## Compact USB dongle for wireless peripherals

A single chip solution with the nRF24LU1+

The nRF24LU1+ is a unique single chip solution enabling ultra compact USB dongles for wireless peripherals. By integrating an USB 2.0 compliant device controller, 8 bit application microcontroller and a nRF24L01+ compatible 2.4GHz RF Transceiver it supports a wide range of application including PC peripherals, sports accessories and game peripherals.

With air data rate of up to 2 Mbps combined with full speed USB, supporting up to 12 Mbps, the nRF24LU1+ meets all the requirements of applications with stringent performance requirements such as wireless mouse, game controllers and media center remote controls with displays.

Block diagram
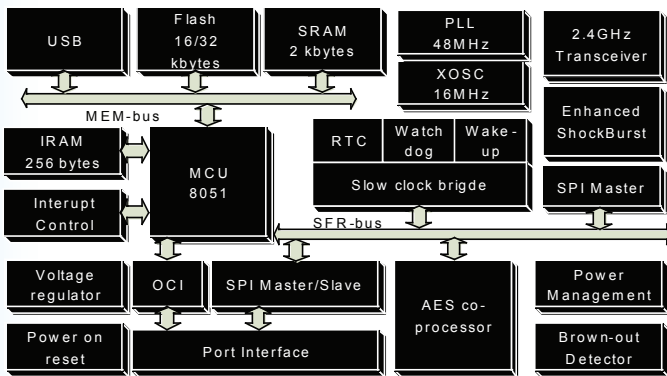
Highly integrated solution

Compact 5x5mm package, low cost external BOM

In addition to the main blocks the nRF24LU1+ integrates other critical functionality, saving cost and board space. Internal memory removes the need for an external EEPROM. An internal voltage regulator enables the chip to be powered directly from the USB bus; it does not require an external voltage regulator. With a fully integrated RF synthesizer and PLL for the USB no external loop filters, resonators or VCO varactor diodes is required.

Only 1 low cost ±60ppm 16MHz crystal plus passives for ESD protection, decoupling, antenna matching circuitry is required. nRF24LU1+ enables true single chip USB dongles.
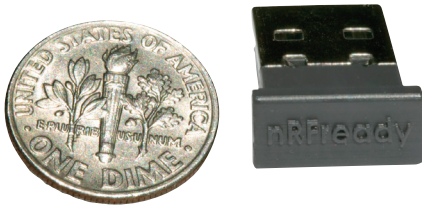
SUMMARY OF BENEFITS

- Compact USB dongle for wireless peripherals
- A low cost solution is enabled by high level of integration and a minimum number of low cost external components
- Power directly from USB power removing the need for external voltage regulator
- Complete development platform for reduced development cycles and risk

PRODUCT BRIEF

nRF24LU1+
nRF24LU1P-F16Q32
nRF24LU1P-F32Q32

Ultra Low Power Wireless System-on-Chip USB solution

KEY FEATURES

- nRF24L01+ compatible RF Transceiver
- Worldwide 2.4GHz ISM band operation
- Up to 2 Mbps on air data rate
- Enhanced ShockBurst™ hardware link layer
- On air compatible with nRF24LE1, LU1, L01+, L01, nRF2401A, 02, E1 and E2
- Low cost external ±60ppm 16MHz crystal
- Full speed USB 2.0 compliant device controller
- Up to 12 Mbps USB transfer rate
- 2 control, 10 bulk/interrupt and 2 ISO endpoints
- 512 bytes dedicated USB endpoint buffer RAM
- Software controlled on-chip pull-up resistor for D+
- Integrated PLL for full-speed USB operation
- On chip Voltage regulators, 4.0 to 5.25V supply range
- Enhanced 8-bit 8051 compatible microcontroller
- Reduced instruction cycle time
- 32-bit multiplication-division unit
- 16 or 32 Kbytes on-chip flash memory
- 2 Kbytes SRAM
- 6 general purpose digital input/output pins
- Hardware SPI and UART
- 3 16-bit timers/counters
- 128 bit AES encryption/decryption co-processor
- Supports flash programming and upgrades over USB
- Supports nRFprobe and FS2 hardware debuggers
- Compact 32-pin 5x5mm QFN package
- nRFgo compatible development kit

APPLICATIONS

Compact USB dongles for wireless peripherals:
- Mouse, Keyboard, remote control
- Advanced media center remote controls
- Game controllers
- Intelligent sports equipment
- Toys

nRFgo a complete development platform

For firmware and hardware engineers

The nRF24LU1+ is supported by a complete development platform enabling designers to easily develop hardware and firmware for the chip. The platform comprises two key elements: the nRFgo Starter Kit and the nRF24LU1+ Development Kit. Both are required to get started with nRF24LU1+ development.

nRFgo Starter Kit   **nRF24LU1+ Development Kit**

The nRFgo Starter Kit provides a generic development platform for all nRF devices providing motherboards with sockets for the nRFgo development kit modules as well as the nRFgo Studio evaluation and management PC application. The nRF24LU1+ Development Kit comes in only one version, fitted with nRF24LU1P-F32Q32 (32 kbytes flash memory) devices. The kit include nRFgo compatible nRF24LU1+ radio modules, a production ready USB dongle, complete Software Development Kit (SDK) and the nRFprobe hardware debug utility.

For more information

Please visit www.nordicsemi.com for the complete product specification and more information about this or any other ultra low power wireless products.

About Nordic Semiconductor ASA

Ultra low power RF silicon solutions

Nordic Semiconductor is fabless semiconductor company specializing in ULP short-range wireless communication. Nordic is a public company listed on the Norwegian stock exchange.

Nordic provides RF Silicon Solutions for ultra low power wireless including:
• Highly integrated RF silicon
• Sophisticated and flexible development tools
• Application specific communication software
• Complete reference designs

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SPECIFICATIONS

Frequency band	2.4GHz ISM (2.400 – 2.4835GHz)
On-air data rate	250 kbps, 1 or 2 Mbps
Modulation	GFSK
RF channels	79 within the 2.4 GHz ISM band
RF channel resolution	1 MHz
RF output power	Programmable: 0, -6, -12 or -18 dBm
Receiver sensitivity	-94 dBm @ 250 kbps
	-85 dBm @ 1 Mbps
	-82 dBm @ 2 Mbps
External crystal	16MHz ±60ppm
Hardware Link layer	Enhanced ShockBurst™
	- Automatic packet assembly (Preamble, Address, CRC)
	- Automatic packed detection and validation
	- Dynamic payload length (0 to 32 bytes)
	- Auto acknowledgment with payload
	- Auto retransmit
	6 data pipe MultiCeiver™
USB Interface	Full-speed USB 2.0 compliant
	- 2 control, 10 bulk/interrupt and 2 ISO endpoints
	- Double buffered ISO endpoints
	- Dedicated 512 bytes endpoint RAM
	- On chip software controlled pull-up resistor for D+
	- Suspend and resume power management functions
Microcontroller	Enhanced 8-bit 8051 compatible microcontroller
	- Reduced instruction cycle time Up to 12X compared to legacy 8051
	- Up to 16MHz operation
	- 32-bit multiplication/division unit
Program Memory	- Flash
	- Programmable over USB
	- 16 kbytes – nRF24LU1P F16Q32
	- 32 kbytes – nRF24LU1P-F32Q32
RAM	2 kbytes SRAM
Hardware Security	128-bit key-length AES co-processor
Digital I/O	6 programmable I/O pins
	- Hardware SPI master/slave
	- UART, GPIO, interrupts
	- JTAG Debug interface
Hardware debuggers supported	nRFprobe (incl. in development kit)
	System Navigator from First Silicon Solutions (FS2)
Package options	RoHS compliant
	32-pin 5x5mm QFN

Related Products

nRF6700	nRFgo Starter Kit
nRF24LU1P-FxxQ32-DK	nRFgo Development Kit for nRF24LU1+
nRF24LE1	Ultra low power wireless system on chip devices
nRF24L01+	Single chip 2.4 GHz transceiver

Visit **www.nordicsemi.com** for Nordic Semiconductor sales offices and distributors worldwide.