Vaibhav Nandha

This document explains the function of the interposer, its schematic level design, its board level design, and its functional testing

Interposer

Revision 1.0.0



Table of Contents

[1 Introduction 3](#_Toc19655435)

[1.1 Function 3](#_Toc19655436)

[1.2 Requirements 3](#_Toc19655437)

[2 Detailed Description 4](#_Toc19655438)

[2.1 Functional Block Diagram 4](#_Toc19655439)

[2.1.1 ADCS Microcontroller 4](#_Toc19655440)

[2.1.2 EEPROM 4](#_Toc19655441)

[2.1.3 H-Bridges 4](#_Toc19655442)

[2.1.4 Magnetorquer Coils 4](#_Toc19655443)

[2.1.5 IMUs 4](#_Toc19655444)

[2.1.6 ADCs 4](#_Toc19655445)

[2.1.7 GPS 5](#_Toc19655446)

[2.2 Schematic 5](#_Toc19655447)

[2.2.1 Power Rails 5](#_Toc19655448)

[2.2.2 ADCS Microcontroller 5](#_Toc19655449)

[2.2.3 EEPROM 5](#_Toc19655450)

[2.2.4 H-bridges 5](#_Toc19655451)

[2.2.5 IMUs 5](#_Toc19655452)

[2.2.6 ADCS ADCs 5](#_Toc19655453)

[2.2.7 GPS 6](#_Toc19655454)

[2.2.8 Power & ADCS Jacks 6](#_Toc19655455)

[2.2.9 I2C Bus 6](#_Toc19655456)

[2.3 Board 7](#_Toc19655457)

[2.3.1 Layout Constraints 7](#_Toc19655458)

[3 Testing 8](#_Toc19655459)

[3.1 Before First Power-On Check 8](#_Toc19655460)

[3.1.1 Test Instructions 8](#_Toc19655461)

[3.1.2 Test Data 8](#_Toc19655462)

[3.1.3 Test Notes 9](#_Toc19655463)

[3.2 Command Response 9](#_Toc19655464)

[3.2.1 Test Instructions 9](#_Toc19655465)

[3.2.2 Test Data 9](#_Toc19655466)

[3.2.3 Test Notes 9](#_Toc19655467)

[3.3 Orientation Determination 9](#_Toc19655468)

[3.3.1 Test Instructions 9](#_Toc19655469)

[3.3.2 Test Data 9](#_Toc19655470)

[3.3.3 Test Notes 9](#_Toc19655471)

[3.4 Location Determination 9](#_Toc19655472)

[3.4.1 Test Instructions 9](#_Toc19655473)

[3.4.2 Test Data 10](#_Toc19655474)

[3.4.3 Test Notes 10](#_Toc19655475)

[3.5 Storage 10](#_Toc19655476)

[3.5.1 Test Instructions 10](#_Toc19655477)

[3.5.2 Test Data 10](#_Toc19655478)

[3.5.3 Test Notes 10](#_Toc19655479)

[3.6 Current Monitoring 10](#_Toc19655480)

[3.6.1 Test Instructions 10](#_Toc19655481)

[3.6.2 Test Data 10](#_Toc19655482)

[3.6.3 Test Notes 10](#_Toc19655483)

[3.7 Temperature Monitoring 10](#_Toc19655484)

[3.7.1 Test Instructions 11](#_Toc19655485)

[3.7.2 Test Data 11](#_Toc19655486)

[3.7.3 Test Notes 11](#_Toc19655487)

[3.8 Light Monitoring 11](#_Toc19655488)

[3.8.1 Test Instructions 11](#_Toc19655489)

[3.8.2 Test Data 11](#_Toc19655490)

[3.8.3 Test Notes 12](#_Toc19655491)

[3.9 ADCS Programming 12](#_Toc19655492)

[3.9.1 Test Instructions 12](#_Toc19655493)

[3.9.2 Test Data 12](#_Toc19655494)

[3.9.3 Test Notes 12](#_Toc19655495)

# Introduction

This document explains how the Interposer will fulfill the following Function and conform to the following Requirements.

## Function

The Interposer is responsible for the following:

* Connect the Backplane to the Germination Chamber

## Requirements

The Interposer does not have any direct requirements it needs to meet but rather, it enables the requirements the Germination Chamber from payload to be met and these can be found on [GitHub](https://github.com/CougsInSpace/CougSat1-Readme/blob/master/CougSat1-Requirements.pdf).

# Detailed Description

This section references the Interposer Board schematic. Page numbers will be listed and may have coordinates listed (number and letter combination found around the frame).

## Functional Block Diagram

The block diagram can be found on the first page of the schematic.

### Power Rails

Page 2 of the schematic illustrates the power rails the Avionics Board draws from. The ADCS subsystem draws power from 3.3V-2 and VBATT-5.

## Board

Common test instructions can be found on the [wiki](http://cougs.space/wiki).

## Before First Power-On Check

**Configuration:**

### Test Instructions

### Test Data

| Node | Resistance |  | Node | Resistance |
| --- | --- | --- | --- | --- |
| 3.3V-2 |  |  | ADCS\_I2C0\_SDA |  |
| VBATT-5 |  |  | ADCS\_I2C1\_SCL |  |
| AVDD-0 |  |  | ADCS\_I2C1\_SDA |  |
| AVREF-0 |  |  | GPS\_TX |  |
| ADCS\_BUS\_SCL |  |  | GPS\_RX |  |
| ADCS\_BUS\_SDA |  |  | ADCS\_JTDI |  |
| ADCS\_I2C0\_SCL |  |  | ADCS\_JTMS |  |
| ADCS\_JTCK |  |  | ADCS\_JTDO |  |

### Test Notes

## Command Response

**Configuration:**

This test evaluates the ability to respond to a command from the IHU.

### Test Instructions

Send a signal on the BUS\_I2C bus, use ADCS microcontroller to respond.

### Test Data

| Check if data is sent by ADCS microcontroller when requested on BUS\_I2C | | | |
| --- | --- | --- | --- |
| Device | Signal Received | Passing Criteria | Pass / Fail |
| ADCS microcontroller |  | *Data Received* |  |

### Test Notes

## Orientation Determination

**Configuration:**

This test evaluates the functionality of the orientation determination system.

### Test Instructions

Rotate IMUs and record changes in Euler angles and angular rate. Move the IMUs and record changes in acceleration. Lift and lower IMUs and record changes in gravity vector.

### Test Data

### Test Notes

## Location Determination

**Configuration:**

This test evaluates the functionality of the location determination system.

### Test Instructions

Move GPS around town, record data, compare to actual coordinates.

### Test Data

| Check if data from GPS is within acceptable error of actual | | | | | |
| --- | --- | --- | --- | --- | --- |
| Location Tested | Coordinates Measured | Coordinates Actual | Error | Passing Criteria | Pass / Fail |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

### Test Notes

## Storage

**Configuration:**

This test evaluates the functionality of accessing storage.

### Test Instructions

Write test package to both EEPROM and read back both test packages.

### Test Data

| Check if package sent is received when read | | | |
| --- | --- | --- | --- |
| Device | Package Received | Passing Criteria | Pass / Fail |
| EEPROM0 |  | *Package Received* |  |
| EEPROM1 |  | *Package Received* |  |

### Test Notes

## Current Monitoring

**Configuration:**

This test evaluates the functionality of the current monitoring system.

### Test Instructions

Supply a varying current using the ADCS Microcontroller and the H-bridge. Read resultant current through ADC.

### Test Data

| Check if current read by the ADC is the same as being supplied | | | | |
| --- | --- | --- | --- | --- |
| Current Supplied | Current Read | Error | Passing Criteria | Pass / Fail |
| 60 mA |  |  |  |  |
| 120 mA |  |  |  |  |
| 180 mA |  |  |  |  |

### Test Notes