

Learning Board Acoustic Measurement Setup

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High Performance Analog / Audio

ABSTRACT

Passive radiator systems and the Smart EQ feature require performing acoustic measurements of the loudspeaker using a microphone. This document explains how to configure the Learning Board to perform such acoustic measurements.

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1 Hardware Setup

TI has tested several microphone / pre-amplifier options with the Learning Board. A full list of recommended options are provided in the PurePath™ Smart Amp User Manual (TAS5766M/TAS5768M).

The microphone / pre-amp combination below is recommended due to its versatility, portability and relatively low cost. Calibration files are also available on the manufacturer’s website based on the serial number of the microphone.

Table 1. Recommended Microphone Measurement Setup

Manufacturer	Model	Type
Dayton Audio	EMM-6	½" diameter condenser microphone.
Shure	X2u	USB pre-amp with monitor output.
Mediabridge	MPC-35-2XRCA-6	3.5mm Male to 2-Male RCA Adapter

Connecting the hardware is simple (see [Figure 1](#)):

1. Attach the microphone to the pre-amp XLR connector.
2. Connect the USB cable from the pre-amp to the PC.
3. Connect the 3.5mm to RCA cable from the pre-amp to the Learning Board.

Note that the power and speakers must be connected to the Learning Board and is omitted from the picture for simplification.

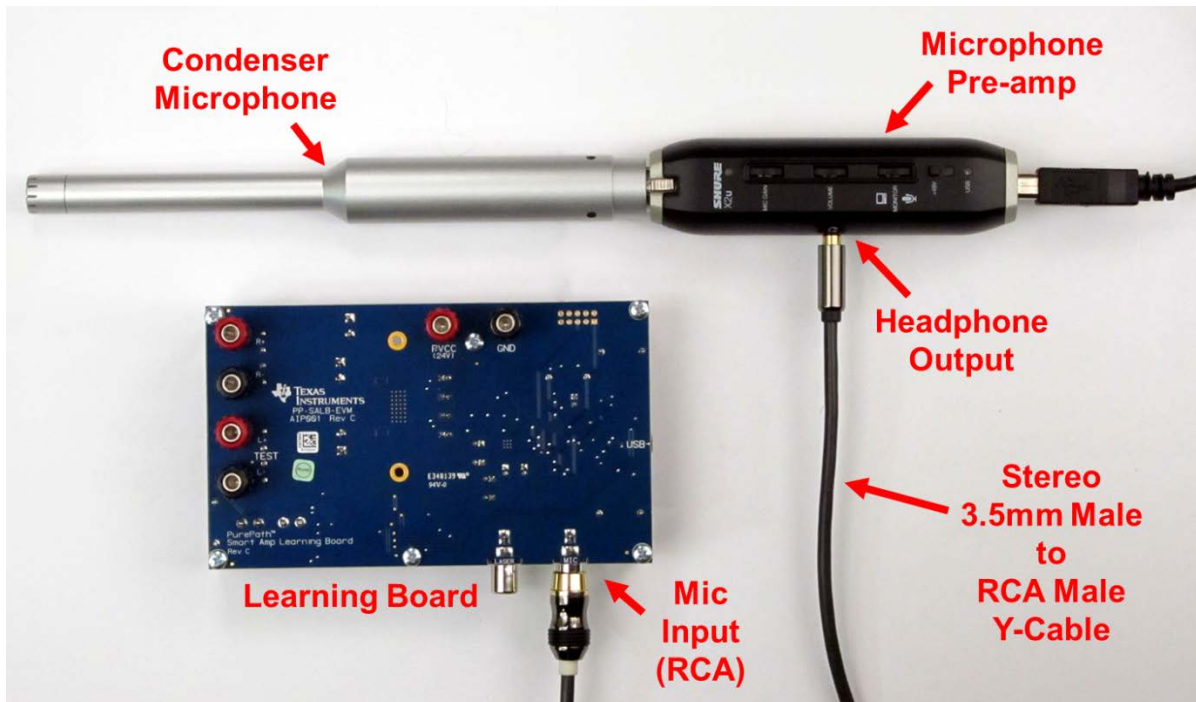


Figure 1. Hardware Setup

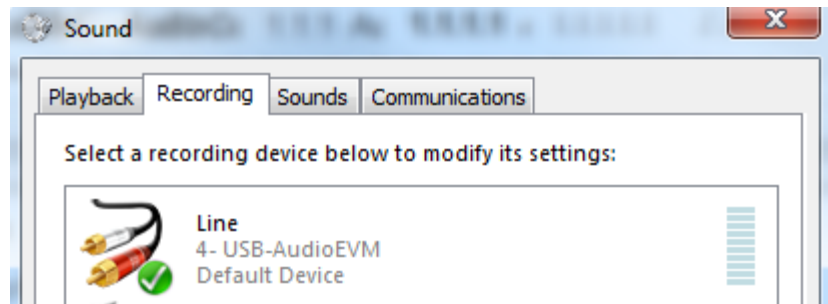
2 Performing Acoustic Measurements

The pre-amp can act as both as an analog microphone pre-amp and USB sound card. For Learning Board measurements, the microphone signal is routed through the **Headphone Output** of the pre-amp.

1. Ensure the Learning Board is fully powered.
2. Follow the step-by-step characterization process in PurePath™ Console 3 until instructed to connect the microphone.
3. Configure the microphone pre-amp as follows:
 - a. Turn **Mic Gain** fully down.
 - b. Turn **Output Monitor Volume** fully down.
 - c. Turn **Monitor Mix** fully down.
 - d. Enable **Phantom Power** (+48V switch).
4. Connect the USB cable and connect the audio cable between the pre-amp and the Learning Board.



5. Before proceeding with the measurement, ensure that the **USB-AudioEVM** is set as the default sound card for both Playback and Record. Also the sample rate needs to match the EVM.



6. In PurePath™ Console 3, click the **Check Microphone** button. This will play test noise through the loudspeaker.
7. Position the microphone in front of the speaker at far field but close enough such that room reflection effects are not dominating. On-axis is typical if the room acoustics are favorable. Other methods can be used if desired.

8. Increase the **Mic Gain** of the pre-amp until the Mic Level Indicator **X2u** becomes orange. If it becomes green, increase the gain. If it becomes red, reduce the gain.
9. Increase the **Output Monitor Volume** until the loudness meter in PurePath™ Console 3 becomes green.



Figure 2 shows a typical result. Note that the low frequency noise is room noise. Low frequencies are not important since Smart SPL will merge Smart Bass with the acoustic SPL measurement.



Figure 2. Acoustic SPL Measurement

3 Support

Smart Amp is supported through the [Audio Amplifiers Support Forum](#). Please include the words *Smart Amp* and the part number in the subject line. Contact your local TI sales representative for additional details.

Revision History

This revision history highlights the changes made to this application report.

Revision History

Version	Date	Author(s)	Additions/Modifications/Deletions
SLOU	20150824	J. Arbona	Fixed footers. Changed title.
SLOU	20150821	J. Arbona	Initial Release.

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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