

nuvoTon  
新唐科技

# Motor Product Line

Motor Application Marketing Department

DATE : 2020/July/02

Official Website <https://www.nuvoton.com>

NuForum <http://www.nuvoton-mcu.com/forum.php?mod=viewthread&tid=1819&fromuid=177288>



# About nuvoTon



2008/7/1

Spin-off from Winbond  
Electronics' Logic business  
group

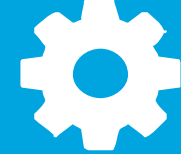


2010/9/27

Became public on the Taiwan  
Stock Exchange (TSE).



Number of employees:  
1,653



Worldwide Locations :  
Headquarters : Taiwan  
Other Regions : China,  
U.S.A., Israel, India...



Main Products :  
Microcontrollers,  
Audio ICs, Cloud  
and Computing ICs,  
Foundry Service





# nuvoTon International Team

## Nuvoton Technology Corp.(HQ)

- Location : Hsinchu Science Park, Taiwan
- HQ team dedicates to worldwide operation, and integrates the resources of R&D, marketing, manufacturing, sales and related information from each site.

## Nuvoton Tech. Corp. America (NTCA)

- Location : San Jose. CA, U.S.A.
- NTCA team utilizes the remarkable analogy technology to develop consumer/industrial products and provides marketing and technical support to U.S. regions.

## Nuvoton Tech. Israel Ltd. (NTIL)

- Location : Herzlia, Israel
- NTIL team is well positioned to system innovation capability, responsible for computer and consumer products development.

## Nuvoton Elect. Tech. (NTSH) Nuvoton Elect. Tech. (NTSZ) Nuvoton Elect. Tech. (NTHK) Limited

- Location : Shanghai / Shenzhen(SZ) / Hong Kong(HK), China
- CN team is in charge of the local sales and technology support, fulfilling customers' demand and timely product service.

# nuvoTon Business Groups

## Microcontroller Application

- Cortex-M0/M4
- Cortex-M23
- ARM9 / ARM7
- 8051



Microcontroller  
Application  
Business Group

Cloud and  
Computing  
Business Group

## Cloud & Computing

- TPM\*
- BMC/ EC/ Super IO\*\*
- Power Management
  - Power Switch
  - LDO/DDR Regulator
  - Fan, Motor Driver, and PWM Controller



## Audio Product

- Audio MCU
- CODEC
- ISD Chip Coder
- Speech



Audio Product  
Business Group

Manufacturing  
Business Group



## Manufacturing

- HV Foundry Service
- Flat Cell Process
- Embedded Memory, Mixed signal Process

\* TPM: Trusted Platform Module

\*\* BMC: Baseboard Management Controller  
EC: Embedded Controller





**Product line**



**Tools for development**



**Application &  
Selection Guide**



# IMC Product Roadmap

**NM1530** : [LQFP48<sub>\(7x7mm<sup>2</sup>\)</sub>/LQFP64<sub>\(10x10mm<sup>2</sup>\)</sub>](#)

[LQFP100<sub>\(14x14mm<sup>2</sup>\)</sub>](#)

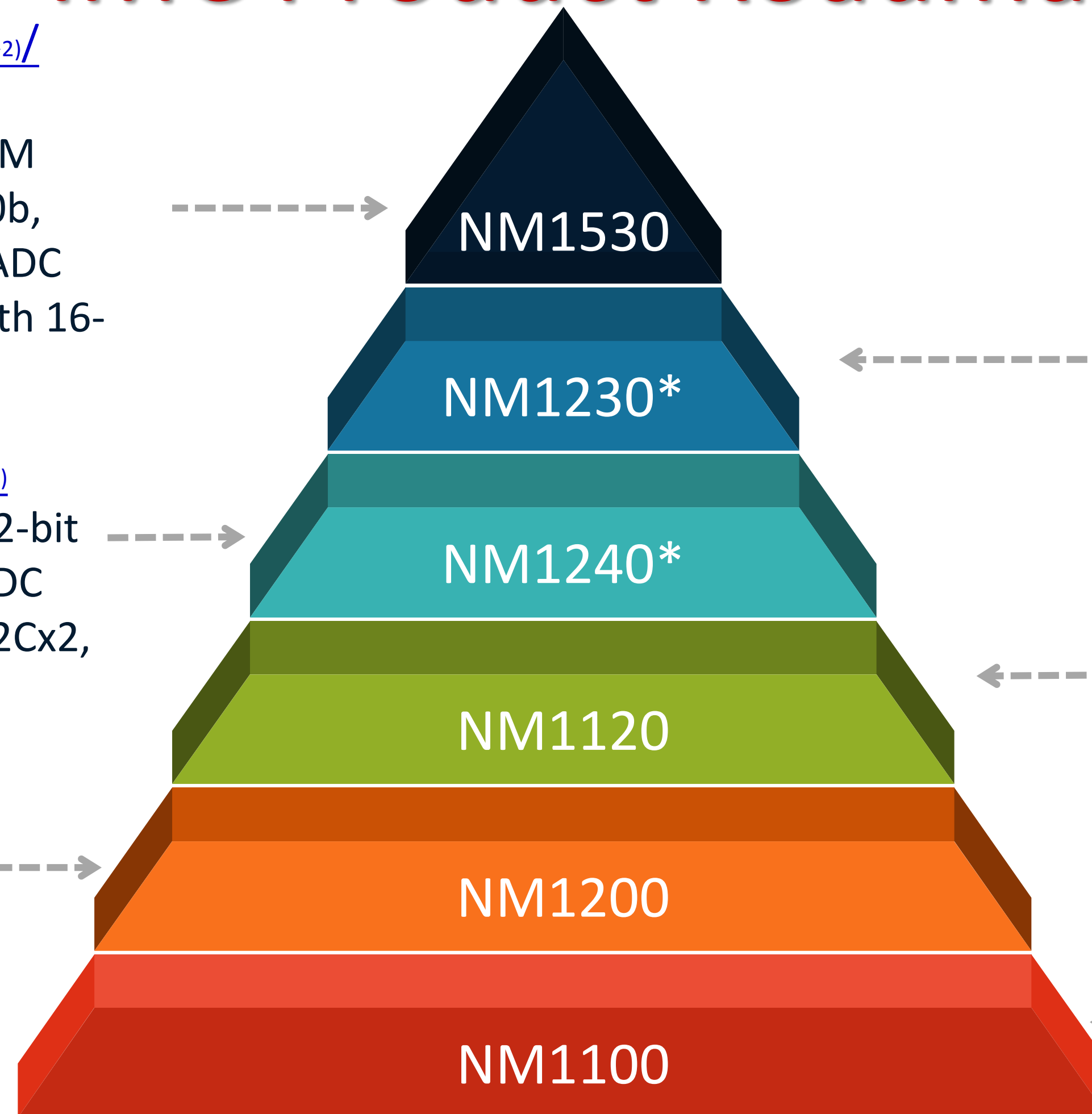
64kB/128kB Flash with ISP, 8kB/16kB RAM  
72MHz, 32-bit Divider, MDU, QEI, CAN2.0b,  
UART x 2, I<sup>2</sup>C x 1, SPI x 3, 800kHz 12-bit ADC  
with 2 S/H, OP x 2, 1~ 2 motor control with 16-  
bit PWM

**NM1240\*** : [QFN33<sub>\(4x4mm<sup>2</sup>\)</sub>/LQFP48<sub>\(7x7mm<sup>2</sup>\)</sub>](#)

64kB Flash with ISP, 60MHz, 8kB RAM, 32-bit  
Divider, OPAX1,ACMPx1, DACx2, 12-bit ADC  
with 2 S/H, 16-bit PWM ,ECAP, UARTx2, I2Cx2,  
SPIx1,DMA

**NM1200** : [QFN33<sub>\(5x5mm<sup>2</sup>\)</sub>/LQFP48<sub>\(7x7mm<sup>2</sup>\)</sub>](#)

17.5kB Flash with ISP, 48MHz, 2kB  
RAM, UART x 2, I<sup>2</sup>C x 1, SPI x 1, 500 kHz  
10-bit ADC with 1 S/H, 32-bit Divider,  
16-bit PWM, ACMP x 2



**NM1230\*** : [QFN48<sub>\(7x7mm<sup>2</sup>\)</sub>/LQFP48<sub>\(7x7mm<sup>2</sup>\)</sub>](#)

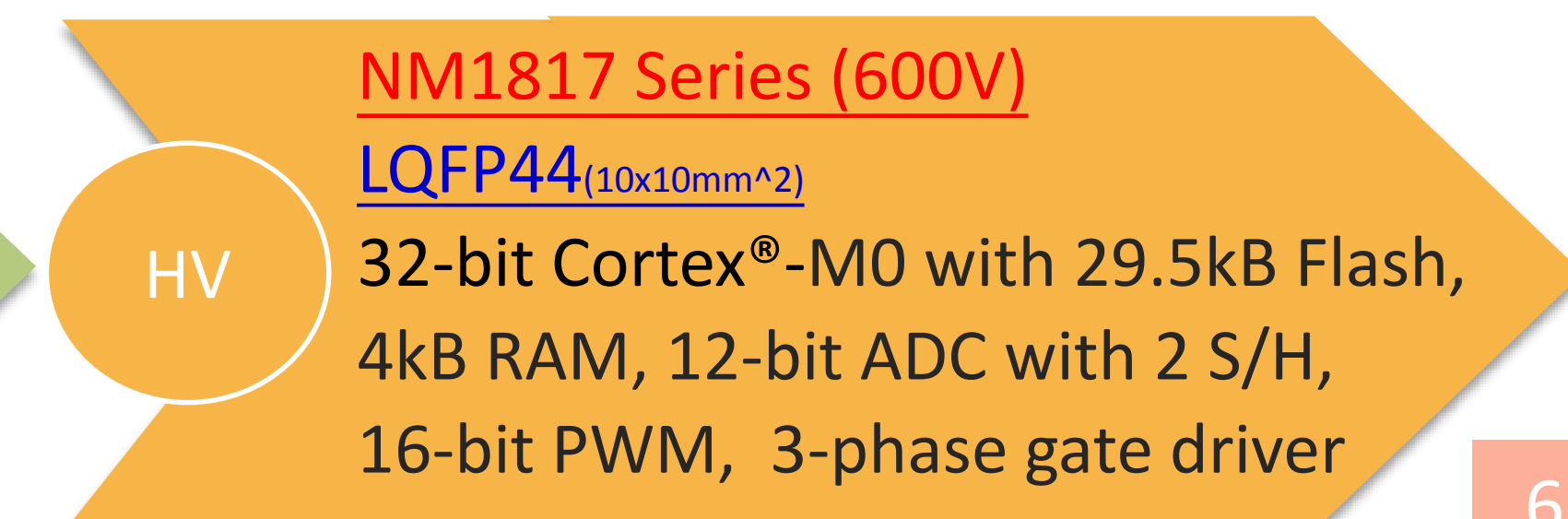
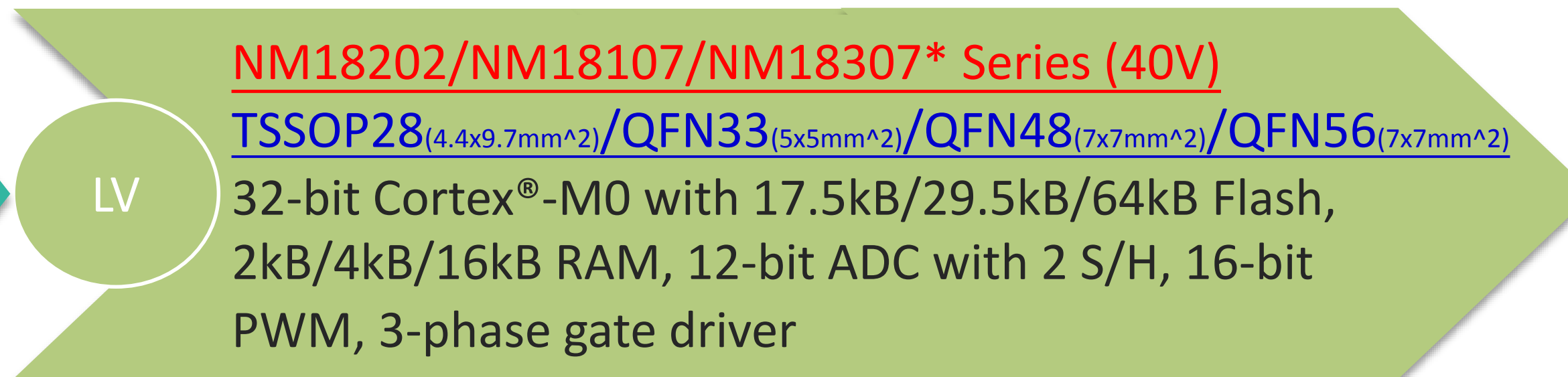
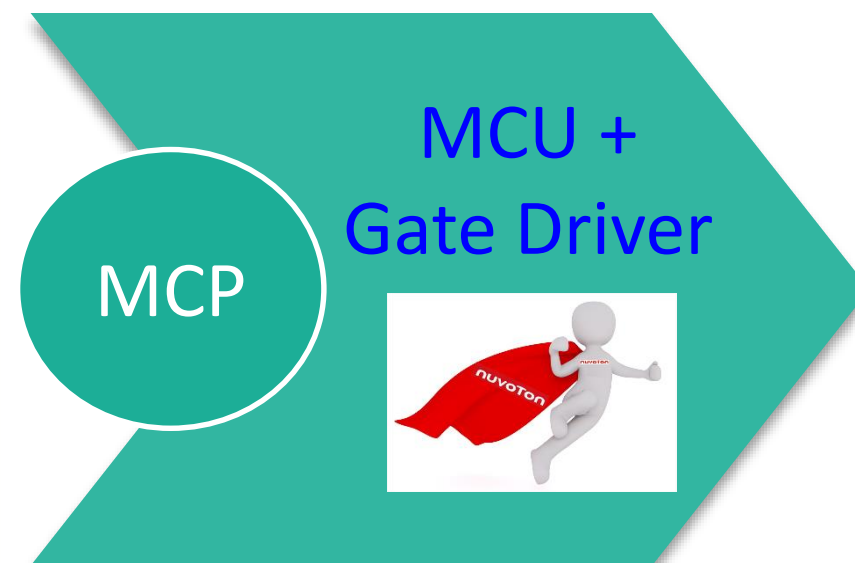
32kB/48kB/64kB Flash with ISP, 72MHz,  
8kB/16kB RAM, 32-bit Divider, OPA x 3,  
ACMP x 2, 12-bit ADC with 2 S/H, 16-bit  
PWM , ECAP, QEI ,UART x 3 , I2C x 3, SPI x 2 ,  
DAC x 2

**NM1120** : [QFN20<sub>\(4x4mm<sup>2</sup>\)</sub>/TSSOP20<sub>\(4.4x6.5mm<sup>2</sup>\)</sub>/](#)  
[TSSOP28<sub>\(4.4x9.7mm<sup>2</sup>\)</sub>](#)

29.5kB Flash with ISP, 48MHz  
4kB RAM, UART x 2, SPI x 2, I2C x 2, 32-bit  
Divider, 800 kHz 12-bit ADC with 2 S/H, 16-  
bit PWM, ECAP, ACMP x 2, PGA x 1

**NM1100** : [TSSOP20<sub>\(4.4x6.5mm<sup>2</sup>\)</sub>](#)

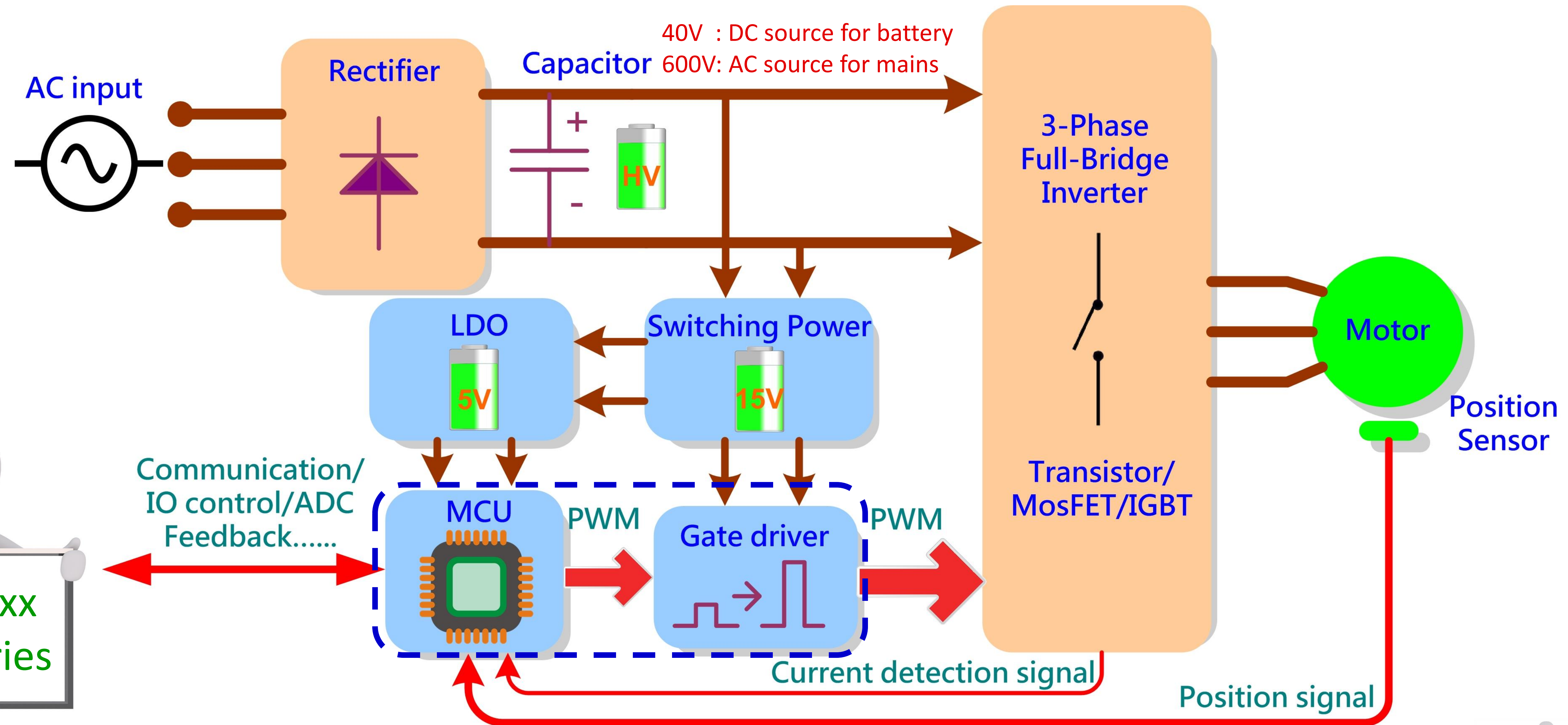
17.5kB Flash with ISP, 48MHz, 2kB RAM,  
UART x 1, 500kHz 10-bit ADC with 1 S/H,  
32-bit Divider, 16-bit PWM, ACMP x 2



\*:Under Development



# Motor Application Block Diagram

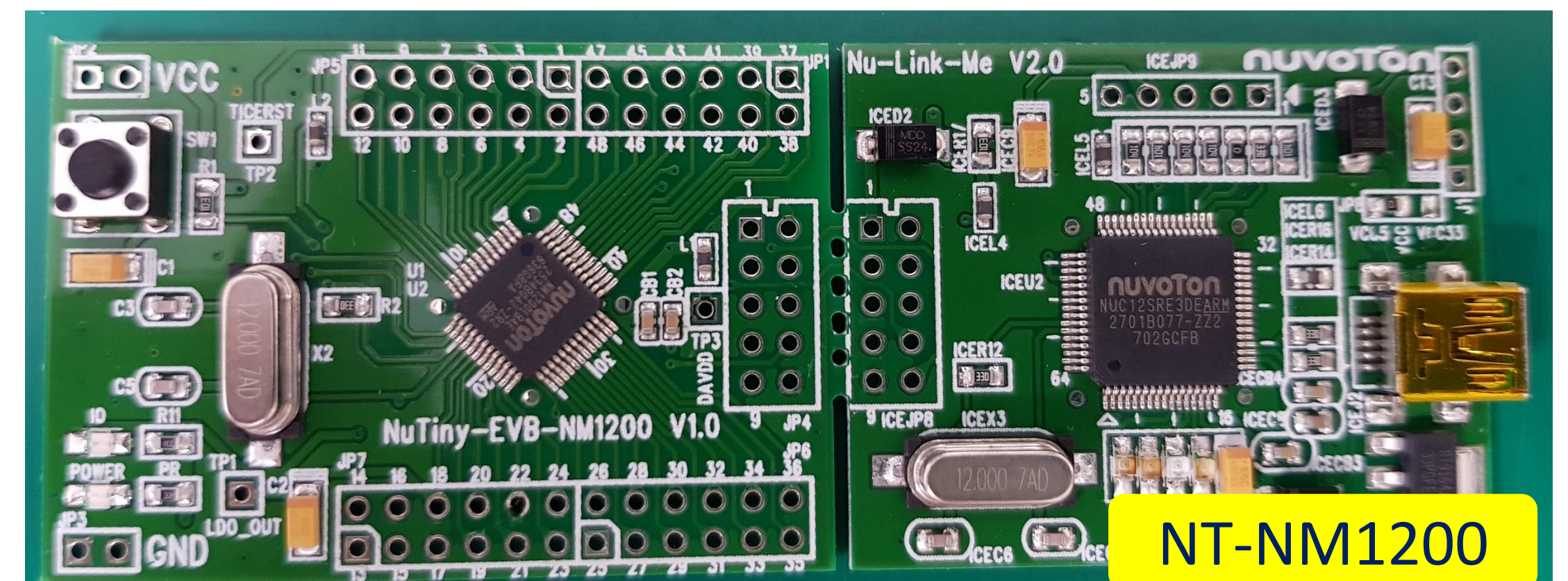




# NM1100/NM1200 Series Main Features

Joy of innovation  
**nuvoTon**

- ARM® Cortex® -M0 core runs up to **48 MHz**
- Operating Voltage/Temperature: **2.5V ~ 5.5V** / -40°C ~ 105°C
- Memory
  - 17.5kB Flash APROM with ISP/ICP/IAP
  - 2kB RAM, Data Flash share with APROM
- Serial Interface: UART x 2, SPI x 1, I2C x 1
- One Divider: **32-bit ÷ 16-bit with signed**
- **1%@25°C** accuracy of **48MHz** internal RC & 10kHz Low speed oscillator
- Advanced PWM
  - **16-bit x 6ch PWM outputs** with Dead-zone, Polarity control, Hardware Brake
- Analog device
  - 8 channels, 500 kSPS 10-bit ADC
  - **1R & 2R Sequential Mode**
  - **2 analog comparators**, each has 4 multi-input
- Package: TSSOP20<sub>(7x7mm<sup>2</sup>)</sub>/QFN33<sub>(4x4mm<sup>2</sup>)</sub>/LQFP48<sub>(7x7mm<sup>2</sup>)</sub>

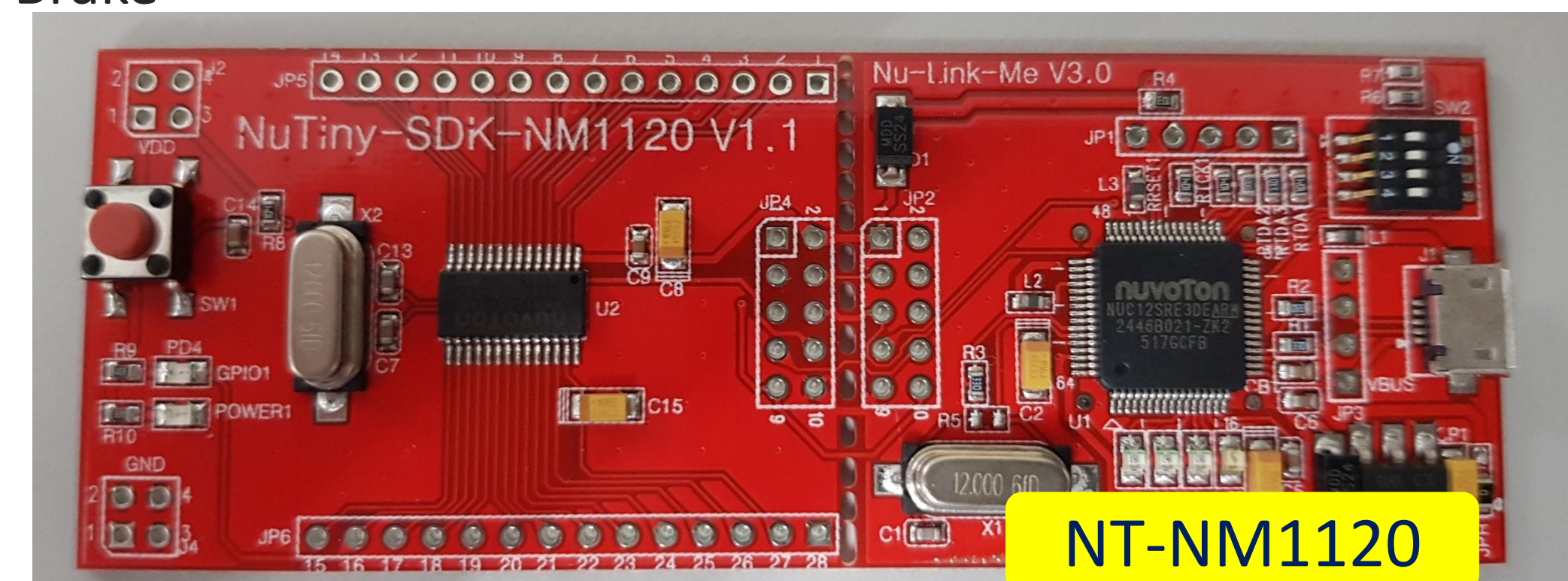




# NM1120 Series Main Features

- ARM® Cortex® -M0 core runs up to **48MHz**
- Operating Voltage/Temperature: **2.5V ~ 5.5V** / -40°C ~ 105°C
- Memory
  - 29.5kB Flash APROM with ISP/ICP/IAP
  - 4kB RAM , Data Flash share with APROM
- Serial Interface: UART x 2, SPI x 2, I2C x 2
- One Divider: 32-bit ÷ 16-bit with signed
- **1%@25°C** accuracy of **48MHz** internal RC & 10kHz Low speed oscillator
- Peripheral for Motor
  - **16-bit PWM x 6CH with** Dead-zone, Polarity control, Hardware Brake
  - ECAP for Hall
- Analog device
  - 800kHz 12-bit ADC with 2 S/H
  - **PGA x 1, ACMP x 2**

Package: QFN20<sub>(4x4mm<sup>2</sup>)</sub>/TSSOP20<sub>(4.4x6.5mm<sup>2</sup>)</sub>/TSSOP28<sub>(4.4x9.7mm<sup>2</sup>)</sub>

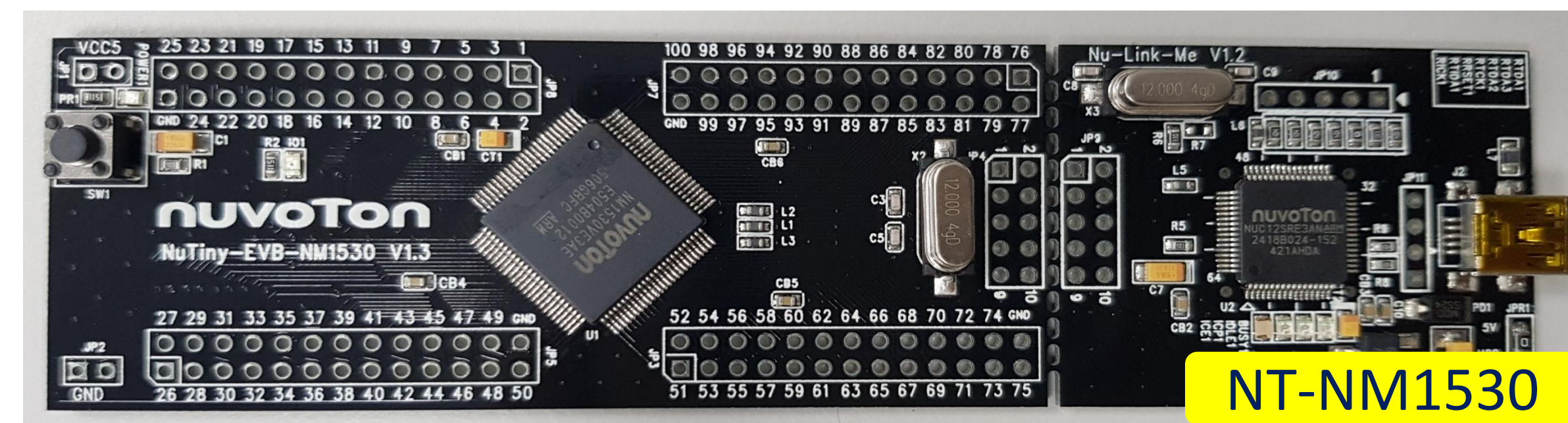
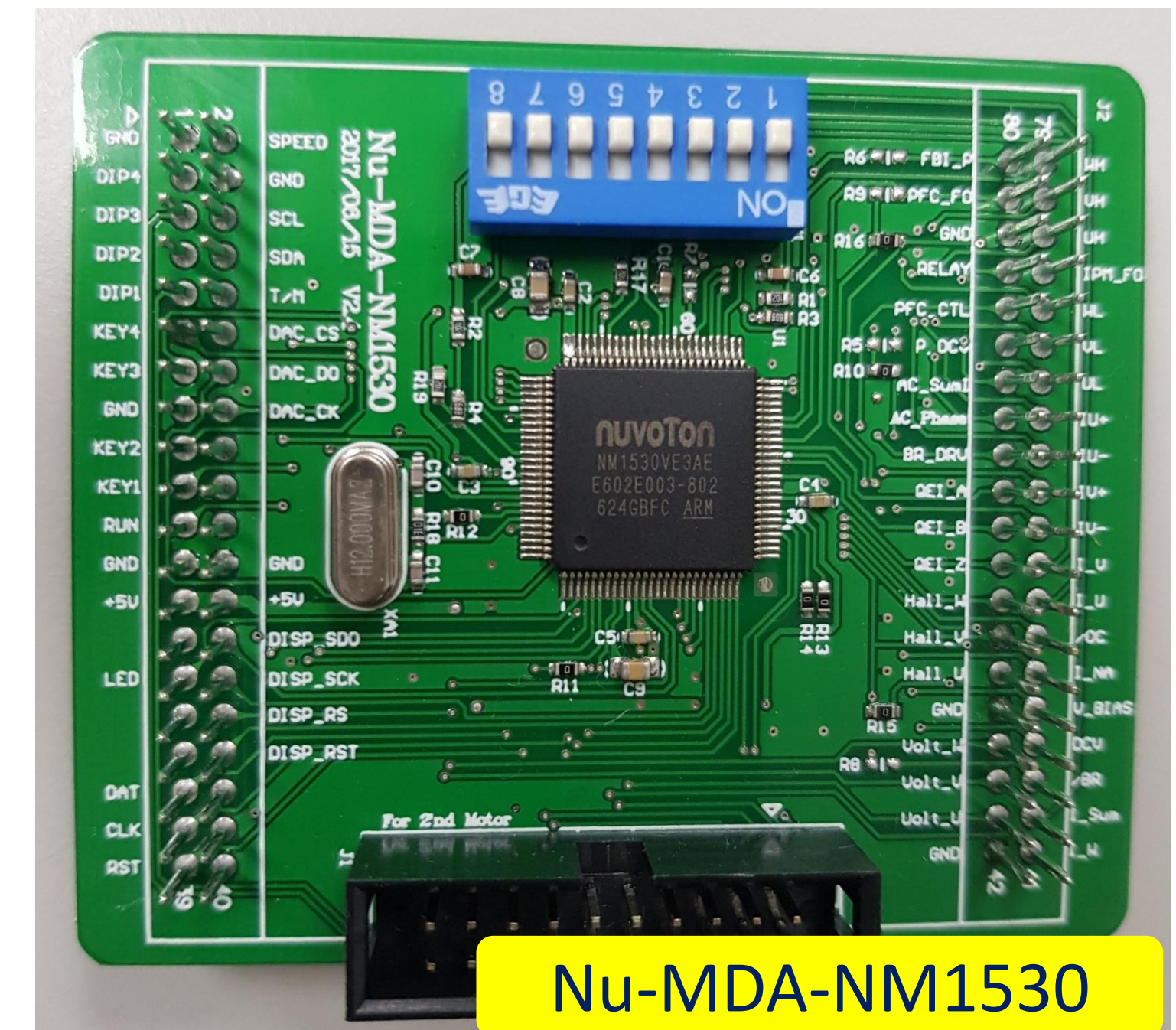




# NM1530 Series Main Features

- ARM® Cortex® -M0 core runs up to **72 MHz**
- Operating Voltage/Temperature: **2.5V ~ 5.5V**/ -40°C ~ 105°C
- Memory
  - 128kB/64kB Flash APROM with ISP/ICP/IAP
  - 16kB/8kB RAM
- Serial Interface: UART x 2, Three SPI x 3, I2C x 1, **CAN2.0b** x 1,
- One Divider: 32 ÷ 16 bit with signed
- 3%@25°C accuracy of 22MHz internal RC
- Peripheral for Motor **x 2**
  - **16-bit PWM x 6CH with** Dead-zone, Polarity control, Hardware Brake
  - ECAP for Hall , **QEI**
- **MDU (Motor Drive Unit):** PI + FOC + SVPWM
- Analog device
  - 7~16 channels, 800kSPS **12-bit ADC with 2 S/H**
  - **OPA x 2, ACMP x 3**

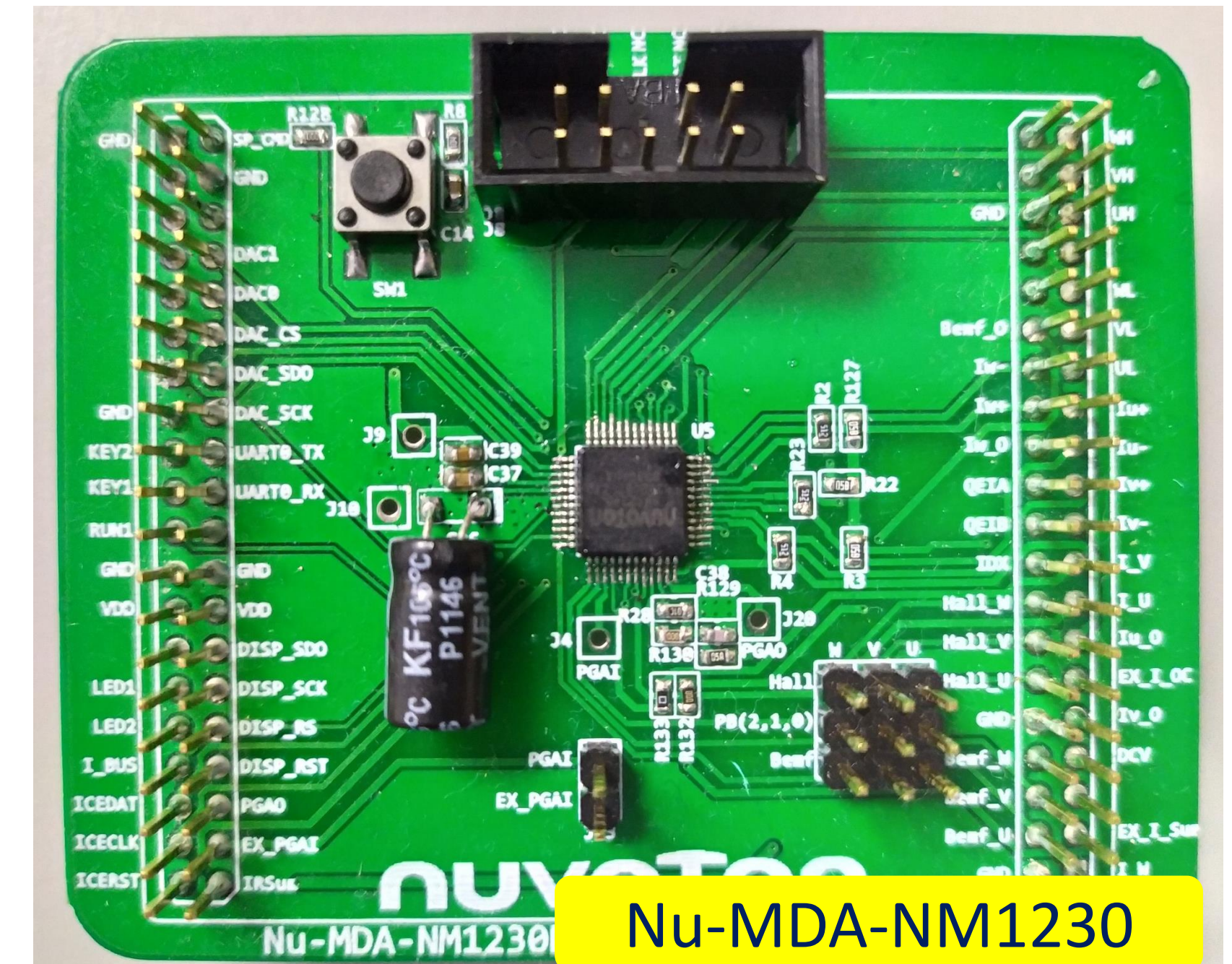
Package: LQFP48<sub>(7x7mm<sup>2</sup>)</sub>/LQFP64<sub>(10x10mm<sup>2</sup>)</sub>/LQFP100<sub>(14x14mm<sup>2</sup>)</sub>



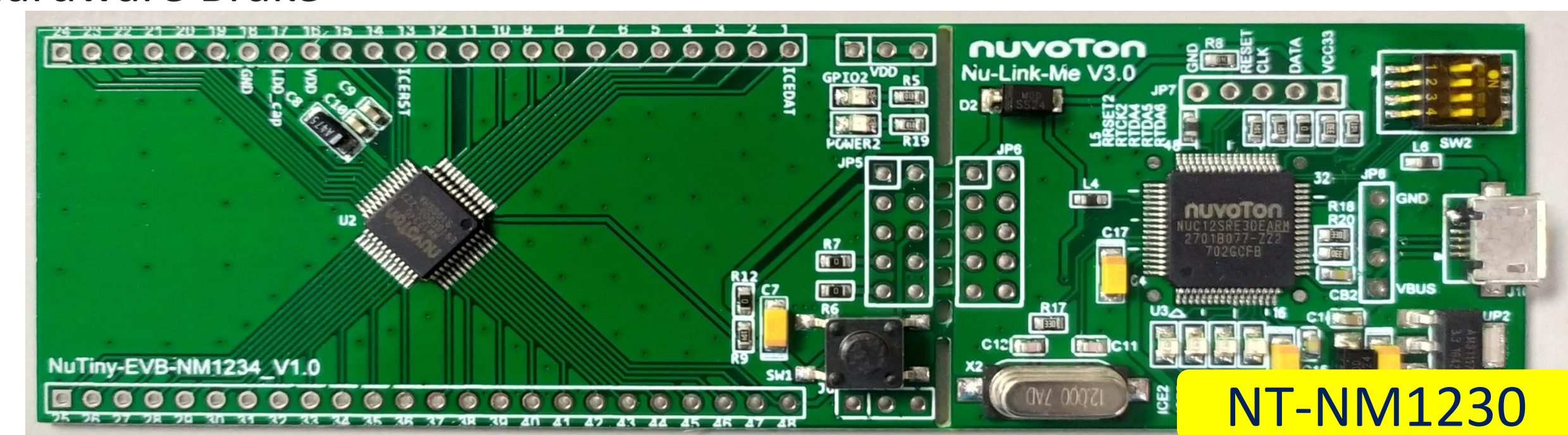


# NM1230 Series Main Features

- ARM® Cortex® -M0 core runs up to **72 MHz**
- Operating Voltage/Temperature: **2.5V ~ 5.5V** / -40°C ~ 105°C
- Memory
  - 32kB/48kB/64kB Flash APROM with ISP/ICP/IAP
  - 8kB/16kB RAM , Data Flash share with APROM
- Serial Interface: UART x 3, SPI x 2, I2C x 3
- **1%@25°C** accuracy of **72MHz** internal RC & 10kHz Low speed oscillator
- Peripheral for Motor
  - **16-bit PWM x 6CH with** Dead-zone, Polarity control, Hardware Brake
  - ECAP for Hall, **QEI** (Quadrature Encoder Interface)
- Analog device
  - 16 channels, 1 MSPS **12-bit ADC with 2 S/H**
  - **PGA, OPA x 3, ACMP x 2, DAC x 2**
- Package: QFN48<sub>(7x7mm<sup>2</sup>)</sub>/LQFP48<sub>(7x7mm<sup>2</sup>)</sub>



Nu-MDA-NM1230



NT-NM1230



# NM1240\* series Main Features

- ARM® Cortex® -M0 core runs up to **60 MHz**
- Operating Voltage/Temperature: **2.5V ~ 5.5V** / -40°C ~ 105°C
- Memory
  - 64kB Flash APROM with ISP/ICP/IAP
  - 8kB RAM , Data Flash share with APROM
- Serial Interface: UART x 2, SPI x 1, I2C x 2
- **1%@25°C** accuracy of **60MHz** internal RC & 10kHz Low speed oscillator
- Peripheral for Motor
  - **16-bit PWM x 6CH with** Dead-zone, Polarity control, Hardware Brake
  - ECAP for Hall
- Analog device
  - 20 channels, 1 MSPS **12-bit ADC with 2 S/H**
  - **OPA x 1, ACMP x 1 , DAC x 2**
- Package : QFN33<sub>(4x4mm<sup>2</sup>)</sub>/LQFP48<sub>(7x7mm<sup>2</sup>)</sub>



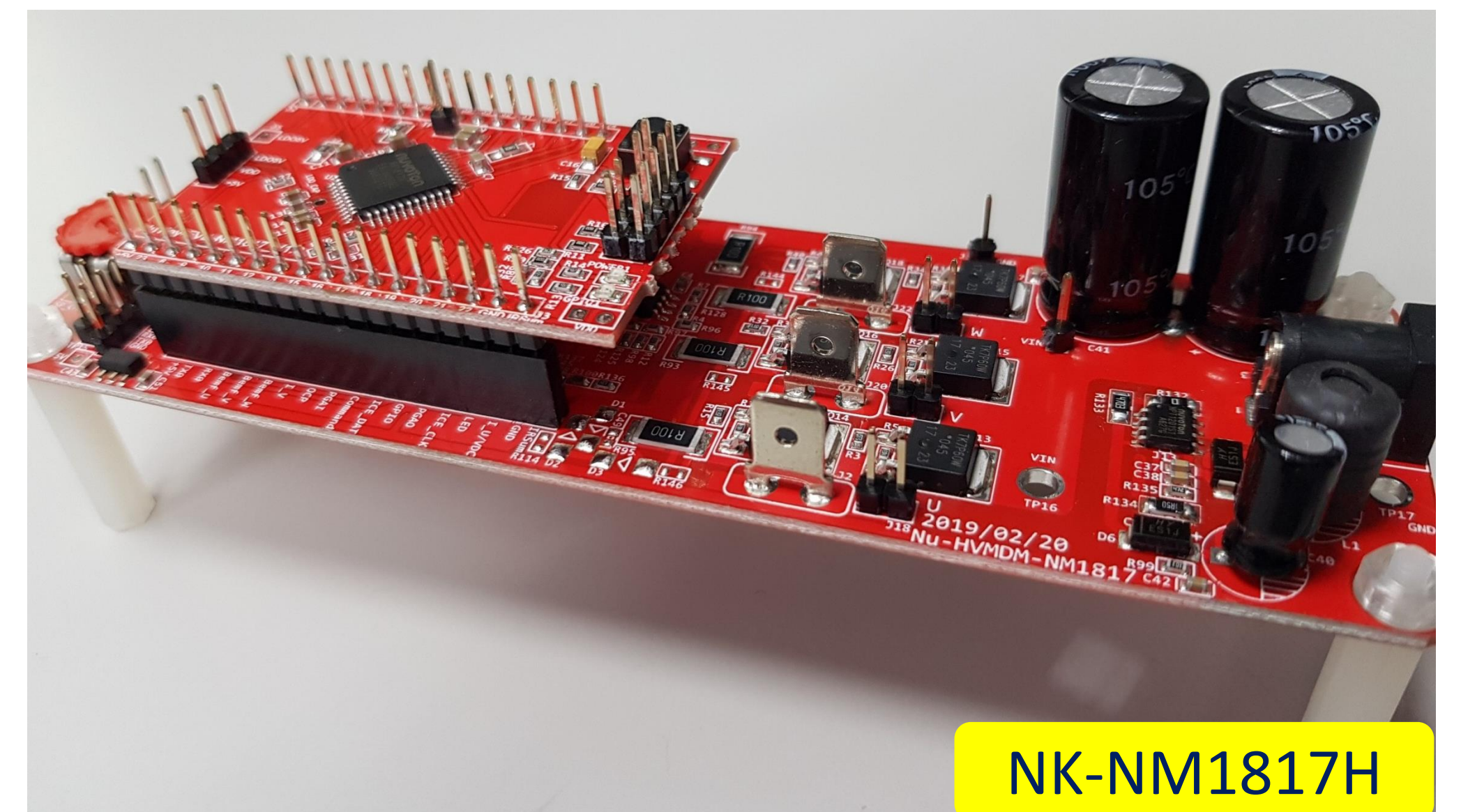
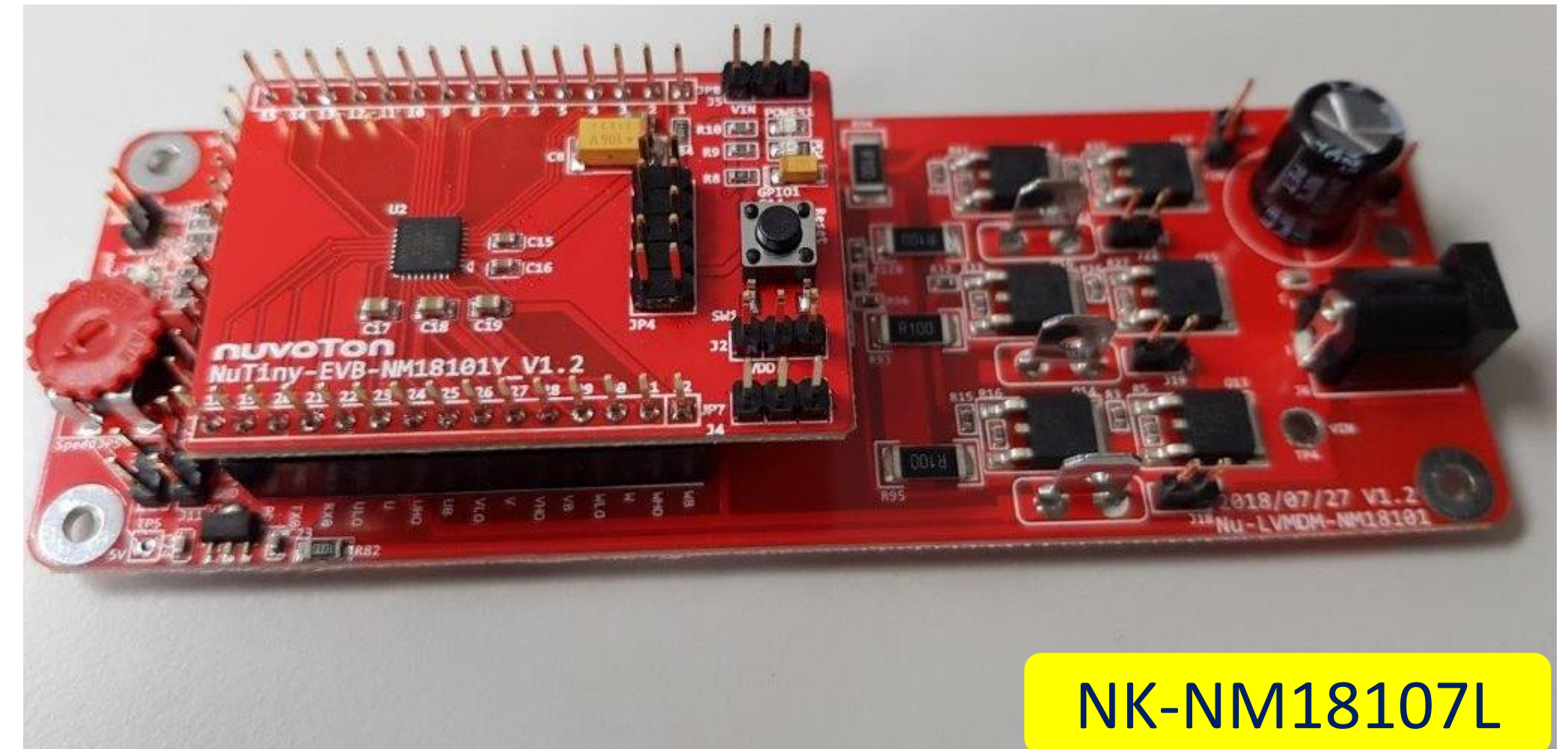
**\*Under Development**





# NM18202Y/NM18107Y/NM18307Y\*/NM1817NT Joy of innovation nuvoTon

- ARM® Cortex® -M0 core runs up to 48/72 MHz
- NM18202Y
  - MCU: NM1200, Gate Driver: NCT3612
  - Package: QFN48(7x7mm<sup>2</sup>)
  - Gate Driver output 12V
- NM18107Y
  - MCU: NM1120, Gate Driver: NCT3612
  - Package: QFN33(5x5mm<sup>2</sup>)
  - Gate Driver output 12V
- NM18307Y\*
  - MCU: NM1230, Gate Driver: NCT3612
  - Package: QFN56(7x7mm<sup>2</sup>)
  - Gate Driver output 12V
- NM1817NT (HV Gate driver)
  - MCU: NM1120, Gate Driver: NPT2312
  - Package: LQFP44(10x10mm<sup>2</sup>)
- Temperature : -40 ~ 105°C







**Product line**



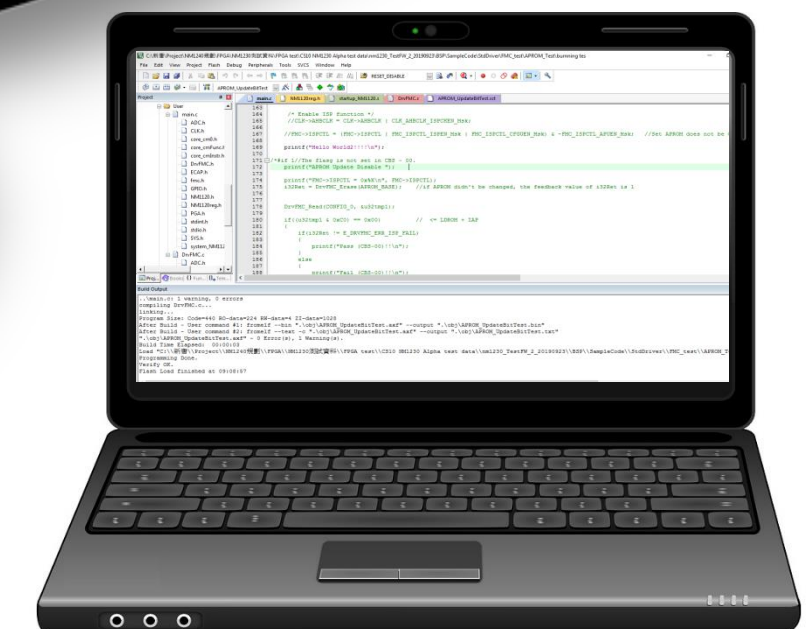
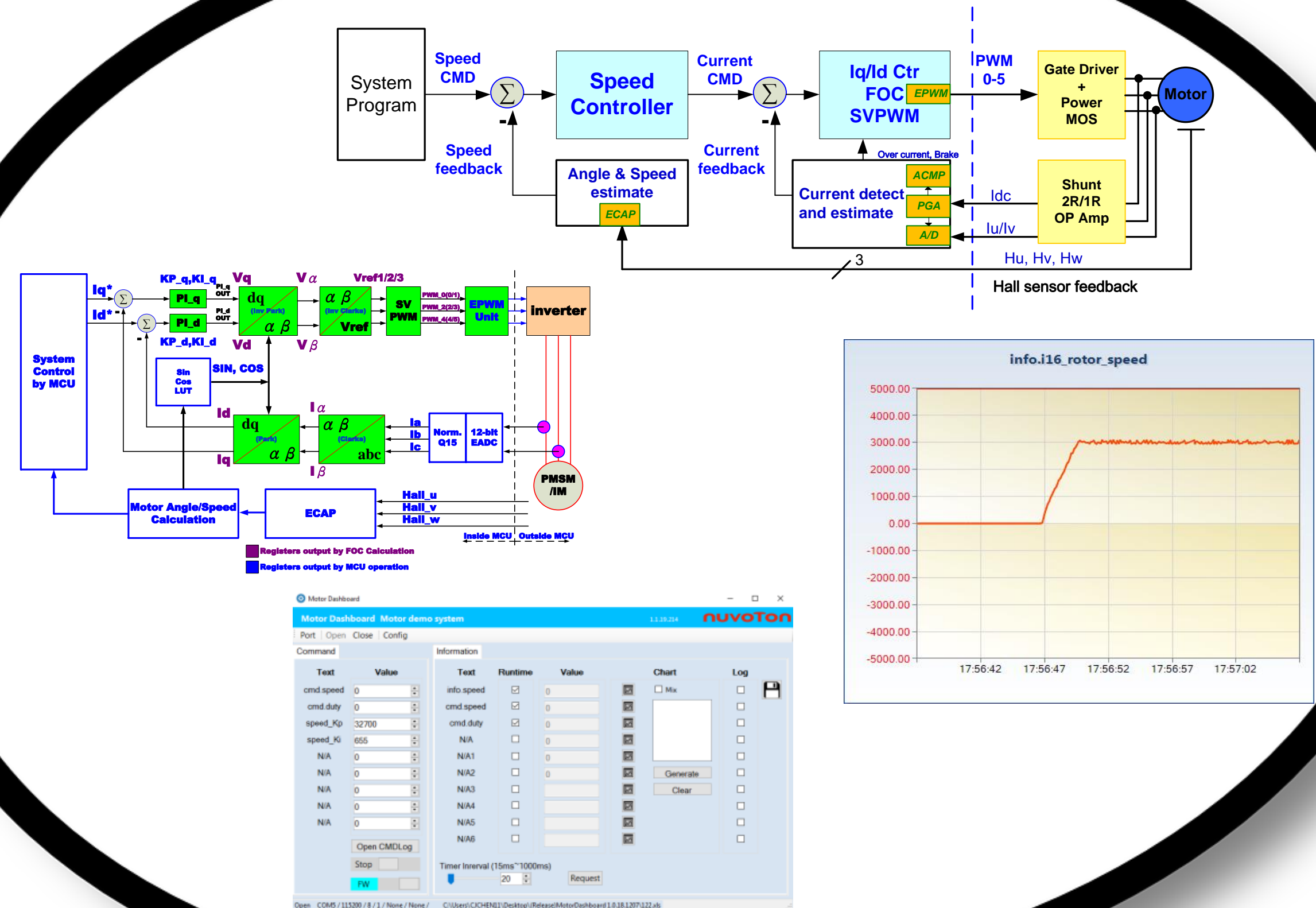
**Application &  
Selection Guide**

**Tools for development**



# Tool Kits for Development-SoftWare

- Support for all NM series.
- Demo code for
  - Hall + FOC + 2-shunt R
  - Hall + FOC + 1-shunt R
  - Hall + Six step square wave control
- Provide multiple algorithms for motor drive
  - FOC + SVPWM (Library)
  - PI control for speed or current control
  - Motor speed estimated
- Friendly GUI interface – Nu-Motor system
  - Tune parameters to control motor speed
  - Help to evaluation new project



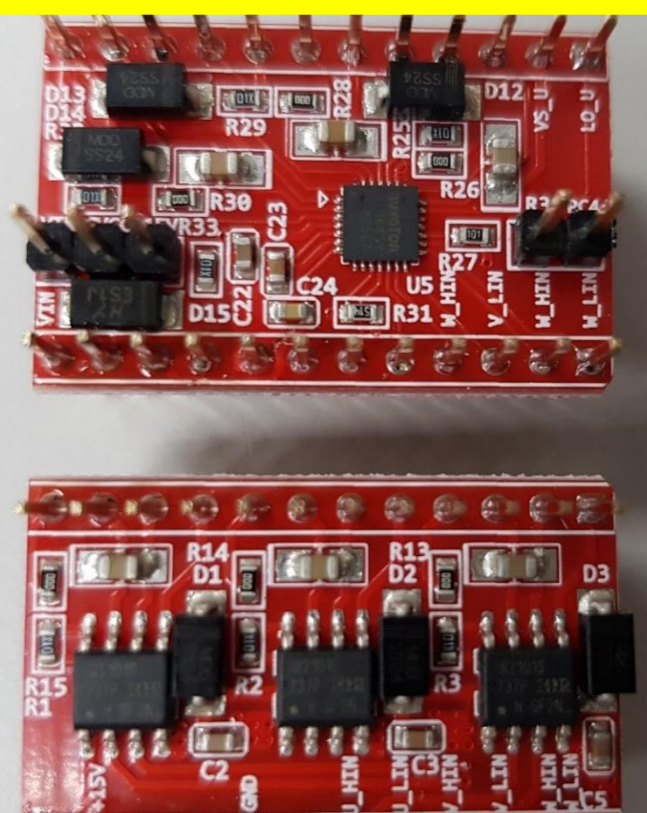


# Tool Kits for Development-HardWare



Nu-MDA-NM1200/Nu-MDA-NM1120  
Nu-MDA-NM1230/Nu-MDA-NM1530

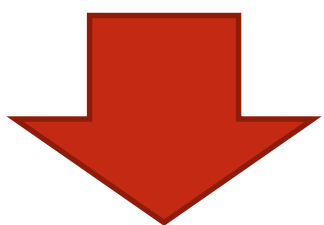
LV Gate Driver



HV Gate Driver

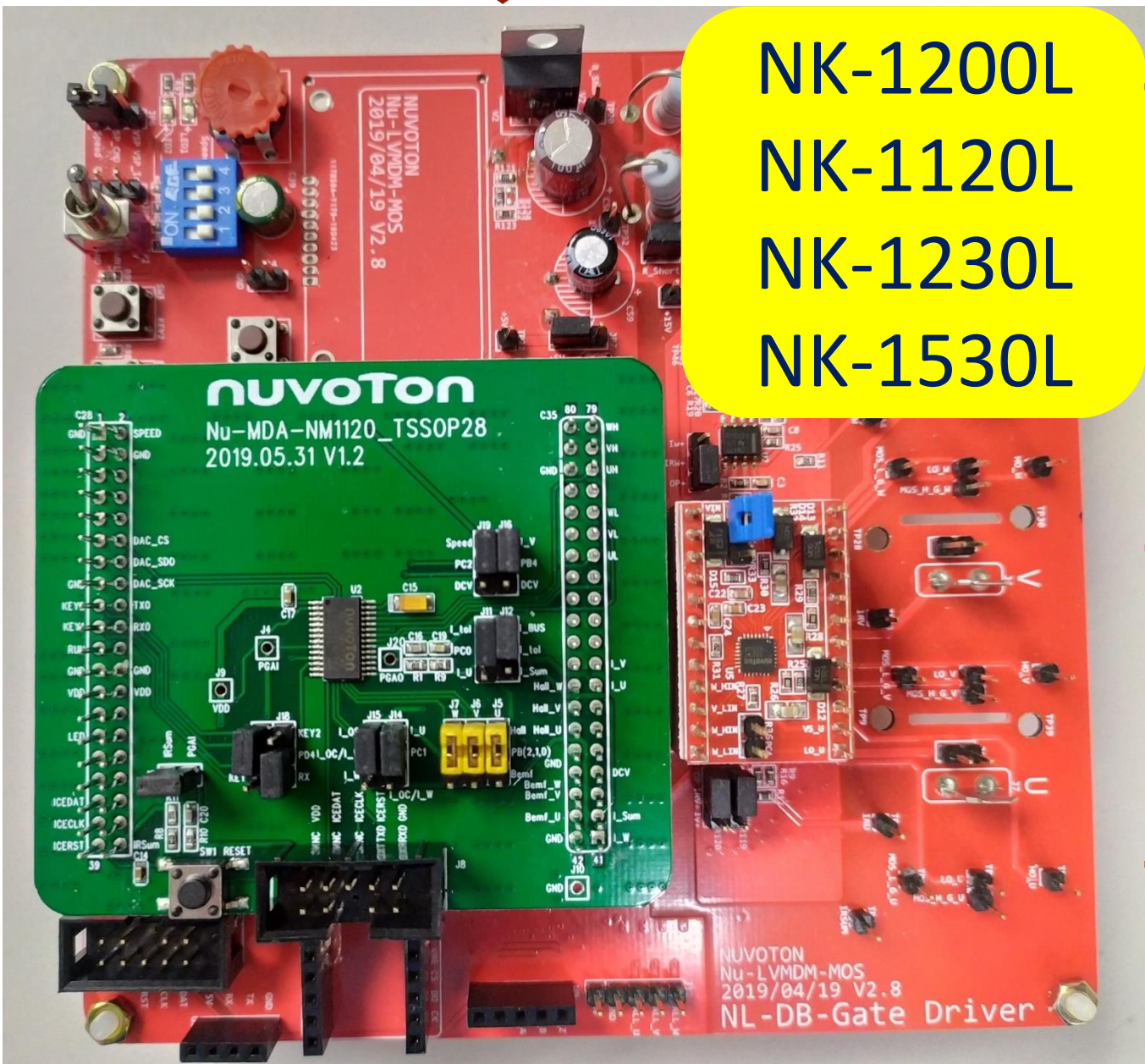
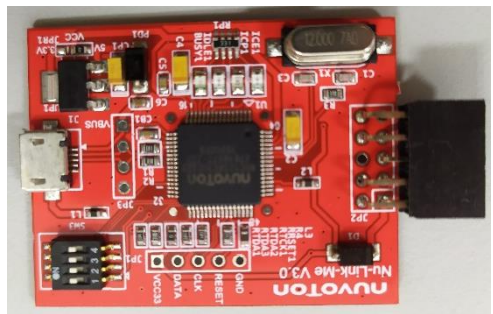


Nu-LVMDM-MOS

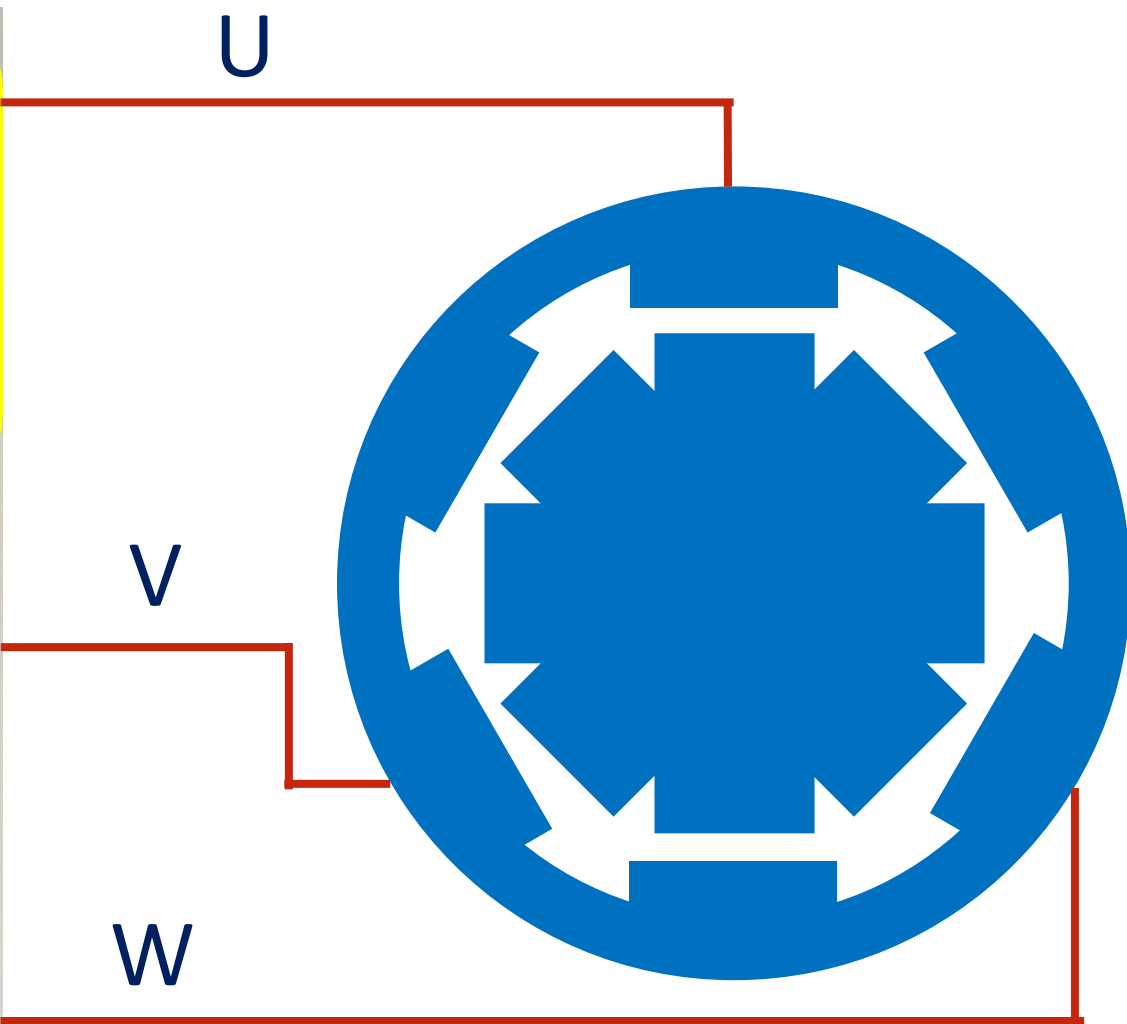


Nu-Motor

USB

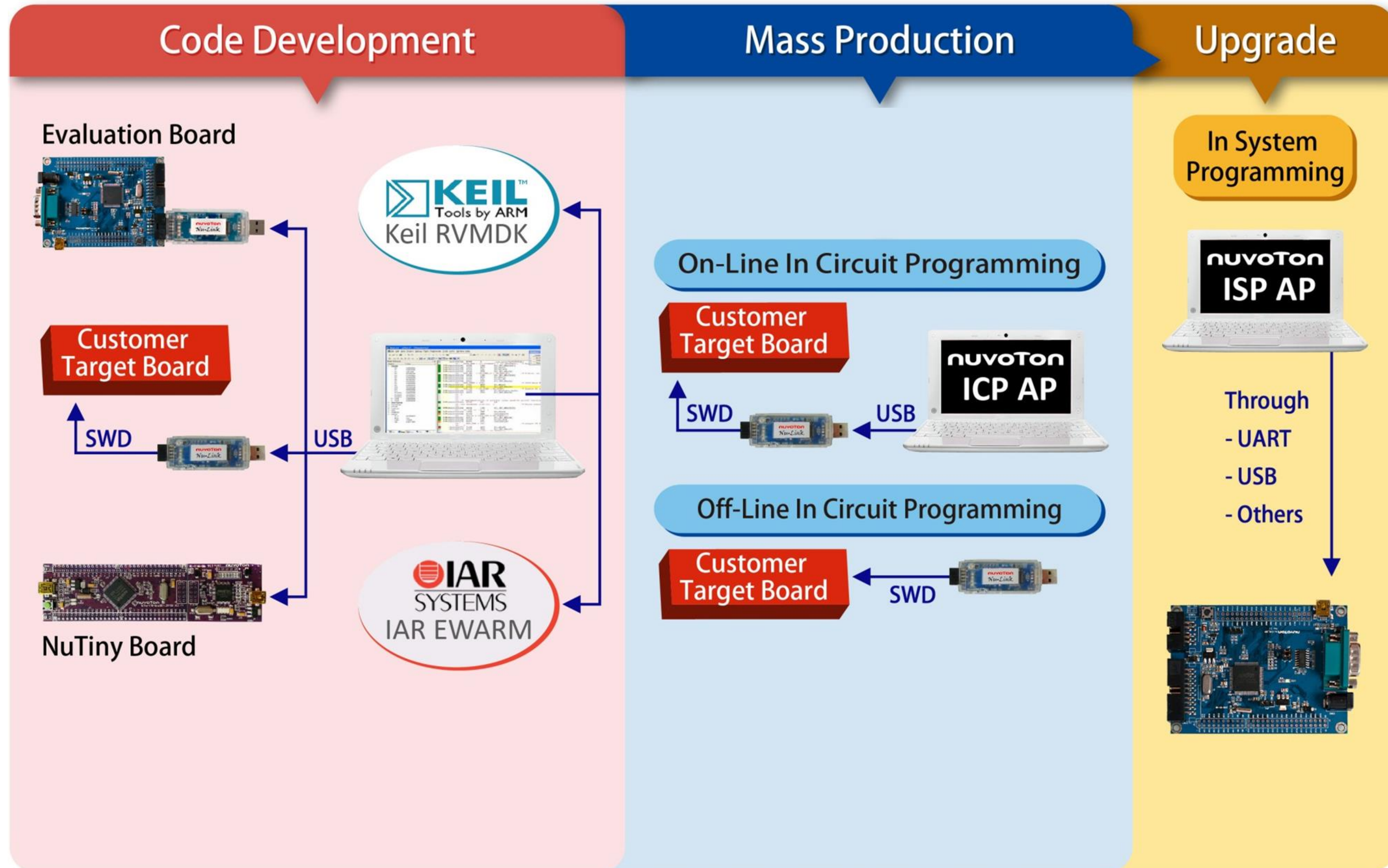


NK-1200L  
NK-1120L  
NK-1230L  
NK-1530L





# NuMicro Development







**Product line**



**Tools for development**



**Application &  
Selection Guide**



# Application

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Food



Clothing

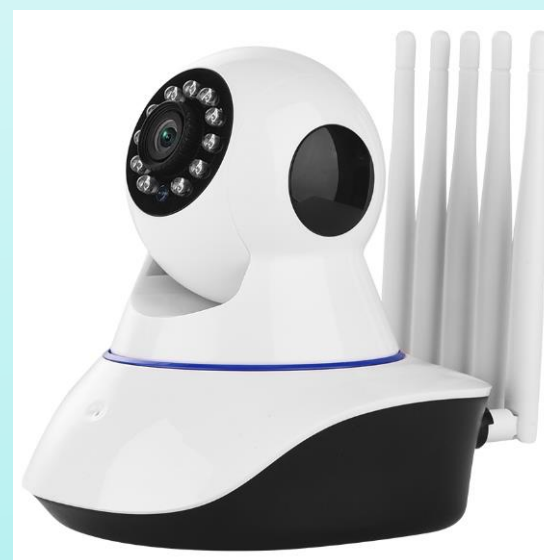
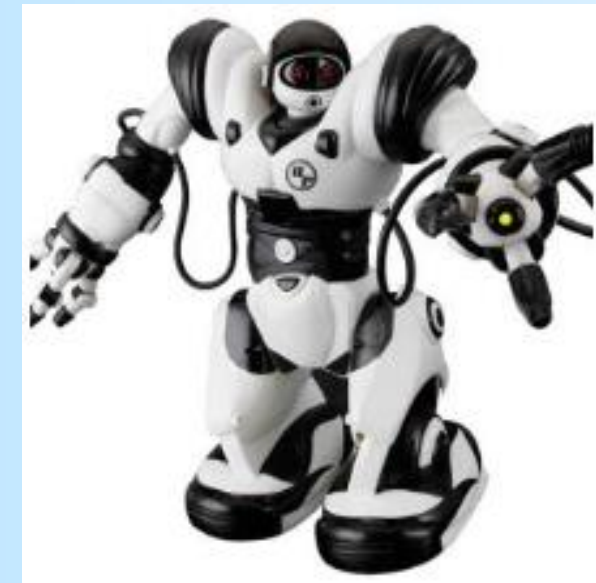


Traffic

Housing



Entertainment



Else





# Nuvoton Motor MCU Product Selection Guide-1

2020/04/20

Part Number	Flash ROM (KB)	SRAM (KB)	I/O	Timer 32-bits	EPWM 16-bit	ADC ch 10-bit	Comp.	UART SPI I2C	MAX HCLK	Package Type
NM1100FBAE	17.5	2	17	2	6	8	2	1/0/0	48	TSSOP20
NM1200ZBAE	17.5	2	29	2	6	12	2	2/1/1	48	QFN33 (5x5)
NM1200LBAE	17.5	2	33	2	6	12	2	2/1/1	48	LQFP48 (7x7)

Part Number	Flash ROM (KB)	SRAM (KB)	I/O	Timer 32-bits	EPWM 16-bit	ADC ch 12-bit	Comp.	UART SPI I2C	MAX HCLK	BPWM 16-bit	ECAP 24-bit	PGA	SPROM (KB)	Package Type
NM1120XC1AE	29.5	4	18	2	6	8	2	2/2/2	48	2	3	1	3x0.5	QFN20 (4x4)
NM1120FC1AE	29.5	4	18	2	6	8	2	2/2/2	48	2	3	1	3x0.5	TSSOP20
NM1120EC1AE	29.5	4	22	2	6	8	2	2/2/2	48	2	3	1	3x0.5	TSSOP28

Part Number	Flash ROM (KB)	SRAM (KB)	I/O	Timer 32-bits	EPWM 16-bit	ADC ch 12-bit	Comp.	UART SPI I2C	MAX HCLK	BPWM 16-bit	ECAP 24-bit	PGA	SPROM (KB)	OPA	QEI (A/B/IDX)	DAC 12-bit	Package Type
NM1232D	32	8	44	4	6	16	2	3/2/3	72	2	3	1	3x0.5	3	1	2	LQFP48 (7x7)
NM1232Y	32	8	44	4	6	16	2	3/2/3	72	2	3	1	3x0.5	3	1	2	QFN48 (7x7)
NM1233D	48	8	44	4	6	16	2	3/2/3	72	2	3	1	3x0.5	3	1	2	LQFP48 (7x7)
NM1233Y	48	8	44	4	6	16	2	3/2/3	72	2	3	1	3x0.5	3	1	2	QFN48 (7x7)
NM1234D	64	16	44	4	6	16	2	3/2/3	72	2	3	1	3x0.5	3	1	2	LQFP48 (7x7)
NM1234Y	64	16	44	4	6	16	2	3/2/3	72	2	3	1	3x0.5	3	1	2	QFN48 (7x7)
NM1235D*	64	16	60	4	6	16	2	3/2/3	72	2	3	1	3x0.5	4	1	2	LQFP64
NM1235Y*	64	16	60	4	6	16	2	3/2/3	72	2	3	1	3x0.5	4	1	2	QFN64 (9x9)
NM1236D*	128	16	96	4	12	20	2	3/2/3	72	2	6	1	3x0.5	4	2	2	LQFP100



# Nuvoton Motor MCU Product Selection Guide-2 Joy of innovation **nuvoTon**

Part Number	Flash ROM (KB)	SRAM (KB)	I/O	Timer 32-bits	EPWM 16-bit	ADC ch 12-bit	Comp.	UART SPI I2C	MAX HCLK	BPWM 16-bit	ECAP 24-bit	CAN2.0	MDU	OPA	QEI (A/B/IDX)	Package Type
NM1520LD2AE	64	8	38	4	9	9	1	2/1/1	72	0	3**	1	√	2	1	LQFP48
NM1520RD2AE	64	8	51	4	12	14	2	2/1/1	72	1	3**	1	√	2	1	LQFP64
NM1520RC2AE	32	8	51	4	12	14	2	2/1/1	72	1	3**	1	√	2	1	LQFP64
NM1530VD3AE	64	16	82	4	12	16	3	2/3/1	72	2	6	1	√	2	2	LQFP100
NM1530VE3AE	128	16	82	4	12	16	3	2/3/1	72	2	6	1	√	2	2	LQFP100

Part Number	Flash ROM (KB)	SRAM (KB)	I/O	Timer 32-bits	EPWM 16-bit	ADC ch 12-bit	Comp.	UART SPI I2C	MAX HCLK	BPWM 16-bit	ECAP 24-bit	PGA	SPROM (KB)	OPA	QEI (A/B/IDX)	DAC 12-bit	Package Type
TF5102Y	48	8	30	4	6	12	2	3/2/3	72	1	3	1	3x0.5	1	1	2	QFN33 (4x4)
TF5103Y	64	16	30	4	6	12	2	3/2/3	72	1	3	1	3x0.5	1	1	2	QFN33 (4x4)
TF5103D	64	16	44	4	6	16	2	3/2/3	72	2	3	1	3x0.5	3	1	2	LQFP48 (7x7)

Part Number	Flash ROM (KB)	SRAM (KB)	I/O	Timer 32-bits	EPWM 16-bit	ADC ch 12-bit	Comp.	UART SPI I2C	MAX HCLK	BPWM 16-bit	ECAP 24-bit	PGA	SPROM (KB)	LDO	Package Type
NM18107Y	29.5	4	14	2	6	8	2	2/1/2	48	2	3	1	3x0.5	5V & 12V	QFN33 (5x5)

Part Number	Flash ROM (KB)	SRAM (KB)	I/O	Timer 32-bits	EPWM 16-bit	ADC ch 10-bit	Comp.	UART I2C	MAX HCLK	LDO	Package Type
NM18202S	17.5	2	10	2	6	7	2	2/0	48	5V & 12V	TSSOP28
NM18202Y	17.5	2	23	2	6	12	2	2/1	48	5V & 12V	QFN48 (7x7)



# Nuvoton Motor MCU Product Selection Guide-3



Part Number	Flash ROM (KB)	SRAM (KB)	I/O	Timer 32-bits	EPWM 16-bit	ADC ch 12-bit	Comp.	UART SPI I2C	MAX HCLK	BPWM 16-bit	ECAP 24-bit	PGA	SPROM (KB)	LDO	Package Type
NM1817NT	29.5	4	15	2	6	8	2	2/2/2	48	2	3	1	3x0.5	5V	LQFP44 (10x10)

Part Number	Flash ROM (KB)	SRAM (KB)	I/O	Timer 32-bits	EPWM 16-bit	ADC ch 12-bit	Comp.	UART SPI I2C	MAX HCLK	BPWM 16-bit	ECAP 24-bit	PGA	SPROM (KB)	OPA	QEI (A/B/IDX)	DAC 12-bit	LDO	Package Type
NM18307Y*	64	16	36	4	6	16	2	3/2/3	72	2	3	1	3x0.5	3	1	2	5V & 12V	OFN56 (7x7)

Part Number	Flash ROM (KB)	SRAM (KB)	I/O	Timer 32-bits	EPWM 16-bit	ADC ch 12-bit	Comp.	UART SPI I2C	MAX HCLK	BPWM 16-bit	ECAP 24-bit	PGA	SPROM (KB)	OPA	QEI (A/B/IDX)	DAC 12-bit	Package Type
NM1220EBK0*	48	8	44	4	6	16	2	3/2/3	72	2	3	1	3x0.5	3	1	2	LQFP48 (7x7)

\* Under Planning  
\*\* from QEI Module



# EVB Selection Guide

Type	Part Number	Function
Single Chip	NT-NM1120	NM1120 series development board
	NT-NM1200	NM1200 series development board
	NT-NM1230	NM1230 series development board
	NT-TF5103	TF5103 series development board
	NT-NM1530	NM1530 series development board
Development kit	NK-NM1120L	Low voltage motor development kit for NM1120 series
	NK-NM1200L	Low voltage motor development kit for NM1200 series
	NK-NM1230L	Low voltage motor development kit for NM1230 series
	NK-NM1530L	Low voltage motor development kit for NM1530 series
	NK-NM18202L	Low voltage motor development kit for NM18202 series
	NK-NM18107L	Low voltage motor development kit for NM18107 series
	NK-NM1817H	High voltage motor development kit for NM1817 series



