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Reference Documents

	Title	Issue
RD-1	Herschel/Planck IID-A	Issue 3.3
RD-2	REQUIREMENTS FOR THE CONTROL OF ELECTROMAGNETIC INTERFERENCE CHARACTERISTICS OF SUBSYSTEMS AND EQUIPMENT	Mil-Std-461E

1. Introduction

SPIRE is a cryogenic instrument which uses NTD thermistors mounted on a thermally isolating spider web mesh as bolometric detectors. The NTD thermistors are extremely sensitive, and are well isolated from the base stage which makes them extremely sensitive to light passing through the optical system (NEP ~ 1x10⁻¹⁷W/√Hz). Unfortunately, the detectors are sensitive to all forms of radiation and spurious heating.

Ideally any EMC susceptibility test on the instrument needs to be carried out in an environment and configuration as close as is possible to the flight configuration. The SPIRE CQM-II test campaign was the first opportunity to test SPIRE with both representative cryogenic units and warm electronics.

The scope of the test was to investigate the conducted susceptibility of the instrument to conducted disturbances in the

2. Test Cases

2.1. DM: 10kHz to 50kHz

ObsID	Step	Description
1033	1	Quiescent – No noise
	2	10 kHz
	3	15 kHz
	4	20 kHz
	5	25 kHz
	6	30 kHz

	7	35 kHz
	8	40 kHz
	9	45 kHz
	10	50 kHz
	11	10 kHz

2.2. DM: 50kHz to 115kHz

ObsID	Step	Description
1034	1	
	2	50 kHz
	3	55 kHz
	4	60 kHz
	5	65 kHz
	6	75 kHz
	7	84 kHz
	8	95 kHz
	9	105 kHz
	10	115 kHz
	11	120 kHz
	12	125 kHz
	13	128 kHz
	14	131 kHz
	15	131 kHz
	16	134 kHz
	17	140 kHz
	18	150 kHz

2.3. DM: 190kHz-50MHz

ObsID	Step	Test Condition	Comments
1035	1		
	2	190 kHz	
	3	242 kHz	
	4	300 kHz	
	5	380 kHz	
	6	483 kHz	
	7	614 kHz	
	8	779 kHz	
	9	989 kHz	
	10	1.256 MHz	
	11	1.595 MHz	
	12	2.206 MHz	
	13	3.680 MHz	
	14	5.000 MHz	
	15	7.000 MHz	

	16	9.000 MHz	
	17	11.000 MHz	
	18	13.000 MHz	
	19	16.000 MHz	
	20	19.000 MHz	
	21	23.000 MHz	
	22	27.000 MHz	
	23	32.000 MHz	
	24	36.000 MHz	
	25	40.000 MHz	
	26	44.000 MHz	
	27	46.000 MHz	
	28	50.000 MHz	

3. Test Configuration

TBW – Include a schematic of the nominal grounding configuration and location of FPU Faraday Shield short

4. Results

4.1. Test deficiencies

4.2. DM Tests

4.2.1. Thresholds


4.3. CM Tests

4.3.1. Threshold

5. Conclusions

TBW - This section concentrates on the lessons learnt from the initial confidence test and the resulting changes/improvements to the subsequent Instrument and System level testing.


Appendix A – Extracts from CQM Test Log 06-10-04

		ASSEMBLY INTEGRATION AND TEST RECORD		PRODUCT ASSURANCE Space Science and Technology Department	
PROJECT	HERSCHEL SPIRE CQM (06/10/04)			PAGE	1/13
Date/Time	Activity			Signature	
06/10/2004 09:11	Set PLW offsets				
10:20	Stopped data generation and switch OFF jfets. SUBKTEMP 264.31 mK Pump Heat Switch 16.36K			Asier Abreu	
10:26	After DRCU power supply was back on run SCU-FUNC03 obsid : 0x30000092 and SCU-FUNC06 obsid : 0x30000093 from HCSS with the default values for the prompted parameters (0xA085FFFF and 0xA0860001) respectively. After switched ON the CQM array detectors running DCU-FUNC11-PHOT_version2.0.tcl obsid : 0x30000094 with parameters: Data mode :PLW T_status : cold Bias frequency : 70 Hz Sampling frequency : 15 Hz Bias amplitude : 16.47 mV rms Jfet_units: 0 Lias_stat : 0 Vss Level : -1.5 V			Asier Abreu	
10:39	Cleared SPECHTRV housekeeping wrong reading by sending 0x84330000			AA	
10:58	Some operation in the clean room leads to a power failure on the DRCU power supply. Restarted as usual DC and AC thermometry and switched back on detectors.				
12:15	Set bias divisor to 2 0x84180002 Used Standard_PCAL_Flash_Calculator.tcl from TOPE to calculate number of DCU samples for each pcal frequency. Start standard PCAL flash @ 70 Hz bias frequency 23.3 Hz sampling frequency obsid :0x30000098 Pcal frequency : 0.25Hz Number of cycles:10 DCU data mode :3 DCU samples:46			AA	

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		ASSEMBLY INTEGRATION AND TEST RECORD		PRODUCT ASSURANCE Space Science and Technology Department													
PROJECT	HERSCHEL SPIRE CQM (06/10/04)			PAGE	2/13												
Date/Time	Activity			Signature													
finished@12:19	Delay in DCU sampling in microsec: 46863 SCU sampling :80 Hz (parameter 0) SCU samples :159 Test completed OK																
12:23	Start standard PCAL flash @ 70 Hz bias frequency 23.3 Hz sampling frequency obsid :0x30000099 Pcal frequency : 0.5Hz Number of cycles:10 DCU data mode :3 DCU samples:23 Delay in DCU sampling in microsec: 46863 SCU sampling :80 Hz (parameter 0) SCU samples :79 Events 0x50F received <table border="1"> <thead> <tr> <th></th> <th>BEFORE</th> <th>AFTER</th> <th>AFTER FLUSHING FIFOS</th> </tr> </thead> <tbody> <tr> <td>SCUFRAMECNT</td> <td>61160</td> <td>62304</td> <td>62318</td> </tr> <tr> <td>DCUFRAMECNT</td> <td>19368</td> <td>21115</td> <td>21138</td> </tr> </tbody> </table>				BEFORE	AFTER	AFTER FLUSHING FIFOS	SCUFRAMECNT	61160	62304	62318	DCUFRAMECNT	19368	21115	21138		
	BEFORE	AFTER	AFTER FLUSHING FIFOS														
SCUFRAMECNT	61160	62304	62318														
DCUFRAMECNT	19368	21115	21138														
finished@12:26	Test completed OK																
12:31	A previous try had been aborted due to error in typing parameters ,hence the jump in obsid STOPPED TEST CONTROL AND TOPE ANS RESTART THEM TO AVOID TEST LOG OBJECT LOCKING ERRORS. Start standard PCAL flash @ 70 Hz bias frequency 23.3 Hz sampling frequency obsid :0x3000009B Pcal frequency : 1Hz Number of cycles:10 DCU data mode :3 DCU samples:11 Delay in DCU sampling in microsec: 46863																


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		ASSEMBLY INTEGRATION AND TEST RECORD		PRODUCT ASSURANCE Space Science and Technology Department													
PROJECT	HERSCHEL SPIRE CQM (06/10/04)			PAGE	3/13												
Date/Time	Activity			Signature													
finished@12:34	SCU sampling :80 Hz (parameter 0) SCU samples :39 Events 0x50F received <table border="1"> <thead> <tr> <th></th> <th>BEFORE</th> <th>AFTER</th> <th>AFTER FLUSHING FIFOS</th> </tr> </thead> <tbody> <tr> <td>SCUFRAMECNT</td> <td>62318</td> <td>62832</td> <td>62845</td> </tr> <tr> <td>DCUFRAMECNT</td> <td>21138</td> <td>21935</td> <td>21957</td> </tr> </tbody> </table> Test completed OK				BEFORE	AFTER	AFTER FLUSHING FIFOS	SCUFRAMECNT	62318	62832	62845	DCUFRAMECNT	21138	21935	21957		
	BEFORE	AFTER	AFTER FLUSHING FIFOS														
SCUFRAMECNT	62318	62832	62845														
DCUFRAMECNT	21138	21935	21957														
12:36	Start standard PCAL flash @ 70 Hz bias frequency 23.3 Hz sampling frequency obsid :0x300009C Pcal frequency : 2Hz Number of cycles:10 DCU data mode :3 DCU samples:5 Delay in DCU sampling in microsec: 46863 SCU sampling :80 Hz (parameter 0) SCU samples :19 Events 0x50F received <table border="1"> <thead> <tr> <th></th> <th>BEFORE</th> <th>AFTER</th> <th>AFTER FLUSHING FIFOS</th> </tr> </thead> <tbody> <tr> <td>SCUFRAMECNT</td> <td>62845</td> <td>64244</td> <td>62301</td> </tr> <tr> <td>DCUFRAMECNT</td> <td>21957</td> <td>22307</td> <td>22322</td> </tr> </tbody> </table> Test completed OK				BEFORE	AFTER	AFTER FLUSHING FIFOS	SCUFRAMECNT	62845	64244	62301	DCUFRAMECNT	21957	22307	22322		
	BEFORE	AFTER	AFTER FLUSHING FIFOS														
SCUFRAMECNT	62845	64244	62301														
DCUFRAMECNT	21957	22307	22322														
finished@12:38																	
12:41	Start standard PCAL flash @ 70 Hz bias frequency 23.3 Hz sampling frequency obsid :0x300009D Pcal frequency : 2Hz Number of cycles:10 DCU data mode :3																

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		ASSEMBLY INTEGRATION AND TEST RECORD		PRODUCT ASSURANCE Space Science and Technology Department																																					
PROJECT	HERSCHEL SPIRE CQM (06/10/04)			PAGE	4/13																																				
Date/Time	Activity			Signature																																					
finished@12:43	DCU samples:5 Delay in DCU sampling in microsec: 46863 SCU sampling :80 Hz (parameter 0) SCU samples :19 Events 0x50F received <table border="1"> <thead> <tr> <th></th> <th>BEFORE</th> <th>AFTER</th> <th>AFTER FLUSHING FIFOS</th> </tr> </thead> <tbody> <tr> <td>SCUFRAMECNT</td> <td>64301</td> <td>64866</td> <td>64905</td> </tr> <tr> <td>DCUFRAMECNT</td> <td>22322</td> <td>22385</td> <td>22409</td> </tr> </tbody> </table> Test completed OK BUT THIS LAST FLASH LEFT PCAL ON NONE OF THE OTHER FLASHES HAD LEFT PCAL ON				BEFORE	AFTER	AFTER FLUSHING FIFOS	SCUFRAMECNT	64301	64866	64905	DCUFRAMECNT	22322	22385	22409																										
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SCUFRAMECNT	64301	64866	64905																																						
DCUFRAMECNT	22322	22385	22409																																						
14:22	EMC test to be started: Run StartObs from TOPE and loaded steps.lincoln stack with steps up to 16 decimal. Obsid:0x30001033 <table border="1"> <thead> <tr> <th>STEP</th> <th>start time</th> <th>Frequency/kHz</th> </tr> </thead> <tbody> <tr><td>1</td><td>14:22:33</td><td>Quiescent</td></tr> <tr><td>2</td><td>14:24:55</td><td>10</td></tr> <tr><td>3</td><td>14:30:20</td><td>15</td></tr> <tr><td>4</td><td>14:33:24</td><td>20</td></tr> <tr><td>5</td><td>14:38:14</td><td>25</td></tr> <tr><td>6</td><td>14:40:41</td><td>30</td></tr> <tr><td>7</td><td>14:43:36</td><td>35</td></tr> <tr><td>8</td><td>14:45:54</td><td>40</td></tr> <tr><td>9</td><td>14:48:20</td><td>45</td></tr> <tr><td>10</td><td>14:51:38</td><td>50 - Amplifier switched off after this step</td></tr> <tr><td>11</td><td>14:53:56</td><td>Reference case</td></tr> </tbody> </table> End of test@14:56:19			STEP	start time	Frequency/kHz	1	14:22:33	Quiescent	2	14:24:55	10	3	14:30:20	15	4	14:33:24	20	5	14:38:14	25	6	14:40:41	30	7	14:43:36	35	8	14:45:54	40	9	14:48:20	45	10	14:51:38	50 - Amplifier switched off after this step	11	14:53:56	Reference case		
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PROJECT	HERSCHEL SPIRE CQM (06/10/04)			PAGE	5/13																																										
Date/Time	Activity			Signature																																											
15:00	PCAL Static Test: Mode_ILT_PERF_CPC_P: OBSID:0x00a0 15 seconds per step, 0.5 to 7mA in steps of 0.5mA. PCAL current set back to 0 for 15 seconds after each step. SUBKTEMP at start is 264.7mK Test completed OK No noticeable change in SUBKTEMP. Temperature of thermistor T2 went up slightly at the higher levels of PCAL current (~5-7mA).																																														
15:33	Some problem inside clean room leads to DRCU power off. Switched back AC /DC thermometry and pump heat switch + detectors. EMC test to be started: Run StartObs from TOPE and loaded steps.lincoln stack with steps up to 16 decimal. Obsid:0x30001034																																														
	<table border="1"> <thead> <tr> <th>STEP</th> <th>start time</th> <th>Frequency/kHz</th> </tr> </thead> <tbody> <tr><td>1</td><td>15:48:12</td><td>Quiescent</td></tr> <tr><td>2</td><td>15:49:03</td><td>50</td></tr> <tr><td>3</td><td>15:51:55</td><td>55</td></tr> <tr><td>4</td><td>15:54:06</td><td>60</td></tr> <tr><td>5</td><td>16:02:38</td><td>65</td></tr> <tr><td>6</td><td>16:05:17</td><td>75</td></tr> <tr><td>7</td><td>16:07:46</td><td>85</td></tr> <tr><td>8</td><td>16:11:01</td><td>95</td></tr> <tr><td>9</td><td>16:13:54</td><td>105</td></tr> <tr><td>10</td><td>16:16:40</td><td>115</td></tr> <tr><td>11</td><td>16:19:23</td><td>120</td></tr> <tr><td>12</td><td>16:21:41</td><td>125</td></tr> <tr><td>13</td><td>16:25:02</td><td>128</td></tr> </tbody> </table>			STEP	start time	Frequency/kHz	1	15:48:12	Quiescent	2	15:49:03	50	3	15:51:55	55	4	15:54:06	60	5	16:02:38	65	6	16:05:17	75	7	16:07:46	85	8	16:11:01	95	9	16:13:54	105	10	16:16:40	115	11	16:19:23	120	12	16:21:41	125	13	16:25:02	128	SDS/AAA	
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	<table border="1"> <tbody> <tr><td>14</td><td>16:27:26</td><td>131</td></tr> <tr><td>15</td><td>16:29:10</td><td>131</td></tr> <tr><td>16</td><td>16:31:34</td><td>134</td></tr> <tr><td>17</td><td>16:33:52</td><td>140</td></tr> <tr><td>18</td><td>16:36:07</td><td>150</td></tr> <tr><td>19</td><td>16:38:05</td><td>Quiescent (reference)</td></tr> </tbody> </table> End of test@16:40			14	16:27:26	131	15	16:29:10	131	16	16:31:34	134	17	16:33:52	140	18	16:36:07	150	19	16:38:05	Quiescent (reference)																																			
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19	16:38:05	Quiescent (reference)																																																						
start@15:41	EMC test to be started: Run StartObs from TOPE and loaded steps.lincoln stack with steps up to 16 decimal. Obsid:0x30001035																																																							
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STEP	start time	Frequency/kHz																																																						
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PROJECT	HERSCHEL SPIRE CQM (06/10/04)		PAGE	7/13	
Date/Time	Activity			Signature	
17	17:34:33	11000			
18	17:36:39	13000			
19	17:38:46	16000	SIGNAL increased ON THE DETECTORS for this f, signal changes noticeably. EMC susceptibility found for this frequency.		
20	17:48:50	19000	Signal recovered from EMC susceptibility		
21	17:51:15	23000			
22	17:53:27	27000			
23	17:55:47	32000			
24	17:58:01	36000			
25	18:00:32	40000	Another susceptibility found		
26	18:03:26	44000			
27	18:06:07	46000			
28	18:08:30	50000			
29	18:13:03	Quiescent			
End of test@18:15					
18:24	T_FLIP_MIRROR(EXTERNAL)				
18:37-18:49	Prepared saved stack tfts_scans_1.lincoln for the overnight Tfts scans spectral response test.				
18:57	T_FLIP_MIRROR(CBB) – the earlier setting of the flip mirror to external was a mistake since we are preparing to do an AC Load Curve. Reset the offsets Wait for the bolometer signals to stabilise				SDS
During this period, at about 19:10, there was a sudden negative jump in raw signal which slowly settled back to base level after about 10 minutes. The cause of this is unknown at this stage.					
19:26	AC Load Curve: Mode_ILT-PERF-DAL_P_SinglePhase OBSID: 0x00a4 Bias Freq: 70Hz, Sampling Freq: 17Hz, Phase: 168 deg Had to unset lias_stat because the Test Control script complained that the LIAs were not on, when they				
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Date/Time	Activity			Signature	
	were clearly on! Test completed OK				
12:00	T_FLIP_MIRROR(EXTERNAL)				
20:03	Executed DATA_GENERATION.tcl script Stopped PLW data generation Reset offsets				
20:10-	Some preliminary Tfts scans to ensure that beam is centred on C5 Stage at ZPD (25mm downward of home) Poor signal				
20:30	Beam re-centred on C5, Z had to be adjusted by 4mm – now Tfts scans look OK. Yesa=0, Zesa=-89.85				
	NOTE: for the following scans, the metal plate just at the entrance of the Tfts has been removed.				SR
20:42-21:12	Low resolution Tfts scans on C5 with the HBB at 1200 Celsius: StartObs executed OBSID: 0x1036 Stage at ZPD (25mm downward of home) Distance: 20mm Iterations: 20 Sampling Interval: 25um Velocity: 0.5mm/s Test completed OK but with PLW bias: 250 raw units (68.63mV) – not the optimum value! EndObs executed				
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Appendix B – Extracts from CQM Test Log 08-10-04

 ASSEMBLY INTEGRATION AND TEST RECORD		PRODUCT ASSURANCE Space Science and Technology Department	
PROJECT	HERSCHEL SPIRE CQM (08/10/04)	PAGE	1/4
Date/Time	Activity	Signature	
08/10/2004 9:22	Execute EndObs from TOPE FTS obsid was already at 0x30000000 although the rest were set at 0x30001024 The TFTS scans failed because the scans were started from ZPD, rather than Home.	Asier Abreu	
10:00	Switch off JFETs and LIAs and switched them on back again using DCU-FUNC11-PHOT_version2.0.tcl Obsid :0x300000C0	Asier Abreu	
10:01	Start AC LOAD CURVE 70Hz bias frequency 15 Hz sampling frequency 168 degrees obsid: 0x300000C1 with only 5 points instead of 10 in the first range (0-10 raw bias units).	AA	
11:15	Tried script Mode_ILT_PERF_CPS_P.tcl (STANDARD PCAL FLASH). Obsid :0x300000C8 CUS Script works fine. 2 Sets of PCAL flashes of 60 and 30 cycles respectively seen within the SCU science packets. 1 Event Report (5,1) 0x50F received and cleared after 25 seconds. 1 Event Report (5,1) 0x50C received and cleared just after (within 1 second) 1 Event Report (5,1) 0x522 received and cleared just after (within 1 second)	Asier Abreu	
11:54	Switched ON detectors for PCAL FLASH. Obsid: 0x300000C9	AA	
11:58	Run Mode_ILT_PERF_CPS_P.tcl Obsid : 0x300000CA Bias frequency 70 Hz Sampling frequency 23.2 Hz (Bias divisor 2) Lowbias :0 mA Highbias :3.5 mA PCAL 1 st Frequency : 0.5 Hz PCAL 2 nd Frequency :0.25 Hz Number of PCAL cycles 1 st F: 60 Number of PCAL cycles 2 nd F: 30 Dcu datamode :3 Number of DCU samples 1 st F : 23	AA	
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Finished:12:07:55	Number of DCU samples 2 nd F :46 DCU sampling delay : 46863 Number of SCU samples 1 st F : 79 Number of SCU samples 2 nd F :159 SCU sampling Frequency : 80 Hz 2 Events (5,1) 0x50F Test completed OK		
11:17:02	Attached scope to measure detectors bias amplitude values. Sent manual command 0x8403001F 8.51 mV rms Sent manual command 0x84030078 32.94 mV rms Sent manual command 0x840300F0 65.88 mV rms Sent manual command 0x840303C 16.47 mV rms	MEASURED pk -pk 21.1 mV 84.8 mV 166 mV 41.2 mV	
13:44	Run StartObs from TOPE obsid:0x30001044 EMC tests SWEEP THROUGH A RANGE OF FREQUENCIES STEP starttime Frequency KHz 1 13:57:14 reference 2 13:59:29 range1 NOT VALID 3 14:02:40 range1 NOT VALID 4 14:10:03 range1 VALID 5 14:17:34 range2 VALID 6 14:25:04 range3 VALID 7 14:32:17 range4 VALID 8 14:38:01 range5 VALID 9 14:42:15 range6 VALID 10 14:49:45 range7 VALID 11 14:55:57 range8 VALID 12 15:02:04 range9 VALID 13 15:10:00 range10 VALID 14 15:15:19 range11 VALID		
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Date/Time	Activity			Signature	
15	15:21:10	range12	VALID		
16	15:30:38	range13	VALID		
17	15:37:58	range14	VALID - detectors responded to this frequency range at ~15:42		
18	15:49:32	range15	VALID step was 15ms instead of 120ms		
19	15:52:48	range15	again but with step 120ms - detectors responded to frequency towards the end of this step 3.7 to 4.67MHz VALID		
20	15:58:46	range16	VALID		
21	16:04:20	range17	VALID - detectors responded to this frequency range at ~16:08		
22	16:12:28	range18	VALID - possible susceptibility found around 16:13		
23	16:48:15	range19=range18	Same range as above to verify this.		
24	16:54:35				
25	17:00:38	range21	- Susceptibility @ around 17:01:08		
26	17:07:08	range22			
27	17:16:19	range23			
28	17:21:10	range24			
29	17:27:00	range25	- Susceptibility at around 17:26:03		
30	17:35:06	range26	- Susceptibilities all the time now		
31	17:46:41	range27	Slight panic ensued about the steps caused by misleading values in the TC history display		
			Test completed OK		
19:40	Test with the new telescope simulator software - working fine			SR	
20:00	Updated the StartObs, ClearObs and EndObs BBs in the CUS to set the OBSID and BBID for all of the SPIRE test equipment (CDMS Sim, TFCS, TFTS), as well as for the instrument.			SDS	
	Several test observations run to check the scripts - all OK.				
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Appendix C - Extracts from CQM Test Log 13-10-04



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PROJECT	HERSCHEL SPIRE CQM (13/10/04)		PAGE	1/10
Date/Time	Activity		Signature	
09:00	Subktemp stable at 264 mk			
09:00	Reset offsets Bias 16.47 Freq 70 Phase 168			
09:15	PCAL Flash OBSID 0103 Levels 0-1 - 0-2 - 0-3 - 0-3 because this is what is default in the command window - what should it be? Frequency 0.25 Hz SCU Sampling 80 Hz Sent 843e0001 at end to start data generation again			
10:47	JFET_PHOT_switch_off.tcl Bias off: 0x84000000 The Phot Heater appeared to be on: turned it off: 0x84110000 LIAs off: PROC-OPER-SPIRE-LIO clear_HK_report_1.2J.tcl The DRCU was switched off, breakout box plugged in and the DRCU switched on again.			
	Switched on DC and AC thermometry: SCU-FUNC-03 (needed to run this twice) and SCU-FUNC-06. Switched off SPEC JFETs manually DCU-FUNC11-PHOT_version2.0 executed: Manually switched on the PLW JFET Vdd's SUBKTEMP was increasing slowly: Turned the SPHS on at 565mV @ 11:05: 0xa0c40deb Reduced power @ 11:09 0xa0c409ec Back to old power @ 11:10 0xa0c40deb SUBKTEMP stabilising slowly			

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Date/Time	Activity		Signature	
11:21	Started PLW data generation. Had to reset offsets			
	Decision was made to remove the breakout box from the DCU. Executed the DRCU switch off procedure: Switched off thermometry - PROC-OPER-SPIRE-THO JFET_PHOT_switch_off PROC-OPER-SPIRE-LIO 0x84000000 Stopped the Photometer bias clear_HK_report_1.2J.tcl Switched on the DRCU: define_new_HK_report_1.2J.tcl Turned the SPHS on at 564.73mV: 0xa0c40deb SCU-FUNC-03 SCU-FUNC-06 DCU-FUNC11-PHOT_version2.0 executed: the Vdd's did not get switched on. Manually switched on the PLW JFET Vdd's PLW JFET Vss's set to -1.49V The SPEC JFET Vss's, Vdd's and Heater switched off to clear the spurious HK values.			
12:34	EMC tests: 11MHz to 16MHz sweep, no ground strap StartObs OBSID: 0x1053 12:35.06 to 12:40:16 Step 1: 11MHz to 16MHz sweep, no ground strap			



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PROJECT	HERSCHEL SPIRE CQM (13/10/04)			PAGE	3/10
Date/Time	Activity			Signature	
	12:43:09 to 12:48:23 Step 2: 11MHz to 16MHz sweep, WITH ground strap EndObs				
	EMC tests: 13.608MHz level sweep, with ground strap StartObs OBSID: 0x1054 12:56:18 to 12:58:21 Step 1: Amp off 12:59:49 to 13:01:54 Step 2: 1.4V peak-to-peak 13:02:56 to 13:04:58 Step 3 928mV peak-to-peak 13:05:26 to 13:07:28 Step 4 568mV peak-to-peak 13:10:20 to 13:12:23 Step 5 316mV peak-to-peak EndObs				
13:16	Standard_PCAL_Flash: PCAL flash at 0.25Hz OBSID: 0x010b PCAL frequency : 0.25Hz Number of cycles:15 DCU data mode :3 DCU samples:46 Delay in DCU sampling in microsec: 46863 SCU sampling :80 Hz (parameter 0) SCU samples :159 Test completed OK				
13:21	Mode_ILT_PERF_CPS_P: PCAL Flash at 2 frequencies OBSID: 0x010c				

Appendix D - Extracts from CQM Test Log 14-10-04

		ASSEMBLY INTEGRATION AND TEST RECORD		PRODUCT ASSURANCE Space Science and Technology Department	
PROJECT		HERSCHEL SPIRE CQM (14/10/04)		PAGE 1/8	
Date/Time	Activity			Signature	
14 th Oct 2004					
10:40	<p>Set up for EMC tests:</p> <p>Switched off the JFETs, LIAs and SCU thermometry, cleared HK reports. Switched off the DRCU and switched it back on again.</p> <p>Switched on power to the SP HS: 0xa0c40deb.</p> <p>Switched on the SCU DC and AC thermometry (SCU-FUNC-03 and SCU-FUNC-06).</p> <p>Executed DCU-FUNC-11-PHOT_version2.0:</p> <p>PLW cold 70Hz bias 17Hz sampling 16mV PLW bias 168° PLW phase 0xf JFET units 0 LIAs are off, i.e. they need to be switched on -1.5V PLW JFET Vss's</p> <p>MSTK commands sent to: set the PLW bias to 16.47mV set all the STM biases, JFET Vss's, Vdd's off and bias heaters to 0</p>			SDS	
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		ASSEMBLY INTEGRATION AND TEST RECORD		PRODUCT ASSURANCE Space Science and Technology Department	
PROJECT		HERSCHEL SPIRE CQM (14/10/04)		PAGE 2/8	
Date/Time	Activity			Signature	
11:16	Set the PLW JFET 2 Vss to -5.0V: 0x841000ff				
11:33	<p>Standard_PCAL_Flash: PCAL flash at 0.25Hz but JFET 2 Vss at -5.0V OBSID: 0x011d</p> <p>PCAL frequency : 0.25Hz Number of cycles:15 DCU data mode :3 DCU samples:46 Delay in DCU sampling in microsec: 46863 SCU sampling :80 Hz (parameter 0) SCU samples :159</p> <p>Test completed OK</p>				
	Stopped and restarted the CDMS Sim bus controller. Reset the DRCU counters.				
11:42	<p>Mode_ILT_PERF_CPS_P: PCAL Flash at 2 frequencies OBSID: 0x010c</p> <p>Bias frequency 70 Hz Sampling frequency 17.5Hz (Bias divisor 3)</p> <p>Lowbias :0 mA Highbias :3.5 mA PCAL 1st Frequency : 0.5 Hz PCAL 2nd Frequency :0.25 Hz Number of PCAL cycles 1st F: 60 Number of PCAL cycles 2nd F: 30 Dcu datamode :3 Number of DCU samples 1st F : 23 Number of DCU samples 2nd F :46 DCU sampling delay : 46863</p>				
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PROJECT	HERSCHEL SPIRE CQM (14/10/04)	PAGE	3/8
Date/Time	Activity	Signature	
	Number of SCU samples 1 st F : 79 Number of SCU samples 2 nd F :159 SCU sampling Frequency : 80 Hz Test completed OK		
12:50	Set up for EMC tests again: Switched off the JFETs, LIAs and SCU thermometry, cleared HK reports. Switched off the DRCU and switched it back on again. Switched on power to the SP HS: 0xa0c40deb. Switched on the SCU DC and AC thermometry (SCU-FUNC-03 and SCU-FUNC-06). Executed DCU-FUNC-11-PHOT_version2.0: PLW cold 70Hz bias 17Hz sampling 16mV PLW bias 168° PLW phase 0xf JFET units 0 LIAs are off, i.e. they need to be switched on -1.5V PLW JFET Vss's		
14:39	Common mode sweep frequency test 11 to 16 MHz 2V peak to peak StartObs executed TOPE OBSID 0x105b Step 1: 14:44:43-15:01 BST		
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PROJECT	HERSCHEL SPIRE CQM (14/10/04)	PAGE	4/8												
Date/Time	Activity	Signature													
	EndObs														
	Noticed that the DRCU had shutdown in the middle of the previous EMC test Lots of event reports had been generated during the test: <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">Event ID</td> <td style="text-align: left;">Packet Display Time (GMT)</td> <td style="text-align: left;">Error</td> </tr> <tr> <td>0x050c</td> <td>13:52:25</td> <td>Subsystem Error</td> </tr> <tr> <td>0x0522</td> <td>ditto</td> <td>NO SCU response</td> </tr> <tr> <td>0x0520</td> <td>ditto</td> <td>No DCU response</td> </tr> </table> These error reports were being generated at the rate of once per second. Each report was cleared after about a second (viz Event IDs 0x850c, 0x522 and 0x8520 respectively) and then the whole cycle repeated itself until the end of the test. Not surprisingly the PLW science data generation had stopped during this period.	Event ID	Packet Display Time (GMT)	Error	0x050c	13:52:25	Subsystem Error	0x0522	ditto	NO SCU response	0x0520	ditto	No DCU response	SDS	
Event ID	Packet Display Time (GMT)	Error													
0x050c	13:52:25	Subsystem Error													
0x0522	ditto	NO SCU response													
0x0520	ditto	No DCU response													
15:09	Executed SCU-FUNC-03, SCU-FUNC-06 to switch on DC and AC thermometry. Switched on power to the SP HS: 0xa0c40deb. Executed DCU-FUNC-11-PHOT_version2.0 Executed saved stack ResetForPLW_PhotSpec_DCUTM.lincoln which sets the PLW bias to 16.47mV sets all the STM biases, JFET Vss's, Vdd's off and bias heaters to 0.														
	Executed SCU-FUNC-03, SCU-FUNC-06 to switch on DC and AC thermometry. Switched on power to the SP HS: 0xa0c40deb.														
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Date/Time	Activity	Signature
	Executed DCU-FUNC-11-PHOT_version2.0 Executed saved stack ResetForPLW_PhotSpec_DCUTM.lincoln which sets the PLW bias to 16.47mV sets all the STM biases, JFET Vss's, Vdd's off and bias heaters to 0.	
16:03	Common mode sweep frequency test 11 to 16 MHz – Half level 1 volt peak to peak StartObs executed TOPE OBSID 0x105d Step 1: 16:24:07-16:40:57 Susceptibility present EndObs	
	Common mode sweep frequency test 11 to 16 MHz – 500mV peak to peak StartObs executed TOPE OBSID 0x105e Step 1: 16:47:05-17:04:43 Susceptibility present EndObs	
17:20	Standard_PCAL_Flash: PCAL flash at 0.25Hz OBSID: 0x012a PCAL frequency : 0.25Hz Number of cycles:15 DCU data mode :3 DCU samples:46 Delay in DCU sampling in microsec: 46863 SCU sampling :80 Hz (parameter 0) SCU samples :159	SDS