



Certificate of Calibration

Certificate Number **431602 - 8044 - 431612**

Illiana Instrumentation Service 1831 Govert Drive Schererville, In 46375 Customer Ship To Address: Laura Grolla 219-227-8788 Contact 4161 P.O. Number Release Number Calibration Location: <u>Tru Cal Intl. Inc.</u>	Description <u>Digital Multimeter</u> Manufacturer <u>HP/Agilent</u> Model No. <u>34401A</u> Serial No. <u>3146A01748</u> Control No. <u>3146A01748</u> Asset No. <u>1205</u> Department _____ Location _____	Rec'd Date <u>01/27/2021</u> Cal Date <u>02/05/2021</u> Due Date _____ Procedure Used <input checked="" type="checkbox"/> Mfg. <input type="checkbox"/> Other <u>M1680/Metcal 7.2</u> Temperature <u>69.6</u> °F Humidity <u>22.5</u> %RH
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Fault/Symptom

Received Condition: **In Tolerance**

Work Performed

Returned Condition: **In Tolerance/Cal Only**

Verified Manufacturers Specifications.

Calibration Standards			
Asset No.	Asset Model	Due Date	Traceability Number
A457	Fluke 5700A/EP3 Calibrator	8/19/2021	406444-0142-406454
A896	HP 3325B Function Generator	10/15/2021	423798-0142-423808

This certifies that the above instrument was calibrated in compliance with ANSI/NCSL Z540-1-1994, with a quality system that meets ISO9001:2015 and accredited to ISO/IEC 17025:2017 using applicable procedures. Standards of known accuracy used to perform this calibration are traceable to National Institute of Standards and Technology (NIST). Some measurements are traceable to natural physical constants, consensus standards or ratio type measurements. The test limits stated in the report correspond to the published specifications of the equipment, at the points tested unless otherwise noted. This certification statement of conformance only applies to warranted specifications and does not take measurement uncertainty in account unless otherwise agreed. A final decision about whether the item's performance actually satisfies requirements of the user can only be made by the user. Points to be found outside of specifications will be marked with an "*". Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." When requested, reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. ! Indicates Non-Accredited Service. This certificate or report shall not be reproduced, copied in full, without written approval of Tru Cal International. Digitally Signed by Shauna Ernst on 2/10/2021 1:42:13.

CALIBRATION DATA SHEET

HP/Agilent / 34401A

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Parameters Tested/Test Specification	Nom. Applied	- Limit	+ Limit	As Found	As Left	Uncertainty
Self Test	----	Pass	Fail	Pass		----
Zero Offset Test (Front Inputs)						
10mA DC Range	Open	-0.00200	0.00200	0.00016		----
100mA DC Range	Open	-0.0050	0.0050	0.0002		----
1A DC Range	Open	-0.000100	0.000100	0.000008		----
3A DC Range	Open	-0.000600	0.000600	0.00007		----
100mV DC Range	Short	-0.0035	0.0035	0.0033		----
1V DC Range	Short	-0.000007	0.000007	0.000004		----
10V DC Range	Short	-0.00005	0.00005	0.00001		----
100V DC Range	Short	-0.0006	0.0006	0.0001		----
1000V DC Range	Short	-0.010	0.010	0.000		----
100 Ohm Range, 2-Wire	Short	-0.0040	0.0040	0.0001		----
1kOhm Range, 2-Wire	Short	-0.000010	0.000010	0.000001		----
10kOhm Range, 2-Wire	Short	-0.00010	0.00010	0.00003		----
100kOhm Range, 2-Wire	Short	-0.0010	0.0010	0.0003		----
1MOhm Range, 2-Wire	Short	-0.000010	0.000010	0.000001		----
10MOhm Range, 2-Wire	Short	-0.00010	0.00010	-0.00000		----
100MOhm Range, 2-Wire	Short	-0.0100	0.0100	0.0003		----
100Ohm Range, 4-Wire	Short	-0.0040	0.0040	0.0018		----
1kOhm Range, 4-Wire	Short	-0.000010	0.000010	0.000001		----
10kOhm Range, 4-Wire	Short	-0.00010	0.00010	0.00002		----
100kOhm Range, 4-Wire	Short	-0.0010	0.0010	0.0002		----
1MOhm Range, 4-Wire	Short	-0.000010	0.000010	-0.000001		----
10MOhm Range, 4-Wire	Short	-0.00010	0.00010	-0.00001		----
100MOhm Range, 4-Wire	Short	-0.0100	0.0100	0.0002		----
Zero Offset Test (Rear Inputs)						
10mA DC Range	Open	-0.00200	0.00200	0.00006		----
100mA DC Range	Open	-0.0050	0.0050	0.0001		----
1A DC Range	Open	-0.000100	0.000100	0.000004		----
3A DC Range	Open	-0.000600	0.000600	0.000000		----
100mV DC Range	Short	-0.0035	0.0035	0.0017		----
1V DC Range	Short	-0.000007	0.000007	0.000002		----
10V DC Range	Short	-0.00005	0.00005	0.00000		----
100V DC Range	Short	-0.0006	0.0006	0.0001		----
1000V DC Range	Short	-0.010	0.010	0.001		----
100Ohm Range, 2-Wire	Short	-0.0040	0.0040	0.0002		----
1kOhm Range, 2-Wire	Short	-0.000010	0.000010	-0.000000		----
10kOhm Range, 2-Wire	Short	-0.00010	0.00010	0.00002		----
100kOhm Range, 2-Wire	Short	-0.0010	0.0010	0.0002		----
1MOhm Range, 2-Wire	Short	-0.000010	0.000010	0.000001		----
10MOhm Range, 2-Wire	Short	-0.00010	0.00010	0.00001		----
100MOhm Range, 2-Wire	Short	-0.0100	0.0100	-0.0000		----
100Ohm Range, 4-Wire	Short	-0.0040	0.0040	0.0006		----
1kOhm Range, 4-Wire	Short	-0.000010	0.000010	0.000001		----
10kOhm Range, 4-Wire	Short	-0.00010	0.00010	0.00001		----
100kOhm Range, 4-Wire	Short	-0.0010	0.0010	-0.0001		----
1MOhm Range, 4-Wire	Short	-0.000010	0.000010	-0.000000		----
10MOhm Range, 4-Wire	Short	-0.00010	0.00010	0.00001		----

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Parameters Tested/Test Specification	Nom. Applied	- Limit	+ Limit	As Found	As Left	Uncertainty
100MOhm Range, 4-Wire	Short	-0.0100	0.0100	0.0000		----
DC Voltage						
100mV Range	100.0000mV	99.9915	100.0085	99.9984		.58μV
1V Range	1.000000V	0.999953	1.000047	0.999997		5.8μV
10V Range	10.00000V	9.99960	10.00040	10.00003		58μV
10V Range	-10.00000V	-10.00040	-9.99960	-10.00004		58μV
100V Range	100.0000V	99.9949	100.0051	100.0000		0.6mV
1000V Range	1000.000V	999.945	1000.055	1000.007		0.6mV
AC Voltage						
100 mV Range @1kHz	10.000mV	9.9540	10.0460	9.9982		5.6μV
100 mV Range @1kHz	100.0000mV	99.9000	100.1000	100.0060		20μV
@50kHz	100.0000mV	99.8300	100.1700	100.0053		28μV
1V Range @20Hz	1.000000V	0.999100	1.000900	0.999873		.28mV
@1kHz	1.000000V	0.999100	1.000900	1.000047		.08mV
@50kHz	1.000000V	0.998300	1.001700	0.999999		.10mV
@100kHz	1.000000V	0.993200	1.006800	0.999051		.16mV
@300kHz	1.000000V	0.955000	1.045000	0.996846		.45mV
10V Range @ 1kHz	10.00000V@1kHz	9.99100	10.00900	10.00093		.52mV
@50kHz	10.00000V	9.98300	10.01700	10.00097		.89mV
@10Hz	10.00000V	9.99100	10.00900	10.00231		.52mV
100V Range@1kHz	100.0000V	99.9100	100.0900	100.0037		8.3mV
@50kHz	100.0000V	99.8300	100.1700	99.9914		11mV
750V Range@ 1kHz	750.000V	749.325	750.675	750.021		60mV
@50 kHz	219.000V	218.362	219.638	218.906		22mV
Frequency Response						
@20Hz	1.000000V	0.999100	1.000900	0.999860		.28mV
@1kHz	1.000000V	0.999100	1.000900	1.000031		.28mV
@20kHz	1.000000V	0.999100	1.000900	1.000141		.08mV
@50kHz	1.000000V	0.998300	1.001700	0.999989		.16mV
@100kHz	1.000000V	0.993200	1.006800	0.999032		.16mV
@300kHz	1.000000V	0.955000	1.045000	0.996620		.45mV
Linearity @ 1kHz	10.00000V	9.99100	10.00900	10.00096		.52mV
	1.00000V	0.99650	1.00350	1.00002		.08mV
	0.10000V	0.08700	0.11300	0.10022		20μV
DC Current						
10mA Range	10.000000mA	9.99300	10.00700	10.0027		.41μA
100mA Range	100.0000mA	99.9450	100.0550	100.0007		5.3μA
1A Range	1.000000A	0.998900	1.001100	1.000057		8.8μA
3A Range	2.000000A	1.995800	2.004200	1.999999		.22mA
AC Current						
1A Range@1kHz	1.000000A	0.998600	1.001400	1.000081		.31mA
3A Range@1kHz	2.000000A	1.995200	2.004800	1.999991		.58mA
4-Wire Ohms						
100Ohm Range	99.99735	99.98335	100.01135	100.0005		1.2mΩ
1kOhm Range	1.0000079	0.9998979	1.0001179	1.000014		8.8mΩ
10kOhm Range	9.999908	9.998808	10.001008	9.99997		87mΩ
100kOhm Range	99.99872	99.98772	100.00972	99.9989		1.1Ω

