



## ESL ELECTRO-SCIENCE

CERAMIC TAPES &  
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# DIELECTRIC COMPOSITION

# 4917

## Cadmium, Lead and Nickel-Free\* Multilayer Dielectric Designed To Combat The Battery Effect When Using Mixed Metal Conductors

ESL 4917 dielectric is designed to be free of battery effects when used in circuits containing mixed metal conductors. Metal migration under conditions that normally produce the battery effect have been effectively controlled by employing an alkali and lead-free glass system that partially crystallizes during standard thick film processing at 850°C. The 4917 is non-porous and the TCE is matched to 96% alumina. Recommended conductor systems for mixed metal multilayers include 9695-G Pd/Ag for buried layers, 9697-G Ag/Pd via fill, and 8844-G or 8846-G Au and 5837-G as the solderable top conductor.

ESL 4917 has a high voltage breakdown and is excellent for use as a crossover dielectric.

### PASTE DATA

<b>Rheology:</b>	Thixotropic, screen-printable paste
<b>Viscosity:</b> (Brookfield RVT, 10 rpm, ABZ spindle, 25.5 ± 0.5 °C)	250 ± 25 Pa.s
<b>Colour:</b>	Blue
<b>Shelf Life (20 - 25 °C):</b>	6 months

### PROCESSING

<b>Screen Mesh, Emulsion:</b>	200 & 325 S/S, 40 µm
<b>Levelling Time (at 20°C):</b>	5 - 10 min
<b>Drying Time (at 125°C):</b>	10 - 15 min
<b>Firing Temperature Range:</b>	850 - 930°C (in air)
	Optimum: 850°C
	Time at peak: 10 min
<b>Total Firing Cycle:</b>	1 hour
<b>Substrate for Calibration:</b>	96% alumina
<b>Thinner:</b>	ESL 401

ESL Europe 4917 0511-C

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See Caution and Disclaimer on other side.

## TYPICAL PROPERTIES

<b>Fired Thickness:</b> (at least 2 layers between Au conductors on 96% alumina)		35 - 50 $\mu\text{m}$
<b>Dielectric Constant (K) at 1 kHz:</b> (at 25°C)		8 - 11
<b>Dissipation Factor at 1 kHz:</b> (at 25°C, depending upon conductor)		<0.4%
<b>Breakdown Voltage:</b> (at 25°C in air)		>1500 VDC / 25 $\mu\text{m}$
<b>Insulation Resistance:</b> (at 100V DC)		>1 x 10 <sup>11</sup> $\Omega$
<b>Via Definition:</b>		250 $\mu\text{m}$ x 250 $\mu\text{m}$
<b>Thermal Coefficient of Expansion (TCE):</b>		
	(25°C - 500°C x ppm / °C)	6.3
	(25°C - 700°C x ppm / °C)	6.6
<b>Solder Wettability (Top layer):</b> (RMA Flux, 5 sec. dip 62Sn/36Pb/2Ag, 220°C $\pm$ 5°C)	5837-G	90 - 95 %

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\*Complies with RoHS, ELV, WEEE and CHIP 3 EC directives.

**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.

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