

Atmel AVR10003: ATmega256RFR2 Evaluation Kit – Quick Start Guide

8-bit Atmel Microcontrollers

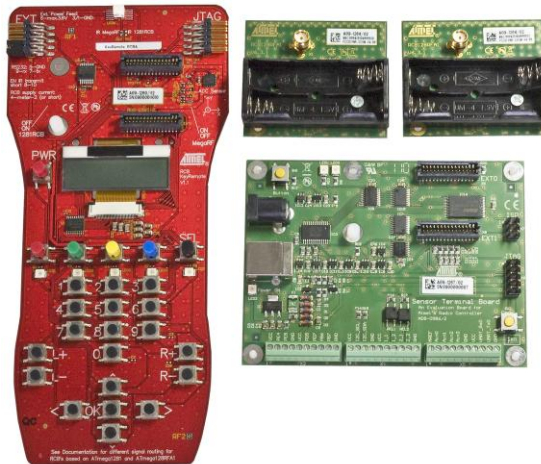
Features

This application note briefly describes how to set up and run the pre-flashed performance test application included with the Atmel® ATmega256RFR2.

The latest dedicated applications can be downloaded from www.atmel.com and flashed to the kit hardware by using the serial bootloader functionality of the pre-flashed application.

Kit contents

- 2x Atmel RCB256RFR2 Radio Controller Board
- 1x Atmel RCB Sensor Terminal Board (STB)
- 1x Atmel RCB Key Remote Control board
- 1x RCB-BB RS232 cable
- 1x USB cable
- 2x 2.4GHz antenna
- 4x AAA battery
- 1x Quick Start Guide



1. Simple range measurement

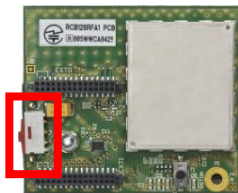
The pre-flashed performance test application on the RCB256RFR2 radio controller boards features a simple range measurement. Each board operates in a standalone manner, and is able to transmit or receive data frames. A successful transmit or receive operation is indicated by a blinking LED.

1.1 Board assembling



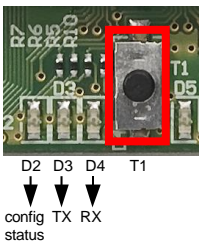
1. Connect the antennas to both RCBs.
2. Insert two batteries in each of the RCBs.

1.2 Power up the boards



Apply power to both RCBs by switching on the power switch located on the top side of the board. The RCBs run a power-on check and indicate the successful completion by switching on the second of the three LEDs.

1.3 Run simple range measurement application



Choose one of the RCB256RFR2 RCBs, and press button T1 to start the simple range measurement application. First, the RCB initiates a connection and configuration procedure by sending broadcast frames, and waiting for a response from the second RCB. After a successful configuration, the RCBs turn on LED-D2 to indicate that status. Afterwards the initiator starts to transmit data frames immediately. Each data frame transmission is indicated by blinking the TX status LED-D3. A successful data frame reception on the second node is indicated by blinking the RX status LED-D4.

The RX status LED stops blinking if no data frames are received, such as when, for example, the node has left the communication range. Data frame transmission can be stopped by pressing T1 once more on the node transmitting frames. Moreover the RCBs can transmit and receive frames simultaneously. Pressing button T1 on both nodes initiates each node to transmit frames. The three LEDs indicate their respective functions: LED-D2 a successful configuration, LED-D3 transmission and LED-D4 reception.

Note: The node connection and configuration gets lost when the RCBs' power supply is switched off. To restart the simple range measurement, power cycles both RCBs before pressing T1 on one RCB to restart the application.

2. Packet error rate measurement

The pre-flashed performance test application is also configured with packet error rate (PER) measurement functionality (as defined in IEEE[®] 802.15.4), enabling the user to explore various radio transceiver features, radio transceiver registers, and performance by tuning with customized configurations. For this application, one RCB256RFR2 RCB needs to be connected to a PC.

2.1 Board assembling



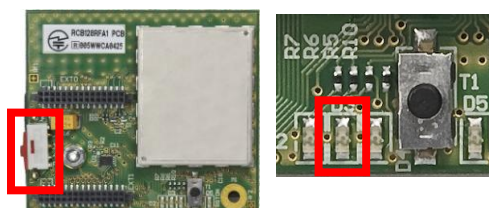
1. Switch off power from one RCB, or remove the batteries and connect the RCB to the STB.
2. Download the patched FT245RL driver files from the kit website, and follow the installation guidelines on your PC to install the USB driver.
3. Connect the STB to a PC with the USB cable.
4. A successful installation and enumeration of the USB connection with the PC is indicated by the power status LED on the STB.

2.2 Set up the terminal program on the PC

A terminal program running on the PC is used to control the application running on the RCB connected to the STB. Set up the terminal program as follows:

BAUD RATE:	9600
PARITY:	None
DATA BITS:	8
STOP BITS:	1
FLOW CONTROL:	Off

2.3 Power up the boards



1. Apply the standalone RCB (optional) by turning on the power switch on the top side of the board. The RCB runs a power-on check and indicates the successful completion by switching on the second of the three LEDs.
2. The RCB mounted on the STB is powered via the USB connection. Make sure that the batteries are removed or that the power switch is in the off position.

2.4 Run the packet error rate measurement

Type any character in the terminal window to initiate the configure procedure for both RCB nodes and show the menu. Optionally, if no peer node is active, the search for a peer device can be aborted by pressing ENTER. The node gets configured for stand-alone operation. The packet error rate measurement can be operated through the menu options displayed on the UART terminal program. A detailed description of the menu options can be found in the ATmega256RFR2 Evaluation Kit – User Guide.

3. Serial bootloader

The application offers serial bootloader functionality to flash other applications to the RCBs. A detailed description on the usage of the bootloader can be found in the [Atmel AVR2054 Serial Bootloader - User Guide](#).

4. Agency Certification

4.1 UNITED STATES (FCC)

This equipment complies with Part 15 of the FCC rules and regulations. To fulfill FCC Certification requirements, an OEM manufacturer must comply with the following regulations:

1. The RCB256RFR2 limited modular transmitter must be labeled with its own FCC ID number, and, if the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:
Contains FCC ID: VW4A091786 The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.
Any similar wording that expresses the same meaning may be used.

WARNING: The Original Equipment Manufacturer (OEM) must ensure that the OEM limited modular transmitter must be labeled with its own FCC ID number. This includes a clearly visible label on the outside of the final product enclosure that displays the contents shown below. If the FCC ID is not visible when the equipment is installed inside another device, then the outside of the device into which the equipment is installed must also display a label referring to the enclosed equipment.

IMPORTANT: This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation (FCC 15.19).

The internal / external antenna(s) used for this mobile transmitter must provide a separation distance of at least 20 cm from all persons and must not be colocated or operating in conjunction with any other antenna or transmitter.

Installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance. This device is approved as a mobile device with respect to RF exposure compliance, and may only be marketed to OEM installers. Use in portable exposure conditions (FCC 2.1093) requires separate equipment authorization.

IMPORTANT: Modifications not expressly approved by this company could void the user's authority to operate this equipment (FCC section 15.21).

IMPORTANT:

The FCC ID for the module is valid only under the following conditions:

- The Antenna supplied with the module is used (the antenna shown in the filing)
- The Antenna must not be in the user accessible area of the final host device. (This means the antenna must not be accessible from the battery compartment.)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense (FCC section 15.105).

4.2 European Union (ETSI)

The RCB256RFR2 Modules has been certified for use in European Union countries. If these modules are incorporated into a product, the manufacturer must ensure compliance of the final product to the European harmonized EMC and lowvoltage/safety standards. A Declaration of Conformity must be issued for each of these standards and kept on file as described in Annex II of the R&TTE Directive.

Furthermore, the manufacturer must maintain a copy of the modules' documentation and ensure the final product does not exceed the specified power ratings, antenna specifications, and/or installation requirements as specified in the user manual. If any of these specifications are exceeded in the final product, a submission must be made to a notified body for compliance testing to all required standards.

IMPORTANT: The 'CE' marking must be affixed to a visible location on the OEM product. The CE mark shall consist of the initials "CE" taking the following form:

The CE marking must have a height of at least 5mm except where this is not possible on account of the nature of the apparatus.

The CE marking must be affixed visibly, legibly, and indelibly.

More detailed information about CE marking requirements you can find at "DIRECTIVE 1999/5/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL" on 9 March 1999 at section 12.

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