NOTES ON THE FIRMWARE

The radar is configured to transmit with one transmitter (TX1) and to receive the echoes with all four receiving antennas (RX). For each frame, two chirps are transmitted. Only the first one is processed.

Figure 1 and Figure 2 show the chirps' and frame parameters with their default values. The parameters which can be changed through the user interface are highlighted in red.

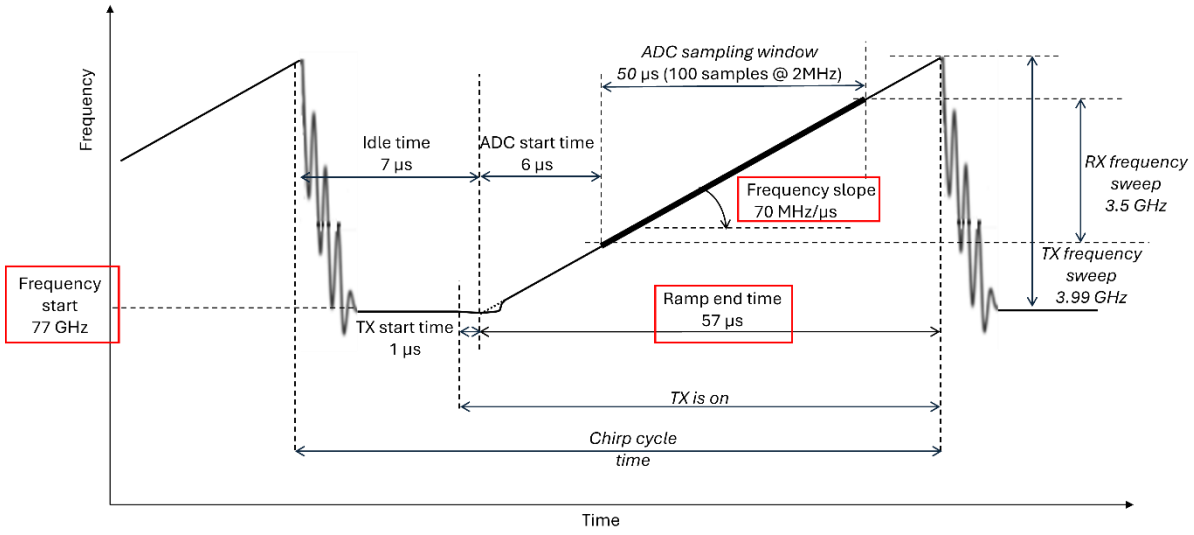

Figure 1. Parameters of the chirp with their default values. The parameters that can be changed through the user interface are highlighted in red.

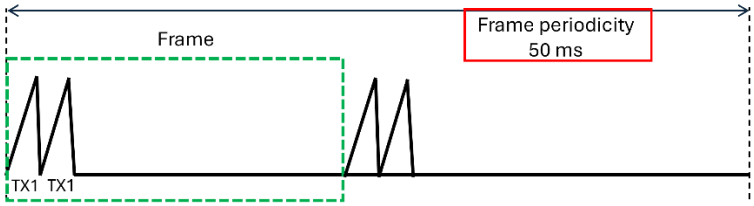

Figure 2. Structure of the frame. The periodicity can be changed through the user interface.

The goal of this version of the firmware is to transmit raw ADC data to the computer. Nevertheless, to have a clue on the correct positioning on the board and behavior of the radar, a very basic processing has been implemented. The main steps of this processing are the following:

- calculate the "range profile" by summing in magnitude the FFTs on the received signals;

- identify the target's position as the position of the maximum of the range profile, in a user-defined range;
- starting from the phase of the signal at target's position, calculate the breath and heart waveforms through unwrapping and filtering algorithms.

The breath and heart waveform are transmitted via UART to the PC as the radar starts. The transmission of range profile and ADC raw data must be enabled with the proper user interface command (see the guide dedicated to the user interface).