khs instruments

analog::blocks

Power OpAmp Board and Module

User Manual

Rev. 1.0

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Contents

1) General Description 1

2) Common Circuit 2

3) Configuration Notes 3

4) TO-220 Power-OpAmp Prototype Board 4

5) Populated Function Module 4

6) Module Interface and Pin Assignment 5

History: 7

1) General Description

The analog::blocks Power-OpAmp uses a pre-routed amplifier circuit based on the OPA452.

Configurable resistor positions provide access to the inverting and non-inverting OpAmp inputs, the application-defined REF input and the analog outputs.

The OpAmp supply can be selected for ±12 V or ± PWR based operation. Dedicated through-hole pads at -OPAMP and OUT-OPAMP provide convenient access for feedback components, avoiding repeated rework of the 0805 SMD positions during experiments.

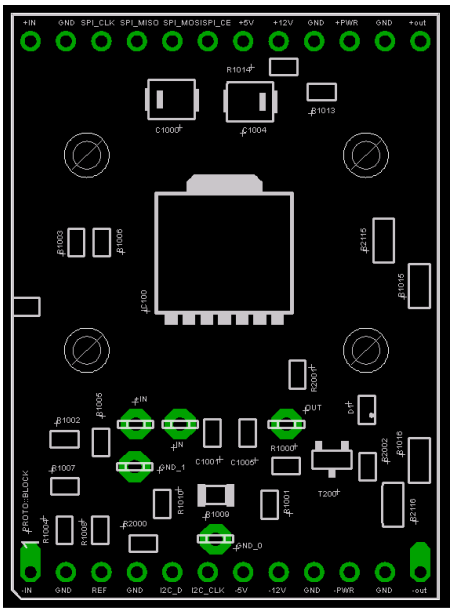


Figure 1. Power OpAmp Board layout

2) Common Circuit

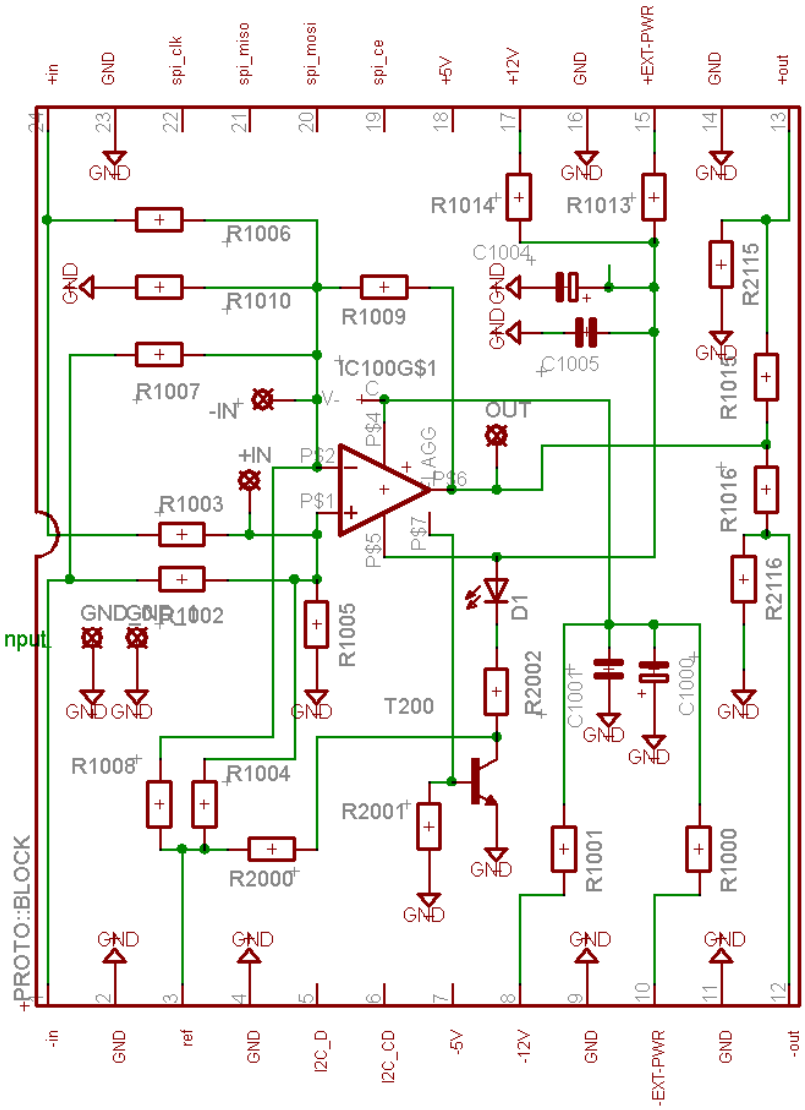


Figure 2. Power OpAmp circuit.

Components / pads	Function
R1006 / R1010 / R1007	Configuration of the inverting (-) OpAmp input
R1003 / R1002 / R1005	Configuration of the non-inverting (+) OpAmp input
R1009	OpAmp Feedback configuration
R1008 / R1004	Connection to the application-defined REF input
-IN / +IN / OUT	Through-hole pads for external feedback components
R2116 / R1016, R1015 / R2115	Output routing
R1013 / R1014	Positive supply selection: +12 V or +PWR
R1000 / R1001	Negative supply selection: -12 V or -PWR
R2000 / R2001 / R2002	Device fault detection, not used yet
T200 / D1	

3) Configuration Notes

The PCB supports non-inverting, inverting and differential amplifier configurations by changing the resistor population.

Non-inverting amplifier: The input signal is applied to the non-inverting input. R1010 and the feedback resistor R1009 determine the voltage gain.

Inverting amplifier: The input signal is applied to the inverting input through R1006 or R1007. The non-inverting input is normally connected to GND through R1005.

Differential amplifier: Both analog inputs are used. The resistor ratios determine the differential gain and should be matched accordingly.

The REF input provides an application-defined reference potential for the amplifier circuit. It can be used to shift the signal reference from ground to another voltage, for example to establish a virtual ground in single-supply applications or to add a defined DC offset to the output signal. R1008 and R1004 allow the REF input to be connected to the appropriate nodes of the amplifier circuit.

External feedback components may be connected between the −OPAMP and OUT-OPAMP through-hole pads, either in addition to or instead of R1009.

Configuration	**Populated components**
Non-inverting, IN-	R1002 / R1010 / R1009
Non-inverting, IN+	R1003 / R1010 / R1009
Inverting, IN-	R1007 / R1005 / R1009
Inverting, IN+	R1006 / R1005 / R1009
Differential (IN+) - (IN-)	R1002 / R1005 / R1007 / R1009
Differential (IN-) - (IN+)	R1003 / R1005 / R1006 / R1009

Configuration Output	**Populated components**
out+	R1015
out-	R1016

Configuration Power	**Populated components**
+12 V	R1014 / C1004 / C1005
+PWR	R1013 / C1004 / C1005
-12 V	R1001 / C1001 / C1000
-PWR	R1000 / C1001 / C1000

Configuration Reference	**Populated components**
REF	R1008 or R1004

4) TO-220 Power-OpAmp Prototype Board

Pre-routed board for a power operational amplifier. The resistor and feedback positions allow application-specific amplifier configurations to be implemented without designing a dedicated PCB.

Ordering Information: ABL-PAO-12-U1-TO-220

5) Populated Function Modules

The populated Function Modules use the same configurable circuit as the Prototype Boards. Their factory configuration can therefore be modified by changing the corresponding resistor and capacitor positions.

Operating Limits:	Refer to the datasheet of the installed OpAmp.	
Common population:	C1005 / C1001:	1.5 µF / 35 V tantalum
	C1004 / C1000:	0.47 µF / 100 V 1206, X7R

5.1) TO-220 Power OpAmp Module

Configuration:	Voltage amplifier: +IN, +OUT
OpAmp:	IC1: OPA452
Resistors:	R1006, R1010: 10 kΩ / R1009, R1005: 910 kΩ
Gain:	10 ±5%
Bandwidth:	250 kHz (-3 dB)
Supply:	±PWR / R1000 / R1013: Ferrite 1K @ 100MHz
Ordering Information:	ABL-MAO-12-U1-TO-220-OPA452G10

6) Module Interface and Pin Assignment

The module interface consists of 24 contacts. The four corner contacts are the principal analog signal connections. The signal names IN and OUT describe their usual purpose; an individual module may use these analog contacts in the opposite direction.

Pinout

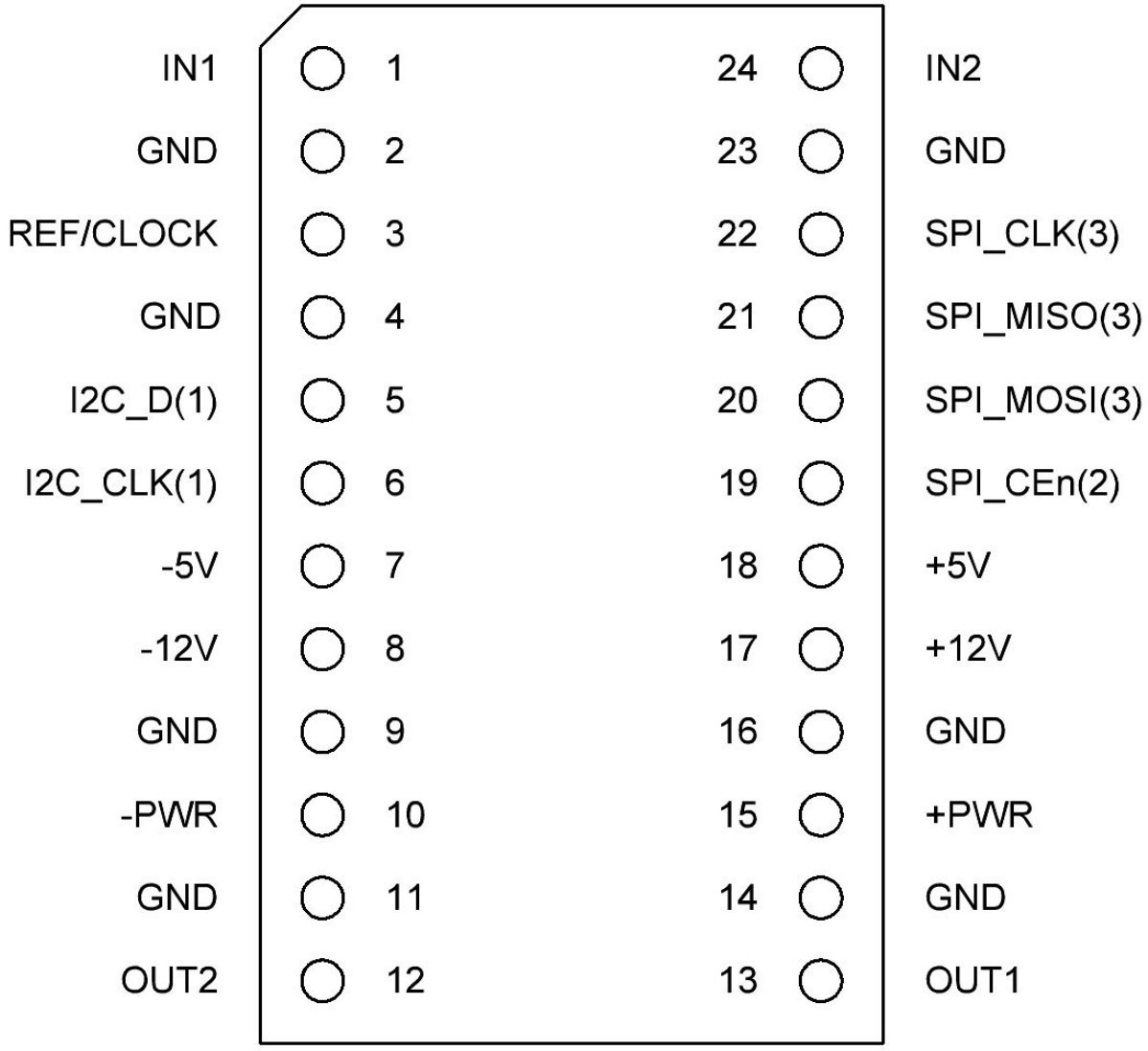


Figure 3: 24-pin analog::blocks module interface, top view.

History:

Revision	date yy/mm/dd	Changes
1.0	26/10/04	Initial.