

Date : 13 - 11 - 96

To : Alcatel - Mietec, Oudenaarde, Belgium.
 Attn : Mr L. Schlegel, Mr D. Van Hecke, Ms R. Vercaemst
 cc : Mr I. Borde, Mr F. LeRoy

Canon : Mr Sugimori - Mgr, Mr Fisher - Mgr

ENGINEERING COMMUNICATION SHEET

Subject : Lens performance @0.35um on Canon FPA-3000i4 - Stepper #8

Background

As part of the acceptance test criteria for Canon FPA-3000i4 in Mietec, it is necessary to demonstrate the performance of the lens on 0.35um CD. The tests required are of CD Depth of Focus, Wall Angle Depth of Focus, Linewidth Repeatability within Field and Wafer, Proximity Effect of Dense and Isolated Lines and CD Linearity from 0.35 to 1.00um. Specifications for these tests are from Mietec Specification for Canon FPA-3000i4. The machine is set to its standard configuration for these tests of NA = 0.63, $\sigma = 0.65$, and Normal Illumination Mode.

Procedure

For CD and Wall Angle DOF, a sample wafer of 9 points of the lens within 20mm was prepared at a dose to give 0.35um. The resist used was JSR IX825. The depth of focus range of horizontal and vertical lines, top and bottom CD was examined at each of the nine points of the lens.

For CD linearity, the same wafer was used, the measurements of CDs between 0.35um and 1.00um were made at best focus.

For Proximity Effect, the DOF wafer was again used, and the centre line of 5 was measured, and then the extended line which exists specifically to replicate an isolated line on the reticle was measured at the same point. Nine points of the field were examined for horizontal and vertical lines.

For Linewidth Repeatability within Wafer and Field, a 32 shot layout of 20mm shots was made using reticle 700. For measurements within wafer, the centre point of 10 shots was measured, and for within field, 9 points within 3 shots were measured.

Results

Attached are the results of 0.35um lens performance with Normal Illumination for CD and Wall Angle DOF, CD Linearity, Proximity Effect and Linewidth Repeatability within Wafer and Field. A short summary of the results is as follows :

Test	Spec	Result	Judgement
CD DOF @0.35um +/-10%	$\geq 0.60\mu\text{m}$	1.00um	OK
Wall Angle DOF @0.35um	$\geq 0.60\mu\text{m}$	0.80um ?	OK
CD Linearity 0.35 - 1.00um	$\leq 10\%$	4.1% max	OK
Proximity Effect @0.35um Dense & Isolated Lines	$\leq 0.050\mu\text{m}$	0.0489um	OK
Linewidth Repeatability / Wafer @0.35um	$\leq 40\text{nm}$	15.6nm	OK
Linewidth Repeatability / Field @0.35um	$\leq 40\text{nm}$	30.6nm	OK

0.7 on graph
- data?

The minimum resolution achievable at the best focus and exposure conditions using Normal Illumination was 0.30um. One important point was noted throughout the evaluation and that was the condition of the top of the resist profile. In almost all cases, the top of the line was jagged in appearance for about 5% of the total thickness, and this had an effect on the wall angle result, particularly on the linewidth repeatability within wafer / field tests. This has been attributed to resist thickness optimisation, and is being addressed separately.

A further point concerning the linewidth repeatability was the possibility to achieve a consistent wall angle. The specification asks that all points measured should have a wall angle not less than 85°, but this has proved to be very difficult both within a field and wafer due largely to the top profile of the resist. Preliminary cross section photographs of resist on various substrates has shown that the wall angle is indeed

in excess of 85° , but an optimal way of expressing this with respect to topside CD measurements by in-line SEM has to be found. At this time, as we know that it is possible to achieve $\geq 85^\circ$ profile even when top / bottom measurements do not reflect this, and the CD repeatability is very good, we consider this test successful, but for future tests, a reliable method has to be in place to assess the wall angle performance.

CD Linearity was well inside specification, and Proximity Effect was towards the high end, but still inside specification.

Conclusions

Stepper #8 has met all the specifications for 0.35um Normal Illumination performance in Mietec's specification, with the exception of wall angle $\geq 85^\circ$ due to poor profile of the top of the lines. This issue is being addressed internally within Mietec.

This evaluation is now completed.

Canon Europa NV
Application Engineering Dept
(Total of 13 pages)

Written by

 C. Howells



Depth of Focus Performance

Resist thick 0.8651 umt
Resist IX825
Machine Exposure 3000i4 #601596i4
1450 um2

V	Bottom		Top		H		H		Angle		
	UR	LR	UR	LR	Bottom	Top	Bottom	Top	T/B	T/B	
-0.40											
-0.30	0.3685		0.3166	84.7	0.3698		0.3788				
-0.20	0.3503		0.3166	82.4	0.3771		0.3771				
-0.10	0.3430	0.1835	0.3166	84.7	0.3698		0.3698				
0.00	0.3389	0.1073	0.3166	82.4	0.3541	0.1732	0.489	84.0			
0.10	0.3441	0.1043	0.3031	82.1	0.3419	0.059	0.290	82.0			
0.20	0.3446	0.1346	0.3006	83.1	0.3493	0.1125	0.322	82.2			
0.30	0.3359	0.1615	0.4751	84.1	0.3449	0.1245	0.351	82.4			
0.40	0.3413	0.2057	0.6027	85.5	0.3405	0.2023	0.584	85.4			
0.50	0.3446	0.2220	0.6442	85.9	0.3405	0.2023	0.584	85.4			
0.60	0.3388	0.2187	0.6308	85.9	0.3537	0.207	0.586	85.2			
0.70	0.3373	0.2182	0.6459	86.1	0.3511	0.2211	0.630	85.7			
0.80	0.3458	0.1950	0.5639	85.0	0.3524	0.2031	0.576	85.1			
0.90	0.3391	0.1891	0.3577	85.0	0.3528	0.1998	0.566	84.9			
1.00											
1.10											
1.20											

V	Bottom		Top		H		H		Angle		
	CR	LR	CR	LR	Bottom	Top	Bottom	Top	T/B	T/B	
-0.40											
-0.30	0.3459		0.3166	84.7	0.3768		0.3768				
-0.20	0.3370		0.3166	82.4	0.3511		0.3511				
-0.10	0.3404		0.3166	84.7	0.3398		0.3398				
0.00	0.3370	0.1470	0.4362	83.7	0.3424	0.1154	0.370	82.5			
0.10	0.3394	0.1804	0.5269	84.7	0.3456	0.1491	0.4310	83.5			
0.20	0.3394	0.1868	0.5887	85.4	0.3477	0.1880	0.5407	84.7			
0.30	0.3398	0.2018	0.5939	85.4	0.3466	0.2027	0.5848	85.2			
0.40	0.3389	0.2103	0.6260	85.8	0.3461	0.2194	0.6338	85.8			
0.50	0.3358	0.2133	0.6352	86.0	0.3468	0.2325	0.6704	86.2			
0.60	0.3383	0.2210	0.6533	86.1	0.3466	0.2282	0.6584	86.1			
0.70	0.3436	0.2045	0.5952	85.4	0.3305	0.1959	0.6048	85.7			
0.80											
0.90											
1.00											
1.10											
1.20											

V	Bottom		Top		H		H		Angle		
	DL	LR	DL	LR	Bottom	Top	Bottom	Top	T/B	T/B	
-0.40											
-0.30	0.3731		0.3656		0.3656		0.3656				
-0.20	0.3481		0.3646		0.3646		0.3646				
-0.10	0.3383		0.3599		0.3599		0.3599				
0.00	0.3403	0.0893	0.2918	82.1	0.3523	0.1515	0.4300	83.4			
0.10	0.3425	0.1530	0.4467	83.7	0.3329	0.0890	0.2673	82.0			
0.20	0.3435	0.1748	0.5089	84.4	0.3432	0.1027	0.2952	82.1			
0.30	0.3456	0.1977	0.5720	85.1	0.3376	0.1389	0.4114	83.4			
0.40	0.3472	0.1977	0.6328	85.8	0.3402	0.1693	0.4947	84.3			
0.50	0.3420	0.2213	0.6471	86.0	0.3415	0.1893	0.5543	85.0			
0.60	0.3425	0.2125	0.6204	85.7	0.3388	0.1988	0.5697	85.4			
0.70	0.3425	0.2152	0.6283	85.8	0.3380	0.2207	0.6530	86.1			
0.80	0.3400	0.2005	0.5897	85.4	0.3427	0.2200	0.6420	85.9			
0.90	0.3550	0.1901	0.5295	84.4	0.3362	0.2081	0.6153	85.7			
1.00											
1.10											
1.20											

CD DOF (Common from 9 points) = 1.00 um
Wall Angle DOF (Common from 9 points) = 0.80 um
(Slice level > 81.9 deg = 30% Slice)

0.35um

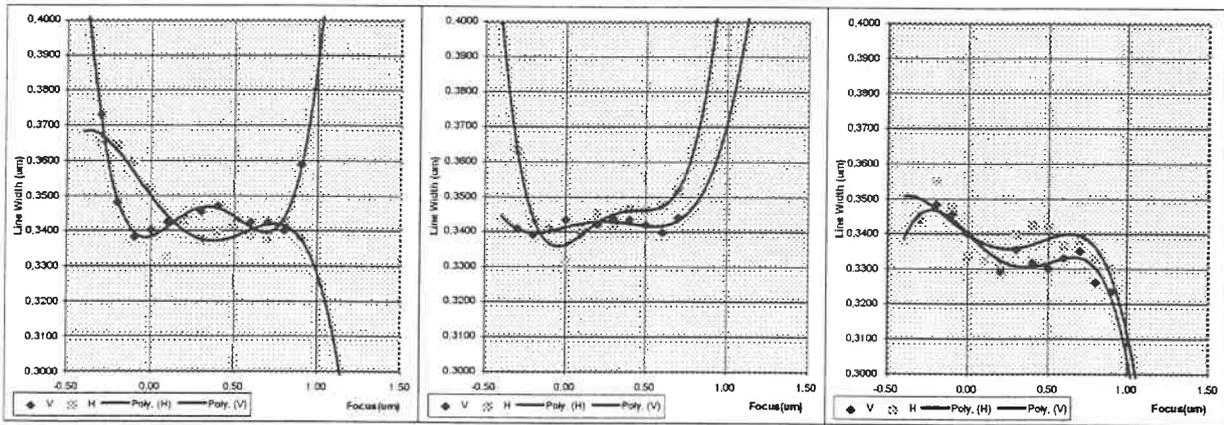
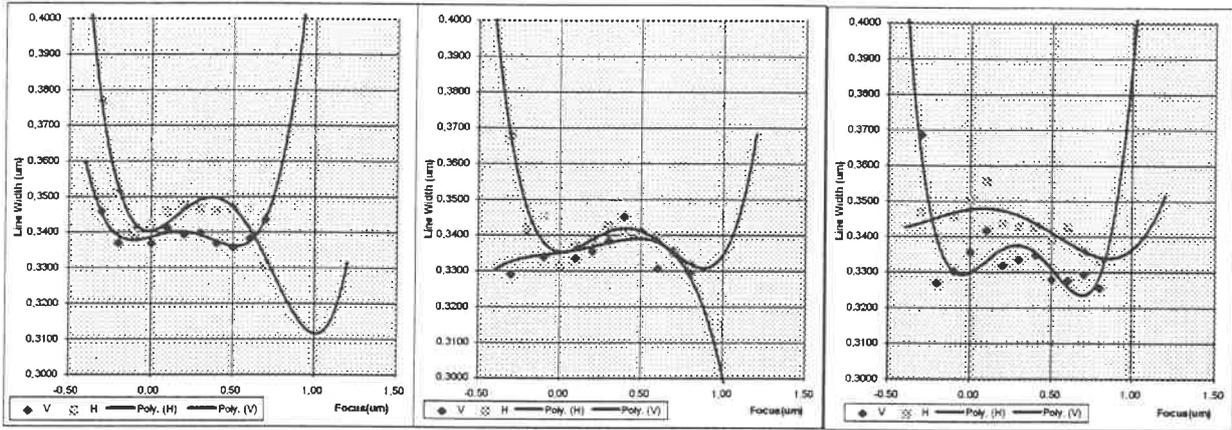
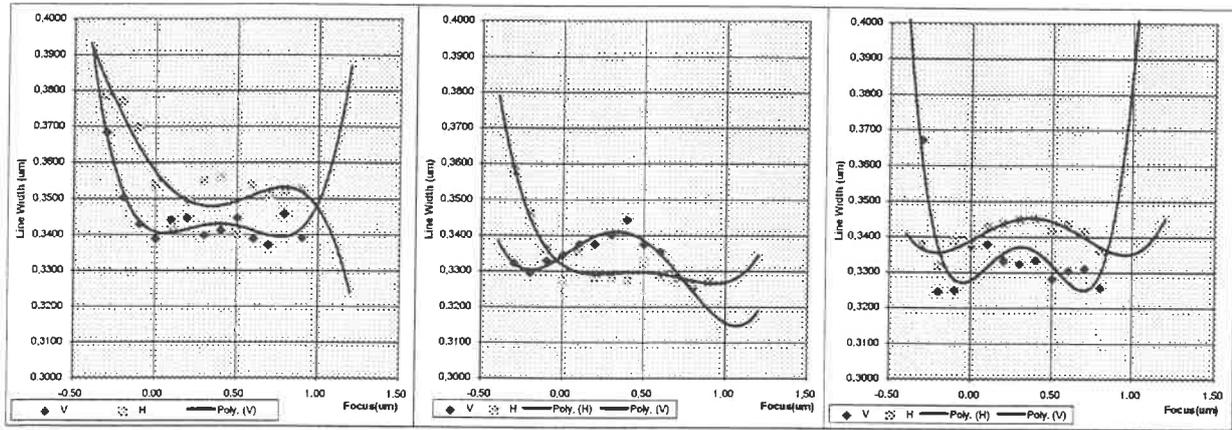
Focus Start Step -0.4
0.1

V	Bottom		Top		H		H		Angle		
	UC	LR	UC	LR	Bottom	Top	Bottom	Top	T/B	T/B	
-0.40											
-0.30	0.3323		0.3580		0.3580		0.3580				
-0.20	0.3296		0.3460		0.3460		0.3460				
-0.10	0.3330	0.0894	0.2865	82.0	0.3361	0.1679	0.4996	84.4			
0.00	0.3345	0.1533	0.4593	84.0	0.3273	0.0944	0.4299	83.8			
0.10	0.3376	0.2025	0.5998	85.5	0.3357	0.1168	0.3556	83.0			
0.20	0.3401	0.2127	0.6254	85.8	0.3282	0.1489	0.4537	84.1			
0.30	0.3444	0.2292	0.6855	86.2	0.3274	0.1943	0.5935	85.6			
0.40	0.3355	0.2228	0.6844	86.6	0.3326	0.2132	0.6410	86.1			
0.50	0.3355	0.2228	0.6844	86.6	0.3326	0.2147	0.6526	86.2			
0.60	0.3282	0.2109	0.5426	85.1	0.3267	0.2173	0.6611	86.3			
0.70	0.3252	0.2086	0.5415	85.1	0.3267	0.1975	0.6045	85.7			
0.80					0.3270	0.1893	0.5789	85.4			
0.90											
1.00											
1.10											
1.20											

V	Bottom		Top		H		H		Angle		
	CC	LR	CC	LR	Bottom	Top	Bottom	Top	T/B	T/B	
-0.40											
-0.30	0.3291		0.3681		0.3681		0.3681				
-0.20	0.3414		0.3422		0.3422		0.3422				
-0.10	0.3339	0.1147	0.3435	82.8	0.3452	0.0513	0.1486	80.4			
0.00	0.3336	0.1690	0.5095	84.6	0.3314	0.1166	0.3518	83.9			
0.10	0.3396	0.2071	0.6203	85.8	0.3369	0.1615	0.4794	84.2			
0.20	0.3353	0.2036	0.6072	85.6	0.3384	0.1919	0.5671	85.2			
0.30	0.3384	0.2232	0.6557	86.1	0.3426	0.2019	0.6893	85.4			
0.40	0.3453	0.2317	0.6710	86.2	0.3410	0.2100	0.6158	85.7			
0.50	0.3411	0.2308	0.6766	86.4	0.3400	0.2145	0.6279	85.8			
0.60	0.3307	0.2175	0.6577	86.3	0.3400	0.2145	0.6279	85.8			
0.70	0.3355	0.2222	0.6623	86.3	0.3350	0.2162	0.6457	86.1			
0.80	0.3295	0.2099	0.6370	86.0	0.3318	0.2182	0.6576	86.2			
0.90											
1.00											
1.10											
1.20											

V	Bottom		Top		H		H		Angle		
	DC	LR	DC	LR	Bottom	Top	Bottom	Top	T/B	T/B	
-0.40											
-0.30	0.3409		0.3632		0.3632		0.3632				
-0.20	0.3391		0.3425		0.3425		0.3425				
-0.10	0.3408	0.1543	0.4528	83.9	0.3405	0.1288	0.3888	83.3			
0.00	0.3435	0.1837	0.5348	84.7	0.3313	0.1548	0.4543	83.9			
0.10	0.3496	0.2103	0.6193	85.7	0.3410	0.1548	0.4543	83.9			
0.20	0.3422	0.2242	0.6552	86.1	0.3454	0.1683	0.4973	84.2			
0.30	0.3438	0.2330	0.6777	86.3	0.3422	0.1840	0.5377	84.8			
0.40	0.3436	0.2276	0.6624	86.2	0.3467	0.1909	0.5505	84.9			
0.50	0.3421	0.2295	0.6709	86.3	0.3461	0.2039	0.5881	85.3			
0.60	0.3398	0.2391	0.7036	86.7	0.3477	0.1997	0.5743	85.1			
0.70	0.3441	0.2125	0.6176	85.7	0.3520	0.1967	0.5568	84.9			
0.80											
0.90											
1.00											
1.10											
1.20											

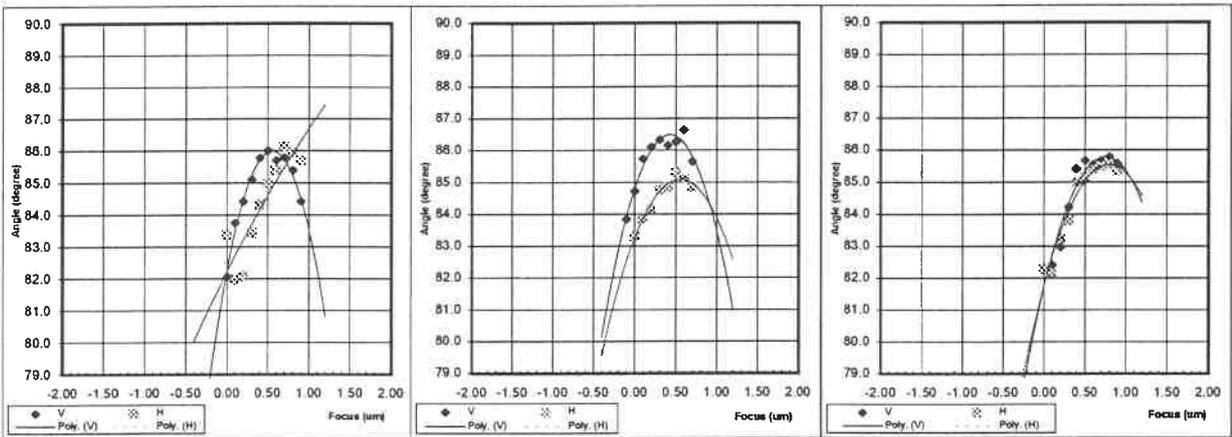
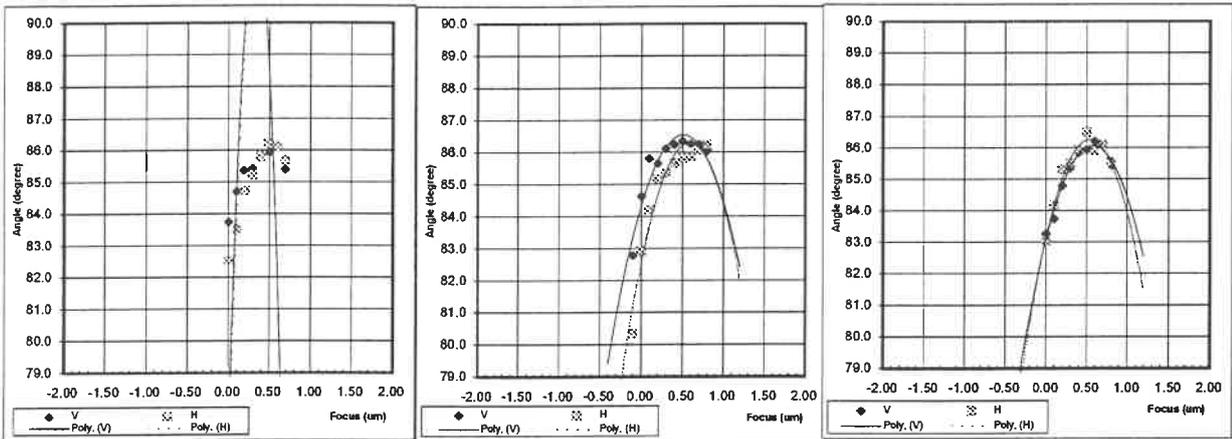
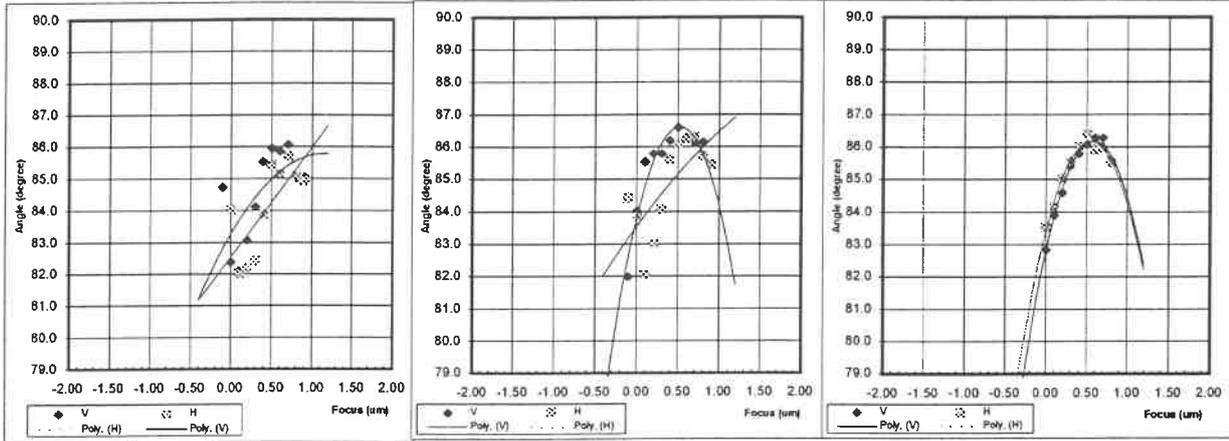
Average CD = 0.3410 um
Max CD (Within DOF Range) = 0.3788 um
Min CD (Within DOF Range) = 0.3234 um
Range CD (Within DOF Range) = 0.0554 um
Average Wall Angle = 84.9 deg
Max Wall Angle = 86.7 deg
Min Wall Angle = 80.4 deg
Min Angle above slice = 80.4 deg



CD Performance - 9 Fields

0.35um

Canon



Profile Performance - 9 Fields

0.35um

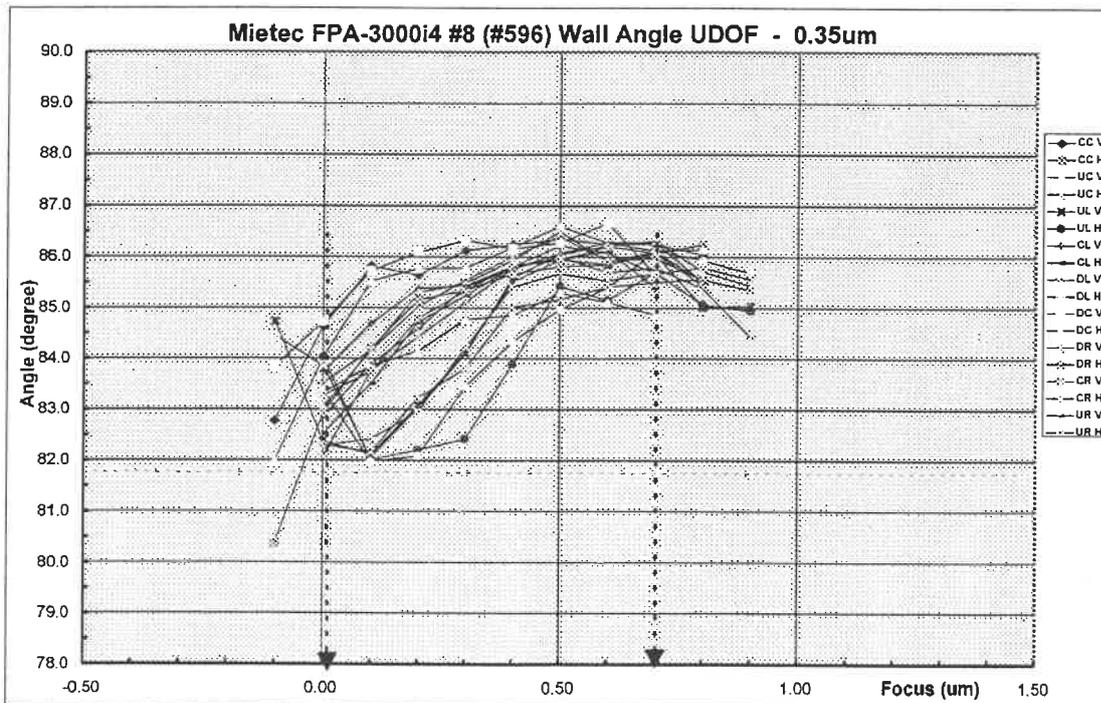
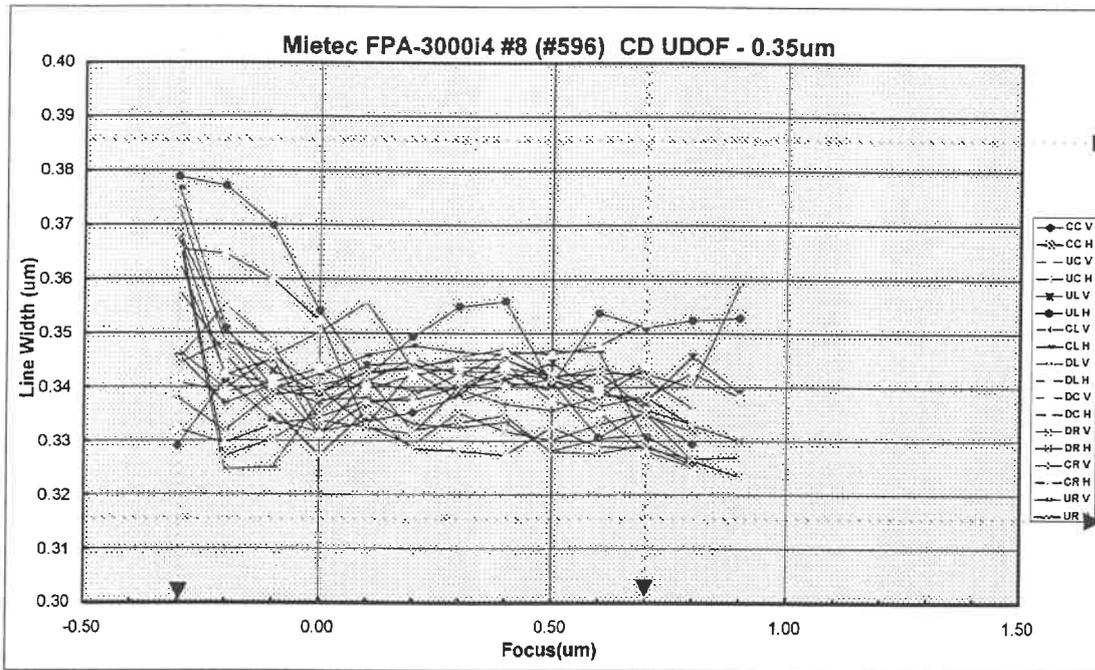


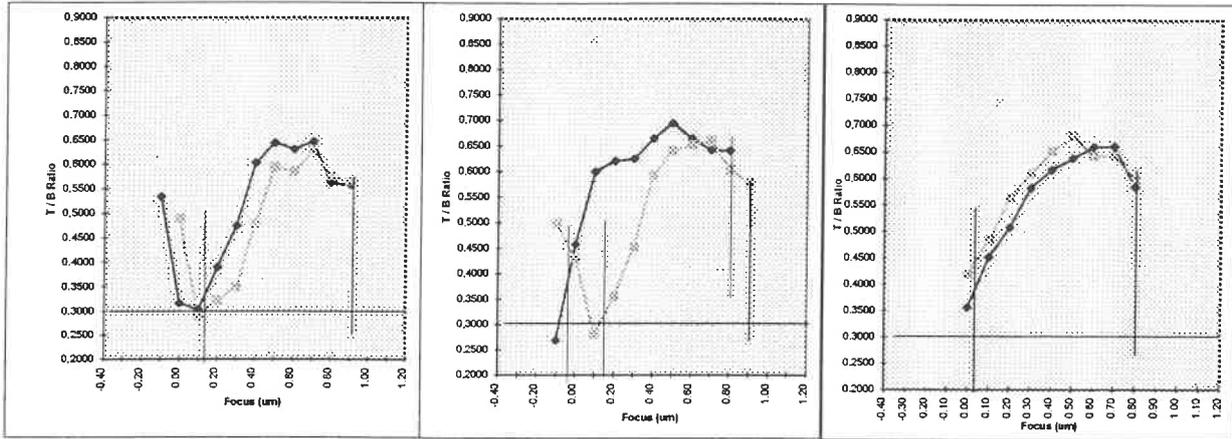


DOF performance

Machine : #601596i4

FPA-3000i4





Blue = V
Pink = H

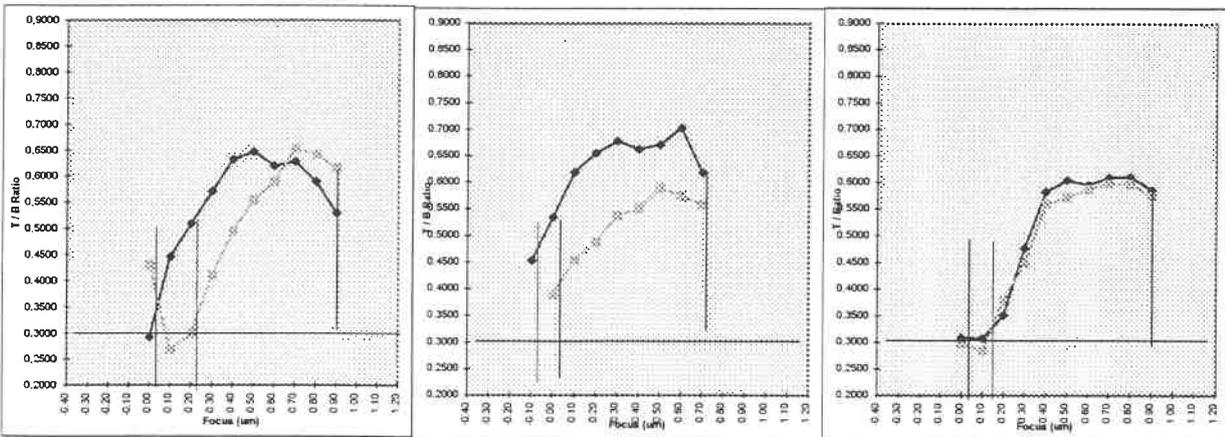
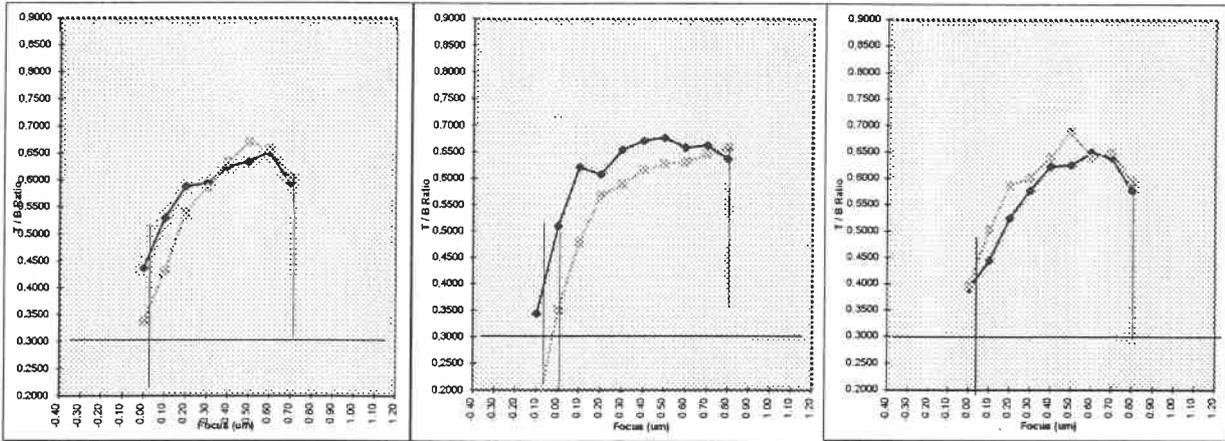


Image Surface Width - 9 Fields

(T / B vs Focus)

0.35um

Canon



Lens Performance Data

0.35um

From SEM measurement data :

Best Focus			
Vertical	0.500	0.355	0.400
	0.350	0.350	0.400
	0.550	0.300	0.450
			Ave Focus
			0.452
Horizontal	0.500	0.505	0.400
	0.350	0.410	0.400
	0.450	0.350	0.510
Ave Y			
	-10	0	10
10	0.500	0.430	0.400
0	0.350	0.380	0.400
-10	0.500	0.325	0.480
Ave X			0.450 0.378 0.427

Compensation Amount for Tilt			
	-10	0	10
10	-0.016	-0.004	0.007
0	-0.012	0.000	0.012
-10	-0.007	0.004	0.016

9 points tilt amount			
	X	Y	
-10	0.450	0.435	
0	0.378	0.377	
10	0.427	0.443	

Tilt 1.2 -0.4 ppm

HV Diff			
	0.000	-0.150	0.000
	0.000	-0.060	0.000
	0.100	-0.050	-0.060

After shot tilt compensation			
Vertical	0.064	-0.093	-0.060
	-0.090	-0.102	-0.064
	0.106	-0.156	-0.018

Horizontal			
0.064	0.057	-0.060	
-0.090	-0.042	-0.064	
0.005	-0.106	0.042	

Average of H&V after Tilt			
0.064	-0.018	-0.060	
-0.090	-0.072	-0.064	
0.055	-0.131	0.012	

4 corners focus only			
0.064	-0.060		
0.055	0.012		

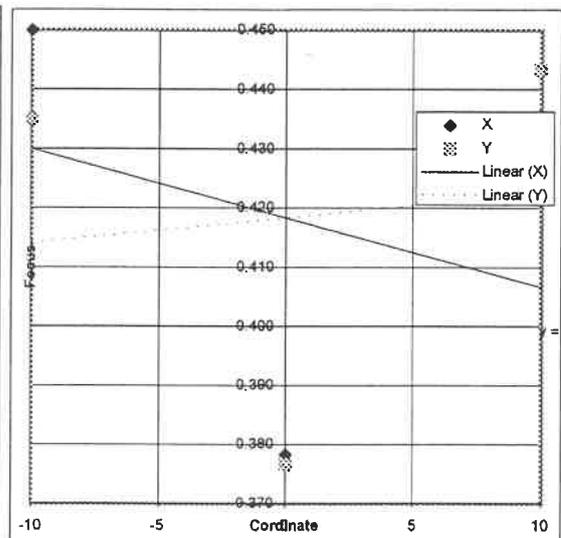
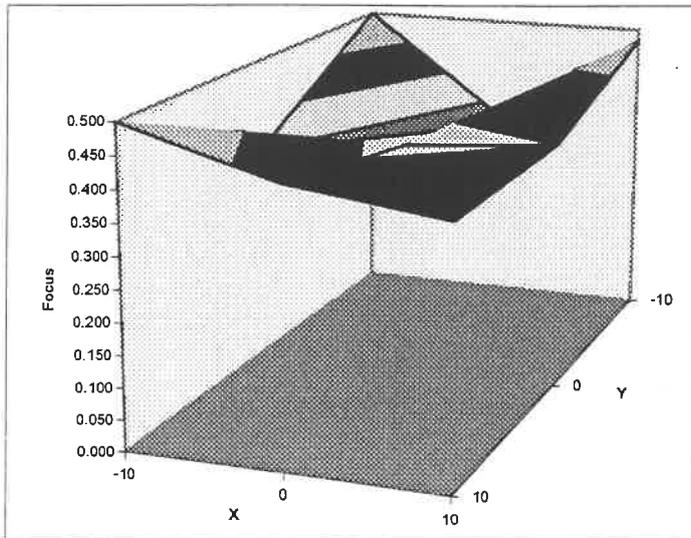
Shot tilt based on 4 corners

Average Corner HV focus			
0.500	0.400		
0.500	0.380		
0.500	0.480		

Average focus of sides			
0.500	0.45		
0.500	0.380		
0.500	0.440		
0.500	0.490		

4 corner tilt amount			
Tilt X	-3.00	ppm	
Tilt Y	-2.00	ppm	

Field Curvature	0.175	um
Tilt Compensated	0.195	um
4 Corner Range	0.123	um
4 Corner Mean - Centre	0.090	um
Image Field Deviation	0.250	um
Tilt Compensated	0.262	um
Astigmatism	0.150	um





CD Linearity - 0.35um

FPA-3000i4

Resist IX825 Machine 3000i4
 Thickness 0.8701 um Serial No #60159614

Exposure 1610 Jm2
 Focus 0.50 um

UL		Limits		V		H		Linear		% Error V		% Error H	
Mask CD	CD	0.315	-0.385	0.3477	0.3573	0.35	0.3573	0.35	0.3573	-0.66	2.09	-0.66	2.09
0.40	0.40	0.36	-0.44	0.3922	0.3936	0.40	0.3936	0.40	0.3936	-0.20	-1.60	-0.20	-1.60
0.45	0.45	0.405	-0.495	0.4517	0.4486	0.45	0.4486	0.45	0.4486	0.38	-3.1	0.38	-3.1
0.50	0.50	0.45	-0.55	0.5172	0.5094	0.50	0.5094	0.50	0.5094	3.44	1.88	3.44	1.88
0.55	0.55	0.495	-0.605	0.5606	0.5656	0.55	0.5656	0.55	0.5656	1.93	2.84	1.93	2.84
0.60	0.60	0.54	-0.66	0.6095	0.6070	0.60	0.6070	0.60	0.6070	1.58	1.17	1.58	1.17
0.65	0.65	0.585	-0.715	0.6513	0.6588	0.65	0.6588	0.65	0.6588	0.65	2.0	0.65	2.0
0.70	0.70	0.63	-0.77	0.7069	0.7113	0.70	0.7113	0.70	0.7113	0.99	1.61	0.99	1.61
0.75	0.75	0.675	-0.725	0.7518	0.7562	0.75	0.7562	0.75	0.7562	0.24	0.83	0.24	0.83
0.80	0.80	0.72	-0.88	0.8042	0.8089	0.80	0.8089	0.80	0.8089	0.52	1.11	0.52	1.11
0.90	0.90	0.81	-0.99	0.9041	0.9081	0.90	0.9081	0.90	0.9081	0.46	0.90	0.46	0.90
1.00	1.00	0.90	-1.10	1.0084	1.0190	1.00	1.0190	1.00	1.0190	0.94	1.90	0.94	1.90

UC		Limits		V		H		Linear		% Error V		% Error H	
Mask CD	CD	0.315	-0.385	0.3522	0.3388	0.35	0.3388	0.35	0.3388	0.63	-3.20	0.63	-3.20
0.40	0.40	0.36	-0.44	0.3994	0.3878	0.40	0.3878	0.40	0.3878	-0.15	-0.58	-0.15	-0.58
0.45	0.45	0.405	-0.495	0.4595	0.4474	0.45	0.4474	0.45	0.4474	2.11	-0.8	2.11	-0.8
0.50	0.50	0.45	-0.55	0.5126	0.4986	0.50	0.4986	0.50	0.4986	2.52	-0.8	2.52	-0.8
0.55	0.55	0.495	-0.605	0.5655	0.5525	0.55	0.5525	0.55	0.5525	2.78	0.45	2.78	0.45
0.60	0.60	0.54	-0.66	0.6072	0.5967	0.60	0.5967	0.60	0.5967	1.20	-0.55	1.20	-0.55
0.65	0.65	0.585	-0.715	0.6552	0.649	0.65	0.649	0.65	0.649	0.80	-0.15	0.80	-0.15
0.70	0.70	0.63	-0.77	0.7129	0.6981	0.70	0.6981	0.70	0.6981	1.84	-0.27	1.84	-0.27
0.75	0.75	0.675	-0.725	0.7664	0.7509	0.75	0.7509	0.75	0.7509	2.19	0.12	2.19	0.12
0.80	0.80	0.72	-0.88	0.814	0.8001	0.80	0.8001	0.80	0.8001	1.75	0.01	1.75	0.01
0.90	0.90	0.81	-0.99	0.9111	0.9023	0.90	0.9023	0.90	0.9023	1.23	0.26	1.23	0.26
1.00	1.00	0.90	-1.10	1.0123	1.0081	1.00	1.0081	1.00	1.0081	1.23	0.81	1.23	0.81

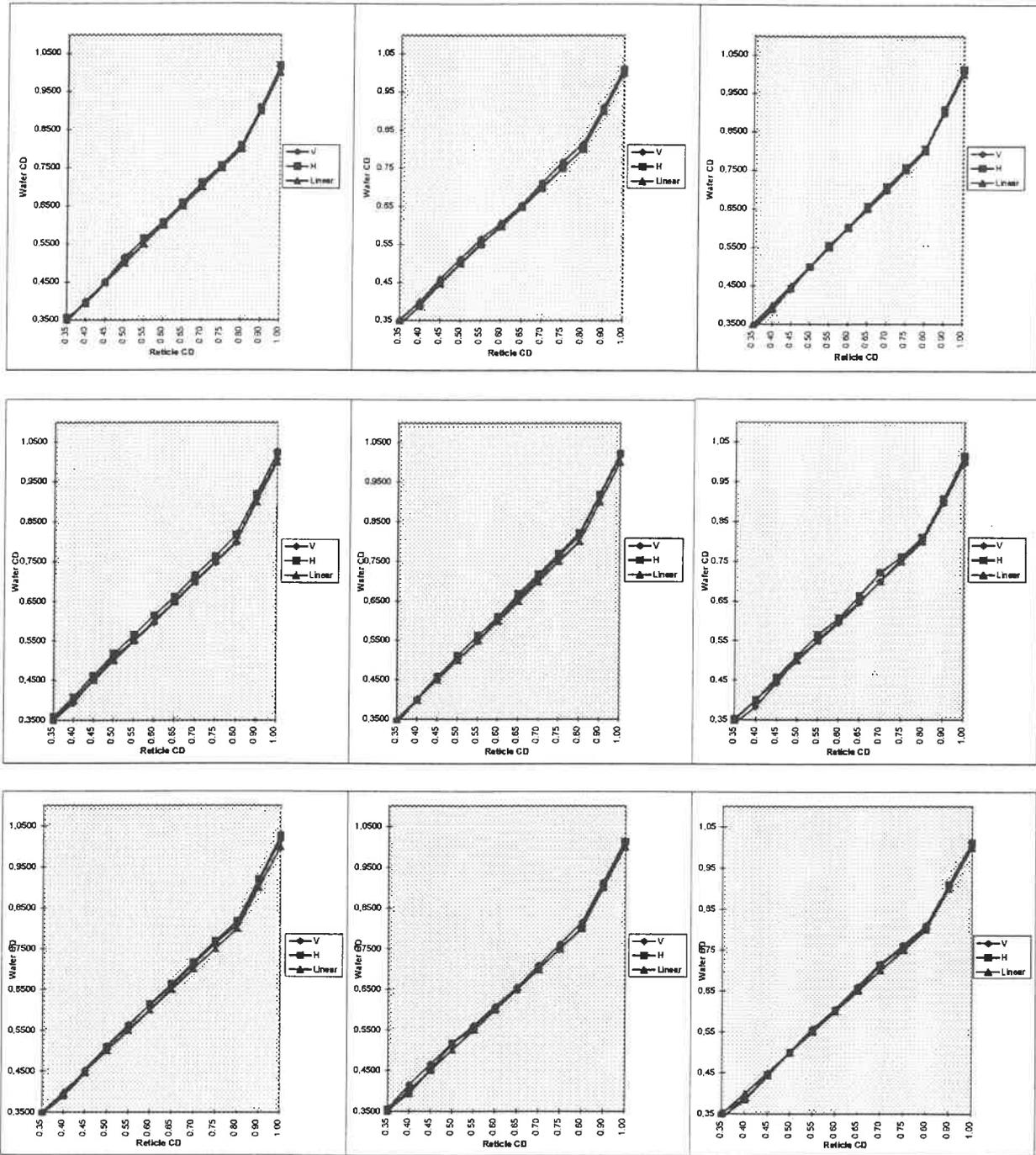
UR		Limits		V		H		Linear		% Error V		% Error H	
Mask CD	CD	0.315	-0.385	0.3397	0.3356	0.35	0.3356	0.35	0.3356	-2.94	-4.11	-2.94	-4.11
0.40	0.40	0.36	-0.44	0.3945	0.3884	0.40	0.3884	0.40	0.3884	0.40	-1.38	0.40	-1.38
0.45	0.45	0.405	-0.495	0.4414	0.4434	0.45	0.4434	0.45	0.4434	0.45	-1.91	0.45	-1.91
0.50	0.50	0.45	-0.55	0.4986	0.4999	0.50	0.4999	0.50	0.4999	0.50	-0.28	0.50	-0.28
0.55	0.55	0.495	-0.605	0.5543	0.5540	0.55	0.5540	0.55	0.5540	0.78	0.73	0.78	0.73
0.60	0.60	0.54	-0.66	0.6007	0.6031	0.60	0.6031	0.60	0.6031	0.12	0.52	0.12	0.52
0.65	0.65	0.585	-0.715	0.6485	0.6558	0.65	0.6558	0.65	0.6558	-0.23	0.89	-0.23	0.89
0.70	0.70	0.63	-0.77	0.6976	0.7076	0.70	0.7076	0.70	0.7076	0.34	1.09	0.34	1.09
0.75	0.75	0.675	-0.725	0.7506	0.7570	0.75	0.7570	0.75	0.7570	0.08	0.93	0.08	0.93
0.80	0.80	0.72	-0.88	0.8025	0.8053	0.80	0.8053	0.80	0.8053	0.30	0.66	0.30	0.66
0.90	0.90	0.81	-0.99	0.8987	0.9087	0.90	0.9087	0.90	0.9087	-0.03	0.97	-0.03	0.97
1.00	1.00	0.90	-1.10	1.0055	1.0118	1.00	1.0118	1.00	1.0118	0.55	1.18	0.55	1.18

GL		Limits		V		H		Linear		% Error V		% Error H	
Mask CD	CD	0.315	-0.385	0.3477	0.3581	0.35	0.3581	0.35	0.3581	-0.66	2.31	-0.66	2.31
0.40	0.40	0.36	-0.44	0.3929	0.4081	0.40	0.4081	0.40	0.4081	-1.77	2.02	-1.77	2.02
0.45	0.45	0.405	-0.495	0.4510	0.4621	0.45	0.4621	0.45	0.4621	0.22	2.69	0.22	2.69
0.50	0.50	0.45	-0.55	0.5103	0.5179	0.50	0.5179	0.50	0.5179	2.06	3.58	2.06	3.58
0.55	0.55	0.495	-0.605	0.5497	0.5650	0.55	0.5650	0.55	0.5650	-0.05	2.73	-0.05	2.73
0.60	0.60	0.54	-0.66	0.5969	0.6148	0.60	0.6148	0.60	0.6148	-0.52	2.47	-0.52	2.47
0.65	0.65	0.585	-0.715	0.6481	0.6624	0.65	0.6624	0.65	0.6624	-0.29	1.91	-0.29	1.91
0.70	0.70	0.63	-0.77	0.6993	0.7158	0.70	0.7158	0.70	0.7158	-0.10	2.28	-0.10	2.28
0.75	0.75	0.675	-0.725	0.7478	0.7632	0.75	0.7632	0.75	0.7632	-0.29	1.76	-0.29	1.76
0.80	0.80	0.72	-0.88	0.7976	0.8170	0.80	0.8170	0.80	0.8170	-0.30	2.12	-0.30	2.12
0.90	0.90	0.81	-0.99	0.9081	0.9200	0.90	0.9200	0.90	0.9200	0.90	2.22	0.90	2.22
1.00	1.00	0.90	-1.10	1.0068	1.0235	1.00	1.0235	1.00	1.0235	0.68	2.35	0.68	2.35

CC		Limits		V		H		Linear		% Error V		% Error H	
Mask CD	CD	0.315	-0.385	0.3404	0.3442	0.35	0.3442	0.35	0.3442	-2.74	-1.66	-2.74	-1.66
0.40	0.40	0.36	-0.44	0.4003	0.3982	0.40	0.3982	0.40	0.3982	0.08	-0.45	0.08	-0.45
0.45	0.45	0.405	-0.495	0.4599	0.4558	0.45	0.4558	0.45	0.4558	2.20	1.29	2.20	1.29
0.50	0.50	0.45	-0.55	0.5010	0.5112	0.50	0.5112	0.50	0.5112	0.20	2.24	0.20	2.24
0.55	0.55	0.495	-0.605	0.5476	0.5627	0.55	0.5627	0.55	0.5627	-0.44	2.31	-0.44	2.31
0.60	0.60	0.54	-0.66	0.6078	0.6104	0.60	0.6104	0.60	0.6104	1.30	1.73	1.30	1.73
0.65	0.65	0.585	-0.715	0.6599	0.6688	0.65	0.6688	0.65	0.6688	1.52	2.89	1.52	2.89
0.70	0.70	0.63	-0.77	0.7094	0.7182	0.70	0.7182	0.70	0.7182	1.34	2.60	1.34	2.60
0.75	0.75	0.675	-0.725	0.7623	0.7695	0.75	0.7695	0.75	0.7695	1.64	2.60	1.64	2.60
0.80	0.80	0.72	-0.88	0.8145	0.8219	0.80	0.8219	0.80	0.8219	1.81	2.74	1.81	2.74
0.90	0.90	0.81	-0.99	0.9151	0.9196	0.90	0.9196	0.90	0.9196	1.68	2.18	1.68	2.18
1.00	1.00	0.90	-1.10	1.0156	1.0220	1.00	1.0220	1.00	1.0220	1.56	2.20	1.56	2.20

CR		Limits		V		H		Linear		% Error V		% Error H	
Mask CD	CD	0.315	-0.385	0.3405	0.3519	0.35	0.3519	0.35	0.3519	-2.71	0.54	-2.71	0.54
0.40	0.40	0.36	-0.44	0.3834	0.3894	0.40	0.3894	0.40	0.3894	0.40	-4.15	0.40	-4.15
0.45	0.45	0.405	-0.495	0.4433	0.4571	0.45	0.4571	0.45	0.4571	0.45	-1.49	0.45	-1.49
0.50	0.50	0.45	-0.55	0.5062	0.5123	0.50	0.5123	0.50	0.5123	0.50	1.24	0.50	1.24
0.55	0.55	0.495	-0.605	0.5488	0.5652	0.55	0.5652	0.55	0.5652	-0.22	2.76	-0.22	2.76
0.60	0.60	0.54	-0.66	0.5955	0.6075	0.60	0.6075	0.60	0.6075	-0.75	1.25	-0.75	1.25
0.65	0.65	0.585	-0.715	0.6462	0.6632	0.65	0.6632	0.65	0.6632	0.65	2.03	0.65	2.03
0.70	0.70	0.63	-0.77	0.701	0.7218	0.70	0.7218	0.70	0.7218	0.14	3.11	0.14	3.11
0.75	0.75	0.675	-0.725	0.7556	0.7612	0.75	0.7612	0.75	0.7612	0.75	1.49	0.75	1.49
0.80	0.80	0.72	-0.88	0.8012	0.8101	0.80	0.8101	0.80	0.8101	0.15	1.26	0.15	1.26
0.90	0.90	0.81	-0.99	0.8966	0.9071	0.90	0.9071	0.90	0.9071	-0.38	0.79	-0.38	0.79
1.00	1.00	0.90	-1.10	0.999	1.0141	1.00	1.0141	1.00	1.0141	-0.10	1.41	-0.10	1.41

DL		Limits		V		H		Linear		% Error V		% Error H	
Mask CD	CD	0.315	-0.385	0.3475	0.3469	0.35	0.3469	0.35	0.3469	-0.71	-0.89	-0.71	-0.89
0.40	0.40	0.36	-0.44	0.3946	0.3892	0.40	0.3892	0.40	0.3892	-1.35	-2.70	-1.35	-2.70
0.45	0.45	0.405	-0.495	0.4529	0.4469	0.45	0.4469	0.45	0.4469	0.64	-0.69	0.64	-0.69
0.50	0.50	0.45	-0.55	0.5117	0.5095	0.50	0.5095	0.50	0.5095	2.34	1.90	2.34	1.90
0.55	0.55	0.495	-0.605	0.5645	0.5600	0.55	0.5600	0.55	0.5600	2.64	1.82	2.64	1.82
0.60	0.60	0.54	-0.66	0.6126	0.6145	0.60	0.6145	0.60	0.6145	2.10	2.42	2.10	2.42
0.65	0.65	0.585	-0.715	0.6582	0.6640	0.65	0						



CD Linearity - 0.35um



FPA-300014



Proximity Effect of Dense & Isolated Lines

0.35um

Resist IX825 Machine 3000i4 Exposure 1610 jm2
 Thick 0.8637 um Serial #601596i4

	Isolated	Dense		
V	0.3301	0.3604	0.3556	0.3520
H	0.3606	0.3613	0.3532	0.3445
V	0.3214	0.3669	0.3482	0.3651
H	0.3180	0.3569	0.3562	0.3491
V	0.3381	0.3542	0.3301	0.3571
H	0.3577	0.3513	0.3627	0.3457
			0.3367	0.3446
			0.3479	0.3458
			0.3256	0.3543
			0.3433	0.3515
			0.3373	0.3444
			0.3486	0.3488

Max CD (All Points)	=	0.3669 um
Min CD (All Points)	=	0.3180 um
Total Range (All points)	=	0.0489 um



Linewidth Repeatability within FIELD 0.35um

Resist Thick 0.8729 (um) Range 0.0037 (um) Stepper 8

TOP

Vert		Horiz		Reticle 700-1	
B	0.3647 0.3619 0.3707	0.3683 0.3556 0.3757			
T	0.1987 0.2514 0.1761	0.1960 0.1949 0.1629			
	0.3554 0.3475 0.3593	0.3629 0.3623 0.3547	CD V	Max	Min
	0.2483 0.2420 0.2020	0.2323 0.2174 0.2246	CD H	0.3781	0.3475
	0.3781 0.3624 0.3600	0.3695 0.3748 0.3625	Mean V CD	0.3757	0.3547
	0.2140 0.2658 0.2039	0.2082 0.1969 0.2022	Mean H CD	0.3622	0.3651
		Range V (nm)	30.60		
		Range H (nm)	21.00		
Angle	84.6 86.4 83.6	84.4 84.7 83.1	Max	Min	
	86.5 86.5 84.9	85.7 85.3 85.7	Ang V	86.8	83.6
	84.6 86.8 84.9	84.7 84.2 84.8	Ang H	85.7	83.1

CENTRE

Vert		Horiz		Reticle 700-1	
B	0.3622 0.3588 0.3691	0.3598 0.3579 0.3612			
T	0.2003 0.2213 0.1899	0.1890 0.2012 0.1878			
	0.3511 0.3498 0.3536	0.3621 0.3656 0.3624	CD V	Max	Min
	0.2321 0.2433 0.2103	0.2054 0.2316 0.2361	CD H	0.3691	0.3498
	0.3632 0.3667 0.3589	0.3628 0.3676 0.3580	Mean H CD	0.3676	0.3579
	0.2073 0.2132 0.2165	0.2057 0.2153 0.2160	Mean V CD	0.3593	0.3619
		Range V (nm)	19.30		
		Range H (nm)	9.70		
Angle	84.7 85.5 84.1	84.4 84.9 84.3	Max	Min	
	86.1 86.5 85.3	84.9 85.6 85.9	Ang V	86.5	84.1
	84.9 85.0 85.3	84.9 85.0 85.3	Ang H	85.9	84.3

BOTTOM

Vert		Horiz		Reticle 700-1	
B	0.3611 0.3688 0.3583	0.3566 0.3582 0.3523			
T	0.1975 0.1945 0.2033	0.2188 0.2123 0.2174			
	0.3578 0.3499 0.3523	0.3562 0.3488 0.3603	CD V	Max	Min
	0.2245 0.2278 0.2303	0.2248 0.2451 0.2402	CD H	0.3688	0.3499
	0.3642 0.3672 0.3602	0.3635 0.3622 0.3619	Mean H CD	0.3635	0.3488
	0.2112 0.2278 0.2252	0.2155 0.2193 0.2205	Mean V CD	0.3600	0.3600
		Range V (nm)	18.90		
		Range H (nm)	14.70		
Angle	84.6 84.3 84.9	85.5 85.2 85.6	Max	Min	
	85.6 86.0 86.0	85.7 86.6 86.1	Ang V	86.0	84.3
	85.0 85.4 85.6	85.2 85.3 85.4	Ang H	86.6	85.2

Across 3 fields

	H	V	Total (H&V)
CD Range	26.90	30.60	30.60
Max CD	0.3757	0.3781	
Min CD	0.3488	0.3475	
Max Angle	86.6	86.8	
Min Angle	83.1	83.6	