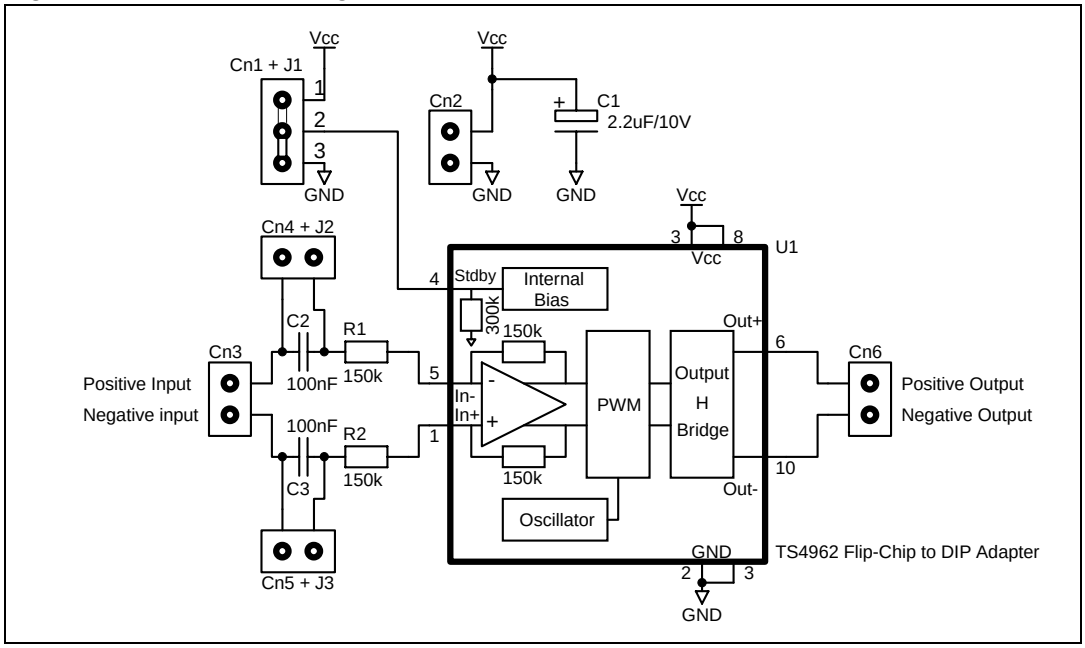
AN2134
Application note

TS4962M
Using the mono class D demo board

Introduction

The mono class D demo board is designed for the TS4962M class D audio amplifier. The TS4962M device, in a flip-chip package, is mounted on an adapter board with DIP connectors (see *Section 5: Flip-chip to DIP adapter on page 5*) which is, in turn, mounted on the demo board. *Figure 1* shows the schematic diagram of the demo board, including the flip-chip to DIP adapter.

Figure 1. Schematic diagram of mono class D demo board



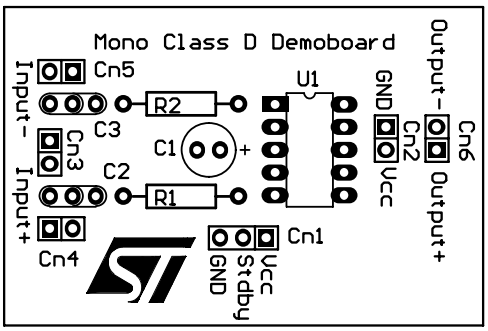
About the TS4962M

- Low voltage class D differential audio power amplifier with standby mode
- Operating range from V_{CC}=2.4V to 5.5V
- 2.3W output power @ V_{CC}=5V, THD=1%, F=1kHz, with 4Ω load
- 1.4W output power @ V_{CC}=5V, THD=1%, F=1kHz, with 8Ω load
- Ultra low power consumption in standby mode (10nA)
- 63dB PSRR @ 217Hz in grounded mode (A_V=2V/V)
- Low pop & click
- Fast startup time 5ms
- Module gain set at 2V/V
- Thermal and short-circuit protection

1 Description of the demo board

Figure 2 shows the top view of the demo board PCB, with the location of all connectors.

Figure 2. Mono class D demo board - top view



A list of components mounted on the demo board is given in *Table 1*.

Table 1. Mono class D demo board bill of materials

Name	Quantity	Description
C1	1	2.2µF/10V, electrolytic capacitor
C2	1	100nF/63V
C3	1	100nF/63V
Cn1	1	3 pins header 2.54mm pitch
Cn2	1	2 pins header 2.54mm pitch
Cn3	1	2 pins header 2.54mm pitch
Cn4	1	2 pins header 2.54mm pitch
Cn5	1	2 pins header 2.54mm pitch
Cn6	1	3 pins header 2.54mm pitch
J1 to J3	4	Jumper, 2.54mm pitch
R1	1	150kΩ, 1/4W 1% resistor
R2	1	150kΩ, 1/4W 1% resistor
U1	1	TS4962M flip-chip to DIP adapter

Table 2 gives the list of the connectors on the demo board, with a description and configuration information for each one.

2 Demo board connectors

Table 2. Demo board connectors

Connectors	Description
Cn4	Input signal connector (active input signal positive and negative)
Cn4 and Cn5	Connectors to modify input configuration (from capacitor-coupled = no jumper to common mode feedback = short-circuit)
Cn6	Output signal connector (Vo+ and Vo-)
Cn1	Standby control connector (GND, Standby, V_{CC}).
Cn2	Power connector (V_{CC} and GND). Power supply voltage from 2.4V to 5.5V.
U1	Socket connector for flip-chip to DIP adapter

Caution: When you apply the power supply through Cn2, **do not** invert the polarity because it would destroy the amplifier U1.

3 Demo board layout

Figure 3 and *Figure 4* show the bottom and top layers of the demo board PCB.

Figure 3. PCB bottom layer

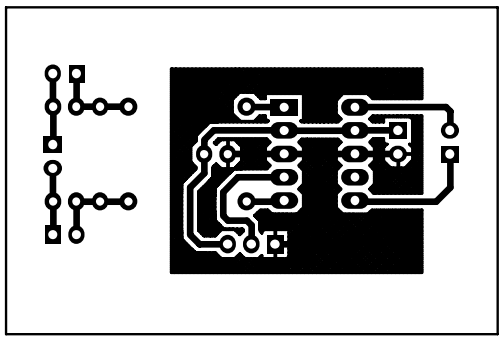
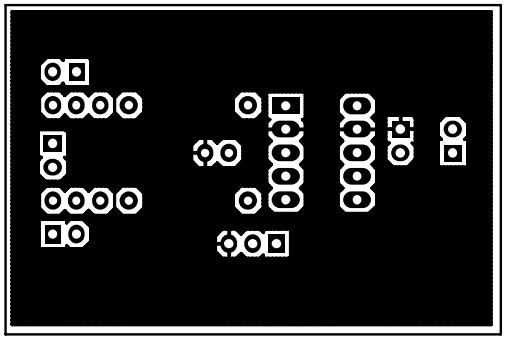


Figure 4. PCB top layer



4 Configuring the demo board characteristics

4.1 Differential gain

The demo board is set up with the differential gain, A_V, set to 2V/V.

If necessary, the differential gain can be adapted by modifying the values of resistors R1 and R2, in accordance with the following relation:

$$A_v = \frac{300k\Omega}{R1} \text{ or } A_v = \frac{300k\Omega}{R2}$$

where R1=R2 in kΩ

4.2 Input configuration

On the demo board, the Cn4 and Cn5 jumpers allow you to change the input configuration. You can select either **capacitor-coupled** or **common-mode feedback**.

In the **capacitor-coupled** configuration, the -3dB cut-off frequency in Hz is:

$$\frac{1}{2\pi \times R_1 \times C_2} = \frac{1}{2\pi \times R_2 \times C_3}$$

with R in Ohms, C in Farads and where C2=C3.

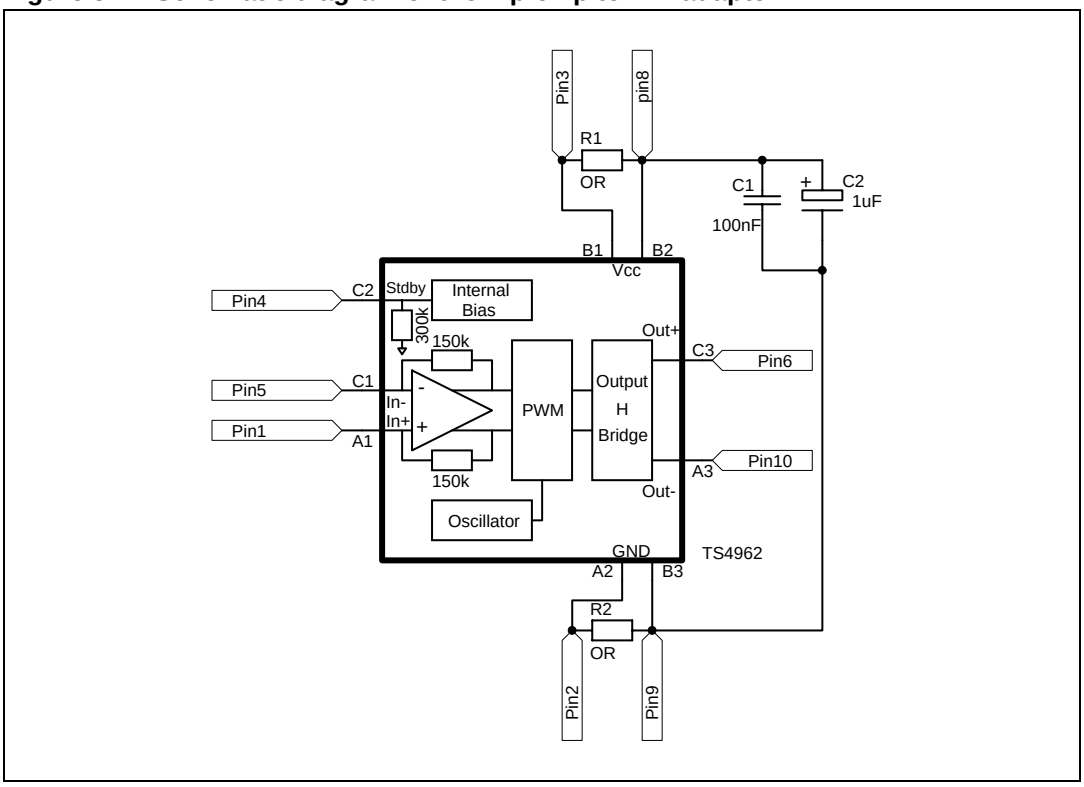
More information about component calculations is available in the TS4962M datasheet.

5 Flip-chip to DIP adapter

The TS4962M is available in a flip-chip package which, while offering the advantages of excellent thermal dissipation and maximum space-savings, is difficult to manipulate for test or evaluation purposes.

For this reason, the TS4962M device is pre-mounted onto a flip-chip to DIP adapter, shown schematically in *Figure 5*.

Figure 5. Schematic diagram of the flip-chip to DIP adapter

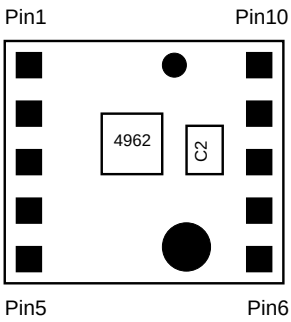


A component list for this adapter is given in *Table 3* below. The top-view of the adapter is shown in *Figure 6*.

Table 3. Flip-chip to DIP adapter bill of materials

Designation	Quantity	Description
C1	1	100nF/10V, ceramic capacitor, 0603
C2	1	1µF/6.3V, Tantalus capacitor, 0805
R1	1	0R resistor, 0603
R2	1	0R resistor, 0603
U1	1	TS4962MIJ

Figure 6. Adapter top view



6 Revision history

Date	Revision	Changes
1-Mar-2005	1	Initial release.
1-Dec-2005	2	Format updated.
6-Feb-2007	3	Updated document structure and format.
27-Feb-2007	4	Removed draft banner, added this revision history.