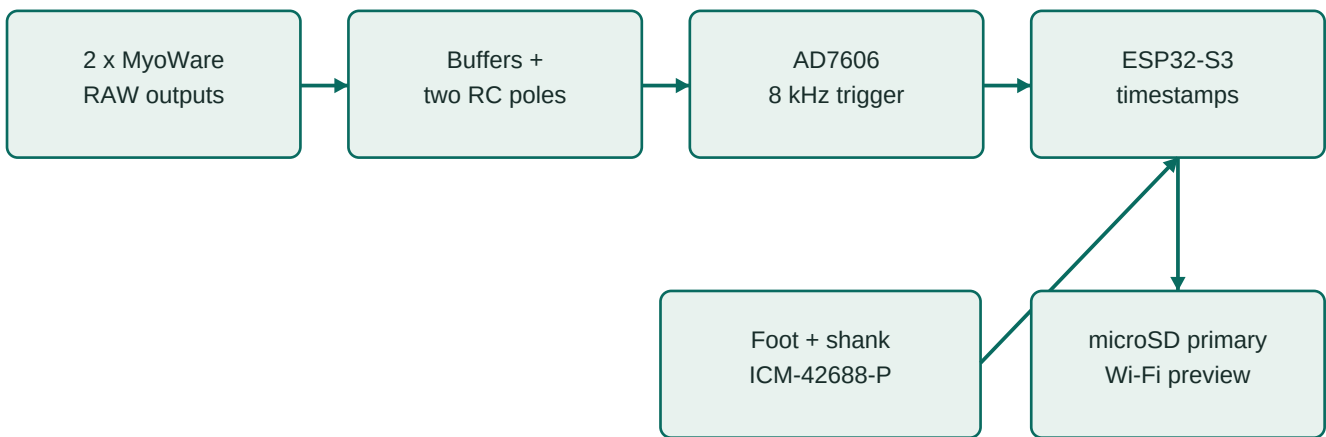


Circuit diagrams

AD7606 / fixed two EMG channels / ICM-42688-P

Muttakin Rahman | 7 October 2026

This pack combines a functional bench interface map with the exact KiCad recorder schematic. The final sheet retains its original large vector page: zoom to read component values, pin numbers and nets. It is not an A4 wiring poster.



Functional paths only; not physical header positions.

How to use this pack

Use the next page to identify signals. Use the assembly workspace and contact-level wiring tables for physical module header positions. Use the final KiCad sheet for the custom PCB circuit, passive components, protection, decoupling and connector numbering.

The bench uses an ESP32 DevKit and regulator / ADC / IMU modules; the custom PCB uses the ESP32 module and ADC chip directly. GPIO identity is not the same as package pad number or DevKit header position. SD CMD differs between the two firmware profiles.

Engineering prototype. Physical module straps, voltage levels and reference must be measured before connecting ESP32 signal pins. No hardware performance or human-use safety is certified by this drawing.

Bench interface map

Function	ESP32 GPIO / rail	Destination / condition
ADC supply	Regulated 5 V / GND	AD7606 module power; VIO separately at 3.3 V
Conversion trigger	GPIO11	CVA and CVB together
ADC status / reset	GPIO8 / GPIO9	BUSY / RST
ADC serial control	GPIO10 / GPIO12	CS / RD-SCLK
ADC data	GPIO13	DOUTA (DB7 in serial mode); 128 clocks for eight words
ADC static settings	Defined straps	Serial mode; +/-5 V; oversampling off. Verify module strap location.
EMG1 / EMG2	3.0 V analog, GND, RAW	Two matching buffered two-pole RC paths to V1 / V2; V3-V8 defined at ground
IMU shared SPI	GPIO4 / 5 / 6	MOSI / MISO / SCLK
Foot IMU	GPIO7 / GPIO16	CS / interrupt; 3.3 V and ground
Shank IMU	GPIO15 / GPIO17	CS / interrupt; 3.3 V and ground
microSD	GPIO39 / 40 / 47	Bench CLK / D0 / CMD; PCB CMD uses GPIO38
Controls	GPIO18 / 21	Button / active-low USB-present detection
Indicators / battery	GPIO41 / 42 / 2; GPIO1	Record / error / low LEDs; battery-divider sense

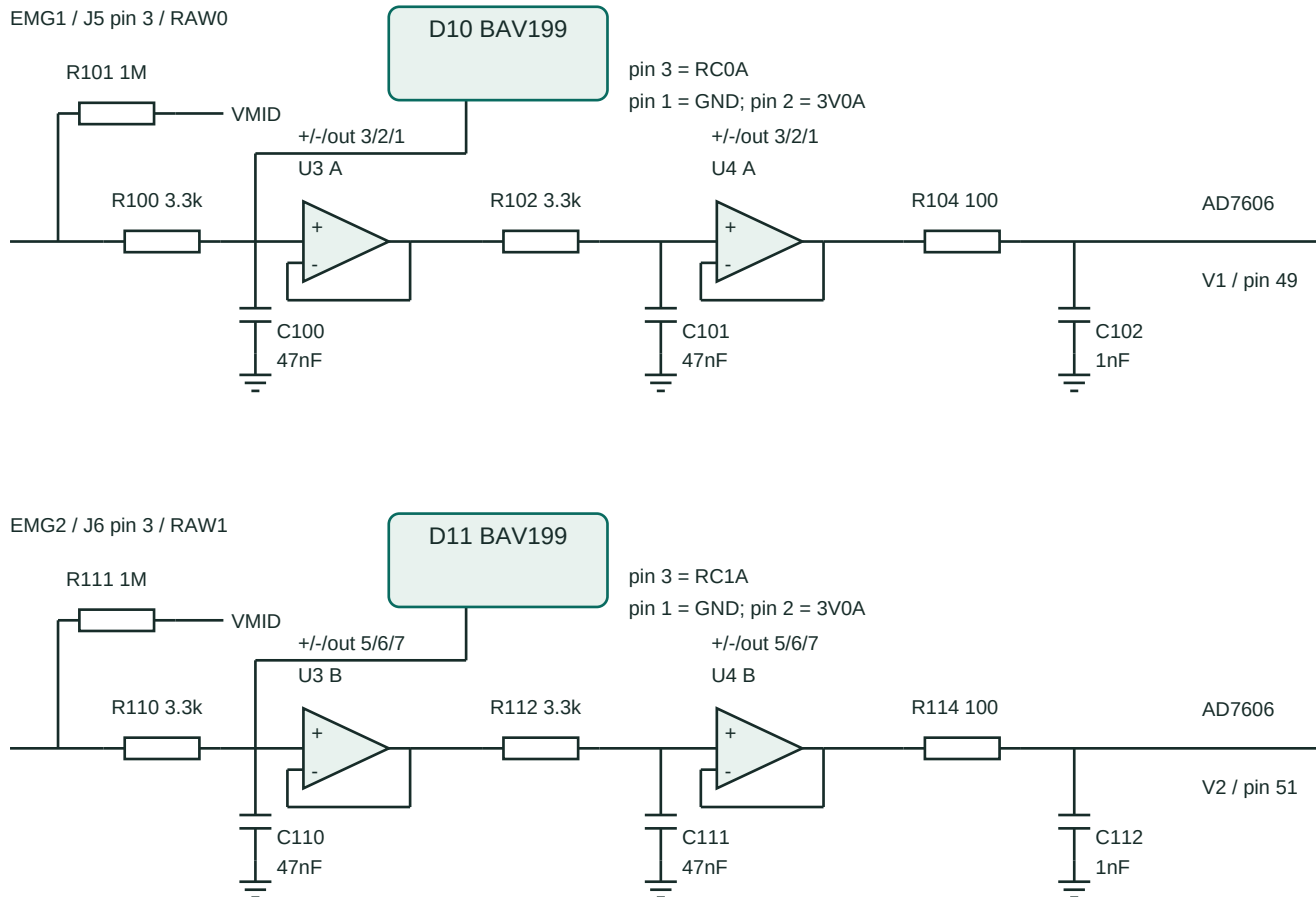
Connector reference

PCB J3/J4: 1=3.3 V, 2=GND, 3=SCLK, 4=MOSI, 5=MISO, 6=CS, 7=INT, 8=GND. J5/J6: 1=3.0 V analog, 2=GND, 3=RAW. These are recorder connector numbers, not the external carrier header numbering.

Source: hardware/main/afo_revb_main.kicad_sch; schematic SHA-256:
986421596255436480984f6841f94ff47ef9eff8552750a3031fa5ae14021c49

Two EMG input circuits

Electrical reading diagram derived from circuit-spec.json. Named nets join the same electrical node. Component references and amplifier pins below are the PCB references; breadboard DIP packages use their own contact tables.



Supply and unused amplifiers

U3 and U4: pin 4 = 3V0A, pin 11 = GND, each with 100 nF local bypass (C33/C34). Unused sections: pin 10 = GND, pins 9/8 joined; pin 12 = GND, pins 13/14 joined. J5/J6 pin 1 = 3V0A and pin 2 = GND. All filter capacitors return to the common ground.

The clamp diagram states the BAV199 pin connections explicitly; it does not establish protection performance. Use the selected package pinout and polarity. Confirm the received AD7606 module pin map before wiring.

Midpoint and ADC connections

Midpoint circuit

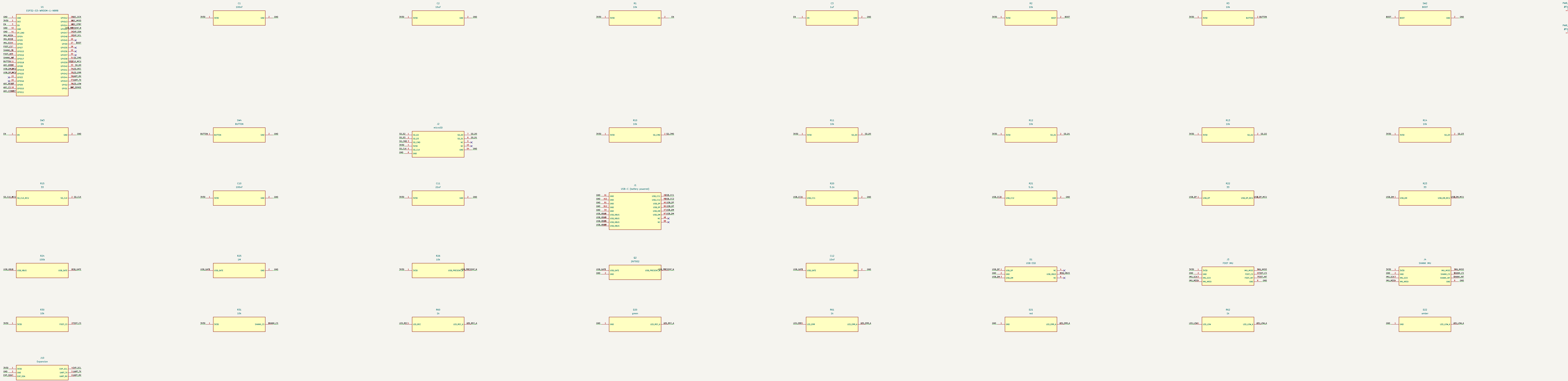
Element	Connection	Purpose
R40 / R41: 10k each	3V0A -> R40 -> VMID_DIV -> R41 -> GND	Nominal half-supply divider
C30: 1 uF	VMID_DIV to GND	Divider filtering
U5 MCP6001	Pin 3 VMID_DIV; pins 4 and 1 VMID_BUF; pin 5 3V0A; pin 2 GND	Unity-gain midpoint buffer
R42: 100 / C31: 1 uF	VMID_BUF -> R42 -> VMID; C31 VMID to GND	Reference isolation and filtering
C32: 100 nF	3V0A to GND at U5	Local supply bypass
R101 / R111: 1M	RAW0 / RAW1 to VMID	Defined bias with sensor unplugged

AD7606 chip static connections

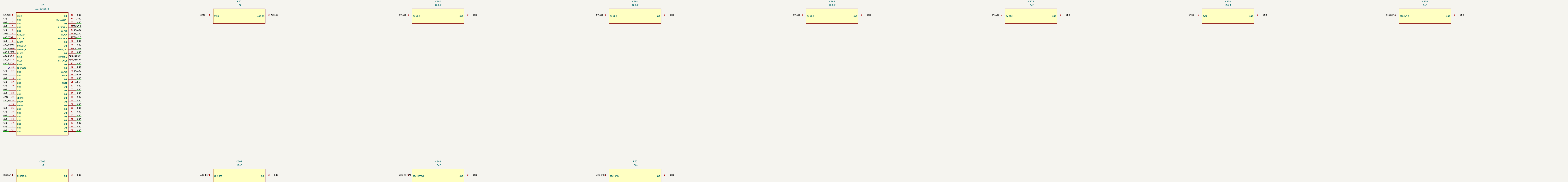
Signal	Chip pin / connection	Interpretation
AVCC / VDRIVE	1,37,38,48: 5V_ADC; 23: 3V3D	Analog supply and interface voltage are separate
PAR/SER / STBY / RANGE	6: 3V3D; 7: 3V3D; 8: GND	Serial operation, normal operation, +/-5 V
OS0 / OS1 / OS2	3,4,5: GND	Oversampling disabled
CONVST A / B	9,10: ADC_CONVST	Simultaneous trigger
RST / RD / CS / BUSY	11 / 12 / 13 / 14	Reset / SCLK / chip select / conversion status
DOUTA / DOUTB	24: ADC_MISO; 25 unused	Single-output eight-word read
Reference select	34: 3V3D	Internal reference enabled
Analog input pair	49: AIN0P; 51: AIN1P; 50,52 GND	Two retained channels
Other analog inputs	53-64: GND	Unused input and return pins defined

See the following original KiCad sheet for reference capacitors, both REGCAP nodes, supply bypassing, every remaining digital pin, switching regulators, USB, SD, buttons and indicators. This summary supplements that sheet; it is not a replacement for its complete netlist.

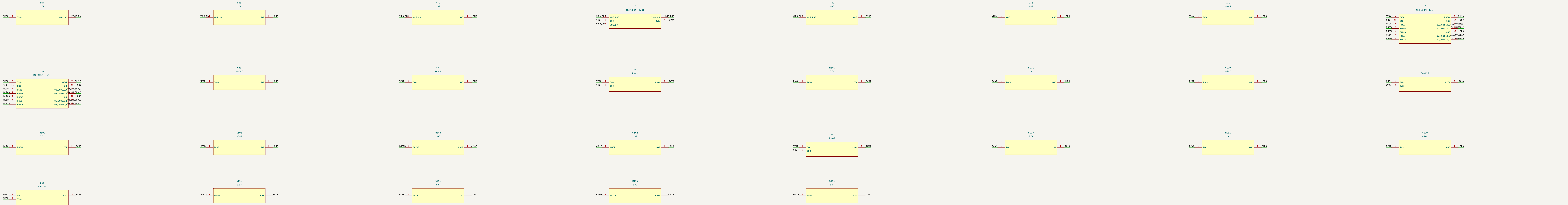
DIGITAL



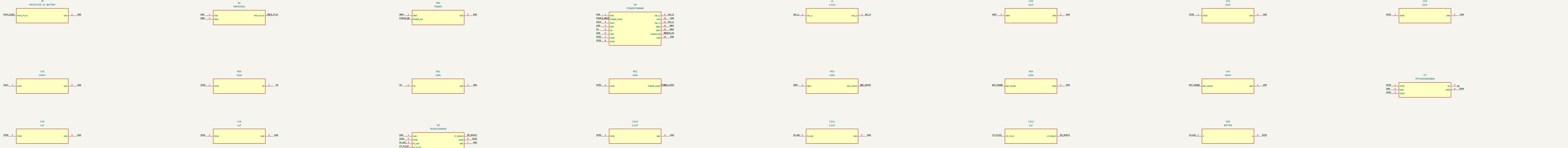
ADC



ANALOG



POWER



MECHANICAL

