KW2XD REFERENCE DESIGNS

OCCUPANCY SENSOR NODE

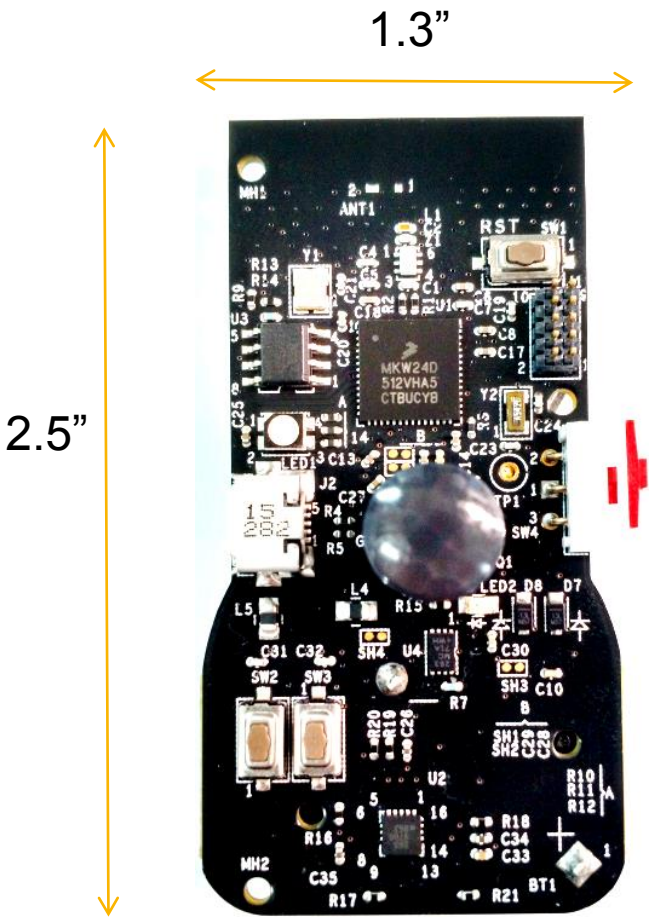
WIRELESS APPLICATION ENGINEERING
FEB, 2017

PUBLIC

SECURE CONNECTIONS FOR A SMARTER WORLD

What is a Reference Design?

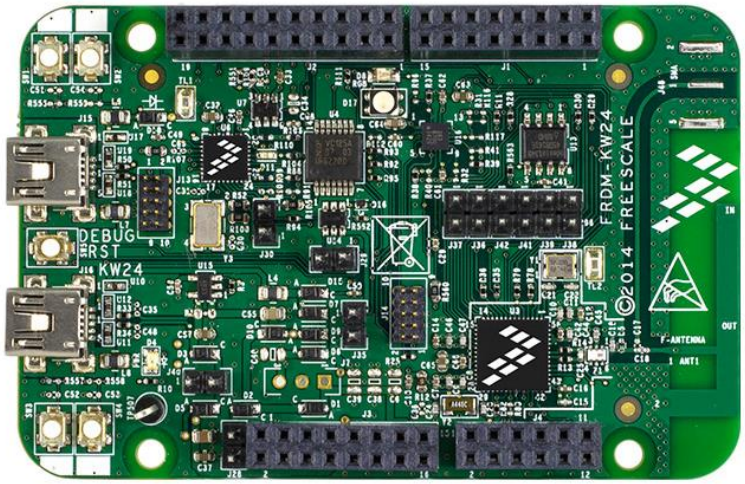
- A form-factor design example, essentially ready to build
- Proven performance
- Excellent starting point for OEM design
- Differ from development boards in that the circuitry is simpler and functionally oriented
- NXP has reference designs for all platforms



Development Boards vs. Reference Designs

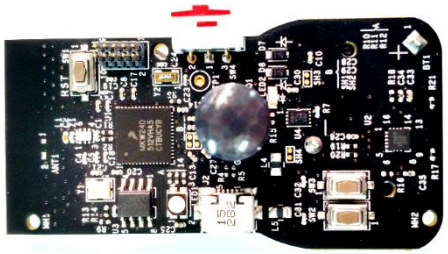
FRDM-KW24D512 Development Board:

Designed for lab use, code development and experimentation. Lots of stuff….



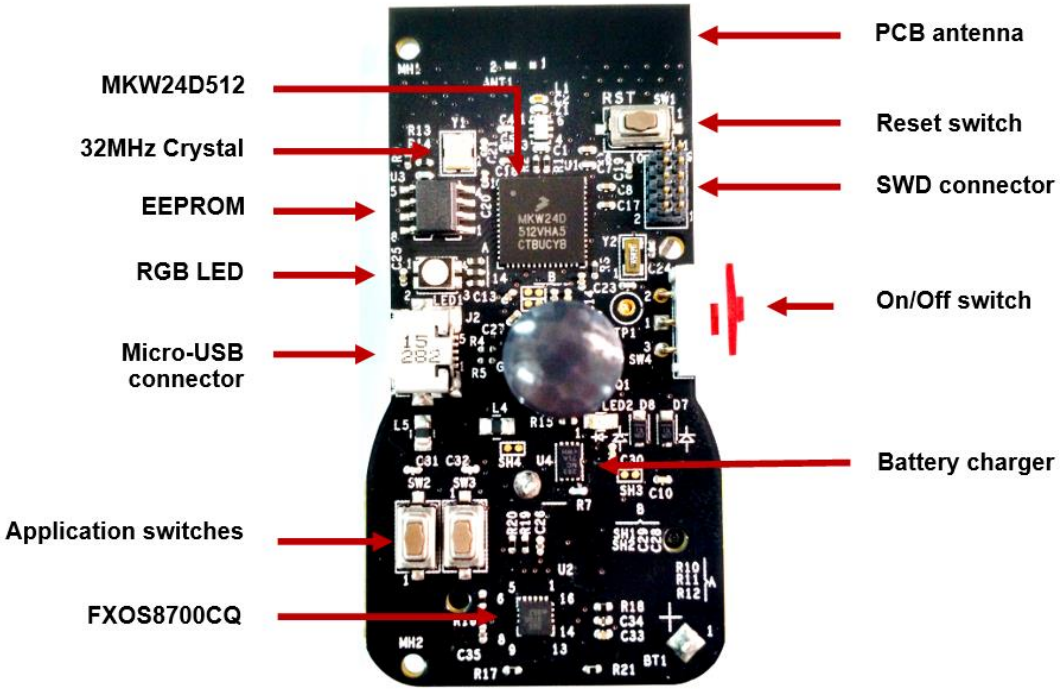
KW2x-OSN-RD Reference Design Board:

Basic RF layout with critical components. Designed to be a starting point for OEM designs. Also for add-on to existing hardware



KW2xD Occupancy Sensor Node – Hardware

The KW2X-OSN-RD board is based on the NXP MKW24D512 SIP device; it incorporates a complete low power IEEE® 802.15.4 Standard 2.4GHz radio frequency transceiver and a Kinetis family low power, mixed-signal ARM Cortex-M4 MCU into a single package.

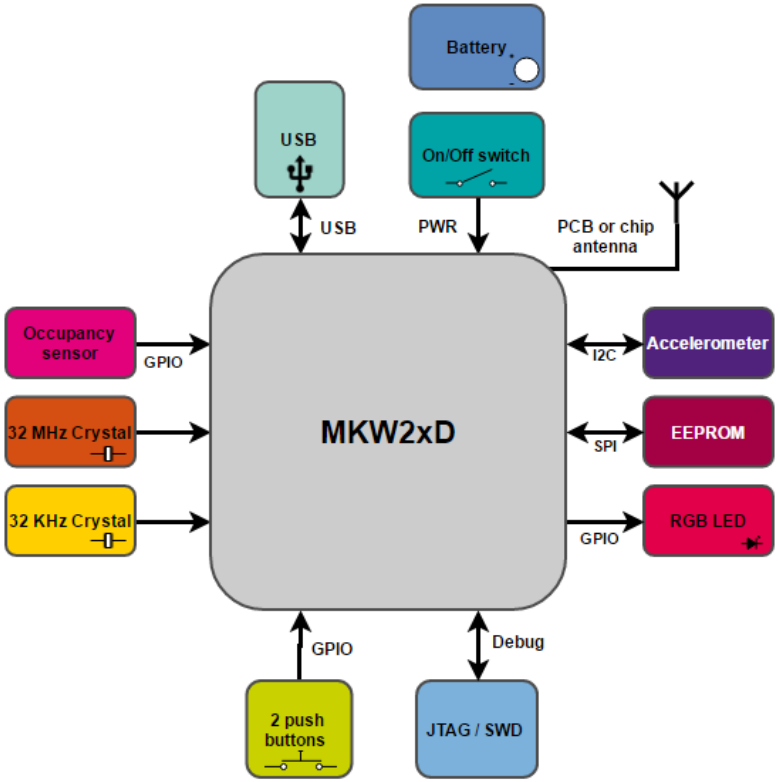


KW2xD Occupancy Sensor Node – Board features

The KW2X-OSN-RD board includes the following features:

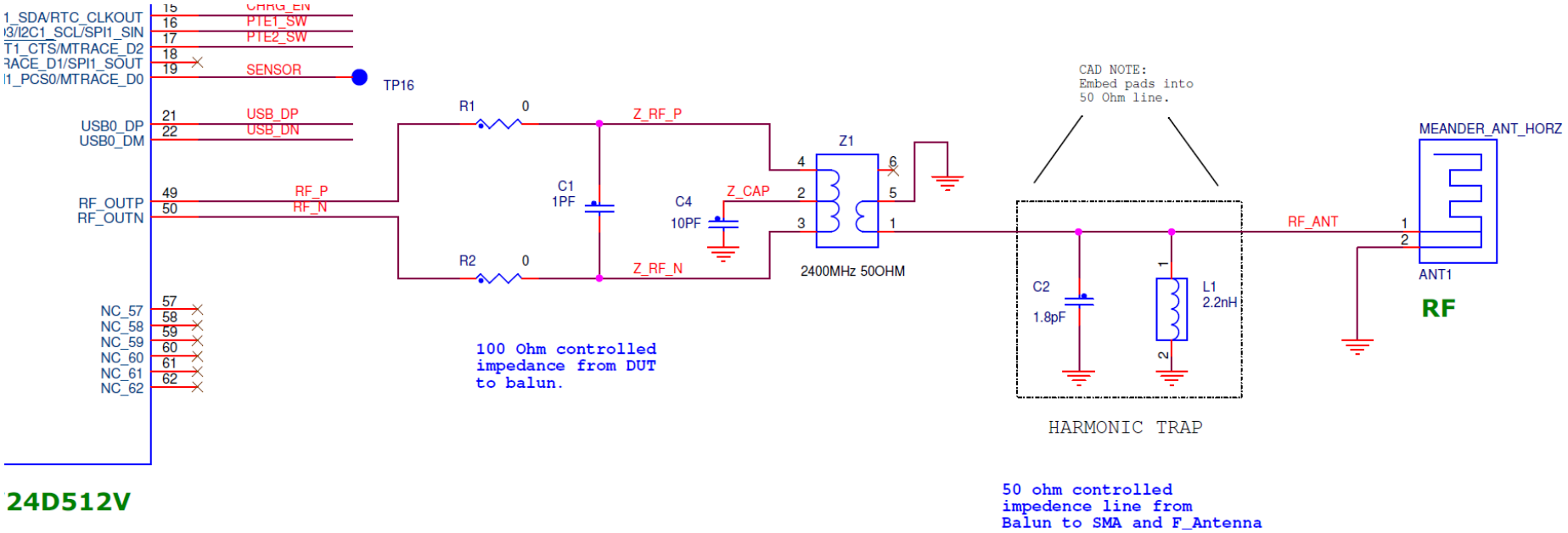
- The NXP low-power MKW24D512 802.15.4 transceiver
- Full IEEE 802.15.4 compliant wireless node
- Reference design area with small footprint, low-cost RF node
- Integrated PCB meander horizontal antenna
- 32 MHz reference oscillator
- 32 kHz clock oscillator for low power
- 2.4 GHz frequency operation (ISM Band)
- Cortex 10-pin SWD debug port
- 1 RGB LED indicator
- 2 Interrupt push button switches (LLWU)
- 1 FXOS87000CQ Combo sensor
- 1 Coin Cell Battery Holder
- 1 On/Off Switch
- 1 Occupancy Sensor
- 1 EEPROM
- 1 Battery Charger

  1 micro-USB connector



KW2xD Occupancy Sensor Node – RF Circuitry

The layout has provision for out-of-band signal suppression (components L1 and C2) if required.

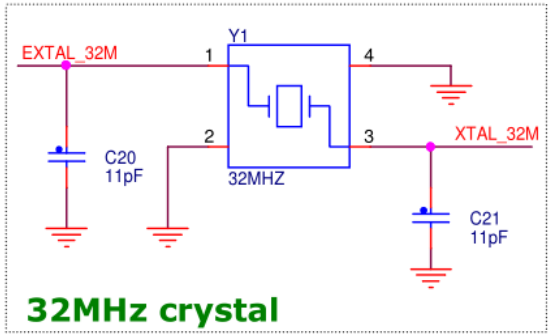


Typical topology for the RF circuitry

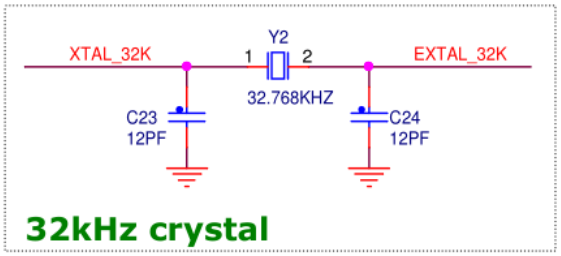
KW2xD Occupancy Sensor Node – Clocks

The KW2X-OSN-RD provides two clocks:

- 32 MHz Reference Oscillator: The IEEE 802.15.4 Standard requires accurate frequency (less that +/-40 ppm)

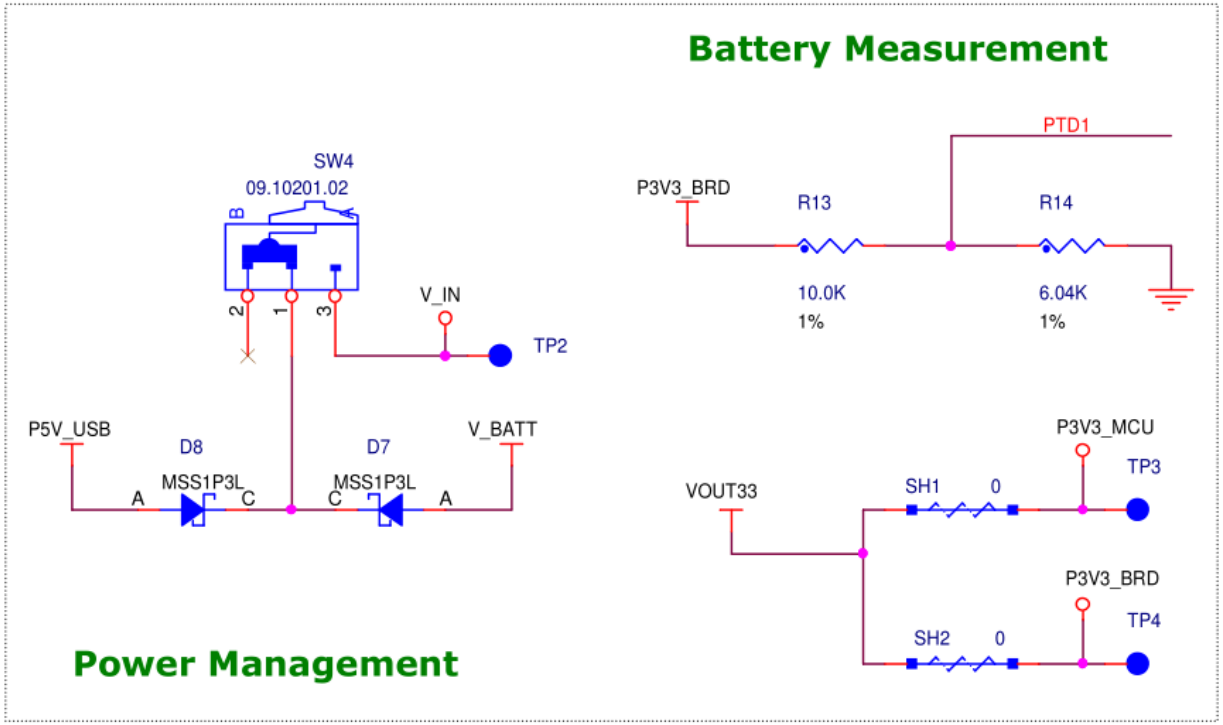


- 32.768 kHz Crystal Oscillator: Secondary crystal used for low power accurate time base.



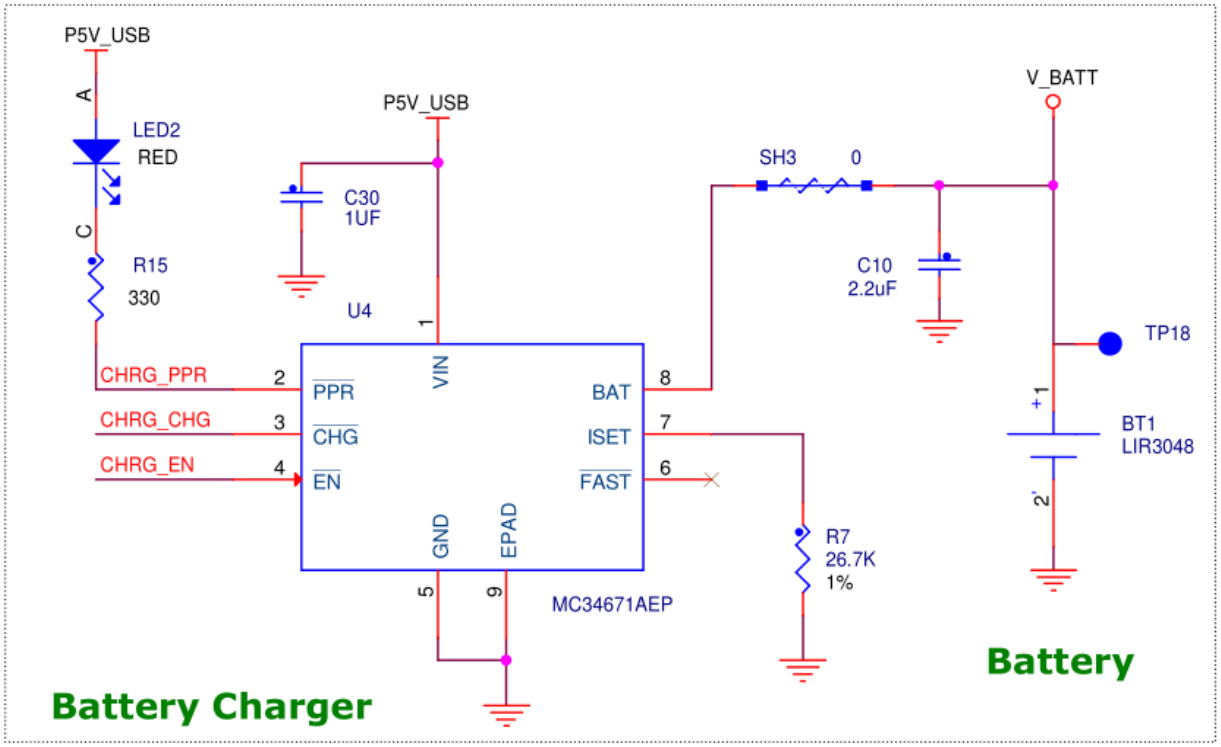
KW2xD Occupancy Sensor Node – Power Management

The KW2X-OSN-RD power management circuit is designed to be powered by a Lithium-ion Rechargeable Cell Battery or via USB. An On/Off switch is included.



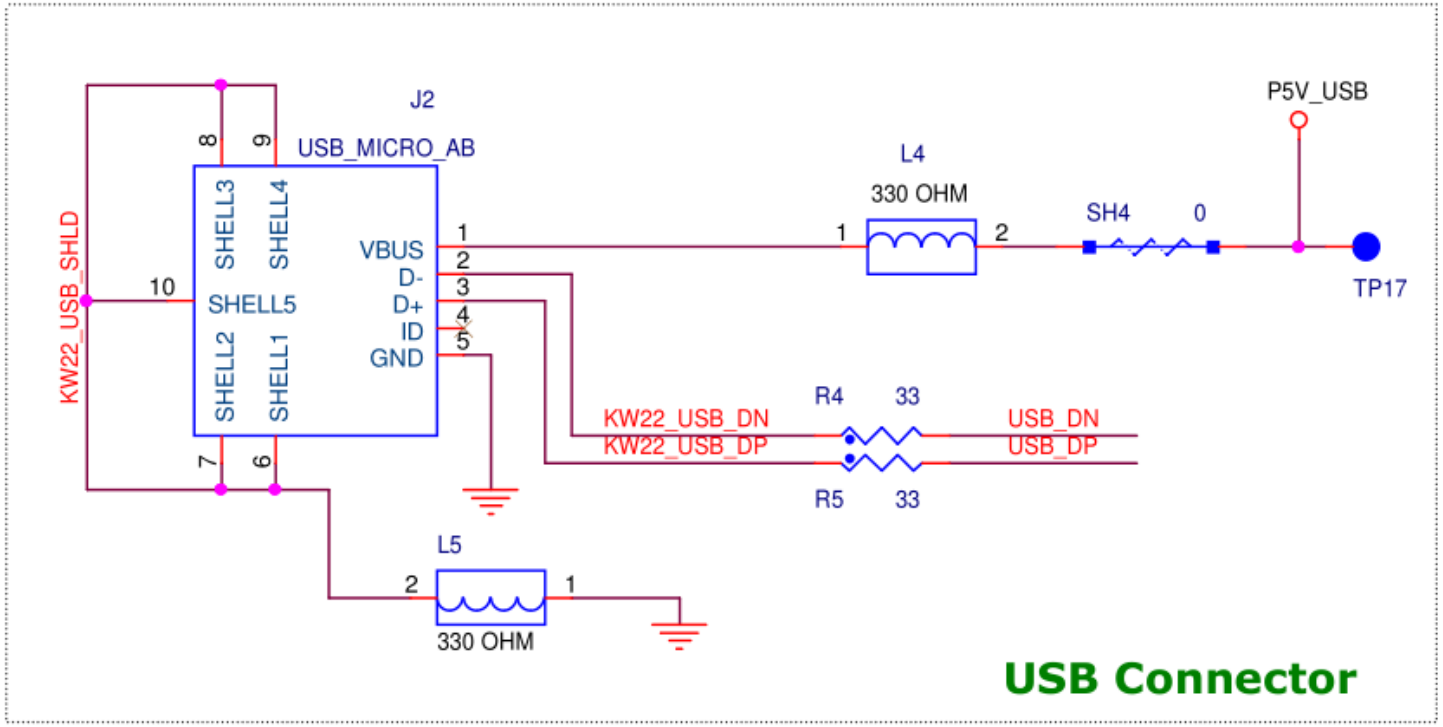
KW2xD Occupancy Sensor Node – Battery charger

The KW2X-OSN-RD includes the NXP MC34671 battery charger for Li-Ion or Li-Polymer batteries.



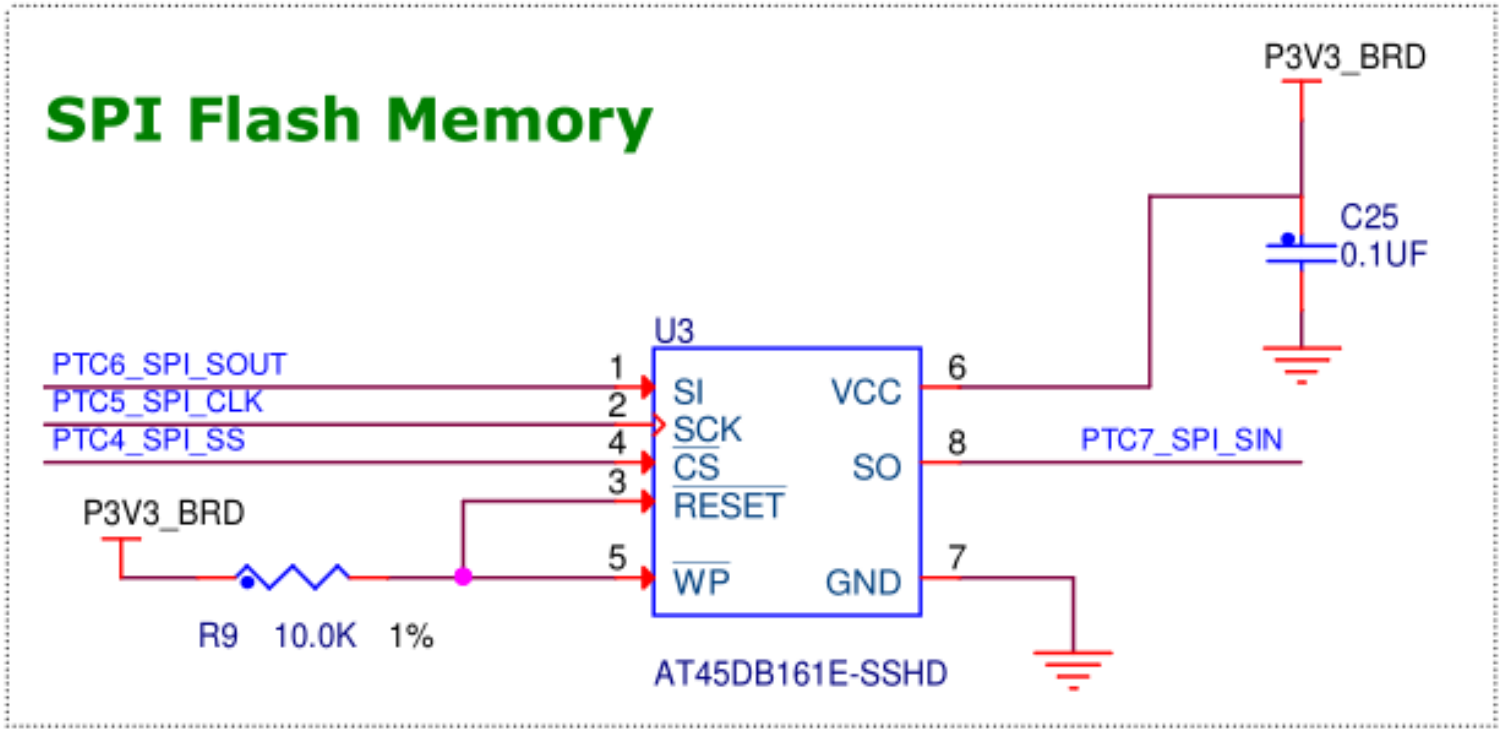
KW2xD Occupancy Sensor Node – USB connector

The KW2X-OSN-RD includes a micro-USB connector.



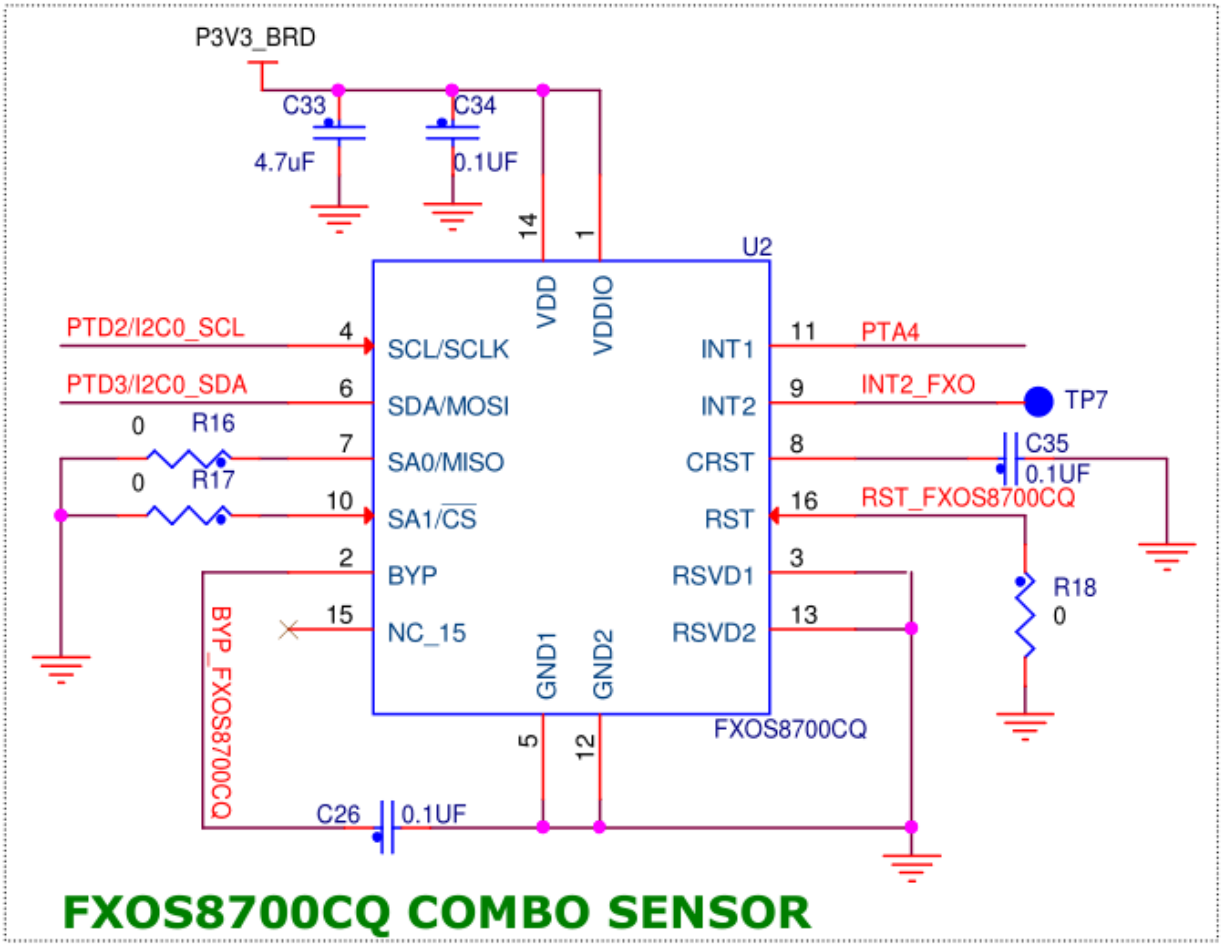
KW2xD Occupancy Sensor Node – External Flash Memory

The KW2X-OSN-RD includes an external SPI flash memory.



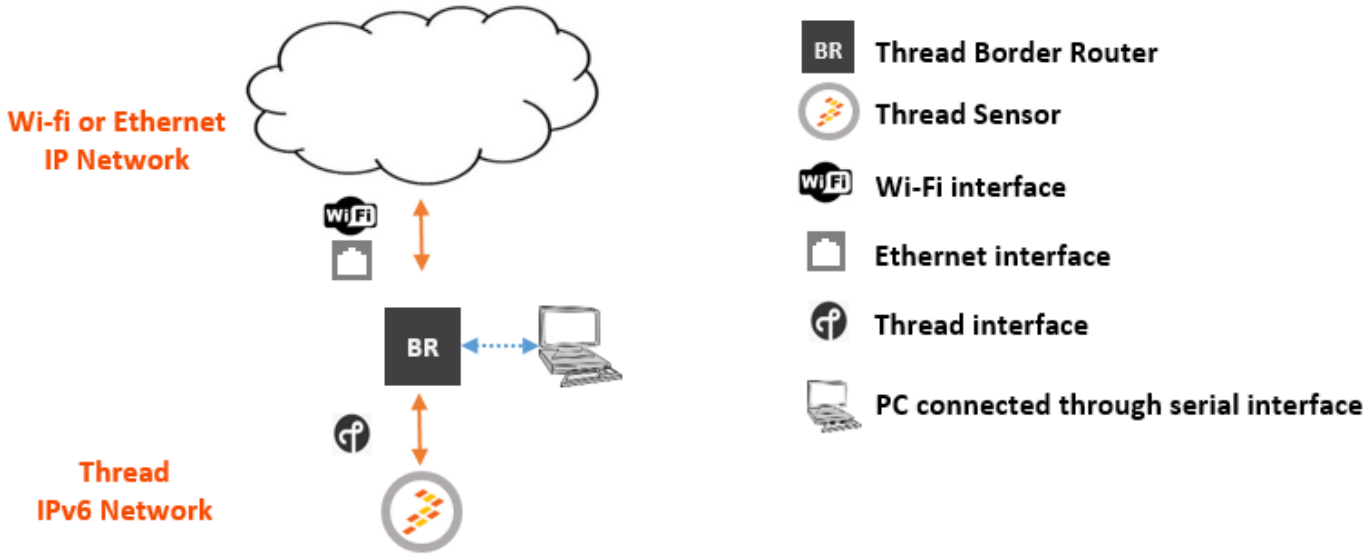
KW2xD Occupancy Sensor Node – Combo sensor

Component U2 is a FXOS8700CQ NXP sensor, a 6-axis sensor with integrated linear accelerometer and magnetometer, very low power consumption, I²C selectable.



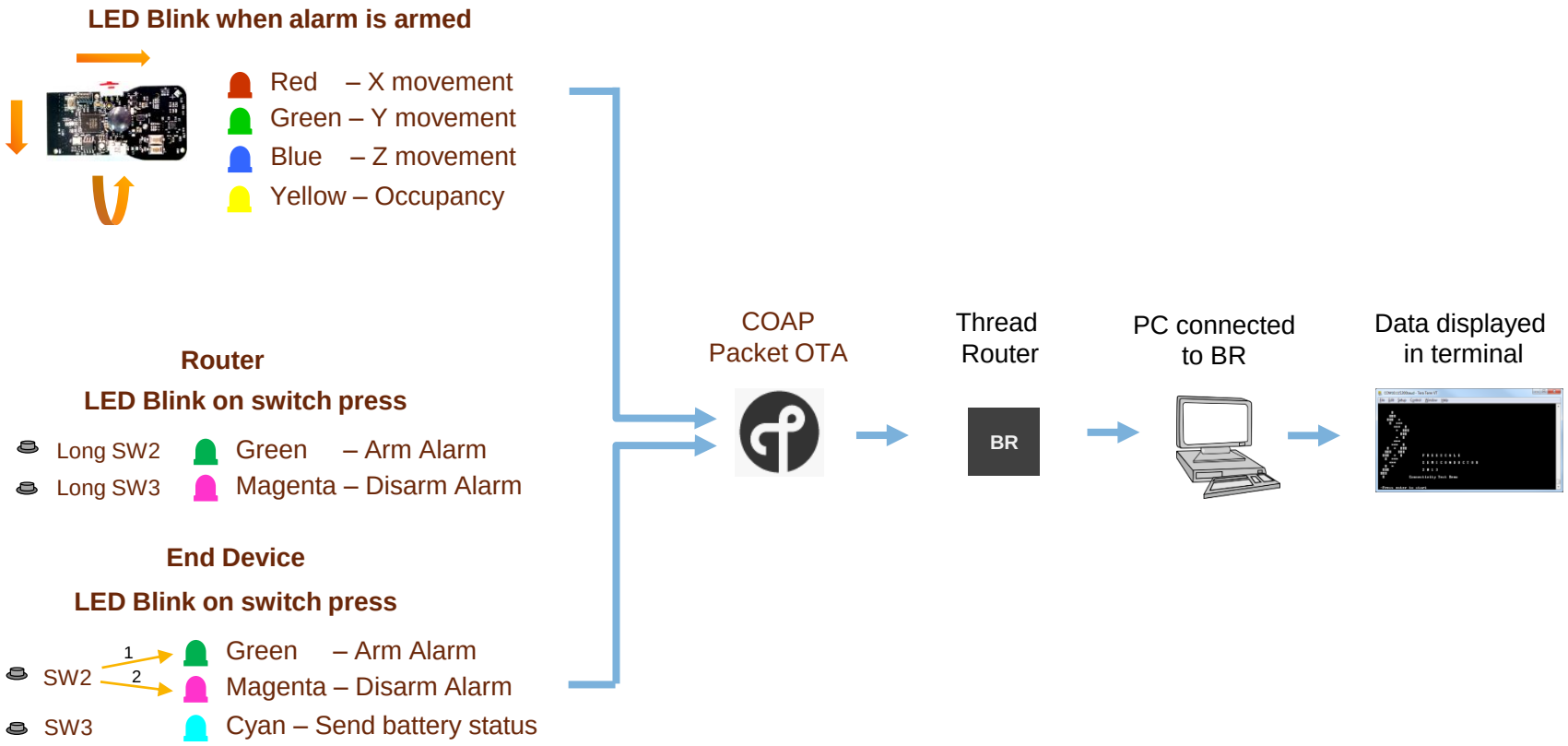
KW2xD Occupancy Sensor Node - Software

The KW2xD Occupancy Sensor Node demo is part of a Thread network. It sends CoAP notifications to a router or border router upon the slightest occupancy or movement event.



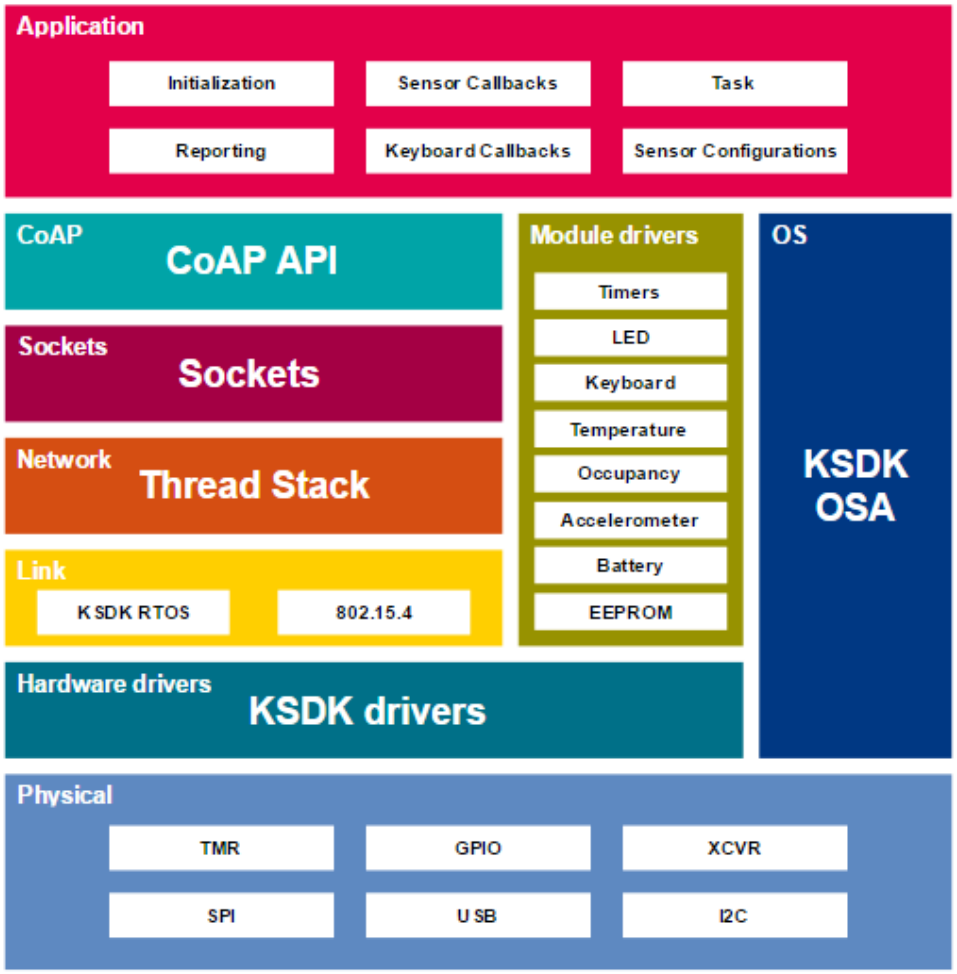
KW2xD Occupancy Sensor Node - Software

High level description:



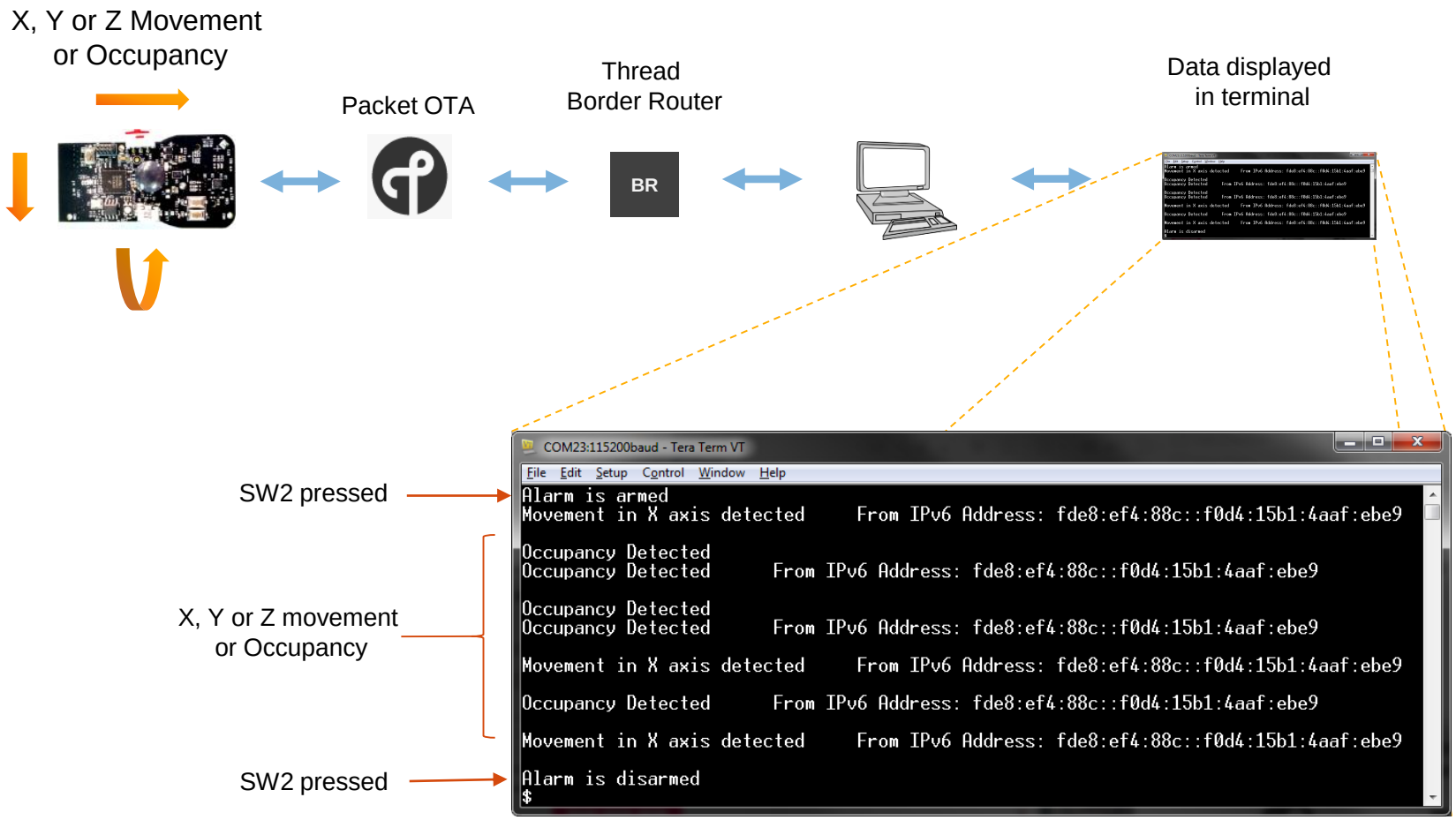
KW2xD Occupancy Sensor Node - Software

Software architecture diagram



KW2xD Occupancy Sensor Node - Software

Output on Router's terminal:



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