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

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CALIBRATION

Valid To: December 31, 2025 Certificate Number: 6493.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1, 5]:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
DC Voltage – Generate[3]	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1020) V	17 µV/V + 1.0 µV 9.8 µV/V + 2.0 µV 9.3 µV/V + 20 µV 14 µV/V + 150 µV 14 µV/V + 1.5 mV	Fluke 5522A
DC Voltage – Measure[3]	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V	14 µV/V + 300 nV 8.7 µV/V + 300 nV 7.6 µV/V + 500 nV 9.7 µV/V + 30 µV 11 µV/V + 100 µV	HP 3458A
DC Current – Generate[3]	(0 to 330) µA (0.33 to 3.3) mA (3.3 to 33) mA (0 to 330) mA (0.33 to 1.1) A (1.1 to 3) A (0 to 11) A (11 to 20.5) A	120 µA/A + 20 nA 79 µA/A + 50 nA 78 µA/A + 250 nA 79 µA/A + 2.5 µA 160 µA/A + 40 µA 300 µA/A + 40 µA 500 µA/A + 500 µA 810 µA/A + 750 µA	Fluke 5522A

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
DC Current – Measure[3]	(10 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	120 µA/A + 800 pA 53 µA/A + 5.0 nA 51 µA/A + 50 nA 64 µA/A + 500 nA 120 µA/A + 10 µA	HP 3458A

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Generate[3]			
(1 to 33) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	640 µV/V + 6.0 µV 180 µV/V + 6.0 µV 200 µV/V + 6.0 µV 800 µV/V + 6.0 µV 2.7 mV/V + 12 µV 6.3 mV/V + 50 µV	Fluke 5522A
(33 to 330) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	240 µV/V + 8.0 µV 120 µV/V + 8.0 µV 130 µV/V + 8.0 µV 280 µV/V + 8.0 µV 630 µV/V + 32 µV 1.6 mV/V + 70 µV	
(0.33 to 3.3) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	240 µV/V + 50 µV 120 µV/V + 60 µV 150 µV/V + 60 µV 240 µV/V + 50 µV 550 µV/V + 130 µV 1.9 mV/V + 600 µV	
(3.3 to 33) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	240 µV/V + 650 µV 120 µV/V + 600 µV 190 µV/V + 600 µV 280 µV/V + 600 µV 710 µV/V + 1.6 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	160 µV/V + 2.0 mV 160 µV/V + 6.0 mV 200 µV/V + 6.0 mV 280 µV/V + 6.0 mV 1.6 mV/V + 50 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz	250 µV/V + 10 mV 210 µV/V + 10 mV	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Measure[3]			
(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	310 µV/V + 3.0 µV 250 µV/V + 1.1 µV 300 µV/V + 1.1 µV 800 µV/V + 1.1 µV 3.9 mV/V + 1.1 µV 32 mV/V + 2.0 µV	HP 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	190 µV/V + 4.0 µV 190 µV/V + 2.0 µV 210 µV/V + 2.0 µV 300 µV/V + 2.0 µV 650 µV/V + 2.0 µV 2.3 mV/V + 10 µV	
(0.1 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	90 µV/V + 40 µV 90 µV/V + 20 µV 130 µV/V + 20 µV 240 µV/V + 20 µV 630 µV/V + 20 µV 2.3 mV/V + 100 µV	
(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	180 µV/V + 400 µV 90 µV/V + 200 µV 130 µV/V + 200 µV 240 µV/V + 200 µV 670 µV/V + 200 µV 2.3 mV/V + 1.0 mV	
(10 to 100) V	40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	170 µV/V + 2.0 mV 170 µV/V + 2.0 mV 280 µV/V + 2.0 mV 940 µV/V + 2.0 mV	
(100 to 1000) V	40 Hz to 1 kHz (1 to 20) kHz	320 µV/V + 20 mV 470 µV/V + 20 mV	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Current – Generate[3]			
(29 to 330) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	1.6 mA/A + 100 nA 1.2 mA/A + 100 nA 970 µA/A + 100 nA 2.3 mA/A + 150 nA 6.2 mA/A + 200 nA 12 mA/A + 400 nA	Fluke 5522A (Lcomp OFF)
(0.33 to 3.3) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	1.6 mA/A + 150 nA 970 µA/A + 150 nA 780 µA/A + 150 nA 1.6 mA/A + 200 nA 3.9 mA/A + 300 nA 7.8 mA/A + 600 nA	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	1.4 mA/A + 2.0 µA 700 µA/A + 2.0 µA 310 µA/A + 2.0 µA 620 µA/A + 2.0 µA 1.6 mA/A + 3.0 µA 3.1 mA/A + 4.0 µA	
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	1.4 mA/A + 20 µA 710 µA/A + 20 µA 310 µA/A + 20 µA 780 µA/A + 50 µA 1.6 mA/A + 100 µA 3.1 mA/A + 200 µA	
(0.33 to 1.1) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	1.4 mA/A + 100 µA 390 µA/A + 100 µA 4.7 mA/A + 1.0 mA 19 mA/A + 5.0 mA	
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	1.4 mA/A + 100 µA 490 µA/A + 100 µA 4.7 mA/A + 1.0 mA 19 mA/A + 5.0 mA	
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	540 µA/A + 2.0 mA 790 µA/A + 2.0 mA 23 mA/A + 2.0 mA	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Current – Measure[3]			
(0 to 100) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz 100 Hz to 5 kHz	3.1 mA/A + 30 nA 1.2 mA/A + 30 nA 510 µA/A + 30 nA 510 µA/A + 30 nA	HP 3458A
(0.1 to 1) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz 100 Hz to 5 kHz (5 to 20) kHz	3.1 mA/A + 200 nA 1.2 mA/A + 200 nA 490 µA/A + 200 nA 270 µA/A + 200 nA 490 µA/A + 200 nA	
(1 to 10) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz	3.1 mA/A + 2.0 µA 1.2 mA/A + 2.0 µA 490 µA/A + 2.0 µA 270 µA/A + 2.0 µA 490 µA/A + 2.0 µA	
(10 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz	3.1 mA/A + 20 µA 1.2 mA/A + 20 µA 480 µA/A + 20 µA 260 µA/A + 20 µA 480 µA/A + 20 µA	
(0.1 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	3.1 mA/A + 200 µA 1.3 mA/A + 200 µA 680 µA/A + 200 µA 820 µA/A + 200 µA	
Resistance – Generate[3]	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ to 1.1 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ (330 to 1100) MΩ	53 µΩ/Ω + 1.0 mΩ 47 µΩ/Ω + 1.5 mΩ 28 µΩ/Ω + 1.4 mΩ 25 µΩ/Ω + 2.0 mΩ 11 mΩ/Ω + 2.0 mΩ 25 µΩ/Ω + 20 mΩ 25 µΩ/Ω + 20 mΩ 25 µΩ/Ω + 200 mΩ 24 µΩ/Ω + 200 mΩ 25 µΩ/Ω + 2.0 Ω 35 µΩ/Ω + 2.0 Ω 47 µΩ/Ω + 30 Ω 100 µΩ/Ω + 50 Ω 190 µΩ/Ω + 2.5 kΩ 390 µΩ/Ω + 3.0 kΩ 2.3 mΩ/Ω + 100 kΩ 12 mΩ/Ω + 500 kΩ	Fluke 5522A

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Resistance – Measure[3]	(1 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ	27 μΩ/Ω + 50 μΩ 18 μΩ/Ω + 500 μΩ 13 μΩ/Ω + 500 μΩ 12 μΩ/Ω + 5.0 mΩ 13 μΩ/Ω + 50 mΩ 19 μΩ/Ω + 2.0 Ω 50 μΩ/Ω + 100 Ω	HP 3458A

[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. 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.

[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] 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.

[5] This scope meets A2LA's *P112 Flexible Scope Policy.*

Accredited Laboratory

A2LA has accredited

HAPEMAN ELECTRONICS INC.

Stoneboro, PA

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 4th day of December 2023

Mr. Trace McIntuff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 6493.01
Valid to December 31, 2025

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