



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

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CALIBRATION

Valid To: May 31, 2012

Certificate Number: 1395.19

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
DC Voltage ³ – Generate	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (330 to 1000) V	23 μV/V + 1 μV 8.2 μV/V + 10 μV 4.3 μV/V + 100 μV 24 μV/V + 1.1 mV 11 μV/V + 6 mV	Fluke 5520A/SC1000
DC Voltage ³ – Measure	(0 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V*	13 μV/V + 0.3 μV 7.9 μV/V + 0.3 μV 7.2 μV/V + 0.5 μV 9.3 μV/V + 30 μV 9.8 μV/V + 1 mV	HP 3458A *Add 12 μV/V x (Vin/1000)/2 for inputs > 100 V

Parameter/Equipment	Range	CMC ^{2,5} (\pm)	Comments
DC Current ³ – Generate	(0 to 330) μ A 330 μ A to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 11) A (11 to 20) A	23 μ A/A + 2 nA 19 μ A/A + 20 nA 19 μ A/A + 20 nA 19 μ A/A + 2 μ A 51 μ A/A + 20 μ A 0.014 % + 200 μ A 0.092 % + 200 μ A	Fluke 5520A/SC1000 [1] Floor specification doubled after 30 seconds
DC Current ³ – Measure	(0 to 1) μ A (1 to 10) μ A (10 to 100) μ A 100 μ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	0.016 % + 100 parts in 10^6 21 μ A/A + 10 parts in 10^6 14 μ A/A + 1 parts in 10^6 6 μ A/A + 1 parts in 10^6 16 μ A/A + 1 parts in 10^6 17 μ A/A + 1 parts in 10^6 0.011 % + 1 parts in 10^6	HP 3458A
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 (0.11 to 1.1) G Ω	66 $\mu\Omega/\Omega$ + 1 $\mu\Omega$ 27 $\mu\Omega/\Omega$ + 1.5 m Ω 14 $\mu\Omega/\Omega$ + 1.4 m Ω 18 $\mu\Omega/\Omega$ + 2 m Ω 13 $\mu\Omega/\Omega$ + 2 m Ω 14 $\mu\Omega/\Omega$ + 20 m Ω 13 $\mu\Omega/\Omega$ + 20 m Ω 17 $\mu\Omega/\Omega$ + 200 m Ω 13 $\mu\Omega/\Omega$ + 200 m Ω 38 $\mu\Omega/\Omega$ + 2 Ω 18 $\mu\Omega/\Omega$ + 2 Ω 73 $\mu\Omega/\Omega$ + 30 Ω 35 $\mu\Omega/\Omega$ + 50 Ω 0.02 % + 2.5 k Ω 0.017 % + 3 k Ω 2.2 m Ω/Ω + 500 k Ω	Fluke 5520A/SC1000 CMC's shown are based on 4 wire compensation only; for 2 wire and 2 wire compensation add 5 μ V per Amp stimulus current. ($R_{\text{floor}} = E/I$)
Resistance ³ – Measure	(0 to 10) Ω (10 to 100) Ω 100 Ω to 1 k Ω (1 to 10) k Ω (10 to 100) k Ω 100 k Ω to 1 M Ω (1 to 10) M Ω (10 to 100) M Ω (100 to 1000) M Ω	14 $\mu\Omega/\Omega$ + 0.5 $\mu\Omega$ 14 $\mu\Omega/\Omega$ + 0.5 $\mu\Omega$ 5.2 $\mu\Omega/\Omega$ + 1 $\mu\Omega$ 5.1 $\mu\Omega/\Omega$ + 10 $\mu\Omega$ 5.1 $\mu\Omega/\Omega$ + 10 $\mu\Omega$ 13 $\mu\Omega/\Omega$ + 10 $\mu\Omega$ 14 $\mu\Omega/\Omega$ + 10 $\mu\Omega$ 35 $\mu\Omega/\Omega$ + 100 $\mu\Omega$ 1.9 m Ω/Ω + 1.2 m Ω	HP 3458A, within ± 1 $^{\circ}$ C of last ACAL and ± 5 $^{\circ}$ C of T_{CAL} .

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Phase Angle ³ – Generate 0.5 V / 3 V 65 Hz 400 Hz 1 kHz 10 kHz 30 kHz 1 kHz 3 V / 1 A / 65 Hz 3 V / 5 A / 400 Hz	 0.0 ° 0.0 ° 0.0 ° 0.0 ° 0.0 ° 60 °, 90 ° 0.0 ° 0.0 °, 60 °, 90 °	 0.1° 0.3° 0.6° 6° 10° 0.7° 0.1° 0.3°	 Fluke 5520A/SC1000
Oscilloscopes ³ – Level Sine Amp – 50 kHz reference Level Sine Flatness – Generate 5 mV to 5.5 V relative to 50 kHz reference Square Wave – Generate 1 MΩ, 10 Hz to 100 KHz 50 Ω, 10 Hz to 100 KHz Time Marker Output into 50 Ω Pulse Rise Time	 10 mV to 5.0 V _(p-p) 1 mV to 55 V _(p-p) 1 mV to 55 V _(p-p) 1 ns to 20 ms 20 ms to 5 s ≤300 ps	 1.6 % + 300 μV 3.5 % + 400 μV 4.1 % + 400 μV 6.7 % + 400 μV 7.3 % + 400 μV 3.5 % + 100 μV 3.7 % + 100 μV 2.5 μs/s (25 + 1000t) parts in 10 ⁶ 4.8 ps	 Fluke 5520A/SC1000

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Electrical Simulation of Thermocouples ³ – Generate			
Type E	-125 °C to 400 °C	0.17 °C	Fluke 5520A
Type J	-125 °C to 400 °C	0.16 °C	
Type K	-125 °C to 400 °C	0.18 °C	
Type T	-125 °C to 400 °C	0.21 °C	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Voltage ³ – Generate			
(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	0.028 % + 6 μV 0.027 % + 6 μV 0.027 % + 6 μV 0.087 % + 6 μV 3 mV/V + 12 μV 7.1 mV/V + 50 μV	Fluke 5520A/SC1000
(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	0.015 % + 8 μV 0.014 % + 8 μV 0.015 % + 8 μV 0.028 % + 8 μV 0.068 % + 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	0.014 % + 8 μV 0.014 % + 8 μV 0.018 % + 8 μV 0.024 % + 8 μV 0.055 % + 32 μV 1.9 mV/V + 70 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	0.013 % + 650 μV 0.013 % + 600 μV 0.020 % + 600 μV 0.029 % + 600 μV 0.070 % + 1.6 mV	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
AC Voltage ³ – Generate (cont)			
(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	0.015 % + 2mV 0.017 % + 6 mV 0.021 % + 6 mV 0.024 % + 6 mV 1.1 mV/V + 50 mV	Fluke 5520A/SC1000
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.054 % + 10 mV 0.054 % + 10 mV 0.050 % + 10 mV	
AC Voltage ³ – Measure			
(1 to 10) mV	(1 to 45) Hz 45 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz 100 kHz to 1 MHz	72 μV/V + 3 μV 51 μV/V + 1.1 μV 58 μV/V + 1.1 μV 83 μV/V + 1.1 μV 0.03 % + 1.1 μV	HP 3458A
(10 to 100) mV	(1 to 45) Hz 45 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz 100 kHz to 1MHz	71 μV/V + 3 μV 51 μV/V + 1.1 μV 58 μV/V + 1.1 μV 85 μV/V + 1.1 μV 0.03 % + 1.1 μV	
100 mV to 1 V	(1 to 45) Hz 45 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz 100 kHz to 1MHz	47 μV/V + 40 μV 49 μV/V + 20 μV 40 μV/V + 20 μV 39 μV/V + 20 μV 0.03 % + 100 μV	
(1 to 10) V	(1 to 45) Hz 45 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz 100 kHz to 1 MHz	43 μV/V + 400 μV 43 μV/V + 200 μV 61 μV/V + 200 μV 90 μV/V + 200 μV 0.027 % + 1 mV	
(10 to 100) V	(1 to 45) Hz 45 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz 100 kHz to 1MHz	56 μV/V + 4 mV 56 μV/V + 2 mV 75 μV/V + 2 mV 0.011 % + 2 mV 2.4 mV/V + 10 mV	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
AC Voltage ³ – Measure (cont) (100 to 1000) V	(1 to 45) Hz 45 Hz to 1 kHz (1 to 30) kHz (30 to 100) kHz	0.06 % + 40 mV 0.057 % + 20 mV 0.067 % + 20 mV 1.3 mV/V + 20 mV	HP 3458A
AC Current ³ – Generate @ 1kHz	(30 to 330) µA 330 µA to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3) A (3 to 11) A (11A to 20.5) A	2.1 mA/A + 0.1 µA 1.5 mA/A + 0.15 µA 0.044 % + 2 µA 0.071 % + 20 µA 0.027 % + 100 µA 0.057 % + 100 µA 0.055 % + 2 mA 1.6 mA/A + 5 mA	Fluke 5520A/SC1000; LCOMP off
AC Current ³ – Measure @ 1 kHz	(5 to 100) µA 100 µA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	0.027 % + 0.03 µA 0.021 % + 0.2 µA 0.012 % + 2 µA 0.012 % + 20 µA 0.012 % + 0.2 mA	HP 3458A

II. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC ^{2, 5} (±)	Comments
RF Power – Generate (+13 to -80) dBm (+10 to -100) dBm	200 Hz to 80 MHz 10 MHz to 20 GHz (20 to 26.5) GHz	0.26 dBm 4.3 dB 4.9 dB	HP 3335A HP 8340A (Bands 0-3) HP 8340A (Band 4)
Absolute RF Power – Measure 0 dBm	50 MHz	2 %	EL 1300 Thermal Converter

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
Absolute RF Power – Measure (cont)			
(+15 to -20) dBm	100 kHz to 18 GHz	3.1 %	HP 8902A w/11722A power sensors
(-20 to -70) dBm	100 kHz to 18 GHz	3.5 %	HP 437B 8482A, 8485A, 8484A
Tuned RF Power, Relative ³ – Measure			
0 dB, Reference	2.5 MHz to 18 GHz	Reference	HP 8902A, 11793A w/ 11722A, 11792
(0 to -3) dB		0.13 dB	
(-3 to -10) dB		0.13 dB	
(-10 to -40) dB		0.16 dB	
(-40 to -50) dB		0.18 dB	
(-50 to -80) dB		0.24 dB	
(-80 to -90) dB		0.26 dB	
(-90 to -110) dB		0.3 dB	
(-110 to -127) dB		0.4 dB	
Amplitude Modulation ³ – Measure			
(0.02 to 1300) MHz	Rate: 20 Hz to 10 kHz, Depths up to 99 %	2.9 % <i>D</i>	HP 8902A <i>D</i> = depth of modulation
	Rate: 20 Hz to 100 kHz, Depths up To 99 %	2.9 % <i>D</i>	
Frequency Modulation – Measure ³			
(0.15 to 1300) MHz	Rate: 50 Hz to 100 kHz, Deviations <= 400 kHz	1.2 % + 1 digit	HP 8902A
	Rate: 10 Hz to 200 kHz, Deviations <= 400 kHz	5.8 % + 1 digit	

III. Time & Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
Frequency ³ – Measure	10 Hz to 26.5 GHz	1.2 x 10 ⁻⁷	HP5342A
Frequency – Generate	(0.01 to 26.5) GHz	2.2 parts in 10 ⁻⁷	HP 3335C, Fluke 6061 HP 8340A

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

² Calibration and Measurement Capability (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. Calibration and Measurement Capabilities 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 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.

⁴ Based on using the standard at the temperature the HP 3458A was calibrated ($t_{cal} \pm 5^{\circ}\text{C}$) and an auto-calibration (ACAL) was performed within the previous 24 hours ($\pm 1^{\circ}\text{C}$ of ambient temperature) more than 5°C . For resistance, a zero calibration is performed at least every 12 hours within $\pm 1^{\circ}\text{C}$ of use.

⁵ In the statement of CMC, the value is defined as the percent



World Class Accreditation

The American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

SIMCO ELECTRONICS DE MEXICO S.A DE C.V.

Tijuana, Mexico

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/NCSL Z540-1-1994 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 4th day of November 2010.





President & CEO
For the Accreditation Council
Certificate Number 1395.19
Valid to May 31, 2012

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