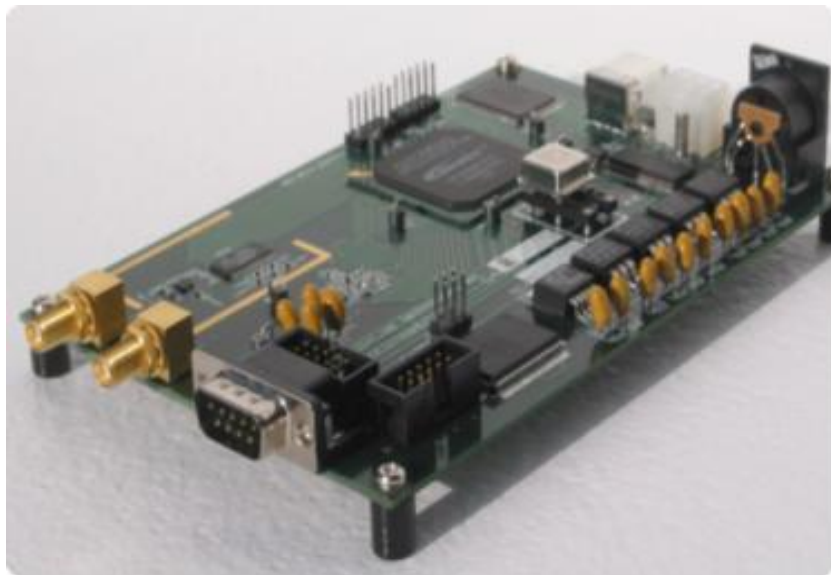




RadioProcessor™ USB

Low Frequency Operation Manual



SpinCore Technologies, Inc.
<http://www.spincore.com>

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I. Preparing the Board for DC Operation

The receiver of the RadioProcessor is capacitively coupled, leading to attenuation at low frequencies. To operate at low frequencies, it is necessary to remove the capacitor (C680) at the input of the RadioProcessor. Illustration 1 below shows the location of C680.

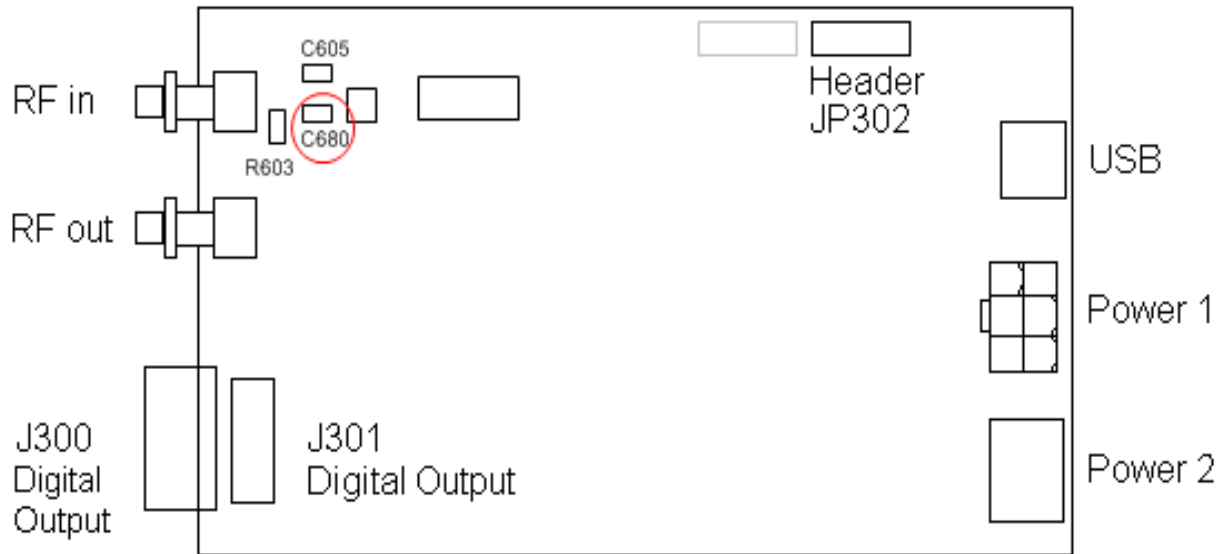


Illustration 1: Location of C680

NOTE: Removing the capacitor at C680 will introduce a DC offset in measured values when the receiver is loaded. See the section below on handling the DC offset.

To prepare the board for DC operation, please follow the following steps:

1. Carefully remove capacitor C680 from the receiver of the RadioProcessor (see Illustration 1 above for the location of C680.)
2. Connect the pads at C680 using either a small piece of wire or solder.
3. Verify continuity between R603 and connection created in step 2.
4. Verify that there is no short between C680 and C605.

II. Operating at Low Frequencies

Acquisition Parameters

The filter pipeline of the RadioProcessor contains a CIC filter with a cut-off frequency of approximately 1 kHz. At low frequencies when using base-band conversion, the result of the conversion leads to spurious peaks in the pass-band of the CIC filter. To avoid these spurious peaks, it is necessary to set the spectrometer frequency to 0 Hz.

DC Offset

By removing the capacitor at C680, a DC offset will be introduced into the receiver. This offset can be eliminated in software by first calculating the DC offset at the receiver when loaded by a 50 Ohm capacitor, and adjusting the values of data acquired. To remove the DC offset:

1. Terminate the RadioProcessor receiver using a 50-Ohms terminator.
2. Acquire data using at least 1024 points and a spectrometer frequency of 100 Hz.
3. In software, calculate the average value of the data captured by the RadioProcessor.
4. Modify the acquisition program to apply offset correction by subtracting the value calculated in step 3 from each point of data downloaded from the board before storing it to the FID.

III. Receiver Characteristics

Acceptable Input Voltage Range

Testing of the RadioProcessor with C680 removed showed that the receiver is linear within the tested range of 0.5V to 2.0V.

The input voltage to the RadioProcessor must be positive. To measure a range of voltages from negative to positive, introducing a DC offset that will shift the required voltage range into the linear operating region of the RadioProcessor is acceptable.

Frequency Characteristics

Illustration 2 below demonstrates the characteristics of the RadioProcessor at low frequencies. The green line represents the characteristics with capacitor C680 and the CIC filter enabled. The capacitor leads to a large attenuation at low frequencies, while the CIC filter attenuates higher frequencies.

The red line represents the characteristics of the receiver once the capacitor C680 has been removed from the receiver circuit. Once the capacitor has been removed, low frequencies down to DC can be acquired by the RadioProcessor. The CIC filter was enabled for this test, leading to attenuation at higher frequencies.

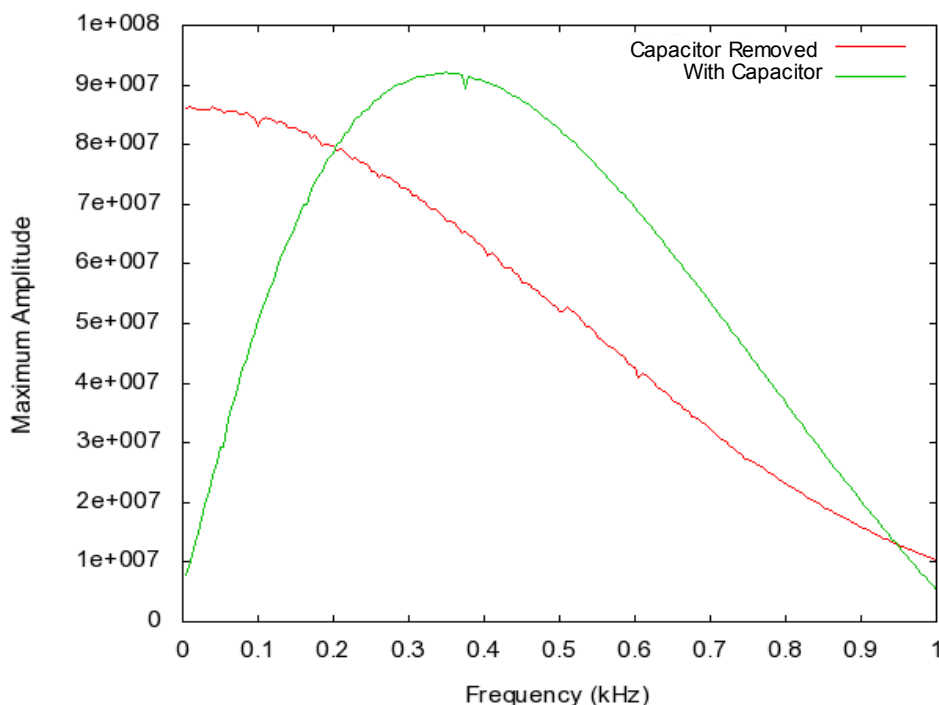


Illustration 2: Low frequency characteristics of the RadioProcessor receiver.

The data shown in Illustration 2 was collected by performing scans and taking the maximum magnitude point acquired for each frequency. The spectrometer frequency was set to 0.0 Hz, and the spectral width was set to 2 kHz for each acquisition.

IV. Contact Information

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Product URL: <http://www.spincore.com/products/RadioProcessor/>