



Reliability Science Symposium

Fall 2025

October 17, 2025

calce

Center for Advanced Life Cycle Engineering (CALCE)

FY26 Research Kickoff Meeting

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CALCE EPS Consortium

The CALCE EPS Consortium provides a forum for *defining* fundamental research needs, *conducting* research, and *sharing* research findings among participating organizations. The research focus for the CALCE EPS Consortium includes risk assessment, mitigation, and management of electronic products and systems. Output from the consortium activities includes

- design and manufacturing methods,
- simulation techniques,
- models,
- experimental methods,
- guidelines,
- instructional information, and
- future engineers and technical leaders.

CALCE Research Areas

A. Reliability Physics (failure mechanisms, modeling, testing, standards, metrology and characterization):

1. Substrates/Printed Boards/Interposers
 - Traces and pads
 - Dielectrics
 - Vias
 - Interfaces
 - Embedded components & interfaces
2. Interconnects
 - Permanent
 - Separable
3. Active devices and packaging
4. Passive devices
5. Batteries
6. Additively manufactured electronics
7. Cooling systems and thermal management

B. System level assessment (co-design for heterogeneous integration, cooling design, reliability assessment, safety assessment, RUL prognostics):

- Reduced order models
- data-based models
- fusion models

C. Accelerated qualification

- Test methods
- Failure analysis and reliability metrology
- Physics-based and data-based approaches for acceleration factors

D. Supply-chain management

- Counterfeit avoidance and detection
- Security
- Blockchains and machine learning
- Agent-based modeling

E. Life cycle cost and affordability

- Obsolescence
- Sustainment cost

FY26 Project Development Schedule

<http://www.calce.umd.edu/members/projects/2026/>

- Provide project ideas to CALCE staff (February)
- Present Proposal at CALCE Consortium Spring Planning Meeting
- Solicit and review feedback from interest survey (March)
- Update project proposals on CALCE Web Site (May)
- Post projects on website (September)
- Present Next Year Projects at Fall Project Kickoff Meeting (October)

FY26 Projects

C26-19 Ripple Current Testing of Multilayer Ceramic Capacitors (MLCCs) for Correlation with Selection Criteria

C26-20 Rapid Assessment of Electronic Assemblies Using Side-Channel Power Modulation Analysis

C26-22 Modeling and Physical Analysis of Lubrication in Lightly Loaded Contacts Undergoing Fretting

C26-11 HDI Laminate Reliability Concerns.

C26-12 Feature Size-based Dimensional Data for Component Reliability Assessment.

C26-03 Microstructure-sensitive Grain-scale Model for Cyclic Fatigue in Oligocrystalline SAC Interconnects

C26-26 Coating Durability in Electronic Products

C26-07 Thermal Cycle Reliability Models for Lead-free High-Performance Solder Interconnects and Wafer Level Package Solder Interconnect Tests

C26-08 Reliability of Low-Temperature Solder Interconnects

C26-09 Tin Whisker Mitigation and Risk

CALCE EPSC FY2026 Project Feedback Form

Name (required):

Email (required):

C26-19 Ripple Current Testing of Multilayer Ceramic Capacitors (MLCCs) for Correlation with Selection Criteria

- High Interest
- Interest
- No Interest
- Abstain (i.e. not qualified to comment)

Comments and Suggestions:

C26-20 Rapid Assessment of Electronic Assemblies Using Side-Channel Power Modulation Analysis

- High Interest
- Interest
- No Interest
- Abstain (i.e. not qualified to comment)

Comments and Suggestions: