



Keysight Technologies Malaysia Sdn Bhd (463532-M)
 Bayan Lepas Free Industrial Zone
 11900 Penang, Malaysia



5962-0476

Certificate of Calibration

ANSI/NCSL Z540-1-1994

Certificate No: PENANG4397681-5379192-1

Manufacturer: Keysight Technologies
Model No: 34420A
Options Installed With Specifications: N/A

Description: Nano Volt/Micro Ohm Meter
Serial No: MY42009500

Date of Calibration: 05-MAR-2020
Temperature: (23 ± 2) °C
Procedure: 34420A.CAL.N76

Humidity: (30 to 70)% RH

This certifies that the equipment has been calibrated using applicable Keysight Technologies procedures and in compliance with ISO/IEC 17025:2017 and ANSI/NCSL Z540-1-1994. The quality management system is registered to ISO 9001:2015.

As Received Conditions: Factory tested. No incoming data available.

Action Taken:
 - No corrective actions were necessary.

As Shipped Conditions: At the completion of the calibration, measured values were IN SPECIFICATION at the points tested.

Remarks or special requirements:
 This calibration includes the attached measurement report with report number 2007A55173.

- Notes:**
1. This calibration report may refer to equipment manufactured by HP, Agilent and Keysight as being manufactured by Keysight Technologies, Inc.
 2. The test limits stated in the calibration report correspond to the published specifications of the equipment, at the points tested.
 3. The documented test results relate to the equipment tested only.
 4. This calibration report shall not be reproduced, except in full

Traceability Information: Measurements are traceable to the International System of Units (SI) via national metrology institutes (www.keysight.com/find/NMI) that are signatories to the CIPM Mutual Recognition Arrangement.

Uncertainty of Measurement
 The uncertainty evaluation has been performed in accordance with ISO/IEC Guide 98-3:2008 (GUM). The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %. This probability corresponds to a coverage factor of k=2 for a normal distribution.

Print Date: 05-MAR-2020

Tay Eng Su
 Quality Manager

Keysight Technologies				
	DD	MM	YY	BY:
CAL	05	03	20	AM
DUE				



Certificate of Calibration

ANSI/NCSL Z540-1-1994

Certificate No: PENANG4397681-5379192-1

Calibration Equipment Used

<u>Model Number</u>	<u>Model Description</u>
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FLU 742A-10	Resistance Standard
FLU 742A-1	Resistance Standard
FLU 742A-100K	Resistance Standard
FLU 742A-100	Resistance Standard
FLU 5720A	Calibrator

Date Used: Date equipment used in this calibration

<u>Equipment ID</u>	<u>Date Used</u>	<u>Cal Due Date</u>
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PZ00061	05-MAR-2020	24-OCT-2020
PZ00060	05-MAR-2020	24-OCT-2020
PZ00063	05-MAR-2020	26-OCT-2020
PZ00062	05-MAR-2020	26-OCT-2020
PZ00034	05-MAR-2020	24-MAY-2020

Measurement Report

Keysight Technologies Malaysia Sdn Bhd (463532-M)
Bayan Lepas Free Industrial Zone
11900, Penang
Malaysia

Report Number: 2007A55173
Model Number: 34420A
Tested Options:

Customer:
Serial Number: MY42009500

Test Date: 5 Mar 2020
Temperature: (23.0±2) °C

Tested By: N1008234
Humidity: (30 to 70)% RH

Test Program Name: HP34420A Part No. 5011-4052
Test Program Version: C.02.04
Test Executive: STE/9000 C.09.05W (MENDOR B.06.34)

Specification Limits:

Unless indicated otherwise, the units for minimum and/or maximum specification limits are the same as the units stated for the measured value.

Measurement Report

Report Number: 2007A55173
Model Number: 34420A

Test Date: 5 Mar 2020
Serial Number: MY42009500

Result Status Flags:

Each measurement result stated will contain a result status flag.

The status flags are defined as follows:

- ' ' **Passed.** The measured values of the equipment were observed in specification at the points tested. Additionally, the expanded measurement uncertainty intervals about the measured values were in specification.
- 'P‡' **Passed‡.** The measured values of the equipment were observed in specification at the points tested. However, a portion of the expanded measurement uncertainty intervals about one or more measured values exceeded specification. Consequently, compliance with specification cannot be declared based on the stated coverage probability.
- 'F‡' **Failed‡.** One or more measured values of the equipment were observed out of specification at the points tested. However, a portion of the expanded measurement uncertainty intervals about one or more measured values were in specification. Consequently, non-compliance with specification cannot be declared based on the stated coverage probability.
- 'F' **Failed.** One or more measured values of the equipment were observed out of specification at the points tested. Additionally, the expanded measurement uncertainty intervals about one or more measured values were entirely outside the specification.

Calibration Standards Used

<u>Model No.</u>	<u>Serial No.</u>	<u>Asset No.</u>	<u>Cal Due Date</u>
FLU5720A	7660210	PZ00034	24 May 2020
FLUKE 742A-100K	7944003	PZ00063	26 Oct 2020
FLUKE 742A-100	7950004	PZ00062	26 Oct 2020
FLUKE 742A-10	7955002	PZ00061	24 Oct 2020
FLUKE 742A-1	8004006	PZ00060	24 Oct 2020

Report Number: 2007A55173
Model Number: 34420A

Test Date: 5 Mar 2020
Serial Number: MY42009500

PERFORMANCE TEST RESULTS SUMMARY

<u>Test Name</u>	<u>Status</u>
INITIAL SETUP	DONE
ZERO OFFSET	PASSED
DC VOLTAGE GAIN	PASSED
OHMS GAIN	PASSED

Measurement Report

Report Number: 2007A55173
Model Number: 34420A

Test Date: 5 Mar 2020
Serial Number: MY42009500

ZERO OFFSET

PASSED

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	UNCERT.
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Range	Input
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DC Voltage Channel1

1 mV 0 V	-120.0	-0.6 nV	120.0	53 nV
10 mV 0 V	-0.130	-0.002 μ V	0.130	50 nV
100 mV 0 V	-0.40	0.01 μ V	0.40	50 nV
1 V 0 V	-4.0	-0.1 μ V	4.0	0.23 μ V
10 V 0 V	-0.040	0.000 mV	0.040	1.0 μ V
100 V 0 V	-0.50	0.00 mV	0.50	25 μ V

DC Voltage Channel2

1 mV 0 V	-120.0	5.5 nV	120.0	53 nV
10 mV 0 V	-0.130	0.005 μ V	0.130	50 nV
100 mV 0 V	-0.40	-0.01 μ V	0.40	50 nV
1 V 0 V	-4.0	-0.4 μ V	4.0	0.28 μ V
10 V 0 V	-0.040	0.000 mV	0.040	0.48 μ V

4-Wire Ohms

1 Ω 0 Ω	-2.0	-0.8 $\mu\Omega$	2.0	0.47 $\mu\Omega$
10 Ω 0 Ω	-0.020	0.005 m Ω	0.020	3.3 $\mu\Omega$
100 Ω 0 Ω	-0.20	-0.01 m Ω	0.20	33 $\mu\Omega$
1 k Ω 0 Ω	-2.0	-0.2 m Ω	2.0	0.28 m Ω
10 k Ω 0 Ω	-0.020	0.002 Ω	0.020	1.8 m Ω
100 k Ω 0 Ω	-0.40	-0.01 Ω	0.40	14 m Ω
1 M Ω 0 Ω	-4.0	-0.2 Ω	4.0	0.14 Ω

Low Power Ohms

1 Ω 0 Ω	-2.0	-0.6 $\mu\Omega$	2.0	0.55 $\mu\Omega$
10 Ω 0 Ω	-0.020	0.004 m Ω	0.020	3.3 $\mu\Omega$
100 Ω 0 Ω	-0.20	-0.04 m Ω	0.20	18 $\mu\Omega$
1 k Ω 0 Ω	-2.0	0.0 m Ω	2.0	0.28 m Ω
10 k Ω 0 Ω	-0.040	-0.001 Ω	0.040	7.1 m Ω
100 k Ω 0 Ω	-1.50	-0.04 Ω	1.50	33 m Ω
1 M Ω 0 Ω	-4.0	-0.2 Ω	4.0	0.23 Ω

Voltage Limited Ohms

10 Ω 0 Ω	-0.020	0.006 m Ω	0.020	3.3 $\mu\Omega$
100 Ω 0 Ω	-0.20	0.06 m Ω	0.20	33 $\mu\Omega$

2-Wire Ohms

1 Ω 0 Ω	-200002.0	27143.1 $\mu\Omega$	200002.0	0.22 m Ω
10 Ω 0 Ω	-200.020	26.440 m Ω	200.020	0.12 m Ω

Measurement Report

Report Number: 2007A55173
Model Number: 34420A

Test Date: 5 Mar 2020
Serial Number: MY42009500

ZERO OFFSET

CONTINUED

<u>TEST CONDITIONS</u>	<u>MINIMUM</u>	<u>MEASURED</u>	<u>MAXIMUM</u>	<u>UNCERT.</u>
100 Ω 0 Ω	-200.20	26.10 mΩ	200.20	86 μΩ
1 kΩ 0 Ω	-202.0	25.9 mΩ	202.0	0.29 mΩ
10 kΩ 0 Ω	-0.220	0.025 Ω	0.220	4.1 mΩ
100 kΩ 0 Ω	-0.60	0.01 Ω	0.60	15 mΩ
1 MΩ 0 Ω	-4.2	0.1 Ω	4.2	0.14 Ω

DC VOLTAGE GAIN

PASSED

<u>TEST CONDITIONS</u>		<u>MINIMUM</u>	<u>MEASURED</u>	<u>MAXIMUM</u>	<u>UNCERT.</u>
<u>Range</u>	<u>Input</u>				
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DC Voltage Channel1					
100 mV	100 mV	99.99560	100.00010 mV	100.00440	1.2 μV
1 V	1 V	0.9999610	1.0000001 V	1.0000390	5.8 μV
10 V	10 V	9.999660	10.000001 V	10.000340	38 μV
100 V	100 V	99.99600	100.00093 V	100.00400	0.56 mV
DC Voltage Channel2					
100 mV	100 mV	99.99560	100.00108 mV	100.00440	1.2 μV
1 V	1 V	0.9999610	1.0000013 V	1.0000390	5.8 μV
10 V	10 V	9.999660	10.000001 V	10.000340	38 μV
DC Low-Voltage Channel1					
1 mV	1 mV	0.9999300	1.0000185 mV	1.0000700	16 nV
10 mV	10 mV	9.999470	9.999958 mV	10.000530	0.11 μV
DC Low-Voltage Channel2					
1 mV	1 mV	0.9999300	1.0000040 mV	1.0000700	15 nV
10 mV	10 mV	9.999470	9.999951 mV	10.000530	0.12 μV

OHMS GAIN

PASSED

<u>TEST COND.</u>	<u>MINIMUM</u>	<u>MEASURED</u>	<u>MAXIMUM</u>	<u>UNCERT.</u>
<u>Range (Ohm)</u>	<u>Input (Ohm)</u>			
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Measurement Report

Report Number: 2007A55173
Model Number: 34420A

Test Date: 5 Mar 2020
Serial Number: MY42009500

OHMS GAIN

CONTINUED

<u>TEST COND.</u>		<u>MINIMUM</u>	<u>MEASURED</u>	<u>MAXIMUM</u>	<u>UNCERT.</u>
4-Wire Ohms					
1	1	0.9999280	0.9999992 Ω	1.0000720	16 μΩ
10	10	9.999380	9.999988 Ω	10.000620	0.14 mΩ
100	100	99.99380	99.99971 Ω	100.00620	0.98 mΩ
1k	1k	0.9999380	0.9999997 kΩ	1.0000620	7.8 mΩ
10k	10k	9.999380	9.999988 kΩ	10.000620	77 mΩ
100k	100k	99.99360	100.00008 kΩ	100.00640	1.0 Ω
1M	1M	0.9999260	0.9999957 MΩ	1.0000740	18 Ω
Low Power Ohms					
1	1	0.9999280	0.9999986 Ω	1.0000720	16 μΩ
10	10	9.999380	9.999986 Ω	10.000620	0.14 mΩ
100	100	99.99380	99.99961 Ω	100.00620	0.97 mΩ
1k	1k	0.9999380	1.0000000 kΩ	1.0000620	7.8 mΩ
10k	10k	9.999360	9.999981 kΩ	10.000640	77 mΩ
100k	100k	99.99250	100.00019 kΩ	100.00750	1.0 Ω
1M	1M	0.9999260	0.9999958 MΩ	1.0000740	18 Ω
Voltage Limited Ohms					
10	10	9.999280	9.999970 Ω	10.000720	0.14 mΩ
100	100	99.99280	99.99996 Ω	100.00720	0.97 mΩ
