

G-Bias and Adapter Boards

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DUNE Electronics Review

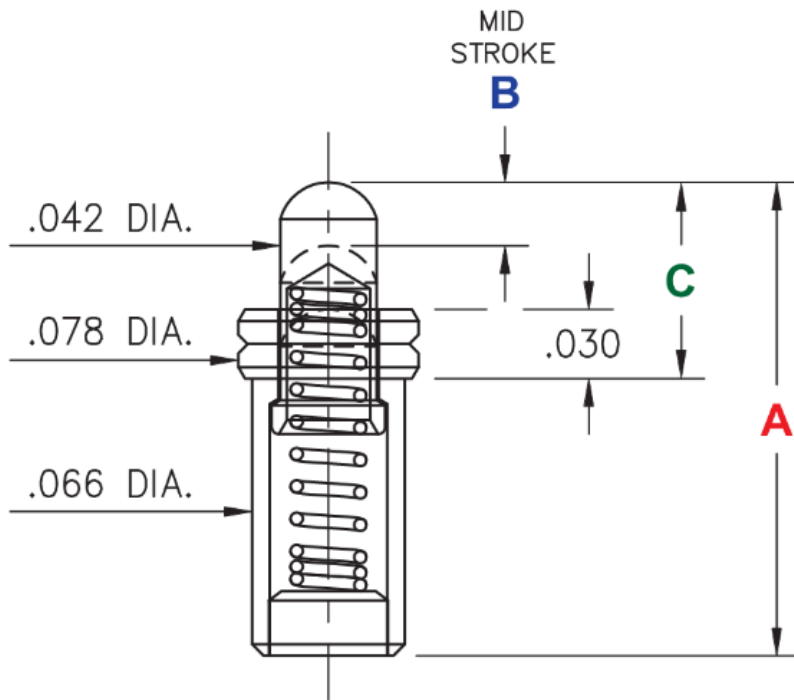
2019 November 18

G-Bias Board Features

- Mounted on G-layer head boards
- Includes a bias filter with ten 3.9-nF caps
- ProtoDUNE used twelve capacitor-resistor pairs to bias 48 wires
- DUNE uses 48 capacitor-resistor pairs to bias 48 wires (49 for boards with an extra wire)
- Board thickness 0.125 in. (3.18 mm)
- Electrical connections: spring-loaded contacts

G-Bias Board-to-Board Contacts

- Mill-Max 0921-1-15-20-75-14-11-0
- Hand-soldered through-hole components



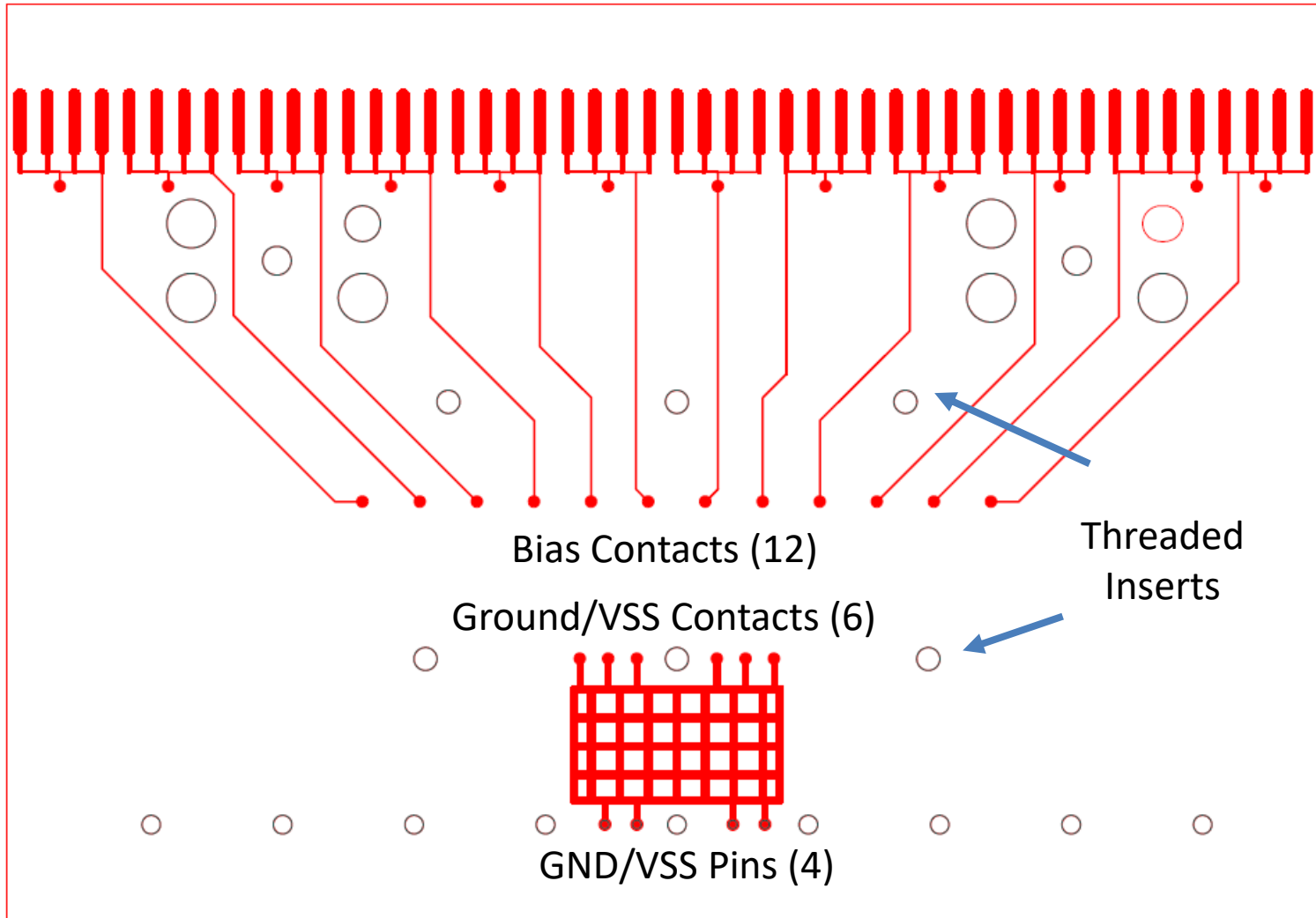
Basic Part Number	Length (A)	MID. Stroke (B)	Length (C)
* 0921-1	.205	.0275	.085

Shell: 20 μ" Gold over Nickel
 Contact: 10 μ" Gold over Nickel

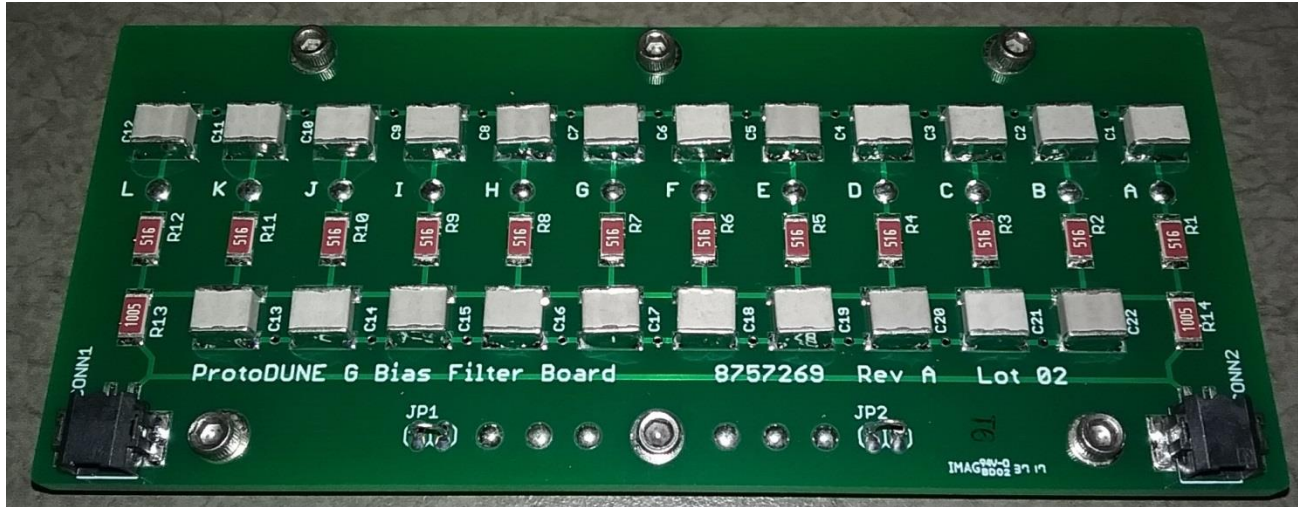
G-Bias Board-to-Board Contacts

- Spring force per contact: 1.1 N (112 grams)
- ProtoDUNE boards had 18 contacts
- Six screws applied total force of 20N (4.5 lbs)
- DUNE boards will have 55 contacts
- Four screws will apply most of the force keeping 49 contacts mated: 54N (12 lbs)
- May need to brace the board to limit flexing

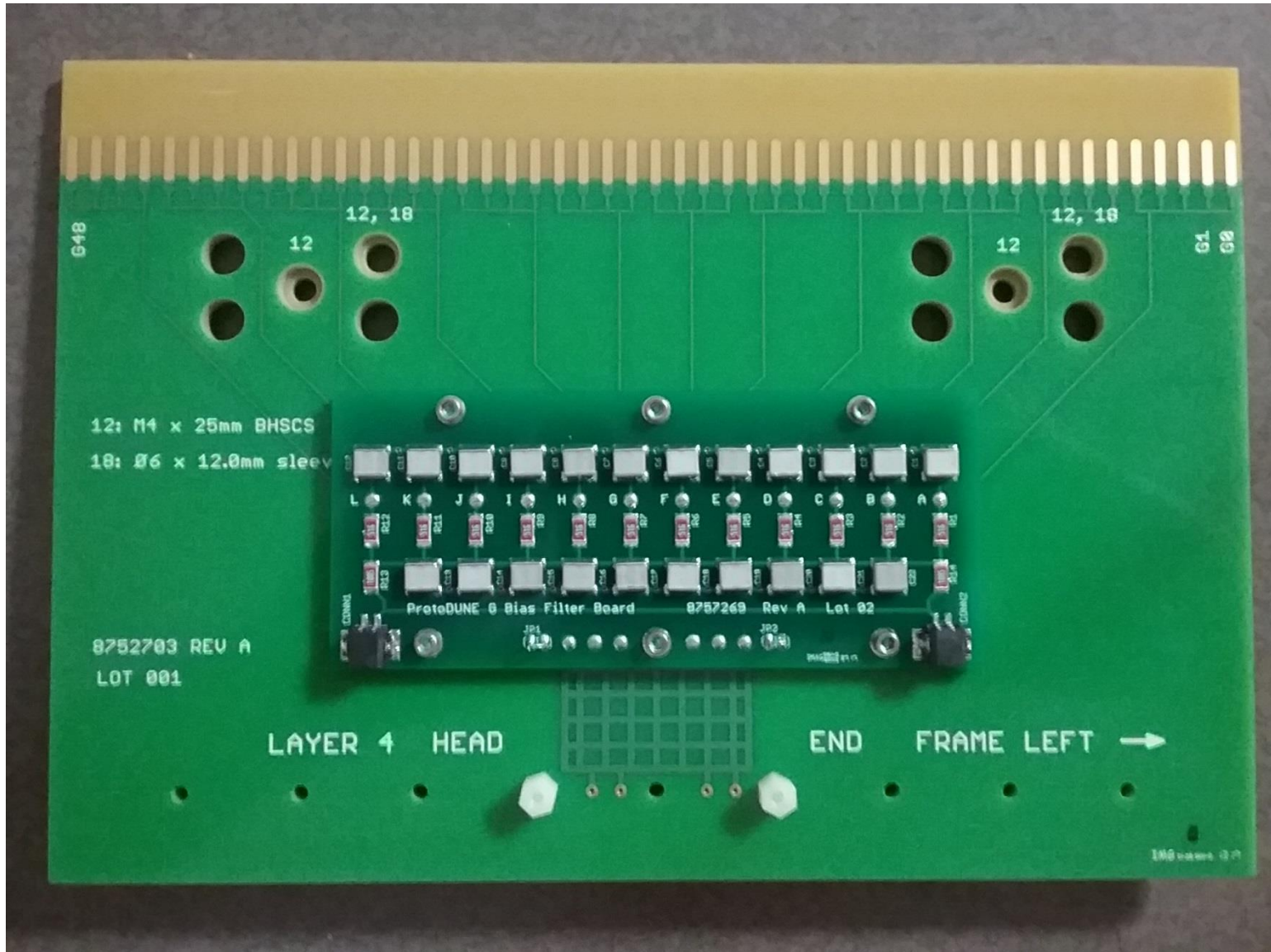
ProtoDUNE G-Layer Head Board



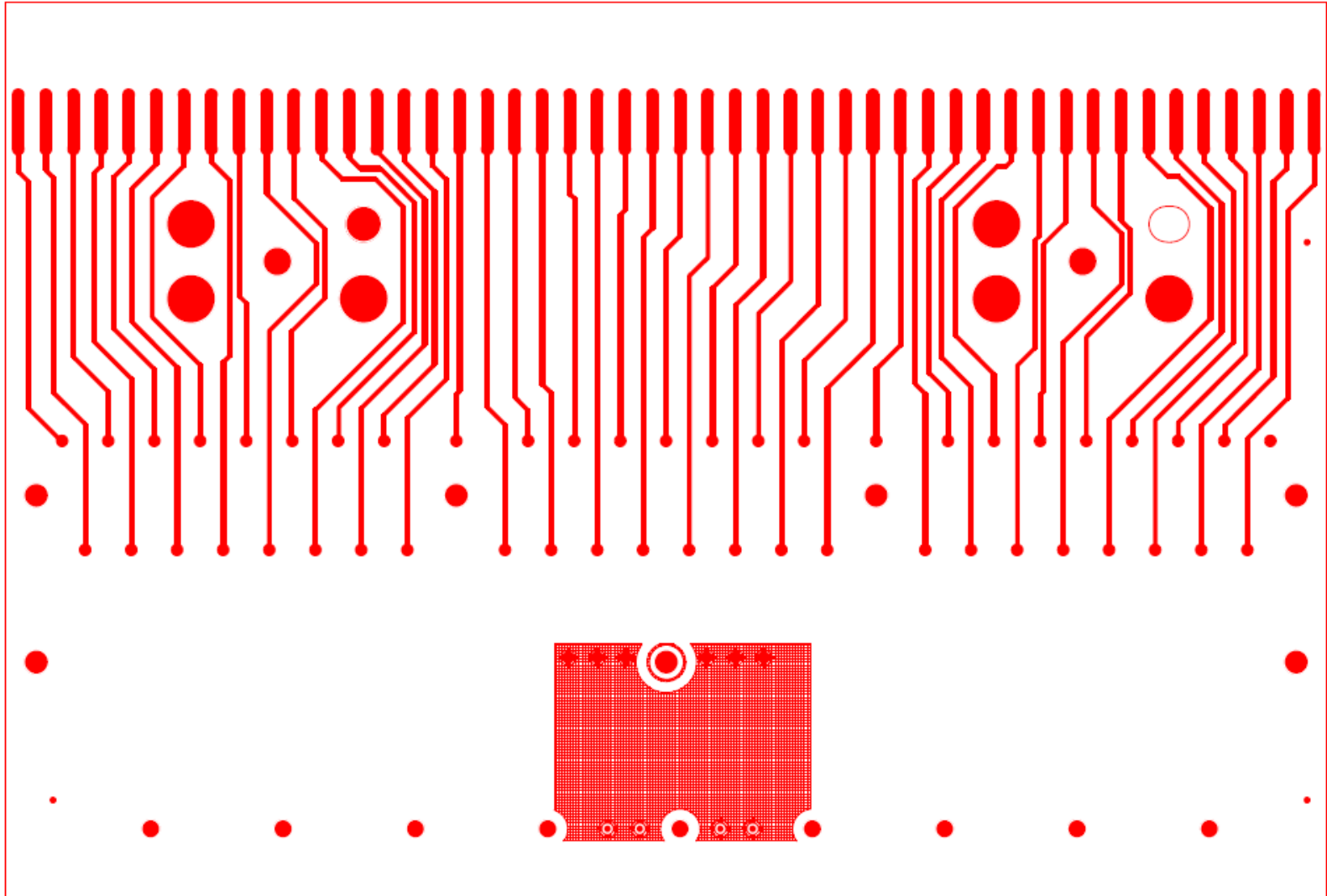
ProtoDUNE G-Bias Board



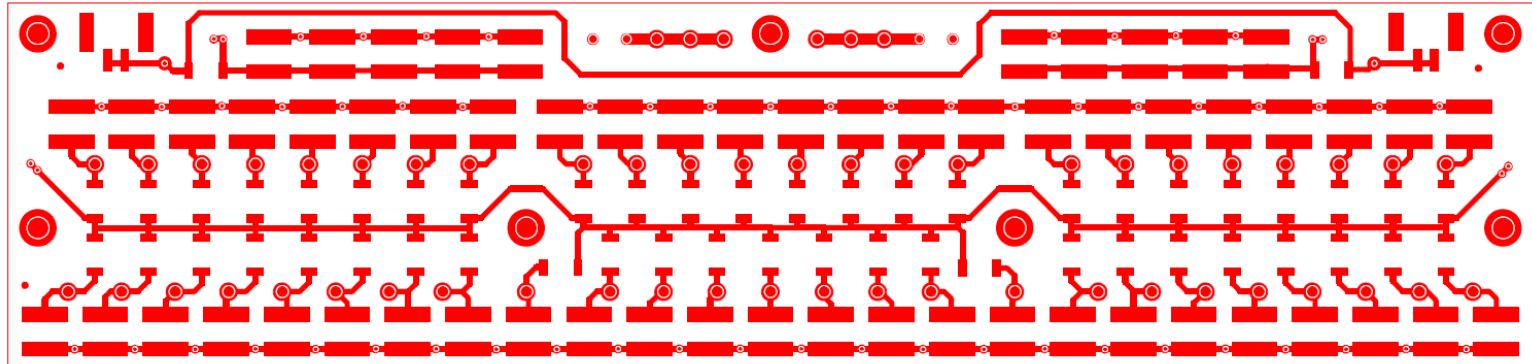
G Head Board With Bias Board



DUNE G-Layer Head Board



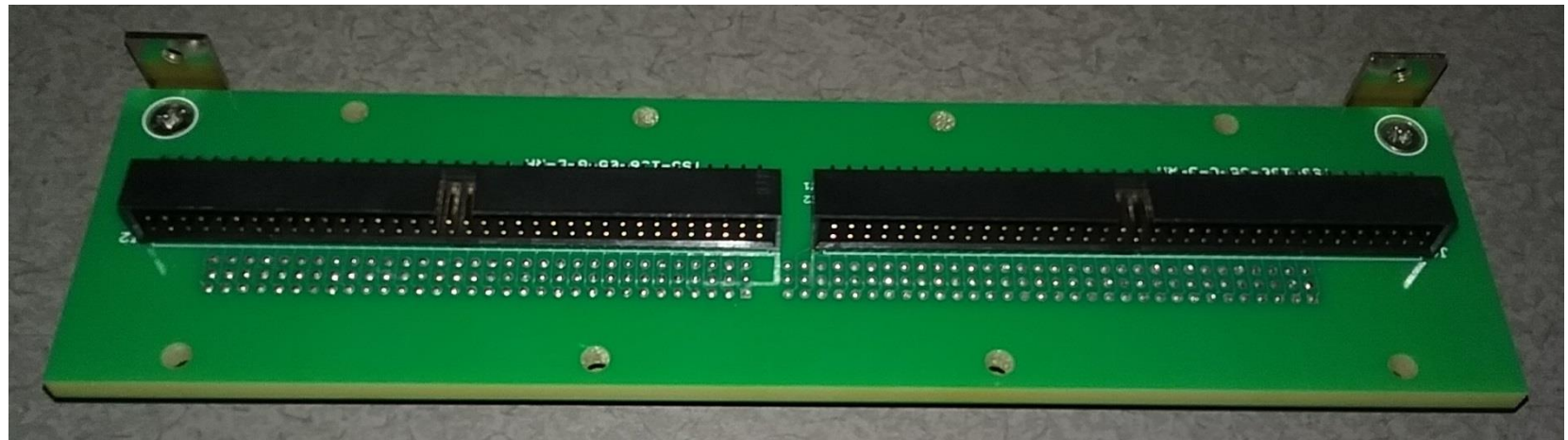
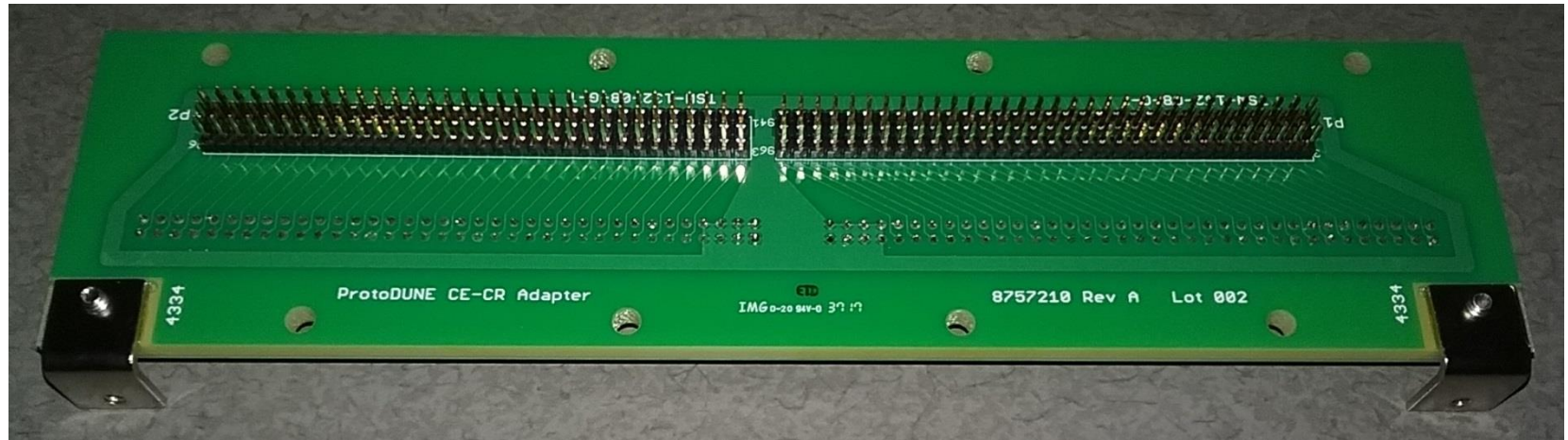
DUNE G-Bias Board



G-Bias Board Manufacturing

- Mostly handled the same way as CR Boards
- Same components and soldering process
- Only one side with components
- No through-hole components needed selective soldering
- Spring contacts are hand-soldered
- No pressed-in components

Adapter Board Design (Unchanged)



Adapter Board Manufacturing

- Boards thickness: 0.1875 in. (4.76 mm)
- Soldering by hand requires boards be heated to $\sim 150^{\circ}\text{C}$ to overcome the heat load
- Most of the solder at the surface of the board
- Empty through-holes allow connector pins to act as long levers attached to solder joints
- The only proven way to consistently fill holes is with molten solder applied from below using Wave or Selective Soldering