Celanese
The chemistry inside innovation™

Micromax™ 5092D

Electronic Inks and Pastes

PTC Thermistor Composition

Micromax™ 5091D, Micromax™ 5092D and Micromax™ 5093D positive temperature coefficient (PTC) Thermistor compositions are intended for making PTC Thermistor in thick film microcircuits using conventional thick film processing. Potential applications include temperature sensors, temperature compensation elements, and heaters.

Product benefits

- Linear dependence of resistance with temperature
- Compatibility with thick film processing
- Blendability
- High positive TCR
- Laser trim stability
- Environmental stability

Product information

Solvent or thinner	Micromax™ 4553
Blend member or series	5091D/5092D/5093D

Rheological properties

Viscosity	150 - 250[1]	Pa.s

[1]: Brookfield HAT, UC&SP, 10 rpm, 25°C

Application technique

Mask mesh	200	
Mask emulsion	12 - 18	µm
Drying time	10 - 15	min
Drying temperature	150	°C
Recommended film thickness, dried	23 - 27	µm
Leveling time	5 - 10	min

Electrical properties

Surface resistivity	90000 - 110000[2]	mOhm per square
Hot Temperature Coefficient Resistance	2800 - 3200[3]	ppm/K
Cold Temperature Coefficient Resistance	2900 - 3300[4]	ppm/K

[2]: Terminations Ag/Pd Micromax™ 7484; Substrate 96% alumina; Printing 200-mesh stainless steel screen (15±3 µm emulsion thickness) to a dried thickness 25±2 µm; Firing - recommended short profile to a peak temperature of 850°C for 10 minutes. Resister geometry for R, laser trim stability: 1.5 x 1.5 mm.

[3]: Resister geometry for TCR, laser trim stability: 1.5 x 1.5 mm. Measured from +25 to +125°C.

[4]: Resister geometry for TCR, laser trim stability: 1.5 x 1.5 mm. Measured from -55 to +25°C.

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Storage and stability

Shelf life	6[5] months

[5]: in unopened containers, from date of shipment, at temperature <25 °C

Additional information

How to use

Processing

- Terminations
  - Reported properties are based on tests with Micromax™ 7484 Ag/Pd conductor composition, prefired at 850 °C. Excellent results have also been obtained using Ag Micromax™ 6160, prefired at 850 °C.
- Substrates
  - Properties are based on tests on 96% alumina substrates. Substrates of other compositions and from various manufacturers may result in variations in performance properties.
- Printing
  - Specified properties are based on resistors printed to 25±2µm dried print thickness. This is readily achieved using 200-mesh stainless steel screes with 15±3µm emulsion thickness.
- Drying
  - Prints should be allowed to level 5-10 minutes at room temperature and then dried 10-15 minutes at 150 °C.
- Firing
  - Resistivity and TCR specifications are based on the recommended 30 minutes firing profile with a 10 minute peak at 850 °C. Slight variation in resistance and TCR will occur when longer firing profiles or higher peak temperature are used.
- Encapsulant
  - In general, glass encapsulation is not required. However, for applications in need of mechanical protection or protection from extreme environments such as high temperature nitrogen or forming gas, encapsulant Micromax™ 9137, or QQ550 fired at 500 °C is recommended.

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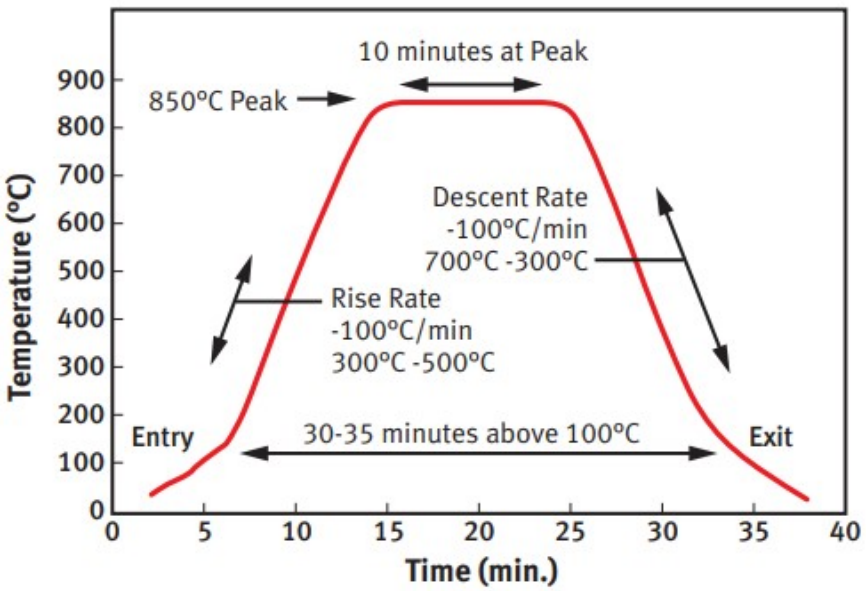
FIGURE 1. 30 MINUTES PROFILE



Properties

Typical PCT Thermistor Properties

Test	Properties
Post Laser Trim Stability*1 (%) 25°C/1000 hours	< 0.2
Post Laser Trim Stability*1 (%) 85%RH/85°C/1000 hours	< 0.2
Post Laser Trim Stability*1 (%) 150°C/1000 hours	< 0.2

*1 This data is based on tests of 1.5 x 1.5mm resistors trimmed to 1.5 x initial value with a single plunge cut. All resistors were un-encapsulated.

Information in this datasheet shows anticipated typical physical properties for Micromax™ 5091D, 5092D & 5093D based on specific controlled experiments in our labs and are not intended to represent the product specifications, details of which are available upon request.

Storage and shelf life

Containers should be stored, tightly sealed, in a clean, stable environment at room temperature (<25°C). Shelf life of material in unopened containers is six months

from date of shipment. Some settling of solids may occur and compositions should be thoroughly mixed prior to use.

Safety and handling

For safety and handling information pertaining to this product, read Safety Data Sheet (SDS).