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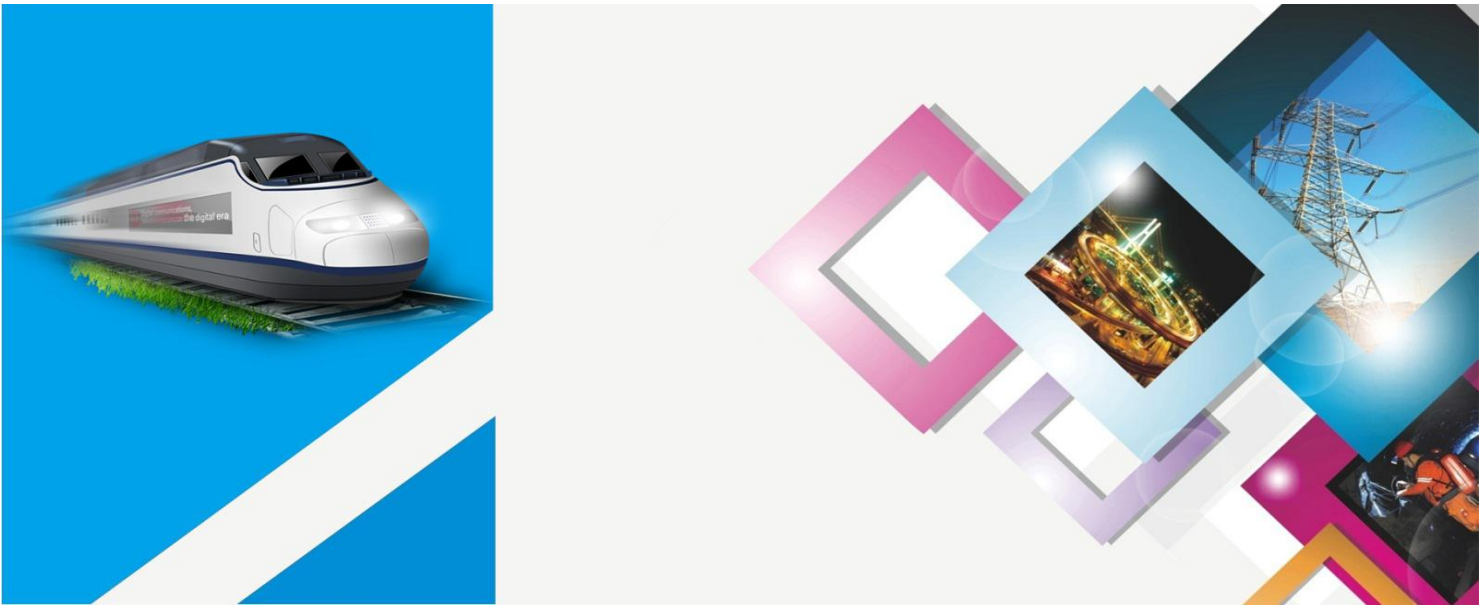

NPM301 Serial Server Module

Hardware Manual

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Industrial Ethernet communication solutions experts **3onedata Co., Ltd.**

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Preface

The quick installation guide of NPM301 serial server module introduces:

- Product features
- Hardware description

Readers

This manual mainly suits for the 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 interface word. e.g.: "Port number".
>	Multi-level path is separated by ">".Such as open the local connection path description: Open "Control Panel > Network Connection > Local Connection".
Light blue font	It represents the words clicked to achieve hyperlink. Font color as: "Light blue".
About this chapter	The "About This Chapter" section provides links to each section and corresponding principles/operating chapters in this chapter.

Icon Convention

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 may cause personal injury.

Format	Description
 Note	Conduct a necessary supplements and explanations for the description of operation content.
 Key	Configuration, operation or tips for device usage.
 Tips	Pay attention to the operation or information for ensuring success device configuration or normal working.

Revision History

Version NO.	Revision Date	Revision Description
01	7/22/2013	Product release
02	10/1/2013	Document upgrade
03	9/12/2019	Document upgrade

Contents

1 Product Overview

1.1 Product Introduction

NPM301 is a high-performance embedded serial to Ethernet module. It can implement self-adaptive 10Base-T/100Base-TX Ethernet port. Its serial port has communication rate of 300 bps-115200bps and multiple operating modes like TCP Server, TCP Client, TCP Auto, UDP and Real COM. It supports up to 4 connections and other functions such as domain name visiting.

All settings of NPM301 module can be achieved through serial port and network. The module can be used as a 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, medical care automation system, measuring instrument, and environment power monitoring system.

1.2 Product Function

- Adopt 32-bit ARM processor
- Support self-adaptive 10/100M Ethernet interface
- Support AUTO MDI/MDIX, using crossed or cut-through network cable for connection
- Support 300bps-115200bps wire speed non-blocking communication
- Support low power consumption mode and high performance mode.
- Support multiple operating modes like TCP Server, TCP Client, TCP Auto, UDP and Real COM driver. Operating port, destination IP address and port are all configurable

- Support WEB server management, which is convenient for client to configure webpage
- Support AT command, convenient for user's secondary development
- Support DNS, can meet the requirement of achieving communication via domain name
- Support virtual serial port drive access mode and automatic recovery and reconnection from network interrupt
- Flexible serial port data framing setting, can meet user's various requirements for data partition
- Support SOCKET operating modes (TCP Server, TCP Client, UDP etc.)
- Flexible serial port data framing setting, can meet user's various requirements for data partition
- TCP supports multi-connection, enable up to 4 users to manage the device with embedded module simultaneously
- In UDP mode, it supports stand-alone and multi-computer communication, enable multiple users to manage the device with embedded module simultaneously
- Support multiple configurations like SOCKET, serial port and WEB
- Support both local and remote system firmware upgrade
- -40～75℃ operating temperature

2 Product Features

TCP/UDP Direct Programmatic Access

NPM301 module supports TCP/UDP Ethernet direct access mode of standard API interface form such as WINSOCK. It can implement all control and transmission process through easy programming. In most cases, direct programmatic access, which could achieve error-free connection, is the best solution.

Virtual Serial Port Access

For most serial devices based on serial port programmatic access, reprogramming is not always the best choice. NPM301 module provides a virtual serial port access mode. User only needs to install the driver that comes with the product, and then multiple virtual serial ports would be created on PC. User software can transparently access remote serial port device by opening the serial port virtualized by software and need no complicate Ethernet access process. And all Ethernet control and transmission process related to NPM301 module could be operated on the driver.

Interconnection of Two Serial Device Networking Servers

Sometimes user can extend serial port distance via Ethernet only. NPM301 module supports this application, which is to implement point-to-point interconnection of two devices through easy settings and no need of programming and drivers.

Multiple Hosts Sharing One Serial Device Networking Server

In many cases, multiple users need to share data resources from one serial port; therefore, it needs multiple hosts to access one serial device networking server.

NPM301 module could operate in this mode according to user's requirements, allowing multiple hosts to access one serial port at different times.

One Host Accessing Multiple Serial Device Networking Servers

Because of the scattered distribution of collecting devices, it usually needs one host to access multiple serial device networking servers in data collecting system. NPM301 module provides two modes to support this situation: one is establishing multiple virtual serial ports for accessing different serial device networking servers respectively; the other is using one virtual port to access all serial device networking servers. User could reasonably choose those two modes according to their own features.

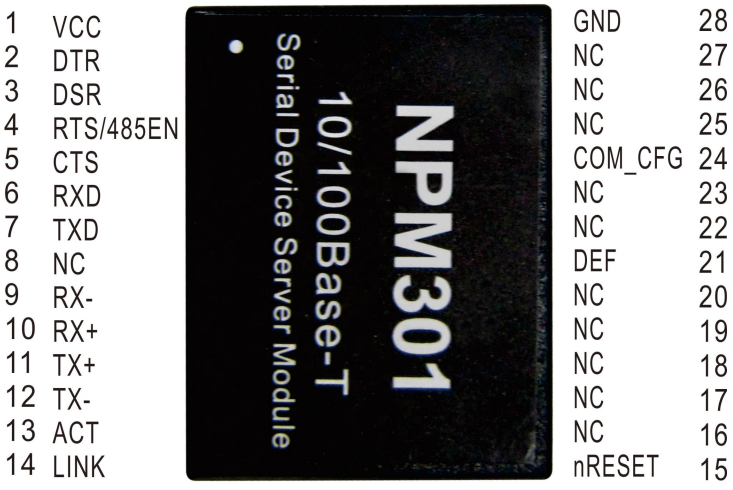
Support Cross-router Transmission

Routers are needed for connecting devices of both ends in many projects. NPM301 module could cross router to connect opposite device easily. The setup process is quite easy as well.

3 Hardware Description

3.1 Pin Distribution

NPM301 package pin diagram (top view):



Pin definition list of NPM301

Pin NO	Name	Pin NO	Name
1	VCC	2	DTR
3	DSR	4	RTS/ 485EN
5	CTS	6	RXD
7	TXD	8	NC
9	RX-	10	RX+

Pin NO	Name	Pin NO	Name
11	TX+	12	TX-
13	ACT	14	LINK
15	nRESET	16	NC
17	NC	18	NC
19	NC	20	NC
21	DEF	22	NC
23	NC	24	COM_CFG
25	NC	26	NC
27	NC	28	GND

Detailed description of NPM301 pin:

Pin NO	Name	Type	Description
1	VCC	Input	Power input pin: 3.3V±5%
2	DTR	Output	The ready signal pin for digital terminal device
3	DSR	Input	The ready signal pin for digital communication device
4	RTS/ 485EN	Output	Device request signal pins(RS-232 full duplex mode), LOW permit sending, when 485EN is valid, setting operation in half duplex mode, data direction control signal (RS-485 half duplex mode), its direction is controlled by module automatically. It is LOW and in receiving state when no data to send
5	CTS	Input	Pin of device erasing sending signal, when CTS is valid, setting operation in full duplex mode, device will erase sending signal (RS-232 full duplex mode), LOW permit sending.
6	RXD	Input	(0-5V)TTL level input pin
7	TXD	Output	(0 -3.3V) TTL level output pin
8	NC	Reserved	Reserved

Pin NO	Name	Type	Description
9	RX-	Input	The negative end of Ethernet differential input signal
10	RX+	Input	The positive end of Ethernet differential input signal
11	TX+	Output	The positive end of Ethernet differential output signal
12	TX-	Output	The negative end of Ethernet differential output signal
13	ACT	Output	Pin of Ethernet data transmission indication
14	LINK	Output	Pin of Ethernet connection state indication
15	nRESET	Input	Pin of module reset. Low level is valid. The module will be in reset state when the pin is input low level of at least 200 microsecond continuously.
16	NC	Reserved	Reserved
17	NC	Reserved	Reserved
18	NC	Reserved	Reserved
19	NC	Reserved	Reserved
20	NC	Reserved	Reserved
21	DEF	Input	Restoring to factory settings. The module will restore to factory setting when the pin is input low level of at least 200 microseconds continuously.
22	NC	Reserved	Reserved
23	NC	Reserved	Reserved
24	COM_CFG	Input	Pin of AT commend setting. The module will be in AT commend mode when the pin is inputted low level of at least 200 microsecond continuously.
25	NC	Reserved	Reserved
26	NC	Reserved	Reserved
27	NC	Reserved	Reserved

Pin NO	Name	Type	Description
28	GND		Signal grounding

Notice

Please hang the unused pin in the air during user design!

3.2 Ethernet Port Description

Name	Pin NO	Type	Description
TX+	11	Output	The positive end of Ethernet differential output signal
TX-	12	Output	The negative end of Ethernet differential output signal
RX+	10	Input	The positive end of Ethernet differential input signal
RX-	9	Input	The negative end of Ethernet differential input signal

3.3 Power Supply Port Description

Name	Pin NO	Type	Description
VCC	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) level output pin
RXD	6	Input	(0-5V) TL level input pin
RTS/	4	Output	Device request signal pin(RS-232 full duplex

485EN			mode), LOW permit sending, when 485EN is valid, setting operation in half duplex mode, data direction control signal (RS-485 half duplex mode), its direction is controlled by module automatically. It is LOW and in receiving state when no data to send
CTS	5	Input	Pin of device erasing sending signal, when CTS is valid, setting operation in full duplex mode, device will erase sending signal (RS-232 full duplex mode), LOW permit sending.
DTR	2	Output	The ready signal pin for digital terminal device
DSR	3	Input	The ready signal pin for digital communication device

Notice

All serial ports and I/O ports of NPM301 conform to TTL level standard (can connect to interface chips like MAX232, MAX485 directly). The I/O port could be used as both output and input port. The maximum drive capability of each I/O port is 25mA.

3.5 Pin Description of LED Indication

Name	Pin NO	Type	Description
ACT	13	Output	Pin of Ethernet data transmission indication. This indicator blinks when data is being transmitted.
LINK	14	Output	Pin of Ethernet connection state indication. It would be bright when network link is normal.

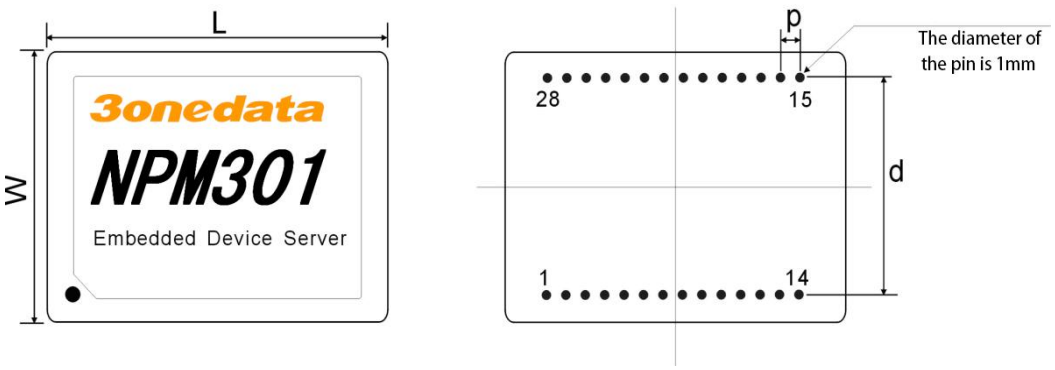
3.6 Other Pin Description

Name	Pin NO	Type	Description

COM_CFG	24	Input	Pin of AT commend setting. The module will be in AT commend mode when the pin is inputted low level of at least 200 microsecond continuously.
nRESET	15	Input	Pin of module reset. Low level is valid. The module will be in reset state when the pin is input low level of at least 200 microsecond continuously.
DEF	21	Input	Restoring to factory settings. The module will restore to factory setting when the pin is input low level of at least 200 microseconds continuously.
GND	28	–	Pin of signal grounding
NC	8, 16, 17, 18, 19, 20, 22, 23, 25, 26, 27	Reserved	Reserved

4 Mechanical Dimensional Drawing

Top view and mechanical dimension of the module:



L	32.5mm	Length
W	25mm	Width
H	8.5mm	Height (do not include pin length, pin length 5.3mm)
d	20mm	The width between two rows of pins
P	2.0mm	Pin spacing

5 Performance and Parameter

Ethernet port:

- Standard: 10Base-T/100Base-T
- Protocol: Support TCP, UDP, ARP, ICMP, HTTP, DHCP and DNS protocol
- Rate: 10M/100M
- Ways of operating: Full-duplex or half-duplex
- Operating mode: multiple operating modes like TCP Server, TCP Client, TCP Auto, UDP and Real COM driver are available in both low power consumption mode and high performance mode.

Serial port:

- Interface: TTL serial port(3.3V)
- TTL：TXD, RXD, CTS, RTS, DTR, DSR, GND
- Check bit: 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 hyper terminal, BlueEyes_II management software

Power supply:

- Power input: 3.3VDC±5%
- Low power consumption mode
  No-load: 0.2871W@3.3VDC
  Full-load: 0.4191W@3.3VDC
- High performance mode
  No-load: 0.5016W@3.3VDC
  Full-load: 0.6435W@3.3VDC

Operating environment:

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

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

Structure:

- Dimension (L×W×H): 32.5mm×25mm×8.5mm(includes pin) 14 pins on the left row, 14 pins on the right row, pin spacing is 2.0mm
- Weight: 9g

Warranty:

- Warranty period: 3 years

Certification description:

- Safety: UL508 (in the certification)
- Shock: IEC 60068-2-27
- Free fall: IEC 60068-2-32
- Vibration: IEC 60068-2-6

Please check 3onedata website for latest product certification trend

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