



**GELLER
MICROANALYTICAL
LABORATORY**

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CALIBRATION

In compliance with ISO/IEC 17025

Certification Date: 2-April-2013

Recertification Due: _____

CERTIFICATION OF MEASUREMENT

MRS4-XYZ R24-138

500µm pitch	X-Traverse		Y-Traverse	
	Left	Right	Top	Bottom
1	499.99	499.92	500.08	499.95
2	499.99	499.90	499.97	500.07
3	499.96	499.97	499.97	499.95
4	499.97	499.98	500.09	499.92
5	500.03	499.95	500.10	500.07
6	<u>500.02</u>	<u>499.93</u>	<u>500.01</u>	<u>499.98</u>
Average	499.99	499.94	500.04	499.99
2-Sigma	0.05	0.06	0.12	0.13
50µm pitch	X-Traverse		Y-Traverse	
	Left	Right	Top	Bottom
1	49.99	49.99	50.02	50.03
2	49.98	50.00	50.01	50.01
3	50.00	49.97	50.02	50.01
4	50.00	50.01	50.03	50.05
5	50.00	49.99	50.00	50.01
6	49.98	49.98	50.00	49.97
7	49.98	49.98	49.98	49.99
8	<u>49.97</u>	<u>49.98</u>	<u>49.93</u>	<u>49.94</u>
Average	49.99	49.99	50.00	50.00
2-Sigma	0.02	0.03	0.07	0.07
2µm pitch	X-Traverse		Y-Traverse	
	Left	Right	Top	Bottom
1	2.000	1.997	1.998	1.996
2	2.002	2.000	1.998	2.003
3	2.006	2.004	1.998	1.997
4	1.999	1.997	2.007	1.998
5	2.002	1.998	1.996	1.995
6	1.998	2.001	2.002	2.006
7	1.999	2.001	1.997	1.997
8	<u>1.996</u>	<u>2.001</u>	<u>2.001</u>	<u>2.000</u>
Average	2.000	2.000	2.000	1.999
2-Sigma	0.006	0.005	0.007	0.007

1µm pitch	X-Traverse		Y-Traverse	
	Left	Right	Top	Bottom
1	1.013	1.013	1.010	1.010
2	0.999	0.999	1.001	1.002
3	0.999	0.999	1.002	0.997
4	0.999	0.997	1.001	1.004
5	0.996	0.996	0.999	1.000
6	0.997	0.992	1.001	0.999
7	0.998	0.999	1.000	0.995
8	<u>1.000</u>	<u>1.000</u>	<u>0.997</u>	<u>0.997</u>
Average	1.000	0.999	1.001	1.001
2-Sigma	0.011	0.012	0.007	0.009
0.50µm pitch	X-Traverse		Y-Traverse	
	Left	Right	Top	Bottom
1	0.503	0.496	0.502	0.497
2	0.496	0.504	0.502	0.502
3	0.504	0.501	0.499	0.500
4	0.496	0.494	0.502	0.501
5	0.506	0.506	0.494	0.501
6	0.497	0.490	0.502	0.498
7	0.495	0.509	0.498	0.500
8	0.508	0.492	0.502	0.493
9	0.493	0.505	0.503	0.506
10	<u>0.508</u>	<u>0.496</u>	<u>0.494</u>	<u>0.497</u>
Average	0.501	0.499	0.500	0.499
2-Sigma	0.011	0.013	0.007	0.007

Z = 0.0700µm
Z Uncertainty = ±0.005µm
Temperature = 68.5 Deg F
Z Primary Standard: MRS-2 S/N R5-143

Pitch	Uncertainty(k=2)	Traceable to:
500µm	±0.25µm	MRS-4 S/N R23-169
50µ	±0.104µm	MRS-4 S/N R23-169
2µm	±0.031µm	MRS-4 S/N R23-169

Pitch	Uncertainty	Traceable to:
1µm	±0.03µm	MRS-4 S/N R23-169
1/2µm	±0.038µm	MRS-4 S/N R23-169

XY Working Standard: MRS-4 S/N R24-171

The "ruler" is not traceable.

Joseph D. Geller
President & Reviewer