NWRM1000 User Manual

The NWRM1000 communicates with the host MCU over a standard asynchronous serial interface consisting of TX and RX pins. The radio module has got embedded AT commands interpreter to adjust settings and sends messages via NWave radio protocol. Over this serial interface, the NWRM device provides a standard Hayes "AT" command set used to control the module using ASCII readable commands and get answers, as well as to send or receive data. This interface allows two-way UART communication to be performed in low energy modes, using only a few µA during active communication and only 150 nA when waiting for incoming data.

Below can be found serial port settings and supported AT commands which external processor shall use.

Serial Port Settings

By default radio module settings are as follows:

- LVTTL electrical level
- 9600 bps
- 8 data bits
- 1 stop bit
- No parity
- No software/hardware control

Bootloader

The NWRM1000 module contains an integrated bootloader which allows reflashing the module firmware either over the RX/TX UART connection, or over the air using the built-in RF transceiver.

ADC

The NWRM1000 provides an interface to an integrated low-power successive approximation register ADC, capable of a resolution of up to 12 bits at up to 1 Msps or 6 bits at up to 1.86 Msps. The ADC0 and ADC1 pins provide the external interface to the ADC. When not used for ADC operation, these 2 pins can be configured to perform other functions using "AT" configuration commands.

Carrying Frequency

Syntax:

```
«AT+FREQ=[Carrying_frequency],[Bandwidth]»
```

Whereas «Carrying_frequency» is a value of carrying frequency in Hz, «Bandwidth» is a range inside of which the module sends messages.

Example:

```
«AT+FREQ=868000000,25000»
```

Answer in case of success:

```
«Ok»
```

Answer in case of error:

```
«Error»
```

Sending Messages

Maximum length of the message is 20 bytes.

Syntax:

```
«AT+SEND=[&hex_byte1][&hex_byte2]..[
[&hex_byteN]]»
```

Whereas hex_byte[n] represents data in hex format, n – byte number. Before each byte it's needed to put «$» sign.

Syntax:

```
«AT+SEND=$23$0A$5D$5F»
```

In case of success the module answers in 3-10 seconds:

```
«Ok»
```

In case of error:

```
«Error»
```

Getting Modem Network Address

Syntax:

```
«AT+SERIAL=?»
```

Example:

```
«AT+SERIAL=?»
```

In case of success the module returns number in hex:

```
«0000F556»
```

In case of error:

```
«Error»
```

The NWRM1000 is FCC Approved as module to be installed in other devices. This device should be used only for fixed and mobile applications and if the final product after integration is intended for portable use, a new application and FCC is required.

This device 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, including interference that may cause undesired operation of the device.

The user must refer to below information to meet the FCC's RF exposure rules and regulations when they design:
• The system antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Manufacturers of mobile, fixed or portable devices incorporating this module are advised to clarify any regulatory questions and to have their complete product tested and approved for FCC compliance.

• NWRM1000 is intended for the OEM integrator only.

• The user is required to see the Grant of Equipment document for other restrictions.

The following regulatory and safety notices must be published in documentation supplied to the end user of the product or system incorporating an adapter in compliance with local regulations.

• Host system including NWRM1000 must be labeled with

“Contains transmitter module with FCC ID: 2ADCZNVRM1000”