SPIRE EQM Warm Functional Test Report

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1. Introduction

1.1 Introduction

This document reports on the SPIRE Warm Functional Test performed at EADS Astrium in Ottobrunn during 18th and 19th July 2005 after electrical integration of the instrument cryoharnesses to the SPIRE warm and cold units.
These tests were carried out in warm conditions on the CQM model of SPIRE instrument. The mechanisms in this is model are only thermally representative and have no movable parts ,i.e, only an STM SMECm is present and the BSM has no real movement on its axis. Also only one of the five instrument BDAs (PLW) is present in this model.

1.2 Change Record

Draft1, 26/07/2005 – First version.

Issue 1.0 15/08/05 – Some corrections for the general layout.

1.3 Applicable Documents

AD1 - CCS-SPIRE-WFT_Issue1.4.doc SPIRE-RAL-PRC-002422 Issue 1.4 Sunil D.Sidher& Asier A.Aramburu 15/07/05

1.4 Reference Documents

RD1 - SPIRE 3rd Warm Functional Test Report HP-2-ASED-TR-0077_1_0 S.Ilsen 19/07/05

RD2 - Spire CQMII Functional Test Report SPIRE-RAL-REP-002212 Draft 1 Sunil D.Sidher& Asier A.Aramburu 11/10/2004

RD3 - SCU QM1 Test Report SEDI-SCU-MM-2003-1 v0.4 15/09/2003

2. Test Results

2.1 Summary of Tests Performed

Here we will just layout the general warm functional test sequence as it was executed. Only the tests were instrument produced telemetry had to be analysed to verify for the success or failure of the test are reported here, these are highlighted in blue. Tests were only housekeeping parameters had to be checked are reported in RD1. For the detailed test procedure refer to AD1.

1. SPIRE-CCS-FUNC-SCU01. (SCU Science Generation Check)
2. SPIRE-CCS-FUNC-SCU02. (SCU Science Data Check)
3. SPIRE-CCS-FUNC-SCU08. (SCU Test Pattern Check)
4. SPIRE-CCS-FUNC-DCU01. (DCU Science Generation Check)
5. SPIRE-CCS-FUNC-DCU02. (DCU Science Data Check)
6. SPIRE-CCS-FUNC-DCU03. (DCU Test Pattern Check)
7. SPIRE-CCS-FUNC-DCU04-PS-ON (DCU LIAs Check)
8. SPIRE-CCS-FUNC-SCU04 (Photometer Calibrator check)
9. SPIRE-CCS-FUNC-SCU05 (Spectrometer Calibrator check)
10. SPIRE-CCS-FUNC-SCU07 (Cooler Heaters Check)
11. SPIRE-CCS-FUNC-SCU03 (DC Thermometry Check)
12. SPIRE-CCS-FUNC-SCU06 (AC Thermometry Check)
13. SPIRE-CCS-STP-LC-P (Detector Load curve)

2.2 Test Results

2.2.1

Test Name:	**SPIRE-CCS-FUNC-SCU-02**
Purpose:	SCU science data check .Comparison between SCU HK parameters and SCU science frame parameters.
Test Pass/Fail criteria:	SCU HK parameters and science frame parameters which correspond to the same measure have to agree to within +/- 10%.
Obsid:	0xb000000a
Start time (UT):	18th July ~ 15:57
End time (UT):	18th July ~ 15:58

Test Results:
A file was produced in real time with the comparison between the SCU housekeeping parameters and the SCU nominal science frame parameters. The contents of the file are shown bellow:

Housekeeping @ Mon Jul 18 16:52:27 BST 2005
SCU Science @ Mon Jul 18 16:52:17 BST 2005

Name	HSK value	SCU value	Equal?
TCHTRV	32768	32768	TRUE
PCALCURR	2	65477	FALSE
SCAL4CURR	2	2	TRUE
SCAL2CURR	2	2	TRUE
PCALV	2	3	FALSE
SCAL4V	3	2	FALSE
SCAL2V	1	2	FALSE
PUMPHTRTEMP	1200	1198	FALSE
PUMPHSTEMP	1588	1589	FALSE
EVAPHSTEMP	1765	1767	FALSE
SHUNTTEMP	60637	60642	FALSE
SOBTEMP	147	148	FALSE
SL0TEMP	1447	1445	FALSE
PL0TEMP	62590	62587	FALSE
OPTTEMP	65415	65414	FALSE
BAFTEMP	65086	65086	TRUE
BSMIFTEMP	65206	65208	FALSE
SCAL2TEMP	65278	65278	TRUE
SCAL4TEMP	64928	64932	FALSE
SCALTEMP	65303	65304	FALSE
SMECIFTEMP	0	65534	FALSE

Analysis:
The code that writes the file, tries to make an exact match of the SCU housekeeping and the SCU science frame parameters, but due to the inherent jitter with time in these parameters, the comparison will usually fail as it can be seen from the last column in the table. An SPR (#397**)** has been raised on QLA to try to rectify this error. The comparison though is successful. The disagreement on the PCALCURR and SMECIFTEMP values is due to a wrong parameter type definition in QLA.

Test Pass/Fail: **Pass**

Remarks:
The times specified as start time and end times are the times that QLA *PacketReceiver* display shows as *current time (UTC)* while the obsid is set for this test. These times don't agree though with the times appearing in the recorded file, as it can be seen from the Test Results. This is due to the way displays the packet receiver time.
As a consequence, if playback of any of the telemetry received during these warm functional tests is needed it should be done by grabbing the telemetry correspondent to the particular test's obsid, not by the times, as they only give and approximate idea of when the test was run.

2.2.2

Test Name:	**SPIRE-CCS-FUNC-SCU-08**
Purpose:	SCU Test Pattern check .SCU electronics integrity check
Test Pass/Fail criteria:	The test pattern produced by the SCU has to match a previously produced test pattern.
Obsid:	0xb000000b
Start time (UT):	18th July ~ 16:10
End time (UT):	18th July ~ 16:11

Test Results:
A file was produced on real time with the produced SCU test. The contents are shown bellow:

SCU Test Pattern @ Mon Jul 18 17:33:48 BST 2005

Name	Value[0]	Value[20]
SCUTSTOBSID	2.95E+09	0
SCUTSTBBID	2.32E+09	0
SCUTSTBLKLEN	30	30
SCUTSTFRAMEID	33	33
SCUTST001	43690	31181
SCUTST002	21844	62363
SCUTST003	43688	59190
SCUTST004	21840	52844
SCUTST005	43680	40153
SCUTST006	21825	14771
SCUTST007	43650	29543
SCUTST008	21765	59086
SCUTST009	43530	52637
SCUTST010	21524	39739
SCUTST011	43048	13943
SCUTST012	20560	27887
SCUTST013	41120	55774
SCUTST014	16705	46012
SCUTST015	33411	26489
SCUTST016	1287	52978
SCUTST017	2574	40420
SCUTST018	5149	15304
SCUTST019	10298	30608
SCUTST020	20597	61216
SCUTST021	41194	56896
SCUTST022	16852	48257
SCUTST023	33705	30978
SCUTST024	1874	61956
SCUTSTADCFLGS	0	0
SCUTSTFRAMETIME	313039	391164
SCUTSTCHECKWORD	42254	31877

Analysis:
This test pattern was compared to that produced by the same model of the SCU electronics on 12th Dec 2003. The comparison was successful.

Test Pass/Fail: **Pass**

Remarks:
Same remarks as in previous test. Here the difference is even bigger.

2.2.3

Test Name:	**SPIRE-CCS-FUNC-DCU-02**
Purpose:	DCU science data check for all Photometer and Spectrometer packet types (PF, PSW, PMW, PLW, SF, SSW, SLW)
Test Pass/Fail criteria:	The sampling time within the different types of frames has to agree with the sampling rate requested.
Obsid:	0xb0000012
Start time (UT):	19th July ~ 6:39
End time (UT):	19th July ~ 6:47

Test Results:
One hundred frames of each type of DCU nominal science are generated during this test.
The data is analyzed to calculate the difference in frametime (time when the frame was created) between two consecutive frames for each type. The mean and the standard deviation for these values are derived. The results are shown bellow:

	Δt = Time diffence between consecutive frames in sec σ = Standard deviation of Δt	
BDA	**Δt**	**σ**
PHOTF	0.065560992	1.28E-06
PHOTSW	0.065561012	1.26E-06
PHOTMW	0.065560993	1.25E-06
PHOTLW	0.06556097	1.27E-06
SPEF	0.012543902	5.59E-07
SPECSW	0.012543871	6.40E-07
SPECLW	0.012543894	5.82E-07

Analysis:
To verify for the success/failure of this tests we compare this results with the expected time differences for the photometer and spectrometer for a commanded sampling frequency. The comparison is shown in the following table.

Data type	Expected difference (ms)	Measured difference (ms)	Difference between the two (ms)
Photometer	65.2288	65.5609	~ 0.34
Spectrometer	12.4928	12.5438	~ 0.06

Test Pass/Fail: **Pass**

2.2.4

Test Name:	**SPIRE-CCS-FUNC-DCU-03**
Purpose:	DCU test pattern check (Full Photometer and Full Spectrometer Test Patterns)
Test Pass/Fail criteria:	The test pattern produced by the SCU has to match a previously produced test pattern.
Obsid:	0xb0000013
Start time (UT):	19th July ~ 8:12
End time (UT):	19th July ~ 8:15

Test Results:
Two files were produced on real time. The contents of these files are the Full Photometer Test Pattern and the Full Spectrometer Test Pattern which are shown bellow:

Full Photometer Test Pattern: 0th and 20th frame values from the 100 requested.
(Just a set of values is presented from the 288 values)

Name	Value[0]	Value[20]
PHOTFTSTOBSID	2.95E+09	2.95E+09
PHOTFTSTBBID	2.28E+09	2.28E+09
PHOTFTSTBLKLEN	294	294
PHOTFTSTFRAMEID	9	9
PHOTFTST001	6583	6583
PHOTFTST002	43658	43658
PHOTFTST003	31282	31282
PHOTFTST004	11751	11751
PHOTFTST005	57605	57605
PHOTFTST006	49072	49072
PHOTFTST007	62379	62379
PHOTFTST008	64232	64232
PHOTFTST009	59411	59411
PHOTFTST010	30336	30336
…	…	…
PHOTFTST279	16933	16933
PHOTFTST280	7109	7109
PHOTFTST281	16101	16101
PHOTFTST282	41909	41909
PHOTFTST283	43695	43695
PHOTFTST284	36126	36126
PHOTFTST285	32243	32243
PHOTFTST286	30919	30919
PHOTFTST287	28974	28974
PHOTFTST288	62188	62188
PHOTFTSTADCFLGS	0	0
PHOTFTSTFRAMETIME	6879508	7289264
PHOTFTSTCHECKWORD	353	49602

The Full Spectrometer Test Pattern: 0th and 20th frame values from the 100 requested.
(Just a set of values is presented from the 72 values)

Name	Value[0]	Value[20]
SPECFTSTOBSID	2.95E+09	0
SPECFTSTBBID	2.28E+09	0
SPECFTSTBLKLEN	78	78
SPECFTSTFRAMEID	13	13
SPECFTST001	6583	6583
SPECFTST002	23180	23180
SPECFTST003	31282	31282
SPECFTST004	53988	53988
SPECFTST005	57605	57605
…	…	…
SPECFTST069	4661	4661
SPECFTST070	9667	9667
SPECFTST071	57818	57818
SPECFTST072	56499	56499
SPECFTSTADCFLGS	0	0
SPECFTSTFRAMETIME	1.72E+07	1.73E+07
SPECFTSTCHECKWORD	59534	55887

Analysis:
Both test patterns were checked against those generated on 21st October 2004 and both checks were successful.

Test Pass/Fail: **Pass**

2.2.5

Test Name:	**SPIRE-CCS-FUNC-DCU-04-PS**
Purpose:	Photometer and spectrometer LIAs switch on, integrity check
Test Pass/Fail criteria:	LIAs have to switch ON.
Obsid:	0xb0000014
Start time (UT):	19th July ~ 8:20
End time (UT):	19th July ~ 8:21

Test Results:
The procedure consists on switching ON the Photometer LIAs which in the QM1 electronics model used for EQM testing also switches the Spectrometer LIAs. Only the LIAs board temperatures are available on the Nominal HK and these parameters are used to verify that the LIAs are actually switched ON. The following is a ~ 1 hour timeline from switch ON of the Spectrometer LIA temperature values extracted from the available telemetry.

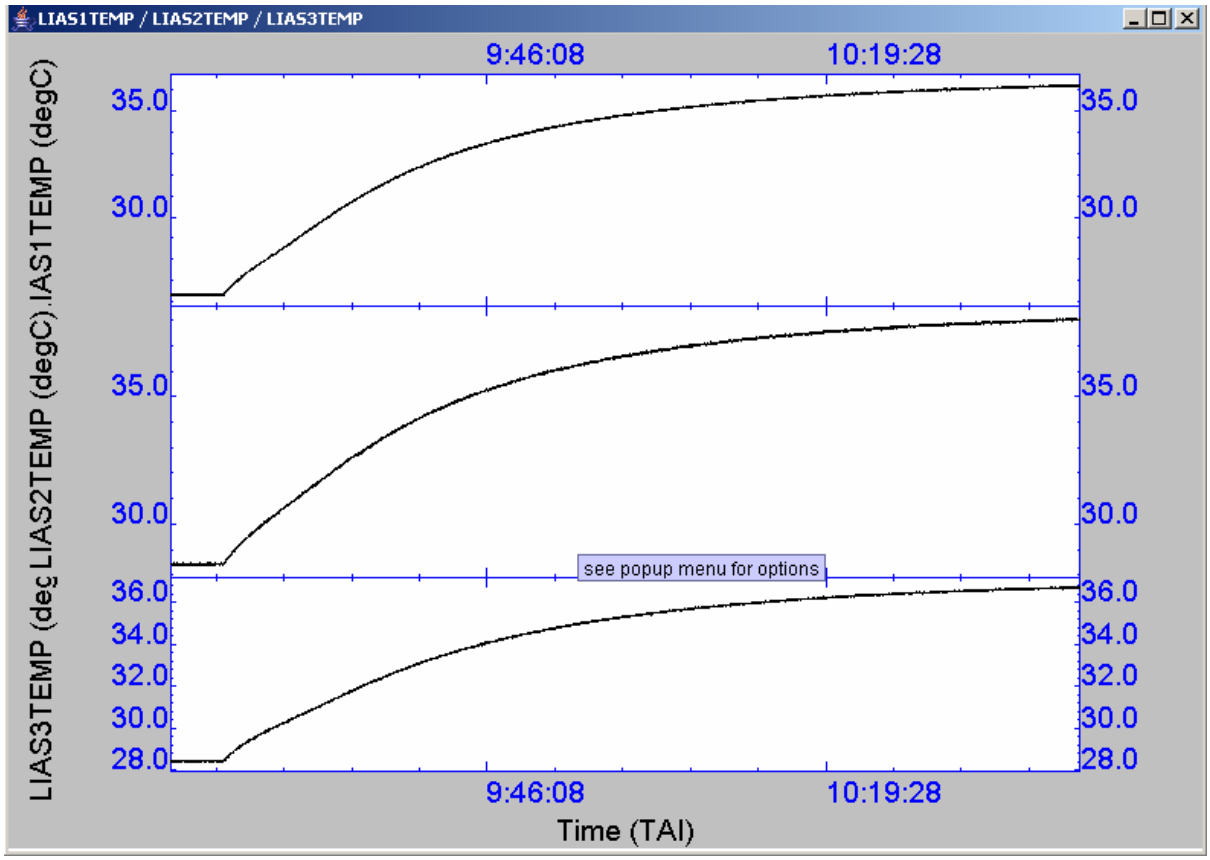


Figure 1 Spectrometer LIA Temperatures

The correspondent timeline for the photometer LIAs is showed bellow.

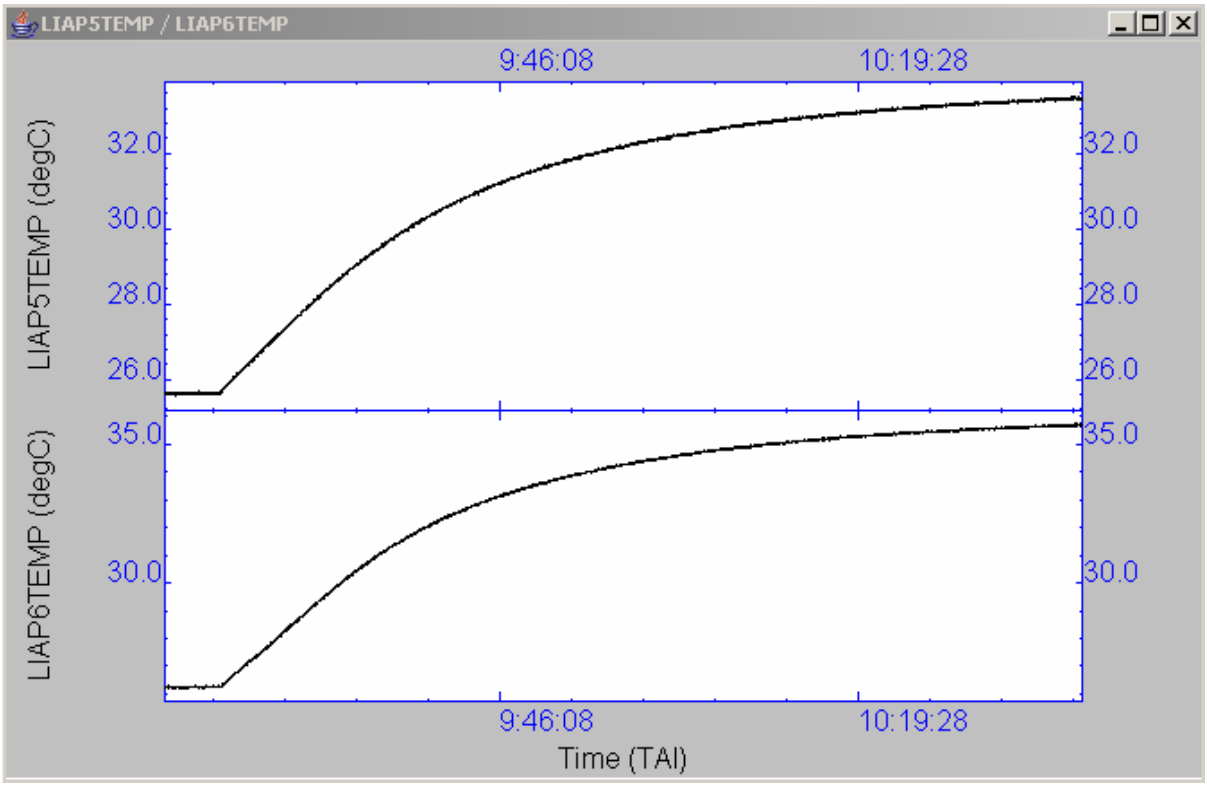


Figure 2 Photometer LIA Temperatures

Test Pass/Fail: **Pass**

2.2.6

Test Name:	**SPIRE-CCS-FUNC-SCU-04**
Purpose:	Photometer calibrator (PCAL) check
Test Pass/Fail criteria:	Measured PCAL current has to match the commanded current.
Obsid:	0xb0000015
Start time (UT):	19th July ~ 8:26
End time (UT):	19th July ~ 8:29

Test Results:
The following is a QLA time series plot of the measured PCAL current and voltages (available in the SPIRE nominal HK telemetry packet) during the execution of the test.

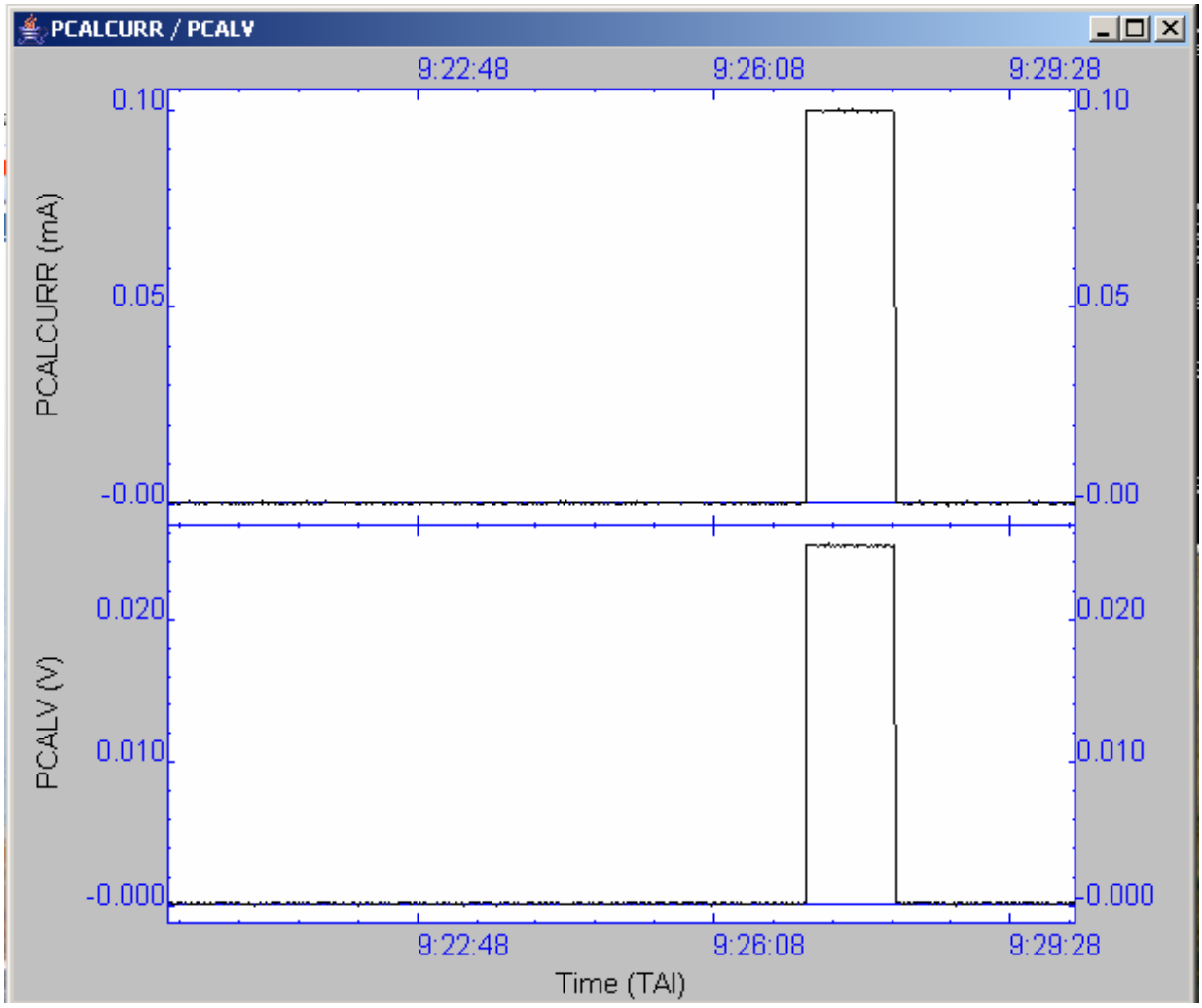


Figure 3 Photometer Calibrator measured I and V

Analysis:
The current applied to PCAL was 0.1mA.
As it can be seen on the plot the measured current agrees with the commanded current.

Remarks:
To compare the measured voltage with an expected voltage we look at RD3, which provides a range of resistance values [200-500]Ω for PCAL, thus giving an expected voltage range of [20-50]mV for a commanded 0.1mA bias. The measured voltage is checked against the expected range and then compared with a previous run of the test, e.g, that appearing in RD2; As it can be seen from the plot the measured voltage is within the expected range and agrees with a previous test run.

Test Pass/Fail: **Pass**

2.2.6

Test Name:	**SPIRE-CCS-FUNC-SCU-05**
Purpose:	Spectrometer calibrators (SCAL2/SCAL4) check
Test Pass/Fail criteria:	Measured SCAL2/SCAL4 currents have to match the commanded currents.
Obsid:	0xb0000016
Start time (UT):	19th July ~ 8:30
End time (UT):	19th July ~ 8:33

Test Results:
The following are QLA time series plots of the measured SCAL4 and SCAL2 current and voltages (available in the SPIRE nominal HK telemetry packet) during the execution of the test.

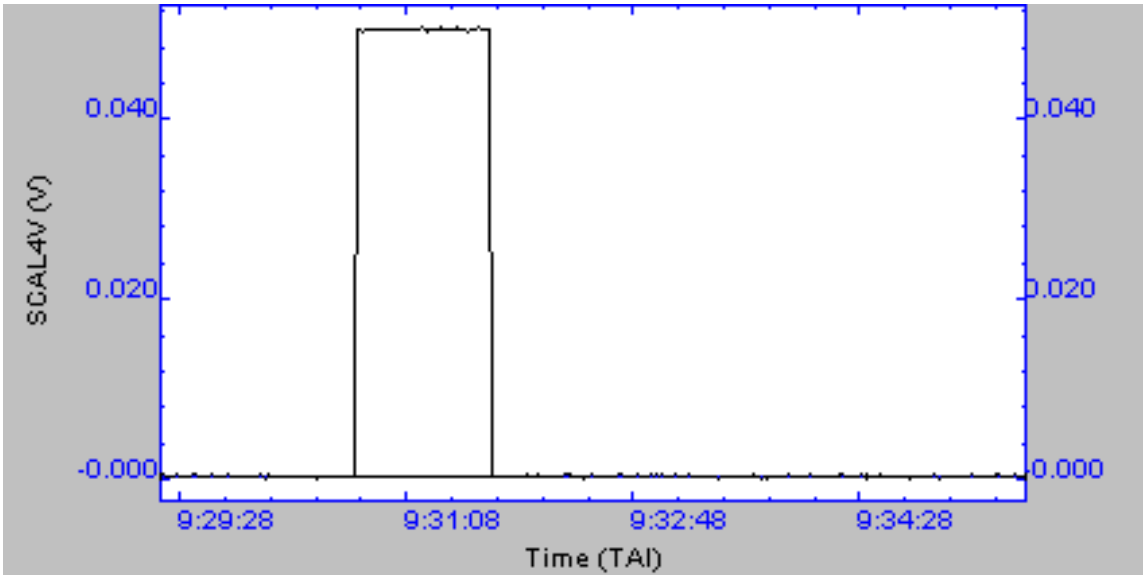


Figure 4 SCAL4% measured voltage

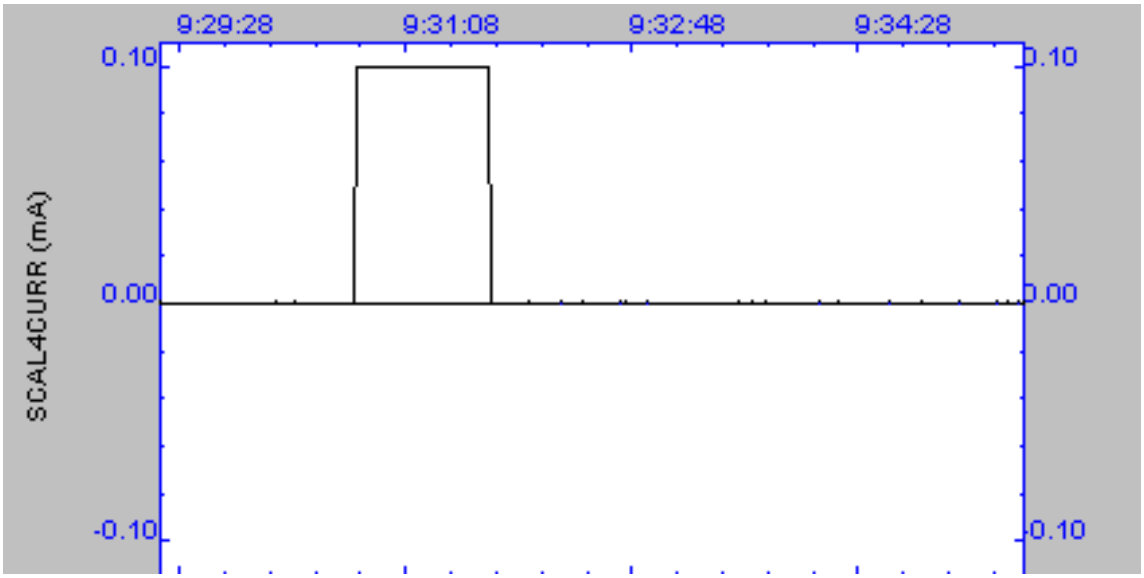


Figure 5 SCAL4% measured current

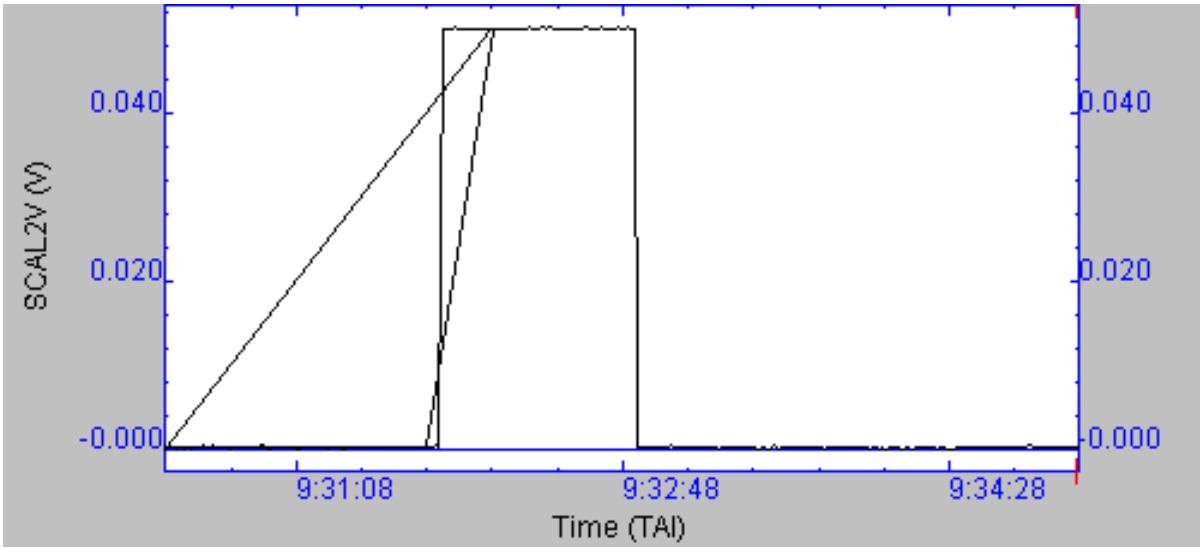


Figure 6 SCAL2% measured voltage

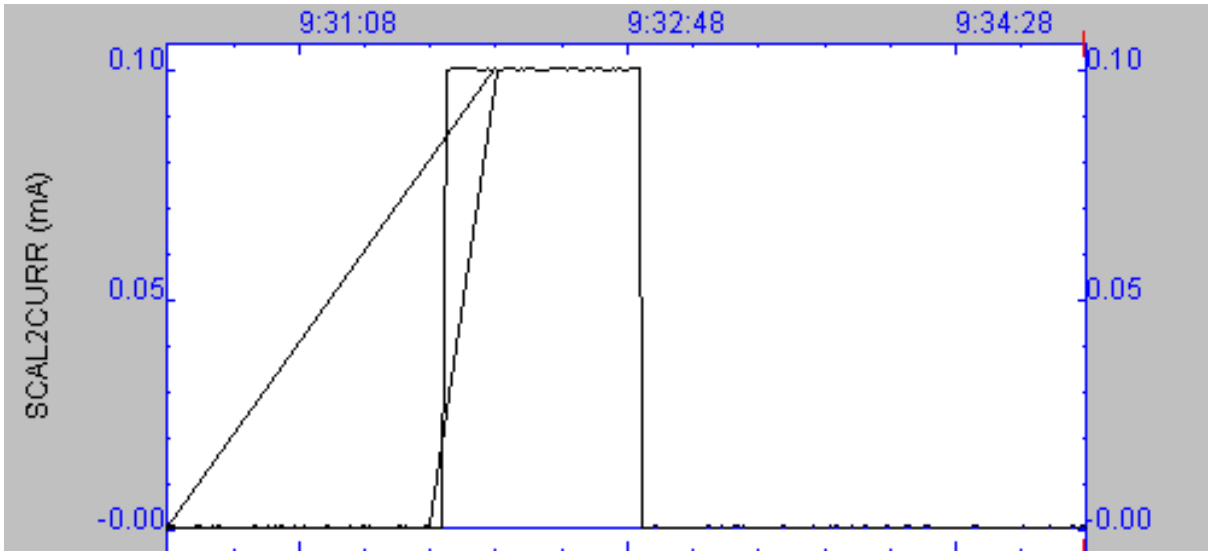


Figure 7 SCAL2% measured current

Analysis:
The currents applied to SCAL2 and SCAL4 were 0.1mA.
As it can be seen, the measured SCAL2/SCAL4 currents agree with the commanded currents. For a 500Ω resistor (for both SCAL2 and SCAL4 in RD3) a current of 0.1mA gives 50mV drop across these resistors, which also agrees with the measured voltage.

Remarks:
The solid line features that appear on the SCAL2 plots do not represent real current or voltage. They are due to an SPIRE HK timeline problem (time going backwards) which seems to affect part of the tests and is currently under investigation.

Test Pass/Fail: **Pass**

2.2.7

Test Name:	**SPIRE-CCS-FUNC-SCU-07**
Purpose:	Cooler heat switches and pump heater checks
Test Pass/Fail criteria:	cooler heat switches and pump heater measured voltages have to be in agreement with the expected voltage for a given commanded bias.
Obsid:	0xb0000017
Start time (UT):	19th July ~ 8:44
End time (UT):	19th July ~ 8:48

Test Results:
The following are QLA time series plots of the measured Evaporator Heat Switch, Sorption Pump Heat Switch, and Sorption Pump Heater voltages (available in the SPIRE nominal HK telemetry packet) during the execution of the test.

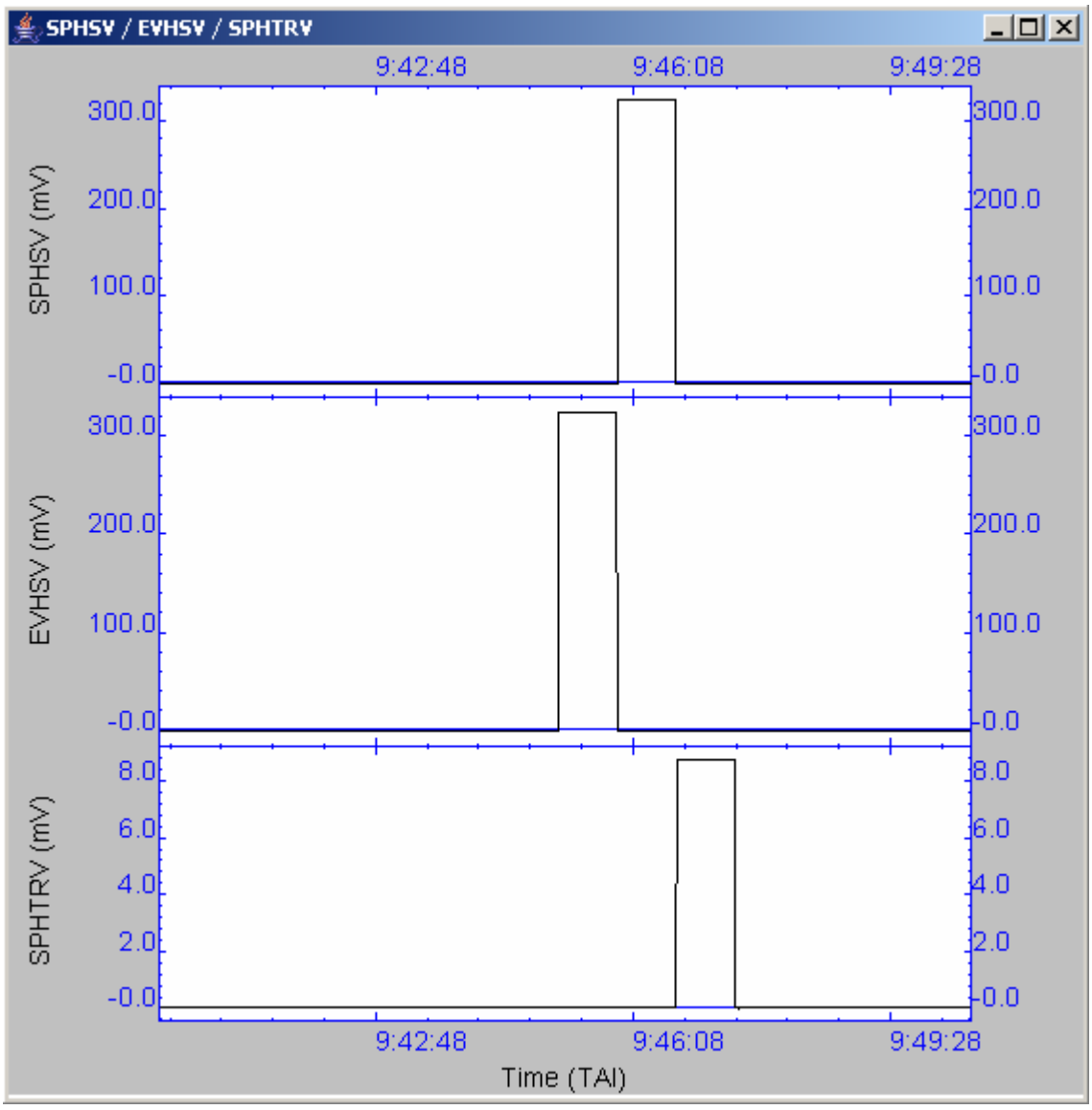


Figure 8 Cooler Heat Switches and Pump Heater voltages

Analysis:
The commanded current for both the Evaporator Heat Switch and Sorption Pump Heat Switch is ~ 0.8 mA. For the Sorption Pump Heater the commanded current is ~ 21.85mA.
The expected voltages on the switches and pump heater for these currents based on the theoretical resistor general value of 402Ω, are ~ 321 mV on the switches and ~ 8V on the pump heater. (Resistor values as in RD3). As it can be seen from the plots the measured voltages agree with the theoretical ones.

Remarks:
There is an error on the QLA plot for the sorption pump heater voltage units; they should be volts instead of mV.

Test Pass/Fail: **Pass**

2.2.8

Test Name:	**SPIRE-CCS-FUNC-SCU-03**
Purpose:	DC thermometry check
Test Pass/Fail criteria:	Temperature readings have to agree with FPU thermal status (warm/cool/cold).
Obsid:	0xb0000018
Start time (UT):	19th July ~ 8:50
End time (UT):	19th July ~ 8:51

Test Results:
The following is a QLA clock display of the DC temperature channels after the tests. Most of the calibration curves for these channels are out of range at room temperature as it can be seen (32768 readings for a 16 bit signed integer), the only "in range" values are SOBTEMP, SMECTEMP and SMECIFTEMP but the resolution above 75K (only two points in the curve) is very poor, and so the converted values are not good enough on the range 80K- 300K. These values were compared to those in RD2. The comparison was successful.

SCUTEMPSTAT	65535.0
PUMPHTRTEMP	32768
PUMPHSTEMP	32768
EVAPHSTEMP	32768
SHUNTTEMP	32768
SOBTEMP	221.57
SLOTEMP	32768
PLOTEMP	32768
OPTTEMP	32768
BAFTEMP	32768
BSMIFTEMP	32768
SCAL2TEMP	32768
SCAL4TEMP	32768
SMECIFTEMP	63212
SMECTEMP	58390
BSMTEMP	13.318

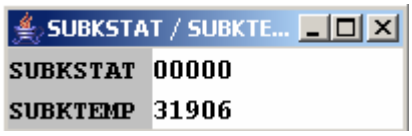
Test Pass/Fail: **Pass**

2.2.9

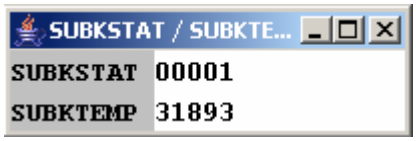
Test Name:	**SPIRE-CCS-FUNC-SCU-06**
Purpose:	AC thermometry check
Test Pass/Fail criteria:	Evaporator cold tip temperature reading has to agree with FPU thermal (warm/cool/cold).
Obsid:	0xb0000019
Start time (UT):	19th July ~ 8:56
End time (UT):	19th July ~ 8:57

Test Results:
The following is a QLA clock display of the SCU AC temperature channel before and after the test. This value was compared to that in RD2. The comparison was successful.

Before:



After:



Remarks:
The evaporator temperature sensor is only in range (not short circuit) when the FPU is bellow ~ 13K. The purpose of this test when the instrument is warm, is to verify that the SCU AC channel is actually working, which it can be seen for the small change in the raw reading.

Test Pass/Fail: **Pass**

2.2.10

Test Name:	**SPIRE-CCS-SPT-LC-P**
Purpose:	Perform a Load Curve after detector switch ON to verify the integrity of the JFETs.
Test Pass/Fail criteria:	Detector response in this thermal condition is as expected.
Obsid:	0xb000001B
Start time (UT):	19th July ~ 9:48
End time (UT):	19th July ~ 9:58

Test Results:
The following table shows results of two consecutive runs of this test.
Detectors were biased at 200Hz with a sequence of different bias amplitudes from ~10mVrms to ~50mVrms in steps of 10mVrms, and the output signal demodulated at φ_0=168°.
On the second run the phase was shifted 180° to check the relative behaviour of the detector's signal from the first phase to the second.

	Phase = 168 deg			Phase = 348 deg.			
Pixel	DAC 1	DAC 2	Diff	DAC1	DAC2	Diif	Change (%)
A1	28000	39500	-11500	6000	Offscale		
A2	16545	16655	-110	16315	16195	120	-9%
A3	16545	16640	-95	16370	16285	85	11%
A4	16560	16655	-95	16375	16285	90	5%
A5	16610	16785	-175	16270	16100	170	3%
A6	16465	16555	-90	16295	16210	85	6%
A7	16485	16585	-100	16290	16190	100	0%
A8	16505	16640	-135	16252	16125	127	6%
A9	16505	16595	-90	16330	16243	87	3%
B1	16535	16645	-110	16325	16220	105	5%
B2	16545	16640	-95	16350	16257	93	2%
B3	16510	16610	-100	16317	16220	97	3%
B4	16460	16555	-95	16275	16180	95	0%
B5	No signal	No signal		13330	8250	5080	
B6	No signal	No signal		14050	9800	4250	
B7	16448	16537	-89	16275	16190	85	4%
B8	16512	16608	-96	16330	16240	90	6%
C1	16446	16426	20	16483	16503	-20	0%
C2	16555	16660	-105	16350	16250	100	5%
C3	16535	16640	-105	16325	16222	103	2%
C4	16510	16598	-88	16335	16245	90	-2%
C5	16584	16698	-114	16360	16245	115	-1%
C6	16600	16738	-138	16330	16194	136	1%
C7	16567	16757	-190	16192	16005	187	2%
C8	16552	16636	-84	16388	16305	83	1%
C9	16482	16586	-104	16278	16175	103	1%

	Phase = 168 deg			Phase = 348 deg.			
Pixel	DAC 1	DAC 2	Diff	DAC1	DAC2	Diif	Change (%)
D1	16526	16607	-81	16370	16290	80	1%
D2	16634	16814	-180	16285	16105	180	0%
D3	16598	16740	-142	16320	16180	140	1%
D4	16733	17018	-285	16180	15895	285	0%
D5	No signal	No signal		25600	33850	-8250	
D6	16585	16733	-148	16300	16150	150	-1%
D7	16430	16404	26	16480	16510	-30	-15%
D8	No signal	No signal		30400	43450	-13050	
E1	14775	14784	-9	14756	14746	10	
E2	16464	16462	2	16470	16474	-4	-100%
E3	15738	15045	693	17140	17850	-710	
E4	16452	16460	-8	16442	16436	6	25%
E5	16535	16638	-103	16327	16225	102	1%
E6	16470	16522	-52	16370	16317	53	-2%
E7	16558	16668	-110	16340	16234	106	4%
E8	16554	16648	-94	16370	16285	85	10%
E9	16534	16626	-92	16355	16263	92	0%
R1	No signal	No signal		45900	22800	23100	
T1	16464	16508	-44	16385	16345	40	9%
T2	16170	15865	305	16756	17060	-304	0%
DP1	16528	16628	-100	16335	16240	95	5%
DP2	17066	17700	-634	16835	16225	610	4%

Analysis:

- For nominally performing pixels, it is expected that the signal changes by around 100 DAC units when the bias amplitude is increased by ~10mVrms.
- For nominally performing pixels, it is expected that the change in output has opposite sign when the demodulation phase is changed by 180°
- Pixels C1, D7 and E4 have a low output indicating a low detector impedance. The performance of these channels is to be reviewed at operating temperature.
- Pixels A1, B5, B6, D5, D8 E1, E3 were identified as being defective during ILT.
- Pixel R1 is a resistor and is expected to have a large output at room temperature.

Test Pass/Fail: **Pass**

3. Problems Found:

3.1 NCRs

NCR (#1269 in RD1) affecting the test execution has been raised on Alcatel. One of the Alcatel delivered SPIRE MIB bridge files, the tmd.dat file which is used by the CCS to identify the different types of telemetry (nominal HK tm, DCU science tm, SCU science tm, events tm) received from the instrument , did not include the spids (SCOS packet identifiers) for the event telemetry type.
As a consequence, the CCS would flag every event packet received from the DPU as an unknown telemetry packet and would not forward it to the instrument EGSE.
An example of this type of telemetry is the event packet (5,2) which is generated by the boot software of SPIRE DPU at boot time. The contents of this packet have to be checked prior to any attempt in starting the On Board Software tasks, but the CCS would not forward the event to the IEGSE if is not defined in the tmd.dat file.

3.2 Telemetry Problems

There seem to be a recurrent problem with the SPIRE HK telemetry.
When telemetry playback is attempted from SCOS, the system raises the following error:

R*eceived n packets with the same packet time*.

SCOS archives telemetry assigning to each received packet a packet reception time at the SCOS station. When the user wants to playback the HK telemetry stored in SCOS TM archive, this is done taking the HK packet reception time as the timeline reference.
Now, if for whatever reason, a bottleneck occurs somewhere in telemetry downlink chain (SPIRE DPU creates an HK packet @ $\boldsymbol{t}$ → CDMU → CCS → Pipe Gateway → EGSE Router → EGSE Gateway → SCOS2000 receives the packet @ $\boldsymbol{t + \Delta t}$) so that the packets are received all at once in SCOS, SCOS will store them with the same reception time.
The source of this problem is not known yet and could arise from different points in this downlink chain. This is currently under investigation.

3.2 Software problems

A java based application called Quick Analysis Tool (QLA) is used to analyze the data produced during the tests. For each of the test a jython script is used which triggers the monitoring and recording of data based on certain events occurring in the SPIRE HK.
These scripts make use of different mathematical libraries which vary from one HCSS release to another making the task of mathematical analysis release dependent. Several SPRs have been raised on QLA to try to track down and solve this problem.

4. Conclusions:

The conclusion of these warm functional tests is that SPIRE instrument is fully functional and the next phase of the EQM testing can go ahead. No problems were found with the hardware.
There is though and outstanding issue related to HK telemetry timeline as explained before.