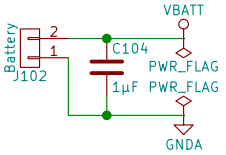
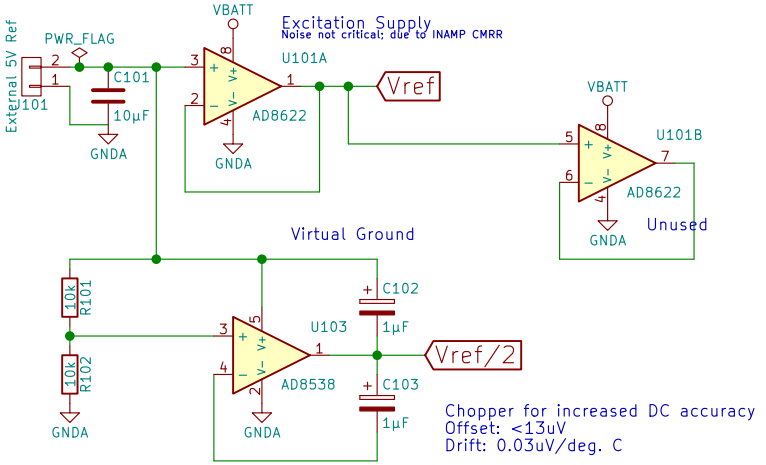
channel0-1

channel0.sch





Notes:

R101,R102: Resistor pack for good match

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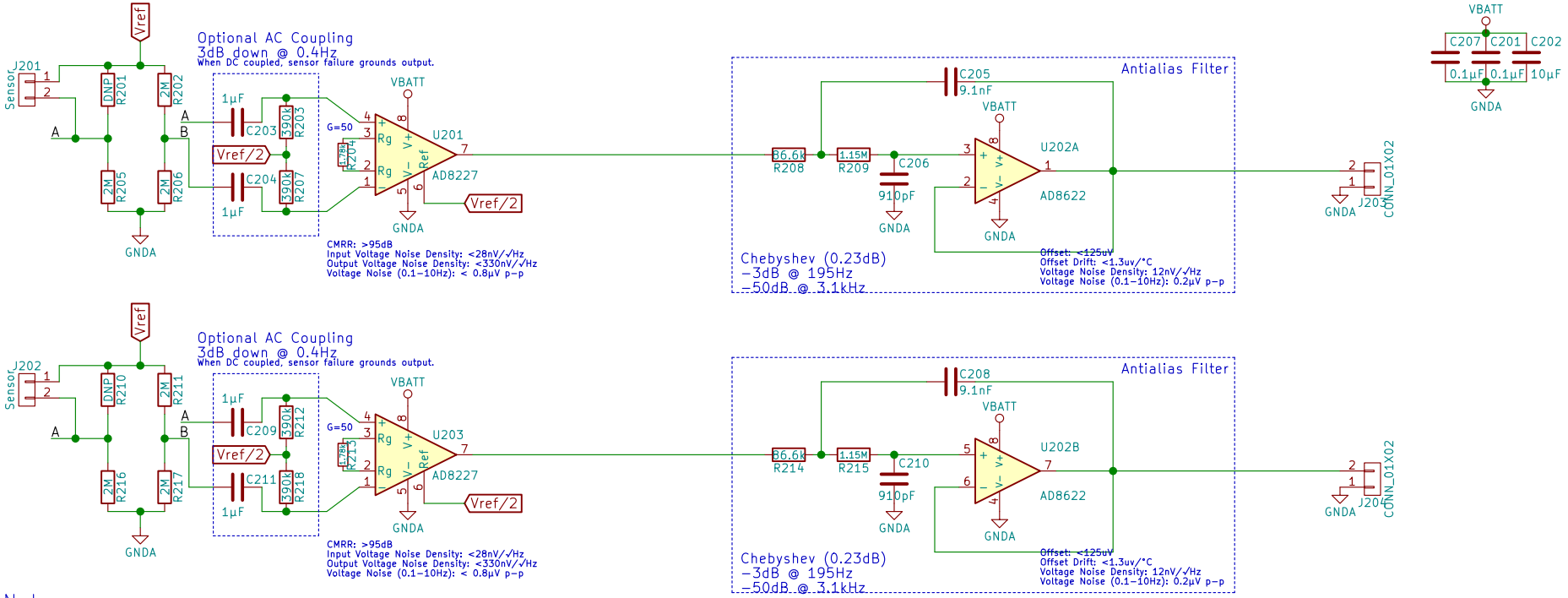

Notes:
Designed for 0–5V Output
Output can swing from AGND to VBATT (5.125–12V) in some failure modes.
May damage ADC if input range is <= VBATT

R204, R213: 0.1%
R208, R209: 1%
R202, R205, R206 & R203, R207: Metal Foil / Thin Film (Resistor packs preferred)
ALL C: 5%, 16V

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%

Analysis Notes:

1. Steep digital filter 0.4–175Hz
   - Respiration typically 0.25–0.33Hz
   - Narrower useful bandwidth likely, modeling needed.
2. Correct for temporal offset of sample due to sequential sampling.
3. 2x decimation for 13–bit (ENOB) and noise reduction

Open Questions:

1. Trimming the bridge.
   - Only makes sense w/ DC coupling
   - Bad tempco
   - Bad UX
   - Needed for significant gain
2. AC vs DC Coupling; both have advantages: AC is easier
3. Reducing R202,R203,R206,R207 to decrease Johnson noise: Probably useless.
   - Changing R202,R206 may break INAMP CMRR
4. Use chopper amps in signal path: Probably bad
   - Lower total noise for *extremely* small bandwidths (<5Hz?)
   - Lower offset (if DC coupled)
5. Driven shields for output: Probably useless
   - Reduce error due to leakage current
   - No analysis done to determine if this is significant
   - Current DAQ isn't likely to benefit

Monadnock Systems

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

Title: Input Channel 0

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