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LFI Project System Team

Planck LFI

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CHANGE RECORD

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1 ACRONYMS

AIV	Assembly, Integration, Verification
ASW	Application Software
CCS	Central Check-out System
CDMU	Central Data Management Unit
DPU	Digital Processing Unit
IST	Integrated Satellite Test
OBC	On Board Clock
OBT	On Board Time
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
TBD	To Be Defined
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 description of a feature observed during PLM SIT test on RCA 23, this description could be used to open a dedicated NCR in order to monitor the problem through the System Test Campaign. The data shown here after have been collected during the PLM SIT performed on the 24th of October 2007 in Cannes.

3 APPLICABLE AND REFERENCE DOCUMENTS

3.1 Reference Documents

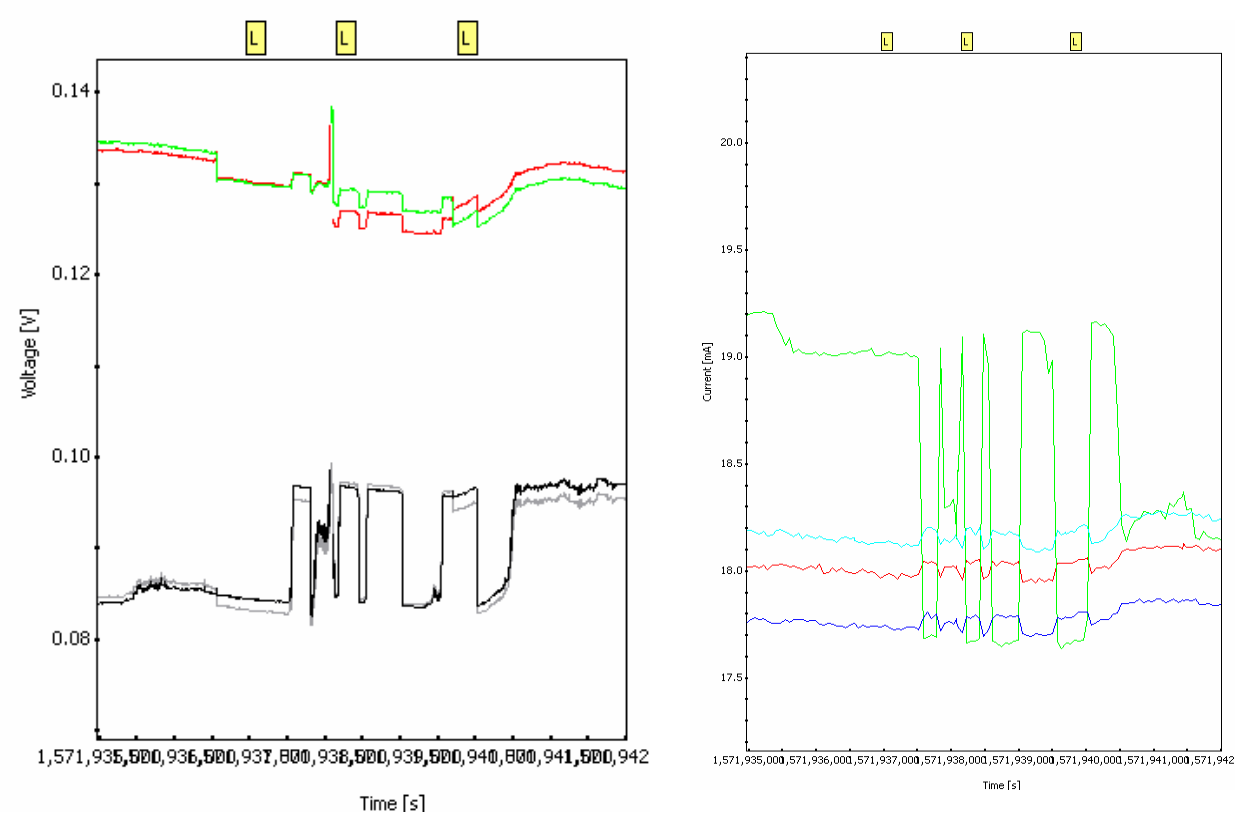
[RD01] MEMO: RCA 23 INVESTIGATION FROM WARM TESTS. F. Cuttaia, INAF- IASF Bo, 13-10-2006, issue 3.0

[RD02] BISTABLE NOISE IN OPERATIONAL AMPLIFIER, S. T. Hsu, IEEE Journal of solid state circuits

[RD03] QUICK LOOK DATA ANALYSIS OF LFI PERFORMED DURING SIT, PL-LFI-PST-RP-024, 0.1 Draft.

4 Description

RCA 23 shows, from data analysis performed on data collected during the PLM SIT , a strange behaviour as in figure 1 a.

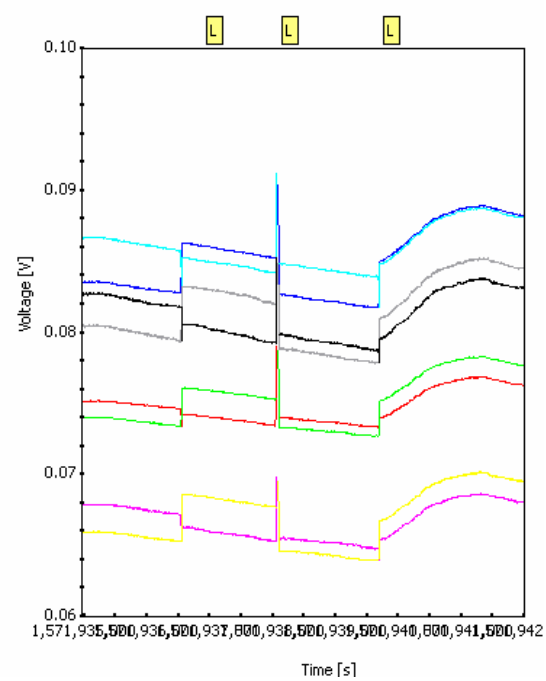


a) Scientific Output (Volt) b) I drain (mA) DAE HK

Fig. 1. RCA23 Burst Noise AMB_0114

In the above figure the output from the detector R1D1 (in gray) and the output from the detector R0D0 (In red and green) are shown. A quite high "*Burst Noise like*" is visible in both outputs where no changes in LFI configuration where expected.
Looking at I drain current values (fig 1 b) from the House Keeping it is quite evident that the current of the LNA associated to S1 is changing within three different values (*high low* and *middle* values). The change in the S1 is somehow reflected in the currents of the others LNA and this is also visible in voltage output. The order of magnitude of the current changes is about 1.5mA (peak to peak).
The feature is visible for 1 hour and the I drain of S1 stabilize at a *middle* value. In this configuration the change in percentage of the current respect to WFT test that is our reference point is more than 5%, while at the beginning of the test when the current was in his *higher* state the difference respect to WFT was lower than 0.8%. The current remains in this *middle* values all along the test until the end.
The first time the feature appears in AMB_0113 at the 14:09:06 just when the LUT of the SCS were uploaded via TC, anyway there is no direct connection between the two event because the LUT were uploaded also at 9:44:52 and no feature was visible at that time.

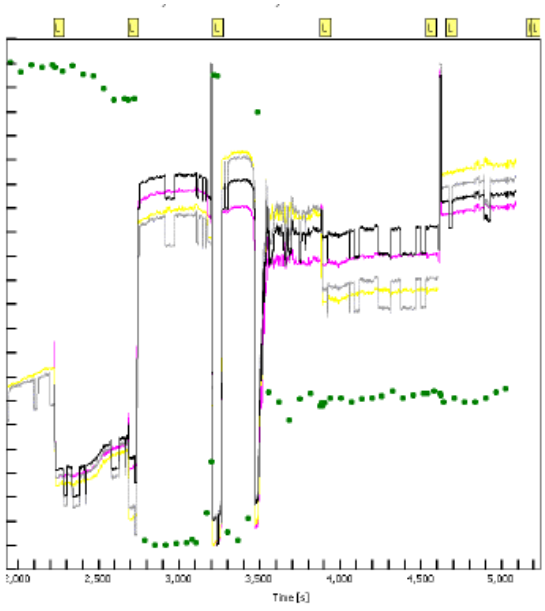
In the figure below is show the same output when the right current is applied and no noise is seen.



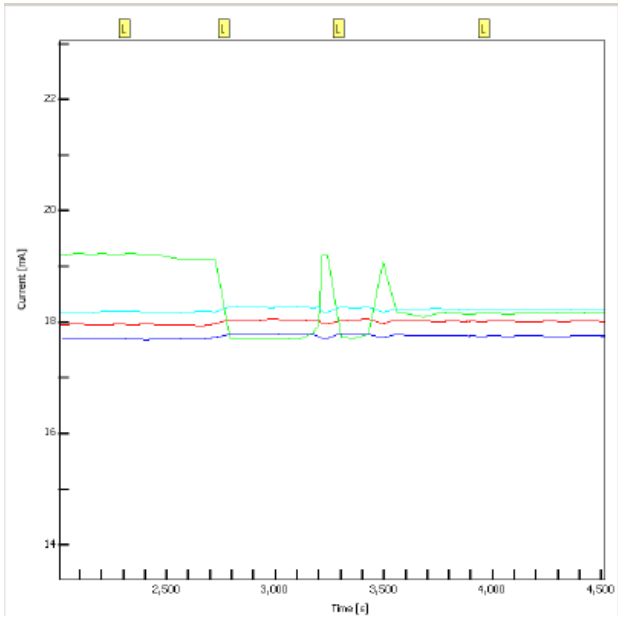
The changes in output in the figure above are due to changes of the PS status via TC sending.

4.1 Feature during FM test campaign

A similar feature was found during the FM test campaign (Summer 2006) at instrument level.



a) Scientific Output (Volt)



b) I drain (mA) DAE HK

The above picture refers to data collected during FM test AMB_0090 [RD01]. It is visible the current noise of the same order of magnitude of the one found in system level, ~1.5mA. The Burst noise was found before and after the FM calibration in cryogenic condition and a NCR was open at that time to keep trace of the unexpected behaviour.

5 Conclusions

From literature, the nature of the *Burst Noise like* in output voltage is that it has a strong dependence with applied voltages to amplifier, this means that the higher the voltages the higher the noise could be. [RD02] From FM test campaign the Burst noise was no observed during the whole cryogenic test where lower biases to S1 ACA were applied respect to the one applied during the Warm Tests. If nothing is changed somewhere from the FM cryogenic tests we would expect that also in CSL and in Flight the feature will disappear, but indeed this Noise appeared only during the PLM SIT tests and it was not visible during WFT, SFT and EMC tests.
LFI would monitor the feature so a dedicated NCR should be opened.
This feature is different from the *popcorn noise* one that it is still visible in data collected that it has a lower order magnitude and it is covered by another NCR opened (and closed as Use As Is) during FM test campaign.