DuPont™ Fodel® 5989

PHOTOIMAGEABLE THICK-FILM PASTE

Technical Data Sheet

Product Description

DuPont™ Fodel® 5989 photoimageable thick-film paste gold conductor is an inner and top layer photoimageable thick film composition specially developed to be compatible with:

- Alumina
- DuPont 5704 dielectric
- Low-temperature cofire ceramic (LTCC), post -fired (LTCC-external use only)

Product Benefits

Fodel® 5989 gold conductor is compatible with Fodel® QM44F dielectric and conventional DuPont 5704 dielectric compositions. Fodel® 5989 conductor offers the following benefits:

- Precise conductor line edge acuity
- No screen printing pattern distortion
- Excellent wire bond interconnections
- Excellent line and space resolution
- Extremely high conductor and via density, when used with Fodel® QM44F dielectric

Processing

Storage

Fodel® 5989 gold conductor composition should be thoroughly mixed prior to use. Jar-rolling is not recommended. Paste must be stored in opaque containers and should be opened and handled in yellow safe light areas (Fodel® Safe Lighting).

Substrates

Properties were measured on 96% Alumina substrates. Substrates of other compositions and from various manufacturers may result in performance property variations.

Typical Fired Properties

Test	Properties
Line/Space Resolution (µm) (7-8µm fired thick)	40/50
Resistivity (mΩ/sq) [7-8µm fired thickness)	< 6
Wire Bond Performance[1] 1 mil Au thermosonic, ball (g) 1 mil Al ultrasonic, wedge (g) Aged 1 mil Al (g) (1.25 hours @ 315°C)	 10 12 6 - 7 No lifts
Fired Thickness (µm)	7-8
Composition Properties	
Viscosity (Pa.S) (Brookfield HBT utility cup &spindle#14, 10 rpm, 25°C)	40-100
Print Speed (cm/sec)	5-12 cm/sec
Coverage[2] (cm²/g)	75-85
Thinner	DuPont 9450

[1] Typical wire bond properties are based on laboratory test on DuPont QM44F and 96% Alumina substrates, using recommended processes and procedures
[2] Calculated at dry thickness of 17 µm

This table show anticipated typical physical properties for Fodel® 5989 based on specific controlled experiments in our labs and are not intended to represent the product specifications, details of which are available upon request.

Printing

Print a single conductor layer with a 280-mesh (30µm wire) or 325 mesh (28 µm wire) stainless steel screen. The thickness of the final fired conductor will be about 50% of the dried conductor thickness. The print speed is 5-12 cm/sec, using a single wet pass.

Drying

Allow the wet print to level for 5-10 minutes at room temperature. Dry for 15-25 minutes at 80°C. Higher drying temperatures or longer drying times will deactivate the photosensitive system.

Exposure

Expose the conductor layer (15-18 µm) dried thickness) with the appropriate photo tool and a Hg or Hg/Xe ultraviolet light source (365 nm.). The recommended exposure energy range is 450-1200 mJ/cm². This corresponds to a 30-75 second exposure on a high intensity (1kW) UV light source.

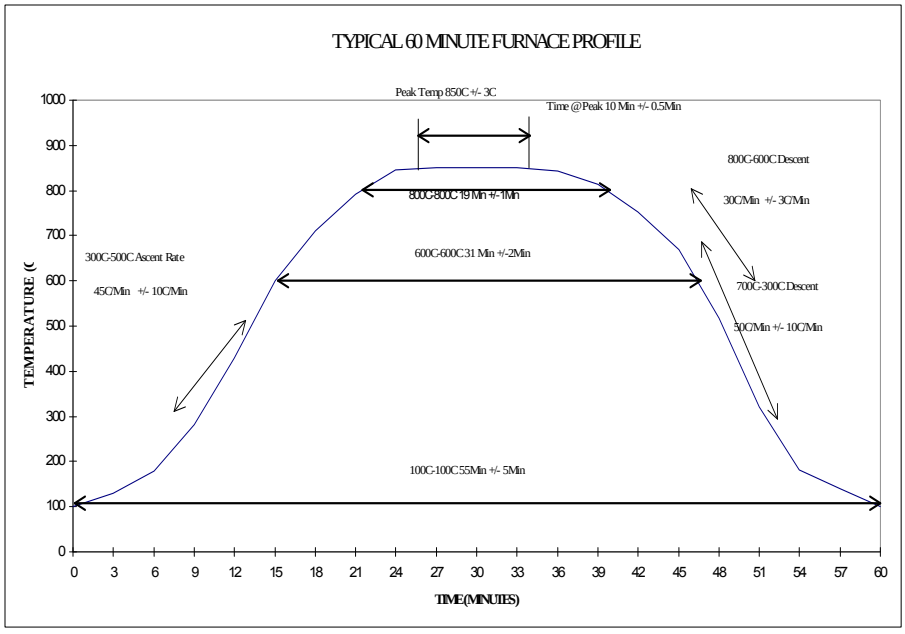
Development

The development process is conducted in a conveyorized, spray development unit filled with 0.8-1.0% Na_2CO_3 at 85°F (30°C). Total development time will depend upon equipment design, spray pressure, and Fodel® conductor thickness. The total cleaning time (TTC) for a dried, unexposed sample of the conductor should be determined. The exposed conductor samples should then be developed for 1.3-1.5 x the TTC. The samples should be rinsed with water immediately after development, normally in the same piece of equipment. The excess water is then removed by blow-drying with ambient or warm air.

Firing

DuPont™ Fodel® 5989 photoimageable thick-film paste is normally fired in a belt furnace. A 60-minutes firing cycle with a peak temperature of 850°C for 10 minutes is recommended (Figure 1).

Figure 1. Firing Profile
(Typical 850°C 60 minute Profile)



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Related Data Sheets

Fodel(®Safe Lighting
Fodel®Q170P silver/platinum conductor
Fodel®6778 silver conductor
Fodel® QM44F dielectric

Safety and Handling

For Safety and Handling information pertaining to this product, read the Material Safety Data Sheet (MSDS).

Caution: Do not use in medical applications involving implantation in the human body or contact with internal body fluids or tissue unless the product is provided by DuPont under a formal written contract consistent with the DuPont Policy Regarding Medical Applications of DuPont Materials H-50103-2 ("Medical Applications Policy") and which expressly acknowledges the contemplated use. For additional information, please request a copy of DuPont Medical Caution Statement H-50102-2 and the DuPont Medical Applications Policy.

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