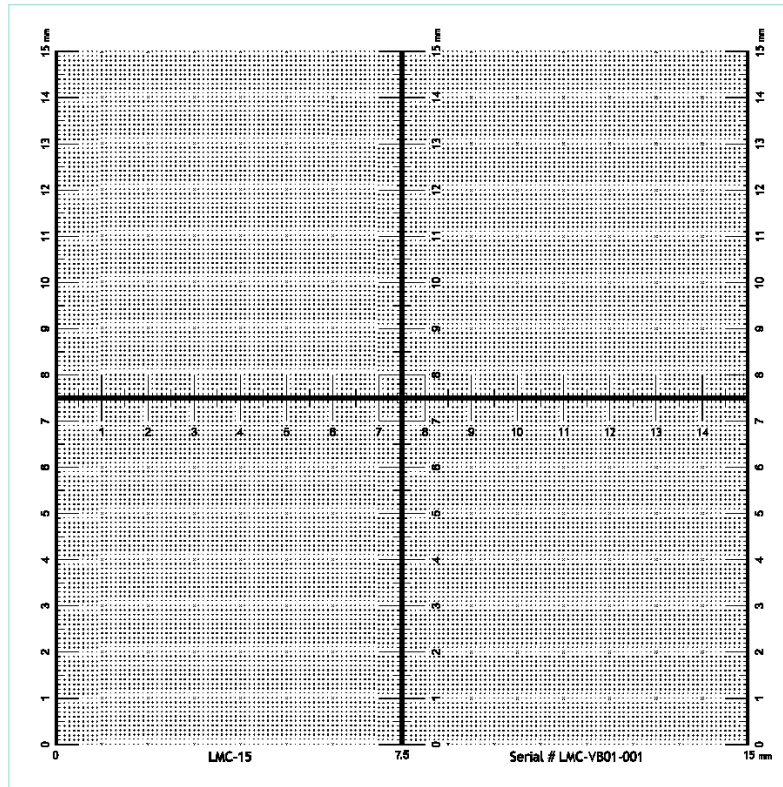




Wafer Level Certificate of Traceability for EM-Tec LAMC-15 Low Magnification Calibration Standard



Product Numbers: 31-T33000-U, 31-T33000-3, 31-T33000-7, 31-T33000-9, 31-T33000-10 and 31-T33000-11

Product Description: EM-Tec LAMC-15 Low Magnification Calibration Standard

Product Serial Number: LMC 15 VB01-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.

The following applies to both horizontal and vertical fiducial lines:

Line	Average certified distance with (1 σ range)	Standard Deviation (1 σ)	Total expanded uncertainty (3 σ)
0-1 mm	1.000 (0 to 0.997-1.003) mm	$\pm 0.30\%$	$\pm 0.90\%$
0-2 mm	2.000 (0 to 1.994-2.006) mm	$\pm 0.30\%$	$\pm 0.90\%$
0-3 mm	3.000 (0 to 2.991-3.009) mm	$\pm 0.30\%$	$\pm 0.90\%$
0-4 mm	4.000 (0 to 3.988-4.012) mm	$\pm 0.30\%$	$\pm 0.90\%$
0-5 mm	5.000 (0 to 4.985-5.015) mm	$\pm 0.30\%$	$\pm 0.90\%$
0-6 mm	6.000 (0 to 5.982-6.018) mm	$\pm 0.30\%$	$\pm 0.90\%$
0-7 mm	7.000 (0 to 6.979-7.021) mm	$\pm 0.30\%$	$\pm 0.90\%$






0-8 mm	8.000 (0 to 7.976-8.024) mm	±0.30%	±0.90%
0-9 mm	9.000 (0 to 8.973-9.027) mm	±0.30%	±0.90%
0-10 mm	10.000 (0 to 9.970-10.030) mm	±0.30%	±0.90%
0-11mm	11.000 (0 to 10.967-11.033) mm	±0.30%	±0.90%
0-12 mm	12.000 (0 to 11.964-12.036) mm	±0.30%	±0.90%
0-13 mm	13.000 (0 to 12.961-13.039) mm	±0.30%	±0.90%
0-14 mm	14.000 (0 to 13.958-14.042) mm	±0.30%	±0.90%
0-15 mm	15.000 (0 to 14.955-15.045) mm	±0.30%	±0.90%
0-0.1 mm	0.100 (0 to 0.0996-0.1004) mm	±0.40%	±1.20%
0-0.2 mm	0.200 (0 to 0.1992-0.2008) mm	±0.40%	±1.20%
0-0.3 mm	0.300 (0 to 0.2988-0.3012) mm	±0.40%	±1.20%
0-0.4 mm	0.400 (0 to 0.3984-0.4016) mm	±0.40%	±1.20%
0-0.5 mm	0.500 (0 to 0.4980-0.5020) mm	±0.40%	±1.20%
0-0.6 mm	0.600 (0 to 0.5976-0.6024) mm	±0.40%	±1.20%
0-0.7 mm	0.700 (0 to 0.6972-0.7028) mm	±0.40%	±1.20%
0-0.8 mm	0.800 (0 to 0.7968-0.8032) mm	±0.40%	±1.20%
0-0.9 mm	0.900 (0 to 0.8964-0.9036) mm	±0.40%	±1.20%
0-0.01 mm	0.010 (0 to 0.00994-0.01006) mm	±0.60%	±1.80%
0-0.02 mm	0.020 (0 to 0.01988-0.02012) mm	±0.60%	±1.80%
0-0.03 mm	0.030 (0 to 0.02982-0.03018) mm	±0.60%	±1.80%
0-0.04 mm	0.040 (0 to 0.03976-0.04024) mm	±0.60%	±1.80%
0-0.05 mm	0.050 (0 to 0.04970-0.05030) mm	±0.60%	±1.80%
0-0.06 mm	0.060 (0 to 0.05964-0.06036) mm	±0.60%	±1.80%
0-0.07 mm	0.070 (0 to 0.06958-0.07042) mm	±0.60%	±1.80%
0-0.08 mm	0.080 (0 to 0.07952-0.08048) mm	±0.60%	±1.80%
0-0.09 mm	0.090 (0 to 0.08946-0.09054) mm	±0.60%	±1.80%

The average pitch was determined using ten randomly sampled die. 80 center-to-center measurements were taken across each of the ten die. 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	Manufacturer	Serial #	Objective Lenses	NIST Certified CD/Recalibration	Repeatability
Light Microscope	Motic BA310MET	117000 0170	10x, 0.25N.A, 20x 0.4N.A. & 50x 0.55N.A. Plan Achromat	CD-PG01-0518 / June 2016	0.07%

Dudley S Finch
Certified by


Signature

August 14th 2015
Date

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TSB 31-T33000 Global Certificate of traceability 2015-08-18 Revision 1

