



WHITEPAPERS

Demystifying a Speaker's Power Rating

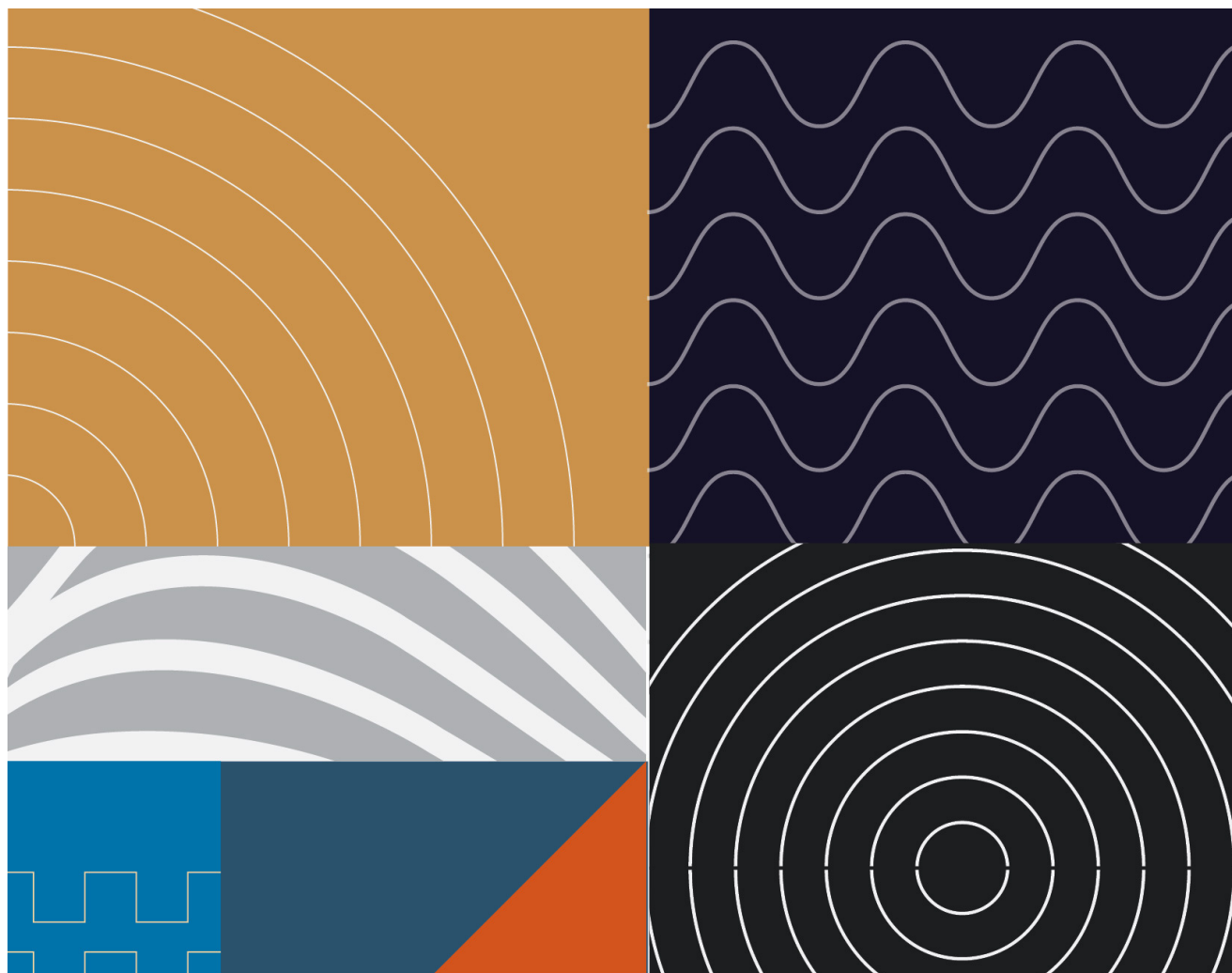
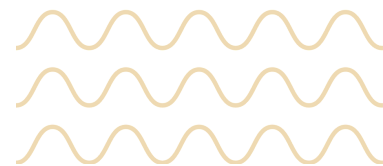


Table of Contents

Overview	3
Selecting the Right Amplifier	4
Consider Your Environment	5

Overview

A speaker's rated input power is the level at which the speaker was designed to play at continuously. A speaker's maximum input power is the level at which the speaker can sustain instantaneous peaks (such as with voice or music). When using a speaker to reproduce a continuous pure tone (such as a sine wave), it is important not to exceed the rated input power. To determine how much power the speaker is dissipating, you must calculate using the peak voltage. If using a multimeter that displays RMS voltage, multiply the measurement by 1.414, square the result, and then divide by the impedance. For instance, a 2Vrms measured pure tone signal applied to an 8 ohm speaker dissipates 1 Watt of power across the voice coil.



All PUI Audio speakers have two power level ratings that are listed on the specifications sheet:

A. Rated Input Power

B. Max Input Power

Parameters	Values	Units
Rated Input Power	10	Watts
Max Input Power	20	Watts

When using a speaker to reproduce a continuous pure tone (such as a sine wave), it is important not to exceed the rated input power. To determine how much power the speaker is dissipating, you must calculate using the peak voltage. If using a multimeter that displays RMS voltage, multiply the measurement by 1.414, square the result, and then divide by the impedance. For instance, a 2Vrms measured pure tone signal applied to an 8 ohm speaker dissipates 1 Watt of power across the voice coil

Calculating Power to a Speaker:

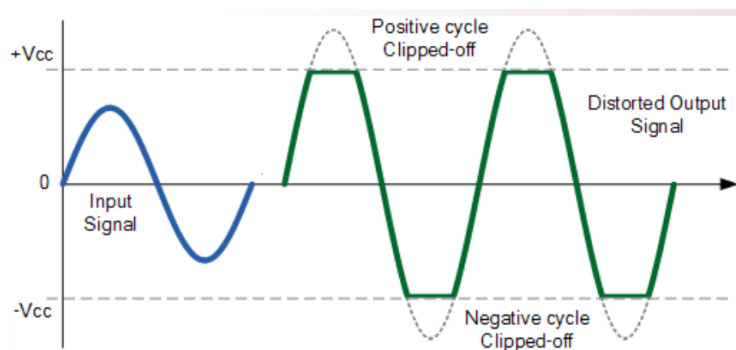
$$P = \frac{(V_{\text{RMS}} * \sqrt{2})^2}{\Omega}$$

Voice and music signals are not pure power and it is ok to use the measured RMS voltage to determine the power dissipated. For instance, a 2Vrms measured signal will average about 0.5 Watts of power across the voice coil. It would still be a good idea to check the signal using an oscilloscope to ensure the peaks of the signal do not exceed the max power, though.

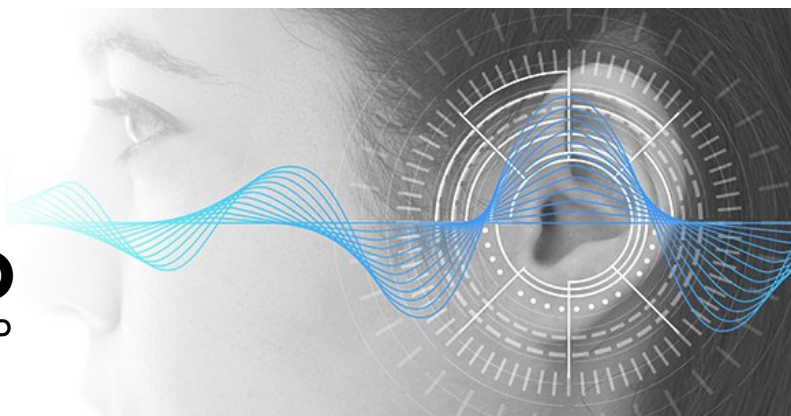
Selecting the Right Amplifier

One of the most common questions we are asked at PUI Audio is, "Which amplifier should I use?" Amplifier selection is pretty straightforward as long as you pay attention to the amplifier specifications. Pay particular attention to how much power an amplifier can create with a given input voltage condition and given impedance load while remaining under 1% THD (Total Harmonic Distortion).

Exceeding 1% distortion with an amplifier could drive it into a "clipping" condition that sends harmful DC voltage to a speaker, forcing it to the outer mechanical bounds and often causing a break of the leads that connect the input terminal to the voice coil. It is possible to damage a speaker rated for 5 Watts with a 4 Watt clipped signal. PUI Audio recommends selecting an amplifier that has double the power capacity of what you need. :



Sound Pressure Level



Consider Your Environment

Despite choosing the correct speaker with the needed parameters, low perceived sound can still occur. A common reason for that is that the ambient sound levels where the product is deployed were not considered.

- Invest in a low cost SPL meter, or download an SPL app for your smartphone
- Take multiple measurements of the environment
- Build a use-case to determine the distance between your product and the target audience
- Target a value of about 15 dB to 20 dB over ambient SPL for your product to be discernable, at the appropriate distance.

PUI Audio's knowledge and expertise has led to relationships with Medtech companies that have lasted for decades. From concept to production, Medical engineers rely on our ability to 3D model and rapid prototype, as well as our professional customer service. PUI Audio is the acoustic component partner you can trust



**Additional
whitepapers at:**

puiaudio.com/pages/whitepapers



PUIaudio
WHEN IT NEEDS TO BE HEARD