輝創工程有限公司
Sun Creation Engineering Limited
Calibration & Testing Laboratory

# Certificate of Calibration
# 校正證書

Certificate No. : C220969
證書編號

**ITEM TESTED / 送檢項目** ( Job No. / 序引編號 : IC22-0235 ) Date of Receipt / 收件日期 : 9 February 2022

Description / 儀器名稱 : Precision Acoustic Calibrator
Manufacturer / 製造商 : LARSON DAVIS
Model No. / 型號 : CAL200
Serial No. / 編號 : 11334
Supplied By / 委託者 : Envirotech Services Co.
Room 113, 1/F, My Loft, 9 Hoi Wing Road, Tuen Mun,
New Territories, Hong Kong

**TEST CONDITIONS / 測試條件**

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (50 ± 25)%
Line Voltage / 電壓 : ---

**TEST SPECIFICATIONS / 測試規範**

Calibration check

**DATE OF TEST / 測試日期** : 19 February 2022

**TEST RESULTS / 測試結果**

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification & user's specified acceptance criteria.
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
- 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 : 22 February 2022

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.
本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗所書面批准。

Sun Creation Engineering Limited Calibration & Testing Laboratory
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# Certificate of Calibration
# 校正證書

Certificate No. : C220969
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

| Equipment ID | Description | Certificate No. |
|---|---|---|
| CL130 | Universal Counter | C213954 |
| CL281 | Multifunction Acoustic Calibrator | AV210017 |
| TST150A | Measuring Amplifier | C201309 |

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

| UUT Nominal Value | Measured Value (dB) | User's Spec. (dB) | Uncertainty of Measured Value (dB) |
|---|---|---|---|
| 94 dB, 1 kHz | 93.6 | ± 0.5 | ± 0.2 |
| 114 dB, 1 kHz | 113.7 | | |

5.2 Frequency Accuracy

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

Remarks : - The user's specified acceptance criteria (user's spec.) is a customer pre-defined operating tolerance of the UUT, suitable for one's own intended use.

- 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.

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Sun Creation Engineering Limited
Calibration & Testing Laboratory

# Certificate of Calibration
# 校正證書

Certificate No. : C222710
證書編號

**ITEM TESTED / 送檢項目** ( Job No. / 序号編號 : IC22-0821 ) Date of Receipt / 收件日期 : 3 May 2022

| | | |
|---|---|---|
| Description / 儀器名稱 | : | Sound Level Meter |
| Manufacturer / 製造商 | : | Rion |
| Model No. / 型號 | : | NL-52 |
| Serial No. / 編號 | : | 00542913 |
| Supplied By / 委託者 | : | Envirotech Services Co.<br>Room 712, 7/F, My Loft, 9 Hoi Wing Road, Tuen Mun,<br>New Territories, Hong Kong |

**TEST CONDITIONS / 測試條件**

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (50 ± 25)%

Line Voltage / 電壓 : ---

**TEST SPECIFICATIONS / 測試規範**

Calibration check

**DATE OF TEST / 測試日期** : 20 May 2022

**TEST RESULTS / 測試結果**

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
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
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

Tested By 測試 : CK Lo
Project Engineer

Certified By 核證 : K C Lee
Engineer

Date of Issue 簽發日期 : 24 May 2022

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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# Certificate of Calibration
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Certificate No. : C222710
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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 :

| Equipment ID | Description | Certificate No. |
|---|---|---|
| CL280 | 40 MHz Arbitrary Waveform Generator | C220381 |
| CL281 | Multifunction Acoustic Calibrator | AV210017 |

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 Spec. (dB) |
|---|---|---|---|---|---|---|---|
| Range (dB) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. (kHz) | | |
| 30 - 130 | $L_A$ | A | Fast | 94.00 | 1 | 93.3 | ± 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 | 93.3 (Ref.) |
| | | | | 104.00 | | 103.3 |
| | | | | 114.00 | | 113.3 |

IEC 61672 Class 1 Spec. : ± 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 Spec. (dB) |
|---|---|---|---|---|---|---|---|
| Range (dB) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. (kHz) | | |
| 30 - 130 | $L_A$ | A | Fast | 94.00 | 1 | 93.3 | Ref. |
| | | | Slow | | | 93.3 | ± 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 Spec. (dB) |
|---|---|---|---|---|---|---|---|
| Range (dB) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. | | |
| 30 - 130 | $L_A$ | A | Fast | 94.00 | 63 Hz | 67.1 | -26.2 ± 1.5 |
| | | | | | 125 Hz | 77.1 | -16.1 ± 1.5 |
| | | | | | 250 Hz | 84.6 | -8.6 ± 1.4 |
| | | | | | 500 Hz | 90.1 | -3.2 ± 1.4 |
| | | | | | 1 kHz | 93.3 | Ref. |
| | | | | | 2 kHz | 94.5 | +1.2 ± 1.6 |
| | | | | | 4 kHz | 94.3 | +1.0 ± 1.6 |
| | | | | | 8 kHz | 92.3 | -1.1 (+2.1 ; -3.1) |
| | | | | | 16 kHz | 85.4 | -6.6 (+3.5 ; -17.0) |

6.3.2 C-Weighting

| UUT Setting | | | | Applied Value | | UUT Reading (dB) | IEC 61672 Class 1 Spec. (dB) |
|---|---|---|---|---|---|---|---|
| Range (dB) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. | | |
| 30 - 130 | $L_C$ | C | Fast | 94.00 | 63 Hz | 92.5 | -0.8 ± 1.5 |
| | | | | | 125 Hz | 93.1 | -0.2 ± 1.5 |
| | | | | | 250 Hz | 93.3 | 0.0 ± 1.4 |
| | | | | | 500 Hz | 93.3 | 0.0 ± 1.4 |
| | | | | | 1 kHz | 93.3 | Ref. |
| | | | | | 2 kHz | 93.1 | -0.2 ± 1.6 |
| | | | | | 4 kHz | 92.5 | -0.8 ± 1.6 |
| | | | | | 8 kHz | 90.4 | -3.0 (+2.1 ; -3.1) |
| | | | | | 16 kHz | 83.4 | -8.5 (+3.5 ; -17.0) |

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Remarks : - UUT Microphone Model No. : UC-59 & S/N : 06492

- Mfr's Spec. : 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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