

# Atmel AVR2081: REB231FE2 Evaluation Kit - Quick Start Guide



## Features

This application note briefly describes how to set up and run the pre-flashed applications supplied with the Atmel® REB231FE2 Evaluation Kit.

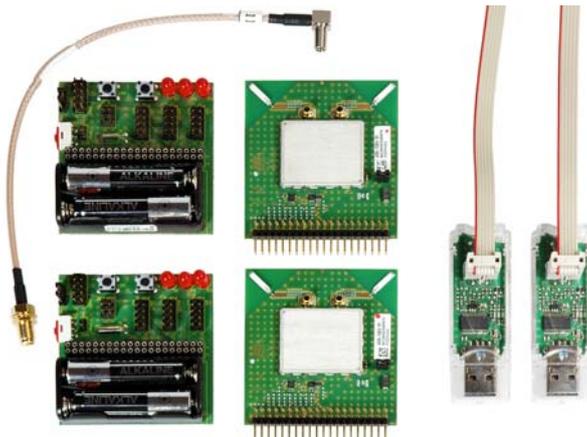
The Atmel Controller Base Board (CBB) is intended to serve as microcontroller platform for the Atmel Radio Extender Board (REB) family. The REB connected to a CBB forms a full functional, battery powered and portable wireless node. The REB231FE2 evaluation kit is targeted for evaluating the [Atmel AT86RF231](#) radio transceiver combined with a radio front end module.

## 8-bit Atmel Microcontrollers

## Application Note

## 1 Kit contents

- |                         |                         |
|-------------------------|-------------------------|
| 2 × Atmel CBB           | 2 × Atmel REB231FE2     |
| 1 × MS-147 to SMA cable | 2 × USB level converter |
| 1 × Quick start guide   | 4 × AAA battery         |



From left to right: MS-147 to SMA cable, 2 × CBB, 2 × REB, 2 × USB level converter.

## 2 Board assembling

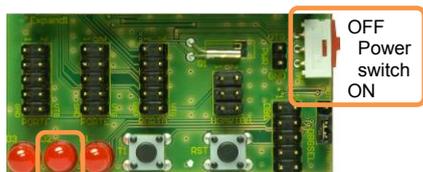
1. Check/set power switch off at the two CBBs.
2. Insert two batteries in each CBB.
3. Connect each REB to a CCB to create two REB-CBB assemblies.



### 3 Simple range measurement

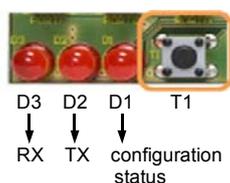
The pre-flashed RF performance test suite on the Atmel REB231FE2 evaluation kit assemblies features a simple range measurement application. Each assembly operates in a standalone manner, and is able to transmit or receive data frames. A successful transmit or receive operation is indicated by a blinking LED.

#### 3.1 Power up the assemblies



Apply power to both REB-CBB assemblies by switching on the power switch located on the top side of the CBB. The assemblies run a power-on check and indicate the successful completion by switching on the second of the three LEDs, LED-D2.

#### 3.2 Run simple range measurement application



Choose one of the REB-CBB assemblies, and press button T1 to start the simple range measurement application.

First, the REB-CBB initiates a connection and configuration procedure by sending broadcast frames and waiting for a response from the second REB-CBB. After a successful configuration, the REB-CBBs turn on LED-D1 to indicate that status. The initiator starts to transmit data frames. Each data frame transmission is indicated by blinking the TX status LED-D2. A successful data frame reception on the second node is indicated by blinking the RX status LED-D3. 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.

The REB-CBBs are able to transmit and receive simultaneously. Pressing button T1 on both nodes initiates each node to transmit frames. Operating modes are indicated as: LED-D1 a successful start-up, LED-D2 in transmit and LED-D3 in receive mode.

NOTE

For stable data transfer, ensure the nodes are at least 0.5m apart. When the nodes are too close together the high output power of the TX can saturate the RX node and consequently degrades its performance significantly (data loss).

NOTE

The node configuration gets lost when resetting or switching off the REB-CBB power supply; to restart, a reset or power cycle is required for both REB-CBB assemblies before pressing T1 on one (or both) REB-CBB(s).

### 4 Packet error rate measurement

The RF performance test suite features a packet error rate measurement (as defined by IEEE<sup>®</sup> 802.15.4), and allows to explore various radio transceiver features, radio transceiver registers, and performance by tuning with customized configurations. For this application, at least one REB-CBB assembly needs to be connected to a PC.

#### 4.1 Board assembling

1. Assemble the boards as described in Chapter 2, [Board assembling](#).
2. Make sure that the power switch on both assemblies is in the off position.



3. Plug an USB level converter into a free USB port on your PC. Interconnect this level converter and one of both REB-CBB assemblies via the 6pin ribbon cable such that it fits the notch on the level converter and the colored stripe of the ribbon cable connects to pin 1 of the CBB header, USARTD0.

## 4.2 Driver installation

Download the drivers required for the USB level converter from its website <http://www.dresden-elektronik.de/shop/prod152.html?language=en>, 'Downloads' tab and extract the archive to a folder of your selection. If the 'New Hardware Found' wizard prompts for drivers ignore Windows® update search ('No, not this time'). In the next dialog, select 'Install from a list or a specific location' and point to the extraction directory. Confirm installation, ignore warnings that the driver is not digitally signed or did not pass the Windows driver certification.

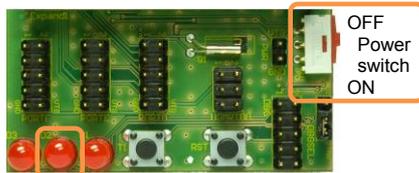
If no wizard pops up, install drivers manually via the device manager. Note that the driver installation needs to be performed twice.

## 4.3 Set up the terminal program on the PC

A terminal program running on the PC is used to control the application running on the two REB-CBB assemblies. Set up the terminal program as follows:

COM PORT:	select COM port assigned during USB level converter driver installation
BAUD RATE:	9600
PARITY:	None
DATA BITS:	8
STOP BITS:	1
FLOW CONTROL:	Off

## 4.4 Power up the assemblies



Apply power to both (optional one) REB-CBB assemblies by switching on the power switch located on the top side of the CBB. The assemblies run a power-on check, and indicate the successful completion by switching on LED-D2.

## 4.5 Run the packet error rate measurement

```
Character received : PER Measurement mode
Press ENTER to Abort Search for Peer Device and to start single node operation
mode
Search for Peer Device Initiated.....
Search for peer device aborted
Starting Performance test Application in single node operation mode
*****
Software Version:3.1
Performance test application (AT86RF231+FEM / ATmega256A3)
Main menu:
(1) Transceiver Configuration
(2) Transceiver State Selection
(3) Service Functions
>
```

Type any character in the terminal window to initiate the configuration procedure for both REB-CBB assembly nodes. 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 Atmel REB231FE2 Evaluation Kit User's Guide.

## 5 Applications and documentation

Additional hardware and software documentation related to the REB231FE2 Evaluation Kit can be found on the kit website:

<http://www.atmel.com/tools/REB231FE2-EK.aspx>

**Atmel Corporation**

2325 Orchard Parkway  
San Jose, CA 95131  
USA

**Tel:** (+1)(408) 441-0311

**Fax:** (+1)(408) 487-2600

[www.atmel.com](http://www.atmel.com)

**Atmel Asia Limited**

Unit 01-5 & 16, 19F  
BEA Tower, Millennium City 5  
418 Kwun Tong Road

Kwun Tong, Kowloon

HONG KONG

**Tel:** (+852) 2245-6100

**Fax:** (+852) 2722-1369

**Atmel Munich GmbH**

Business Campus  
Parkring 4  
D-85748 Garching b. Munich  
GERMANY

**Tel:** (+49) 89-31970-0

**Fax:** (+49) 89-3194621

**Atmel Japan**

16F, Shin Osaki Kangyo Bldg.  
1-6-4 Osaki Shinagawa-ku  
Tokyo 104-0032

JAPAN

**Tel:** (+81) 3-6417-0300

**Fax:** (+81) 3-6417-0370

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