



MICRO PRECISION CALIBRATION PTE LTD
BLOCK 5008 ANG MO KIO AVENUE 5 #07-04
TECHPLACE II SINGAPORE 569874
65 67484384



Certificate of Calibration

Date: October 12, 2018

Cert No. 551220081616139

Customer:

GES SINGAPORE PTE LTD
28 MARSILING LANE
SINGAPORE 739152

Work Order #: SG-11009017

MPC Control #: MY48003234
Asset ID: N/A
Gage Type: 6 1/2 - DIGIT MULTIMETER
Manufacturer: AGILENT
Model Number: 34411A
Size: N/A
Temp/RH: 22.5°C / 44 %
Location: Calibration performed at Customer's facility

Serial Number: MY48003234
Department: N/A
Performed By: JOEL DE VERA
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: October 12, 2018
Cal. Interval: 12 MONTHS
Cal. Due Date: October 12, 2019

Calibration Notes:

Performance test passed. See attached data (4 pages).

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
DB8884	CALIBRATOR	5500A	7520009	FLUKE	Sep 13, 2019	551220081558522

Procedures Used in this Event

Procedure Name	Description
AGILENT 34411A	6 1/2 DIGIT DIGITAL MULTIMETER

Calibrating Technician:


JOEL DE VERA

QC Approval:


JULES PHILIPPE AGPANGAN

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO/IEC 17025:2017, ANSI/NCSL Z540-1-1994, ANSI/NCSL Z540.3-2006, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. The information on this report, pertains only to the instrument identified.

All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. This report may not be reproduced in part or in a whole without the prior written approval of the issuing MPC lab.



Measurement Report Agilent 34411A Digital Multimeter

1 year specifications

Procedure: 34411A AGILENT

Order Number: SG-11009017

ID Number: MY48003234

Calibration Date: October 12, 2018

Section 1 - Zero Offset Verification

Front panel input terminals

Function/Range	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
DCV / 100 mV	0.0000 mV	-0.0035 mV	0.0003 mV	0.0003 mV	0.0035 mV	PASS	0.000058 mV
DCV / 1 V	0.000000 V	-0.000007 V	0.000001 V	0.000001 V	0.000007 V	PASS	0.0000058 V
DCV / 10 V	0.00000 V	-0.00005 V	0.00000 V	0.00000 V	0.00005 V	PASS	0.0000058 V
DCV / 100 V	0.0000 V	-0.0006 V	0.0000 V	0.0000 V	0.0006 V	PASS	0.000058 V
DCV / 1000 V	0.000 V	-0.006 V	-0.001 V	-0.001 V	0.006 V	PASS	0.00058 V
DCI / 100 µA	0.0000 µA	-0.0250 µA	0.0002 µA	0.0002 µA	0.0250 µA	PASS	0.000058 µA
DCI / 1 mA	0.000000 mA	-0.060000 mA	0.000002 mA	0.000002 mA	0.060000 mA	PASS	0.0000058 mA
DCI / 10 mA	0.00000 mA	-0.00200 mA	0.00000 mA	0.00000 mA	0.00200 mA	PASS	0.0000058 mA
DCI / 100 mA	0.0000 mA	-0.0050 mA	0.0000 mA	0.0000 mA	0.0050 mA	PASS	0.000058 mA
DCI / 1 A	0.000000 A	-0.000100 A	0.000000 A	0.000000 A	0.000100 A	PASS	0.0000058 A
DCI / 3 A	0.00000 A	-0.00060 A	0.00000 A	0.00000 A	0.00060 A	PASS	0.0000058 A
4-Wire / 100 Ω	0.0000 Ω	-0.0040 Ω	0.0005 Ω	0.0005 Ω	0.0040 Ω	PASS	0.000058 Ω
4-Wire / 1 kΩ	0.000000 kΩ	-0.000010 kΩ	0.000001 kΩ	0.000001 kΩ	0.000010 kΩ	PASS	0.0000058 kΩ
4-Wire / 10 kΩ	0.00000 kΩ	-0.00010 kΩ	0.00000 kΩ	0.00000 kΩ	0.00010 kΩ	PASS	0.0000058 kΩ
4-Wire / 100 kΩ	0.0000 kΩ	-0.0010 kΩ	0.0000 kΩ	0.0000 kΩ	0.0010 kΩ	PASS	0.000058 kΩ
4-Wire / 1 MΩ	0.000000 MΩ	-0.000010 MΩ	0.000000 MΩ	0.000000 MΩ	0.000010 MΩ	PASS	0.0000058 MΩ
4-Wire / 10 MΩ	0.00000 MΩ	-0.00010 MΩ	0.00000 MΩ	0.00000 MΩ	0.00010 MΩ	PASS	0.0000058 MΩ
4-Wire / 100 MΩ	0.0000 MΩ	-0.0010 MΩ	0.0000 MΩ	0.0000 MΩ	0.0010 MΩ	PASS	0.000058 MΩ
2-Wire / 100 Ω	0.0000 Ω	-0.0040 Ω	0.0000 Ω	0.0000 Ω	0.0040 Ω	PASS	0.000058 Ω
2-Wire / 1 kΩ	0.000000 kΩ	-0.000010 kΩ	0.000000 kΩ	0.000000 kΩ	0.000010 kΩ	PASS	0.0000058 kΩ
2-Wire / 10 kΩ	0.00000 kΩ	-0.00010 kΩ	0.00000 kΩ	0.00000 kΩ	0.00010 kΩ	PASS	0.0000058 kΩ
2-Wire / 100 kΩ	0.0000 kΩ	-0.0010 kΩ	0.0000 kΩ	0.0000 kΩ	0.0010 kΩ	PASS	0.000058 kΩ
2-Wire / 1 MΩ	0.000000 MΩ	-0.000010 MΩ	0.000001 MΩ	0.000001 MΩ	0.000010 MΩ	PASS	0.0000058 MΩ
2-Wire / 10 MΩ	0.00000 MΩ	-0.00010 MΩ	0.00000 MΩ	0.00000 MΩ	0.00010 MΩ	PASS	0.0000058 MΩ
2-Wire / 100 MΩ	0.0000 MΩ	-0.0010 MΩ	0.0000 MΩ	0.0000 MΩ	0.0010 MΩ	PASS	0.000058 MΩ

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Section 1 - Zero Offset Verification (continued)

Rear panel input terminals

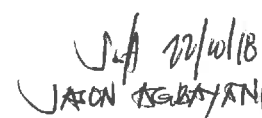
Function/Range	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
DCV / 100 mV	0.0000 mV	-0.0035 mV	0.0003 mV	0.0003 mV	0.0035 mV	PASS	0.000058 mV
DCV / 1 V	0.000000 V	-0.000007 V	0.000002 V	0.000002 V	0.000007 V	PASS	0.0000058 V
DCV / 10 V	0.00000 V	-0.00005 V	0.00000 V	0.00000 V	0.00005 V	PASS	0.0000058 V
DCV / 100 V	0.0000 V	-0.0006 V	0.0000 V	0.0000 V	0.0006 V	PASS	0.000058 V
DCV / 1000 V	0.000 V	-0.006 V	0.000 V	0.000 V	0.006 V	PASS	0.00058 V
DCI / 100 µA	0.0000 µA	-0.0250 µA	0.0002 µA	0.0002 µA	0.0250 µA	PASS	0.000058 µA
DCI / 1 mA	0.000000 mA	-0.060000 mA	0.000002 mA	0.000000 mA	0.060000 mA	PASS	0.0000058 mA
DCI / 10 mA	0.00000 mA	-0.00200 mA	0.00002 mA	0.00000 mA	0.00200 mA	PASS	0.0000058 mA
DCI / 100 mA	0.0000 mA	-0.0050 mA	-0.0001 mA	-0.0001 mA	0.0050 mA	PASS	0.000058 mA
DCI / 1 A	0.000000 A	-0.000100 A	0.000000 A	0.000000 A	0.000100 A	PASS	0.0000058 A
DCI / 3 A	0.00000 A	-0.00060 A	0.00000 A	0.00000 A	0.00060 A	PASS	0.0000058 A
4-Wire / 100 Ω	0.0000 Ω	-0.0040 Ω	0.0002 Ω	0.0002 Ω	0.0040 Ω	PASS	0.000058 Ω
4-Wire / 1 kΩ	0.000000 kΩ	-0.000010 kΩ	0.000000 kΩ	0.000000 kΩ	0.000010 kΩ	PASS	0.0000058 kΩ
4-Wire / 10 kΩ	0.00000 kΩ	-0.00010 kΩ	0.00000 kΩ	0.00000 kΩ	0.00010 kΩ	PASS	0.0000058 kΩ
4-Wire / 100 kΩ	0.0000 kΩ	-0.0010 kΩ	0.0000 kΩ	0.0000 kΩ	0.0010 kΩ	PASS	0.000058 kΩ
4-Wire / 1 MΩ	0.000000 MΩ	-0.000010 MΩ	0.000000 MΩ	0.000000 MΩ	0.000010 MΩ	PASS	0.0000058 MΩ
4-Wire / 10 MΩ	0.00000 MΩ	-0.00010 MΩ	0.00000 MΩ	0.00000 MΩ	0.00010 MΩ	PASS	0.0000058 MΩ
4-Wire / 100 MΩ	0.0000 MΩ	-0.0010 MΩ	0.0000 MΩ	0.0000 MΩ	0.0010 MΩ	PASS	0.000058 MΩ
2-Wire / 100 Ω	0.0000 Ω	-0.0040 Ω	0.0000 Ω	0.0000 Ω	0.0040 Ω	PASS	0.000058 Ω
2-Wire / 1 kΩ	0.000000 kΩ	-0.000010 kΩ	0.000000 kΩ	0.000000 kΩ	0.000010 kΩ	PASS	0.0000058 kΩ
2-Wire / 10 kΩ	0.00000 kΩ	-0.00010 kΩ	0.00000 kΩ	0.00000 kΩ	0.00010 kΩ	PASS	0.0000058 kΩ
2-Wire / 100 kΩ	0.0000 kΩ	-0.0010 kΩ	0.0000 kΩ	0.0000 kΩ	0.0010 kΩ	PASS	0.000058 kΩ
2-Wire / 1 MΩ	0.000000 MΩ	-0.000010 MΩ	0.000001 MΩ	0.000001 MΩ	0.000010 MΩ	PASS	0.0000058 MΩ
2-Wire / 10 MΩ	0.00000 MΩ	-0.00010 MΩ	0.00000 MΩ	0.00000 MΩ	0.00010 MΩ	PASS	0.0000058 MΩ
2-Wire / 100 MΩ	0.0000 MΩ	-0.0010 MΩ	0.0000 MΩ	0.0000 MΩ	0.0010 MΩ	PASS	0.000058 MΩ

Section 2 - DC Voltage Gain Verification Test

Range	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
100 mV	100.0000 mV	99.9915 mV	99.9997 mV	99.9997 mV	100.0085 mV	PASS	0.0017 mV
100 mV	-100.0000 mV	-100.0085 mV	-99.9995 mV	-99.9995 mV	-99.9915 mV	PASS	0.0017 mV
1 V	1.000000 V	0.999958 V	0.999996 V	0.999996 V	1.000042 V	PASS	0.0000098 V
10 V	10.00000 V	9.99965 V	9.99990 V	9.99990 V	10.00035 V	PASS	0.000043 V
10 V	-10.00000 V	-10.00035 V	-9.99996 V	-9.99996 V	-9.99965 V	PASS	0.000043 V
100 V	100.0000 V	99.9954 V	99.9987 V	99.9987 V	100.0046 V	PASS	0.00065 V
1000 V	1000.000 V	999.954 V	999.985 V	999.985 V	1000.046 V	PASS	0.0061 V

Section 3 - DC Current Gain Verification Test

Range	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
100 µA	100.0000 µA	99.9250 µA	100.0010 µA	100.0010 µA	100.0750 µA	PASS	0.010 µA
1 mA	1.000000 mA	0.999440 mA	1.000015 mA	1.000015 mA	1.000560 mA	PASS	0.000043 mA
10 mA	10.00000 mA	9.99300 mA	10.00008 mA	10.00008 mA	10.00700 mA	PASS	0.00041 mA
100 mA	100.0000 mA	99.9450 mA	100.0018 mA	100.0018 mA	100.0550 mA	PASS	0.0053 mA
1 A	1.000000 A	0.998900 A	1.000009 A	1.000009 A	1.001100 A	PASS	0.000094 A
3 A	2.00000 A	1.99640 A	2.00015 A	2.00015 A	2.00360 A	PASS	0.00018 A



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Section 4 - AC Voltage Gain Verification Test

Range Frequency	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
100 mV / 1 kHz	100.0000 mV	99.9100 mV	100.0011 mV	100.0011 mV	100.0900 mV	PASS	0.015 mV
100 mV / 50 kHz	100.0000 mV	99.8500 mV	100.0090 mV	100.0090 mV	100.1500 mV	PASS	0.027 mV
100 mV / 300 kHz	100.0000 mV	98.3000 mV	99.9988 mV	99.9988 mV	101.7000 mV	PASS	0.11 mV
1 V / 1 kHz	1.000000 V	0.999100 V	1.000080 V	1.000080 V	1.000900 V	PASS	0.000053 V
1 V / 50 kHz	1.000000 V	0.998500 V	1.000021 V	1.000021 V	1.001500 V	PASS	0.000085 V
1 V / 300 kHz	1.000000 V	0.983000 V	0.999760 V	0.999760 V	1.017000 V	PASS	0.000050 V
10 V / 10 Hz	10.00000 V	9.99097 V	10.00105 V	10.00105 V	10.00903 V	PASS	0.0028 V
10 V / 1 kHz	10.00000 V	9.99100 V	10.00119 V	10.00119 V	10.00900 V	PASS	0.00050 V
10 V / 50 kHz	10.00000 V	9.98500 V	10.00207 V	10.00207 V	10.01500 V	PASS	0.00085 V
10 V / 300 kHz	10.00000 V	9.83000 V	10.00311 V	10.00311 V	10.17000 V	PASS	0.0034 V
100 V / 1 kHz	100.0000 V	99.9100 V	100.0100 V	100.0100 V	100.0900 V	PASS	0.0046 V
100 V / 50 kHz	100.0000 V	99.8500 V	100.0102 V	100.0102 V	100.1500 V	PASS	0.0076 V
100 V / 300 kHz	50.0000 V	48.9000 V	50.0219 V	50.0219 V	51.1000 V	PASS	0.015 V
750 V / 1 kHz	750.000 V	749.010 V	750.221 V	750.221 V	750.990 V	PASS	0.056 V
750 V / 50 kHz	210.000 V	209.415 V	210.108 V	210.108 V	210.585 V	PASS	0.016 V
750 V / 300 kHz	70.000 V	65.410 V	71.045 V	71.045 V	74.590 V	PASS	0.020 V

Section 5 - AC Current Gain Verification Test

Range Frequency	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
100 µA / 1 kHz	100.0000 µA	99.8600 µA	100.0443 µA	100.0443 µA	100.1400 µA	PASS	0.020 µA
100 µA / 5 kHz	100.0000 µA	99.8600 µA	100.0234 µA	100.0234 µA	100.1400 µA	PASS	0.040 µA
1 mA / 1 kHz	1.000000 mA	0.998600 mA	1.000650 mA	1.000650 mA	1.001400 mA	PASS	0.00016 mA
1 mA / 5 kHz	1.000000 mA	0.998600 mA	1.000540 mA	1.000540 mA	1.001400 mA	PASS	0.00033 mA
10 mA / 1 kHz	10.00000 mA	9.98600 mA	10.00430 mA	10.00430 mA	10.01400 mA	PASS	0.0016 mA
10 mA / 5 kHz	10.00000 mA	9.97600 mA	10.00540 mA	10.00540 mA	10.02400 mA	PASS	0.0028 mA
100 mA / 1 kHz	100.0000 mA	99.8600 mA	100.0256 mA	100.0256 mA	100.1400 mA	PASS	0.015 mA
100 mA / 5 kHz	100.0000 mA	99.7600 mA	100.0567 mA	100.0567 mA	100.2400 mA	PASS	0.032 mA
1 A / 1 kHz	1.000000 A	0.998600 A	0.999976 A	0.999976 A	1.001400 A	PASS	0.00030 A
1 A / 5 kHz	1.000000 A	0.998600 A	1.000278 A	1.000278 A	1.001400 A	PASS	0.00052 A
3 A / 1 kHz	2.00000 A	1.99520 A	2.00010 A	2.00010 A	2.00480 A	PASS	0.00056 A
3 A / 5 kHz	2.00000 A	1.99520 A	2.00050 A	2.00050 A	2.00480 A	PASS	0.00096 A

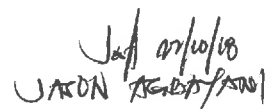
Section 6 - Frequency Gain Verification Test

Input Voltage	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
10 mV	40.00000 Hz	39.97200 Hz	40.00002 Hz	40.00002 Hz	40.02800 Hz	PASS	0.0000058 Hz
10 V	10.00000 kHz	9.99930 kHz	10.00003 kHz	10.00003 kHz	10.00070 kHz	PASS	0.0000058 kHz

Section 7 - Ohms Gain Verification Test

4-Wire Ohms, @ 100Mohms Verify only. 2-Wire Ohms.

Range	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
100 Ω	100.0000 Ω	99.9860 Ω	99.9995 Ω	99.9995 Ω	100.0140 Ω	PASS	0.0011 Ω
1 kΩ	1.000000 kΩ	0.999890 kΩ	0.999980 kΩ	0.999980 kΩ	1.000110 kΩ	PASS	0.0000090 kΩ
10 kΩ	10.00000 kΩ	9.99890 kΩ	9.99978 kΩ	9.99978 kΩ	10.00110 kΩ	PASS	0.000090 kΩ
100 kΩ	100.0000 kΩ	99.9890 kΩ	99.9965 kΩ	99.9965 kΩ	100.0110 kΩ	PASS	0.0014 kΩ
1 MΩ	1.000000 MΩ	0.999870 MΩ	0.999995 MΩ	0.999995 MΩ	1.000130 MΩ	PASS	0.000024 MΩ
10 MΩ	10.00000 MΩ	9.99590 MΩ	9.99956 MΩ	9.99956 MΩ	10.00410 MΩ	PASS	0.00043 MΩ
100 MΩ	100.00000 MΩ	99.999199 MΩ	99.999760 MΩ	99.999760 MΩ	100.000801 MΩ	PASS	0.00084 MΩ



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ID Number: MY48003234

Section 8 - Capacitance Measurement

Range	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty ($\pm$)
1.0000 μ F	1.0000 μ F	0.9950 μ F	1.0010 μ F	1.0010 μ F	1.0050 μ F	PASS	0.0040 μ F
10.000 μ F	1.000 μ F	0.986 μ F	1.001 μ F	1.001 μ F	1.014 μ F	PASS	0.0040 μ F


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