



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017,
ANSI/NCSLI Z540-1-1994 & ANSI/NCSLI Z540-3-2006

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CALIBRATION

Valid To: September 30, 2023

Certificate Number: 2357.11

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 7}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Micrometers ³ –			
Inside	Up to 12 in (12 to 36) in	(58 + 1.2L) μin (43 + 2.4L) μin	Fowler Trimos 1000
Length	Up to 4 in (4 to 36) in	(30 + 1.0L) μin (50 + 5.3L) μin	Master gage blocks
Depth	Up to 4 in (4 to 36) in	(58 + 0.51L) μin (87 + 1.5L) μin	Master gage blocks
Flatness	Up to 1 in	4.1 μin	Optical flats
Height Gages ³	Up to 4 in (4 to 36) in	(58 + 0.51L) μin (65 + 5.1L) μin	Master gage blocks
Calipers ³	Up to 4 in (4 to 36) in	(59 + 0.51L) μin (86 + 5.1L) μin	Master gage blocks
Parallelism	Up to 1 in	8.3 μin	Gage blocks, surface plate

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Indicators ³	Up to 6 in	54 μin	Master gage blocks
	Up to 2 in	(83 + 0.1L) μin	Trimos ULM
Pin Gages	Up to 2 in	(51 + 1L) μin	Lasermike 183

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
DC Voltage – Generate ³	0 V	0.58 nV	Copper short
	Up to 220 mV	11 μV/V + 0.62 μV	Fluke 5720A
	220 mV to 2.2 V	6.4 μV/V + 0.93 μV	
	(2.2 to 11) V	6.4 μV/V + 3.1 μV	
	(11 to 22) V	6.5 μV/V + 6.2 μV	
(22 to 220) V	7.2 μV/V + 78 μV		
	220 V to 1.1 kV	8.7 μV/V + 470 μV	
DC Voltage – Measure ³	0 V	0.1 μV	Fluke 8508A 01 w/short
	Up to 200 mV	5.1 μV/V + 93 nV	Fluke 8508A 01
	(0.2 to 2) V	3.6 μV/V + 0.39 μV	
	(2 to 20) V	3.6 μV/V + 3.9 μV	
	(20 to 200) V	5.5 μV/V + 39 μV	
	(200 to 1050) V	5.5 μV/V + 490 μV	
	(1 to 75) kV	1.7 mV/V	Ross Engineering VD75 w/Agilent 34401A
DC Current – Measure ³	0 V	0.4 nA	Fluke 8508A 01, open
	(0 to 200) μA	13 pA/μA + 0.31 nA	Fluke 8508A 01
	(0.2 to 20) mA	13 nA/mA + 3.1 nA	
	(2 to 20) mA	14 nA/mA + 31 nA	
	(20 to 200) mA	48 nA/mA + 0.62 μA	
	(0.2 to 2) A	0.18 mA/A + 12 μA	
	(2 to 20) A	0.41 mA/A + 0.31 mA	

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
DC Current – Measure ³ (cont) Ohms Law Method	Up 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 (1 to 10) A (10 to 100) A (100 to 300) A	14 µA/A 10 µA/A 21 µA/A 33 µA/A 2.2 mA/A 18 µA/A 2.5 mA/A 0.11 mA/A 0.21 mA/A	Fluke 8508A w/ Guildline 9711 shunt
DC Current – Generate ³ Ohms Law Method Clamp-On Only	0 A Up to 220 µA 220 µA to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A (2.2 to 11) A (11 to 20.5) A Up 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 (1 to 10) A (10 to 100) A (100 to 300) A (16.5 to 149.999) A (150 to 1025) A	0.4 nA 51 µA/A + 5.4 nA 42 µA/A + 6.2 nA 42 µA/A + 39 nA 48 µA/A + 0.62 µA 76 µA/A + 12 µA 0.28 mA/A + 0.37 mA 0.78 mA/A + 0.58 mA 15 µA/A 10 µA/A 22 µA/A 34 µA/A 2.2 mA/A 19 µA/A 2.5 mA/A 0.11 mA/A 0.19 mA/A 3.9 mA/A + 0.11 mA 4.0 mA/A + 0.39 mA	OPEN Fluke 5720A Fluke 5720A/5725A Fluke 5520A/SC1100 Fluke 8508A w/ Guildline 9711 shunt Fluke 5520A/SC1100 w/ Fluke 5500 coil
DC Resistance – Generate ³	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 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	33 µΩ/Ω + 0.78 mΩ 24 µΩ/Ω + 1.2 mΩ 22 µΩ/Ω + 1.1 mΩ 23 µΩ/Ω + 1.6 mΩ 22 µΩ/Ω + 1.6 mΩ 23 µΩ/Ω + 16 mΩ 23 µΩ/Ω + 16 mΩ 23 µΩ/Ω + 0.16 Ω 23 µΩ/Ω + 0.16 Ω 26 µΩ/Ω + 1.6 Ω 26 µΩ/Ω + 1.6 Ω 48 µΩ/Ω + 23 Ω	Fluke 5520A/SC1100

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
DC Resistance – Generate ³ (cont)	(3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ 330 MΩ to 1.1 GΩ	0.10 mΩ/Ω + 39 Ω 0.21 mΩ/Ω + 1.9 kΩ 0.40 mΩ/Ω + 2.3 kΩ 2.4 mΩ/Ω + 78 kΩ 12 mΩ/Ω + 0.39 MΩ	Fluke 5520A/SC1100
	(1 to 10) GΩ (10 to 100) GΩ 10 GΩ to 1 TΩ	0.59 % 1.2 % 2.6 %	IET Labs HRRS-B-3-1G-5KV
Fixed Values	0 Ω	0.20 μΩ	Copper short
	0.001 Ω	2.4 mΩ/Ω	Ohm Labs CS-100
	0.01 Ω 0.1 Ω 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ	50 μΩ/Ω 31 μΩ/Ω 31 μΩ/Ω 52 μΩ/Ω 4.9 μΩ/Ω 4.6 μΩ/Ω 8.3 μΩ/Ω	Guildline 9200
	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	0.13 mΩ 0.18 mΩ 0.23 mΩ 0.43 mΩ 1.1 mΩ 2.0 mΩ 8.2 mΩ 16 mΩ 85 mΩ 0.15 Ω 1.0 Ω 2.7 Ω 50 Ω 60 Ω 4.0 kΩ 8.5 kΩ 26 kΩ	Fluke 5720
DC Resistance – Measure ³	0 Ω	0.20 μΩ	Fluke 8508A 01, open
	(0 to 2) Ω (2 to 20) Ω (20 to 200) Ω (0.2 to 2) kΩ (2 to 20) kΩ (20 to 200) kΩ (0.2 to 2) MΩ (2 to 20) MΩ (20 to 200) MΩ	19 μΩ/Ω + 4.0 μΩ 10 μΩ/Ω + 14 μΩ 8.8 μΩ/Ω + 50 μΩ 8.7 μΩ/Ω + 0.50 mΩ 8.7 μΩ/Ω + 5.0 mΩ 8.9 μΩ/Ω + 50 mΩ 11 μΩ/Ω + 1.0 Ω 21 μΩ/Ω + 10 Ω 68 μΩ/Ω + 1.0 kΩ	Fluke 8508A 01

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
DC Resistance – Measure ³ (cont)	(0.2 to 2) GΩ (2 to 20) GΩ	0.19 mΩ/Ω + 0.10 MΩ 1.5 mΩ/Ω + 10 MΩ	HV mode HV mode

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Voltage – Generate ³			
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	0.53 mV/V + 3.9 μV 0.48 mV/V + 3.9 μV 0.46 mV/V + 3.9 μV 0.53 mV/V + 3.9 μV 0.68 mV/V + 4.7 μV 1.2 mV/V + 9.3 μV 1.7 mV/V + 19 μV 3 mV/V + 19 μV	Fluke 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	0.25 mV/V + 3.9 μV 0.12 mV/V + 3.9 μV 0.11 mV/V + 3.9 μV 0.21 mV/V + 3.9 μV 0.48 mV/V + 4.7 μV 1.0 mV/V + 9.3 μV 1.3 mV/V + 19 μV 2.7 mV/V + 19 μV	
(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	0.37 mV/V + 12 μV 93 μV/V + 6.2 μV 80 μV/V + 6.2 μV 0.2 mV/V + 6.2 μV 0.47 mV/V + 16 μV 0.86 mV/V + 19 μV 1.3 mV/V + 23 μV 2.6 mV/V + 47 μV	
(0.022 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	0.24 mV/V + 39 μV 86 μV/V + 16 μV 42 μV/V + 7.8 μV 71 μV/V + 9.3 μV 0.13 mV/V + 31 μV 0.39 mV/V + 78 μV 0.93 mV/V + 0.19 mV 1.6 mV/V + 0.31 mV	
(2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz	0.23 mV/V + 0.39 mV 87 μV/V + 0.16 mV	
(2.2 to 22) V	40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	42 μV/V + 54 μV 71 μV/V + 93 μV 94 μV/V + 0.19 mV	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Voltage – Generate ³ (cont)			
(2.2 to 22) V	(100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.25 mV/V + 0.62 mV 0.93 mV/V + 1.9 mV 1.4 mV/V + 3.1 mV	Fluke 5720A
(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	0.23 mV/V + 0.39 mV 87 μV/V + 0.16 mV 52 μV/V + 54 μV 79 μV/V + 93 μV 0.14 mV/V + 2.3 mV 0.85 mV/V + 16 mV 4.2 mV/V + 39 mV 7.8 mV/V + 78 mV	
(220 to 1100) V	(15 to 50) Hz 50 Hz to 1 kHz	0.28 mV/V + 16 mV 71 μV/V + 3.1 mV	
(220 to 1100) V	(0.04) to 1) kHz (1 to 20) kHz (20 to 30) kHz	75 μV/V + 3.1 mV 0.13 mV/V + 4.7 mV 0.47 mV/V + 8.5 mV	Fluke 5720A w/ Fluke 5725A
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	0.47 mV/V + 8.5 mV 1.8 mV/V + 35 mV	
AC Voltage – Measure ³			
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 kHz to 1 MHz	0.27 μV/mV + 2.3 μV 0.18 μV/mV + 0.85 μV 0.25 μV/mV + 0.85 μV 0.78 μV/mV + 0.85 μV 3.9 μV/mV + 0.85 μV 9.3 μV/mV + 3.9 μV	Agilent 3458A 002
(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	0.13 μV/mV + 3.1 μV 71 nV/mV + 1.6 μV 0.11 μV/mV + 1.6 μV 0.23 μV/mV + 1.6 μV 0.62 μV/mV + 1.6 μV 2.3 μV/mV + 7.8 μV 7.8 μV/mV + 7.8 μV	
100 mV to 1 V	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	80 μV/V + 31 μV 56 μV/V + 16 μV 0.11 mV/V + 16 μV 0.23 mV/V + 16 μV 0.62 mV/V + 16 μV 2.3 mV/V + 78 μV 7.8 mV/V + 78 μV	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Voltage – Measure ³ (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 300 kHz to 1 MHz	78 µV/V + 0.31 mV 55 µV/V + 0.16 mV 0.11 mV/V + 0.16 mV 0.23 mV/V + 0.16 mV 0.62 mV/V + 0.16 mV 2.3 mV/V + 0.78 mV 7.8 mV/V + 0.78 mV	Agilent 3458A 002
(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	0.16 mV/V + 3.1 mV 0.16 mV/V + 1.6 mV 0.16 mV/V + 1.6 mV 0.27 mV/V + 1.6 mV 0.93 mV/V + 1.6 mV 3.1 mV/V + 7.8 mV 12 mV/V + 7.8 mV	
(100 to 700) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.32 mV/V + 31 mV 0.31 mV/V + 16 mV 0.47 mV/V + 16 mV 0.93 mV/V + 16 mV 2.3 mV/V + 16 mV	Fluke 8508A 01
(700 to 1000) V	(1 to 10) Hz (10 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.50 mV/V + 10 mV 0.13 mV/V + 20 mV 0.16 mV/V + 20 mV 0.38 mV/V + 40 mV 0.66 mV/V + 0.20 V	Ross Engineering VD75 w/Agilent 34401A
(1 to 26.5) kV	60 Hz	7.0 mV/V	
AC Current – Generate ³			
(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	0.4 nA/µA + 16 nA 1.5 nA/µA + 10 nA 0.11 nA/µA + 7.9 nA 0.25 nA/µA + 12 nA 0.85 nA/µA + 63 nA	Fluke 5720A
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	0.35 µA/mA + 40 nA 0.18 µA/mA + 32 nA 0.16 µA/mA + 32 nA 0.21 µA/mA + 0.10 µA 0.86 µA/mA + 0.63 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	0.34 µA/mA + 0.40 µA 0.15 µA/mA + 0.32 µA 0.12 µA/mA + 0.32 µA 0.18 µA/mA + 0.56 µA 0.86 µA/mA + 4.8 µA	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Current – Generate ³ (cont)			
(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	0.35 μ A/mA + 4 μ A 0.15 μ A/mA + 3.2 μ A 0.12 μ A/mA + 2.4 μ A 0.18 μ A/mA + 3.2 μ A 0.86 μ A/mA + 9.5 μ A	Fluke 5720A
220 mA to 2.2 A	10 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.25 μ A/mA + 32 μ A 0.37 μ A/mA + 79 μ A 5.43 mA/A + 0.16 mA	
(2.2 to 11) A	40 to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.36 mA/A + 0.13 mA 0.69 mA/A + 0.30 mA 2.6 mA/A + 0.60 mA	
(11 to 20.5) A	45 to 100 Hz 100 Hz to 1 kHz 1 to 5 kHz	0.94 mA/A + 3.9 mA 1.2 mA/A + 3.9 mA 23 mA/A + 3.9 mA	Fluke 5720A, Fluke 5725A
(Up to 330) μ A (0.33 to 3.3) mA (3.3 to 33) mA (33 to 330) mA	(10 to 30) kHz	12 μ A/mA + 0.31 μ A 7.8 μ A/mA + 0.47 μ A 3.4 μ A/mA + 3.1 μ A 3.1 mA/A + 0.16 mA	Fluke 5520A/SC1100
Clamp-on Only			
Torodial (16.5 to 150) A	45 to 65 Hz 65 to 440Hz	0.39 % 0.84 %	Fluke 5520A/SC1100
(150 to 1025) A	45 to 65 Hz 65 to 440Hz	0.38 % 0.84 %	
Non-Toroidal (16.5 to 150) A	45 to 65 Hz 65 to 440Hz	0.77 % 1.2 %	Fluke 5520A/SC1100 w/ Fluke 5500 coil
(150 to 1025) A	45 to 65 Hz 65 to 440Hz	1.2 % 1.6 %	
AC Current – Measure ³			
Up to 199.99 μ A	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.49 mA/A + 19 nA 0.49 mA/A + 19 nA 0.65 mA/A + 19 nA 3.1 mA/A + 19 nA	Fluke 8508A 01

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Current – Measure ³ (cont)			
(0.2 to 1.9999) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.32 mA/A + 0.19 µA 0.3 mA/A + 0.19 µA 0.6 mA/A + 0.19 µA 3.1 mA/A + 0.19 µA	Fluke 8508A 01
(2 to 19.999) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.32 mA/A + 1.9 µA 0.29 mA/A + 1.9 µA 0.6 mA/A + 1.9 µA 3.1 mA/A + 1.9 µA	
(20 to 199.99) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.31 mA/A + 19 µA 0.28 mA/A + 19 µA 0.6 mA/A + 19 µA	
(0.2 to 1.9999) A	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.55 mA/A + 0.19 mA 0.65 mA/A + 0.19 mA 2.4 mA/A + 0.19 mA	
(2 to 19.999) A	10 Hz to 2 kHz (2 to 10) kHz	0.75 mA/A + 1.9 mA 2.0 mA/A + 1.9 mA	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of Thermocouple Indicators ³ –			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.39 °C 0.13 °C 0.11 °C 0.13 °C 0.16 °C	Fluke 5520/SC1100
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.25 °C 0.13 °C 0.12 °C 0.14 °C 0.18 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.27 °C 0.14 °C 0.13 °C 0.20 °C 0.31 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of Thermocouple Indicators ³ – (cont)			
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.32 °C 0.18 °C 0.15 °C 0.14 °C 0.21 °C	Fluke 5520/SC1100
Type R	(0 to 250) °C (250 to 400) °C (400 to 1 000) °C (1000 to 1767) °C	0.47 °C 0.29 °C 0.27 °C 0.32 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.42 °C 0.29 °C 0.30 °C 0.37 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.50 °C 0.19 °C 0.13 °C 0.11 °C	
Measure Type J Type K Type T Type E	(-210 to 1200) °C (-200 to 1372) °C (-250 to 400) °C (-250 to 1000) °C	0.14 °C 0.14 °C 0.14 °C 0.14 °C	Fluke 5700A, Agilent 3458A, ice point, half junction
Electrical Simulation of RTDs ³ –			
Pt 385, 100 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.085 °C 0.12 °C 0.12 °C 0.11 °C 0.097 °C 0.11 °C 0.20 °C	Fluke 5520A/SC1100
Pt 3926, 100 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.064 °C 0.076 °C 0.075 °C 0.089 °C 0.095 °C 0.17 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of RTDs ³ – (cont)			
Pt 3916, 100 Ω	(-200 to -190) °C (-190 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.21 °C 0.060 °C 0.068 °C 0.070 °C 0.077 °C 0.084 °C 0.090 °C 0.13 °C 0.19 °C	Fluke 5520A/SC1100
Pt 385, 200 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.041 °C 0.043 °C 0.044 °C 0.051 °C 0.098 °C 0.11 °C 0.11 °C 0.13 °C	
Pt 385, 500 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.036 °C 0.043 °C 0.044 °C 0.051 °C 0.066 °C 0.066 °C 0.073 °C 0.088 °C	
Pt 385, 1 kΩ	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.029 °C 0.029 °C 0.036 °C 0.042 °C 0.050 °C 0.18 °C 0.057 °C 0.18 °C	
PtNi 385, 120 Ω	(-80 to 0) °C (0 to 100) °C (100 to 260) °C	0.081 °C 0.11 °C 0.11 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.69 °C	

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Oscilloscopes ³ – Amplitude DC Signal 50 Ω Load 1 MΩ Load Amplitude Square Wave 50 Ω Load 1 MΩ Load Leveled Sine Wave – Flatness Relative to 50 kHz Time Marker into 50 Ω Load	(0 to 6.6) V (0 to 130) V 10 Hz to 10 kHz 1 mV to 6.6 V _{p-p} 1 mV to 130 V _{p-p} 5 mV to 5.5 V: 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 5 mV to 3.5 V: (600 to 1100) MHz 5 s to 50 ms 1 ns to 20 ms (cardinal points) 1 ns to 20 ms (noncardinal points)	1.9 mV/V + 31 μV 0.39 mV/V + 31 μV 1.6 mV/V + 31 μV 0.78 mV/V + 31 μV 3.0 % + 78 μV 3.4 % + 78 μV 4.3 % + 78 μV 4.9 % + 78 μV 7.8 ms/s + 0.0019 % 6.2 μs/s 39 μs/s	Fluke 5520A/SC1100
Rise Time – Generate	1 kHz to 2 MHz (200 to 300) ps 2 MHz to 10 MHz (250 to 350) ps	19 ps 19 ps	Fluke 5520A/SC1100
Rise Time – Measure	800 ps to 1 ms	170 ps	TDS 540A
DC Power – Generate ³ 33 mV to 1020 V Output: (0.33 to 329.99) mA (0.33 to 2.9999) A (3 to 20.5) A	0.01 mW to 337 W (0.01 to 3060) W (3060 to 20910) W	0.18 mW/W 0.17 mW/W 0.57 mW/W	Fluke 5520A/SC1100

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
AC Power – Generate ³ (45 to 65) Hz PF=1			
33 mV to 0.33 V: (3.3 to 8.999) mA (9 to 32.99) mA (33 to 330) mA (0.33 to 1.1) A (1.1 to 3) A (3 to 11) A (11 to 20.5) A	(0.1089 to 2.97) mW (0.297 to 10.89) mW (1.089 to 29.7) mW (2.97 to 108.9) mW (10.89 to 297) mW (29.7 to 726) mW 72.6 mW to 1.485 W 148.5 mW to 6.76 W	2.3 mW/W 1.4 mW/W 1.1 mW/W 1.3 mW/W 1.0 mW/W 1.0 mW/W 1.1 mW/W 1.0 mW/W	Fluke 5520A/SC1100
(0.33 to 1020): (3.3 to 8.999) mA (9 to 32.99) mA (33 to 330) mA (0.33 to 1.1) A (1.1 to 3) A (3 to 11) A (11 to 20.5) A	1.089 mW to 9.179 W 2.97 mW to 33.6 W 10.89 mW to 91.8 W 29.7 mW to 336.6 W 108.9 mW to 918 W 297 mW to 2244 W 72.6 mW to 4590 W (1.49 to 20910) W	3.4 mW/W 0.65 mW/W 0.94 mW/W 0.62 mW/W 0.86 mW/W 0.71 mW/W 0.96 mW/W 0.81 mW/W	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
Inductance – Measure ³ 1 mH to 10 H	12 Hz to 100 kHz	0.49 mH/H	GenRad 1689-9700 (CMC defined at 1 kHz Only) ⁵
Capacitance – Measure ³ (0.1 to 10) pF (10 to 100) pF 100 pF to 25 μF (25 to 100) μF 100 μF to 1 mF	12 Hz to 100 kHz	4.7 mF/F 0.59 mF/F 0.47 mF/F 0.48 mF/F 4.8 mF/F	GenRad 1689-9700 (CMC defined at 1 kHz Only) ⁵

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
Capacitance – Generate ³ (0.19 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 110) nF (110 to 330) nF (0.33 to 1.1) μF (1.1 to 3.3) μF (3.3 to 11) μF (11 to 33) μF (33 to 110) μF (110 to 330) μF (0.33 to 1.1) mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	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 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz (0 to 50) Hz (0 to 20) Hz (0 to 6) Hz (0 to 2) Hz (0 to 0.6) Hz (0 to 0.2) Hz	4.1 pF/nF + 7.8 pF 4 pF/nF + 7.8 pF 2.3 pF/nF + 7.8 pF 2.3 pF/nF + 78 pF 2.3 pF/nF + 0.23 nF 2.3 nF/μF + 0.78 nF 2.3 nF/μF + 2.3 nF 2.3 nF/μF + 7.8 nF 3.4 nF/μF + 23 nF 3.7 nF/μF + 78 nF 3.5 nF/μF + 0.23 μF 3.5 μF/mF + 0.78 μF 3.5 μF/mF + 2.3 μF 3.5 μF/mF + 7.8 μF 5.8 μF/mF + 23 μF 8.5 μF/mF + 78 μF	Fluke 5520A/SC1100
AC Level Flatness ³ 3 VRMS	10 Hz 100 Hz 10 kHz 30 kHz 100 kHz 300 kHz 1 MHz 3 MHz 8 MHz 10 MHz 20 MHz 30 MHz 50 MHz 70 MHz 80 MHz 100 MHz	0.12 % 0.12 % 0.12 % 0.23 % 0.29 % 0.29 % 0.58 % 0.70 % 0.70 % 0.70 % 0.72 % 1.7 % 2.6 % 3.5 % 3.9 % 4.7 %	Agilent 3458A w/ Ballantine 1395B-3 thermal converter Reference to 1 kHz

III. Electrical – RF/Microwave

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
RF Power – Generate ³ (13.5 to 24) dBm (+24.0 to -56.00) dBm	DC to 20 MHz	0.37 dB 0.42 dB	HP 3325B
(-60 to 13) dBm	100 kHz to 2 GHz	2.2 dB	HP 8642B
RF Power – Measure ³ (-30 to 20) dBm	100 kHz to 2 GHz	1.7 %	HP E4418A w/ 8482A
(-60 to -20) dBm	10 MHz to 2 GHz	2.5 %	HP E4418A w/ 8481D
RF Attenuation ³ – Measure (0 to -20) dB (-20 to -60) dB	100 kHz to 2 GHz 10 MHz to 2 GHz	1.7 % 2.5 %	E4418A w/ 8482A E4418A w/ 8481D

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Torque Tools ³	(5 to 50) in·ozf (5 to 50) in·lbf (40 to 400) in·lbf (100 to 1000) in·lbf (25 to 250) ft·lbf (60 to 600) ft·lbf	0.58 % 0.30 % 0.30 % 0.30 % 0.30 % 0.29 %	CDI Suretest model 5000ST
Pressure ³ – Pneumatic	(0 to 17) psig (17 to 150) psig (150 to 1000) psig	0.012 % 0.012 % 0.012 %	Mensor CPC6050
Hydraulic	(0.5 to 15) kpsig	0.034 %	Budenberg 480D

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Scales and Balances ³ –	(1 to 20) mg	16 µg	Class 2 weights
	(20 to 200) mg	29 µg	
	(200 to 500) mg	41 µg	
	(0.5 to 2) g	65 µg	
	(2 to 3) g	67 µg	
	(3 to 5) g	73 µg	
	(5 to 10) g	87 µg	
	(10 to 50) g	0.29 mg	
	(50 to 100) g	0.58 mg	
	(100 to 300) g	1.2 mg	
	(300 to 500) g	2.9 mg	
	(0.5 to 1) kg	5.8 mg	
	(1 to 2) kg	12 mg	
	(2 to 3) kg	17 mg	
	(3 to 5) kg	29 mg	
	(0.25 to 0.5) lb	0.000052 lb	Class 6 weights
	(0.5 to 10) lb	0.00076 lb	
	(10 to 25) lb	0.0029 lb	
	(25 to 50) lb	0.0051 lb	Class F weights
	(50 to 100) lb	0.012 lb	
	(100 to 500) lb	0.026 lb	
Tachometers Non-Contact	(0.01 to 600 000) rpm	0.0019 %	LED w/frequency generator

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 8} (±)	Comments
Temperature – Measuring Equipment ³	(-20 to 250) °C (250 to 660) °C	0.028 °C 0.59 °C	Hart 5626 SPRT w/ Hart 1502 and temperature sources

Parameter/Equipment	Range	CMC ^{2, 8} (±)	Comments
Temperature – Measure ³	(-200 to 100) °C (100 to 660) °C	0.16 °C 0.19 °C	Hart 5626 SPRT w/ Hart 1502

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 8} (±)	Comments
Time Interval – Totalize Method ³	(1 to 86 400) s	39 ms	Agilent 53132A w/ Fluke 910R
Frequency – Generate ³	(0.001 to 1000) Hz (0.001 to 20) MHz 10 MHz to 2 GHz	12 µHz/Hz 0.6 nHz/Hz 36 nHz/Hz	HP 3325B locked to GPS HP 8642B w/ Fluke 910R
Frequency – Measure ³ Fluke 5520A SC1100	DC to 1 kHz (1 to 1000) kHz (1 to 225) MHz (0.225 to 12.4) GHz	0.12 mHz/Hz 0.64 nHz/Hz 0.59 nHz/Hz 0.59 nHz/Hz	HP 53132A w/ Fluke 910R HP 53132A w/ Fluke 910R

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 In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches; % are percent of reading of input unless otherwise stated.

⁵ The measurements uncertainty at frequencies other than 1 kHz are estimated using the IET Laboratory Accuracy Calculator

⁶ 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 percent or fraction of the reading plus a fixed floor specification.

⁷ This scope meets A2LA's *P112 Flexible Scope Policy*.

⁸ 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

TEKTRONIX, INC

Tulsa, Oklahoma

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 the requirements of ANSI/NCSLI Z540.3-2006 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 16th day of August 2021.

A blue ink signature of the Vice President of Accreditation Services, written over a horizontal line.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2357.11
Valid to September 30, 2023

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