



Certificate of Calibration

Keysight Calibration

Certificate Number 1-13658387422-1

Model Number 34401A
Manufacturer Keysight Technologies Inc
Description Digital multimeter, 6.5 digit
Serial Number 3146A09484
Customer Asset No. 1811
Options Installed See Measurement Report

Customer
Keysight Technologies Japan K.K.
9-1 Takakura-Cho
HACHIOJI-SHI, Tokyo 192-8550
Japan

Date of Calibration 22 Jan 2021
Procedure STE-50111013-D.03.05
Temperature (23±3) °C
Humidity (30-70) %RH

Location of Calibration
Keysight Technologies Japan K.K.
Service Center
9-1 Takakura-cho
Hachioji-shi, Tokyo 192-8550
JAPAN

This certifies that the equipment has been calibrated using applicable Keysight Technologies procedures in compliance with a quality management system registered to ISO 9001:2015.

As Received Conditions

The measured values of the equipment were observed in specification at the points tested.

Action Taken

- No corrective actions were necessary.

As Completed Conditions

The measured values of the equipment were observed in specification at the points tested.

Keysight considers the uncertainties of measurements during the development of performance tests. In this report, conformance statements of "Passed" or "Failed" are determined by simple comparison of observed measurements to the warranted specifications.

Remarks or Special Requirements

This calibration report shall not be reproduced, except in full. The documented results relate to the equipment calibrated only.

The test limits stated in the report correspond to the published specifications of the equipment, at the points tested.

This calibration report may refer to equipment manufactured by HP, Agilent and Keysight as being manufactured by Keysight Technologies.

Akira Nukiyama Services Manager



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Traceability Information

Technician ID N5224640

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.

Calibration Equipment Used

<u>Model Number</u>	<u>Model Description</u>	<u>Equipment ID</u>	<u>Cal Due Date</u>	<u>Certificate Number</u>
33250A	Function/Arbitrary Waveform Generator, 80 MHz	3080	26 Oct 2021	1-13195004096-1
5071A	Primary frequency standard	2308	3 Jun 2021	1-12673077665-1
5725A	Amplifier for 5700A or 5720A	2858	21 Apr 2021	1-13335745118-2
5730A	High Performance Multifunction Calibrator	4268	21 Apr 2021	1-13335745118-1

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Compliance with Specification

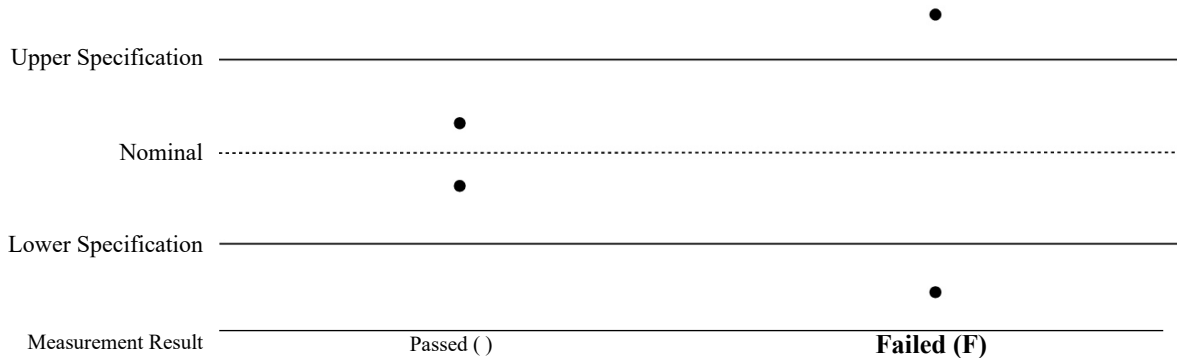
Measured values of the equipment that were observed in specification at the points tested are determined to have Passed (). Measured values of the equipment that were observed out of specification at the points tested are determined to have Failed (F).

An overall statement of compliance for all tests performed as received, and as completed (if any adjustments / repairs were performed) is included at the beginning of this report. Statements of compliance apply only to warranted specifications. When functional verification tests are performed, results are reported in the "Functional Test" section, and do not affect these statements of compliance.

The status summaries relate to the tested item only. A final decision about whether the item's performance actually satisfies requirements of the user can only be made by the user.

Measurement results are reported as:

- Passed () - The measured values of the equipment were observed in specification at the points tested.
- Failed (F) - One or more measured values of the equipment were observed out of specification at the points tested.



() This result is indicated on the measurement report as a blank space in the column labeled "Status" or "Sts".
 Note: For more information on the level of risk such as false accept and false reject and statistical assumptions of these statements of conformity, please visit: www.keysight.com/find/decisionrules.



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Calibration Test Results Summary

<u>Test Name</u>	<u>As Received Status</u>
ZERO OFFSET - FRONT TERMINALS	Passed
ZERO OFFSET - REAR TERMINALS	Passed
DC VOLTS	Passed
AC VOLTS	Passed
FREQUENCY	Passed
4-WIRE OHMS	Passed
2-WIRE OHMS MATH NULL ON	Passed
2-WIRE OHMS MATH NULL OFF	Passed
DC CURRENT	Passed
AC CURRENT	Passed

Tested Configuration

Firmware Version 3-1-1

(As Rec) 3-1-1

ZERO OFFSET - FRONT TERMINALS

Passed

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	Status
<i>Range</i>	<i>Input</i>				
<i>(Front)</i>					

<i>DC Volts Zero Offset</i>					
100 mV	0 V	-3.5 uV	0.0 uV	3.5 uV	
1 V	0 V	-7 uV	1 uV	7 uV	
10 V	0 V	-0.05 mV	0.00 mV	0.05 mV	
100 V	0 V	-0.6 mV	0.1 mV	0.6 mV	
1000 V	0 V	-10 mV	1 mV	10 mV	
<i>Range</i>	<i>Input</i>				
<i>(Front)</i>					

<i>4-Wire Ohms Zero Offset</i>					
100 Ω	0 Ω	-4.0 m Ω	-1.1 m Ω	4.0 m Ω	
1 k Ω	0 Ω	-10 m Ω	-1 m Ω	10 m Ω	
10 k Ω	0 Ω	-0.10 Ω	-0.01 Ω	0.10 Ω	
100 k Ω	0 Ω	-1.0 Ω	-0.1 Ω	1.0 Ω	
1 M Ω	0 Ω	-10 Ω	0 Ω	10 Ω	
10 M Ω	0 Ω	-0.10 k Ω	-0.01 k Ω	0.10 k Ω	
100 M Ω	0 Ω	-10.0 k Ω	0.0 k Ω	10.0 k Ω	
<i>Range</i>	<i>Input</i>				
<i>(Front)</i>					

<i>2-Wire Ohms Zero Offset</i>					
100 Ω	0 Ω	-204.0 m Ω	49.2 m Ω	204.0 m Ω	
1 k Ω	0 Ω	-210 m Ω	48 m Ω	210 m Ω	
10 k Ω	0 Ω	-0.30 Ω	0.04 Ω	0.30 Ω	
100 k Ω	0 Ω	-1.2 Ω	0.1 Ω	1.2 Ω	
1 M Ω	0 Ω	-10 Ω	1 Ω	10 Ω	
10 M Ω	0 Ω	-0.10 k Ω	0.02 k Ω	0.10 k Ω	
100 M Ω	0 Ω	-10.0 k Ω	0.0 k Ω	10.0 k Ω	
<i>Range</i>	<i>Input</i>				
<i>(Front)</i>					

<i>DC Current Zero Offset</i>					
10 mA	0 A	-2.00 uA	0.03 uA	2.00 uA	
100 mA	0 A	-5.0 uA	0.1 uA	5.0 uA	
1 A	0 A	-100 uA	-3 uA	100 uA	
3 A	0 A	-600 uA	5 uA	600 uA	

ZERO OFFSET - REAR TERMINALS

Passed

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	Status
<i>Range</i>	<i>Input</i>				
	(Rear)				

<i>DC Volts Zero Offset</i>					
100 mV	0 V	-3.5 uV	0.0 uV	3.5 uV	
1 V	0 V	-7 uV	1 uV	7 uV	
10 V	0 V	-0.05 mV	0.00 mV	0.05 mV	
100 V	0 V	-0.6 mV	0.0 mV	0.6 mV	
1000 V	0 V	-10 mV	0 mV	10 mV	
<i>Range</i>	<i>Input</i>				
	(Rear)				

<i>4-Wire Ohms Zero Offset</i>					
100 Ω	0 Ω	-4.0 mΩ	0.4 mΩ	4.0 mΩ	
1 kΩ	0 Ω	-10 mΩ	1 mΩ	10 mΩ	
10 kΩ	0 Ω	-0.10 Ω	0.00 Ω	0.10 Ω	
100 kΩ	0 Ω	-1.0 Ω	0.0 Ω	1.0 Ω	
1 MΩ	0 Ω	-10 Ω	-1 Ω	10 Ω	
10 MΩ	0 Ω	-0.10 kΩ	0.01 kΩ	0.10 kΩ	
100 MΩ	0 Ω	-10.0 kΩ	0.2 kΩ	10.0 kΩ	
<i>Range</i>	<i>Input</i>				
	(Rear)				

<i>2-Wire Ohms Zero Offset</i>					
100 Ω	0 Ω	-204.0 mΩ	50.9 mΩ	204.0 mΩ	
1 kΩ	0 Ω	-210 mΩ	52 mΩ	210 mΩ	
10 kΩ	0 Ω	-0.30 Ω	0.06 Ω	0.30 Ω	
100 kΩ	0 Ω	-1.2 Ω	0.0 Ω	1.2 Ω	
1 MΩ	0 Ω	-10 Ω	1 Ω	10 Ω	
10 MΩ	0 Ω	-0.10 kΩ	0.02 kΩ	0.10 kΩ	
100 MΩ	0 Ω	-10.0 kΩ	0.3 kΩ	10.0 kΩ	
<i>Range</i>	<i>Input</i>				
	(Rear)				

<i>DC Current Zero Offset</i>					
10 mA	0 A	-2.00 uA	0.01 uA	2.00 uA	
100 mA	0 A	-5.0 uA	0.1 uA	5.0 uA	
1 A	0 A	-100 uA	-1 uA	100 uA	
3 A	0 A	-600 uA	2 uA	600 uA	

DC VOLTS

Passed

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	Status
<i>Range Input(Front)</i>					
100 mV	100 mV	99.9915 mV	100.0000 mV	100.0085 mV	
1 V	1 V	0.999953 V	1.000002 V	1.000047 V	
10 V	10 V	9.99960 V	10.00003 V	10.00040 V	
10 V	-10 V	-10.00040 V	-10.00003 V	-9.99960 V	
100 V	100 V	99.9949 V	100.0004 V	100.0051 V	
1000 V	1000 V	999.945 V	1000.005 V	1000.055 V	

AC VOLTS

Passed

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	Status
<i>Input Freq.</i>					
<i>(Front)</i>					

<i>100 mV Range</i>					
10 mV	1 kHz	9.9540 mV	10.0003 mV	10.0460 mV	
100 mV	1 kHz	99.9000 mV	99.9874 mV	100.1000 mV	
100 mV	50 kHz	99.8300 mV	100.0213 mV	100.1700 mV	
<i>Input Freq.</i>					
<i>(Front)</i>					

<i>1 V Range</i>					
1 V	20 Hz	0.999100 V	0.999712 V	1.000900 V	
1 V	1 kHz	0.999100 V	0.999895 V	1.000900 V	
1 V	20 kHz	0.999100 V	0.999948 V	1.000900 V	
1 V	50 kHz	0.998300 V	1.000145 V	1.001700 V	
1 V	100 kHz	0.993200 V	1.000881 V	1.006800 V	
1 V	300 kHz	0.955000 V	1.004577 V	1.045000 V	
<i>Input Freq.</i>					
<i>(Front)</i>					

<i>10 V Range</i>					
100 mV	1 kHz	86.94 mV	100.25 mV	113.06 mV	
1 V	1 kHz	0.99640 V	0.99973 V	1.00360 V	
10 V	10 Hz	9.99100 V	9.99893 V	10.00900 V	
10 V	1 kHz	9.99100 V	9.99876 V	10.00900 V	
10 V	50 kHz	9.98300 V	10.00257 V	10.01700 V	
<i>Input Freq.</i>					
<i>(Front)</i>					

<i>100 V Range</i>					
100 V	1 kHz	99.9100 V	99.9900 V	100.0900 V	

Model 34401A Serial 3146A09484 Firmware Rev 3-1-1
Options Tested

 Test Date 22 Jan 2021
 Condition As Received

AC VOLTS (cont.)

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
100 V 50 kHz	99.8300 V	99.9936 V	100.1700 V	

Input Freq.
(Front)

750 V Range

700 V 1 kHz	699.355 V	699.940 V	700.645 V	
700 V 50 kHz	698.785 V	700.021 V	701.215 V	
700 V 45 Hz	699.355 V	699.857 V	700.645 V	

FREQUENCY

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
10 mV 100 Hz	99.9000 Hz	100.0046 Hz	100.1000 Hz	

Input Freq.
(Front)

100 mV Range
1 V Range

1 V 100 kHz	99.9900 kHz	100.0006 kHz	100.0100 kHz	
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4-WIRE OHMS

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
100 Ω 100 Ω	99.9860 Ω	99.9994 Ω	100.0140 Ω	

4-Wire Ohms
Range Input(Front)

1 kΩ 1 kΩ	0.999890 kΩ	0.999989 kΩ	1.000110 kΩ	
10 kΩ 10 kΩ	9.99890 kΩ	9.99992 kΩ	10.00110 kΩ	
100 kΩ 100 kΩ	99.9890 kΩ	99.9997 kΩ	100.0110 kΩ	
1 MΩ 1 MΩ	0.999890 MΩ	1.000002 MΩ	1.000110 MΩ	
10 MΩ 10 MΩ	9.99590 MΩ	9.99963 MΩ	10.00410 MΩ	
100 MΩ 100 MΩ	99.1900 MΩ	99.9378 MΩ	100.8100 MΩ	

2-WIRE OHMS MATH NULL ON

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
100 Ω 100 Ω	99.9860 Ω	99.9992 Ω	100.0140 Ω	

2-Wire Ohms Math Null ON
Range Input(Front)

1 kΩ 1 kΩ	0.999890 kΩ	0.999990 kΩ	1.000110 kΩ	
10 kΩ 10 kΩ	9.99890 kΩ	9.99991 kΩ	10.00110 kΩ	
100 kΩ 100 kΩ	99.9890 kΩ	99.9997 kΩ	100.0110 kΩ	
1 MΩ 1 MΩ	0.999890 MΩ	1.000001 MΩ	1.000110 MΩ	

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Options Tested

 Test Date 22 Jan 2021
 Condition As Received

2-WIRE OHMS MATH NULL ON (cont.)

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
10 MΩ 10 MΩ	9.99590 MΩ	9.99971 MΩ	10.00410 MΩ	
100 MΩ 100 MΩ	99.1900 MΩ	99.9229 MΩ	100.8100 MΩ	

2-WIRE OHMS MATH NULL OFF

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
<i>2-Wire Ohms Math Null OFF</i>				
<i>Range Input(Front)</i>				
100 Ω 100 Ω	99.7860 Ω	100.0546 Ω	100.2140 Ω	
1 kΩ 1 kΩ	0.999690 kΩ	1.000046 kΩ	1.000310 kΩ	
10 kΩ 10 kΩ	9.99870 kΩ	9.99998 kΩ	10.00130 kΩ	
100 kΩ 100 kΩ	99.9888 kΩ	99.9999 kΩ	100.0112 kΩ	
1 MΩ 1 MΩ	0.999890 MΩ	1.000002 MΩ	1.000110 MΩ	
10 MΩ 10 MΩ	9.99590 MΩ	9.99971 MΩ	10.00410 MΩ	
100 MΩ 100 MΩ	99.1900 MΩ	99.9209 MΩ	100.8100 MΩ	

DC CURRENT

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
<i>Range Input(Front)</i>				
10 mA 10 mA	9.99300 mA	10.00183 mA	10.00700 mA	
100 mA 100 mA	99.9450 mA	100.0168 mA	100.0550 mA	
1 A 1 A	0.998900 A	1.000007 A	1.001100 A	
3 A 2 A	1.99700 A	1.99992 A	2.00300 A	

AC CURRENT

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
<i>Input Freq. (Front)</i>				

<i>1 Amp Range</i>				
10 mA 1 kHz	8.590 mA	9.975 mA	11.410 mA	
1 A 1 kHz	0.998600 A	0.999904 A	1.001400 A	
<i>3 Amp Range</i>				
2 A 1 kHz	1.99520 A	1.99990 A	2.00480 A	