

Evaluation Board Quick Start

EV9730

Publication: QS/EV9730/1

1 Introduction

Thank you for your interest in the EV9730 Evaluation Board.

This quick start quide will help you get started with your EV9730 evaluation. The respective datasheet and user manual provide full details on the board, but this "guick 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 EV9730 and PE0003 •
- Installing PE0003 USB driver •
- Using PE0003 graphical user interface (GUI) to adjust CMX973 settings for modulator and demodulator operation

2 History

Version	Changes	Date
1	Initial release	15-01-26

3 EV9730 Operation

3.1 **Download of Documents and Software**

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

- CMX973 Datasheet •
- EV9730 User Manual •
- EV9730 Schematic •
- EV9730 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. •
- +5V supply (rated for 300mA) for PE0003 and EV9730. •
- RF signal generator •
- Baseband IQ signal generator •
- RF spectrum analyzer
- Oscilloscope (for generic signal viewing if desired)

3.3 Basic Connections

- Connect EV9730 to "C-BUS1" port on PE0003.
- Apply +5V to PE0003 and EV9730.

At this point the boards should look like this:



Figure 1: EV9730 and PE0003

3.4 PE0003 Installation

The EV9730 can be controlled with either the PE0003 PC Interface Card or its predecessor, the PE0002. The unzipped EV9730 Evaluation Software package includes software to allow the use of either PC interface card. A "Readme.txt" file indicates which file to use with which PC interface card.

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.

3.5 EV9730 Graphical User Interface

The EV9730 graphical user interface (GUI), named "ES9730xx.exe", is available in the unzipped software package that corresponds with PE0003. Double-click the executable file and you will be presented with this window:

Bus Control	
Write a Register	Read a Register
Register Address	Register Address
Register Data	Register Data
Write	Read
EV	Kit
	EV9700
0	EV9710
ć	EV9730
Select Target Board	Reset Device
C.RUS Header 1 C.C.RUS Header 2	Gen Reset

Figure 2: EV9730 GUI Opening Screen

Select EV9730 and click "Gen Reset" button in bottom right corner of GUI.

3.6 Modulator Operation

- Apply 892MHz @ -10dBm to EV9730 LO_IN connector J3.
- Apply baseband IQ inputs, biased at 1.6V, to EV9730 TXI/TXQ header J9.
 Input amplitude should be 500mVpk-pk on each of TXI+/TXI- and TXQ+/TXQ-.
- Connect spectrum analyser to Tx_OUT connector J2.



Figure 3:EV9730 Modulator Connections

- Click "Gen Reset" in "C-BUS Control" tab of GUI.
- Setup the "Registers 1" tab as follows, then click "Write All" to apply settings to CMX973:

General Control Register(\$1B)	Rx Mode Register(\$1D)	
Image: Figure 1 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2 Image: Figure 2	I/Q Channels I & Q Channels Differential Amplifiers Both Off RX LO Fre 0 dec Write Rx Mode Reg	
Rx Control Register(\$1C)	Tx Control Register(\$1E)	
I/Q Output Drive Correction Circuit		
IF Amplifier gain VGB Max Gain I/Q Baseband Amplifier Max Gain VGA	TX LO Frequency	
Write Rx Ctrl Reg	Write Tx Control Reg	

Figure 4: Settings for Modulator Operation

• A 446MHz signal should be present on the spectrum analyser.

3.7 Demodulator Operation

- Apply 180MHz @ -10dBm to EV9730 LO_IN connector J3.
- Apply IF signal = 45.002MHz @ -60dBm to EV9730 IF_IN connector J5.



Figure 5:EV9730 Demodulator Connections

- Click "Gen Reset" in "C-BUS Control" tab of GUI.
- Setup the "Registers 1" tab as follows, then click "Write All" to apply settings to CMX973:

😕 EV9730 Evaluation Kit Software	
C-Bus Control Registers 1 Registers 2 Script Handler	
General Control Register(\$1B) Generator PLL Enable Differential Amplifier Tot XE Enable VCO Tot XE Enable RX LO Division /4 TX LO Division /4	Fx: Mode Register(\$1D) I/Q Channels I & Q Channels Differential Amplifiers Both Off RX LO Fre 0 dec
Write Gen Ctrl Reg Rx Control Register(\$1C) I/Q Output Drive Correction Circuit	Tx Control Register(\$1E)
IF Amplifier gain VGB Max Gain ▼ I/Q Baseband Amplifier Max Gain ▼ VGA Write Rx Ctrl Reg	TX LO Frequency
Write All	Close

Figure 6:Settings for Demodulator Operation

- Remove jumpers from EV9730 RXI/RXQ header J8.
- Measure DC voltages on J8 and ensure that:
 - o abs(RXI+ RXI-) < 25mV
 - \circ abs(RXQ+ RXQ-) < 25mV.
 - If these conditions aren't met, adjust I DC and Q DC sliders in "RX Offset Register (\$1F)" area of "Registers 2" tab in GUI.

😬 EV9730 Evaluation Kit Software	
C-Bus Control Registers 1 Registers 2 Script Handler	
RX Offset Register(\$1F) I DC 0 mV Q DC 0 Write Rx Offset Reg	VCO Control Register(\$2F) Performance VCO NR Amplifier Maximum VCO NR Amplifier Write VCO Qui Reg
Charge Pump E/D PLL E/D PLL E/D PLL Lock Detect M/R Dividers Ratio Required Frequency 180 MHz Comparison Frequency 100 KHz Reference Frequency 19.2 MHz R = 192 dec Galculate M = 1800 dec Write PLL Div Reg	Read Only Registers Gen Control 00 Rx Offset 00 Rx Control 00 PLL M 000000 Rx Mode 00 PLL R 0000 Tx Control 00 VCO Control 00 Read Reg Read Reg Read Reg Read Reg
Write All	Close

Figure 7: Rx IQ DC Offset Adjustment Area

• EV9730 should now be operating as a receiver with IF=45MHz.

3.8 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.

Detailed information on GUI operation can be found in the PE0003 User Manual.

A reference document for the Script language can be downloaded from the CML website's PE0003 product page on the Knowledge Base tab.

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

Keep RF leads routed away from the boards and other 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.

CML does not assume any responsibility for the use of any algorithms, methods or circuitry described. No IPR or circuit patent licenses are implied. CML reserves the right at any time without notice to change the said algorithms, methods and circuitry and this product specification. CML has a policy of testing every product shipped using calibrated test equipment to ensure compliance with this product specification. Specific testing of all circuit parameters is not necessarily performed.

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