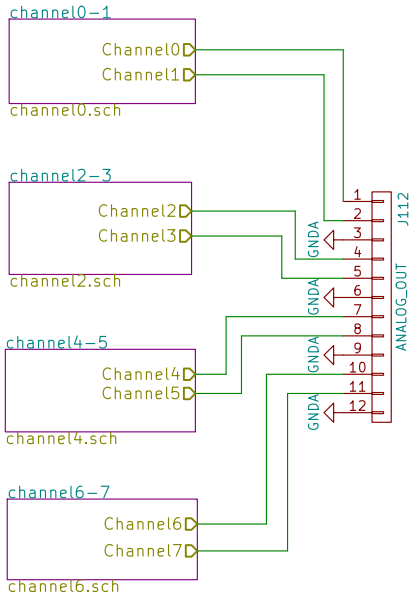
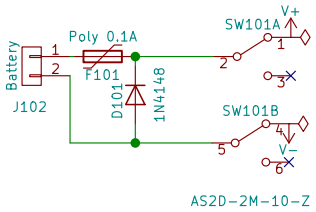
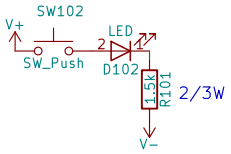
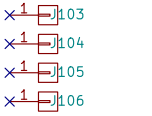


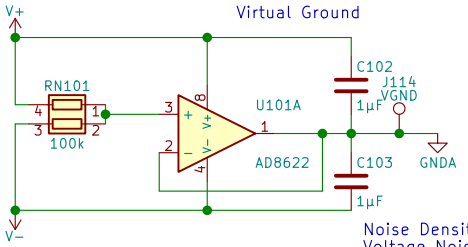
Battery Voltage: 5–30V
Output is ±Vbatt/2





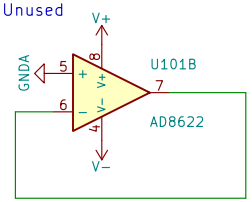
Mounting Holes





Noise Density: 12nV/√Hz
Voltage Noise (0.1–10Hz): 0.2µV p–p
Drift: <1.2µV/°C
Supply Current: <250µA

Unused



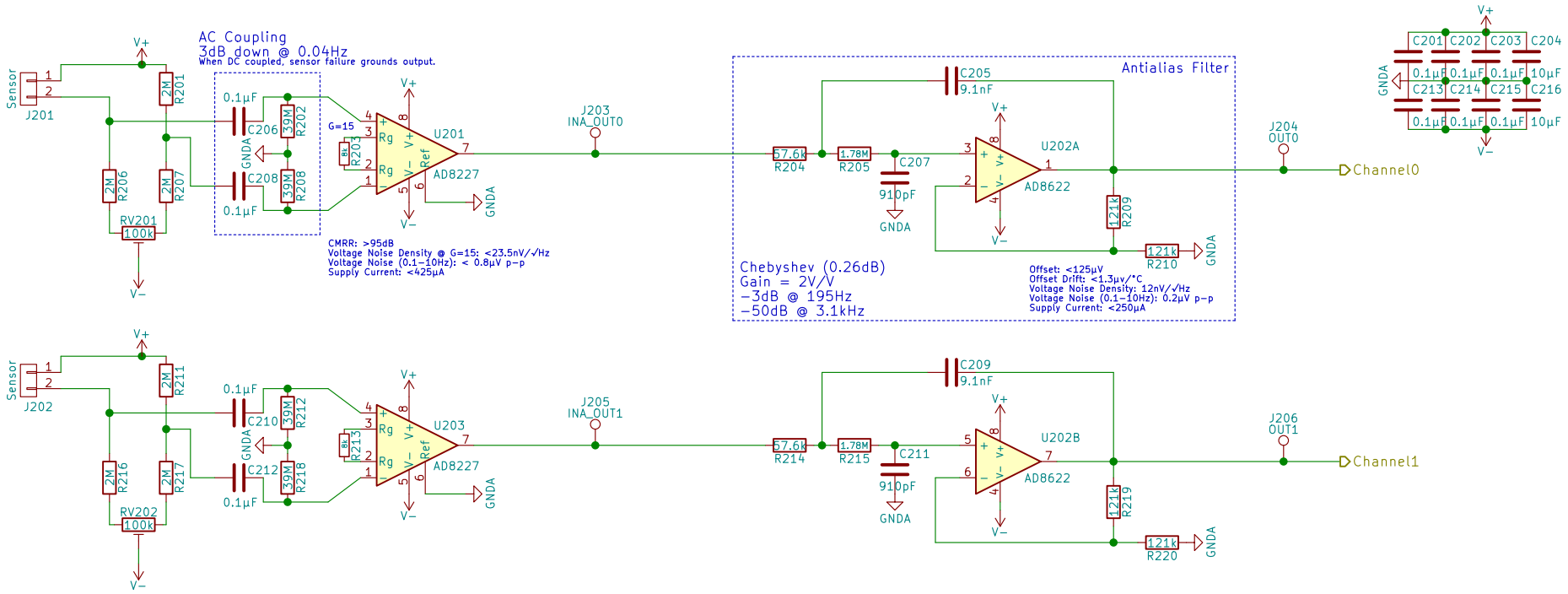
Supply Current: <250µA

Monadnock Systems

Sheet: /
File: bmi-8ch.sch

Title: Polymer Sensor Amplifier

Size: USLetter	Date: 2017-03-31	**Rev: AB**
KiCad E.D.A. kicad 4.0.6		Id: 1/5



Problems:

- USB–1208FS has fixed single–ended range of ±10V
  - Drop in upgrade to USB–1608FS (16bit and variable range)
  - Mitigated initially by running on 18V via two 9V batteries.
- R202, R208, R212, R218; 39M only available in thick film.
  - More (slightly) 1/f noise and ±5% accuracy.
- AC coupling isn't optional in this design. Rhodri keen to try AC route first; add cost / complexity later if needed.

Assumptions:

- (Initial) DAQ is MCC USB–1208FS (available at BMI)
  - 11–bit, max 6250 S/sec for each channel; sequential
- Target Bandwidth: 195Hz
- Sampling Rate 6240 S/s
- Sensor resistance 2MΩ
- Respiration motion changes sensor resistance by < ±10%
- Sensor resistance changes with handling; would require at least per–subject trimming if DC coupled.

Notes:

R203, R213: 0.1%
Other R: 1%
C205, C206, C207, C208, C209, C210, C211, C212: 50V NP0
Bypass Caps: 50V X7R X5R

Open Questions:

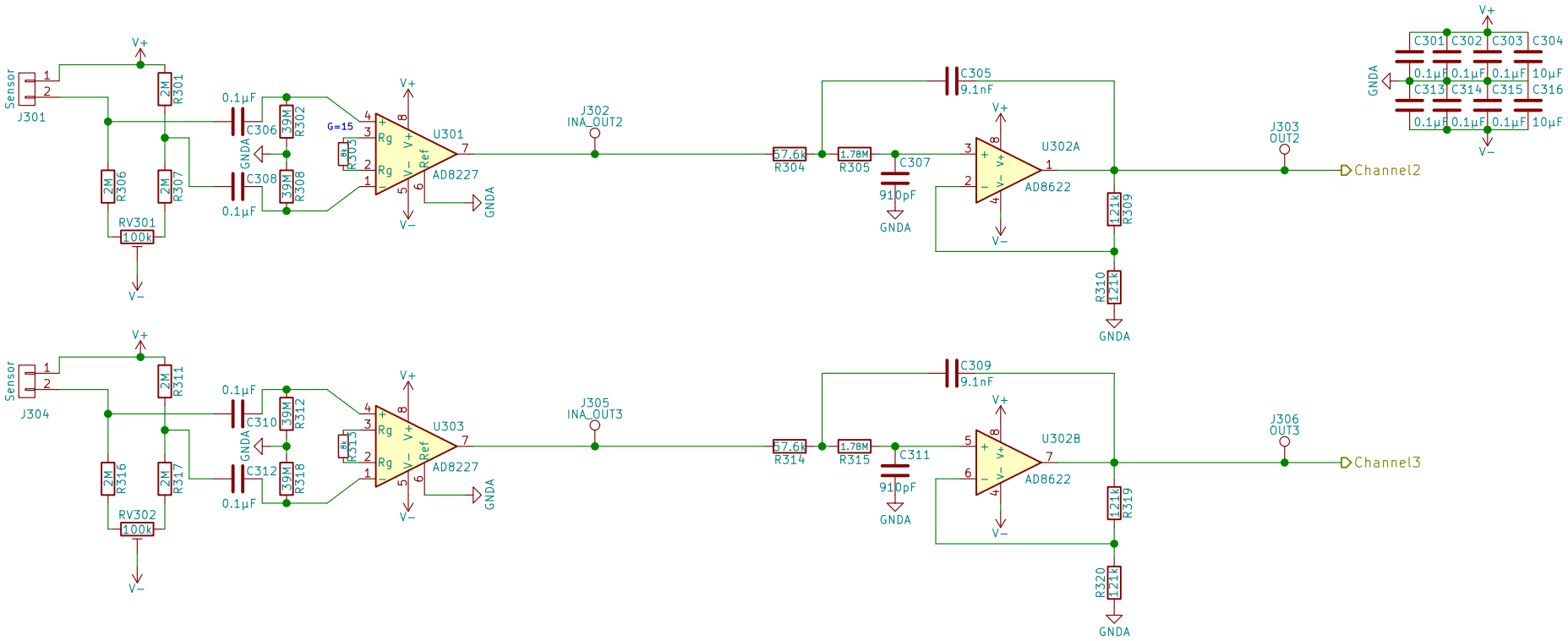
1. AC vs DC Coupling:
   - AC; no trimming, better UX, better tempco, cheaper
   - DC; captures all low–frequency signal that may be of interest
2. Use chopper amps in signal path: Probably bad
   - Lower total noise for *extremely* small bandwidths (<5Hz?)
   - Lower offset (if DC coupled)

Monadnock Systems

Sheet: /channel0–1/
File: channel0.sch

Title: Input Channel 0 & 1

Size: USLetter	Date: 2017–03–31	**Rev: AB**
KiCad E.D.A. kicad 4.0.6		Id: 2/5



Notes:

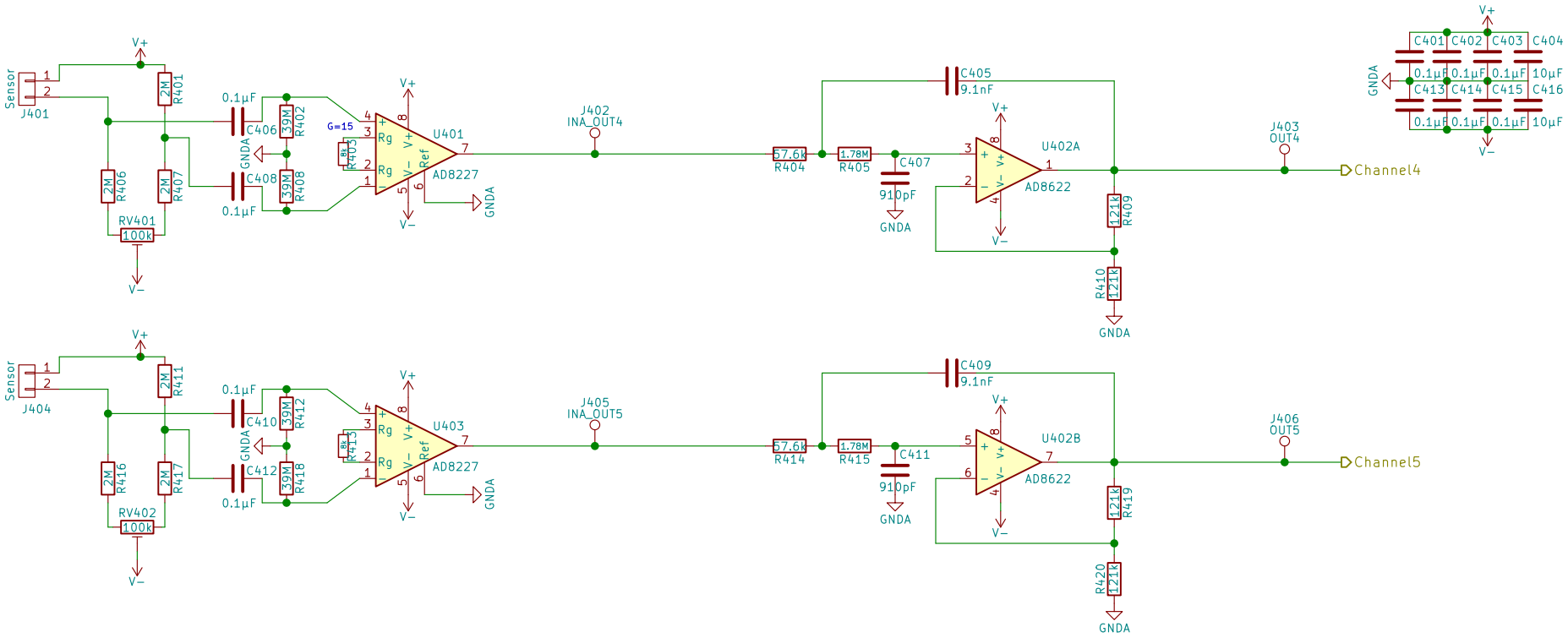
R303, R313: 0.1%
Other R: 1%
C305, C306, C307, C308, C309, C310, C311, C312: 50V NP0
Bypass Caps: 50V X7R or X5R

Monadnock Systems

Sheet: /channel2-3/
File: channel2.sch

Title: Input Channel 2 & 3

Size: USLetter	Date: 2017-03-31	**Rev: AB**
KiCad E.D.A. kicad 4.0.6		Id: 3/5



Notes:

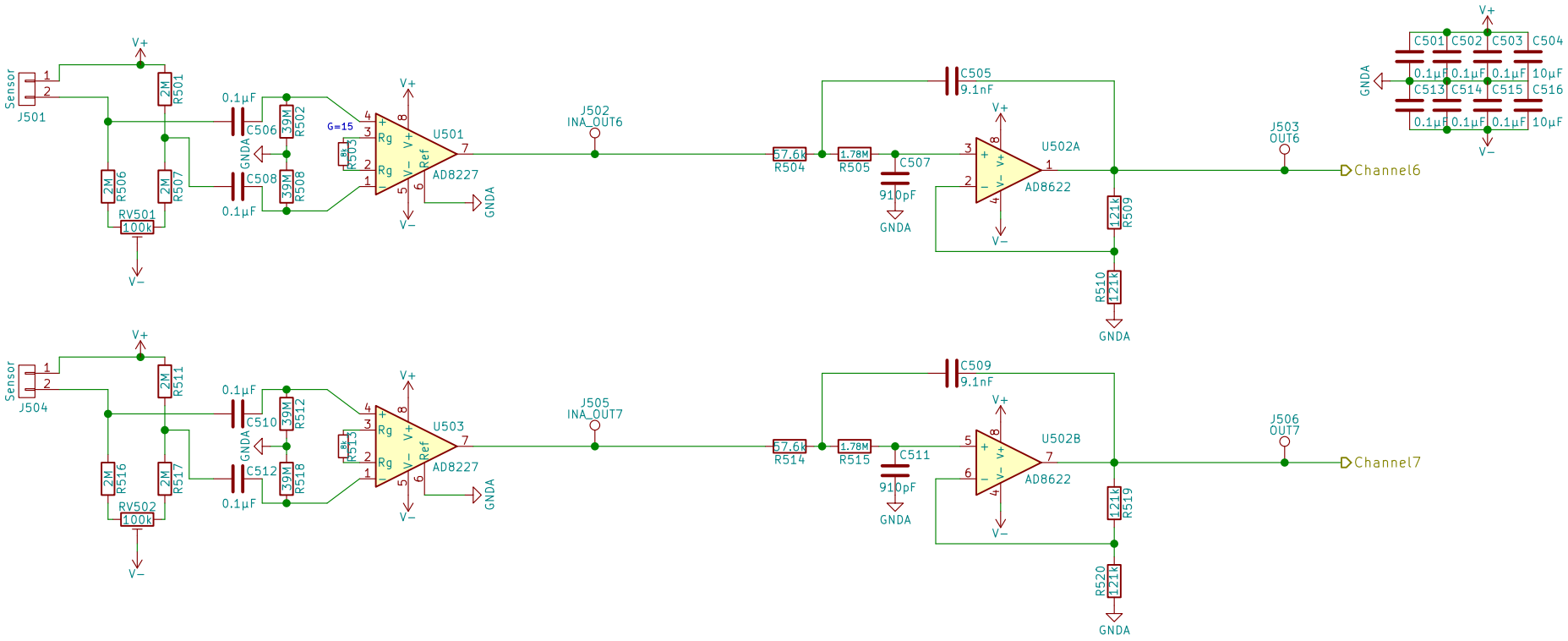
R403, R413: 0.1%
Other R: 1%
C405, C406, C407, C408, C409, C410, C411, C412: 50V NP0
Bypass Caps: 50V X7R or X5R

Monadnock Systems

Sheet: /channel4-5/
File: channel4.sch

Title: Input Channel 4 & 5

Size: USLetter	Date: 2017-03-31	**Rev: AB**
KiCad E.D.A. kicad 4.0.6		Id: 4/5



Notes:

R503, R513: 0.1%
Other R: 1%
C505, C506, C507, C508, C509, C510, C511, C512: 50V NP0
Bypass Caps: 50V X7R or X5R

Monadnock Systems

Sheet: /channel6-7/
File: channel6.sch

Title: Input Channel 6 & 7

Size: USLetter	Date: 2017-03-31	**Rev: AB**
KiCad E.D.A. kicad 4.0.6		Id: 5/5