



RBSP EFW Instrument Requirements Document

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RBSP EFW Instrument Requirements Document, RBSP_EFW_SYS_001L

ID	Req. Title	Subject	Priority	Requirement Body or Section Heading	Description / Clarification	Source Type	Rationale	Impacts / Effects	Verification Method	Verification Planning Notes	Working Comments
				3 Functional Requirements							
				3.1 Functional, performance and general design requirements							
EFW-1	Instrument Design life	Each EFW Instrument	shall	be designed for a total lifetime duration of 2 years plus 60 days.		Inherited	IPLD - 14	EFW-137	A	Analyses of limited life items and consumables, parts radiation tolerance, parts reliability	
EFW-200	Instrument Calibration	Each EFW Instrument	shall	be calibrated prior to launch, and be designed to accommodate additional in-flight calibration		Inherited	IPLD - 506	RBSP_EFW_TE_001, EFW-29	T	Calibration, software functional tests	
EFW-6	Instrument Orbit Inclination Operability	Each EFW Instrument	shall	be capable of operating in an orbit with an inclination of 10° ± 0.25°.		Inherited	IPLD - 120	EFW-136, EFW-209, EFW-43, EFW-44, EFW-45, EFW-46, EFW-47, EFW-48, EFW-49, EFW-50, EFW-51, EFW-52	A	Environmental analysis, Lower level requirement verification	
EFW-7	Instrument Orbit Perigee Operability	Each EFW Instrument	shall	be capable of operating in an orbit where perigee altitude is between 500 km and 675 km.		Inherited	IPLD - 184	EFW-136, EFW-209, EFW-43, EFW-44, EFW-45, EFW-46, EFW-47, EFW-48, EFW-49, EFW-50, EFW-51, EFW-52	A	Environmental analysis, Lower level requirement verification	
EFW-8	Instrument Orbit Apogee Operability	Each EFW Instrument	shall	be capable of operating in an orbit where apogee altitude is between 30,050 km and 31,250 km.		Inherited	IPLD - 183	EFW-136, EFW-209, EFW-43, EFW-44, EFW-45, EFW-46, EFW-47, EFW-48, EFW-49, EFW-50, EFW-51, EFW-52	A	Environmental analysis, Lower level requirement verification	
EFW-201	Instrument Accommodation of Observatory Sun Off-Point Angle (Component)	Each EFW Instrument	shall	shall be capable of collecting required science measurements under the condition where the off-pointing angle between the spin axis of each observatory and the Sun-Earth line during nominal operations does not exceed 25 degrees North or South of the ecliptic plane, or 25 degrees East or West in the ecliptic plane, where "north" and "south" are with respect to an ecliptic coordinate system.	Note: "North" and "South" are not specified with respect to a geographic coordinate system	Inherited	IPLD - 121	EFW-136, EFW-209, EFW-43, EFW-44, EFW-45, EFW-46, EFW-47, EFW-48, EFW-49, EFW-50, EFW-51, EFW-52	A	Environmental analysis, Lower level requirement verification	
EFW-202	Instrument Accommodation of Observatory Sun Off-Point Angle (Composite)	Each EFW Instrument	shall	be capable of collecting required science measurements under the condition where the total off-pointing angle between the spin axis of each observatory and the Sun-Earth line during nominal operations is greater than 15 degrees, and does not exceed 27 degrees.	Spin axis assumed to be pointing into the solar hemisphere.	Inherited	IPLD - 177	EFW-136, EFW-209, EFW-43, EFW-44, EFW-45, EFW-46, EFW-47, EFW-48, EFW-49, EFW-50, EFW-51, EFW-52	A	Environmental analysis, Lower level requirement verification	
EFW-9	Instrument Accommodation of Observatory Operational Spin Rate Range	Each EFW Instrument	shall	be capable of operating nominally within an observatory spin rate range of no less than 4 rpm and no more than 6 rpm.	Nominal spin rate is 5rpm	Inherited	IPLD - 185	EFW-119, RBSP_EFW_SPB_001	A,T	Key Reel Force, FSW Tests	
EFW-10	Instrument Accommodation of Observatory Selected Operational Spin Rate	Each EFW Instrument	shall	be capable of collecting required science measurements at a specific, optimal spin rate selected for both observatories that is within the specified allowable range		Inherited	IPLD - 186	EFW-119	T	FSW Tests	
EFW-11	Instrument Accommodation of Observatory Selected Spin Rate Stability	Each EFW Instrument	shall	be capable of collecting required science measurements at an observatory spin rate that is maintained to within +/- 0.25 rpm of the in-flight selected value, except during maneuvers.		Inherited	IPLD - 188	EFW-119	T	FSW Tests	
EFW-203	Instrument Accommodation of Observatory Commissioning Spin Rate Range	Each EFW Instrument	shall	be capable of accommodating an observatory spin rate during commissioning period activities within a range between 3 RPM and 15 RPM.		Inherited	IPLD - 150	EFW-119, RBSP_EFW_SPB_001	A,T	Key Reel Force	
EFW-12	Instrument Accommodation of Unattended Mission Operations	Each EFW Instrument	shall	be designed to accommodate periods of unattended mission operations (unstaffed MOC) during the operational phase of the mission of up to 5 days.		Inherited	IPLD - 178	RBSP_EFW_TE_001	T	Long duration functional tests, Automation tests	

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EFW-13	Instrument On-Board Burst Notification Generation	Each EFW Instrument	shall	be capable of generating, and sending to the host spacecraft, a burst flag that indicates each respective instrument's determination of the general activity level of the external environment.		inherited	IPLD - 204	EFW-130,EFW-93	T	FSW Tests	
EFW-204	Instrument On-Board Burst Notification Reception	Each EFW Instrument	shall	be capable of receiving and responding to a message that represents a concatenation of the burst flags of other instruments on the same spacecraft		inherited	IPLD - 532	EFW-130	T	FSW Tests	
EFW-15	Instrument Responsibility for On-Board Data Compression	Each EFW Instrument	shall	be responsible for any and all on-board compression of their own data.		inherited	IPLD - 166	EFW-84	T	FSW Tests	
EFW-18	Timeliness of Instrument Survey Data to Spacecraft	Each EFW Instrument	shall	provide continuous mode survey science measurement data to the spacecraft within 24 hours of the time when the measurement was taken.		inherited	IPLD - 203	EFW-82	T	FSW Tests	
EFW-205	Instrument Provision of Telemetry Supporting Fault Diagnosis	Each EFW Instrument	shall	be designed to provide telemetry, within their own telemetry stream, sufficient to enable fault diagnosis by the appropriate SOC.		inherited	IPLD - 223	EFW-113	T	FSW Tests	
EFW-21	EFW Instrument Complement	Each EFW Instrument	shall	consist of four orthogonally oriented, boom-mounted spin-plane boom-mounted sensors, an Electronics Box, and two axial boom mounted sensors with harness as defined in the Spacecraft to EFW ICD.		inherited	IPLD - 231	EFW-53, EFW-54, EFW-55 EFW-56, EFW-88, EFW-89, EFW-90	I		
EFW-22	Functionally Identical EFW Instrument Suites	Each EFW Instrument	shall	be functionally identical.		inherited	IPLD - 230	EFW-23	T	Calibrations, CPT	
EFW-23	EFW - Spacecraft ICD Compliance	Each EFW Instrument	shall	comply with the EFW-to-Spacecraft interface control documents (ICDs).		inherited	IPLD - 232, IPLD - 260, IPLD - 201, IPLD - 206, IPLD - 264, IPLD - 567, IPLD - 568, IPLD - 578, EFW-22	EFW-63, EFE-64, EFW-65, EFW-66, EFW-67, EFW-68, EFW-69, EFW75, EFW-76, EFW-77, EFW-78, EFW-79, EFW-80, EFW-81, EFW-82, EFW-83, EFW-85, EFW-86, EFW-87, EFW-88, EFW-89, EFW-90, EFW-91, EFW-92, EFW-96, EFW-96,EFW-103, EFW-104, EFW-105, EFW-106, EFW-107, EFW-108, EFW-111, EFW-112, EFW-116, EFW-135	T	CPT, FSW Tests	
EFW-24	EFW Instrument Availability	Each EFW Instrument	shall	be designed to be available for the collection of its required measurements at least 99% of the time during the operational phase of the mission		inherited	IPLD - 283	EFW-97, EFW-118	A, T	Analysis of probability and duration of events that cause data loss; Long duration functional tests	
EFW-27	EFW Maximum Daily Data Delivery Volume to Spacecraft	Each EFW Instrument	shall	deliver no more than 1.0368 Gbits per day to its respective spacecraft during the science operations phase of the RBSP mission		inherited	IPLD - 287	EFW-82	T	FSW Tests	
EFW-29	Instrument On-Orbit Parameter Load or Software Change Capability	Each EFW Instrument	shall	be capable of modifying operational flight software and/or change calibration coefficients or tables in response to ground commands		inherited	IPLD - 229, EFW-200	EFW-109, EFW-114	T	FSW Tests	
EFW-32	EFW Burst Data Delivery	Each EFW Instrument	shall	be designed to telemeter a daily average of 32 MSamples of burst and interferometric wave data..	This data volume will support 3 hours of burst data containing three components each of electric and magnetic fields and a measurement of density at a rate of 300 samples/s. It simultaneously supports 86 seconds of interferometric timing data at a rate of 16,000 samples/s. On orbit burst rates and durations will be programmable	inherited	IPLD - 507	EFW-130, EFW-93	T	FSW Tests, CPT	

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EFW-206	EFW Timeliness of Burst Data Delivery to Spacecraft	Each EFW Instrument	shall	provide selected science measurement data collected in burst mode to the spacecraft within 42 days of the time when the measurement was taken.	The requirement does not apply to EFW data collected in survey mode	inherited	IPLD - 297	EFW-118, EFW-93	T	FSW Tests	
EFW-33	EFW Allocated Instrument Timing Knowledge Uncertainty	Each EFW Instrument	shall	limit its internal instrument timing uncertainty to +/- 1 msec (3-sigma).	This is the maximum allowable error than can be introduced by the instrument itself in determining the time of an observation. NOTE: The value of ± 1 msec is required to satisfy the absolute time knowledge accuracy requirement per observatory; however, EFW internal timing accuracy is also needed to achieve the ≤ 3 degree observatory post-processed attitude knowledge requirement, but does not need to be as tight for attitude knowledge (5 ms, equivalent to 0.15 degrees).	inherited	IPLD - 212	EFW-110	T	Timing and Phasing test (Cal)	
EFW-35	EFW On-Board Reception of EMFISIS Waves 3D Analog Search Coil Signals	Each EFW Instrument	shall	be capable of receiving 3D buffered analog search coil signals from the EMFISIS Waves instrument aboard its respective observatory, as follows: -- frequency range: 10 Hz to 300 Hz; -- noise floor: < 1 x10 ⁻⁶ (nT) ² /Hz at 100 Hz; -- dynamic range: 90 dB	Requirements (bandwidth, noise floor, and dynamic range) revised to be consistent with RBSP EFW to EMFISIS ICD (rev dash), APL document number 7417-9089	inherited	IPLD - 243	EFW-55,EFW-56,EFW-121	T	Tests with simulators (Cal), test with EMFISIS	
EFW-207	EFW On-Board Reception of EMFISIS DC-Coupled 3-Axis MAG Data	Each EFW Instrument	shall	Each EFW instrument shall be capable, in the event of a failure of the EMFISIS MEB CDPU board, of digitizing each of the three DC-coupled, 3-axis analog signals received from the EMFISIS MAG instrument aboard its respective observatory, as follows: -- at a sampling rate of 64 samples per second; -- with an accuracy of 1.0% (goal of 0.1%) of the value of the total of the sensor voltage range; -- with the DC offset of the conversion less than 0.1% of	Requirements (bandwidth, noise floor, and dynamic range) revised to be consistent with RBSP EFW to EMFISIS ICD (rev C).	inherited	IPLD - 244	EFW-55,EFW-56,EFW-121	T	Tests with simulators (Cal), test with EMFISIS	
EFW-215	EFW Contingency Digitization of EMFISIS DC-Coupled 3-Axis MAG Signals	Each EFW Instrument	shall	be capable, in the event of a failure of the EMFISIS MEB CDPU board, of digitizing each of the three DC-coupled, 3 axis analog signals received from the EMFISIS MAG instrument aboard its respective observatory, as follows: -- at a sampling rate of 64 samples per second; -- with an accuracy of 1.0% (goal of 0.1%) of the value of the total of the sensor voltage range; -- with the DC offset of the conversion less than 0.1% of the total maximum possible range of the signal;	Refer also to the RBSP EFW to EMFISIS ICD.	inherited	IPLD - 585	EFW-55, RBSP_EFW_DFB_001	T		
EFW-216	Contingency EMFISIS MAG Data Digitized Data Packets	Each EFW Instrument	shall	Each EFW instrument shall be capable of generating and providing to the spacecraft digitized 3-axis flux gate magnetometer data packets, as follows: -- when manually commanded to do so; -- as derived from analog signals received from EMFISIS MAG and digitized by EFW (see IPLD-585); -- in CCSDS-compliant packets; -- with each packet containing data for 512 samples (8 seconds of data at 64 samples per second) of the measurement, 16 bits per axis, 3 axis measurements per sample; -- encoded with a unique identifier (APID).	This capability is intended for use in the event of a failure of the EMFISIS MEB CDPU board, and would not be exercised under nominal operational conditions. Refer also to the RBSP EFW to EMFISIS ICD.	inherited	IPLD - 586	EFW-217	T		

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EFW-36	EFW On-Board Delivery of Signals and to EMFISIS - Spin Plane Sensor Pairs	Each EFW Instrument	shall	be capable of providing buffered, analog probe voltage difference signals for two orthogonal pairs of spin plane electric field sensors directly to the EMFISIS instrument suite aboard its respective observatory, specified in terms of two frequency ranges, as follows: Frequency Range 1: -- frequency range: from 10 Hz to 12 kHz; -- sensitivity: 3.10-14 (V/m) ² /Hz at 1 kHz; -- bandwidth: 175 Hz; -- dynamic range: 100 dB. Frequency Range 2: -- frequency range: from 10 kHz to 400 kHz; -- sensitivity: 3.10-17 (V/m) ² /Hz at 100 kHz; -- bandwidth: 7 kHz; -- dynamic range: 100 dB; -- maximum signal amplitude: 30 mV/m at 1 kHz.	Requirements (bandwidth, noise floor, and dynamic range) revised to be consistent with RBSP EFW to EMFISIS ICD (rev C).	inherited	IPLD - 245	EFW-53,EFW-54,EFW-55,EFW-56,EFW-131, EFW-102	T	Tests with simulators (Cal), test with EMFISIS	
EFW-208	EFW On-Board Delivery of Signals to EMFISIS - Single Pair Axial	Each EFW Instrument	shall	be capable of providing a buffered, analog spin axis electric field measurement directly to the EMFISIS instrument suite aboard its respective observatory, specified in terms of two frequency ranges, as follows: Frequency Range 1: -- frequency range: from 10 Hz to 12 kHz; -- bandwidth: 175 Hz; -- dynamic range: 80 dB; -- sensitivity: 3.10-12 (V/m) ² /Hz at 100 Hz. Frequency Range 2: -- frequency range: from 10 kHz to 400 kHz; -- bandwidth: 7 kHz; -- dynamic range: 80 dB; -- sensitivity: 3.10-15 (V/m) ² /Hz at 100 kHz; -- maximum signal amplitude: 30 mV/m at 1 kHz.	Requirements (bandwidth, noise floor, and dynamic range) revised to be consistent with RBSP EFW to EMFISIS ICD (rev C). Note: The aft axial boom will sometimes be in spacecraft shadow and cannot be used in constructing a differential signal at those times.	inherited	IPLD - 246	EFW-214, RBSP_EFW_DFB_001	T	Cal	
EFW-213	EFW Space Weather Data Products	Each EFW Instrument	shall	be capable of generating and providing to the spacecraft the following measurement data, for inclusion in near-real-time space weather broadcasts: 2D Spin Plane Vector Electric Field: -- at a cadence of 1 vector per spin; -- 2 components in de-spun coordinates; Spacecraft Potential (Plasma Density): -- spacecraft potential; -- at a cadence of once per spin	Instruments will choose space weather data from measurements based on information normally available to the instrument	inherited	IPLD - 574	EFW-130, EFW-124	T	FSW Test	
EFW-37	EFW Space Weather Data Product Identification	Each EFW Instrument	shall	Each EFW instrument shall deliver space weather data to the spacecraft in packets that are separate from other EFW data and are uniquely identifiable as space weather data packets.	to the spacecraft in packets that are separate from other information normally available to the instrument	inherited	IPLD - 308	EFW-53,EFW-55,EFW-56	T	FSW Test	
EFW-209	EFW Spin Axis Measurement Sensitivity Validity	Each EFW Instrument	shall	meet Spin Axis measurement sensitivity requirements outside time periods defined as follows: the interval where the aft axial boom is shadowed by the spacecraft or solar panels, and 25 seconds after the end of such periods.		inherited	IPLD - 552, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	RBSP_EFW_DFB_001	A, T	Cal	
EFW-43	Measure 3D Low-Frequency AC Magnetic Field Cross-Spectra	Each EFW Instrument	shall	measure 3-D low frequency AC magnetic field cross-spectra, as follows: -- using the EMFISIS search coil signal; -- frequency range: 10 Hz to 300 Hz]; -- magnitude range: 90 dB; -- cadence: every 1 spin; -- sensitivity: 1 x 10 ⁻⁶ nT ² /Hz@ 100 Hz	consider a 3-D AC magnetic field (survey) measurement to be unobtainable or otherwise invalid under the following operational conditions: -- When EMFISIS signals are not valid (reference IPLD 490, 492).	inherited	IPLD - 68, IPLD - 491, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	EFW-53, EFW-55,EFW-56, RBSP_EFW_DFB_001	T	Cal	
EFW-44	Measure AC Magnetic Field (Burst)	Each EFW Instrument	shall	measure burst AC magnetic field, as follows: -- using EMFISIS magnetic search coil data; -- frequency range: 10 Hz-250 Hz; -- magnitude range: 90 dB; -- cadence: 512 samples/sec; -- sensitivity: 1 x10 ⁻⁶ (nT) ² /Hz at 100 Hz.	consider a 3-D AC magnetic field (burst) measurement to be unobtainable or otherwise invalid under the following operational conditions: -- When EMFISIS signals are not valid (reference IPLD 490, 492).	inherited	IPLD - 71, IPLD - 493, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	EFW-55,EFW-56, RBSP_EFW_DFB_001	T	Cal	

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EFW-45	Measure Interferometric Timing (Burst)	Each EFW Instrument	shall	perform interferometric timing measurements at high cadence using independent measurements from each of the paired probes, as follows: -- for waves of .1 mV/m to 300 mV/m, velocity range of 0 - 500 km/s in spin plane, and wave spatial scales of 0.1 -30 km when inter-probe wave coherence >0.5 -- cadence: 16 k samples/sec (214 samples/s); -- sensitivity: 0.05 mV/m	consider an interferometric timing measurement to be unobtainable or otherwise invalid under the following operational conditions: -- All probes are not illuminated	inherited	IPLD - 61, IPLD - 505, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	EFW-53,EFW-54,EFW-55,EFW-56, RBSP_EFW_DFB_001	T	Cal	
EFW-46	Measure Spin Plane DC Electric Field (Survey)	Each EFW Instrument	shall	measure an electric field component perpendicular to the observatory spin axis (survey), as follows: -- frequency range: DC to 15 Hz; -- magnitude range: 0 to 500 mV/m, at geocentric distances greater than 2.5 Re; -- cadence: 32 vectors/second; -- sensitivity: 0.3 mV/m or 10% for R > 3.5 Re, 3.0 mV/m for 2.5 Re < R < 3.5 Re 10 mV/m for 1.5 Re < R < 2.5 Re.	consider a spin plane DC electric field (survey) measurement to be unobtainable when: 1) the spacecraft is in Earth shadow; 2) the spin plane boom pointing requirements are not met; 3) magnetic field data is not within required accuracy; 4) spacecraft attitude information is not within required specifications; 5) spacecraft velocity measurements are not within specification; 6) the electrostatic cleanliness specification is not capable of controlling differential charging of spacecraft surface (i.e., differential charging across spacecraft surface > 1 volt).	inherited	IPLD - 38, IPLD - 494, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	EFW-53,EFW-54,EFW-55,EFW-56, RBSP_EFW_DFB_001	T	Cal	
EFW-47	EFW Spin Plane Cold Plasma Density Measurements	Each EFW Instrument	shall	determine cold plasma density by measuring the observatory (spacecraft) potential: as follows: -- magnitude range: 0.1 - 50 cm-3, for electron temperatures less than 30 eV; -- cadence: 1 sample per second; -- sensitivity 50%.	consider a cold plasma density measurement to be unobtainable when: 1) the electron temperature is above 30 eV; 2) the spacecraft is in Earth shadow; 3) the electrostatic cleanliness specification is not capable of controlling differential charging of spacecraft surface (i.e., differential charging across spacecraft surface > 1 volt).	inherited	IPLD - 55, IPLD - 503, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	EFW-53,EFW-54,EFW-55,EFW-56, RBSP_EFW_DFB_001	A, T	Cal	
EFW-48	Measure Low-Frequency AC Electric Field Cross Spectra	Each EFW Instrument	shall	measure low frequency AC electric field cross-spectra, as follows: -- frequency range: 10 Hz to 300 Hz; -- magnitude range: 80 dB; -- cadence: 6 seconds; -- sensitivity: 1x10-12 (V/m)2/Hz at 30 Hz, 1x10-14 (V/m)2/Hz at 300 Hz.	consider a 3-D low-frequency AC electric field (survey) measurement to be unobtainable or otherwise invalid under the following operational conditions: -- When EMFISIS signals are not valid (reference IPLD 490, 492):.	inherited	IPLD - 66, IPLD - 499, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	EFW-53,EFW-54,EFW-55,EFW-56, RBSP_EFW_DFB_001	T	Cal	

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EFW-49	Measure Spin Plane DC Electric Field (Burst)	Each EFW Instrument	shall	measure an electric field component perpendicular to the observatory spin axis (burst), as follows: -- frequency range: DC to 250 Hz; -- magnitude range: 0.3 - 500 mV/m; -- cadence: 512 samples per second; -- sensitivity: 10-12 (V/m) ² /Hz at 30 Hz 10-14 (V/m) ² /Hz at 300 Hz.	consider a spin plane DC electric field (burst) measurement to be unobtainable when: 1) the spacecraft is in Earth shadow; 2) the spin plane boom pointing requirements are not met; 3) spacecraft attitude information is not within required specifications; 4) the electrostatic cleanliness specification is not capable of controlling differential charging of spacecraft surface (i.e., differential charging across spacecraft surface > 1 volt).	inherited	IPLD - 42, IPLD - 495, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	EFW-53,EFW-55,EFW-56, RBSP_EFW_DFB_001	T	Cal	
EFW-50	Measure Density Perturbation (Burst)	Each EFW Instrument	shall	measure density perturbations (burst), as follows: -- frequency range: DC to 250 Hz; -- magnitude range: 0.1 - 50 cm ⁻³ , (<30 eV electrons); -- cadence: 512 samples per second; -- sensitivity (dn/n): ~ 10%.	consider a cold plasma density perturbation measurement to be unobtainable when: 1) the electron temperature is above 30 eV; 2) the spacecraft is in Earth shadow; 3) the electrostatic cleanliness specification is not capable of controlling differential charging of spacecraft surface (i.e., differential charging across spacecraft surface > 1 volt); 4) density is above 300 cm ⁻³ .	inherited	IPLD - 59, IPLD - 504, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	EFW-53,EFW-54,EFW-55,EFW-56, RBSP_EFW_DFB_001	T	Cal	
EFW-51	Measure Spin Axis DC Electric Field (Survey)	Each EFW Instrument	shall	measure axial electric field components (survey), as follows: -- frequency range: DC to 15Hz; -- magnitude range: 2 mV/m - 500 mV/m; -- cadence: 32 vectors/second; -- sensitivity: 4 mV/m or 20% for R > 3.5 Re, 6 mV/m or 20% for 3.5 Re > R > 2.5 Re, 12 mV/m or 20% for 1.5 Re < R < 2.5 Re.	consider a spin axis DC electric field (survey) measurement to be unobtainable when: 1) the spacecraft is in Earth shadow; 2) the spin axis boom pointing requirements are not met; 3) magnetic field data is not within required accuracy; 4) spacecraft attitude information is not within required specifications; 5) spacecraft velocity measurements are not within specification; 6) the electrostatic cleanliness specification is not capable of controlling differential charging of spacecraft surface (i.e., differential charging across spacecraft surface > 1 volt); 7) the aft spin axis boom is in spacecraft shadow.	inherited	IPLD - 44, IPLD - 496, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	EFW-54,EFW-55,EFW-56, RBSP_EFW_DFB_001	T	Cal	

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EFW-52	Measure Spin Axis DC Electric Field (Burst)	Each EFW Instrument	shall	measure axial electric field components (burst), as follows: -- frequency range: DC to 256 Hz; -- magnitude range: 0.4 - 500 mV/m; -- cadence: 512 samples per second; -- sensitivity: 1 mV/m or 10% @ 50 Hz.	consider a spin axis DC electric field (burst) measurement to be unobtainable when: 1) the spacecraft is in Earth shadow; 2) the spin axis boom pointing requirements are not met; 3) spacecraft attitude information is not within required specifications; 4) the electrostatic cleanliness specification is not capable of controlling differential charging of spacecraft surface (i.e., differential charging across spacecraft surface > 1 volt); 5) the aft spin axis boom is in spacecraft shadow.	inherited	IPLD - 47, IPLD - 497, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	EFW-54, EFW-55, EFW-56, RBSP_EFW_DFB_001	T	Cal	
EFW-218	EFW Axial Boom Structural Mode Frequencies	Each EFW instrument	shall	be developed such that the structural mode frequencies for the EFW axial booms is at least 1.5 times the maximum planned operational spin rate of 6 RPM or above 0.15 Hz.		Derived	IPLD-588	EFW-54			
EFW-219	EFW Spin Plane Boom Wire Damping Capacity	Each EFW instrument	shall	be developed such that the damping capacity of the wire used for the EFW spin plane booms is at least 0.020 J (or J/rad ²) where this capacity is measured as the change in energy per cycle divided by the squared amplitude of the deflection angle (in radians) of a pendulum made of the wire operating in a vacuum with tension along the wire equal to that experienced in flight at the nominal spin rate of 5 rpm.		Derived	IPLD-589	EFW-53			

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EFW-220	EFW Axial Boom Total Static Internal Alignment Error	Each EFW instrument	shall	be developed such that the total static internal alignment error of each EFW axial boom (deployed) is ≤ 1.0 degrees (3-sigma).		Derived	IPLD-590	EFW-54a			
				Required Components to Achieve Above							
EFW-53	EFW Spin Plane E-Field Booms	Each EFW SPB	shall	be capable of deploying 50 meters of wire with an E-Field sensor preamp at the end capable of measuring E-Fields to 400 kHz		derived	EFW-37, EFW-49, EFW-36, EFW-43, EFW-44, EFW-45, EFW-46, EFW-47, EFW-48, EFW-50, EFW-219	EFW-56, EFW-92a, RBSP_EFW_SPB_001	T	Deployment tests, Preamp tests	
EFW-54	EFW Axial E-Field Booms	Each EFW AXB	shall	be capable of deploying 7 meters with an E-Field sensor preamp at the end capable of measuring E-Fields to 400 kHz		derived	EFW-37, EFW-45, EFW-46, EFW-36, EFW-48, EFW-50, EFW-51, EFW-52, EFW-218	EFW-56, EFW-92a, RBSP_EFW_AXB_001	T	Deployment tests, Preamp tests	
EFW-54a	EFW Axial E-Field Booms	Each EFW AXB	shall	Deploy the AXB sensors within +/- 1 degree of the AXB deployment system axis		derived	EFW-51, EFW-220	RBSP_EFW_AXB_001	T	Deployment tests	
EFW-55	EFW Instrument Data Processor Unit	Each EFW IDPU	shall	house and provide EMC closeout, thermal control, and radiation protection to the following: boom electronics, a/d circuitry, E-Field buffers, computer and solid state recorder, power controller, and power converter.		derived	EFW-43, EFW-44, EFW-45, EFW-46, EFW-47, EFW-48, EFW-49, EFW-50, EFW-51, EFW-52, EFW-215, EFW-207, EFW-36, EFW-101	EFW-56, EFW-57, EFW-58, EFW-59, EFW-60, EFW-61, EFW-62	I, A, T	EMC Test, Thermal vac test	
EFW-56	EFW Harnessing	Each EFW Harness	shall	connect the SPB, AXB, IDPU, EMFISIS/MAG and EMFISIS/SCM units together as detailed in the ICDs		derived	EFW-53, EFW-54, EFW-55, EFW-37, EFW-42, EFW-207, EFW-36, EFW-45, EFW-46, EFW-47, EFW-48, EFW-49, EFW-50, EFW-51, EFW-52	RBSP_EFW_SYS_015	D	CPT	
				3.2 Power allocations and related requirements							
EFW-57	EFW Boom Electronics	Each EFW IDPU	shall	contain Boom Electronics Board (BEB) which will control four SPB sensors and 2 AXB sensors.		derived	EFW-55	RBSP_EFW_BEB_001	D	CPT	
EFW-58	EFW Analog/Digital Conversion	Each EFW IDPU	shall	contain Digital Fields Board (DFB) which will digitize SPB, AXB, and EMFISIS signals and perform other analyses		derived	EFW-55	RBSP_EFW_DFB_001	D	CPT	
EFW-59	EFW E-Field Buffering	Each EFW IDPU	shall	contain circuitry to buffer differential E-Field signals to EMFISIS		derived	EFW-55	RBSP_EFW_BEB_001	D	CPT	
EFW-60	EFW Data Processing	Each EFW IDPU	shall	contain a processor and solid-state recorder capable of recording and playing back E-Field and B-Field data		derived	EFW-55	EFW-118, RBSP_EFW_DCB_003	D	CPT	
EFW-61	EFW Power Control	Each EFW IDPU	shall	contain circuitry to open SPB and AXB doors and deploy sensors		derived	EFW-55	RBSP_EFW_LVPS_001	D	CPT	
EFW-62	EFW Low Voltage Conversion	Each EFW IDPU	shall	contain circuitry to provide voltages to IDPU boards using the S/C-provided 28Volts		derived	EFW-55	RBSP_EFW_LVPS_001	D	CPT	
				3.2 Power allocations and related requirements							
EFW-63	EFW Main Power Allocation	Each EFW Instrument	shall	not exceed the total power of 11.16W from the EFW Main 28V Service		derived	EFW-23	EFW-98, RBSP_EFW_BEB_001, RBSP_EFW_DFB_001, RBSP_EFW_DCB_003, RBSP_EFW_LVPS_001	T	CPT	
EFW-64	EFW Main Power In-Rush	Each IDPU	shall	not exceed ICD values as follows: 10A for 100 usec; 5A for 100us to 1ms 2.5A after 1ms		derived	EFW-23	RBSP_EFW_LVPS_001	T	Functional	
EFW-65	EFW Main Power Max Voltage	Each IDPU	shall	tolerate without damage a maximum input voltage of 40V indefinitely as defined in the ICD		derived	EFW-23	RBSP_EFW_LVPS_001	T	Functional	

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EFW-66	EFW Main Power Turn Off	Each IDPU	shall	tolerate without damage having power removed without notice as defined in the ICD		derived	EFW-23	RBSP_EFW_LVPS_001	T	Functional	
EFW-67	EFW SPB Deployment Power	Each EFW SPB	shall	not exceed 4.0 Amps from the EFW SPB Deployment Service		derived	EFW-23	EFW-70,EFW-71, EFW-98, EFW-99	T	Functional	
EFW-68	EFW AXB Deployment Power	Each EFW AXB	shall	not exceed 4.0 Amps from the EFW AXB Deployment Service		derived	EFW-23	EFW-72,EFW-73,EFW-74, EFW-98, EFW-100	T	Functional	
EFW-69	EFW Survival Heaters	Each EFW Suite	shall	accommodate survival heaters up to 1/2 nominal power at 22V bus voltage, or approximately 113 Ohms if necessary.		derived	EFW-23	<i>not used</i>	T	Functional	
				3.3 Performance budget sub-allocations with respect to system budgets							
EFW-70	EFW SPB Door Power	Each EFW SPB	shall	not exceed 2.0 Amps at 28V		budgeted	EFW-67	RBSP_EFW_SPB_001	T	Functional	
EFW-71	EFW SPB Motor Power	Each EFW SPB	shall	not exceed 0.2 Amps at 28V (1.5A startup)		budgeted	EFW-67	RBSP_EFW_SPB_001	T	Functional	
EFW-72	EFW AXB Whip Release Power	Each EFW AXB	shall	not exceed 2.0 Amps at 28V		budgeted	EFW-68	RBSP_EFW_AXB_001	T	Functional	
EFW-73	EFW AXB Stacer Release Power	Each EFW AXB	shall	not exceed 2.0 Amps at 28V		budgeted	EFW-68	RBSP_EFW_AXB_001	T	Functional	
EFW-74	EFW AXB Motor Power	Each EFW AXB	shall	not exceed 0.2 Amps at 28V (1.5A startup)		budgeted	EFW-68	RBSP_EFW_AXB_001	T	Functional	
				3.4 Operational requirements							
EFW-75	EFW IDPU Operational Temp Range	The EFW IDPU	shall	perform as designed from -25 to +55C	Assumes conductively mounted to spacecraft	derived	EFW-23	RBSP_EFW_BPL_001	T	Thermal Vac	
EFW-76	EFW SPB Operational Temp Range	The EFW SPB	shall	perform as designed from -25 to +55C	Assumes conductively mounted to spacecraft	derived	EFW-23	RBSP_EFW_SPB_001	T	Thermal Vac	
EFW-77	EFW AXB Operational Temp Range	The EFW AXB	shall	perform as designed from -25 to +55C for the Stacer, -25 to +65C for the Whip	Assumes conductively mounted to spacecraft	derived	EFW-23	RBSP_EFW_AXB_001	T	Thermal Vac	
EFW-78	EFW IDPU Survival Temp Range	The EFW IDPU	shall	survive without damage from -30 to +60C	Assumes conductively mounted to spacecraft	derived	EFW-23	RBSP_EFW_BPL_001	T	Thermal Vac	
EFW-79	EFW SPB Survival Temp Range	The EFW SPB	shall	survive without damage from -30 to +60C	Assumes conductively mounted to spacecraft	derived	EFW-23	RBSP_EFW_SPB_001	T	Thermal Vac	
EFW-80	EFW AXB Survival Temp Range	The EFW AXB	shall	survive without damage from -30 to +60C for Stacer, -30 to +70C for the Whip	Assumes conductively mounted to spacecraft	derived	EFW-23	RBSP_EFW_AXB_001	T	Thermal Vac	
				3.5 Command and telemetry requirements							
EFW-81	EFW Command	The EFW IDPU	shall	accept commands via serial interface		derived	EFW-23,EFW-29	EFW-111	T	CPT	
EFW-82	EFW Telemetry Rate	The EFW IDPU	shall	generate a continuous, serial telemetry stream at a rate not to exceed 12,000 bps.		derived	EFW-18, EFW-23, EFW-27	EFW-112	T	CPT	
EFW-83	EFW Telemetry Peak	The EFW IDPU	shall	limit the instantaneous data rate to the spacecraft to ≤80 kbps		derived	EFW-23	EFW-112	T	CPT	
EFW-84	EFW Telemetry Compression	The EFW IDPU	shall	perform data compression		derived	EFW-15	EFW-129	T	CPT	
EFW-85	EFW use of MET	The EFW IDPU	shall	use Mission Elapsed Time (MET) as the reference time for time stamps produced for science, space weather,		derived	EFW-23	EFW-110	T	CPT	
EFW-86	EFW MET Acceptance	The EFW IDPU	shall	accept the distribution of MET from its respective spacecraft at a frequency of 1 Hz.		derived	EFW-23	EFW-111	T	CPT	
				3.6 Interfaces to the spacecraft bus							
EFW-87	EFW Serial Interface	The EFW IDPU	shall	accommodate a standard point-to-point serial interface for data exchange with the spacecraft.		derived	EFW-23	RBSP_EFW_DFB_001, RBSP_EFW_FSW_002	T	CPT	
EFW-88	EFW IDPU ICD Compliance	The EFW IDPU	shall	comply with the requirements and constraints imposed by all relevant instrument-to-spacecraft interface control documents (ICDs).		derived	EFW-23	RBSP_EFW_BPL_001	I,T	CPT, functionals	
EFW-89	EFW SPB ICD Compliance	The EFW SPB	shall	comply with the requirements and constraints imposed by all relevant instrument-to-spacecraft interface control documents (ICDs).		derived	EFW-23	RBSP_EFW_SPB_001	I,T	CPT, functionals	
EFW-90	EFW AXB ICD Compliance	The EFW AXB	shall	comply with the requirements and constraints imposed by all relevant instrument-to-spacecraft interface control documents (ICDs).		derived	EFW-23	RBSP_EFW_AXB_001	I,T	CPT, functionals	
				3.7 Umbilical interfaces							
				<i>not applicable</i>							
				3.8 System test Interfaces							

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EFW-91	SPB Signal Test Input	Each EFW SPB	shall	provide a connector for test input to the sensor accessible during all integration phases.		derived	EFW-23	RBSP_EFW_SPB_001	D	CPT	
EFW-92	AXB Signal Test Input	Each EFW AXB	shall	provide a connector for test input to the sensor accessible when the top and bottom of the spacecraft are accessible.		derived	EFW-23, EFW-53, EFW-54	RBSP_EFW_AXB_001	D	CPT	
				3.9 Instrument modes							
EFW-92a	EFW Engineering Mode	The EFW IDPU	shall	provide an Engineering Mode for deployments		derived	EFW-53, EFW-54	RBSP_EFW_FSW_002	T	CPT	
EFW-93	EFW Normal Mode	The EFW IDPU	shall	provide a Normal Mode for science data collection		derived	EFW-13, EFW-32, EFW-206, EFW-43, EFW-44, EFW-48, EFW-49, EFW-51, EFW-131	RBSP_EFW_FSW_002	T	CPT	
				3.10 Fault detection and correction considerations/requirements							
EFW-96	EFW Illegal Commands	The EFW IDPU	shall	validate commands prior to execution.		derived	EFW-23	RBSP_EFW_FSW_002	T	CPT	
EFW-97	EFW Data Integrity	The EFW IDPU	shall	detect and correct data errors in its Solid State Recorder.		derived	EFW-24	RBSP_EFW_FSW_002	T	CPT	
EFW-98	EFW Illegal Power States	The EFW IDPU	shall	not be damaged by the application of boom power while the Main power is Off.		derived	EFW-63, EFW-67, EFW-68	RBSP_EFW_LVPS_001	T	CPT	
EFW-99	EFW SPB Deployment Enable	The EFW IDPU	shall	not deploy SPB booms or fire SPB actuators without the SPB and Main power ON.		derived	EFW-67	EFW-122, EFW=117, RBSP_EFW_LVPS_001	T	CPT	
EFW-100	EFW AXB Deployment Enable	The EFW IDPU	shall	not deploy AXB booms or fire AXB actuators without the AXB and Main power ON.		derived	EFW-68	EFW-122, EFW=117, RBSP_EFW_LVPS_001	T	CPT	
				3.11 Redundancy description							
EFW-101	EFW Boom Pair Redundancy	The EFW IDPU	shall	have separate supplies for each preamp boom axis		derived	EFW-55	RBSP_EFW_LVPS_001	T	Functional	
EFW-102	EFW Safing by subsystem	The EFW IDPU	shall	continue to provide EMFISIS with E-Field signals on failure of DCB or DFB		derived	EFW-36	RBSP_EFW_LVPS_001	T	Functional	
				3.12 Mass allocation							
EFW-103	EFW Total Mass	Each EFW Instrument	shall	The EFW shall not exceed the total allocated mass budget of 31.62kg (or as allocated in RBSP System Mass Budget).		derived	EFW-23	RBSP_EFW_TE_001	T	Mass Properties	
EFW-104	EFW IDPU Mass	The EFW IDPU	shall	not exceed 9.73kg		derived	EFW-23	RBSP_EFW_TE_001	T	Mass Properties	
EFW-105	EFW SPB Mass	The EFW SPB	shall	not exceed 2.43 kg		derived	EFW-23	RBSP_EFW_SPB_001	T	Mass Properties	
EFW-106	EFW AXB Mass	The EFW AXB	shall	not exceed 3.40 kg		derived	EFW-23	RBSP_EFW_AXB_001	T	Mass Properties	
EFW-107	EFW AXB Tube Mass	The EFW AXB Tube	shall	not exceed 1.29 kg		derived	EFW-23	RBSP_EFW_AXB_001	T	Mass Properties	
EFW-108	EFW Harness Mass	The EFW Harness	shall	not exceed 4.06kg		derived	EFW-23	RBSP_EFW_SYS_200	T	Mass Properties	
				3.13 Summary of software requirements and Interfaces							
EFW-109	EFW FSW Program Execution	The EFW FSW	shall	provide the capability for uploading programs and running them in the instrument;	EXEC	derived	EFW-29	EFW-115, RBSP_EFW_FSW_002	T	FSW Test	
EFW-110	EFW FSW Timing	The EFW FSW	shall	provide a timing module which will perform scheduled activities under interrupt processing	BKG	derived	EFW-33, EFW-85	RBSP_EFW_FSW_002	T	FSW Test	
EFW-111	EFW FSW Commands	The EFW FSW	shall	provide a command module which injects command strings and executes them	CMD	derived	EFW-81, EFW-86	RBSP_EFW_FSW_002	T	FSW Test	
EFW-112	EFW FSW Telemetry	The EFW FSW	shall	provide a telemetry module which provides a continuous telemetry stream to the spacecraft	TM	derived	EFW-82	RBSP_EFW_FSW_002	T	FSW Test	
EFW-113	EFW FSW Housekeeping	The EFW FSW	shall	provide a housekeeping sampling routine which measures analog voltages, temperatures, etc and provides engineering packets to telemetry.	HSK	derived	EFW-205	RBSP_EFW_FSW_002	T	FSW Test	
EFW-114	EFW FSW Loader	The EFW FSW	shall	provide a loader module which writes RAM or EEPROM and can dump out the contents of memory.	LD	derived	EFW-29	EFW-123, RBSP_EFW_FSW_002	T	FSW Test	
EFW-115	EFW FSW Utilities	The EFW FSW	shall	provide math utilities as required by other modules	UTIL	derived	EFW-109-EFW-130	RBSP_EFW_FSW_002	T	FSW Test	
EFW-116	EFW FSW Input/Output	The EFW FSW	shall	provide a structured input/output module which communicates with IDPU hardware according to specification.	IO	derived	EFW-23, RBSP_EFW_DCB_001, RBSP_EFW_DCB_003	RBSP_EFW_FSW_002	T	FSW Test	
EFW-117	EFW FSW Power Control	The EFW FSW	shall	provide a power module which controls the EFW deployment switches	PWR	derived	EFW-99, EFW-100	RBSP_EFW_FSW_002	T	FSW Test	
EFW-118	EFW FSW Recorder Control	The EFW FSW	shall	provide a Solid State Recorder module store and retrieve all science data	SSR	derived	EFW-24, EFW-206, EFW-60	RBSP_EFW_FSW_002	T	FSW Test	
EFW-119	EFW FSW Attitude	The EFW FSW	shall	provide a module to determine the roll phase of the spacecraft in order to collect EFW and MAG Spin Fit samples at the right phase angle.	ACS	derived	EFW-11, EFW-10, EFW-9, EFW-203	RBSP_EFW_FSW_002	T	FSW Test	
EFW-120	EFW FSW E-Field Sampling	The EFW FSW	shall	provide a module to operate the BEB and DFB in order to bias the sensors and read the voltages.	EFI	derived	EFW-57, EFW-58	RBSP_EFW_FSW_002	T	FSW Test	

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EFW-121	EFW FSW B-Field Sampling	The EFW FSW	shall	provide a module to collect MAG data	DFB	derived	EFW-35, EFW-207	RBSP_EFW_FSW_002	T	FSW Test	
EFW-122	EFW FSW Deployment	The EFW FSW	shall	provide a boom deployment module	DEP	derived	EFW-53, EFW-54, EFW-99, EFW-100	RBSP_EFW_FSW_002	T	FSW Test	
EFW-123	EFW FSW EEPROM Loader	The EFW FSW	shall	provide an EEPROM loader module	EFP	derived	EFW-114, EFW-123	RBSP_EFW_FSW_002	T	FSW Test	
EFW-124	EFW FSW Fit Control	The EFW FSW	shall	provide a module to collect EFW and MAG samples, perform Spin Fits and generate packets	FIT	derived	EFW-213	EFW-125, EFW-126, EFW-127, EFW-128, RBSP_EFW_FSW_002	T	FSW Test	
EFW-125	EFW FSW Spin Fitter	The EFW FSW	shall	provide a Sine Wave Least Square Fitter	SPIN	derived	EFW-124	RBSP_EFW_FSW_002	T	FSW Test	
EFW-126	EFW FSW Matrix Solving	The EFW FSW	shall	provide a floating point matrix solver	MATRIX	derived	EFW-124	RBSP_EFW_FSW_002	T	FSW Test	
EFW-127	EFW FSW Trigonometrics	The EFW FSW	shall	provide a trigonometric package	TRIG	derived	EFW-124	RBSP_EFW_FSW_002	T	FSW Test	
EFW-128	EFW FSW Floating Point	The EFW FSW	shall	provide a high-speed floating point package	FFP	derived	EFW-124	RBSP_EFW_FSW_002	T	FSW Test	
EFW-129	EFW FSW Compression	The EFW FSW	shall	provide a compression module	CMP	derived	EFW-84	RBSP_EFW_FSW_002	T	FSW Test	
EFW-130	EFW FSW Data Analysis	The EFW FSW	shall	provide scientific analyses, space weather, burst event identification and data generation.	SCI	derived	EFW-13, EFW-32, EFW-37, EFW-204, EFW-213	RBSP_EFW_FSW_002	T	FSW Test	
EFW-214	EFW Provide EMFISIS with Axial Shadowing Status	The EFW FSW	shall	provide in "shared data" two bits of status which are commanded from the ground: when AXB is continuously in sun, intermittently in shadow, and continuously in shadow.	CMD, SCI	derived	EFW-208	RBSP_EFW_FSW_002	T	FSW Test	
EFW-217	EFW FSW DC MAG Data	The EFW FSW	shall	when commanded to do so, packetize and telemeter 64Hz MAG data in an unique APID	DFB, TM	derived	EFW-216	RBSP_EFW_FSW_002	T	FSW Test	
				3.14 Power-on reset state							
EFW-131	EFW Initial Power On/Reset State	The EFW IDPU	shall	power up in a nominal condition for measuring E-Fields without processor intervention.		derived	EFW-36, EFW-93	RBSP_EFW_BPL_001	T	CPT	
				3.15 Contamination control requirements							
EFW-132	Instrument Compliance with Contamination Control Plan	Each EFW Instrument	shall	comply with the requirements and constraints imposed by the RBSP Observatory Contamination Control Plan, APL document no. 7417-9011		Inherited	IPLD - 220	RBSP_EFW_PA_005	I, T	Inspections, Bakeout	
EFW-133	Instrument Compliance with EM Environment Control Plan	Each EFW Instrument	shall	comply with the requirements and constraints imposed by the RBSP Electromagnetic Environment Control Plan, APL document no. 7417-9018.		Inherited	IPLD - 218	RBSP_EFW_SPB_001, RBSP_EFW_AXB_001, RBSP_EFW_BPL_001	T	EMC Tests	
EFW-135	EFW ESC Control	Each EFW Instrument	shall	comply with the UCB Electrostatic Cleanliness (ESC) Plan		derived	EFW-23	RBSP_EFW_SPB_001, RBSP_EFW_AXB_001, RBSP_EFW_SYS_015	T	ESC tests	
EFW-136	Instrument Compliance with Environmental Design and Test Requirements Document	Each EFW Instrument	shall	comply with the requirements and constraints imposed by the RBSP Environmental Design and Test Requirements Document, APL document no. 7417-9019.		Inherited	IPLD - 257, IPLD - 179, IPLD - 118, IPLD - 199, IPLD - 219, IPLD - 298, EFW-6, EFW-7, EFW-8, EFW-201, EFW-202	RBSP_EFW_SPB_001, RBSP_EFW_AXB_001, RBSP_EFW_IDPU_001, RBSP_EFW_TE_001	T	Various per RBSP_EFW_TE_001	
EFW-137	EFW Quality Assurance	Each EFW Instrument	shall	comply with the RBSP Performance Assurance Implementation Plan, as modified by the Compliance Matrix		Contract	EFW-1	RBSP_EFW_SPB_001, RBSP_EFW_AXB_001, RBSP_EFW_IDPU_001, RBSP_EFW_PA_001	I	per RBSP_EFW_PA_001	
EFW-211	Instrument Range Safety	Each EFW Instrument	shall	comply with all relevant requirements and constraints imposed by AFSPC 91-710, Range Safety User Requirements Manual.		Inherited	IPLD - 577	RBSP_EFW_SPB_001, RBSP_EFW_AXB_001, RBSP_EFW_IDPU_001, RBSP_EFW_PA_001	I	per RBSP_EFW_PA_001	
EFW-212	Observer Naming Convention	Each EFW Instrument	shall	use an observatory naming convention, as follows: -- Observatory A is the top observatory in the stacked configuration for launch; -- Observatory B is the bottom observatory in the stacked configuration for launch.		inherited	IPLD - 555		I		
				3.16 Special accommodations							
				<i>not applicable</i>							
				3.17 Personnel safety requirements							
				<i>not applicable</i>							
				3.18 System safety requirements							
				<i>not applicable</i>							

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				3.19 Verification Matrix							
				<i>included in columns J, K</i>							
				4 Functional Description							
				4.1 Description and characteristics of the major functional elements							
				4.2 Functional block diagram							
				4.3 A state diagram indicating the subsystem's response to external stimuli, commands, etc.							
				4.4 Operational sequences, flow diagrams, layout diagrams, and other tabular information may be included as required.							