SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: March 31, 2016 Certificate Number: 2147.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1]:

I. Chemical

Parameter/Equipment	Range	CMC Uncertainty[2] (±)	Comments
pH – Measuring Equipment	4, 7, 8, 10, 13	0.0017 pH	Buffer solution
Conductivity – Measuring Equipment	84 µS/cm 1413 µS/cm 5000 µS/cm 12.880 mS/cm 80.000 mS/cm 111.800 mS/cm	1.0 µS/cm 5.0 µS/cm 20 µS/cm 50 µS/cm 0.20 mS/cm 0.40 mS/cm	Conductivity solutions

II. Dimensional

Parameter/Equipment	Range	CMC Uncertainty[2] (±)	Comments
Bore Gauges	(0.25 to 1) in (1 to 4) in (4 to 8) in	41 µin 41 µin 42 µin	Master ring gauges

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Parameter/Equipment	Range	CMC Uncertainty[2, 6] (±)	Comments
Calipers[3] – Dial, Digital, Vernier	(6 to 12) in (12 to 48) in	380 µin 410 µin	Gage blocks
Depth Gage[3] – Dial, Digital, Vernier	(0.001 to 6) in	72 µin	Gage blocks
Gage Blocks	Up to 1.0 in (1 to 12) in	4.6 µin (4.6 + 0.75*L*) µin	P&W Labmaster[8], gage blocks
Height Gages[3] – Working Gages	(0.05 to 24) in	80 µin	Gage blocks
Height Gages – Precision Gages	(0.05 to 24) in	45 µin	Gage blocks
I.D. Micrometer[3]	Up to 12 in	260 µin	Gage blocks
Indicator[3]	(0.00001 to 1) in	37 µin	Gage blocks, surface plate
Length Standards[3]	Up to 4 in (4 to 24) in (24 to 48) in	37 µin 47 µin 70 µin	Labmaster[8], gage blocks
Length Standards	(48 to 96) in	110 µin	Gage blocks
Micrometer Master	Up to 8 in	68 µin	Gage blocks
Micrometers[3] –			
Outside	Up to 6 in (6 to 12) in	71 µin 79 µin	Gage blocks
Depth	Up to 6 in	210 µin	
Thread	(0.001 to 1) in	120 µin	

Parameter/Equipment	Range	CMC Uncertainty[2] (±)	Comments
Pin Gage	(0.01 to 1) in	6.3 µin	P&W Labmaster[8], gage blocks
Thread Rings	Up to 4 in	275 µin	Set Plugs
Threaded Plugs	#80 to #6	49 µin	P&W Labmaster[8], gage blocks
Plain Plug Gage	(0.04 to 4) in	6.2 µin	P&W Labmaster[8], gage blocks
Protractor	(1 to 180)°	0.026°	Surface plate, sine bar
Plain Ring Gage	Up to 1 in (1 to 4) in (4 to 8) in	8.2 µin 11 µin 12 µin	P&W Labmaster[8], gage blocks
Measuring Rule[3]	Up to 36 in (76.2 to 1000) mm	0.0019 in 62 µm	Master rule
Sine Bar	(5 to 10) in	48 µin	Surface plate
Surface Plate[3]	Up to 48 in (49 to 72) in	23 µin 33 µin	Electronic level
Thread Wires	#80 to #6	11 µin	P&W Labmaster[8], gage blocks
Thickness Gage –			
Hard	(0.0010 to 8.0000) in	87 µin	P&W Labmaster[8], gage blocks
Ultrasonic	(0.001 to 8.000) in	170 µin	Gage blocks

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC Uncertainty[2, 7, 9] (±)	Comments
DC Voltage[3] – Generate/Measure	100 µV to 1 mV (1 to 10) mV (10 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V 1000 V	0.63 µV 0.75 µV 0.70 µV 1.4 µV 6.3 µV 4.7 µV 560 µV 7.6 µV/V	Calibrator
	100 V to 10 kV	0.50 % rdg + 3.0 V	High volt DMM
	300 V to 40 kV	2.0 % rdg	DMM w/high volt probe
	(1 to 3) µV (3 to 10) µV 10 µV	0.17 µV 0.20 µV 0.37 µV	Micro-volt meter/null detector
DC Voltage – Solid State	10 V 1.018 V	1.4 µV/V 2.1 µV/V	DC reference standard
	1.0 V 10.0 V 100.0 V 1000.0 V	1.3 µV/V 1.3 µV/V 1.3 µV/V 1.4 µV/V	Null detector, DC reference standard, reference divider
DC Current[3] – Generate/Measure	100 µA to 1.0 mA (1.0 to 10.0) mA (10.0 to 100.0) mA 100.0 mA to 1 A 1.000 A	0.041 µA 0.068 µA 0.56 µA 5.6 µA 0.13 mA	Calibrator/DMM
	(0 to 20) A	0.02 %	Current shunt
DC Clamp-On Meter	(0 to 1000) A	1.1 %	Calibrator w/coil

Parameter/Equipment	Range	CMC Uncertainty[2,7,9] (±)	Comments
DC Resistance[3] – Generate/Measure, Fixed Points	(10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ	0.34 mΩ 1.6 mΩ 1.7 mΩ 0.017 Ω 0.20 Ω 30 Ω 300 Ω 2.5 kΩ	Calibrator/DMM
	(100 to 300) MΩ 300 MΩ to 1.1 GΩ	1.4 MΩ 18 MΩ	Calibrator/DMM
	(1 to 10) Ω 10 kΩ	3.8 μΩ/Ω 1.4 μΩ/Ω	Lab resistor Lab resistor
	0.01 mΩ to 99.9999 MΩ	0.052 %	Precision LCR meter

Parameter/Range	Frequency	CMC Uncertainty[2,7,9] (±)	Comments
AC Voltage[3] – Measure			
3 mV	(10 to 100) Hz 100 Hz to 30 kHz (30 to 200) kHz (200 to 500) kHz 500 kHz to 1 MHz	0.11 % 0.093 % 0.13 % 0.25 % 0.50 %	Datron 4920A
10 mV	(10 to 100) Hz 100 Hz to 30 kHz (30 to 200) kHz (200 to 500) kHz 500 kHz to 1 MHz	0.034 % 0.021 % 0.052 % 0.14 % 0.35 %	
30 mV	(10 to 100) Hz 100 Hz to 30 kHz (30 to 200) kHz (200 to 500) kHz 500 kHz to 1 MHz	0.027 % 0.017 % 0.039 % 0.11 % 0.27 %	

Parameter/Range	Frequency	CMC Uncertainty[2,7,9] (±)	Comments
AC Voltage[3] – Measure (cont)			
100 mV	(10 to 100) Hz 100 Hz to 30 kHz (30 to 200) kHz (200 to 500) kHz 500 kHz to 1 MHz	0.020 % 0.010 % 0.019 % 0.058 % 0.16 %	Datron 4920A
300 mV	(1 to 2) Hz (2 to 10) Hz (10 to 40) Hz 40 Hz to 30 kHz (30 to 200) kHz (200 to 500) kHz 500 kHz to 1 MHz	0.029 % 0.013 % 30 µV/V 33 µV/V 0.018 % 0.029 % 0.079 %	
1 V	(1 to 2) Hz (2 to 10) Hz (10 to 40) Hz 40 Hz to 30 kHz (30 to 200) kHz (200 to 500) kHz 500 kHz to 1 MHz	0.029 % 0.013 % 30 µV/V 32 µV/V 77 µV/V 0.029 % 0.078 %	
3 V	(1 to 2) Hz (2 to 10) Hz (10 to 40) Hz 40 Hz to 30 kHz (30 to 200) kHz (200 to 500) kHz 500 kHz to 1 MHz	0.029 % 0.013 % 30 µV/V 32 µV/V 80 µV/V 0.029 % 0.078 %	
10 V	(1 to 2) Hz (2 to 10) Hz (10 to 40) Hz 40 Hz to 30 kHz (30 to 200) kHz (200 to 500) kHz 500 kHz to 1 MHz	0.029 % 0.013 % 30 µV/V 30 µV/V 68 µV/V 0.029 % 0.078 %	

Parameter/Range	Frequency	CMC Uncertainty[2,7,9](±)	Comments
AC Voltage[3] – Measure (cont)			
30 V	(1 to 2) Hz (2 to 10) Hz (10 to 40) Hz 40 Hz to 30 kHz (30 to 200) kHz (200 to 500) kHz 500 kHz to 1 MHz	0.029 % 0.013 % 37 µV/V 30 µV/V 68 µV/V 0.029 % 0.078 %	Datron 4920A
100 V	(1 to 2) Hz (2 to 10) Hz (10 to 40) Hz 40 Hz to 30 kHz (30 to 200) kHz	0.029 % 0.013 % 37 µV/V 31 µV/V 83 µV/V	
300 V	(1 to 2) Hz (2 to 10) Hz (10 to 40) Hz 40 Hz to 20 kHz (20 to 100) kHz	0.031 % 0.016 % 46 µV/V 46 µV/V 0.011 %	
1000 V	(1 to 2) Hz (2 to 10) Hz (10 to 40) Hz 40 Hz to 20 kHz (20 to 100) kHz	0.032 % 0.016 % 46 µV/V 52 µV/V 0.011 %	

Parameter/Range	Frequency	CMC Uncertainty[2,7] (±)	Comments
AC Voltage[3] – Generate			
1 mV	(10 to 31) Hz (32 to 320) Hz 300 Hz to 10 kHz (10 to 33) kHz (30 to 100) kHz (100 to 330) kHz (0.3 to 1.0) MHz	7.9 µV 7.9 µV 7.2 µV 7.2 µV 7.4 µV 7.2 µV 17 µV	Calibrator/DMM

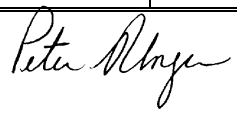
Parameter/Range	Frequency	CMC Uncertainty[2,9](±)	Comments
AC Voltage[3] –Generate (cont)			
1 mV	(10 to 31) Hz (32 to 320) Hz 300 Hz to 10 kHz (10 to 33) kHz (30 to 100) kHz (100 to 330) kHz (0.3 to 1.0) MHz	7.9 µV 7.9 µV 7.2 µV 7.2 µV 7.4 µV 7.2 µV 17 µV	Calibrator/DMM
10 mV	(10 to 31) Hz (32 to 320) Hz 300 Hz to 10kHz (10 to 33) kHz (30 to 100) kHz (100 to 330) kHz (0.3 to 1.0) MHz	8.7 µV 8.6 µV 8.0 µV 8.0 µV 8.2 µV 15 µV 18 µV	
100 mV	(10 to 31) Hz (32 to 320) Hz 300 Hz 10 kHz (10 to 33) kHz (30 to 100) kHz (100 to 330) kHz (0.3 to 1.0) MHz	18 µV 18 µV 18 µV 18 µV 18 µV 24 µV 190 µV	
1 V	(10 to 31) Hz (32 to 330) Hz 300 Hz to 33 kHz (30 to 100) kHz (100 to 330) kHz (0.3 to 1.0) MHz	170 µV 140 µV 120 µV 150 µV 530 µV 2.9 mV	
10 V	(10 to 31) Hz (32 to 330) Hz 300 Hz to 33 kHz (30 to 100) kHz (100 to 330) kHz (0.3 to 1.0) MHz	420 µV 290 µV 190 µV 310 µV 1.3 mV 2.1 mV	
100 V	(10 to 31) Hz (32 to 330) Hz 300 Hz to 33 kHz 30 to 100) kHz (100 to 330) kHz	4.2 mV 3.6 mV 7.0 mV 7.0 mV 17 mV	

Parameter/Range	Frequency	CMC Uncertainty[2, 7, 9] (±)	Comments
AC Voltage[3] – Generate (cont)			Calibrator/DMM
1000 V	(10 to 31) Hz (32 to 330) Hz 300 Hz to 3.3 kHz (3 to 10) kHz (10 to 33) kHz	190 mV 190 mV 140 mV 180 mV 180 mV	
100 V to 10 kV	(10 to 400) Hz	1.0 % + 5 V(NF)	High volt meter
300 V to 40 kV	(50 to 400) Hz	5.0 %	DMM w/ high volt probe
AC Current[3] – Measure/ Generate			
(0 to 20) A	Up to 1 kHz (1 to 5) kHz	0.025 % 0.035 %	Calibrator/DMM/ shunt
Clamp-On Meter			
(0 to 1000) A	(45 to 445) Hz	1.1 %	Calibrator w/coil
Phase Angle – Measure/ Generate			
(0 to 360) º (0.01 to 120) Vrms	10 Hz to 5 kHz (5 to 20) kHz (20 to 100) kHz (100 to 200) kHz (200 to 500) kHz (0.500 to 1) MHz (1 to 3) MHz (3 to 5) MHz	0.050 º 0.10 º 0.70 º 1.4 º 3.5 º 7.0 º 21 º 35 º	Phase meter

Parameter/Equipment	Range	CMC Uncertainty[2,7,9] (±)	Comments
Capacitance[3] – Generate	(0 to 0.3) nF (0 to 1) nF (1 to 3) nF (3 to 10) nF (10 to 30) nF (30 to 100) nF (100 to 300) nF (0.3 to 1) µF (1 to 3) µF (3 to 10) µF (10 to 30) µF (30 to 100) µF (100 to 300) µF (0.3 to 1) mF (1 to 3) mF (3 to 10) mF (10 to 30) mF (30 to 110) mF	0.012 nF 0.015 nF 0.025 nF 0.035 nF 0.18 nF 0.35 nF 1.1 nF 3.5 nF 11 nF 35 nF 150 nF 550 nF 1.7 µF 5.5 µF 17 µF 55 µF 260 µF 1.4 mF	Fluke 5520A
Capacitance – Measure 10 Hz to 1 MHz	(0.01 to 9.999999) F	0.050 %	Precision LCR meter
Capacitance – Dissipation	(0.000 001 to 9.999999) F	0.00050 sec	Precision LCR meter

Parameter/Equipment	Range	CMC Uncertainty[2] (±)	Comments
Thermocouple Simulation[3] –			
Type B	(600 to 800) ºC	0.44 ºC	Fluke 5520A
	(800 to 1000) ºC	0.34 ºC	
	(1000 to 1550) ºC	0.30 ºC	
	(1550 to 1820) ºC	0.33 ºC	
Type C	(0 to 150) ºC	0.30 ºC	
	(150 to 650) ºC	0.26 ºC	
	(650 to 1000) ºC	0.31 ºC	
	(1000 to 1800) ºC	0.50 ºC	
	(1800 to 2316) ºC	0.84 ºC	
Type E	(-250 to -100) ºC	0.50 ºC	
	(-100 to -25) ºC	0.16 ºC	
	(-25 to 350) ºC	0.14 ºC	
	(350 to 650) ºC	0.16 ºC	
	(650 to 1000) ºC	0.21 ºC	
Type J	(-210 to -100) ºC	0.27 ºC	
	(-100 to -30) ºC	0.16 ºC	
	(-30 to 150) ºC	0.14 ºC	
	(150 to 760) ºC	0.17 ºC	
	(760 to 1200) ºC	0.23 ºC	
Type K	(-200 to -100) ºC	0.33 ºC	
	(-100 to -25) ºC	0.18 ºC	
	(-25 to 120) ºC	0.16 ºC	
	(120 to 410) ºC	0.26 ºC	
	(410 to 1000) ºC	0.33 ºC	
	(1000 to 1372) ºC	0.40 ºC	
Type L	(-200 to -100) ºC	0.37 ºC	
	(-100 to -25) ºC	0.26 ºC	
	(-25 to 800) ºC	0.33 ºC	
	(800 to 900) ºC	0.22 ºC	
Type N	(-200 to -100) ºC	0.40 ºC	
	(-100 to -25) ºC	0.22 ºC	
	(-25 to 120) ºC	0.19 ºC	
	(120 to 410) ºC	0.18 ºC	
	(410 to 1300) ºC	0.27 ºC	

Parameter/Equipment	Range	CMC Uncertainty[2] (±)	Comments
Thermocouple Simulation[3] – (cont)			
Type R	(0 to 250) ºC (250 to 400) ºC (400 to 1000) ºC (1000 to 1767) ºC	0.57 ºC 0.35 ºC 0.33 ºC 0.40 ºC	Fluke 5520A
Type S	(0 to 250) ºC (250 to 1000) ºC (1000 to 1400) ºC (1400 to 1767) ºC	0.47 ºC 0.36 ºC 0.37 ºC 0.46 ºC	
Type T	(-250 to -150) ºC (150 to 0) ºC (0 to 120) ºC (120 to 400) ºC	0.63 ºC 0.24 ºC 0.16 ºC 0.14 ºC	
Type U	(-200 to 0) ºC (0 to 600) ºC	0.56 ºC 0.27 ºC	
RTD Simulation[3] –			
Pt 385, 100 Ω	(-200 to -80) ºC (-80 to 0) ºC (0 to 100) ºC (100 to 300) ºC (300 to 400) ºC (400 to 630) ºC (630 to 800) ºC	0.050 ºC 0.050 ºC 0.070 ºC 0.090 ºC 0.10 ºC 0.12 ºC 0.23 ºC	Fluke 5520A
Pt 3926, 100 Ω	(-200 to -80) ºC (-80 to 0) ºC (0 to 100) ºC (100 to 300) ºC (300 to 400) ºC (400 to 630) ºC	0.050 ºC 0.050 ºC 0.070 ºC 0.090 ºC 0.10 ºC 0.12 ºC	
Pt 3916, 100 Ω	(-200 to -190) ºC (-190 to -80) ºC (-80 to 0) ºC (0 to 100) ºC (100 to 260) ºC (260 to 300) ºC (300 to 400) ºC (400 to 600) ºC (600 to 630) ºC	0.25 ºC 0.040 ºC 0.050 ºC 0.060 ºC 0.070 ºC 0.080 ºC 0.090 ºC 0.10 ºC 0.23 ºC	



Parameter/Equipment	Range	CMC Uncertainty[2,9](±)	Comments
RTD Simulation[3] – (cont)			
Pt 385, 200 Ω	(-200 to -80) ºC (-80 to 0) ºC (0 to 100) ºC (100 to 260) ºC (260 to 300) ºC (300 to 400) ºC (400 to 600) ºC (600 to 630) ºC	0.040 ºC 0.040 ºC 0.040 ºC 0.050 ºC 0.12 ºC 0.13 ºC 0.14 ºC 0.16 ºC	Fluke 5520A
Pt 385, 500 Ω	(-200 to -80) ºC (-80 to 0) ºC (0 to 100) ºC (100 to 260) ºC (260 to 300) ºC (300 to 400) ºC (400 to 600) ºC (600 to 630) ºC	0.040 ºC 0.050 ºC 0.050 ºC 0.060 ºC 0.080 ºC 0.080 ºC 0.090 ºC 0.11 ºC	
Pt 385, 1000 Ω	(-200 to -80) ºC (-80 to 0) ºC (0 to 100) ºC (100 to 260) ºC (260 to 300) ºC (300 to 400) ºC (400 to 600) ºC (600 to 630) ºC	0.030 ºC 0.030 ºC 0.040 ºC 0.050 ºC 0.060 ºC 0.070 ºC 0.070 ºC 0.23 ºC	
Ni 120, 120 Ω	(-80 to 0) ºC (0 to 100) ºC	0.080 ºC 0.l4 ºC	
Cu 427, 10 Ω	(100 to 260) ºC	0.30 ºC	
Inductance[3] –			
Generate, Fixed Points	100 uH 1 mH (1 to 10) mH (10 to 100) mH 100 mH to 1 H	2.1 % 2.1 % 1.2 % 0.60 %	General radio 1490D
Measure 10 Hz to 1 MHz	0.01 nH to 99.999 kH	0.050 %	Precision LCR meter

IV. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC Uncertainty[2] (±)	Comments
Leveled Sine Wave[3] –			
Absolute Accuracy 50 Ω			
(-48 to 24) dBm	100 kHz to 125 MHz	0.050 dB	Fluke 9640A
(-74 to -48) dBm		0.20 dB	
(-94 to 74) dBm		0.50 dB	
(-130 to -94) dBm		1.5 dB	
(-17 to 24) dBm	1 GHz	0.25 dB	
(-74 to -17) dBm		0.50 dB	
(-94 to -74) dBm		1.0 dB	
(-130 to -94) dBm		1.5 dB	
(-74 to 14) dBm	4 GHz	0.50 dB	
(-84 to -74) dBm		1.0 dB	
Absolute Amplitude[3] –			
Amplitude @ 50 Ω			
(20 to 24) dBm	9 Hz to 125 MHz	0.050 dB	Fluke 9640A
(14 to 20) dBm	9 Hz to 125 MHz	0.050 dB	
	(125 to 300) MHz	0.10 dB	
	300 MHz to 1.4 GHz	0.25 dB	
(-17 to 14) dBm	9 Hz to 125 MHz	0.050 dB	
	(125 to 300) MHz	0.10 dB	
	300 MHz to 1.4 GHz	0.25 dB	
	(1.4 to 3) GHz	0.30 dB	
	(3 to 4.024) GHz	0.50 dB	
(-48 to -17) dBm	9 Hz to 125 MHz	0.050 dB	
	(125 to 300) MHz	0.10 dB	
	300 MHz to 4.024 GHz	0.50 dB	
(-74 to -48) dBm	100 kHz to 300 MHz	0.20 dB	
	300 MHz to 4.024 GHz	0.20 dB	
(-84 to -74) dBm	100 kHz to 300 MHz	0.50 dB	
	300 MHz to 4.024 GHz	1.0 dB	
(-94 to -84) dBm	100 kHz to 300 MHz	0.50 dB	
	300 MHz to 3 GHz	1.0 dB	
(-130 to -94) dBm	100 kHz to 3 GHz	1.5 dB	

Parameter/Range	Frequency	CMC Uncertainty[2, 9] (±)	Comments
Frequency Modulation[3] – Generate	20 Hz to 1 kHz (1 to 10) kHz (10 to 100) kHz (100 to 300) kHz	0.012 % 0.10 % 1.0 % 10 %	Fluke 9640A
Attenuation[3, 4, 5] – (0 to 33) dB (33 to 64) dB (64 to 100) dB	100 kHz to 100 MHz	0.035 dB 0.040 dB 0.10 dB	Fluke 9640A
Frequency Modulation[3] – Measure 50 kHz to10 MHz Mod: 20 Hz to 10 kHz 10 MHz to 1.3 GHz Mod: 50 Hz to 100 kHz 10 MHz to 1.3 GHz Mod: 20 Hz to 50 Hz	10 Hz to 1300 MHz	2.2 % 1.2 % 5.9 %	HP 8901A
Amplitude Modulation[3] – Measure 150 kHz to 10MHz Rate: 50 Hz to 10 kHz >5% depth 150 kHz to 10 MHz Rate: 20 Hz to 10 kHz (10 to 1300) MHz Rate: 50 Hz to 50 kHz >5% depth (10 to 1300) MHz Rate: 20 Hz to 100 kHz 10 Hz to 1300 MHz Rate: 20 Hz to 20 kHz	10 Hz to 1300 MHz	2.2 % 3.2 % 1.1 % 3.2 % 3.2 %	HP 8901A

Parameter/Range	Frequency	CMC Uncertainty[2, 9] (±)	Comments
Phase Modulation[3] – Measure Rate: 20 Hz to 20 kHz	10 Hz to 1300 MHz	3.1 %	HP 8901A
Amplitude Modulation[3] – Sine Depth (Internal) 2.0 % to 99 %	50 kHz to 4.024 GHz	3.2 %	Fluke 9640A
Amplitude Modulation[3] – Sine Distortion 10.0 % to 89.0 %	50 kHz to 125 MHz	-40 dBc	Fluke 9640A
Frequency Modulation[3] – Sine Deviation 10 Hz to 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (1 to 4.8) MHz	50 kHz to 4.024 GHz	3.0 % 3.0 % 3.0 % 3.0 % 3.0 %	Fluke 9640A
Phase Modulation[3] – Sine Depth (0.0001 to 10) rad (10 to 100) rad (100 to 1000) rad	50 kHz to 4.024 GHz	3.3 % 3.2 % 3.1 %	Fluke 9640A
RF Power[3] – Measure	(10 to 50) MHz (50 to 500) MHz (500 to 1000) MHz (1000 to 2000) MHz (2000 to 3000) MHz (3000 to 4000) MHz	2.5 % + 0.020 dB 2.5 % + 0.020 dB 2.6 % + 0.020 dB 2.6 % + 0.020 dB 2.6 % + 0.020 dB 2.6 % + 0.020 dB	HP 8484A w/ HP 436A
Sound Pressure[3]	(94 to 114) dB 114 dB	0.19 dB 0.24 dB	Sound calibrator
THD	20Hz to 20kHz	0.82 dB	Keithly 2015

IV. Mechanical

Parameter/Equipment	Range	CMC Uncertainty[2, 9] (±)	Comments
Accelerometers[3]	7 Hz to 10 kHz	3.1 %	9100D Vibration standard
Tachometers[3]	6 rpm 60 rpm 600 rpm 6000 rpm 60 000 rpm 100 000 rpm	0.0020 rpm 0.020 rpm 0.20 rpm 1.7 rpm 8.5 rpm 52 rpm	Master tachometer
Pressure/Vacuum[3]	-15 to 25 PSI -22 in·Hg to 100 PSI (100 to 500) PSI (0 to 1500) PSI (1500 to 3000) PSI (3000 to 5000) PSI (5000 to 10 000) PSI (0 to 1) inH_20	0.021 % 0.030 PSI 0.050 PSI 0.15 PSI 0.011% 0.25 PSI 0.011 % 0.0010 psi	Fluke PPC4EX Pressure calibrator Pressure module DPG 2500 Pressure sensor
Mass Flow[3]	Up to 50 LPM	0.83 % + 0.20 % FS	Mass flow meters
Torque[3]	(0 to150) in-lbf (0 to150) ft-lbf	1.2 % 1.2 %	Torque analyzer
Force[3]	(0 to1000) lb	0.21 %	Load cell

Parameter/Equipment	Range	CMC Uncertainty[2] (±)	Comments
Balances/Weights	50 mg 500 mg 1 g 5 g 50 g 100 g 200 g 2000 g 6000 g	0.014 mg 0.025 mg 0.034 mg 0.054 ng 0.12 mg 0.25 mg 0.51 mg 24 mg 85 mg	Class S1, Class1, Class F Weights

V. Thermodynamics

Parameter/Equipment	Range	CMC Uncertainty[2] (±)	Comments
Infrared[3]	Ambient to 315 ºC	1.3 ºC	Black body
Thermocouples, RTDs, and Liquid Thermometers[3]	Ambient to 100 ºC (100 to 375) ºC	0.070 ºC 0.40 ºC	Dry well, PRTD
Humidity – Measuring Equipment	(0 to 99) % RH	1.4 % RH	Humidity generator
Humidity- Measure	(0 to 99) % RH	1.4 % RH	Humidity probe

VI. Time & Frequency

Parameter/Equipment	Range	CMC Uncertainty[2] (±)	Comments
Timers/Stopwatches[3]	0 s to 60 hr	0.11 s	Master tachometer

Parameter/Equipment	Range	CMC Uncertainty[2] (±)	Comments
Frequency[3] – Measuring Equipment	(0.1 to 110) Hz 110 Hz to 1.1 kHz (1.1 to 10) kHz 9 Hz to 100 MHz 100 MHz to 4.024 GHz	310 µHz 3.0 mHz 28 mHz 0.27 µHz/Hz	Fluke 5520A Fluke 9640A
Frequency Out	(1 to 10) MHz	0.044 µHz/Hz	
Frequency – Measure[3]	(0.1 to 18) GHz	1 Count + 20 µHz	HP 5342A

[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. CMC 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 and this laboratory meets A2LA *R104 – General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. 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] Specifications are typical below 10 MHz.

[5] Relative to +16 dBm output.

[6] In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches.

[7] The measurands stated are generated using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure the measurand in the ranges indicated. CMC are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.

[8] "Labmaster" is a registered trade mark with a last listed owner of Pratt & Whitney Measurement Systems, Inc., Connecticut U.S.A.

[9] In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.

American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

ENI LABS

Fort Wayne, IN

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. 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 8 January 2009*).

Presented this 6th day of June 2014.

President & CEO
For the Accreditation Council
Certificate Number 2147.01
Valid to March 31, 2016

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