Herschel/Planck Ground Segment System Test Plan

prepared by/*préparé par*	Herschel/Planck Team
reference/*référence*	PT-CMOC-SYS-PL-7202-OPS-ONV
issue/*édition*	1
revision/*révision*	1
date of issue/*date d'édition*	21 Mar 2006
status/*état*	
Document type/*type de document*	Test Plan
Distribution/*distribution*	List inside

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APPROVAL

Title / titre	Herschel/Planck Ground Segment System Test Plan	issue / issue	1	revision / revision	1

author / auteur	E. Chester	date / date	21 Mar 2006

approved / approuvé	H/P Integration and Test Steering Group	date / date	

authorised / autorisé	J. Dodsworth, GSM (OPS-OA)	date / date	

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CHANGE LOG

reason for change / *raison du changement*	issue	revision	date
Issue 1	1	0	1 Mar 2006
Updates following interface changes and ITSG meeting 8 (21/Mar/2006)	1	1	21 Mar 2006

CHANGE RECORD

Issue: 1 Revision: 1

reason for change/ *raison du changement*	page(s)	paragraph(s)
Mission planning validation tests added	65, 66	8.2, 8.3
Objectives for test definitions updated, interfaces updated for the manual stack printout interface.	Various	Various

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1   INTRODUCTION

1.1   Background

The Herschel Space Observatory and the Planck Surveyor are two astronomy missions of the ESA Horizon 2000 Science Programme. Both missions carry cryogenic payloads and will be placed into similar orbits around the Sun-Earth L2 point. Commonality in the flight hardware and in the mission concepts has led naturally to a shared launch, and a shared approach to mission implementation and ground segment preparation and management. Summary and detailed information describing Herschel and Planck are available in [RD-5] and [RD-6] respectively.

The MOC ground segment architecture is presented in [AD-5], and is complemented by the science ground segments for each mission, described in [RD-3] and [RD-4]. The Mission Operations Centre (MOC) will be common to both Herschel and Planck, and shall be located at ESOC in Darmstadt, Germany.

The Herschel/Planck ground segment consists of several different elements contributed by the Project, by the ESA OPS Directorate, and by the Science centres associated with each spacecraft and each instrument. The elements together form a complex and critical system. It is necessary to validate the correct functioning of the ground segment system prior to launch, with regard to spacecraft control and payload utilisation, data retrieval and useful scientific products.

1.2   Purpose and Scope

The purpose of this document is to outline the integration and technical verification (see QMS document [AD-9]) concepts that will be applied to the development and preparation of the ground segment resources for the Herschel and Planck missions. The approach documented here will be followed in order to ensure timely validation and full ground segment readiness to support the mission operations.

Performance of the Ground Segment Operational Validation (see QMS document AD-[10]) is specifically excluded from the scope of this document.

According to [AD-9], this Ground Segment System Test Plan (GSSTP) covers test and validation activities conducted at system level, and in addition provides references to lower level test and validation activities as far as these constitute pre-requisites for system-level activities. In general, the GSSTP covers all activities involving more than one major ground segment element, to the level of interface validation between elements. It also presents appropriate references to activities involving single elements, where these are pre-requisites for higher- or system-level activities. For example, these include unit acceptance testing of the Mission Control System. The GSSTP therefore complements element or site-specific verification work and retains system-wide perspective. Lower level plans and procedures for the integration and verification of subsystems, ground segment elements and also the end-to-end ground segment will be derived from, and consistent with, this plan.

Post-test activities prior to launch are listed as described in [AD-10], as the next logical step to ensure readiness for operations.

The overall schedule and status of integration and test activities is maintained in a separate document: 'H/P Integration and Test Schedule and Status Report' [RD-7]. The latest version contains the most recent schedule information, and status of activities.

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1.3   Objectives

The GSSTP compiles and presents all test activities relevant to system-level validation of the Herschel and Planck combined ground segment. It therefore comprises a primary input into the test planning and preparation work. It shall meet the following objectives:

1. To define the integration and technical validation concepts, and to coordinate lower-level validation planning, in order to maximise consistency and test case coverage.

2. To identify tools, documents, data sources etc. required for test and validation activities.

3. To specify test scenarios and their usage of tools and resources as above.

4. To present plans for the validation activities at system level.

5. To enhance coordination between centres, elements and teams to improve test efficiency and overall quality of validation.

1.4   Applicability

1.4.1   ESA Management

This GSSTP (together with the ITSSR) provide visibility to ESA management in that it:

*   demonstrates that the Herschel/Planck system activities are centrally coordinated, and that schedule risks are minimised by ensuring consistency between the integration and test activities and schedules of different elements.
*   provides visibility of integration and testing planning in a way consistent with the architectural design, in turn providing technical confidence in the system.

1.4.2   H/P Project Management

This GSSTP provides visibility to H/P Project management in that it:

*   is complementary to the system architecture description and is concerned with the interface relationships at facility and centre levels.
*   provides relationships between relevant ICDs and their role in system level testing plans.
*   defines the relationships between system and element level testing.
*   describes the rationale for integration and test scheduling.
*   facilitates management of the overall integration and test schedule and is a coordination tool for all integration and test activities in different centres.
*   identifies pre-requisite activities and resources for testing in line with the overall rationale of system integration and preparation.
*   provides a master document overview supporting the reference to and review of lower-level, more detailed, validation plans.

1.4.3   Ground Segment Element/Centre/Facility Managers

This GSSTP is applicable to Element/Centre/Facility management in that it:
- defines system-level requirements applicable to lower-level activities.
- provides test definitions that contain the requirements for integration and test activities between elements, centres and facilities
- defines organisational responsibilities
- provides information to support review of lower-level validation plans
- is a reference for coordinating integration and test activities

1.4.4   Test Managers

This GSSTP is applicable to Test Managers in that it:
- provides system-level inputs required to define individual test plans and procedures
- defines organisational responsibilities
- is a reference for coordinating integration and test activities

1.5   Test Planning Documentation

The following Figure 1 shows the relationship between various documents that either support the definition of this GSSTP (e.g. system requirements), or are derivatives from it (e.g. specific test plans). The system-level requirements documents for the MOC are the MIRD [AD-1], and the ground segment specifications are the component top-level requirements. The Herschel and Planck Science Ground Segment requirements are found in the Herschel and Planck SIRDs [AD-14] and [AD-15] respectively. The ground segment *as a system* is to be validated against these requirements.

Requirements on interfaces are partly verified during lower-level component tests and compatibility tests, and partly verified in context during system-level integration and verification as outlined in the remainder of this document. The lower-level (detailed) activities on components, centres and facilities are presented in dedicated System Test Plans (STP), Acceptance Test Plans (ATP), Integration and Test Plans (ITP), and Verification and Validation Plans (VVP). In some cases, requirements presented in this GSSTP are inputs to the lower-level plans that must be regarded as test requirements.

Documentation produced in test preparation, execution and reporting is described in section 5 'Test Organisation'.
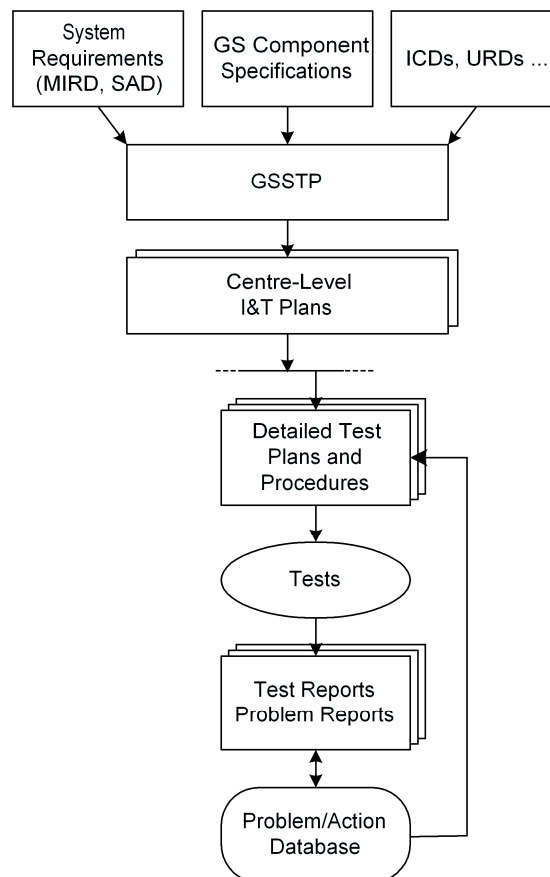

Figure 1: Documentation Relationships

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1.6   Document Overview

The following table lists the organisation of sections within this GSSTP.

Chapter	
2	Documentation
	A list of applicable and reference documents is given.
3	Ground Segment Description
	This chapter provides an overview of the overall ground segment, and the list of all interfaces involved.
4	Integration and Validation Approach
	This chapter explains how the various integration and validation activities have been classified into:
	• Compatibility tests (stand alone tests)
	• Integration tests (involving two or more elements, centre/stations, facilities) and
	• Validation tests (complex operational scenarios involving major parts of the GS).
5	Test Organisation
	This chapter describes the organisation of the integration and validation activities including responsibilities for testing, reporting procedures, and documentation to be developed.
6	Compatibility Tests
	Compatibility tests involve two GS elements and are aimed primarily at interface format verification without the use of formal communication interfaces and protocols. The operational interface scenario does not apply. A description is provided for each interface test to be performed, to a level sufficient to derive the individual test plans and procedures.
7	Integration Tests
	Integration tests involve two or more GS elements and are aimed primarily at interface format verification over the operation interface using formal communication procedures. A description is provided for each interface test to be performed, to a level sufficient to derive the individual test plans and procedures.
8	Technical Validation Tests
	Ground segment technical validation tests [AD-9] involve two or more GS elements, and are aimed primarily at validating the functionality of the GS systems/elements and in verifying their compatibility with external entities and with the space segment, exercising, to the maximum extent possible, operational interfaces, and maximising the use of operational hardware, software, personnel and procedures. The validation scenarios for each ground segment chain are described.
9	Post-Validation Activities
	This chapter mentions the list of activities to be performed after successful completion of the Integration and Technical Validation until the start of the operational missions. This includes "Ground Segment Operational Validation" [AD-10] which is the ultimate step of the GS validation process during which all GS elements including operations teams and support data are exercised through realistic mission scenarios in order to achieve a final confirmation of the adequacy of the GS to support the mission. **Post-Validation is specifically excluded from the scope of the GSSTP.**
10	Annexes
	Interfaces, Tests and Requirements coverage matrices

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1.7 Assumptions

The list of assumptions is available in a separate document 'Integration and Test Schedule and Status Report' (ITSSR). The latest available version of the ITSSR [RD-7] should be consulted.

1.8 Definitions and Terminology

The following terms are used with specific meanings in this document;

Centre	A co-located set of 1 or more integrated subsystems that perform a specific role within the mission and its ground segment, e.g. HSC, PACS-ICC, LFI-DPC. Interfaces to a centre are at the level of the end-to-end system.
Facility	A functional equivalent of a centre.
Subsystem	A primary part of a facility/centre. Interfaces to a subsystem are internal to the centre.
Component	A single subsystem of a facility, at the lowest level modelled in the architecture. Interfaces to a component are internal to the Centre/Facility.
Element	Any distinct part of the ground segment at any level

1.9 Acronyms

AD	Applicable Document
AHF	Attitude History File
AIV	Assembly, Integration, Verification
ACMS	Attitude Control and Measurement System
APF	Attitude Parameter File
APID	Application Program Identifier
APPL	Augmented Pre-programmed Pointing List
ASF	Attitude Snapshot File
AT	Acceptance Test
ATP	Acceptance Test Plan
CCS	Configuration Control System
CCS	Central Check-out System
CDMU	Command and Data Management Unit
CLTU	Command Link Transmission Unit
CReMA	Consolidated Report on Mission Analysis
CRP	Contingency Recovery Procedure
CT	Compatibility Test
CTT	Compatibility Test Trailer
DDS	Data Disposition System
DFE	Data Front-End Equipment
DFT	Data Flow Test
DPC	Data Processing Centre
DSN	Deep Space Network
DTCP	Daily Telecommunication Period
E2E	End-To-End [Test]
EE	End-to-End test
EGSE	Electrical Ground Support Equipment
EM	Engineering Model
EPOS	Enhanced Preferred Observation Sequence File (Herschel planning)
ESA	European Space Agency
ESOC	European Space Operations Centre
ESTEC	European Space Research and Technology Centre
FAR	Flight Acceptance Review
FCP	Flight Control Procedure
FD	Flight Dynamics
FDS	Flight Dynamics System
FM	Flight Model
FOP	Flight Operations Plan
FR	Frame Relay [Services]

FTP	File Transfer Protocol
G/S	Ground Station
GS	Ground Segment
GSIT	Ground Segment Integrated Test
GSM	Ground Segment Manager
GSRR	Ground Segment Readiness Review
GSSTP	Ground Segment System Test Plan
HFI	(Planck) High-Frequency Instrument
HGA	High-Gain Antenna
HIFI	(Herschel) Heterodyne Instrument
HK	Housekeeping
HPR	Hardware Problem Report
HPSDB	Herschel/Planck Spacecraft DataBase
HSC	Herschel Science Centre
HW	Hardware
IA	Interactive Analysis
ICD	Interface Control Document
ICP	Instrument Command Parameter
IDIS	Integrated Data and Information System
IID-B	Instrument Interface Document, Part B
ILT	Instrument Level Test
IOM	Instrument Operations Manager
IOT	Instrument Operations Team
IP	Internet Protocol
ISDN	Integrated Services Data Network
IST	Integrated System Test
IT	Integration Test
ITSG	Integration and Test Steering Group
ITSSR	Integration and Test Schedule and Status Report
KBPS	Kilo Bit Per Second
KOUROU	ESA LEOP Station [Kourou, French Guyana]
LAN	Local Area Network
LEOP	Launch and Early Orbit Phase
LFI	(Planck) Low-Frequency Instrument
LOS	Loss of Signal
MCS	Mission Control System

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MOC	Mission Operations Centre		RT	Real Time
MOM	Mission Operations Manager		RTA	Real-time Assessment
MPS	Mission Planning System			
MRT	Mission Readiness Test		S/C	Spacecraft
MVL	Monitored Variable List (Station antenna angles)		S2K	SCOS-2000
			SCH	Scheduling Office (ESOC)
			SCOE	Special Check-out Equipment
NCD	Network Configuration Document		SCOS	Spacecraft Operating System
NCTRS	Network Control & Telemetry Receiver System		SDS	Secure Data Server
			SGS	Science Ground Segment
NDIU	Network Data Interface Unit		SLE	Space Link Extension
NNO	New Norcia Ground Station, W. Australia		SLES	SLE Services
			SMP	Science Management Plan
NRT	Near-Real Time		SODA	SCOS-ORATOS Data Access server (FDS interface)
OBCP	Onboard Control Procedure		SOM	Spacecraft Operations Manager
OBSW	On-Board Software		SOVT	System Operational Validation Test
OBSM	Onboard Software Maintenance		SPIRE	(Herschel) Spectral and Photometric Image Receiver
OBSMS	OBSM System			
OD	Operational Day		SPR	Software Problem Report
ODB	Operational Database		SSH	Secure Shell (protocol)
OM	Operations Manager		SSMM	Solid-State Mass Memory
OOL	Out of limits		SSO	Solar System Object
OPSLAN	Operational LAN		STDM	
OPSNET	Operational Network		STP	System Test Plan
			SVM	Service Module
PACS	(Herschel) Photo Detector Array Camera and Spectrometer		SVT	System Validation Test
			SW	Software
PFOP	Planck Flight Operations Plan			
PI	Principal Investigator		TBC	To be confirmed
PISA	Principal Investigator Support Area [MOC]		TBD	To be defined
			TC	Telecommand
PLM	Payload Module		TCP	Transmission Control Protocol
POD	Planning and Observation Data [File]		THF	Telecommand History File
POS	Preferred Observation Sequence		TIF	TMTCS Interface (for SIM-MCS)
PPL	Pre-programmed Pointing List		TM	Telemetry
PS	Project Scientist		TOO	Target of Opportunity
PSF	Planning Skeleton File		TPF	Task Parameter File
PSO	Planck Science Office		TSF	Timeline Summary File
PSR	Project Support Room		TVP	Target Visibility Predictor
PSS	Portable Satellite Simulator			
PST	Polling Sequence Table		VC	Virtual Channel
PSTN	Public Switched Telephone Network		VT	(Technical) Validation Test
PV	Performance Verification		VVP	Verification and Validation Plan
QA	Quality Assurance		WAN	Wide Area Network
QLA	Quick Look Analysis			
QM	Qualification Model			
RD	Reference Document			
REPOS	Re-planned EPOS			
RF	Radio Frequency			

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2   DOCUMENTS

2.1   Applicable Documents

The following documents are applicable to this Ground Segment System Test Plan. The most recent issue applies unless otherwise indicated.

AD	Document Title	Reference
1	Herschel/Planck Mission Implementation Requirements Document	SCI-PT-8818 Issue 1.4, 1 Jul 2004
2	Herschel/Planck Mission Implementation Plan	PT-MGT-MIP-1001-TOS-OGH Issue 1.0, May 2003
3	Herschel/Planck Operations Interface Requirements Document	SCI-PT-RS-07360 Issue 2.2, 31 Sep 2003
5	Herschel/Planck MOC Ground Segment System Architecture Description	PT-CMOC-SYS-ADD-7101-OPS-ONV Issue 1.2, 1 Dec 2005
6	Herschel Ground Segment Interface Requirements Document	FIRST/HSC/DOC/0117 Issue 2.4, 20 May 2005
7	Planck Ground Segment Interface Requirements Document	Planck/PSO/2002-003 Issue 3.0, 27 Sep 2004
8	Herschel/Planck Station and Facilities Requirements Document	PT-CMOC-GF-RS-5001-OPS-ONV Issue 1.2, 24 Jan 2005
9	Procedure for GS Integration and Technical Validation	QMS-ESOC-GSEG-PR-1300-OPS Issue 1.5, Sep 2004
10	Procedure for Performance of GS Operational Validation	QMS-ESOC-GSEG-PR-1600-OPS Issue 1.4, Sep 2004
11	Work Instruction for Test Planning and Reporting	QMS-ESOC-GSEG-WI-1301-OPS Issue 1.5, Sep 2004
12	Anomaly and Problem Identification Reporting and Resolution.	QMS-ESOC-PROB-PR-6200-OPS Issue 1.6, Sep 2004
13	Herschel/Planck Space to Ground ICD	SCI-PT-ICD-07418 Issue 3.2, 1 Dec 2004
14	Herschel Science Implementation Requirements Document (SIRD)	SCI-PT-3646 Issue 1.1, 18 May 2001
15	Planck Science Implementation Requirements Document	SCI-PT-08584 15 Dec 2001
16	Procedure for Identification, Control and Analysis of Non-Conformances	QMS-ESOC-PROB-PR-6300-OPS Issue 1.6, Sep 2004

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2.2   Reference Documents

The following reference documents have been identified.

RD	Document Title	Reference
1	*deleted*	
2	Herschel/Plank MOC Configuration Management Plan	PT-QA-PL-1001-TOS-OGH Issue 1.0, 27 May 2003
3	Herschel Ground Segment Design Description	Herschel/HSC/DOC/0146 Issue 1.4, 4 Oct 2004
4	Planck Ground Segment Design Description	Planck/PSO/2002-002 Issue 3.0, 27 Sep 2004
5	Herschel Operations Scenario	Herschel/HSC/DOC/0114 Issue 1.2, 17 Mar 2002
6	Planck Operations Scenario	Planck/PSO/2001-001 Issue 0.1.5, 26 Mar 2003
7	Herschel/Planck Ground Segment Integration and Test Schedule and Status Report	PT-CMOC-SYS-SCH-7302-OPS-ONV Issue 2.0, 21 Nov 2005
8	Integration and Test Steering Group Terms of Reference	PT-CMOC-SYS-TOR-7301-OPS-ONV Issue 1.0, 21 Feb 2005
9	Guide to software verification and validation	ESA PSS-05-10 Issue 1 Rev 1, Mar 1995

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3   INTEGRATION AND VALIDATION APPROACH

3.1   Overview

The Herschel/Planck Ground Segment integration and validation approach is based upon progressive integration and testing of the elements of the ground segment. This is accomplished by interface testing and end-to-end validation of subsets of elements, culminating with complete ground segment end-to-end validation.

Integration and testing at subsystem level is the responsibility of the subsystem manager. The integration and validation of the separate Science Ground Segment centres are the responsibility of the Herschel and Planck SGS Test Managers respectively. A separate test manager shall support MOC integration and validation. Overall system integration and validation remains the responsibility of the GSM, and is coordinated and driven by the Integration and Test Steering Group (ITSG) (refer to section 5.2).

3.2   Test Naming Convention

In order to maintain consistent test descriptions, reports, and clarity in relevant communications, each test shall have an identifying name according to the following scheme. Note that Acceptance Tests are not in the scope of this document.

        [H,P,HP]GS-xT-id-n[.m]

where H, P or HP indicates relevant mission(s), GS signifies 'Ground Segment', 'T' is 'test', and the placeholder values are defined according to the following table.

Placeholder	Description	Values			
		Acceptance Test	*Compatibility Test*	*Integration Test*	*Validation Test*
x	Test type	A	C	I	V
id	Identifier	Component identifier (1)	Interface identifier or element/scope acronym (2)		
n	test sequence number	a sequential numeric identifier for tests of the specified interface (3)			
m	sub-sequence number	a sub-test or step identifier for the specified interface (3) - *optional*			

Table 1: Test Naming Convention

Notes

1 –   For tests not involving a specific interface (i.e. acceptance tests, validation testing) `iii` shall be the acronym of the component or element concerned, e.g. DDS, SVT.

2 –   Interface identifier consistent and compliant with the named groups within section 4.3.

3 –   `n` and `m` are sequential counters for the test.

Note that the numbering does not necessarily imply or require chronological test execution. For example, test `HPGS-CT-M02-1.0` may be performed after `HPGS-CT-M02-3.0` – depending upon compliance with pre-requisite steps.

The number of digits for `n` and `m` is variable and is the width of the value.

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Examples

```
HGS-IT-H01-3.014
```
          14th subtest or step of integration test 3 between HSC and MOC

```
PGS-VT-P01-11.007
```
          7th subtest or step of validation test 11 between Planck SGS and MOC

3.3   Logical and Functional Test Levels

The Herschel/Planck ground segment can be divided into several levels from components up to the complete system. An overview of these levels is provided in Figure 2 below. The level at which an element appears naturally also corresponds to the testing activities applicable to it.
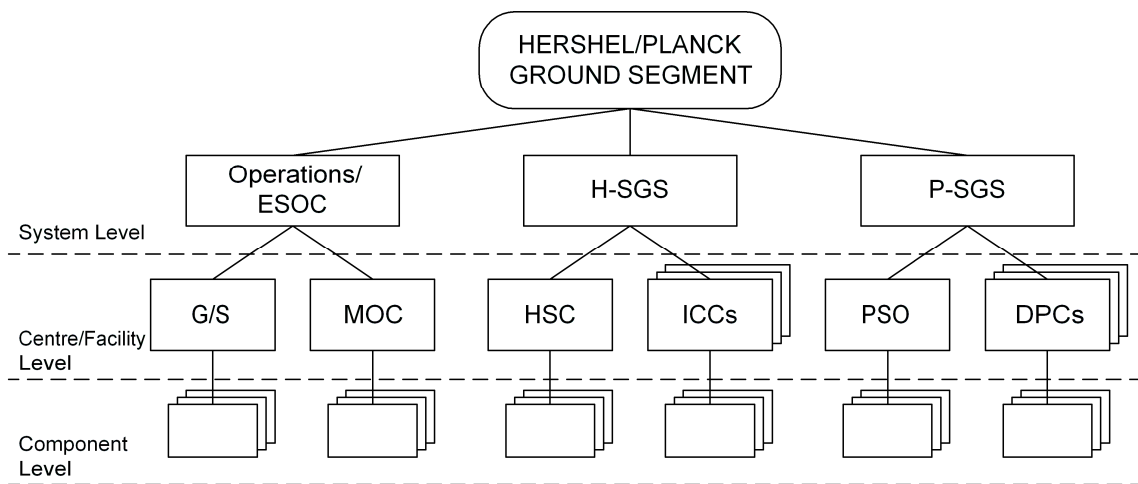

Figure 2: Test Levels

The various test levels can be defined as follows. System level describes major components at the top level, e.g. the MOC and the Science Ground Segments (as distinct entities) which interact via top-level interfaces that are considered external to the components.

Centre-level describes activities internal to a system-level major component. Centre-level includes in general several components each of which must be integrated and validated to support the functionality of the centre. Note that centre does not necessarily correspond to a physical centre or site, but rather a logical (or functional) entity.

Component level describes individual elements of the ground segment, such as a software facility or hardware component that is logically interfaced via a higher-level component.

This GSSTP is concerned with activities at system level, i.e. the integration of the science centres, the MOC and the spacecraft interfaces. Test and validation activities at centre level and 'below' are to be described in dedicated ATPs, STPs and VVPs as required.

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3.4   Test Configurations

The GSSTP comprises:

- Compatibility and Integration tests between two ground segment elements . These are aimed primarily at interface verification (sections 3.4.1 and 3.4.2). The additional case of interfaces with the spacecraft is also included.

- Validation tests involving more ground segment elements, aimed primarily at exercising operational interfaces. These maximise the use of operational hardware, software, personnel and procedures (section 8). Validation tests are concerned primarily with functionality rather than data (e.g. Planning, Processing, Distribution, Reporting etc.). In this light they also deal with the configuration, consistency and coordination of the ground segment.

3.4.1   GS Compatibility Tests

Compatibility tests are the first step in ground segment testing

Test scenario	Stand-alone tests involving only two elements
Interfaces	Email, fax, ftp or other exchange as required.
Data Sources	Represented by simulators, simulated test data, *etc.*
Purpose	To test compatibility for the exchange of data on facility level between different GS elements, centre/stations, facilities. It is not required to validate the interface on both sides of a data exchange during the same test.
Goal	Verification of ICDs with respect to data structure, file syntax, etc.
Pre-requisites	Functionality to process (or check via manual means) the data which are provided from the other side of the interface to be tested.
Assumptions	
Constraints	Scheduling must be consistent with element, centre/station, facility development and test planning.

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3.4.2   GS Integration Tests

Integration tests are a second step in ground segment testing involving increased complexity. Integration tests involve at least two connected ground segment elements. Integration tests of multiple interfaces may be combined into a single test activity if it is convenient and logical to do so. Details for each integration test shall be provided in a dedicated I&T Plan or VVP. The integration tests to be performed are presented in section 7.

Test scenario	Two or more elements connected with each other to enable functional testing and data exchange
Interfaces	The final links and protocols are not necessarily exercised, but interfaces supporting data exchange in a representative way (temporary links, etc.) are used.
Data Sources	Sample files, recorded data, simulators
Purpose	1. Test of communication protocols and synchronisation
	2. Syntax check of data structures exchanged on the interface
	3. Test of the functionality of the facilities
	4. Test of operations procedures
Goal	1. Communication verification
	2. Verification of ICDs
Pre-requisites	1. Functionality of interfaces required by a particular test
	2. Compatibility tests of elements involved are successfully completed. This step may be skipped in simple cases.
	3. Element interfaces are acceptance and compatibility tested successfully, as required to support the integration test.
Assumptions	1. The elements to be integrated have been Acceptance Tested according to the relevant ATP.
	2. Facilities not directly involved in the test but having interfaces to the tested facilities are either available for the test or represented by simulators, simulated test data etc.
	3. Tests can be carried out in an incremental manner with increasing complexity
Constraints	1. Facilities involved in a test are available with the full functionality needed.
	2. Links between tested facilities must be either available or represented with sufficient level of performance.
	3. Scheduling must be consistent with element, centre/station, facility development and test planning.

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3.4.3 GS Technical Validation Tests

Technical validation tests form the final stage of ground segment technical verification and involve the operational system elements at centre level, and the ground interfaces with the spacecraft. Validation tests are based on scenarios related to functional chains of dataflow. These scenarios are described in section 8. The details for each test are to be provided in the appropriate VVP.

Test scenario	Involvement of two or more operational GS elements
Interfaces	Operational network between the ground segment elements with full performance, including spacecraft interfaces.
Data Sources	Functional subsystems, spacecraft (e.g. AVM, SVM, satellite), recorded data, simulators
Purpose	Verify overall GS operability and robustness under real conditions. Validate ground segment operational processes.
Goal	Validation of system level requirements on functionality and dataflow
Pre-requisites	1. Operational GS elements available with functionality as needed for the various validation scenarios 2. Successful completion of Integration Tests which are pre-requisite for a particular validation scenario
Assumptions	GS elements not playing an active role in the respective test can be represented by simulators, simulated test data, *etc.*
Constraints	Test activities completed for operational validation phase, and in time for the Sims campaign.

4 GROUND SEGMENT DESCRIPTION

4.1 System Overview

The overall ground segment for the Herschel and Planck missions is presented in the following documents, and the architecture and its details are not repeated here. However, a brief summary of the ground segment is present below (excerpt from [AD-5]). These documents are used as constraints to the planning of integration and test activities.

- MOC System Architecture [AD-5]
- Herschel Science Ground Segment Design Description [RD-3]
- Planck Science Ground Segment Design Description [RD-4]

The Herschel/Planck Ground Segment is composed of several elements, described in section 3.2.

This section is provided as a reference illustration to support and structure the component descriptions in following sections. It is not intended as a complete diagram of all aspects of the Herschel and Planck ground segments, just a top-level block diagram of the centres and their interconnections. The Herschel/Planck Ground Segment is fully described in [AD-5], [RD-3] and [RD-4].


MOC	Mission Operations Centre, ESOC
HSC	Herschel Science Centre
SPIRE ICC	Herschel SPIRE Instrument Control Centre
HIFI ICC	Herschel HIFI Instrument Control Centre
PACS ICC	Herschel PACS Instrument Control Centre
PSO	Planck Science Office
HFI DPC	Planck HFI Data Processing Centre
LFI DPC	Planck LFI Data Processing Centre
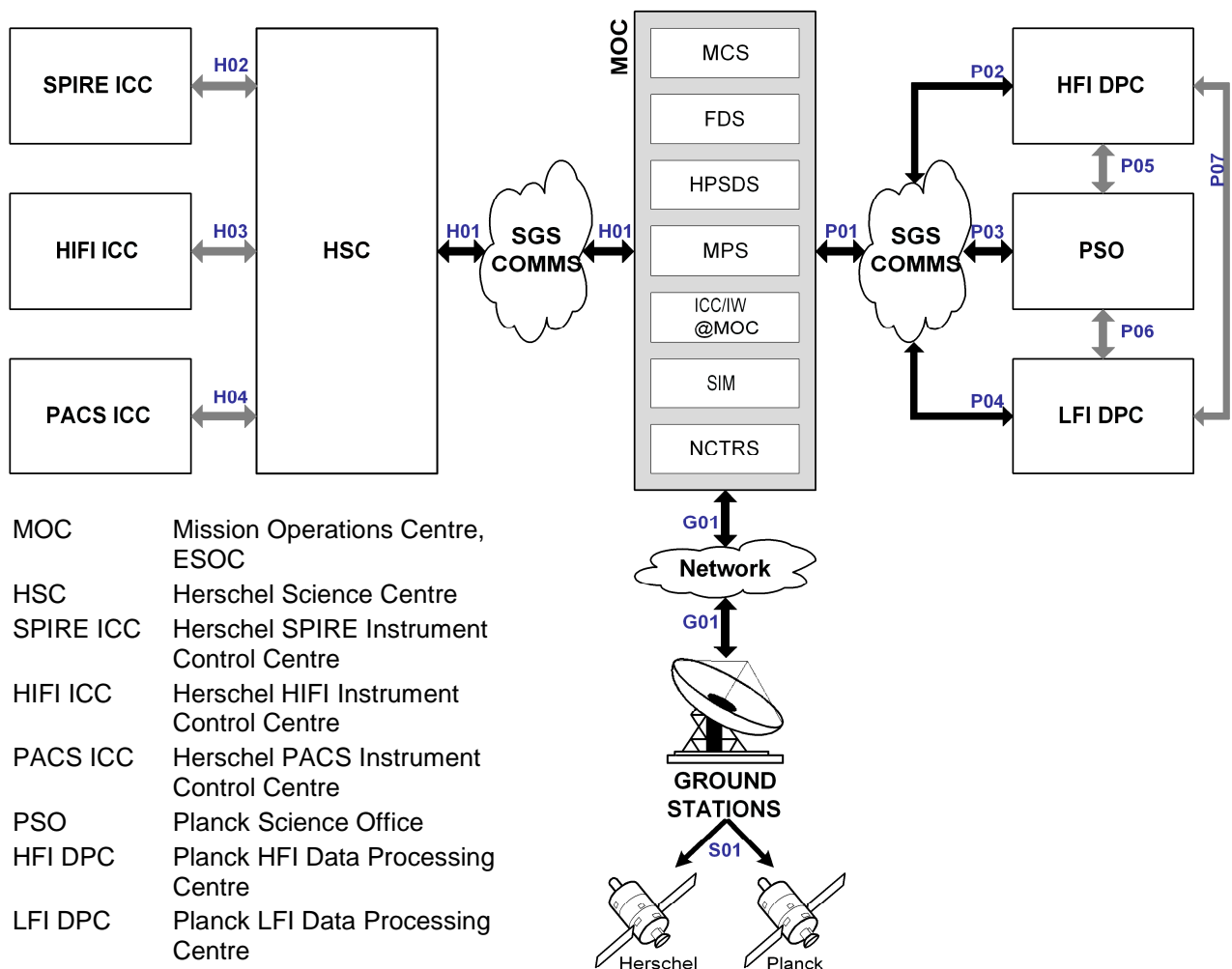
Figure 3: Herschel/Planck Ground Segment Overview

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4.1.1   Component List

MOC - ESOC, Darmstadt

DPC-M	Planck instrument workstations @MOC
FDS	Flight Dynamics Systems (Including Attitude, Orbit and Planning subsystems)
ICC-M	Herschel ICC@MOC
LANS	The networks required at MOC to support the MOC subsystems: OPSLAN, RELAYLAN, ACCESSLAN, PISALAN, SIMLAN, DEVLAN
MCS	Mission Control System
MOC	Mission Operations Centre
MPS	Mission Planning System
NCT	NCTRS / NIS
SDA	SODA Server
SDE	Software Development Environment
SDS	SDS
SDS-D	SDS DDS Service
SDS-F	SDS RTSI system (previously 'frame decommutator')
SDS-T	SDS File Transfer Service
SIM	Simulator

External Components

JPL	NASA/JPL

Ground Network – ESA Ground Infrastructure

COM-N	ESTRACK Comms Network OPSNET
COM-S	Science Ground Segment Comms Network
STA	Ground Station LEOP/Transfer: New Norcia, Kourou and Villafranca Routine: New Norcia, Cebreros
SCH	Station Scheduling

Herschel SGS - Distributed

HCSS	Herschel Common Science System
HSC	Herschel Science Centre – ESAC, Spain
ICC-H	HIFI ICC - SRON, Gröningen, Holland
ICC-P	PACS ICC - MPE Garching, Germany
ICC-S	SPIRE ICC - Rutherton-Appleton Laboratories, UK
ODB	ODBMS Subsystem
OBS	OBSM Subsystem
HLP	Helpdesk Subsystem
HOT	HOTAC Subsystem
HAB	Herschel Archive Browser
HDPS	Herschel Data Processing System

Planck SGS – Distributed

DPC-H	HFI DPC - IAS, Orsay, France
DPC-L	LFI DPC - OAT Trieste Italy
PSO	Planck Science Office, ESAC, Spain

Table 2: Component Identifiers

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4.2 End-to-End Data Flow

The end-to-end data flow in the Herschel/Planck ground segment is the primary driver for the ground segment architecture, and therefore for the integration and testing plan. Testing activities at GSSTP level are focussed on system level interfaces, and functional chains of subsystems. These are illustrated in the following figure.
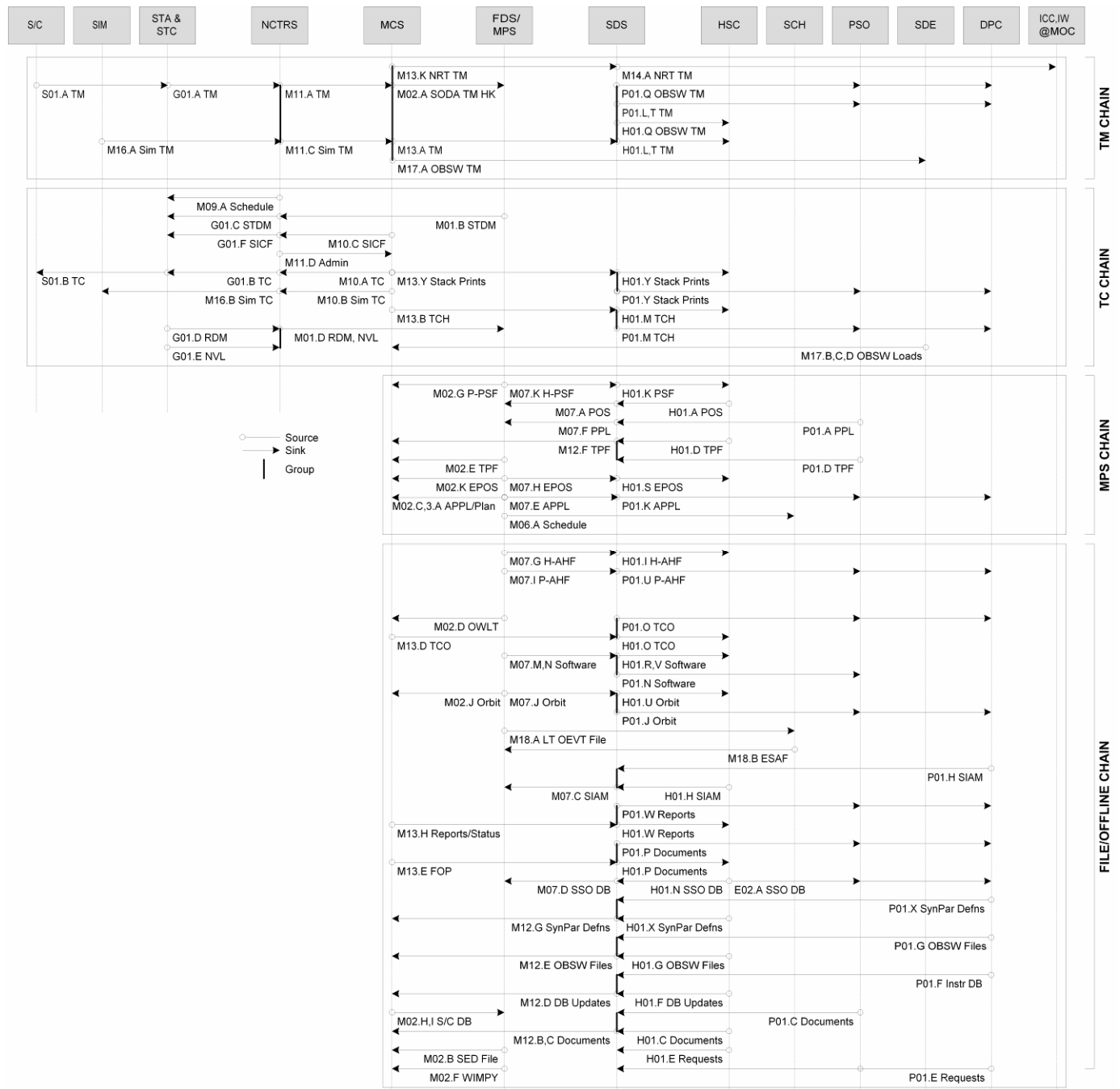

Figure 4: End-end data flow interfaces

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4.3   Interfaces

4.3.1   Interface Identifiers

The following scheme of interface naming pertains to the overall Herschel and Planck ground segment. This description is as presented in [AD-5], updated with inputs from Science Ground Segment. The following interface group designators are used.

- M: MOC Interfaces (Mnn)
- H: Herschel SGS Interfaces (Hnn)
- P: Planck SGS Interfaces (Pnn)
- G: Ground Network Interfaces (Gnn)
- S: Space Network Interfaces (Snn)
- E: External (to all of the above) interfaces (Enn)

The labels for each interface group are maintained throughout this document, with individual interfaces within a group identified in the following way

        Tnn.X.AAA.BBB

where:

T	is the interface group designators M, H, P, G, S as above
nn	is the interface group number
X	is a letter assigned to the specific interface within the group
AAA	is the interface source component mnemonic*
BBB	is the interface sink component mnemonic*

Component mnemonics are typically 3 letters. Where necessary, these may be extended to 4 or more characters.

It is simple therefore to determine an interface's relationship to the top-level system context from its name alone. The subsystems associated with an interface are explicitly shown, as is the direction of the exchange on the interface. 'Flat' naming structure (no hierarchy) allows simple tracking of test and integration status in a database. Newly defined or discovered interfaces can easily be added and tracked

Examples

M10.A.MCS.NCT	(Forward Telecommands from MCS to NCTRS)
P01.C.DPC.SDS	(Planck Instrument Manuals and Configuration Files, from either DPC to the HP-SDS component)

4.3.2   Interface Levels for Integration and Test

This section captures the interfaces defined in the system architecture and shows the level at which they are handled in integration and test planning. This ensures coverage of the defined interfaces. For each interface, the functional level is indicated. In the following subsection, those indicated as 'System Level' below are extracted, with references to the applicable ICD(s) and where the test is described later in this test plan.

Interface	Description	Test Level		
		System *(GSSTP)*	**Centre** *(Centre I&T Plan)*	**Subsystem** *(Acceptance Test Plans)*
E01 External Interfaces				
E01.A.MOC.JPL	FD Orbit file to JPL in CCSDS format		■	
G01 NCTRS to/from Ground Stations				
G01.A.STA.NCT	Incoming TM	■	■	■
G01.B.NCT.STA	Forward TCs	■	■	■
G01.C.STA.NCT	STDM to Station		■	■
G01.D.STA.NCT	Ranging/doppler/meteo from IFMS to FDS		■	
G01.E.STC.NCT	Antenna angles; MVL		■	
G01.F.NCT.STA	SICF for Station TMTCS via NCTRS		■	■
G01.G.NCT.STC	Tracking schedule		■	■
H01 MOC to/from SGS Comms network				
H01.A.HSC.SDS	POS (Planned and re-planned POS) from HSC to FDS (via SDS)	■		
H01.C.HSC.SDS	Instrument Manuals and Configuration [Herschel]		■	
H01.D.HSC.SDS	Task Parameter Files [Herschel]	■		
H01.E.HSC.SDS	DDS Requests (Online and XML) [Herschel]	■		
H01.F.HSC.SDS	Instrument database updates [Herschel]	■		
H01.G.HSC.SDS	Instrument OBSW files [Herschel]	■		
H01.H.HSC.SDS	Spacecraft/Instrument Alignment History (SIAM) [Herschel]	■		
H01.I.SDS.HSC	Attitude History File (AHF) from FDS to HSC [Herschel] (via SDS)	■		
H01.K.SDS.HSC	PSF from FD to HSC [Herschel] (via SDS)	■		
H01.L.SDS.HSC	Consolidated and unconsolidated TM [Herschel]	■		
H01.M.SDS.HSC	TC History [Herschel]	■		
H01.N.HSC.SDS	SSO DB from HSC to FDS (via SDS)	■		
H01.O.SDS.HSC	Time Correlation	■		
H01.P.SDS.HSC	Flight Operations Procedures		■	
H01.Q.SDS.HSC	OBSW Images (TM)	■		
H01.R.SDS.HSC	Attitude Constraint Checker	■		■ FDS
H01.S.SDS.HSC	EPOS, EPOS summary and APF from FDS to HSC [Herschel] (via SDS)	■		
H01.T.SDS.HSC	Derived parameter and OOL TM	■		
H01.U.SDS.HSC	Orbit Data	■		
H01.V.SDS.HSC	Slew time and path predictor	■		■ FDS

Interface	Description	Test Level		
		System *(GSSTP)*	*Centre* *(Centre I&T Plan)*	*Subsystem* *(Acceptance Test Plans)*
H01.W.SDS.HSC	Status reports (operations and schedule)	■		■
H01.X.HSC.SDS	Derived parameter definitions	■		
H01.Y.SDS.HSC	Manual stack printout files	■		
H02	HSC to/from SPIRE ICC		■	
H03	HSC to/from HIFI ICC		■	
H04	HSC to/from PACS ICC		■	
M01 NCTRS link to/from FDS				
M01.B.FDS.NCT	STDM to Station (from FDS via NCTRS)		■	■ FDS
M01.D.NCT.FDS	Tracking data STA to FDS (Ranging/doppler/meteo/MVL)		■	■ FDS
M02 MCS link to/from FDS				
M02.A.MCS.FDS	HK TM from MCS via SODA		■	■ FDS
M02.B.FDS.MCS	SED file		■	■ FDS
M02.C.FDS.MCS	APPL, APPL summary and APF from FDS [Planck]		■	■ FDS
M02.D.FDS.MCS	Propagation delay data to MCS		■	■ FDS
M02.E.FDS.MCS	FD-TPFs from FDS to MCS		■	■ FDS
M02.F.FDS.MCS	WIMPY file to MCS		■	■ FDS
M02.G.FDS.MCS	PSF from FD to P-MCS [Planck]		■	■ FDS
M02.H.MCS.FDS	HPSDB to FDS from MCS mirror		■	■ FDS
M02.I.MCS.FDS	HPSDB ASCII dump to FDS		■	■ FDS
M02.J.FDS.MCS	FD Orbit Events File delivery to MCS		■	■ FDS
M02.K.FDS.MCS	EPOS, EPOS summary and APF from FDS to MCS [Herschel]		■	■ FDS
M03 MPS link to MCS				
M03.A.MPS.MCS	Mission plan, timeline, saved stacks/sequences		■	■
M04 and M05 are superceded or not needed. They are removed from MOC SAD from Issue 1.3 onwards.				
M06 MPS link to SCH (Station schedules)				
M06.A.MPS.SCH	Station scheduling request file		■	
M07 FDS link to/from SDS				
M07.A.SDS.FDS	POS (Planned and re-planned POS) from HSC to FDS (via SDS)	■	■	
M07.C.SDS.FDS	Incoming Spacecraft/Instrument Alignment History (SIAM) [H/P]		■	
M07.D.SDS.FDS	SSO DB from HSC to FDS (via SDS)		■	
M07.E.FDS.SDS	APPL (Augmented Preprogrammed Pointing List),APPL Summary and APF from FD to PSO	■	■	
M07.F.SDS.FDS	PPL (Preprogrammed Pointing List) from Planck SGS to FDS (via SDS)	■	■	
M07.G.FDS.SDS	Attitude History File (AHF) from FDS to HSC (via SDS)	■	■	
M07.H.FDS.SDS	EPOS, EPOS summary and APF from FDS to HSC [Herschel] (via SDS)	■	■	
M07.I.FDS.SDS	Attitude History File (AHF) from FDS to PSO, DPCs	■	■	

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Interface	Description	System (GSSTP)	Centre (Centre I&T Plan)	Subsystem (Acceptance Test Plans)
M07.J.FDS.SDS	Orbit data from FDS	■	■	
M07.K.FDS.SDS	PSF from FD to HSC [Herschel] (via SDS)	■	■	
M07.M.FDS.SDS	Attitude Constraint Checker			■ FDS
M07.N.FDS.SDS	Slew time and path predictor			■ FDS
M10 MCS to NCTRS				
M10.A.MCS.NCT	Forward Telecommands from MCS to NCTRS	■	■	■
M10.B.MCS.NCT	Simulator Forward TCs		■	■
M10.C.MCS.NCT	SICF for Station TMTCS via NCTRS		■	■
M11 NCTRS to MCS				
M11.A.NCT.MCS	Incoming TM	■	■	■
M11.C.NCT.MCS	Simulator TM		■	■
M11.D.NCT.MCS	NCTRS Admin Messages		■	■
M12 SDS to MCS				
M12.B.SDS.MCS	Instrument Operations Procedures [H/P]		■	
M12.C.SDS.MCS	Instrument Manuals and Configuration [H/P]		■	
M12.D.SDS.MCS	Instrument database updates [H/P]		■	
M12.E.SDS.MCS	Instrument OBSW files [H/P]		■	
M12.F.SDS.MCS	Task Parameter Files [H/P]		■	
M12.G.SDS.MCS	Derived parameter definitions		■	
M13 MCS to SDS				
M13.A.MCS.SDS	Consolidated TM	■	■	
M13.B.MCS.SDS	TC History [H/P]	■	■	
M13.D.MCS.SDS	Time Correlation [H/P]	■	■	
M13.E.MCS.SDS	Flight Operations Procedures		■	
M13.H.MCS.SDS	Status reports (operations and schedule)	■	■	
M13.K.MCS.SDS	Incoming NRT TM for ICC@MOC	■	■	
M13.Y.MCS.SDS	Manual stack printout	■		
M14 SDS to PISA Systems				
M14.A.SDS.ICC-M	NRT TM from NCTRS	■		
M14.B.ICC-M.SDS	SDS Requests (Online and XML)	■		
M14.C.SDS.ICC-M	Consolidated TM	■		
M14.D.SDS.ICC-M	DDS Auxiliary Files	■		
M16 Sim to/from NCTRS				
M16.A.SIM.NCT	Simulated TM		■	■
M16.B.NCT.SIM	Simulator Forward TCs		■	■
M17 SDE to/from MCS				
M17.A.MCS.SDE	OBSW Dump TM		■	
M17.B.SDE.MCS	OBSW Images for OBSM		■	
M17.C.SDE.MCS	OBCP Token Code Binary		■	
M17.D.SDE.MCS	OBCP Saved Stacks		■	
M18 SCH to/from FDS				
M18.A.FDS.SCH	Long term Orbit Events File		■	

Interface	Description	Test Level		
		System (GSSTP)	Centre (Centre I&T Plan)	Subsystem (Acceptance Test Plans)
M18.B.SCH.FDS	ESTRACK station scheduling and allocation file (ESAF)		■	
P01 MOC to/from SGS Comms network				
P01.A.PSO.SDS	PPL (Preprogrammed Pointing List) from Planck SGS to FDS (via SDS)	■		
P01.C.DPC.SDS	Instrument Manuals and Configuration [Planck]		■	
P01.D.DPC.SDS	Task Parameter Files and sequences [Planck]	■		
P01.E.DPC.SDS	SDS Requests (Online and XML) [Planck]	■		
P01.F.DPC.SDS	Instrument database updates [Planck]	■		
P01.G.DPC.SDS	Instrument OBSW files [Planck]	■		
P01.H.DPC.SDS	Spacecraft/Instrument Alignment History (SIAM) [Planck]	■		
P01.J.SDS.PSO	Orbit data	■		
P01.K.SDS.PSO	APPL, APPL Summary and APF to PSO, DPCs [Planck] (via SDS)	■		
P01.L.SDS.DPC	Consolidated TM	■		
P01.M.SDS.DPC	TC History [Planck]	■		
P01.N.SDS.DPC	Slew time, path predictor, constraint checking software algorithms from FDS			■ FDS
P01.O.SDS.DPC	Time Correlation [Planck]	■		
P01.P.SDS.DPC	Flight Operations Procedures		■	
P01.Q.SDS.DPC	OBSW Images (TM)	■		
P01.T.SDS.DPC	Derived parameter and OOL TM	■		
P01.U.SDS.DPC	Attitude History File (AHF) from FDS to PSO, DPCs [Planck] (via SDS)	■		
P01.W.SDS.DPC	Status reports (operations and schedule)		■	
P01.X.DPC.SDS	Derived parameter definitions	■		
P01.Y.SDS.DPC	Manual stack printout files	■		
P02	MOC to/from HFI DPC (via COM)		■	
P03	MOC to/from PSO (via COM)		■	
P04	MOC to/from LFI DPC (via COM)		■	
P05	PSO to/from HFI DPC		■	
P06	PSO to/from LFI DPC		■	
P07	HFI DPC to/from LFI DPC		■	
S01 Space link between stations and spacecraft				
S01.A.SC.STA	RF TM spacecraft link	■		
S01.B.STA.SC	RF TC spacecraft link	■		

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4.3.3 GSSTP System-Level Interfaces

Note that the MOC internal interfaces to be validated during MOC internal integration testing, and during SVTs, are not included in this list, but they are referenced within the relevant test descriptions where they may be supporting a system-level test of MOC-external interfaces. Further, all the following interfaces may be considered to be exercised during the SOVT campaigns, and so the overview of the SOVT (see section 8.7) is not referred to repeatedly for each interface.

Interface	*Description*	*ICD(s)*	*Test Section(s)*
G01.A.STA.NCT	Incoming TM	IG-TMTC-ICD-1000-TOS-GIB	7.9 8.1.2 8.1.3 8.1.4 8.5.2
G01.B.NCT.STA	Forward TCs	IG-TMTC-ICD-1000-TOS-GIB	7.9 8.1.2 8.1.3 8.1.4
H01.A.HSC.SDS	POS (Planned and re-planned POS) from HSC to FDS (via SDS)	HGS-ICD-024	6.3.1 7.5 7.6
H01.D.HSC.SDS	Task Parameter Files [Herschel]	PT-HMOC-FD-ICD-2105-OPS-GFT, PT-FDOS-HMCS-ICD-0004-TOS-GFT	6.3.2 7.8
H01.E.HSC.SDS	SDS Requests (Online and XML) [Herschel]	PT-CMOC-MDS-3108-OPS-GDS	6.3.2 6.3.3 7.4 7.7 8.5.1
H01.F.HSC.SDS	Instrument database updates [Herschel]	S2K-MCS-ICD-0001-TOS-GIC, PT-CMOC-OPS-ICD-6101-OPS-OGH	6.3.4
H01.G.HSC.SDS	Instrument OBSW files [Herschel]	PT-CMOC-MDS-ICD-3105-OPS-GDS, PT-CMOC-OPS-ICD-6101-OPS-OGH	6.3.4 7.6 8.6
H01.H.HSC.SDS	Spacecraft/Instrument Alignment History (SIAM) [Herschel]	PT-HMOC-FD-ICD-2111-OPS-GFT, PT-FDOS-HSC-ICD-0003-TOS-GFT	6.3.5 7.6
H01.I.SDS.HSC	Attitude History File (AHF) from FDS to HSC [Herschel] (via SDS)	PT-HMOC-FD-ICD-2109-OPS-GFT, PT-FDOS-HSC-ICD-0002-TOS-GFT	6.3.1 7.5 7.7
H01.K.SDS.HSC	PSF from FD to HSC [Herschel] (via SDS)	PT-CMOC-FD-ICD-2104-OPS-GFT	6.3.1 7.5 7.6
H01.L.SDS.HSC	Consolidated and unconsolidated TM [Herschel]	PT-CMOC-MDS-3108-OPS-GDS	6.3.3 7.4 7.7 8.5.1
H01.M.SDS.HSC	TC History [Herschel]	PT-CMOC-MDS-3108-OPS-GDS	6.3.2 7.4 7.7 8.4
H01.N.HSC.SDS	SSO DB from HSC to FDS (via SDS)	HGS-ICD-022	6.3.5 7.6

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Interface	Description	ICD(s)	Test Section(s)
H01.O.SDS.HSC	Time Correlation	PT-CMOC-MDS-ICD-3102-OPS-GDS, HGS-ICD-015	6.3.3 7.4 7.5 7.7
H01.Q.SDS.HSC	OBSW Images (TM)	S2K-MCS-ICD-0014-TOS-GCI	6.3.4 7.6 8.6
H01.S.SDS.HSC	EPOS, EPOS summary and APF from FDS to HSC [Herschel] (via SDS)	PT-HMOC-FD-ICD-2107-OPS-GFT	6.3.1 7.5 7.7
H01.T.SDS.HSC	Derived parameter and OOL TM	PT-CMOC-MDS-3108-OPS-GDS	6.3.3 7.4 8.5.1
H01.U.SDS.HSC	Orbit Data	PT-CMOC-FD-ICD-2103-OPS-GFI	6.3.1 7.5 7.6
H01.W.SDS.HSC	Status reports	PT-CMOC-OPS-ICD-6101-OPS-OGH	
H01.X.HSC.SDS	Derived parameter definitions	PT-CMOC-OPS-ICD-6101-OPS-OGH	6.3.4
H01.Y.SDS.HSC	Manual stack printout files	PT-CMOC-OPS-ICD-6101-OPS-OGH	7.8
M07.A.SDS.FDS	POS (Planned and re-planned POS) from HSC to FDS (via SDS)	HGS-ICD-024	6.3.1
M07.E.FDS.SDS	APPL (Augmented Preprogrammed Pointing List),APPL Summary and APF from FD to PSO	PT-PMOC-FD-ICD-2108-OPS-GFT	6.4.1 7.5
M07.F.SDS.FDS	PPL (Preprogrammed Pointing List) from Planck SGS to FDS (via SDS)	PGS-ICD-017	6.4.1
M07.G.FDS.SDS	Attitude History File (AHF) from FDS to HSC (via SDS)	PT-PMOC-FD-ICD-2110-OPS-GFT	6.3.1 7.5
M07.H.FDS.SDS	EPOS, EPOS summary and APF from FDS to HSC [Herschel] (via SDS)	PT-HMOC-FD-ICD-2107-OPS-GFT	6.3.1 7.5
M07.I.FDS.SDS	Attitude History File (AHF) from FDS to PSO, DPCs	PT-PMOC-FD-ICD-2110-OPS-GFT	6.4.1 7.5
M07.J.FDS.SDS	Orbit data from FDS	PT-CMOC-FD-ICD-2103-OPS-GFI	6.3.1 6.4.1 7.5
M07.K.FDS.SDS	PSF from FD to HSC [Herschel] (via SDS)	PT-CMOC-FD-ICD-2104-OPS-GFT	6.3.1 7.5
M10.A.MCS.NCT	TC from MCS to NCTRS	N2K-MCS-ICD-0002-TOS-GCI	8.1.2 8.1.3 8.1.4
M11.A.NCT.MCS	Incoming TM	N2K-MCS-ICD-0002-TOS-GCI	8.1.2 8.1.3 8.1.4 8.5.2
M13.A.MCS.SDS	Consolidated TM	PT-CMOC-MDS-3108-OPS-GDS	6.3.3 6.4.3 8.5.1

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Interface	Description	ICD(s)	Test Section(s)
M13.B.MCS.SDS	TC History [H/P]	PT-CMOC-MDS-3108-OPS-GDS	6.3.2 6.4.2 8.4
M13.D.MCS.SDS	Time Correlation [H/P]	PT-CMOC-MDS-ICD-3102-OPS-GDS	6.3.3 6.4.5 7.4
M13.H.MSC.SDS	Status Reports	PT-CMOC-OPS-ICD-6101-OPS-OGH	
M13.K.MCS.SDS	Incoming NRT TM for ICC@MOC	PT-CMOC-MDS-ICD-3101-OPS-GDS	7.3.3 8.1.4 8.5.1
M13.Y.MCS.SDS	Manual stack printout	PT-CMOC-OPS-ICD-6101-OPS-OGH	7.8
M14.A.SDS.ICC-M	NRT TM from NCTRS	PT-CMOC-MDS-ICD-3101-OPS-GDS	7.3.3 8.1.4 8.5.1
M14.B.ICC-M.SDS	SDS Requests (Online and XML)	PT-CMOC-MDS-ICD-3108-OPS-GDS	7.3.3 8.1.4
M14.C.SDS.ICC-M	Consolidated TM	PT-CMOC-MDS-ICD-3108-OPS-GDS	7.3.3 8.1.4
M14.D.SDS.ICC-M	DDS Auxiliary Files	PT-CMOC-MDS-ICD-3108-OPS-GDS	7.3.3 8.1.4
P01.A.PSO.SDS	PPL (Preprogrammed Pointing List) from Planck SGS to FDS (via SDS)	PGS-ICD-017	6.4.1
P01.D.DPC.SDS	Task Parameter Files and sequences [Planck]	PT-CMOC-OPS-ICD-6106-OPS-OGH, PGS-ICD-053	6.4.2
P01.E.DPC.SDS	SDS Requests (Online and XML) [Planck]	PT-CMOC-MDS-3108-OPS-GDS	6.4.3 7.4 8.5.1
P01.F.DPC.SDS	Instrument database updates [Planck]	PT-CMOC-MDS-ICD-3104-OPS-GDS, S2K-MCS-ICD-0001-TOS-GIC	6.4.4
P01.G.DPC.SDS	Instrument OBSW files [Planck]	PT-CMOC-MDS-ICD-3105-OPS-GDS, PT-CMOC-OPS-ICD-6101-OPS-OGH	6.4.4 8.6
P01.H.DPC.SDS	Spacecraft/Instrument Alignment History (SIAM) [Planck]	PT-PMOC-FD-ICD-2112-OPS-GFT, PT-FDOS-DPC-ICD-0003-TOS-GFT	6.4.5
P01.J.SDS.PSO	Orbit data	PT-CMOC-FD-ICD-2103-OPS-GFI	6.4.1 7.5
P01.K.SDS.PSO	APPL, APPL Summary and APF to PSO, DPCs [Planck] (via SDS)	PT-PMOC-FD-ICD-2108-OPS-GFT	6.4.1 7.5
P01.L.SDS.DPC	Consolidated TM	PT-CMOC-MDS-3108-OPS-GDS	6.4.3 7.4 8.5.1
P01.M.SDS.DPC	TC History [Planck]	PT-CMOC-MDS-3108-OPS-GDS	6.4.2 7.4 8.4
P01.O.SDS.DPC	Time Correlation [Planck]	PT-CMOC-MDS-ICD-3102-OPS-GDS, PGS-ICD-007	6.4.5 7.4 7.5
P01.Q.SDS.DPC	OBSW Images (TM)	S2K-MCS-ICD-0014-TOS-GCI	6.4.4 8.6
P01.T.SDS.DPC	Derived parameter and OOL TM	PT-CMOC-MDS-3108-OPS-GDS	7.4 8.5.1

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Interface	Description	ICD(s)	Test Section(s)
P01.U.SDS.DPC	Attitude History File (AHF) from FDS to PSO, DPCs [Planck] (via SDS)	PT-HMOC-FD-ICD-2109-OPS-GFT	6.4.1 7.5
P01.X.DPC.SDS	Derived parameter definitions	PT-CMOC-OPS-ICD-6101-OPS-OGH	6.4.4
P01.Y.SDS.DPC	Manual stack printout files	PT-CMOC-OPS-ICD-6101-OPS-OGH	
S01.A.SC.STA	RF TM spacecraft link	SCI-PT-ICD-07418	6.2 8.1.2 8.1.3 8.1.4 8.5.2
S01.B.STA.SC	RF TC spacecraft link	SCI-PT-ICD-07418	6.2 8.1.2 8.1.3 8.1.4

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5   TEST ORGANISATION

5.1   Overall Hierarchy and Responsibilities

The functional organisation of integration and test, including responsibilities and reporting is described below. Figure 5 illustrates the following chain of responsibilities:

- the Ground Segment Manager:
    - oversees the activities of the ITSG who reports to him
    - provides final confirmation of the ground segment readiness to proceed into the operational validation phase, following conclusion of integration and technical validation programme and follow-up activities.
    - ensures readiness of the required ground segment elements.
    - ensures completeness of the required systems integration and test plans.

- the Integration and Test Steering Group (ITSG):
    - see section 5.2

- the Test Manager. In practice, most test managers are responsible for all tests of a given Centre. The manager for a test is determined on a per test basis, and will be documented in the test description. The test managers:
    - coordinate with the ITSG for all tests under their responsibility
    - prepare, execute and evaluate all tests under their responsibility
    - organise the test conductors and test teams for each test
    - ensure preparation and pre-requisite steps are complete
    - schedule test activities within the scope of their responsibility
    - coordinate with other test managers as required
    - chair the Test Review Boards (TRBs) for test under their responsibility
    - issue test reports (TRs)
    - conduct any follow-up activities as required
- the Test Team who support the test manager, responsible for:
    - supporting the relevant test manager(s) and element/component responsibles
    - assists in the preparation, execution and evaluation of a test
    - operates the components/facilities as required
    - raise anomaly reports and SPRs as required

The sharing of responsibilities and assignment of tasks is in general specific for each test. Details for each test shall be described in the detailed test plans generated in each case.

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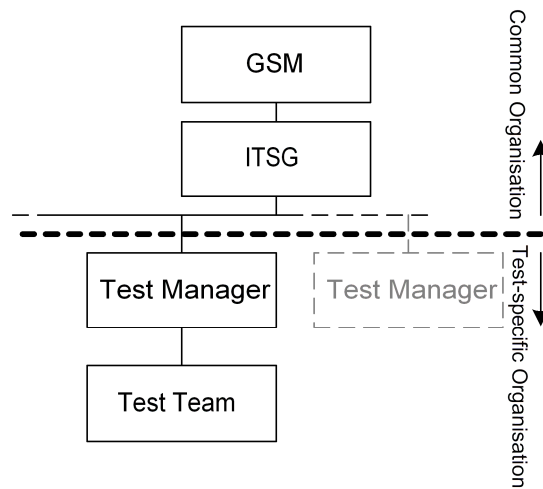
Figure 5: Integration and Test Team Hierarchy

5.2   Integration and Test Steering Group

The Integration and Test Steering Group is responsible for the coordination of integration and test processes at system level. It has the overall aim to define the ground segment end-to-end integration and test concept and implementation plan, and to coordinate and monitor its execution. The scope of the ITSG work therefore covers the interfaces between the following elements for each mission. The ITSG is concerned only with the integration and validation of the ground segment as a whole; the coordination of the internal integration of e.g. a DPC is not within the remit of the ITSG. Centre-level integration and test remains the responsibility of the centre managers.

Herschel	Planck
MOC	MOC
HSC	PSO
ICCs	DPCs
ICC@MOC	IWS@MOC

The ITSG is responsible for the following specific activities:

1) Completion of the integration and test concept definition

2) Development and maintenance of this GSSTP.

3) Coordinate and monitor the execution of all ground segment tests within the scope of this GSSTP.

4) Maintain an overall ground segment test schedule with inputs taken from the schedules defined in the lower level I&TP documents, from the deliverables schedule, and from the AIV constraints of both ground and space elements.

5) Identify the resources (tools, data sources, people, equipment) needed to successfully complete integration and test tasks at system level.

6) Planning of all integration and validation tests at system level while maintaining consistency both with the consolidated schedule of the missions, and with the lower-level integration and test activities, their schedules and constraints.

7) Reporting of programme advancement and the issues of test reports.

8) Scope the test data requirements for different system level tests, and identify mechanisms for test data production. This also includes securing data from Industry's spacecraft-related testing activities as required.

9) Retrieve and discuss AIV constraints from Project/ Industry as a base for integration and validation planning.

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10) Organising a close-out review of the overall Integration and Technical Validation test programme to address all outstanding NCRs, ARs, SPRs and to propose recommendations for the resolution of all open problem areas.

The ITSG reports to the GSM, and liases with the Planck and Herschel systems engineering working groups.

Any system-level non-compliance shall be addressed by PA according to QMS-6300 [AD-16] with the dedicated MRB.

5.3   Test Organisation, Evaluation and Reporting

The preparation, execution and evaluation activities for each test shall be broken down according to [AD-9] into the following phases (see Figure 6):

- test preparation
    o detailed test planning
    o procedure generation
    o team coordination/assignment
    o test data generation (or collection, collation as required)
- test readiness assessment
- test execution
- test evaluation/review

A test cannot be started if:

- the test plan is not approved and distributed
- test procedures are not approved and distributed
- system configuration is not compliant with the requirements of the test, as stated in the test plan

It is possible that following a test review, the Test Review Board may identify corrective or follow-up actions to be undertaken, or may require that a test be performed again if needed. All tests and re-tests shall be documented and reported in the same way – final reports from a specific test must be accompanied by details of the previous run(s) and any configuration (or other) changes made in subsequent runs. The schedule for re-testing shall be determined by the Test Manager.

PA shall attend test readiness review and test review board. In case the PA representative cannot be present the PA function shall be appointed to another member of the test organisation.

Each phase is elaborated in the following subsections, and each description is a general definition of the phase. Variations to this outline are inevitable, as required for individual test cases.

Note that the relative durations of each part of a test process are not representative in Figure 6; it is for illustrative purposes only. Similarly, there may be overlap between some stages as required.

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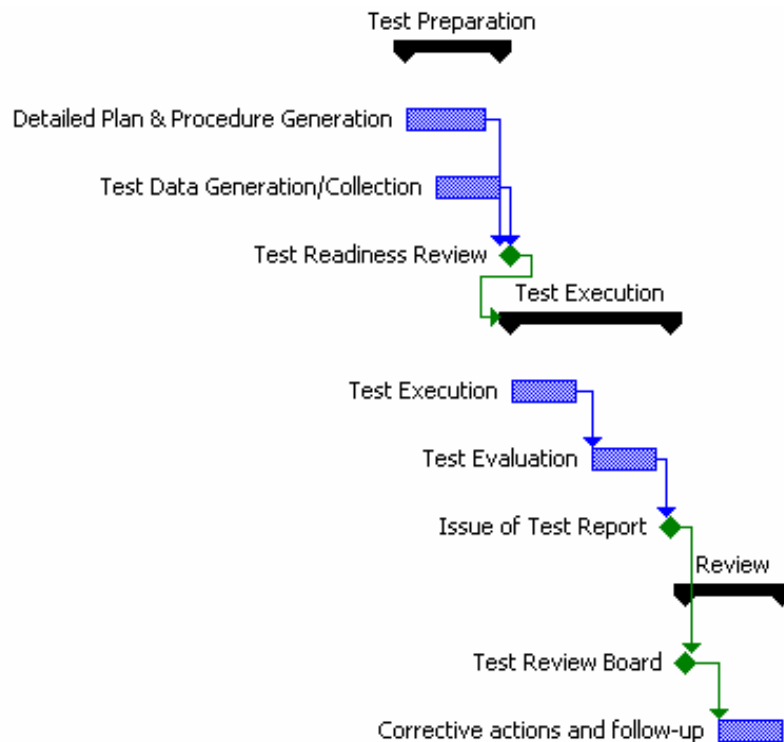
Figure 6: Conceptual Test Schedule

5.3.1 Test Preparation Phase

5.3.1.1 Detailed Planning

The detailed test plan will be generated during this phase under the responsibility of the Test Manager and shall include:

- overall test objectives, including requirements to be tested
- overall test configuration
- constraints and limitations
- any test pre-requisites
- description of each test case and its steps, including
    - Introduction including test context within the ground segment development.
    - List of Reference Documents
    - List of test features to be tested including reference to their requirements
    - Test approach
    - Item Pass/Fail criteria
    - Suspension criteria and resumption Requirements
    - Test Deliverables
    - Testing Tasks
    - Environmental needs
    - Responsibilities
    - Participants
    - Staffing Training and needs
    - Schedule

Overall, the detailed test plans shall follow the standards provided in [AD-11]. Test plans shall be available at least one month prior to the test.

5.3.1.2 Procedure Generation

In this phase, all procedures which must be executed in order to meet the objectives of the test are generated. These include:

- procedures to configure and prepare the facilities/centres/components according to the test plan
- procedures to perform the required test according to the detailed test plan

Overall, the generated procedures shall follow the standards provided in [AD-11]. Procedure generation should be complete sufficiently in advance to allow distribution, review and approval, before the TRR. This is typically a minimum of 2 weeks.

5.3.1.3 Data Generation

This phase is used to generate all the necessary input test data. To the maximum extent possible, test data shall be re-used from previously performed tests. When the input test data are ready, the Test Manager shall store all test data in the test data repository (see 5.4.2) before holding the Test Readiness Review (TRR) (see section 5.3.1.4).

5.3.1.4 Test Readiness Review

The Test Readiness Review (TRR) ends the test preparation phase. The purpose of the TRR is to verify that:

- the approved test plan is distributed
- the approved test procedures are distributed
- the planned and required resources are in place
- the configuration of the systems under test corresponds to the planned and required configuration for the test

This ends the Test Preparation Phase; a successful TRR provides the formal go-ahead for the next phase. PA shall concur to the go-ahead for the next phase. The next phase is Test Execution.

5.3.2 Test Execution Phase

The test execution phase includes:

- preparation activities such as communication checks, interface protocol testing, etc.
- the execution of the test according to the detailed test plan and the test procedures

Any incident detected during a test shall be reported according to the QMS procedure in [AD-16], in an Anomaly Report (AR). The ARs will be raised in the AR database (see section5.4.1) and will be dispositioned by the Test Review Board and/or the Test Manager.

If necessary the Test Manager may call the TRB at any time during the test execution phase if problems occur which require immediate analysis and a decision to continue or terminate the test.

The test execution phase is followed by the test evaluation phase and generation of the test report.

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5.3.3   Evaluation Phase

The final evaluation phase follows the execution phase, and may be very short, or an extended period of time depending upon the test concerned. The purpose of the evaluation phase is:

- to analyse the status of any ARs raised during the test
- to update the status of any ARs as required
- to evaluate the test against the pass/fail criteria documented in the detailed test plan.

The Test Manager (TM) is responsible for the Test Evaluation Phase, along with the TMs of other involved elements. If open problems are identified, these shall be reported to the ITSG, and dedicated expert groups may be formed. Such expert groups will be monitored by the Test Manager(s).

The AR database (see section 5.4.1) will be maintained for ARs raised during integration and test activities. Each AR will be managed by the respective TM.

The TM shall report any changes in the status of an AR or related configuration or SCR (Software Change Request) or SPR to the TRB and ITSG. The TMs are responsible for ensuring that the reported status of an AR correctly corresponds to the actual status (including lower-level status).

The TM may (re)convene the TRB at any time during the test evaluation phase if problems occur which require decisions that have an impact upon the continuation of the overall validation activity.

Under normal circumstances the TRB only meets at the end of the test evaluation phase (see Figure 6).

The results of the final evaluation phase shall be reported in the Test Evaluation Report. It shall include:

- a list of the requirements satisfied
- a list of the tests carried out, with results
- a list of ARs raised, including their current dispositions/status information, and resulting actions
- a description of the status of any special actions initiated during the test evaluation by the TRB
- the specification of requirements for re-testing, as required
- an assessment of the achievement of the overall objectives.

The Test Evaluation Report (TER) shall be written by the Test Manager, and distributed to the TRB and the ITSG.

The TER shall follow the standards provided in [AD-11].

5.3.4   Test Review Board

The members of the TRB are the Test Manager, the PA representative, and depending upon the exact details of the detailed test plan, some of the following:

- test conductor
- test teams
- centre/facility managers
- test manager(s) of other involved centre(s)

The TRB is to be chaired by the test manager. The TRB shall be convened:

- by the test manager
- at the end of test execution
- at any time during test execution if incidents arise that require review
- at the end of test evaluation phase following as soon as possible after issue of the test report.

The objectives of the TRB are:

- to review and disposition any ARs arising from the test activities. This may involve:
  - identifying procedures/components/interfaces/facilities causing the non-compliance
  - raising NCRs, SPRs and SCRs as required against the system that caused the non-compliance
  - assigning responsibilities for SPRs and SCRs
  - NCRs related to the spacecraft (for example NCRs identified during SVTs) shall be brought to the attention of the Herschel/Planck Project
  - determining AR/SPR status
  - identification and decisions on corrective actions and possible re-testing activities
  - assigning responsibility and due dates for the actions
  - approval of the test evaluation report

5.4   Supporting Tools

5.4.1   AR Database - eLog

The 'electronic log' tool 'eLog' is used by the flight control team and other ESOC-based teams to record test activities, configurations, and anomalies. An interface has been implemented to the ESA Anomaly Reporting and Tracking System (ARTS) to allow Anomaly Reports to be raised to ARTS for formal anomaly management.

Each centre is responsible for its own reporting and tracking mechanisms; refer to the SGS-level test plans for details of procedures in the Herschel and Planck science ground segments.

5.4.2   Test Document and Data Repository

In order to support compatibility and other early test activities, an ftp server has been made available by the ESOC Flight Dynamics team. Authentic users of this system to support Herschel/Planck ground segment integration and testing are already aware of the server credentials.

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6   COMPATIBILITY TESTS

Compatibility tests are intended as precursor tests to ensure that data products generated by a system can be correctly accepted and interpreted by a receiving system. The exchange does not exercise the operational interface, and so these tests can be conducted before integration is completed. Data exchange compatibility tests provide high confidence that when a data product will be exchanged on the operational interface, then it will be correctly processed. Exchange of data products for compatibility tests may in general take place on any interface, *e.g.*

- email
- ftp
- media exchange (disks etc.)

Compatibility tests shall be defined in test plans including the following information in the test summary table:

GSSTP Reference	The unique GSSTP reference number used throughout this document and the test plans, test reports, etc.
Test Name	Descriptive name of the test.
Objectives	Objectives for this test
Test Responsibility	The centre responsible for the test.
Test Manager	The test manager.
Test Conductor	The test conductor.
Interface(s) under test	The interface(s) to be tested including its reference number.
ICD Reference(s)	The ICD(s) governing the interface(s) to be tested.
Locations/sites involved	All centres/sites involved in the execution of this test.
VVP/ITP Test Reference	Reference to the existing test plan (and test cases as needed).
Functional Pre-requisites	Description of any functionality required within the centre/facility/element prior to starting this test. Internal validation of interfaces/facilities necessary to conduct this test should be noted, and will include acceptance testing of each such element.
Required Test Data	Reference test data required in support of this test, to be used e.g. as required input or for comparison with test input.
Required Analyses Tools	Any analysis tools needed to evaluate the result of the test, including the specification of output data of a test activity to be evaluated with the specific tool.
Required tools	All other prerequisites required in order to support this test, e.g. simulators, CFIs and other support items.
Outputs	Outputs relevant for other GSSTP tests.
Constraints	Any other applicable constraints for the test not covered by the prerequisites above.

Table 3: Test Summary Table for Compatibility Tests

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6.1   MOC Internal Compatibility Tests

In line with the documentation plan for Herschel/Plan ground segment with regard to integration and test, centre-level internal testing is detailed in the centre-level test plans. MOC compatibility testing which previously would have been covered by the GSSTP, is therefore out of scope.

6.2   Space – Ground Compatibility Tests

The Space to Ground compatibility tests are primarily performed in the following test campaigns:

- RF Compatibility Test (using identical flight-standard RF hardware)
- Major satellite system tests (TBC)
- SVTs

GSSTP Reference	HGS-CT-S01-1.0 (Herschel)
	PGS-CT-S01-2.0 (Planck)
Test Name	RFCT
Objectives	Demonstrate compatibility between the ground segment equipment and the flight model RF hardware as defined in the SGICD.
Test Responsibility	OPS-ONV
Test Manager	A.Head
Test Conductor	A.Gesmundo, G.Billig
Interface(s) under test	S01.A (Spacecraft-Ground return link)
	S01.B (Ground-Spacecraft forward link)
ICD Reference(s)	SCI-PT-ICD-07418 (H/P SGICD)
Locations/sites involved	ESOC - Reference station
VVP Test Reference	Herschel-Planck Kourou, Cebreros and New Norcia RF compatibility test plan (PT-CMOC-GST-PL-5504-OPS-ONV)
Functional Pre-requisites	Delivery and configuration (as required) of the RF Suitcase
Required Test Data	Generated in S/C transponder suitcase
Required Analysis Tools	BER checker, reference station test equipment
Required tools	RF Suitcase
	PSS
	IFMS
	TCDS
	TMTCS
	MCS
Outputs	Statement of S/C transponder compliance with ESOC GS
Constraints	Single RF suitcase for both missions. It must be configured as Herschel or Planck, requiring return to industry for reconfiguration.

6.3   MOC – Herschel SGS Compatibility Tests

6.3.1   HGS-CT-H01-1

GSSTP Reference	HGS-CT-H01-1
Test Name	MOC – HSC Compatibility test 1 - Planning
Objectives	Establish that mission planning products for Herschel (POS, PSF, AHF, EPOS, Orbit files) are compliant with the ICD in terms of data format, structure, naming conventions etc.
Test Responsibility	Herschel Science Centre
Test Manager	L. O'Rourke
Test Conductor	MOC test team member, L. O'Rourke
Interface(s) under test	**NOTE THAT THE SDS INTERFACES ARE NOT REQUIRED FOR THESE COMPATIBILITY TESTS. DIRECT EXCHANGE VIA EMAIL OR FTP IS PLANNED.** H01.A.HSC.SDS / M07.A.SDS.FDS (POS file) H01.I.SDS.HSC / M07.G.FDS.SDS (AHF) H01.K.SDS.HSC / M07.K.FDS.SDS (PSF) H01.S.SDS.HSC / M07.H.FDS.SDS (EPOS & Summary) H01.U.SDS.HSC / M07.J.FDS.SDS (Orbit files)
ICD Reference(s)	H01.A, M07.A: HGS-ICD-024 H01.I: PT-HMOC-FD-ICD-2109-OPS-GFT, PT-FDOS-HSC-ICD-0002-TOS-GFT M07.G: PT-PMOC-FD-ICD-2110-OPS-GFT H01.K, M07.K: PT-CMOC-FD-ICD-2104-OPS-GFT H01.S, M07.H: PT-HMOC-FD-ICD-2107-OPS-GFT H01.U, M07.J: PT-CMOC-FD-ICD-2103-OPS-GFI
Locations/sites involved	HSC MOC
VVP Test Reference	
Functional Pre-requisites	Implementation of FDS software, or prototypes, or manual effort to generate PSF, AHF, EPOS, EPOS Summary, and Orbit files. Availability of HCSS 0.EE.1. Availability of the software to produce files consistent with the format defined in the relevant ICDs.
Required Test Data	Example files of the following types: PSF, POS, AHF, EPOS, EPOS Summary, Orbit files
Required Analyses Tools	Visual inspection / HCSS / FDS software (to assess successful parsing/ingestion as required by detailed test plan)
Required tools	Software applicable to generate the data products.
Outputs	Test reports
Constraints	Software development schedule to support data product generation.

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6.3.2   HGS-CT-H01-2

GSSTP Reference	HGS-CT-H01-2
Test Name	MOC – HSC Compatibility test 2 - Commanding
Objectives	Establish that data products related to instrument commanding for Herschel (TPF), including receipt of TC history, are compliant with the ICDs in terms of data format, structure, naming conventions etc.
Test Responsibility	Herschel Science Centre
Test Manager	L. O'Rourke
Test Conductor	MOC test team member, L. O'Rourke
Interface(s) under test	H01.D.HSC.SDS / M12.F.SDS.MCS (TPF)
	H01.E.HSC.SDS (DDS Requests)
	H01.M.SDS.HSC / M13.B.MCS.SDS (TC History)
ICD Reference(s)	H01.D: PT-HMOC-FD-ICD-2105-OPS-GFT, PT-FDOS-HMCS-ICD-0004-TOS-GFT H01.E, H01.M, M13.B: PT-CMOC-MDS-3108-OPS-GDS
Locations/sites involved	HSC MOC
VVP Test Reference	
Functional Pre-requisites	Acceptance and integration testing of FTS, DDS following MCS D2.
	Availability of the software to produce files consistent with the format defined in the relevant ICDs.
Required Test Data	TPF files
	TC history available in the LTA (if retrieved via DDS) OR a TC history file in the required format available for transfer via another mechanism.
Required Analyses Tools	None
Required tools	DDS
	FTS
	HPMCS
Outputs	Test report
Constraints	MOC ODB must contain instrument database details sufficient to allow successful elaboration of commands and sequences from the TPF
	DDS server must be configured with user accounts and accessible from outside ESOC (if DDS exchange is used).

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6.3.3 HGS-CT-H01-3

GSSTP Reference	HGS-CT-H01-3
Test Name	MOC – HSC Compatibility test 3 - Telemetry
Objectives	Establish that telemetry and associated products needed to correct interpret telemetry, are compliant with the ICD in terms of data format, structure, naming conventions etc. This includes synthetic parameters, time correlation and OOL data and relates to products delivered by the HPDDS.
Test Responsibility	Herschel Science Centre
Test Manager	L. O'Rourke
Test Conductor	MOC test team member, L. O'Rourke
Interface(s) under test	H01.E.HSC.SDS (DDS Requests)
	H01.L.SDS.HSC / M13.A.MCS.SDS (Telemetry)
	H01.T (OOL, SynPar TM)
	H01.O.SDS.HSC / M13.D.MCS.SDS (TCO)
ICD Reference(s)	PT-CMOC-MDS-ICD-3108-OPS-GDS
	H01.T: PT-CMOC-MDS-3108-OPS-GDS, PT-CMOC-OPS-ICD-6101-OPS-OGH
	H01.O: PT-CMOC-MDS-ICD-3102-OPS-GDS
Locations/sites involved	HSC MOC
VVP Test Reference	
Functional Pre-requisites	Acceptance and integration of DDS following MCS D2.
	Configuration of RELAYLAN and firewall to allow external requesting via web and ftp interfaces.
	Availability of the software to produce files consistent with the format defined in the relevant ICDs.
Required Test Data	Recorded or simulated TM data available on the HPMCS LTA.
	Time packets from MCS available via DDS (but file can be sent over alternative interface).
Required Analyses Tools	HCSS 0.EE.1 to ingest incoming TM.
Required tools	HPMCS SDS (DDS) HCSS
Outputs	Test report
Constraints	MCS D2 must have been installed and configured
	DDS must be configured with user accounts

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6.3.4   HGS-CT-H01-4

GSSTP Reference	HGS-CT-H01-4
Test Name	MOC – HSC Compatibility test 4 - Maintenance
Objectives	Demonstrate compatibility in file naming, structure and contents for software and database updates. These are 'maintenance' tasks. Derived parameter definitions are also included. The operational interfaces are not required.
Test Responsibility	Herschel Science Centre
Test Manager	L. O'Rourke
Test Conductor	MOC test team member, L. O'Rourke
Interface(s) under test	H01.F.HSC.SDS (Database updates)
	H01.G.HSC.SDS (Instrument OBSW updates)
	H01.X.HSC.SDS (Derived parameter definitions)
	H01.Q.SDS.HSC (OBSW Image TM)
ICD Reference(s)	S2K-MCS-ICD-0001-TOS-GIC, PT-CMOC-OPS-ICD-6101-OPS-OGH PT-CMOC-MDS-ICD-3105-OPS-GDS, PT-CMOC-OPS-ICD-6101-OPS-OGH PT-CMOC-OPS-ICD-6101-OPS-OGH
	H01.Q: S2K-MCS-ICD-0014-TOS-GCI
	H01.X: PT-CMOC-OPS-ICD-6101-OPS-OGH
Locations/sites involved	HSC
	MOC
VVP Test Reference	
Functional Pre-requisites	Acceptance and integration of DDS following MCS D2.
	External access configuration is not required, just provision of output file for TM.
	Availability of the software to produce files consistent with the format defined in the relevant ICDs.
Required Test Data	An HSC-generated instrument database snapshot.
	Instrument software memory image.
	Memory dump TM (either image via FTS, or service 6 packets via DDS – TBC)
Required Analyses Tools	
Required tools	DDS
	FTS
	OBSM
Outputs	Test report
Constraints	It may not be possible to generate TM packets (or dump image) corresponding to a image sent for upload by HSC. Instead, the ICD compliance can be validated by successful ingestion of a memory image, even if it does not match what was sent. End-end on-board software updating and validation is in the scope of SVTs.

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6.3.5   HGS-CT-H01-5

GSSTP Reference	HGS-CT-H01-5
Test Name	MOC – HSC Compatibility test 5 - General
Objectives	This test covers compatibility testing of general products not included in the mission planning, telecommanding, or telemetry chains. The objective is to demonstrate naming, structure, and content compliance with the ICD without requiring the operation interfaces. The test is defined here covering the SIAM file and SSO database; additional products may be included in the detailed test plan.
Test Responsibility	Herschel Science Centre
Test Manager	L. O'Rourke
Test Conductor	MOC test team member, L. O'Rourke
Interface(s) under test	H01.H.HSC.SDS / M07.C.SDS.FDS (SIAM)
	H01.N.HSC.SDS / M07.D.SDS.FDS (SSO DB)
ICD Reference(s)	H01.H: PT-HMOC-FD-ICD-2111-OPS-GFT
	H01.N: TBW
Locations/sites involved	HSC
	MOC
VVP Test Reference	
Functional Pre-requisites	FDS software/script prototype to ingest SIAM inputs.
	HCSS 0.EE.1
	MCS D2, including DDS.
	Availability of the software to produce files consistent with the format defined in the relevant ICDs.
Required Test Data	SIAM inputs from HSC
Required Analyses Tools	None.
Required tools	
Outputs	Test reports.
Constraints	

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6.4 MOC – Planck SGS Compatibility Tests

6.4.1 PGS-CT-P01-1

GSSTP Reference	PGS-CT-P01-1
Planck test references	HPGS-CT-P02-003.1 (HFI) (APPL & Summary)
	HPGS-CT-P03-003.1 (PSO) (APPL & Summary)
	HPGS-CT-P04-003.1 (LFI) (APPL & Summary)
	HPGS-CT-P02-006.1 (HFI) (AHF)
	HPGS-CT-P03-006.1 (PSO) (AHF)
	HPGS-CT-P04-006.1 (LFI) (AHF)
	HPGS-CT-P03-017.1 (PPL)
	HPGS-CT-P03-049.1 (Orbit files)
Test Name	MOC – PSO/DPC Compatibility test 1 – Planning
Objectives	Establish that mission planning products for Planck (PPL, APPL, AHF, Orbit files) are compliant with the ICD in terms of data format, structure, naming conventions etc.
Test Responsibility	Planck Science Office
Test Manager	M. McKinnell
Test Conductor	TBD
Interface(s) under test	**NOTE THAT THE SDS INTERFACES ARE NOT REQUIRED FOR THESE COMPATIBILITY TESTS. DIRECT EXCHANGE VIA EMAIL OR FTP IS PLANNED.**
	P01.A.PSO.SDS / M07.F.SDS.FDS (PPL)
	P01.U.SDS.DPC / M07.I.FDS.SDS (AHF)
	P01.K.SDS.PSO / M07.E.FDS.SDS (APPL & Summary)
	P01.J.SDS.PSO / M07.J.FDS.SDS (Orbit files)
ICD Reference(s)	PT-HMOC-FD-ICD-2109-OPS-GFT
	PT-PMOC-FD-ICD-2108-OPS-GFT
	PT-CMOC-FD-ICD-2103-OPS-GFI
	PGS-ICD-017, PGS-ICD-003, PGS-ICD-006, PGS-ICD-049
Locations/sites involved	PSO
	MOC
	HFI DPC
	LFI DPC
VVP Test Reference	
Functional Pre-requisites	Implementation of FDS software, or prototypes, or manual effort to generate AHF, APPL, APPL Summary, and Orbit files.
	Availability of SPPT (version TBC).
Required Test Data	Example files of the following types: PPL, AHF, APPL, APPL Summary, Orbit files
Required Analyses Tools	Visual inspection / SPPT / FDS software (to assess successful parsing/ingestion as required by detailed test plan)
Required tools	Software applicable to generate the data products
Outputs	Test reports
Constraints	Software development schedule to support data product generation

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6.4.2 PGS-CT-P01-2, PGS-CT-P01-3

GSSTP Reference	PGS-CT-P01-2 (LFI DPC) and PGS-CT-P01-3 (HFI DPC)
Planck test references	HPGS-CT-P02-053.1 (HFI) (TPF)
	HPGS-CT-P04-053.1 (LFI) (TPF)
	HPGS-CT-P02-004.1 (HFI) (TCHIST)
	HPGS-CT-P02-004.1 (PSO) (TCHIST)
	HPGS-CT-P02-004.1 (LFI) (TCHIST)
Test Name	MOC – DPC Compatibility test - Commanding
Objectives	Establish that data products related to instrument commanding for Planck (TPF), including receipt of TC history, are compliant with the ICDs in terms of data format, structure, naming conventions etc.
Test Responsibility	Planck Science Office
Test Manager	M. McKinnell
Test Conductor	TBD
Interface(s) under test	P01.D.DPC.SDS (TPF)
	P01.M.SDS.DPC / M13.B.MCS.SDS (TC History)
ICD Reference(s)	PT-CMOC-OPS-ICD-6106-OPS-OGH, PGS-ICD-053 PT-CMOC-MDS-3108-OPS-GDS
	PGS-ICD-053, PGS-ICD-004
Locations/sites involved	LFI DPC HFI DPC MOC
VVP Test Reference	
Functional Pre-requisites	Acceptance and integration of MCS D2, including DDS, and TPF handling functionality. File exchange can use alternative interfaces. FTS for TPF transfers is not required.
Required Test Data	TPF files
	Command history available in MCS LTA. Requesting of the TC history from the archive can be performed by the MOC. External request testing will be performed as integration and validation test cases as it requires the operational communications configuration.
	Availability of the software to produce files consistent with the format defined in the relevant ICDs.
Required Analyses Tools	None
Required tools	DDS
	HPMCS
Outputs	Test report
Constraints	MOC ODB must contain instrument database details sufficient to allow successful elaboration of commands and sequences from the TPF
	DDS server must be configured with user accounts and accessible from outside ESOC

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6.4.3   PGS-CT-P01-4, PGS-CT-P01-5

GSSTP Reference	PGS-CT-P01-4 (LFI), PGS-CT-P01-5 (HFI)
Planck test references	HPGS-CT-P02-001.1 (HFI)
	HPGS-CT-P04-001.1 (LFI)
	HPGS-CT-P02-008.1 (HFI)
	HPGS-CT-P04-008.1 (LFI)
	HPGS-CT-P02-009.1 (HFI)
	HPGS-CT-P04-009.1 (LFI)
Test Name	MOC – DPC Compatibility test 3 - Telemetry
Objectives	Establish that telemetry and associated products needed to correct interpret telemetry, are compliant with the ICD in terms of data format, structure, naming conventions etc. This includes synthetic parameters, time correlation and OOL data and relates to products delivered by the HPDDS.
Test Responsibility	Planck Science Office
Test Manager	M. McKinnell
Test Conductor	TBD
Interface(s) under test	P01.E.DPC.SDS (DDS Requests)
	P01.L.SDS.DPC / M13.A.MCS.SDS (Telemetry)
	P01.O.SDS.HSC / M13.D.MCS.SDS (TCO)
ICD Reference(s)	TM: PT-CMOC-MDS-3108-OPS-GDS, PGS-ICD-001, PGS-ICD-008, PGS-ICD-009
	P01.O: PT-CMOC-MDS-ICD-3102-OPS-GDS
Locations/sites involved	LFI DPC (HPGS-CT-P01-4 only)
	HFI DPC (HPGS-CT-P01-5 only)
	MOC
VVP Test Reference	
Functional Pre-requisites	Acceptance and integration of MCS D2 in order to generate TM data files in DDS format.
	SGS software to ingest delivered TM files.
Required Test Data	Recorded or simulated TM data available on the HPMCS LTA
	Time couples available from DDS
Required Analyses Tools	DPC pipeline software
	TCO: either processing with prototype software, or manual inspection for compliance with ICD
Required tools	HPMCS
	SDS (DDS)
	HCSS
Outputs	Test report
Constraints	MCS D2 must have been installed and configured
	DDS must be configure with user accounts

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6.4.4   PGS-CT-P01-6, PGS-CT-P01-7

GSSTP Reference	PGS-CT-P01-6 (LFI), PGS-CT-P01-7 (HFI)
Planck test references	Database updates: HPGS-CT-P02-022.1 (HFI), HPGS-CT-P04-022.1 (LFI)
	OBSW Updates: HPGS-CT-P02-019.1 (HFI), HPGS-CT-P04-019.1 (LFI)
	Derived parameters: HPGS-CT-P02-052.1 (HFI), HPGS-CT-P04-052.1 (LFI)
	OBSW TM: HPGS-CT-P02-010.1 (HFI), HPGS-CT-P04-010.1 (LFI)
Test Name	MOC – DPC Compatibility test 4 – Maintenance
Objectives	Demonstrate compatibility in file naming, structure and contents for software and database updates. These are 'maintenance' tasks. Derived parameter definitions are also included. The operational interfaces are not required.
Test Responsibility	Planck Science Office
Test Manager	M. McKinnell
Test Conductor	TBD
Interface(s) under test	P01.F.DPC.SDS (Database updates)
	P01.G.DPC.SDS (Instrument OBSW updates)
	P01.X.DPC.SDS (Derived parameter definitions)
	P01.Q.SDS.DPC (OBSW Image TM)
ICD Reference(s)	PT-CMOC-MDS-ICD-3104-OPS-GDS, S2K-MCS-ICD-0001-TOS-GIC PT-CMOC-MDS-ICD-3105-OPS-GDS, PT-CMOC-OPS-ICD-6101-OPS-OGH PT-CMOC-OPS-ICD-6101-OPS-OGH
	P01.Q: S2K-MCS-ICD-0014-TOS-GCI
	PGS-ICD-022, PGS-ICD-019, PGS-ICD-052, PGS-ICD-010
Locations/sites involved	LFI DPC (HPGS-CT-P01-6 only)
	HFI DPC (HPGS-CT-P01-7 only)
	MOC
VVP Test Reference	
Functional Pre-requisites	Acceptance and integration of DDS following MCS D2.
	External access configuration is not required, just provision of output file for TM.
Required Test Data	A DPC-generated instrument database snapshot.
	Instrument software memory image.
	Memory dump TM (either image via FTS, or service 6 packets via DDS – TBC).
	Availability of the software to produce files consistent with the format defined in the relevant ICDs.
Required Analyses Tools	None.
Required tools	DDS
	FTS
	OBSM
Outputs	
Constraints	It may not be possible to generate TM packets (or dump image) corresponding to a image sent for upload by the DPC. Instead, the ICD compliance can be validated by successful ingestion of a memory image, even if it does not match what was sent. End-end on-board software updating and validation is in the scope of SVTs.

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6.4.5   PGS-CT-P01-8, PGS-CT-P01-9

GSSTP Reference	PGS-CT-P01-8 (LFI), PGS-CT-P01-9 (HFI)
Planck test references	HPGS-CT-P04-007.1 (LFI)
	HPGS-CT-P02-007.1 (HFI)
	HPGS-CT-P05-039.1 (HFI) (also to include MOC)
Test Name	MOC – DPC Compatibility test 5 - General
Objectives	This test covers compatibility testing of general products not included in the mission planning, telecommanding, or telemetry chains. The objective is to demonstrate naming, structure, and content compliance with the ICD without requiring the operation interfaces. The test is defined here covering the SIAM file; additional products may be included in the detailed test plan.
Test Responsibility	Planck Science Office
Test Manager	M. McKinnell
Test Conductor	TBD
Interface(s) under test	P01.H.DPC.SDS (SIAM)
ICD Reference(s)	PT-PMOC-FD-ICD-2112-OPS-GFT, PT-FDOS-DPC-ICD-0003-TOS-GFT
Locations/sites involved	LFI DPC (HPGS-CT-P01-8 only)
	HFI DPC (HPGS-CT-P01-9 only)
	MOC
VVP Test Reference	
Functional Pre-requisites	SIAM file processing software (FDS)
	SIAM ingestion process (SPPT).
Required Test Data	Test SIAM file
Required Analyses Tools	SIAM: ingestion software
Required tools	SIAM software
Outputs	Test report
Constraints	

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7 INTEGRATION TESTS

This section presents the top level of integration tests resulting from the element definition presented earlier, and from the architecture design of the overall ground segment, including science ground segment components. Each integration test shall have a unique reference and name.

Integration activities within centres are not covered by this GSSTP except where such tests impact system level testing (as pre-requisite steps, etc.). Specific test plans for all tests should be consulted. Table 4 defines the overview of a test, including responsibles, objectives, pre-requisites, data source requirements and constraints. Integration tests shall be defined in test plans including at least the following information.

GSSTP Reference	The unique GSSTP reference number used throughout this document and the test plans, test reports, etc.
Test Name	Descriptive name of the test.
Objectives	Objectives for this test
Test Responsibility	The centre(s) responsible for the test.
Test Manager	The test manager(s) – note that for multiple centres multiple test managers may be involved.
Test Conductor	The test conductor.
Interface(s) under test	The interface(s) to be tested including its reference number.
ICD Reference(s)	The ICD(s) governing the interface(s) to be tested.
Locations/sites involved	All centres/sites involved in the execution of this test.
VVP Test Reference	Reference to the existing test plan (and test cases as needed).
Functional Pre-requisites	Description of any functionality required within the centre/facility/element prior to starting this test. Internal validation of interfaces/facilities necessary to conduct this test should be noted, and will include acceptance testing of each such element.
GSSTP Pre-requisites	Test pre-requisites at system level that are required in order to start this test activity.
Required Test Data	Reference test data required in support of this test, to be used e.g. as required input or for comparison with test input.
Required Analyses Tools	Any analysis tools needed to evaluate the result of the test, including the specification of output data of a test activity to be evaluated with the specific tool.
Required tools	All other prerequisites required in order to support this test, e.g. simulators, CFIs and other support items.
Outputs	Outputs relevant for other GSSTP tests.
Constraints	Any other applicable constraints for the test not covered by the prerequisites above.

Table 4: Test Summary Table for Integration and Validation Tests

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7.1 Herschel Comms Throughput Tests

GSSTP Reference	HGS-IT-COM-1.0 (ISDN)
	HGS-IT-COM-2.0 (Leased Line)
Test Name	Herschel Comms Throughput Test
Objectives	To demonstrate communications channel capacity, availability and error rate are in accordance with the MIRD requirements. No specific data products are exchanged.
Test Responsibility	ESOC / OPS-ONC
Test Manager	E. Warhurst
Test Conductor	E. Warhurst / L. O'Rourke
Interface(s) under test	Leased line and ISDN lines to HSC
	Leased line between HSC and ICCs.
ICD Reference(s)	No ICD (as no data products exchanged)
Locations/sites involved	ESOC
	HSC at ESAC
	ICCs
VVP Test Reference	
Functional Pre-requisites	Installation and configuration of leased lines (ESOC deliverable)
	Installation and configuration of ISDN backup lines (ESOC deliverable)
	Installation and configuration of remote routers (ESOC deliverable)
	RELAC LAN configured to support new lines
GSSTP Pre-requisites	None
Required Test Data	Large volume of dummy TM (volume TBD)
	PSS
	BER test data
Required Analyses Tools	BER test equipment (ESOC deliverable)
Required tools	FTP server at ESOC
	FTP server at HSC
Outputs	Test report, including results for –
	• Bearer service availability
	• Configuration correctness
	• Bit error rate
	• Throughput
	• Security
Constraints	If possible, test should be conducted after MCS D2, to enable throughput test to exercise HPSDS server on DEVLAN. This should however be considered in the frame of SVT preparation and other schedule constraints – it is not mandatory to conduct this test with MCS D2.

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7.2   Planck Comms Throughput Tests

GSSTP Reference	PGS-IT-COM-3.0 (ISDN)
	PGS-IT-COM-4.0 (Leased Line)
Test Name	Planck Comms Throughput Test
Objectives	To demonstrate communications channel capacity, availability and error rate are in accordance with the MIRD requirements. No specific data products are exchanged.
Test Responsibility	ESOC / OPS-ONC
Test Manager	E. Warhurst
Test Conductor	TBD
Interface(s) under test	Leased line and ISDN lines to DPCs
ICD Reference(s)	No ICD (as no data products exchanged)
Locations/sites involved	ESOC
	LFI DPC at Trieste
	HFI DPC at Orsay
VVP Test Reference	
Functional Pre-requisites	Installation and configuration of leased lines (ESOC deliverable)
	Installation and configuration of ISDN backup lines (ESOC deliverable)
	Installation and configuration of remote routers (ESOC deliverable)
	RELAC LAN configured to support new lines
GSSTP Pre-requisites	None
Required Test Data	Large volume of dummy TM (volume TBD)
	PSS
	BER test data
Required Analyses Tools	BER test equipment (ESOC deliverable)
Required tools	FTP server at ESOC
	FTP server at each DPC
Outputs	Test report, including results for –
	• service availability
	• configuration correctness
	• bit error rate
	• throughput
	• security
Constraints	If possible, test should be conducted after MCS D2, to enable throughput test to exercise HPSDS server on DEVLAN. This should however be considered in the frame of SVT preparation and other schedule constraints – it is not mandatory to conduct this test with MCS D2.

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7.3 ICC@MOC – PI Institutes Connectivity

7.3.1 Herschel ICC Communications

GSSTP Reference	HGS-IT-COM-5.0
Test Name	PISA – ICC communications test
Objectives	To demonstrate required connectivity between instrument workstations at the MOC and the home institutes using the agreed protocols.
Test Responsibility	ESOC / OPS-ONC
Test Manager	E. Warhurst
Test Conductor	TBC
Interface(s) under test	ESOC PISALAN external internet access
ICD Reference(s)	No applicable ICD
Locations/sites involved	ESOC
	HIFI ICC
	PACS ICC
	SPIRE ICC
VVP Test Reference	None
Functional Pre-requisites	ICC@MOC delivered and integrated with PISALAN network
	PISALAN external access configured as per SFIRD
GSSTP Pre-requisites	None
Required Test Data	None
Required Analyses Tools	None
Required tools	None
Outputs	Test report, including results for – • Incoming and outgoing FTP • Incoming and outgoing SSH • Incoming (to ICC@MOC) HTTP
Constraints	

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7.3.2 Planck IW Communications

GSSTP Reference	PGS-IT-COM-6.0
Test Name	PISA – DPC communications test
Objectives	To demonstrate required connectivity between instrument workstations at the MOC and the home institutes using the agreed protocols.
Test Responsibility	ESOC / OPS-ONC
Test Manager	E. Warhurst
Test Conductor	TBC
Interface(s) under test	ESOC PISALAN external internet access
ICD Reference(s)	No applicable ICD
Locations/sites involved	ESOC HFI DPC LFI DPC
VVP Test Reference	None
Functional Pre-requisites	IW@MOC delivered and integrated with PISALAN network PISALAN external access configured as per SFIRD
GSSTP Pre-requisites	None
Required Test Data	None
Required Analyses Tools	None
Required tools	None
Outputs	Test report, including results for – • Incoming and outgoing FTP • Incoming and outgoing SSH • Incoming (to ICC@MOC) HTTP
Constraints	

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7.3.3 Near-Real Time Telemetry Flow

GSSTP Reference	PGS-IT-M14-1 (HFI)
	PGS-IT-M14-2 (LFI)
	PGS-IT-M14-3 (SCS)
	HGS-IT-M14-4 (PACS)
	HGS-IT-M14-5 (SPIRE)
	HGS-IT-M14-6 (HIFI)
Test Name	Instrument workstation / control centre integration tests
Objectives	To demonstrate correct integration of the RTSI component of the HPSDS and the instrument workstations on the PISALAN. The test establishes correctness of network configuration, RTSI service configuration, and instrument workstation client configuration for near real-time telemetry.
Test Responsibility	ESOC / OPS-GDS
Test Manager	G. Di Girolamo
Test Conductor	MOC: TBD, and an instrument team representative
Interface(s) under test	Near-real-time TM interface (RTSI) from MCS to ICC@MOC: • M14.A • M13.K DDS user interfaces to ICC@MOC: • M14.B / M14.C / M14.D
ICD Reference(s)	PT-CMOC-MDS-ICD-3101-OPS-GDS PT-CMOC-MDS-3108-OPS-GDS
Locations/sites involved	MOC
VVP Test Reference	None
Functional Pre-requisites	ICC@MOC delivered and integrated with PISALAN network DDS accounts for PI teams configured Test data available in the LTA
GSSTP Pre-requisites	
Required Test Data	TM, TCHIST available in MCS archive
Required Analyses Tools	TQL on ICC@MOC
Required tools	None
Outputs	Test report, including results for – • Retrieval of NRT TM from RTSI • Retrieval of consolidated TM from DDS • Retrieval of TC history from DDS
Constraints	MCS D2 must be configured, and have passed final acceptance testing PI team representative for each ICC@MOC platform needed to operate ICC@MOC equipment and confirm successful TM and file processing. This test should be performed during the delivery and integration of the ICC@MOC systems, a minimum of 6 weeks prior to SVT-2.

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7.4 DDS Data Retrieval Tests

GSSTP Reference	HPGS-IT-H01-0.2
	HGS-IT-DDS-2.0 (ICC@MOC)
	PGS-IT-DDS-1.0
	PGS-IT-DDS-2.0 (IW@MOC)
Test Name	DDS Data Retrieval Test
Objectives	To demonstrate integration of the HPSDS with external access provision via RELAY, ACCESS and PISA LANs; proper configuration of required user accounts; proper integration and configuration of the PI institutes receiving node (FTP server); configuration and access to the HPSDS request interfaces (online and via FTP submission); to further validate the delivered data products against the ICDs by using the operational software (or a representative prototype) to receive and process the products. The test includes TM delivery, TC history delivery, and TCO couple delivery.
Test Responsibility	ESOC
Test Manager	L. O'Rourke (Herschel)
	DPC Test Managers (Planck)
	MOC test team member
Test Conductor	TBD
Interface(s) under test	• P01.L / P01.T / H01.L / H01.T (TM)
	• P01.M / H01.M (TCHIST)
	• P01.E / H01.E (Requesting)
	• H01.O.SDS.HSC / P01.O.SDS.DPC / M13.D.MCS.SDS (TCO)
	For ICC@MOC, IW@MOC testing:
	• M14.B (requesting)
	• M14.C (TM)
	• M14.D (TCHIST / Auxiliary files)
ICD Reference(s)	PT-CMOC-MDS-3108-OPS-GDS (TM, TCHIST, Requesting)
	PT-CMOC-MDS-ICD-3102-OPS-GDS (TCO)
Locations/sites involved	MOC
VVP Test Reference	TBD
Functional Pre-requisites	DDS accounts for PI teams configured
	Test data available in the LTA
GSSTP Pre-requisites	Compatibility tests completed (HGS-IT-COM-1.0, HGS-IT-COM-2.0, PGS-IT-COM-3.0, PGS-IT-COM-4.0)
	Communications lines available
Required Test Data	TM, TCHIST available in MCS archive
Required Analyses Tools	SGS software to receive/ingest returned data.
Required tools	TBD
Outputs	Test report, including results for –
	• Retrieval of consolidated TM from DDS
	• Retrieval of TC history from DDS
Constraints	MCS D2 must be configured, and have passed final acceptance testing

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7.5 FTS Data Delivery Tests

GSSTP Reference	HPGS-IT-H01-0.1 (Herschel HSC)
	PGS-IT-FTS-1.0 (Planck DPCs)
Test Name	File transfer system integration test
Objectives	To demonstrate integration of the HPFTS component of the HPSDS. This is established via the exchange of each type of product (prototype, example or dummy products that are compliant with the ICDs may be used in place where necessary) detailed in the H/P FTS ICD. The test establishes correct configuration of FTS nodes in the H/P science ground segment and in the MOC and Flight Dynamics System. Operational or representative prototype software is to be used to validate the data products exchanged with FTS.
Test Responsibility	ESOC
Test Manager	L. O'Rourke (Herschel)
	DPC Test Managers (Planck)
	MOC test team member
Test Conductor	TBD
Interface(s) under test	Operational interfaces for – H01.I, M07.G, M07.I, P01.U (AHF)
	H01.K, M07.K (PSF), H01.O, P01.O (TCO)
	H01.A, M07.A (POS), H01.S, M07.H (EPOS, EPOS Summary, APF)
	H01.U, M07.J, P01.J (Orbit files), M07.E, P01.K (APPL, APPL summary, APF)
ICD Reference(s)	PT-CMOC-MDS-ICD-3102-OPS-GDS (TCO)
	HGS-ICD-024 (POS)
	PT-PMOC-FD-ICD-2108-OPS-GFT (APPL, APPL summary, APF)
	PT-HMOC-FD-ICD-2107-OPS-GFT (EPOS, EPOS Summary, APF)
	PT-CMOC-FD-ICD-2103-OPS-GFI (Orbit Files)
	PT-HMOC-FD-ICD-2109-OPS-GFT, PT-PMOC-FD-ICD-2110-OPS-GFT (AHF)
	PT-CMOC-FD-ICD-2104-OPS-GFT (PSF)
Locations/sites involved	ESOC, HSC, LFI DPC, HFI DPC
VVP Test Reference	
Functional Pre-requisites	
GSSTP Pre-requisites	Compatibility testing of all data products to be exchanged via FTS.
Required Test Data	Example/Dummy files of types: AHF, PSF, TCO, EPOS and Herschel timeline summary file, Orbit Files, APPL and Planck timeline summary file
Required Analyses Tools	Inspection/Ingestion appropriate to each data product type
Required tools	None
Outputs	Test report
Constraints	MCS D2 must be configured, and have passed final acceptance testing
	FDS software to produce dummy files must be at least prototyped
	HCSS/SPPT functionality implemented as required to :
	- inspect/ingest received files
	- generate test data

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7.6   HSC-MOC Integration Test 1 - Uplink

GSSTP Reference	HPGS-IT-H01-1.0
Test Name	HSC to MOC Integration Test 1 – Uplink test
Objectives	To demonstrate integration of the elements involved in the instrument 'uplink' chain. This includes HCSS commanding subsystems, the HPFTS, MCS and FDS systems. The test also establishes correct configuration of the software systems in HSC and MOC for processing the files exchanged on the interfaces listed below.
Test Responsibility	HSC MOC
Test Manager	L. O'Rourke and MOC test team representative
Test Conductor	L. O'Rourke (for HSC) and MOC test team member
Interface(s) under test	Operational interfaces for – H01.A (POS) H01.G (OBSW files) H01.H (SIAM) H01.K (PSF) H01.N (SSO DB) H01.Q (OBSW Images) H01.U (Orbit Data)
ICD Reference(s)	
Locations/sites involved	ESOC HSC
VVP Test Reference	
Functional Pre-requisites	FTS Transfer Mechanism Set-up & verification completed Software required to generate all files acceptance tested
GSSTP Pre-requisites	FDS-MOC Integration test completed MOC Delivery 2 Acceptance Tested HSC 0.EE.1 Acceptance Tested
Required Test Data	PSF, POS, SIAM, SSO, OBSM images, OBSM dumps, Orbit data
Required Analyses Tools	TBD
Required tools	None
Outputs	Test report, including results confirming : - Verification of the successful transfer of HSC specific "uplink" files to the MOC via the FTS - Verification of the successful transfer of MOC Specific "Uplink" files to the HSC via the FTS - Validation of the correct transfer mechanisms expected to be used in operations Validation of the HSC internal systems processing of these files
Constraints	FTS interface installed & tested

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7.7   HSC-MOC Integration Test 2 - Downlink

GSSTP Reference	HPGS-IT-H01-2.0
Test Name	HSC to MOC Integration Test 2 – Downlink test
Objectives	To demonstrate integration of the MOC and HSC with regard to all elements involved in data delivery. This includes TM, but also AHF, TC history, time correlation and mission planning products (timeline summary). Operational or representative prototype software is used in MOC and HSC to generate, delivery and process each data product.
Test Responsibility	HSC
	MOC
Test Manager	L. O'Rourke and MOC test team representative
Test Conductor	L. O'Rourke (for HSC) and MOC test team member
Interface(s) under test	Operational interfaces for –
	H01.E (SDS Requests (Online and XML))
	H01.I (AHF)
	H01.L (Consolidated and unconsolidated TM)
	H01.M (TC History)
	H01.O (Time Correlation)
	H01.S (Timeline Summary file i.e. EPOS, EPOS summary & APF)
ICD Reference(s)	
Locations/sites involved	MOC
	HSC
VVP Test Reference	
Functional Pre-requisites	DDS Transfer Mechanism Set-up & verification completed
	Software required to generate all files acceptance tested
GSSTP Pre-requisites	FDS-MOC Integration test completed
	MOC Delivery 2 Acceptance Tested
	HSC 0.EE.1 Acceptance Tested
Required Test Data	AHF, TSF, Time Correlation, TCH, S/C & Science TM
Required Analyses Tools	
Required tools	DDS
Outputs	Test report, including results confirming :
	- Verification of the successful processing of MOC Specific "downlink" files provided to the HSC via the FTS and via the DDS
	- Validation of the correct transfer mechanisms expected to be used in operations
	Validation of the HSC and the MOC internal systems processing of these files
Constraints	DDS interface tested

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7.8   HSC-MOC Integration Test 3 – Manual Commanding

GSSTP Reference	HPGS-IT-H01-3.0
Test Name	HSC to MOC Integration Test 3 – Manual Commanding test
Objectives	Validation of the interfaces and integration of data exchange systems used in manual commanding of Herschel payload. This includes provision of TPF data to populate command sequences, and return of command stacks in ASCII form. The operational HCSS and MCS software shall be used to validate the interfaces, which are provided by the HPFTS.
Test Responsibility	HSC
	MOC
Test Manager	L. O'Rourke and MOC test team representative
Test Conductor	L. O'Rourke (for HSC) and MOC test team member
Interface(s) under test	Operational interfaces for –
	H01.D (Task Parameter Files)
	M13.Y, H01.Y (Manual Stack Printout file)
ICD Reference(s)	
Locations/sites involved	ESOC
	HSC
VVP Test Reference	
Functional Pre-requisites	FTS Transfer Mechanism Set-up & verification completed
	Software required to generate all files acceptance tested
GSSTP Pre-requisites	MOC Delivery 2 Acceptance Tested
	HSC 0.EE.1 Acceptance Tested
Required Test Data	TPF
	Agreed operational request including sequence definition to be exercised.
Required Analyses Tools	HPMCS, HCSS
Required tools	None
Outputs	Test report, including results confirming :
	- Validation of the successful processing of TPFs sent by the HSC
	- Validation of the loading of sequences (based upon these TPFs) on the manual stack and generation of a manual stack printout to be sent to the HSC via FTS
	- stack and generation of a manual stack printout to be sent to the HSC via FTS
	- Validation of the correct transfer mechanisms expected to be used in operations
	- Validation of the HSC and the MOC internal systems processing of these files
Constraints	FTS interface installed & tested

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7.9   Ground Stations Integration Testing (Long Loop)

GSSTP Reference	HPGS-IT-G01-1 (NNO)
	HPGS-IT-G01-2 (CEB)
	HPGS-IT-G01-3 (VIL)
	HPGS-IT-G01-4 (KOU)
Test Name	Ground station integration testing
Objectives	To validate integration of the HP NCTRS with the communications network and the ground station equipment. This includes exchange of all data products between stations and MOC as described below. Operational systems are required to generate and process each data product. The test establishes the correctness of the NCTRS and ground station equipment configurations to support the H/P mission.
Test Responsibility	ESOC / OPS-ONV
Test Manager	TBD
Test Conductor	TBD
Interface(s) under test	G01.A.STA.NCT (TM)
	G01.B.NCT.STA (TC)
	G01.C.STA.NCT (STDM)
	G01.D.STA.NCT (Ranging/Doppler/Meteo for FDS)
	G01.E.STC.NCT (MVL)
	G01.F.NCT.STA (SICF)
	G01.G.NCT.STC (Schedule)
ICD Reference(s)	IG-TMTC-ICD-1000-TOS-GIB
	N2K-MCS-ICD-0002-TOS-GCI
Locations/sites involved	ESOC
	ESTRACK Ground stations for H/P (NNO, CEB, VIL, KOU)
VVP Test Reference	
Functional Pre-requisites	Communications lines available to H/P NCTRS systems
	PSS installed and configured in Ground Stations
GSSTP Pre-requisites	MCS D3 installed and acceptance tested
Required Test Data	PSS TCs to be despatched from MCS manual stack
Required Analyses Tools	TM Packet History, TM displays, TC History
Required tools	PSS
Outputs	Test report
Constraints	

7.10   JPL Orbit File Provision

This interface (E01.A.MOC.JPL) is considered a system-level interface but as a single data product produced by FDS and transferred via internet (using no H/P operational communications infrastructure) the test will be considered within the scope of the Flight Dynamics Interface Test Plans. It is not considered further at the level of the GSSTP.

For completeness of the coverage matrices, the system level test reference is: HPGS-IT-JPL-1.

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8 TECHNICAL VALIDATION TESTS

The planning of validation test scenarios shall be based upon the following principles:

Selection of scenarios

- The complexity of validation testing should be minimised wherever possible to reduce the impact of unavailability of the different elements, facilities, or data sources. This is achieved by defining multiple scenarios for the validation activities, each involving dedicated subsets of the ground segment elements. The overall aim of validation testing can thus be achieved without requiring the entire ground segment to be available for all tests.

- Each scenario should exercise a complete functional chain (e.g. mission planning, telemetry processing, control data flow, etc.) and should be as independent as possible from other scenarios (and functional chains).

- Validation tests shall be designed in order to maximise reuse of existing test data.

Scheduling of validation activities

- Validation tests should be carried out after compatibility and integration testing of all involved elements in the functional chain under test has been completed.

Reference Test Data

- Validation activities are based upon reference test data sets and scenarios in order to ensure compatibility and consistency between data sets and operations.

- Data sets generated as part of specific validation activities should be used as reference test data inputs for successive tests.

Validation test plans shall include the test summary table as used for Integration tests, as shown in Table 4 on page 47.

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8.1 System Validation Tests (SVT)

The SVT test campaigns are described in the 'H/P System Validation Test Overview' document [RD-20]. As far as the scope of the SVTs concerns system-level interface validation, the objectives, interfaces and tests are presented in this GSSTP.

8.1.1 Overview of Objectives

The top-level objectives for the SVT campaigns are as follows:

- To confirm the ability of the ground station equipment (NDIUs) to correctly decode the TM data.
- To confirm the ability of the MCS (and ground station back-end equipment) to receive, process and display TM for all the different data rates and data transmission scenarios.
- To verify the data is correctly extracted from TM packets and interpreted correctly.
- To verify the functionality of the MCS telecommanding subsystem, operating in a closed loop with the satellite, in AD and BD modes with either decoder, including directives.
- To verify MCS manual telecommanding functionality.
- To verify the MCS automatic telecommanding functionality.
- Verify the modelling of on-board systems used for telecommanding/display (MTL, SSMM)
- To verify, as far as is possible, the correctness of the operational database (calibration, validity, limits, mode dependency, status consistency, derived parameters, PTV command verification, etc.).
- To confirm the ability of the ground station equipment (NDIU) to correctly encode TCs.
- To confirm the ability of the telecommand and telemetry router equipment (NCTRS) to correctly exchange all required data types.
- To confirm the ability of the Flight Dynamics (FDS) systems to retrieve, process and display TM correctly.
- To verify that commands generated by FDS are correctly encoded. This requires modelling of the orbital environment to stimulate the attitude sensors according to the actuator outputs.
- To verify all functionality is in place in the MCS to support nominal and contingency operational flight procedures (e.g. redundancy switching, recovery from safe modes).
- To confirm that the spacecraft response to commands is as expected by the procedures and timelines as defined in the FOP.
- To verify that the final product of the mission planning process (i.e. time-tagged command schedules, the onboard Mission Timeline) can be correctly executed by the satellites.
- To verify, for all on-board memories accessible to maintenance processes, that the products of the OBSM function can be correctly loaded on-board the satellites.
- To verify that the contents of the on-board memories can be correctly dumped, stored, interpreted and displayed by the OBSM function.
- To verify that OBCPs can be generated, loaded, executed and controlled from the ground.
- To confirm that the spacecraft launch configuration is as expected, and is fully compatible with the ESOC post-launch initial acquisition Flight Control Procedures (SVT-1 or SVT-2 – TBC).
- To provide reference data useful for the verification of the spacecraft simulator.

8.1.2 SVT-0 (Avionics Model)

GSSTP Reference	HGS-VT-SVT-0 (Herschel)
	PGS-VT-SVT-0 (Planck)
Test Name	Herschel/Planck SVT-0
Objectives	*See section 8.1.1*
Test Responsibility	ESOC / OPS-OAH
Test Manager	M. Schmidt (SOM)
Test Conductor	HP FCT
Interface(s) under test	*In SVTs, the ground station is represented by the NDIU*
	S01.A.SC.STA (TM)
	S01.B.STA.SC (TC)
	G01.A.STA.NCT (TM)
	G01.B.NCT.STA (TC)
	M02.A.MCS.FDS (HK TM over SODA)
	M02.B.FDS.MCS (SED)
	M02.D.FDS.MCS (OWLT)
	M02.E.FDS.MCS (FDS TPFs)
	M02.J.FDS.MCS (Orbit data)
	M10.A.MCS.NCT (TC)
	M10.B.MCS.NCT (Sim TC)
	M11.A.NCT.MCS (TM)
	M11.C.NCT.MCS (Sim TM)
ICD Reference(s)	S01: SCI-PT-ICD-07418
	M10,M11: N2K-MCS-ICD-0002-TOS-GCI
	M02.J: PT-CMOC-FD-ICD-2103-OPS-GFI
	M02.A: FDOS-FDIS-ICD-1422-TOS-GFS
	G01: IG-TMTC-ICD-1000-TOS-GIB
Locations/sites involved	MOC, AAS-I Test Site
VVP Test Reference	TBC
Functional Pre-requisites	Integration of: HPMCS D2, NCTRS, FTS, NDIU, SIM
GSSTP Pre-requisites	HGS-CT-S01-1.0 (RFCT)
	PGS-CT-S01-2.0 (RFCT)
Required Test Data	Prepared stacks and procedures according to agreed SVT-0 Test Plan.
	OWLT and Orbit file products from FDS.
Required Analyses Tools	HPMCS
Required tools	HPMCS, NCTRS, Simulator, FDS, PSS
	NDIU$_{lite}$ / NDIU$_{TMTCS}$
Outputs	SVT-0 Test Report, including observations, complete TC History, significant TM results, any SPRs.
Constraints	Availability of spacecraft, SCOEs and industry test teams in test environment

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8.1.3 SVT-1

GSSTP Reference	HGS-VT-SVT-1 (Herschel)
	PGS-VT-SVT-1 (Planck)
Test Name	Herschel/Planck SVT-1
Objectives	*See section 8.1.1.*
	SVT-1 also considers payload interface and commanding validation.
Test Responsibility	ESOC / OPS-OAH
Test Manager	M. Schmidt (SOM)
Test Conductor	HP FCT
Interface(s) under test	*In SVTs, the ground station is represented by the NDIU*
	S01.A.SC.STA (TM), G01.A.STA.NCT (TM), S01.B.STA.SC (TC),
	G01.B.NCT.STA (TC), M02.A.MCS.FDS (HK TM over SODA)
	M02.B.FDS.MCS (SED), M02.D.FDS.MCS (OWLT)
	M02.E.FDS.MCS (FDS TPFs), M02.J.FDS.MCS (Orbit data)
	M10.A.MCS.NCT (TC), M10.B.MCS.NCT (Sim TC), M11.A.NCT.MCS (TM)
	M11.C.NCT.MCS (Sim TM)
ICD Reference(s)	S01: SCI-PT-ICD-07418
	M10,M11: N2K-MCS-ICD-0002-TOS-GCI
	M02.J: PT-CMOC-FD-ICD-2103-OPS-GFI
	M02.A: FDOS-FDIS-ICD-1422-TOS-GFS
	G01: IG-TMTC-ICD-1000-TOS-GIB
Locations/sites involved	MOC
	Herschel:
	ESTEC, HSC
	Planck:
	LFI DPC, HFI DPC
VVP Test Reference	TBC
Functional Pre-requisites	MOC-level integration of: HPMCS D2, NCTRS, FTS, NDIU, SIM
	Spacecraft integration of FM instruments
GSSTP Pre-requisites	*Herschel:* HGS-VT-SVT0-1, HGS-CT-H01-3, HGS-CT-H01-4, HGS-IT-COM-1.0
	HGS-IT-DDS-1.0, HGS-IT-FTS-1.0
	Planck: PGS-VT-SVT0-2, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-COM-3.0
	PGS-IT-DDS-1.0, PGS-IT-FTS-1.0
Required Test Data	Prepared stacks and procedures according to agreed SVT-1 Test Plan.
	OWLT and Orbit file products from FDS.
Required Analyses Tools	HPMCS
Required tools	HPMCS, NCTRS, Simulator, FDS, PSS
	Planck: $NDIU_{TMTCS}$ Herschel: $NDIU_{IFMS}$
Outputs	SVT-1 Test Report, including observations, complete TC History, significant TM results, any SPRs.
Constraints	Availability of spacecraft, SCOEs and industry test teams in test environment

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8.1.4   SVT-2

GSSTP Reference	HGS-VT-SVT-2 (Herschel)
	PGS-VT-SVT-2 (Planck)
Test Name	Herschel/Planck SVT-2
Objectives	*See section 8.1.1.*
Test Responsibility	ESOC / OPS-OAH
Test Manager	M. Schmidt (SOM)
Test Conductor	HP FCT
Interface(s) under test	*In SVTs, the ground station is represented by the NDIU*
	S01.A.SC.STA (TM), G01.A.STA.NCT (TM), M11.A.NCT.MCS (TM),
	M11.C.NCT.MCS (Sim TM), S01.B.STA.SC (TC), G01.B.NCT.STA (TC),
	M10.A.MCS.NCT (TC), M10.B.MCS.NCT (Sim TC)
	M02.A.MCS.FDS (HK TM over SODA)
	M02.B.FDS.MCS (SED), M02.D.FDS.MCS (OWLT)
	M02.E.FDS.MCS (FDS TPFs)
	M02.J.FDS.MCS (Orbit data)
	M13.K.MCS.SDS, M14.A.SDS.ICC-M(RTSI NRT TM)
	M14.B.ICC-M.SDS, M14.C.SDS.ICC-M, M14.D.SDS.ICC-M (DDS)
ICD Reference(s)	S01: SCI-PT-ICD-07418
	M10,M11: N2K-MCS-ICD-0002-TOS-GCI
	M13.K, M14.A: TM: PT-CMOC-MDS-ICD-3101-OPS-GDS
	M14.B, M14.C, M14.D: TM: PT-CMOC-MDS-ICD-3108-OPS-GDS
	M02.J: PT-CMOC-FD-ICD-2103-OPS-GFI
	M02.A: FDOS-FDIS-ICD-1422-TOS-GFS
	G01: IG-TMTC-ICD-1000-TOS-GIB
Locations/sites involved	MOC
	Herschel:
	ESTEC, HSC, ICCs
	Planck:
	AAS-F Test Site, LFI DPC, HFI DPC
VVP Test Reference	TBC
Functional Pre-requisites	MOC-level integration of: HPMCS D3 and final, accepted versions of all subsystems (NCTRS, SIM, FTS, etc.)
	PISA configuration, including PISALAN and external access.
	Delivery and integration of instrument workstations at MOC PISA (integration tests of ICC/IW @MOC are GSSTP pre-requisites, see below).
GSSTP Pre-requisites	*Herschel:*
	HGS-VT-SVT0-1, HGS-CT-H01-3, HGS-CT-H01-4, HGS-IT-COM-1.0
	HGS-IT-DDS-1.0, HGS-IT-FTS-1.0, HGS-IT-M14-1, HGS-IT-M14-2, HGS-IT-M14-3
	Planck:
	PGS-VT-SVT0-2, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-COM-3.0
	PGS-IT-DDS-1.0, PGS-IT-FTS-1.0, PGS-IT-M14-1, PGS-IT-M14-2, PGS-IT-M14-3
Required Test Data	Prepared stacks and procedures according to agreed SVT-2 Test Plan.

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	OWLT and Orbit file products from FDS.
Required Analyses Tools	HPMCS, ICC@MOC, IW@MOC
Required tools	HPMCS, NCTRS, Simulator, FDS, PSS
	NDIU$_{TMTCS}$
	ICC@MOC, IW@MOC (for each instrument)
Outputs	SVT-2 Test Report, including observations, complete TC History, significant TM results, any SPRs.
Constraints	Availability of spacecraft, SCOEs and industry test teams in test environment

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8.2 Herschel Mission Planning Cycle Validation

GSSTP Reference	HGS-VT-MPS-1
Test Name	Mission planning chain validation test
Objectives	To validate the mission planning chain involving MOC, FDS and the science ground segment in exchange of all data products related to mission planning. The operational software, hardware and interfaces are required, and this test validates the configuration and system-level interaction of the components involved.
Test Responsibility	ESOC / HSC
Test Manager	ESOC Test Manager
	SGS Test Manager
Test Conductor	HP FCT and SGS operations team members
Interface(s) under test	H01.K, M07.K (PSF)
	H01.A, M07.A (POS)
	H01.D, M12.D, M02.E (TPF)
	H01.S, M07.H, M02.K (EPOS / Timeline summary file)
ICD Reference(s)	PSF: PT-CMOC-FD-ICD-2104-OPS-GFT
	POS: HGS-ICD-024
	TPF: PT-HMOC-FD-ICD-2105-OPS-GFT, PT-FDOS-HMCS-ICD-0004-TOS-GFT
	EPOS: PT-HMOC-FD-ICD-2107-OPS-GFT
Locations/sites involved	MOC (including FDS)
	HSC
VVP Test Reference	TBW
Functional Pre-requisites	Completion of all integration tests involving the above interfaces
GSSTP Pre-requisites	
Required Test Data	OWLT and Orbit file products from FDS.
	Mission planning products from science ground segment corresponding to the Orbit data provided by FDS.
Required Analyses Tools	HPMCS
	HCSS
Required tools	HPMCS, Simulator, FDS, SDS
	Full science-ground-segment software and systems involved in mission planning tasks
	SGS data pipeline processing systems
Outputs	Test report
Constraints	

The mission planning cycle will also be validated operationally via the End-End testing in the SOVT test campaign. Integration tests are assumed to have been completed successfully. See section 8.7.

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8.3 Planck Mission Planning Cycle Validation

GSSTP Reference	PGS-VT-MPS-1
Test Name	Mission planning chain validation test
Objectives	To validate the mission planning chain involving MOC, FDS and the science ground segment in exchange of all data products related to mission planning. The operational software, hardware and interfaces are required, and this test validates the configuration and system-level interaction of the components involved.
Test Responsibility	ESOC PSO
Test Manager	ESOC Test Manager / SGS Test Manager
Test Conductor	HP FCT and SGS operations team members
Interface(s) under test	P01.A, M07.F (PPL) P01.D, M12.F, M02.E (TPF) M07.E, P01.K, M02.C, M03.A (APPL / Timeline summary file)
ICD Reference(s)	PPL: PGS-ICD-017 TPF: P01.D, M12.F, M02.E: PT-CMOC-OPS-ICD-6106-OPS-OGH, PGS-ICD-053 APPL: PT-PMOC-FD-ICD-2108-OPS-GFT
Locations/sites involved	MOC (including FDS) PSO DPCs
VVP Test Reference	TBW
Functional Pre-requisites	Completion of all integration tests involving the above interfaces
GSSTP Pre-requisites	
Required Test Data	OWLT and Orbit file products from FDS. Mission planning products from science ground segment corresponding to the Orbit data provided by FDS.
Required Analyses Tools	HPMCS SPPT
Required tools	HPMCS, Simulator, FDS, SDS Full science-ground-segment software and systems involved in mission planning tasks SGS data pipeline processing systems
Outputs	Test report
Constraints	

The mission planning cycle will also be validated operationally via the End-End testing in the SOVT test campaign. Integration tests are assumed to have been completed successfully. See section 8.7.

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8.4 Commanding Chain Validation

GSSTP Reference	HPGS-VT-TC-1
Test Name	Command chain validation test, including TC history
Objectives	To validate the commanding chain from MCS to Simulator, generation of TC history, delivery of TC history and manual stack printouts in ASCII form. Stacks and TC history to be delivered by FTS to SGS components and ingested using operational software and interfaces.
Test Responsibility	ESOC
Test Manager	TBD
Test Conductor	HP FCT
Interface(s) under test	M16.B. NCT.SIM (Sim TC)
	M10.B.MCS.NCT (Sim TC)
	M13.B.MCS.SDS (TC History)
	H01.M.SDS.HSC (TC History)
	P01.M.SDS.DPC (TC History)
	H01.Y, P01.Y, M13.Y (Stack printout)
ICD Reference(s)	M10, M16: N2K-MCS-ICD-0002-TOS-GCI
	M13, H01, P01: PT-CMOC-MDS-3108-OPS-GDS
	H01.Y, P01.Y, M13.Y: PT-CMOC-OPS-ICD-6101-OPS-OGH
Locations/sites involved	MOC
	HSC
	Planck DPCs
VVP Test Reference	
Functional Pre-requisites	Integration and acceptance testing of MCS D3
GSSTP Pre-requisites	HGS-IT-DDS-1.0
	PGS-IT-DDS-1.0
Required Test Data	Prepared procedures and command stacks for the simulator
Required Analyses Tools	HPMCS
	HCSS / Planck SGS software to ingest/receive TC history (if applicable)
Required tools	HPMCS, NCTRS, Simulator, FDS, PSS
Outputs	Test report
Constraints	Availability of MCS D3, SIM D3
	DDS configuration to support TC history return to instrument teams

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8.5   Telemetry Processing Chain Validation

8.5.1   TM Processing

GSSTP Reference	HPGS-VT-TM-1.0
Test Name	End-end TM delivery validation test
	Validation similar to DDS integration tests, using operational interfaces and realistic data volume.
Objectives	To validate the telemetry chain from Simulator or other data source, to MCS, via SDS to SGS elements. This validation is similar to DDS integration tests, using operational software and interfaces and realistic data volumes based on archive consolidation planned for the commissioning phase.
Test Responsibility	ESOC / OPS-OAH
Test Manager	TBD
Test Conductor	HP FCT
Interface(s) under test	M16.A.SIM.NCT, M11.C.MCS.NCT, M13.K.MCS.SDS
	M02.A.MCS.FDS, M13.A.MCS.SDS, M14.A.SDS.ICC-M
	P01.L.SDS.DPC, P01.T.SDS.DPC, P01.E.DPC.SDS
	H01.E.HSC.SDS, H01.L.SDS.HSC, H01.T.SDS.HSC
ICD Reference(s)	P01, H01: PT-CMOC-MDS-3108-OPS-GDS
	M02.A: FDOS-FDIS-ICD-1422-TOS-GFS
	M11, M16: N2K-MCS-ICD-0002-TOS-GCI
	M13, M14: PT-CMOC-MDS-ICD-3101-OPS-GDS
Locations/sites involved	MOC
	HSC
	DPCs
	ICC@MOC
	IW@MOC
VVP Test Reference	TBD
Functional Pre-requisites	
GSSTP Pre-requisites	HGS-IT-COM-5.0, PGS-IT-COM-6.0, HGS-IT-DDS-1.0, PGS-IT-DDS-1.0
	PGS-IT-M14-1 (HFI), PGS-IT-M14-2 (LFI), PGS-IT-M14-3 (SCS)
	HGS-IT-M14-4 (PACS), HGS-IT-M14-5 (SPIRE), HGS-IT-M14-6 (HIFI)
Required Test Data	PSS or HPSIM as TM data source
Required Analyses Tools	HPMCS
	SGS software to ingest/parse incoming TM
Required tools	HPMCS, SIM, PSS
Outputs	Statement of readiness to support SOVT. A full test report is not required.
Constraints	Availability of instrument team representatives to operate instrument workstations. This test could be conducted in the timeframe of workstation delivery prior to SVT-2, provided the operational interfaces including external communications leased lines are available.

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8.5.2   Listen-In Testing

GSSTP Reference	HPGS-VT-LIT-1.0
Test Name	H/P Listen-In Testing
Objectives	Demonstrate connectivity and proper configuration of the MCS to the test site, including correct processing, display and archiving of real TM data.
Test Responsibility	ESOC / OPS-OAH
Test Manager	M. Schmidt / S. Manganelli
Test Conductor	HP FCT
Interface(s) under test	*In this test (as in SVTs) ground station is represented by NDIU* S01.A.SC.STA (TM) G01.A.STA.NCT (TM) M02.A.MCS.FDS (HK TM over SODA) M11.A.NCT.MCS (TM)
ICD Reference(s)	S01: SCI-PT-ICD-07418 M11: N2K-MCS-ICD-0002-TOS-GCI M02.A: FDOS-FDIS-ICD-1422-TOS-GFS G01: IG-TMTC-ICD-1000-TOS-GIB
Locations/sites involved	MOC Spacecraft integration site (AAS-I, AAS-F, ESTEC)
VVP Test Reference	PT-CMOC-SYS-PL-7204-OPS-ONV
Functional Pre-requisites	None.
GSSTP Pre-requisites	Integration
Required Test Data	Spacecraft as a TM source
Required Analyses Tools	HPMCS
Required tools	HPMCS, NCTRS, NDIU
Outputs	Listen-In Test report as required (see HP LIT Plan, PT-CMOC-SYS-PL-7204-OPS-ONV)
Constraints	The Satellite Test Configuration will be continually evolving over the time window allocated to Listen In Testing as more equipment is integrated onto the satellite. Hence, it is not possible to define any particular configuration per Listen In Test. The maximum data rate that can be supported by the communications setup with the MOC is 256kbps. This corresponds to the medium-rate spacecraft TM link, at 150kbps.

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8.6   On-Board Software Maintenance Chain Validation

GSSTP Reference	HPGS-VT-OBS-1
Test Name	Onboard software maintenance validation test
Objectives	To validate the operational chain of interfaces involved in onboard software maintenance. This includes all data products related to the OBSM subsystem integrated into the MOC, interfaces with OBSM systems in the science ground segment, and validation of the configuration of software and exchange mechanism (HPFTS) to support such maintenance.
Test Responsibility	ESOC
Test Manager	R. Furnell
Test Conductor	TBD
Interface(s) under test	H01.G, P01.G, M12.E (Instrument OBSW files) H01.Q, P01.Q (OBSW Image TM) M17.A (OBSW Dump to SDE) M17.B (OBSW Images for uplink) M17.C (Token code) M17.D (OBSM Saved stacks)
ICD Reference(s)	PT-CMOC-MDS-ICD-3105-OPS-GDS, PT-CMOC-OPS-ICD-6101-OPS-OGH S2K-MCS-ICD-0014-TOS-GCI
Locations/sites involved	MOC HSC DPC GAV (for Star tracker if applicable during testing) AAS (for CDMU/ACC if applicable during testing)
VVP Test Reference	
Functional Pre-requisites	Integration of MCS and OBSM / SDE platforms. All parties agreeing on the patches, and that those patches have been tested at source (i.e. Eng Model or similar build) before use on the S/C.
GSSTP Pre-requisites	Completion of FTS integration tests (HPGS-IT-H01-0.1, PGS-IT-FTS-1.0)
Required Test Data	Software images
Required Analyses Tools	OBSM
Required tools	HPMCS, OBSM
Outputs	Test report
Constraints	

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8.7 End-to-End System Validation

8.7.1 Overview and Scope

The End-End tests for both missions have the following top-level objectives:

- validation of the mission planning cycle as applicable to each mission
- validation of the data exchange interfaces in an operational context
- validation of operational procedures
- demonstration of end-end integration of subsystems and their system-level interfaces
- identification of timing constraints and data product processing issues
- familiarisation of the routine operational scenario for participating teams

8.7.2 End-End Validation

GSSTP Reference	HGS-VT-SOV-1, HGS-VT-SOV-2 (Herschel)
	PGS-VT-SOV-1, PGS-VT-SOV-2 (Planck)
Test Name	End-end tests (SOVT)
Objectives	*See section 8.7.1 above.*
Test Responsibility	ESOC / OPS-OAH
Test Manager	M. Schmidt
Test Conductor	HP FCT, FDS, and Instrument teams
Interface(s) under test	All commanding, telemetry, mission planning, and reporting interfaces
ICD Reference(s)	Various
Locations/sites involved	MOC
	Herschel:
	ESTEC, HSC, HIFI-ICC, PACS-ICC, SPIRE-ICC
	Planck:
	AAS-F Test Site, PSO, LFI DPC, HFI DPC
VVP Test Reference	TBW
Functional Pre-requisites	Completion of all integration tests involving the above interfaces
GSSTP Pre-requisites	
Required Test Data	Prepared procedures according to agreed SOVT Test Plan.
	OWLT and Orbit file products from FDS.
	Mission planning products from science ground segment corresponding to the Orbit data provided by FDS.
Required Analyses Tools	HPMCS
Required tools	HPMCS, Simulator, FDS, SDS
	Full science-ground-segment software and systems involved in mission planning tasks
	SGS data pipeline processing systems
Outputs	SOVT Test Reports
Constraints	Availability of spacecraft, SCOEs and industry test teams in test environment

9   POST-VALIDATION ACTIVITIES

Following successful integration and technical validation of the Herschel/Planck ground segment, the following activities will be initiated. These are listed here as the activities of this test plan form pre-requisites to all of the following (note that these are in *approximate* chronological order only):

These activities are **outside** the scope of the GSSTP. They will be led and coordinated by ESOC. The GSM may decide, at a later stage, to associate the ITSG in some of these activities.

- Operational Validation
- GS Rehearsal activities
- Simulations
- Mission Readiness Tests
- Operations training
- Ground Segment freeze
- Launch preparation
- LEOP
- CPV Phase
- Routine Phase Operations

10   ANNEXES

10.1   Data Products

The table of data products in the GSSTP has been superseded by the following two data flow technical notes:

- Herschel Science Ground Segment Data Flow TN, Issue 1.0, 30 Sept. 2005, HSCDT-TN052

- Planck Science Ground Segment Data Flow TN, Draft 0.1, 9 Jan 2006, Planck/PSO/2005-027

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10.2   Interfaces and Requirements Coverage Matrices

Note 1

The source requirements from: H-SGS IRD v2.4, P-SGS IRD v3.0 and MIRD v.1.4.

Note 2

MIRD 'MASS' assumptions, 'MMAN' management statements, and 'MPA' PA requirements are not included

Note 3

The coverage matrices included in this annex are three different views of the same set of information, arranged by tests, then interfaces, then requirements. In the model of the ground segment, requirements may be linked to interfaces (see the HP MOC SAD matrices, [AD-5] section 6). Naturally, test definitions can be linked to both interfaces and to requirements separately. Therefore, in the requirements coverage, a reference to a test definition can be found in two ways: direct linking of the test to the requirement and also indirectly – where a test is specified referencing an interface and that interface is separately associated with a requirement. Both sources of coverage information are included in the requirements coverage matrix as follows:

Example:

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From requirements:
HGS-VT-SOV-1
From interfaces:
None
```

The corresponding view of these two sources is also given in the tests matrix, where requirements have two sources.

Note 4

The 'None' shown above does not mean that the requirement is not related to any interface, it just means that the test definition is linked directly to the requirement, and it has not been 'inherited' in the indirect way described above. This possible confusion is alleviated as all three matrices are provided, which show for test, interface and requirement, its relationship with the other types of information.

Note 5

Some tests have been defined purely by linking to interfaces based upon the SAD. Other tests, especially those involving many interfaces, have been linked to requirements. The modeling performed in the generation of this test plan covers the integration and validation of the system-level interfaces as identified in section 4. It is possible to enhance the model by introducing additional links, e.g. by linking requirements with tests that are only otherwise defined using the relevant interfaces.

Note 6

Future revisions of the ground segment model, or of other aspects of this GSSTP, *may* result in the following compliance matrices becoming a standalone Annex document, in order to simplify updates without affecting official issues of the GSSTP.

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10.2.1 Tests Matrix

Test Reference	Section	Description	Interfaces	Requirements
HGS-CT-H01-1	6.3.1	MOC-HSC Compatibility Test 1 - Planning	H01.A.HSC.SDS H01.I.SDS.HSC H01.K.SDS.HSC H01.S.SDS.HSC H01.U.SDS.HSC M07.A.SDS.FDS M07.G.FDS.SDS M07.H.FDS.SDS M07.J.FDS.SDS M07.K.FDS.SDS	Direct requirements: *None* From interfaces: FGS-IR-3.1-120 FGS-IR-3.1-140 FGS-IR-3.1-210 FGS-IR-3.1-220 FGS-IR-3.1-230 FGS-IR-3.1-270 FGS-IR-3.1-290 FGS-IR-3.1-350 FGS-IR-3.1-370 FGS-IR-3.1-380 FGS-IR-3.1-400 FGS-IR-3.1-410 FGS-IR-3.4-10 FGS-IR-3.4-50 MFUN-165 MPER-085 MPER-115 PGS-IR-4.7-100
HGS-CT-H01-2	6.3.2	MOC-HSC Compatibility Test 2 - Commanding	H01.D.HSC.SDS H01.E.HSC.SDS H01.M.SDS.HSC H01.W.SDS.HSC H01.Y.SDS.HSC M12.F.SDS.MCS M13.B.MCS.SDS M13.Y.MCS.SDS	Direct requirements: *None* From interfaces: FGS-IR-3.1-300 FGS-IR-3.1-330 FGS-IR-3.1-340 FGS-IR-3.1-75 FGS-IR-3.3-35 PGS-IR-4.1-230
HGS-CT-H01-3	6.3.3	MOC-HSC Compatibility Test 3 - Telemetry	H01.E.HSC.SDS H01.L.SDS.HSC H01.O.SDS.HSC H01.T.SDS.HSC M13.A.MCS.SDS M13.D.MCS.SDS	Direct requirements: *None* From interfaces: FGS-IR-3.1-10 FGS-IR-3.1-100 FGS-IR-3.1-20 FGS-IR-3.1-420 FGS-IR-3.1-436 FGS-IR-3.1-470 FGS-IR-3.1-475 FGS-IR-3.1-490 FGS-IR-3.1-75 FGS-IR-3.3-35 FGS-IR-3.5-20 MPER-235 MPER-245 PGS-IR-4.1-360 PGS-IR-4.1-430 PGS-IR-4.1-460
HGS-CT-H01-4	6.3.4	MOC-HSC Compatibility Test 4 - Maintenance	H01.F.HSC.SDS H01.G.HSC.SDS H01.Q.SDS.HSC H01.X.HSC.SDS	Direct requirements: *None* From interfaces: FGS-IR-3.1-496 FGS-IR-3.1-498 FGS-IR-3.4-100 FGS-IR-3.4-120 FGS-IR-3.4-125 FGS-IR-3.4-150 FGS-IR-3.4-80 FGS-IR-3.7-210
HGS-CT-H01-5	6.3.5	MOC-HSC Compatibility Test 5 - General	H01.H.HSC.SDS H01.N.HSC.SDS M07.C.SDS.FDS M07.D.SDS.FDS	Direct requirements: *None* From interfaces: FGS-IR-3.4-140
HGS-CT-S01-1.0	6.2	RFCT Herschel (H-RFCT)	SO1.A.SC.STA SO1.B.STA.SC	Direct requirements: *TBW* From interfaces: *None*
HGS-IT-COM-1.0 HGS-IT-COM-2.0	7.1	HSC-MOC ISDN & Leased line Throughput tests	*None*	Direct requirements: *None* From interfaces: *None*
HGS-IT-COM-5.0	7.3.1	Herschel ICC comms test	*None*	Direct requirements: *None* From interfaces: *None*

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Test Reference	Section	Description	Interfaces	Requirements
HGS-IT-DDS-2.0	7.4	DDS Data Retrieval Test for ICC@MOC - Herschel	M14.B.ICC-M.SDS M14.C.SDS.ICC-M M14.D.SDS.ICC-M	Direct requirements: *None* From interfaces: *None*
HGS-IT-M14-4 (PACS) HGS-IT-M14-5 (SPIRE) HGS-IT-M14-6 (HIFI)	7.3.3	ICC@MOC integration tests with NRT TM Flow	M13.K.MCS.SDS M14.A.SDS.ICC-M M14.B.ICC-M.SDS M14.C.SDS.ICC-M M14.D.SDS.ICC-M	Direct requirements: *None* From interfaces: FGS-IR-3.3-10 FGS-IR-3.3-30 FGS-IR-3.3-40 FGS-IR-3.3-50 MFUN-485 PGS-IR-4.2-10 PGS-IR-4.2-20 PGS-IR-4.2-30
HGS-VT-MPS-1	8.2	Mission planning chain validation test	H01.A.HSC.SDS H01.D.HSC.SDS H01.K.SDS.HSC H01.S.SDS.HSC M02.E.FDS.MCS M02.K.FDS.MCS M07.A.SDS.FDS M07.H.FDS.SDS M07.K.FDS.SDS M12.F.SDS.MCS	Direct requirements: *None* From interfaces: FGS-IR-3.1-210 FGS-IR-3.1-220 FGS-IR-3.1-230 FGS-IR-3.1-270 FGS-IR-3.1-290 FGS-IR-3.4-10 FGS-IR-3.4-50 MFUN-165 MPER-085
HGS-VT-SOV-1	8.7	Herschel End-End Test 1 (H-SOVT-1)	*None*	Direct requirements: FGS-IR-3.1-10 FGS-IR-3.1-100 FGS-IR-3.1-110 FGS-IR-3.1-120 FGS-IR-3.1-130 FGS-IR-3.1-140 FGS-IR-3.1-20 FGS-IR-3.1-210 FGS-IR-3.1-220 FGS-IR-3.1-230 FGS-IR-3.1-260 FGS-IR-3.1-270 FGS-IR-3.1-280 FGS-IR-3.1-290 FGS-IR-3.1-295 FGS-IR-3.1-30 FGS-IR-3.1-300 FGS-IR-3.1-310 FGS-IR-3.1-320 FGS-IR-3.1-330 FGS-IR-3.1-340 FGS-IR-3.1-350 FGS-IR-3.1-360 FGS-IR-3.1-370 FGS-IR-3.1-380 FGS-IR-3.1-390 FGS-IR-3.1-400 FGS-IR-3.1-410 FGS-IR-3.1-420 FGS-IR-3.1-430 FGS-IR-3.1-435 FGS-IR-3.1-436 FGS-IR-3.1-440 FGS-IR-3.1-470 FGS-IR-3.1-475 FGS-IR-3.1-480 FGS-IR-3.1-490 FGS-IR-3.1-495 FGS-IR-3.1-496 FGS-IR-3.1-498 FGS-IR-3.1-75 FGS-IR-3.1-80 FGS-IR-3.4-10 FGS-IR-3.4-50 FGS-IR-3.5-10 FGS-IR-3.5-100 FGS-IR-3.5-110 FGS-IR-3.5-120 FGS-IR-3.5-130 FGS-IR-3.5-135 FGS-IR-3.5-140 FGS-IR-3.5-145 FGS-IR-3.5-15 FGS-IR-3.5-150 FGS-IR-3.5-40 FGS-IR-3.5-50 FGS-IR-3.5-60 FGS-IR-3.5-70 FGS-IR-3.5-80 FGS-IR-3.5-90 FGS-IR-3.7-210 FGS-IR-3.7-215 FGS-IR-3.7-40 FGS-IR-3.7-45 FGS-IR-3.7-47 FGS-IR-3.7-50 FGS-IR-3.7-60 FGS-IR-3.7-65 FGS-IR-3.7-80 FGS-IR-3.7-85 FGS-IR-3.8-10 FGS-IR-3.8-20 FGS-IR-3.8-25 FGS-IR-3.8-26 FGS-IR-3.8-30 FGS-IR-3.9-10 FGS-IR-3.9-20 MFUN-005 MFUN-120 MFUN-125 MFUN-130 MFUN-135 MFUN-140 MFUN-141 MFUN-147 MFUN-150 MFUN-155 MFUN-160 MFUN-165 MFUN-170 MFUN-225 MFUN-230 MFUN-240 MFUN-245 MFUN-255 MFUN-260 MFUN-265 MFUN-270 MFUN-275 MFUN-295 MFUN-300 MFUN-310 MFUN-375 MFUN-380 MFUN-385 MFUN-390 MFUN-440 MFUN-455 MFUN-460

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Test Reference	Section	Description	Interfaces	Requirements
				MFUN-465 MFUN-470 MFUN-475 MFUN-480 MFUN-485 MFUN-585 MOPS-060 MOPS-065 MOPS-070 MOPS-075 MOPS-080 MOPS-085 MOPS-090 MOPS-100 MOPS-110 MPA-125 MPER-060 MPER-065 MPER-070 MPER-075 MPER-080 MPER-085 MPER-086 MPER-115 MPER-120 MPER-125 MPER-170 MPER-175 MPER-180 MPER-185 MPER-190 MPER-200 MPER-235 MPER-240 MPER-245 From interfaces: *None*
HGS-VT-SOV-2	8.7	Herschel End-End Test 2 (H-SOVT-2)	*None*	Direct requirements: FGS-IR-3.1-10 FGS-IR-3.1-100 FGS-IR-3.1-110 FGS-IR-3.1-120 FGS-IR-3.1-130 FGS-IR-3.1-140 FGS-IR-3.1-20 FGS-IR-3.1-210 FGS-IR-3.1-220 FGS-IR-3.1-230 FGS-IR-3.1-260 FGS-IR-3.1-270 FGS-IR-3.1-280 FGS-IR-3.1-290 FGS-IR-3.1-295 FGS-IR-3.1-30 FGS-IR-3.1-300 FGS-IR-3.1-310 FGS-IR-3.1-320 FGS-IR-3.1-330 FGS-IR-3.1-340 FGS-IR-3.1-350 FGS-IR-3.1-360 FGS-IR-3.1-370 FGS-IR-3.1-380 FGS-IR-3.1-390 FGS-IR-3.1-400 FGS-IR-3.1-410 FGS-IR-3.1-420 FGS-IR-3.1-430 FGS-IR-3.1-435 FGS-IR-3.1-436 FGS-IR-3.1-440 FGS-IR-3.1-470 FGS-IR-3.1-475 FGS-IR-3.1-480 FGS-IR-3.1-490 FGS-IR-3.1-495 FGS-IR-3.1-496 FGS-IR-3.1-498 FGS-IR-3.1-75 FGS-IR-3.1-80 FGS-IR-3.3-10 FGS-IR-3.3-20 FGS-IR-3.3-30 FGS-IR-3.3-35 FGS-IR-3.3-40 FGS-IR-3.3-50 FGS-IR-3.4-10 FGS-IR-3.4-50 FGS-IR-3.5-10 FGS-IR-3.5-100 FGS-IR-3.5-110 FGS-IR-3.5-120 FGS-IR-3.5-130 FGS-IR-3.5-135 FGS-IR-3.5-140 FGS-IR-3.5-145 FGS-IR-3.5-15 FGS-IR-3.5-150 FGS-IR-3.5-40 FGS-IR-3.5-50 FGS-IR-3.5-60 FGS-IR-3.5-70 FGS-IR-3.5-80 FGS-IR-3.5-90 FGS-IR-3.7-210 FGS-IR-3.7-215 FGS-IR-3.7-40 FGS-IR-3.7-45 FGS-IR-3.7-47 FGS-IR-3.7-50 FGS-IR-3.7-60 FGS-IR-3.7-65 FGS-IR-3.7-80 FGS-IR-3.7-85 FGS-IR-3.8-10 FGS-IR-3.8-20 FGS-IR-3.8-25 FGS-IR-3.8-26 FGS-IR-3.8-30 FGS-IR-3.9-10 FGS-IR-3.9-20 MFUN-005 MFUN-120 MFUN-125 MFUN-130 MFUN-135 MFUN-140 MFUN-141 MFUN-147 MFUN-150 MFUN-155 MFUN-160 MFUN-165 MFUN-170 MFUN-225 MFUN-230 MFUN-240 MFUN-245 MFUN-255 MFUN-260 MFUN-265 MFUN-270 MFUN-275 MFUN-295 MFUN-300 MFUN-310 MFUN-375 MFUN-380 MFUN-385 MFUN-390 MFUN-440 MFUN-455 MFUN-460 MFUN-465 MFUN-470 MFUN-475 MFUN-480 MFUN-485 MFUN-585 MOPS-060 MOPS-065 MOPS-070 MOPS-075 MOPS-080 MOPS-085 MOPS-090 MOPS-100 MOPS-110 MPA-125 MPER-060 MPER-065 MPER-070 MPER-075 MPER-080 MPER-085 MPER-086 MPER-115 MPER-120 MPER-125

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Test Reference	Section	Description	Interfaces	Requirements
				MPER-170 MPER-175 MPER-180 MPER-185 MPER-190 MPER-200 MPER-235 MPER-240 MPER-245 From interfaces: *None*
HGS-VT-SVT-0 PGS-VT-SVT-0 HGS-VT-SVT-1 PGS-VT-SVT-1	8.1	Herschel SVT-0 (H-SVT-0) Planck SVT-0 (P-SVT-0) Herschel SVT-1 (H-SVT-1) Planck SVT-1 (P-SVT-1)	G01.A.STA.NCT G01.B.NCT.STA M02.A.MCS.FDS M02.B.FDS.MCS M02.D.FDS.MCS M02.E.FDS.MCS M02.J.FDS.MCS M10.A.MCS.NCT M10.B.MCS.NCT M11.A.NCT.MCS M11.C.NCT.MCS SO1.A.SC.STA SO1.B.STA.SC	Direct requirements: FGS-IR-3.1-75 FGS-IR-3.1-80 FGS-IR-3.1-90 MFUN-225 MFUN-230 MFUN-235 MFUN-245 MFUN-255 MFUN-260 MFUN-265 MFUN-270 MFUN-275 MFUN-305 MFUN-315 MFUN-320 MFUN-325 MFUN-390 MFUN-455 MFUN-460 MFUN-465 MFUN-470 MFUN-475 MFUN-480 MFUN-485 MFUN-490 MFUN-495 MFUN-500 MFUN-510 MFUN-520 MFUN-545 MFUN-600 MFUN-630 MPA-115 MPER-100 MPER-155 MPER-180 MPER-185 MPER-190 MPER-200 MPER-230 From interfaces: MFUN-460 MPER-230
HGS-VT-SVT-2 PGS-VT-SVT-2	8.1	Herschel SVT-2 (H-SVT-2) Planck SVT-2 (P-SVT-2)	G01.A.STA.NCT G01.B.NCT.STA M02.A.MCS.FDS M02.B.FDS.MCS M02.D.FDS.MCS M02.E.FDS.MCS M02.J.FDS.MCS M10.A.MCS.NCT M10.B.MCS.NCT M11.A.NCT.MCS M11.C.NCT.MCS M13.K.MCS.SDS M14.A.SDS.ICC-M M14.B.ICC-M.SDS M14.C.SDS.ICC-M M14.D.SDS.ICC-M SO1.A.SC.STA SO1.B.STA.SC	Direct requirements: FGS-IR-3.1-75 FGS-IR-3.1-80 FGS-IR-3.1-90 FGS-IR-3.3-10 FGS-IR-3.3-20 FGS-IR-3.3-30 FGS-IR-3.3-35 FGS-IR-3.3-40 FGS-IR-3.3-50 MFUN-225 MFUN-230 MFUN-235 MFUN-245 MFUN-255 MFUN-260 MFUN-265 MFUN-270 MFUN-275 MFUN-305 MFUN-315 MFUN-320 MFUN-325 MFUN-390 MFUN-455 MFUN-460 MFUN-465 MFUN-470 MFUN-475 MFUN-480 MFUN-485 MFUN-490 MFUN-495 MFUN-500 MFUN-510 MFUN-520 MFUN-545 MFUN-600 MFUN-630 MPA-115 MPER-100 MPER-155 MPER-180 MPER-185 MPER-190 MPER-200 MPER-230 From interfaces: FGS-IR-3.3-10 FGS-IR-3.3-30 FGS-IR-3.3-40 FGS-IR-3.3-50 MFUN-460 MFUN-485 MPER-230 PGS-IR-4.2-10 PGS-IR-4.2-20 PGS-IR-4.2-30
HPGS-IT-G01-1 (NNO) HPGS-IT-G01-2 (CEB) HPGS-IT-G01-3 (VIL) HPGS-IT-G01-4 (KOU)	7.9	NCTRS - Station Integration tests	G01.A.STA.NCT G01.B.NCT.STA G01.C.STA.NCT G01.D.STA.NCT G01.E.STC.NCT G01.F.NCT.STA G01.G.NCT.STC	Direct requirements: *None* From interfaces: MFUN-460 MPER-230

Test Reference	Section	Description	Interfaces	Requirements
HPGS-IT-H01-0.1	7.5	Herschel FTS data delivery test	H01.A.HSC.SDS H01.I.SDS.HSC H01.K.SDS.HSC H01.O.SDS.HSC H01.S.SDS.HSC H01.U.SDS.HSC M07.A.SDS.FDS M07.G.FDS.SDS M07.H.FDS.SDS M07.J.FDS.SDS M07.K.FDS.SDS	Direct requirements: *None* From interfaces: FGS-IR-3.1-120 FGS-IR-3.1-140 FGS-IR-3.1-210 FGS-IR-3.1-220 FGS-IR-3.1-230 FGS-IR-3.1-270 FGS-IR-3.1-290 FGS-IR-3.1-350 FGS-IR-3.1-370 FGS-IR-3.1-380 FGS-IR-3.1-400 FGS-IR-3.1-410 FGS-IR-3.1-420 FGS-IR-3.1-436 FGS-IR-3.4-10 FGS-IR-3.4-50 MFUN-165 MPER-085 MPER-115 PGS-IR-4.7-100
HPGS-IT-H01-0.2	7.4	DDS Data Retrieval Test	H01.E.HSC.SDS H01.L.SDS.HSC H01.M.SDS.HSC H01.O.SDS.HSC H01.T.SDS.HSC M13.D.MCS.SDS	Direct requirements: *None* From interfaces: FGS-IR-3.1-10 FGS-IR-3.1-100 FGS-IR-3.1-20 FGS-IR-3.1-300 FGS-IR-3.1-330 FGS-IR-3.1-340 FGS-IR-3.1-420 FGS-IR-3.1-436 FGS-IR-3.1-475 FGS-IR-3.1-75 FGS-IR-3.3-35 FGS-IR-3.5-20 MPER-235 MPER-245 PGS-IR-4.1-360
HPGS-IT-H01-1.0	7.6	HSC to MOC Integration Test 1 – Uplink test	H01.A.HSC.SDS H01.G.HSC.SDS H01.H.HSC.SDS H01.K.SDS.HSC H01.N.HSC.SDS H01.Q.SDS.HSC H01.U.SDS.HSC	Direct requirements: *None* From interfaces: FGS-IR-3.1-120 FGS-IR-3.1-140 FGS-IR-3.1-210 FGS-IR-3.1-220 FGS-IR-3.1-230 FGS-IR-3.1-350 FGS-IR-3.1-370 FGS-IR-3.1-496 FGS-IR-3.1-498 FGS-IR-3.4-10 FGS-IR-3.4-100 FGS-IR-3.4-140 FGS-IR-3.4-50 FGS-IR-3.4-80 MPER-085
HPGS-IT-H01-2.0	7.7	HSC to MOC Integration Test 2 – Downlink test	H01.E.HSC.SDS H01.I.SDS.HSC H01.L.SDS.HSC H01.M.SDS.HSC H01.O.SDS.HSC H01.S.SDS.HSC	Direct requirements: *None* From interfaces: FGS-IR-3.1-10 FGS-IR-3.1-100 FGS-IR-3.1-20 FGS-IR-3.1-270 FGS-IR-3.1-290 FGS-IR-3.1-300 FGS-IR-3.1-330 FGS-IR-3.1-340 FGS-IR-3.1-380 FGS-IR-3.1-400 FGS-IR-3.1-410 FGS-IR-3.1-420 FGS-IR-3.1-436 FGS-IR-3.1-75 FGS-IR-3.3-35 FGS-IR-3.5-20 MFUN-165 MPER-115 MPER-235
HPGS-IT-H01-3.0	7.8	HSC to MOC Integration Test 3 – Manual Commanding test	H01.D.HSC.SDS H01.Y.SDS.HSC	Direct requirements: *None* From interfaces: *None*
HPGS-IT-JPL-1	7.10	Orbit file exchange tests with JPL	E01.A.MOC.JPL	Direct requirements: *None* From interfaces: MFUN-635
HPGS-VT-LIT-1	8.5.2	MOC Listen-In Testing (LIT)	G01.A.STA.NCT M02.A.MCS.FDS M11.A.NCT.MCS SO1.A.SC.STA	Direct requirements: *None* From interfaces: MFUN-460 MPER-230

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Test Reference	Section	Description	Interfaces	Requirements
HPGS-VT-OBS-1	8.6	OBSW Maintenance Chain Validation	H01.G.HSC.SDS H01.Q.SDS.HSC M12.E.SDS.MCS M17.A.MCS.SDE M17.B.SDE.MCS M17.C.SDE.MCS M17.D.SDE.MCS P01.G.DPC.SDS P01.Q.SDS.DPC	Direct requirements: *None* From interfaces: FGS-IR-3.1-496 FGS-IR-3.1-498 FGS-IR-3.4-100 FGS-IR-3.4-80 PGS-IR-4.1-480 PGS-IR-4.4-10 PGS-IR-4.4-32 PGS-IR-4.4-35 PGS-IR-4.4-38
HPGS-VT-TC-1.0	8.4	Commanding Chain VT	H01.M.SDS.HSC H01.Y.SDS.HSC M10.B.MCS.NCT M13.B.MCS.SDS M16.B.NCT.SIM P01.M.SDS.DPC P01.Y.SDS.DPC	Direct requirements: *None* From interfaces: FGS-IR-3.1-300 FGS-IR-3.1-330 FGS-IR-3.1-340 PGS-IR-4.1-230 PGS-IR-4.1-260
HPGS-VT-TM-1.0	8.5.1	Routine data delivery VT	H01.E.HSC.SDS H01.L.SDS.HSC H01.T.SDS.HSC M02.A.MCS.FDS M11.C.NCT.MCS M13.A.MCS.SDS M13.K.MCS.SDS M14.A.SDS.ICC-M M16.A.SIM.NCT P01.E.DPC.SDS P01.L.SDS.DPC P01.T.SDS.DPC	Direct requirements: *None* From interfaces: FGS-IR-3.1-10 FGS-IR-3.1-100 FGS-IR-3.1-20 FGS-IR-3.1-470 FGS-IR-3.1-475 FGS-IR-3.1-490 FGS-IR-3.1-75 FGS-IR-3.3-10 FGS-IR-3.3-30 FGS-IR-3.3-35 FGS-IR-3.3-40 FGS-IR-3.3-50 FGS-IR-3.5-20 MFUN-485 MPER-235 MPER-245 PGS-IR-4.1-10 PGS-IR-4.1-110 PGS-IR-4.1-20 PGS-IR-4.1-250 PGS-IR-4.1-335 PGS-IR-4.1-370 PGS-IR-4.1-40 PGS-IR-4.1-410 PGS-IR-4.1-430 PGS-IR-4.1-440 PGS-IR-4.1-460 PGS-IR-4.1-470 PGS-IR-4.1-665 PGS-IR-4.1-70 PGS-IR-4.2-10 PGS-IR-4.2-20 PGS-IR-4.2-30
PGS-CT-P01-1	6.4.1	MOC-PSO Compatibility Test 1 - Planning	M07.E.FDS.SDS M07.F.SDS.FDS M07.I.FDS.SDS M07.J.FDS.SDS P01.A.PSO.SDS P01.J.FDS.PSO P01.K.SDS.PSO P01.U.SDS.DPC	Direct requirements: *None* From interfaces: MFUN-150 MFUN-165 MPER-115 PGS-IR-4.1-140 PGS-IR-4.1-200 PGS-IR-4.1-210 PGS-IR-4.1-280 PGS-IR-4.1-295 PGS-IR-4.1-310 PGS-IR-4.1-315 PGS-IR-4.1-340 PGS-IR-4.1-345 PGS-IR-4.1-660 PGS-IR-4.1-670 PGS-IR-4.3-10 PGS-IR-4.3-30 PGS-IR-4.3-61 PGS-IR-4.7-100 PGS-IR-4.7-165
PGS-CT-P01-2 (LFI) PGS-CT-P01-2 (HFI)	6.4.2	MOC- DPC Compatibility test - Commanding	M13.B.MCS.SDS M13.Y.MCS.SDS P01.D.DPC.SDS P01.M.SDS.DPC P01.W.SDS.DPC P01.Y.SDS.DPC	Direct requirements: *None* From interfaces: FGS-IR-3.1-300 FGS-IR-3.1-340 MOPS-070 PGS-IR-4.1-230 PGS-IR-4.1-260 PGS-IR-4.5-30 PGS-IR-4.5-35

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Test Reference	Section	Description	Interfaces	Requirements
PGS-CT-P01-4 (LFI) PGS-CT-P01-5 (HFI)	6.4.3	MOC- DPC Compatibility test - Telemetry	M13.A.MCS.SDS M13.D.MCS.SDS P01.E.DPC.SDS P01.L.SDS.DPC P01.O.SDS.DPC	Direct requirements: *None* From interfaces: FGS-IR-3.1-420 FGS-IR-3.1-470 FGS-IR-3.1-490 MPER-235 MPER-245 PGS-IR-4.1-10 PGS-IR-4.1-110 PGS-IR-4.1-20 PGS-IR-4.1-250 PGS-IR-4.1-335 PGS-IR-4.1-360 PGS-IR-4.1-370 PGS-IR-4.1-380 PGS-IR-4.1-40 PGS-IR-4.1-430 PGS-IR-4.1-460 PGS-IR-4.1-470 PGS-IR-4.1-665 PGS-IR-4.1-70
PGS-CT-P01-6 (LFI) PGS-CT-P01-7 (HFI)	6.4.4	MOC- DPC Compatibility test - Maintenance	P01.F.DPC.SDS P01.G.DPC.SDS P01.Q.SDS.DPC P01.X.DPC.SDS	Direct requirements: *None* From interfaces: PGS-IR-4.1-480 PGS-IR-4.1-500 PGS-IR-4.1-520 PGS-IR-4.4-10 PGS-IR-4.4-160 PGS-IR-4.4-170 PGS-IR-4.4-32 PGS-IR-4.4-35 PGS-IR-4.4-60 PGS-IR-4.4-70
PGS-CT-P01-8 (LFI) PGS-CT-P01-9 (HFI)	6.4.5	MOC- DPC Compatibility test - General	P01.H.DPC.SDS	Direct requirements: *None* From interfaces: PGS-IR-4.4-130 PGS-IR-4.4-140 PGS-IR-4.4-150
PGS-CT-S01-2.0	6.2	Planck RFCT (P-RFCT)	SO1.A.SC.STA SO1.B.STA.SC	Direct requirements: *None* From interfaces: *None*
PGS-IT-COM-3.0 PGS-IT-COM-4.0	7.2	DPC-MOC ISDN & Leased Line Throughput test	*None*	Direct requirements: *None* From interfaces: *None*
PGS-IT-COM-6.0	7.3.2	Planck - IW@MOC to DPC comms test ESOC PISALAN external internet access	*None*	Direct requirements: *None* From interfaces: *None*
PGS-IT-DDS-1.0	7.4	Planck DDS Data Retrieval Test DDS Data Retrieval Test	M13.D.MCS.SDS P01.E.DPC.SDS P01.L.SDS.DPC P01.M.SDS.DPC P01.O.SDS.DPC P01.T.SDS.DPC	Direct requirements: *None* From interfaces: FGS-IR-3.1-420 MPER-245 PGS-IR-4.1-10 PGS-IR-4.1-110 PGS-IR-4.1-20 PGS-IR-4.1-250 PGS-IR-4.1-260 PGS-IR-4.1-335 PGS-IR-4.1-360 PGS-IR-4.1-370 PGS-IR-4.1-380 PGS-IR-4.1-40 PGS-IR-4.1-410 PGS-IR-4.1-440 PGS-IR-4.1-470 PGS-IR-4.1-665 PGS-IR-4.1-70
PGS-IT-DDS-2.0	7.4	DDS Data Retrieval Test for IW@MOC - Planck	M14.B.ICC-M.SDS M14.C.SDS.ICC-M M14.D.SDS.ICC-M	Direct requirements: *None* From interfaces: *None*

Test Reference	Section	Description	Interfaces	Requirements
PGS-IT-FTS-1.0	7.5	Planck FTS data delivery test	M07.E.FDS.SDS M07.I.FDS.SDS M07.J.FDS.SDS P01.J.FDS.PSO P01.K.SDS.PSO P01.O.SDS.DPC P01.U.SDS.DPC	Direct requirements: *None* From interfaces: MFUN-165 MPER-115 PGS-IR-4.1-140 PGS-IR-4.1-200 PGS-IR-4.1-210 PGS-IR-4.1-280 PGS-IR-4.1-295 PGS-IR-4.1-310 PGS-IR-4.1-315 PGS-IR-4.1-340 PGS-IR-4.1-345 PGS-IR-4.1-380 PGS-IR-4.1-660 PGS-IR-4.1-670 PGS-IR-4.7-100 PGS-IR-4.7-165
PGS-IT-M14-1 (HFI) PGS-IT-M14-2 (LFI) PGS-IT-M14-3 (SCS)	7.3.3	IW @MOC integration tests with NRT TM Flow	M13.K.MCS.SDS M14.A.SDS.ICC-M M14.B.ICC-M.SDS M14.C.SDS.ICC-M M14.D.SDS.ICC-M	Direct requirements: *None* From interfaces: FGS-IR-3.3-10 FGS-IR-3.3-30 FGS-IR-3.3-40 FGS-IR-3.3-50 MFUN-485 PGS-IR-4.2-10 PGS-IR-4.2-20 PGS-IR-4.2-30
PGS-VT-MPS-1	8.3	Mission planning chain validation test	M02.C.FDS.MCS M02.E.FDS.MCS M03.A.MPS.MCS M07.E.FDS.SDS M07.F.SDS.FDS M12.F.SDS.MCS P01.A.PSO.SDS P01.D.DPC.SDS P01.K.SDS.PSO	Direct requirements: *None* From interfaces: MFUN-150 MFUN-165 MOPS-070 PGS-IR-4.1-200 PGS-IR-4.1-210 PGS-IR-4.1-660 PGS-IR-4.1-670 PGS-IR-4.3-10 PGS-IR-4.3-30 PGS-IR-4.3-61 PGS-IR-4.7-165
PGS-VT-SOV-1 PGS-VT-SOV-2	8.7	Planck End-End Test 1 Planck End-End Test 2 (P-SOVT-1, 2)	*None*	Direct requirements: MFUN-005 MFUN-120 MFUN-125 MFUN-130 MFUN-135 MFUN-140 MFUN-141 MFUN-147 MFUN-150 MFUN-155 MFUN-160 MFUN-165 MFUN-170 MFUN-225 MFUN-230 MFUN-240 MFUN-245 MFUN-255 MFUN-260 MFUN-265 MFUN-270 MFUN-275 MFUN-295 MFUN-300 MFUN-310 MFUN-375 MFUN-380 MFUN-385 MFUN-390 MFUN-440 MFUN-455 MFUN-460 MFUN-465 MFUN-470 MFUN-475 MFUN-480 MFUN-485 MFUN-585 MOPS-060 MOPS-065 MOPS-070 MOPS-075 MOPS-080 MOPS-085 MOPS-090 MOPS-100 MOPS-110 MPA-125 MPER-060 MPER-065 MPER-070 MPER-075 MPER-080 MPER-085 MPER-086 MPER-115 MPER-120 MPER-125 MPER-170 MPER-175 MPER-180 MPER-185 MPER-190 MPER-200 MPER-235 MPER-240 MPER-245 PGS-IR-4.1-10 PGS-IR-4.1-130 PGS-IR-4.1-135 PGS-IR-4.1-140 PGS-IR-4.1-145 PGS-IR-4.1-150 PGS-IR-4.1-155 PGS-IR-4.1-160 PGS-IR-4.1-170 PGS-IR-4.1-175 PGS-IR-4.1-190 PGS-IR-4.1-20 PGS-IR-4.1-200 PGS-IR-4.1-210 PGS-IR-4.1-220 PGS-IR-4.1-230 PGS-IR-4.1-240 PGS-IR-4.1-250 PGS-IR-4.1-260 PGS-IR-4.1-270 PGS-IR-4.1-280 PGS-IR-4.1-290 PGS-IR-4.1-295 PGS-IR-4.1-30 PGS-IR-4.1-310 PGS-IR-4.1-315 PGS-IR-4.1-335 PGS-IR-4.1-340 PGS-IR-4.1-345 PGS-IR-4.1-360 PGS-IR-4.1-365 PGS-IR-4.1-370 PGS-IR-4.1-380 PGS-IR-4.1-390 PGS-IR-4.1-40 PGS-IR-4.1-400 PGS-IR-4.1-410 PGS-IR-4.1-420 PGS-IR-4.1-430 PGS-

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Test Reference	Section	Description	Interfaces	Requirements
				IR-4.1-440 PGS-IR-4.1-450 PGS-IR-4.1-460 PGS-IR-4.1-470 PGS-IR-4.1-475 PGS-IR-4.1-480 PGS-IR-4.1-490 PGS-IR-4.1-50 PGS-IR-4.1-60 PGS-IR-4.1-660 PGS-IR-4.1-665 PGS-IR-4.1-670 PGS-IR-4.1-680 PGS-IR-4.1-70 PGS-IR-4.1-700 PGS-IR-4.1-705 PGS-IR-4.1-710 PGS-IR-4.1-715 PGS-IR-4.1-80 PGS-IR-4.3-10 PGS-IR-4.3-20 PGS-IR-4.3-30 PGS-IR-4.3-40 PGS-IR-4.3-50 PGS-IR-4.3-60 PGS-IR-4.3-61 PGS-IR-4.3-65 PGS-IR-4.3-70 PGS-IR-4.3-75 PGS-IR-4.5-10 PGS-IR-4.5-100 PGS-IR-4.5-110 PGS-IR-4.5-120 PGS-IR-4.5-30 PGS-IR-4.5-35 PGS-IR-4.5-40 PGS-IR-4.6-300 PGS-IR-4.6-310 PGS-IR-4.6-320 PGS-IR-4.6-330 PGS-IR-4.7-150 PGS-IR-4.7-155 PGS-IR-4.7-160 PGS-IR-4.7-165 PGS-IR-4.8-10 PGS-IR-4.8-20 PGS-IR-4.8-30 From interfaces: *None*

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10.2.2 Interface Matrix

Interface	ICDs	Related Requirements	Test References
E01.A.MOC.JPL FD Orbit file to JPL	*not yet available*	MFUN-635	HPGS-IT-JPL-1
E02.A.HSC.PSO SSO DB from HSC to P-SGS	*not yet available*		
G01.A.STA.NCT Incoming TM	IG-TMTC-ICD-1000-TOS-GIB	MFUN-460 MPER-230	HGS-VT-SVT-0 HGS-VT-SVT-1 HGS-VT-SVT-2 HPGS-IT-G01-1 HPGS-IT-G01-2 HPGS-IT-G01-3 HPGS-IT-G01-4 HPGS-VT-LIT-1 PGS-VT-SVT-0 PGS-VT-SVT-1 PGS-VT-SVT-2
G01.B.NCT.STA Forward TCs	IG-TMTC-ICD-1000-TOS-GIB		HGS-VT-SVT-0 HGS-VT-SVT-1 HGS-VT-SVT-2 HPGS-IT-G01-1 HPGS-IT-G01-2 HPGS-IT-G01-3 HPGS-IT-G01-4 PGS-VT-SVT-0 PGS-VT-SVT-1 PGS-VT-SVT-2
G01.C.STA.NCT STDM to Station	N2K-MCS-ICD-0003-TOS-GCI, ICD-SC-EI-ANS-003		HPGS-IT-G01-1 HPGS-IT-G01-2 HPGS-IT-G01-3 HPGS-IT-G01-4
G01.D.STA.NCT Ranging/doppler/meteo from IFMS to FDS	MakaluMedia/MR/IFMS/ICD/FTP-OCC		HPGS-IT-G01-1 HPGS-IT-G01-2 HPGS-IT-G01-3 HPGS-IT-G01-4
G01.E.STC.NCT Antenna angles; MVL			HPGS-IT-G01-1 HPGS-IT-G01-2 HPGS-IT-G01-3 HPGS-IT-G01-4
G01.F.NCT.STA SICF for Station TMTCS via NCTRS	GSS-SICM-ASW-ICD-0001, ICD-SC-EI-ANS-003		HPGS-IT-G01-1 HPGS-IT-G01-2 HPGS-IT-G01-3 HPGS-IT-G01-4
G01.G.NCT.STC Tracking schedule			HPGS-IT-G01-1 HPGS-IT-G01-2 HPGS-IT-G01-3 HPGS-IT-G01-4
H01.A.HSC.SDS POS (Planned and re-planned POS) from HSC to FDS	HGS-ICD-024	FGS-IR-3.4-10 FGS-IR-3.4-50	HGS-CT-H01-1 HGS-VT-MPS-1 HPGS-IT-H01-0.1 HPGS-IT-H01-1.0
H01.C.HSC.SDS Instrument Manuals and Configuration	PT-CMOC-OPS-ICD-6101-OPS-OGH	FGS-IR-3.4-130	

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Interface	ICDs	Related Requirements	Test References
H01.D.HSC.SDS Task Parameter Files	PT-HMOC-FD-ICD-2105-OPS-GFT, PT-FDOS-HMCS-ICD-0004-TOS-GFT, PT-CMOC-OPS-ICD-6106-OPS-OGH, HGS-ICD-035		HGS-CT-H01-2 HGS-VT-MPS-1 HPGS-IT-H01-3.0
H01.E.HSC.SDS SDS Requests (Online and XML)	PT-CMOC-MDS-3108-OPS-GDS	FGS-IR-3.1-75 FGS-IR-3.3-35	HGS-CT-H01-2 HGS-CT-H01-3 HPGS-IT-H01-0.2 HPGS-IT-H01-2.0 HPGS-VT-TM-1.0
H01.F.HSC.SDS Instrument database updates	S2K-MCS-ICD-0001-TOS-GIC, PT-CMOC-OPS-ICD-6101-OPS-OGH, PT-CMOC-MDS-ICD-3104-OPS-GDS	FGS-IR-3.4-120 FGS-IR-3.4-125	HGS-CT-H01-4
H01.G.HSC.SDS Instrument OBSW files	PT-CMOC-MDS-ICD-3105-OPS-GDS, PT-CMOC-OPS-ICD-6101-OPS-OGH	FGS-IR-3.4-100 FGS-IR-3.4-80	HGS-CT-H01-4 HPGS-IT-H01-1.0 HPGS-VT-OBS-1
H01.H.HSC.SDS Spacecraft/Instrument Alignment History	PT-HMOC-FD-ICD-2111-OPS-GFT, PT-FDOS-HSC-ICD-0003-TOS-GFT	FGS-IR-3.4-140	HGS-CT-H01-5 HPGS-IT-H01-1.0
H01.I.SDS.HSC Attitude History File (AHF)	PT-HMOC-FD-ICD-2109-OPS-GFT, PT-FDOS-HSC-ICD-0002-TOS-GFT	FGS-IR-3.1-380 FGS-IR-3.1-400 FGS-IR-3.1-410 MPER-115	HGS-CT-H01-1 HPGS-IT-H01-0.1 HPGS-IT-H01-2.0
H01.K.SDS.HSC PSF from FD to HSC	PT-CMOC-FD-ICD-2104-OPS-GFT	FGS-IR-3.1-210 FGS-IR-3.1-220 FGS-IR-3.1-230 MPER-085	HGS-CT-H01-1 HGS-VT-MPS-1 HPGS-IT-H01-0.1 HPGS-IT-H01-1.0
H01.L.SDS.HSC Consolidated TM	PT-CMOC-MDS-3108-OPS-GDS	FGS-IR-3.1-10 FGS-IR-3.1-100 FGS-IR-3.1-20 FGS-IR-3.3-35 FGS-IR-3.5-20 MPER-235	HGS-CT-H01-3 HPGS-IT-H01-0.2 HPGS-IT-H01-2.0 HPGS-VT-TM-1.0
H01.M.SDS.HSC TC History	PT-CMOC-MDS-3108-OPS-GDS	FGS-IR-3.1-300 FGS-IR-3.1-330 FGS-IR-3.1-340	HGS-CT-H01-2 HPGS-IT-H01-0.2 HPGS-IT-H01-2.0 HPGS-VT-TC-1.0
H01.N.HSC.SDS SSO DB from HSC to FDS (via SDS)	HGS-ICD-022		HGS-CT-H01-5 HPGS-IT-H01-1.0
H01.O.SDS.HSC Time Correlation	PT-CMOC-MDS-ICD-3102-OPS-GDS, HGS-ICD-015	FGS-IR-3.1-420 FGS-IR-3.1-436	HGS-CT-H01-3 HPGS-IT-H01-0.1 HPGS-IT-H01-0.2 HPGS-IT-H01-2.0
H01.P.SDS.HSC Flight Operations Procedures	PT-CMOC-OPS-ICD-6101-OPS-OGH		
H01.Q.SDS.HSC OBSW Images (TM)	S2K-MCS-ICD-0014-TOS-GCI	FGS-IR-3.1-496 FGS-IR-3.1-498	HGS-CT-H01-4 HPGS-IT-H01-1.0 HPGS-VT-OBS-1
H01.R.SDS.HSC Attitude Constraint Checker	PT-FDOS-HSC-ICD-0004-TOS-GFT	FGS-IR-3.1-150 FGS-IR-3.1-170	

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Interface	ICDs	Related Requirements	Test References
H01.S.SDS.HSC EPOS, EPOS summary and APF from FDS to HSC	PT-HMOC-FD-ICD-2107-OPS-GFT	FGS-IR-3.1-270 FGS-IR-3.1-290 MFUN-165	HGS-CT-H01-1 HGS-VT-MPS-1 HPGS-IT-H01-0.1 HPGS-IT-H01-2.0
H01.T.SDS.HSC Derived parameter and OOL TM	PT-CMOC-MDS-3108-OPS-GDS	FGS-IR-3.1-10 FGS-IR-3.1-100 FGS-IR-3.1-20 FGS-IR-3.1-475 MPER-235 MPER-245	HGS-CT-H01-3 HPGS-IT-H01-0.2 HPGS-VT-TM-1.0
H01.U.SDS.HSC Orbit Data	PT-CMOC-FD-ICD-2103-OPS-GFI	FGS-IR-3.1-120 FGS-IR-3.1-140 FGS-IR-3.1-350 FGS-IR-3.1-370	HGS-CT-H01-1 HPGS-IT-H01-0.1 HPGS-IT-H01-1.0
H01.V.SDS.HSC Slew time and path predictor	PT-HMOC-FD-ICD-2116-OPS-GFT, HGS-ICD-029		
H01.W.SDS.HSC Status reports	PT-CMOC-OPS-ICD-6101-OPS-OGH		HGS-CT-H01-2
H01.X.HSC.SDS Derived parameter definitions	PT-CMOC-OPS-ICD-6101-OPS-OGH	FGS-IR-3.4-150 FGS-IR-3.7-210	HGS-CT-H01-4
H01.Y.SDS.HSC Manual stack printout	PT-CMOC-OPS-ICD-6101-OPS-OGH		HGS-CT-H01-2 HPGS-IT-H01-3.0 HPGS-VT-TC-1.0
M01.B.FDS.NCT STDM to Station	N2K-MCS-ICD-0003-TOS-GCI		
M01.D.NCT.FDS Tracking data STA to FDS	N2K-MCS-ICD-0003-TOS-GCI		
M02.A.MCS.FDS HK TM from MCS via SODA	FDOS-FDIS-ICD-1422-TOS-GFS		HGS-VT-SVT-0 HGS-VT-SVT-1 HGS-VT-SVT-2 HPGS-VT-LIT-1 HPGS-VT-TM-1.0 PGS-VT-SVT-0 PGS-VT-SVT-1 PGS-VT-SVT-2
M02.B.FDS.MCS SED file	PT-PMOC-FD-ICD-2108-OPS-GFT		HGS-VT-SVT-0 HGS-VT-SVT-1 HGS-VT-SVT-2 PGS-VT-SVT-0 PGS-VT-SVT-1 PGS-VT-SVT-2
M02.C.FDS.MCS APPL, APPL summary and APF from FDS	PT-PMOC-FD-ICD-2108-OPS-GFT		PGS-VT-MPS-1
M02.D.FDS.MCS Propagation delay data to MCS	PT-CMOC-FD-ICD-2102-OPS-GFI		HGS-VT-SVT-0 HGS-VT-SVT-1 HGS-VT-SVT-2 PGS-VT-SVT-0 PGS-VT-SVT-1 PGS-VT-SVT-2

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Interface	ICDs	Related Requirements	Test References
M02.E.FDS.MCS FD-TPFs from FDS to MCS	S2K-MCS-ICD-0003-TOS-GCI, PT-HMOC-FD-ICD-2105-OPS-GFT, PT-PMOC-FD-ICD-2106-OPS-GFT		HGS-VT-MPS-1 HGS-VT-SVT-0 HGS-VT-SVT-1 HGS-VT-SVT-2 PGS-VT-MPS-1 PGS-VT-SVT-0 PGS-VT-SVT-1 PGS-VT-SVT-2
M02.F.FDS.MCS WIMPY file to MCS	not yet available - FDS-MCS ICD		
M02.G.FDS.MCS PSF from FD to P-MCS	PT-CMOC-FD-ICD-2104-OPS-GFT		
M02.H.MCS.FDS HPSDB to FDS from MCS mirror	S2K-MCS-ICD-0001-TOS-GIC		
M02.I.MCS.FDS HPSDB ASCII dump to FDS	S2K-MCS-ICD-0001-TOS-GIC		
M02.J.FDS.MCS FD Orbit Events File delivery to MCS	PT-CMOC-FD-ICD-2101-OPS-GFI, PT-CMOC-FD-ICD-2103-OPS-GFI, HGS-ICD-020, HGS-ICD-027, PGS-ICD-005, PGS-ICD-018, PGS-ICD-036		HGS-VT-SVT-0 HGS-VT-SVT-1 HGS-VT-SVT-2 PGS-VT-SVT-0 PGS-VT-SVT-1 PGS-VT-SVT-2
M02.K.FDS.MCS EPOS, EPOS summary and APF from FDS to MCS	PT-HMOC-FD-ICD-2107-OPS-GFT		HGS-VT-MPS-1
M03.A.MPS.MCS Mission plan, timeline, saved stacks/sequences	not yet available		PGS-VT-MPS-1
M06.A.MPS.SCH Station scheduling request file	HPMCS ? ESOC Scheduling Office ICD (not yet available)		
M07.A.SDS.FDS POS (Planned and re-planned POS) from HSC to FDS	HGS-ICD-024		HGS-CT-H01-1 HGS-VT-MPS-1 HPGS-IT-H01-0.1
M07.C.SDS.FDS Incoming Spacecraft/Instrument Alignment History	PT-PMOC-FD-ICD-2112-OPS-GFT,PT-HMOC-FD-ICD-2111-OPS-GFT		HGS-CT-H01-5
M07.D.SDS.FDS SSO DB from HSC to FDS	HGS-ICD-022		HGS-CT-H01-5
M07.E.FDS.SDS APPL (Augmented Preprogrammed Pointing List),APPL Summary and APF from FD to PSO	PT-PMOC-FD-ICD-2108-OPS-GFT	MFUN-165 PGS-IR-4.1-660 PGS-IR-4.7-165	PGS-CT-P01-1 PGS-IT-FTS-1.0 PGS-VT-MPS-1

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Interface	ICDs	Related Requirements	Test References
M07.F.SDS.FDS PPL (Preprogrammed Pointing List) from Planck SGS to FDS	PGS-ICD-017	MFUN-150	PGS-CT-P01-1 PGS-VT-MPS-1
M07.G.FDS.SDS Attitude History File (AHF) from FDS to HSC	PT-PMOC-FD-ICD-2110-OPS-GFT	FGS-IR-3.1-380 MPER-115	HGS-CT-H01-1 HPGS-IT-H01-0.1
M07.H.FDS.SDS EPOS, EPOS summary and APF	PT-HMOC-FD-ICD-2107-OPS-GFT	FGS-IR-3.1-270 MFUN-165	HGS-CT-H01-1 HGS-VT-MPS-1 HPGS-IT-H01-0.1
M07.I.FDS.SDS Attitude History File (AHF)	PT-HMOC-FD-ICD-2109-OPS-GFT	MPER-115 PGS-IR-4.1-345	PGS-CT-P01-1 PGS-IT-FTS-1.0
M07.J.FDS.SDS Orbit files	PT-CMOC-FD-ICD-2103-OPS-GFI	PGS-IR-4.7-100	HGS-CT-H01-1 HPGS-IT-H01-0.1 PGS-CT-P01-1 PGS-IT-FTS-1.0
M07.K.FDS.SDS PSF from FD to HSC [Herschel]	PT-CMOC-FD-ICD-2104-OPS-GFT	FGS-IR-3.1-210 MPER-085	HGS-CT-H01-1 HGS-VT-MPS-1 HPGS-IT-H01-0.1
M07.M.FDS.SDS Attitude Constraint Checker	PT-FDOS-HSC-ICD-0004-TOS-GFT	FGS-IR-3.1-150 PGS-IR-4.7-10	
M07.N.FDS.SDS Slew time and path predictor	PT-HMOC-FD-ICD-2116-OPS-GFT, PT-PMOC-FD-ICD-2117-OPS-GFT	PGS-IR-4.7-10	
M10.A.MCS.NCT Forward Telecommands from MCS to NCTRS M10.B.MCS.NCT Simulator Forward TCs	N2K-MCS-ICD-0002-TOS-GCI		HGS-VT-SVT-0 HGS-VT-SVT-1 HGS-VT-SVT-2 PGS-VT-SVT-0 PGS-VT-SVT-1 PGS-VT-SVT-2
M10.C.MCS.NCT SICF for Station TMTCS via NCTRS	GSS-SICM-ASW-ICD-0001		
M11.A.NCT.MCS Incoming TM M11.C.NCT.MCS Simulator TM	N2K-MCS-ICD-0002-TOS-GCI		HGS-VT-SVT-0 HGS-VT-SVT-1 HGS-VT-SVT-2 HPGS-VT-LIT-1 PGS-VT-SVT-0 PGS-VT-SVT-1 PGS-VT-SVT-2
M11.D.NCT.MCS NCTRS Admin Messages	N2K-MCS-ICD-0002-TOS-GCI		
M12.B.SDS.MCS Instrument Operations Procedures	PT-CMOC-OPS-ICD-6101-OPS-OGH		

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Interface	ICDs	Related Requirements	Test References
M12.C.SDS.MCS Instrument Manuals and Configuration	PT-CMOC-OPS-ICD-6101-OPS-OGH		
M12.D.SDS.MCS Instrument database updates	S2K-MCS-ICD-0001-TOS-GIC		
M12.E.SDS.MCS Instrument OBSW files	PT-CMOC-MDS-ICD-3105-OPS-GDS, PT-CMOC-OPS-ICD-6101-OPS-OGH		HPGS-VT-OBS-1
M12.F.SDS.MCS Task Parameter Files	PT-HMOC-FD-ICD-2105-OPS-GFT, PT-FDOS-HMCS-ICD-0004-TOS-GFT		HGS-CT-H01-2 HGS-VT-MPS-1 PGS-VT-MPS-1
M12.G.SDS.MCS Derived parameter definitions	PT-CMOC-OPS-ICD-6101-OPS-OGH		
M13.A.MCS.SDS All TM	PT-CMOC-MDS-3108-OPS-GDS	FGS-IR-3.1-470 FGS-IR-3.1-490 MPER-235 MPER-245 PGS-IR-4.1-430 PGS-IR-4.1-460	HGS-CT-H01-3 HPGS-VT-TM-1.0 PGS-CT-P01-4 PGS-CT-P01-5
M13.B.MCS.SDS TC History	PT-CMOC-MDS-3108-OPS-GDS	FGS-IR-3.1-300 FGS-IR-3.1-340 PGS-IR-4.1-230	HGS-CT-H01-2 HPGS-VT-TC-1.0 PGS-CT-P01-2 PGS-CT-P01-3
M13.D.MCS.SDS Time Correlation	PT-CMOC-MDS-ICD-3102-OPS-GDS	FGS-IR-3.1-420 PGS-IR-4.1-360	HGS-CT-H01-3 HPGS-IT-H01-0.2 PGS-CT-P01-4 PGS-CT-P01-5 PGS-IT-DDS-1.0
M13.E.MCS.SDS Flight Operations Procedures	PT-CMOC-OPS-ICD-6101-OPS-OGH		
M13.H.MCS.SDS Status reports	PT-CMOC-OPS-ICD-6101-OPS-OGH		
M13.K.MCS.SDS Incoming NRT TM for ICC@MOC	PT-CMOC-MDS-ICD-3101-OPS-GDS	FGS-IR-3.3-10 FGS-IR-3.3-30 FGS-IR-3.3-40 FGS-IR-3.3-50 MFUN-485 PGS-IR-4.2-10 PGS-IR-4.2-20 PGS-IR-4.2-30	HGS-IT-M14-4 HGS-IT-M14-5 HGS-IT-M14-6 HGS-VT-SVT-2 HPGS-VT-TM-1.0 PGS-IT-M14-1 PGS-IT-M14-2 PGS-IT-M14-3 PGS-VT-SVT-2
M13.Y.MCS.SDS Manual stack printout	PT-CMOC-OPS-ICD-6101-OPS-OGH		HGS-CT-H01-2 PGS-CT-P01-2 PGS-CT-P01-3

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Interface	ICDs	Related Requirements	Test References
M14.A.SDS.ICC-M NRT TM from NCTRS	PT-CMOC-MDS-ICD-3101-OPS-GDS	FGS-IR-3.3-10 FGS-IR-3.3-30 FGS-IR-3.3-40 FGS-IR-3.3-50 MFUN-485 PGS-IR-4.2-10 PGS-IR-4.2-20 PGS-IR-4.2-30	HGS-IT-M14-4 HGS-IT-M14-5 HGS-IT-M14-6 HGS-VT-SVT-2 HPGS-VT-TM-1.0 PGS-IT-M14-1 PGS-IT-M14-2 PGS-IT-M14-3 PGS-VT-SVT-2
M14.B.ICC-M.SDS SDS Requests	PT-CMOC-MDS-ICD-3108-OPS-GDS		HGS-IT-DDS-2.0 HGS-IT-M14-4 HGS-IT-M14-5 HGS-IT-M14-6 HGS-VT-SVT-2 PGS-IT-DDS-2.0 PGS-IT-M14-1 PGS-IT-M14-2 PGS-IT-M14-3 PGS-VT-SVT-2
M14.C.SDS.ICC-M Consolidated TM	PT-CMOC-MDS-ICD-3108-OPS-GDS		HGS-IT-DDS-2.0 HGS-IT-M14-4 HGS-IT-M14-5 HGS-IT-M14-6 HGS-VT-SVT-2 PGS-IT-DDS-2.0 PGS-IT-M14-1 PGS-IT-M14-2 PGS-IT-M14-3 PGS-VT-SVT-2
M14.D.SDS.ICC-M DDS Auxiliary Files	PT-CMOC-MDS-ICD-3108-OPS-GDS		HGS-IT-DDS-2.0 HGS-IT-M14-4 HGS-IT-M14-5 HGS-IT-M14-6 HGS-VT-SVT-2 PGS-IT-DDS-2.0 PGS-IT-M14-1 PGS-IT-M14-2 PGS-IT-M14-3 PGS-VT-SVT-2
M16.A.SIM.NCT Simulated TM	not yet available - Simulator ICD		HPGS-VT-TM-1.0
M16.B.NCT.SIM Simulator TCs	not yet available - Simulator ICD		HPGS-VT-TC-1.0
M17.A.MCS.SDE OBSW Dump TM	S2K-MCS-ICD-0014-TOS-GCI		HPGS-VT-OBS-1
M17.B.SDE.MCS OBSW Images for OBSM	S2K-MCS-ICD-0014-TOS-GCI		HPGS-VT-OBS-1
M17.C.SDE.MCS OBCP Token Code Binary	PT-CMOC-OBSM-TN-3702-OPS-OFM	PGS-IR-4.4-38	HPGS-VT-OBS-1
M17.D.SDE.MCS OBCP Saved Stacks	PT-CMOC-OBSM-TN-3702-OPS-OFM	PGS-IR-4.4-38	HPGS-VT-OBS-1
M18.A.FDS.SCH Long term Orbit Events File	not yet available	MPER-086	

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Interface	ICDs	Related Requirements	Test References
M18.B.SCH.FDS ESTRACK station Schedule and Allocation File	not yet available		
P01.A.PSO.SDS PPL	PGS-ICD-017	MFUN-150 PGS-IR-4.3-10 PGS-IR-4.3-30 PGS-IR-4.3-61	PGS-CT-P01-1 PGS-VT-MPS-1
P01.C.DPC.SDS Instrument Manuals and Configuration	PT-CMOC-OPS-ICD-6101-OPS-OGH		
P01.D.DPC.SDS Task Parameter Files	PT-CMOC-OPS-ICD-6106-OPS-OGH, PGS-ICD-053	MOPS-070	PGS-CT-P01-2 PGS-CT-P01-3 PGS-VT-MPS-1
P01.E.DPC.SDS SDS Requests	PT-CMOC-MDS-3108-OPS-GDS	PGS-IR-4.1-250 PGS-IR-4.1-335 PGS-IR-4.1-370 PGS-IR-4.1-40 PGS-IR-4.1-470 PGS-IR-4.1-665	HPGS-VT-TM-1.0 PGS-CT-P01-4 PGS-CT-P01-5 PGS-IT-DDS-1.0
P01.F.DPC.SDS Instrument database updates	PT-CMOC-MDS-ICD-3104-OPS-GDS, S2K-MCS-ICD-0001-TOS-GIC	PGS-IR-4.1-500 PGS-IR-4.1-520 PGS-IR-4.4-60 PGS-IR-4.4-70	PGS-CT-P01-6 PGS-CT-P01-7
P01.G.DPC.SDS Instrument OBSW files	PT-CMOC-MDS-ICD-3105-OPS-GDS, PT-CMOC-OPS-ICD-6101-OPS-OGH	PGS-IR-4.4-10 PGS-IR-4.4-32 PGS-IR-4.4-35	HPGS-VT-OBS-1 PGS-CT-P01-6 PGS-CT-P01-7
P01.H.DPC.SDS Spacecraft/Instrument Alignment History	PT-PMOC-FD-ICD-2112-OPS-GFT, PT-FDOS-DPC-ICD-0003-TOS-GFT	PGS-IR-4.4-130 PGS-IR-4.4-140 PGS-IR-4.4-150	PGS-CT-P01-8 PGS-CT-P01-9
P01.J.FDS.PSO Orbit files FDS to PSO via SDS	PT-CMOC-FD-ICD-2103-OPS-GFI	PGS-IR-4.1-280 PGS-IR-4.1-295	PGS-CT-P01-1 PGS-IT-FTS-1.0
P01.K.SDS.PSO APPL, APPL Summary and APF to PSO, DPCs	PT-PMOC-FD-ICD-2108-OPS-GFT	MFUN-165 PGS-IR-4.1-200 PGS-IR-4.1-210 PGS-IR-4.1-670 PGS-IR-4.7-165	PGS-CT-P01-1 PGS-IT-FTS-1.0 PGS-VT-MPS-1
P01.L.SDS.DPC Consolidated TM	PT-CMOC-MDS-3108-OPS-GDS	MPER-245 PGS-IR-4.1-10 PGS-IR-4.1-110 PGS-IR-4.1-20 PGS-IR-4.1-40 PGS-IR-4.1-70	HPGS-VT-TM-1.0 PGS-CT-P01-4 PGS-CT-P01-5 PGS-IT-DDS-1.0
P01.M.SDS.DPC TC History	PT-CMOC-MDS-3108-OPS-GDS	PGS-IR-4.1-260	HPGS-VT-TC-1.0 PGS-CT-P01-2 PGS-CT-P01-3 PGS-IT-DDS-1.0
P01.N.SDS.DPC Slew time, path predictor and attitude constraint algorithm software	PT-PMOC-FD-ICD-2117-OPS-GFT, PGS-ICD-040	PGS-IR-4.7-30	

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Interface	ICDs	Related Requirements	Test References
P01.O.SDS.DPC Time Correlation	PT-CMOC-MDS-ICD-3102-OPS-GDS, PGS-ICD-007	PGS-IR-4.1-380	PGS-CT-P01-4 PGS-CT-P01-5 PGS-IT-DDS-1.0 PGS-IT-FTS-1.0
P01.P.SDS.DPC Flight Operations Procedures	PT-CMOC-OPS-ICD-6101-OPS-OGH		
P01.Q.SDS.DPC OBSW Images (TM)	S2K-MCS-ICD-0014-TOS-GCI	PGS-IR-4.1-480	HPGS-VT-OBS-1 PGS-CT-P01-6 PGS-CT-P01-7
P01.T.SDS.DPC Derived parameter and OOL TM	PT-CMOC-MDS-3108-OPS-GDS	MPER-245 PGS-IR-4.1-110 PGS-IR-4.1-410 PGS-IR-4.1-440	HPGS-VT-TM-1.0 PGS-IT-DDS-1.0
P01.U.SDS.DPC Attitude History File (AHF) from FDS to PSO, DPCs	PT-PMOC-FD-ICD-2210-OPS-GFT	PGS-IR-4.1-140 PGS-IR-4.1-310 PGS-IR-4.1-315 PGS-IR-4.1-340 PGS-IR-4.1-345	PGS-CT-P01-1 PGS-IT-FTS-1.0
P01.W.SDS.DPC Status reports	PT-CMOC-OPS-ICD-6101-OPS-OGH	PGS-IR-4.5-30 PGS-IR-4.5-35	PGS-CT-P01-2 PGS-CT-P01-3
P01.X.DPC.SDS Derived parameter definitions	PT-CMOC-OPS-ICD-6101-OPS-OGH	PGS-IR-4.4-160 PGS-IR-4.4-170	PGS-CT-P01-6 PGS-CT-P01-7
P01.Y.SDS.DPC Manual stack printout	PT-CMOC-OPS-ICD-6101-OPS-OGH		HPGS-VT-TC-1.0 PGS-CT-P01-2 PGS-CT-P01-3
SO1.A.SC.STA RF TM spacecraft link SO1.B.STA.SC RF TC spacecraft link	SCI-PT-ICD-07418		HGS-CT-S01-1.0 HGS-VT-SVT-0 HGS-VT-SVT-1 HGS-VT-SVT-2 HPGS-VT-LIT-1 PGS-CT-S01-2.0 PGS-VT-SVT-0 PGS-VT-SVT-1 PGS-VT-SVT-2

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10.2.3 Requirements Matrix

10.2.3.1 MIRD

Reference	Interfaces	Test References
MFUN-005		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MFUN-020 MFUN-030 MFUN-035 MFUN-040 MFUN-080 MFUN-085 MFUN-090 MFUN-095 MFUN-100 MFUN-105		From requirements: *None* From interfaces: *None*
MFUN-120 MFUN-125 MFUN-130 MFUN-135 MFUN-140 MFUN-141		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MFUN-145 MFUN-146		From requirements: *None* From interfaces: *None*
MFUN-147		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MFUN-150	M07.F.SDS.FDS P01.A.PSO.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-VT-MPS-1
MFUN-155 MFUN-160		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MFUN-165	H01.S.SDS.HSC M07.E.FDS.SDS M07.H.FDS.SDS P01.K.SDS.PSO	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HPGS-IT-H01-0.1, HPGS-IT-H01-2.0, PGS-CT-P01-1, PGS-IT-FTS-1.0
MFUN-170		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*

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Reference	Interfaces	Test References
MFUN-175 MFUN-180 MFUN-185 MFUN-190 MFUN-200 MFUN-205 MFUN-210 MFUN-215 MFUN-220		From requirements: *None* From interfaces: *None*
MFUN-225 MFUN-230		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MFUN-235		From requirements: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MFUN-240		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MFUN-245		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MFUN-250		From requirements: *None* From interfaces: *None*
MFUN-255 MFUN-260 MFUN-265 MFUN-270 MFUN-275		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MFUN-280 MFUN-290		From requirements: *None* From interfaces: *None*
MFUN-295 MFUN-300		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MFUN-305		From requirements: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SVT-0 PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*

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Reference	Interfaces	Test References
MFUN-310		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MFUN-315 MFUN-320 MFUN-325		From requirements: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MFUN-330 MFUN-340 MFUN-345 MFUN-350 MFUN-355 MFUN-360 MFUN-365		From requirements: *None* From interfaces: *None*
MFUN-375 MFUN-380 MFUN-385		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MFUN-390		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MFUN-430 MFUN-435		From requirements: *None* From interfaces: *None*
MFUN-440		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MFUN-455		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MFUN-460	G01.A.STA.NCT, G02.A.NCT.STA	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, HPGS-IT-G01-1, HPGS-IT-G01-2, HPGS-IT-G01-3, HPGS-IT-G01-4, HPGS-VT-LIT-1, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2
MFUN-465 MFUN-470 MFUN-475 MFUN-480		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*

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Reference	Interfaces	Test References
MFUN-485		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SVT-0, HGS-VT-SVT-1 HGS-VT-SVT-2, PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0 PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HGS-IT-M14-4, HGS-IT-M14-5, HGS-IT-M14-6, HGS-VT-SVT-2 HPGS-VT-TM-1.0, PGS-IT-M14-1, PGS-IT-M14-2, PGS-IT-M14-3 PGS-VT-SVT-2
MFUN-490 MFUN-495 MFUN-500 MFUN-510 MFUN-520 MFUN-545		From requirements: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MFUN-550 MFUN-555 MFUN-560 MFUN-570 MFUN-575 MFUN-580		From requirements: *None* From interfaces: *None*
MFUN-585		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MFUN-600		From requirements: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MFUN-605 MFUN-610 MFUN-615 MFUN-620 MFUN-625		From requirements: *None* From interfaces: *None*
MFUN-630		From requirements: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MFUN-635	E01.A.MOC.JPL	From requirements: *None* From interfaces: HPGS-IT-JPL-1
MFUN-640 MOPS-050 MOPS-055		From requirements: *None* From interfaces: *None*
MOPS-060 MOPS-065		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MOPS-070	P01.D.DPC.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-2, PGS-CT-P01-3, PGS-VT-MPS-1

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Reference	Interfaces	Test References
MOPS-075 MOPS-080 MOPS-085 MOPS-090 MOPS-100 MOPS-110		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MOPS-115 MOPS-120 MOPS-125 MOPS-130 MOPS-135 MOPS-140 MOPS-145 MOPS-150 MOPS-155 MOPS-160 MOPS-165 MOPS-170 MOPS-175 MPER-005 MPER-010 MPER-015 MPER-020 MPER-025 MPER-030 MPER-035 MPER-045 MPER-050		From requirements: *None* From interfaces: *None*
MPER-060 MPER-065 MPER-070 MPER-075 MPER-080		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MPER-085	H01.K.SDS.HSC M07.K.FDS.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HGS-VT-MPS-1, HPGS-IT-H01-0.1, HPGS-IT-H01-1.0
MPER-086	M18.A.FDS.SCH	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MPER-090		From requirements: *None* From interfaces: *None*
MPER-100		From requirements: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MPER-110 MPER-111		From requirements: *None* From interfaces: *None*

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Reference	Interfaces	Test References
MPER-115	H01.I.SDS.HSC M07.G.FDS.SDS M07.I.FDS.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HPGS-IT-H01-0.1, HPGS-IT-H01-2.0, PGS-CT-P01-1 PGS-IT-FTS-1.0
MPER-120 MPER-125		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MPER-135 MPER-140 MPER-145 MPER-150		From requirements: *None* From interfaces: *None*
MPER-155		From requirements: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MPER-160		From requirements: *None* From interfaces: *None*
MPER-170 MPER-175		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
MPER-180 MPER-185 MPER-190 MPER-200		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
MPER-205 MPER-210 MPER-220		From requirements: *None* From interfaces: *None*
MPER-230	G01.A.STA.NCT	From requirements: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2, HPGS-IT-G01-1, HPGS-IT-G01-2, HPGS-IT-G01-3, HPGS-IT-G01-4, HPGS-VT-LIT-1, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2
MPER-235	H01.L.SDS.HSC H01.T.SDS.HSC M13.A.MCS.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: HGS-CT-H01-3, HPGS-IT-H01-0.2, HPGS-IT-H01-2.0, HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5
MPER-240		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*

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Reference	Interfaces	Test References
MPER-245	H01.T.SDS.HSC M13.A.MCS.SDS P01.L.SDS.DPC P01.T.SDS.DPC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: HGS-CT-H01-3, HPGS-IT-H01-0.2, HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
MPER-250 MPER-260 MPER-265 MPER-270		From requirements: *None* From interfaces: *None*

10.2.3.2 Herschel IRD

Reference	Interfaces	Test References
FGS-IR-3.1-10 FGS-IR-3.1-100	H01.L.SDS.HSC H01.T.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-3, HPGS-IT-H01-0.2, HPGS-IT-H01-2.0, HPGS-VT-TM-1.0
FGS-IR-3.1-110		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-120	H01.U.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HPGS-IT-H01-0.1, HPGS-IT-H01-1.0
FGS-IR-3.1-130		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-140	H01.U.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HPGS-IT-H01-0.1, HPGS-IT-H01-1.0
FGS-IR-3.1-145		From requirements: *None* From interfaces: *None*
FGS-IR-3.1-150	H01.R.SDS.HSC M07.M.FDS.SDS	From requirements: *None* From interfaces: *None*
FGS-IR-3.1-160		From requirements: *None* From interfaces: *None*
FGS-IR-3.1-170	H01.R.SDS.HSC	From requirements: *None* From interfaces: *None*
FGS-IR-3.1-180 FGS-IR-3.1-190		From requirements: *None* From interfaces: *None*

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Reference	Interfaces	Test References
FGS-IR-3.1-20	H01.L.SDS.HSC H01.T.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-3, HPGS-IT-H01-0.2, HPGS-IT-H01-2.0, HPGS-VT-TM-1.0
FGS-IR-3.1-200		From requirements: *None* From interfaces: *None*
FGS-IR-3.1-210	H01.K.SDS.HSC M07.K.FDS.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HGS-VT-MPS-1, HPGS-IT-H01-0.1, HPGS-IT-H01-1.0
FGS-IR-3.1-220 FGS-IR-3.1-230	H01.K.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HGS-VT-MPS-1, HPGS-IT-H01-0.1, HPGS-IT-H01-1.0
FGS-IR-3.1-260		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-270	H01.S.SDS.HSC M07.H.FDS.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HGS-VT-MPS-1, HPGS-IT-H01-0.1, HPGS-IT-H01-2.0
FGS-IR-3.1-280		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-290	H01.S.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HGS-VT-MPS-1, HPGS-IT-H01-0.1, HPGS-IT-H01-2.0
FGS-IR-3.1-295		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-30		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-300	H01.M.SDS.HSC M13.B.MCS.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-2, HPGS-IT-H01-0.2, HPGS-IT-H01-2.0, HPGS-VT-TC-1.0 PGS-CT-P01-2, PGS-CT-P01-3
FGS-IR-3.1-310		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-320		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-330	H01.M.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-2, HPGS-IT-H01-0.2, HPGS-IT-H01-2.0, HPGS-VT-TC-1.0

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Reference	Interfaces	Test References
FGS-IR-3.1-340	H01.M.SDS.HSC M13.B.MCS.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-2, HPGS-IT-H01-0.2, HPGS-IT-H01-2.0, HPGS-VT-TC-1.0 PGS-CT-P01-2, PGS-CT-P01-3
FGS-IR-3.1-350	H01.U.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HPGS-IT-H01-0.1, HPGS-IT-H01-1.0
FGS-IR-3.1-360		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-370	H01.U.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HPGS-IT-H01-0.1, HPGS-IT-H01-1.0
FGS-IR-3.1-375		From requirements: *None* From interfaces: *None*
FGS-IR-3.1-380	H01.I.SDS.HSC M07.G.FDS.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HPGS-IT-H01-0.1, HPGS-IT-H01-2.0
FGS-IR-3.1-390		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-400 FGS-IR-3.1-410	H01.I.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HPGS-IT-H01-0.1, HPGS-IT-H01-2.0
FGS-IR-3.1-420	H01.O.SDS.HSC M13.D.MCS.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-3, HPGS-IT-H01-0.1, HPGS-IT-H01-0.2, HPGS-IT-H01-2.0 PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
FGS-IR-3.1-430 FGS-IR-3.1-435		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-436	H01.O.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-3, HPGS-IT-H01-0.1, HPGS-IT-H01-0.2, HPGS-IT-H01-2.0
FGS-IR-3.1-440		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-470	M13.A.MCS.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-3, HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5
FGS-IR-3.1-475	H01.T.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-3, HPGS-IT-H01-0.2, HPGS-VT-TM-1.0

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Reference	Interfaces	Test References
FGS-IR-3.1-480		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-490	M13.A.MCS.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-3, HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5
FGS-IR-3.1-495		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.1-496	H01.Q.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-4, HPGS-IT-H01-1.0, HPGS-VT-OBS-1
FGS-IR-3.1-498	H01.Q.SDS.HSC	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-4, HPGS-IT-H01-1.0, HPGS-VT-OBS-1
FGS-IR-3.1-500 FGS-IR-3.1-505 FGS-IR-3.1-506 FGS-IR-3.1-510 FGS-IR-3.1-515 FGS-IR-3.1-516 FGS-IR-3.1-520 FGS-IR-3.1-525 FGS-IR-3.1-526 FGS-IR-3.1-530 FGS-IR-3.1-535 FGS-IR-3.1-536 FGS-IR-3.1-540 FGS-IR-3.1-545 FGS-IR-3.1-548		From requirements: *None* From interfaces: *None*
FGS-IR-3.1-75	H01.E.HSC.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2 From interfaces: HGS-CT-H01-2, HGS-CT-H01-3, HPGS-IT-H01-0.2, HPGS-IT-H01-2.0, HPGS-VT-TM-1.0
FGS-IR-3.1-80		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2, HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2 From interfaces: *None*
FGS-IR-3.1-90		From requirements: HGS-VT-SVT-0, HGS-VT-SVT-1, HGS-VT-SVT-2 From interfaces: *None*
FGS-IR-3.10-10 FGS-IR-3.10-20 FGS-IR-3.11-10 FGS-IR-3.11-20 FGS-IR-3.2-10 FGS-IR-3.2-15 FGS-IR-3.2-18		From requirements: *None* From interfaces: *None*

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Reference	Interfaces	Test References
FGS-IR-3.3-10	M13.K.MCS.SDS M14.A.SDS.ICC-M	From requirements: HGS-VT-SOV-2, HGS-VT-SVT-2 From interfaces: HGS-IT-M14-4, HGS-IT-M14-5, HGS-IT-M14-6, HGS-VT-SVT-2, HPGS-VT-TM-1.0, PGS-IT-M14-1, PGS-IT-M14-2, PGS-IT-M14-3 PGS-VT-SVT-2
FGS-IR-3.3-20		From requirements: HGS-VT-SOV-2, HGS-VT-SVT-2 From interfaces: *None*
FGS-IR-3.3-30	M13.K.MCS.SDS M14.A.SDS.ICC-M	From requirements: HGS-VT-SOV-2, HGS-VT-SVT-2 From interfaces: HGS-IT-M14-4, HGS-IT-M14-5, HGS-IT-M14-6, HGS-VT-SVT-2 HPGS-VT-TM-1.0, PGS-IT-M14-1, PGS-IT-M14-2, PGS-IT-M14-3 PGS-VT-SVT-2
FGS-IR-3.3-35	H01.E.HSC.SDS H01.L.SDS.HSC	From requirements: HGS-VT-SOV-2, HGS-VT-SVT-2 From interfaces: HGS-CT-H01-2, HGS-CT-H01-3, HPGS-IT-H01-0.2, HPGS-IT-H01-2.0 HPGS-VT-TM-1.0
FGS-IR-3.3-40 FGS-IR-3.3-50	M13.K.MCS.SDS M14.A.SDS.ICC-M	From requirements: HGS-VT-SOV-2, HGS-VT-SVT-2 From interfaces: HGS-IT-M14-4, HGS-IT-M14-5, HGS-IT-M14-6, HGS-VT-SVT-2 HPGS-VT-TM-1.0, PGS-IT-M14-1, PGS-IT-M14-2, PGS-IT-M14-3 PGS-VT-SVT-2
FGS-IR-3.4-10	H01.A.HSC.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HGS-VT-MPS-1, HPGS-IT-H01-0.1, HPGS-IT-H01-1.0
FGS-IR-3.4-100	H01.G.HSC.SDS	From requirements: *None* From interfaces: HGS-CT-H01-4, HPGS-IT-H01-1.0, HPGS-VT-OBS-1
FGS-IR-3.4-110 FGS-IR-3.4-115		From requirements: *None* From interfaces: *None*
FGS-IR-3.4-120 FGS-IR-3.4-125	H01.F.HSC.SDS	From requirements: *None* From interfaces: HGS-CT-H01-4
FGS-IR-3.4-130	H01.C.HSC.SDS	From requirements: *None* From interfaces: *None*
FGS-IR-3.4-135		From requirements: *None* From interfaces: *None*
FGS-IR-3.4-140	H01.H.HSC.SDS	From requirements: *None* From interfaces: HGS-CT-H01-5, HPGS-IT-H01-1.0

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Reference	Interfaces	Test References
FGS-IR-3.4-145	*None*	From requirements: *None* From interfaces: *None*
FGS-IR-3.4-150	H01.X.HSC.SDS	From requirements: *None* From interfaces: HGS-CT-H01-4
FGS-IR-3.4-155 FGS-IR-3.4-30		From requirements: *None* From interfaces: *None*
FGS-IR-3.4-50	H01.A.HSC.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-1, HGS-VT-MPS-1, HPGS-IT-H01-0.1, HPGS-IT-H01-1.0
FGS-IR-3.4-80	H01.G.HSC.SDS	From requirements: *None* From interfaces: HGS-CT-H01-4, HPGS-IT-H01-1.0, HPGS-VT-OBS-1
FGS-IR-3.4-90		From requirements: *None* From interfaces: *None*
FGS-IR-3.5-10		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.5-100 FGS-IR-3.5-110 FGS-IR-3.5-120 FGS-IR-3.5-130 FGS-IR-3.5-135 FGS-IR-3.5-140 FGS-IR-3.5-145 FGS-IR-3.5-15 FGS-IR-3.5-150		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.5-160 FGS-IR-3.5-165 FGS-IR-3.5-170		From requirements: *None* From interfaces: *None*
FGS-IR-3.5-20	H01.L.SDS.HSC	From requirements: *None* From interfaces: HGS-CT-H01-3, HPGS-IT-H01-0.2, HPGS-IT-H01-2.0, HPGS-VT-TM-1.0
FGS-IR-3.5-30		From requirements: *None* From interfaces: *None*
FGS-IR-3.5-40		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*

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Reference	Interfaces	Test References
FGS-IR-3.5-50 FGS-IR-3.5-60 FGS-IR-3.5-70 FGS-IR-3.5-80 FGS-IR-3.5-90		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.7-10 FGS-IR-3.7-100 FGS-IR-3.7-110 FGS-IR-3.7-120 FGS-IR-3.7-125 FGS-IR-3.7-127 FGS-IR-3.7-130 FGS-IR-3.7-140 FGS-IR-3.7-150 FGS-IR-3.7-155 FGS-IR-3.7-160 FGS-IR-3.7-165 FGS-IR-3.7-170 FGS-IR-3.7-175 FGS-IR-3.7-180 FGS-IR-3.7-185 FGS-IR-3.7-20 FGS-IR-3.7-200		From requirements: *None* From interfaces: *None*
FGS-IR-3.7-210	H01.X.HSC.SDS	From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: HGS-CT-H01-4
FGS-IR-3.7-215 FGS-IR-3.7-40 FGS-IR-3.7-45 FGS-IR-3.7-47		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.7-48		From requirements: *None* From interfaces: *None*
FGS-IR-3.7-50 FGS-IR-3.7-60 FGS-IR-3.7-65		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*
FGS-IR-3.7-70 FGS-IR-3.7-75		From requirements: *None* From interfaces: *None*
FGS-IR-3.7-80 FGS-IR-3.7-85 FGS-IR-3.8-10 FGS-IR-3.8-20 FGS-IR-3.8-25 FGS-IR-3.8-26 FGS-IR-3.8-30 FGS-IR-3.9-10 FGS-IR-3.9-20		From requirements: HGS-VT-SOV-1, HGS-VT-SOV-2 From interfaces: *None*

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Reference	Interfaces	Test References
FGS-IR-4.1-05 FGS-IR-4.1-10 FGS-IR-4.1-100 FGS-IR-4.1-110 FGS-IR-4.1-20 FGS-IR-4.1-25 FGS-IR-4.1-30 FGS-IR-4.1-40 FGS-IR-4.1-60 FGS-IR-4.1-70 FGS-IR-4.1-80 FGS-IR-4.1-90 FGS-IR-4.10-10 FGS-IR-4.10-15 FGS-IR-4.10-20 FGS-IR-4.13-10 FGS-IR-4.13-20 FGS-IR-4.13-30 FGS-IR-4.13-40 FGS-IR-4.13-50 FGS-IR-4.13-60 FGS-IR-4.14-10 FGS-IR-4.14-20 FGS-IR-4.14-30 FGS-IR-4.14-40 FGS-IR-4.14-50 FGS-IR-4.14-60 FGS-IR-4.14-70 FGS-IR-4.14-80 FGS-IR-4.2-10 FGS-IR-4.2-20 FGS-IR-4.2-21		From requirements: *None* From interfaces: *None*
FGS-IR-4.2-25 FGS-IR-4.2-30 FGS-IR-4.2-40 FGS-IR-4.2-50 FGS-IR-4.2-60 FGS-IR-4.2-70 FGS-IR-4.2-80 FGS-IR-4.2-90 FGS-IR-4.3-10 FGS-IR-4.3-20 FGS-IR-4.3-25 FGS-IR-4.3-26 FGS-IR-4.3-35 FGS-IR-4.3-40 FGS-IR-4.3-50 FGS-IR-4.3-60 FGS-IR-4.4-10 FGS-IR-4.4-20 FGS-IR-4.4-30 FGS-IR-4.4-40 FGS-IR-4.4-50 FGS-IR-4.5-10 FGS-IR-4.5-20 FGS-IR-4.7-10 FGS-IR-4.7-20 FGS-IR-4.7-40		From requirements: *None* From interfaces: *None*

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10.2.3.3 Planck IRD

Reference	Interfaces	Test References
PGS-IR-4.9-40 PGS-IR-3.4-10 PGS-IR-4.0-5		From requirements: *None* From interfaces: *None*
PGS-IR-4.1-10	P01.L.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
PGS-IR-4.1-100		From requirements: *None* From interfaces: *None*
PGS-IR-4.1-110	P01.L.SDS.DPC P01.T.SDS.DPC	From requirements: *None* From interfaces: HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
PGS-IR-4.1-120 PGS-IR-4.1-125		From requirements: *None* From interfaces: *None*
PGS-IR-4.1-130		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1 PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.1-135		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.1-140	P01.U.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-IT-FTS-1.0
PGS-IR-4.1-145 PGS-IR-4.1-150 PGS-IR-4.1-155 PGS-IR-4.1-160 PGS-IR-4.1-170 PGS-IR-4.1-175 PGS-IR-4.1-190		From requirements: PGS-VT-SOV-1 PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.1-20	P01.L.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
PGS-IR-4.1-200 PGS-IR-4.1-210	P01.K.SDS.PSO	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-IT-FTS-1.0, PGS-VT-MPS-1
PGS-IR-4.1-220		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*

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Reference	Interfaces	Test References
PGS-IR-4.1-230	M13.B.MCS.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HPGS-VT-TC-1.0, PGS-CT-P01-2, PGS-CT-P01-3
PGS-IR-4.1-240		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1 PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.1-250	P01.E.DPC.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
PGS-IR-4.1-260	P01.M.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HPGS-VT-TC-1.0, PGS-CT-P01-2, PGS-CT-P01-3, PGS-IT-DDS-1.0
PGS-IR-4.1-270		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.1-280	P01.J.FDS.PSO	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-IT-FTS-1.0
PGS-IR-4.1-290		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.1-295	P01.J.FDS.PSO	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-IT-FTS-1.0
PGS-IR-4.1-30		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.1-300 PGS-IR-4.1-305		From requirements: *None* From interfaces: *None*
PGS-IR-4.1-310 PGS-IR-4.1-315	P01.U.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-IT-FTS-1.0
PGS-IR-4.1-320 PGS-IR-4.1-325	*None*	From requirements: *None* From interfaces: *None*

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Reference	Interfaces	Test References
PGS-IR-4.1-335	P01.E.DPC.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
PGS-IR-4.1-340	P01.U.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-IT-FTS-1.0
PGS-IR-4.1-345	M07.I.FDS.SDS P01.U.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-IT-FTS-1.0
PGS-IR-4.1-350 PGS-IR-4.1-355		From requirements: *None* From interfaces: *None*
PGS-IR-4.1-360	M13.D.MCS.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HGS-CT-H01-3, HPGS-IT-H01-0.2, PGS-CT-P01-8, PGS-CT-P01-9, PGS-IT-DDS-1.0
PGS-IR-4.1-365		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1 PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.1-370	P01.E.DPC.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1 PGS-VT-SVT-2 From interfaces: HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
PGS-IR-4.1-380	P01.O.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0, PGS-IT-FTS-1.0
PGS-IR-4.1-390		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.1-40	P01.E.DPC.SDS P01.L.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
PGS-IR-4.1-400		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*

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Reference	Interfaces	Test References
PGS-IR-4.1-410	P01.T.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HPGS-VT-TM-1.0, PGS-IT-DDS-1.0
PGS-IR-4.1-420		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.1-430	M13.A.MCS.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HGS-CT-H01-3, HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5
PGS-IR-4.1-440	P01.T.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HPGS-VT-TM-1.0, PGS-IT-DDS-1.0
PGS-IR-4.1-450		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.1-460	M13.A.MCS.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HGS-CT-H01-3, HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5
PGS-IR-4.1-470	P01.E.DPC.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
PGS-IR-4.1-475		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.1-480	P01.Q.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: HPGS-VT-OBS-1, PGS-CT-P01-6, PGS-CT-P01-7
PGS-IR-4.1-490 PGS-IR-4.1-50		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.1-500	P01.F.DPC.SDS	From requirements: *None* From interfaces: PGS-CT-P01-6, PGS-CT-P01-7

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Reference	Interfaces	Test References
PGS-IR-4.1-510	*None*	From requirements: *None* From interfaces: *None*
PGS-IR-4.1-520	P01.F.DPC.SDS	From requirements: *None* From interfaces: PGS-CT-P01-6, PGS-CT-P01-7
PGS-IR-4.1-525 PGS-IR-4.1-562 PGS-IR-4.1-572 PGS-IR-4.1-580 PGS-IR-4.1-582 PGS-IR-4.1-590		From requirements: *None* From interfaces: *None*
PGS-IR-4.1-60		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1, PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.1-600 PGS-IR-4.1-610 PGS-IR-4.1-620 PGS-IR-4.1-630 PGS-IR-4.1-640		From requirements: *None* From interfaces: *None*
PGS-IR-4.1-660	M07.E.FDS.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-IT-FTS-1.0, PGS-VT-MPS-1
PGS-IR-4.1-665	P01.E.DPC.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
PGS-IR-4.1-670	P01.K.SDS.PSO	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-IT-FTS-1.0, PGS-VT-MPS-1
PGS-IR-4.1-680		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.1-70	P01.L.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: HPGS-VT-TM-1.0, PGS-CT-P01-4, PGS-CT-P01-5, PGS-IT-DDS-1.0
PGS-IR-4.1-700 PGS-IR-4.1-705 PGS-IR-4.1-710 PGS-IR-4.1-715		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.1-80		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2, PGS-VT-SVT-0, PGS-VT-SVT-1 PGS-VT-SVT-2 From interfaces: *None*

Reference	Interfaces	Test References
PGS-IR-4.1-90		From requirements: *None* From interfaces: *None*
PGS-IR-4.2-10 PGS-IR-4.2-20	M13.K.MCS.SDS M14.A.SDS.ICC-M	From requirements: PGS-VT-SOV-2, PGS-VT-SVT-2 From interfaces: HGS-IT-M14-4, HGS-IT-M14-5, HGS-IT-M14-6, HGS-VT-SVT-2, HPGS-VT-TM-1.0, PGS-IT-M14-1, PGS-IT-M14-2, PGS-IT-M14-3 PGS-VT-SVT-2
PGS-IR-4.2-25		From requirements: PGS-VT-SOV-2, PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.2-30	M13.K.MCS.SDS M14.A.SDS.ICC-M	From requirements: PGS-VT-SOV-2, PGS-VT-SVT-2 From interfaces: HGS-IT-M14-4, HGS-IT-M14-5HGS-IT-M14-6, HGS-VT-SVT-2 HPGS-VT-TM-1.0, PGS-IT-M14-1, PGS-IT-M14-2, PGS-IT-M14-3 PGS-VT-SVT-2
PGS-IR-4.2-40 PGS-IR-4.2-50 PGS-IR-4.2-60		From requirements: PGS-VT-SOV-2, PGS-VT-SVT-2 From interfaces: *None*
PGS-IR-4.3-10	P01.A.PSO.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-VT-MPS-1
PGS-IR-4.3-20		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.3-30	P01.A.PSO.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-VT-MPS-1
PGS-IR-4.3-40 PGS-IR-4.3-50 PGS-IR-4.3-60		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.3-61	P01.A.PSO.SDS	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-VT-MPS-1
PGS-IR-4.3-62		From requirements: *None* From interfaces: *None*
PGS-IR-4.3-65 PGS-IR-4.3-70 PGS-IR-4.3-75		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.4-10	P01.G.DPC.SDS	From requirements: *None* From interfaces: HPGS-VT-OBS-1, PGS-CT-P01-6, PGS-CT-P01-7

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Reference	Interfaces	Test References
PGS-IR-4.4-100 PGS-IR-4.4-110 PGS-IR-4.4-120		From requirements: *None* From interfaces: *None*
PGS-IR-4.4-130 PGS-IR-4.4-140 PGS-IR-4.4-150	P01.H.DPC.SDS	From requirements: *None* From interfaces: PGS-CT-P01-8, PGS-CT-P01-9
PGS-IR-4.4-160 PGS-IR-4.4-170	P01.X.DPC.SDS	From requirements: *None* From interfaces: PGS-CT-P01-6, PGS-CT-P01-7
PGS-IR-4.4-180 PGS-IR-4.4-20 PGS-IR-4.4-30		From requirements: *None* From interfaces: *None*
PGS-IR-4.4-32 PGS-IR-4.4-35	P01.G.DPC.SDS	From requirements: *None* From interfaces: HPGS-VT-OBS-1, PGS-CT-P01-6, PGS-CT-P01-7
PGS-IR-4.4-38	M17.C.SDE.MCS M17.D.SDE.MCS	From requirements: *None* From interfaces: HPGS-VT-OBS-1
PGS-IR-4.4-60	P01.F.DPC.SDS	From requirements: *None* From interfaces: PGS-CT-P01-6, PGS-CT-P01-7
PGS-IR-4.4-70	P01.F.DPC.SDS	From requirements: *None* From interfaces: PGS-CT-P01-6, PGS-CT-P01-7
PGS-IR-4.4-75 PGS-IR-4.4-80 PGS-IR-4.4-90 PGS-IR-4.4-95		From requirements: *None* From interfaces: *None*
PGS-IR-4.5-10 PGS-IR-4.5-100 PGS-IR-4.5-110 PGS-IR-4.5-120		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.5-130 PGS-IR-4.5-135 PGS-IR-4.5-140 PGS-IR-4.5-150 PGS-IR-4.5-160 PGS-IR-4.5-170 PGS-IR-4.5-180 PGS-IR-4.5-20 PGS-IR-4.5-200 PGS-IR-4.5-210 PGS-IR-4.5-220		From requirements: *None* From interfaces: *None*

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Reference	Interfaces	Test References
PGS-IR-4.5-30 PGS-IR-4.5-35	P01.W.SDS.DPC	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-2, PGS-CT-P01-3
PGS-IR-4.5-40		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.5-42 PGS-IR-4.5-44 PGS-IR-4.5-50 PGS-IR-4.5-60 PGS-IR-4.5-70 PGS-IR-4.5-75 PGS-IR-4.5-77 PGS-IR-4.6-100 PGS-IR-4.6-120 PGS-IR-4.6-130 PGS-IR-4.6-140 PGS-IR-4.6-15 PGS-IR-4.6-150 PGS-IR-4.6-16 PGS-IR-4.6-160 PGS-IR-4.6-20 PGS-IR-4.6-200 PGS-IR-4.6-210 PGS-IR-4.6-220 PGS-IR-4.6-230 PGS-IR-4.6-240 PGS-IR-4.6-250 PGS-IR-4.6-260 PGS-IR-4.6-270		From requirements: *None* From interfaces: *None*
PGS-IR-4.6-300 PGS-IR-4.6-310 PGS-IR-4.6-320 PGS-IR-4.6-330 PGS-IR-4.6-340		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.6-40 PGS-IR-4.6-400 PGS-IR-4.6-410 PGS-IR-4.6-420 PGS-IR-4.6-430 PGS-IR-4.6-45 PGS-IR-4.6-450 PGS-IR-4.6-50 PGS-IR-4.6-60 PGS-IR-4.6-70 PGS-IR-4.6-90		From requirements: *None* From interfaces: *None*
PGS-IR-4.7-10	M07.M.FDS.SDS M07.N.FDS.SDS	From requirements: *None* From interfaces: *None*
PGS-IR-4.7-100	M07.J.FDS.SDS	From requirements: *None* From interfaces: HGS-CT-H01-1, HPGS-IT-H01-0.1, PGS-CT-P01-1, PGS-IT-FTS-1.0

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Reference	Interfaces	Test References
PGS-IR-4.7-110 PGS-IR-4.7-120 PGS-IR-4.7-130		From requirements: *None* From interfaces: *None*
PGS-IR-4.7-150 PGS-IR-4.7-155 PGS-IR-4.7-160		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.7-165	M07.E.FDS.SDS P01.K.SDS.PSO	From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: PGS-CT-P01-1, PGS-IT-FTS-1.0, PGS-VT-MPS-1
PGS-IR-4.7-20		From requirements: *None* From interfaces: *None*
PGS-IR-4.7-30	P01.N.SDS.DPC	From requirements: *None* From interfaces: *None*
PGS-IR-4.7-35		From requirements: *None* From interfaces: *None*
PGS-IR-4.8-10 PGS-IR-4.8-20 PGS-IR-4.8-30		From requirements: PGS-VT-SOV-1, PGS-VT-SOV-2 From interfaces: *None*
PGS-IR-4.8-50 PGS-IR-4.8-60 PGS-IR-4.8-70 PGS-IR-4.9-10 PGS-IR-4.9-15 PGS-IR-4.9-20 PGS-IR-4.9-25 PGS-IR-4.9-27 PGS-IR-4.9-30 PGS-IR-4.9-35 PGS-IR-4.9-40		From requirements: *None* From interfaces: *None*