



Certificate of Calibration

Keysight Calibration

Certificate Number 1-10334572191-1

Model Number	U1273A	Customer	Keysight Technologies Inc
Manufacturer	Keysight Technologies Inc		1220 E Campbell Rd Ste 100
Description	DMM handheld 30,000 counts true RMS with OLED display		RICHARDSON TX 75081-1935
Serial Number	MY54270038		United States
Customer Asset No.	U1273A70038	Location of Calibration	Keysight Technologies Inc
Date of Calibration	6 Sep 2018		10090 Foothills Blvd.
Procedure	STE-50114646-A.02.00		Roseville CA 95747-7102
Temperature	(23 ± 5) °C		UNITED STATES
Humidity	(50 ± 30) %RH		

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 certificate may refer to instruments manufactured by HP, Agilent and Keysight as being manufactured by Keysight Technologies, Inc.

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

Based on the customer's request, the next calibration is due on 6 Sep 2019.

Keysight Technologies Inc
10090 Foothills Blvd.
Roseville CA 95747-7102
UNITED STATES

Issue Date 7 Sep 2018

Wes Fischbach Roseville Serv. Cntr. Mgr.

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Traceability Information

Technician ID Number 01005308

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.

This certificate shall not be reproduced, except in full, without prior written approval of the laboratory.

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	33250A01492	31 May 2019	1-10044279300-1
3458A	Digital multimeter, 8.5 digit	3458A26218	6 Mar 2019	1-9758715486-1
5520A	Multi-Product Calibrator	5520A90203	7 Oct 2018	1-8592988924-1

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Compliance with Specification

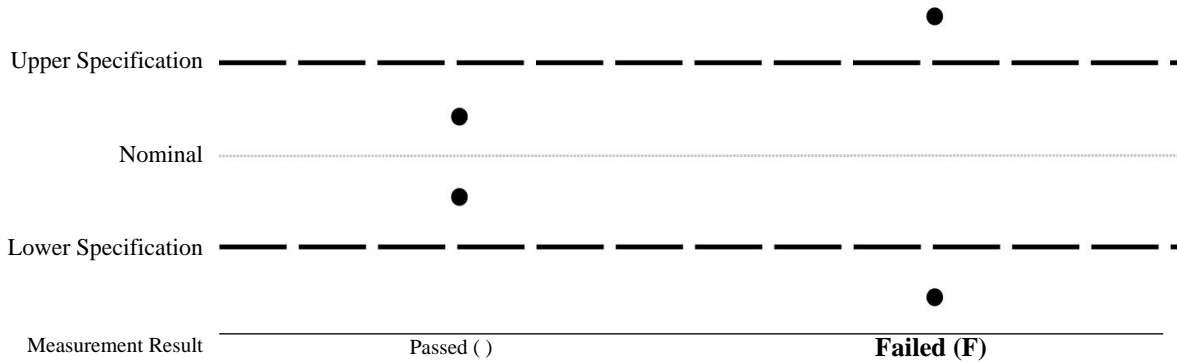
Measured values of the equipment that were observed in specification at the points tested are determined to have Passed (). Measured values of the equipment that were observed out of specification at the points tested are determined to have Failed (F).

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".



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Performance Test Results Summary

<u>Test Name</u>	<u>As Received Status</u>
FUNCTIONAL TEST ON Zlow	Done
ACV TEST	Passed
FREQUENCY AND DUTY CYCLE TEST	Passed
AC mV TEST	Passed
DC/AC V TEST	Passed
DC/AC mV TEST	Passed
RESISTANCE TEST	Passed
DIODE TEST	Passed
CAPACITANCE TEST	Passed
TEMPERATURE TEST	Passed
DC/AC μ A TEST	Passed
DC/AC mA AND A TEST	Passed

FUNCTIONAL TEST ON Zlow

Done

TEST CONDITIONS	RESULT
Range Input	

1000 V 3 V	DONE
1000 V 1.67 kΩ	DONE

ACV TEST

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
Range Input				

3 V 3 V, 20 Hz	2.9675 V	2.9821 V	3.0325 V	
3 V 3 V, 45 Hz	2.9800 V	2.9978 V	3.0200 V	
3 V 3 V, 65 Hz	2.9800 V	3.0002 V	3.0200 V	
3 V 3 V, 1 kHz	2.9675 V	3.0171 V	3.0325 V	
3 V 3 V, 5 kHz	2.9525 V	3.0100 V	3.0475 V	
3 V 3 V, 20 kHz	2.9360 V	3.0159 V	3.0640 V	
3 V 2.7 V, 100 kHz	2.6015 V	2.7405 V	2.7985 V	
30 V 30 V, 20 Hz	29.675 V	29.825 V	30.325 V	
30 V 30 V, 45 Hz	29.800 V	29.979 V	30.200 V	
30 V 30 V, 65 Hz	29.800 V	30.002 V	30.200 V	
30 V 30 V, 1 kHz	29.675 V	30.028 V	30.325 V	
30 V 30 V, 5 kHz	29.525 V	29.997 V	30.475 V	
30 V 30 V, 20 kHz	29.360 V	30.057 V	30.640 V	
30 V 27 V, 100 kHz	26.015 V	27.265 V	27.985 V	
300 V 300 V, 45 Hz	298.00 V	299.81 V	302.00 V	
300 V 300 V, 65 Hz	298.00 V	300.02 V	302.00 V	
300 V 300 V, 1 kHz	296.75 V	301.44 V	303.25 V	
300 V 300 V, 5 kHz	295.25 V	300.81 V	304.75 V	
300 V 270 V, 20 kHz	264.20 V	271.87 V	275.80 V	
1000 V 1000 V, 45 Hz	992.0 V	1000.1 V	1008.0 V	
1000 V 1000 V, 65 Hz	992.0 V	1000.7 V	1008.0 V	
1000 V 1000 V, 1 kHz	987.5 V	1001.9 V	1012.5 V	
1000 V 1000 V, 5 kHz	982.5 V	1001.5 V	1017.5 V	
LPF MODE				
3 V 3 V, 20 Hz	2.9675 V	2.9813 V	3.0325 V	
3 V 3 V, 45 Hz	2.9800 V	2.9965 V	3.0200 V	
3 V 3 V, 65 Hz	2.9800 V	2.9986 V	3.0200 V	
3 V 2.7 V, 430 Hz	2.5625 V	2.7246 V	2.8375 V	

FREQUENCY AND DUTY CYCLE TEST

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
Freq accuracy in AC V position				
Input				

1 kHz, 0.096 V	0.99950 kHz	1.00003 kHz	1.00050 kHz	
Duty cycle accuracy in AC V position				
Input				

50%, 100 Hz, 3 Vpp	49.70 %	50.00 %	50.30 %	

AC mV TEST

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
Range Input				

30 mV 30 mV, 20 Hz	29.765 mV	29.827 mV	30.235 mV	
30 mV 30 mV, 45 Hz	29.800 mV	29.981 mV	30.200 mV	
30 mV 30 mV, 65 Hz	29.800 mV	30.005 mV	30.200 mV	
30 mV 30 mV, 1 kHz	29.765 mV	30.030 mV	30.235 mV	
30 mV 30 mV, 5 kHz	29.675 mV	30.020 mV	30.325 mV	
30 mV 30 mV, 20 kHz	29.660 mV	30.003 mV	30.340 mV	
30 mV 30 mV, 100 kHz	28.910 mV	30.095 mV	31.090 mV	
300 mV 300 mV, 20 Hz	297.65 mV	298.28 mV	302.35 mV	
300 mV 300 mV, 45 Hz	298.00 mV	299.80 mV	302.00 mV	
300 mV 300 mV, 65 Hz	298.00 mV	300.03 mV	302.00 mV	
300 mV 300 mV, 1 kHz	297.65 mV	300.29 mV	302.35 mV	
300 mV 300 mV, 5 kHz	296.75 mV	300.35 mV	303.25 mV	
300 mV 300 mV, 20 kHz	296.60 mV	300.29 mV	303.40 mV	
300 mV 300 mV, 100 kHz	289.10 mV	302.74 mV	310.90 mV	

DC/AC V TEST

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
DC V accuracy in DC+AC V position				
Range Input				

3 V 3 V	2.9980 V	2.9994 V	3.0020 V	
30 V 30 V	29.983 V	30.000 V	30.017 V	
300 V 300 V	299.83 V	300.00 V	300.17 V	
1000 V 1000 V	999.3 V	1000.0 V	1000.7 V	
AC+DC V accuracy in DC+AC V position				
Range Input				

3 V 3 V, 20 Hz	2.9640 V	2.9836 V	3.0360 V	
3 V 3 V, 45 Hz	2.9765 V	2.9983 V	3.0235 V	
3 V 3 V, 65 Hz	2.9765 V	3.0009 V	3.0235 V	
3 V 3 V, 1 kHz	2.9640 V	3.0176 V	3.0360 V	
3 V 3 V, 5 kHz	2.9490 V	3.0101 V	3.0510 V	
3 V 3 V, 20 kHz	2.9325 V	3.0161 V	3.0675 V	
3 V 2.7 V, 100 kHz	2.5983 V	2.7406 V	2.8017 V	
30 V 30 V, 20 Hz	29.640 V	29.852 V	30.360 V	
30 V 30 V, 45 Hz	29.765 V	29.986 V	30.235 V	
30 V 30 V, 65 Hz	29.765 V	30.010 V	30.235 V	
30 V 30 V, 1 kHz	29.640 V	30.036 V	30.360 V	
30 V 30 V, 5 kHz	29.490 V	30.003 V	30.510 V	
30 V 30 V, 20 kHz	29.325 V	30.064 V	30.675 V	
30 V 27 V, 100 kHz	25.983 V	27.274 V	28.017 V	
300 V 300 V, 45 Hz	297.65 V	299.85 V	302.35 V	
300 V 300 V, 65 Hz	297.65 V	300.09 V	302.35 V	
300 V 300 V, 1 kHz	296.40 V	301.51 V	303.60 V	
300 V 300 V, 5 kHz	294.90 V	300.88 V	305.10 V	
300 V 270 V, 20 kHz	263.88 V	271.93 V	276.12 V	
1000 V 1000 V, 45 Hz	990.5 V	1000.4 V	1009.5 V	
1000 V 1000 V, 65 Hz	990.5 V	1001.1 V	1009.5 V	
1000 V 1000 V, 1 kHz	986.0 V	1002.0 V	1014.0 V	
1000 V 1000 V, 5 kHz	981.0 V	1001.8 V	1019.0 V	

DC/AC mV TEST

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
DC mV accuracy in DC+AC mV position				
Range Input				

30 mV 30 mV	29.965 mV	30.007 mV	30.035 mV	
30 mV -30 mV	-30.035 mV	-29.991 mV	-29.965 mV	
300 mV 300 mV	299.80 mV	300.01 mV	300.20 mV	
300 mV -300 mV	-300.20 mV	-299.97 mV	-299.80 mV	

AC+DC mV accuracy in DC+AC mV position				
Range Input				

30 mV 30 mV, 20 Hz	29.715 mV	29.868 mV	30.285 mV	
30 mV 30 mV, 45 Hz	29.750 mV	30.011 mV	30.250 mV	
30 mV 30 mV, 65 Hz	29.750 mV	30.035 mV	30.250 mV	
30 mV 30 mV, 1 kHz	29.715 mV	30.059 mV	30.285 mV	
30 mV 30 mV, 5 kHz	29.625 mV	30.051 mV	30.375 mV	
30 mV 30 mV, 20 kHz	29.610 mV	30.033 mV	30.390 mV	
30 mV 30 mV, 100 kHz	28.860 mV	30.122 mV	31.140 mV	
300 mV 300 mV, 20 Hz	297.30 mV	298.59 mV	302.70 mV	
300 mV 300 mV, 45 Hz	297.65 mV	300.12 mV	302.35 mV	
300 mV 300 mV, 65 Hz	297.65 mV	300.35 mV	302.35 mV	
300 mV 300 mV, 1 kHz	297.30 mV	300.60 mV	302.70 mV	
300 mV 300 mV, 5 kHz	296.40 mV	300.65 mV	303.60 mV	
300 mV 300 mV, 20 kHz	296.25 mV	300.59 mV	303.75 mV	
300 mV 300 mV, 100 kHz	288.75 mV	303.03 mV	311.25 mV	

RESISTANCE TEST

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
Range Input				

30 Ω 30 Ω	29.930 Ω	30.006 Ω	30.070 Ω	
300 Ω 300 Ω	299.35 Ω	299.96 Ω	300.65 Ω	
3 k Ω 3 k Ω	2.9935 k Ω	2.9997 k Ω	3.0065 k Ω	
30 k Ω 30 k Ω	29.935 k Ω	30.000 k Ω	30.065 k Ω	
300 k Ω 300 k Ω	299.35 k Ω	300.00 k Ω	300.65 k Ω	
3 M Ω 3 M Ω	2.9815 M Ω	3.0001 M Ω	3.0185 M Ω	
30 M Ω 30 M Ω	29.635 M Ω	29.983 M Ω	30.365 M Ω	

Model U1273A Serial MY54270038 Firmware Rev V01.95
Options Tested

Test Date 6 Sep 2018
Condition As Received

RESISTANCE TEST (cont.)

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
300 MΩ 120 MΩ	110.30 MΩ	119.89 MΩ	129.70 MΩ	

DIODE TEST

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
Input ----- 3 V	2.9845 V	3.0000 V	3.0155 V	

CAPACITANCE TEST

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
Range Input -----				
10 nF 10 nF	9.895 nF	9.994 nF	10.105 nF	
100 nF 100 nF	98.98 nF	99.95 nF	101.02 nF	
1000 nF 1000 nF	989.8 nF	1000.0 nF	1010.2 nF	
10 uF 10 uF	9.898 uF	10.002 uF	10.102 uF	
100 uF 100 uF	98.98 uF	100.00 uF	101.02 uF	
1000 uF 1000 uF	989.8 uF	999.4 uF	1010.2 uF	
10 mF 10 mF	9.898 mF	10.035 mF	10.102 mF	

TEMPERATURE TEST

Passed

According to the service manual(U1271-90020, Edition 18), temperature test limit includes two parts, DMM accuracy and probe accuracy.

So probe accuracy (1.1 deg C) is added to all of the test limits below.

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
Input ----- -200 °C	-204.1 °C	-201.1 °C	-195.9 °C	

TEMPERATURE TEST (cont.)

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
0 °C	-2.1 °C	-0.4 °C	2.1 °C	
1372 °C	1356.2 °C	1371.9 °C	1387.8 °C	

DC/AC uA TEST

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
DC uA accuracy in DC+AC uA position				
Range	Input			
-----	-----			
300 uA	300 uA	299.35 uA	300.11 uA	300.65 uA
3000 uA	3000 uA	2993.5 uA	3000.2 uA	3006.5 uA
AC uA accuracy in DC+AC uA position				
Range	Input			
-----	-----			
300 uA	300 uA, 20 Hz	297.05 uA	298.17 uA	302.95 uA
300 uA	300 uA, 45 Hz	297.95 uA	299.76 uA	302.05 uA
300 uA	300 uA, 65 Hz	297.95 uA	300.00 uA	302.05 uA
300 uA	300 uA, 1 kHz	297.05 uA	300.33 uA	302.95 uA
3000 uA	3000 uA, 20 Hz	2970.5 uA	2982.5 uA	3029.5 uA
3000 uA	3000 uA, 45 Hz	2979.5 uA	2997.7 uA	3020.5 uA
3000 uA	3000 uA, 65 Hz	2979.5 uA	2999.9 uA	3020.5 uA
3000 uA	3000 uA, 1 kHz	2970.5 uA	3002.9 uA	3029.5 uA

DC/AC mA AND A TEST

Passed

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
DC mA accuracy in DC+AC mA+A position				
Range	Input			
-----	-----			
30 mA	30 mA	29.935 mA	30.016 mA	30.065 mA
300 mA	300 mA	299.35 mA	300.02 mA	300.65 mA
AC mA accuracy in DC+AC mA+A position				
Range	Input			
-----	-----			
30 mA	30 mA, 20 Hz	29.705 mA	29.819 mA	30.295 mA

Model U1273A Serial MY54270038 Firmware Rev V01.95
Options Tested
Test Date 6 Sep 2018
Condition As Received

DC/AC mA AND A TEST (cont.)

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM	Status
30 mA 30 mA, 45 Hz	29.795 mA	29.978 mA	30.205 mA	
30 mA 30 mA, 65 Hz	29.795 mA	30.002 mA	30.205 mA	
30 mA 30 mA, 1 kHz	29.705 mA	30.027 mA	30.295 mA	
300 mA 300 mA, 20 Hz	297.05 mA	298.27 mA	302.95 mA	
300 mA 300 mA, 45 Hz	297.95 mA	299.80 mA	302.05 mA	
300 mA 300 mA, 65 Hz	297.95 mA	300.02 mA	302.05 mA	
300 mA 300 mA, 1 kHz	297.05 mA	300.30 mA	302.95 mA	

DC A accuracy in DC+AC mA+A position

Range Input

Range	Input	MINIMUM	MEASURED	MAXIMUM
3 A	3 A	2.9900 A	3.0018 A	3.0100 A
10 A	10 A	9.960 A	10.002 A	10.040 A

AC A accuracy in DC+AC mA+A position

Range Input

Range	Input	MINIMUM	MEASURED	MAXIMUM
3 A	3 A, 45 Hz	2.9735 A	2.9985 A	3.0265 A
3 A	3 A, 65 Hz	2.9735 A	3.0008 A	3.0265 A
3 A	3 A, 1 kHz	2.9675 A	3.0038 A	3.0325 A
10 A	10 A, 45 Hz	9.895 A	9.997 A	10.105 A
10 A	10 A, 65 Hz	9.895 A	10.003 A	10.105 A
10 A	10 A, 1 kHz	9.875 A	10.012 A	10.125 A