Texas Instruments

MSP430FR6047

Ultrasonic Sensing

Troubleshooting Guide

Prepared for distribution

MSP430 Applications

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Introduction

The MSP430FR6047 is a family of Ultrasonic Sensing MCUs for water flow measurement applications.

Required Software Tools

To be able to program, debug and execute code on the EVM430-MSP430FR6047, the following tools are required.

- Java run-time engine (JRE) version 1.7 or later is required for the CapTIvate Design Center
  - To verify which version you are using, from a command line prompt, type *java –version*
  - If update is needed, download and install the latest version from www.java.com

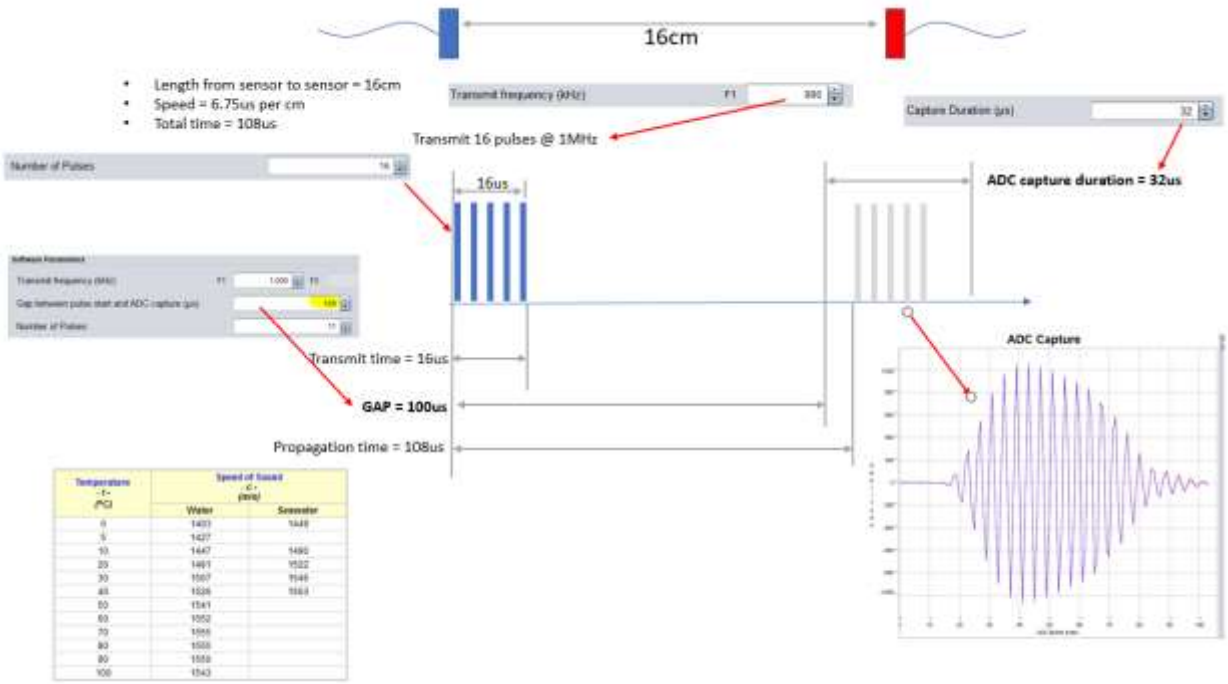
- Ultrasonic Sensing Design Center
  - PC GUI tool used to configure and tune sensors
  - Automatically generates firmware
  - Windows 7+, Apple-OS, Linux-OS
- TI Code Composer Studio
  - IDE development platform
    - Need if modifying, programming and debugging firmware
- Uniflash Utility [optional]
  - Flashes firmware images on target MCU
  - Note: not required for development, but is handy when you need to program your MCU without using Code Composer Studio

Setting GUI parameters

In this section we cover the basic parameter setup to get a good ADC capture.

- Measure the distance between the two transducers.
- Look up the Speed of Sound based on the water temperature
- Use the speed to estimate the propagation time or aTOF (absolute time of flight)
- Set the GAP parameter a few microseconds less than the propagation time
  (This allows the ADC to capture a few points before the arriving signal)
- Set the ADC capture duration just long enough to capture a waveform like the one shown below
- Adjust the Gain control and repeat as needed to achieve amplitude approximate +/-900 counts

If you follow these steps above and are unable to capture any waveform, go back and measure the distance between the transducers and double check your aTOF calculation. If everything checks out, skip to the next section, Verify Transmit and Receive Pulses.



Verify Transducer Transmit and Receive Signal on the EVM430-FR6047

You will need a 2-channel oscilloscope. A logic analyzer with analog measurement capability can be used too. You can conveniently connect the probes to the CH0_OUT and CH1_OUT header pins.