Efficiency curve testing for audio amplifiers

Consumer Audio Amplifiers & Haptics (CAAH)

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1 Background

Guidelines for Measuring Audio Power Amplifier Performance (Rev. A)[1]

1 https://www.ti.com/lit/an/sloa068a/sloa068a.pdf?ts=1748968851206&ref_url=https%253A%252F%252Fwww.ti.com%252Fsitesearch%252Fen-us%252Fdocs%252Funiversalsearch.tsp%253FlangPref%253Den-US%2526nr%253D3561%2526searchTerm%253Daudio+amplifier+performance#page=18&zoom=100,0,592

2 Test setup

- Set power supply voltage and current according to test requirements (VBAT, PVDD, VDD, etc).
- Connect **resistor + inductor** load to output of amplifier - usually 15µH or 33µH - according to test requirements.
  Using resistor load only would adversely affect the Class-D amplifier efficiency.
  Resistor load must be used only in combination with Class-AB amplifiers.
- Estimate output power for a single point based on amplifier gain and load impedance.
  - eg. gain = 21dBV and load = 4Ω+33µH. For 1W RMS it requires 2Vrms across the load, which is approximately 6dBV. Considering the gain of 21dBV, the required input signal is 6-21=-15dBFS
- Power up and initialize the amplifier according to test requirements.
  - Measured power supplies must be connected only to the amplifier, **all other circuitry on EVM must be power separately**.
  - Remove any jumpers on EVM to **isolate power to EVM from any other circuitry**. Follow User's Guide instructions.
- Connect the measurement equipment as described in the diagram.
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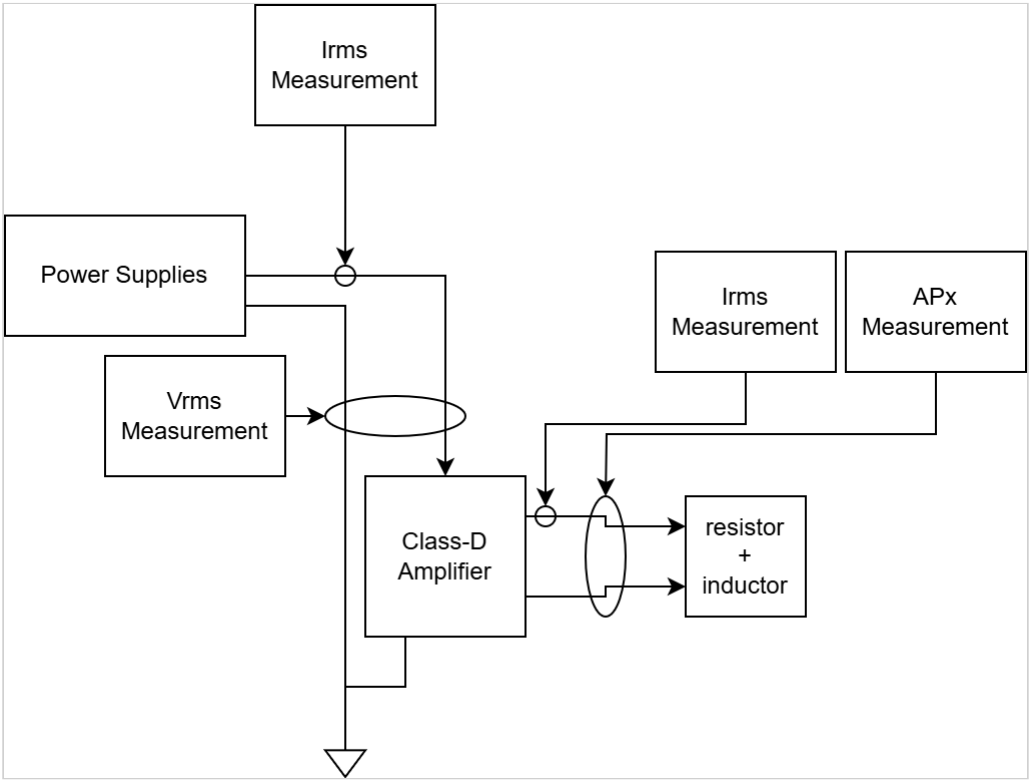
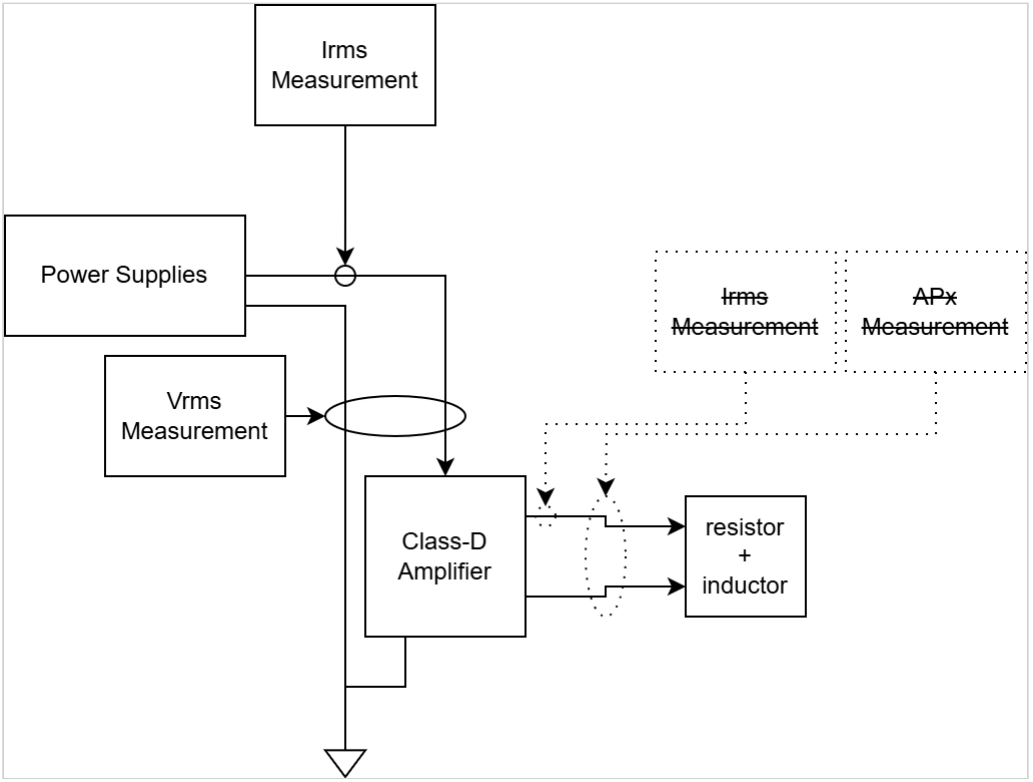


- Perform output power measurement, confirm the measurement matches the estimated value from previous step.
- Disconnect the measurement equipment from the output of the amplifier. Only the resistor + inductor load must be connected to the amplifier.

- 

- Repeat the power estimation process for all the required Pout points, calculate the corresponding dBFS input signal levels.
- Play each dBFS level and measure the supply (input) power for each one.
- Calculate the power efficiency for each of the measured input power and estimated output power points.