

## MM86rf211 Minimodule for radio communication

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# User's Guide

REV 1

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## Introduction

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**MM86RF211** is a miniature, complete transmission-reception module (transceiver) based on the AT86RF211 device from Atmel. The module works in the free-access ISM 433 MHz frequency band and it contains all elements for its operation, except the antenna. It is possible to deliver the module for operation in the 888 and 915 MHz bands.

The use of a complete, ready-to-operate module frees the designer from the necessity to develop that part of a system which works on radio frequencies and to complete the necessary elements. Thus, designing systems employing wireless communications becomes a quick and simple process

The AT86RF211 is a single chip transceiver dedicated to low power wireless applications, optimized for license-free ISM band operations from 400 MHz to 950 MHz. Detailed specifications of the AT86RF211 device can be found at the manufacturer's website: [www.atmel.com](http://www.atmel.com)

The connection with a microcontroller is achieved with the use of five lines. Three of them form the interface used to configure the transceiver. The remaining two lines form an interface for data transmitted by radio.

The **MM86RF211** can be used both for prototype work, eliminating the need to design a printed circuit board, and for final designs on which the minimodule is applied as a "sandwich".

## Features

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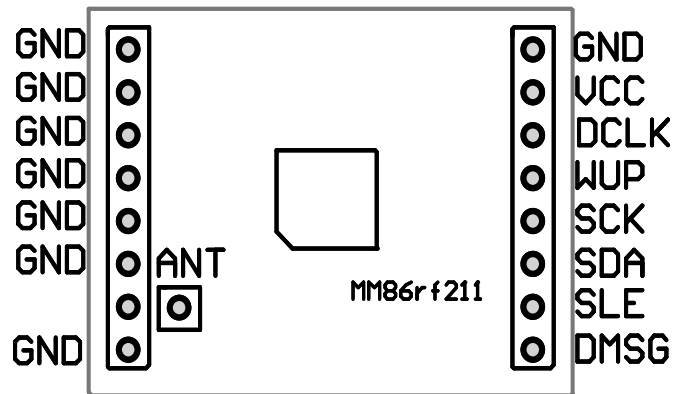
- a complete, ready for use module
- small dimensions
- horizontal or vertical mounting
- operation in the 433 MHz band
- range up to approx. 2000 m
- transmission rate to 76.8 kBaud
- supply voltage: 2.1 – 3.6 V
- low power consumption
- output power programmable between –20 and 10 dBm
- high sensitivity: -105 dBm
- Received Signal Strength measurement
- Programmable transmission and reception frequencies
- does not require tuning

## Example applications

- alarm systems
- automation
- telemetry
- remote control
- toys

## Description of terminals

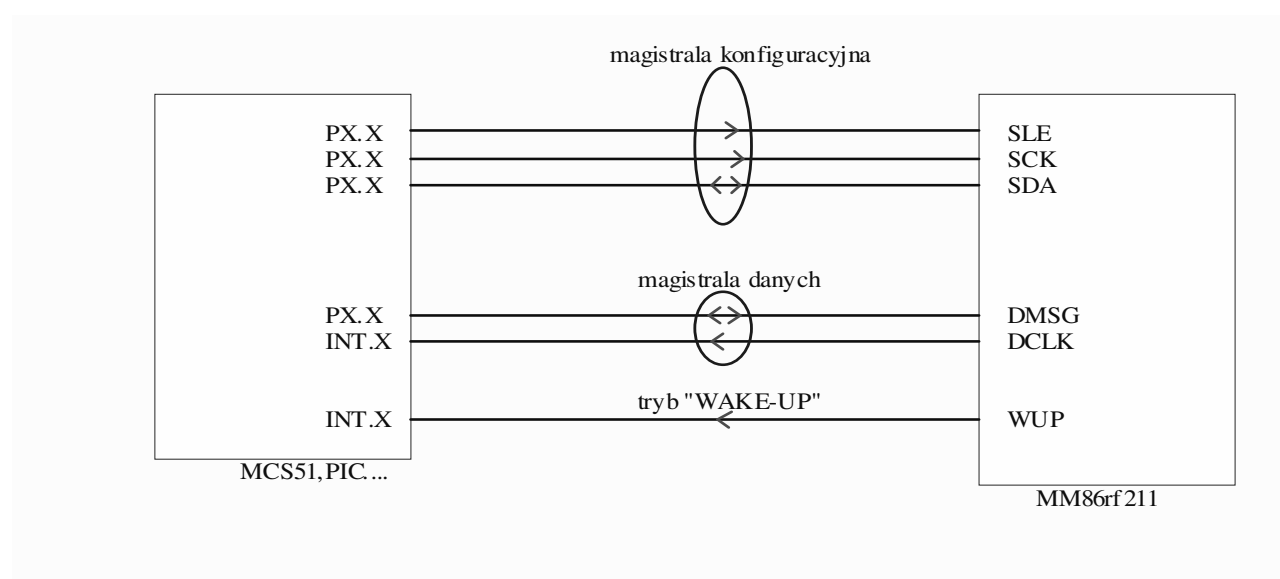
All signals necessary for communication with the minimodule, supply voltages and antenna input/output terminals are lead out to two SIL9 pin connectors. The module is designed for horizontal mounting; it can be soldered to a circuit board or placed in an appropriate socket.



1	<b>GND</b>	Ground
2	<b>VCC</b>	Supply voltage input
3	<b>DCLK</b>	Data clock recovery
4	<b>WUP</b>	Wake-up output
5	<b>SCK</b>	Serial interface clock
6	<b>SDA</b>	Serial interface data
7	<b>SLE</b>	Serial interface enable
8	<b>DMSG</b>	Input/output digital message
9	<b>ANT</b>	Antenna

## Connection with the microprocessor system

The connection with a microcontroller is achieved with the use of five lines. Three of them form the interface used to configure the AT86RF211 (setting such parameters as: transmission/reception frequency, output power, operating mode etc.). This interface includes a bi-directional data line (data can be sent to from the circuit), a clock line (controlled by the microprocessor) and an enable line. The remaining two lines form an interface for data transmitted by radio; they are: a bi-directional data line and a clock line. In the case of this interface, the transmission is synchronized by the AT86RF211 (both during transmission and reception), therefore this signal should be connected to the interrupt input of the microcontroller. In addition, the WUP signal can be used for restoring microcontroller from sleep mode.



## Antena

The MMcc1000 module can be used with antennas of various kinds, having an impedance of 50 Ohms. In the simplest case, the antenna could be a 16.4 cm length of wire (approximating a quarter wave). Such an antenna should be soldered as close as possible to the module terminals, on the module itself.

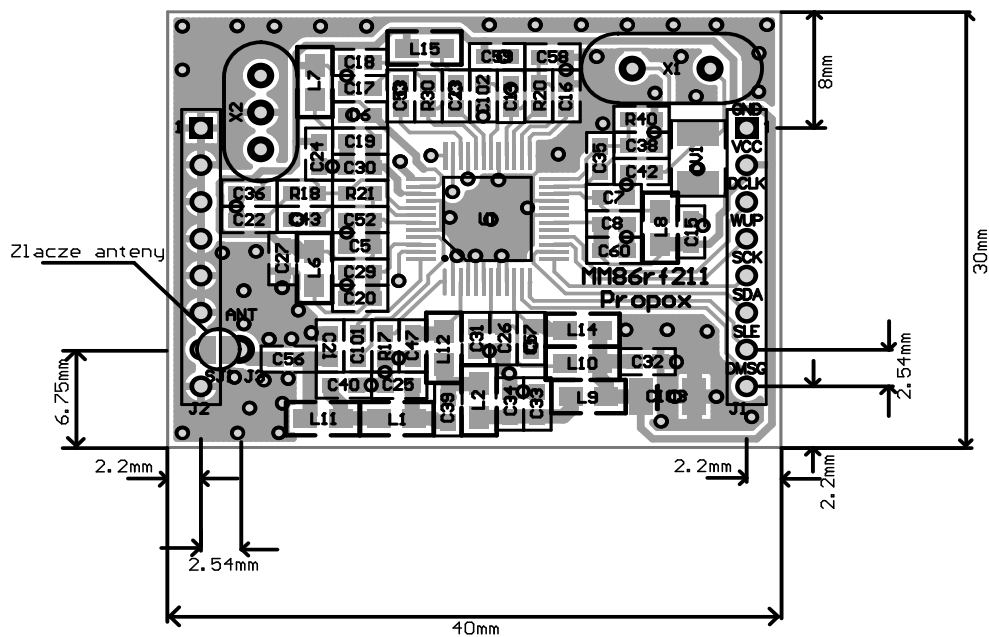
Moduł wyposażony jest w złącze umożliwiające montaż anteny, oraz w zworę, która po zamknięciu ze złączem antenowym pozwala mocować antenę na płycie „matce”, w którą wetknięty jest moduł.

In this case one should expect a range up to tens of meters (inside a building). If there is need to extend the distance of the antenna, the connection should be made by coaxial cable with a characteristic impedance of 50 ohms.

Technical parameters with Vcc= 3 V and at 25°C, for 433MHz band

Parameter	Value
Sensitivity at 4.8kBaud	-105 dBm
Maximum output power	14 dBm
Power consumption, transmission Pout = 10dBm	35 mA
Power consumption, „sleep” mode	3 uA
Power consumption, reception	29 mA
RX to TX Toggle Time	200us
Phase Noise (at 10 kHz from the carrier)	-80dBc/Hz
Phase Noise (at 100 kHz from the carrier)	-91dBc/Hz
Maximum transmission speed	64 kBaud
Lock Time	30 us

## Dimensions and components placement

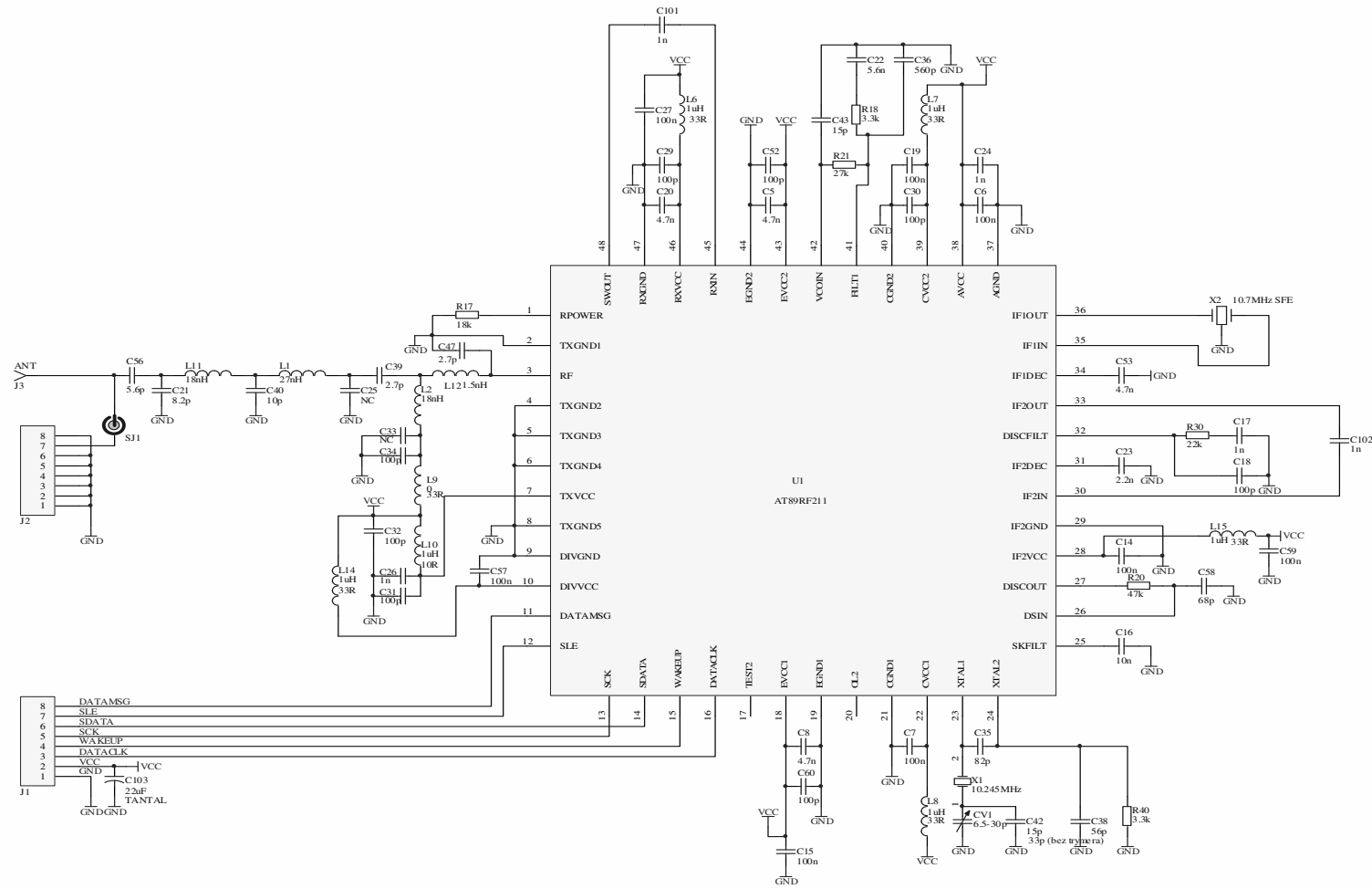


## Technical assistance

For technical assistance, please contact us at: [support@propox.com](mailto:support@propox.com). Please provide the following data:

- MMcc1000 minimodule version
- Microprocessor type and clock frequency
- Detailed description of the problem

# Schematics



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	Date: 16-02-2004	Sheet 1 of 1	1.00