

SPEAKER EVALUATION KIT

U))) SOUND

CARME KIT UJ-E1040C06, UJ-E1040C05 & UJ-E1040G00 USER MANUAL



The Carme kit is a speaker evaluation kit for USound MEMS speakers, enabling easy electrical connection for acoustic measurement in free field and with coupler. It can be combined with other products from the USound landscape, such as amplifiers and development boards. For each USound MEMS speaker footprint, there is a dedicated Carme kit.

Carme kit Ganymede: UJ-E1040G00 for Adap UT-P2023, UT-P2019 and Achelous UT-P2020, UT-P2018 MEMS speaker.

Carme kit 6 mm: UJ-E1040C06 for Conamara 6 mm UA-C0601-2F MEMS speaker

Carme kit 5 mm: UJ-E1040C05 for Conamara 5 mm UA-C0501-2F MEMS speaker

FEATURES

- Multifunctional evaluation kit for easy acoustical testing of USound MEMS speakers
- Speaker box with 100 mm³ back volume, enabling free field measurements and simple listening tests
- Connection PCB to provide electrical connection to the MEMS speaker
- Coupler adapter for reproducing the acoustical measurement results in the MEMS speaker datasheets
- Compatible with the development board Helike UA-E3010 (only UJ-E1040G00)
- Compatible with the linear amplifier Amalthea 1.0 UA-R3010
- Compatible with the USound smart audio amplifier evaluation board UC-E2120 for coupler and free field measurements.

PACKAGE CONTENT

- Connection PCB
- Coupler adapter (including screws and gasket)
- Speaker box (including screws and gasket)
- 2 pole cable with banana plugs (40 cm)
- 2 pole cable with female pin header (40 cm)

The MEMS speaker is **not** included.

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REVISION HISTORY

Janurary 2021: First Release

PACKAGE CONTENT

The speaker evaluation kit consists of the components shown in the picture below. It can be easily combined with other products from the USound landscape, like the amplifiers and development boards.



Figure 1: Carme kit package content (reference photo with UJ-E1040C06).

SETUP FOR FREE FIELD MEASUREMENTS AND SIMPLE LISTENING TESTS

For free field measurements, the MEMS speaker needs to be assembled inside the speaker box. Furthermore, an amplifier needs to be connected to the connection PCB to drive the speaker. Below is the assembly of the speaker box (Figure 2), and the description of how to connect the amplifier is provided.

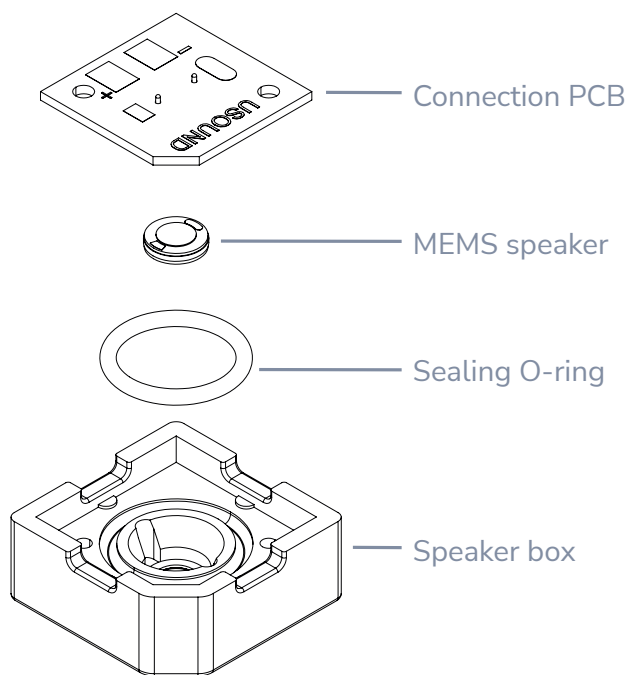


Figure 2: Speaker box assembly (reference drawing with UJ-E1040C06) .

- The speaker box is delivered with the connection PCB attached by the screws. First, remove the screws
- Depending on the use case (see below), solder the suitable cables to the connection PCB
- Put the MEMS speaker inside the speaker box with the contact pads facing up, as shown in Figure 3
- Verify the O-ring is placed correctly. This will ensure proper sealing and prevent an acoustic short circuit
- Place the connection PCB, with the required cables soldered to it, on the speaker box. Make sure the contacting pads shape on the speaker and the orientation marks on the connection PCB match, as seen in Figure 3
- Tighten the two screws with reasonable force to enable sealing.

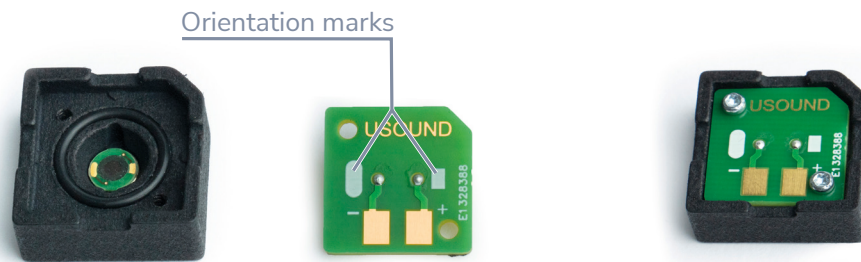


Figure 3: Speaker box with the MEMS speaker and connection PCB (reference photo with UJ-E1040C06).

In order to bring an electrical signal to the MEMS speaker, the following amplifiers can be used. Depending on the use case, the provided cables need to be soldered to the connection PCB.

- To connect to the **development board Helike UA-E3010**, the cable with the female pin header needs to be used. Note that only the Carme kit Ganymede UJ-E1040G00 can be used with Helike UA-E3010. For more details, please refer to the Helike user manual.
- To connect to the **Amalthea 1.0 UA-R3010**, the cable with the banana plugs needs to be used. The positive input of the speaker box, marked with a “+” on PCB, should be connected to the positive output of the Amalthea 1.0 UA-R3010 and the negative input of the speaker box, marked with “-” on the PCB, should be connected to the negative output of the Amalthea 1.0 UA-R3010. For more details, please refer to the Amalthea 1.0 user manual.
- To connect to the **smart audio amplifier evaluation board, UC-E2120**, no cable is needed. The electrical connection is made via pogo-pins on the holder, attached to the board that directly connects to the connection PCB, as shown in Figure 4. The speaker box has 2 magnets, which allow the box to be well fixed to the holder, as shown in Figure 5. For more details, please refer to the evaluation board UC-E2120 user manual.
- For the connection to a **measurement amplifier**, use the cables that best fit the lab environment. Please check the correct operating conditions of the speaker in the appropriate USound MEMS speaker data-sheet.

As USound MEMS speakers need a DC to operate correctly, the polarity of the signal is critical.

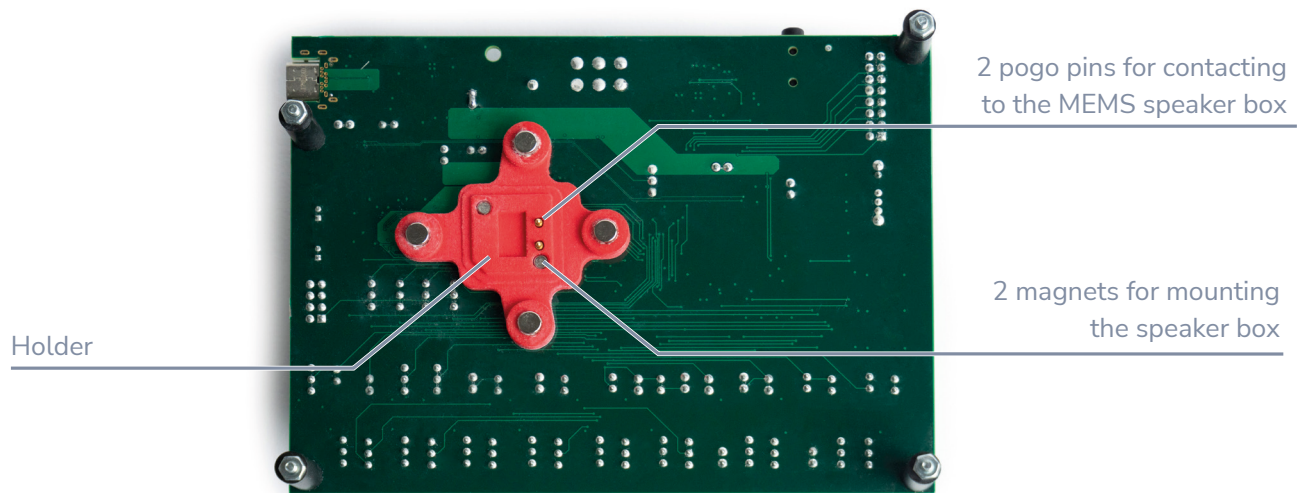


Figure 4: Speaker box holder and electrical connections on the smart audio amplifier evaluation board UC-E2120.

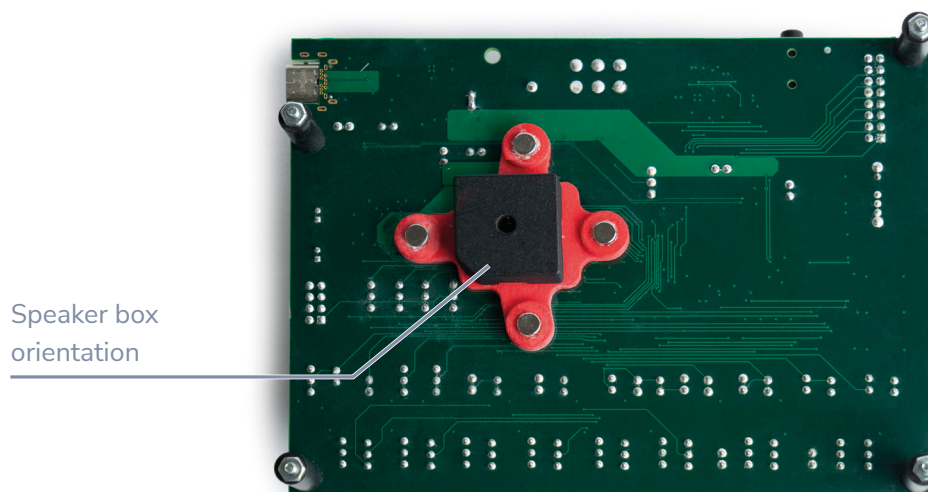


Figure 5: Speaker box including connection PCB connected to the smart audio amplifier evaluation board UC-E2120 for the free field measurement or simple listening tests.

SETUP FOR COUPLER MEASUREMENTS

For coupler measurements, the MEMS speaker needs to be assembled inside the coupler adapter. Furthermore, an amplifier needs to be connected to the connection PCB to drive the speaker. Below is the assembly of the coupler adapter (Figure 6), and the description of how to connect the amplifier is provided.

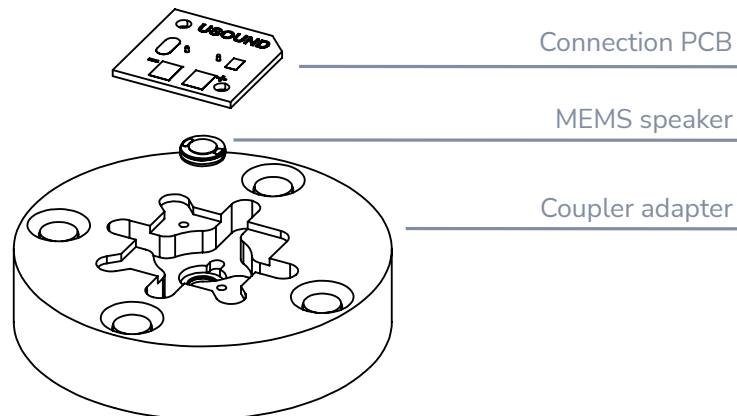


Figure 6: Coupler adapter assembly (reference drawing with UJ-E1040C06).

- Depending on the use case (see below), solder the suitable cables to the connection PCB
- If the coupler adapter is closed with the connection PCB, open it by removing the screws
- Put the MEMS speaker inside the coupler adapter, with the contact pads facing up, as shown in Figure 7
- Place the connection PCB on the coupler adapter. Make sure the contacting pads shape on the speaker and the orientation marks on the connection PCB match, as shown in Figure 7.
- Tighten the two screws.
- The M22x1 threading in the back will fit e.g. couplers from GRAS and some other manufacturers.

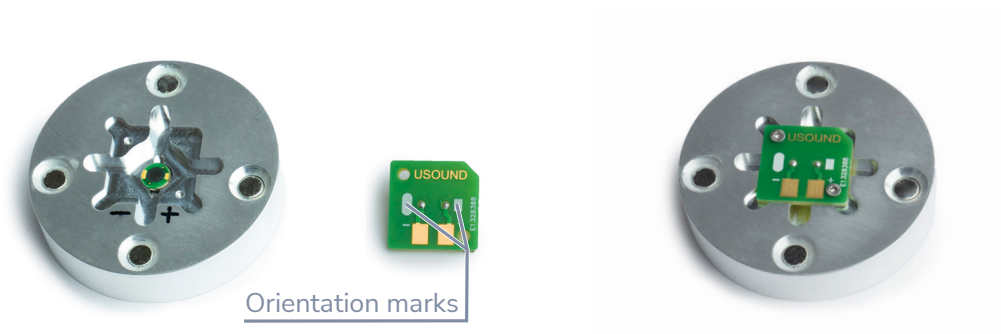


Figure 7: Coupler adapter with the MEMS speaker and the connection PCB (reference photo with UJ-E1040C06).

In order to bring an electrical signal to the MEMS speaker, the following amplifiers can be used. Depending on the use case, the provided cables need to be soldered to the connection PCB.

- To connect to the **development board Helike UA-E3010**, the cable with the female pin header needs to be used. Note that only the Carme kit Ganymede UJ-E1040G00 can be used with Helike UA-E3010. For more details, please refer to the Helike user manual.
- To connect to the **Amalthea 1.0 UA-R3010**, the cable with the banana plugs needs to be used. The positive input of the speaker box, marked with a “+” on PCB, should be connected to the positive output of the Amalthea 1.0 UA-R3010 and the negative input of the speaker box, marked with “-” on the PCB, should be connected to the negative output of the Amalthea 1.0 UA-R3010. For more details, please refer to the Amalthea 1.0 user manual.
- To connect to the **smart audio amplifier evaluation board, UC-E2120**, no cable is needed. The electrical connection is made via pogo-pins on the holder, attached to the board that directly connects to the connection PCB, as shown in Figure 8 (right). The holder has 4 magnets, which allow the evaluation board to hold well on the coupler adapter. For more details, please refer to the evaluation board UC-E2120 user manual.
- For the connection to a **measurement amplifier**, use the connection PCB and the cables that best fit the lab environment (Figure 8, left). Please check the correct operating conditions of the speaker in the appropriate USound MEMS speaker datasheet.

As USound MEMS speakers need a DC to operate correctly, the polarity of the signal is critical.

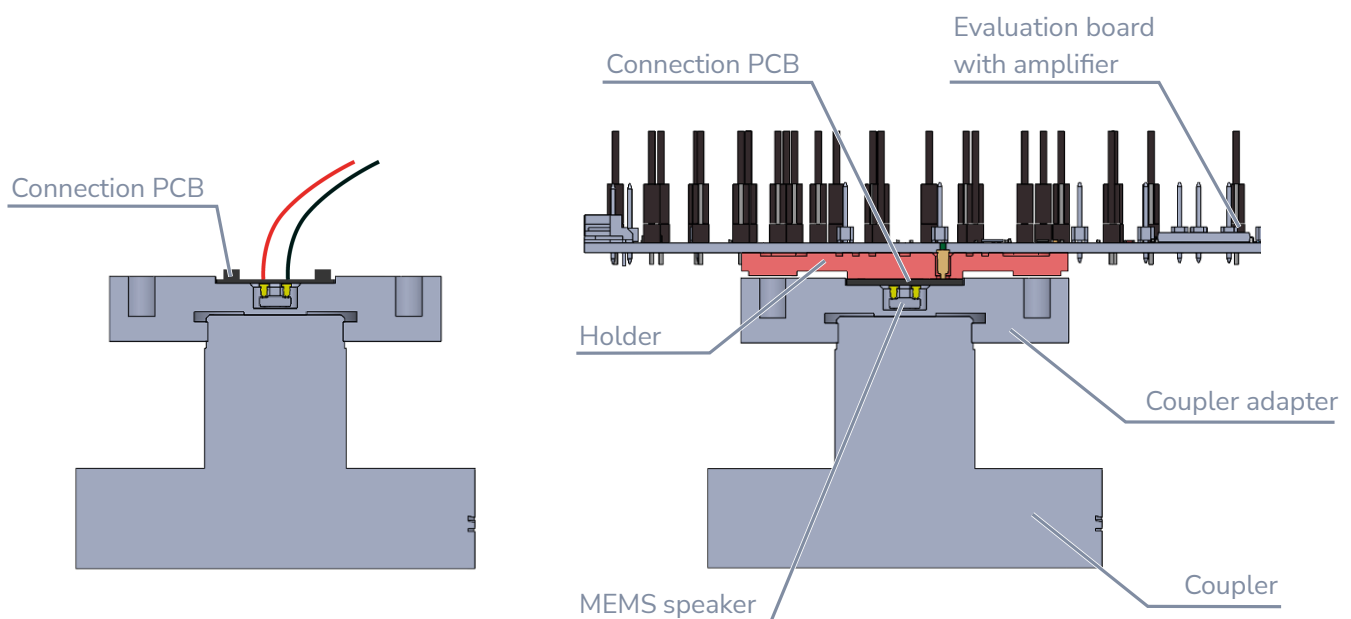


Figure 8: left: Coupler adapter attached to the IEC 60318-4 coupler, measurement setup with cables. right: Coupler adapter attached to the IEC 60318-4 coupler, measurement setup with USound evaluation board UC-E2120.

RELATED DOCUMENTATION

[Smart audio amplifier evaluation board UC-E2120 user manual](#)

[Amalthea 1.0 UA-R3010 user manual](#)

[Helike 1.0 UA-E3010 user manual](#)

[Adap UT-P2023, UT-P2019 MEMS speaker datasheet](#)

[Achelous UT-P2020, UT-P2018 MEMS speaker datasheet](#)

[Conamara 6 mm UA-C0601-2F MEMS speaker datasheet](#)

COMPATIBLE PRODUCTS

Product name	Description
Helike 1.0 UA-E3010	Development board for evaluating, rapid prototyping, and designing audio solutions using USound MEMS speaker technology.
Amalthea 1.0 UA-R3010	A linear amplifier with a frequency range up to 80 kHz can drive up to 40 MEMS speakers, including heatsink housing.
Smart audio amplifier evaluation board UC-E2120	An evaluation board for testing smart audio amplifier UC-P2120 and USound MEMS speakers.

SIMILAR PRODUCTS

Product name	Description
Carme 2.0 UJ-R1020	A speaker box for testing the performance of the Ganymede MEMS speaker family, compatible with the linear amplifier Amalthea 1.0
Carme 3.0 UJ-R1030	A speaker box designed for testing the performance of Ganymede MEMS speaker family, compatible with Helike 1.0 development board.

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