



# NPM301Z Serial Server Module Hardware Manual


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## 3onedata Co., Ltd.

Headquarter address: 3/B, Zone 1, Baiwangxin High Technology Industrial Park, Song Bai Road,  
Nanshan District, Shenzhen, 518108, China

Technology support: [tech-support@3onedata.com](mailto:tech-support@3onedata.com)

Service hotline: +86-400-880-4496

E-mail: [sales@3onedata.com](mailto:sales@3onedata.com)

Fax: +86-0755-26703485

Website: <http://www.3onedata.com>

## Preface

NPM301Z serial server module hardware user manual has introduced:

- Product features
- Hardware Description

## Audience



This manual mainly suits for engineers as follows:




- Network administrator responsible for network configuration and maintenance
- On-site technical support and maintenance staff
- Hardware engineer

## Text Format Convention

Format	Description
“”	Words with “” represent the interface words. e.g.: "The port number".
>	Multi-level paths are separated by ">". Such as opening the local connection path description: Open "Control Panel> Network Connection> Local Area Connection".
Light Blue Font	It represents the words clicked to achieve hyperlink. The font color is as follows: 'Light Blue'.
About this chapter	The section 'about this chapter' provides links to various sections of this chapter, as well as links to the Principles Operations Section of this chapter.

## Symbols

Format	Description
 Notice	Remind the announcements in the operation, improper operation may result in data loss or equipment damage.
 Warning	Pay attention to the notes on the mark, improper operation

Format	Description
	may cause personal injury.
 Note	Make a necessary supplementary instruction for operation description.
 Key	Configuration, operation, or tips for device usage.
 Tips	Pay attention to the operation or information to ensure success device configuration or normal working.

## Revision Record

Version No.	Revision Date	Revision Description
01	2020-10-30	Manual development

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# 1 Product Overview

## 1.1 Product Introduction

NPM301Z a high-performance embedded serial-to-Ethernet module with embedded network transformer, which can realize 10Base-T/100Base-TX self-adaptive Ethernet interface only by adding an RJ45 port. The module has a serial communication rate of 300 bps-115,200 bps, and has multiple working modes such as RealCom, TCP Server, TCP Client, UDP Server, Pair Master, Pair Slave, UDP Rang and UDP Multicast, and supports up to four connections and functions such as domain name access.

All settings of NPM301Z module are realized through serial port or network, which can be used as communication processor between serial device and PC, or remote communication between multiple serial devices. It can be widely used in PLC control and management, Building Automation System, Health Care Automation System, measuring instrument and environmental forces monitoring system.

## 1.2 Product Function

- Adopt 32-bit ARM processor
- Support 10/100Base-T(X) self-adaptive Ethernet interface
- Support AUTO MDI/MDIX and can be connected using either cross-wire or through wire
- Support 300bps-115200bps line speed and non-blocking communication
- Support RealCom, TCP Server, TCP Client, UDP Server, UDP Client, Pair Master, Pair Slave, UDP Rang, UDP Multicast and other operating modes
- Support cross-gateway and cross-router communication

- Support multiple hosts polling mode, which allows multiple hosts to access the same serial port
- Support delimiter matching communication, achieving various demands for serial port packaging
- Support FIFO, compatible with various old type terminal devices
- Support IP address and MAC address filtering, which can achieve accurate access control easily
- Support graded user management to implement humanized authority management
- Support serial port status and parameters monitoring, ensuring the communication status be clear at a glance
- Support RTS/CTS, DTR/DSR and XON/XOFF flow control
- Compatible with various virtual serial port management software
- Support virtual serial port drive access mode and automatic connection recovery after network interruption
- Flexible serial port data framing setting, which can satisfy user's various demands for data packets segmentation
- Support standard TCP/IP SOCKET application access
- TCP supports multi-connection, which allows maximum 4 users to monitor or manage the serial device simultaneously
- UDP supports single machine or multi-machine communication, which allows multiple users to monitor or manage the serial device simultaneously
- Support multiple configuration forms like Windows configuration tool, serial port and WEB



## 2 Product Features

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### **TCP/UDP Direct Programmatic Access**

The NPM301Z module supports TCP/UDP Ethernet direct access mode in the form of standard API interfaces such as WINSOCK, and can realize all control and transmission processes through simple programming. In most cases, direct programmatic access can realize error-free connection, which is the best solution.

### **Virtual Serial Port Access**

For most serial devices based on serial programmatic access, reprogramming is not necessarily the best choice. The NPM301Z module provides a virtual serial port access mode. Users only need to install the driver included with the product, and they can generate multiple virtual serial ports simulated by the driver on the PC. The user software can transparently access the remote serial device by opening the virtual serial port of the software, without having to ask the complicated Ethernet access process, and all the Ethernet control and transmission processes related to NPM301Z module are completed by the driver.

### **Two serial device networking servers are interconnected**

Sometimes, users just need to extend the serial port distance through Ethernet. NPM301Z module supports this application that point-to-point interconnection between two devices can be realized by simple setup without programming and driver.

## **Networking server with multiple hosts sharing the same serial device**

In many cases, multiple users need to share data resources from the same serial port. At this time, multiple hosts need to be able to access the same serial device networking server. The NPM301Z module can work in this mode according to the needs of users, allowing multiple hosts to access the same serial port in a time-sharing manner.

## **A host accesses multiple serial device networking servers**

In the data acquisition system, because the acquisition device may be scattered, it is often necessary for one host to access multiple serial device networking servers. NPM301Z module provides two ways to support this situation: one way is to establish multiple virtual serial ports on the host for accessing different serial device networking servers; Another method is to access all the serial device networking servers through a virtual serial port. Users can choose these two methods reasonably according to their own characteristics.

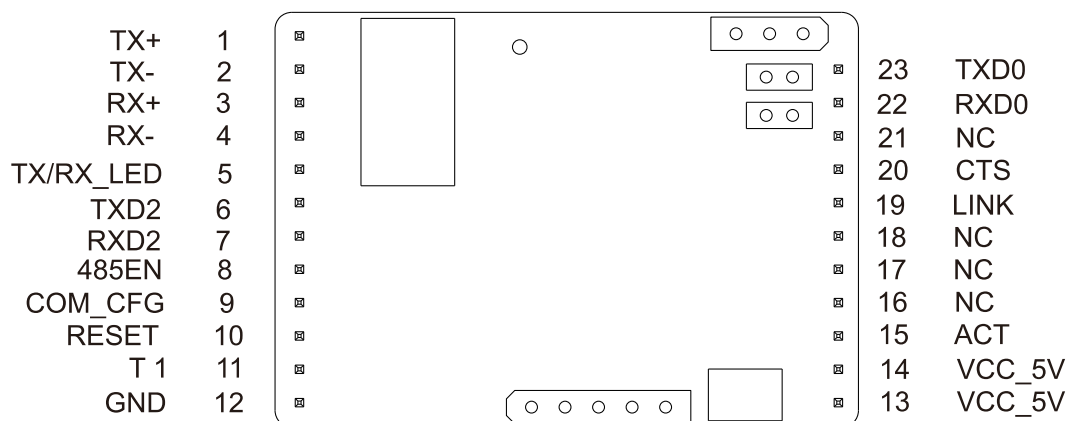
## **Support cross-route transmission**

Many projects need to connect devices at both ends through routers. NPM301Z module can easily connect opposite devices across routers, and the setup process is also very simple.

# 3 Hardware Description

## 3.1 PIN Distribution

Pin diagram of NPM301Z encapsulation (top view):



### Pin definition list of NPM301Z

PIN	PIN name	PIN	PIN name
1	TX+	2	TX-
3	RX+	4	RX-
5	TX/RX_LED	6	TXD2
7	RXD2	8	485EN
9	COM_CFG	10	RESET
11	T1	12	GND
13	VCC_5V	14	VCC_5V
15	ACT	16	NC
17	NC	18	NC

PIN	PIN name	PIN	PIN name
19	LINK	20	CTS
21	NC	22	RXD0
23	TXD0		

### Detailed Description of NPM301Z Pin:

Pin No.	Name	Type	Description
1	TX+	Output	Positive end of Ethernet differential output signal
2	TX-	Output	Negative end of Ethernet differential output signal
3	RX+	Input	Positive end of Ethernet differential input signal
4	RX-	Input	Negative end of Ethernet differential input signal
5	TX/RX_LED	Output	Serial port data transmission indicator
6	TXD2	Output	(0-5V) TTL level output pin
7	RXD2	Input	(0-5V) TTL level input pin
8	RTS/ 485EN	Output	<p>The pin definition varies according to the serial communication mode configured by the network management software:</p> <ul style="list-style-type: none"> <li>When the serial port is configured as RS232, it indicates that the device requests to send signal pins and adopts full duplex mode;</li> <li>When the serial port is configured as RS485, it indicates the data transmission direction control pin. It adopts half-duplex mode and direction control is automatically realized by the module. Low level indicates receiving status, and no data is currently sent.</li> </ul>
9	COM_CFG	Input	AT command setting pin, and the module will enter the AT command mode after continuous low level input for at least 200 microseconds

Pin No.	Name	Type	Description
10	RESET	Input	Module reset pin, low level is active, and the module will enter reset state after continuous low level input for at least 200 microseconds
11	T1	-	Protective grounding
12	GND	-	Signal ground
13	VCC_5V	Input	Power input pin, 5V±5% (123mA DC power supply in low power mode and 186 mA DC power supply in high performance mode)
14	VCC_5V	Input	Power input pin, 5V±5% (123mA DC power supply in low power mode and 186 mA DC power supply in high performance mode)
15	ACT	Output	Ethernet port data receiving and sending indication pin
16	NC	Reserved	Reserved
17	NC	Reserved	Reserved
18	NC	Reserved	Reserved
19	LINK	Output	Ethernet port connection status indication pin
20	CTS	Input	Clear To Send signal pin. When CTS is valid, it is set to work in full duplex mode, the device clears the sending signal (RS-232 full duplex mode), and LOW allows to send
21	NC	Reserved	Reserved
22	RXD0	Reserved	Debug serial port pin. It should be suspended when not in use
23	TXD0	Reserved	Debug serial port pin. It should be suspended when not in use



Notice

Please leave unused pins suspended when designing!

## 3.2 Ethernet Port Description

Name	Pin No.	Type	Description
TX+	1	Output	Positive end of Ethernet differential output signal
TX-	2	Output	Negative end of Ethernet differential output signal
RX+	3	Input	Positive end of Ethernet differential input signal
RX-	4	Input	Negative end of Ethernet differential input signal



Notice

NPM301Z module has embedded Ethernet communication transformer, which can realize 10Base-T/100Base-TX Ethernet interface only by adding an RJ45 port. To improve anti-interference, the module and RJ45 port should be as close as possible.

## 3.3 Power Supply Interface Description

Name	Pin No.	Type	Description
VCC_5V	13, 14	Input	Power input pin, 5V±5% (123mA DC power supply in low power mode and 186 mA DC power supply in high performance mode)

## 3.4 Serial Port and I/O Port Description

Name	Pin No.	Type	Description
TXD2	6	Output	(0-5V) TTL level output pin
RXD2	7	Input	(0-5V) TTL level input pin
RTS/ 485EN	8	Output	The pin definition varies according to the serial communication mode configured by the network management software: <ul style="list-style-type: none"> <li>When the serial port is configured as RS232, it indicates that the device requests to send signal pins and</li> </ul>

			<ul style="list-style-type: none"> <li>adopts full duplex mode; When the serial port is configured as RS485, it indicates the data transmission direction control pin. It adopts half-duplex mode and direction control is automatically realized by the module. Low level indicates receiving status, and no data is currently sent.</li> </ul>
CTS	20	Input	Clear To Send signal pin. When CTS is valid, it is set to work in full duplex mode, the device clears the sending signal (RS-232 full duplex mode), and LOW allows to send



Notice

All serial ports and I/O ports of NPM301Z meet TTL level standard (interface chips such as MAX232 and MAX485 can be directly connected). I/O port can be used as both output and input. The maximum driving capacity of each I/O port is 20mA, and the total current of all I/O of the chip cannot exceed 100mA.

## 3.5 LED Indication Pin Description

Name	Pin No.	Type	Description
ACT	15	Output	Ethernet port data receiving and sending indication pin. Its indicator blinks when there exists data transmission
LINK	19	Output	Ethernet port connection status indication pin. Its indicator will be on when the network Link is normal

## 3.6 Other Pin Description

Name	Pin No.	Type	Description
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COM_C FG	9	Input	AT command setting pin, and the module will enter the AT command mode after continuous low level input for at least 200 microseconds
RESET	10	Input	Module reset pin, low level is active, and the module will enter reset state after continuous low level input for at least 200 microseconds
T1	11	-	Protective ground pin
GND	12	-	Signal ground pin
NC	16 , 17 , 18, 21	Reserved	Reserved

### 3.7 Debug Serial Port Description

Name	Pin No.	Type	Description
RXD0	22	Input	Debug Serial Port PIN
TXD0	23	Output	Debug Serial Port PIN

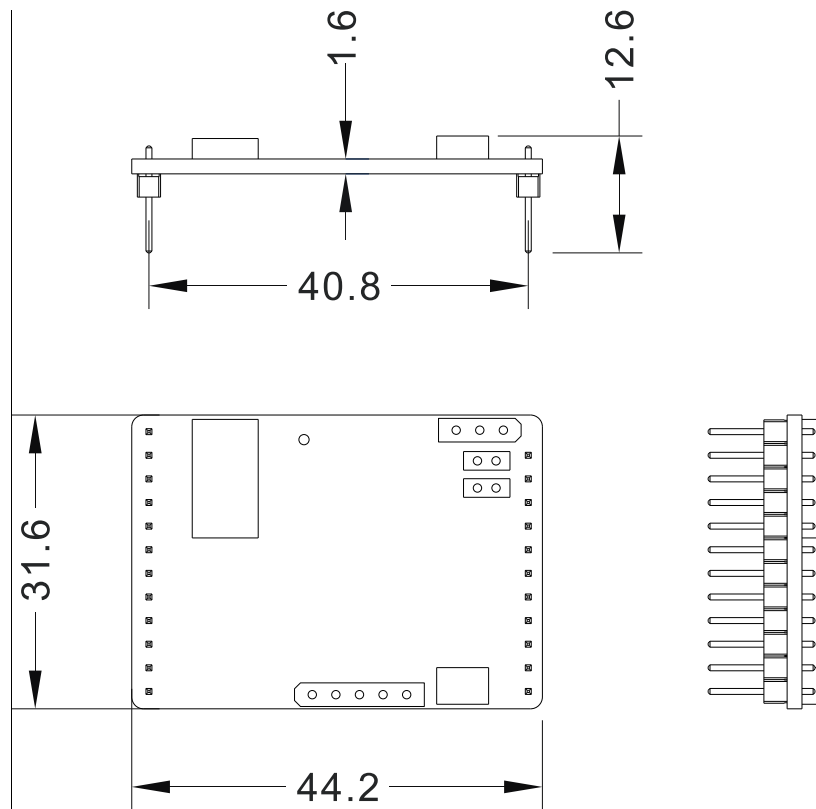
### 3.8 Description of Module's Other Functions

Name	Pin No.	Description
GND	24	Signal ground (The baseplate needs no external connection and is used with No. 25 foot)
DEF	25	Restore the factory settings pin that shorts out with No. 24 foot. The module will restore the factory settings after being power up again for continuous low level input for at least 200 microseconds
POWER	26	Power indicator



## 4 Machine Dimension Figure

Top view of module and machine dimension:



# 5

## Product Performance and Parameter

### Ethernet port:

- Standard: 10Base-T/100Base-T
- Protocol: TCP, UDP, ARP, ICMP, HTTP, DHCP and DNS protocols are supported
- Rate: 10M/100M
- Work mode: full duplex mode or half duplex mode
- Operating mode: Support RealCom, TCP Server, TCP Client, UDP Server, UDP Client, Pair Master, Pair Slave, UDP Rang, UDP Multicast and other operating modes

### Serial port:

- interface: TTL serial port (5V)
- TTL: TXD, RXD, CTS, RTS, GND
- Parity: None, Even, Odd, Space, Mark
- Data bit: 5bit, 6bit, 7bit, 8bit
- Stop bit: 1bit, 1.5bit, 2bit
- Baud rate: 300bps-115200bps

### Software:

- Configuration method: Web browser, Windows HyperTerminal, BlueEyes\_II management software

### Power supply:

- Power input: 5VDC±5%
- Power consumption  
No-load: 0.6W@5VDC  
Full-load: 0.7W@5VDC

### Working environment:

- Operating temperature: -40~75℃, 5~95%RH (operating humidity)

- Storage temperature: -40~85℃, 5~95%RH (operating humidity)

### Structure:

- Dimension (L × W × H): 44.2mm×31.6mm×12.6mm (including pins), with 12 pins in the left row and 11 pins in the right row, and a pin spacing of 2.54mm.
- Weight: 7g

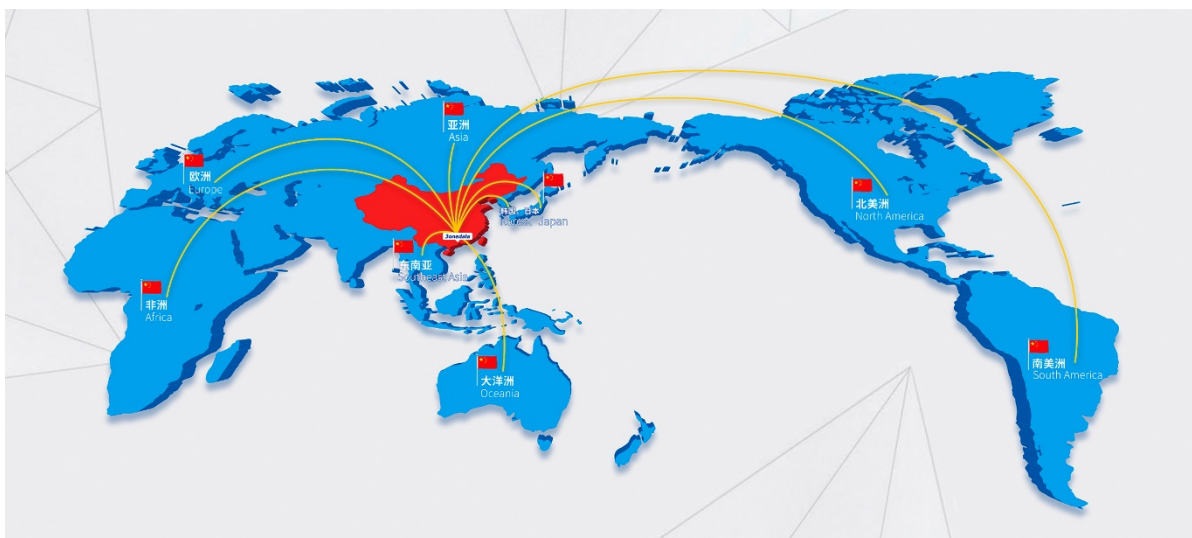
### Warranty:

- Warranty period: 3 years

### Certification:

- Security: UL508(in authentication)
- Shock: IEC 60068-2-27
- Free fall: IEC 60068-2-32
- Vibration: IEC 60068-2-6

Please check the website of 3onedata for the latest product certification updates



## **3onedata Co., Ltd.**

Address: 3/B, Zone 1, Baiwangxin High Technology Industrial park, Nanshan District, Shenzhen, 518108 China

Tel: +86-755-26702668

E-mail: [sales@3onedata.com](mailto:sales@3onedata.com)

Fax: +86-755-26703485

Website: <http://www.3onedata.com>