



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

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CALIBRATION

Valid To: August 31, 2017

Certificate Number: 2836.01

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</sup> (±)	Comments
Micrometers – Outside – 0.0001 in increments 0.001 in increments Inside Depth Micrometers Standards Thread Micrometers	Up to 12 in Up to 48 in (2.5 to 48) in Up to 12 in (1 to 11) in (11 to 48) in Up to 5 in	0.00013 in 0.0013 in 0.0012 in 0.0012 in 0.00059 in 0.00086 in 0.0010 in	Length standards Length standards Length standards Length standards Length standards 60° standards
Pi Tapes	(2 to 48) in	0.0012 in	Ring gages
Gage Blocks	(0.05 to 20) in	0.00015 in	Length standards

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Plain Plugs	Up to 4 in	0.00011 in	Height master
Pin Gages	Up to 4 in	0.00025 in	Height master
Threaded Plug Gages	Up to 5 in	0.0013 in	Thread micrometer
Straight Edges & Rules	Up to 72 in	0.0012 in	CMM or trans check, surface plate
L Squares	Up to 36 in	0.00073 in	CMM
Levels, Precision Machinist	0.0005 in increment/ft	0.00058 in	Surface plate
Indicators	Up to 12 in:  0.0001 in increments 0.001 in increments	0.00015 in 0.0012 in	Height master
Surface Plates	Up to (18 × 18) in	0.00011 in	Surface plate w/ trans check
Calipers	Up to 48 in	0.0012 in	Length standards
Height Gages	Up to 48 in	0.0012 in	Length standards
Protractors/Inclinometers, Mechanical, Digital	(0 to 180)°	0°, 5', 45", 0.1°	Surface plate, sine plate, gage blocks



II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2, 5, 7</sup> ( $\pm$ )	Comments
DC Voltage <sup>3</sup> – Measure	(10 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	11 $\mu$ V/V + 0.4 $\mu$ V 10 $\mu$ V/V + 0.4 $\mu$ V 10 $\mu$ V/V + 0.6 $\mu$ V 12 $\mu$ V/V + 40 $\mu$ V 12 $\mu$ V/V + 0.1 mV	Agilent 3458A
	(1 to 20) kV (20 to 35) kV (35 to 40) kV	2.3 % 1.2 % 2.3 %	Agilent 3458A Fluke 80K40
DC Voltage <sup>3</sup> – Generate	(10 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	11 $\mu$ V/V + 0.4 $\mu$ V 10 $\mu$ V/V + 0.4 $\mu$ V 10 $\mu$ V/V + 0.6 $\mu$ V 12 $\mu$ V/V + 40 $\mu$ V 12 $\mu$ V/V + 0.1 mV	Fluke 5440B with Agilent 3458A
	Fixed Point	10 V	7 $\mu$ V/V Fluke 732A
DC Current <sup>3</sup> – Measure	(0 to 100) nA 100 nA to 1 $\mu$ A (1 to 10) $\mu$ A (10 to 100) $\mu$ A 100 $\mu$ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	44 $\mu$ A/A + 45 pA 27 $\mu$ A/A + 45 pA 27 $\mu$ A/A + 110 pA 24 $\mu$ A/A + 0.9 nA 24 $\mu$ A/A + 6 nA 24 $\mu$ A/A + 60 nA 41 $\mu$ A/A + 600 nA 0.013 % + 12 $\mu$ A	Agilent 3458A
	(1 to 20) A	0.013 %	Agilent 3458A Fluke Y5020
	(20 to 50) A	110 mA	Agilent 3458A Rubicon 1600



Parameter/Equipment	Range	CMC <sup>2,5,7</sup> ( $\pm$ )	Comments
DC Current <sup>3</sup> – Generate	(0 to 100) nA 100 nA to 1 $\mu$ A (1 to 10) $\mu$ A (10 to 100) $\mu$ A 100 $\mu$ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A  (1 to 20) A  (20 to 50) A	44 $\mu$ A/A + 45 pA 27 $\mu$ A/A + 45 pA 27 $\mu$ A/A + 110 pA 24 $\mu$ A/A + 0.9 nA 24 $\mu$ A/A + 6 nA 24 $\mu$ A/A + 60 nA 41 $\mu$ A/A + 600 nA 0.013 % + 12 $\mu$ A  0.01 %  110 mA	Fluke 5100B and current shunts with Agilent 3458A        Current standards with Agilent 3458A and Fluke Y5020  Current standards and shunts with Agilent 3458A
Capacitance <sup>3</sup> – Generate, @ 1 kHz	(0.0001 to 0.5) $\mu$ F	0.12 % + 0.5 pF	Arco Electronics SS-32
Resistance <sup>3</sup> – Measure	(0 to 10) $\Omega$ (10 to 100) $\Omega$ 100 $\Omega$ to 1 k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ 100 k $\Omega$ to 1 M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$ (100 to 1000) M $\Omega$	18 $\mu\Omega/\Omega$ + 60 $\mu\Omega$ 14 $\mu\Omega/\Omega$ + 0.6 m $\Omega$ 12 $\mu\Omega/\Omega$ + 0.6 m $\Omega$ 12 $\mu\Omega/\Omega$ + 6 m $\Omega$ 12 $\mu\Omega/\Omega$ + 60 m $\Omega$ 18 $\mu\Omega/\Omega$ + 3 $\Omega$ 89 $\mu\Omega/\Omega$ + 110 $\Omega$ 0.078 % + 1.2 k $\Omega$ 0.058 % + 12 k $\Omega$	Agilent 3458A
Resistance <sup>3</sup> – Generate	(0 to 10) $\Omega$ (10 to 100) $\Omega$ 100 $\Omega$ to 1 k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ 100 k $\Omega$ to 1 M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$ (100 to 1000) M $\Omega$	18 $\mu\Omega/\Omega$ + 60 $\mu\Omega$ 14 $\mu\Omega/\Omega$ + 0.6 m $\Omega$ 12 $\mu\Omega/\Omega$ + 0.6 m $\Omega$ 12 $\mu\Omega/\Omega$ + 6 m $\Omega$ 12 $\mu\Omega/\Omega$ + 60 m $\Omega$ 18 $\mu\Omega/\Omega$ + 3 $\Omega$ 89 $\mu\Omega/\Omega$ + 110 $\Omega$ 0.078 % + 1.2 k $\Omega$ 0.58 % + 12 k $\Omega$	Resistance standards monitored with Agilent 3458A
Fixed Points	1 $\Omega$  10 k $\Omega$	10 $\mu\Omega$  50 m $\Omega$	Fluke 742A-1  Fluke 742A-10K



Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Voltage <sup>3</sup> – Measure			
(0 to 10) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 4) MHz (4 to 8) MHz	0.03 % + 5 μV 0.02 % + 3.1 μV 0.03 % + 3.1 μV 0.12 % + 3.1 μV 0.58 % + 3.1 μV 4.6 % + 4 μV 1.4 % + 7 μV 8.1 % + 9 μV 23 % + 10 μV	Agilent 3458A
(10 to 100) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz	0.01 % + 4 μV 0.01 % + 2 μV 0.017 % + 2 μV 0.04 % + 2 μV 0.1 % + 2 μV 0.35 % + 10 μV 1.2 % + 10 μV 1.8 % + 10 μV 4.6 % + 71 μV 4.6 % + 80 μV	
100 mV to 1 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz	0.01 % + 41 μV 0.01 % + 21 μV 0.02 % + 21 μV 0.03 % + 21 μV 0.09 % + 21 μV 0.35 % + 0.1 mV 1.2 % + 0.1 mV 1.7 % + 0.1 mV 4.6 % + 0.7 mV 4.6 % + 0.8 mV 17 % + 1 mV	



Parameter/Range	Frequency	CMC <sup>2, 5, 7</sup> ( $\pm$ )	Comments
AC Voltage <sup>3</sup> – Measure (cont)			
(1 to 10) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz	0.01 % + 410 $\mu$ V 0.01 % + 210 $\mu$ V 0.02 % + 210 $\mu$ V 0.03 % + 210 $\mu$ V 0.09 % + 210 $\mu$ V 0.35 % + 1 mV 1.2 % + 1 mV 1.7 % + 1 mV 4.6 % + 7 mV 4.6 % + 7 mV 17 % + 10 mV	Agilent 3458A
(10 to 100) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.02 % + 4.1 mV 0.02 % + 2.1 mV 0.02 % + 2.1 mV 0.04 % + 2.1 mV 0.14 % + 2.1 mV 0.46 % + 10 mV 1.8 % + 10 mV	
(100 to 1000) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.05 % + 41 mV 0.05 % + 20 mV 0.07 % + 20 mV 0.14 % + 21 mV 0.35 % + 21 mV	
(1 to 28) kV	60 Hz	5.8 %	Agilent 3458A Fluke 80K40
AC Voltage <sup>3</sup> – Generate			
(0 to 10) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 4) MHz (4 to 8) MHz	0.03 % + 5 $\mu$ V 0.02 % + 3.1 $\mu$ V 0.03 % + 3.1 $\mu$ V 0.12 % + 3.1 $\mu$ V 0.58 % + 3.1 $\mu$ V 4.6 % + 4 $\mu$ V 1.4 % + 7 $\mu$ V 8.1 % + 9 $\mu$ V 23 % + 10 $\mu$ V	AC voltage standards monitored with Agilent 3458A



Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Voltage <sup>3</sup> – Generate (cont)			
(10 to 100) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz	0.01 % + 4 μV 0.01 % + 2 μV 0.017 % + 2 μV 0.04 % + 2 μV 0.1 % + 2 μV 0.35 % + 10 μV 1.2 % + 10 μV 1.8 % + 10 μV 4.6 % + 71 μV 4.7 % + 80 μV	AC voltage standards monitored with Agilent 3458A
100 mV to 1 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz	0.01 % + 41 μV 0.01 % + 21 μV 0.02 % + 21 μV 0.03 % + 21 μV 0.09 % + 21 μV 0.35 % + 0.1 mV 1.2 % + 0.1 mV 1.7 % + 0.1 mV 4.6 % + 0.7 mV 4.6 % + 0.8 mV 17 % + 1 mV	
(1 to 10) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz	0.01 % + 410 μV 0.01 % + 210 μV 0.02 % + 210 μV 0.03 % + 210 μV 0.09 % + 210 μV 0.35 % + 1 mV 1.2 % + 1 mV 1.7 % + 1 mV 4.6 % + 7 mV 4.6 % + 7 mV 17 % + 10 mV	
(10 to 100) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.02 % + 4.1 mV 0.02 % + 2.1 mV 0.02 % + 2.1 mV 0.04 % + 2.1 mV 0.14 % + 2.1 mV 0.46 % + 10 mV 1.7 % + 10 mV	



Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Voltage <sup>3</sup> – Generate (cont)  (100 to 1000) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.05 % + 41 mV 0.05 % + 20 mV 0.07 % + 20 mV 0.14 % + 21 mV 0.35 % + 21 mV	AC voltage standards monitored with Agilent 3458A
AC Current <sup>3</sup> – Measure  (1 to 100) µA  (0.1 to 1) mA  (1 to 10) mA  (10 to 100) mA  (0.1 to 1) A	(10 to 20) Hz (20 to 45) Hz 45 Hz to 5 kHz  (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz  (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz  (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz  (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz	0.46 % + 30 nA 0.17 % + 30 nA 0.07 % + 30 nA  0.46 % + 0.2 µA 0.17 % + 0.2 µA 0.07 % + 0.2 µA 0.03 % + 0.2 µA 0.07 % + 0.2 µA 0.46 % + 0.4 µA 0.64 % + 1.5 µA  0.46 % + 2 µA 0.17 % + 2 µA 0.07 % + 2 µA 0.04 % + 2 µA 0.07 % + 2 µA 0.46 % + 4 µA 0.64 % + 15 µA  0.46 % + 20 µA 0.17 % + 20 µA 0.07 % + 20 µA 0.03 % + 20 µA 0.07 % + 20 µA 0.46 % + 40 µA 0.64 % + 0.15 mA  0.46 % + 200 µA 0.19 % + 200 µA 0.09 % + 200 µA 0.12 % + 200 µA 0.35 % + 200 µA 1.2 % + 400 µA	Agilent 3458A and current shunts





Parameter/Range	Frequency	CMC <sup>2, 5, 7</sup> (±)	Comments
AC Current <sup>3</sup> – Measure (cont)			
(1 to 20) A	DC to 1 kHz (1 to 5) kHz	0.033 % 0.043 %	Agilent 3458A and current shunts
(20 to 50) A	60 Hz	0.7 %	
AC Current <sup>3</sup> – Generate			AC current standards and shunts monitored with Agilent 3458A
(1 to 100) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 5 kHz	0.46 % + 30 nA 0.17 % + 30 nA 0.07 % + 30 nA	
(0.1 to 1) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.46 % + 0.2 µA 0.17 % + 0.2 µA 0.07 % + 0.2 µA 0.03 % + 0.2 µA 0.07 % + 0.2 µA 0.46 % + 0.4 µA 0.64 % + 1.5 µA	
(1 to 10) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.46 % + 2 µA 0.17 % + 2 µA 0.07 % + 2 µA 0.04 % + 2 µA 0.07 % + 2 µA 0.46 % + 4 µA 0.64 % + 15 µA	
(10 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.46 % + 20 µA 0.17 % + 20 µA 0.07 % + 20 µA 0.03 % + 20 µA 0.07 % + 20 µA 0.46 % + 40 µA 0.64 % + 0.15 mA	
(0.1 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz	0.46 % + 200 µA 0.19 % + 200 µA 0.09 % + 200 µA 0.12 % + 200 µA 0.35 % + 200 µA 1.2 % + 400 µA	



Parameter/Range	Frequency	CMC <sup>2,5,7</sup> (±)	Comments
AC Current <sup>3</sup> – Generate (cont)			
(1 to 20) A	DC to 1 kHz (1 to 5) kHz	0.033 % 0.043 %	AC current standards and shunts monitored with Agilent 3458A
(20 to 50) A	60 Hz	0.7 %	
Oscilloscope Calibration –			
Square Wave Signal	(10 to 100) kHz	0.29 % + 1.4 μV	Tektronix CG5001
Edge – Generate	(0.4 to 100) ns	12 ps	
Time Marker	10 ns to 5 s	0.01 %	

### III. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments
Frequency Modulation – Measure			
Rate: 20 Hz to 10 kHz	250 kHz to 10 MHz	3.6 %	Agilent 8901A  ± 1 digit for all measurements
50 Hz to 100 kHz	(10 to 1300) MHz	3 %	
20 Hz to 200 kHz	(10 to 1300) MHz	6.4 %	
Phase Modulation – Measure	(10 to 1300) MHz	4.5 %	Agilent 8901A  ± 1 digit for all measurements



Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments
Amplitude Modulation – Measure  Rate: 50 Hz to 10 kHz Depths: 5 % to 99 %  Rate: 20 Hz to 10 kHz Depths: 5 % to 99 %  Rate: 50 Hz to 50 kHz Depths: 5 % to 99 %  Rate: 20 Hz to 100 kHz Depths: 5 % to 99 %	150 kHz to 10 MHz  150 kHz to 10 MHz  (10 to 1300) MHz  (10 to 1300) MHz	2.4 %  3.5 %  1.2 %  3.5 %	Agilent 8901A  ± 1 digit for all measurements
RF Power <sup>4,8</sup> – Measure  (+20 to -30) dBm 50 Ω  (-70 to -20) dBm 50 Ω	100 kHz to 4.2 GHz 10 MHz to 18 GHz  10 MHz to 18 GHz	0.16 dB 0.23 dB  0.53 dB	Agilent 436A/8482A Agilent 436A/8481A  Agilent 436A/8484A
RF Power <sup>4,8</sup> – Generate  (+20 to -30) dBm 50 Ω  (-70 to -20) dBm 50 Ω	100 kHz to 4.2 GHz 10 MHz to 18 GHz  10 MHz to 18 GHz	0.23 dB 0.23 dB  0.53 dB	Signal generators monitored with:  Agilent 436A/8482A Agilent 436A/8481A  Agilent 436A/8484A
Distortion – Measure	10 Hz to 20 kHz (20.1 to 50) kHz (50.1 to 110) kHz	1.2 dB 2.3 dB 3.5 dB	Sound Technology 1700B OPT 003, 005



IV. Fluid Quantities

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Viscosity Cups –  G10 G20 G35 G60 G100 G200 G350	17.71 cts 34.07 cts 64.77 cts 117.7 cts 228.2 cts 396.8 cts 715.7 cts	0.094 s 0.083 s 0.15 s 0.15 s 0.15 s 0.21 s 0.36 s	Thermometer, stop watch, viscosity oils
Weight / Gallon Cups –	(0 to 410.00) g	0.022 g	Thermometer, scale, distilled water

V. Mechanical

Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
Torque Wrenches <sup>3</sup>	Up to 20 in·lbf (20 to 240) in·lbf (50 to 2400) in·lbf  (100 to 2500) ft·lbf (100 to 5000) ft·lbf	0.1 % ± 0.002 in·lbf 0.1 % ± 0.03 in·lbf 0.1 % ± 0.1 in·lbf  0.1 % ± 0.3 ft·lbf 0.15 %	Torque cell Torque cell Torque cell  Torque cell Torque cell
Contact Tachometers	Up to 5000 rpm	1.2 %	Gen Rad 1531-AB
Rotational Speed, Optical Tachometers	Up to 25 000 rpm	0.2 rpm	HP 5345A/HP 58503A Gen Rad 1531-AB
Pressure Gages	(4 to 600) inH <sub>2</sub> O  (1 to 300) psi (5 to 10 000) psi	0.2 %  0.1 % 0.1 %	Ametek RK  Mansfield Green



Parameter/Equipment	Range	CMC <sup>2, 6, 9</sup> ( $\pm$ )	Comments
Force, Tension, & Compression <sup>3</sup>	Up to 32 000 lbf	0.01 % FS	Class F weights
	(100 to 100 000) lbf	0.01 % FS	Load cells
Scales & Balances <sup>3</sup>	1 mg to 100 g 100 g to 1 kg (1 to 100) kg	0.040 mg + 0.6R 0.013 g + 0.6R 0.017 g + 0.6R	Class 1 weights
	(0.01 to 2000) lb (2001 to 30 000) lb	0.013 % FS + 0.6R 0.013 % FS + 0.6R	Class 1 & F weights
Mass	1 mg to 205 g (206 to 5000) g	0.00004 g 0.013 g	Comparison with mass standards
	(5001 to 64 000) g	0.17 g	Analytical balance
	(200 to 2000) lb	0.013 % FS	Load cell

#### VI. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2</sup> ( $\pm$ )	Comments
Temperature – Measure	(18 to 220) °F (220 to 400) °F (400 to 760) °F	0.33 °F 0.62 °F 1.2 °F	Comparisons w/ liquid filled thermometers

#### VII. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2</sup> ( $\pm$ )	Comments
Frequency / Time – Measure & Measuring Equipment	Up to 500 MHz 500 MHz to 18 GHz	3.1 mHz 1.3 Hz	Comparison w/ frequency counters or signal generators referenced to HP GPS 58503A



- <sup>1</sup> This laboratory offers commercial calibration service and field calibration service.
- <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 or 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 R104 – *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 actual 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> Exclusive of SWR effects and connector repeatability.
- <sup>5</sup> In the statement of CMC, percentages are to be read as percent of reading, unless otherwise noted.
- <sup>6</sup> In the statement of CMC, "FS" represents "full scale".
- <sup>7</sup> The measurands stated are measured with the Agilent 3458A. This capability is suitable for the calibration of the devices intended to generate the measurand in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a combination of the fraction of the reading/output plus a range specification.
- <sup>8</sup> The CMC does not include  $M$ , which represents the mismatch source.
- <sup>9</sup> In the statement of CMC,  $R$  is the resolution of the unit under test.





## Accredited Laboratory

A2LA has accredited

**MODERN MACHINE & TOOL CO., INC.**

*Newport News, VA*

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 and the requirements of ANSI/NCSLI Z540.3-2006 and any additional program requirements in the field of calibration. 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 13<sup>th</sup> day of January 2016.

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

President & CEO  
For the Accreditation Council  
Certificate Number 2836.01  
Valid to August 31, 2017  
Revised July 31, 2017

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