



## Rapporti Tecnici INAF INAF Technical Reports

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# BC-SIM-TR-030

## EGSE ICO#4 Report

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## 1 Introduction

### 1.1 Scope

In this document we will describe all the tests performed during the fourth Instrument Checkout (ICO#04) for the Spectrometers and Imagers for MPO BepiColombo Integrated Observatory SYStem (SIMBIO-SYS). The checkout session was performed between December 13<sup>th</sup> and 14<sup>th</sup> 2020. For each test it will be presented the pipeline report and, where necessary, a discussion on the detected anomalies.

### 1.2 Reference Document

- [RD.1] BC-SIM-PL-006-Checkout\_04\_Test\_Summary\_Issue\_1 (DOI: <https://doi.org/10.20371/INAF/TechRep/204>)
- [RD.2] BC-SIM-TN-003 - Reports and Notes Layout and Flow – Version 2 (DOI: <https://doi.org/10.20371/INAF/TechRep/179>)
- [RD.3] BC-SIM-TR-XXX Technical Report - Software User Manual, in preparation;
- [RD.4] BC-SIM-GAF-IC-002\_rev12 - SIMBIO-SYS Software Interface Control Document
- [RD.5] BepiColombo FOP data package 3.1
- [RD.6] BC-ASD-SP-00176\_1\_4 SIMBIO URD
- [RD.7] BC-SIM-GAF-MA-002 10 001 - SIMBIO-SYS User Manual;
- [RD.8] BC-SIM-TN-006\_-\_simClean\_-\_User\_Manual (DOI: <https://doi.org/10.20371/INAF/TechRep/103>);
- [RD.9] BC-SIM-TR-023\_-\_Anomalies\_in\_the\_Packet\_sorting (DOI: <https://doi.org/10.20371/INAF/TechRep/176>);
- [RD.10] BC-SIM-TN-007\_-\_simResort\_-\_User\_Manual (DOI: <https://doi.org/10.20371/INAF/TechRep/184>);

### 1.3 Attached Document

- [AT.1] ICO04\_Events\_list 
- [AT.2] ICO04\_Command\_Stack 

### 1.4 Acronyms

|                   |                                                                             |
|-------------------|-----------------------------------------------------------------------------|
| <b>APID</b>       | Application Process Identifier                                              |
| <b>CSV</b>        | Comma Separated Values                                                      |
| <b>FPA</b>        | Focal Plane Assembly                                                        |
| <b>HK</b>         | Housekeeping                                                                |
| <b>HRIC</b>       | High spatial Resolution Imaging Channel                                     |
| <b>ME</b>         | Main Electronics                                                            |
| <b>NECP</b>       | Near Earth Commissioning Phase                                              |
| <b>dNECP</b>      | delta Near Earth Commissioning Phase                                        |
| <b>PDS</b>        | Planetary Data System                                                       |
| <b>PE</b>         | Proximity Electronics                                                       |
| <b>PNG</b>        | Portable Network Graphics                                                   |
| <b>PSC</b>        | Packet Sequence Control                                                     |
| <b>SIMBIO-SYS</b> | Spectrometers and Imagers for MPO BepiColombo Integrated Observatory SYStem |

|                                                                                   |          |                                                                          |          |   |
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|             |                                            |
|-------------|--------------------------------------------|
| <b>SSC</b>  | Source Sequence Count                      |
| <b>STC</b>  | STereo imaging Channel                     |
| <b>TC</b>   | Telecommand                                |
| <b>TM</b>   | Telemetry                                  |
| <b>VIHI</b> | Visible and Hyper-spectral Imaging channel |
| <b>XML</b>  | eXtensible Markup Language                 |

## 1.5 Document Format and Repository

This document is compliant with the SIMBIO-SYS Report and Note Layout and Flow [RD.2] and will be archived both on the INAF Open Access repository and the SIMBIO-SYS team Archive.

## 1.6 Test Plan

The ICO#4 test was planned to be executed on two days based on the tests described in [RD.1].

| ID | Test Description      | Start                   | Stop                    |
|----|-----------------------|-------------------------|-------------------------|
| 1  | HRIC Functional Test  | 2020-12-14T21:00:00.00Z | 2020-12-14T21:28:12.00Z |
| 2  | HRIC Performance Test | 2020-12-14T21:28:15.00Z | 2020-12-14T21:36:00.00Z |
| 3  | STC Functional Test   | 2020-12-14T21:42:00.00Z | 2020-12-14T22:19:00.00Z |
| 4  | STC Performance Test  | 2020-12-14T22:20:00.00Z | 2020-12-14T22:50:00.00Z |
| 5  | VIHI Performance Test | 2020-12-14T22:52:00.00Z | 2020-12-14T23:14:00.00Z |
| 6  | Interference Test     | 2020-12-14T23:20:00.00Z | 2020-12-15T02:42:00.00Z |

Table 1-1: Test Schedule.

## 1.7 Report Schema

For each test, the report will be formed by four sections created by an automatic procedure:

- a summary of all the data produced in that test;
- a report with the events and telecommand acknowledgments;
- a report of the PE events;
- a check on the lost packets.

The report includes even two sections with a comparison between the commanded TCs and the data results. Eventual problems or discrepancies will be discussed.

The complete Sections list defined for each test is shown in Table 1-2 and described in the subsections below.

| Session # | Session Name   |
|-----------|----------------|
| 1         | Telecommands   |
| 2         | Data Procedure |
| 3         | Events Check   |

|                                                                                   |          |                                                                          |          |   |
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|   |                   |
|---|-------------------|
| 4 | PE Event          |
| 5 | Lost packets      |
| 6 | Telecommand Check |
| 7 | Discussion        |

Table 1-2: Section structure defined for each Test.

### 1.7.1 Telecommands

In this Section, the telecommands used for the test will be reported. For each telecommand an analysis and an evaluation of the produced data will be performed.

### 1.7.2 Data Produced

In this Section, a table with the data produced will be reported. The output files consist into two different types of CSVs (one for the diagnostic housekeeping and one with all the housekeeping parameters related to a single image) and a file containing the image in binary format. All data are compliant to the PDS4 format, which means that they include an XML file with all the parameters of each acquisition, both considering as source the instrument or the spacecraft. A complete description of the file structure and the folder tree is reported in [RD.3]. For each image it is present an additional file in PNG format as a quick preview.

In the summary schema it will be reported the number and the total size of the following file types:

- Diagnostic HKs
- Acquisition HKs;
- Images

### 1.7.3 Event Checks

In the event checks section, it will be reported:

- all the negative telecommand acknowledgments,
- the rejected telecommands, TM(1,2),
- the failed telecommands, TM(1,8).

For each negative event (rejected or failed telecommand), all the information about the telecommand, mnemonic name, description, time of execution, and all associated parameters are reported. For each event it is reported a list for the low severity (TM(5,2)), medium severity (TM(5,3)) and high severity (TM(5,4)) errors with a description of the event.

The complete list of events and telecommand acknowledgments is reported into the Event file stored in each test folder. All the information relative to an event or a telecommand acknowledgments are from [RD.4].

|                                                                                   |          |                                                                          |          |   |
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#### 1.7.4 PE Events

From an automatic analysis of the diagnostic HK, a list of the negative event alerts, sent by the PE, is created. Each alert is reported with the associated decimal ID and with its complete description. All the information relative to a PE event refers to [RD.4].

#### 1.7.5 Lost Packets

The automatic check on the lost packets is performed using the Packet Sequence Control (PSC) number (see [RD.4]). The PSC is a serial number associated with the TM packets and follows a different enumeration for different APID. A list of the used APID is reported in the following table:

| APID | Description             |
|------|-------------------------|
| 801  | TC Verification         |
| 804  | HK Reports              |
| 807  | Event Reports           |
| 828  | HRIC Data High Priority |
| 844  | STC Data High Priority  |
| 860  | VIHI Data High Priority |
| 870  | HRIC Data Low Priority  |
| 892  | STC Data Low Priority   |
| 908  | VIHI Data Low Priority  |

Table 1-3:List of the APIDs associated to each dataflow.

The PSC number is stored in 14 bits. This means that the maximum value is 16383. After that, the counter restart from 0.

**NB:** A manual check-in is required in order to evaluate if some packets are lost at the beginning and the end of the acquisition. The automatic check detects only holes in the PSC sequence.

#### 1.7.6 Telecommand Check

In this Section it is checked that the ME and the PE have executed all received telecommand.

#### 1.7.7 Test Results

In this Section we will discuss the results, the discrepancies, and the errors if they are present.

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## 2 Preprocessing

The TM file downloaded from the EDDS server has been preprocessed using the simClean tools [RD.8] to remove the duplicate HK and the duplicated science packets due to the reception of the same one by different antennas. In a preliminary analysis of the data was found the issue described in [RD.9], and the data was reprocessed using the module simResort described in [RD.10].

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### 3 ICO#4 Results Analysis

#### 3.1 General consideration

With reference to Table 3-1, we report the following satisfaction table:

| ID | Test Name             | Test result |
|----|-----------------------|-------------|
| 01 | HRIC Functional Test  |             |
| 02 | HRIC Performance Test |             |
| 03 | STC Functional Test   |             |
| 04 | STC Performance Test  |             |
| 05 | VIHI Performance Test |             |
| 06 | Interference Test     |             |

Table 3-1: Satisfaction table.

for which we use the following color keys in the last column:

**Red:** test failed.

**Yellow:** test partially passed.

**Green:** Test passed.

#### 3.2 HRIC Functional Test

##### 3.2.1 Test Scope

The aim of this test is:

- to check the status and the functionality of the following electric components of the channel:
  - PE;
  - Detector;
  - TEC;
- to modify some configuration parameters;
- to perform some science acquisitions.

##### 3.2.2 Test Execution

**Time Frame:** 2020-12-14T21:00:00.00Z ÷ 2020-12-14T21:28:12.00Z

In Table 3-2 is reported the initial status of the instrument:

| INSTRUMENT INITIAL STATUS |      |     |      |
|---------------------------|------|-----|------|
| ME                        | HRIC | STC | VIHI |
| OFF                       | OFF  | OFF | OFF  |

Table 3-2: Instrument status before the HRIC Functional Test.

|                                                                                   |          |                                                                          |          |   |
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### 3.2.3 Science

Concerning the Science TCs, the following three science sessions have been performed.

| ID | SSC | Duration  | Mode       | Repetition Time [s] | Expected Acquisition | Expected Frame |
|----|-----|-----------|------------|---------------------|----------------------|----------------|
| 1  | 213 | 6 minutes | Continuous | 2.0                 | 180                  | 180            |
| 1  | --- | 6 minutes | ---        | ---                 | 180                  | 180            |

Table 3-3: Description of the TC used during HRIC Functional Test.

Table 3-3 describes the duration and the number of images and frames expected for each TCs commanded during the Functional Test.

### 3.2.4 Data Produced

#### 3.2.4.1 Data Volume

|                     | #Packets | DV      |
|---------------------|----------|---------|
| HK                  | 1334     | 61.1 kB |
| H RIC low priority  | 905      | 3.0 MB  |
| H RIC high priority | 0        | 0 Bytes |

Table 3-4: DV produced during the H RIC Functional test.

#### 3.2.4.2 Output Files

| Bundle Miscellaneous |     |      |          |
|----------------------|-----|------|----------|
| File                 | CSV |      |          |
|                      |     | #    | 2        |
|                      |     | Size | 576.8 kB |

| Bundle Raw H RIC |     |      |          |
|------------------|-----|------|----------|
| File             | CSV |      |          |
|                  |     | #    | 181      |
|                  |     | Size | 164.3 kB |
|                  | DAT |      |          |
|                  |     | #    | 181      |
|                  |     | Size | 95.1 MB  |

Table 3-5: Data produced during the H RIC Functional Test.

### 3.2.5 ME Events

None

### 3.2.6 PE Events

None

### 3.2.7 Lost Packets

| Type of Packets          | #    | Note               |
|--------------------------|------|--------------------|
| Telecommand Verification | 44   | [Lost Packet(s) 0] |
| HK Report                | 1334 | [Lost Packet(s) 0] |
| Event/Anomaly Report     | 6    | [Lost Packet(s) 0] |
| H RIC low Priority       | 905  | [Lost Packet(s) 0] |

|                                                                                   |          |                                                                          |          |   |
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|                    |   |                    |
|--------------------|---|--------------------|
| HRIC high Priority | 0 | [Lost Packet(s) 0] |
|--------------------|---|--------------------|

Table 3-6: Packets and lost packet report for the HRIC Functional Test.

### 3.2.8 TC Check

| Telecommand Status | #  |
|--------------------|----|
| TC Accepted        | 22 |
| TC Executed        | 22 |
| TC Rejected        | 0  |
| TC Failed          | 0  |

Table 3-7: TC report for the HRIC Functional Test.

### 3.2.9 Discussion

Produced output is in line with what expected.

The details are reported in Table 3-8 with information from section 3.2.3 and 3.2.4.

|                  | Commanded | From TM |
|------------------|-----------|---------|
| Images           | 181       | 181     |
| Science Sessions | 1         | 1       |

Table 3-8: Comparison between data commanded and produced for the HRIC Functional Test.

|                                                                                   |          |                                                                          |          |   |
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### 3.3 HRIC Performance Test

#### 3.3.1 Test Scope

The aim of this test is to perform several acquisitions in dark condition and variable integration times to monitor the DC evolution during the cruise phase.

#### 3.3.2 Test Execution

**Time Frame:** 2020-12-14T21:28:15.000Z ÷ 2020-12-14T21:36:00.000Z

In Table 3-9 is reported the initial status of the instrument:

| INSTRUMENT INITIAL STATUS |      |     |      |
|---------------------------|------|-----|------|
| ME                        | HRIC | STC | VIHI |
| ON                        | ON   | OFF | OFF  |

Table 3-9: Instrument status before the HRIC Performance Test.

#### 3.3.3 Science

Concerning the Science TCs, the following science session has been performed.

| ID | SSC | Duration                       | Mode    | Repetition Time [s] | Expected Acquisition | Expected Frame |
|----|-----|--------------------------------|---------|---------------------|----------------------|----------------|
| 1  | 216 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 2  | 217 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 3  | 218 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 4  | 219 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 5  | 220 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 6  | 221 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 7  | 222 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 8  | 223 | 18 seconds                     | Limited | 2.0                 | 9                    | 9              |
| 9  | 224 | 36 seconds                     | Limited | 4.0                 | 9                    | 9              |
| 9  | --- | <b>1 minute and 57 seconds</b> | ---     | ---                 | <b>81</b>            | <b>81</b>      |

Table 3-10: Description of the TC used during HRIC Performance Test.

| ID | SSC | Duration                       | Mode    | Repetition Time [s] | Expected Acquisition | Expected Frame |
|----|-----|--------------------------------|---------|---------------------|----------------------|----------------|
| 1  | 216 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 2  | 217 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 3  | 218 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 4  | 219 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 5  | 220 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 6  | 221 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 7  | 222 | 9 seconds                      | Limited | 1.0                 | 9                    | 9              |
| 8  | 223 | 18 seconds                     | Limited | 2.0                 | 9                    | 9              |
| 9  | 224 | 36 seconds                     | Limited | 4.0                 | 9                    | 9              |
| 9  | --- | <b>1 minute and 57 seconds</b> | ---     | ---                 | <b>81</b>            | <b>81</b>      |

Table 3-10 describes the duration and the number of images and frames expected for each TCs commanded during the Performance Test.

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 14/28                                                                    |          |   |

### 3.3.4 Data Produced

#### 3.3.4.1 Data Volume

|                    | #Packets | DV       |
|--------------------|----------|----------|
| HK                 | 38       | 1.5 kB   |
| HRIC low priority  | 45446    | 186.2 MB |
| HRIC high priority | 0        | 0 Bytes  |

Table 3-11: DV produced during the HRIC Performance Test.

#### 3.3.4.2 Output Files

| Bundle Miscellaneous |     |      |         |
|----------------------|-----|------|---------|
| File                 | CSV |      |         |
|                      |     | #    | 2       |
|                      |     | Size | 14.9 kB |

| Bundle Raw HRIC |     |      |          |
|-----------------|-----|------|----------|
| File            | CSV |      |          |
|                 |     | #    | 82       |
|                 |     | Size | 74.5 kB  |
|                 | DAT |      |          |
|                 |     | #    | 82       |
|                 |     | Size | 212.9 MB |

Table 3-12: Data produced during the HRIC Performance Test.

### 3.3.5 ME Events

None.

### 3.3.6 PE Events

None.

### 3.3.7 Lost Packets

| Type of Packets          | #     | Note               |
|--------------------------|-------|--------------------|
| Telecommand Verification | 22    | [Lost Packet(s) 0] |
| HK Report                | 38    | [Lost Packet(s) 0] |
| Event/Anomaly Report     | 20    | [Lost Packet(s) 0] |
| HRIC low Priority        | 45446 | [Lost Packet(s) 0] |
| STC low Priority         | 0     | [Lost Packet(s) 0] |
| VIHI low Priority        | 0     | [Lost Packet(s) 0] |
| HRIC high Priority       | 0     | [Lost Packet(s) 0] |
| STC high Priority        | 0     | [Lost Packet(s) 0] |
| VIHI high Priority       | 0     | [Lost Packet(s) 0] |

Table 3-13: Packets and lost packet report for the HRIC Performance Test.

### 3.3.8 TC Check

| Telecommand Status | # |
|--------------------|---|
|--------------------|---|

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 15/28                                                                    |          |   |

|             |    |
|-------------|----|
| TC Accepted | 11 |
| TC Executed | 11 |
| TC Rejected | 0  |
| TC Failed   | 0  |

Table 3-14: TC report for the HRIC Performance Test.

### 3.3.9 Discussion

Produced output is in line with what expected.

The details are reported in Table 3-15 with information from section 3.3.3 and 3.3.4.

|                  | Commanded | From TM |
|------------------|-----------|---------|
| Images           | 81        | 81      |
| Science Sessions | 9         | 9       |

Table 3-15: Comparison between data commanded and produced for the HRIC Performance Test.

|                                                                                   |          |   |                                                                          |   |
|-----------------------------------------------------------------------------------|----------|---|--------------------------------------------------------------------------|---|
|  | Document |   | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |   |
|                                                                                   | Date     |   | 06/12/2022                                                               |   |
|                                                                                   | Issue    | 1 | Revision                                                                 | 0 |
|                                                                                   | Page     |   | 16/28                                                                    |   |

### 3.4 STC Functional Test

#### 3.4.1 Test Scope

The aim of this test is:

- to check the status and the functionality of the following electric components of the channel:
  - PE,
  - Detector and
  - TEC;
- to modify some configuration parameters.
- to perform some science acquisitions.

#### 3.4.2 Test Execution

**Time Frame:** 2020-12-14T21:42:00.00Z ÷ 2020-12-14T22:19:00.00Z

In Table 3-16 is reported the initial status of the instrument:

| INSTRUMENT INITIAL STATUS |      |     |      |
|---------------------------|------|-----|------|
| ME                        | HRIC | STC | VIHI |
| OFF                       | OFF  | OFF | OFF  |

Table 3-16: Instrument status before the STC Functional Test.

#### 3.4.3 Science

Concerning the Science TCs, the following science sessions have been performed.

| ID | SSC | Duration                        | Mode       | Repetition Time [s] | Expected Acquisition | Expected Frame |
|----|-----|---------------------------------|------------|---------------------|----------------------|----------------|
| 1  | 246 | 20 seconds                      | Continuous | 2.0                 | 11                   | 33             |
| 2  | 247 | 2 minutes and 10 seconds        | Continuous | 12.3                | 11                   | 33             |
| 3  | 248 | 4.70 seconds                    | Continuous | 0.4                 | 12                   | 60             |
| 4  | 249 | 23.90 seconds                   | Continuous | 2.05                | 12                   | 60             |
| 5  | 252 | 8 minutes and 59.30 seconds     | Continuous | 2.0                 | 270                  | 270            |
| 5  | --- | <b>12 minutes and 4 seconds</b> | ---        | ---                 | <b>316</b>           | <b>431</b>     |

Table 3-17: Description of the TC used during STC Performance Test.

Table 3-17 describes the duration and the number of images and frames expected for each TCs commanded during the Performance Test.

#### 3.4.4 Data Produced

##### 3.4.4.1 Data Volume

|                   | #Packets | DV      |
|-------------------|----------|---------|
| HK                | 1419     | 64.8 kB |
| STC low priority  | 1767     | 6.3 MB  |
| STC high priority | 0        | 0 Bytes |

Table 3-18: DV produced during the STC Functional Test.

| Bundle Miscellaneous |     |  |  |
|----------------------|-----|--|--|
| File                 | CSV |  |  |

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 17/28                                                                    |          |   |

|      |          |
|------|----------|
| #    | 2        |
| Size | 619.5 kB |

| Bundle Raw STC |      |  |          |
|----------------|------|--|----------|
| File           | CSV  |  |          |
|                | #    |  | 431      |
|                | Size |  | 396.5 kB |
|                | DAT  |  |          |
|                | #    |  | 431      |
|                | Size |  | 44.5 MB  |

Table 3-19: Data produced during the STC Functional Test.

### 3.4.5 ME Events

None.

### 3.4.6 PE Events

None.

### 3.4.7 Lost Packets

| Type of Packets          | #    | Note               |
|--------------------------|------|--------------------|
| Telecommand Verification | 58   | [Lost Packet(s) 0] |
| HK Report                | 1419 | [Lost Packet(s) 0] |
| Event/Anomaly Report     | 5    | [Lost Packet(s) 0] |
| STC low Priority         | 1767 | [Lost Packet(s) 0] |
| STC high Priority        | 0    | [Lost Packet(s) 0] |

Table 3-20: Packets and lost packet report for the STC Functional Test.

### 3.4.8 TC Check

| Telecommand Status | #  |
|--------------------|----|
| TC Accepted        | 29 |
| TC Executed        | 29 |
| TC Rejected        | 0  |
| TC Failed          | 0  |

Table 3-21: TC report for the STC Functional Test.

### 3.4.9 Discussion

Produced output is in line with what expected.

The details are reported in Table 3-22 with information from section 3.4.3 and 3.4.4.

|                  | Commanded | From TM |
|------------------|-----------|---------|
| Images           | 431       | 431     |
| Science Sessions | 5         | 5       |

Table 3-22: Comparison between data commanded and produced for the STC Functional Test.

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 18/28                                                                    |          |   |

### 3.5 STC Performance Test

#### 3.5.1 Test Scope

The aim of this test is to acquire the Dark Current in order to study its evolution during the cruise phase and to test the Mitigate strategy to be used in CM to mitigate the DC reset for a long waiting time.

#### 3.5.2 Test Execution

**Time Frame:** 2020-12-14T22:20:00.00Z ÷ 2020-12-14T22:50:00.00Z.

In Table 3-23 is reported the initial status of the instrument:

| INSTRUMENT INITIAL STATUS |      |     |      |
|---------------------------|------|-----|------|
| ME                        | HRIC | STC | VIHI |
| ON                        | OFF  | ON  | OFF  |

Table 3-23: Instrument status before the STC Performance Test.

#### 3.5.3 Science

Concerning the Science TCs, the following science session has been performed.

| ID | SSC | Duration                | Mode       | Repetition Time [s] | Expected Acquisition | Expected Frame |
|----|-----|-------------------------|------------|---------------------|----------------------|----------------|
| 1  | 254 | 2 minutes and 3 seconds | Limited    | 12.3                | 10                   | 30             |
| 2  | 255 | 2 minutes and 3 seconds | Limited    | 12.3                | 10                   | 30             |
| 3  | 256 | 2 minutes and 3 seconds | Limited    | 12.3                | 10                   | 30             |
| 4  | 257 | 2 minutes and 3 seconds | Limited    | 12.3                | 10                   | 30             |
| 5  | 258 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 6  | 259 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 7  | 260 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 8  | 261 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 9  | 262 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 10 | 263 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 11 | 264 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 12 | 265 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 13 | 266 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 14 | 267 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 15 | 268 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 16 | 269 | 4 seconds               | Limited    | 0.45                | 10                   | 20             |
| 17 | 270 | 7 seconds               | Limited    | 0.78                | 10                   | 20             |
| 18 | 271 | 12 seconds              | Limited    | 1.26                | 10                   | 20             |
| 19 | 272 | 51 seconds              | Limited    | 5.10                | 10                   | 20             |
| 20 | 273 | 1 minute and 39 seconds | Limited    | 9.9                 | 10                   | 20             |
| 21 | 274 | 1 minute and 10 seconds | Limited    | 7.0                 | 10                   | 20             |
| 22 | 275 | 1 minute and 10 seconds | Limited    | 7.0                 | 10                   | 20             |
| 23 | 276 | 1 minute and 10 seconds | Limited    | 7.0                 | 10                   | 20             |
| 24 | 277 | 1 minute and 10 seconds | Limited    | 7.0                 | 10                   | 20             |
| 25 | 278 | 1 minute and 11 seconds | Continuous | 7.0                 | 10                   | 20             |
| 26 | 280 | 4 seconds               | Continuous | 0.4                 | 10                   | 50             |
| 27 | 282 | 1 second                | Limited    | 0.5                 | 2                    | 2              |
| 28 | 283 | 4 seconds               | Continuous | 0.4                 | 10                   | 50             |
| 29 | 285 | 1 second                | Limited    | 0.25                | 4                    | 4              |

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 19/28                                                                    |          |   |

| ID | SSC | Duration                         | Mode       | Repetition Time [s] | Expected Acquisition | Expected Frame |
|----|-----|----------------------------------|------------|---------------------|----------------------|----------------|
| 30 | 286 | 4 seconds                        | Continuous | 0.4                 | 10                   | 50             |
| 31 | 288 | 2 seconds                        | Limited    | 0.2                 | 10                   | 10             |
| 32 | 289 | 4 seconds                        | Continuous | 0.4                 | 10                   | 50             |
| 33 | 291 | 1 minute and 10 seconds          | Limited    | 7.0                 | 10                   | 30             |
| 34 | 292 | 1 minute and 10 seconds          | Limited    | 7.0                 | 10                   | 30             |
| 35 | 293 | 1 minute and 10 seconds          | Limited    | 7.0                 | 10                   | 30             |
| 36 | 294 | 1 minute and 10 seconds          | Limited    | 7.0                 | 10                   | 30             |
| 37 | 295 | 1 minute and 10 seconds          | Limited    | 7.0                 | 10                   | 30             |
| 38 | 296 | 8 seconds                        | Limited    | 0.8                 | 10                   | 20             |
| 39 | 297 | 8 seconds                        | Limited    | 0.8                 | 10                   | 20             |
| 40 | 298 | 20 seconds                       | Limited    | 2.0                 | 10                   | 20             |
| 41 | 299 | 20 seconds                       | Limited    | 2.0                 | 10                   | 20             |
| 42 | 300 | 50 seconds                       | Limited    | 5.0                 | 10                   | 20             |
| 43 | 301 | 50 seconds                       | Limited    | 5.0                 | 10                   | 20             |
| 44 | 302 | 1 minute and 10 seconds          | Limited    | 7.0                 | 10                   | 20             |
| 44 | --- | <b>27 minutes and 42 seconds</b> | ---        | ---                 | <b>426</b>           | <b>1046</b>    |

Table 3-24: Description of the TC used during STC Functional Test.

Table 3-24 describes the duration and the number of images and frames expected for each TCs commanded during the Performance Test.

### 3.5.4 Data Produced

#### 3.5.4.1 Data Volume

|                   | #Packets | DV       |
|-------------------|----------|----------|
| HK                | 420      | 18.6 kB  |
| STC low priority  | 32874    | 133.6 MB |
| STC high priority | 0        | 0 Bytes  |

Table 3-25: DV produced during the STC Performance Test.

#### 3.5.4.2 Output Files

| Bundle Miscellaneous |     |      |          |
|----------------------|-----|------|----------|
| File                 | CSV |      |          |
|                      |     | #    | 2        |
|                      |     | Size | 177.4 kB |

| Bundle Raw STC |     |      |          |
|----------------|-----|------|----------|
| File           | CSV |      |          |
|                |     | #    | 1035     |
|                |     | Size | 952.2 kB |
| File           | DAT |      |          |
|                |     | #    | 1035     |
|                |     | Size | 153.2 MB |

Table 3-26: Data produced during the STC Performance Test.

### 3.5.5 ME Events

None.

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 20/28                                                                    |          |   |

### 3.5.6 PE Events

None.

### 3.5.7 Lost Packets

| Type of Packets          | #     | Note               |
|--------------------------|-------|--------------------|
| Telecommand Verification | 98    | [Lost Packet(s) 0] |
| HK Report                | 420   | [Lost Packet(s) 0] |
| Event/Anomaly Report     | 60    | [Lost Packet(s) 0] |
| STC low Priority         | 32874 | [Lost Packet(s) 0] |
| STC high Priority        | 0     | [Lost Packet(s) 0] |

Table 3-27: Packets and lost packet report for the STC Performance Test.

### 3.5.8 TC Check

| Telecommand Status | #  |
|--------------------|----|
| TC Accepted        | 49 |
| TC Executed        | 49 |
| TC Rejected        | 0  |
| TC Failed          | 0  |

Table 3-28: TC report for the STC Performance Test.

### 3.5.9 Discussion

Produced output is not in line with what is expected. TC # 4 and 5 (SSC 257 and 258) had 27 and 12 images instead of 30 and 20 images commanded due to incorrect distances between the TCs. The details are reported in Table 3-29 with information from section 3.5.3 and 3.5.4.

|                  | Commanded | From TM |
|------------------|-----------|---------|
| Images           | 1046      | 1035    |
| Science Sessions | 44        | 44      |

Table 3-29: Comparison between data commanded and produced for the STC Performance Test.

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 21/28                                                                    |          |   |

### 3.6 VIHI Performance Test

#### 3.6.1 Test Scope

The test will be devoted to the accurate description and understanding of the Dark Current management.

#### 3.6.2 Test Execution

**Time Frame:** 2020-12-14T22:52:00.00Z ÷ 2020-12-14T23:14:00.00Z.

In Table 3-30 is reported the initial status of the instrument:

| INSTRUMENT INITIAL STATUS |      |     |      |
|---------------------------|------|-----|------|
| ME                        | HRIC | STC | VIHI |
| OFF                       | OFF  | OFF | OFF  |

Table 3-30: Instrument status before the VIHI Performance Test.

#### 3.6.3 Science

Concerning the Science TCs, the following science session has been performed.

| ID | SSC | Duration                        | Mode       | Repetition Time [s] | Expected Acquisition | Expected Frame |
|----|-----|---------------------------------|------------|---------------------|----------------------|----------------|
| 1  | 321 | 3 seconds                       | Continuous | 0.13                | 24                   | 24             |
| 2  | 322 | 2.88 seconds                    | Continuous | 0.13                | 24                   | 24             |
| 3  | 323 | 2.76 seconds                    | Continuous | 0.13                | 24                   | 24             |
| 4  | 324 | 19.64 seconds                   | Continuous | 2.015               | 12                   | 12             |
| 5  | 327 | 15.46 seconds                   | Continuous | 2.015               | 8                    | 8              |
| 6  | 328 | 19.34 seconds                   | Continuous | 2.015               | 12                   | 12             |
| 7  | 329 | 15.16 seconds                   | Continuous | 2.015               | 8                    | 8              |
| 8  | 330 | 19.04 seconds                   | Continuous | 2.015               | 12                   | 12             |
| 9  | 331 | 14.86 seconds                   | Continuous | 2.015               | 8                    | 8              |
| 9  | --- | <b>2 minutes and 10 seconds</b> | ---        | ---                 | <b>132</b>           | <b>132</b>     |

Table 3-31: Description of the TC used during VIHI Functional Test.

Table 3-31 describes the duration and the number of images and frames expected for each TCs commanded during the Performance Test.

#### 3.6.4 Data Produced

##### 3.6.4.1 Data Volume

|                    | #Packets | DV      |
|--------------------|----------|---------|
| HK                 | 1274     | 80.7 kB |
| VIHI low priority  | 792      | 3.2 MB  |
| VIHI high priority | 0        | 0 Bytes |

Table 3-32: DV produced during the VIHI Performance Test.

##### 3.6.4.2 Output Files

Bundle Miscellaneous

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 22/28                                                                    |          |   |

|      |     |      |          |
|------|-----|------|----------|
| File | CSV |      |          |
|      |     | #    | 2        |
|      |     | Size | 879.0 kB |

| Bundle Raw VIHI |     |      |         |
|-----------------|-----|------|---------|
| File            | CSV |      |         |
|                 |     | #    | 24      |
|                 |     | Size | 34.5 kB |
|                 | DAT |      |         |
|                 |     | #    | 24      |
|                 |     | Size | 3.2 MB  |

Table 3-33: Data produced during the VIHI Performance Test.

## 3.6.5 ME Events

| Severity Level        | #  |
|-----------------------|----|
| Low Severity Error    | 11 |
| Medium Severity Error | 1  |
| High Severity Error   | 0  |

Table 3-34: ME Events occurred during the VIHI Performance Test.

### 3.6.5.1 Low Severity Error

- 2020-12-14T23:09:43.28672Z - TM(5,2) - [APID:807] - Event 40810 - Science rejected From VIHI PE because EOP/EOR not received in time.
- 2020-12-14T23:09:43.43672Z - TM(5,2) - [APID:807] - Event 40810 - Science rejected From VIHI PE because EOP/EOR not received in time.
- 2020-12-14T23:09:43.58676Z - TM(5,2) - [APID:807] - Event 40810 - Science rejected From VIHI PE because EOP/EOR not received in time.
- 2020-12-14T23:09:43.73678Z - TM(5,2) - [APID:807] - Event 40810 - Science rejected From VIHI PE because EOP/EOR not received in time.
- 2020-12-14T23:09:43.88677Z - TM(5,2) - [APID:807] - Event 40810 - Science rejected From VIHI PE because EOP/EOR not received in time.
- 2020-12-14T23:09:44.03677Z - TM(5,2) - [APID:807] - Event 40810 - Science rejected From VIHI PE because EOP/EOR not received in time.
- 2020-12-14T23:09:44.18675Z - TM(5,2) - [APID:807] - Event 40810 - Science rejected From VIHI PE because EOP/EOR not received in time.
- 2020-12-14T23:09:44.33671Z - TM(5,2) - [APID:807] - Event 40810 - Science rejected From VIHI PE because EOP/EOR not received in time.
- 2020-12-14T23:09:44.48664Z - TM(5,2) - [APID:807] - Event 40810 - Science rejected From VIHI PE because EOP/EOR not received in time.
- 2020-12-14T23:09:44.63677Z - TM(5,2) - [APID:807] - Event 40810 - Science rejected From VIHI PE because EOP/EOR not received in time.
- 2020-12-14T23:09:44.78677Z - TM(5,2) - [APID:807] - Event 40810 - Science rejected From VIHI PE because EOP/EOR not received in time.

### 3.6.5.2 Medium Severity Error

- 2020-12-14T23:09:44.80677Z - TM(5,3) - [APID:807] - Event 41202 - Stop Science acquisition with VIHI due to persistent ME/PE failure of length/timeout message checks.

## 3.6.6 PE Events

None.

## 3.6.7 Lost Packets

| Type of Packets          | #    | Note               |
|--------------------------|------|--------------------|
| Telecommand Verification | 62   | [Lost Packet(s) 0] |
| HK Report                | 1274 | [Lost Packet(s) 0] |
| Event/Anomaly Report     | 25   | [Lost Packet(s) 0] |
| VIHI low Priority        | 792  | [Lost Packet(s) 0] |
| VIHI high Priority       | 0    | [Lost Packet(s) 0] |

Table 3-35: Packets and lost packet report for the VIHI Performance Test.

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 23/28                                                                    |          |   |

### 3.6.8 TC Check

| Telecommand Status | #  |
|--------------------|----|
| TC Accepted        | 30 |
| TC Executed        | 21 |
| TC Rejected        | 0  |
| TC Failed          | 8  |

Table 3-36: TC report for the VIHI Performance Test.

#### 3.6.8.1 Failed TC

- 2020-12-14T23:09:46.03463Z - TM(1,8) - [APID:801] - Event N/A - Telecommand Executed Failed [APID: 812, Sequence n.: 323] - Failure ID: 40012 - Recived: Service: 173 SubService: 2
- 2020-12-14T23:09:49.03472Z - TM(1,8) - [APID:801] - Event N/A - Telecommand Executed Failed [APID: 812, Sequence n.: 324] - Failure ID: 40012 - Recived: Service: 173 SubService: 2
- 2020-12-14T23:10:24.03456Z - TM(1,8) - [APID:801] - Event N/A - Telecommand Executed Failed [APID: 812, Sequence n.: 326] - Failure ID: 40012 - Recived: Service: 173 SubService: 13
- 2020-12-14T23:11:24.03439Z - TM(1,8) - [APID:801] - Event N/A - Telecommand Executed Failed [APID: 812, Sequence n.: 327] - Failure ID: 40012 - Recived: Service: 173 SubService: 2
- 2020-12-14T23:11:44.03465Z - TM(1,8) - [APID:801] - Event N/A - Telecommand Executed Failed [APID: 812, Sequence n.: 328] - Failure ID: 40012 - Recived: Service: 173 SubService: 2
- 2020-12-14T23:12:04.03427Z - TM(1,8) - [APID:801] - Event N/A - Telecommand Executed Failed [APID: 812, Sequence n.: 329] - Failure ID: 40012 - Recived: Service: 173 SubService: 2
- 2020-12-14T23:12:24.05967Z - TM(1,8) - [APID:801] - Event N/A - Telecommand Executed Failed [APID: 812, Sequence n.: 330] - Failure ID: 40012 - Recived: Service: 173 SubService: 2
- 2020-12-14T23:12:44.03460Z - TM(1,8) - [APID:801] - Event N/A - Telecommand Executed Failed [APID: 812, Sequence n.: 331] - Failure ID: 40012 - Recived: Service: 173 SubService: 2

### 3.6.9 Discussion

Produced output is not in line with what expected, it due to the failed TC.

The details are reported in Table 3-29 with information from section 3.5.3 and 3.5.4.

|                  | Commanded | From TM |
|------------------|-----------|---------|
| Images           | 134       | 24      |
| Science Sessions | 9         | 1       |

Table 3-37: Comparison between data commanded and produced for the VIHI Performance Test.

|                                                                                   |          |   |                                                                          |   |
|-----------------------------------------------------------------------------------|----------|---|--------------------------------------------------------------------------|---|
|  | Document |   | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |   |
|                                                                                   | Date     |   | 06/12/2022                                                               |   |
|                                                                                   | Issue    | 1 | Revision                                                                 | 0 |
|                                                                                   | Page     |   | 24/28                                                                    |   |

### 3.7 Interference test

#### 3.7.1 Test Scope

The aim of this test is to evaluate if and how the cameras (i.e., HRIC and STC) detector reset fluctuations change with respect to the Repetition Time parameter contained in their Science TC. In addition, the test will indicate if the operativity of the VIHI channel influences or not such a fluctuation.

#### 3.7.2 Test Execution

**Time Frame:** 2020-12-14T23:20:00.00Z ÷ 2020-12-15T02:42:00.00Z

In Table 3-38 is reported the initial status of the instrument:

| INSTRUMENT INITIAL STATUS |      |     |      |
|---------------------------|------|-----|------|
| ME                        | HRIC | STC | VIHI |
| OFF                       | OFF  | OFF | OFF  |

Table 3-38: Instrument status before the Interference Test.

#### 3.7.3 Science

##### 3.7.3.1 HRIC

| ID | SSC | Duration              | Mode       | Repetition Time [s] | Expected Acquisition | Expected Frame |
|----|-----|-----------------------|------------|---------------------|----------------------|----------------|
| 1  | 335 | 3 minutes             | Continuous | 0.5                 | 360                  | 360            |
| 2  | 337 | 6 minutes             | Continuous | 1.0                 | 360                  | 360            |
| 3  | 339 | 9 minutes             | Continuous | 1.5                 | 360                  | 360            |
| 4  | 341 | 14 minutes            | Continuous | 2.0                 | 420                  | 420            |
| 5  | 345 | 3 minutes             | Continuous | 0.5                 | 360                  | 360            |
| 6  | 347 | 6 minutes             | Continuous | 1.0                 | 360                  | 360            |
| 7  | 349 | 9 minutes             | Continuous | 1.5                 | 360                  | 360            |
| 8  | 351 | 14 minutes            | Continuous | 2.0                 | 420                  | 420            |
| 9  | 363 | 3 minutes             | Continuous | 0.5                 | 360                  | 360            |
| 10 | 365 | 6 minutes             | Continuous | 1.0                 | 360                  | 360            |
| 11 | 367 | 9 minutes             | Continuous | 1.5                 | 360                  | 360            |
| 12 | 370 | 14 minutes            | Continuous | 2.0                 | 420                  | 420            |
| 13 | 375 | 3 minutes             | Continuous | 0.5                 | 360                  | 360            |
| 14 | 378 | 6 minutes             | Continuous | 1.0                 | 360                  | 360            |
| 15 | 380 | 9 minutes             | Continuous | 1.5                 | 360                  | 360            |
| 16 | 383 | 14 minutes            | Continuous | 2.0                 | 420                  | 420            |
| 16 | --- | 2 hours and 8 minutes | ---        | ---                 | 6000                 | 6000           |

Table 3-39: Description of the science TC used by HRIC during the Interference Test.

##### 3.7.3.2 STC

| ID | SSC | Duration              | Mode       | Repetition Time [s] | Expected Acquisition | Expected Frame |
|----|-----|-----------------------|------------|---------------------|----------------------|----------------|
| 1  | 334 | 28 minutes            | Continuous | 2.0                 | 840                  | 840            |
| 2  | 344 | 28 minutes            | Continuous | 1.0                 | 1680                 | 1680           |
| 3  | 362 | 28 minutes            | Continuous | 2.0                 | 840                  | 840            |
| 4  | 374 | 28 minutes            | Continuous | 1.0                 | 1680                 | 1680           |
| 4  | --- | 1 hour and 52 minutes | ---        | ---                 | 5040                 | 5040           |

Table 3-40: Description of the science TC used by STC during the Interference Test.

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 25/28                                                                    |          |   |

### 3.7.3.3 VIHI

| ID | SSC | Duration                  | Mode       | Repetition Time [s] | Expected Acquisition | Expected Frame |
|----|-----|---------------------------|------------|---------------------|----------------------|----------------|
| 1  | 361 | 15 minutes                | Continuous | 0.5                 | 1800                 | 1800           |
| 2  | 368 | 15 minutes                | Continuous | 0.5                 | 1800                 | 1800           |
| 3  | 372 | 15 minutes                | Continuous | 0.5                 | 1800                 | 1800           |
| 4  | 376 | 10 minutes and 30 seconds | Continuous | 0.425               | 1484                 | 1484           |
| 4  | --- | 55 minutes and 30 seconds | ---        | ---                 | 6884                 | 6884           |

Table 3-41: Description of the science TC used by VIHI during the Interference Test.

## 3.7.4 Data Produced

### 3.7.4.1 Data Volume

|                    | #Packets | DV      |
|--------------------|----------|---------|
| HK                 | 1186     | 48.7 kB |
| HRIC low priority  | 12000    | 25.2 MB |
| HRIC high priority | 0        | 0 Bytes |
| STC low priority   | 5040     | 2.9 MB  |
| STC high priority  | 0        | 0 Bytes |

Table 3-42: DV produced during the Interference Test.

### 3.7.4.2 Output Files

| Bundle Miscellaneous |      |          |  |
|----------------------|------|----------|--|
| File                 | CSV  |          |  |
|                      | #    | 3        |  |
|                      | Size | 457.6 kB |  |

| Bundle Raw HRIC |      |          |  |
|-----------------|------|----------|--|
| File            | CSV  |          |  |
|                 | #    | 6000     |  |
|                 | Size | 5.4 MB   |  |
|                 | DAT  |          |  |
|                 | #    | 6000     |  |
|                 | Size | 791.9 MB |  |

| Bundle Raw STC |      |         |  |
|----------------|------|---------|--|
| File           | CSV  |         |  |
|                | #    | 5040    |  |
|                | Size | 4.6 MB  |  |
|                | DAT  |         |  |
|                | #    | 5040    |  |
|                | Size | 87.2 MB |  |

| Bundle Raw VIHI |      |      |  |
|-----------------|------|------|--|
| File            | CSV  |      |  |
|                 | #    | 0    |  |
|                 | Size | 0 MB |  |
|                 | DAT  |      |  |
|                 | #    | 0    |  |
|                 | Size | 0 MB |  |

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 26/28                                                                    |          |   |

Table 3-43: Data produced during the Interference Test.

### 3.7.5 ME Error

None.

### 3.7.6 PE Error

None.

### 3.7.7 Lost Packets

| Type of Packets          | #     | Note               |
|--------------------------|-------|--------------------|
| Telecommand Verification | 80    | [Lost Packet(s) 0] |
| HK Report                | 1186  | [Lost Packet(s) 0] |
| Event/Anomaly Report     | 44    | [Lost Packet(s) 0] |
| HRIC low Priority        | 12000 | [Lost Packet(s) 0] |
| STC low Priority         | 5040  | [Lost Packet(s) 0] |
| VIHI low Priority        | 0     | [Lost Packet(s) 0] |
| HRIC high Priority       | 0     | [Lost Packet(s) 0] |
| STC high Priority        | 0     | [Lost Packet(s) 0] |
| VIHI high Priority       | 0     | [Lost Packet(s) 0] |

Table 3-44: Packets and lost packet report for the Interference Test.

### 3.7.8 TC Check

| Telecommand Status | #  |
|--------------------|----|
| TC Accepted        | 40 |
| TC Executed        | 40 |
| TC Rejected        | 0  |
| TC Failed          | 0  |

Table 3-45: TC Report for the Interference Test.

**NB: In the list of the accepted and executed TC there are no VIHI TC.**

**In the Event List there are no information about the TC with SSC 354, VIHI Power On.**

### 3.7.9 Discussion

Produced output is in line with what is expected for the HRIC and STC channels. VIHI has not acquired any images.

The details are reported in the following tables with information from section 3.7.3 and 3.7.4.

#### 3.7.9.1 HRIC

|                  | Commanded | From TM |
|------------------|-----------|---------|
| Images           | 6000      | 6000    |
| Science Sessions | 16        | 16      |

Table 3-46: Comparison between data commanded and produced by HRIC for the Interference Test.

|                                                                                   |          |                                                                          |          |   |
|-----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4<br>ReportBC-SIM-TR-XXX - EGSE ICO#4<br>Report |          |   |
|                                                                                   | Date     | 06/12/2022                                                               |          |   |
|                                                                                   | Issue    | 1                                                                        | Revision | 0 |
|                                                                                   | Page     | 27/28                                                                    |          |   |

### 3.7.9.2 STC

|                  | Commanded | From TM |
|------------------|-----------|---------|
| Images           | 5040      | 5040    |
| Science Sessions | 4         | 4       |

Table 3-47: Comparison between data commanded and produced by STC for the Interference Test.

### 3.7.9.3 VIHI

|                  | Commanded | From TM |
|------------------|-----------|---------|
| Images           | 6882      | 0       |
| Science Sessions | 4         | 0       |

Table 3-48: Comparison between data commanded and produced by VIHI for the Interference Test.

### 3.7.9.4 Graphical Summary

In the following figure is reported the timeline of the test.

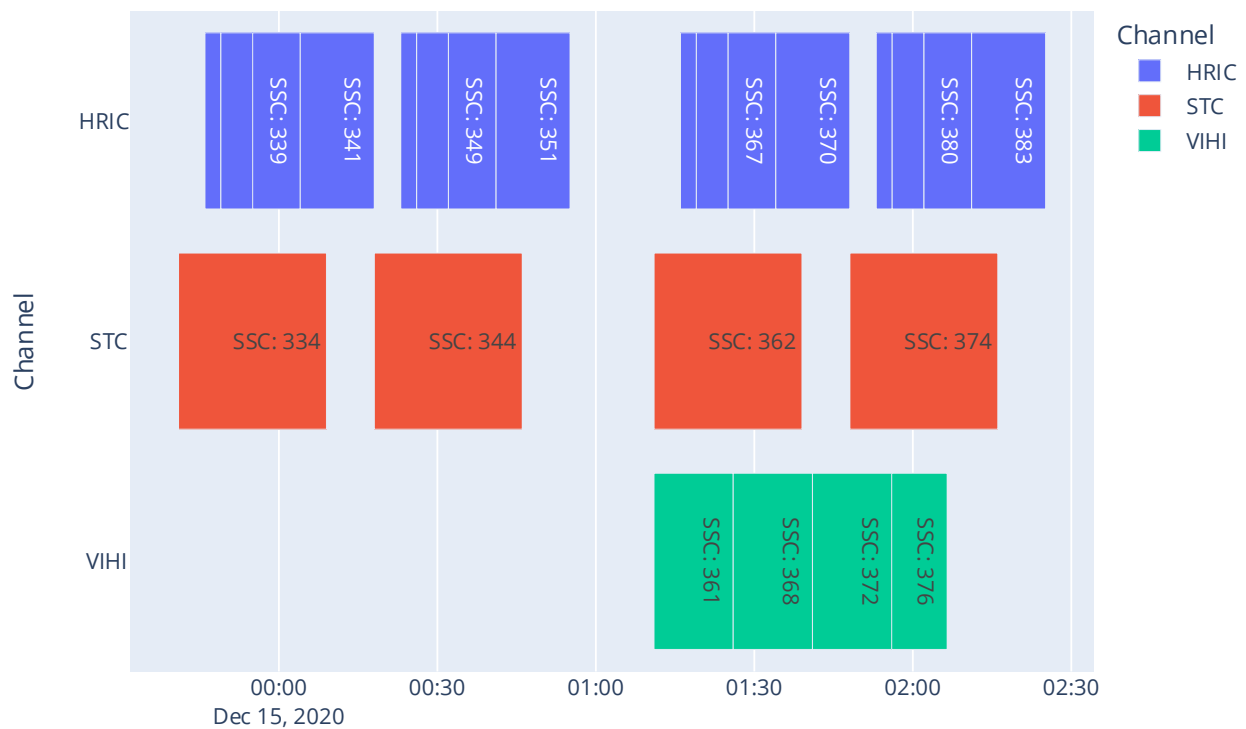


Figure 1: Graphical summary of the Interference Test.

|                                                                                  |          |                                                                    |          |   |
|----------------------------------------------------------------------------------|----------|--------------------------------------------------------------------|----------|---|
|  | Document | BC-SIM-TR-XXX - EGSE ICO#4 ReportBC-SIM-TR-XXX - EGSE ICO#4 Report |          |   |
|                                                                                  | Date     | 06/12/2022                                                         |          |   |
|                                                                                  | Issue    | 1                                                                  | Revision | 0 |
|                                                                                  | Page     | 28/28                                                              |          |   |

## 4 Summary

| ID | Test description      | Test Last  | Science Sessions | Data from TLM [Mb] |         |        |         |         |        |         | # Images |      |      | Failure |   |   |     |   |   |      |    |   |
|----|-----------------------|------------|------------------|--------------------|---------|--------|---------|---------|--------|---------|----------|------|------|---------|---|---|-----|---|---|------|----|---|
|    |                       |            |                  | HK                 | HRIC LP | STC LP | VIHI LP | HRIC HP | STC HP | VIHI HP | HRIC     | STC  | VIHI | HRIC    |   |   | STC |   |   | VIHI |    |   |
| 01 | HRIC Functional Test  | 6m         | 1                | 0.06               | 3.00    | 0      | 0       | 0       | 0      | 0       | 181      | 0    | 0    | 0       | 0 | 0 | 0   | 0 | 0 | 0    | 0  | 0 |
| 02 | HRIC Performance Test | 1m 57s     | 9                | 0.00               | 186.20  | 0      | 0       | 0       | 0      | 0       | 82       | 0    | 0    | 0       | 0 | 0 | 0   | 0 | 0 | 0    | 0  | 0 |
| 03 | STC Functional Test   | 12m 4s     | 5                | 0.06               | 0       | 6.30   | 0       | 0       | 0      | 0       | 0        | 431  | 0    | 0       | 0 | 0 | 0   | 0 | 0 | 0    | 0  | 0 |
| 04 | STC Performance Test  | 27m 42s    | 44               | 0.02               | 0       | 133.6  | 0       | 0       | 0      | 0       | 0        | 1035 | 0    | 0       | 0 | 0 | 0   | 0 | 0 | 0    | 0  | 0 |
| 05 | VIHI Performance Test | 2m 10s     | 9                | 0.08               | 0       | 0      | 3.2     | 0       | 0      | 0       | 0        | 0    | 24   | 0       | 0 | 0 | 0   | 0 | 0 | 8    | 12 | 0 |
| 06 | Interference Test     | 2h 10m     | 22               | 0.04               | 25.2    | 2.9    | 0       | 0       | 0      | 0       | 6000     | 5040 | 0    | 0       | 0 | 0 | 0   | 0 | 0 | 0    | 0  | 0 |
|    |                       | 2h 49m 53s | 90               | 0.62               | 214.4   | 142.8  | 3.2     | 0       | 0      | 0.8     | 6263     | 6506 | 24   | 0       | 0 | 0 | 0   | 0 | 0 | 8    | 12 | 0 |

Table 4-1: ICO#4 Summary of all the tests.

| Data Volume [Mb] |       |
|------------------|-------|
| HK               | 0.62  |
| HRIC             | 214.4 |
| STC              | 142.8 |
| VIHI             | 3.2   |
| 361.02           |       |

Table 4-2: Data volume produced in the ICO#4.