



## ESL ELECTROSCIENCE

CERAMIC TAPES &  
THICK-FILM MATERIALS

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### CO-FIRE CERAMIC TAPE

### 41110

#### RoHS Compliant\* Ceramic Tape for Multilayer and Microwave Applications Requiring Low Dielectric Constant

A flexible cast film of inorganic dielectric powder dispersed in an organic matrix, designed to be fired at 850°C to give a dense body. Multilayer parts can be formed by laminating metallized sheets of the tape into a monolithic structure prior to firing. A pressure/temperature combination of 21 MPa and 70°C works well for laminating this tape. Ceramic tape is provided on a silicone-coated polyester film to minimize environmental contamination, to protect it from mechanical damage, and to aid in handling. This material is useful in microwave applications that require low dielectric constant and low loss.

#### PROCESSING PARAMETERS

<b>LAMINATING:</b>	21 MPa at 70°C
<b>FIRING TEMPERATURE:</b>	850°C
<b>TIME AT PEAK TEMPERATURE:</b>	10 minutes

#### TAPE CHARACTERISTICS

<b>TAPE THICKNESS:</b>	100-130 µm
<b>COLOR:</b>	blue
<b>SHELF LIFE:</b> (when stored in dry N <sub>2</sub> )	6 months

ESL Europe (KOP) 41110 0711-J

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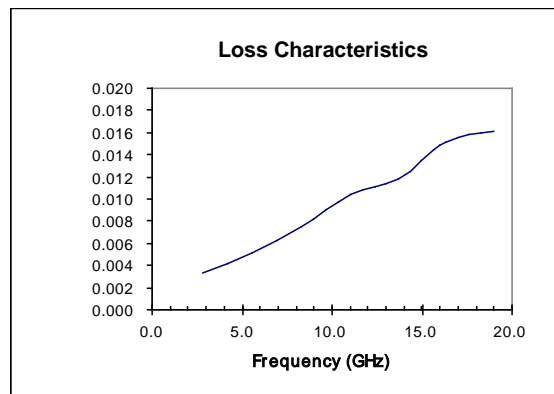
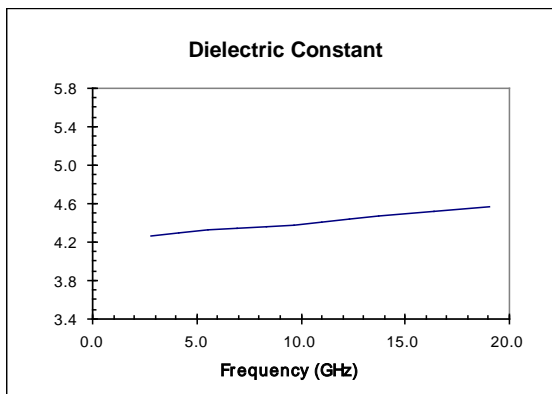
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See Caution and Disclaimer on other side.

## FIRED TAPE PROPERTIES (Tested with ESL 803 post-fired gold conductor)

<b>DIELECTRIC CONSTANT:</b> (1 MHz, using post-fired ESL 903-A silver conductor)		4.0-5.0
<b>DIELECTRIC CONSTANT:</b> (GHz, cofired with ESL 903-A silver conductor, see microwave properties below)		4.3-4.7
<b>DISSIPATION FACTOR:</b> (1 MHz, using post-fired ESL 903-A silver conductor)		≤ 0.4%
<b>INSULATION RESISTANCE:</b> (100 VDC)		≥ 10 <sup>12</sup> Ω
<b>THERMAL CONDUCTIVITY:</b>		2.5-3.0 W/(m·K)
<b>TCE:</b> (25°C to 300°C)		6.4 ppm/°C
<b>BREAKDOWN VOLTAGE:</b>		> 1500 V/25 μm
<b>PRESSURE COOKER:</b> (Insulation resistance after 15 minutes at 2 atmospheres)		≥ 10 <sup>12</sup> Ω
<b>FIRED SHRINKAGE:</b> (Using recommended processing parameters)	X and Y	15 ± 1%
	Z	16 ± 2%
<b>FIRED DENSITY:</b> (Theoretical)		2.30 g/cm <sup>3</sup>
<b>COMPATIBLE CONDUCTORS:</b>	ESL 803, 902, 903-A, 903-B, 903-C, 963	

## MICROWAVE PROPERTIES \*



\* Data obtained from measurements on ring resonators. Metallization is co-fired 903-A silver.

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\*None of the six substances referred to in the RoHS Directive (2002/95/EC) are used in the formulation of this product.

**CAUTION:** Proper industrial safety precautions should be exercised in using these products. Use with adequate ventilation. Avoid prolonged contact with skin or inhalation of any vapours emitted during use or heating of these compositions. The use of safety eye goggles, gloves or hand protection creams is recommended. Wash hands or skin thoroughly with soap and water after using these products. Do not eat or smoke in areas where these materials are used. Refer to appropriate MSDS sheet.

**DISCLAIMER:** The product information and recommendations contained herein are based on data obtained by tests we believe to be accurate, but the accuracy and completeness thereof is not guaranteed. No warranty is expressed or implied regarding the accuracy of these data, the results obtained from the use hereof, or that any such use will not infringe any patent. ElectroScience assumes no liability for any injury, loss, or damage, direct or consequential, arising out of its use by others. This information is furnished upon the condition that the person receiving it shall make his own tests to determine the suitability thereof for his particular use, before using it. User assumes all risk and liability whatsoever in connection with his intended use. ElectroScience's only obligation shall be to replace such quantity of the product proved defective.