

Micromax™ LL602

Electronic Inks and Pastes

Co-Fired Silver Conductor

Micromax™ LL602 is an internal silver ground plane conductor for the Micromax™ GreenTape™ 9K7 low temperature co-fired ceramic (LTCC) material system. It may also be used externally in applications where soldered adhesion is not required. The composition is cadmium and lead free*.

Product benefits

When used with the Micromax™ GreenTape™ 9K7 LTCC system, Micromax™ LL602 offers the following benefits:

- Co-fire processing
- High yields and reliability
- 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™ 8250
Solid content	68.4 - 70.4 ^[1] %
[1]: 750 °C	

Rheological properties

Viscosity	180 - 300 ^[2] Pa.s
[2]: Brookfield 2xHAT, UC&SP, SC4-14/6R, 10 rpm, 25 °C	

Application technique

Mask mesh	325
Mask emulsion	10 - 12 µm
Drying time	5 min
Drying temperature	100 °C
Theoretical coverage	80 - 90 cm ² /g
Recommended film thickness, dried	13 - 18 ^[3] µm
Recommended film thickness, fired	7 - 10 ^[3] µm
Print resolution, lines	125 ^[4] µm
Print resolution, spaces	125 ^[4] µm
Leveling time	5 - 10 min

[3]: print thickness

[4]: Dried Line Resolution

Micromax™ LL602

Electronic Inks and Pastes

Electrical properties

Surface resistivity

$\leq 5^{[5]}$ mOhm per square

[5]: normalized to 15µm dry thickness

Storage and stability

Shelf life

6^[6] months

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

Additional information

How to use

Processing features

- For detailed recommendations on the use of Micromax™ LL602 and the Micromax™ GreenTape™ 9K7 system, consult this data sheet and the Micromax™ GreenTape™ LTCC Design Guide. For compatible co-fired and post fired conductor compositions, reference the Micromax™ GreenTape™ 9K7 Product Selector Guide.

Processing

• Printing

- The composition should be thoroughly stirred for 1 to 2 minutes prior to use. This is best achieved by slowly stirring the paste by hand using a clean, burr-free spatula (flexible plastic or stainless steel). Care must be taken to avoid air entrapment.
- Micromax™ LL602 directly on the preconditioned Micromax™ GreenTape™ 9K7 green sheets using appropriate thick film screen printing methods and a vacuum stone or other support structure which uniformly distributes a vacuum to secure the green sheet to the printer's stage plate.
- Printing is typically performed using a 325 mesh, stainless steel screen with a 10 to 12 micron emulsion thickness.
- Printing should be performed in a clean, well ventilated area. Optimum printing characteristics are generally achieved when the room and paste container temperatures are in the 20 to 23°C range.

• Clean-up solvent

- 1-Propoxy-2-Propanol

• Drying

- Allow the conductor prints to level for 5 to 10 minutes at room temperature and then dry in a well ventilated oven or conveyor dryer for 5 minutes at 100°C. Do not over-dry.

Micromax™ LL602

Electronic Inks and Pastes

• Lamination

- Collate, stack and laminate multiple sheets of the printed circuit patterns according to the recommended processing parameters detailed in the Micromax™ GreenTape™ LTCC Design Guide.
- Typical lamination parameters are 3000 psi at 70°C for 10 minutes. Lamination pressures may vary slightly based upon part design and the individual tape lot shrinkage factors.

• Firing

- Fire in a well ventilated conveyor or static 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.
- Micromax™ GreenTape™ 9K7 requires the use of dedicated, specially coated setters in order to prevent parts from sticking during firing.
- Consult the Micromax™ GreenTape™ 9K7 low temperature co-fired ceramic system data sheet and Micromax™ GreenTape™ LTCC Design Guide for additional details.
- For further information regarding firing profiles, furnace recommendations and setter tile choices, please contact your local Micromax™ Technical Service Representative.

Properties

- Information in this datasheet shows anticipated typical physical and electrical properties for Micromax™ LL602 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).

Micromax™ LL602

Electronic Inks and Pastes

Printed: 2023-09-21

Page: 4 of 4

Revised: 2023-06-21 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, 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.

© 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.