Wireless Power Transfer enables IIoT
WE Cut the Cord !

Cem Som
Wireless Connectivity & Sensors Team

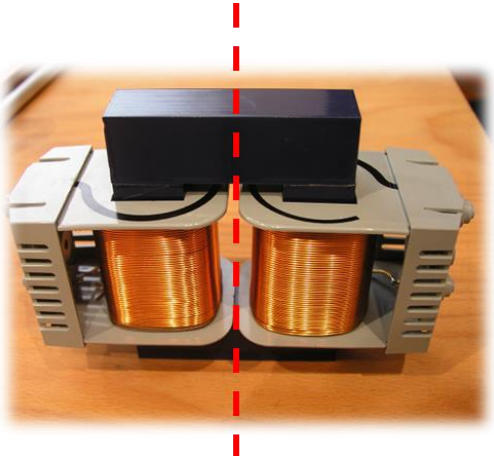
Wireless Power Transfer

February, 2021

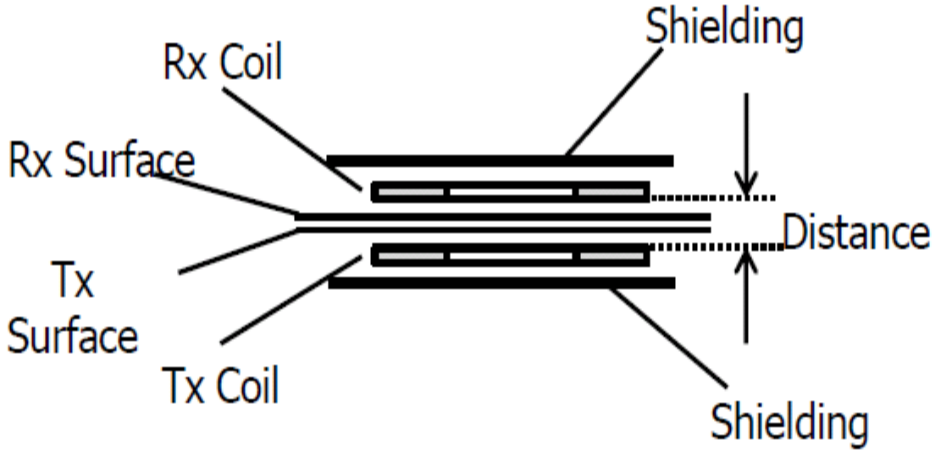
https://www.quantum-systems.com/project/trinity-f90/

How does Wireless Power Transfer work?

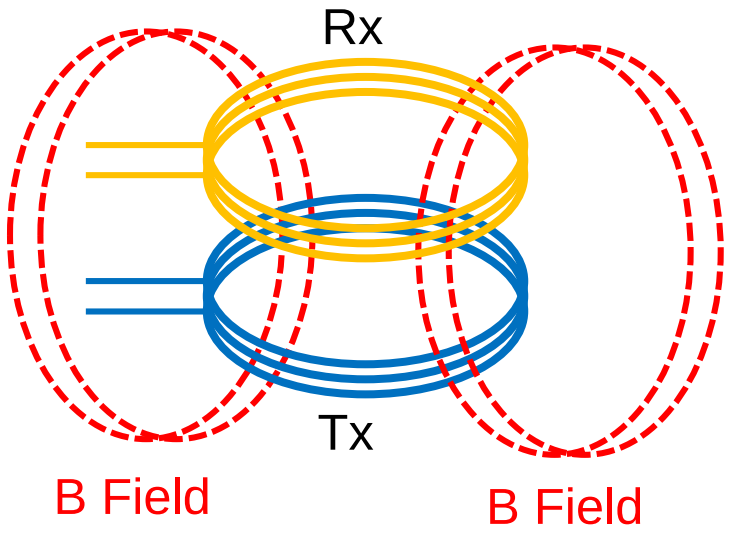
- Power transfers via inductive coupling at short distances (mm range)
- Transmitter (Tx) and Receiver (Rx) Coils are inductively coupled coils.



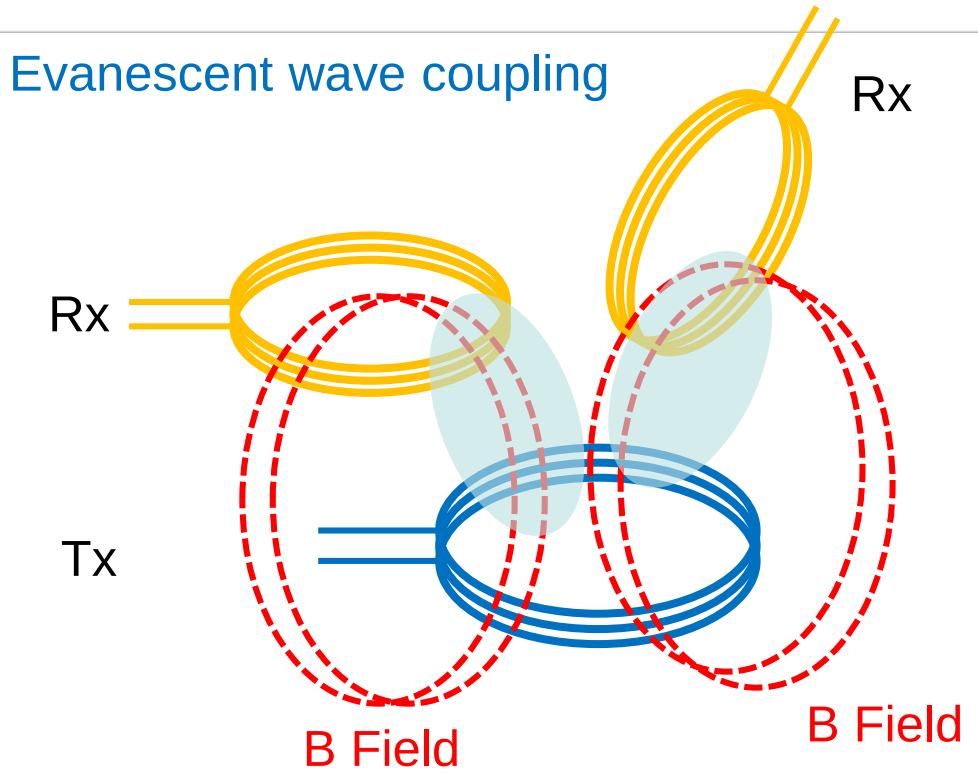
- Magnetic field concentrated in small volume between Tx / Rx



Inductive and Resonant Coupling



inductive power transfer



resonant power transfer

Agenda

Applications

200W Development Kit

Proof of Concept

Added-values

WPT enables IIoT

Our support

LCD board

Implement WPT technology in your application

Applications up to 200W

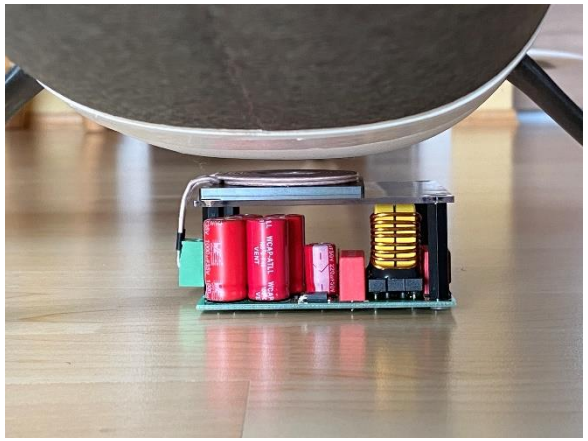
Drone project

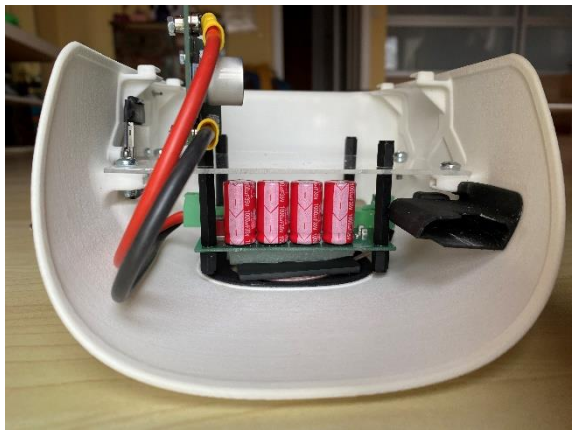
Bildermaterial von der Quantum-Systems GmbH zur Verfügung gestellt

Drone project

quantum systems

WÜRTH ELEKTRONIK



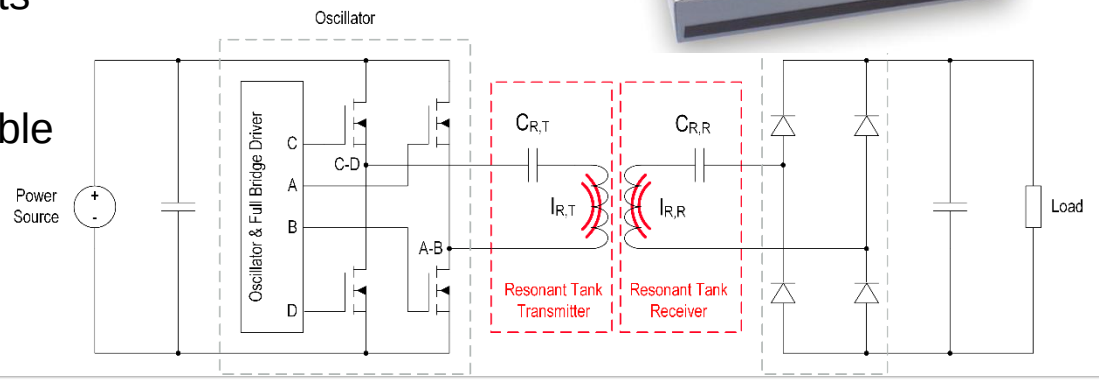


200W Development Kit with Data Transfer

www.we-online.com/wirelesspower/200WKit

- The current profile is almost sinusoidal
- By changing the resonance frequency the output voltage can be regulated
- It is scalable from low to high power (10W – 10kW)
- The MOSFETs switch close to the zero crossover point (ZVS)
  → efficiency > 90%
- It is scalable for many different voltages/currents
- Data transfer from receiver to transmitter possible

www.we-online.de/ANP070



200W Development Kit with Data Transfer
How to Download the Software ?

1

- 200 W Development Kit Flyer
- 200 W Development Kit Manual
- LCD Board for 200 W Development Kit
- Würth Elektronik components used
- Information on the Infineon Key Components
- Application Note ANP070, BOM, Gerber Files, Schematic, Layout and current Firmware
- 200 W Kit - FAQ

4

Request Design Files for WPT High Power - ANP070

We provide you all design files (Gerber, Layout, Schematic, BOM, Software for transmitter & receiver boards) for this application free of charge. Please fill in the below form to download the files.

Thanks for your interest in our pcb layout files. You can download them here: ANP070 - Proprietary wireless power transfer solution for high performance including data transmission

Data protection notice (mandatory, must be read and confirmed)

Request Design Files for WPT High Power - ANP070

We provide you all design files (Gerber, Layout, Schematic, BOM, Software for transmitter & receiver boards) for this application free of charge. Please fill in the below form to download the files.

First / Last Name: Cem | Som

Company: Würth Elektronik eiSos

E-mail: cem.som@we-online.com *

Data protection notice (mandatory, must be read and confirmed)

2

I'm not a robot

reCAPTCHA

Privacy - Terms

Download

3

Fri 06-Nov-20 8:14

WE Web Site Mailer <no-reply@we-online.com>

Request Design Files for WPT High Power - ANP070

To Som, Cem

Request Design Files for WPT High Power - ANP070

Thanks for your interest in our pcb layout files. You can download them here: ANP070 - Proprietary wireless power transfer solution for high performance including data transmission

Data protection | I have taken note of the data protection notice

5

Opening ANP070.zip

You have chosen to open:

ANP070.zip

which is: Compressed (zipped) Folder (47.6 MB)

from: https://www.we-online.com

What should Firefox do with this file?

Open with: Windows Explorer (default)

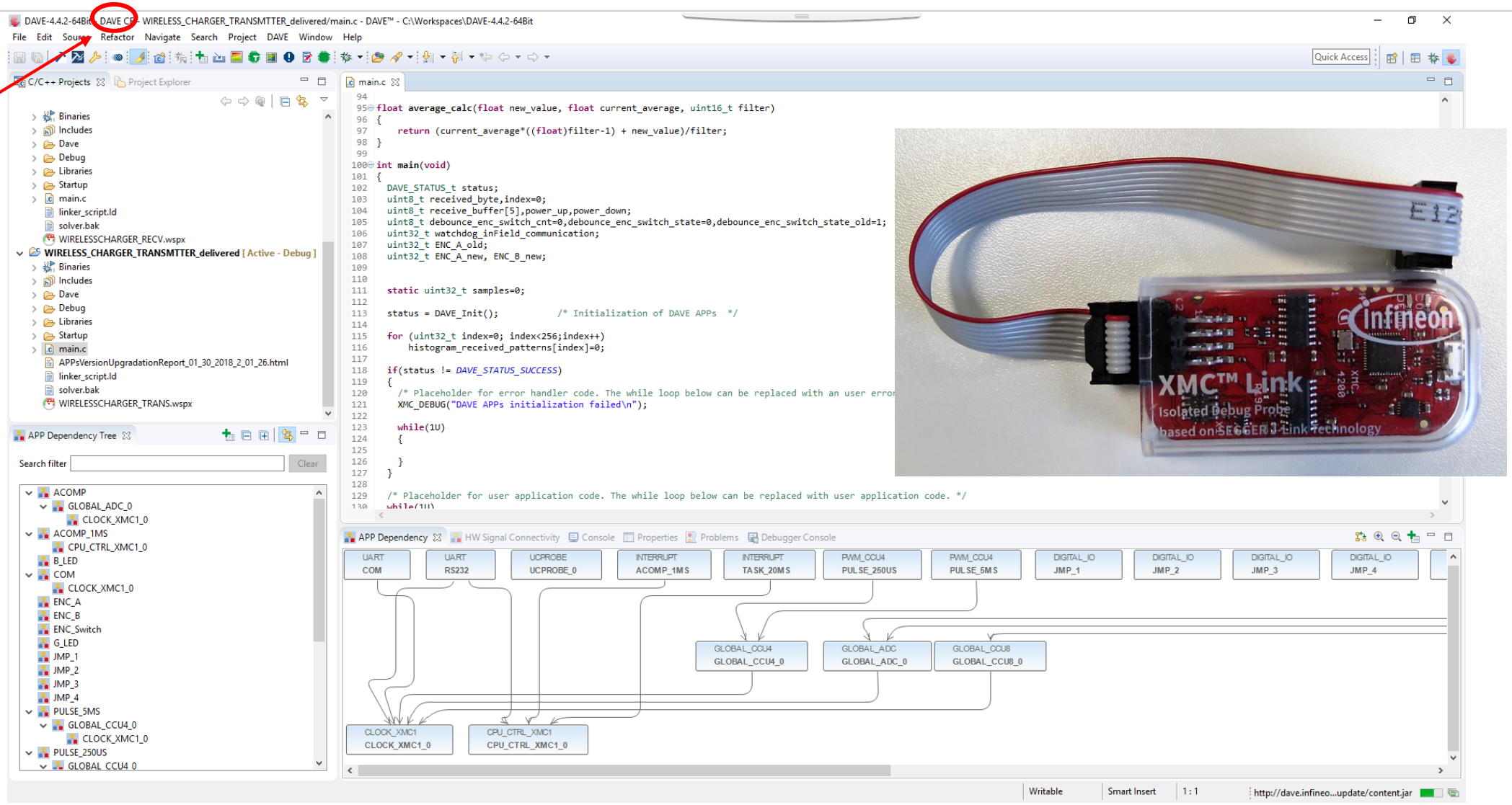
Save File

Do this automatically for files like this from now on.

OK | Cancel

200W Development Kit with Data Transfer

www.we-online.com/wirelesspower/200WKit



200W Development Kit with Data Transfer

More power needed? Our added values are ...

BOM change for 48V application available

Altium files on request

760 308 101 311

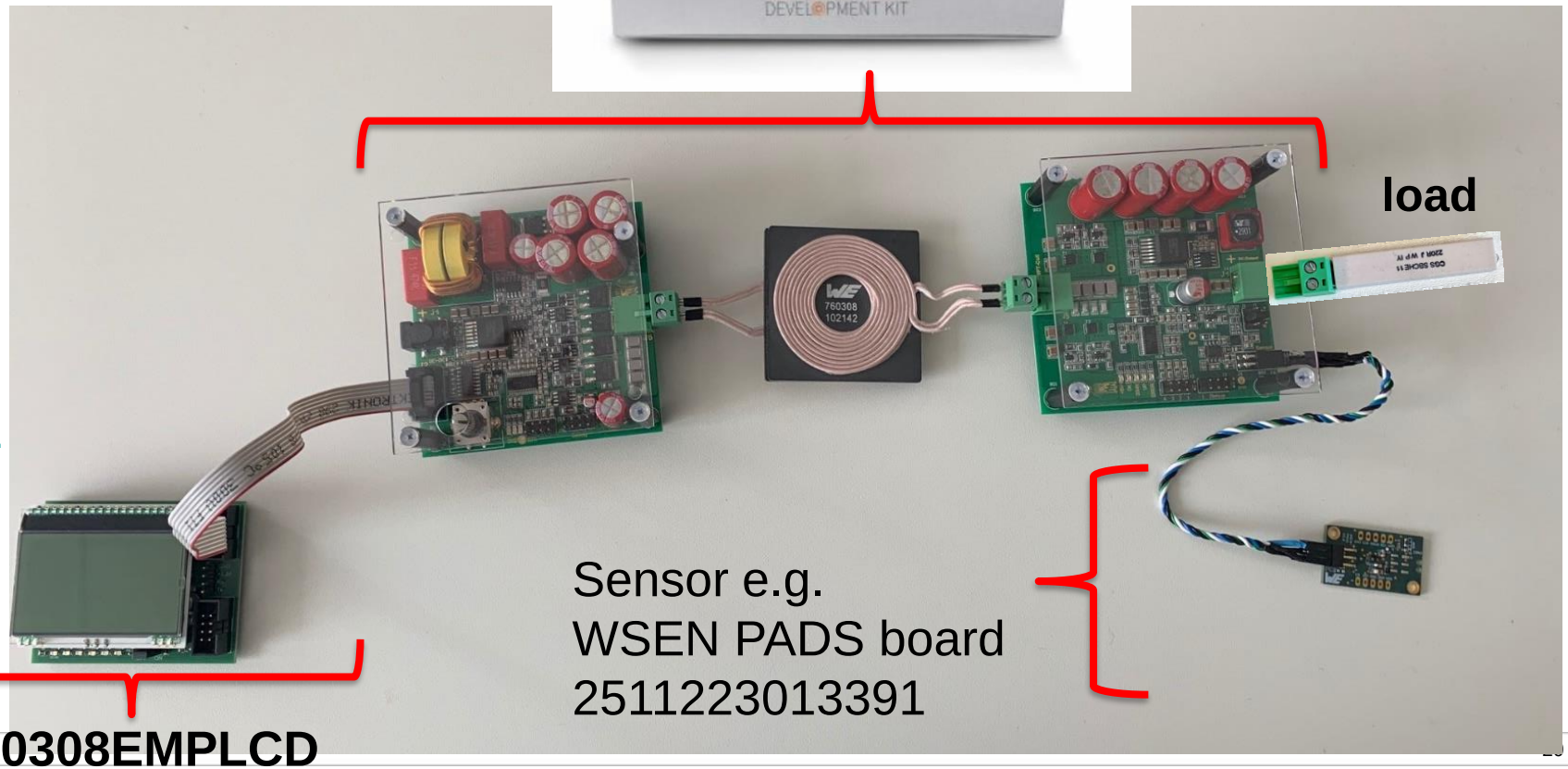
LCD Board for 200 W Development Kit - enables IIoT

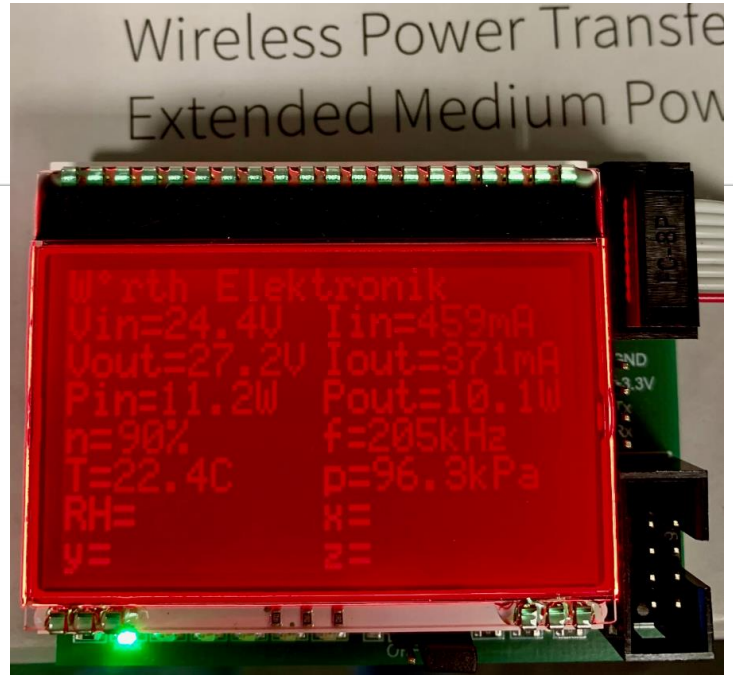
- **End-to-end IoT system implementation**
- **LCD Board: add-on to 200 W Development Kit + Sensor**
- **Bi-directional data transfer**

760308EMP

New Website:

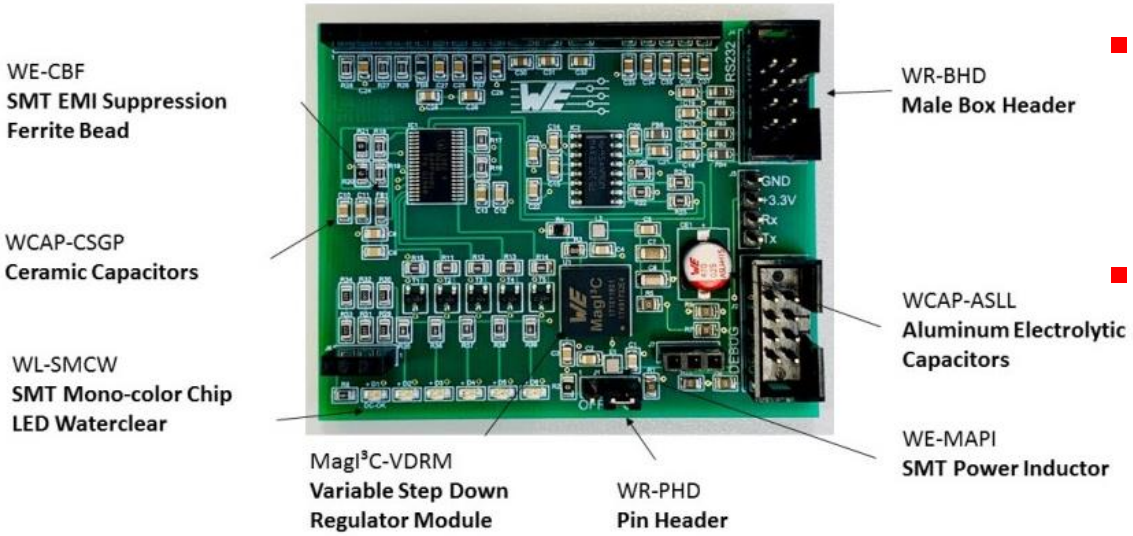
www.we-online.com/wirelesspower/lcd





LCD Board
for 200 W Development Kit - enables IIoT

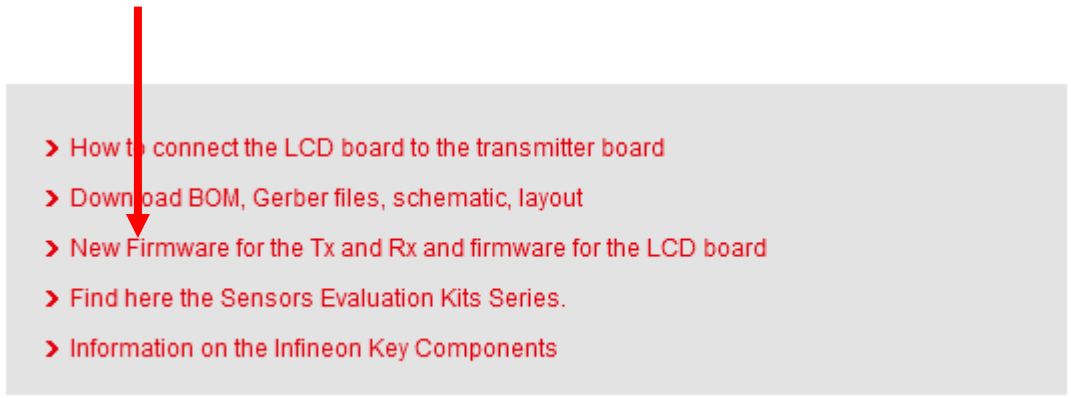
- LCD board populated with WE components
- LCD display programmable
- Available to download: Instructions, BOM, Gerber files, schematic, layout, Firmware for Tx, Rx and LCD board
- Applications
  - Industrial IoT, environmental control, ...
- Please request a quotation via WE Online catalogue



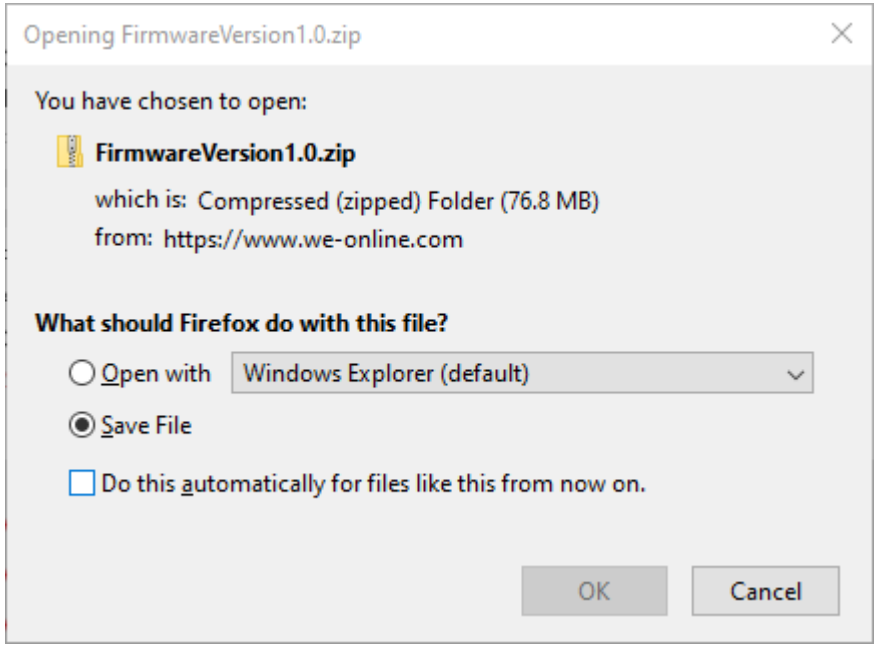
200W Development Kit with Data Transfer
How to download the software ?

Step 1:
Go to the website: www.we-online.com/wirelesspower/lcd

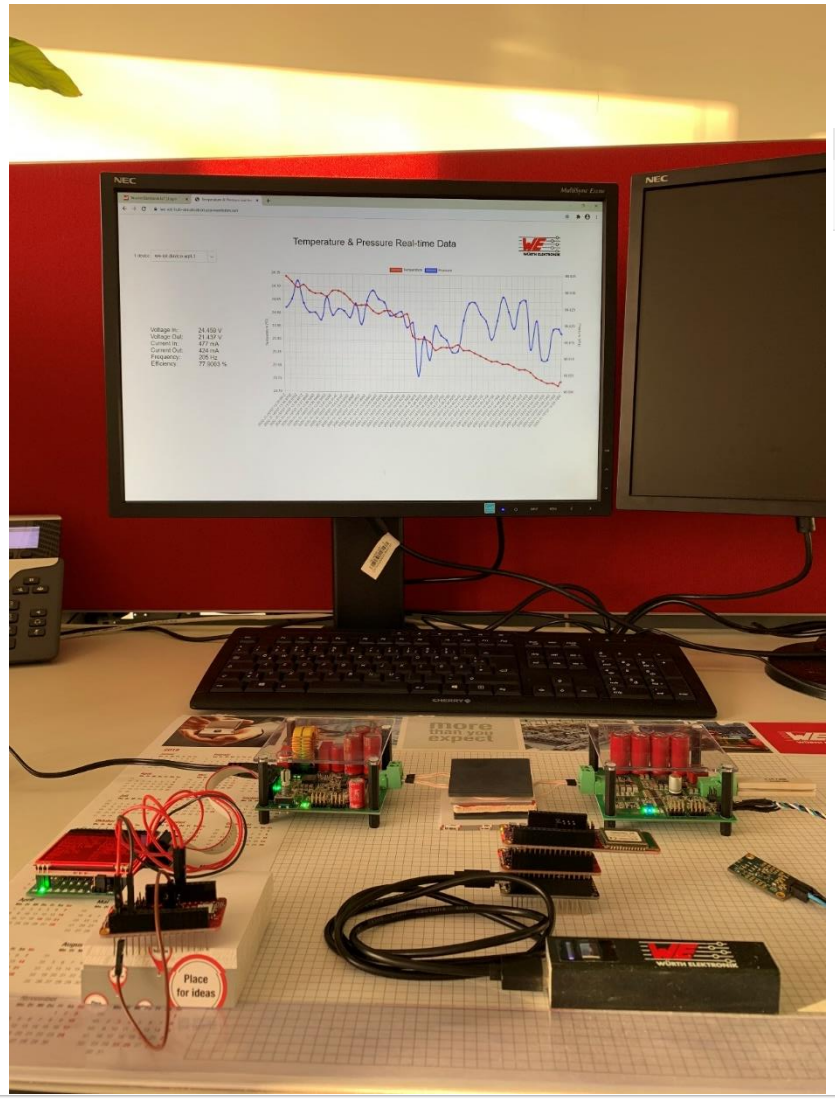
Step 2:
Click the field „New Firmware ....“

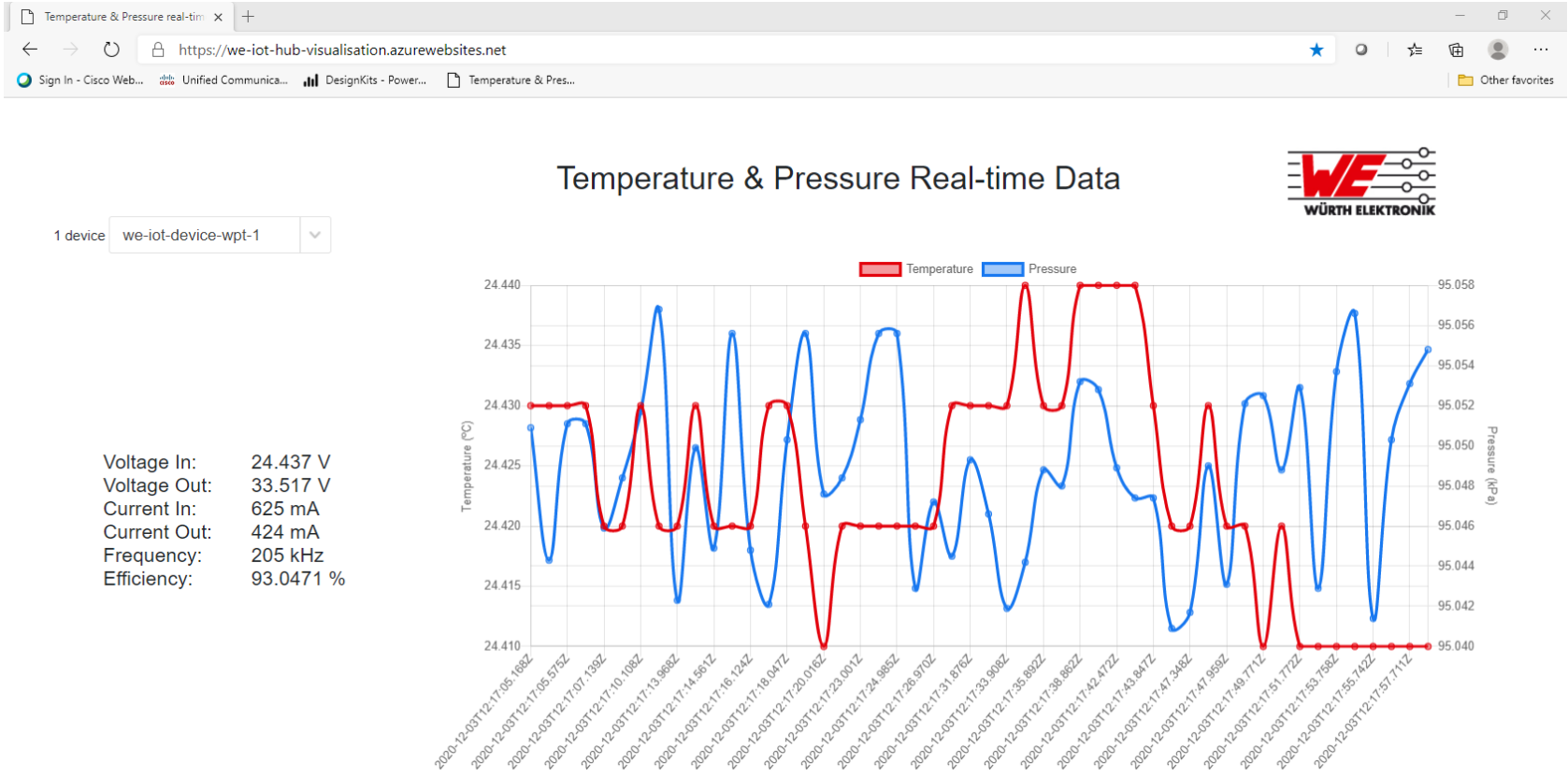


Step 3:
Pop-up window will appear.



Wireless Power Transfer enables IIoT – *WE* Cut the Cord!





LIVE DEMONSTRATION

Wireless Power Transfer enables IIoT

WE Cut the Cord!

In-band data transfer
500Bit/s

UART data transfer
115kBit/s

Tx Board

FSK →

← ASK

Rx Board

WPT coil

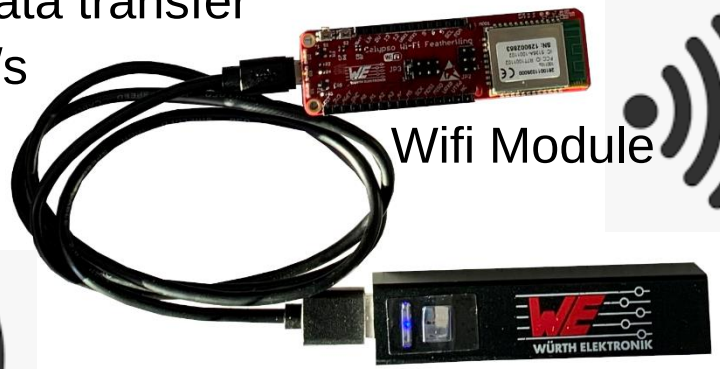
Sensors

I²C sensor data
100kBit/s

https://we-iot-device....

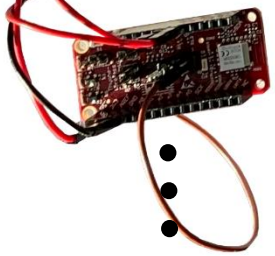
LCD Board

UART data transfer
115kBit/s



Wifi Module

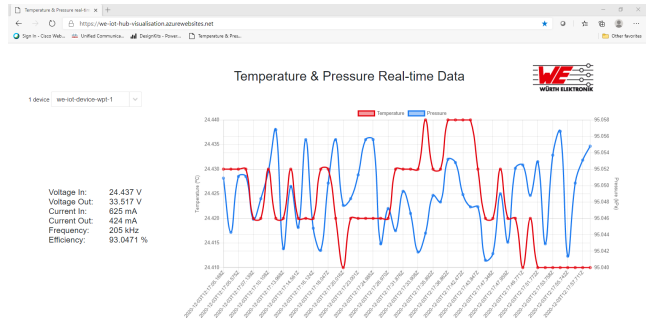
Wifi transfer
2.4GHz



Wireless Node
maximum 1 –
65536 nodes

Proprietary WE
wireless transfer
2.4GHz

cloud

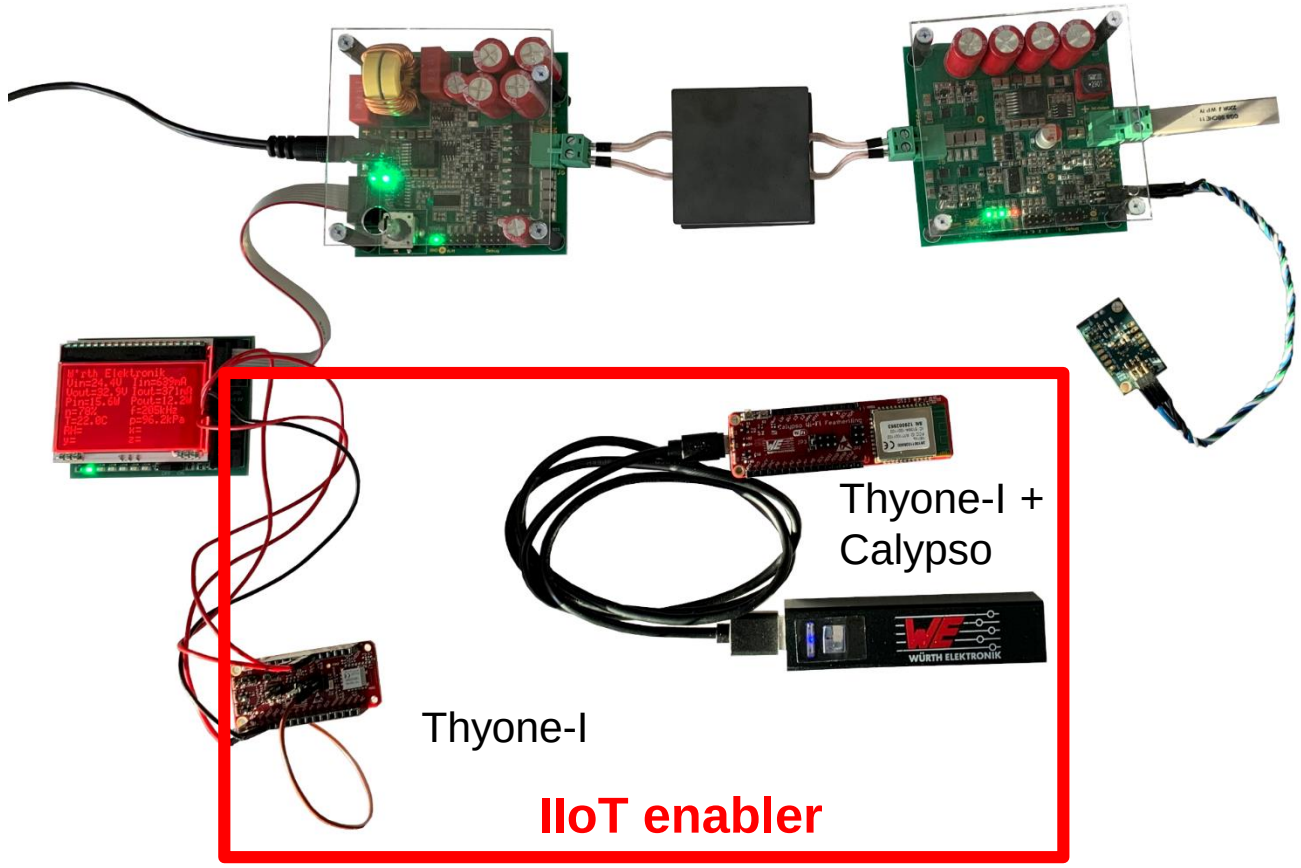


Smart or mobile devices

Wireless Power Transfer enables IIoT – *WE* Cut the Cord!

WE FeatherWings enable rapid IIoT prototyping

- Node
  - **Thyone-I** sends data 1:1 to gateway (transparent mode)
  - 2,4-GHz **proprietary** protocol
- Gateway
  - **Thyone-I** receives data from node
  - M0 microprocessor manages data
  - **Calypso** uses 2.4 GHz **Wi-Fi** to send data to **cloud**
  - Secure TLS 1.2 and MQTT protocol (port 8883)



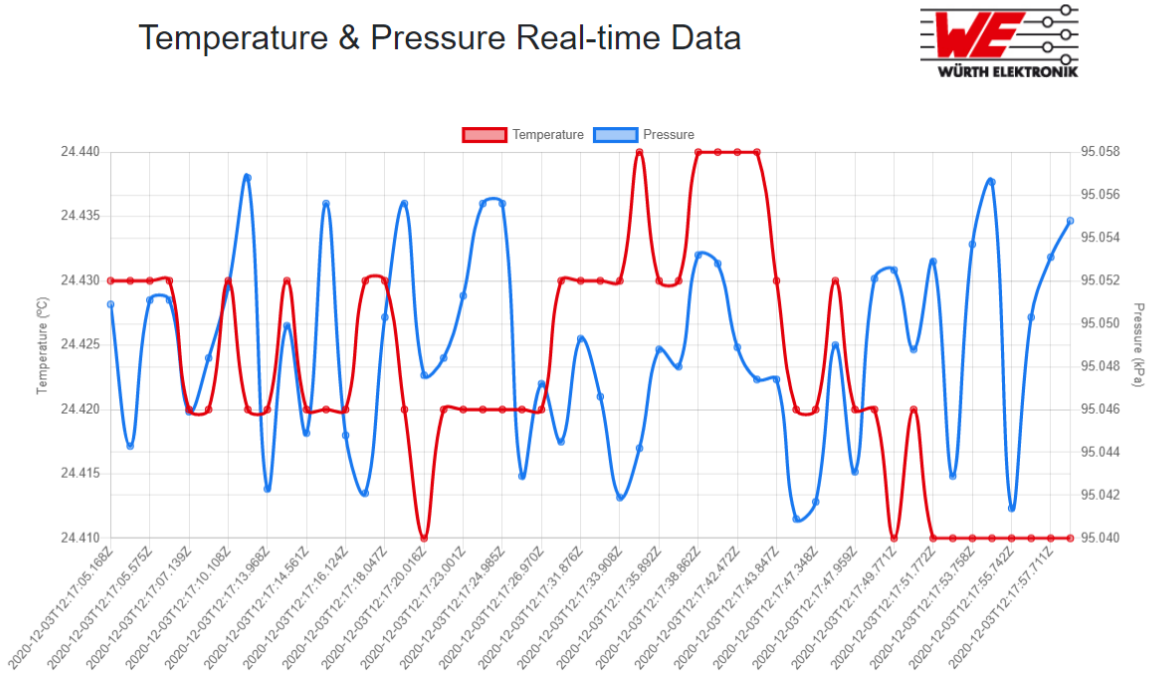
Wireless Power Transfer enables IIoT – *WE* Cut the Cord!

WE FeatherWings enable rapid IIoT prototyping

- Dashboard:
  - depending on customer request
  - support of Microsoft Azure & Amazon AWS
  - HTML/JS based **Web Application**
  - secure https: on Microsoft Azure Cloud

1 device we-iot-device-wpt-1

Voltage In:	24.437 V
Voltage Out:	33.517 V
Current In:	625 mA
Current Out:	424 mA
Frequency:	205 kHz
Efficiency:	93.0471 %



- *WE* support on GitHub:
  - Extensive step-by-step documentation
  - Code examples

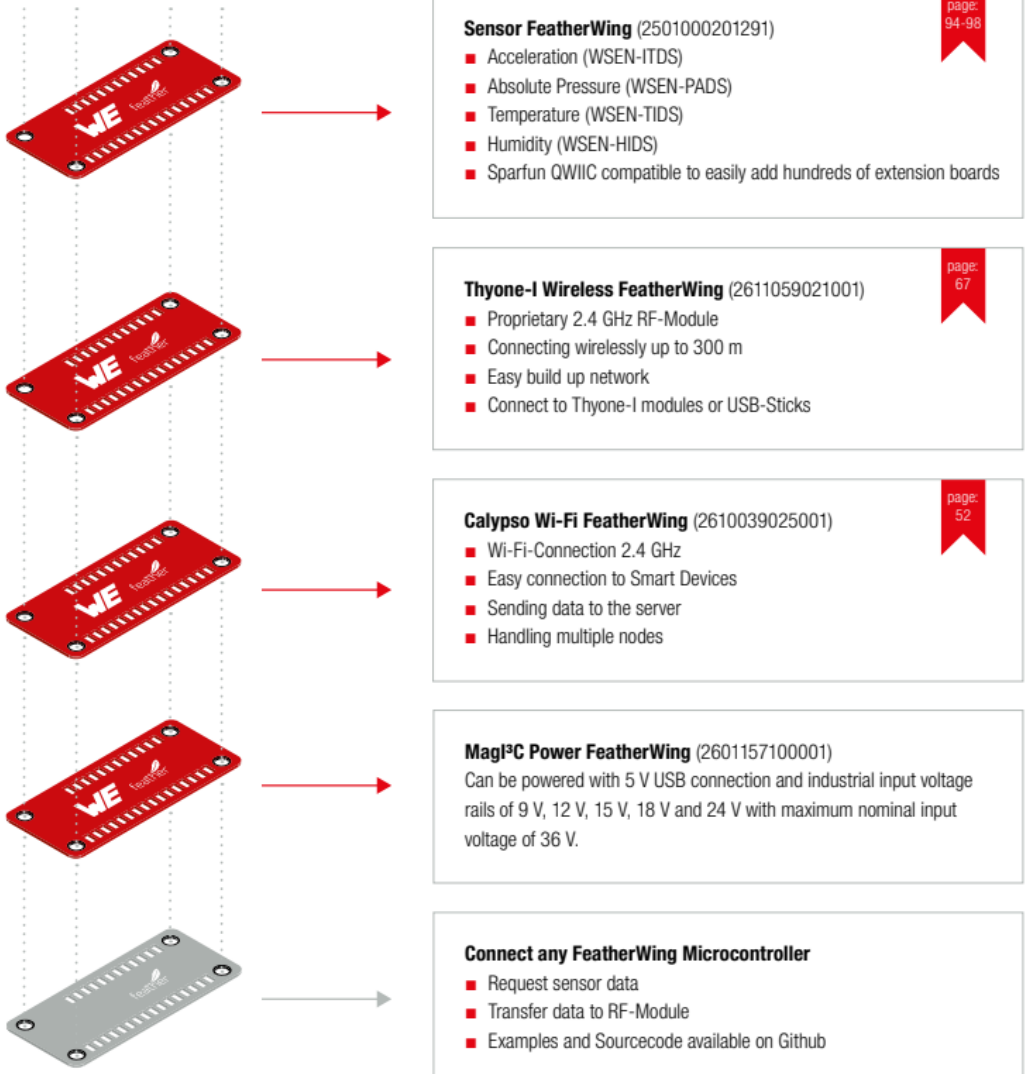
https://github.com/WurthElektronik/FeatherWings

Wireless Power Transfer enables IIoT – *WE* Cut the Cord!

WE FeatherWings for IIoT

- Rapid prototyping
- **Sensor-to-Cloud**
- „dumb“ application → **smart IoT application**
- Use any microprocesor
- Lego-like building blocks
- **Adafruit Feather** and **SparkFun QWIIC** form-factor

  → use hundreds of already existing boards



Sensor FeatherWing (2501000201291) page: 94-98
- Acceleration (WSEN-ITDS)
- Absolute Pressure (WSEN-PADS)
- Temperature (WSEN-TIDS)
- Humidity (WSEN-HIDS)
- Sparfun QWIIC compatible to easily add hundreds of extension boards

Thyone-I Wireless FeatherWing (2611059021001) page: 67
- Proprietary 2.4 GHz RF-Module
- Connecting wirelessly up to 300 m
- Easy build up network
- Connect to Thyone-I modules or USB-Sticks

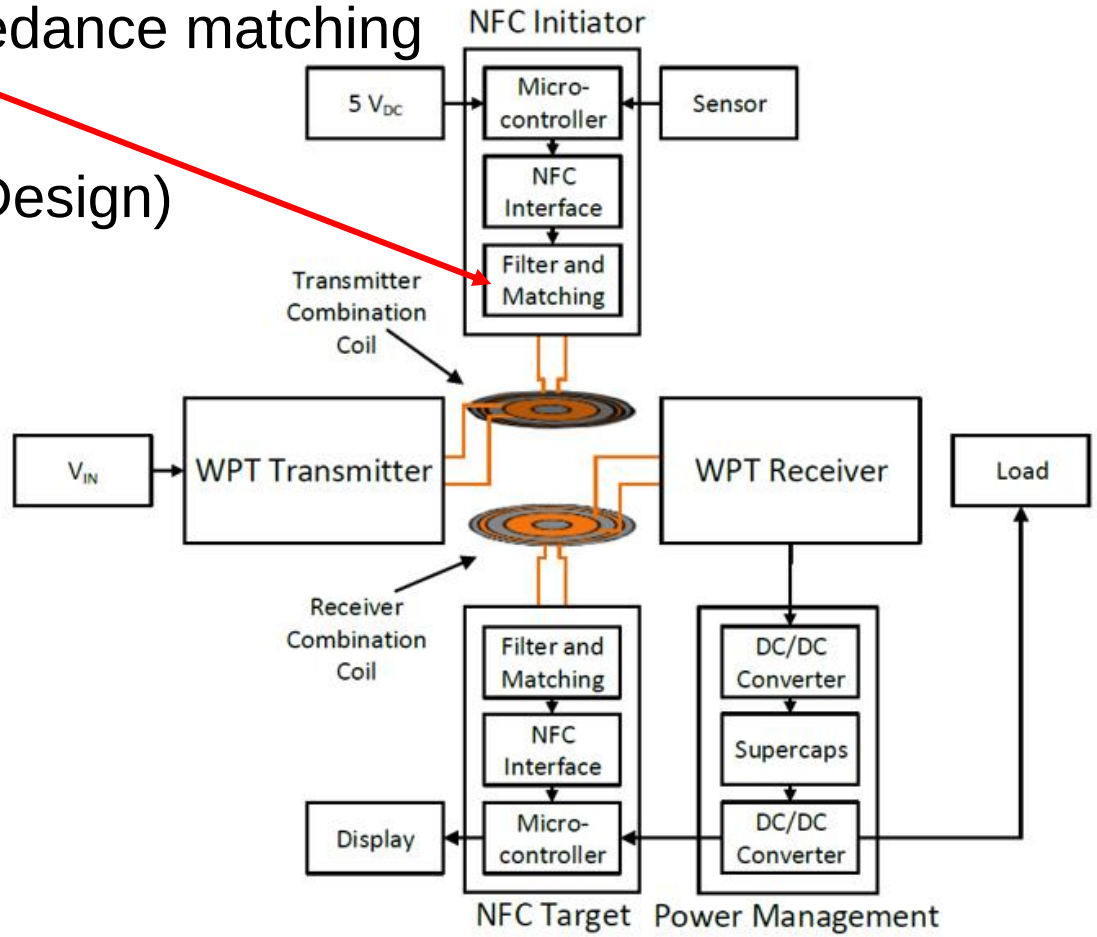
Calypso Wi-Fi FeatherWing (2610039025001) page: 52
- Wi-Fi-Connection 2.4 GHz
- Easy connection to Smart Devices
- Sending data to the server
- Handling multiple nodes

MagI³C Power FeatherWing (2601157100001)
Can be powered with 5 V USB connection and industrial input voltage rails of 9 V, 12 V, 15 V, 18 V and 24 V with maximum nominal input voltage of 36 V.

Connect any FeatherWing Microcontroller
- Request sensor data
- Transfer data to RF-Module
- Examples and Sourcecode available on Github

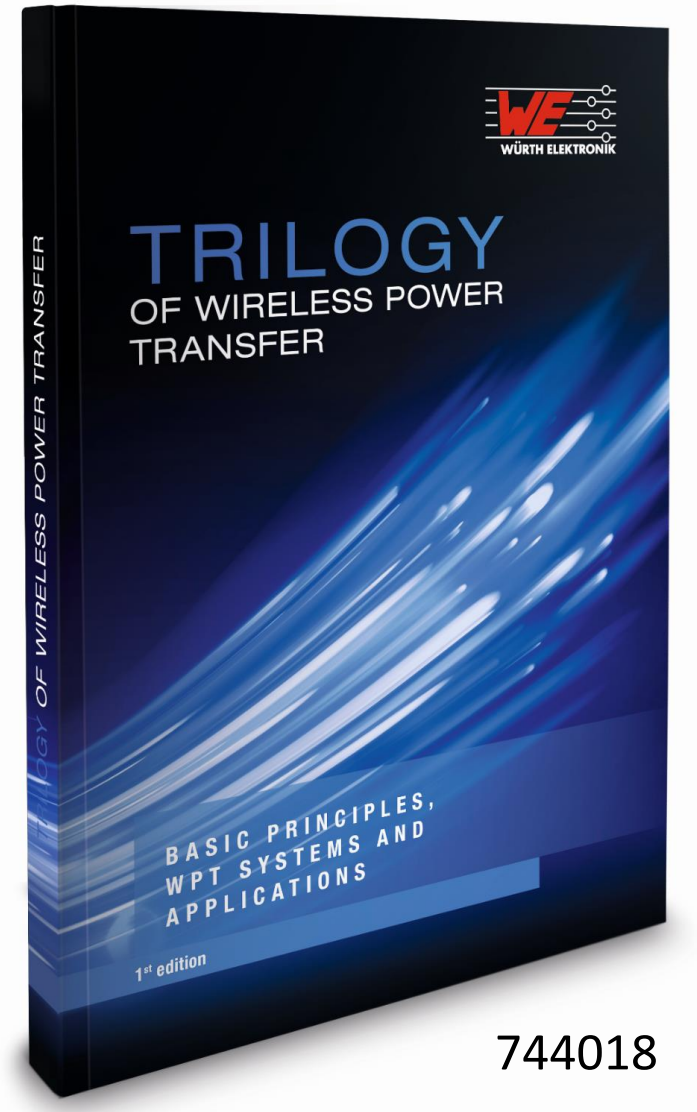
Next steps

- New Appnote (ANP084) about NFC antenna impedance matching
- New WPT/NFC Product 760308101150 (A11 Qi Design)



- Add-on NFC-Board for 200 W Development Kit

Trilogy of Wireless Power Transfer



744018

Order here

Additional help or support needed

- Download the App. Note (ANP070) and all other documents:
  BOM, Layout, GERBER, Schematic and software for the WPT

  www.we-online.de/wirelesspower

- Your local Würth Elektronik eiSos contact
- wirelesspower@we-online.com_ with email subject: 200W Kit
- www.we-online.com/wcs-support or digital.engineer@we-online.com
- https://github.com/WurthElektronik

Nothing is
more powerful
than an idea whose time has come.

Victor Hugo

Questions
& Answers

We are here for you now!
Ask us directly via our chat or via E-Mail.

eiSos-webinar@we-online.com

Cem.Som@we-online.de