

ECE 4460 – Introduction to Electronic Systems Packaging
Spring 2009

Microelectronics represents a trillion dollar industry today with every electronic product requiring integrated circuit chips to perform various functions. These products include personal computers, cell phones, microwave ovens, super computers, global positioning systems, to name a few. A critical part of microelectronics is packaging without which the integrated circuits cannot be connected to the external world. With the demand for light weight, small size, high performance and low cost systems, the role of packaging is becoming very important. This is leading to System-in-Package (SIP) and System-on-Package (SOP) technologies for packaging future systems.

This course provides an introduction to the issues related to the packaging of electronic systems with emphasis on Digital and Mixed Signal systems. The main focus of this course will be on the electrical and thermal challenges faced in packaging with emphasis on Signal, Power and Thermal Integrity. As part of this course, the students will work on projects for the design of packaged sub-systems using the Physical CAD tools from Cadence, parasitic extraction tools, and circuit simulators. Examples of projects are shown in the figures below of a Four Chip Module (FCM) with Electromagnetic Bandgap (EBG) structures.

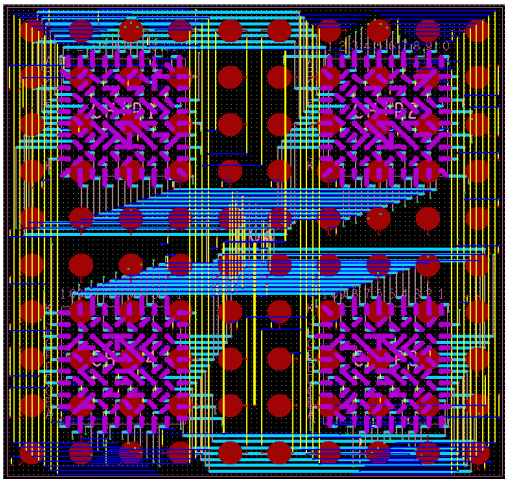


Figure 1: Four Chip Module

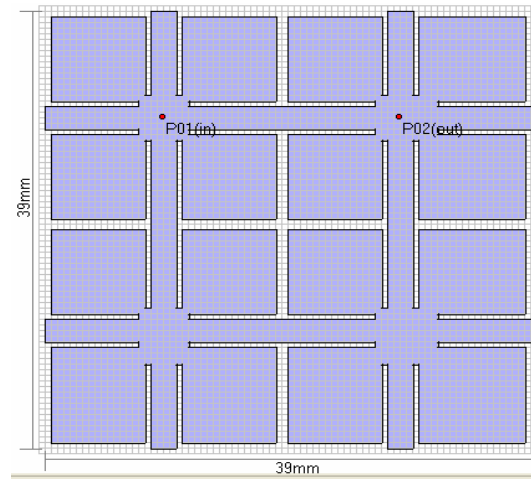


Figure 2: EBG Structure

Prerequisites: ECE 3710 or ECE 3040

Text:

- 1) Class Notes – posted on web
- 2) Power Integrity Modeling and Design for Semiconductors and Systems, Madhavan Swaminathan and Ege Engin, Prentice Hall, 2007, ISBN 0_13_615206_6
- 3) Fundamentals of Microsystems Packaging edited by Rao. R. Tummala, McGraw Hill, ISBN 0-07-137169-9, 2001.
- 4) Circuits, Interconnections and Packaging of VLSI, H. B. Bakoglu, Addison Wesley (Out of Print) – posted on web

References:

- 1) Microelectronics Packaging Handbook edited by Rao R. Tummala, Eugene Rymaszewski and Alan Klopfenstein, Chapman and Hall, 1997.
- 2) Digital Signal Integrity, Brian Young, ISBN 0-13-028904-3

Instructor: Madhavan Swaminathan, Klaus 1358; Email: madhavan.swaminathan@ece.gatech.edu
Office Hours MW: 1:00 – 2:30pm
TA Rishiraj Bhide; Klaus 1351, Email: rbheda3@gatech.edu

Website <https://t-square.gatech.edu/portal/site/!gateway/page/!gateway-100>

Grading: Class Attendance (10%), Homework (25%); Mid-term (25%); Project (40%)