SP-OXF-224

HIRDLS

HIGH RESOLUTION DYNAMICS LIMB SOUNDER

Originator: C. L. Hepplewhite. Date: 13 June 2000

Subject/Title: EMC Test Procedures for the IFC.

Contents/Description/Summary

Procedures for testing for the electromagnetic susceptibility and emissions of the IFC.

NOTE: Unless otherwise stated the IFC means the Electronic Unit (BEU), the cable (U25) and the dummy black body (DBB).

Key Words: In-flight calibrator, IFC EMC/EMI Test Procedure.

Purpose: (20 chars max)
To describe the tests required to verify the EMC of the IFC

Reviewed By: Approved By:
Date (yy-mm-dd)

OXFORD UNIVERSITY
DEPARTMENT OF PHYSICS
ATMOSPHERIC, OCEANIC AND PLANETARY PHYSICS
PARKS ROAD, OXFORD. OX1 3PU

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Contents:

1 GENERAL

1.1 Purpose Scope of this document

This document defines the procedures for the formal verification of the IFC in respect of its electromagnetic susceptibility and emissions appropriate for the HIRDLS instrument.

A copy of this document may be appended to the test results and form the test report document.

The tests included in this document are specific to the IFC, which interfaces electrically to the IPU. The IPU provides power to the IFC via power converter modules with filters; the IFC does not include any power supply conditioning or filtering. Issues that may be of concern are therefore conducted susceptibility on the power lines from the IPU (pickup in cables or generated by the IPU or shared equipment).

The IFC uses low-level analogue signals at 125 Hz; therefore susceptibility to pickup at this frequency (or harmonics) may be of interest. The IFC contains some very low power logic circuits, but no high-speed clocks. The only source of RF emissions should be from the transients of the logic gates during the rise and fall transitions.

The summary of the scope of tests is therefore:
MIL-STD-462C method CS01 adjusted to the levels of the expected IPU generated noise, with a close look around 125 Hz.
MIL-STD-462C method CS06
MIL-STD-462C method CE01
MIL-STD-462C method CE03
MIL-STD-462C method RS01 for pick up in cable U25 with a close look at 125 Hz.
MIL-STD-462C method RE04/02

1.2 Applicable Documents & References

TP-OXF-179	IFC Test Plan
SP-HIR-044	IFC Subsystem Specification Document
GSFC-422-11-12-01	EOS GIRD
PA-OXF-152 (Oxford)	Performance Assurance Implementation Plan
SP-HIR-267	IFC-IPU Interface Control Document
MIL-STD-461C	Requirements for the Control of Electromagnetic Interference Emissions and Susceptibility
MIL-STD-462 Notice 1	Measurement of Electromagnetic Interference Characteristics

1.3 Acronyms & Abbreviations used in this document

2 EQUIPMENT & FACILITIES

2.1 Facility Environment & Precautions

The following conditions during the tests or at the facility will be met:

- Cleanliness - the IFC shall be kept free of particulate and molecular contamination. The methods as described in the contamination control plan will be applied.
- ESD - Antistatic measures will be in place during handing.
- Appropriate measures will be taken in the preparation of the IFC and test equipment. This will include checking readiness, safe-to-mate, monitoring and logging events.

2.2 Equipment

The following items will be required:

- PFM IFC BEU
- PFM U25 harness.
- Dummy BB.
- IPU simulator, including DC power supplies, data and control interface in accordance with the ICD.
- Test cabling.
- EMC stimuli and measuring equipment as supplied by the test house.

2.3 Test Configuration

The testing of the IFC will be done without the use of a LISN. The test configurations are described in the following subsections.

3 PROCEDURES

3.1 Conducted Susceptibility - power leads 30 Hz to 50 kHz

Conducted Susceptibility testing will be performed at the HIRDLS instrument level EMC Test in accordance with CS01 and CS06 with a special testing at 125 Hz.

The test method will be in accordance with MIL-STD-462C.

A special test will be performed around the fundamental frequency of operation of the IFC thermometry bridge, viz, 62.5, 125, 250 & 500 (TBV) Hz. the levels will be the same as above; the bandwidth will be f0/25 (TBV) where f0 is the target frequency. This special test will be accomplished by dwelling the source in this frequency range for sufficient time to ensure that no significant disturbance is seen in the operation of the IFC

The IFC shall be polled by the IPU in accordance with the command and telemetry definitions.

3.2 Conducted emissions - Power leads 30 Hz to 50 MHz (CE01/CE03).

Performed in accordance with CE01 and CE03 of MIL-STD-462 except that no broadband emission measurement is required.

During these tests, the IFC shall be powered and operated in its mission mode.

3.3 Radiated Susceptibility - magnetic field 30 Hz to 200 KHz (RS01)

- electric field 14 KHz to 18 GHz (RS03).

RS01 will be performed in accordance of MIL-STD-462 including a special test.

The special test will be performed around the fundamental frequency of operation of the IFC thermometry bridge, viz, 62.5, 125, 250 & 500 (TBV) Hz. the levels will be the same as above; the bandwidth will be f0/25 (TBV) where f0 is the target frequency. This special test will be accomplished by dwelling the source in the frequency range of interest to determine whether any significant disturbance is seen in the output of the EUT.

RS03 will be performed in accordance of MIL-STD-462 using the following field strengths:

- 2V/m between 14 KHz and 2 GHz
- 10V/m between 2 GHz and 18 GHz except at the following spacecraft transmitter frequencies:
    - 20V/m at 2.2875 GHz ± 2 MHz
    - 20V/m at 8.16 GHz ± 100 MHz

The IFC shall be polled by the IPU in accordance with the command and telemetry definitions.

3.4 Radiated Emissions - magnetic field 30 Hz to 18 GHz.

RE01 will be performed in accordance with of MIL-STD-462 except that no broadband emission measurement is required. Worst face. No broad-band measurement.

14 kHz to 1 GHz, notch at 2 GHz & 8.16 GHz.

RE04 of MIL-STD-462 will be performed at the instrument level EMI/EMC tests.

During these tests, the IFC shall be powered and operated in its mission mode.

4 - Reporting

The testing facility will provide a final report of the test results and documentation within 5 business days.