



MICROELECTRONIC INTERCONNECT MATERIALS

Mountain Ridge Business Park, Unit B12
 1248 Sussex Turnpike, Randolph, New Jersey 07869-2908
 Phone: 973.895-3600 Fax: 973.895-3617 www.koartan.com
 Sales@koartan.com

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Preliminary Technical Information

7981 SERIES Pd-Ag RESISTOR PASTES

BLENDABLE Pb-FREE COMPOSITIONS FOR ALUMINUM NITRIDE

The 7981 series resistor pastes are lower cost versions of KOARTAN 7961 series pastes. Wider TCR specification allows for lower palladium content in this series, resulting in cost savings. The 7981 series pastes exhibit excellent adhesion to aluminum nitride and are particularly suitable for heating element and other applications where a wider TCR range can be tolerated. Key features of the system include:

- ? Wide Resistivity Range
- ? Lower Cost than Standard Systems
- ? Lead-Free Compositions
- ? Blendability Across the Full Range.
- ? Firing in Standard 850°C Profile.
- ? Compatibility Aluminum Nitride
- ? Passivation with Low and High Temperature Overglaze.

TYPICAL FIRED FILM CHARACTERISTICS⁽¹⁾

	7981	7985	7991	7993
Resistivity ⁽²⁾ Ohms / Square	0.100 ± 20%	0.500 ± 20%	1.000 ± 20%	3.000 ± 20%
TCR ppm/°C, 25°C to +125°C	300 ± 100	300 ± 100	300 ± 100	300 ± 100

- (1) Typical properties are based on testing of several batches under various processing conditions. They are not intended as specification limits.
- (2) The resistivity is measured on 1mmx14mm pads, fabricated with 7981 series resistors and 6292 silver-palladium termination, on 0.040" thick AlN substrate supplied by Maruwa America Corporation. All firing done in a standard 36 minute furnace profile with 10 minutes at 850°C.

COMPOSITION PROPERTIES

Viscosity: 120-180 Kcps, when measured with Brookfield HBT, Spindle #14, utility cup, 10 RPM, 25 °C.

Recommended Thinner: KOARTAN A-1039

RECOMMENDED PROCESSING PROCEDURE

Printing: For best results, printing with a 250 mesh stainless steel screen with 10-15 μm emulsion and 45 degree angle is recommended. Other mesh counts, 200-325, and emulsion thicknesses, 5-25 μm , may be used for special applications.

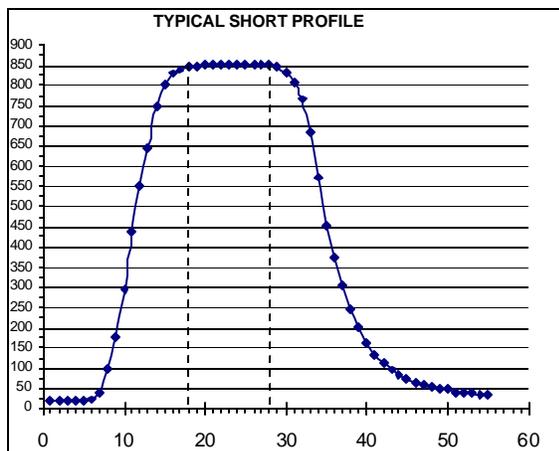
Coverage varies significantly among the end members, as the paste specific gravity is different.

Drying: Wet prints should be allowed to level for 5-10 minutes prior to drying. Dry for 10-15 minutes in a convection oven or belt dryer at 125°C-150°C.

Firing: Firing in air using a belt furnace and a 36-60 minute profile, with 10 minutes at a peak temperature of 850°C, is recommended. Air flow rates must be optimized to ensure that the products of binder burn-off discharge properly and create a fully oxidizing atmosphere in the muffle.

Application Notes: The 7981 series resistor pastes have high palladium contents. During heating and cooling palladium metal oxidizes in the 500°C-700°C temperature range; it converts back to metallic form when it gets out of this range. However, if Pd-Ag resistors are overglazed in this temperature range, the overglaze prevents the palladium from fully converting back to metallic. As a result, an upward resistance shift of up to 30% may result when the overglaze firing temperature is 600°C-650°C. KOARTAN overglaze 5662 paste fires in this temperature range and limits the resistance shift to $\pm 1\%$.

Storage and Shelf Life: Store in tightly capped containers at room temperature. Shelf life is 6 months for unopened jars. Thorough mixing of the paste before each use is recommended. Under ordinary conditions of storage and use the product should not require thinning. However, solvent loss during extended printing runs may be corrected by incorporating up to 0.5% of KOARTAN A-1039 thinner.



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