Certificate of Calibration

KEYSIGHT TECHNOLOGIES

ANSI/NCSL Z540.1-1994 (R2002)

Certificate Number 1-8733968233-1

Model Number	34401A
Manufacturer	Keysight Technologies Inc
Description	Digital multimeter, 6.5 digit
Serial Number	MY41036593
Customer Asset No.	34401A6593
Date of Calibration	30 Mar 2017
Procedure	STE-50111013-D.02.03
Temperature	(23 ± 3) °C
Humidity	(50 ± 20) %RH

Customer
Keysight Technologies Taiwan Ltd
324 PINGZHEN
20 Kao Shuang Rd
D400 Service Center
Taiwan

Location of Calibration
Keysight Technologies Taiwan Ltd.
Support Solution Unit
20,Kuo-Shuang Road,Ping-Chen district 32450
Tao-Yuan City,Taiwan, R.O.C
TAIWAN

This certifies that the equipment has been calibrated using applicable Keysight Technologies procedures and in compliance with ANSI/ NCSL Z540.1-1994 (R2002). The quality management system is registered to ISO 9001:2015.

This calibration report is composed of a certificate of calibration, performance test results and/or certificate appendices. Each report section is numbered separately.

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.

Uncertainties are calculated at a 95% confidence interval with a coverage factor of 2 (k=2). When not specifically called out in the measurement report, a Test Uncertainty Ratio (TUR) of 4:1 can be assumed.

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.

Based on the customer's request, the next calibration is due on 30 Mar 2018.

Keysight Technologies Taiwan Ltd.
Support Solution Unit
20,Kuo-Shuang Road,Ping-Chen district
32450
Tao-Yuan City,Taiwan, R.O.C
TAIWAN

Chen Chin-Ming - Authorized Signatory

Certificate of Calibration

ANSI/NCSL Z540.1-1994 (R2002)

Certificate Number 1-8733968233-1

Traceability Information

Technician ID 00808778

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	33250A14005	19 Sep 2017	1-8145130749-1
5720A	Multifunction Calibrator - No Options	FLU5720A204	25 Jun 2017	1-7633804997-1
5725A	Amplifier for 5700A or 5720A	FLU5725A002	25 Jun 2017	1-7633760907-1

Measurement Report

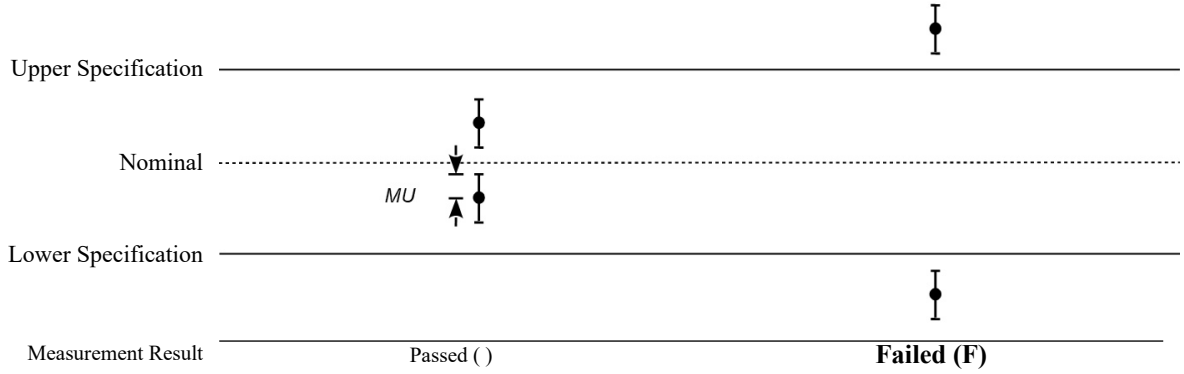
Certificate Number 1-8733968233-1

Model Number	34401A
Serial Number	MY41036593
Test Date	30 Mar 2017
Test Program Name	HP34401A, 5011-1013
Test Program Version	D.02.03
Test Executive	STE/9000, C.08.94W
Test Subsystem	MENDOR, B.06.34

Note: Traceability information can be found on the calibration certificate.

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.



MU = 95% expanded measurement uncertainty.
( ) 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.

KEYSIGHT TECHNOLOGIES

Measurement Report

Certificate Number 1-8733968233-1

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

Measurement Report

Certificate Number 1-8733968233-1

Model 34401A **Serial** MY41036593 **Test Date** 30 Mar 2017
Options Tested **Condition** As Received

ZERO OFFSET - FRONT TERMINALS — Passed

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
Range	*Input (Front)*					
DC Volts Zero Offset						
100 mV	0 V	−3.5 uV	−1.2 uV	3.5 uV	1.1 uV	
1 V	0 V	−7 uV	−2 uV	7 uV	1.2 uV	
10 V	0 V	−0.05 mV	0.00 mV	0.05 mV	6.6 uV	
100 V	0 V	−0.6 mV	0.0 mV	0.6 mV	0.17 mV	
1000 V	0 V	−10 mV	0 mV	10 mV	0.74 mV	
Range	*Input (Front)*					
4-Wire Ohms Zero Offset						
100 Ω	0 Ω	−4.0 mΩ	−1.6 mΩ	4.0 mΩ	1.2 mΩ	
1 kΩ	0 Ω	−10 mΩ	−1 mΩ	10 mΩ	1.2 mΩ	
10 kΩ	0 Ω	−0.10 Ω	−0.01 Ω	0.10 Ω	0.014 Ω	
100 kΩ	0 Ω	−1.0 Ω	−0.1 Ω	1.0 Ω	0.13 Ω	
1 MΩ	0 Ω	−10 Ω	0 Ω	10 Ω	0.68 Ω	
10 MΩ	0 Ω	−0.10 kΩ	−0.01 kΩ	0.10 kΩ	0.011 kΩ	
100 MΩ	0 Ω	−10.0 kΩ	0.0 kΩ	10.0 kΩ	0.058 kΩ	
Range	*Input (Front)*					
2-Wire Ohms Zero Offset						
100 Ω	0 Ω	−204.0 mΩ	−11.0 mΩ	204.0 mΩ	3.0 mΩ	
1 kΩ	0 Ω	−210 mΩ	−11 mΩ	210 mΩ	3.3 mΩ	
10 kΩ	0 Ω	−0.30 Ω	−0.02 Ω	0.30 Ω	8.4 mΩ	
100 kΩ	0 Ω	−1.2 Ω	−0.1 Ω	1.2 Ω	0.068 Ω	
1 MΩ	0 Ω	−10 Ω	0 Ω	10 Ω	1.3 Ω	
10 MΩ	0 Ω	−0.10 kΩ	0.00 kΩ	0.10 kΩ	7.8 Ω	
100 MΩ	0 Ω	−10.0 kΩ	0.0 kΩ	10.0 kΩ	0.058 kΩ	
Range	*Input (Front)*					
DC Current Zero Offset						
10 mA	0 A	−2.00 uA	−0.03 uA	2.00 uA	0.16 uA	
100 mA	0 A	−5.0 uA	−0.1 uA	5.0 uA	0.21 uA	
1 A	0 A	−100 uA	−2 uA	100 uA	7.0 uA	
3 A	0 A	−600 uA	0 uA	600 uA	11 uA	

ZERO OFFSET - REAR TERMINALS — Passed

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
Range	*Input (Rear)*					
DC Volts Zero Offset						
100 mV	0 V	−3.5 uV	−0.9 uV	3.5 uV	0.88 uV	
1 V	0 V	−7 uV	−1 uV	7 uV	0.91 uV	
10 V	0 V	−0.05 mV	0.00 mV	0.05 mV	6.1 uV	
100 V	0 V	−0.6 mV	0.0 mV	0.6 mV	0.074 mV	
1000 V	0 V	−10 mV	0 mV	10 mV	0.61 mV	
Range	*Input (Rear)*					
4-Wire Ohms Zero Offset						
100 Ω	0 Ω	−4.0 mΩ	0.4 mΩ	4.0 mΩ	1.1 mΩ	
1 kΩ	0 Ω	−10 mΩ	0 mΩ	10 mΩ	0.82 mΩ	
10 kΩ	0 Ω	−0.10 Ω	0.00 Ω	0.10 Ω	8.3 mΩ	
100 kΩ	0 Ω	−1.0 Ω	0.0 Ω	1.0 Ω	0.16 Ω	
1 MΩ	0 Ω	−10 Ω	0 Ω	10 Ω	0.98 Ω	
10 MΩ	0 Ω	−0.10 kΩ	0.00 kΩ	0.10 kΩ	6.3 Ω	
100 MΩ	0 Ω	−10.0 kΩ	−0.1 kΩ	10.0 kΩ	0.058 kΩ	
Range	*Input (Rear)*					
2-Wire Ohms Zero Offset						
100 Ω	0 Ω	−204.0 mΩ	1.7 mΩ	204.0 mΩ	6.1 mΩ	
1 kΩ	0 Ω	−210 mΩ	1 mΩ	210 mΩ	5.8 mΩ	
10 kΩ	0 Ω	−0.30 Ω	−0.01 Ω	0.30 Ω	7.2 mΩ	
100 kΩ	0 Ω	−1.2 Ω	−0.1 Ω	1.2 Ω	0.068 Ω	
1 MΩ	0 Ω	−10 Ω	0 Ω	10 Ω	0.60 Ω	
10 MΩ	0 Ω	−0.10 kΩ	0.00 kΩ	0.10 kΩ	0.0097 kΩ	
100 MΩ	0 Ω	−10.0 kΩ	−0.3 kΩ	10.0 kΩ	0.058 kΩ	
Range	*Input (Rear)*					
DC Current Zero Offset						
10 mA	0 A	−2.00 uA	0.03 uA	2.00 uA	5.8 nA	
100 mA	0 A	−5.0 uA	0.1 uA	5.0 uA	0.21 uA	
1 A	0 A	−100 uA	−1 uA	100 uA	4.7 uA	
3 A	0 A	−600 uA	2 uA	600 uA	8.7 uA	

KEYSIGHT TECHNOLOGIES

Measurement Report

Certificate Number 1-8733968233-1

Model 34401A **Serial** MY41036593 **Test Date** 30 Mar 2017
Options Tested **Condition** As Received

DC VOLTS

Passed

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
Range	*Input(Front)*					
100 mV	100 mV	99.9915 mV	99.9995 mV	100.0085 mV	0.0029 mV	
1 V	1 V	0.999953 V	0.999999 V	1.000047 V	0.0000070 V	
10 V	10 V	9.99960 V	10.00000 V	10.00040 V	0.000043 V	
10 V	-10 V	−10.00040 V	−10.00001 V	−9.99960 V	0.000041 V	
100 V	100 V	99.9949 V	99.9998 V	100.0051 V	0.00058 V	
1000 V	1000 V	999.945 V	999.999 V	1000.055 V	0.0084 V	

AC VOLTS

Passed

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
Input (Front)	*Freq.*					
100 mV Range						
10 mV	1 kHz	9.9540 mV	10.0007 mV	10.0460 mV	0.0056 mV	
100 mV	1 kHz	99.9000 mV	99.9898 mV	100.1000 mV	0.021 mV	
100 mV	50 kHz	99.8300 mV	100.0115 mV	100.1700 mV	0.035 mV	
Input (Front)	*Freq.*					
1 V Range						
1 V	20 Hz	0.999100 V	0.999645 V	1.000900 V	0.00012 V	
1 V	1 kHz	0.999100 V	0.999891 V	1.000900 V	0.000063 V	
1 V	20 kHz	0.999100 V	0.999893 V	1.000900 V	0.000065 V	
1 V	50 kHz	0.998300 V	0.999933 V	1.001700 V	0.00016 V	
1 V	100 kHz	0.993200 V	0.999872 V	1.006800 V	0.00030 V	
1 V	300 kHz	0.955000 V	0.998987 V	1.045000 V	0.00063 V	
Input (Front)	*Freq.*					
10 V Range						
100 mV	1 kHz	86.94 mV	100.65 mV	113.06 mV	0.20 mV	
1 V	1 kHz	0.99640 V	0.99981 V	1.00360 V	0.00019 V	
10 V	10 Hz	9.99100 V	9.99891 V	10.00900 V	0.0029 V	
10 V	1 kHz	9.99100 V	9.99879 V	10.00900 V	0.00059 V	
10 V	50 kHz	9.98300 V	10.00157 V	10.01700 V	0.0016 V	
Input (Front)	*Freq.*					
100 V Range						
100 V	1 kHz	99.9100 V	99.9942 V	100.0900 V	0.0079 V	

AC VOLTS (cont.)

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
100 V	50 kHz	99.8300 V	100.0138 V	100.1700 V	0.015 V	
Input (Front)	*Freq.*					
750 V Range						
700 V	1 kHz	699.355 V	699.942 V	700.645 V	0.073 V	
700 V	50 kHz	698.785 V	700.204 V	701.215 V	0.45 V	
700 V	45 Hz	699.355 V	699.891 V	700.645 V	0.12 V	

FREQUENCY

Passed

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
Input (Front)	*Freq.*					
100 mV Range						
10 mV	100 Hz	99.9000 Hz	100.0003 Hz	100.1000 Hz	0.0048 Hz	
1 V Range						
1 V	100 kHz	99.9900 kHz	100.0000 kHz	100.0100 kHz	0.00065 kHz	

4-WIRE OHMS

Passed

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
4-Wire Ohms Range	*Input(Front)*					
100 Ω	100 Ω	99.9860 Ω	100.0009 Ω	100.0140 Ω	0.0028 Ω	
1 kΩ	1 kΩ	0.999890 kΩ	1.000000 kΩ	1.000110 kΩ	0.000012 kΩ	
10 kΩ	10 kΩ	9.99890 kΩ	10.00001 kΩ	10.00110 kΩ	0.00011 kΩ	
100 kΩ	100 kΩ	99.9890 kΩ	100.0002 kΩ	100.0110 kΩ	0.0014 kΩ	
1 MΩ	1 MΩ	0.999890 MΩ	0.999999 MΩ	1.000110 MΩ	0.000022 MΩ	
10 MΩ	10 MΩ	9.99590 MΩ	9.99985 MΩ	10.00410 MΩ	0.00043 MΩ	
100 MΩ	100 MΩ	99.1900 MΩ	99.9364 MΩ	100.8100 MΩ	0.14 MΩ	

2-WIRE OHMS MATH NULL ON

Passed

TEST CONDITIONS		MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
2-Wire Ohms Math Null ON Range	*Input(Front)*					
100 Ω	100 Ω	99.9860 Ω	100.0016 Ω	100.0140 Ω	0.0025 Ω	
1 kΩ	1 kΩ	0.999890 kΩ	1.000001 kΩ	1.000110 kΩ	0.0000091 kΩ	
10 kΩ	10 kΩ	9.99890 kΩ	9.99998 kΩ	10.00110 kΩ	0.000090 kΩ	
100 kΩ	100 kΩ	99.9890 kΩ	100.0006 kΩ	100.0110 kΩ	0.0012 kΩ	
1 MΩ	1 MΩ	0.999890 MΩ	1.000000 MΩ	1.000110 MΩ	0.000021 MΩ	

2-WIRE OHMS MATH NULL ON (cont.)

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
10 MΩ 10 MΩ	9.99590 MΩ	9.99991 MΩ	10.00410 MΩ	0.00042 MΩ	
100 MΩ 100 MΩ	99.1900 MΩ	99.9349 MΩ	100.8100 MΩ	0.015 MΩ	

2-WIRE OHMS MATH NULL OFF — Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
2-Wire Ohms Math Null OFF					
Range Input(Front)					
100 Ω 100 Ω	99.7860 Ω	100.1353 Ω	100.2140 Ω	0.013 Ω	
1 kΩ 1 kΩ	0.999690 kΩ	1.000134 kΩ	1.000310 kΩ	0.000024 kΩ	
10 kΩ 10 kΩ	9.99870 kΩ	10.00012 kΩ	10.00130 kΩ	0.00015 kΩ	
100 kΩ 100 kΩ	99.9888 kΩ	100.0007 kΩ	100.0112 kΩ	0.0012 kΩ	
1 MΩ 1 MΩ	0.999890 MΩ	1.000001 MΩ	1.000110 MΩ	0.000021 MΩ	
10 MΩ 10 MΩ	9.99590 MΩ	9.99992 MΩ	10.00410 MΩ	0.00042 MΩ	
100 MΩ 100 MΩ	99.1900 MΩ	99.9364 MΩ	100.8100 MΩ	0.014 MΩ	

DC CURRENT — Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
Range Input(Front)					
10 mA 10 mA	9.99300 mA	9.99993 mA	10.00700 mA	0.00042 mA	
100 mA 100 mA	99.9450 mA	99.9995 mA	100.0550 mA	0.0054 mA	
1 A 1 A	0.998900 A	1.000037 A	1.001100 A	0.000097 A	
3 A 2 A	1.99700 A	2.00010 A	2.00300 A	0.00026 A	

AC CURRENT — Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	UNCERT.	Status
Input Freq.					
(Front)					
--- ---					
1 Amp Range					
10 mA 1 kHz	8.590 mA	9.997 mA	11.410 mA	0.032 mA	
1 A 1 kHz	0.998600 A	0.999934 A	1.001400 A	0.00033 A	
3 Amp Range					
2 A 1 kHz	1.99520 A	1.99926 A	2.00480 A	0.00065 A	