

AUDIO MODULE FOR AUDIO GLASSES

DANUBE 5.0 UAM-P2050 | PRODUCT BRIEF

U))) SOUND



The Danube 5.0 audio module is an easy-to-use kit for rapid prototyping of smart eyewear. It provides the best-in-class ratio between audio performance and the required mechanical volume to enhance glasses with an appealing sound in a 2-way audio system, by combining a MEMS tweeter and an ED woofer.

The module and its fixture are intended as a reference design for audio-enabled glasses, but can also be used as a demonstrator for other wearable applications.

This module is an extension kit of the development board Helike UA-E3010.

DANUBE FEATURES

- Two-way audio system for high sound quality
- Tweeter: USound MEMS speaker Adap
- Woofer: 15 x 8 x 2.5 mm electrodynamic speaker
- Wide audio bandwidth: 300 Hz–20 kHz
- High SPL at small space consumption
- Dipole configuration and optimized acoustic design for maximum audio privacy over a wide bandwidth
- Easy-to-use fixing mechanism for reproducible positioning and measurements
- The modules are symmetrical and can be mounted on both sides of the test glasses.

HELIKE DEVELOPMENT BOARD FEATURES

- Stand-alone mode (SD card playback)
- Extension to Raspberry Pi platform via I2S interface
- Multiple supply options
- SD card slot
- Joystick for playback control

PACKAGE CONTENT:

- Danube 5.0 set including left and right modules
- Test glasses
- Fixation set for repeatable mounting
- 2x 1 meter cable with pin connectors

NOTE: Helike UA-E3010 development board is not included in the package.

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REVISION HISTORY

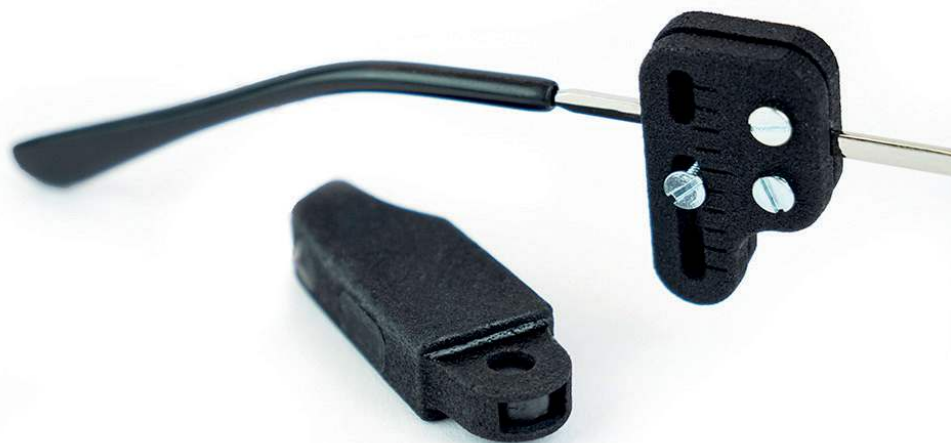
Released in November 2020

INTRODUCTION

The Danube 5.0 audio module is an extension kit that enables fast prototyping of smart eyewear. The module consists of one MEMS tweeter and one electrodynamic woofer. It features USound's patented dipole configuration for maximum directivity to the ear canal, high SPL, and a compact form factor. It also includes a magnetic fixture mechanism for an easy attachment.

The module does not include electronics and it's advised to be used together with the development board Helike. It requires two amplifier signals, one for the MEMS speakers and one for the woofer, which are provided by the Helike development board. The board also includes a dedicated filter set-up which can be applied to optimise the acoustic performance. Additionally, these filters can be adjusted to meet a specific target curve. The Helike UA-E3010 board supports up to four Danube 5.0 in parallel — two left, and two right modules can be connected and driven simultaneously.

For more details on how to use the extension kit Danube 5.0 on the Helike development board, please refer to the Helike UA-E3010 user manual.



SPECIFICATIONS

Standard conditions: Module fixed on test glasses on KEMAR head.

Fixture mounted 5.5 cm distance from the glasses front plane (see image below).

Woofer driving: $1 V_{RMS}$

Tweeter driving: $15 V_p$ ($10.6 V_{RMS}$) + $15 V_{DC}$

Module on KEMAR - woofer without filters		
500 Hz	[dB]	82
1 kHz	[dB]	88
4 kHz	[dB]	111
THD @ 400 Hz	[%]	11
Nominal impedance	[Ω]	7

Module on KEMAR - tweeter without filters		
2 kHz	[dB]	87
4 kHz	[dB]	101
8 kHz	[dB]	94
THD @ 6.5 kHz	[%]	1.8
Capacitance @ 1 kHz / $15V_p$	[nF]	38

MEASUREMENT SETUP ON KEMAR

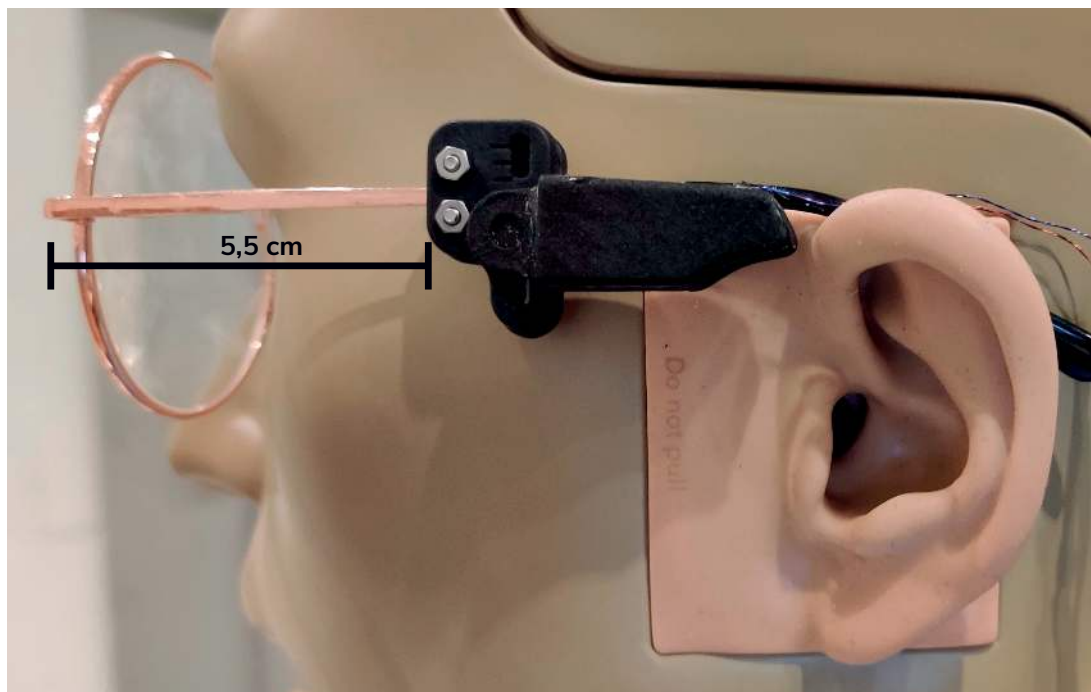


Figure 1: The fixture is placed on the temple as shown on the photo. The top of the module coincides with the top of the temple.

MECHANICAL DIMENSIONS

General		
Size (L x W x H)	[mm]	40 x 13 x 8
Woofer size	[mm]	15 x 8 x 2.5
Tweeter size	[mm]	6.7 x 4.7 x 1.6
Weight	[g]	4.1

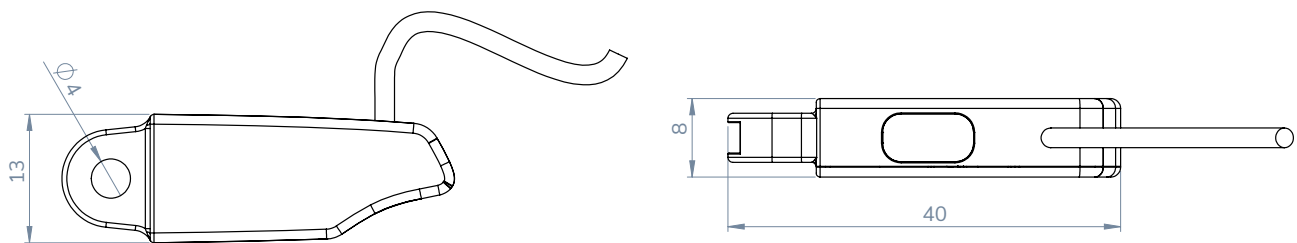


Figure 2: Mechanical drawings: top/down/side view

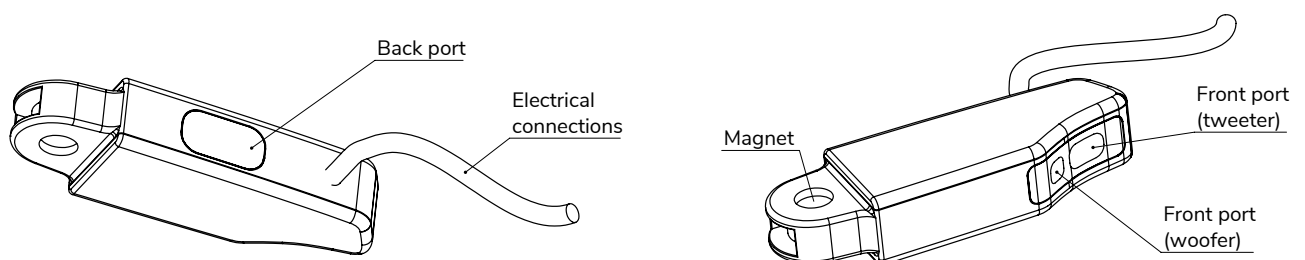


Figure 3: Mechanical drawings: perspective view

ELECTRICAL CONNECTIONS

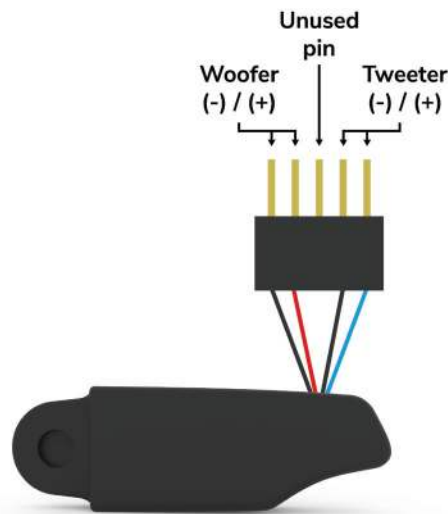
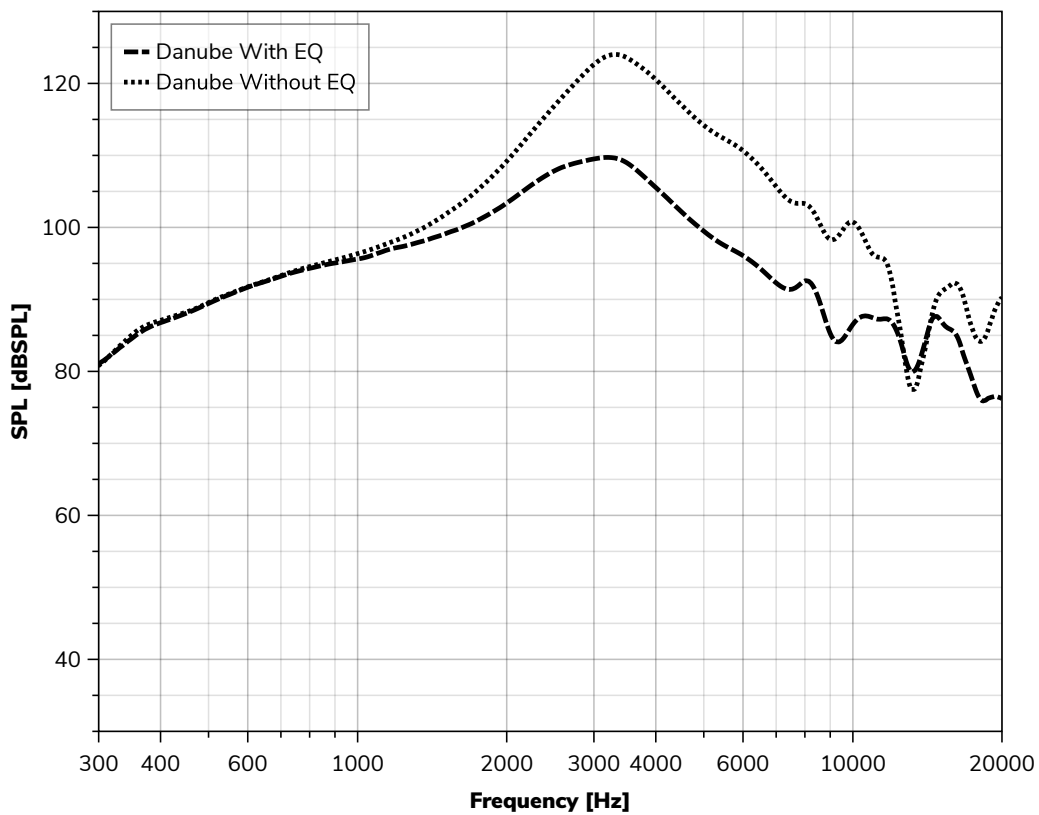


Figure 4: The electrical connection is done with a 5-pole pin header. The middle pin is unused. With this configuration, the pin order is directly compatible with Helike UA-E3010.

ACOUSTIC PERFORMANCE ON KEMAR



Note: Acoustic performance at 0dBFS with and without filters applied.

RELATED DOCUMENTATION

[Helike UA-E3010 User manual](#)
[Helike UA-E3010 Datasheet](#)
[Adap UTP-2019 Datasheet](#)

COMPATIBLE PRODUCTS OVERVIEW

Product name	Description
Helike UA-E3010	Development board for evaluating, rapid prototyping and designing audio solutions using our MEMS speaker technology.

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