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Low power RF

Introduction and overview





Low-power RF focus technologies

 **Bluetooth® 5**

2.4 GHz proprietary

Bluetooth® SIG Mesh



Wearable, healthcare,
smart appliances

Toys, gaming, remote
controllers

Sensor networks,
home appliances,
industrial

Asset tracking,
Sensor-to-Cloud

Remote metering,
energy management

Sensor networks,
home, industrial
automation

- Security
- Interoperability
- BT SIG Standard

- Open radio
- Low latency
- High throughput

- Mesh topology
- Large scale
- BT SIG Standard

- Global and reliable
- Geo-localization
- Security by-default

- European standard
- Star topology
- Master / slave

- Mesh topology
- Large scale
- Installation flexibility
- IPv6

ST low-power RF complete solution



RELIABILITY & SECURITY

Robust radio for reliable secure wireless connectivity

LOW POWER

Longer battery life and lower maintenance costs

SCALABILITY

Sensor ready for seamless Sensor-to-Cloud solutions
Scalable packages for space and cost saving applications

SUPPORT

SW and tools eco-system to shorten development time
RF module catalog to ease design-in, costs and time-to-market

ST low-power RF product lines

Connectivity, efficiency and robustness

Enabling the Sensor-to-Cloud wireless connectivity

BlueNRG Family



Ultra Low Power ARM-Based
Bluetooth® Low Energy Processors

BlueNRG-MESH



Sensors



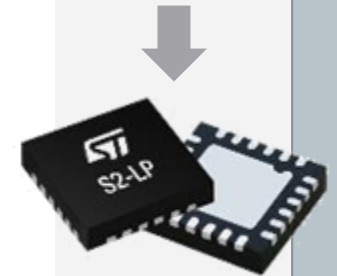
SPIRIT Family



Sub-1GHz Radio Transceivers
and LPWAN networking



Sensors





Sub-1 GHz markets

Smart Industry



Smart City



Smart Home



Smart Agriculture



Asset Tracking



Metering



Alarm System



Heat Cost Allocator



SPIRIT family: Performance, Flexibility, Scalability



S2-LP family overview

Performance

Sub
1GHz

S2-LP / S2-LPCB / S2-LPTX

- 413-479 MHz / 826-958 MHz
- 452-527 MHz / 904-1055 MHz (**)
- -40°C to +105°C
- QFN24 4x4x1



Radio performance

- 100 bps to 500 kbps
- -130 dBm @ 0.3kbps (*)
- +16 dBm output power



Ultra low-power consumption

- Sleep / Shutdown: 700nA / 2.5nA
- Rx peak: 7 mA (*)
- Tx peak: 10 mA @+10dBm



(*) RX Feature only available on transceivers: S2-LP and S2-LPCB
(**) Frequency bands only available on S2-LPCB

Protocols



Markets



Remote metering



Smart living



Alarm & surveillance



Smart home



Smart utilities



Healthcare & assistance



Smart parking



Smart agriculture

Bluetooth® Low Energy markets

Wearable



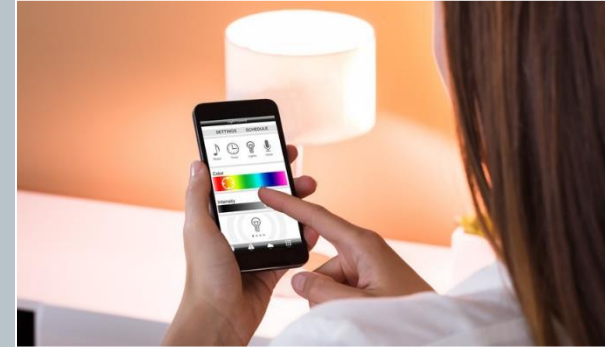
Healthcare



Beacon / Retail



Lighting



Remote Controller



Animal Tracking



Toys / Gaming



Home Appliance



BlueNRG family: Performance, Flexibility, Scalability



BlueNRG SoC simplifies IoT

**Low-Power Bluetooth® Low Energy Application Processor
(ARM Cortex-M0/-M0+ programmable core with up to 256KB eFLASH)**



- Simplified HMI
- Easy customization
- Remote reading
- Service and maintenance
- Firmware upgrade
- Added-value services



QFN48
6 x 6 mm



QFN32
5 x 5 mm



WLCSP49
3.14 x 3.14 mm

WLCSP34
2.66 x 2.56 mm

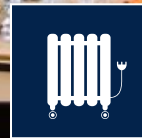
← Scalable packages →



BlueNRG-Mesh brings smart-home to your fingertip

Easily connecting appliances to iOS/Android, out-of-the-box

- Bluetooth® **Mesh 1.0.1** certified **Profile Library, Server and Client Model**, and **Bluetooth® LE stack**
- **Two-layer security** (128-bit AES-CCM and 256-bit ECDH protocol)
- **Low-power** and **Friendship** supported
- Provisioned node **database transfer** among smartphones via Email and Cloud application
- **Embedded** and **Mobile SDK** to build both your Android and iOS Apps
- Reduces development costs and accelerates time-to-market





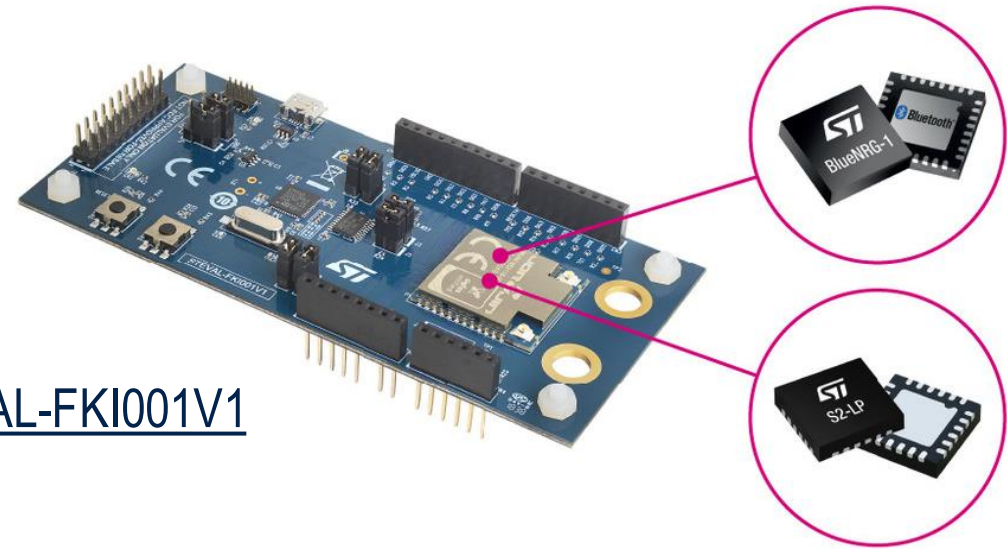
Dual-radio SDK: BLE + SIGFOX



STSW-BNRG-S2LP

Dual-Radio SDK based on BlueNRG-1 and S2-LP

STEVAL-FKI001V1



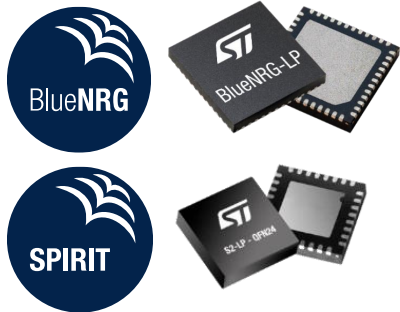
Software Development Kit

- [STSW-S2LP-SFX-DK](#)
- [STSW-BNRG-S2LP-DK](#)



ST low-power RF ecosystem

RF chipsets



Evaluation and hardware development tools



RF modules



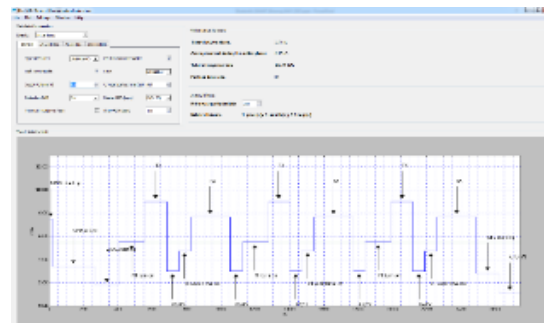
Software development



RF NAVIGATOR



Graphical UI

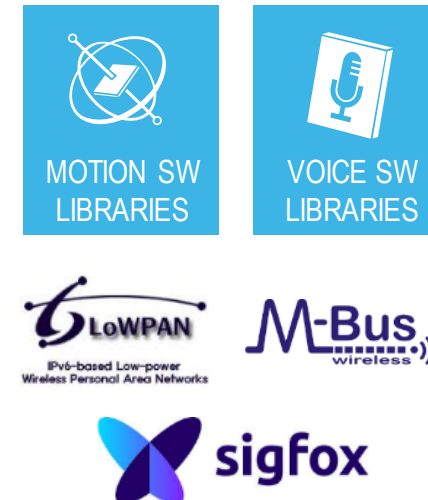


RF Power Simulator

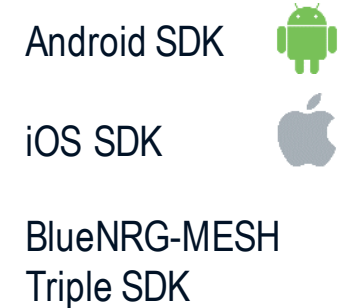


GUI PC application

Protocols / SW IP



Mobile SDK



Low-power RF modules

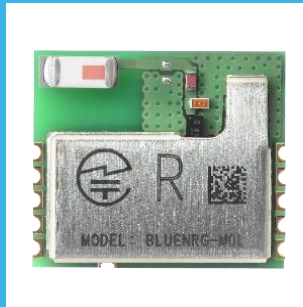


Huge engineering **cost savings**
Multi-Regional **certifications**
Fast **time-to-market**



BlueNRG-M0L BlueNRG-M0A

- Based on BlueNRG-MS
- BLE4.2 certification



BlueNRG-M2SA BlueNRG-M2SP

- Based on BlueNRG-2
- BLE5.0 certification



SPSGRF-868 SPSGRF-915

Antenna option
Two carrier frequency versions:
868 MHz & 915 MHz



SPSGRFC-433 SPSGRFC-868 SPSGRFC-915

- Connector option
- Three carrier frequency versions:
433 MHz, 868 MHz and 915 MHz



Thank you

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