

### Certificate of Calibration

Certificate Number 445497 - 8044 - 445507

Calibration  
 Certificate #  
 1278.01



<b>Illiana Instrumentation Service</b>		<b>Description</b>		<b>Digital Multimeter</b>		<b>Rec'd Date</b>	
1831 Govert Drive		Manufacturer <b>HPI/Agilent</b>		Model No. <b>34401A</b>		Cal Date <b>03/07/2022</b>	
Scherverville, In 46375		Model No. <b>3146A01748</b>		Serial No. <b>3146A01748</b>		Due Date <b>03/07/2023</b>	
Customer Ship To Address:		Control No. <b>1205</b>		Asset No. <b>1205</b>		Procedure Used <input checked="" type="checkbox"/> Mfg. <input type="checkbox"/> Other M1680/Metcal 7.2	
Contact		Department		Temperature <b>71.24 °F</b>		Humidity <b>39.9 %RH</b>	
P. O. Number <b>4273</b>		Location		Release Number		N/A	
Calibration Location: <b>Tru Cal Intl. Inc.</b>		Fault/Symptom				N/A	

Received Condition: **In Tolerance**

Fault/Symptom

Work Performed

Verified Manufacturers Specifications.

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

Calibration Standards			Traceability Number
Asset No.	Asset Model	Due Date	
A858	Fluke 5522A Calibrator	12/28/2022	EVL763458

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, except in full, without written approval of Tru Cal International Inc. As found and as left readings are the same unless otherwise noted.

Digitally Signed by Shauna Ernst on 3/8/2022 1:51:44

*Shauna Ernst*

Received By (Customer) sme Rec'd Date Alberto Ron  
 QAM Initial QAM Certified By Alberto Ron

Inspected By Shauna Ernst Page 1 of 4

## CALIBRATION DATA SHEET

Certificate Number  
445497 - 8044 - 445507

HP/Agilent / 34401A

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	0.00012		-----
100mA DC Range	Open	-0.0050	0.0050	0.0001		-----
1A DC Range	Open	-0.000100	0.000100	0.000001		-----
3A DC Range	Open	-0.000600	0.000600	0.00001		-----
100mV DC Range	Short	-0.0035	0.0035	0.0023		-----
1V DC Range	Short	-0.000007	0.000007	0.000002		-----
10V DC Range	Short	-0.000005	0.000005	0.00000		-----
100V DC Range	Short	-0.0006	0.0006	0.0000		-----
1000V DC Range	Short	-0.010	0.010	0.000		-----
100 Ohm Range, 2-Wire	Short	-0.0040	0.0040	0.0003		-----
1kOhm Range, 2-Wire	Short	-0.000010	0.000010	0.000000		-----
10kOhm Range, 2-Wire	Short	-0.000010	0.000010	0.00000		-----
100kOhm Range, 2-Wire	Short	-0.0010	0.0010	0.0001		-----
1MOhm Range, 2-Wire	Short	-0.000010	0.000010	0.000002		-----
10MOhm Range, 2-Wire	Short	-0.00010	0.00010	0.00001		-----
100MOhm Range, 2-Wire	Short	-0.0100	0.0100	0.0000		-----
1000MOhm Range, 2-Wire	Short	-0.0040	0.0040	0.0003		-----
1kOhm Range, 4-Wire	Short	-0.000010	0.000010	0.000001		-----
10kOhm Range, 4-Wire	Short	-0.000010	0.000010	0.00000		-----
100kOhm Range, 4-Wire	Short	-0.0010	0.0010	0.0001		-----
1MOhm Range, 4-Wire	Short	-0.000010	0.000010	0.000002		-----
10MOhm Range, 4-Wire	Short	-0.00010	0.00010	0.00001		-----
100MOhm Range, 4-Wire	Short	-0.0100	0.0100	0.0000		-----
Zero Offset Test (Rear Inputs)						
10mA DC Range	Open	-0.00200	0.00200	0.00008		-----
100mA DC Range	Open	-0.0050	0.0050	0.0001		-----
1A DC Range	Open	-0.000100	0.000100	0.000002		-----
3A DC Range	Open	-0.000600	0.000600	0.000001		-----
100mV DC Range	Short	-0.0035	0.0035	0.0005		-----
1V DC Range	Short	-0.000007	0.000007	0.000000		-----
10V DC Range	Short	-0.000005	0.000005	0.00001		-----
100V DC Range	Short	-0.0006	0.0006	0.0001		-----
1000V DC Range	Short	-0.010	0.010	0.000		-----
100Ohm Range, 2-Wire	Short	-0.0040	0.0040	0.0023		-----
1kOhm Range, 2-Wire	Short	-0.000010	0.000010	0.000002		-----
10kOhm Range, 2-Wire	Short	-0.00010	0.00010	0.00000		-----
100kOhm Range, 2-Wire	Short	-0.0010	0.0010	0.0001		-----
1MOhm Range, 2-Wire	Short	-0.000010	0.000010	0.000002		-----
10MOhm Range, 2-Wire	Short	-0.00010	0.00010	0.00000		-----
100MOhm Range, 2-Wire	Short	-0.0100	0.0100	0.0003		-----
1000MOhm Range, 2-Wire	Short	-0.0040	0.0040	0.0010		-----
1kOhm Range, 4-Wire	Short	-0.000010	0.000010	0.000002		-----
10kOhm Range, 4-Wire	Short	-0.00010	0.00010	0.00002		-----
100kOhm Range, 4-Wire	Short	-0.0010	0.0010	0.0001		-----
1MOhm Range, 4-Wire	Short	-0.000010	0.000010	0.000002		-----
10MOhm Range, 4-Wire	Short	-0.00010	0.00010	0.00000		-----
100MOhm Range, 4-Wire	Short	-0.0100	0.0100	0.0003		-----
1000MOhm Range, 4-Wire	Short	-0.0040	0.0040	0.0010		-----
1kOhm Range, 2-Wire	Short	-0.000010	0.000010	0.000002		-----
10kOhm Range, 2-Wire	Short	-0.00010	0.00010	0.00002		-----
100kOhm Range, 2-Wire	Short	-0.0010	0.0010	0.0001		-----
1MOhm Range, 2-Wire	Short	-0.000010	0.000010	0.000002		-----
10MOhm Range, 2-Wire	Short	-0.00010	0.00010	0.00000		-----
100MOhm Range, 2-Wire	Short	-0.0100	0.0100	0.0003		-----
1000MOhm Range, 2-Wire	Short	-0.0040	0.0040	0.0010		-----
1kOhm Range, 4-Wire	Short	-0.000010	0.000010	0.000002		-----
10kOhm Range, 4-Wire	Short	-0.00010	0.00010	0.00002		-----
100kOhm Range, 4-Wire	Short	-0.0010	0.0010	0.0001		-----
1MOhm Range, 4-Wire	Short	-0.000010	0.000010	0.000002		-----
10MOhm Range, 4-Wire	Short	-0.00010	0.00010	0.00000		-----
100MOhm Range, 4-Wire	Short	-0.0100	0.0100	0.0003		-----
1000MOhm Range, 4-Wire	Short	-0.0040	0.0040	0.0010		-----

## CALIBRATION DATA SHEET

Certificate Number  
 445497 - 8044 - 445507

HP/Agilent / 34401A

Parameters Tested/Test Specification	Norm. Applied	- Limit	+ Limit	As Found	As Left	Uncertainty
100M Ohm Range, 4-Wire	Short	-0.0100	0.0100	0.0002		----
DC Voltage						
100mV Range	100.0000mV	99.9915	100.0085	99.9952		.58µV
1V Range	1.000000V	0.999953	1.000047	0.999990		5.8µV
10V Range	10.00000V	9.99960	10.00040	9.99997		58µV
10V Range	-10.00000V	-10.00040	-9.99960	-10.00001		58µV
100V Range	100.0000V	99.9949	100.0051	99.9993		0.6mV
1000V Range	1000.000V	999.945	1000.055	999.995		0.6mV
AC Voltage						
100 mV Range @ 1kHz	10.000mV	9.9540	10.0460	10.005		5.6µV
100 mV Range @ 1kHz	100.0000mV	99.9000	100.1000	100.010		20µV
@ 50kHz	100.0000mV	99.8300	100.1700	100.008		28µV
1V Range @ 20Hz	1.000000V	0.999100	1.000900	0.99983		.28mV
@ 1kHz	1.000000V	0.999100	1.000900	1.00005		.08mV
@ 50kHz	1.000000V	0.998300	1.001700	1.00012		.10mV
@ 100kHz	1.000000V	0.993200	1.006800	0.99944		.16mV
@ 300kHz	1.000000V	0.955000	1.045000	0.99812		.45mV
10V Range @ 1kHz	10.00000V@1kHz	9.99100	10.00900	10.0001		.52mV
@ 50kHz	10.00000V	9.98300	10.01700	10.0003		.89mV
@ 10Hz	10.00000V	9.99100	10.00900	10.0013		.52mV
100V Range @ 1kHz	100.0000V	99.9100	100.0900	100.010		8.3mV
@ 50kHz	100.0000V	99.8300	100.1700	100.009		11mV
750V Range @ 1kHz	750.000V	749.325	750.675	750.074		60mV
@ 50 kHz	219.000V	218.362	219.638	218.958		22mV
Frequency Response						
@ 20Hz	1.000000V	0.999100	1.000900	0.999862		.28mV
@ 1kHz	1.000000V	0.999100	1.000900	1.000054		.28mV
@ 20kHz	1.000000V	0.999100	1.000900	1.000180		.08mV
@ 50kHz	1.000000V	0.998300	1.001700	1.000123		.16mV
@ 100kHz	1.000000V	0.993200	1.006800	0.999432		.16mV
@ 300kHz	1.000000V	0.955000	1.045000	0.997452		.45mV
Linearity @ 1kHz	10.00000V	9.99100	10.00900	10.00046		.52mV
	1.00000V	0.99650	1.00350	1.000062		.08mV
	0.10000V	0.08700	0.11300	0.100006		20µV
DC Current						
10mA Range	10.000000mA	9.99300	10.00700	10.00020		.41µA
100mA Range	100.00000mA	99.9450	100.0550	99.9992		5.3µA
1A Range	1.000000A	0.998900	1.001100	1.000035		8.8µA
3A Range	2.000000A	1.995800	2.004200	2.00005		.22mA
AC Current						
1A Range @ 1kHz	1.000000A	0.998600	1.001400	1.00022		.31mA
3A Range @ 1kHz	2.000000A	1.995200	2.004800	2.0008		.58mA
4-Wire Ohms						
100 Ohm Range	99.99735	99.98335	100.01135	100.0044		1.2mΩ
1k Ohm Range	1.0000079	0.9998979	1.0001179	1.000007		8.8mΩ
10k Ohm Range	9.999908	9.998808	10.001008	10.00004		87mΩ
100k Ohm Range	99.99872	99.98772	100.00972	99.99999		1.1Ω

## CALIBRATION DATA SHEET

Certificate Number  
**445497 - 8044 - 445507**

HP/Agilent / 34401A

Parameters Tested/Test Specification	Nom. Applied	- Limit	+ Limit	As Found	As Left	Uncertainty
4-Wire Ohms (Cont'd)						
1M Ohm Range	0.9999727	0.9998627	1.0000827	1.000020		18Ω
10M Ohm Range	9.999467	9.995367	10.003567	9.99875		3.5kΩ
100M Ohm Range	100.0045	99.1945	100.8145	99.8479		13kΩ
2-Wire Ohms						
100 Ohm Range	99.99735	99.98335	100.01135	100.0017		1.2mΩ
1k Ohm Range	1.000079	0.9998979	1.0001179	1.000081		8.8mΩ
10k Ohm Range	9.999908	9.998808	10.001008	10.00012		87mΩ
100k Ohm Range	99.99872	99.98772	100.00972	100.0001		1.1Ω
1M Ohm Range	0.9999727	0.9998627	1.0000827	1.000018		18Ω
10M Ohm Range	9.999467	9.995367	10.003567	9.99878		3.5kΩ
100M Ohm Range	100.0045	99.1945	100.8145	99.85401		13kΩ
Frequency						
100mV Range@100mV	100.0000Hz	99.9000	100.1000	99.9965		5x10 <sup>-6</sup>
1V Range@1V	100.0000kHz	99.9900	100.0100	100.0000		5x10 <sup>-6</sup>