

SDK-RFP

**Development kit for RFP
radiomodules**



User's Guide



**PROCONTROL ELECTRONICS
LTD.**

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Table of contents

SDK-RFP development board.....	2
Application.....	2
The RFP modules and their connections.....	3
Structure.....	4
Power supply.....	6
Breadboard.....	6
Further information.....	8
Creating, editing programs.....	10
Loading programs.....	10
The process of programming.....	12
Testing.....	15
Content of the CD.....	16
SDK board.....	18
RFP-2 radiotransceiver for 433 MHz, SMT hybrid circuit.....	19
Description.....	19
Connection.....	19
Specifications.....	19
Application area.....	20
Technical specifications.....	20
Size.....	21
Typical application.....	21
RFP RX/TX software.....	22
Manufacturer of the product.....	22
RFP-2A radiotransceiver / controller for 868 MHz, with built-in antenna.....	23
Description.....	23
Connection.....	23
Specifications.....	23
Application area.....	24
Technical specifications.....	24
Size.....	25
Typical application.....	25
RFP RX/TX software.....	26
Manufacturer of the product.....	26

RFP-3 radiotransceiver / controller for 433 MHz, with SMA rubber-antenna	27
Description.....	27
Connection	28
Application area	28
Technical specifications	29
Size	30
Typical application	31
RFP RX/TX software	32
Manufacturer of the product.....	32
Service codes of the RFP modules	33
Enter to service mode.....	33
Commands	33
Sheet of commands.....	36
Manufacturer of the product.....	36
Licence exempt free bands	37
RSC-2R Wireless Modem RS232 Line extension	38
Application area	39
Structure	39
Power supply	40
Software	41
Connecting 2pcs 0901-05 Wireless Modem.....	42
Schematic illustration of 0901-05 Wireless Modem	43
0901-05-WRC RFP-3 RC Remote Control Unit 868 MHz	44
0901-05-WST Wireless sensor	45
RFID Super Long Range System	46
Software	47

SDK-RFP Development KIT for RFP Radio Modules

The SDK-RFP development kit is designed to program, test and carry out developing work easily and quickly.

The 3 type of RFP modules:

- RFP-2 radio transceiver 433 MHz, SMT hybrid circuit
- RFP-2A radio transceiver /controller 868 MHz, built-in antenna
- RFP-3 radio transceiver /controller 433 MHz, SMA antenna

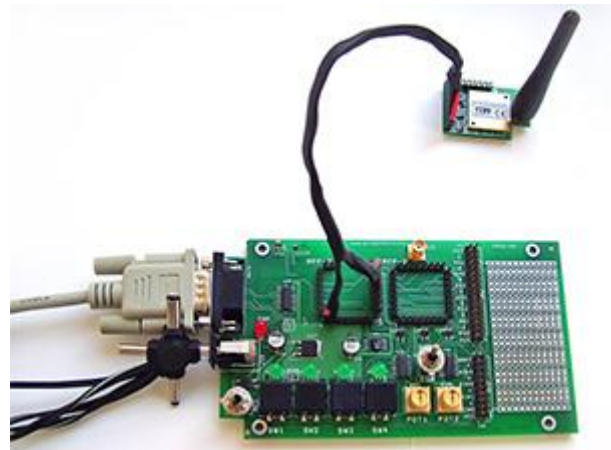
The SDK-RFP development kit can be ordered with any of the modules.

The RFP OEM radio modules are variably useable intelligent devices. The 8051 compatible microcontroller can be used with programs written in C or Assembly. The development kit's main part is the SDK board. There is a breadboard on it and sockets to connect the RFP modules.

Content of the SDK-RFP development KIT (164251):

- 2pcs SDK-RFP board, parts/each board:
 - DB9 socket for RS232
 - 4 press button
 - 2 potential meter
 - 4 LED
 - Socket for RFP modules
 - SMA antenna connector
 - 3.3V power source for RFP modules
- 2 RFP-3B-RX/TX (others can be chosen as well)
- 2 SMA rubber antenna (395204)
- 2 RS232 cable
- 2 Power supply 12V
- Development software pack



SDK-RFP board with
RFP-2 moduleSDK-RFP board with
RFP-3 module

Content of development software pack:

ID	Description
RFP-PROG	programming software
RFP-BIN	transferring binary data DEMO program (switches, LEDs)
RFP-AN	transferring analogue signals (device display 0-100%, potential meter, thermometer humidity meter)
RFP-RX/TX	serial data transfer, line extension program

RFP RX/TX Radio Modem Software:

The radio module programmed with the RFP-RX/TX works as a serial data line extension: 19 200 baud, two-way, half duplex transfer between two units. It doesn't require any software setting (encoding, noise reduction) from the user. In the case of a potential data collision the data won't get lost because of the 256 byte puffer.

The manufacturer, dealer contact:



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SDK-RFP Development Board



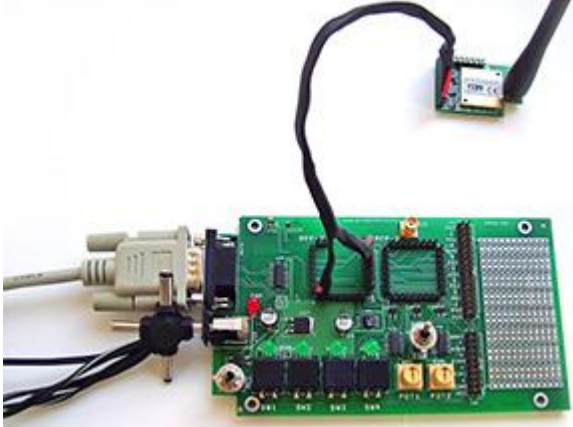
Application

SDK-RFP Development Kit is designed to program, test and carry out development works easily and quickly.



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RFP Modules and Connections

<p>SDK-RFP board with RFP-2 module</p>	 <p>A green printed circuit board (PCB) with various electronic components. It features a central microcontroller, a yellow module labeled 'RFP-2', and several connectors along the edges, including a D-sub connector and a multi-pin header. The board is populated with various passive components like resistors and capacitors.</p>
<p>SDK-RFP board with RFP-2A module</p>	 <p>A green PCB similar to the first one, but with a different module labeled 'RFP-2A'. It includes a small antenna on the top surface and a different arrangement of components and connectors.</p>
<p>SDK-RFP board with RFP-3 module</p>	 <p>A green PCB with a module labeled 'RFP-3' connected via a black ribbon cable. The board has a different layout of components compared to the previous two, including a different antenna and connector configuration.</p>

Structure

The board can be connected with a DB9 plug and a serial cable to a PC.
(COM port).

Plugs, sockets on the board:

- RFP-2: to connect the RFP-2 module
- RFP-2A: to connect the RFP-2A module
- J22: external antenna (SMA rubber antenna)
- J35: 20 contacts, double row header: the radio module's leads
(further information at the modules' documentation!):

3,5,7,...19:	GND
2:	VCC
4:	AIN0
8:	AIN1
12:	AIN2
16:	AIN3
20:	AREF
1,6,10,14,18:	NC

- J37: 32 contacts, double row header: the radio module's leads
(further information at the modules' documentation!):

3,5,...,31:	GND
2:	VCC
4:	P00
8:	P01
12:	P02
16:	P03
20:	P04
24:	P05
28:	P06
32:	P07

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Switches, buttons, LEDs:

- S1: „COM”: data transfer between PC and module
„PRG”: loading in or reading out program from the module
- S2: switching the device on/off
- SW1–4: buttons. Connected to P03, 04, 05, 06. Pressing the button changes to H-level (the basic is L-level on P03-06 ports).
- LED1–4: green LEDs connected to P03–06 ports.

Other units on the board:

- P1, P2: potential meters, connected to AIN0, AIN1 ports. Variable voltage levels can be set to the appropriate analogue inputs. Suitable to program and test analogue signals (AD-converter). The converter can work with internal, or external(built on the board) voltage reference. The status of the P00 lead sets it. In the case of L-level, with internal (1.22 V), H-level, with external reference (0,8-1,5 V, itt: 1,2V) works. These modes can be set on the J37 lead by a jumper. Connecting leads 2-4 provides H-level, connecting leads 3-4 provides L-level on P00.
- NTC1: thermometer. Voltage on AIN2 port is proportional with the temperature. Only informative data! (5–15% accuracy)
- U24: thermometer. Connected to AIN3 port. For high precision (1%) measurement. Type: LM20. (optional) Datasheet is on the disk.
- PWR LED: indicates the switched-on power source.

Power Supply

Power supply by the attached adaptor (300 or 500 mA / 12 V), or any other AC/DC source (6–15 V). The rated current of the board is 40–80 mA (with the module).

Breadboard

The breadboard is useful to build up smaller circuits by the user.

Upper line: (GND)

Lower line: (VCC)

Take into consideration the following:

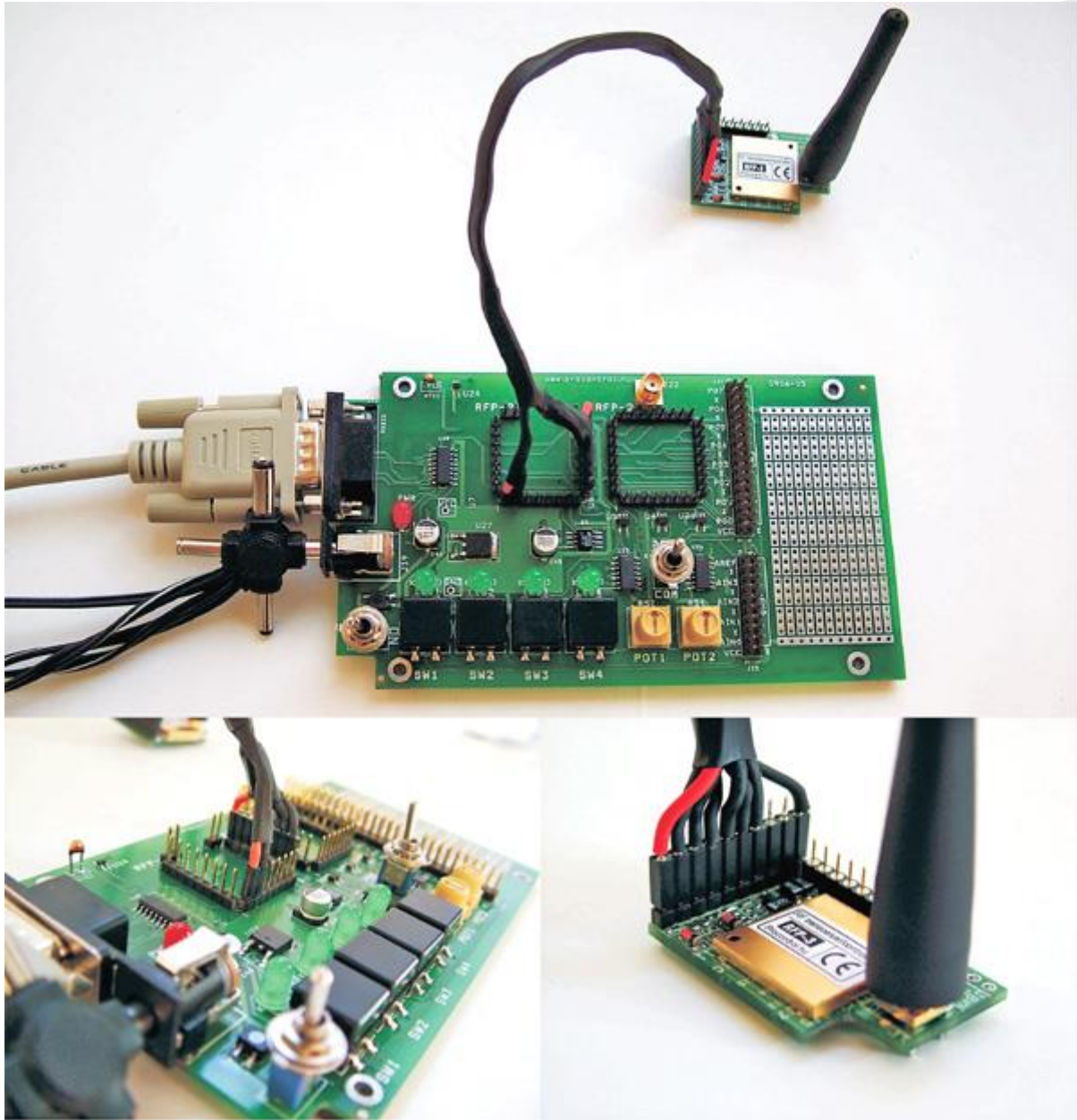
The board's internal voltage is 3,3 V. Higher voltage can damage the SDK board and the RFP module.

The maximum load capacity of the built-in stabilizer is 800 mA, so the user's circuit's current should not be higher than 600 mA.

Further Information

We suggest to study the RFP module's documentation because incorrect programming can cause fatal error. If P03-06 ports used as outputs and set to L-level and any of the buttons are pressed, the particular output will get H-level what can cause fatal error.

The RFP-3 module can not be placed on the sockets. It can be connected to the board by the cable included in the kit. There are 3 sockets on the cable. The 10 lead socket needs to be connected to the RFP-3 module. If the antenna connector is on the right, than the cable connects onto the left-hand side header. Lead no.1 is on the bottom (red cable!) The 8 lead socket connects to the RFP-2A or RFP-2 headers, to no.9-16(red goes to no.16) The 2 lead socket connects to no.1-2. (red goes to no.1)



This cable is primary used for programming. Through this connector the module is supplied with 3,3V. We suggest to use the cable only for the time of testing. The 7 lead header on the upper side of the module is for normal operating mode. Through this connector the module is supplied with 5V. The built-in stabiliser creates the necessary voltage (3,3V).

Using higher voltage or changing polarity causes fatal error! Lower voltage may result in uncertain or faulty operation.

Creating, Editing Programs

Useful to study the documentation of the modules and the controller (Nordic nRF9e5):

www.procontrol.hu

www.nordicsemi.no

Nordic nRF9E5 chip:

<http://www.nordicsemi.no/index.cfm?obj=product&act=display&pro=82>

Suggested free applications for writing programs:

C-translator: <http://sdcc.sourceforge.net/>

KEIL 8051 C-translator and assembler demo: <http://www.keil.com/demo/>

Our translated programs' hex file can be prepared to load into the EEPROM by eeprep.exe (download from Nordic webpage) This program inserts the necessary letter-heads into the hex file.

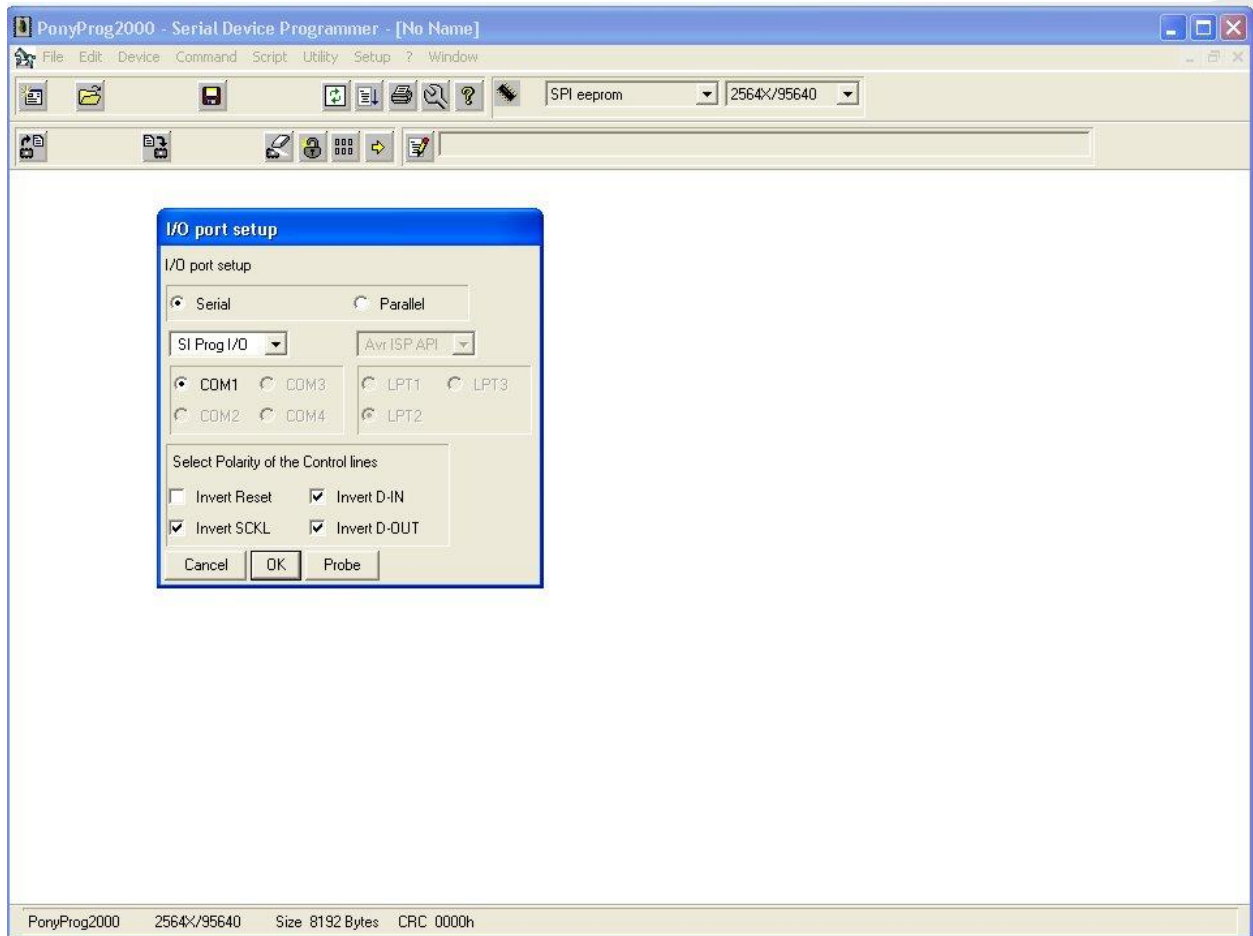
Further info: Nordic nRF9E5 datasheet: Program format in External EEPROM (page 62)

Programme Loading

With the help of the SDK board we can read out the programs from the modules and load in new program. Suggested programming program: PonyProg 2000 Free download: www.lancos.com

Quick guide for PonyProg 2000:

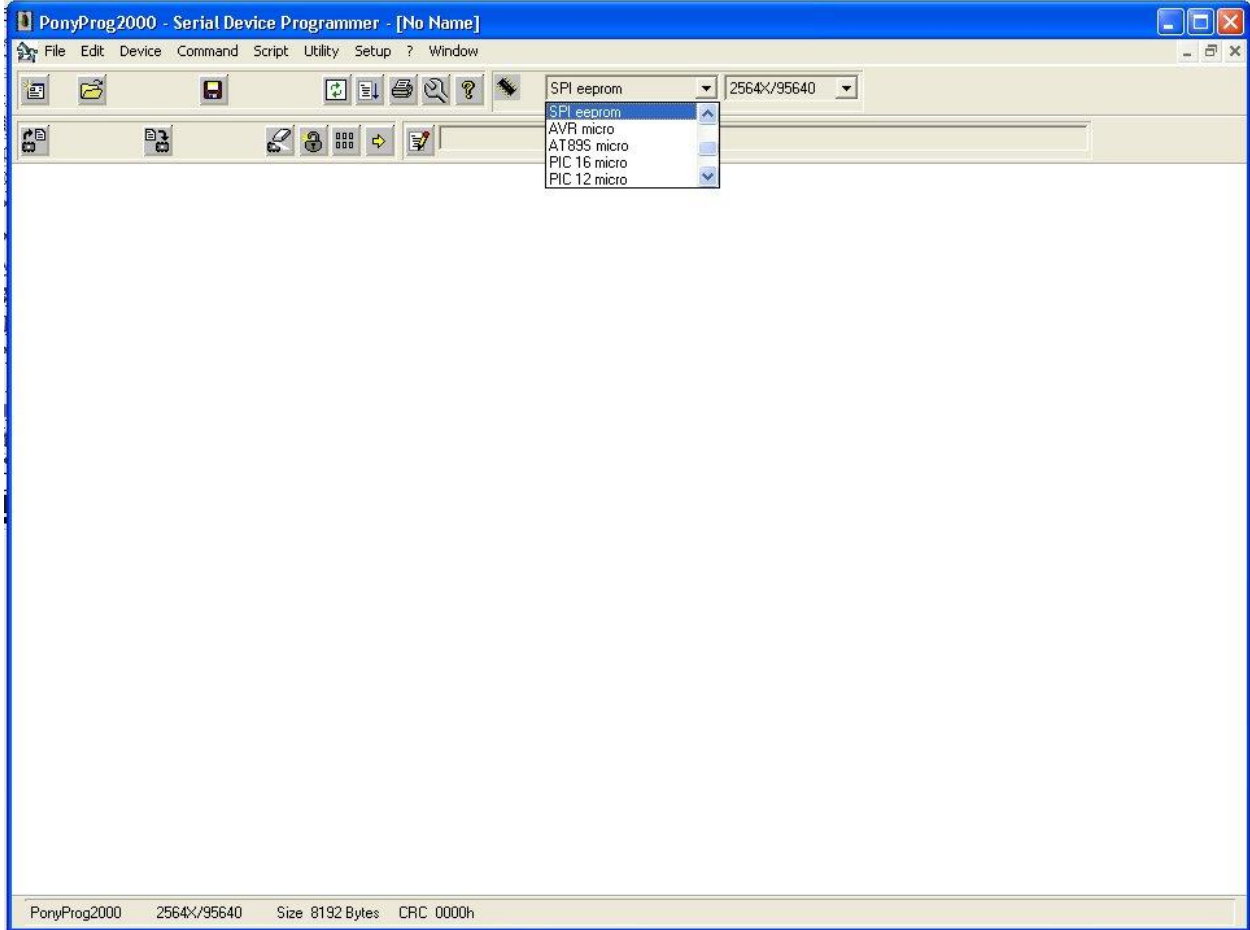
Unzip the downloaded file and setup on the PC. Before using it, some settings need to be done. Click on the „wrench” icon. All necessary settings are on the picture.

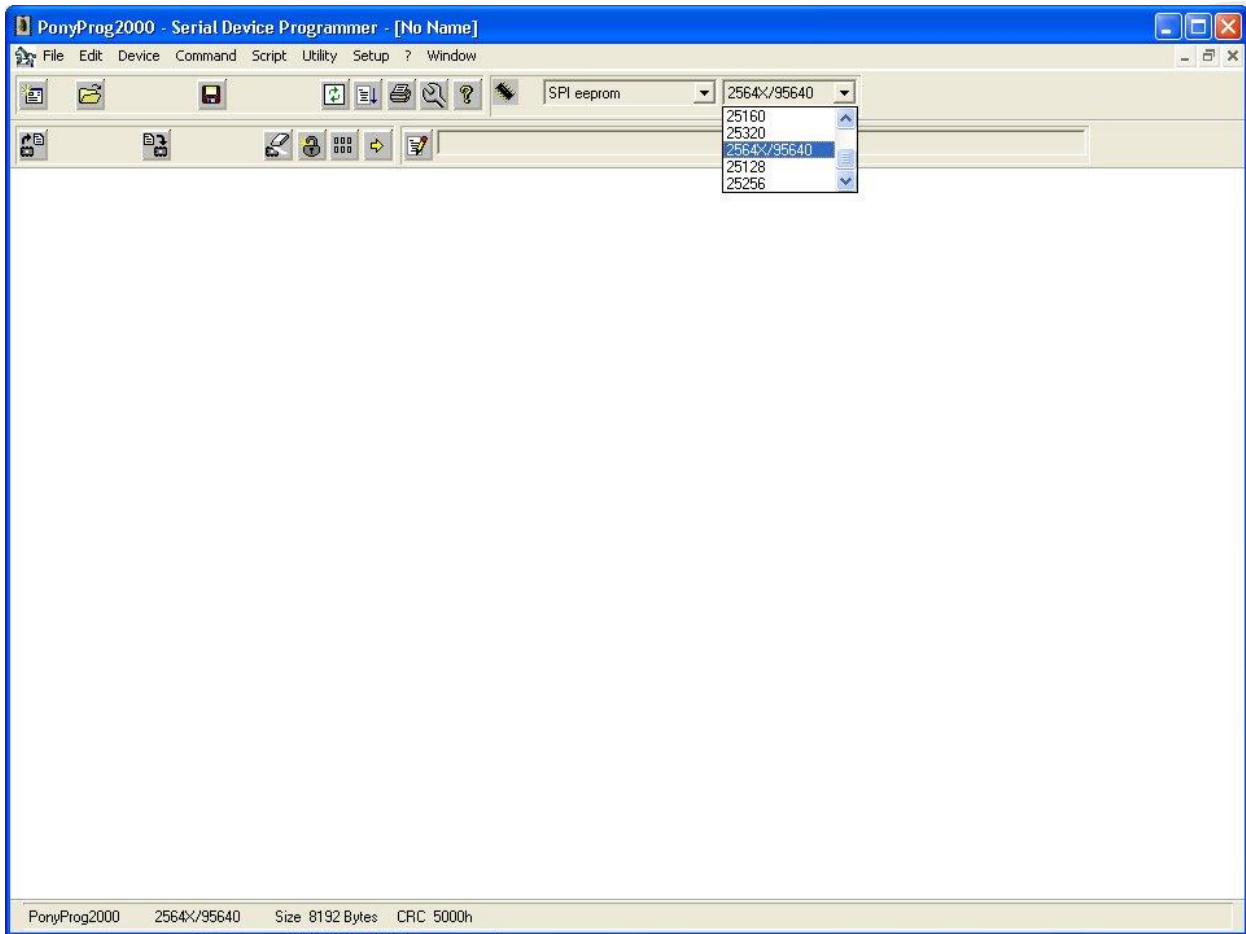


The software performs a calibration at the first run. It takes a few seconds. Later this can be reached through the „Setup/Calibration” path.

Process of Programming:

1. Set the programming device (SPI Eeprom, 2564x/95640).





2. Loading HEX file.

File / Open Device File

3. Programming.

Command / Write All, or Toolbar / bottom line, the second icon on the left (switch in „PRG“). After programming PonyProg checks the data. The result appears in a message. (Write Fail or Write Successful)

Reading out the program from the module: Command / Read All, or Toolbar / bottom line, left icon.

The program can edit the HEX file (Edit / Edit buffer enabled). Just click on the byte you want to edit.

Warning! Not proper editing can result faulty or not working program.

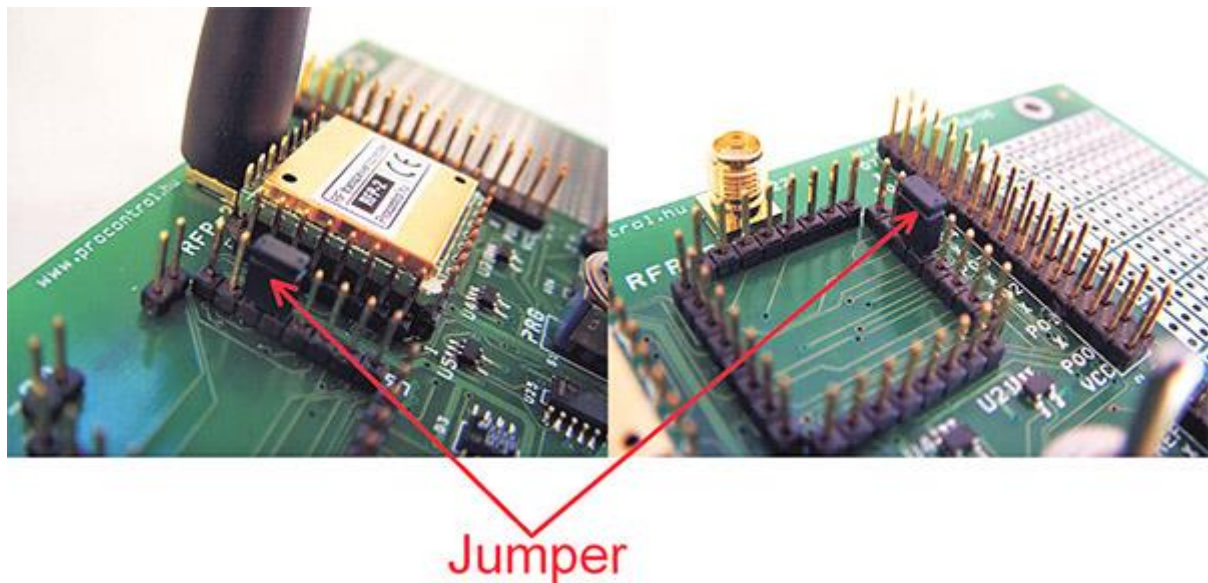
Saving Hex files: (File / Save Device File).

If faulty program is loaded into the module than sometimes the module can't be reprogrammed. In this case we get „Device not responding“, or „Write Failed“ message. This is because the controller continuously reads the Eeprom and it can't be written. Repro-

programming is available by a jumper. Put the jumper on a socket's (which doesn't have a module) no.13-14 leads(numbers counter-clockwise) The process of reprogramming:

1. Place the jumper onto the turned-off SDK board and switch to „PRG”.
2. Turn-on the device and after short time (couple tenths of seconds enough) remove the jumper.
3. Load the new program into the module.

Placing the jumper:

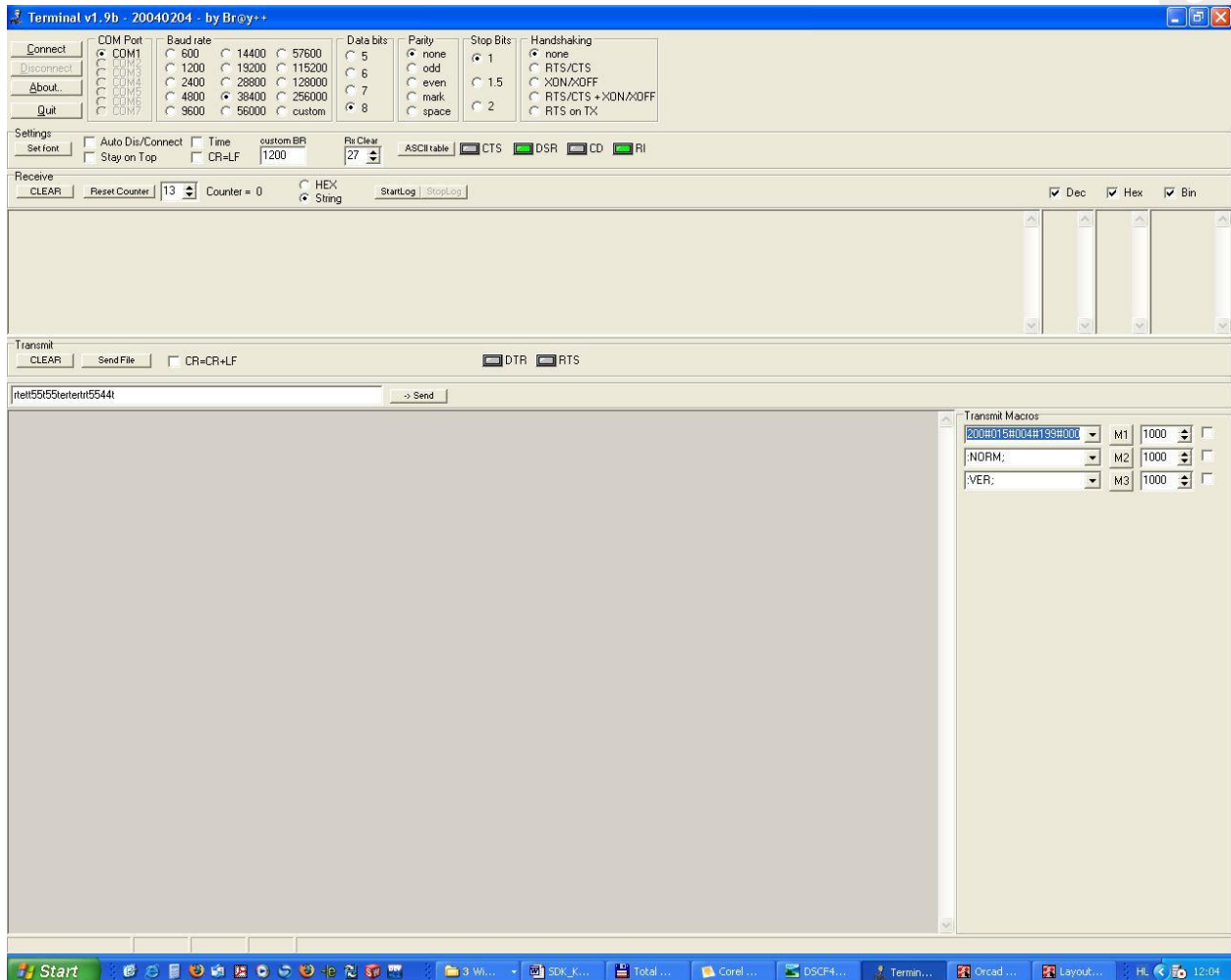


This two option is equivalent at RFP-3.

More info about PonyProg2000: www.lancos.com .

Testing

Switch to „COM” if you want to test the module or the program. Use the Terminal program. Download: <https://sites.google.com/site/terminalbpp/>. All necessary settings are on the picture. With the Connect button you can connect to the device. The program occupies the port until the Disconnect is not pressed.



If the Baud Rate is changed in the module, than change it in the program as well, otherwise the communication will not work. The program's main function is to send the typed characters on the serial port and to display the incoming data. We can send characters in more different ways. The easiest is to simply type into the grey rectangle under the sign „Transmit”. These are sent immediately on the serial port. The text written into the white area will get to the port by clicking on „Send”. The program can manage macros as well. These are frequently used commands and can be sent by one click

(M1, M2, M3 under „Transmit Macros”). The program remembers these commands. For the pre-programmed modules the service codes can be used. Testing macros:

```
#001#254#003#250#200#015#004#199#000 /service mode  
:NORM; /return to normal mode  
:VER; /burnt program's version no.
```

At the process of testing to units needs to be used. One connects to PC (COM-port), the other connects to PC as well or on the serial plug connect the second and the third lead. (RXT and TXT)

Content of the CD:

- Terminal.exe
- PonyProg 2000
- HEX files
- RF module service codes
- RF module data sheets (RFP-2, FRP-2A, RFP-3)
- SDK-RFP KIT datasheet
- SDK board documentation, Nordic programs
- LM20 thermometer circuit datasheet
- NTC thermometer resistor datasheet

The CD contains the following HEX files:

- RX/TX, ADC (build_0207 – 860MHz, build_0208 – 430MHz)
- BIN (build_0218 – 860MHz, build_0217 – 430MHz)

Short Description of the Programs:

RX/TX ADC: serial line extender with transmission/reception display.

The program creates half duplex serial connection through radio: the module transmits the incoming characters through RF connection to the other device which sends out the received characters to the serial port. This works both ways. If there is transmission at the same time on both sides than the data can get lost because of the collision. The module displays the transmission and the reception with a LED:

LED3 = RF transmission

LED4 = RF reception

The module's parameters can be changed in service mode. In service mode you can query the ADC inputs and the power source.

Command: VDD – Get VDD Voltage.

Answer: xxx – in hexa format, mV

Command: ADCx – Get ADC Value, x shows the ADC channel (0..3)

Answer: xxxx – ADC value in hexa format (0x0000 – 0x0FFF 12 bit)

BIN: LED and button test program for the SDK board

This program sends the status of the buttons through radio connection to the other board and it is displayed by LED. This program has to be loaded into two SDK board.

Operation: If you press SW1 or SW2 buttons, than LED3 or LED4 will light on the other board. This works both ways.

SW1 – LED3

SW2 – LED4

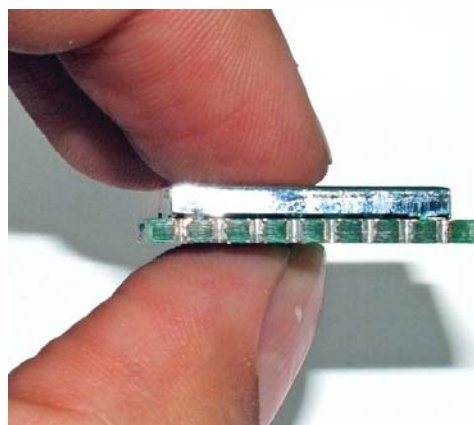
SW3 – LED1

SW4 – LED2

Applications:

- Sports and leisure equipment
- Alarm and system
- Industrial sensors

- Remote control
- Surveillance
- Automotive industry
- Telemetry
- Keyless entry
- Toys

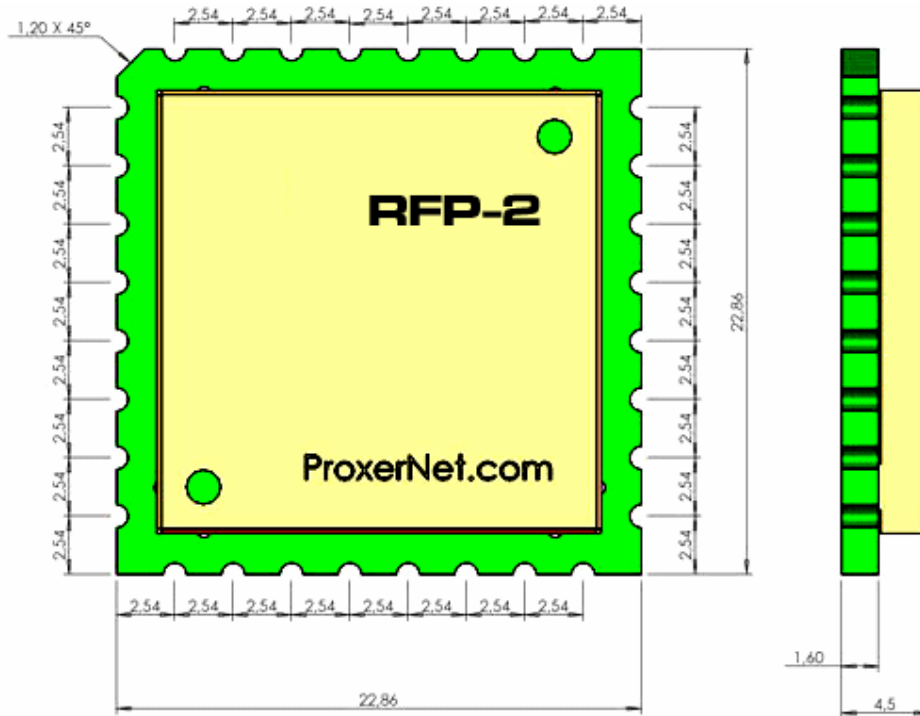


Quick reference data

Parameters	Value	Unit
Supply voltage range	1.9 ... 3.6	V
Supply current in transmit mode	30	mA
Supply current in receive mode	15	mA
Frequency range	433.1 ... 434.7	MHz
Frequency step	100	kHz
Range	~300	m
Baudrate (maximum)	38400	baud/s
Temperature range	-40 ... +85	°C
Supply current for microcontroller (16MHz / on 3V)	2.6	mA
Supply current for ADC	0.9	mA
Maximum transmit output power	10	dBm
Transmitted data rate	100	Kbps
Receiver sensitivity	-100	dBm
Supply current in power down mode	2.5	µA

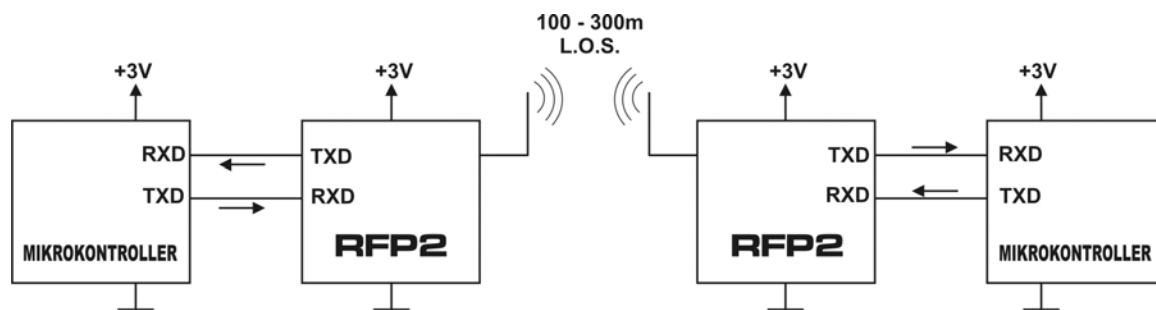
Dimensions

(mm)

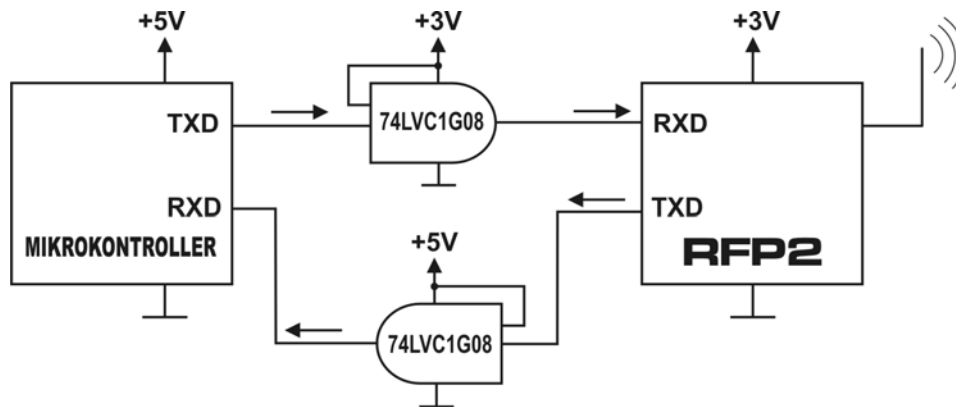


RFP-2 Radio Transceiver 433 MHz SMT hybrid module

Typical application:



Az RFP-2 illesztése 5V-os rendszerhez



Attention!

The basic version of the RFP modules are sold **without embedded software**.

Option: The module is available in programmed version with RFP-RX/TX serial datatransmitter software. The ID of the programmed version is: RFP-2-RX/TX

RFP RX/TX radiomodem software:

The RFP-RX/TX radiomodule works as a serial line extension device: you can achieve max 38400 baud speed, two-way, half duplex data transmission between two of these radiofrequency modules. No need for any software changes (addressing, framing, noise filtering) by user.

The manufacturer, dealer contact:



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RFP-2A

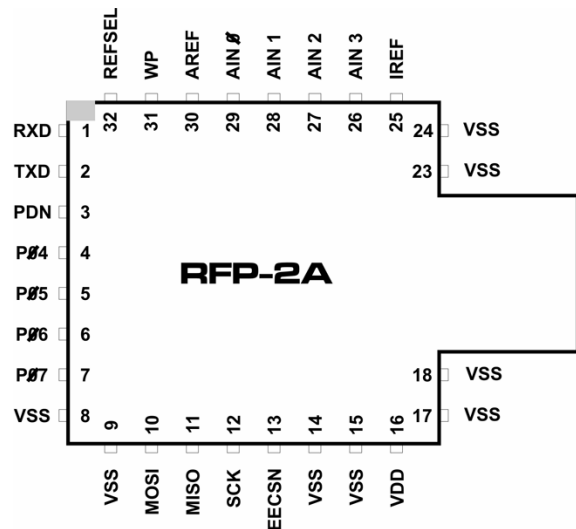
Radio Transceiver/Controller, 868 MHz, embedded antenna



RFP-2A is a hybrid data radio module built with nRF true single chip system: integrated radio frequency transceiver with embedded microcontroller and a 4 input (10bit 80ksps) ADC converter, antenna filter and adapter system with the on-module loop antenna.

The transceiver of the system among others supports ShockBurst technology, which handles the automatic "allocation", addressing and CRC default correcting. The circuit has embedded voltage regulators, which provides maximal noise immunity and allows operation on a single 1.9V to 3.6V supply. The module is compatible with FCC CFR47 standard and ETSI EN 200-1. It operates in licence-free frequency bands.

Pinout:



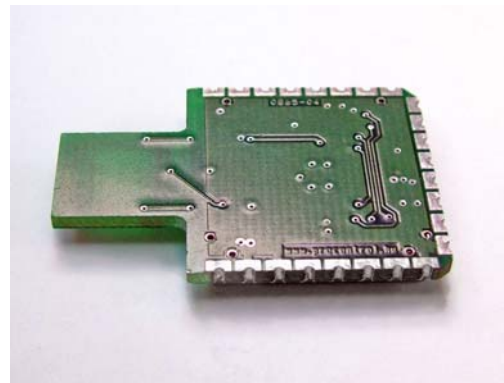
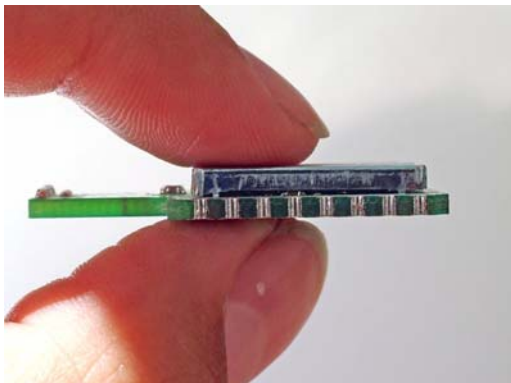
Features:

- 868 MHz transceiver
- 8051 compatible microcontroller
- 4 input, 10bit 80ksps ADC
- 1.9V - 3.6V power supply
- Embedded antenna and antenna interfacing
- SMD (Surface Mounted Device) with 24 pins
- 2.5µA operating current (standby) with timed or outer wakeup
- Adjustable output up to 10dBm
- Channel switching time less than 650µs
- Low TX (transmit) current, 12mA (at -10dBm)
- Low RX (receive) current; 12.5mA
- Low MCU current; 2.6mA (16MHz / on 3V)
- Carrier Detect signal for Listen Before Transmit protocol

RFP-2A Radio Transceiver/Controller, 868 MHz, embedded antenna

Applications:

- Sports and leisure equipment
- Alarm and system
- Industrial sensors
- Remote control
- Surveillance
- Automotive industry
- Telemetry
- Keyless entry
- Toys



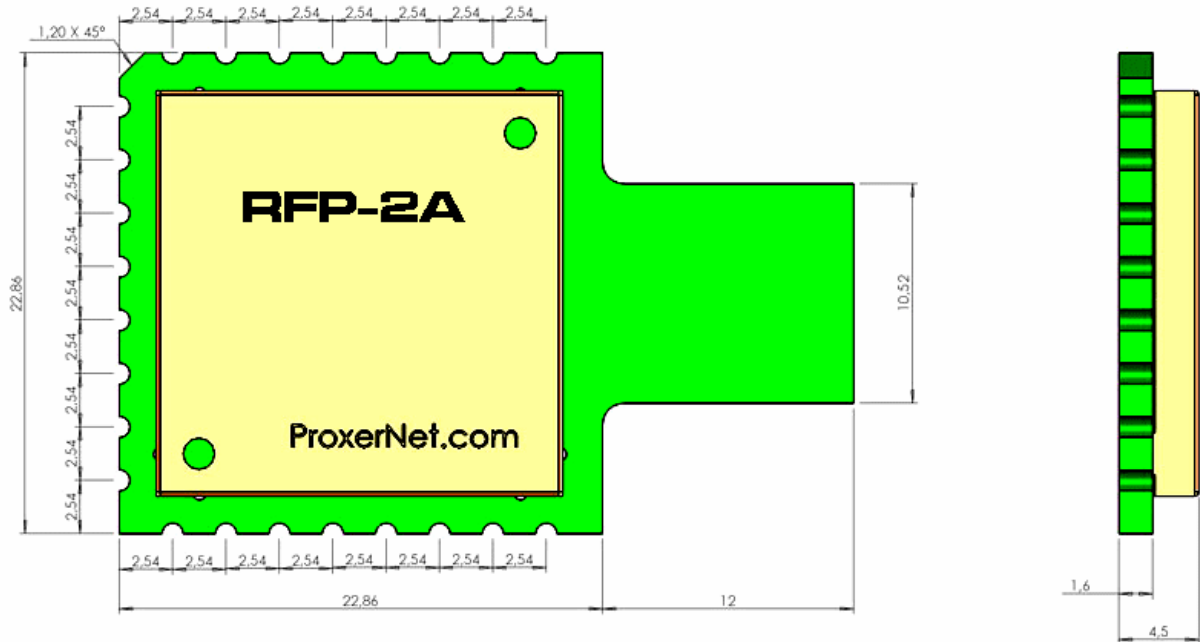
Quick reference data

Parameters	Value	Unit
Supply voltage range	1.9 ... 3.6	V
Supply current in transmit mode	30	mA
Supply current in receive mode	15	mA
Frequency range	866.2 ... 869.4	MHz
Frequency step	100	kHz
Range	~300	m
Baudrate (maximum)	38400	baud/s
Temperature range	-40 .. +85	°C
Supply current for microcontroller (16MHz / on 3V)	2.6	mA
Supply current for ADC	0.9	mA
Maximum transmit output power	10	dBm
Transmitted data rate	100	Kbps
Receiver sensitivity	-100	dBm
Supply current in power down mode	2.5	µA

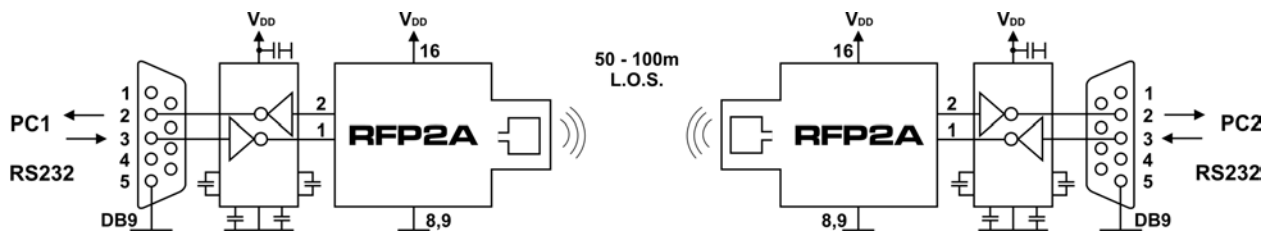
RFP-2A Radio Transceiver/Controller, 868 MHz, embedded antenna

Dimensions

(mm)



Typical application:



Attention!

The basic version of the RFP modules are sold **without embedded software**.

Option: The module is available in programmed version with RFP-RX/TX serial datatransmitter software. The ID of the programmed version is: RFP-2A-RX/TX

RFP RX/TX radiomodem software:

The RFP-RX/TX radiomodule works as a serial line extension device: you can achieve max 38400 baud speed, two-way, half duplex data transmission between two of these radiofrequency modules. No need for any software changes (addressing, framing, noise filtering) by user.

Manufacturer, dealer contact:

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Procontrol[®] RFP-3

Radio Transceiver / controller 433 or 868 MHz,
SMA connection prepared

Datasheet

Version: 4.0

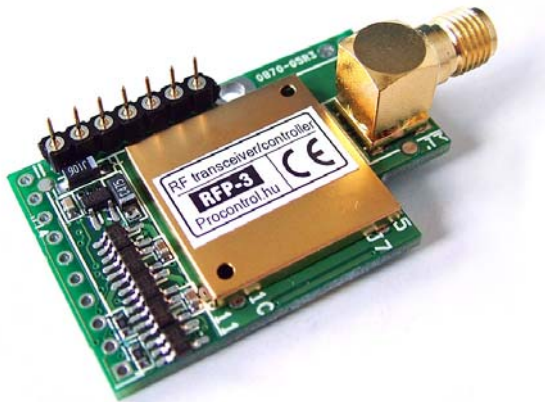
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Table of contents

RFP-3	3
Radio Transceiver / controller 433 or 868 MHz, SMA connection prepared	3
Features:	3
Pinout:	4
Applications:	4
Dimensions	6
Typical application:	6
The manufacturer, dealer contact:	7

RFP-3

Radio Transceiver / controller 433 or 868 MHz, SMA connection prepared



RFP-3 is a hybrid data radio module built with nRF true single chip system: integrated radio frequency transceiver with embedded microcontroller and a 4 input (10bit 80kps) ADC converter, antenna filter and adapter system for connecting an 50 Ohm antenna, 50 Ohm SMA antenna connection prepared.

The transceiver of the system among others supports ShockBurst technology, which handles the automatic "allocation", addressing and CRC default correcting. The circuit has embedded voltage regulators, which provides maximal noise immunity and allows operation on a single 3.6V to 5.5 V supply. The module is compatible with FCC CFR47 standard and ETSI EN 200-1. It operates in licence-free frequency bands.

The module has internal signal interface circuits, so it is connectable directly to Rx/D, Tx/D signals of 3,3 V and 5V systems (see Typical applications).

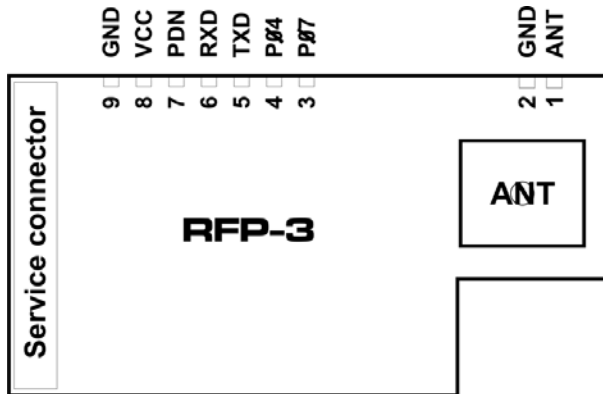
Features:

- Típusok:
 - RFP-3A: 433 MHz-re
 - RFP-3B: 868 MHz-re
- 8051 compatible embedded microcontroller
- 4 input, 10bit 80kps ADC
- 3,6V - 5,5V power supply
- Embedded antenna interfacing
- 2.5µA operating current (standby) with timed or outer wakeup
- Adjustable output power up to 10dBm
- Channel switching time less than 650µs
- Low TX (transmit) current, 12mA (at -10dBm)
- Low RX (receive) current; 12.5mA peak
- Low MCU current; 2.6mA (16MHz / on 3V)
- Carrier Detect signal for Listen Before Transmit protocol
- SMA antenna connection prepared
- External antenna connection



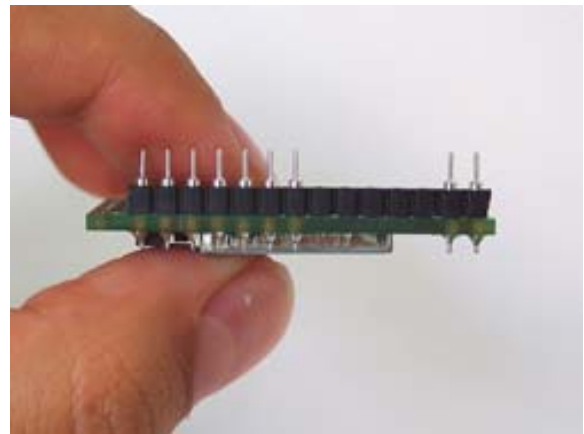
RFP-3 Radio Transceiver / controller 433 MHz, SMA connection prepared

Pinout:



Applications:

- Sports and leisure equipment
- Alarm and system
- Industrial sensors
- Remote control
- Surveillance
- Automotive industry
- Telemetry
- Keyless entry
- Toys



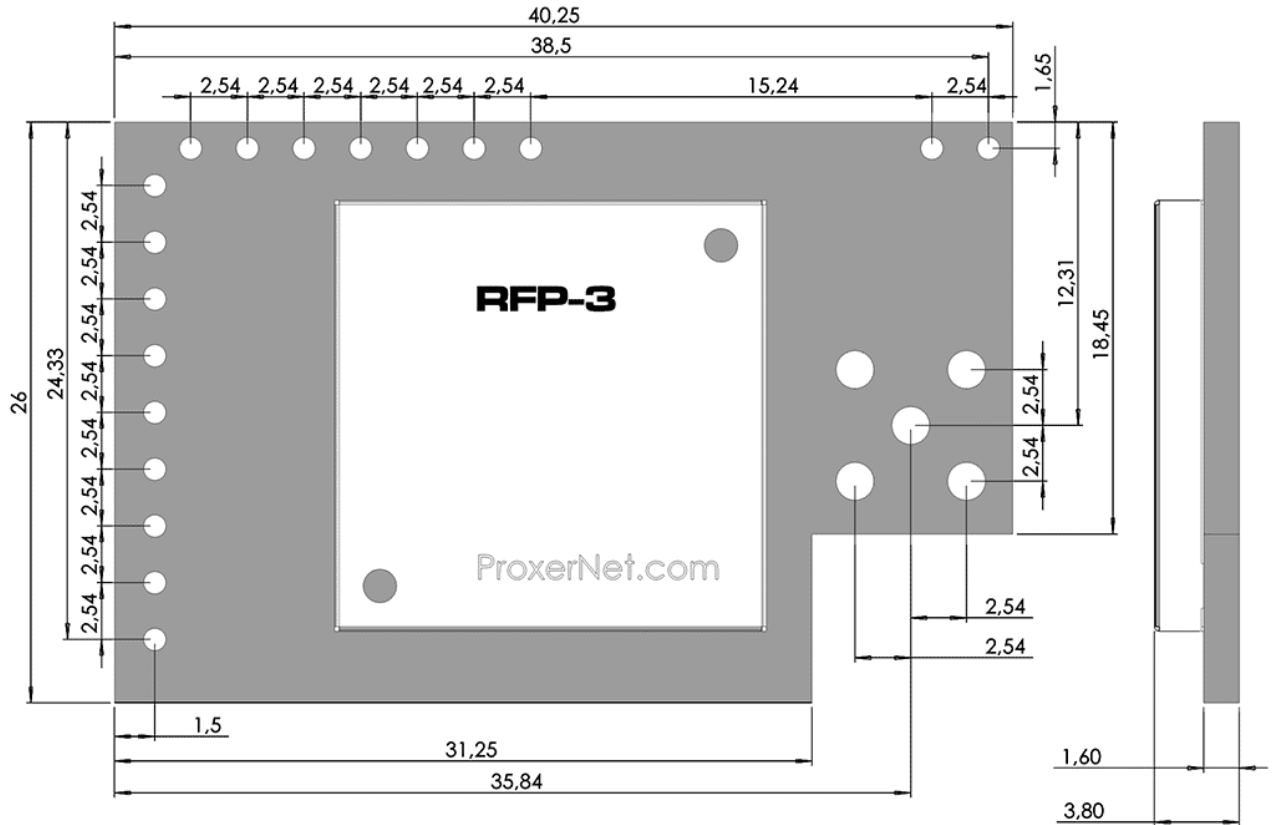
RFP-3 Radio Transceiver / controller 433 MHz, SMA connection prepared

Quick reference data

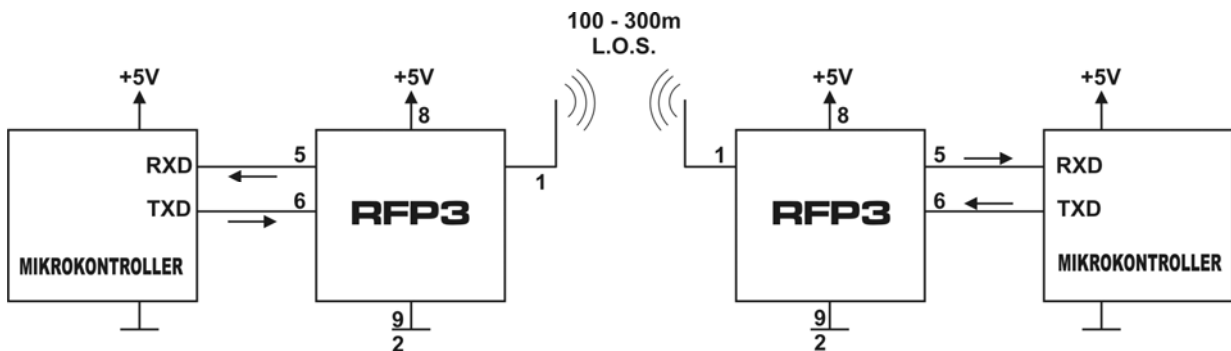
Parameters	Value	Unit
Supply voltage range	3.6...5.5	V
Supply current in transmit mode	30	mA
Supply current in receive mode	15	mA
Frequency range RFP-3A	433.1 ... 434.7	MHz
Frequency range RFP-3B	866.2 ... 869.4	MHz
Frequency step	100	kHz
Range	~300	m
Baudrate (maximum)	38400	baud/s
Temperature range	-40 .. +85	°C
Supply current for microcontroller (16MHz / on 3V)	2.6	mA
Maximum transmit output power	10	dBm
Transmitted data rate	100	Kbps
Receiver sensitivity	-100	dBm
Supply current in „Power down” mode	2.5	µA

Dimensions

(mm)



Typical application:



The basic version of the RFP modules are sold with embedded software: RFP-RX/TX serial datatransmitter software. The ID of the programmed version is: RFP-3-RX/TX

The manufacturer, dealer contact:



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Service Codes of RFP Modules

v1.3

Enter Service Mode

With a special character code through serial port or even radio.

Byte no.	Received character	
	Serial port	Radio
1	1	1
2	254	254
3	3	3
4	250	250
5	200	200
6	15	15
7	4	4
8	199	199
9	0	Module address

Response:

- 'SS' in case of serial port
- 'SR' in case of radio

Commands

Command format: **:CCCC;**

So the first character is a colon, than the command and a semicolon at last.

Confirmation: 'C' character or the appropriate response to the command.

Confirmation in case of a wrong command: '*' (star/asterix character)

Exit from Service Mode

Command: NORM

Response: 'N'

Baudrate:

Command	Baud rate	Unit
BR0	300	baud
BR1	600	baud
BR2	1200	baud
BR3	2400	baud
BR4	4800	baud
BR5	9600	baud

BR6	19200	baud
BR7	38400	baud

Serial Parity bit:

Command	Parity
PAR0	non
PAR1	odd
PAR2	even

RF Power Output:

Command	Power	Unit
PW0	-10	dBm
PW1	-2	dBm
PW2	+6	dBm
PW3	+10	dBm

RF Channel:

Command	Middle frequency 433MHz version	Middle frequency 866MHz version	Unit
CH00	433.1	866.2	MHz
CH01	433.2	866.4	MHz
CH02	433.3	866.8	MHz
CH03	433.4	867.2	MHz
CH04	433.5	867.0	MHz
CH05	433.6	867.2	MHz
CH06	433.7	867.4	MHz
CH07	433.8	867.6	MHz
CH08	433.9	867.8	MHz
CH09	434.0	868.0	MHz
CH10	434.1	868.2	MHz
CH11	434.2	868.4	MHz
CH12	434.3	868.6	MHz
CH13	434.4	868.8	MHz
CH14	434.5	869.0	MHz
CH15	434.6	869.2	MHz
CH16	434.7	869.4	MHz

RF Carrier

Switching ON RF carrier frequency (only on serial port)

Command: CR

Switching off carrier: you exit from service mode

Get Parameters

Get EEPROM parameters

Command: GP

Response: xx x x xx (device address (hexa), baudrate, RF power, RF channel (decimal)), parity

Set Address

Change address: (1...255)

Command: ADRxx, xx is the address in hexa format: 0x01...0xFF.

Get SW version

Command: VER

Response: Bxxxxx, xxxxx is the firmware no.

Set Device Number

Set module ID.

Command: SDNxxxxxxxx, xxxxxxxx 32 bit number in hexa format.

Get Device Number

Command: GDN

Response: xxxxxxxx, 32 bit number in hexa format.

Get VDD Voltage

RF module VDD

Command: VDD

Response: xxxx, voltage in mV, hexa format

Get ADC Value

Measuring voltage on ADC inputs.

The P00 lead sets the ADC reference source:

- L = internal reference (1.22V)
- H = external reference ($U_{AREF}=0.8 \dots 1.5V$).

Command: ADCx, x is the ADC channel's number (0...3).

Response: xxxx, ADC value in hexa format (0x0000 ... 0x0FFF, 12 bit)

Commands

Description	Command + parameter	Format	Range of parameter	Response	Format
Get ADC value	ADCx	dec	0...3	xxxx	hex
Set address	ADRxx	hex	01h...FFh	C	
Serial baudrate	BRx	dec	0...7	C	
Serial parity	PARx	dec	0..2	C	
RF channel	CHxx	dec	00...15	C	
RF carrier	CR			C	
Get device number	GDN			xxxxxxxx	hex
Get parameters	GP			xx x x xx	hex dec dec dec
Exit from service mode	NORM			N	
RF power output	PWx	dec	0...3	C	
Set device number	SDNxxxxxxxx	hex	0...FFFFFF FFFh	C	
Get VDD voltage	VDD			xxxx	hex
Get SW version	VER			Bxxxxx	dec

What are licence exempt free bands?

A: SRDs or Short Range Devices operate in frequency allocations set aside by local governments. They are generally low output power, typically 10mW and are tightly controlled in terms of frequency accuracy, power output and spurious emissions.

The rules governing these devices have been changing in recent years and a degree of harmonisation now exists between countries, particularly Europe. There are now two harmonised bands for all CEPT countries (EU and beyond). These are 433-4MHz and 868-870MHz. These are "free to air" systems where neither the supplier nor the user has to pay a transmitting licence fee unlike paging companies and mobile services providers.

In order to place a product on the market the maker must demonstrate that they comply with the technical regulations. In Europe this means compliance with the R&TTE Directive, which covers EMC and radio specifications. It is possible to "self-certify" the product complies but many manufacturers continue to use outside Test Houses" to perform this work as they used to under the old regulations (MPT, FTZ etc.) In the USA it is still necessary to carry out official independent tests in order to be approved under the FCC rules.

The most significant bands are as follows:

Frequency range	Where used	Approx max. power	Restrictions
2.40-2.483GHz	Worldwide	10mW (up to 200mW – US)	virtually none
433.05 – 434.79MHz	Europe	10mW	No audio, 10% duty cycle
433.05 – 434.79MHz	Europe	1mW	No audio, up to 100% DC
434.04 – 434.79MHz	Europe	10mW	No audio, 25KHz channels
433.05 – 434.79MHz	SA, Australia, NZ	10mW	Check locally
868-870MHz	Europe	Variable	see plan*
863-865MHz	Europe	10mW	– audio/speech Max B/W 300KHz
864.8- 865MHz	Europe	10mW	– audio/speech 50KHz channels
902-928MHz	USA/Canada	1mw	none
902-928MHz	USA/Canada	Up to 1W	Only frequency hopping systems allowed.
458MHz	UK	500mW	25KHz channels
173.225MHz	UK	10mW	25KHz channels
40-49MHz	Europe	10mW	Frequencies vary locally
1.88-1.9GHz	DECT	Europe 250mW	Protocol controlled speech and data
Around 5GHz	Worldwide	TBA	

A document entitled ERC Recommendation 70-03 is available at www.ero.dk. This outlines all the current requirements for Europe. It can be found on their home page entitled "Updated ERC REC 70-03 on Short Range Devices" For the USA rules go to http://www.access.gpo.gov/nara/cfr/waisidx_01/47cfr15_01.html
The most useful sections are from 15.229 to 15.249

If in difficulty please email barry.gillibrand@lprs.co.uk

[VIEW/DOWNLOAD RELATED DOCUMENT](#)

RSC-2R

Wireless Modem RS232, RS232 line extender,
RS 232 / Radio converter

Application

The RSC-2R modem can be connected to serial port by a DB9 plug and works as an intelligent radio modem.

Useful, if serial data is needed to be transferred in wireless way:

- Mobil measuring, controlling, datacollecting systems
- Remote control machines, robots
- Toys, models
- Access control systems, door control
- Other



Structure

The modem is built into an impact ABS house.

The indoor, IP40 type has a DB9 socket, a USB A connector and rubber antenna. Find the type number at the ordering information below.



The external version is in IP65 housing.

The data cable and the power cable connects through two PG9 glands. The 433 or 868 MHz HELIX antenna is placed inside the housing.

Power supply

There are 3 different type of power supply methods available:

- a./ voltage from the RS232 port output signal's rectification
- b./ DC from USB port
- c./ wall-mount power adaptor

a./ method doesn't require any additional device. If the PC Com. Port output leads are switched to 0 than on the RS232 output 5-12V DC flows. This is enough to supply the module after the diode rectification.

For b./ method you need a normal USB cable. 5V is connected to the USB plug's no.1 and 4 leads.

c./ method is always available by the wall-mount power adaptor

There is a Low Drop power supply controller in the modules. It creates the stabilized voltage.

There is an RS232 level matching module built in as well.

Software

The modem is shipped with a basic software, it works as a serial line extender without any previous programming. Two way 38400 Baud communication is available with the factory settings between two modems. The modems don't need any additional hardware or software such as encoding or noise reduction, because these are all included. The 256 byte puffer ensures that no data gets lost in the case of data collision.

With a simple terminal program (e.g. terminal V1.9) you can measure and check the modem's radius. Connect one of the modems by a serial cable to PC and connect together the other modem's RS232 connector's no.2 and 3 leads(RXD,TXD) The pressed character goes to the other modem and comes back. The radius is where the echo works.

The RFP-2 transcieveres can be programmed.

Terminal V1.9 program and „RFP module service codes” is attached to the modem.

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Ordering codes

RSC-2R modems can have 3 suffixes:

RSC-2R**x-y-zzz**

x is the frequency.

- A - 433 Mhz
- B - 868 Mhz

y is the type of antenna (optional)

- K: external
- B: internal

zzz is the housing (optional).

- empty – indoor housing
- EXT – IP65 ABS housing

E.g.: RSC-2R**B-K-EXT**: 868Mhz, external antenna, outdoor housing

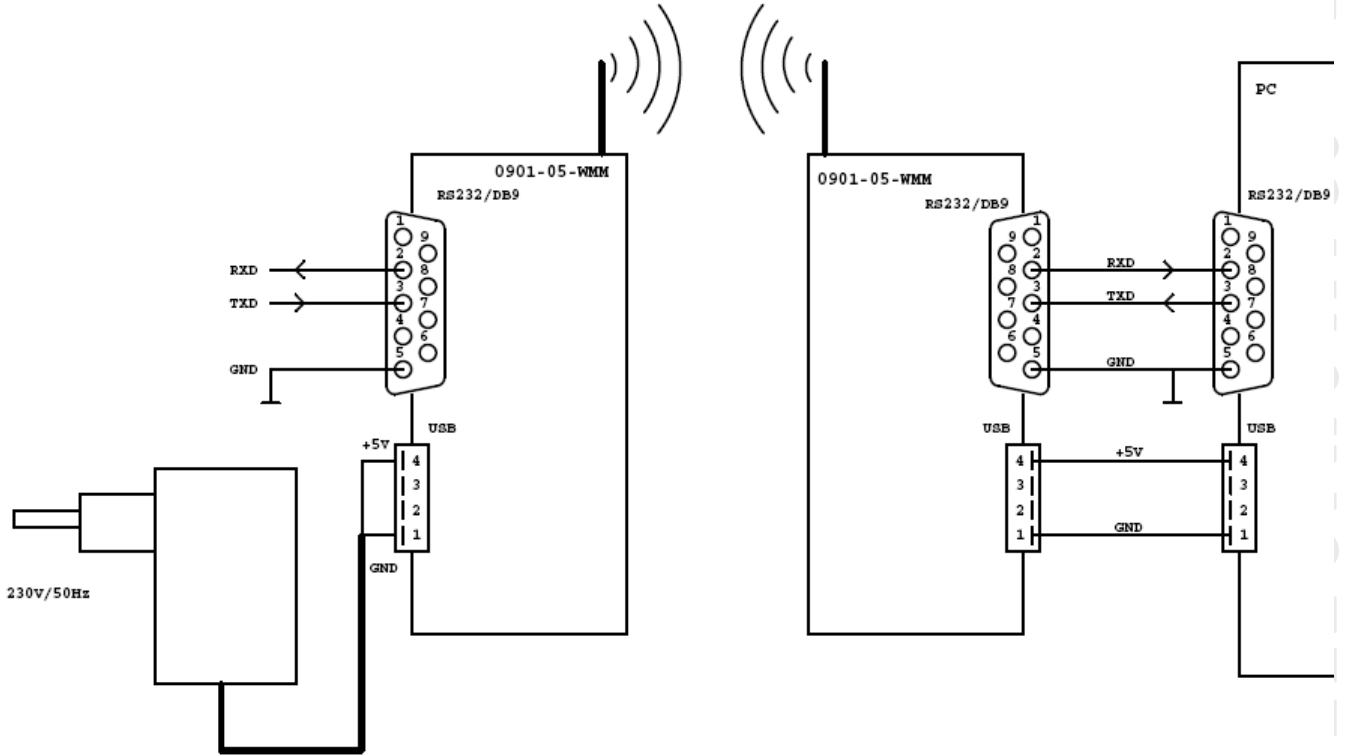
RSC-2R modems built by Procontrol 0901-05 drawings.

Radius

	Indoor (Works through one floor)	Outdoor (unobstructed area)
With internal antenna	~ 30m	~ 150-200m
With external antenna	~ 30-40m	~ 250-300m

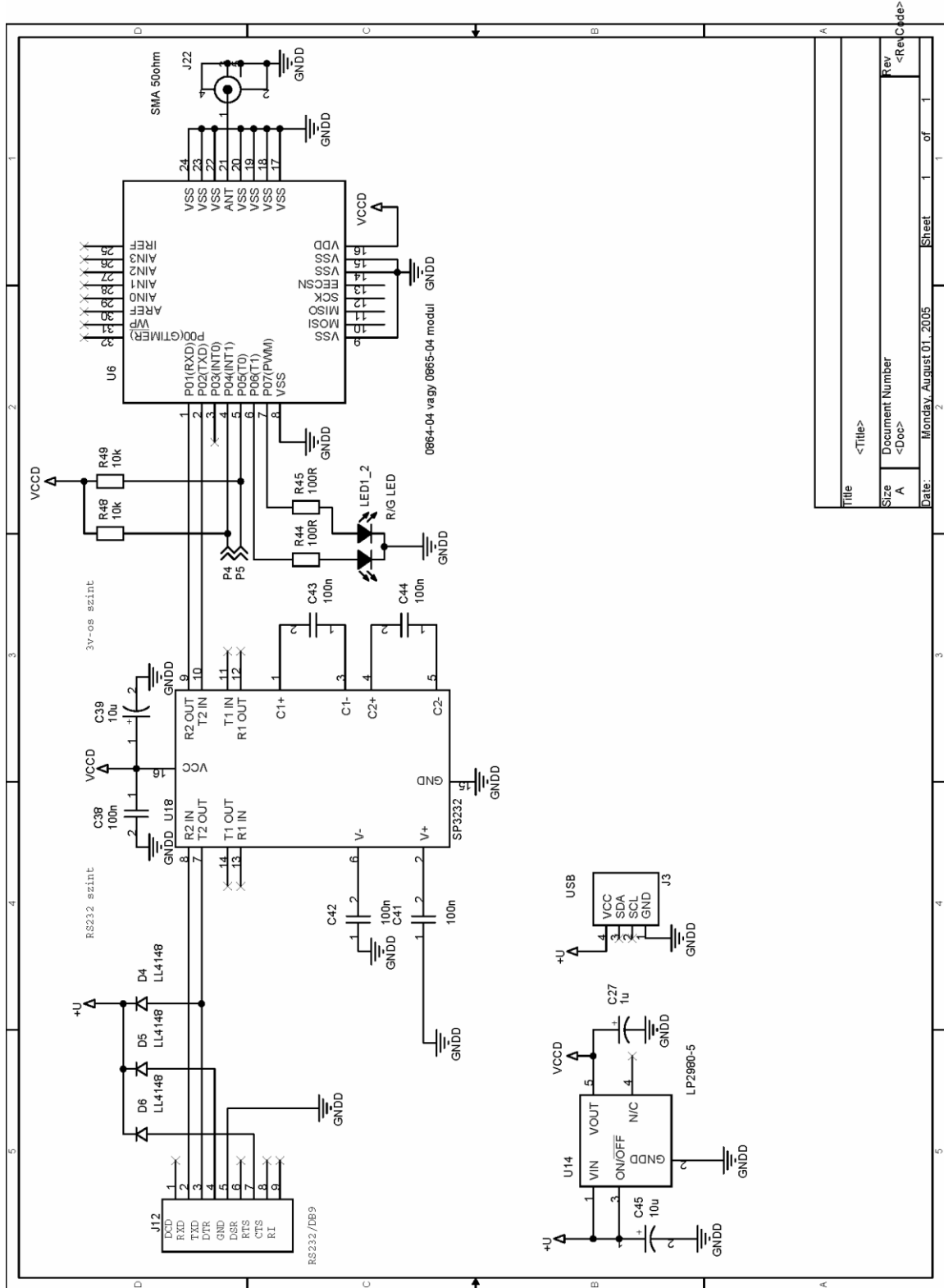
*The distances depend on the surrounding effects.

Connecting two RSC-2R Wireless Modem as a RS232 line extender:



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Circuit schematic



Title	<Title>
Size	A
Document Number	<Doc>
Rev	<RevCode>
Date:	Monday, August 01, 2005
Sheet	1 of 1

0901-05-WRC

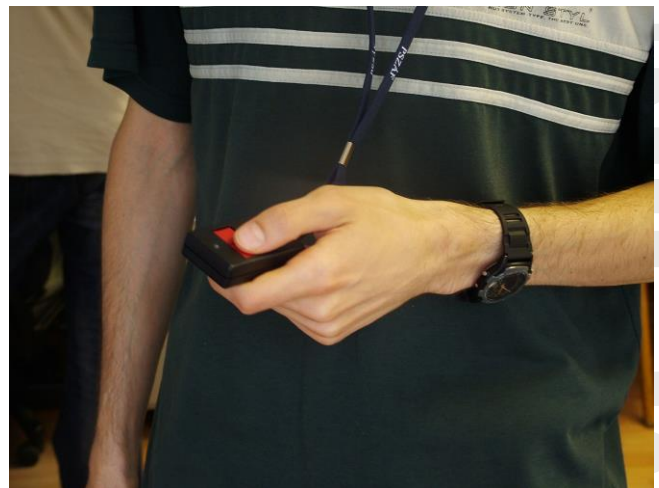
RFP-3 RC Remote Control Unit 868 MHz

The mini remote controller works with a 868 MHz chip and a built-in loop antenna. There are two options:

„A” option is supplied by a 3V lithium battery.

It has two buttons: A and B. Press any of them to activate the system and send the code to the receiver.

The receiver confirms the arrived code: A or B LED lights for 1 second on the controller. After this the system shuts down and doesn't use any energy until one of the buttons is not pressed.



RFP-3 Modem

„B” option: the remote controller connects by a DB9 connector to RS232 port and works as an intelligent radio module.

The power supply is from rectifying the RS232 port output signals or DC from the USB port by a Low Drop stabilized power source.

In this build there is a RS232 level matching module as well.

The software works as a serial line extender. Between two units 19200 Baud connection is available.

The modems don't need any additional hardware or software such as encoding or noise reduction, because these are all included.

The 256 byte puffer ensures that no data gets lost in the case of data collision.

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0901-05-WST

Wireless sensor

The sensor has a 868 MHz radio chip, thermometer chip; supplied by a battery (optional humidity measuring: 0901-05-WSH)

Real Time mode

The system is programmed to measure and send the data in T time. The controller wakes up after T time, reads the sensors, sends the data to the center, waits for the confirmation and switches off for another T time. The time is measured by the controller's clock.

The sensor is supplied by a 3V battery. In sleep mode it consumes 3 μ A so the battery lasts for years. The battery's lifetime depends on T which can be set from 3 minute up to 24 hour.

Logger mode

In Logger mode the system stores the data readed in T_1 time and sends in one pack in T_2 time.

T_1 and T_2 can be adjusted.

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RFID Super Long Range System

RFID - SLR

The radiofrequency identification's key is a passive transponder what is read by an active reader. This method works in 5-10-max 100cm, can't be used for few meters distances.

The RFID-SLR system works in **5 - 150 m distance** location and direction selectively.

Identification keys for the SLR system:

-PROX-SLR active transponder, small size, pocket or neckstrap. Size: 59 x 36 x 7.5 mm

-LR 48 mini active transponder, for tools or machines Size: 48 x 25 x 7.5 mm

-LR 80 bankcard size active transponder. Use in pocket, breafcase, vehicle or tools, machines. Size: 54 x 85 x 4.5 mm.

The identification and additional informations get from the transponders to the readers by secured dialogue. The reading destination is adjustable between 5 and 150m.

The RSLR reader reads the transponder's signals (anticollision mode: reads more than one at the same time) and records them with a time stamp.

If the reader is in ON-LINE mode than the received identifications are sent immediately to the PC connected on serial (Ethernet, RS232, RS485, USB) port.

The reader can be used in OFF-LINE mode as well. In this case every record is stored in the reader's memory and can be queried by PC. The RSLR 12 reads only a small adjustable area, so the system can observe invisibly that who comes in a gate for example.

