GEIA G-12
Solid State Devices Committee
Initiatives

Mark Porter - Chairman

19th Microelectronic Workshop
JAXA’s Tsukuba Space Center, Ibaraki, Japan
October 25th through 27th, 2006
Summary Slide

• Committee Overview

• Collaborative Relationships

• Key Focus Areas & Initiatives
Electronic Industries Alliance (EIA)

- The EIA is a national trade organization that includes the full spectrum of U.S. manufacturers, representing more than 80% of the $550 billion electronics industry.

- The Alliance is a partnership of electronic and high tech associations and companies whose mission is promoting the market development and competitiveness of the U.S. high tech industry through domestic and international policy efforts.

- EIA is comprised of more than 2,500 member companies whose products and services range from the smallest electronic components to the most complex systems used by defense, space and industry, including the full range of consumer electronic products.
Government Electronics and Information Technology Association (GEIA)

- GEIA represents the high-tech industry doing business with the government.
- Association members include companies involved in producing information technology (IT) solutions as well as advanced electronics products and services for defense and civil government markets.
- GEIA Members are systems integrators, suppliers, contractors, hardware manufacturers, and software providers in the IT, Defense and Communications Industries.
- GEIA connects industry to government through its renowned forecasting process.

G Panels / Committees
- G-11 Component Parts
- G-12 Solid State Devices
- G-33 Data and Configuration Management
- G-34 Computer Resources
- G-43 Quality
- G-45 Human Factors
- G-46 Electromagnetic Compatibility
- G-47 Systems Engineering
- G-48 Systems Safety
- Avionics Process Management Committee
- Compact Model Council
- Input Output Buffer Information Spec.
- Quality & Reliability Engineering
G-12 Solid State Devices Committee

• The G-12 Committee develops solutions to technical problems in the application, standardization, and reliability of solid state devices.

• This is implemented by evaluation and preparation of recommendations for specifications, standards, and other documents, both government and industry, to assure that solid state devices are suitable for their intended purposes.

• Focus Areas ...
  • Standardization
  • Manufacturability
  • Specifications and Standards Impacting Solid State Devices
  • Quality and Reliability
  • System Performance (End Use)
  • Diminishing Manufacturing Sources
  • Market Consistency
  • Continued Improvement
  • Acquisition Reform
  • Best Commercial Practices
  • Commercial Part Insertion
G-12 Active Member Companies

- BAE SYSTEMS
- Boeing Company
- Corfin Industries
- CSC ITS
- Defense Microelectronics Activity
- General Dynamics Corp
- Goodrich Fuel & Utility
- Honeywell
- L-3 Cincinnati Electronics
- L-3 Communication Systems*
- Lockheed Martin
- Northrop Grumman
- Raytheon
- Rockwell Collins
- Six Sigma*
- Tecnológica
- Textron
- United Space Alliance

As of September 24, 2006:
Voting Members (16)
Observing Member (2) *
Collaborative Relationships

Semiconductor Device Manufacturers

JEDEC Solid State Products Technology Association

Government Electronics and Information Technology Association

JC Committees
- JC-10 Terms, Definitions & Symbols
- JC-11 Mechanical Standards
- JC-13 Government Liaison
- JC-14 Quality & Reliability
- JC-15 Electrical/Thermal Characteristics
- JC-16 Power Supply
- JC-22 Diodes & Thyristors
- JC-25 Transistors
- JC-40 Digital
- JC-42 Memory
- JC-50 Gallium Arsenide

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- Avionics Process Management Committee
The JC-13 Committee represents the manufacturing segment of the solid state device industry.

The committee is responsible for standardizing quality and reliability methodologies for solid state products used in military, space, and environments requiring special use condition capabilities beyond those of standard commercial products.

- Includes long-term reliability and/or special screening requirements
Collaborative Relationships

G12
Solid State Devices

U.S. Government
• DSCC
• U.S. Army
• U.S. Navy
• U.S. Air Force
• NASA
• DMEA
• GIDEP
• DMPG

JC-13 Government Liaison
• JC-13.1 Discrete Devices
• JC-13.2 Microelectronic Devices
• JC-13.4 Radiation Hardness Assurance and Characterization
• JC-13.5 Hybrids, RF/Microwave, MCM

Europe & Asia
• Japan Aerospace Exploration Agency (JAXA)
• European Space Agency (ESA)
• British National Space Centre (BNSC)
• Deutsches Zentrum für Luft- und Raumfahrt e.V (DLR)

JC-14 Quality & Reliability
Collaborative Relationships

- Information Sharing and Regular Communications with …
  - Automotive Electronics Council
  - Best Manufacturing Practices Center of Excellence
  - Center for Commercial Component Insertion (The C3I)
  - Centre National d'Etudes Spatialies (CNES)
  - Defense Semiconductor Association
  - The FIDES Group
  - International Electrotechnical Commission (IEC)
  - Institute for Printed Circuits
  - Italian Ministry of Defense
  - Semiconductor Assembly Council (SAC)
  - Society of Japanese Aerospace Companies
Standards Purview

- EIA GEB1, DMSMS Management Practices
- EIA GEB2, Reducing the Risk of Tin Whisker-Induced Failures in Electronic Equipment
- EIA SSB-1, Guidelines for Using Plastic Encapsulated Microcircuits and Semiconductors in Military, Aerospace and Other Rugged Applications
- Design Guideline for Electrical & Electronic Parts Used in Satellite Applications
- MIL-PRF-38534, Hybrid Microcircuits, General Specification for
- MIL-STD-883, Test Method Standard for Microcircuits
- MIL-HDBK-103, List of Standard Microcircuit Drawings
- MIL-STD-1835, Electronic Component Case Outlines
- MIL-PRF-19500, Semiconductor Devices, General Specification for
- MIL-HDBK-5961, List of Standard Semiconductor Devices
- MIL-HDBK-6100, List Of Case Outlines and Dimensions For Discrete Semiconductor Devices
- MIL-STD-1560, Destructive Physical Analysis for Electronic, Electromagnetic, and Electromechanical Parts
- Related Areas …
  - SD-18, Defense Standardization Program Guide for Part Requirement & Application
  - MIL-HDBK-454, General Guidelines for Electronic Equipment
  - MIL-STD-1686 & ANSI-ESD S20.20, ESD
  - Solderability Requirements & Lead-Free Issues
Sub-Committees & Active Tasks

- Space Parts Sub-Committee
- Plastic Encapsulated Microcircuit (PEM) Sub-Committee
- Lead-Free Sub-Committee

STG95-04: RGA Issues (JC TG 97-02)
G00-10  Failure Rate Estimating Methods
G01-01  Scanning Acoustical Microscopy
G02-04  MIL-STD-1580 Rewrite & Coordination
G03-02  New Derating Standards
G03-09  Area Array Package Standardization
G05-01  PIND Testing
G05-02  Life Limiting Failure Modes
G05-03  Parts Management Reengineering
G05-04  Real-Time X-Ray
G05-05  Hot Solder Dip Standard
G05-06  Prohibited PM&P
G06-01  Counterfeit Part Risk Mitigation
G06-02  Leak Detection for UB Packages
G06-03  Schottky Boilerplate
Key Focus Areas & Initiatives

• Lead-Free Issues
  – Lead-Free Issues Sub-Committee
  – GEIA-STD-0005-2 Standard for Mitigating the Effects of Tin Whiskers in Aerospace and High Performance Electronic Systems
  – Developing Basis for Qualification of Lead-Free Solders in High Performance Applications

• Use of COTS Parts in Military and Aerospace Applications
  – Aerospace Qualified Electronic Component (AQEC)

• Counterfeit Parts in Military and Aerospace Applications (Task G06-01)
  – Teaming with SIA Counterfeit Parts Task Force

• Diminishing Manufacturing Sources and Material Shortages (DMSMS)
  – Diminishing Supplier Base for Space Qualified Parts

• Other Focus Areas
  – Failure Rate Estimating Methods (Task G00-10)
  – RGA Testing (Task G95-04)
  – Life Limiting Failure Modes (Task G05-02)
Lead-Free Subcommittee

- DoD / Aerospace Industry Reliability Issues Associated With Lead-free Electronics
  - Pure-tin Plating And Finishes On Components
    - Possible Formation Of Tin Whiskers
  - Lead-free Solder In Boards And Circuits
    - Unknown Reliability
    - Will Require Changes In Production Practices

- Industry Standards And Guidelines Are Needed Which Enable Us To Continue To Produce Reliable, Supportable, Repairable, And Affordable DoD / Aerospace Electronic Systems
  - Joint Standards Being Developed By GEIA, AIA, and IEC
Lead-Free Standards

  - Used by “customers” to communicate requirements to aerospace / high performance electronic system “suppliers” Examples: Reliability, configuration control, repair, maintenance, and support
  - Used by “customers” and “suppliers” to determine how much whisker mitigation is needed in a particular application. For each level of mitigation there are requirements regarding material monitoring, mitigating actions, and analyses.
- GEIA-HB-0005-1, Program Manager’s Handbook (Released June 2006)
  - Used by program managers to address all issues related to lead-free electronics, e.g., logistics, warranty, design, production, contracts, procurement, etc.
- GEIA-HB-0005-2, Technical Guidelines for Using Lead-free Solder in Aerospace Applications (Not Ready for Ballot)
  - Used by “suppliers” to select and use lead-free solder alloys, other materials, and processes. It may include analytical methods, technical data, specific solutions, lessons learned, test results, etc.
  - Used by “suppliers” to qualify lead-free solder alloys, other materials, and processes.
Aerospace Qualified Electronic Component (AQEC)

- GEIA-STD-0002-1 Released September 2005
  - AQEC Requirements Standard
- Requires Defined Processes and Documentation
- Implementation is an Issue
- Working to Sign on Vendors
Counterfeit Parts Task Group (G06-01)

- Teaming with SIA Counterfeit Parts Task Force
- Numerous Instances of Counterfeit Parts in Military and Aerospace Inventories
- "Counterfeiting" can refer to a variety of activities. It could be as simple as remarking scrapped or stolen and possibly nonworking parts—or as complex as illegally manufacturing complete parts from original molds or designs.
- A fake part may be relabeled to appear to come from a different manufacturer/broker or to appear to be a newer or even an older but more sought-after component than it actually is.
- Counterfeit parts are hard to spot and are all too often slipped into the supply chain by either unknowing or corrupt distributors. Among the most popular counterfeit products right now are cell phone batteries.
- Parts are not being found until they are in builds down stream which could end up to be very costly to replace or even more serious, there could be serious consequences like latent defect failures.
Diminishing Supplier Base for Space Market Piece Parts

  – Increasingly, Space System Providers Are Being Forced To Rely On Fewer Qualified Piece Part Suppliers.
  – Consolidations That Have Occurred Over The Last 7-10 Years Have Resulted In Less Manufacturing Capacity And Less Supplier Choice.
  – This Is Resulting In Increased Cost, Increased Lead Times, And Increased Risk To Field Capable Space Systems On Schedule.
  – In Some Key Technology Areas There Is Only A Single Source Manufacturing Critical Piece Parts.
• With The Total Military Piece Part Market Share Already Below 0.5%, There Is Also Potential For Additional Manufacturers Exiting The Space Piece Part Business.
• G-12 Goal: Raise Awareness, Work to Improve Availability
Residual Gas Analysis (RGA) Testing for water vapor content continues to be problematic…

- High Moisture Content in cavity packages is a potential reliability risk.
- Correlation/test lab repeatability problems extend from lab to lab and one piece of equipment to another.
- Test is very sensitive and dependent upon many factors making it difficult to distinguish between an invalid test and a device failure.
- Differences in procedures and calibration techniques among test labs demands a very high level of expertise to perform test, analyze results and determine reasons for non-correlation.
- Concerns about testing very small packages and very large packages.
RGA Testing (Task G95-04) - continued

- Longest Running Task Group In History
- New Focus on Equipment Calibration
- Benny Damron (NASA) and Mark Porter (General Dynamics) Visiting U.S. Laboratories
  - Understanding Process
  - Understanding Variables
  - Understanding Differences Between Laboratory Capabilities
- Additional Correlation Studies Planned
- 5000 ppm – Should This Be a Fixed Requirement?
Conclusions

• GEIA G-12 Solid State Devices Committee activities
  – promote system reliability
  – minimize part obsolescence
  – enhance logistics readiness and interoperability
  – reduce cost of ownership to the government

• Our acquisition reform initiatives integrate commercial practices with military product requirements to ensure the semiconductor industry supports our needs for state-of-the art components without compromising equipment performance

• G-12 collaboration with …
  – Semiconductor Industry (JEDEC)
  – Government Agencies (DSCC, DoD Services, NASA, etc.)
  – Other industry and international participants (e.g. JAXA, ESA, etc.)
… produces results toward resolving solutions to common problems
G-12 Membership Information

Cost

• Participating Committee Member (Voting)
  – One Committee $2000/year
  – Two Committees $3500/year
  – Three or More Committees $5000/year

• Observing Committee Member (Non-voting)
  – Participation in Any Committee $500/year
G-12 Membership Information
Benefits of Membership

• Leverage business development, market planning and forecasting, and maintain a competitive edge
• Access major decision-makers across the federal government and networking with industry peers and competitors
• Participate in committees tailored to the interests of federal Contractors
• Extend your influence on future industry directions by developing industry standards for many management disciplines
  – Systems Engineering
  – Software Life Cycle Processes
  – Configuration Management
Invitation to Attend

• **Next Meeting**
  – Date: January 8-11, 2007
  – Place: Savannah, GA
  – Hyatt Regency Savannah

• **Following Meeting**
  – Date: May 21-24, 2007
  – Place: Myrtle Beach, SC
  – Sheraton Myrtle Beach Convention Center

• See the G-12 web site at …

http://www.geia.org/
For More Information

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