



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: September 30, 2025

Certificate Number: 1395.03

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1,6}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2,4} ($\pm$)	Comments
Micrometers ³ (Outside, Inside, Depth)	Up to 1 in (1 to 16) in	(30 + 2L) μ in (20 + 15L) μ in	Gage blocks, optical flat
Micrometer End Standards	Up to 12 in	(5.9 + 3.7L) μ in	Pratt & Whitney LabMaster™ Universal & gage blocks
Height Gages ³	Up to 1 in (1 to 36) in	76 μ in (77 + 14L) μ in	Gage blocks, surface plate
Calipers ³	Up to 36 in	(290 + 10L) μ in	Gage blocks
Linear Indicators – Digital & Analog	Up to 10 in: (20 μ in resolution) (50 μ in resolution) (100 μ in resolution) (0.001 in resolution)	(8.1 + 5L) μ in (13 + 5L) μ in (28 + 5L) μ in (150 + 5L) μ in	Pratt & Whitney LabMaster™ Universal & gage blocks

Parameter/Equipment	Range	CMC ^{2,4} ($\pm$)	Comments
Cylindrical Plug Gages & Master Discs	Up to 1 in (1 to 12) in	10 μ in (4.8 + 5L) μ in	Pratt & Whitney LabMaster™ Universal & gage blocks
Cylindrical Ring Gages	(0.040 to 1.0) in (> 1.0 to 14) in	10 μ in (8.8 + 3.3L) μ in	Pratt & Whitney LabMaster™ Universal & gage blocks
Thread Plugs – UN (60° threads) UN	Pitch Diameter: Up to 12 in, Pitch: (4 to 80) TPI Pitch Diameter: (1 to 300) mm, Pitch: (0.3 to 4) mm Major Diameter: Up to 1 in (1 to 12) in	(70 + 5L) μ in (1.7 + 0.13L) μ m 10 μ in (4.8 + 5L) μ in	Pratt & Whitney LabMaster™ Universal, gage blocks & thread wires Pratt & Whitney LabMaster™ Universal & gage blocks
Wafer Film Thickness Standards	(3.0 to 1500) nm	0.65 nm	Woolam VASE System w/ NIST SRMs: NIST 2534 NIST 2531 NIST 2532
Precision Step Height Standards	(10 to 100) nm (>100 to 2500) nm	2.5 % 0.6 %	Veeco Dektak 3 comparator, Veeco 138 - 367, -369, -371 step height standards

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 5} ($\pm$)	Comments
DC Voltage ³ – Generate	Up to 220 mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	8.1 μ V/V + 0.4 μ V 4.6 μ V/V + 0.7 μ V 3.5 μ V/V + 2.5 μ V 3.5 μ V/V + 4 μ V 4.4 μ V/V + 40 μ V 5.2 μ V/V + 400 μ V	Fluke calibrator 5720A
	(1 to 75) kV	0.16 %	ROSS probe VD90-16.5Y-AK-K
Fixed Points	1 V 1.018 V 10 V	2 μ V/V 4 μ V/V 1 μ V/V	Fluke Zener standard 732A
DC Voltage ³ – Measure	Up to 200 mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1050) V	6.4 μ V/V + 0.1 μ V 4.1 μ V/V + 0.4 μ V 4.4 μ V/V + 4.0 μ V 5.9 μ V/V + 40 μ V 5.9 μ V/V + 0.50 mV	Fluke DMM 8508A
	(1 to 90) kV	0.16 %	ROSS probe VD90-16.5Y-AK-K
DC Current ³ – Generate	Up to 220 μ A 220 μ A to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A	37 μ A/A + 6 nA 32 μ A/A + 7 nA 35 μ A/A + 40 nA 41 μ A/A + 0.7 μ A 64 μ A/A + 12 μ A	Fluke calibrator 5720A
	(2.2 to 11) A	0.034 % + 0.48 mA	Fluke amplifier 5725A
	(1 to 10) A (10 to 100) A	0.015 % 0.052 %	Guildline 9211A shunt, HP 6031A, Fluke DMM 8508A
DC Current – Clamp Meters ³	(10 to 16.5) A (16.5 to 150) A (150 to 1000) A	0.40 % + 0.06 A 0.40 % + 0.06 A 0.40 % + 0.06 A	Fluke 5500A/coil & 5520A

Parameter/Equipment	Range	CMC ^{2, 4, 5} ($\pm$)	Comments
DC Current ³ – Measure	Up to 200 μ A 200 μ A to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	13 μ A/A + 0.4 nA 13 μ A/A + 4 nA 15 μ A/A + 40 nA 50 μ A/A + 0.8 μ A 0.019 % + 16 μ A 0.042 % + 0.40 mA	Fluke DMM 8508A
	(1 to 10) A (10 to 20) A (20 to 100) A (100 to 300) A	0.015 % 0.054 % 0.052 % 0.11 %	Guildline 9211A shunt, Fluke DMM 8508A
Resistance ³ – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) k Ω (1.1 to 3.3) k Ω (3.3 to 11) k Ω (11 to 33) k Ω (33 to 110) k Ω (110 to 330) k Ω (0.33 to 1.1) M Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω (110 to 330) M Ω (0.33 to 1.1) G Ω	36 $\mu\Omega/\Omega$ + 0.78 m Ω 27 $\mu\Omega/\Omega$ + 1.2 m Ω 25 $\mu\Omega/\Omega$ + 1.1 m Ω 25 $\mu\Omega/\Omega$ + 1.6 m Ω 25 $\mu\Omega/\Omega$ + 1.6 m Ω 26 $\mu\Omega/\Omega$ + 16 m Ω 26 $\mu\Omega/\Omega$ + 16 m Ω 26 $\mu\Omega/\Omega$ + 0.16 Ω 26 $\mu\Omega/\Omega$ + 0.16 Ω 28 $\mu\Omega/\Omega$ + 1.6 Ω 28 $\mu\Omega/\Omega$ + 1.6 Ω 50 $\mu\Omega/\Omega$ + 24 Ω 0.011 % + 39 Ω 0.021 % + 2 k Ω 0.040 % + 2.4 k Ω 0.24 % + 78 k Ω 1.2 % + 0.39 M Ω	Fluke 5522A
Fixed Points	1.0 Ω	4 $\mu\Omega/\Omega$	L&N 4210
	0 Ω	52 $\mu\Omega$	Fluke calibrator 5720A
	1 Ω	84 $\mu\Omega/\Omega$	
	1.9 Ω	84 $\mu\Omega/\Omega$	
	10 Ω	24 $\mu\Omega/\Omega$	
	19 Ω	25 $\mu\Omega/\Omega$	
	(100, 190) Ω	11 $\mu\Omega/\Omega$	
	1 k Ω	8.6 $\mu\Omega/\Omega$	
	1.9 k Ω	8.0 $\mu\Omega/\Omega$	
	(10, 19) k Ω	8.0 $\mu\Omega/\Omega$	
	100 k Ω	10 $\mu\Omega/\Omega$	
	190 k Ω	10 $\mu\Omega/\Omega$	

Parameter/Equipment	Range	CMC ^{2, 4, 5} (±)	Comments
Resistance ³ – Generate (cont)			
Fixed Points	1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	16 μΩ/Ω 17 μΩ/Ω 34 μΩ/Ω 42 μΩ/Ω 0.011 %	Fluke calibrator 5720A
Resistance ³ – Measure	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 kΩ (2 to 20) kΩ (20 to 200) kΩ 200 kΩ to 2 MΩ (2 to 20) MΩ (20 to 200) MΩ 200 MΩ to 2 GΩ (2 to 100) GΩ	20 μΩ/Ω + 4 μΩ 11 μΩ/Ω + 14 μΩ 8.6 μΩ/Ω + 50 μΩ 8.6 μΩ/Ω + 500 μΩ 8.6 μΩ/Ω + 5 mΩ 8.9 μΩ/Ω + 50 mΩ 11 μΩ/Ω + 1.0 Ω 24 μΩ/Ω + 0.10 kΩ 80 μΩ/Ω + 1 kΩ 0.022 % + 100 kΩ 0.74 %	Fluke DMM 8508A Keithley 6517B
Electrical Simulation of Thermocouples ³ –			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.41 °C 0.18 °C 0.17 °C 0.18 °C 0.21 °C	Fluke calibrator 5522A
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.24 °C 0.18 °C 0.17 °C 0.18 °C 0.22 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.28 °C 0.19 °C 0.18 °C 0.24 °C 0.33 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.50 °C 0.22 °C 0.18 °C 0.17 °C	

Parameter/Range	Frequency	CMC ^{2, 5} ($\pm$)	Comments
AC Voltage ³ — Generate			
Up to 2.2 mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.19 % + 4 μ V 0.12 % + 4 μ V 0.10 % + 4 μ V 0.15 % + 4 μ V 0.20 % + 5 μ V 0.36 % + 10 μ V 0.52 % + 20 μ V 0.65 % + 20 μ V	Fluke calibrator 5720A
(2.2 to 22) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.024 % + 4 μ V 0.012 % + 4 μ V 0.011 % + 4 μ V 0.025 % + 4 μ V 0.053 % + 5 μ V 0.097 % + 10 μ V 0.13 % + 20 μ V 0.27 % + 20 μ V	
(22 to 220) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.022 % + 12 μ V 95 μ V/V + 7 μ V 79 μ V/V + 7 μ V 0.019 % + 7 μ V 0.043 % + 17 μ V 0.076 % + 20 μ V 0.12 % + 25 μ V 0.26 % + 45 μ V	
220 mV to 2.2 V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.024 % + 40 μ V 88 μ V/V + 15 μ V 47 μ V/V + 8 μ V 78 μ V/V + 10 μ V 0.011 % + 30 μ V 0.036 % + 80 μ V 0.091 % + 0.20 mV 0.15 % + 0.30 mV	
(2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.022 % + 0.40 mV 89 μ V/V + 0.15 mV 47 μ V/V + 50 μ V 77 μ V/V + 0.10 mV 0.010 % + 0.20 mV 0.028 % + 0.60 mV 0.091 % + 2 mV 0.14 % + 3.2 mV	Subject to a 2.2×10^7 V- Hz output

Parameter/Range	Frequency	CMC ^{2, 5} ($\pm$)	Comments
AC Voltage ³ – Generate (cont)			
(22 to 220) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.022 % + 4.0 mV 88 μ V/V + 1.5 mV 53 μ V/V + 0.60 mV 87 μ V/V + 1.0 mV 0.014 % + 2.5 mV 0.080 % + 16 mV 0.42 % + 40 mV 0.70 % + 80 mV	Fluke calibrator 5720A w/ Fluke amplifier 5725A (max. output = 250 V for [15 to 50] Hz)
(220 to 1100) V	(15 to 50) Hz 50 Hz to 1 kHz	0.026 % + 16 mV 70 μ V/V + 3.5 mV	Fluke calibrator 5720A
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	0.037 % + 11 mV 0.14 % + 45 mV	
(750 to 1100) V	40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz	87 μ V/V + 4 mV 0.013 % + 6 mV 0.037 % + 11 mV	
AC Voltage ³ – Measure			
(0.6 to 2.2) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.14 % + 1 μ V 0.062 % + 1 μ V 0.039 % + 1 μ V 0.067 % + 1.6 μ V 0.097 % + 2 μ V 0.18 % + 3.2 μ V 0.19 % + 6.3 μ V 0.31 % + 6.3 μ V	Fluke AC standard 5790A
(2.2 to 7) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.068 % + 1 μ V 0.030 % + 1 μ V 0.019 % + 1 μ V 0.033 % + 1.6 μ V 0.048 % + 2 μ V 0.097 % + 3.2 μ V 0.11 % + 6.3 μ V 0.19 % + 6.3 μ V	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
AC Voltage ³ – Measure (cont)			
(7 to 22) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.024 % + 1 µV 0.016 % + 1 µV 96 µV/V + 1 µV 0.017 % + 1.6 µV 0.026 % + 2 µV 0.067 % + 3.2 µV 0.074 % + 6.3 µV 0.14 % + 6.3 µV	Fluke AC standard 5790A
(22 to 70) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.022 % + 1.2 µV 0.012 % + 1.2 µV 74 µV/V + 1.2 µV 0.013 % + 1.6 µV 0.025 % + 2 µV 0.048 % + 3.2 µV 0.063 % + 6.3 µV 0.097 % + 6.3 µV	
(70 to 220) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.018 % + 1.2 µV 71 µV/V + 1.2 µV 36 µV/V + 1.2 µV 68 µV/V + 1.6 µV 0.015 % + 2 µV 0.024 % + 3.2 µV 0.033 % + 6.3 µV 0.082 % + 6.3 µV	
(220 to 700) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.017 % + 1.2 µV 70 µV/V + 1.2 µV 29 µV/V + 1.2 µV 46 µV/V + 1.6 µV 66 µV/V + 2 µV 0.017 % + 3.2 µV 0.026 % + 6.3 µV 0.077 % + 6.3 µV	
700 mV to 2.2 V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.016 % 56 µV/V 21 µV/V 40 µV/V 58 µV/V 0.016 % 0.022 % 0.075 %	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
AC Voltage ³ – Measure (cont)			
(2.2 to 7) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.017 % 57 µV/V 22 µV/V 44 µV/V 67 µV/V 0.018 % 0.033 % 0.098 %	Fluke AC standard 5790A
(7 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.016 % 57 µV/V 24 µV/V 40 µV/V 67 µV/V 0.017 % 0.033 % 0.098 %	
(22 to 70) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.016 % 58 µV/V 29 µV/V 55 µV/V 81 µV/V 0.017 % 0.033 % 0.095 %	
(70 to 220) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz	0.016 % 58 µV/V 31 µV/V 57 µV/V 81 µV/V 0.017 % 0.040 %	
(220 to 700) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.016 % 80 µV/V 38 µV/V 0.011 % 0.040 %	
(700 to 1000) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.016 % 80 µV/V 36 µV/V 0.011 % 0.040 %	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
AC Voltage ³ – Measure (cont)			
(1 to 65) kV	(50 to 60) Hz	0.60 %	Ross VD90-16.5Y-AK-K & Fluke 8508A
AC Flatness ³ – Measure			
(0.6 to 2.2) mV	(10 to 30) Hz 30 Hz to 120 kHz 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.089 % 0.051 % 0.064 % + 0.78 µV 0.14 % + 0.78 µV 0.25 % + 0.78 µV 0.56 % + 1.6 µV	Fluke 5790A wideband
(2.2 to 7) mV	(10 to 30) Hz 30 Hz to 120 kHz 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.082 % 0.048 % 0.058 % + 0.78 µV 0.087 % + 0.78 µV 0.15 % + 0.78 µV 0.32 % + 0.78 µV	
(7 to 22) mV	(10 to 30) Hz 30 Hz to 120 kHz 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.081 % 0.04 % 0.058 % 0.087 % 0.15 % 0.32 %	
(22 to 70) mV	(10 to 30) Hz 30 Hz to 120 kHz 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.081 % 0.04 % 0.043 % 0.085 % 0.13 % 0.3 %	
(70 to 220) mV	(10 to 30) Hz 30 Hz to 120 kHz 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.08 % 0.033 % 0.043 % 0.084 % 0.13 % 0.3 %	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
AC Flatness ³ – Measure (cont)			
220 mV to 7 V	(10 to 30) Hz 30 Hz to 120 kHz 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.08 % 0.025 % 0.043 % 0.083 % 0.13 % 0.3 %	Fluke 5790A wideband
AC Current ³ – Generate			
Up to 220 µA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.024 % + 16 nA 0.015 % + 10 nA 0.012 % + 8 nA 0.030 % + 12 nA 0.094 % + 65 nA	Fluke calibrator 5720A w/Fluke 5725A
220 µA to 2.2 mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.024 % + 40 nA 0.015 % + 35 nA 0.012 % + 35 nA 0.019 % + 110 nA 0.090 % + 0.65 µA	
(2.2 to 22) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.026 % + 0.40 µA 0.015 % + 0.35 µA 0.012 % + 0.35 µA 0.019 % + 0.55 µA 0.090 % + 5 µA	
(22 to 220) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.026 % + 4 µA 0.015 % + 3.5 µA 0.012 % + 2.5 µA 0.019 % + 3.5 µA 0.092 % + 10 µA	
220 mA to 2.2 A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.025 % + 35 µA 0.040 % + 80 µA 0.60 % + 0.16 mA	
(2.2 to 11) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.050 % + 0.17 mA 0.090 % + 0.38 mA 0.33 % + 0.75 mA	

Parameter/Range	Frequency	CMC ^{2, 5} ($\pm$)	Comments
AC Current – Clamp Meters ³ – (0 to 500) A (500 to 1000) A	 (45 to 440) Hz (45 to 440) Hz	 0.37 % + 0.1 A 0.39 % + 0.2 A	 Fluke 5522A w/5500 coil
AC Current ³ – Measure Up to 200 μ A 200 μ A to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	 10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 2 kHz (2 to 10) kHz 10 Hz to 2 kHz (2 to 10) kHz	 0.037 % + 20 nA 0.031 % + 200 nA 0.032 % + 2 μ A 0.030 % + 20 μ A 0.062 % + 200 μ A 0.075 % + 200 μ A 0.082 % + 2 mA 0.25 % + 2 mA	 Fluke DMM 8508A
Oscilloscope ³ – DC Signal Rise/Fall Times	 ± 1 mV to ± 200 Vdc (into 50 Ω) ± 1 mV to ± 50 Vdc (into 1 M Ω) 40 μ V to <1 mV _{pk-pk} 1 mV to 200 V _{pk-pk} 50 kHz Reference Amplitude 0.1 Hz to 300 MHz (>300 to 550) MHz (>0.55 to 2.5) GHz (>2.5 to 3.0) GHz (350 to 550) ps 10 Hz to 2 MHz	 0.061 % + 25 μ V 0.83 % + 10 μ V 0.16 % + 10 μ V 1.2 % 2.2 % 2.5 % 2.8 % 2.8 % 33 ps	 Fluke 9500B scope calibrator w/ 9530 heads

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
Oscilloscope ³ – (cont)			
Rise/Fall Times	(125 to 175) ps 10 Hz to 2 MHz	14 ps	Fluke 9500B scope calibrator w/ 9530 heads
Timing Marker Functions	9.0091 ns to <83 µs ≥83 µs to 55 s	0.2 µs/s 2.3 µs/s	
Pulse Width	(1 to 100) ns	4.1 % + 200 ps	
Inductance ³ – Measure			
(100 to 200) µH 200 µH to 200 H	1 kHz, 120 Hz	0.25 %	Gen Rad 1657 RLC bridge
Capacitance ³ – Generate			
(0.19 to 0.3999) nF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 32.9999) nF (33 to 109.999) nF (110 to 329.999) nF	10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz	0.61 % + 7.8 pF 0.44 % + 7.8 pF 0.42 % + 7.8 pF 0.24 % + 7.8 pF 0.23 % + 7.8 pF 0.23 % + 7.8 pF 0.23 % + 0.23 nF	Fluke calibrator 5522A
(0.33 to 1.099 99) µF (1.1 to 3.299 99) µF (3.3 to 10.9999) µF (11 to 32.9999) µF (33 to 109.999) µF (110 to 329.999) µF	10 Hz to 600 Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz (0 to 50) Hz	0.23 % + 0.8 nF 0.23 % + 2.3 nF 0.23 % + 7.8 nF 0.33 % + 23 nF 0.37 % + 78 nF 0.37 % + 0.23 µF	
(0.33 to 1.099 99) mF (1.1 to 3.2999) mF (3.3 to 10.9999) mF (11 to 32.9999) mF (33 to 110) mF	(0 to 20) Hz (0 to 6) Hz (0 to 2) Hz (0 to 0.6) Hz (0 to 0.2) Hz	0.37 % + 0.8 µF 0.37 % + 2.3 µF 0.37 % + 8 µF 0.59 % + 23 µF 0.86 % + 78 µF	
(1, 10) pF (100, 1000) pF (0.01, 0.1, 1) µF	1 kHz	0.13 %	Agilent 16380A/16380C standard air capacitor set, BNC 4 terminal pair

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
Capacitance ³ – Generate (cont)			
Fixed Points			
1 pF	1 MHz 2 MHz 3 MHz 4 MHz 5 MHz 10 MHz 13 MHz	0.12 % 0.12 % 0.13 % 0.14 % 0.15 % 0.28 % 0.39 %	Agilent 16380A/16380C standard air capacitor set, BNC 4 terminal pair
10 pF	1 MHz 2 MHz 3 MHz 4 MHz 5 MHz 10 MHz 13 MHz	0.12 % 0.12 % 0.12 % 0.12 % 0.12 % 0.12 % 0.12 %	
100 pF	1 MHz 2 MHz 3 MHz 4 MHz 5 MHz 10 MHz 13 MHz	0.12 % 0.12 % 0.12 % 0.12 % 0.12 % 0.13 % 0.13 %	
1000 pF	1 MHz 2 MHz 3 MHz 4 MHz 5 MHz 10 MHz 13 MHz	0.12 % 0.12 % 0.12 % 0.13 % 0.14 % 0.23 % 0.31 %	
Capacitance ³ – Measure			
1 pF to 1 µF	1 kHz	61 µF/F	
1 pF to 100 mF	20 Hz to 1 MHz	0.064 %	

III. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
RF Power³ – Generate (+13 to -5) dBm (-6 to -45) dBm (-46 to -85) dBm (+20 to -100) dBm	200 Hz to 80 MHz 2.5 MHz to 26.5 GHz	0.09 dB 0.13 dB 0.20 dB 0.55 dB	HP 3335A generator HP 8340B synthesizer w/ HP 8902 audio analyzer; HP 11722A, HP 11792A sensors, HP 11793A converter
RF Power³ – Measure 1 mW for 50 Ω Reference (-20 to + 30) dBm	(1 to 30) MHz 50 MHz (50 to 100) MHz (100 to 500) MHz (0.5 to 1) GHz 100 kHz to 2.6 GHz 50 MHz to 26.5 GHz	0.94 % 0.39 % 0.53 % 0.65 % 0.79 % 0.063 dB + 1 digit 0.13 dB + 1 digit	HP 478A-H75 thermistor mount w/ Agilent N432A power meter HP 8902A measuring receiver w/ HP 11792A power sensor
Tuned RF Power – Measure (Relative) (+10 to 0) dB (0 to -10) dB (-10 to -20) dB (-20 to -30) dB (-30 to -40) dB (-40 to -50) dB (-50 to -60) dB (-60 to -70) dB (-70 to -80) dB (-80 to -90) dB (-90 to -100) dB (-100 to -110) dB (-110 to -120) dB	(0.15 to 1300) MHz	0.11 dB 0.11 dB 0.12 dB 0.14 dB 0.15 dB 0.16 dB 0.18 dB 0.21 dB 0.23 dB 0.25 dB 0.27 dB 0.29 dB 0.52 dB	HP 8902A measuring receiver w/ HP 11722A power sensor

Parameter/Range	Frequency	CMC ^{2, 5} (±)	Comments
Tuned RF Power – Measure (Relative) (cont) (+10 to 0) dB (0 to -10) dB (-10 to -20) dB (-20 to -30) dB (-30 to -40) dB (-40 to -50) dB (-50 to -60) dB (-60 to -70) dB (-70 to -80) dB (-80 to -90) dB (-90 to -100) dB (-100 to -110) dB (-110 to -120) dB	(1.3 to 26.5) GHz	0.11 dB 0.11 dB 0.11 dB 0.13 dB 0.15 dB 0.16 dB 0.18 dB 0.21 dB 0.23 dB 0.25 dB 0.27 dB 0.29 dB 0.52 dB	HP 8902A measuring receiver w/ HP 11793A converter, HP 11792A power sensor
Amplitude Modulation ³ – Measure Rate: 50 Hz to 10 kHz Depth: (5 to 99) % Rate: 20 Hz to 10 kHz Depth: To 99 % Rate: 50 Hz to 50 kHz Depth: (5 to 99) % Rate: 20 Hz to 100 kHz Depth: To 99 % Rate: 50 Hz to 50 kHz Depth: (5 to 99) % Rate: 20 Hz to 100 kHz Depth: To 99 %	150 kHz to 10 MHz (10 to 1300) MHz (1.3 to 26.5) GHz	2.1 % + 1 digit 3.0 % + 1 digit 1.1 % + 1 digit 3.0 % + 1 digit 1.6 % + 1 digit 3.0 % + 1 digit	HP 8902A measuring receiver w/ HP 11793A converter, HP 11792A power sensor

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
Frequency Modulation ³ – Measure			
Rate: 20 Hz to 10 kHz Dev.: ≤ 40 kHz peak	250 kHz to 10 MHz	2.0 % + 1 digit	HP 8902A measuring receiver
Rate: 50 Hz to 100 kHz Dev.: ≤ 400 kHz peak	(10 to 1300) MHz	1.1 % + 1 digit	
Rate: 20 Hz to 200 kHz Dev.: ≤ 400 kHz peak	(10 to 1300) MHz	5.0 % + 1 digit	
Phase Modulation – Measure			
Rate: 200 Hz to 10 kHz	150 kHz to 10 MHz	4 % + 0.015 rad	HP 8902A measuring receiver w/ HP 11792A power sensor
Rate: 20 Hz to 200 kHz	10 MHz to 26.5 GHz	5 % + 0.019 rad	
Harmonic Distortion – Measure			
≤ -80 dB	≤ 20 Hz to 20 kHz	1.0 dB	HP 8903B audio analyzer
≤ -65 dB	(20 to 100) kHz >100 kHz to 13.2 GHz	2.0 dB 2.7 dB	HP 8563E spectrum analyzer
In Line RF Power Meters –			
(1 to 80) W	(0.1 to 500) MHz (0.5 to 1.0) GHz	1.7 % 1.9 %	RF Attenuator, Agilent 478-H75 w/8482, Agilent N478 w/8482, AR amplifier

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2, 4, 7} (±)	Comments
Scales & Balances ³	(1 to 500) mg (0.5 to 5) g (5 to 20) g (20 to 500) g (0.5 to 5) kg (10 to 500) lb	0.024 mg + 0.6 <i>R</i> 0.040 mg + 0.6 <i>R</i> 0.078 mg + 0.6 <i>R</i> 2.5 µg/g + 0.6 <i>R</i> 5.4 µg/g + 0.6 <i>R</i> 0.010 % + 0.6 <i>R</i>	Class 1 weights Class 2 weights Class F weights
Pressure ³ – Measuring Equipment	Nitrogen Gas (0 to 90) psia (>90 to 300) psia (300 to 1000) psia Hydraulic (-14.5 to 300) psig (300 to 1000) psig (1000 to 2000) psig (2000 to 10 000) psig	0.0021 % + 0.009 psia + 0.58<i>R</i> 0.0054 % + 0.015 psia + 0.6<i>R</i> 0.01 % + 0.01 psia + 0.6<i>R</i> 0.0054 % + 0.015 psi + 0.6<i>R</i> 0.01 % + 0.01 psi + 0.6<i>R</i> 0.011 % + 2.1 psi + 0.6<i>R</i> 0.10 % + 0.45 psi + 0.6<i>R</i>	Additel ADT780 pressure calibrator Crystal reference pressure gauge
Torque – Measuring Equipment ³	(1 to 10) ozf·in (10 to 100) ozf·in (5 to 50) lbf·in 50 lbf·in to 250 lbf·ft	1.4 % 1.7 % 0.64 % + 0.58 <i>R</i> 1.7 %	Digital torque load cells

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 7} ($\pm$)	Comments
Temperature ³ – Measuring Equipment	(-80 to 0) °C (0 to 420) °C (420 to 660) °C (50 to 420) °C (420 to 660) °C	0.025 °C 0.061 °C 0.12 °C 0.14 °C 0.17 °C	Monitored by Hart Scientific 5626 PRT/ Fluke 8508A DMM, Wahl IPR4-1 ice point reference for 0 °C & mixture dry ice/alcohol for below 0 °C Fluke 9144 dry well

Parameter/Equipment	Range	CMC ^{2, 7} ($\pm$)	Comments
Temperature ³ – Measure	(-200 to 400) °C (400 to 660) °C	0.018 °C 0.020 °C	Hart Scientific 5626 PRT w/Fluke 8508A DMM

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 7} ($\pm$)	Comments
Frequency Reference	10 MHz Reference Signal	1.8×10^{-12} Hz/Hz	Fluke 910 GPS receiver
Frequency ³ – Measuring Equipment	1 μ Hz to 26.5 GHz	1.8×10^{-12} Hz/Hz + 0.58R	GPS receiver w/ synthesized generator
Frequency ³ – Measure	DC to 225 MHz	1.5×10^{-9} Hz/Hz + 5 μ Hz	GPS receiver w/ 53132 counter
	225 MHz to 26.5 GHz	1.8×10^{-12} Hz/Hz + 1.3 Hz	5343A counter
Stopwatches & Timers ³	(0 to 19.99) s/day	0.12 s/day	Timometer

¹ This laboratory offers commercial calibration service and field calibration service.

² 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. CMC 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.

³ Field calibration service is available for this calibration. 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.

⁴ In the statement of CMC, L is defined as the length of the unit under test in inches, D is the diameter of the unit under test in inches, R is the resolution of the device under test and % is percentage of reading, unless otherwise indicated.

⁵ 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 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.

⁶ This scope meets A2LA's *P112 Flexible Scope Policy*.

⁷ The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.



Accredited Laboratory

A2LA has accredited

SIMCO ELECTRONICS

Richardson, TX

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 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 April 2017*).



Presented this 6th day of September 2023.

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1395.03
Valid to September 30, 2025

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