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LFI Project System Team

Planck LFI

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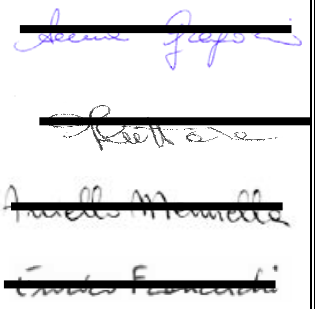
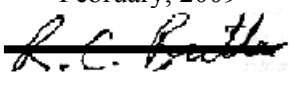
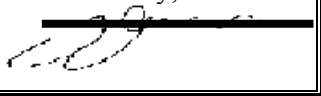
Prepared by	**A. GREGORIO** **F. CUTTAIA** **A. MENNELLA** **E. FRANCESCHI** **On Behalf of LFI IOT**	**Date:** February, 2009 **Signature:** 
Agreed by	**C. BUTLER** **LFI Program Manager**	**Date:** February, 2009 **Signature:** 
Approved by	**N. MANDOLESI** **LFI Principal Investigator**	**Date:** February, 2009 **Signature:** 

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CHANGE RECORD

Issue	Date	Sheet	Description of Change	Release
1.0	February 09	All	First Draft of Document	Draft

TABLE OF CONTENTS

1 ACRONYMS

AIV	Assembly, Integration, Verification
ASW	Application Software
BEM	Back End Module
BEU	Back End Unit
CCS	Central Check-out System
CDMU	Central Data Management Unit
DAE	Data Acquisition Electronics
DPU	Digital Processing Unit
EGSE	Electrical ground Support Equipment
FEM	Front End Module
I-EGSE	Instrument EGSE
IST	Integrated Satellite Test
OBC	On Board Clock
RAA	Radiometer Array Assembly
REBA	Radiometric Electronic Box Assembly
S/C	Spacecraft
SCOE	Spacecraft Control and Operation System
SPU	Signal Processing Unit
SUSW	Start- Up Software
SVM	Service Module
TBC	To Be Checked
TBW	To Be Written
TC	Telecommand
TM	Telemetry
UFT	Unit Functional Test

2 INTRODUCTION

This document has been issued in the frame of ASI contract that has been released for the activities of Planck-LFI Phase E2

2.1 Purpose and Scope

Scope of this document is to give a first quick look analysis response of the functionality of the LFI instrument during the IST Test Campaign run at the Kourou CSG centre before launch.

The objective of Planck IST is two fold:

to verify the correct performance of the satellites and the compatibility between all the integrated electrical subsystems and instruments,
to mimic the operation procedures which will be exercised during the different phases of the satellite mission.

The document is divided in two sections. The first section is related to the description of the work done that is to say the description of the LFI Log Book and the description of the performed tests. The second section is the summary of the results of each test coming from both real time and offline data analysis.

2.2 Test configuration

The test configuration is the following

SCOS 2 K HPCCS Version
LFI Gateway Version
TQL TBC
LIFE Machine version OM

LFI Personnel involved during the test is:

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3 APPLICABLE AND REFERENCE DOCUMENTS

3.1 Applicable Documents

[AD1] Herschel/Planck Instrument Interface document Part A
SCI-PT-IIDA-04624 Issue 3.3

[AD2] Herschel/Planck Instrument Interface document Part B
SCI-PT-IIDB-04142 Issue 3.1

[AD3] Herschel/Planck Instrument Interface document Part B
SCI-PT-IIDB-04142 Issue 3.1, Annex 3, ICD 750800115

[AD4] Herschel/Planck Instrument Interface document Part A
SCI-PT-IIDA-04624 Issue 3.3 Annex 10

3.2 Reference Documents

[RD1] Planck Instrument Testing at PFM S/C levels
H-P-3-ASP-TN-0676, Issue 1.0

[RD2] Planck LFI User Manual
PL-LFI-PST-MA-001 Issue 3.0

[RD3] Planck LFI REBA Herschel PACS SPU: LFI REBA FMs User's Manual
FPL-MA-1214-04 CRS Issue 1.0

[RD4] LFI- REBA application Software User Manual (SUM)
DS/UM_FIR/178v.4

[RD5] LFI Warm Functional Test Procedure (WFT)
PL-LFI-PST-PR-017_3_1

[RD6] PLM SIT Test Specification
H-P-3-ASP-TS-1421 Issue 2.0

[RD7] IST1 and IST2 Combined LFI HFI tests
PL-LFI-PST-PR-019 Issue 4.3

[RD8] Quick Look Data Analysis Of LFI performed during SIT
PL-LFI-PST-RP-024 Issue 1.0

[RD9] Quick Look Data Analysis Of LFI PLM SIT Test
PL-LFI-PST-RP-056 Issue 1.0

4 IST Test Execution

For each modular block of procedure test results and conclusions are presented.

4.1 PLM SIT - Switch on LFI in nominal science (Nominal Unit)

4.1.1 Procedure/ Test sequence

LFI SIT: Switch on (Nominal Unit)					1:00:00	
Switch ON LFI				1	0:39:00	
	Go to Stand By Mode	OFF to standby	0:32:00	1	0:32:00	0:32:00
	Go to DAE Set Up Mode	Standby to DAE set up	0:07:00	1	0:07:00	0:39:00
LFI in Normal Science (Warm test Config..)				1	0:21:00	
	Setting Telemetry Rate	Nominal Values	0:02:00	1	0:02:00	0:41:00
	Event Packet Enabling		0:02:00	1	0:02:00	0:43:00
	Definition of science Processing Parameters	Naverage set to 256	0:02:00	1	0:02:00	0:45:00
	Changing Processing Type to 1		0:05:00	1	0:05:00	0:50:00
	Spu Connection		0:02:00	1	0:02:00	0:52:00
	Science Activation Type 1		0:04:00	1	0:04:00	0:56:00
	RCA Activation		0:02:00	1	0:02:00	0:58:00
	Set DAE Default configuration		0:02:00	1	0:02:00	1:00:00

At the end of the Procedure LFI will stay in listening mode with HFI and SCS had performed WFT and Health check.

4.1.2 Results and Conclusions

The procedure was run on February the 24th without any problem and the test was finished successfully.

Pass and Fail Criteria

No errors from the REBA HW Self check	
No un-expected event Packets	
REBA Power Consumption within the ranges of expected values	
EEPROM Check Sum passed	
REBA synchronization achieved	
DAE Power Consumption within the ranges of expected values	
DAE Synchronization achieved	
The FEM I Drain Currents obtained from Telemetry are within the ranges expected (5%)	
The DC voltages Outputs (Science Telemetry)	

are within the ranges expected. (10%)	
No unexpected features in FFT spectrum (Spike, Pop corn noise, currents drops…)	

No NCRs have been raised.

4.2 PLM SIT - Nominal Science with nominal unit

During this step HFI and SCS are performing their WFT. LFI stays in nominal acquisition acquiring data for analysis.

4.2.1 Procedure/ Test sequence

No test sequence for LFI is requested to be applied here.

4.2.2 Results and Conclusions

Pass and Fail Criteria

No un-expected event Packets	
REBA Power Consumption within the ranges of expected values	
DAE Power Consumption within the ranges of expected values	
No unexpected features during HFI activity in Scientific signal	
No unexpected features during SCS activity in Scientific signal	

No NCRs have been raised.

4.2.2.1 Currents monitoring during HFI WFT and during SCS-N HC

No evident changes in the drain currents are observed during the activities of other instruments: all changes are well within the standard deviation measured during the LFI AMB_02 itself.

4.3 PLM SIT - LFI Execution of AMB02

4.3.1 Procedure/ Test sequence

LFI SIT: AMB02 execution (Nominal Unit)					3:24:00	
Switch ON LFI - AMB-02				1	3:24:00	
	RCA Activation		0:05:00	1	0:05:00	0:05:00
	Perform DAE Initialization		0:10:00	1	0:10:00	0:15:00
	Wait for thermalization of power groups		0:30:00	1	0:30:00	0:35:00
	Configure DAE (Scwitch ACA on)		0:02:00	1	0:02:00	0:37:00
	Wait for thermalization of FPU		0:25:00	1	0:25:00	1:02:00
	Enable 4KH switching A/C		0:02:00	1	0:02:00	1:04:00
	Acquire data		0:30:00	1	0:30:00	1:34:00
	Change PS stauts to one on B/D		0:02:00	1	0:02:00	1:36:00
	Acquire data		0:30:00	1	0:30:00	2:06:00
	Disable 4KH switching A/C		0:02:00	1	0:02:00	2:08:00
	Enable 4KHz switching B/D		0:02:00	1	0:02:00	2:10:00
	Change PS status to zero on A/C		0:02:00	1	0:02:00	2:12:00
	Acquire data		0:30:00	1	0:30:00	2:42:00
	Change PS status to one on A/C		0:02:00	1	0:02:00	2:44:00
	Acquire Data		0:30:00	1	0:30:00	3:14:00

4.3.2 Results and Conclusions

The procedure was run on February the 24th and the test was finished successfully.

Pass and Fail Criteria

No un-expected event Packets	
The FEM I Drain Currents obtained from Telemetry are within the ranges expected (5%)	
The DC voltages Outputs (Science Telemetry) are within the ranges expected. (10%)	
No unexpected features in FFT spectrum (Spike, Pop corn noise, currents drops…)	
Every ACA and every P/S is responding to Biases stimulus as expected.	

Data are contained in the two following files:
AMB_0207: LFI in monitoring while SCS and HFI activities
AMB_0208: LFI AMB02 functional test

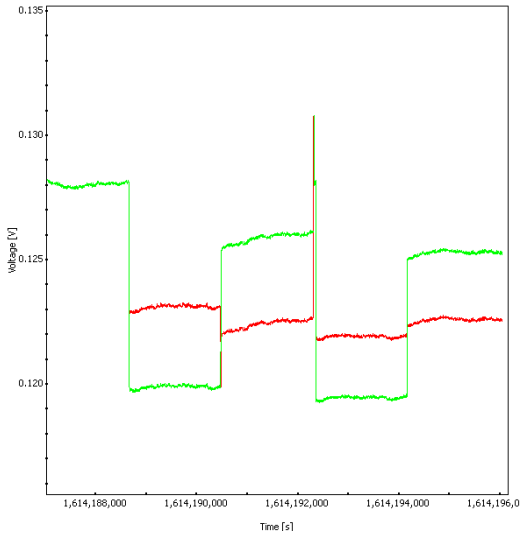

Figure 1 Representative scientific output during AMB02 (RCA 19 R0D0)

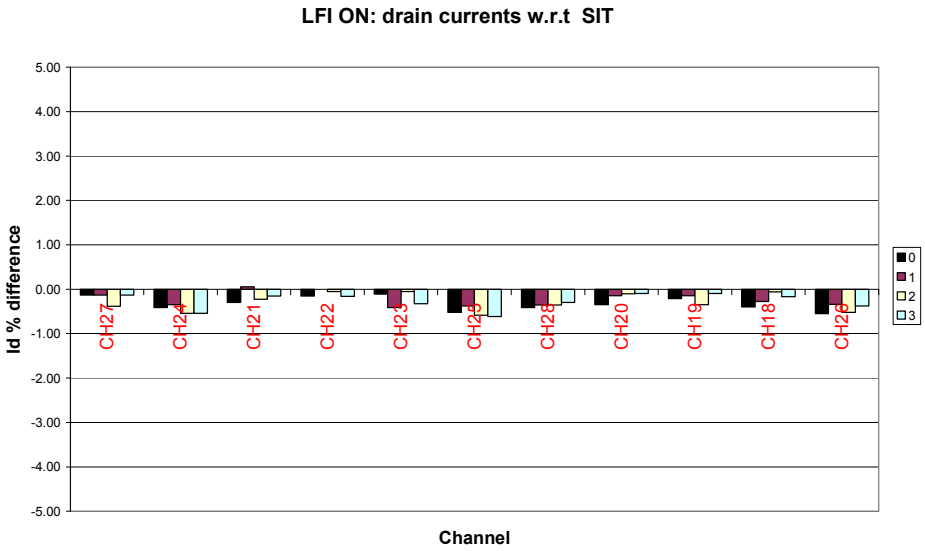

Figure 2 Id comparison with SIT in CSL (AMB02)

RCA #	Detector ID		SCOS Parameter	VG1		VG2		Vd		I1		I2	
				DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX
CH27	00	00	LP001320	250	FA	130	82	200	C8	205	CD	205	CD
	01	01	LP002320	250	FA	130	82	200	C8	205	CD	205	CD
	02	10	LP003320	250	FA	130	82	200	C8	205	CD	205	CD
	03	11	LP004320	250	FA	130	82	200	C8	205	CD	205	CD
CH24	04	00	LP005320	241	E6	241	E5	255	FF	205	CD	205	CD
	05	01	LP006320	241	E6	241	E5	255	FF	205	CD	205	CD
	06	10	LP007320	241	E6	241	E6	255	FF	205	CD	205	CD
	07	11	LP008320	241	E6	241	E6	255	FF	205	CD	205	CD
CH21	08	00	LP009320	217	D9	178	B2	255	FF	255	FF	255	FF
	09	01	LP010320	218	DA	163	A3	255	FF	255	FF	255	FF
	0A	10	LP011320	133	85	178	B2	255	FF	255	FF	255	FF
	0B	11	LP012320	151	97	163	A3	255	FF	255	FF	255	FF
CH22	0C	00	LP013320	166	A6	172	AC	255	FF	255	FF	255	FF
	0D	01	LP014320	142	8E	124	7C	255	FF	255	FF	255	FF
	0E	10	LP015320	154	9A	124	7C	255	FF	255	FF	255	FF
	0F	11	LP016320	142	8E	121	79	255	FF	255	FF	255	FF
CH23	10	00	LP017320	162	A2	130	82	255	FF	255	FF	255	FF
	11	01	LP018320	148	94	127	7F	255	FF	255	FF	255	FF
	12	10	LP019320	141	8D	133	85	255	FF	255	FF	255	FF
	13	11	LP020320	183	B7	177	B1	255	FF	255	FF	255	FF
CH25	14	00	LP021320	242	F2	242	F2	255	FF	205	CD	205	CD
	15	01	LP022320	242	F2	242	F2	255	FF	205	CD	205	CD
	16	10	LP023320	242	F2	242	F2	255	FF	205	CD	205	CD
	17	11	LP024320	242	F2	242	F2	255	FF	205	CD	205	CD
CH28	18	00	LP025320	247	F7	128	80	200	C8	206	CE	205	CD
	19	01	LP026320	247	F7	128	80	200	C8	205	CD	206	CE
	1A	10	LP027320	246	F6	128	80	200	C8	205	CD	206	CE
	1B	11	LP028320	247	F7	128	80	200	C8	206	CE	205	CD
CH20	1C	00	LP029320	151	97	127	7F	255	FF	255	FF	255	FF
	1D	01	LP030320	112	70	172	AC	255	FF	255	FF	255	FF
	1E	10	LP031320	127	7F	154	9A	255	FF	255	FF	255	FF
	1F	11	LP032320	145	91	172	AC	255	FF	255	FF	255	FF
CH19	20	00	LP033320	109	6D	114	72	255	FF	255	FF	255	FF
	21	01	LP034320	157	9D	148	94	255	FF	255	FF	255	FF
	22	10	LP035320	172	AC	174	AE	255	FF	255	FF	255	FF
	23	11	LP036320	115	73	168	A8	255	FF	255	FF	255	FF
CH18	24	00	LP037320	177	B1	132	84	255	FF	255	FF	255	FF
	25	01	LP038320	135	87	180	B4	255	FF	255	FF	255	FF
	26	10	LP039320	156	9C	147	93	255	FF	255	FF	255	FF
	27	11	LP040320	165	A5	129	81	255	FF	255	FF	255	FF
CH26	28	00	LP041320	241	F1	242	F2	255	FF	205	CD	205	CD
	29	01	LP042320	242	F2	241	F1	255	FF	205	CD	205	CD
	2A	10	LP043320	241	F1	241	F1	255	FF	205	CD	205	CD
	2B	11	LP044320	241	F1	241	F1	255	FF	205	CD	205	CD

Figure 3 Bias synoptic frame during AMB02-NOM

RCA #	Detector ID			SCOS Parameter	MEASURED AMB 208 KOU
CH27	00	00	M1	LM051322	15.43
	01	01	M2	LM052322	15.1
	02	10	S1	LM053322	15.61
	03	11	S2	LM054322	15.18
CH24	04	00	M2	LM055322	28.72
	05	01	M1	LM056322	28.45
	06	10	S2	LM057322	29.28
	07	11	S1	LM058322	29.25
CH21	08	00	S2	LM059322	20.23
	09	01	S1	LM060322	17.86
	0A	10	M1	LM061322	17.84
	0B	11	M2	LM062322	19.36
CH22	0C	00	S2	LM063322	19.13
	0D	01	S1	LM064322	18.73
	0E	10	M1	LM065322	18.83
	0F	11	M2	LM066322	18.76
CH23	10	00	S2	LM067322	18.13
	11	01	S1	LM068322	19.26
	12	10	M1	LM069322	17.86
	13	11	M2	LM070322	18.2
CH25	14	00	M1	LM071322	26.7
	15	01	M2	LM072322	26.23
	16	10	S1	LM073322	27.21
	17	11	S2	LM074322	27.58
CH28	18	00	M1	LM075322	17.01
	19	01	M2	LM076322	16.75
	1A	10	S1	LM077322	16.88
	1B	11	S2	LM078322	16.56
CH20	1C	00	S2	LM079322	19.85
	1D	01	S1	LM080322	19.9
	1E	10	M1	LM081322	19.69
	1F	11	M2	LM082322	20.02
CH19	20	00	S2	LM083322	19.08
	21	01	S1	LM084322	19.91
	22	10	M1	LM085322	19.77
	23	11	M2	LM086322	20.06
CH18	24	00	S2	LM087322	19.96
	25	01	S1	LM088322	17.92
	26	10	M1	LM089322	16.32
	27	11	M2	LM090322	17.93
CH26	28	00	M2	LM091322	26.91
	29	01	M1	LM092322	26.43
	2A	10	S2	LM093322	26.63
	2B	11	S1	LM094322	26.27

Figure 4 drain currents during AMB02

Id w.r.t WFT CANNES				
CH	<00>	<01>	<10>	<11>
CH27	0.00	0.60	-0.13	0.00
CH24	-0.21	-0.11	-0.20	-0.24
CH21	-0.05	0.45	0.17	0.31
CH22	0.42	0.38	0.37	0.54
CH23	0.50	0.21	0.51	0.17
CH25	-0.26	-0.08	-0.29	-0.33
CH28	-0.35	-0.36	-0.41	-0.30
CH20	0.10	0.10	0.20	0.25
CH19	0.05	0.10	-0.15	0.00
CH18	9.01	-0.78	-0.43	-0.44
CH26	-0.44	-0.38	-0.56	-0.45

Id w.r.t IST CANNES				
CH	<00>	<01>	<10>	<11>
CH27	-0.06	-0.07	-0.19	0.00
CH24	-0.42	-0.25	-0.37	-0.44
CH21	-0.15	0.34	0.17	0.16
CH22	0.26	0.27	0.37	0.32
CH23	0.39	0.00	0.39	0.05
CH25	-0.45	-0.30	-0.51	-0.43
CH28	-0.23	-0.30	-0.24	-0.18
CH20	0.10	0.10	0.20	0.20
CH19	0.10	0.05	-0.25	0.00
CH18	8.89	-0.61	-0.31	-0.39
CH26	-0.59	-0.49	-0.67	-0.57

Id w.r.t SIT CSL				
CH	<00>	<01>	<10>	<11>
CH27	-0.13	-0.13	-0.38	-0.13
CH24	-0.42	-0.35	-0.54	-0.54
CH21	-0.30	0.06	-0.22	-0.15
CH22	-0.16	0.00	-0.05	-0.16
CH23	-0.11	-0.41	-0.06	-0.33
CH25	-0.52	-0.38	-0.58	-0.61
CH28	-0.41	-0.36	-0.35	-0.30
CH20	-0.35	-0.15	-0.10	-0.10
CH19	-0.21	-0.15	-0.35	-0.10
CH18	-0.40	-0.28	-0.06	-0.17
CH26	-0.55	-0.34	-0.52	-0.38

Figure 5 FEM drain currents comparison w.r.t. Cannes WFT reference test in Cannes, (LEFT) IST test in Cannes (center), SIT in CSL (right) : the drain current of RCA 18 S2 seems to have suffered an evolution from tests performed in CANNES and the setup in CSL: it was already traced during CSL test campaign

RCA #	BEM	STEP1			STEP2			STEP3			STEP4		
		sky	ref	sym	sky	ref	sym	sky	ref	sym	sky	ref	sym
CH27	0.030581	0.992567	0.97891	0.999483	0.999026	0.977603	1.007039	0.987895	0.974894	0.999437	0.995491	0.973617	1.007094
	0.036114	1.052631	1.037924	0	1.050123	1.042974	0	1.047144	1.033005	0	1.046865	1.039325	0
	0.036157	0.933032	0.931241	0.992089	0.94367	0.925175	1.010099	0.928762	0.922651	0.997923	0.939879	0.925766	1.004219
	0.031093	0.776222	0.760923	0	0.769093	0.767709	0	0.766979	0.757358	0	0.771451	0.764499	0
CH24	0.003559	0.004503	0.004552	0.993498	0.004577	0.004549	1.004065	0.004491	0.004556	0.990487	0.004583	0.004532	1.008075
	0.004863	0.005752	0.005734	0	0.005782	0.005796	0	0.005746	0.005713	0	0.005747	0.005779	0
	0.00382	0.003995	0.004011	0.99578	0.003991	0.003984	1.004352	0.003983	0.003985	0.997878	0.003991	0.003989	1.001804
	0.005243	0.005467	0.005443	0	0.005436	0.00547	0	0.005441	0.005423	0	0.005435	0.00545	0
CH21	0.008812	0.031449	0.030902	1.021923	0.031483	0.032467	0.973532	0.031162	0.03067	1.020001	0.031208	0.032084	0.976276
	0.00781	0.028352	0.029104	0	0.029759	0.029096	0	0.028128	0.028812	0	0.029499	0.028914	0
	0.016107	0.058675	0.057553	1.018408	0.058427	0.059666	0.979833	0.059136	0.058546	1.008138	0.060043	0.060733	0.989853
	0.020115	0.056203	0.057175	0	0.057949	0.056816	0	0.057703	0.058059	0	0.059501	0.058971	0
CH22	0.019234	0.078783	0.076829	1.033194	0.078116	0.080462	0.975299	0.078941	0.078196	1.016179	0.080539	0.081586	0.991912
	0.016706	0.085186	0.08861	0	0.089612	0.087757	0	0.086772	0.088696	0	0.09101	0.090661	0
	0.013964	0.071271	0.068632	1.03631	0.070119	0.073038	0.959155	0.070461	0.069469	1.012874	0.072004	0.073313	0.982033
	0.017361	0.083504	0.086389	0	0.088523	0.084843	0	0.084643	0.085635	0	0.089097	0.087488	0
CH23	0.047231	0.143071	0.143225	0.999875	0.141037	0.14117	1.001869	0.137715	0.14007	0.984821	0.140012	0.137929	1.017434
	0.053112	0.167608	0.167723	0	0.164869	0.165574	0	0.163444	0.161192	0	0.160566	0.163687	0
	0.069049	0.175844	0.177535	0.992201	0.175832	0.175115	1.005511	0.182792	0.184446	0.992532	0.182731	0.181956	1.005941
	0.032673	0.086615	0.086246	0	0.085473	0.086192	0	0.089372	0.088981	0	0.088198	0.089028	0
CH25	0.005935	0.023316	0.023933	0.984772	0.024763	0.024567	1.017378	0.023205	0.024523	0.956365	0.024643	0.023758	1.047399
	0.00527	0.021576	0.0215	0	0.02216	0.022776	0	0.022137	0.021419	0	0.021433	0.02269	0
	0.005007	0.006806	0.006916	0.980586	0.006966	0.006838	1.018906	0.006771	0.00688	0.983852	0.006942	0.006849	1.01524
	0.003602	0.00524	0.005114	0	0.005169	0.005268	0	0.005196	0.00511	0	0.005159	0.005249	0
CH28	0.024667	0.481515	0.474055	0.995774	0.490119	0.478115	1.003551	0.479339	0.476646	0.9867	0.487513	0.470853	1.012784
	0.030967	0.641971	0.629795	0	0.646627	0.638617	0	0.644906	0.627296	0	0.638091	0.635608	0
	0.025725	0.607238	0.600991	0.994433	0.613999	0.599977	1.00476	0.604965	0.598325	0.994754	0.610811	0.597374	1.004498
	0.026038	0.551098	0.538437	0	0.550971	0.542428	0	0.549595	0.536933	0	0.54815	0.539865	0
CH20	0.02134	0.123121	0.119906	1.028231	0.122487	0.125961	0.973309	0.121929	0.119464	1.021934	0.122625	0.125331	0.97919
	0.021605	0.109627	0.112892	0	0.11517	0.112208	0	0.109222	0.111773	0	0.114695	0.112406	0
	0.022375	0.127619	0.124364	1.028217	0.125996	0.129535	0.972929	0.125817	0.124417	1.012689	0.127671	0.129361	0.987757
	0.020672	0.131581	0.135548	0	0.137426	0.133738	0	0.131705	0.133555	0	0.137162	0.135589	0
CH19	0.014389	0.089135	0.085636	1.036597	0.087339	0.090291	0.968434	0.088964	0.087627	1.012697	0.091124	0.091946	0.990887
	0.023355	0.092358	0.095373	0	0.096621	0.093673	0	0.094388	0.095362	0	0.098341	0.097429	0
	0.016968	0.11523	0.113253	1.0173	0.115337	0.117977	0.98236	0.113629	0.111794	1.016776	0.114067	0.116541	0.98289
	0.022304	0.109983	0.111868	0	0.113486	0.112043	0	0.107686	0.109533	0	0.111216	0.109793	0
CH18	0.03821	0.134584	0.132003	1.015988	0.133444	0.135588	0.980985	0.132747	0.13097	1.010745	0.133856	0.135195	0.985977
	0.046233	0.17786	0.180233	0	0.182739	0.17883	0	0.175131	0.176643	0	0.180861	0.177768	0
	0.038528	0.076038	0.076015	1.000605	0.07482	0.074979	0.999048	0.072755	0.074163	0.981794	0.074277	0.072994	1.018277
	0.047213	0.085984	0.086059	0	0.084707	0.084714	0	0.083645	0.08218	0	0.082226	0.08378	0
CH26	0.004755	0.008906	0.008974	1.002395	0.009114	0.009169	1.000865	0.008903	0.009133	0.98067	0.009117	0.009014	1.022871
	0.005173	0.010234	0.010348	0	0.010483	0.010555	0	0.010422	0.010274	0	0.010181	0.010517	0
	0.005028	0.012713	0.01285	0.99262	0.013115	0.013036	1.010811	0.012647	0.012932	0.979019	0.01304	0.012811	1.024837
	0.005289	0.014657	0.014591	0	0.014899	0.015122	0	0.014807	0.01451	0	0.014568	0.015019	0

Figure 6 Vout table during AMB_02

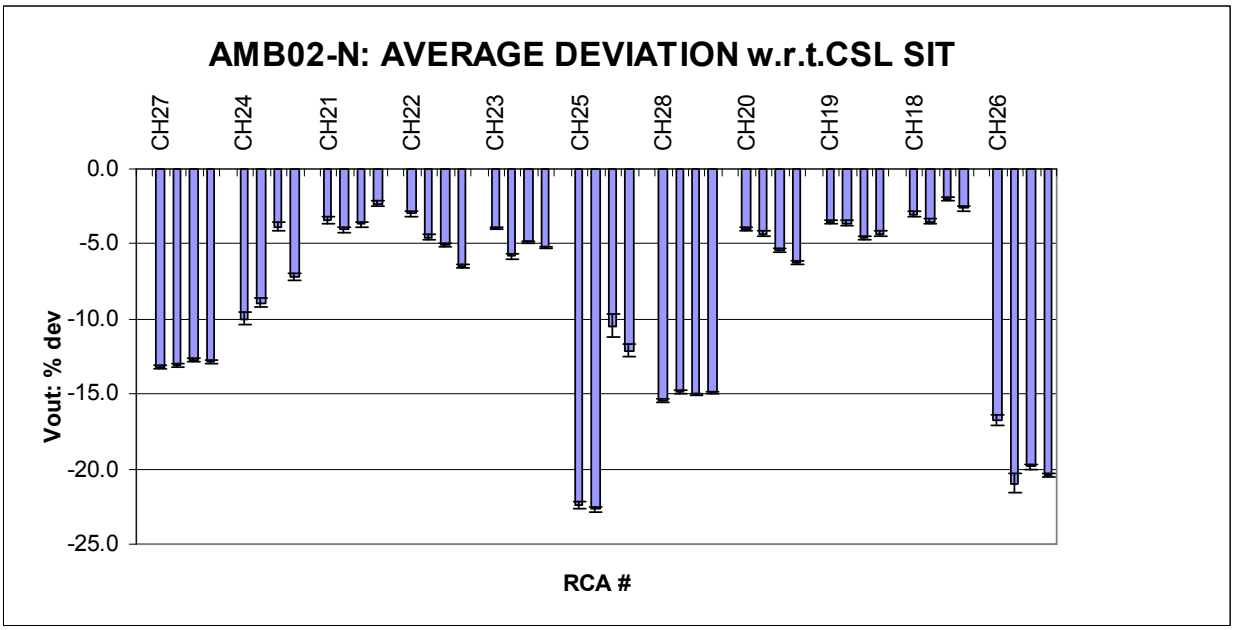

Figure 7 Vout during AMB_02: comparison with SIT test in CSL.

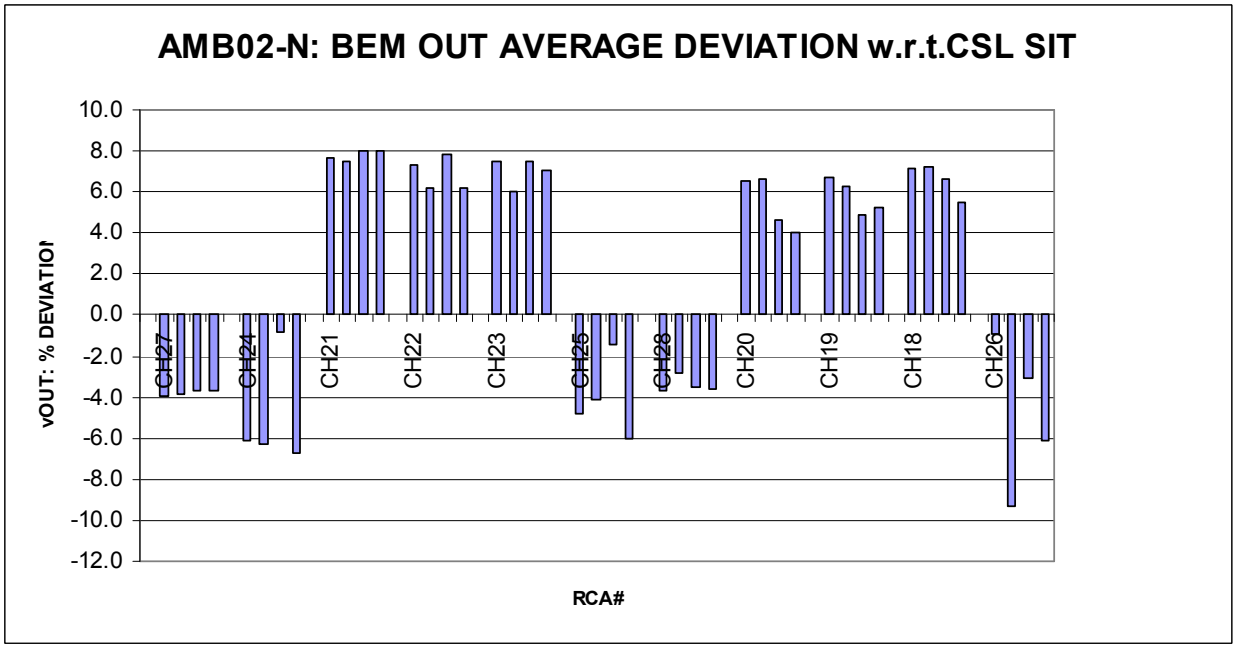

Figure 8 Vout when the FEMs are biased to 0 during AMB_02: comparison with SIT test in CSL

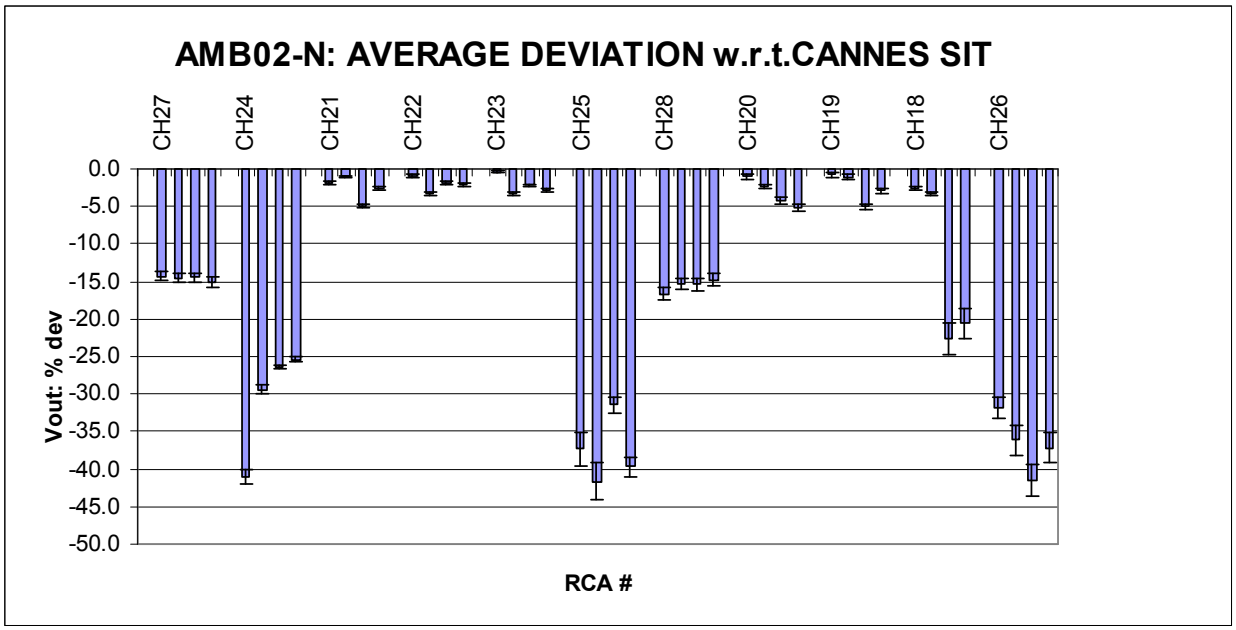

Figure 9 Vout during AMB_02: comparison with IST in CANNES test.

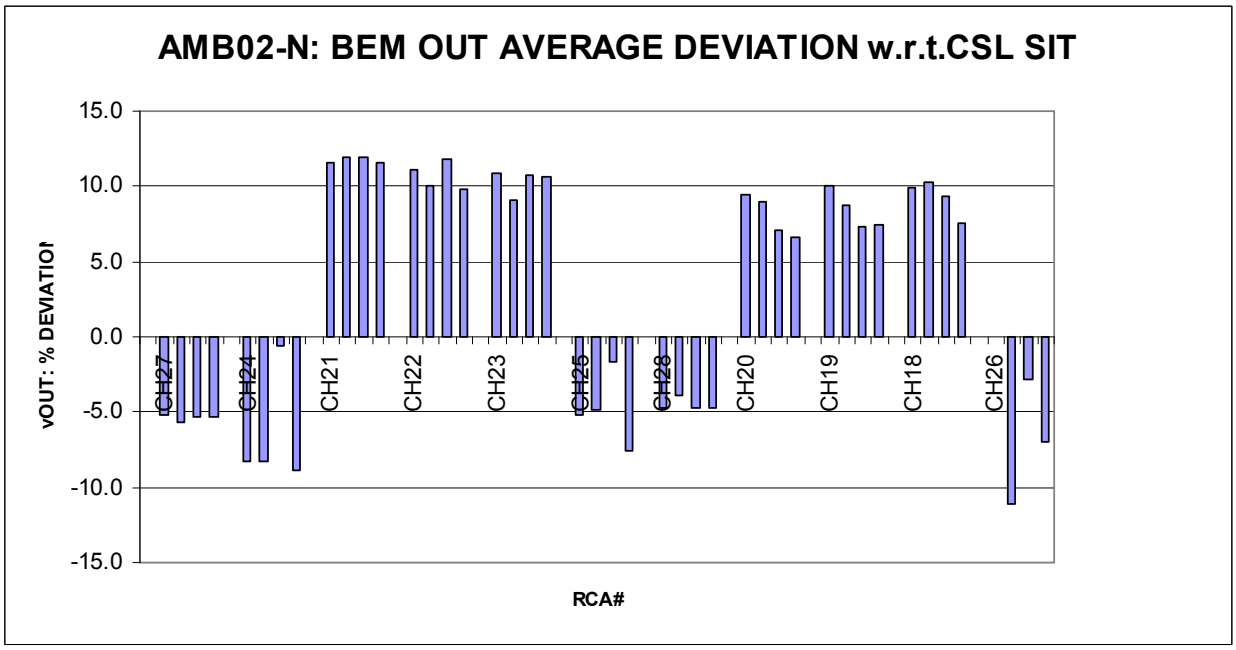

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Figure 10 Vout when the FEMs are biased to 0 during AMB_02: comparison with IST in CANNES test.

4.4 PLM SIT – Extra Test on RCA 18 S2

4.4.1 Procedure/ Test sequence

LFI SIT: Extra test (Nominal Unit)					0:18:00	
Perform extra-test				1	0:18:00	
	Switch off RCA 18 S2		0:01:00	2	0:02:00	0:02:00
	Switch on RCA 18 S2 (special order)		0:02:00	2	0:04:00	0:06:00
	Acquire data		0:03:00	2	0:06:00	0:12:00
	Initialize (switch off) all RCAs		0:02:00	1	0:02:00	0:14:00
	Switch on all RCAs from memory		0:01:00	1	0:01:00	0:15:00
	Acquire data		0:03:00	1	0:03:00	0:18:00

4.4.2 Results and Conclusions

The procedure was run on February the 24th without any problem and the test was finished successfully.

Pass and Fail Criteria

No un-expected event Packets	
No un-expected behaviour of RCA 18 S2	

No NCRs have been raised.

The test was required to verify that the high RCA 18 S2 drain current measured in CSL in warm conditions (with respect to previous tests performed in Cannes, see NC 17799, already closed with “Use as is”) is not related to possible oscillation effects observed in cold conditions on RCA 24 S1. RCA 18 S2 was switched on using the same approach as already proved to have a positive effect on RCA 24. No change in the drain current measurements has been observed.

4.5 PLM SIT - Switch off the Nominal Unit

4.5.1 Procedure/ Test sequence

LFI SIT: Switch off (Nominal Unit)					0:20:00	
Switch OFF LFI				1	0:20:00	
	Science De-Activation		0:05:00	1	0:05:00	0:05:00
	RCA De-Activation		0:05:00	1	0:05:00	0:10:00
	LFI to Standby	DAE Set Up to Standby	0:05:00	1	0:05:00	0:15:00
	Switch OFF	Standby to OFF	0:05:00	1	0:05:00	0:20:00

4.5.2 Results and Conclusions

The procedure was run on January the 24th without any problem and the test was finished successfully.

Pass and Fail Criteria

No un-expected event Packets	
No more telemetry coming from LFI	

No NCRs have been raised.

4.5.3 THERMAL BEHAVIOUR

A strong thermal drift is observed during the first part of the test (when the other instruments operate). It is measured on the BEU sensors and reflects on the scientific signals, with different shape depending on the channels: 30 and 44 GHz show decreasing Vout 70 GHz show increasing Vout.
It is in agreement with the susceptibility to thermal variations already known from previous tests. Moreover, this feature impact on the absolute Vout, especially after FEMs have been switched ON : it is woth mentioning that during Kourou tests temperatures in the BEU are at least 4 deg higher than the correspondent SIT in CSL.

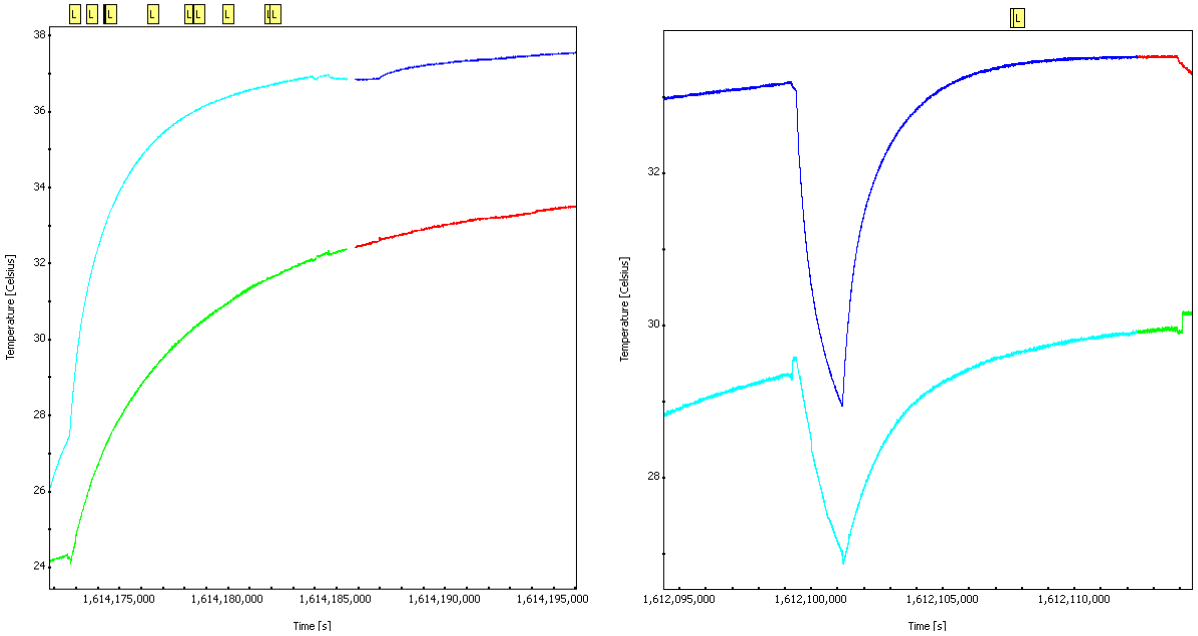

Figure 11 behaviour of readout sensors RBEM1 and LBEM1 on BEU: SIT in KOUROU (left side) vs. SIT in CSL (right side) : all sensors in Kourou measure temperatures about 4 deg higher . The same will be observed for the Redundant unit.

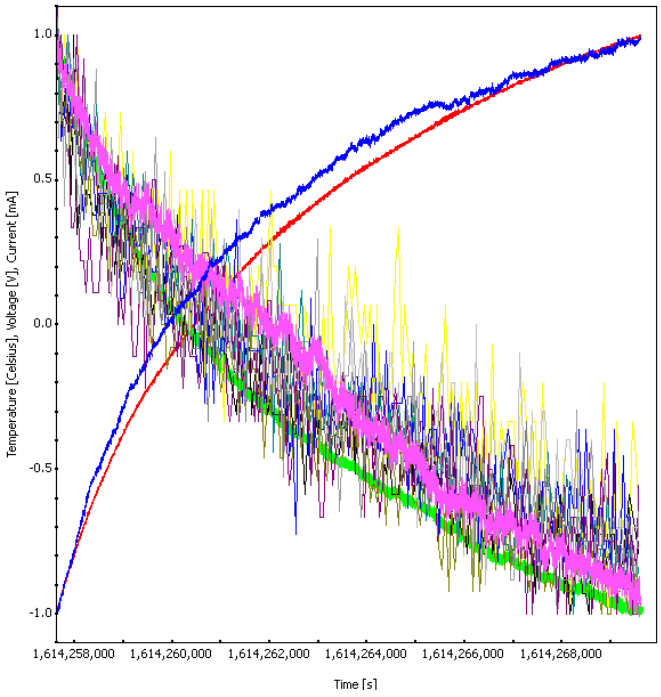

Figure 12 correlation between Sci output, Id, L-BEM sensor: green and magenta curves refer to 30 and 44 GHz voltage output ,and are anti-correlated with BEM sensor and correlated with Id. /0 GHz output (blue curve) is correlated with L-BEM and anti-correlated with Id.

4.6 PLM SIT - Switch on LFI in nominal science (Redundant Unit)

4.6.1 Procedure/ Test sequence

LFI SIT: Switch on (Redundant Unit)						**1:00:00**	
	Switch ON LFI				1	**0:39:00**	
		Go to Stand By Mode	OFF to standby	0:32:00	1	0:32:00	0:32:00
		Go to DAE Set Up Mode	Standby to DAE set up	0:07:00	1	0:07:00	0:39:00
	LFI in Normal Science (Warm test Config..)				1	**0:21:00**	
		Setting Telemetry Rate	Nominal Values	0:02:00	1	0:02:00	0:41:00
		Event Packet Enabling		0:02:00	1	0:02:00	0:43:00
		Definition of science Processing Parameters	Naverage set to 256	0:02:00	1	0:02:00	0:45:00
		Changing Processing Type to 1		0:05:00	1	0:05:00	0:50:00
		Spu Connection		0:02:00	1	0:02:00	0:52:00
		Science Activation Type 1		0:04:00	1	0:04:00	0:56:00
		RCA Activation		0:02:00	1	0:02:00	0:58:00
		Set DAE Default configuration		0:02:00	1	0:02:00	1:00:00

At the end of the Procedure LFI will stay in listening mode with HFI and SCS had performed WFT and Health check.

4.6.2 Results and Conclusions

The procedure was run on February the 25th without any problem and the test was finished successfully.

Pass and Fail Criteria

No errors from the REBA HW Self check	
No un-expected event Packets	
REBA Power Consumption within the ranges of expected values	
EEPROM Check Sum passed	
REBA synchronization achieved	
DAE Power Consumption within the ranges of expected values	
DAE Synchronization achieved	
The FEM I Drain Currents obtained from Telemetry are within the ranges expected (5%)	
The DC voltages Outputs (Science Telemetry) are within the ranges expected. (10%)	
No unexpected features in FFT spectrum (Spike, Pop corn noise, currents drops…)	

No NCRs have been raised.

4.7 PLM SIT - Nominal Science with redundant unit

During this step HFI and SCS are performing their WFT. LFI stays in nominal acquisition acquiring data for analysis.
HK parameters (drain currents) are quite stable (within the standard deviation of test AMB_02 performed later with other instruments in monitoring)

4.7.1 Procedure/ Test sequence

No test sequence for LFI is requested to be applied here.

4.7.2 Results and Conclusions

Pass and Fail Criteria

No un-expected event Packets	
REBA Power Consumption within the ranges of expected values	
DAE Power Consumption within the ranges of expected values	
No unexpected features during HFI activity in Scientific signal	
No unexpected features during SCS activity in Scientific signal	

No NCRs have been raised.

4.7.2.1 Currents monitoring during HFI WFT and during SCS-R HC

No evident changes in the drain currents are observed during the activities of other instruments: all changes are well within the standard deviation measured during the LFI AMB_02 itself.

4.8 PLM SIT - LFI Execution of AMB02

4.8.1 Procedure/ Test sequence

LFI SIT: AMB02 execution (Redundant Unit)					3:24:00	
	Switch ON LFI - AMB-02			1	3:24:00	
	RCA Activation		0:05:00	1	0:05:00	0:05:00
	Perform DAE Initialization		0:10:00	1	0:10:00	0:15:00
	Wait for thermalization of power groups		0:30:00	1	0:30:00	0:35:00
	Configure DAE (Scwitch ACA on)		0:02:00	1	0:02:00	0:37:00
	Wait for thermalization of FPU		0:25:00	1	0:25:00	1:02:00
	Enable 4KH switching A/C		0:02:00	1	0:02:00	1:04:00
	Acquire data		0:30:00	1	0:30:00	1:34:00
	Change PS stauts to one on B/D		0:02:00	1	0:02:00	1:36:00
	Acquire data		0:30:00	1	0:30:00	2:06:00
	Disable 4KH switching A/C		0:02:00	1	0:02:00	2:08:00
	Enable 4KHz switching B/D		0:02:00	1	0:02:00	2:10:00
	Change PS status to zero on A/C		0:02:00	1	0:02:00	2:12:00
	Acquire data		0:30:00	1	0:30:00	2:42:00
	Change PS status to one on A/C		0:02:00	1	0:02:00	2:44:00
	Acuire Data		0:30:00	1	0:30:00	3:14:00

4.8.2 Results and Conclusions

The procedure was run on February the 25th without any problem and the test was finished successfully.

Pass and Fail Criteria

No un-expected event Packets	
The FEM I Drain Currents obtained from Telemetry are within the ranges expected (5%)	
The DC voltages Outputs (Science Telemetry) are within the ranges expected. (10%)	
No unexpected features in FFT spectrum (Spike, Pop corn noise, currents drops…)	
Every ACA and every P/S is responding to Biases stimulus as expected.	

No NCRs have been raised.

During the last part of the AMB-02 tests, the signal separation sky-load was not that clear on one channel. In order to verify its correct behaviour we asked for a variation of the Phase Switch current. Everything was fine and finally the nominal values were restored. Note that this is part of the normal-working operations during this kind of functionality tests. This part of the test is shown in the figure below

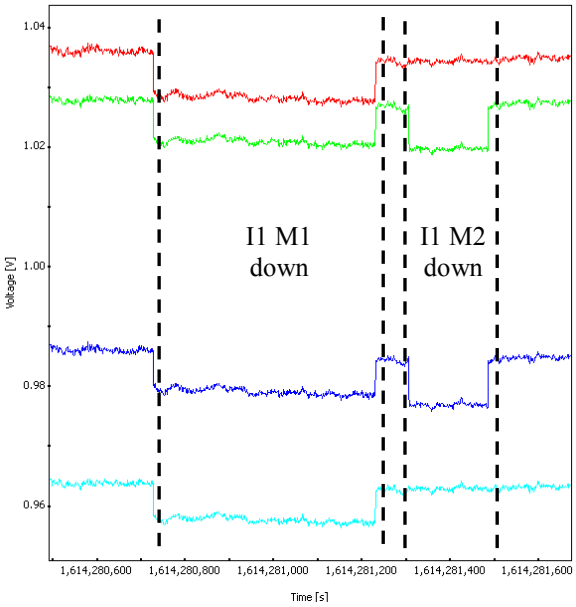

Figure 13 While B/D was switching I1 current was firstly reduced to 160 on M1 (the 4 signals go down, as expected, because 4KHz is active on the paired ACA) , then on M2 (the 2 homologous signals on the paired diodes go down, as expected)

DATA are stored in the three files AMB211 , AMB212 restored,

RCA #	Detector ID			SCOS Parameter	MEASURED AMB 212 KOU
CH27	00	00	M1	LM051322	15.42
	01	01	M2	LM052322	15.09
	02	10	S1	LM053322	15.62
	03	11	S2	LM054322	15.17
CH24	04	00	M2	LM055322	28.69
	05	01	M1	LM056322	28.42
	06	10	S2	LM057322	29.25
	07	11	S1	LM058322	29.24
CH21	08	00	S2	LM059322	20.21
	09	01	S1	LM060322	17.85
	0A	10	M1	LM061322	17.83
	0B	11	M2	LM062322	19.35
CH22	0C	00	S2	LM063322	19.11
	0D	01	S1	LM064322	18.71
	0E	10	M1	LM065322	18.81
	0F	11	M2	LM066322	18.75
CH23	10	00	S2	LM067322	18.12
	11	01	S1	LM068322	19.24
	12	10	M1	LM069322	17.84
	13	11	M2	LM070322	18.2
CH25	14	00	M1	LM071322	26.69
	15	01	M2	LM072322	26.2
	16	10	S1	LM073322	27.18
	17	11	S2	LM074322	27.57
CH28	18	00	M1	LM075322	17.01
	19	01	M2	LM076322	16.75
	1A	10	S1	LM077322	16.87
	1B	11	S2	LM078322	16.55
CH20	1C	00	S2	LM079322	19.84
	1D	01	S1	LM080322	19.88
	1E	10	M1	LM081322	19.68
	1F	11	M2	LM082322	20.01
CH19	20	00	S2	LM083322	19.09
	21	01	S1	LM084322	19.89
	22	10	M1	LM085322	19.76
	23	11	M2	LM086322	20.06
CH18	24	00	S2	LM087322	19.96
	25	01	S1	LM088322	17.9
	26	10	M1	LM089322	16.29
	27	11	M2	LM090322	17.92
CH26	28	00	M2	LM091322	26.9
	29	01	M1	LM092322	26.4
	2A	10	S2	LM093322	26.62
	2B	11	S1	LM094322	26.25

Figure 14 currents during AMB02

Id w.r.t WFT CANNES				
CH	<00>	<01>	<10>	<11>
CH27	-0.06	0.53	-0.06	-0.07
CH24	-0.31	-0.21	-0.31	-0.27
CH21	-0.15	0.39	0.11	0.26
CH22	0.31	0.27	0.27	0.48
CH23	0.44	0.10	0.39	0.17
CH25	-0.30	-0.19	-0.40	-0.36
CH28	-0.35	-0.36	-0.47	-0.36
CH20	0.05	0.00	0.15	0.20
CH19	0.10	0.00	-0.20	0.00
CH18	9.01	-0.89	-0.61	-0.50
CH26	-0.48	-0.49	-0.60	-0.53

Id w.r.t IST CANNES				
CH	<00>	<01>	<10>	<11>
CH27	-0.13	-0.13	-0.13	-0.07
CH24	-0.52	-0.35	-0.48	-0.48
CH21	-0.25	0.28	0.11	0.10
CH22	0.16	0.16	0.27	0.27
CH23	0.33	-0.10	0.28	0.05
CH25	-0.48	-0.42	-0.62	-0.47
CH28	-0.23	-0.30	-0.30	-0.24
CH20	0.05	0.00	0.15	0.15
CH19	0.16	-0.05	-0.30	0.00
CH18	8.89	-0.72	-0.49	-0.44
CH26	-0.63	-0.60	-0.71	-0.64

AMB02-R Id w.r.t SIT CSL				
CH	<00>	<01>	<10>	<11>
CH27	-0.19	-0.20	-0.32	-0.20
CH24	-0.52	-0.46	-0.65	-0.58
CH21	-0.39	0.00	-0.28	-0.21
CH22	-0.26	-0.11	-0.16	-0.21
CH23	-0.17	-0.52	-0.17	-0.33
CH25	-0.56	-0.49	-0.69	-0.65
CH28	-0.41	-0.36	-0.41	-0.36
CH20	-0.40	-0.25	-0.15	-0.15
CH19	-0.16	-0.25	-0.40	-0.10
CH18	-0.40	-0.39	-0.24	-0.22
CH26	-0.59	-0.45	-0.56	-0.46

Figure 15 FEM drain currents comparison w.r.t. WFT test (LEFT) and w.r.t. AMB-02 performed with Nominal REBA

RCA #		STEP1			STEP2			STEP3			STEP4		
	BEM	sky	ref	sym	sky	ref	sym	sky	ref	sym	sky	ref	sym
CH27	0.030605	0.98829	0.974574	0.999494	0.992749	0.971363	1.007036	0.981688	0.968648	0.999455	0.98687	0.965084	1.007077
	0.036083	1.047157	1.032419	0	1.042693	1.035477	0	1.039742	1.025607	0	1.036919	1.029302	0
	0.036185	0.929005	0.927211	0.992074	0.937251	0.918702	1.010121	0.921872	0.915689	0.997897	0.930856	0.91684	1.00419
	0.03109	0.772552	0.757286	0	0.763701	0.76218	0	0.761203	0.751493	0	0.763961	0.756988	0
CH24	0.00356	0.004502	0.004559	0.992622	0.004568	0.004539	1.004376	0.004485	0.004556	0.990173	0.004562	0.004511	1.009008
	0.004845	0.005742	0.005723	0	0.005744	0.00576	0	0.005722	0.005692	0	0.005702	0.005743	0
	0.003812	0.003996	0.004014	0.995363	0.003998	0.003991	1.004142	0.003967	0.003968	0.998935	0.003971	0.003972	1.00192
	0.005241	0.005475	0.005449	0	0.005424	0.005456	0	0.005423	0.005414	0	0.005403	0.005422	0
CH21	0.008796	0.031268	0.030715	1.022182	0.031271	0.032187	0.974436	0.030898	0.030476	1.018953	0.030875	0.03185	0.974509
	0.007804	0.028162	0.028915	0	0.029541	0.028879	0	0.027933	0.028618	0	0.029231	0.028649	0
	0.016074	0.05828	0.057154	1.018348	0.057952	0.059166	0.97996	0.058701	0.058105	1.008356	0.059389	0.060084	0.989724
	0.020069	0.055831	0.056778	0	0.057503	0.056379	0	0.05726	0.057628	0	0.058927	0.058399	0
CH22	0.019212	0.07827	0.076306	1.033123	0.077505	0.079805	0.975382	0.078372	0.0776	1.016618	0.079714	0.080772	0.991492
	0.016704	0.084547	0.087911	0	0.088812	0.086961	0	0.086015	0.087962	0	0.090011	0.089616	0
	0.013944	0.070685	0.0681	1.035458	0.069432	0.072327	0.959005	0.06982	0.068844	1.0124	0.071148	0.07244	0.981917
	0.017371	0.083007	0.08578	0	0.087766	0.084098	0	0.083899	0.084817	0	0.088046	0.086436	0
CH23	0.047075	0.141927	0.142092	0.999799	0.139915	0.140029	1.001922	0.136724	0.139017	0.985029	0.138644	0.136583	1.017321
	0.053122	0.166623	0.166726	0	0.163874	0.164572	0	0.16256	0.160338	0	0.159129	0.16219	0
	0.068966	0.174784	0.176421	0.992342	0.17464	0.173916	1.005561	0.181654	0.183257	0.992507	0.18109	0.180355	1.005641
	0.032641	0.086043	0.08567	0	0.084833	0.085548	0	0.088734	0.088299	0	0.087338	0.088113	0
CH25	0.005955	0.023334	0.023953	0.984421	0.024653	0.024474	1.017155	0.023078	0.024392	0.956777	0.024398	0.02356	1.045982
	0.005293	0.02162	0.021529	0	0.0221	0.02272	0	0.022065	0.021371	0	0.021349	0.022576	0
	0.005019	0.006804	0.006914	0.979761	0.006959	0.006835	1.018687	0.006762	0.006865	0.984962	0.006951	0.006859	1.015342
	0.00361	0.005241	0.005105	0	0.005152	0.005252	0	0.005171	0.005093	0	0.005134	0.005226	0
CH28	0.024681	0.479679	0.472225	0.9958	0.486893	0.474988	1.003298	0.475691	0.472918	0.986576	0.482892	0.466375	1.012711
	0.030981	0.639904	0.627779	0	0.643084	0.634866	0	0.640542	0.622822	0	0.632395	0.629844	0
	0.025738	0.605729	0.599443	0.9945	0.610715	0.596741	1.004801	0.601431	0.594841	0.994722	0.606455	0.592841	1.004692
	0.026079	0.550228	0.537619	0	0.548338	0.539861	0	0.546631	0.534016	0	0.544484	0.536206	0
CH20	0.021288	0.122266	0.119067	1.028738	0.121453	0.12489	0.973163	0.121038	0.118535	1.022403	0.121558	0.124308	0.979093
	0.021529	0.108816	0.112166	0	0.114219	0.111239	0	0.1084	0.110981	0	0.113646	0.111421	0
	0.022315	0.126644	0.123443	1.027902	0.12505	0.128512	0.973367	0.124883	0.123459	1.013045	0.126399	0.128068	0.987749
	0.020644	0.130801	0.134694	0	0.136389	0.132796	0	0.130652	0.132543	0	0.135997	0.134431	0
CH19	0.014359	0.088531	0.085134	1.036407	0.086683	0.08958	0.968619	0.088269	0.086942	1.013004	0.090337	0.091127	0.991046
	0.023316	0.091867	0.094914	0	0.09604	0.093112	0	0.093765	0.094788	0	0.097607	0.096707	0
	0.016935	0.114312	0.112399	1.016794	0.114298	0.116903	0.982388	0.112616	0.110762	1.017102	0.112861	0.115296	0.982915
	0.022245	0.109115	0.110922	0	0.112431	0.110997	0	0.106751	0.108617	0	0.11016	0.108743	0
CH18	0.038101	0.133829	0.131261	1.015868	0.132658	0.134785	0.981079	0.13214	0.130323	1.011132	0.133074	0.134406	0.985927
	0.046141	0.176899	0.179221	0	0.181686	0.177825	0	0.174209	0.175782	0	0.17989	0.176799	0
	0.038403	0.075589	0.075569	1.000496	0.074354	0.074553	0.998804	0.07235	0.073763	0.981874	0.073855	0.072583	1.018114
	0.047132	0.08562	0.08568	0	0.084356	0.084365	0	0.083308	0.081874	0	0.081882	0.083408	0
CH26	0.004757	0.008947	0.00902	1.000879	0.009139	0.009196	1.001623	0.008916	0.009141	0.981845	0.009088	0.008989	1.020478
	0.005193	0.010327	0.010417	0	0.010522	0.010611	0	0.010468	0.010337	0	0.010251	0.010546	0
	0.005048	0.012766	0.012904	0.992388	0.013155	0.013069	1.01105	0.012665	0.012946	0.979266	0.013063	0.012837	1.024282
	0.005308	0.014685	0.014613	0	0.014895	0.015118	0	0.014786	0.014492	0	0.01455	0.014989	0

Figure 16 Voltage synoptic frame during AMB02-RED

RCA #	BEM	STEP 1		STEP2		STEP3		STEP4	
CH27	0.1	-0.4	-0.4	-0.6	-0.6	-0.6	-0.6	-0.9	-0.9
	-0.1	-0.5	-0.5	-0.7	-0.7	-0.7	-0.7	-1.0	-1.0
	0.1	-0.4	-0.4	-0.7	-0.7	-0.7	-0.8	-1.0	-1.0
	0.0	-0.5	-0.5	-0.7	-0.7	-0.8	-0.8	-1.0	-1.0
CH24	0.0	0.0	0.2	-0.2	-0.2	-0.1	0.0	-0.5	-0.5
	-0.4	-0.2	-0.2	-0.7	-0.6	-0.4	-0.4	-0.8	-0.6
	-0.2	0.0	0.1	0.2	0.2	-0.4	-0.4	-0.5	-0.4
	0.0	0.1	0.1	-0.2	-0.3	-0.3	-0.2	-0.6	-0.5
CH21	-0.2	-0.6	-0.6	-0.7	-0.9	-0.9	-0.6	-1.1	-0.7
	-0.1	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.9	-0.9
	-0.2	-0.7	-0.7	-0.8	-0.8	-0.7	-0.8	-1.1	-1.1
	-0.2	-0.7	-0.7	-0.8	-0.8	-0.8	-0.7	-1.0	-1.0
CH22	-0.1	-0.7	-0.7	-0.8	-0.8	-0.7	-0.8	-1.0	-1.0
	0.0	-0.8	-0.8	-0.9	-0.9	-0.9	-0.8	-1.1	-1.2
	-0.1	-0.8	-0.8	-1.0	-1.0	-0.9	-0.9	-1.2	-1.2
	0.1	-0.6	-0.7	-0.9	-0.9	-0.9	-1.0	-1.2	-1.2
CH23	-0.3	-0.8	-0.8	-0.8	-0.8	-0.7	-0.8	-1.0	-1.0
	0.0	-0.6	-0.6	-0.6	-0.6	-0.5	-0.5	-0.9	-0.9
	-0.1	-0.6	-0.6	-0.7	-0.7	-0.6	-0.6	-0.9	-0.9
	-0.1	-0.7	-0.7	-0.8	-0.7	-0.7	-0.8	-1.0	-1.0
CH25	0.3	0.1	0.1	-0.4	-0.4	-0.5	-0.5	-1.0	-0.8
	0.4	0.2	0.1	-0.3	-0.2	-0.3	-0.2	-0.4	-0.5
	0.2	0.0	0.0	-0.1	0.0	-0.1	-0.2	0.1	0.1
	0.2	0.0	-0.2	-0.3	-0.3	-0.5	-0.3	-0.5	-0.4
CH28	0.1	-0.4	-0.4	-0.7	-0.7	-0.8	-0.8	-1.0	-1.0
	0.0	-0.3	-0.3	-0.5	-0.6	-0.7	-0.7	-0.9	-0.9
	0.1	-0.2	-0.3	-0.5	-0.5	-0.6	-0.6	-0.7	-0.8
	0.2	-0.2	-0.2	-0.5	-0.5	-0.5	-0.5	-0.7	-0.7
CH20	-0.2	-0.7	-0.7	-0.8	-0.9	-0.7	-0.8	-0.9	-0.8
	-0.4	-0.7	-0.6	-0.8	-0.9	-0.8	-0.7	-0.9	-0.9
	-0.3	-0.8	-0.7	-0.8	-0.8	-0.7	-0.8	-1.0	-1.0
	-0.1	-0.6	-0.6	-0.8	-0.7	-0.8	-0.8	-0.9	-0.9
CH19	-0.2	-0.7	-0.6	-0.8	-0.8	-0.8	-0.8	-0.9	-0.9
	-0.2	-0.5	-0.5	-0.6	-0.6	-0.7	-0.6	-0.7	-0.7
	-0.2	-0.8	-0.8	-0.9	-0.9	-0.9	-0.9	-1.1	-1.1
	-0.3	-0.8	-0.8	-0.9	-0.9	-0.9	-0.8	-1.0	-1.0
CH18	-0.3	-0.6	-0.6	-0.6	-0.6	-0.5	-0.5	-0.6	-0.6
	-0.2	-0.5	-0.6	-0.6	-0.6	-0.5	-0.5	-0.5	-0.5
	-0.3	-0.6	-0.6	-0.6	-0.6	-0.6	-0.5	-0.6	-0.6
	-0.2	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
CH26	0.0	0.5	0.5	0.3	0.3	0.1	0.1	-0.3	-0.3
	0.4	0.9	0.7	0.4	0.5	0.4	0.6	0.7	0.3
	0.4	0.4	0.4	0.3	0.3	0.1	0.1	0.2	0.2
	0.4	0.2	0.2	0.0	0.0	-0.1	-0.1	-0.1	-0.2

Figure 17 Vout during AMB_02: comparison with AMB_02 NOMINAL

RCA #	Detector ID		SCOS Parameter	VG1		VG2		Vd		I1		I2	
				DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX
CH27	00	00	LP001320	250	FA	130	82	200	C8	205	CD	205	CD
	01	01	LP002320	250	FA	130	82	200	C8	205	CD	205	CD
	02	10	LP003320	250	FA	130	82	200	C8	205	CD	205	CD
	03	11	LP004320	250	FA	130	82	200	C8	205	CD	205	CD
CH24	04	00	LP005320	241	E6	241	E5	255	FF	205	CD	205	CD
	05	01	LP006320	241	E6	241	E5	255	FF	205	CD	205	CD
	06	10	LP007320	241	E6	241	E6	255	FF	205	CD	205	CD
	07	11	LP008320	241	E6	241	E6	255	FF	205	CD	205	CD
CH21	08	00	LP009320	217	D9	178	B2	255	FF	255	FF	255	FF
	09	01	LP010320	218	DA	163	A3	255	FF	255	FF	255	FF
	0A	10	LP011320	133	85	178	B2	255	FF	255	FF	255	FF
	0B	11	LP012320	151	97	163	A3	255	FF	255	FF	255	FF
CH22	0C	00	LP013320	166	A6	172	AC	255	FF	255	FF	255	FF
	0D	01	LP014320	142	8E	124	7C	255	FF	255	FF	255	FF
	0E	10	LP015320	154	9A	124	7C	255	FF	255	FF	255	FF
	0F	11	LP016320	142	8E	121	79	255	FF	255	FF	255	FF
CH23	10	00	LP017320	162	A2	130	82	255	FF	255	FF	255	FF
	11	01	LP018320	148	94	127	7F	255	FF	255	FF	255	FF
	12	10	LP019320	141	8D	133	85	255	FF	255	FF	255	FF
	13	11	LP020320	183	B7	177	B1	255	FF	255	FF	255	FF
CH25	14	00	LP021320	242	F2	242	F2	255	FF	205	CD	205	CD
	15	01	LP022320	242	F2	242	F2	255	FF	205	CD	205	CD
	16	10	LP023320	242	F2	242	F2	255	FF	205	CD	205	CD
	17	11	LP024320	242	F2	242	F2	255	FF	205	CD	205	CD
CH28	18	00	LP025320	247	F7	128	80	200	C8	206	CE	205	CD
	19	01	LP026320	247	F7	128	80	200	C8	205	CD	206	CE
	1A	10	LP027320	246	F6	128	80	200	C8	205	CD	206	CE
	1B	11	LP028320	247	F7	128	80	200	C8	206	CE	205	CD
CH20	1C	00	LP029320	151	97	127	7F	255	FF	255	FF	255	FF
	1D	01	LP030320	112	70	172	AC	255	FF	255	FF	255	FF
	1E	10	LP031320	127	7F	154	9A	255	FF	255	FF	255	FF
	1F	11	LP032320	145	91	172	AC	255	FF	255	FF	255	FF
CH19	20	00	LP033320	109	6D	114	72	255	FF	255	FF	255	FF
	21	01	LP034320	157	9D	148	94	255	FF	255	FF	255	FF
	22	10	LP035320	172	AC	174	AE	255	FF	255	FF	255	FF
	23	11	LP036320	115	73	168	A8	255	FF	255	FF	255	FF
CH18	24	00	LP037320	177	B1	132	84	255	FF	255	FF	255	FF
	25	01	LP038320	135	87	180	B4	255	FF	255	FF	255	FF
	26	10	LP039320	156	9C	147	93	255	FF	255	FF	255	FF
	27	11	LP040320	165	A5	129	81	255	FF	255	FF	255	FF
CH26	28	00	LP041320	241	F1	242	F2	255	FF	205	CD	205	CD
	29	01	LP042320	242	F2	241	F1	255	FF	205	CD	205	CD
	2A	10	LP043320	241	F1	241	F1	255	FF	205	CD	205	CD
	2B	11	LP044320	241	F1	241	F1	255	FF	205	CD	205	CD

Figure 18 Bias synoptic frame during AMB02-RED

4.9 PLM SIT - Switch off the Redundant Unit

4.9.1 Procedure/ Test sequence

LFI SIT: Switch off (Redundant Unit)					0:20:00	
	Switch OFF LFI			1	0:20:00	
	Science De-Activation		0:05:00	1	0:05:00	0:05:00
	RCA De-Activation		0:05:00	1	0:05:00	0:10:00
	LFI to Standby	DAE Set Up to Standby	0:05:00	1	0:05:00	0:15:00
	Switch OFF	Standby to OFF	0:05:00	1	0:05:00	0:20:00

4.9.2 Results and Conclusions

The procedure was run on February the 25th without any problem and the test was finished successfully.

Pass and Fail Criteria

No un-expected event Packets	
No more telemetry coming from LFI	

No NCRs have been raised.

THE comparison between AMB_02 performed with Nominal and Redundant REBA showed that:

- Drain currents measured with the Redundant Reba unit are compliant with requirements and with Nominal Reba
- The Vout are consistent with those measured before with the Nominal REBA
- The same thermal drift is observed as in the previous data

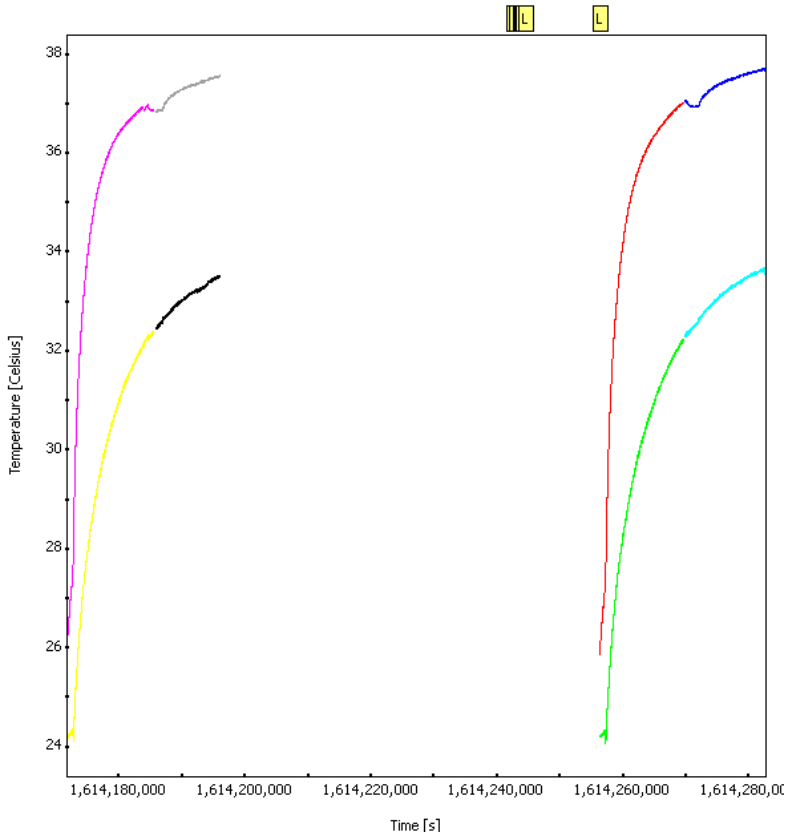

Figure 19 Thermal drift during test AMB_211 and AMB_212: it is consistent with drift during AMB207-AMB208

4.10 OTHER FEATURES

Here follows some features have been kept under monitoring because observed sometimes in previous tests at ILT in Milan or at Spacecraft Level in Cannes or in CSL.

4.10.1 Current drops in RCA 23

No evidence of drops during the whole PLMSIT

4.10.2 Scientific output crossing in RCA 25

No evidence of signal crossing: crossing was found to be dependent on the signal level: during PLM-SIT the RCA 25 Vout is quite lower than during Tests performed in Cannes and probably this feature has no way to be triggered.

4.10.3 SKY REF separation in RCA 25

In the SIT performed in Cannes RCA25 showed a bad separation (sky-ref) depending on the combination PS/ 4KHz. During PLM-SIT, as demonstrated by figures below, separation is instead very clear

4.10.4 POP CORN NOISE ON RCA 24

Observed on diode R0D1: has the same features (amplitude and shape) already observed during previous functional tests at ILT and in CANNES

4.10.5 Spurious frequency spikes

Spurious "1 Hz" frequency spikes have been characterised during the PLM-SIT test both for nominal and redundant REBA. The following tests have been analysed:

Test #	Time window	Description
AMB_0207	[1614176882, 1614183548]	Nominal REBA Acquisition before AMB02 test during HFI and SCS warm functional tests. Instrument is switching with B/D switching and A/C = 1
AMB_0208	[1614188805, 1614190299] [1614190681, 1614192225] [1614192541, 1614194052] [1614194334, 1614195894]	Nominal REBA Acquisition during AMB02 in the 4 switching conditions: A/C sw., B/D = 0 A/C sw., B/D = 1 B/D sw., A/C = 0 B/D sw., A/C = 1
AMB_0211	[1614258835, 1614267752]	Redundant REBA Acquisition before AMB02 test during HFI and SCS warm functional

		tests. Instrument is switching with B/D switching and A/C = 1
AMB_0212	[1614273732, 1614275312] [1614275637, 1614277144] [1614277425, 1614278976] [1614279301, 1614280571]	Redundant REBA Acquisition during AMB02 in the 4 switching conditions: A/C sw., B/D = 0 A/C sw., B/D = 1 B/D sw., A/C = 0 B/D sw., A/C = 1

Amplitude spectra of all the analysed tests are provided in the following files:

AMB_0207	spikes_AMB_0207_PLMSIT_NOM_pre-AMB02.pdf
AMB_0208	spikes_AMB_0208_PLMSIT_NOM_ACsw_BD0.pdf spikes_AMB_0208_PLMSIT_NOM_ACsw_BD1.pdf spikes_AMB_0208_PLMSIT_NOM_BDsw_AC0.pdf spikes_AMB_0208_PLMSIT_NOM_BDsw_AC1.pdf
AMB_0211	spikes_AMB_0211_PLMSIT_RED_pre-AMB02.pdf
AMB_0212	spikes_AMB_0208_PLMSIT_RED_ACsw_BD0.pdf spikes_AMB_0208_PLMSIT_RED_ACsw_BD1.pdf spikes_AMB_0208_PLMSIT_RED_BDsw_AC0.pdf spikes_AMB_0208_PLMSIT_RED_BDsw_AC1.pdf

We also provide a series of 44 plots (spike_summary.pdf) that compare spikes from the PLM SIT tests from Cannes to Kourou.

In summary the main results are consistent with those already outlined in [RD9] and are outlined here for reader's convenience:

Main harmonics 1 Hz frequency spikes are stable throughout the PLM SIT test. Higher harmonics show small variability, but this is expected.
Main harmonics of 1 Hz frequency spikes are reproducible between Cannes, CSL TVTB and CSL-Liege and CSG-Kourou PLM SIT tests. Higher harmonics in PLM SIT are generally smaller or non-existent with respect to Cannes and CSL TVTB
The anomalous spike in LFI22M-00 and LFI22M-01 is still present and reproducible
Spikes disappear (in few cases they are present, but at a negligible level) in differenced datastreams, as expected.

Differences in spikes characterised in the four phase switch states are within the repeatability confidence limits (TBC).

No unexpected features regarding 1Hz spikes have been found during CSL PLM-SIT tests

4.10.6 Noise / spikes in signal corresponding to some SCS activities

A deeper offline analysis is required to map these features. This paragraph will be completed in the next Issue.

4.10.7 Thermal variation in BEM sensors when science is disabled

As observed in the previous tests performed in Cannes, a like digital variation exhibits in LBEM and RBEM sensors when science is activated – deactivated.
This feature was hence expected (possible explanation given in WFT test report PL-LFI-PST-RP-023) and here is just monitored (displayed in previous Figure 11)

5 Conclusions

The first part of the test (Nominal REBA) was performed without any problem. No new features have been observed.
All HK parameters are in agreement with specifications.
LNAs functionality is in agreement with what already known from previous tests.
No major changes are observed in the time the LFI is still on with other instruments are operating.

The second part of the test was performed with the Redundant REBA without any problems. No new features have been observed.
All HK parameters are in agreement with specifications.
LNAs functionality is in agreement with what already known from previous tests.
No major changes are observed in the time the LFI is still on with other instruments are operating.

For what regards the success criteria of PLMSIT, they can be summarized as follows:

· No generation of (5,1), (5,2), (5,4) and (1,8) telemetry: OK
· No loss of data: OK

· Fulfillment of the instruments success criteria as defined in [RD-5] and [RD-7]:
− No un-expected event Packets: OK
− Power Consumption of REBA within the ranges of expected values: OK
− Power Consumption of RAA within the ranges of expected values: OK

From the AMB 02 execution the following pass/fail criteria are followed:
− The FEM I Drain Currents obtained from Telemetry are within the ranges expected (5%). In this case the results are consistent with the last PLM-SIT run in CSL before departure to Kourou. All the channels display drain currents within ±5% apart from LFI18S2 which is about 9% higher than the expected This is known since the SOVT1 test (before the cryo-test campaign). An extra test run during this test has not changed the behaviour.

− The DC voltages Outputs (Science Telemetry) are within the ranges expected (10%): In this case the voltage outputs recorded at comparable BEU tempeatures are within 10% for all the LFI channels apart from the 44 GHz which are about 20% smaller compared to the PLM SIT run at Cannes taken as a reference. The

reason of this discrepancy has not been fully understood. The receivers, however, appear functional in all the tested configurations and thus there is no reason to believe a loss of functionality has occurred.

− No unexpected features in FFT spectrum (Spike, Pop corn noise, currents drops…): OK