Micromax™ Fodel® S2139

Electronic Inks and Pastes

Fine Line Photo-imageable & Cofirable Silver Conductor

Micromax™ Fodel® S2139 is a fine line photo-imageable and co-firable silver inner and via conductor specially developed for chip inductor applications and LTCC-Low Temperature Cofired Ceramic compositions.

Product benefits

- Fine line and high density patterning
- Very low resistivity
- One system for patterning electrode and filling via
- Precise conductor line edge definition
- Lead, Cadmium, Nickel and Phthalate free*

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

Product information

Solvent or thinner	Micromax™ 8250	
Solid content	76 - 78[1]	%
Fineness Of Grind, 4th scratch	≤6	µm
Fineness Of Grind, 50% point	≤5	µm

[1]: 750 °C

Rheological properties

Viscosity	24 - 36[2]	Pa.s

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

Application technique

Mask mesh	325 - 400	
Drying time	5 - 10	min
Drying temperature	50 - 60	°C
Recommended film thickness, dried	12 - 14	µm
Recommended film thickness, fired	7 - 9	µm
Print resolution, lines	≤20	µm
Print resolution, spaces	20	µm
Leveling time	5 - 10	min

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Electrical properties

Volume resistivity	≤25[3]	µOhm.cm

[3]: 400µm x 17mm line

Storage and stability

Shelf life	6[4]	months

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

Additional information

How to use

Processing

- Using safe lighting
  - To prevent accidental polymerization, handle Micromax™ Fodel® materials under yellow or amber "safe lights" which have no UV, violet, or blue light wavelengths. Use safe lights in all areas where parts are printed, dried, exposed, and developed. Protect parts from all sources of white light unless these sources are carefully checked to ensure that they will not cause polymerization. To determine whether while light is present in your production area, turn off all yellow lights and look for any remaining white light. (This assumes that there are no white light leaks from yellow light fixtures).
- Substrates
  - Properties were measured on 96% Alumina substrate fired in a box furnace at 900°C for 30 minutes. Substrates of other compositions like ceramic green sheets and from various manufacturers may result in performance property variations.
- Printing
  - Silver conductor Micromax™ Fodel® S2139 should be thoroughly mixed before use. This is best achieved by slow, gentle hand stirring with a clean, burr-free spatula (flexible plastic or stainless steel) for 1-2 minutes. Care must be taken to avoid air bubble entrapment.
  - Print a single conductor layer with a 325 or 400-mesh stainless steel screen. Ideal print speed is 3-5 in/sec using a single wet pass. The weight of the printed wet film should be determined as control to target the final conductor thickness.
- Drying
  - Allow the wet print to level 5-10 minutes at room temperature. Dry for 5-10 minutes at 50-60°C. Higher temperature or longer drying times will deactivate the photosensitive system.
- Exposure
  - Expose the conductor layer with the appropriate photo tool and a

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Hg or Hg/Xe ultraviolet light source (365nm). The recommended exposure energy range is 100-300 ml/cm².

- Development
  - The development process is conducted in a conveyorized, spray development unit filled with 0.4wt% Na_2CO_3 at 25°C. Total development time will depend upon equipment design, spray pressure, and Micromax™ Fodel® paste thickness. The total cleaning time (TTC) for a dried, unexposed sample of the conductor should be determined. The exposed conductor sample should than be developed for 1.1-1.3x the TTC with spraying pressure of 0.15-0.25 Mpa. The samples should than be rinsed with water immediately after development, normally in the same piece of equipment. The excess water in then removed by blow-drying with ambient or warm air.
- Firing
  - The Micromax™ Fodel® S2139 fine line photo-imageable and co-firable silver conductor is normally fired in a belt furnace. A 60-minute firing cycle with a peak temperature of 850°C for 10 minutes is recommended. However, depending on the composition of green sheet, firing in a belt furnace at peak temperature of 870-900°C for 1h is also possible with a separate burn-out process in a box oven (400°C/2h) before firing.

Properites

- Information in this datasheet shows anticipated typical physical properties for Micromax™ Fodel® S2139 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

Paste should be stored in opaque containers, tightly sealed, in a clean, stable environment at room temperature (<25°C), and could be opened and handled in yellow safe light areas (Micromax™ Fodel® safe lighting). 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).

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