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

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

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.

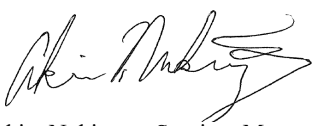
As Completed Conditions
The measured values of the equipment were observed in specification at the points tested.

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.



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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

Model Number	Model Description	Equipment ID	Cal Due Date	Certificate Number
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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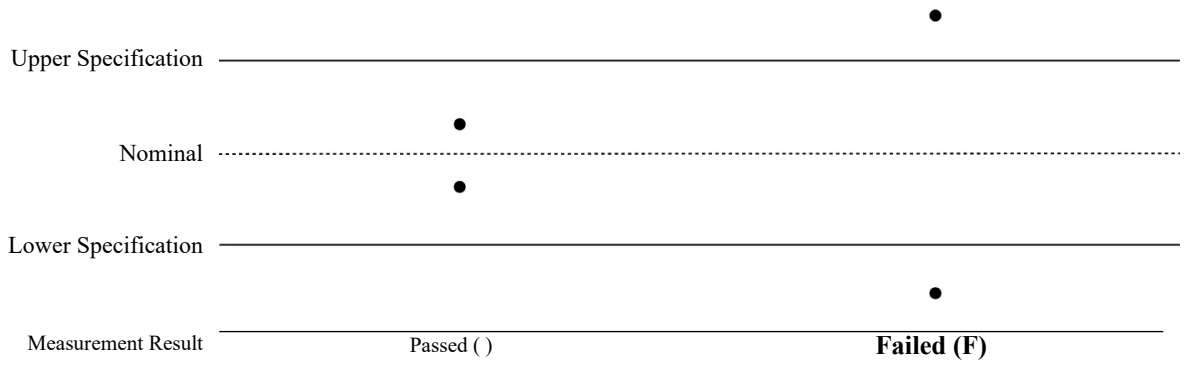
Compliance with Specification

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

Test Name	As Received Status
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
Range	*Input (Front)*				
DC Volts Zero Offset					
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	
Range	*Input (Front)*				
4-Wire Ohms Zero Offset					
100 Ω	0 Ω	−4.0 mΩ	−1.1 mΩ	4.0 mΩ	
1 kΩ	0 Ω	−10 mΩ	−1 mΩ	10 mΩ	
10 kΩ	0 Ω	−0.10 Ω	−0.01 Ω	0.10 Ω	
100 kΩ	0 Ω	−1.0 Ω	−0.1 Ω	1.0 Ω	
1 MΩ	0 Ω	−10 Ω	0 Ω	10 Ω	
10 MΩ	0 Ω	−0.10 kΩ	−0.01 kΩ	0.10 kΩ	
100 MΩ	0 Ω	−10.0 kΩ	0.0 kΩ	10.0 kΩ	
Range	*Input (Front)*				
2-Wire Ohms Zero Offset					
100 Ω	0 Ω	−204.0 mΩ	49.2 mΩ	204.0 mΩ	
1 kΩ	0 Ω	−210 mΩ	48 mΩ	210 mΩ	
10 kΩ	0 Ω	−0.30 Ω	0.04 Ω	0.30 Ω	
100 kΩ	0 Ω	−1.2 Ω	0.1 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	0.0 kΩ	10.0 kΩ	
Range	*Input (Front)*				
DC Current Zero Offset					
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
Range	*Input (Rear)*				
DC Volts Zero Offset					
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	
Range	*Input (Rear)*				
4-Wire Ohms Zero Offset					
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	
Range	*Input (Rear)*				
2-Wire Ohms Zero Offset					
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	
Range	*Input (Rear)*				
DC Current Zero Offset					
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
Range	*Input(Front)*				
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
Input (Front)	*Freq.*				
100 mV Range					
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	
Input (Front)	*Freq.*				
1 V Range					
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	
Input (Front)	*Freq.*				
10 V Range					
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	
Input (Front)	*Freq.*				
100 V Range					
100 V	1 kHz	99.9100 V	99.9900 V	100.0900 V	

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)				
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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
Input Freq. (Front)				
------- -------				
100 mV Range				
10 mV 100 Hz	99.9000 Hz	100.0046 Hz	100.1000 Hz	
1 V Range				
1 V 100 kHz	99.9900 kHz	100.0006 kHz	100.0100 kHz	

4-WIRE OHMS **Passed**

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
4-Wire Ohms				
Range Input(Front)				
100 Ω 100 Ω	99.9860 Ω	99.9994 Ω	100.0140 Ω	
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
2-Wire Ohms Math Null ON				
Range Input(Front)				
100 Ω 100 Ω	99.9860 Ω	99.9992 Ω	100.0140 Ω	
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	

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
2-Wire Ohms Math Null OFF				
Range Input(Front)				
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
Range Input(Front)				
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
Input Freq. (Front)				
--- ---				
1 Amp Range				
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	
3 Amp Range				
2 A 1 kHz	1.99520 A	1.99990 A	2.00480 A	