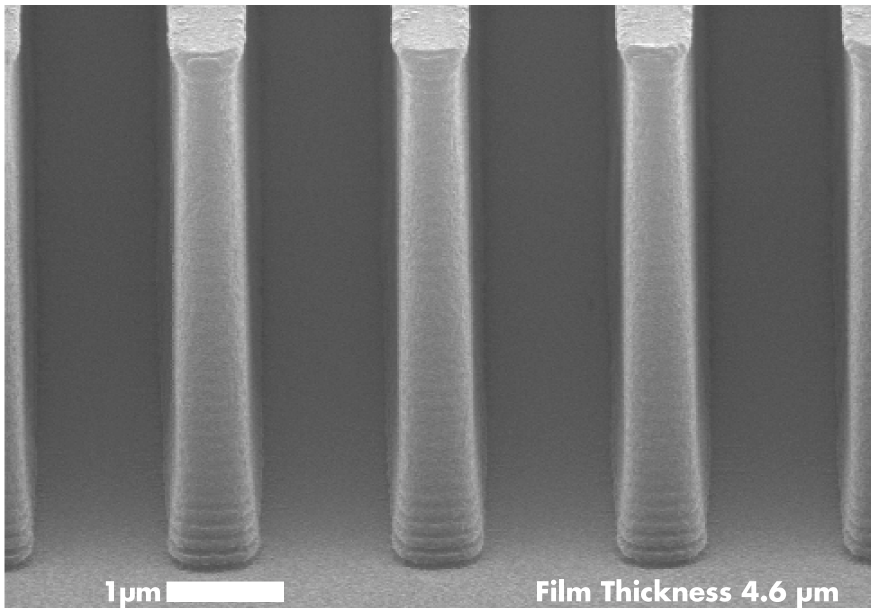


AZ® 9200 Photoresist

High-Resolution Thick Resist

AZ® 9200 thick film photoresist is designed for the more demanding higher-resolution thick resist requirements. It provides high resolution with superior aspect ratios, as well as wide focus and exposure latitude and good sidewall profiles. AZ® 9200 photoresist is available in two viscosity grades for film thicknesses of 4 to 24 µm. Critical dimension resolutions range from < 1 µm lines and spaces at a film thickness of 4.6 µm, to 3.5 µm lines and spaces at a film thickness of 24 µm on silicon using today's standard broadband exposure tools. Aspect ratios of 5 – 7 can be achieved.

Under the guidance of leading thin film recording head manufacturers, AZ® 9200 photoresist is optimized for both coil plating and top pole recording head applications.

AZ® 9200 photoresist can be used as a higher resolution replacement for AZ® P4000 photoresist. It can be processed on the same exposure tools using similar processing conditions; it is developed from the same chemistry and has similar curing, electrical and thermal properties.

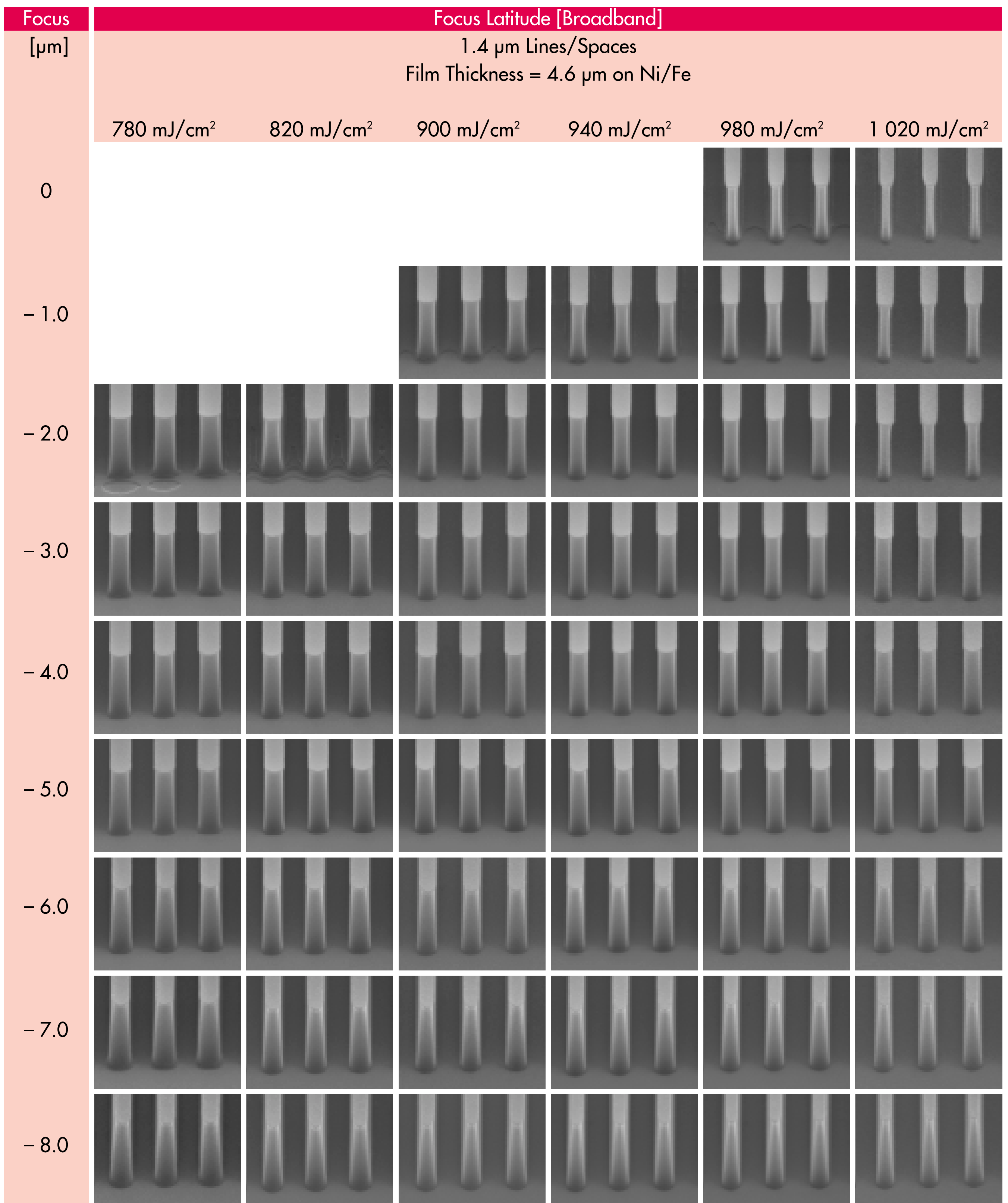
Sensitivity to both h- and i-line makes AZ® 9200 photoresist capable for both broadband and i-line steppers.

Recommended developers are inorganic based upon potassium hydroxide. The preferred developer is AZ® 400K Developer 1:4, a buffered developer designed to maximize bath life and process stability. For integrated circuit applications, TMAH developers such as AZ® 300 MIF developer can be used.

Clariant

Linewidth [μm]	Linearity [Broadband] Film Thickness = 4.6 μm on Ni/Fe					
	780 mJ/cm²	820 mJ/cm²	900 mJ/cm²	940 mJ/cm²	980 mJ/cm²	1 020 mJ/cm²
2.0						
1.40						
1.20						
1.10						
1.0						
0.95						
0.90						
0.80						

Softbake Hotplate 110°C, 120 sec
Exposure Ultratech Model 1500 stepper, 0.315 NA
Focus = –5 μm
AZ® 400K Developer 1:4, 180 sec spray at 27°C



Softbake Hotplate 110°C, 120 sec
Exposure Ultratech Model 1500 stepper, 0.315 NA
AZ® 400K Developer 1:4, 180 sec spray at 27°C

Linearity and Latitude [Broadband]

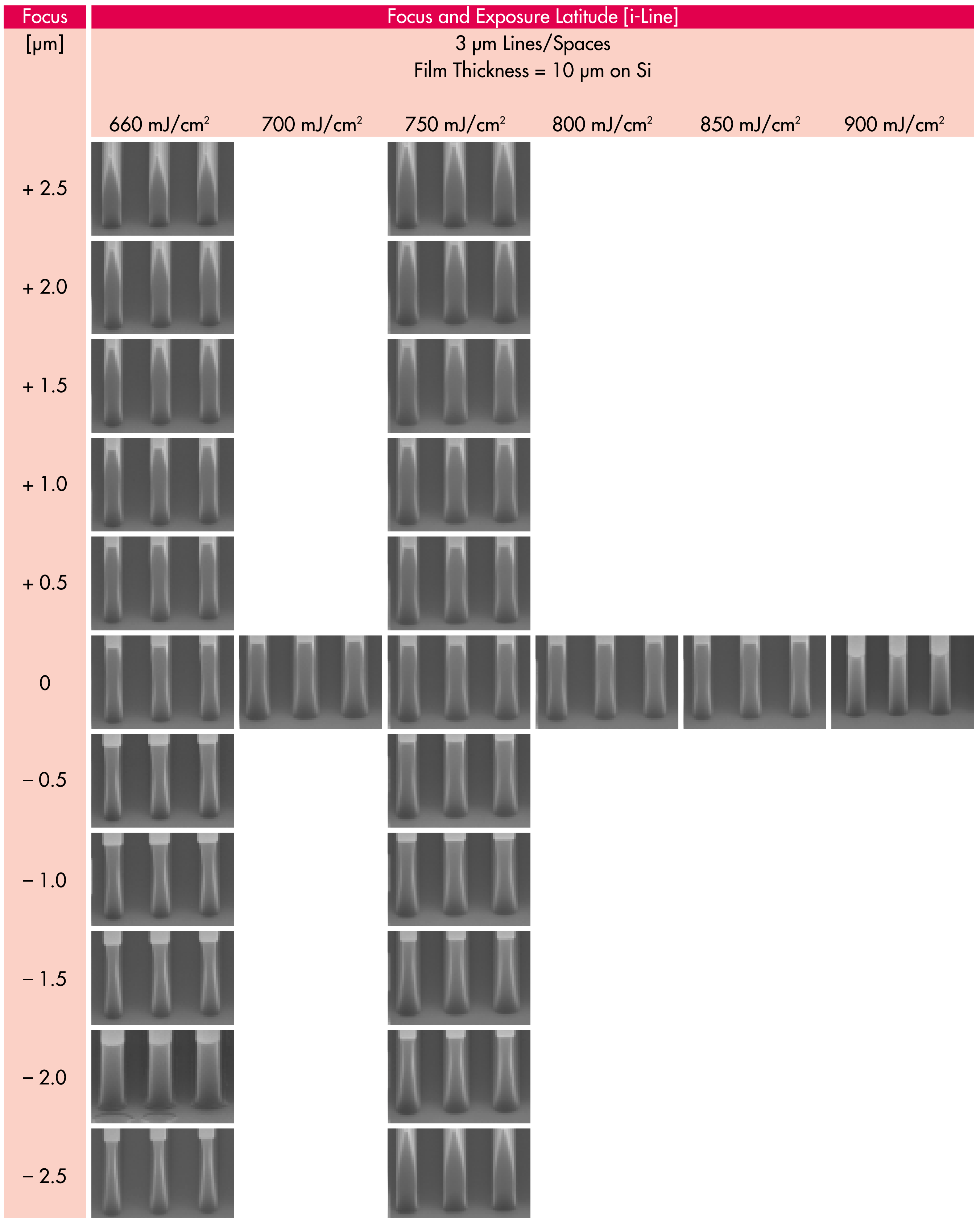
6 µm Lines/Spaces

Film Thickness = 24 µm on Si

Linewidth [µm]	1 850 mJ/cm²
8.0	
7.0	
6.0	
5.0	
4.0	
3.5	

Focus [µm]	1 850 mJ/cm²	2 030 mJ/cm²	2 210 mJ/cm²
+ 1			
– 1			
– 3			
– 5			
– 7			
– 9			
– 11			
– 13			

Softbake Hotplate 110°C, 240 sec
Exposure Ultratech Model 1500 stepper, 0.315 NA
AZ® 400K Developer 1:4, 260 sec spray at 27°C



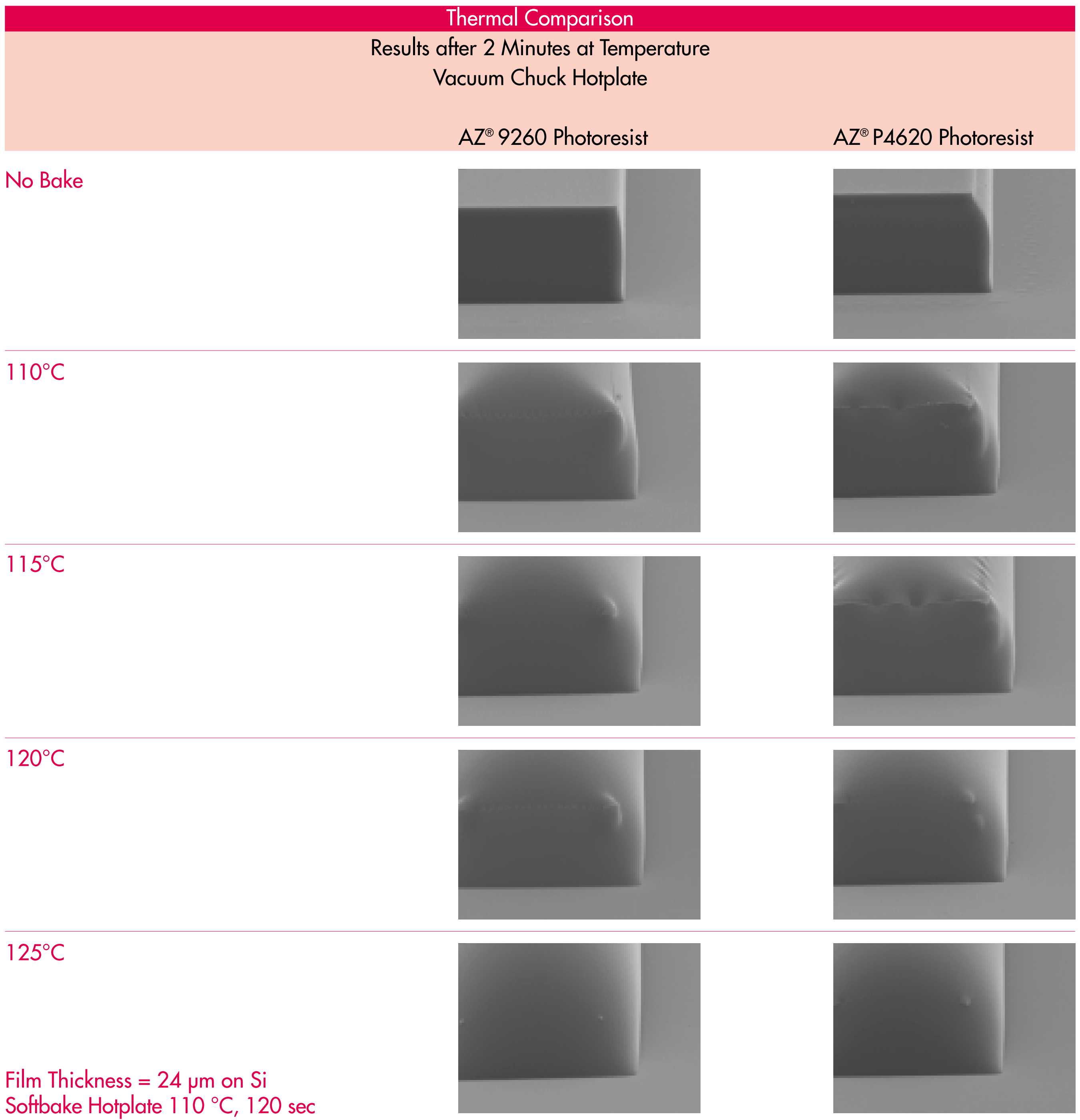
Softbake Hotplate 90°C, 155 sec
Exposure NIKON® i-line stepper, 0.54 NA
AZ® 300 MIF Developer, 360 sec spray at 22°C

Typical Process for 4.6 µm Film Thickness [AZ® 9245 Photoresist (220 CPS)]	
Coat	Dispense: static or dynamic @ 300 rpm Spin: 3 800 rpm, 60 sec
Softbake	110 °C, 120 sec hotplate
Edge Bead Removal	Rinse: 500 rpm, 10 sec Dry: 1 000 rpm, 10 sec
Exposure (10% bias)	900 mJ/cm^2, broadband stepper
Post Exposure Bake	not recommended in most applications
Development	AZ® 400K Developer 1:4, 120 sec spray Dispense temp. 27 °C Rinse: 300 rpm, 20 sec. Dry: 4 000 rpm, 15 sec.

Typical Process for 10 µm Film Thickness [AZ® 9260 Photoresist (520 CPS)]	
Coat	Dispense: static or dynamic @ 300 rpm Spin: 2 400 rpm, 60 sec
Softbake	110 °C, 165 sec hotplate
Edge Bead Removal	Rinse: 500 rpm, 10 sec Dry: 1 000 rpm, 10 sec
Exposure (10% bias)	1 500 mJ/cm^2, broadband stepper
Post Exposure Bake	not recommended in most applications
Development	AZ® 400K Developer 1:4, 180 sec spray Dispense temp. 27°C Rinse: 300 rpm, 20 sec. Dry: 4 000 rpm, 15 sec.

Typical Process for 24 µm Film Thickness [AZ® 9260 Photoresist (520 CPS)]	
First Coat	Target: 10 µm film thickness Dispense: static or dynamic @ 300 rpm Spin: 2 400 rpm, 60 sec
Edge Bead Removal	Rinse: 500 rpm, 10 sec Dry: 1 000 rpm, 10 sec
First Softbake	110 °C, 80 sec hotplate
Second Coat	Target: 24 µm total film thickness Dispense: static or dynamic @ 300 rpm Spin: 2 100 rpm, 60 sec
Edge Bead Removal	Rinse: 500 rpm, 10 sec Dry: 1 000 rpm, 10 sec
Second Softbake	110 °C, 160 sec hotplate
Exposure Dose (10% bias)	2 100 mJ/cm^2, broadband stepper
Post Exposure Bake	not recommended in most applications
Development	AZ® 400K Developer 1:4, 260 sec spray Dispense temp. 27°C Rinse: 300 rpm, 20 sec. Dry: 4 000 rpm, 15 sec.

Note: Recommendations on single-coat 24 µm processes are also available



Film Thickness	2 000 rpm	2 500 rpm	3 000 rpm	3 500 rpm
AZ® 9245 Photoresist 220 cP	6,60 µm	5,80 µm	5,20 µm	4,80 µm
AZ® 9260 Photoresist 520 cP	11,40 µm	9,60 µm	8,80 µm	7,90 µm

Electrical Properties	200 °C	225 °C	250 °C
Dielectric Constant	4.03	4.37	4.90
Breakdown Voltage (v/µm)	694	642	600

Modeling Parameters			
Cauchy Coefficients (unexposed)	N_1 = 1.61406	N_2 = – 0.00087 μm^2	N_3 = – 0.00196 μm^4
Cauchy Coefficients (exposed)	$N_{1'}$ = 1.60843	$N_{2'}$ = +0.00994 μm^2	$N_{3'}$ = – 0.00165 μm^4

Companion Products

Developers: AZ® 400K Developer 1:4 is the recommended developer for thick films of AZ® 9200 photoresist. This developer may be used for both spray and immersion development processes. AZ® 400K is a buffered potassium-based developer that provides the process latitude associated with inorganic developers while minimizing the risk associated with mobile ion contamination.

AZ® 300 MIF Developer, a standard non-surfactant TMAH developer, can be used with AZ® 9200 photoresist for high resolution IC applications.

Strippers: AZ® 400T and 300T strippers are recommended for removal of AZ® 9200 photoresist. AZ® S-46 stripper is a non-NMP sovent stripper particularly suited to thin film recording head applications.

Edge Bead Removers: AZ® EBR 70/30 and AZ® EBR solvent are recommended for AZ® 9200 photoresist for both front- and back-side edge bead removal.

Solvent Safety

AZ® 9200 photoresist is formulated with propylene glycol monomethyl ether acetate (PGMEA), a safer solvent patented by Hoechst Celanese Corp. for use in photoresists (U.S. patent number 4,550,069). This is one of the safest and most thoroughly tested solvents in the industry.

Equipment Compatibility

AZ® 9200 photoresist is compatible with all commercially available wafer and photomask processing equipment. Recommended materials of construction include stainless steel, glass, ceramic, PTFE, polypropylene, and high-density polyethylene.

Storage

Keep in sealed original container. Protect from light and heat. Store between 30 and 70°F (–1 to 24°C). Refrigerate whenever possible. Refrigeration may extend shelf life. Empty container may contain harmful residue and vapors.

Handling Precautions
First Aid

Refer to the current Material Safety Data Sheet (MSDS) for detailed information prior to handling.

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