National Aeronautics and Space Administration

NASA

Introducing the:

ELECTRICAL, ELECTRONIC, AND ELECTROMECHANICAL (EEE) PARTS MANAGEMENT AND CONTROL REQUIREMENTS FOR SPACE FLIGHT HARDWARE & CRITICAL GROUND SUPPORT EQUIPMENT

….aka…The EEE Parts Standard

Engineering Directorate
Concept-to-Flight

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Current Policy Documents

NPD 8730.2 NASA Parts Policy

- Needed update to be within NPD and OSMA guidance

NPR 8705.4 Risk Classification for NASA Payloads

- Appendix B: Guidance on acceptable risk levels
- Appendix C: Recommended SMA – Related Requirements
  - Critical Single Point Failures
  - EEE Part Levels
  - Reliability

Center EEE Part Documents

- GSFC: EEE-INST-002
- MSFC –STD-3012
- Others

Gap Analysis of Documents

		Agency	Agency	JPL	MSFC	GSFC	JSC/ISS	LaRC	ARC	GRC	KSC
		NPD 8732.2C (Revalidated 12/6/13)	NHB 5300 Vol 1F July 1989	See column O	MSFC-STD-3012 Rev A 2012	EEE-INST-002, Apr 2008	SSP 30312 Vol I, Rev K, Sep 1, 2011	EEE-INST-002, Apr 2008	APR 8730.2 June 2009	GLPR 7120.5.30 Nov 3, 2009	KSC-PLN-5406 Oct 22, 2013
Parts Management											
	Part Types (applicability)			78157 1.0	4	5.1	1.3 & 1.4	5.1	1	5.2	5
	Part Grades		1F301.2	78157 2.0	4.1	2.0 & 6.0	3.2.1.2...	2.0 & 6.0	7.1	5.2.2	6
	Commercial grade			78157 Table 3	5.5.1	6.7.1	3.2.1.5	6.7.1		5.2.2.a	7
	Criticality Categories		Appdx A & 1F301.1	78157 Table 1	S&MA Requirement		3.2.1.2...				6.2.2
	COTS assemblies		1F301.4	57732 Appdx A	5.2.2 & 5.9.2	6.2.7	3.16	6.2.7			7
	Parts Control Documnt	5.b.(1) & 5.f.(1)	1F203	78157	5.1		3.1.1		7.1.3	5.2.1	
	Parts Control Board		1F201	58792	5.1.2	6.1	5.1	6.1	6.2 & 7.1.2		3.2
	Roles & Responsibilities	5		57732 7.1	Organization Instruction ES43-EE-OI-001				6.2		3
	Part Qualification		1F301.4b	78157 Table 3	5.2	6.4	3.5	6.4		5.2.3	11
	Heritage				5.9.1					2.3a	11
	Standard Part		1F301.3	78157 Table 3	5.5.2		3.2.1			5.2.2b	6
	Non Standard Part		1F301.4	78157 Table 3	5.5.2		3.3			5.2.2b	7
	NPSL (or equivalent)	5.a.(2), 5.f.(2).(b)	1F301(MIL-STD-975)		5.5.1		6.0 - SSP 30423		7.1	5.2.2.c	16.2, 17
	Part selection	5.f.(2)	1F301.1	57732 7.1	5.5.1	6.2	3.2	6.2	7.1.1	5.2, 5.2.2	6.2
	SMD, SCD		1F301.4a	78157 Table 3	5.5.3	6.2	3.1	6.2			7.4
	Waivers	5.f.(2)(a)	1F301.5	78157 1.0	5.5.4					8.9.2	3.2
	NSPAR		1F201 & 1F301.4c		5.6.3		3.3		7.1.4		7.1
	Plastic Encapsulated uCkts			78157 3.2.2.3	5.5.5	6.2.6		6.2.6			E.14
	DPA		1F313.2	78157 3.2.2.1	5.3.2.1		3.7				
	RGA			78157 Table 3	Notes to Selection Tables V, VI, VII						
	PIND			78157 Table 3	5.3.3.1		3.2.1.3				
	Xray			78157 Table 3	5.3.3.2						
	Non-compliance			78157 1.0	5.5.4					8.9	7.1
	PL's - As Designed		1F304.1.a	57732 7.2	5.6.2		3.15.1			5.7	8
	PL's - As Built		1F304.1.b	57732 7.2	5.6.5		3.15.2		7.1	5.7	8
	Screening		1F302	78157 Table 3	5.3.3	6.3		6.3	7.2.1	5.2.4	10
	Parts Obsolescence	Attchmnt C		78395 3.1.1	5.7.1	6.7.3	3.2.2	6.7.3		5.4.1	16
	GIDEP	Attchmnt C	1F308	3.3.3	5.3.6	6.7.4	3.17	6.7.4	7.1	5.7a, 8.10	15
	Suspect parts			57732 5.2	5.8.6						20
	Parts Age/Storage Restriction				5.8.3	6.7.2	3.14	6.7.2		5.6	20
	Problem parts (High risk)		1F305				3.18			5.8	
	Review, Audit & Verification of sub-tier parts management			78230	6					2.5	21
	Receiving Insp	Attchmnt C	1F313	78230	5.3.4				7.2.3	8.5.2	14.5
	ESD		1F310.3	78744	5.8.1	6.7.2	3.12	6.7.2	7.2.3	8.8	20
	Envrn Cntrl		1F310.2a	38112	5.8.2	6.7.2	3.14	6.7.2		5.5, 8.6.4, 8.7	20
	Reuse	5.f.(2)(a)			5.8.7						
	Retesting		1F310.2.b				3.14			8.11	
	Shipping		1F310.1	57252						8.13	
	Derating	5.f.(4)	1F306	78157 3.2.2.2 (in	5.4.1 & 5.6.4	6.5	3.8	6.5	7.1.1	5.2.5	12
	Failure Analysis			78157 3.5			3.19				
	GSE / Interfaces			several	5.10		3.2.1.6				6.2.1
	Flow-down req's	5.f.(3) & Attchmnt C	1F102 & 1F200	58032 5.14.3.3	5.1.2		1.3, 3.1			P.2a, 2.2	1
	Handling/Storing Moisture Sensitive Plastic surface Mount Devices			57732 5.1							

Guidelines

Document Guidelines (NPR 1400.1F &

- **NPD**: Agency policy statements that describe (1) what is required by NASA management to achieve NASA's vision, mission, and external mandates, (2) assignment of responsibilities (who is responsible) for policy implementation

- **NPR**: Provide the Agency's mandatory instructions and requirements to implement NASA policy as delineated in an associated NPD

- Neither NPDs nor NPRs may contain technical requirements.
- NPD should be no more than 5 pages

- **NASA Technical Standards**: Contain common and repeated use of rules, conditions, guidelines, or characteristics for products or related processes

Goals

- **Create Agency-Level Document**
  - Capture list of issues that must be addressed
  - Not overburden “higher risk” projects with excessive requirements
  - Not require changes to Center documents

- **Maintain Center-to-Project relationship**
  - Center still has ample control
  - Project still assumes the risk

Details

Applicability

- Flight hardware - Launch vehicles - Critical ground support equipment (GSE) - Critical ground test systems
- Category 1 and Category 2 projects as defined by NPR 7120.5, NASA Space Flight Program and Project Management Requirements
- Class A, B, C or D payloads as defined by NPR 8705.4, Risk Classification for NASA Payloads, Appendix A.

Non – Applicability

- Institutional projects as defined by NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Requirements
- Research and Technology Development Programs and Projects as defined by NPR 7120.8, NASA Research and Technology Program and Project Management Requirements

Tailoring

- Individual NASA Centers may establish **more restrictive** program/project-specific **requirements** and/or guidelines, as appropriate. To do this, individual provisions of this standard **may be tailored** (i.e., modified or deleted) by contract or program specifications **to meet specific constraints and program/project needs**.
- **Formally documented** as part of program or project requirements and **approved by the Technical Authority** in accordance with procedures in NPR 8715.3, NASA General Safety Program Requirements & and NASA-STD 8709.20, Management of Safety and Mission Assurance Technical Authority

Table of Contents

TABLE OF CONTENTS

DRAFT 1 — NASA-STD-XXXXR — MONTH DD, YYYY

SECTION — TABLE OF CONTINUED — PAGE

More Details…

- **Every EEE part intended for use in space flight and critical ground support equipment shall be reviewed and approved for compatibility with the intended environment and mission life, as applicable.**
- **Parts shall be selected so that flight hardware meets all performance and reliability requirements in the worst-case predicted mission environment**

EEE Part Grade Description

GRADE	SUMMARY	RELIABILITY	RISK	MTBF	COST	TYPICAL USE
1	Space quality class qualified parts, or equivalent.	Highest	Very Low	Longest	Very High	Spaceflight
2	Full Military quality class qualified parts, or equivalent.	Very High	Low	Very Long	High	Space flight or critical ground support equipment
3	Low Military quality class parts, and Vendor Hi-Rel or equivalent. Screened automotive grade (AEC) EEE parts	Medium	Medium	Variable	Moderate	Space flight experiments, aeronautical flight experiments, critical ground support equipment, test demonstrations and ground support systems
4	“Commercial" quality class parts. Qualification data at manufacturer’s discretion. No government process monitors incorporated during manufacturing.	Variable	High	Variable	Lowest	Aeronautical flight experiments noncritical ground support equipment, ground support systems, test demonstrations and prototypes. Limited critical GSE.

More Details…

- Parts Assurance
  - Qualification
    - Part Level
    - Assembly Level
  - Screening
  - Receiving and Inspection
  - Qualification
- Parts Selection
  - Reliability
    - Criticality
  - Derating
  - Environment
    - Radiation
  - PEMS
- Documentation
  - Project EEE Parts Plan
  - As Designed Parts List
    - EPARTS
    - Approval Record
  - As Built Parts List
  - Derating Analysis
  - Counterfeit Control
  - Prohibited Materials
- Parts Management
  - Procurement
  - Obsolescence
  - Counterfeit Avoidance

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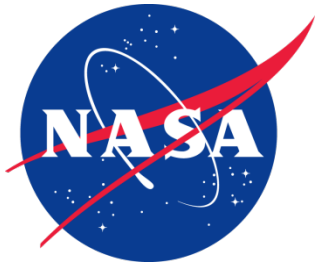
Status

- **Draft document is written**
- **Final W/G review is near finished**
- **Larger scale review**
- **Enter the OSMA Document Review Process**
  - Internal Review
  - Agency-wide Stakeholder Review
    - Other Agency Organizations
  - Publish and Publicize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