

# Introduction to Electret Microphones

### Introduction

All microphones are based on an electret condenser principle which provides advanced performance in a miniature package. The microphone Integrated Circuit design uses the latest technology to provide the lowest noise and highest EMI protection. Microphones are categorized into single omni directional microphones and single directional microphones.

The omni directional microphones accept sound from all around the perimeter while directional microphones reject sound from certain directions. The directional microphones are best used for an application where unwanted sound needs to be filtered out. Sonion offers the microphones with the best performing Directionality Index. Sonion also provides modules where both omni and directional microphones are grouped to provide a switchable package to support different environments.

Depending on the design, we can accommodate a vast range of spouts and port locations. Additionally, Sonion gives you the ability to attach plastic spouts to our transducers for custom hearing instrument applications

### Overview of the microphones

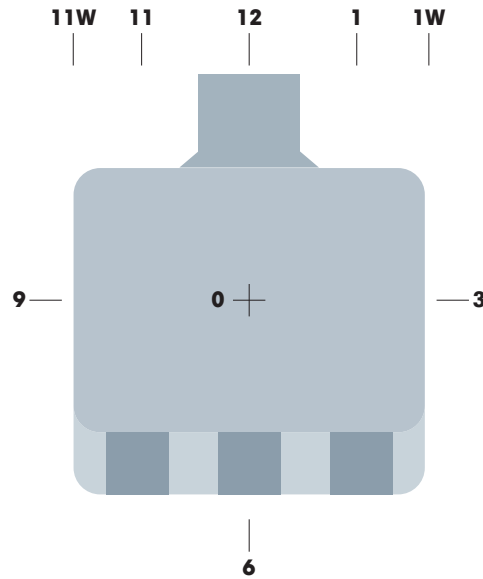
Family	Sensitivity @1kHz re 1V/ Pa (dB)	Equivalent A-weighted Noise dB(A)SPL	Dimensions mm [in] typical			Volume mm <sup>3</sup>
			L	W	H	
<b>Omni Directional</b>						
<b>5000</b>	-34.5	26	3.55 [0.140]	2.55 [0.100]	1.31 [0.052]	11.9
<b>5100</b>	-32.5	25	3.55 [0.140]	2.55 [0.100]	1.31 [0.052]	11.9
<b>5100T</b>	-34.5	25.5	3.55[0.140]	2.55[0.100]	1.07 [0.042]	9.7
<b>8000</b>	-33.5	25	2.56 [0.101]	2.56 [0.101]	∅	13.2
<b>8900</b>	-31.5	24.5	2.56 [0.101]	2.56 [0.101]	∅	13.2
<b>6500T</b>	-34.5	26	3.55 [0.140]	3.55 [0.140]	1.07 [0.042]	13.5
<b>6500</b>	-32.0	25	3.55 [0.140]	3.55 [0.140]	1.27 [0.052]	16.0
<b>6000</b>	-37.0	26.5	3.55 [0.140]	3.55 [0.140]	1.32 [0.052]	16.6
<b>6200</b>	-34.5	26	3.55 [0.140]	3.55 [0.140]	1.32 [0.050]	16.6
<b>6600</b>	-33.5	26.5	3.55 [0.140]	3.55 [0.140]	1.32 [0.052]	16.6
<b>6300/6400</b>	-35.0	25.5	3.58 [0.141]	3.58 [0.141]	1.71 [0.067]	21.9
<b>9000</b>	-33.0	25	3.58 [0.141]	3.58 [0.141]	2.23 [0.088]	28.6
<b>100</b>	-33.0	23	5.54 [0.218]	3.95 [0.156]	2.23 [0.088]	48.8
<b>Directional &amp; Directional Omni Combinations</b>						
<b>6000</b>	-37.0	34 (directional)	3.55 [0.140]	3.55 [0.140]	1.32 [0.052]	16.6
<b>6900</b>	-37.0	26	3.58 [0.141]	3.58 [0.141]	2.65 [0.104]	34.0
<b>6950</b>	-36.0	26.5	3.58 [0.141]	3.58 [0.141]	2.90[0.104]	37.2

### Schematic of port locations

View of the front (cover) of the microphone. The code number is laser marked on the cover. The numbers correspond with positions on a clock face with terminals at 6 o'clock and they denote the location of the signal port.

Letters give further information on signal port location and type. Some signal port locations are not available on particular microphones.

The 6000 and 6500 series have no possibility for a port location on the cover (j-location).



**n** no tube



**j** cover



**jp** tube perpendicular to cover



**12kp** tube perpendicular to case B-spout

The 5000 microphone

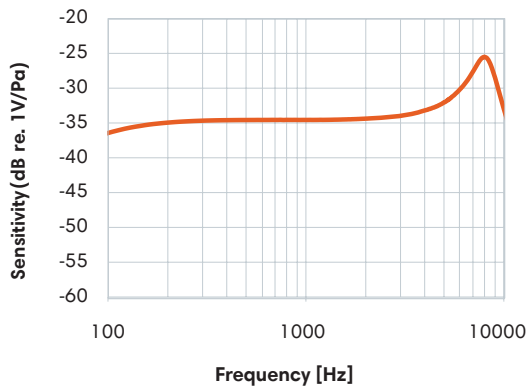
# The Tiny Giant



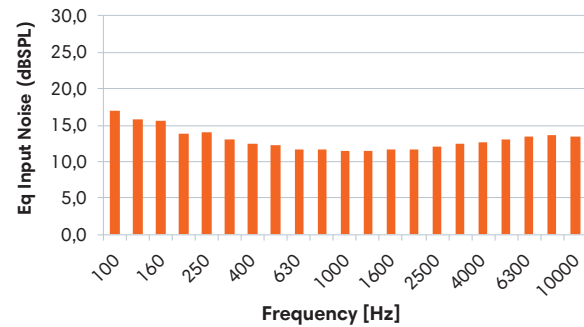
## Description

The 5000 microphone is 30% smaller than existing industry standard microphones, yet packs similar performance. The 5000 microphone has been built on known technology and production concepts. The 5000 microphone will offer design engineers more freedom in two ways: a) It will consume 30% less space than existing industry standard microphones; b) Rectangular offers more rotational freedom than square, because the microphone can be turned around three axis to achieve different footprints in the HI design.

## Typical response curve



## Noise curves

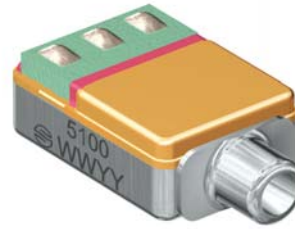


Parameter	Unit	Value
<b>S1kHz</b>	dB re 1V/Pa	-34.5
<b>EIN</b>	dB(A) SPL	26.0
<b>Current drain</b>	μA	17
<b>EMI</b>	dB SPL	<25
<b>PSRR</b>	dB	12
<b>Dimensions</b>	mm	2.55 x 3.55 x 1.31
<b>Volume</b>	mm <sup>3</sup>	11.9

Features
Industry standard performance in 30% smaller size
Unique rectangular form factor
The new industry standard microphone
Also available in matched pairs

The 5100 microphone

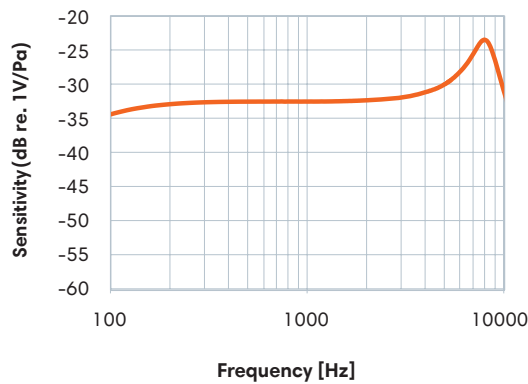
# Zero Compromise



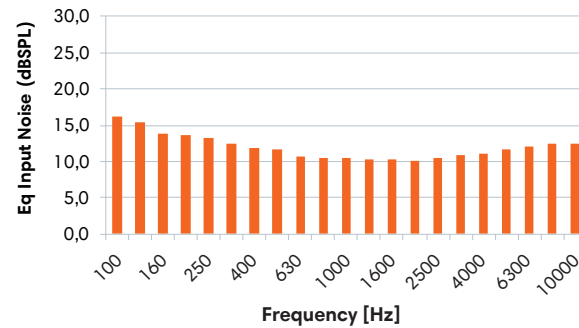
### Description

The 5100 microphone has the same tiny dimensions as the 5000, but with significantly improved sensitivity and noise performance. The new ASIC that comes with the 5100 has a very low interference due to a high PSRR and a low EMI. In summary, the 5100 is the best performing microphone in the smallest package – i.e. ‘zero compromise’.

### Typical response curve



### Noise curves



Parameter	Unit	Value
<b>Sensitivity 1kHz</b>	dB re 1V/Pa	-32.5
<b>A-weighted Noise</b>	dB(A) SPL	25.0
<b>Current drain</b>	µA	25
<b>EMI</b>	dB SPL	< 25
<b>PSRR</b>	dB	33
<b>Dimensions</b>	mm	2.55 x 3.55 x 1.31
<b>Volume</b>	mm <sup>3</sup>	11.9

Features
Zero compromise: best performance in smallest size
Low interference: improved PSRR and very low EMI
Also available in matched pairs

## The 5100T microphone

# Sub 10 mm<sup>3</sup>

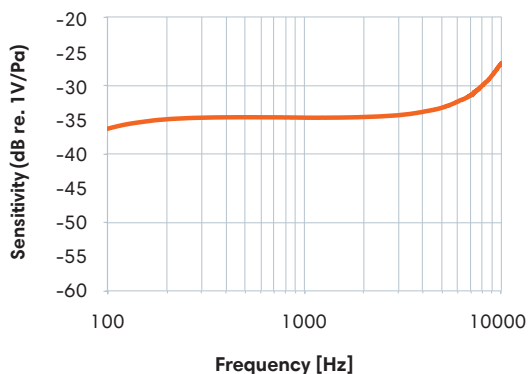


### Description

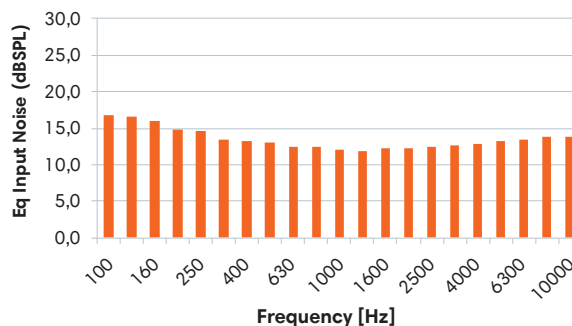
The 5100T is the smallest high performance electret microphone in the world @ 9.7 mm<sup>3</sup>: It has the same tiny footprint as our other 5000 microphones, but at an 18% reduced height!

It uses the latest IC technology and has a superior performance-to-size ratio: It has a high max input level (117 dB SPL), sensitivity at (-34.5 dB @ 1kHz) and a high PSRR (33 dB).

### Typical response curve



### Noise curves



Parameter	Unit	Value
<b>Sensitivity 1kHz</b>	dB re 1V/Pa	-34.5
<b>A-weighted Noise</b>	dB(A) SPL	25.5
<b>Current drain</b>	μA	25
<b>EMI</b>	dB SPL	< 25
<b>PSRR</b>	dB	33
<b>Dimensions</b>	mm	2.55 x 3.55 x 1.07
<b>Volume</b>	mm <sup>3</sup>	9.7

### Features

Less than 10mm<sup>3</sup> in size and just 1.07mm in thickness

~20% thinner than the 5100 microphone

Industry standard performance in an extremely small package

## The 8000 microphone

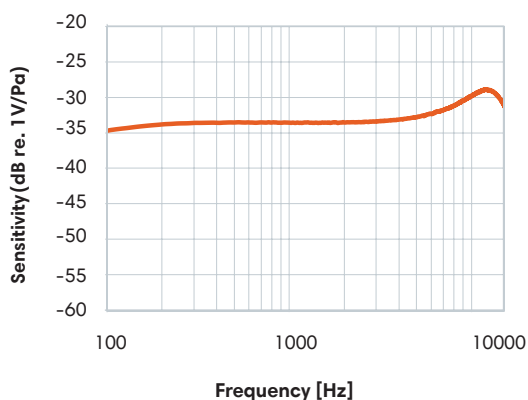
# Small & Cylindrical



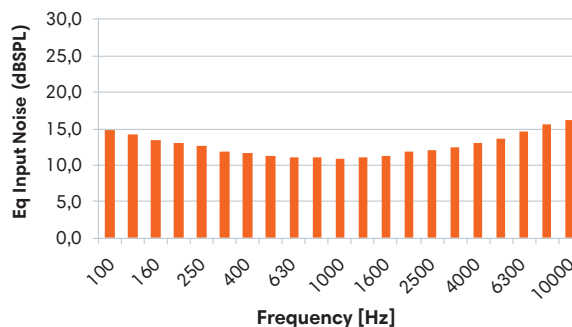
### Description

The 8000 microphone is one of the smallest electrets condenser microphones available. Its cylindrical shape and compact size provide for superior fit rates, especially in ITE applications. It has low noise, excellent EMI performance and a wideband frequency response

### Typical response curve



### Noise curves



Parameter	Unit	Value
<b>S1kHz</b>	dB re 1V/Pa	-33.5
<b>EIN</b>	dB(A) SPL	25.0
<b>Current drain</b>	μA	17
<b>EMI</b>	dB SPL	<30
<b>PSRR</b>	dB	14
<b>Dimensions</b>	mm	2.56 x Ø2.56
<b>Volume</b>	mm <sup>3</sup>	13.2

### Features

- Small
- Excellent EMI suppression
- Variety of response curves available
- Also available in matched pairs

The 8900 microphone

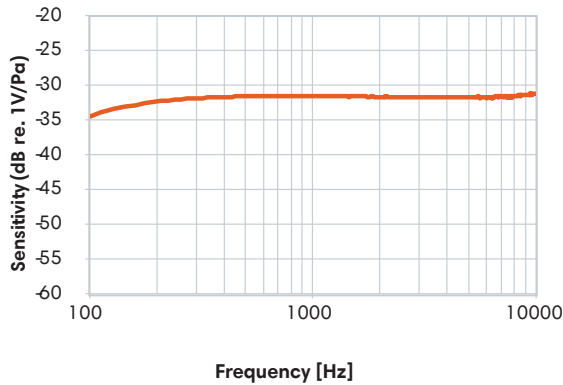
# Best-in-class dynamic range



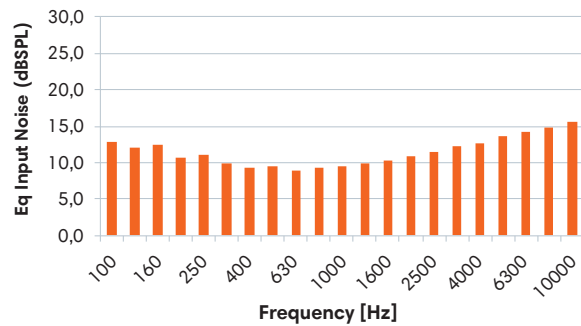
**Description**

The 8900 microphone has the same size and shape as the 8000-series, but has superior performance. The sensitivity is 2dB higher in the same package. In addition to this the use of a new ASIC results in a better PSRR of 33dB and gives it a better dynamic range: overload margining of 115dB SPL at 3%THD.

**Typical response curve**



**Noise curves**



Parameter	Unit	Value
<b>S1kHz</b>	dB re 1V/Pa	-31.5
<b>EIN</b>	dB(A) SPL	24.5
<b>Current drain</b>	µA	25
<b>EMI</b>	dB SPL	<30
<b>PSRR</b>	dB	33
<b>Dimensions</b>	mm	2.56 x Ø2.56
<b>Volume</b>	mm <sup>3</sup>	13.2

Features
High sensitivity
High power supply rejection ratio
Low noise
Small cylindrical shape with superior performance



## The 6500 microphone

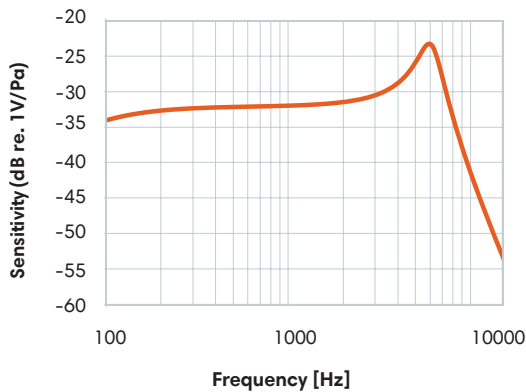
# Best In Class



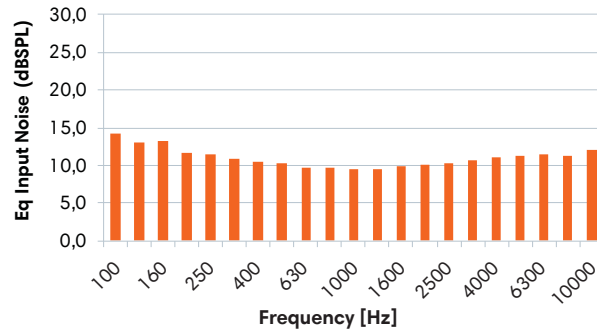
### Description

Sonion is proud to introduce the 6500-series microphone - superior sensitivity and noise performance in today's most commonly used form factor. It has the same footprint as the industry standard 6200-microphone series, but the optimized cartridge design and new ASIC gives it a 2dB higher sensitivity and 1dB lower noise.

### Typical response curve



### Noise curves



Parameter	Unit	Value
<b>S1kHz</b>	dB re 1V/Pa	-32.0
<b>EIN</b>	dB(A) SPL	25.0
<b>Current drain</b>	μA	17
<b>EMI</b>	dB SPL	<25
<b>PSRR</b>	dB	12
<b>Dimensions</b>	mm	3.55 x 3.55 x 1.27
<b>Volume</b>	mm <sup>3</sup>	16.0

Features
Standard square form factor
2dB higher sensitivity compared to 6200 series microphone
1dB lower noise level compared to 6200 series microphone

### The 6500T microphone

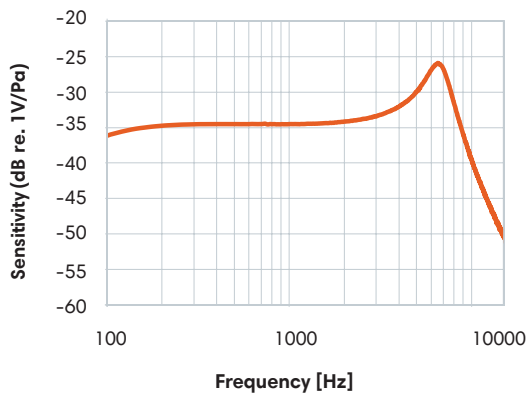
# Slim Fit



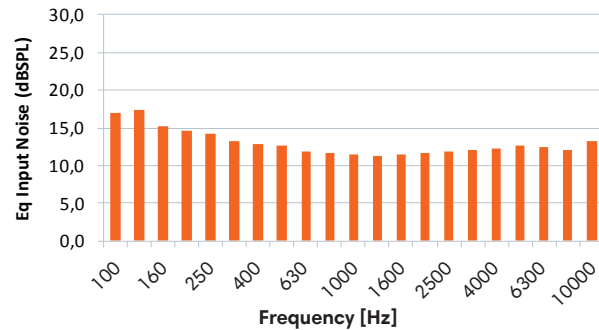
### Description

At a height of 1.07mm, the 6500T is the thinnest microphone available. When you need that extra 20% headroom, the 6500T can prove highly valuable – e.g. by improving the fitting rate of devices with microphones in the ear. The 6500T completes the microphone offering from Sonion: 5000 (if you want narrow), 6500T (if you want thin), 6500 (if you want best in class performance).

### Typical response curve



### Noise curves



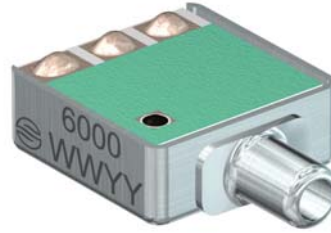
Parameter	Unit	Value
<b>S1kHz</b>	dB re 1V/Pa	-34.5
<b>EIN</b>	dB(A) SPL	26.0
<b>Current drain</b>	µA	17
<b>EMI</b>	dB SPL	<25
<b>PSRR</b>	dB	12
<b>Dimensions</b>	mm	3.55 x 3.55 x 1.07
<b>Volume</b>	mm <sup>3</sup>	13.5

### Features

- Thinnest microphone with 6200 footprint
- Industry standard performance
- General purpose microphone when height is critical

The 60/62/6600 microphone

# The Industry Standard

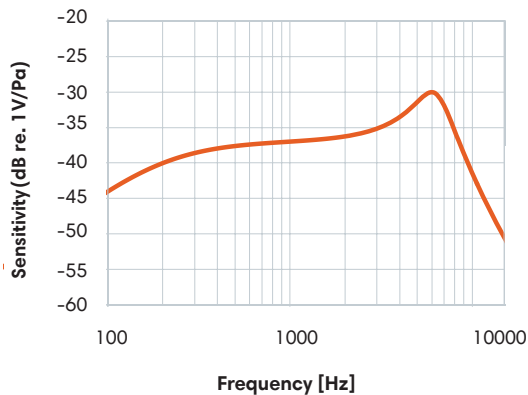


## Description

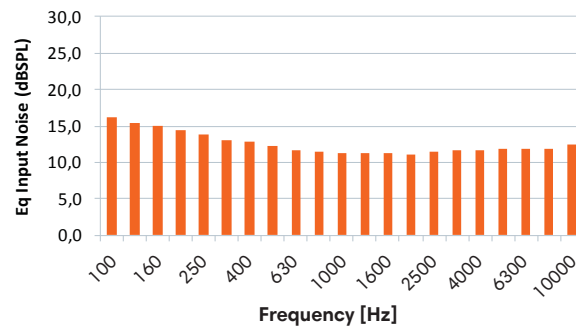
The 6000 family (60/62/6600) microphones have become the industry standard in both performance and form factor. Low noise and stable low-end response achieved through an electrical HPF. They are perfectly suited for matching and directional applications.

The 6000-series is the first generation with a sensitivity of -37.5dB. Based on the same design the 6200 and 6600 microphones are developed with increased sensitivity and lower noise. The 6200 has the lowest noise; the 6600 is optimized for a high PSRR

## Typical response curve



## Noise curves



Parameter	Unit	Value
<b>S1kHz</b>	dB re 1V/Pa	-37.0 **
<b>EIN</b>	dB(A) SPL	26.5 ***
<b>Current drain</b>	µA	17
<b>EMI</b>	dB SPL	<30
<b>PSRR</b>	dB	12 *
<b>Dimensions</b>	mm	3.55 x 3.55 x 1.32
<b>Volume</b>	mm <sup>3</sup>	16.6

\* 33dB for 6600 series; \*\*-34/-33 for 62/6600 series; \*\*\*24.5 for 6200 series

## Features

Industry standard performance

Variety of response curves and spouts possible

Also available in matched pairs

The 63/6400 microphone

# The Industry Standard



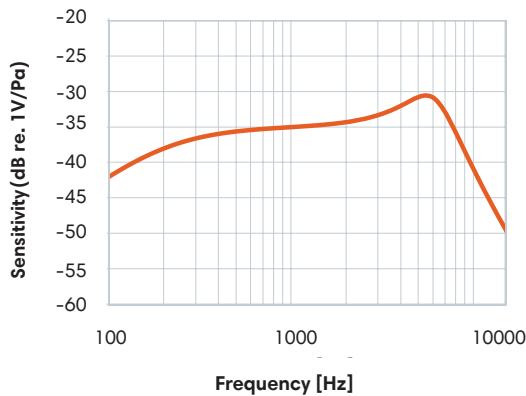
## Description

The 6000 family (60/62/6600) microphones have become the industry standard in both performance and Description

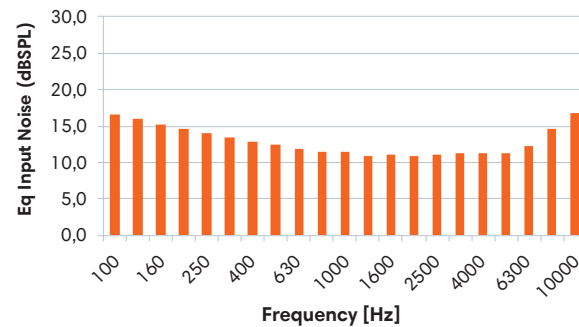
The 63/6400 microphone provides the combination between size and performance. Low noise and stable low-end response achieved through an electrical HPF.

The design is based on the 6000-family with an additional cover to improve the signal to noise ratio, with an increased thickness as trade-off.

## Typical response curve



## Noise curves



Parameter	Unit	Value
<b>S1kHz</b>	dB re 1V/Pa	-35.0
<b>EIN</b>	dB(A) SPL	25.5
<b>Current drain</b>	µA	17
<b>EMI</b>	dB SPL	<35
<b>PSRR</b>	dB	12
<b>Dimensions</b>	mm	3.58 x 3.58 x 1.71
<b>Volume</b>	mm <sup>3</sup>	21.9

Features
Industry standard performance
Variety of response curves and spouts possible
Also available in matched pairs

The 9000 microphone

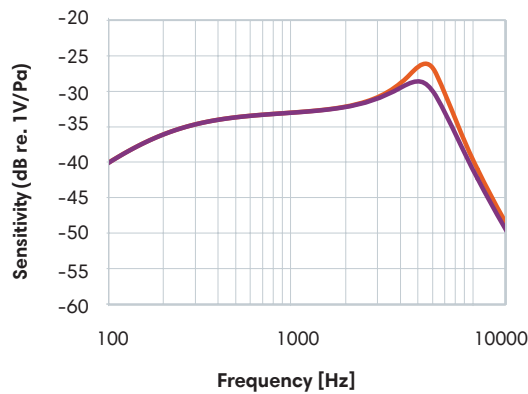
# Great Performance



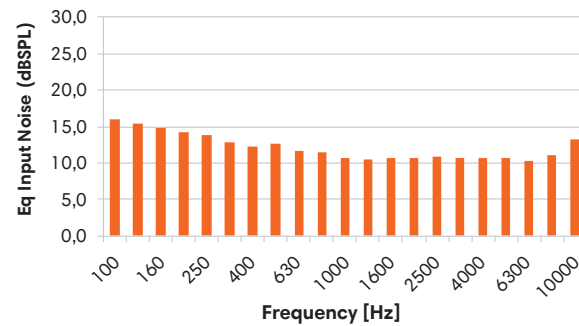
## Description

The 9000-microphone has proven itself for years as a very popular microphone for instrument manufacturers due to its rugged construction and excellent electro-acoustic performance.

## Typical response curve



## Noise curves



Parameter	Unit	Value
<b>S1kHz</b>	dB re 1V/Pa	-33.0
<b>EIN</b>	dB(A) SPL	25.0
<b>Current drain</b>	μA	17 or 45*
<b>EMI</b>	dB SPL	<30
<b>PSRR</b>	dB	12 or 25*
<b>Dimensions</b>	mm	3.58 x 3.58 x 2.23
<b>Volume</b>	mm <sup>3</sup>	28.6

\* Depending on the exact model

## Features

- Rugged construction
- High resistance to mechanical shock
- Numerous port locations and frequency responses available

### The 100 microphone

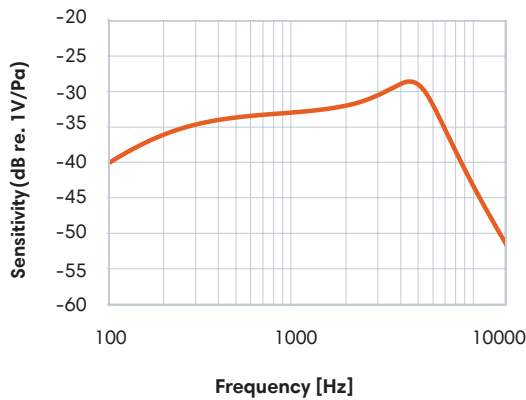
# Legacy Product



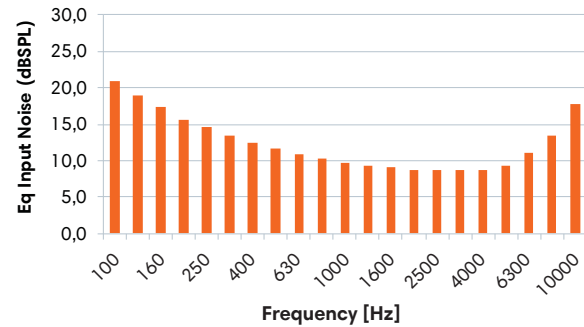
### Description

The 100-microphone has the lowest equivalent input noise, a result of the large form factor of 48mm<sup>3</sup>. A variety of spout configuration is available. It is also available in 6dB and 12dB ski-slope response curves.

### Typical response curve



### Noise curves



Parameter	Unit	Value
<b>S1kHz</b>	dB re 1V/Pa	-33.0
<b>EIN</b>	dB(A) SPL	23.0
<b>Current drain</b>	µA	35
<b>PSRR</b>	dB	12
<b>Dimensions</b>	mm	5.54 x 3.95 x 2.23
<b>Volume</b>	mm <sup>3</sup>	48.8

\* Depending on the exact model

Features
Not recommended for new design-ins
Please contact us for more information

## The 6900 microphone

# Directional Modules

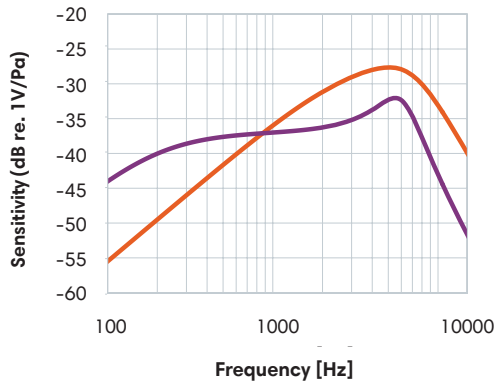


### Description

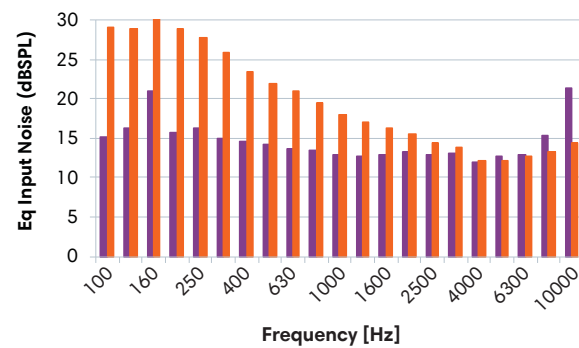
The 6900 microphone modules provide a space saving solution for directional applications.

By conjoining an omni- and a directional microphone, the mounting time is reduced and the need for any acoustic tubing is minimized.

### Typical response curve



### Noise curves



Parameter	Unit	Value
<b>S1kHz*</b>	dB re 1V/Pa	-36.5
<b>EIN*</b>	dB(A) SPL	32.0
<b>Current drain</b>	μA	17
<b>EMI</b>	dB SPL	<35
<b>PSRR</b>	dB	12
<b>Dimensions</b>	mm	3.58 x 3.58 x 2.65
<b>Volume</b>	mm <sup>3</sup>	34.0

\* Directional mode

Features
Available in many configurations, various port diameters and lengths
Please check our website for details

The 6950 microphone

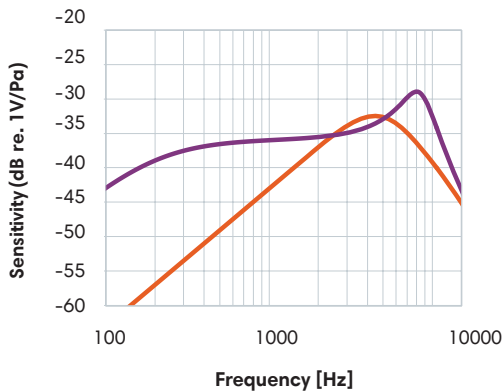
# CC-Mic Module



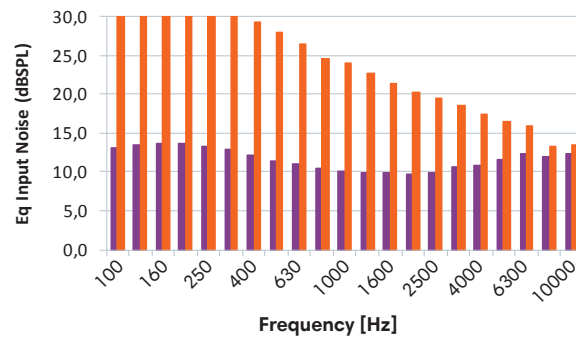
## Description

The 6950 microphone or CC-mic has the highest directivity index of 5.8. The design is based on the industry standard 6000 microphone and combines an omni microphone with a directional microphone in a very small package. Ideal for use in faceplates where space is limited.

## Typical response curve



## Noise curves



Parameter	Unit	Value
<b>S1kHz*</b>	dB re 1V/Pa	-43.0
<b>EIN*</b>	dB(A) SPL	38.0
<b>Current drain</b>	μA	17
<b>EMI</b>	dB SPL	<40
<b>PSRR</b>	dB	12
<b>Dimensions</b>	mm	3.58 x 3.58 x 2.90
<b>Volume</b>	mm <sup>3</sup>	37.2

\* Directional mode

Features
Superior directionality made simple
Highest directivity index performance
Excellent EMI and ESD protection