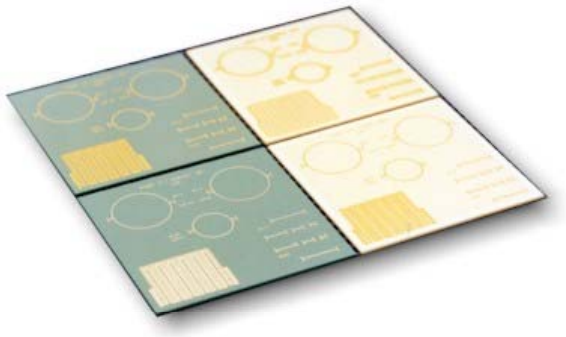
LTCC

for Micro- and Millimeter-Wave Applications



LTCC Class

29. + 30. August 2007

Empire and MultiLib Tutorial

new date: 28. August 2007

Kansas-City, Missouri

Hotel „Hilton President Kansas City“

IMST GmbH
Carl-Friedrich-Gauss-Str. 2
47475 Kamp-Lintfort
Germany
Tel.: +49 (0)2842 / 981-400
Fax: +49 (0)2842 / 981-499
kulke@imst.de
http://www.imst.de
http://www.ltcc.de

Theme

LTCC as a ceramic multilayer technology has a great potential for micro- and millimeter-wave applications. The dielectric tapes as well as the gold and silver conductors have appropriate physical and electrical properties. In spite of being a very mature technology, LTCC has recently gone through large improvements in material development and has become available for communication equipment manufacturers through LTCC foundries. The competitive price of materials and production makes LTCC an ideal basis for System in Package (SiP) and Multi Chip Modules (MCM). LTCC circuits can consist of a nearly arbitrary number of layers. Components can be integrated in cavities. LTCC substrates are rugged, hermetic and environmentally stable. These features and further favorable characteristics are utilized to develop compact and efficient modules for communication and sensor applications.

This LTCC Class is organized by a group of people which daily work together in designing and realizing microwave and millimeter-wave circuits. The different sessions are closely coordinated to each other. The seminar material has been presented before in internal meetings. The seminar is an integrated piece and aims to teach the audience an understanding of the basics for a successful design and manufacturing of LTCC modules for microwave and millimeter-wave applications.

Target Audience

The course is dedicated to scientists and engineers working in research and development of RF, micro- and millimeter-wave modules. The participants should have a basic knowledge in RF- and/or microwave design. It will give managers an understanding of this technology.

Learning Objectives/Outcomes

The learning objectives of this LTCC course are to give the audience a basic overview and knowledge about LTCC substrate and conductor materials, process steps and design rules. A specific focus will lie upon the design of micro- and millimeter-wave circuits and antennas. This includes typical waveguides in LTCC as well as transitions, housing, filters and other passive components. Solutions for entire transceiver modules will be discussed to give the participants an insight into the design and development of basic and complex circuits. Keywords for typical applications are ISM-Band and Frontend Modules, Radar and sensor technology.

Empire/MultiLib Tutorial

This tutorial is intended for RF engineers, who want to analyze, develop or optimize their RF components and antennas with the aid of 3D electromagnetic field solvers. To utilize these modeling tools efficiently in their projects the participants will be introduced to theoretical background and will gather practical experience with the help of highly qualified modeling experts and RF designers.

Instructors

Dipl.-Ing. Reinhard Kulke: Electrical engineer since 1991; Head of section “RF Modules”; Responsible for R&D in RF and microwave circuit design in LTCC; More than 30 publications about with focus in ceramic applications; Organizer of several seminars and workshops.

Dipl.-Ing. Peter Uhlig: Electrical engineer since 1984. Head of section “Hybrid Microelectronics Laboratory” including LTCC prototyping line; Expert in RF and microwave packaging, thin film, PCB, LTCC, assembly and integration techniques.

Dipl.-Ing. Winfried Simon: Electrical engineer since 1997. Senior engineer in the department

of Antennas & EM Modelling. Expert in 3D EM simulation, passive component design and antennas.

Tuesday, 28. August

8:30 – 10:30 Empire Tutorial

- Introduction into FDTD
- LTCC Examples in Empire
- Software Demonstration

Coffee Break

11:00 – 12:00 MultiLib Tutorial

- LTCC Examples in MultiLib
- Software Demonstration

Lunch

13:00 – 15:00 Empire & Multilib Practice 1

- LTCC antenna

Coffee Break

15:30 – 17:00 Empire & Multilib Practice 2

- LTCC 25 GHz Filter

Wednesday, 29. August

9:00 – 10:30 LTCC Materials, Tapes and Pastes

Coffee Break

11:00 – 12:30 Waveguides in LTCC

Lunch

13:30 – 15:00 LTCC Process I

Coffee Break

15:30 – 17:00 Assembly and Integration Techniques

Thursday, 30. August

9:00 – 10:30 LTCC Process II

Coffee Break

11:00 – 12:30 LTCC Applications I

Lunch

13:30 – 15:00 Material Systems of Different Suppliers, comparison commercially available LTCC systems

Coffee Break

15:30 – 17:00 LTCC Applications II

Miscellaneous

Handouts will be made available.

Registration:
Participants should register before **June 29** using the registration form on the right by fax or mail.

Cancellation:

- Cancellation fee is 30% of the course fee.
- No cancellation later than 30 days prior to the course.
- Course is subject to changes. IMST reserves the right to cancel the course. 100% refund is granted for such event.

Hotel:
The workshop will take place in Hotel “Hilton President Kansas City” 1329 Baltimore, Kansas City, Missouri, US 64105
Tel: 1-816-221-9490 Fax: 1-816-221-9422

Registration

Binding Registration for (mark any):

☐ **LTCC Class: 1,300 US$**
(2 days: 29. and 30. August 2007)

☐ **Software Tutorial: Free of Charge**
(1 day: 28. August 2007)

Company, Department

Name, First Name

E-Mail

Address / Billing Address

Postal Code / City

Tel. Fax

Date legal Signature
Company’s Stamp

Deadline for binding registration:
29. June 2007
ask for extension

Fax Registration: +49-(0)2842-981-499
IMST GmbH, Germany