

Micromax[™] 8070

Electronic Inks and Pastes

Resistor Compositions

Resistor compositions MicromaxTM 8070 and 8074 are intended to be applied to ceramic substrates by screen printing and fired in a conveyor furnace in an air (oxidising) atmosphere, to form specific resistive elements in hybrid microcircuits and networks. These resistors provide an extension to the MicromaxTM HS80 Series, extending the resistance range up to $40M\Omega/sq$.

Product characteristics

- Resistances up to 40MΩ/sq
- Blendable with Micromax™ HS80 (Micromax™ 8059)
- · Compatible with Pd/Ag conductors
- Laser trimmable

Product information

Solvent or thinner MicromaxTM 8250
Blend member or series 8070 and 8074

Rheological properties

Viscosity 145 - 210^[1] Pa.s

[1]: Brookfield HBT, UC&SP, SC4-14/6R, 10 rpm, 25°C ± 0.2°C

Application technique

[2]: based on wet film thickness of 50µm

Electrical properties

Surface resistivity 9E9 - 1.1E10^[3] mOhm per

Hot Temperature Coefficient Resistance -250 - 250^[4] ppm/K Cold Temperature Coefficient Resistance -250 - 250^[5] ppm/K

[3]: sheet resistance values are reported to 25µm dried thickness

[4]: measured in the ranges : +25°C to +125°C [5]: measured in the ranges : -55°C to +25°C

Printed: 2023-09-21 Page: 1 of 4

Revised: 2023-07-03 Source: Celanese Materials Database



Micromax[™] 8070

Electronic Inks and Pastes

Storage and stability

Shelf life 6^[6] months

[6]: in unopened containers, from date of shipment, at temperature <25°C (>0°C)

Additional information

How to use

Design & compatibility

Design

- MicromaxTM 8070 and 8074 compositions are NOT recommended for high voltage applications. Parts should be protected from static charges. MicromaxTM 8070 and 8074 compositions are blendable together. MicromaxTM 8070 is blendable with MicromaxTM 8059 (1MΩ/sq).
- Variations in the peak firing temperature or insufficient airflows may result in shifts in of resistivity or TCR.
- In general glass encapsulation is not required. However, in applications which require mechanical protection from extreme environments, low temperature encapsulants MicromaxTM QQ550 or 9537 are recommended to be screen printed over the resistors before laser trimming and fired at 500°C.
- To ensure long term stability of the resistors and to achieve maximum trimming accuracy, care is needed in the choice trimming parameters and trim geometry. Parameters should be selected to achieve a clean laser cut (Kerf) and it is recommended to cut into the substrate by 6-8μm. Measurement of high ohmic resistors also require different techniques and is invariably much slower than for normal resistance values.

Compatibility

- Whilst MicromaxTM has tested this composition with the materials specified above and the recommended processing conditions, it is impossible or impractical to cover every combination of materials, customer processing conditions and circuit layouts.
- It is therefore essential that customers thoroughly evaluate the materials in their specific situations in order to completely satisfy themselves with the overall quality and suitability of the compositions for their intended application(s).

Processing

Substrates

- · 96% alumina.
- Substrates of different compositions and from various manufacturers may result in variations in performance properties.

Printed: 2023-09-21 Page: 2 of 4

Revised: 2023-07-03 Source: Celanese Materials Database



MicromaxTM 8070

Electronic Inks and Pastes

Printing

- 200 mesh stainless steel screen with a 8-12µm emulsion thickness. Print speeds of 10 to 20 cm/s may be used.
- The composition should be thoroughly mixed before use. This is best achieved by slow, gently, hand stirring with a clean burr-free spatula (flexible plastic or stainless steel) for 1-2 minutes. Care must be taken to avoid air entrapment.
- Printing should be performed in a clean and well ventilated area.
- Note: Optimum printing characteristics are generally achieved in the room temperature range of 20°C - 23°C. It is therefore important that the material, in its container, is at this temperature prior to commencement of printing.
- Class 10,000 printing area is recommended for building complex hybrids and multilayer circuits, otherwise severe yield losses could occur.

Thinning

- This composition is optimized for screen printing, thinning is not normally required.
- Use the MicromaxTM recommended thinner for slight adjustments to viscosity or to replace evaporation losses. The use of too much thinner or the use of a non recommended thinner may affect the rheological behaviour of the material and its printing characteristics.

Drying

- 10-15 minutes at 150°C.
- Allow prints to level for 5-10 minutes at room temperature, then dry in a well ventilated oven or conveyor dryer.

Firing

- 850°C peak held for 10 minutes on 60 minute cycle in an air (oxidising) atmosphere.
- Fire in a well ventilated belt or conveyor furnace Air flows and extraction rates should be optimized to ensure that oxidizing conditions exist within the muffle, and that no exhaust gases enter the room.

Properties

Notes

- $\circ\,$ Specified properties are based on resistors printed to 25±3µm dried print thickness.
- Typical fired properties are based on laboratory tests (see resistor method G-1.5.5).
- Unless expressly noted elsewhere the following processing conditions have been used:

Printed: 2023-09-21 Page: 3 of 4

Revised: 2023-07-03 Source: Celanese Materials Database



Micromax[™] 8070

Electronic Inks and Pastes

- Pd/Ag conductor composition 9061 terminations prefired at 850°C. Substrate 96% Alumina Dried Print with thickness of 25±3µm. Fired on a 60 minute firing cycle with ten minutes at peak of 850°C. Resistor geometry 1.5mm x 1.5mm
- All values reported here are results of experiments in our laboratories intended to illustrate product performance potential with a given experimental design. They are not intended to represent the product's specifications, details of which are available upon demand.

General

Performance will depend to a large degree on care exercised in screen printing. Scrupulous care should be taken to keep the composition, printing screens and other tools free of metal contamination. Dust, lint and other particulate matter may also contribute to poor yields.

Storage and shelf life

Storage : Containers may be stored in a clean, stable environment at room temperature (< 25° C), with their lids tightly sealed. Storage in freezers (temperature < 0° C) is NOT recommended as this could cause irreversible changes in the material.

Shelf life: This composition has a shelf life of 6 months from date of shipment for factory-sealed (unopened) containers, stored under room-temperature conditions.

Safety and handling

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

Printed: 2023-09-21 Page: 4 of 4

Revised: 2023-07-03 Source: Celanese Materials Database

NOTICE TO USERS: Values shown are based on testing of laboratory test specimens and represent data that fall within the standard range of properties for natural material. These values alone do not represent a sufficient basis for any part design and are not intended for use in establishing maximum, minimum, or ranges of values for specification purposes. Colourants or other additives may cause significant variations in data values. Properties of moulded parts can be influenced by a wide variety of factors including, but not limited to, material selection, additives, part design conditions and environmental exposure. Other than those products expressly identified as medical grade (including by MT® product designation or otherwise), Celanese's products are not intended for use in medical or dental implants. Regardless of any such product designation, any determination of the suitability of a particular material and part design for any use contemplated by the users and the manner of such use is the sole responsibility of the users, who must assure themselves that the material as subsequently processed meets the needs of their particular product or use. To the best of our knowledge, the information contained in this publication is accurate; however, we do not assume any liability whatsoever for the accuracy and completeness of such information. The information contained in this publication should not be construed as a promise or guarantee of specific properties of our products. It is the sole responsibility of the users to investigate whether any existing patents are infringed by the use of the materials mentioned in this publication, we neither suggest nor guarantee that such hazards are the only ones that exist. We recommend that persons intending to rely on any recommendation or to use any equipment, processing technique or material mentioned in this publication should satisfy themselves that they can meet all applicable safety and health standards. We strongly recommend that users seek and adhere to the manufac

© 2023 Celanese or its affiliates. All rights reserved. Celanese®, registered C-ball design and all other trademarks identified herein with ®, TM, SM, unless otherwise noted, are trademarks of Celanese or its affiliates. Fortron is a registered trademark of Fortron Industries LLC. KEPITAL is a registered trademark of Korea Engineering Plastics Company, Ltd.