We help the world listen

14 November 2023
Ad Lafort

sonion sound innovation partner

SONION HAS BEEN HELPING THE WORLD TO LISTEN FOR HALF A CENTURY

- Leading B2B supplier of micro electro-acoustic and micromechanical products and solutions for the hearing health, consumer and professional audio markets
- Owned by Novo Holdings A/S (Denmark) since September 2014
- Revenue ~250M USD

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PRODUCTION IS CONSOLIDATED IN THREE FACTORIES IN VIETNAM AND THE PHILIPPINES, WHILE R&D TAKES PLACE IN THE NETHERLANDS

- ~6000 employees
- Facilities in Denmark, the Netherlands, Poland, US, China, Vietnam and the Philippines
- Certified according to ISO 9001: 2015, ISO 14001: 2015 and ISO 45001: 2018
- Lean manufacturing, 6 Sigma, 99% delivery performance

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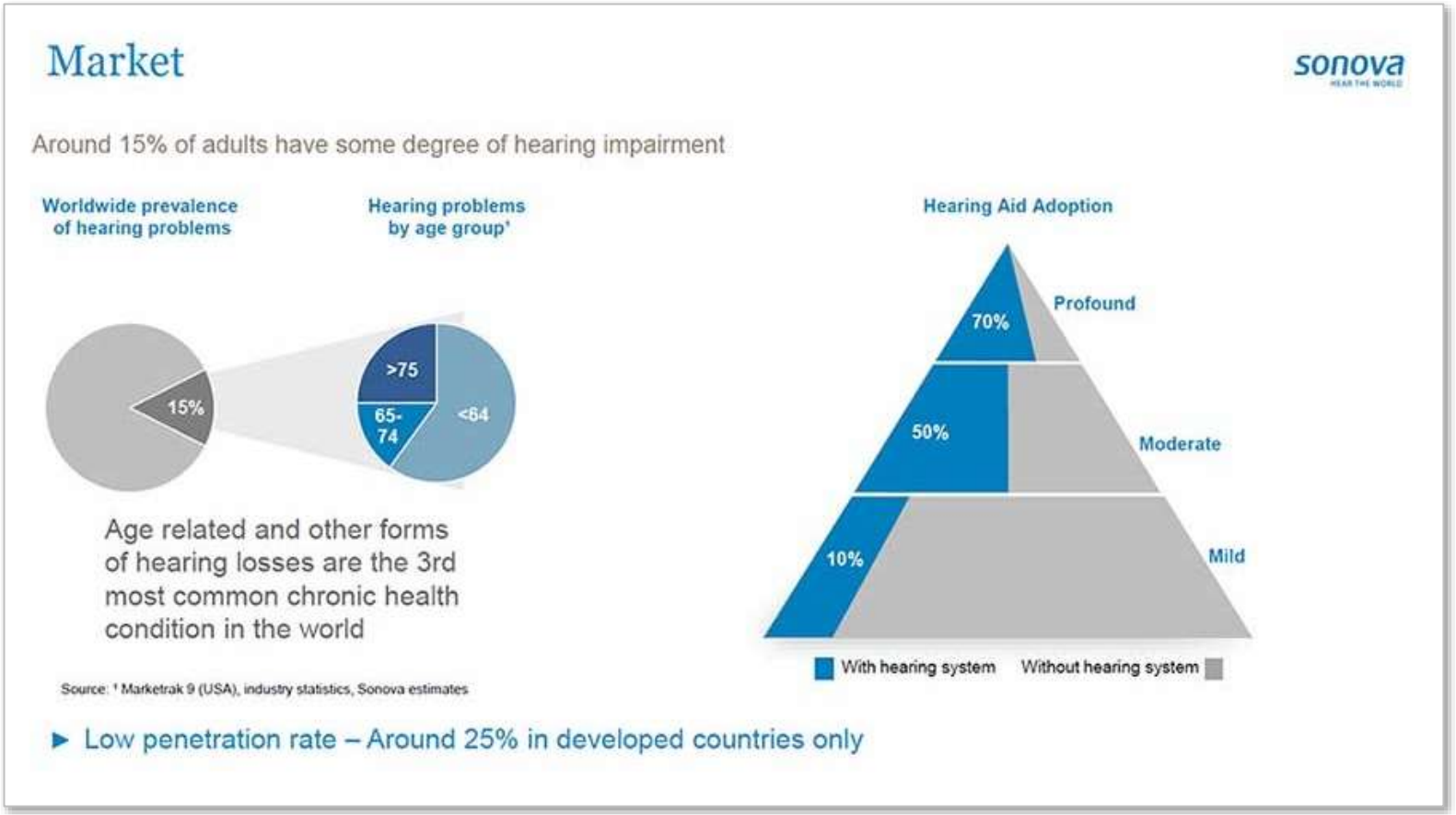
Sonion Nederland, Hoofddorp

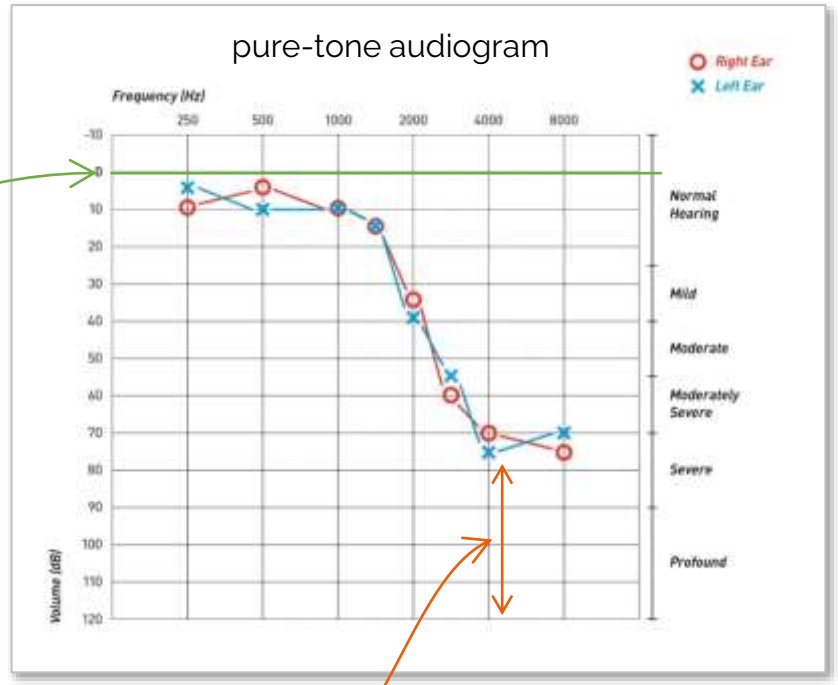
- 115 FTE; approx. 70 R&D
- BSc, MSc, PhD
- physics, mechanics, electronics, materials engineering
- 22 nationalities

World market and market penetration (source: Sonova)



Different degrees of hearing loss (source: Starkey)

Ear sensitivity & hearing loss



- dB SPL is dB re. 20 µPa
- Hearing threshold is determined for “average young persons”
- Hearing loss is determined relative to threshold
- Gain and compression in hearing aid are programmed in DSP per frequency band

remaining dynamic range

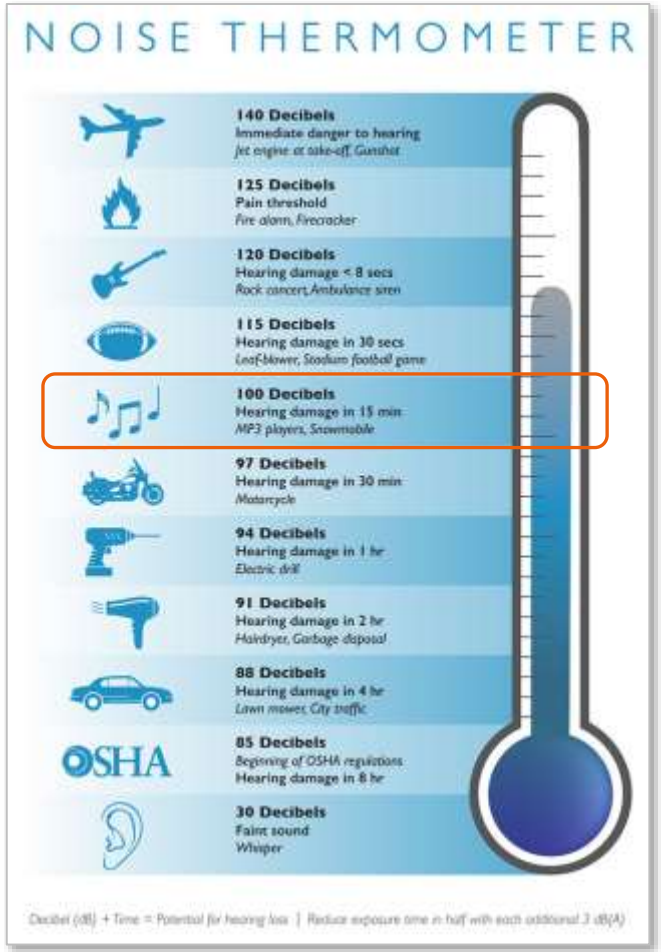
Hearing loss, risk & prevention

Takeaways:

- A hearing aid doesn't restore your hearing; it only enables better use of what remains

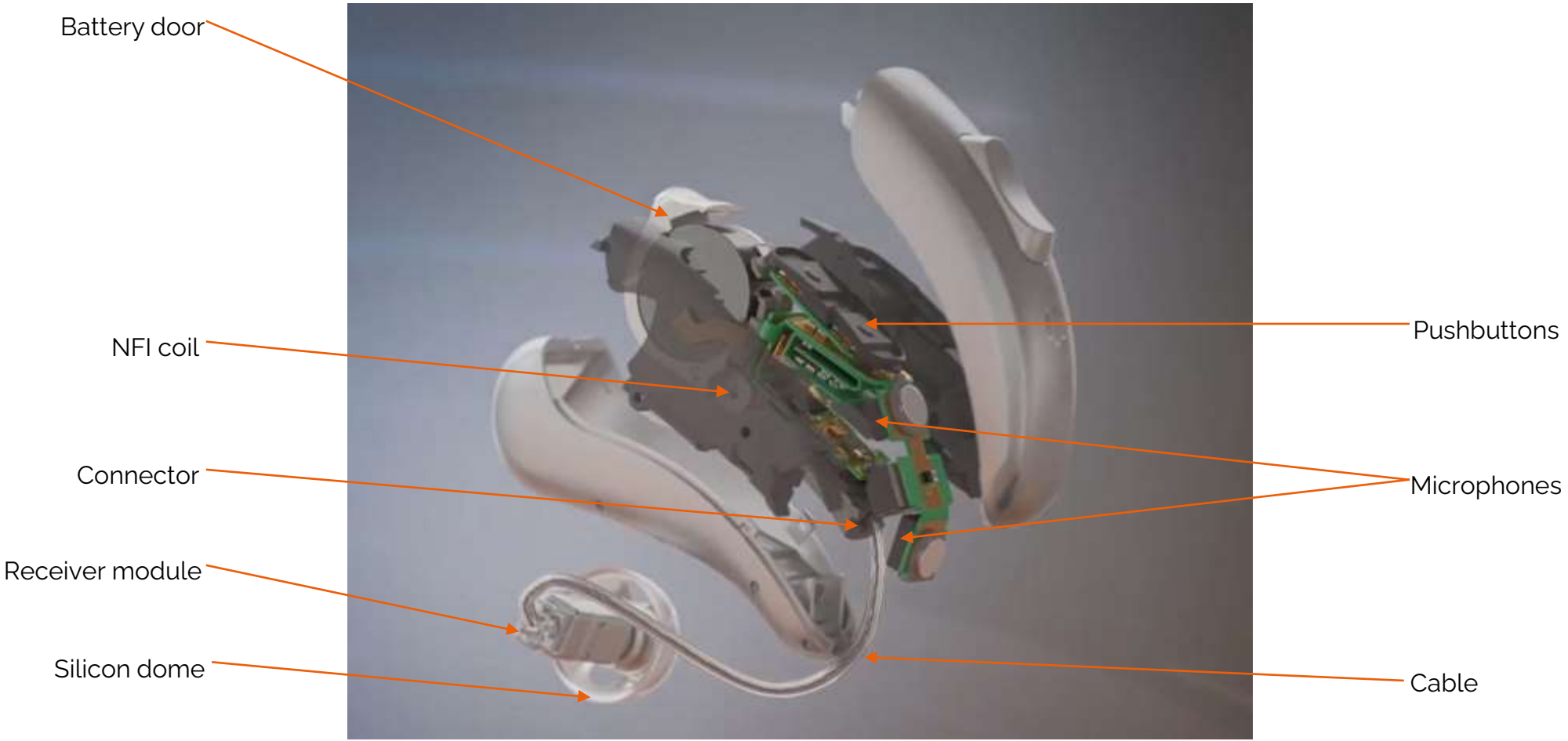
Thus:

1. Prevent exposure to loud noise
2. **Use hearing protection**

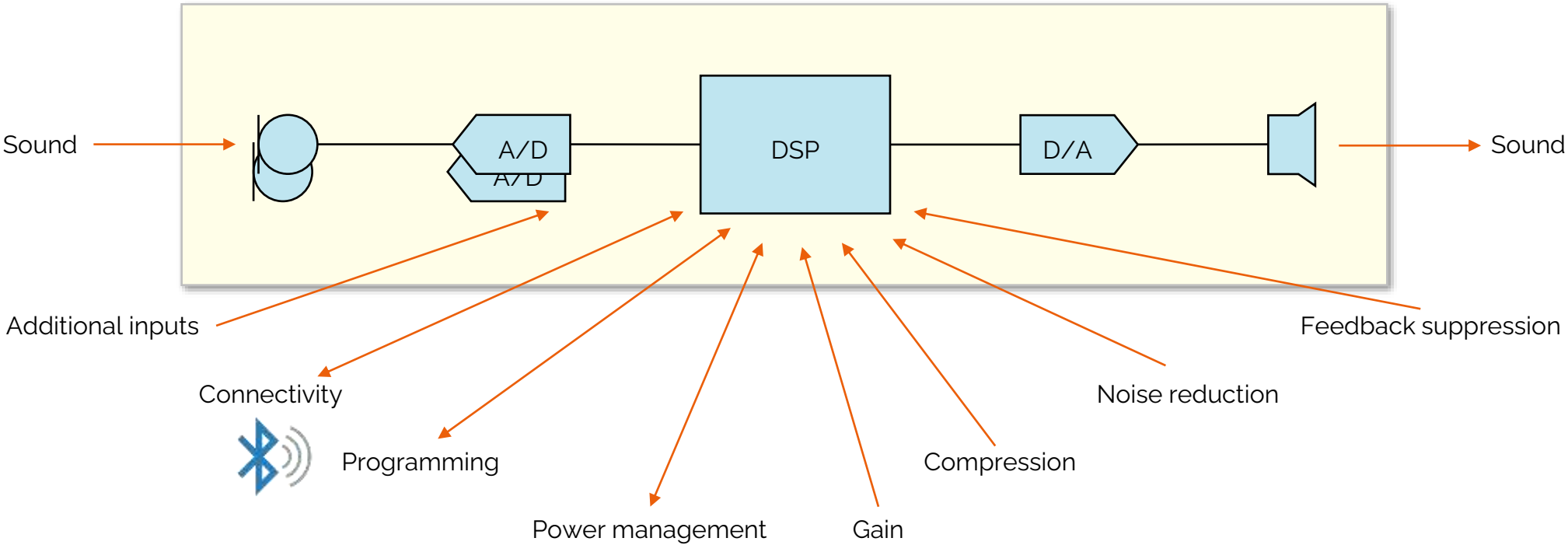


Different styles of hearing instruments

Inside of an RIC-style hearing aid (source: Sivantos)

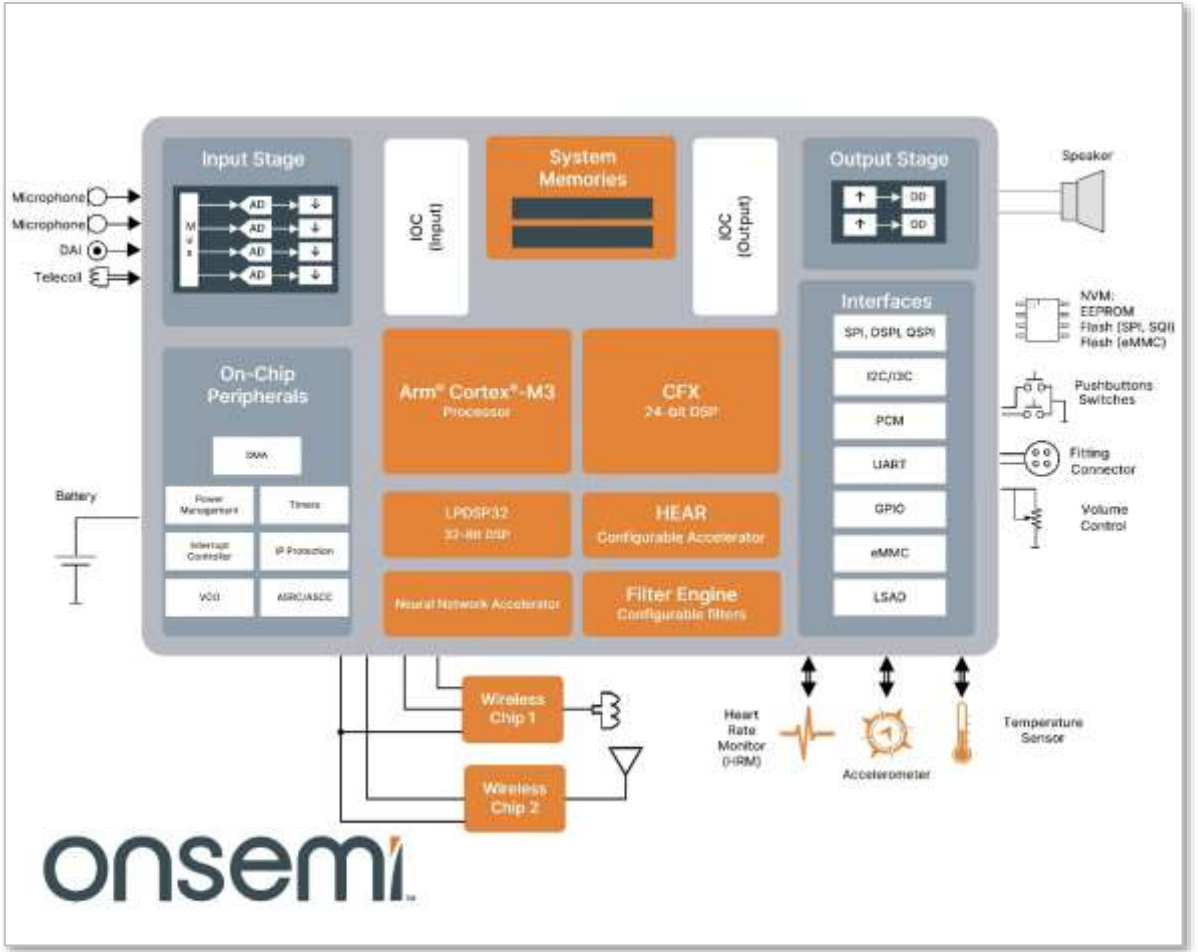


Generic architecture of hearing aid

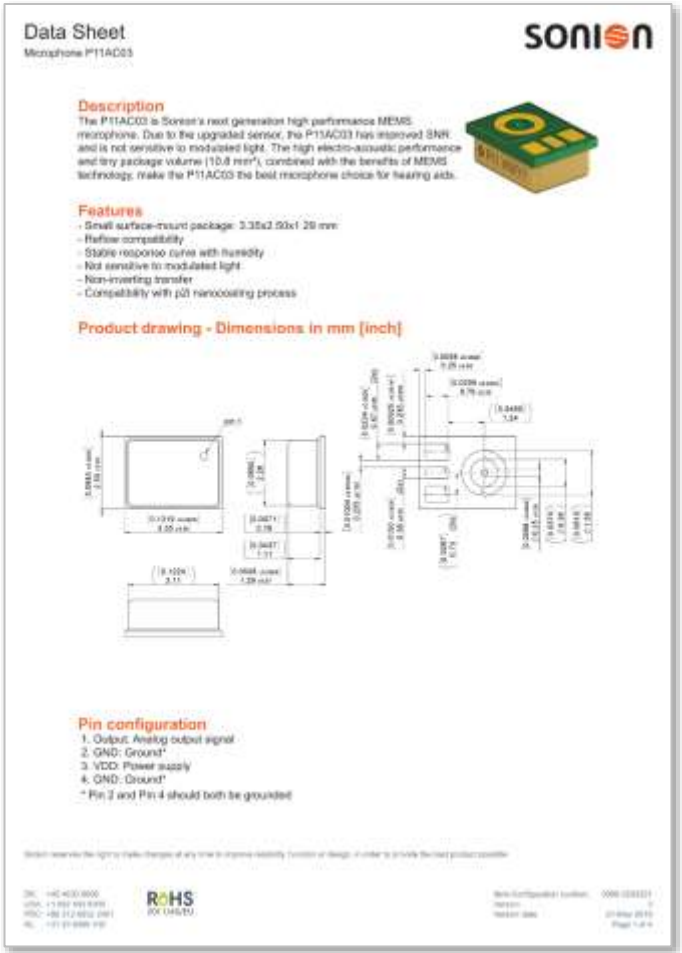


DSP architecture (source: onsemi)

- Most HA manufactures have proprietary DSP platform.
- Example of generic platform is Onsemi Ezario.



Microphone example: Sonion P11AC03



Data Sheet
Microphone P11AC03

SONION

Description

The P11AC03 is Sonion's next generation high performance MEMS microphone. Due to the upgraded sensor, the P11AC03 has improved SNR and is not sensitive to modulated light. The high electro-acoustic performance and tiny package volume (10.8 mm³), combined with the benefits of MEMS technology, make the P11AC03 the best microphone choice for hearing aids.

Features

- Small surface-mount package: 3.35x2.50x1.29 mm
- Reflow compatibility
- Stable response curve with humidity
- Not sensitive to modulated light
- Non-inverting transfer
- Compatibility with µ2i nanocoating process

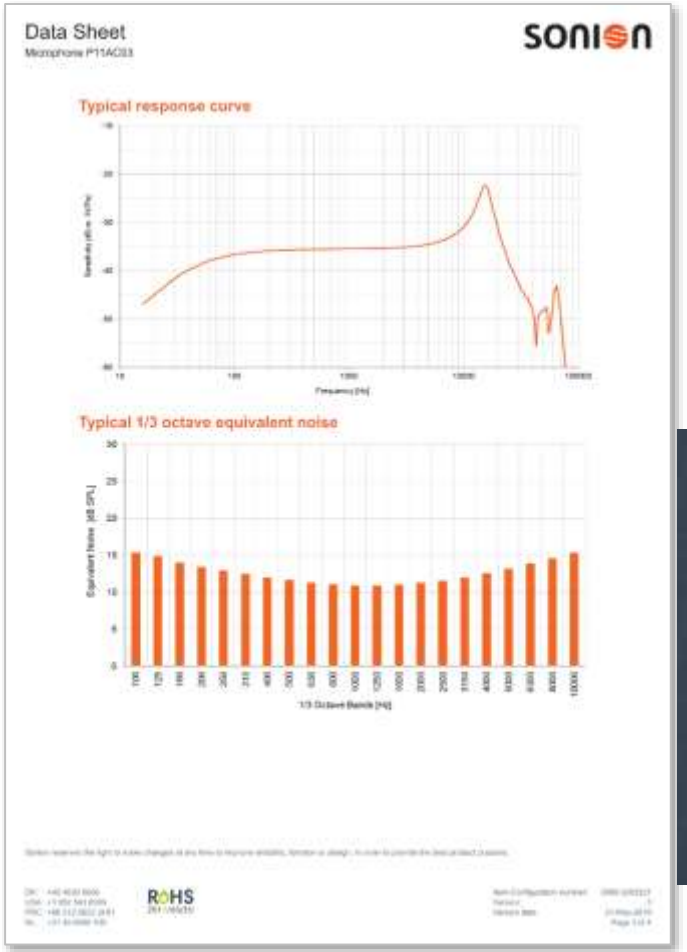
Product drawing - Dimensions in mm [inch]

Pin configuration

1. Output: Analog output signal
2. GND: Ground*
3. VDD: Power supply
4. GND: Ground*

* Pin 2 and Pin 4 should both be grounded

RoHS



Data Sheet
Microphone P11AC03

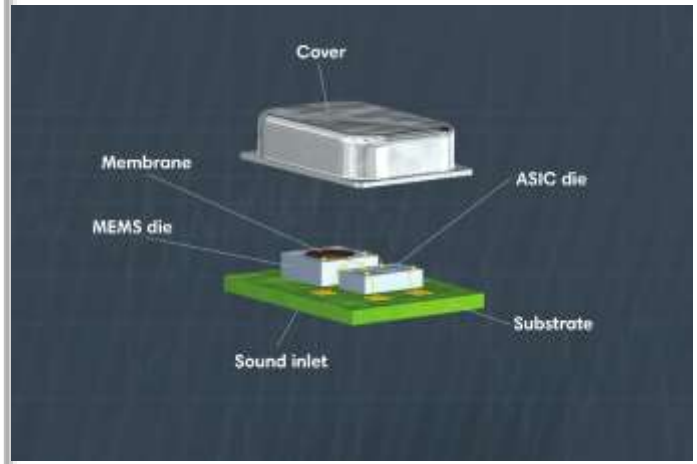
SONION

Typical response curve

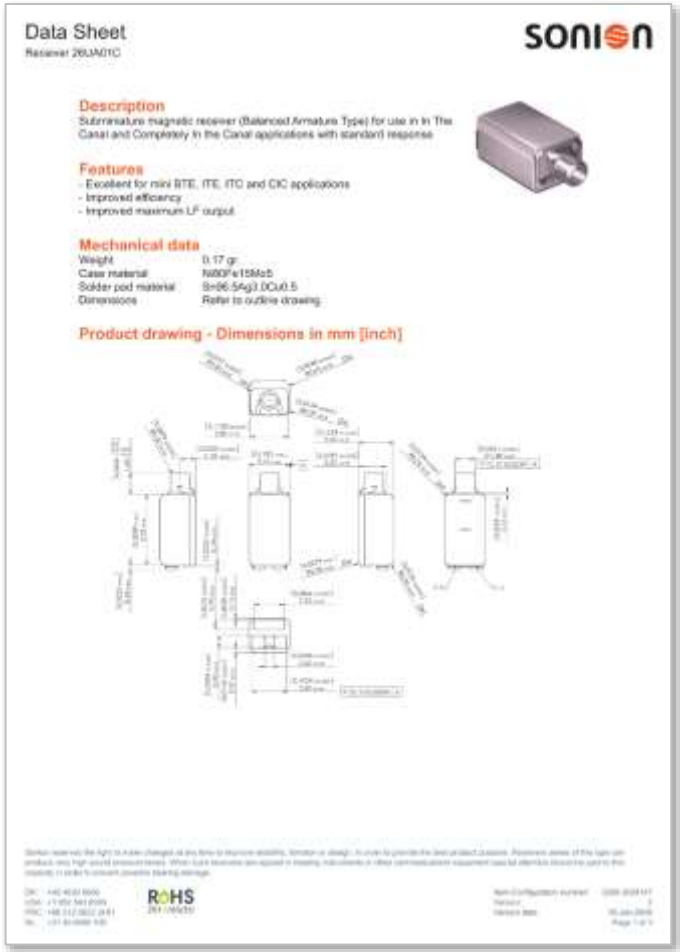
Typical 1/3 octave equivalent noise

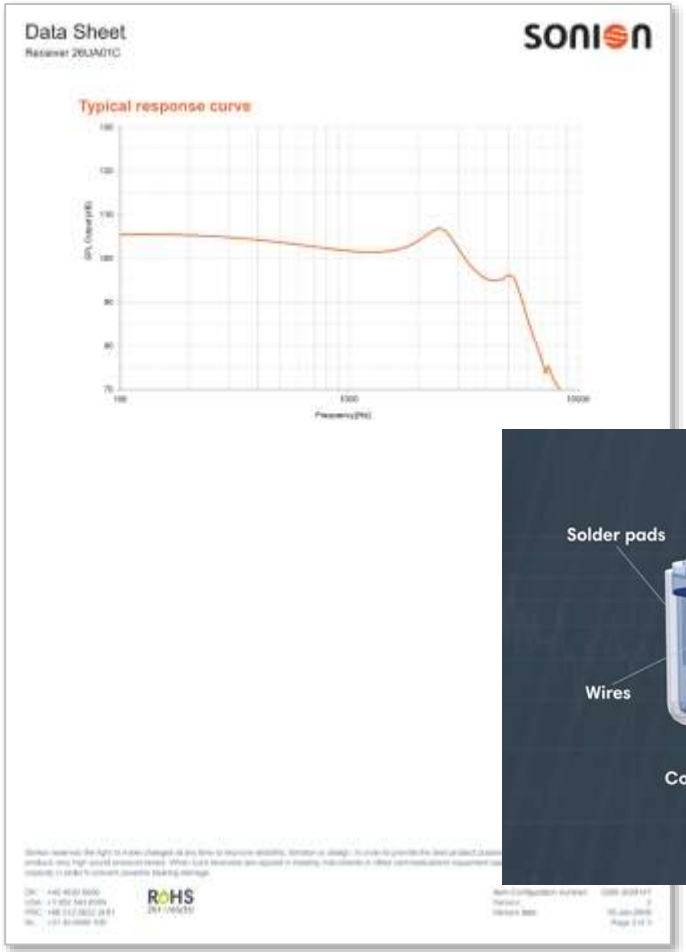
RoHS

- Volume: 11 mm³
- Sensitivity: -35 dB V/Pa
- Noise: 4.5 dB SPL (A)
- Power: 29 µW

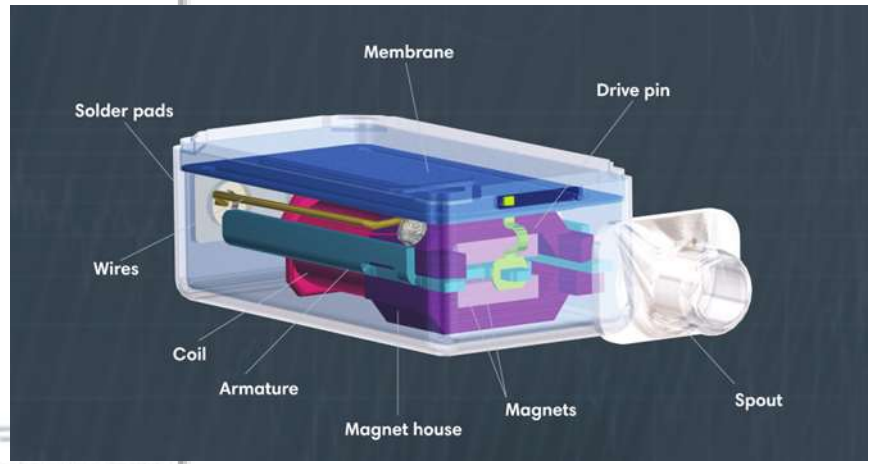


Balanced armature receiver example: Sonion 26UA01C


Data Sheet
Receiver 26UA01C
SONION
Description
Subminiature magnetic receiver (Balanced Armature Type) for use in In The Canal and Completely In the Canal applications with standard response.
Features
- Excellent for mini BTE, ITE, ITC and CIC applications
- Improved efficiency
- Improved maximum LF output
Mechanical data
Weight 0.17 gr
Case material Ni80Fe15Mo5
Solder pad material Sn96.5Ag3.0Cu0.5
Dimensions Refer to outline drawing
Product drawing - Dimensions in mm [inch]
RoHS

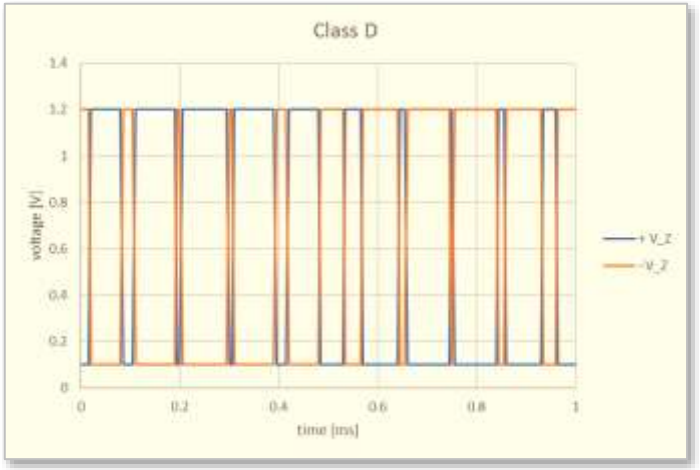

Data Sheet
Receiver 26UA01C
SONION
Typical response curve
RoHS

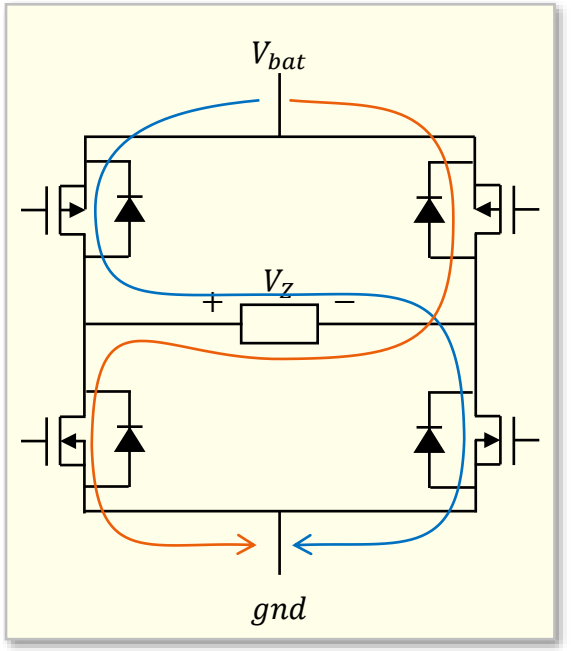
- Volume: 42 mm^3
- 500 Hz efficiency: 103.5 dB SPL @ 0.35 mAV



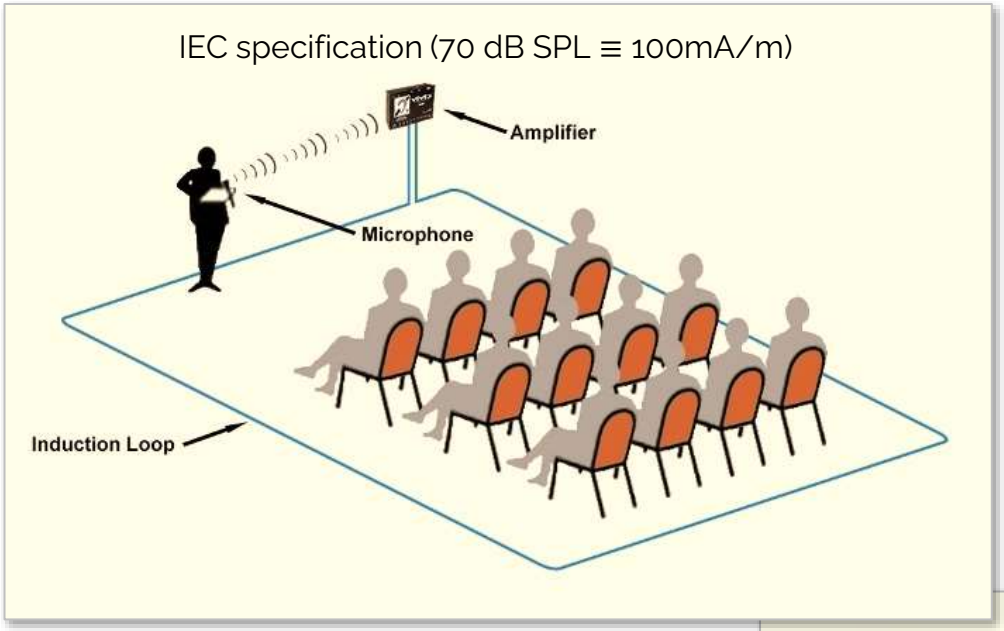
Driving the receiver by an H-bridge

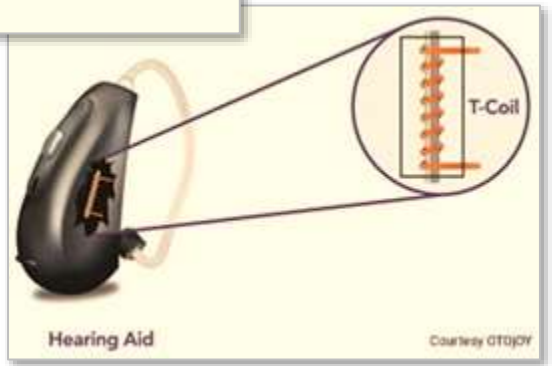
- Switching frequency approx. 1 MHz
- No filtering used (BA-receiver has inductive impedance)
- HA manufactures apply smart schemes to save current
- Receiver size selection based on required output SPL
- Receiver impedance selection based on efficiency optimization

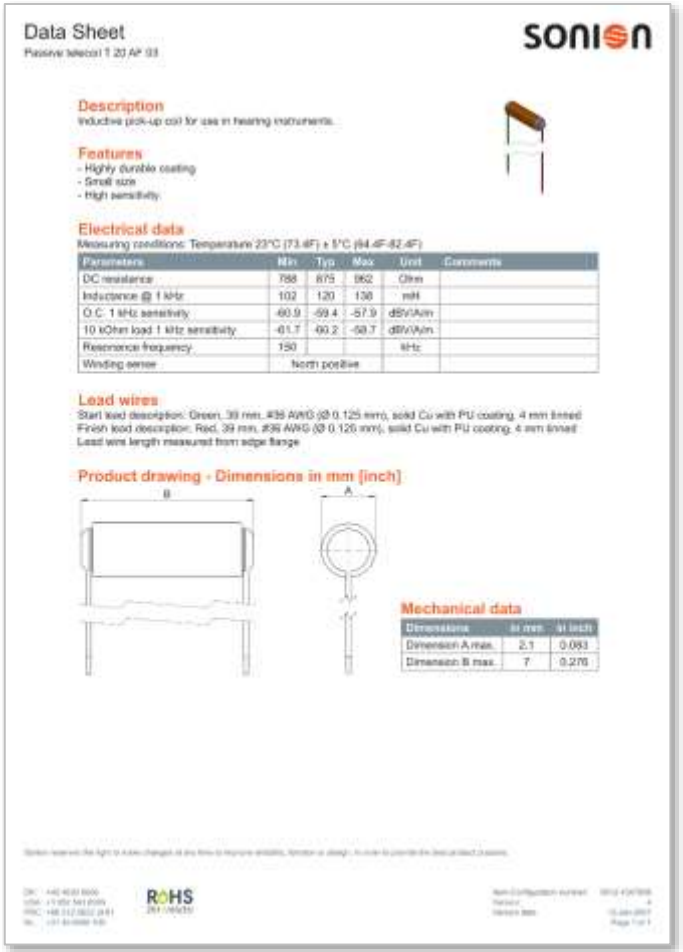




The hearing loop & telecoil example: Sonion T20AF03

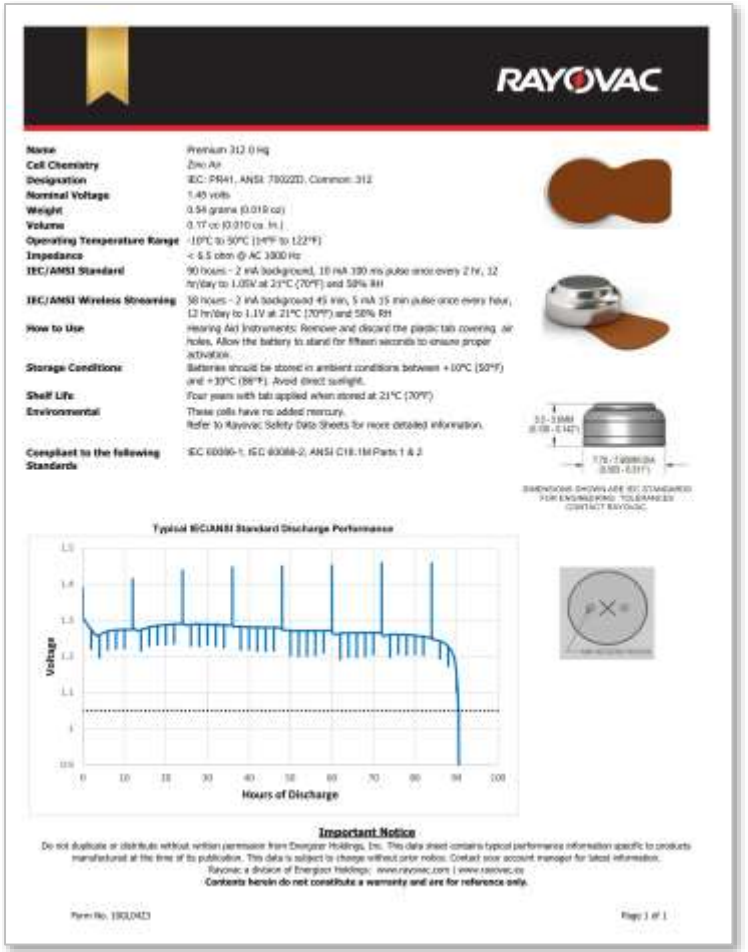






Hearing aid batteries: size 312

- Expected battery life 5-7 days (approx. 80 hrs.)
- Regulated voltage 1.05-1.10 V
- H-bridge supplied directly from battery
- Impedance estimated from datasheet approx. 70 Ω



RAYOVAC

Name	Premium 312 0 Hg
Cell Chemistry	Zinc Air
Designation	IEC: PR41, ANSI: 7002ZD, Common: 312
Nominal Voltage	1.45 volts
Weight	0.54 grams (0.019 oz)
Volume	0.17 cc (0.010 cu. in.)
Operating Temperature Range	-10°C to 50°C (14°F to 122°F)
Impedance	< 6.5 ohm @ AC 1000 Hz
IEC/ANSI Standard	90 hours - 2 mA background, 10 mA 100 ms pulse once every 2 hr, 12 hr/day to 1.05V at 21°C (70°F) and 50% RH
IEC/ANSI Wireless Streaming	58 hours - 2 mA background 45 min, 5 mA 15 min pulse once every hour, 12 hr/day to 1.1V at 21°C (70°F) and 50% RH
How to Use	Hearing Aid Instruments: Remove and discard the plastic tab covering air holes. Allow the battery to stand for fifteen seconds to ensure proper activation.
Storage Conditions	Batteries should be stored in ambient conditions between +10°C (50°F) and +30°C (86°F). Avoid direct sunlight.
Shelf Life	Four years with tab applied when stored at 21°C (70°F)
Environmental	These cells have no added mercury. Refer to Rayovac Safety Data Sheets for more detailed information.
Compliant to the following Standards	IEC 60086-1, IEC 60086-2, ANSI C18.1M Parts 1 & 2

Typical IEC/ANSI Standard Discharge Performance

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QUESTIONS?

THANK YOU FOR LISTENING

World's #1 supplier of balanced armature receivers to high-end in-ear earphones and professional in-ear monitors

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