



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

ANKO ELECTRONICS
4091 E. La Palma Ave., Ste. N
Anaheim, CA 92807

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

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: 10 November 2022

Certificate Number: AC-2921



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
AND ANSI/NCSL Z540-1-1994 (R2002)**

ANKO ELECTRONICS
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Anaheim, CA 92807
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CALIBRATION

Valid to: **November 10, 2022**

Certificate Number: **AC-2921**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Generate	(0 to 329.999) mV (0 to 3.299 999) V (0 to 32.999 99) V (30 to 329.999 9) V (0.1 to 1) kV	6.5 μ V 33 μ V 0.35 mV 4.9 mV 16 mV	Fluke 5520A Multifunction Calibrator
DC Current – Generate	(0 to 329.999) μ A (0.33 to 3.299 99) mA (3 to 32.999 9) mA (33 to 329.999) mA (0.33 to 1.099 99) A To 2.999 99) A (3 to 10.999 9) A (11 to 20.5) A	54 nA 0.29 μ A 2.8 μ A 28 μ A 0.2 mA 0.94 mA 4.7 mA 17 mA	Fluke 5520A Multifunction Calibrator
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	1.4 μ V 7.9 μ V 75 μ V 1.1 mV 24 mV	Agilent 3458A Option 002 Digital Multimeter
DC Current – Measure	(0 to 100) μ A 100 μ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	4.1 nA 36 nA 0.37 μ A 5.6 μ A 0.15 mA	Agilent 3458A Option 002 Digital Multimeter
DC Resistance – Generate	(0 to 10.999 9) Ω (11 to 32.999 9) Ω (33 to 109.999 9) Ω (110 to 329.999 9) Ω	1.2 m Ω 2 m Ω 2.9 m Ω 7.7 m Ω	Fluke 5520A Multifunction Calibrator



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DC Resistance – Generate	(330 to 1.099 999) k Ω	25 m Ω	Fluke 5520A Multifunction Calibrator
	(1.1 to 3.299 999) k Ω	79 m Ω	
	(3.3 to 10.999 99) k Ω	0.25 Ω	
	(11 to 32.999 99) k Ω	0.79 Ω	
	(33 to 109.999 9) k Ω	2.5 Ω	
	(110 to 329.999 9) k Ω	8.8 Ω	
	330 k Ω to 1.099 999 M Ω	30 Ω	
	(1.1 to 3.299 999) M Ω	0.16 k Ω	
	(3.3 to 10.999 99) M Ω	1.1 k Ω	
	(11 to 32.999 9) M Ω	7.3 k Ω	
	(33 to 109.999 9) M Ω	45 k Ω	
(110 to 329.999 9) M Ω	0.78 M Ω		
(330 to 1100) M Ω	13 M Ω		
DC Resistance – Measure	(0 to 10) Ω	0.25 m Ω	Agilent 3458A Option 002 Digital Multimeter
	(10 to 100) Ω	2.5 m Ω	
	100 Ω to 1 k Ω	14 m Ω	
	(1 to 10) k Ω	0.14 Ω	
	(10 to 100) k Ω	1.4 Ω	
	100 k Ω to 1 M Ω	21 Ω	
	(1 to 10) M Ω	0.71 k Ω	
(10 to 100) M Ω	62 k Ω		
AC Voltage – Generate	(1 to 33) mV		Fluke 5520A Multifunction Calibrator
	(10 to 45) Hz	25 μ V	
	45 Hz to 10 kHz	9.1 μ V	
	(10 to 20) kHz	10 μ V	
	(20 to 50) kHz	31 μ V	
	(50 to 100) kHz	99 μ V	
	(100 to 500) kHz	0.24 mV	
	(33 to 330) mV		
	(10 to 45) Hz	83 μ V	
	45 Hz to 10 kHz	44 μ V	
	(10 to 20) kHz	49 μ V	
	(20 to 50) kHz	97 μ V	
	(50 to 100) kHz	0.23 mV	
	(100 to 500) kHz	0.57 mV	
	(0.33 to 3.3) V		
	(10 to 45) Hz	0.81 mV	
	45 Hz to 10 kHz	0.43 mV	
(10 to 20) kHz	0.54 mV		
(20 to 50) kHz	0.81 mV		
(50 to 100) kHz	1.9 mV		
(100 to 500) kHz	6.7 mV		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Generate	(3.3 to 33) V		Fluke 5520A Multifunction Calibrator
	(10 to 45) Hz	8.2 mV	
	45 Hz to 10 kHz	4.4 mV	
	(10 to 20) kHz	6.7 mV	
	(20 to 50) kHz	9.5 mV	
	(50 to 100) kHz	24 mV	
	(33 to 330) V		
	45 Hz to 1 kHz	52 mV	
	(1 to 10) kHz	57 mV	
	(10 to 20) kHz	70 mV	
	(20 to 50) kHz	87 mV	
	(50 to 100) kHz	0.55 V	
	AC Voltage – Measure	(330 to 1020) V	
45 Hz to 1 kHz		0.25 V	
(1 to 5) kHz		0.21 V	
(5 to 10) kHz		0.25 V	
(1 to 10) mV			
40 Hz to 1 kHz		4.5 μ V	
(1 to 20) kHz		16 μ V	
(20 to 50) kHz		5.5 μ V	
(50 to 100) kHz		60 μ V	
(100 to 300) kHz		0.47 mV	
(10 to 100) mV			
40 Hz to 1 kHz		12 μ V	
(1 to 20) kHz		20 μ V	
(20 to 50) kHz		52 μ V	
(50 to 100) kHz		0.1 mV	
(100 to 300) kHz		0.36 mV	
300 kHz to 1 MHz		1.7 mV	
100 mV to 1 V			
40 Hz to 1 kHz	0.12 mV		
(1 to 20) kHz	0.19 mV		
(20 to 50) kHz	0.39 mV		
(50 to 100) kHz	0.97 mV		
(100 to 300) kHz	3.5 mV		
300 kHz to 1 MHz	12 mV		
(1 to 2) MHz	20 mV		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	(1 to 10) V		Agilent 3458A Option 002 Digital Multimeter
	(1 to 40) Hz	1.4 mV	
	40 Hz to 1 kHz	1.2 mV	
	(1 to 20) kHz	2.0 mV	
	(20 to 50) kHz	3.9 mV	
	(50 to 100) kHz	9.6 mV	
	(100 to 300) kHz	36 mV	
	(10 to 100) V		
	40 Hz to 1 kHz	26 mV	
	(1 to 20) kHz	27 mV	
	(20 to 50) kHz	44 mV	
	(50 to 100) kHz	0.14 V	
	(100 to 700) V		
	40 Hz to 1 kHz	0.35 V	
AC Current – Generate	(29 to 330) μ A		Fluke 5520A Multifunction Calibrator
	(10 to 20) Hz	0.6 μ A	
	(20 to 45) Hz	0.47 μ A	
	45 Hz to 1 kHz	0.40 μ A	
	(1 to 5) kHz	0.89 μ A	
	(5 to 10) kHz	2.2 μ A	
	(10 to 30) kHz	4.4 μ A	
	330 μ A to 3.3mA		
	(10 to 20) Hz	5.3 μ A	
	(20 to 45) Hz	3.3 μ A	
	45 Hz to 1 kHz	2.7 μ A	
	(1 to 5) kHz	5.3 μ A	
	(5 to 10) kHz	13 μ A	
	(10 to 30) kHz	26 μ A	
	(3.3 to 33) mA		
	(10 to 20) Hz	48 μ A	
	(20 to 45) Hz	25 μ A	
	45 Hz to 1 kHz	13 μ A	
	(1 to 5) kHz	23 μ A	
	(5 to 10) kHz	54 μ A	
	(10 to 30) kHz	0.11 mA	
	(33 to 330) mA		
	(10 to 20) Hz	0.48 mA	
	(20 to 45) Hz	0.25 mA	
	45 Hz to 1 kHz	0.12 mA	
	(1 to 5) kHz	0.3 mA	
	(5 to 10) kHz	0.6 mA	
	(10 to 30) kHz	1.2 mA	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment		
AC Current – Generate	330 mA to 1.09999 A (10 to 45) Hz	1.6 mA	Fluke 5520A Multifunction Calibrator		
	45 Hz to 1 kHz (1 to 5) kHz	0.52 mA 5.9 mA			
	(5 to 10) kHz	25 mA			
	(1.1 to 2.99999) A (10 to 45) Hz	4.4 mA			
	45 Hz to 1 kHz (1 to 5) kHz	1.7 mA 15 mA			
	(5 to 10) kHz	62 mA			
	(3 to 10.9999) A (45 to 100) Hz	7.2 mA			
	100 Hz to 1 kHz (1 to 5) kHz	10 mA 0.26 A			
	(11 to 20.5) A (45 to 100) Hz	23 mA			
	100 Hz to 1 kHz (1 to 5 kHz)	28 mA 0.48 A			
	AC Current – Measure	(0 to 100) μ A			Agilent 3458A Option 002 Digital Multimeter
		10 Hz to 20 Hz		0.5 μ A	
		20 Hz to 45 Hz		0.21 μ A	
		45 Hz to 100 Hz		0.11 μ A	
100 Hz to 1 kHz		0.11 μ A			
100 μ A to 1 mA (10 to 20) Hz		4.9 μ A			
(20 to 45) Hz		2 μ A			
(45 to 100) Hz		0.94 μ A			
100 Hz to 5 kHz (5 to 20) kHz		0.59 μ A 0.94 μ A			
(20 to 50) kHz		5.1 μ A			
(1 to 10) mA (10 to 20) Hz		49 μ A			
(20 to 45) Hz		20 μ A			
(45 to 100) Hz		9.4 μ A			
100 Hz to 5 kHz (5 to 20) kHz		5.9 μ A 9.4 μ A			
(20 to 50) kHz	51 μ A				



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure	(10 to 100) mA		Agilent 3458A Option 002 Digital Multimeter
	(10 to 20) Hz	0.49 mA	
	(20 to 45) Hz	0.20 mA	
	(45 to 100) Hz	94 μ A	
	100 Hz to 5 kHz	59 μ A	
	(5 to 20) kHz	94 μ A	
	(20 to 50) kHz	0.51 mA	
	100 mA to 1 A		
	(10 to 20) Hz	4.9 mA	
	(20 to 45) Hz	2.1 mA	
	(45 to 100) Hz	1.2 mA	
	100 Hz to 5 kHz	1.4 mA	
	(5 to 20) kHz	3.7 mA	
	Electrical Stimulation of Thermocouple Indicating Devices	Type E	
(-250 to -100) °C		0.39 °C	
(-100 to -25) °C		0.13 °C	
(-25 to 350) °C		0.11 °C	
(350 to 650) °C		0.13 °C	
(650 to 1 000) °C		0.18 °C	
Type J			
(-210 to -100) °C		0.21 °C	
(-100 to -30) °C		0.13 °C	
(-30 to 150) °C		0.11 °C	
(150 to 760) °C		0.14 °C	
(760 to 1 200) °C		0.18 °C	
Type K			
(-200 to -100) °C		0.26 °C	
(-100 to -25) °C		0.14 °C	
(-25 to 120) °C		0.13 °C	
(120 to 1 000) °C		0.21 °C	
(1 000 to 1 372) °C		0.31 °C	
Type S			
(0 to 250) °C		0.37 °C	
(250 to 1 000) °C		0.28 °C	
(1 000 to 1 400) °C		0.29 °C	
(1 400 to 1 767) °C		0.38 °C	
Type T			
(-250 to -150) °C	0.49 °C		
(150 to 0) °C	0.19 °C		
(0 to 120) °C	0.13 °C		
(120 to 400) °C	0.11 °C		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Capacitance-Generate	(0.4 to 3.299 99) nF (3.3 to 32.999 9) nF (33 to 329.999) nF (0.33 to 3.299 99) μ F (3.3 to 32.999) μ F (33 to 329.999) μ F (.33 to 3.299 99) mF	20 pF 0.14 nF 0.36 nF 8.3 nF 0.12 μ F 1.3 μ F 13 μ F	Fluke 5520A Multifunction Calibrator
Oscilloscopes Amplitude DC Signal 50 Ω load	(1 to 24.999) mV (25 to 109.99) mV 110 mV to 2.1999 V (2.2 to 6.6) V	78 μ V 0.24 mV 4.4 mV 13 mV	Fluke 5522A/SC1100 Multifunction Calibrator
Amplitude DC Signal 1 M Ω Load	(1 to 24.999) mV (25 to 109.99) mV 110 mV to 2.1999 V (2.2 to 10.999) V (11 to 130) V	41 μ V 74 μ V 0.85 mV 4.3 mV 51 mV	
Rise Time	1 kHz to 2 MHz (200 to 300) pF 2 MHz to 10 MHz (200 to 350) pF	0.23 ns 0.23 ns	
Time Marker 50 Ω load	(1 to 5) ns 10 ns (20 to 50) ns 100 ns to 20 ms	9.7 fs 19 fs 97 fs 39 ns	

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Calipers	(0 to 12) in	0.000 89 in	Gage Blocks
Indicators (Dial & Digital)	(0 to 0.2) in	0.000 32 in	Dial Indicator Calibrator

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Hydraulic Gage Pressure - Measure	(0 to 5) psi (0 to 100) psi (0 to 10 000) psi	0.001 5 psi 0.064 psi 2.4 psi	Pressure Gages Additel ADT681-02-005 Additel ADT681-02-100 Additel ADT681-02-GP10k
Torque Wrenches	(50 to 800) lbf ft	1 % of reading	Torque Calibrator

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Relative Humidity – Measuring Equipment	(15 to 80) % RH	1.5 %RH	Vaisala M170/HMP77B Thermohygrometer
Temperature – Measuring Equipment	22 °C	0.3 °C	Vaisala M170/HMP77B Thermohygrometer

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. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope
2. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2921.



R. Douglas Leonard Jr., VP, PILR SBU