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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

D2 D3 D4   T1

config TX RX
status

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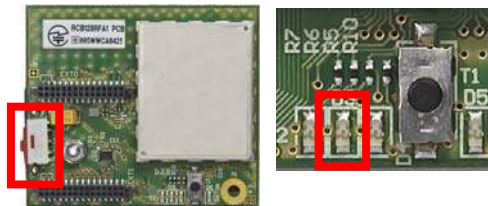
1. Apply the standalone RCB (optional) by turning on the power switch on the top side of the board. The RCB runs a power-on check and indicates the successful completion by switching on the second of the three LEDs.
2. The RCB mounted on the STB is powered via the USB connection. Make sure that the batteries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

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