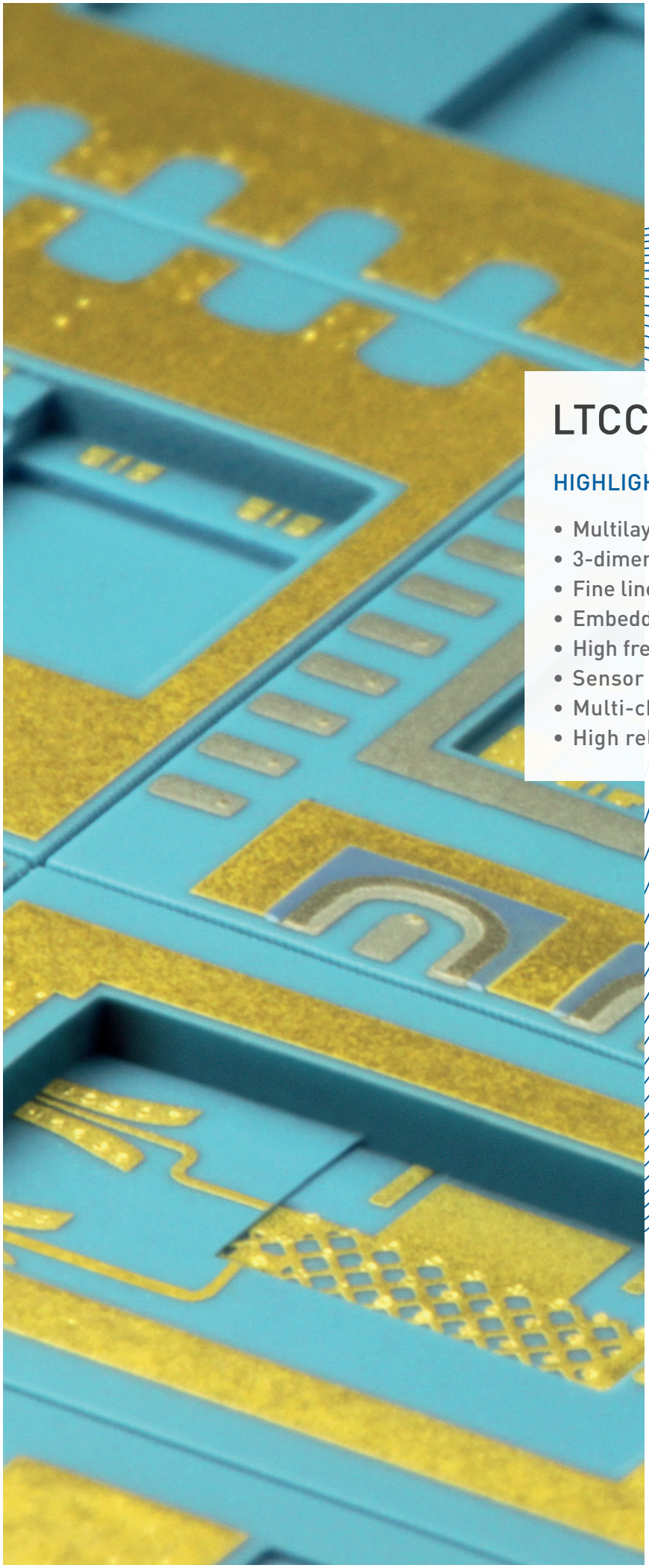


MST
Micro Systems Technologies

LTCC Substrates

HIGHLIGHTS

- Multilayer technology
- 3-dimensional design
- Fine line patterning
- Embedded passive components
- High frequency low loss packages
- Sensor packages
- Multi-chip modules
- High reliability substrates

MICRO SYSTEMS ENGINEERING
an MST company

LTCC Substrates

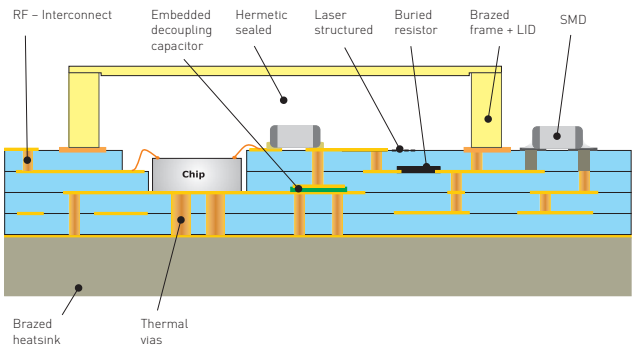
LTCC Technology

LTCC (**L**ow **T**emperature **C**o-fired **C**eramic) is a multilayer capable substrate technology offering excellent RF and microwave performance characteristics. Its low sintering temperature (approximately 900°C) allows co-firing with highly conductive metals such as silver and gold. The excellent mechanical and electrical properties of LTCC substrates, combined with the ability to embed passive components, offer superior RF performance and device miniaturization for high frequency applications.

Features

- **Multilayer technology** up to more than 20 layers
- **Gold and silver** based metallisation systems
- **Fine line patterning** (< 50 µm in selected areas)
- **Trimmable thick** film resistors on outer surface
- **Embedded** resistors, capacitors, inductors and strip lines
- **Radio frequency** performance up to 120 GHz by use of low loss ceramic
- Integrated **fluidic channels** and **3D structures** (stepped cavities, windows)
- **Adjusted thermal expansion** coefficient to Si and GaAs
- Short wire bonds due to capability of **precise cavity** generation
- **Thermal vias** for heat dissipation or windows for direct chip assembly on heatsink
- Application of heat sinks, frames and nail head pins by **brazing**

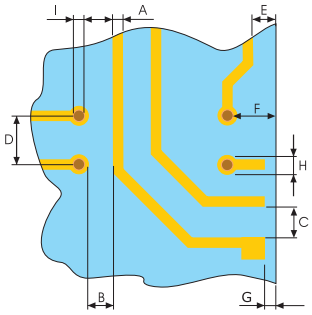
Packages

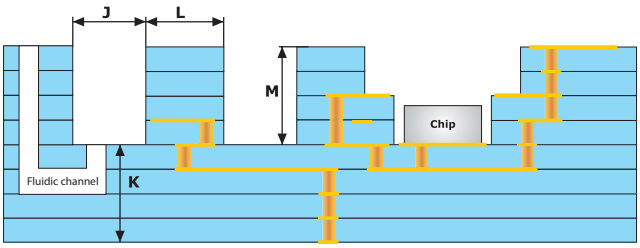


Substrate characteristics

- **Maximum substrate size:** 4" x 4"
- **Tape thickness:** 98 µm, 135 µm, 204 µm
- **Flexural strength:** 320 MPa
- **Thermal coefficient of expansion:** 5.8 ppm/K
- **Thermal conductivity:** >3 W/mK
- **Dielectric constant @10 GHz:** 7.5
- **Dielectric loss @10 GHz:** < 0.0015
- **Breakdown voltage:** > 1000 VDC / 25 µm
- **Insulation resistance @100 VDC:** > 10^{12} Ω
- **Substrate flatness:** < 0.002 mm/mm

Cavities, Lines / Spaces





A	Line width	80 µm
B	Line to via coverpad spacing	100 µm
C	Line spacing	80 µm
D	Via pitch	300 µm (*,#)
E	Line to edge spacing	200 µm
F	Via to edge spacing	300 µm
G	Pad to edge spacing	200 µm
H	Via coverpad	I+50 µm
I	Via diameter	≥ 100 µm
J	Cavity width/length	≥ 800 µm (#)
K	Cavity bottom thickness	2 layers
L	Distance between cavities	≥ 2 mm (#)
M	Cavity depth	Design related

* Depends on number of vias and vias per row
\# Smaller sizes on request

For the complete DESIGN GUIDELINES please contact MSE.

Micro Systems Engineering GmbH (MSE) specializes in customized solutions for advanced microelectronics. MSE has experienced continuous growth since 1984, and today the company is among Europe's leading suppliers of complex LTCC substrates as well as board assembly and semiconductor packaging technologies for both ceramic and organic substrates.

MSE is ISO 13485, ISO 9001 and ISO 50001 certified.

Micro Systems Engineering GmbH is a company of the MST group.

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