# Standard Modules

## Low Power Consumption Application Note

Issue 1.0 Date 2020-01-10

**Notice**

This document provides guide for users to use standard modules.

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

THIS GUIDE PROVIDES INSTRUCTIONS FOR CUSTOMERS TO DESIGN THEIR APPLICATIONS. PLEASE FOLLOW THE RULES AND PARAMETERS IN THIS GUIDE TO DESIGN AND COMMISSION. NEOWAY WILL NOT TAKE ANY RESPONSIBILITY OF BODILY HURT OR ASSET LOSS CAUSED BY IMPROPER OPERATIONS.

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# Contents

# About This Document

## Scope

This document is applicable to Neoway standard modules.

## Audience

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

## Change History

| Issue | Date | Change | Changed By |
|-------|------|--------|------------|
| 1.0 | 2019-11 | Initial draft | Qin Weixing |

## Conventions

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

# 1 Overview

This document describes how to use the low power consumption function of the module, including the HW design, the method of entering SLEEP mode, the response processes of different services, and the method of exiting from SLEEP mode.

# 2 HW Design

You can use the DTR pin to control the sleep mode of the module together with AT commands.

> The pin that is used to enable SLEEP mode may varies with modules, for example, the PSM_WAKEUP of N58, the WAKEUP pin of N21, the SLEEP pin of N720V5 as well as the DTR pin of N720. For the HW design of different modules, refer to the relevant HW design guide.

If you do not use the sleep mode of the module, leave the pin floating.

To use the sleep mode, refer to the following interface design.
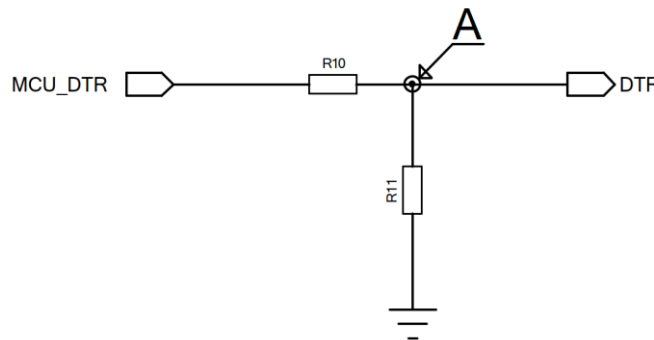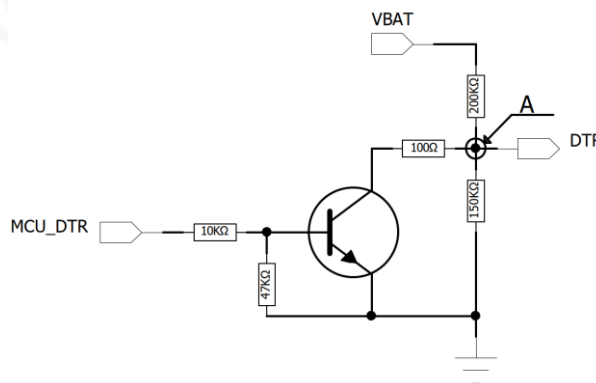
Figure 2-1 Reference design I of the DTR pin



Figure 2-2 Reference design II of the DTR pin



> ● Connect MCU_DTR to the GPIO of the MCU.
>
> ● The level at point A is divided by the resistor to match the level of the DTR pin of the module..

# 3 Entering Sleep Mode

To enter the sleep mode, send an AT command to enable SLEEP mode. Table 3-1 shows the AT command and parameters.

Table 3-1 AT command to control the sleep mode

| Description | To enable or disable sleep mode |
| --- | --- |
| Format | <ul><li>AT+ENPWRSAVE=\<n\>\<CR\></li><li>AT+ENPWRSAVE?\<CR\></li></ul> |
| Parameter | \<n\>：<br>0: Forbid sleep mode. (default)<br>1: Allow sleep mode (a low level at DTR triggers sleep mode)<br>2: Allow sleep mode (a high level at DTR triggers sleep mode) |
| Return Value | See the example. |
| Example | AT+ENPWRSAVE=1<br>OK     Enable sleep mode.<br><br>AT+ENPWRSAVE?<br>+ENPWRSAVE: 1     Query current sleep mode status.<br>OK |
| Remark | <ul><li>The setting by this command is not saved after the module is powered off.</li><li>Sleep mode is triggered by inputting a low level at DTR by default.</li><li>After this command is sent and low (or high) level is input at DTR, the module can enter sleep mode unless the circuit of each part inside the module allows.</li></ul> |

AT+ENPWRSAVE=1, for example, a module enters sleep mode in the following process:

1. Set the DTR pin of the module to a high level.

2. Send AT+ENPWRSAVE=1 to enable the sleep mode of the module.

3. Set the DTR pin to a low level to enter the sleep mode.

The module enters the sleep mode only when it is idle. If any data exchange is ongoing, it will finish processing them before entering the sleep mode.

The serial port of the module is closed and does not respond to AT commands in the sleep mode.

For the current consumed in sleep mode, see the relevant product specifications. The module can

respond to incoming calls, incoming SMS messages, and data service in time by exiting from SLEEP mode temporarily. It enters the sleep mode again after completing the service. The external MCU can also control the sleep mode of the module through the DTR pin.

Figure 3-2 The process of entering the sleep mode
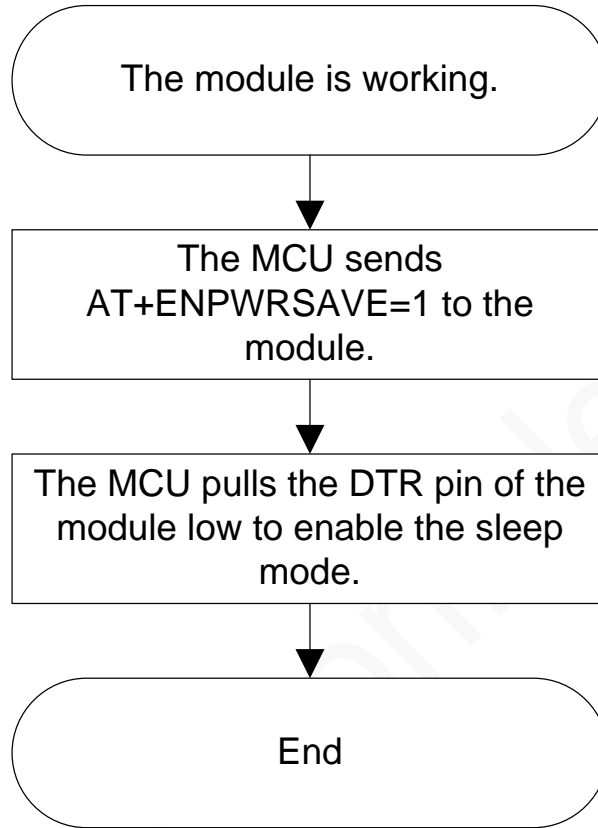
# 4 Outgoing Services

To initiate a data or call service, the MCU sets the DTR pin of the module to a high level to exit from the sleep mode. Then the serial port is opened and can respond to the AT command. After the outgoing service is processed, the MCU sets the DTR pin to a low level and the module enters the sleep mode.

Figure 4-1 shows the flowchart of an outgoing service in SLEEP mode.

Figure 4-1 The process of initiating a data or call service in SLEEP mode
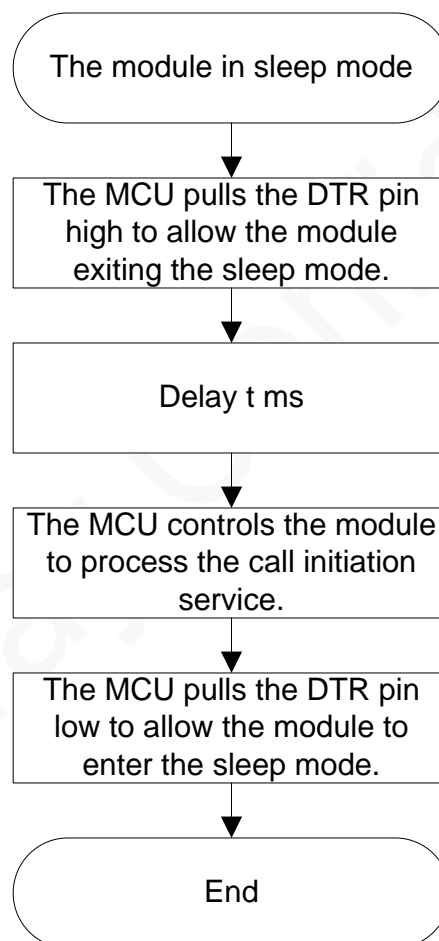


⚠ The delay time 't' varies with modules.

Set the delay time according to the actual situation. It is set to 1 s generally.

# 5 Incoming Services

The module will exit from the sleep mode immediately and prints prompt messages via the serial port when receiving an incoming call, an incoming SMS message or data from the server. After the MCU detects the serial port message, set the DTR pin to a high level before processing the services. Pull the DTR low to allow the module to enter the sleep mode again.

If the DTR pin is not set to a high level and the serial port does not receive any command, the module will enter the sleep mode automatically after the call ends.

Figure 5-1 shows the flowchart of an incoming service.

Figure 5-1 The process of receiving data or call services in SLEEP mode
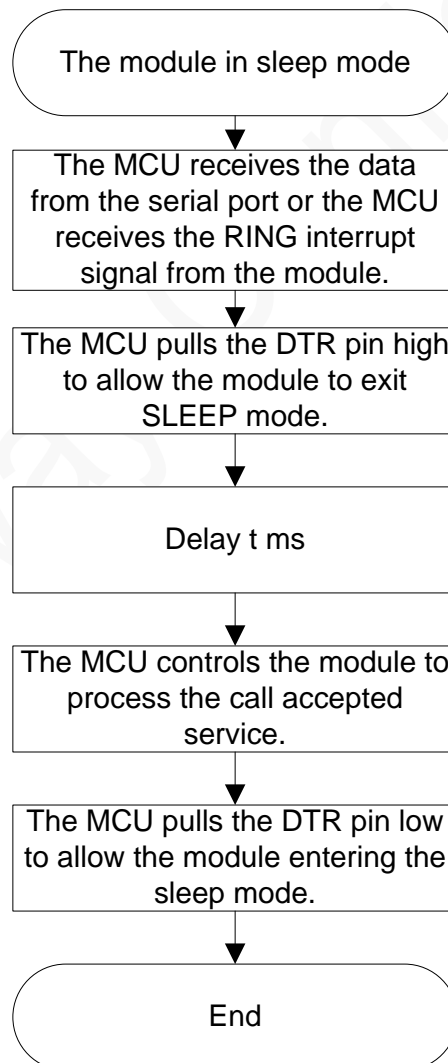
# 6 Disabling Sleep Mode
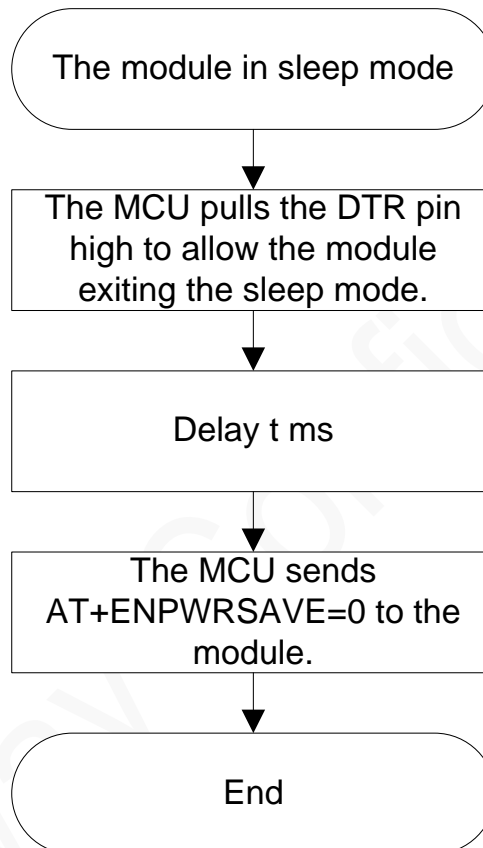
You can disable the sleep mode without restarting the module.

Figure 6-1 The process of disabling SLEEP mode

```
┌──────────────────────────────────┐
│    The module in sleep mode      │
└──────────────────────────────────┘
                 │
                 ▼
┌──────────────────────────────────┐
│  The MCU pulls the DTR pin       │
│  high to allow the module        │
│  exiting the sleep mode.         │
└──────────────────────────────────┘
                 │
                 ▼
┌──────────────────────────────────┐
│           Delay t ms             │
└──────────────────────────────────┘
                 │
                 ▼
┌──────────────────────────────────┐
│        The MCU sends             │
│  AT+ENPWRSAVE=0 to the           │
│         module.                  │
└──────────────────────────────────┘
                 │
                 ▼
┌──────────────────────────────────┐
│             End                  │
└──────────────────────────────────┘
```

⚠ To use the USB port of the module for communication, ensure that the VBUS pin of the USB port is controllable in your hardware design. The power supply of VBUS shall be cut before the module enters the sleep mode. Otherwise, the module cannot enter the sleep mode.