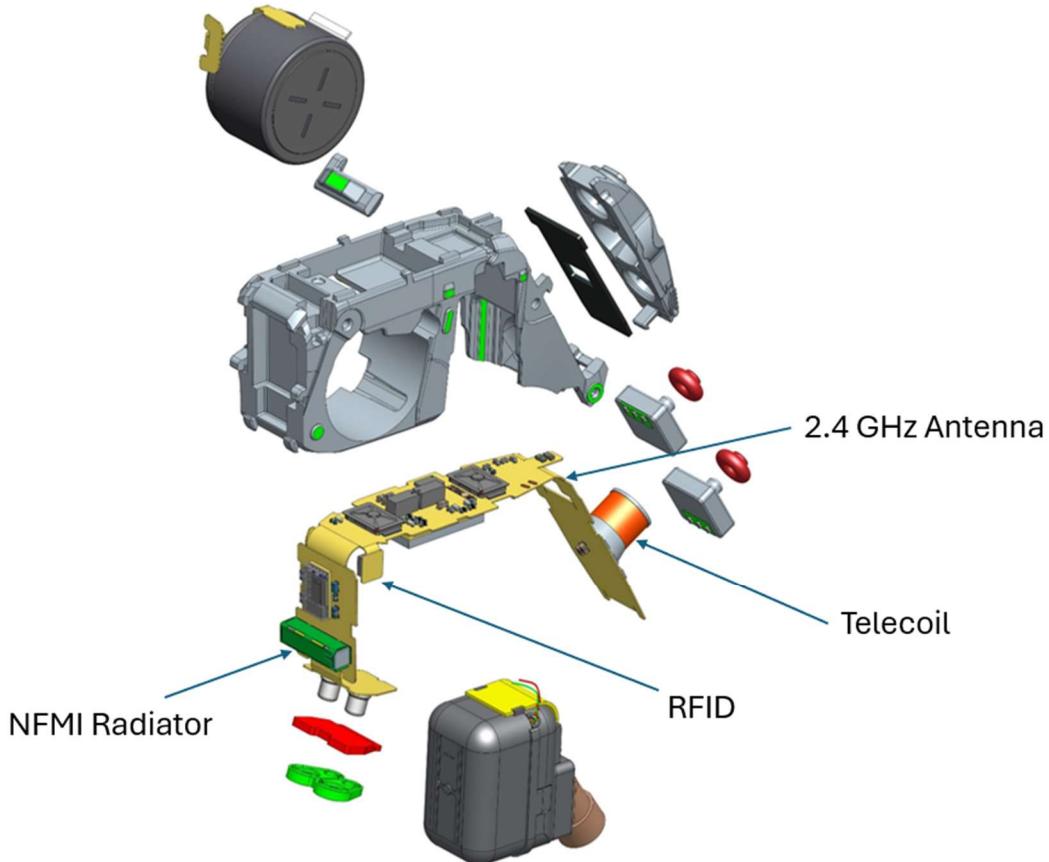


## Radio Module Installation Guide

### General information:

The radio module (CL\_AU5\_BTEMPP = HVIN (Canada)) contains two radio transceivers running at 3.84 MHz and 2.4 GHz respectively and both are implemented on a single hardware platform.

The radio module is implemented on the main PCB with connection to the integral inverted-F antenna (IFA), telecoil, microphones, speaker, and battery terminals. The radio module (main PCB) can be seen in Picture 1.



Picture 1 Radio Module rack assembly

The 3.84 MHz radio is a low power, short range inductive radio transceiver (NFMI – Near Field Magnetic Induction) working at a single channel at 3.84 MHz using MSK modulation with 320 kbit/s data rate and connected to a small coil radiator.

The 2.4 GHz radio is a Bluetooth Low Energy (BLE core 5.4) transceiver using GFSK modulation with 1 Mbit/s, 2 Mbit/s data rates, also capable of proprietary reception modes (xBLE) with higher data rates (2 Mbit/s, 4 Mbit/s) using 2FSK/4FSK modulation. The 2.4 GHz radio is using a PCB antenna with a maximum gain of -1.4 dBi.

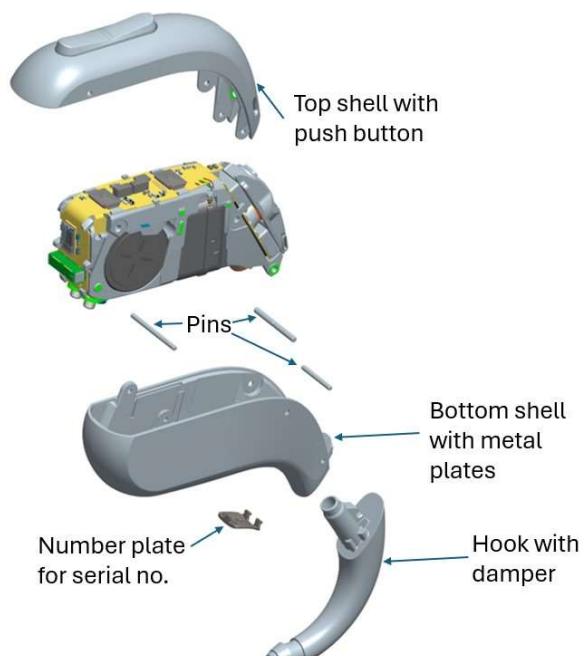
The 2.4 GHz integral antenna has a 1-5 mm distance to the skin of the ear and head and cannot be removed without destroying the PCB.

Additionally, a passive RFID tag operating at 865 MHz – 928 MHz with internal antenna is glued onto the PCB. The RFID tag has no electrical connections to the radio module.

The radio module integration only requires an acoustic tube, outer plastic shells that define the industrial design of the hearing aid end-products in order to be operational.

The radio module is tested in a reference host (End product) with all I/O, DC supply voltage, sensors, acoustic interfaces externally integrated into the module rack assembly. The reference host represents the worst-case configuration and conditions for the module rack integrated as a hearing instrument.

There are no conditions that limit the initial modular approval when integrated as a hearing instrument, including RF exposure considerations. The worst-case host configuration is tested in all operating modes. The production performs full operational tests on all manufactured products.



Picture 2 Reference host configuration

The worst-case host configuration is tested in all operating modes and an FCC part 15B and ICES-003 is demonstrating the compliance of the host type.

No changes are applied to the module design for the defined variations in host designs to accommodate brand differentiations. The Top level BOM list (Separate exhibit) lists the possible host configurations with this rack assembly covered by the LMA of this module. The guidance for host assembly is shown in picture 2 above and is equal to the work instruction used in the SBO Hearing A/S production sites.

**Test plan:**

This module does not contain a shield and therefore is limited. The host integrator shall assess the host integration as follows:

1. For host integration of the module into a different mechanical design i.e. as shown in picture 2. No testing is required the host is equal in assembly to the reference tested host. A mechanical host as shown in picture 2 is filed as a Class 1 Permissive Change (C1PC).
2. For host integration of the module into a new/different host requires the host integrator to file a Class 2 Permissive Change (C2PC) for each new specific installation. The test plan listed in Annex A of this guide has to be performed to demonstrate continued compliance.

**End products and production test:**

The radio module is intended to be integrated only in the SBO Hearing A/S manufactured products for the main brands Oticon, Bernafon, Philips and affiliated private label brands of wireless hearing instrument devices wearing style miniBTE and are not intended to be used differently than granted in the LMA certificate. SBO Hearing A/S is the one legal manufacturing company in the Demant group. Demant is listed on the Danish national stock exchange.

The integral antenna has a 1-5 mm distance to the skin behind the ear. The antenna cannot be removed or placed differently in the miniBTE host products.

The miniBTE hearing aids are all label exempted and thus the product label is placed on the packaging label and in the Instruction for Use (IFU).

Production performs operation tests on all manufactured products that for the RF tests include conducted test and adjustment of the transmitter power, power ramp in different operating modes and receiver sensitivity tests. The radio module is tested and screened separately in the wafer factory also a subsidiary of the Demant group where the chips making up the module are manufactured.

**Regulatory Label Information for USA & Canada for the hearing instruments**

Radio Model Name (HVIN): CL\_AU5\_BTEMPP

Contains: FCC ID: 2ACAH-AU5BTEMPP

IC: 11936A-AU5BTEMPP

**NOTICE:**

This device complies with Part 15, Part 15.223, Part 15.247 of the FCC Rules and with RSS-210 and RSS-247 of Industry Canada.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications made to this equipment not expressly approved by SBO Hearing A/S may void the FCC authorization to operate this equipment.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

**Regulatory Label Information for Japan**

Description: Radio module with 2.4 GHz low power transceiver to be integrated into various hearing instruments and associated devices.

Regulatory label:



This device is granted pursuant to the Japanese Radio Law (電波法)

この機器には、電波法に基づく技術基準適合証明を受けた特定無線設備が含まれています。

This device should not be modified (otherwise the granted designation number will become invalid)

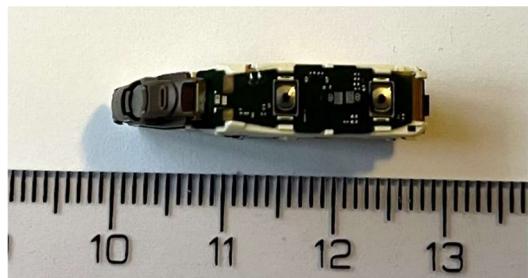
当該製品の改造は認められていません。 (改造時には技術基準適合証明は無効になります。)

NB: The regulatory label is not shown on the radio module itself or any end products with it, since they are too small for the label to be readable without any optical aids or magnification.

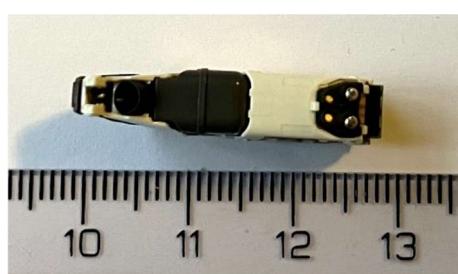
Below the radio module is shown, with size of about 7 mm x 28 mm x 15 mm.



Picture 3 Radio module from the side



Picture 4 Radio module from the top side (button side)



Picture 5 Radio module from bottom side

**Annex A: FCC test plan for new and different host integration**

This module does not contain a shield and therefore is limited. The host integrator will be required to file a Class II Permissive Change for each new/different host specific installation.

The following testing should be performed to demonstrate continued compliance:

*For all operating modes in the band 2400 MHz – 2483.5 MHz:*

§15.247(b)(4) System gain

§15.247(e) Power Spectral Density

§15.247(a)(2) DTS Bandwidth – 6 dB bandwidth

§15.247(b)(3) Maximum Output Power

§15.247(d) Spurious Emission Conducted, Spurious Emission radiated 30 MHz – 1 GHz, Spurious Emission above 1 GHz

§15.205 Band Edge Measurements

§15.209(a) Spurious Emission radiated below 30 MHz

*For all operating modes operating at 3.84 MHz:*

§15.223(a) Fieldstrength of Fundamental

§15.223(a) Emission Bandwidth - 6 dB bandwidth

§15.209(e) Field Strength of harmonics and spurious.

As hosts are battery powered §15.107 / §15.207 are not applicable.