

National Measurement Laboratory

Report of Calibration



Date of Issue: May 31, 2019

Report No.: E190337B

Instrument: DC Voltage Standard

Manufacturer: FLUKE

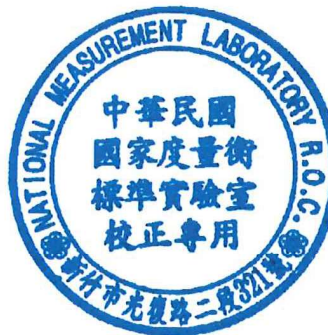
Model: 732B

Serial Number: 6480002

Applicant: Illya Tsemenko

Address: [REDACTED]

The result of this calibration, performed by the National Measurement Laboratory, is specified in this report. When the cover and the following 1 pages are separated, the validity of this report no longer exists.



Shih-Fang Chen

Approved Signatory

Jeng-Yow Lin

Chief Executive
National Measurement Laboratory

INSTRUCTIONS OF THE CALIBRATION REPORT

1. The result of this calibration, performed by the National Measurement Laboratory, is specified in this report. Only to the designated instrument is the calibration result applied.
2. The calibration data was obtained under the specific conditions of this laboratory. After the calibration, the accuracy and precision of this measuring instrument/standard will depend on the care of handling as well as the frequency of use.
3. Unless otherwise specified, no adjustment to the measuring instrument/standard will be made in our laboratory. It is recommended that the clients have the measuring instrument/standard adjusted by its manufacturer or dealer if needed. The measuring instrument/standard should be recalibrated to ensure its accuracy after any adjustment.
4. Periodical recalibration, with a user-defined period, is recommended for ensuring the accuracy of the measuring instrument/standard.
5. The calibration result has been confirmed and authorized by the technical manager of the National Measurement Laboratory.
6. The client should not dismantle this report. This calibration certificate shall not be reproduced or excerpted from any part of the contents except in full, without written approval of our laboratory.
7. This certificate is consistent with the capabilities that are included in Appendix C of the MRA drawn up by the CIPM. Under the MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainty specified in Appendix C (for details see <http://www.bipm.org>).

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Instrument: DC Voltage Standard

Ambient Temp.: $(23.0 \pm 1.5) ^\circ\text{C}$

Manufacturer: FLUKE

Relative Humidity: $(45 \pm 10) \%$

Model: 732B

Serial No.: 6480002

Calibration Results and Descriptions

I. Calibration Result

Nominal value (V)	Measured value (V)	Relative expanded uncertainty ($\mu\text{V}/\text{V}$)
10	10.000 0152	0.02

Note : The calibration result is based on the new Josephson constant ($K_J = 483597.85 \text{ GHz/V}$).

II. Descriptions

1. Date of Calibration

This calibration was performed on May 30, 2019.

2. Calibration Methods

This calibration was carried out according to Instrument Calibration Technique for Programmable Josephson Voltage Measurement System¹. The DC voltage standard was calibrated by comparing its outputs of 10 V with those of NML programmable Josephson voltage standard.

3. Standard Used

10 V programmable Josephson voltage standard chip (S/N : chip 10WC_131122-12).

4. Relative Expanded Uncertainty

4.1 The relative expanded uncertainty was evaluated according to Measurement System Validation Procedure for Programmable Josephson Voltage Measurement System².

4.2 The reported relative expanded uncertainty was obtained by multiplying the relative combined standard uncertainty with a coverage factor $k = 2$, corresponding to a level of confidence of approximately 95 %.

III. References

1. Instrument Calibration Technique for Programmable Josephson Voltage Measurement System, 07-3-A1-0079, 2nd, CMS/ITRI, 2017.
2. Measurement System Validation Procedure for Programmable Josephson Voltage Measurement System, 07-3-A1-0201, 2nd, CMS/ITRI, 2017.