



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

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CALIBRATION

Valid To: September 30, 2025

Certificate Number: 1395.01

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. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
EFT/Burst Generator ³ –			
Voltage	(0.113 to 4) kV	5.1 %	Verification of generator conformance to the waveform parameters & levels of: IEC 61000-4-4
Rise Time	(3.5 to 7) ns	10 %	
Pulse Width	(30 to 150) ns	14 %	
Repetition Frequency	(4 to 120) kHz	2.9 %	The EMC shop EFT-AT50 EFT-AT1000 Tektronix TDS7404B
Burst Width	(12 to 18) ms	1.0 %	
Burst Period	(240 to 360) ms	0.59 %	

Parameter/Equipment	Range	CMC ^{2, 5, 6} (±)	Comments
ESD Simulators – Tip Voltage Rise Time Peak Current 30 ns Current 60 ns Current	 (2 to 30) kV (0.6 to 1) ns (7.5 to 30) A (4 to 16) A (2 to 8) A	 0.94 % 96 ps 6.9 % 9.7 % 15 %	 Verification of generator conformance to the waveform parameters & levels of: IEC 61000-4-2 Tektronix TDS684C Simco ESD-HVD Tektronix TDS7404B ESDEMC A4001-208 Fluke 5522A/SC100
Transient Generators ³ – (Surge Generator) Front/Rise Time: Open Circuit Short Circuit Time to Half Value/Duration: Open Circuit Short Circuit Open Circuit Voltage Short Circuit Current	 (0.84 to 1.56) µs (1.75 to 9.6) µs (15 to 60) µs (16 to 32.5) µs (0.01 to 0.1) kV (0.1 to 7) kV (0.04 to 0.5) kA (1 to 2) kA	 8.8 % 10 % 8.8 % 10 % 7.5 % 3.4 % 1.7 % 6.5 %	 Verification of generator conformance to the waveform parameters & levels of: IEC 61000-4-5 Tektronix P6015 (x2) Tektronix TDS684C Fluke 5522A/SC1100 Pearson 110 Tektronix 011-0059-02
DC Voltage – Generate ³	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1000) V	0.0023 % + 1 µV 0.0013 % + 2 µV 0.0017 % + 20 µV 0.0021 % + 150 µV 0.0021 % + 1.5 mV	Fluke 5522A/ SC1100
DC Voltage – Generate	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	9.3 µV/V + 0.4 µV 5.9 µV/V + 0.7 µV 4.2 µV/V + 2.5 µV 4.7 µV + 4 µV 6 µV/V + 40 µV 7.6 µV/V + 400 µV	Fluke 5720A

Parameter/Equipment	Range	CMC ^{2, 5, 6} ($\pm$)	Comments
DC Voltage – Measure ³	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V (1 to 90) kV	9.1 μ V/V + 0.3 μ V 7.4 μ V/V + 0.3 μ V 7.4 μ V/V + 0.5 μ V 9.6 μ V/V + 30 μ V 11 μ V/V + 100 μ V 0.12 %	HP 3458A opt-2 Ross Eng. HV divider, HP 34401A
DC Current – Generate ³	(0 to 330) μ A (0.33 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 1.1) A (1.1 to 11) A (11 to 20.5) A (20.5 to 150) A (150 to 1000) A	0.017 % + 20 nA 0.012 % + 50 nA 0.012 % + 0.25 μ A 0.012 % + 2.5 μ A 0.029 % + 40 μ A 0.039 % + 500 μ A 0.078 % + 750 μ A 0.61 % + 0.14 A 0.62 % + 0.5 A	Fluke 5522A/ SC1100 Fluke 5522A/SC1100 w/ current coil
DC Current – Generate	Up to 220 μ A 220 μ A to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A (2.2 to 11) A	47 μ A/A + 6.0 nA 46 μ A/A + 7.0 nA 45 μ A/A + 40 nA 56 μ A/A + 0.7 μ A 99 μ A/A + 12 μ A 0.028 % + 0.48 mA	Fluke 5720A Fluke 5720A w/ Fluke 5725A
DC Power – Generate ³	0.011 mW to 20.5 kW	0.085 %	Fluke 5522A/SC1100
DC Current – Measure ³	(0 to 100) μ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A (0.1 to 1) A (> 1 to 10) A (> 10 to 100) A	0.0033 % + 800 pA 0.0031 % + 5 nA 0.0032 % + 50 nA 0.0051 % + 500 nA 0.014 % + 10 μ A 0.012 % + 3.0 μ A 0.058 % + 30 μ A 0.018 % + 0.30 mA	HP 3458A Guildline 9211A/ HP 3458A

Parameter/Equipment	Range	CMC ^{2, 5, 6} ($\pm$)	Comments
Resistance – Measure ³	10 m Ω 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	25 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 20 $\mu\Omega/\Omega$ + 0.5 m Ω 17 $\mu\Omega/\Omega$ + 0.5 m Ω 17 $\mu\Omega/\Omega$ + 5 m Ω 17 $\mu\Omega/\Omega$ + 0.05 Ω 23 $\mu\Omega/\Omega$ + 2 Ω 87 $\mu\Omega/\Omega$ + 100 Ω 0.10 % + 1 k Ω	HP 3458A opt-2
Oscilloscopes ³ –			
Level Sine Amp: 50 kHz Ref.	5.0 mV to 5.5 V _{p-p}	2.3 % + 300 μ V	Fluke 5522A/SC1100
Level Sine Flatness: 5 mV to 5.5 V 5 mV to 3.5 V $\geq$ 600 MHz Relative to 50 kHz Reference	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1000) MHz	2.2 % + 100 μ V 2.5 % + 100 μ V 4.7 % + 100 μ V 5.8 % + 100 μ V	
Square Wave Amp	1 mV to 130 V _{p-p} 1 mV to 6.6 V _{p-p}	0.12 % + 40 μ V 0.29 % + 40 μ V	Into 1 M Ω load Into 50 Ω load
DC Signal Level	Up to 130 V Up to 6.6 V	0.058 % + 40 μ V 0.31 % + 40 μ V	Into 1 M Ω load Into 50 Ω load
Time Marker Output Into 50 Ω	1 ns to 20 ms 50 ms to 5 s	2.9 μ s/s (29 + 1000 $\cdot t$) μ s/s	t = time in seconds
Edge Transition Time	1 kHz to 2 MHz (2 to 10) MHz (200 to 350) ps	40 ps 59 ps	
Input Resistance Measurement	(40 to 60) Ω (0.5 to 1.5) M Ω	0.12 % 0.13 %	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of Thermocouples – Generate & Measure ³			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.58 °C 0.20 °C 0.18 °C 0.20 °C 0.25 °C	Fluke 5522A/SC1100
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.32 °C 0.21 °C 0.19 °C 0.22 °C 0.28 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.39 °C 0.22 °C 0.20 °C 0.31 °C 0.47 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.73 °C 0.29 °C 0.20 °C 0.18 °C	
Electrical Simulation of Thermocouples – Generate ³			
Type E	(-250 to 1000) °C	0.14 °C	
Type J	(-210 to 1200) °C	0.14 °C	
Type K	(-200 to 1372) °C	0.14 °C	
Type T	(-250 to 400) °C	0.13 °C	
			Fluke 5720A, burns PRT, Omega TRP series thermocouple reference probes

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of Thermocouples – Measure ³			
Type E	(-250 to 1000) °C	0.13 °C	HP 3458A, Burns PRT, Omega TRP series thermocouple reference probes
Type J	(-210 to 1200) °C	0.13 °C	
Type K	(-200 to 1372) °C	0.13 °C	
Type T	(-250 to 400) °C	0.13 °C	
Electrical Simulation of RTD 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	0.064 °C 0.063 °C 0.086 °C 0.11 °C 0.12 °C 0.15 °C 0.27 °C	Fluke 5522A/ SC1100

Parameter/Range	Frequency	CMC ^{2,6} (±)	Comments
AC Voltage – Generate ³			
(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	0.093 % + 6 μV 0.020 % + 6 μV 0.025 % + 6 μV 0.12 % + 6 μV 0.41 % + 12 μV 0.93 % + 50 μV	Fluke 5522A/SC1100
(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	0.035 % + 8 μV 0.017 % + 8 μV 0.019 % + 8 μV 0.041 % + 8 μV 0.093 % + 32 μV 0.23 % + 70 μV	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Voltage – Generate ³ (cont)			
(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 450) kHz	0.035 % + 50 µV 0.018 % + 60 µV 0.022 % + 60 µV 0.035 % + 50 µV 0.081 % + 130 µV 0.28 % + 600 µV	Fluke 5522A/SC1100
(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	0.035 % + 650 µV 0.018 % + 600 µV 0.028 % + 600 µV 0.041 % + 600 µV 0.10 % + 1.6 mV	
(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	0.022 % + 2.0 mV 0.023 % + 6.0 mV 0.029 % + 6.0 mV 0.036 % + 6.0 mV 0.23 % + 50 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.035 % + 10 mV 0.029 % + 10 mV 0.035 % + 10 mV	
AC Voltage – Generate			
(0 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	0.11 % + 4.0 µV 0.10 % + 4.0 µV 0.10 % + 4.0 µV 0.13 % + 4.0 µV 0.19 % + 5.0 µV 0.33 % + 10 µV 0.48 % + 20 µV 0.63 % + 20 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	0.039 % + 4.0 µV 0.022 % + 4.0 µV 0.016 % + 4.0 µV 0.032 % + 4.0 µV 0.066 % + 5.0 µV 0.14 % + 10 µV 0.19 % + 20 µV 0.35 % + 20 µV	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Voltage – Generate (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	0.033 % + 12 µV 0.013 % + 7.0 µV 0.012 % + 7.0 µV 0.024 % + 7.0 µV 0.055 % + 17 µV 0.11 % + 20 µV 0.16 % + 25 µV 0.32 % + 45 µV	Fluke 5720A
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	0.038 % + 50 µV 0.013 % + 20 µV 0.0064 % + 10 µV 0.011 % + 12 µV 0.016 % + 40 µV 0.062 % + 100 µV 0.14 % + 250 µV 0.24 % + 400 µV	
(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	0.032 % + 400 µV 0.013 % + 150 µV 0.0062 % + 50 µV 0.010 % + 100 µV 0.013 % + 200 µV 0.035 % + 600 µV 0.12 % + 2.0 mV 0.19 % + 3.2 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	0.066 % + 4.0 mV 0.059 % + 1.5 mV 0.058 % + 0.6 mV 0.059 % + 1.0 mV 0.061 % + 2.5 mV	
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	0.072 % + 11 mV 0.27 % + 45 mV	Fluke 5720A w/ Fluke 5725A
(220 to 1100) V	50 Hz 50 Hz to 1 kHz	0.037 % + 16 mV 0.015 % + 3.5 mV	Fluke 5720A
(750 to 1100) V	40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz	0.016 % + 4.0 mV 0.071 % + 6.0 mV 0.071 % + 11 mV	Fluke 5720A w/ Fluke 5725A

Parameter/Range	Frequency	CMC ^{2, 5, 6} ($\pm$)	Comments
AC Voltage – Measure ³			
(10 to 100) mV, Locked on 100 mV Range	40 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz 100 kHz to 1 MHz	0.010 % + 2 μ V 0.016 % + 2 μ V 0.099 % + 2 μ V 1.2 % + 10 μ V	HP 3458A opt-2
100 mV to 1 V	40 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz 100 kHz to 1 MHz	0.0090 % + 20 μ V 0.017 % + 20 μ V 0.095 % + 20 μ V 1.2 % + 100 μ V	
(1 to 10) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz 100 kHz to 1 MHz	0.0090 % + 0.4 mV 0.023 % + 0.2 mV 0.017 % + 0.2 mV 0.094 % + 0.2 mV 1.2 % + 1.0 mV	
(10 to 100) V	40 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz	0.024 % + 2 mV 0.024 % + 2 mV 0.14 % + 2 mV	
(100 to 700) V	40 Hz to 1 kHz	0.047 % + 20 mV	
(1 to 64) kV	60 Hz	0.60 %	Ross Eng. HV divider, HP 34401A
AC Current – Generate ³			
(29 to 329.99) μ A	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.024 % + 27 nA 0.042 % + 95 nA 0.056 % + 95 nA 0.10 % + 0.17 μ A	Fluke 5522A/SC1100
(0.33 to 3.2999) mA	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.016 % + 42 nA 0.015 % + 49 nA 0.015 % + 86 nA 0.098 % + 0.24 μ A	
(3.3 to 32.999) mA	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.014 % + 0.40 μ A 0.015 % + 0.50 μ A 0.027 % + 0.70 μ A 0.091 % + 1.1 μ A	
(33 to 329.99) mA	Up to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.016 % + 25 μ A 0.019 % + 36 μ A 0.031 % + 36 μ A 0.086 % + 41 μ A	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Current – Generate ³ (cont)			
(0.33 to 1.099 99) A	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.012 % + 50 µA 0.066 % + 0.60 mA 0.29 % + 2.7 mA	Fluke 5522A/SC1100
(1.1 to 2.999 99) A	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.040 % + 0.12 mA 0.056 % + 1.0 mA 0.36 % + 9.2 mA	
(3 to 10.9999) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.033 % + 2.2 mA 0.025 % + 0.70 mA 1.0 % + 0.11 A	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.053 % + 3.3 mA 0.15 % + 3.5 mA 1.1 % + 0.18 A	
(20.5 to 150) A (150 to 1000) A (20.5 to 150) A (150 to 1000) A	(45 to 65) Hz (45 to 65) Hz (65 to 440) Hz (65 to 440) Hz	0.68 % + 0.25 A 0.68 % + 0.9 A 1.2 % + 0.25 A 1.2 % + 0.91 A	Fluke 5522A/SC1100 w/ current coil
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	0.029 % + 16 nA 0.019 % + 10 nA 0.015 % + 8.0 nA 0.036 % + 12 nA 0.13 % + 65 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	0.029 % + 40 nA 0.019 % + 35 nA 0.014 % + 35 nA 0.032 % + 110 nA 0.13 % + 0.65 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	0.029 % + 0.40 µA 0.019 % + 0.35 µA 0.014 % + 0.35 µA 0.023 % + 0.55 µA 0.13 % + 5.0 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	0.029 % + 4.0 µA 0.019 % + 3.5 µA 0.014 % + 2.5 µA 0.023 % + 3.5 µA 0.13 % + 10 µA	
220 mA to 2.2 A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.030 % + 35 µA 0.052 % + 80 µA 0.81 % + 0.16 mA	

Parameter/Range	Frequency	CMC ^{2, 5, 6} (±)	Comments
AC Current – Generate ³ (cont) (2.2 to 11) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.068 % + 0.17 mA 0.12 % + 0.38 mA 0.42 % + 0.75 mA	Fluke 5720A w/ Fluke 5725A
AC Power – Generate ³ 0.11 mV to 20.9 kW (Power Factor = 1)	(45 to 65) Hz	0.11 %	Fluke 5522A/SC1100
AC Current – Measure ³ (5 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A (> 0.2 to 2) A (> 2 to 20) A (> 20 to 100) A	45 Hz to 1 kHz 45 Hz to 5 kHz 45 Hz to 5 kHz 45 Hz to 5 kHz 45 Hz to 5 kHz (1 to 5) kHz 1 kHz 1 kHz	0.074 % + 0.03 µA 0.037 % + 0.2 µA 0.037 % + 2 µA 0.037 % + 20 µA 0.12 % + 0.2 mA 0.034 % + 0.02 mA 0.059 % + 0.20 mA 0.059 % + 2.0 mA	HP 3458A opt-2 Vahalla 2575A wideband current shunt/HP 3458A digital multimeter

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Capacitance ³ – Generate	(0.19 to 0.3999) nF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 32.9999) nF (33 to 109.999) nF (110 to 329.999) nF (0.33 to 1.099 99) µF (1.1 to 3.299 99) µF (3.3 to 10.9999) µF (11 to 32.9999) µF (33 to 109.999) µF (110 to 329.999) µF (0.33 to 1.099 99) mF (1.1 to 3.299 99) mF (3.3 to 10.9999) mF (11 to 32.9999) mF (33 to 110) mF	0.72 % + 0.01 nF 0.63 % + 0.01 nF 0.59 % + 0.01 nF 0.30 % + 0.01 nF 0.29 % + 0.1 nF 0.30 % + 0.1 nF 0.30 % + 0.3 nF 0.30 % + 1 nF 0.30 % + 3 nF 0.30 % + 10 nF 0.47 % + 30 nF 0.53 % + 100 nF 0.53 % + 300 nF 0.53 % + 1 µF 0.52 % + 3 µF 0.52 % + 10 µF 0.87 % + 30 µF 1.3 % + 100 µF	Fluke 5522A/ SC1100

II. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC ^{2, 6} ($\pm$)	Comments
Amplitude Modulation – Measure ³			
50 Hz to 10 kHz rate Depth: (5 to 99) %	(0.15 to 10) MHz	2.3 % + 1 digit	HP 8902A measuring receiver
20 Hz to 10 kHz rate Depth: Up to 99 %		3.5 % + 1 digit	
50 Hz to 50 kHz rate Depth (5 to 99) %	(10 to 1300) MHz	1.2 % + 1 digit	
20 Hz to 100 kHz rate Depth: Up to 99 %		3.5 % + 1 digit	
50 Hz to 50 kHz rate Depth: (5 to 99) %	(1.3 to 18) GHz	1.2 % + 1 digit	w/ HP 11793A, HP 83630B
20 Hz to 100 kHz rate Depth: Up to 99 %		3.5 % + 1 digit	
Frequency Modulation – Measure ³			
20 Hz to 10 kHz rate ≤ 40 kHz _{peak}	(0.25 to 10) MHz	2.3 % + 1 digit	HP 8902A measuring receiver
50 Hz to 100 kHz rate ≤ 400 kHz _{peak}	(10 to 1300) MHz	1.2 % + 1 digit	
20 Hz to 200 kHz rate ≤ 40 kHz _{peak}		5.8 % + 1 digit	w/ HP 11793A, HP 83630B
50 Hz to 100 kHz rate ≤ 400 kHz _{peak}	(1.3 to 18) GHz	1.2 % + 1 digit	
20 Hz to 200 kHz rate ≤ 400 kHz _{peak}		5.8 % + 1 digit	

Parameter/Range	Frequency	CMC ^{2, 5, 6} ($\pm$)	Comments
Phase Modulation – Measure ³			
200 Hz to 10 kHz rate 40 radians	150 kHz to 10 MHz	4.6 % + 1 digit	HP 8902A measuring receiver w/ HP 11793A, HP 83630B
200 Hz to 20 kHz rate 400 radians	(10 to 1300) MHz	3.5 % + 1 digit	
200 Hz to 20 kHz rate 400 radians	(1.3 to 18) GHz	3.5 % + 1 digit	
RF Absolute Power – Measure ³			
Power Reference: 1 mW, Type-N (f), 50 Ω	50 MHz	0.034 dB (0.78 %)	HP 432A w/ HP 478A-H75
(+20 to -30) dBm, 50 Ω	100 kHz to 4.2 GHz	0.075 dB (1.7 %)	HP 8482A w/ HP 438A
(+20 to -30) dBm, 50 Ω	10 MHz to 18 GHz	0.084 dB (1.9 %)	HP 8481A w/ HP 438A
(-20 to -70) dBm, 50 Ω	10 MHz to 18 GHz	0.083 dB (1.9 %)	HP 8481D w/ HP 438A
(+30 to -20) dBm	100 kHz to 2.6 GHz	0.12 dB (2.9 %)	HP 11722A w/ HP 8902A
(+30 to -20) dBm	50 MHz to 26.5 GHz	0.22 dB (5.1 %)	HP 11792A w/ HP 8902A

Parameter/Range	Frequency	CMC ^{2, 6} ($\pm$)	Comments
Distortion – Measure ³ (-80 to 0) dB (-65 to 0) dB, CW Input $\geq$ -13 dB (-90 to 0) dB, CW Input $\geq$ -13 dB	20 Hz to < 20 kHz (20 to 100) kHz 100 kHz to 13.25 GHz	1.2 dB 2.3 dB 4.0 dB	HP 8903B distortion analyzer HP 8563E spectrum analyzer
Attenuation, Relative – Measure ³ (0 to -10) dB (-10 to -20) dB (-20 to -30) dB (-30 to -40) dB (-40 to -50) dB (-50 to -60) dB (-60 to -70) dB (-70 to -80) dB (-80 to -90) dB (-90 to -100) dB (-100 to -110) dB (-110 to -120) dB (0 to -10) dB (-10 to -20) dB (-20 to -30) dB (-30 to -40) dB (-40 to -50) dB (-50 to -60) dB (-60 to -70) dB (-70 to -80) dB (-80 to -90) dB (-90 to -100) dB (0 to -10) dB (-10 to -20) dB (-20 to -30) dB (-30 to -40) dB (-40 to -50) dB (-50 to -60) dB (-60 to -70) dB (-70 to -80) dB	(2.5 to 1300) MHz 1300 MHz to 18 GHz (18 to 26.5) GHz	0.079 dB 0.091 dB 0.11 dB 0.14 dB 0.13 dB 0.14 dB 0.16 dB 0.19 dB 0.28 dB 0.30 dB 0.31 dB 0.39 dB 0.15 dB 0.16 dB 0.19 dB 0.20 dB 0.20 dB 0.26 dB 0.27 dB 0.29 dB 0.37 dB 0.39 dB 0.15 dB 0.16 dB 0.19 dB 0.20 dB 0.20 dB 0.26 dB 0.27 dB 0.29 dB	HP 8902A measuring receiver w/ HP 83630B HP 8902A measuring receiver w/ HP 11722A, HP 11793A, HP 83630B HP 8902A measuring receiver w/ HP 11722A, HP 11793A, HP 83630B

Parameter/Range	Frequency	CMC ^{2, 5, 6} (±)	Comments
RF Absolute Power – Generate ³			
Sine Wave Into 50 Ω (10 to 3) V _{p-p} (2.99 to 1) mV _{p-p}	0.001 Hz to 100 kHz 0.001 Hz to 100 kHz	0.14 % 0.63 %	HP 3325B, Agilent 3458A
Sine Wave Into 50 Ω (10 to 3) V _{p-p} (2.999 to 0.1) V _{p-p} (99.99 to 1) mV _{p-p}	100 kHz to 20 MHz 100 kHz to 20 MHz 100 kHz to 20 MHz	1.9 % 2.4 % 3.1 %	HP 3325B HP 438A HP 8482A
Sine Wave Into 50 Ω (+13 to -10) dBm (-10 to -30) dBm (-30 to -100) dBm (-100 to -120) dBm	100 kHz to 2 GHz 100 kHz to 2 GHz 100 kHz to 2 GHz 100 kHz to 2 GHz	0.15 dB 0.16 dB 0.37 dB 0.46 dB	HP 8657A HP 8902A HP 11722A
Sine Wave Into 50 Ω (+13 to -10) dBm (-10 to -50) dBm (-50 to -100) dBm (-50 to -80) dBm	10 MHz to 26.5 GHz 10 MHz to 26.5 GHz 10 MHz to 18 GHz (18 to 26.5) GHz	0.09 dB 0.29 dB 0.47 dB 0.36 dB	HP 83630B HP 8902A HP 11792A

III. Mechanical

Parameter/Equipment	Range	CMC ^{2, 8} (±)	Comments
Pressure/Vacuum – Measure	(-15 to 30) psig	0.0084 psi	Heise DXD-50
	(0 to 50) psia	0.0084 psi	Heise DXD-50
	(-15 to 100) psig	0.031 psi	Additel ADT160A-02- CP100-PSI-N
	(-15 to 500) psig	0.20 psi	Additel ADT160A-02- CP500-PSI-N
	(-15 to 1000) psig	0.28 psi	Additel ADT160A-02- CPIK-PSI-N
	(0 to 10 000) psig	12 psi	Additel ADT680-10- GP10K-PSI-N2

IV. Optical Quantities

Parameter/Equipment	Range	CMC ^{2, 5, 8} ($\pm$)	Comments
Optical Power – Measuring Equipment, 850 nm			Agilent 81624B w/ Agilent 81618A, HP 8163A
Absolute Power	100 μ W	0.97 %	
Nonlinearity	0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm	0.020 dB 0.019 dB 0.019 dB 0.019 dB 0.020 dB 0.020 dB	
Optical Power – Measuring Equipment, 1310 nm			Agilent 81624B w/ Agilent 81618A, HP 8163A
Absolute Power	100 μ W	0.82 %	
Nonlinearity	0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm	0.013 dB 0.013 dB 0.013 dB 0.013 dB 0.013 dB 0.013 dB	
Optical Power – Measuring Equipment, 1550 nm			Agilent 81624B w/ Agilent 81618A, HP 8163A
Absolute Power	100 μ W	0.82 %	
Nonlinearity	0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm	0.013 dB 0.013 dB 0.013 dB 0.013 dB 0.013 dB 0.013 dB	
Optical Power – Measuring Equipment, (600 to 1020) nm	(+10 to -80) dBm	0.11 dB	HP 81520A w/ HP 81533B, HP 8153A
Optical Power – Measuring Equipment, (1000 to 1650) nm	(+10 to -60) dBm	0.13 dB	HP 81521B w/ HP 81533B, HP 8153A

Parameter/Equipment	Range	CMC ^{2, 5} ($\pm$)	Comments
Optical Wavelength – Measuring Equipment	(1510 to 1590) nm (1270 to 1650) nm (600 to 1700) nm	0.0014 nm 0.0035 nm 0.013 nm	SRM 2517A, SRM 2519A, HP 86120C, HP 86142A, HP 8168F, spectral lamps

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 8} ($\pm$)	Comments
Temperature – Measure ³	(-196 to 420) °C	0.089 °C	Burns Eng. PRT 18332, HP 3458A
Temperature – Measuring Equipment ³	(0 to Ambient) °C (Ambient to 300) °C (> 300 to 420) °C (16 to 32) °C	0.14 °C 0.16 °C 0.53 °C 0.14 °C	Burns Eng. PRT 18332, HP 3458A, temperature blocks Vaisala HMP-155 & RH chamber
Relative Humidity – Measuring Equipment	(25 to 90) % RH	1.1 % RH	Vaisala HMP-155 & RH chamber
Relative Humidity – Measure ³	(11 to 95) % RH	1.5 % RH	Vaisala HMI41/HMP46

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 8} ($\pm$)	Comments
Frequency – Measuring Equipment ³	1 mHz to 20 MHz 20 MHz to 3 GHz (3 to 26.5) GHz	(1.3 x 10 ⁻¹⁰) Hz/Hz + 5 μ Hz (1.3 x 10 ⁻¹⁰) Hz/Hz (1.2 x 10 ⁻⁶) Hz/Hz	Fluke 910 w/ HP 3325B HP 83630B

Parameter/Equipment	Range	CMC ^{2, 8} (±)	Comments
Frequency – Measure ³	1 mHz to 3 GHz	(1.3 x 10 ⁻¹⁰) Hz/Hz + 5 µHz	Fluke 910 w/ HP 53131A
	(3 to 26.5) GHz	(1.2 x 10 ⁻⁶) Hz/Hz	HP 5351B
Stopwatches & Timers ³	1 s to 24 hr	0.036 s/day	Helmut Klein 4500 timometer

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. 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. 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 The contributions from the “best existing device” are not included in the CMC claim.

⁵ In the statement of CMC, R is the resolution of the unit under test; percentages are percent of reading, unless otherwise indicated; L is the numerical value of the nominal length of the device in inches.

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

SIMCO ELECTRONICS

Greensboro, NC

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 30th day of August 2023.

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1395.01
Valid to September 30, 2025

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