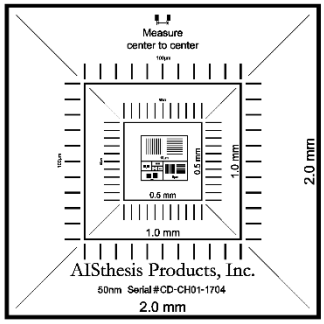
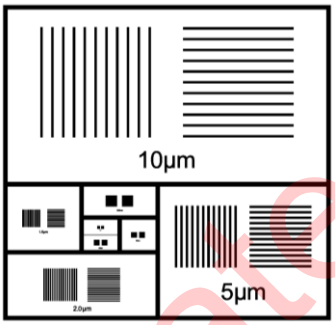
AISthesis Products
Advanced Imaging Products for Nanotechnology, Engineering and Life Sciences
PO Box 1950, Clyde NC 28721

ACCREDITED CERT #4904.01

Wafer Level Certificate of Traceability for Pelcotec™ Critical Dimension Magnification Standard





Product Number: **Pelcotec™** 710-01 CDMS-XY-0.05T-ISO-Etched

Product Description: 2.5x2.5mm, **Pelcotec™** 2mm-50nm Critical Dimension Magnification Standard.

Product Serial Number: CD-CH01

As Received Condition: New

As Returned Condition: N/A

Date of Receipt: N/A

Customer name and contact information:

TED PELLA, INC.
Microscopy Products for Science and Industry

P.O. Box 492477
Redding, CA 96049-2477
Tel: 530.243.2200
www.tedpella.com

The accuracy of this product with Wafer Identifier CD-CH01 was determined using a Field Emission Scanning Electron Microscope (FE-SEM) by reference comparison to working standards traceable to the National Institute of Standards and Technology (NIST), using CP 01 FE-SEM Imaging of Critical Dimension Magnification Standards (CDMS) and CP 02 Certification of Critical Dimension Magnification Standards. Die were sampled according to method SOP 08 Sampling Die. The data applies only to the CDMS products identified in this report. All results are “as-is”. Repair and/or adjustments are not possible.

Below are the average ISO 17025:2017-compliant Certified 10 µm Pitch Measurements unique to Die with Wafer Identifier CD-CH01 and traceable to NIST Certified Standard CD-PG01-0211.

X-Direction

Line	ISO 17025:2017 Compliant Certified Average Pitch on Wafer	Position of Measurement
0-10 µm	9.993 µm	± 7.5 µm from center
10-20 µm	9.980 µm	± 7.5 µm from center
20-30 µm	9.980 µm	± 7.5 µm from center
30-40 µm	9.999 µm	± 7.5 µm from center

40-50 µm	10.007 µm	± 7.5 µm from center
50-60 µm	10.014 µm	± 7.5 µm from center
60-70 µm	9.999 µm	± 7.5 µm from center
70-80 µm	9.999 µm	± 7.5 µm from center
80-90 µm	9.998 µm	± 7.5 µm from center
90-100 µm	10.001 µm	± 7.5 µm from center

Average	9.997 µm
2-Sigma *	0.029 µm

* Corrected for sample size using the appropriate Student t-factor.

Y-Direction

Line	ISO 17025:2017 Compliant Certified Average Pitch on Wafer	Position of Measurement
0-10 µm	9.993 µm	± 7.5 µm from center
10-20 µm	9.980 µm	± 7.5 µm from center
20-30 µm	9.980 µm	± 7.5 µm from center
30-40 µm	9.999 µm	± 7.5 µm from center
40-50 µm	10.007 µm	± 7.5 µm from center
50-60 µm	10.014 µm	± 7.5 µm from center
60-70 µm	9.999 µm	± 7.5 µm from center
70-80 µm	9.999 µm	± 7.5 µm from center
80-90 µm	9.998 µm	± 7.5 µm from center
90-100 µm	10.001 µm	± 7.5 µm from center

Average	9.997 µm
2-Sigma *	0.029 µm

* Corrected for sample size using the appropriate Student t-factor.

Measurements are reported with an uncertainty (k=2)** of ± 0.012 µm. Statements of Conformity are not provided in this report. Review the results and verify that they meet the requirements for the intended use. Physical damage to or contamination of the CDMS occurring after calibration may invalidate the reported measurements. Use this product at 25ºC ± 5ºC and at less than 80% RH.

** Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. The reported expanded measurement uncertainty is stated as the standard measurement uncertainty multiplied by the coverage factor K such that the coverage probability corresponds to approximately 95%.

X-Direction

Line	Number of Lines	Position of Measurement	Non-ISO 17025:2017 Compliant Measured Distance (first to last line)	Average Pitch of Wafer
2.0 mm	2	± 1.00mm from center	2.000 mm	2.000 mm
1.0 mm	2	± 0.5mm from center	1.000 mm	1.000 mm
0.5 mm	2	± 0.25mm from center	0.500 mm	0.500 mm
0.25 mm	2	± 0.125mm from center	0.250 mm	0.250 mm
0.10 mm	11	± 50 µm from center	1.001 mm	100.076 µm
50 µm	11	± 50 µm from center	0.500 mm	50.018 µm

5.0 µm	12	± 20 µm from center	55.021 µm	5.002 µm
2.0 µm	16	± 10 µm from center	30.042 µm	2.003 µm
1.0 µm	17	± 5 µm from center	16.021 µm	1.001 µm
500 nm	20	± 4 µm from center	9.523 µm	501.2 nm
250 nm	21	± 2.5 µm from center	5.014 µm	250.7 nm
100 nm	52	± 2.5 µm from center	5.115 µm	100.3 nm
50 nm	51	± 1.25 µm from center	2.500 µm	50.0 nm

Y-Direction

Line	Number of Lines	Position of Measurement	Non-ISO 17025:2017 Compliant Measured Distance (first to last line)	Average Pitch of Wafer
2.0 mm	2	± 1.00mm from center	2.000 mm	2.00 mm
1.0 mm	2	± 0.5mm from center	1.000 mm	1.00 mm
0.5 mm	2	± 0.25mm from center	0.500 mm	0.500 mm
0.25 mm	2	± 0.125mm from center	0.250 mm	0.250 mm
0.10 mm	11	± 50 µm from center	1.001 mm	100.076 µm
50 µm	11	± 50 µm from center	0.500 mm	50.018 µm
5.0 µm	12	± 20 µm from center	55.021 µm	5.002 µm
2.0 µm	16	± 10 µm from center	30.042 µm	2.003 µm
1.0 µm	17	± 5 µm from center	16.024 µm	1.001 µm
500 nm	20	± 4 µm from center	9.522 µm	501.2 nm
250 nm	21	± 2.5 µm from center	5.013 µm	250.7 nm
100 nm	52	± 2.5 µm from center	5.111 µm	100.2 nm
50 nm	51	± 1.25 µm from center	2.500 µm	50.0 nm

The average pitch is derived from the stated length that was determined using measurements (taken center-to-center) over the stated number of lines (i.e., length divided by the number of lines minus one).

Date of Analysis: January 25th, 2024

Equipment used:

Instrument	Model	Serial #	Resolution	Repeatability	Temperature	Humidity	Ref.
FE-SEM	FEI Apreo2	9958357	0.9nm	0.030%	21.9 ± 0.1 °C	33.3 ± 0.8%	CD-PG01-0211

Location: AISthesis Products, Inc., PO Box 1950, Clyde North Carolina 28721.

Notes:

D.S. Finch _____ _____

Certified by Signature

H. Haehlen _____ _____ January 25th, 2024

Authorized by Signature Date report issued.

P.O. Box 1950, Clyde, North Carolina 28721 Tel: 828.627.6555 E-mail: CDMS@aisthesisproducts.com

End of report.