

The IoT and Thread in PHYTEC Nodes

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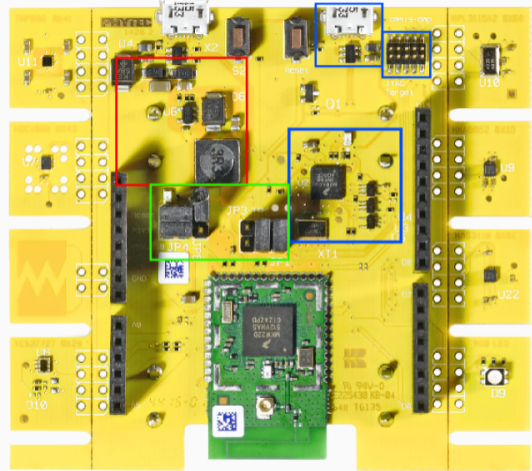
Company Introduction

- headquartered in Mainz, Germany
- more than 200 employees worldwide
- Hardware
 - **S**ingle **B**oard **C**omputer
 - **S**ystem **o**n **M**odules
 - Embedded Imaging
- Software
 - **B**oard **S**upport **P**ackages
 - Yocto Linux distribution
- Test, Support and Lifecycle Management

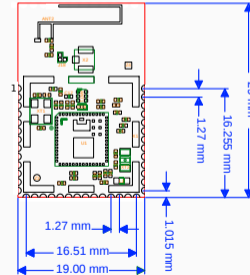
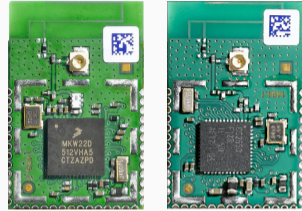
- Standard Products
 - rapid prototype your application
 - simply order qts from 1 to many 1000
 - e.g. phyCORE (ARM based SoM), phyWAVE
- Customer specific Hardware Design
 - we make use of tested building blocks
 - form factor that fits into your housing

IoT Hardware Components

- on board debugger
- sensors, button and signaling
- battery holder
- device USB
- phyWAVE agnostic - generic board for different modules



- dimension: 19 mm x 29 mm
- price/module: 6.50 to 7.20 € (for 1000 pcs)
- PCB or external Antenna via U.FI
- most GPIOs connected to solder connector
- I2C, SPI, UART, Analog, PWM



- TI CC2650 multi-standard 2.4 GHz RF MCU
- 802.15.4, Bluetooth[®] Smart
- multi standard SDR
- ARM Cortex-M3, 128KB ROM, 128KB Flash, 20KB SRAM
- RX Current 5.9 mA
- TX Current at 0 dBm: 6.1 mA



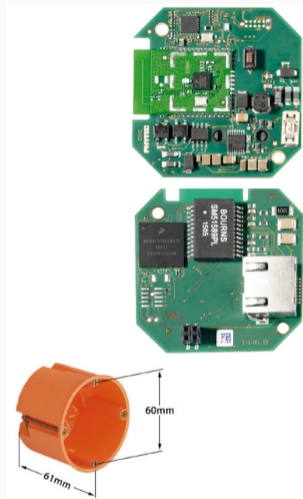
- NXP (former Freescale) Kinetis KW2x 2.4 GHz RF MCU
- 802.15.4
- ARM Cortex-M4, 512KB Flash, 64KB SRAM
- RX Current 19 mA
- TX Current at 0 dBm: 17 mA



- build with phyWAVE-KW2x
- Device USB feature of the KW2x SoC
- development and productive use
- virtualized Ethernet over USB or Serial over USB for SBC or Desktop PC
- IEEE 802.15.4 sniffer with Wireshark



- NXP Kinetis K64 and dedicated IEEE 802.15.4 transceiver
- Ethernet, PoE
- fits in a flush-mounted box



- ePaper Display
- phyWAVE-KW2x or phyWAVE-CC2650
- BLE/IEEE802.15.4



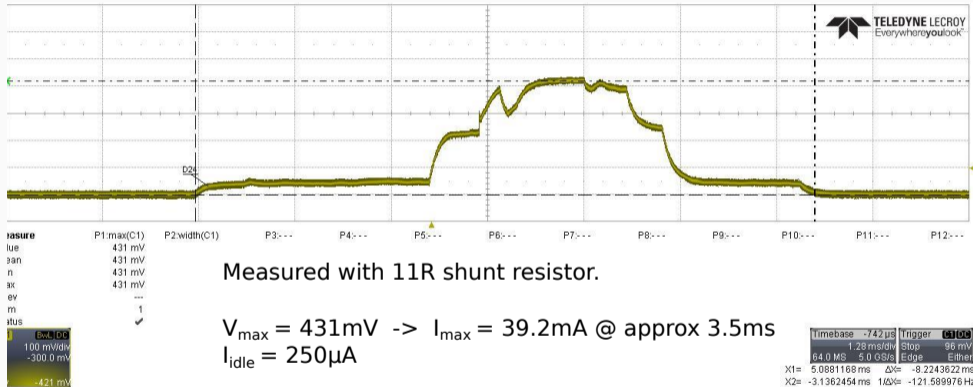
OS and Software

- <http://www.riot-os.org>
- LGPL-licensed, hosted on GitHub
- useable with phyWAVE-KW2x
- support for phyNODE-KW2x board and sensors
- 6LoWPAN, IPv6, RPL, CoAP
- in progress: USB Stack implementation for phyNODE/phySTICK/samr21-Board

- <http://www.contiki-os.org>
- BSD-licensed, hosted on GitHub
- useable with phyWAVE-CC2650
- Texas Instruments port for the CC26xx SoC
- 6LoWPAN, IPv6, RPL, CoAP

- Bluetooth[®] Low Energy Stack
- <http://www.ti.com/tool/ble-stack>
- useable with phyWAVE-CC2650
- stack itself closed source, example applications BSD like license

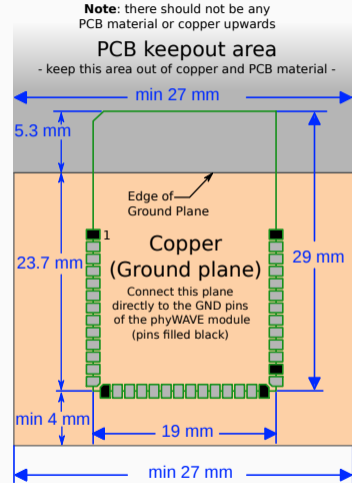
- Threadgroup - <http://www.threadgroup.org/>
- NXP Thread implementation, Openthread released at Github
- 6LoWPAN, IPv6, Distance Vector Routing, UDP + DTLS, CoAP
- beta version available for phyWAVE-KW2x and phyGATE-K64



Validation, Certification and Guidelines

- phyWAVE modules measured for CE conformity
 - EN 300 328 - RF compatibility
 - EN 301 489 - Electromagnetic compatibility
 - EN 60950-1 - Safety checks
- Bluetooth[®] SIG certification for phyWAVE-CC2650
 - SW-stack is pre certified
 - Bluetooth[®] Full Conformance Test
 - Buy a Product Listing at [Bluetooth.org](https://www.bluetooth.org)
- Internal and External Antenna validated

- hardware manuals and application guides
- Design-in guides for phyWAVE modules
- recommended phyWAVE Footprint
- example schematics for phyWAVE modules



- PHYTEC is a direct distributor
- selling to private and business customers
- order via Mail: *order@phytec.de* or
- call our Sales team for direct advice

Your Questions.

Hardware Preview

- What is better with the NWP KW41Z SoC?
 - Lower Power: e.g. 17mA/RX compared to 6.2mA/RX
 - Dual Stack via SDR (BLE and IEEE 802.15.4)
 - Fast switching times allows simultaneous operation
 - in-package dc-dc converter (buck and boost)
- one single AA battery (0.9 to 4.2V)