

Ear Microphone Demonstrator Headset TC-32282-B111

Technical Challenge

Many products and technologies address the problem of intelligibility in the presence of severe wind and background noise. A well-designed ear microphone solves provides both intelligibility and isolation. Vocal cord vibrations are naturally present in an occluded ear canal.

Low frequencies are conducted more efficiently to the ear than are high frequencies. The phenomenon is known as the "Occlusion Effect". A talker's own voice is perceived as loud and booming when the ear canal is blocked. The effect is real, and can be measured using a probe-tube microphone inside an occluded ear.

Higher frequencies are also present in the occluded ear, but attenuated.

Microphone Technology

Any small microphone can be used to listen to the sound present in an occluded ear. The occlusion provides isolation from outside sound and wind, but the remaining sound is not natural sounding. The technical challenge is to convert the booming voice sounds in the occluded ear into more natural and intelligible speech. The microphone element in the TC-32282-B111 meets this challenge, and does so without the adding the cost and complexity of active electronics. The EM series microphone chosen for this demonstrator utilizes 100% acoustic filtering. The microphone technology maximizes signal to noise performance in a small size package. The microphone construction is specialized to filter out the booming low frequencies and accentuate speech intelligibility.

Two EM models are recommended for occluded ear voice pickup:

- EM-23059-000 (standard)
- EM-23459-D65 (includes EMI filter circuit)

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AMERICAS:
Knowles Acoustics
1151 Maplewood Drive
Itasca, IL 60143
U.S.A.
Tel: 630-250-5930
Fax: 630-250-5932

EUROPE:
Knowles Electronics Denmark
Havnevej 7 4000 Roskilde
Denmark
Tel: 45 70 25 35 70
Fax: 45 70 25 35 71

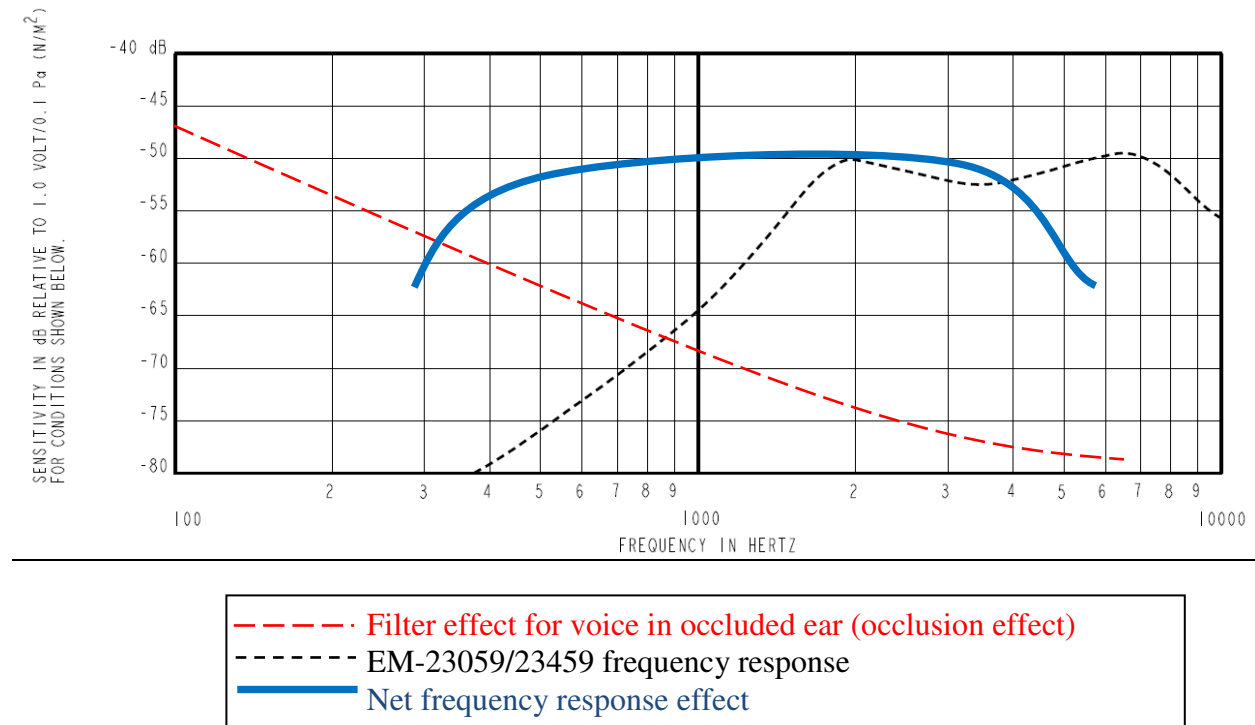
JAPAN:
Knowles Electronics Japan, KK
2-2-16, Sanganjaya,
Setagaya-ku, Tokyo
154-0024 JAPAN
Tel. +81-3-5779-8503
Fax: +81-3-5779-8523

ASIA:
Knowles Acoustics
5F, No. 129, Lane 235, Bauchiau Rd.
Shindian City, Taipei 231, Taiwan
Republic of China
Tel: 886-2-8919-1799
Fax: 886-2-8919-1798

Both models are compatible with the microphone supply voltage provided by typical mobile handsets and radios.

Acoustic Filtering

The frequency response of EM-23059-000 filters low frequencies at 12dB/octave, and provides an acoustic boost for frequencies above 1.5kHz. The boost amplifies the articulation of consonants critical to distinguishing between like-sounding words. The figure below illustrates the equalization effect of the microphone in an occluded ear and does not represent measurement data.



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Demonstrator Configuration

The left earpiece contains a balanced armature driver model RAB-32063-000. The right earpiece contains microphone EM-23059-000, which is connected through a narrow tube visible at the housing exit. The earpieces are labeled "L" and "R" on the inside surface of the housing and are worn with the cable exit facing forward and draped back over the ear. The in-line microphone is not connected.



The TRRS connector pinout is shown below.

EM Microphone in earpiece

Common ground

No connection

RAB driver



Demonstrator model contains an assortment of ear tips – a good seal to the ear canal is needed for good performance. Demonstrator model and component models are labeled on the bag and on the headset cable.

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Fax: 45 70 25 35 71

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