
The TS488 low power stereo headphone amplifier evaluation board user guidelines

Introduction

This application note concerns the evaluation board DEMOTS488, designed to evaluate the TS488 pop-free 120 mW stereo headphone amplifier.

The device is unity gain stable and configured by external gain setting resistors.

In this document a description of the TS488 low power audio amplifier, a description of the evaluation board with all its components and layout, are handled.

The key features of the TS488 include:

- Pop and click noise protection circuitry
- Operating range from $V_{CC} = 2.2$ V to 5.5 V
- Standby mode active low
- Output power
 - 120 mW @5 V, into 16 Ω with 0.1% THD+N max. (1 kHz)
 - 55 mW @3.3 V, into 16 Ω with 0.1% THD+N max. (1 kHz)
- Low current consumption: 2.7 mA max. @5 V
- Ultra low standby current consumption: 10 nA typical
- High signal-to-noise ratio
- High crosstalk immunity: 102 dB (F = 1 kHz)
- PSRR: 70 dB typ. (F = 1 kHz), inputs grounded @5 V
- Unity-gain stable
- Short-circuit protection circuitry
- Available in lead-free MiniSO-8 and DFN8 2x2 mm

1 Description of the evaluation board

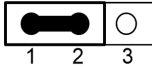
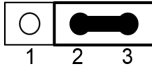
The DemoTS488 is an evaluation board designed for the TS488 pop-free stereo headphone amplifier. The gain (A_V) is set at 1 V/V for both channels and can be adapted if necessary with a modification of R11 or R12 values for channel 1, and of R21 or R22 values for channel 2.

Table 1. Gain per channel

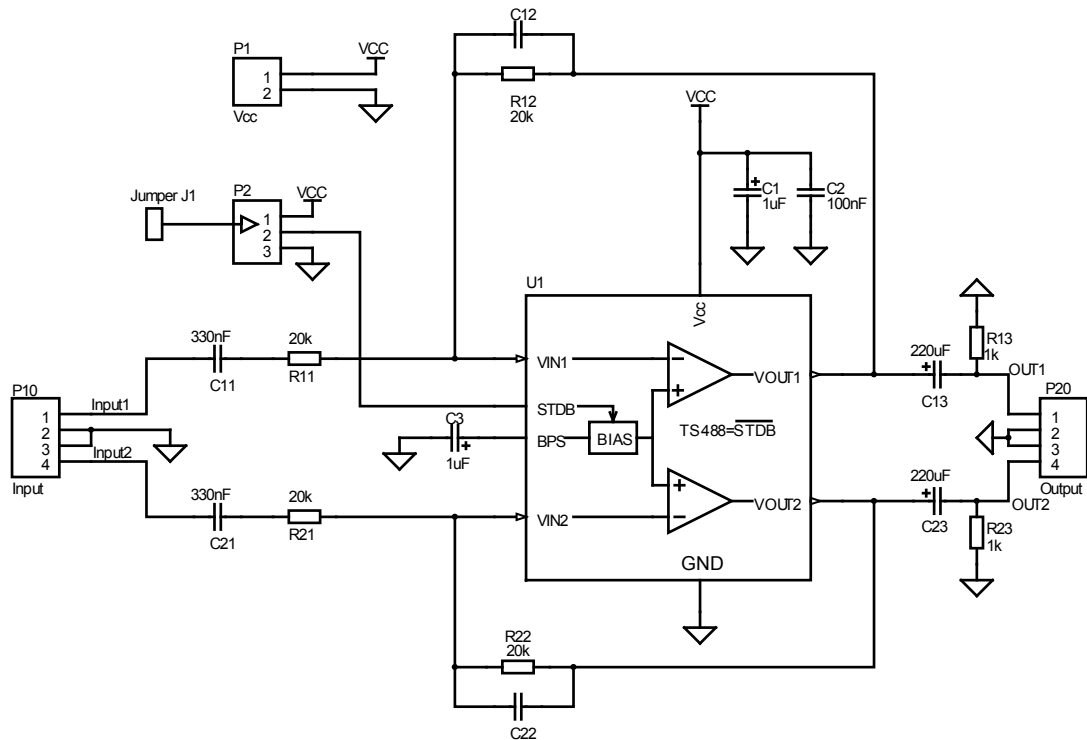
Channel	Gain (V/V)
Channel 1	$A_V = \frac{R_{12}}{R_{11}}$
Channel 2	$A_V = \frac{R_{22}}{R_{21}}$

C11 with R11 (or C21 with R21) create an input high-pass filter with a cut-off frequency of 24.1 Hz. C13 with a 16 Ω load (or C23 with a 32 Ω load) create an output high-pass filter with a cut-off frequency of 45.2 Hz (22.6 Hz). For information on how to change the value of the cut-off frequency, refer to the datasheet. The C12 and C22 component locations are left empty in order to add a low-pass filter if required.

Table 2. Evaluation board connectors

Connector	Description
P1	Power connector (VCC and GND). Power supply voltage from 2.2 V to 5.5 V. Standby control connector:  pins 1 and 2 are shorted, TS488 operation mode  pins 2 and 3 are shorted, TS488 standby mode.
P2	The connector pins are as follows: <ol style="list-style-type: none"> V_{CC} Standby control GND
P10	Input signal connector (GND and active input signal). The pin 1 and 2 for the input 1 and the pin 3 and 4 for the input 2
P20	Output signal connector (GND and active output signal). The pin 1 and 2 for the output 1 and the pin 3 and 4 for the output 2

Note: When you apply the power supply through P1, do not invert the polarity because it would destroy the amplifier at U1.

Figure 1. Schematic diagram

Table 3. Component list for the evaluation board

Designation	Quantity	Description
C11, C21	2	330 nF/16 V, ceramic capacitors, 0805
C12, C22	0	Not assembled, 0603
C2	1	100 nF/16 V, ceramic capacitors, 0805
C1, C3	2	1 μ F/50 V, electrolytic capacitor, 1206
C13, C23	2	220 μ F/10 V, electrolytic capacitor
P1	1	2-pin header 2.54 mm pitch
P2	1	3-pin header 2.54 mm pitch
P10, P20	2	4-pin header 2.54 mm pitch
J1	1	Jumper, 2.54 mm pitch
U1	1	TS488

2 Evaluation board layout

The following schematics show the layers and the top view of the evaluation board.

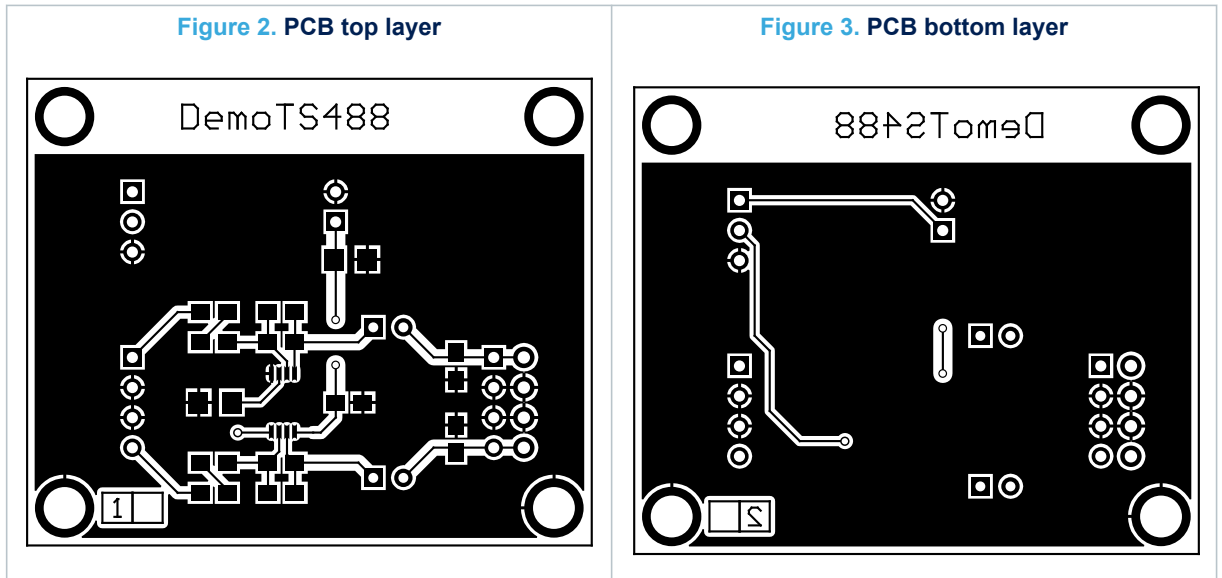
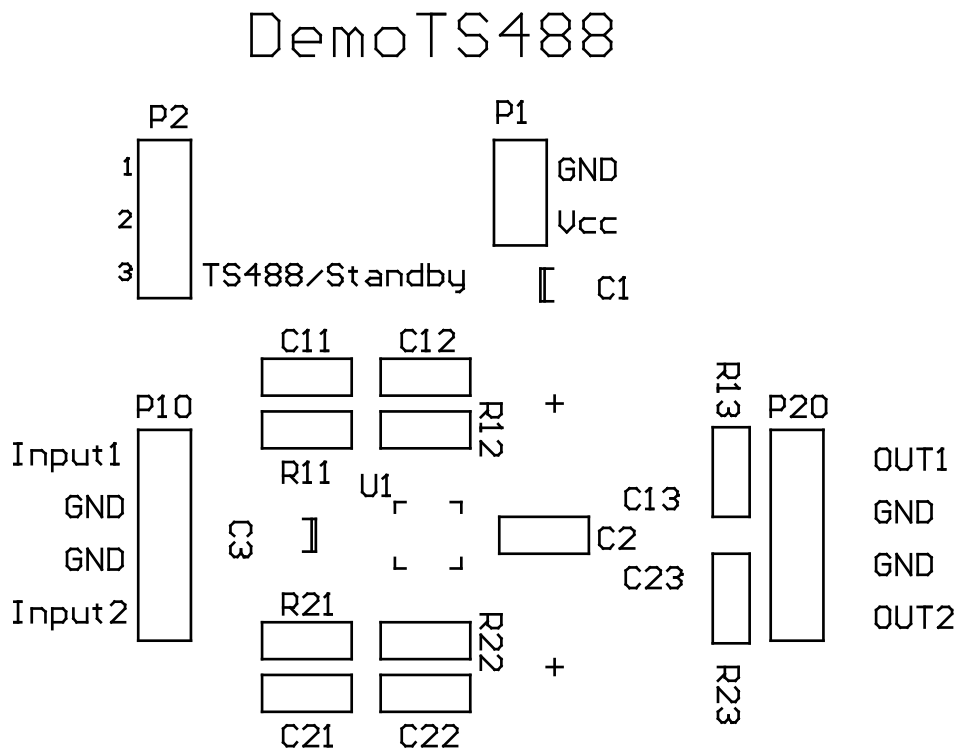


Figure 4. Top view of the evaluation board



Revision history

Table 4. Document revision history

Date	Version	Changes
25-Sep-2007	1	Initial release.
17-Dec-2021	2	Removed all references to the TS489

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