

# DuPont™ Fodel® 6778

PHOTOIMAGEABLE THICK-FILM CONDUCTOR

## Technical Data Sheet

### Product Description

DuPont™ Fodel® 6778 is a photoimageable thick-film composition specially developed to be compatible on alumina substrates and GreenTape™ 951 Low-temperature Cofire Ceramic (LTCC).

### Product Benefits

- High density patterning
- Very low resistivity
- Good solderability
- Precise conductor line edge definition
- No screen printing pattern distortion

### Processing

#### Using Safe Lighting

To prevent accidental polymerization, handle 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 white 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). For additional information on Safe Lighting refer to Fodel® Design Guide.

### 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/µm) (8 - 9µm fired thick)	50/50
Resistivity (mΩ/sq)	1.5 - 2.5
Solder Acceptance <sup>1</sup> (%)	>95
Resistance to leaching <sup>2</sup>	3 cycles
Adhesion <sup>3</sup>	
Initial (Al <sub>2</sub> O <sub>3</sub> ) (N)	25
Aged (48hrs/150°C) (N)	25
Fired Thickness (µm)	8 - 10
<sup>1</sup> 62Sn/36Pb/2Ag, 220°C, 5 sec dip <sup>2</sup> 62Sn/36Pb/2Ag, 230°C, 10 sec dip <sup>3</sup> 62Sn/36Pb/2Ag, 220°C	
Composition Properties	
Viscosity (Pa•s) (Brookfield HBT, 10 RPM, UC&SP#14, 25°C)	40 - 100
Solids (%)	70.0 - 73.0
Coverage <sup>1</sup> , (cm <sup>2</sup> /g)	85 - 95
Thinner	DuPont 9450
<sup>1</sup> Calculated at dry thickness of 22µm	

This table shows anticipated typical physical properties for Fodel® 6778 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 200-mesh (40µm wire) or 280-mesh (30µm wire) stainless steel screen. The thickness of the final fired conductor will be about 45% of the dried conductor thickness. Ideal print speed is 2-3 in/ 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 temperature or longer drying times will deactivate the photosensitive system.

### Exposure

Expose the conductor layer (18-24 µm dried thickness) with the appropriate phototool and a Hg or Hg/Xe ultraviolet light source (365 nm.). The recommended exposure energy range is 500-1200 mJ/cm<sup>2</sup>. This corresponds to a 40-75 second exposure using a high intensity (1-kW) UV light source.

### Development

The development process is conducted in a conveyORIZED spray development unit filled with 0.8 - 1.0% Na<sup>2</sup>CO<sup>3</sup> at 85°F (30°C). Total development time will depend upon equipment design, spray pressure, and Fodel paste 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 1.3-1.8 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

The Fodel® 6778 photoimageable thick-film paste 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

### Related Documents

Fodel® Safe Lighting  
Fodel® Q170P platinum/silver conductor  
Fodel® 5989 silver conductor  
Fodel® QM44F dielectric

### Storage and Shelf Life

Fodel® 6778 silver conductor should be thoroughly mixed prior to use. Jar rolling is not recommended. Paste should be stored in opaque containers and should be opened and handled in yellow safe light areas (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 the Material Safety Data Sheet (MSDS).



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For more information on DuPont™ Fodel® 6778 photoimageable thick-film conductor or other DuPont Microcircuit Materials products, please contact your local representative:

Americas

DuPont Microcircuit Materials  
14 T.W. Alexander Drive  
Research Triangle Park, NC 27709  
Tel.: 800-284-3382

Europe

Du Pont (U.K.) Limited  
Coldharbour Lane  
Bristol BS16 1QD  
U.K.  
Tel.: 44-117-931-3191

Asia

DuPont Kabushiki Kaisha  
DuPont Electronic Center  
KSP R&D B213, 2-1, Sakado 3-chome, Takatsu-ku,  
Kawasaki-shi, Kanagawa, 213-0012, Japan

Tel.: +81-44-820-7575

DuPont Taiwan Ltd  
45, Hsing-Pont Road,  
Taoyuan, Taiwan 330  
Tel.: 886-3-377-3616

DuPont China Holding Co. Ltd  
Bldg 11, 399 Keyuan Rd., Zhangji Hi-Tech Park,  
Pudong New District, Shanghai 201203, China  
Tel.: 86-21-6386-6366 ext.2202

DuPont Korea Inc.  
3~5th Floor, Asia tower #726,  
Yeoksam-dong, Gangnam-gu  
Seoul 135-719, Korea  
Tel.: 82-10-6385-5399

E. I. DuPont India Private Limited  
7th Floor, Tower C, DLF Cyber Greens,  
Sector-25A, DLF City, Phase-III,  
Gurgaon 122 002 Haryana, India  
Tel.: 91-124-4091818

Du Pont Company (Singapore) Pte Ltd  
1 HarbourFront Place, #11-01  
HarbourFront Tower One,  
Singapore 098633  
Tel.: 65-6586-3022

<http://mcm.dupont.com>