Everywhere you imagine. RENESAS

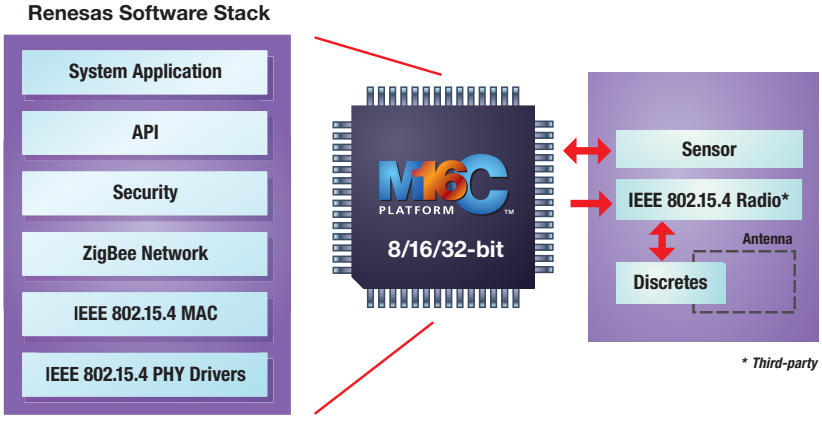
ZigBee System Solution

Fully-Integrated ZigBee-Ready Platform from Renesas

Renesas Technology — the #1 supplier of microcontrollers worldwide, with years of experience in the metering, industrial control, and building automation markets — offers a fully integrated hardware and software platform for a wide range of low-data-rate wireless applications. The ZigBee System Solution is a comprehensive platform designed to quickly jump start development and implementation of reliable, cost-effective ZigBee wireless applications. The solution comes complete with a microcontroller, radio, ZigBee software stack, MAC software and integrated development environment.

Using this platform, you benefit from the speed and convenience of a fully-integrated, off-the-shelf solution that enables you to experience true mesh networking and evaluate and develop wireless ZigBee applications and products. The market-ready, high-performance ZigBee System Solution reduces overall development costs, shortens system development time and maximizes valuable engineering resources, while providing the flexibility to accommodate existing and future application requirements.

Renesas ZigBee System Solution



Renesas ZigBee Solution Includes:

Low-Power, High-Performance M16C Microcontrollers

- Common architecture addresses the entire 8-bit through 32-bit price/performance application space
- Multi-year battery performance
- Extensive RAM/ROM/Flash memory and peripheral combinations
- Best pin-to-pin and code-compatible platform
- Unmatched EMI/EMS

Standards-Based Radios

- Full spectrum coverage with proven transceivers in 2.4GHz and 868/915MHz frequency bands (available from leading third-party providers)
- "Fully-tested" reference design with MAC. Proven RF devices available from leading third-party suppliers

MAC Software

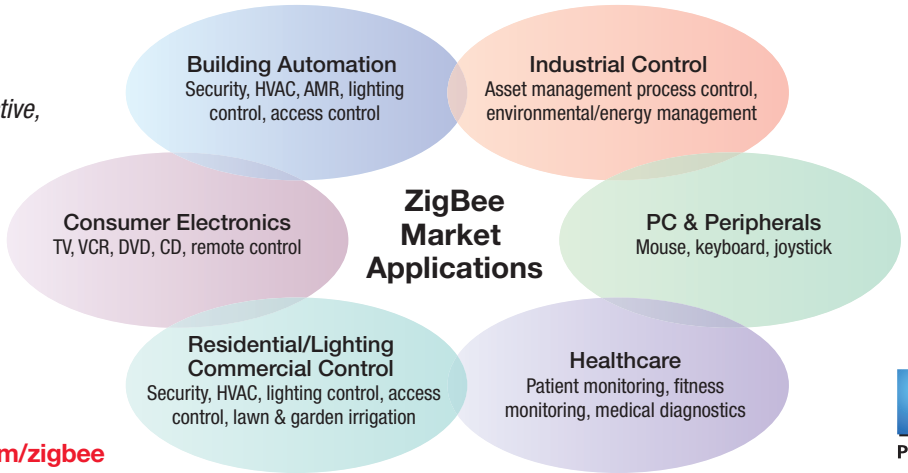
- Complete IEEE 802.15.4 implementation developed by Renesas

ZigBee IEEE 802.15.4 Software Stack

- ZigBee-compliant IEEE 802.15.4 Software Stack

ZigBee Technology –

A standards-based, cost-effective, low-power wireless networking solution that saves development time while achieving high return on investment.



www.america.renesas.com/zigbee

M16C PLATFORM™

Complete ZigBee Development Environment

Experience the full capabilities of Renesas' ZigBee Platform with our three-part development environment, encompassing complete demos to full development kits.

ZigBee

Renesas Three-part Solution
1. Demo Kit
2. Evaluation Kit
3. Product Development Kit

Part 1. ZigBee Demo Kit (ZDK)

Experience true mesh networking first hand!

The ZigBee Demo Kit (ZDK) is the first of three kits in Renesas' complete development environment for either 2.4GHz or 900MHz networks. The kit provides you with the hardware, software, and documentation necessary to experience true ZigBee mesh networking capabilities first hand.

The hardware consists of four M16C RF development boards, with one board pre-programmed with sniffer functionality. Additional boards can be ordered to expand the network.

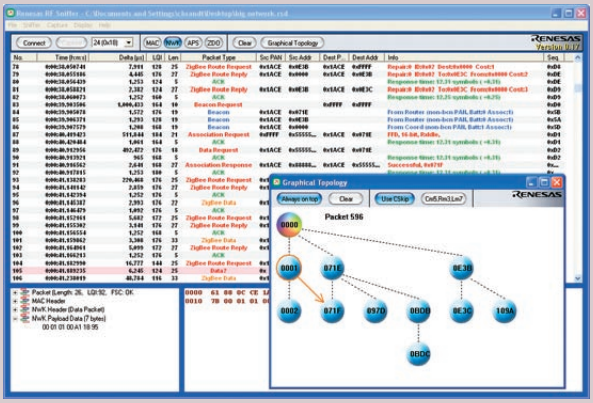
Developed in-house by Renesas, the software includes a full implementation demo version of the ZigBee stack and IEEE 802.15.4 MAC. The ZDK comes with a Renesas packet sniffer that can follow devices as they create and join networks and trace packets transmitted over the air between nodes. You also receive an evaluation version of the M16C software development suite of tools that can be used to develop M16C applications. Additional demos can be downloaded from www.america.renesas.com/zigbee.

The easy-to-follow ZDK Quick-Start Guide enables you to get the demo up and running in minutes.

- Four Renesas boards with:
  - Low-power, high-performance M16C microcontrollers
  - IEEE 802.15.4 standard-based radios
  - Battery Packs
  - LCD, temperature and light sensors, potentiometer, switches, and LEDs
  - Sample driver code
- HEW4 integrated development environment (IDE) and debug environment for M16C (evaluation version)
- ZigBee IEEE 802.15.4 software demo
- ZigBee IEEE 802.15.4 MAC software (object code)
  - Renesas packet sniffer (one board is programmed with sniffer functionality)
  - Frontline packet sniffer (evaluation version)

Renesas Packet Sniffer

- Any ZDK board can be used as the sniffer and interfaces to existing FoUSB hardware
- Real-time color-coded packet displays show decoded ZigBee PHY/MAC/NWK packet details
- Options for display filtering
- Save/open file sessions and add help notes about your traffic
- GUI is Free!

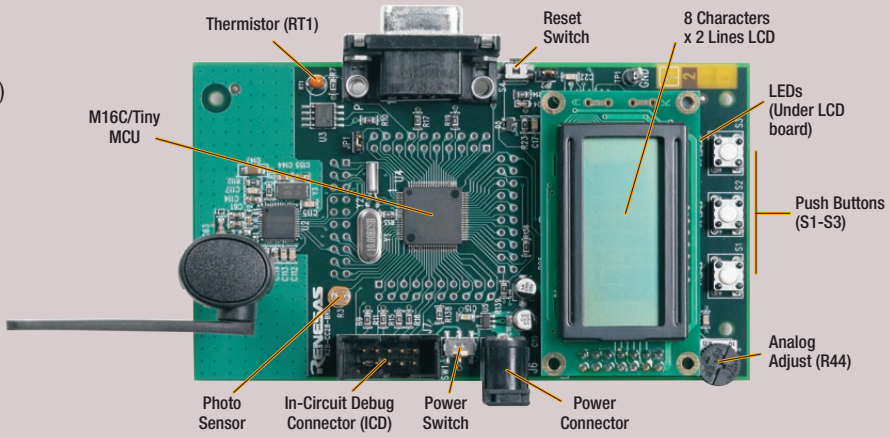


Frontline and Daintree Sniffers

- Frontline and Daintree Professional Packet Sniffer (evaluation version)
- Full version can be purchased from Frontline or Daintree
- Evaluation version uses ZDK FoUSB hardware

M16C Board

- Input voltage 3.4 to 16 Volts
- Professionally tuned antenna design (SMA)
- Light and temperature sensors
- Potentiometer
- RS-232 interface
- Power to analog sensors are fed via a FET so they can be turned off for low-power mode demos
- USB debugger and 802.15.4 sniffer interfaces
- 2.4GHz version shown, 900MHz version available



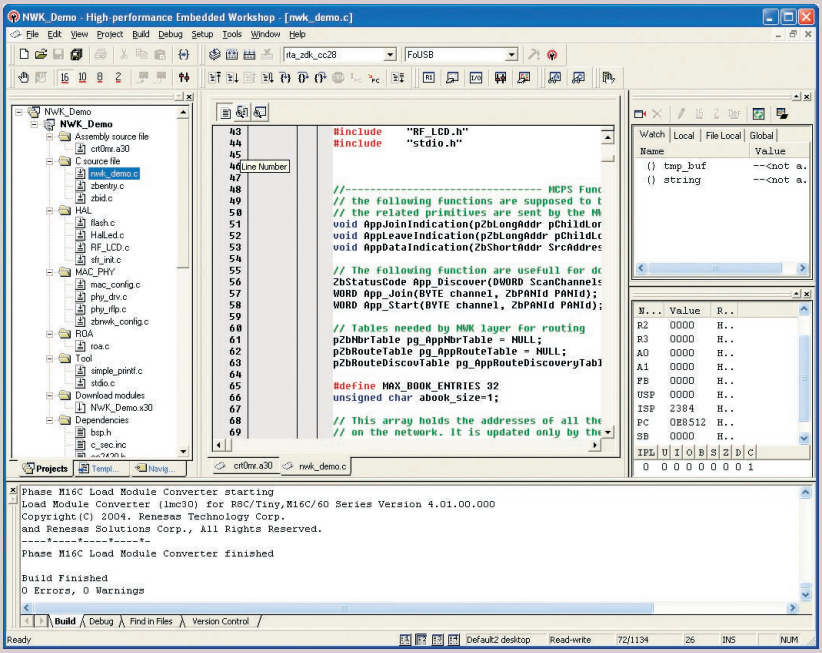
Part 2. ZigBee Evaluation Kit (ZEK)

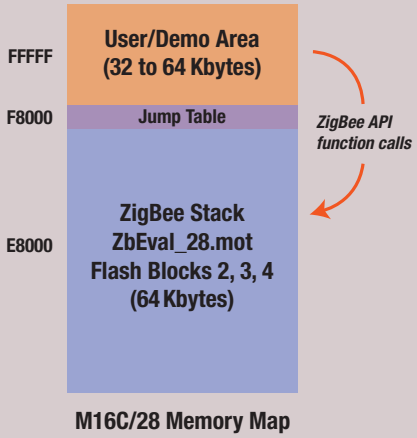
Test drive your application with our full ZigBee stack and 802.15.4 MAC

Receive a free evaluation version of the full ZigBee stack and IEEE 802.15.4 MAC software developed in-house by Renesas. Simply install the ZEK from the Renesas ZDK CD. The ZEK evaluation version of the full ZigBee stack and IEEE 802.15.4 MAC software in binary form lets you design true ZigBee applications on your existing ZDK boards. An additional 32 to 64 Kbytes is available for this evaluation version to support your application.

- Evaluation version of Zigbee network stack and IEEE 802.15.4 MAC for the ZDK platform

HEW4 Build and Debug Environment





M16C/28 Memory Map

Part 3. ZigBee Product Development Kit (ZPK)

Deliver reliable ZigBee solutions on schedule

The ZigBee Product Development Kit (ZPK) provides you with a complete development environment to create a production ZigBee enabled product. Receive answers to all your development questions from a single point of contact. Work with Renesas field engineers who are fully trained and available to support your ZigBee networking development needs.

- ZigBee Stack – Complete set of ZigBee libraries, headers, and low-level driver source files
- Integrated RTOS for scheduling and increased system reliability
- Sample code
- Full support

Renesas – A Comprehensive Solution

Market-Ready

- Complete ZigBee compliant IEEE 802.15.4 network stack simplifies development and ensures end-to-end reliability
- Renesas M16C based IEEE 802.15.4 modules are offered by third parties

Flexible

- 2.4GHz and 868/915MHz RF versions are available – lets you easily shift product design between different radios and frequencies
- Additional solutions based on M16C family devices are offered for gateways to Ethernet, CAN, LIN, and Power Line Carrier (PLC) networks
- Alternate network stacks – versions of TCP/UDP/IPv6 and proprietary standards are available from Renesas and third-party providers
- ZDK hardware can be used with other protocols, including versions of UDP/IPv6 and proprietary protocols

Powerful

- Multi-year M16C battery performance can be achieved
- M16C microcontrollers deliver efficient throughput, plus unmatched EMI/EMS characteristics – reduces BOM costs and accelerates time to market

Broad

- M16C microcontrollers offer the largest selection of powerful peripherals available in a compatible device family
- Wide range of M16C options, including Flash memory from 4 Kbytes to 1 Mbyte, on-chip RAM from 512 bytes to 31 Kbytes, and packages ranging from 20 to 144 pins

Scalable

- Code-compatible M16C platform addresses entire 8-bit to 32-bit application space, minimizing re-engineering costs and development times for product variants and upgrades
- Vast vendor community offers support products and services for applications that use Renesas microcontrollers

ZigBee™ Alliance

Wireless Control That Simply Works

The ZigBee Alliance is an association of companies working together to enable reliable, cost-effective, low-power, wirelessly networked monitoring and control products based on an open global standard. Renesas Technology is an active member of the Alliance.

ZigBee technology takes full advantage of a powerful radio device specified by the IEEE 802.15.4 standard and adds logical network, security, and application software. It supports static and dynamic star, cluster tree, and the robust mesh networking structures. ZigBee-based designs can run for long periods on inexpensive batteries at very low power consumption, delivering low data rates (from 20 kbps using a 900MHz band to 250 kbps using a 2.4GHz band) for short-range communications (up to 100 meters).

Renesas Partners with Technology Market Leaders

Renesas supports IEEE 802.15.4 radios from:

Chipcon:
www.chipcon.com

ZMD:
www.zmda.com

Integration Associates Inc.:
www.integration.com

UBEC:
www.ubec.com.tw/

Additional third-party stacks and tools from:

Daintree:
www.daintree.net

Frontline:
www.fte.com

Innovative Wireless Technologies:
www.iwtwireless.com

Integration Associates Inc.:
www.integration.com

Modules using Renesas technology are available from these suppliers:

Eazix:
www.eazix.com

Innovative Wireless Technologies:
www.iwtwireless.com

Integration Associates Inc.:
www.integration.com

To learn more about the ZigBee System Solution, go to
www.america.renesas.com/zigbee

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