

N21/N23

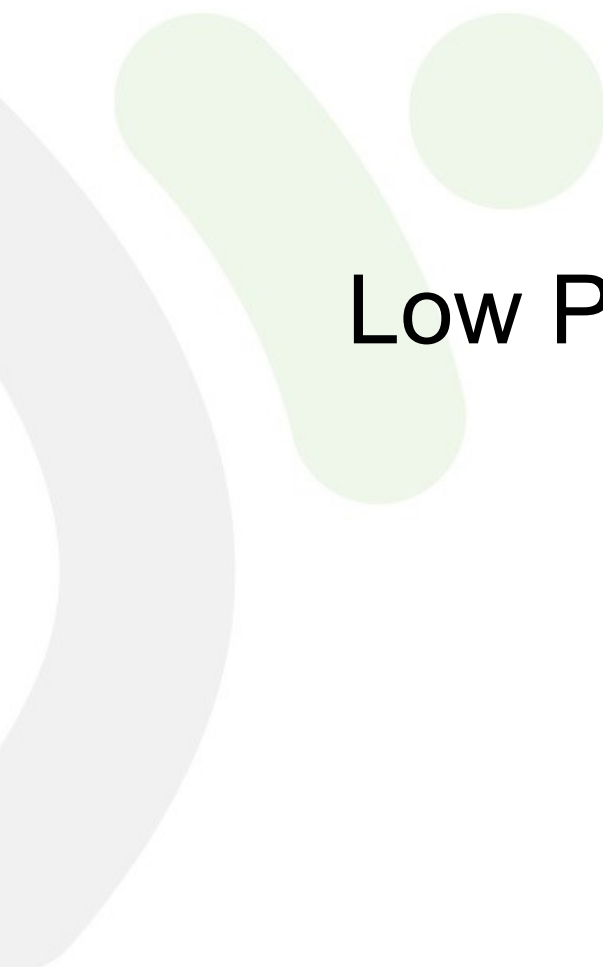
Low Power Consumption

Application Notes

Issue 1.0

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Neoway Product Document



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Notice

This document provides guide for users to use N21/N23.

This document is intended for system engineers (SEs), development engineers, and test engineers.

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About This Document

Scope

This document is applicable to N21/N23 series.




Audience

This document is intended for [system engineers \(SEs\)](#), [development engineers](#), and [test engineers](#).

Change History

| Issue | Date | Change | Changed By |
|-------|---------|---|------------|
| 1.0 | 2018-09 | Initial draft | Cenny |
| 2.0 | 2018-11 | <ul style="list-style-type: none">Modified the reference design of WAKEUP.Added N23. | Cenny |

Conventions

| Symbol | Indication |
|--|---|
|  Warning | This warning symbol means danger. You are in a situation that could cause fatal device damage or even bodily damage. |
|  Caution | Means reader be careful. In this situation, you might perform an action that could result in module or product damages. |
|  Note | Means note or tips for readers to use the module |

1 Overview

N21 and N23 module support low power consumption, including Power Saving Mode (PSM) and extended Discontinuous Reception (eDRX). This document describes how to use these two modes.

2 Reference Documents

Neoway_N21_AT_Command_Mannual

Neoway_N23_AT_Command_Mannual

Neoway_N21_Hardware_User_Guide

Neoway_N23_Hardware_User_Guide

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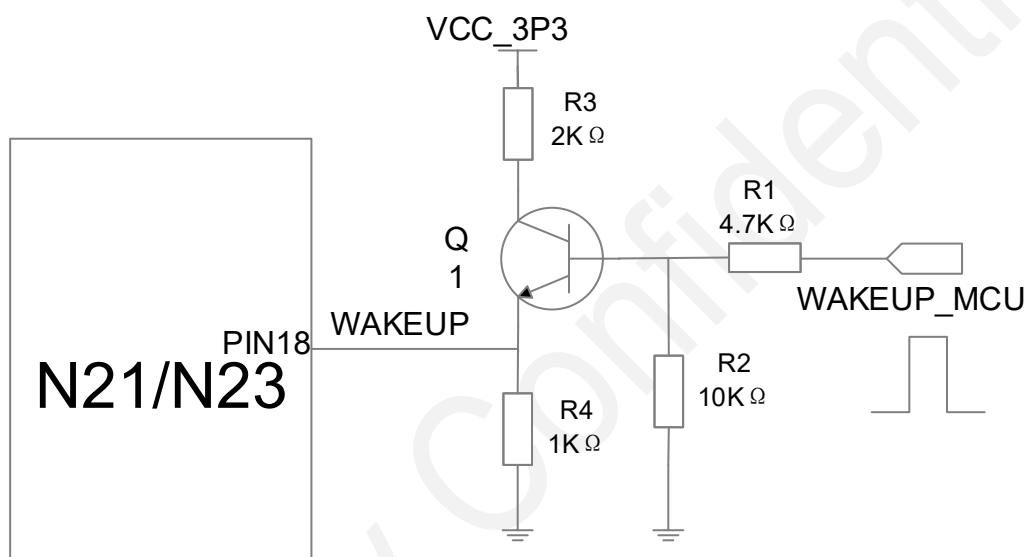
3 HW Design

The 18th pin of N21 and N23, WAKEUP, is used to wake up the module from PSM mode.

If you do not use the PSM mode of the modules, leave this pin floating.

To use the PSM mode, refer to the following interface design.

Figure 3-1 Reference design of WAKEUP



WAKEUP is at low level close to 0 V by default. Inputting high level at this pin wakes up the module from PSM mode. If the module is in PSM mode and receives data service request, MCU pulls WAKEUP high for 1 second or longer and pulls it low then the module wakes up from PSM mode.

The typical value of VCC_3P3 is 3.3V and it is supplied by power domain of external MCU.

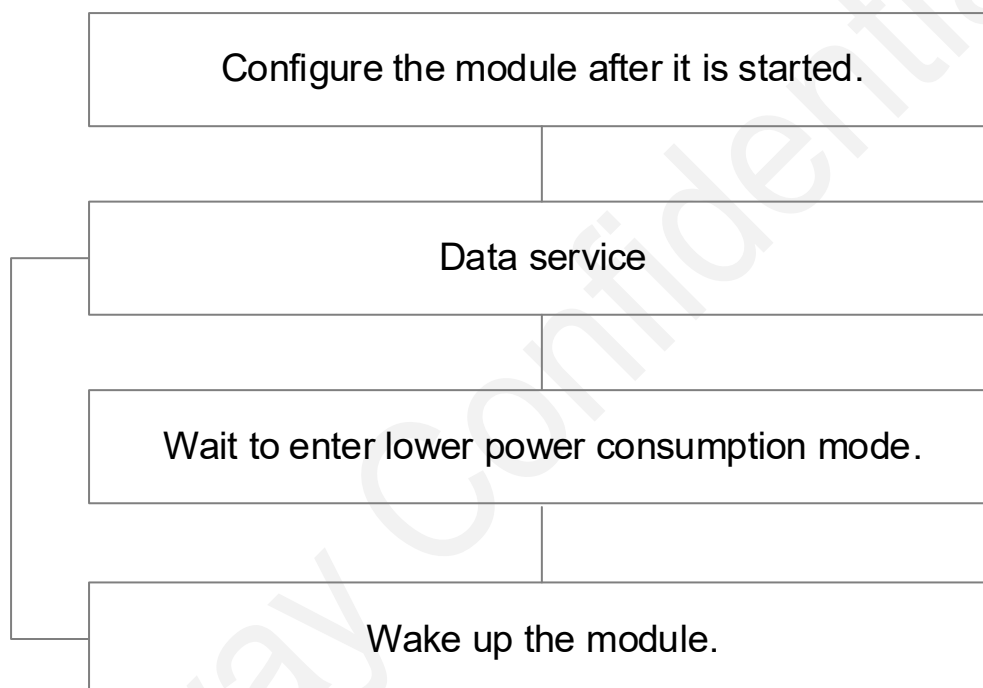
WAKEUP_MCU is connected to GPIO of MCU. WAKEUP_MCU outputs a positive pulse wider than 1 second only when the module is in PSM mode. Keep it low all the time.

4 AT Process

The following three commands are used in low power consumption: **AT+NVSETPM**, **AT+CEDRXS**, and **AT+CPSMS**. For details about commands, see AT command manual of the corresponding module.

This chapter describes how to use the low power consumption mode.

Figure 4-1 Application process of low power consumption



1. Configure the module.

After the module is started, configure the module by issuing the following commands:
AT+NVSETPM=2, **AT+CEDRXS=1**, and **AT+CPSMS=1**.

Set **AT+CPSMS=0** to disable PSM mode if you use eDRX mode only.

Set **AT+CEDRXS=0** to disable eDRX mode if you use PSM mode only.

To obtain the PSM status automatically, set baud rate to a fixed value by sending **AT+IPR** command and enable the automatic report function by sending **AT+NEONBIOTCFG=0,0,1,0**.

2. Process data service.

After the module is started up, configured, and registered with a network, it can initiate data services, such as connecting to IoT platforms and set up TCP/UDP, HTTP/HTTPS, FTP, and MQTT connections.

3. Wait to enter lower power consumption mode.

After the module processes data services and MCU stops sending AT commands to UART port, the module waits to enter low power consumption mode.

The waiting time is configured by the network. To enable low power consumption mode for the module fast, release the RRC connection by sending **AT+RRCRLSREQ** after the data communication is completed.

4. Wake up the module.

MCU pulls WAKEUP high for 1 second or longer, and the module wakes up from PSM mode.

5. Process data services.

After waking up from PSM mode, N21 and N23 can execute **AT+UDPSEND** directly to send data.

To process other data services after waking up from PSM mode, the module shall set up connections and then send or receive data.

5 Examples

This chapter provides the examples of how to use the low power consumption function when processing UDP and TCP data services. For other data services such as HTTP/HTTPS, FTP, and MQTT, refer to the application notes of corresponding functions.

5.1 UDP Data Service

1. Configure the module after it is started.

```
AT //Check whether the AT communication works properly.
OK

AT+CEREG? // Query network registration status.
+CEREG: 0,1
OK

AT+NVSETPM=2 //Enable low power consumption mode.
OK

AT+CEDRXS=1 //Enable eDRX mode.
OK

AT+CPSMS=1 //Enable PSM mode.
OK
```

/*****Set PSM mode report as required*****/

```
AT+IPR=? //Query the baud rates that the module supports.
+IPR: 0,2400,4800,9600,14400,19200,28800,33600,38400,57600
OK

AT+IPR=9600 //Set the baud rate to 9600.
OK

AT+NEONBIOTCFG=0,0,1,0 //Set automatic PSM status report.
OK
```

2. Data service

```
AT+XIIC=1 //Obtain the IP address manually.
OK

AT+XIIC?
+XIIC: 1,10.34.94.95
OK

AT+UDPSETUP=1,58.60.184.213,10102 //Set up a UDP connection. Note the IP address and port
you use.
```

```
OK

+UDPSETUP: 1,OK

AT+UDPSSEND=1,10 //Send data through the UDP connection.
>
send->1234567890
OK

+UDPSSEND: 1,10 //Data is sent successfully.
+UDPRECV: 1,10, 1234567890 //Receive data. The receiving mode can be set by issuing
AT+RCVMODE. For details, see AT command manuals.
```

3. Wait to enter lower power consumption mode.

/*****PSM status is reported if the automatic report function is set*****/

```
+PSMEVENT: ENTER PSM //The module enters PSM mode.
+AT //The module still responds to service request from network but does not respond
to AT commands in PSM mode.
+AT
```

4. Wake up the module.

```
AT //After MCU pulls WAKEUP high and wakes up the module, it issues AT to detect baud
rate automatically. The module outputs +PBREADY.
+PBREADY
```

/*****PSM status is reported if the automatic report function is set*****/

```
+PSMEVENT: PSM WAKEUP

AT+UDPSSEND=1,10 //Sends data directly after the module wakes up from PSM mode.
>
send->12345qwert
OK

+UDPSSEND: 1,10 //Data is sent successfully.
+UDPRECV: 1,10,12345qwert //Receive data.
```

5.2 TCP Data Service

1. Configure the module after it is started.

```
AT //Check whether the AT communication works properly.
OK

AT+CEREG? // Query network registration status.
+CEREG: 0,1
OK

AT+NVSETPM=2 //Enable low power consumption mode.
OK

AT+CEDRXS=1 //Enable eDRX mode.
OK
```

```
AT+CPSMS=1          //Enable PSM mode.
OK
```

/*****Set PSM mode report as required*****/

```
AT+IPR=?           //Query the baud rates that the module supports.
+IPR: 0,2400,4800,9600,14400,19200,28800,33600,38400,57600
OK
```

```
AT+IPR=9600        //Set the baud rate to 9600.
OK
```

```
AT+NEONBIOTCFG=0,0,1,0 //Set automatic PSM status report.
OK
```

2. Data service

```
AT+XIIC=1          //Obtain the IP address manually.
OK
```

```
AT+XIIC?
+XIIC: 1,100,86.248.125
OK
```

```
AT+TCPSETUP=0,58.60.184.213,10115 //Set up a TCP connection. Note the IP address and port
you use.
OK
+TCPSETUP: 0,OK
```

```
AT+TCPSEND=0,10 //Send data through the TCP connection.
>
send->12345qwert
OK
```

```
+TCPSEND: 0,10 //Data is sent successfully.
+TCPRECV: 0,10,12345qwert //Receive data. The receiving mode can be set by issuing
AT+RCVMODE. For details, see AT command manuals.
```

3. Wait to enter lower power consumption mode.

/*****PSM status is reported if the automatic report function is set*****/

```
+PSMEVENT: ENTER PSM //The module enters PSM mode.
[ ] AT //The module still responds to service request from network but does not respond
to AT commands in PSM mode.
[ ]
```

4. Wake up the module.

```
AT //After MCU pulls WAKEUP high and wakes up the module, it issues AT to detect baud
rate automatically. The module outputs +PBREADY.
+PBREADY
```

/*****PSM status is reported if the automatic report function is set*****/

```
+PSMEVENT: PSM WAKEUP
```

```
AT+TCPSEND=0,10 //The TCP connection is closed after the module wakes up from PSM mode.
Fails to send data directly.
```

```
+TCPSEND: SOCKET ID OPEN FAILED

AT+TCPSETUP=0,58.60.184.213,10115 //Set up a new TCP connection after the module wakes up
from PSM mode.
OK
+TCPSETUP: 0,OK

AT+TCPSEND=0,10 //Send data through the new TCP connection.
>
send->12345qwert
OK

+TCPSEND: 0,10 //Data is sent successfully.
+TCPRECV: 0,10,12345qwert //Data is received successfully.
```