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Univ. Helsinki**

LFI Project System Team

Planck LFI

TITLE: **Planck-LFI CPV: Blanking Time Verification** (P_PVP_LFI_0014_01)

DOC. TYPE: **Test Report**

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		Date:	October, 2009
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Planck-LFI CPV: Blanking Time Verification

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CHANGE RECORD

Issue	Date	Sheet	Description of Change	Release
1.0	October 2009	All	First draft of document	01.00.00

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
CPV	Calibration Performance Verification
CSL	Centre Spatiale de Liège
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
SCS	Sorption Cooler 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   APPLICABLE AND REFERENCE DOCUMENTS

2.1   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

[AD5]   Data analysis and scientific performance of the LFI FM instrument, PL-LFI-PST-AN-006 3.0

[AD6]   Planck-LFI TV-TB test report: executive summary, PL-LFI-PST-RP-040 1.1

[AD7]   Testing plan of the LFI instrument during the Planck Commissioning and CPV phase, PL-LFI-PST-PL-043 (4.2)

2.2   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 2.1

[RD3]   Estimate of Planck-LFI in flight performance, PL-LFI-PST-RP-040 1.0

[RD4]   Planck-LFI CPV: 1 Hz frequency spikes, PL-LFI-PST-RP-061

3 Introduction

This test consists in five steps, of about 15 minutes, with different blanking times: 7.5 μιχρο-s, 0 μιχρο-s, 15 μιχρο-s, 22.5 μιχρο-s, and again 7.5 μιχρο-s. In particular we want to verify that:

- no current drops or abrupt variations are observed in FEM drain currents;

- no frequency spikes are observed besides those already characterised during the SPIKE-02 test;

- frequency spikes are not affected by the different blanking time values;

- no pop-corn noise is detected in radiometer voltage outputs.

4 Test Execution

4.1 Test configuration

The test configuration is the following

SCOS 2K EGSE 3.1 Release 1.2
RTSILib version 1.0
RTSI Client version 1.2
LEVEL1 (TMH/TQL) version 5.1
LIFE Machine version OM 3.00
IDIS 2.7.3.4

LFI Personnel involved during the test is:

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Industry support	Paola Battaglia

4.2　　　Pass-fail criteria, verification matrix

CPV	**P_PVP_LFI_0014_01**	
July, 16, 17th 2009	**DoY 196, 197**	**OD 64, 66**
Duration	**1.00.00**	
Test name:	**Blanking Time**	

Test objectives:　Check receiver noise properties in different DAE blanking time conditions:
- Check that whine noise scales correctly with Blanking Time
- Check that frequency spikes do not change with Blanking Time

Check	Verification matrix					
	Passed?				**Recovered?**	
	Yes	**No**	**Notes**		**Yes**	**No**
No unexpected event Packets	Yes					
TC procedure	Yes					
No unexpected errors during software optimization runs	Yes					
No unexpected features		no	During the PS tuning verification tests, an oscillation effect on RCA 24 created saturation effect on RCA 27 (see AR P_SC-34). The test was performed again a few days later, July the 17th-18th		yes	
Data saved and stored at DPC	Yes					

4.3 Procedure/ Test sequence and environmental conditions

4.3.1 Test procedure

The test consisted in about 90 minutes data acquisition with the instrument running in stable conditions: no telecommands were uploaded to the instrument. Test started at about 1.626.530.600 (OD65) and ended at about 1.626.535.700 (OD65). The time intervals selected for the data analysis are **12 minutes** long and these are the starting and ending times, for each step:

- **Step 1**: 1.626.531.200 – 1.626.531.920 (Blanking Time = 7.5 μιχρο-s)

- **Step 2**: 1.626.532.250 – 1.626.532.970 (Blanking Time = 0 μιχρο-s)

- **Step 3**: 1.626.533.170 – 1.626.533.890 (Blanking Time = 15 μιχρο-s)

- **Step 4**: 1.626.534.100 – 1.626.534.820 (Blanking Time = 22.5 μιχρο-s)

- **Step 5**: 1.626.534.960 – 1.626.535.680 (Blanking Time = 7.5 μιχρο-s)

4.3.2   Bias, phase switch and DAE configuration

The biases for all 44 ACAs and phase switches are reported in tables from 2 to 6, together with the DAE gains and offsets. There is one table for each step.

The used switching configuration was the nominal one for each step and is reported in the following table.

<div align="center">

Table 1 Phase Switch Configuration

RCA	A/C 4KHz	B/D4KHz	A/C pos	B/D pos
LFI18	0	1	1	0
LFI19	0	1	1	0
LFI20	0	1	1	0
LFI21	0	1	1	0
LFI22	0	1	1	0
LFI22	0	1	1	0
LFI23	1	0	1	0
LFI24	0	1	1	0
LFI25	0	1	1	0
LFI26	0	1	1	0
LFI27	0	1	1	0
LFI28	0	1	1	0

</div>

Table 2 Step 1 (Blanking Time equal to 7.5 μχρο-s)

		Vg1	Vg2	Vd	I1	I2	DAE Gain	DAE Offset
27	**M1**	242	97	156	148	220	9.000000	1.102596
27	**M2**	255	96	157	145	205	9.000000	1.211556
27	**S1**	235	86	157	127	184	9.000000	1.152142
27	**S2**	248	113	156	148	195	9.000000	0.938643
24	**M2**	227	204	183	77	185	11.000000	0.010389
24	**M1**	219	204	183	98	215	4.000000	0.010532
24	**S2**	225	208	152	86	205	4.000000	0.010630
24	**S1**	218	207	157	84	235	4.000000	0.010506
21	**S2**	205	243	132	255	255	9.000000	0.888843
21	**S1**	170	221	136	255	255	9.000000	0.936770
21	**M1**	192	231	147	255	255	2.000000	0.994380
21	**M2**	191	224	136	255	255	2.000000	0.993816
22	**S2**	193	231	130	255	255	9.000000	1.232358
22	**S1**	210	221	128	255	255	9.000000	1.231858
22	**M1**	208	218	130	255	255	9.000000	0.908454
22	**M2**	188	188	135	255	255	9.000000	1.232539
23	**S2**	198	213	127	255	255	9.000000	1.076172
23	**S1**	180	222	123	255	255	9.000000	1.522126
23	**M1**	211	206	120	255	255	8.000000	2.109642
23	**M2**	190	228	119	255	255	9.000000	1.326854
25	**M1**	231	203	177	154	245	10.000000	0.010568
25	**M2**	218	200	178	79	255	10.000000	0.010445
25	**S1**	231	196	167	79	205	10.000000	0.010388
25	**S2**	223	199	166	119	225	10.000000	0.010581
28	**M1**	243	101	150	130	160	9.000000	0.937000
28	**M2**	240	112	163	127	228	9.000000	1.190773
28	**S1**	235	81	157	127	222	9.000000	0.937406
28	**S2**	249	90	158	103	165	9.000000	0.936893
20	**S2**	169	215	127	255	255	9.000000	1.651696
20	**S1**	179	230	132	255	255	9.000000	1.632372
20	**M1**	191	244	121	255	255	2.000000	1.327795
20	**M2**	209	231	127	255	255	2.000000	1.327359
19	**S2**	207	222	125	255	255	9.000000	1.093667
19	**S1**	202	226	120	255	255	9.000000	1.210497
19	**M1**	205	221	124	255	255	9.000000	0.937057
19	**M2**	196	216	126	255	255	9.000000	1.052922
18	**S2**	216	182	114	255	255	1.000000	2.268937
18	**S1**	155	215	138	255	255	0.000000	2.268899
18	**M1**	195	189	126	255	255	1.000000	1.325203
18	**M2**	198	201	125	255	255	1.000000	1.133805
26	**M2**	226	200	170	153	165	4.000000	0.010355
26	**M1**	247	203	169	108	255	4.000000	0.010596
26	**S2**	240	197	169	93	225	4.000000	0.059393
26	**S1**	227	194	172	135	235	10.000000	0.010444

Table 3 Step 2 (Blanking Time equal to 0 μχρο s)

		Vg1	Vg2	Vd	I1	I2	DAE Gain	DAE Offset
27	M1	242	97	156	148	220	9.000000	1.103469
27	M2	255	96	157	145	205	9.000000	1.211649
27	S1	235	86	157	127	184	9.000000	1.151765
27	S2	248	113	156	148	195	9.000000	0.937826
24	M2	227	204	183	77	185	11.000000	0.009746
24	M1	219	204	183	98	215	4.000000	0.009825
24	S2	225	208	152	86	205	4.000000	0.009912
24	S1	218	207	157	84	235	4.000000	0.009774
21	S2	205	243	132	255	255	9.000000	0.886806
21	S1	170	221	136	255	255	9.000000	0.936555
21	M1	192	231	147	255	255	2.000000	0.994983
21	M2	191	224	136	255	255	2.000000	0.995362
22	S2	193	231	130	255	255	9.000000	1.231050
22	S1	210	221	128	255	255	9.000000	1.230600
22	M1	208	218	130	255	255	9.000000	0.907104
22	M2	188	188	135	255	255	9.000000	1.230920
23	S2	198	213	127	255	255	9.000000	1.073778
23	S1	180	222	123	255	255	9.000000	1.521194
23	M1	211	206	120	255	255	8.000000	2.109952
23	M2	190	228	119	255	255	9.000000	1.326503
25	M1	231	203	177	154	245	10.000000	0.009872
25	M2	218	200	178	79	255	10.000000	0.009748
25	S1	231	196	167	79	205	10.000000	0.009819
25	S2	223	199	166	119	225	10.000000	0.009861
28	M1	243	101	150	130	160	9.000000	0.936664
28	M2	240	112	163	127	228	9.000000	1.190960
28	S1	235	81	157	127	222	9.000000	0.937012
28	S2	249	90	158	103	165	9.000000	0.936625
20	S2	169	215	127	255	255	9.000000	1.646410
20	S1	179	230	132	255	255	9.000000	1.626913
20	M1	191	244	121	255	255	2.000000	1.326676
20	M2	209	231	127	255	255	2.000000	1.326541
19	S2	207	222	125	255	255	9.000000	1.092632
19	S1	202	226	120	255	255	9.000000	1.209178
19	M1	205	221	124	255	255	9.000000	0.935895
19	M2	196	216	126	255	255	9.000000	1.052203
18	S2	216	182	114	255	255	1.000000	2.266112
18	S1	155	215	138	255	255	0.000000	2.268101
18	M1	195	189	126	255	255	1.000000	1.327166
18	M2	198	201	125	255	255	1.000000	1.133379
26	M2	226	200	170	153	165	4.000000	0.009791
26	M1	247	203	169	108	255	4.000000	0.009866
26	S2	240	197	169	93	225	4.000000	0.058750
26	S1	227	194	172	135	235	10.000000	0.009768

Table 4 Step 3 (Blanking Time equal to 15 μχρο s)

		Vg1	Vg2	Vd	I1	I2	DAE Gain	DAE Offset
27	**M1**	242	97	156	148	220	9.000000	1.105011
27	**M2**	255	96	157	145	205	9.000000	1.213190
27	**S1**	235	86	157	127	184	9.000000	1.153465
27	**S2**	248	113	156	148	195	9.000000	0.939180
24	**M2**	227	204	183	77	185	11.000000	0.011291
24	**M1**	219	204	183	98	215	4.000000	0.011375
24	**S2**	225	208	152	86	205	4.000000	0.011336
24	**S1**	218	207	157	84	235	4.000000	0.011232
21	**S2**	205	243	132	255	255	9.000000	0.888379
21	**S1**	170	221	136	255	255	9.000000	0.938052
21	**M1**	192	231	147	255	255	2.000000	0.996342
21	**M2**	191	224	136	255	255	2.000000	0.996898
22	**S2**	193	231	130	255	255	9.000000	1.232529
22	**S1**	210	221	128	255	255	9.000000	1.232237
22	**M1**	208	218	130	255	255	9.000000	0.908688
22	**M2**	188	188	135	255	255	9.000000	1.231935
23	**S2**	198	213	127	255	255	9.000000	1.075691
23	**S1**	180	222	123	255	255	9.000000	1.523171
23	**M1**	211	206	120	255	255	8.000000	2.111477
23	**M2**	190	228	119	255	255	9.000000	1.328268
25	**M1**	231	203	177	154	245	10.000000	0.011429
25	**M2**	218	200	178	79	255	10.000000	0.011275
25	**S1**	231	196	167	79	205	10.000000	0.011294
25	**S2**	223	199	166	119	225	10.000000	0.011315
28	**M1**	243	101	150	130	160	9.000000	0.938243
28	**M2**	240	112	163	127	228	9.000000	1.192598
28	**S1**	235	81	157	127	222	9.000000	0.938574
28	**S2**	249	90	158	103	165	9.000000	0.938261
20	**S2**	169	215	127	255	255	9.000000	1.648176
20	**S1**	179	230	132	255	255	9.000000	1.628388
20	**M1**	191	244	121	255	255	2.000000	1.328159
20	**M2**	209	231	127	255	255	2.000000	1.328160
19	**S2**	207	222	125	255	255	9.000000	1.094176
19	**S1**	202	226	120	255	255	9.000000	1.210744
19	**M1**	205	221	124	255	255	9.000000	0.937322
19	**M2**	196	216	126	255	255	9.000000	1.053767
18	**S2**	216	182	114	255	255	1.000000	2.267632
18	**S1**	155	215	138	255	255	0.000000	2.269437
18	**M1**	195	189	126	255	255	1.000000	1.328787
18	**M2**	198	201	125	255	255	1.000000	1.135027
26	**M2**	226	200	170	153	165	4.000000	0.011258
26	**M1**	247	203	169	108	255	4.000000	0.011457
26	**S2**	240	197	169	93	225	4.000000	0.060256
26	**S1**	227	194	172	135	235	10.000000	0.011210

Table 5 Step 4 (Blanking Time equal to 22.5 μιχρο-σ)

		Vg1	Vg2	Vd	I1	I2	DAE Gain	DAE Offset
27	M1	242	97	156	148	220	9.000000	1.106000
27	M2	255	96	157	145	205	9.000000	1.214094
27	S1	235	86	157	127	184	9.000000	1.154162
27	S2	248	113	156	148	195	9.000000	0.940195
24	M2	227	204	183	77	185	11.000000	0.012242
24	M1	219	204	183	98	215	4.000000	0.012287
24	S2	225	208	152	86	205	4.000000	0.012317
24	S1	218	207	157	84	235	4.000000	0.012131
21	S2	205	243	132	255	255	9.000000	0.889185
21	S1	170	221	136	255	255	9.000000	0.939000
21	M1	192	231	147	255	255	2.000000	0.997323
21	M2	191	224	136	255	255	2.000000	0.997770
22	S2	193	231	130	255	255	9.000000	1.233473
22	S1	210	221	128	255	255	9.000000	1.233138
22	M1	208	218	130	255	255	9.000000	0.909751
22	M2	188	188	135	255	255	9.000000	1.232867
23	S2	198	213	127	255	255	9.000000	1.076491
23	S1	180	222	123	255	255	9.000000	1.523676
23	M1	211	206	120	255	255	8.000000	2.112286
23	M2	190	228	119	255	255	9.000000	1.328901
25	M1	231	203	177	154	245	10.000000	0.012388
25	M2	218	200	178	79	255	10.000000	0.012258
25	S1	231	196	167	79	205	10.000000	0.012213
25	S2	223	199	166	119	225	10.000000	0.012297
28	M1	243	101	150	130	160	9.000000	0.939286
28	M2	240	112	163	127	228	9.000000	1.193335
28	S1	235	81	157	127	222	9.000000	0.939407
28	S2	249	90	158	103	165	9.000000	0.939034
20	S2	169	215	127	255	255	9.000000	1.648796
20	S1	179	230	132	255	255	9.000000	1.629518
20	M1	191	244	121	255	255	2.000000	1.329036
20	M2	209	231	127	255	255	2.000000	1.328996
19	S2	207	222	125	255	255	9.000000	1.095084
19	S1	202	226	120	255	255	9.000000	1.211785
19	M1	205	221	124	255	255	9.000000	0.938160
19	M2	196	216	126	255	255	9.000000	1.054726
18	S2	216	182	114	255	255	1.000000	2.268741
18	S1	155	215	138	255	255	0.000000	2.270331
18	M1	195	189	126	255	255	1.000000	1.329452
18	M2	198	201	125	255	255	1.000000	1.136042
26	M2	226	200	170	153	165	4.000000	0.012172
26	M1	247	203	169	108	255	4.000000	0.012362
26	S2	240	197	169	93	225	4.000000	0.061224
26	S1	227	194	172	135	235	10.000000	0.012094

Table 6 Step 5 (Blanking Time equal to 7.5 μχρο-s)

		Vg1	Vg2	Vd	I1	I2	DAE Gain	DAE Offset
27	M1	242	97	156	148	220	9.000000	1.102596
27	M2	255	96	157	145	205	9.000000	1.211556
27	S1	235	86	157	127	184	9.000000	1.152142
27	S2	248	113	156	148	195	9.000000	0.938643
24	M2	227	204	183	77	185	11.000000	0.010389
24	M1	219	204	183	98	215	4.000000	0.010532
24	S2	225	208	152	86	205	4.000000	0.010630
24	S1	218	207	157	84	235	4.000000	0.010506
21	S2	205	243	132	255	255	9.000000	0.888843
21	S1	170	221	136	255	255	9.000000	0.936770
21	M1	192	231	147	255	255	2.000000	0.994380
21	M2	191	224	136	255	255	2.000000	0.993816
22	S2	193	231	130	255	255	9.000000	1.232358
22	S1	210	221	128	255	255	9.000000	1.231858
22	M1	208	218	130	255	255	9.000000	0.908454
22	M2	188	188	135	255	255	9.000000	1.232539
23	S2	198	213	127	255	255	9.000000	1.076172
23	S1	180	222	123	255	255	9.000000	1.522126
23	M1	211	206	120	255	255	8.000000	2.109642
23	M2	190	228	119	255	255	9.000000	1.326854
25	M1	231	203	177	154	245	10.000000	0.010568
25	M2	218	200	178	79	255	10.000000	0.010445
25	S1	231	196	167	79	205	10.000000	0.010388
25	S2	223	199	166	119	225	10.000000	0.010581
28	M1	243	101	150	130	160	9.000000	0.937000
28	M2	240	112	163	127	228	9.000000	1.190773
28	S1	235	81	157	127	222	9.000000	0.937406
28	S2	249	90	158	103	165	9.000000	0.936893
20	S2	169	215	127	255	255	9.000000	1.651696
20	S1	179	230	132	255	255	9.000000	1.632372
20	M1	191	244	121	255	255	2.000000	1.327795
20	M2	209	231	127	255	255	2.000000	1.327359
19	S2	207	222	125	255	255	9.000000	1.093667
19	S1	202	226	120	255	255	9.000000	1.210497
19	M1	205	221	124	255	255	9.000000	0.937057
19	M2	196	216	126	255	255	9.000000	1.052922
18	S2	216	182	114	255	255	1.000000	2.268937
18	S1	155	215	138	255	255	0.000000	2.268899
18	M1	195	189	126	255	255	1.000000	1.325203
18	M2	198	201	125	255	255	1.000000	1.133805
26	M2	226	200	170	153	165	4.000000	0.010355
26	M1	247	203	169	108	255	4.000000	0.010596
26	S2	240	197	169	93	225	4.000000	0.059393
26	S1	227	194	172	135	235	10.000000	0.010444

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4.3.3 Results and Conclusions

The test was executed in the scheduled time and no non-nominal features were observed from the point of view of the test conduction.

The white noise is very similar in all steps (within few percent), and the variations are mainly due to the different integration time corresponding to the different values of the blanking time. There is an anomaly in the first step, in which the white noise is higher with respect to the other steps (the channels in which this occurs are pointed out in yellow). This is probably due to some instabilities found in the `-15V_1553_Volt` REBA parameter (and the corresponding `-15V_1553_Curr`) or in the trend found in the RFEM1 and LFEM1 temperatures (see Figure 1).
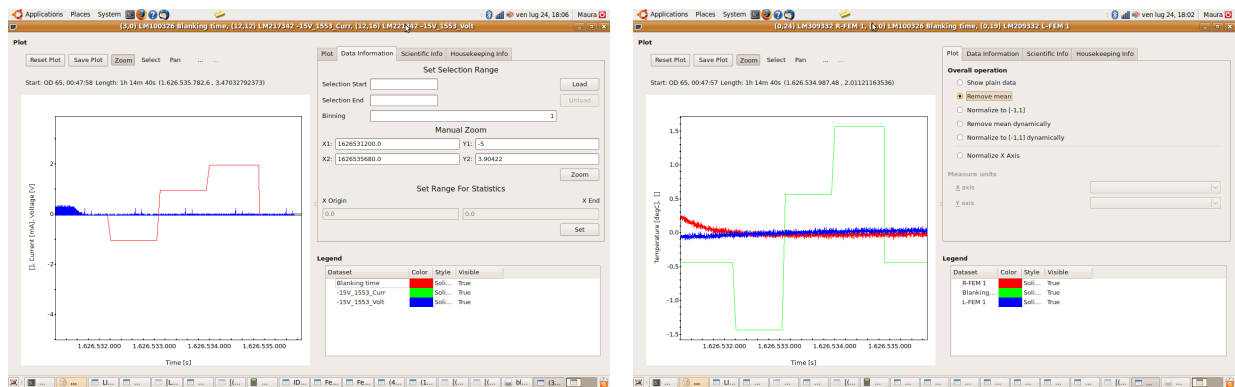

Figure 1 -15V_1553_Volt and -15V_1553_Curr (left side) and RFEM1 and LFEM1 (right side).

5 Data Analysis

5.1 Drain current stability

To characterise drain current stability we have calculated the standard deviation for Id in all channels. Values reported in Table 7 show that the stability is very good, with variations that are less than 1% for all channels.

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Table 7 – Drain current average values and standard deviation

STEP 1		STEP 2		STEP 3		STEP 4		STEP 4	
Id	Id_stddev	Id	Id_stddev	Id	Id_stddev	Id	Id_stddev	Id	Id_stddev
7.9534	0.0077	7.9591	0.0048	7.9538	0.0061	7.9583	0.0064	7.9562	0.0046
7.5341	0.0035	7.5383	0.0054	7.5361	0.0030	7.5387	0.0060	7.5361	0.0064
8.2234	0.0047	8.2215	0.0036	8.2202	0.0069	8.2211	0.0063	8.2254	0.0049
7.9981	0.0076	7.9977	0.0063	7.9970	0.0057	7.9992	0.0057	7.9981	0.0057
7.1321	0.0061	7.1321	0.0061	7.1359	0.0040	7.1340	0.0041	7.1335	0.0059
7.2531	0.0044	7.2547	0.0065	7.2610	0.0060	7.2612	0.0081	7.2603	0.0059
7.7328	0.0052	7.7366	0.0091	7.7399	0.0039	7.7400	0.0060	7.7430	0.0099
8.2760	0.0062	8.2844	0.0044	8.2857	0.0057	8.2859	0.0052	8.2861	0.0077
22.1153	0.0067	22.0984	0.0059	22.0904	0.0040	22.0855	0.0046	22.0848	0.0041
19.3142	0.0166	19.2791	0.0073	19.2673	0.0075	19.2633	0.0067	19.2588	0.0058
21.5186	0.0078	21.5034	0.0120	21.4843	0.0137	21.5034	0.0101	21.4939	0.0150
23.6937	0.0101	23.6667	0.0060	23.6521	0.0056	23.6439	0.0041	23.6311	0.0061
19.1499	0.0295	19.0786	0.0143	19.0580	0.0092	19.0445	0.0099	19.0340	0.0121
21.2616	0.0127	21.2324	0.0021	21.2207	0.0036	21.2097	0.0051	21.1988	0.0044
18.8236	0.0082	18.8010	0.0075	18.7881	0.0064	18.7815	0.0070	18.7756	0.0066
18.6856	0.0064	18.6753	0.0064	18.6630	0.0040	18.6594	0.0076	18.6607	0.0065
17.8526	0.0078	17.8386	0.0095	17.8331	0.0093	17.8219	0.0096	17.8253	0.0099
21.9203	0.0037	21.9161	0.0060	21.9119	0.0042	21.9084	0.0047	21.9088	0.0038
17.3205	0.0095	17.3018	0.0069	17.2937	0.0052	17.2866	0.0075	17.2913	0.0077
17.6683	0.0081	17.6594	0.0073	17.6495	0.0081	17.6530	0.0070	17.6483	0.0055
6.3243	0.0075	6.3201	0.0057	6.3290	0.0043	6.3243	0.0085	6.3200	0.0066
6.3099	0.0052	6.3118	0.0045	6.3116	0.0060	6.3137	0.0077	6.3136	0.0053
6.0635	0.0100	6.0707	0.0058	6.0657	0.0085	6.0681	0.0062	6.0685	0.0069
5.9769	0.0097	5.9853	0.0070	5.9823	0.0084	5.9788	0.0107	5.9816	0.0092
8.9818	0.0076	8.9776	0.0057	8.9825	0.0095	8.9741	0.0076	8.9760	0.0101
9.8098	0.0092	9.8121	0.0065	9.8083	0.0054	9.8091	0.0064	9.8093	0.0098
8.8153	0.0079	8.8168	0.0081	8.8150	0.0084	8.8157	0.0072	8.8154	0.0030
9.3665	0.0080	9.3722	0.0041	9.3696	0.0051	9.3645	0.0081	9.3661	0.0093
16.9621	0.0053	16.9579	0.0053	16.9544	0.0073	16.9544	0.0089	16.9486	0.0076
17.6338	0.0093	17.6227	0.0070	17.6190	0.0058	17.6184	0.0086	17.6178	0.0086
21.4044	0.0159	21.3738	0.0043	21.3699	0.0048	21.3646	0.0042	21.3604	0.0037
21.3172	0.0079	21.3080	0.0017	21.3080	0.0050	21.3087	0.0042	21.3040	0.0033
17.9826	0.0072	17.9838	0.0068	17.9756	0.0063	17.9736	0.0090	17.9733	0.0058
18.1735	0.0083	18.1654	0.0087	18.1615	0.0051	18.1598	0.0113	18.1607	0.0054
20.2526	0.0043	20.2373	0.0068	20.2302	0.0070	20.2300	0.0059	20.2271	0.0029
19.5763	0.0064	19.5754	0.0096	19.5705	0.0086	19.5683	0.0063	19.5660	0.0059
18.9935	0.0067	19.0030	0.0073	19.0081	0.0063	19.0034	0.0089	19.0089	0.0062
16.5035	0.0077	16.5223	0.0066	16.5210	0.0086	16.5465	0.0071	16.5365	0.0132
13.7071	0.0095	13.7076	0.0118	13.7253	0.0072	13.7238	0.0100	13.7179	0.0103
14.9754	0.0034	14.9784	0.0047	14.9839	0.0042	14.9848	0.0076	14.9916	0.0047
8.4473	0.0071	8.4507	0.0062	8.4491	0.0045	8.4477	0.0081	8.4529	0.0072
8.0826	0.0061	8.0826	0.0042	8.0819	0.0042	8.0838	0.0059	8.0781	0.0104
6.2141	0.0040	6.2179	0.0085	6.2162	0.0050	6.2172	0.0062	6.2169	0.0092
6.4603	0.0065	6.4641	0.0041	6.4657	0.0063	6.4656	0.0074	6.4615	0.0054

5.2   Output signal stability

In Tables from 8 to 12 we summarise average voltage outputs and corresponding standard deviations.

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Table 8 Step 1 (Blanking Time equal to 7.5 μ s)

		Sky		Ref		Dif	
		Mean	Stddev	Mean	Stddev	Mean	Stddev
27	M-00	1.224565	0.000419	1.406751	0.000408	-2.40E-07	0.000207
27	M-01	1.323551	0.000438	1.523556	0.000426	-2.42E-07	0.000224
27	S-10	1.268684	0.000393	1.451812	0.000396	-1.12E-07	0.000195
27	S-11	1.035525	0.000361	1.184112	0.000359	-9.63E-08	0.000174
24	M-00	0.048948	3.40E-05	0.053617	3.74E-05	-2.40E-09	9.07E-06
24	M-01	0.049492	3.69E-05	0.054795	3.94E-05	-1.64E-08	1.13E-05
24	S-10	0.076551	5.37E-05	0.08414	5.58E-05	-2.42E-08	2.24E-05
24	S-11	0.081591	4.87E-05	0.090488	4.94E-05	-3.32E-08	2.79E-05
21	M-00	1.078333	0.001152	1.143088	0.001197	-8.89E-08	1.12E-04
21	M-01	1.045476	0.0012	1.08752	0.001231	-5.10E-08	1.03E-04
21	S-10	1.000528	0.000915	1.040134	0.000935	-4.67E-08	9.23E-05
21	S-11	0.999046	0.000881	1.022258	0.000894	-5.20E-08	9.82E-05
22	M-00	1.333678	0.001155	1.362899	0.001151	1.49E-08	1.30E-04
22	M-01	1.327202	0.000914	1.353215	0.000926	-1.52E-07	1.24E-04
22	S-10	1.225083	0.00235	1.229755	0.002323	1.13E-08	1.18E-04
22	S-11	1.474271	0.002571	1.465486	0.00253	-4.53E-08	1.30E-04
23	M-00	1.340337	0.002283	1.43214	0.002441	-3.7E-08	0.000126
23	M-01	1.753614	0.003148	1.776866	0.003455	2.53E-07	0.000319
23	S-10	2.653904	0.003494	2.757014	0.00362	-1.67E-07	0.000243
23	S-11	1.439528	0.002014	1.500904	0.002074	-1.58E-07	0.000141
25	M-00	0.09852	8.83E-05	0.120629	0.00018	9.98E-08	8.48E-05
25	M-01	0.093984	9.15E-05	0.117198	0.000204	1.03E-07	9.24E-05
25	S-10	0.074624	8.60E-05	0.088456	0.000147	-1.50E-07	1.23E-04
25	S-11	0.065962	6.95E-05	0.079932	0.000258	-2.61E-07	0.000223
28	M-00	1.096061	0.000374	1.126254	0.000332	-5.42E-08	0.000167
28	M-01	1.377784	0.000464	1.430019	0.000407	-1.38E-07	0.000214
28	S-10	0.971845	0.000293	1.050634	0.000261	-1.30E-07	0.000151
28	S-11	0.845279	0.000237	0.920401	0.000219	-5.76E-08	0.000135
20	M-00	1.920588	0.004524	1.996914	0.004631	-4.00E-08	0.000196
20	M-01	1.905762	0.00455	1.970911	0.004677	-1.58E-07	0.000191
20	S-10	1.37414	0.001729	1.41778	0.001776	2.70E-08	0.000132
20	S-11	1.367961	0.001514	1.415566	0.001538	-6.74E-08	0.00013
19	M-00	1.363073	0.000825	1.406275	0.000852	-8.34E-08	0.000142
19	M-01	1.458302	0.000833	1.537896	0.000875	-1.06E-07	0.000149
19	S-10	1.05529	0.001225	1.116213	0.001292	-1.08E-08	1.08E-04
19	S-11	1.333071	0.001709	1.384454	0.001759	-1.26E-07	0.000133
18	M-00	2.531126	0.00585	2.633785	0.006049	-1.87E-07	0.000265
18	M-01	3.316874	0.007558	3.469009	0.007898	-2.17E-07	0.000343
18	S-10	2.019777	0.00217	2.170827	0.002377	-2.29E-07	0.000211
18	S-11	1.678896	0.001548	1.742701	0.001542	-9.29E-08	1.62E-04
26	M-00	0.07535	5.38E-05	0.090139	1.01E-04	-7.35E-08	6.29E-05
26	M-01	0.091065	5.87E-05	0.109496	1.80E-04	-1.53E-07	1.35E-04
26	S-10	0.070288	6.21E-05	0.078818	7.64E-05	2.50E-08	2.97E-05
26	S-11	0.077315	6.20E-05	0.086838	8.25E-05	3.38E-08	3.75E-05

Table 9 Step 2 (Blanking Time equal to 0 μχρο-s)

		Sky		Ref		Dif	
		Mean	Stddev	Mean	Stddev	Mean	Stddev
27	M-00	1.22347	0.00037	1.402432	0.000363	1.49E-07	0.000205
27	M-01	1.319916	0.000388	1.520608	0.000395	2.15E-07	0.000218
27	S-10	1.266239	0.000366	1.44611	0.000361	1.97E-07	0.000195
27	S-11	1.031476	0.00031	1.180563	0.000303	1.52E-07	0.000169
24	M-00	0.048156	3.44E-05	0.05212	3.68E-05	5.62E-09	8.37E-06
24	M-01	0.048171	3.58E-05	0.053832	3.92E-05	2.87E-09	1.05E-05
24	S-10	0.075654	5.89E-05	0.081988	6.23E-05	1.23E-08	1.36E-05
24	S-11	0.079645	4.60E-05	0.089475	5.20E-05	6.13E-09	1.28E-05
21	M-00	1.064155	0.001334	1.127978	0.001398	7.67E-08	1.10E-04
21	M-01	1.033897	0.001451	1.074483	0.001485	9.66E-08	1.06E-04
21	S-10	0.989638	0.000886	1.027542	0.000917	5.09E-08	8.91E-05
21	S-11	0.989493	0.001023	1.01167	0.001052	4.16E-08	9.15E-05
22	M-00	1.318236	0.000704	1.345587	0.000716	1.48E-07	1.20E-04
22	M-01	1.312356	0.000661	1.337754	0.000676	1.06E-07	1.19E-04
22	S-10	1.203231	0.001808	1.20764	0.001796	1.21E-07	1.12E-04
22	S-11	1.449068	0.002258	1.441019	0.002239	1.43E-07	1.22E-04
23	M-00	1.312002	0.000964	1.399807	0.001018	9.91E-08	0.000123
23	M-01	1.730878	0.000954	1.753535	0.000938	1.93E-07	0.000146
23	S-10	2.604908	0.002505	2.702939	0.002587	1.98E-07	0.000236
23	S-11	1.411985	0.00135	1.470901	0.001393	4.67E-08	0.00014
25	M-00	0.097846	7.87E-05	0.117555	9.74E-05	4.22E-08	2.52E-05
25	M-01	0.091789	7.91E-05	0.116602	9.65E-05	4.65E-08	2.49E-05
25	S-10	0.07394	7.91E-05	0.086573	9.27E-05	-2.30E-08	2.43E-05
25	S-11	0.064999	6.58E-05	0.078072	8.62E-05	-4.86E-08	3.83E-05
28	M-00	1.091348	0.000274	1.124556	0.000254	2.37E-07	0.000158
28	M-01	1.37634	0.000345	1.424259	0.000314	2.60E-07	0.000202
28	S-10	0.9635	0.000259	1.047606	0.000245	1.43E-07	0.000143
28	S-11	0.84271	0.000228	0.910864	0.000219	9.51E-08	0.000132
20	M-00	1.88998	0.000822	1.964867	0.000848	1.20E-07	0.00018
20	M-01	1.877778	0.000829	1.940538	0.00086	9.75E-08	0.000188
20	S-10	1.358114	0.000841	1.400842	0.000856	4.05E-08	0.000131
20	S-11	1.352932	0.000802	1.399545	0.000822	1.21E-07	0.000125
19	M-00	1.350515	0.000897	1.393321	0.000932	1.50E-07	0.000137
19	M-01	1.444184	0.000934	1.521806	0.00097	7.18E-09	0.00015
19	S-10	1.043899	0.000557	1.103589	0.00058	4.87E-08	1.05E-04
19	S-11	1.319192	0.000697	1.369447	0.000712	5.53E-08	0.000133
18	M-00	2.500191	0.004244	2.600381	0.004377	1.39E-07	0.000257
18	M-01	3.282308	0.005401	3.425132	0.005559	1.09E-07	0.000335
18	S-10	2.000933	0.001714	2.145021	0.00185	1.71E-07	0.000206
18	S-11	1.66375	0.0012	1.726006	0.001248	1.28E-07	1.46E-04
26	M-00	0.074551	5.26E-05	0.087747	6.29E-05	3.23E-09	1.74E-05
26	M-01	0.089346	5.92E-05	0.108161	7.75E-05	-1.73E-08	2.41E-05
26	S-10	0.069444	6.44E-05	0.077393	7.02E-05	1.40E-08	1.43E-05
26	S-11	0.076061	6.33E-05	0.085991	7.14E-05	1.79E-08	1.42E-05

Table 10 Step 3 (Blanking Time equal to 15 μχρο s)

		Sky		Ref		Dif	
		Mean	*Stddev*	*Mean*	*Stddev*	*Mean*	*Stddev*
27	M-00	1.226115	0.000373	1.408242	0.000371	-3.45E-08	0.000209
27	M-01	1.324155	0.000373	1.524047	0.00038	-2.15E-08	0.000225
27	S-10	1.269319	0.000337	1.452336	0.000346	-8.46E-08	0.000199
27	S-11	1.035644	0.000281	1.18418	0.000285	2.25E-08	0.000175
24	M-00	0.049852	3.34E-05	0.054582	3.54E-05	-1.82E-09	9.14E-06
24	M-01	0.050378	3.49E-05	0.055635	3.84E-05	-4.40E-09	1.15E-05
24	S-10	0.077218	5.23E-05	0.084842	5.54E-05	2.14E-09	1.49E-05
24	S-11	0.08239	4.56E-05	0.091161	5.02E-05	-1.73E-09	1.45E-05
21	M-00	1.073011	0.00139	1.13746	0.001444	-1.28E-08	1.17E-04
21	M-01	1.041746	0.001333	1.083868	0.001367	-6.61E-08	1.08E-04
21	S-10	1.000621	0.000909	1.040276	0.00096	-1.93E-08	9.56E-05
21	S-11	1.001465	0.000947	1.024731	0.000972	-5.84E-08	9.99E-05
22	M-00	1.332465	0.000724	1.362064	0.000728	-6.65E-08	1.28E-04
22	M-01	1.326987	0.000676	1.35307	0.000686	-2.10E-10	1.25E-04
22	S-10	1.218479	0.001549	1.22343	0.001541	-8.42E-08	1.16E-04
22	S-11	1.467984	0.001702	1.459171	0.001703	-2.96E-09	1.32E-04
23	M-00	1.333821	0.001082	1.425421	0.001166	-9.2E-09	0.000129
23	M-01	1.756303	0.00096	1.780162	0.000948	-7.8E-08	0.000149
23	S-10	2.643135	0.002389	2.74615	0.002505	-1.51E-07	0.000253
23	S-11	1.431447	0.001335	1.492429	0.001381	-7.28E-09	0.000146
25	M-00	0.099427	7.80E-05	0.121997	0.0001	-9.20E-09	2.76E-05
25	M-01	0.095005	7.56E-05	0.118408	0.000102	-2.23E-08	2.92E-05
25	S-10	0.075575	7.57E-05	0.089201	9.46E-05	2.18E-08	2.91E-05
25	S-11	0.066943	6.66E-05	0.080439	9.4E-05	3.48E-08	4.75E-05
28	M-00	1.096471	0.000302	1.126722	0.000256	-6.56E-08	0.000166
28	M-01	1.378658	0.000379	1.430986	0.000325	-5.26E-08	0.000212
28	S-10	0.972588	0.000269	1.051327	0.000254	-3.72E-08	0.000148
28	S-11	0.846368	0.000233	0.921652	0.000216	-6.14E-08	0.000135
20	M-00	1.909554	0.00081	1.985622	0.000849	-3.11E-09	0.000191
20	M-01	1.894047	0.000845	1.959241	0.000892	-1.63E-07	0.000197
20	S-10	1.370291	0.00088	1.413684	0.000897	-1.00E-08	0.000137
20	S-11	1.364454	0.000788	1.412153	0.000818	-2.41E-08	0.000128
19	M-00	1.364176	0.00086	1.407661	0.000889	-5.11E-08	0.000146
19	M-01	1.459253	0.000872	1.538741	0.000913	-3.31E-08	0.000153
19	S-10	1.053673	0.000505	1.114487	0.000523	-3.21E-08	1.11E-04
19	S-11	1.331805	0.000662	1.383161	0.000681	-1.55E-08	0.000135
18	M-00	2.538027	0.003646	2.641094	0.003778	5.10E-08	0.000265
18	M-01	3.33052	0.004645	3.484534	0.00487	-1.83E-07	0.000362
18	S-10	2.028587	0.001421	2.180482	0.001541	5.46E-09	0.000221
18	S-11	1.685337	0.001008	1.749232	0.001015	-1.20E-08	1.60E-04
26	M-00	0.076197	5.35E-05	0.090997	6.64E-05	4.77E-09	1.90E-05
26	M-01	0.091856	6.09E-05	0.109942	8.19E-05	1.90E-08	2.81E-05
26	S-10	0.071136	6.55E-05	0.079785	7.19E-05	-6.46E-09	1.50E-05
26	S-11	0.078052	6.38E-05	0.08766	7.23E-05	-1.17E-08	1.53E-05

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Table 11 Step 4 (Blanking Time equal to 22.5 μχρο-s)

		Sky		Ref		Dif	
		Mean	Stddev	Mean	Stddev	Mean	Stddev
27	M-00	1.227019	0.000363	1.40915	0.000365	2.53E-08	0.000212
27	M-01	1.32488	0.000397	1.524753	0.000395	4.02E-08	0.000227
27	S-10	1.269663	0.000348	1.452662	0.000346	4.38E-08	0.000206
27	S-11	1.036405	0.000308	1.184909	0.000305	5.22E-08	0.000178
24	M-00	0.050802	3.21E-05	0.055523	3.58E-05	-2.93E-09	9.34E-06
24	M-01	0.051288	3.49E-05	0.056542	3.81E-05	4.32E-09	1.21E-05
24	S-10	0.078195	5.63E-05	0.085817	5.91E-05	4.36E-09	1.49E-05
24	S-11	0.083307	4.81E-05	0.092074	5.26E-05	1.21E-08	1.47E-05
21	M-00	1.075746	0.001121	1.140024	0.001167	3.19E-09	1.18E-04
21	M-01	1.044276	0.001147	1.086676	0.001184	4.34E-08	1.09E-04
21	S-10	1.001917	0.000771	1.041625	0.00081	2.46E-08	9.65E-05
21	S-11	1.00295	0.000828	1.026183	0.000841	2.65E-08	0.000102
22	M-00	1.332466	0.000694	1.362129	0.000706	-1.43E-08	1.33E-04
22	M-01	1.327046	0.000628	1.353064	0.000636	8.34E-08	1.26E-04
22	S-10	1.216239	0.001678	1.221356	0.001687	-3.91E-08	1.19E-04
22	S-11	1.4656	0.002035	1.456656	0.002025	3.76E-08	1.33E-04
23	M-00	1.334371	0.000769	1.426106	0.000827	2.39E-08	0.000134
23	M-01	1.757092	0.001061	1.78084	0.001059	2E-08	0.000148
23	S-10	2.639414	0.003094	2.742429	0.003219	2.46E-08	0.000259
23	S-11	1.429285	0.001773	1.49004	0.00184	8.00E-09	0.000147
25	M-00	0.100372	7.72E-05	0.122957	9.22E-05	-1.33E-08	2.47E-05
25	M-01	0.09599	7.28E-05	0.119384	9.33E-05	3.13E-09	2.45E-05
25	S-10	0.076514	7.63E-05	0.090128	9.18E-05	4.90E-09	2.55E-05
25	S-11	0.067972	6.58E-05	0.081476	8.86E-05	1.73E-08	3.86E-05
28	M-00	1.097537	0.000293	1.127766	0.000255	9.60E-08	0.000171
28	M-01	1.379326	0.000374	1.431654	0.000322	8.90E-08	0.00022
28	S-10	0.973213	0.000258	1.051949	0.000241	6.03E-08	0.00015
28	S-11	0.84689	0.00022	0.922166	0.000213	5.40E-08	0.00014
20	M-00	1.910201	0.00079	1.986174	0.000804	-1.63E-09	0.000196
20	M-01	1.895005	0.000801	1.960378	0.000818	3.46E-08	0.000205
20	S-10	1.370983	0.000991	1.414193	0.001032	2.95E-08	0.000138
20	S-11	1.36485	0.001203	1.412748	0.001242	2.42E-08	0.000133
19	M-00	1.364079	0.000847	1.407699	0.000884	-5.20E-09	0.000146
19	M-01	1.459873	0.000825	1.539085	0.000888	5.45E-08	0.000163
19	S-10	1.05441	0.000544	1.115201	0.000559	2.82E-08	1.15E-04
19	S-11	1.332508	0.000674	1.383883	0.00071	1.86E-08	0.000142
18	M-00	2.535331	0.005211	2.638009	0.005428	8.97E-08	0.000277
18	M-01	3.327515	0.006199	3.481723	0.006472	1.01E-07	0.000372
18	S-10	2.027588	0.0019	2.179618	0.002072	8.98E-10	0.000229
18	S-11	1.686119	0.001418	1.749802	0.001411	6.50E-08	1.73E-04
26	M-00	0.07707	5.51E-05	0.091887	6.41E-05	1.02E-09	1.75E-05
26	M-01	0.092741	6.04E-05	0.110816	7.57E-05	8.93E-09	2.44E-05
26	S-10	0.072163	6.54E-05	0.080813	7.15E-05	-4.22E-09	1.53E-05
26	S-11	0.078952	6.32E-05	0.088551	7.04E-05	6.46E-09	1.47E-05

Table 12 Step 5 (Blanking Time equal to 7.5 μχρο-s)

		Sky Mean	Sky Stddev	Ref Mean	Ref Stddev	Dif Mean	Dif Stddev
27	M-00	1.22355	0.000358	1.405549	0.000343	-5.22E-08	0.000209
27	M-01	1.322231	0.000377	1.522012	0.000368	7.91E-09	0.000223
27	S-10	1.267527	0.000344	1.450424	0.000335	7.49E-08	0.000196
27	S-11	1.034579	0.000287	1.183035	0.000281	9.35E-08	0.000173
24	M-00	0.048956	3.25E-05	0.053635	3.52E-05	3.16E-09	8.60E-06
24	M-01	0.049519	3.55E-05	0.054818	3.80E-05	1.78E-09	1.11E-05
24	S-10	0.076563	5.63E-05	0.084104	6.26E-05	-3.54E-09	1.30E-05
24	S-11	0.081625	4.82E-05	0.090451	5.40E-05	-2.05E-09	1.29E-05
21	M-00	1.07402	0.001863	1.138645	0.001951	9.74E-08	1.11E-04
21	M-01	1.041182	0.001861	1.083135	0.001917	5.12E-08	1.05E-04
21	S-10	0.999504	0.000713	1.039093	0.000745	1.95E-08	9.21E-05
21	S-11	0.998208	0.00072	1.021462	0.000745	-1.87E-08	9.73E-05
22	M-00	1.330742	0.00067	1.360042	0.000693	-5.95E-09	1.25E-04
22	M-01	1.325261	0.000629	1.351353	0.000645	3.58E-08	1.22E-04
22	S-10	1.211989	0.001762	1.216813	0.001756	-1.44E-08	1.11E-04
22	S-11	1.459331	0.00214	1.450785	0.002125	2.89E-08	1.27E-04
23	M-00	1.332226	0.000897	1.423471	0.000956	4.01E-08	0.000123
23	M-01	1.755183	0.00108	1.77912	0.00106	7.34E-08	0.000147
23	S-10	2.63402	0.002738	2.73643	0.002874	5.33E-08	0.000245
23	S-11	1.428082	0.001562	1.489099	0.001608	3.55E-08	0.000138
25	M-00	0.098595	7.82E-05	0.121026	9.65E-05	2.88E-09	2.26E-05
25	M-01	0.094083	7.44E-05	0.117658	9.5E-05	6.69E-09	2.42E-05
25	S-10	0.07474	7.82E-05	0.088234	9.22E-05	1.01E-08	2.48E-05
25	S-11	0.066063	6.66E-05	0.079394	8.57E-05	1.06E-08	3.78E-05
28	M-00	1.095051	0.000318	1.125302	0.000284	3.54E-08	0.000167
28	M-01	1.376669	0.000402	1.428908	0.000367	5.12E-08	0.00021
28	S-10	0.971138	0.000262	1.049932	0.000243	5.93E-08	0.000147
28	S-11	0.844781	0.000228	0.919875	0.000206	4.62E-08	0.000135
20	M-00	1.911913	0.000864	1.988059	0.000887	6.42E-08	0.000184
20	M-01	1.897306	0.000862	1.962273	0.000885	1.05E-08	0.00019
20	S-10	1.368918	0.001034	1.412443	0.001065	-2.95E-08	0.000129
20	S-11	1.362599	0.000729	1.410116	0.000763	2.24E-08	0.000126
19	M-00	1.363983	0.00092	1.407334	0.000959	2.57E-08	0.000138
19	M-01	1.459648	0.000953	1.539303	0.001005	8.32E-09	0.000149
19	S-10	1.053993	0.000606	1.114849	0.000642	4.32E-08	1.07E-04
19	S-11	1.331104	0.000855	1.382432	0.000882	1.83E-08	0.000131
18	M-00	2.532302	0.003316	2.635065	0.003447	2.08E-08	0.000261
18	M-01	3.318843	0.004193	3.471079	0.004374	7.87E-08	0.000343
18	S-10	2.023168	0.001824	2.174502	0.001976	6.71E-08	0.000205
18	S-11	1.682554	0.001244	1.746534	0.001276	5.39E-08	1.49E-04
26	M-00	0.075304	5.33E-05	0.089915	6.21E-05	-6.12E-09	1.63E-05
26	M-01	0.090948	5.96E-05	0.109001	7.54E-05	3.78E-09	2.34E-05
26	S-10	0.070282	6.08E-05	0.078887	6.84E-05	2.46E-09	1.39E-05
26	S-11	0.077297	6.12E-05	0.086925	7.00E-05	2.65E-09	1.39E-05

5.3   Frequency spikes

The complete set of power spectra is reported in Appendix 1.

5.4   Noise Properties

In Table 13 we summarise the uncalibrated white noise limit and its standard deviation for all channels.

Table 13 – Uncalibrated white noise and standard deviations (V/rtHz)

		M-00		M-01		S-10		S-11	
		mean	*stddev*	*mean*	*stddev*	*mean*	*stddev*	*mean*	*stddev*
	18	8.01E-05	5.29E-06	1.03E-04	3.12E-06	5.75E-05	5.61E-06	4.24E-05	2.86E-07
	19	4.16E-05	1.49E-06	4.27E-05	2.34E-06	3.13E-05	1.30E-06	3.69E-05	9.32E-07
	20	5.56E-05	4.47E-06	5.70E-05	9.36E-07	3.93E-05	1.89E-06	3.88E-05	2.00E-06
	21	3.02E-05	3.41E-07	2.90E-05	3.13E-07	2.69E-05	1.02E-06	3.11E-05	1.07E-06
	22	3.72E-05	1.13E-06	3.63E-05	1.09E-06	3.56E-05	1.48E-06	3.66E-05	1.76E-06
STEP 1	23	3.77E-05	9.65E-07	4.24E-05	3.27E-06	7.17E-05	2.05E-06	3.89E-05	2.35E-06
	24	2.44E-06	6.31E-08	3.36E-06	1.87E-07	3.56E-06	8.01E-08	3.21E-06	1.67E-07
	25	4.62E-06	1.58E-07	4.55E-06	1.17E-07	4.68E-06	6.98E-08	5.17E-06	1.61E-07
	26	4.10E-06	3.12E-08	4.83E-06	2.82E-07	3.80E-06	6.41E-08	3.27E-06	1.54E-08
	27	4.37E-05	1.23E-06	4.61E-05	7.62E-07	4.28E-05	1.51E-06	3.69E-05	9.79E-07
	28	3.84E-05	1.97E-06	4.65E-05	1.15E-06	3.05E-05	1.39E-06	2.83E-05	1.09E-06
	18	7.67E-05	1.96E-06	9.78E-05	5.18E-06	6.14E-05	2.87E-06	4.25E-05	1.78E-06
	19	4.13E-05	1.49E-06	4.57E-05	1.21E-06	3.09E-05	4.43E-07	4.04E-05	2.50E-06
	20	5.76E-05	2.78E-06	6.04E-05	1.79E-06	4.10E-05	1.18E-06	3.84E-05	1.71E-06
	21	3.04E-05	1.37E-06	2.99E-05	1.56E-06	2.75E-05	1.41E-06	2.89E-05	1.47E-06
	22	3.33E-05	2.55E-06	3.25E-05	2.14E-06	3.42E-05	2.49E-06	3.72E-05	6.20E-07
STEP 2	23	3.90E-05	1.23E-06	4.35E-05	2.79E-06	7.15E-05	5.05E-06	4.05E-05	6.21E-07
	24	2.36E-06	1.47E-07	3.28E-06	1.08E-07	3.68E-06	8.53E-08	3.47E-06	2.36E-07
	25	4.99E-06	1.42E-07	4.54E-06	1.59E-07	4.89E-06	2.83E-07	4.89E-06	4.93E-08
	26	4.23E-06	9.35E-08	4.94E-06	3.49E-07	3.85E-06	9.66E-08	3.33E-06	7.06E-08
	27	4.17E-05	1.94E-06	4.59E-05	1.35E-06	4.11E-05	5.82E-07	3.67E-05	2.38E-06
	28	3.58E-05	2.14E-06	4.66E-05	4.70E-06	3.32E-05	3.73E-07	2.83E-05	1.39E-06
	18	8.02E-05	2.25E-06	1.05E-04	2.51E-06	6.28E-05	1.72E-06	4.76E-05	3.20E-06
	19	4.42E-05	1.61E-06	4.46E-05	1.63E-06	3.25E-05	2.00E-06	3.99E-05	1.92E-06
	20	5.88E-05	1.98E-06	6.01E-05	1.14E-06	4.22E-05	1.69E-06	4.06E-05	2.47E-06
	21	3.17E-05	3.01E-06	3.10E-05	6.66E-07	2.86E-05	1.09E-06	3.14E-05	1.64E-06
	22	3.67E-05	4.88E-07	3.68E-05	1.16E-06	3.54E-05	1.72E-06	3.93E-05	1.11E-06
STEP 3	23	3.97E-05	1.38E-06	4.08E-05	6.33E-07	7.78E-05	3.95E-06	4.31E-05	7.38E-07
	24	2.58E-06	1.81E-07	3.49E-06	4.34E-08	3.73E-06	3.47E-07	3.67E-06	2.14E-07
	25	5.10E-06	4.51E-07	4.87E-06	3.74E-07	4.82E-06	6.46E-08	5.14E-06	1.15E-07
	26	4.25E-06	1.03E-07	5.04E-06	1.63E-07	3.88E-06	2.60E-07	3.47E-06	6.25E-08
	27	4.27E-05	1.50E-06	4.56E-05	8.84E-07	4.32E-05	2.13E-06	3.89E-05	1.07E-06
	28	3.74E-05	1.08E-06	4.85E-05	1.49E-06	3.29E-05	1.99E-06	2.94E-05	4.66E-07
STEP 4	18	8.08E-05	2.60E-06	1.19E-04	7.13E-06	6.87E-05	5.64E-06	5.11E-05	7.14E-07
	19	4.56E-05	1.39E-06	5.09E-05	6.61E-07	3.37E-05	1.27E-06	4.39E-05	1.99E-06
	20	6.05E-05	1.30E-06	6.45E-05	9.38E-07	4.41E-05	3.04E-06	4.06E-05	9.53E-07
	21	3.29E-05	1.43E-06	3.32E-05	2.92E-07	2.81E-05	3.51E-07	3.21E-05	2.02E-06
	22	4.06E-05	1.16E-06	3.68E-05	8.96E-07	3.58E-05	1.06E-06	4.06E-05	1.97E-06
	23	4.17E-05	1.42E-06	4.36E-05	2.34E-06	8.06E-05	2.29E-06	4.42E-05	1.39E-06
	24	2.91E-06	2.90E-07	3.66E-06	2.05E-07	4.36E-06	3.66E-07	4.40E-06	4.37E-07
	25	6.10E-06	3.51E-07	5.90E-06	6.39E-07	5.57E-06	1.74E-07	5.61E-06	5.21E-07
	26	4.91E-06	3.68E-07	5.63E-06	6.39E-07	4.25E-06	1.19E-07	4.12E-06	5.01E-07
	27	4.66E-05	1.26E-06	5.03E-05	2.28E-06	4.76E-05	1.70E-06	4.26E-05	2.05E-06

	28	4.02E-05	2.87E-07	5.13E-05	1.40E-06	3.40E-05	1.93E-06	3.11E-05	1.54E-06
	18	7.82E-05	9.98E-07	1.02E-04	9.36E-06	5.91E-05	2.96E-06	4.16E-05	1.11E-06
	19	4.21E-05	2.45E-06	4.69E-05	2.19E-06	3.20E-05	2.17E-06	3.64E-05	7.37E-07
	20	5.46E-05	1.17E-06	5.84E-05	4.36E-06	4.00E-05	1.49E-06	3.72E-05	1.90E-06
	21	2.97E-05	1.31E-06	2.80E-05	1.12E-06	2.75E-05	1.06E-06	3.20E-05	1.69E-06
	22	3.58E-05	2.00E-06	3.35E-05	4.37E-07	3.39E-05	1.35E-06	3.74E-05	1.32E-06
STEP 5	23	3.92E-05	1.26E-06	4.00E-05	2.00E-06	7.11E-05	1.18E-06	3.93E-05	2.95E-06
	24	2.42E-06	7.33E-08	3.38E-06	1.03E-07	3.65E-06	9.09E-08	3.17E-06	1.18E-07
	25	4.79E-06	3.01E-07	4.78E-06	3.09E-07	4.77E-06	2.27E-07	5.00E-06	2.41E-07
	26	4.16E-06	1.10E-07	4.48E-06	2.49E-07	3.89E-06	3.09E-07	3.29E-06	2.06E-07
	27	4.13E-05	1.22E-06	4.57E-05	1.70E-06	4.35E-05	1.24E-06	3.88E-05	1.03E-06
	28	3.48E-05	1.46E-06	4.64E-05	9.68E-07	3.18E-05	8.13E-07	2.81E-05	3.22E-07

**Planck-LFI CPV: Blanking Time
Verification**

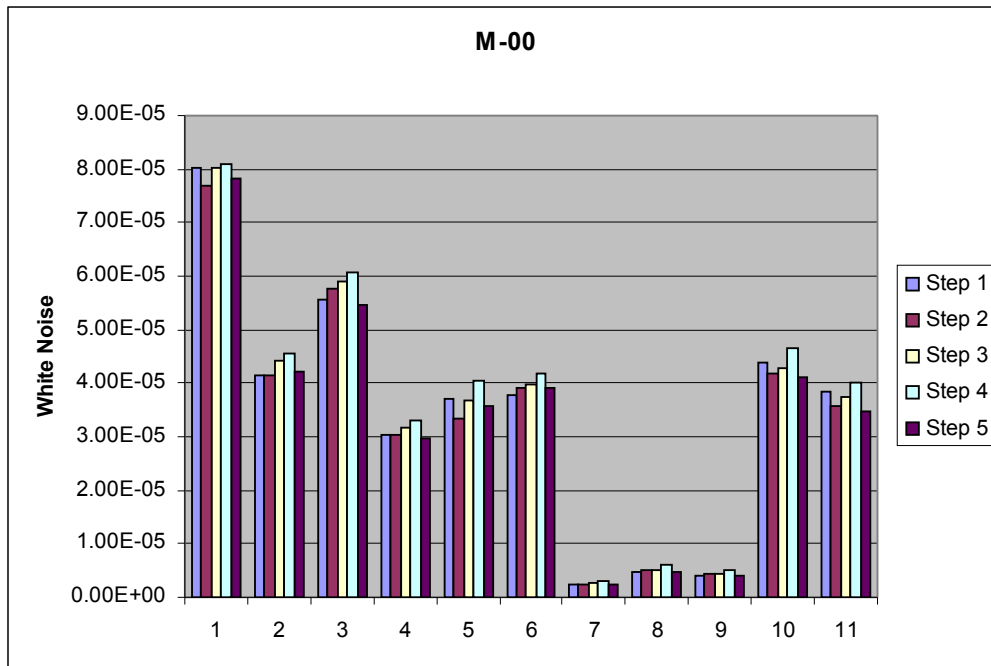|	
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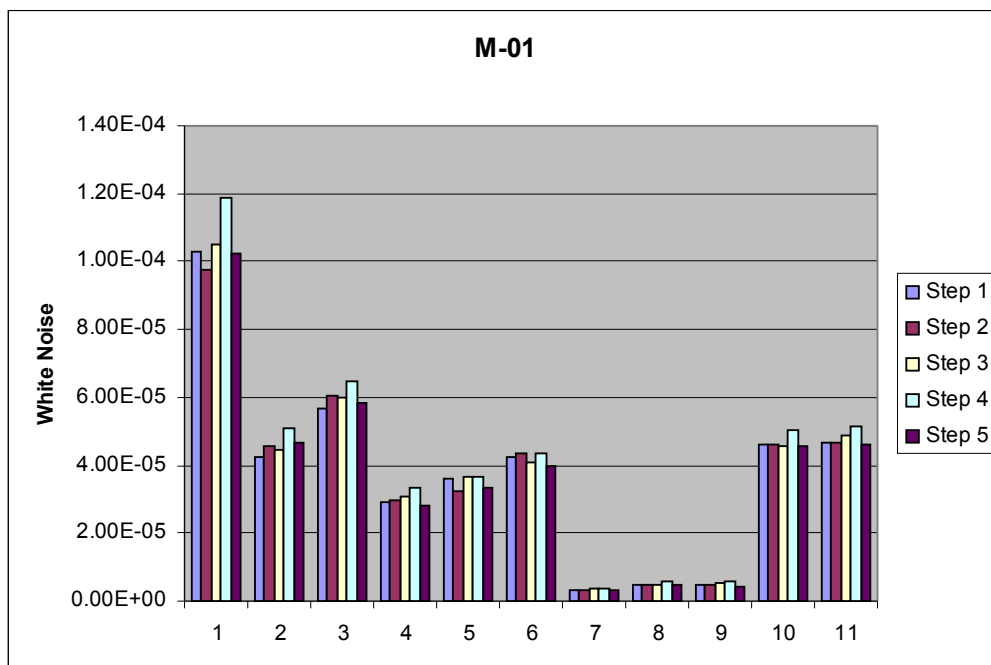**Figure 2 Uncalibrated White Noise – M00**

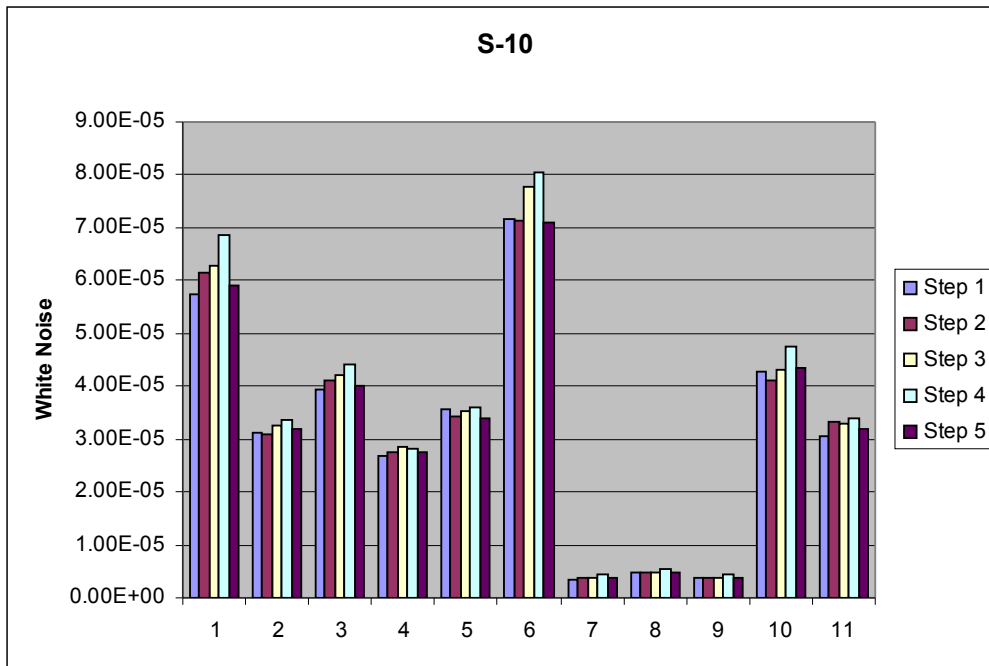
Figure 3 Uncalibrated White Noise – M01
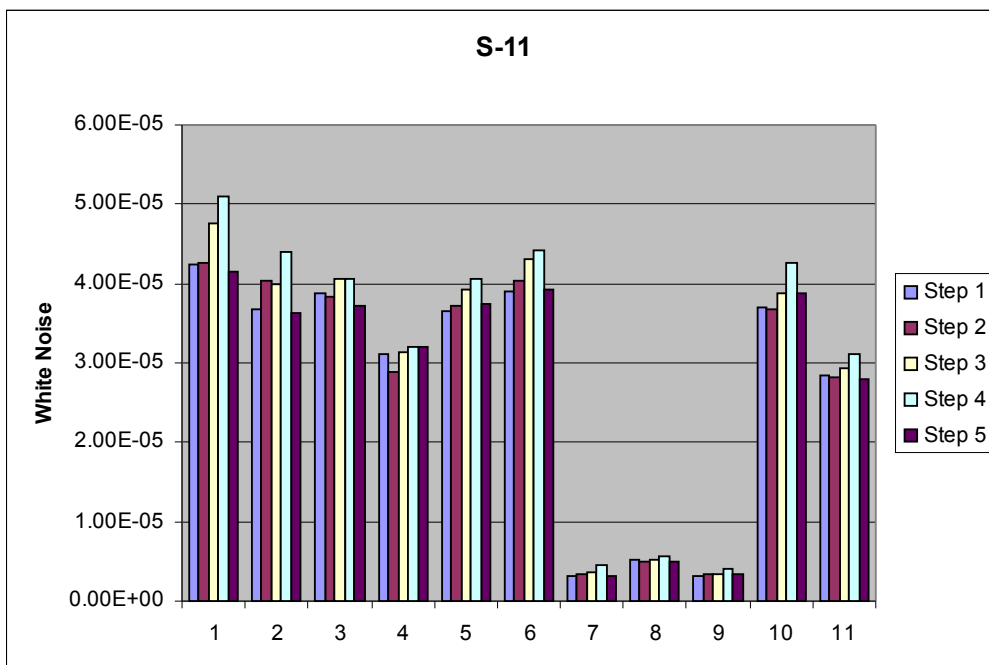
Figure 4 Uncalibrated White Noise – S10

Figure 5 Uncalibrated White Noise – S11

6 Conclusions and recommendations

The Blanking Time Verification Test has been correctly run and the data have been analysed. We can summarise the results as follows:

- drain currents showed a very good stability

- the spikes observed during this test appear to be the usual well known 1 Hz spikes from the DAE housekeeping sequencer and they are independent from the blanking time, as expected;

- no pop-corn noise is detected in radiometer voltage outputs;

- uncalibrated white noise are quite the same changing the blanking time.