nuvoTon
Joy of innovation

2019 Microcontrollers Selection Guide

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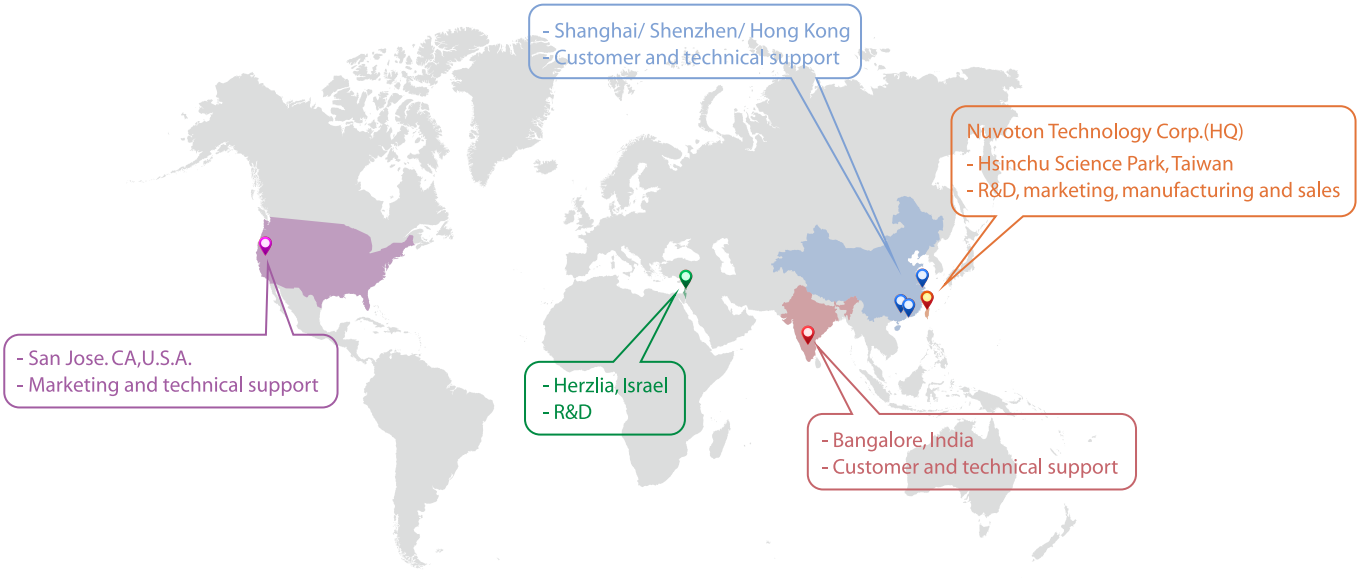
新唐科技

Nuvoton Technology Corporation (NTC) was founded to bring innovative semiconductor solutions to the market. NTC was spun-off as a Winbond Electronics affiliate in July 2008 and went public in September 2010 on the Taiwan Stock Exchange (TSE). Nuvoton Technology focuses on development of microcontroller, analog/mixed signal, cloud and computing products and has strong market share in Industrial, Consumer and Computer markets. Nuvoton owns a wafer fab, featuring customized processes for MCU, analog and power products. Besides in-house IC products, the wafer fab also provides part of its capacity for foundry services. Nuvoton Technology provides products with a high performance/cost ratio for its customers by leveraging flexible technology, advanced design capability and integration of digital and analog technologies. Nuvoton values long term relationships with its partners and customers and is dedicated to continuous innovation of its products, processes and services. The company has established subsidiaries in the USA, China, Israel, and India to strengthen regional customer support and global management. For more information, please visit http://www.nuvoton.com



Nuvoton Technology Corporation certifies that semiconductor products designated by Nuvoton are compliant with the requirements of the European Union's Restriction on Use of Hazardous Substances ("RoHS") Directive, 2011/65/EU & Commission Delegated Directive (EU) 2015/863.

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• Package Dimension for Arm® Cortex® M0/M4/M23 MCUs

Package Code	Package	Dimension (mm)
F	TSSOP20	4.4x6.5
E	TSSOP28	4.4x9.7
T	QFN33*	4x4
Z	QFN33	5x5
N	QFN48	7x7
L	LQFP48	7x7
S	LQFP64*	7x7
R	LQFP64	10x10
V	LQFP100	14x14
K	LQFP128	14x14
J	LQFP144	20x20
H	LQFP176	24x24

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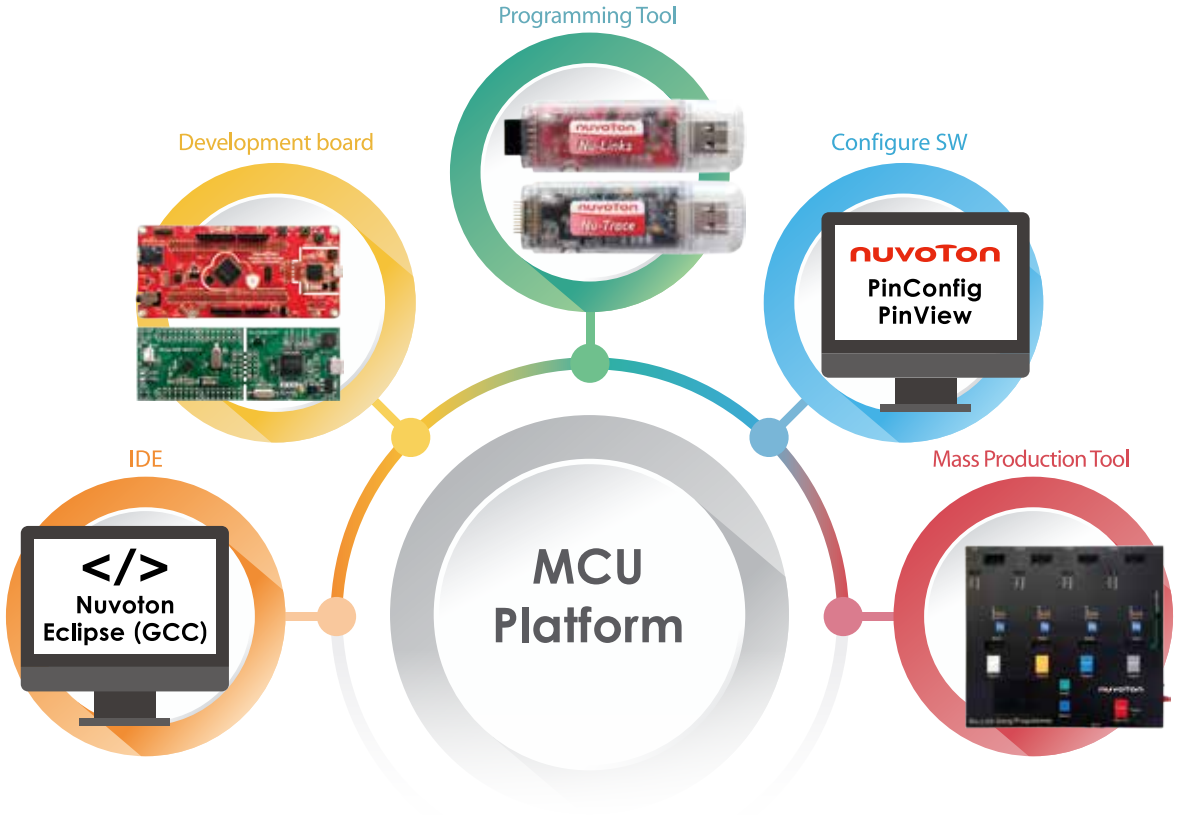
Nuvoton has been committed to build a customer-oriented MCU ecosystem with rich platform products, evaluation boards, device drivers, BSP, own-developed debugging tools, software development tools, integrated development tools, mass production supporting tools, and operating system software to meet customers' needs from product selection, development, to mass production stages.

Nuvoton provides various development boards, Nu-Link debugger, and ETM-supported Nu-Trace run-time tracing tools to speed up the development time. Software tools include PinConfig for GPIO multi-function pin setting; ClockConfig for clock setting, and PinView for real-time pin status display. For the compiler and integrated development environment, the Nuvoton MCU platform supports Nuvoton Eclipse (GCC), Keil MDK, and IAR Embedded Workbench based on the Windows and Linux to facilitate end products development and debugging. Meanwhile, for mass production, Nuvoton provides Nu-Link-Gang programmer, which can program four target chips with different part numbers to greatly enhance production efficiency and flexibility. The Nuvoton MCU ecosystem includes diverse integrated development environments, development boards, debuggers, visualized graphics development software, and mass production tools. The eco-system brings the best user experience to customers.



NuMicro® Family MCU Platform

Nuvoton's NuMicro® Family MCU platform comprises five product lines: 32-bit Arm® Cortex®-M23, Arm® Cortex®-M0, and Arm® Cortex®-M4 MCUs; Arm9™ MPUs; 8-bit 8051 MCUs, providing a rich portfolio of products to serve various application fields including security system, industrial control, IoT applications, etc.

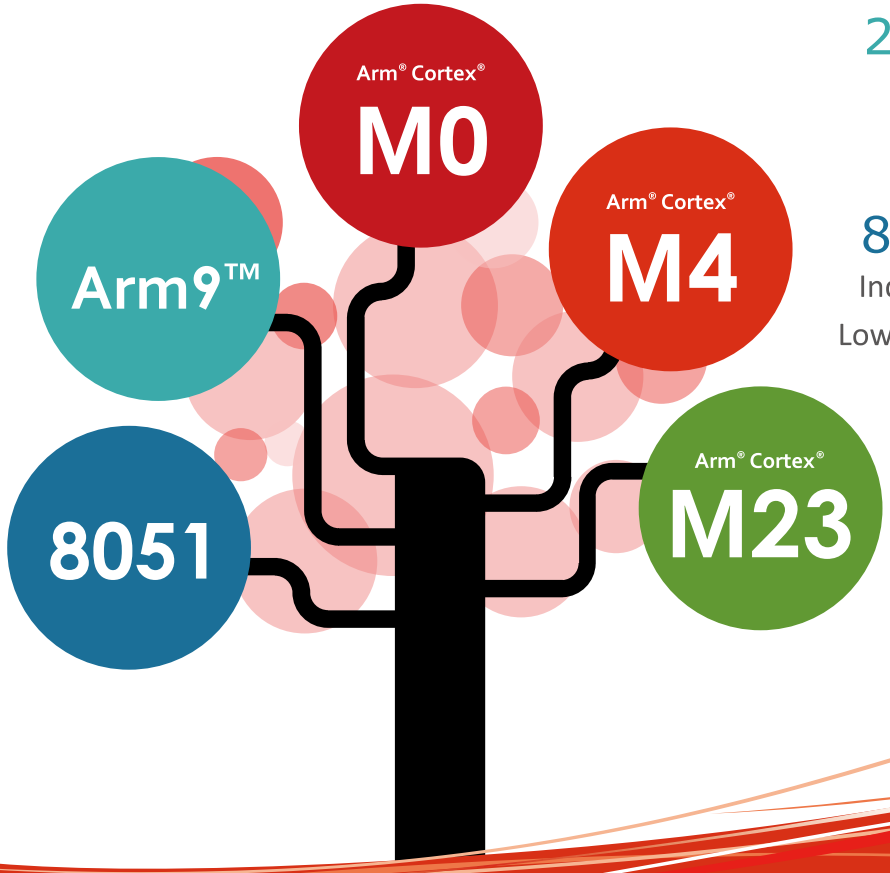
Cortex® M23 — 2016
IoT Security

2012 — **Cortex® M4**
High Performance
Low Power
Security

Cortex® M0 — 2009
High Performance
Low Power

2000 — **Arm 9™**
Industrial
HMI

8051 — 1992
Industrial
Low Power

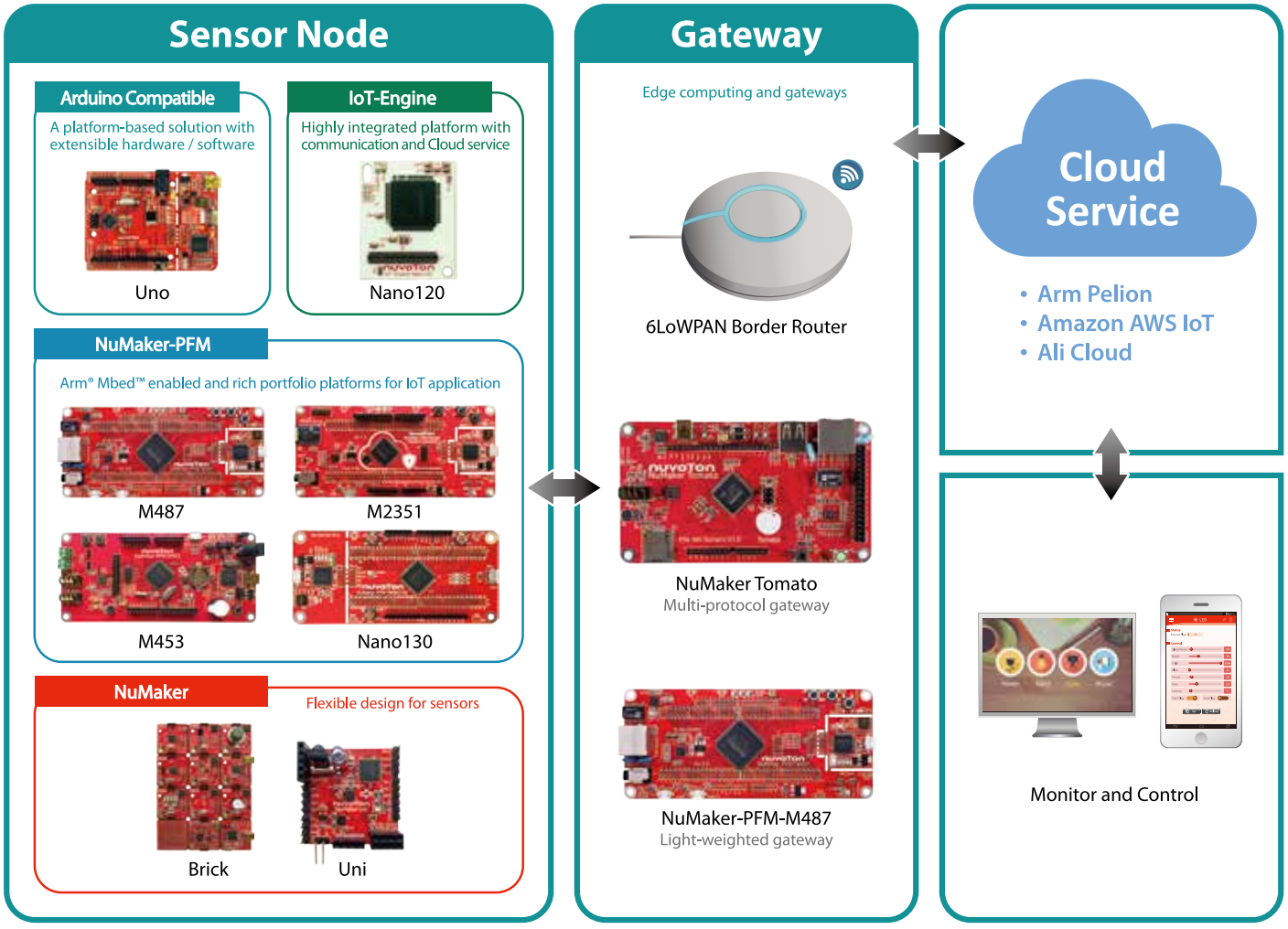


NuMicro® IoT Platform

With the rising of IoT applications, Nuvoton provides complete IoT development platforms with IoT NuMaker evaluation boards supporting IoT operating systems and software library to deploy them to the sensor devices and gateways. At the same time, the real-time control and Human Machine Interface are getting popular. In order to ease the development of HMI, Nuvoton works with Segger to launch the emWin graphics development platform which can build smooth HMI with high quality easily.

The NuMicro® IoT Platform integrates essential hardware components and software for developers to create innovative IoT devices and applications. The platform can either be used as stand-alone devices or freely combined with other platforms for faster IoT solution creation and deployment.

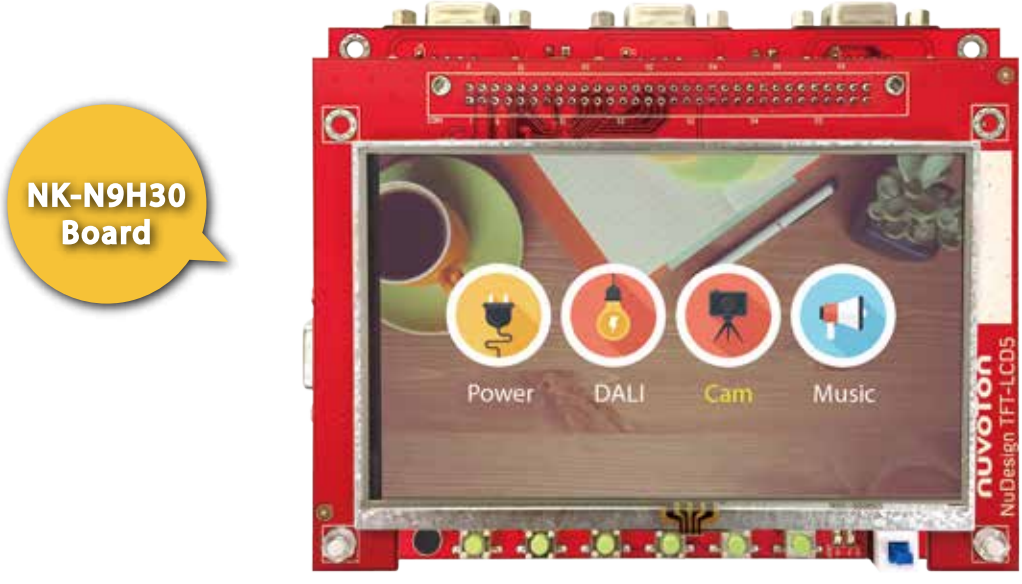
The highly expandable designs such as Arduino Uno, mikroBUS, and NuMaker interfaces on the boards are useful for IoT developer to use additional components in an easy way. The platform supports well-known Arm® Mbed™ OS, FreeRTOS, AliOS Things, and Linux, depending on the choice of microcontrollers or microprocessors for simple or complex smart devices as well as aggregator or gateway. The platform also supports major cloud services including Arm® Pelion Device Management, Amazon AWS IoT, Ali Cloud, etc. (Copyright notice is required.)



NuMicro® emWin Platform

The NuMicro® emWin platform offers an easy-to-use development environment to help designers create powerful and outstanding graphical user interface (GUI). Through dragging-and-dropping graphic widgets in GUIBuilder, the GUI design can be completed within seconds. The NuMicro® emWin platform also integrates a TFT-LCD panel for displaying and debugging the art work during development. For all kinds of applications with graphical user interfaces, like HMI or Industrial IoT gateway, the NuMicro® emWin platform provides friendly development packages for designers, including GUI templates, development boards, software tools, libraries, and APIs.

LCD Resolution	LCD Interface	Platform	Development Boards	Remark
320 x 240 ~ 1024 x 768	RGB / i80 / SPI	N9H Series	NK-N9H30 NK-N9H26 NK-N9H20	Core Speed: up to 300 MHz • Hardware MJPEG Codec • Hardware Graphics Accelerator
< 320 x 240	i80/SPI	M480 Series	NK-BEDM487D	Core Speed: up to 192 MHz
< 320 x 240	SPI	NUC126 Series	NK-NUC126D	Core Speed: up to 72 MHz



More information: http://www.nuvoton.com/emWin

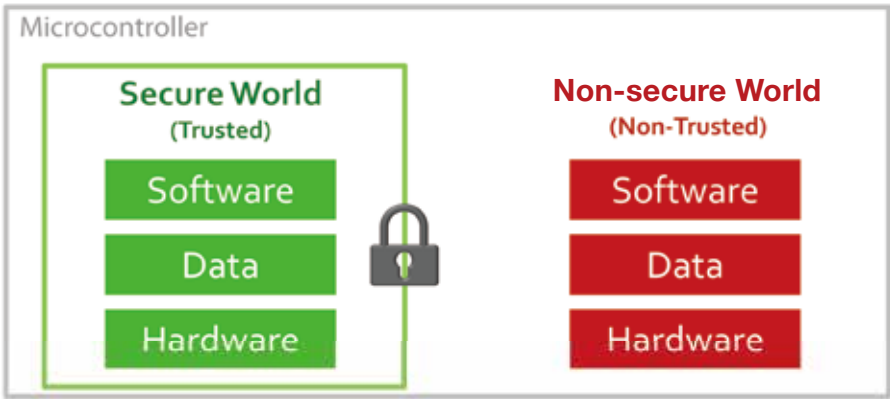
NuMicro® Family Arm® Cortex®-M23 MCUs

– the TrustZone® empowered and Cortex®-M23 based secure microcontrollers focusing on IoT security.

Cortex®-M23 CPU Core Based with TrustZone® for Armv8-M

The NuMicro® M23 Family is based on the Arm® Cortex®-M23 core and is empowered by the Arm® TrustZone® for Armv8-M architecture. The NuMicro® M2351 series is the first series in the Family to realize robust IoT security applications.

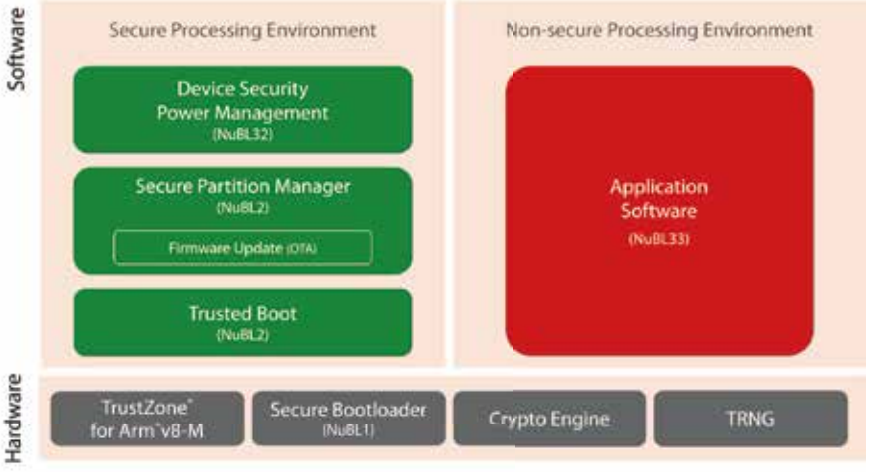
With TrustZone® implemented, memory and peripherals could be divided into secure and non-secure worlds to achieve data integrity, firmware update and operation security. In addition, TrustZone® for Armv8-M provides the key benefit of context switching between secure and non-secure worlds by hardware for faster transitions and greater power efficiency.



Arm® Platform Security Architecture (PSA) Support

The Platform Security Architecture (PSA) is a holistic set of threat models, security analyses, hardware and firmware architecture specifications, and an open source firmware reference implementation. PSA is a contribution from Arm to the entire IoT security ecosystem, offering common ground rules and a more economical approach to building more secure devices, which ideally works with the TrustZone technology for Armv8-M.

To support Arm® PSA for better implementation of IoT security technology, Nuvoton has developed the Nuvoton Secure Microcontroller Platform (NuSMP). The NuSMP is a mixture of hardware and software technology to help users meet up with the vast security requirements of general purpose and secure IoT microcontrollers. With the NuSMP, developers can easily achieve the secure services with M2351 Series microcontroller in coverage of: Trusted Boot (Root of Trust), Secure OTA (Over-The-Air) firmware update (including secure software download), Power management APIs for non-secure world and PC side crypto related development software tool. Nuvoton offers application note, sample code and training videos for each technology for developers' access and reference.



M2351 Series

The rise of the internet of things era has increased awareness for the integration of the physical world into digital systems. While the digitization of our everyday lives led to efficiency improvements and economic benefits, it has also caused pressure on systems designers who are now required to come up with innovative IoT products capable of performing secure connection and data exchange while maintaining low power consumption. Since security and power consumption are both key requirements in IoT application, Nuvoton has developed the NuMicro® M2351 Series, which excels in supporting the proliferation of intelligent connected devices.

The NuMicro® M2351 microcontroller series is powered by Arm® Cortex®-M23 core with TrustZone® for Armv8-M architecture, which elevates the traditional firmware security to a new level of robust software security.

The low-power M2351 series microcontroller operates at up to 64 MHz frequency, with up to 512 Kbytes embedded Flash memory in dual bank mode, supporting secure OTA (Over-The-Air) firmware update and up to 96 Kbytes embedded SRAM. Furthermore, the M2351 series also provides high-performance connectivity peripheral interfaces such as UART, SPI, I²C, GPIOs, USB and ISO 7816-3 for smart card reader. Its secure and efficient power management features strengthen the innovation of IoT security.

*For more information, please visit https://m2351.nuvoton.com

Operating Frequency: 64 MHz
Operating Voltage: 1.8V to 3.6V, all GPIOs support 5V tolerance
Operating Temperature: -40°C to 105°C

Potential Applications: Smart Meter, Gaming Software IP Protection, Smart City, Smart Wearable, Medical Device, IoT Devices with Secure Connection, Collaborative Secure Software Development Model…etc.

Key Features: TrustZone® for Armv8-M Technology, 8 regions MPU_NS (for non-secure world) and 8 regions MPU_S (for secure world), Hardware Crypto Accelerators, CRC calculation unit, Up to 6 tamper detection pins, Arm® Platform Security Architecture (PSA) and Trusted Base System Architecture-M (TBSA-M) supported, Multiple power modes.

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Operating Frequency (MHz)	ISP ROM (Kbytes)	I/O	Crypto				Connectivity										Timer (32-bit)	Basic PWM (16-bit)	Enhanced PWM (16-bit)	EBI	USB OTG	ECAP	Analog Comp.	ADC(12-bit)	DAC(12-bit)	Tamper	QEI	RTC (V_{BAT})	ETM	Package[3]	Mass Production
						TRNG	DES/ 3-DES/ AES	ECC	SHA	LPUART	7816-3[1] ISO-	SPI	Quad SPI/I²S	I²S	I²C	USCI[2]	CAN	LIN	SD Host															
M2351ZIAAE	512	96	64	4	25	√	√	√	√	6	3	1	3	1	3	2	1	2	1	4	12	12	-	FS	-	2	10	2	-	1	√	-	QFN33[3]	√
M2351CIAAE	512	96	64	4	41	√	√	√	√	6	3	1	3	1	3	2	1	2	1	4	12	12	√	FS	1	2	12	2	-	2	√	-	WLCSP49[4]	√
M2351SIAAE	512	96	64	4	51	√	√	√	√	6	3	1	4	1	3	2	1	2	1	4	12	12	√	FS	1	2	16	2	1	2	√	-	LQFP64	√
M2351KIAAE	512	96	64	4	107	√	√	√	√	6	3	1	4	1	3	2	1	2	1	4	12	12	√	FS	2	2	16	2	6	2	√	√	LQFP128	√

1. ISO-7816 supports full duplex UART mode.
2. USCI supports UART, SPI and I²C mode.
3. QFN33 (5x5 mm)
4. M2351CIAAE with the package WLCSP49 is upon request

Development Tools: NK-BEDM2351

Mass Production Programmer: NLG-32Z (QFN33)/ NLG-64S (LQFP64)/ NLG-128KX (LQFP128)

NuMicro® Family Arm® Cortex®-M0/M23 MCUs

As one of the leading Microcontroller (MCU) companies in the world, Nuvoton provides the state-of-the–art NuMicro® 32-bit MCU family powered by the Arm® Cortex®-M0/M23 core. The Cortex®-M0/M23 MCUs provide wide operating voltage (1.8V~3.6V, 2.1V~5.5V, 2.5V-5.5V, 1.8V~5.5V), industrial temperature (-40°C-105°C), high accuracy oscillator and high immunity (8KV ESD, 4KV EFT).

The Cortex®-M0/M23 MCU family includes Industrial control 1.8V M031 series, 5V NUC029 series, NUC121/123/125/126 series with USB 2.0 FS device, NUC130/131/140/230/240 series with Controller Area Network (CAN) bus, Mini51 and M051 series for value solutions and ultra-low power solution Nano100 series(1.8V-3.6V), M251/2 series(1.8V-5.5V), targeting at battery powered applications. They are ideal solutions for industrial control systems, industrial automation, consumer products, embedded network control, energy, power systems and motor control.

Mini51 Series

The NuMicro® Mini51 series embedded with the Arm® Cortex®-M0 core runs up to 50 MHz with 4~32 Kbytes Flash program memory, 2/4 Kbytes SRAM. The Mini51 series is equipped with a plenty of ADC & PWM for different industrial application, supporting Low Voltage Reset, Brown-out Detected Reset, 96-bit Unique ID and 128-bit Unique Customer ID.

Potential Applications: Wireless Charger, Home Appliances, Security/Alarm, Temperature Sensor, Motor, Industrial Control,etc.

• Mini51 Series

Operating Frequency: 24 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Key Features: Configurable Data Flash, 2 Kbytes ISP loader

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity			PWM(16-bit)	ADC(10-bit)	Comparator	ICP IAP ISP	IRC 10 kHz 22 MHz	Package	Mass Production
							UART	SPI	I²C							
MINI51FDE	4	2	Configurable	2	17	2	1	1	1	3	4	-	√	√	TSSOP20	√
MINI51TDE	4	2	Configurable	2	29	2	1	1	1	6	8	2	√	√	QFN33*	√
MINI51ZDE	4	2	Configurable	2	29	2	1	1	1	6	8	2	√	√	QFN33	√
MINI51LDE	4	2	Configurable	2	30	2	1	1	1	6	8	2	√	√	LQFP48	√
MINI52FDE	8	2	Configurable	2	17	2	1	1	1	3	4	-	√	√	TSSOP20	√
MINI52TDE	8	2	Configurable	2	29	2	1	1	1	6	8	2	√	√	QFN33*	√
MINI52ZDE	8	2	Configurable	2	29	2	1	1	1	6	8	2	√	√	QFN33	√
MINI52LDE	8	2	Configurable	2	30	2	1	1	1	6	8	2	√	√	LQFP48	√
MINI54FDE	16	2	Configurable	2	17	2	1	1	1	3	4	-	√	√	TSSOP20	√
MINI54TDE	16	2	Configurable	2	29	2	1	1	1	6	8	2	√	√	QFN33*	√
MINI54ZDE	16	2	Configurable	2	29	2	1	1	1	6	8	2	√	√	QFN33	√
MINI54LDE	16	2	Configurable	2	30	2	1	1	1	6	8	2	√	√	LQFP48	√

Development Tools: NT-Mini51F (Mini51, Mini52, Mini54)/ NT-Mini51L (Mini51, Mini52, Mini54)

QFN33*: 4x4mm

Mass Production Programmer: NLG-Mini51n; n should be replaced by Package Code

• Mini55 Series

Operating Frequency: 48 MHz
Operating Voltage: 2.1V to 5.5V
Operating Temperature: -40°C to 105°C

Key Features: Supports Hardware Divider

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity				PWM(16-bit)	ADC(10-bit)	Comparator	ICP IAP ISP	IRC 10 kHz 48 MHz	Package	Mass Production
							USCI*	UART	SPI	I²C							
MINI55TDE	17.5	2	Configurable	2	29	2	-	2	1	1	6	12	2	√	√	QFN33*	√
MINI55LDE	17.5	2	Configurable	2	33	2	-	2	1	1	6	12	2	√	√	LQFP48	√

*USCI can be set to UART, SPI or I²C

QFN33*: 4x4mm

Development Tools: NT-Mini55L

Mass Production Programmer: NLG-Mini55n; n should be replaced by Package Code

• Mini57 Series

Operating Frequency: 48 MHz
Operating Voltage: 2.1V to 5.5V
Operating Temperature: -40°C to 105°C

Key Features: 2 Sample and Hold ADC, Programmable Gain Amplifier

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity				PWM(16-bit)	ADC(12-bit)*	PGA*	Comparator	ICP IAP ISP	IRC 10 kHz 48 MHz	Package	Mass Production
							USCI*	UART	SPI	I²C								
MINI57FDE	29.5	4	Configurable	2.5	18	2	2	-	-	-	8	8	√	2	√	√	TSSOP20	√
MINI57EDE	29.5	4	Configurable	2.5	22	2	2	-	-	-	8	8	√	2	√	√	TSSOP28	√
MINI57TDE	29.5	4	Configurable	2.5	22	2	2	-	-	-	8	8	√	2	√	√	QFN33*	√

*USCI can be set to UART, SPI or I²C
*PGA (Programmable Gain Amplifier)

QFN33*: 4x4mm

Development Tools: NT-Mini57E
Mass Production Programmer: NLG-Mini57n; n should be replaced by Package Code

• Mini58 Series

Operating Frequency: 50 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Key Features: Configurable Data Flash

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity			PWM(16-bit)	ADC(10-bit)	Comparator	ICP IAP ISP	IRC 10 kHz 22 MHz	Package	Mass Production
							UART	SPI	I²C							
MINI58FDE	32	4	Configurable	2.5	17	2	2	1	2	6	4	-	√	√	TSSOP20	√
MINI58TDE	32	4	Configurable	2.5	29	2	2	1	2	6	8	2	√	√	QFN33*	√
MINI58ZDE	32	4	Configurable	2.5	29	2	2	1	2	6	8	2	√	√	QFN33	√
MINI58LDE	32	4	Configurable	2.5	30	2	2	1	2	6	8	2	√	√	LQFP48	√

QFN33*: 4x4mm

Development Tools: NT-Mini58L (Mini58L)
Mass Production Programmer: NLG-Mini51n; n should be replaced by Package Code

M051 Series

The NuMicro® M051 series embedded with the Arm® Cortex®-M0 core, equipped with a plenty resource and variety of peripherals, such as 8~256 Kbytes Flash, 4~20 Kbytes SRAM, and 4/8 Kbytes Flash loader memory for In-System Programming (ISP), up to 20 ch ADC and 14 ch PWM. It support Low Voltage Reset, Brown-out Detected Reset, 96-bit Unique ID and 128-bit Unique Customer ID.

Potential Applications: Industrial Control, Security/Alarm, Temperature Sensor, Motor, etc.

• M051 Series

Operating Frequency: 50 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Key Features: 4 KB Data Flash, Hardware Divider, 4x comparators

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity			PWM(16-bit)	ADC(12-bit)	Comparator	EBI	ICP IAP ISP	IRC 10 kHz 22 MHz	Package	Mass Production
							UART	SPI	I²C								
M052ZDE	8	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	√
M052LDE	8	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	√
M054ZDE	16	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	√
M054LDE	16	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	√
M058ZDE	32	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	√
M058LDE	32	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	√
M0516ZDE	64	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	√
M0516LDE	64	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	√

Development Tools: NT-M051L (M052, M054, M058, M0516)
Mass Production Programmer: NLG-M051n; n should be replaced by Package Code

• M0518 Series

Operating Frequency: 50 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Key Features: Configurable Data Flash, 24-ch 100 MHz PWM output, 6x UART

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity				PWM(16-bit)	ADC(12-bit)	ICP IAP ISP	IRC 10 kHz 22 MHz	Package	Mass Production
							UART	SPI	I²C	LIN						
M0518LC2AE	36	8	Configurable	4	42	4	6	1	2	3	24	8	√	√	LQFP48	√
M0518SC2AE	36	8	Configurable	4	56	4	6	1	2	3	24	8	√	√	LQFP64*	√
M0518LD2AE	68	8	Configurable	4	42	4	6	1	2	3	24	8	√	√	LQFP48	√
M0518SD2AE	68	8	Configurable	4	56	4	6	1	2	3	24	8	√	√	LQFP64*	√

Development Tools: NT-M0518S

LQFP64*: 7x7mm

Mass Production Programmer: NLG-M0518n; n should be replaced by Package Code

• M0519 Series

Operating Frequency: 72 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Key Features: Hardware Divider, Dual ADC, 2x OPAs, 3x Comparators

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity				PWM(16-bit)	ADC(12-bit)	Comparator	OPA	Capture	ICP IAP ISP	IRC 10 kHz 22 MHz	Package	Mass Production
							UART*	SPI	I²C	LIN									
M0519LD3AE	64	16	4	8	38	4	3+2	1	1	2	6	8+8	2	2	-	√	√	LQFP48	√
M0519SD3AE	64	16	4	8	51	4	3+2	2	1	2	10	8+8	2	2	-	√	√	LQFP64*	√
M0519LE3AE	128	16	Configurable	8	38	4	3+2	1	1	2	6	8+8	2	2	-	√	√	LQFP48	√
M0519SE3AE	128	16	Configurable	8	51	4	3+2	2	1	2	10	8+8	2	2	-	√	√	LQFP64*	√
M0519VE3AE	128	16	Configurable	8	82	4	3+2	3	1	2	14	8+8	3	2	6	√	√	LQFP100	√

*Marked in the table (3+2) means 3 UART + 2 ISO-7816 UART

LQFP64*: 7x7mm

Development Tools: NT-M0519V

Mass Production Programmer: NLG-M0519n; n should be replaced by Package Code

• M0564 Series

Operating Frequency: 72 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Key Features: Configurable Data Flash, Hardware Divider, Up to 8x UARTs, 144 MHz PWM output, 800 kSPS ADC

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	SPROM (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	PWM	Connectivity					ADC(12-bit)	ACMP	PDMA	RTC(V_{BAT})	V_{DDIO} (1.8V-5.5V)	EBI	ICP IAP ISP	IRC 10 kHz 22 MHz 48 MHz	Package	Mass Production
									USCI*	UART*	ISO-7816-3*	SPI/I²S	I²C										
M0564LE4AE	128	20	Configurable	2	4	41	4	12	3	3+2	2	2	2	10	2	5	-	√	√	√	√	LQFP48	√
M0564SE4AE	128	20	Configurable	2	4	53	4	12	3	3+2	2	2	2	15	2	5	√	√	√	√	√	LQFP64*	√
M0564LG4AE	256	20	Configurable	2	4	41	4	12	3	3+2	2	2	2	10	2	5	-	√	√	√	√	LQFP48	√
M0564SG4AE	256	20	Configurable	2	4	53	4	12	3	3+2	2	2	2	15	2	5	√	√	√	√	√	LQFP64*	√
M0564VG4AE	256	20	Configurable	2	4	85	4	12	3	3+2	2	2	2	20	2	5	√	√	√	√	√	LQFP100	√

*USCI can be set to UART, SPI or I²C
*Marked in the table (3+2) means 3 UART+ 2ISO-7816 UART
*ISO-7816-3 UART supports full duplex mode

LQFP64*: 7x7mm

Development Tools: NT-M0564V

Mass Production Programmer: NLG-M0564n; n should be replaced by Package Code

NUC029 Series

The NuMicro® NUC029 series is designed for Industrial Applications supported by its robust noise immunity EFT features. Embedded with the Arm® Cortex®-M0 core. 5V operating voltage. NUC029 series provides 16~256Kbytes Flash, 2~20K bytes SRAM, equipped with high performance peripherals such as 12-bit ADC, UART, PWM, SPI, I²C…etc. Specific parts support hardware divider, comparator, USB 2.0 full-speed device by crystal-less.

Operating Frequency: 72 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 85°C/105°C

Potential Applications: Industrial Control, High Precision Meter, HMI, Motor Control, Communication System, etc.

• NUC029 Series

Key Features: 5V industrial control, Robust noise immunity EFT 4.4KV and strong ESD up to HBM 7KV.

Part Number	Flash (Kbytes)	SRAM (Kbytes)	Operating Frequency (MHz)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer (32-bit)	Connectivity							PWM (16-bit)	PDMA	EBI	CRC	PLL	LXT	RTC	ACMP	Divider	ADC(12-bit)	ICP IAP ISP	IRC 10 kHz 22 MHz	V_{DDIO} (1.8V-5.5V)	Package	Operating Temp. Range (°C)	Mass Production
								USCI*	UART*	SPI	I²C	I²S	ISO-7816-3*	LIN	USB*																
NUC029FAE	16	2	24	Configurable	2	17	2	-	1	1	1	-	-	-	-	3	-	-	-	-	√	-	2	-	4 (10-bit)	√	√	-	TSSOP20	-40 to +105	√
NUC029TAN	32	4	50	4	4	24	4	-	2	1	2	-	-	-	-	5	-	-	-	√	-	-	3	√	5	√	√	-	QFN33*	-40 to +85	√
NUC029ZAN	64	4	50	4	4	24	4	-	2	1	2	-	-	-	-	5	-	-	-	√	-	-	3	√	5	√	√	-	QFN33	-40 to +85	√
NUC029NAN	64	4	50	4	4	40	4	-	2	2	2	-	-	-	-	8	-	√	-	√	-	-	4	√	8	√	√	-	QFN48	-40 to +85	√
NUC029LAN	64	4	50	4	4	40	4	-	2	2	2	-	-	-	-	8	-	√	-	√	-	-	4	√	8	√	√	-	LQFP48	-40 to +85	√
NUC029LDE	68	8	50	Configurable	4	42	4	-	4	1	2	-	-	3	-	12	-	-	-	√	-	-	-	-	8	√	√	-	LQFP48	-40 to +105	√
NUC029SDE	68	8	50	Configurable	4	56	4	-	4	1	2	-	-	3	-	12	-	-	-	√	-	-	-	-	8	√	√	-	LQFP64*	-40 to +105	√
NUC029LEE	128	16	72	Configurable	8	31	4	-	2	1	2	-	-	2	1	4	9	-	√	√	√	√	-	-	10	√	√	-	LQFP48	-40 to +105	√
NUC029SEE	128	16	72	Configurable	8	45	4	-	3	2	2	-	-	3	1	6	9	√	√	√	√	√	-	-	12	√	√	-	LQFP64*	-40 to +105	√
NUC029LGE	256	20	72	Configurable	4	35	4	3	3	2	2	2	-	-	1	10	5	√	√	√	√	√	2	-	9	√	√	√	LQFP48	-40 to +105	√
NUC029SGE	256	20	72	Configurable	4	49	4	3	3	2	2	2	-	-	1	12	5	√	√	√	√	√	2	-	15	√	√	√	LQFP64*	-40 to +105	√
NUC029KGE	256	20	72	Configurable	4	86	4	3	3+2	2	2	2	2	-	1	12	5	√	√	√	√	√	2	-	20	√	√	√	LQFP128	-40 to +105	√

*USCI can be set to UART, SPI or I²C
*Marked in the table (3+2) means 3 UART + 2 ISO-7816 UART
*USB support FS Device mode crystal-less
*ISO-7816-3 UART supports full duplex mode

QFN33*: 4x4mm
LQFP64*: 7x7mm

Development Tools: NT-NUC029F/NT-NUC029L/NT-NUC029SD/NT-NUC029SE/NT-NUC029SG/NT-NUC029KG

Mass Production Programmer: NLG-NUC029nA/NLG-NUC029nD/NLG-NUC029nE/NLG-NUC029nG ; n should be replaced by Package Code

M031 Series

The NuMicro® M031 series embedded with the Arm® Cortex®-M0 core, designed for 1.8V~3.6V industrial applications, it equipped high performance and plenty peripherals, such as 2 Msps ADC, up to 144 MHz PWM. It also supports IEC60730 safety specifications and USB crystal-less. Built-in 16~512 Kbytes Flash, 2~96Kbytes SRAM.

Operating Frequency: 48~72 MHz
Operating Voltage: 1.8V to 3.6V
Operating Temperature: -40°C to 105°C

Potential Applications: Industrial Control, High Precision Meter, Wireless Charger, HMI, IoT Node Device, Security System, Motor Control, Communication System, etc.

• M031 Series

Key Features: Configurable up to 10 UARTs, 144 MHz PWM, 2 Msps ADC, 24 MHz SPI, 1-wire UART, OTA, USB-FS Crystal-less, Security program ROM.

Part Number	Flash (Kbytes)	SRAM (Kbytes)	Operating Frequency (MHz)	ISP ROM (Kbytes)	SPROM (Byte)	I/O	Timer (32-bit)	Connectivity						PWM (16-bit)	PDMA	EBI	CRC	PLL	LXT	RTC	ACMP	Divider	ADC(12-bit)	ICP IAP ISP	IRC 38.4 kHz 48 MHz	Package	Mass Production
								USCI*	UART	QSPI	SPI / I²S	I²C	USB*															
M031FB0AE	16	2	48	2	512	15	2	0	3	0	1	2	-	6	0	-	√	-	-	-	-	√	7	√	√	TSSOP20	Q2
M031EB0AE	16	2	48	2	512	23	2	0	3	0	1	2	-	6	0	-	√	-	-	-	-	√	9	√	√	TSSOP28	Q2
M031TB0AE	16	2	48	2	512	27	2	0	3	0	1	2	-	6	0	-	√	-	-	-	-	√	10	√	√	QFN33*	Q2
M031FC1AE	32	4	48	2	512	15	4	0	3	0	1	2	-	6	2	-	√	-	-	-	-	√	7	√	√	TSSOP20	Q1
M031EC1AE	32	4	48	2	512	23	4	0	3	0	1	2	-	6	2	-	√	-	-	-	-	√	9	√	√	TSSOP28	Q1
M031TC1AE	32	4	48	2	512	27	4	0	3	0	1	2	-	6	2	-	√	-	√	-	-	√	10	√	√	QFN33*	Q1
M031LC2AE	32	8	48	2	512	42	4	1	3	0	1	2	-	12	5	-	√	√	√	-	2	√	12	√	√	LQFP48	Q1
M031SC2AE	32	8	48	2	512	55	4	1	3	0	1	2	-	12	5	-	√	√	√	-	2	√	16	√	√	LQFP64*	Q1
M031TD2AE	64	8	48	2	512	27	4	1	3	0	1	2	-	12	5	-	√	√	√	-	2	√	10	√	√	QFN33*	Q1
M031LD2AE	64	8	48	2	512	42	4	1	3	0	1	2	-	12	5	-	√	√	√	-	2	√	12	√	√	LQFP48	Q1
M031SD2AE	64	8	48	2	512	55	4	1	3	0	1	2	-	12	5	-	√	√	√	-	2	√	16	√	√	LQFP64*	Q1
M031LE3AE	128	16	48	8	512	42	4	1	3	0	1	2	-	12	5	√	√	√	√	-	2	√	12	√	√	LQFP48	Q2
M031SE3AE	128	16	48	8	512	55	4	1	3	0	1	2	-	12	5	√	√	√	√	-	2	√	16	√	√	LQFP64*	Q2
M032LE3AE	128	16	48	8	512	38	4	1	3	0	1	2	√	12	5	√	√	√	√	-	2	√	12	√	√	LQFP48	Q2
M032SE3AE	128	16	48	8	512	51	4	1	3	0	1	2	√	12	5	√	√	√	√	-	2	√	16	√	√	LQFP64*	Q2
M031LG6AE	256	32	72	4	2048	42	4	2	6	1	1	2	-	24	7	√	√	√	√	√	2	√	12	√	√	LQFP48	Q4
M031SG6AE	256	32	72	4	2048	55	4	2	6	1	1	2	-	24	7	√	√	√	√	√	2	√	16	√	√	LQFP64*	Q4
M031KG6AE	256	32	72	4	2048	111	4	2	6	1	1	2	-	24	7	√	√	√	√	√	2	√	16	√	√	LQFP128	Q4
M032LG6AE	256	32	72	4	2048	38	4	2	6	1	1	2	√	24	7	√	√	√	√	√	2	√	12	√	√	LQFP48	Q4
M032SG6AE	256	32	72	4	2048	51	4	2	6	1	1	2	√	24	7	√	√	√	√	√	2	√	16	√	√	LQFP64*	Q4
M032KG6AE	256	32	72	4	2048	108	4	2	6	1	1	2	√	24	7	√	√	√	√	√	2	√	16	√	√	LQFP128	Q4
M031LG8AE	256	64	72	4	2048	42	4	2	6	1	1	2	-	24	7	√	√	√	√	√	2	√	12	√	√	LQFP48	Q4
M031SG8AE	256	64	72	4	2048	55	4	2	6	1	1	2	-	24	7	√	√	√	√	√	2	√	16	√	√	LQFP64*	Q4
M031KG8AE	256	64	72	4	2048	111	4	2	6	1	1	2	-	24	7	√	√	√	√	√	2	√	16	√	√	LQFP128	Q4
M032LG8AE	256	64	72	4	2048	38	4	2	6	1	1	2	√	24	7	√	√	√	√	√	2	√	12	√	√	LQFP48	Q4
M032SG8AE	256	64	72	4	2048	51	4	2	6	1	1	2	√	24	7	√	√	√	√	√	2	√	16	√	√	LQFP64*	Q4
M032KG8AE	256	64	72	4	2048	108	4	2	6	1	1	2	√	24	7	√	√	√	√	√	2	√	16	√	√	LQFP128	Q4
M031SIAAE	512	96	72	8	2048	55	4	2	8	1	1	2	-	24	9	√	√	√	√	√	2	√	16	√	√	LQFP64*	Q4
M031KIAAE	512	96	72	8	2048	111	4	2	8	1	1	2	-	24	9	√	√	√	√	√	2	√	16	√	√	LQFP128	Q4
M032SIAAE	512	96	72	8	2048	51	4	2	8	1	1	2	√	24	9	√	√	√	√	√	2	√	16	√	√	LQFP64*	Q4
M032KIAAE	512	96	72	8	2048	108	4	2	8	1	1	2	√	24	9	√	√	√	√	√	2	√	16	√	√	LQFP128	Q4

*USCI can be set to UART, SPI or I²C
*USB supports FS Device mode crystal-less

QFN33*: 4x4mm
LQFP64*: 7x7mm

Development Tools: NK-M031TB/NK-M031TC/NK-M031SD/NK-M031SE/NK-M032SE/NK-M031KG/NK-M032KG/NK-M031KI/NK-M032KI

Mass Production Programmer: NLG-20F/NLG-28E/NLG-32T (QFN33*)/ NLG-48L (LQFP48)/ NLG-64S (LQFP64)/ NLG-128KX (LQFP128)

NUC121 Series

The NuMicro® NUC121 series embedded with the Arm® Cortex®-M0 core with 32~256 Kbytes Flash memory, 8~20 Kbytes SRAM, and 4 Kbytes Flash loader memory for In-System Programming (ISP). This series is a standard USB series which supports crystal-less (except NUC123). 48 MHz high speed RC oscillator supports crystal-less USB transfer and 24-ch PWM/BPWM for external components control. Besides, NUC121 series provides a plenty selections up to 24-ch PWM and 20-ch ADC.

Key Features: Over 4 Kbytes ISP loader. USB 2.0 FS Device Crystal-less (except NUC123). NUC125/126 supports voltage adjustable interface (VAI) with individual I/O (1.8V-5.5V) connecting to the external components to allow more flexbile in designs.
Potential Applications: USB Composite Device, Gaming Mouse/Keyboard/Pad, USB Type-C Earphone, Industrial Automation, IoT device, etc.

• NUC121 Series

Operating Frequency: 50 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Part No.	Flash (Kbytes)	SRAM (Kbytes)	ISP ROM (Kbytes)	SPROM (Bytes)	I/O	Timer(32-bit)	Connectivity					PWM (16-bit)	ADC (12-bit)	PDMA	ICP IAP ISP	IRC 10 kHz 48 MHz	Package	Mass Production
							USCI*	UART	SPI/I²S	I²C	USB*							
NUC121ZC2AE	32	8	4.5	512	22	4	1	1	1	2	1	17	4	5	√	√	QFN33	√
NUC121LC2AE	32	8	4.5	512	38	4	1	1	1	2	1	24	4	5	√	√	LQFP48	√
NUC121SC2AE	32	8	4.5	512	52	4	1	1	1	2	1	24	12	5	√	√	LQFP64*	√

*USCI can be set to UART, SPI or I²C
*USB supports FS Device mode crystal-less
LQFP64*: 7x7mm

Development Tools: NT-NUC121S
Mass Production Programmer: NLG-NUC121n; n should be replaced by Package Code

• NUC125 Series

Operating Frequency: 50 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Key Features: Voltage Adjustable Interface from 1.8V~5.5V, up to 12-ch ADC

Part No.	Flash (Kbytes)	SRAM (Kbytes)	ISP ROM (Kbytes)	SPROM (Bytes)	I/O	Timer(32-bit)	V_{DDIO} (1.8V-5.5V)	Connectivity					PWM (16-bit)	ADC (12-bit)	PDMA	ICP IAP ISP	IRC 10 kHz 48 MHz	Package	Mass Production
								USCI*	UART	SPI/I²S	I²C	USB*							
NUC125ZC2AE	32	8	4.5	512	22	4	√	1	1	1	2	1	17	4	5	√	√	QFN33	√
NUC125LC2AE	32	8	4.5	512	37	4	√	1	1	1	2	1	23	4	5	√	√	LQFP48	√
NUC125SC2AE	32	8	4.5	512	51	4	√	1	1	1	2	1	23	12	5	√	√	LQFP64*	√

*USCI can be set to UART, SPI or I²C
*USB supports FS Device mode crystal-less
LQFP64*: 7x7mm

Development Tools: NT-NUC125S
Mass Production Programmer: NLG-NUC125n; n should be replaced by Package Code

• NUC123 Series

Operating Frequency: 72 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Part No.	Flash (Kbytes)	SRAM (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity						PWM(16-bit)	ADC(10-bit)	PDMA	CRC	ICP IAP ISP	IRC 10 kHz 22 MHz	Package	Mass Production
						UART	SPI	I²C	I²S	USB	PS2								
NUC123ZC2AE1	36	12	4	20	4	1	3	1	1	1	-	3	3	6	√	√	√	QFN33	√
NUC123LC2AE1	36	12	4	36	4	2	3	2	1	1	1	4	8	6	√	√	√	LQFP48	√
NUC123SC2AE1	36	12	4	47	4	2	3	2	1	1	1	4	8	6	√	√	√	LQFP64*	√
NUC123ZD4AE0	68	20	4	20	4	1	3	1	1	1	-	3	3	6	√	√	√	QFN33	√
NUC123LD4AE0	68	20	4	36	4	2	3	2	1	1	1	4	8	6	√	√	√	LQFP48	√
NUC123SD4AE0	68	20	4	47	4	2	3	2	1	1	1	4	8	6	√	√	√	LQFP64*	√

Development Tools: NT-NUC123S

LQFP64*: 7x7mm

Mass Production Programmer: NLG-NUC123n; n should be replaced by Package Code

• NUC126 Series

Operating Frequency: 72 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Key Features: Up to 12-ch 144 MHz PWM, 800 Ksps 20-ch ADC, Hardware Divider

Part No.	Flash (Kbytes)	SRAM (Kbytes)	SPROM (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	V_{DDIO} (1.8V-5.5V)	Connectivity						PWM (16-bit)	ADC(12-bit)	ACMP	PDMA	RTC (V_{BAT})	EBI	ICP IAP ISP	IRC 10 kHz 22 MHz 48 MHz	Package	Mass Production
								USB*	USCI*	UART*	ISO-7816-3*	SPI/I²S	I²C										
NUC126NE4AE	128	20	2	4	35	4	√	1	3	3+2	2	2	2	10	9	2	5	-	√	√	√	QFN48	√
NUC126LE4AE	128	20	2	4	35	4	√	1	3	3+2	2	2	2	10	9	2	5	-	√	√	√	LQFP48	√
NUC126SE4AE	128	20	2	4	49	4	√	1	3	3+2	2	2	2	12	15	2	5	√	√	√	√	LQFP64	√
NUC126LG4AE	256	20	2	4	35	4	√	1	3	3+2	2	2	2	10	9	2	5	-	√	√	√	LQFP48	√
NUC126SG4AE	256	20	2	4	49	4	√	1	3	3+2	2	2	2	12	9	2	5	√	√	√	√	LQFP64*	√
NUC126VG4AE	256	20	2	4	81	4	√	1	3	3+2	2	2	2	12	20	2	5	√	√	√	√	LQFP100	√

*Marked in the table (3+2) means 3 UART + 2 ISO-7816 UART
*USCI can be set to UART, SPI or I²C
*ISO-7816-3 UART supports full duplex mode

LQFP64*: 7x7mm

Development Tools: NT-NUC126V

Mass Production Programmer: NLG-NUC126n; n should be replaced by Package Code

NUC130 CAN Series

The NuMicro® NUC130/131/140/230/240 series with Controller Area Network (CAN) bus embedded with the Arm® Cortex®-M0 core with 32~128 Kbytes Flash memory, 4~16 Kbytes SRAM, and 4/8 Kbytes Flash loader memory for In-System Programming (ISP). This series is designed for CAN applications, and it also equipped with a variety of peripherals for general connectivity function such as LIN, USB 2.0 FS, UART, I²C, and ADC, Analog Comparator, Low Voltage Reset and Brown-out Detector.

NUC130 CAN Series	USB FS	LIN	CAN
NUC131		V	V
NUC130		V	V
NUC140	V	V	V
NUC230		V	V
NUC240	V	V	V

Key Features: LIN and up to 2-ch CAN Bus Supported, 4 Kbytes Data Flash, and 4/8 Kbytes ISP loader.
Potential Applications: Automotive, Security/ Alarm, Temperature Sensor, Communication System, etc.

• NUC131 Series

Operating Frequency: 50 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity					PWM(16-bit)	ADC(12-bit)	ICP IAP ISP	IRC 10 kHz 22 MHz	Package	Mass Production
							UART	SPI	I²C	LIN	CAN						
NUC131LC2AE	36	8	Configurable	4	42	4	6	1	2	3	1	24	8	√	√	LQFP48	√
NUC131SC2AE	36	8	Configurable	4	56	4	6	1	2	3	1	24	8	√	√	LQFP64*	√
NUC131LD2AE	68	8	Configurable	4	42	4	6	1	2	3	1	24	8	√	√	LQFP48	√
NUC131SD2AE	68	8	Configurable	4	56	4	6	1	2	3	1	24	8	√	√	LQFP64*	√

LQFP64*: 7x7mm

Development Tools: NT-NUC131S
Mass Production Programmer: NLG-NUC131n; n should be replaced by Package Code

• NUC130 Series

Operating Frequency: 50 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 85°C

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity								PWM(16-bit)	ADC(12-bit)	Comparator	RTC	EBI	PDMA	ICP ISP	IRC 10 kHz 22 MHz	Package	Mass Production
							UART	ISO-7816-3	SPI	I²C	I²S	USB	LIN	CAN										
NUC130LC1CN	32	4	4	4	35	4	3	-	1	2	1	-	2	1	4	8	1	√	-	9	√	√	LQFP48	√
NUC130RC1CN	32	4	4	4	49	4	3	-	2	2	1	-	2	1	6	8	2	√	√	9	√	√	LQFP64	√
NUC130LD2CN	64	8	4	4	35	4	3	-	1	2	1	-	2	1	4	8	1	√	-	9	√	√	LQFP48	√
NUC130RD2CN	64	8	4	4	49	4	3	-	2	2	1	-	2	1	6	8	2	√	√	9	√	√	LQFP64	√
NUC130LE3CN	128	16	Configurable	4	35	4	3	-	1	2	1	-	2	1	4	8	1	√	-	9	√	√	LQFP48	√
NUC130RE3CN	128	16	Configurable	4	49	4	3	-	2	2	1	-	2	1	6	8	2	√	√	9	√	√	LQFP64	√
NUC130VE3CN	128	16	Configurable	4	80	4	3	-	4	2	1	-	2	1	8	8	2	√	√	9	√	√	LQFP100	√

Development Tools: NT-NUC140V
Mass Production Programmer: NLG-NUC100n; n should be replaced by Package Code

• NUC140 Series

Operating Frequency: 50 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 85°C

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM	I/O	Timer(32-bit)	Connectivity								PWM(16-bit)	ADC(12-bit)	Comparator	RTC	EBI	PDMA	ICP ISP	IRC 10 kHz 22 MHz	Package	Mass Production
							UART	ISO-7816-3	SPI	I²C	I²S	USB	LIN	CAN										
NUC140LC1CN	32	4	4	4	31	4	2	-	1	2	1	1	2	1	4	8	1	√	-	9	√	√	LQFP48	√
NUC140RC1CN	32	4	4	4	45	4	3	-	2	2	1	1	2	1	4	8	2	√	√	9	√	√	LQFP64	√
NUC140LD2CN	64	8	4	4	31	4	2	-	1	2	1	1	2	1	4	8	1	√	-	9	√	√	LQFP48	√
NUC140RD2CN	64	8	4	4	45	4	3	-	2	2	1	1	2	1	4	8	2	√	√	9	√	√	LQFP64	√
NUC140LE3CN	128	16	Configurable	4	31	4	2	-	1	2	1	1	2	1	4	8	1	√	-	9	√	√	LQFP48	√
NUC140RE3CN	128	16	Configurable	4	45	4	3	-	2	2	1	1	2	1	4	8	2	√	√	9	√	√	LQFP64	√
NUC140VE3CN	128	16	Configurable	4	76	4	3	-	4	2	1	1	2	1	8	8	2	√	√	9	√	√	LQFP100	√

Development Tools: NT-NUC140V
Mass Production Programmer: NLG-NUC100n; n should be replaced by Package Code

• NUC230 Series

Operating Frequency: 72 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity								PWM(16-bit)	ADC(12-bit)	Comparator	PDMA	CRC	RTC (V_{BAT})	ICP IAP ISP	IRC 10 kHz 22 MHz	Package	Mass Production
							UART*	ISO-7816-3*	SPI	I²C	I²S	USB	LIN	CAN										
NUC230LC2AE	32	8	4	8	35	4	3+2	2	1	2	1	-	3	2	4	7	1	9	√	√	√	√	LQFP48	√
NUC230SC2AE	32	8	4	8	49	4	3+2	2	2	2	1	-	3	2	6	7	2	9	√	√	√	√	LQFP64*	√
NUC230LD2AE	64	8	4	8	35	4	3+2	2	1	2	1	-	3	2	4	7	1	9	√	√	√	√	LQFP48	√
NUC230SD2AE	64	8	4	8	49	4	3+2	2	2	2	1	-	3	2	6	7	2	9	√	√	√	√	LQFP64*	√
NUC230LE3AE	128	16	Configurable	8	35	4	3+2	2	1	2	1	-	3	2	4	7	1	9	√	√	√	√	LQFP48	√
NUC230SE3AE	128	16	Configurable	8	49	4	3+2	2	2	2	1	-	3	2	6	7	2	9	√	√	√	√	LQFP64*	√
NUC230VE3AE	128	16	Configurable	8	83	4	3+3	3	4	2	1	-	3	2	8	8	2	9	√	√	√	√	LQFP100	√

*Marked in the table (3+3) means 3 UART+ 3 ISO-7816 UART
*ISO-7816-3 UART supports full duplex mode

LQFP64*: 7x7mm

Development Tools: NT-NUC240V
Mass Production Programmer: NLG-NUC200n; n should be replaced by Package Code

• NUC240 Series

Operating Frequency: 72 MHz
Operating Voltage: 2.5V to 5.5V
Operating Temperature: -40°C to 105°C

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity								PWM(16-bit)	ADC(12-bit)	Comparator	PDMA	CRC	RTC (V_{BAT})	ICP IAP ISP	IRC 10 kHz 22 MHz	Package	Mass Production
							UART*	ISO-7816-3*	SPI	I²C	I²S	USB	LIN	CAN										
NUC240LC2AE	32	8	4	8	31	4	2+2	1	1	2	1	1	2	2	4	7	1	9	√	√	√	√	LQFP48	√
NUC240SC2AE	32	8	4	8	45	4	3+2	2	2	2	1	1	3	2	4	7	2	9	√	√	√	√	LQFP64*	√
NUC240LD2AE	64	8	4	8	31	4	2+2	1	1	2	1	1	2	2	4	7	1	9	√	√	√	√	LQFP48	√
NUC240SD2AE	64	8	4	8	45	4	3+2	2	2	2	1	1	3	2	4	7	2	9	√	√	√	√	LQFP64*	√
NUC240LE3AE	128	16	Configurable	8	31	4	2+2	1	1	2	1	1	2	2	4	7	1	9	√	√	√	√	LQFP48	√
NUC240SE3AE	128	16	Configurable	8	45	4	3+2	2	2	2	1	1	3	2	4	7	2	9	√	√	√	√	LQFP64*	√
NUC240VE3AE	128	16	Configurable	8	79	4	3+3	3	4	2	1	1	3	2	8	8	2	9	√	√	√	√	LQFP100	√

*Marked in the table (3+3) means 3 UART+ 3 ISO-7816 UART
*ISO-7816-3 UART supports full duplex mode

LQFP64*: 7x7mm

Development Tools: NT-NUC240V
Mass Production Programmer: NLG-NUC200n; n should be replaced by Package Code

Nano Series

The NuMicro® Nano series supports ultra low power consumption and embedded with the Arm® Cortex®-M0 core with 16~128 Kbytes Flash Memory and 4~16 Kbytes SRAM and 4 Kbytes Flash loader memory for In-System Programming (ISP). The Nano series integrates COM/SEG LCD controller, Real Time Counter (RTC), ADC, DAC, USB 2.0 FS device, ISO-7816-3 and rich peripherals, supports fast wake-up via many interfaces.

Key Features: Ultra-low power and short wake-up time.
Potential Applications: Suitable for limited battery-powered devices such as Smart Wearable, IoT Device, Portable Medical Device, Smart Home Appliance, Security / Alarm, Mobile Payment Smart Card Reader, GPS Data Collector, Wireless Communication (Zigbee, LoRa...etc.) Node Device, Electronic Shelf Label (ESL), RFID, Smart Heat/Water/Gas Meters, etc.

• Nano100 Series

Operating Frequency: 42 MHz
Operating Voltage: 1.8V to 3.6V
Operating Temperature: -40°C to 85°C

Key Features: Ultra-low power: 200 µA/MHz (Normal), 75 µA/MHz (Idle), 2.5 µA (Power Down, RTC On, RAM retention) and 1 µA (Power Down, RAM retention) and less than 3.5 µs wake-up time.

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity						PWM(16-bit)	ADC(12-bit)	RTC	EBI	PDMA	LCD	DAC(12-bit)	ICP IAP ISP	IRC 10 kHz 12 MHz	Package	Mass Production
							UART*	ISO-7816-3*	SPI	I²C	I²S	USB											
NANO100NC2BN	32	8	Configurable	4	38	4	2+2	2	3	2	1	-	6	7	√	-	8	-	2	√	√	QFN48	√
NANO100LC2BN	32	8	Configurable	4	38	4	2+2	2	3	2	1	-	6	7	√	-	8	-	2	√	√	LQFP48	√
NANO100SC2BN	32	8	Configurable	4	52	4	2+3	3	3	2	1	-	8	7	√	-	8	-	2	√	√	LQFP64*	√
NANO100ND2BN	64	8	Configurable	4	38	4	2+2	2	3	2	1	-	6	7	√	-	8	-	2	√	√	QFN48	√
NANO100ND3BN	64	16	Configurable	4	38	4	2+2	2	3	2	1	-	6	7	√	-	8	-	2	√	√	QFN48	√
NANO100LD2BN	64	8	Configurable	4	38	4	2+2	2	3	2	1	-	6	7	√	-	8	-	2	√	√	LQFP48	√
NANO100LD3BN	64	16	Configurable	4	38	4	2+2	2	3	2	1	-	6	7	√	-	8	-	2	√	√	LQFP48	√
NANO100SD2BN	64	8	Configurable	4	52	4	2+3	3	3	2	1	-	8	7	√	-	8	-	2	√	√	LQFP64*	√
NANO100SD3BN	64	16	Configurable	4	52	4	2+3	3	3	2	1	-	8	7	√	-	8	-	2	√	√	LQFP64*	√
NANO100KD3BN	64	16	Configurable	4	86	4	2+3	3	3	2	1	-	8	12	√	√	8	-	2	√	√	LQFP128	√
NANO100NE3BN	128	16	Configurable	4	38	4	2+2	2	3	2	1	-	6	7	√	-	8	-	2	√	√	QFN48	√
NANO100LE3BN	128	16	Configurable	4	38	4	2+2	2	3	2	1	-	6	7	√	-	8	-	2	√	√	LQFP48	√
NANO100SE3BN	128	16	Configurable	4	52	4	2+3	3	3	2	1	-	8	7	√	-	8	-	2	√	√	LQFP64*	√
NANO100KE3BN	128	16	Configurable	4	86	4	2+3	3	3	2	1	-	8	12	√	√	8	-	2	√	√	LQFP128	√

*Marked in the table (2+3) means 2 UART+ 3 ISO-7816 UART
*ISO-7816-3 UART supports half duplex mode

LQFP64*:7X7mm

Development Tools: NT-Nano100K (Nano100)/ NT-Nano120K (Nano100)/ NT-Nano130K (Nano100)
Mass Production Programmer: NLG-Nano100n; n should be replaced by Package Code

• Nano102 Series

Operating Frequency: 32 MHz
Operating Voltage: 1.8V to 3.6V
Operating Temperature: -40°C to 85°C

Key Features: Ultra-low power: 150 µA/MHz (Normal), 65 µA/MHz (Idle), 1.5 µA (Power Down, RTC On, RAM retention) and 0.65 µA (Power Down, RAM retention) and less than 3.5 µs wake-up time.

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity				Comparator	PWM(16-bit)	ADC(12-bit)	RTC	PDMA	LCD	ICP IAP ISP	IRC 10 kHz 12 MHz 16 MHz	Package	Mass Production
							UART*	ISO-7816-3*	SPI	I²C										
NANO102ZB1AN	16	4	Configurable	4	27	4	2+1	1	2	2	2	4	2	√	4	-	√	√	QFN33	√
NANO102LB1AN	16	4	Configurable	4	40	4	2+2	2	2	2	2	4	7	√	4	-	√	√	LQFP48	√
NANO102ZC2AN	32	8	Configurable	4	27	4	2+1	1	2	2	2	4	2	√	4	-	√	√	QFN33	√
NANO102LC2AN	32	8	Configurable	4	40	4	2+2	2	2	2	2	4	7	√	4	-	√	√	LQFP48	√
NANO102SC2AN	32	8	Configurable	4	58	4	2+2	2	2	2	2	4	7	√	4	-	√	√	LQFP64*	√

*Marked in the table (2+2) means 2 UART + 2 ISO-7816 UART
*ISO-7816 UART supports UART full duplex mode

LQFP64*: 7x7mm

Development Tools: NT-Nano102S (Nano102)/ NT-Nano112V (Nano102)
Mass Production Programmer: NLG-Nano102Z(QFN33)/NLG-Nano112L(LQFP48)/NLG-Nano112S(LQFP64)

• Nano103 Series

Operating Frequency: 36 MHz
Operating Voltage: 1.8V to 3.6V
Operating Temperature: -40°C to 105°C

Key Features: Ultra-low power: 180 µA/MHz (Normal), 75 µA/MHz (Idle), 2 µA (Power Down, RTC On, RAM retention).

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity					PWM	ADC(12-bit)	ACMP	RTC	IRC 10 KHz 4 MHz 12/16MHz 36 MHz	PDMA	ICP IAP ISP	Package	Mass Production
							UART*	ISO-7816-3*	SPI	I²C	I²S									
NANO103ZD3AE	64	16	Configurable	4	26	4	2+2	2	4	2	-	2	6	1	√	√	4	√	QFN33	√
NANO103LD3AE	64	16	Configurable	4	39	4	2+2	2	4	2	-	6	8	1	√	√	4	√	LQFP48	√
NANO103SD3AE	64	16	Configurable	4	53	4	2+2	2	4	2	-	6	8	1	√	√	4	√	LQFP64*	√

*Marked in the table (2+2) means 2 UART + 2 ISO-7816 UART
*ISO-7816-3 UART supports UART full duplex mode

LQFP64*: 7x7mm

Development Tools: NT-Nano103S
Mass Production Programmer: NLG-Nano103n; n should be replaced by Package Code

• Nano110 Series

Operating Frequency: 42 MHz
Operating Voltage: 1.8V to 3.6V
Operating Temperature: -40°C to 85°C

Key Features: Integrates 4x40 & 6x38 COM/SEG LCD controller, ultra-low power: 200 µA/MHz (Normal), 75 µA/MHz (Idle), 2.5 µA (Power Down, RTC On, RAM retention) and 1 µA (Power Down, RAM retention) and less than 3.5 µs wake-up time.

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity						PWM(16-bit)	ADC(12-bit)	RTC	EBI	PDMA	LCD	DAC(12-bit)	ICP IAP ISP	IRC 10 kHz 12 MHz	Package	Mass Production
							UART*	ISO-7816-3*	SPI	I²C	I²S	USB											
NANO110SC2BN	32	8	Configurable	4	51	4	2+3	3	3	2	1	-	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64*	√
NANO110RC2BN	32	8	Configurable	4	51	4	2+3	3	3	2	1	-	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64	√
NANO110KC2BN	32	8	Configurable	4	86	4	2+3	3	3	2	1	-	8	12	√	√	8	4x40, 6x38	2	√	√	LQFP128	√
NANO110SD2BN	64	8	Configurable	4	51	4	2+3	3	3	2	1	-	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64*	√
NANO110SD3BN	64	16	Configurable	4	51	4	2+3	3	3	2	1	-	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64*	√
NANO110RD2BN	64	8	Configurable	4	51	4	2+3	3	3	2	1	-	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64	√
NANO110RD3BN	64	16	Configurable	4	51	4	2+3	3	3	2	1	-	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64	√
NANO110KD2BN	64	8	Configurable	4	86	4	2+3	3	3	2	1	-	8	12	√	√	8	4x40, 6x38	2	√	√	LQFP128	√
NANO110KD3BN	64	16	Configurable	4	86	4	2+3	3	3	2	1	-	8	12	√	√	8	4x40, 6x38	2	√	√	LQFP128	√
NANO110SE3BN	128	16	Configurable	4	51	4	2+3	3	3	2	1	-	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64*	√
NANO110RE3BN	128	16	Configurable	4	51	4	2+3	3	3	2	1	-	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64	√
NANO110KE3BN	128	16	Configurable	4	86	4	2+3	3	3	2	1	-	8	12	√	√	8	4x40, 6x38	2	√	√	LQFP128	√

*Marked in the table (2+3) means 2 UART+ 3 ISO-7816 UART
*ISO-7816-3 UART supports half duplex mode

LQFP64*:7X7mm

Development Tools:NT-Nano130K (Nano110)
Mass Production Programmer: NLG-Nano100n; n should be replaced by Package Code

• Nano112 Series

Operating Frequency: 32 MHz
Operating Voltage: 1.8V to 3.6V
Operating Temperature: -40°C to 85°C

Key Features: Integrates 4x36 & 6x34 COM/SEG LCD controller, ultra-low power: 150 µA/MHz (Normal), 65 µA/MHz (Idle), 1.5 µA (Power Down, RTC On, RAM retention) and 0.65 µA (Power Down, RAM retention) and less than 3.5 µs wake-up time.

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity				Comparator	PWM(16-bit)	ADC(12-bit)	RTC	PDMA	LCD	ICP IAP ISP	IRC 10 kHz 12 MHz 16 MHz	Package	Mass Production
							UART*	ISO-7816-3*	SPI	I²C										
NANO112LB1AN	16	4	Configurable	4	40	4	2+2	2	2	2	2	4	7	√	4	4x20, 6x18	√	√	LQFP48	√
NANO112SB1AN	16	4	Configurable	4	58	4	2+2	2	2	2	2	4	7	√	4	4x32, 6x30	√	√	LQFP64*	√
NANO112RB1AN	16	4	Configurable	4	58	4	2+2	2	2	2	2	4	7	√	4	4x32, 6x30	√	√	LQFP64	√
NANO112LC2AN	32	8	Configurable	4	40	4	2+2	2	2	2	2	4	7	√	4	4x20, 6x18	√	√	LQFP48	√
NANO112SC2AN	32	8	Configurable	4	58	4	2+2	2	2	2	2	4	7	√	4	4x32, 6x30	√	√	LQFP64*	√
NANO112RC2AN	32	8	Configurable	4	58	4	2+2	2	2	2	2	4	7	√	4	4x32, 6x30	√	√	LQFP64	√
NANO112VC2AN	32	8	Configurable	4	80	4	2+2	2	2	2	2	4	8	√	4	4x36, 6x34	√	√	LQFP100	√

*Marked in the table (2+2) means 2 UART + 2 ISO-7816 UART
*ISO-7816-3 UART supports UART full duplex mode

LQFP64*:7X7mm

Development Tools: NT-Nano112V
Mass Production Programmer: NLG-Nano112n; n should be replaced by Package Code

• Nano120 Series

Operating Frequency: 42 MHz
Operating Voltage: 1.8V to 3.6V
Operating Temperature: -40°C to 85°C

Key Features: Integrates USB 2.0 FS device interface, ultra-low power: 200 µA/MHz (Normal), 75 µA/MHz (Idle), 2.5 µA (Power Down, RTC On, RAM retention) and 1µA (Power Down, RAM retention) and less than 3.5 µs wake-up time.

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity						PWM(16-bit)	ADC(12-bit)	RTC	EBI	PDMA	LCD	DAC(12-bit)	ICP IAP ISP	IRC 10 kHz 12 MHz	Package	Mass Production
							UART*	ISO-7816-3*	SPI	I²C	I²S	USB											
NANO120LC2BN	32	8	Configurable	4	34	4	2+2	2	3	2	1	1	4	7	√	-	8	-	2	√	√	LQFP48	√
NANO120SC2BN	32	8	Configurable	4	48	4	2+3	3	3	2	1	1	8	7	√	-	8	-	2	√	√	LQFP64*	√
NANO120LD2BN	64	8	Configurable	4	34	4	2+2	2	3	2	1	1	4	7	√	-	8	-	2	√	√	LQFP48	√
NANO120LD3BN	64	16	Configurable	4	34	4	2+2	2	3	2	1	1	4	7	√	-	8	-	2	√	√	LQFP48	√
NANO120SD2BN	64	8	Configurable	4	48	4	2+3	3	3	2	1	1	8	7	√	-	8	-	2	√	√	LQFP64*	√
NANO120SD3BN	64	16	Configurable	4	48	4	2+3	3	3	2	1	1	8	7	√	-	8	-	2	√	√	LQFP64*	√
NANO120KD3BN	64	16	Configurable	4	86	4	2+3	3	3	2	1	1	8	8	√	√	8	-	2	√	√	LQFP128	√
NANO120LE3BN	128	16	Configurable	4	34	4	2+2	2	3	2	1	1	4	7	√	-	8	-	2	√	√	LQFP48	√
NANO120SE3BN	128	16	Configurable	4	48	4	2+3	3	3	2	1	1	8	7	√	-	8	-	2	√	√	LQFP64*	√
NANO120KE3BN	128	16	Configurable	4	86	4	2+3	3	3	2	1	1	8	8	√	√	8	-	2	√	√	LQFP128	√

*Marked in the table (2+3) means 2 UART+ 3 ISO-7816 UART
*ISO-7816-3 UART supports half duplex mode

LQFP64*:7X7mm

Development Tools: NT-Nano120K/ NT-Nano130K (Nano120)
Mass Production Programmer: NLG-Nano100n; n should be replaced by Package Code

• Nano130 Series

Operating Frequency: 42 MHz
Operating Voltage: 1.8V to 3.6V
Operating Temperature: -40°C to +85°C

Key Features: Integrates 4x40 & 6x38 COM/SEG LCD controller and USB 2.0 FS device interface,ultra-low power: 200 µA/MHz (Normal), 75 µA/MHz (Idle), 2.5 µA (Power Down, RTC On, RAM retention) and 1 µA (Power Down, RAM retention) and less than 3.5 µs wake-up time.

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer(32-bit)	Connectivity						PWM(16-bit)	ADC(12-bit)	RTC	EBI	PDMA	LCD	DAC(12-bit)	ICP IAP ISP	IRC 10 kHz 12 MHz	Package
							UART*	ISO-7816-3*	SPI	I²C	I²S	USB										
NANO130SC2BN	32	8	Configurable	4	47	4	2+3	3	3	2	1	1	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64*
NANO130KC2BN	32	8	Configurable	4	86	4	2+3	3	3	2	1	1	8	8	√	√	8	4x40, 6x38	2	√	√	LQFP128
NANO130SD2BN	64	8	Configurable	4	47	4	2+3	3	3	2	1	1	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64*
NANO130SD3BN	64	16	Configurable	4	47	4	2+3	3	3	2	1	1	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64*
NANO130KD2BN	64	8	Configurable	4	86	4	2+3	3	3	2	1	1	8	8	√	√	8	4x40, 6x38	2	√	√	LQFP128
NANO130KD3BN	64	16	Configurable	4	86	4	2+3	3	3	2	1	1	8	8	√	√	8	4x40, 6x38	2	√	√	LQFP128
NANO130SE3BN	128	16	Configurable	4	47	4	2+3	3	3	2	1	1	7	7	√	-	8	4x31, 6x29	2	√	√	LQFP64*
NANO130KE3BN	128	16	Configurable	4	86	4	2+3	3	3	2	1	1	8	8	√	√	8	4x40, 6x38	2	√	√	LQFP128

*Marked in the table (2+3) means 2 UART+ 3 ISO-7816 UART
*ISO-7816-3 UART supports half duplex mode

LQFP64*:7X7mm

Development Tools: NT-Nano130K
Mass Production Programmer: NLG-Nano100n; n should be replaced by Package Code

M251/M252 Series

The NuMicro® M251/M252 is ultra-low power series embedded with the Arm® Cortex®-M23 core for Armv8-M architecture, supports wide operation voltage and built-in 16~256 Kbytes Flash memory, 8~32 Kbytes SRAM and 4 Kbytes Flash loader memory for In-System Programming (ISP). The M251/M252 series integrates PSIO (Programmable Serial I/O) that is capable of emulating various serial communication protocols including: UART, SPI, I²C...etc. In addition Real Time Counter (RTC), ADC, DAC, Analog Comparator, Operational Amplifier, VAI (Voltage Adjustable Interface), USB 2.0 FS device (Crystal-less), ISO-7816-3, and rich peripherals, supports fast wake-up via communication interfaces.

Operating Frequency: 48 MHz
Operating Voltage: 1.8V to 5.5V
Operating Temperature: -40°C to 105°C

Potential Applications: Suitable for limited battery-powered devices, such as Wearable Device, IoT Device, Portable Medical Device, Smart Home Appliance, Security / Alarm Monitoring, Mobile Payment Smart Card Reader, GPS Data Collector, Wireless Communication (Zigbee, LoRa...etc.) Node Device, Electronic Shelf Label (ESL), RFID, Smart Heat/Water/Gas Meters, etc.

• M251 Series

Key Features: Up to 8-ch PSIO that is capable of emulating various serial communication protocols. Ultra-low-power Consumption with 138uA/MHz (Normal), 60uA/MHz (Idle), 2.5 uA (Power Down, RTC on, RAM retention) and 1.5 uA (Power Down, RTC off, RAM retention)

Part Number	Flash (Kbytes)	SRAM (Kbytes)	ISP ROM (Kbytes)	I/O	Timer (32-bit)	PWM(16-bit)	WDT/WWDT	Connectivity							ADC(12-Bit)	ACMP	DAC	OPA	PDMA	Crypto	V_{DDIO} (1.8V-5.5V)	V_{Bat}	Package	Mass Production
								USCI	UART*	QSPI	SPI /I²S	I²C	ISO-7816-3*	PSIO										
M251FB2AE	16	8	4	15	4	9	V	1	2+1	1	-	2	1	-	7	-	-	-	5	-	-	-	TSSOP20	Q2
M251EB2AE	16	8	4	23	4	11	V	1	2+1	1	-	2	1	-	9	-	-	-	5	-	-	-	TSSOP28	Q2
M251ZB2AE	16	8	4	26	4	12	V	1	2+1	1	-	2	1	-	10	-	-	-	5	-	V	-	QFN33	Q2
M251FC2AE	32	8	4	15	4	9	V	1	2+1	1	-	2	1	-	7	-	-	-	5	-	-	-	TSSOP20	Q2
M251EC2AE	32	8	4	23	4	11	V	1	2+1	1	-	2	1	-	9	-	-	-	5	-	-	-	TSSOP28	Q2
M251ZC2AE	32	8	4	26	4	12	V	1	2+1	1	-	2	1	-	10	-	-	-	5	-	V	-	QFN33	Q2
M251LC2AE	32	8	4	41	4	24	V	2	3+1	1	1	2	1	4	12	2	-	-	5	-	V	-	LQFP48	Q2
M251SC2AE	32	8	4	54	4	24	V	2	3+1	1	1	2	1	4	16	2	-	-	5	-	V	-	LQFP64*	Q2
M251ZD2AE	64	12	4	26	4	24	V	2	3+1	1	1	2	1	4	10	2	-	-	5	-	V	-	QFN33	Q2
M251LD2AE	64	12	4	41	4	24	V	2	3+1	1	1	2	1	4	12	2	-	-	5	-	V	-	LQFP48	Q2
M251SD2AE	64	12	4	54	4	24	V	2	3+1	1	1	2	1	4	16	2	-	-	5	-	V	-	LQFP64*	Q2
M251LE3AE	128	16	4	41	4	24	V	3	3+1	1	1	2	1	8	12	2	-	-	8	-	V	-	LQFP48	Q2
M251SE3AE	128	16	4	53	4	24	V	3	3+1	1	1	2	1	8	16	2	-	-	8	-	V	V	LQFP64*	Q2
M251KE3AE	128	16	4	85	4	24	V	3	3+1	1	1	2	1	8	16	2	-	-	8	-	V	V	LQFP128	Q2
M251LG6AE	256	32	4	41	4	24	V	3	3+1	1	1	2	1	8	12	2	1	1	8	V	V	-	LQFP48	Q2
M251SG6AE	256	32	4	53	4	24	V	3	3+1	1	1	2	1	8	16	2	1	1	8	V	V	V	LQFP64*	Q2
M251KG6AE	256	32	4	85	4	24	V	3	3+1	1	1	2	1	8	16	2	1	1	8	V	V	V	LQFP128	Q2

*Marked in the table (2+1) means 2 UART+ 1 ISO-7816-3 UART
* ISO-7816-3 UART supports full duplex mode

LQFP64*:7X7mm

Development Tools: NK-M251KG/NK-M251KE/NK-M251SD/NK-M251ZC
Mass Production Programmer: NLG-20F/NLG-28E/NLG-32Z (QFN33)/ NLG-48L (LQFP48)/ NLG-64S (LQFP64)/ NLG-128KX (LQFP128)

• M252 Series

Key Features: USB 2.0 FS Device Crystal-less and up to 8-ch PSIO that is capable of emulating various serial communication protocols. Ultra-low-power Consumption with 138 µA/MHz (Normal), 60 µA/MHz (Idle), 2.5 µA (Power Down, RTC on, RAM retention) and 1.5 µA (Power Down, RTC off, RAM retention)

Part Number	Flash (Kbytes)	SRAM (Kbytes)	ISP ROM (Kbytes)	I/O	Timer (32-bit)	PWM(16-bit)	WDT/WWDT	Connectivity								ADC(12-Bit)	ACMP	DAC	OPA	PDMA	Crypto	V_{DDIO} (1.8V-5.5V)	V_{Bat}	Package	Mass Production
								USCI	UART*	QSPI	SPI /I²S	I²C	ISO-7816-3*	USB*	PSIO										
M252FC2AE	32	8	4	11	4	7	V	1	2+1	1	-	2	1	1	-	3	-	-	-	5	-	-	-	TSSOP20	Q2
M252EC2AE	32	8	4	19	4	11	V	1	2+1	1	-	2	1	1	-	9	-	-	-	5	-	-	-	TSSOP28	Q2
M252ZC2AE	32	8	4	22	4	12	V	1	2+1	1	-	2	1	1	-	10	-	-	-	5	-	V	-	QFN33	Q2
M252LC2AE	32	8	4	37	4	24	V	2	3+1	1	1	2	1	1	4	12	2	-	-	5	-	V	-	LQFP48	Q2
M252SC2AE	32	8	4	50	4	24	V	2	3+1	1	1	2	1	1	4	16	2	-	-	5	-	V	-	LQFP64*	Q2
M252ZD2AE	64	12	4	22	4	20	V	2	3+1	1	1	2	1	1	4	10	2	-	-	5	-	V	-	QFN33	Q2
M252LD2AE	64	12	4	37	4	24	V	2	3+1	1	1	2	1	1	4	12	2	-	-	5	-	V	-	LQFP48	Q2
M252SD2AE	64	12	4	50	4	24	V	2	3+1	1	1	2	1	1	4	16	2	-	-	5	-	V	-	LQFP64*	Q2
M252LE3AE	128	16	4	37	4	24	V	3	3+1	1	1	2	1	1	8	12	2	-	-	8	-	V	-	LQFP48	Q2
M252SE3AE	128	16	4	49	4	24	V	3	3+1	1	1	2	1	1	8	16	2	-	-	8	-	V	V	LQFP64*	Q2
M252KE3AE	128	16	4	81	4	24	V	3	3+1	1	1	2	1	1	8	16	2	-	-	8	-	V	V	LQFP128	Q2
M252LG6AE	256	32	4	37	4	24	V	3	3+1	1	1	2	1	1	8	12	2	1	1	8	V	V	-	LQFP48	Q2
M252SG6AE	256	32	4	49	4	24	V	3	3+1	1	1	2	1	1	8	16	2	1	1	8	V	V	V	LQFP64*	Q2
M252KG6AE	256	32	4	81	4	24	V	3	3+1	1	1	2	1	1	8	16	2	1	1	8	V	V	V	LQFP128	Q2

* Marked in the table (2+1) means 2 UART+ 1 ISO-7816-3 UART
* ISO-7816-3 UART supports full duplex mode
* USB support FS Device mode crystal-less

LQFP64*:7X7mm

Development Tools: NK-M252KG/NK-M252KE/NK-M252SD/NK-M252ZC

Mass Production Programmer: NLG-20F/NLG-28E/NLG-32Z (QFN33)/ NLG-48L (LQFP48)/ NLG-64S (LQFP64)/ NLG-128KX (LQFP128)

NuMicro® Family ARM Cortex®-M4 MCUs

The NuMicro Family Cortex®-M4 based MCUs provide high performance system design with up to 90-240 DMIPS operating at up to 72-192 MHz. When executing from the embedded Flash memory, the power consumption can be lowered to 130 µA/MHz with dynamic power scaling function supported by the M480 series. EBI supports Intel 8080 panel. With emWin graphics library, designer can easily creates the outstanding graphical user interface.

The NuMicro Family Cortex®-M4 based MCUs are composed of the following product series.

M480 Series: 192 MHz CPU, up to 512 KB of dual bank Flash memory, up to 160 KB of SRAM memory, SPI Master interface with XIP (eXecute-In-Place), and 16-bit I80 QVGA LCD

M481 – 192 MHz PWM, dual SDHC, dual 5 MSPS ADC, and dual 1 MSPS DAC.
M482 – USB 2.0 Full Speed device/host/OTG with integrated OTG PHY and 1 KB data buffer, dual 5 MSPS ADC.
M483 – Dual/Triple CAN 2.0B, dual USB supporting High Speed (HS) OTG and Full Speed (FS) OTG.
M484 – USB 2.0 High Speed device/host/OTG with integrated OTG PHY and 4 KB data buffer, USB 2.0 Full Speed device/host/OTG with integrated OTG PHY and 1 KB data buffer.
M485 – Hardware cryptography engine including ECC-256, AES-256, and SHA-512, random number generator, and dual USB 2.0 device/host/OTG.
M487 – 10/100 Mbps Ethernet MAC with RMII/MDC/MDIO interface, hardware cryptography engine, dual CAN 2.0B, and dual USB 2.0 device/host/OTG.

M451 Series: 72 MHz CPU, up to 256 KB of Flash memory, up to 32 KB of SRAM memory, and Quad-SPI interface

M451 – 144 MHz PWM, 1 MSPS ADC, 1 MSPS DAC
M452 – USB 2.0 Full Speed device/host/OTG with integrated OTG PHY
M453 – USB 2.0 Full Speed device/host/OTG with integrated OTG PHY, CAN 2.0B

M451 Series

The high immunity NuMicro® M451 series embedded with Arm® Cortex®-M4F core supports DSP instruction and integrated floating-point unit (FPU).The dynamic power consumption can be down to 430 µA/MHz and the standby current can be down to 1.6 µA.

Operating Frequency: 72 MHz
Operating Voltage: 2.5V to 5.5V, all GPIOs support 5V tolerance
Operating Temperature: -40°C to 105°C

Potential Applications: Industrial Automation, Home Automation, Motor Control, Communication Systems, USB Accessory, etc.

M451 Series	USB FS	CAN
M451		
M452	V	
M453	V	V

Key Features: Configurable data flash, Voltage Adjustable Interface, 16+16 bytes UART FIFO for TX/RX, 1 MSPS ADC, USB full speed device/host/OTG with on-chip PHY, Intel 8080 on EBI, ICP/ISP

Part No.	Flash (Kbytes)	SRAM (Kbytes)	ISP ROM (Kbytes)	PDMA	I/O	Timer(32-bit)	PWM[1](16-bit)	Connectivity					Quad SPI	EBI(i80)	USB FS	ADC(12-bit)	DAC(12-bit)	Analog Comp.	VAI	RTC	Package	Mass Production
								UART[2]	ISO-7816-3[3]	SPI/I²S	I²C	CAN										
M451LC3AE	40	16	4	8	39	4	12	4	1	1	2	-	1	√	-	10	1	2	√	√ (V_{BAT})	LQFP48	√
M451MLC3AE	40	16	4	8	42	4	12	4	1	1	2	-	1	√	-	11	1	2	-	-	LQFP48	√
M451RC3AE	40	16	4	8	53	4	12	4	1	1	2	-	1	√	-	16	1	2	√	√ (V_{BAT})	LQFP64	√
M451MSC3AE	40	16	4	8	55	4	12	4	1	1	2	-	1	√	-	13	1	2	-	-	LQFP64[5]	√
M451LD3AE	72	16	4	8	39	4	12	4	1	1	2	-	1	√	-	10	1	2	√	√ (V_{BAT})	LQFP48	√
M451MLD3AE	72	16	4	8	42	4	12	4	1	1	2	-	1	√	-	11	1	2	-	-	LQFP48	√
M451RD3AE	72	16	4	8	53	4	12	4	1	1	2	-	1	√	-	16	1	2	√	√ (V_{BAT})	LQFP64	√
M451MSD3AE	72	16	4	8	55	4	12	4	1	1	2	-	1	√	-	13	1	2	-	-	LQFP64[5]	√
M451LE6AE	128	32	4	12	39	4	12	3	1	2	2	-	1	√	-	8	1	2	√	√ (V_{BAT})	LQFP48	√
M451MLE6AE	128	32	4	12	42	4	12	4	1	2	2	-	1	√	-	9	1	2	-	-	LQFP48	√
M451RE6AE	128	32	4	12	53	4	12	4	1	2	2	-	1	√	-	12	1	2	√	√ (V_{BAT})	LQFP64	√
M451VE6AE	128	32	4	12	85	4	12	4	1	2	2	-	1	√	-	16	1	2	√	√ (V_{BAT})	LQFP100	√
M451LG6AE	256	32	4	12	39	4	12	3	1	2	2	-	1	√	-	8	1	2	√	√ (V_{BAT})	LQFP48	√
M451MLG6AE	256	32	4	12	42	4	12	3	1	2	2	-	1	√	-	9	1	2	-	-	LQFP48	√
M451RG6AE	256	32	4	12	53	4	12	4	1	2	2	-	1	√	-	12	1	2	√	√ (V_{BAT})	LQFP64	√
M451VG6AE	256	32	4	12	85	4	12	4	1	2	2	-	1	√	-	16	1	2	√	√ (V_{BAT})	LQFP100	√
M452LC3AE	40	16	4	8	35	4	10	4	1	1	2	-	1	√	Device	10	1	2	√	√ (V_{BAT})	LQFP48	√
M452LD3AE	72	16	4	8	35	4	10	4	1	1	2	-	1	√	Device	10	1	2	√	√ (V_{BAT})	LQFP48	√
M452RD3AE	72	16	4	8	49	4	12	4	1	1	2	-	1	√	Device	16	1	2	√	√ (V_{BAT})	LQFP64	√
M452LE6AE	128	32	4	12	34	4	10	3	1	1	2	-	1	√	OTG	8	1	2	√	√ (V_{BAT})	LQFP48	√
M4521LE6AE	128	32	4	8	35	4	10	3*	1	1	2	-	1	√	Host/Device[4]	10	-	-	√	√ (V_{BAT})	LQFP48	√
M4521SE6AE	128	32	4	8	49	4	12	4*	1	1	2	-	1	√	Host/Device[4]	16	-	-	√	√ (V_{BAT})	LQFP64[5]	√
M452RE6AE	128	32	4	12	48	4	12	4	1	2	2	-	1	√	OTG	12	1	2	√	√ (V_{BAT})	LQFP64	√
M452VE6AE	128	32	4	12	80	4	12	4	1	2	2	-	1	√	OTG	16	1	2	√	√ (V_{BAT})	LQFP100	√
M452LG6AE	256	32	4	12	34	4	10	3	1	1	2	-	1	√	OTG	8	1	2	√	√ (V_{BAT})	LQFP48	√
M452RG6AE	256	32	4	12	48	4	12	4	1	2	2	-	1	√	OTG	12	1	2	√	√ (V_{BAT})	LQFP64	√
M452VG6AE	256	32	4	12	80	4	12	4	1	2	2	-	1	√	OTG	16	1	2	√	√ (V_{BAT})	LQFP100	√
M453LC3AE	40	16	4	8	35	4	10	4	1	1	2	1	1	√	Device	10	1	2	√	√ (V_{BAT})	LQFP48	√
M453LD3AE	72	16	4	8	35	4	10	4	1	1	2	1	1	√	Device	10	1	2	√	√ (V_{BAT})	LQFP48	√
M453RD3AE	72	16	4	8	49	4	12	4	1	1	2	1	1	√	Device	16	1	2	√	√ (V_{BAT})	LQFP64	√
M453VD3AE	72	16	4	8	72	4	12	4	1	1	2	1	1	√	Device	16	1	2	√	√ (V_{BAT})	LQFP100	√
M453LE6AE	128	32	4	12	34	4	10	3	1	2	2	1	1	√	OTG	8	1	2	√	√ (V_{BAT})	LQFP48	√
M453RE6AE	128	32	4	12	48	4	12	4	1	2	2	1	1	√	OTG	12	1	2	√	√ (V_{BAT})	LQFP64	√
M453VE6AE	128	32	4	12	80	4	12	4	1	2	2	1	1	√	OTG	16	1	2	√	√ (V_{BAT})	LQFP100	√
M453LG6AE	256	32	4	12	34	4	10	3	1	2	2	1	1	√	OTG	8	1	2	√	√ (V_{BAT})	LQFP48	√
M453RG6AE	256	32	4	12	48	4	12	4	1	2	2	1	1	√	OTG	12	1	2	√	√ (V_{BAT})	LQFP64	√
M453VG6AE	256	32	4	12	80	4	12	4	1	2	2	1	1	√	OTG	16	1	2	√	√ (V_{BAT})	LQFP100	√

1. 12-ch PWM from 6x 16-bit timers. (144 MHz)
2. All UARTs support IrDA SIR. UART0/1 support LIN function. *M4521xE6AE doesn't support LIN function.
3. ISO-7816 supports full duplex UART mode with 4+4 bytes FIFO for TX/RX.
4. USB supports crystal-less feature in full speed device mode.
5. LQFP64, 7 mm x 7 mm

Development Tools: NT-M451V (M451, M452, M453, M451M), NT-M4521S (M4521)
Mass Production Programmer: NG-M451n (M451n)/ NG-M451Mn (M451Mn); n should be replaced by Package Code/ NG-M453L (M452L, M453L, M4TKL)/ NG-M453R (M452R, M453R, M4TKR)/ NG-M453V (M453V, M4TKV)

M480 Series

The high performance, low power consumption, secure boot and hardware cryptography NuMicro® M480 series embedded with Arm® Cortex®-M4F core supports DSP instruction and integrated floating-point unit (FPU).The dynamic power consumption can be down to 175 or 130 μA/MHz and the standby current can be down to 1 μA. M480 series supports Secure Boot functionality, which provides a constant digital signature of system software for identification during boot up, to protect the integrity of Flash content from attack.

Operating Frequency: 192 MHz
Operating Voltage: 1.8V to 3.6V, all GPIOs support 5V tolerance
Operating Temperature: -40°C to 105°C

Potential Applications: Industrial Automation, Home Automation, Motor Control, Sensor Hub, IoT/IIoT Gateway, Security System, Ethernet Converter, Gaming Accessory, etc.

M480 Series	USB FS	USB HS	CAN	Crypto	Ethernet
M481					
M482	V				
M483	V	V	V		
M484	V	V			
M485	V	V		V	
M487	V	V	V	V	V

Key Features: Configurable data flash, Voltage Adjustable Interface, 16+16 bytes UART FIFO for TX/RX, Dual 5 MSPS ADC, USB high speed device/host/OTG with on-chip PHY, Hardware ECC (Elliptic Curve Cryptography), 10/100 Mbps Ethernet, Intel 8080 on EBI, ICP/ISP/IAP

Part No.	Flash(Kbytes)	SRAM(Kbytes)	ISP ROM(Kbytes)	SPROM(Kbytes)	XOM	PDMA	I/O	Timer(32-bit)	PWM[1](16-bit)	Connectivity								Quad SPI	SPI Master[5]	EBI(i80)	USB OTG	Ethernet MAC	ADC(12-bit)	DAC(12-bit)	Analog Comp.	OP Amp.	QEI	eCAP	Camera	Crypto Engine	TRNG	VAI	RTC	Package	Mass Production
										LPUART[2]	ISO-7816-3[3]	SPI/I²S	I²S	I²C	USCI[4]	CAN	SD Host																		
M481ZG8AE	256	64	4	-	√	16	26	4	24	8	1	2	1	3	-	-	1	2	-	-	-	-	10	1	2	-	2	-	√	AES	√	√	√ (V_{BAT})	QFN33	Q3
M481LG8AE	256	64	4	-	√	16	41	4	24	8	1	2	1	3	-	-	1	2	-	√	-	-	12	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP48	Q3
M481SG8AE	256	64	4	-	√	16	52	4	24	8	1	3	1	3	-	-	1	2	-	√	-	-	16	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP64	Q3
M481ZGAAE	256	96	4	4	-	16	26	4	24	6	3	3	1	3	2	-	1	1	1	-	-	-	10	2	2	1	1	-	-	-	-	√	√	QFN33	√
M481LGAAE	256	96	4	4	-	16	41	4	24	6	3	3	1	3	2	-	2	1	1	√	-	-	12	2	2	2	2	1	-	-	-	√	√	LQFP48	√
M481SGAAE	256	96	4	4	-	16	52	4	24	6	3	4	1	3	2	-	2	1	1	√	-	-	16	2	2	2	2	1	-	-	-	√	√	LQFP64	√
M481ZGCAE	256	128	4	-	√	16	26	4	24	8	1	2	1	3	-	-	1	2	-	-	-	-	10	1	2	-	2	-	√	AES	√	√	√ (V_{BAT})	QFN33	Q3
M481LGCAE	256	128	4	-	√	16	41	4	24	8	1	2	1	3	-	-	1	2	-	√	-	-	12	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP48	Q3
M481SGCAE	256	128	4	-	√	16	52	4	24	8	1	3	1	3	-	-	1	2	-	√	-	-	16	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP64	Q3
M481ZIDAE	512	160	4	4	-	16	26	4	24	6	3	3	1	3	2	-	1	1	1	-	-	-	10	2	2	1	1	-		-	-	√	√	QFN33	√
M481LIDAE	512	160	4	4	-	16	41	4	24	6	3	3	1	3	2	-	2	1	1	√	-	-	12	2	2	2	2	1		-	-	√	√	LQFP48	√
M481SIDAE	512	160	4	4	-	16	52	4	24	6	3	4	1	3	2	-	2	1	1	√	-	-	16	2	2	2	2	1		-	-	√	√	LQFP64	√
M482ZG8AE	256	64	4	-	√	16	26	4	24	8	1	2	1	3	-	-	1	2	-	√	FS[6]	-	10	1	2	-	2	-	√	AES	√	√	√ (V_{BAT})	QFN33	Q3
M482LG8AE	256	64	4	-	√	16	41	4	24	8	1	2	1	3	-	-	1	2	-	√	FS[6]	-	12	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP48	Q3
M482SG8AE	256	64	4	-	√	16	52	4	24	8	1	3	1	3	-	-	1	2	-	√	FS[6]	-	16	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP64	Q3
M482LGAAE	256	96	4	4	-	16	41	4	24	6	3	3	1	3	2	-	2	1	1	√	FS	-	12	2	2	2	2	1	-	-	-	√	√	LQFP48	√
M482SGAAE	256	96	4	4	-	16	52	4	24	6	3	4	1	3	2	-	2	1	1	√	FS	-	16	2	2	2	2	1	-	-	-	√	√	LQFP64	√
M482KGAAE	256	96	4	4	-	16	100	4	24	6	3	4	1	3	2	-	2	1	1	√	FS	-	16	2	2	3	2	2	-	-	-	√	√	LQFP128	√
M482ZGCAE	256	128	4	-	√	16	26	4	24	8	1	2	1	3	-	-	1	2	-	√	FS[6]	-	10	1	2	-	2	-	√	AES	√	√	√ (V_{BAT})	QFN33	Q3
M482LGCAE	256	128	4	-	√	16	41	4	24	8	1	2	1	3	-	-	1	2	-	√	FS[6]	-	12	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP48	Q3
M482SGCAE	256	128	4	-	√	16	52	4	24	8	1	3	1	3	-	-	1	2	-	√	FS[6]	-	16	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP64	Q3
M482KGCAE	256	128	4	-	√	16	100	4	24	8	1	3	1	3	-	-	1	2	-	√	FS[6]	-	16	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP128	Q3
M482ZIDAE	512	160	4	4	-	16	26	4	24	6	3	3	1	3	2	-	1	1	1	-	FS	-	10	2	2	1	1	-		-	-	√	√	QFN33	√
M482LIDAE	512	160	4	4	-	16	41	4	24	6	3	3	1	3	2	-	2	1	1	√	FS	-	12	2	2	2	2	1		-	-	√	√	LQFP48	√
M482SIDAE	512	160	4	4	-	16	52	4	24	6	3	4	1	3	2	-	2	1	1	√	FS	-	16	2	2	2	2	1		-	-	√	√	LQFP64	√
M482KIDAE	512	160	4	4	-	16	100	4	24	6	3	4	1	3	2	-	2	1	1	√	FS	-	16	2	2	3	2	2		-	-	√	√	LQFP128	√
M483SG8AE	256	64	4	-	√	16	52	4	24	8	1	3	1	3	-	2	1	2	-	√	FS[6]	-	16	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP64	Q3
M483SGAAE	256	96	4	4	-	16	44	4	24	6	3	4	1	3	2	2	2	1	1	√	HS	-	16	2	2	2	2	1	-	-	-	√	√	LQFP64	√
M483SGCAE	256	128	4	-	√	16	52	4	24	8	1	3	1	3	-	2	1	2	-	√	FS[6]	-	16	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP64	Q3
M483KGCAE	256	128	4	-	√	16	100	4	24	8	1	3	1	3	-	3	1	2	-	√	FS[6]	-	16	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP128	Q3
M483SIDAE	512	160	4	4	-	16	44	4	24	6	3	4	1	3	2	2	2	1	1	√	HS	-	16	2	2	2	2	1		-	-	√	√	LQFP64	√
M483KIDAE	512	160	4	4	-	16	100	4	24	6	3	4	1	3	2	2	2	1	1	√	HS+FS	-	16	2	2	3	2	2	-	-	-	√	√	LQFP128	√
M484SGAAE	256	96	4	4	-	16	44	4	24	6	3	4	1	3	2	-	2	1	1	√	HS	-	16	2	2	2	2	1	-	-	-	√	√	LQFP64	√
M484SIDAE	512	160	4	4	-	16	44	4	24	6	3	4	1	3	2	-	2	1	1	√	HS	-	16	2	2	2	2	1	-	-	-	√	√	LQFP64	√
M484KIDAE	512	160	4	4	-	16	100	4	24	6	3	4	1	3	2	-	2	1	1	√	HS+FS	-	16	2	2	3	2	2	-	-	-	√	√	LQFP128	√
M485ZIDAE	512	160	4	4	-	16	26	4	24	6	3	3	1	3	2	-	1	1	1	-	FS	-	10	2	2	1	1	-	-	√	-	√	√	QFN33	√
M485LIDAE	512	160	4	4	-	16	41	4	24	6	3	3	1	3	2	-	2	1	1	√	FS	-	12	2	2	2	2	1	-	√	-	√	√	LQFP48	√
M485SIDAE	512	160	4	4	-	16	44	4	24	6	3	4	1	3	2	-	2	1	1	√	HS	-	16	2	2	2	2	1	-	√	-	√	√	LQFP64	√
M485KIDAE	512	160	4	4	-	16	100	4	24	6	3	4	1	3	2	-	2	1	1	√	HS+FS	-	16	2	2	3	2	2	-	√	-	√	√	LQFP128	√
M487SGAAE	256	96	4	4	-	16	44	4	24	6	3	4	1	3	2	2	2	1	1	√	HS	√	16	2	2	2	2	1	-	√	-	√	√	LQFP64	√
M487SIDAE	512	160	4	4	-	16	44	4	24	6	3	4	1	3	2	2	2	1	1	√	HS	√	16	2	2	2	2	1	-	√	-	√	√	LQFP64	√
M487KIDAE	512	160	4	4	-	16	100	4	24	6	3	4	1	3	2	2	2	1	1	√	HS+FS	√	16	2	2	3	2	2	-	√	-	√	√	LQFP128	√
M487JIDAE	512	160	4	4	-	16	114	4	24	6	3	4	1	3	2	2	2	1	1	√	HS+FS	√	16	2	2	3	2	2	-	√	-	√	√	LQFP144	√
M483SG8AE2A	256	64	4	-	√	16	52	4	24	8	1	3	1	3	-	2	1	2	-	√	FS[6]	-	8+8	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP64	Q3
M483KGCAE2A	256	128	4	-	√	16	100	4	24	8	1	3	1	3	-	3	1	2	-	√	FS[6]	-	16+8	1	2	-	2	2	√	AES	√	√	√ (V_{BAT})	LQFP128	Q3
M484SGAAE2U	256	96	4	4	-	16	44	4	24	6	3	4	1	3	2	-	2	1	1	√	HS+FS	-	16	2	2	2	2	1	-	-	-	√	√	LQFP64	√
M484SIDAE2U	512	160	4	4	-	16	44	4	24	6	3	4	1	3	2	-	2	1	1	√	HS+FS	-	16	2	2	2	2	1	-	-	-	√	√	LQFP64	√

1. 12-ch Enhanced PWM from 6x 16-bit timers + 12-ch Basic PWM from 2x 16-bit timers. (192 MHz)
2. All UARTs support IrDA SIR. UART0/1 support LIN function.
3. ISO-7816 supports full duplex UART mode.
4. USCI supports configurable UART, SPI and I²C mode. UART mode supports 1+2 bytes FIFO for TX/RX.
5. SPI Master is designed for accessing SPI Flash and supports XIP(eXecute-In-Place) with 32 KB cache.
6. USB supports crystal-less feature in full speed device mode.

Development Tools: NK-BEDM487, NK-BEDM487D, NK-BEDM487E

Mass Production Programmer: NLG-32Z (QFN33)/ NLG-48L (LQFP48)/ NLG-64S (LQFP64)/ NLG-128KX (LQFP128)/ NLG-144J (LQFP144)

NUC505 Series

The NuMicro® NUC505 series embedded with Arm® Cortex®-M4F core supports DSP instructions and integrated floating-point unit (FPU). The dynamic power consumption can be down to 479 µA/MHz and the standby current can be down to 7 µA. NUC505 series supports internal Audio PLL and internal stereo 24-bit Sigma-Delta audio CODEC with Mic/Line input and headphone output.

Operating Frequency: 100 MHz
Operating Voltage: 3.3V, all GPIOs support 5V tolerance
Operating temperature: -40°C to 85°C

Potential Applications: Thermal Printer, GPS Tracker, Wireless Microphone, Alarm Speaker, etc.

Key Features: 128-bit Key for Code Protection, 64+64 bytes UART FIFO for TX/RX, Dual USB, Audio PLL, 24-bit audio CODEC

Part No.	Serial Flash (Kbytes)	SRAM (Kbytes)	I/O	Timer(32-bit)	PWM[1](16-bit)	Connectivity							Quad SPI	SPI Master[3]	USB Host	USB Device	ADC(12-bit)	DAC(12-bit)	Digital Mic	Auio CODEC (24-bit)	RTC	Package	Mass Production
						UART[2]	ISO-7816-3	SPI	I²S	I²C	CAN	SD Host											
NUC505DLA	512	128	18	4	-	2	-	1	1	2	-	-	-	1	-	HS	5-ch	-	√	√	-	LQFP48	√
NUC505YLA	512	128	18	4	-	2	-	1	1	2	-	-	-	1	-	HS	5-ch	-	√	√	-	QFN48	√
NUC505YLA2Y	512	128	25	4	4	3	-	2	1	3	-	√	-	1	FS	HS	5-ch	-	√	-	√ (V_{BAT})[5]	QFN48	√
NUC505DSA	512	128	34	4	4	3	-	2	1	2	-	√	-	1	FS	HS	5-ch	-	√	√	-	LQFP64	√
NUC505DL13Y	2048	128	25	4	4	3	-	2	1	2	-	√	-	1	FS	HS	5-ch	-	√	-	√ (V_{BAT})[5]	LQFP48	√
NUC505DS13Y	2048	128	35	4	4	3	-	2	1	2	-	√	-	1	FS	HS	8-ch	-	√	√[4]	√ (V_{BAT})[5]	LQFP64	√
NUC505YO13Y	2048	128	52	4	4	3	-	2	1	2	-	√	-	1	FS	HS	8-ch	-	√	√	√ (V_{BAT})	QFN88	√

1. 4-ch PWM from single 2x 16-bit timers.
2. All UARTs support IrDA SIR. UART0 only supports 16+16 bytes FIFO for TX/RX. UART1/2 support LIN function.
3. SPI Master is designed for accessing SPI Flash and supports XIP(eXecute-In-Place).
4. Only headphone output is supported
5. Not support 32 kHz crystal pin out.

Development Tools: NT-NUC505Y

Mass Production Programmer: NG-NUC505LA (NUC505DLA)/ NG-NUC505L (NUC505DL13Y)/ NG-NUC505NA (NUC505YLA)/ NG-NUC505N (NUC505YLA2Y)/ NG-NUC505SA (NUC505DSA)/ NG-NUC505S (NUC505DS13Y)/ NG-NUC505O (NUC505YO13Y)

NuMicro® Family Arm9 MPUs

NUC970/980 Series

Nuvoton's ARM9 Industrial network series offers LQFP packages stacked with 16 MB~128 MB DDR memory to reduce PCB size and EMI issues. Rich peripherals include 11 sets of UART, dual Ethernet, SDIO/eMMC interface, NAND Flash interface, LCD controller, CAN 2.0B interface and High-Speed USB 2.0 host/device controller to allow more flexibility in designs. The Arm9 Industrial network series also integrates the crypto engine which provides hardware acceleration for AES, ECC, RSA and SHA function.

Operaing Frequency: 300 MHz (ARM926EJ-S)
Operating Voltage: 3.0V to 3.6V, GPIOs support 5V tolerance
Operating temperature: -40°C to 85°C

Boot Source: SPI NOR, SPI NAND, NAND, SD, eMMC
Potential Applications: Industrial Control, HMI, Industrial IoT Gateway, Network Printer, Meter Concentrator and Smart Home Gateway applications.

Series	EBI	LCD	Crypto	Linux
NUC980DF	√	-	AES/ECC/RSA/SHA	√
NUC980DK	√	-	AES/ECC/RSA/SHA	√
NUC980DR	-	-	AES/ECC/RSA/SHA	√
NUC972DF	√	√	AES/ECC/SHA/DES/3DES	√
NUC975DK	-	-	AES/ECC/SHA/DES/3DES	√
NUC976DK	-	√	AES/ECC/SHA/DES/3DES	√
NUC977DK	-	√	AES/ECC/SHA/DES/3DES	√
NUC978DK	-	√	AES/ECC/SHA/DES/3DES	√

Key Features: MCP industrial DDR in LQFP package, Dual USB High Speed Host, Dual 10/100M Ethernet MAC.

Part No.	Stack DDR Size(MB)	Crypto	Q SPI Flash Boot	SPI NAND Boot	NAND Flash Boot	SD Memory Boot	eMMC I/F	SD / SDIO	Ethernet	USB 2.0 HS Host	USB 2.0 HS Device	USB 2.0 FS Host Lite	JPEG Codec	2D Graphics	Parallel RGB LCD Color(bit)	Touch Screen Controller	Real-Time Clock(RTC)	Timer(32-bit)	WatchdogTimer	Window Watchdog Timer	ADC(12bit)	EBI	PWM	CMOS Interface	UART	CAN BUS	I²C	SPI	ISO7816-3	I²S	GPIO(Max)	Package	Mass Production
NUC972DF71YC	128	√	√	-	√	-	√	2	2	2	1	-	√	√	24	√	√	5	√	√	8	√	4	1	11	2	2	2	2	1	146	LQFP216	√
NUC972DF61YC	64	√	√	-	√	-	√	2	2	2	1	-	√	√	24	√	√	5	√	√	8	√	4	1	11	2	2	2	2	1	146	LQFP216	√
NUC972DF61Y	64	√	√	-	√	-	√	2	2	2	1	-	√	√	24	√	√	5	√	√	8	√	4	1	11	-	2	2	2	1	146	LQFP216	√
NUC975DK61Y	64	√	√	-	√	-	√	2	1	2	1	-	√	-	-	-	-	5	√	√	4	-	2	1	10	-	2	2	2	1	87	LQFP128	√
NUC975DK41Y	16	√	√	-	√	-	√	2	1	2	1	-	√	-	-	-	-	5	√	√	4	-	2	1	10	-	2	2	2	1	87	LQFP128	√
NUC976DK61YC	64	√	√	-	-	-	√	2	1	2	1	-	√	√	16	√	√	5	√	√	4	-	4	1	6	1	2	2	2	1	80	LQFP128	√
NUC976DK61Y	64	√	√	-	-	-	√	2	1	2	1	-	√	√	16	√	√	5	√	√	4	-	4	1	6	-	2	2	2	1	80	LQFP128	√
NUC976DK41Y	16	√	√	-	-	-	√	2	1	2	1	-	√	√	16	√	√	5	√	√	4	-	4	1	6	1	2	2	2	1	80	LQFP128	√
NUC977DK61YC	64	√	√	-	√	-	√	2	1	2	1	-	√	√	16	-	√	5	√	√	-	-	4	1	8	1	2	2	2	1	87	LQFP128	√
NUC977DK61Y	64	√	√	-	√	-	√	2	1	2	1	-	√	√	16	-	√	5	√	√	-	-	4	1	8	-	2	2	2	1	87	LQFP128	√
NUC977DK41Y	16	√	√	-	√	-	√	2	1	2	1	-	√	√	16	-	√	5	√	√	-	-	4	1	8	-	2	2	2	1	87	LQFP128	√
NUC978DK61Y	64	√	√	-	√	-	√	2	1	2	1	-	√	√	16	√	√	5	√	√	5	-	4	1	9	-	2	2	2	1	86	LQFP128	√
NUC978DK41Y	16	√	√	-	√	-	√	2	1	2	1	-	√	√	16	√	√	5	√	√	5	-	4	1	9	-	2	2	2	1	86	LQFP128	√
NUC980DF71YC	128	√	√	√	√	√	√	2	2	2	1	6		-	-	-	√	6	√	√	8	√	8	2	10	4	4	3	2	1	104	LQFP216	√
NUC980DF61YC	64	√	√	√	√	√	√	2	2	2	1	6		-	-	-	√	6	√	√	8	√	8	2	10	4	4	3	2	1	104	LQFP216	√
NUC980DK61YC	64	√	√	√	√	√	√	2	2	2	1	6		-	-	-	√	6	√	√	8	√	8	2	10	4	4	3	2	1	92	LQFP128	√
NUC980DK61Y	64	√	√	√	√	√	√	2	2	2	1	-		-	-	-	√	6	√	√	8	√	8	2	10	-	4	3	2	1	92	LQFP128	√
NUC980DK41Y	16	√	√	√	√	√	√	2	2	2	1	-		-	-	-	√	6	√	√	8	√	8	2	10	-	4	3	2	1	92	LQFP128	√
NUC980DR61Y	64	√	-	-	√	√	√	2	1	1	1	-		-	-	-	-	6	√	√	2	-	5	2	8	-	2	2	2	1	40	LQFP64-EP	√
NUC980DR41Y	16	√	-	-	√	√	√	2	1	1	1	-		-	-	-	-	6	√	√	2	-	5	2	8	-	2	2	2	1	40	LQFP64-EP	√

Development Tools: ND-NUC972 (NUC972/ NUC976/ NUC977), NK-NUC980 (NUC980DF/ NUC980DK/ NUC980DR)

N9H Series

The HMI emWin N9H Series is embedded with the ARM926EJ-S core. CPUs operating at up to 200 MHz, 264 MHz and 300 MHz respectively. It uses Multi Chip Package (MCP) with SDRAM stacked, size ranging from 2 MB to 128 MB, which significantly reduces PCB size and electromagnetic interference (EMI) to minimize system design efforts and shorten the product design cycle time.

The N9H series BSP (Board Support Package) comes with licensed industrial leading emWin embedded GUI library, which contains emWin library, samples, tools and documents. Nuvoton licensed it from SEGGER to allow developers to create smooth, professional, high quality.

Operaing Frequency: 200/264/300 MHz (ARM926EJ-S)
Operating Voltage: 3.0V to 3.6V, GPIOs support 5V tolerance
Operating temperature: -40°C to 85°C / -20°C to 85°C

Boot Source: SPI NOR, NAND, SD, eMMC
Potential Applications: HMI (Human Machine Interface) of home automation and industrial

Series	Operating Frequency	LCD	Video Codec	Audio DAC	Ethernet/CAN	Operating Temp	Linux
N9H20	200	16 / 24bit	JPEG	√	-	-20°C to 85°C	√
N9H26	264	24bit	JPEG /H.264	√	-	-20°C to 85°C	√
N9H30	300	16 / 24bit	JPEG	-	√	-40°C to 85°C	√

Key Features: MCP Memory up to 128MB, LCD up to 1024x768 24-bit, Supports SEGGER emWin library

Part No.	Stack DDR Size(MB)	SPI NOR Boot	NAND Flash Boot	SD Card Boot	eMMC I/F	SD / SDIO	Ethernet	USB 2.0 HS Host	USB 2.0 HS Device	USB 2.0 FS Host	2D Graphics	Parallel RGB LCD Color(bit)	Touch Screen Controller	Real-Time Clock(RTC)	Timer(32-bit)	Watchdog Timer	Window Watchdog Timer	ADC	PWM	EBI	UART	CAN BUS	I²C	SPI	I²S	GPIO(Max)	Package	Mass Production
N9H20R11N	2	√	-	√	√	1	-	-	1	1	√	16	-	-	2	√	-	-	4	-	2	-	1	1	-	44	TQFP64-EP	√
N9H20K11N	2	√	√	√	√	3	-	-	1	1	√	24	√	√	2	√	-	10bit x 3CH	4	-	2	-	1	2	1	70	LQFP128	√
N9H20K31N	8	√	√	√	√	3	-	-	1	1	√	24	√	√	2	√	-	10bit x 3CH	4	-	2	-	1	2	1	70	LQFP128	√
N9H20K51N	32	√	√	√	√	3	-	-	1	1	√	24	√	√	2	√	-	10bit x 3CH	4	-	2	-	1	2	1	70	LQFP128	√
N9H26K51N	32	√	√	√	√	3	-	1	1	-	√	24	√	√	4	√	-	10bit x 7CH	4	-	2	-	1	2	1	80	LQFP128	√
N9H30K41I	16	√	√	-	√	2	-	2	1	-	√	16	√	√	5	√	√	12bit x 5CH	4	-	2	-	2	2	1	86	LQFP128	√
N9H30F61IEC	64	√	√	-	√	2	2	2	1	-	√	24	√	√	5	√	√	12bit x 8CH	4	√	11	2	2	2	1	146	LQFP216	√
N9H30F71IEC	128	√	√	-	√	2	2	2	1	-	√	24	√	√	5	√	√	12bit x 8CH	4	√	11	2	2	2	1	146	LQFP216	√

Development Tools: NK-N9H20(N9H20), **NK-N9H26(N9H26)**, **NK-N9H30(N9H30)**

N329 Series

Designed for cost-effective solutions targeting at consumer electronics, the ARM-based SoC are embedded with various H/W accelerators and a number of useful peripherals. All parts even come up with a unique MCP (Multi-Chip Package) in the LQFP footprint, which is ideal in terms of several key design factors: high performance, small dimension, much less EMI, stable production yield, and lower BOM cost.

Operaing Frequency: 200/240 MHz (ARM926EJ-S)
Operating Voltage: 3.0V to 3.6V
Operating temperature: -20°C to 85°C

Boot Source: SPI NOR, NAND, SD, eMMC

Series	Operation Frequency	Video Codec	Linux
N3290xR	200	JPEG	√
N32901R7	200	JPEG	-
N3290xU	200	JPEG	√
N3290xK	200	JPEG	√
N3292xU	240	JPEG /H.264	√

Key Features: H.264 / MJPEG Codec, LQFP MCP Memory up tp 64MB , LCD Display, Bulid in Audio Codec

Part No.	Stacked DDR Size(MB)	SPI NOR Boot	NAND Flash Boot	SD / SDIO	USB FS Host(12 Mbps)	USB HS Host	USB Device(FS / HS)	Video Codec	2D Graphics	Parallel RGB LCD Color(bit)	Max. Resolution[3]	SAR ADC	ADC for MIC Input	Touch Panel(Wire)	Stereo DAC(bits)	JTAG	Ethernet MAC	CMOS Sensor	UART	I²C	SPI	RTC	PWM	I²S	GPIO(Max)	Package	Mass Production
N32901R1DN	2	√	-	2	1	-	HS	MJPEG	-	-	-	1	√	-	16	-	-	1	2	-	1	-	2	√	34	LQFP64	√
N32903R5DN	8	√	-	2	1	-	HS	MJPEG	-	-	-	1	√	-	16	-	-	1	2	-	1	-	2	√	34	TQFP64-EP	√
N32905R3DN	32	√	-	2	1	-	HS	MJPEG	-	-	-	1	√	-	16	-	-	1	2	-	1	-	2	√	34	TQFP64-EP	√
N32901R7DN	2	√	-	1	1	-	HS	MJPEG	√	16	QVGA	-	-	-	-	√	-	-	2	1	1	-	4	-	44	TQFP64-EP	√
N32901U1DN	2	√	√	3	1	-	HS	MJPEG	√	18	QVGA	2	√	4	16	√	-	1	2	1	1	√	4	√	64	LQFP128	√
N32903U5DN	8	√	√	3	1	-	HS	MJPEG	√	18	VGA	2	√	4	16	√	-	1	2	1	1	√	4	√	64	LQFP128	√
N32905U3DN	32	√	√	3	1	-	HS	MJPEG	√	18	VGA	2	√	4	16	√	-	1	2	1	1	√	4	√	64	LQFP128	√
N32901K3DN	2	√	√	3	1	-	HS	MJPEG	√	24	VGA	3	-	4	16	√	-	1	2	1	2	√	4	√	70	LQFP128	√
N32903K5DN	8	√	√	3	1	-	HS	MJPEG	√	24	VGA	3	-	4	16	√	-	1	2	1	2	√	4	√	70	LQFP128	√
N32905K5DN	32	√	√	3	1	-	HS	MJPEG	√	24	VGA	3	-	4	16	√	-	1	2	1	2	√	4	√	70	LQFP128	√
N32926U4DN	64	√	√	3	1	1	HS	MJPEG/H.264	√	24	XGA	7	√	4/5	16	√	1	2	2	1	1	√	4	√	80	LQFP128	√

Development Tools: ND-N32905 (N32901, N32903, N32905)/ ND-N32926 (N32926)

NuMicro® Family 8051 MCUs

As a leading supplier of 8051 microcontrollers (MCUs), Nuvoton offers a variety of products with the best-in-class price/performance critical to the success of consumers and industrial products. The 8-bit MCU comes equipped with rich peripherals to meet various system requirements and is supported by the tool chain from world leading tool makers for rapid product development.

Key Features: N76E N79E series offer high-value features by integrating high resolution of ADC, power management circuit such as LDO, POR and BOD.

N76E Series (1T)

Operaing Frequency: 16 MHz
Operating Voltage:2.4V to 5.5V
Operating temperature: -40°C to 105°C

Potential Applications: Industrial Control, Thermostat, HMI, LED Control, Consumer, etc.

Part No.		SRAM (bytes)	Data Flash (bytes)	ISP ROM	I/O	Timer (16-bit)	Connectivity			PWM	ADC	Package	Mass Production
							UART	SPI	I²C				
N76E003AT20	18	256+768	Configurable	√	up to 18	4	2	1	1	6*16-bit	8*12-bit	TSSOP20	√
N76E003AQ20	18	256+768	Configurable	√	up to 18	4	2	1	1	6*16-bit	8*12-bit	QFN20*	√
N76E003BQ20	18	256+768	Configurable	√	up to 18	4	2	1	1	6*16-bit	8*12-bit	QFN20**	√

*QFN20: 0.4mm Pitch width
**QFN20: 0.5mm Pitch width

Development Tools: NT-N76E003, Nu-Link

Operating Frequency: 25 MHz
Operating Voltage: 2.4V to 5.5V
Operating temperature: -40°C to 105°C

Part No.	Flash (Kbytes)	SRAM (bytes)	Data Flash (bytes)	ISP ROM	I/O	Timer (16-bit)	Connectivity			PWM	ADC	Package	Mass Production
							UART	SPI	I²C				
N76E885AT20	18	512	Configurable	√	up to 26	4	2	1	1	8*12-bit	10*10-bit	TSSOP20	√
N76E885AT28	18	512	Configurable	√	up to 26	4	2	1	1	8*12-bit	10*10-bit	TSSOP28	√

Development Tools: NT-NT-N76E885, Nu-Link, Nu-Link2

Operating Frequency: 16 MHz
Operating Voltage: 2.4V to 5.5V
Operating temperature: -40°C to 105°C

Part No.	Flash (Kbytes)	SRAM (bytes)	Data Flash (bytes)	ISP ROM	I/O	Timer (16-bit)	Connectivity			LCD Driver	PWM	ADC	Package	Mass Production
							UART	SPI	I²C					
N76E616AL48	18	512	Configurable	√	up to 46	up to 7	2	-	1	4X32 6X30	4*16-bit	8*10 -bit	LQFP48	√
N76E616AF44	18	512	Configurable	√	up to 46	up to 7	2	-	1	4X32 6X30	4*16-bit	8*10 -bit	PQFP44	√
N76E616AM44	18	512	Configurable	√	up to 46	up to 7	2	-	1	4X32 6X30	4*16-bit	8*10 -bit	LQFP44	√

Development Tools: NT-N76E616 Nu-Link, Nu-Link2

N79E Series (4T)

Operaing Frequency: 24 MHz
Operating Voltage: 2.4V to 5.5V
Operating temperature: -40°C to 105°C

Part No.	Flash (Kbytes)	SRAM (bytes)	Data Flash (bytes)	ISP ROM	I/O	Timer (16-bit)	Connectivity			PWM	ADC	Package	Mass Production
							UART	SPI	I²C				
N79E715AS28	16	512	Configurable	2	up to 25	3	1	1	1	4	8*10-bit	SOP28	√
N79E715AS20	16	512	Configurable	2	up to 25	3	1	1	1	4	8*10-bit	SOP20	√
N79E715AS16	16	512	Configurable	2	up to 25	3	1	1	1	4	8*10-bit	SOP16	√
N79E715AT28	16	512	Configurable	2	up to 25	3	1	1	1	4	8*10-bit	TSSOP28	√
N79E715AT20	16	512	Configurable	2	up to 25	3	1	1	1	4	8*10-bit	TSSOP20	√

Development Tools: NT-N79E715, ISP-ICP Programmer (NWR-005)

MS51 Series (1T)

Operaing Frequency: 16 MHz/ 24MHz
Operating Voltage: 2.4V to 5.5V
Operating temperature: -40°C to 105°C

Potential Applications: Industrial Control, Battery Pack, Home Appliance, LED Control, Consumer Devices, etc.

Part No.	Flash (Kbytes)	SRAM (bytes)	Data Flash (bytes)	ISP ROM	I/O	Timer (16-bit)	Connectivity			PWM	ADC	Package	Mass Production
							UART	SPI	I²C				
MS51FB9AE	16	256+1K	Configurable	√	up to 18	4	2	1	1	6*16-bit	8*12-bit	TSSOP20	Q1
MS51XB9AE	16	256+1K	Configurable	√	up to 18	4	2	1	1	6*16-bit	8*12-bit	QFN20*	Q1
MS51XB9BE	16	256+1K	Configurable	√	up to 18	4	2	1	1	6*16-bit	8*12-bit	QFN20**	Q1

*QFN20: 0.4mm Pitch width
**QFN20: 0.5mm Pitch width

Development Tools: NT-MS51, Nu-Link

ML51 Series

NuMicro® ML51 series embedded with 1T 8051 core is suitable for low power and high performance applications. The internal voltage reference and analog comparator can support portable devices, where power consumption is critical.

Operaing Frequency: 24 MHz
Operating Voltage: 1.8V to 5.5V
Operating temperature: -40°C to 105°C

Key Features: The operating current can support 100 uA/MHz, power consumption of low power run mode is 15 uA, low power idle mode is 13 uA, Power Down mode is 0.8 uA at 3.3V, and 10 us fast wake-up time, high immunity (8KV ESD, 4KV EFT) and 20 mA large sink current, which makes this series also ideal for industrial applications.
Potential Applications: Industrial Control, Home Appliance, Thermostat, E-lock, HMI, Battery Pack, Medical Devices, etc.

• ML51 series

Part No.	Flash (Kbytes)	SRAM (Kbytes)	ISP ROM (Kbytes)	PDMA	I/O	Timer (16-bit)	PWM	Connectivity				Internal Voltage Reference	Analog Comp.	ADC (12-bit)	ICP IAP ISP	Package	Mass Production
								UART	SPI	ISO-7816-3	I²C						
ML51BB9AE	16	1	4	-	7	4	6	2	1	1	2	-	-	2	√	MSOP10	√
ML51DB9AE	16	1	4	-	11	4	6	2	1	1	2	-	-	3	√	TSSOP14	√
ML51FB9AE	16	1	4	-	16	4	6	2	1	1	2	-	-	6	√	TSSOP20	√
ML51OB9AE	16	1	4	-	17	4	6	2	1	1	2	-	-	6	√	SOP20	√
ML51XB9AE	16	1	4	-	17	4	6	2	1	1	2	-	-	6	√	QFN20	√
ML51EB9AE	16	1	4	-	24	4	6	2	1	1	2	-	-	8	√	TSSOP28	√
ML51UB9AE	16	1	4	-	24	4	6	2	1	1	2	-	-	8	√	SOP28	√
ML51PB9AE	16	1	4	2	28	4	6	2	2	1	2	Y	2	8	√	LQFP32	√
ML51TB9AE	16	1	4	2	28	4	6	2	2	1	2	Y	2	8	√	QFN33	√
ML51EC0AE	32	2	4	2	24	4	6	2	2	1	2	Y	2	8	√	TSSOP28	√
ML51UC0AE	32	2	4	2	24	4	6	2	2	1	2	Y	2	8	√	SOP28	√
ML51PC0AE	32	2	4	2	28	4	6	2	2	1	2	Y	2	8	√	LQFP32	√
ML51TC0AE	32	2	4	2	28	4	6	2	2	1	2	Y	2	8	√	QFN33	√

Development Tools: NT-ML51P, NK-ML51P, Nu-Link, Nu-Link 2

Standard 8051

The Nuvoton standard 8051 series is based on 6/12 cycle core structure, and provides 22.1184 MHz internal oscillator (1% accuracy at 25°C, 5V) , data Flash configurable and high immunity (8KV ESD, 4KV EFT).

Operaing Frequency: 40 MHz
Operating Voltage: 2.5V to 5.5V
Operating temperature: -40°C to 105°C

Potential Applications: Industrial Control, Power Management, etc.
Key Features: Flash size: 16KB~64KB, power energy management circuit such as LDO, POR and BOD.

• N78E Series

Operaing Frequency: 40 MHz
Operating Voltage: 2.5V to 5.5V
Operating temperature: -40°C to 105°C

Part No.	Flash (Kbytes)	SRAM (bytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer (16-bit)	Connectivity			Comp	PWM (8-bit)	ADC (10-bit)	INT	ISP	Special Function	Package	Mass Production
							UART	SPI	I²C								
N78E055A	16	256+1K	4	2.5	up to 40	3	1	1	-	-	5	-	4	√	6T/12T option, Extra I/O port, 22.1184 MHz internal RC, BOR	PLCC44/PQFP44/LQFP48/ DIP40	√
N78E059A	32	256+1K	4	2.5	up to 40	3	1	1	-	-	5	-	4	√	6T/12T option, Extra I/O port, 22.1184 MHz internal RC, BOR	PLCC44/PQFP44/LQFP48/ DIP40	√
N78E517A	64	256+1K	Configurable	2.5	up to 40	3	1	1	-	-	5	-	4	√	6T/12T option, Extra I/O port, 22.1184 MHz internal RC, BOR	PDIP40/PLCC44/PQFP44/ LQFP48 /TQFP44	√
N78E366A	64	256+1K	-	2.5	up to 40	3	1	1	-	-	5	-	4	√	6T/12T option, Extra I/O port, 22.1184 MHz internal RC, BOR	PLCC44/PQFP44/LQFP48/ DIP40	√

Development Tools: ISP-ICP Programmer (NWR-005)

• W78 Series

Operaing Frequency: 40 MHz
Operating Voltage: 2.5V to 5.5V
Operating temperature: -40°C to 105°C

Part No.	Flash (Kbytes)	SRAM (bytes)	ISP ROM (Kbytes)	I/O	Timer (16-bit)	Connectivity			Comp	PWM (8-bit)	ADC (10-bit)	INT	ISP	Special Function	Package	Mass Production
						UART	SPI	I²C								
W78E052D	8	256	2	up to 36	3	1	-	-	-	-	-	4	√	6T/12T option, Extra I/O port	PDIP40/PLCC44/PQFP44/ LQFP48//TQFP44	√
W78E054D	16	256	2	up to 36	3	1	-	-	-	-	-	4	√	6T/12T option, Extra I/O port	PDIP40/PLCC44/PQFP44/ LQFP48//TQFP44	√
W78E058D	32	512	4	up to 36	3	1	-	-	-	-	-	4	√	6T/12T option, Extra I/O port	PDIP40/PLCC44/PQFP44/ LQFP48	√
W78E516D	64	512	4	up to 36	3	1	-	-	-	-	-	4	√	6T/12T option, Extra I/O port	PDIP40/PLCC44/PQFP44/ LQFP48	√

Development Tools: ISP-ICP Programmer (NWR-005)

Integrated Development Environment (IDE)

Nuvoton has been committed to building the customer-oriented MCU eco-System from rich platform products, evaluation boards, device drivers, BSP, own-developed debugging tools, software developing tools, integrated development tools, and mass production supporting tools, and the operating system software to fulfill customers' needs from product selection, development and mass production stages.

IDE	Validated MCUs	License	Debugger	Windows	Linux
NuEclipse (GCC)	NuMicro M0/M4/M23	Free	Nu-Link	√	√
KEIL MDK Nuvoton edition M0/M23	NuMicro M0/M23	Free	Nu-Link / J-Link / U-Link	√	
KEIL MDK Nuvoton edition M4	NuMicro M4	Special offer	Nu-Link / J-Link / U-Link	√	
IAR EWARM	NuMicro M0/M4/M23	IAR	Nu-Link	√	
KEIL C51	NuMicro 8-bit	Keil	4T: Nu-Tiny-51 1T: Nu-Link	√	
IAR EW8051	NuMicro 8-bit 1T MCUs	IAR	Nu-Link	√	

Development Platforms

Nuvoton offers distinctive evaluation boards and a variety of debug tools to shorten the development time. Each evaluation board includes a Nu-Link-Me ICE adaptor, so no additional debug equipments is needed.

• NuMaker PFM

The NuMaker Platform is an Internet of Things (IoT) application focused platform specially developed by Nuvoton. It is a convenient starter kit pin-compatible with Arduino and supported by IAR EWARM, Keil RVMDK, NuEclipse environment as well as ARM mbed OS 5.5. It is ideal for arrays of IoT application development for prototype development designs with sensors and wireless modules. The kit includes examples with source code and the Nu-Link-Me ICE adaptor.

• NuTiny Board

The NuTiny board is a simple, easy to use evaluation/development kit supported by IAR EWARM, Keil RVMDK and NuEclipse environment. Its compact size is applicable for all types of product development. The Nu-Link-Me ICE adaptor is also included.

• Nu-Learning Board

The Nu-Learning board includes rich functional blocks that connects to the embedded microcontroller. With the functional blocks, users can develop and verify applications to emulate the real behavior. It can be used as a real system controller to design users' target systems. The Nu-Link-Me ICE adapter is also included for easy debug.

Debugger and Programmer

• Nu-Link2

Nuvoton's Nu-Link2 Debug Adapter is an USB debugger/programmer and can be applied to the development of NuMicro® Family microcontrollers. It supports all Nu-Link's features plus programmable output V_{DD} and wide target V_{DD} input level. The Nu-Link2 includes an USB 2.0 High-Speed port that can be connected to a computer host, a set of Status LEDs, an off-line programming button, a SWD port which can be adjusted through software as 1.8V, 2.5V, 3.3V, or 5.0V. It supports on-line/off-line ICP based on the SWD signal interface up to 24 Mbps. It has USCI port to support additional functions. Nu-Link2 has one control bus that supports chip firmware update on automatic IC programming system. Nu-Link2 can be used with Keil RVMDK, IAR EWARM and NuEclipse IDE.

• Nu-Trace

The Nu-Trace supports all of Nu-Link2's features plus ETM trace function
(4-bit data). The Nu-Trace can debug and program a target chip through SWD interface, or through SWD with ETM interface up to 96M tracing bit rate. The voltage level of the SWD port can be adjusted through software as 1.8V, 2.5V, 3.3V, or 5.0V. Nu-Trace can be used with Keil RVMDK, IAR EWARM and NuEclipse IDE.

• ISP-ICP Programming Tool

A programmar designed for NuMicro® 8051 Family microcontrollers. It supports online/offline mode ICP and ISP. Under on-line mode, users can plug the programmer into PC's USB port and update the program memory of the 8051 MCU. Owing to the it's built-in non-volatile storage, users can download data into the programmer. Under off-line mode, users can use the programmer with preloaded data to update the program memory of the 8051 MCU without PC's intervention.
Apply to N79E715, N79E81x series, N79E845/844/8432, W78E052/054/058/516, N78E366, and N78E517. For other NuMicro® 8051 Family microcontrollers, Nu-Link2 programmer is recommanded.

• Nu-Link-Me

The Nuvoton ICE adapter Nu-Link-Me is included in all evaluation development boards. It connects the PC's USB port to the target system and allows users to program and debug embedded programs on the target chip. It supports online ICP and there is no need to install additional debug hardware. The Nu-Link-Me V3.0 also supports VCOM function, which gives users more flexibility for debugging. Nu-Link-Me can be used with Keil RVMDK, IAR EWARM and NuEclipse IDE. (Not for retail sale)

Configure Software

• PinConfig

PinConfigure is used to configure GPIO multi-functions of Nuvoton MCU families.

• PinView

NuTool-PinView is a monitoring and visualization tool that can immediately show the current status of I/O pins, and inform users of certain common pin configuration errors.

• ClockConfig

ClockConfigure is used to configure clock settings of Nuvoton MCU families.

• NuConsole

Nu-Console provides non-invasive message-logging mechanism via the SWD.

Please visit: www.nuvoton.com/NuTool

Programmer

• Nu-Link-Gang

The Nu-Link-Gang Programmer is specially designed for mass-production in the customer site. Supports programming all Nuvoton NuMicro® Family and 8051 1T series and packages with flexible programming setting, such as 3 options of programming voltage (1.8V, 3.3V, or 5.0V), 4 different chips with individual firmware image file, and offline programming 4 chips simultaneously or individually. It is suitable for automatic IC programming system.

Joy of innovation

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