SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

GEFEN ELECTRONIC SERVICES LTD
30 Hasivim Street
Petah-Tikva 039266044
Israel
Arcady Gefen Phone: 03-9266044

CALIBRATION

Valid To: September 30, 2013 Certificate Number: 3537.01

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

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2] (±)	Comments
DC Voltage – Generate	2.2 µV 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	12 µV/V + 0.9 µV 8.7 µV/V + 1.5 µV 8.6 µV/V + 5.2 µV 8.6 µV/V + 8.2 µV 11 µV/V + 110 µV 12 µV/V + 580 µV	Fluke 5700A; CMCs stated as a portion of the setting plus a portion of the range.
DC Current – Generate	(0.02 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 to 10) A	0.17 % + 9.3 nA 75 µA/A + 9.3 nA 75 µA/A + 93 nA 85 µA/A + 0.92 µA 0.014 % + 29 µA 0.024 % + 58 µA/A	Fluke 5700A; CMCs stated as a portion or percent of the setting plus a portion of the range. Datron 4800 w/ Datron 4600 transconductance amplifier

Parameter/Equipment	Range	CMC[2] (±)	Comments
Resistance – Generate, Fixed Points	0 Ω (1, 1.9) Ω 10 Ω 19 Ω (100, 190) Ω 1 kΩ 1.9 kΩ (10, 19) kΩ (100, 190) kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	58 μΩ 0.011 % rdg 34 μΩ/Ω 33 μΩ/Ω 20 μΩ/Ω 16 μΩ/Ω 17 μΩ/Ω 17 μΩ/Ω 19 μΩ/Ω 26 μΩ/Ω 27 μΩ/Ω 61 μΩ/Ω 81 μΩ/Ω 0.021 % rdg	Fluke 5700A (4-wire) (2-wire)

Parameter/Range	Frequency	CMC[2] (±)	Comments
AC Voltage – Generate			
(2.2 to 22) mV	(20 to 40) Hz 40 Hz to 20 kHz (20 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.078 % + 6 μV 0.066 % + 6 μV 0.14 % + 8.1 μV 0.29 % + 14 μV 0.75 % + 29 μV	Fluke 5700A; CMC's stated as a portion or percent of setting plus the floor specification.
(22 to 220) mV	(20 to 40) Hz 40 Hz to 20 kHz (20 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.029 % + 9 μV 0.019 % + 9 μV 0.11 % + 29 μV 0.16 % + 29 μV 0.46 % + 93 μV	
220 mV to 2.2 V	(20 to 40) Hz 40 Hz to 20 kHz (20 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.029 % + 9 μV 0.019 % + 10 μV 0.11 % + 29 μV 0.16 % + 29 μV 0.46 % + 92 μV	
(2.2 to 22) V	(20 to 40) Hz 40 Hz to 20 kHz (20 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.02 % + 290 μV 0.014 % + 70 μV 0.041 % + 0.4 μV 0.067 % + 1.7 mV 0.3 % + 10 mV	

Parameter/Range	Frequency	CMC[2] (±)	Comments
AC Voltage – Generate (cont)			
(22 to 220) V	(20 to 40) Hz 40 Hz to 20 kHz (20 to 100) kHz	0.02 % + 2.9 mV 0.013 % + 0.9 mV 0.1 % + 9.2 mV	Fluke 5700A; CMC's stated as a portion or percent of setting plus the floor specification.
(220 to 1100) V	(15 to 50) Hz 50 Hz to 1 kHz	0.05 % + 19 mV 0.014 % + 4 mV	
AC Current – Generate			
(0.1 to 220) µA	40 Hz to 1 kHz (1 to 10) kHz	0.039 % + 19 nA 0.19 % + 92 nA	Fluke 5700A; CMC's stated as a percent of setting plus the floor specification.
220 µA to 2.2 mA	40 Hz to 1 kHz (1 to 10) kHz	0.029 % + 40 nA 0.19 % + 1 µA	
(2.2 to 22) mA	40 Hz to 1 kHz (1 to 10) kHz	0.029 % + 0.4 µA 0.19 % + 9.3 µA	
(22 to 220) mA	40 Hz to 1 kHz (1 to 10) kHz	0.029 % + 4 µA 0.19 % + 9.2 µA	
220 mA to 2.2 A	40 Hz to 1 kHz (1 to 10) kHz	0.089 % + 92 µA 1 % + 190 µA	
(2 to 10) A	10 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 20) kHz	0.045 % + 1.4 mA 0.1 % + 1.8 mA 0.25 % + 6.9 mA 0.86 % + 39 mA	Datron 4800 w/ Datron 4600 transconductance amplifier; CMC's stated as a percentage of setting.

Parameter/Range	Frequency	CMC[2] (±)	Comments
Oscilloscope –			
DC Voltage Amplitude	± 1 mV to 190 V	0.029 % rdg + 29 µV	Wavetek 9500; The percentages are related to the reference level.
Leveled Sine Wave	50 kHz to 10 MHz	1.8 % rdg	
Flatness	(50 to 550) MHz (relative to 50 kHz to 10 MHz)	2.3 % rdg	
	(550.01 to 1000) MHz (relative to 50 kHz to 10 MHz)	4.9 % rdg	
Time Marker			
Sine Wave	550.01 ps to 2 ns	10 parts in 10^6	
Square Wave	10 ns to 10 ms	10 parts in 10^6	
Time Interval	50 ps to 100 µs	3 parts in 10^4	SR FS 725 Rubidium frequency standard, HP frequency stand 33120, 83712A

II. Optical Quantities

Parameter/Equipment	Range	CMC[2] (±)	Comments
Optical Attenuation – Measure, (1310 to 1550) nm	(0 to 50) dB	0.7 % rdg (0.03 dB)	ANDO AQ2735
Optical Time Domain Reflectometer – (OTDR): Distance	Up to 200 km Back reflection -50 dB	1.3 m/10 km range	OPCOM BX-C-9B1-4-3-2-1-C-33A

Parameter/Equipment	Range	CMC[2] (±)	Comments
Optical Spectrum Analyzer –			
Power	(+0 to -50) dBm	4 % of rdg	ANDO AQ2735 Burleigh WA-7600
Wavelength	(1480 to 1570) nm	0.9 parts in 10^6	
Optical Power – Absolute Power Measure, (1309, 1550) nm	(1 to 2000) μW	4 % of rdg (0.17 dB)	ANDO AQ2735
Wavelength – Measure	(1270 to 1680) nm	0.9 parts in 10^6	Burleigh WA-7600

III. Thermodynamics

Parameter/Equipment	Range	CMC[2] (±)	Comments
Temperature – Measure, Ovens	-50 °C to 125 °C	1.3 °C	Fluke Hydra 2625 w/ PT-100
	(30 to 95) % RH	3 % RH	Omega RH5100

IV. Time & Frequency

Parameter/Equipment	Range	CMC[2] (±)	Comments
Frequency – Measure			
Time Base	10 MHz	5.4 parts in 10^{10}	SR FS 725 Rubidium frequency standard
Frequency	(0.001 to 100) Hz 100 Hz to 3 GHz	10 parts in 10^6 5.4 parts in 10^{10}	HP 53131A
	500 MHz to 26.5 GHz	5.4 parts in 10^{10}	HP 5351A

Parameter/Equipment	Range	CMC[2] (±)	Comments
Frequency – Measuring Equipment	(0.001 to 100) Hz 100 Hz to 15 MHz 10 MHz to 20 GHz (1 to 26.5) GHz	10 parts in 10^6 5.4 parts in 10^{10} 5.4 parts in 10^{10} 5.4 parts in 10^{10}	HP 33120 HP 83712A HP 8340B
Jitter – Measure and Measuring Equipment	(0.05 to 20) UI	2 % rdg for null point of Bessel Function, 4 % rdg for other points	HP 8562E

[1] This laboratory offers commercial calibration service and field calibration service.

[2] Calibration and Measurement Capability (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.

American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

GEFEN ELECTRONIC SERVICES LTD.

Petah-Tikva, Israel

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 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 13th day of August 2012.

President & CEO
For the Accreditation Council
Certificate Number 3537.01
Valid to September 30, 2013
Revised July 3, 2013

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