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Koala EVM Quick Start Manual

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Revision History

Edit	Date	Design	Approval	Description
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1 Introduction

This document describes the Koala EVM board and how to begin developing for a STM32F407/STM32F429 microcontroller.

1.1 Purpose

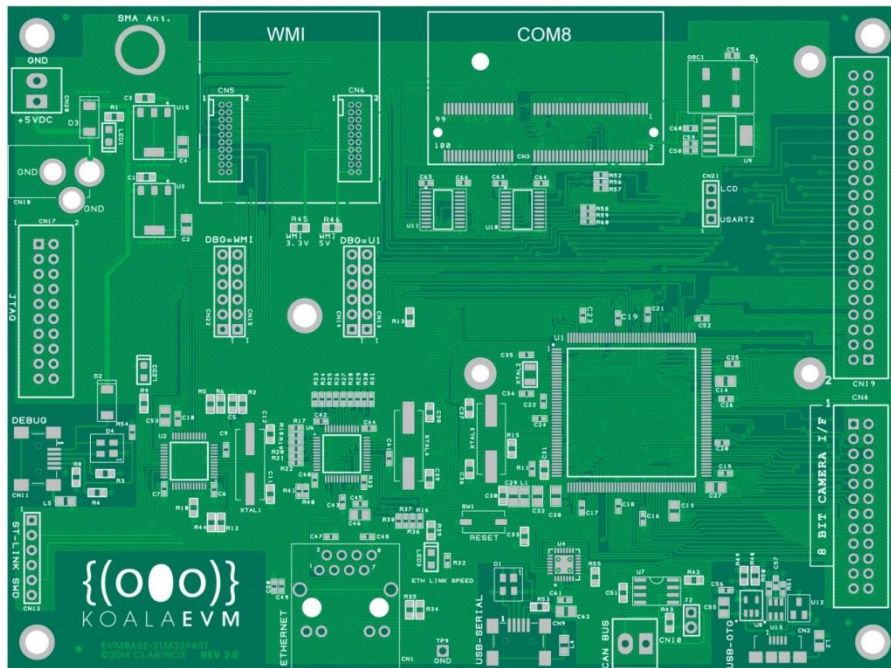
The purpose of this document is to discuss how to use the Clarinox Koala EVM and the steps for hardware and software setup and the debugging of applications.

1.2 System Requirements

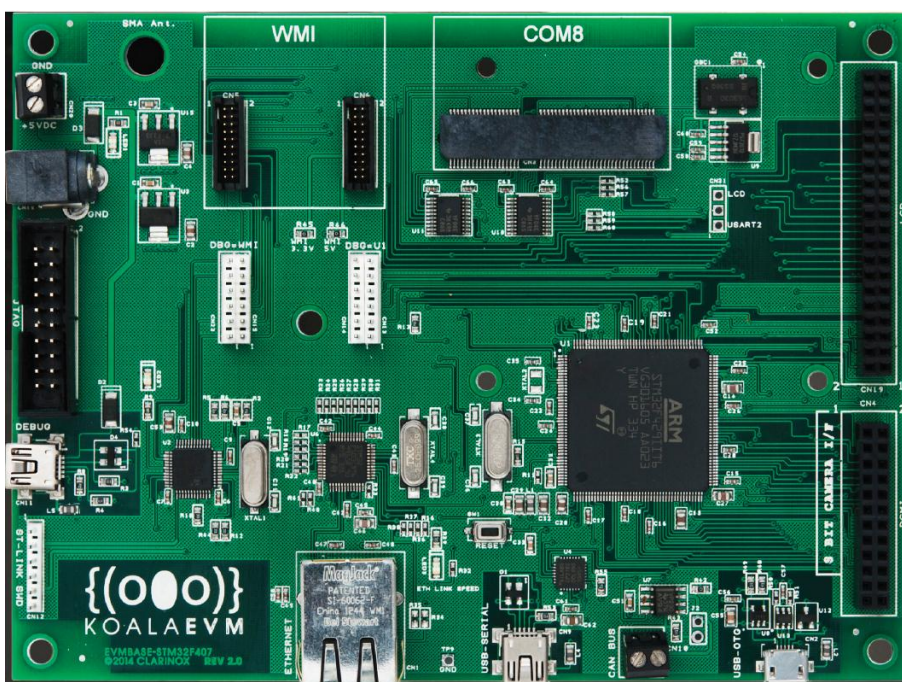
- Windows 7/8/8.1
- 2 x USB mini cable for JTAG connection and debug output
- LCD module, camera module, Ethernet cable and micro USB cable (optional depending on required peripherals)

1.3 Supported Development Tool Chains

- IAR EWARM
- Keil MDK-ARM



1. The Koala EVM must be supplied by 5v power. Power can be supplied by external supply using CN20 screw terminal, CN18 barrel connector for 5v DC adaptor or USB power by connecting USB mini cable to CN11. Green power LED, LED1 will light up to indicate board is powered.
2. Green ST-LINK LED, LED2 lights up when CN11 connected indicating USB JTAG debug and programmer support.
3. To program the board, connect CN11 mini USB port to a PC, configure the tool chain to use ST-LINK JTAG and connect appropriate jumpers from ST-LINK to programming target (main MCU or WMI module).
4. Use provided applications for the board for test and development.
5. Connect additional accessories (LCD, camera, wireless modules, USB or Ethernet cables) as required
6. Use preferred tool-chain to download and run the software applications.



3 Configuring the Koala EVM Hardware

The Koala EVM hardware is configured by setting on board jumpers according to the following.

3.1 CAN Bus Termination

For high speed or long distance transmission it is recommended to enable the CAN termination resistor. This is done by shorting J2 pins.

3.2 USART2 / FSMC (LCD) Selection

A UART peripheral and the LCD controller share a data line on the Koala EVM and the required function must be selected accordingly.

If any of the WMI modules require access to USART2, then CN21 pins 1-2 must be connected.

To be able to use the LCD functionality, CN21 pins 2-3 must be connected.

3.3 ST-LINK Configuration: Programming / Debugging the Koala EVM

The embedded ST-LINK can be used to program the on board microcontroller and debug applications. In order to enable this, the jumpers must be configured as follows:

Jumpers between CN13 and CN14 pins – Select STM32F407/STM32F429 MCU to program/debug



4 Using Demo Application Binaries

Programs required for PC

- STM32 ST-LINK Utility program
- ST-LINK driver
- Silicon labs CP120x driver (USB-UART serial bridge)

4.1 Programming Binaries Using ST-LINK

1. Make sure jumpers on Koala EVM are installed as follows:

Jumpers between CN13 and CN14 pins – Select STM32F407/STM32F429 MCU to program/debug



2. Connect the board to PC using USB mini cable via CN11 (DEBUG) connector, this will power the board and allow JTAG connection for programming the binaries.
3. Open the **STM32 ST-LINK Utility** program:
 - a. Select the JTAG connection and untick Enable debug in Low power mode (Target menu → Settings)
 - b. connect to the target board (Target menu → Connect)
 - c. perform a full erase of the Flash memory (Target menu → Erase Chip or CTRL+E)
 - d. open the binary or hex file for the example project (File menu → Open file or CTRL+O)
 - e. write the binary or hex file to the Flash memory (Target menu → Program and Verify or CTRL+P)
 - f. disconnect the board (Target menu → Disconnect or CTRL+D)
4. Reset the Koala EVM. The RESET button (SW1) is located near the USB-Serial connector.

4.2 Ethernet to UART Application

1. Connect USB-Serial connector to PC with another USB mini cable, keep debug cable connected for powering the board
2. PC Driver may be required for USB-UART peripheral (Silicon labs CP120x)
3. Open a serial port console (Tera Term, Putty, Hyper Terminal are suitable), select the serial COM port corresponding to USB-Serial port connection (in the form of COM1, COM2 etc)
 - Settings 921600 baud, 8bit, 1 stop, no parity, no flow control
4. Connect the Koala EVM to an Ethernet network and connect to it via TCP
5. Open a telnet console and connect to TCP 192.168.0.243, port 8080 or enter 192.168.0.243:8080 in a web browser
6. Any characters from the network should appear in the serial console.

4.3 IAP Ethernet example

1. Connect the Koala EVM to an Ethernet network and connect to it via a web browser
2. enter 192.168.0.243 in a web browser
3. It should open the IAP application demo website
4. User name is "user", password is "stm32"

4.4 USB to Serial example (printf)

Silicon Labs CP210x_VCP_Windows driver may be required for USB-UART peripheral.

1. Connect USB-serial to PC with another USB mini cable, keep debug cable connected for power
2. PC Driver may be required for USB-UART peripheral (Silicon labs CP120x)
3. Open a serial port console (Tera Term, Putty, Hyper terminal are suitable), select the USB-Serial port connection (in the form of COM1, COM2 etc.)
 - Settings 921600 baud, 8bit, 1 stop, no parity, no flow control

4. The Koala EVM will display characters from the terminal

4.5 USB HID Device Example

1. Connect the Koala EVM to pc with USB micro cable from CN2 (USB-OTG connector)
2. The PC cursor should move in a straight direction

5 Wireless Module Interfaces

5.1 Connecting Modules

The Koala EVM provides a 100 pin COM8 socket for connecting Wi-Fi / Bluetooth modules. The connector is marked "COM8" and is notched. Position of the notch must be observed to avoid damaging the module.

Clarinox WMI modules may also be connected to the Koala EVM with the dedicated WMI connectors. The WMI module is to be inserted in both connectors, observing the notches for correct placement of the module.

5.2 Hardware interface

When connecting a module to the COM8 connector, the following methods are to be used for interfacing with the STM32F407/STM32F429 Microcontroller.

WLAN communications are through SDIO interface, as shown in the following diagram.

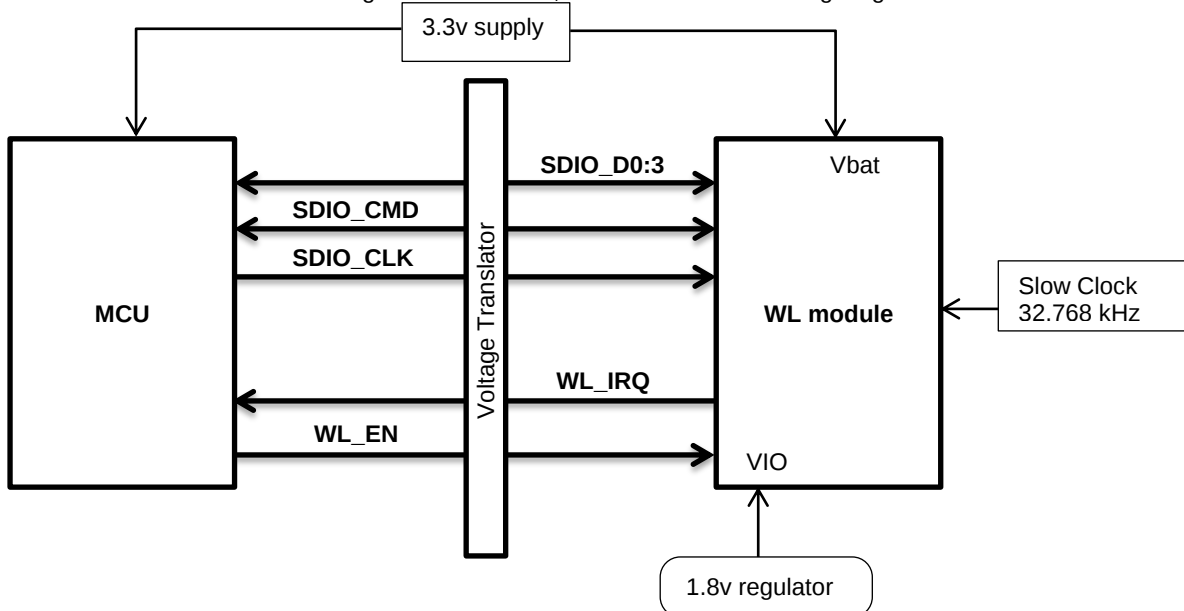


Figure 3: Wi-Fi communication hardware layout and signals

Bluetooth HCI is connected to USART6 of the microcontroller. Cross connection of TX/RX and RTS/CTS lines must be observed according to the following diagram.

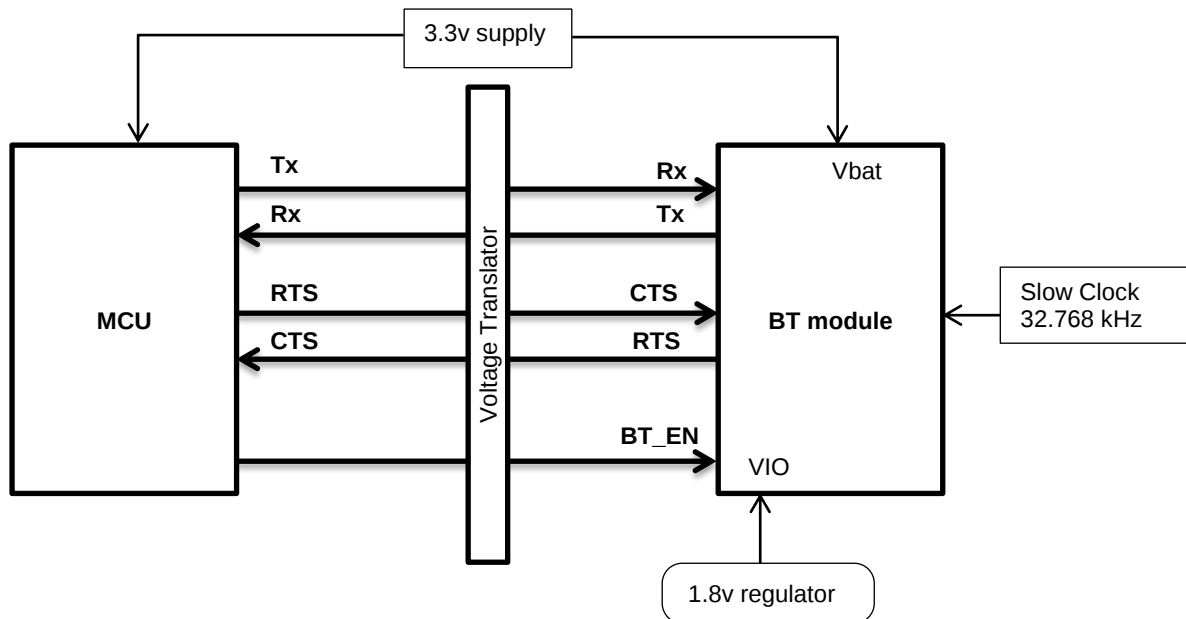


Figure 4: Bluetooth communications hardware layout and signals

Bluetooth and Wi-Fi modules both have their own select/enable line. An interrupt line is also provided for Wi-Fi to inform the Koala EVM.

The Koala EVM board provides level translation and slow clock for interfacing to the attached COM8 TI wireless module.

Debug UART output is provided to USART2 (for WMI), or USART1 (for Koala) of the microcontroller. Clarinox PC based Debugger can be connected to the CPU via the USB-Serial bridge of Koala MCU USART1 port. Clarinox Debugger is a powerful GUI tool for interfacing and debugging ClarinoxSoftFrame-based applications.

To be able to debug the WMI module, first the Koala MCU must be programmed with the UART switching firmware. Then the Koala MCU diverts the WMI UART output to the USB-Serial bridge port and vice-versa.

The PC must have the CP210x_VCP_Windows driver installed to be able to recognize the USB-Serial connections as a serial port.

6 Brief Description of Key Peripherals

Power supply

The Koala EVM has a connector for external power supply of 5v to supply on board regulators and USB-OTG VBUS.

Powered by USB or external supply (5v)

Regulators provide 3.3v for MCU and peripherals and 1.8v for wireless module.

5v and 3.3v are supplied to WMI connector.

USB

The Koala EVM supports USB-OTG HS. The USB micro connector (CN2) allows a user to connect a host or peripheral device in full speed operation without a PC.

In addition, another USB mini connector is featured (CN9) which enables direct communication with a PC by converting USB to serial (USART). This connection is accessed via a standard COM port of the PC.

Camera interface

The Koala EVM features a digital camera interface (DCMI connector) to acquire images from a camera accessory. Single frame or continuous capture is supported in 8 to 12 bit parallel interface. Crop and several image formats are also supported by the MCU.

The DCMI interface is most suitable for OV9655 cameras.

LCD Interface

The Koala EVM Board includes an interface for LCD module with touch screen.

Display is controlled through the FSMC interface and touch data is read through SPI as well as GPIOs for touch interrupts.

The connector assumes LCD controller IC is built in the LCD module.

To use the LCD, a jumper must be placed across CN21 pins 2 and 3.

CAN Bus

The Koala EVM uses a driver (SN65HVD230) to interface to an external CAN Bus. This allows the MCU to create a node on the bus and communicate with other peripherals in an automotive setting.

Ethernet

The Koala EVM features an Ethernet interface and physical layer (DP83848I), allowing it to connect to a wired network for communicating with other LAN devices.