CHALMERS
Department of Computer Science and Engineering

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DAT096
Embedded Electronic System Design Project
DA board using the AD5062
Disclaimer

The DA boards have not been tested any more than that they have been connected and powered up, no code has been written so there is a risk that there is some problems with one or two of the boards.

When I did the PCB layout I made a mistake in the footprint for one of the devices. This has been corrected with a small adapter and I guess this is where the biggest risk for an error exists.

The description starts by describing the full circuit design but all of the functionality has not been included so the description goes on describing what´s really there.

You can add the rest of the circuit if you like.

Full circuit

The schematic of the design is given in *Figure 1* while the PCB layout is given in *Figure 2*.

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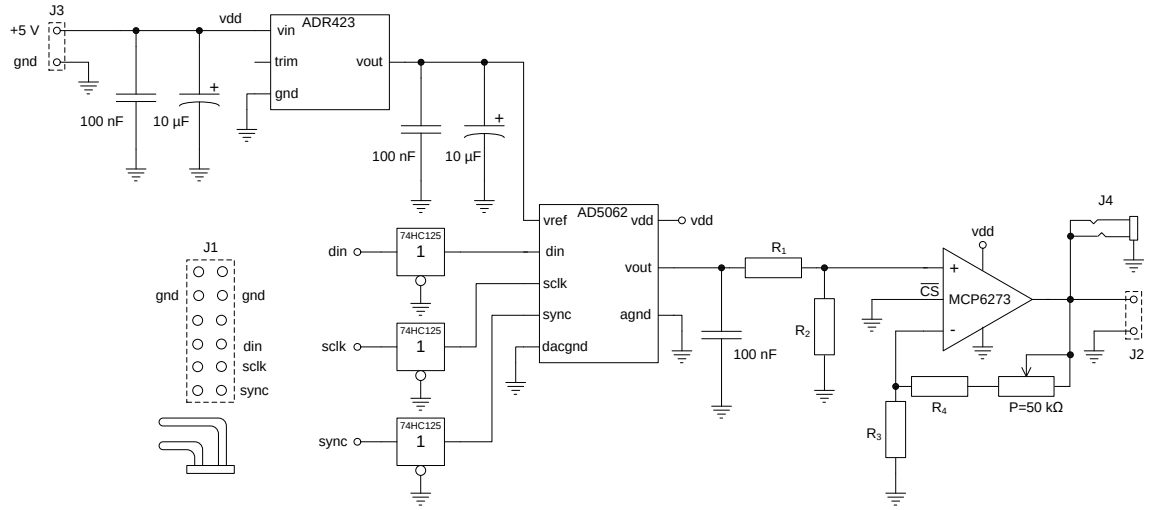

Figure 1 Full schematic of the board

The voltage reference ADR423 gives +3 Volts and this means that the output span is 0 – 3 Volts.

As can be seen in the schematic there is an OP stage added. The intention with this stage is to give the opportunity for some attenuation and some amplification. The OP stage is non-inverting since the board only uses positive supply. Such a stage can only give amplification but not attenuation. Because of this the stage is preceded by a passive attenuation stage. Some suitable resistor values for the attenuation and OP stage is given in *Table 1*. However, as seen below this part of the design is not implemented but you can do the redesign if you like.

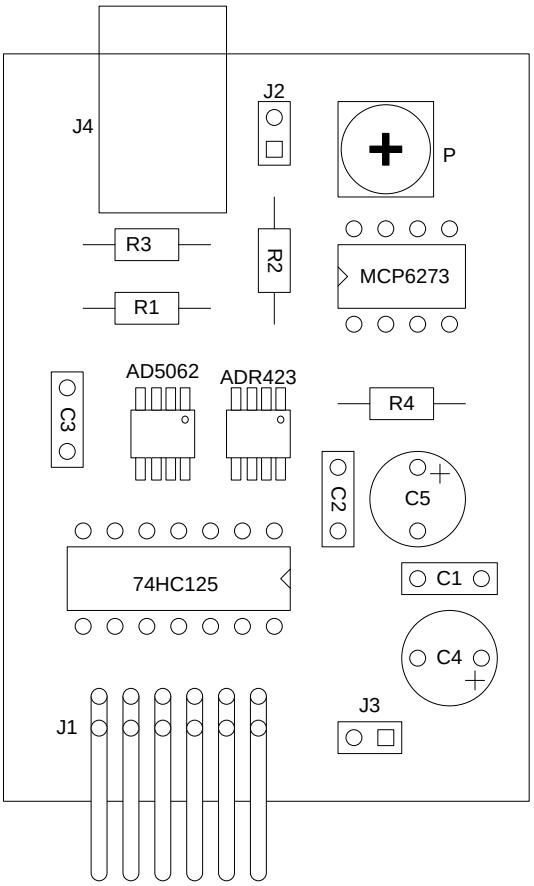

Figure 1 Full schematic of the board

R_1 [kΩ]	R_2 [kΩ]	R_3 [kΩ]	R_4 [kΩ]	P [kΩ]	*Amplification interval*
39	10	2.2	0	50	0.204 – 4.84
33	10	53.3	0	50	0.236 – 3.76
22	10	5.6	0	50	0.313 – 3.10
10	10	15	0	50	0.5 – 2.17

Table 1 Recommended resistors for the amplification stage

Connection to the FPGA board

The DA board is connected to the FPGA board using one of the Pmod connectors on the FPGA board. The pinning is given in *Table 2*.

Pmod pin	*Pmod signal*	*DA board signal*
1		/SYNC
2		SCLK
3		DIN
5	GND	gnd
6	VCC	Not connected
11	GND	gnd
12	VCC	Not connnected

Table 1 Pmod connection

The DA board requires +5 Volts but the Pmod connectors can only supply 3.3 Volts so the DA board must be powered another way. The only place on the FPGA board where there is an easy access to +5 Volts is at the power connection close to the USB connector for program download. There is a jumper there , JP3, that selects where the power is coming from. It can be USB, external power supply or battery. Default the jumper is set for USB power. You should remove this jumper and replace it with the yellow wire supplied with the DA board. This wire still works as a jumper so there is still USB power but there is also an outlet that should be connected to connector J3 on the DA board to power this board. The ground pin has been cut from J3 so you can´t accidently connect +5 Volts to ground. The ground supply for the DA board is coming through the Pmod connector.

Output from the board is coming from two connectors in parallel, one two pin connector with output and ground and one 3.5 mm stereo tele connector. In the tele connector the output supplies both left and right channel with the same signal. This means that you must connect a stereo cable. You cannot use a mono wire as this will ground the output.

The implemented simplifications

To make things easier the attenuation and the amplification stages are not implemented on the board. There is just a buffer at the output, *Figure 3*. As mentioned you can add the attenuation and amplification stages if you like.

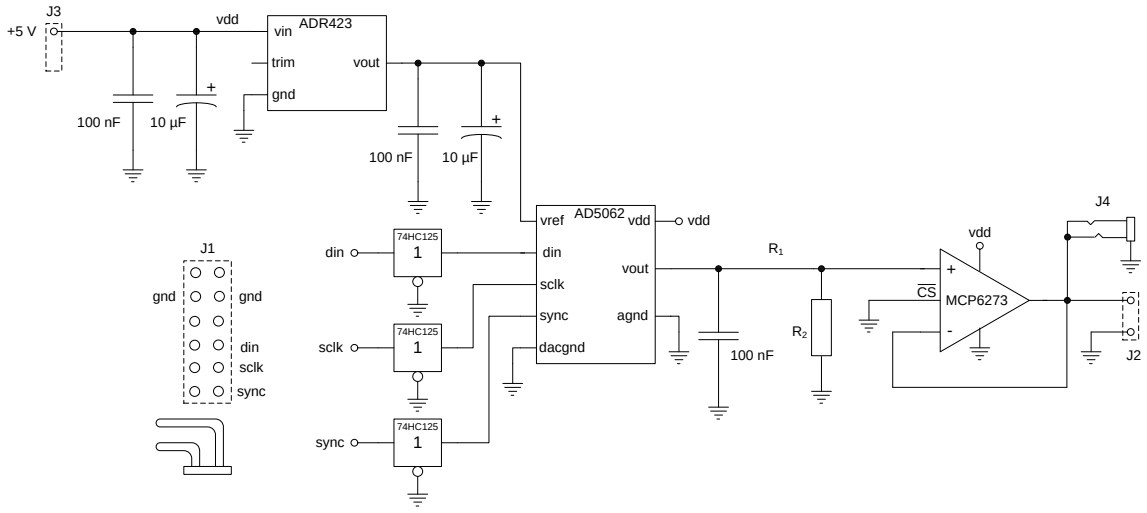

Figure 2 Simplified version of the board