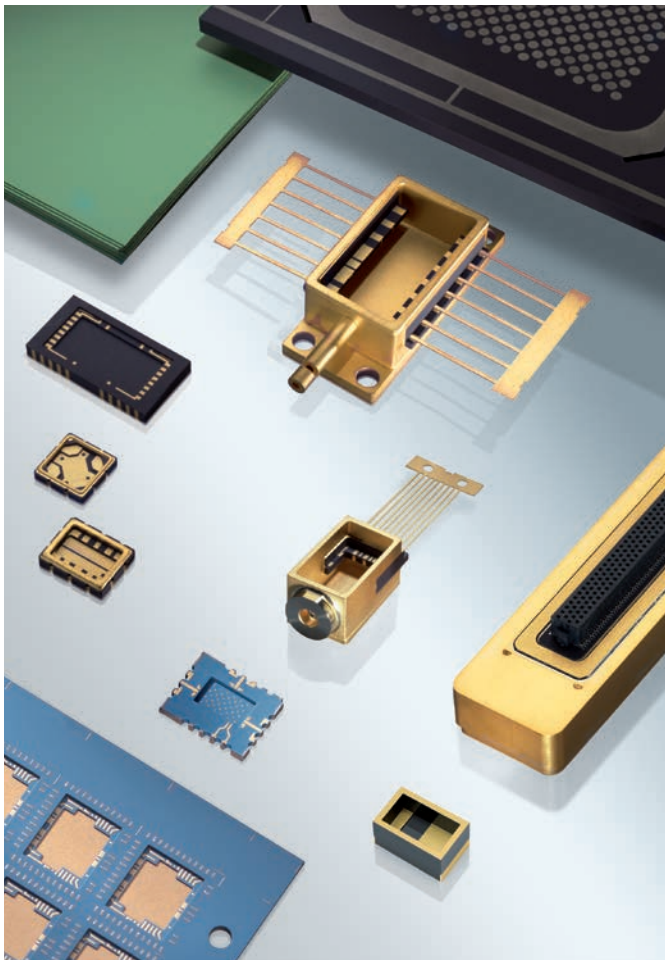


High and Low Temperature Cofired Multilayer Ceramics (HTCC and LTCC)



Product Information

SCHOTT Electronic Packaging is the only major supplier in Europe that offers all types of hermetic housing technologies. Well-known for our expertise in glass-to-metal sealing technology (GTMS), we also offer hermetic packages with high temperature cofired multilayer ceramics. Together with our partner VIA electronic, we can furthermore supply LTCC technology.

This means that depending on individual requirements of the application, we can offer the technology that perfectly fits to our customers' needs.

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.

Applications

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.

Characteristics of HTCC technologies

- Excellent mechanical stability
- High temperature stability
- Easy integration into metal housings due to matched thermal coefficients of expansion via high temperature brazing
- Good thermal conductivity

Main applications for HTCC

General packaging, RF packaging with short path length

Characteristics of LTCC technologies

- Excellent HF properties due to low dielectric constant and the use of high conductivity metal
- Embedded passive components (resistors, inductors, capacitors) provide space saving solutions
- High electrical conductivity of metal patterns

Main applications for LTCC

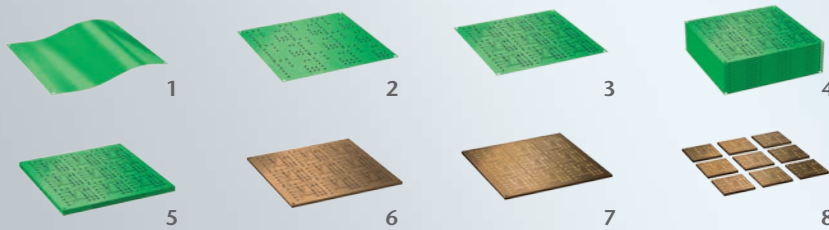
RF packaging with extended path length

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Advantages

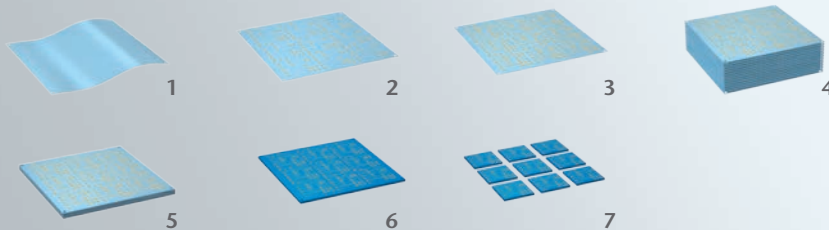
- Customized solutions based on a variety of manufacturing processes
- Efficient solutions due to high degree of design support from the beginning of the product development cycle
- Availability of a variety of mechanical, thermal (ANSYS, ABACUS), optical (ZEMAX) and electrical (HFSS, ADS) simulation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

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

Material	Composition	DK ϵ 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 ³]	Feedthrough Materials	Min. lines/spaces [μ m]
HTCC	> 92% Al ₂ O ₃	9.4/9.0	5/10	17	6.8	460	3.6	W, Mo	100/100
LTCC* (standard DuPont 951)	~ 50% Al ₂ O ₃ ~ 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



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