Spacecraft Interface Specification

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EIS-sys-des-scifspec-0.1

1.0 Introduction

This document is a set of suggestions for forming the EIS interface to the spacecraft. It covers some aspects of the electrical interface but makes no attempt yet to look at thermal or mechanical details.

It is presented as an aid to discussion about and evolution of a functional interface.

2.0 Data Uploads to EIS

2.1 Use USB standard?

2.2 Connector

2.3 Electrical Characteristics

Differential 5V signals

Serial data and frame with embedded clock

Impedance

2.4 Data Structure

Variable length packets (0 -> 1024 bytes?)

2.5 Timings and Protocols

2.6 Virtual Channels

2.6.1 Commands

2.6.2 On board time

2.6.3 Telemetry Frame Synchronisation

2.6.4 Broadcast data sent to all experiments

2.7 Error Protection

Implement as part of operator console to instrument link

3.0 Data Downloads from EIS

(Use same physical connector as the data uploads, and use bi-directional signals?)

3.1 Use USB standard?

3.2 Connector

3.3 Electrical Signals

3.4 Data Structure

3.5 Timings and Protocols

3.6 Virtual Channels

3.6.1 Science data

3.6.2 Engineering Data

3.7 Error Protection

Use spacecraft system

4.0 Power - Main Bus

4.1 Voltage

4.2 Current

4.3 Connector

4.4 Overload Protection

4.5 Isolation

The instrument will be electically isolated with a switched mode power converter.

4.6 Converter Frequency

About 500kHz, synchronisation signal not required.

4.7 EMC

5.0 Power - Keep Alive

5.1 Voltage

12V

5.2 Current

10mA maximum

5.3 Connector

5.4 Overload Protection

5.5 EMC

6.0 High Power Commands

(Pulse commands for driving latching relays directly)

7.0 Systems Powered by the Spacecraft

7.1 Temperature monitors

Driven by spacecraft telemetry system

7.2 Standby Heaters

These heaters are used with the instrument powered off to prevent excessively low temperatures.

8.0 Redundancy

Use full redundancy for each electrical interface with individual switching.

Use separate connectors for prime and redundant interfaces.

9.0 EMC

Overall points to consider.

10.0 Data Structure

10.1 Science Data Packet Structure

Science packet identification
Time tag
Packet count
Packet length
Mirror position
Exposure duration
Automatic exposure control value
Calibration lamp on flag
Number of packets in data set
Packet position in data set
Single image or movie flag
Movie frame number
Movie key frame identification
Science data
Packet checksum

10.2 Packet Grouping

Image sizes may vary from near zero to much greater than the maximum packet size.

If an image plus the header is equal to or less than the maximum packet size, then the packet size is set to efficiently include no more than the image plus header.

If the image plus header is larger than the maximum packet size, then the image is spread over more than one packet as appropriate. Each packet would contain the same header information except for an incrementing ‘packet position in data set’ value.