KOARTAN
MICROELECTRONIC INTERCONNECT MATERIALS
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Technical Information

KOARMISTOR SERIES 7321

BLENDABLE NTC THERMISTOR PASTES

The 7321 series NTC thermistors are designed to provide excellent temperature response and stability in small geometries. They are suitable for the fabrication of discrete surface mount components. They are also useful for the integration of temperature sensing, impedance matching, current limiting, or switching sub-circuitry. For lower resistivity and/or higher Beta constants please see KOARTAN 7380 series. Key features of the 7321 system include:

- RoHS Compliant
- Wide Resistivity Range
- Large Beta Constant, Small Hysteresis
- Blendability Across the Full Range.
- Firing in Standard 850℃ Profile.
- Compatibility with Ag:Pd, and Gold Termination.
- Passivation with Low Temperature Overglaze or Polymer Encapsulant.

TYPICAL FIRED FILM CHARACTERISTICS(1)

	7321-100	7321	7322	7323	7324	7325
Resistivity(2) Ohms / Sqare	100 ± 20%	250 ± 20%	500 ± 20%	1K± 20%	10 K± 20%	100 K ±20%
Beta Constant + 25℃ to +125℃	-800 ± 100	-900 ± 100	-1200 ± 100	-1500 ± 100	-2100 ± 100	-2500 ± 100
Hysteresis(3) % change in Beta	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.3

(1) Typical properties are based on testing of several batches under various processing conditions. They are not intended as specification limits.
(2) The electrical results are based on 1mmx1mm pads, fabricated with 7321 series thermistors and 6261 palladium- silver termination. All firing done in a standard 36 minute furnace profile with 10 minutes at 850℃.
(3) Change in Beta after four cycles from -55℃ to +125℃.

COMPOSITION PROPERTIES

Viscosity: 150 ± 30 Kcps, when measured with Brookfield HBT viscometer, Spindle #14, utility cup, 10 RPM, 25℃

Specific Gravity: 2.0 - 2.4 g/cm^3

Recommended Thinner: KOARTAN A-1039

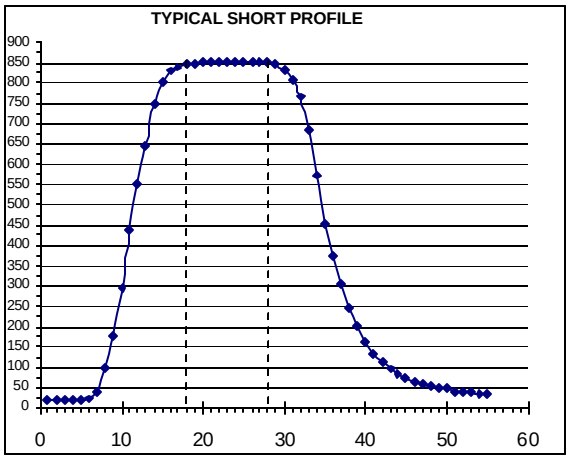
RECOMMENDED PROCESSING PROCEDURE

Printing: For best results, printing with a 325 mesh stainless steel screen with 10-15 µm emulsion and 45 degree angle is recommended. Other mesh counts, 200-280, and emulsion thicknesses, 5-25 µm, may be used for special applications.

Coverage is approximately 120 cm^2/g, when utilizing 325 mesh screen and a wet print thickness of about 38 µm.

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.



Temperature (°C) vs. Time (minutes))

Application Notes: The data provided in this brochure was generated on 0.040"x 0.040" pads, terminated with a 6:1 Ag:Pd conductor and fired as above. To utilize the highest Beta for any particular application, it is recommended that the highest permissible resistivity Koarmistor paste or blend be selected. Partial square geometries may be designed for this purpose. Higher silver content termination inks are compatible with Koarmistor series thermistors. The choice of termination material should be dictated by overall reliability and cost goals.

The 7321 series thermistors are relatively insensitive to furnace profile. Longer profiles and higher peak temperatures generally produce slightly lower resistivity and higher beta. Utilization of such profiles are recommended only when they are readily available or minor improvement in properties is crucial to fabrication of acceptable parts

KOARTAN also offers a series of lead-free NTC thermistors, the 7380 series, with much higher Beta constant. These thermistors are, however, constructed similarly to thick film capacitor and require better process control than the 7321 series.

Passivation: Low temperature overglaze such as KOARTAN 5650, or polymer encapsulant is recommended. Please consult Koartan's technical staff for recommendation for your particular application.

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.