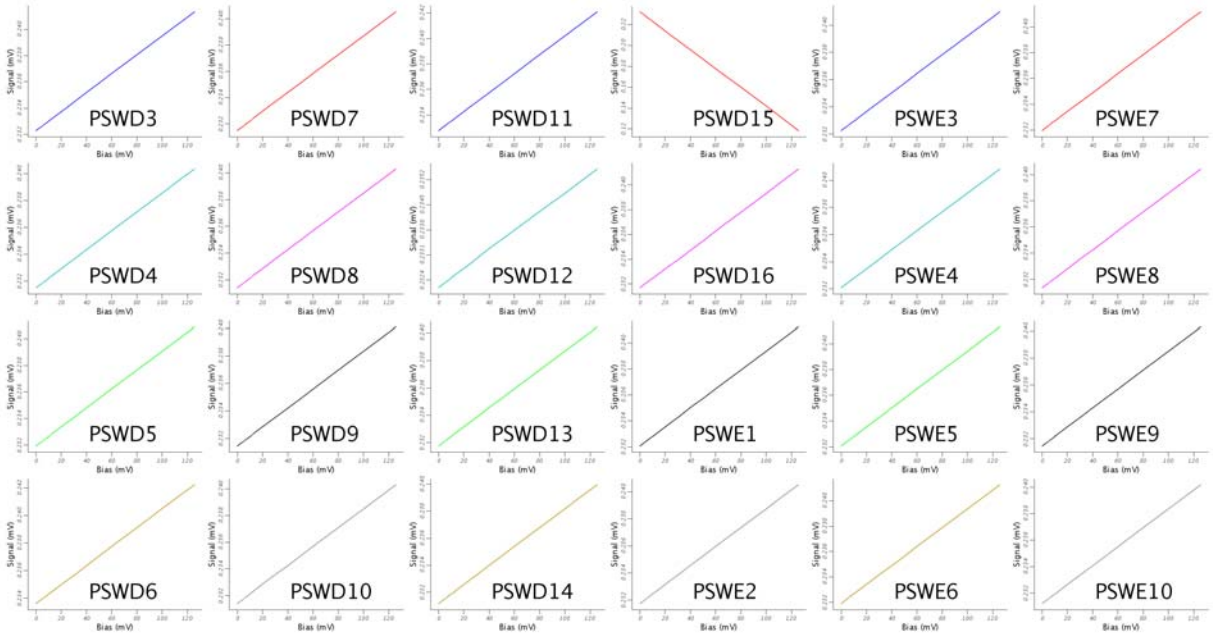


Figure 3. PSW Detectors (3)

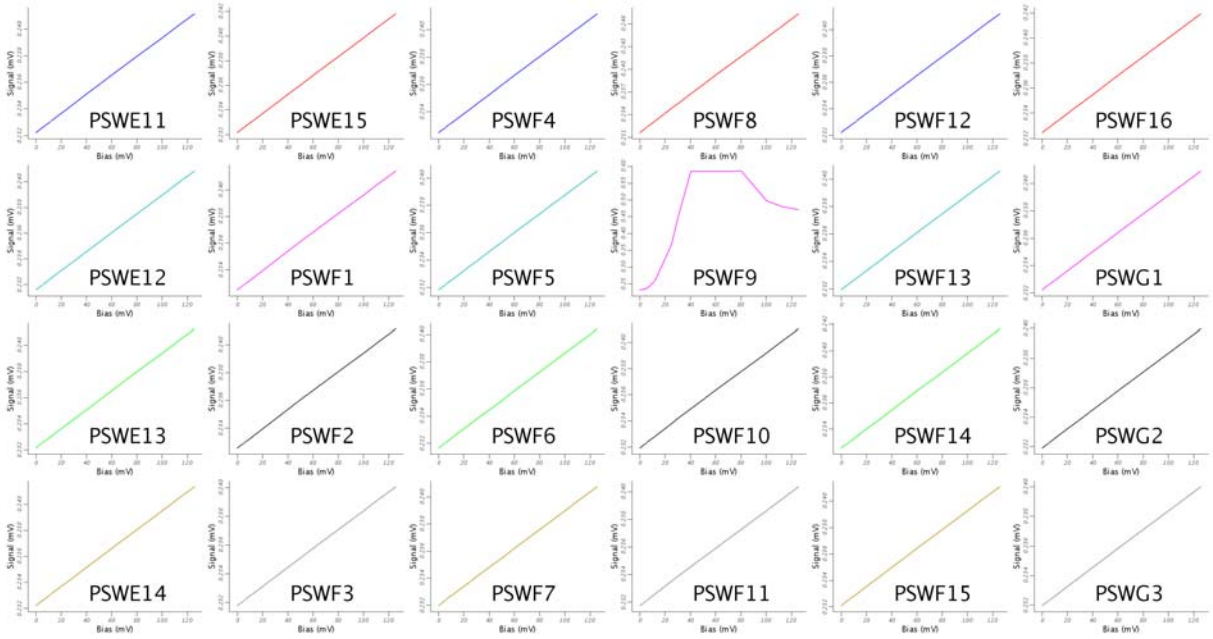


Figure 4. PSW Detectors (4)

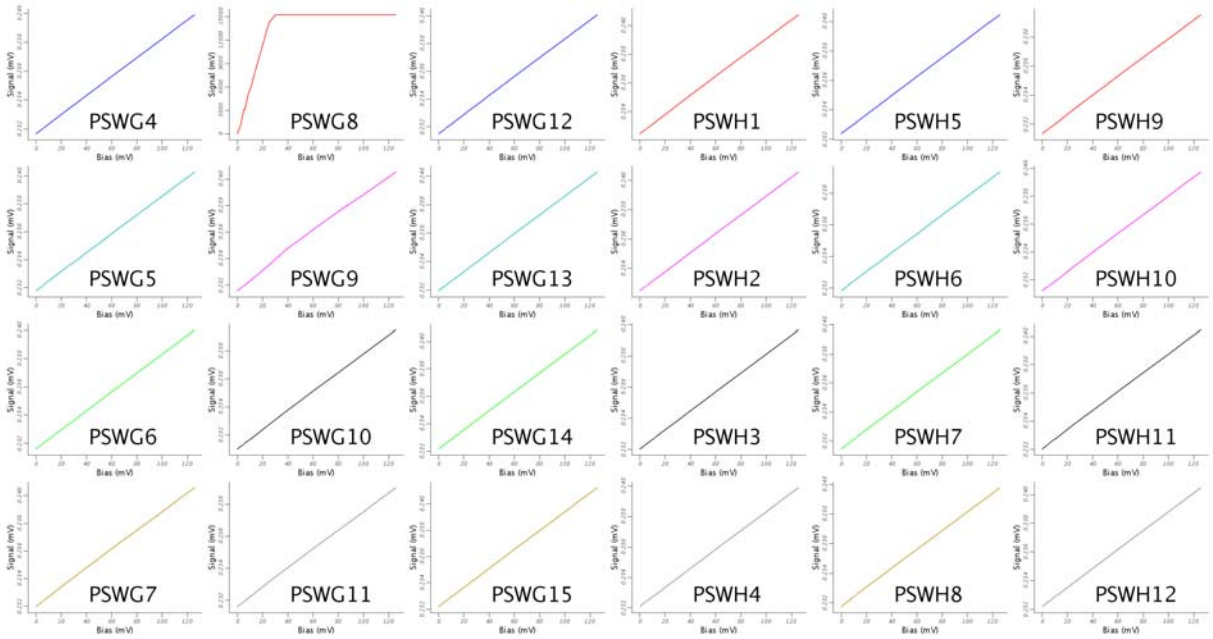


Figure 5. PSW Detectors (5)

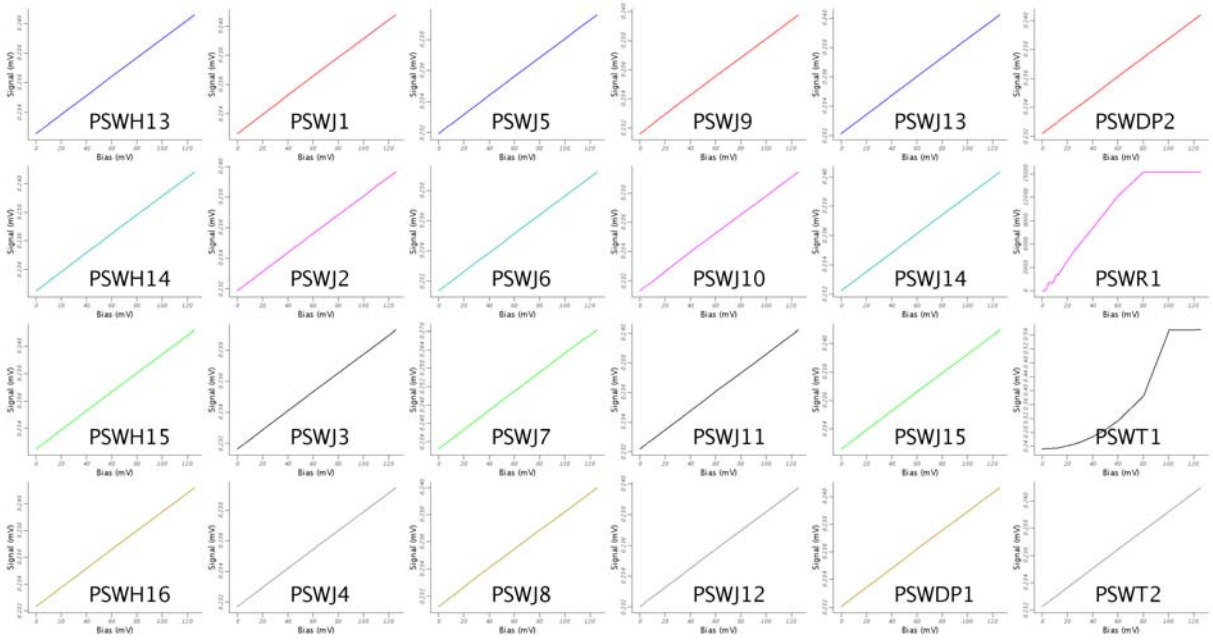


Figure 6. PSW Detectors (6)

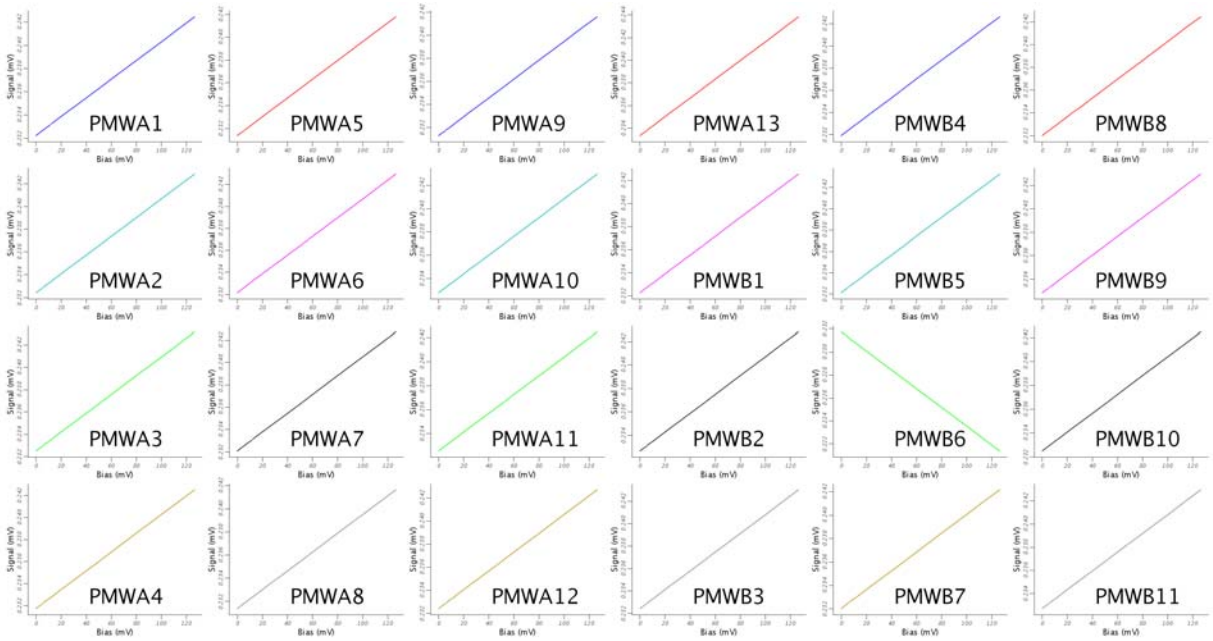


Figure 7. PMW Detectors (1)

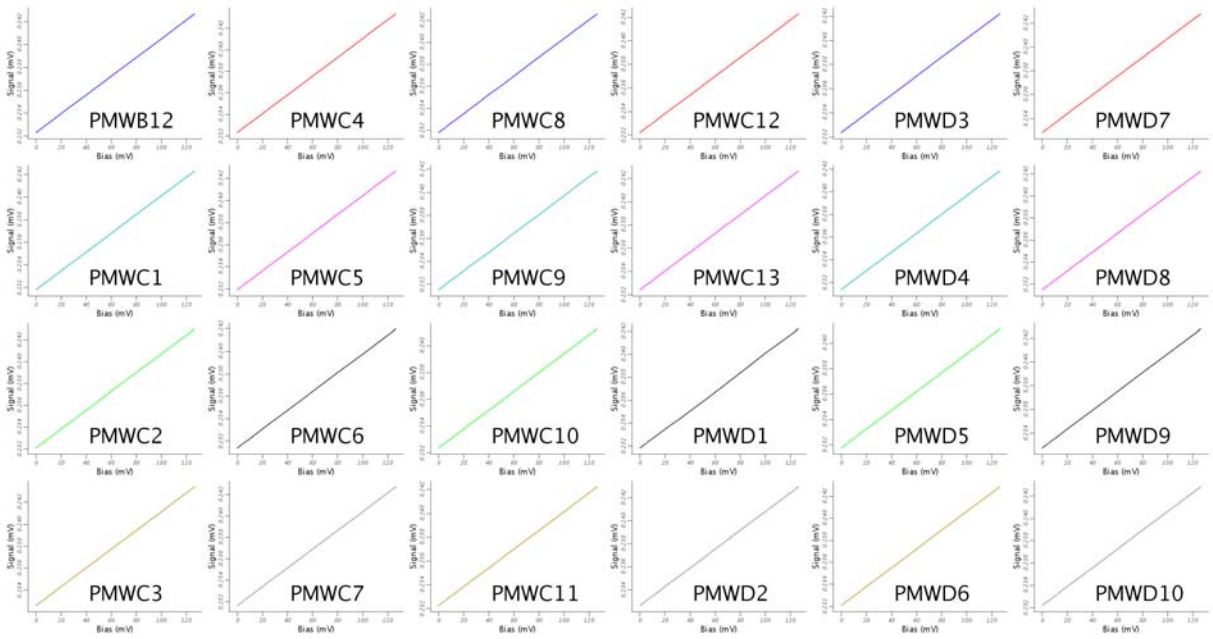


Figure 8. PMW Detectors (2)

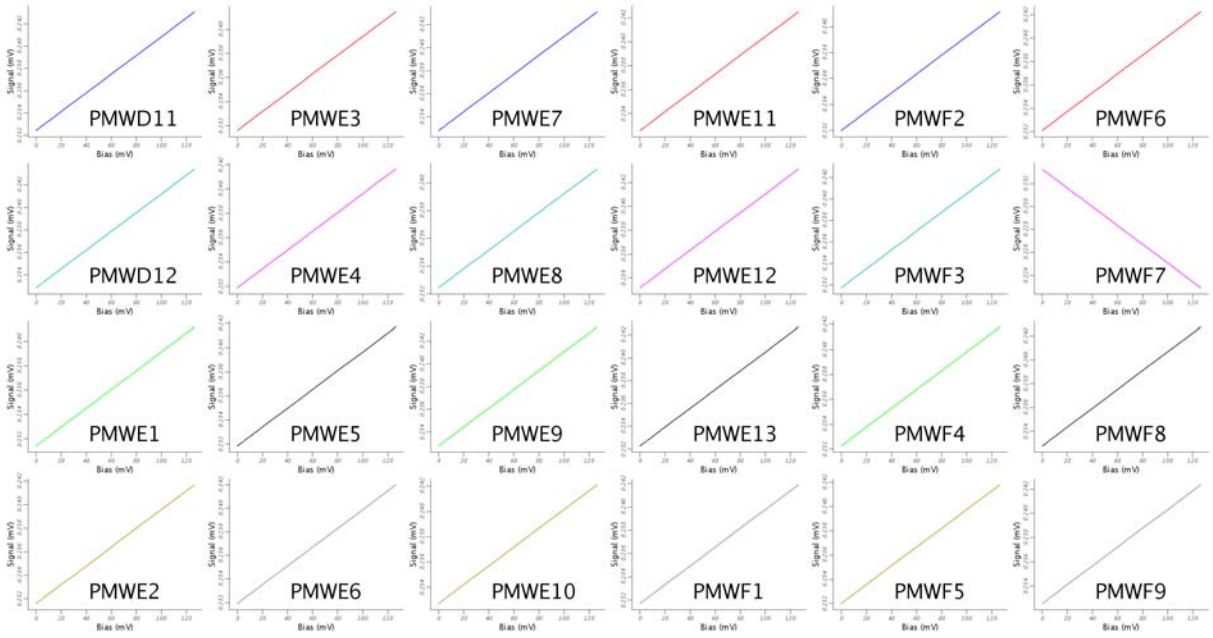


Figure 9. PMW Detectors (3)

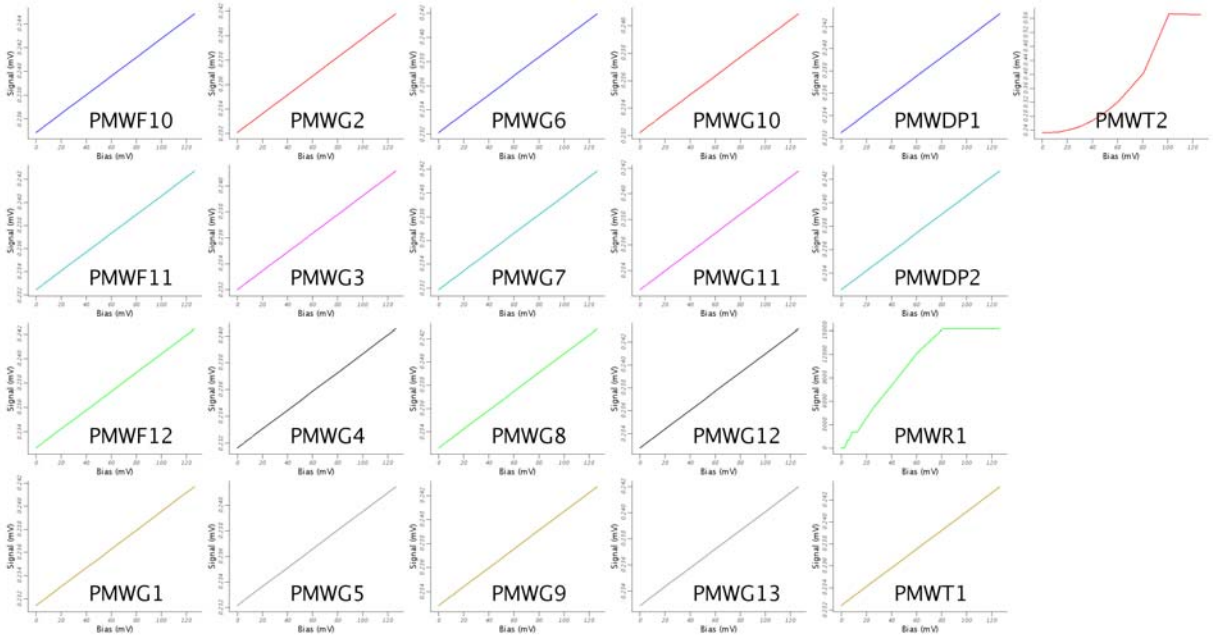


Figure 10. PMW Detectors (4)

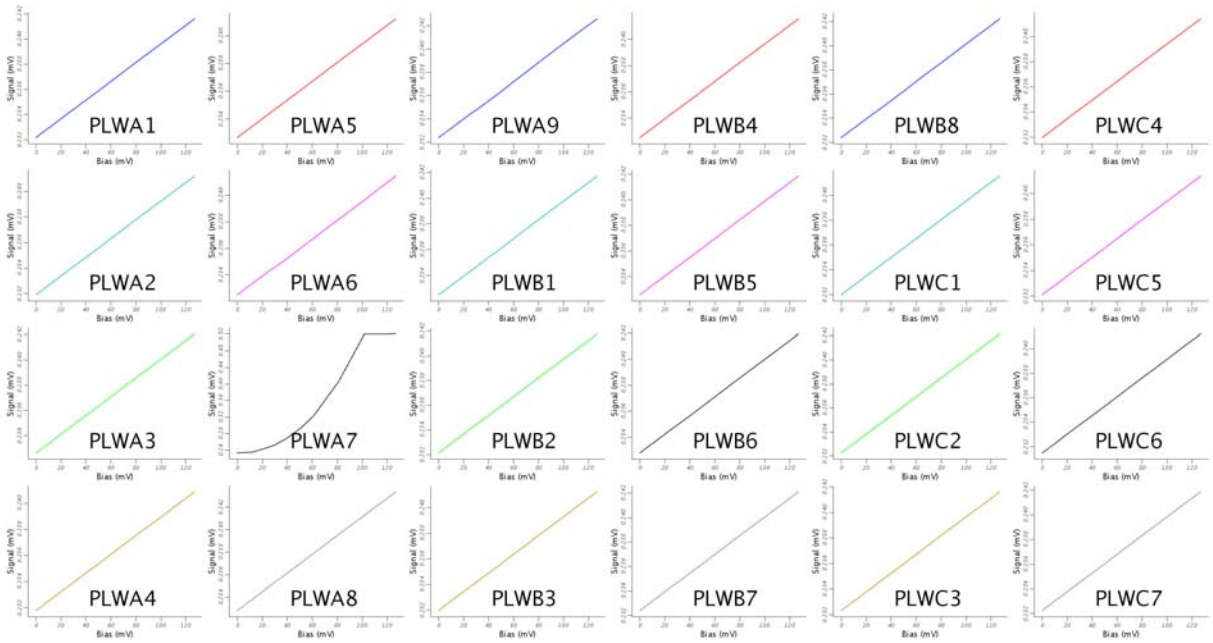


Figure 11. PLW Detectors (1)

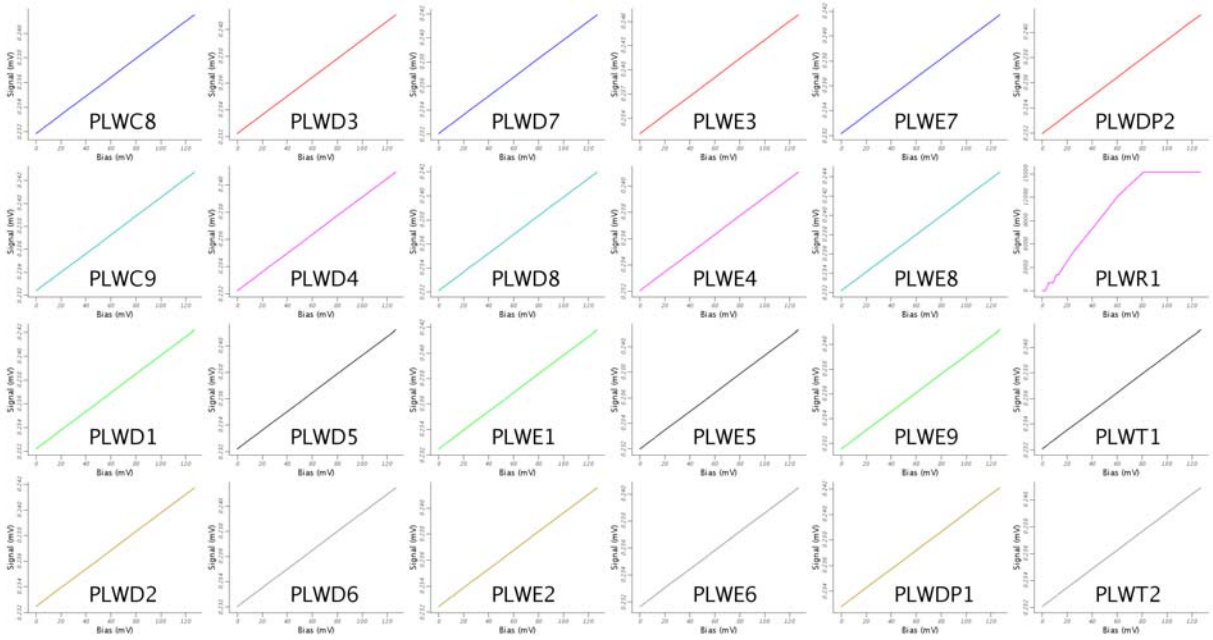
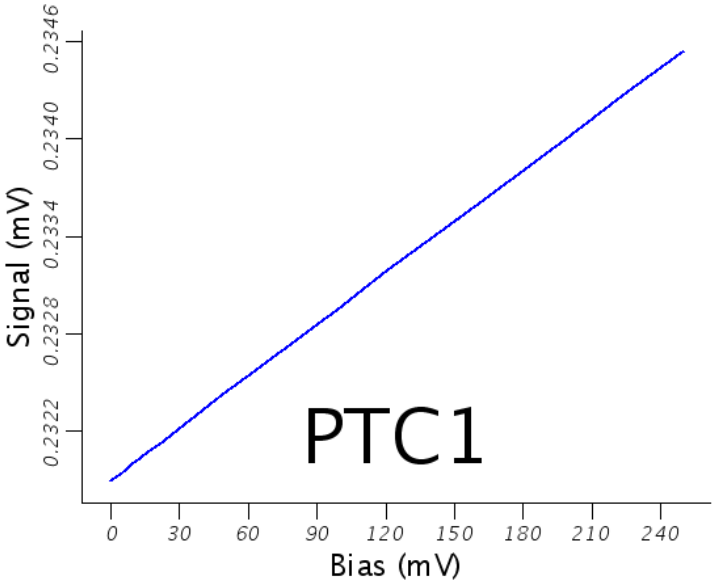
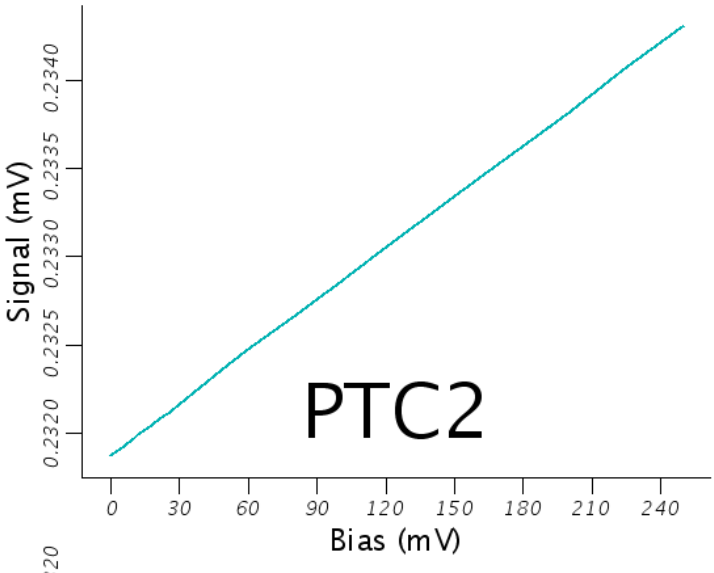


Figure 12. PLW Detectors (2)


PTC1
Signal (mV)
0.2322
0.2328
0.2334
0.2340
0.2346
0
30
60
90
120
150
180
210
240
Bias (mV)


PTC2
Signal (mV)
0.2320
0.2325
0.2330
0.2335
0.2340
0
30
60
90
120
150
180
210
240
Bias (mV)

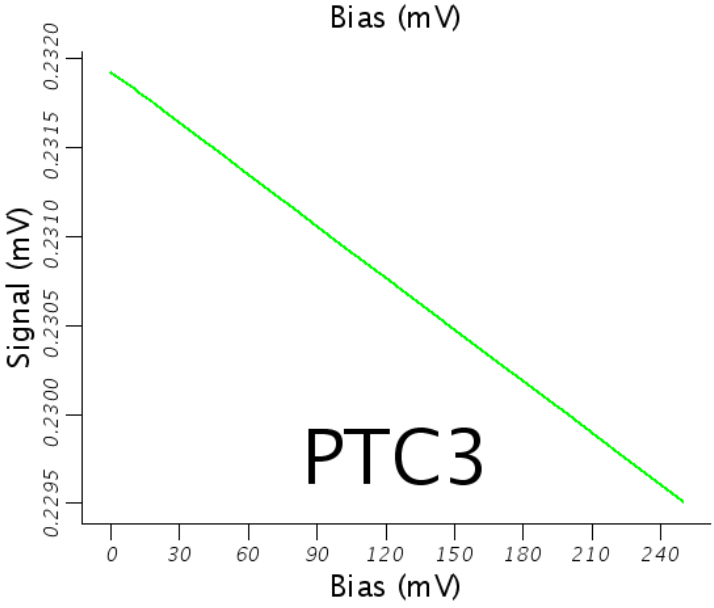

PTC3
Signal (mV)
0.2295
0.2300
0.2305
0.2310
0.2315
0.2320
0
30
60
90
120
150
180
210
240
Bias (mV)

Figure 13. PTC Detectors (1)

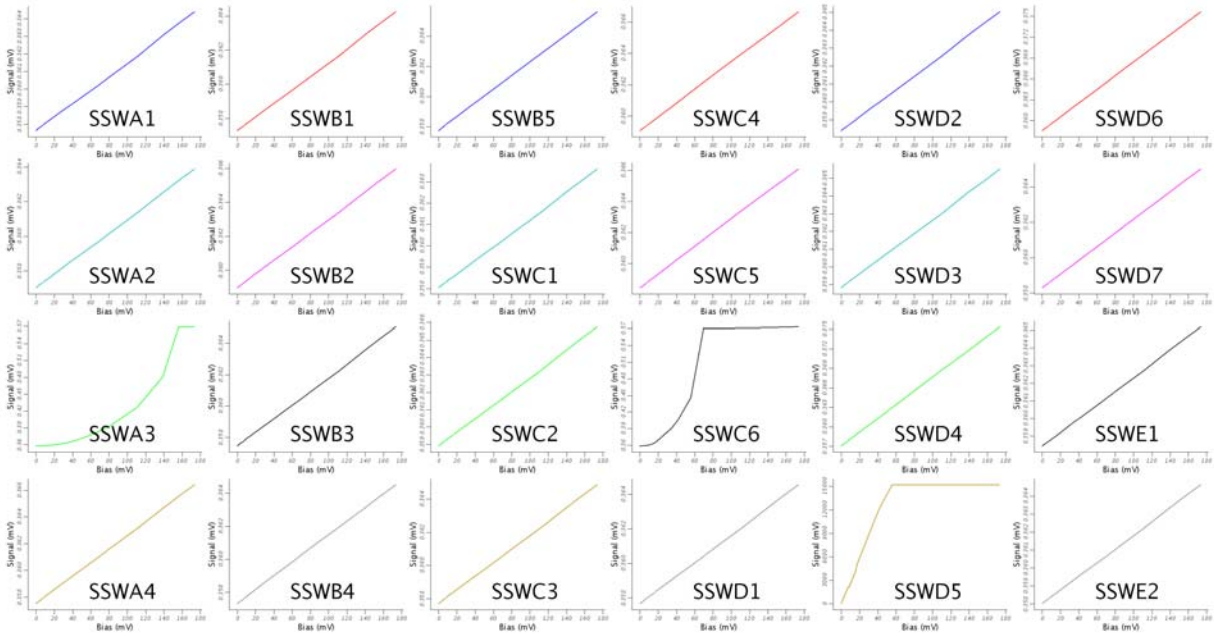


Figure 14. SSW Detectors (1)

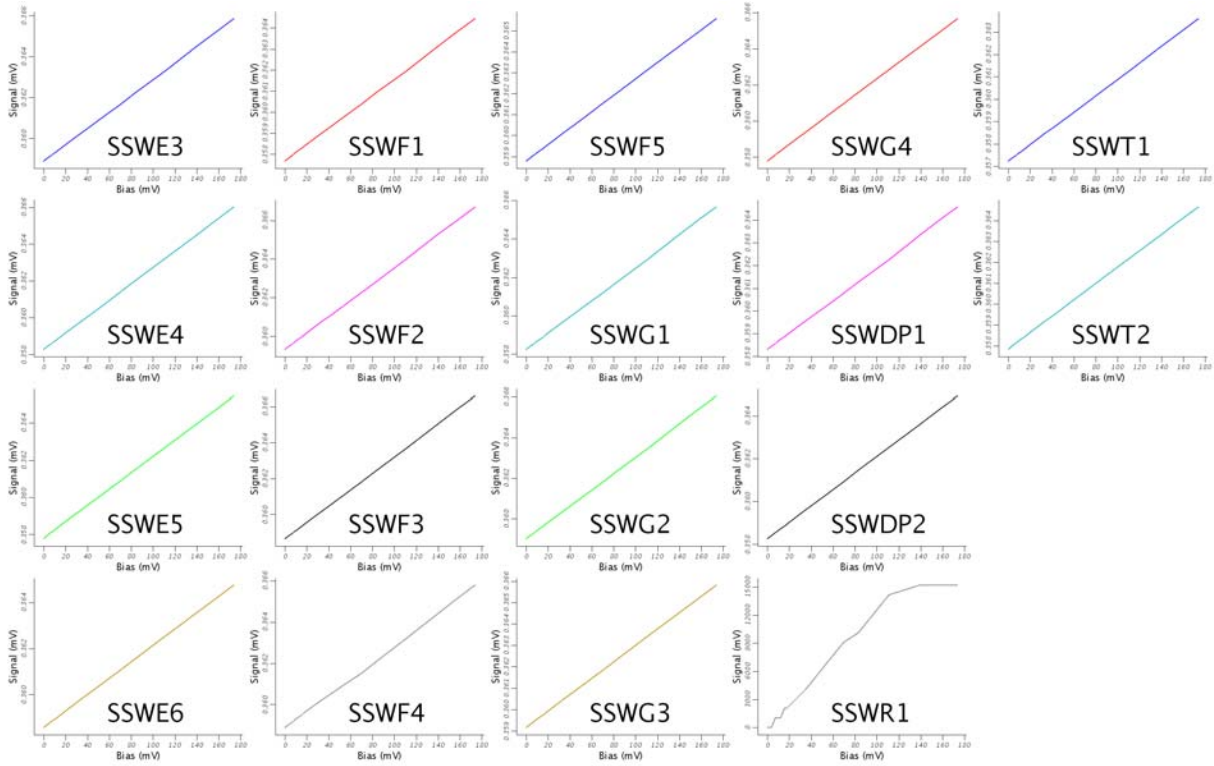


Figure 135. SSW Detectors (2)

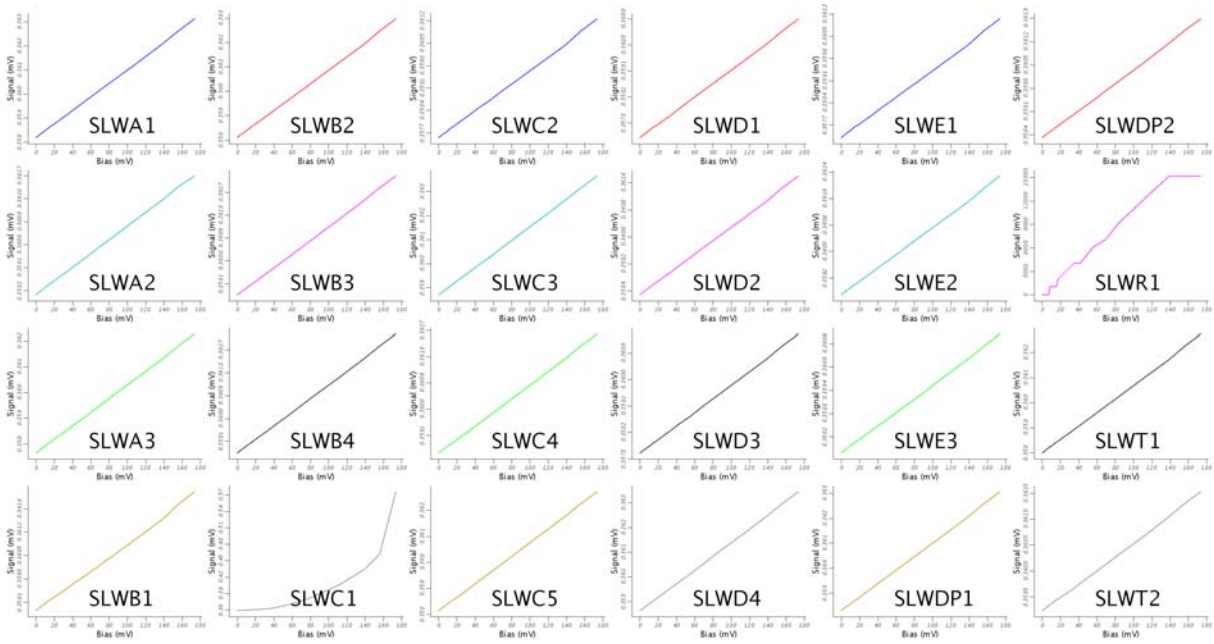


Figure 146. SLW Detectors (1)