

Ethernet GPIO Modules

 Have a question? Enter a search term

SEARCH

Popular Search: USB GPIO (), USB Relay (), FPGA ()



16 Channel Ethernet GPIO Module With Analog Inputs

 1826 views

 February 18, 2016

 admin

 0



Search



- + Introduction
- + How to use the module
 - + Components/Tools required
 - + USB Interface
 - + Ethernet Interface
 - + DC Power Supply
 - + Factory Reset

- + GPIO/Analog inputs
- + Configure 16 Channel Ethernet GPIO
 - + Configuration Command Set
 - + Configuration command Images
- + Powering Up 16 Channel Ethernet GPIO module
- + Accessing the module
 - + Accessing the module using web interface
- + GPIO Status and Control
 - + Digital Input(I/P)
 - + Digital Output(O/P)
 - + Analog Input (I/P)
 - + Device Settings
- + Controlling the module through TELNET interface
- + Sending Commands
 - + The TELNET command set
- + Additional Information
 - + Analog to Digital Converter
 - + Using GPIOs with switches
- + Technical Specifications
- + FAQ
- + Mechanical Dimensions

Introduction [↗](#)



(<https://numato.com/blog/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-1.jpg>) Numato Lab's 16 Channel Ethernet GPIO Module is a versatile product for controlling electrical and electronic devices remotely from a PC over Ethernet link. Ease of use and wider operating system compatibility are the primary goals behind this product's design. This simplicity allows the use of off-the-shelf Terminal Emulation programs such as HyperTerminal and TeraTerm for controlling the module with a simple set of human-readable commands through Telnet or through easy to use Web interface. For power users, this module can be controlled by writing programs in various programming languages

Features:

- 16 TTL (3.3V) compatible GPIOs.
- 10 analog inputs with 10-bit resolution (multiplexed with digital IOs).
- Microcontroller: Microchip PIC18F97J60(1-Mbit Flash Microcontroller with 10Mbps Ethernet communication peripheral).
- Memory: Microchip 25LC1024 serial EEPROM provides 1024 Kbits of storage for both web pages and nonvolatile configuration.
- MAC Address: Separate Serial EEPROM(24AA02E48) with Globally Unique value used as MAC Address for the device.
- Reset Jumper: Resets the board to factory defaults.
- Password-protected Web console and Telnet communication interface.
- LED indication for Power.

Some of the possible uses of this module include:

- Home Automation
- Lighting Control
- Garden Equipment Control
- Industrial Automation
- Test Fixtures
- DIY and Hobby

[✎ Suggest edit](#)

How to use the module [↗](#)

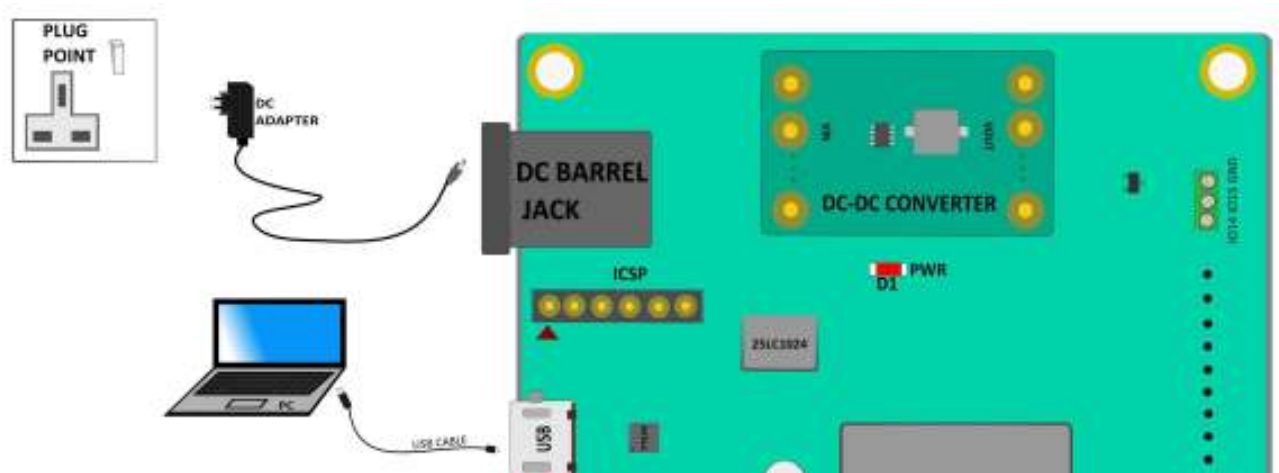
The following section describes how to use this module

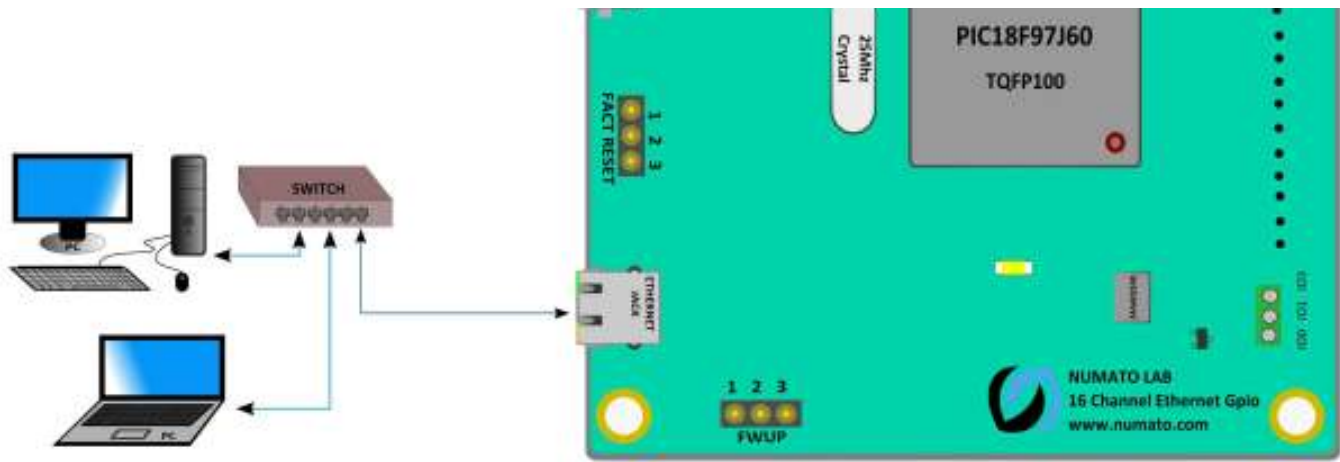
[✎ Suggest edit](#)

Components/Tools required [↗](#)

Along with the module, you may need the items in the list below for easy and fast installation.

1. CAT 5e Ethernet Cable(Straight through cable)
2. 7-12V A DC power supply
3. Medium size Philips screwdriver





(<https://numato.com/help/wp-content/uploads/2018/01/ConnDgm16EthGPIO.jpg>)

The above image shows a basic connection diagram that can be used in most of the situations. Use a Straight Through Ethernet cable for communication when connecting the board to a switch or router. A Crossover Ethernet Cable may be required in some situations if connecting directly to a PC/Laptop port.

The following sections identify individual connections in detail.

[✎ Suggest edit](#)

USB Interface [↔](#)

The onboard USB Interface helps a PC/Linux/computer to communicate and configure this module seamlessly. This module detects as COM port and the user can configure the module using any serial emulator program like hyper terminal, TeraTerm, etc. Use FTDI (<http://www.ftdichip.com/Drivers/VCP.htm>) drivers for the USB COM port device.

Use a USB A to micro USB cable to connect to a PC. Please visit [numato.com](http://www.numato.com) (<http://www.numato.com>) to buy cables and accessories for this product.

[✎ Suggest edit](#)

Ethernet Interface [↗](#)



(<https://numato.com/blog/wp-content/uploads/2016/03/32-Channel-Ethernet-GPIO-Module-Ethernet-Port.jpg>)The on-board Ethernet port supports Ethernet 10 Mbps transmission speed that helps a computer to communicate and control this module easily. There are two basic network configurations for this board/can be used in two ways.

1. Direct connection to Local Area Network(LAN) via straight-through Ethernet cable.
Eg: Connecting the module to a switch in a network.
2. Direct connection to a PC through a cross over Ethernet cable.
Eg: Connecting the module directly to the PC. Some PC/Laptops can detect and adapt to the cable type. In such situations, a straight-through cable also can be used.

[✎ Suggest edit](#)

DC Power Supply [↗](#)

(<https://numato.com/blog/wp-content/uploads/2016/03/DC-Power-Supply-3.jpg>)This board can be operated with a single DC power supply. Use a 7-12V 1A DC power supply on DC jack(J1/Vin) on the Board for the logic circuit.



Connecting power supply incorrectly can cause damage to the module and/or other devices.

[✎ Suggest edit](#)

Factory Reset [↗](#)

This Jumper is used to reset the settings onboard to factory defaults. To execute the factory reset, please follow the steps below.

- 1. Power off the device.
- 2. Configure the FACT RESET Jumper to 2-3.
- 3. Power on the device.
- 4. Wait for 15-20 sec until the LED D2 onboard turns on.
- 5. Configure the FACT RESET Jumper back to 1-2.
- 6. Power off the board and back on.

Below steps are applicable only for hardware version 3(with USB Micro Connector) and firmware version 5

- 7. Connect the USB Cable.
- 8. Using any serial emulation software connects to the COM Port and ENTER.
- 9. Login using the config user name and password as “admin” and send a “reboot” command.
- 10. LED D2 will turn off and you can see the Config details in the terminal.

Please use this feature only for recovering the User name / Password. This action will reset User name, Password, Device ID and also other settings as well. After reset, the board can be accessed using the default User name and Password.

The factory default settings will be as below table.

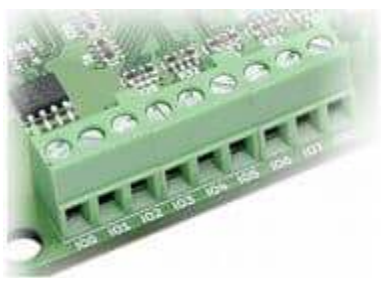
User name	admin
Password	admin
Config user name	admin
Config Password	admin
Device ID	00000000
IP Address	169.254.1.1
Telnet Authentication	ON
Telnet Port	23
Access IP	Disabled

IP0 to IP9	255.255.255.255
Access MAC	Disabled
MAC0 to MAC9	FF FF FF FF FF FF
DHCP Status	Enabled

 Suggest edit

GPIO/Analog inputs

(<https://numato.com/blog/wp-content/uploads/2016/03/32-Channel-Ethernet-GPIO-Analog-inputs.jpg>)



The module has 16 General Purpose IO pins that can be used for various custom applications. Some of these pins can be used as Analog to Digital Converter inputs as well. All IO pins support 3.3V TTL signals and the ADC input range is 0 to +3.3V. The ADC can acquire analog signals at the resolution of 10 bits per sample. It is recommended to use a series resistor with the GPIO/ADC pins when interfacing with other circuits. In output mode, GPIOs can source up to 25mA. So no additional circuitry is needed to drive regular LEDs. A 470 Ohms series resistor is recommended for current limiting when connecting LED to a GPIO. The table below summarizes the GPIO and Analog to Digital Converter input positions on the Screw terminals.

GPIO	ADC
IO0	ADC0
IO1	ADC1

GPIO	ADC
IO2	ADC2
IO3	ADC3
IO4	ADC4
IO5	ADC5
IO6	ADC6
IO7	ADC7
GND	GND
IO8	ADC8
IO9	ADC9
IO10	NA
IO11	NA
IO12	NA
IO13	NA
IO14	NA
IO15	NA
GND	GND

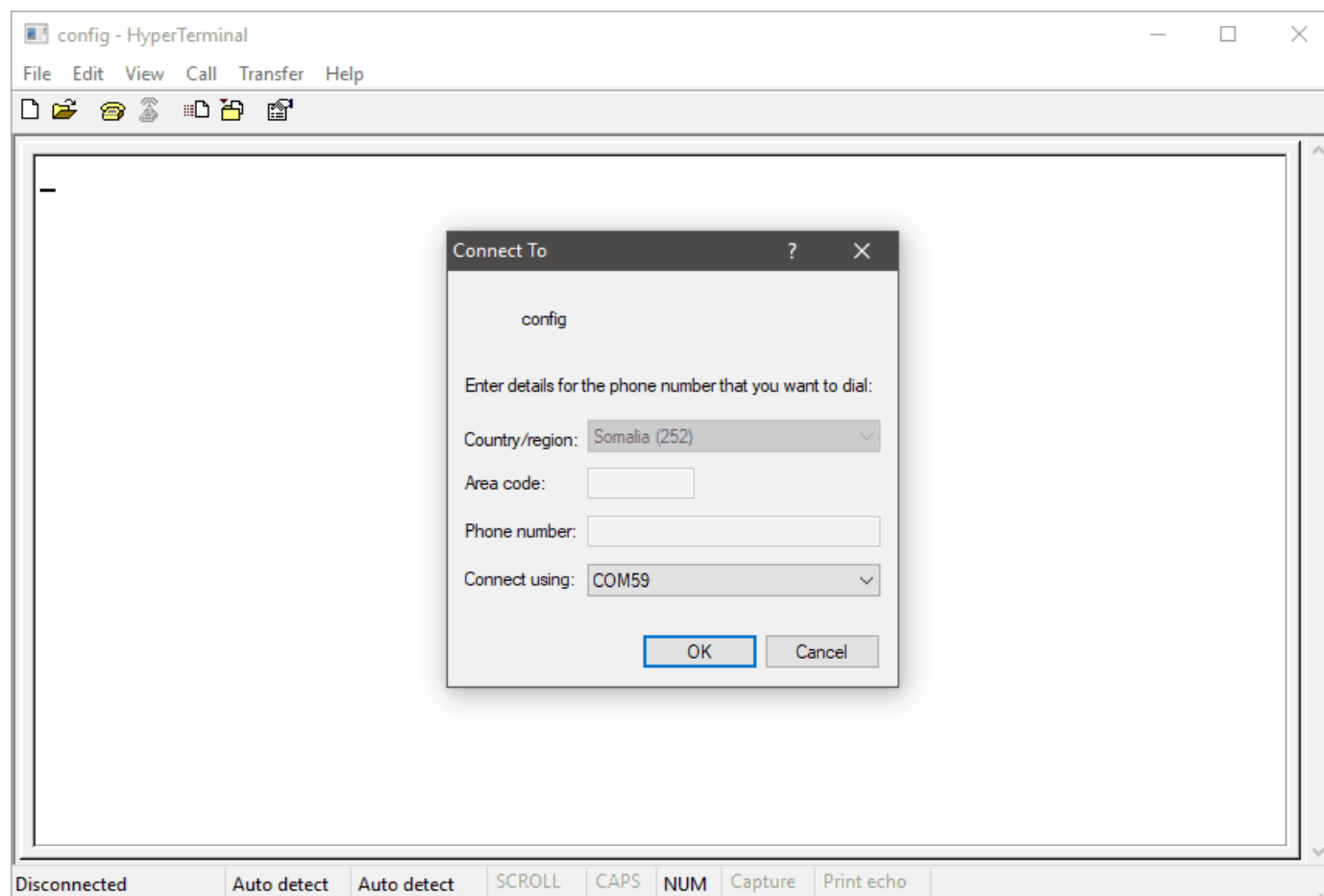
 Suggest edit

Configure 16 Channel Ethernet GPIO [↗](#)

Connect a DC power supply and power up the device as mentioned DC Power Supply section above. A red LED (D1) will glow which indicates active power. For configuration over USB connect a USB Micro cable to the module also connect the module to a PC or a Switch/Router as mentioned in the Ethernet Interface section above. Run the hyper terminal program or any serial terminal program like Tera Term, PuTTY, etc.

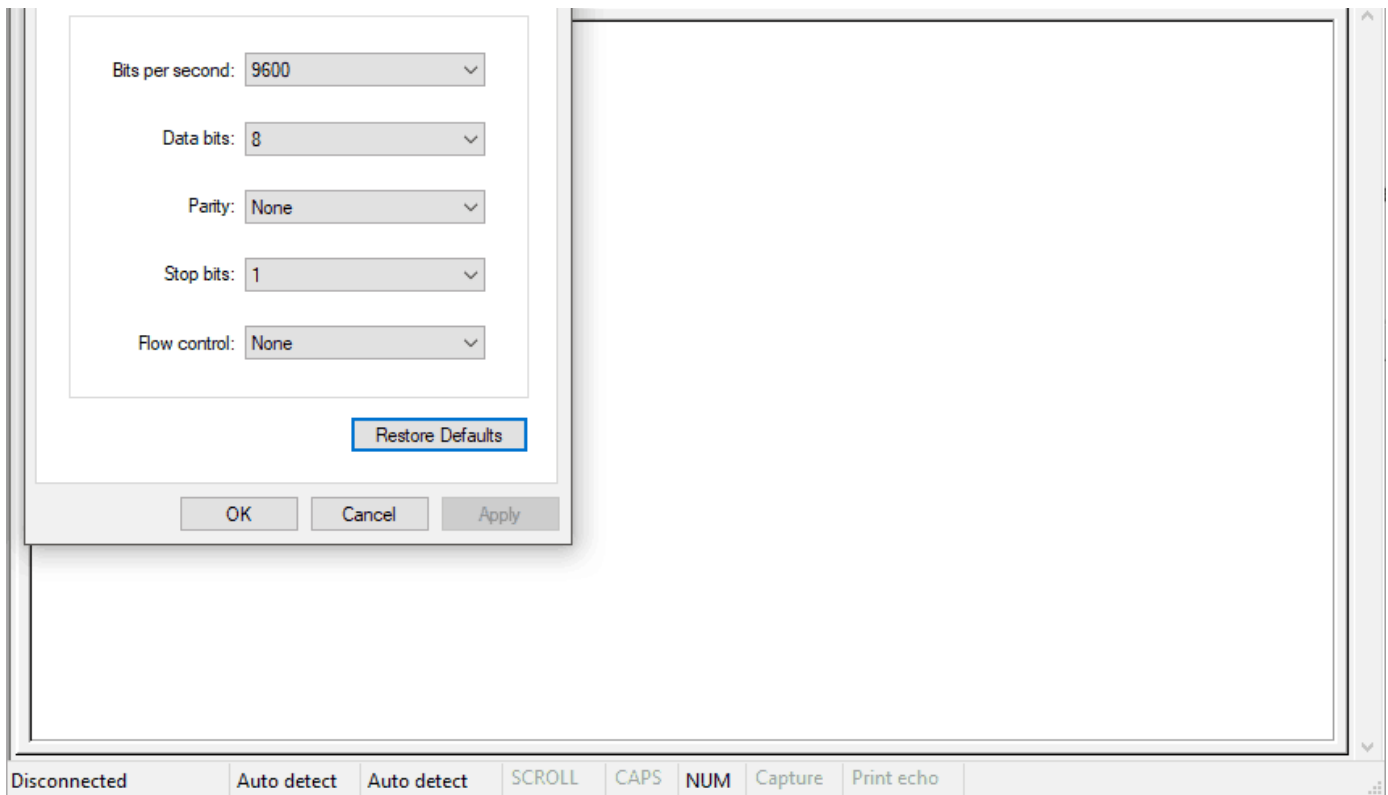
NB: By default, the module is configured with factory settings. To login to USB configuration settings, users need to send a reboot command from telnet or do a factory reset.

Connect the Module COM port and use the default settings as similar to the below images.

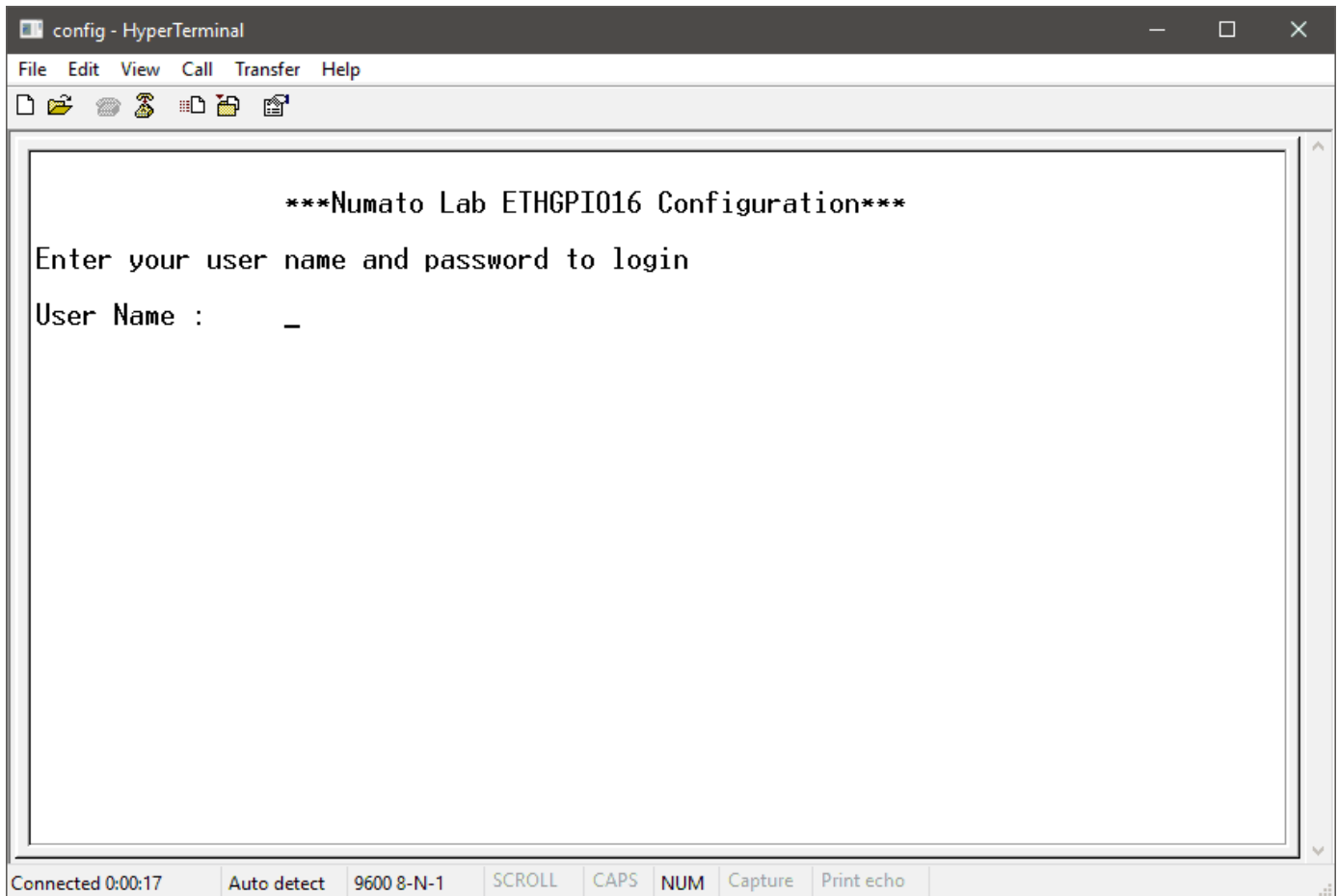


(<https://numato.com/help/wp-content/uploads/2018/04/Capture1.png>)



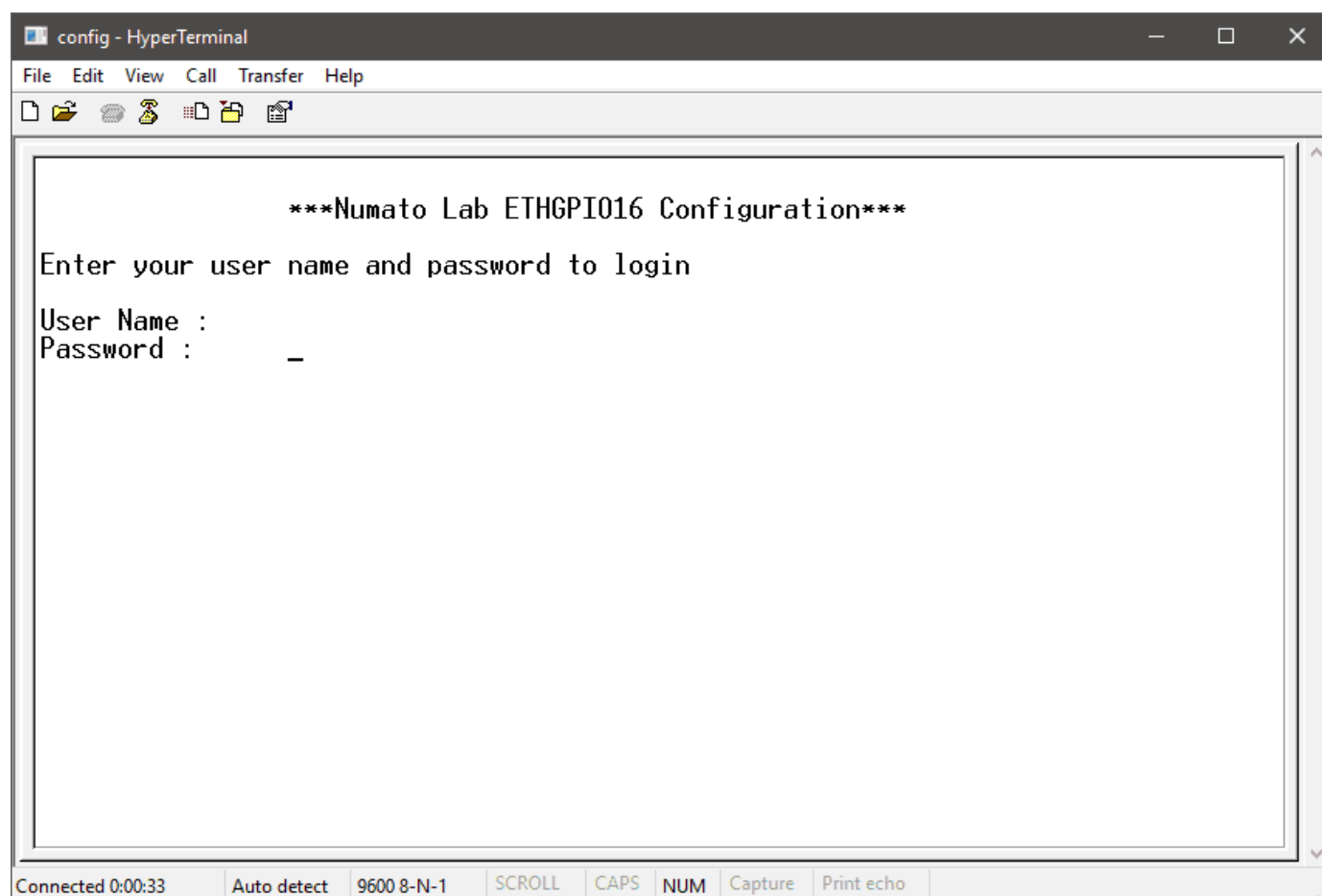


(<https://numato.com/help/wp-content/uploads/2018/04/Capture2.png>)



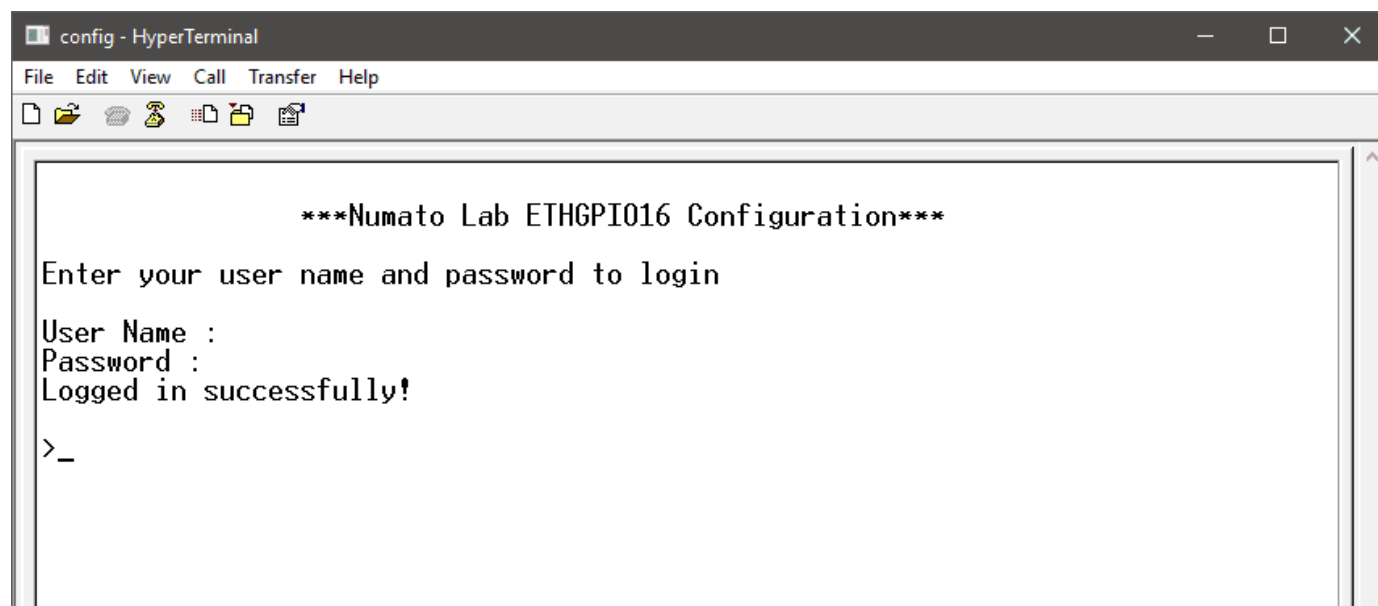
(<https://numato.com/help/wp-content/uploads/2018/04/Capture3.png>)

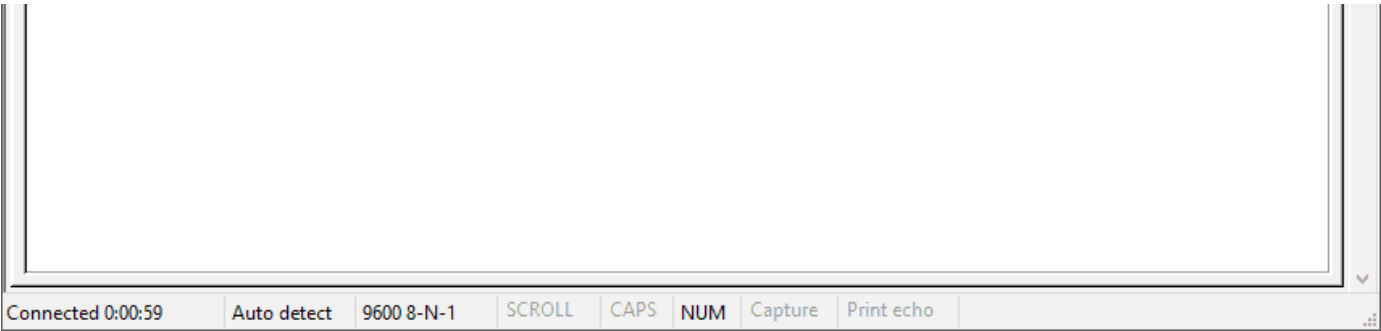
Users will be prompted to enter the User name and Password. The default User name and Password is 'admin'. You may change the User name and Password once logged in.



(<https://numato.com/help/wp-content/uploads/2018/04/Capture4.png>)

If the user name and password are correct, we will be able to see the login successfully message.





(<https://numato.com/help/wp-content/uploads/2018/04/Capture5.png>)

 Suggest edit

Configuration Command Set

No.	Command	Example	Description
1	usr	usr set xxxxxxxx	Sets the new username for telnet, where x can be any alphanumeric character. The username can be 1-8 characters long.
		usr get	Read the current username of telnet. The default username is "admin".
2	pass	pass set	Sets the new password for telnet, where x can be any alphanumeric character. The username can be 1-8 characters long.
		pass get	Read the current password of telnet. The default password is "admin".
3	config usr	config usr set xxxxxxxx	Sets the new username for configuration over USB, where x can be any alphanumeric character. The username can be 1-8 characters long.

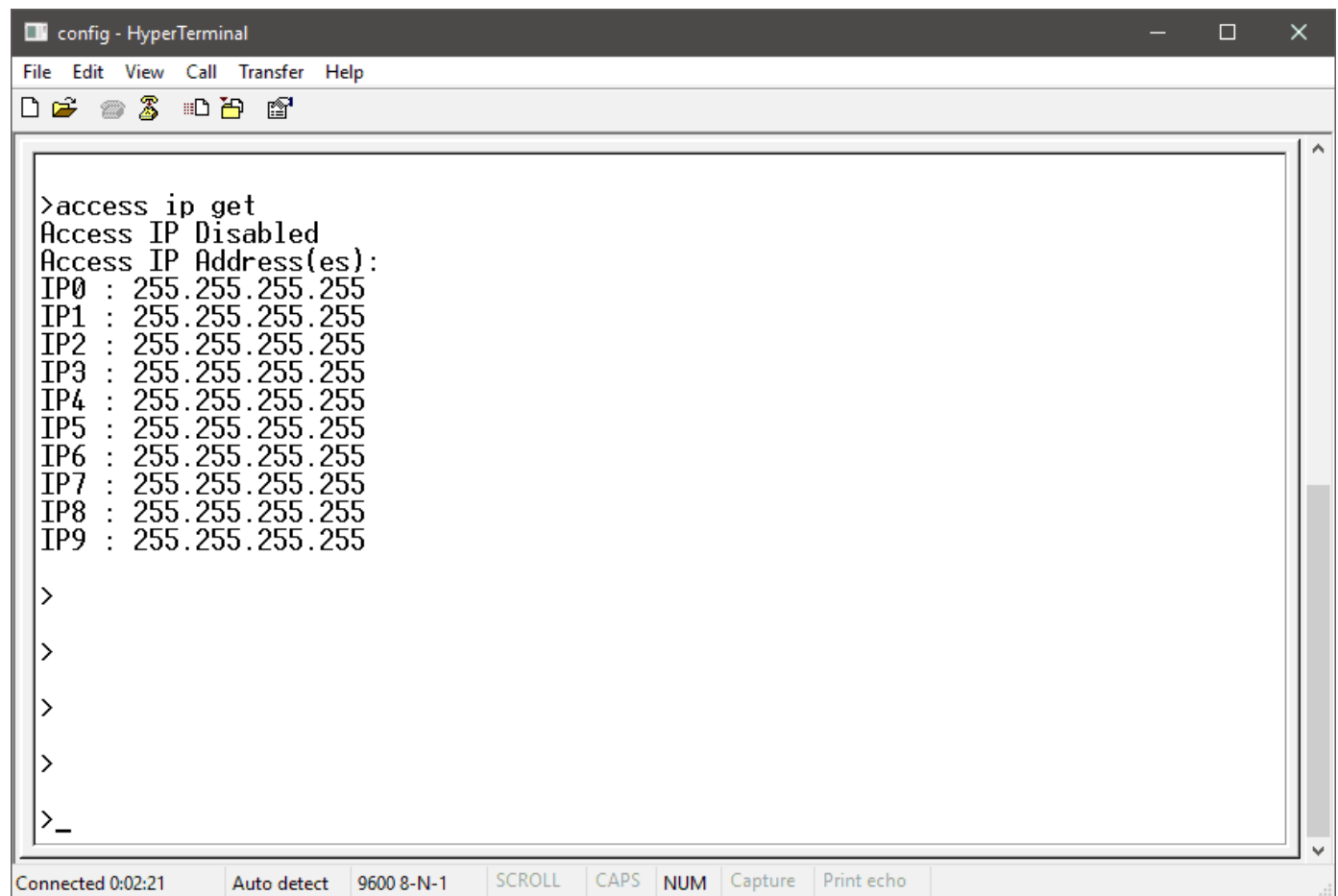
No.	Command	Example	Description
4	config pass	config usr get	Read the current username of configuration over USB. The default username is "admin".
		config pass set xxxxxxxx	Sets the new password for configuration over USB, where x can be any alphanumeric character. The username can be 1-8 characters long.
		config pass get	Read the current password for configuration over USB. The default password is "admin".
5	telnet	telnet auth on/off	Enable and disable the telnet authentication. telnet auth on enabling the telnet authentication and telnet off disabling the telnet authentication.
		telnet auth get	Read the status of telnet authentication.
		telnet port set xx	Sets the telnet port, where xx can be in the range of 00 to 99. The default value of telnet port is 23.
6	access	access ip on/off	Enable of disabling the IP based access to the module, this command adds filtering. Once the command is enabled, the stored IP using the access ip set command will be able to access the module. By default access IP is disabled.
		access ip set N xxx.xxx.xxx.xxx	Set the acceptable IP in the network and save the same. Where N is the number 0-9, maximum 10 IP we can store in the non-volatile memory. Eg: access ip set 0 192.168.0. 2
		access ip get	Read the stored IP in the memory.

No.	Command	Example	Description
		access mac on/off	Enable of disabling the MAC-based access to the module, this command adds filtering. Once the command is enabled, the stored MAC using the access mac set command will be able to access the module. By default access MAC is disabled
		access mac set N XX XX XX XX XX XX	Set the acceptable IP in the network and save the same. Where N is the number 0-9, maximum 10 MAC we can store in the non-volatile memory. Eg: access mac set 0 D4 93 98 D2 4A 34
		access mac get	Reads the stored MAC in the memory.
7	dhcp	dhcp on/off	Enable and disable the DHCP of the module.
8	ip	ip set xxx.xxx.xxx.xxx	Sets the static IP to the module. Eg: ip set 192.168.5.48
		ip get	Read the status of DHCP and the static IP. If DHCP is enabled it will display the DHCP status and if it is disabled it will display the static IP too
9	mac id get	mac id get	Read the mac id of the module.
10	reboot	reboot	Exit the configuration interface and enter to the application mode and start the telnet communication.

 Suggest edit

Configuration command Images [↗](#)

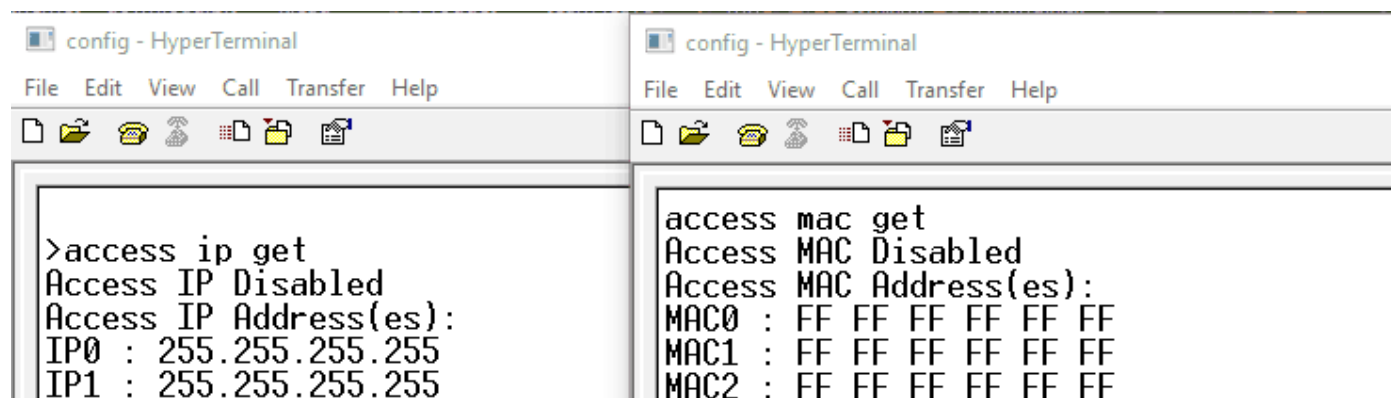
Example commands and results after executing the commands.



```
>access ip get
Access IP Disabled
Access IP Address(es):
IP0 : 255.255.255.255
IP1 : 255.255.255.255
IP2 : 255.255.255.255
IP3 : 255.255.255.255
IP4 : 255.255.255.255
IP5 : 255.255.255.255
IP6 : 255.255.255.255
IP7 : 255.255.255.255
IP8 : 255.255.255.255
IP9 : 255.255.255.255

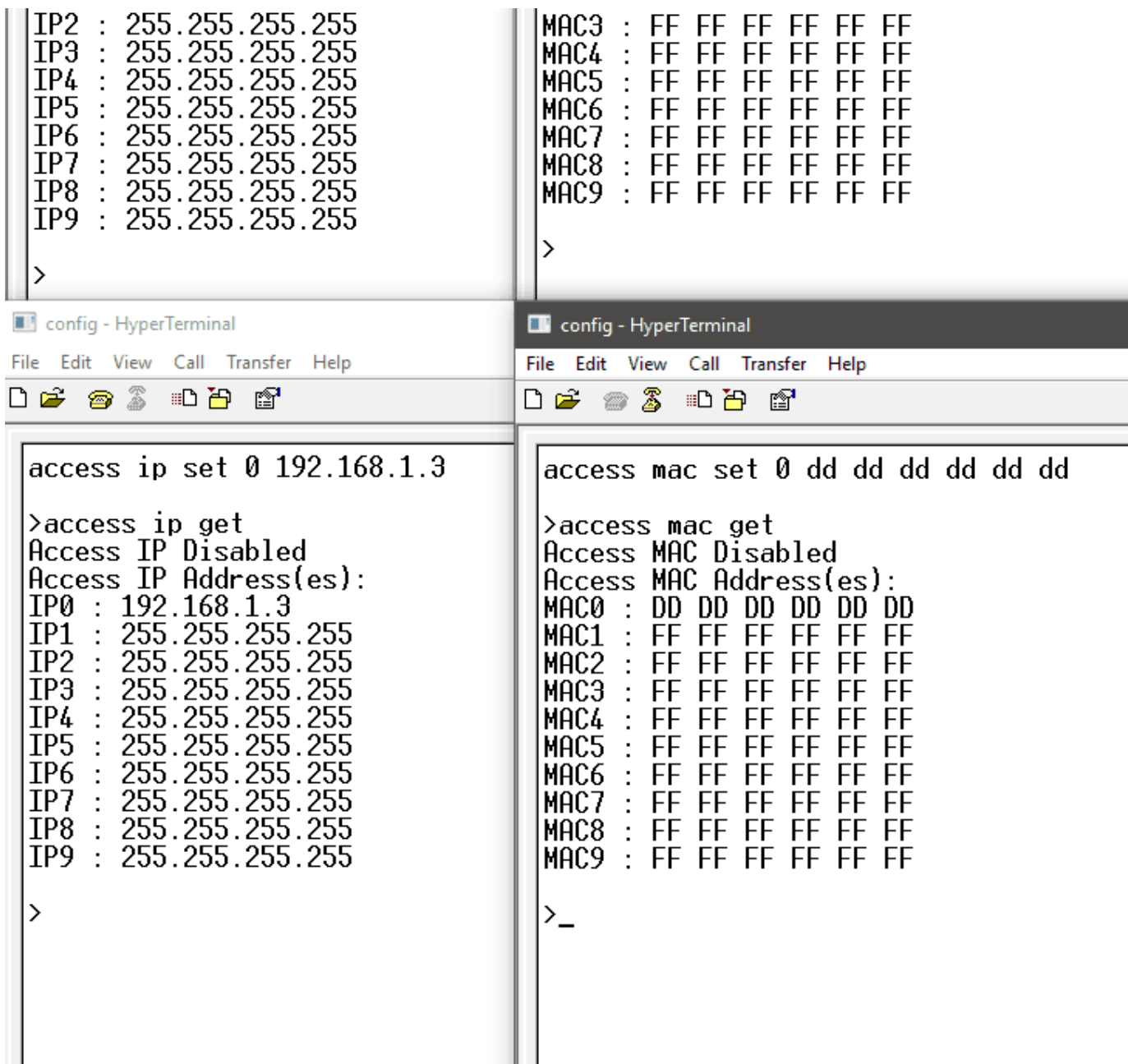
>
>
>
>
>_
```

(https://numato.com/help/wp-content/uploads/2018/04/Capture6_1.png)

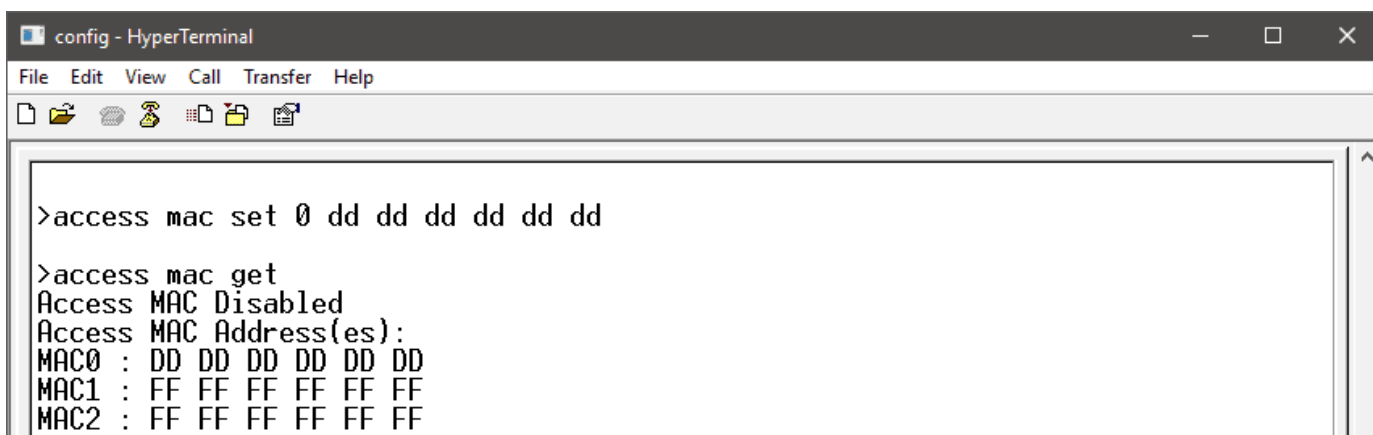


```
>access ip get
Access IP Disabled
Access IP Address(es):
IP0 : 255.255.255.255
IP1 : 255.255.255.255

access mac get
Access MAC Disabled
Access MAC Address(es):
MAC0 : FF FF FF FF FF FF
MAC1 : FF FF FF FF FF FF
MAC2 : FF FF FF FF FF FF
```

(<https://numato.com/help/wp-content/uploads/2018/04/Capture6.png>)



```
MAC3 : FF FF FF FF FF FF
MAC4 : FF FF FF FF FF FF
MAC5 : FF FF FF FF FF FF
MAC6 : FF FF FF FF FF FF
MAC7 : FF FF FF FF FF FF
MAC8 : FF FF FF FF FF FF
MAC9 : FF FF FF FF FF FF

>

>

>

>_
```

Connected 0:23:43 Auto detect 9600 8-N-1 SCROLL CAPS NUM Capture Print echo

(https://numato.com/help/wp-content/uploads/2018/04/Capture6_4.png)

```
config - HyperTerminal
File Edit View Call Transfer Help
[Icons]

>
>
>
>
>
>
>
>reboot

***** ETHERNET GPIO16 *****
MAC:      D8 80 39 96 A0 A1
-----
Telnet Port      : 23
DHCP              : Enabled
Access IP        : Disabled
Access MAC       : Disabled
IP Address of the module: 192.168.1.5
_
```

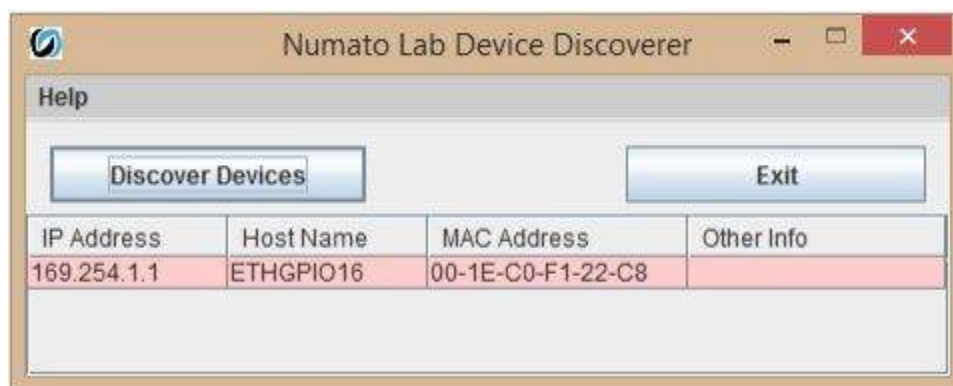
Connected 0:07:14 Auto detect 9600 8-N-1 SCROLL CAPS NUM Capture Print echo

(<https://numato.com/help/wp-content/uploads/2018/04/Capture7-1.png>)

 Suggest edit

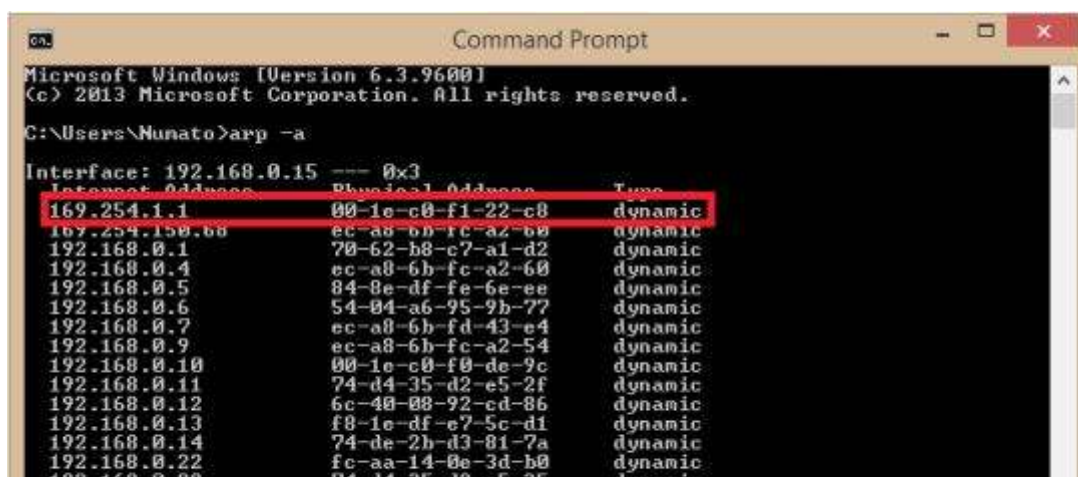
Powering Up 16 Channel Ethernet GPIO module [↗](#)

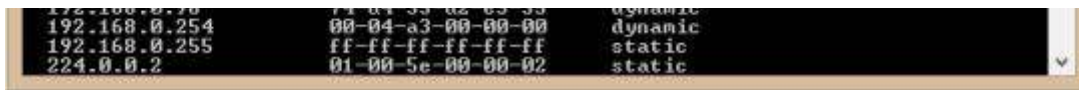
Connect a DC power supply and power up the device as mentioned DC Power Supply section above. The LED (D1) will glow which indicates active power. Connect the module to a PC or a Switch/Router as mentioned in the Ethernet Interface section above. Run Numato Lab Device Discoverer.jar (Java Runtime must be installed on the target machine), click on Discover Devices. The window will display the IP address, Host Name, MAC Address, and Other information.



(<https://numato.com/blog/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Numato-Lab-Device-Discoverer-1.jpg>)

IP Address and MAC Address can be seen in command prompt also, open the command prompt and type the command 'arp -a'. This will display the available network interfaces and connected devices along with the MAC address and IP address of each device. Look for the IP address that corresponds to your device's MAC address. The MAC address for each GPIO Module is printed on a label on the board for your convenience. Use the IP address obtained in order to access the device.





(<https://numato.com/blog/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Command-Prompt-1.jpg>)

Suggest edit

Accessing the module

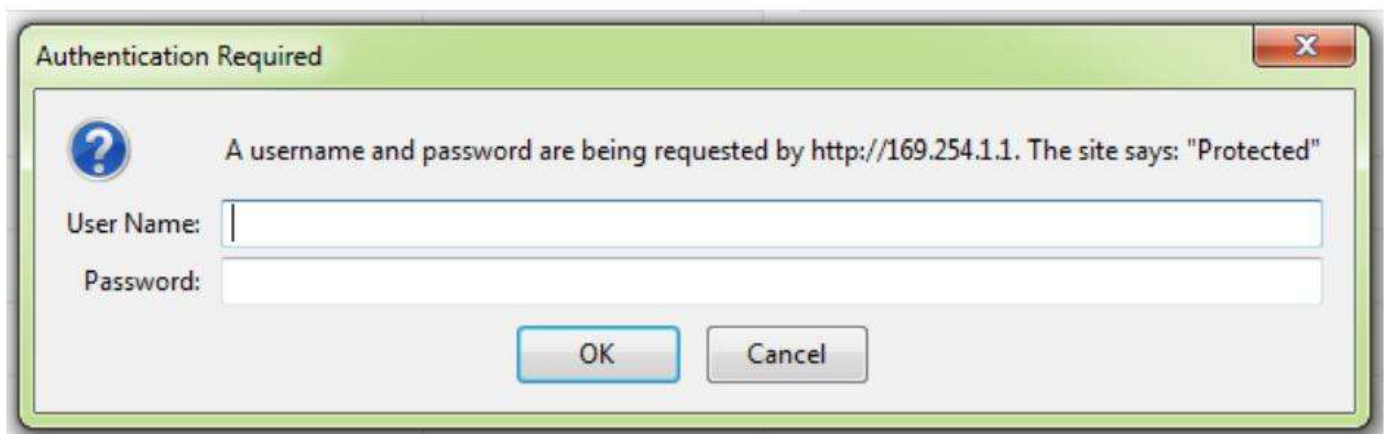
The module can be controlled by using one of the two interfaces below.

1. Through HTML/Web Page served from the device.
2. Through a Serial Terminal Emulator that supports TELNET (Eg: Hyperterminal, TeraTerm, PUTTY..)

Suggest edit

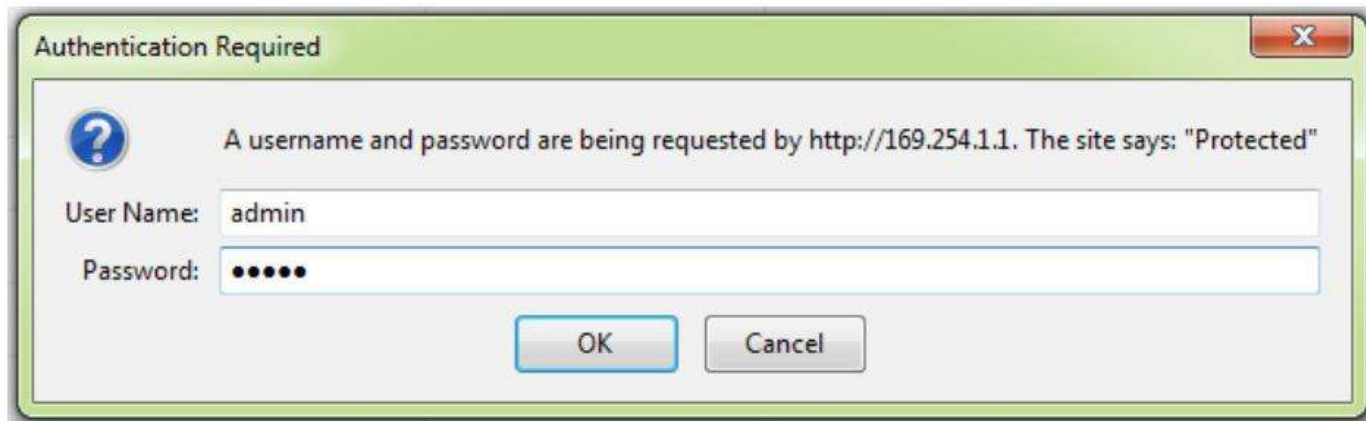
Accessing the module using web interface

The easiest method for controlling the module is through a web page served from the device. To open the administration web page, type in the IP address in to the address bar of any web browser and press enter



(<https://numato.com/blog/wp-content/uploads/2016/03/8channel-accessingmoduleimg1.jpg>)

You will be prompted to enter the User name and Password. The default User name and Password is 'admin'. You may change the User name and Password once logged in.

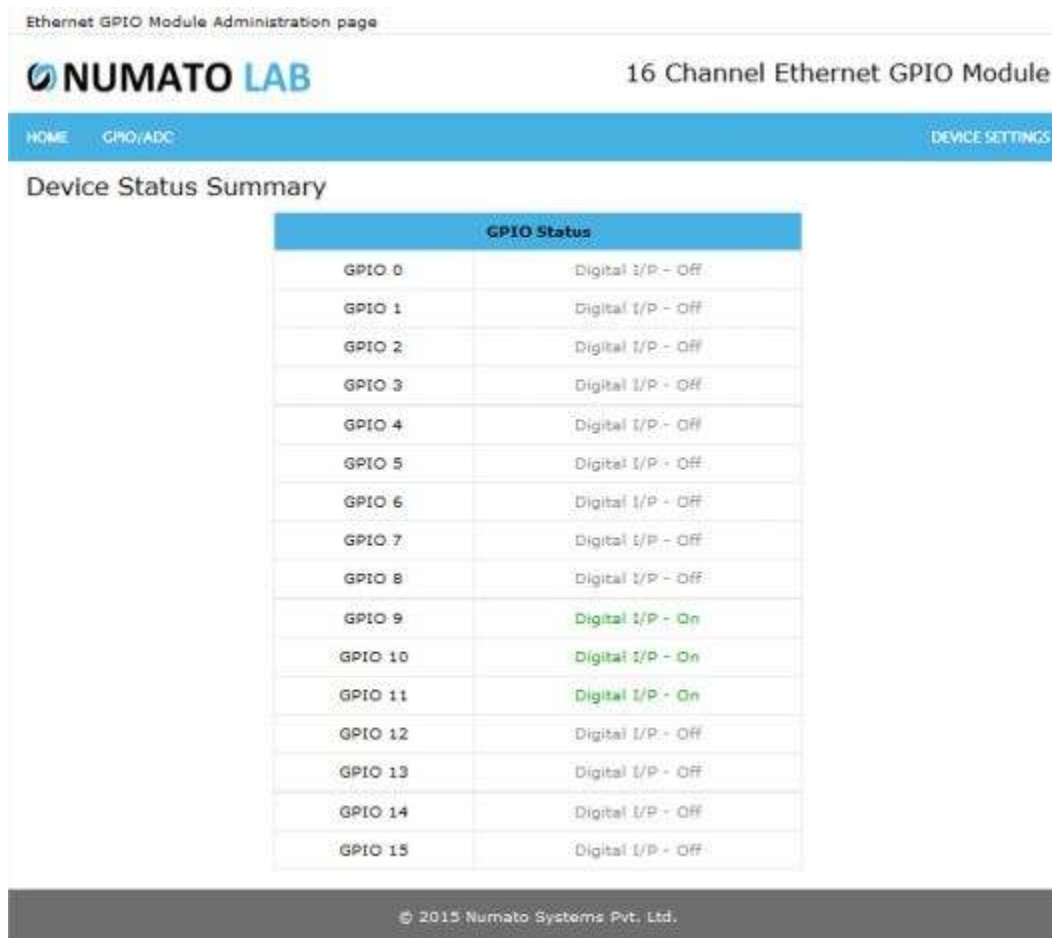


The image shows a web browser dialog box titled "Authentication Required". It contains a question mark icon and a message: "A username and password are being requested by http://169.254.1.1. The site says: 'Protected'". Below the message are two input fields: "User Name:" with the text "admin" and "Password:" with masked characters (dots). At the bottom are "OK" and "Cancel" buttons.

(<https://numato.com/blog/wp-content/uploads/2016/03/8channel-accessingmoduleimg2.jpg>)

Enter the default user name and password then click OK.

You will be presented with the device home page that shows the status of Relays and GPIOs



The image shows the "Ethernet GPIO Module Administration page" for the "16 Channel Ethernet GPIO Module". The page has a blue header with the "NUMATO LAB" logo and navigation links for "HOME", "GPIO/ADC", and "DEVICE SETTINGS". The main content area is titled "Device Status Summary" and contains a table showing the status of 16 GPIO pins.

GPIO Status	
GPIO 0	Digital I/P - Off
GPIO 1	Digital I/P - Off
GPIO 2	Digital I/P - Off
GPIO 3	Digital I/P - Off
GPIO 4	Digital I/P - Off
GPIO 5	Digital I/P - Off
GPIO 6	Digital I/P - Off
GPIO 7	Digital I/P - Off
GPIO 8	Digital I/P - Off
GPIO 9	Digital I/P - On
GPIO 10	Digital I/P - On
GPIO 11	Digital I/P - On
GPIO 12	Digital I/P - Off
GPIO 13	Digital I/P - Off
GPIO 14	Digital I/P - Off
GPIO 15	Digital I/P - Off

© 2015 Numato Systems Pvt. Ltd.

(<https://numato.com/blog/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Device-Status-Summary-2.jpg>)

[✎ Suggest edit](#)

GPIO Status and Control

This board has 16 general-purpose input/outputs among 10 multiplexed with analog input. Click on the GPIO/ADC link on the menu bar to access the GPIO configuration page. The GPIOs can be turned on/off by clicking on the Toggle GPIO button next to the corresponding GPIO.

Ethernet GPIO Module Administration page

16 Channel Ethernet GPIO Module

HOME GPIO/ADC DEVICE SETTINGS

GPIO Status and Control

GPIO Status				
GPIO Index	Current Config	Status	Toggle GPIO	Change Config
GPIO 0	Digital I/P	Low	↑↓	
GPIO 1	Digital I/P	Low	↑↓	
GPIO 2	Digital I/P	Low	↑↓	
GPIO 3	Digital I/P	Low	↑↓	
GPIO 4	Digital I/P	Low	↑↓	
GPIO 5	Digital I/P	Low	↑↓	
GPIO 6	Digital I/P	Low	↑↓	

(<https://numato.com/blog/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-GPIO-Status-and-Control-e1458837530609.jpg>)

Individual GPIO can be configured in three modes.

1. Digital Input(I/P)
2. Digital Output(O/P)
3. Analog Input

[✎ Suggest edit](#)

Digital Input(I/P) [↗](#)

To configure a GPIO as Digital Input, click on corresponding GPIO's Change Config button. Select Digital I/P radio and click the Submit button.

Ethernet GPIO Module Administration page

16 Channel Ethernet GPIO Module

HOMEGPIO/ADCDDEVICE SETTINGS

GPIO Configuration

GPIO Configuration	
GPIO	Settings
GPIO 0	☒ Digital I/P ☐ Digital O/P ☐ Analog I/P
Submit	

© 2015 Numato Systems Pvt. Ltd.

(<https://numato.com/blog/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Digital-Input.jpg>)

[✎ Suggest edit](#)

Digital Output(O/P) [↗](#)

To configure a GPIO as Digital Output, click on corresponding GPIO's Change Config button. Select Digital O/P radio and click the Submit button.



The screenshot shows the Numato Lab 16 Channel Ethernet GPIO Module web interface. The page title is "16 Channel Ethernet GPIO Module". The navigation bar includes "HOME", "GPIO/ADC", and "DEVICE SETTINGS". The main heading is "GPIO Configuration". Below it is a table titled "GPIO Configuration" with two columns: "GPIO" and "Settings". The table has one row for "GPIO 1". In the "Settings" column for "GPIO 1", there are three radio buttons: "Digital I/P", "Digital O/P" (which is selected), and "Analog I/P". Below the table is a "Submit" button. At the bottom of the page, there is a copyright notice: "© 2015 Numato Systems Pvt. Ltd."

GPIO Configuration	
GPIO	Settings
GPIO 1	☐ Digital I/P ☒ Digital O/P ☐ Analog I/P

© 2015 Numato Systems Pvt. Ltd.

(<https://numato.com/blog/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Digital-Input-Output-1.jpg>)

[✎ Suggest edit](#)

Analog Input (I/P) ⇄

To configure a GPIO as Analog Input, click on corresponding GPIO's Change Config button. Select Analog I/P radio and click the Submit button.



The screenshot shows the Numato Lab 16 Channel Ethernet GPIO Module web interface. The page title is "16 Channel Ethernet GPIO Module". The navigation bar includes "HOME", "GPIO/ADC", and "DEVICE SETTINGS". The main heading is "GPIO Configuration". Below it is a table titled "GPIO Configuration" with two columns: "GPIO" and "Settings". The table has one row for "GPIO 2". In the "Settings" column for "GPIO 2", there are three radio buttons: "Digital I/P", "Digital O/P", and "Analog I/P" (which is selected). Below the table is a "Submit" button. At the bottom of the page, there is a copyright notice: "© 2015 Numato Systems Pvt. Ltd."

GPIO Configuration	
GPIO	Settings
GPIO 2	☐ Digital I/P ☐ Digital O/P ☒ Analog I/P

© 2015 Numato Systems Pvt. Ltd.

(<https://numato.com/blog/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Digital-Input-Analog-Input-1.jpg>)

[✎ Suggest edit](#)

Device Settings [↗](#)

Device Settings page displays the current firmware version, Device ID, Account Settings and Basic Network Settings. A logged-in user can change and save the Device ID, User name, Password and network settings

Ethernet GPIO Module Administration page

16 Channel Ethernet GPIO Module

HOMEGPIO/ADCDEVICE SETTINGS

Device Settings

Device Info	
Device ID	00000000
FW version	00000008

Account Settings	
User Name	admin
Password	admin

Basic Network Settings	
MAC Address	00:1E:C0:F1:8B:88
Host Name	ETHGPIO16
Enable DHCP	☒
IP Address	169.254.151.82

© 2015 Numato Systems Pvt. Ltd.

(<https://numato.com/blog/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Device-Settings-1.jpg>)

In the above image, the firmware version is displayed as 00000008, default device ID 00000000, default User name and Password as 'admin'. The user can change and save the Device ID, User name and Password as explained in command set (<https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-inputs/#the-command-set-18>) or

changing the appropriate field on this page and clicking on the save button on the right side. The User name and Password can be reset to factory defaults via Factory Reset explained elsewhere in this document. The Basic Network Settings Shows the Device MAC address, Host Name, and IP Address. The default hostname and IP Address can also be changed according to the user's wish. After saving changes the board will reboot with the new network settings.

 Suggest edit

Controlling the module through TELNET interface

The simple set of ASCII based human-readable command set supported by this module makes controlling GPIOs easy via TELNET protocol very easy. The following sections give examples of how to use the module with HyperTerminal and TeraTerm.

To use this module with HyperTerminal, please follow the steps below

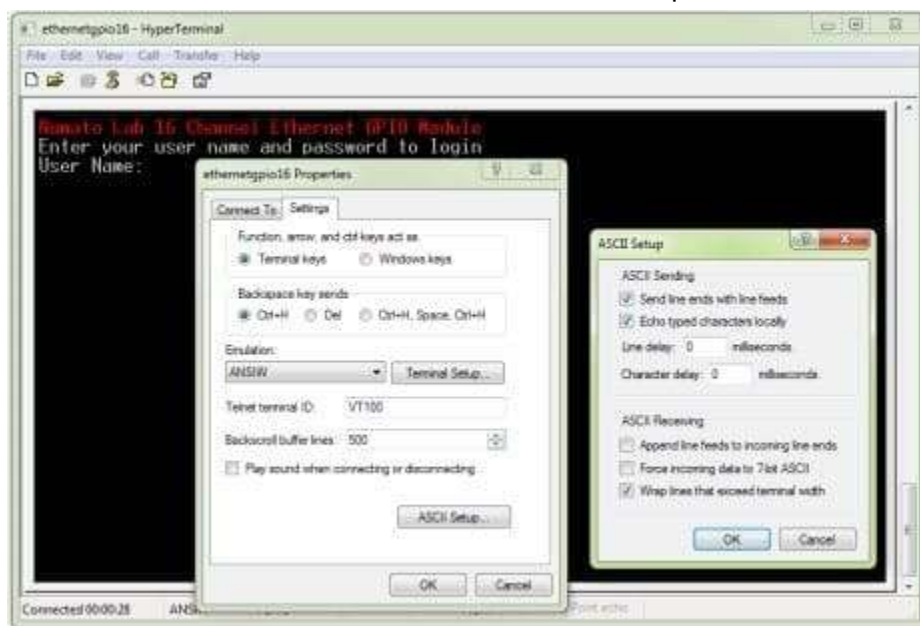
- Connect the module to the PC or LAN.
- Open HyperTerminal and enter the IP address corresponding to the module, leave the port number as 23.

- Click OK.



(<https://numato.com/help/wp-content/uploads/2018/01/16-Channel-Ethernet-GPIO-Module-HyperTerminal-e1458837090679-1.jpg>)

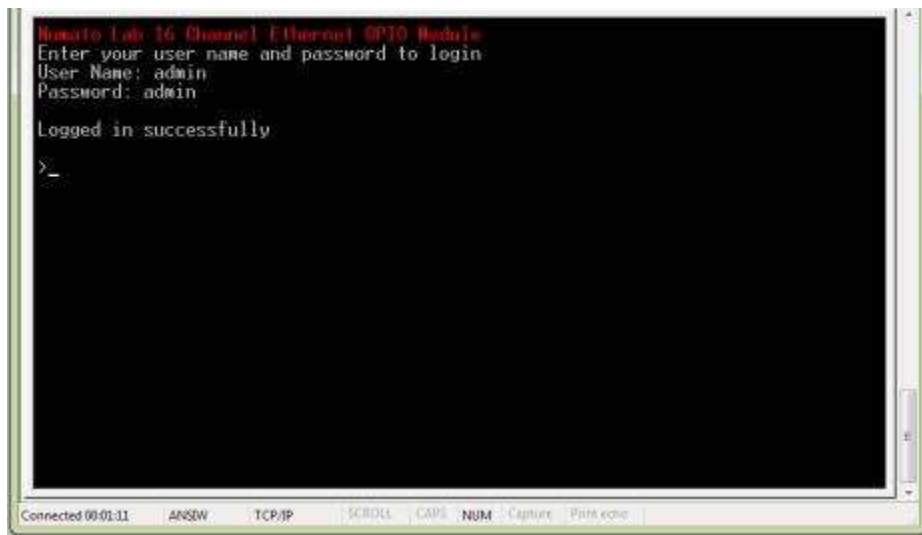
- If everything goes well, you should be presented with a screen as below.
- Select the properties button and do as same as shown below, then press OK.



(<https://numato.com/help/wp-content/uploads/2018/01/16-Channel-Ethernet-GPIO-Module-HyperTerminal1-e1458837133683.jpg>)

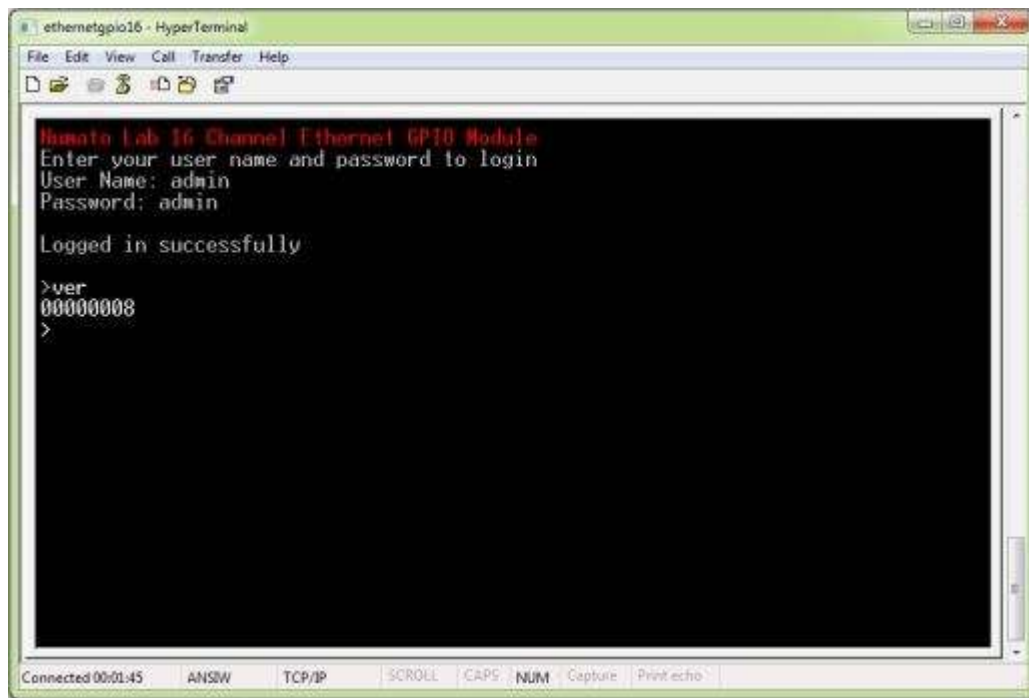
- Type in the TELNET User name and Password when asked and press enter key.





(<https://docs.numato.com/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-HyperTerminal2.jpg>)

- Press ENTER key again and the command prompt should appear. Commands listed in the table below (please see section “Sending Commands”) can be entered here now. For example, here is the response for the “ver” command.



(<https://numato.com/blog/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-HyperTerminal3-e1458837231995.jpg>)

Using the GPIO module with TeraTerm is just as easy. Please follow the steps below.



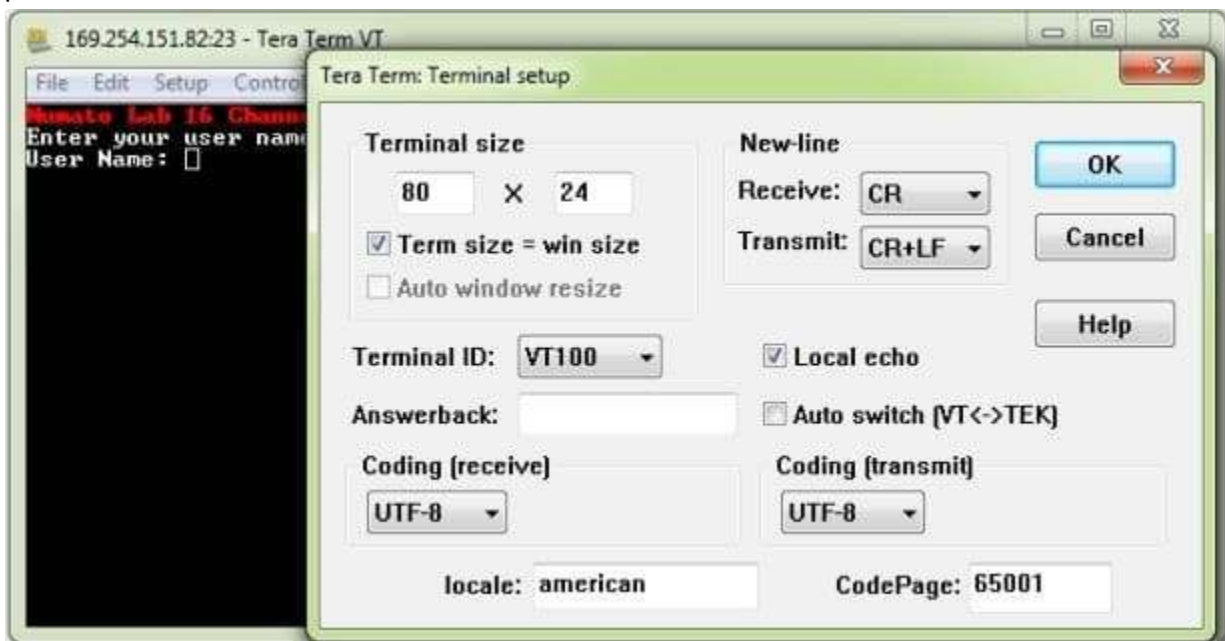
TeraTerm is an open source software. A free copy can be downloaded from <http://en.sourceforge.jp/projects/ttssh2/releases/> (<http://en.sourceforge.jp/projects/ttssh2/releases/>)

- Run TeraTerm and type in the IP address corresponding to the module in the “New connection” dialog and click OK.



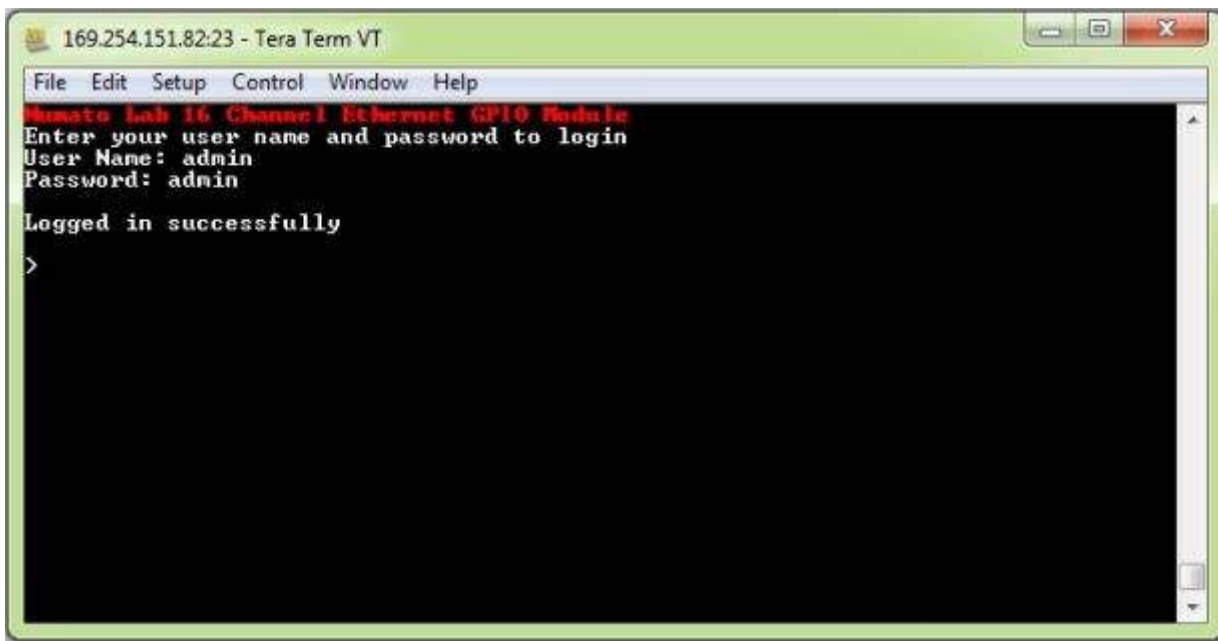
(<https://docs.numato.com/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Teraterm-disconnected-VT.jpg>)

- Then select the terminal setup from the setup button and make sure the settings are as shown below, and press OK.



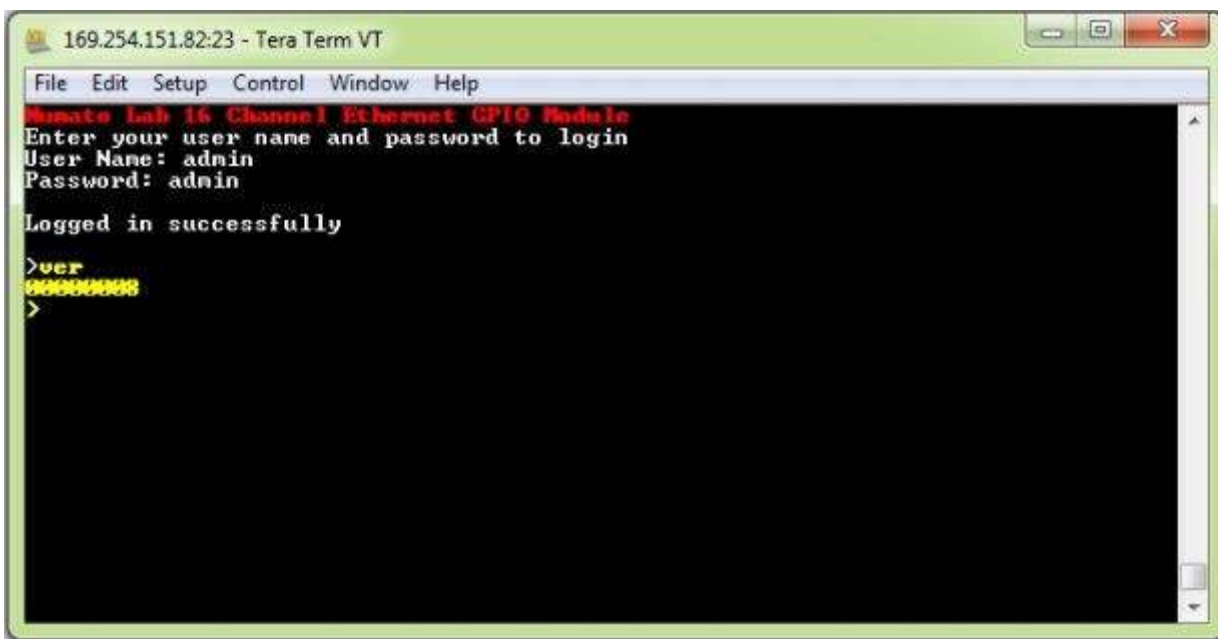
(<https://docs.numato.com/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Tera-Term-Terminal-Setup.jpg>)

- Type the User name and Password when asked.



(<https://docs.numato.com/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Teraterm-VT.jpg>)

- Press ENTER key and the command prompt should appear. Commands listed in the table below (please see section “Sending Commands”) can be entered here now. For example, here is the response for the “ver” command.



(<https://docs.numato.com/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Teraterm-VT1.jpg>)

 Suggest edit

Sending Commands [↗](#)

One of the most powerful features of this module is the simple easy to use command set it supports. This command set allows for a very simple interface to access the features of the module through TELNET protocol. The following sections give details of the command set and how to use the command set.

[✎ Suggest edit](#)

The TELNET command set [↗](#)

This product supports a very simple command set that is designed to be less cryptic and easy to use manually (using terminal emulation programs that support TELNET) or through a program written in one of the many supported languages.

List of currently supported commands.

No.	Command	Parameters	Example	Description
1	ver	None	ver	Returns firmware Version
2	id	get/set xxxxxxxx	Id get, id set 12345678	Reads/Sets id of the module
3	usr	get/set xxxxxxxx	usr get, usr set admin	Reads/Sets User name
4	pass	get/set xxxxxxxx	pass get, pass set admin	Reads/Sets Password

No.	Command	Parameters	Example	Description
5	gpio	set/clear/read, gpio number readall/writeall/ iomask/iodir, gpio notify on/off/get	gpio set 0, gpio clear 0, gpio read 0, gpio readall, gpio writeall ffff, gpio iomask ffff, gpio iodir 0000, gpio notify on, gpio notify off, gpio notify get	Control General Purpose Input/Output
6	adc	read, channel	adc read 0	Read Analog to Digital Converter input
7	reboot	None	reboot	Exit the application mode and enter to the configuration interface and start the configuration via USB.

The table below has more detailed information about available commands.

No.	Command	Example	Description
1	ver	ver	Returns current firmware version.
2	id	id get id set xxxxxxxx	Id get reads the module ID. Id set will assign a new ID to the module. “x” stands for alphanumeric characters including symbols. The new ID must be exactly 8 characters in length.

No.	Command	Example	Description
3	usr	usr get usr set xxxxxxx	usr get reads the default User name. usr set will assign a new usr name to the module. “x” stands for alphanumeric characters including symbols. The new User name can be 1 – 8 characters length.
4	pass	pass get pass set xxxxxxx	pass get reads the default Password. pass set will assign a new Password to the module. “x” stands for alphanumeric characters including symbols. The new Password can be 1 – 8 characters length.
5	gpio	gpio set x gpio clear x	Sets the GPIO output status to high. Here “x” is the number of the GPIO. This command accepts GPIO number from 0 -9 and A – F, total 16 values Please see examples below. gpio set 0 – Sets GPIO 0 to high state gpio set A – Sets GPIO 10 to high state Sets the GPIO output status to low. Here “x” is the number of the GPIO. This command accepts GPIO number from 0 -9 and A – F, total 16 values Please see examples below. gpio clear 0 – Sets GPIO 0 to low state gpio clear A – Sets GPIO 10to low state

No.	Command	Example	Description
	gpio read x		Reads the digital input status present at the input mentioned. Here “x” stands for the number of GPIO. This command accepts GPIO number from 0 -9 and A – F, total 16 values. The response will be either “on” or “off” depending on the current digital state of the GPIO. Please see examples below. gpio read 0 – Reads GPIO 0 status gpio read 4 – Reads GPIO 4 status
	gpio iomask xxxx		Set mask for selectively update multiple GPIOs with writeall/iowrite command. A hexadecimal value(yyyy) must be specified with desired bit positions set to 0 or 1 with no “0x” prepended (eg 0002, 00ff). A 0 in a bit position mask the corresponding GPIO and any update to that GPIO is ignored during writeall/iowrite command. A 1 in a bit position will unmask that particular GPIO and any updates using writeall/iowrite command will be applied to that GPIO. This mask does not affect the operation of set and clear commands. gpio iomask ffff – Unmask all GPIOs. gpio iomask 0000 – mask all GPIOs. Refer Understanding readall/writeall commands for GPIO Modules (https://numato.com/kb/understanding-readallwriteall-commands-gpio-modules/) to know more.

No.	Command	Example	Description
	<code>gpio iodir</code>	<code>xxxx</code>	Sets the direction of all GPIO in a single operation. A hexadecimal value(<code>xxxx</code>) must be specified with desired bit positions set to 0 or 1 with no “0x” prepended (eg 0002, 0045, 00ff). A 0 in a bit position configures that GPIO as output and 1 configures as input. Before using <code>gpio readall/writeall</code> commands, the direction of GPIO must be set using “<code>gpio iodir xxxx</code>” command. GPIO direction set by using <code>iodir</code> command will be modified with subsequent <code>set/clear/read</code> commands (only affects the GPIO accessed using these commands). <code>gpio iodir 0000</code> – Sets all GPIO to output. Refer Understanding <code>readall/writeall</code> commands for GPIO Modules (https://numato.com/kb/understanding-readallwriteall-commands-gpio-modules/) to know more.
	<code>gpio readall</code>		Reads the status of all GPIO in a single operation. The return value will a hexadecimal number with binary value 1 at bit positions for GPIO in ON state and 0 for GPIO in OFF state. Eg: a return value 0000 (binary 0000 0000 0000 0000) means all GPIO are OFF. A value ffff (binary 1111 1111 1111 1111) means all GPIO are ON. <code>gpio readall</code> – Reads all GPIO status. Refer Understanding <code>readall/writeall</code> commands for GPIO Modules (https://numato.com/kb/understanding-readallwriteall-commands-gpio-modules/) to know more.

No.	Command	Example	Description
	gpio		This command enables the gpio input change notification.
	notify on		When the gpio Notify feature is enabled, changes to the input pins will be detected and a notification is sent to the host. To use Notify feature on a GPIO, the GPIO must be set to input mode by using "gpio iodir" command.
			To turn on the Notify feature, send the command in the format below. "gpio notify on"
			The GPIO change notification is sent to the host is in the below format. <Current value> <Previous value> <IODIR> Current value - 16 bits in hexadecimal format that represents the current input states of all GPIOs. Previous value - 16 bits in hexadecimal format that represents the previous input states of all GPIOs. IODIR - Current IODIR value on the device.
			For example, a GPIO change notification "FFFE FFFF FFFF" means the following.
			1. Current IODIR value is FFFF which means all GPIOs are set to input mode.
			2. Input values present on the GPIOs is FFFF. This means input logic applied to all IOs were login 1s
			3. Current input values present at GPIOs is FFFE. All IOs

No.	Command	Example	Description
			stayed the same except for IO0 which changed from logic 1 to 0. This change triggered the device to send this notification.
		gpio notify off	This command disables the gpio input change notification feature.
		gpio notify get	This command returns whether Notify feature is enabled or disabled.
		gpio writeall xxxx	Control all GPIO in a single operation. A hexadecimal value (xxxx) must be specified with desired bit positions set to 0 or 1. A value 0 at a bit position will turn off the corresponding GPIO. A value 1 at a bit position will turn on the corresponding GPIO. gpio writeall ffff – Sets all GPIO to high state. Refer Understanding readall/writeall commands for GPIO Modules (https://numato.com/kb/understanding-readallwriteall-commands-gpio-modules/) to know more.
6	adc	adc read x	Reads the analog voltage present at the ADC input mentioned. “x” stands for the number of ADC input. The response will be a number that ranges from 0 – 1023. Please see examples below. adc read 0 – Reads analog input 0 adc read 2 – Reads analog input 2
7	reboot	reboot	Exit the application mode and enter to the configuration interface and start the configuration via USB.

NOTE!

1. For the commands like gpio read/set/clear, the gpio numbers greater than 9, should be given in upper case(A – V).
Egs :- gpio set A, gpio clear H
2. For the commands like gpio writeall/iomask/iodev, the value should be in lower case hexadecimal value(0000 – ffff).
Egs :- gpio writeall f9ce, gpio iodev a2d5, gpio iomask 4ba8
3. For the commands like gpio readall/notify on, the output will be showed in upper case hexadecimal value(0000 – FFFF).

Refer Understanding readall/writeall commands for GPIO Modules (<https://numato.com/kb/understanding-readallwriteall-commands-gpio-modules/>) to know more.

 Suggest edit

Additional Information

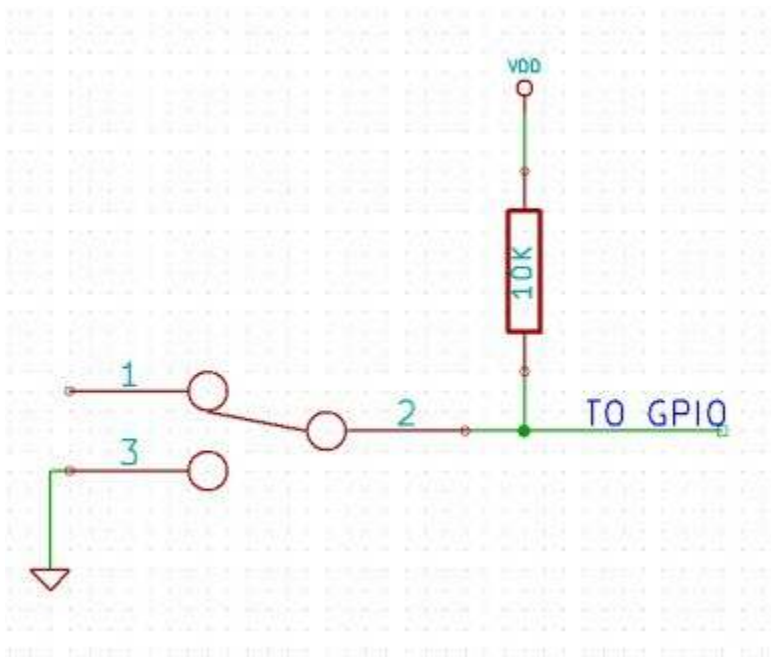
Analog to Digital Converter

16 Channel Ethernet GPIO does support Analog to Digital Conversion on some of the GPIO terminals. A list of GPIOs that supports analog function in this product is listed elsewhere in this document. There is no special command required to execute to switch between analog and digital mode. Executing the“adc” command will set the GPIO to the analog mode and executing the “gpio” command will set the GPIO back to digital mode on the fly. The resolution of the ADC is 10 bits unless otherwise noted. The input voltage range of the ADC is 0 – VDD (this product uses 3.3V power supply, so the range will be 0 – 3.3V). The result will be returned as a number starting at zero and ending at 1023. Zero indicates zero volts at the ADC input and 1023 indicates VDD (3.3V for this product) at ADC input.

 Suggest edit

Using GPIOs with switches

(https://numato.com/blog/wp-content/uploads/2016/03/digitaltoanalog-8ethernetrelay.jpg)It is possible to read the position of a switch that is connected to a GPIO. An SPST or SPDT switch is recommended to use with GPIOs. Push switches do maintain the contacts closed only for a very short time so using them is discouraged. The fundamental idea of using a switch with GPIO is to have the switch cause a voltage level change at the GPIO pin when pressed. Usually, this is achieved by using an external pull-up resistor along with the switch. The pull up resistor is connected between the GPIO and VDD and the switch is connected between the GPIO and ground. When the switch is not pressed, the pull-up resistor will cause the GPIO to stay at the VDD voltage level. When the switch is pressed, the GPIO is short-circuited to the ground and stays at zero voltage. This change in voltage and thus the position of the switch can be read using “gpio read” command.



Suggest edit

Technical Specifications

Parameter *	Value	Unit
Basic Specifications		

Parameter *	Value	Unit
Number of GPIOs	16	
Number of analog inputs (Multiplexed with GPIOs)	10	
Digital circuit power supply voltage (External)	7-12	V
Maximum current drawn by digital circuitry	450	mA
IO Specifications		
Maximum IO source current : IO0 – IO9	2	mA
Maximum IO source current : IO10 – IO15	25	mA
Maximum IO sink current : IO0 – IO9	2	mA
Maximum IO sink current : IO10 – IO15	25	mA
GPIO input low voltage	0.15	V
GPIO input high voltage	3.3	V
GPIO output low voltage	0	V
GPIO output high voltage	3.3	V
ADC Specifications		
Resolution	10	bits
Full scale range	0 – VDD	V
Reference voltage	VDD	V
Recommended Impedance of Analog Voltage Source	2.5	KΩ

* All parameters considered nominal. Numato Systems Pvt. Ltd. reserves the right to modify products without notice.

 Suggest edit

FAQ

Q. What is the connector marked as ICSP on this module?

A. This connector is used to program the onboard microcontroller. This connector is primarily intended for factory use.

Q. I need a customized version of this product, can Numato do the customization for me?

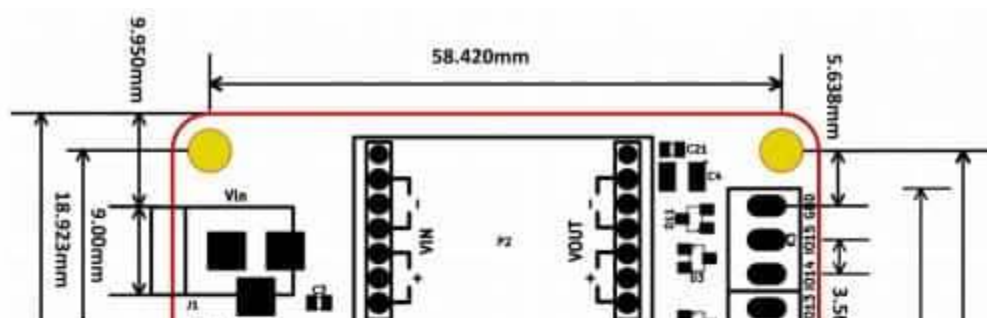
A. Yes, we can definitely do customization but there may be minimum order requirements depending on the level of customization required. Please write to sales@numato.com (<http://sales@numato.com>) for a quote.

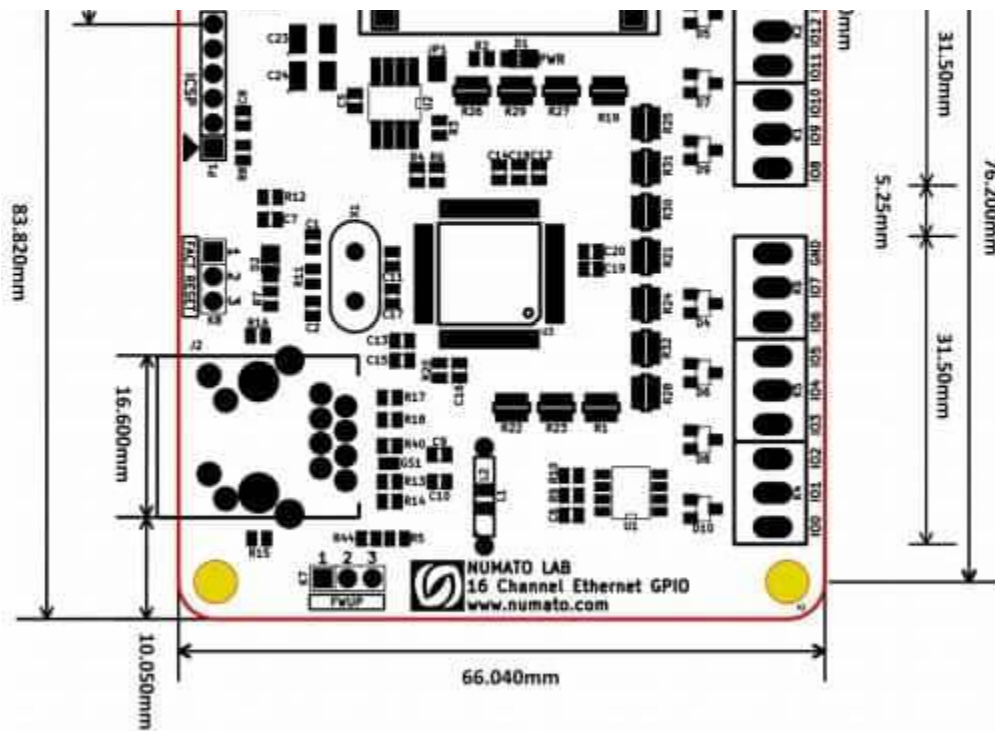
Q. Where can I buy this product?

A. All Numato products can be ordered directly from our web store <http://www.numato.com> (<http://www.numato.com>). We accept major credit cards and Paypal and ship to almost all countries with a few exceptions. We do have distributors in many countries where you can place your order. Please find the current list of distributors at <http://numato.com/distrib> (<https://numato.com/distrib>).

 Suggest edit

Mechanical Dimensions





L x W x H : 83.820 mm x 66.040 mm x 20 mm
Mechanical Hole Diameter : 4.0 mm

(<https://numato.com/blog/wp-content/uploads/2016/03/16-Channel-Ethernet-GPIO-Module-Physical-Dimensions-1.jpg>)

[✎ Suggest edit](#)



([https://twitter.com/home?status=https://numato.com/docs/16-channel-](https://twitter.com/home?status=https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-inputs/)

[ethernet-gpio-module-with-analog-inputs/](https://twitter.com/home?status=https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-inputs/))



([https://www.facebook.com/sharer](https://www.facebook.com/sharer/sharer.php?u=https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-inputs/)

[/sharer.php?u=https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-](https://www.facebook.com/sharer/sharer.php?u=https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-inputs/)

[inputs/](https://www.facebook.com/sharer/sharer.php?u=https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-inputs/))



([https://pinterest.com/pin/create/button/?url=https://numato.com](https://pinterest.com/pin/create/button/?url=https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-inputs/&media=&description=)

[/docs/16-channel-ethernet-gpio-module-with-analog-inputs/&media=&description=\)](https://pinterest.com/pin/create/button/?url=https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-inputs/&media=&description=)



([https://plus.google.com/share?url=https://numato.com/docs/16-channel-](https://plus.google.com/share?url=https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-inputs/)

[ethernet-gpio-module-with-analog-inputs/](https://plus.google.com/share?url=https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-inputs/))



(<https://www.linkedin.com>

/shareArticle?mini=true&url=https://numato.com/docs/16-channel-ethernet-gpio-module-with-analog-inputs/)

Make the best product decisions

Stay in the loop with new products, software, and tools!

Subscribe



(<https://twitter.com/numatolab>)



(<https://www.facebook.com/numato/>)



(<https://www.youtube.com/user/NumatoLab>)



(<https://plus.google.com/+Numatosystems>)

[Privacy Policy](#) [Terms of Use](#)

© 2018 Numato Systems Pvt. Ltd. (<https://numato.com>). All Rights Reserved. [Privacy Policy](#) (<https://numato.com/privacy-policy/>) | [Terms of Use](#) (<https://numato.com/tearm-of-service/>)