



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

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CALIBRATION

Valid to: November 11, 2014

Certificate Number: AC-1349

I. Electromagnetic - DC/Low Frequency¹

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage - Measure	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV	6.1 µV/V + 3.5 µV 5.7 µV/V + 400 nV 5.4 µV/V + 1 µV 9 µV/V + 40 µV 11 µV/V + 100 µV	Agilent 3458A Opt 002 (90 day spec)	Lockheed Martin and OEM Procedures; DC Voltage is traceable to intrinsic standards, the Josephson Junction Voltage Standard, 10 V Array.
DC Voltage - Source	Up to 220 mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV	6 µV/V + 400 nV 3.5 µV/V + 700 nV 2.5 µV/V + 2.5 µV 2.5 µV/V + 4 µV 3.5 µV/V + 40 µV 4.5 µV/V + 400 µV	Fluke 5720A	
DC Current - Measure	Up to 100 µA 100 µA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	25 µA/A + 900 pA 21 µA/A + 6 nA 29 µA/A + 60 nA 40 µA/A + 600 pA 120 µA/A + 12 µA	Agilent 3458A Opt 002	
DC Current - Source	Up 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	35 µA/A + 6 nA 30 µA/A + 7 nA 30 µA/A + 40 nA 40 µA/A + 700 nA 60 µA/A + 12 µA 340 µA/A + 480 µA	Fluke 5720A with Fluke 5725A	



PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Resistance - Measure	Up to 10 Ω (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	17 μΩ/Ω + 58 μΩ 12 μΩ/Ω + 580 μΩ 9 μΩ/Ω + 600 μΩ 9 μΩ/Ω + 6 mΩ 9 μΩ/Ω + 60 μΩ 14 μΩ/Ω + 2 Ω 59 μΩ/Ω + 120 Ω 580 μΩ/Ω + 1.2 kΩ	Agilent 3458A Opt 002	
Resistance - Source Fixed Points	0 Ω (1, 1.9) Ω (10, 19) Ω (100, 190) Ω (1, 1.9, 10, 1.9) kΩ (100, 190) kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	40 μΩ 80 μΩ/Ω 21 μΩ/Ω 9 μΩ/Ω 7.5 μΩ/Ω 9 μΩ/Ω 15 μΩ/Ω 16 μΩ/Ω 31 μΩ/Ω 39 μΩ/Ω 95 μΩ/Ω	Fluke 5720A (90 day spec)	
AC Voltage - Measure	(1 to 12) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (10 to 120) mV (1 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 kHz to 1 MHz 100 mV to 1.2 V (1 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 kHz to 1 MHz	720 μV/V + 340 nV 580 μV/V + 1.3 μV 580 μV/V + 1.3 μV 1.3 mV/V + 1.3 μV 5.8 mV/V + 1.3 μV 46 mV/V + 2.3 μV 350 μV/V + 5 μV 150 μV/V + 2 μV 210 μV/V + 2 μV 380 μV/V + 2 μV 990 μV/V + 2 μV 3.5 mV/V + 1.1 μV 12 mV/V + 1 μV 270 μV/V + 340 μV 90 μV/V + 130 μV 170 μV/V + 130 μV 350 μV/V + 130 μV 930 μV/V + 130 μV 3.5 mV/V + 110 μV 12 mV/V + 110 μV	Agilent 3458A Opt 002	Lockheed Martin and OEM Procedures

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	(1 to 12) V (1 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 kHz to 1 MHz (10 to 120) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz 100 V to 1 kV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	270 µV/V + 3.4 mV 90 µV/V + 1.3 mV 170 µV/V + 1.3 mV 350 µV/V + 1.3 mV 930 µV/V + 1.3 mV 3.5 mV/V + 1.1 mV 120 mV/V + 11 mV 320 µV/V + 5 mV 230 µV/V + 2 mV 230 µV/V + 2 mV 410 µV/V + 2 mV 1.4 mV/V + 2 mV 470 µV/V + 50 mV 470 µV/V + 20 mV 760 µV/V + 20 mV 1.6 mV/V + 20 mV 3.5 mV/V + 20 mV	Agilent 3458A Opt 002	Lockheed Martin and OEM Procedures
AC Voltage - Source	(2.2 to 22) mV (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 (22 to 220) mV (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	220 µV/V + 4 µV 85 µV/V + 4 µV 75 µV/V + 4 µV 180 µV/V + 4 µV 460 µV/V + 4 µV 900 µV/V + 10 µV 1.2 mV/V + 25 µV 2.5 mV/V + 20 µV 220 µV/V + 12 µV 85 µV/V + 7 µV 75 µV/V + 7 µV 180 µV/V + 7 µV 420 µV/V + 17 µV 750 µV/V + 20 µV 1.2 mV/V + 25 µV 2.5 mV/V + 45 µV	Fluke 5720A	



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AC Voltage - Source	<p>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</p> <p>(2.2 to 22) 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</p> <p>(22 to 220) 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</p> <p>220 V to 1.1 kV (15 to 50) Hz 50 Hz to 1 kHz</p> <p>1 100 V 40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz</p> <p>750 V (30 to 50) kHz (50 to 100) kHz</p>	<p>220 µV/V + 40 µV 80 µV/V + 15 µV 40 µV/V + 8 µV 70 µV/V + 10 µV 110 µV/V + 30 µV 340 µV/V + 80 µV 900 µV/V + 200 µV 1.5 mV/V + 300 µV</p> <p>220 µV/V + 400 µV 80 µV/V + 150 µV 40 µV/V + 50 µV 70 µV/V + 100 µV 95 µV/V + 200 µV 260 µV/V + 600 µV 900 µV/V + 2 mV 1.3 mV/V + 3.3 mV</p> <p>220 µV/V + 4 mV 80 µV/V + 1.5 mV 47 µV/V + 600 µV 75 µV/V + 1 mV 130 µV/V + 2.5 mV 800 µV/V + 16 mV 4.2 mV/V + 40 mV 70 mV/V + 80 mV</p> <p>260 µV/V + 16 mV 60 µV/V + 3.5 mV</p> <p>80 µV/V + 4 mV 125 µV/V + 6 mV 360 µV/V + 11 mV</p> <p>360 µV/V + 11 mV 1.3 mV/V + 45 mV</p>	<p>Fluke 5720A</p> <p>Fluke 5720A with Fluke 5725A</p>	<p>Lockheed Martin and OEM Procedures</p>



PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current - Measure	Up to 120 µA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz 100 µA to 1.2 mA (10 to 20) Hz 20 Hz to 1 kHz (1 to 5) kHz (1 to 120) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz 100 mA to 1 A 10 Hz to 1 kHz (1 to 5) kHz	4.6 mA/A + 40 nA 1.7 mA/A + 40 nA 700 µA/A + 40 nA 4.6 mA/A + 200 nA 1.7 mA/A + 200 nA 450 µA/A + 200 nA 4.7 mA/A + 20 µA 1.7 mA/A + 20 µA 700 µA/A + 20 µA 400 µA/A + 20 µA 4.6 mA/A + 200 µA 1.2 mA/A + 200 µA	Fluke 5790A and A40, A40A	
AC Current - Source	(22 to 220) µA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 µA to 2.2 mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (2.2 to 22) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (22 to 220) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	230 µA/A + 16 nA 140 µA/A + 10 nA 110 µA/A + 8 nA 250 µA/A + 12 nA 900 µA/A + 65 nA 230 µA/A + 40 nA 140 µA/A + 35 nA 110 µA/A + 35 nA 180 µA/A + 110 nA 900 µA/A + 650 nA 230 µA/A + 400 nA 140 µA/A + 350 nA 110 µA/A + 350 nA 180 µA/A + 550 nA 900 µA/A + 5 µA 230 µA/A + 4 µA 140 µA/A + 3.5 µA 110 µA/A + 2.5 µA 180 µA/A + 3.5 µA 900 µA/A + 10 µA	Fluke 5720A	Lockheed Martin and OEM Procedures

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AC Current - Source (cont.)	220 mA to 2.2 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (2.2 to 11) A 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	240 µA/A + 35 µA 390 µA/A + 80 µA 600 µA/A + 160 µA 400 µA/A + 170 µA 850 µA/A + 380 µA 3.3 mA/A + 750 µA	Fluke 5720A/5725A	Lockheed Martin and OEM Procedures

II. Time and Frequency

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency - Source, Fixed Points	10 MHz	5×10^{-12} Hz/Hz 6 months aging rate	Symmetricom 5071A with NIST GPS 76100S Traceability	Lockheed Martin and OEM Procedures with NIST FMAS GPS Service
Frequency - Source ¹	1 Hz to 30 MHz	30 nHz/Hz	Fluke 5720A Wideband with Agilent 53132A	
Frequency - Measure ¹	1 Hz to 225 MHz	30 nHz/Hz	Agilent 53132A	

Notes:

1. This notation indicates that both in-house and field calibration services are accredited.
2. Calibration and Measurement Capabilities (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of $k=2$. The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty stated in the scope of accreditation due to the behavior of the customer's device.
3. This scope is part of and must be included with the Certificate of Accreditation Number AC-1349.



Vice President

