BlueNRG-2

The IoT Ready Bluetooth® low energy System-on-Chip

BlueNRG-2 boosts the performance of Smart Things

Certified Bluetooth 5.0, ST's new generation of Bluetooth® low energy application processor ensures interoperability with the latest generation of smartphones and offers ultra-low current consumption with robust RF performance, increasing the battery lifetime of applications.

In addition to a large integrated memory and a scalable number of GPIOs, the latest evolution of the Bluetooth low energy stack adds state-of-the-art communication, security and privacy along with an extended packet length for a faster data transfer.

KEY BENEFITS

New enhanced features

- Bluetooth 5.0 certification to ensure interoperability with the latest generation of smartphones and tablets
- State-of-the-art security and privacy features to protect against Eaves Dropping attack during pairing stage
- Faster data transfer rate with packet length extension to boost the Over-The-Air FW update in the field
- Bluetooth Mesh-ready to extend network coverage to large areas
- Extended battery life thanks to highest radio efficiency in the market combined with an ultra-low latency technology

KEY FEATURES

Extended battery life and secure connection

- Optimized memory architecture: 256 KB of embedded Flash memory, 24 KB of ultra-low-leakage RAM (with full data retention)
- Extended battery life thanks to highest radio efficiency in the market combined with an ultra-low latency technology
- Single-core, ultra-low-power 32-bit ARM® Cortex®-M0 core architecture up to 32 MHz
- Enhanced power saving down to 0.9 uA sleep mode with active BLE stack
- More than 3.5 years in Connection mode and 1.5 year in Advertising mode (1s Intervals) powered by CR2032 battery
- Suitable for 9-axis Sensor Fusion (MotionFX library) and ADPCM audio compression (BlueVoice library)
- Operating temperature up to +105 °C
- Up to +8 dBm maximum output power
- Up to 26 GPIOs (in QFN48 package)
- Triple package offering:
  - QFN32 (5 x 5 x 1 mm)
  - WLCSP32 (2.66 x 2.56 x 0.5 mm)
  - QFN48 (6 x 6 x 1 mm)

BLUENRG-2 DESCRIPTION

Bluetooth® low energy System-on-Chip

The BlueNRG-2 is a very low power Bluetooth low energy single-mode SoC, compliant with Bluetooth 5.0 specifications. The BlueNRG-2 embeds an ultra-low-power 32-bit ARM Cortex®-M0 core running up to 32 MHz to host Bluetooth low energy stack and user application code. It allows ultra-fast wake-up capability, efficient execution of 9-axis inertial sensor fusion and streaming of real-time data, consuming just 1.4mA at 25 Hz. The on-chip 256-Kbytes Flash memory simplifies system design by saving external memory components and offering full upgradability of both Bluetooth low energy stack and application code. The BlueNRG-2 comes with 24 Kbytes of ultra-low-leakage RAM with full-data retention and offers SPI, UART, and I²C peripherals, multifunction timers, watchdog, RTC, and DMA controller.
It also features a low-power 10-bit ADC for interfacing with analog sensors as well as monitoring the integrated battery level. A digital filter and the PDM input interface support seamless voice capturing from a digital MEMS microphone.
The BlueNRG-2 offers excellent RF performance, robustness and connection reliability. The integrated high-efficiency DC/DC converter enables ultra-low power figures with an enhanced sleep mode, extending battery lifetime. Different packages with a scalable number of GPIOs (up to 26) are available, including a WLCSP package for size-constrained applications.
The BlueNRG-2 comes with a full-featured eco-system of tools, evaluation board and SDKs. The Navigator GUI enables to quickly run proposed examples and start developing new projects out-of-the-box.

AVAILABLE TOOLS AND TECHNICAL DOCUMENTATION

Evaluation kit	STEVAL-IDB008V2		BlueNRG-232 evaluation kit, including ST companion integrated chip balun
	STEVAL-IDB009V1		BlueNRG-248 evaluation kit, including discrete balun
	STEVAL-BCN002V1B		BlueNRG-Tile Bundle Kit: multi-sensor board based on BlueNRG-232
HW resources	Schematic pack		Evaluation kit: schematic
	BOM		Evaluation kit: bill of material
	Gerber pack		Evaluation kit: board manufacturing specification
SW tools	STSW-BNRGUI	GUI	Graphical user interface for driving by PC evaluation kit
	STSW-BLUENRG1-DK	Navigator	PC application providing interface to demonstration and peripheral driver example
		Radio Wizard	PC application allowing BlueNRG-2 initialization parameter setup
	STSW-BNRG001	Power Estimator	PC application for current consumption estimation
	STSW-BNRG-MESH	Mesh	Comprehensive software solution for connecting multiple BlueNRG-2 in Mesh networks
	STSW-BLEPROFILES	Profiles	BlueNRG-2 BLE Profiles package
	STSW-BNRG1STLINK	ST-Link Utility	ST-LINK utility for BlueNRG-2 MCU
	STSW-BNRGFLASHER	Flasher	PC application allowing BlueNRG-2 programming
SW examples	OTA		Demonstration software for enabling the over the air firmware update
	Sensor		Demonstration software showing communication between BlueNRG-2 and smartphone
	Beacon		Demonstration software showing BlueNRG-2 beacon functionality
	HID peripheral		Demonstration software showing BlueNRG-2 HID (mouse and keyboard) functionality
	Remote control		Demonstration software showing how BlueNRG-2 can control a remote device
	Chat		Demonstration software showing how to implement two way communication between two BlueNRG-2 devices
	Security		Demonstration software showing how to implement a BLE security scenario
	Privacy		Demonstration software showing how to implement a BLE controller privacy
	Throughput		Demonstration software showing how to implement uni/bi-directional throughput test between two BlueNRG-2 devices and between BlueNRG-2 and smartphone
	DTM		Software for enabling direct test mode
Documentation	AN4378		Using the BlueNRG family transceivers under FCC title 47 part 15 in the 2400 – 2483.5 MHz band
	AN4387		Using the BlueNRG family transceivers under ETSI EN 300 328 in 2400 –2483.5 MHz band
	AN4392		Using the BlueNRG family transceivers under ARIB STD-T66 in the 2400 – 2483.5 MHz band
	AN4818		Bringing up the BlueNRG-1 and BlueNRG-2 device
	AN4819		PCB design guidelines for the BlueNRG-1 and BlueNRG-2 devices
	AN4820		BlueNRG-1 and BlueNRG-2 low power modes
	AN4869		BlueNRG-1 and BlueNRG-2 BLE over the air firmware upgrade
	AN4872		BlueNRG-1 and BlueNRG-2 UART bootloader protocol
	AN5187		The BlueNRG-1, BlueNRG-2 improving robustness
	PM0257		BlueNRG-1, BlueNRG-2 BLE stack programming guidelines
	UM2058		BlueNRG GUI SW package
	UM2109		BlueNRG-1 ST-LINK Utility software description
	UM2379		The BlueNRG-1, BlueNRG-2 radio driver
	UM2406		The BlueNRG-1, BlueNRG-2 Flasher SW package