

CASSIS CALIBRATION REQUIREMENTS

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Restrictions:	N/A

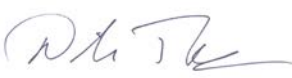

	Name	Signature	Date
Prepared by	Nicolas Thomas Principal Investigator		14 11 2014
Reviewed by	Ruth Ziethé Project Manager		14 11 2014
Reviewed by	Olivier Witasse TGO Project Scientist		
Approved by	Jorge Vago ExoMars Project Scientist		

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Scope

This specification states the scientific requirements to the Colour and Stereo Surface Imaging System (CaSSIS) Camera for the 2016 ExoMars Trace Gas Orbiter (TGO).

1 MISSION DESCRIPTION

The CaSSIS instrument is intended to fly on TGO. It is intended to be the main imaging system providing images of the surface of Mars of scientific (i.e. publishable in recognized journals) quality.

2 REQUIREMENTS WEIGHTING FACTORS

“Shall” designates the most important weighting level—mandatory. Any deviations from these mandatory requirements require approval by the PI or his prior to implementation. “Shall” requirements appearing in subsequent sections require verification of compliance.

“Should” designates requirements requested by Systems Engineering and are not mandatory. Unless required by other contract provisions, non-compliance with “should” requirements does not require approval by the PI but he or his representative shall be informed of any deviation.

3 APPLICABLE DOCUMENTS

3.1 General

The following documents, except those identified as Reference Documents, form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the contract.

It is best practice to list the documents in a tabular format that identifies where in this specification the document is referenced—thus the “Reference Location” column. The “Rev” column is here to accommodate the “unless otherwise specified” statement above.

3.2 European Space Agency Documents

Identifier	Name	Number
ESA-REF1	Experiment-Instrument Requirements Document	EXM-PL-IRD-ESA-00003 Issue 2 Rev 0 TGO E-IRD (JCCB - Signed)
ESA-REF2	Science Management Plan	[IR 5] ExoMars Science Management Plan - Issue 5.4 - 12feb10

3.3 UBE Documents

Identifier	Name	Number
UBE-REF1	Top Level System Requirement Document	EXM-CA-RSD-UBE-00003

3.4 Reference Documents

Identifier	Name	Number
RD01	List of Acronyms Iss 1 Rev 1	EXM-CA-LIS-UBE-00001

4 REQUIREMENTS

4.1 Characteristics

This subsection should contain the required scientific characteristics of the experiment. System (engineering) requirements are deferred to the System Requirements Document (SRD) [UBE-REF1].

4.2 Level 1 Science Requirements

4.2.1 Pre-ample

Level 1 science requirements shall determine the criteria against which experiment success shall be judged.

4.2.2 Requirements

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments (Document numbers of test reports etc)	
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant		
CAS-SCI-0010	The CaSSIS experiment shall provide images which will augment and enhance our knowledge of Mars.					X													

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments (Document numbers of test reports etc)
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant	
CAS-SCI-0020	The CaSSIS experiment shall image surface features possibly related to trace gas sources and sinks.					X												
CAS-SCI-0025	The CaSSIS experiment shall support surface change detection objectives as required.					X												
CAS-SCI-0030	The CaSSIS experiment shall support the certification of future landing sites.					X												
CAS-SCI-0040	The CaSSIS experiment shall support Mars landed operations as required.					X												
CAS-SCI-0050	The CaSSIS experiment shall acquire high resolution surface stereo images.					X												
CAS-SCI-0060	The CaSSIS experiment shall acquire high resolution surface colour images.					X												
CAS-SCI-0070	The CaSSIS experiment shall provide calibrated data to appropriate publicly accessible databases.					X												

Requirement ID	Description	Verification						Category			Level			Compl. Status			Comments (Document numbers of test reports etc)	
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant		Non Compliant
CAS-SCI-0080	The CaSSIS experiment shall establish a science team which shall publish results in internationally recognized refereed journals.					X												
CAS-SCI-0090	The CaSSIS experiment shall provide higher level data products (e.g. DTMs) to the community.					X												

4.3 Level 2 Science Requirements

4.3.1 Pre-ambble

Level 2 science requirements shall define top-level instrument requirements which can be derived from or enhance the level 1 requirements.

4.3.2 Requirements

Requirement ID	Description	Verification						Category			Level			Compl. Status			Comments (Document numbers of test reports etc)	
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant		Non Compliant
CAS-SCI-0100	The CaSSIS experiment shall provide images of Mars with a resolution of better than 10 m. Information: The intention is that CaSSIS should obtain data at a resolution comparable to that of CTX on MRO. <i>Higher level req: [CAS-SCI-0010], [CAS-SCI-0030], [CAS-SCI-0040], [CAS-SCI-0050]</i>					X												
CAS-SCI-0105	The CaSSIS experiment shall provide targetted images to an accuracy +/- 1 km. <i>Higher level req: [CAS-SCI-0020], [CAS-SCI-0030]</i>					X												
CAS-SCI-0110	The CaSSIS experiment shall be capable of acquiring a minimum of one full resolution stereo imaging pair of					X												

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments (Document numbers of test reports etc)
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant	
	observations during each orbit. <i>Higher level req: [CAS-SCI-0050]</i>																	
CAS-SCI-0120	The CaSSIS experiment shall image >0.5% of the surface of Mars per Mars year with a resolution of better than 10 m. <i>Higher level req: [CAS-SCI-0010], [CAS-SCI-0030]</i>					X												
CAS-SCI-0130	The CaSSIS experiment shall image >0.1% of the surface of Mars per Mars year in stereo with a vertical resolution of <10 m. <i>Higher level req: [CAS-SCI-0050]</i>					X												
CAS-SCI-0140	The CaSSIS experiment shall image >0.1% of the surface of Mars per Mars year in a minimum of 3 colours (2 colours plus a panchromatic channel). <i>Higher level req: [CAS-SCI-0060]</i>					X												
CAS-SCI-0142	The CaSSIS experiment shall obtain an SNR >100 for all colours at an illumination angle of 45 degrees over dark terrain. <i>Higher level req: [CAS-SCI-0010]</i>					X												
CAS-SCI-0150	The CaSSIS experiment shall provide relative photometry to an accuracy of better than 5%. <i>Higher level req: [CAS-SCI-0025]</i>					X												
CAS-SCI-0160	The CaSSIS experiment shall provide absolute photometry to an accuracy of better than 15%. <i>Higher level req: [CAS-SCI-0025]</i>					X												

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments (Document numbers of test reports etc)
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant	
CAS-SCI-0162	The CaSSIS experiment shall provide a calibration pipeline which shall automatically correct instrument artefacts to meet the relative and absolute photometric requirements. <i>Higher level req: [CAS-SCI-0070]</i>					X												
CAS-SCI-0164	The CaSSIS experiment shall deliver output from the calibration pipeline to the Planetary Science Archive (PSA). <i>Higher level req: [CAS-SCI-0070]</i>																	

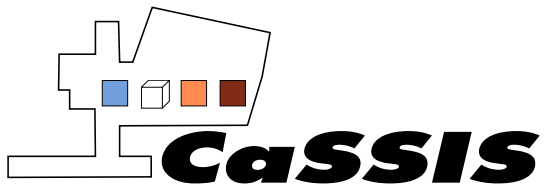
4.4 Engineering Requirements

4.4.1 Pre-amble

The CaSSIS experiment must meet the science requirements within the constraints provided by the spacecraft.

4.4.2 Requirements

Requirement ID	Description	Verification							Category			Level			Compl. Status			Comments (Document numbers of test reports etc)	
		N/A	Inspection	Analysis	Test	Review	Demonstration	Similarity	Qualification	Protoqual	Acceptance	Component	Subsystem	Spacecraft	Compliant	Partially Compliant	Non Compliant		
CAS-SCI-0170	The CaSSIS experiment shall meet the science requirements under the constraints provided by the E-IRD. Should there be deviations from the E-IRD (either during build or in flight), the science requirements shall be re-assessed and revised accordingly.					X													



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