Dieter.Kos
08.07.2024
Approved

HEAD acoustics
Kalibrierlaboratorium

# Kalibrierschein / *Calibration Certificate*

erstellt durch das Kalibrierlaboratorium der
*issued by the calibration laboratory of the*

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-K-21099-02-00

HEAD acoustics GmbH
Ebertstraße 30a
52134 Herzogenrath
Germany

*Mitglied im / Member of the*
**Deutschen Kalibrierdienst** DKD

| Kalibrierzeichen *Calibration mark* | |
|---|---|
| | 000453 |
| | D-K-21099-02-00 |
| | 2024-07 |

| | |
|---|---|
| Gegenstand *Object* | **Multichannel-Frontend** |
| Hersteller *Manufacturer* | **HEAD acoustics GmbH** |
| Typ *Type* | **labCORE** |
| Fabrikat/Serien-Nr. *Serial Number* | **77000342** |
| Auftraggeber *Customer* | **Sporton International Inc.**<br>**Huaya 1st Rd., Guishan Distr No. 52**<br>**Taoyuan City 333** |
| Kostenträger *Order No.* | **R8247014** |
| Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate* | **7** |
| Datum der Kalibrierung *Date of calibratio* | **2024-07-08** |

Dieser Kalibrierschein dokumentiert die metrologische Rückführbarkeit auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.
*This calibration certificate documents the metrological traceability to national standards, which realize the units of measurement according to the International System of Units (SI).*
*The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.*
*The user is obliged to have the object recalibrated at appropriate intervals.*



Datum der Ausstellung
*Date of issue*
**2024-07-08**

Freigabe des Kalibrierscheins durch (siehe Freigabestempel)
*Approval of the calibration certificate by (see release seal)*

**Dieter Kos**
Leiter des Kalibrierlaboratoriums
*Head of the calibration laboratory*

**René Collet**
Stellv. Leiter des Kalibrierlaboratoriums
*Deputy Head of the calibration laboratory*

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**Kalibriergegenstand**
*Calibration object*

labCORE SN: 77000342, FW: 3.7.5,

**Kalibrierverfahren**
*Calibration procedure*

Software: ACQUA 4.3.100

Die Kalibrierung erfolgte durch Vergleich der Anzeige des Kalibriergegenstandes (DUT) mit den durch die Kalibriergeräte/Normale dargestellten Werten. Bezug ist die Realisierung der Einheiten der PTB.

*The calibration was performed by comparing the indication of the calibration object (DUT) with the values, displayed by the standards/normals. References are the units of the PTB.*

**Ort der Kalibrierung**
*Place of calibration*

Kalibrierlabor der HEAD acoustics GmbH, Ebertstr. 30a, 52134 Herzogenrath.

Calibration laboratory of the HEAD acoustics GmbH, Ebertstr. 30a, 52134 Herzogenrath.

**Messbedingungen**
*Measurement conditions*

Vor der Kalibrierung waren der Kalibriergegenstand und das Referenzequipment mehr als 4 Stunden am Ort der Kalibrierung aufgestellt und eingeschaltet.

Before calibration the calibration object and the reference equipment were installed and powered on for more than 4 hours at the place of calibration.

**Umgebungsbedingungen**
*Ambient conditions*

Temperatur: (23 ± 2) °C
*Temperature*

Rel. Luftfeuchtigkeit: (50 ± 30)) %
*Rel. humidity*

**Messergebnisse**
*Measurement results*

Auf den folgenden Seiten sind die Messergebnisse dokumentiert, diese beziehen sich nur auf die geprüften bzw. kalibrierten Gegenstände.
*On the following pages, the measurement results are documented, these results relate only to the items tested or calibrated.*

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**Messunsicherheit**
*Measurement uncertainty*

Angegeben ist die erweiterte Messunsicherheit, die sich aus der Standardmessunsicherheit durch Multiplikation mit dem Erweiterungsfaktor k = 2 ergibt. Sie wurde gemäß EA-4/02 M:2022 ermittelt. Der Wert der Messgröße liegt mit einer Wahrscheinlichkeit von etwa 95 % im zugeordneten Werteintervall.
Ein Anteil für die Langzeit-Stabilität des Kalibriergegenstandes ist nicht enthalten.

*Given is the enlarged uncertainty, calculated by multiplication of the standard uncertainty with the factor k = 2. It was calculated in relation to EA-4/02 M:2022. The values of the measurements are with a probability of about 95 % inthe related range. A part for long time stability of the calibrated instrument is not included.*

**Anerkennung des Kalibrierscheines**
*Recognition of the calibration certificate*

Die Deutsche Akkreditierungsstelle GmbH ist Unterzeichnerin der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine. Die weiteren Unterzeichner innerhalb und außerhalb Europas sind den Internetseiten von EA (www.european-accreditation.org) und ILAC (www.ilac.org) zu entnehmen.

*The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates. The other signatories in Europe and beyond can be found on the website of EA (www.european-accreditation.org) and ILAC (www.ilac.org).*

**Auswertung**
*Evaluation*

Die gemessenen Werte liegen innerhalb der Herstellerspezifikationen.

The measured values are within the manufacturer's specifications.

**Anmerkung**
*Remark*

**Erläuterung der Spaltenüberschriften**
*Explanation of the column headings*

| Header Title | Meaning | Bedeutung |
|---|---|---|
| Measurement | Type of Measurement | Bezeichnung der Messung |
| Nominal/unit | Nominal Value | Sollwert |
| Indicated/unit | Indicated Value | Angezeigter Wert (Istwert) |
| Min/mV | Lower Tolerance Value | Unterer Toleranzwert |
| Max/mV | Upper Tolerance Value | Oberer Toleranzwert |
| MU/unit | Measurement Uncertainty | Messunsicherheiten |

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| Analog Inputs | | | | | | |
|---|---|---|---|---|---|---|
| **Measurement** | **Nominal/mV** | **Indicated/mV** | **Min/mV** | **Max/mV** | **MU/mV** | |
| Input Level -12 dB 1 kHz Ch 1 | 250,0 | 250,1 | 247,1 | 252,9 | 1,0 | |
| Input Level -12 dB 1 kHz Ch 2 | 250,0 | 250,1 | 247,1 | 252,9 | 1,0 | |
| Input Level -6 dB 1 kHz Ch 1 | 500,0 | 500,0 | 494,3 | 505,7 | 2,0 | |
| Input Level -6 dB 1 kHz Ch 2 | 500,0 | 500,0 | 494,3 | 505,7 | 2,0 | |
| **Measurement** | **Nominal/V** | **Indicated/V** | **Min/V** | **Max/V** | **MU/mV** | |
| Input Level 0 dB 1 kHz Ch 1 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Input Level 0 dB 1 kHz Ch 2 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Input Level 6 dB 1 kHz Ch 1 | 2,000 | 2,001 | 1,978 | 2,022 | 6,6 | |
| Input Level 6 dB 1 kHz Ch 2 | 2,000 | 2,001 | 1,978 | 2,022 | 6,6 | |
| | | | | | | |
| **Measurement** | **Nominal/mV** | **Indicated/mV** | **Min/mV** | **Max/mV** | **MU/mV** | |
| Input Linearity 0 dB 1 kHz Ch 1 | 100,0 | 100,0 | 89,0 | 111,0 | 1,0 | |
| Input Linearity 0 dB 1 kHz Ch 2 | 100,0 | 100,0 | 89,0 | 111,0 | 1,0 | |
| Input Linearity 0 dB 1 kHz Ch 1 | 500,0 | 500,0 | 489,0 | 511,0 | 2,0 | |
| Input Linearity 0 dB 1 kHz Ch 2 | 500,0 | 500,0 | 489,0 | 511,0 | 2,0 | |
| Input Linearity 0 dB 1 kHz Ch 1 | 900,0 | 900,1 | 889,0 | 911,0 | 2,0 | |
| Input Linearity 0 dB 1 kHz Ch 2 | 900,0 | 900,1 | 889,0 | 911,0 | 2,0 | |
| | | | | | | |
| **Measurement** | **Nominal/V** | **Indicated/V** | **Min/V** | **Max/V** | **MU/mV** | |
| Frequency response 0 dB 100 Hz CH 1 | 1,000 | 1,002 | 0,983 | 1,017 | 2,0 | |
| Frequency response 0 dB 100 Hz CH 2 | 1,000 | 1,002 | 0,983 | 1,017 | 2,0 | |
| Frequency response 0 dB 1 kHz CH 1 | 1,000 | 1,001 | 0,989 | 1,011 | 2,0 | |
| Frequency response 0 dB 1 kHz CH 2 | 1,000 | 1,001 | 0,989 | 1,011 | 2,0 | |
| Frequency response 0 dB 10 kHz CH 1 | 1,000 | 1,004 | 0,983 | 1,017 | 2,0 | |
| Frequency response 0 dB 10 kHz CH 2 | 1,000 | 1,004 | 0,983 | 1,017 | 2,0 | |
| Frequency response 0 dB 20 kHz CH 1 | 1,000 | 0,998 | 0,983 | 1,017 | 2,0 | |
| Frequency response 0 dB 20 kHz CH 2 | 1,000 | 0,998 | 0,983 | 1,017 | 2,0 | |

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| Analog Outputs | | | | | | |
|---|---|---|---|---|---|---|
| **Measurement** | **Nominal/mV** | **Indicated/mV** | **Min/mV** | **Max/mV** | **MU/mV** | |
| Output Level -24 dB 1 kHz Ch 1 | 60,0 | 60,0 | 59,3 | 60,7 | 0,2 | |
| Output Level -24 dB 1 kHz Ch 2 | 60,0 | 59,8 | 59,3 | 60,7 | 0,2 | |
| Output Level -18 dB 1 kHz Ch 1 | 125,0 | 125,0 | 123,6 | 126,4 | 0,6 | |
| Output Level -18 dB 1 kHz Ch 2 | 125,0 | 125,0 | 123,6 | 126,4 | 0,6 | |
| Output Level -12 dB 1 kHz Ch 1 | 250,0 | 250,0 | 247,1 | 252,9 | 1,0 | |
| Output Level -12 dB 1 kHz Ch 2 | 250,0 | 250,0 | 247,1 | 252,9 | 1,0 | |
| Output Level -6 dB 1 kHz Ch 1 | 500,0 | 499,9 | 494,3 | 505,7 | 2,0 | |
| Output Level -6 dB 1 kHz Ch 2 | 500,0 | 499,9 | 494,3 | 505,7 | 2,0 | |
| **Measurement** | **Nominal/V** | **Indicated/V** | **Min/V** | **Max/V** | **MU/mV** | |
| Output Level 0 dB 1 kHz Ch 1 | 1,000 | 0,999 | 0,989 | 1,011 | 2,0 | |
| Output Level 0 dB 1 kHz Ch 2 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Output Level 3 dB 1 kHz Ch 1 | 1,410 | 1,409 | 1,394 | 1,426 | 6,0 | |
| Output Level 3 dB 1 kHz Ch 2 | 1,410 | 1,409 | 1,394 | 1,426 | 6,0 | |
| | | | | | | |
| **Measurement** | **Nominal/mV** | **Indicated/mV** | **Min/mV** | **Max/mV** | **MU/mV** | |
| Output Linearity 0 dB 1 kHz Ch 1 | 100,0 | 100,0 | 89,0 | 111,0 | 1,0 | |
| Output Linearity 0 dB 1 kHz Ch 2 | 100,0 | 100,0 | 89,0 | 111,0 | 1,0 | |
| Output Linearity 0 dB 1 kHz Ch 1 | 500,0 | 499,7 | 489,0 | 511,0 | 2,0 | |
| Output Linearity 0 dB 1 kHz Ch 2 | 500,0 | 499,8 | 489,0 | 511,0 | 2,0 | |
| Output Linearity 0 dB 1 kHz Ch 1 | 900,0 | 899,5 | 889,0 | 911,0 | 2,0 | |
| Output Linearity 0 dB 1 kHz Ch 2 | 900,0 | 899,6 | 889,0 | 911,0 | 2,0 | |
| | | | | | | |
| **Measurement** | **Nominal/V** | **Indicated/V** | **Min/V** | **Max/V** | **MU/mV** | |
| Frequency response 0 dB 100 Hz CH 1 | 1,000 | 1,000 | 0,983 | 1,017 | 2,0 | |
| Frequency response 0 dB 100 Hz CH 2 | 1,000 | 1,000 | 0,983 | 1,017 | 2,0 | |
| Frequency response 0 dB 1 kHz CH 1 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Frequency response 0 dB 1 kHz CH 2 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Frequency response 0 dB 10 kHz CH 1 | 1,000 | 0,999 | 0,983 | 1,017 | 2,0 | |
| Frequency response 0 dB 10 kHz CH 2 | 1,000 | 0,999 | 0,983 | 1,017 | 2,0 | |
| Frequency response 0 dB 20 kHz CH 1 | 1,000 | 0,992 | 0,983 | 1,017 | 2,0 | |
| Frequency response 0 dB 20 kHz CH 2 | 1,000 | 0,993 | 0,983 | 1,017 | 2,0 | |

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| Analog Inputs (coreIN-Mic4) | | | | | | |
|---|---|---|---|---|---|---|
| **Measurement** | **Nominal/mV** | **Indicated/mV** | **Min/mV** | **Max/mV** | **MU/mV** | |
| Input Level 108 dB 1 kHz Ch 1 | 60,0 | 60,0 | 59,3 | 60,7 | 0,2 | |
| Input Level 108 dB 1 kHz Ch 2 | 60,0 | 60,0 | 59,3 | 60,7 | 0,2 | |
| Input Level 114 dB 1 kHz Ch 1 | 125,0 | 125,0 | 123,6 | 126,4 | 0,6 | |
| Input Level 114 dB 1 kHz Ch 2 | 125,0 | 125,0 | 123,6 | 126,4 | 0,6 | |
| Input Level 120 dB 1 kHz Ch 1 | 250,0 | 250,0 | 247,1 | 252,9 | 1,0 | |
| Input Level 120 dB 1 kHz Ch 2 | 250,0 | 250,0 | 247,1 | 252,9 | 1,0 | |
| Input Level 126 dB 1 kHz Ch 1 | 500,0 | 500,0 | 494,3 | 505,7 | 2,0 | |
| Input Level 126 dB 1 kHz Ch 2 | 500,0 | 500,0 | 494,3 | 505,7 | 2,0 | |
| **Measurement** | **Nominal/V** | **Indicated/V** | **Min/V** | **Max/V** | **MU/mV** | |
| Input Level 132 dB 1 kHz Ch 1 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Input Level 132 dB 1 kHz Ch 2 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Input Level 138 dB 1 kHz Ch 1 | 2,000 | 2,000 | 1,978 | 2,022 | 6,6 | |
| Input Level 138 dB 1 kHz Ch 2 | 2,000 | 2,000 | 1,978 | 2,022 | 6,6 | |
| Input Level 144 dB 1 kHz Ch 1 | 4,000 | 4,000 | 3,955 | 4,045 | 10 | |
| Input Level 144 dB 1 kHz Ch 2 | 4,000 | 4,000 | 3,955 | 4,045 | 10 | |
| | | | | | | |
| **Measurement** | **Nominal/mV** | **Indicated/mV** | **Min/mV** | **Max/mV** | **MU/mV** | |
| Input Level 108 dB 1 kHz Ch 3 | 60,0 | 60,0 | 59,3 | 60,7 | 0,2 | |
| Input Level 108 dB 1 kHz Ch 4 | 60,0 | 60,0 | 59,3 | 60,7 | 0,2 | |
| Input Level 114 dB 1 kHz Ch 3 | 125,0 | 125,0 | 123,6 | 126,4 | 0,6 | |
| Input Level 114 dB 1 kHz Ch 4 | 125,0 | 125,0 | 123,6 | 126,4 | 0,6 | |
| Input Level 120 dB 1 kHz Ch 3 | 250,0 | 250,0 | 247,1 | 252,9 | 1,0 | |
| Input Level 120 dB 1 kHz Ch 4 | 250,0 | 250,0 | 247,1 | 252,9 | 1,0 | |
| Input Level 126 dB 1 kHz Ch 3 | 500,0 | 500,0 | 494,3 | 505,7 | 2,0 | |
| Input Level 126 dB 1 kHz Ch 4 | 500,0 | 500,0 | 494,3 | 505,7 | 2,0 | |
| **Measurement** | **Nominal/V** | **Indicated/V** | **Min/V** | **Max/V** | **MU/mV** | |
| Input Level 132 dB 1 kHz Ch 3 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Input Level 132 dB 1 kHz Ch 4 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Input Level 138 dB 1 kHz Ch 3 | 2,000 | 2,000 | 1,978 | 2,022 | 6,6 | |
| Input Level 138 dB 1 kHz Ch 4 | 2,000 | 2,000 | 1,978 | 2,022 | 6,6 | |
| Input Level 144 dB 1 kHz Ch 3 | 4,000 | 4,000 | 3,955 | 4,045 | 10 | |
| Input Level 144 dB 1 kHz Ch 4 | 4,000 | 4,000 | 3,955 | 4,045 | 10 | |

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| Linearity (coreIN-Mic4) | | | | | | |
|---|---|---|---|---|---|---|
| **Measurement** | **Nominal/mV** | **Indicated/mV** | **Min/mV** | **Max/mV** | **MU/mV** | |
| Input Linearity 1 kHz 132 dB Ch 1 | 100,0 | 100,0 | 89,0 | 111,0 | 1,0 | |
| Input Linearity 1 kHz 132 dB Ch 2 | 100,0 | 100,0 | 89,0 | 111,0 | 1,0 | |
| Input Linearity 1 kHz 132 dB Ch 1 | 500,0 | 500,0 | 489,0 | 511,0 | 2,0 | |
| Input Linearity 1 kHz 132 dB Ch 2 | 500,0 | 500,0 | 489,0 | 511,0 | 2,0 | |
| Input Linearity 1 kHz 132 dB Ch 1 | 900,0 | 900,0 | 889,0 | 911,0 | 2,0 | |
| Input Linearity 1 kHz 132 dB Ch 2 | 900,0 | 900,0 | 889,0 | 911,0 | 2,0 | |
| **Measurement** | **Nominal/mV** | **Indicated/mV** | **Min/mV** | **Max/mV** | **MU/mV** | |
| Input Linearity 1 kHz 132 dB Ch 3 | 100,0 | 100,0 | 89,0 | 111,0 | 1,0 | |
| Input Linearity 1 kHz 132 dB Ch 4 | 100,0 | 100,0 | 89,0 | 111,0 | 1,0 | |
| Input Linearity 1 kHz 132 dB Ch 3 | 500,0 | 500,0 | 489,0 | 511,0 | 2,0 | |
| Input Linearity 1 kHz 132 dB Ch 4 | 500,0 | 500,0 | 489,0 | 511,0 | 2,0 | |
| Input Linearity 1 kHz 132 dB Ch 3 | 900,0 | 900,0 | 889,0 | 911,0 | 2,0 | |
| Input Linearity 1 kHz 132 dB Ch 4 | 900,0 | 900,0 | 889,0 | 911,0 | 2,0 | |

| Frequency response (coreIN-Mic4) | | | | | | |
|---|---|---|---|---|---|---|
| **Measurement** | **Nominal/V** | **Indicated/V** | **Min/V** | **Max/V** | **MU/mV** | |
| Frequency response 132 dB 100 Hz Ch 1 | 1,000 | 1,000 | 0,983 | 1,017 | 2,0 | |
| Frequency response 132 dB 100 Hz Ch 2 | 1,000 | 1,000 | 0,983 | 1,017 | 2,0 | |
| Frequency response 132 dB 1 kHz Ch 1 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Frequency response 132 dB 1 kHz Ch 2 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Frequency response 132 dB 10 kHz Ch 1 | 1,000 | 1,001 | 0,983 | 1,017 | 2,0 | |
| Frequency response 132 dB 10 kHz Ch 2 | 1,000 | 1,001 | 0,983 | 1,017 | 2,0 | |
| Frequency response 132 dB 20 kHz Ch 1 | 1,000 | 1,001 | 0,983 | 1,017 | 2,0 | |
| Frequency response 132 dB 20 kHz Ch 2 | 1,000 | 1,001 | 0,983 | 1,017 | 2,0 | |
| **Measurement** | **Nominal/V** | **Indicated/V** | **Min/V** | **Max/V** | **MU/mV** | |
| Frequency response 132 dB 100 Hz Ch 3 | 1,000 | 1,000 | 0,983 | 1,017 | 2,0 | |
| Frequency response 132 dB 100 Hz Ch 4 | 1,000 | 1,000 | 0,983 | 1,017 | 2,0 | |
| Frequency response 132 dB 1 kHz Ch 3 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Frequency response 132 dB 1 kHz Ch 4 | 1,000 | 1,000 | 0,989 | 1,011 | 2,0 | |
| Frequency response 132 dB 10 kHz Ch 3 | 1,000 | 1,001 | 0,983 | 1,017 | 2,0 | |
| Frequency response 132 dB 10 kHz Ch 4 | 1,000 | 1,001 | 0,983 | 1,017 | 2,0 | |
| Frequency response 132 dB 20 kHz Ch 3 | 1,000 | 1,001 | 0,983 | 1,017 | 2,0 | |
| Frequency response 132 dB 20 kHz Ch 4 | 1,000 | 1,001 | 0,983 | 1,017 | 2,0 | |

- Ende des Kalibrierscheines -
*- End of Calibration Certificate -*

# 中国赛宝实验室计量检测中心
# (工业和信息化部电子第五研究所计量检测中心)
# CHINA CEPREI LABORATORY CALIBRATION & TESTING CENTRE

# 校 准 证 书
# CALIBRATION CERTIFICATE

证书编号: 2JB25006520-0001
Certificate No.

中国认可
国际互认
校准
CALIBRATION
CNAS L13344

| | |
|---|---|
| 委托单位: Client | 耕興股份有限公司/Sporton International Inc. |
| 委托方地址: Address | 桃園市龜山區華亞一路52號/Huaya 1st Rd., Guishan Dist No. 52 Taoyuan City 333 |
| 仪器名称: Description | 多通道信號分析儀 |
| 型号/规格: Model/Type | labCORE |
| 制造商: Manufacturer | HEAD acoustics |
| 出厂编号: Serial No. | 77000342 |
| 管理号: Asset No. | / |
| 接收日期: Rec. Date | 2025-07-28 |
| 校准日期: Cal. Date | 2025-07-29 |
| 签发日期: App. Date | 2025-08-01 |
| 建议校准周期: Reference Cal. Period | 12个月(12 months) |
| 结论: Conclusion | 所校准项目符合技术要求(The calibrated items meet the technical requirements) |

校准: Calibrated by 曹慧慧　　核验: Inspected by 徐俊

签发: Approved by 胡爱军　　印章: Stamp

扫一扫查真伪

赛宝计量检测中心
总部地址：广州市增城区朱村街朱村大道西78号
实验室地址：江苏省苏州市高新区泰山路601号
客服电话：0512-68077103 传真：0512-68076669
投诉电话：0512-68026260/66719750、020-87236896
邮件：service-hd@ceprei.com
网址：www.ceprei-cal.com

CEPREI Calibration and Testing Centre
H.Q. Addr: No.78,Zhucun Avenue West,Zengcheng District,Guangzhou,China
Add. of the Lab:No.601, Taishan Road, Hi-Tech District, Suzhou, Jiangsu, China
Service Tel: 0512-68077103 Fax: 0512-68076669
Complaint Tel: 0512-68078465/66719750、020-87236896
Email: service-hd@ceprei.com
Website: www.ceprei-cal.com

# 说　明
# DIRECTIONS

**1. 本机构是国家市场监管总局授权建立的法定计量检定机构："国家环境综合试验设备计量站"，国家国防科工局授权建立的"国防科技工业4412区域计量站"，本机构质量管理体系符合ISO/IEC 17025:2017标准的要求。**

This laboratory is the legal metrological institute authorized by the State Administration for Market Regulation. It is the "Nation Metrology Station of Combined Environmental Testing Equipment". It is the "No. 4412 Regional Metrology Station of Science, Technology and Industry for National Defense" authorized by the State Administration of Science, Technology and Industry for National Defense. The quality management system of this laboratory is in accordance with the ISO/IEC 17025:2017.

**2. 本证书中的数据可溯源到国际单位制（SI）单位和/或社会公用计量标准。**

The data of the certificate is traceable to the International system of Units（SI）and/or the public metrological standards.

**3. 本次校准的技术依据及CNAS认可范围**(Reference documents and CNAS accredited scopes)**：**

- JJF 1288-2011 多通道声分析仪校准规范： Sound pressure level:(20～130)dB;Voltage:1mV～100V;Frequency:1Hz～30kHz;Total distortion:(0.01～100)%

* 详细内容请查看CNAS网站中注册编号为L13344的证书附件，超出范围的内容未被认可，其结果/结论所依据的合格评定活动不在认可范围内。(Please see the attachment of certificate No. L13344 at CNAS website for details,beyond which is not accredited, the conformity assessment activities on which the results/conclusions are based are outside the scope of accreditation.)

**4. 本次校准所使用的主要测量标准及溯源性声明**(The main measurement standards used during the calibration and traceability declaration)**：**

| 名　称 (Description) | 证书号/有效期/溯源单位 (Certificate No./Due Date/Traceability to) | 技术指标 (Specification) | 测量范围 (Measuring Range) |
|---|---|---|---|
| 信号发生器(338511) | 4JC25000172-0001/2026-03-30/赛宝(苏州) | 频率响应：1Hz~200KHz± 0.2dB | 频率：1Hz~200kHz；电压：0.1V~15V |

**计量溯源性声明**(Metrological Traceability Declaration)**：**

| 被校准器具 Instrument | 设备名称 Standard Name | 外部机构/溯源证书编号 Institute/Certificate No. |
|---|---|---|
| 多通道信號分析儀 | 信号发生器 | 中国计量院/SPss2023-01464 |

**5. 校准地点**(The calibration place)**：**

苏州市高新区泰山路601号2号楼二楼2205室

**6. 环境条件**(Environmental conditions)**：**

温度(Temperature)：21.6　　相对湿度(Relative Humidity)：45%　　其它(Other)：/

**7. 本证书中给出的扩展不确定度依据JJF1059.1-2012《测量不确定度评定与表示》评定，由合成标准不确定度乘以包含概率约为95%时对应的包含因子*k*得到。**

The extended uncertainty given in this certificate is evaluated according to JJF1059.1-2012 "Evaluation and Expression of Uncertainty in Measurement", and is calculated by multiplying the combined standard uncertainty by the coverage factor *k* which corresponding to the coverage probability about 95%.

**8. 证书中"P"、"合格"代表"测量结果在允许范围内"，"F"、"不合格"代表"测量结果不在允许范围内"，"N/A"代表"不适用或技术指标暂时无法确认等"。本证书报告的结论仅供参考，使用人员应结合实际测量的要求合理使用，如考虑测量结果测量不确定度的影响等。**

"P" and "Pass" in this certificate stand for "Low Limit≤the measured value ≤High Limit", "F" and "Fail" stand for "the measured value＜Low Limit or the measured value＞High Limit", "N/A" stands for "Not Applicable or The technical specification has not been confirmed etc".The conclusions of this certificate are for reference only. Users should use them reasonably according to the actual measurement requirements, such as considering the impact of measurement uncertainty, etc.

**9. 建议校准周期是本实验室依据本证书报告的技术依据和仪器设备常规使用条件给出的建议，供委托方参考。委托方可以根据实际使用情况自行决定样品的校准周期。**

The reference calibration period is based on the reference documents and normal operating conditions of the calibrated instrument. It is only for reference. The client may decide the calibration period of the instrument according to the actual use.

注: 1.本证书未经本机构书面授权，不得部分复制。(The certificate shall not be partly reproduced without written approval of the laboratory.)

2.本次校准结果仅与被校物有关。(The results are only related to the items calibrated.)

3.“委托方”、“委托方联络信息”由委托方提供，“制造厂”、“型号规格”、“出厂编号”以及“设备编号”为仪器上标注，委托方对上面内容如有异议，须在收到证书后二十个工作日内提出。

The information Client and Contact Information are provided by client, and the Manufacurer, Model/Type, Serial No. and Equipment No. are marked on the items.Client shall submit any objection within 20 working days after receiving the certificate for the information above.

1 外观与工作正常性检查 (Appearance and Function Check)

无影响证书中校准结果准确度的因素和缺陷。

There are no factor and defect that affect the calibration result accuracy of the certificate.

2 线性度(Linearity) 频率(Frequency): 1000 Hz

| 通道 (Channel) | 标准值 (Reference) (dB) | 示值 (Indication) (dB) | 误差 (Error) (dB) | 允许误差 (Limit) (dB) | 结论 (Pass/Fail) (P/F) | *U* (*k*=2) (dB) |
|---|---|---|---|---|---|---|
| CH1 | 94.0 | 94.0 | 0.0 | ±1.1 | P | 0.2 |
| | 84.0 | 84.0 | 0.0 | ±1.1 | P | 0.2 |
| | 74.0 | 74.0 | 0.0 | ±1.1 | P | 0.2 |
| | 64.0 | 64.0 | 0.0 | ±1.1 | P | 0.2 |
| | 54.0 | 54.0 | 0.0 | ±1.1 | P | 0.2 |
| | 44.0 | 44.0 | 0.0 | ±1.1 | P | 0.2 |
| | 34.0 | 34.0 | 0.0 | ±1.1 | P | 0.2 |
| CH2 | 94.0 | 94.0 | 0.0 | ±1.1 | P | 0.2 |
| | 84.0 | 84.0 | 0.0 | ±1.1 | P | 0.2 |
| | 74.0 | 74.0 | 0.0 | ±1.1 | P | 0.2 |
| | 64.0 | 64.0 | 0.0 | ±1.1 | P | 0.2 |
| | 54.0 | 54.0 | 0.0 | ±1.1 | P | 0.2 |
| | 44.0 | 44.0 | 0.0 | ±1.1 | P | 0.2 |
| | 34.0 | 34.0 | 0.0 | ±1.1 | P | 0.2 |

3 A计权特性 (A Weighting Characteristic)

1 通道(Channel 1)

| 频率 (Frequency) (Hz) | 示值 (Indication) (dB) | 标准值 (Reference) (dB) | 误差 (Error) (dB) | 允许误差 (Limit) (dB) | 结论 (Pass/Fail) | *U* (*k*=2) (dB) |
|---|---|---|---|---|---|---|
| 20 | -50.6 | -50.5 | -0.1 | ± 2.5 | P | 0.2 |
| 25 | -44.8 | -44.7 | -0.1 | -2.0,+2.5 | P | 0.2 |
| 31.5 | -39.2 | -39.4 | 0.2 | ± 2.0 | P | 0.2 |
| 40 | -34.6 | -34.6 | 0.0 | ± 1.5 | P | 0.2 |
| 50 | -30.2 | -30.2 | 0.0 | ± 1.5 | P | 0.2 |
| 63 | -26.2 | -26.2 | 0.0 | ± 1.5 | P | 0.2 |
| 80 | -22.5 | -22.5 | 0.0 | ± 1.5 | P | 0.2 |
| 100 | -19.1 | -19.1 | 0.0 | ± 1.5 | P | 0.2 |
| 125 | -16.1 | -16.1 | 0.0 | ± 1.5 | P | 0.2 |
| 160 | -13.3 | -13.4 | 0.1 | ± 1.5 | P | 0.2 |
| 200 | -10.9 | -10.9 | 0.0 | ± 1.5 | P | 0.2 |
| 250 | -8.5 | -8.6 | 0.1 | ± 1.4 | P | 0.2 |
| 315 | -6.6 | -6.6 | 0.0 | ± 1.4 | P | 0.2 |
| 400 | -4.8 | -4.8 | 0.0 | ± 1.4 | P | 0.2 |
| 500 | -3.2 | -3.2 | 0.0 | ± 1.4 | P | 0.2 |
| 630 | -1.9 | -1.9 | 0.0 | ± 1.4 | P | 0.2 |
| 800 | -0.8 | -0.8 | 0.0 | ± 1.4 | P | 0.2 |
| 1000 | 0.0 | 0.0 | 0.0 | ± 1.1 | P | 0.2 |
| 1250 | 0.6 | 0.6 | 0.0 | ± 1.4 | P | 0.2 |
| 1600 | 1.0 | 1.0 | 0.0 | ± 1.6 | P | 0.2 |
| 2000 | 1.2 | 1.2 | 0.0 | ± 1.6 | P | 0.2 |
| 2500 | 1.3 | 1.3 | 0.0 | ± 1.6 | P | 0.2 |
| 3150 | 1.2 | 1.2 | 0.0 | ± 1.6 | P | 0.2 |
| 4000 | 1.0 | 1.0 | 0.0 | ± 1.6 | P | 0.2 |
| 5000 | 0.5 | 0.5 | 0.0 | ± 2.1 | P | 0.2 |
| 6300 | 0.0 | -0.1 | 0.1 | -2.6,+2.1 | P | 0.2 |
| 8000 | -1.0 | -1.1 | 0.1 | -3.1,+2.1 | P | 0.2 |
| 10000 | -2.5 | -2.5 | 0.0 | -3.6,+2.6 | P | 0.2 |
| 12500 | -4.3 | -4.3 | 0.0 | -6.0,+3.0 | P | 0.2 |
| 16000 | -6.6 | -6.6 | 0.0 | -17.0,+3.5 | P | 0.2 |
| 20000 | -9.3 | -9.3 | 0.0 | -∞,+4.0 | P | 0.2 |

3 A计权特性 (A Weighting Characteristic)

2 通道(Channel 2)

| 频率 (Frequency) (Hz) | 示值 (Indication) (dB) | 标准值 (Reference) (dB) | 误差 (Error) (dB) | 允许误差 (Limit) (dB) | 结论 (Pass/Fail) | *U* (*k*=2) (dB) |
|---|---|---|---|---|---|---|
| 20 | -50.6 | -50.5 | -0.1 | ± 2.5 | P | 0.2 |
| 25 | -44.8 | -44.7 | -0.1 | -2.0,+2.5 | P | 0.2 |
| 31.5 | -39.2 | -39.4 | 0.2 | ± 2.0 | P | 0.2 |
| 40 | -34.6 | -34.6 | 0.0 | ± 1.5 | P | 0.2 |
| 50 | -30.2 | -30.2 | 0.0 | ± 1.5 | P | 0.2 |
| 63 | -26.2 | -26.2 | 0.0 | ± 1.5 | P | 0.2 |
| 80 | -22.5 | -22.5 | 0.0 | ± 1.5 | P | 0.2 |
| 100 | -19.1 | -19.1 | 0.0 | ± 1.5 | P | 0.2 |
| 125 | -16.1 | -16.1 | 0.0 | ± 1.5 | P | 0.2 |
| 160 | -13.3 | -13.4 | 0.1 | ± 1.5 | P | 0.2 |
| 200 | -10.9 | -10.9 | 0.0 | ± 1.5 | P | 0.2 |
| 250 | -8.6 | -8.6 | 0.0 | ± 1.4 | P | 0.2 |
| 315 | -6.6 | -6.6 | 0.0 | ± 1.4 | P | 0.2 |
| 400 | -4.9 | -4.8 | -0.1 | ± 1.4 | P | 0.2 |
| 500 | -3.2 | -3.2 | 0.0 | ± 1.4 | P | 0.2 |
| 630 | -1.9 | -1.9 | 0.0 | ± 1.4 | P | 0.2 |
| 800 | -0.8 | -0.8 | 0.0 | ± 1.4 | P | 0.2 |
| 1000 | 0.0 | 0.0 | 0.0 | ± 1.1 | P | 0.2 |
| 1250 | 0.6 | 0.6 | 0.0 | ± 1.4 | P | 0.2 |
| 1600 | 1.0 | 1.0 | 0.0 | ± 1.6 | P | 0.2 |
| 2000 | 1.2 | 1.2 | 0.0 | ± 1.6 | P | 0.2 |
| 2500 | 1.3 | 1.3 | 0.0 | ± 1.6 | P | 0.2 |
| 3150 | 1.2 | 1.2 | 0.0 | ± 1.6 | P | 0.2 |
| 4000 | 1.0 | 1.0 | 0.0 | ± 1.6 | P | 0.2 |
| 5000 | 0.5 | 0.5 | 0.0 | ± 2.1 | P | 0.2 |
| 6300 | -0.1 | -0.1 | 0.0 | -2.6,+2.1 | P | 0.2 |
| 8000 | -1.1 | -1.1 | 0.0 | -3.1,+2.1 | P | 0.2 |
| 10000 | -2.5 | -2.5 | 0.0 | -3.6,+2.6 | P | 0.2 |
| 12500 | -4.3 | -4.3 | 0.0 | -6.0,+3.0 | P | 0.2 |
| 16000 | -6.6 | -6.6 | 0.0 | -17.0,+3.5 | P | 0.2 |
| 20000 | -9.3 | -9.3 | 0.0 | -∞,+4.0 | P | 0.2 |

4 C计权特性 (C Weighting Characteristic)

1 通道(Channel 1)

| 频率 (Frequency) (Hz) | 示值 (Indication) (dB) | 标准值 (Reference) (dB) | 误差 (Error) (dB) | 允许误差 (Limit) (dB) | 结论 (Pass/Fail) | *U* (*k*=2) (dB) |
|---|---|---|---|---|---|---|
| 20 | -6.3 | -6.2 | -0.1 | ± 2.5 | P | 0.2 |
| 25 | -4.5 | -4.4 | -0.1 | -2.0,+2.5 | P | 0.2 |
| 31.5 | -3.0 | -3.0 | 0.0 | ± 2.0 | P | 0.2 |
| 40 | -2.0 | -2.0 | 0.0 | ± 1.5 | P | 0.2 |
| 50 | -1.3 | -1.3 | 0.0 | ± 1.5 | P | 0.2 |
| 63 | -0.8 | -0.8 | 0.0 | ± 1.5 | P | 0.2 |
| 80 | -0.5 | -0.5 | 0.0 | ± 1.5 | P | 0.2 |
| 100 | -0.3 | -0.3 | 0.0 | ± 1.5 | P | 0.2 |
| 125 | -0.2 | -0.2 | 0.0 | ± 1.5 | P | 0.2 |
| 160 | -0.1 | -0.1 | 0.0 | ± 1.5 | P | 0.2 |
| 200 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 250 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 315 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 400 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 500 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 630 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 800 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 1000 | 0.0 | 0.0 | 0.0 | ± 1.1 | P | 0.2 |
| 1250 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 1600 | -0.1 | -0.1 | 0.0 | ± 1.6 | P | 0.2 |
| 2000 | -0.2 | -0.2 | 0.0 | ± 1.6 | P | 0.2 |
| 2500 | -0.3 | -0.3 | 0.0 | ± 1.6 | P | 0.2 |
| 3150 | -0.5 | -0.5 | 0.0 | ± 1.6 | P | 0.2 |
| 4000 | -0.8 | -0.8 | 0.0 | ± 1.6 | P | 0.2 |
| 5000 | -1.3 | -1.3 | 0.0 | ± 2.1 | P | 0.2 |
| 6300 | -2.1 | -2.0 | -0.1 | -2.6,+2.1 | P | 0.2 |
| 8000 | -3.0 | -3.0 | 0.0 | -3.1,+2.1 | P | 0.2 |
| 10000 | -4.4 | -4.4 | 0.0 | -3.6,+2.6 | P | 0.2 |
| 12500 | -6.2 | -6.2 | 0.0 | -6.0,+3.0 | P | 0.2 |
| 16000 | -8.5 | -8.5 | 0.0 | -17.0,+3.5 | P | 0.2 |
| 20000 | -11.2 | -11.2 | 0.0 | -∞,+4.0 | P | 0.2 |

4 C计权特性 (C Weighting Characteristic)

2 通道(Channel 2)

| 频率 (Frequency) (Hz) | 示值 (Indication) (dB) | 标准值 (Reference) (dB) | 误差 (Error) (dB) | 允许误差 (Limit) (dB) | 结论 (Pass/Fail) | *U* (*k*=2) (dB) |
|---|---|---|---|---|---|---|
| 20 | -6.3 | -6.2 | -0.1 | ±2.5 | P | 0.2 |
| 25 | -4.5 | -4.4 | -0.1 | -2.0,+2.5 | P | 0.2 |
| 31.5 | -3.0 | -3.0 | 0.0 | ±2.0 | P | 0.2 |
| 40 | -2.0 | -2.0 | 0.0 | ±1.5 | P | 0.2 |
| 50 | -1.3 | -1.3 | 0.0 | ±1.5 | P | 0.2 |
| 63 | -0.8 | -0.8 | 0.0 | ±1.5 | P | 0.2 |
| 80 | -0.5 | -0.5 | 0.0 | ±1.5 | P | 0.2 |
| 100 | -0.3 | -0.3 | 0.0 | ±1.5 | P | 0.2 |
| 125 | -0.2 | -0.2 | 0.0 | ±1.5 | P | 0.2 |
| 160 | -0.1 | -0.1 | 0.0 | ±1.5 | P | 0.2 |
| 200 | 0.0 | 0.0 | 0.0 | ±1.5 | P | 0.2 |
| 250 | 0.0 | 0.0 | 0.0 | ±1.4 | P | 0.2 |
| 315 | 0.0 | 0.0 | 0.0 | ±1.4 | P | 0.2 |
| 400 | 0.0 | 0.0 | 0.0 | ±1.4 | P | 0.2 |
| 500 | 0.0 | 0.0 | 0.0 | ±1.4 | P | 0.2 |
| 630 | 0.0 | 0.0 | 0.0 | ±1.4 | P | 0.2 |
| 800 | 0.0 | 0.0 | 0.0 | ±1.4 | P | 0.2 |
| 1000 | 0.0 | 0.0 | 0.0 | ±1.1 | P | 0.2 |
| 1250 | 0.0 | 0.0 | 0.0 | ±1.4 | P | 0.2 |
| 1600 | -0.1 | -0.1 | 0.0 | ±1.6 | P | 0.2 |
| 2000 | -0.2 | -0.2 | 0.0 | ±1.6 | P | 0.2 |
| 2500 | -0.3 | -0.3 | 0.0 | ±1.6 | P | 0.2 |
| 3150 | -0.5 | -0.5 | 0.0 | ±1.6 | P | 0.2 |
| 4000 | -0.8 | -0.8 | 0.0 | ±1.6 | P | 0.2 |
| 5000 | -1.3 | -1.3 | 0.0 | ±2.1 | P | 0.2 |
| 6300 | -2.0 | -2.0 | 0.0 | -2.6,+2.1 | P | 0.2 |
| 8000 | -3.0 | -3.0 | 0.0 | -3.1,+2.1 | P | 0.2 |
| 10000 | -4.4 | -4.4 | 0.0 | -3.6,+2.6 | P | 0.2 |
| 12500 | -6.2 | -6.2 | 0.0 | -6.0,+3.0 | P | 0.2 |
| 16000 | -8.5 | -8.5 | 0.0 | -17.0,+3.5 | P | 0.2 |
| 20000 | -11.2 | -11.2 | 0.0 | -∞,+4.0 | P | 0.2 |

5 Z计权特性 (C Weighting Characteristic)

1 通道(Channel 1)

| 频率 (Frequency) (Hz) | 示值 (Indication) (dB) | 标准值 (Reference) (dB) | 误差 (Error) (dB) | 允许误差 (Limit) (dB) | 结论 (Pass/Fail) | *U* (*k*=2) (dB) |
|---|---|---|---|---|---|---|
| 20 | -0.1 | 0.0 | -0.1 | ± 2.5 | P | 0.2 |
| 25 | -0.1 | 0.0 | -0.1 | -2.0,+2.5 | P | 0.2 |
| 31.5 | 0.0 | 0.0 | 0.0 | ± 2.0 | P | 0.2 |
| 40 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 50 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 63 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 80 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 100 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 125 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 160 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 200 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 250 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 315 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 400 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 500 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 630 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 800 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 1000 | 0.0 | 0.0 | 0.0 | ± 1.1 | P | 0.2 |
| 1250 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 1600 | 0.0 | 0.0 | 0.0 | ± 1.6 | P | 0.2 |
| 2000 | 0.0 | 0.0 | 0.0 | ± 1.6 | P | 0.2 |
| 2500 | 0.0 | 0.0 | 0.0 | ± 1.6 | P | 0.2 |
| 3150 | 0.0 | 0.0 | 0.0 | ± 1.6 | P | 0.2 |
| 4000 | 0.0 | 0.0 | 0.0 | ± 1.6 | P | 0.2 |
| 5000 | 0.0 | 0.0 | 0.0 | ± 2.1 | P | 0.2 |
| 6300 | 0.0 | 0.0 | 0.0 | -2.6,+2.1 | P | 0.2 |
| 8000 | 0.0 | 0.0 | 0.0 | -3.1,+2.1 | P | 0.2 |
| 10000 | 0.0 | 0.0 | 0.0 | -3.6,+2.6 | P | 0.2 |
| 12500 | 0.0 | 0.0 | 0.0 | -6.0,+3.0 | P | 0.2 |
| 16000 | 0.0 | 0.0 | 0.0 | -17.0,+3.5 | P | 0.2 |
| 20000 | 0.0 | 0.0 | 0.0 | -∞,+4.0 | P | 0.2 |

5 Z计权特性 (Z Weighting Characteristic)

2 通道(Channel 2)

| 频率 (Frequency) (Hz) | 示值 (Indication) (dB) | 标准值 (Reference) (dB) | 误差 (Error) (dB) | 允许误差 (Limit) (dB) | 结论 (Pass/Fail) | *U* (*k*=2) (dB) |
|---|---|---|---|---|---|---|
| 20 | -0.1 | 0.0 | -0.1 | ± 2.5 | P | 0.2 |
| 25 | -0.1 | 0.0 | -0.1 | -2.0,+2.5 | P | 0.2 |
| 31.5 | 0.0 | 0.0 | 0.0 | ± 2.0 | P | 0.2 |
| 40 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 50 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 63 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 80 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 100 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 125 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 160 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 200 | 0.0 | 0.0 | 0.0 | ± 1.5 | P | 0.2 |
| 250 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 315 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 400 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 500 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 630 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 800 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 1000 | 0.0 | 0.0 | 0.0 | ± 1.1 | P | 0.2 |
| 1250 | 0.0 | 0.0 | 0.0 | ± 1.4 | P | 0.2 |
| 1600 | 0.0 | 0.0 | 0.0 | ± 1.6 | P | 0.2 |
| 2000 | 0.0 | 0.0 | 0.0 | ± 1.6 | P | 0.2 |
| 2500 | 0.0 | 0.0 | 0.0 | ± 1.6 | P | 0.2 |
| 3150 | 0.0 | 0.0 | 0.0 | ± 1.6 | P | 0.2 |
| 4000 | 0.0 | 0.0 | 0.0 | ± 1.6 | P | 0.2 |
| 5000 | 0.0 | 0.0 | 0.0 | ± 2.1 | P | 0.2 |
| 6300 | 0.0 | 0.0 | 0.0 | -2.6,+2.1 | P | 0.2 |
| 8000 | 0.0 | 0.0 | 0.0 | -3.1,+2.1 | P | 0.2 |
| 10000 | 0.0 | 0.0 | 0.0 | -3.6,+2.6 | P | 0.2 |
| 12500 | 0.0 | 0.0 | 0.0 | -6.0,+3.0 | P | 0.2 |
| 16000 | 0.0 | 0.0 | 0.0 | -17.0,+3.5 | P | 0.2 |
| 20000 | 0.0 | 0.0 | 0.0 | -∞,+4.0 | P | 0.2 |