

# Micromax™ 5091D

## Electronic Inks & Pastes

### PRODUCT DESCRIPTION

#### 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

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

### PRODUCT INFORMATION

| General Properties     | Value Unit        |
|------------------------|-------------------|
| Application            | Chip resistor     |
| Solvent or thinner     | Micromax™ 4553    |
| Blend member or series | 5091D/5092D/5093D |

### TECHNICAL DATA

| Rheological Properties | Value Unit      |
|------------------------|-----------------|
| Viscosity <sup>1</sup> | 150 to 250 Pa.s |

| Application Technique                                | Value        | Unit           |
|------------------------------------------------------|--------------|----------------|
| Mask mesh                                            | 200          |                |
| Mask emulsion                                        | 12 to 18     | µm             |
| Drying time                                          | 10 to 15     | min            |
| Drying temperature                                   | 150          | °C             |
| Recommended film thickness                           | 24 to 26     | µm             |
| Leveling time                                        | 5 to 10      | min            |
| Electrical Properties                                | Value        | Unit           |
| Resistivity <sup>2</sup>                             | 9 to 11      | Ohm per square |
| Hot Temperature Coefficient Resistance <sup>3</sup>  | 2900 to 3300 | ppm/°C         |
| Cold Temperature Coefficient Resistance <sup>4</sup> | 2900 to 3300 | ppm/°C         |
| Storage and Stability                                | Value        | Unit           |
| Shelf life <sup>5</sup>                              | 6            | months         |

<sup>1</sup>Brookfield HAT, UC&SP, 10 rpm, 25°C

<sup>2</sup>Terminations Ag/Pd 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. Resistor geometry for R, laser trim stability: 1.5 x 1.5 mm.

<sup>3</sup>Resistor geometry for TCR, laser trim stability: 1.5 x 1.5 mm. Measured from +25 to +125°C.

<sup>4</sup>Resistor geometry for TCR, laser trim stability: 1.5 x 1.5 mm. Measured from -55 to +25°C.

<sup>5</sup>in unopened containers, from date of shipment, stable environment at room temperature between 5°C - 30°C

## PROCESSING GUIDELINES

### 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 screens 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.

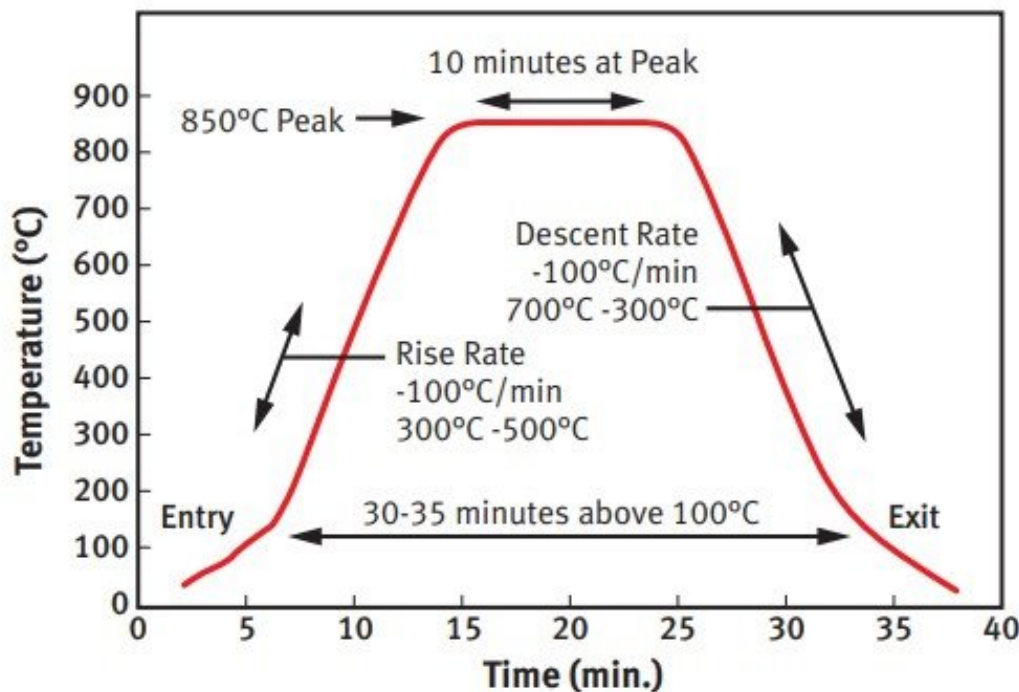
### Firing

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.

**FIGURE 1. 30 MINUTES PROFILE**



### Typical PCT Thermistor Properties

| Test                                                              | Properties |
|-------------------------------------------------------------------|------------|
| Post Laser Trim Stability* <sup>1</sup> (%) 25°C/1000 hours       | < 0.3      |
| Post Laser Trim Stability* <sup>1</sup> (%) 85%RH/85°C/1000 hours | < 0.2      |
| Post Laser Trim Stability* <sup>1</sup> (%) 150°C/1000 hours      | < 0.3      |

\*<sup>1</sup> 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 between 5°C - 30°C. Shelf life of material in unopened containers is 6 months from date of shipment. Some settling of solids may occur and compositions should be thoroughly mixed prior to use.

Storage conditions on the product data sheets are intended to represent long-term material storage recommendations and not a shipping or temperature-at-receipt requirement.

Transportation: Under normal shipping conditions, without temperature control, Micromax™ products are not expected to exhibit a change in quality or fitness for use. Should extraordinary events result in extended transportation periods, Micromax™ recommends customers confirm products remain suitable for the intended application.

### Safety and handling

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

## SAFETY & WARNING

It is recommended that the company/operator read and review the Safety Data Sheets for the appropriate health and safety warnings before use.

**Safety Data Sheets are available.**

## WASTE TREATMENT

Prior to using any recommendations or suggestions for waste treatment, the user is required to know the appropriate local/state/federal regulations for on-site or off-site treatment which may require permits. If there is any conflict regarding our recommendations, local/state/federal regulations take precedence.

## CONTACT INFORMATION

[www.macdermidalpha.com](http://www.macdermidalpha.com)

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Also read carefully warning and safety information on the Safety Data Sheet. This data sheet contains technical information required for safe and economical operation of this product. READ IT THOROUGHLY PRIOR TO PRODUCT USE . Emergency safety directory assistance: US 1 202 464 2554, Europe + 44 1235 239 670, Asia + 65 3158 1074, Brazil 0800 707 7022 and 0800 172 020, Mexico 01800 002 1400 and (55) 5559 1588

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