

輝創工程有限公司

Sun Creation Engineering Limited

Calibration & Testing Laboratory

Certificate of Calibration

校正證書

Certificate No. : C240423

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC24-0020)

Date of Receipt / 收件日期 : 5 January 2024

Description / 儀器名稱 : Precision Acoustic Calibrator

Manufacturer / 製造商 : LARSON DAVIS

Model No. / 型號 : CAL200

Serial No. / 編號 : 16172

Supplied By / 委託者 : Envirotech Services Co.

Room 712, 7/F, My Loft, 9 Hoi Wing Road, Tuen Mun,

New Territories, Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : $(23 \pm 2)^{\circ}\text{C}$

Relative Humidity / 相對濕度 : $(50 \pm 25)\%$

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 24 January 2024

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.

The results do not exceed specified limits.

These limits refer to manufacturer's published tolerances as requested by the customer.

The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Hottinger Brüel & Kjær Calibration Laboratory, Denmark
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

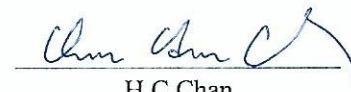
Tested By

測試


K C Lee
Engineer

Certified By

核證


H C Chan
Engineer

Date of Issue

簽發日期

24 January 2024

The test equipment used for calibration is traceable to the National Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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Sun Creation Engineering Limited - Calibration & Testing Laboratory

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輝創工程有限公司 - 校正及檢測實驗室

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Certificate of Calibration

校正證書

Certificate No. : C240423
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- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

| <u>Equipment ID</u> | <u>Description</u> | <u>Certificate No.</u> |
|---------------------|-----------------------------------|------------------------|
| CL130 | Universal Counter | C233799 |
| CL281 | Multifunction Acoustic Calibrator | CDK2302738 |
| TST150A | Measuring Amplifier | C221750 |

- Test procedure : MA100N.

- Results :

5.1 Sound Level Accuracy

| UUT Nominal Value | Measured Value (dB) | Mfr's Limit (dB) | Uncertainty of Measured Value (dB) |
|----------------------|------------------------|---------------------|---------------------------------------|
| 94 dB, 1 kHz | 93.90 | ± 0.2 | ± 0.20 |
| 114 dB, 1 kHz | 113.90 | | |

5.2 Frequency Accuracy

| UUT Nominal Value (kHz) | Measured Value (kHz) | Mfr's Limit | Uncertainty of Measured Value (Hz) |
|----------------------------|-------------------------|----------------|---------------------------------------|
| 1 | 1.000 | 1 kHz ± 1 % | ± 1 |

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :

Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.



Certificate of Calibration 校正證書

Certificate No. : C234378
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC23-1403)

Date of Receipt / 收件日期 : 11 July 2023

Description / 儀器名稱 : Sound Level Meter

Manufacturer / 製造商 : Rion

Model No. / 型號 : NL-52

Serial No. / 編號 : 00331806

Supplied By / 委託者 : Envirotech Services Co.

Room 712, 7/F, My Loft, 9 Hoi Wing Road, Tuen Mun,
New Territories, Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : $(23 \pm 2)^{\circ}\text{C}$

Relative Humidity / 相對濕度 : $(50 \pm 25)\%$

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 30 July 2023

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.

The results do not exceed specified limits.


These limits refer to manufacturer's published tolerances as requested by the customer.

The results are detailed in the subsequent page(s).


The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Hottinger Brüel & Kjær Calibration Laboratory, Denmark
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

Tested By
測試


H T Wong
Assistant Engineer

Certified By
核證


K C Lee
Engineer

Date of Issue
簽發日期

31 July 2023

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Certificate of Calibration

校正證書

Certificate No. : C234378

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1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration was performed before the test.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

| <u>Equipment ID</u> | <u>Description</u> | <u>Certificate No.</u> |
|---------------------|-------------------------------------|------------------------|
| CL280 | 40 MHz Arbitrary Waveform Generator | C230306 |
| CL281 | Multifunction Acoustic Calibrator | CDK2302738 |

5. Test procedure : MA101N.

6. Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

| UUT Setting | | | | Applied Value | | UUT Reading (dB) | IEC 61672 Class 1 Limit (dB) |
|-------------|----------------|---------------------|----------------|---------------|-------------|------------------|------------------------------|
| Range (dB) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. (kHz) | | |
| 30 - 130 | L _A | A | Fast | 94.00 | 1 | 93.1 | ± 1.1 |

- 6.1.2 Linearity

| UUT Setting | | | | Applied Value | | UUT Reading (dB) |
|-------------|----------------|---------------------|----------------|---------------|-------------|------------------|
| Range (dB) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. (kHz) | |
| 30 - 130 | L _A | A | Fast | 94.00 | 1 | 93.1 (Ref.) |
| | | | | 104.00 | | 103.1 |
| | | | | 114.00 | | 113.1 |

IEC 61672 Class 1 Limit : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

- 6.2 Time Weighting

| UUT Setting | | | | Applied Value | | UUT Reading (dB) | IEC 61672 Class 1 Limit (dB) |
|-------------|----------------|---------------------|----------------|---------------|-------------|------------------|------------------------------|
| Range (dB) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. (kHz) | | |
| 30 - 130 | L _A | A | Fast | 94.00 | 1 | 93.1 | Ref. |
| | | | Slow | | | 93.1 | ± 0.3 |

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6.3 Frequency Weighting

6.3.1 A-Weighting

| UUT Setting | | | | Applied Value | | UUT Reading (dB) | IEC 61672 Class 1 Limit (dB) |
|-------------|----------------|---------------------|----------------|---------------|--------|------------------|------------------------------|
| Range (dB) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. | | |
| 30 - 130 | L _A | A | Fast | 94.00 | 63 Hz | 66.8 | -26.2 ± 1.5 |
| | | | | | 125 Hz | 76.9 | -16.1 ± 1.5 |
| | | | | | 250 Hz | 84.4 | -8.6 ± 1.4 |
| | | | | | 500 Hz | 89.8 | -3.2 ± 1.4 |
| | | | | | 1 kHz | 93.1 | Ref. |
| | | | | | 2 kHz | 94.3 | +1.2 ± 1.6 |
| | | | | | 4 kHz | 94.1 | +1.0 ± 1.6 |
| | | | | | 8 kHz | 92.0 | -1.1 (+2.1 ; -3.1) |
| | | | | | 16 kHz | 85.1 | -6.6 (+3.5 ; -17.0) |

6.3.2 C-Weighting

| UUT Setting | | | | Applied Value | | UUT Reading (dB) | IEC 61672 Class 1 Limit (dB) |
|-------------|----------------|---------------------|----------------|---------------|--------|------------------|------------------------------|
| Range (dB) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. | | |
| 30 - 130 | L _C | C | Fast | 94.00 | 63 Hz | 92.2 | -0.8 ± 1.5 |
| | | | | | 125 Hz | 92.9 | -0.2 ± 1.5 |
| | | | | | 250 Hz | 93.0 | 0.0 ± 1.4 |
| | | | | | 500 Hz | 93.1 | 0.0 ± 1.4 |
| | | | | | 1 kHz | 93.1 | Ref. |
| | | | | | 2 kHz | 92.9 | -0.2 ± 1.6 |
| | | | | | 4 kHz | 92.3 | -0.8 ± 1.6 |
| | | | | | 8 kHz | 90.1 | -3.0 (+2.1 ; -3.1) |
| | | | | | 16 kHz | 83.2 | -8.5 (+3.5 ; -17.0) |

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Remarks : - UUT Microphone Model No. : UC-59 & S/N : 10446

- Mfr's Limit : IEC 61672 Class 1

- Uncertainties of Applied Value :

| | | |
|--------|------------------|--------------------------|
| 94 dB | : 63 Hz - 125 Hz | : ± 0.35 dB |
| | 250 Hz - 500 Hz | : ± 0.30 dB |
| | 1 kHz | : ± 0.20 dB |
| | 2 kHz - 4 kHz | : ± 0.35 dB |
| | 8 kHz | : ± 0.45 dB |
| | 16 kHz | : ± 0.70 dB |
| 104 dB | : 1 kHz | : ± 0.10 dB (Ref. 94 dB) |
| 114 dB | : 1 kHz | : ± 0.10 dB (Ref. 94 dB) |

- The uncertainties are for a confidence probability of not less than 95 %.

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