

ADC12DJ3200EVM

Decimation Mode Usage

JMODE14 – Dual Input – 3200MSPS

Decimate by 8 – Complex Data Output

EVM Setup Used

- Decimation Modes (complex output) are limited to the dual input modes of the ADC
- Maximum Sample Rate is 3200 MSPS (for ADC12DJ3200)
- Example uses JMODE14 – Decimate by 8
- $F_{in} = 2482.77\text{MHz}$ in VINA – DDC A is used by default on VINA
- Setup steps:
 - Clock Source – On-board
 - On-board F_s Selection – $F_s = 3200\text{ Msp}$ s
 - Decimation and Serial Data Mode = JMODE14
 - Clock Program Clocks and ADC

ADC12DJ3200EVM Setup

The screenshot shows the ADC12DJ3200 GUI window. The title bar reads "ADC12DJ3200 GUI". The menu bar includes "File", "Debug", "Settings", and "Help". The main title is "ADC12DJxx00 GUI". Below this is a tabbed interface with tabs for "EVM", "Control", "JESD204B", "NCO Configuration", "Trim", "LMK04828", "LMX2582", and "Low Level View". The "EVM" tab is selected. In the top right corner, there is a "USB Status" indicator (a green light) and a "Reconnect?" button.

1. User Inputs

#1. Clock Source
On-board

#2a. On-board Fs Selection
Fs = 3200 Msps

#2b. External Fs Selection
1000 MHz

#3. Decimation and Serial Data Mode
JMODE14

Program Clocks and ADC

2. Temp Sensor:

ADC Temp
81 degrees C

LM95233 Local Temp
40 degrees C

Update Temperatures

START HERE!

This tab is used to control the EVM to program the clocks, basic mode of the ADC, and read the temperature. Once the EVM is programmed, the other tabs allow the user to configure the ADC.

1. User Inputs - How to program the EVM clocks and ADC:
#1. Clock Source - the DEVCLK to the ADC may be supplied by the on-board PLLVCO or externally by the user. If the on-board clock is selected, choose the Fs at #2a. If the external clock is selected, enter the Fs at #2b.
#2a. On-board Fs Selection - The PLLVCO will be programmed to provide any of the available sampling clock frequencies to the DEVCLK, as well as provide the clock for distribution via the LMK04828 for the JESD204B clocks.
#2b. External Fs Selection - The user must enter the external Fs supplied (in MHz). The PLLVCO will be powered down; see the Users Guide for details regarding external clocks required.
#3. Decimation and Serial Data Mode - Choose the decimation mode and serial data mode for the ADC.
#4. Program Clocks and ADC - once all modes have been selected, press this button to write selections to the PLLVCO, LMK04828, and ADC.

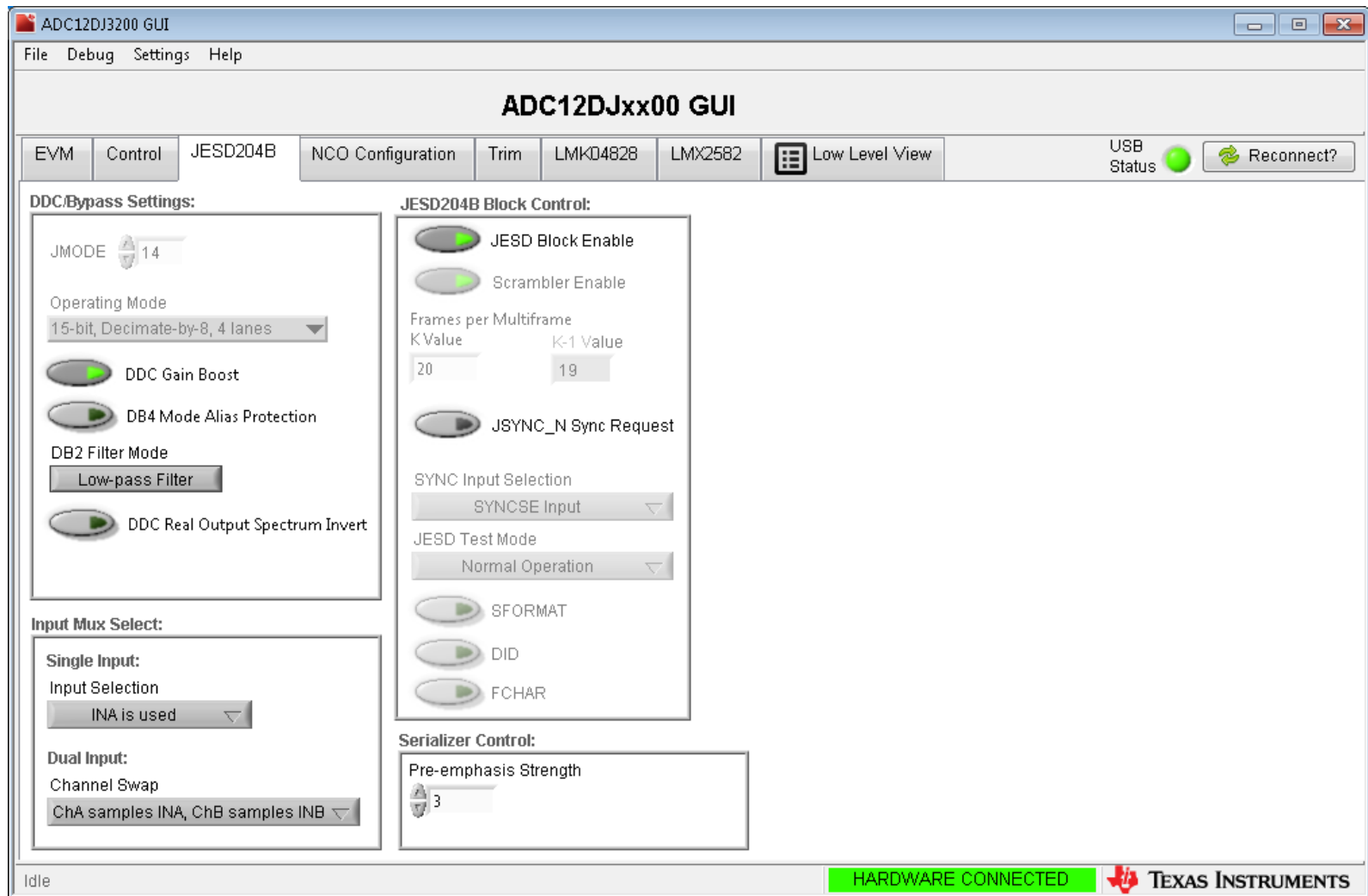
2. Temp Sensor - the temperature for the device and ambient (board) may be read.

Idle

HARDWARE CONNECTED

TEXAS INSTRUMENTS

Enable DDC Gain Boost – Click button



Default NCO Frequency is $\frac{3}{4}F_s = 2400\text{MHz}$

ADC12DJ3200 GUI

File Debug Settings Help

ADC12DJxx00 GUI

EVM Control JESD204B NCO Configuration Trim LMK04828 LMX2582 Low Level View USB Status Reconnect?

NCO Configuration:

CSELA/CSELB NCO Sel Mode

Preset 0 NCO Sel A

Preset 0 NCO Sel B

Enable Rational NCO Mode

Desired FSTEP 10 kHz

NCO_RDIV 0

NCO_RDIV in range

NCO_RDIV is Integer

Preset 0 Frequency (DDC A) 3221225472 2400.000000000 MHz

Preset 1 Frequency (DDC A) 3221225472 2400.000000000 MHz

Preset 2 Frequency (DDC A) 3221225472 2400.000000000 MHz

Preset 3 Frequency (DDC A) 3221225472 2400.000000000 MHz

Preset 4 Frequency (DDC B) 3221225472 2400.000000000 MHz

Preset 5 Frequency (DDC B) 3221225472 2400.000000000 MHz

Preset 6 Frequency (DDC B) 3221225472 2400.000000000 MHz

Preset 7 Frequency (DDC B) 3221225472 2400.000000000 MHz

Preset 0 Phase (DDC A) 0 0.000000000 radians

Preset 1 Phase (DDC A) 0 0.000000000 radians

Preset 2 Phase (DDC A) 0 0.000000000 radians

Preset 3 Phase (DDC A) 0 0.000000000 radians

Preset 4 Phase (DDC B) 0 0.000000000 radians

Preset 5 Phase (DDC B) 0 0.000000000 radians

Preset 6 Phase (DDC B) 0 0.000000000 radians

Preset 7 Phase (DDC B) 0 0.000000000 radians

This tab is used to program the NCO features of the ADC.

The NCO may be programmed to up to eight preset frequency/phase pairs. Changing this register after the JESD204B interface is running will result in non-deterministic NCO phase. If deterministic phase is required, the JESD204B interface should be re-initialized (assert and de-assert ~SYNC) after changing this register.

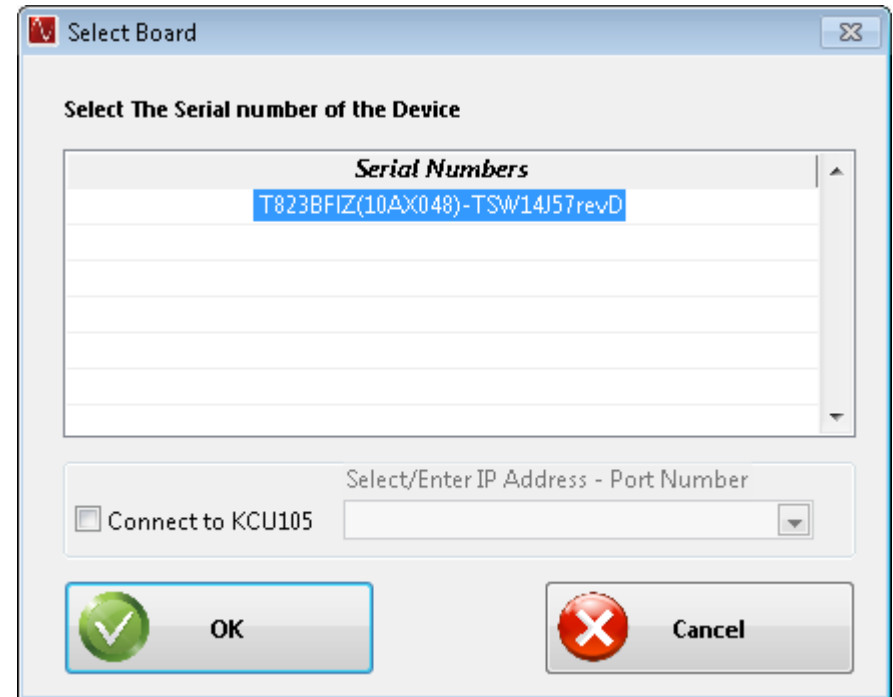
To program a preset pair, do the following:

1. Choose whether the NCO Preset Values shall be selected via the NCO_SEL bits or input pins.
2. Choose which NCO Preset Value shall be configured (Preset 0 ... Preset 7).
3. Load/adjust the Preset Frequency register value. The NCO frequency (FNCO) is: $FNCO = NCO_FREQ * 2^{32} * F_s$
 F_s is the sampling frequency of the ADC, and NCO_FREQ is the integer value of this register. This register can be interpreted as signed or unsigned.
4. Select the Preset Phase. This value is left-justified into a 32-bit field and then added to the phase accumulator. The phase (radians) is:
 $PHASE = NCO_PHASE * 2^{16} * 2 * \pi$
This register may be interpreted as signed or unsigned.

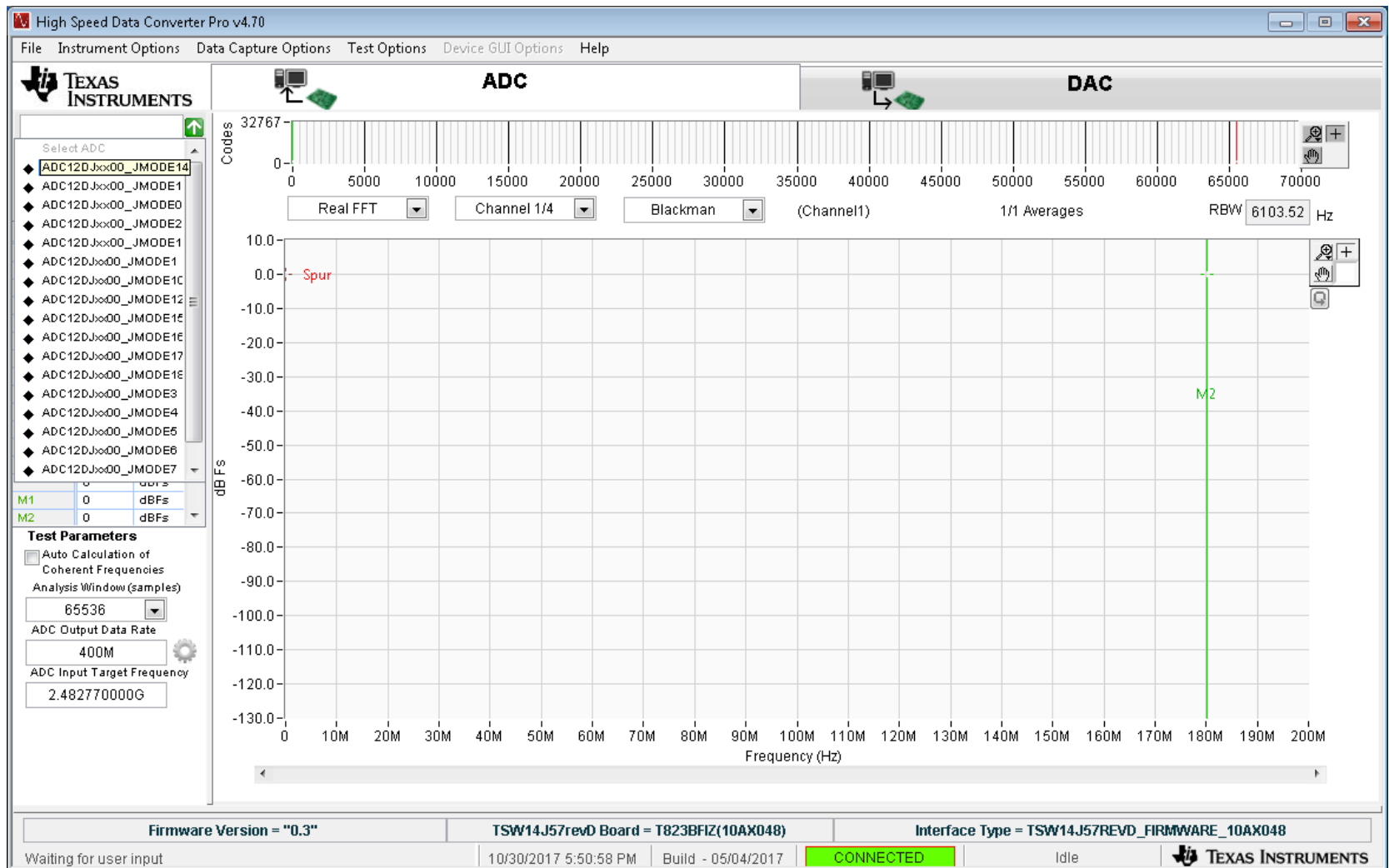
Idle HARDWARE CONNECTED TEXAS INSTRUMENTS

High Speed Data Converter Pro Setup

- Launch High Speed Data Converter Pro GUI
- Select board in popup and click OK
- Acknowledge No Firmware or current line-rate settings popup
- Select ADC12DJxx00_JMODE14 in upper left pull-down (see next slide)
- Then click Gear symbol next to ADC Output Data Rate entry field
- Click OK to Download Firmware when prompted

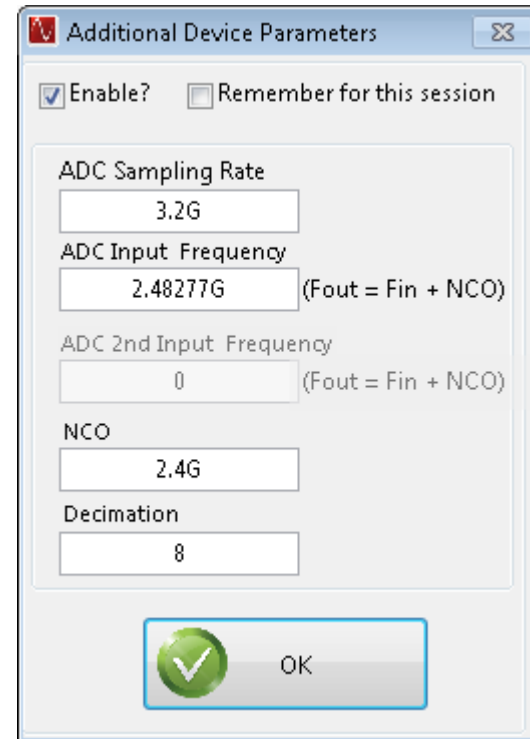


High Speed Data Converter Pro Setup



HSDC Pro – Decimation Mode Configuration

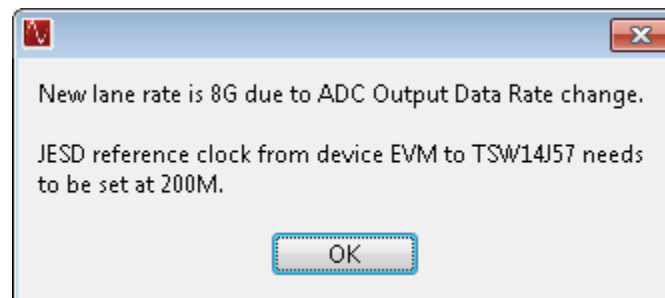
- Click on Gear symbol to right of ADC Output Data Rate box
- Enter ADC sample rate = 3.2G
- ADC Input Frequency = 2482.77M
- NCO Frequency = 2.4G
- Decimation = 8



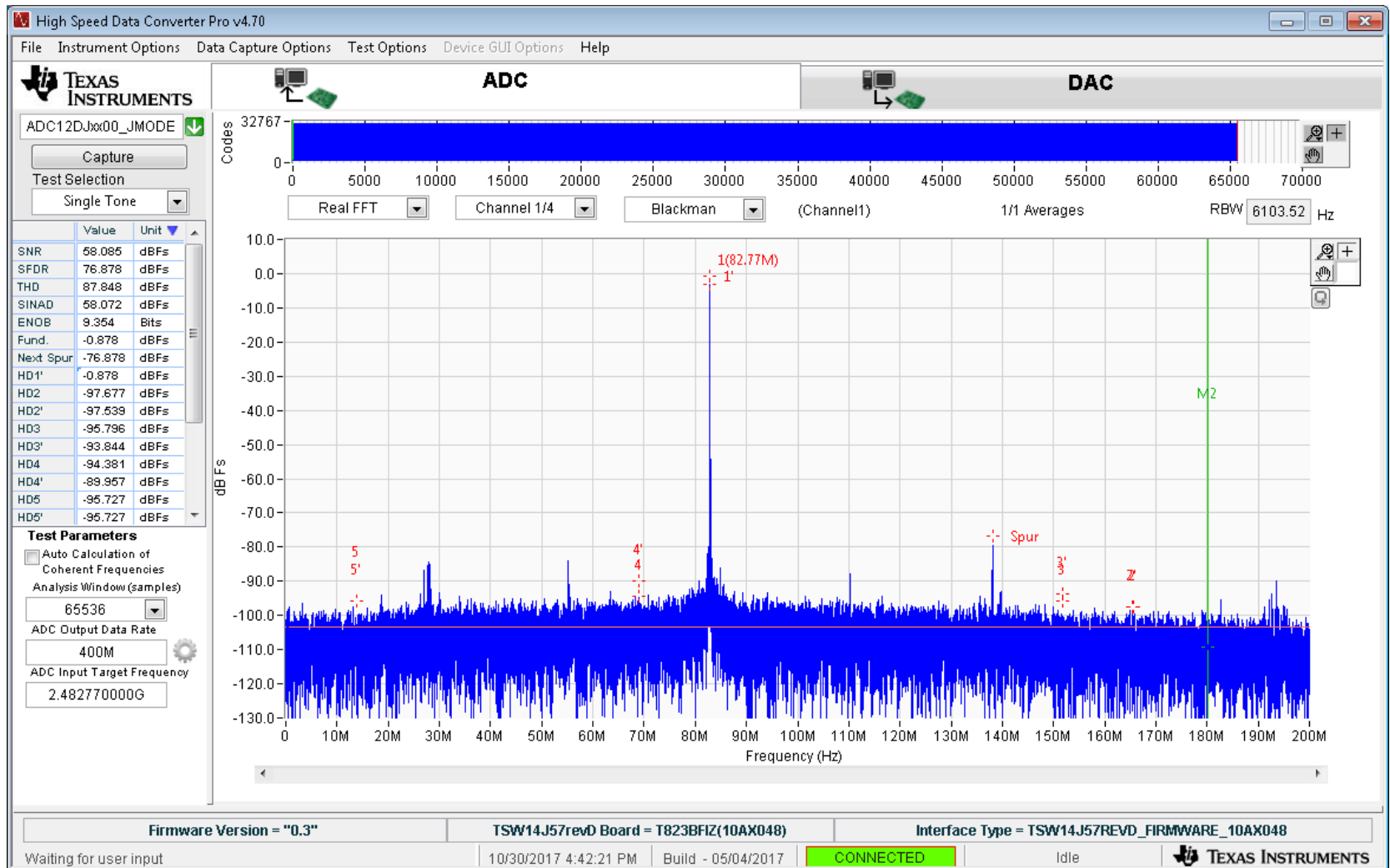
The screenshot shows a dialog box titled "Additional Device Parameters" with a close button (X) in the top right corner. Inside the dialog, there are two checkboxes: "Enable?" (checked) and "Remember for this session" (unchecked). Below these are several input fields with labels and units, and a formula for each: "ADC Sampling Rate" with value "3.2G", "ADC Input Frequency" with value "2.48277G" and formula "(Fout = Fin + NCO)", "ADC 2nd Input Frequency" with value "0" and formula "(Fout = Fin + NCO)", "NCO" with value "2.4G", and "Decimation" with value "8". At the bottom right is an "OK" button with a green checkmark icon.

Parameter	Value	Formula
ADC Sampling Rate	3.2G	
ADC Input Frequency	2.48277G	(Fout = Fin + NCO)
ADC 2nd Input Frequency	0	(Fout = Fin + NCO)
NCO	2.4G	
Decimation	8	

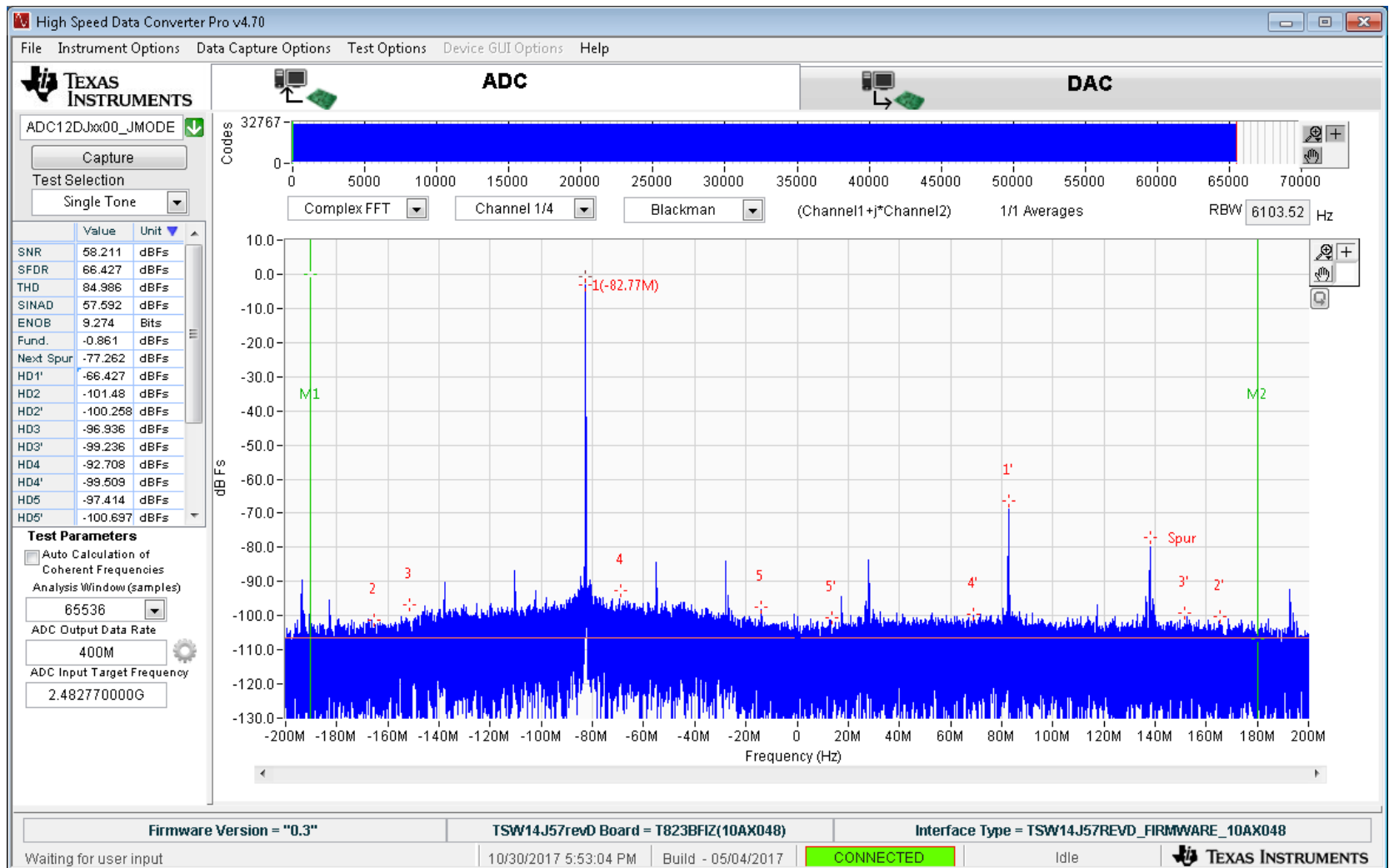
Lane Rate Confirmation Popup



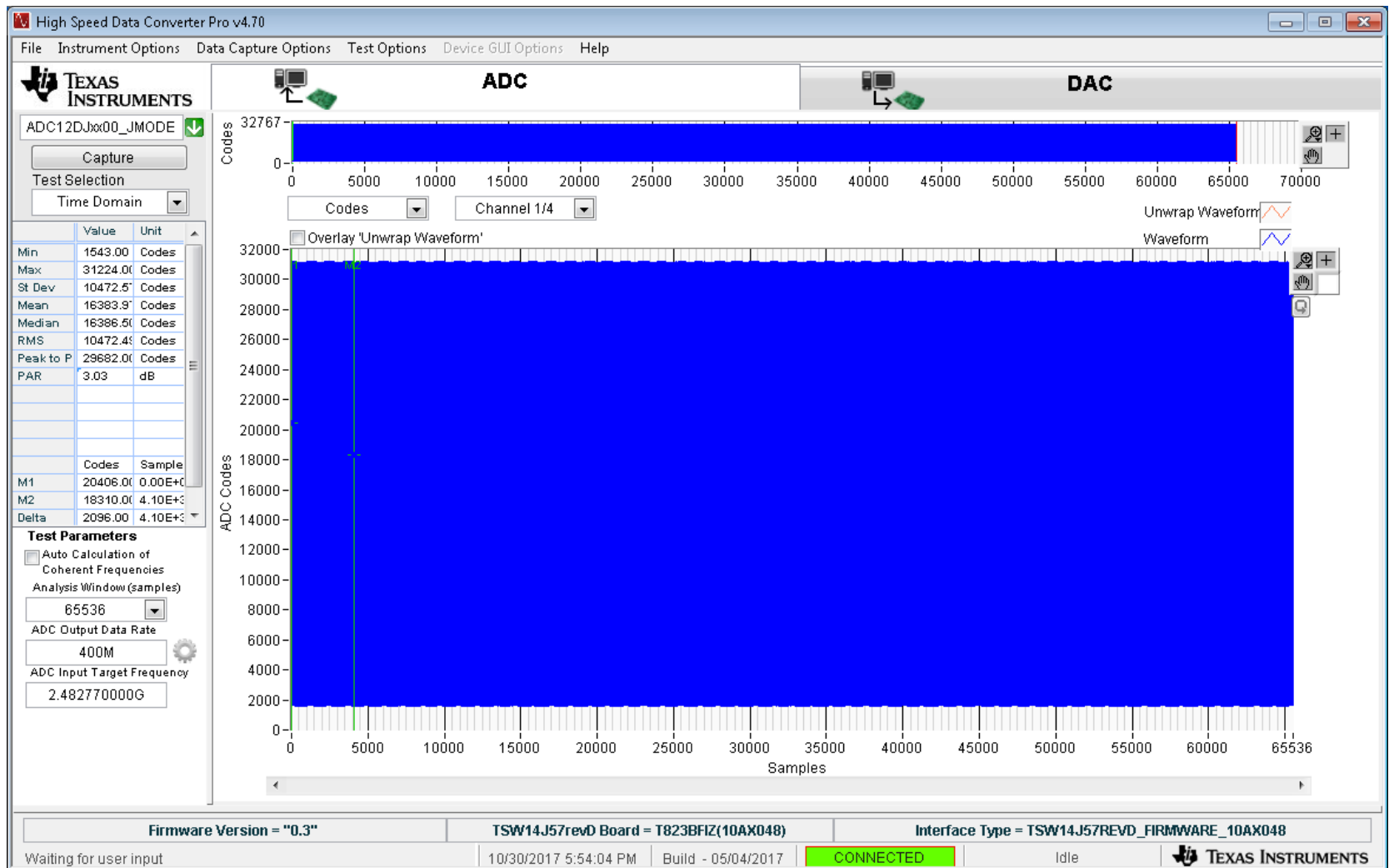
Click Capture – Initial Display is Real FFT



Change Display to Complex FFT



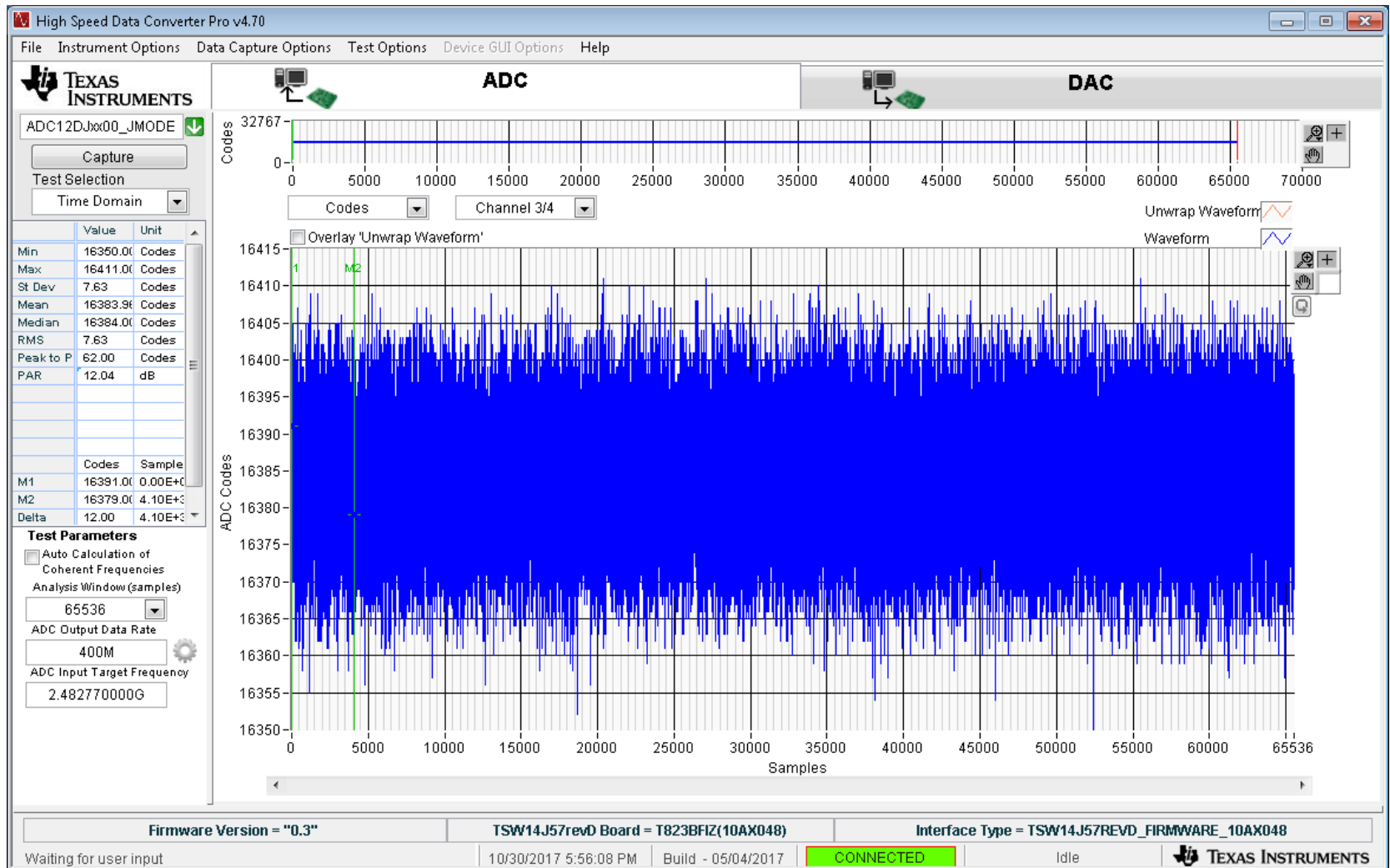
Change Test Selection to Time Domain



Select Desired Channel of Data

- Note Channel 1 of 4 is displayed by default
- Data in this mode is displayed from 0 to 32768
- Change this pull-down to show other channels of time domain data
- Note Channel 1 and 2 have I and Q data for DDCA
- No signal applied to VINB, so Channel 3 (I) and 4 (Q) for DDCB have only noise

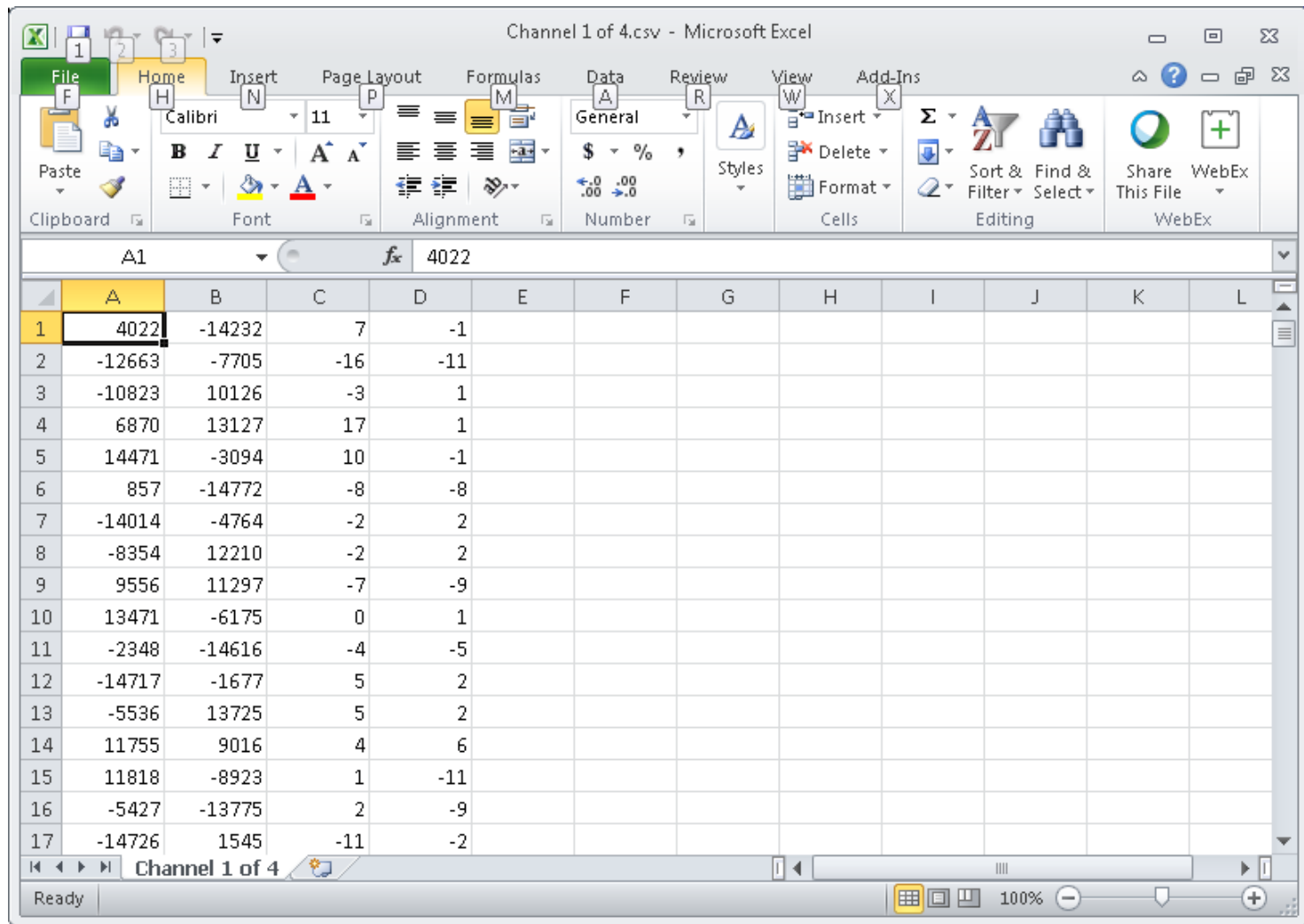
Channel 3 data



Export Channel Data

- Select Channel 1/4
- Click File>Save I32 Codes as CSV File
- Select location and file name and click OK
- Note exported data is signed

Channel 1+2+3+4 Data



	A	B	C	D	E	F	G	H	I	J	K	L
1	4022	-14232	7	-1								
2	-12663	-7705	-16	-11								
3	-10823	10126	-3	1								
4	6870	13127	17	1								
5	14471	-3094	10	-1								
6	857	-14772	-8	-8								
7	-14014	-4764	-2	2								
8	-8354	12210	-2	2								
9	9556	11297	-7	-9								
10	13471	-6175	0	1								
11	-2348	-14616	-4	-5								
12	-14717	-1677	5	2								
13	-5536	13725	5	2								
14	11755	9016	4	6								
15	11818	-8923	1	-11								
16	-5427	-13775	2	-9								
17	-14726	1545	-11	-2								