



## ESL ELECTROSCIENCE

CERAMIC TAPES &  
THICK-FILM MATERIALS

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## HIGH K CAPACITOR DIELECTRICS

## 4200-C Series

### LOW TEMPERATURE FIRING CAPACITORS WITH k VALUES RANGING FROM 2,000 TO 12,000

ESL 4200-C Series is a blendable series of low-temperature firing, screen-printable, high capacitance density pastes that provide dielectric constants in the range of 2,000 to 12,000. These materials are compatible with a wide range of ESL conductors, but best results are obtained when the dielectrics are terminated with specially developed silver or gold based conductors (see recommended conductors on second page). Optimum properties are achieved when the capacitors are overglazed to provide hermeticity.

#### PASTE DATA:

<b>RHEOLOGY:</b>	Thixotropic, screen-printable pastes
<b>VISCOSITY:</b> (Brookfield RVT, ABZ Spindle, 10 rpm, 25.5°C±0.5°C)	210±30 Pa·s
<b>COLOR:</b>	yellow-tan
<b>SHELF LIFE:</b> (at 4°C)	6 months

#### PROCESSING

<b>SCREEN MESH/EMULSION:</b>	200/37.5 µm
<b>LEVELING TIME:</b>	10-15 minutes
<b>DRYING AT 125°C:</b>	10-15 minutes
<b>FIRING TEMPERATURE RANGE:</b>	850°C-930°C
<b>OPTIMUM:</b>	900°C
<b>TIME AT PEAK:</b>	10 minutes
<b>TOTAL FIRING CYCLE:</b>	60 minutes

4200-C Series 0604-G

#### ESL Affiliates

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See Caution and Disclaimer on other side.

**SUBSTRATE FOR CALIBRATION:** 96% alumina  
**THINNER:** ESL 401  
**SCREEN CLEANER:** acetone, isopropanol, and polar organic solvents

**TYPICAL PROPERTIES**

(Properties based on measurements of 1 mm x 1 mm test capacitors.)

**FIRED THICKNESS:** 4202-C 40-55 µm 4212-C 35-50 µm

**DIELECTRIC CONSTANT (k) AT 1kHz:**  
 (Fired at 900°C, 9516 conductor, measured at 25°C)

	<u>Nominal Value</u>	<u>Capacitance Density</u>
<b>4202-C</b>	2,000±300	500 pf/mm <sup>2</sup>
<b>4212-C</b>	12,000±1500	3,200 pf/mm <sup>2</sup>
<b>DISSIPATION FACTOR AT 1 kHz: (25°C)</b>		≤ 3.0%
<b>INSULATION RESISTANCE AT 100 VDC:</b> (as fired)		≥ 10 <sup>9</sup> Ω
<b>INSULATION RESISTANCE AT 100 VDC:</b> (overglazed with 2 layers of G-481)		≥ 10 <sup>10</sup> Ω
<b>BREAKDOWN VOLTAGE:</b> (VDC/25 µm, 25°C in air, as fired)		≥ 100
<b>BREAKDOWN VOLTAGE:</b> (VDC/25 µm, 25°C in air, overglazed with 2 layers of G-481)		≥ 200
<b>RECOMMENDED CONDUCTORS:</b>		9916, 9516, 8816
<b>OVERGLAZES:</b> (2 layers separately fired)		G-481

4200-C Series 0604-G

**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 vapors 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. Electro-Science 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 their own tests to determine the suitability thereof for their particular use, before using it. User assumes all risk and liability whatsoever in connection with their intended use. Electro-Science's only obligation shall be to replace such quantity of the product proved defective.