BLUENRG-LP WIRELESS PROCESSOR

life.augmented

Future-ready Bluetooth LE 5.2 programmable System-on-Chip

Faster connectivity and more design possibilities with the BlueNRG-LP SoC for Bluetooth-enabled applications

Compliant with Bluetooth SIG core specification version 5.2, ST's third generation of BlueNRG 2.4 GHz Radio IP combines unparalleled RF performance with very long battery lifetime.

The BlueNRG-LP SoC addresses both point-to-multipoint connectivity and Bluetooth SIG Mesh networking, enabling reliable large-scale device networks. Suitable for proprietary radio communication, the BlueNRG-LP is also ideal for ultra-low latency applications.

KEY FEATURES & BENEFITS

- Bluetooth® LE 5.2 supported features:
  - 2 Mbps data rate
  - Long Range (Coded PHY)
  - Advertising extensions
  - LE Power Control
  - Channel Selection Algorithm #2
  - GATT caching
- Pre-certified and upgradable BLE stack with optimized code footprint
- Supports up to 128 concurrent connections
- Radio performance
  - RX sensitivity level: -97 dBm at 1 Mbps, -104 dBm at 125 kbps
  - 4.3 mA peak current in TX (at 0 dBm, 3.3 V)
  - 3.4 mA peak current in RX (at sensitivity level, 3.3V)
  - 0.6 uA in ultra-low-power DEEPSTOP mode (full-RAM retention, 3.3V)
- Programmable output power up to +8 dBm
- Embedded 32-bit Arm® Cortex®-M0+ up to 64MHz
- Embedded BlueCORE accelerator for Bluetooth time-critical operations
- Hardware enforced bootloader and software security
- Embedded balun (50 Ω single-ended output) and minimized BOM for cost optimization
- 1.7 to 3.6 V operating supply voltage
- -40 to 105 °C temperature range

KEY APPLICATIONS

Asset tracking and indoor position, Smart tools and appliances, Remote controllers, Wireless sensors and IoT networking solutions, Industrial connectivity, Lighting and building automation, Personal electronics, Healthcare, Wearable.

www.st.com/ble

Bluetooth Low Energy (BLE) System-on-Chip

The BlueNRG-LP is a very low power Bluetooth Low Energy (BLE) single-mode SoC, compliant with Bluetooth 5.2 specifications. The BlueNRG-LP embeds a 32-bit Arm Cortex-M0+ microcontroller core that can operate up to 64 MHz, as well as the BlueCORE accelerator (DMA-based) for Bluetooth LE time-critical operations.
The BlueNRG-LP embeds ultra low-leakage and flexible memory types: 256 Kbytes of Flash memory, up to 64 Kbytes of RAM memory and 1Kbytes of one-time-programmable (OTP) memory area.
In addition to high-speed 2Mbps on-air throughput, the BlueNRG-LP radio front-end supports Long Range (Coded PHY), Advertising extensions, GATT Caching, as well as the LE Power Control & Path Loss feature, which further expands battery lifetime, improves connectivity, and reduces interference. Designed for demanding radio applications, the BlueNRG-LP gets excellent RF performance at the lowest power budget of 4.3mA in transmitter mode at 0dBm and 3.4mA in receiver mode.

An extensive peripheral set

An embedded 12-bit ADC (up to 16 bits with a decimation filter) can measure up to eight external sources and up to three internal sources, including battery monitoring and a temperature sensor.
The BlueNRG-LP embeds a low-power RTC, an advanced 16-bit timer, and independent Watchdog and SysTick.
Standard and advanced communication interfaces set include: 1x SPI, 2x SPI/I2S, 1x LPUART, 1x USART supporting ISO 7816 (smartcard mode), IrDA and Modbus mode, 2x I2C supporting SMBus/PMBus, and 1x PDM. 1x DMA controller with 8 channels supports ADC, SPI, I2C, USART and LPUART.
5V tolerant programmable GPIOs with up to +/-20mA driving capability.

Security

The BlueNRG-LP offers enhanced security features such as Flash read and write protection, SWD disabling, Secure bootloader and 48-bit unique ID. A true random number generator (RNG), together with hardware public key accelerator (PKA) and a hardware encryption AES security co-processor at 128 bits, ensure state-of-the-art security.

Product Portfolio

The BlueNRG-LP series is available in three types of packages, including the QFN32 (5 x 5mm, 20 I/Os), QFN48 (6 x 6mm, 32 I/Os), and WLCSP49 package (3.13 x 3.14mm, 30 I/Os) for size-constrained applications.
Two options are available both in terms of RAM memory size (32 and 64 Kbytes) and operating temperature range (up to 85 and up to 105 °C).

Software Development Kits and libraries to reduce your development time

Evaluation Kit	STEVAL-IDB011V2	BlueNRG-355MC Evaluation Kit
SDK	STSW-BNRGLP-DK	BlueNRG-LP Software Development Kit package
	STSW-LP-PROFILES	BlueNRG-LP Bluetooth LE Profiles SW package
	STSW-BNRGLP-MESH	Comprehensive software solution for connecting multiple BlueNRG-LP in Mesh networks
PC GUI and Tools	STSW-BNRGUI	Graphical user interface / Command line interface for driving by PC evaluation kit
	STSW-BNRGFLASHER	Graphical user interface / Command line interface allowing BlueNRG-LP programming
	STSW-BNRG001	Graphical user interface for current consumption estimation
	STSW-WISE-STUDIO	WISE-Studio free IDE for Window, Linux, MAC OS
Documentation	DS13282	BlueNRG-LP Datasheet
	RM0479	BlueNRG-LP ARM Cortex-M0+ based Reference Manual
	UM2735	BlueNRG-LP User Manual
	UM2726	The BlueNRG-LP 2.4 GHz radio proprietary driver
	PM0269	Bluetooth LE stack v3.x programming guidelines
	AN5463	The BlueNRG-LP OTA (over-the-air) firmware upgrade
	AN5466	BlueNRG-LP power save modes
	AN5469	The BlueNRG-LP timer module
	AN5471	The BlueNRG-LP UART bootloader protocol
	AN5503	Bringing up the BlueNRG-LP device
	AN5526	PCB design guidelines for the BlueNRG-LP device
	AN5528	Radio communication range estimation in ISM band
	AN5574	Driving an external RF front-end with the BlueNRG-LP
	DB4617	STEVAL-IDB011V2 databrief
	DB4257	STSW-BNRGLP-DK SW package databrief

Order code: FL2204BLUENRGLP