

Free Field Point Source

APPLICATIONS:

- Microphone Testing
- In-Situ Measurements of Hearing Aids or other Microphone Devices
- Head And Torso Simulator (HATS) and Manikin Measurements & Calibration
- Measurement of Head-Related Transfer Functions (HRTFs)
- Directional Measurements

FEATURES:

- Time-Aligned Coincident Driver
- Small, Low Diffraction Profile enabling close far field working distance
- Flat, Smooth Easy to Equalize Broadband Response
- Built-in Protection Circuit
- Individual Calibration

OVERVIEW

The Free Field Point Source was developed as a reference source for testing microphones where a wide band, free field sound source is required. The Free Field Point Source is capable of producing a pure tone output of over 95 dB SPL at a distance of 1m. The symmetrical time-aligned, co-axial design maintains the on-axis response within ± 1 dB through a 6° solid angle, to minimize positioning errors. The small device size enables far field measurements at distances as close as 0.8m, facilitating time selective simulated free field measurements. A flat response from 100 Hz to 20 kHz is easily obtained with equalization. A built-in overload protection circuit minimizes the risk of accidental damage to the unit.

Description

The Free Field Point Source is a small profile, stable, low distortion reference sound source for testing electroacoustic transducers. Measurements of microphones require a wide bandwidth source for substitution or comparison measurements. The Free Field Point Source fulfills this requirement. Calibration of the device can be performed with any high quality reference microphone with a flat response wider than the device under test. The stable response ensures accuracy when substituting the device under test. The coincident driver results in a consistent response from a well-



defined angle at the reference position. The Free Field Point Source consists of a time-aligned, co-axial loudspeaker mounted in a specially shaped, acoustically optimized housing with a 2-way crossover and an overload protection circuit. Input is via a standard banana socket at the rear of the unit. A 3/8-16 UNC threaded insert is also provided for tripod mounting or ceiling suspension.

Frequency Response

The typical free field frequency response at 1m for a 2.83V input is shown in Fig. 1. Response variation relative to the reference position at 1m appears in Table 1. The Free Field



Product Information

Preliminary

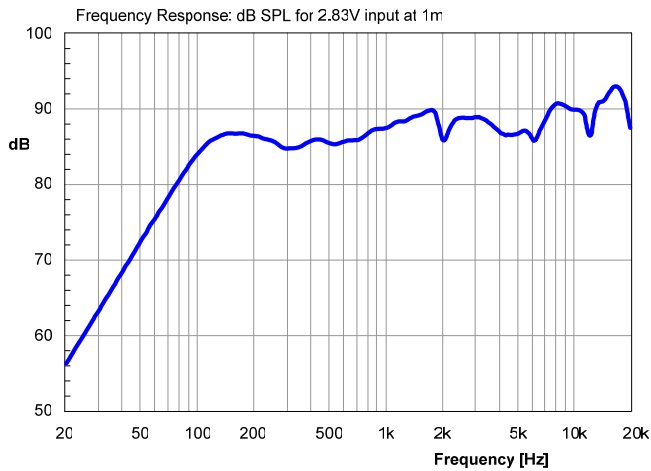


Fig. 1. Free Field Point Source Frequency Response

Point Source is delivered with an individual calibration chart showing the frequency response measured under standard operating conditions. The nominal impedance of the Free Field Point Source is 4 ohms.

Output SPL and Response Equalization

Nominal sensitivity is 87 dB SPL at 1m for a 2.83 V input. The frequency response is ± 4 dB from 100 Hz to 20 kHz. In this range, equalization can be used to obtain a flat response using inverse parametric filtering, point-by-point frequency compensation, or complex division in the frequency domain. The Free Field Point Source can be operated at maximum continuous input levels up to 10W. Higher power levels up to 50W are possible using short duration pulsed signals with periods of less than 2s (in a 1:10 on/off duty cycle), producing an output level of 103 dB SPL at 1m.

Position	Response re. Reference Level at 1m
On-axis, 0.9m	0.92 dB ± 1 dB
On-axis, 1.1m	-0.83 dB ± 1 dB
$\leq 6^\circ$ Off-axis, 1m	± 1 dB

Table 1. Response variation with position re. Reference Level measured at 1m on-axis.

Applications

Testing of microphones is facilitated with the Free Field Point Source using either the substitution or 2-channel comparison method – or a combination of these techniques. Measurements may be performed in an anechoic chamber or using time selective techniques. The microphone under test may also be rotated – usually with an automated turntable – to perform directional measurements and obtain polar data.

The Free Field Point Source can also be used to perform in-situ measurements of hearing aids or other body-worn, microphone-equipped devices. A reference measurement is performed using a probe microphone to obtain the open ear response. A second measurement is then performed with the device under test in place. The ratio of these two responses yields the Insertion Gain. Using multiple Free Field Point Sources, or rotation of the subject (or both), Head Related Transfer Function (HRTF) data can be obtained. Alternatively, simulated in-situ and/or HRTF tests can be performed using a manikin or Head And Torso Simulator (HATS) using this same technique. The Free Field Point Source can also be used to verify the calibration of a measurement manikin or HATS. Rotation of the manikin or HATS enables directional measurements to be performed.

Technical Specifications

SENSITIVITY:

86 dB SPL at 1m for 2.83V input

FREQUENCY RESPONSE:

100 Hz to 20 kHz, ± 4 dB

TOTAL HARMONIC DISTORTION:

< 1% for 1 W input

IMPEDANCE:

4 ohms

POWER HANDLING:

Maximum continuous power: 10 W at 20 °C (68°F)

Maximum short term power: 50 W for 2 seconds (limited by the overload protection circuit)

DIMENSIONS:

Length: 28.7 cm (11.3 in)

Maximum Diameter: 23.8 cm (9.4 in)

WEIGHT:

3.75 kg (8.25 lbs)

ACCESSORIES INCLUDED:

Threaded eye bolt for ceiling suspension

Calibration Chart

Instruction Note

ACCESSORIES AVAILABLE:

Stand

Travel Case



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