



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

**Spectrum Technologies,
a Transcat Company**
1228 State Route 487
Paxinos, PA 17860

Fulfills the requirements of

ISO/IEC 17025:2017

and national standards

**ANSI/NCSL Z540-1-1994 (R2002) AND
ANSI/NCSL Z540.3-2006 (R2013)**

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

A handwritten signature in black ink, appearing to read 'R. Douglas Leonard Jr.', is positioned above a horizontal line.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 07 September 2021
Certificate Number: AC-2489.19



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
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).

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017,
ANSI/NCSL Z540-1-1994 (R2002) AND ANSI/NCSL Z540.3 (R2013)**

**Spectrum Technologies,
a Transcat Company**

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CALIBRATION

Valid to: **September 7, 2021**

Certificate Number: **AC-2489.19**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-) ^{1,2}	Reference Standard, Method, and/or Equipment	
DC Voltage - Source	(0 to 330) mV	0.004 8 % + 2.3 μV	Fluke 5500A	
	(0.33 to 3.3) V	0.003 9 % + 3.9 μV		
	(3.3 to 33) V	0.004 % + 39 μV		
	(33 to 330) V	0.004 3 % + 0.39 mV		
	(330 to 1 000) V	0.004 3 % + 1.2 mV		
DC Current - Source	(0 to 3.3) mA	0.01 % + 0.04 μA	Fluke 5500A	
	(3.3 to 33) mA	0.009 6 % + 0.19 μA		
	(33 to 330) mA	0.007 8 % + 2.5 μA		
	(0.33 to 2.2) A	0.025 % + 34 μA		
	(2.2 to 11) A	0.047 % + 0.26 mA		
AC Voltage - Source	(1 to 33) mV	0.27 % + 16 μV	Fluke 5500A	
	(10 to 45) Hz			
	(0.045 to 10) kHz			0.12 % + 16 μV
	(10 to 20) kHz			0.16 % + 16 μV

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-) ^{1,2}	Reference Standard, Method, and/or Equipment
AC Voltage - Source	(1 to 33) mV (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	 0.19 % + 16 μV 0.27 % + 26 μV 0.78 % + 47 μV	Fluke 5500A
	(33 to 330) mV (10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	 0.19 % + 39 μV 0.039 % + 16 μV 0.078 % + 16 μV 0.12 % + 31 μV 0.19 % + 0.13 mV 0.54 % + 0.26 mV	
	(0.33 to 3.3) V (10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	 0.12 % + 0.19 mV 0.023 % + 46 μV 0.062 % + 47 μV 0.11 % + 0.23 mV 0.19 % + 1.3 mV 0.39 % + 2.6 mV	
	(3.3 to 33) V (10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	 0.12 % + 1.9 mV 0.031 % + 0.47 mV 0.062 % + 2 mV 0.15 % + 3.9 mV 0.19 % + 13 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-) ^{1,2}	Reference Standard, Method, and/or Equipment
AC Voltage - Source	(33 to 330) V		Fluke 5500A
	45 Hz to 1 kHz	0.039 % + 5.1 mV	
	(1 to 10) kHz	0.062 % + 12 mV	
	(10 to 20) kHz	0.07 % + 26 mV	
	(330 to 1020) V		
	45 Hz to 1 kHz	0.039 % + 62 mV	
(1 to 5) kHz	0.16 % + 78 mV		
(5 to 10) kHz	0.16 % + 390 mV		
AC Current - Source	(30 to 330) μ A		
	(10 to 20) Hz	0.25 % + 0.12 μ A	
	(20 to 45) Hz	0.098 % + 0.12 μ A	
	45 Hz to 1 kHz	0.097 % + 0.12 μ A	
	(1 to 5) kHz	0.31 % + 0.12 μ A	
	(0.33 to 3.3) mA		
	(10 to 20) Hz	0.16 % + 0.23 μ A	
	(20 to 45) Hz	0.16 % + 0.23 μ A	
	45 Hz to 1 kHz	0.078 % + 0.23 μ A	
	(1 to 5) kHz	0.16 % + 0.23 μ A	
	(5 to 10) kHz	0.47 % + 0.23 μ A	
	(3.3 to 33) mA		
	(10 to 20) Hz	0.16 % + 2.3 μ A	
	(20 to 45) Hz	0.079 % + 2.3 μ A	
	45 Hz to 1 kHz	0.07 % + 2.3 μ A	
(1 to 5) kHz	0.16 % + 2.3 μ A		
(5 to 10) kHz	0.47 % + 2.3 μ A		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-) ^{1,2}	Reference Standard, Method, and/or Equipment
AC Current - Source	(33 to 330) mA		Fluke 5500A
	(10 to 20) Hz	0.16 % + 23 μ A	
	(20 to 45) Hz	0.078 % + 23 μ A	
	45 Hz to 1 kHz	0.07 % + 23 μ A	
	(1 to 5) kHz	0.16 % + 23 μ A	
	(5 to 10) kHz	0.47 % + 23 μ A	
	(0.330 to 2.2) A		
	(10 to 45) Hz	0.16 % + 0.23 mA	
	45 Hz to 1 kHz	0.078 % + 0.23 mA	
	(1 to 5) kHz	0.58 % + 0.23 mA	
	(2.2 to 10) A		
	(10 to 65) Hz	0.047 % + 1.6 mA	
(65 to 500) Hz	0.078 % + 1.6 mA		
500 Hz to 1 kHz	0.26 % + 1.6 mA		
Resistance - Source	(0 to 11) Ω	0.009 4 % + 0.004 6 Ω	Fluke 5500A
	(11 to 33) Ω	0.009 4 % + 0.007 7 Ω	
	(33 to 110) Ω	0.007 % + 0.007 7 Ω	
	(110 to 330) Ω	0.007 1 % + 0.007 7 Ω	
	(0.33 to 1.1) k Ω	0.007 1 % + 0.047 Ω	
	(1.1 to 3.3) k Ω	0.007 1 % + 0.047 Ω	
	(3.3 to 11) k Ω	0.007 % + 0.47 Ω	
	(11 to 33) k Ω	0.007 1 % + 0.47 Ω	
	(33 to 110) k Ω	0.008 6 % + 4.7 Ω	
	(110 to 330) k Ω	0.009 5 % + 4.7 Ω	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-) ^{1,2}	Reference Standard, Method, and/or Equipment
Resistance - Source	(0.33 to 1.1) MΩ	0.012 % + 43 Ω	Fluke 5500A
	(1.1 to 3.3) MΩ	0.013 % + 43 Ω	
	(3.3 to 11) MΩ	0.047 % + 0.43 kΩ	
	(11 to 33) MΩ	0.086 % + 0.43 kΩ	
	(33 to 110) MΩ	0.4 % + 4.3 kΩ	
	(110 to 330) MΩ	0.54 % + 4.3 kΩ	
Capacitance - Source	(0.33 to 11) nf (50 to 1 000) Hz	0.41 % + 7.8 pF	Fluke 5500A
	(11 to 110) nf (50 to 1 000) Hz	0.22 % + 7.8 pF	
	(110 to 330) nf (50 to 1 000) Hz	0.22 % + 0.23 nF	
	(0.33 to 1.1) μf (50 to 1 000) Hz	0.22 % + 0.77 nF	
	(1.1 to 3.3) μf (50 to 1 000) Hz	0.22 % + 2.3 nF	
	(3.3 to 11) μf (50 to 400) Hz	0.22 % + 7.8 nF	
	(11 to 33) μf (50 to 400) Hz	0.33 % + 23 nF	
	(33 to 110) μf (50 to 200) Hz	0.45 % + 78 nF	
	(110 to 330) μf (50 to 100) Hz	0.59 % + 0.23 μF	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-) ^{1,2}	Reference Standard, Method, and/or Equipment
Capacitance - Source	(0.33 to 1.1) mf (50 to 100) Hz	0.85 % + 0.23 µF	Fluke 5500A

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Source	0.01 Hz to 2 MHz	19 µHz/Hz + 0.78 mHz	Fluke 5500A

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. Values listed with percent (%) are percent of reading unless otherwise noted
2. CMC is for a controlled laboratory environment of 18 °C to 28 °C (65 °F to 82 °F), when outside of this environment, larger measurement uncertainties are expected than what is reported on the accredited scope.
3. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2489.19.



R. Douglas Leonard Jr., VP, PILR SBU