

## WI-FI MODULE CALYPSO V2.0.0

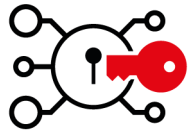
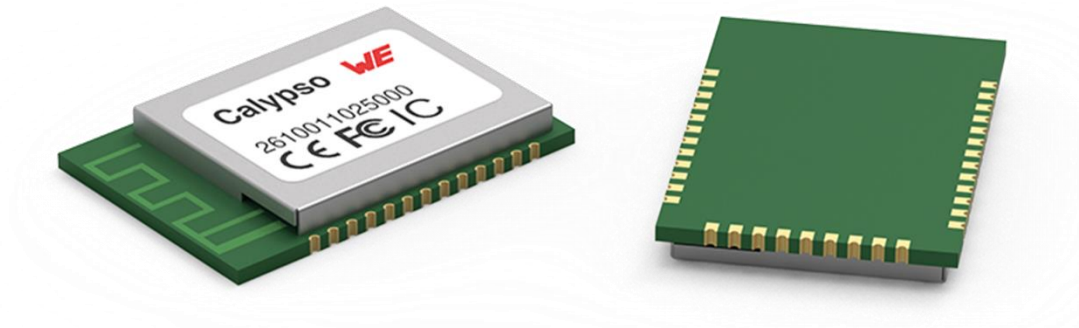
NEW FEATURE INTRODUCTION

Wireless Connectivity & Sensors

**WÜRTH ELEKTRONIK** MORE THAN YOU EXPECT

# Wi-Fi Module Calypso

Overall functionality and focus



- Security



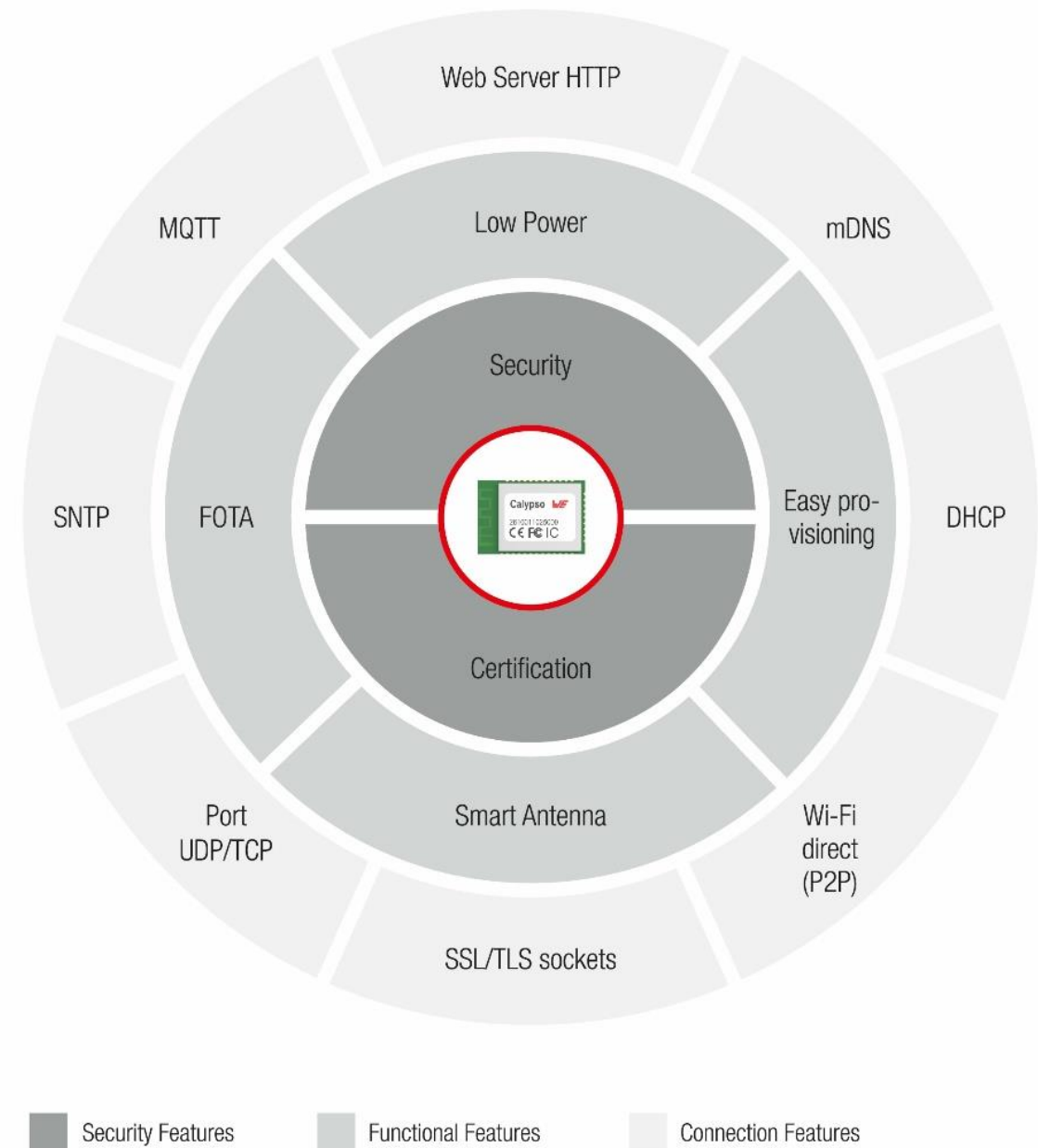
- „All-inclusive“ – fitting in nearly every application



- (Long Term) Availability



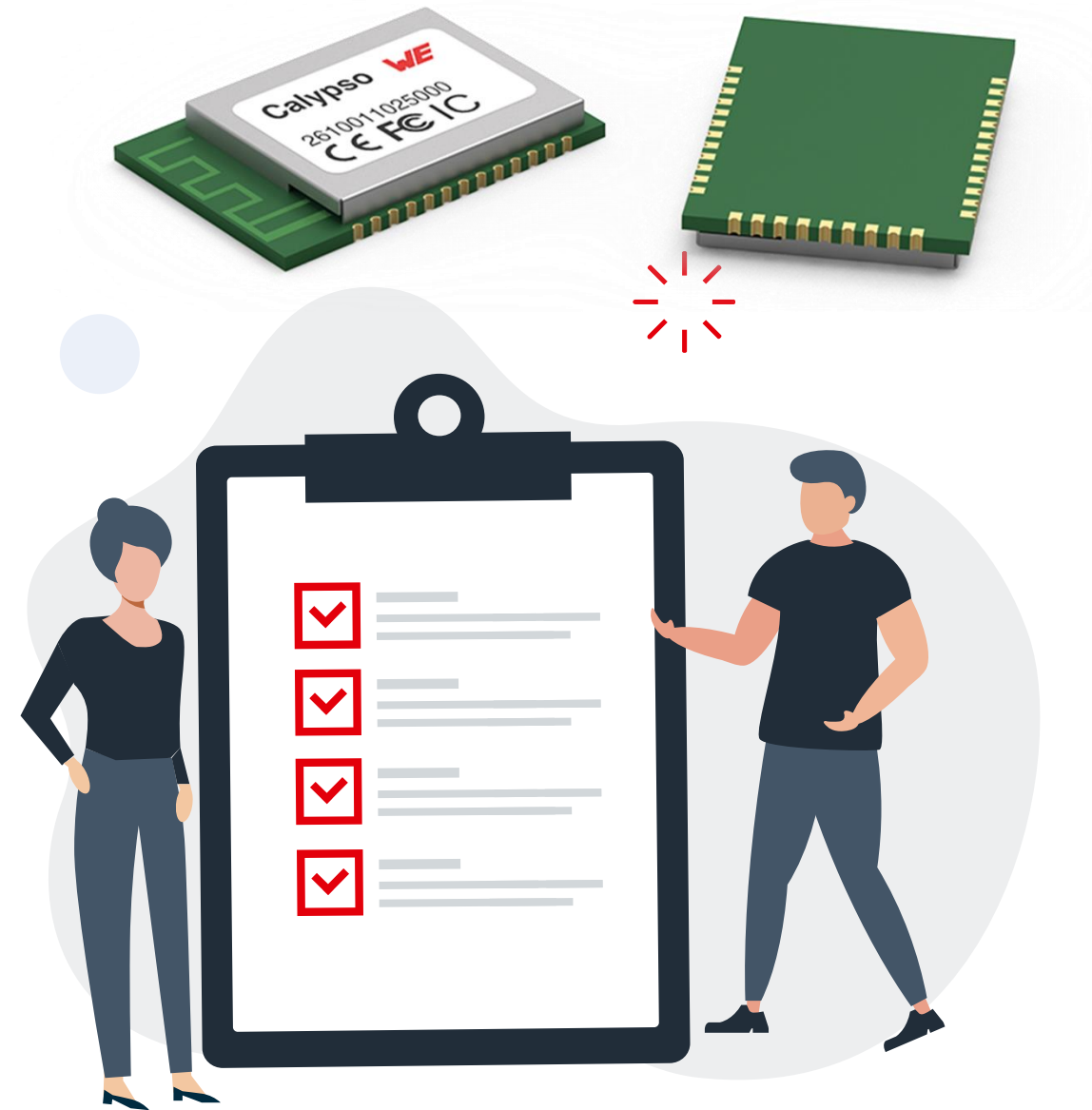
- Documentation / Support



# New feature introduction v2.0.0

## Overview

1. UART-to- Wi-Fi bridge or Transparent mode
2. New power save mode
3. Remote GPIO control
4. WPA3 security mode support
5. Customizable web pages
6. Improved overall performance

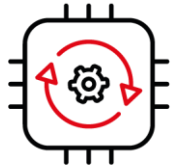


# 1. UART to Wi-Fi bridge

Transparent mode

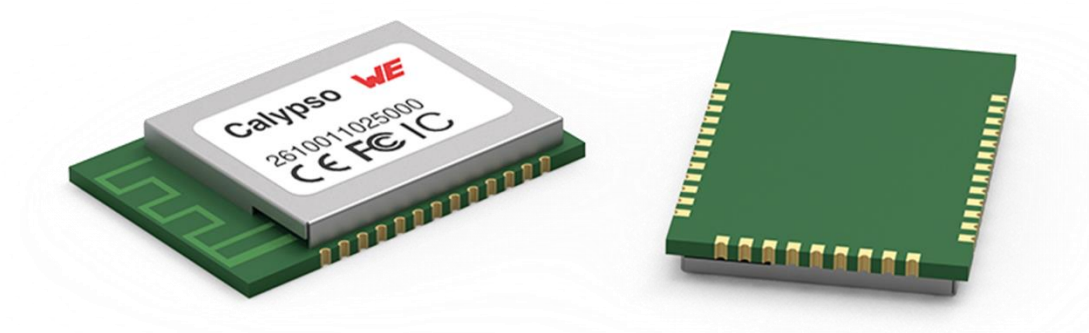
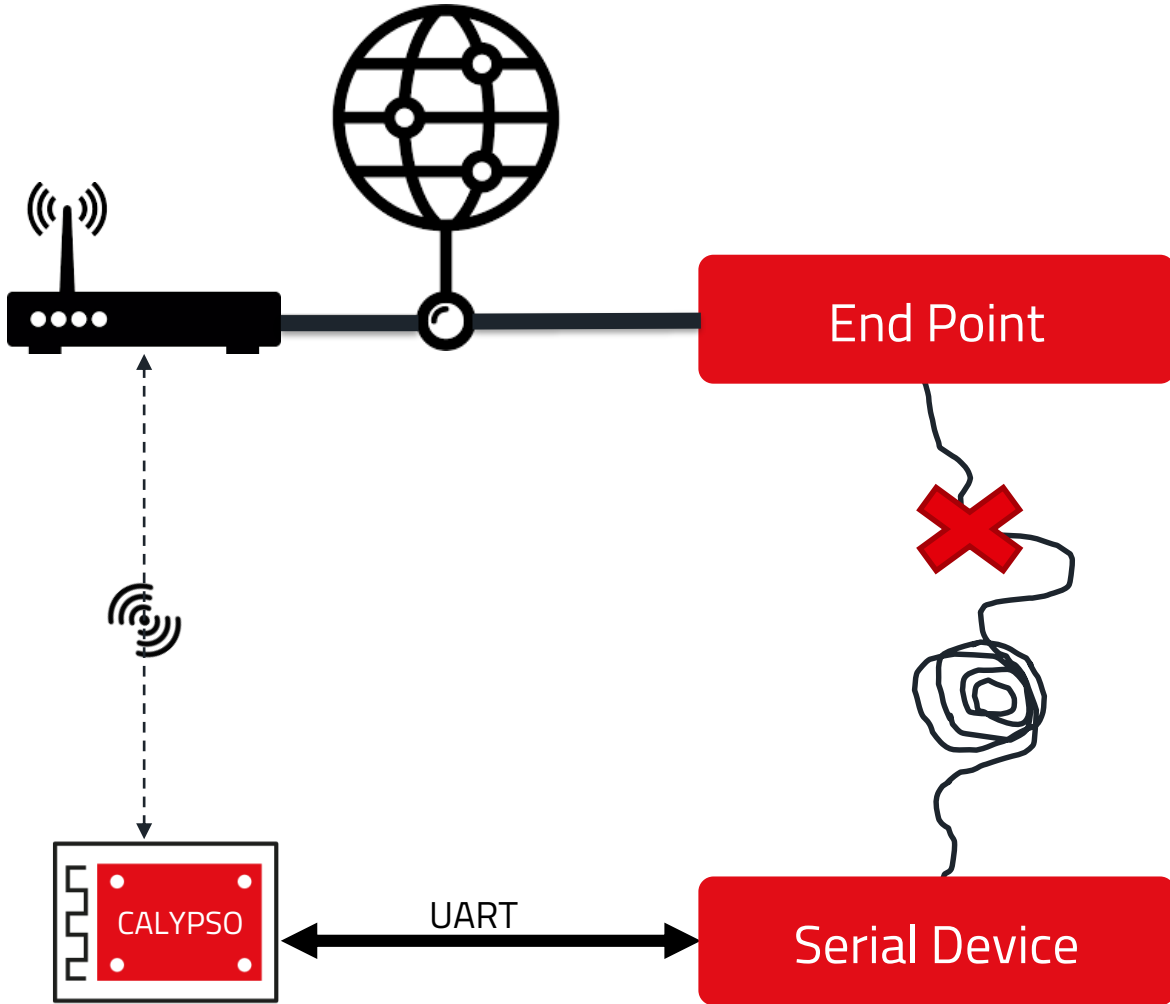
Boot-up mode selection

- normal mode
  - AT-commands
  - UART Connection
  - „normal“ Data transmission
- provisioning mode
  - acts as Access Point (AP)
  - onboard Webserver
  - easy configuring
- OTA mode
  - FW update
- **transparent mode**
  - automatic connection to preconfigured external Access Point
  - Roles: TCP server/client, UDP, TLS server/client
  - Configuration via
    - AT command interface or
    - web interface (including certificates for TLS)
  - Power save mode support (Average current consumption < 2 mA)
  - **No need to implement the AT command interface – works without HOST**



# 1. UART to Wi-Fi bridge

Transparent mode



User Settings

GET SET

SET user settings

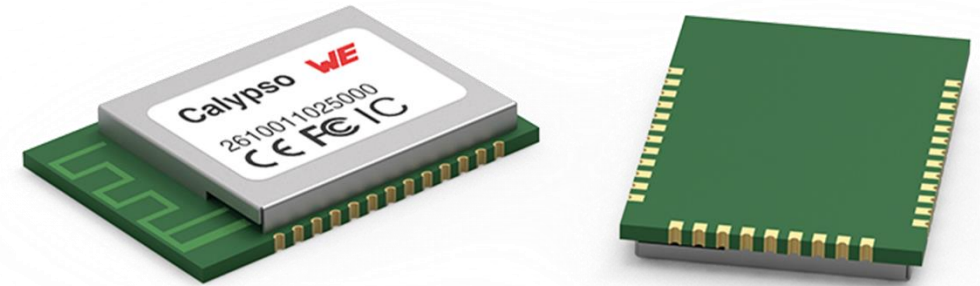
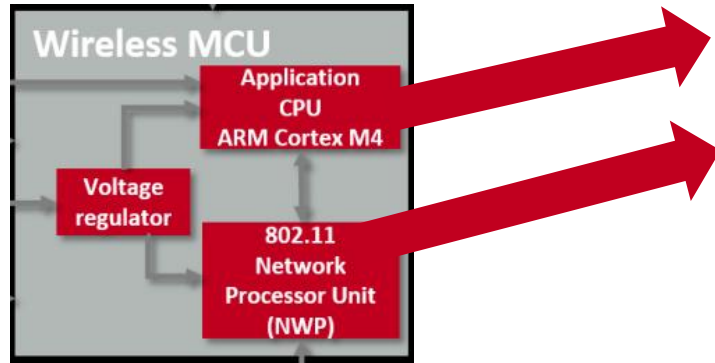
Category	transparent_mode
Setting	remote_address
Value 1	192.168.178.36

POST

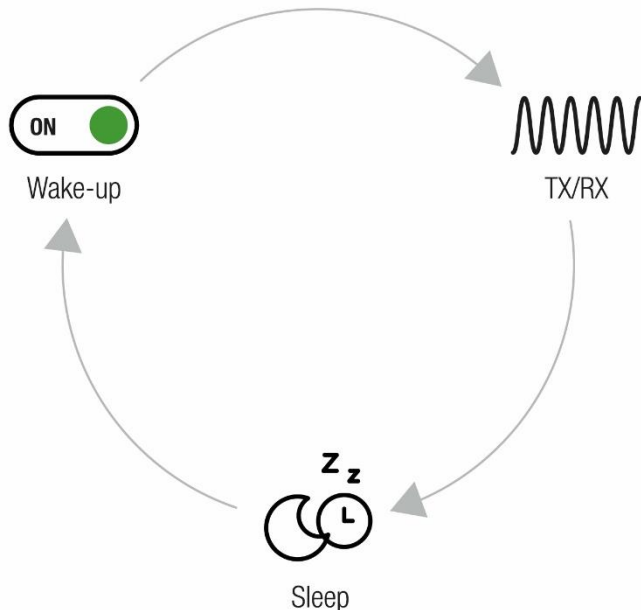


## 2. Power save mode

Save battery without going offline!



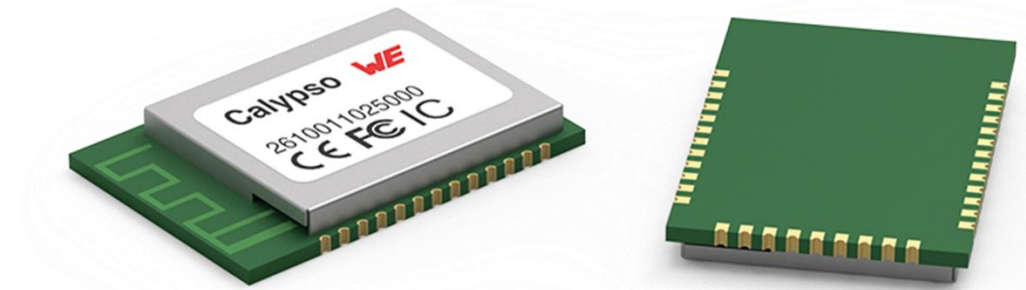
- Application processor in sleep
- Network processor **active and connected**
- Calypso online and connected (to AP with an active socket)
  - No new connection after wake up necessary
  - Saves a lot of time and with this energy
- Received packets still forwarded to the host MCU
- Wake up to transmit data
- Supported both in AT command mode as well as Transparent mode
- Average current consumption as TCP client connected to a server < **2 mA** (When idle)



## 3. Remote GPIO

Wi-Fi switch!

- 4 general purpose pins
  - can be controlled remotely over Wi-Fi
  - Configured as Input or Output
  - For 2 Pins also PWM mode possible
- Pin configuration can be saved on flash (no re-configuration on every re-start needed)
- Configuration and control via web API:



GET SET

GPIO GET

ID

Default

GET

GET SET

GPIO SET

ID

Type

Save

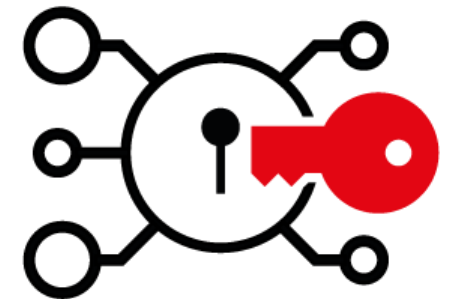
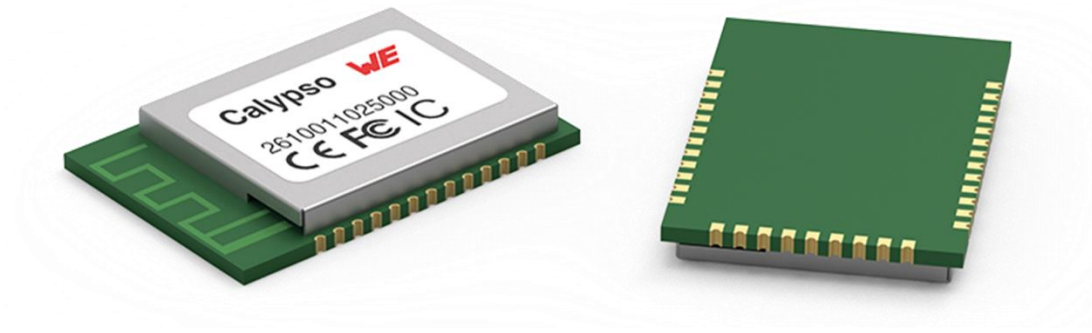
Value 1

POST

## 4. WI-FI SECURITY

Security mode Overview, new modes in red

- Open
- WEP
- WPA Personal (Wi-Fi Protected Access)
- WPA2 Personal
  - WPA2 –TKIP (Temporal Key Integrity Protocol)
  - **WPA2-CCMP (Counter Mode with Cipher Block Chaining Message Authentication Code Protocol)**
- NEW** ▪ **WPA2+ Personal (Fixed security vulnerability of WPA2)**
- NEW** ▪ **WPA3 Personal (AES-128 im CCM (Counter with CBC-MAC))**
- NEW** ▪ **WPA Enterprise (AES-256 in GCM (Galois/Counter Mode))**





# 5. CUSTOMIZABLE WEB PAGES

## RESTful APIs



- Representational State Transfer Application Programming Interface
  - architectural style for an API that uses HTTP requests
  - commonly used in the development of Web services



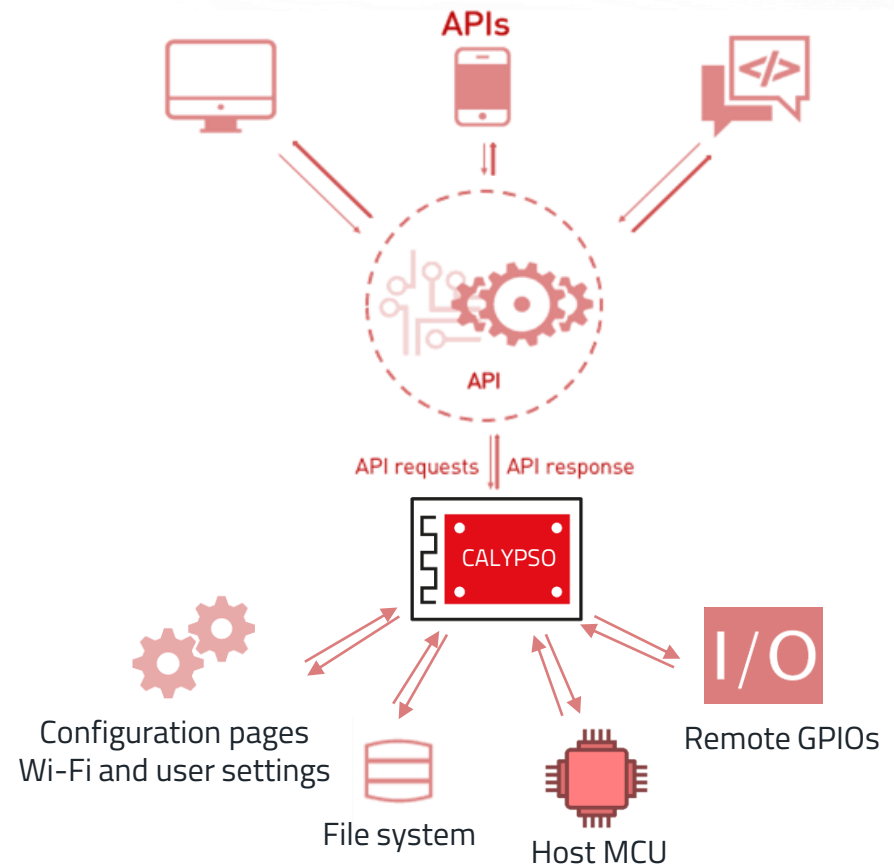
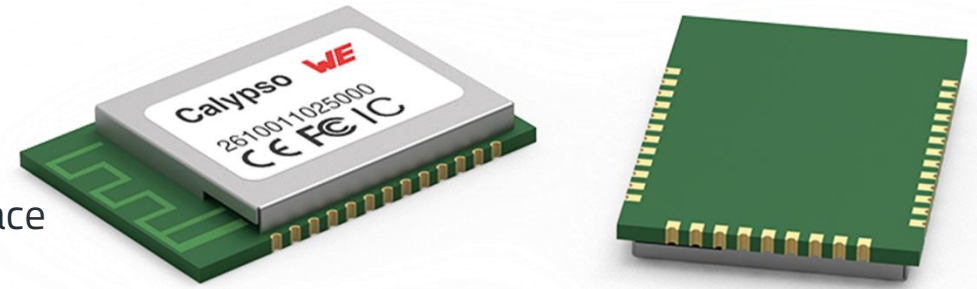
- Web APIs available to
  - Configure Wi-Fi and network
  - Configure user settings
  - Upload files to the module
  - Configure/control remote GPIOs
  - Custom API to talk to host MCU



- Custom API
  - Web content determined by the host MCU
  - i.e. Display sensor values
  - i.e. Switch off a motor connected to the host



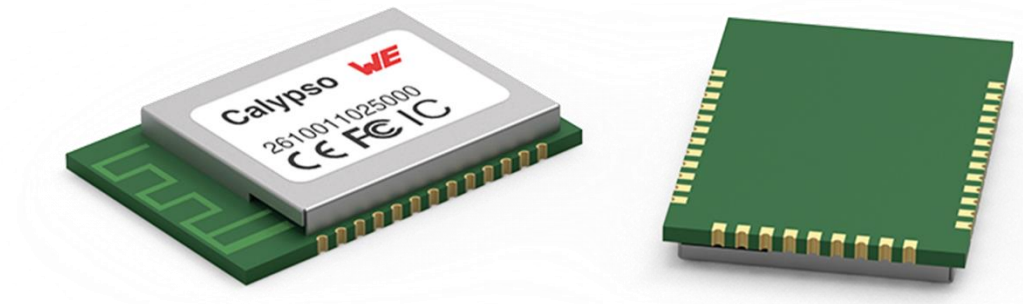
- Example web pages on-board



## 6. OTHER UPDATES

More than you expect!

- Update NWP (Network Processor) service pack
- TI RTOS (Real-time Operating System) and drivers
- Bug fixes for known issues from v1.3.0
- Overall performance enhancements
  - Lower latency: 1ms → 10µs
  - Higher throughput: 40% higher
- NEW** ▪ New look website
- Easy FW Update (OTA) in AP mode
- Updated AT command tool
- NEW** ▪ New Appnotes and user manual
- NEW** ▪ The STM32 WCON SDK now supports Calypso Wi-Fi module



### Calypso WLAN module

WURTH ELEKTRONIK  
MORE THAN YOU EXPECT

#### Add Profile

SSID

Enter SSID or select from list

Security type

Security key

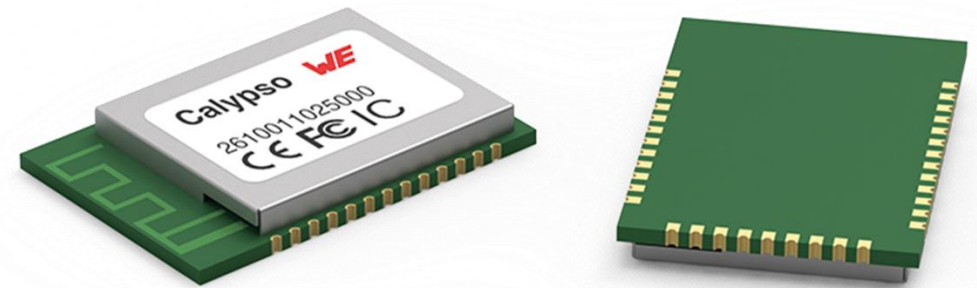
#### Device Mode

Device Mode

Settings will take effect after reset

# CALYPSO v2.0.0

## CONCLUSION



1. UART-to- Wi-Fi bridge or Transparent mode
  - automatic connection to preconfigured external AP
  - Power save mode support (Average current < 2 mA)
  - Possible to work without HOST



2. New power save mode
  - with an average current consumption of < 2 mA
  - Always active network connection



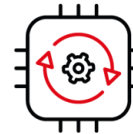
3. Remote GPIO control
  - can be controlled remotely over Wi-Fi
  - Configured as Input or Output
  - For 2 Pins also PWM mode possible



4. WPA3 security mode support
  - state of the art security



5. Customizable web pages
  - Web content determined by the host MCU
  - Easy development of Web services

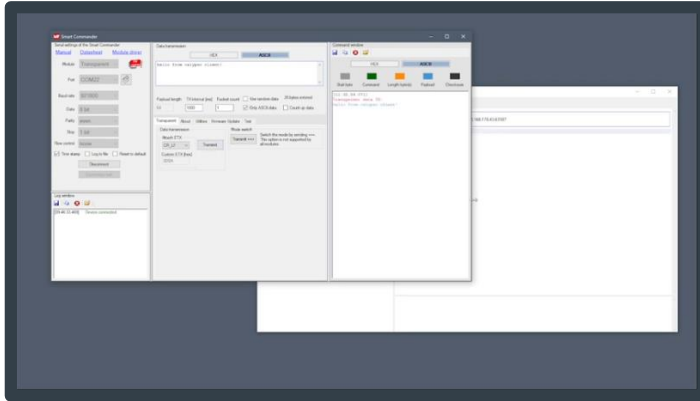


6. Improved overall performance
  - Lower latency: 1ms → 10μs
  - Higher throughput: 40% higher
  - STM32-SDK including Calypso
  - New look website

# CALYPSO TRAINING MATERIAL

Hands-on Videos (4-8min to understand the functionality)

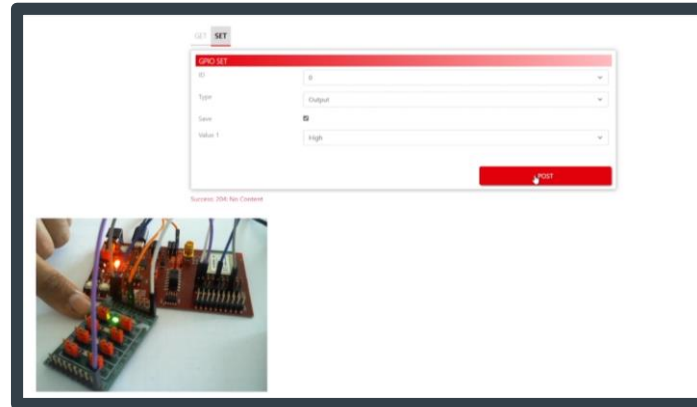
## UART-to-WiFi bridge



- Retrofitting IIoT
- Replace serial cable connection
- Transparent data communication

[AppNote UART-to-WiFi-bridge](#)

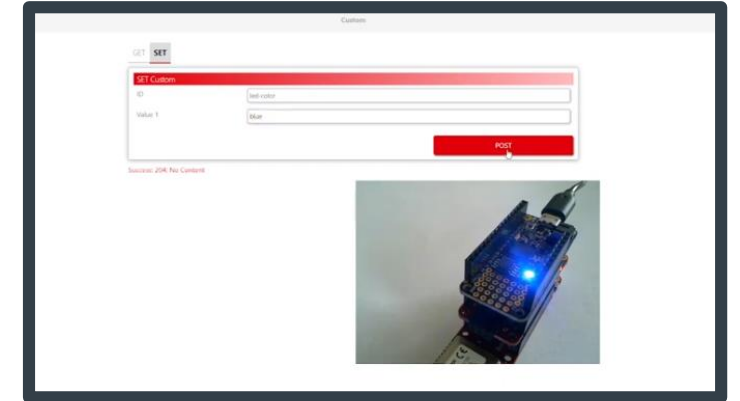
## Remote GPIO control



- WiFi switch

[AppNote Remote GPIO control](#)

## Dynamic Web Content



- Visualize Sensor Data
- Web interface

# EVALUATION TOOLS

## Module



- Detailed [documentation](#) available
- UART communication
- Hand soldering with edge castellation
- [Altium](#), [Eagle](#) and [CAD/STEP-files](#) available

## Evaluation Kit



- Easy evaluation
- Special [PC-Software AT-Commander](#) available

## Feather Wing



- Easy Proof of Concept
- Stackable
- A lot of other [Feather Wings](#) available
- [Codes and examples](#) on github