SHIPLEY MEGAPOSIT® SPR®3000 PHOTO RESIST

Introduction

SPR®3000 positive multi-wavelength photoresist delivers wide process latitude and high throughput over a wide range of exposure wavelengths (g-, h-, and i-Line) for mix'n'match and broadband applications.

Features

- Design rules ≥ 0.6 µm
- Versatile across g-, h-, and i-Line wavelengths in multiple developer families to extend the life of existing equipment
- Wide process latitude for improved yield
- High throughput for reduced cost of ownership

Baseline Process Conditions

Thickness	0.8–1.7 µm
Softbake	95°C/60 sec. Contact Hotplate
Exposure	As indicated
PEB	115°C/60 sec. Contact Hotplate
Develop	As indicated, 60 sec. SP at 21°C

Cauchy Coefficients

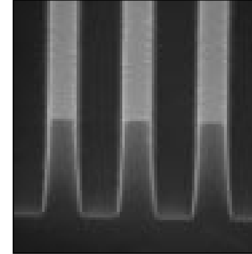
	n_1	n_2	n_3
SPR3012	1.6041	1.639e+06	-3.285e+09
SPR3012L	1.6070	1.816e+06	1.107e+10
SPR3015M	1.5983	1.601e+06	-1.173e+10

Dill Parameters SPR3012

λ (nm)	A (μm^{-1})	B (μm^{-1})
365	0.948	0.061
405	1.090	0.028
436	0.597	0.019

Multi-wavelength Flexibility

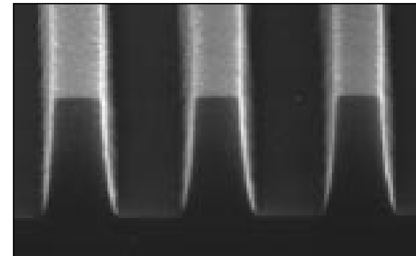
GCA XLS 7500 Stepper
i-Line



0.35 µm Lines/Spaces

FT:	0.97 µm
NA:	0.55
E_S:	140 mJ/cm^2
Developer:	MF-701

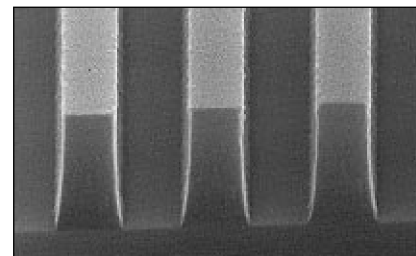
Ultratech® 1000 Stepper
Broadband (390 nm–450 nm)



0.65 µm Lines/Spaces

FT:	1.17 µm
NA:	0.34
E_S:	171 mJ/cm^2
Developer:	MF-319

GCA ALS 200 Stepper
g-Line



0.60 µm Lines/Spaces

FT:	1.17 µm
NA:	0.42
E_S:	182 mJ/cm^2
Developer:	MF-319

SPR® 3000

Lithographic Capability Summary

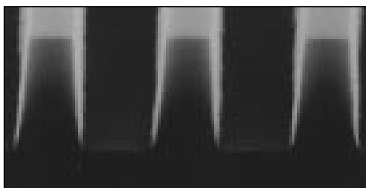
Application/ Developer Name			Nominal CD (μm)	Sizing Energy (mJ/cm²)	E_S/E_0 Ratio	Masking Linearity (μm)	Focus Latitude† (μm)	Exposure Latitude § (%)
SPR 3012	i-Line	MF-319	0.500	114	1.84	0.375	1.50	35.1
SPR 3012	i-Line	MF-320	0.500	84	1.65	0.375	1.50	29.4
SPR 3012	i-Line	MF CD-26	0.500	90	1.80	0.375	150-1.65	37.4
SPR 3012	i-Line	MF-503	0.500	128	2.10	0.350	1.50	41.4
SPR 3012	i-Line	MF-701	0.500	136	2.03	0.350	≥ 1.50	30.9
			0.400	135	2.01	0.350	1.20	25.9
			0.375	137	2.04	0.350	1.00	16.8
SPR 3012	g-Line	MF-319	0.800	182	1.72	0.600	≥ 3.20	37.2
			0.700	179	1.69	0.600	3.00	27.4
			0.650	179	1.69	0.600	2.20	17.3
SPR 3012	g-Line	MF-320	0.800	160	1.88	0.600	≥ 3.20	31.3
			0.700	160	1.88	0.600	≥ 2.80	25.6
			0.650	160	1.88	0.600	2.20	20.0
SPR 3012	g-Line	MF CD-26	0.800	135	1.55	0.650	≥ 3.20	≥ 29.6
			0.700	135	1.55	0.650	2.40	22.2
SPR 3012	g-Line	MF-503	0.800	195	1.81	0.600	≥ 4.50	36.9
			0.700	196	1.81	0.600	3.30	32.7
			0.650	196	1.81	0.600	3.00	23.5
SPR 3012	Ultratech®	MF-319	0.800	166	1.60	0.650	≥ 4.00	32.7
			0.700	164	1.58	0.650	3.00	25.6
SPR 3012	Ultratech®	MF-320	0.800	123	1.58	0.650	2.50	30.9
			0.700	124	1.59	0.650	2.00	18.5
SPR 3012L	i-Line	MF-319	0.500	117	1.95	0.375	1.50	38.5
SPR 3012L	g-Line	MF-319	0.800	227	2.00	0.550	≥ 3.20	37.4
			0.700	224	1.98	0.550	≥ 3.20	31.3
			0.650	221	1.96	0.550	≥ 3.20	24.8
SPR 3017M	i-Line	MF-319	0.800	259	1.79	0.500	1.50	33.2
SPR 3017M	g-Line	MF-319	1.000	357	1.79	0.700	3.30	31.6
			0.900	358	1.79	0.700	3.00	29.2
			0.800	356	1.79	0.700	2.70	22.8

*Masking Linearity: Reported at best focus and noted sizing energy. Reported value is the smallest resolved feature with a linear fit that remains ±10% of the nominal CD.

†Focus Latitude: Maximum focal range where full film thickness is maintained, and CDs are within ±10% of the target CD.

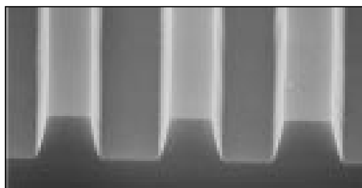
§Exposure Latiude: CD vs. exposure is plotted and a curve fit is applied. Exposure latitude is calculated at ±10% of the target CD.

0.60 μm



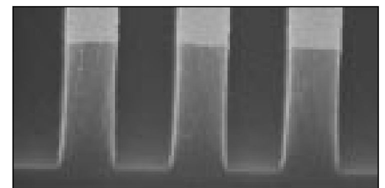
FT: 0.97 μm Exp: Ultratech 2244i Stepper (0.31 NA)

1.5 μm



FT: 1.18 μm Exp: Perkin Elmer 500 UV4, Aperture 4

0.475 μm



FT: 1.17 μm Exp: Nikon (0.54 NA)