EXPLOIT THE BENEFITS OF LTCC

Low Temperature Co-fired Ceramic is a composite of ceramic and glass. The “green” tape enters below 950°C, which allows the use of screen-printed gold and silver conductors with high conductivity. Screen printing, an established, low-cost technology, is combined with punched and wet-felted holes for a complete multilayer process. LTCC is put into thin layers with a lamination in an isostatic press followed by sintering in a process furnace. The final product is robust in the harshest environments and temperatures. Its coefficient of thermal expansion is very close to integrated circuits on Silicon or GaAs, which is an advantage for multi-chip modules (MCM).

Special packaging functions can be easily integrated into the module by using cavities and windows in the LTCC substrate. Buried elements, like inner capacitors, inductors and transistors, can be used to enhance the capabilities of LTCC. Even the challenging task of integrating antennas into passive modules can be readily accomplished by this unique technology.

ABOUT US

IMST GmbH provides radio communication solutions for mobile applications, industrial automation, and medical technologies. Our clients count on us for comprehensive technology solutions. The LTCC team of IMST designs your RF circuits and antennas from MHz to high GHz frequencies. Our experts also provide real 3D electromagnetic simulations, and they address challenges of highly-integrated multi-layer RF circuits.

A group of specialists in LTCC manufacturing and characterization are available at our sophisticated facilities. Our team puts more than 10 years of industry-related and application-driven R&D experience at your service.

IMST Solutions: Radio System Engineering
IMST Components: Power IC to Antenna
IMST Products: Advanced Design Tools
IMST Services: Test & Approval, EMC, SAR, RF, Antennas

WE DO
- Designing and developing circuits, modules, and antennas
- Manufacturing prototypes and production line of complex devices
- Characterizing RF and microwave circuits and antennas
- Consulting and feasibility studies
- Teaching and extension theory and practice
- Partnering in R&D projects with groups like ICU
**Sample Production Line**

Our in-house LTCC prototype production line is a cost-effective, fast and accurate way to create multilayer LTCC modules. Our specialists are experts in material and foundry services, and have established excellent working relationships with LTCC material suppliers and foundry services. Ask for more information from our LTCC team!

**At a Glance**

- Rapid prototyping
- Antennas, R, L and C integration (buried components)
- Cavities, windows and microchannels
- Signal and thermal vias
- Standard and special LTCC materials
- Large number of substrate layers
- Post-processing, inspection, SMT, soldering, bonding, flipchip and dicing

**Design and Applications**

IMST applies standard LTCC technology with screen printed conductors from a few hundred MHz to around 50 GHz. Extended frequency applications using high resolution conductor lines and low loss (VCC tapes) are available for specialized use, such as 800 MHz WINAC and 48 GHz automotive RADAR. The driving markets for LTCC are mobile and wireless communication, car electronics, RADAR sensor technology and both military and space applications.

LTCC is the right solution for demanding applications. Even in space operations, LTCC’s rugged and highly integrated designs provide high reliability, reasonable costs, low thermal expansion, and hermeticity. These characteristics have been exploited in components for satellite multimedia applications at 20 GHz. The photograph above shows a modular radome concept: a fractional N synthesizer with VCO in SiGe technology integrated into a multi-layer LTCC sandwiched with KOVAR lid for hermetic sealing. RF and DC interfaces are on bottom of the ceramic for reworking on a carrier board.

IMST has successfully designed components and modules for:

- GSM power amplifier, 2 GHz
- Bluetooth™ transceiver with integrated antenna, 2.4 GHz
- FM/CW RADAR sensor, 24 GHz
- Point-to-Multipoint Transceiver, 26 GHz
- Digital beam forming antenna, 30 GHz
- Fixed-Wireless Access components, 43 GHz
- Wi-Fi radio, 60 GHz

**LTCC-Services**

- Consulting
- Development
- Testing/Measurements
- Demonstration
- Production

**From Start to Finish**

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- Fixed-Wireless Access components, 43 GHz
- Wi-Fi radio, 60 GHz
Our in-house LTCC prototype production line is a cost-effective, fast and accurate way to create multilayer LTCC modules. Our specialists are experts in material and foundry services. We offer experience in microwave, RF and mobile communication applications, and have established excellent working relationships with LTCC material suppliers and foundry services. Ask for more information from our LTCC team!

**Sample Production Line**

- Rapid prototyping
- Antennas, R, L, C integration (buried components)
- Cavities, windows and micro channels
- Signal and thermal vias
- Standard and special LTCC materials
- Large number of substrate layers
- Post processing, inspection, S11, soldering, bonding, flipchip and dicing

**Design and Applications**

IMST applies standard LTCC technology with screen printed conductors from a few hundred MHz to around 50 GHz. Extended frequency applications using high resolution conductor lines and low loss (TCC) tapes are available for specialized uses, such as 802.11p (V2V) and 867 GHz automotive RADAR. The driving markets for LTCC are mobile and wireless communication, car electronics, RADAR sensor technology and both military and space applications.

IMST has successfully designed components and modules for:
- GSM power amplifier, 2 GHz
- Bluetooth™ transceiver with integrated antenna, 2.4 GHz
- FMCW RADAR sensor, 24 GHz
- Point-to-Multipoint Tx/Rx module, 26 GHz
- Digital beam forming antenna, 30 GHz
- Fixed-Wireless-Access components, 42 GHz
- WLAN radio, 60 GHz

**LTCC-Services**

- Design and Applications
- Consulting and Expertise Services
- Development and Test Services
- Production and Transfer-to-Production Services
- Training and Seminars in Theory and Practice
- Consulting and Feasibility Studies
- Expert Advice and Investigations
- Development and Circuit Design
- Antennas and Module Systems
- Prototyping and LTCC Manufacturing Line
- Assembly and Integration Techniques
- Testing and Circuit + Antenna Measurements
- EMC Compatibility Tests
- Demonstrator and Pre-production Model Studies
- Production and Foundry Selection
- Transfer to Production

*The project is supported by DLR/BMWi.*
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