

# High and Low Temperature Cofired Multilayer Ceramics (HTCC and LTCC)

## Product Information:

SCHOTT Electronic Packaging is the only major supplier in Europe that offers all types of hermetic housing technologies. Well-known for its expertise in glass-to-metal sealing technology (GTMS), SCHOTT has been also supplying HTCC for the last 10 years. Now, it works together with its partner VIA electronic to supply LTCC. With the combination of a broad technical competence and worldwide service network, customers can enjoy excellent support from the initial stages of circuit diagram development through to manufacturing and final delivery of the ceramic substrates.

Multilayer ceramic packages are ideal for micro-electronic-mechanical systems (MEMS) and high frequency applications because such packages are hermetic and enable a large number of electrical feedthroughs within very small spaces.

## Advantages:

- Customized solutions based on a variety of manufacturing processes
- Efficient solutions due to high degree of design support from the beginning of the product development cycle
- Availability of a variety of mechanical, thermal (ANSYS, ABACUS), optical (ZEMAX) and electrical (HFSS, ADS) simulation tools
- Worldwide customer support from local manufacturing facilities with technical competence centers

## Characteristics of HTCC technologies

**Excellent mechanical stability**

**Easy integration into metal housings** due to matched thermal coefficient of expansion

**High thermal conductivity**

**Use of non-noble metal pastes**

## Characteristics of LTCC technologies

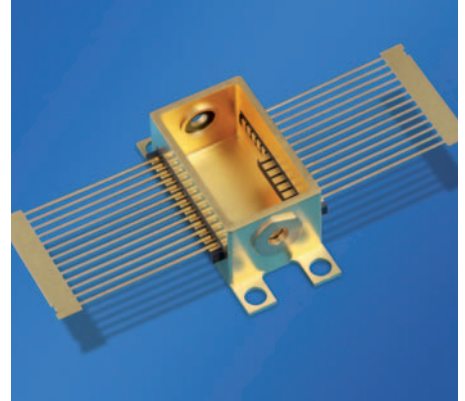
**Excellent HF properties** provided by low dielectric losses and high conductivity metal

**High electrical conductivity** of metal patterns

**Realization of hermetic packages** by fluxless soldering processes

**Embedded passive components** (resistors, inductors, capacitors) provide space saving solutions

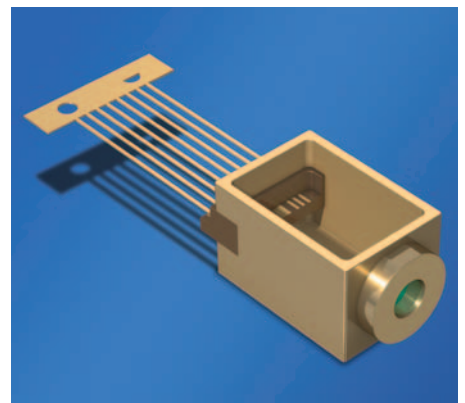
**Variety of product options** are available based on different tape and metal paste systems



*Butterfly Package*



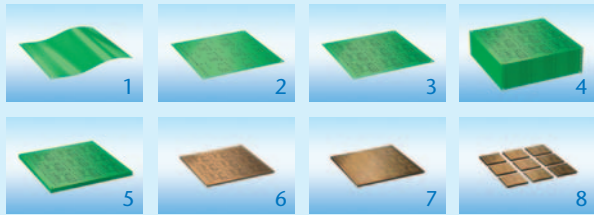
*High Pin Count Electrical Feedthrough*



*XFP Package*

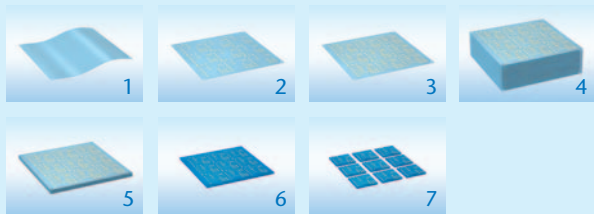
# High and Low Temperature Cofired Multilayer Ceramics (HTCC and LTCC)

High temperature multilayer ceramics are sintered at 1600-1800° C

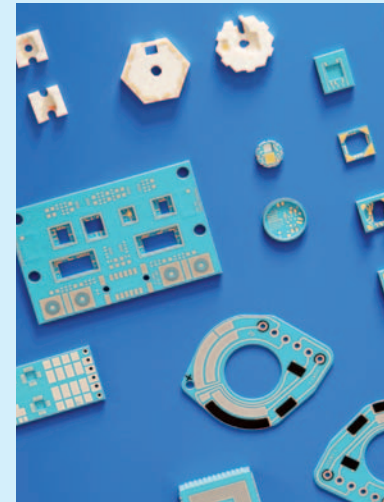


- 1 Green Sheet
- 2 Stamping and filling of vias
- 3 Screen printing of pattern
- 4 Stacking
- 5 Laminating
- 6 Sintering
- 7 Plating
- 8 Dicing

Low temperature multilayer ceramics are sintered at 850-900° C



- 1 Green Sheet
- 2 Stamping and filling of vias
- 3 Screen printing of pattern
- 4 Stacking
- 5 Laminating
- 6 Sintering
- 7 Dicing



LTCC Packages

## Physical Properties

Material	Composition	DK $\epsilon$ at 1MHz/10 GHz	Loss $\tan \delta$ ( $\times 10^{-4}$ ) at 1 MHz/10 GHz	Thermal Conductivity [W/mK]	CTE [ppm/K]	Ultimate Bending Strength [MPa]	Density [g/cm <sup>3</sup> ]	Feedthrough Materials	Min.lines/spaces [ $\mu$ m]
HTCC	> 92% Al <sub>2</sub> O <sub>3</sub>	9.4/9.0	5/10	17	6.8	460	3.6	W, Mo	100/100
LTCC* (Standard DuPont 951)	~ 50% Al <sub>2</sub> O <sub>3</sub> ~ 50% glass	7 – 8	10/50	2.8 – 5	5 – 6	250 – 320	2.8	Au, Ag, AgPd, AuPt, AuPtPd	80/80

Specific LTCC material systems are available on request: Low loss (DuPont 943, DuPont 9k7), Leadfree (Ceramtape), High compressive (Heratape CT 700), Silicon matched (BGK), Ferritic and others

## Ceramic-to-metal sealing (SCHOTT CerTMS®)

SCHOTT also offers hermetic packages with high temperature cofired multilayer ceramics. The SCHOTT CerTMS® packages are broadly used in the medical, telecommunication, sensor as well as defense industry.



For more information on LTCC technology, please contact  
[www.via-electronic.de](http://www.via-electronic.de)

For more information on HTCC technology, please contact

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**SCHOTT**  
 glass made of ideas