

Micromax™ 7401

Microcircuit and Component Materials

Glass Encapsulant

High temperature glass encapsulant composition Micromax™ 7401 is intended for use as an insulating and protective layer over hybrid circuits and resistor network. Micromax™ 7401 has been designed to be compatible with Micromax™ 7400 surge resistor series. As well as providing a dense hermetic fired film. Micromax™ 7401 has been specifically formulated to allow resistors to be laser trimmed through the encapsulant. Micromax™ 7401 is applied to ceramic substrates by screen printing and fired in an air (oxidizing) atmosphere.

Product benefits

- Blue color
- Thin, dense fired film
- Fired at a peak temperature of 850 °C
- Provides excellent high voltage pulse stability when used in conjunction with Micromax™ 7400 series surge resistors
- Laser trimmable
- Cadmium, Lead, Nickel and Phthalate free*

*Cadmium, Lead, Nickel and Phthalate 'free' as used herein means that cadmium, lead, nickel, and phthalate are not intentional ingredients in and are not intentionally added to the referenced product. Trace amounts however may be present.

Product information

Solvent or thinner

Micromax™ 4553

Rheological properties

Viscosity

120 - 220^[1] Pa.s

[1]: Brookfield HBT, SC4-14/6R, 10 rpm, 25 °C

Application technique

Mask mesh

325

Drying time

10 - 15 min

Drying temperature

150 °C

Theoretical coverage

160 - 180^[2] cm²/g

Recommended film thickness, fired

10 - 14 μm

Leveling time

5 - 10 min

[2]: based on a fired film thickness of 12 μm

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Storage and stability

Shelf life

6^[3] months

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

Additional information

How to use

Design & compatibility

- **Compatibility**

- Encapsulant Micromax™ 7401 is designed to be compatible with Micromax™ 7400 series surge resistor compositions.

Processing

- **Printing**

- Encapsulant composition Micromax™ 7401 should be thoroughly mixed before use. This is best achieved by slow, gentle hand stirring with a clean, burr-free spatula (flexible plastic) for 1-2 minutes. Care must be taken to avoid air-bubble entrapment. Printing should be carried out in a clean, well-ventilated area.
- Note: optimum printing characteristics of Micromax™ 7401 are generally achieved in the temperature range 20°C - 23°C. It is therefore important that the material, in its container, is at this temperature prior to commencement of printing. Micromax™ 7401 encapsulant should be printed with a 325 mesh stainless steel screen, to obtain a fired thickness of 10-14µm.

- **Thinning**

- Micromax™ 7401 is optimized for screen printing and thinning is not normally required. Micromax™ 4553 thinner, may be used sparingly for slight adjustments to viscosity or to replace evaporation losses.

- **Drying**

- Allow prints to level for 5-10 minutes at room temperature in a clean, environment, followed by drying for 10-15 minutes at 150°C in a well ventilated oven or conveyor dryer.

- **Firing**

- Fire in a well ventilated belt or conveyor furnace in air with a 30 minute cycle with a peak of 850°C held for 10 minutes. Predictable shifts in resistance values of Micromax™ 7400 series resistors will occur after encapsulation. Typical changes are shown in the table below.
- Care must be taken to ensure that any gases/vapors from other chemicals/materials (e.g. halogenated solvents) do not enter the furnace muffle. It is also essential that the air supply to the furnace

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- is clean, dry and free of contaminants
- Air flows and extraction rates should be optimized to ensure the oxidizing conditions exist within the muffle, and that no furnace exhaust gases enter the room.
- **Laser trimming**
 - Laser trimming of resistors encapsulated with Micromax™ 7401 should be carried out at higher power setting than is normally used with low firing encapsulants. Typical conditions that have been used for Micromax™ 7401 encapsulant at 12µm fired thickness with Micromax™ 7400 series resistors are as follows: bite size 4-5 µm, pulse frequency 4-5kHz; average power 4.0-5.0 W, giving trim speeds of up to 25 mm/s.

Properties

Resistance change on overglaze firing*1

Resistor	ΔR
Micromax™ 7410R	<5%
Micromax™ 7420R	<5%
Micromax™ 7450R	<5%
Micromax™ 7499R	<5%
Micromax™ 744R	<10%

*1 Termination Micromax™ QM21R prefired using a 30 minute cycle. Resistor and encapsulant fired using a 30 minute cycle.

Information in this datasheet shows anticipated typical physical properties for Micromax™ 7401 based on specific controlled experiments in our labs and are not intended to represent the product specifications, details of which are available upon request.

General

Yields and performance will depend to a large degree on the care excised during processing, particularly in screen printing. Great care should be taken to keep the conductor 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

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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).

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, processing 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. Moreover, there is a need to reduce human exposure to many materials to the lowest practical limits in view of possible adverse effects. To the extent that any hazards may have been 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 manufacturer's current instructions for handling each material they use, and entrust the handling of such material to adequately trained personnel only. Please call the telephone numbers listed for additional technical information. Call Customer Services for the appropriate Materials Safety Data Sheets (MSDS) before attempting to process our products.

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