

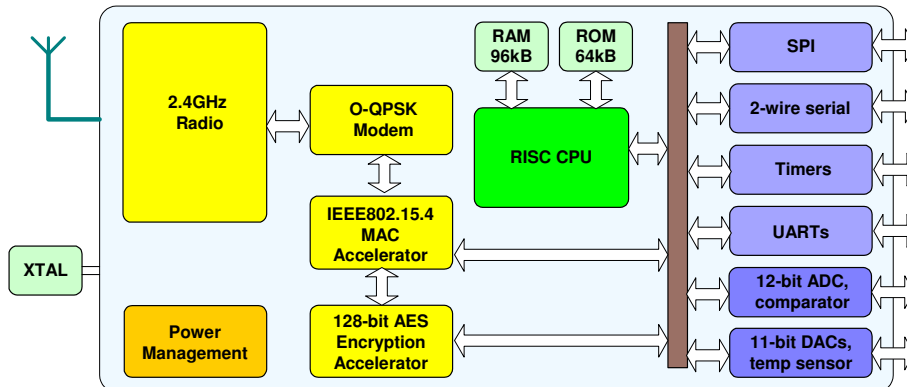
## Product Brief – JN5121

### IEEE802.15.4 / ZigBee Wireless Microcontroller

#### Overview

The JN5121 is the first in a series of low power, low cost IEEE802.15.4 compliant wireless microcontrollers. Combining an on chip 32-bit RISC core, a fully compliant 2.4GHz IEEE802.15.4 transceiver, 64kB of ROM and 96kB of RAM, provides a versatile low cost solution for wireless sensor networking applications. The high level of integration helps to reduce the overall system cost. In particular, the ROM enables integration of point-to-point and mesh network stack protocols, and the RAM allows support of router and controller functions without the need for additional external memory. The JN5121 uses hardware MAC and highly secure AES encryption accelerators for low power and minimum processor overhead. Integrated sleep oscillator and power saving facilities are provided, giving low system power consumption. The device also incorporates a wide range of digital and analogue peripherals for the user to connect to their application.

#### Block Diagram



#### Features: Transceiver

- 2.4GHz IEEE802.15.4 compliant
- Security processor (128-bit AES)
- MAC accelerator with packet formatting, CRCs, address check, auto-acks, timers
- Integrated power management and sleep oscillator for low power
- On-chip power regulation for 2.2V to 3.6V battery operation
- Sleep current (with active beacon timer) < 5µA
- Needs minimum of external components (<US\$1 extra cost)
- Rx current < 50mA
- Tx current < 45mA
- Receiver sensitivity -90dBm
- Transmit power 0dBm

#### Features: Microcontroller

- 16MHz 32-bit RISC optimised for low power (3MIPS/mA) and efficient code density
- 96kB RAM for shared program, data and routing tables
- 64kB ROM for program code
- 4-input 12-bit ADC, 2 11-bit DACs, comparator, temperature sensor
- 2 Application timer/counters, 3 system timers
- 2 UARTs (one for in-system debug)
- SPI port with 5 selects
- 2-wire serial interface
- 21 GPIO

**Industrial temperature range**  
(-40°C to +85°C)

**8x8mm 56 lead QFN package**

**Lead-free and RoHS compliant**

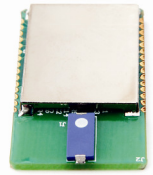
#### Benefits

- Single chip solution with integrated transceiver and microcontroller for wireless sensor networks
- Capacity and power efficient microcontroller for both controllers and sensor units
- Low application BOM cost and size
- Hardware MAC ensures low power consumption and low processor overhead
- Extensive user peripherals

#### Applications

- Robust and secure low power wireless applications
- Wireless sensor networks, particularly IEEE802.15.4 / ZigBee systems
- Home and commercial building automation
- Home networks
- Toys and gaming peripherals
- Industrial systems
- Telemetry and utilities (e.g. AMR)

The JN5121 IEEE802.15.4 wireless microcontroller allows very small low power, low cost modules to be constructed. The high level of integration ensures that a minimum of external components are required to implement the majority of sensor and control applications, enabling extremely compact modules to be designed without recourse to advanced PCB technologies. Jennic provides reference module designs that can be readily customised.

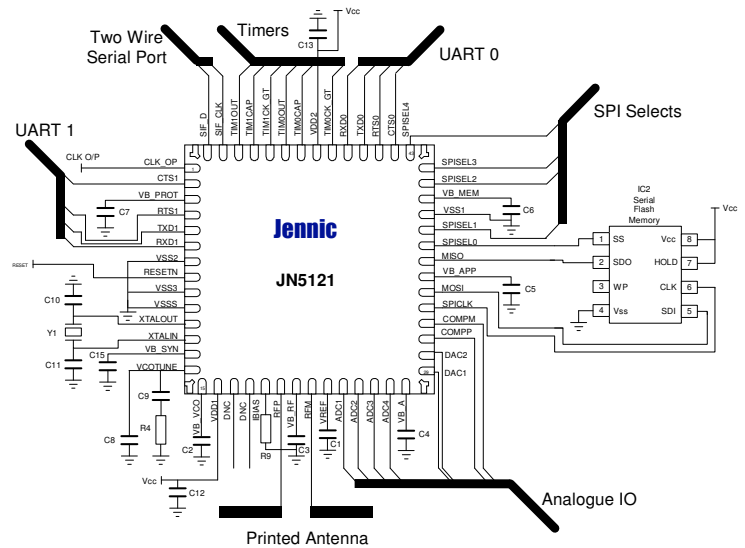


reference module

The module illustrated is just 18x30mm in size, including an integrated antenna. Reference designs are consistent with FCC CFR47, Part 15 (US), ETSI EN 300 440 (EU), ARIB STD-T66 (Japan).

## Application Diagram

The JN5121 requires minimal external components to support wireless applications – a crystal, flash memory, decoupling components and printed antenna are all that is required for the lowest bill of materials cost and smallest size. The wireless microcontroller connects to the Software Developer Kit running on a PC via a UART and the rest of the peripherals are available for the application. Jennic also provides IEEE802.15.4 protocol software, an evaluation kit comprising of controller and sensor units, reference modules and software development tools.



## Evaluation Kits

Jennic provides an Evaluation Kit (JN5121-EK) which ensures that the user can quickly, easily and effectively develop applications around wireless sensor networks. It includes a controller board, four sensor boards and an RS-232 interface cable to the PC-based development tools.

A Software Developer Kit (SDK) provides a comprehensive suite of tools to facilitate the development of application code. The kit includes a C compiler, graphical and text debuggers, assembler/linker and flash programmer.

Libraries are included with the SDK that drive the peripherals of the JN5121 wireless microcontroller. Applications call library functions via a simple Application Programming Interface (API).

## Wireless Protocol Stacks

A library is provided as standard for an IEEE802.15.4 compliant protocol stack suitable for point-to-point, star or tree networks. Libraries are also available for mesh network stacks such as ZigBee and IPv6.