GREEN
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Microwave Hybrid Design for Manufacturability (DFM)

1 DAY

Microwave hybrids, RF MMIC modules and other multichip hi reliability products, such as, Class III medical implants, all require a lot of thinking and design tradeoffs prior to full scale production. There have been many instances where designers unknowingly placed tremendous burdens on manufacturing that translate into yield loss, production delays, reliability problems, and unhappy customers. This course is intended to sensitize designers to the issues important to manufacturing. Hybrid circuit designers must "design with the process in mind." Any circuit that can't be assembled within reasonable cost and schedule constraints is a bust.

This course is a must for inexperienced designers and those not familiar with standard microwave hybrid materials and manufacturing processes.

Course Outline

Rationale and Significance of DFM

Typical Problems Encountered During Hybrid Manufacturing and
How they can be prevented!

Design with the Process in Mind

Package Design Issues
- Deep access vs. conventional bonding
- Sidewall clearance, package pins and stand offs, lid dimensions and flexing
- Plating requirements

Substrate Selection
- Thick film vs. thin film on ceramic
- Problems with PTFE (Duroid) and other soft board substrates and how to avoid

Die and Sub Attach
- Soldering processes
    - Vacuum solder vs. scrub-assisted eutectic processes
    - Solder temperature hierarchy
- Mixing flux and non-flux processes
- Epoxy selection and process implications

Die, Substrate and Package compatibility
- Coefficient of Thermal Expansion (CTE)
- Thermal impedance and importance of minimizing junction temperature

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Simple excel spreadsheet demonstrates importance of proper material selection for typical microwave hybrid material sets

Wire and Ribbon Bonding

Guidelines for wire and ribbon selection
Deep access, fine wire and bonding to gate pads on FETs
Design rules for die and wirebond layout and placement

Design for rework and maximum process yields

Course Summary
Student Examination Test and Review
Student Feedback and Course Critique