Heraeus

Advanced Materials

Heratape® CT2000

Low Temperature Co-Fireable Tape

Description:
Heraeus' low temperature co-fireable tape, Heratape® CT 2000 is designed to allow production of high performance wireless and multilayer circuits.

Heratape® CT 2000 is available in sheet or roll form in thicknesses of 2.0 mils, 3.9 mils and 5.1 mils. (Other tape thicknesses available by request).

- **Key Benefits:**
  - Silver conductor compatible
  - Lead and cadmium free
  - Excellent handling properties
  - Dimensionally stable on 850°C refire
  - For use in a variety of high frequency, high performance applications
  - Low cost and design flexibility
  - High Q
  - Near zero T_f (temperature coefficient of frequency)
  - Mixed metal capability
- **Typical Fired Electrical Properties:**

Dielectric Constant:
@ 2.5GHZ, 25°C
9.1 ± .1

Dissipation Factor:
@ 2.5 GHz
$\leq 2x10^{-3}$

Thermal Coefficient of Expansion
25°C to 300°C
5.6 ppm/°C

Breakdown Voltage
> 1 kV @ 25 μm

Surface Roughness
< 0.22μm

Camber
Conforms to setter

Insulation Resistance
@ 25°C
$> 10^{13}$ Ωcm

Temperature Coefficient of Frequency (T_f)
<10 ppm/°C (-40 to 80 °C)

- **Typical Unfired Properties**:

Green Density
2.45 g/cm^3

Tensile Strength
240 psi (dependent on test method)

Unfired Sheet Thickness
2.0 mils (50.8 μm), 3.9 mils (99.1 μm), 5.1 mils (130 μm)

- **Typical Fired Properties:**

Shrinkage (Co-Firing Process)
Nominal lamination pressure is 4000 psi @ 65°C for 10 minutes.
Burn out and firing should be done in a box oven.
Recommended firing profile:

- 3°C/minute to 100°C
- 1-2°C/minute to 450°C
- 5.5°C/minute to 865-875°C , hold for 20 – 30 minutes. Cooling rate is approximately 6 - 10°C/minute (furance cooling rate)

Firing should be done on flat setter material (e.g. 96% alumina) since the tape will conform to the setter material.

x,y	10.6 ± 0.3 %
z	16.0 ± 1.5%

*Laminated to fired shrinkage. To calculate green to fired thickness, add 6.3% to the z shrinkage as a compressibility factor.

Fired Density
> 3.05 g/cm^3

Flexural Strength
310 Mpa (ASTM # F394-78)

Fired Sheet Thickness
1.6 mils (40.6μm), 3.1 mils (78.7μm), 4.1 mils (104.1μm)

Note: For processsing details for CT2000, see Design Guidelines for Heratape® CT2000 Materials System

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Co-fireable Conductor Materials

	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)
Co-fireable Solder Mask	TO2001	TO2001	TO2001

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Americas
Heraeus Incorporated
Thick Film Materials Division
24 Union Hill Road
West Conshohocken, PA 19428
USA
Phone: +1 (610) 825-6050
E-Mail: techservice.hcd@heraeus.com
Internet: www.thickfilm.net

Europe
W.C. Heraeus GmbH
Thick Film Materials Division
Heraeusstr. 12-14
63450 Hanau
Germany
Phone: +49 (6181) 35-5466
E-mail: th-info@heraeus.com
Internet: www.heraeus-th.com

Asia
Heraeus Materials Technology
Shanghai Ltd.
No. 1 Guang Zhong Road
Zhuanqiao Town, Minhang District
Shanghai 201108
People's Republic of China
Phone: + 86 (21) 6442-6838
E-Mail: th.hmts@heraeus.com
Internet: www.heraeus-th.com

W. C. Heraeus