DuPont™ GreenTape™ 9K7

LOW TEMPERATURE CO-FIRED CERAMIC SYSTEM

Technical Data Sheet

The DuPont™ GreenTape™ 9K7 low temperature co-fired ceramic (LTCC) system is comprised of a low loss, co-fireable glass-ceramic dielectric tape and compatible gold and silver conductors. The dielectric tape is both cadmium and lead free* and ideally suited for applications requiring low loss at frequencies in the high GHz range:

- Advanced high frequency applications
- Wireless and mobile communications
- High density multilayer interconnect for high speed digital applications

Product Benefits

The GreenTape™ 9K7 system provides a complete co-fireable system of gold, silver and resistive components having excellent low loss properties at frequencies in excess of 100 GHz:

- Co-fire processing and refire stability
- Cadmium and lead free* tape
- Low temperature brazing
- External cavities
- Buried component integration

*Cadmium and lead "free" as used herein means that cadmium and lead are not an intentional ingredients in and are not intentionally added to the referenced product. Trace amounts however may be present.

Processing

For detailed recommendations on the use of the GreenTape™ 9K7 low temperature co-fired ceramic (LTCC) system, consult the DuPont™ GreenTape™ LTCC Design Guide. For compatible post fired and co-fired conductor compositions, consult the DuPont™ GreenTape™ 9K7 Product Selector Guide.

Printing

Compatible co-fireable thick film compositions are printed directly on preconditioned GreenTape™ 9K7 green sheets using appropriate thick film screen printing methods.

Typical Properties

Physical Property	Value
Unfired thickness, (um)	127, +/- 9 (9K7V)
	254, +/- 14 (9K7X)
X, Y, shrinkage, (%) [1]	9.1, +/- 0.3
Z shrinkage, (%) [1]	11.8, +/- 0.5
TCE, (23° - 300° C)	4.4
Density, (g/cm^3)	3.1
Camber, (um / 25 mm)	25
Surface roughness, (um)	0.52
Thermal conductivity, (W / m-K)	4.6
Flexural strength, (MPa)	230
Young's modulus, (GPa)	145
Poisson's ratio	0.25

Electrical Property	Value
Dielectric constant, (10 GHz) [2]	7.10 +/- 0.20
Loss tangent, (10 GHz) [2]	0.0009
Insulation resistance, (@100VDC, Ω)	> 10^{12}
Breakdown voltage, (kV / 25 um)	>/= 1100

[1]: Isostatic lamination, 3000 psi, 70° C, 10 minutes
[2]: split cavity measurement method

The above tables show the anticipated typical physical and electrical properties for GreenTape™ 9K7 based on specific controlled experiments in our labs and are not intended to represent the product specifications, details of which are available upon request.

A vacuum stone or other support structure which distributes a uniform vacuum is recommended to secure the green sheet to the printer's stage plate. Printing should be performed in a clean, well ventilated area. Optimum printing characteristics are generally achieved when the room and paste container temperatures are in the 20° to 23°C range.

Drying
Allow conductor prints to level for 5 to 10 minutes at room temperature and then dry in a well ventilated oven or conveyor dryer for 5 minutes at 100°C. Do not over-dry.

Lamination
Collate, stack and laminate multiple sheets of the printed circuit patterns according to the recommended processing parameters detailed in the DuPont™ GreenTape™ LTCC Design Guide.

Typical lamination parameters are 3000 psi at 70°C for 10 minutes. Lamination pressures may vary slightly based upon part design and the individual tape lot shrinkage factors.

Firing
Fire in a well ventilated conveyor or static furnace. Air flows and extraction rates should be optimized to ensure that oxidizing conditions exist within the muffle and that no exhaust gases enter the room.

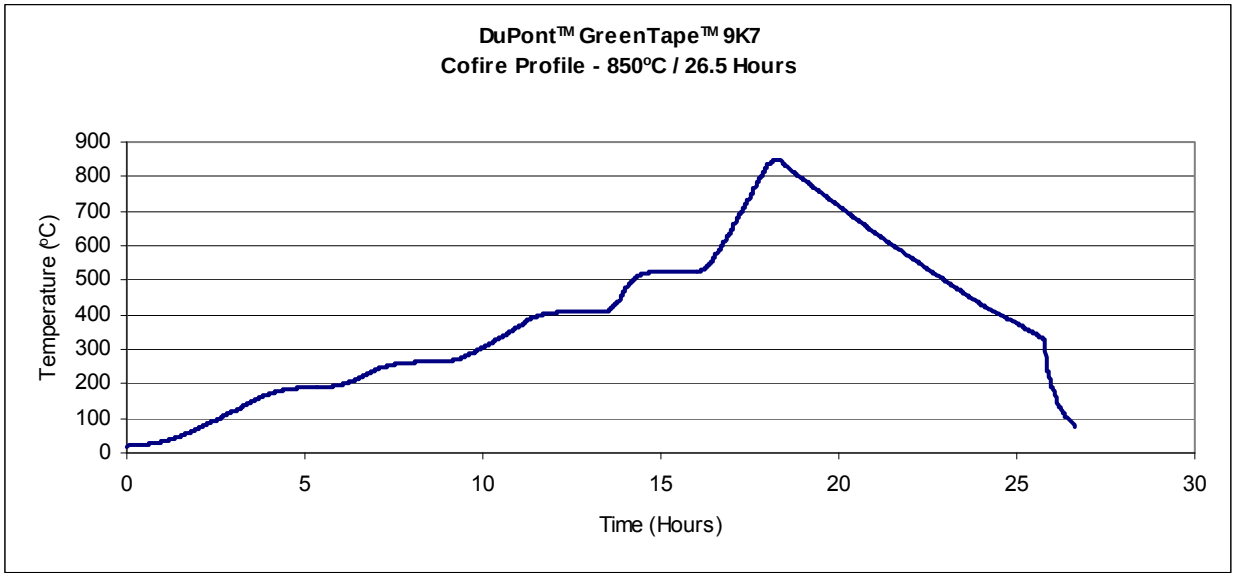
GreenTape™ 9K7 requires the use of dedicated, specially coated setters in order to prevent parts from sticking during firing.

The initial fire/co-fire should use the recommended 26.5 hr. profile. For further information regarding firing profiles, furnace recommendations and setter tile choices, please contact your local DuPont Technical Service Representative.

Post Fire Processing
Compatible post fired materials are printed directly on the co-fired GreenTape™ 9K7 laminate surface and fired at the recommended post fire profile.

Storage and Shelf Life
Containers should be tightly sealed and stored in a clean, stable environment at room temperature (<25°C). The shelf life of the material, in unopened containers, is six months from the date of shipment. Some settling of solids may occur and compositions should be thoroughly mixed prior to use.

Safety and Handling
For Safety and Handling information pertaining to this product, refer to the Material Safety Data Sheet (MSDS).



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