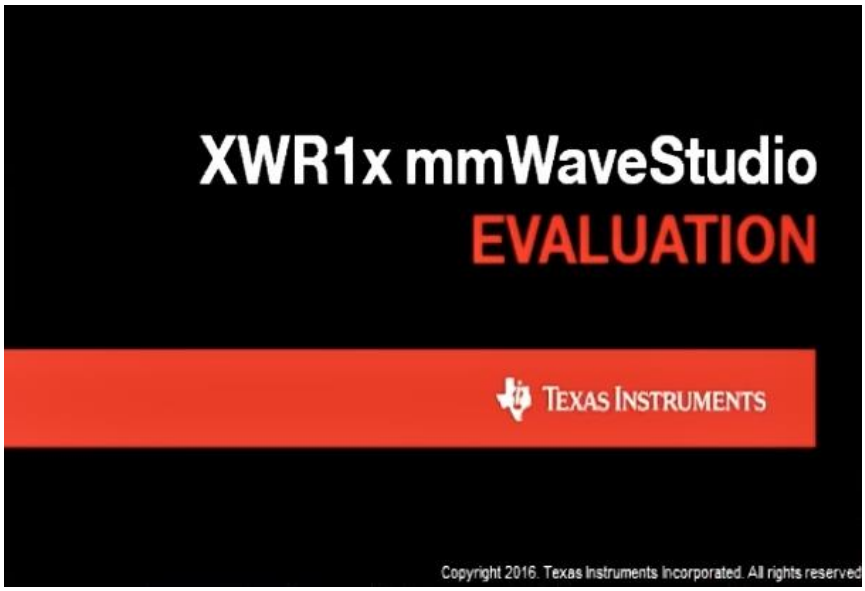
Tutorial of Basic Configurations in Texas Instrument's mmWave Studio with DCA1000EVM and IWR6843ISK



Detailed requirements and setups refer to the following video:
DCA1000 Training Video : https://training.ti.com/dca1000-training-video
Video for following steps: https://youtu.be/6t-P8zM8yU4

- **Step A: Connection [Figures 1-6]**
  Follow the color-coded and numbered buttons to set up the connections
  1. Reset control
  2. Connect COM port for RS232 operations
  3. Load BSS firmware
  4. Load MSS firmware
  5. SPI Connect
  6. RF Power-up

- **Step B: Static Configuration (StaticConfig) [Figures 7-9]**
  1. Select **Tx2** (the 3rd transmitter) for IWR6843ISK to use MIMO configuration in azimuth direction
  2. Set basic configuration
  3. Set advanced configuration (default settings)
  4. Click **RF Init** button (changes to **RF Init Done** after clicking it)

- **Step C: Data Configuration (DataConfig) [Figures 10-12]**
  1. Set data path configuration (default settings)
  2. Set clock configuration (default settings)
  3. Set data configuration (default settings)

- **Step D: Sensor Configuration (SensorConfig) [Figures 13-19]**
  1. In **Profile** section, change the **Sample Rate (ksps)** to **2047** and **Ramp End Time (µs)** to **133** (so that Bandwidth=3987.61MHz for a range resolution ≅ 4cm), then **Set**
  2. In **Chirp** section, select **Tx0** only with Start Chirp **0** and End Chirp **0**, then **Set**
  3. In **Chirp** section, select **Tx1** only with Start Chirp **1** and End Chirp **1**, then **Set**
  4. In **Chirp** section, select **Tx2** only with Start Chirp **2** and End Chirp **2**, then **Set**
  5. In **Frame** section, **Start Chirp TX 0** and **End Chirp TX 2** for TDM MIMO configuration. Set up desire number of chirps and frames with appropriate frame periodicity.
     $$DutyCycle = \frac{ChirpDuration * NumChirp * NumTx}{FramePeriodicity} = \frac{(IdleTime + RampEndTime) * NumChirp * NumTx}{FramePeriodicity}$$
     Example:
     Idle Time = 100 µs, Ramp End Time = 133 µs, Periodicity = 180 ms
     Number of Transmitters = 3 (Tx0, Tx1, Tx2), Number of Chirp(No of Chirp Loops) = 128,
     $$DutyCycle = \frac{(100\mu s + 133\mu s) * 128 * 3}{180ms} \cong 49.7\%$$
  6. At the left-most section, click the **Set Up DCA1000** button to open the **RFDataCaptureCard** window
  7. Click the **Connect, Reset and Configure** button to setup the DCA100EVM

- **Step E: Data Capture and Post Processing (SensorConfig – Capture and Post Processing Section) [Figures 20-22]**
  1. Browser and select the .bin file to save captured data
  2. DCA100 ARM
  3. Trigger Frame
  4. PostProc (post processing)

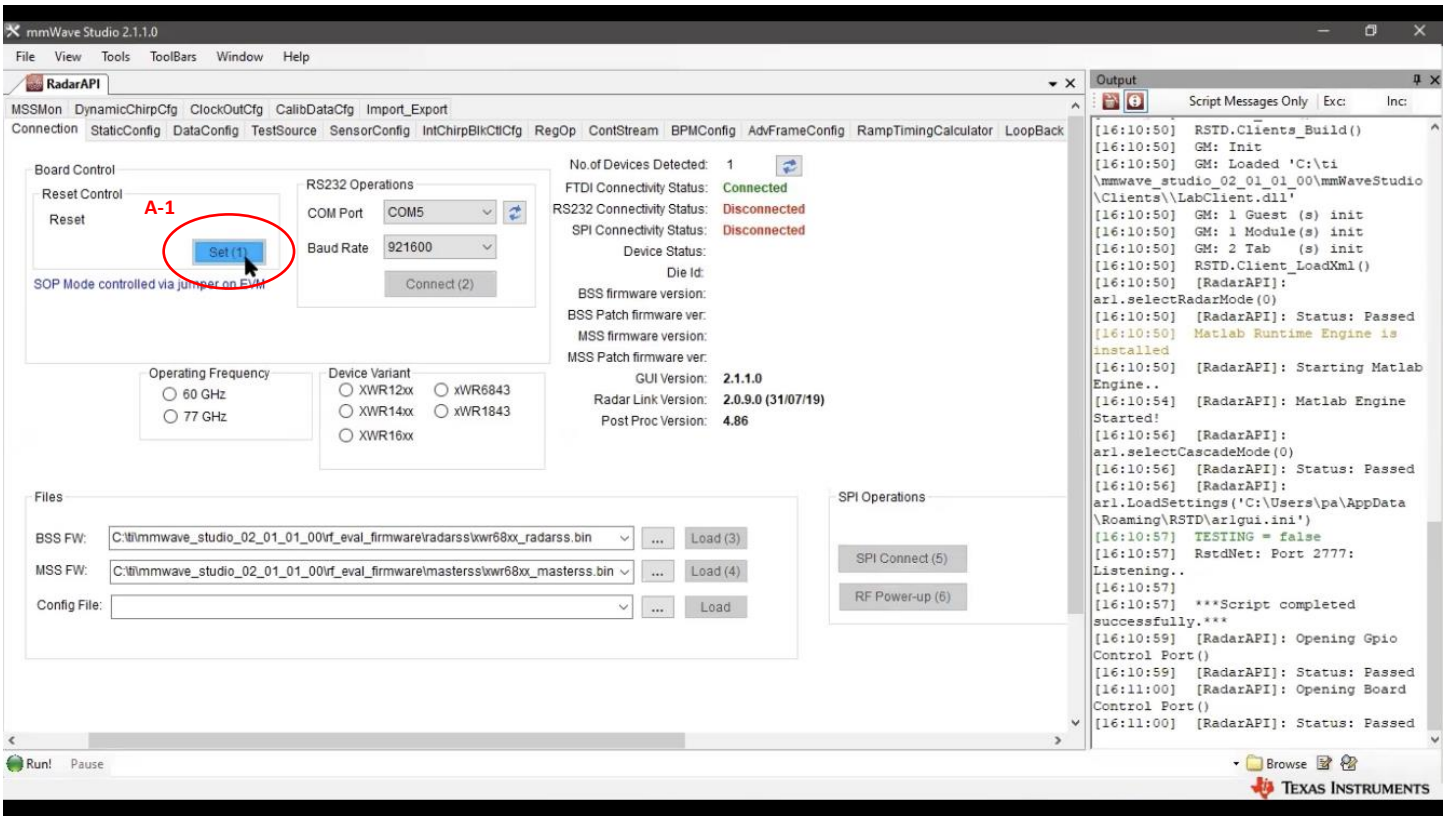


Fig. 1. Reset Control

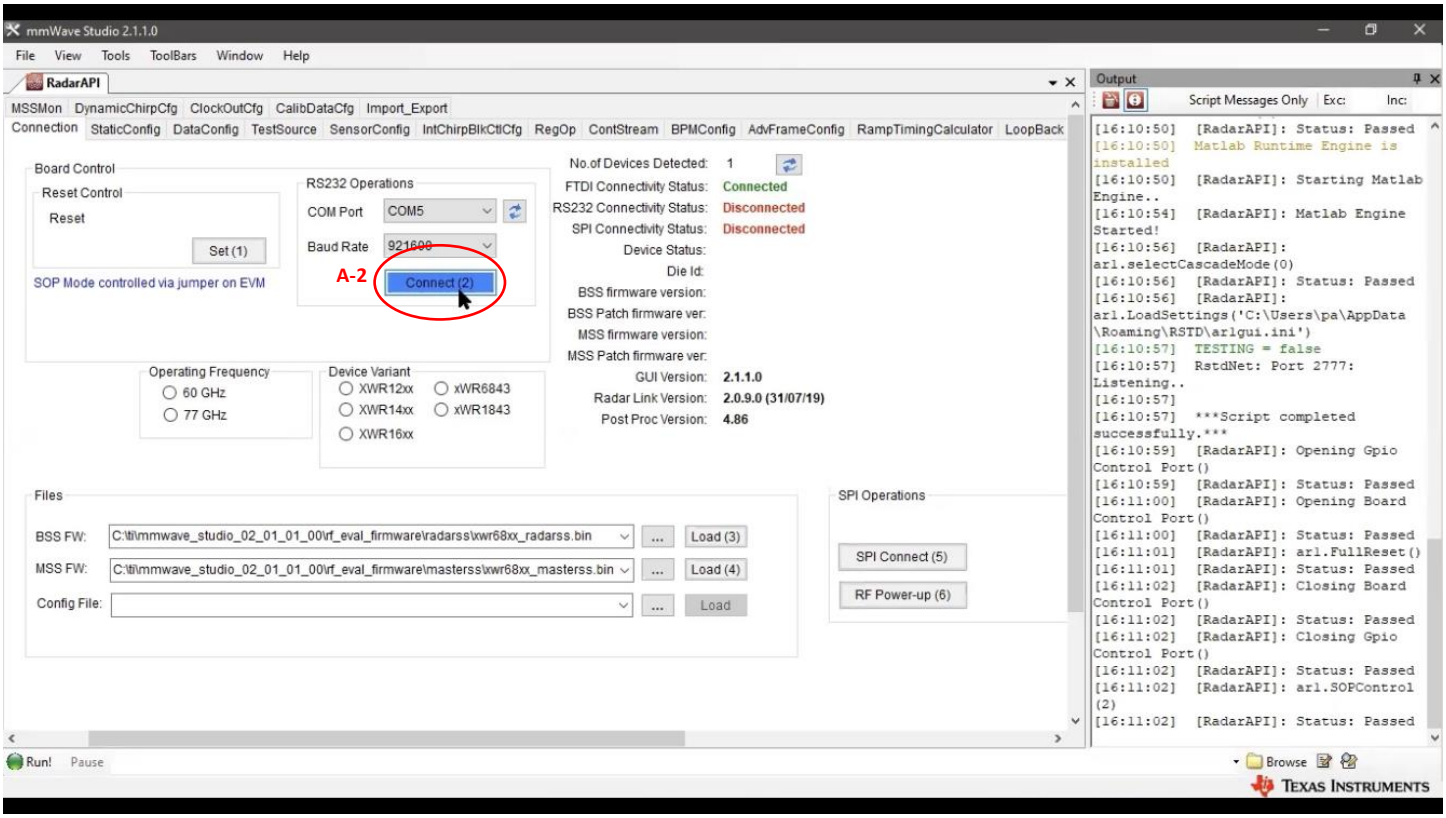


Fig. 2. COM Port Connect for RS232 Operations

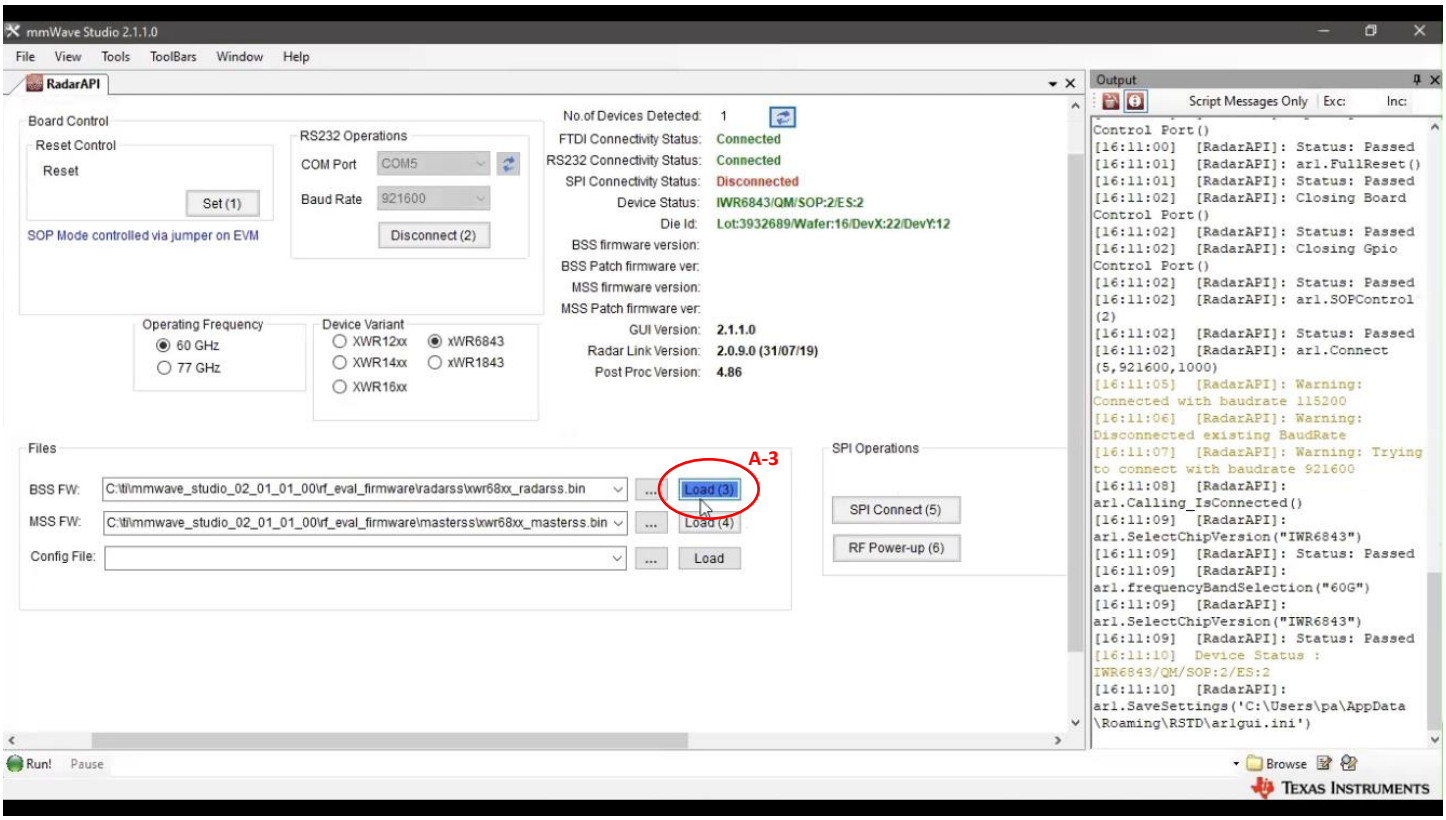


Fig. 3. Load BSS Firmware

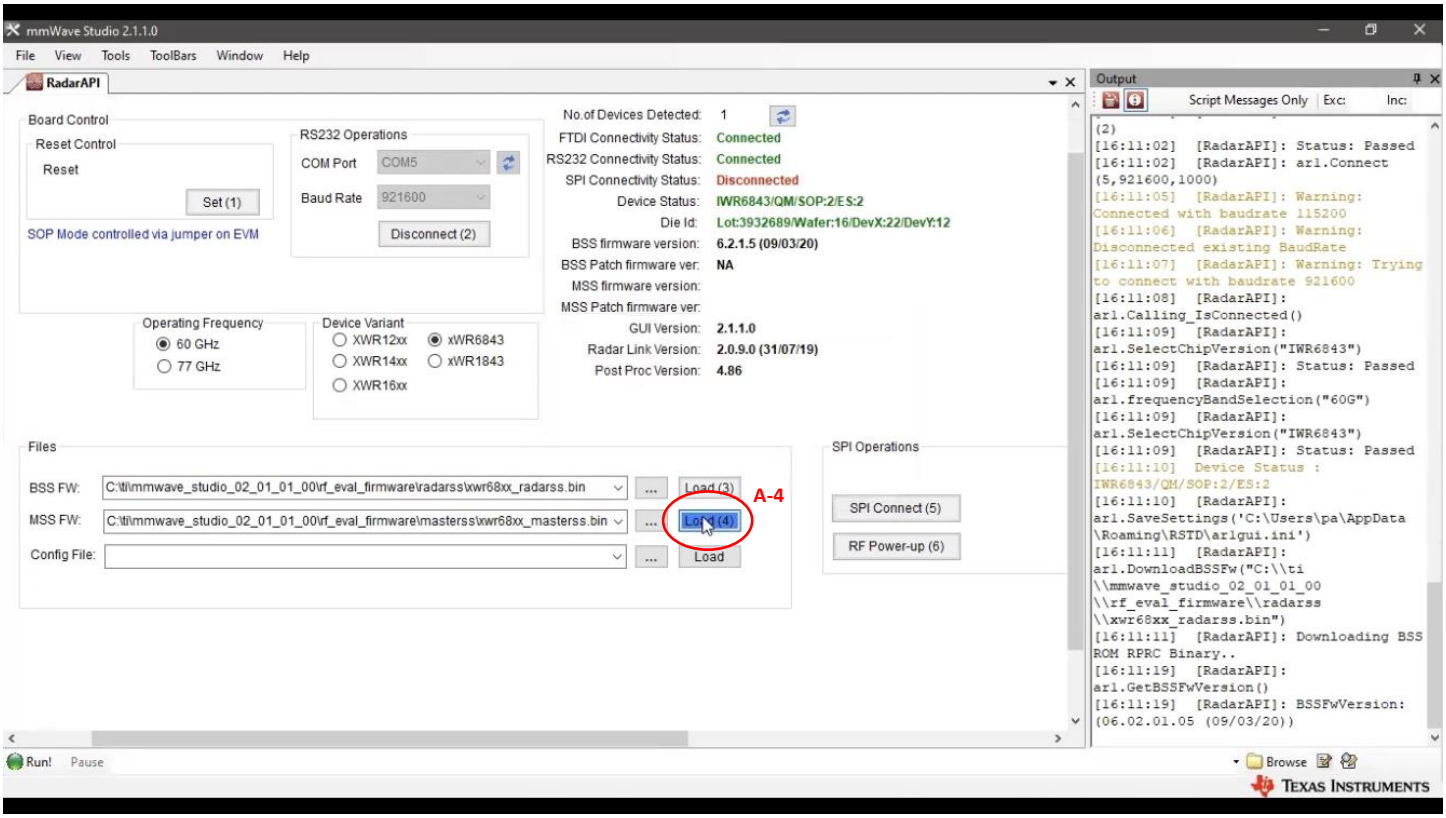


Fig. 4. Load MSS Firmware

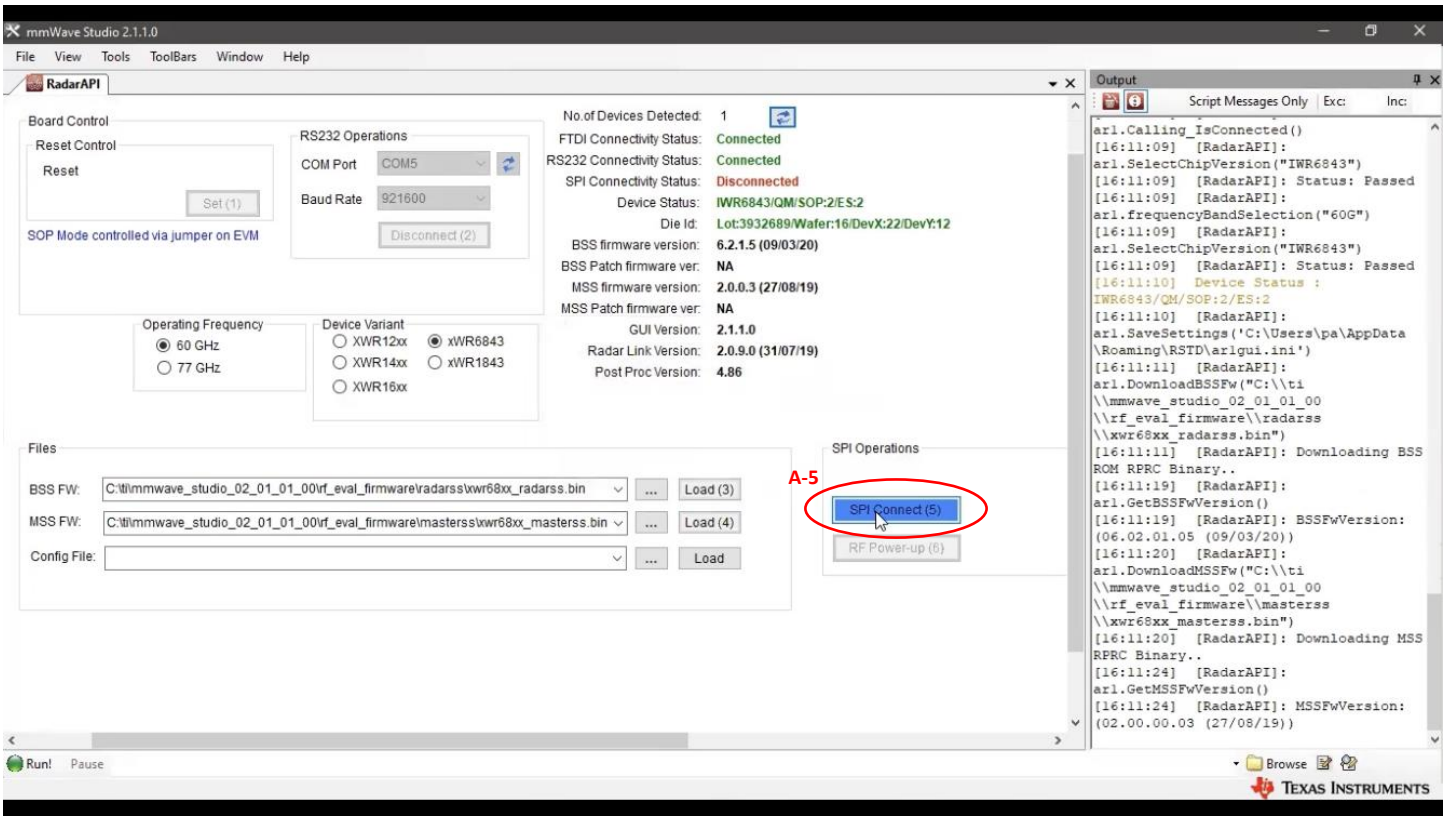


Fig. 5. SPI Connect

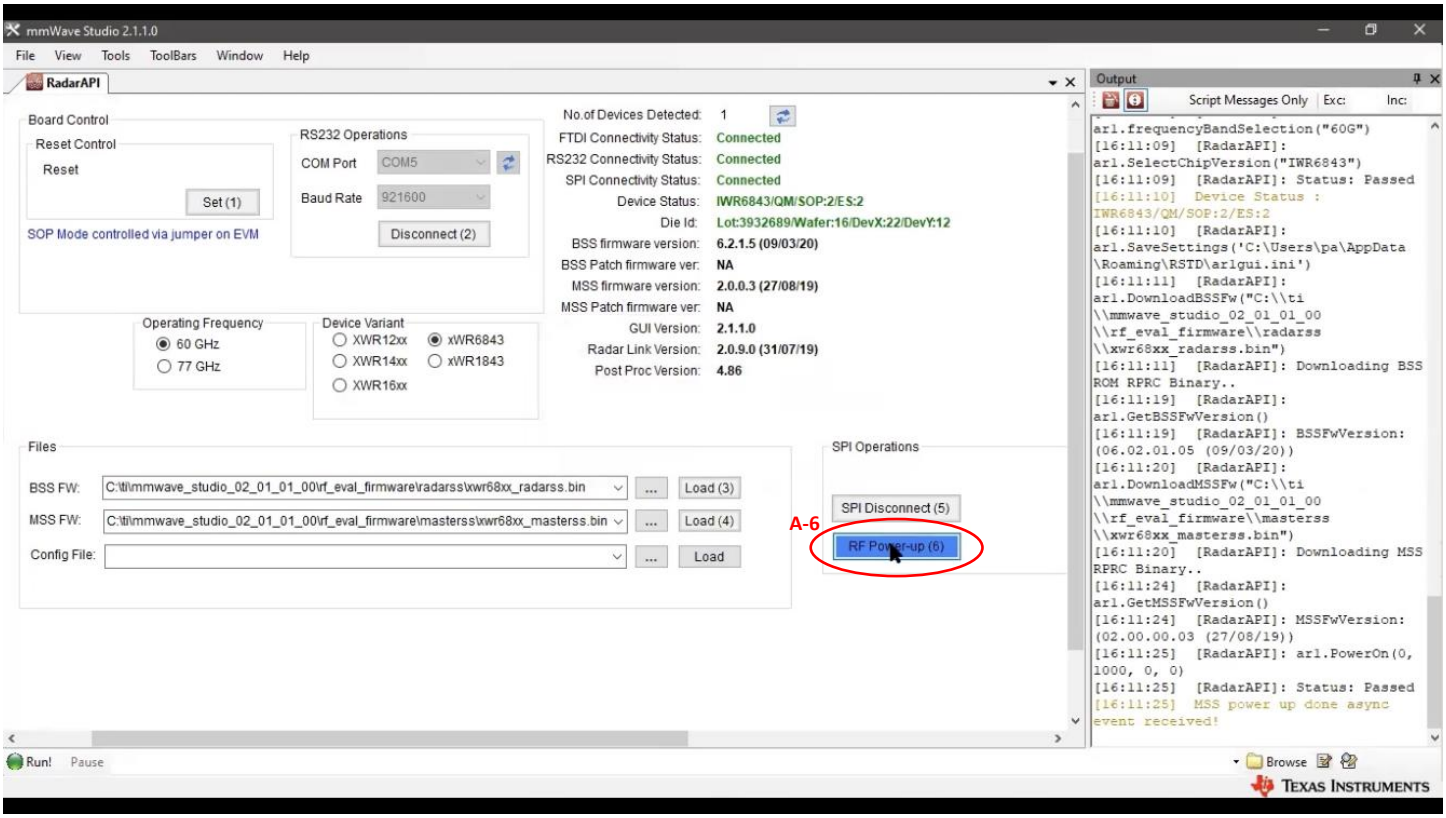


Fig. 6. RF Power-up

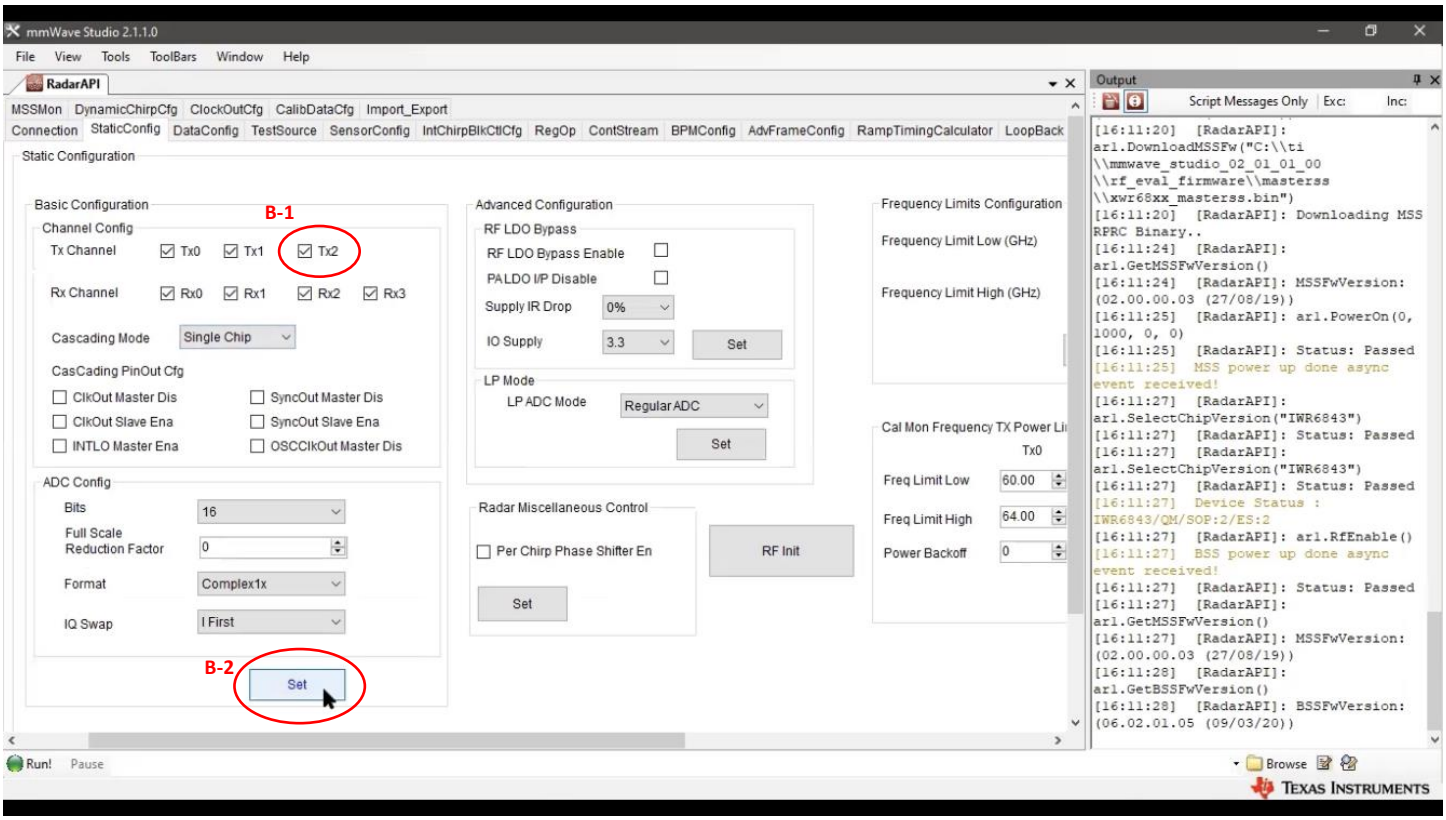


Fig. 7. Basic Static Configuration

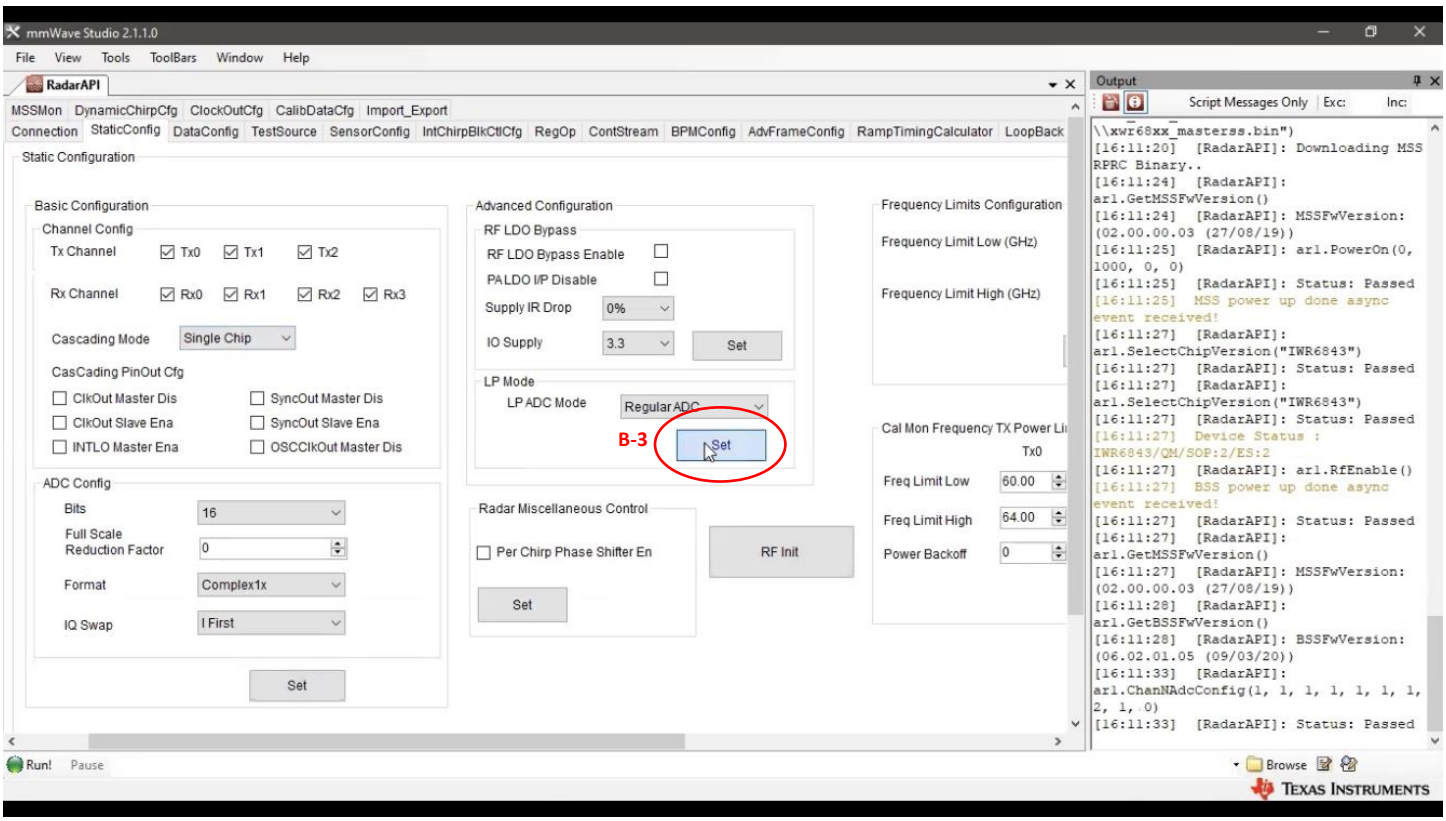


Fig. 8. Advanced Static Configuration

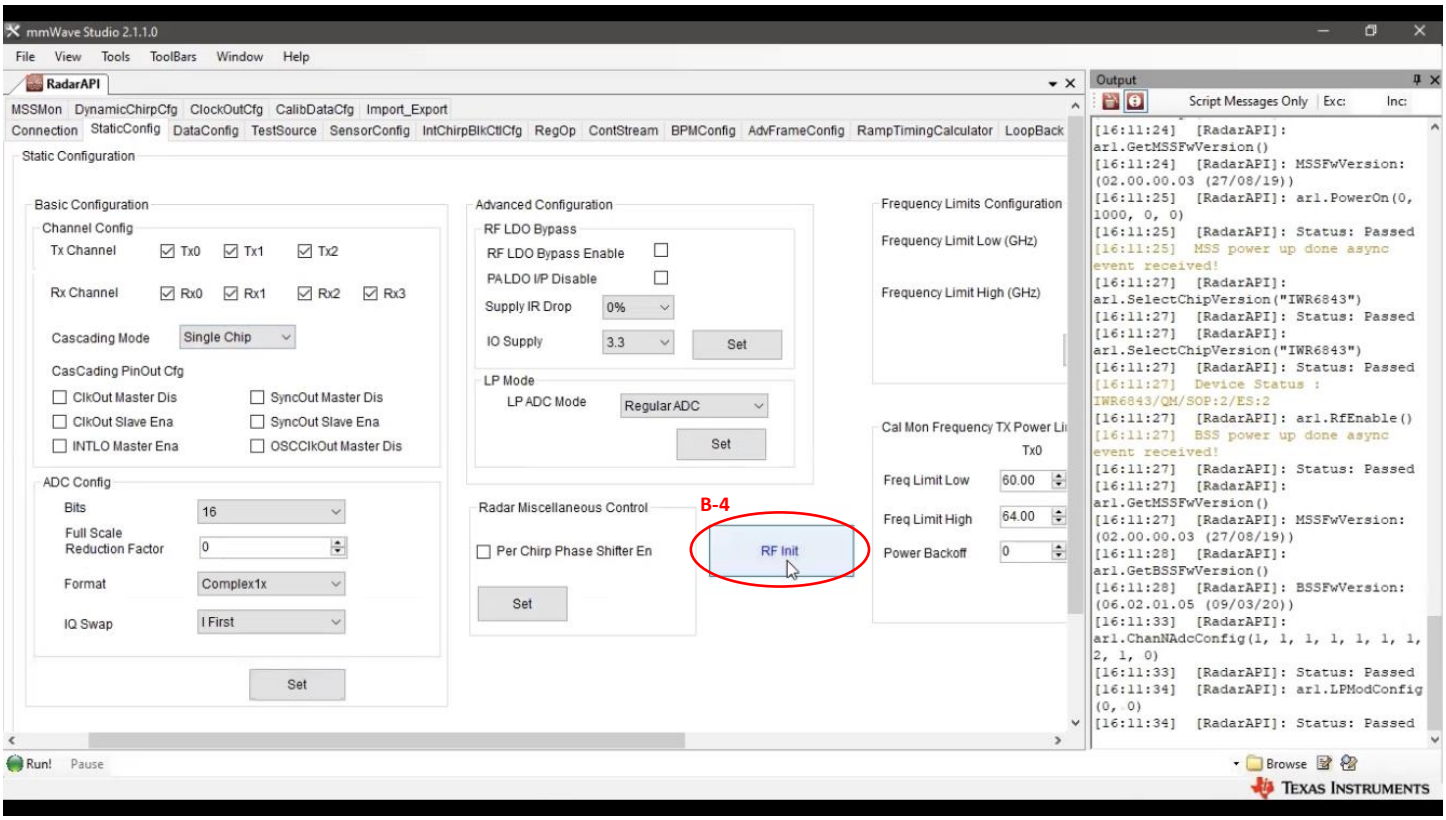


Fig. 9. RF Init

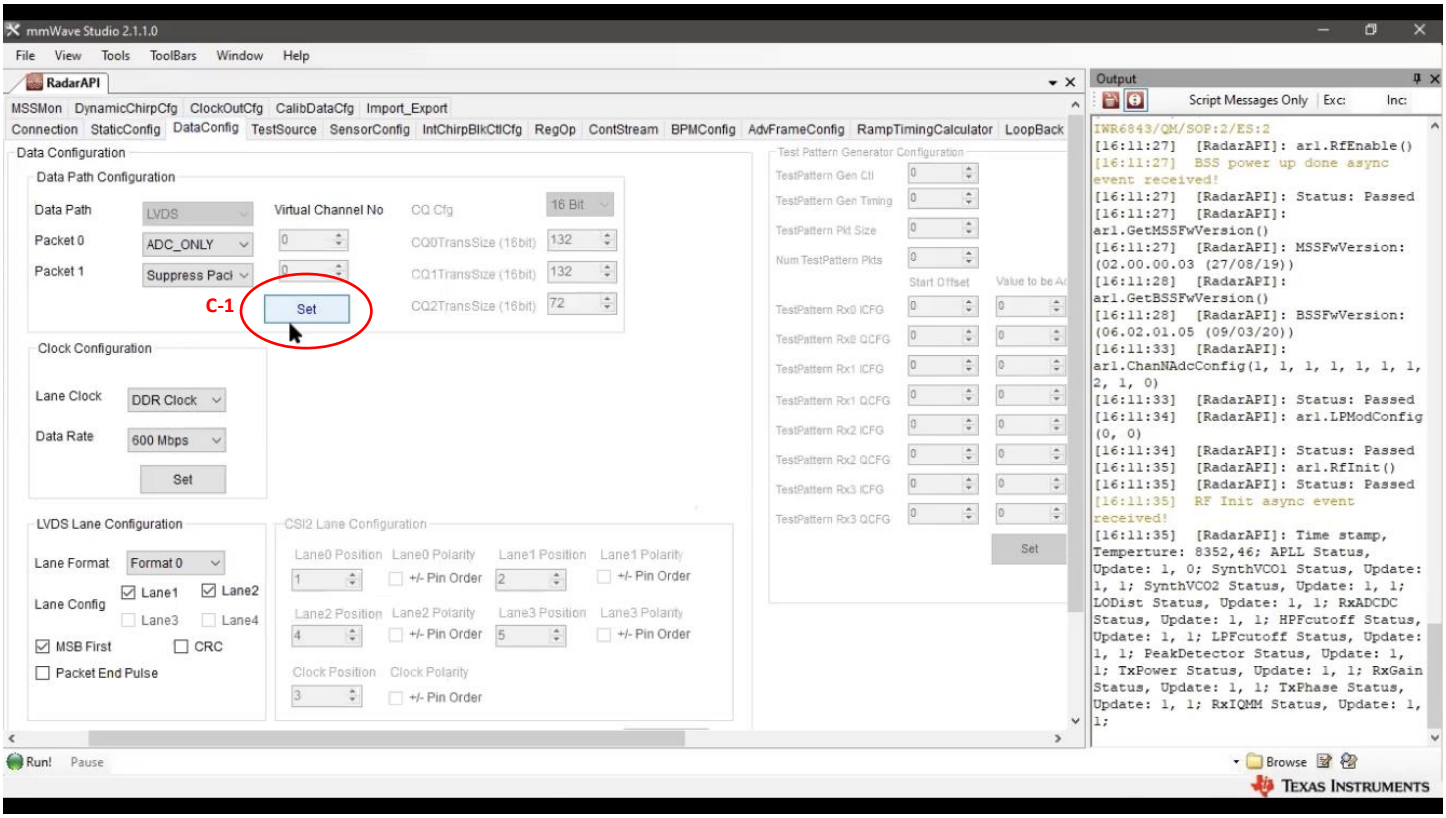


Fig. 10. Data Path Configuration

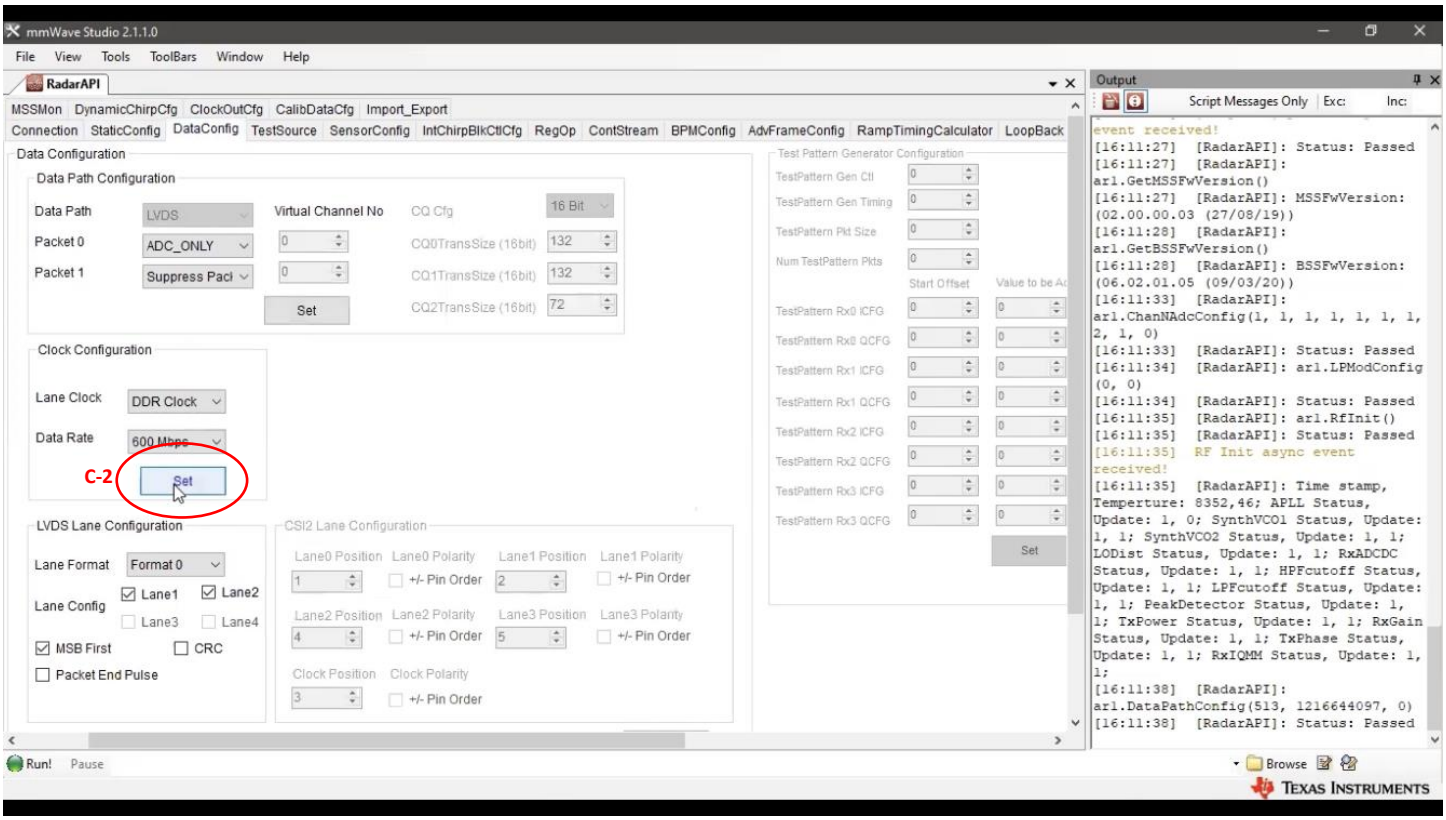


Fig. 11. Clock Configuration

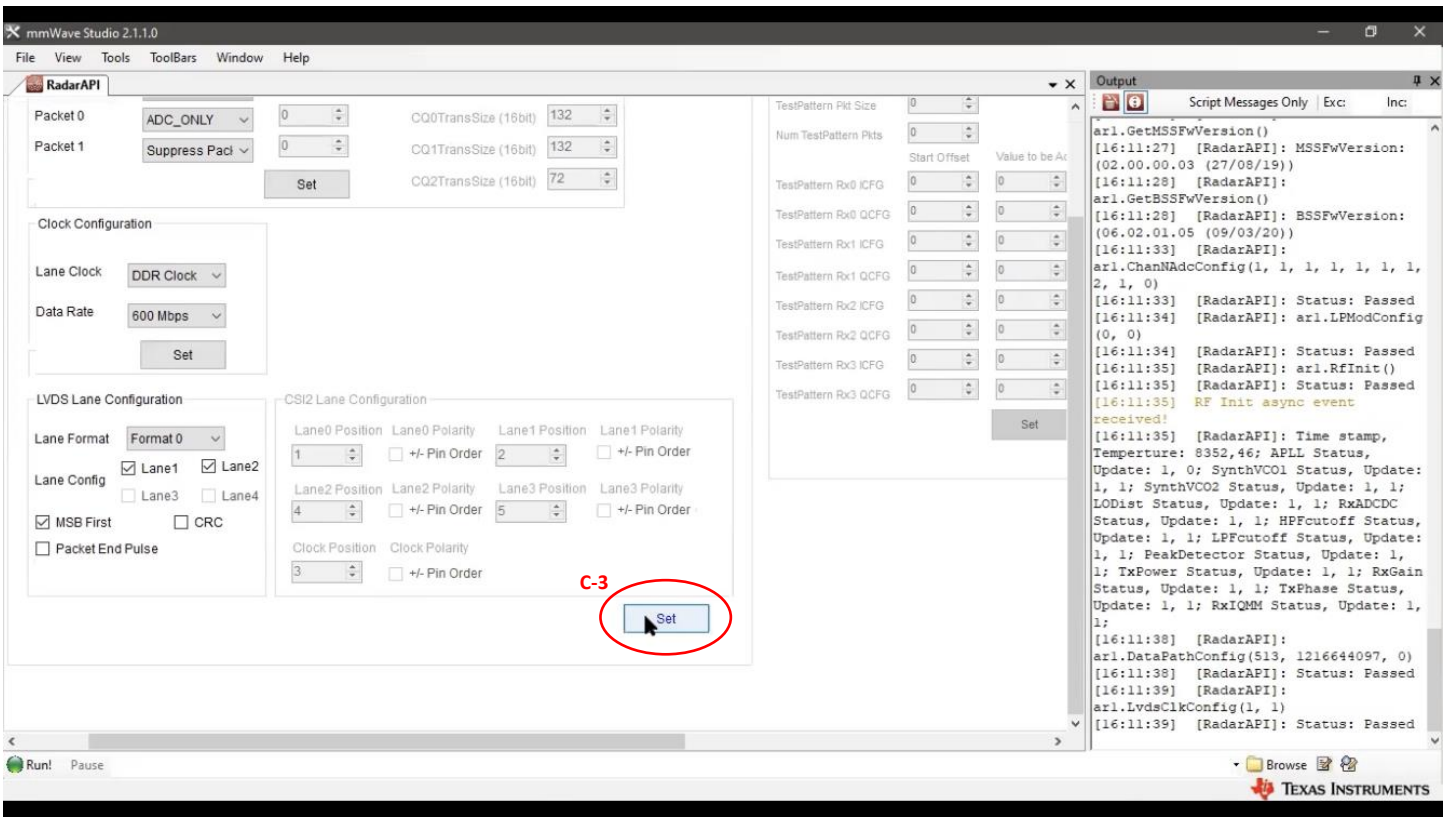


Fig. 12. Data Configuration

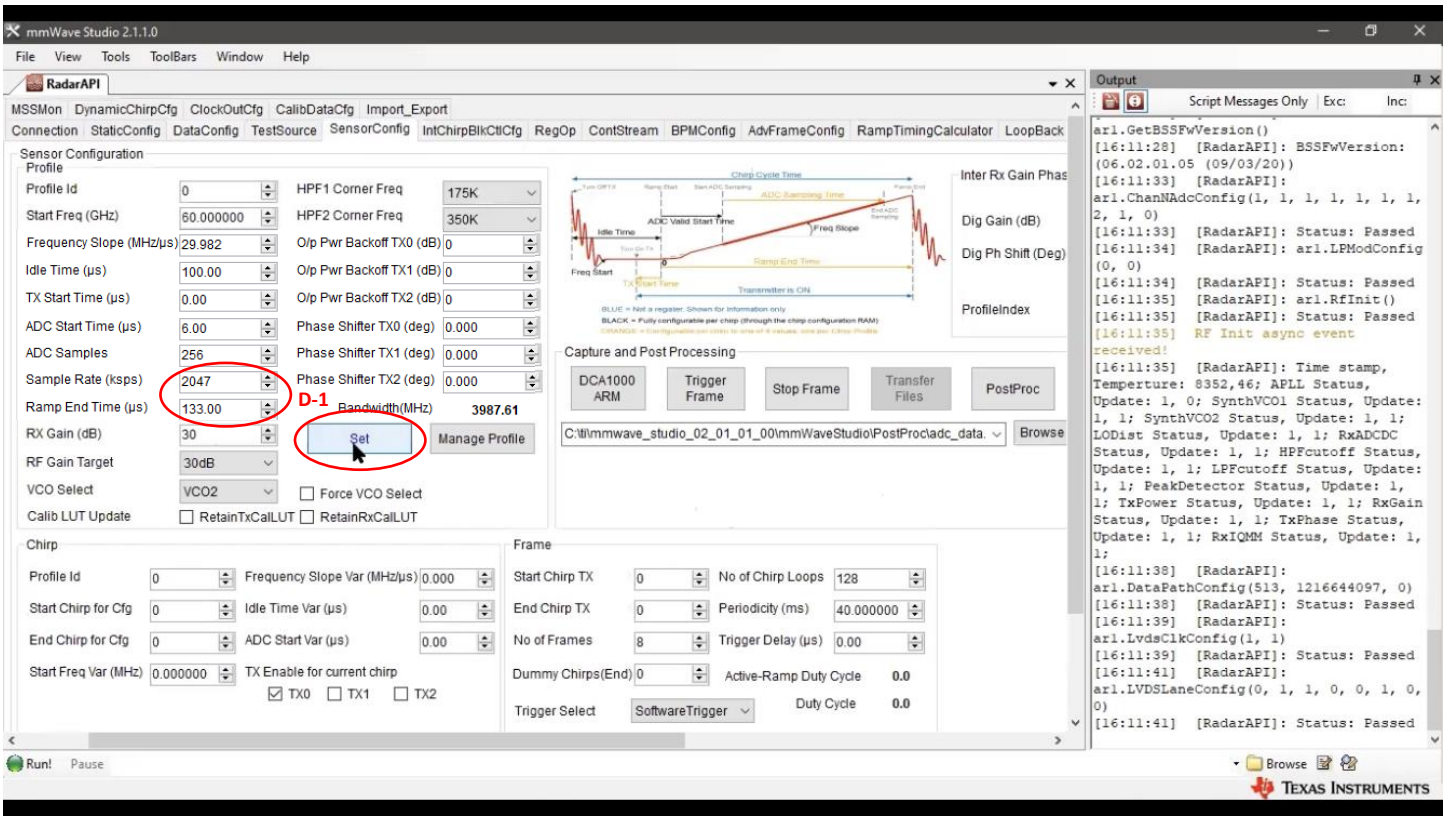


Fig. 13. Profile Setup

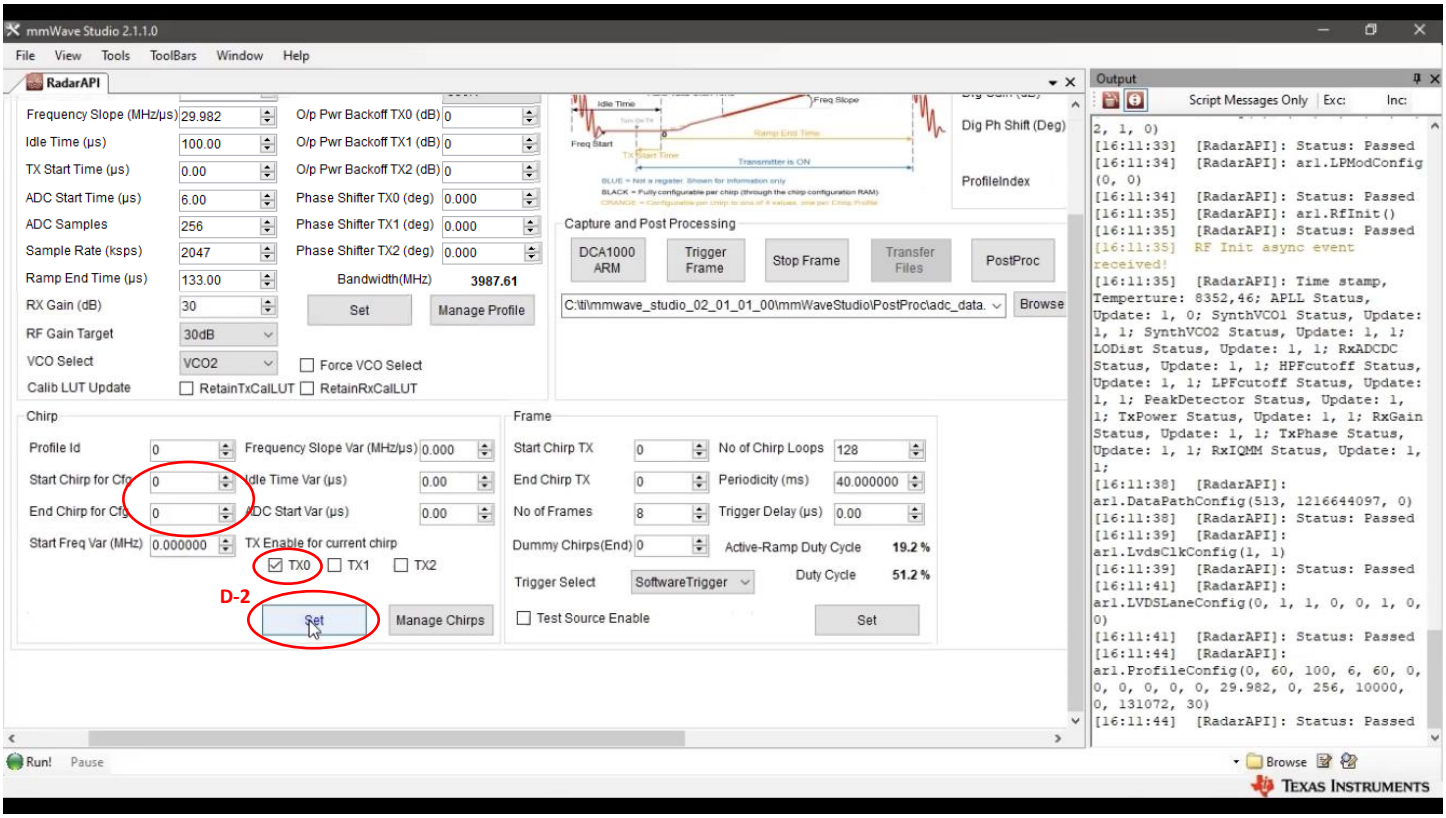


Fig. 14. Chirp Setup with Tx0

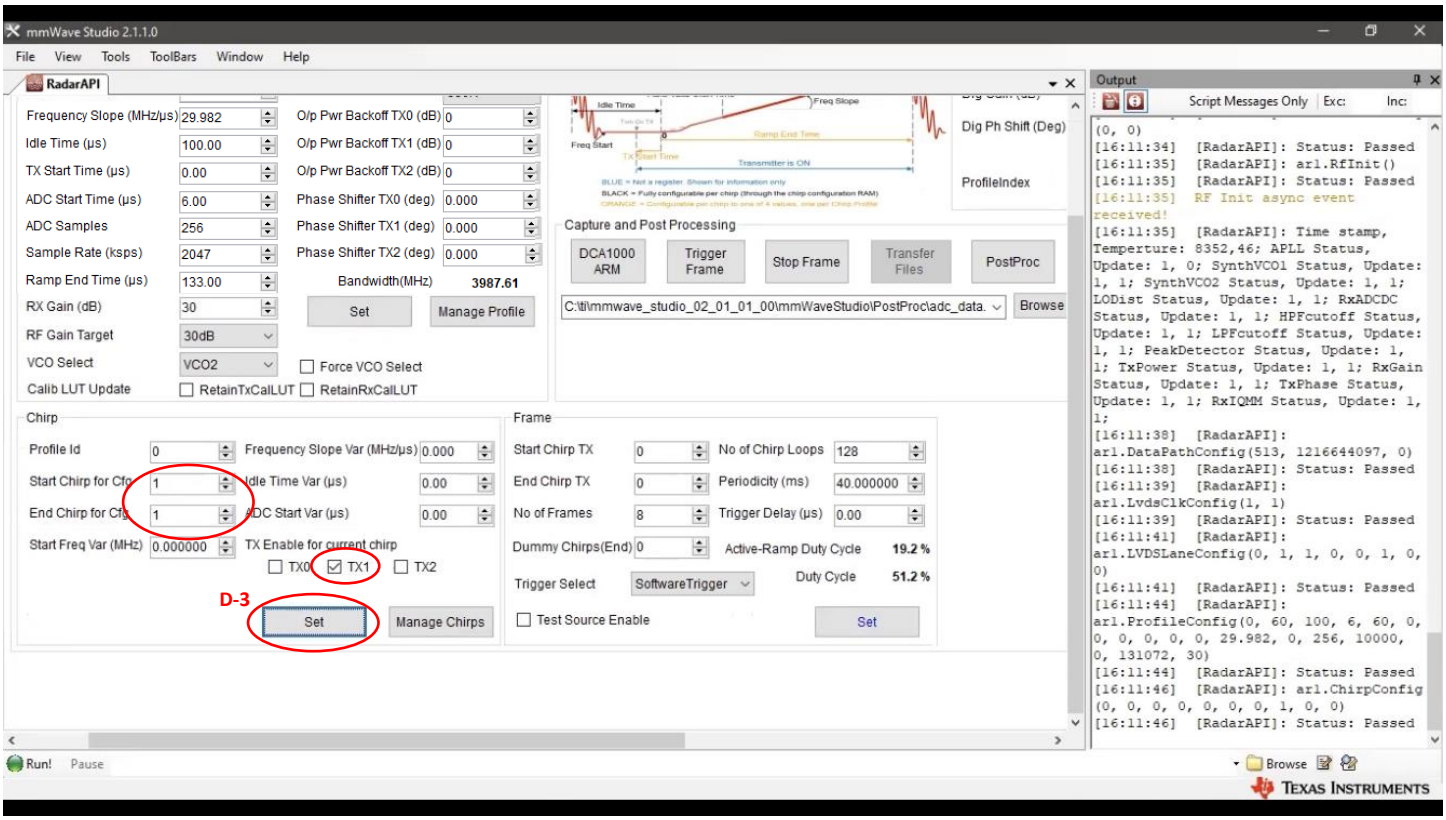


Fig. 15. Chirp Setup with Tx1

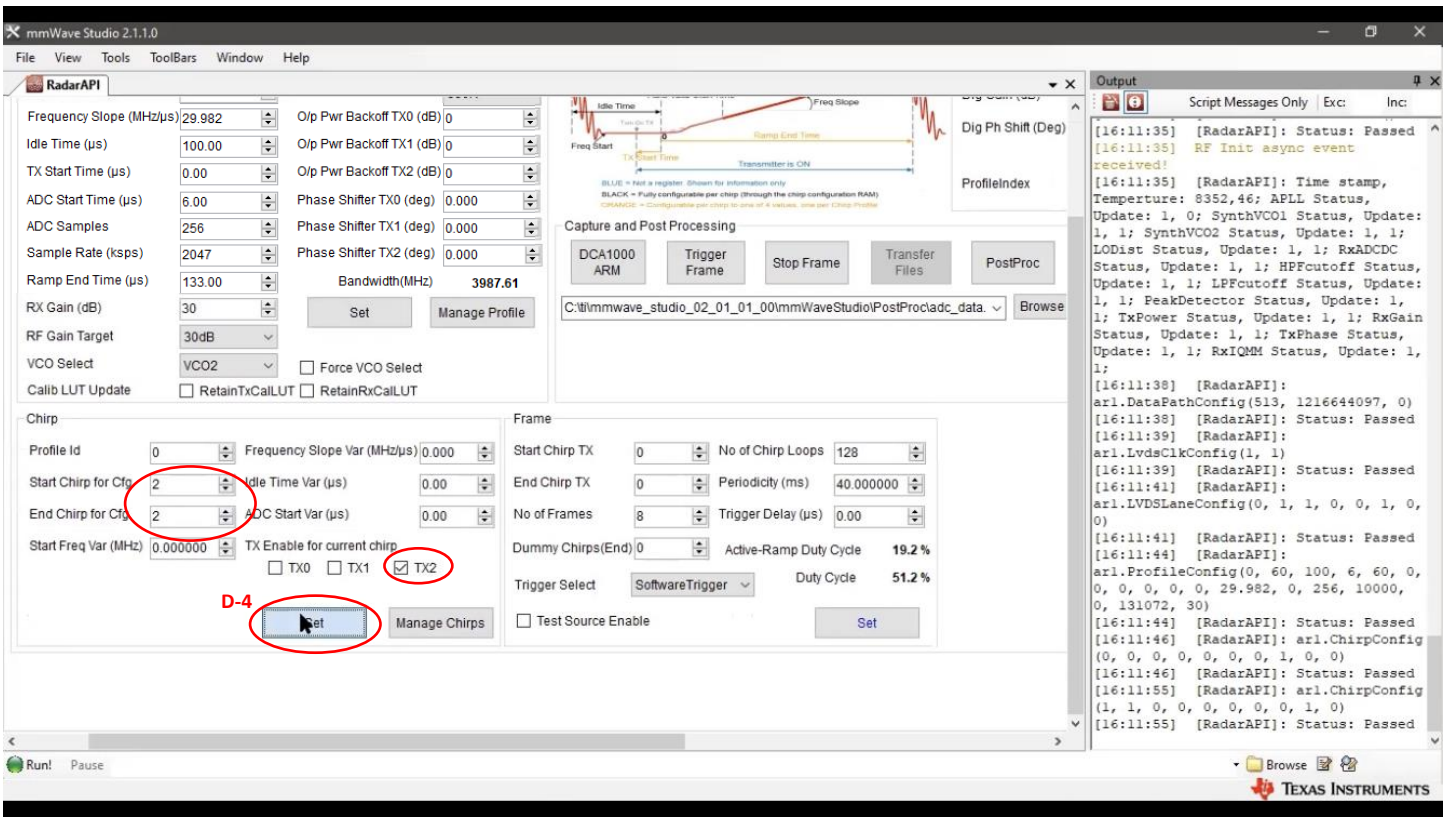


Fig. 16. Chirp Setup with Tx2

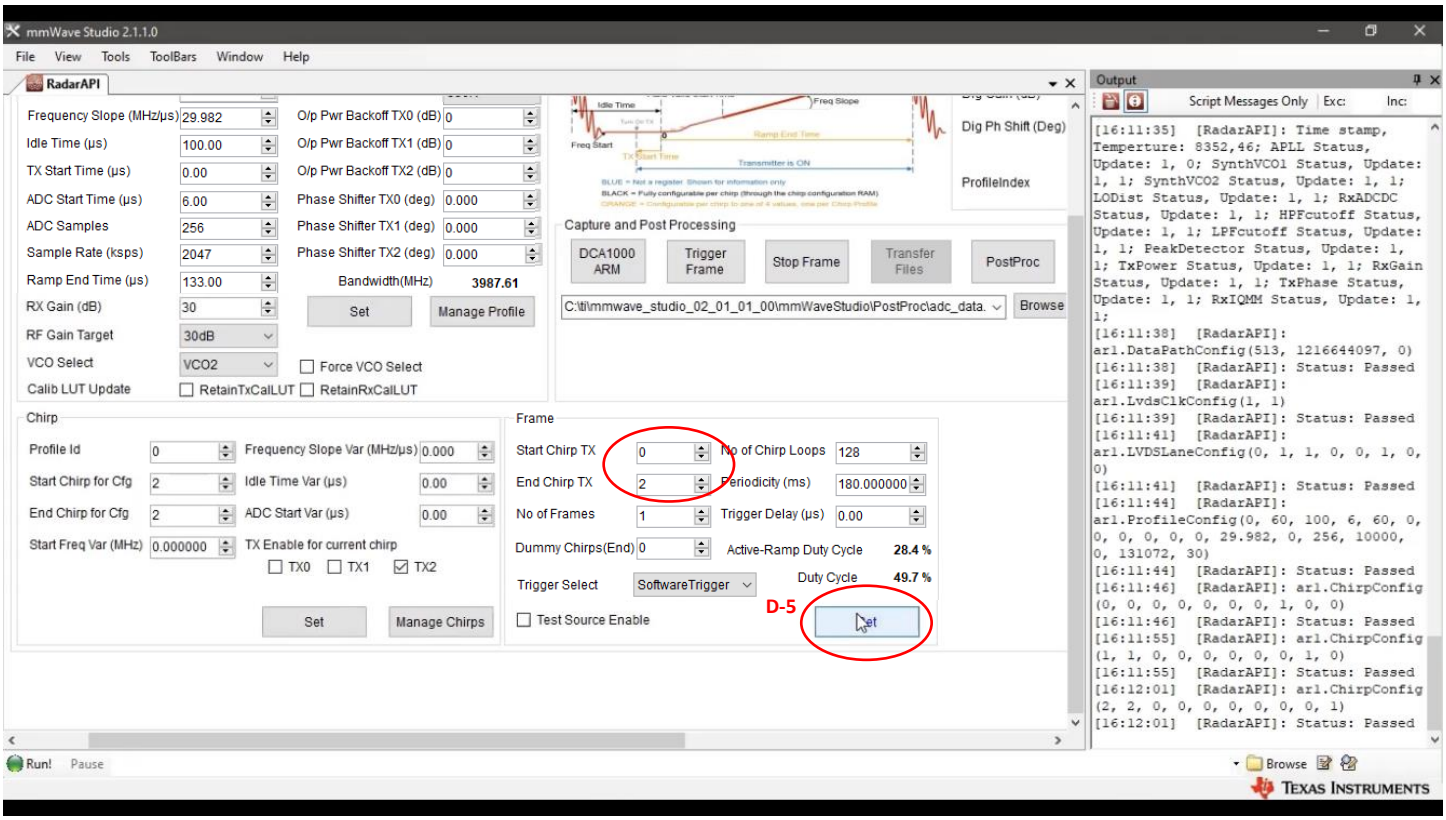


Fig. 17. Frame Setup

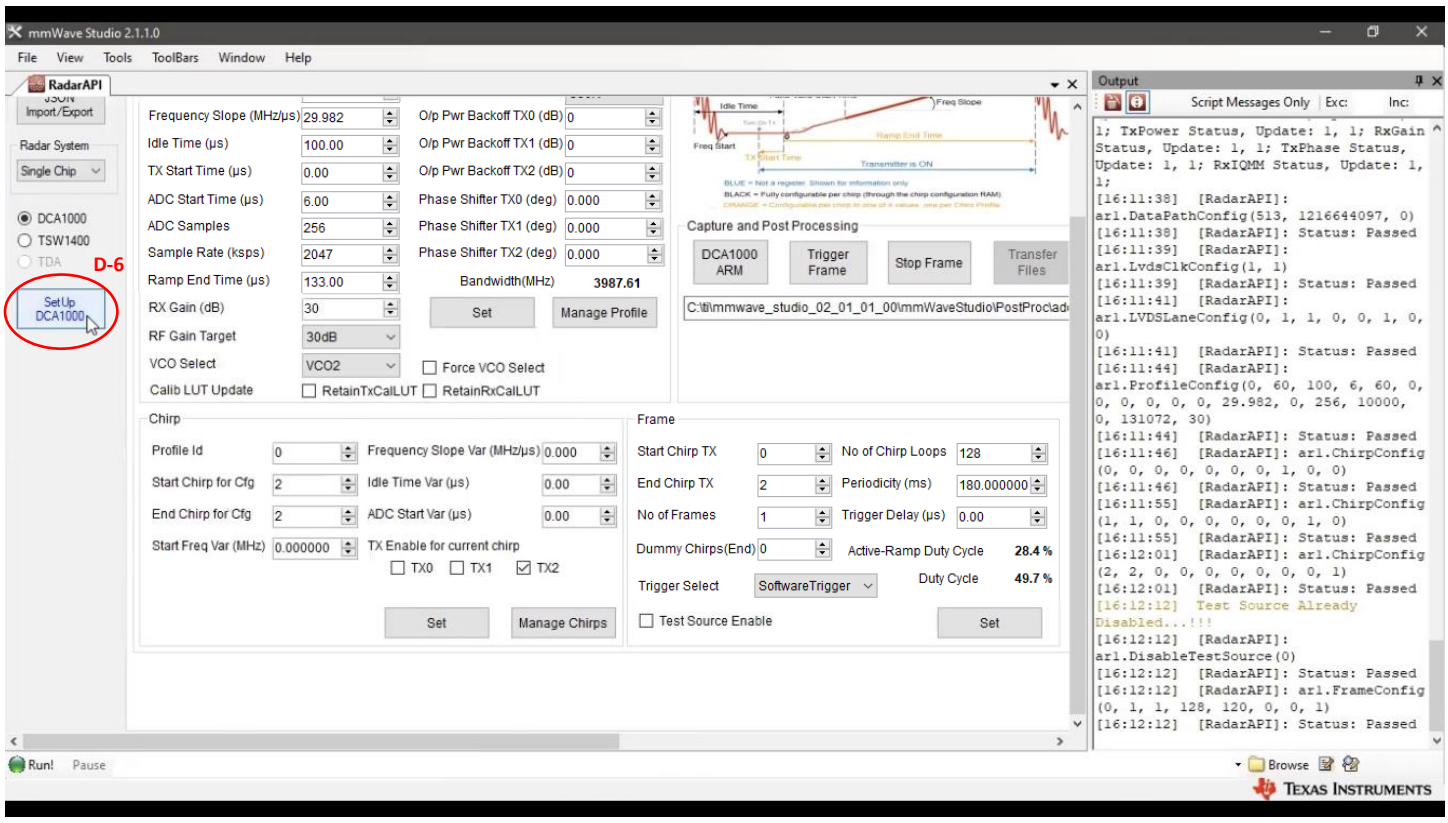


Fig. 18. Open RFDataCaptureCard Configuration Window

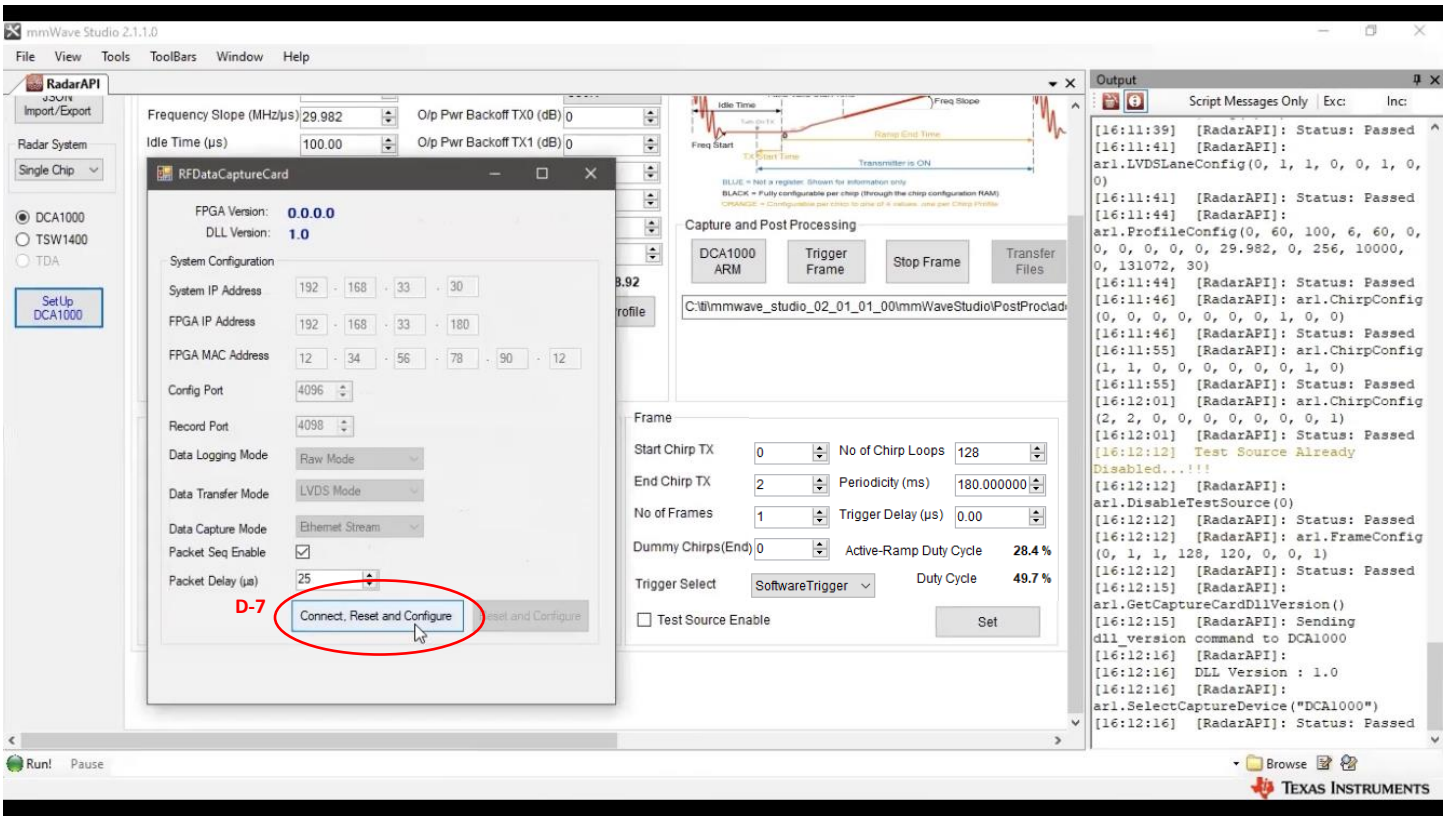


Fig. 19. Connect, Reset and Configure DCA1000

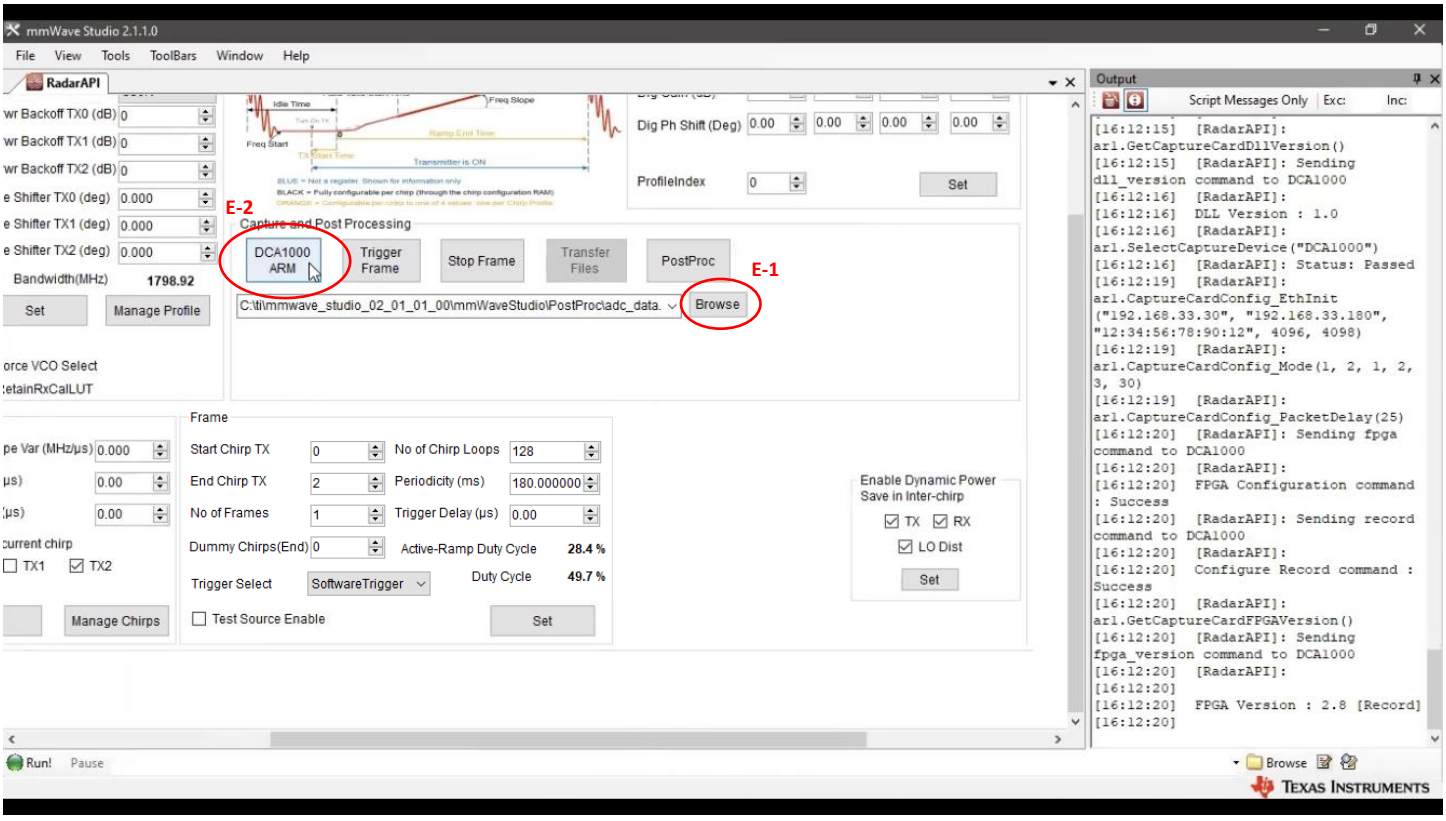


Fig. 20. DCA1000 ARM

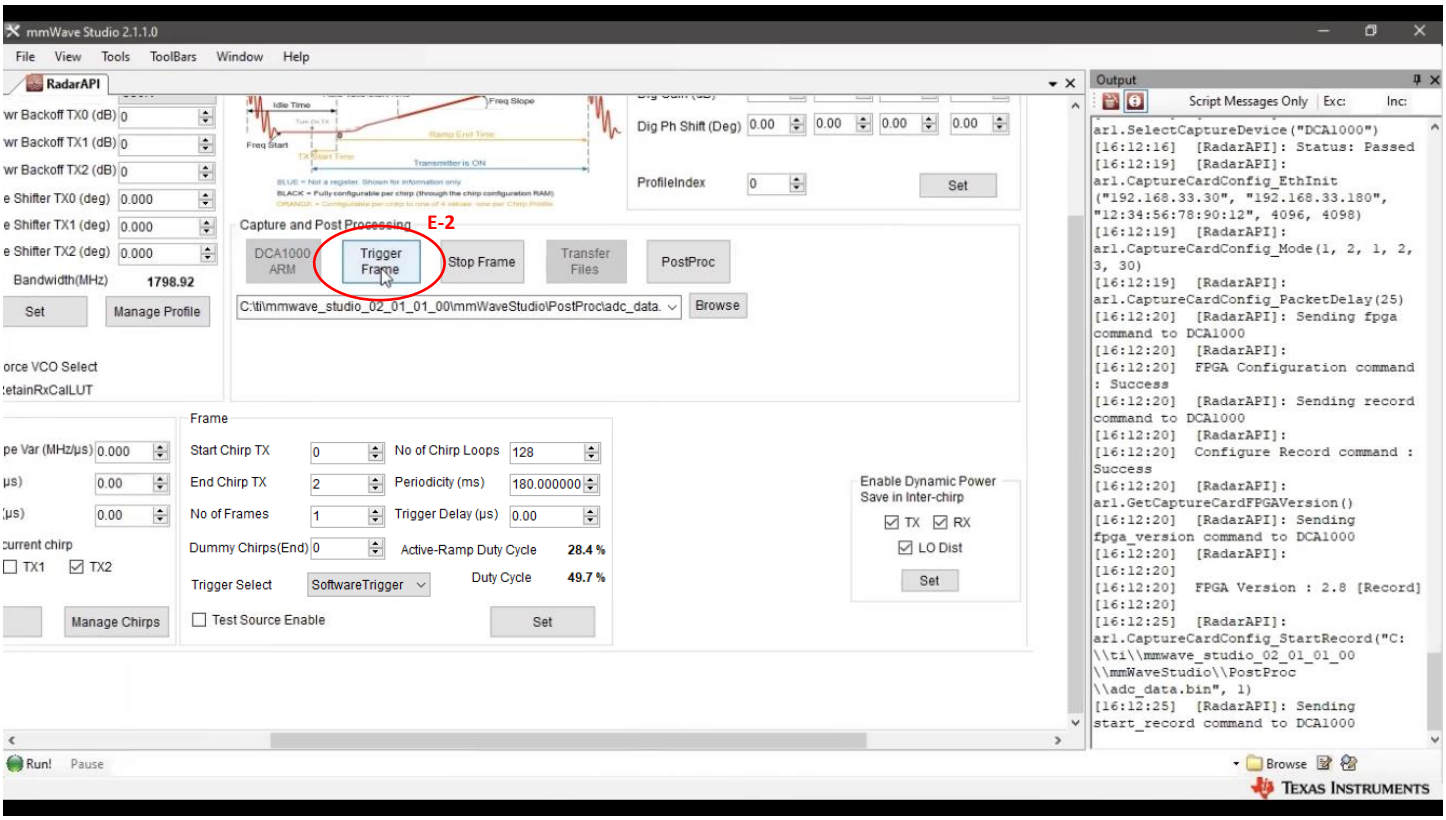


Fig. 21. Trigger Frames

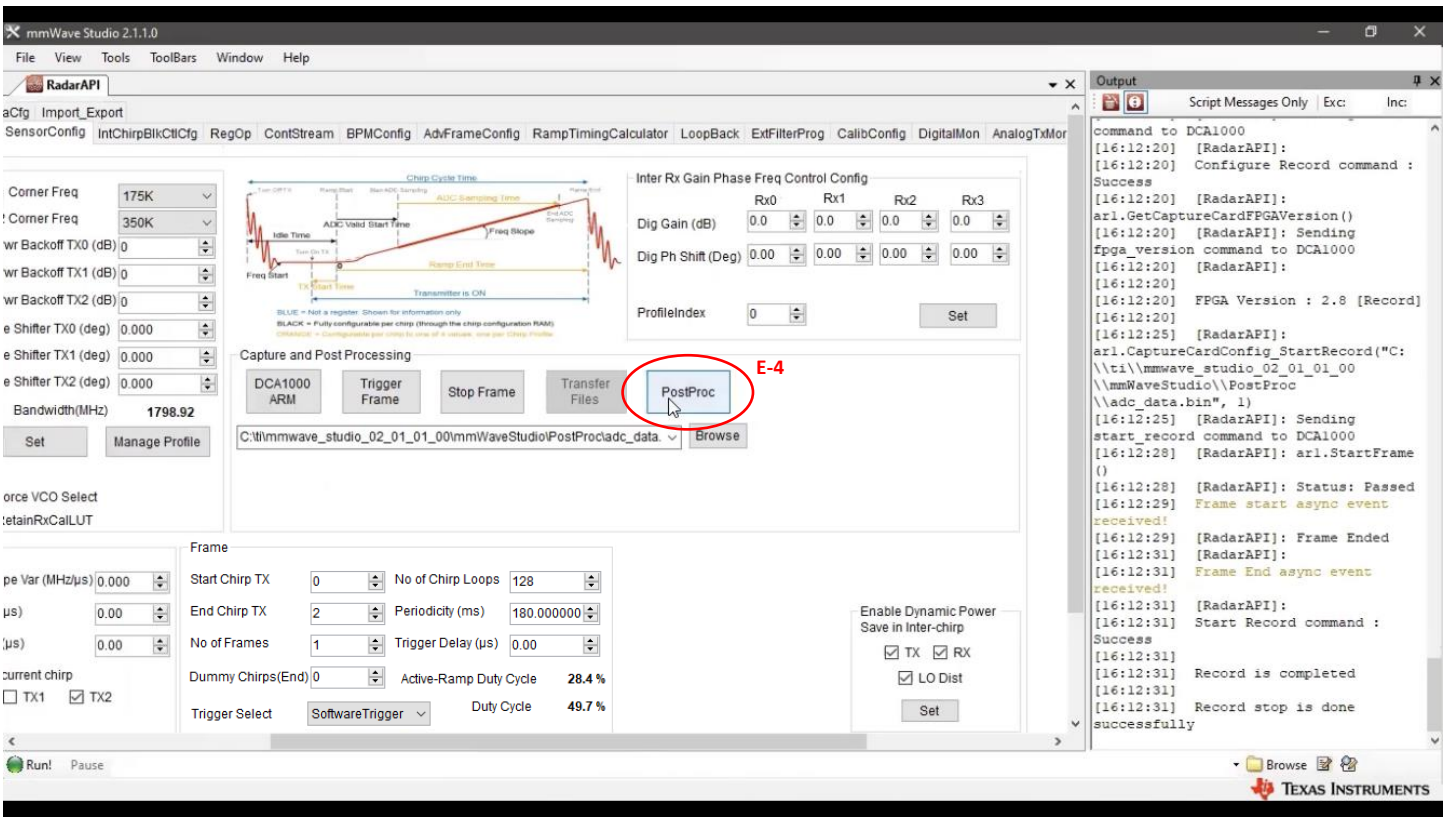


Fig. 22. Post Processing