AZ® 1500 Photoresist
AZ® 1500 series positive photoresists are well established g-line and broad-band resists. Wide exposure latitude and good resolution and depth of focus improve yield and throughput. Various viscosity grades are available for a multitude of applications and dyed versions are engineered to control reflective notching. Resists of AZ’s 1500 series can be developed in a variety of metal ion free developers (with and without surfactants) using a spray/puddle process.

For high throughput batch processing in a tank, inorganic developers are an excellent alternative.
AZ® 1500 Photoresist Products

AZ® 1500 Photoresist
  AZ® 1505
  AZ® 1512
  AZ® 1518
  AZ® 1529

AZ® 1500-SFD Photoresist
  AZ® 1512-SFD
  AZ® 1518-SFD
### AZ® 1500 Photoresist

**g-line Resolution at Specific Film Thickness**

<table>
<thead>
<tr>
<th>Film Thickness (µm)</th>
<th>Resolution (µm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ® 1505</td>
<td>0.5</td>
</tr>
<tr>
<td>AZ® 1512</td>
<td>0.6</td>
</tr>
<tr>
<td>AZ® 1518/1518-SFD</td>
<td>0.7</td>
</tr>
<tr>
<td>AZ® 1512-SFD</td>
<td>0.8</td>
</tr>
<tr>
<td>AZ® 1518/1518-SFD</td>
<td>0.9</td>
</tr>
<tr>
<td>AZ® 1512-SFD</td>
<td>1.0</td>
</tr>
<tr>
<td>~</td>
<td>~</td>
</tr>
<tr>
<td>~</td>
<td>1.5</td>
</tr>
<tr>
<td>~</td>
<td>~</td>
</tr>
<tr>
<td>AZ® 1529</td>
<td>2.0</td>
</tr>
</tbody>
</table>

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## AZ® 1500 Photoresist

<table>
<thead>
<tr>
<th>AZ® 1505</th>
<th>Lift off process for patterning MR stripe</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ® 1512</td>
<td>Good process latitude in <strong>g-line</strong>, and broad band&lt;br&gt;Excellent for wet etch processes</td>
</tr>
<tr>
<td>AZ® 1518</td>
<td>Good process latitude in <strong>g-line</strong>, and broad band&lt;br&gt;Excellent for wet etch processes&lt;br&gt;Thicker film for increased etch resistance</td>
</tr>
<tr>
<td>AZ® 1529</td>
<td>Great for pad layer applications&lt;br&gt;Can be coated from 2.5 to 5µm&lt;br&gt;Ideal for plating processes</td>
</tr>
<tr>
<td><strong>AZ® 1500-SFD Photoresist</strong></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>AZ® 1512-SFD</strong></td>
<td></td>
</tr>
<tr>
<td>Dyed version</td>
<td></td>
</tr>
<tr>
<td>Suppresses swing and reflective notching effects on substrates with high or varying reflectivity, e.g. metals and contacts</td>
<td></td>
</tr>
<tr>
<td><strong>AZ® 1518-SFD</strong></td>
<td></td>
</tr>
<tr>
<td>Dyed version</td>
<td></td>
</tr>
<tr>
<td>Higher film thickness, can be coated from 1.5 – 3µm</td>
<td></td>
</tr>
<tr>
<td>Suppresses swing and reflective notching effects on substrates with high or varying reflectivity, e.g. metals and contacts</td>
<td></td>
</tr>
</tbody>
</table>
### AZ® 1500 Resist

#### Recommended Process Conditions

<table>
<thead>
<tr>
<th>Process</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Soft Bake:</strong></td>
<td>90-100°C for 30-60sec (hotplate)</td>
</tr>
<tr>
<td><strong>Exposure:</strong></td>
<td>g-line or broadband</td>
</tr>
<tr>
<td><strong>Post Exposure bake:</strong></td>
<td>optional</td>
</tr>
<tr>
<td><strong>Developer:</strong></td>
<td>AZ® 300MIF Developer</td>
</tr>
<tr>
<td></td>
<td>AZ® 917 MIF Developer</td>
</tr>
<tr>
<td></td>
<td>AZ® 1:1 Developer</td>
</tr>
<tr>
<td><strong>Develop Cycle:</strong></td>
<td>30-50sec spray@ 100-200rpm or 60-120sec immersion @ 23±1°C</td>
</tr>
</tbody>
</table>
Spin Speed Curve for AZ® 1500 Resist Products

6” silicon wafers
Static dispense
SB: 100°C/60sec
Summary

g-Line Performance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>1µm L/S</th>
<th>0.9µm L/S</th>
<th>1µm Trench</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of Focus</td>
<td>1.8µm</td>
<td>1.8µm</td>
<td>2.4µm</td>
</tr>
<tr>
<td>Exposure Latitude</td>
<td>20%</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>Dose to Print (DTP)</td>
<td>319mJ/cm²</td>
<td>339mJ/cm²</td>
<td>339mJ/cm²</td>
</tr>
<tr>
<td>Resolution</td>
<td></td>
<td>0.9µm</td>
<td>0.8µm</td>
</tr>
</tbody>
</table>
# AZ® 1500 Photoresist

## Optical Parameters

### Refractive Index

<table>
<thead>
<tr>
<th></th>
<th>Bleached</th>
<th></th>
<th>405nm</th>
<th></th>
<th>435nm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n</strong></td>
<td>1.6994</td>
<td>1.6714</td>
<td>1.6571</td>
<td></td>
<td></td>
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<tr>
<td><strong>k</strong></td>
<td>0.0058</td>
<td>0.0010</td>
<td>0.0003</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Unbleached</th>
<th></th>
<th>405nm</th>
<th></th>
<th>435nm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n</strong></td>
<td>1.7123</td>
<td>1.6906</td>
<td>1.6948</td>
<td></td>
<td></td>
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<tr>
<td><strong>k</strong></td>
<td>0.0358</td>
<td>0.0336</td>
<td>0.0227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AZ® 1500 Photoresist
Optical Parameters

◊ Dill Parameters

<i-line>: 
A = 1.0133 (µm⁻¹)  
B = 0.2177 (µm⁻¹)  
C = 0.0239 (cm²/mJ)

<g-line>: 
A = NA  
B = NA  
C = NA

◊ Cauchy Coefficients

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleached</td>
<td>1.5966</td>
<td>0.003758</td>
<td>2.45E⁻⁰³</td>
</tr>
<tr>
<td>Unbleached</td>
<td>1.5996</td>
<td>0.013498</td>
<td>1.90E⁻⁰⁴</td>
</tr>
</tbody>
</table>
AZ® 1500-SFD Photoresist
Optical Parameters

◊ Refractive Index

<table>
<thead>
<tr>
<th></th>
<th>365nm</th>
<th>405nm</th>
<th>435nm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bleached</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>1.6947</td>
<td>1.6665</td>
<td>1.6503</td>
</tr>
<tr>
<td>k</td>
<td>0.0058</td>
<td>0.0021</td>
<td>0.0047</td>
</tr>
<tr>
<td><strong>Unbleached</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>1.7057</td>
<td>1.6822</td>
<td>1.6846</td>
</tr>
<tr>
<td>k</td>
<td>0.0337</td>
<td>0.0327</td>
<td>0.0257</td>
</tr>
</tbody>
</table>
AZ® 1500-SFD Photoresist
Optical Parameters

◊ Dill Parameters

**i-line:**
- \( A = 0.9765 \, (\mu m^{-1}) \)
- \( B = 0.2037 \, (\mu m^{-1}) \)
- \( C = 0.0254 \, (cm^2/mJ) \)

**g-line:**
- \( A = 0.48 \, (\mu m^{-1}) \)
- \( B = 0.265 \, (\mu m^{-1}) \)
- \( C = 0.0223 \, (cm^2/mJ) \)

◊ Cauchy Coefficients

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleached</td>
<td>1.5933</td>
<td>0.007923</td>
<td>1.39E-03</td>
</tr>
<tr>
<td>Unbleached</td>
<td>1.6028</td>
<td>0.002763</td>
<td>5.21E-03</td>
</tr>
</tbody>
</table>
AZ® 1500-SFD Photoresist
Optical Parameters - Absorptivity
AZ® 1512 Photoresist
Resolution for Dense Lines, FT = 1.21 µm

Focus –0.4µm
SB: 95°/ 50sec; PEB 105°C/50 sec
GCA 0.42NA g-line stepper, 70 mJ/cm²
AZ® 327 MIF developer, 40 sec spray/puddle @ 21°C
AZ® 1512 Photoresist
DOF for 1.3 µm Dense Lines, FT = 1.21 µm

SB: 95°/ 50sec; PEB 105°C/50 sec
GCA 0.42NA g-line stepper, 70 mJ/cm²
AZ® 327 MIF developer, 40 sec spray/puddle @ 21°C
AZ® 1518-SFD Photoresist
Exposure Latitude for Dense Lines, FT = 2.22 µm

SB: 100°/ 60sec; PEB 110°C/60 sec
GCA 0.42NA g-line stepper
AZ® 425 MIF developer
AZ® 1518-SFD Photoresist
Linearity/Resolution - Dense Lines, FT = 2.32µm

SB : 95°C for 60sec contact
Exposure : GCA 0.42 NA g-line stepper, 319 mJ/cm²
PEB : 115°C for 60sec contact
Develop: AZ® 917 MIF Developer / Single puddle for 60 sec @ 21.0°C

AZ Electronic Materials
AZ® 1518-SFD Photoresist
Exposure Latitude – 1.0 µm Dense Lines, FT = 2.32µm

260 mJ/cm²
270 mJ/cm²
280 mJ/cm²
290 mJ/cm²

319 mJ/cm²
310 mJ/cm²
300 mJ/cm²

SB : 95°C for 60sec contact
Exposure : GCA 0.42 NA g-line stepper
PEB : 115°C for 60sec contact
Develop: AZ® 917 MIF Developer / Single puddle for 60 sec @ 21.0°C
AZ® 1518-SFD Photoresist
Exposure Latitude - 0.9 µm Dense Lines, FT = 2.32µm

280 mJ/cm²  290 mJ/cm²  300 mJ/cm²

310 mJ/cm²

339 mJ/cm²  329 mJ/cm²  319 mJ/cm²

SB : 95°C for 60sec contact
Exposure : GCA 0.42 NA g-line stepper
PEB : 115°C for 60sec contact
Develop: AZ® 917 MIF Developer/ Single puddle for 60 sec @ 21.0°C

AZ Electronic Materials
AZ® 1518-SFD Photoresist
DOF for 1.0 µm Dense Lines, FT = 2.32µm

SB : 95°C for 60sec contact
Exposure : GCA 0.42 NA g-line stepper, 319 mJ/cm²
PEB : 115°C for 60sec contact
Develop: AZ® 917 MIF Developer/Single puddle for 60 sec @ 21.0°C
AZ® 1518-SFD Photoresist
DOF for 0.9 µm Dense Lines, FT = 2.32µm

1.20 µm  0.90 µm  0.60 µm

-0.60 µm  -0.30 µm  0.00 µm

SB : 95°C for 60sec contact
Exposure : GCA 0.42 NA g-line stepper, 339 mJ/cm²
PEB : 115°C for 60sec contact
Develop: AZ® 917 MIF Developer / Single puddle for 60 sec @ 21.0°C

AZ Electronic Materials
AZ® 1518-SFD Photoresist

Exp. Latitude – 1.0 µm Trench – Pitch 1:2, FT = 2.32µm

SB: 95°C for 60sec contact
Exposure: GCA 0.42 NA g-line stepper
PEB: 115°C for 60sec contact

Develop: AZ® 917 MIF Developer/ Single puddle for 60 sec @ 21.0°C

AZ Electronic Materials
AZ® 1518-SFD Photoresist

DOF for 1.0 µm Trench – Pitch 1:2, FT = 2.32µm

1.50 µm  1.20 µm  0.90 µm  0.60 µm  0.30 µm

SB : 95°C for 60sec contact
Exposure : GCA 0.42 NA g-line stepper, 339 mJ/cm²
PEB : 115°C for 60sec contact
Develop: AZ® 917 MIF Developer/ Single puddle for 60 sec @ 21.0°C

AZ Electronic Materials
AZ® 1518-SFD Photoresist

Linearity - 1.0 µm Trench – Pitch 1:2, FT = 2.32µm

1.50 µm  1.35 µm  1.20 µm  1.10 µm  1.00 µm

0.90 µm

0.65 µm  0.70 µm  0.75 µm  0.80 µm  0.85 µm

SB : 95°C for 60sec contact
Exposure : GCA 0.42 NA g-line stepper, 339 mJ/cm²
PEB : 115°C for 60sec contact
Develop: **AZ® 917 MIF Developer**/ Single puddle for 60 sec @ 21.0°C

AZ Electronic Materials
AZ® 1529 Photoresist
Thermal Stability - Large Pads

Film Thickness: 3.5µm
SB: 95°C for 25min convection oven
Exposure: Ultratech 1500 stepper
Develop: AZ® Developer (diluted to 0.21N)
Hardbake: 2min hot plate
AZ® 1518-SFD Photoresist

g-line Performance

in AZ® 425 MIF and AZ® 917 MIF Developer
AZ® 1518-SFD Photoresist

Exp. Latitude for 1.30 µm Dense Lines, FT = 1.825 µm

SB : 100°C for 60sec contact
Exposure : GCA 0.42 NA g-line stepper
PEB : 110°C for 60sec contact

Develop: AZ® 917 MIFDeveloper / Single puddle for 60 sec @ 21°C

AZ Electronic Materials
AZ® 1518-SFD Photoresist
Linearity - Dense Lines, FT = 2.32 µm

SB : 95°C for 60sec contact
Exposure : GCA 0.42 NA g-line stepper, 339 mJ/cm²
PEB : 115°C for 60sec contact
Develop: AZ® 917 MIF Developer/ Single puddle for 60 sec @ 21.0°C

AZ Electronic Materials
AZ® 1518-SFD Photoresist
Exposure Latitude for 1.0 µm Dense Lines, FT = 2.32 µm

270 mJ/cm²

280 mJ/cm²

290 mJ/cm²

300 mJ/cm²

329 mJ/cm²

319 mJ/cm²

310 mJ/cm²

SB : 95°C for 60sec contact
Exposure : GCA 0.42 NA g-line stepper
PEB : 115°C for 60sec contact
Develop: AZ® 917 MIF Developer/ Single puddle for 60 sec @ 21.0°C
AZ® 1518-SFD Photoresist
DOF for 1.0 µm Dense Lines, FT = 2.32 µm

SB : 95°C for 60sec contact
Exposure : GCA 0.42 NA g-line stepper, 319 mJ/cm²
PEB : 115°C for 60sec contact
Develop: AZ® 917 MIF Developer/ Single puddle for 60 sec @ 21.0°C
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SB : 95°C for 60sec contact
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