

The AD7745/46 capacitive input range can be changed by scaling the excitation voltage.
Scaling the excitation voltage down by factor of N, the capacitive input range is scaled up by factor of N.
 Also, the CAP DAC range is scaled up by factor of N.

Note, that the system performance, such as gain error, gain drift, offset, offset drift and noise performance, are directly affected by the performance of the excitation voltage scaling circuit. (For example, 5% tolerance resistors used for the divider will cause up to 10% gain error in the modified range.)

The pictures below show modification of the AD7745/46 standard evaluation board for a $\pm 100\text{pF}$ input range.

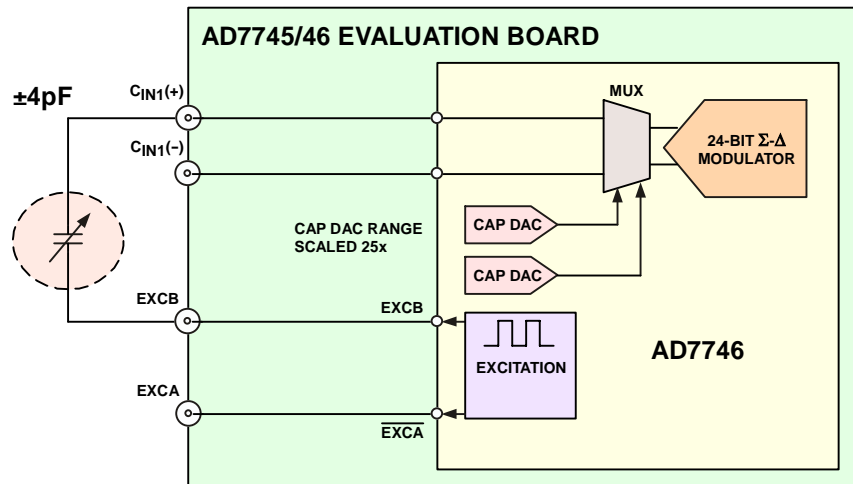


Figure 1. - The original AD7746 evaluation board configuration.

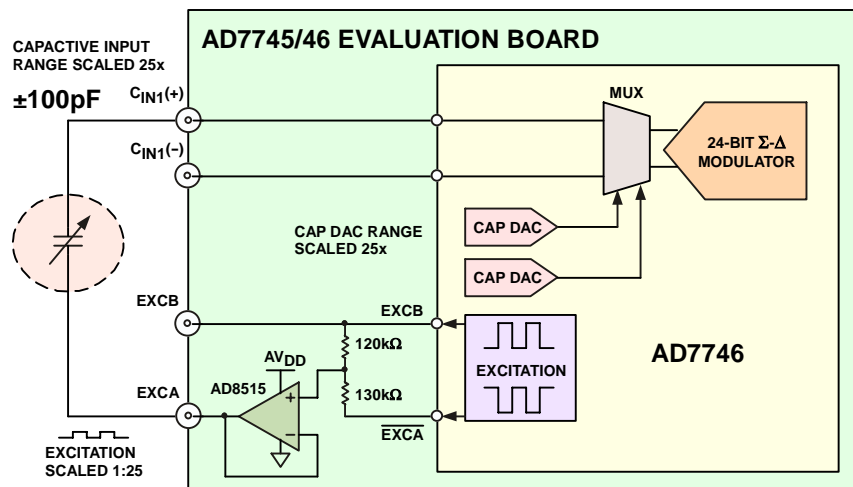


Figure 2. - Modified AD7746 evaluation board for $\pm 100\text{pF}$ range.

The AD7746 should be set for the excitation voltage enabled on the EXCB pin and the inverted excitation voltage enabled on the EXCA pin to work in the modified configuration.

Using the standard AD7745/46 evaluation software (ver.2.0.1 or later):

- Connect the modified board to the PC USB port
- Execute the AD7746 evaluation software
- Set excitation voltage EXCB, and inverted EXCA, level $\pm VDD/2$
 - Open registers summary window (Click on the “Registers” button)
 - Change the EXC setup register Hex value to 27 (It will set bits EXCB, EXCA, EXCLVL1 and EXCLVL0)
 - Write the registers and close the registers window (Click “OK” button)
- Set user units to $\pm 100\text{pF}$ full range
 - Open user units window (Click “User Units Setup” button)
 - Set the range to 100
 - Change unit to “pF”
 - Confirm and close the user units window (Click “OK” button)
- Set part to the desired mode of operation, for example Cin1, differential, 62ms conversion time
 - Open setup window (Click on “Setup” button)
 - Enable capacitive channel (Click on the Capacitive Channel Enable check box)
 - Do NOT change the EXC setup
 - Select mode of operation – Continuous conversion
 - Confirm and close the setup window (Click “OK” button)
- Start sampling
 - Select “Real Time”
 - Click “START” button”
- Connect your capacitance to between the EXCA and CIN connectors on the board
- The correct capacitance should be indicated as the User Units
- The setup can be saved into a file
 - Click “File” and “Save settings” in the main menu
 - Change the file name and location if needed
 - Confirm (Click “OK” button)
- The setup can be loaded from the file when the software with modified board is used
 - Click “File” and “Load settings” in the main menu
 - Point to the file where the settings was saved
 - Confirm (Click “OK” button)
 - The acquisition can be started directly (click “START” button)

More tips:

- A small offset can be calibrated out using Cap Offset Cal mode from setup menu
- The exact input range can be calibrated either using the Cap Gain Cal mode (the AD7746 then provides the scaling) or adjusting the user units to match exactly (software does the scaling)
- In the single ended mode, the input range can be shifted from $\pm 100\text{pF}$ to $0..200\text{pF}$ using CAPDAC

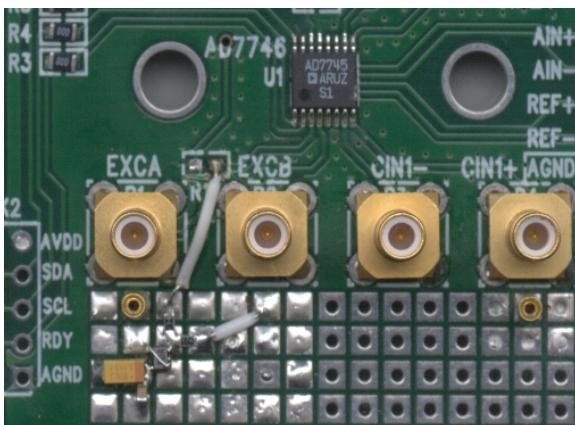


Figure 3. - Modified AD7746 EVB – Component side.

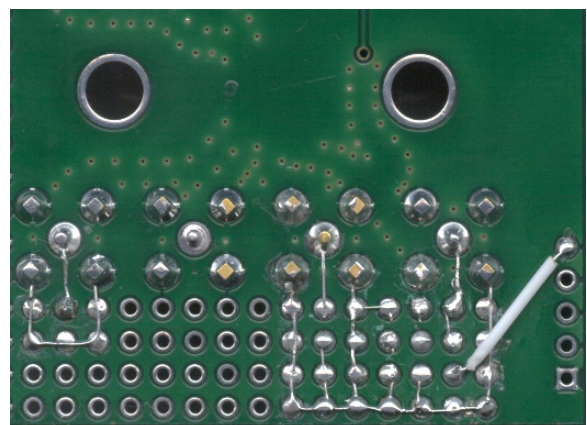
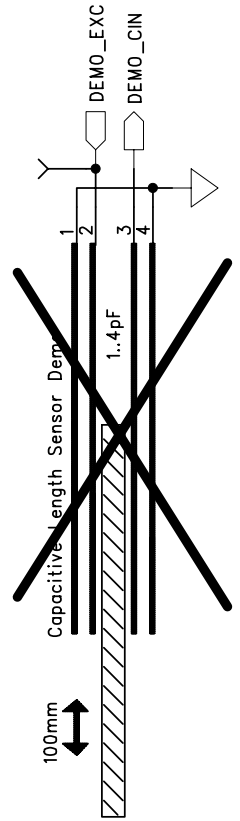
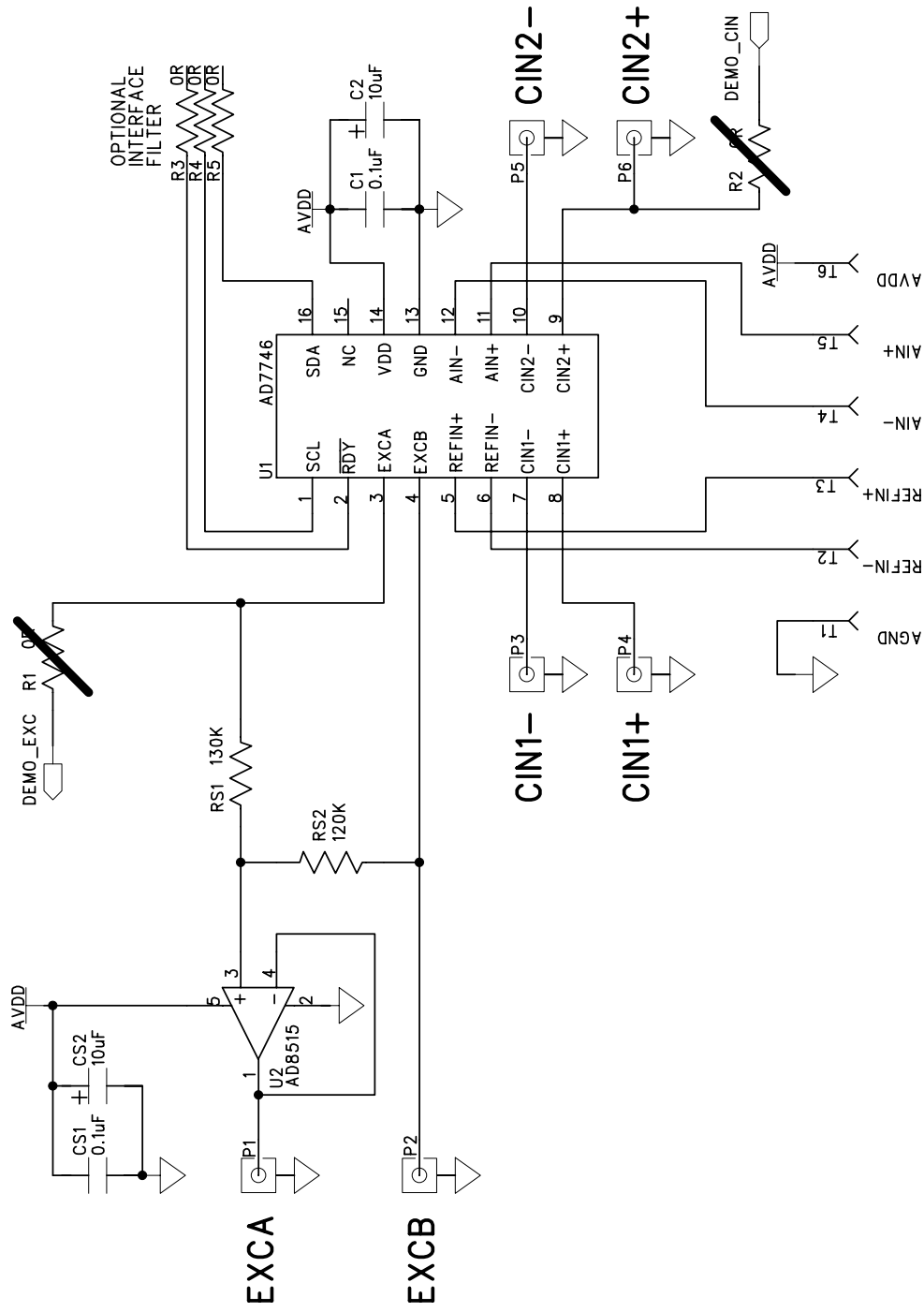


Figure 4. - Modified AD7746 EVB – Solder side



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EVAL-AD7745/46EB

Modification for +/-100pF, 30 Mar 2005
Instrumentation Converter Applications