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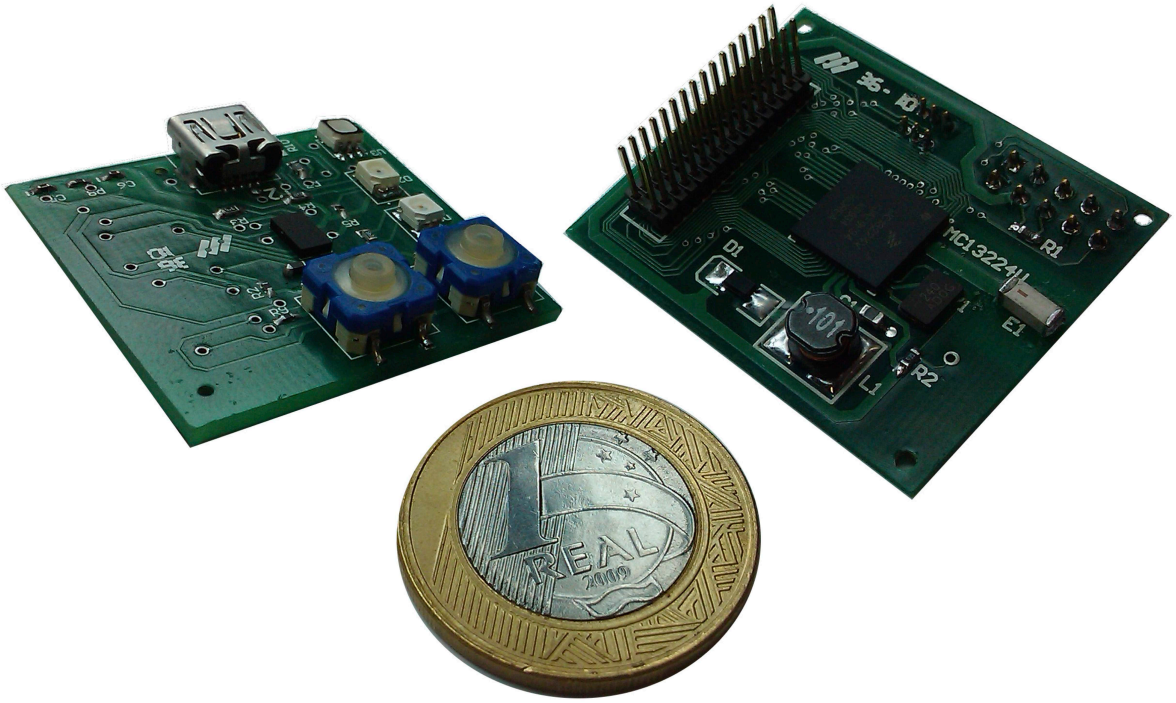
EPOSMote II



Main-board download

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- EPOSMote II Project - ARM7 Version FINAL (schematic + partlist + gerber) - Recommended
- EPOSMote II Project - ARM7 Version Beta (schematic + partlist + gerber)
- EPOSMote II Project - ZigBit Version (schematic + partlist + gerber)

Project Description

The EPOSMote II will focus on modularization of the EPOSMote. The idea is to have different, interchangeable modules for each function (processing/communication, sensing and power supply).

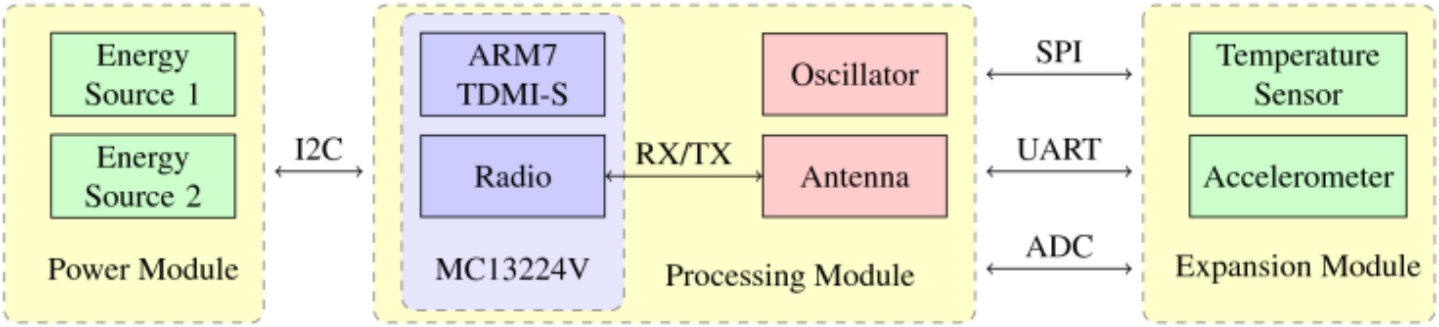
A list of available modules with integrated CPU and 802.15.4 RF components was built to help on defining which platforms to use.

A set of requirements for the EPOSMote II were also defined.

The chosen PiP (Platform-in-Package) was the Freescale MC13224V, it's based in an 32-bit ARM7 core and your major features include an integrated balun for an easy antenna matching circuit, a built-in radio, 128Kbyte flash memory, 80Kbyte rom memory, 96Kbyte RAM memory and an integrated PA which provides programmable output power from -30dBm to +4dBm, all this in a 9.5x9.5mm² footprint.

Here are some of it's characteristics:

- -96dBm per 1% RX sensitivity
- Up to 3dBm output power
- Low power consumption:
  - 22mA RX current
  - 29mA TX current
  - 0.85uA sleep current
- High memory density:
  - 128Kbyte flash memory
  - 96Kbyte RAM memory
  - 80Kbyte ROM memory
- Many different interfaces:
  - 2 UARTs
  - 2 individual ADCs with 8 input channels and a 12-bit resolution
  - SPI
  - SSI
  - KBI
- Almost every pin can be used as a GPIO
- Balun for easier antenna design
- 2.4 GHz ISM band



EPOSMote II block diagram

Processing Module

Beyond the MC13224V, the Processing Module contains an chip antenna connected to the MC13224V's radio. The PiP also needs an external 24MHz crystal oscillator, contained in the module, to operate. It has also 2 male headers connectors, the smallest with 6 pins is intended to be connected to a Power Module for a complete energy management system through an I2C bus. The bigger connector with 32 pins has most of the MC13224V ADC, communcation interfaces and GPIOs pins disposed, and can be used with an Extension Module to interface with sensors and actuators. The MC13224V contains an internal buck regulator that needs some extra external components to work properly, all these components are present in the Processing Module.

Power Module

A Power Module that manages more than one energy source can be connected to the Processing Module.

Expansion Module

Intended to be used with sensors and actuators, the Expansion Module can communicate with the

Processing Module through some industry standard busses like UART or SPI and send analog signals through the digital ADC pins. It has also an USB to UART interace that possibilitates a PC connection with an USB-mini cable. An Expansion Module called Startup Board was built in LISHA to demonstrate the EPOSMote II features.

Startup Board

The Startup Board counts with an 3-axis accelerometer, a temperature sensor, buttons and leds. It's connected to the Processing Module through an female header connector. The board power suply comes from a voltage regulator that converts the 5V from the USB bus to 3.3V, the regulator can be bypassed (in case you use an Power Module supply power) by switching the board's switch position.

Startup Board download

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- Startup Board Project FINAL (schematic + partlist + gerber) - Recommended
- Startup Board Project Beta (schematic + partlist + gerber)

3-axis accelerometer

The Analog Devices' ADXL345 is a low-power 3-axis accelerometer (23uA in measurement mode and 0.1uA in standby mode), with an SPI interface. It has lots of energy harvesting features like wake-up triggers, user-set thresholds and a high resolution (13bits) to measure from -16g to +16g.

Temperature sensor

Consisting in an thermistor that can make temperature measures from -40ºC to 125ºC, the temperature sensor is connected to one of the analog pins of the connector.

Buttons

The Startup Board counts with 2 push buttons for human interface.

Leds

1 green led, 1 red led and 1 RGB led are available in the board.

USB to UART interface

For a PC communcation, the Startup Board is equiped with and UART to USB transceiver. The UART bus is connected directly to FT232RL chip for a PC interface with the Processing Module, discarding the need of a proper USB stack.