

DuPont 5091D/5092D/5093D

PTC THERMISTOR COMPOSITION

Technical Data Sheet

Product Description

DuPont 5091D, DuPont 5092D and DuPont 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
- Bendability
- High positive TCR
- Laser trim stability
- Environmental stability

Processing

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.

Typical Physical Properties

Test	Properties
Viscosity (Pa.S) (Brookfield HAT, UC&SP, 10 rpm, 25°C)	150 - 250
Thinner	DuPont 4553

Table 1 shows anticipated typical physical properties for DuPont 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.

Terminations

Reported properties are based on tests with 7484 Ag/Pd conductor composition, prefired at 850°C. Excellent results have also been obtained using Ag 6160, prefired at 850°C.

Printing

Specified properties are based on resistors printed to 25±2 µm dried print thickness. This is readily achieved using 200 -mesh stainless steel screens with 15±3 µm emulsion thickness.

Drying

Prints should be allowed to level 5-10 minutes at room temperature and then dried 10-15 minutes at 150°C.

Typical PTC Thermistor Properties			
	5091D	5092D	5093D
Resistivity ^{1,2} (Ω/sq)	10	100	1000
Shipping Specification(%)	±10	±10	±20
Temperature Coefficient of Resistance ³ (ppm/°C)	3100 ± 200	3000 ± 200 (Hot) 3100 ± 200 (Cold)	2750 ± 250
Post Laser Trim Stability ⁴ (%)			
25°C/1000 hours	<0.3	<0.2	<0.2
85%RH/85°C/1000 hours	<0.2	<0.2	<0.2
150°C/1000 hours	<0.3	<0.2	<0.2

¹ Terminations Ag/PD 7484; Substrate 96% alumina; Printing 200-mesh stainless steel screen (15±3 µm emulsion thickness) to a dried thickness of 25±2 µm; Firing - recommended short firing profile to a peak temperature of 850°C for 10 minutes.

² Resistor geometry for R, TCR, laser trim stability: 1.5 x 1.5 mm

³ TCR

Cold TCR measured from -55 to +25°C

Hot TCR measured from +25 to +125°C

⁴ Post Laser trim stability

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

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. See Figure 1

Encapsulation

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 9137, 9537 or QQ550 fired at 500 °C is recommended.

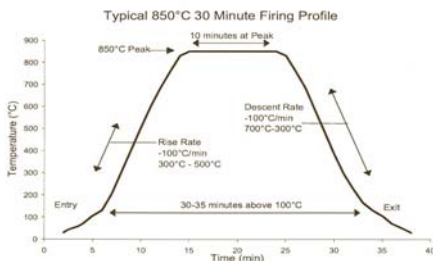
Storage and Shelf Life

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 the Material Safety Data Sheet (MSDS).

Figure 1 - 30 Minutes Profile



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