National Aeronautics and Space Administration

NASA Electronic Parts and Packaging (NEPP) Program
2021 Electronics Technology Workshop (ETW)

Government Working Group (GWG) Update

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Acronyms

ARP	Aerospace Recommended Practice
AS	Aerospace Standard
ATM	Advanced Technology Microcircuits
CE-11	SAE Component Parts Committee
CE-12	SAE Solid State Devices Committee
COTS	Commercial Off The Shelf
DLA	Defense Logistics Agency
DPA	Destructive Physical Analysis
DSPO	Defense Standardization Program Office
EP	Engineering Practice
ESA	European Space Agency
ETW	Electronics Technology Workshop
FOD	Foreign Object Debris
GWG	Government Working Group
HWG	Hybrid Working Group
JEDEC	Joint Electronics Device Council
MCM	Multi-Chip Module
MDA	Missile Defense Agency
MELF	Metal Electrode Leadless Face
MIL-PRF	Military Performance Specification
MIL-STD	Military Standard
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
NEPAG	NASA Electronic Parts Assurance Group
NEPP	NASA Electronics Parts and Packaging
NRO	National Reconnaissance Office
NSWC	Naval Surface Warfare Center
Pb	Lead
PCN	Product Change Notice
PDA	Percent Defective Allowable
PEMs	Plastic Encapsulated Microcircuits
PIDTP	Package Integrity Demonstration Test Plan
PMWG	Parts Management Working Group
QML	Qualified Manufacturer List
QPL	Qualified Products List
Rev.	Revision
SAE	Society of Automotive Engineers
SMC	Space and Missile Center
SME	Subject Matter Expert
TM	Test Method

GWG was established in January 2017

NEPAG

Purpose

- Discuss in detail topics that flow down from NEPAG which require technical solutions.
- Support parts assurance and reliability focused NEPP, NEPAG, & HWG initiatives.

Objective

- Establish a one government stance to both terrestrial and space programs as applicable.

Community

- Chaired by Kathy Laird/NASA-MSFC and Christian Schuler/NSWC Crane.
- Attendees represent 7 government agencies: Air Force (SMC & Wright Patterson), Army, DLA, MDA, NASA Centers, Navy, and NRO/Aerospace Corporation.

GWG has held 103 meetings since inception.

GWG Activity Summary

Technical Support

- Radiography Requirements Continuous Improvement
- Remote DLA Audit & Inspection Support Options (Covid-19 Impacts)
- MIL-PRF-19500 Package Mounting Pad Requirements
- Burn-In 96hr Test Window Discussion
- Assessment of a Manufacturers PCN Plating Proposal
- DLA EP Study: Thermal Shock Testing Concerns
- ESA DPA Radiography Failure
- HWG Support

JEDEC/SAE Support

- Pb-Free Bump Proposal for MIL-PRF-38535
- MIL-STD-1580 DPA Working Group
- Use of Life Test Parts
- PEMs Space Qualification Standardization
- JEDEC/SAE CE-11/12 Virtual Meeting Preparation

Guidelines & Specification Support

- Review of MIL-PRF-19500 Rev. R Draft Document
- DLA EP Study Phase II: Class N Microcircuits
- Standardization of Foreign Material Definition in MIL-STD-750/-883 Test Methods
- Development of MIL-PRF-ATM for New Technology Devices
- COTS Assembly Hardware Selection Checklist Initiative
- Guidelines, Specifications, & EP Study Draft Release Reviews

GWG has provided dedicated support for more than 45 topics since last ETW meeting.

Technical Support Details

- **Radiography Requirements Continuous Improvement**
  - ✓ Supporting a continuous improvement effort to incorporate best practices language into MIL-STD-883-2 TM2012 to aid in the identification of rejectable anomalies such as FOD and voiding.

- **Remote DLA Audit & Inspection Support Options (Covid-19 Impacts)**
  - ✓ Discussed progress made during virtual dry run audits and lessons learned from actual virtual audits of two MIL-PRF-19500 manufacturing facilities.

- **MIL-PRF-19500 Package Mounting Pad Requirements**
  - ✓ Discussed the need to include bond pad size and additional mounting specifics of axial leaded and MELF surface mount configurations should within the slash sheets to clearly define part thermal dissipation requirements for the user.

- **Burn-In 96hr Test Window Discussion**
  - ✓ Discussed the need for establishing criteria to define a time limit in MIL-STD-883 TM 1015 for the maximum period parts can sit before performing a 24hr reburn-in and functional/electricals.

- **DLA EP Study: Thermal Shock Testing Concerns**
  - ✓ Concluded that a controlled ramp rate insertion was not a supply chain issue but was technically justified for MIL-STD-202 TM107 Thermal Shock testing of MIL-PRF-27 transformers and inductor ferrite core designs to prevent cracking. Conclusion was based on white paper research of the phenomenon, SME input, and manufacturer recommendations.

- **Assessment of a Manufacturers PCN Plating Proposal**
  - ✓ Evaluated a manufacturers gold electroplating finish process flow proposal to transition from a double to single layer plating process and alleviated concerns that it would result in a mission assurance risk for the manufacturer and user community.

JEDEC/SAE Support Details

- **Pb-Free Bump Proposal for MIL-PRF-38535**
  - ✓ Discussed the flip-chip communities need to incorporate Pb-Free bump requirements into MIL-PRF-38535 which was further supported by a recent SAE ARP6537 document release titled "Risk Mitigation for Pb-Free Solders Used Internally to Parts." Provided comments to an associated DLA EP Study release "Evaluation and Test Requirements of Pb-Free Bumps for Flip Chip Devices" which contained the proposed updates to MIL-PRF-38535.

- **MIL-STD-1580 DPA Working Group**
  - ✓ Reviewing proposed comments for the next update and discussing the logistics of splitting the document into sections to aid in the coordination, review and release efficiency of future updates.

- **Use of Life Test Parts**
  - ✓ Collaborated with SAE CE-12/JEDEC chair and the established joint working group to propose verbiage for insertion into MIL-PRF-19500/-38534/-38535 performance specifications to address traceability, identification, and end-user notification to effectively distinguish life tested parts from flight parts in product shipments.

- **PEMs Space Qualification Standardization**
  - ✓ Supporting an SAE working group initiative to standardize SAE AS6294 "Requirements for Plastic Encapsulated Microcircuits" to a military specification space level requirements document.

- **JEDEC/SAE CE-11/12 Virtual Meeting Preparation**
  - ✓ Summarized topics of interest and outstanding NEPAG, GWG, and HWG action items for group review and discussion.

Guidelines & Specification Support Details

- **Review of MIL-PRF-19500 Rev. R Draft Document**
  - ✓ Continued work to resolve outstanding action items within the 2nd released draft including lot norm, PDA, die element evaluation, tri-temperature electrical discrepancies between MIL-PRF-38534/-19500, appendix J non-hermetics, and the use of life test parts.

- **DLA EP Study Phase II: Class N Microcircuits**
  - ✓ Discussed current QPL Class N offerings to gauge the grandfathering effect if proposed enhancement modifications to the QML flow were adopted. Determined the concern was not an issue due to the limited offerings by 2 participating manufacturers and the proposed changes were necessary for the terrestrial user community.

- **Standardization of Foreign Material Definition in MIL-STD-750/-883 Test Methods**
  - ✓ Compiled a presentation documenting findings from an extensive review of MIL-STD-750/-883 test methods to ensure criteria previously included in the definition was incorporated to the body of applicable test methods and identified instances where other terminology required standardization.

- **Development of MIL-PRF-ATM Specification for New Technology Devices**
  - ✓ Discussed the DLA initiative to create a separate performance specification for advanced new technology devices (2.1D, 2.5D, 3D, SIP and MCM) and the intent to apply the PIDTP to the manufacturing process which was also developed for Class Y flip chip packages in MIL-PRF-38535.

- **COTS Assembly Hardware Selection Checklist Initiative**
  - ✓ Supporting a DSPO PMWG working group objective to develop and peer review a tailorable checklist template for the selection of safety and mission critical electronic COTS assemblies.

- **Guidelines, Specifications, & EP Study Draft Release Reviews**
  - ✓ Reviewed and provided feedback on draft documents that were released by DLA, JEDEC, SAE and ESA since last ETW.

Questions?

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