National Aeronautics and Space Administration

European Space Agency (ESA)
European Space Components Conference (ESCCON)
March 25-27, 2025

Standards Update including CE-12 Activities

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NASA's SPHEREx (Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer) observatory and PUNCH (Polarimeter to Unify the Corona and Heliosphere) satellites lift off on a SpaceX Falcon 9 rocket from Vandenberg Space Force Base in California on March 11, 2025.
Credit: SpaceX

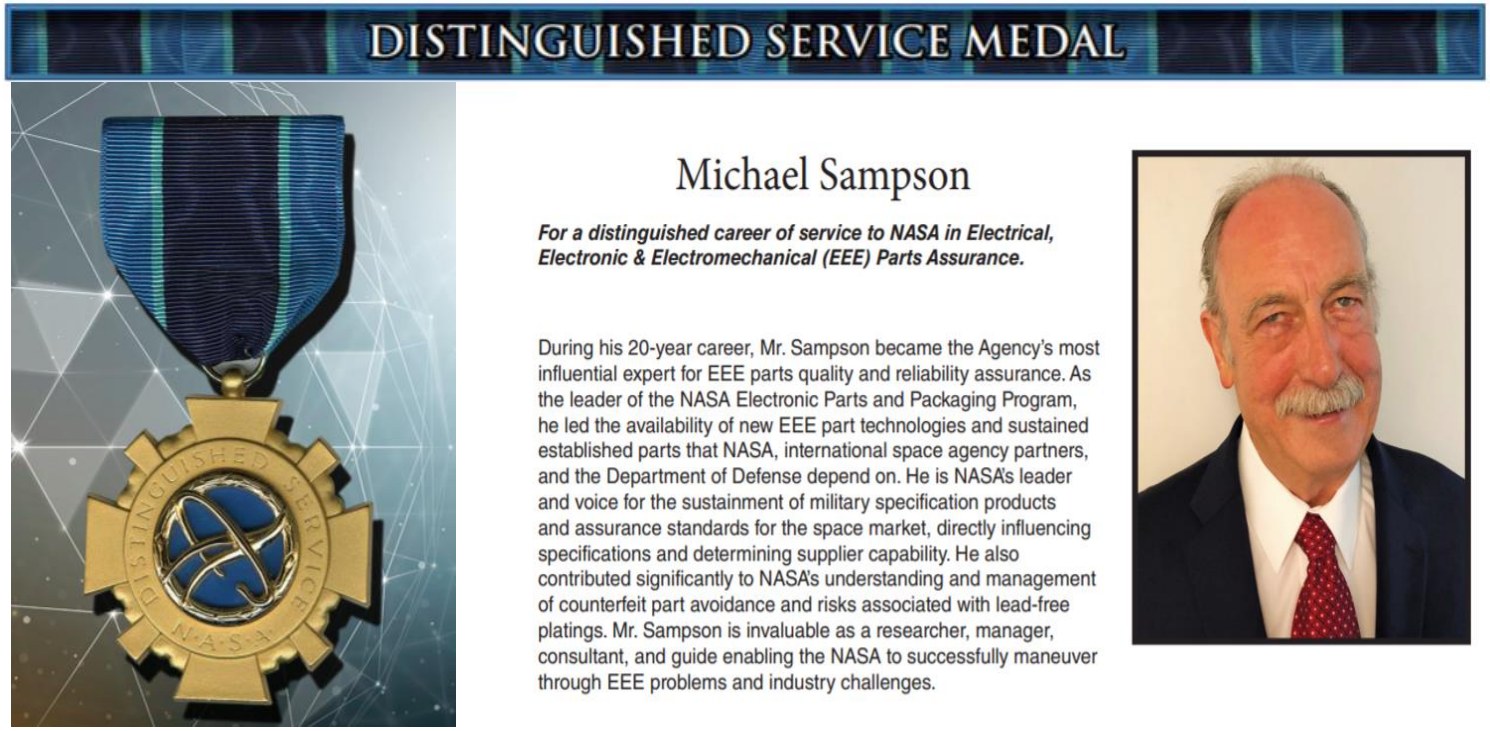
Thank you, ACCEDE-ESCCON Team, for your invitation.

It's a pleasure to be in this great city of Sevilla, Spain. ESA is our valued partner in NASA Electronic Parts Assurance Group (NEPAG) activities.

This year marks the Silver Jubilee of our partnership!

Loss of a Dear Friend, Michael J. Sampson

It is with great sadness that we pass along this news to you of the passing of Michael Sampson on September 23, 2024 at the age of 74 at his home in Greenville, SC. Up until his retirement, Mike spent the last ~30 years of his career supporting NASA's electronic parts assurance activities and was instrumental in fostering relations with our international partners, including ESA. His message: We are One Space community. community).



So Long, John!

Our Friend, Colleague and Mentor, John W. Evans

A World-Renowned Authority In Fracture Mechanics

It is with a heavy heart that we share the news that our friend and colleague, John Evans, passed away today. John was part of our OSMA family for many years as an expert in Reliability and Maintainability, Model Based Mission Assurance, and our Program Executive for the NASA Electronic Parts and Packaging (NEPP) Program. Many had the pleasure to meet and speak with John at our last OSMA Face to Face event just this past August.

John first joined NASA in 2008 as part of GSFC's Reliability and Risk Analysis Branch. As a senior engineer supporting development of the James Webb Space Telescope (JWST), he was instrumental in applying Physics of Failure and Bayesian approaches to more accurately assess the reliability of critical systems including JWST's Sunshield Deployment Subsystem. John served a pioneering role as Chief Safety and Mission Assurance Officer (CSO) for GSFC's Exploration & Space Communications Projects Division. John was also the creator of NASA's Model-Based Mission Assurance (MBMA) Program, and worked in partnership with OCE's Model-Based Systems Engineering (MBSE) Program to bring SMA and Engineering together as part of the Digital Engineering Environment.

John's service to the technical community extended well beyond NASA. He held a Ph.D. in Materials Science and Engineering from Johns Hopkins University, authored over 80 technical publications and 3 books, and shared his passion for knowledge and learning through his service as an Adjunct Professor in the Department of Industrial and Systems Engineering at the Morgan State University in Baltimore, MD. (His message: Share knowledge)

With sympathy and support,

Elaine E. Seasly, D.Eng.
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Email of November 15, 2024

NASA Electronic Parts Assurance Group (NEPAG)

NEPAG is about Standards for electronic parts, finding solutions for NASA flight projects/programs, and day-to-day parts issues. We are part of NASA OSMA's Mission Assurance Standards and Capabilities Division (MASCD).

Maintenance:

Provide NASA leadership

Creation

- Infuse New Technology, e.g., Class Y for Space
- Address the advances in packaging technology, e.g., 2.5D/3D devices
- Respond to user requests, e.g., creation of a new Class P, standard radiation hardened plastic encapsulated microcircuits (PEMs) for use in Space
- Workforce Development; Fracture Mechanics

Related Activities: Hold Telecons

- NASA Electronic Parts Assurance Group (NEPAG)
  - Led by S. Agarwal
  - Weekly Domestic and monthly International
- Government Working Group (GWG)
  - Led by C. Schuler, R. Hodge, B. Damron
  - Detailed discussion of topics, build community consensus
- Hybrid Working Group (HWG)
  - Led by J. Pandolf
  - Hybrids specific issues
- Support Defense Logistics Agency (DLA) audits of supply chain (limited number of ESD audits)
- Partnerships: JEDEC, SAE, Domestic and International space organizations, DLA, Aerospace, Navy Crane, JHU, GIDEP, others
- Standard microcircuits drawing (SMD) review
- Outreach (Publish NASA EEE Parts Bulletins, present at meetings)
- Learn and Lunch Webinars with the supply chain
- Parts issues resolution at JPL. Publish booklets.
- Fracture Mechanics
- Others as needed

NEPAG International Telecons Typical Agenda

Teleconferences held since 2000

TOPICS FOR THE WEEK

JAXA News (H. Shindou or his alternate)

ESA News (K. Lundmark or her alternate): Preparations for ACCEDE-ESCCON

CSA News (R. Jaramillo)

NASA News (P. Majewicz, S. Douglas, S. Agarwal)

Parts Engineering School Update (“School” Team)

Government Working Group Meeting Report (C. Schuler, R. Hodge, B. Damron)

Draft Document Table Review (B. Damron)

Hybrid Working Group Meeting Report (J. Pandolf)

JEDEC/SAE Related Items (S. Agarwal, Others)

EEE Parts Needed Bulletin (J. Brusse)

Upcoming International Audits (J. Pandolf)

Other, Today (2/4/25): Hybrid Working Group Telecon, at 10am (Pacific)

NEPAG EEE Parts Needed Bulletins
(Coordinated by Jay Brusse of NASA/GSFC)

Introductory Paragraph:

The NASA EEE Parts Assurance Group (NEPAG) is contacting you on behalf of a Project that is in need of the following EEE part(s). NEPAG requests that you review inventories of EEE parts accessible to you and your organization to see if you have the ability to help out the Project noted below. Please direct your responses to this request DIRECTLY to the Project point of contact listed below:

NASA Center, Point of Contact, Email address, Project Name

An Example:

P/N: HR257-5.0 , Mfr: Teledyne

Desc: Relay, Magnetic-Latching, DPDT, Half-Size Crystal Can, Space Grade Relay (HIREL)

https://www.teledynedefenseelectronics.com/relays/Datasheets/HR255_257.pdf

Qty needed: min. 2, but 6 desired

JC-13 / SAE CE-11/CE-12 Updates

JC-13/SAE Leaderships Update:

CE-12	• Chairs: Shri Agarwal (NASA), Sultan Lilani (Integra) • Vice-chair: Pete Majewicz (NASA) • Space Subcommittee Chair: Susana Douglas (NASA)
JC-13	• Chair: Ben Mendoza (Golden Altos)
JC-13.2	• Chairs: Steve Hirschfeld (Rochester Electronics), Jonathan Thao (Teledyne e2v)

Meeting Schedule for 2025

01.25 Virtual	Task Team meetings early January, main meetings Jan 20-31week of 20 and 27 of 2025
05.19–22.25 Virtual	On-line
09.15–18.25 (In-Person)	Renaissance, Columbus, OH

NEPAG

JEDEC JC13 and SAE CE-11,12 Outreach

- How familiar is the user community with the activities of JEDEC and SAE organizations?
- Started out as a tutorial at the CMSE conference earlier this year. The instructors included practitioners from NASA/JPL, Aerospace Corporation, Integra, Maxar and Boeing.
- Subsequently, there were requests from Raytheon and Lockheed Martin for the team to teach the same tutorial to their respective component engineers and managers (done).
- Since then, there have been more requests from other primes.
- As an interim solution, this tutorial has been made a part of NASA Training event hosted by NASA/JPL in December.
- The next training event will be held on December 9-10, 2025. There is no fee for this event, but registration is required.

NASA Electronic Parts Assurance Group (NEPAG) is a part of NASA SMA's Mission Assurance Standards and Capabilities (MASC) Division, a core portion of NEPP, about collaboration.

This year is the 25th anniversary of NEPAG

JEDEC JC-13
(Manufacturers)

JC-13	Solid State Devices for Government Products
JC-13.1	Discrete Semiconductors for Government Products
JC-13.2	Microelectronics for Government Products
JC-13.4	Radiation Hardness
JC-13.5	Hybrids and Multi-chip Modules for Government Products
JC-13.7	New Electronic Device Insertion for Government Products

Joint meetings held 3 times a year

Weekly NEPAG and Biweekly GWG Telecons (Domestic)

Monthly Telecons (International and HWG)

SAE CE-11/CE-12
(Industry Users, Primes, Subs)

SAE SSTC CE-11	Users of Passive Components
SAE SSTC CE-12	Users of Solid State Devices **CE-12 Management:** **Co-Chairs:** **S. Agarwal (NASA)** **S. Lilani (Micross)** **Vice chair:** **P. Majewicz (NASA)**
SAE SSTC CE-11 & CE-12	Space Subcommittee Chair: S. Douglas (NASA)

NASA Centers

- ARC
- GRC
- GSFC
- JPL
- JSC
- KSC
- LaRC
- MSFC

Partners from Outside NASA:

Domestic
- ***JHU/APL, Others***
- ***The Aerospace Corp,***
- ***U.S Air Force, U.S Navy,***
- ***U.S Army, MDA, DLA***

International
- ***ESA, JAXA, CSA***

Newly added:

NNSA Weapons, Quality Division; Space X

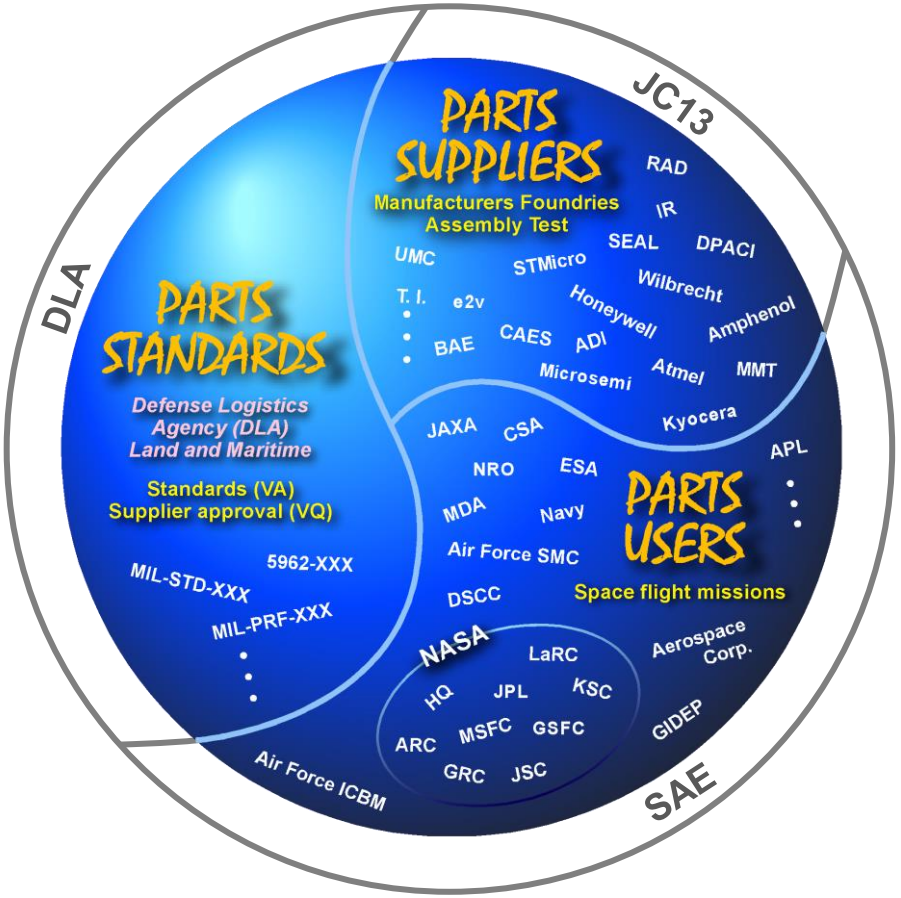
New:

Free Training: NASA Parts Engineering School, JEC-13/SAE Outreach

Support from all partners is appreciated, particularly the International Agencies for their support of telecons

Space Parts World

Developing/Maintaining Standards for Electronic Parts



The parts users and standards organizations work with suppliers to ensure availability of standard parts for NASA, DoD, and others. For Space microcircuits, DLA, NASA/JPL (S. Agarwal*) and the U.S. Air Force / Aerospace Corp. (L. Harzstark) form the Qualifying Activity (QA).

*Also, SAE CE-12 Co-Chair.

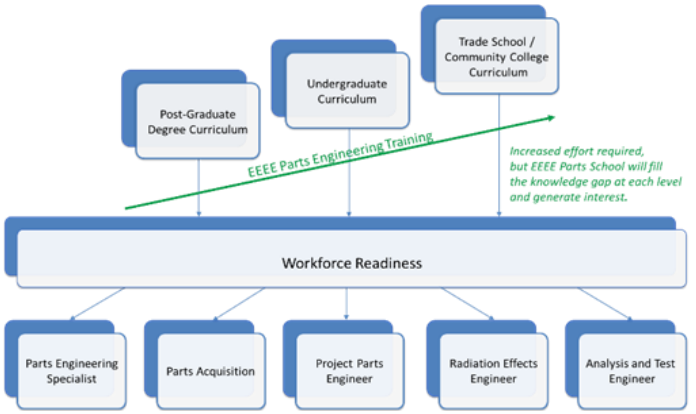
Workforce Development
NASA Parts Engineering School

Certificate & Master's Degree Programs

JPL Jet Propulsion Laboratory · Goddard Space Flight Center · Marshall Space Flight Center · Langley Research Center · Auburn University · University of Maryland · University of Central Florida

NASA Parts Engineering Definition:

Conducts engineering assessments and reviews all EEEE parts for reliability-related performance. Support projects with part selection that maximizes reliability appropriate for the project life cycle while considering schedule and cost constraints. Oversees part procurement and works with parts manufacturers to ensure compliance with engineering requirements. Establishes test plans for EEEE parts, including screening and qualification test campaigns and any required failure analysis, and evaluates test results for proper disposition for space flight usage. Assesses the capabilities of new EEEE technologies and suppliers for spaceflight use.



FY25 Qtr	Plan	Output
1 – 4	• JPL Host EEE Parts Engineering 101 Training Workshop • Develop Internship Program • Continue Recruiting Universities	• Opening remarks from Dr. Robert Hodson, NASA Technical Fellow for Avionics. Well received. • Submitted Announcement of Opportunity for Internship • Hold meetings with VT, UCB, NASA HQ
2 – 4	• Organize and Plan EEE Parts 202 Training Workshop advanced topics • Organize presentation/training material for distribution, reference • Update Parts Engineering School Website • Expand existing course in fracture mechanics at UCF to include semiconductor packaging	• Conduct sessions at space conferences as invited by organizers, as well as a full workshop in December • Material posted on NESC website • Scheduled for January, then semiannually • Completed material available for teaching graduate students
3 – 4	• Host Intern/s • Develop Database to Supply to Universities • Hold Discussion with Potential International Partners	• Identify opportunities for multiple internships at JPL, other NASA centers, and industry partners • Ongoing activity • Hold meetings with ESA, JAXA, CSA

Q1FY25 Highlights

EEE Parts 101 Training Workshop

Tuesday, December 3rd

8:00 am - 8:15 am	**Welcome Statement** **Opening Remarks** Dr. Robert Hodson, NASA Technical Fellow for Avionics
8:15 am – 8:20 am	**Tribute to John Evans and Mike Sampson** Shri Agarwal
8:20 am - 9:15 am	**Parts Engineering School Discussion** Auburn University University of Central Florida NASA School Team
9:15 am - 9:45 am	**SCALE Discussion** Peggy Williams, Scalable Asymmetric Lifecycle Engagement (SCALE)
9:45 am – 10:15 am	**Golden Altos Training** Ben Mendoza, Golden Altos
10:15 am – 11:15 am	**Radiation Tutorial** Greg Allen, JPL
11:15 am - 12:15 pm	**Lunch**
12:15 pm – 1:00 pm	**Overview of NASA-STD-8739.11** Pete Majewicz, GSCF
1:00 pm – 1:15 pm	**Parts Engineering School Discussion** University of Maryland
1:15 pm – 2:45 pm	**JEDEC/SAE Tutorial** Larry Harzstark, Aerospace Shri Agarwal, JPL Sultan Lilani, Integra
2:45 pm – 3:30 pm	**Part Manufacturing Process: Discrete Devices** Benny Damron, MSFC

Wednesday, December 4th

8:00 am – 9:00 am	**Screening Method for Bulk Metal Foil or Thin Film Resistors** Jay Brusse, GSFC
9:00 am – 10:00 am	**Part Failures and Analysis** Lyudmyla Ochs, GSFC
10:00 am – 10:45 am	**ESD Effects** Irene Yeh, JPL
10:45 am – 11:30 am	**Techniques to Assess Delamination** John Bescup, JPL
11:30 am – 12:30 pm	**Lunch**
12:30 pm – 1:30 pm	**Physics of Failure for Fracture Mechanics** Scott Popelar, Frontgrade
1:30 pm – 1:40 pm	**Development of Course in Fracture Mechanics** Dr. Ali Gordon, UCF
1:40 pm – 2:00 pm	**Fracture Mechanics Status** Shri Agarwal, JPL
2:00 pm – 3:30 pm	**Fracture Mechanics: Testing of Small and Large Packages** Scott Popelar, Frontgrade Ben Mendoza, Golden Altos Dr. Reza Ghaffarian, JPL Ray Kuang, Microchip

NASA Parts Engineering 101 Training Workshop:
Workshop Metrics

Day 1 (December 3, 2024)	**Day 2** (December 4, 2024)
• Total Number of Attendees = 495 • Total Registered = 751 • Full day of Parts 101 Training	• Total Number of Attendees = 341 • Total Registered = 451 • Day was equally split between Parts 101 Training, and John Evans Symposium on Fracture Mechanics of Electronic Parts

NASA Parts Engineering School Scope of Work

List of EEEE Commodities

- Capacitors
- Connectors with EEEE components
- Crystals
- Crystal Oscillators
- Fiber Optics, Passive
- Filters
- Fuses
- Heaters
- Magnetics
- Microcircuits
  - Hybrid
  - Monolithic
  - Plastic Encapsulated (PEMs)
- Relays, Electromagnetic
- Resistors
- Semiconductor Devices, Discrete
- Switches
- Thermistors including PRTs

Areas of Focus

- Mechanics of Electronic Packages
- Introduction to EEEE Parts
- Semiconductor Manufacturing — CHIPS ACT
- Parts Assembly
- Standards Development — JEDEC, SAE, DLA
- Parts Supply Chain
- Parts Selection and Approval
- Parts Acquisition
- Parts Risk Assessment
- Parts Reliability — NESC, IRPS
- Parts Construction Analysis
- Failure Investigations and Analysis
- Non-Destructive Evaluation
- Parts Screening and Qualification
- Optical Inspection
- Electrical Evaluation and Testing — ITC
- Engineering Communication
- Schedule and Budget Management
- Parts Security and Counterfeit
- Parts Radiation Effect (Being addressed separately by other groups in NASA and industry) — NSREC
- Meetings — NEPP ETW

Electronic Parts Engineering

(for the benefit of all industries where EEEE parts are used)

NASA Parts Engineering School:

Outreach

- Volume 15, Issue 1, May 26, 2023
- NASA Parts Engineering School

The NASA Electronic Parts and Packaging Program (NEPP) is encouraging the development of a NASA Parts Engineering Program alongside university partners Auburn University and University of Maryland, through NASA center-wide collaborations between NASA Jet Propulsion Laboratory (JPL), Goddard Space Flight Center (GSFC), Marshall Space Flight Center (MSFC), and Langley Research Center (LaRC). The program will address the knowledge gap in the current electronic parts engineering workforce and will lead to increases in the number of trained professionals in the workforce, including cultivating the next generation of Parts Engineers.

OPPORTUNITY

With new developments in EEEE parts, there is an ever growing knowledge gap for incoming Parts Engineers

- The need to address this gap has been prevalent through all NASA facilities and involved industries.
- It is critical to tackle the lack of awareness as well as the lack of technical knowledge.
- Currently, there are no programs offering a comprehensive parts engineering focus either at universities or throughout industries in the field.

SOLUTION

Workforce Development at a national level to narrow the knowledge gap.

- Leveraging the knowledge base of the universities and industry partners will assist in filling these gaps.
- NASA to provide guidance in developing university programs to support the aerospace, military, and industrial community

PROGRAM GOAL

Parallel Workforce Development

- Encourage the development of a curriculum of EEEE parts engineering topics at the university level.
- Expand and share training materials currently offered to NASA EEEE Parts Engineers.

NEPAG

NASA Parts Engineering School Resources and Specialized Programs

Program Website

https://www.jpl.nasa.gov/go/parts-engineering-school

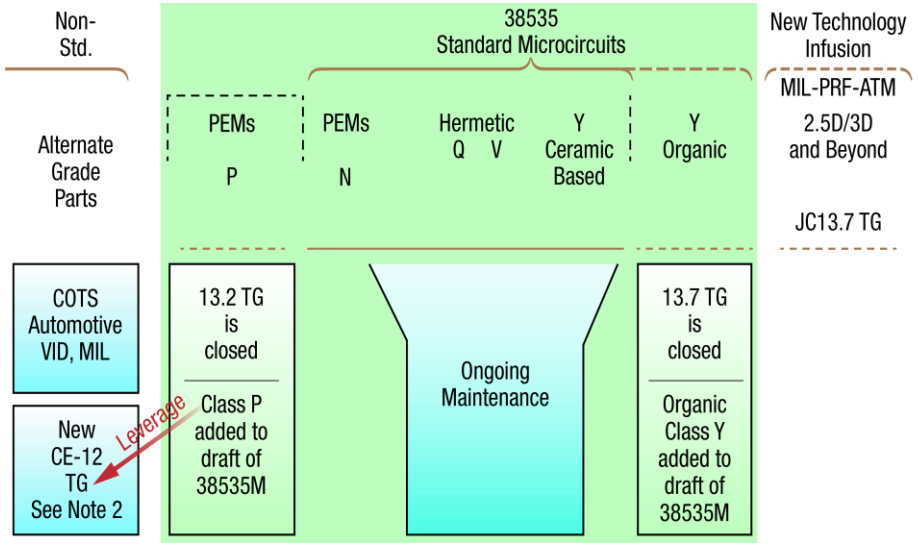
Social Media Posts

LinkedIn
Instagram
Twitter
Facebook

Strategic Radiation-Hardened Electronics Council (SRHEC)

Radiation Test Training Workshops

Microcircuit Standards Development



- **Note 1:** Standard PEMs for Space (QMLP) initiative using SAE AS6294 as baseline. Supported by NASA Parts Bulletins on PEMs.
- **Note 2:** For alternate grade microcircuits, follow the activity in 13.2 TG to avoid any duplication of effort.
- **Note 3:** ATM = Advanced Technology Microcircuits. Supported by NASA parts bulletin on KGD.
- **Note 4:** VID = Vendor Item Drawing. Contact DLA for latest information.
- **Note 5:** *The boundaries separating various classes/grades must be clearly defined—a future outreach activity.*

The revision M of microcircuits specification, MIL-PRF-38535, was released last November. It introduced two new classes of standard parts for space missions:

(a)
Organic Class Y, which has been baselined for NASA's high-performance spaceflight computing (HPSC) processor being developed by Microchip Corporation, and

(b)
Class P, Radiation Hardened/Tolerant Plastic Encapsulated Microcircuits (PEMs) for Space. The flight projects can realize substantial cost/schedule savings by procuring standard Class P parts (rather than buying commercial-off-the-shelf (COTS) PEM devices and getting them upscreened).

(c)
DLA has begun auditing the suppliers of Classes Organic Class Y, and P.

The green area shows current standards coverage. This pretty much completes the standards coverage for 38535 devices.

Some Notes on Fracture Mechanics in Plastic Packages

PEMS

Lots of JC13/CE-12 activity to develop Standards for Microcircuits

- **Heavy discussion on plastic parts in the next 2-3 years (and beyond), on both ends (overmolded and organic)**
- **Good time to review the fundamentals of plastic packages – the community is making heavy investment in them to cover expanded application spectrum/ infuse new technology**

Temp cycling

- **Done per MIL-STD-883, Test Method 1010**
  - **Condition C: -65C to +150C, used for ceramic parts**
  - **Condition B: -55C to +125C, being proposed for PEMs for Space**
  - **Condition A: -55C to +85C**
  - **How about the ramp rates, dwell times?**

Glass Transition Temperature

- **No one seems to talk about it any more, it has been a mystery.**
  - **Always measured lower than specified (JPL experience from several years ago)**

Packages are getting smaller, thinner.

- **A GaN device that NASA/JPL wants to use comes in a 8mm x 8mm size package.**

Post Assembly

- **Are any parts issues (e.g., crack propagation) off limits (IPC problem?)**
  - **CTE mismatches**
  - **Time dependence**

- **Bring parts, IPC, manufacturer communities together**
  - **Could a QCI type test/set of guidelines be developed at the part level?**
  - **Look at 38535 and 19500 products**

- **What tests do the materials suppliers run to demonstrate quality/reliability?**

- **Making improvements to standards, performance specifications**
  - **Is the potential impact of stress/pressure build up in plastic packages being adequately addressed?**

Is it time to address Fracture Mechanics and Microcircuit Standards?

- To identify any gaps and assess their impact

- Plastic encapsulants, dielectric polymers, and underfill materials are subject to delamination and cracking with thermal cycling. Crack propagation during use environment exposure, drives the potential for failure of microelectronic devices and is therefore a necessary focal point in qualification and life testing.

- Develop methodology for evaluating the time-dependent mechanical failure of semiconductor packages
  - Resulting from combined effect of stress, temperature, moisture absorption and crack like defect

Fracture Mechanics (FM) in PEM Package : At a Glance

- Partners include Golden Altos (GA) and Frontgrade.
  - The test article is an FRAM from Cypress (Infineon)
  - Using existing test program developed by GA
  - Failure analysis to be performed by Frontgrade
- Small package outline PEM evaluation consisting of moisture pre-conditioning, temperature cycle testing, high temp storage testing
- NEW Partner: Vorago. Will test their microcontroller.

- Partner includes Microchip
- This effort is specific to Class Y processor being developed for HPSC project
- Action item from HPSC review board to NEPAG is to determine whether there are fracture mechanics-related issues with larger packages such as the ones to be used for the HPSC
- Phase I: Microchip has provided test packages
- Phase II: Developed Test Plan
- Phase III: Testing started

- Published a booklet and distributed to NASA centers
- Literature search is on-going
- Presenting the topic at every JEDEC meeting
- Continuing to seek partners

- Phase I: Can the test setup in 514 radiation lab be used to perform the board level functionality check.
  - Status: Completed with 4 unique evaluation boards
- Phase II: Plan under development

NASA's Involvement in Developing New Space Products

With the Defense Logistics Agency (DLA) and the Aerospace Corporation, NASA participates in the review and approval of new space products:	In FY24, a total of 8 microcircuit SMDs were approved for release. The mix of new product types included:	Per manufacturers, there is a continuing strong demand for standard space products.
• Standard Microcircuit Drawings (SMDs) • Characterization and qualification data per Appendix H of MIL-PRF-38535 (for the monolithics)	• Standard Microcircuit Drawings (SMDs) • Characterization and qualification data per Appendix H of MIL-PRF-38535 (for the monolithics)	

Standards Development in Other Areas

Outside of 38535 Microcircuits

GaN on Si	New Task Group (TG) on Integrated Photonics	Extreme Environments
• Used on a couple of NASA projects • DLA is auditing the companies oCommunity has developed 19500 slash sheet. • Had L@L with one of the GaN suppliers, others are to be scheduled	• Started in January 2024. • Coordination with JC14 is being worked. • L@Ls with supply chain are planned	• Another emerging area. M. Mojarradi of NASA gave a Tech Talk in September 2023. • NASA is collecting responses to cold electronics surveys

Task Groups (TG) Status

(Source: JC-13, SAE meetings)

Alternate Grade Parts – Mark Porter	Why we Test TG – Mark Porter	SILICON PHOTONICS - Susana Douglas
The purpose of this task group is to create a document which will provide EEE piece part manufacturers with a list of information that OEMs desire to be able to select their part for use. Providing this list allows EEE piece part manufacturers an ability to establish mechanisms for providing the desired information in advance. It is understood that EEE piece part manufacturers may consider all or part of this information to be proprietary in nature.	This task team is working on why we perform the various tests during screening and qualification test within MIL-PRF-19500, MIL-PRF-38534, and MIL-PRF-38535, document. The rough matrices in spread sheet format are being worked on and contains the information on: • What defects we are attempting to prevent? • Why are the limits established as they are? • Why were the parametrics set the way they are?	Updates: • Working to republish Aerospace TOR to be shareable to public. Continuation of ARP draft (Dillon Johnstone) • Working to see if there's an agreement with Telcordia that will allow sharing of Telcordia standards in TG • Working to provide list of manufacturers that are PIC manufacturers

Task Groups (TG) Status

(Source: JEC-13, SAE meetings)

IGA TG – Brandan Hirsh, Sultan Lilani	De-Rating TG – Dennis Cruz, Mary Whitelaw, B. Mendoza and Sultan Lilani (Scribe)
The agenda for this TG is as follows: • The development of a Body of Knowledge to instill confidence in testing and accuracy of results • Anticipated results: MIL-STD-883 / 750 TM1018 Initial Draft request • Anticipated publication (white paper) of common IGA practice (Fall '24)	De-Rating TG – Dennis Cruz, Mary Whitelaw, B. Mendoza and Sultan Lilani (Scribe) • Currently focused on Ceramic Capacitor & Film Resistor Derating Criteria ○ Working to determine revised derating criteria for the military resistors and ceramic capacitors: • Derating criteria from a variety of industry documents (both canceled and not canceled) are included for reference • Had Derating Meeting August 23, 2024 with guest speaker: Alan DeVoe, President Presidio Components

Task Groups (TG) Status

(Source: JC-13, SAE meetings)

Long Term Storage TG – Stephen Wright, Sultan Lilani	Joint SAE / JEDEC GaN Working Group– Rod DeLeon -	ATM TG - Eli Minson
• The task team is making great progress and significant amount of the document has been completed. • The team's work is almost done. reviewing the final draft for ballot. Most likely go to ballot soon. • The next step would be to start re-lifing task team and a proposal could be made in January meeting for the task team	Since TG has completed drafting the related sections of MIL-PRF-19500 to insert Power GaN FETs and have been submitted to DLA for review and comments, they are now in standby mode.	It is a JC13 task team. This TG is different than other TG teams since it is attempting to standardize non-standard items. There is no standard flow for ATM products that it can leverage from. There is no guidance for radiation testing and it is almost requiring an SCD for each part type.

Task Groups (TG) Status

(Source: JC-13, SAE meetings)

PEMS Sub-committee – Sultan Lilani, Rod De Leon

The PEMs sub-committee meeting addressed the following agenda:

- Reports (VID, PEM Class N) – Rodney Chambers
- 19500 J Update Benny Damron
- Micron – Todd Legler
- TI Class P Update – Donna Moreland
- Renesas Class P Update – Corkey Newman
- Infineon – Helmut Puchner
- Acoustic Microscopy Task Team Update (Sultan). Micron has been added to provide status of their Flash Memory PEM activities

Electronic Parts and ElectroStatic Discharge (ESD)

Electronica Parts and ESD

NASA Specific Goals	Return on investment for NASA flight projects	FY24 Status Report: See S. Agarwal presentation at Space Parts Working Group meeting in May 2024.
• During the DLA audits of the supply chain, we realized that there were practically no requirements for ESD. Needed to update standards. • Microcircuit pin count increased significantly (e.g., Vertex FPGAs have 1752 columns). Existing qualification standards were developed years ago with pin counts in the twenties. Applying these old device testing standards to modern high-pin count products caused severe problems (e.g., testing times increase dramatically). • Furthermore, microcircuit part production is no longer under one roof, but landscape of supply chain is multiple specialty houses. • ESD surveys/audits of COTS hardware/parts suppliers should be mandatory. • Mitigation strategies include ESD surveys, observations during audits, standards updates & outreach to the military & space communities. There is always a latency risk from ESD. • Outreach: NASA has published extensively on this subject (released 4 Parts Bulletins). We plan to publish a guideline document and will continue to report at conferences.	• NASA initiated and led the Electronic Parts and ESD effort. We provide updates at JC-13/SAE, SPWG and ETW meetings. • Supply chain is deriving benefits from NASA ESD Surveys.	

Counterfeit Parts

1. Refers to counterfeit parts awareness and mitigation
2. GIDEPs (Government Industry Data Exchange Program [reports]) on counterfeit parts are reviewed on NEPAG telecons.
3. During the DLA audits, the manufacturers are asked for their counterfeit mitigation plans. Most of them have some form of mitigation.
4. NASA provides counterfeit training.
5. NASA supports the SAE (Society of Automotive Engineers) effort.
6. Procure parts, particularly new technology devices, from the authorized sources

Industry Leading Parts Manufacturers (ILPMs)
Criteria for an ILPM

Will share parts quality and reliability data

- DPPM (defective parts per million), field failure DPPM and/or part failure rates (FITs), FMEAs, Design Practices, etc.

Will provide NASA how unscreened parameters are guaranteed.

Will describe the parameters that are being monitored to maintain process controls.

Will allow NASA to visit on-site and/or to work with NASA to maintain a strong customer-manufacturer relationship.

PoC: S. Douglas, P. Majewicz

PEAL at a Glance

Parts Evaluation and Assessment Laboratory

(PoC: S. Douglas, P. Majewicz)

Considerations

Project Driven Concerns

- Schedule
- Timeline
- Cost
- Commodity
- Mission requirements

Availability

- Make from part & quantity
  - Can parts be used prior to completion of Qual (pre-release)?
- Test facility's cost & schedule

Functions of PEAL

- Establish Lab Facility with ATE and other test equipment
- Assign a managing coordinator
- Establish and execute testing to meet project requirements. Personnel involved:
  - Specialists
  - Project Parts Engineers
  - Radiation experts
  - Failure Analysis experts
  - Test engineers
  - Procurement and Acquisitions
- New technology evaluations
- Create a NASA-wide database of parts
- Develop skillsets
- Other objectives as needed

→ Deliver parts to projects

Thank you, ESA!

- The addition of new technology and the continual maintenance of current standards bring both unique challenges and the opportunity to reinvent parts engineering.
- NASA supports a variety of space missions and programs. The success of each mission is critical to the future of space exploration.
- ESD aspects should not be ignored.
- We encourage other agencies to take advantage of NASA Parts Engineering School, and Fracture Mechanics initiatives.
- The space community needs to continue to evolve. NASA's ILPM and PEAL initiatives are a step in that direction.
- ACCEDE-ESCCON workshops are an incredible experience, offering participants the chance to work with space organizations around the world.

National Aeronautics and Space Administration

European Space Agency (ESA)
European Space Components Conference (ESCCON)
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