

## Calibration Certificate

Report No:1574939-1

Manufacturer: KEITHLEY  
Model Number: 2001  
Serial Number: 0544257

Calibration Date: 14 January 2014

Temperature: 24.3 °C

Relative Humidity: 46.1 %

Procedure: MS-1574 REV. G

Condition as Received: **OUT OF TOLERANCE**

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- Keithley Instruments, a Tektronix Company, certifies that the above instrument meets its published measurement specifications.
  - This instrument has been calibrated using measurement standards traceable to the International System of Units (SI) through NIST or other National Metrology Institutes (such as NIM, NPL, PTB, etc.).
  - This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.
  - This calibration certificate shall not be reproduced, except in full, without the written approval of this calibration laboratory.

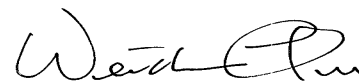
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### Calibration Facility

Tektronix Taiwan Ltd.  
3F, No. 89, Sec. 2  
Ti Ding A  
Taipei City, 114, Taiwan (ROC)

Engineer: \_\_\_\_\_

Approved By: \_\_\_\_\_



Weidar Chu

Title: Service Manager

Certificate Issue Date: 14-Jan-2014

## Standards Used

<u>Control Number</u>	<u>Description</u>	<u>Due Date</u>
5506	FLUKE 5700A CALIBRATOR	08-Apr-2014
7445	FLUKE 5725A AMPLIFIER	05-Apr-2014
7764	KEITHLEY 2001-758 1G OHM STANDARD	12-Apr-2014
9583	Agilent 33220A 20MHz Function Generator	08-Oct-2014

# Measurement Report -

As-Received

Report Number:  
1574939-1

Test Description	Expected Value	Measured Value	Measurement Uncertainty	Lower Limit	Upper Limit	Test Status
<b>DC VOLT ZEROES</b>						
0 mV	0.00000 mV	0.0004 mV	2.2e-007 V	-0.0012 mV	0.0012 mV	Pass
0 V	0.0000000 V	0.000000 V	6.1e-007 V	-0.000004 V	0.000004 V	Pass
0 V	0.000000 V	-0.00015 V	6.6e-006 V	-0.00008 V	0.00008 V	Fail
0 V	0.00000 V	0.0001 V	6.1e-005 V	-0.0006 V	0.0006 V	Pass
0 V	0.0000 V	-1.121 V	6.5e-004 V	-0.006 V	0.006 V	Fail
0.0000 V	0.0000 V	0.000 V		-0.000 V	0.000 V	Pass
<b>RESISTANCE ACCURACY TEST</b>						
0 Ω	0.000000 Ω	-0.00003 Ω	1.9e-005 Ω	-0.00020 Ω	0.00020 Ω	Pass
19 Ω	18.999739 Ω	19.21043 Ω	4.9e-004 Ω	18.99823 Ω	19.00125 Ω	Fail
190 Ω	189.99705 Ω	190.0933 Ω	3.2e-003 Ω	189.9850 Ω	190.0091 Ω	Fail
1.9 kΩ	1.8999900 kΩ	1.900920 kΩ	2.3e-002 Ω	1.899887 kΩ	1.900093 kΩ	Fail
19 kΩ	18.998962 kΩ	19.00349 kΩ	2.1e-001 Ω	18.99793 kΩ	18.99999 kΩ	Fail
190 kΩ	189.98493 kΩ	189.6909 kΩ	2.5e+000 Ω	189.9669 kΩ	190.0029 kΩ	Fail
1.9 MΩ	1.8998690 MΩ	1.900379 MΩ		1.899556 MΩ	1.900182 MΩ	Fail
19 MΩ	18.999233 MΩ	19.02112 MΩ		18.98204 MΩ	19.01642 MΩ	Fail
100 MΩ	99.99047 MΩ	99.5121 MΩ	1.2e+004 Ω	97.9707 MΩ	102.0103 MΩ	Pass
9.9e+037	1e+038	1e+038		1e+038	1e+038	Pass
9.9e+037	1e+038	1e+038		1e+038	1e+038	Pass
<b>DC VOLTAGE ACCURACY TEST</b>						
-190 mV	-190.00000 mV	-190.2362 mV	2.1e-006 V	-190.0082 mV	-189.9918 mV	Fail
100 mV	100.00000 mV	100.1242 mV	1.5e-006 V	99.9951 mV	100.0049 mV	Fail
190 mV	190.00000 mV	190.2354 mV	2.1e-006 V	189.9918 mV	190.0082 mV	Fail
-1.9 V	-1.9000000 V	-1.902322 V	1.3e-005 V	-1.900052 V	-1.899948 V	Fail
1.9 V	1.9000000 V	1.902321 V	1.3e-005 V	1.899948 V	1.900052 V	Fail
-19 V	-19.000000 V	-19.02258 V	1.0e-004 V	-19.00054 V	-18.99946 V	Fail
10 V	10.000000 V	10.01160 V	5.4e-005 V	9.99968 V	10.00032 V	Fail
19 V	19.000000 V	19.02218 V	1.0e-004 V	18.99946 V	19.00054 V	Fail
-190 V	-190.00000 V	-190.2708 V	1.2e-003 V	-190.0078 V	-189.9922 V	Fail
190 V	190.00000 V	190.2710 V	1.2e-003 V	189.9922 V	190.0078 V	Fail
-1000 V	-1000.0000 V	-1002.476 V	8.7e-003 V	-1000.047 V	-999.953 V	Fail
1000 V	1000.0000 V	1000.234 V	8.6e-003 V	999.953 V	1000.047 V	Fail
<b>AC VOLTAGE ACCURACY TEST</b>						
190 mV @ 10 Hz	190.0000 mV	190.427 mV	1.2e-004 V	189.837 mV	190.163 mV	Fail
19 mV @ 20 Hz	19.0000 mV	19.027 mV	1.0e-005 V	18.959 mV	19.041 mV	Pass
190 mV @ 20 Hz	268.7000 mV	268.767 mV	4.1e-004 V	267.085 mV	270.315 mV	Pass
1.9 V @ 100 kHz	1.900000 V	1.90028 V	5.6e-004 V	1.89400 V	1.90600 V	Pass
19 V @ 10 Hz	19.00000 V	19.0327 V	1.1e-002 V	18.9837 V	19.0163 V	Fail
19 V @ 10 kHz	19.00000 V	19.0030 V	1.5e-003 V	18.9809 V	19.0192 V	Pass
19 V @ 1 MHz	19.00000 V	19.1620 V	6.2e-002 V	18.2000 V	19.8000 V	Pass
19 V @ 1 kHz	26.87000 V	26.8533 V	6.8e-003 V	26.7031 V	27.0369 V	Pass
19 V @ 25 kHz	26.87000 V	26.8667 V	1.8e-002 V	26.6924 V	27.0476 V	Pass
190 V @ 100 kHz	190.0000 V	189.852 V	1.1e-001 V	189.392 V	190.608 V	Pass
750 V @ 5 kHz	750.000 V	748.77 V	1.0e-001 V	748.79 V	751.21 V	Fail

# Measurement Report - As-Received

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Test Description	Expected Value	Measured Value	Measurement Uncertainty	Lower Limit	Upper Limit	Test Status
750 V @ 25 kHz	750.000 V	744.44 V	2.8e-001 V	748.57 V	751.43 V	Fail
<b>AVG AND DC COUPLING TEST</b>						
1.9 V @ 100 kHz	1.710600 V	1.71156 V	5.6e-004 V	1.70467 V	1.71653 V	Pass
1.9 V	1.900000 V	1.90275 V	1.4e-005 V	1.89722 V	1.90278 V	Adjust
<b>DC CURRENT ACCURACY TEST</b>						
0 $\mu$ A	0.0000 $\mu$ A	0.018 $\mu$ A	1.0e-008 A	-0.005 $\mu$ A	0.005 $\mu$ A	Fail
190 $\mu$ A	190.0000 $\mu$ A	190.254 $\mu$ A	2.0e-008 A	189.900 $\mu$ A	190.100 $\mu$ A	Fail
1.9 mA	1.900000 mA	1.90243 mA	1.1e-007 A	1.89920 mA	1.90080 mA	Fail
19 mA	19.00000 mA	19.0229 mA	1.1e-006 A	18.9920 mA	19.0080 mA	Fail
190 mA	190.0000 mA	190.335 mA	1.4e-005 A	189.901 mA	190.099 mA	Fail
-1 A	-1.000000 A	-1.00023 A	1.1e-004 A	-1.00104 A	-0.99896 A	Pass
1 A	1.000000 A	1.00058 A	1.1e-004 A	0.99896 A	1.00104 A	Pass
<b>AC CURRENT ACCURACY TEST</b>						
190 $\mu$ A @ 20 Hz	190.0000 $\mu$ A	189.603 $\mu$ A	9.7e-008 A	188.260 $\mu$ A	191.740 $\mu$ A	Pass
1.9 mA @ 200 Hz	1.900000 mA	1.90203 mA	3.1e-007 A	1.89742 mA	1.90258 mA	Adjust
19 mA @ 200 Hz	19.00000 mA	19.0192 mA	3.1e-006 A	18.9742 mA	19.0258 mA	Adjust
190 mA @ 20 Hz	190.0000 mA	190.032 mA	7.6e-005 A	189.400 mA	190.600 mA	Pass
1.9 A @ 5 kHz	1.900000 A	1.90260 A	1.5e-003 A	1.89105 A	1.90895 A	Pass
<b>HIGH FREQUENCY AC VOLTAGE ACCURACY TEST</b>						
190 mV @ 2 MHz	190.00 mV	190.1 mV	7.7e-004 V	180.1 mV	199.9 mV	Pass
1.9 V @ 2 MHz	1.9000 V	1.912 V	6.2e-003 V	1.801 V	1.999 V	Pass
<b>FREQUENCY ACCURACY TEST</b>						
100 Hz	100.00000 Hz	99.9996 Hz	2.0e-003 Hz	99.9700 Hz	100.0300 Hz	Pass
15 MHz	15.00000 MHz	15.0000 MHz	3.1e+002 Hz	14.9955 MHz	15.0045 MHz	Pass
<b>900 M<math>\Omega</math> TEST</b>						
0.923707 G $\Omega$	0.923707 G $\Omega$	0.93918 G $\Omega$	4.6e+005 $\Omega$	0.88666 G $\Omega$	0.96076 G $\Omega$	Pass
<b>REAR INPUT TEST</b>						
1 k $\Omega$	0.9999883 k $\Omega$	1.000482 k $\Omega$	1.2e-002 $\Omega$	0.999930 k $\Omega$	1.000046 k $\Omega$	Fail
1.9 mA	1.900000 mA	1.90243 mA	1.1e-007 A	1.89920 mA	1.90080 mA	Fail

Comments:

\*\*\*\*\* End of Measurement Report \*\*\*\*\*