

## Advanced Materials

### X-200

#### LTCC Dielectric Powder

##### Description:

Heraeus' X-200 LTCC powder mix is designed to be cast into green tape used for module and passive component applications. In these applications the relatively low permittivity and low loss of this material allow for the production of high performance components and multilayer circuits.

X-200 is compatible with binder systems typically used in tape fabrication. In tape form this material is also compatible with Heraeus' silver and gold conductor systems.

##### ● Key Benefits:

- Silver conductor compatible
- Lead and cadmium free
- High Q
- Near zero  $T_f$  (temperature coefficient of frequency)

##### ● Typical Powder Properties:

Particle Size (microns):

D90: 5 – 7

D50: 2.25 – 3.25

Surface Area ( $m^2/g$ ): 2.4 – 3.0

Fired Density ( $g/cm^3$ ): 3.0 – 3.2

##### Burnout and Firing in a Box Oven:

Heating Rate 5-5.5°C/minute

Peak Temperature 870-880°C

Dwell Time @ Peak 20-30 minutes

Cooling Rate ~ 3 – 6 °C/min

Setter 96% Alumina

##### ● Typical Fired Properties:

##### Dielectric Constant

@ 30 MHz, 25°C \* 8.8 – 9.5

##### Dissipation Factor

@ 30 MHz  $\leq 2 \times 10^{-3}$

##### Thermal Coefficient of Expansion (25°C to 300°C)

5.6 ppm/°C

##### Breakdown Voltage

> 1 kV @ 25  $\mu$ m

##### Insulation Resistance

(@ 25°C)

>  $10^{13}$   $\Omega$ cm

##### Temperature Coefficient of Frequency ( $T_f$ )

<10 ppm/°C (-40 to 80 °C)

##### Thermal Conductivity

3 W/mK

\*30 MHz data measured on pressed disc, ~20mm diameter x 1.7mm thick.

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##### Compatible Pastes:

Co-fireable	Silver System	Gold System	Mixed Metal
Inner Layer – Printable	TC2306	TC7102	TC2306 (Ag)
Via Fill	TC2305	TC7101	TC7406 (Ag/Pd)
Top Conductor	TC2603	TC7102	TC7102 (Au)
Ground Plane	TC2306	TC7103	TC2306 (Ag)
Cofireable Solder Mask	TO2001	TO2001	TO2001

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