

# Use NuMicroPy on NuMaker IoT board

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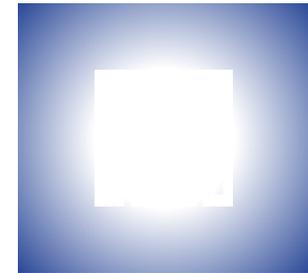
Joy of innovation  
**NUVOTON**

# The NuMicroPy



# | The NuMicroPy

- **Python** is an interpreted language. It provides a REPL (Read Evaluate Print Loop) mode that allows users to quickly test and run code through a terminal.
- **MicroPython** (<https://micropython.org/>) is a implementation of the Python 3 includes a small subset of the Python standard library and is optimized to run on microcontrollers.
- **NuMicroPy** (<https://github.com/OpenNuvoton/NuMicroPy>) is a port of MicroPython for Nuvoton NuMicro microcontrollers.



# The NuMicroPy Resources

- Source code on GitHub
  - <https://github.com/OpenNuvoton/NuMicroPy>
  - Includes README for introduction, usage, and how-to-build, as well as pre-built firmware and user manual.
- Pre-built firmware for NuMaker IoT boards

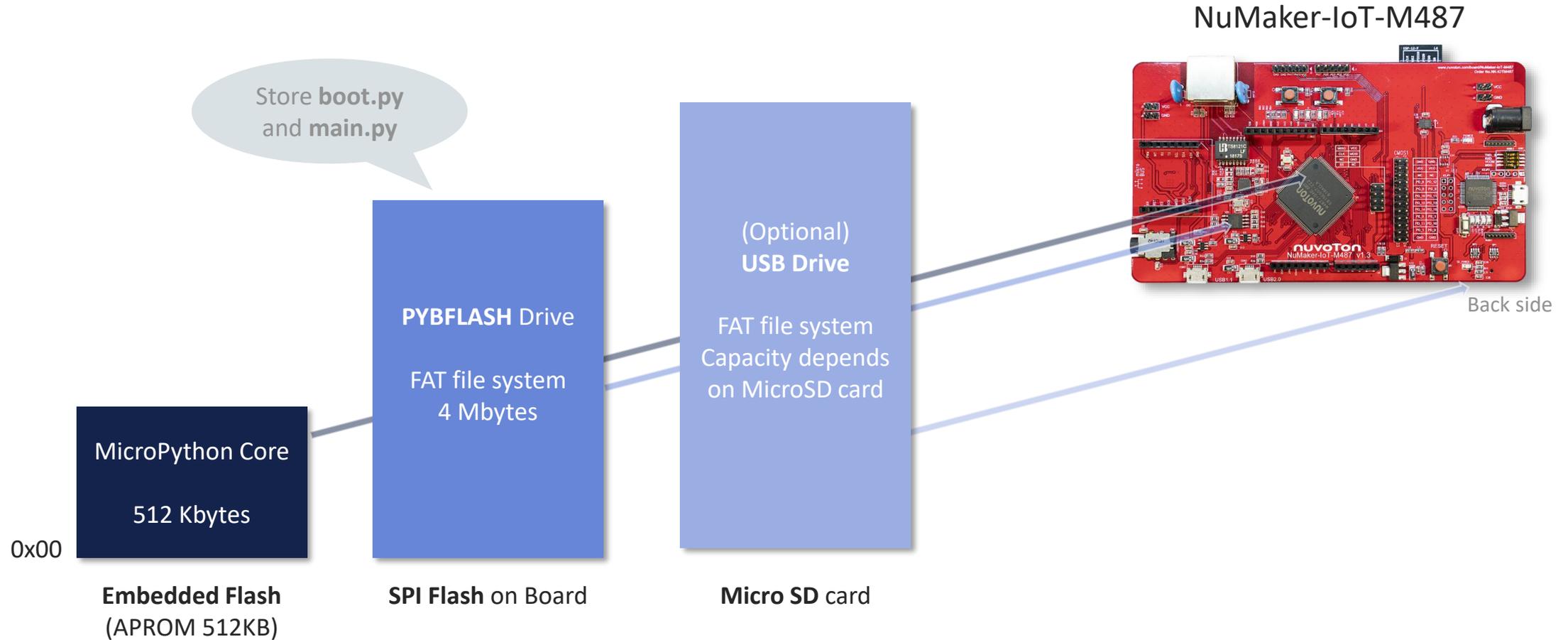
Board	MCU	Support Network	Required ROM size	Required RAM size
NuMaker-PFM-M487	M487	Ethernet	383 KB 660 KB (w/LVGL)	92 KB 128 KB (w/LVGL)
NuMaker-IoT-M487*	M487	Wi-Fi	351 KB	64 KB
NuMaker-M263KI	M263		266 KB	35 KB

\* Used in the tutorial

NuMaker-IoT-M487



# | The Memory and Storage Allocation



# | Prerequisite

## Hardware

- A NuMaker-IoT-M487 board
- Two Micro USB cables
- A Wi-Fi AP for network connections



## Software

- Terminal tool
  - Such as Tera Term, Putty, etc. to open COM port

# Build the NuMicroPy on NuMaker IoT Board



# Firmware Download

- Use browser to visit the URL

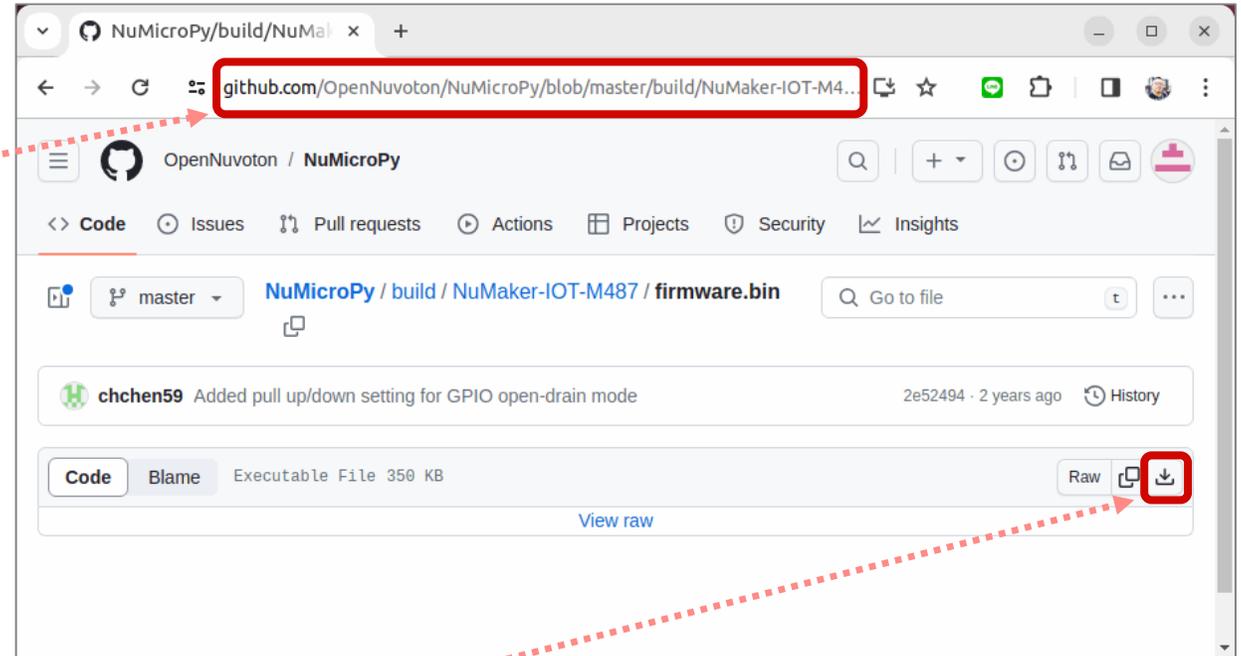
<https://github.com/OpenNuvoton/NuMicroPy/blob/master/build/NuMaker-IOT-M487/firmware.bin>

Or

<https://github.com/OpenNuvoton/>

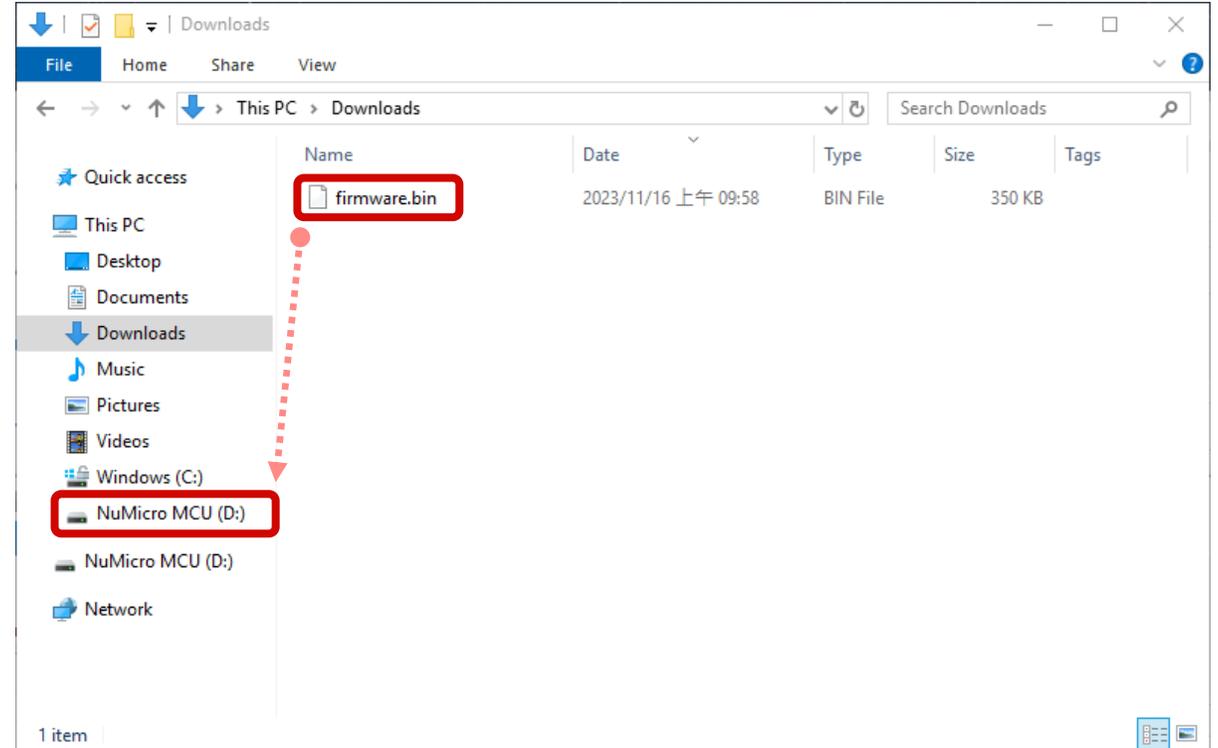
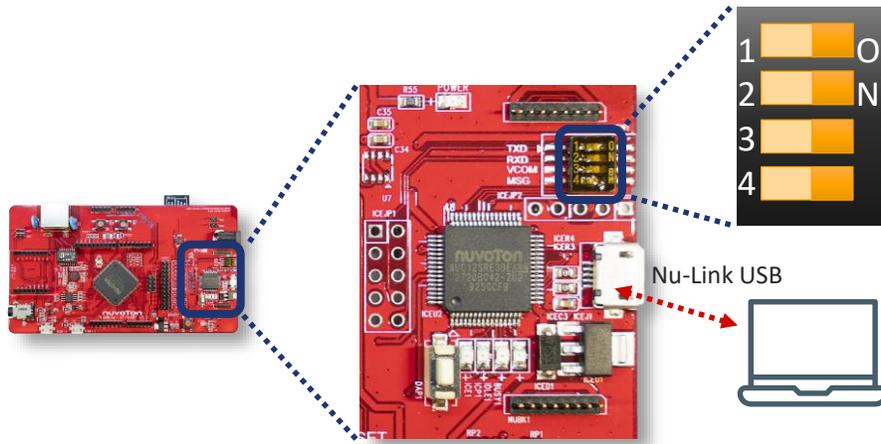
- ➔ Click “NuMaker-Platform”
- ➔ Click “MicroPython porting for NuMaker Platform”
- ➔ Click “build”
- ➔ Click “NuMaker-IOT-M487”
- ➔ Click “firmware.bin”

- Click **Download** icon to download **firmware.bin**



# Firmware Program via Nu-Link-ME (e.g. on NuMaker-IoT-M487)

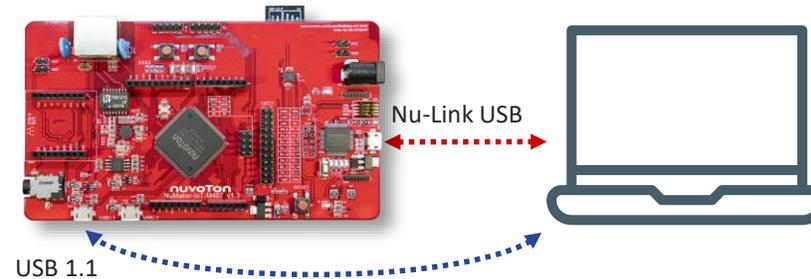
- Make sure that all ISW1 switches set to ON.



- Connect the USB connector on Nu-Link to the PC with a Micro USB cable.
- A “NuMicro MCU” drive appears on the PC
- Copy **firmware.bin** to “NuMicro MCU” drive to program the firmware to board.

# Connections between Board and PC

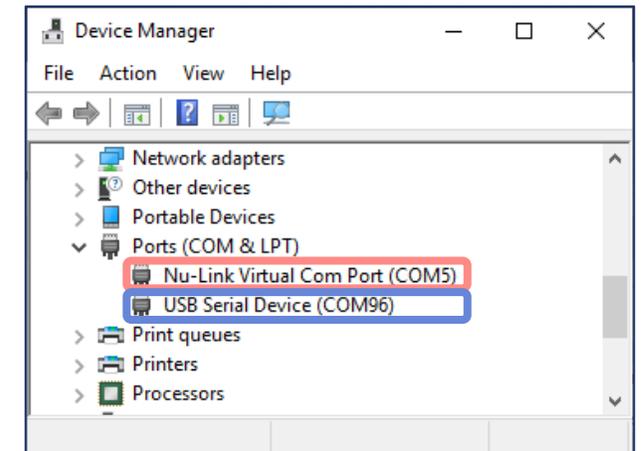
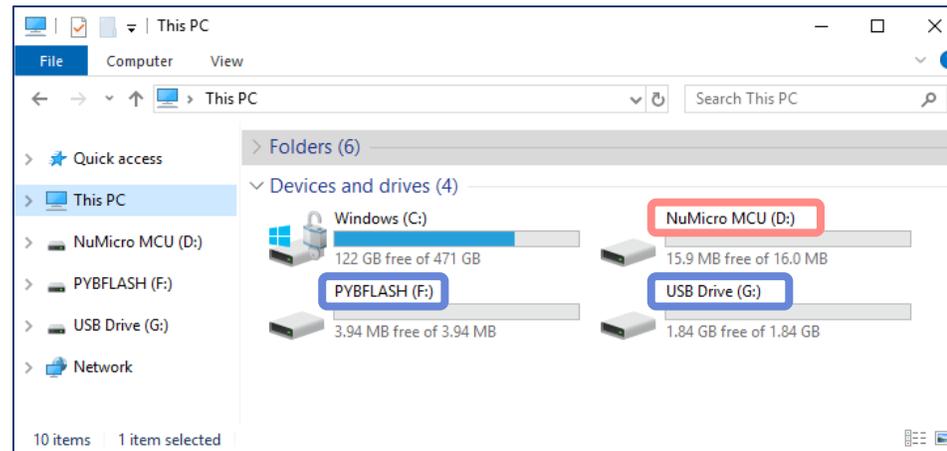
- Connect the USB 1.1 connector on board to the PC with another Micro USB cable.



- Press RESET button on NuMaker-IoT-M487 board to restart the NuMicroPy
- If the external SPI flash doesn't format in FAT format, the first execution will format it. Please pay attention to the data in the flash will be gone after format. A **boot.py** file will be put into the SPI Flash (PYBFLASH drive) after format.

# Drives and Virtual COMs

- After board start up, mass storage drives and COM ports show on PC as below diagrams
- Execute the terminal tool twice to open two COM ports respectively. One for Debug Messages and one for NuMicroPy Console. Baud rate is 115,200.



# Run Python Code on NuMaker IoT Board



# | The Python Code for Test

- Create a **main.py** file, fill the following code into **main.py**. This is a simple http client example.
- Modify the Wi-Fi SSID and password in the code for your Wi-Fi AP.
- Store the **main.py** to **PYBFLASH** drive

```
import pyb
import network
import usocket

# The SSID and password of your Wi-Fi AP
ssid = 'YOUR-WIFI-SSID'
password = 'YOUR-WIFI-PASSWORD'

# URL for test
url = 'http://micropython.org/ks/test.html'

# Declare the http_get function
def http_get(url):
    _, _, host, path = url.split('/', 3)
    addr = usocket.getaddrinfo(host, 80)[0][-1]
    s = usocket.socket()
    s.connect(addr)
    s.send(bytes('GET /%s HTTP/1.0\r\nHost: %s\r\n\r\n' % (path, host), 'utf8'))
```

```
while True:
    data = s.recv(100)
    if data:
        print(str(data, 'utf8'), end='')
    else:
        break
s.close()

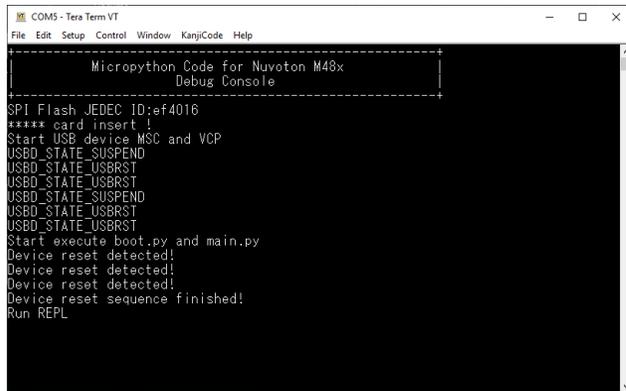
# Connect to the Wi-Fi AP
wlan = network.WLAN()
wlan.connect(ssid, password)
print('IP address is ', wlan.ifconfig()[0])

# Connect to the test URL
print('Send a request to URL : ', url)

http_get(url)
```

# Run Python Code

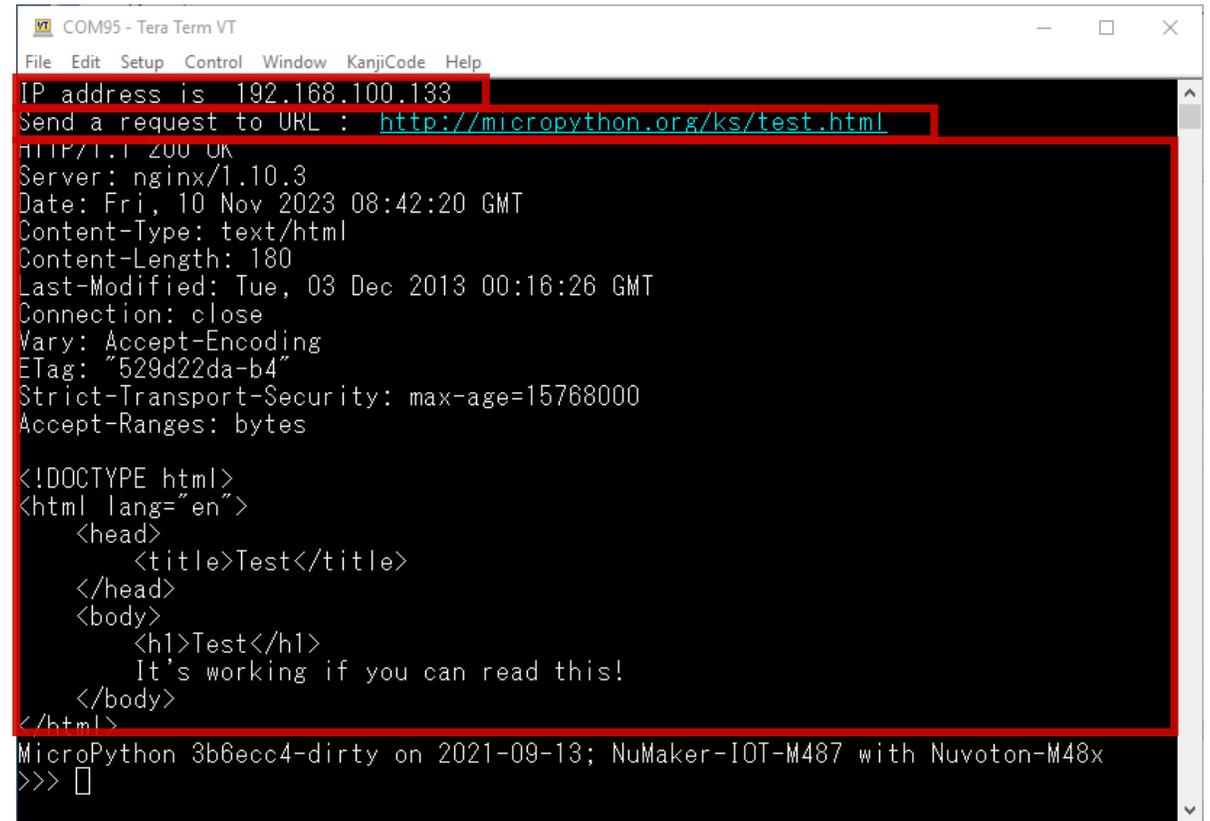
- Press RESET button on NuMaker-IoT-M487 board to restart it.
- NuMicroPy run **boot.py** then **main.py** in PYBFLASH drive
- NuMicroPy console outputs
  - Got IP address
  - Send a request to URL
  - Output the server response
- After that, NuMicroPy outputs “>>>” prompt and enter interactive mode.



```
COM5 - Tera Term VT
-----
Micropython Code for Nuvoton M48x
Debug Console

SPI Flash JEDEC ID:ef4016
**** card insert !
Start USB device MSC and VCP
USBD_STATE_SUSPEND
USBD_STATE_USBRST
USBD_STATE_USBRST
USBD_STATE_USBRST
USBD_STATE_USBRST
USBD_STATE_USBRST
USBD_STATE_USBRST
USBD_STATE_USBRST
Start execute boot.py and main.py
Device reset detected!
Device reset detected!
Device reset detected!
Device reset sequence finished!
Run REPL
```

Debug Message output



```
COM95 - Tera Term VT
File Edit Setup Control Window KanjiCode Help
IP address is 192.168.100.133
Send a request to URL : http://micropython.org/ks/test.html
HTTP/1.1 200 OK
Server: nginx/1.10.3
Date: Fri, 10 Nov 2023 08:42:20 GMT
Content-Type: text/html
Content-Length: 180
Last-Modified: Tue, 03 Dec 2013 00:16:26 GMT
Connection: close
Vary: Accept-Encoding
ETag: "529d22da-b4"
Strict-Transport-Security: max-age=15768000
Accept-Ranges: bytes

<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Test</title>
  </head>
  <body>
    <h1>Test</h1>
    It's working if you can read this!
  </body>
</html>

MicroPython 3b6ecc4-dirty on 2021-09-13; NuMaker-IOT-M487 with Nuvoton-M48x
>>> █
```

NuMicroPy console

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**nuvoTon**

谢谢

謝謝

Děkuji

Bedankt

Thank you

Kiitos

Merci

Danke

Grazie

ありがとう

감사합니다

Dziękujemy

Obrigado

Спасибо

Gracias

Teşekkür ederim

Cảm ơn