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, 2023 Certificate Number: 2356.01

In recognition of the successful completion of the A2LA evaluation process, 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	(0 to 220) mV 220 mV to 2.2 V (2.2 to 22) V (22 to 220) V (220 to 1100) V	6.2 µV/V + 0.85 µV 4.5 µV/V + 1.4 µV 3.2 µV/V + 5.8 µV 4.2 µV/V + 170 µV 4.8 µV/V + 2.4 mV	Fluke 5700A/EP
DC Voltage – Measure	(10 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	4.4 µV/V + 0.37 µV 3.2 µV/V + 1.4 µV 3.4 µV/V + 7 µV 4.5 µV/V + 190 µV 3.5 µV/V + 3.8 mV	HP 3458A with option 002
DC Current – Generate	(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	36 µA/A + 0.0066 µA 30 µA/A + 0.0099 µA 25 µA/A + 0.14 µA 45 µA/A + 0.65 µA 66 µA/A + 29 µA 0.023 % + 1.1 mA	Fluke 5700A/EP with Fluke 5725A

Parameter/Equipment	Range	CMC[2, 3, 4] (±)	Comments
DC Current – Measure	(10 to 100) µA 100 µA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	14 µA/A + 0.023 µA 26 µA/A + 0.005 µA 16 µA/A + 0.11 µA 18 µA/A + 3.5 µA 100 µA/A + 22 µA	HP 3458A with option 002
Resistance – Generate, Fixed Points			
4 Wire	0 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ	52 µΩ 250 µΩ 530 µΩ 3.7 mΩ 25 mΩ 6.2 Ω 24 Ω 49 Ω 4.3 kΩ	Fluke 5700A/EP
2 Wire	100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ	2.1 mΩ 10 mΩ 760 mΩ 8.4 Ω 24 Ω 2.1 kΩ 660 kΩ	Fluke 5700A/EP
	1 mΩ 10 mΩ 100 mΩ 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ	2.0 µΩ 20 µΩ 200 µΩ 2.0 mΩ 13 mΩ 100 mΩ 1.0 Ω 10 Ω 100 Ω	Resistor set HP 42030A four terminal pair standard
Resistance – Measure, Fixed Points	10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ	320 µΩ 1.8 mΩ 11 mΩ 150 mΩ 1.5 Ω 17 Ω 610 Ω 51 kΩ 550 kΩ	HP 3458A with option 0024 wire measurement

Parameter/Range	Frequency	CMC[2, 3, 6] (±)	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			
(2.2 to 22) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.24 µV/V + 4.1 µV 0.098 µV/V + 4.0 µV 0.073 µV/V + 5.1 µV 0.078 µV/V + 5.1 µV 0.25 µV/V + 16 µV 1.4 µV/V + 3.9 µV 4.0 µV/V + 3.9 µV	Fluke 5700/EP
(22 to 220) mV	(10 to 20) Hz (20 to 40) Hz (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	0.24 µV/V + 12 µV 0.085 µV/V + 9 µV 0.068 µV/V + 11 µV 0.18 µV/V + 11 µV 0.40 µV/V + 35 µV 0.58 µV/V + 100 µV 1.0 µV/V + 100 µV 2.1 µV/V + 190 µV	
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	240 µV/V + 39 µV 91 µV/V + 16 µV 49 µV/V + 9.3 µV 76 µV/V + 9.4 µV 0.011 % + 31 µV 0.040 % + 92 µV 0.094 % + 190 µV 0.31 % + 310 µV	

Parameter/Range	Frequency	CMC[2, 3, 4] (±)	Comments
AC Voltage – Generate, Fixed Points (cont)			
(2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	240 µV/V + 390 µV 90 µV/V + 160 µV 50 µV/V + 55 µV 50 µV/V + 55 µV 97 µV/V + 200 µV 0.027 % + 620 µV 0.094 % + 1.9 mV 0.16 % + 1.9 mV	Fluke 5700/EP
(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	46 µV/V + 3.9 mV 23 µV/V + 1.6 mV 59 µV/V + 550 µV 54 µV/V + 550 µV 87 µV/V + 940 µV 0.015 % + 2.3 mV	
(220 to 1000) V	15 Hz to 1 kHz	0.028 % + 19 mV	
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	0.015 % + 2.2 µV 0.018 % + 3.9 µV 0.40 % + 13 µV 0.54 % + 120 µV 1.1 % + 16 µV 6.9 % + 20 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	53 µV/V + 5.4 µV 98 µV/V + 8.6 µV 0.059 % + 29 µV 0.22 % + 110 µV 1.9 % + 190 µV 3.5 % + 640 µV 3.8 % + 270 µV 14 % + 1.1 mV	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Measure, Range (cont)			
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 8) MHz (8 to 10) MHz	89 µV/V + 16 µV 0.019 % + 120 µV 0.038 % + 16 µV 0.091 % + 20 µV 0.30 % + 100 µV 1.0 % + 100 µV 1.0 % + 100 µV 4.2 % + 100 µV 15 % + 100 µV	HP 3458A with option 002
3 V	100 kHz to 1 MHz (1 to 2) MHz (2 to 8) MHz (8 to 10) MHz	1.1 % + 100 µV 1.6 % + 100 µV 4.1 % + 100 µV 15 % + 100 µV	
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	89 µV/V + 310 µV 74 µV/V + 400 µV 78 µV/V + 200 µV 0.017 % + 160 µV 0.032 % + 200 µV 0.082 % + 200 µV 0.30 % + 1 mV 0.30 % + 1 mV 1.0 % + 1 mV	
100 V	40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.020 % + 2 mV 0.020 % + 2.1 mV 0.065 % + 2 mV 1.5 % + 2 mV	
700 V	40 Hz to 1 kHz (1 to 20) kHz	0.042 % + 2 mV 0.062 % + 2.1 mV	

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
Capacitance – Generate, Fixed Points			
1 pF	1 kHz	0.0012 pF	HP 16380A standard capacitor set
10 pF	1 kHz	0.012 pF	
100 pF	1 kHz	0.12 pF	
1000 pF	1 kHz	1.2 pF	
1 pF	1 MHz	0.0013 pF	
10 pF	1 MHz	0.012 pF	
100 pF	1 MHz	0.12 pF	
1000 pF	1 MHz	1.2 pF	
1 pF	2 MHz	0.006 pF	HP 16380A standard capacitor set
10 pF	2 MHz	0.012 pF	
100 pF	2 MHz	0.17 pF	
1000 pF	2 MHz	1.2 pF	
0.01 µF	120 Hz to 100 kHz	12 pF	HP 16380C standard capacitor set
0.1 µF	120 Hz to 100 kHz	120 pF	
1 µF	120 Hz to 100 kHz	1.2 nF	
10 µF	120 Hz to 100 kHz	5.8 nF	
AC Current – Measure, Fixed Points			
100 µA	100 Hz to 5 kHz	0.09 µA	HP 3458A with option 002
1 mA	100 Hz to 5 kHz	0.51 µA	
10 mA	100 Hz to 5 kHz	5.1 µA	
100 mA	100 Hz to 5 kHz	52 µA	
1 A	100 Hz to 5 kHz	1.2 mA	

Parameter/Range	Frequency	CMC[2, 3] (±)	Comments
AC Current – Generate			
220 µA Range	(10 to 20) Hz 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.023 % + 0.019 µA 0.010 % + 0.014 µA 0.031 % + 0.013 µA 0.082 % + 0.12 µA	Fluke 5700A/EP
2.2 mA Range	(10 to 20) Hz 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.22 µA/A + 0.97 µA 0.092 µA/A + 0.96 µA 0.17 µA/A + 0.18 µA 1.0 µA/A + 0.65 µA	
22 mA Range	(10 to 20) Hz 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.022 % + 1.6 µA 0.018 % + 0.44 µA 0.016 % + 1.4 µA 0.094 % + 3.9 µA	
220 mA Range	(10 to 20) Hz 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.026 % + 8.9 µV 0.016 % + 7.5 µA 0.019 % + 9.3 µA 0.094 % + 53 µA	
1 A Range	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.014 % + 32 µA 0.049 % + 78 µA 0.33 % + 160 µA	
10 A Fixed Point	40 Hz to 5 kHz (5 to 10) kHz	8.7 mA 32 mA	Fluke 5725A

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Simulation of Thermocouples –			
Type J	(-180 to -100) ºC (-100 to -25) ºC (-25 to 120) ºC (120 to 800) ºC	0.35 ºC 0.2 ºC 0.17 ºC 0.27 ºC	Fluke 5520A
Type K	(-200 to -100) ºC (-100 to -25) ºC (-25 to 120) ºC (120 to 1000) ºC (1000 to 1300) ºC	0.35 ºC 0.20 ºC 0.17 ºC 0.27 ºC 0.41 ºC	

Parameter/Equipment	Range	CMC[2] (±)	Comments
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

II. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC[2, 6] (±)	Comments
Amplitude Modulation – Measure			
10 MHz to 3 GHz (5 to 99) % Mod Depth	50 Hz to 10 kHz Mod Rates	0.93 % of reading	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	0.041 rad	E4448A with option 233
	2 rad with Mod Rate 1 kHz	0.041 rad	

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	

Parameter/Range	Frequency	CMC[2, 6] (±)	Comments
Attenuation – Generate (cont)			
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	
100 dB	DC to 4 GHz	1.6 dB	
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	

Parameter/Equipment	Frequency	CMC[2, 6] (±)	Comments
Attenuation – Generate (cont)			
Coaxial, Fixed			
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	HP11582A/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	
	(12.4 to 18) GHz SWR< 1.2:1	1.0 dB	
Coaxial, Fixed			
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
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

Parameter/Equipment	Frequency	CMC[2, 6] (±)	Comments
Attenuation – Generate (cont)			
Coaxial, Fixed			
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	8490D/020
20 dB Max	50 MHz to 26.5 GHz (26.5 to 50) GHz	1.3 dB 1.7 dB	

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

Parameter/Range	Frequency	CMC[2, 6] (±)	Comments
Oscilloscopes –			
Rise / Fall Time	(10 to 90) %	30 ps + 590 parts in 10^6	Fluke 9500B/9530 Head
		15 ps + 1600 parts in 10^6	Fluke 9500B/9560 Head
Square Wave 10 Hz to 2 MHz Z = 50 Ω or 1 MΩ	1.9 mV(p-p) to 60 V (p-p)	2.2 % of reading	Fluke 9500B/9530 Head
Time Mark Output into 50 Ω	1 ns to 20 ms	1.3 ns	Fluke 9500B/9530 Head
Leveled Sine Flatness-Rel to 50 kHz	0.1 Hz to 3.2 GHz	4.0 % of reading + 0.2 % of range	Fluke 9500B/9530 Head
DC Voltage	1 mV to 190 V	2.3 µV + 280 parts in 10^6	Fluke 9500B/9530 Head
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	

Parameter/Range	Frequency	CMC[2, 6] (±)	Comments
RF Absolute Power – Generate (cont)			
-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 dB	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	
-30 dB	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	
	(> 40 to ≤ 50) GHz SWR ≤ 2:1	3.2 dB	
-40 dB	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	

Parameter/Range	Frequency	CMC[2, 6] (±)	Comments
RF Absolute Power – Generate (cont)			
-50 dB	(> 40 to ≤ 50) GHz SWR ≤ 2:1	3.3 dB	83650B, 2.4 mm(m)
-60 dB	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 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	4.0 dB	
-80 dB	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	

Parameter/Range	Frequency	CMC[2, 6] (±)	Comments
RF Absolute Power – Generate (cont)			
-80 dB	(> 20 to ≤ 40) GHz SWR ≤ 1.8:1	2.7 dB	83650B, 2.4 mm(m)
	(>40 to ≤ 50) GHz SWR ≤ 2:1	3.9 dB	
-90 dB	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	
Reflection S_{11}/S_{22} – Measure	50 MHz to 1 GHz	0.028 lin 0.91 deg	HP E5071C, 50 Ω N type with 85032F cal kit
	(1 to 50) GHz	0.048 lin 8.2 deg	HP8510C, HP8517A, HP 85056A
Transmission S_{12}/S_{21} – Measure	100 kHz to 1 GHz	1.2 dB 0.70 deg	AGT E5071C , HP 85032F N type cal kit
	(1 to 18) GHz	0.50 dB 2.6 deg	HP 8510C, HP 8517A 2.4 mm, HP 85056A cal kit
	(18 to 40) GHz	0.73 dB 6.3 deg	
	(40 to 50) GHz	1.4 dB 16 deg	
Phase Noise – Measure	Up to 1 MHz Offset (1 to 40) MHz Offset	3.1 dB 4.7 dB	E5504B, E8257D-UNY

III. Time & Frequency

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Frequency Reference	10 MHz Reference	1.1 parts in 10^{11} Hz/Hz	Fluke 910R locked to GPS
Frequency – Measuring Equipment			GPS receiver with:
	1 kHz to 10 MHz	0.0009 Hz + 0.013 parts in 10^6	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	0.0022 Hz	Agilent 53132A
	100 MHz	0.22 Hz	
	200 MHz	0.45 Hz	
	225 MHz	0.45 Hz	
	100 MHz to 46 GHz	3.8×10^{-9} Hz	Agilent 53152A electronic counters with Fluke 910R
Period – Measure	100 s to 1 ms	8.4×10^{-8} 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 5700 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

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 25th day of October 2021.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2356.01
Valid to October 31, 2023

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