

BLUENRG-LP WIRELESS PROCESSOR



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
 - 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, 3.3V)
 - 3.4 mA peak current in RX (at sensitivity level, 3.3V)
 - 0.6 uA in ultra-low-power DEEPSLEEP 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 FEATURES & BENEFITS

Asset tracking and beacons, Smart tools and appliances, Industrial connectivity, Lighting and building automation, Personal electronics, People and animal tracking, Healthcare, Wearable.

Bluetooth LE System-on-Chip

The BlueNRG-LP is a very low power Bluetooth Low Energy 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.

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 WLCSF49 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-IDB011V1	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	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
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
	DB4266	STEVAL-IDB011V1 databrief
	DB4257	STSW-BNRGLP-DK SW package databrief



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