PUlaudio

NEW PRODUCT HIGHLIGHT

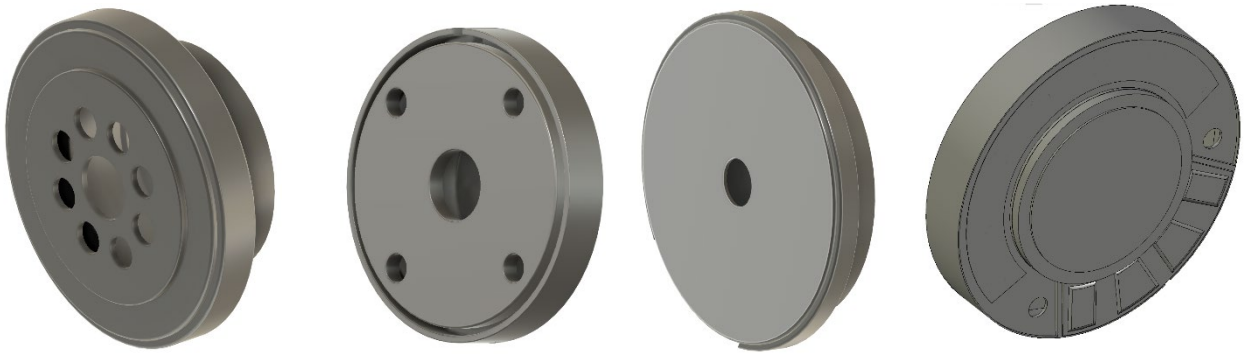
Audio Receivers

May 13th, 2025

Table Of Contents

Introduction

PUI Audio is excited to introduce our new line of audio receivers, featuring impedance options from 16Ω to 50Ω, delivering SPLs from 100–125dB @ 1kHz when driven by 1mW and measured at 1cm. These receivers are engineered for efficient coupling to the ear canal or acoustic tubing and are compatible with 1 cc couplers per IEC 60318-4 for standardized testing. Ideal for applications requiring high SPL in limited space (available in 10mm to 40mm diameters), they maintain low total harmonic distortion (THD < 5%) and consistent phase response across the audio band.



Key Applications

- Hearing Assistance Devices
    - Behind-the-Ear (BTE) and In-the-Ear (ITE) hearing aids
    - Completely-in-Canal (CIC) and Invisible-in-Canal (IIC) devices
- Wireless Earpieces & Earbuds
    - Bluetooth communication headsets
    - Fitness and health monitoring wearables
- Secure Communication
    - Earpieces for law enforcement and military radio systems
    - Industrial headsets for noisy environments
- Medical Devices
    - Audio output in diagnostic tools and hearing test systems
    - Patient monitoring systems with discreet audio alerts
- Consumer Electronics
    - Smart glasses, smart helmets and voice-assistance devices
    - Remote control or notification receivers in IoT wearables

Key Features

PUI Part Number	Dimensions	Impedance	Power Rating		Resonant Frequency	SPL	Frequency Range
	Dia. x Depth	+/- 15% Ω	mWatts		+/- 20%	f = 1kHz P = 1mW Dist. = 1cm	
	mm		Normal	Max	Hz	db	Hz
AR01016MR	10 x 4.20	16	3	5	130	113	20 to 7000
AR01032MR-3	10 x 3.03	32	3	5	122	114.3	20 to 20000
AR01032MR-4	10 x 5.10	32	5	10	122	98.5	20 to 20000
AR01116MR	11 x 5.15	16	3	5	145	99.7	50 to 5000
AR01330MR	13 x 1.95	30	5	10	260	113.5	20 to 20000
AR01416MR	14.2 x 3.6	16	30	50	120	125	20 to 20000
AR03032MR-2	30 x 4.9	32	15	25	130	119	20 to 20000
AR03032MR-3	30 x 5.4	32	15	20	100	122	20 to 20000
AR03450MR	34 x 7.5	50	10	25	90	114	20 to 20000

Design Considerations:

The primary goal for receivers is directly coupling sound into a small, enclosed space, such as the ear canal or acoustic tubing. Unlike speaker drivers, which project sound into open air, receiver enclosures are extremely compact—typically in the mm³ range—and require careful attention to internal cavity tuning and tube resonance.

One of the most critical factors is the back volume (enclosed air space located behind the diaphragm). Even tiny changes in enclosure volume can significantly affect performance, especially in terms of frequency response and sensitivity.

Additionally, receivers must be mechanically isolated from case vibrations, which can introduce unwanted noise or distortion. Vents may also be integrated to manage pressure equalization and maintain consistent acoustic performance in sealed environments.

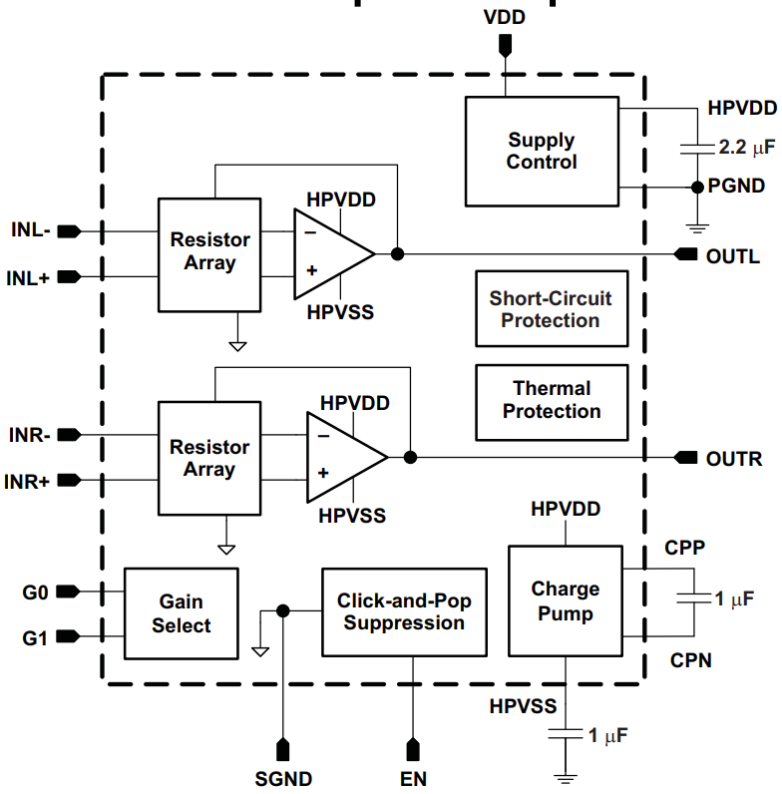
Amplifier Options for Integration

To ensure optimal performance, we recommend pairing our in-ear receivers with one of the following amplifier ICs, based on your system's size, power, and audio quality goals:

1. Texas Instruments TPA6132A2 (25-mW, stereo, analog input headphone amplifier)
2. Analog Devices MAX97220A (Differential Input DirectDrive Line Drivers/Headphone Amplifiers)

Our application engineers are available to provide reference schematics, layout tips, and audio tuning guidance.

TPA6132A2 25-mW Stereo Headphone Amplifier Connection Diagram



Receivers Performance per IEC 60318-4

Our receivers are tested using IEC 60318-4:2010 which is the current international standard that defines a measurement setup (ear simulator) for testing the acoustic performance of insert earphones, such as earbuds, in a way that closely mimics the human ear.
It replaces the older IEC 711 standard and is widely used in the audio industry to evaluate earphones' frequency response, distortion, and sensitivity. The main changes with respect to the previous edition are listed below:
- extension of the usable frequency range to 100Hz – 16,000Hz;
- addition of values of maximum permitted expanded uncertainties to all tolerances.

Key Highlights of the Standard IEC 60318-4

Title: Electroacoustics – Simulators of human head and ear – Part 4: Occluded-ear simulator for the measurement of earphones coupled to the ear by means of ear inserts.

- Purpose:
  Simulates the acoustic impedance of the average adult human ear for in-ear headphone testing (earbuds, hearing aids, etc.).
- Components:
  - Acoustic coupler with a defined geometry.
  - Microphone is placed inside the coupler.
  - Simulates the ear canal resonance characteristics of a real human ear.
- Frequency Range:
  Accurate from approximately 100Hz to 10kHz.
- Used by: Audio labs, headphone manufacturers, hearing aid developers, and standards organizations.

Why It's Critical for Real-World Audio Performance

- Ensures repeatable and standardized measurements.
- Allows meaningful comparisons between different products.
- Helps design products that sound good in real human ears, not just in lab environments.

Handling, Assembling or Integration Notes

1. Diaphragm Is Acoustically and Mechanically Sensitive
   - The diaphragm is extremely thin (often microns thick) and tuned for precise acoustic response.
   - Touching it can dent, stretch, or misalign the diaphragm — leading to permanent degradation in performance.

2. Assembly Guidelines
   - Handle receivers only by their housing or terminals, never the faceplate or port.
   - Use vacuum pickup tools or custom grippers that avoid the acoustic port area.
   - If adhesives are applied, ensure no overflow or vapor reaches the diaphragm.

3. Testing & Inspection
   - When inserting into test fixtures or IEC couplers, ensure no mechanical contact with the diaphragm side.
   - Avoid using compressed air near the acoustic opening — pressure surges can rupture the diaphragm.

4. Enclosure Design: In enclosure or tubing designs, ensure:
   - There is no contact with the diaphragm or port.
   - Debris or foreign particles are kept out — consider using acoustic mesh if needed.
   - The diaphragm side remains isolated from mechanical stress or pressure points.

Conclusion

PUI Audio's new in-ear receivers deliver the ideal combination of compact size, high output, low distortion, and power efficiency to meet the demands of today's most advanced medical, wearable, and communication devices. Whether you're designing hearing aids, wireless earpieces, or next-gen AR/VR headsets, our receivers offer the performance and reliability you need to bring exceptional audio to compact applications.

Contact PUI Audio today for samples, technical support, or to request a custom recommendation based on your system requirements.

Access all our receivers by visiting Speakers and Receivers page and then apply filter of Device type as Receiver