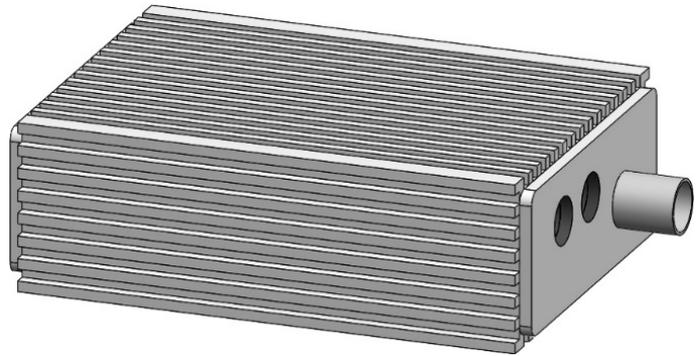


Mono linear amplifier for MEMS Loudspeakers



Features

- › Low distortion
- › Based on TI LM1875
- › Class AB amplifier
- › Up to 30 VPP for 150-nF load

Description

Amalthea is a linear amplifier for piezoelectric speakers

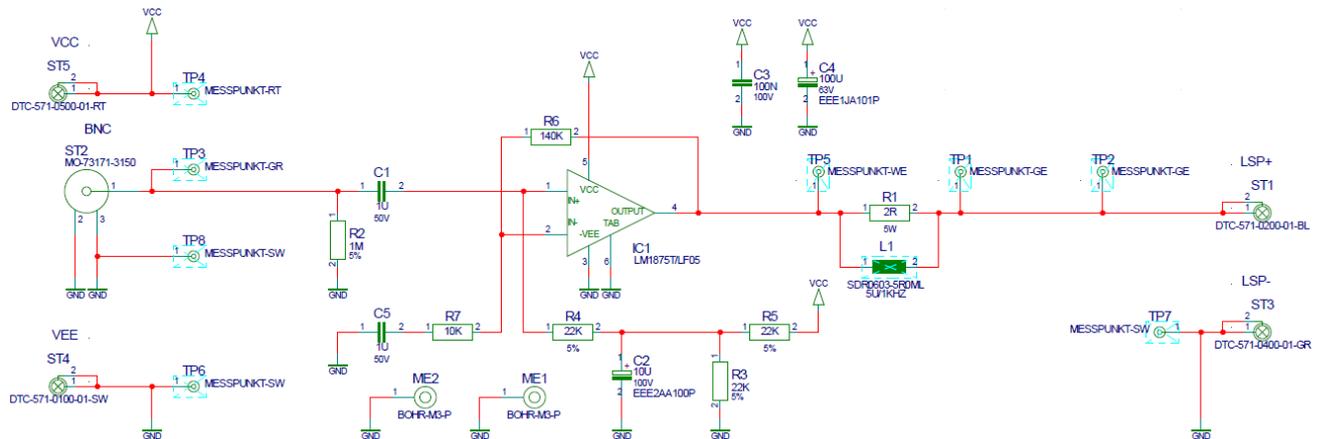
Table of contents

1	INTRODUCTION	3
2	BLOCK DIAGRAM	3
2.1	BILL OF MATERIALS (BOM)	3
3	CONNECTIONS	4
4	OPERATING CONDITIONS	5
5	CHARACTERISTICS	6
5.1	GAIN	6
5.2	THD	6
6	DIMENSIONS	7

1 Introduction

Amalthea is a linear amplifier for piezoelectric speakers

2 Block Diagram



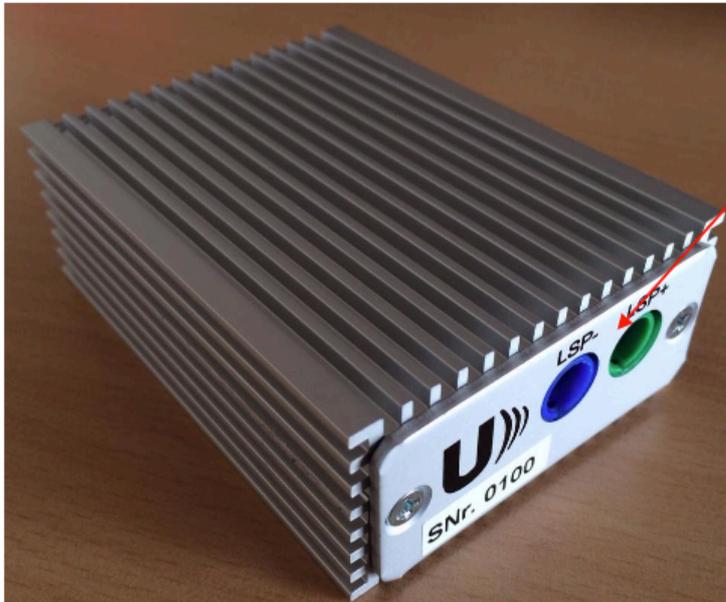
2.1 Bill of materials (BOM)

Reference	Supplier	Footprint	Description
C1		1206	Capacitor, Multicom, Ceramic, X7R 1U/50V, 5%
C2	Panasonic	CASE F	Electrolytic capacitor, Aluminium, fl. 10U/100V, 20%
C3		1206	Capacitor, Multico, Ceramic, X7R 100N/100V, 5%
C4	Panasonic	CASE G	Electrolytic capacitor, Aluminium, fl. 100U/63V, 20%
C5		1206	Capacitor, Multicom, Ceramic, X7R 1U/50V, 10%
IC1	Texas Instruments	LM1875T/LF05	LM1875 20W audio power, 16..60V/4A, 25W
R1	TE Connectivity	TE_SM_5	Wire-wound resistor, 2R/500V, 5W, 5%
R2		1206	Resistor, 1M/200V, 0.25W, 5%
R3		1206	Resistor, 22K/200V, 0.25W, 5%
R4		1206	Resistor, 22K/200V, 0.25W, 5%
R5		1206	Resistor, 22K/200V, 0.25W, 5%
R6		1206	Resistor, 140K/200V, 0.25W, 1%
R7		1206	Resistor, 10K/200V, 0.25W, 1%

3 Connections

Back side

- LSP+: banana socket
- LSP-: banana socket



Speaker output
 $V_{CC}/2$
+ 'Audio Input' x Gain

'blue' belongs to the
bottom electrode (BE)
of the speaker

'green' belongs to all of
the top electrodes (TE)
of the speaker

Front side

- VCC: banana socket
- VEE: banana socket
- Audio Input: BNC connector



Audio Input

Power supply
 $V_{CC} = 30 V_{DC}$
recommended

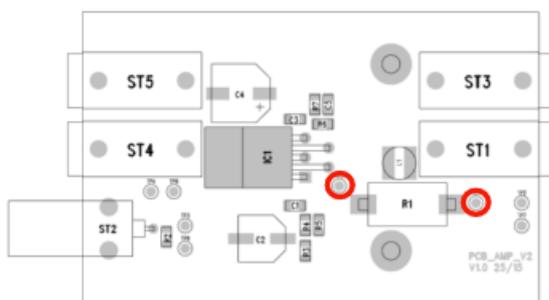
4 Operating conditions

Supply voltage (V_{CC})	30 V _{DC} recommended
Power Consumption (no input; $V_{CC} = 30$ V)	< 1.5 W (< 50 mA)
Power Consumption (650 mV _{rms} ; $V_{CC} = 30$ V)	< 3.9 W (< 130 mA) with bandwidth below 20 kHz
Max. input voltage (AC)	650 mV _{rms} (920 mV _P)
DC at 'Speaker output'	$V_{CC}/2$ from the DC supply (recommended: $V_{CC} = 30$ V)
Gain at 1 kHz	15 (23.5 dB)
Frequency response (-3 dB)	25 Hz – > 80 kHz
THD _{typical} (100 Hz – 20 kHz; $V_{CC} = 30$ V)	< 0.01 %
THD _{max} (< 650 V _{rms} at 'audio input'; $V_{CC} = 30$ V)	< 0.1 %

Make sure to connect the 'green' connector to the bottom electrode and the 'blue' connector to the top electrode of the Speaker. The voltage potential at the 'blue' output is higher than at the 'green' one. This is the correct bias voltage for the MEMS-Speaker.

Note: CURRENT MEASUREMENT WITH AMALTHEA:

A 2-Ωshunt resistance is included in Amalthea for current measurement. To use it, open the housing by removing the two screws at the front and the two at the back.

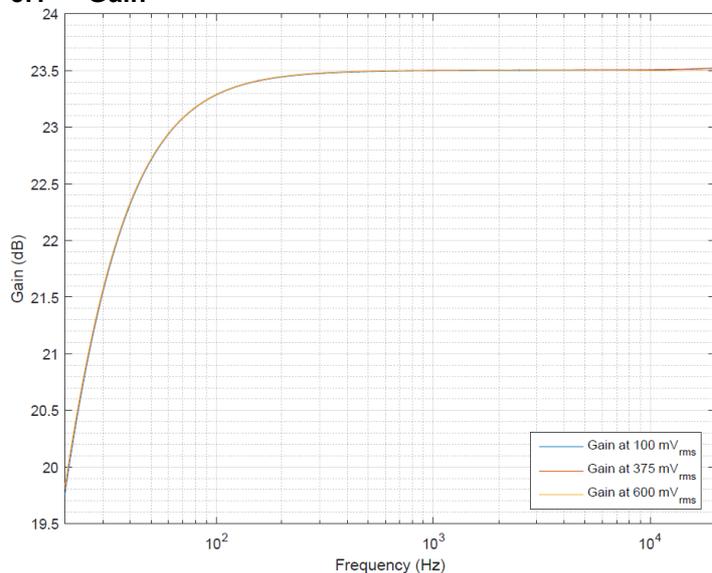


The voltage drop over the resistance (R1) can be measured between the test points TP1 and TP5 (marked in red) or directly at the resistance. The current through the load can then be calculated with the following formula:

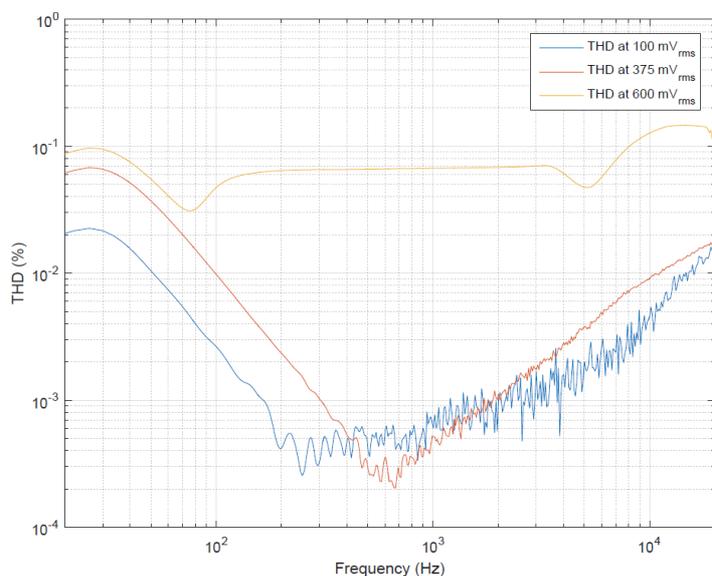
$$I = \frac{U_{shunt}}{R_{shunt}} = \frac{U_{shunt}}{2}$$

5 Characteristics

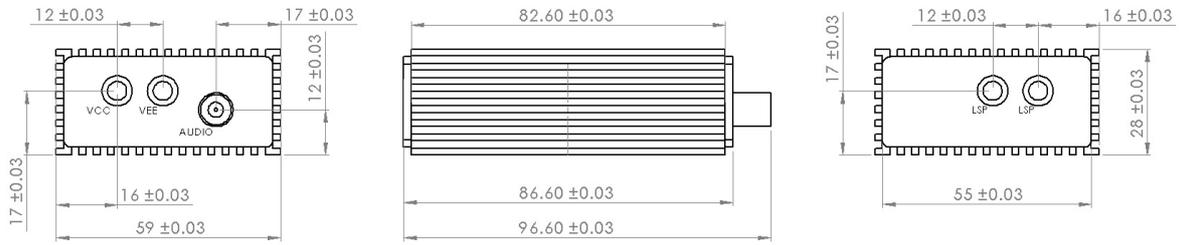
5.1 Gain



5.2 THD



6 Dimensions



USound GmbH ("USound") makes no warranties for the use of USound products, other than those expressly contained in USound's applicable General Terms of Sale, located at www.usound.com USound assumes no responsibility for any errors which may have crept into this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein.

No license to patents or other intellectual property rights of USound are granted in connection with the sale of USound products, neither expressly nor implicitly.

In respect of the intended use of USound products by customer, customer is solely responsible for observing existing patents and other intellectual property rights of third parties and for obtaining, as the case may be, the necessary licenses.

Important note: The use of USound products as components in medical devices and/or medical applications, including but not limited to, safety and life supporting systems, where malfunctions of such USound products might result in damage to and/or injury or death of persons is expressly prohibited, as USound products are neither destined nor qualified for use as components in such medical devices and/or medical applications. The prohibited use of USound products in such medical devices and/or medical applications is exclusively at the risk of the customer.