

## 1 Introduction

Thank you for your interest in the PE0403-734x Evaluation Board.

This quick start guide will help you get started with PE0403-734X evaluation with analogue Function Image™ (FI). 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 is based on using two sets of (PE0403-734x and PE0003) and walks the user through the following steps:

- Downloading necessary files
- Connecting the PE0403-734X and PE0003
- Installing PE0003 USB driver
- Using PE0003 graphical user interface (GUI) to:
  - Download Function Image™ to CMX734x
  - Configure one PE0403-734x for voice + CTCSS transmission
  - Configure a second PE0403-734x for voice + CTCSS receive

This guide helps the user perform the following test:

- PC supplies audio signal (e.g. wave file) to TX CMX734x “MIC” input.
- TX CMX734x processes speech and adds 67Hz CTCSS tone.
- Voice + CTCSS are passed from TX CMX734x “MOD1” output to RX CMX734x “DISC” input.
- RX CMX734x detects presence of CTCSS tone and opens squelch path so voice can be heard with external speakers.

## 2 History

Version	Changes	Date
1	Initial release	15-03-04

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### 3 Preparation for Operation

#### 3.1 Documents and Software

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

- PE0403 Datasheet
- PE0403-734x Board Schematics
- PE0403-734x Scripts
  - CMX7341\_AnalogueFI\_Tx.pes
  - CMX7341\_AnalogueFI\_Rx.pes
- PE0003 User Manual
- PE0003 Evaluation Software
- PE0003 Driver

Please visit the CML Technical Portal and download the following files:

- CMX7341 Datasheet/User Manual
- CMX7341 Function Image™ for analogue operation (i.e. FI-1.x)
- CMX7341 Activation Codes

#### 3.2 Test Equipment

The following test equipment will be needed:

- PC with Windows 8 or earlier.
- +/-5V supply for 2x (PE0003 + PE0403-734x). Typical current consumption for each supply during operation:
  - +5V supply = 460mA
  - -5V supply = 70mA
- “Voice” input (PC or signal generator are convenient sources)
- Speakers or headphones to listen to processed “voice”
- Oscilloscope (for generic signal viewing if desired)
- 2x USB cables (type A male to mini B male).

#### 3.3 Basic Connections

- Connect one PE0403-734x to C-BUS1 port on PE0003. This will be the TX platform.



**Figure 1: PE0003 connected to PE0403-734x**

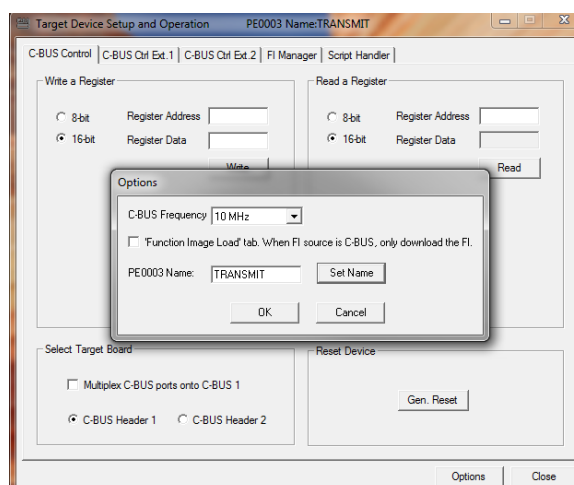
- Connect the second PE0403-734x to C-BUS1 port on the second PE0003. This will be the RX platform.
- For the TX PE0403-734x:
  - Connect audio input to “MIC” 3.5mm audio connector.
  - Ensure J15 3-4 and 5-6 are shorted to allow stereo input signal.
  - Remove J12 jumper to disable microphone bias.
  - Ensure JP6 is open circuit for LINE input level.
  - Short J13 1-2 to connect Tx output to 50ohm driver.
  - Connect “MOD1” (J14 SMA connector) to Rx PE0403-734x “DISC” (J11 SMA connector).
- For the RX PE0403-734x:
  - Ensure J9 1-2 and 3-4 are shorted to route “DISC” input signal to CMX734x.
  - Connect speakers to “AUDIO” 3.5mm connector.
    - JP4 shorted – signal applied to tip and ring.
    - JP4 open – signal applied to tip only.
- Connect +5V to J11 on both PE0003s. The +5V is also distributed to each PE0403-734x via right-angle connector J4.

- Connect -5V to J19 (0V and –V) on both PE0403-734x boards.

## 4 PE0003 Installation and Graphical User Interface

The following steps will install the TX PE0003 on your PC:

- Ensure power is applied to all boards.
- Connect TX 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.
- The PE0003 graphical user interface (GUI) is an executable file located in the PE0003 Evaluation Software package ("ES0003xx.zip", "xx" is version number). Double-click the executable file to launch the GUI for the TX board.
- To aid in identification of TX and RX GUIs, do the following:
  - Click the "Options" button in bottom left corner of GUI.
  - Type TRANSMIT in the "PE0003 Name" field, and click "Set Name". The GUI will look like this:



**Figure 2: PE0003 GUI "Options" Window**

- Click "OK" and drag the GUI to the right side of your PC desktop.
- Connect the RX PE0003 to your PC with a USB cable. The OS should automatically install the USB driver.
- Launch a PE0003 GUI for the RX board. Name that GUI "RECEIVE" and drag it to the left side of your PC desktop. Your desktop should look similar to this:

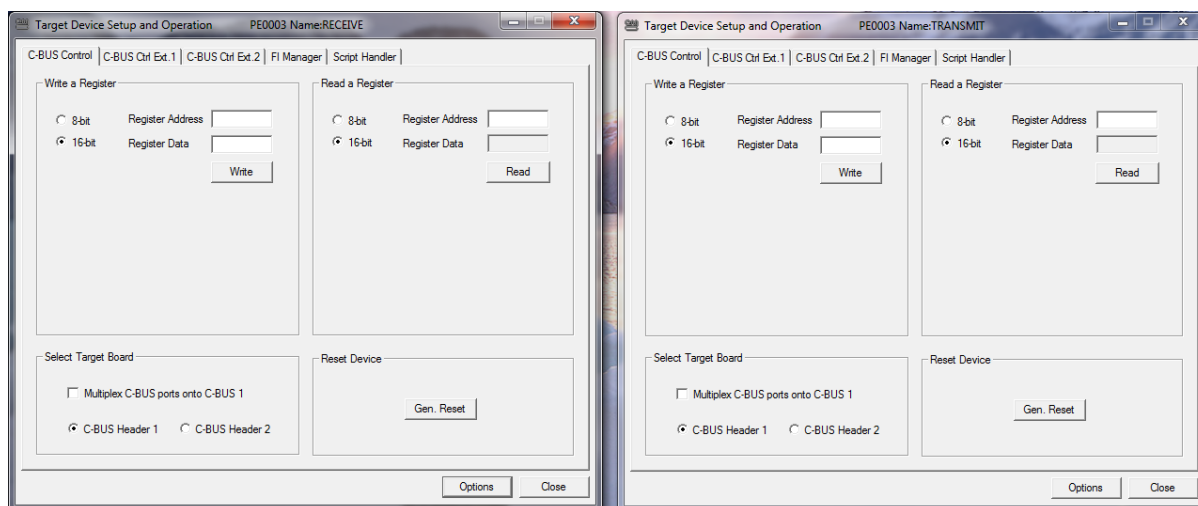


Figure 3:RX and TX GUIs

The complete test setup should look similar to this:

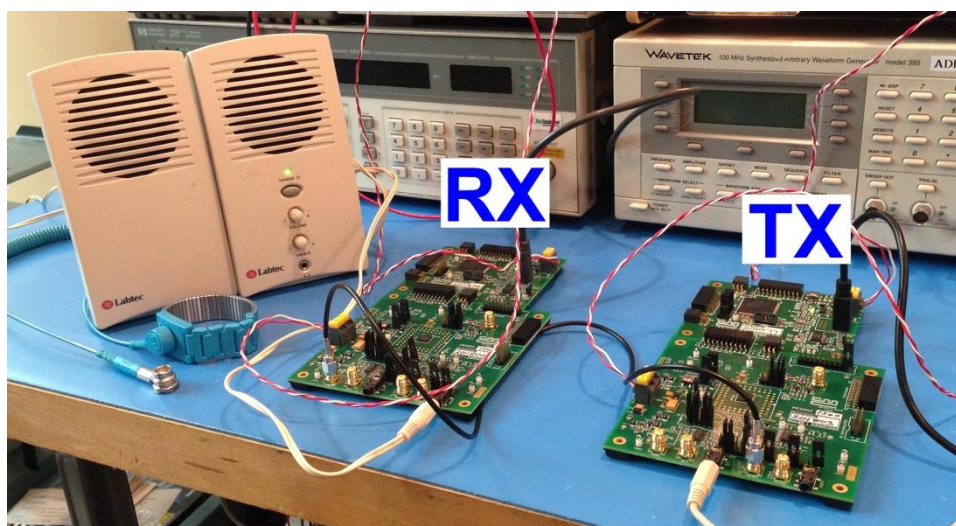
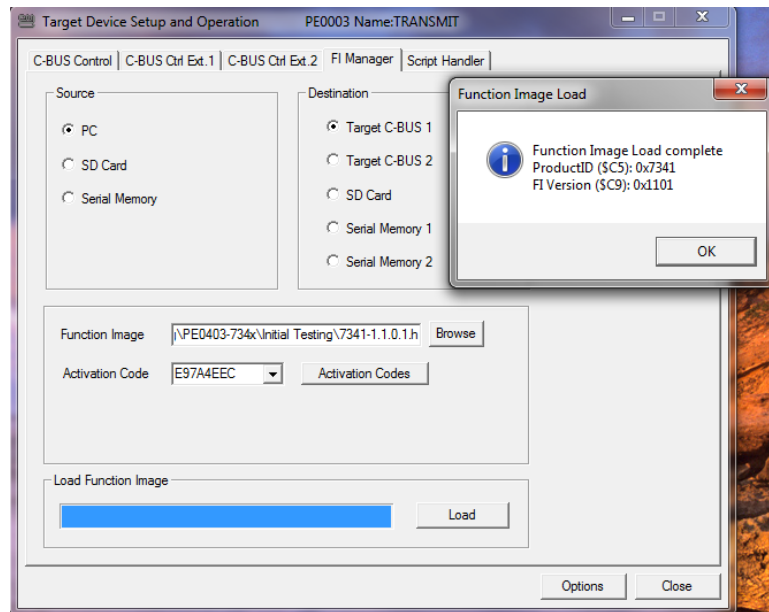


Figure 4:Complete RX/TX Test Setup

## 5 Function Image™ Loading

The CMX734x is a *FirmASIC*® device that requires a Function Image™ file (FI) be loaded after power up or device reset. Perform the following steps to load an analogue FI (FI-1.x) into each CMX734x:

- In the TRANSMIT GUI, click “FI Manager” tab.
- Select “PC” as source and “Target C-BUS 1” as destination.
- Click “Browse”, then locate and select the CMX734x FI you downloaded earlier.
- Enter the “EvKit” activation code.
- Click “Load”. The PE0003 will copy the FI stored on the PC and load it into the CMX734x. A dialogue box will provide additional information about the load:

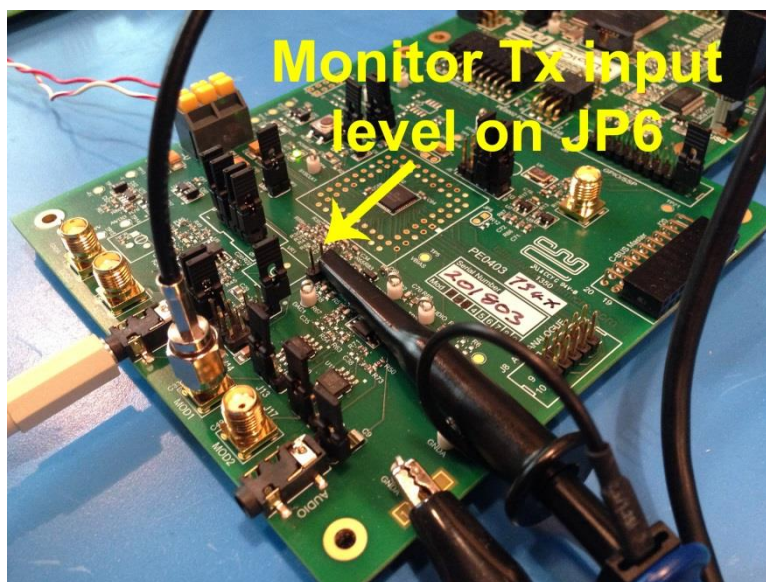


**Figure 5: GUI After Successful FI Load**

- Repeat this procedure with the RECEIVE boards.

## 6 Voice + CTCSS Test

- Turn on external speakers for RECEIVE board.
- In the RECEIVE GUI, click “Select Script” and locate the “CMX7341\_AnalogueFI\_Rx.pes” script. Click “Run”. The GUI indicates that the receiving CMX734x audio path is disabled and no CTCSS tone is present.
  - PE0003 scripts are text files that can be opened and edited with any text editor. Each script contains device configuration information that can help with your firmware development.
- In the TRANSMIT GUI, click “Select Script” and locate the “CMX7341\_AnalogueFI\_Tx.pes” script. Click “Run”.
  - The RECEIVE GUI indicates that CTCSS was detected but since the CTCSS tone is low in frequency and since there is no audio being played, there will be no sound from the speakers.
- Set PC speaker volume to 0% and “loop-play” an audio file. Use an oscilloscope to view the CMX734x Tx input level while adjusting PC speaker volume to an appropriate level.
  - Maximum signal level which can be accommodated without distortion is  $[(3.3 \times 90\%) - (2 \times 0.3V)]$  Volts pk-pk = 838mV rms, assuming a sine wave signal. This should not be exceeded at any stage. A convenient location to monitor Tx input level is JP6:



**Figure 6: Convenient Monitoring Point for Tx Input Level**

- Audio can be heard from the speakers.

The Tx and Rx scripts used in this test can be modified to perform other tasks. Please review the CMX734x datasheet for more information.

### 6.1 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.

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

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