

1 Technical specs

1.1 A/D converter

- 16 channels
- 24 bit resolution
- Single ended
- Input range:
 - Bipolar: $-1.325 \dots 1.325V$ ($-1.25 \dots 1.25$)
- Input resistance: 10M
- Asynchronous sampling:
 - All channels simultaneously at a rate of 1kHz, 8 channels at 2kHz and 1-2 channels at 4kHz.
 - Latency is one sampling interval.
- Latency for synchronous sampling approx 2ms.

1.2 D/A converter

- 4 channels
- 8 bit resolution
- Output range:
 - Unipolar: $0 \dots 2.5V$
- Max output current: 1mA
- Latency approx 300us.

1.3 24 bit digital I/O

- Direction is programmable via comedi.
- PWM (8 channels or 4 channels with polarity bit)
- Latency for writes approx 300us and approx 500us for read operations.

1.4 Connectivity: USBDUX-D

- D connectors only
- Female 44 pin high density D connector electrically isolated for analogue I/O with +/-5V supply.
- Female 15 pin D connector for the digital I/O.

1.5 Physical Dimensions

- Enclosure: 144x90x30mm
- Board: 136x80x15mm

Latencies vary depending on system and USB bus load.

2 USB-DUX-SIGMA Pinouts

2.1 Analogue I/O

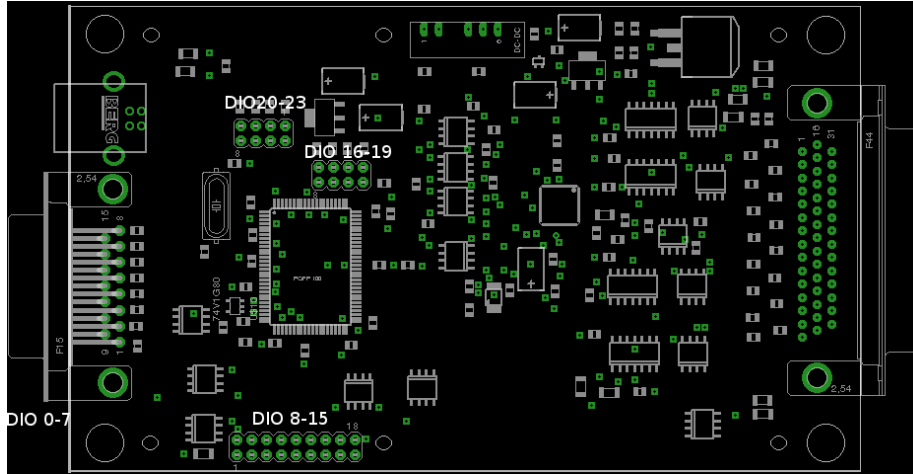
The analogue I/O have a 44 pin D connector (f). All signals and the supply output are electrically isolated from the USB and the digital I/O.

Pin	Direction	Function
1-14	GND	GND
15	I	A/D channel 15
16	I	A/D channel 0
17	I	A/D channel 1
18	I	A/D channel 2
19	I	A/D channel 3
20	I	A/D channel 4
21	I	A/D channel 5
22	I	A/D channel 6
23	I	A/D channel 7
24	I	A/D channel 8
25	I	A/D channel 9
26	I	A/D channel 10
27	I	A/D channel 11
28	I	A/D channel 12
29	I	A/D channel 13
30	I	A/D channel 14
31	O (!)	-5V
32	O (!)	+5V
33	N/C	N/C
34-40	GND	
41	O	D/A channel 0, unipol
42	O	D/A channel 1, unipol
43	O	D/A channel 2, unipol
44	O	D/A channel 3, unipol

Pins 31 and 32 are outputs (!) which can provide about 20mA of supply current for external circuitry such as amplifiers. It is advised to add 10 μ F decoupling capacitors because the voltage is unregulated and the internal DC/DC converter generates high frequency noise. The supply is provided through 51 Ω resistors so that there will be a voltage drop when the current increases. Rail to rail amplifiers are recommended.

2.2 Digital I/O

There are a total of 24 digital I/O ports which are located at different positions on the board:



DIO 0-7 is available at the 15 pin D connector and the other DIO signals are available internally.

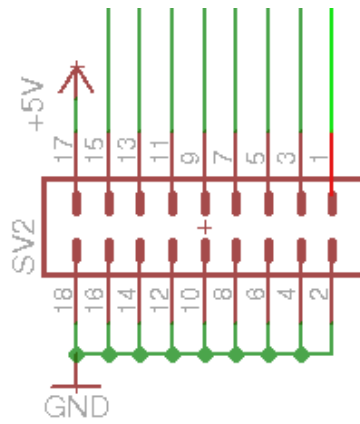
2.2.1 Bits 0-7

The I/O lines are 3.3V logic level and are protected by an diode array and 51Ω resistors.

Pin	Direction	Function
1	I/O	digital I/O bit 7
2	I/O	digital I/O bit 6
3	I/O	digital I/O bit 5
4	I/O	digital I/O bit 4
5	I/O	digital I/O bit 3
6	I/O	digital I/O bit 2
7	I/O	digital I/O bit 1
8	I/O	digital I/O bit 0
9-14	GND	
15	O (!)	NC/5V

2.2.2 Bits 8-15

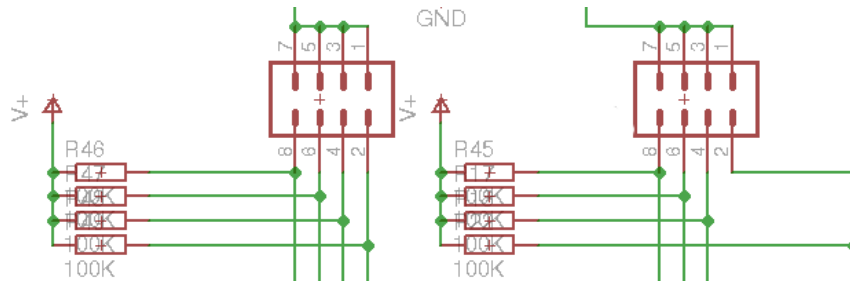
The inputs are available at a pin header internally. They are protected by an diode array. The logic is 3.3V.



Pin	Direction	Function
1	I/O	digital I/O bit 0
3	I/O	digital I/O bit 1
5	I/O	digital I/O bit 2
7	I/O	digital I/O bit 3
9	I/O	digital I/O bit 4
11	I/O	digital I/O bit 5
13	I/O	digital I/O bit 6
15	I/O	digital I/O bit 7
17	O (!)	NC/5V
2,4,6,...,18	GND	

2.2.3 Bits 16-24

These I/O lines are connected to 100KΩ pull up resistors so that these headers can be used with jumpers to code a certain configuration which can then be read by the PC. Note that special care has to be taken if these ports are used for other purposes because they are not protected by a diode array.



Pin	Direction	Function
2	I/O	digital I/O bit 0,4
4	I/O	digital I/O bit 1,5
6	I/O	digital I/O bit 2,6
8	I/O	digital I/O bit 3,7
1,3,5,7	GND	GND