



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: October 31, 2027

Certificate Number: 2356.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations^{1,5}:

I. Electrical – DC/Low Frequency

| Parameter/Equipment | Range | CMC ^{2,3,4} (±) | Comments |
|------------------------------------|---|--|-------------------------------------|
| DC Voltage – Generate ⁷ | (0 to 220) mV 220 mV to 2.2 V (2.2 to 22) V (22 to 220) V (220 to 1100) V | 7.5 µV/V + 0.4 µV 4.7 µV/V + 1.4 µV 2.8 µV/V + 22 µV 4.6 µV/V + 120 µV 6.0 µV/V + 1100 µV | Fluke 5730A |
| DC Voltage – Measure | (10 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V | 3.7 µV/V + 1.3 µV 48 µV/V + 3.2 µV 35 µV/V + 7.7 µV 52 µV/V – 160 µV 64 µV/V + 980 µV | HP 3458A with option 002 |
| DC Current – Generate ⁷ | (0 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 | 40 µA/VA + 0.006 µA 29 µA/A + 0.021 µA 28 µA/A + 0.2 µA 37 µA/A + 2.8 µA 66 µA/A + 47 µA 0.037 % + 470 µA | Fluke 5730A With Fluke 5725A |

| Parameter/Equipment | Range | CMC ^{2,4} (±) | Comments |
|--|---|--|---|
| Resistance – Measure, Fixed Points (cont) | 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ | 1.5 Ω 24 Ω 900 Ω 72 kΩ 5000 kΩ | HP 3458A with option 002 4 wire measurement |

| Parameter/Range | Frequency | CMC ^{2,3,9} (±) | Comments |
|---|--|--|---|
| Resistance – Generate, Fixed Points | | | |
| 10 Ω | 1 MHz 2 MHz | 13 mΩ 16 mΩ | HP 42030A four terminal pair, standard resistor set |
| 100 Ω | 1 MHz 2 MHz | 120 mΩ 130 mΩ | |
| 1 kΩ | 100 kHz 1 MHz 2 MHz | 1.2 Ω 850 mΩ 1.0 Ω | |
| 10 kΩ | 100 kHz 1 MHz | 8.3 Ω 8.5 Ω | |
| 100 kΩ | 100 kHz 1 MHz | 85 Ω 120 Ω | |
| AC Voltage – Generate, Fixed Points ⁷ | | | |
| (2.2 to 22) mV | (10 to 20) Hz (20 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 to 500) kHz 500 kHz to 1 MHz | 240 μV/V + 4 μV 84 μV/V + 4.5 μV 78 μV/V + 4.2 μV 78 μV/V + 4.1 μV 200 μV/V + 4.2 μV 480 μV/V + 5.3 μV 0.1 % + 11 μV 0.14 % + 21 μV 0.24 % + 32 μV | Fluke 5730A |

| Parameter/Range | Frequency | CMC ^{2,3} (±) | Comments |
|--|--|---|-------------|
| AC Voltage – Generate, Fixed Points ⁷ (cont) | | | |
| (22 to 220) mV | (10 to 20) Hz (20 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 to 500) kHz 500 kHz to 1 MHz | 240 μV/V + 13 μV 83 μV/V + 9.3 μV 55 μV/V + 7.9 μV 55 μV/V + 7.9 μV 110 μV/V + 10 μV 0.029 % + 22 μV 0.062 % + 29 μV 0.12 % + 40 μV 0.25 % + 110 μV | Fluke 5730A |
| 220 mV to 2.2 V | (10 to 20) Hz (20 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 to 500) kHz 500 kHz to 1 MHz | 83 μV/V + 36 μV 89 μV/V + 18 μV 39 μV/V + 16 μV 38 μV/V + 18 μV 62 μV/V + 23 μV 82 μV/V + 38 μV 310 μV/V + 160 μV 0.1 % + 2.0 mV 0.17 % + 3.3 mV | |
| (2.2 to 22) V | (10 to 20) Hz (20 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 to 500) kHz 500 kHz to 1 MHz | 260 μV/V + 0.11 mV 84 μV/V + 0.31 mV 38 μV/V + 0.17 mV 37 μV/V + 0.18 mV 64 μV/V + 0.17 mV 79 μV/V + 0.32 mV 220 μV/V + 1.5 mV 990 μV/V + 2.3 mV 0.11 % + 14 mV | |
| (22 to 220) V | (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz | 240 μV/V + 5.2 mV 81 μV/V + 4.0 mV 47 μV/V + 2.2 mV 47 μV/V + 2.4 mV 74 μV/V + 2.6 mV 130 μV/V + 7.5 mV | |
| (220 to 1000) V | (15 to 50) Hz 50 Hz to 1 kHz | 300 μV/V + 19 mV 57 μV/V + 18 mV | |

| Parameter/Range | Frequency | CMC ^{2,4} (±) | Comments |
|----------------------|---|--|-----------------------------|
| AC Voltage – Measure | | | |
| 10 mV | 40 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 4) MHz | 0.024 % + 1.1 μV 0.029 % + 1.2 μV 0.5 % + 1.1 μV 4 % + 2 μV 1.2 % + 6.6 μV 7 % + 7.2 μV | HP 3458A with option 002 |
| 100 mV | 40 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz | 70 μV/V + 4.1 μV 140 μV/V + 2.3 μV 0.083 % - 0.1 μV 0.31 % + 1.3 μV 1 % + 0.0072 mV 4 % + 0.07 mV 4 % + 0.08 mV 15 % + 0.1 mV | |
| 1 V | 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz | 82 μV/V + 22 μV 150 μV/V + 22 μV 290 μV/V + 31 μV 780 μV/V + 31 μV 0.3 % + 0.11 mV 1 % + 0.11 mV 1.0 % + 150 μV 4 % + 0.7 mV 4 % + 0.8 mV 15 % + 1 mV | |
| 10 V | (10 to 20) Hz (20 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 to 500) kHz 500 kHz to 1 MHz | 130 μV/V + 250 μV 82 μV/V + 390 μV 83 μV/V + 190 μV 150 μV/V + 200 μV 370 μV/V + 220 μV 0.081 % + 0.2 mV 0.3 % + 1 mV 1 % + 0.99 mV 1.5 % + 1 mV | |
| 100 V | 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz | 0.021 % + 1.9 mV 0.021 % + 1.9 mV 0.037 % + 1.9 mV 0.12 % + 1.9 mV | |
| 700 V | 50 Hz 50 Hz to 1 kHz (1 to 20) kHz | 0.041 % + 20 mV 0.041 % + 20 mV 0.06 % + 20 mV | |

| Parameter/Range | Frequency | CMC ^{2,4,9} (±) | Comments | |
|---|---|---|-------------------------------------|-------------------------------------|
| Capacitance – Generate, Fixed Points | | | | |
| 1 pF | 1 kHz | 0.0021 pF | HP 16380A standard capacitor set | |
| 10 pF | 1 kHz | 0.013 pF | | |
| 100 pF | 1 kHz | 0.1 pF | | |
| 1000 pF | 1 kHz | 1.0 pF | | |
| 1 pF | 1 MHz | 0.001 pF | | |
| 10 pF | 1 MHz | 0.01 pF | | |
| 100 pF | 1 MHz | 0.1 pF | | |
| 1000 pF | 1 MHz | 1.0 pF | | |
| 1 pF | 2 MHz | 0.001 pF | | HP 16380A standard capacitor set |
| 10 pF | 2 MHz | 0.01 pF | | |
| 100 pF | 2 MHz | 0.1 pF | | |
| 1000 pF | 2 MHz | 1.0 pF | | |
| 0.01 μF | 120 Hz to 100 kHz | 10 pF | | HP 16380C standard capacitor set |
| 0.1 μF | 120 Hz to 100 kHz | 100 pF | | |
| 1 μF | 120 Hz to 100 kHz | 1 nF | | |
| 10 μF | 120 Hz to 100 kHz | 10 nF | | |
| AC Current – Measure, Fixed Points | | | | |
| 100 μA | (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz | 0.4 % + 30 nA 0.15 % + 30 nA 0.061 % + 30 nA | HP 3458A with option 002 | |
| 1 mA | (10 to 20) Hz (20 to 40) Hz 10 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz | 0.4 % + 0.2 μA 0.4 % + 0.2 μA 300 μA/A + 0.2 μA 300 μA/A + 0.2 μA 600 μA/A + 0.2 μA | | |
| 10 mA | (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz | 0.4 % + 2 μA 0.15 % + 2 μA 0.03 % + 2 μA 0.03 % + 2 μA 0.06 % + 2 μA | | |
| 100 mA | (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz | 0.4 % + 20 μA 0.15 % + 20 μA 600 μA/A + 20 μA | | |

| Parameter/Range | Frequency | CMC ^{2, 3, 4, 9} (±) | Comments |
|--|--|---|-----------------------------|
| AC Current – Measure, Fixed Points (cont) | | | |
| 100 mA | (1 to 5) kHz (5 to 10) kHz | 300 μ A/A + 20 μ A 600 μ A/A + 20 μ A | HP 3458A with option 002 |
| 1 A | (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz | 0.4 % + 0.2 mA 0.16 % + 0.2 mA 0.084 % + 0.2 mA 0.11 % + 0.19 mA | Fluke 5730A |
| AC Current – Generate ⁷ | | | |
| 220 μ A Range | (10 to 20) Hz 20 Hz to 40 Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz | 230 μ A/A + 22 nA 140 μ A/A + 15 nA 86 μ A/A + 13 nA 200 μ A/A + 0.035 μ A 0.1 % + 83 nA | Fluke 5730A |
| 2.2 mA Range | (10 to 20) Hz 20 Hz to 40 Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz | 220 μ A/A + 0.11 μ A 140 μ A/A + 0.09 μ A 82 μ A/A + 0.093 μ A 170 μ A/A + 0.18 μ A 0.11 % + 0.68 μ A | |
| 22 mA Range | (10 to 20) Hz 20 Hz to 40 Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz | 220 μ A/A + 1.2 μ A 140 μ A/A + 0.90 μ A 82 μ A/A + 0.93 μ A 170 μ A/A + 1.4 μ A 0.11 % + 5.3 μ A | |
| 220 mA Range | (10 to 20) Hz 20 Hz to 40 Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz | 420 μ A/A + 3.9 μ A 180 μ A/A + 3.4 μ A 130 μ A/A + 2.4 μ A 200 μ A/A + 5.5 μ A 0.11 % + 11 μ A | |
| 2.2 A Range | 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz | 350 μ A/A + 50 μ A 660 μ A/A + 61 μ A 1 % - 0.13 mA | |
| 10 A Fixed Point | 40 Hz to 1 kHz 1 kHz to 5 kHz (5 to 10) kHz | 390 μ A/A + 1.2 mA 0.14 % - 0.41 mA 0.45 % + 7.1 mA | With Fluke 5725A |

| Parameter/Equipment | Range | CMC ^{2,9} (±) | Comments |
|---|-------------------|------------------------|-----------------------------|
| Electrical Simulation of Thermocouples – Generate | | | |
| Type J | (-180 to -100) °C | 0.65 °C | Fluke 5520A |
| | (-100 to -25) °C | 0.63 °C | |
| | (-25 to 120) °C | 0.65 °C | |
| | (120 to 800) °C | 0.81 °C | |
| Type K | (-200 to -100) °C | 0.33 °C | |
| | (-100 to -25) °C | 0.33 °C | |
| | (-25 to 120) °C | 0.32 °C | |
| | (120 to 1000) °C | 0.32 °C | |
| | (1000 to 1300) °C | 0.36 °C | |
| DC Power Supplies | (1 to 10) A | 0.5 µA + 400 µA/A | CS10/3458A/TDS784D |
| | (10 to 15) A | 0.1 mA + 400 µA/A | LN4360/3458A/TDS784D |
| | (15 to 50) A | 0.2 mA + 97 µA/A | CS50/3458A/TDS784D/N3306A |
| | (50 to 100) A | 0.16 mA + 400 µA/A | LN4361/3458A/TDS784D/N3305A |
| | (100 to 300) A | 0.13 mA + 400 µA/A | LN4363/3458A/TDS784D |
| Oscilloscopes – | | | |
| Rise/Fall Time | (10 to 90) % | | |
| | 500 ps | 27 ps | Fluke 9500B/9530 head |
| | 150 ps | 30 ps | |
| | 70 ps | 9.8 ps | Fluke 9500B/9560 head |

| Parameter/Equipment | Range | CMC ^{2, 8, 9} (\pm) | Comments |
|--|---|---|--------------------------|
| Oscilloscopes – (cont) | | | |
| Square Wave, 10 Hz to 2 MHz: Z = 50 Ω or 1 M Ω | (0.04 to 5) V _{p-p} , 50 Ω (5 to 60) V _{p-p} , 1 M Ω | 0.16 % - 0.038 mV _{p-p} 0.086 % + 8.7 mV _{p-p} | Fluke 9500B/9530 head |
| Time Mark Output into 50 Ω | 1 ns to 20 ms | 58 μ s/s + -0.000 16 fs | |
| Leveled Sine Flatness – Rel to 50 kHz | 0.1 Hz to 3.2 GHz | 4.0 % + 0.2 % of range | |
| DC Voltage | 4 mV to 1 V (1 to 190) V | 270 μ V/V + 0.0003 mV 130 μ V/V + 0.0037 mV | |

II. Electrical – RF/Microwave

| Parameter/Range | Frequency | CMC ^{2, 6, 8} (\pm) | Comments |
|---|---|----------------------------------|---------------------------|
| Amplitude Modulation – Measure 10 MHz to 3 GHz (5 to 99) % Mod Depth | Mod Rates: 50 Hz to 10 kHz | 0.93 % | E4448A with option 233 |
| Frequency Modulation – Measure 10 MHz to 1 GHz | Mod Rates: 20 Hz to 200 kHz; Peak Deviation: 200 Hz to 400 kHz | 1.2 kHz | E4448A with option 233 |
| Phase Modulation – Measure 100 kHz to 1 GHz | 1 rad with Mod Rate 1 kHz 2 rad with Mod Rate 1 kHz | 0.041 rad 0.041 rad | E4448A with option 233 |

| Parameter/Range | Frequency | CMC ^{2,6} (±) | Comments |
|------------------------|-------------|------------------------|--------------------|
| Attenuation – Generate | | | |
| Coaxial, 1 dB Step: | | | |
| 1 dB | DC to 4 GHz | 0.21 dB | HP 8494G type N(f) |
| 2 dB | DC to 4 GHz | 0.25 dB | |
| 3 dB | DC to 4 GHz | 0.33 dB | |
| 4 dB | DC to 4 GHz | 0.33 dB | |
| 5 dB | DC to 4 GHz | 0.32 dB | |
| 6 dB | DC to 4 GHz | 0.33 dB | |
| 7 dB | DC to 4 GHz | 0.41 dB | |
| 8 dB | DC to 4 GHz | 0.41 dB | |
| 9 dB | DC to 4 GHz | 0.42 dB | |
| 10 dB | DC to 4 GHz | 0.42 dB | |
| 11 dB | DC to 4 GHz | 0.51 dB | |
| Coaxial, 10 dB Step: | | | |
| 10 dB | DC to 4 GHz | 0.22 dB | HP 8496 G type N |
| 20 dB | DC to 4 GHz | 0.41 dB | |
| 30 dB | DC to 4 GHz | 0.51 dB | |
| 40 dB | DC to 4 GHz | 0.71 dB | |
| 50 dB | DC to 4 GHz | 0.82 dB | |
| 60 dB | DC to 4 GHz | 1.0 dB | |
| 70 dB | DC to 4 GHz | 1.2 dB | |
| 80 dB | DC to 4 GHz | 1.3 dB | |
| 90 dB | DC to 4 GHz | 1.5 dB | |

| Parameter/Range | Frequency | CMC ^{2,6} (±) | Comments |
|----------------------------------|--------------------------------------|------------------------|-------------------------|
| Attenuation – Generate (cont) | | | |
| Coaxial, 10 dB Step: | | | |
| 100 dB | DC to 4 GHz | 1.6 dB | HP 8496 G type N |
| 110 dB | DC to 4 GHz | 1.8 dB | |
| Coaxial, Fixed: | | | |
| 3 dB | 50 MHz to 12.4 GHz, SWR< 1.25:1 | 0.33 dB | HP 11582A/003 type N |
| | (12.4 to 18) GHz, SWR< 1.2:1 | 0.34 dB | |
| 6 dB | 50 MHz to 12.4 GHz, SWR< 1.25:1 | 0.39 dB | HP 11582A/006 |
| | (12.4 to 18) GHz, SWR< 1.2:1 | 0.47 dB | |
| 10 dB | 50 MHz to 12.4 GHz, SWR< 1.25:1 | 0.67 dB | HP 11582A/010 |
| | (12.4 to 18) GHz, SWR< 1.2:1 | 0.64 dB | |
| 20 dB | 50 MHz to 12.4 GHz, SWR< 1.25:1 | 0.68 dB | HP 11582A/020 |
| | (12.4 to 18) GHz, SWR< 1.2:1 | 1.2 dB | |
| 30 dB | 50 MHz to 12.4 GHz, SWR< 1.25:1 | 1.0 dB | HP 11582A/020 |
| | (12.4 to 18) GHz, SWR< 1.2:1 | 1.0 dB | |
| 3 dB | 50 MHz to 18 GHz (18 to 26.5) GHz | 0.54 dB 1.1 dB | HP 11583C/003 |
| 6 dB | 50 MHz to 18 GHz (18 to 26.5) GHz | 0.62 dB 0.62 dB | HP 11583C/006 |

| Parameter/Equipment | Frequency | CMC ^{2,6} (±) | Comments |
|----------------------------------|--|-------------------------------|---------------|
| Attenuation – Generate (cont) | | | |
| Coaxial, Fixed: | | | |
| 10 dB | 50 MHz to 18 GHz (18 to 26.5) GHz | 0.33 dB 0.55 dB | HP 11583C/010 |
| 20 dB | 50 MHz to 18 GHz (18 to 26.5) GHz | 0.53 dB 0.63 dB | HP 11583C/020 |
| 30 dB | 50 MHz to 18 GHz (18 to 26.5) GHz | 0.59 dB 0.67 dB | HP 11583C/030 |
| 3 dB Minus | 50 MHz to 26.5 GHz (26.5 to 40) GHz (40 to 50) GHz | 0.52 dB 0.55 dB 0.58 dB | 8490D/003 |
| 3 dB Max | 50 MHz to 26.5 GHz (26.5 to 50) GHz | 0.91 dB 1.8 dB | |
| 6 dB Minus | 50 MHz to 26.5 GHz (26.5 to 40) GHz (40 to 50) GHz | 0.61 dB 0.64 dB 0.66 dB | 8490D/006 |
| 6 dB Max | 50 MHz to 26.5 GHz (26.5 to 50) GHz | 0.91 dB 1.8 dB | |
| 10 dB Minus | 50 MHz to 26.5 GHz (26.5 to 40) GHz (40 to 50) GHz | 0.62 dB 0.64 dB 0.68 dB | 8490D/010 |
| 10 dB Max | 50 MHz to 26.5 GHz (26.5 to 50) GHz | 0.91 dB 1.3 dB | |
| 20 dB Minus | 50 MHz to 26.5 GHz (26.5 to 40) GHz (40 to 50) GHz | 0.82 dB 0.82 dB 0.86 dB | |
| 20 dB Max | 50 MHz to 26.5 GHz (26.5 to 50) GHz | 1.3 dB 1.7 dB | 8490D/020 |

| Parameter/Equipment | Frequency | CMC ^{2, 6, 8} (±) | Comments |
|--|--|--|--|
| Digital MOD – Measure EVM for FSK Magnitude: EVM for MSK, GMSK, BPSK, DQPSK, n/4DQPSK, 8 PSK, 16 QAM, QPSK, OQPSK Phase: Phase Error for MSK, GMSK, BPSK, DQPSK, n/4DQPSK, 8 PSK, 16 QAM, QPSK, OQPSK | Symbol Rate = 1.152 MHz Frequency Span: ≤ 1 MHz > 1 MHz > 1 MHz | 2.1 % 0.68 % 1.5 % 0.6° | HP 89441A |
| RF Absolute Power – Measure 1 mW, Type-N(f), 50 Ω: (20 to -30) dBm, 50 Ω (20 to -30) dBm, 50 Ω (-20 to -70) dBm, 50 Ω (20 to -30) dBm, 50 Ω (-20 to -70) dBm, 50 Ω (-60 to 20) dBm, 50 Ω | 50 MHz 100 kHz to 4.2 GHz 50 MHz to 18 GHz 50 MHz to 18 GHz 50 MHz to 50 GHz 50 MHz to 50 GHz 9 kHz to 6 GHz | 5.8 μW 0.14 dB 0.14 dB 0.16 dB 0.16 dB 0.24 dB 0.23 dB | HP 432A w/ HP478A-H76 E4419B w/ HP 8482A, type N(M) E4419B w/ HP 8481A,type N(M) E4419B w/ HP 8481D, type N(M) E4419B w/ HP 8487A, type 2.4mm (M) E4419B w/ HP 8487D, type 2.4mm (M) E4419B w/ HP E9304A type N (M) |

| Parameter/Range | Frequency | CMC ^{2, 6} (±) | Comments |
|---------------------------------|--|-------------------------------|-------------------|
| RF Absolute Power – Generate | | | |
| -20 dBm | < 10 MHz (10 to 50) MHz (50 to 80) MHz | 0.49 dB 0.53 dB 0.66 dB | AGT 33250A |
| -10 dBm | < 10 MHz (10 to 50) MHz (50 to 80) MHz | 0.27 dB 0.35 dB 0.50 dB | |
| 0 dBm | < 10 MHz (10 to 50) MHz (50 to 80) MHz | 0.18 dB 0.27 dB 0.49 dB | |
| 10 dBm | < 10 MHz (10 to 50) MHz (50 to 80) MHz | 0.18 dB 0.27 dB 0.49 dB | |
| 20 dBm | < 10 MHz (10 to 50) MHz (50 to 80) MHz | 0.16 dB 0.26 dB 0.48 dB | |
| -10 dBm | 10 MHz to 2 GHz, SWR ≤ 1.6:1 | 1.4 dB | 83650B, 2.4 mm(m) |
| | (≥ 2 to ≤ 20) GHz, SWR ≤ 1.6:1 | 1.5 dB | |
| | (> 20 to ≤ 40) GHz, SWR ≤ 1.8:1 | 1.9 dB | |
| | (> 40 to ≤ 50) GHz, SWR ≤ 2:1 | 3.2 dB | |
| -20 dBm | 10 MHz to 2 GHz, SWR ≤ 1.6:1 | 1.4 dB | |
| | (≥ 2 to ≤ 20) GHz, SWR ≤ 1.6:1 | 1.6 dB | |
| | (> 20 to ≤ 40) GHz SWR ≤ 1.8:1 | 2.0 dB | |
| | (> 40 to ≤ 50) GHz, SWR ≤ 2:1 | 3.1 dB | |

| Parameter/Range | Frequency | CMC ^{2,6} (±) | Comments | |
|--|------------------------------------|------------------------------------|----------|-------------------|
| RF Absolute Power – Generate (cont) | -30 dBm | 10 MHz to 2 GHz, SWR ≤ 1.6:1 | 1.4 dB | 83650B, 2.4 mm(m) |
| | | (≥ 2 to ≤ 20) GHz, SWR ≤ 1.6:1 | 1.6 dB | |
| | | (> 20 to ≤ 40) GHz, SWR ≤ 1.8:1 | 1.9 dB | |
| | | (> 40 to ≤ 50) GHz, SWR ≤ 2:1 | 3.2 dB | |
| | -40 dBm | 10 MHz to 2 GHz, SWR ≤ 1.6:1 | 1.4 dB | |
| | | (≥ 2 to ≤ 20) GHz, SWR ≤ 1.6:1 | 1.6 dB | |
| | | (> 20 to ≤ 40) GHz, SWR ≤ 1.8:1 | 1.9 dB | |
| | -50 dBm | (> 40 to ≤ 50) GHz, SWR ≤ 2:1 | 3.3 dB | |
| | -60 dBm | 10 MHz to 2 GHz, SWR ≤ 1.6:1 | 1.4 dB | |
| | | (≥ 2 to ≤ 20) GHz, SWR ≤ 1.6:1 | 1.7 dB | |
| | | (> 20 to ≤ 40) GHz, SWR ≤ 1.8:1 | 2.1 dB | |
| | | (> 40 to ≤ 50) GHz, SWR ≤ 2:1 | 3.2 dB | |
| -70 dBm | 10 MHz to 2 GHz, SWR ≤ 1.6:1 | 2.1 dB | | |
| | (≥ 2 to ≤ 20) GHz, SWR ≤ 1.6:1 | 2.4 dB | | |
| | (> 20 to ≤ 40) GHz, SWR ≤ 1.8:1 | 2.7 dB | | |

| Parameter/Range | Frequency | CMC ^{2,6} (±) | Comments |
|--|------------------------------------|------------------------|-------------------|
| RF Absolute Power – Generate (cont) | | | |
| -70 dBm | (> 40 to ≤ 50) GHz, SWR ≤ 2:1 | 4.0 dB | 83650B, 2.4 mm(m) |
| -80 dBm | 10 MHz to 2 GHz, SWR ≤ 1.6:1 | 2.1 dB | |
| | (≥ 2 to ≤ 20) GHz, SWR ≤ 1.6:1 | 2.2 dB | |
| | (> 20 to ≤ 40) GHz, SWR ≤ 1.8:1 | 2.6 dB | |
| | (> 40 to ≤ 50) GHz, SWR ≤ 2:1 | 4.0 dB | |
| | 10 MHz to 2 GHz, SWR ≤ 1.6:1 | 2.1 dB | |
| | (≥ 2 to ≤ 20) GHz, SWR ≤ 1.6:1 | 2.4 dB | |
| | (> 20 to ≤ 40) GHz, SWR ≤ 1.8:1 | 2.7 dB | |
| | (> 40 to ≤ 50) GHz, SWR ≤ 2:1 | 3.9 dB | |
| -90 dBm | 10 MHz to 2 GHz, SWR ≤ 1.6:1 | 2.1 dB | |
| | (≥ 2 to ≤ 20) GHz, SWR ≤ 1.6:1 | 2.3 dB | |
| | (> 20 to ≤ 40) GHz, SWR ≤ 1.8:1 | 2.6 dB | |
| | (> 40 to ≤ 50) GHz, SWR ≤ 2:1 | 4.0 dB | |

| Parameter/Range | Frequency | CMC ^{2,6} (±) | Comments |
|---|------------------|------------------------|--|
| Reflection S ₁₁ /S ₂₂ – Measure | 50 MHz to 1 GHz | 0.028 lin 0.91 ° | HP E5071C, 50 Ω N type with 85032F cal kit |
| | (1 to 50) GHz | 0.048 lin 8.2 ° | HP8510C, HP8517A, HP 85056A |
| Transmission S ₁₂ /S ₂₁ – Measure | 100 kHz to 1 GHz | 1.2 dB 0.70 ° | AGT E5071C , HP 85032F N type cal kit |
| | (1 to 18) GHz | 0.50 dB 2.6 ° | HP 8510C, HP 8517A 2.4 mm, HP 85056A cal kit |
| | (18 to 40) GHz | 0.73 dB 6.3 ° | |
| | (40 to 50) GHz | 1.4 dB 16 ° | |
| Tuned RF – Measure | 200 MHz | -10 dB | HP 8902A |
| | | -20 dB | |
| | | -30 dB | |
| | | -40 dB | |
| | | -50 dB | |
| | | -60 dB | |
| | | -70 dB | |
| | | -80 dB | |
| | | -90 dB | |
| | | -100 dB | |
| | -110 dB | | |
| | 1 GHz | -10 dB | HP 8902A |
| | | -20 dB | |
| | | -30 dB | |
| | | -40 dB | |
| | | -50 dB | |
| | | -60 dB | |
| | | -70 dB | |
| | | -80 dB | |
| | | -90 dB | |
| -100 dB | | | |
| -110 dB | | | |

| Parameter/Range | Frequency | CMC ^{2,6} (±) | Comments |
|------------------------------|-----------|------------------------|----------|
| Tuned RF – Measure (cont) | | | |
| -10 dB | 2 GHz | 0.12 dB | HP 8902A |
| -20 dB | | 0.14 dB | |
| -30 dB | | 0.14 dB | |
| -40 dB | | 0.19 dB | |
| -50 dB | | 0.19 dB | |
| -60 dB | | 0.18 dB | |
| -70 dB | | 0.22 dB | |
| -80 dB | | 0.23 dB | |
| -90 dB | | 0.24 dB | |
| -100 dB | | 0.26 dB | |
| -110 dB | | 0.28 dB | |
| -10 dB | 8 GHz | 0.1 dB | |
| -20 dB | | 0.1 dB | |
| -30 dB | | 0.11 dB | |
| -40 dB | | 0.13 dB | |
| -50 dB | | 0.17 dB | |
| -60 dB | | 0.16 dB | |
| -70 dB | | 0.19 dB | |
| -80 dB | | 0.21 dB | |
| -90 dB | | 0.23 dB | |
| -100 dB | | 0.25 dB | |
| -10 dB | 12 GHz | 0.11 dB | |
| -20 dB | | 0.1 dB | |
| -30 dB | | 0.12 dB | |
| -40 dB | | 0.14 dB | |
| -50 dB | | 0.17 dB | |
| -60 dB | | 0.16 dB | |
| -70 dB | | 0.19 dB | |
| -80 dB | | 0.27 dB | |
| -90 dB | | 0.29 dB | |
| -100 dB | | 1.2 dB | |
| -10 dB | 2 GHz | 0.17 dB | |
| -20 dB | | 0.2 dB | |
| -30 dB | | 0.22 dB | |
| -40 dB | | 0.24 dB | |
| -50 dB | | 0.26 dB | |
| -60 dB | | 0.24 dB | |
| -70 dB | | 0.3 dB | |
| -80 dB | | 0.27 dB | |
| -90 dB | | 0.28 dB | |
| -100 dB | | 0.29 dB | |

III. Time & Frequency

| Parameter/Equipment | Range | CMC ^{2,6} (\pm) | Comments |
|---------------------------------|-------------------|------------------------------------|--|
| Frequency Reference | 10 MHz Reference | 2.1 parts in 10^{12} Hz | Fluke 910R locked to GPS |
| Frequency – Measuring Equipment | 1 kHz to 10 MHz | 0.0009 Hz + 0.013 parts in 10^6 | GPS receiver with: 33250 synthesized generator |
| | 10 MHz to 50 GHz | 1.2 Hz + 0.000 078 parts in 10^6 | 83650B synthesized generator |
| Frequency – Measure | 1 MHz | 0.0012 Hz | Agilent 53132A |
| | 100 MHz | 0.24 Hz | |
| | 200 MHz | 0.24 Hz | |
| | 225 MHz | 0.45 Hz | |
| | 100 MHz to 46 GHz | 3.8 Hz | Agilent 53152A electronic counters with Fluke 910R |
| Period – Measure | 100 s to 1 ms | 0.083 μ s | Agilent 53132A |

¹ This laboratory does not offer commercial 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 The measurands stated are generated with the Fluke 5730A series of instruments. This capability is suitable for the calibration of the devices intended to measure the stated measurand in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.

⁴ HP 3458A CMC is read as either a specific value that covers the full range or as combination of the percent or portion of the reading plus a floor specification.

- ⁵ This scope meets A2LA's *P112 Flexible Scope Policy*.
- ⁶ 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
- ⁷ The contributions from the "best existing device" are not included in the CMC claim for this parameter.
- ⁸ In the statement of CMC, percentages are percentages of reading, unless otherwise indicated.
- ⁹ 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 fraction/percentage of the reading plus a fixed floor specification.



Accredited Laboratory

A2LA has accredited

TESTEQUITY LLC

Moorpark, CA

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/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 8th day of December 2025.

A blue ink signature of Mr. Trace McInturff, written in a cursive style.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2356.01
Valid to October 31, 2027

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