

報告使用說明

Directions & Reminders

1. 本案係依約定之委託服務項目、內容及執行方法對委託人送檢樣品進行檢測。

This Measurement Service is conducted on the Sample(s) provided by the CLIENT according to the terms and conditions mutually agreed by both parties.

2. 本案報告僅供委託人內部參考使用，未經本院同意，委託人不得任意摘錄或複製使用，亦不得以之作為任何證明、法庭證據、廣告或商品行銷之用。

This Report is intended for CLIENT's internal use only, and shall not be abridged or copied in any way nor be used for any certification / verification, court evidence, commercial/advertising purposes, or any other promotion without prior written consent of ITRI.

3. 除特別聲明外，報告內之數值係於本院實驗室環境下執行檢測所得之結果。

Unless otherwise specified herein, the data and information contained in this Report are obtained under the environmental condition in ITRI lab.

4. 本報告無論正副本均應加蓋本院報告專用章及經實驗室主管審核確認，始生效力。

This Report, including its original and copy, shall be invalid unless affixed with ITRI authorized chops and reviewed and approved by the chief of the ITRI lab.



Test Item: Performance test of sound calibrator

Brand Name: AZ

Model: 8930

Serial No.: ---

Test Results and Descriptions

I. Test Results

1. Sound pressure level

1.1 Test sample AZ8930 (SN 001)

Microphone type	Nominal Frequency Hz	Nominal SPL dB re 20 μ Pa	Output SPL dB re 20 μ Pa	Expanded uncertainty dB
WS2P* B&K4134	1000	94	93.99	0.12
		104	103.96	0.12
		114	113.98	0.12

1.2 Test sample AZ8930 (SN 002)

Microphone type	Nominal Frequency Hz	Nominal SPL dB re 20 μ Pa	Output SPL dB re 20 μ Pa	Expanded uncertainty dB
WS2P* B&K4134	1000	94	93.99	0.12
		104	103.98	0.12
		114	113.98	0.12

Note*: WS2P is a half inch working standard microphone¹.

The output sound pressure level (SPL) is corrected to the reference conditions of
Ambient pressure: 101.325 kPa

Temperature: 23.0 °C

Relative Humidity: 50 %



2. Short-term sound pressure level fluctuation

Time-weighting: Fast Measurement period: 60 s

2.1 Test sample AZ8930 (SN 001)

Microphone type	Nominal frequency Hz	Nominal SPL dB re 20 μ Pa	SPL fluctuation dB	Expanded uncertainty dB
WS2P* B&K4134	1000	94	0.02	0.03
		104	0.01	0.03
		114	0.01	0.03

2.2 Test sample AZ8930 (SN 002)

Microphone type	Nominal frequency Hz	Nominal SPL dB re 20 μ Pa	SPL fluctuation dB	Expanded uncertainty dB
WS2P* B&K4134	1000	94	0.02	0.03
		104	0.01	0.03
		114	0.01	0.03

3. Sound pressure level difference over range of supply voltage

Nominal operating voltage: 3 V Minimum operating voltage: 2 V

3.1 Test sample AZ8930 (SN 001)

Microphone type	Nominal frequency Hz	Nominal SPL dB re 20 μ Pa	SPL difference dB	Expanded uncertainty dB
WS2P* B&K4134	1000	94	0.06	0.04
		104	0.03	0.04
		114	0.05	0.04

3.2 Test sample AZ8930 (SN 002)

Microphone type	Nominal frequency Hz	Nominal SPL dB re 20 μ Pa	SPL difference dB	Expanded uncertainty dB
WS2P* B&K4134	1000	94	0.05	0.04
		104	0.06	0.04
		114	0.03	0.04



4. Frequency

4.1 Test sample AZ8930 (SN 001)

Microphone type	Nominal SPL dB re 20 μ Pa	Nominal frequency Hz	Output frequency Hz	Expanded uncertainty %
WS2P* B&K4134	94	1000	997.4	0.2
	104	1000	997.4	0.2
	114	1000	997.4	0.2

4.2 Test sample AZ8930 (SN 002)

Microphone type	Nominal SPL dB re 20 μ Pa	Nominal frequency Hz	Output frequency Hz	Expanded uncertainty %
WS2P* B&K4134	94	1000	997.4	0.2
	104	1000	997.4	0.2
	114	1000	997.4	0.2

5. Total distortion + noise

5.1 Test sample AZ8930 (SN 001)

Microphone type	Nominal Frequency Hz	Nominal SPL dB re 20 μ Pa	Total distortion %	Expanded uncertainty %
WS2P* B&K4134	1000	94	1.0	0.5
		104	0.3	0.5
		114	0.1	0.5

5.2 Test sample AZ8930 (SN 002)

Microphone type	Nominal Frequency Hz	Nominal SPL dB re 20 μ Pa	Total distortion %	Expanded uncertainty %
WS2P* B&K4134	1000	94	1.1	0.5
		104	0.4	0.5
		114	0.1	0.5



II. Descriptions

1. Date and Location of Test

The test was performed at 321, Kuang Fu Rd., Sec. 2, Hsinchu, Center for Measurement Standards from August 10, 2020 to September 4, 2020.

2. Test Methods

2.1 The test items and test methods listed in this report were agreed by the client and the Industrial Technology Research Institute.

2.2 This test was carried out according to Instrument Calibration Technique for Sound Calibrator – Insert Voltage Technique² and IEC 60942³.

2.3 This test method is to use a microphone with known sound pressure sensitivity as reference standard. An Insert Voltage Technique is applied to obtain the open-circuit voltage output of the microphone. By comparing the sensitivity of the microphone with the measured insert voltage, then the SPL of device under test can be calculated.

3. Environmental Conditions

This test was performed under the following environmental conditions.

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

Relative humidity: $(50 \pm 20) \%$

Ambient pressure: $(101.3 \pm 2.0) \text{ kPa}$

4. Standard Used

Standard	Manufacturer /Model	Serial No.	Calibration Organization	Certificate No.	Certificate Date (Calibration Interval)
Microphone	B&K 4134	1591088	NML	A180285A	2018/11/19 (2 years)
Multimeter	HP 34401A	US36057886	NML	E200352A	2020/07/02 (2 years)
Precision Attenuator	GDS EL100	037	NML	E200351A	2020/07/02 (2 years)
Audio Analyzer	HP8903B	3011A12827	ITRI	10907C022 45-1-2-03 ver. A	2020/07/02 (3 years)

NML: National Measurement Laboratory, R.O.C.

ITRI: Industrial Technology Research Institute



5. Expanded Uncertainty

- 5.1 The expanded uncertainty was evaluated according to Measurement System Validation Procedure for Sound Pressure Level of Sound Level Meter Calibration System⁴.
- 5.2 The reported expanded uncertainty was obtained by multiplying the combined standard uncertainty with a coverage factor ($k = 2$), corresponding to a level of confidence of approximately 95 %.

III. Reference

1. IEC 61094-4 Measurement microphones – Part 4 : Specifications for working standard microphones, 1995.
2. IEC 60942 Electroacoustics – Sound calibrators, 2017.
3. Instrument Calibration Techniques for Sound Calibrator – Insert Voltage Technique, 07-3-83-0050, 6th edition, CMS/ITRI, 2016.
4. Measurement System Validation Procedure for Sound Calibrator Calibration System – Insert Voltage Technique, 07-3-91-0061, 5th edition, CMS/ITRI, 2016.

章(一)