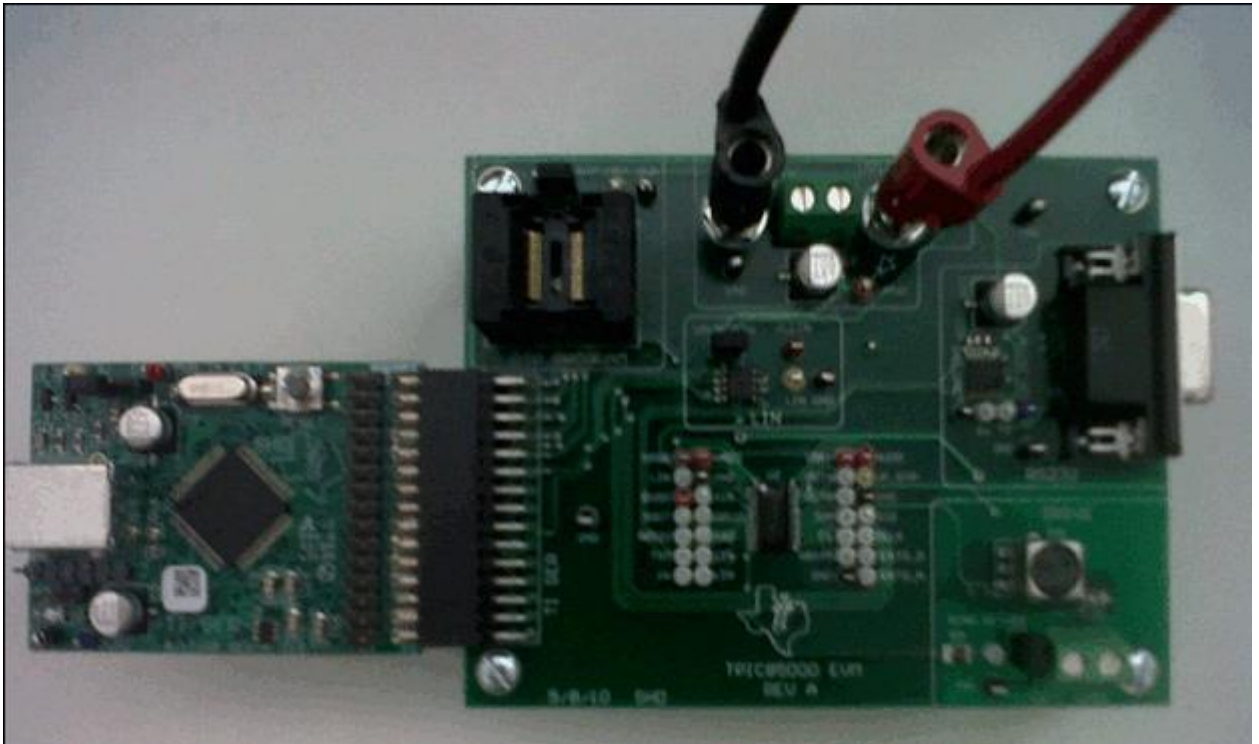# *Tuning Procedure for PGA450Q1EVM*

Mixed Signal Automotive

Test Procedure for the TI-GER Boards

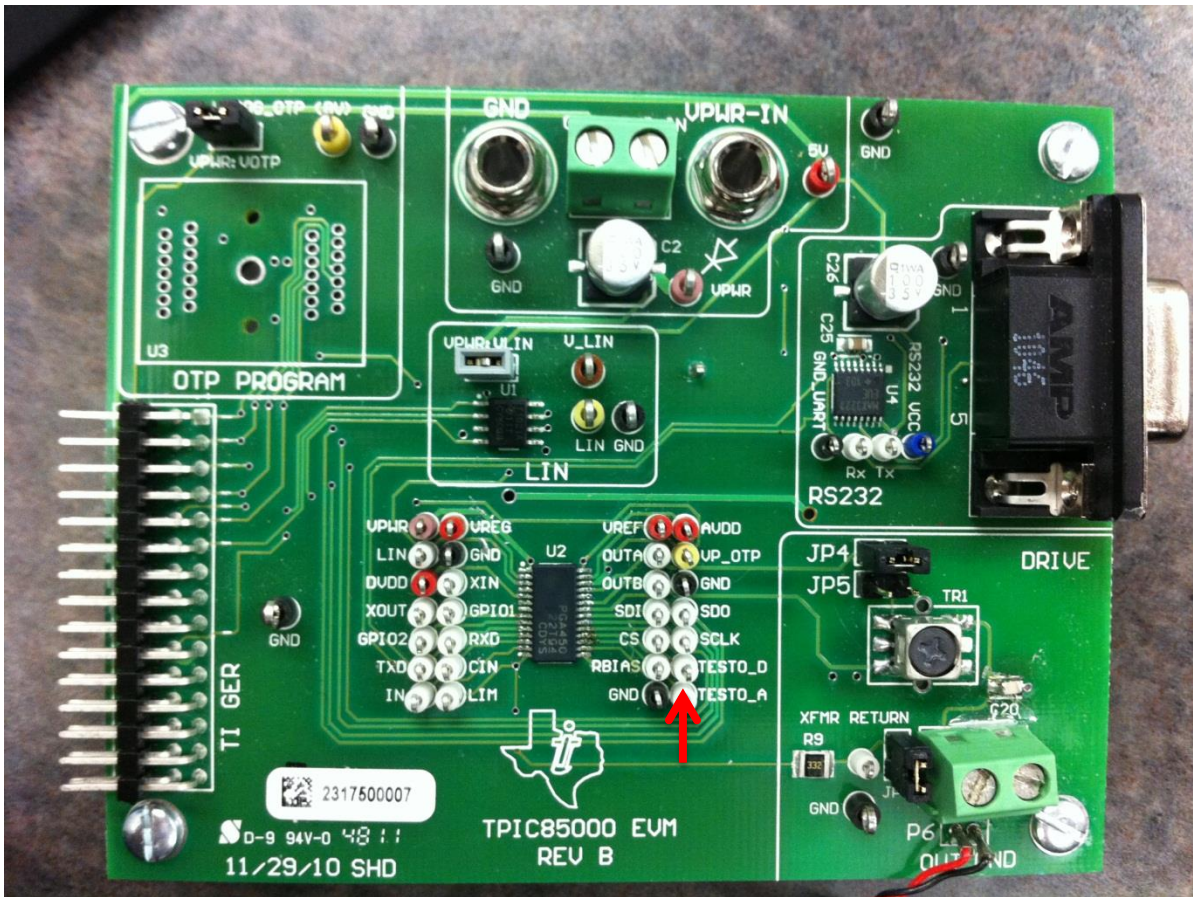1. Attach TIGER Board to PGA450Q1EVM as shown in Figure 2

Figure 1: How to connect TIGER to PGA450EVM

2. Apply +12 volts to VPWR-IN and GND banana plugs as shown in Figure 1 (red and black cables)

3. Plug the TIGER board into computer via USB cable.

4. Connect an oscilloscope probe from Channel 1 to the TESTO_A test point on the EVM.


5. Set-up the oscilloscope with the following settings:

   a. Vertical Division on Channel 1: ~500mV/div

   b. Horizontal Division: ~200us/div

   c. Set trigger to channel 1, Normal mode, at 500mV

   d. Move horizontal position to near the left edge of the o-scope display.

   e. Move Channel 1 down to near the bottom of the o-scope display.

6. Open the "PGA450_Customer_GUI 1.38.3.exe".

7. Place micro into reset by clicking on the "Off (Micro Reset)" button shown in Figure 3.
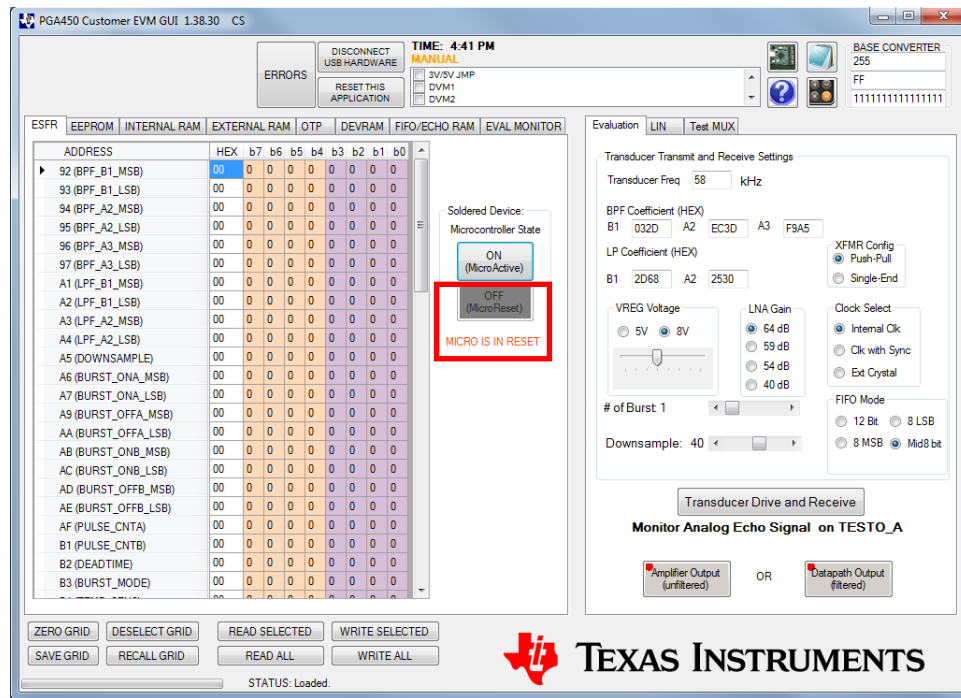
8. In the OTP tab, click on the "Check OTP Status" button (Make sure it says "PROGRAMMED to jump to DEVRAM" or "EMPTY"). If it says just "PROGRAMMED", replace the PGA450 unit on the EVM with a new one.
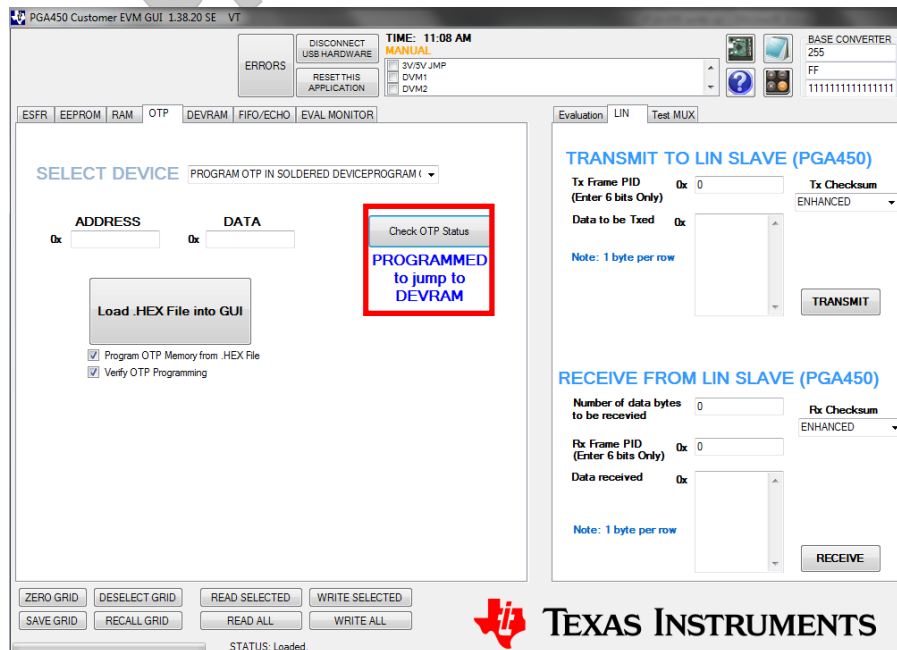
9. If the OTP status was EMPTY, then you need to have the "Program OTP Memory Also" box checked in the "DEVRAM" tab, and supply 8V on VPROG OTP pin by installing the VPROG_OTP jumper, and connecting the (8V) and VP_OTP pins.

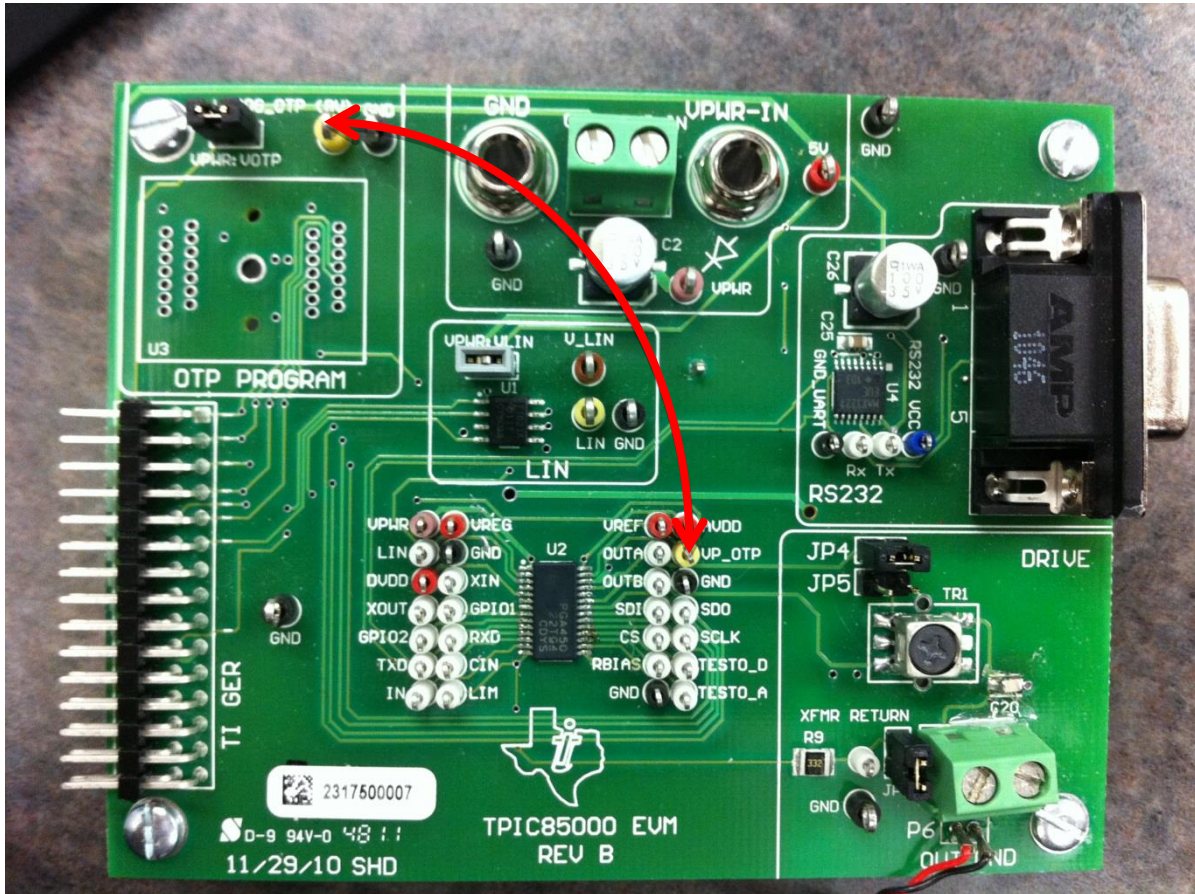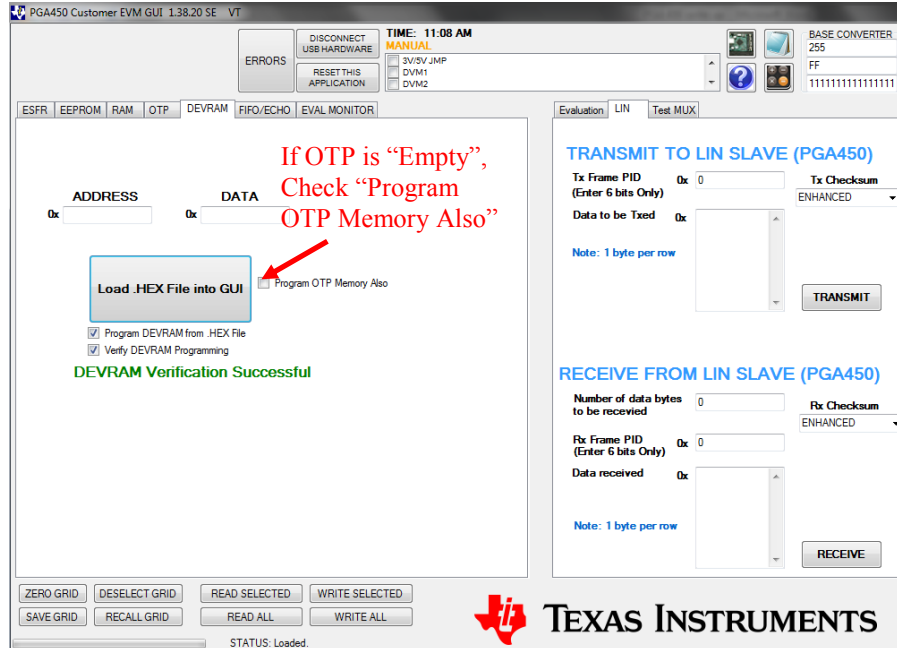**Figure 1: PGA450 GUI**

10. Load the PGA450.hex file into the DEVRAM by clicking on the "Load .HEX File into GUI" button on the DEVRAM tab. Then choose the PGA450.hex file included at the top of this file. If the OTP status read "Empty" in step 4, make sure that 8V is supplied to the VP_OTP pin and that the "Program OTP Memory Also" box is checked during this step.


11. Disconnect the (8V) and VP_OTP pins if they were connected.

12. On the Evaluation tab, click on the "Amplifier Output (unfiltered)" button. There should be a green dot in the upper left corner of the button indicating that it is selected.
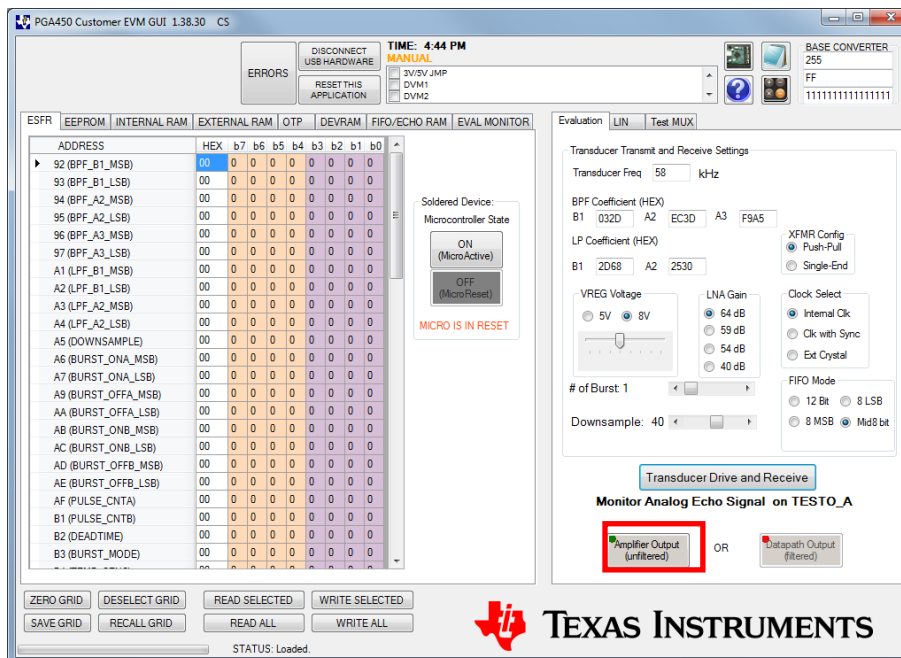
13. Release the micro out of reset by clicking on the "ON (Micro Active)" button.
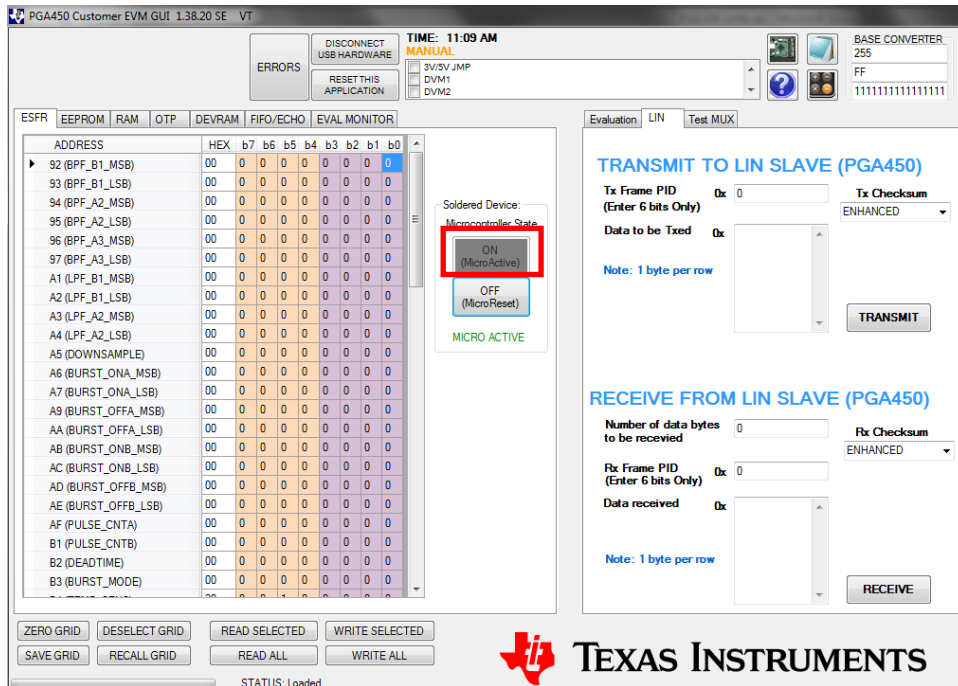

14. In the LIN tab, receive a LIN transmission by clicking "RECEIVE" with PID = 21 and Number of bytes to be received = 2. As shown below, 0x(1234) should be received. This verifies that the firmware is loaded properly and that the GUI is communicating through LIN with the PGA450.
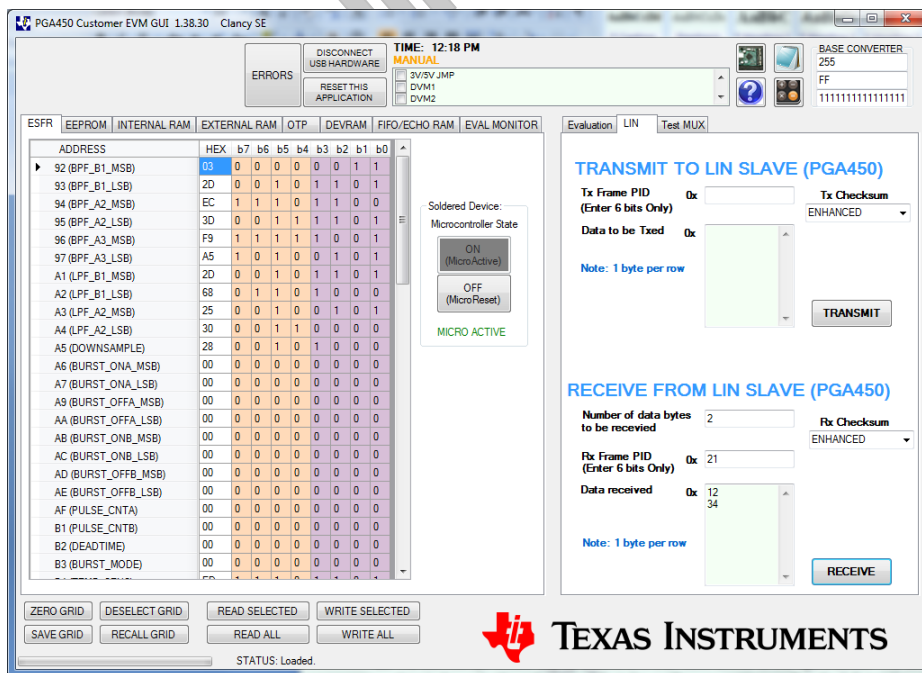
15. Send a LIN transmission by clicking the TRANSMIT button with PID = 11 and Data = 0x(00) as shown below. This will trigger a "short distance" measurement.
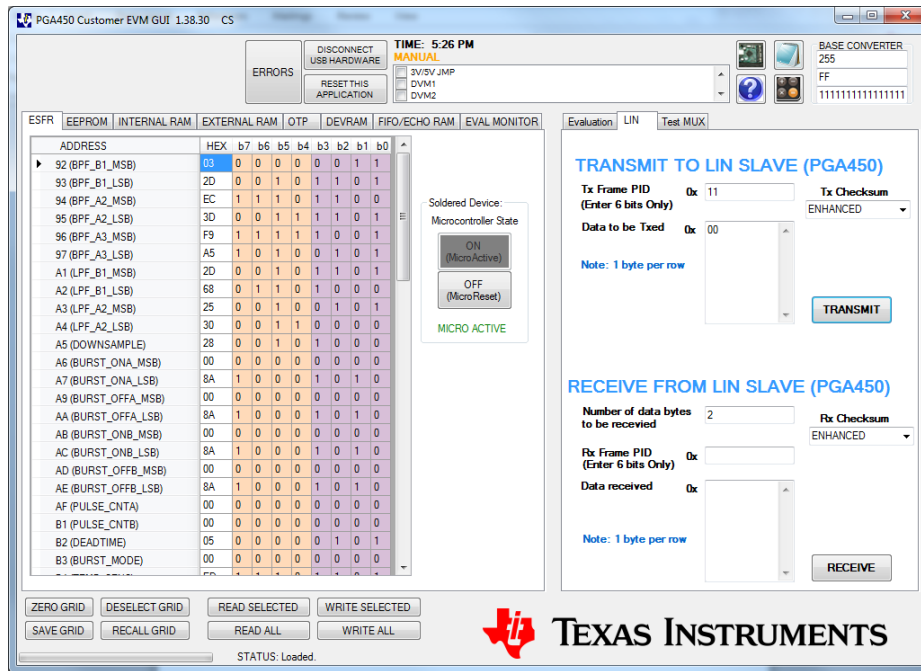

16. The oscilloscope should display a waveform that looks similar to the figure below. The decay time is shown by the red arrow. Adjust the oscilloscope settings so that the full signal can be seen.
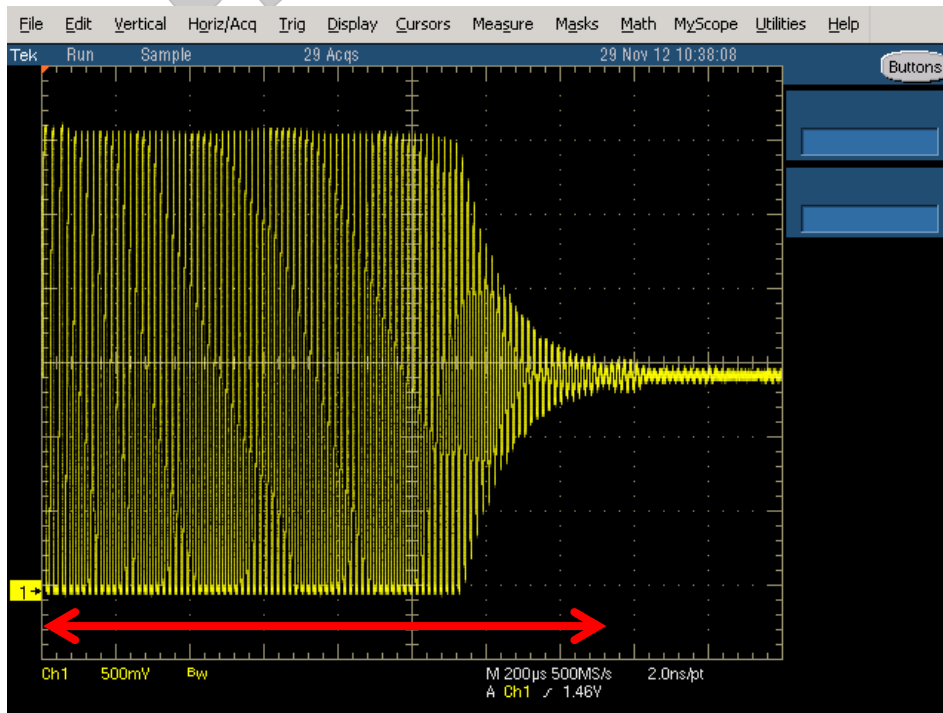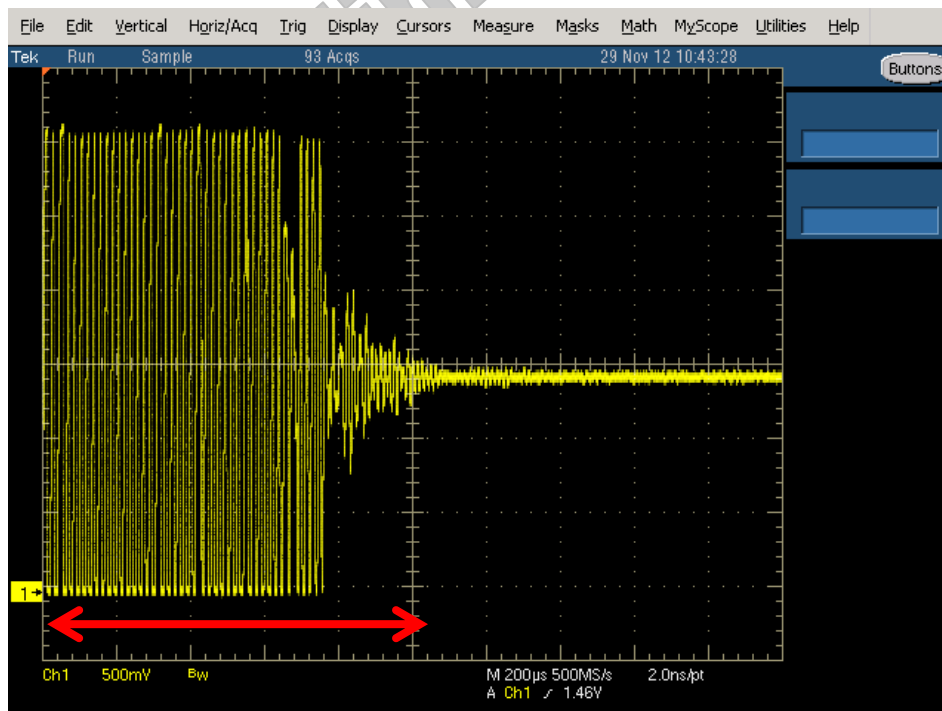
17. Use a small screwdriver to slowly turn the transformer until the burst signal on the oscilloscope decays as quickly as possible. Keep clicking on the "TRANSMIT" button to update the signal on the oscilloscope.
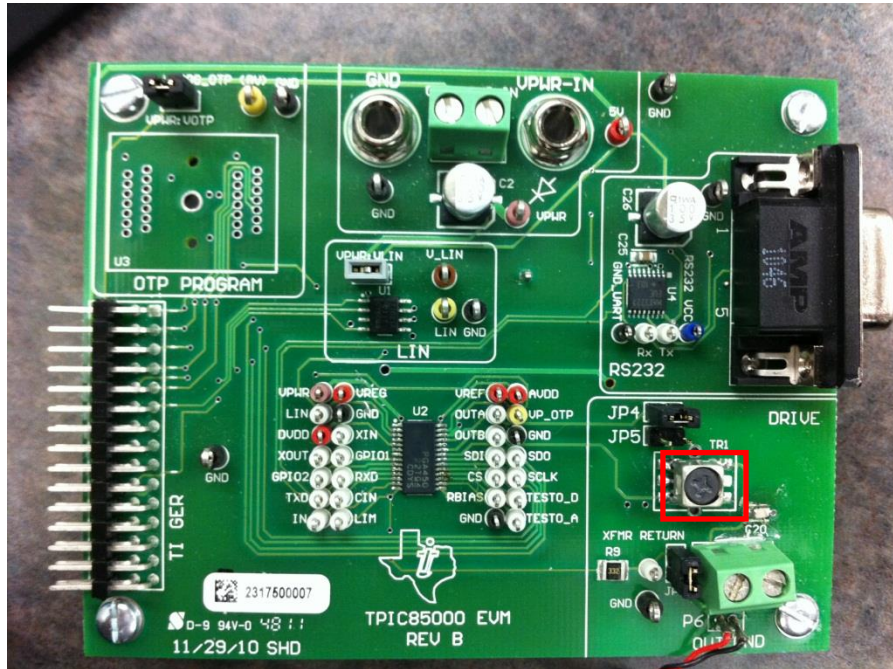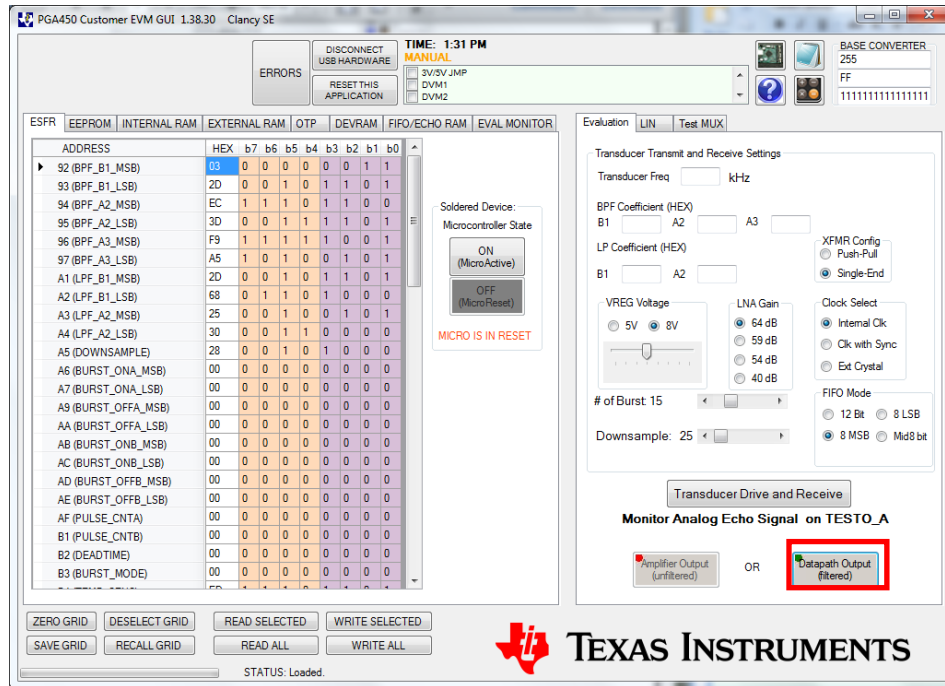

18. Below is an example of the minimum decay time for one board.

19. A tuned board should be able to detect an object at 15cm – 1m away from the transducer consistently. To see the result on an oscillascope, put the mirco in "reset", and then click on the "Datapath Output (filtered)" button. A green dot should be on the upper left corner of the button.


20. Release the micro out of reset by clicking the "ON (MicroActive)" button, place an object (pipe/hand) 30cm away from the transducer, and repeat step 15.

Oscilloscope Configuration:

    a.   Vertical Division on Channel 1: 200mV/div

    b.   Horizontal Division: 400us/div

    c.   Set trigger to channel 1, Normal mode, at 240mV

    d.   Move horizontal position to near the left edge of the o-scope display.

    e.   Move Channel 1 down to near the bottom of the o-scope display.

At the "TESTO_A" test point, an example waveform like the one below will be shown. For a good tuned board, there should be no spikes in region B, and the object should be clearly visible.
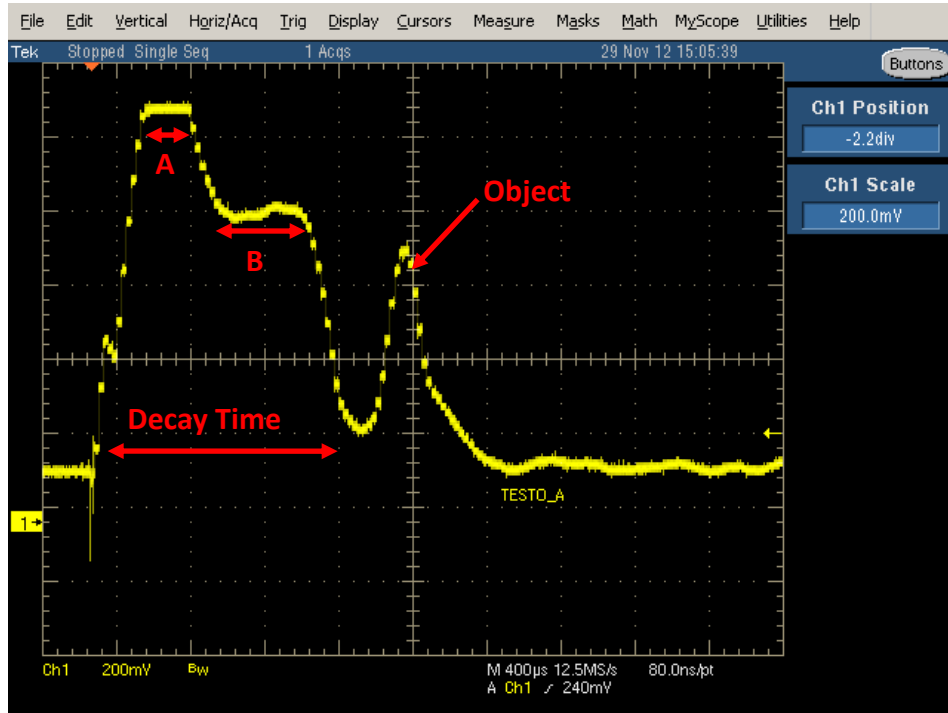
21. Turn off the power supply and remove the oscilloscope probe. The PGA450EVM's transformer is now tuned.