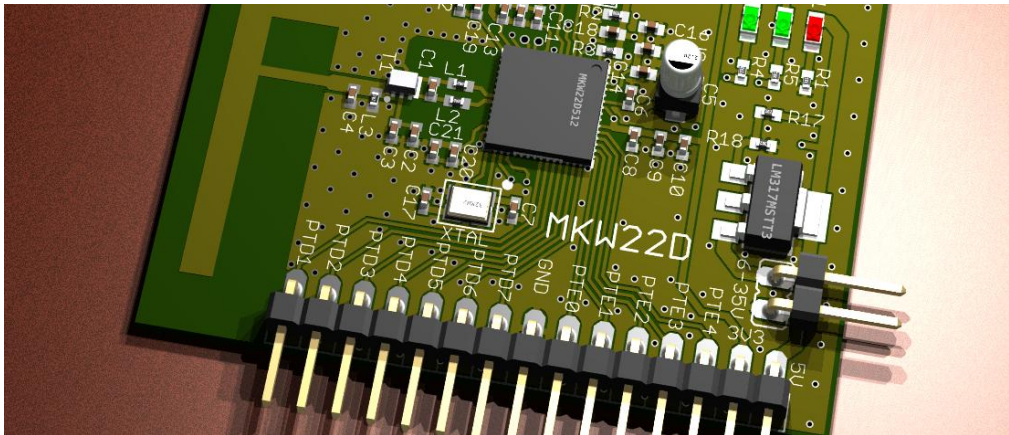


ULTRA LOW COST ZIGBEE EVB



BY JOSHUA NUÑO



The ULC-Zigbee evaluation board is covered under the GNU General Public License; hence all the design files are available for download at the Freescale Communities. You can either use the design as is or modify it as per your application requirements. It measures 30 x 50mm and has a wireless coverage of up to 100ft.

BUILDING THE ULTRALOW COST EVALUATION BOARD FOR ZIGBEE COSTS LESS THAN \$10USD

Currently in order to evaluate or test Zigbee connectivity for a new product we have two options, either buying an expensive Zigbee evaluation kit or going through a time and money consuming process that could take even more resources than what buying an evaluation kit would take.

The Ultra Low Cost Zigbee Evaluation Board (ULC-Zigbee) addresses this issue by lowering the commercial price whilst increasing the ease of access to ZigBee wireless connectivity tools.

Due to its size and the two layers design, building the ULC-ZigBee EVB would cost around \$9USD, (non including the KW22D512). Yes you read it correctly, that is \$9USD to test Zigbee connectivity directly in your application.

At such low price, the ULC-ZigBee EVB is accessible to anyone willing to evaluate or get familiar with 802.15.4 stacks (including ZigBee), which are available for free at Freescale's website. Not only schools could forget about buying expensive kits for their labs and have each

student building their own ULC-ZigBee EVB, but also companies could use it as example for their final board design or evaluation.

The EVB design files are available for free at the Freescale Communities and can be either modified to suit the specific application needs or be built as is.

The ULC-ZigBee EVB is based on the Kinetis Wireless family (KW22 or KW24) and it is designed to be mounted on a proto board with its (90°) male headers, having access to the MCU peripherals.

OPEN SOURCE HARDWARE (OSH)

The ULC-ZigBee board is licensed under the [GNU General Public License](#), which require derivative works to be released under the same license as the original but it allows commercial use (if you use the appropriate Eagle CadSoft License). So you can base your design in the ULC-ZigBee and commercialize with it, however you must license your hardware as GNU General Public License.



TECHNICAL FEATURES

- [MKW22D512](#) or [MKW24D512](#) 2.4GHz RF MCUs.
- Up to 12 I/O pins
- JTAG connector
- I²C
- UART
- SPI
- 16bit ADC
- 6-bit DAC
- Battery or Power supply from 6v to 35v
- 3.3v and 5v supply to external devices.

Wireless Connectivity Software

The ULC-ZigBee software can be created with [BeeKit Wireless Connectivity Toolkit](#), which includes an unlimited use license for the SMAC, 802.15.4 compliant (MAC), BeeStack Consumer (RF4CE) and BeeStack (ZigBee) codebases.

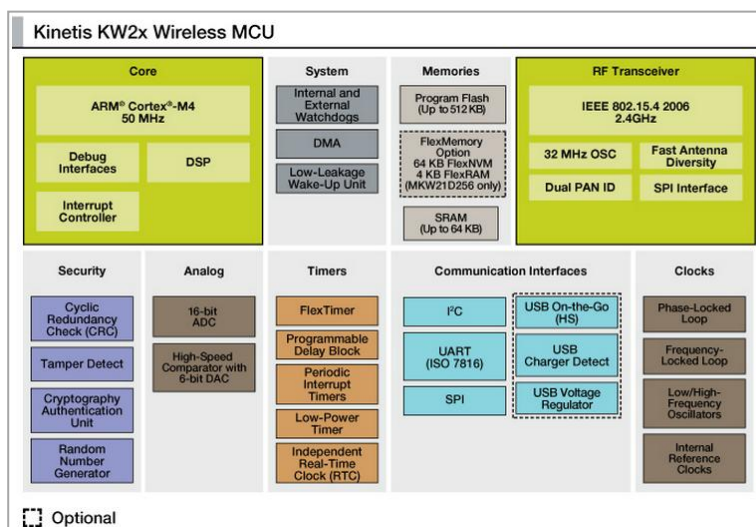
While using some of the codebases mentioned may require having a proper IDE license due to its code size, SMAC application examples are small enough to use IAR KickStart editions and therefore start evaluating the MKW2x without additional cost.

SMAC projects for MKW2x devices are normally available in Freescale's installation folder, i.e. C:\Program Files\Freescale\SMAC\MKW2x.

The applications using the other codebases are available using Beekit's graphic user interface.

Kinetis KW2x Wireless MCU

The ULC-ZigBee board is based on the Kinetis MKW22D512. Nevertheless, it could also support the MKW24D512 since it has the same pin-out. If MKW21Dxxx device is to be used, minor changes to the design files will be necessary due to its pin assignment.

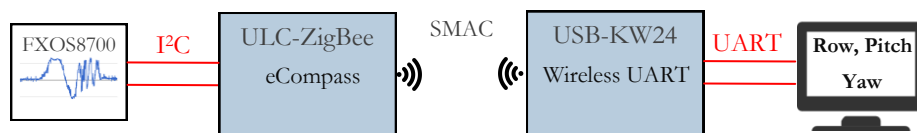


Please also note that despite MKW22D512 and MKW24D512 have a USB On-The-Go module, the ULC-ZigBee board **does not** have the USB signals available for external use. If USB connectivity is required, the design files will need to be modified.

WIRELESS READY SOLUTION

An example code for the ULC-ZigBee board is available in the Freescale communities. The software basically communicates wirelessly the ULC-ZigBee board with a [USB-KW24D512](#) using SMAC codebase and implementing eCompass application.

An [FXOS8700](#) is externally connected thru the prototype board connector via I²C so the magnetic and acceleration values (row, pitch and yaw) are wirelessly transmitted to the USB stick, which prints the values in a serial console @115200bps.



NOTE: The SMAC code used with the FXOS8700 as well as the eCompass application and I²C drivers used are simply for evaluation purposes and should be taken only as example. Support might be limited.