PUIaudio

NEW PRODUCT HIGHLIGHT

40mm and 50mm Speakers

September 30, 2025

Table Of Contents

Announcement

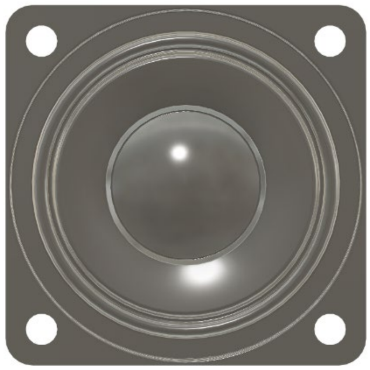
PUI Audio is introducing two new speakers, 40mm and 50mm expanding electromagnetic speaker portfolio. Audio is integral to providing notifications in any application. These new waterproof speakers' unique features vary from excellent frequency response, slimmer designs, to low Total Harmonic Distortion. Key applications include hand-held devices, portable devices, and devices that value compact design.

AS05008MO-WP-HT

Features:

- 111dBSPL: PDRIVE = 1.0W, distance = 0.1m
- 8 Ohms
- 5.0W continuous dissipation
- 320Hz free-air resonance
- 50.0mm x 37.0mm x 21.0mm dimensions
- IP65 Rated, High Temperature Tolerance

AS04008MR-22-WP



Features:

- 82dBSPL: PDRIVE = 1.0W, distance = 0.1m
- 8 Ohms
- 0.5W continuous dissipation
- 520Hz free-air resonance
- 40.0mm x 40.0mm x 11.5mm dimensions
- IP67 Rated

Frequently Asked Questions

How can I match a PUI Audio speaker to my enclosure volume and desired SPLs?

Selecting the right speaker involves balancing the enclosure volume, frequency response, and sound pressure level (SPL) targets. PUI Audio provides detailed datasheets with Thiele-Small parameters to help you model performance. Our applications engineering team can also provide guidance to ensure the speaker/enclosure system meets your specific acoustic goals.

Can PUI Audio assist with FEA/acoustic simulation during early product development

Yes. Our engineering team provide simulation results that reveal a range of net back-volumes and the corresponding low-frequency performance each achieves. Customers can use this range to help determine the enclosure's volume and insight into what to expect for a volume in the simulation's range. We offer an added-value service that uses application enclosure design to manufacture a speaker system complete with speaker, wiring harness (with stripped wire ends or a connector), and the enclosure. Such a system is post-assembly tested to ensure acoustic operation and a leak-free enclosure. It is a plug-and-play solution that ensures high-yield.

Do you provide a recommendation on sealed back volume?

Yes, The sealed back volume (sealed enclosure) dimensions is a balance between the three-dimensional volume that the end device can dedicate to the structure against the desired low-frequency performance achieved by the speaker + enclosure (the speaker system). It is best to determine this volume and design a corresponding enclosure, based on device's physical dimensions. Its shape is somewhat arbitrary, but specific to the end-product's design – it does not have to be a six-sided box with 90degreee angles.

It is also common practice to stuff the box with absorbent material. Many materials can be used: polyurethane, fiberglass filling, bonded cellulose acetate fiber, long fiber wool etc .

Adding stuffing to your box will translate into 15 % – 25 % volume increase. The stuffing has various advantages such as absorbing standing waves, lower resonance, and increasing internal volume. When you are building the enclosure, you should really focus on making the box airtight. You can ensure this by applying silicone sealants to all the joints. If you do this, make sure you don't place the speaker just yet, because the fumes from the fresh silicone will "attack" the speaker. Make sure you let it rest for at least 12 hours before placing it in your speaker.

What guidelines do PUI Audio recommend for venting and porting to optimize frequency response?

Enclosure type dictates low-frequency response and efficiency. A vented enclosure can extend bass response through tuned ports. These ports help reduce cone excursion near the tuning frequency but require precise alignment to avoid unwanted resonance. Vented designs also allow for smaller enclosures with equivalent bass extension, though at the cost of increased design complexity and potential distortion if mistuned.

$$\lambda = \frac{c}{f}$$

where

- λ = wavelength (ft),
- c = speed of sound ≈ 1130 ft/s (at 20 °C),
- f = frequency (Hz).

As long as the vent is located within approximately ¼ of a wavelength, its position will not significantly affect performance. If the vent is placed farther than ¼ wavelength, the bass frequency response becomes dependent on the listener's position relative to the driver and vent. Since this requirement is easily met in most systems, vent placement is generally not critical.

Frequency	Wavelength	1/4 Wavelength
200 Hz	5.65 ft	1.41 ft
100 Hz	11.30 ft	2.83 ft
80 Hz	14.13 ft	3.53 ft
60 Hz	18.83 ft	4.81 ft
50 Hz	22.60 ft	5.65 ft
40 Hz	28.25 ft	7.06 ft
30 Hz	37.67 ft	9.42 ft
20 Hz	56.50 ft	14.13 ft
10 Hz	113.00 ft	28.25 ft

When designing multiple ports, the same "¼ wavelength rule" applies to both vent-driver spacing and inter-port spacing. Designers often place vents on the front baffle near the driver. If the vents are positioned at the rear of the enclosure, midrange leakage through the vent is less noticeable. For a given box size, the net internal volume is reduced by the vent's displacement. While this reduction is negligible in large enclosures, it can become significant in micro-sized enclosures where vent volume may represent a considerable portion of the total internal volume, thereby impacting system performance.

In vented speakers operated at full excursion, audible noise may result from air turbulence in the port. For a given system, smaller vent openings lead to higher air velocity, increasing the likelihood of vent noise. Small investigated this and determined that to avoid excessive noise, maximum air velocity should not exceed approximately 5% of the speed of sound, provided the vent's internal surface is smooth and its edges are rounded to a reasonable radius.

He further developed an approximate formula to limit port velocity to 4.5% of the speed of sound across a wide range of alignments:

$S(V) >= 0.8 * f(B) * V(D)$
where the area of the vent, S(V), is in square meters, and the peak volume displacement of the cone, V(D), is in cubic meters. After converting S(V) to square inches and V(D) to cubic inches this formula becomes:
$S(V) >= 0.02032 * f(B) * V(D)$
f(B) is the box tuning frequency in Hz

Source: "Vented-Box Loudspeaker Systems Part II: Large Signal Analysis"
Journal of the Audio Engineering Society, Volume 21, Number 6
July/August 1973

Other Resources

https://puiaudio.com/wp-content/uploads/2024/07/Speaker-20-58MM.pdf
https://puiaudio.com/wp-content/uploads/2023/02/Speaker-Updates-40-55MM.pdf