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Goddard Space Flight Center **Greenbelt, MD 20771**	**Approved: 02-19-2019** **Revalidation Date: 02-19-2024**

Requirements for Partner Payloads Hosted on GSFC Spacecraft

MEASUREMENT SYSTEM IDENTIFICATION: US Customary Units

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FOREWORD

This standard is published by the Goddard Space Flight Center (GSFC) to provide uniform engineering and technical requirements for processes, procedures, practices, and methods that have been endorsed as standard for NASA programs and projects, including requirements for selection, application, and design criteria of an item.

This standard establishes the set of requirements to impose on partner payloads hosted on GSFC spacecraft to protect the spacecraft. From the perspective of this standard, mission success for the partner payload is deferred to the partner's own practices.

Requests for information, corrections, or additions to this standard should be submitted via "Contact Us" on the GSFC Technical Standards website at http://standards.gsfc.nasa.gov.

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Requirements for partner payloads hosted on GSFC spacecraft

1. SCOPE

1.1 Purpose

The purpose of this standard is to establish the minimum requirements set for payloads whose mission success is the responsibility of an external partner, that are hosted on GSFC spacecraft.

1.2 Applicability

This standard is applicable to all payloads paid for and provided by external partners to be hosted on GSFC spacecraft.

This standard may be cited in contract, program, and other Agency documents as a technical requirement. Mandatory requirements are indicated by the word "shall." Tailoring of this standard for application to a specific program or project shall be approved by the Technical Authority for that program or project.

2. APPLICABLE DOCUMENTS

2.1 General

The documents listed in this section contain provisions that constitute requirements of this standard as cited in the text of section 4. The latest issuances of cited documents shall be used unless otherwise approved by the assigned Technical Authority. The applicable documents are accessible via the NASA Technical Standards System at http://standards.nasa.gov, directly from the Standards Developing Organizations, or from other document distributors.

2.2 Government Documents

1. NPR 8715.3 General Safety Program Requirements
2. GSFC-STD-7000 General Environmental Verification Specification
3. GSFC P-302-720 Failure Modes and Effects Analysis

2.3 Non-Government Documents

None

2.4 Order of Precedence

When this standard is applied as a requirement or imposed by contract on a program or project, the technical requirements of this standard take precedence, in the case of conflict, over the technical requirements cited in applicable documents or referenced guidance documents.

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3. ACRONYMS AND DEFINITIONS

3.1 Acronyms and Abbreviations

CDR	Critical Design Review
EMI	Electromagnetic Interference
FMEA	Failure Modes and Effects Analysis
ICD	Interface Control Document
PDR	Preliminary Design Review
PSR	Pre-Shipment Review
RF	Radio Frequency

3.2 Definitions

None

4. REQUIREMENTS

4.1 Timing

Strong consideration should be given to the timing of key analyses and how the results factor in to major project milestones. There is no predetermined set of items that would be consistently required by particular reviews but a requirements document should specify products, analyses, and verifications needed by the major milestones (PDR, CDR, PSR, etc) that consider unique aspects of development of both the payload and the host.

4.2 Procedure

4.2.1 An ICD between the payload and the GSFC Observatory shall be created as a joint activity between the provider and the host spacecraft for documenting form, fit, and functional interfaces required to achieve installation and checkout. This document should consider such items at a minimum and be verified on both sides:

- Connector Pinouts
- Power Input Circuits
- Temperature Limits

4.2.2 An Interface Failure Modes and Effects Analysis (FMEA) shall be performed as a joint activity between the payload developer and the host spacecraft. The FMEA should cover at a minimum electrical/EMI, structural, thermal, contamination, and geometric (e.g., blockage of a field of view) faults that may propagate from the payload into the host.

4.2.3 Using the Interface FMEA as a guide, protections shall be provided by the payload to prevent propagation of faults into the host and described in a host protection plan. The following are recommended in the respective areas:

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4.2.3.1 Electrical: Incorporation of fusing and/or circuit breaker architecture for the payload

4.2.3.2 EMI: Performance of radiated emissions and conducted emissions for the payload, and payload/host compatibility testing, including the use of any RF components

4.2.3.3 Structural: Structural verification per GSFC-STD-7000, including elements such as coupled loads analysis, workmanship vibration testing of the payload, and strength testing by either static load testing or sine burst, incorporation of isolators or dampers as necessary to prevent propagation of payload vibration into the host spacecraft. Testing should be performed to protoflight levels.

4.2.3.4 Thermal: thermal analysis of the payload and support to an integrated thermal analysis performed by the host. Thermal balance to demonstrate proper thermal modeling. Minimum of one thermal cycle in vacuum to demonstrate structural integrity. Review of EEE part and board assembly operation for thermal concerns for the payload.

4.2.3.5 Contamination: Review of payload materials list, requirements against use of silicone and other materials that may cause bonding or similar problems, performance of bakeouts, cleanliness and clean room requirements.

4.3 The host developer shall create a payload mission assurance requirements document after careful application of 4.2.1 and 4.2.2 above to the specific circumstances of the project and associated development cycle.