Accredited Laboratory

A2LA has accredited

LIBERTY TEST EQUIPMENT, INC.

Roseville, CA

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 22nd day of June 2023.

Trace McInturff Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4926.01
Valid to June 30, 2025
Revised November 16, 2023

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

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

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CALIBRATION

Valid To: June 30, 2025 Certificate Number: 4926.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1, 4]:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 3] (±)	Comments
DC Voltage – Generate	Up to 220 mV (0.22 to 2.2) V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	10 µV/V + 0.4 µV 5.5 µV/V 3.9 µV/V 4.5 µV/V 5.3 µV/V 7.1 µV/V	Fluke 5730A-05
DC Voltage – Measure	Up to 100 mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V	15 µV/V + 0.3 µV 7.1 µV/V 6.7 µV/V 8.9 µV/V 21 µV/V	Keysight 3458A-02
DC Current – Generate	Up to 220 µA (0.22 to 2.2) mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A	42 µA/A + 6.0 nA 40 µA/A 40 µA/A 95 µA/A 0.11 mA/A	Fluke 5730A-05

Parameter/Equipment	Range	CMC[2, 3] (±)	Comments
DC Current – Measure	Up to 100 nA (0.1 to 1) µA (1 to 10) µA (10 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	0.041% + 40 pA 43 µA/A + 40 pA 18 µA/A + 0.10 nA 29 µA/A + 0.8 nA 33 µA/A 34 µA/A 54 µA/A 0.14 mA/A	Agilent 3458A-02
Resistance – Generate Fixed Points	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	0.10 mΩ 0.19 mΩ 0.24 mΩ 0.45 mΩ 1.0 mΩ 2.0 mΩ 7.0 mΩ 14 mΩ 71 mΩ 0.13 Ω 0.89 Ω 1.7 Ω 14 Ω 36 Ω 0.41 kΩ 0.99 kΩ 11 kΩ	Fluke 5730A-05
Resistance – Measure	Up to 10 Ω (10 to 100) Ω (0.1 to 1.0) kΩ (1.0 to 10) kΩ (10 to 100) kΩ (0.1 to 1.0) MΩ (1 to 10) MΩ (10 to 100) MΩ	17 µΩ/Ω + 50 µΩ 19 µΩ/Ω 13 µΩ/Ω 16 µΩ/Ω 13 µΩ/Ω 19 µΩ/Ω 65 µΩ/Ω 0.55 mΩ/Ω	Keysight 3458A-02

Parameter/Range	Frequency	CMC[2, 3] (±)	Comments
AC Voltage – 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 (0.5 to 1) MHz	0.49 mV/V + 4.0 µV 0.35 mV/V + 4.0 µV 0.34 mV/V + 4.0 µV 0.47 mV/V + 4.0 µV 0.85 mV/V + 5.0 µV 1.7 mV/V + 10 µV 3.2 mV/V + 20 µV 5.8 mV/V + 20 µV	Fluke 5730A-05
(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 (0.5 to 1) MHz	0.46 mV/V 0.31 mV/V 0.30 mV/V 0.42 mV/V 0.78 mV/V 1.6 mV/V 2.6 mV/V 4.0 mV/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 (0.5 to 1) MHz	0.31 mV/V 0.13 mV/V 0.10 mV/V 0.16 mV/V 0.41 mV/V 0.78 mV/V 1.6 mV/V 4.2 mV/V	
(0.22 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 (0.5 to 1) MHz	0.27 mV/V 0.12 mV/V 69 µV/V 92 µV/V 0.12 mV/V 0.39 mV/V 1.1 mV/V 1.9 mV/V	

Parameter/Range	Frequency	CMC[2, 3] (±)	Comments
AC Voltage – Generate (cont)			
(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 (0.5 to 1) MHz	0.27 mV/V 0.10 mV/V 47 µV/V 80 µV/V 0.10 mV/V 0.31 mV/V 1.1 mV/V 1.8 mV/V	Fluke 5730A-05
(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	0.27 mV/V 0.10 mV/V 58 µV/V 0.14 mV/V 0.20 mV/V	
AC Voltage – Measure			
Up 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	1.6 mV/V + 3.0 µV 0.80 mV/V + 1.1 µV 0.97 mV/V + 1.1 µV 4.4 mV/V + 1.1 µV 7.0 mV/V + 1.1 µV 53 mV/V + 2.0 µV	Keysight 3458A-02
(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 300 kHz to 1 MHz	0.36 mV/V 0.29 mV/V 0.43 mV/V 1.8 mV/V 2.0 mV/V 5.0 mV/V 4.4 mV/V	
(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 300 kHz to 1 MHz	0.34 mV/V 0.26 mV/V 3.2 mV/V 0.77 mV/V 1.4 mV/V 4.7 mV/V 14 mV/V	

Parameter/Range	Frequency	CMC[2, 3] (±)	Comments
AC Voltage – Measure (cont)			Keysight 3458A-02
(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 300 kHz to 1 MHz	0.34 mV/V 0.27 mV/V 0.40 mV/V 0.73 mV/V 1.2 mV/V 4.4 mV/V 14 mV/V	
(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 300 kHz to 1 MHz	0.46 mV/V 0.37 mV/V 0.50 mV/V 0.59 mV/V 1.8 mV/V 4.7 mV/V 16 mV/V	
(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	0.68 mV/V 0.59 mV/V 0.77 mV/V 1.4 mV/V 3.2 mV/V	
Oscilloscopes[5] –			
Amplitude – DC Signal 50 Ω 1 MΩ	 1 mV to 5 V 1 mV to 220 V	 0.025% + 25 µV 0.025% + 25 µV	 Fluke 9500B w/ 9530 Head
Bandwidth (Flatness)	5 mV to 5 V 0.1 Hz to 300 MHz 300 MHz to 550 MHz 550 MHz to 1.1 GHz 1.1 GHz to 3.2 GHz	 2.0% 2.5% 3.5% 4.0%	
Time Markers	9.0091 ns to 55 s	0.25 µs/s	

[1] This laboratory offers commercial 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] 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. CMCs are expressed as either a specific value that covers the full range or as a percentage or fraction of the reading plus a fixed floor specification.

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

[5] CMC components that can be reasonably attributed to the device under test have not been utilized in the calculation of the CMC value for this measurement parameter.