



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005  
ANSI/NCSL Z540-1-1994 & ANSL/NCSL Z540.3-2006

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CALIBRATION

Valid To: November 30, 2019

Certificate Number: 2917.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1</sup>:

I. Dimensional

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Gage Blocks	Up to 4 in (5 to 20) in	(3.2 + 1.9L) μin (4.5 + 2.3L) μin	Master gage blocks
Calipers <sup>3</sup>	Up to 36 in	(580 + 3.4L) μin	Gage blocks
Micrometers <sup>3</sup>	Up to 24 in	(86 + 2.7L) μin	Gage blocks
Height Gage <sup>3</sup>	Up to 24 in	(290 + 3.0L) μin	Gage blocks
Indicator <sup>3</sup>	Up to 0.008 in Up to 1 in	38 μin 68 μin	Indicator calibrator
Cylindrical Rings	Up to 6 in (6 to 12) in	(21 + 3.7L) μin (44 + 3.3L) μin	P&W UMM 1000
Cylindrical Plugs	Up to 12 in	(34 + 1.9L) μin	Helios Supra UMM

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Thread Plugs – Simple Pitch Diameter Major Diameter	Up to 6 in Up to 6 in	(99 + 2.6L) μin (23 + 0.3L) μin	Helios Supra UMM
Thread Rings – Simple Pitch Diameter Minor Diameter	Up to 2 in Up to 2 in	(56 + 15L) μin (180 + 65L) μin	Helios Supra UMM
Optical Comparator <sup>3</sup>	Up to 12 in	(100 + 2.2L) μin	Glass scale standard
LVDT	Up to 0.01 in Up to 1.0 in	11 μin 37 μin	Gage blocks
Z-Mike	Up to 1 in	(61 + 26L) μin	Plug gage
Pin Gage <sup>3</sup>	Up to 0.75 in	(62 + 28L) μin	Z-Mike
Length Standard	Up to 40 in	(0.8 + 2.2L) μin	P&W 1000A
Surface Finish Analyzer <sup>3</sup>	(2 to 116) μin	4 μin	Mitutoyo surface finish tester
Surface Finish Patch <sup>3</sup>	(2 to 116) μin	6 μin	Mitutoyo surface finish tester
CMM <sup>3</sup> – Repeatability Linearity Volumetric Bi-Directional	40 in x 30 in x 16 in	54 μin 130 μin 77 μin 45 μin	Calibration sphere Laser Ball bar Gage blocks

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Dial Indicator Calibrator	Up to 1 in	17 µin	Gage block and electronic amplifier
Universal Measuring Machines (UMMs, Laser Scale, Micrometers) <sup>3</sup>	Up to 12 in	(7 + 5L) µin	Gage blocks, master plug gages
Optical Scales (Reticles, Optical Micrometer Scales, Optical Grids)	12 in x 12 in	(28 + 0.8L) µin	OGP vision systems, glass scales/grids

## II. Dimensional Testing<sup>6</sup>

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Length, Angle, Geometry – Piece Parts, First Articles, Fixture Gages	16 in x 18 in x 16 in 20 in x 20 in x 10 in	260 µin 160 µin	CMM, vision systems (contact and non-contact measurements)

## III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
DC Voltage – Generate <sup>3</sup>	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1020) V	11 µV/V + 3.4 µV 11 µV/V + 5.7 µV 10 µV/V + 62 µV 15 µV/V + 0.19 mV 15 µV/V + 1.9 mV	Fluke 5520A opt 1

Parameter/Equipment	Range	CMC <sup>2,7</sup> ( $\pm$ )	Comments
DC Current – Generate <sup>3</sup>	(0 to 330) $\mu$ A (0.33 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 3) A (3 to 20.5) A	120 $\mu$ A/A + 16 nA 75 $\mu$ A/A + 49 nA 74 $\mu$ A/A + 0.35 $\mu$ A 98 $\mu$ A/A + 4.5 $\mu$ A 290 $\mu$ A/A + 54 $\mu$ A 810 $\mu$ A/A + 0.88 mA	Fluke 5520A opt1
DC Voltage – Measure <sup>3</sup>	(0 to 200) mV (0.2 to 2) V (2 to 20) V (20 to 200) V (200 to 1000) V	6.1 $\mu$ V/V + 0.13 $\mu$ V 3.5 $\mu$ V/V + 0.82 $\mu$ V 3.5 $\mu$ V/V + 7.5 $\mu$ V 5.3 $\mu$ V/V + 69 $\mu$ V 5.6 $\mu$ V/V + 0.67 mV	Fluke 8508A
DC Current – Measure <sup>3</sup>	(0 to 200) $\mu$ A (0.2 to 2) mA (2 to 20) mA (20 to 200) mA (0.2 to 2) A (2 to 20) A	12 $\mu$ A/A + 0.55 nA 13 $\mu$ A/A + 4.3 nA 13 $\mu$ A/A + 45 nA 40 $\mu$ A/A + 1.4 $\mu$ A 170 $\mu$ A/A + 19 $\mu$ A 360 $\mu$ A/A + 0.63 mA	Fluke 8508A
Resistance – Generate <sup>3</sup>	(0 to 11) $\Omega$ (11 to 33) $\Omega$ (33 to 110) $\Omega$ (110 to 330) $\Omega$ (0.33 to 1.1) k $\Omega$ (1.1 to 3.3) k $\Omega$ (3.3 to 11) k $\Omega$ (11 to 33) k $\Omega$ (33 to 110) k $\Omega$ (110 to 330) k $\Omega$ (0.33 to 1.1) M $\Omega$ (1.1 to 3.3) M $\Omega$ (3.3 to 11) M $\Omega$ (11 to 33) M $\Omega$ (33 to 110) M $\Omega$ (110 to 330) M $\Omega$ (0.33 to 1.1) G $\Omega$	45 $\mu\Omega/\Omega$ + 1.2 m $\Omega$ 24 $\mu\Omega/\Omega$ + 1.2 m $\Omega$ 23 $\mu\Omega/\Omega$ + 1.1 m $\Omega$ 25 $\mu\Omega/\Omega$ + 2.4 m $\Omega$ 24 $\mu\Omega/\Omega$ + 3.4 m $\Omega$ 33 $\mu\Omega/\Omega$ + 14 m $\Omega$ 27 $\mu\Omega/\Omega$ + 12 m $\Omega$ 25 $\mu\Omega/\Omega$ + 0.14 $\Omega$ 24 $\mu\Omega/\Omega$ + 0.17 $\Omega$ 31 $\mu\Omega/\Omega$ + 0.68 $\Omega$ 28 $\mu\Omega/\Omega$ + 1.8 $\Omega$ 63 $\mu\Omega/\Omega$ + 20 $\Omega$ 100 $\mu\Omega/\Omega$ + 38 $\Omega$ 210 $\mu\Omega/\Omega$ + 2.2 k $\Omega$ 500 $\mu\Omega/\Omega$ + 3.0 k $\Omega$ 0.24 % + 95 k $\Omega$ 1.2 % + 0.53 M $\Omega$	Fluke 5520A opt 1

Parameter/Equipment	Range	CMC <sup>2,7</sup> ( $\pm$ )	Comments
Resistance – Measure <sup>3</sup>	(0 to 2) $\Omega$ (2 to 20) $\Omega$ (20 to 200) $\Omega$ (0.2 to 2) k $\Omega$ (2 to 20) k $\Omega$ (20 to 200) k $\Omega$ (0.2 to 2) M $\Omega$ (2 to 20) M $\Omega$ (20 to 200) M $\Omega$ (0.2 to 2) G $\Omega$	16 $\mu\Omega/\Omega$ + 5.2 $\mu\Omega$ 9 $\mu\Omega/\Omega$ + 21 $\mu\Omega$ 7.6 $\mu\Omega/\Omega$ + 70 $\mu\Omega$ 7.9 $\mu\Omega/\Omega$ + 0.65 m $\Omega$ 7.2 $\mu\Omega/\Omega$ + 14 m $\Omega$ 8.2 $\mu\Omega/\Omega$ + 57 m $\Omega$ 13 $\mu\Omega/\Omega$ + 1.6 $\Omega$ 22 $\mu\Omega/\Omega$ + 0.10 k $\Omega$ 150 $\mu\Omega/\Omega$ + 9.8 k $\Omega$ 0.14 % + 0.95 M $\Omega$	Fluke 8508A
AC Voltage – Measure <sup>3</sup>			
(0 to 199) mV	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	130 $\mu\text{V}/\text{V}$ + 16 $\mu\text{V}$ 130 $\mu\text{V}/\text{V}$ + 5 $\mu\text{V}$ 110 $\mu\text{V}/\text{V}$ + 5 $\mu\text{V}$ 110 $\mu\text{V}/\text{V}$ + 2.4 $\mu\text{V}$ 130 $\mu\text{V}/\text{V}$ + 5 $\mu\text{V}$ 420 $\mu\text{V}/\text{V}$ + 10 $\mu\text{V}$ 670 $\mu\text{V}/\text{V}$ + 24 $\mu\text{V}$	Fluke 8508A
199 mV to 1.99 V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (0.1 to 1) MHz	120 $\mu\text{V}/\text{V}$ + 0.14 mV 100 $\mu\text{V}/\text{V}$ + 24 $\mu\text{V}$ 84 $\mu\text{V}/\text{V}$ + 24 $\mu\text{V}$ 75 $\mu\text{V}/\text{V}$ + 24 $\mu\text{V}$ 120 $\mu\text{V}/\text{V}$ + 24 $\mu\text{V}$ 390 $\mu\text{V}/\text{V}$ + 50 $\mu\text{V}$ 540 $\mu\text{V}/\text{V}$ + 0.24 mV 0.24 % + 24 mV	
(2 to 19.9) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (0.1 to 1) MHz	120 $\mu\text{V}/\text{V}$ + 1.4 mV 110 $\mu\text{V}/\text{V}$ + 0.24 mV 84 $\mu\text{V}/\text{V}$ + 0.24 mV 76 $\mu\text{V}/\text{V}$ + 0.24 mV 130 $\mu\text{V}/\text{V}$ + 0.24 mV 210 $\mu\text{V}/\text{V}$ + 0.50 mV 460 $\mu\text{V}/\text{V}$ + 2.4 mV 0.82 % + 0.24 V	

Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Voltage – Measure <sup>3</sup>			
(20 to 199) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	120 $\mu\text{V}/\text{V}$ + 14 mV 110 $\mu\text{V}/\text{V}$ + 2.4 mV 91 $\mu\text{V}/\text{V}$ + 2.4 mV 78 $\mu\text{V}/\text{V}$ + 2.4 mV 120 $\mu\text{V}/\text{V}$ + 2.4 mV 200 $\mu\text{V}/\text{V}$ + 5.0 mV 480 $\mu\text{V}/\text{V}$ + 24 mV	Fluke 8508A
(200 to 1000) V	(1 to 10) Hz (10 to 40) Hz (0.04 to 10) kHz (10 to 30) kHz (30 to 100) kHz	57 $\mu\text{V}/\text{V}$ + 0.16 V 91 $\mu\text{V}/\text{V}$ + 50 mV 93 $\mu\text{V}/\text{V}$ + 50 mV 150 $\mu\text{V}/\text{V}$ + 0.10 V 240 $\mu\text{V}/\text{V}$ + 0.50 V	
AC Current – Measure <sup>3</sup>			
(0 to 200) $\mu\text{A}$	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	260 $\mu\text{A}/\text{A}$ + 24 nA 240 $\mu\text{A}/\text{A}$ + 24 nA 430 $\mu\text{A}/\text{A}$ + 24 nA	Fluke 8508A
200 $\mu\text{A}$ to 2 mA	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	270 $\mu\text{A}/\text{A}$ + 0.24 $\mu\text{A}$ 240 $\mu\text{A}/\text{A}$ + 0.24 $\mu\text{A}$ 340 $\mu\text{A}/\text{A}$ + 0.24 $\mu\text{A}$	
(2 to 20) mA	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	280 $\mu\text{A}/\text{A}$ + 2.4 $\mu\text{A}$ 250 $\mu\text{A}/\text{A}$ + 2.4 $\mu\text{A}$ 240 $\mu\text{A}/\text{A}$ + 2.4 $\mu\text{A}$	
(20 to 200) mA	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	280 $\mu\text{A}/\text{A}$ + 24 $\mu\text{A}$ 230 $\mu\text{A}/\text{A}$ + 24 $\mu\text{A}$ 240 $\mu\text{A}/\text{A}$ + 24 $\mu\text{A}$	
200 mA to 2 A	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	530 $\mu\text{A}/\text{A}$ + 0.24 mA 520 $\mu\text{A}/\text{A}$ + 0.24 mA 670 $\mu\text{A}/\text{A}$ + 0.24 mA	
(2 to 20) A	(0.01 to 2) kHz (2 to 10) kHz	690 $\mu\text{A}/\text{A}$ + 2.4 mA 0.21 % + 2.4 mA	

Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Current – Generate <sup>3</sup>			
Up to 330 µA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.17 % + 0.1 µA 0.11 % + 0.1 µA 0.093 % + 0.1 µA 0.24 % + 0.15 µA 0.61 % + 0.2 µA 1.2 % + 0.4 µA	Fluke 5520A opt 1
330 µA to 3.3 mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.17 % + 0.15 µA 0.10 % + 0.15 µA 0.081 % + 0.15 µA 0.15 % + 0.2 µA 0.39 % + 0.3 µA 0.78 % + 0.6 µA	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 2 µA 0.071 % + 2 µA 0.032 % + 2 µA 0.062 % + 2 µA 0.16 % + 3 µA 0.31 % + 4 µA	
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 20 µA 0.072 % + 20 µA 0.033 % + 20 µA 0.077 % + 50 µA 0.15 % + 0.10 mA 0.31 % + 0.20 mA	
330 mA to 3 A	(10 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 0.10 mA 0.054 % + 0.10 mA 0.46 % + 10 mA 2.0 % + 50 mA	
(3 to 20.5) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.10 % + 50 mA 0.12 % + 50 mA 2.5 % + 50 mA	
AC Voltage – Generate <sup>3</sup>			
Up to 33 mV	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	590 µV/V + 6 µV 150 µV/V + 6 µV 200 µV/V + 6 µV 780 µV/V + 6 µV 0.27 % + 12 µV 0.59 % + 50 µV	Fluke 5520A opt 1

Parameter/Range	Frequency	CMC <sup>2,7</sup> ( $\pm$ )	Comments
AC Voltage – Generate (cont) <sup>3</sup>			
(33 to 330) mV	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	230 $\mu$ V/V + 8 $\mu$ V 120 $\mu$ V/V + 8 $\mu$ V 130 $\mu$ V/V + 8 $\mu$ V 290 $\mu$ V/V + 8 $\mu$ V 610 $\mu$ V/V + 32 $\mu$ V 0.16 % + 70 $\mu$ V	Fluke 5520A opt 1
330 mV to 3.3 V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	230 $\mu$ V/V + 50 $\mu$ V 120 $\mu$ V/V + 60 $\mu$ V 160 $\mu$ V/V + 60 $\mu$ V 290 $\mu$ V/V + 50 $\mu$ V 770 $\mu$ V/V + 0.13 mV 0.19 % + 0.60 mV	
(3.3 to 33) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	230 $\mu$ V/V + 0.65 mV 130 $\mu$ V/V + 0.60 mV 190 $\mu$ V/V + 0.60 mV 270 $\mu$ V/V + 0.60 mV 690 $\mu$ V/V + 1.6 mV	
(33 to 330) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	240 $\mu$ V/V + 2 mV 180 $\mu$ V/V + 6 mV 240 $\mu$ V/V + 6 mV 330 $\mu$ V/V + 6 mV 0.23 % + 50 mV	
(330 to 1020) V	(0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	310 $\mu$ V/V + 10 mV 200 $\mu$ V/V + 10 mV 240 $\mu$ V/V + 10 mV	



Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
Capacitance <sup>3</sup> –			
0.35 nF	10 Hz to 10 kHz	0.58 % + 10 pF	Fluke 5520A opt 1
1.1 nF	10 Hz to 10 kHz	0.45 % + 10 pF	
3.3 nF	10 Hz to 3 kHz	0.41 % + 10 pF	
11 nF	10 Hz to 1 kHz	0.21 % + 10 pF	
33 nF	10 Hz to 1 kHz	0.13 % + 0.10 nF	
109 nF	10 Hz to 1 kHz	0.19 % + 0.10 nF	
300 nF	10 Hz to 1 kHz	0.20 % + 0.30 nF	
1.09 uF	(10 to 600) Hz	0.19 % + 1 nF	
3 uF	(10 to 300) Hz	0.18 % + 3 nF	
10.9 uF	(10 to 150) Hz	0.19 % + 10 nF	
30 uF	(10 to 120) Hz	0.30 % + 30 nF	
109 uF	(10 to 80) Hz	0.35 % + 0.10 μF	
300 uF	(0 to 50) Hz	0.39 % + 0.30 μF	
1.09 mF	(0 to 20) Hz	0.35 % + 1 μF	
3 mF	(0 to 6) Hz	0.34 % + 3 μF	
10.9 mF	(0 to 2) Hz	0.35 % + 10 μF	
30 mF	(0 to 0.6) Hz	0.57 % + 30 μF	
109 mF	(0 to 0.2) Hz	0.84 % + 0.10 mF	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Simulation of Thermocouples – Generate			
Type C	(0 to 150) °C	0.35 °C	Fluke 5520A
	(150 to 650) °C	0.33 °C	
	(650 to 1000) °C	0.36 °C	
	(1000 to 1800) °C	0.47 °C	
	(1800 to 2316) °C	0.7 °C	
Type E	(-250 to -100) °C	0.47 °C	
	(-100 to -25) °C	0.29 °C	
	(-25 to 350) °C	0.28 °C	
	(350 to 650) °C	0.29 °C	
	(650 to 1000) °C	0.31 °C	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Simulation of Thermocouples – Generate (cont)			
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.34 °C 0.29 °C 0.28 °C 0.29 °C 0.32 °C	Fluke 5520A
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.37 °C 0.30 °C 0.29 °C 0.33 °C 0.41 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.51 °C 0.38 °C 0.37 °C 0.41 °C	
Type S	(0 to 250) °C (250 to 400) °C (400 to 1400) °C (1400 to 1767) °C	0.45 °C 0.38 °C 0.39 °C 0.44 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.55 °C 0.32 °C 0.29 °C 0.28 °C	
Type U	(-200 to 0) °C (0 to 600) °C	0.51 °C 0.34 °C	

IV. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments
Amplitude Modulation – Measure <sup>3</sup>  Rate: (1 to 100) kHz Depth: (10 to 90) %	9 kHz to 26.5 GHz	4.2 % + 1 digit	E4407B opt BAA
Frequency Modulation – Measure <sup>3</sup>  Rate: (1 to 100) kHz  Deviation: (1 to 100) kHz	9 kHz to 26.5 GHz  9 kHz to 26.5 GHz	3.1 % + 1 digit  3.1 % + 1 digit	E4407B opt BAA
Absolute RF Power <sup>3</sup> – Measure, 50 Ω  (20 to 0) dBm  (0 to -20) dBm  (-20 to -35) dBm	(100 to 500) kHz 500 kHz to 3 MHz (3 to 10) MHz 10 MHz to 1.2 GHz (1.2 to 18) GHz (18 to 26.5) GHz  (100 to 500) kHz 500 kHz to 3 MHz (3 to 10) MHz 10 MHz to 1.2 GHz (1.2 to 18) GHz (18 to 26.5) GHz  (100 to 500) kHz 500 kHz to 3 MHz (3 to 10) MHz 10 MHz to 1.2 GHz (1.2 to 18) GHz (18 to 26.5) GHz	0.48 dBm 0.47 dBm 0.46 dBm 0.55 dBm 0.42 dBm 0.54 dBm  0.48 dBm 0.46 dBm 0.46 dBm 0.60 dBm 0.37 dBm 0.51 dBm  0.48 dBm 0.47 dBm 0.46 dBm 0.60 dBm 0.37 dBm 0.51 dBm	HP 53148A power meter w/HP 8485A and 8482A sensors

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
Absolute RF Power – Generate, 50 Ω <sup>3</sup>			
(10 to -30) dBm	< 2 GHz (2.05 to 10) GHz (10.05 to 20) GHz (20.05 to 26.5) GHz	0.40 dBm 0.43 dBm 0.43 dBm 0.63 dBm	HP 83630 sweeper, E4407B spectrum analyzer, 11667B splitter, 8485A power sensor
(-30 to -50) dBm	< 2 GHz (2.05 to 10) GHz (10.05 to 20) GHz (20.05 to 26.5) GHz	0.63 dBm 0.54 dBm 0.61 dBm 0.76 dBm	
(-50 to -80) dBm	< 2 GHz (2.05 to 10) GHz (10.05 to 20) GHz (20.05 to 26.5) GHz	0.63 dBm 0.53 dBm 0.62 dBm 0.80 dBm	
< -80 dBm	< 2 GHz (2.05 to 10) GHz (10.05 to 20) GHz (20.05 to 26.5) GHz	0.38 dBm 0.38 dBm 0.62 dBm 0.71 dBm	
Attenuation – Generate Coaxial, 1 dB Step <sup>3</sup>			
0 dB	DC to 50 MHz	0.57 dB	Agilent 8494B 1 dB/step attenuator
1 dB		0.49 dB	
2 dB		0.49 dB	
3 dB		0.6 dB	
4 dB		0.6 dB	
5 dB		0.72 dB	
6 dB		0.71 dB	
7 dB		0.84 dB	
8 dB		0.84 dB	
9 dB		0.83 dB	
10 dB		0.84 dB	
11 dB	0.96 dB		

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
Attenuation – Generate Coaxial, 1 dB Step <sup>3</sup> (cont)			
0 dB	(50 to 500) MHz	0.56 dB	Agilent 8494B 1 dB/step attenuator
1 dB		0.49 dB	
2 dB		0.49 dB	
3 dB		0.60 dB	
4 dB		0.60 dB	
5 dB		0.71 dB	
6 dB		0.71 dB	
7 dB		0.83 dB	
8 dB		0.84 dB	
9 dB		0.83 dB	
10 dB		0.84 dB	
11 dB	0.96 dB		
0 dB	500 MHz to 1 GHz	0.64 dB	
1 dB		0.50 dB	
2 dB		0.49 dB	
3 dB		0.60 dB	
4 dB		0.60 dB	
5 dB		0.71 dB	
6 dB		0.72 dB	
7 dB		0.84 dB	
8 dB		0.84 dB	
9 dB		0.84 dB	
10 dB		0.93 dB	
11 dB	0.96 dB		
0 dB	(1 to 12.4) GHz	1 dB	
1 dB		1 dB	
2 dB		0.99 dB	
3 dB		0.99 dB	
4 dB		0.99 dB	
5 dB		0.99 dB	
6 dB		1.1 dB	
7 dB		1.1 dB	
8 dB		1.1 dB	
9 dB		1.1 dB	
10 dB		1.2 dB	
11 dB	1.2 dB		



Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
Attenuation – Generate Coaxial, 10 dB Step <sup>3</sup> (cont)			
0 dB	(1 to 8) GHz	0.80 dB	Agilent 8496B 10 dB/ step attenuator
10 dB		0.76 dB	
20 dB		0.99 dB	
30 dB		1.2 dB	
40 dB		1.6 dB	
50 dB		2.0 dB	
60 dB		2.4 dB	
70 dB		2.8 dB	
80 dB		3.2 dB	
90 dB		3.6 dB	
100 dB		3.9 dB	
110 dB	4.3 dB		
0 dB	(8 to 12.4) GHz	0.91 dB	
10 dB		0.87 dB	
20 dB		1.1 dB	
30 dB		1.6 dB	
40 dB		2.1 dB	
50 dB		2.6 dB	
60 dB		3.2 dB	
70 dB		3.7 dB	
80 dB		4.2 dB	
90 dB		4.7 dB	
100 dB		5.2 dB	
110 dB	5.8 dB		
0 dB	(12.4 to 18) GHz	1.1 dB	
10 dB		1.1 dB	
20 dB		1.3 dB	
30 dB		1.7 dB	
40 dB		2.2 dB	
50 dB		2.7 dB	
60 dB		3.2 dB	
70 dB		3.7 dB	
80 dB		4.2 dB	
90 dB		4.8 dB	
100 dB		5.3 dB	
110 dB	5.8 dB		

V. Mechanical

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Acceleration <sup>3</sup>	20 to 100 hz 100 to 2500 hz 2500 to 10 000 hz	2.0 % + 1 digit 1.8 % + 1 digit 3.3 % + 1 digit	Dytran 3120B reference accelerometer
Scales and Balances <sup>3</sup>	(0 to 300) lb (1 to 1000) g	0.24 lb 0.09 g	Class F weights Class 1 weights
Pressure – Measure	(0 to 1.5) PSIA (1.5 to 15) PSIA (15 to 25) PSIA	0.01 psi + 0.002 psi 0.01 psi + 0.002 psi 0.01 psi + 0.002 psi	Fluke PM600-A200K
	(0 to 50) psi (50 to 250) psi (250 to 500) psi (500 to 1000) psi	0.05 psi + 0.07 psi 0.06 psi + 0.07 psi 0.08 psi + 0.07 psi 0.14 psi + 0.07 psi	Fluke PM600-A7M
Pressure – Measure <sup>3</sup>	Low (0 to 5) H <sub>2</sub> O (5 to 15) H <sub>2</sub> O (15 to 25) H <sub>2</sub> O	0.02 H <sub>2</sub> O + 1 digit 0.02 H <sub>2</sub> O + 1 digit 0.02 H <sub>2</sub> O + 1 digit	Ashcroft / AQS-1
	Medium (0 to 2000) psi (2000 to 4000) psi (4000 to 6000) psi (6000 to 8000) psi (8000 to 10000) psi	0.44 psi + 1 digit 0.93 psi + 1 digit 1.5 psi + 1 digit 2.1 psi + 1 digit 2.8 psi + 1 digit	Fluke P3124-PSI
	High (-13 to 10) psi (-10 to 36) psi (36 to 360) psi	0.04 psi + 1 digit 0.11 psi + 1 digit 0.11 psi + 1 digit	Additel ADT761-M
Torque Transducers	(25 to 400) in·oz 400 in·oz to 20 ft·lbf (20 to 200) ft·lbf (200 to 2000) ft·lbf	0.16 in·oz + 1 digit 1.6 in·oz + 1 digit 0.09 ft·lbf + 1 digit 0.80 ft·lbf + 1 digit	CI torque arms and Class F weights



Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Torque <sup>3</sup>	(5 to 50) in.oz (50 to 200) in.oz (30 to 400) in.lbf (400 to 1000) in.lbf (30 to 50) ft.lbf (50 to 250) ft.lbf (250 to 600) ft.lbf (100 to 1000) ft.lbf	0.78 % IV + 1 div 0.42 % IV + 1 div 0.54 % IV + 1 div 0.61 % IV + 1 div 0.43 % IV + 1 div 0.36 % IV + 1 div 0.48 % IV + 1 div 0.43 % IV + 1 div	CDI torque transducers  IV = indicated value  div = lowest division identified

#### VI. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Temperature – Measure <sup>3</sup>	(-20 to 50) °C  (-200 to 660) °C	0.16 °C + 1 div  0.01 °C + 1 div	Edgetech Model 645  Blackstack 1560, SPRT 2560, SPRT 5628
Humidity – Measure <sup>3</sup>	(0 to 10) % RH (10 to 92) % RH	0.80 % RH + 1 digit 0.73 % RH + 1 digit	Edgetech Model 645

#### VII. Time and Frequency

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
GPS Disciplined Oscillator Frequency Reference	10 MHz	1.1 x 10 <sup>-12</sup> Hz/Hz	Fluke 910R
Frequency – Measure <sup>3</sup>	(1 to 1000) Hz (1 to 10) kHz (10 to 100) kHz (0.1 to 350) MHz	1.2 x 10 <sup>-6</sup> Hz/Hz 1.2 x 10 <sup>-7</sup> Hz/Hz 2.7 x 10 <sup>-8</sup> Hz/Hz 2.8 x 10 <sup>-8</sup> Hz/Hz	Agilent 53220A

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<sup>1</sup> This laboratory offers commercial dimensional testing, calibration and field services where noted.

<sup>2</sup> Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards of nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

<sup>3</sup> Field calibration service is available for this calibration and this laboratory meets A2LA *RI04 – General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

<sup>4</sup> In the statement of CMC,  $L$  is the numerical value of the nominal length of the device measured in inches.

<sup>5</sup> In the statement of CMC, percentages are to be read as percent of reading, unless noted otherwise.

<sup>6</sup> This laboratory meets R205 – *Specific Requirements: Calibration Laboratory Accreditation Program* for the types of dimensional tests listed above and is considered equivalent to that of a calibration.

<sup>7</sup> The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.



## Accredited Laboratory

A2LA has accredited

# MICRON INSPECTION & CALIBRATION SERVICES, INC.

York, PA

for technical competence in the field of

## Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSLI Z540-1-1994, the requirements of ANSI/NCSLI Z540.3-2006, and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).



Presented this 5<sup>th</sup> day of October 2017.

A handwritten signature in black ink, written over a horizontal line.

President and CEO  
For the Accreditation Council  
Certificate Number 2917.01  
Valid to November 30, 2019

*For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.*