



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

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CALIBRATION

Valid To: September 30, 2025

Certificate Number: 2357.16

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} (±)	Comments
Micrometers ³			
Linearity	Up to 12 in (12 to 48) in	(9.3 + 3.3L) µin (15 + 2.8L) µin	Grade 0 & 00 gage blocks
Flatness	Up to 1 in	5.2 µin	Optical flat
Parallelism	Up to 1 in	10 µin	Optical parallel
Calipers ³	Up to 4 in (4 to 12) in (12 to 48) in	58 µin (62 + 2.1L) µin (79 + 3L) µin	Grade 0 & 00 gage blocks
Indicators ³	Up to 3 in	34 µin	ULM
Height Gages	(0.05 to 4) in (4 to 12) in (12 to 48) in	590 µin 590 µin (590 + 0.3L) µin	Grade 0 & 00 gage blocks

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,5} ($\pm$)	Comments
DC Voltage ³ – 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	8.3 μ V/V + 0.39 μ V 4.8 μ V/V + 0.62 μ V 3.1 μ V/V + 2.3 μ V 3.7 μ V/V + 3.9 μ V 4.7 μ V/V + 39 μ V 6.3 μ V/V + 0.39 mV	Fluke 5730A
DC Voltage ³ – Measure	Up to 100 mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V	12 μ V/V + 0.23 μ V 7.1 μ V/V + 0.23 μ V 6.3 μ V/V + 0.39 μ V 9.4 μ V/V + 23 μ V 22 μ V/V + 78 μ V	HP 3458A, OPT 002
DC Current ³ – Generate	(0 to 220) μ A (0.22 to 2.2) mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A (2.2 to 11) A (11 to 20.5) A	40 μ A/A + 5.4 nA 32 μ A/A + 6.2 nA 32 μ A/A + 39 nA 40 μ A/A + 0.62 μ A 72 μ A/A + 12 μ A 0.28 mA/A + 0.37 mA 0.78 mA/A + 0.58 mA	Fluke 5730A w 5725A Fluke 552XA
Clamp-On Only	(0 to 150) A (150 to 1025) A	3.9 mA/A + 0.11 mA 4.0 mA/A + 0.39 mA	Fluke 552XA w/coil
DC Current ³ – Measure	Up to 100 nA (0.1 to 1) μ A (1 to 10) μ A (10 to 100) μ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 15) A (15 to 100) A (100 to 300) A	66 μ A/A + 31 pA 32 μ A/A + 31 pA 16 μ A/A + 78 pA 19 μ A/A + 0.62 nA 19 μ A/A + 3.9 nA 19 μ A/A + 39 nA 36 μ A/A + 0.39 μ A 88 μ A/A + 7.8 μ A 51 μ A/A 72 μ A/A 58 μ A/A	HP 3458A HP 3458A w/ Guildline 9211

Parameter/Equipment	Range	CMC ^{2, 5} ($\pm$)	Comments
DC Resistance ³ – Measure	(0 to 10) Ω (10 to 100) Ω (0.1 to 1) k Ω (1 to 10) k Ω (10 to 100) k Ω (0.1 to 1) M Ω (1 to 10) M Ω (10 to 100) M Ω (100 to 1200) M Ω	12 $\mu\Omega/\Omega$ + 39 $\mu\Omega$ 9.0 $\mu\Omega/\Omega$ + 0.39 m Ω 8.0 m $\Omega/\text{k}\Omega$ + 0.39 m Ω 8.0 m $\Omega/\text{k}\Omega$ + 3.9 m Ω 8.0 m $\Omega/\text{k}\Omega$ + 39 m Ω 12 $\Omega/\text{M}\Omega$ + 1.6 Ω 39 $\Omega/\text{M}\Omega$ + 78 Ω 0.40 k $\Omega/\text{M}\Omega$ + 0.78 k Ω 4.7 k $\Omega/\text{M}\Omega$ + 7.8 k Ω	HP 3458A
DC Resistance ³ – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (0.11 to 0.33) k 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 (0.11 to 0.33) M 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 (330 to 1100) M Ω	32 $\mu\Omega/\Omega$ + 0.78 m Ω 26 $\mu\Omega/\Omega$ + 1.2 m Ω 24 $\mu\Omega/\Omega$ + 1.1 m Ω 24 $\mu\Omega/\Omega$ + 1.6 m Ω 24 $\mu\Omega/\Omega$ + 1.6 m Ω 24 $\mu\Omega/\Omega$ + 16 m Ω 23 $\mu\Omega/\Omega$ + 16 m Ω 24 $\mu\Omega/\Omega$ + 0.16 Ω 24 $\mu\Omega/\Omega$ + 0.16 Ω 29 $\mu\Omega/\Omega$ + 1.6 Ω 28 $\mu\Omega/\Omega$ + 1.6 Ω 64 $\mu\Omega/\Omega$ + 23 Ω 0.10 m Ω/Ω + 39 Ω 0.42 m Ω/Ω + 1.9 k Ω 0.41 m Ω/Ω + 2.3 k Ω 2.5 m Ω/Ω + 78 k Ω 12 m Ω/Ω + 0.39 M Ω	Fluke 552XA
Fixed Values	0 Ω 1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 k Ω 1.9 k Ω 10 k Ω 19 k Ω 100 k Ω 190 k Ω 1 M Ω 1.9 M Ω 10 M Ω 19 M Ω 100 M Ω	49 $\mu\Omega$ 0.12 m Ω 0.17 m Ω 0.21 m Ω 0.42 m Ω 0.97 m Ω 1.9 m Ω 6.4 m Ω 13 m Ω 64 m Ω 0.12 Ω 0.81 Ω 1.9 Ω 13 Ω 57 Ω 0.89 k Ω 1.7 k Ω 20 k Ω	Fluke 5730A

Parameter/Range	Frequency	CMC ^{2, 5} ($\pm$)	Comments
Distortion ³ – Measure, 20 Hz to 100 kHz, Fundamental Frequency (0 to -99) dB (0 to -99) dB	20 Hz to 20 kHz (20 to 100) kHz	1.2 dB 2.3 dB	HP 8903B
AC Voltage ³ – Generate (0.2 to 2.2) mV (2.2 to 22) mV (22 to 220) mV (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 (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 (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 (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	0.42 mV/V + 3.9 μ V 0.36 mV/V + 3.9 μ V 0.35 mV/V + 3.9 μ V 0.4 mV/V + 3.9 μ V 0.64 mV/V + 4.7 μ V 1.1 mV/V + 9.3 μ V 1.5 mV/V + 19 μ V 2.8 mV/V + 19 μ V 0.24 mV/V + 3.9 μ V 0.11 mV/V + 3.9 μ V 0.1 mV/V + 3.9 μ V 0.2 mV/V + 3.9 μ V 0.47 mV/V + 4.7 μ V 1.0 mV/V + 9.3 μ V 1.3 mV/V + 19 μ V 2.7 mV/V + 19 μ V 0.36 mV/V + 12 μ V 92 μ V/V + 6.2 μ V 58 μ V/V + 6.2 μ V 0.12 mV/V + 6.2 μ V 0.31 mV/V + 16 μ V 0.62 mV/V + 19 μ V 1.3 mV/V + 23 μ V 2.6 mV/V + 47 μ V 0.49 mV/V + 39 μ V 87 μ V/V + 16 μ V 39 μ V/V + 7.8 μ V 63 μ V/V + 9.3 μ V 0.11 mV/V + 31 μ V 0.32 mV/V + 78 μ V 0.93 mV/V + 0.19 mV 1.6 mV/V + 0.31 mV	Fluke 5730A w/ 5725A

Parameter/Range	Frequency	CMC ^{2, 5} (±)	Comments
AC Voltage ³ – 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	0.37 mV/V + 0.39 mV 92 µV/V + 0.16 mV 39 µV/V + 54 µV 63 µV/V + 93 µV 79 µV/V + 0.19 mV 0.23 mV/V + 0.62 mV 0.93 mV/V + 1.9 mV 1.4 mV/V + 3.1 mV	Fluke 5730A w/ 5725A
(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 (0.5 to 1) MHz	0.43 mV/V + 3.9 mV 88 µV/V + 1.6 mV 52 µV/V + 0.54 mV 79 µV/V + 0.93 mV 0.14 mV/V + 2.3 mV 0.86 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 68 µV/V + 3.1 mV	Fluke 5730A
(220 to 1100) V	40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz	78 µV/V + 3.1 mV 0.13 mV/V + 4.7 mV 0.47 mV/V + 8.5 mV	w/5725
(220 to 750) V	30 Hz to 50 kHz (50 to 100) kHz	0.47 mV/V + 8.5 mV 1.8 mV/V + 35 mV	
Wideband Output (OPT 003)			
Absolute:			
Up to 1.1 mV	30 Hz to 500 kHz	6.5 mV/V + 1.6 µV	Fluke 5730A
(1.1 to 3) mV	30 Hz to 500 kHz	5.5 mV/V + 2.3 µV	
(3 to 11) mV	30 Hz to 500 kHz	5.4 mV/V + 6.2 µV	
(11 to 33) mV	30 Hz to 500 kHz	4.7 mV/V + 12 µV	
(33 to 110) mV	30 Hz to 500 kHz	4.7 mV/V + 31 µV	
(110 to 330) mV	30 Hz to 500 kHz	3.9 mV/V + 78 µV	
330 mV to 1.1 V	30 Hz to 500 kHz	3.9 mV/V + 0.31 mV	
(1.1 to 3.5) V	30 Hz to 500 kHz	3.1 mV/V + 0.39 mV	
Flatness:			
Up to 1.1 mV	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.4 mV/V 0.86 mV/V 1.6 mV/V + 2.3 µV 3.1 mV/V + 2.3 µV 4.7 mV/V + 2.3 µV 12 mV/V + 12 µV	

Parameter/Range	Frequency	CMC ^{2, 5} ($\pm$)	Comments
AC Voltage ³ – Generate (cont)			
Flatness: (1.1 to 3.3) mV	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.4 mV/V 0.81 mV/V 0.81 mV/V + 2.3 μ V 2.3 mV/V + 2.3 μ V 4 mV/V + 2.3 μ V 12 mV/V + 2.3 μ V	Fluke 5730A
(3.3 to 11) mV	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.3 mV/V 0.78 mV/V 0.8 mV/V + 2.3 μ V 1.6 mV/V + 2.3 μ V 3.2 mV/V + 2.3 μ V 7.8 mV/V + 2.3 μ V	
(11 to 33) mV	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.3 mV/V 0.8 mV/V 0.8 mV/V + 2.3 μ V 1.6 mV/V + 2.3 μ V 3.2 mV/V + 2.3 μ V 7.8 mV/V + 2.3 μ V	
(33 to 110) mV	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.3 mV/V 0.79 mV/V 0.79 mV/V + 2.3 μ V 1.6 mV/V + 2.3 μ V 3.2 mV/V + 2.3 μ V 7.8 mV/V + 2.3 μ V	
(110 to 330) mV	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.3 mV/V 0.8 mV/V 0.8 mV/V + 2.3 μ V 1.6 mV/V + 2.3 μ V 3.2 mV/V + 2.3 μ V 7.8 mV/V + 2.3 μ V	
330 mV to 1.1 V	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.3 mV/V 0.79 mV/V 0.79 mV/V + 2.3 μ V 1.6 mV/V + 2.3 μ V 3.2 mV/V + 2.3 μ V 7.8 mV/V + 2.3 μ V	
(1.1 to 3.5) V	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.3 mV/V 0.79 mV/V 0.79 mV/V + 2.3 μ V 1.6 mV/V + 2.3 μ V 3.2 mV/V + 2.3 μ V 7.8 mV/V + 2.3 μ V	

Parameter/Range	Frequency	CMC ^{2, 5} (±)	Comments
AC Current ³ – Measure			
(10 to 100) μA	(10 to 20) Hz 20 Hz to 45 Hz 45 Hz to 5 kHz	3.1 nA/μA + 23 nA 1.2 nA/μA + 23 nA 0.49 nA/μA + 23 nA	HP 3458A
(0.1 to 1) mA	(10 to 20) Hz 20 Hz to 45 Hz (45 to 100) Hz 100 Hz to 5 kHz	3.1 μA/mA + 0.16 μA 1.2 μA/mA + 0.16 μA 0.52 μA/mA + 0.16 μA 0.28 μA/mA + 0.16 μA	
(1 to 10) mA	(10 to 20) Hz 20 Hz to 45 Hz (45 to 100) Hz 100 Hz to 5 kHz	3.1 μA/mA + 1.6 μA 1.2 μA/mA + 1.6 μA 0.49 μA/mA + 1.6 μA 0.28 μA/mA + 1.6 μA	
(10 to 100) mA	(10 to 20) Hz 20 Hz to 45 Hz (45 to 100) Hz 100 Hz to 5 kHz	3.1 μA/mA + 16 μA 1.2 μA/mA + 16 μA 0.49 μA/mA + 16 μA 0.28 μA/mA + 16 μA	
(0.1 to 1) A	(10 to 20) Hz 20 Hz to 45 Hz (45 to 100) Hz 100 Hz to 5 kHz	3.1 mA/A + 0.16 mA 1.3 mA/A + 0.16 mA 0.69 mA/A + 0.16 mA 0.83 mA/A + 0.16 mA	
AC Voltage ³ – Measure			
(0.03 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	0.38 μV/mV + 2.3 μV 0.19 μV/mV + 0.85 μV 0.25 μV/mV + 0.85 μV 0.79 μV/mV + 0.85 μV 3.9 μV/mV + 0.85 μV 31 μV/mV + 3.9 μV	HP 3458A (synchronous sub-sampled mode)
(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	0.30 μV/mV + 3.1 μV 87 nV/mV + 1.6 μV 0.12 μV/mV + 1.6 μV 0.26 μV/mV + 1.6 μV 0.63 μV/mV + 1.6 μV 2.3 μV/mV + 7.8 μV 7.9 μV/mV + 7.8 μV	
(0.10 to 1) V	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.28 mV/V + 31 μV 75 μV/V + 16 μV 0.12 mV/V + 16 μV 0.26 mV/V + 16 μV 0.63 mV/V + 16 μV 2.3 mV/V + 78 μV 8.0 mV/V + 78 μV	

Parameter/Range	Frequency	CMC ^{2,5} ($\pm$)	Comments
AC Voltage ³ – Measure			
(1 to 10) V	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.28 mV/V + 0.31 mV 74 μ V/V + 0.16 mV 0.12 mV/V + 0.16 mV 0.26 mV/V + 0.16 mV 0.63 mV/V + 0.16 mV 2.3 mV/V + 0.78 mV 8.0 mV/V + 0.78 mV	HP 3458A (synchronous sub-sampled mode)
(10 to 100) V	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.31 mV/V + 3.1 mV 0.16 mV/V + 1.6 mV 0.16 mV/V + 1.6 mV 0.30 mV/V + 1.6 mV 0.94 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	0.42 mV/V + 31 mV 0.31 mV/V + 16 mV 0.47 mV/V + 16 mV 0.94 mV/V + 16 mV 2.3 mV/V + 16 mV	
AC Current – Generate			
(9 to 220) μ A	(10 to 20) Hz (20 to 40) Hz (0.040 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.24 mA/A + 16 nA 0.16 mA/A + 9.3 nA 0.1 mA/A + 7.8 nA 0.27 mA/A + 12 nA 1 mA/A + 62 nA	Fluke 5730A
(0.22 to 2.2) mA	(10 to 20) Hz (20 to 40) Hz (0.040 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.24 mA/A + 39 nA 0.16 mA/A + 31 nA 0.1 mA/A + 31 nA 0.2 mA/A + 0.1 μ A 1.0 mA/A + 0.62 μ A	
(2.2 to 22) mA	(10 to 20) Hz (20 to 40) Hz (0.040 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.24 mA/A + 0.39 μ A 0.16 mA/A + 0.31 μ A 0.1 mA/A + 0.31 μ A 0.19 mA/A + 0.54 μ A 1 mA/A + 4.7 μ A	
(22 to 220) mA	(10 to 20) Hz (20 to 40) Hz (0.040 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.24 mA/A + 3.9 μ A 0.16 mA/A + 3.1 μ A 0.1 mA/A + 2.3 μ A 0.19 mA/A + 3.1 μ A 1.0 mA/A + 9.3 μ A	



Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
AC Current – Generate (cont)			
(0.22 to 2.2) A	(0.020 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.24 mA/A + 31 μ A 0.4 mA/A + 78 μ A 6.2 mA/A + 0.16 mA	Fluke 5730A w 5725A
(2.2 to 11) A	(0.040 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.40 mA/A + 0.13 mA 0.76 mA/A + 0.29 mA 2.8 mA/A + 0.58 mA	
(11 to 20.5) A	(10 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.95 mA/A + 3.9 mA 1.2 mA/A + 3.9 mA 23 mA/A + 3.9 mA	Fluke 552XA
(16.5 to 149.999) A	(45 to 65) Hz (65 to 440) Hz	0.31 % 0.81 %	Fluke 552XA w/ coil
(150 to 1025) A	(45 to 65) Hz (65 to 440) Hz	0.33 % 0.82 %	
Capacitance ³ – Generate			
(0.19 to 1.1) nF	10 Hz to 10 kHz	4.1 pF/nF + 7.8 pF	Fluke 552XA
(1.1 to 3.3) nF	10 Hz to 3 kHz	4 pF/nF + 7.8 pF	
(3.3 to 10.9) nF	10 Hz to 1 kHz	2.3 pF/nF + 7.8 pF	
(10.9 to 109.9) nF	10 Hz to 1 kHz	2.3 pF/nF + 78 pF	
(110 to 329.9) nF	10 Hz to 1 kHz	2.3 pF/nF + 0.23 nF	
(0.33 to 1.09) μ F	(10 to 600) Hz	2.3 nF/ μ F + 0.78 nF	
(1.1 to 3.29) μ F	(10 to 300) Hz	2.3 nF/ μ F + 2.3 nF	
(3.29 to 10.9) μ F	(10 to 150) Hz	2.3 nF/ μ F + 7.8 nF	
(11 to 32.9) μ F	(10 to 120) Hz	3.4 nF/ μ F + 23 nF	
(33 to 109.9) μ F	(10 to 80) Hz	3.7 nF/ μ F + 78 nF	
(110 to 329.9) μ F	(10 to 50) Hz	3.5 nF/ μ F + 0.23 μ F	
(0.33 to 1.09) mF	(10 to 20) Hz	3.5 μ F/mF + 0.78 μ F	
(1.09 to 3.29) mF	(0 to 6) Hz	3.5 μ F/mF + 2.3 μ F	
(3.29 to 10.9) mF	(0 to 2) Hz	3.5 μ F/mF + 7.8 μ F	
(10.9 to 32.9) mF	(0 to 0.6) Hz	5.8 μ F/mF + 23 μ F	
(32.9 to 110) mF	(0 to 0.2) Hz	8.5 μ F/mF + 78 μ F	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
Capacitance ³ – Generate Fixed Points			
1 pF	100 Hz to 1 kHz	0.39 fF	16380A cap set
	1 kHz to 1 MHz	0.4 fF	
	(1 to 2) MHz	0.45 fF	
	(2 to 3) MHz	0.57 fF	
	(3 to 4) MHz	0.73 fF	
	(4 to 5) MHz	1.5 fF	
	(5 to 10) MHz	2.5 fF	
	(10 to 13) MHz	4.1 fF	
10 pF	100 Hz to 1 kHz	3.5 fF	
	1 kHz to 1 MHz	3.5 fF	
	(1 to 2) MHz	3.8 fF	
	(2 to 3) MHz	3.8 fF	
	(3 to 4) MHz	3.5 fF	
	(4 to 5) MHz	3.5 fF	
	(5 to 10) MHz	4.1 fF	
	(10 to 13) MHz	4.3 fF	
100 pF	100 Hz to 1 kHz	43 fF	
	1 kHz to 1 MHz	35 fF	
	(1 to 2) MHz	36 fF	
	(2 to 3) MHz	37 fF	
	(3 to 4) MHz	38 fF	
	(4 to 5) MHz	39 fF	
	(5 to 10) MHz	52 fF	
	(10 to 13) MHz	64 fF	
1000 pF	100 Hz to 1 kHz	0.35 pF	16380C cap set
	1 kHz to 1 MHz	0.35 pF	
	(1 to 2) MHz	0.38 pF	
	(2 to 3) MHz	0.45 pF	
	(3 to 4) MHz	0.56 pF	
	(4 to 5) MHz	0.72 pF	
	(5 to 10) MHz	2 pF	
	(10 to 13) MHz	2.9 pF	
10 nF	(100 to 200) Hz	0.62 pF	
	(120 to 1000) Hz	0.71 pF	
	(1 to 10) kHz	0.71 pF	
	(10 to 100) kHz	0.73 pF	

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
Capacitance ³ – Generate Fixed Points (cont)			
100 nF	(100 to 120) Hz (120 to 1000) Hz (1 to 10) kHz (10 to 100) kHz	7.1 pF 7.1 pF 7.1 pF 9.1 pF	16380C cap set
1 μ F	(100 to 120) Hz (120 to 1000) Hz (1 to 10) kHz (10 to 100) kHz	76 pF 70 pF 70 pF 0.58 nF	
Oscilloscopes ³ – Amplitude			
DC:			
50 Ω	± 1 mV to ± 5.0 V	0.19 mV/V + 19 μ V	Wavetek 9500B
1 M Ω	± 1 mV to ± 200 V	0.20 mV/V + 19 μ V	
10 Hz to 100 kHz:	Squarewave		
50 Ω	± 1 mV to ± 5.0 V _(p-p)	0.78 mV/V + 7.8 μ V	
1 M Ω	± 1 mV to ± 200 V _(p-p)	0.78 mV/V + 7.8 μ V	
Time Marker	450.5 ps to 55 s	0.54 μ s/s	
Bandwidth:			
5 mV to 5 V	0.1 Hz to 300 MHz	2.6 %	Wavetek 9500B w/9530
	(300 to 550) MHz	2.9 %	
5 mV to 2 V	(0.55 to 3.2) GHz	4.1 %	
Rise Time ³ – Generate	(125 to 175) ps	18 ps	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouple Indicators & Simulators ³ –			
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	Fluke 552XA
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.26 °C 0.14 °C 0.13 °C 0.20 °C 0.31 °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	
Electrical Calibration of RTD Indicators 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	
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 Calibration of RTD Indicators 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 552XA
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, 1000 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	0.029 °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 (Ni 120)	(-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	

III. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
RF Power – Generate			
(13.5 to 24) dBm (-56 to 13.5) dBm	DC to 20 MHz	0.37 dB 0.42 dB	HP 3325B
(13 to -60) dBm (-120 to -60) dBm	10 MHz to 26.5 GHz	2.2 dB 2.6 dB	HP 83630B
RF Power ³ – Measure			
(+20 to -30) dBm	100 kHz to 2 GHz (2 to 4.2) GHz	1.4 % 1.5 %	HP E4419B w/8482A
	50 MHz to 12 GHz (12 to 18) GHz (18 to 26.5) GHz	3.0 % 3.3 % 4.7 %	HP 11792A
(+20 to -10) dBm	(0.01 to 0.05) GHz (0.05 to 2) GHz (2 to 4) GHz (4 to 6) GHz (6 to 8) GHz (8 to 12) GHz (12 to 13) GHz (13 to 14) GHz (14 to < 18) GHz 18 GHz	1.7 % 1.7 % 2.1 % 1.9 % 2.2 % 2.3 % 2.1 % 2.1 % 2.3 % 2.1 %	HP E4419B w/8481A
(-20 to -70) dBm	10 MHz to 30 MHz 30 MHz to 4 GHz 4 GHz to 6 GHz 6 GHz to 8 GHz 8 GHz to 10 GHz 10 GHz to 12 GHz 12 GHz to 14 GHz 14 GHz to 15 GHz 15 GHz to 18 GHz	2.9 % 3.0 % 3.1 % 3.3 % 3.3 % 3.4 % 3.2 % 3.5 % 3.5 %	HP E4419B w/8481D

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
Amplitude Modulation – Measure & Measuring Equipment ³			
Rate: 50 Hz to 10 kHz Depth: (5 to 99) %	(0.15 to 10) MHz	2.4 % + 1 Digit	HP 8902A
Rate: 20 Hz to 10 kHz Depth: (5 to 99) %	(0.15 to 10) MHz	3.5 % + 1 Digit	
Rate: 50 Hz to 50 kHz Depth: (5 to 99) %	(0.01 to 1.3) GHz	1.2 % + 1 Digit	
Rate: 20 Hz to 100 kHz Depth: (5 to 99) %	(0.01 to 1.3) GHz	3.5 % + 1 Digit	
Rate: 50 Hz to 50 kHz Depth: (5 to 99) %	(1.3 to 26.5) GHz	1.8 % + 1 Digit	HP 8902A w/ microwave converter & LO
Rate: 20 Hz to 100 kHz Depth: (5 to 99) %	(1.3 to 26.5) GHz	3.5 % + 1 Digit	
Amplitude Modulation ³ – Generate			
Rate: (0.05 to 50) kHz Depths: (0 to 99) %	(11 to 13.5) MHz	0.20 %	HP 11715A
Rate: (20 to 50) Hz & (50 to 100) kHz Depths: (0 to 99) %	(11 to 13.5) MHz	0.33 %	
Frequency Modulation – Generate ³			
< 100 kHz Rate	(11 to 13.5) MHz (88 to 108) MHz (352 to 432) MHz	0.39 % 0.38 % 0.38 %	HP 11715A
< 200 kHz Rate	(11 to 13.5) MHz (88 to 108) MHz (352 to 432) MHz	0.38 % 0.38 % 0.53 %	

Parameter/Range	Frequency	CMC ^{2, 5} (±)	Comments
Frequency Modulation – Measure & Measuring Equipment ³			
Rate: 20 Hz to 10 kHz Dev: ≤ 40 kHz peak	(0.25 to 10) MHz	2.3 % + 1 Digit	HP 8902A
Rate: 50 Hz to 100 kHz Dev: ≤ 400 kHz peak	(0.01 to 1.3) GHz	1.2 % + 1 Digit	
Rate: 20 Hz to 200 kHz Dev: ≤ 4.0 kHz peak	(0.01 to 1.3) GHz	5.8 % + 1 Digit	
Rate: 50 Hz to 100 kHz Dev: ≤ 400 kHz peak	(1.3 to 26.5) GHz	1.2 % + 1 Digit	HP 8902A w/microwave converter & LO
Rate: 20 Hz to 200 kHz Dev: ≤ 400 kHz peak	(1.3 to 26.5) GHz	5.8 % + 1 Digit	
Average Noise/Residuals – Spectrum Analyzers			
(-140 to 0) dBm	10 kHz to 3 GHz (3 to 6.6) GHz (6.6 to 22) GHz (22 to 26) GHz	0.80 dB 2.0 dB 2.6 dB 2.6 dB	HP 85052D
Noise System Sidebands – Offset			HP 8663A
(-140 to 0) dBm	100 Hz to 10 MHz	2.3 dB	
Spectrum Analyzer Measure Functions –			
Harmonic Spurs: (-140 to 0) dBm	3 Hz to 3 GHz (3 to 6.6) GHz (6.6 to 22) GHz (22 to 26.5) GHz	1.7 dB 2.4 dB 3.8 dB 4.7 dB	Agilent E4440A
Non-Harmonic Spurs: (-140 to 0) dBm	Fundamental Freq: 1 GHz	2.7 dB	
(-140 to 0) dBm	Fundamental Freq: 1.9765 GHz	4.5 dB	

IV. Mechanical

[illegible]

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,7} ($\pm$)	Comments
Temperature – Measure Chambers, Freezers, Ovens, Metrology Wells	(-196 to 420) °C	0.052°C	Hart Scientific 5614B PRT & 1502A
Temperature – Measuring Equipment LIG Thermometers, Digital Thermometer, Analog Thermometer	(-40 to 140) °C	0.21°C	Hart Scientific 5614B PRT w Kaye instruments LTR-25/140 temp bath
IR Thermometers – Measuring Equipment	(35 to 100) °C (100 to 200) °C (200 to 350) °C (350 to 500) °C	0.46 °C 0.67 °C 1.1 °C 1.5 °C	Fluke 8141 IR calibrator $\epsilon = (0.9 \text{ to } 1)$, $\lambda = (8 \text{ to } 14) \mu\text{m}$
Relative Humidity ³ – Measuring Equipment & Measure	(20 to 80) % RH	1.3 % RH	Vaisala HMP75/MI70 used w/ humidity generator

VI. Time & Frequency

Parameter/Equipment	Frequency	CMC ^{2,7} ($\pm$)	Comments
Frequency ³ – Measuring Equipment	DC to 1 kHz 1 kHz to 50 MHz	0.12 $\mu\text{Hz}/\text{Hz}$ 0.72 nHz/Hz	HP 3325B w/ Efratom PRFS-102
	20 MHz to 26.5 GHz	0.70 nHz/Hz	HP 83630B w/ Efratom PRFS-102
Frequency ³ – Measure	DC to 1 kHz 1 kHz to 3 GHz	0.12 mHz/Hz 0.69 nHz/Hz	HP 53132A w/ Efratom PRFS-102
	(0.5 to 26.5) GHz	0.69 nHz/Hz	HP 5351B w/ Efratom PRFS-102

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. In the statement of CMC, percentages are to be read as percent of reading unless otherwise noted.

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'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.

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

TEKTRONIX, INC

Los Colomos, Guadalajara, MEXICO

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, the requirements of ANSI/NCSL 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 28th 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 2357.16
Valid to September 30, 2025
Revised January 23, 2024

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