SPIRE CQM1 Verification Matrix Report
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This note contains a report from the SPIRE CQM Verification Matrix covering those requirements tested by the CQM Performance tests; the CQM Warm Functional est and the CQM Cold Functional tests as carried out during the CQM1 test campaign.

This is a draft for information a further update will complete the matrix and include those requirements addressed by the Vibration and thermal tests

VERIFIED BY PERFORMANCE TEST					
Requirement Name	**Description**	**Procedure(s) In SPIRE-RAL-NOT-1850**	**Test Report Section**	**NCRs**	**Status/comment**
RD-VER-R03	The CQM verification testing shall demonstrate that the following conditions are met or are likely to be met on the PFM: Correct operation of all FPU sub-systems at cryogenic temperatures for all instrument operation modes for both prime and redundant systems. The instrument cold FPU and JFET box thermal dissipation is within requirements for all instrument operation modes. The warm electronics thermal dissipation at room temperature is within requirements. Correct operation of all on-board software. The instrument straylight environment is within requirements The instrument optics performance is within requirements The performance of the instrument	All			Only photometer fitted to CQM – no spectrometer or BSM tests JFET supplied is not flight performance wrt dissipation DPU o.k. DRCU not flight build OBS testing as part of development Tested for photometer Tested for photometer

VERIFIED BY PERFORMANCE TEST					
Requirement Name	**Description**	**Procedure(s) In SPIRE-RAL-NOT-1850**	**Test Report Section**	**NCRs**	**Status/comment**
	meets the scientific requirements expected for the CQM for all instrument observing modes Development and test of all functional test sequences required for Integrated Systems Testing (IST) at satellite level. The correct functioning of the instrument for all observing modes and calibration sequences. Development and test of all in-flight functional and performance test sequences				Tested for photometer without BSM All functional tests carried out see functional test report No mode tests for CQM1 Testing carried out as part of OBS and procedure development
RD-PHOT-R01	Nominal passband	Spectral Response			CQM1 test inconclusive – to be repeated. Facility level test also required
RD-PHOT-R02	Field of View	Pixel Centre Pupil Test			CQM1 test inconclusive – to be repeated. Facility level test also required
RD-PHOT-R03	Beam FWHM (Arcsec)	PSF Test			Tested
RD-PHOT-R04	Point source sensitivity	Optical Efficiency			Tested
RD-PHOT-R05	Mapping sensitivity for one FOV	Optical Efficiency Pixel Centre			Tested
RD-PHOT-	Field distortion must be <10% across	Pixel Centre			Tested

VERIFIED BY PERFORMANCE TEST					
Requirement Name	**Description**	**Procedure(s) In SPIRE-RAL-NOT-1850**	**Test Report Section**	**NCRs**	**Status/comment**
R10	the FOV				
RD-PHOT-R11	Electrical crosstalk should be <1% (goal 0.5%) between nearest-neighbour pixels and <0.1 % (gaol 0.05%) between all other pixels in the same array.	Optical Cross Talk Test			CQM1 test inconclusive – to be repeated.
RD-PHOT-R12	NEP variation should be < 20% across each array.	Optical Efficiency			CQM PLW array does not meet requirement. Instrument throughput tested.
RD-PHOT-R16	The three arrays need to be co-aligned to within 1 arcsecond.	Pixel Centre			No test really possible.
RD-PHOT-R18	SPIRE Photometric measurements shall be linear to 5% over a dynamic range of 4000 for astronomical signals	Linearity Test			
RD-STRC-R01	Alignment of the instrument w.r.t. the FIRST optical axis	Pupil Test			CQM1 test inconclusive – to be repeated. Facility level test also required
RD-STRC-R04	Optics and associated sub-system alignment	Pupil Test			CQM1 test inconclusive – to be repeated. Facility level test also required
RD-STRC-R08	Attenuation of radiation from cryostat environment	Dark Noise Loadcurve			Tested
RD-STRP-R02	Optics and filters alignment	Optical Cross Talk Test PSF Test Pupil Test			Tested except Pupil Test where CQM1 test inconclusive – to be repeated. Facility level test also required
RD-STRP-R03	Array module alignment	Pixel Centre			Tested

VERIFIED BY PERFORMANCE TEST					
Requirement Name	**Description**	**Procedure(s) In SPIRE-RAL-NOT-1850**	**Test Report Section**	**NCRs**	**Status/comment**
RD-STRP-R06	Attenuation of radiation from common structure environment	Loadcurve Laser Straylight Test Pupil Test			Tested except Pupil Test where CQM1 test inconclusive – to be repeated. Facility level test also required
RD-STRS-R06	Attenuation of radiation from 4-K environment	Loadcurve			Tested
RD-FPHR-R01	Detector harness capacitance	Loadcurve Harness Test			Tested
RD-FPHR-R02	Detector harness mechanical support	Microphonics Test			Tested
RD-OPTP-R00	Compatibility with Herschel telescope	Focus Test			Tested
RD-OPTP-R02	Variation in focal ratio	PSF Test			Tested on one pixel only – to be repeated
RD-OPTP-R03	Distortion	Pixel Centre			Tested
RD-OPTP-R04	Anamorphism	PSF Test			Tested
RD-OPTP-R05	Throughput	Optical Efficiency Spectral Response			CQM1 test inconclusive – to be repeated. Facility level test also required
RD-OPTP-R06	Image quality	PSF Test			Tested
RD-OPTP-R07	Out of band radiation	Spectral Response Out of Band Test			Not tested
RD-OPTP-R08	In-band straylight	Loadcurve			Tested
RD-DETP-R01	Detective Quantum Efficiency at 2 Hz	Noise Tests			Tested

VERIFIED BY PERFORMANCE TEST					
Requirement Name	**Description**	**Procedure(s) In SPIRE-RAL-NOT-1850**	**Test Report Section**	**NCRs**	**Status/comment**
	at nominal incident power levels	Optical Efficiency Frequency Response Test			
RD-DETP-R02	Time constant	Frequency Response Test			Tested
RD-DETP-R03	Uniformity	Optical Efficiency			CQM PLW array does not meet requirement.
RD-DETP-R05	Electrical crosstalk for near neighbour pixels.	Optical Cross Talk Test			CQM1 test inconclusive – to be repeated.
RD-DETP-R06	Electrical crosstalk any pair of pixels	Optical Cross Talk Test			CQM1 test inconclusive – to be repeated.
RD-DETP-R08	Spectral response	Spectral Response			CQM1 test inconclusive – to be repeated. Facility level test also required
RD-DETP-R09	Microphonic susceptibility	Microphonics Test			Tested
RD-DETP-R10	EMI susceptibility	Noise Tests			Tested as much as possible QM1 electronics not flight quality. Further tests to be carried out during CQM2
RD-CALP-R01	Nominal operating output	PCAL Level Response			Tested
RD-CALP-R02	Operating range	PCAL Level Response			Tested
RD-CALP-R03	Equivalent obscuration of aperture through BSM mirror				By analysis?

VERIFIED BY PERFORMANCE TEST					
Requirement Name	**Description**	**Procedure(s) In SPIRE-RAL-NOT-1850**	**Test Report Section**	**NCRs**	**Status/comment**
RD-CALP-R04	Speed of response	PCAL Frequency Response			CQM PCAL does not meet flight requirement.
RD-CALP-R05	Repeatability	PCAL Level Response			?
RD-FTB-R01	Amplifier noise	Noise Tests			Tested
RD-FTB-R02	RF rejection	Noise Tests			Tested
RD-FTB-R06	Operating temperature range	Noise Tests			Tested
RD-RFM-R04	Operating temperature range	Noise Tests			Tested
RD-WE-R08	Photometer detector readout	?			?
VRD-06	Optical design	Optical Tests			Tested
VRD-07	Optical interface to FIRST system	Optical Tests			Tested
VRD-08	Straylight	Straylight Test			Tested
VRD-09	Instrument optical performance	Optical Tests			Tested
VRD-11	Sub-system optical interfaces	PSF Tests Pupil Scan Test Pixel Centre			Tested for photometer LW channel only
VRD-12	Thermal performance	Loadcurve			CQM1 build standard non-flight – to be repeated.
VRD-15	Micro-vibration environment	Microphonics Test			Partly tested – to be repeated with higher fidelity test
VRD-17	Harness mechanical frequency response and routing	Microphonics Test			Partly tested – to be repeated with higher fidelity test
VRD-18	Detector performance versus environment	Noise Tests			Tested

VERIFIED BY PERFORMANCE TEST					
Requirement Name	**Description**	**Procedure(s) In SPIRE-RAL-NOT-1850**	**Test Report Section**	**NCRs**	**Status/comment**
VRD-19	JFET Amplifier performance versus environment	Noise Tests			Tested
VRD-20	Detector Harness performance	Noise Tests			Tested
VRD-22	End-to-end system performance	Noise Tests Optical Efficiency			Tested
VRD-24	Electrical grounding	Noise Tests			Tested
VRD-25	Faraday cage integrity and performance	Noise Tests			Tested
VRD-27	Non-detector Harness performance	PCAL Level			Not tested for SMEC or BSM
VRD-28	Power supply cleanliness	Noise Tests			Not tested for flight configuration – GSE power supply.
VRD-29	Digital/analogue separation	Noise Tests			Tested
VRD-30	Electrical interface to Herschel system	Noise Tests			Tested for DPU only
VRD-39	On board software definition	All			Tested as part of OBS development

Verified by cold functional test					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
RD-VER-R03	The CQM verification testing shall demonstrate that the following conditions are met or are likely to be met on the PFM: Correct operation of all FPU sub-systems at cryogenic temperatures for all instrument operation modes for both prime and redundant systems. The instrument cold FPU and JFET box thermal	SPIRE-RAL-DOC-001888 SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Warm electronics units used for CQM model have not been thermally cycled and do not have full functional capability.

Verified by cold functional test					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
	dissipation is within requirements for all instrument operation modes. The warm electronics thermal dissipation at room temperature is within requirements. Correct operation of all on-board software. The instrument straylight environment is within requirements The instrument optics performance is within requirements The performance of the instrument meets the scientific requirements expected for the CQM for all instrument observing modes Development and test of all functional test sequences required for Integrated Systems Testing (IST) at satellite level. The correct functioning of the instrument for all observing modes and calibration sequences. Development and test of all in-flight functional and performance test sequences				CQM has only verified performance of photometer optics and PLW detector.
RD-FPHR-R01	Detector harness capacitance				Covered by performance tests
RD-DETP-R05	Electrical crosstalk for near neighbour pixels.				Covered by performance tests
RD-DETP-R06	Electrical crosstalk any pair of pixels				Covered by performance tests
RD-CALP-R10	Thermal isolation	SPIRE-RAL-DOC-001652 FUNC-SCU-03 FUNC-SCU-06	SPIRE-RAL-REP-002084		Instrument reached operating temperatures and remained stable.
RD-CALP-R11	Operating temperature	SPIRE-RAL-DOC-001652 FUNC-SCU-03 FUNC-SCU-06	SPIRE-RAL-REP-002084		Calibrated temperatures showing sensible values except BSM thermometer.
RD-CALP-R12	Cold power dissipation	SPIRE-RAL-DOC-001652 FUNC-SCU-07	SPIRE-RAL-REP-002084		Cooler recycling OK

Verified by cold functional test					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
				HR-SP-RAL-NCR-62	Heat switch took too long to close
RD-CALS-R12	Thermal Isolation	SPIRE-RAL-DOC-001652 FUNC-SCU-03 FUNC-SCU-06	SPIRE-RAL-REP-002084		Instrument reached operating temperatures and remained stable.
RD-CALS-R13	Operating Temperature	SPIRE-RAL-DOC-001652 FUNC-SCU-03 FUNC-SCU-06	SPIRE-RAL-REP-002084		Instrument reached operating temperatures and remained stable.
RD-FTB-R01	Amplifier noise	SPIRE-RAL-DOC-001652 FUNC-DCU-11	SPIRE-RAL-DOC-002084		Noise not measured directly?
RD-FTB-R05	Dissipation	SPIRE-RAL-DOC-001652 FUNC-DCU-11	SPIRE-RAL-REP-002084		PLW array only Temperatures measured by TFCS were sensible and stable when powered on.
RD-FTB-R08	Nominal operating temperature	SPIRE-RAL-DOC-001652 FUNC-DCU-11	SPIRE-RAL-REP-002084		PLW array only Temperatures measured by TFCS were sensible and stable when powered on.
RD-RFM-R03	Dissipation	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Temperatures measured during test were sensible
RD-RFM-R05	Nominal operating temperature	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Temperatures measured during test were sensible
RD-WE-R08	Photometer detector readout	SPIRE-RAL-DOC-001652 FUNC-DCU-11	SPIRE-RAL-REP-002084		PLW Array only

Verified by cold functional test					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
RD-WE-R13	PCAL Control	SPIRE-RAL-DOC-001652 FUNC-SCU-04 FUNC-PCAL-01	SPIRE-RAL-REP-002084		
RD-WE-R14	SCAL Control	SPIRE-RAL-DOC-001652 FUNC-SCU-05 FUNC-SCAL-01	SPIRE-RAL-REP-002084	HR-SP-RAL-NCR-64	SCAL 4% failed at operating temperatures
RD-WE-R15	Cooler Control	SPIRE-RAL-DOC-001652 FUNC-SCU-07 Cooler Recycling	SPIRE-RAL-REP-002084	HR-SP-RAL-NCR-62 HR-SP-RAL-NCR-63	Heat switch took too long to close Pump and evaporator heat switch commands were in wrong order
RD-WE-R17	Housekeeping	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Telemetry acquisition as expected
RD-WE-R20	Subsystem Control Loops	N/A	N/A		Not tested
RD-WE-R21	Subsystem Data Acquisition	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Telemetry acquisition as expected
RD-WE-R22	Data Processing	N/A	N/A		No on-board data processing
RD-WE-R23	Communication	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Telecommand, Telemetry, Housekeeping and Science packets being sent/received
RD-WE-R24	WE anomalies	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084	NCR-MCU-123	Over current limited triggered preventing MCU from switching on – to be fixed for MCU-QM1

Verified by cold functional test					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
				NCR- SPIRE-OBS SPR-0288	MCU went into oscillation when powered on causing instrument temperatures to escalate – should be fixed for MCU-QM1 Occasional Tele-Command drop-out.
RD-WE-R25	Subsystem anomalies	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084	HR-SP-RAL-NCR-64	SCAL 4% failed at operating temperatures
RD-WE-R26	Anomaly Management	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084	HR-SP-RAL-NCR-61	Illegal command not rejected by DRCU and not sending an exception report.
RD-WE-R35	Power	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084	NCR-MCU-123 NCR-	Over current limited triggered preventing MCU from switching on – to be fixed for MCU-QM1 MCU went into oscillation when powered on causing instrument temperatures to escalate – should be fixed for MCU-QM1
/RD-12	Thermal performance	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Temperatures measured during test were sensible
/RD-17	Harness mechanical frequency response and routing	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		
/RD-21	Detector sub-system interface compatibility - thermal electrical mechanical	SPIRE-RAL-DOC-001652			Electrical checkout during integration Functional tests showed that there were no problems due to electrical interfaces
/RD-24	Electrical grounding	SPIRE-RAL-DOC-001652			Checked during integration Functional tests showed that there were no

Verified by cold functional test					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
					problems due to grounding loops
/RD-27	Non-detector Harness performance	SPIRE-RAL-DOC-001652		HR-SP-RAL-NCR-63	Pump and evaporator heat switch commands were in wrong order – solution was to update the harness definition and the DRCU/DPU ICD.
/RD-28	Power supply cleanliness	SPIRE-RAL-DOC-001652			Noise within acceptable levels
/RD-29	Digital/analogue separation	?	?		
/RD-30	Electrical interface to Herschel system	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Tested using SPIRE EGSE
/RD-32	Sub-system electrical interfaces				Tested using SPIRE EGSE
/RD-33	Wiring tables	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084	HR-SP-RAL-NCR-63	Pump and evaporator heat switch commands were in wrong order – solution was to update the harness definition and the DRCU/DPU ICD.
/RD-34	Analogue to digital interfaces	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Test results show that A2D circuits were OK
/RD-37	Operating mode definition	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		SPIRE in DRCU ON, REDY, PHOT STANDBY
/RD-38	Instrument commanding definition	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		All commands that did execute produced the expected response
/RD-39	On board software definition	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084	SPIRE-OBS SPR-0288	OBS rejecting some commands at random Otherwise on board software behaved as

Verified by cold functional test					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
					expected
/RD-40	Sub-system operational and control interfaces	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Commands executed as expected
/RD-41	Sub-system data interfaces	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Telemetry as expected
/RD-48	Ground commissioning and calibration plan	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Functional tests performed will be used for all ground testing, in-flight verification and ISTs
/RD-49	Flight commissioning and calibration plan	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Functional tests performed will be used for in-flight verification and ISTs
/RD-50	Instrument to ground facility interfaces	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Instrument tested with full EGSE system including storage of telemetry inside HCSS database, SCOS, QLA

VERIFIED BY WARM FUNCTIONAL TEST					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
RD-VER-R03	The CQM verification testing shall demonstrate that the following conditions are met or are likely to be met on the PFM: Correct operation of all FPU sub-systems at cryogenic temperatures for all instrument operation modes for both prime and redundant systems. The instrument cold FPU and JFET box thermal dissipation is within requirements for all instrument operation modes. The warm electronics thermal dissipation at room temperature is within requirements. Correct	SPIRE-RAL-DOC-001888 SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Warm electronics units used for CQM model have not been thermally cycled and do not have full functional capability. CQM has only verified performance of photometer optics and PLW detector.

VERIFIED BY WARM FUNCTIONAL TEST					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
	operation of all on-board software. The instrument straylight environment is within requirements The instrument optics performance is within requirements The performance of the instrument meets the scientific requirements expected for the CQM for all instrument observing modes Development and test of all functional test sequences required for Integrated Systems Testing (IST) at satellite level. The correct functioning of the instrument for all observing modes and calibration sequences. Development and test of all in-flight functional and performance test sequences				
RD-PHOT-R11	Electrical crosstalk should be <1% (goal 0.5%) between nearest-neighbour pixels and <0.1 % (gaol 0.05%) between all other pixels in the same array.	Electrical Crosstalk Test Procedure – ref ?			Covered by performance tests
RD-PHOT-R13	The photometer dynamic range for astronomical signals shall be > 12 bits.	SPIRE-RAL-DOC-001652 FUNC-DCU-03	SPIRE-RAL-REP-002084		
RD-WE-R01	Packet Services	SPIRE-RAL-DOC-001652 FUNC-DCU-11 FUNC-SCU-01 FUNC-MCU-02	SPIRE-RAL-REP-002084 §4, 7 §7 §7		Science data generation ok
RD-WE-R02	Telecommands	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084	SPIRE-OBS SPR-0288	Some commands failed to execute All commands that did execute produced the expected response
RD-WE-R03	Telemetry	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Telemetry as expected

VERIFIED BY WARM FUNCTIONAL TEST					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
RD-WE-R04	Housekeeping	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Telemetry as expected
RD-WE-R05	Operating Modes	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		SPIRE into DRCU ON, INIT, REDY & STANDBY
RD-WE-R06	Command Services	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084	SPIRE-OBS SPR-0288	Occasional loss of commands
RD-WE-R07	Data Handling	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Telemetry and housekeeping as expected
RD-WE-R18	S/C Interface	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Tested using SPIRE EGSE (CDMS Simulato
RD-WE-R19	Subsystem Interface	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Commands executed as expected
RD-WE-R20	Subsystem Control Loops	N/A	N/A		Not tested at room temperature
RD-WE-R21	Subsystem Data Acquisition	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		All subsystems functioned as expected at room temperature
RD-WE-R22	Data Processing	N/A	N/A		No on-board data processing
RD-WE-R23	Communication	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Telecommand, Telemetry, Housekeeping an Science packets being sent/received
RD-WE-R24	WE anomalies	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084	NCR-MCU-123	Over current limited triggered preventing MC from switching on – to be fixed for MCU-QM

VERIFIED BY WARM FUNCTIONAL TEST					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
				SPIRE-OBS SPR-0288	Occasional Tele-Command drop-out.
RD-WE-R25	Subsystem anomalies	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		None
RD-WE-R26	Anomaly Management	Not Tested	Not Tested		Not tested at room temperature
RD-WE-R35	Power	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084	NCR-MCU-123	Over current limited triggered preventing MC from switching on – to be fixed for MCU-QM
RD-FSIM-R01	Function	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		All subsystems functioned as expected durin WFT
RD-FSIM-R02	Analogue Outputs	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		All subsystems functioned as expected durin WFT Limited test
RD-FSIM-R03	Control loops	N/A	N/A		Not Tested during WFT
/RD-21	Detector sub-system interface compatibility - thermal electrical mechanical	SPIRE-RAL-DOC-001652			Electrical checkout during integration Functional tests showed that there were no problems due to electrical interfaces
/RD-24	Electrical grounding	SPIRE-RAL-DOC-001652			Checked during integration Functional tests showed that there were no

VERIFIED BY WARM FUNCTIONAL TEST					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
					problems due to grounding loops
/RD-27	Non-detector Harness performance	SPIRE-RAL-DOC-001652			
/RD-28	Power supply cleanliness	SPIRE-RAL-DOC-001652			Noise within acceptable levels
/RD-29	Digital/analogue separation	?	?		
/RD-30	Electrical interface to Herschel system	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Tested using SPIRE EGSE
/RD-31	Power supply distribution and control				Tested using SPIRE EGSE
/RD-32	Sub-system electrical interfaces	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Functional tests demonstrate that internal interfaces were ok
/RD-33	Wiring tables	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Limited test at warm temperatures show indirectly that subsystems were wired as per harness definition.
/RD-34	Analogue to digital interfaces	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Limited tests at warm temperatures show tha all A2D circuits were ok.
/RD-35	Digital to digital interfaces	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Some problems with assignment of parameters as signed or unsigned integers – otherwise numbers coming out as expected
/RD-36	Data interface to Herschel system	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Tested using SPIRE EGSE (CDMS Simulato

VERIFIED BY WARM FUNCTIONAL TEST					
Requirement Name	**Description**	**Procedure In**	**Test Report Section**	**NCRs**	**Status/Comments**
/RD-37	Operating mode definition	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		SPIRE into DRCU ON, INIT, REDY & STANDBY
/RD-38	Instrument commanding definition	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		All commands that did execute produced the expected response
/RD-39	On board software definition	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084	SPIRE-OBS SPR-0288	OBS rejecting some commands at random Otherwise on board software behaved as expected
/RD-40	Sub-system operational and control interfaces	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Commands executed as expected
/RD-41	Sub-system data interfaces	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Telemetry as expected
/RD-48	Ground commissioning and calibration plan	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Functional tests performed will be used for in flight verification and ISTs
/RD-50	Instrument to ground facility interfaces	SPIRE-RAL-DOC-001652	SPIRE-RAL-REP-002084		Instrument tested with full EGSE system including storage of telemetry inside HCSS database, SCOS, QLA