



THE AMERICAN ASSOCIATION FOR
LABORATORY ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

IET Labs, Inc.

West Roxbury, MA

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 18 June 2005*).



Presented this 21st day of September 2006.

A handwritten signature in cursive script, reading "Peter M. Meyer".

President

For the Accreditation Council

Certificate Number 2073.01

Valid to April 30, 2008

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

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

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CALIBRATION

Valid To: April 30, 2008

Certificate Number: 2073.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	Best Uncertainty ² (±)	Comments
DC Resistance – Measure, Fixed Points	1 mΩ	200 parts in 10 ⁶	Current characterization method
	10 mΩ	100 parts in 10 ⁶	
	100 mΩ	43 parts in 10 ⁶	
	1 Ω	7.5 parts in 10 ⁶	
	10 Ω	4.5 parts in 10 ⁶	DMM transfer method
	100	3.5 parts in 10 ⁶	
	1 kΩ	2.6 parts in 10 ⁶	
	10 kΩ	2.6 parts in 10 ⁶	
	100 kΩ	4 parts in 10 ⁶	
	1 MΩ	4.1 parts in 10 ⁶	
	10 MΩ	6.3 parts in 10 ⁶	
			Voltage characterization method
	100 MΩ	17 parts in 10 ⁶	
	1 GΩ	0.01 %	
	10 GΩ	0.07 %	
	100 GΩ	0.2 %	
	1 TΩ	2 %	
DC Resistance – Measuring Equipment, Fixed Points	1 mΩ	20 parts in 10 ⁶	SRX-0.001 SRX-0.01 SRX-0.1 SRL-1 SRL-10 SRL-100 SRL-1k SRL-10k SRL-100k SRL-1M SRL-10M SRC-100M SRC-1G
	10 mΩ	30 parts in 10 ⁶	
	100 mΩ	23 parts in 10 ⁶	
	1 Ω	5 parts in 10 ⁶	
	10 Ω	4 parts in 10 ⁶	
	100 Ω	3 parts in 10 ⁶	
	1 kΩ	1.7 parts in 10 ⁶	
	10 kΩ	1.7 parts in 10 ⁶	
	100 kΩ	3.7 parts in 10 ⁶	
	1 MΩ	3.7 parts in 10 ⁶	
	10 MΩ	6.2 parts in 10 ⁶	
	100 MΩ	10 parts in 10 ⁶	
	1 GΩ	100 parts in 10 ⁶	

Parameter/Equipment	Range	Best Uncertainty ² (±)	Comments
DC Resistance – Measuring Equipment, Fixed Points (cont)	10 GΩ 100 GΩ 1 TΩ	220 parts in 10 ⁶ 0.2 % 2 %	SRC-10G SRC-100G SRC-1T
Capacitance – Measure Fixed Points @ 1000 Hz	1 pF 10 pF 100 pF 1000 pF	0.01 % + 30 aF 5.2 parts in 10 ⁶ 5.9 parts in 10 ⁶ 4.8 parts in 10 ⁶	GenRad 1404 and 1620
Capacitance – Measure 50 Hz ≤ <i>f</i> ≤ 1 kHz 12 Hz ≤ <i>f</i> ≤ 100 kHz	10 aF to 11 μF 10 aF to 100 mF	0.01 % + 30 aF 0.02 %	GenRad 1620 Quadtech 1689 <i>f</i> = specified frequency range
Capacitance Measuring Equipment – Fixed Points @ 1 kHz	1 pF 10 pF 100 pF 1000 pF 10 nF 100 nF 1 μF 10 μF 100 μF 1 mF 10 mF	0.01 % 4 parts in 10 ⁶ 5 parts in 10 ⁶ 6 parts in 10 ⁶ 0.01 % 0.01 % 0.01 % 0.02 % 0.05 % 0.4 % 0.3 %	Fused silica standard GenRad 1404-C GenRad 1404-B GenRad 1404-A IET SC-10 nF IET SC-100 nF IET SC-1 μF IET SC-10 μF IET S-100 μF GenRad 1417 GenRad 1417

Parameter/Frequency	Range	Best Uncertainty ² (±)	Comments
Capacitance Measuring Equipment – (cont)			
Fixed Points @ 100 Hz	100 mF	0.4 %	GenRad 1417
	1 F	0.6 %	GenRad 1417
Inductance – Measure 12 Hz ≤ <i>f</i> ≤ 100 kHz	1 pH to 1 MH	0.02 %	GenRad 1693 <i>f</i> = specified frequency range
Inductance – Measure, Fixed Points			GenRad 1482 series standard inductors by transfer method with precision LCR meter
100 Hz	50 μH	0.1 %	
400 Hz		0.1 %	
1 kHz		0.1 %	
10 kHz		0.1 %	
100 Hz	100 μH	0.1 %	
400 Hz		0.1 %	
1 kHz		0.1 %	
10 kHz		0.1 %	
100 Hz	200 μH	0.1 %	
400 Hz		0.1 %	
1 kHz		0.1 %	
10 kHz		0.1 %	
100 Hz	500 μH	0.023 %	
400 Hz		0.023 %	
1 kHz		0.023 %	
10 kHz		0.051 %	
100 Hz	1 mH	0.021 %	
400 Hz		0.021 %	
1 kHz		0.021 %	
10 kHz		0.051 %	
100 Hz	2 mH	0.021 %	
400 Hz		0.021 %	
1 kHz		0.021 %	
10 kHz		0.051 %	

Parameter/Frequency	Range	Best Uncertainty ² (±)	Comments
Inductance – Measure, Fixed Points (cont)			GenRad 1482 series standard inductors by transfer method with precision LCR meter
100 Hz 400 Hz 1 kHz 10 kHz	5 mH	0.023 % 0.023 % 0.023 % 0.051 %	
100 Hz 400 Hz 1 kHz 10 kHz	10 mH	0.021 % 0.021 % 0.021 % 0.051 %	
100 Hz 400 Hz 1 kHz 10 kHz	20 mH	0.023 % 0.023 % 0.023 % 0.051 %	
100 Hz 400 Hz 1 kHz 10 kHz	50 mH	0.023 % 0.023 % 0.023 % 0.051 %	
100 Hz 400 Hz 1 kHz 10 kHz	100 mH	0.021 % 0.021 % 0.021 % 0.051 %	
100 Hz 400 Hz 1 kHz 10 kHz	200 mH	0.023 % 0.023 % 0.023 % 0.051 %	
100 Hz 400 Hz 1 kHz	500 mH	0.023 % 0.023 % 0.051 %	
100 Hz 400 Hz 1 kHz	1 H	0.021 % 0.021 % 0.051 %	
100 Hz 400 Hz 1 kHz	2 H	0.023 % 0.023 % 0.051 %	
100 Hz 400 Hz 1 kHz	5 H	0.023 % 0.1 % 0.2 %	

Parameter/Equipment	Range	Best Uncertainty ² (±)	Comments
Inductance – Measuring Equipment, Fixed Points			GenRad 1482 series standard inductors
100 Hz	10 H	0.021 %	
400 Hz		0.1 %	
1 kHz		0.2 %	
100 Hz	50 µH	0.1 %	
400 Hz		0.1 %	
1 kHz		0.1 %	
10 kHz		0.1 %	
100 Hz	100 µH	0.1 %	
400 Hz		0.1 %	
1 kHz		0.1 %	
10 kHz		0.1 %	
100 Hz	200 µH	0.1 %	
400 Hz		0.1 %	
1 kHz		0.1 %	
10 kHz		0.1 %	
100 Hz	500 µH	0.023 %	
400 Hz		0.023 %	
1 kHz		0.023 %	
10 kHz		0.051 %	
100 Hz	1 mH	0.021 %	
400 Hz		0.021 %	
1 kHz		0.021 %	
10 kHz		0.051 %	
100 Hz	2 mH	0.023 %	
400 Hz		0.023 %	
1 kHz		0.023 %	
10 kHz		0.051 %	
100 Hz	5 mH	0.023 %	
400 Hz		0.023 %	
1 kHz		0.023 %	
10 kHz		0.051 %	
100 Hz	10 mH	0.021 %	
400 Hz		0.021 %	
1 kHz		0.021 %	
10 kHz		0.051 %	

Parameter/Equipment	Range	Best Uncertainty ² (±)	Comments
Inductance – Measuring Equipment, Fixed Points (cont)			GenRad 1482 series standard inductors
100 Hz	20 mH	0.023 %	
400 Hz		0.023 %	
1 kHz		0.023 %	
10 kHz		0.051 %	
100 Hz	50 mH	0.023 %	
400 Hz		0.023 %	
1 kHz		0.023 %	
10 kHz		0.051 %	
100 Hz	100 mH	0.021 %	
400 Hz		0.021 %	
1 kHz		0.021 %	
10 kHz		0.051 %	
100 Hz	200 mH	0.023 %	
400 Hz		0.023 %	
1 kHz		0.023 %	
10 kHz		0.051 %	
100 Hz	500 mH	0.023 %	
400 Hz		0.023 %	
1 kHz		0.051 %	
100 Hz	1 H	0.021 %	
400 Hz		0.021 %	
1 kHz		0.051 %	
100 Hz	2 H	0.023 %	
400 Hz		0.023 %	
1 kHz		0.051 %	
100 Hz	5 H	0.023 %	
400 Hz		0.1 %	
1 kHz		0.2 %	
100 Hz	10 H	0.021 %	
400 Hz		0.1 %	
1 kHz		0.2 %	

Parameter/Equipment	Range	Best Uncertainty ² (±)	Comments
DC Voltage – Measure	(0 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1000) V	4.5 $\mu\text{V/V}$ + 0.1 μV 3 $\mu\text{V/V}$ + 0.4 μV 3 $\mu\text{V/V}$ + 4 μV 4.5 $\mu\text{V/V}$ + 40 μV 4.5 $\mu\text{V/V}$ + 1 mV	Fluke 8508A
DC Voltage Measuring Equipment – Cardinal Points	1 V 1.018 V 10 V	3.6 parts in 10^6 2.8 parts in 10^6 1.6 parts in 10^6	Keop Trancell DC voltage standard model VTS6001-1

Parameter/Range	Frequency	Best Uncertainty ² (±)	Comments
AC Voltage – Measure			
(0 to 200) mV	(10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.013 % + 4 μV 0.011 % + 4 μV 0.010 % + 2 μV 0.010 % + 4 μV 0.030 % + 8 μV 0.071 % + 20 μV	Fluke 8508A
(0.2 to 2) V	(10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.010 % + 20 μV 85 $\mu\text{V/V}$ + 20 μV 65 $\mu\text{V/V}$ + 20 μV 85 $\mu\text{V/V}$ + 20 μV 0.021 % + 40 μV 0.051 % + 200 μV 0.3 % + 2 mV 1 % + 2 mV	
(2 to 20) V	(10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.010 % + 200 μV 85 $\mu\text{V/V}$ + 200 μV 65 $\mu\text{V/V}$ + 200 μV 85 $\mu\text{V/V}$ + 200 μV 0.021 % + 400 μV 0.051 % + 200 μV 0.3 % + 20 mV 1 % + 20 mV	

Parameter/Range	Frequency	Best Uncertainty ² (±)	Comments
AC Voltage – Measure (cont)			Fluke 8508A
(20 to 200) V	(10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.010 % + 2 mV 85 µV/V + 2 mV 65 µV/V + 2 mV 85 µV/V + 2 mV 0.021 % + 4 mV 0.051 % + 20 mV 0.3 % + 200 mV 1 % + 200 mV	
(200 to 1050)	(10 to 40) Hz 40 to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.011 % + 0.02 V 95 µV/V + 0.02 V 0.021 % + 0.04 V 0.051 % + 0.2 V	
AC Current – Measure			Fluke 8508A
(0 to 200) µA	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.028 % + 0.02 µA 0.065 % + 0.02 µA 0.04 % + 0.02 µA	
200 µA to 2 mA	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.028 % + 0.2 µA 0.065 % + 0.2 µA 0.04 % + 0.2 µA	
(2 to 20) mA	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.028 % + 2 µA 0.065 % + 2 µA 0.04 % + 2 µA	
(20 to 200) mA	10 Hz to 10 kHz (10 to 30) kHz	0.025 % + 20 µA 0.060 % + 20 µA	
200 mA to 2 A	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.060 % + 200 µA 0.070 % + 200 µA 0.3 % + 200 µA	
(2 to 20) A	10 Hz to 2 kHz (2 to 10) k Hz	0.08 % + 2 mA 0.25 % + 2 mA	

Parameter/Range	Frequency	Best Uncertainty ² (±)	Comments
AC Resistance – Measure 0.01 mΩ to 100 MΩ 0.1 mΩ to 100 MΩ	12 Hz to 200 kHz 10 Hz to 2 MHz	0.02 % 0.05 %	GenRad 1693 Quadtech 7600
AC Resistance – Measuring Equipment Fixed Points 24.9 Ω 374 Ω 5.97 kΩ 95.317 kΩ	1 kHz 1 kHz 1 kHz 1 kHz	20 parts in 10 ⁶ 20 parts in 10 ⁶ 20 parts in 10 ⁶ 20 parts in 10 ⁶	GenRad 1689-9604 Digibridge Calibration kit

II. Time & Frequency

Parameter/Equipment	Range	Best Uncertainty ² (±)	Comments
Frequency – Measure	0.01 Hz to 125 MHz	2 parts in 10 ⁶	Fluke 1953A

¹ This laboratory offers commercial calibration service.

² “Best Uncertainty” 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 of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer’s device, to the environment (if the calibration is performed in the field) and to influences from the circumstances of the specific calibration.