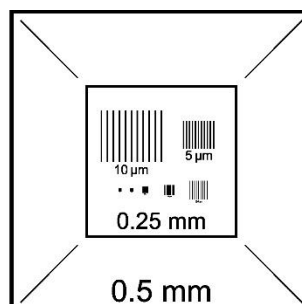
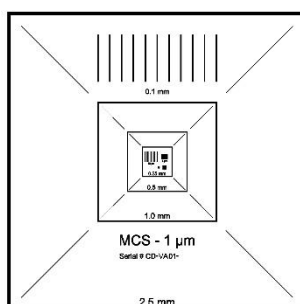


## Wafer Level Certificate of Traceability for EM-Tec MCS-1 Magnification Calibration Standard



Product Numbers: 31-T31000-U, 31-T31000-1, 31-T31000-2, 31-T31000-6, 31-T31000-8, 31-T31000-10

Product Description: EM-Tec MCS-1 Magnification Calibration Standard 2.5mm to 1μm

Wafer Identifier: CD-VA01-xxx

The accuracy of these products was determined by reference comparison to working standards traceable to the National Institute of Standards and Technology (NIST), Test No. 861/280822-11.

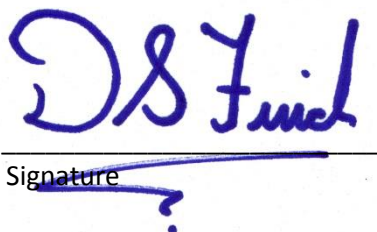
Line	Average pitch of wafer	Average pitch uniformity (1σ uncertainty)	Total expanded uncertainty (3σ) average pitch for wafer*
2.5 mm	2.50 mm	± 2.5 μm (±0.10%)	± 8.75 μm (±0.35%)
1.0 mm	1.00 mm	± 1 μm (±0.10%)	± 3.5 μm (±0.35%)
0.5 mm	0.500 mm	± 0.5 μm (±0.10%)	± 1.75 μm (±0.35%)
0.25mm	0.250 mm	± 0.25 μm (±0.10%)	± 0.9 μm (±0.35%)
0.1 mm	0.100 mm	± 0.10 μm (±0.10%)	± 0.35 μm (±0.35%)
10 μm	10.00 μm	± 0.01 μm (±0.10%)	± 0.035 μm (±0.35%)
5 μm	5.00 μm	± 0.01 μm (±0.20%)	± 0.035 μm (±0.70%)
2.5 μm	2.50 μm	± 0.005 μm (±0.20%)	± 0.0175 μm (±0.70%)
1 μm	1.00 μm	± 0.002 μm (±0.20%)	± 0.007 μm (±0.70%)

\* The 3σ uncertainty (95% confidence interval) average pitch is determined using a minimum of five die per production wafer. Each average pitch is determined using 100+ measurements on each die averaged over the stated number of lines. The total expanded uncertainty includes both Type A and Type B uncertainties corrected for sample size using an appropriate Student t-factor.

Equipment used:

Instrument	Model number	Serial #	NIST Certified CD/Recalibration	Resolution	Repeatability
FE-SEM	FEI Verios	9922557	CD-PG01-0211/June 2016	0.9nm	0.03%

Dudley S Finch  
Certified by

  
Signature

August 20<sup>th</sup> 2015  
Date

This certificate shall not be reproduced without the permission of Vof Micro to Nano.