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NPM301 Serial Server Module

Hardware Manual

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Preface

NPM301 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

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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	2022-03-03	Manual development
02	2023-03-21	Delete AT comand
03	2024-11-28	Modify the RXD pin description, TTL is 0-3.3V

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1 Product Overview

1.1 Product Introduction

NPM301 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 NPM301 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

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- 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

- Operating temperature: -40～75℃

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2 Product Features

TCP/UDP Direct Programmatic Access

The NPM301 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 NPM301 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 NPM301 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. NPM301 module supports this application that point-to-point interconnection between two devices can be realized by simple setup without programming and driver.

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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 NPM301 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. NPM301 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

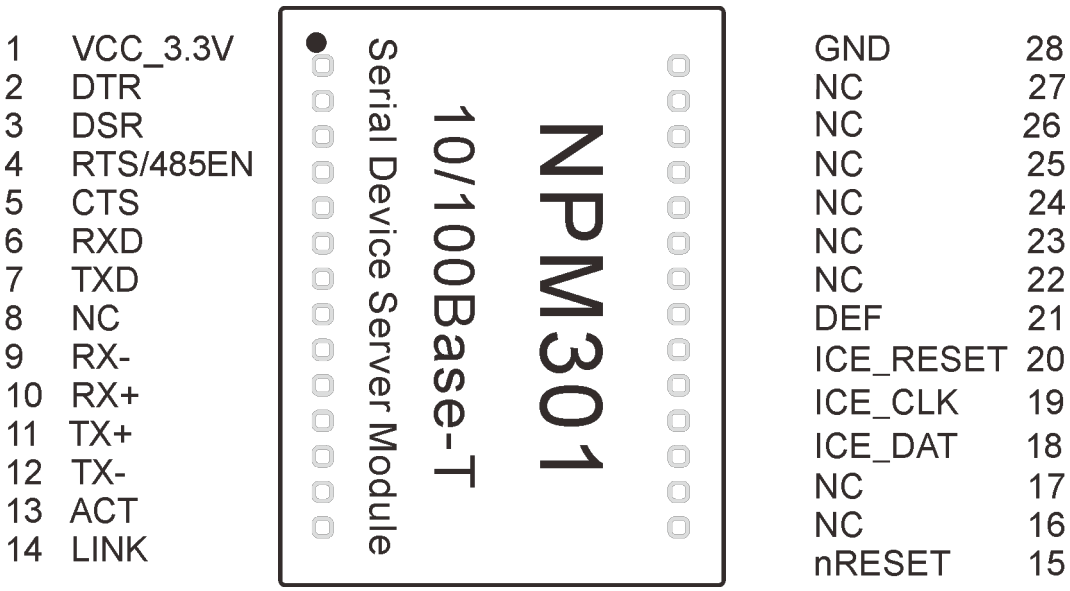
Many projects need to connect devices at both ends through routers. NPM301 module can easily connect opposite devices across routers, and the setup process is also very simple.

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3 Hardware Description

3.1 PIN Distribution

Pin diagram of NPM301 encapsulation (top view):



Pin definition list of NPM301

PIN	PIN name	PIN	PIN name
1	VCC_3.3V	2	DTR
3	DSR	4	RTS/ 485EN
5	CTS	6	RXD
7	TXD	8	NC
9	RX-	10	RX+
11	TX+	12	TX-

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PIN	PIN name	PIN	PIN name
13	ACT	14	LINK
15	nRESET	16	NC
17	NC	18	ICE_DAT
19	ICE_CLK	20	ICE_RESET
21	DEF	22	NC
23	NC	24	NC
25	NC	26	NC
27	NC	28	GND

Detailed Description of NPM301 Pin:

Pin No.	Name	Type	Description
1	VCC_3.3V	Input	Power input pin, 3.3V±5%
2	DTR	Output	Signal pin of Data Terminal Ready
3	DSR	Input	Signal pin of Data Set Ready
4	RTS/ 485EN	Output	The pin definition varies according to the serial communication mode configured by the network management software: • When the serial port is configured as RS232, it indicates that the device requests to send signal pins and 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.
5	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
6	RXD	Input	(0-3.3V) TTL level input pin

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Pin No.	Name	Type	Description
7	TXD	Output	(0-3.3V) TTL level output pin
8	NC	Reserved	Reserved
9	RX-	Input	Negative end of Ethernet differential input signal
10	RX+	Input	Positive end of Ethernet differential input signal
11	TX+	Output	Positive end of Ethernet differential output signal
12	TX-	Output	Negative end of Ethernet differential output signal
13	ACT	Output	Ethernet port data receiving and sending indication pin
14	LINK	Output	Ethernet port connection status indication pin
15	nRESET	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
16	NC	Reserved	Reserved
17	NC	Reserved	Reserved
18	ICE_DAT	Output	Used when burning softwares and it should be suspended when not in use
19	ICE_CLK	Input	Used when burning softwares and it should be suspended when not in use
20	ICE_RESET	Input	Used when burning softwares and it should be suspended when not in use
21	DEF	Input	Restore the factory settings. The module will restore the factory settings after being power up again of continuous low level input for at least 200 microseconds
22	NC	Reserved	Reserved
23	NC	Reserved	Reserved
24	NC	Reserved	Reserved

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Pin No.	Name	Type	Description
25	NC	Reserved	Reserved
26	NC	Reserved	Reserved
27	NC	Reserved	Reserved
28	GND		Signal ground

Notice

Please leave unused pins suspended when designing!

3.2 Ethernet Port Description

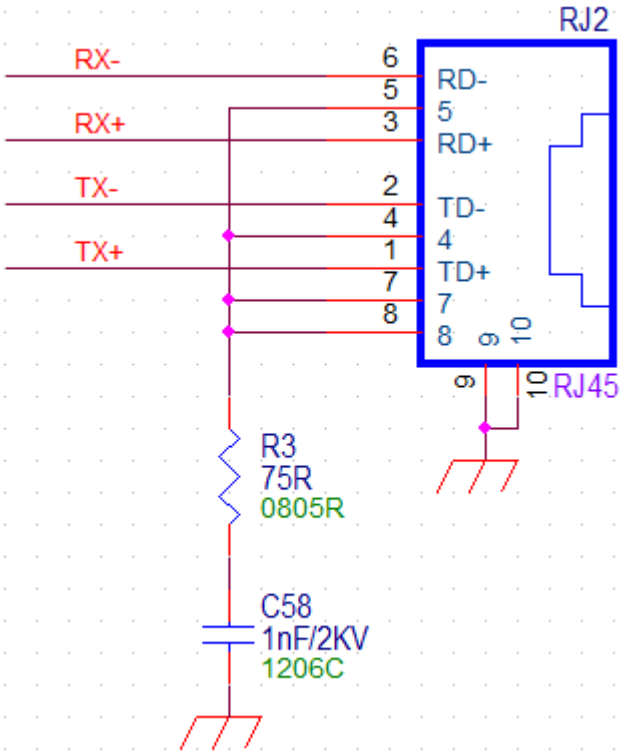
Name	Pin No.	Type	Description
TX+	11	Output	Positive end of Ethernet differential output signal
TX-	12	Output	Negative end of Ethernet differential output signal
RX+	10	Input	Positive end of Ethernet differential input signal
RX-	9	Input	Negative end of Ethernet differential input signal

Notice

NPM301 module has embedded Ethernet communication transformer, which can realize 10 /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.

If RJ45 is added，you can refer to the recommended circuit as below:

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3.3 Power Supply Interface Description

Name	Pin No.	Type	Description
VCC_3.3V	1	Input	Power input pin, 3.3V±5%

3.4 Serial Port and I/O Port Description

Name	Pin No.	Type	Description
TXD	7	Output	(0-3.3V) TTL level output pin
RXD	6	Input	(0-3.3V) TTL level input pin
RTS/ 485EN	4	Output	The pin definition varies according to the serial communication mode configured by the network management software: • When the serial port is configured as RS232, it indicates that the device requests to send signal pins and adopts full duplex mode;

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			• 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.
CTS	5	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
DTR	2	Output	Signal pin of Data Terminal Ready
DSR	3	Input	Signal pin of Data Set Ready

Notice

All serial ports and I/O ports of NPM301 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	13	Output	Ethernet port data receiving and sending indication pin. Its indicator blinks when there exists data transmission
LINK	14	Output	Ethernet port connection status indication pin. Its indicator will be on when the network Link is normal

3.6 Burning Software Description

Name	Pin No.	Type	Description
ICE_DAT	18	Output	Used when burning softwares
ICE_CLK	19	Input	Used when burning softwares

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ICE_RESET	20	Input	Used when burning softwares

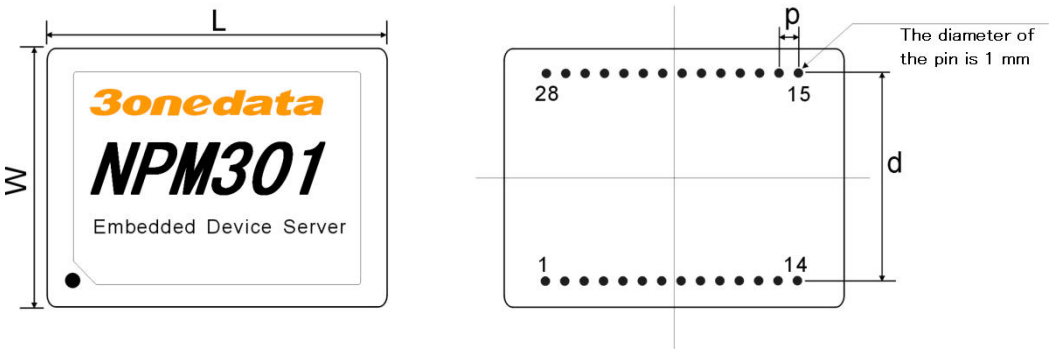
3.7 Other Pin Description

Name	Pin No.	Type	Description
nRESET	15	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
DEF	21	Input	Restore the factory settings. The module will restore the factory settings after being power up again of continuous low level input for at least 200 microseconds
GND	28	-	Signal ground pin
NC	8，16，17，22，23，24，25，26，27	Reserved	Reserved

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4 Machine Dimension Figure

Top view of module and machine dimension:



L	32.5mm	Length
W	25mm	Width
H	8.5mm	Height (pin length is not included, pin 5.3mm)
d	20mm	Width between two rows of pins
p	2.0mm	Pin header spacing

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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 (3.3V)
- TTL: TXD, RXD, CTS, RTS, DTR, DSR, 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: 3.3VDC±5%
- Power consumption
  No-load: 0.6W@3.3VDC
  Full-load: 0.7W@3.3VDC

Working environment:

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

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

Structure:

- Dimension (L × W × H): 32.5mm×25mm×8.5mm (including pins), with 14 pins in the left row and 14 pins in the right row, and a pin spacing of 2.0mm.
- Weight: 7g

Warranty:

- Warranty period: 3 years

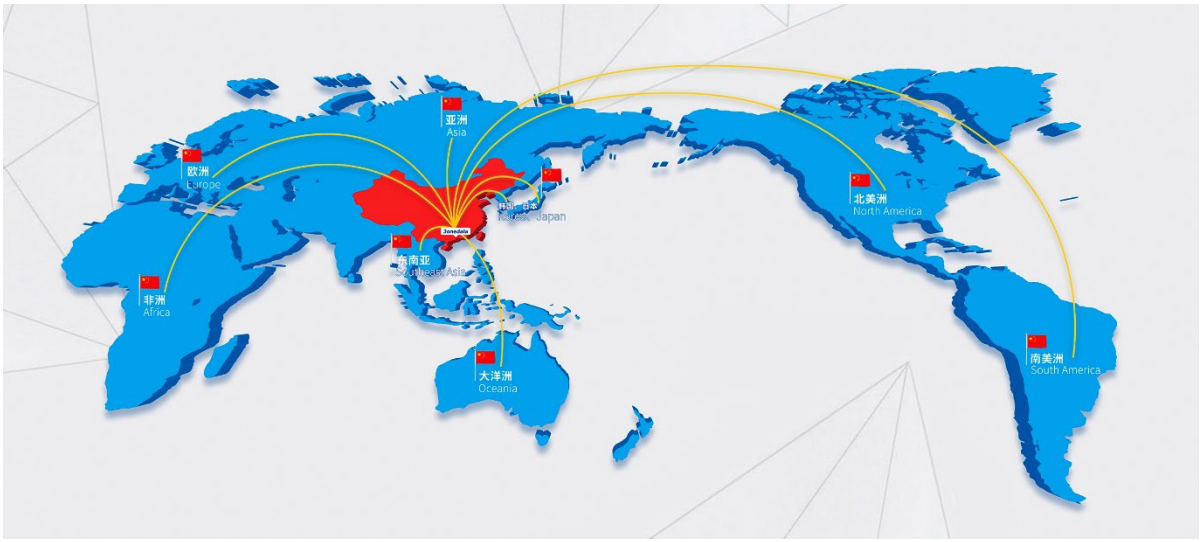
Certification:

- 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

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