# BC-SIM-PL-004
# SIMBIO-SYS Checkout#02
# Test Summary


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# Approvation

| Document generation flow | |
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# Document change record

| Issue | Revision | Date | Affected pages | Change description |
|---|---|---|---|---|
| 1 | 0 | 25/10/2021 | All | First issue |
| | | | | |

# 1. Introduction

## 1.1. Scope

In this document we describe all the tests to be performed during the Instrument CheckOut (ICO) # 02 for the Spectrometers and Imagers for MPO BepiColombo Integrated Observatory SYStem (SIMBIO-SYS).

## 1.2. Reference Document


**[RD.1]** BC-SIM-TN-003_-_Reports_and_Note_Layout_and_Flow, 10.20371/INAF/TechRep/36

**[RD.2]** BC-SIM-GAF-MA-002 10 001 – SIMBIO-SYS User Manual

**[RD.3]** BC-SIM-TN-004_-_SIMBIO-SYS_FOP_update_after_NECP, 10.20371/INAF/TechRep/58

**[RD.4]** BC-ASD-SP-00176

**[RD.5]** BC-SIM-TR-005_-_SIMBIO-SYS_NECP_Test_Report_Issue1_Revision0, 10.20371/INAF/TechRep/42

**[RD.6]** BC-SIM-TR-002_-_HRIC_NECP_report, 10.20371/INAF/TechRep/32

**[RD.7]** BC-SIM-PL-002_-_SIMBIO-SYS_Checkout_01_Test_Summary_Issue1_Revision0, 10.20371/INAF/TechRep/64

**[RD.8]** BC-SIM-PL-003_-_SIMBIO-SYS_Delta_NECP_Test_Summary_Issue1_Revision0, 10.20371/INAF/TechRep/66

**[RD.9]** BC-SIM-GAF-TN-113 rev.0_TEC Control Parameters Revision for Commissioning_F1

**[RD.10]**BC-SIM-TR-015_-_SIMBIO-SYS_ICO#01_Test_Report_Issue1_Revision0, 10.20371/INAF/TechRep/98

**[RD.11]**BC-SIM-TR-012_-_HRIC_ICO#01_report, 10.20371/INAF/TechRep/97

**[RD.12]**BC-SIM-TR- BC-SIM-TR-013_-_STC_ICO#01_report, 10.20371/INAF/TechRep/89

**[RD.13]**BC-ALS-RP-00066_06


## 1.3. Acronyms

| | |
|---|---|
| **APID** | Application Process IDentifier |
| **ASW** | Application SoftWare |
| **CSV** | Comma Separated Values |
| **FPA** | Focal Plane Assembly |
| **FOP** | Flight Operation Procedure |
| **HK** | HouseKeeping |
| **HRIC** | High spatial Resolution Imaging Channel |
| **ICO** | Instrument CheckOut |
| **ME** | Main Electronics |
| **NECP** | Near Earth Commissioning Phase |
| **OBCP** | On-Board Control Procedure |
| **POR** | Payload Direct Operation Request |
| **PDS** | Planetary Data System |
| **PE** | Proximity Electronics |
| **PNG** | Portable Network Graphics |
| **PSC** | Packet Sequence Control |
| **SIMBIO-SYS** | Spectrometers and Imagers for MPO BepiColombo Integrated Observatory SYStem |
| **SSC** | Source Sequence Count |
| **STC** | STereo imaging Channel |
| **TC** | Telecommand |
| **TEC** | Thermo-Electric Cooler |
| **TM** | Telemetry |
| **VIHI** | VIsible and Hyper-spectral Imaging channel |
| **XML** | eXtensible Markup Language |

## 1.4. Document format and Repository

This document is compliant with the SIMBIO-SYS Report and Note Layout and Flow [RD.1] and will be archived both on the INAF Open Access repository and the SIMBIO-SYS team Archive.

## 1.5. Document Organization

This document is organized in sections whose topics are listed as follows:

- Section 2 – ICO#02 objective, with a brief description (see Section 8.2.2 of [RD.2] for details) of the functional tests we are going to execute
- Section 3 – ICO#02 implementation and validation, with:
  - a brief description of which Flight Operation Procedures (FOPs) and Payload Operation Requests (PORs) we are going to use to perform the required test
  - the results of the sequence validation using a Simulation Software developed within the team
  - an estimation of the required resources in terms of Data Volume, duration and expected number of frames for each sequence
- Section 4 – ICO#02 timeline, with the list of activities to be performed logically ordered to optimize instrument activations and test duration

# 2. Test objective

The scope of the SIMBIO ICO#02 is to verify the health status of the instrument at channel and system level after 1 year after launch. Few performance tests are also planned to monitor the evolution of some key instrument parameters.

## 2.1. Functional Test

During the ICO#02 the SIMBIO-SYS functionality shall be verified by means of dedicated Functional Test procedures on the following elements:

- HRIC, with the verification of:
  - PE, TEC and detector activation
  - memory/registers status
  - science acquisition capability
- STC, with the verification of:
  - PE, TEC and detector activation
  - memory/registers status
  - science acquisition capability

## 2.2. Performance Test

During ICO#02 the SIMBIO-SYS performance shall be verified by means of minimal Performance test procedures on the following elements:

- HRIC, with the verification of Dark Current (DC) behaviour for the nominal Integration Time (IT)
- STC, with the verification of:
  - DC behaviour for the nominal IT and Repetition Time (RT)
  - DC and DSNU for large regions of the detector (all_fpa test)
- VIHI, with the verification of:
  - PE, TEC and detector activation
  - Shutter operativity
  - Sources (Lamp and LED) operativity
  - Science acquisition with sources
  - Verification of the detector performances, loading new values for the parameters (Vdet_com, Vdet_adj) as recommend in [RD.2] paragraph 8.3.1.10.

# 3. Test implementation

## 3.1. Tools

Tests reported in the following sub-sessions shall be executed by means of proper FOPs, On-Board Control Procedures (OBCPs) and PORs listed in the following subsections and described in [RD.3], [RD.4] and Annexed files.

## 3.2. Available resources

As per ESA-ESOC official communication, the SIMBIO-SYS ICO#02 test will take place on 27 November 2019 at 04:00:00 UTC and it has agreed to have the same allocated resources of:

- test duration: about 8 hours
- Data-Volume: 20 Gb

# 3.3.SIMBIO-SYS Functional Tests

## 3.3.1. HRIC Functional Test

### 3.3.1.1. Scope

The aim of this test is:

- to check the status and the functionality of the following electric components of the channel:
  - Proximity Electronic (PE),
  - Detector and
  - Thermo-Electric Cooler (TEC);
- to modify some configuration parameters;
- to perform a science acquisition.

### 3.3.1.2. Preparation

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | ON |
| STC | OFF |
| VIHI | OFF |

Waiting for SIMBIO-SYS ME Application SoftWare (ASW) update which should also affect the parameters for the correct TEC activation, a PDOR with **SPOT ID BPSS00286** to upload the correct TEC parameters has been prepared (see **SIMBIOSYS_HRIC_TEC_init_POR** in the Timeline table of Section 4). The POR contains the sequence of TCs for uploading the nominal TEC parameters as indicated in [RD.2] Section 8.3.1.16.
To note that these parameters have been used during NECP determining the occurrence of TEC current issue #1 reported in Section 4.2 of [RD.5] and deeply analysed in [RD.6]; in ICO#01 [RD.7] and dNECP [RD.8] activities, these parameters have been updated according to [RD.9] study but a new issue (i.e., #1) raised as reported in Section 4.2 of [RD.9] and deeply analysed in [RD.11] and [RD.12].

Before starting a new study for the TEC parameters, it has been decided to investigate the SIMBIO-SYS thermal environment conditions, controlled with the SS-FCP-015 FOP (see [RD.3]) on the basis of the MPO Thermal Analysis report (see Table 3.5 of [RD.13]), during all the ICO activities to verify if the delta-temperature requirement for the TEC "soft-activation" (i.e., 10K of difference between the FPA set-point and its starting temperature) was satisfied. From the analysis of the S/C HKs, it was discovered a non-perfect compliance with respect to the requirements and so it was decided, with the support of the ESOC colleagues and the S/C Prime Astrium, to update the on-board thermal thresholds of the heaters that controls the SIMBIO-SYS thermal environment. In particular, the temperature range of thermistor line 18 (which correspond to heater line 22 – STC/VIHI) was increased of just 1K with respect to previous ICOs (from +4/+5°C to +5/+6 °C).

#### 3.3.1.3. Description

Due to some discrepancy in the obtained results relative to the functional tests executed in NECP and IC01, we need to increase the duration of all the three acquisitions foreseen in the test of a factor of 10. Since this updated could not be enough to understand the anomalous detected behaviour, it has been agreed to define a POR based on the FOP SS-TST-010 (see [RD.3] for details) which can be easily implemented and modified as needed.

As a result, a POR with **SPOT ID BPSS00285** has been prepared (see **SIMBIOSYS_HRIC_Functional_POR** in the Timeline table of Section 4) which contains the following operations:

1. SIMBIO-SYS ME switch-on via OBCP
2. the dedicated TC sequence for the nominal TEC parameters upload
3. the HRIC functional test with a sequence of FOPs call that implements the checks listed in Section 3.3.1.1.

#### 3.3.1.4. Validation

The POR **SIMBIOSYS_HRIC_Functional_POR** has been validated by means of a Simulation Software and produces the following results:

| **Sequence duration** | | | | **01:03:00** | |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 6.5536[Gb] | 0 [Mb] | 0 [Mb] | 6.5536[Gb] |
| **HK** | 1.3896[Mb] | 3.4754[Mb] | 0 [Mb] | 0 [Mb] | 4.8650[Mb] |
| **Total** | 1.3896[Mb] | 6.5571[Gb] | 0 [Mb] | 0 [Mb] | 6.5585[Gb] |

*To note that above resources computation has to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

#### 3.3.1.5. Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| **HRIC** | | **STC** | | **VIHI** | |
|---|---|---|---|---|---|
| **TC** | **# frames** | **TC** | **# frames** | **TC** | **# frames** |
| 1 | 1200 | | | | |
| 2 | 1200 | | | | |
| 3 | 100 | | | | |
| **-** | 2500 | | | | |

## 3.3.2. STC Functional Test

### 3.3.2.1. 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.

### 3.3.2.2. Preparation

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | OFF |
| STC | ON |
| VIHI | OFF |

See Section 3.3.1.2.
As per HRIC Functional test, the preparation activities require the definition of a POR with **SPOT ID BPSS00298** for the upload of the nominal TEC activation parameters (see **SIMBIOSYS_STC_TEC_init_POR** in the Timeline table of Section 4).

### 3.3.2.3. Description

A POR with **SPOT ID BPSS00331** has been prepared (see **SIMBIOSYS Functional Test STC** in the Timeline table of Section 4) which contains the following operations:

1. the dedicated TC sequence for the TEC parameters upload
2. the STC functional test via FOP SS-TST-020 whose details can be found in [RD.3]

#### 3.3.2.4. Validation

The POR **SIMBIOSYS Functional Test STC** has been validated by means of a Simulation Software and produces the following results:

| **Sequence duration** | | | **00:19:00** | | |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 0 [Mb] | 0.0615[Gb] | 0 [Mb] | 0.0615[Gb] |
| **HK** | 0.0283[Mb] | 0 [Mb] | 0.9571[Mb] | 0 [Mb] | 0.9853[Mb] |
| **Total** | 0.0283[Mb] | 0 [Mb] | 0.0625[Gb] | 0 [Mb] | 0.0625[Gb] |

*To note that above resources computation has to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

#### 3.3.2.5. Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| **HRIC** | | **STC** | | **VIHI** | |
|---|---|---|---|---|---|
| **TC** | **# frames** | **TC** | **# frames** | **TC** | **# frames** |
| **-** | - | 1 | 30 | - | - |
| | | 2 | 30 | | |
| | | 3 | 125 | | |
| | | 4 | 60 | | |
| | | - | 245 | | |

# 3.4.SIMBIO-SYS Performance Tests

## 3.4.1. HRIC Performance Test

### 3.4.1.1. 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.

### 3.4.1.2. Preparation

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | ON |
| STC | OFF |
| VIHI | OFF |

See Section 3.3.1.2.

### 3.4.1.3. Description

A POR with **SPOT ID BPSS00326** has been prepared (see **SIMBIOSYS_HRIC_Dark_Current_POR** in the Timeline table of Section 4) which contains repeated acquisition with different Integration Time (IT).

#### 3.4.1.4. Validation

The POR **SIMBIOSYS_HRIC_Dark_Current_POR** has been validated by means of a Simulation Software and produces the following results:

| **Sequence duration** | | | **00:12:00** | | |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 4.5233[Gb] | 0 [Mb] | 0 [Mb] | 4.5233[Gb] |
| **HK** | 0.3844[Mb] | 0.5263[Mb] | 0 [Mb] | 0 [Mb] | 0.9108[Mb] |
| **Total** | 0.3844[Mb] | 4.5238[Gb] | 0 [Mb] | 0 [Mb] | 4.5242[Gb] |

*To note that above resources computation has to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

#### 3.4.1.5. Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| **HRIC** | | **STC** | | **VIHI** | |
|---|---|---|---|---|---|
| **TC** | **# frames** | **TC** | **# frames** | **TC** | **# frames** |
| 1 | 10 | - | - | - | - |
| 2 | 10 | | | | |
| 3 | 10 | | | | |
| 3 | 10 | | | | |
| 4 | 10 | | | | |
| 5 | 10 | | | | |
| 6 | 10 | | | | |
| 7 | 10 | | | | |
| 8 | 10 | | | | |
| 9 | 10 | | | | |
| 10 | 10 | | | | |
| 11 | 10 | | | | |
| 12 | 10 | | | | |
| 13 | 10 | | | | |
| 14 | 10 | | | | |
| 15 | 10 | | | | |
| 16 | 10 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 17 | 10 | | | | |
| 18 | 30 | | | | |
| 19 | 30 | | | | |
| 20 | 30 | | | | |
| 21 | 30 | | | | |
| 22 | 30 | | | | |
| 23 | 30 | | | | |
| 24 | 30 | | | | |
| 25 | 30 | | | | |
| 26 | 30 | | | | |
| 27 | 30 | | | | |
| 28 | 30 | | | | |
| 29 | 30 | | | | |
| 30 | 30 | | | | |
| 31 | 30 | | | | |
| 32 | 30 | | | | |
| 33 | 30 | | | | |
| 34 | 30 | | | | |
| - | 680 | | | | |

## 3.4.2. STC Performance Test

### 3.4.2.1. Scope

The aim of this test is to acquire the Dark Current to study its evolution during cruise phase.

### 3.4.2.2. Starting conditions

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | OFF |
| STC | ON |
| VIHI | OFF |

See Section 3.3.2.2.

### 3.4.2.3. Description

A POR with **SPOT ID BPSS00309** has been prepared (see **SIMBIO-SYS - STC_Nominal_Test ICO2** in the Timeline table of Section 4) which contains repeated acquisition with different Integration Time (IT).

### 3.4.2.4. Validation

The POR **SIMBIO-SYS - STC_Nominal_Test ICO2** has been validated by means of a Simulation Software and produces the following results:

| **Sequence duration** | | | | **00:44:00** | |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 0 [Mb] | 4.0944[Gb] | 0 [Mb] | 4.0944[Gb] |
| **HK** | 1.4004[Mb] | 0 [Mb] | 1.9284[Mb] | 0 [Mb] | 3.3287[Mb] |
| **Total** | 1.4004[Mb] | 0 [Mb] | 4.0963[Gb] | 0 [Mb] | 4.0977[Gb] |

*To note that above resources computation has to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

#### 3.4.2.5. Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| HRIC | | STC | | VIHI | |
|---|---|---|---|---|---|
| **TC** | **# frames** | **TC** | **# frames** | **TC** | **# frames** |
| - | - | 1 | 30 | - | - |
| | | 2 | 30 | | |
| | | 3 | 30 | | |
| | | 3 | 30 | | |
| | | 4 | 30 | | |
| | | 5 | 30 | | |
| | | 6 | 30 | | |
| | | 7 | 30 | | |
| | | 8 | 30 | | |
| | | 9 | 30 | | |
| | | 10 | 30 | | |
| | | 11 | 30 | | |
| | | 12 | 30 | | |
| | | 13 | 30 | | |
| | | 14 | 30 | | |
| | | 15 | 30 | | |
| | | 16 | 30 | | |
| | | 17 | 30 | | |
| | | 18 | 30 | | |
| | | 19 | 30 | | |
| | | 20 | 30 | | |
| | | 21 | 30 | | |
| | | 22 | 30 | | |
| | | 23 | 30 | | |
| | | 24 | 30 | | |
| | | 25 | 30 | | |
| | | 26 | 30 | | |
| | | 27 | 30 | | |
| | | 28 | 30 | | |
| | | 29 | 30 | | |
| | | 30 | 30 | | |
| | | 31 | 30 | | |

| | | | | | |
|---|---|---|---|---|---|
| | | 32 | 30 | | |
| | | 33 | 30 | | |
| | | 34 | 30 | | |
| | | 35 | 30 | | |
| | | 36 | 30 | | |
| | | 37 | 30 | | |
| | | 38 | 30 | | |
| | | 39 | 30 | | |
| | | 40 | 30 | | |
| | | 41 | 30 | | |
| | | 42 | 30 | | |
| | | - | 1260 | | |

### 3.4.3. STC All-FPA Test

#### 3.4.3.1. Scope

The aim of the test is the monitoring of dark, DSNU and RON by means of several acquisitions of large regions of the detector (all_fpa test 2.0).

#### 3.4.3.2. Preparation

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | OFF |
| STC | ON |
| VIHI | OFF |

See Section 3.4.1.2.

#### 3.4.3.3. Description

A POR with **SPOT ID BPSS00288** has been prepared (see **SIMBIOSYS_STC_all_fpa ICO2** in the Timeline table of Section 4) which contains acquisitions of different large areas of the detector.

#### 3.4.3.4. Validation

The POR **SIMBIOSYS_STC_all_fpa ICO2** has been validated by means of a Simulation Software and produces the following results:

| **Sequence duration** | | | | **00:10:14** | |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 0 [Mb] | 2.5502[Gb] | 0 [Mb] | 2.5502[Gb] |
| **HK** | 0.9745 [Mb] | 0 [Mb] | 1.3402[Mb] | 0 [Mb] | 2.3147[Mb] |
| **Total** | 0.9745 [Mb] | 0 [Mb] | 2.5516[Gb] | 0 [Mb] | 2.5525[Gb] |

*To note that above resources computation has to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

#### 3.4.3.5. Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| HRIC | | STC | | VIHI | |
|---|---|---|---|---|---|
| **TC** | **# frames** | **TC** | **# frames** | **TC** | **# frames** |
| - | - | 1 | 5 | - | - |
| | | 2 | 5 | | |
| | | 3 | 5 | | |
| | | 3 | 5 | | |
| | | 4 | 5 | | |
| | | 5 | 5 | | |
| | | 6 | 5 | | |
| | | 7 | 5 | | |
| | | 8 | 5 | | |
| | | 9 | 5 | | |
| | | 10 | 5 | | |
| | | 11 | 5 | | |
| | | 12 | 5 | | |
| | | 13 | 5 | | |
| | | 14 | 5 | | |
| | | 15 | 5 | | |
| | | 16 | 5 | | |
| | | 17 | 5 | | |
| | | 18 | 5 | | |
| | | 19 | 5 | | |
| | | 20 | 5 | | |
| | | 21 | 6 | | |
| | | 22 | 6 | | |
| | | 23 | 6 | | |
| | | 24 | 6 | | |
| | | 25 | 6 | | |
| | | 26 | 6 | | |
| | | - | 136 | | |

## 3.4.4. VIHI Performance Test

### 3.4.4.1. Scope

The aim of this test is mainly to check the performance of the detector using the on-board default detector parameters (Vdet_com=2590 and Vdet_adj=1490) and the performance with the parameters recommended by LEONARDO and reported in the User Manual (paragraph 8.3.1.10 of [RD.2]), (Vdet_com=2606 and Vdet_adj=1365). This gaol will be achieved running two times the calibration procedure SS-TST-031 (see [RD.3]), first time with default on board detector parameters, second time with the updated parameters. Comparing the behaviour of the detector responses it will be possible to verify if effectively the updated parameter will improve the performances or not.

### 3.4.4.2. Preparation

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | OFF |
| STC | OFF |
| VIHI | OFF |

No special operations are foreseen.

### 3.4.4.3. Description

A POR with **SPOT ID BPSS00289** has been prepared (see **SIMBIOSYS_VIHI_ICO2_POR** in the Timeline table of Section 4) which contains the call of several elementary FOPs for the channel activation, the TEC parameters update and the SS-TST-031 FOP (see [RD.3]).

#### 3.4.4.4. Validation

The POR **SIMBIOSYS_VIHI_ICO2_POR** has been validated by means of a Simulation Software and produces the following results:

| **Sequence duration** | | | **01:26:05** | | |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 0 [Mb] | 0 [Mb] | 1.6641[Gb] | 1.6641[Gb] |
| **HK** | 0.0679[Mb] | 0 [Mb] | 0 [Mb] | 3.0061[Mb] | 3.0739[Mb] |
| **Total** | 0.0679[Mb] | 0 [Mb] | 0 [Mb] | 1.6671[Gb] | 1.6672[Gb] |

*To note that above resources computation has to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

#### 3.4.4.5. Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| **HRIC** | | **STC** | | **VIHI** | |
|---|---|---|---|---|---|
| **TC** | **# frames** | **TC** | **# frames** | **TC** | **# frames** |
| - | - | - | - | 1 | 14 |
| | | | | 2 | 14 |
| | | | | 3 | 14 |
| | | | | 4 | 14 |
| | | | | 5 | 60 |
| | | | | 6 | 60 |
| | | | | 7 | 60 |
| | | | | 8 | 60 |
| | | | | 9 | 60 |
| | | | | 10 | 60 |
| | | | | 11 | 60 |
| | | | | 12 | 60 |
| | | | | 13 | 60 |
| | | | | 14 | 60 |
| | | | | 15 | 60 |
| | | | | 16 | 60 |
| | | | | 17 | 60 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 18 | 14 |
| | | | | 19 | 14 |
| | | | | 20 | 14 |
| | | | | 21 | 14 |
| | | | | 22 | 60 |
| | | | | 23 | 60 |
| | | | | 24 | 60 |
| | | | | 25 | 60 |
| | | | | 26 | 60 |
| | | | | 27 | 60 |
| | | | | 28 | 60 |
| | | | | 29 | 60 |
| | | | | 30 | 60 |
| | | | | 31 | 60 |
| | | | | 32 | 60 |
| | | | | 33 | 60 |
| | | | | 34 | 60 |
| | | | | - | 1672 |

# 4. Timeline

With reference to the tests described in the previous sections, the following timeline applies:

| ID | Description | Estimated duration | Estimated Data Volume | XML file |
|---|---|---|---|---|
| **1. SS-FCP-001** | ME OBCP Power On via OBCP | 00:03:05 | **-** | See [RD.3] |
| **2. SIMBIOSYS_HRIC_TEC_init_POR** | HRIC Channel TEC init | 00:03:50 | 0.0064 [Mb] | ¤ BPSS00286_00002.BC |
| **3. SIMBIOSYS_HRIC_Functional_POR** | HRIC functional test with memory read/write tests and 3 Science acquisitions | 01:30:00 | 6.5585[Gb] | ¤ BPSS00285_00003.BC |
| **4. SIMBIOSYS_HRIC_Dark_Current_POR** | HRIC DC verification | 00:12:00 | 4.5242[Gb] | ¤ BPSS00326_00003.BC |
| **5. SS-FPC-004** | HRIC Channel Off | 00:03:00 | - | See [RD.3] |
| **6. SIMBIOSYS_STC_TEC_init_POR** | STC Channel TEC init | 00:03:50 | 0.0064 [Mb] | ¤ BPSS00298_00002.BC |
| **7. SIMBIOSYS Functional Test STC** | STC functional test with memory read/write tests | 00:19:00 | 0.0625[Gb] | ¤ BPSS00331_00002.BC |

| | | | | |
|---|---|---|---|---|
| | and several Science acquisitions | | | |
| **8. SIMBIO-SYS - STC_Nominal_Test ICO2** | STC DC verification (nominal filters) | 00:44:00 | 4.0977[Gb] | ¤ BPSS00309_00005.BC |
| **9. SIMBIOSYS_STC_all_fpa ICO2** | STC DC verification (large regions of FPA) | 00:10:14 | 2.5525[Gb] | ¤ BPSS00288_00005.BC |
| **10. SS-FPC-007** | STC Channel Off | 00:03:00 | - | See [RD.3] |
| **11. SIMBIOSYS_VIHI_ICO2_POR** | VIHI nominal TEC parameters upload and VIHI performance verification with nominal operative parameters | 01:26:05 | 1.6672[Gb] | ¤ BPSS00289_00003.BC |
| **12. SS-FCP-002** | ME OBCP Power Off via OBCP | 00:03:00 | - | See [RD.3] |