



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



Certificate of Calibration

Date: Jan 17, 2019

Cert No. 551220082766008

Customer:

GES SINGAPORE PTE LTD
28 MARSILING LANE
SINGAPORE 739152

Work Order #: SG-11009684

MPC Control #: 77640543
Asset ID: N/A
Gage Type: TRUE RMS MULTIMETER
Manufacturer: FLUKE
Model Number: 87 III
Size: N/A
Temp/RH: 22.5°C / 48.0%
Location: Calibration performed at Customer's facility

Serial Number: 77640543
Department: N/A
Performed By: STEVEN CHOO
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: January 17, 2019
Cal. Interval: 12 MONTHS
Cal. Due Date: January 17, 2020

Calibration Notes:

Please refer to the attached calibration data. (3 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
FLUKE 80 SERIES III	Digital Multimeters, FLUKE 83/85/87 SERIES III Service Information, Jun-01-2002

Calibrating Technician:

STEVEN CHOO

QC Approval:

JULES PHILIPPE AGPANGAN

Statements of Pass or Fail Conformance: The uncertainty of measurement has been taken into account when determining compliance with specification, as per ILAC-G8:03/2009. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2008.

The status of compliance with the acceptance criteria is reported as:

PASS - Compliant with specification.

FAIL - Not compliant with specification.

FAIL² - The measured value is not within the acceptance limits. However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.

PASS² - The measured value is within acceptance limits. However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.

The expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3 Method 6-Guard Bands based on Test Uncertainty Ratio. 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. 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 manufacture's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.



Fluke 87 III Digital Multimeter



Procedure: **FLUKE 80 SERIES III**
 ID Number: **77640543**
 Asset Number: **N/A**

Order Number: **SG-11009684**
 Serial Number: **77640543**
 Calibration Date: **Jan 17, 2019**

Functional Test

Function Tested/Range	Result
Display Test	PASS

Rotary Switch Test

Function Tested	Display Value	Lower Limit	As Found	As Left	Upper Limit	Result
OFF	N/A	N/A	N/A	N/A	N/A	PASS
ACV	0	-12	0	0	12	PASS
DCV	-32	-44	-32	-32	-20	PASS
mV DC	-64	-76	-64	-64	-52	PASS
Continuity / Ohms	-96	-108	-96	-96	-84	PASS
Diode Test	-128	-140	-128	-128	-116	PASS
mA / A	-160	-172	-160	-160	-148	PASS
uA	-192	-204	-192	-192	-180	PASS

AC Voltage Accuracy

Function Tested/Range	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
400.0 mV	350 mV @ 60 Hz	347.1 mV	348.9 mV	348.9 mV	352.9 mV	PASS	0.662 mV
400.0 mV	350 mV @ 1 kHz	346.1 mV	348.7 mV	348.7 mV	353.9 mV	PASS	0.662 mV
400.0 mV	350 mV @ 5 kHz	342.6 mV	346.0 mV	346.0 mV	357.4 mV	PASS	0.059 mV
400.0 mV	350 mV @ 20 kHz	341.0 mV	343.6 mV	343.6 mV	359.0 mV	PASS	0.662 mV
4.000 V	3.5 V @ 60 Hz	3.474 V	3.492 V	3.492 V	3.527 V	PASS	0.00663 V
4.000 V	3.5 V @ 1 kHz	3.461 V	3.490 V	3.490 V	3.539 V	PASS	0.0060 V
4.000 V	3.5 V @ 5 kHz	3.426 V	3.461 V	3.461 V	3.574 V	PASS	0.00663 V
4.000 V	3.5 V @ 20 kHz	3.410 V	3.464 V	3.464 V	3.590 V	PASS	0.00663 V
40.00 V	35 V @ 60 Hz	34.74 V	34.92 V	34.92 V	35.27 V	PASS	0.0060 V
40.00 V	35 V @ 1 kHz	34.61 V	35.00 V	35.00 V	35.39 V	PASS	0.0060 V
40.00 V	35 V @ 5 kHz	34.26 V	34.96 V	34.96 V	35.74 V	PASS	0.0663 V
40.00 V	35 V @ 20 kHz	34.10 V	34.92 V	34.92 V	35.90 V	PASS	0.0663 V
400.0 V	350 V @ 60 Hz	347.4 V	349.1 V	349.1 V	352.7 V	PASS	0.663 V
400.0 V	350 V @ 1 kHz	346.1 V	349.8 V	349.8 V	353.9 V	PASS	0.66 V
400.0 V	350 V @ 5 kHz	342.6 V	349.2 V	349.2 V	357.4 V	PASS	1.952 V
1000 V	900 V @ 60 Hz	892 V	904 V	904 V	908 V	PASS	0.59 V
1000 V	900 V @ 1 kHz	887 V	905 V	905 V	913 V	PASS	0.59 V

Frequency Accuracy

Function Tested	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
150 mV rms	19.000 kHz	18.998 kHz	18.999 kHz	18.999 kHz	19.002 kHz	PASS	0.00057 kHz
150 mV rms	190.00 kHz	189.98 kHz	189.99 kHz	189.99 kHz	190.02 kHz	PASS	0.0057 kHz

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Frequency Sensitivity and Trigger Level Accuracy

Range/Amplitude	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
4 VAC/300 mV AC	1 kHz	0.8 kHz	1.0 kHz	1.0 kHz	1.2 kHz	PASS	0.057 kHz
4 VDC/1.7 VAC	1 kHz	0.8 kHz	1.0 kHz	1.0 kHz	1.2 kHz	PASS	0.057 kHz
4 VDC/1.0 VAC	1 kHz	0.0 kHz	0.0 kHz	0.0 kHz	0.0 kHz	PASS	0.057 kHz
40 VDC/6.0 VAC	1 kHz	0.8 kHz	1.0 kHz	1.0 kHz	1.2 kHz	PASS	0.057 kHz
40 VDC/2.0 VAC	1 kHz	0.0 kHz	0.0 kHz	0.0 kHz	0.0 kHz	PASS	0.057 kHz

DC Voltage Accuracy

Range	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
4 V	3.500 V	3.497 V	3.497 V	3.497 V	3.503 V	PASS	0.00057 V
40 V	35.00 V	34.97 V	34.97 V	34.97 V	35.03 V	PASS	0.0057 V
40 V	-35.00 V	-35.03 V	-34.97 V	-34.97 V	-34.97 V	PASS	0.0057 V
400 V	350.0 V	349.7 V	349.8 V	349.8 V	350.3 V	PASS	0.057 V
1000 V	1000 V	998 V	1000 V	1000 V	1002 V	PASS	0.57 V

Peak Min Max Test

Function Tested	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
@ 60 Hz	2.0 V	2.765 V	2.800 V	2.800 V	2.890 V	PASS	0.0 V
@ 60 Hz	-2.0 V	-2.890 V	-2.804 V	-2.804 V	-2.765 V	PASS	0.0 V

mV DC Accuracy

Function Tested	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
350 mV	350.0 mV	349.6 mV	349.7 mV	349.7 mV	350.5 mV	PASS	0.661 mV

Resistance Accuracy

Range	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
400 Ω	190.0 Ω	189.4 Ω	190.0 Ω	190.0 Ω	190.6 Ω	PASS	0.057 Ω
40 kΩ	19.00 kΩ	18.95 kΩ	19.00 kΩ	19.00 kΩ	19.05 kΩ	PASS	0.0057 kΩ
4 MΩ	1.900 MΩ	1.888 MΩ	1.901 MΩ	1.901 MΩ	1.912 MΩ	PASS	0.00057 MΩ
40 MΩ	19.00 MΩ	18.78 MΩ	19.04 MΩ	19.04 MΩ	19.22 MΩ	PASS	0.0057 MΩ

Conductance Accuracy

Range	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
100 MΩ	10.00 nS	9.80 nS	9.96 nS	9.96 nS	10.20 nS	PASS	0.056580 nS

Capacitance Accuracy

Range	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
1.0 μF	1.0 μF	0.95 μF	0.98 μF	0.98 μF	1.05 μF	PASS	0.0074 μF
0.470 μF	0.470 μF	0.462 μF	0.467 μF	0.467 μF	0.478 μF	PASS	0.00232 μF
0.0470 μF	0.0470 μF	0.0462 μF	0.0472 μF	0.0472 μF	0.0478 μF	PASS	0.000232 μF
4.70 μF	4.70 μF	4.62 μF	4.67 μF	4.67 μF	4.78 μF	PASS	0.0232 μF

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Diode Test Accuracy

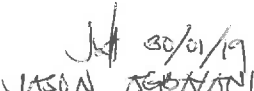
Function Tested	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
3.000 V	3.000 V	2.939 V	2.988 V	2.988 V	3.061 V	PASS	0.00057 V

DC Current Accuracy

Range	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
400.0 µA	350.0 µA	348.9 µA	349.8 µA	349.8 µA	351.1 µA	PASS	1.305 µA
4000 µA	3500 µA	3491 µA	3497 µA	3497 µA	3509 µA	PASS	6.61 µA
40.00 mA	35.00 mA	34.89 mA	34.95 mA	34.95 mA	35.11 mA	PASS	0.0661 mA
400 mA	350.0 mA	349.1 mA	349.5 mA	349.5 mA	350.9 mA	PASS	0.059 mA
4000 mA	3500 mA	3489 mA	3489 mA	3489 mA	3511 mA	PASS	0.57 mA
10.00 A	10.00 A	9.96 A	9.96 A	9.96 A	10.04 A	PASS	0.0057 A

AC Current Accuracy

Range	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
400.0 µA	350 µA @ 60 Hz	346.3 µA	349.1 µA	349.1 µA	353.7 µA	PASS	0.143 µA
400.0 µA	350 µA @ 1 kHz	346.3 µA	350.0 µA	350.0 µA	353.7 µA	PASS	0.143 µA
4000 µA	3500 µA @ 60 Hz	3463 µA	3492 µA	3492 µA	3537 µA	PASS	5.33 µA
4000 µA	3500 µA @ 1 kHz	3463 µA	3500 µA	3500 µA	3537 µA	PASS	1.43 µA
40.00 mA	35 mA @ 60 Hz	34.63 mA	34.87 mA	34.87 mA	35.37 mA	PASS	0.0533 mA
40.00 mA	35 mA @ 1kHz	34.63 mA	34.96 mA	34.96 mA	35.37 mA	PASS	0.0533 mA
400 mA	350 mA @ 60 Hz	346.3 mA	348.6 mA	348.6 mA	353.7 mA	PASS	1.032 mA
400 mA	350 mA @ 1 kHz	346.3 mA	349.2 mA	349.2 mA	353.7 mA	PASS	0.553 mA
4000 mA	3500 mA @ 60 Hz	3463 mA	3483 mA	3483 mA	3537 mA	PASS	5.51 mA
4000 mA	3500 mA @ 1 kHz	3463 mA	3495 mA	3495 mA	3537 mA	PASS	5.51 mA
10.00 A	10 A @ 60 Hz	9.88 A	10.01 A	10.01 A	10.12 A	PASS	0.0107 A
10.00 A	10 A @ 1 kHz	9.88 A	10.03 A	10.03 A	10.12 A	PASS	0.0107 A


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