

# NuMicro<sup>®</sup> IoT Platform

2022-07-20

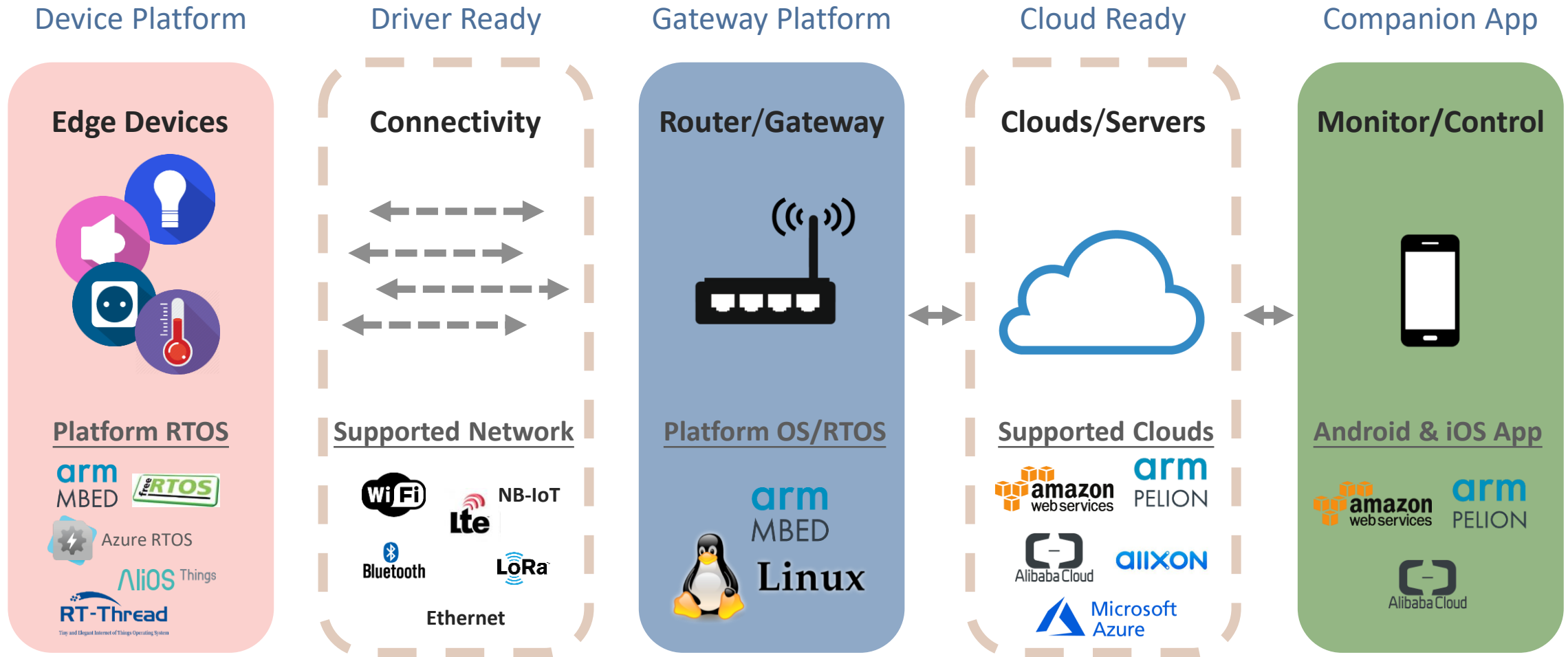
Please Contact

[SalesSupport@nuvoton.com](mailto:SalesSupport@nuvoton.com)

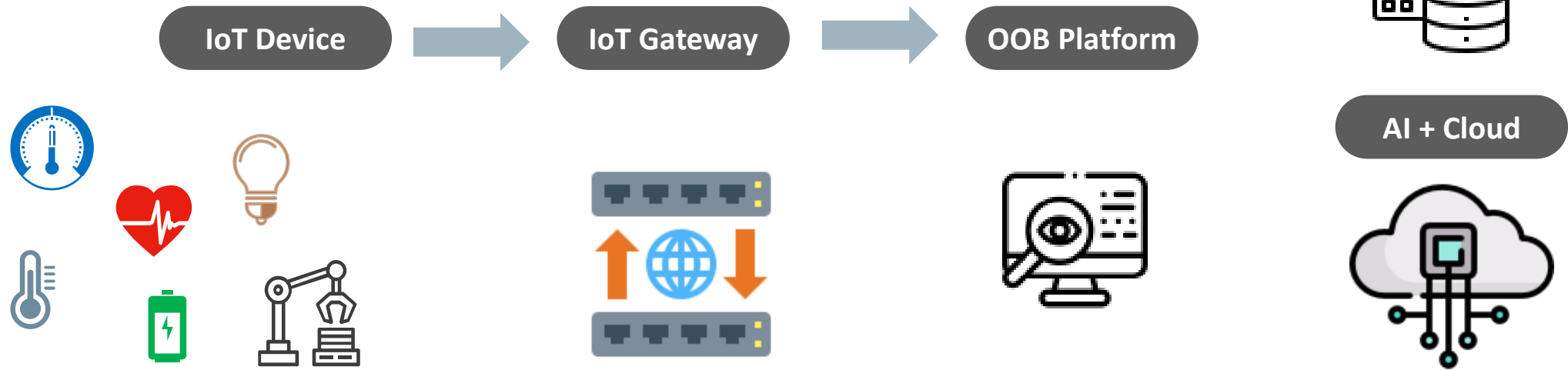
File URL: [https://www.nuvoton.com/iot\\_startup](https://www.nuvoton.com/iot_startup)



# | Nuvoton Provides One-Stop IoT Solution



# Nuvoton IoT Platform



	IoT Device	IoT Gateway	OOB Platform	AI + Cloud
<b>Nuvoton Platform</b>	NuMaker-IoT-M487 NuMaker-IoT-M263A NuMaker-IoT-M2354 NuStamp-ACK-M031LE NuMaker-LoRaD-M252 NuMaker-M031BTYE NuMaker-M032BTAI	NuMaker-IIoT-NUC980 NuMaker-RTU-NUC980 NuMaker-IoT-M487	NuMaker-IIoT-NUC980 NuMaker-RTU-NUC980 NuMaker-IoT-M487	Arm Pelion Amazon Web Service Microsoft Azure Alibaba Cloud Allxon

## Connectivity

- \* Supports Ethernet / Wi-Fi / Bluetooth / 4G & LTE / NB-IoT / LoRa
- \* Supports MQTT / CoAP / HTTP / TLS / AWS / Web Server

# Nuvoton IoT Platform

IoT Platform	Application Platform	NuMaker Board	Details
IoT device platform	IoT General Platform	NuMaker-IoT-M487	For sensor fusion and machine learning device applications: supporting Arm CMSIS-NN for neural network function.
		NuMaker-IoT-M263A	Supports a mini PCIe connector for external modules to realize 3G/4G/NB-IoT connectivity functions
	IoT Security TF-M Platform	NuMaker-IoT-M2354	The latest IoT secure platform based on Arm® Cortex®-M23 TrustZone® technology with secure keys management, and storage protected by physical tampering shield.
	Amazon ACK Platform	NuStamp-ACK-M031LE	Amazon approved Amazon Alexa Connect Kit (ACK) platform. Easy to implement smart home appliances with Alexa echo speaker eco system.
	LoRa Device Platform	NuMaker-LoRaD-M252	LoRa device development platform is fully compliant with LoRaWAN Class A/C standard and supports 868-915MHz (EU/US) or 433-470MHz (CN) Band.
	BLE Platform	NuMaker-M031BTYE	Microcontroller with BLE5.0 & 2.4GHz proprietary for IoT sensor node & home appliances
NuMaker-M032BTAI		Microcontroller with BLE5.0 & 2.4GHz proprietary, USB and Arduino support for smart devices	
IoT gateway platform	IoT Gateway Platform	NuMaker-IIoT-NUC980 NuMaker-RTU-NUC980	IoT Gateway Platform by Linux
	IoT Lite Gateway Platform	NuMaker-IoT-M487	Supporting multiple-cloud service: Arm Pelion, Amazon Web Service, Alibaba Cloud and Microsoft Azure IoT.
OOB Platform for server	OOB Platform	NuMaker-IIoT-NUC980 NuMaker-RTU-NUC980	with Allxon Cloud service
	Lite OOB Platform	NuMaker-IoT-M487	Affordable OOB platform supports complete SSL and TLS library for secure link

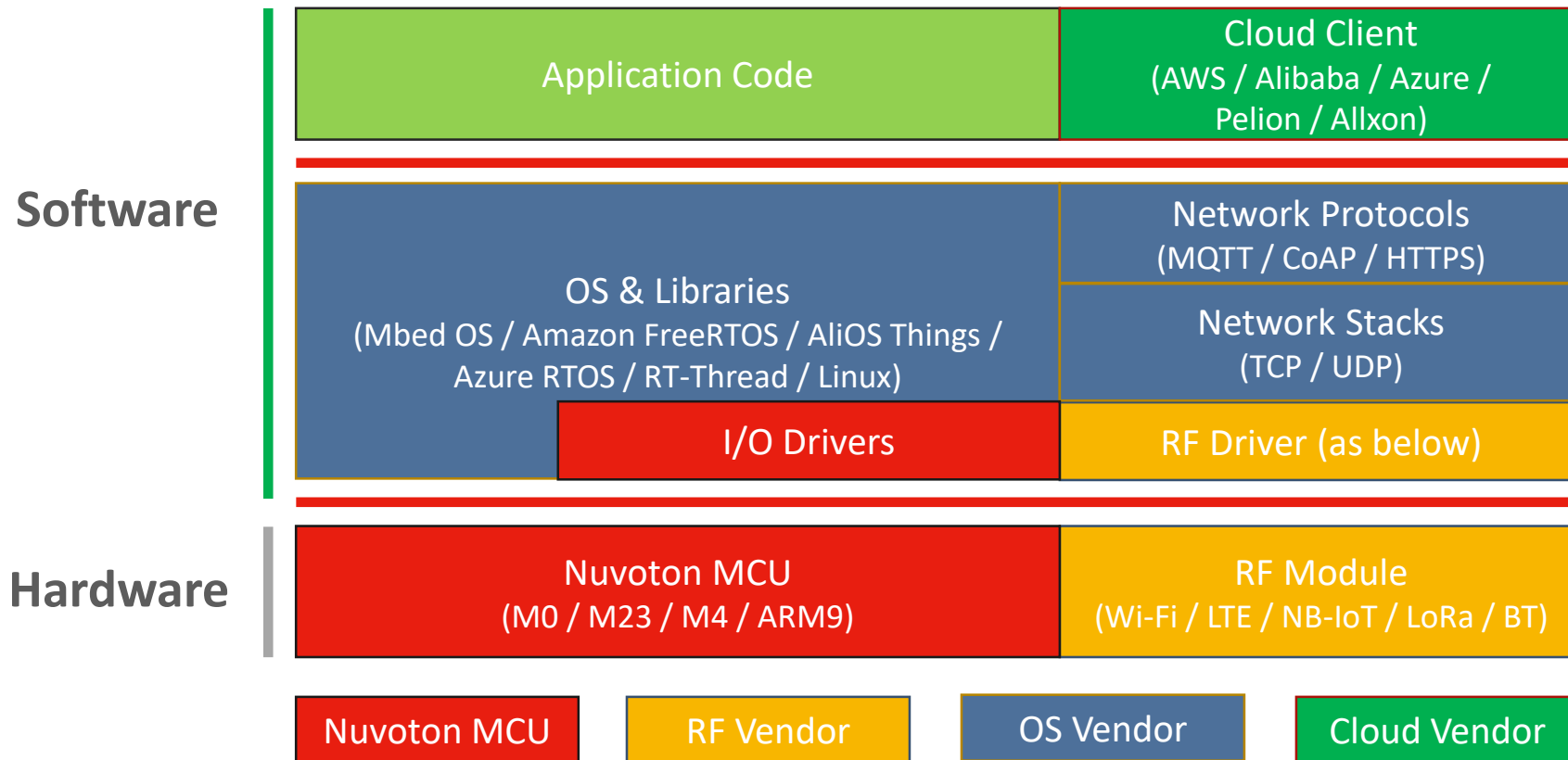
# | Customer Attribute Capabilities



Core & OS	8051 / M0 / M23 / M4 MCU No OS, use BSP only	M4 / M23 MCU RTOS with lite network stack (lwIP)	ARM9 / A35 MPU Linux with full network stack or RTOS with lite network stack
Network	No or simple non-IP network Lower data rate	Ethernet (exclude M2354), Wi-Fi (UART), 4G LTE (UART), NB-IoT (UART) Lower data rate	Ethernet, Wi-Fi (USB/SDIO), 4G LTE (USB/UART), NB-IoT (USB/UART), ... Higher data rate
GUI	No or segmented LCD	with emWin or LVGL	with QT, emWin, or LVGL
R&D	1 or 2	3 to 5	> 10
Applications	Simple Smart Devices	Home Appliances, Smart Devices...	Industrial, Smart Grid, Smart Building, Smart City, ...
Nuvoton Platforms	NuMaker-IoT-M487 NuMaker-IoT-M263A NuMaker-IoT-M2354 NuStamp-ACK-M031LE NuMaker-LoRaD-M252 NuMaker-M031BTYE NuMaker-M032BTAI	NuMaker-IIoT-NUC980 NuMaker-RTU-NUC980 NuMaker-IoT-M487 NuMaker-IoT-M2354	NuMaker-IIoT-NUC980 NuMaker-RTU-NUC980 NuMaker-HMI-N9H30

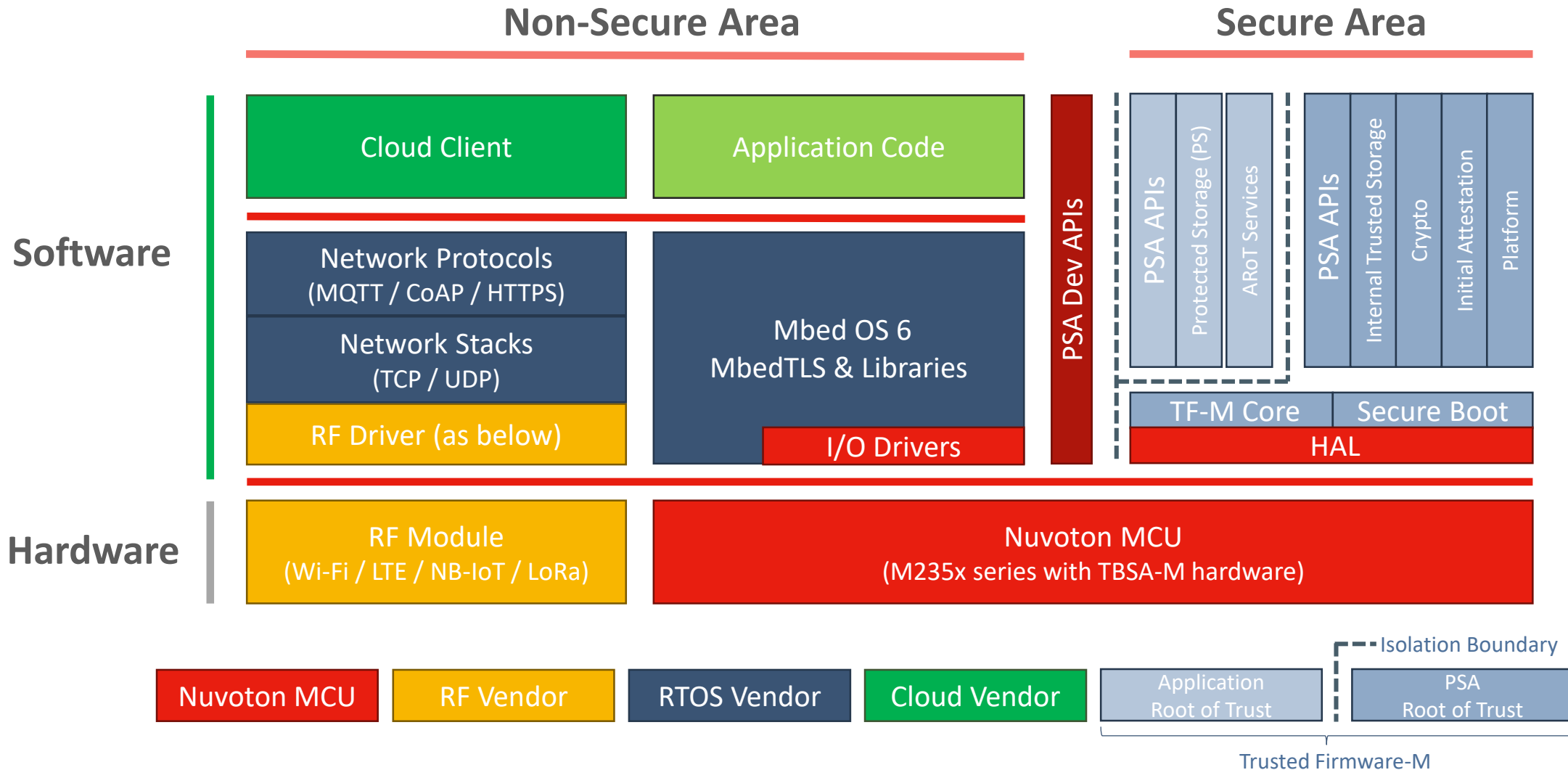
# | Nuvoton IoT Platform – All-in-One

- Integrate MCU/OS/Network Protocols/RF Driver/Application Demos
- Customer can focus on application development.



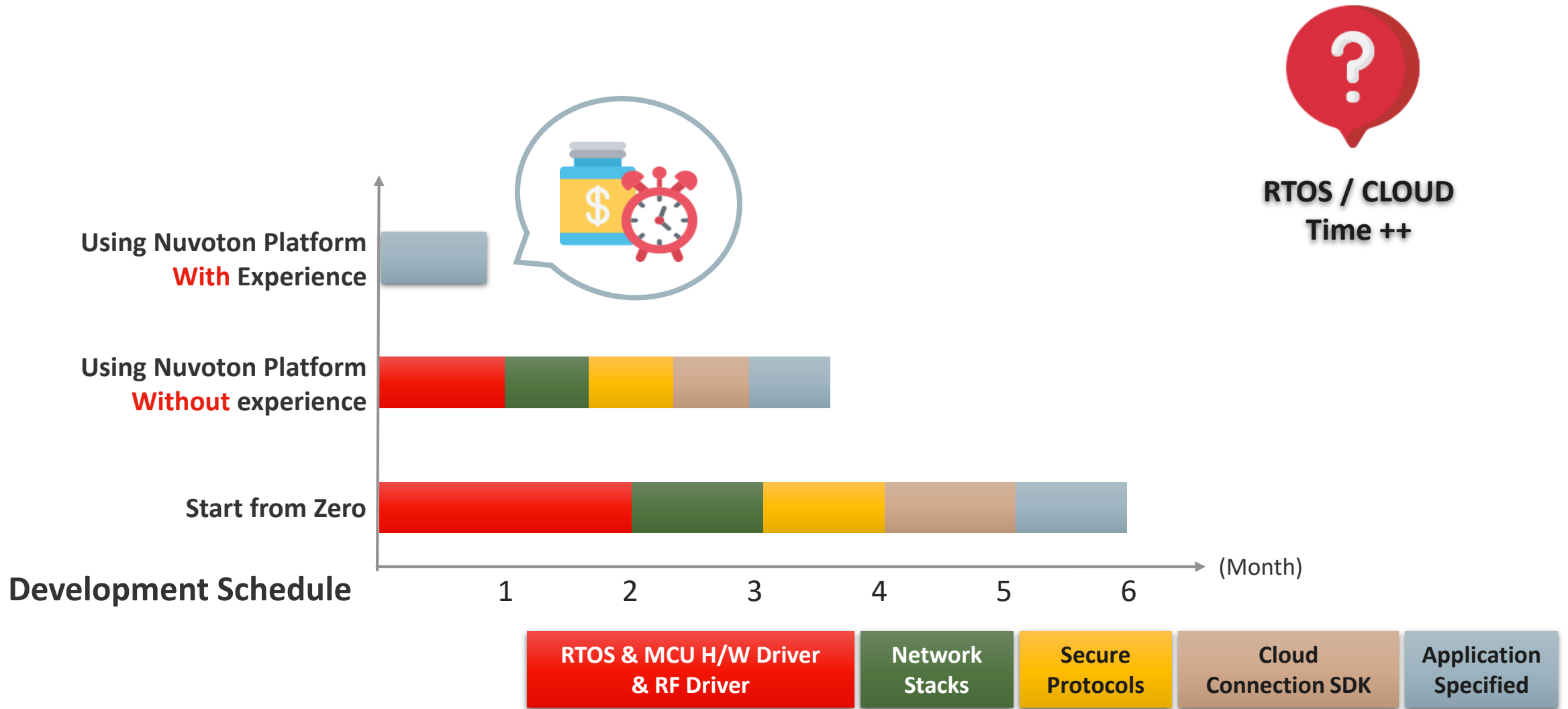
- Cloud Certification
- MQTT/CoAP Example
- Integrate RF Driver
- Multiple HW Platform

# Nuvoton IoT Platform with TF-M





# | Solution for your IIoT Platform





# Connectivity Ecosystems Support

NuMaker Board	OS / RTOS	IP Connectivity					Non-IP Connectivity		Clouds				
		Ether net	Wi-Fi	NB-IoT CAT-M1	NB-IoT	LTE	LoRa (Device)	BLE 5 2.4G	Arm Pelion DM	Amazon AWS	Alibaba Cloud	Microsoft Azure	Allxon <sup>*5</sup>
				Quectel BG96A	SIMCOM 7020E	Quectel EC21A	SX1276						
NuMaker-IIoT-NUC980	Linux	●	●	●		●			●	●	●		
	RT-Thread	●	●								●	●	
NuMaker-RTU-NUC980 (Chili)	Linux	●	●	●		●			●	●	●		●
	RT-Thread	●	●								●	●	
NuMaker-IoT-M487	MbedOS	●	●	●	●	●			●	●	●	●	
	Amazon FreeRTOS	●	●	●						●			
	AliOS Things	●	●								●		
	RT-Thread	●	●								●	●	
	Azure RTOS		●									●	
NuMaker-IoT-M2354	MbedOS <sup>*1</sup>		●	●	●	●			●	●	●	●	
	RT-Thread		●								●	●	
NuMaker-IoT-M263A	MbedOS		●	●	●	●	●		●	●	●	●	
NuMaker-LoRaD-M252 <sup>*2</sup>	MbedOS/Non-OS <sup>*3</sup>						●						
NuMaker-M031BTYPE	Non-OS							●					
NuMaker-M032BTAI	Non-OS							●					
NuStamp-ACK-M031LE	Non-OS		●							● <sup>*4</sup>			

# IoT Device Platform

## Platforms

### IoT General Platform

#### NuMaker-IoT-M487



- Arm® Cortex®-M4 core
- Runs at 192 MHz
- 512 KB Flash Memory
- 160 KB SRAM
- Ethernet Gateway
- Machine Learning  
(license plate recognition  
, Keyword-spotting)

#### NuMaker-IoT-M263A



- Arm® Cortex®-M23 core
- Runs at 64 MHz
- 512 KB Flash Memory
- 96 KB SRAM
- IoT Node

### IoT Security TF-M Platform

#### NuMaker-IoT-M2354



- Arm® Cortex®-M23 core
- Runs at 96 MHz
- 1024 KB Flash Memory
- 256 KB SRAM
- IoT Node
- TrustZone
- PSA Certified

# | IoT Device Platform

## Platforms

Amazon ACK Platform

LoRa Device Platform

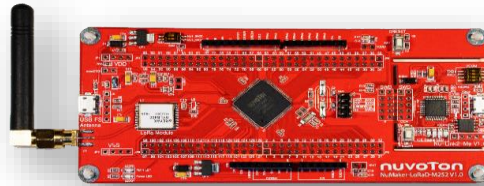
BLE Platform

**NuStamp-ACK-M031LE**



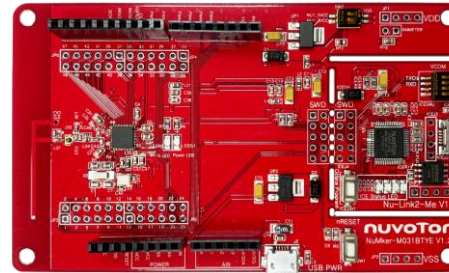
- Arm® Cortex®-M0 core
- Runs at 48 MHz
- 128 KB Flash Memory
- 16 KB SRAM
- **Alexa Sensor Node with Amazon Alexa Connect Kit (ACK)**

**NuMaker-LoRaD-M252**



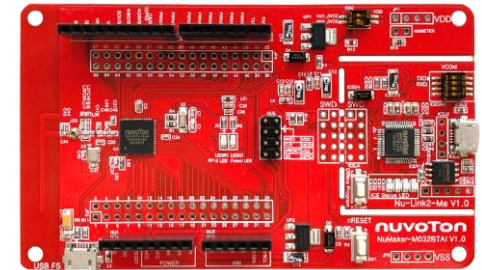
- Arm® Cortex®-M23 core
- Runs at 48 MHz
- 256 KB Flash Memory
- 32 KB SRAM
- **LoRa Node**
- **Helium Node**

**NuMaker-M031BTYE**



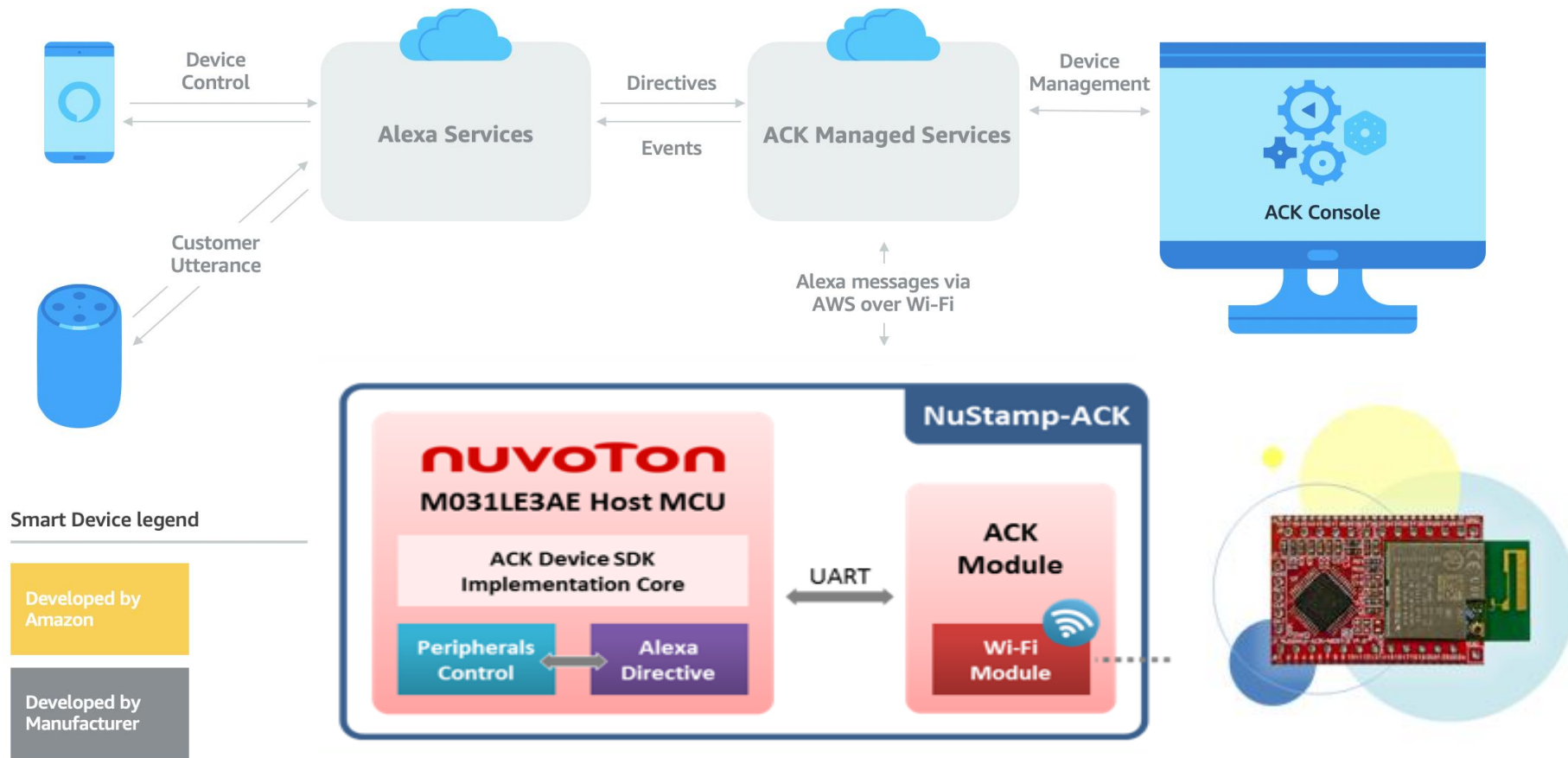
- Arm® Cortex®-M0 core
- Runs at 48 MHz
- 128 KB Flash Memory
- 16 KB SRAM
- **IoT Node**
- **BQB Certified**

**NuMaker-M032BTAI**



- Arm® Cortex®-M0 core
- Runs at 72 MHz
- 512 KB Flash Memory
- 96 KB SRAM
- **IoT Node**
- **BQB Certified**

# | Alexa Connect Kit (ACK) – Interactive with Alexa



# | IoT Gateway Platform

## Platforms

### NuMaker-IIoT-NUC980



- Arm® ARM926 core
- Runs at 300 MHz
- 64 MB DDR (up to 128MB)
- 1 Gb SPI-NAND Flash
- Ethernet Gateway
- Wireless Gateway
- Edge Computing

### NuMaker-RTU-NUC980 “Chili Board”



- Arm® ARM926 core
- Runs at 300 MHz
- 64 MB DDR2 in LQFP64
- 256 Mb SPI NOR Flash
- CAN Bus/RS485 to ETH
- Ethernet Gateway
- Gateway in small size
- Remote terminal unit

### NuMaker-IoT-M487



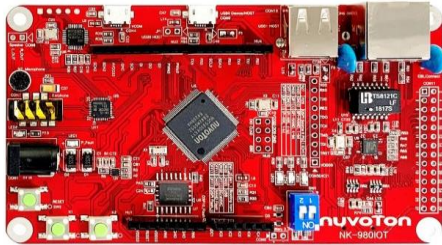
- Arm® Cortex®-M4 core
- Runs at 192 MHz
- 512 KB Flash Memory
- 160 KB SRAM
- Crypto accelerators
- Ethernet Gateway
- Machine Learning Computing



# | OOB Platform for Server

## Platforms

### NuMaker-IIoT-NUC980



- Arm® ARM926 core
- Runs at 300 MHz
- 64 MB DDR (up to 128MB)
- 1 Gb SPI-NAND Flash
- Support Allxon
- Ethernet
- Support Linux 4.4
- Support RT-Thread OOB

### NuMaker-RTU-NUC980 “Chili Board”



- Arm® ARM926 core
- Runs at 300 MHz
- 64 MB DDR2 in LQFP64
- 256 Mb SPI NOR Flash
- Support Allxon
- CAN Bus/RS485 to ETH
- Ethernet
- Support Linux 4.4
- Support RT-Thread OOB

### NuMaker-IoT-M487



- Arm® Cortex®-M4 core
- Runs at 192 MHz
- 512 KB Flash Memory
- 160 KB SRAM
- Crypto accelerators
- Support RT-Thread OOB

# Industrial IoT Gateway

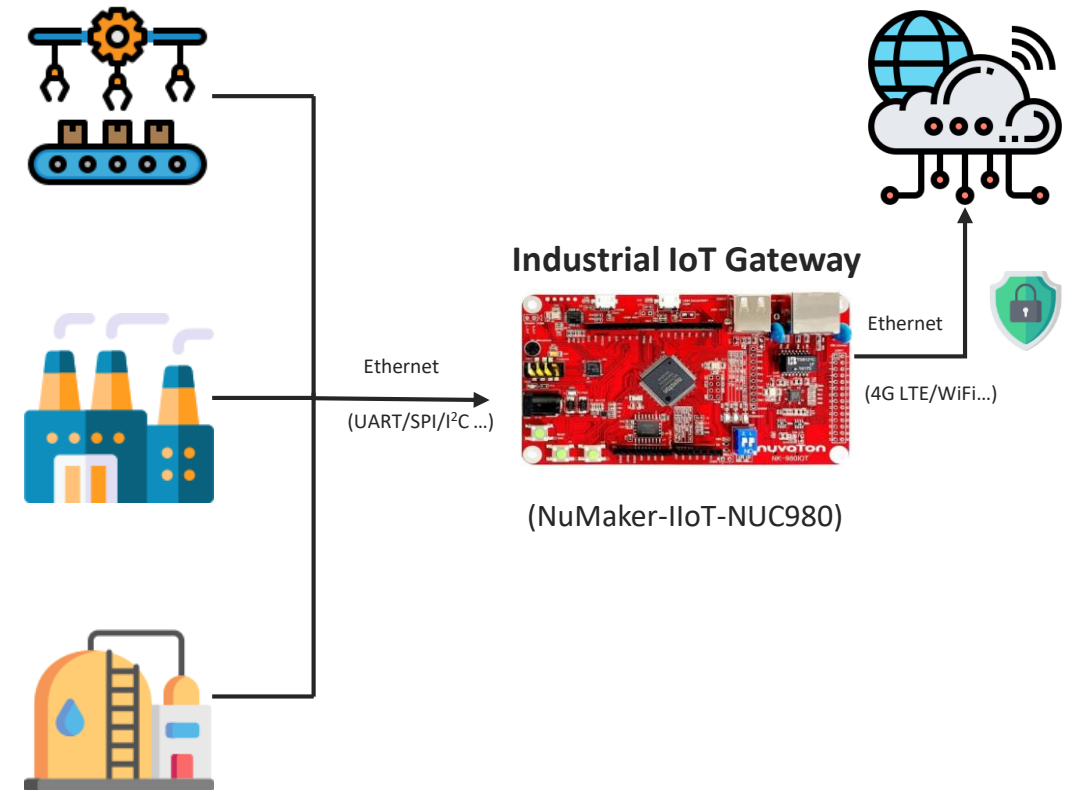
*IoT gateway is a bridge to pass raw data through the network to reach a central server for further processing.*

### Application Key Requirements

- Bridging traditional industrial networks to Internet by secure communication through multiple network connectivity
- Remote configuration and web style management

### NuMaker-IIoT-NUC980 Platform Features

- **Hardware**
  - ARM9, 300 MHz, MCP 64 or 128 MB DDR
  - UART, I<sup>2</sup>C, SPI, PWM, GPIO, USB, and Arduino interface for expansion
- **Software**
  - Buildroot to customized BSP or ready-to-use BSP image
  - Linux/OpenWRT and RTOS are ready for easy programming
  - Network protocols -TCP, UDP, HTTP(S), MQTT, CoAP, etc.
  - Secure data transfer by TLS 1.2 encryption
  - Public cloud client references to Azure, AWS, Arm Pelion, and Ali Cloud, etc.
- **Multiple network connectivity**
  - Ethernet, Wi-Fi, 4G LTE, NB-IoT, LoRa, BLE, sub-1G, etc.
- IoT gateway reference design is ready for easy customization





# Remote Control

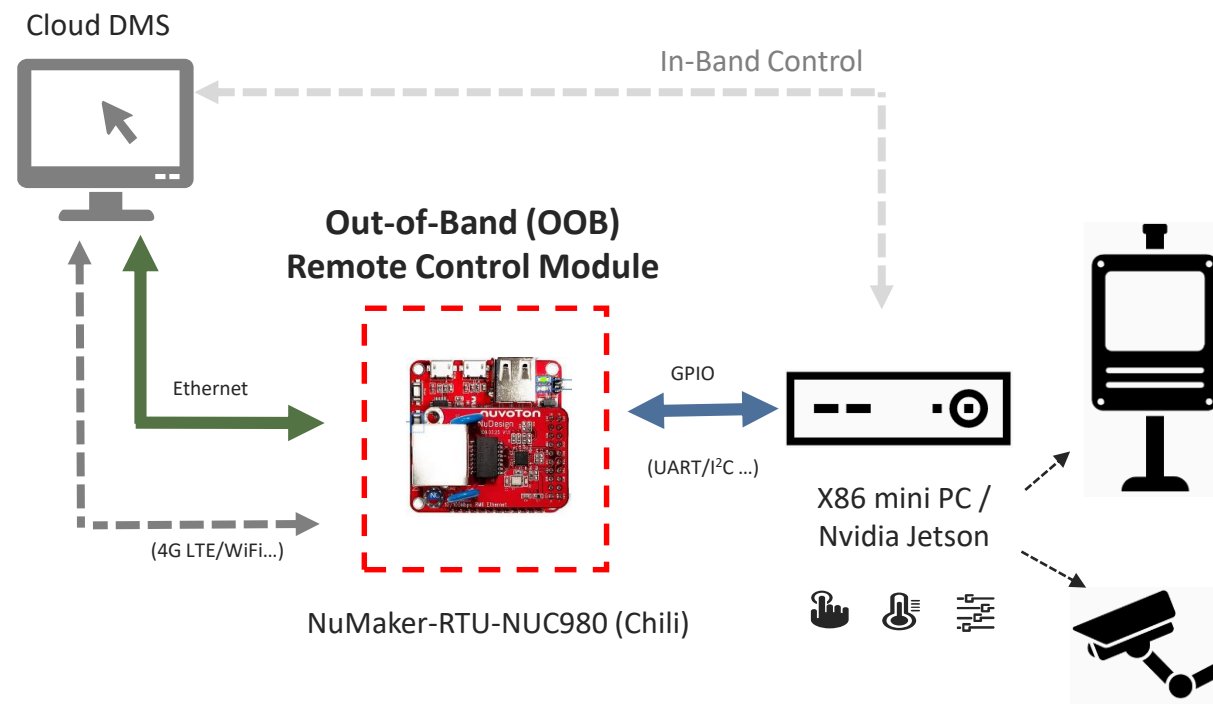
*The out-of-band (OOB) remote device management of Nuvoton NUC980 is a complete solution with Cloud DMS.*

### Application Key Requirements

- Secure communication through multiple network connectivity
- SaaS platform for easy and quick deployment

### NuMaker-IIoT-NUC980 Platform Features

- **Hardware**
  - ARM9, 300 MHz, MCP 64 or 128 MB DDR
  - UART, I<sup>2</sup>C, SPI, PWM, GPIO, USB for expansion
- **Software**
  - Buildroot to customized BSP or ready-to-use BSP image
  - Linux OS and SDK are ready for easy programming
  - Network protocols -TCP, UDP, HTTP(S), MQTT, CoAP, etc.
  - Secure data transfer by TLS encryption
  - SaaS reference platform is ready for easy customization and deployment
  - Public cloud client references to Azure, AWS, Arm Pelion, Ali Cloud, Allxon, etc.
- **Multiple network connectivity**
  - Ethernet, Wi-Fi, 4G LTE, NB-IoT, etc.



# | Secure Wireless Connectivity Solutions

*Enabling System Security for Sensor-to-Cloud Communication*

2.4 GHz



+

Wi-Fi (BT)

IPv4/ IPv6  
Secure key-provisioning service  
Clouds registration support  
Device Management support



+

Cascoda  
CA8211 RF T/R  
+ FW stack

IPv4/ IPv6  
Secure key-provisioning service  
Clouds registration support  
Device Management support



+

Cascoda  
CA8211 RF T/R  
+ Zigbee stack

IPv4/ IPv6  
Secure key-provisioning service  
Clouds registration support  
Device Management support

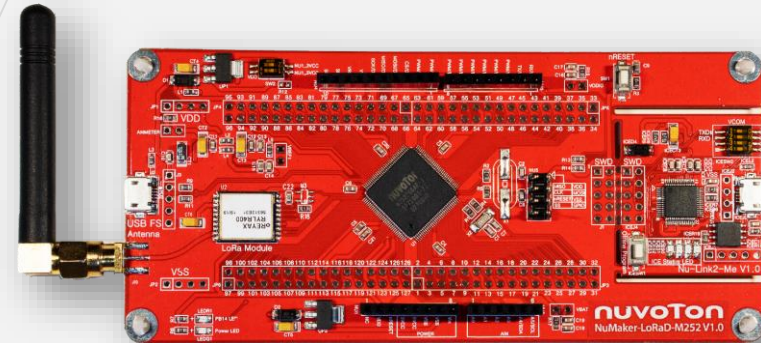
# | NuMaker-LoRaD-M252 LoRaWAN Sensor Node

- **Board Features**

- ARM Mbed OS 5.1
- Support LoRaWAN 1.0.2.
- Compatible with Helium Network
- Supports LoRaWAN Class A/C
- Supports 890 ~ 915 MHz / 433 ~ 470 MHz

- **NuMicro® M252 Series Features**

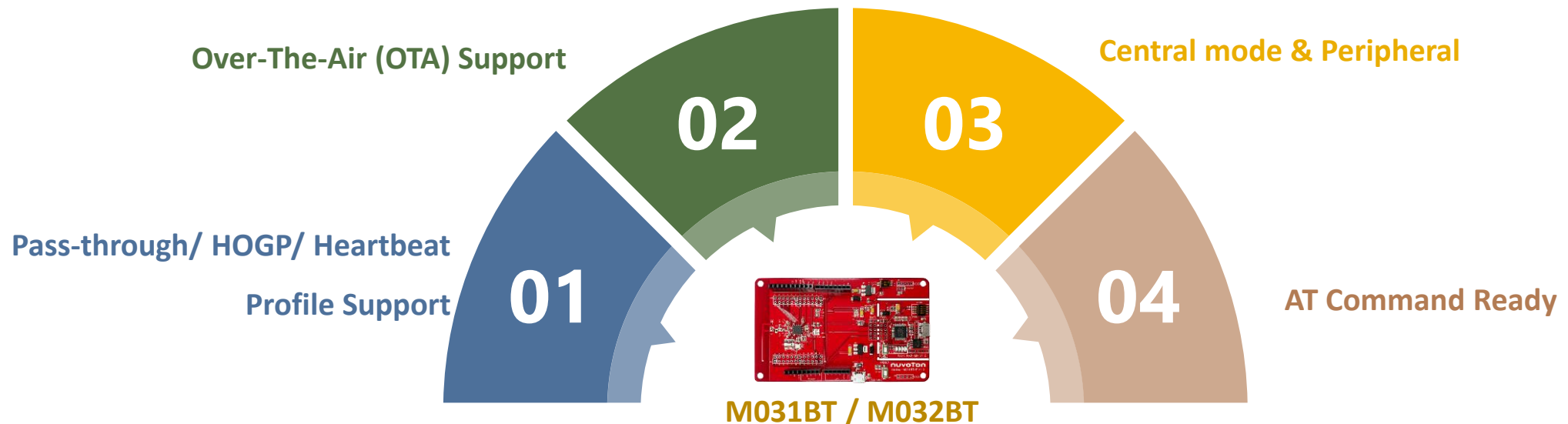
- Arm® Cortex®-M23 core
- Runs up to 48MHz
- 256 K Flash Memory, 32 K SRAM
- 16 sets of 12-bit ADC
- 5 sets of SPI
- 7 sets of UART
- 5 sets of I<sup>2</sup>C
- USB full-speed device



# | Easy Development for Bluetooth Applications



M031BT/M032BT series provide sample code for development



# NuMicro<sup>®</sup> IoT Resource



# | Nuvoton IoT Resource

- IoT resource table
  - Webpages for Boards / RTOS / Network
- IoT training videos
- Supported connection modules
- Supported clouds
- FAQ and more.



# IoT Resource Table

Core	Board	Web	BSP	UM *1	GS *2	Mbed OS	Amazon FreeRTOS	RT- Thread	Linux	Eth	WiFi	4G LTE	NB- IoT	LoRa	BT	Remark
M4	NuMaker-IoT-M487	<u>Y</u>	<u>Non-OS</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	-	NMAR *5	MAR	M	MA	-	-	
M23	NuMaker-IoT-M263A	<u>Y</u>	<u>Non-OS</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	-	-	-	-	M	M	M	M	-	
	NuMaker-IoT-M2354	<u>Y</u>	<u>Non-OS</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	-	<u>Y</u>	-	-	MR	M	M	-	-	
	NuMaker-LoRaD-M252		<u>Non-OS</u>	<u>Y</u>		<u>Y</u>	-	-	-	-	-	-	-	NM	-	限定客戶, 非Mass Market
M0	NuStamp-ACK-M031LE	<u>Y</u>	<u>Non-OS</u>	<u>Y</u>	<u>Y</u>	- *4	-	-	-	-	N	-	-	-	-	
	NuMaker-M031BTYE	<u>Y</u>	<u>Non-OS</u>	*3	<u>Y</u>	-	-	-	-	-	-	-	-	-	N	
	NuMaker-M032BTAI	<u>Y</u>	<u>Non-OS</u>	*3	<u>Y</u>	-	-	-	-	-	-	-	-	-	N	
ARM9	NuMaker-IIoT-NUC980	<u>Y</u>	<u>Linux</u>	<u>Y</u>	<u>Y</u>	-	-	<u>Y</u>	<u>Y</u>	L	L	L	L	-	-	
	NuMaker-RTU-NUC980 (Chili)	<u>Y</u>	<u>Linux</u>	<u>Y</u>	<u>Y</u>	-	-	<u>Y</u>	<u>Y</u>	L	L	L	L	-	-	

\*1 User Manual

\*2 Gerber & Schematics

\*3 Under preparing

\*4 Dash (-) is N/A.

\*5 Support on specified OS/RTOS

N: Non-OS, M: MbedOS, A: A:FreeRTOS, R: RT-Thread, L: Linux



# I IoT Training Videos

- Online Media
  - YouTube Channel <https://www.youtube.com/user/NuMicro>
  - Bilibili Channel <https://space.bilibili.com/544360881>
- Series (Total 44 videos)
  - NuMaker-IoT-M487 + Mbed OS (11 videos each in Chinese and English)
  - NuMaker-IoT-M487 + AliOS Things (4 videos in Chinese)
  - NuMaker-IoT-M263A + Mbed OS (7 videos in Chinese)
  - NuMaker-IoT-NUC980 + Linux (5 videos each in Chinese and English)
  - M031BT Series BLE Demo (in Chinese)

# | Training Videos (M487 + Mbed OS & AliOS)

Core	Board	Topic (Chinese) ( <a href="#">Playlist URL</a> )	Topic (English) ( <a href="#">Playlist URL</a> )
M4	NuMaker-IoT-M487	<a href="#">Step by Step 讓你了解如何運行 Mbed OS (1)</a>	<a href="#">Get Started with Mbed OS (1)</a>
		<a href="#">在 Mbed OS 完成按鍵控制 LED 開關功能 (2)</a>	<a href="#">Control LED and Buttons on Mbed OS (2)</a>
		<a href="#">在 Mbed OS 上使用 Wi-Fi (3)</a>	<a href="#">Use Wi-Fi on Mbed OS (3)</a>
		<a href="#">在 Mbed OS 上使用 NB-IoT/LTE (4)</a>	<a href="#">Use NB-IoT or 4G LTE on Mbed OS (4)</a>
		<a href="#">在 Mbed OS 連接 Pelion 雲端 (5)</a>	<a href="#">Connect to Pelion DM on Mbed OS (5)</a>
		<a href="#">在 Mbed OS 上使用 Ethernet (6)</a>	<a href="#">Use Ethernet on Mbed OS (6)</a>
		<a href="#">在 Mbed OS 使用溫度感測器 (7)</a>	<a href="#">Control Temperature sensor on Mbed OS (7)</a>
		<a href="#">在 Mbed OS 使用 SD 卡 (8)</a>	<a href="#">Use SD Card on Mbed OS (8)</a>
		<a href="#">在 Mbed OS 做錄放音 (9)</a>	<a href="#">Record and Play audio on Mbed OS (9)</a>
		<a href="#">在 Mbed OS 連接 AWS IoT 雲端 (10)</a>	<a href="#">Connect to AWS IoT service (10)</a>
		<a href="#">在 Mbed OS 連接 Microsoft Azure (11)</a>	<a href="#">Connect to Azure IoT Hub service (11)</a>
		<a href="#">在 AliOS Things 完成按鍵控制 LED 開關功能 (1)</a>	
		<a href="#">在 AliOS Things 使用九軸感測器 (2)</a>	
		<a href="#">在 AliOS Things 使用乙太網路連接阿里雲 (3)</a>	
		<a href="#">在 AliOS Things 使用Wi-Fi連接阿里雲 (4)</a>	

# | Training Videos (M263 + Mbed OS)

Core	Board	Topic (Chinese) ( <a href="#">Playlist URL</a> )	
M23	NuMaker-IoT-M263A	<a href="#">三分鐘讓你了解如何運行 Mbed OS (1)</a>	
		<a href="#">在 Mbed OS 控制 LED 與按鍵 (2)</a>	
		<a href="#">在 Mbed OS 上使用 Wi-Fi (3)</a>	
		<a href="#">在 Mbed OS 上使用 NB-IoT 和 LTE (4)</a>	
		<a href="#">在 Mbed OS 連接 Pelion 雲端 (5)</a>	
		<a href="#">在 Mbed OS 使用 SD 卡 (6)</a>	
		<a href="#">在 Mbed OS 上使用環境感測器 (7)</a>	

# | Training Videos (NUC980 + Linux)

Core	Board	Topic (Chinese) ( <a href="#">Playlist URL</a> )	Topic (English) ( <a href="#">Playlist URL</a> )
ARM9	NuMaker-IIoT-NUC980	<a href="#">如何安裝 NuMaker NUC980 IIoT開發環境 (1)</a>	<a href="#">Install Development Environment (1)</a>
		<a href="#">學習透過 GPIO 控制 LED (2)</a>	<a href="#">Control GPIO (2)</a>
		<a href="#">學習透過 Ethernet 連網 (3)</a>	<a href="#">Use Ethernet (3)</a>
		<a href="#">如何使用 LTE 與 NB-IoT (4)</a>	<a href="#">Use LTE and NB-IoT (4)</a>
		<a href="#">連接 Amazon 物聯網服務 (5)</a>	<a href="#">Connect to AWS (5)</a>

Core	Board	Topic (Chinese) ( <a href="#">Playlist URL</a> )	Topic (English) ( <a href="#">Playlist URL</a> )
ARM9	NuMaker-RTU-NUC980(Chili)	<a href="#">10分鐘快速學會在新唐NUC980 上使用嵌入式Linux OS</a>	<a href="#">Nuvoton Chili board with Linux OS, featured in it's compact size, rapid in development</a>
		<a href="#">新唐 Chili Board - 快速、小型、立即上手的 Linux 平台</a>	
		<a href="#">新唐 Chili Board – 開發板與平台介紹</a>	
		<a href="#">新唐 Chili Board (1) – 下載、編譯與燒錄教學</a>	
		<a href="#">新唐 Chili Board (2) – 遠端監控與資料存取實例操作</a>	

# I Training Videos (M031BT BLE)

Core	Board	Topic (Chinese)	
M0	NuMaker-M031BTYE NuMaker-M032BTAI	<a href="#">新唐 NuMicro M031BT BLE 藍牙透傳展示</a>	

# RT-Thread Quick Start Guide

CPU Core	Board	Guide	Supported Driver List
Arm9	NK-980IOT	上手指南 <a href="https://www.rt-thread.org/document/site/#/rt-thread-version/rt-thread-standard/tutorial/quick-start/nk-980iot/quick-start">https://www.rt-thread.org/document/site/#/rt-thread-version/rt-thread-standard/tutorial/quick-start/nk-980iot/quick-start</a> 开发实践指南 (在线电子书) <a href="https://docs.qq.com/doc/DS1FqdHlHVvpJWWRp">https://docs.qq.com/doc/DS1FqdHlHVvpJWWRp</a>	<a href="https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/nuc980">https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/nuc980</a> Or refer to the next slide
M4	NuMaker-PFM-M487	上手指南 <a href="https://www.rt-thread.org/document/site/#/rt-thread-version/rt-thread-standard/tutorial/quick-start/numaker-pfm-m487/quick-start">https://www.rt-thread.org/document/site/#/rt-thread-version/rt-thread-standard/tutorial/quick-start/numaker-pfm-m487/quick-start</a> 开发实践指南 (在线电子书) <a href="https://docs.qq.com/doc/DS2xld3pvSW5FenVB">https://docs.qq.com/doc/DS2xld3pvSW5FenVB</a>	<a href="https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/m480">https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/m480</a> Or refer to the next two slide
M23	NuMaker-M2354	上手指南 <a href="https://www.rt-thread.org/document/site/#/rt-thread-version/rt-thread-standard/tutorial/quick-start/numaker-m2354/quick-start">https://www.rt-thread.org/document/site/#/rt-thread-version/rt-thread-standard/tutorial/quick-start/numaker-m2354/quick-start</a> 开发实践指南 (在线电子书) <a href="https://docs.qq.com/doc/DS2tVSsnJWdW5ZYkdV">https://docs.qq.com/doc/DS2tVSsnJWdW5ZYkdV</a>	<a href="https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/m2354">https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/m2354</a> Or refer to the next three slide
M0	NuMaker-M032KI	上手指南 <a href="https://www.rt-thread.org/document/site/#/rt-thread-version/rt-thread-standard/tutorial/quick-start/numaker-m032ki/quick-start">https://www.rt-thread.org/document/site/#/rt-thread-version/rt-thread-standard/tutorial/quick-start/numaker-m032ki/quick-start</a>	<a href="https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/m031">https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/m031</a> Or refer to the next four slide

# | NUC980 Supported Drivers in RT-Thread

- Refer the URL <https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/NUC980>

Peripheral	rt_device_class_type	Device name
ADC	RT_Device_Class_Miscellaneous (ADC)	<i>adc</i>
CAN	RT_Device_Class_CAN	<i>can[0-3]</i>
CRYPTO	RT_Device_Class_Miscellaneous (HW Crypto)	<i>hwcrypto</i>
EBI	N/A	<i>N/A</i>
EMAC	RT_Device_Class_NetIf	<i>e[0-1]</i>
GPIO	RT_Device_Class_Miscellaneous (Pin)	<i>gpio</i>
I2C	RT_Device_Class_I2CBUS	<i>i2c[0-3]</i>
I2S	RT_Device_Class_Sound	<i>sound0</i>
PDMA	N/A	<i>N/A</i>
QSPI	RT_Device_Class_SPIBUS	<i>qspi[0]</i>
RTC	RT_Device_Class_RTC	<i>rtc</i>
PWM	RT_Device_Class_Miscellaneous (PWM)	<i>pwm[0-1]</i>
USBH	RT_Device_Class_USBHost	<i>usbh</i>
USBD	RT_Device_Class_USBDevice	<i>usbd</i>
SC (UART function)	RT_Device_Class_Char	<i>scuart[0-1]</i>
SDH	RT_Device_Class_Block	<i>sdh[0-1]</i>
SPI	RT_Device_Class_SPIBUS	<i>spi[0-1]</i>
TIMER	RT_Device_Class_Timer	<i>timer[0-5]</i>
UART	RT_Device_Class_Char	<i>uart[0-9]</i>
WDT	RT_Device_Class_Miscellaneous (Watchdog)	<i>wdt</i>



# M480 Supported Drivers in RT-Thread

- Refer the URL <https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/m480>

Peripheral	rt_device_class_type	Device name			
BPWM	RT_Device_Class_Miscellaneous (PWM)	<b><i>bpwm[0-1]</i></b>	EI	RT_Device_Class_Miscellaneous (Pulse encoder)	<b><i>qei[0-1]</i></b>
BPWM (Capture function)	RT_Device_Class_Miscellaneous (Input capture)	<b><i>bpwm[0-1]i[0-5]</i></b>	QSPI	RT_Device_Class_SPIBUS	<b><i>qspi0</i></b>
CAN	RT_Device_Class_CAN	<b><i>can[0-1]</i></b>	RTC	RT_Device_Class_RTC	<b><i>rtc</i></b>
CLK	RT_Device_Class_PM	<b><i>pm</i></b>	SC (UART function)	RT_Device_Class_Char	<b><i>scuart[0-2]</i></b>
CRC	RT_Device_Class_Miscellaneous (HW Crypto)	<b><i>hwcrypto</i></b>	SDH	RT_Device_Class_Block	<b><i>sdh0</i></b>
CRYPTO	RT_Device_Class_Miscellaneous (HW Crypto)	<b><i>hwcrypto</i></b>	SPI	RT_Device_Class_SPIBUS	<b><i>spi[0-3]</i></b>
EADC	RT_Device_Class_Miscellaneous (ADC)	<b><i>eadc[0-1]</i></b>	SPI (I2S function)	RT_Device_Class_Sound/RT_Device_Class_Pipe	<b><i>spii2s[0-3]</i></b>
EBI	N/A	<b><i>N/A</i></b>	TIMER	RT_Device_Class_Timer	<b><i>timer[0-5]</i></b>
ECAP	RT_Device_Class_Miscellaneous (Input capture)	<b><i>ecap[0-1]i[0-2]</i></b>	TIMER (Capture function)	RT_Device_Class_Miscellaneous (Input capture)	<b><i>timer[0-5]i0</i></b>
EMAC	RT_Device_Class_NetIf	<b><i>e0</i></b>	TIMER (PWM function)	RT_Device_Class_Miscellaneous (PWM)	<b><i>tpwm[0-5]</i></b>
EPWM	RT_Device_Class_Miscellaneous (PWM)	<b><i>epwm[0-1]</i></b>	TRNG	RT_Device_Class_Miscellaneous (HW Crypto)	<b><i>hwcrypto</i></b>
EPWM (Capture function)	RT_Device_Class_Miscellaneous (Input capture)	<b><i>epwm[0-1]i[0-5]</i></b>	UART	RT_Device_Class_Char	<b><i>uart[0-5]</i></b>
FMC	FAL	<b><i>N/A</i></b>	USBBD	RT_Device_Class_USBDevice	<b><i>usb0</i></b>
GPIO	RT_Device_Class_Miscellaneous (Pin)	<b><i>gpio</i></b>	USBH	RT_Device_Class_USBHost	<b><i>usbh</i></b>
GPIO	RT_Device_Class_I2CBUS	<b><i>softi2c0[0-1]</i></b>	USCI (I2C function)	RT_Device_Class_I2CBUS	<b><i>ui2c[0-1]</i></b>
HSOTG	RT_Device_Class_USBHost/RT_Device_Class_USBDevice	<b><i>N/A</i></b>	USCI (SPI function)	RT_Device_Class_SPIBUS	<b><i>uspi[0-1]</i></b>
HSUSBD	RT_Device_Class_USBDevice	<b><i>usb0</i></b>	USCI (UART function)	RT_Device_Class_Char	<b><i>uuart[0-1]</i></b>
I2C	RT_Device_Class_I2CBUS	<b><i>i2c[0-2]</i></b>	WDT	RT_Device_Class_Miscellaneous (Watchdog)	<b><i>wdt</i></b>
I2S	RT_Device_Class_Sound/RT_Device_Class_Pipe	<b><i>sound0</i></b>			
PDMA	N/A	<b><i>N/A</i></b>			

# M2354 Supported Drivers in RT-Thread

- Refer the URL <https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/m2354>

Peripheral	rt_device_class_type	Device name			
BPWM	RT_Device_Class_Miscellaneous (PWM)	<i>bpwm[0-1]</i>	SC (UART function)	RT_Device_Class_Char	<i>scuart[0-2]</i>
BPWM (Capture function)	RT_Device_Class_Miscellaneous (Input capture)	<i>bpwm[0-1]i[0-5]</i>	SDH	RT_Device_Class_Block	<i>sdh0</i>
CAN	RT_Device_Class_CAN	<i>can0</i>	SPI	RT_Device_Class_SPIBUS	<i>spi[0-3]</i>
CLK	RT_Device_Class_PM	<i>pm</i>	SPI (I2S function)	RT_Device_Class_Sound/RT_Device_Class_Pipe	<i>spii2s[0-3]</i>
CRC	RT_Device_Class_Miscellaneous (HW Crypto)	<i>hwcrypto</i>	TIMER	RT_Device_Class_Timer	<i>timer[0-5]</i>
CRYPTO	RT_Device_Class_Miscellaneous (HW Crypto)	<i>hwcrypto</i>	TIMER (Capture function)	RT_Device_Class_Miscellaneous (Input capture)	<i>timer[0-5]i0</i>
EADC	RT_Device_Class_Miscellaneous (ADC)	<i>eadc0</i>	TIMER (PWM function)	RT_Device_Class_Miscellaneous (PWM)	<i>tpwm[0-5]</i>
EBI	N/A	<i>N/A</i>	TRNG	RT_Device_Class_Miscellaneous (HW Crypto)	<i>hwcrypto</i>
ECAP	RT_Device_Class_Miscellaneous (Input capture)	<i>ecap[0-1]i[0-2]</i>	UART	RT_Device_Class_Char	<i>uart[0-5]</i>
EPWM	RT_Device_Class_Miscellaneous (PWM)	<i>epwm[0-1]</i>	USB	RT_Device_Class_USBDevice	<i>usb</i>
EPWM (Capture function)	RT_Device_Class_Miscellaneous (Input capture)	<i>epwm[0-1]i[0-5]</i>	USB	RT_Device_Class_USBHost	<i>usbh</i>
FMC	FAL	<i>N/A</i>	USCI (I2C function)	RT_Device_Class_I2CBUS	<i>ui2c[0-1]</i>
GPIO	RT_Device_Class_Miscellaneous (Pin)	<i>gpio</i>	USCI (SPI function)	RT_Device_Class_SPIBUS	<i>uspi[0-1]</i>
GPIO	RT_Device_Class_I2CBUS	<i>softi2c0[0-1]</i>	USCI (UART function)	RT_Device_Class_Char	<i>uuart[0-1]</i>
I2C	RT_Device_Class_I2CBUS	<i>i2c[0-2]</i>	WDT	RT_Device_Class_Miscellaneous (Watchdog)	<i>wdt</i>
I2S	RT_Device_Class_Sound/RT_Device_Class_Pipe	<i>sound0</i>			
PDMA	N/A	<i>N/A</i>			
QEI	RT_Device_Class_Miscellaneous (Pulse encoder)	<i>qei[0-1]</i>			
QSPI	RT_Device_Class_SPIBUS	<i>qspi0</i>			
RTC	RT_Device_Class_RTC	<i>rtc</i>			

# M032KI Supported Drivers in RT-Thread

- Refer the URL <https://github.com/RT-Thread/rt-thread/tree/master/bsp/nuvoton/libraries/m031>

Peripheral	rt_device_class_type	Device name			
ADC	RT_Device_Class_Miscellaneous (ADC)	<i>adc0</i>	UART	RT_Device_Class_Char	<i>uart[0-7]</i>
BPWM	RT_Device_Class_Miscellaneous (PWM)	<i>bpwm[0-1]</i>	USB	RT_Device_Class_USBDevice	<i>usbd</i>
BPWM (Capture function)	RT_Device_Class_Miscellaneous (Input capture)	<i>bpwm[0-1]i[0-5]</i>	USCI (I2C function)	RT_Device_Class_I2CBUS	<i>ui2c[0-1]</i>
CLK	RT_Device_Class_PM	<i>pm</i>	USCI (SPI function)	RT_Device_Class_SPIBUS	<i>uspi[0-1]</i>
CRC	RT_Device_Class_Miscellaneous (HW Crypto)	<i>hwcrypto</i>	USCI (UART function)	RT_Device_Class_Char	<i>uuart[0-1]</i>
EBI	N/A	<i>N/A</i>	WDT	RT_Device_Class_Miscellaneous (Watchdog)	<i>wdt</i>
FMC	FAL	<i>N/A</i>			
GPIO	RT_Device_Class_Miscellaneous (Pin)	<i>gpio</i>			
GPIO	RT_Device_Class_I2CBUS	<i>softi2c0[0-1]</i>			
I2C	RT_Device_Class_I2CBUS	<i>i2c[0-1]</i>			
PDMA	N/A	<i>N/A</i>			
PWM	RT_Device_Class_Miscellaneous (PWM)	<i>pwm[0-1]</i>			
PWM (Capture function)	RT_Device_Class_Miscellaneous (Input capture)	<i>pwm[0-1]i[0-5]</i>			
QSPI	RT_Device_Class_SPIBUS	<i>qspi0</i>			
RTC	RT_Device_Class_RTC	<i>rtc</i>			
SPI	RT_Device_Class_SPIBUS	<i>spi0</i>			
SPI (I2S function)	RT_Device_Class_Sound/RT_Device_Class_Pipe	<i>spii2s0</i>			
TIMER	RT_Device_Class_Timer	<i>timer[0-3]</i>			
TIMER (Capture function)	RT_Device_Class_Miscellaneous (Input capture)	<i>timer[0-3]i0</i>			

# | Supported Connection Modules

- For MPU
- For MCU

# | Supported Connection Modules (MPU)

MPU	OS/RTOS	Type	Interface	Manufacturer	Chip / Module Part Number
NUC980	Linux	Ethernet	RMII	IC Plus	IP101GR
				Realtek	RTL8201FI-VC-CG
		Wi-Fi	SDIO	AMPAK	AP6212 (2.4G), AP6256 (2.4G/5G)
			USB	Realtek	RTL8188EUS (2,4G), RTL8189EU (2.4G) RTL8822BU (2.4G/5G)
				Quectel	EC20/EC21/EC25 (LTE), BG96 (NB-IoT)
		Cellular	USB	SIMCOM	SIM7600 (LTE)
				Semtech	SX1301 (RAK2247, RAK2246, Gemtek)
	RT-Thread	Ethernet	RMII	IC Plus	IP101GR
		Wi-Fi	UART	Espressif	ESP8266
	FreeRTOS	Ethernet	RMII	IC Plus	IP101GR

# | Supported Connection Modules (MCU)

MCU	OS/RTOS	Type	Interface	Manufacture	Chip / Module Part Number
M487	Mbed OS	Ethernet	RMII	IC Plus	IP101GR
M487		Wi-Fi	UART	Espressif	ESP8266 (ESP-12)
M263		Cellular		Quectel	EC21/EC25 (LTE), BG96 (NB-IoT)
M2354				SIMCOM	SIM7020 (NB-IoT)
M252		LoRa	SPI	Semtech	SX1276 (Reyax RYLR890, RYLR400)
M487	Amazon FreeRTOS	Wi-Fi	UART	Espressif	ESP8266 (ESP-12F)
		Cellular		Quectel	BG96 (NB-IoT)
M487	RT-Thread	Ethernet	RMII	IC Plus	IP101GR
		Wi-Fi	UART	Espressif	ESP8266 (ESP-12F)

\* ESP8266 module has to use at least 16Mb SPI flash for the latest firmware.

# Supported Clouds

NuMaker Board	OS / RTOS	Clouds				
		Arm Pelion DM	Amazon AWS	Alibaba Cloud	Microsoft Azure	Allxon
NuMaker-IIoT-NUC980	Linux	*1	*1*5			
	RT-Thread			*2	*2	
NuMaker-RTU-NUC980 (Chili)	Linux	*1	*1*5			*6
	RT-Thread			*2	*2	
NuMaker-IoT-M487	MbedOS	*4*5	*4*5		*4*5	
	Amazon FreeRTOS		*3			
	AliOS Things					
	RT-Thread			*2	*2	
	Azure RTOS				*6	
NuMaker-IoT-M2354	MbedOS <sup>*1</sup>	*4*5	*4*5		*4*5	
	RT-Thread			*2	*2	
NuMaker-IoT-M263A	MbedOS	*4*5	*4*5		*4*5	
NuStamp-ACK-M031LE	Non-OS		*6			

\*1 Detail in [NUC980 BSP document](#)

\*2 Detail on RT-Thread document [1](#) & [2](#)

\*3 Detail on [AWS document site](#)

\*4 Examples on [Mbed OS site](#)

\*5 Nuvoton has [tutorial video](#)

\*6 [Contact us](#) to get more information



# Networks and Protocols on Different Platforms

Core	OS/RTOS	Ethernet (On Chip)	Wi-Fi (USB/SDIO)	Wi-Fi (UART)	Cellular (USB)	Cellular (UART)
NUC980	Linux	1-7	1-7	-	1-7	-
NUC980	RT-Thread	1-5	-	1-4	-	-
M487	RT-Thread	1-5	-	1-4	-	-
M487	Amazon FreeRTOS	1-3,5	-	1-3	-	1-3
M487	MbedOS	1-5	-	1-4	-	1-4

1. http client

2. https client (wth SSL)

3. mqtt client with SSL

4. CoAP client with SSL

5. web server (httpd)

6. web server with SSL

7. mqtt broker (server)

'-' N/A

'?' Unconfirmed, in checking.

\* Web server on RTOS has only basic features

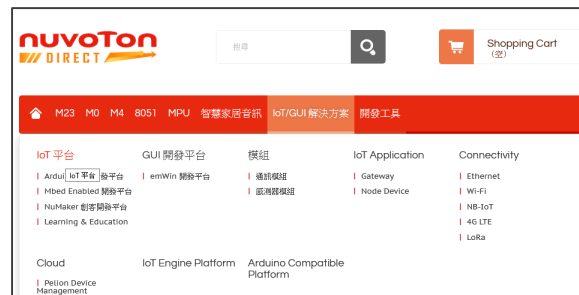
# Platform Service

## Online e-Store

<https://direct.nuvoton.com>



## Select a Platform



## Purchase a Platform



## Resources on Board page

<https://www.nuvoton.com>



Connect to official board page

## Resources

### Development Tools

### Documents

### BSP & SDK

### OS & Examples

### Promotion & Tutorial Videos

### Supporting

Nuvoton  
Github (Worldwide)  
GitLab (China)  
Gitee (China)

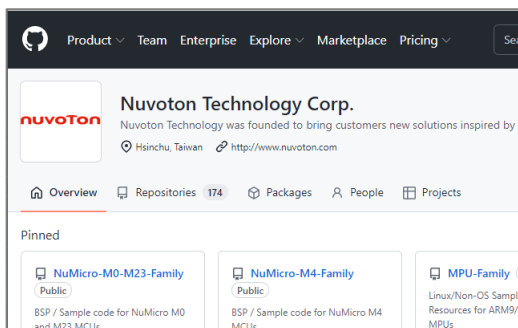
Nuvoton  
Linux  
RT-Thread (China)

YouTube  
Bilibili (China)

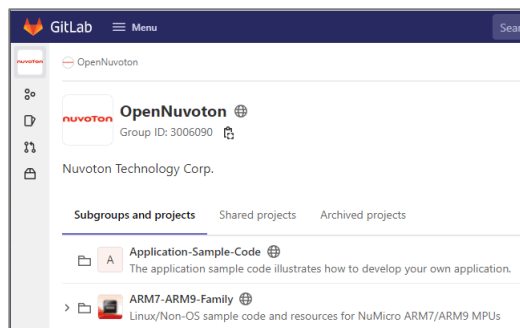
NuForum  
21ic (China)新唐MCU技术论坛  
Online Chat  
Sales Support e-mail

# Technical Supporting Websites

## BSP / SDK / Open Source / Examples



Github



GitLab



Gitee (China)

## RTOS



RT-Thread (China)

## Online Video

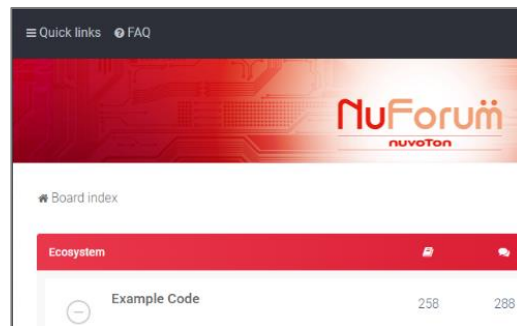


YouTube



Bilibili (China)

## Forums



NuForum



21ic Forum (China)

# Online Resources 在线资源

新唐公司网站

www.nuvoton.com



## 论坛

NuForum

- <http://forum.nuvoton.com>



牛卧堂

- <http://www.nuvoton-MCU.com>



21ic 中国电子网

- <http://bbs.21ic.com/iclist-187-1.html>



## 社群媒体

facebook

- <https://www.facebook.com/NuvotonNuMicro/>



WeChat

- ID: nuvoton\_mcu



- @NuvotonMCU



## BSP 升级档案

GitHub

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



GitLab

- <https://gitlab.com/OpenNuvoton>



G 码云

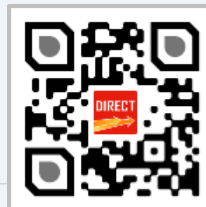
- <https://gitee.com/OpenNuvoton>



## 在线商店

nuvoton DIRECT

- <https://direct.nuvoton.com>



天猫 Tmall.com

- <http://nuvoton.tmall.com/>



TECH DESIGN

- [www.techdesign.com/market/nuvoton](http://www.techdesign.com/market/nuvoton)



# FAQ





# FAQ – RT-Thread

- 使用免费 RT-Thread Studio 高效开发新唐 ARM9/M4/M23/M0 平台
  - <https://www.bilibili.com/video/BV1Rt4y1s7Sh/>
- **NUC980 @ RT-Thread**
  - 快速上手指南视频 <https://www.bilibili.com/video/BV1cu411R7uX/>
  - 快速上手指南 [RT-Thread\\_training\\_Nuvoton\\_NUC980\\_For\\_RTT-2022-0217.pdf](https://www.bilibili.com/video/BV1cu411R7uX/)
  - NUC980 模块评测任务大挑战 <https://club.rt-thread.org/ask/article/7012a902031d6a38.html>
  - NUC980 支持 RT-Thread 应用于串口服务器的方案及优势  
<https://www.bilibili.com/video/BV1CU4y1Z7uy/>
- **M487 @ RT-Thread**
  - 快速上手指南视频 <https://www.bilibili.com/video/BV1LF411W7Qw/>
  - M487 模块评测任务大挑战 <https://club.rt-thread.org/ask/article/766e6c03c20d5bb0.html>
- **M2354 @ RT-Thread**
  - 快速上手指南视频 <https://www.bilibili.com/video/BV1fq4y1379V/>

# FAQ – RT-Thread and NUC980

- **NUC980 评测文章与范例**  
<https://club.rt-thread.org/ask/tag/1977.html?type=article>

Titles		Titles	
<a href="#">【开发板评测】Nuvoton 980开发板4G模块MC615 AT命令联网</a>		<a href="#">NK-980IOT 测评之 WDT 、 CRYPTO</a>	
<a href="#">【NK-980IoT评测】USB测试分享</a>		<a href="#">NK-980IOT I2C测试：读取BMP180</a>	
<a href="#">【NK-980IoT评测】EMAC之6:RTT环境中NUC980的EMAC的使用</a>		<a href="#">NK-980IOT测评之4G Module（三）AT Device上网</a>	
<a href="#">NK-980IOT 测评-CRYPTO</a>		<a href="#">NK-980IOT测评之TIMER</a>	
<a href="#">NK-980IOT 测评之 硬件spi0驱动ili9341</a>		<a href="#">NK-980IOT测评之QSPI</a>	
<a href="#">【NK-980IoT评测】EMAC之5：拿到板子操练一下</a>		<a href="#">NK-980IOT测评之EBI</a>	
<a href="#">【NK-980IoT评测】ADC测试分享</a>		<a href="#">NK-980IOT 测评之 I2S 和 SDH</a>	
<a href="#">NK-980IOT测评之RTC（NTP时间同步）</a>		<a href="#">NUC980IOT测评之UART直接用法</a>	
<a href="#">【NK-980IoT评测】RT-Thread ADC应用实践</a>		<a href="#">NK-980IOT测评之YAFF2文件系统移植</a>	
<a href="#">【NK-980IoT评测】EMAC之3：功能模块的使用说明</a>		<a href="#">NK-980IOT测评之SDH测试</a>	
<a href="#">【NK-980IoT评测】EMAC之2：功能模块的硬件介绍</a>		<a href="#">NK-980IOT测评之QSPI NAND flash的读写测试</a>	
<a href="#">【NK-980IoT评测】EMAC之1：理解原理与开发流程</a>		<a href="#">NK-980IOT测评之UFS文件系统使用体验</a>	
<a href="#">【NK-980IoT评测】基于RT-Thread Studio建立工程与烧写固件</a>		<a href="#">NK-980IOT测评之ESP8266 AT测试</a>	
<a href="#">【NK-980评测】SPI功能测试及其LoRa模块驱动</a>		<a href="#">NK-980IOT测评之4G Module（二）PPP拨号</a>	
<a href="#">NK-980IOT 测评之 GPIO</a>		<a href="#">NK-980IOT测评之4G Module（一）硬件介绍</a>	

更多文章請點上方網址參考

# FAQ – RT-Thread and NUC980

- **NUC980 DIY 项目文章**  
<https://club.rt-thread.org/ask/article/4e9c2586e89c4c34.html>

Titles
<a href="#">NUC980 DIY项目大挑战 - EtherCAT实现</a>
<a href="#">( NUC980 开发板 DIY 项目大挑战 ) WEB服务器远程控制 ( 更新中 )</a>
<a href="#">【NUC980开发板DIY项目大挑战】串口服务器</a>
<a href="#">【NUC980开发板DIY项目大挑战】车间数据采集方案</a>
<a href="#">【NUC980开发板DIY项目大挑战】室内环境采集监测系统</a>
<a href="#">基于NUC980使用RTT与计量芯片HT7017的计量通讯</a>
<a href="#">【NUC980开发板DIY项目大挑战】数据采集网关</a>
<a href="#">【NUC980开发板DIY项目大挑战】环境温湿度采集</a>
<a href="#">【NUC980开发板DIY项目大挑战】数据集中器</a>
<a href="#">【NUC980开发板DIY项目大挑战】modbus RTU控制器</a>



# FAQ – RT-Thread and M487

- **M487 评测文章与范例**

<https://club.rt-thread.org/ask/tag/84733250946dea76.html?type=article>

Titles	Titles
<a href="#">基于RT-Thread的NuMaker-IoT-M487外设评测之TIMER</a>	<a href="#">Numaker-IoT-M487 ECAP 功能评测</a>
<a href="#">基于RT-Thread的NuMaker-IoT-M487外设评测之ADC</a>	<a href="#">【 Numaker-IoT-M487 】 QEI相关功能评测</a>
<a href="#">Numaker IoT-M487开发板测试---NAU88L25</a>	<a href="#">Nuvoton M487USCI之UART串口接收</a>
<a href="#">NuMaker-IoT-M487评测--USBH</a>	<a href="#">【 Nuvoton M487试用 】 GPIO+UART测评</a>
<a href="#">【 开发板评测 】 Numaker-IoT-M487开发板 PWM测评</a>	<a href="#">【 开发板评测 】 Nuvoton M487 GPIO和UART评测</a>
<a href="#">[开发板测评]Numaker-IOT-M487的SDH测试</a>	<a href="#">NUMAKER-PFM-M487开发板评测之OLED屏显示驱动</a>
<a href="#">【 Nuvoton M487模块评测 】 CAN 总线通信功能评测</a>	<a href="#">Nuvoton M487测评之CRYPTO(二) AES</a>
<a href="#">【 开发板评测 】 Numaker-IoT-M487开发板USBD</a>	<a href="#">NUMAKER-IOT-M487开发板评测之WDT和RTC测试</a>
<a href="#">【 开发板评测 】 新唐Nu-maker M487 开发板 usb device 移植</a>	<a href="#">【 Numaker-IoT-M487 】 RTC测试</a>
<a href="#">【 开发板评测 】 Numaker-IoT-M487开发板之emac</a>	<a href="#">【 Numaker-IoT-M487 】 SD接口验证</a>
<a href="#">【 开发板评测 】 Numaker-IoT-M487开发板之Timer</a>	<a href="#">【 开发板评测 】 Nuvoton M487开发板USPI实现ST775S屏幕驱动</a>
<a href="#">Numaker-IoT-M487的RTC</a>	<a href="#">【 开发板评测 】 Nuvoton M487开发板wifi模块可用性</a>
<a href="#">【 开发板评测 】 Nuvoton-IOT-M487开发板SPIM读写W25Q32</a>	<a href="#">【 Numaker-IoT-M487 】 CRYPTO相关功能评测</a>
<a href="#">Nuvoton M487USCI之USPI通讯</a>	<a href="#">Nuvoton M487测评之CRYPTO(一) Hash</a>
<a href="#">【 开发板评测 】 Numaker-IoT-M487开发板 之ADC测试</a>	<a href="#">【 开发板评测 】 Nuvoton M487开发板USCI之UI2C</a>

更多文章請點上方網址參考

# FAQ – RT-Thread and M2354

- **M2354 评测文章与范例**

<https://club.rt-thread.org/ask/tag/e31004a8c5cc30f3.html?type=article>

Titles		Titles	
<a href="#">【 NuMaker-M2354 试用 】 电量芯片SH366006 I2C接口测试验证</a>		<a href="#">【 NuMaker-M2354 试用 】 定时器——基本定时功能</a>	
<a href="#">【 NuMaker-M2354 试用 】 QEI模块测评</a>		<a href="#">【 NuMaker-M2354 试用 】 SPI 驱动W25Q128</a>	
<a href="#">【 NuMaker-M2354 试用 】 USCI测试</a>		<a href="#">【 NuMaker-M2354 试用 】 ECAP测试分享</a>	
<a href="#">【 NuMaker-M2354 试用 】 spi测试分享</a>		<a href="#">【 NuMaker-M2354 试用 】 I2c测试分享</a>	
<a href="#">【 NuMaker-M2354 试用 】 microSD实验</a>		<a href="#">【 NuMaker-M2354 】 UART1测评</a>	
<a href="#">【 NuMaker-M2354 试用 】 RTC实验</a>		<a href="#">【 NuMaker-2354 】 GPIO测评</a>	
<a href="#">【 NuMaker-M2354 试用 】 MicroSD 模块测评</a>		<a href="#">【 NuMaker-M2354 试用 】 CAN 总线通信功能评测</a>	
<a href="#">【 NuMaker-M2354 试用 】 使用TRNG生成随机数</a>		<a href="#">【 NuMaker-M2354 试用 】 看门狗</a>	
<a href="#">【 NuMaker-M2354 试用 】 基于rt-thread CAN驱动框架通信评测</a>		<a href="#">【 NuMaker-M2354 试用 】 WiFi Module测试分享</a>	
<a href="#">【 NuMaker-M2354 试用 】 PWM测评</a>		<a href="#">【 NuMaker-M2354 试用 】 GPIO+PWM测试分享</a>	
<a href="#">【 NuMaker-M2354 试用 】 串口——基本收发功能演示</a>		<a href="#">【 NuMaker-M2354 试用 】 ADC测试分享</a>	
<a href="#">【 NuMaker-M2354 试用 】 M2354测评_CRYPT0</a>		<a href="#">【 NuMaker-M2354 试用 】 使用RT-Thread的CRYPTO设备(1 )</a>	
<a href="#">【 NuMaker-M2354 试用 】 _adc测试分享</a>		<a href="#">【 NuMaker-M2354 试用 】 CAN总线开发与测试分享【硬件篇】</a>	
<a href="#">【 NuMaker-M2354 试用 】 使用RT-Thread的CRYPTO设备(2 )</a>		<a href="#">【 NuMaker-M2354 试用 】 +SPI驱动LCD及TOUCH</a>	
<a href="#">【 NuMaker-M2354 试用 】 定时器——单路PWM</a>		<a href="#">【 NuMaker-M2354 试用 】 +开箱及环境搭建</a>	

更多文章請點上方網址參考

# FAQ – RT-Thread

Q	A
NUC980 支持 5G modules? E.g. RG200U.	Most cellular modules have UART and/or USB for host to connect to. NUC980 does support them. However, cellular modules are controlled via AT command. RT-Thread supported modules can be found in the source code ( <a href="https://github.com/RT-Thread-packages/at_device">https://github.com/RT-Thread-packages/at_device</a> )
N32905 支持 RT-Thread?	Currently, NUC980 and N9H30 support RT-Thread.
人机界面支持那种 GUI tools?	Because integrate with LVGL, the tools are provided by LVGL.
推荐那个平台使用 LVGL?	Most Nuvoton NuMaker boards that support RT-Thread can use LVGL. <a href="https://github.com/RT-Thread/rt-thread/blob/master/bsp/nuvoton/docs/LVGL_Notes.md">https://github.com/RT-Thread/rt-thread/blob/master/bsp/nuvoton/docs/LVGL_Notes.md</a> has the list of LVGL demo on NuMaker boards. You can buy board on Nuvoton online e-store ( <a href="https://direct.nuvoton.com">https://direct.nuvoton.com</a> ) to try it.
N9H30 平台支持 LVGL 吗?	We recommended NuMaker-HMI-N9H30 <a href="https://www.youtube.com/watch?v=EqTG-3NHHAs">https://www.youtube.com/watch?v=EqTG-3NHHAs</a>
N9H30 和 RT-Thread 支持 FMI/NAND Flash?	The port can be download here ( <a href="https://github.com/wosayttn/sdk-bsp-nk-n9h30/tree/fminand">https://github.com/wosayttn/sdk-bsp-nk-n9h30/tree/fminand</a> ). It will also be available after RT-Thread v4.1.0 when the port had integrated into RT-Thread mainstream.
NUC977 支持 RT-Thread 吗?	We recommended NuMaker-IIoT-NUC980. Please contact us if you need more information. <a href="mailto:SalesSupport@nuvoton.com">SalesSupport@nuvoton.com</a>

# FAQ – Mbed OS

Q	A
Any MQTT examples?	<p>AWS IoT example uses MQTT. You can</p> <ul style="list-style-type: none"><li>• Select NuMaker board in Mbed online compiler, you can create a project based on AWS IoT example.</li><li>• Or create a new mbed project using the example URL <a href="https://os.mbed.com/teams/Nuvoton/code/NuMaker-mbed-AWS-IoT-example/">https://os.mbed.com/teams/Nuoton/code/NuMaker-mbed-AWS-IoT-example/</a></li><li>• Or refer this tutorial video <a href="https://www.youtube.com/watch?v=OWrkJzwueZc">https://www.youtube.com/watch?v=OWrkJzwueZc</a> (English) or <a href="https://www.youtube.com/watch?v=u7QOP5RJOPE">https://www.youtube.com/watch?v=u7QOP5RJOPE</a> (Chinese)</li></ul>
Wi-Fi can't work because firmware version is too old?	<p>Mbed OS 5.1x and later request the new firmware version of ESP8266 Wi-Fi module. The new firmware needs 16Mb Flash in size. Some modules (such as ESP-01, ESP-07, etc.) has 8Mb Flash only, so they can't update to the new firmware. NuMaker-PFM-M2351 and early NuMaker-IoT-M487 (v1.2) have ESP-07 Wi-Fi module on board. NuMaker-IoT-M487 v1.3 and later NuMaker boards changed to ESP-12 module which has 32Mb flash, and Nuvoton also updated the Wi-Fi module firmware during board production.</p> <p>If your NuMaker-IoT-M487 Wi-Fi doesn't work while running Mbed OS, please make sure the board version is v1.3. The v1.3 board is available from July 2019.</p>
Coding guidance to reduce power?	<p>Please refer <a href="https://os.mbed.com/docs/mbed-os/latest/apis/power-optimization.html">https://os.mbed.com/docs/mbed-os/latest/apis/power-optimization.html</a></p>
Can IoT-M487 use Mbed Studio?	<p>Mbed Studio can select IoT-M487 board to build firmware, but can't support firmware download directly and online debug.</p>
Does it support FTP Client?	<p>The URL of FTP client example is <a href="https://os.mbed.com/users/dkato/ftp-client/">https://os.mbed.com/users/dkato/ftp-client/</a> Just import this code to your Mbed project. There are a lot of reference codes contributed on Mbed community. Simply use keyword to search on <a href="https://os.mbed.com/">https://os.mbed.com/</a></p>

# | FAQ – Azure RTOS

Q	A
Where is the port of Azure RTOS on NuMaker board?	<p>The source code can be download here <a href="https://github.com/OpenNuvoton/azure-getting-started/tree/nuvoton_azure_rtos/Nuvoton">https://github.com/OpenNuvoton/azure-getting-started/tree/nuvoton_azure_rtos/Nuvoton</a></p> <p>Supported board is <b>NuMaker-IoT-M487</b>.</p> <p>Supported connectivity is <b>Wi-Fi</b>.</p> <p>The README.md has described how to build the RTOS and examples.</p>

# FAQ – LoRa

Q	A
Where is the LoRaWAN device development resources?	<p>Nuvoton provides two versions of LoRaWAN device for <b>NuMaker-LoRaD-M252</b> board</p> <ul style="list-style-type: none"><li>• <b>(Recommended)</b> MbedOS version, please refer the <a href="#">M487+MbedOS training video slides</a> and follow the video “<b>Get Started with Mbed OS</b>” (English) or “<b>Step by Step 讓你了解如何運行 Mbed OS</b>” (Chinese) to create a new project with “<b>NuMaker-LoRaD-M252</b>” platform and “<b>NuMaker mbed OS v6.x LoRaWAN</b>” template.</li><li>• Non-OS version, <a href="https://github.com/OpenNuvoton/NuLoRaNode">https://github.com/OpenNuvoton/NuLoRaNode</a></li></ul>

# FAQ – Common

Q	A
Where to get the Nuvoton IoT information?	Please refer <a href="https://www.nuvoton.com/iot_startup">https://www.nuvoton.com/iot_startup</a>
Is MA35D1 available?	Please contact us for the latest information. <a href="mailto:SalesSupport@nuvoton.com">SalesSupport@nuvoton.com</a>

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谢谢

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Děkuji

Bedankt

Thank you

Kiitos

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Danke

Grazie

ありがとう

감사합니다

Dziękujemy

Obrigado

Спасибо

Gracias

Teşekkür ederim

Cảm ơn