

校准证书

CALIBRATION CERTIFICATE



证书编号: JL2402024851

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客户名称 : 信恒检测技术(深圳)有限公司
Name of Customer
客户地址 : 广东省深圳市宝安区松岗街道潭头社区潭头工业城二区 1 栋厂房 101、201、301
Address of Customer
计量器具名称 : Head and Torso Simulator 头部躯干模拟器
Name of Instrument
型号/规格 : Type 4128C
Type/Specification
出厂编号 : 3107080
Serial No
资产编号 : BTF-EM-148
Asset No
制造单位 : Brule&Kjaer
Ma nuf a ctur e
校准依据 : JJF1520-2015 声学用头和躯干模拟器校准规范
Calibrated in Accordance to



校准日期 : 2024 年 01 月 30 日
Operation Date Year Month Day

建议复校日期: --- 年 -- 月 -- 日
Suggested Recal.Date Year Month Day

签发日期 : 2024 年 01 月 30 日
Issue Date Year Month Day

批准人 : 张瑞纹
Approved by

签名 : 张瑞纹
Signature

核验员 : 胡蓉
Checked by

校准员 : 龙晓峰
Calibrated by

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The relevant content and effectiveness is subject to the electronic version of the original report which was only applied for. When an electronic report and a paper report are applied for at the same time, the electronic report is only a copy of the paper report, and the relevant content and effectiveness is subject to the paper report.
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The QR code has the function of browsing and downloading complete report. Setting this function or not is chosen by the customer. The QR code and its copy enable anyone to scan and obtain the complete electronic version of the test report. Thus, if the owner of this report needs to restrict others from obtaining the content of the test report through the QR code, he shall cover or remove the QR code attached to the test report and its copies by himself. SMQ assumes no responsibility for the information leakage caused by the customer's selection of the QR code function of the test report (This clause applies to certificates with QR code attached) ..

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国家数字电子产品质量检验检测中心
National Digital Electronic Product Testing Center (NETC)
国家营养食品质量检验检测中心(广东)
National Nutrition Food Testing Center (Guangdong)
国家体育用品质量检验检测中心(广东)
National Sports Product Testing Center (Guangdong)
国家环保产品质量检验检测中心(广东)
National Environmental Product Testing Center (Guangdong)
国家分布式光伏发电系统质量检验检测中心(广东)
National Distributed Photovoltaic Power Generation System Testing Center (Guangdong)
国家电动汽车电池及充电系统产业计量测试中心
National Metrology Center for Electric Vehicle Battery and Charging System Industry
国家民用无人机产品质量检验检测中心(广东)
National Civil Unmanned Aerial Vehicle Product Testing Center (Guangdong)
国家高新技术计量站
National Hi-tech Metrology Station
国家医疗器械产业计量测试中心
National Metrology and Testing Center for Medical Device Industry
国家计量数据科学中心深圳分中心
National Metrology Data Science Center (Shenzhen)
国家城市能源计量中心(深圳)
National Urban Energy Measurement Center (Shenzhen)
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Accredited Testing Station (Shenzhen) for Furniture by China National Light Industry Council (CNLIC)
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Guangdong Quality Supervision and Inspection Institution for Ecological Textile and Garment Products (Shenzhen)
广东省质量监督皮革制品检验站
Guangdong Quality Supervision and Inspection Institution for Leather Products
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Guangdong Quality Supervision and Inspection Institution for Furniture Products (Shenzhen)
广东省质量监督学生用品检验站(深圳)
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广东省质量监督钟表检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Horological Products (Shenzhen)
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Guangdong Quality Supervision and Inspection Institution for Eyewear Products (Shenzhen)
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广东省质量监督综合布线系统检验站
Guangdong Quality Supervision and Inspection Institution for Generic Cabling System
深圳市纤维纺织检验所
Shenzhen Quality Inspection Institution for Fiber and Textile
深圳市建材产品质量监督检验站
Shenzhen Quality Supervision and Inspection Institution for Building Materials
深圳市消防产品燃烧性能检测中心
Shenzhen Testing Center for Burning Behavior of Fire Protection Products

联系方式 Contact Information

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传真电话 Fax No.: 0755-27591716 (宝安) 82408176 (八卦岭) 28932840 (龙岗) 0769-21684527 (东莞)
投诉及证书/报告真伪查询电话 Complaint Tel.: 400-900-8999 按5 Email: complaint@smq.com.cn

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校准用主要计量标准装置信息

Main Standard Devices Used

名称 Equipment Name	测量范围 Measuring Range	不确定度/准确度等级/ 最大允许误差 Uncertainty/Accuracy Class/ Maximum Permissible Error	计量标准考核证书号 Certificate No	有效期至 Due Date
_____	_____	_____	_____	_____

校准用主要标准器信息

Main Standards of Measurement Used

名称 Equipment Name	测量范围 Measuring Range	不确定度/准确度等级/ 最大允许误差 Uncertainty/Accuracy Class/ Maximum Permissible Error	设备编号 Equipment No	有效期至 Due Date	溯源单位/ 证书号 Traceability to/ Certificate No
标准传声器	(20~20k)Hz	声压级 $U=0.2\text{dB}, k=2$	SB3979/01	2024-11-26	
噪声、振动测试系统	DC~51.2kHz	电平 $\pm 0.01\text{dB}$	SB5196	2025-01-22	深圳检测院 /JL2401848311

附加说明

Appended Directions

委托日期: 2024 年 01 月 26 日 环境条件: 温度 21.4°C 相对湿度 70%
Application Date Operation Environment

校准地点: 本院声学龙珠实验室
Operation Location

校准项目/参数说明: 本次校准根据委托方要求实施, 校准项目/参数详见校准结果
Items Instructions

符合性及限制使用说明: 参见校准结果使用(Use referring to the results of Calibration)
Statement of Compliance and Limitation

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1 外观检查: 符合要求。

Appearance Check: Pass.

2 灵敏度 (参考频率: 1000 Hz): 见表1

Sensitivity of Ear Simulator (Ref. Freq: 1000 Hz): See Table 1

表 1 Table 1

通道 Channel	传声器型号 Type	传声器编号 No.	灵敏度 (mV/Pa) Sensitivity
L通道	/	/	11.6
R通道	/	/	11.5

3 耳自由场频率响应(声源位于正前方1.0 m处):

Frequency Response of Ear Simulator (The distance is 1m): See Table 2

表 2 Table 2

频率 Frequency	左耳频响 F.R.of Left	右耳频响 F.R.of Right	允许范围 M.P.E.
(Hz)	(dB)	(dB)	(dB)
100	0.5	0.1	+1.0 ~ -1.0
125	0.2	-0.1	+1.0 ~ -1.0
160	0.3	0.1	+1.0 ~ -1.5
200	0.7	0.0	+1.0 ~ -1.5
250	-0.1	-0.3	+1.5 ~ -1.0
315	-0.2	-0.5	+2.0 ~ -0.5
400	1.0	0.8	+2.5 ~ 0.0
500	1.8	1.3	+3.5 ~ +1.0
630	3.9	3.6	+4.0 ~ +1.5
800	2.8	2.8	+6.0 ~ +2.5
1000	4.9	5.0	+5.5 ~ +2.0
1250	3.7	3.9	+6.0 ~ +0.5

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1600	4.5	4.8	+7.0 ~ +2.0
2000	10.0	10.8	+13.5 ~ +9.0
2500	16.4	15.9	+19.5 ~ +14.5
3150	17.1	15.2	+20.5 ~ +13.5
4000	13.8	12.5	+18.0 ~ +12.0
5000	9.0	8.6	+15.5 ~ +8.5
6300	6.8	6.1	+9.0 ~ +2.5
8000	2.2	2.1	+11.0 ~ -1.0
10000	7.3	6.1	+10.0 ~ +0.5

4 耳指向性: Ear directivity

4.1 耳指向性0°: Ear directivity of 0° : See Table 3

表 3 Table 3

频率 Frequency	左耳频响 F.R.of Left	右耳频响 F.R.of Right
(Hz)	(dB)	(dB)
100	71.2	70.7
125	69.4	69.2
160	67.7	67.4
200	67.4	66.8
250	64.4	64.2
315	66.0	65.7
400	64.4	64.2
500	67.7	67.2
630	69.1	68.8
800	71.7	71.7
1000	72.6	72.7
1250	71.3	71.4
1600	72.9	73.2
2000	78.0	78.8

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2500	85.3	84.8
3150	93.9	92.0
4000	85.2	83.9
5000	80.8	80.4
6300	83.9	83.2
8000	68.2	68.2
10000	73.3	72.1

4.2耳指向性90°:

Ear directivity of 90° : See Table 4

表 4 Table 4

频率 Frequency	左耳频响 F.R.ofLeft	右耳频响 F.R.ofRight
(Hz)	(dB)	(dB)
100	71.3	72.3
125	68.8	71.0
160	67.7	70.1
200	66.7	68.9
250	64.4	67.1
315	64.8	68.6
400	62.1	68.1
500	66.9	72.0
630	66.8	72.5
800	71.4	76.5
1000	69.1	76.2
1250	69.5	75.9
1600	71.1	78.0
2000	73.2	79.5
2500	76.4	84.7
3150	81.4	93.0
4000	71.9	85.4
5000	70.8	88.8
6300	73.4	93.3

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8000	56.2	82.1
10000	57.6	76.3

4.3耳指向性180°:

Ear directivity of 180 ° : See Table 5

表 5 Table 5

频率 Frequency	左耳频响 F.R.of Left	右耳频响 F.R.of Right
(Hz)	(dB)	(dB)
100	71.5	71.2
125	69.6	69.1
160	67.8	67.3
200	67.1	67.0
250	64.9	64.4
315	65.7	65.3
400	63.9	63.2
500	67.4	67.0
630	68.6	68.0
800	71.8	71.4
1000	73.1	72.8
1250	72.4	72.1
1600	73.5	73.5
2000	76.8	76.8
2500	82.5	81.8
3150	90.6	88.9
4000	83.4	82.0
5000	75.6	75.3
6300	77.1	77.3
8000	67.5	68.4
10000	68.2	67.1

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4.4耳指向性270°:
Ear directivity of 270° : See Table 6

表 6 Table 6

频率 Frequency	左耳频响 F.R.ofLeft	右耳频响 F.R.ofRight
(Hz)	(dB)	(dB)
100	72.2	70.3
125	71.0	68.0
160	69.9	66.6
200	69.0	66.1
250	67.5	63.9
315	69.1	64.3
400	68.6	61.8
500	72.3	66.3
630	72.7	66.2
800	76.9	71.2
1000	76.2	68.8
1250	76.0	69.3
1600	77.8	71.2
2000	79.0	73.8
2500	85.0	75.5
3150	94.5	79.4
4000	88.0	72.2
5000	89.3	69.5
6300	94.0	72.1
8000	82.0	55.3
10000	77.3	54.6

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5 嘴参考点处的幅频特性:
Frequency Response ofMPR: See Table 7

表 7 Table 7

频率 Frequency	声压级 SPL
(Hz)	(dB)
100	59.6
125	64.8
160	70.0
200	75.1
250	77.1
315	75.9
400	74.0
500	72.7
630	71.8
800	71.8
1000	72.4
1250	73.1
1600	75.8
2000	74.8
2500	68.8
3150	66.3
4000	65.9
5000	64.1
6300	67.8
8000	63.8
10000	64.5

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6 嘴参考点处的失真:

THD of MPR: See Table 8

表 8 Table 8

频率 Frequency (Hz)	失真 THD (%)
100	10.50
125	6.20
160	2.87
200	1.32
250	1.30
315	1.62
400	1.60
500	2.64
630	3.05
800	2.50
1000	2.11
1250	1.62
1600	1.05
2000	1.82
2500	2.13
3150	3.57
4000	1.51
5000	3.40
6300	1.20
8000	0.34
10000	0.42



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7 嘴自由场幅频特性 (传声器位于嘴前0.5 m) :
Amplitude-frequency characteristics: See Table 9

表 9 Table 9

频率 Frequency	声压级 SPL
(Hz)	(dB)
100	50.6
125	56.0
160	59.9
200	65.5
250	67.7
315	67.0
400	65.8
500	67.5
630	65.5
800	61.5
1000	63.6
1250	65.3
1600	70.0
2000	69.6
2500	63.1
3150	61.6
4000	62.1
5000	60.4
6300	64.5
8000	61.5
10000	61.3

附注:

Notes:

1. 参考频率声压级测量结果扩展不确定度:

Related Expanded Uncertainty of Sound Pressure Level at Reference Frequency:

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$U=1.0$ dB, $k=2$ (20 Hz ~ 200 Hz) ;
 $U=0.8$ dB, $k=2$ (250 Hz ~ 400 Hz) ;
 $U=0.6$ dB, $k=2$ (500 Hz ~ 1.25 kHz) ;
 $U=1.0$ dB, $k=2$ (1.6 kHz ~ 10 kHz) 。
 $U=1.2$ dB, $k=2$ (12.5 kHz ~ 20 kHz) 。

2. 失真测量结果扩展不确定度:

Relative Expanded Uncertainty of Distortion:

$U_{rel} = 0.5\%$, $k=2$ (0.05%~30%, 20 Hz ~ 20 kHz) 。

3. 本证书中给出的测量不确定度依据 JJF 1059.1-2012 《测量不确定度评与表示》评定

The uncertainty given in this certificate is evaluated according to JJF 1059.1-2012 *Evaluation and Expression of Uncertainty in Measurement*.

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客户名称 : 信恒检测技术(深圳)有限公司
Name of Customer
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Address of Customer
计量器具名称 : Conditioning Amplifier 调节放大器
Name of Instrument
型号/规格 : Type-2690-030
Type/Specification
出厂编号 : 2673666
Serial No
资产编号 : BTF-EM-146
Asset No
制造单位 : Brule&Kjaer
Ma nuf a ctur e
校准依据 : JJF1157-2006 测量放大器校准规范
Calibrated in Accordance to



校准日期 : 2024 年 01 月 30 日
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批准人 : 张瑞纹
Approved by

签名 : 张瑞纹
Signature

核验员 : 胡岩
Checked by

校准员 : 龙晓峰
Calibrated by

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重要声明

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获得的国家、省、市专业站 Establishment of Following Institutions

国家数字电子产品质量检验检测中心
National Digital Electronic Product Testing Center (NETC)
国家营养食品质量检验检测中心(广东)
National Nutrition Food Testing Center (Guangdong)
国家体育用品质量检验检测中心(广东)
National Sports Product Testing Center (Guangdong)
国家环保产品质量检验检测中心(广东)
National Environmental Product Testing Center (Guangdong)
国家分布式光伏发电系统质量检验检测中心(广东)
National Distributed Photovoltaic Power Generation System Testing Center (Guangdong)
国家电动汽车电池及充电系统产业计量测试中心
National Metrology Center for Electric Vehicle Battery and Charging System Industry
国家民用无人机产品质量检验检测中心(广东)
National Civil Unmanned Aerial Vehicle Product Testing Center (Guangdong)
国家高新技术计量站
National Hi-tech Metrology Station
国家医疗器械产业计量测试中心
National Metrology and Testing Center for Medical Device Industry
国家计量数据科学中心深圳分中心
National Metrology Data Science Center (Shenzhen)
国家城市能源计量中心(深圳)
National Urban Energy Measurement Center (Shenzhen)
中国轻工业联合会家具质量监督检测深圳站
Accredited Testing Station (Shenzhen) for Furniture by China National Light Industry Council (CNLIC)
广东省质量监督食品检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Food (Shenzhen)
广东省质量监督生态纺织服装产品检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Ecological Textile and Garment Products (Shenzhen)
广东省质量监督皮革制品检验站
Guangdong Quality Supervision and Inspection Institution for Leather Products
广东省质量监督家具检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Furniture Products (Shenzhen)
广东省质量监督学生用品检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Student's Articles (Shenzhen)
广东省质量监督自行车检验站
Guangdong Quality Supervision and Inspection Institution for Bicycle Quality
广东省质量监督钟表检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Horological Products (Shenzhen)
广东省质量监督节能环保产品(安全性能)检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Safety Performance of Environmental Protection and Energy Saving Products (Shenzhen)
广东省质量监督眼镜检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Eyewear Products (Shenzhen)
广东省质量监督电磁兼容检验站
Guangdong Quality Supervision and Inspection Institution for Electromagnetic Compatibility
广东省质量监督综合布线系统检验站
Guangdong Quality Supervision and Inspection Institution for Generic Cabling System
深圳市纤维纺织检验所
Shenzhen Quality Inspection Institution for Fiber and Textile
深圳市建材产品质量监督检验站
Shenzhen Quality Supervision and Inspection Institution for Building Materials
深圳市消防产品燃烧性能检测中心
Shenzhen Testing Center for Burning Behavior of Fire Protection Products

联系方式 Contact Information

联系电话 Contact Tel.: 0755-26941696 26941546 (龙珠) 27591789 (宝安) 82426246 (八卦岭) 28932280 (龙岗) 0769-21684525 (东莞)
传真电话 Fax No.: 0755-27591716 (宝安) 82408176 (八卦岭) 28932840 (龙岗) 0769-21684527 (东莞)
投诉及证书/报告真伪查询电话 Complaint Tel.: 400-900-8999 按5 Email: complaint@smq.com.cn

校准证书

CALIBRATION CERTIFICATE

证书编号: JL2402024831
Certificate No

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校准用主要计量标准装置信息

Main Standard Devices Used

名称 Equipment Name	测量范围 Measuring Range	不确定度/准确度等级/ 最大允许误差 Uncertainty/Accuracy Class/ Maximum Permissible Error	计量标准考核证书号 Certificate No	有效期至 Due Date
_____	_____	_____	_____	_____

校准用主要标准器信息

Main Standards of Measurement Used

名称 Equipment Name	测量范围 Measuring Range	不确定度/准确度等级/ 最大允许误差 Uncertainty/Accuracy Class/ Maximum Permissible Error	设备编号 Equipment No	有效期至 Due Date	溯源单位/ 证书号 Traceability to/ Certificate No
多功能声分析系统	0.1 Hz ~ 100 kHz	电压 $U_{rel} = 0.1\%$, $k = 2$	SB3979	2024-06-11	
数字万用表	1 MHz, 1 kV	$U_{rel} = 0.01\%$, $k = 2$	SB0425	2024-06-12	
函数发生器	80 MHz	平坦度优于 0.1dB	SB5260	2024-09-07	

附加说明

Appended Directions

委托日期: 2024 年 01 月 26 日 环境条件: 温度 22.9°C 相对湿度 60.1%
Application Date Operation Environment

校准地点: 本院声学龙珠实验室
Operation Location

校准项目/参数说明: 本次校准根据委托方要求实施, 校准项目/参数详见校准结果
Items Instructions

符合性及限制使用说明: 参见校准结果使用(Use referring to the results of Calibration)
Statement of Compliance and Limitation

校准结果

RESULTS OF CALIBRATION

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1 外观检查: 符合要求
Appearance Check: Pass.

2 频率响应特性 (参考频率: 1000 Hz): 见表1
Frequency Response(Ref. 1000 Hz):See Table 1

表1 Table 1

频率 Frequency	频率响应 Frequency Response		最大允许范围 Limit
	(Hz)	(dB)	
	CH1	CH2	(dB)
20	-0.08	-0.08	±0.2
31.5	-0.01	-0.02	±0.2
63	0.00	-0.01	±0.2
125	0.00	0.00	±0.2
250	0.00	0.00	±0.2
500	0.00	0.00	±0.2
1000	0.0 (ref)	0.0 (ref)	±0.2
2000	0.00	0.00	±0.2
4000	0.00	0.00	±0.2
8000	0.00	-0.01	±0.2
12500	0.00	0.00	±0.2
16000	0.00	0.01	±0.2
20000	+0.01	+0.01	±0.2

质量
(1)
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3 总谐波失真: 见表2
THD: See Table 2

表2 Table 2

频率标称值 Freq. Nominal Value	总谐波失真 THD		最大允许范围 M.P.R.
	CH1	CH2	
(Hz)	(%)	(%)	(%)
63	0.054	0.068	≤0.3
125	0.045	0.038	≤0.3
250	0.049	0.032	≤0.3
500	0.041	0.048	≤0.3
1000	0.044	0.045	≤0.1
2000	0.051	0.055	≤0.3
4000	0.054	0.057	≤0.3
8000	0.051	0.052	≤0.3
12500	0.055	0.044	≤0.3
16000	0.044	0.047	≤0.3
20000	0.047	0.047	≤0.3



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4 增益控制偏差 (1 kHz): 见表3、表4
Gain Indication Error: See Table 3 and Table 4

CH1 表3 Table 3

增益档 Gain	增益标称值 Gain Indi.Value	增益实测值 Gain Meas. Value	误差 Error	最大允许误差 M.P.E.
(mV/Pa)	dB	dB	dB	dB
10	-20	-19.99	0.01	±0.1
31.6	-10	-10.00	0.00	±0.1
100	0	0.00	0.00	±0.1
316	10	10.00	0.00	±0.1
(V/Pa)	dB	dB	dB	dB
1	20	20.00	0.00	±0.1
3.16	30	30.00	0.00	±0.1
10	40	40.00	0.00	±0.1
31.6	50	50.01	0.01	±0.1

CH2 表4 Table 4

增益档 Gain	增益标称值 Gain Indi.Value	增益实测值 Gain Meas. Value	误差 Error	最大允许误差 M.P.E.
(mV/Pa)	dB	dB	dB	dB
10	-20	-19.99	0.01	±0.1
31.6	-10	-10.00	0.00	±0.1
100	0	0.00	0.00	±0.1
316	10	10.00	0.00	±0.1
(V/Pa)	dB	dB	dB	dB
1	20	20.00	0.00	±0.1
3.16	30	30.00	0.00	±0.1
10	40	40.00	0.00	±0.1
31.6	50	50.01	0.01	±0.1

校准章

校准结果

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附注:

Notes:

- 1.电压测量结果扩展不确定度: $U_{rel} = 0.1\%, k = 2$
Relative Expanded Uncertainty of Voltage: $U_{rel} = 0.1\%, k = 2$
- 2.失真测量结果扩展不确定度: $U_{rel} = 1.8\%, k = 2$
Relative Expanded Uncertainty of Distortion: $U_{rel} = 1.8\%, k = 2$
- 3.本证书中给出的测量不确定度依据 JJF 1059.1-2012 《测量不确定度评与表示》评定
The uncertainty given in this certificate is evaluated according to JJF 1059.1-2012 *Evaluation and Expression of Uncertainty in Measurement*.
