



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

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CALIBRATION

Valid To: August 30, 2024

Certificate Number: 6940.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1,6</sup>:

I. Dimensional

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
Gage Blocks – Length Only	(0.01 to 12) in	(2.9 + 0.56L) μin	Labmaster & master gage blocks
Pin/Plug Gages	(0.007 to 6.5) in	(2.9 + 2.3L) μin	Labmaster & master gage blocks
Ring Gages	(0.125 to 7) in	(11 + 1.3L) μin	Labmaster & master ring gages
Indicators <sup>3</sup>	20 μin to 0.002 in (Resolution = 20 μin)  50 μin to 2 in (Resolution = 50 μin)  100 μin to 2 in (Resolution = 100 μin)  (0.001 to 2) in (Resolution = 0.001 in)	15 μin  (29 + 3.3L) μin  (58 + 1.8L) μin  (580 + 0.19L) μin	Labmaster & master gage blocks
Length Standards <sup>3</sup>	(1 to 12) in	(6.9 + 0.22L) μin	Labmaster & master gage blocks

Parameter	Range	CMC <sup>2,7</sup> (±)	Comments
Micrometers <sup>3</sup>	Up to 6 in (Resolution = 50 μin)	30 μin	Gage blocks
	Up to 6 in (Resolution = 100 μin)	58 μin	
	Up to 6 in (Resolution = 0.001 in)	580 μin	
Calipers <sup>3</sup>	Up to 24 in	(290 + 4L) μin	Gage blocks
Height Gages <sup>3</sup>	Up to 24 in	61 μin	Gage blocks
Thread Plugs –			
Major Diameter	(0.060 to 2.5) in	(17 + 2.7L) μin	Labmaster & master gage blocks
Pitch Diameter	(0.060 to 2.5) in	(110 + 0.96L) μin	Labmaster, thread wires, & master gage blocks
Thread Rings, Pitch Diameter	(0.060 to 2.5) in	(110 + 0.96L) μin	Set thread plugs

II. Electrical – DC/Low Frequency

Parameter	Range	CMC <sup>2, 5</sup> (±)	Comments
DC Voltage – Generate <sup>3</sup>	Up to 220 mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	6.3 μV/V + 0.61 μV 4.3 μV/V + 1.7 μV 2.6 μV/V + 9.3 μV 2.5 μV/V + 21 μV 4.4 μV/V + 0.13 mV 5.5 μV/V + 1.4 mV	Fluke 5730A
DC Voltage – Measure <sup>3</sup>	Up to 120 mV (0.12 to 1.2) V (1.2 to 12) V (12 to 120) V (120 to 1050) V  (0.700 to 150) kV	9 μV/V + 0.31 μV 8 μV/V + 0.45 μV 8 μV/V + 2 μV 10 μV/V + 50 μV 10 μV/V + 200 μV  5 mV/V + 3.6 V	Agilent 3458 <sup>a</sup>  High Voltage Inc. DVR-150 with Agilent 3458A
DC Current – Generate <sup>3</sup>	Up to 220 μA (220 to 2.2) mA (2.2 to 22) mA (22 to 100) mA (100 to 220) mA 220 mA to 2.2 A (2.2 to 11) A  (11 to 20.5) A (20 to 1000) A	38 μA/A + 5.9 nA 27 μA/A + 17 nA 26 μA/A + 0.18 μA 34 μA/A + 1 μA 26 μA/A + 2.6 μA 52 μA/A + 37 μA 0.19 mA/A + 0.66 mA  0.15 mA/A + 35 mA 5.5 mA/A + 0.25 A	Fluke 5730A with 5725A  Fluke 5520A Fluke 5520A with 50 Turn Coil
DC Current – Measure <sup>3</sup>	Up to 12 μA (12 to 120) μA 120 μA to 1.2 mA (1.2 to 12) mA (12 to 120) mA 120 mA to 1.05 A	35 μA/A + 5.8 nA 6.7 μA/A + 5.8 nA 17 μA/A + 9.4 nA 17 μA/A + 86 nA 33 μA/A + 0.77 μA 0.11 mA/A + 12 μA	Agilent 3458A

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments
AC Current – Generate <sup>3</sup>			
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	0.29 mA/A + 23 nA 0.19 mA/A + 15 nA 0.11 mA/A + 14 nA 0.3 mA/A + 31 nA 1.2 mA/A + 0.12 µA	Fluke 5730A
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	0.3 mA/A + 97 nA 0.19 mA/A + 76 nA 0.11 mA/A + 76 nA 0.23 mA/A + 0.19 µA 1.3 mA/A + 0.90 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	0.28 mA/A + 1.0 µA 0.19 mA/A + 0.87 µA 0.11 mA/A + 0.88 µA 0.2 mA/A + 1.8 µA 1.3 mA/A + 8.5 µA	
(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	0.3 mA/A + 13 µA 0.18 mA/A + 9.6 µA 0.1 mA/A + 9.1 µA 0.19 mA/A + 17 µA 1.2 mA/A + 62 µA	
220 mA to 2.2 A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.26 mA/A + 0.16 mA 0.43 mA/A + 0.30 mA 7.6 mA/A + 1.2 mA	
(2.2 to 11) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.4 mA/A + 0.93 mA 0.87 mA/A + 1.4 mA 3.6 mA/A + 1.5 mA	Fluke 5730A w/ Fluke 5725A amplifier
(20 to 1000) A	45 Hz to 65 Hz 100 Hz to 440 Hz	3.2mA/A + 87 mA 8 mA/A + 0.19 A	Fluke 5520A with 50 Turn Coil

Parameter/Range	Frequency	CMC <sup>2, 5</sup> (±)	Comments
AC Current – Measure <sup>3</sup>			
(0.6 to 120) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz	4 mA/A + 33 nA 1.5 mA/A + 33 nA 0.59 mA/A + 33 nA	Agilent 3458A
120 µA to 1.2 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	4 mA/A + 0.22 µA 1.5 mA/A + 0.22 µA 0.6 mA/A + 0.22 µA 0.3 mA/A + 0.22 µA	
(1.2 to 12) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	4 mA/A + 2.2 µA 1.5 mA/A + 2.2 µA 0.6 mA/A + 2.2 µA 0.3 mA/A + 2.2 µA	
(12 to 120) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	4 mA/A + 22 µA 0.6 mA/A + 22 µA 0.6 mA/A + 22 µA 0.3 mA/A + 22 µA	
120 mA to 1.05 A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	4 mA/A + 0.23 mA 1.6 mA/A + 0.23 mA 0.78 mA/A + 0.23 mA 0.98 mA/A + 0.23 mA	
AC Voltage – Generate <sup>3</sup>			
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	0.3 mV/V + 5.1 µV 0.12 mV/V + 5.1 µV 0.10 mV/V + 5.1 µV 0.25 mV/V + 5.1 µV 0.59 mV/V + 6.1 µV 1.3 mV/V + 12 µV 1.7 mV/V + 25 µV 3.3 mV/V + 26 µV	Fluke 5730A
(2.2 to 22) mV	(10 to 20) Hz (20 to 40) Hz (40 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz 500 kHz to 1 MHz	0.3 mV/V + 5.2 µV 0.12 mV/V + 5.2 µV 0.1 mV/V + 5.2 µV 0.25 mV/V + 5.3 µV 0.58 mV/V + 6.7 µV 1.3 mV/V + 14 µV 1.6 mV/V + 28 µV 2.8 mV/V + 48 µV	

Parameter/Range	Frequency	CMC <sup>2, 5</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup> (cont)			
(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	0.3 mV/V + 17 μV 0.12 mV/V + 9 μV 0.07 mV/V + 9 μV 0.15 mV/V + 11 μV 0.4 mV/V + 23 μV 0.73 mV/V + 44 μV 1.6 mV/V + 68 μV 2.7 mV/V + 0.23 mV	Fluke 5730A
220 mV 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 500 kHz to 1 MHz	0.3 mV/V + 70 μV 0.11 mV/V + 42 μV 0.05 mV/V + 25 μV 0.08 mV/V + 35 μV 0.1 mV/V + 61 μV 0.37 mV/V + 0.20 mV 1.2 mV/V + 0.38 mV 1.8 mV/V + 1.1 mV	
(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 500 kHz to 1 MHz	0.29 mV/V + 0.85 mV 0.1 mV/V + 0.52 mV 0.04 mV/V + 0.31 mV 0.08 mV/V + 0.36 mV 0.09 mV/V + 0.54 mV 0.26 mV/V + 2.2 mV 1.2 mV/V + 4.7 mV 1.4 mV/V + 17 mV	
(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	0.29 mV/V + 0.85 mV 0.10 mV/V + 0.52 mV 0.04 mV/V + 0.31 mV 0.08 mV/V + 0.36 mV 0.09 mV/V + 0.54 mV 0.26 mV/V + 2.2 mV 1.2 mV/V + 4.7 mV 1.4 mV/V + 17 mV	
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	0.59 mV/V + 22 mV 2.3 mV/V + 49 mV	
(220 to 1100) V	(1 to 20) kHz (20 to 30) kHz	0.15 mV/V + 25 mV 0.59 mV/V + 27 mV	
(1.2 to 12) 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	0.28 mV/V + 3.3 μV 0.19 mV/V + 1.3 μV 0.27 mV/V + 1.6 μV 0.97 mV/V + 1.6 μV 5 mV/V + 2 μV 40 mV/V + 3.5 μV	Agilent 3458A

Parameter/Range	Frequency	CMC <sup>2, 5</sup> (±)	Comments
AC Voltage – Measure <sup>3</sup>			
(1.2 to 12) 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	0.28 mV/V + 3.3 μV 0.19 mV/V + 1.3 μV 0.27 mV/V + 1.6 μV 0.97 mV/V + 1.6 μV 5 mV/V + 2 μV 40 mV/V + 3.5 μV	Agilent 3458A
(12 to 120) 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 (1 to 2) MHz	65 μV/V + 4.9 μV 66 μV/V + 4.8 μV 0.14 mV/V + 2.3 μV 0.29 mV/V + 3.7 μV 0.77 mV/V + 7 μV 3 mV/V + 13 μV 10 mV/V + 16 μV 15 mV/V + 52 μV	
120 mV to 1.2 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 (0.3 to 1) MHz (1 to 2) MHz	68 μV/V + 43 μV 67 μV/V + 25 μV 0.14 mV/V + 26 μV 0.3 mV/V + 29 μV 0.8 mV/V + 29 μV 3 mV/V + 0.11 mV 10 mV/V + 0.11 mV 15 mV/V + 0.28 mV	
(1.2 to 12) 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 (0.3 to 1) MHz (1 to 2) MHz	64 μV/V + 0.52 mV 64 μV/V + 0.31 mV 0.14 mV/V + 0.2 mV 0.3 mV/V + 0.26 mV 0.8 mV/V + 0.31 mV 3 mV/V + 1.1 mV 10 mV/V + 1.2 mV 15 mV/V + 3.2 mV	
(12 to 120) 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 (0.3 to 1) MHz	0.2 mV/V + 4.3 mV 0.2 mV/V + 2.6 mV 0.2 mV/V + 2.8 mV 0.35 mV/V + 2.8 mV 1.2 mV/V + 3.2 mV 4 mV/V + 11 mV 15 mV/V + 11 mV	
(120 to 700) V	1 to 40 Hz 40 Hz to 1 kHz 1 to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.4 mV/V + 43 mV 0.4 mV/V + 26 mV 0.6 mV/V + 28 mV 1.2 mV/V + 28 mV 3 mV/V + 28 mV	
(0.700 to 150) kV	40 Hz to 1 kHz	18 mV/V + 3.6 V	High Voltage Inc. DVR-150 with Agilent 3458A

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
DC Resistance – Generate, Fixed Points <sup>3</sup>	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	0.11 mΩ 0.21 mΩ 0.28 mΩ 0.52 mΩ 1.3 mΩ 2.4 mΩ 9 mΩ 16 mΩ 80 mΩ 16 Ω 1 Ω 2.3 Ω 19 Ω 42 Ω 0.47 kΩ 1.1 kΩ 12 kΩ	Fluke 5730A
DC Resistance – Measure <sup>3</sup>	Up to 0.1 Ω (0.1 to 12) Ω (12 to 120) Ω 120 Ω to 1.2 kΩ (1.2 to 12) kΩ (12 to 120) kΩ 120 kΩ to 1.2 MΩ (1.2 to 12) MΩ (12 to 120) MΩ 120 MΩ to 1.2 GΩ	0.11 mΩ/Ω + 2 μΩ 15 μΩ/Ω + 54 μΩ 11 μΩ/Ω + 0.57 mΩ 9 μΩ/Ω + 1.7 mΩ 9 μΩ/Ω + 17 mΩ 8.9 μΩ/Ω + 0.19 Ω 13 μΩ/Ω + 4.8 Ω 41 μΩ/Ω + 0.13 kΩ 0.45 mΩ/Ω + 7 kΩ 4.5 mΩ/Ω + 0.6 MΩ	Agilent 34420A & Agilent 3458A
DC Resistance – Generate <sup>3</sup>	Up 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 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 MΩ to 1.1 GΩ	41 μΩ/Ω + 1.1 mΩ 32 μΩ/Ω + 1.6 mΩ 28 μΩ/Ω + 1.6 mΩ 29 μΩ/Ω + 2.1 mΩ 26 μΩ/Ω + 6.2 mΩ 29 μΩ/Ω + 21 mΩ 29 μΩ/Ω + 22 mΩ 29 μΩ/Ω + 0.22 Ω 33 μΩ/Ω + 2.1 Ω 33 μΩ/Ω + 2.3 Ω 61 μΩ/Ω + 32 Ω 0.14 mΩ/Ω + 56 Ω 0.24 mΩ/Ω + 3.2 kΩ 0.51 mΩ/Ω + 3.1 kΩ 3.1 mΩ/Ω + 0.11 MΩ 16 mΩ/Ω + 0.55 MΩ	Fluke 5520A



Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
Capacitance – Generate <sup>3</sup>  10 Hz to 10 kHz	Up to 400 pF 400 pF to 1.1 nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF 330 nF 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 330 µF to 1.1 mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	0.44 % of rdg + 12 pF 0.45 % of rdg + 12 pF 0.48 % of rdg + 12 pF 0.25 % of rdg + 12 pF 0.26 % of rdg + 0.1 nF 0.25 % of rdg + 0.11 nF 0.26 % of rdg + 0.3 nF 0.26 % of rdg + 1.1 nF 0.26 % of rdg + 3 nF 0.26 % of rdg + 10 nF 0.41 % of rdg + 30 nF 0.45 % of rdg + 0.13 µF 0.47 % of rdg + 0.3 µF 0.45 % of rdg + 1.1 µF 0.45 % of rdg + 3.1 µF 0.46 % of rdg + 10 µF 0.74 % of rdg + 35 µF 1.1 % of rdg + 0.1 mF	Fluke 5520A
Inductance – Generate Fixed Value  100 Hz to 10 kHz	100 mH 200 mH	± 0.14 mH ± 0.33 mH	General Radio 1482-L & 1482-M (Standard Inductors)

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Simulation of Thermocouples <sup>3</sup> –			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.51 °C 0.17 °C 0.15 °C 0.17 °C 0.22 °C	Fluke 5520A
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1000) °C	0.28 °C 0.17 °C 0.15 °C 0.18 °C 0.24 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.34 °C 0.19 °C 0.17 °C 0.27 °C 0.41 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.41 °C 0.23 °C 0.20 °C 0.19 °C 0.28 °C	
Type R	Up to -250 °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.58 °C 0.36 °C 0.34 °C 0.41 °C	
Type S	Up to 250 °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.48 °C 0.37 °C 0.38 °C 0.47 °C	
Type T	(-250 to -150) °C (-150 °C to 0) °C Up to 120 °C (120 to 400) °C	0.64 °C 0.25 °C 0.17 °C 0.15 °C	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Oscilloscopes <sup>3</sup> –			
Amplitude into 50 Ω DC	Up to 110 mV 110 mV to 2.2 V (2.2 to 6.6) V	2.5 mV/V + 41 μV 2.5 mV/V + 92 μV 2.4 mV/V + 0.59 mV	Fluke 5800A
Amplitude into 50 Ω at 10 Hz to 10 kHz	Up to 25 mV (25 to 110) mV 110 mV to 2.2 V (2.2 to 6.6) V	2.4 mV/V + 47 μV 2 mV/V + 0.12 mV 1.7 mV/V + 2.2 mV 1.7 mV/V + 6.6 mV	
Amplitude into 1 MΩ at DC	Up to 110 mV 110 mV to 2.2 V (2.2 to 11) V (11 to 130) V	0.25 mV/V + 41 μV 0.23 mV/V + 92 μV 0.21 mV/V + 0.59 mV 0.21 mV/V + 5.9 mV	
Amplitude into 1 MΩ at 10 Hz to 1 kHz	Up to 25 mV 25 mV to 110 mV 110 mV to 2.2 V (2.2 to 11) V (11 to 130) V	0.21 mV/V + 26 μV 0.14 mV/V + 0.11 mV 0.12 mV/V + 2.2 mV 0.12 mV/V + 11 mV 0.12 mV/V + 0.13 V	
Amplitude into 1 MΩ at (1 to 10) kHz	Up to 25 mV (25 to 110) mV 110 mV to 2.2 V (2.2 to 11) V (11 to 130) V (5 to 100) mV	0.44 mV/V + 47 μV 0.26 mV/V + 0.12 mV 0.13 mV/V + 2.2 mV 0.12 mV/V + 11 mV 0.12 mV/V + 0.13 V 20 mV/V + 0.31 mV	
Leveled Sine Wave: 50 kHz & 100 MHz	(5 to 100) mV 100 mV to 1 V (1 to 5) V	20 mV/V + 0.31 mV 19 mV/V + 0.87 mV 20 mV/V + 0.91 mV	
50 kHz to 100 MHz	(5 to 100) mV 100 mV to 1 V (1 to 5) V	35 mV/V + 0.31 mV 35 mV/V + 0.87 mV 35 mV/V + 0.91 mV	
(100 to 300) MHz	(5 to 100) mV 100 mV to 1 V (1 to 5) V	40 mV/V + 0.31 mV 39 mV/V + 0.87 mV 40 mV/V + 0.91 mV	
(300 to 500) MHz	(5 to 100) mV 100 mV to 1 V (1 to 5) V	55 mV/V + 0.31 mV 55 mV/V + 0.87 mV 55 mV/V + 0.91 mV	
(500 to 600) MHz	(5 to 100) mV 100 mV to 1 V (1 to 5) V	60 mV/V + 0.31 mV 59 mV/V + 0.87 mV 60 mV/V + 0.91 mV	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Oscilloscopes <sup>3</sup> – (cont)			
Leveled Sine Wave: 600 MHz to 1.1 GHz	(5 to 100) mV 100 mV to 1 V (1 to 5) V	70 mV/V + 0.31 mV 69 mV/V + 0.87 mV 70 mV/V + 0.91 mV	Fluke 5800A
(1.1 to 1.6) GHz	(5 to 100) mV 100 mV to 1 V (1 to 5) V	70 mV/V + 0.31 mV 69 mV/V + 0.87 mV 70 mV/V + 0.91 mV	
(1.6 to 2.1) GHz	(5 to 100) mV 100 mV to 1 V (1 to 5) V	80 mV/V + 0.31 mV 79 mV/V + 0.87 mV 80 mV/V + 0.91 mV	
Leveled Sine Wave Flatness			
50 kHz to 100 MHz (Relative to 50 kHz)	(5 to 100) mV 100 mV to 5 V	15 mV/V + 0.12 mV 15 mV/V + 0.86 mV	
(100 to 300) MHz	(5 to 100) mV 100 mV to 5 V	20 mV/V + 0.12 mV 20 mV/V + 0.86 mV	
(300 to 500) MHz	(5 to 100) mV 100 mV to 5 V	35 mV/V + 0.12 mV 35 mV/V + 0.86 mV	
(500 to 600) MHz	(5 to 100) mV 100 mV to 5 V	40 mV/V + 0.12 mV 40 mV/V + 0.86 mV	
600 MHz to 1.6 GHz (Relative to 10 MHz)	(5 to 100) mV 100 mV to 5 V	50 mV/V + 0.12 mV 50 mV/V + 0.86 mV	
(1.6 to 2.1) GHz	(5 to 100) mV 100 mV to 5 V	60 mV/V + 0.12 mV 60 mV/V + 0.86 mV	
Time Marker	(2 to 20) ms (50 to 5) ms	1 μs/s 3 μs/s + 6 μs	
Edge Rise Time	300 ps	100 ps	

III. Mechanical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Analytical Balances <sup>3</sup>	(1 to 500) mg 500 mg to 2 g (2 to 20) g (20 to 200) g 200 g to 1 kg (1 to 2) kg (2 to 5) kg	1.1 µg 2.3 µg 11 µg 47 µg 0.15 mg 0.41 mg 0.8 mg	Rice Lake Class 1 weight set
Scales & Top Loading Balances <sup>3</sup>	100 mg to 10 kg 220 µlb to 22 lb  (10 to 22.8) kg (22 to 50) lb  (50 to 480) lb	1 mg (2.2 µlb)  52 mg (110 µlb)  0.012 % of rdg	Rice Lake Class 1 weight set  Rice Lake Class F weight set  Comparison to NIST handbook 105 Class F, masses
Torque <sup>3</sup> - Torque Guns, Torque Wrenches, Torque Screwdrivers, & Pneumatic Torque	(10 to 100) oz·in  (4 to 1000) lbf·in (0.452 to 112) Nm  (60 to 600) lbf·ft (81.3 to 813) Nm	0.52 % of rdg  0.28 % of rdg  0.28 % of rdg	CDI 1001-O-DTT  CDI Suretest 5000-ST w/ 2000-400-02 "4in1" transducer  CDI Suretest 5000-ST w/ 2000-12-02 transducer
Pressure –  Absolute Mode    Gauge Mode      Pressure Gage	  (0.2 to 17.5) psi  (1.7 to 70) psi  (2.0 to 700) psi  (0.2 to 17.5) psi  (1.7 to 70) psi  (2 to 700) psi  (700 to 3000) psi  (3000 to 10 000) psi	  0.0023 % of rdg + 0.000 05 psi  0.0026 % of rdg + 0.000 04 psi  0.0022 % of rdg + 0.000 05 psi  0.0026 % of rdg  0.0026 % of rdg + 0.000 002 psi  0.0022 % of rdg + 0.000 02 psi  0.05 % of rdg + 0.19 psi  2.5 psi	  Ruska deadweight system    Ruska deadweight system    Crystal IS33  Ametek pressure gage

#### IV. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2, 4</sup> (±)	Comments
Humidity – Measuring Equipment	11.30 % RH 22.51 % RH 52.89 % RH 75.29 % RH 84.34 % RH 93.58 % RH	2.8 % RH 2.8 % RH 2.8 % RH 2.8 % RH 2.8 % RH 3.3 % RH	Vaisala HMI41/HMP46 w/ saturated salt solutions
Temperature – Generate & Measure	(-80 to 25) °C (25 to 400) °C  (400 to 700) °C	0.028 °C 0.000 06 °C/°C + 0.017 °C  2.1 °C	Fluke 1502A w/ SPRT & Isotech drywell  Fluke 5520A w/ characterized Type S thermocouple & Isotech drywell 2

#### V. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2, 4</sup> (±)	Comments
Stopwatches, Timers & Clocks	≤ 1 Hour 1-48 Hours	± 0.85 μs/s + 0.59 ms ±0.35 s	Fluke 5800A with HP 5335B, Totalize Method
Frequency – Source	≤ 2 MHz	± 1.9 μHz + 5 μHz	Fluke 5520A

<sup>1</sup> This laboratory is available for commercial service.

<sup>2</sup> 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.

<sup>3</sup> 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.

<sup>4</sup> 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.

<sup>5</sup> 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.

<sup>6</sup> This scope meets A2LA's *P112 Flexible Scope Policy*.

<sup>7</sup> L is the numerical value of the nominal length of the device measured in inches.



# Accredited Laboratory

A2LA has accredited

## TEST & MEASUREMENT, INC.

Lenexa, KS

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 6<sup>th</sup> day of December 2022.

A blue ink signature of Mr. Trace McInturff, written over a horizontal line.

Mr. Trace McInturff, Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 6940.01  
Valid to August 30, 2024  
Revised October 30, 2023

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