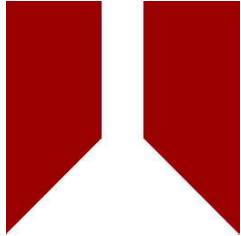


CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 27 February 2025

CERTIFICATE NUMBER 234177



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

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Approved signatory

R.Woodall

Electronically signed:

Sound Level Meter : IEC 61672-3:2013

Instrument information

Manufacturer: Cirrus Research plc

Notes:

Model: CR:900

Serial number: QT000113

Class: 2

Firmware version: 5.9.3442

Test summary

Date of calibration: 25 February 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013.

The sound level meter submitted for testing successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to determine that the model of sound level meter fully conformed to the class 2 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

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Environmental conditions

The following conditions were recorded at the time of the test:

Before	Pressure: 99.50 kPa	Temperature: 22.0 °C	Humidity: 45 %
After	Pressure: 99.50 kPa	Temperature: 22.0 °C	Humidity: 45 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDC7R0238
Attenuator	Cirrus Research	ZE:952	78710

Additional instrument information

Instruction manual:

Reference level range: Single range

Pattern approval: No

Source of pattern approval: -

Preamplifier

Model: MV:200F

Serial number: 9493F

Microphone

Model: MK:224

Serial number: 218024A

Test results summary

Test	Result
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Laboratory uncertainties

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Section 11: Self-generated noise

This test is for indication only and a failure does not, on its own, mean the sound level meter does not comply to the requirements of IEC 61672-1.

Selected range: Single range

		Acoustic	Electrical		
		L _{Aeq}	L _{Aeq}	L _{Ceq}	L _{Zeq}
Level	Measured	NaN	3.35	14.95	28.39
	Highest anticipated	-1.00	16.00	24.00	40.00

All values in the table are given in decibels.

Section 14: Frequency and time weightings at 1 kHz

Result: **Passed**

Selected range: Single range

Frequency weightings at 1 kHz

LAF	LCF	LZF	LAF - LCF	LAF - LZF	Acceptance limit	Uncertainty
93.94	93.94	93.93	0.00	0.01	±0.2	±0.00

All values in the table are given in decibels.

Time weightings at 1 kHz

LAF	LAS	L _{Aeq}	LAF - LAS	LAF - L _{Aeq}	Acceptance limit	Uncertainty
93.94	93.94	93.94	0.00	0.00	±0.1	±0.00

All values in the table are given in decibels.

Section 13: Electrical signal tests of frequency weightings : A-Weighting

Result: **Passed**

Selected range: Single range
Source of microphone free-field correction: Typical
Source of instrument case correction: Part B Manual
Source of windshield correction: Part B Manual

Frequency	LAF	Rel. freq. weighting	Correction A*	Correction B*	Correction C*	Corrected rel. freq. weighting	Target rel. freq. weighting	Deviation	Total uncertainty	Acceptance limit
63 Hz	68.09	-26.2	0.00	0.00	0.00	-25.85	-26.2	0.3	0	±1.0
125 Hz	78.06	-16.1	0.00	0.00	0.00	-15.88	-16.1	0.2	0	±1.0
250 Hz	85.53	-8.6	0.00	0.02	0.16	-8.23	-8.6	0.4	0	±1.0
500 Hz	90.85	-3.2	0.00	0.01	0.25	-2.83	-3.2	0.4	0	±1.0
1000 Hz	93.94	0.0	0.00	-0.03	0.45	0.42	0	0.4	0	±0.7
2000 Hz	95.00	1.2	0.00	-0.01	0.43	1.48	1.2	0.3	0	±1.0
4000 Hz	94.60	1.0	0.00	-0.03	0.41	1.04	1	0.0	0	±1.0
8000 Hz	92.35	-1.1	0.00	-0.08	-0.13	-1.80	-1.1	-0.7	0	+1.5; -2.5
16000 Hz	87.51	-6.6	-0.51	-0.06	-1.79	-8.79	-6.6	-2.2	0	+2.5; -16.0

* Legend
A : Microphone free-field correction
B : Correction for the effect of the instrument case
C : Correction for the effect of the windscreen

All values are given in decibels unless otherwise stated.

Section 13: Electrical signal tests of frequency weightings : C-Weighting

Result: **Passed**

Selected range: Single range
Source of microphone free-field correction: Typical
Source of instrument case correction: Part B Manual
Source of windshield correction: Part B Manual

Frequency	LCF	Rel. freq. weighting	Correction A *	Correction B *	Correction C *	Corrected rel. freq. weighting	Target rel. freq. weighting	Deviation	Total uncertainty	Acceptance limit
63 Hz	93.19	-0.8	0.00	0.00	0.00	-0.75	-0.8	0.1	0	±1.0
125 Hz	93.80	-0.2	0.00	0.00	0.00	-0.14	-0.2	0.1	0	±1.0
250 Hz	93.95	0.0	0.00	0.02	0.16	0.19	0	0.2	0	±1.0
500 Hz	93.98	0.0	0.00	0.01	0.25	0.30	0	0.3	0	±1.0
1000 Hz	93.94	0.0	0.00	-0.03	0.45	0.42	0	0.4	0	±0.7
2000 Hz	93.74	-0.2	0.00	-0.01	0.43	0.22	-0.2	0.4	0	±1.0
4000 Hz	92.96	-0.8	0.00	-0.03	0.41	-0.60	-0.8	0.2	0	±1.0
8000 Hz	90.60	-3.0	0.00	-0.08	-0.13	-3.55	-3	-0.5	0	+1.5; -2.5
16000 Hz	85.74	-8.5	-0.51	-0.06	-1.79	-10.56	-8.5	-2.1	0	+2.5; -16.0

* Legend
A : Microphone free-field correction
B : Correction for the effect of the instrument case
C : Correction for the effect of the windscreen

All values are given in decibels unless otherwise stated.

Section 13: Electrical signal tests of frequency weightings : Z-Weighting

Selected range: Single range

Source of microphone free-field correction: Typical

Source of instrument case correction: Part B Manual

Source of windshield correction: Part B Manual

Result: **Passed**

Frequency	LZF	Rel. freq. weighting	Correction A*	Correction B*	Correction C*	Corrected rel. freq. weighting	Target rel. freq. weighting	Deviation	Total uncertainty	Acceptance limit
63 Hz	94.02	0.0	0.00	0.00	0.00	0.09	0	0.1	0	±1.0
125 Hz	93.96	0.0	0.00	0.00	0.00	0.03	0	0.0	0	±1.0
250 Hz	93.93	0.0	0.00	0.02	0.16	0.18	0	0.2	0	±1.0
500 Hz	93.93	0.0	0.00	0.01	0.25	0.26	0	0.3	0	±1.0
1000 Hz	93.93	0.0	0.00	-0.03	0.45	0.42	0	0.4	0	±0.7
2000 Hz	93.94	0.0	0.00	-0.01	0.43	0.43	0	0.4	0	±1.0
4000 Hz	93.93	0.0	0.00	-0.03	0.41	0.38	0	0.4	0	±1.0
8000 Hz	93.83	0.0	0.00	-0.08	-0.13	-0.31	0	-0.3	0	+1.5; -2.5
16000 Hz	93.66	0.0	-0.51	-0.06	-1.79	-2.63	0	-2.6	0	+2.5; -16.0

* Legend

A : Microphone free-field correction

B : Correction for the effect of the instrument case

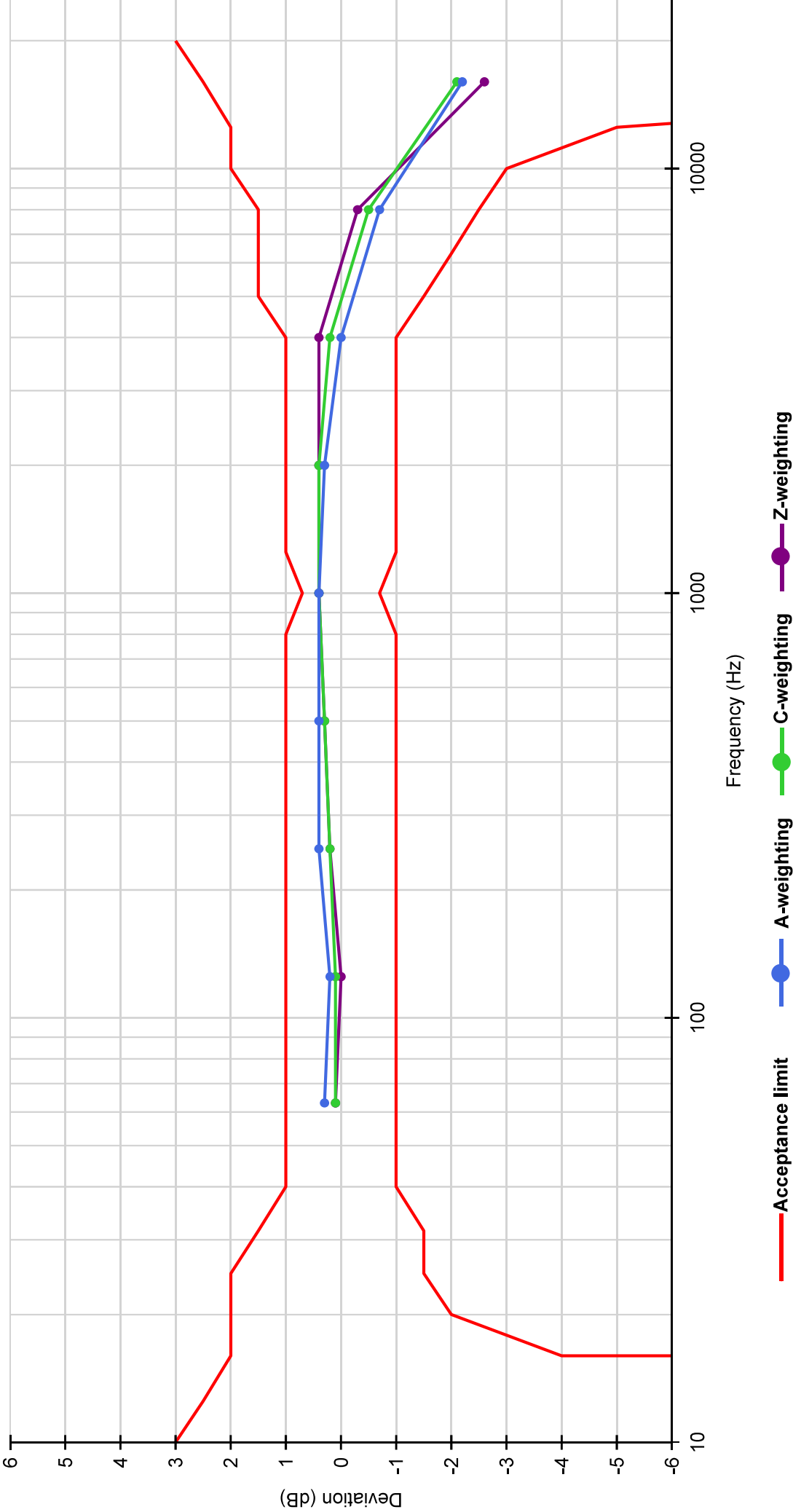
C : Correction for the effect of the windscreen

All values are given in decibels unless otherwise stated.

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Section 13: Electrical signal tests of frequency weightings : Continued

Result: **Passed**



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Result: **Passed**

Section 16: Level linearity on the reference level range

Selected range: Single range **Acceptance limit** ± 0.8 dB **Uncertainty:** 0.00 dB

Frequency: 8000 Hz **Linear operating range at 8000 kHz:** 24-137 dB

Reference level: 94.00 dB

Input level	LAF	Deviation
137.00	137.01	0.1
136.00	136.03	0.1
135.00	135.06	0.1
134.00	133.89	-0.0
133.00	132.90	-0.0
132.00	131.92	0.0
129.00	128.97	0.1
124.00	123.90	-0.0
119.00	118.98	0.1
114.00	113.89	-0.0
109.00	108.97	0.1
104.00	103.91	-0.0
99.00	98.99	0.1
94.00	93.92	0.0
89.00	88.97	0.1
84.00	83.90	-0.0
79.00	79.00	0.1
74.00	73.95	0.0
69.00	69.03	0.1
64.00	63.95	0.0
59.00	59.00	0.1
54.00	53.92	0.0
49.00	49.00	0.1
44.00	43.95	0.0
39.00	39.00	0.1
34.00	33.91	-0.0
29.00	28.95	0.0
28.00	27.98	0.1
27.00	26.99	0.1
26.00	25.89	-0.0
25.00	24.83	-0.1
24.00	23.60	-0.3

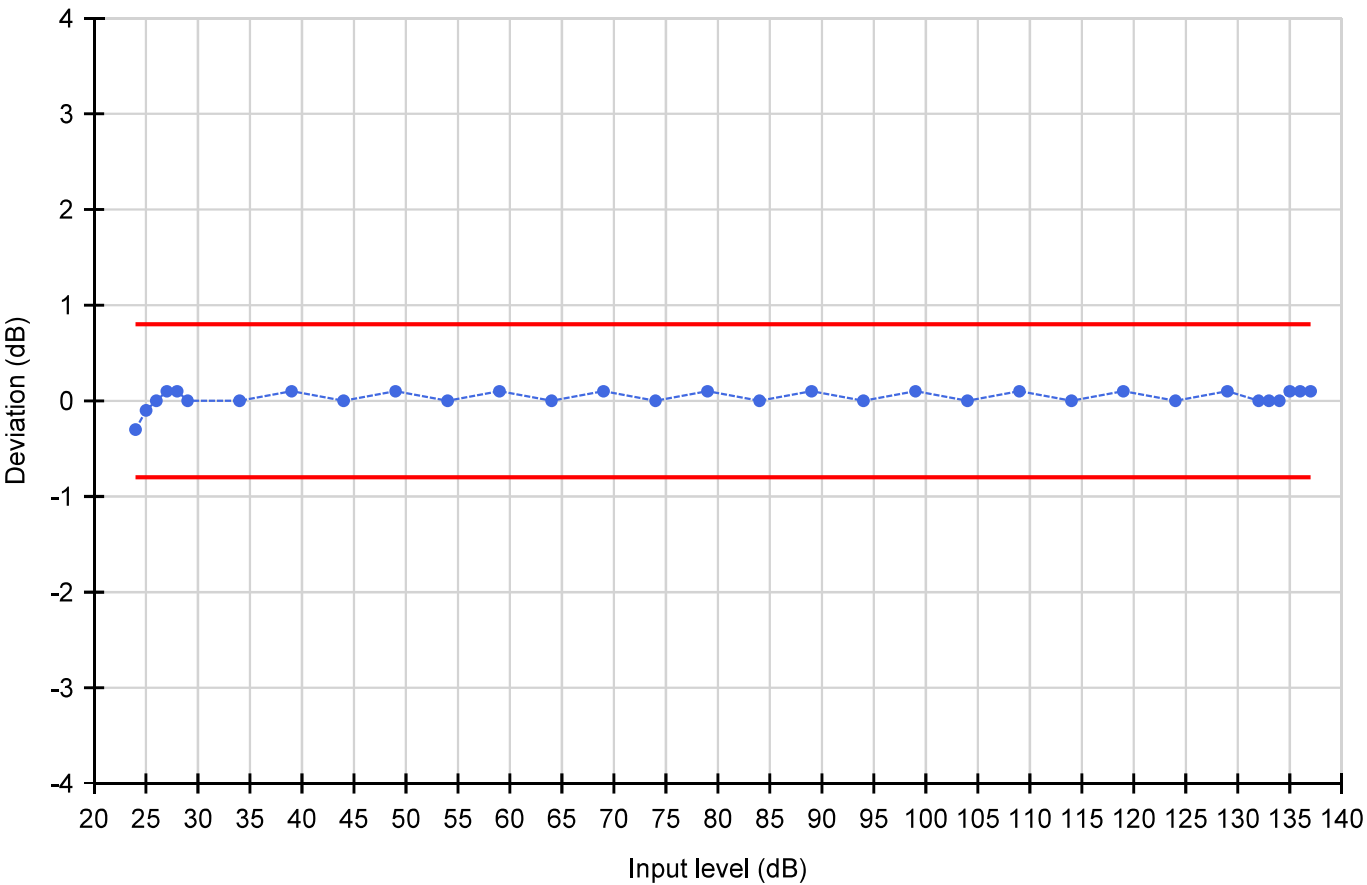
All values in the table are given in decibels.

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**Section 16: Level linearity on the reference
level range**



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Section 18: Toneburst response

Selected range: Single range

Frequency: 4000 Hz

Input level: 137.00 dB

Uncertainty: 0.00 dB

Result: Passed

Fast: Steady level type: LAF Burst level type: LAFMax

Burst duration	Steady level	Burst level	Measured difference	Target difference	Deviation	Acceptance limit	Overload
200 ms	137.00	136.00	-1.00	-1.0	0.0	±0.5	No
2 ms	137.00	118.93	-18.07	-18.0	-0.1	+1.0; -1.5	No
0.25 ms	137.00	109.87	-27.13	-27.0	-0.1	+1.0; -3.0	No

All values in the table are given in decibels unless otherwise stated.

Slow: Steady level type: LAS Burst level type: LASMax

Burst duration	Steady level	Burst level	Measured difference	Target difference	Deviation	Acceptance limit	Overload
200 ms	136.98	129.57	-7.41	-7.4	-0.0	±0.5	No
2 ms	136.98	109.98	-27.00	-27.0	0.0	+1.0; -3.0	No

All values in the table are given in decibels unless otherwise stated.

SEL: Steady level type: LAeq Burst level type: LAE

Burst duration	Steady level	Burst level	Measured difference	Target difference	Deviation	Acceptance limit	Overload
200 ms	137.00	130.01	-6.99	-7.0	0.0	±0.5	No
2 ms	137.00	109.99	-27.01	-27.0	-0.0	+1.0; -1.5	No
0.25 ms	137.00	100.93	-36.07	-36.0	-0.1	+1.0; -3.0	No

All values in the table are given in decibels unless otherwise stated.

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Section 19: C-weighted peak sound level

Selected range: Single range Uncertainty: 0.00 dB

Result: **Passed**

Frequency	Test signal	Reference LCeq	LCPeak	Measured difference	Target difference	Deviation	Acceptance limit	Overload
8000 Hz	Full sinewave	129.92	133.61	3.69	3.4	0.3	±2.0	No
500 Hz	Positive half-sinewave	133.91	136.34	2.43	2.4	0.0	±1.0	No
500 Hz	Negative half-sinewave	133.91	136.36	2.45	2.4	0.1	±1.0	No

All values in the table are given in decibels.

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Section 15: Long-term stability

Result: **Passed**

Frequency: 1000 Hz

Selected range: Single range

Reference input level sig. gen. voltage: 0.151 Vpp

Reference level: 94.00 dB

Reference input level attenuator gain: 0 dB

	Before	After	Difference	Acceptance limit	Uncertainty
LAF	93.94	93.94	0.0	0.1	0.00

All values in the table are given in decibels.

Section 21: High-level stability

Result: **Passed**

Frequency: 1000 Hz

Selected range: Single range

Reference level: 138.00 dB

	Before	After	Difference	Acceptance limit	Uncertainty
LAF	138.02	138.02	0.0	0.1	0.00

All values in the table are given in decibels.

Section 20: Overload indication

Result: **Passed**

Frequency: 4000 Hz

Start input level sig. gen. voltage: 5.053 Vpp

Uncertainty: ± 0.00 dB

Start input level attenuator gain: 10 dB

Selected range: Single range

Start input level: 139.0 dB

Relative input level

Positive half-sinewave	Negative half-sinewave	Difference	Acceptance limit
141.2	141.2	0	1.5

All values in the table are given in decibels unless otherwise stated.

End of results

