CML Microcircuits

COMMUNICATION SEMICONDUCTORS

Evaluation Board Quick Start

EV9830

Publication: QS/EV9830/2

1 Introduction

Thank you for your interest in the EV9830 Evaluation Board.

This quick start guide will help you get started with your EV9830 evaluation. The respective datasheet and user manual provide full details on the board, but this “quick start” guide consolidates information from multiple sources to accelerate your testing.

This guide walks the user through the following steps:

- Downloading necessary files
- Connecting the EV9830, HB9830, and PE0003
- Installing PE0003 USB driver
- Using EV9830 graphical user interface (GUI) to:
  - Configure CMX983 frac-N synthesizers for 901MHz and 2.1GHz
  - Configure CMX983 main ADC (Rx) and DAC (Tx) channels for 75ksps
  - Configure CMX983 Rx/Tx serial ports for data capture to/from PE0003 microSD card

2 History

Version	Changes	Date
2	Modified Tx/Rx GUI settings	15-02-26
1	Initial release	15-01-29

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3 Preparation for Operation

3.1 Download of Documents and Software

Please visit the CML website (www.cmlmicro.com) and download the following files:

- CMX983 Datasheet
- EV9830 User Manual
- EV9830 Schematic
- EV9830 Evaluation Software package
- PE0003 Driver
- PE0003 User Manual

3.2 Test Equipment

The following test equipment will be needed:

- PC with Windows 8 or earlier.
- +/-6V supply (rated for 500mA) for PE0003 and EV9830.
- Baseband IQ signal generator
- RF spectrum analyzer
- Oscilloscope (for generic signal viewing if desired)

3.3 Basic Connections

- Connect HB9830 to “Host Port” port on PE0003 (Do not use PE0003 C-BUS ports!).

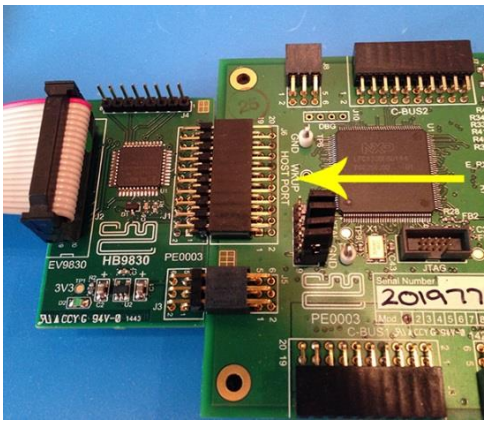

Figure 1: HB9830 Connected to PE0003 Host Port

- Connect 20-pin ribbon cable between EV9830 “Host Port” and HB9830.

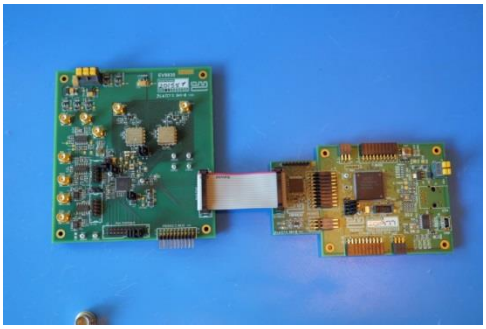

Figure 2: EV9830 Host Port Connected to HB9830

- Apply +6V to PE0003 and +/-6V to EV9830.

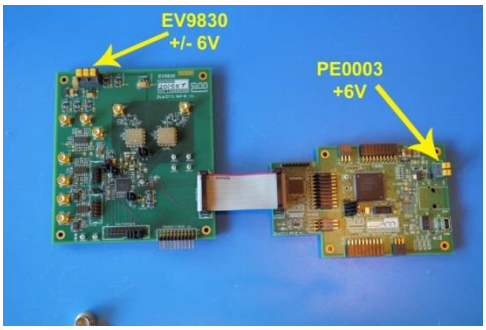

Figure 3: Power Supply Connections

3.4 PE0003 Installation

The following steps will install the PE0003 on your PC:

- Connect PE0003 to PC with USB cable.
- The PC will ask for a USB driver the first time a PE0003 is connected. When prompted, load the USB driver from the unzipped PE0003 Driver package.
- Your PC may attempt to use "Windows Update" to find the PE0003 USB driver. Cancel the "Windows Update" search. On your PC click "Start" button, right click on "Computer" and select "Properties". Select "Device Manager". Right click "PE0003 Evaluation Kit" and choose "Update driver software". Choose "Browse my computer" and locate the PE0003 driver you downloaded earlier. Click "Install anyway" if you get a driver warning message.

4 EV9830 Graphical User Interface

The EV9830 graphical user interface (GUI), named “ES9830xx.exe” (xx=version number), is available in the unzipped EV9830 Evaluation Software package.

- Double-click the executable file to launch the GUI.
- **Click “Init Board” to activate CMX983 internal clock generation.**

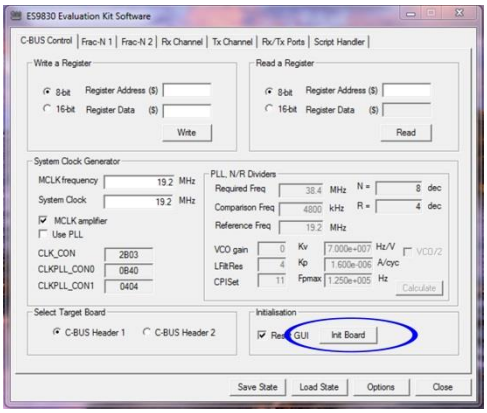

Figure 4: Location of "Init Board" in ES9830 GUI

4.1 Save State and Load State

Clicking “Save State” allows the creation of a user-named “.sta” file that contains all ES9830 GUI selections. These selections can be recalled by clicking “Load State” and selecting the appropriate “.sta” file from your computer. Please note that loading a “.sta” file does not automatically cause the GUI selections to be written to CMX983; the “Write” button on each GUI tab must be clicked in order for the GUI selections to be written to CMX983.

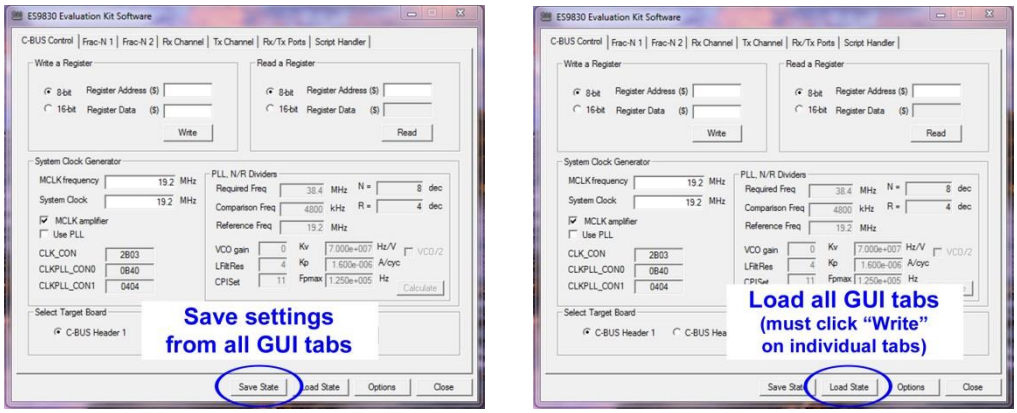

Figure 5: Save State and Load State

5 CMX983 Frac-N Synthesizer Operation

The EV9830 includes external VCO circuits to allow demonstration of frac-N synthesizer operation at 900MHz and 2.1GHz.

- Click “Frac-N 1” tab in GUI, make the following selections, and click “Write Frac-N 1” to enable the frac-N 1 synthesizer to generate 901.2MHz. Output is available on 900MHZ (J101) SMA connector.

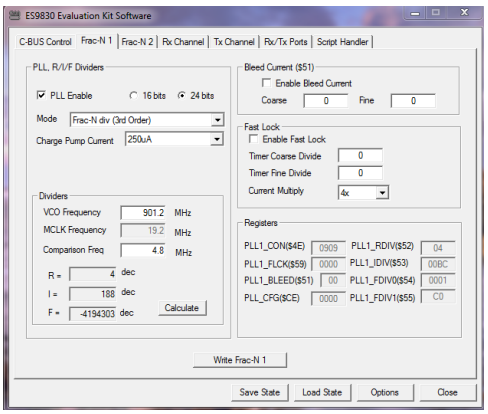

Figure 6: Frac-N 1 Configured for 901.2MHz

- Click “Frac-N 2” tab in GUI, make the following selections, and click “Write Frac-N 2” to enable the frac-N 2 synthesizer to generate 2096.45MHz. Output is available on 2G1HZ (J6) SMA connector.

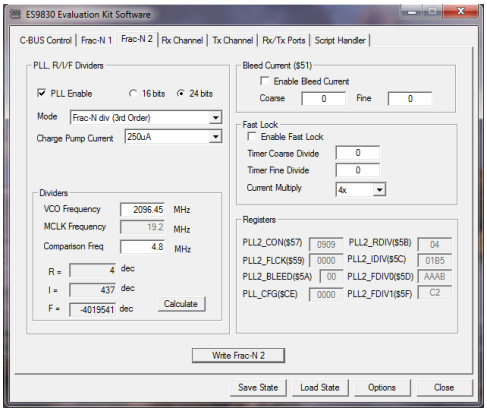

Figure 7: Frac-N 2 Configured for 2096.45MHz

6 CMX983 Rx and Tx Channel Operation

6.1 PE0003 microSD Card

A Class 10 microSD card is required in the PE0003 for proper data transfer to/from CMX983 serial ports. The microSD card is located on PE0003 bottom.

Ensure that the PE0003 microSD card has been partitioned with a large unformatted area for EV9830 data storage. A file system on the microSD card slows down EV9830 data transfer, so serial port data must be stored in the unformatted area of the microSD card.
Here is an example of a 32GB card with a 4GB partition:

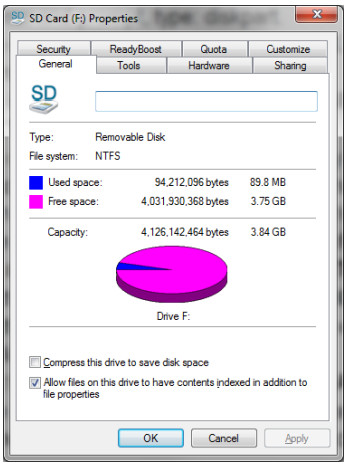

Figure 8: Example of Reduced Size Partition in 32GB SD Card

If you need to establish a partition on a microSD card, insert card into PC and do the following:

1) Backup the files on the SD card by copying them to a separate drive.
2) At a command prompt, type: **diskpart**.
3) Use **LIST DISK** command and identify the disk number that the SD card is mounted as.
4) Use **SELECT DISK** command to select the SD card disk e.g. **SELECT DISK 3**.
5) Double check the correct disk is selected by using the **LIST DISK** command again. The selected disk should have * character in front of it. This step is very important as the wrong selection could result in corruption and data loss of other drives.
6) Use **CLEAN** command to clear all the information off the disk (all data will be lost).
7) Use **CREATE PARTITION PRIMARY** command to create a new partition.
8) Select the partition using **SELECT PARTITION 1**.
9) Shrink the partition by the required amount where the size is specified in Megabytes e.g. to shrink by 500MB use **SHRINK DESIRED=500**.
10) Format the partition as required e.g. **FORMAT fs=NTFS QUICK** (skip this step if the type is already NTFS).
11) Use **FILESYSTEM** command to list properties of drive if desired.
12) Use **EXIT** command to quit the diskpart tool.
13) Copy files onto the SD card from the backup, if necessary.

Every time new data is written to the microSD card the old data is erased, so only one “file” can be on the card’s non-partitioned area at a time.

The microSD card data is in decimal format with I and Q values on the same line, separated by a comma.

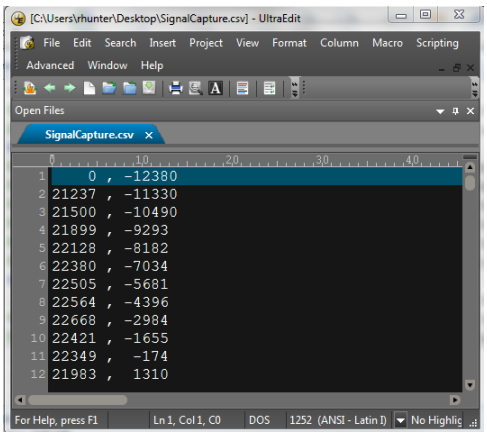

Figure 9: Example of microSD Card IQ Data Format

6.2 Rx Channel Operation

Signal flow for Rx channel operation is:

EV9830 Rx input -> CMX983 ADC -> CMX983 Rx Serial Port -> HB9830 -> PE0003 microSD card

EV9830 Rx inputs can be single-ended or differential. Considerations include the following:

- Single-ended inputs -> Ensure signal source has 50ohm output impedance and inputs are biased at 0V. Ensure jumpers are installed on RX I/Q header (J12, 1-2, 3-4, 7-8, 9-10).
- Differential inputs -> Remove jumpers on RX I/Q header (J12). Ensure inputs are biased at $AV_{DD}/2$.

The maximum CMX983 ADC input amplitude, after internal gain, is 20%-80% AV_{DD}. For Vbias=1.65V (AV_{DD}=3.3V) and with 0dB CMX983 internal gain, this translates to:

- Single-ended: $0.99V_{PP}$, centered on 0V. (EV9830 single-ended input signal path provides +6dB of gain.)
- Differential: +/-0.99 V_{PP} on each of IRXP, IRXN, QRXP, and QRXN, centered on $AV_{DD}/2$.

Click “Rx Channel” GUI tab, make the following selections, and click “Write Rx” to activate CMX983 Rx ADCs at 75ks/s sample rate:

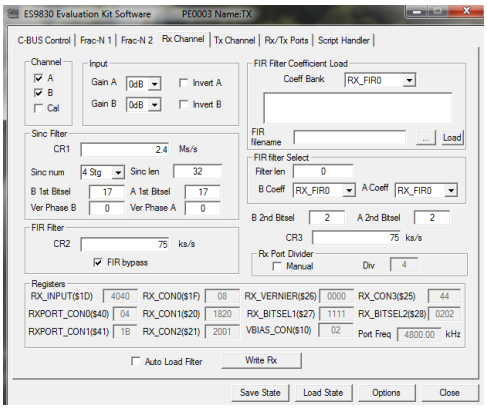

Figure 10: Rx ADC Configuration

The following figure illustrates how to capture CMX983 ADC output to PE0003 microSD card:

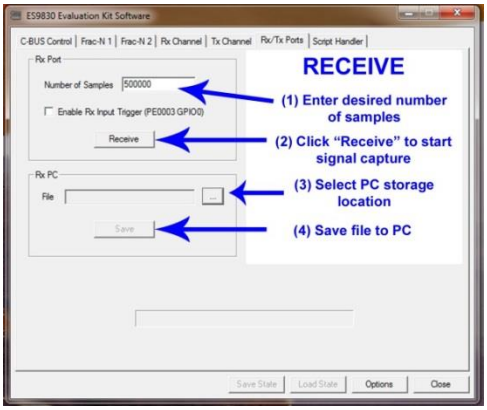

Figure 11: Signal Capture Process

6.3 Tx Channel Operation

Signal flow for Tx channel operation is:

PE0003 microSD card -> HB9830 -> CMX983 Tx Serial Port -> CMX983 Tx DAC -> EV9830 outputs

EV9830 Tx outputs can be single-ended or differential:

- Single-ended -> Outputs are biased at 0V with 50ohm output impedance. Ensure jumpers are installed on TX I/Q header (J7, 1-2, 3-4, 7-8, 9-10).
- Differential -> Remove jumpers on TX I/Q header (J7). Outputs are biased at $AV_{dd}/2$.

Click “Tx Channel” GUI tab, make the following selections, and click “Write Tx” to activate CMX983 Tx DACs at 75ks/s sample rate:

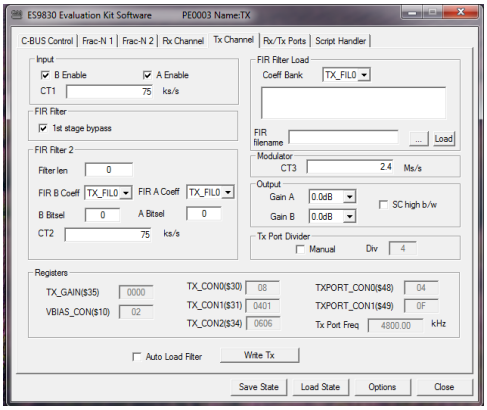

Figure 12: Tx DAC Configuration

The following figure illustrates how to write data from the PE0003 microSD card to the CMX983 Tx DAC inputs:

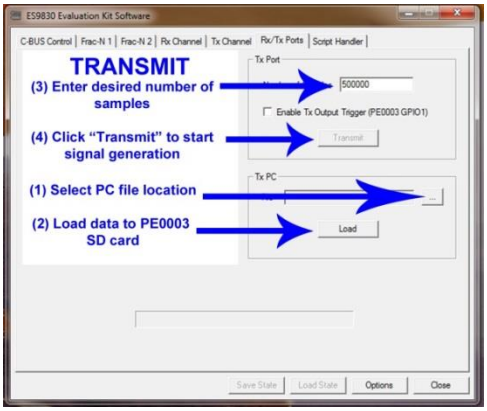

Figure 13: Signal Generation Process

6.4 Helpful Hints

Detailed PE0003 driver installation information can be found in the PE0003 User Manual. For Win7 and Win8 driver signing issues see the FAQ tab on the CML website’s PE0003 Product page.

Keep a reasonable space between RF evaluation boards to avoid RF coupling issues.

Keep RF leads routed away from the boards and other RF sources when making precise measurements. This will avoid signal coupling affecting the results.

The PE0003 generates high spurious noise typical of high speed processors and this may be coupled into the RF circuits. While every care has been taken to avoid issues, optimum performance will be achieved with a production design that includes overall shielding and consideration of the layout with respect to the processor speed and proximity.

Please contact CML Technical Support if you have any questions or require further assistance.

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