MEGAPOSIT™ SPR™660 SERIES PHOTORESIST

For Microlithography Applications

Regional Product Availability

- North America
- Europe, Middle East and Africa
- Latin America
- Asia-Pacific

Description

SPR660 is an advanced i-Line photoresist designed for processing 0.350 micron features and larger. SPR660 performs in both line/space and contact hole applications and on a variety of substrates, including silicon, silicon dioxide, titanium nitride, and organic anti-reflectant coatings. The SPR660 product family includes a range of undyed dilutions as well as two dye loadings (low and medium) for improved processing over reflective surfaces.

Advantages

- Linear resolution
  - 0.325 µm over silicon substrate
  - <0.300 µm over anti-reflectant
- Wide process latitudes
  - DoF 1.5 µm for 0.400 µm lines/spaces
  - DoF 1.2 µm for 0.400 µm contact holes
- Capable of processing over silicon, silicon dioxide, titanium nitride and organic anti-reflectants
- Compatible with 0.24N and 0.26N developers
- 12-month shelf life

Lithography Performance

- Resolution
  - 0.325 µm for dense lines/spaces
  - 0.300 µm isolated lines
- Sizing Energy
  - 200 mJ/cm^2 for 0.325 µm dense lines/spaces
  - 200 mJ/cm^2 for 0.300 µm isolated lines
- Depth of Focus
  - 1.20 µm for 0.350 µm dense lines/spaces
  - 1.40 µm for 0.400 µm isolated lines

See *Figure 1* for lithographic performance and *Table 1* (next page) for recommended process conditions.

Figure 1. Masking Linearity

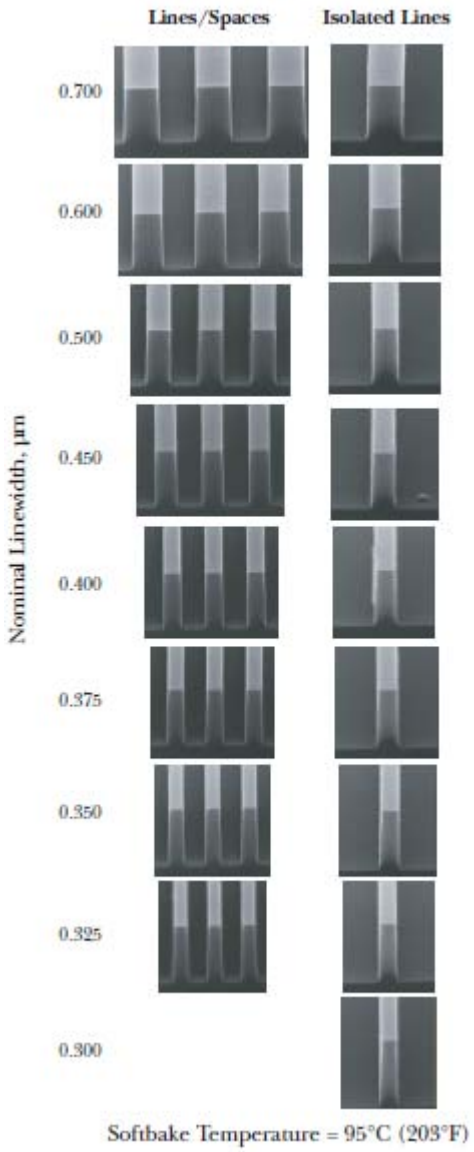


Table I. Recommended Process Conditions		
	Lines/Spaces	Lines/Spaces and Isolated Lies
Thickness	<12,000Å	>12,000Å
Softbake	90°C/90 sec. Proximity Hotplate	90°C/90 sec. Proximity Hotplate
PEB	110°C/90 sec. Proximity Hotplate	110°C/90 sec. Proximity Hotplate
Developer	MF™ CD-26 or MF-26A @ 21°C, 40 sec. single puddle	MF™ CD-26 or MF-26A @ 21°C, 60 sec. single puddle

Note: All data shown within this datasheet used the process conditions listed above unless otherwise stated.

Substrate

SPR660 is compatible with a wide range of substrates, including but not limited to silicon, SiO_2 and titanium nitride. A hexamethyldisilizane (HMDS) based MICROPOSIT™ primer is recommended to promote adhesion with substrates that require such treatment. Vacuum vapor priming at 120°C for 30 seconds with concentrated HMDS is recommended.

Coat

Figure 2 shows the relation between spin speed and resist thickness for silicon substrates. *Figure 3* shows this relation for SPR660 dyed resists. Nominal film thickness may vary slightly due to process, equipment, and ambient conditions.

Figure 2. Spin Speed Curves—Undyed SPR660 Photoresist

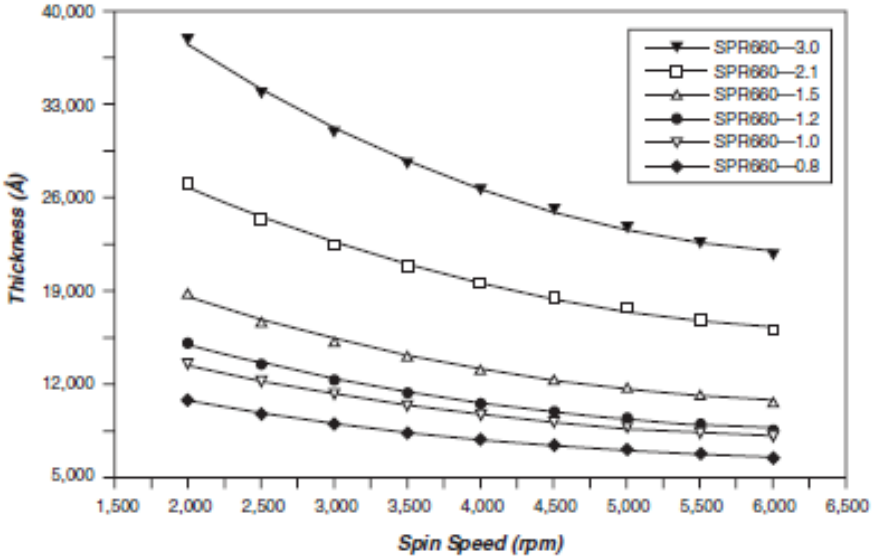
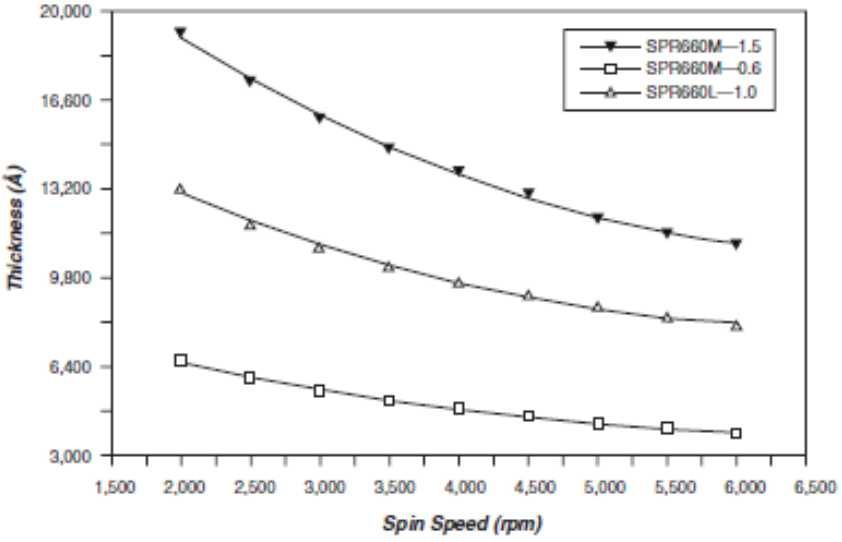


Figure 3. Spin Speed Curves—Dyed SPR660 Photoresist



Softbake

See *Table 2* for recommended softbake conditions.

Table 2. Softbake Process Conditions	
Temperature	90°C
Time	90 sec. Proximity Hotplate (150 µm) 60 sec. Contact Hotplate

Film Thickness Measurement

A resist thickness of 11,850Å was used to characterize the optical parameters shown in *Table 3* and *4*.

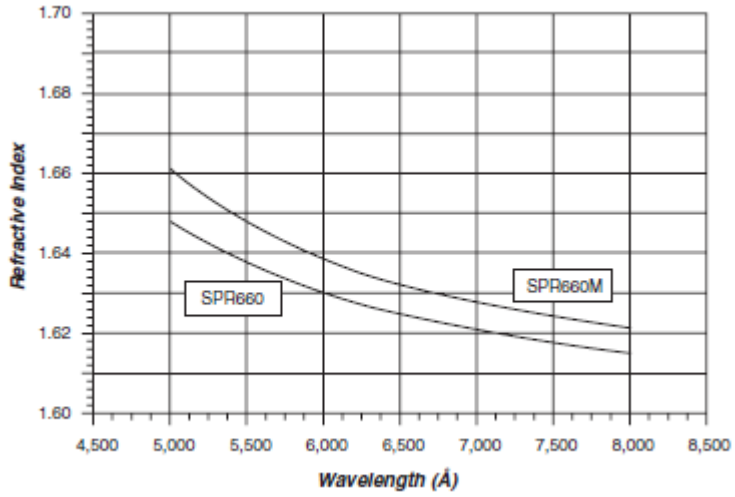
Table 3. Cauchy Coefficients			
	SPR660	SPR660L	SPR660M
n_1	1.5989	1.6308	1.6069
n_2	9.13e+5	-1.03e+6	6.52e+5
n_3	7.96e+12	4.50e+13	1.78e+13

Table 4. Cauchy Coefficients			
	SPR660	SPR660L	SPR660M
Dill A	0.7450	0.7200	0.7100
Dill B	0.0450	0.1850	0.3600

Expose

SPR660 is sensitive to i-Line exposure wavelengths. Dispersion curves are shown in *Figure 4*, for dyed and undyed SPR660.

Figure 4. Dispersion Curve



Post-Exposure Bake

The recommended PEB conditions for SPR660 on reflective and non-reflective substrates are listed in *Table 5*.

Table 5. PEB Process Conditions

	<12,000Å	>12,000Å
Temperature	110°C	110°C
Time	90 sec. Proximity Hotplate (150µm)	60 sec. Proximity Hotplate (150µm)

Develop

SPR660 is optimized for 0.26N developers. A 40-second single puddle with no pre-wet is recommended for most applications, including dense line/spaces, semi-dense lines/spaces, and isolated lines. Resist coatings above 1.2 microns should use a 60-second single spray puddle.

Photoresist Removal

SPR660 can be removed with MICROPOSIT REMOVER 1165. A two-bath process is recommended with each bath at a temperature of 80°C (176°F). The first bath removes the bulk of the photoresist and the second removes residual traces of photoresist. Please consult specific remover data sheets for additional process information.

Handling Precautions

Before using this product, associated generic chemicals or the analytical reagents required for its control, consult the supplier's Material Safety Data Sheet (MSDS)/Safety Data Sheet (SDS) for details on material hazards, recommended handling precautions and product storage.

CAUTION! Keep combustible and/or flammable products and their vapors away from heat, sparks, flames and other sources of ignition including static discharge. Processing or operating at temperatures near or above product flashpoint may pose a fire hazard. Use appropriate grounding and bonding techniques to manage static discharge hazards.

CAUTION! Failure to maintain proper volume level when using immersion heaters can expose tank and solution to excessive heat resulting in a possible combustion hazard, particularly when plastic tanks are used.

Storage

Store products in tightly closed original containers at temperatures recommended on the product label.

Disposal Considerations

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Dow Electronic Materials Technical Representative for more information.

Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products - from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

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