# NuMicro® MA35 Family

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NuMicro® Ecosystem

# Microcontroller Platform

**Feature**
A Audio | BT Bluetooth | C CAN | CF CAN FD | E Ethernet | L LCD | T Touch Key | U USB | V Video Codec | M Motor | P Power
Low Power | TrustZone | AEC-Q100
**Operating Voltage** 1.8 1.8V | 2.4 2.4V | 3.3 3.3V | 5 5V

Operating Frequency

800 MHz
650 MHz
300 MHz
192 MHz
120 MHz
72 MHz
64 MHz
24 MHz
7 MHz

## 8051

| | | | |
|---|---|---|---|
| 1.8 3.3 | ML56 | | T L |
| 1.8 3.3 | ML54 | | L |
| 1.8 3.3 5 | ML51 | | |
| 3.3 5 | MG51 | | |
| 3.3 5 | MS51 | | |
| 3.3 5 | N79E | | |
| 3.3 5 | N76E | | |
| 1.8 3.3 5 | MUG51 | | |

## Cortex®-M0

| | | | |
|---|---|---|---|
| 3.3 5 | NUC1261 | | U |
| 3.3 5 | NUC126 | | U |
| 3.3 | M091 | | |
| 3.3 | M031G | | |
| 3.3 | M029G/M030G | | |
| 1.8 3.3 | M032 | | U |
| 1.8 3.3 | M031 | | |
| 3.3 5 | NUC029 | | U |
| 1.8 3.3 | M032BT | | BT U |
| 1.8 3.3 | M031BT | | BT |
| 3.3 5 | NUC230 | | C |
| 3.3 5 | NUC131U | AEC-Q100 | C |
| 3.3 5 | NUC1311 | | C |
| 2.4 5.5 | ISD9160 | | A |
| 2.4 5.5 | ISD91500 | | A |
| 2.4 5.5 | ISD91200 | | A |
| 1.8 5.5 | N574 | | A T |
| 1.8 5.5 | N572 | | U A T |
| 1.8 5.5 | N570 | | A T |
| 3.3 5 | M0A23 | AEC-Q100 | C |
| 3.3 5 | M071 | | |
| 3.3 5 | M051 | | |
| 3.3 5 | Mini51 | | |
| 1.8 3.3 | Nano100 | | |

## Cortex®-M23

| | | | |
|---|---|---|---|
| 1.8 3.3 | M2354 | Low Power, TrustZone | L |
| 1.8 3.3 | M2L31 | Low Power, TrustZone | T C U |
| 1.8 3.3 | M2351 | Low Power, TrustZone | |
| 3.3 5 | NUC1263 | | U |
| 3.3 5 | NUC1262 | | U |
| 1.8 3.3 | M263 | Low Power | C U |
| 1.8 3.3 | M262 | Low Power | U |
| 1.8 3.3 | M261 | Low Power | |
| 1.8 3.3 5 | M258 | Low Power | T L U |
| 1.8 3.3 5 | M256 | Low Power | T L |
| 1.8 3.3 5 | M254 | Low Power | L |
| 1.8 3.3 5 | M253 | Low Power | CF U |
| 1.8 3.3 5 | M252 | Low Power | U |
| 1.8 3.3 5 | M251 | Low Power | |

## Cortex®-M4

| | | | |
|---|---|---|---|
| 1.6 3.6 | ISD94100 | | A U |
| 1.8 3.3 | M480 | | E C U |
| 1.8 3.3 | M460 | | E CF U |
| 1.8 3.3 | M433 | | C U |
| 3.3 5 | M471 | | U |
| 3 5 | KM1M4BF | | M |
| 3.3 5 | M453 | | C |
| 3.3 5 | M452 | | U |
| 3.3 5 | M451 | | |

## Cortex®-M7

| | | | |
|---|---|---|---|
| 5 | KM1M7AF | | CF P |
| 5 | KM1M7BF | | M |

## AI

### Cortex®-M55

| | | | |
|---|---|---|---|
| | M55M1 | | |

## MPU

### Cortex®-A35

| | | | |
|---|---|---|---|
| | MA35D1 | TrustZone | V E CF L U |
| | MA35D0 | TrustZone | E CF U |
| | MA35H0 | TrustZone | V E CF L U |

### Arm9™

| | | | |
|---|---|---|---|
| | NUC980 | | E C U |
| | NUC970 | | E C L U |
| | N9H | | V E C L U |
| | N329 | | V E L U |


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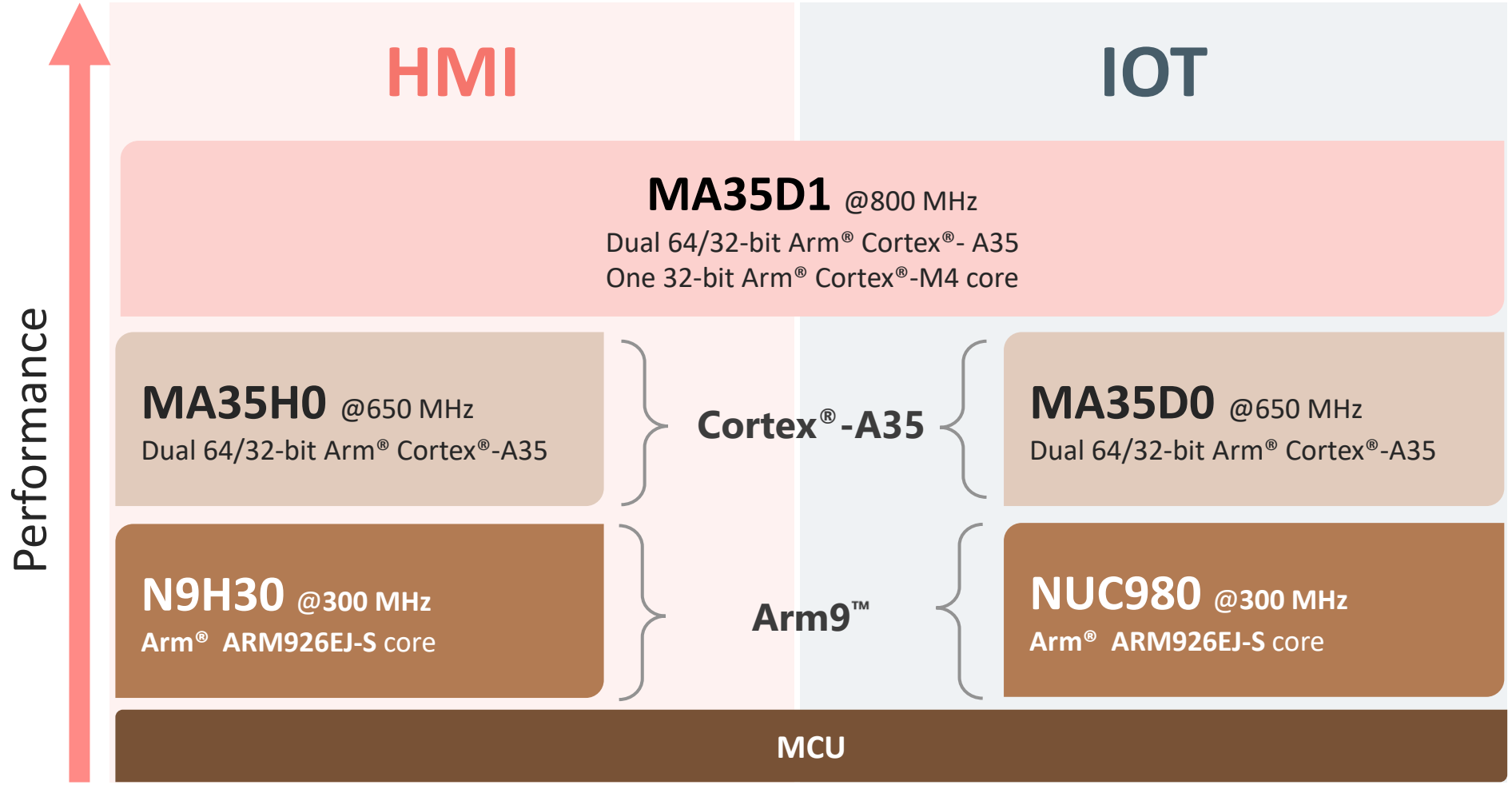
# Nuvoton MPU Platform





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# NuMicro® MA35 Family MPU

| Series & CPU / DDR | MA35H0 Dual A35@650 MHz | MA35D1 Dual A35@800 MHz | | |
|---|---|---|---|---|
| DDR (External) | | | | MA35D16A087C |
| DDR 512 MB | | MA35D16F987C | | |
| DDR 256 MB | | MA35D16F887C | MA35D16A887C | |
| DDR 128 MB | MA35H04F764C | MA35D16F787C | | |
| Package | LQFP216 (MCP DDR) (24 x 24 mm) | LQFP216 (MCP DDR) (24 x 24 mm) | BGA312 (MCP DDR) (15 x 15 mm) | BGA364 (14 x 14 mm) |
| Features | • Megabit Ethernet<br>• 2 sets of CAN FD<br>• 6 sets of UART<br>• 154x GPIO | • Megabit + Gigabit Ethernet<br>• 4 sets of CAN FD<br>• 17 sets of UART<br>• 154x GPIO | • 2 sets of Gigabit Ethernet<br>• 4 sets of CAN FD<br>• 17 sets of UART<br>• EADC<br>• 208x GPIO | • 2 sets of Gigabit Ethernet<br>• 4 sets of CAN FD<br>• 17 sets of UART<br>• EADC<br>• 208x GPIO |
| Security | • TrustZone & Secure Boot<br>• Practical Hardware Security | | • TrustZone & Secure Boot<br>• TSI Advanced Security<br>• Temper pins | |
| Display & Video | • 720P Display + H.264 Decoder | | • 1080P Display + H.264 Decoder<br>• 2 sets of Camera Interface | |
| Operating Temp. (Tj) | -40°C ~ +125°C | | -40°C ~ +105°C | |


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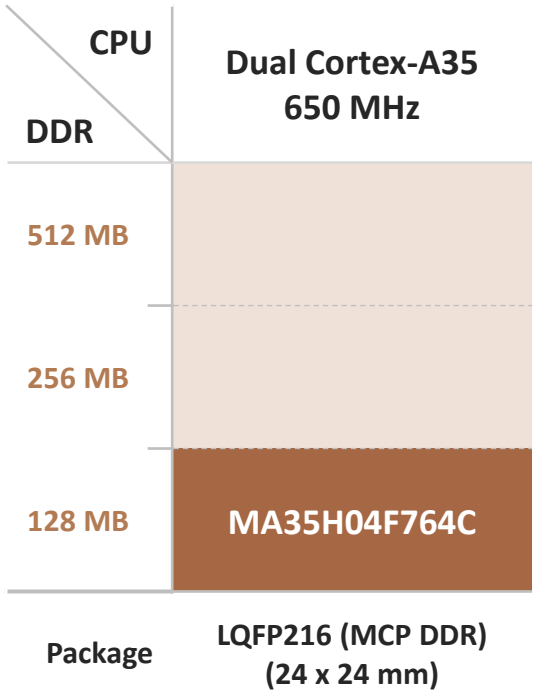
# NuMicro® MA35H0 Series MPU




- **Dual 64-bit Arm® Cortex®-A35 high-performance cores running up to 650 MHz**
- **LQFP package parts with stacking a DDR SDRAM up to 128 MB**
- **Display**
  - LCD display I/F the resolution up to 1280 x 800 (720P) @60 fps
  - 2D Graphic Engine
  - H.264 decoder up to 1920 x 1080 @60 fps
  - JPEG decoder
- **High-speed connectivity**
  - 1 set of 10/100/1000 Mbps Ethernet
  - 1 set of SDIO3.0, 1 set of SDIO2.0
  - 1 set of USB HS Host
  - 1 set of USB HS Host/Device dual role
  - 2 sets of CAN FD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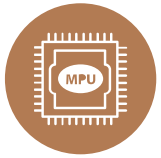
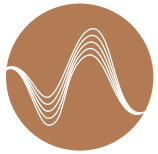
# NuMicro® MA35H0 Series Features




## System

- Dual 64-bit/32-bit Arm® Cortex®-A35 high-performance cores
- Runs up to 650 MHz
- 32 KB I/D L1 cache for each core, and a 512 KB shared L2 cache
- Supports discrete power supply and PMIC solutions
- Operating temperature (Tj): -40°C ~ +125°C
- Offering LQFP package parts with stacking a DDR SDRAM up to 128 MB

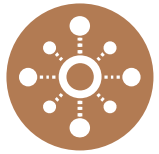


## Analog

- 1 set of 12-bit 500 ksps ADC with 8 input channels, supports 4/5-wire resistive touch

## Display

- LCD RGB I/F display with the resolution up to 1280 x 800 @60 fps
- Integrated a 2D Graphic Engine
- JPEG decoder, picture size up to 16368 x 16368
- H.264 decoder supports baseline, main profile, high profile, and resolution up to 1280 x 800 @60 fps



## Peripherals

- 4 sets of PDMA
- 1 set of 10/100 Mbps Ethernet
- 1 set of USB HS Host, 1 set of USB HS Host/Device dual role
- 1 set of SDIO3.0 and 1 set of SDIO2.0
- 2 sets of CAN FD
- 1 sets of Quad SPI
- 1 sets of $I^2S$
- 2 sets of SPI/$I^2S$
- 6 sets of UART
- 3 sets of $I^2C$
- Up to 150x GPIO (LQFP216)
- 18-channel 28-bit Enhanced PWM (EPWM)
- 12-channel 32-bit Timer PWM (Timer PWM)
- RTC with $V_{BAT}$

## Security

- TrustZone
- Secure Boot
- Hardware Security Features
  - Crypto Engine:  AES256, SHA512, ECC, RSA4096, SM2/3/4
  - True Random Number Generator (TRNG)
  - 8 Kbits One Time Programmable (OTP) memory with Key Store to protect key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# NuMaker-HMI-MA35H0-A1 EVB

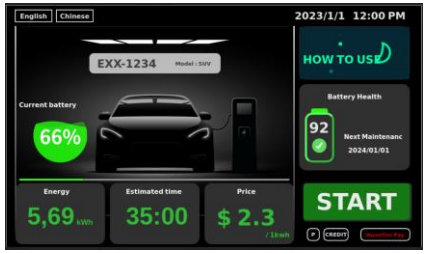
## Features

- MA35H04F764C / LQFP216 package (MCP with 128 MB DDR)
- Dual Cortex-A35, CPU speed up to 650 MHz
- Discrete power supply
- Memory Device
  - NAND Flash 1GB
  - Quad SPI NAND Flash 512MB
  - 1 set of SD3.0 (Standard SD slot), 1 set of SD2.0 (Micro SD slot)
- High-speed Connectivity
  - 1 set of Megabit Ethernet
  - 1 set of USB2.0 HS Host, 1 set of USB2.0 HS Host/Device
  - 1 set of CAN FD
  - 2 sets of RS485 / RS232
- Audio Codec (NAU88C22YG) with Mic & Headset Jack
- Analog and Digital I/O header
- 7” TFT-LCD (1024 x 600) with Resistive Touch

## EVB Info

- https://www.nuvoton.com/products/gui-solution/gui-platform/numaker-hmi-ma35h0-a1/
- Part Number: NuMaker-HMI-MA35H0-A1
- Ordering Number: NK-HMA35H0A1

EV Charging Station




Industrial Control

Coffee Machine

Speed Meter

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# NuMicro® MA35Family Series Targets Applications

IIoT Edge Gateway
Smart Building
Smart Agriculture
Telematics Box
4G/5G Base Station

**Edge Gateway**

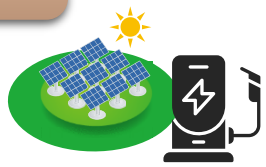
**Tiny AI/ML**

Keyword spotting
Face recognition
Number recognition

**High-Performance**
**Advanced Security**

Industrial HMI
Home Appliance
2-wheel cluster
Medical Devices

**HMI &**
**Industrial Control**



**New Energy**

PV inverter
BMS
Smart Grid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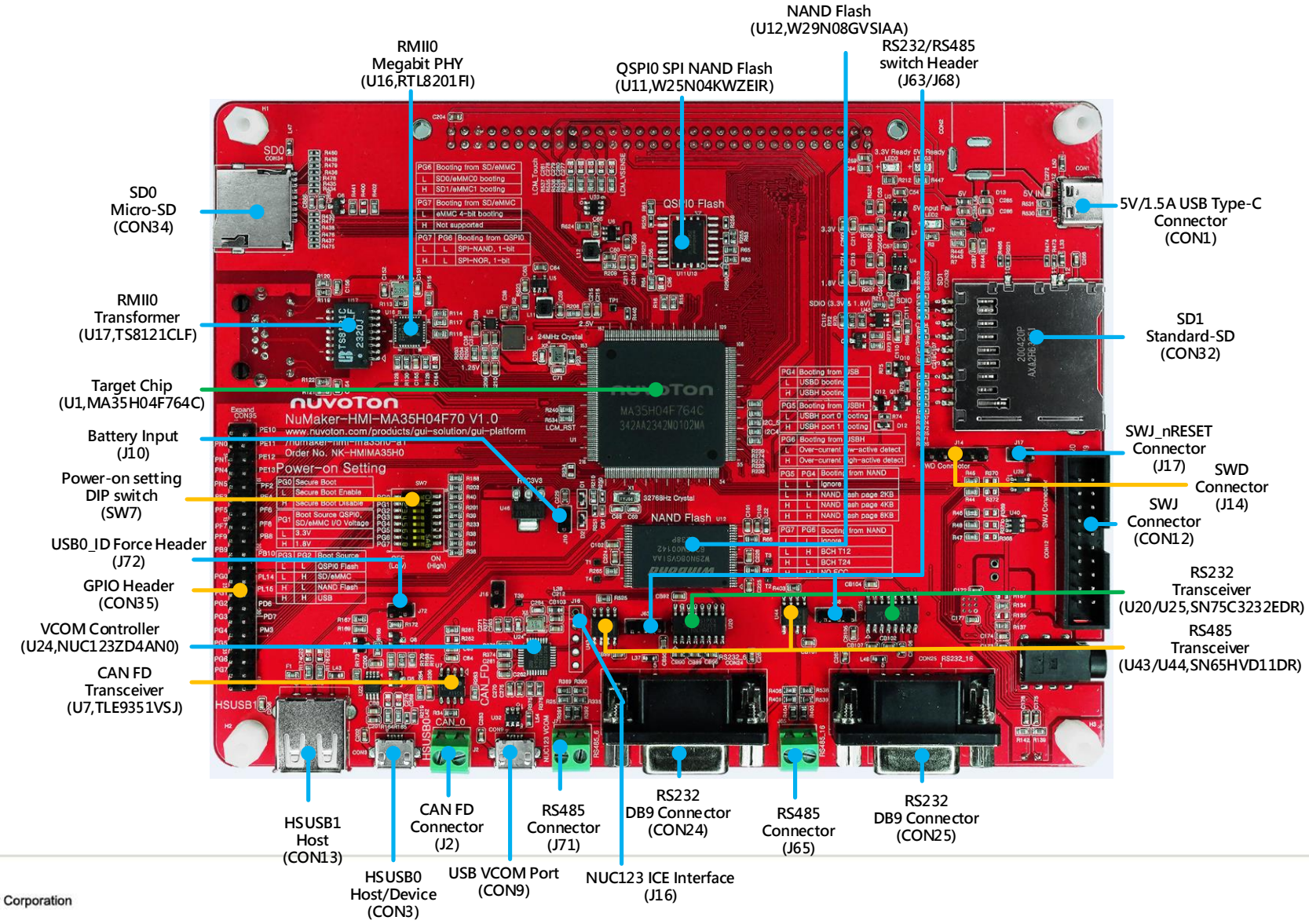
# NuMaker-HMI-MA35H0-A1 EVB Front View





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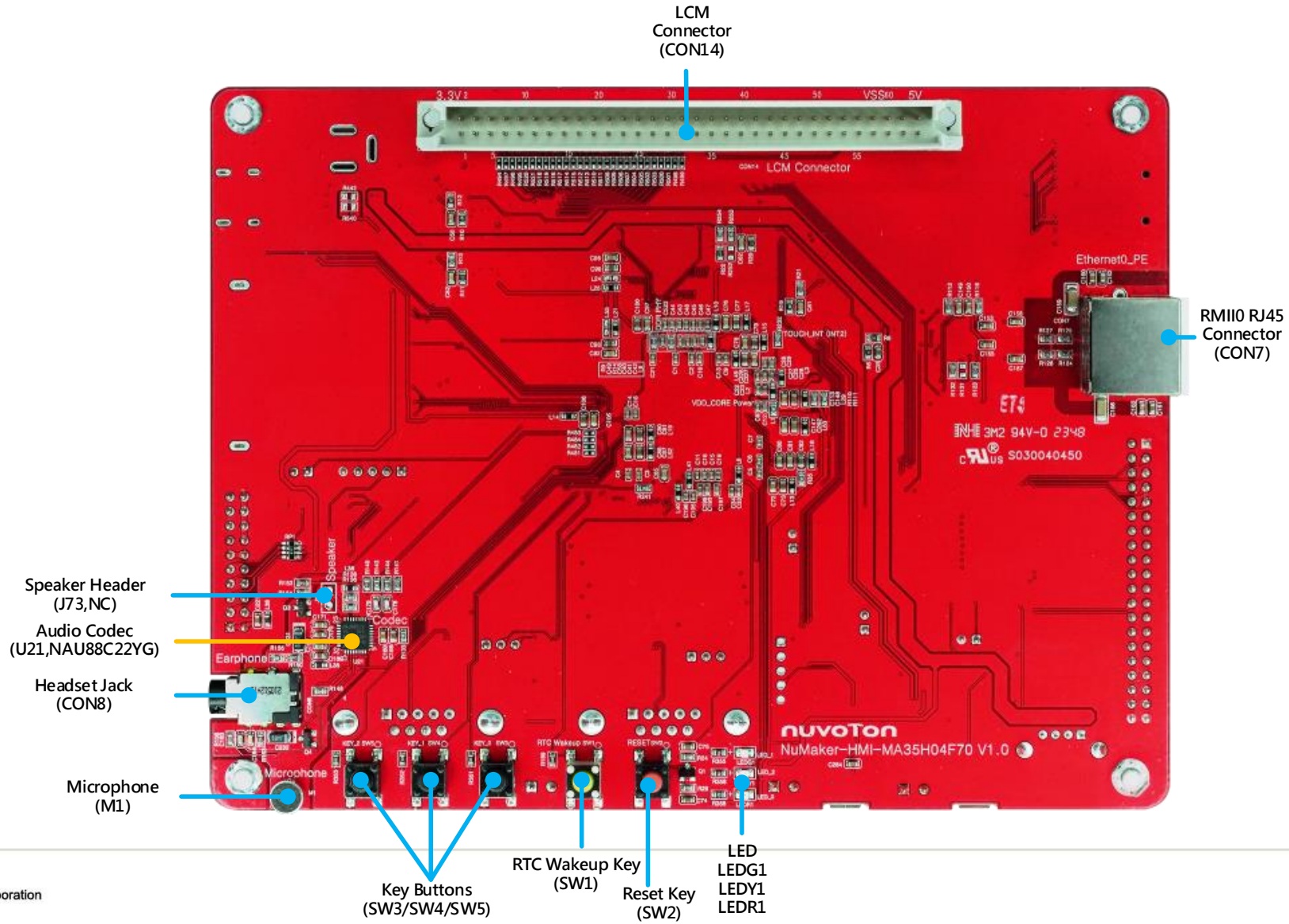
# NuMaker-HMI-MA35H0-A1 EVB Rear View





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# Power-on-Setting

- Options for secure boot enable or disable:

| SW7.1 / PG0* | Secure Booting |
|---|---|
| Low | Enable |
| High | Disable |
| **Note** *: The GPIO PG0 is internal weakly pull-down. | |

- Options for booting source selection:

| SW7.4 / PG3*1 | SW7.3 / PG2*1 | Booting Source |
|---|---|---|
| Low | Low | QSPI0 Flash |
| Low | High | SD/eMMC*2 |
| High | Low | NAND Flash |
| High | High | USB |
| **Note** *1: These GPIO PG2 and PG3 are internal weakly pull-down.<br>**Note** *2: There's only SD0 micro card slot on this NuMaker-HMI-MA35H04F70 board. | | |


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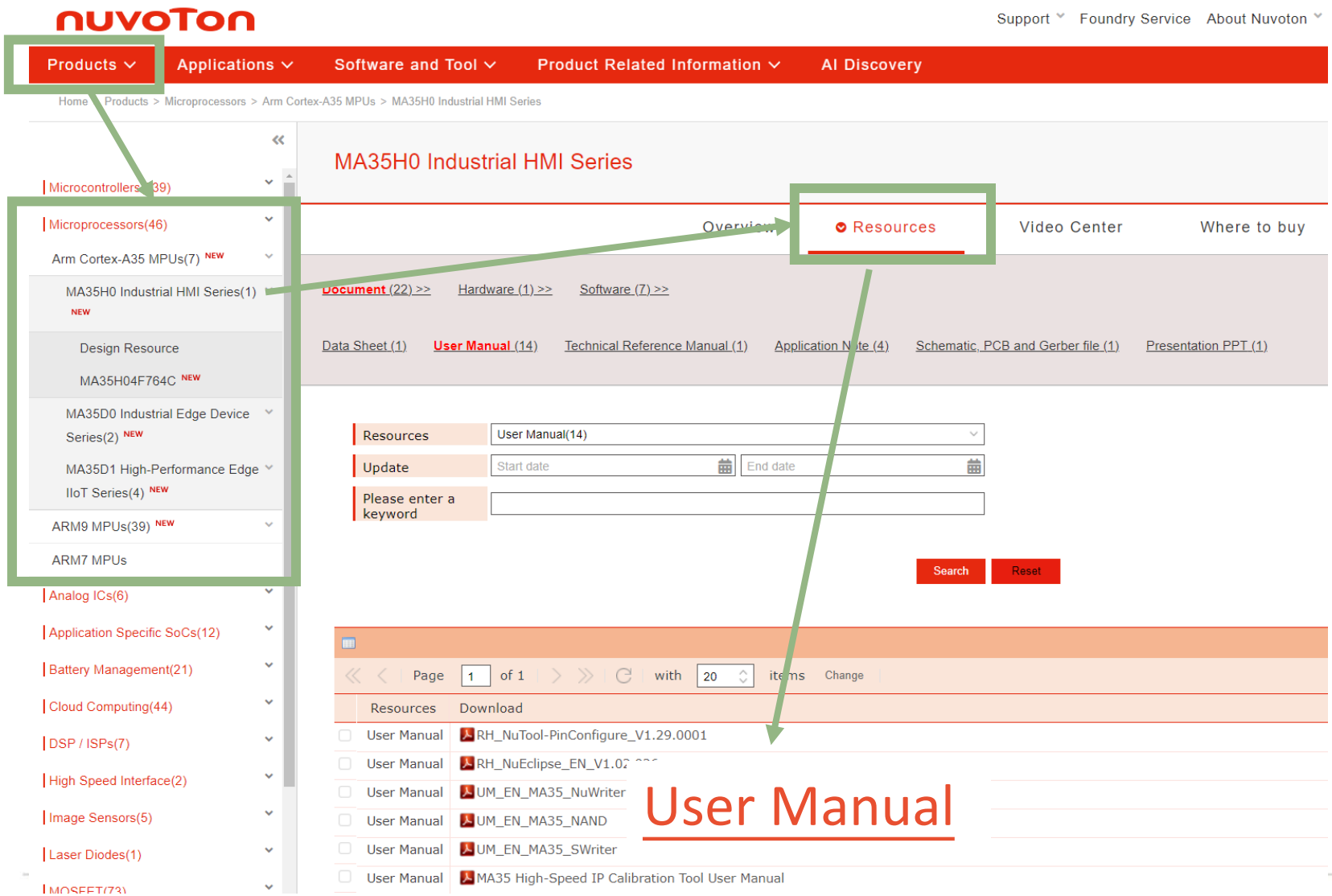
# Source




## Official Website

nuvoTon
www.nuvoton.com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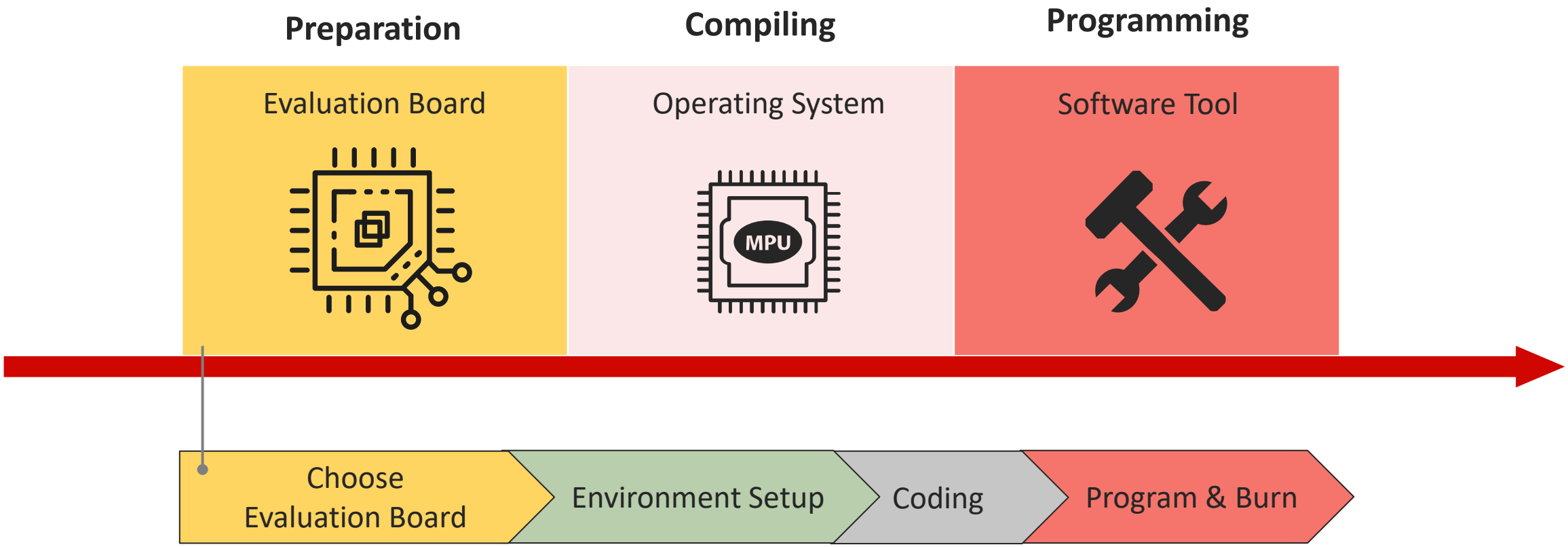
# NuMicro® Development Platform

Evaluation Board / BSP / IDE / Software Tool / Debugger & Programmer

# Golden 3 Steps of Evaluation





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# NuDeveloper Ecosystem – Make Engineers' Jobs Easier

**nuvoton.com**
Product Information / Documents / Selection

- **Online Support**: NuForum / Sales Support Mailbox / Online Chat
- **Social Media & Knowledge Base**: LinkedIn / Facebook / Twitter / WeChat
- **Video Platform**: YouTube / bilibili
- **Open Resource**: Github / Gitlab / Gitee

**Online buy**
- Nuvoton Direct
- Tmall
- TechDesign
- DigiKey

## Digital Platform

### Development Platform

arm KEIL | IAR Embedded Workbench | NuEclipse | NuEdgeWise
IDE

Nu-Link2-Pro/ Nu-Link2-Me
Nu-Link-Gang/ Gang Writer
Debugger & Programmer

NuMaker Series /
Motor Control Series / Power Control Series
Evaluation Board

MCU BSP (API Compatible) / Linux BSP/ Peripheral Driver / Library / Rich Sample Code
Third party resource
BSP & Example Code

NuIDE/ UltraoIO/ VR Lib / CodeGenerator/ PinView / PinConfig/ ClockConfig / LCDView / TouchView/ ICP/ISP Programming/ Nu-Link Command/ USB to Serial Port / NuAudio
Software Tool(NuTool)

### Platform

**HMI Platform**
SEGGER | SQUARELINE | LVGL | Qt | altia

**IoT Device and Gateway**
arm PELION | amazon web services | Alibaba Cloud | Microsoft Azure | Allxon
arm MBED | AliOS | Azure RTOS | RT-Thread | RTOS | Linux | OpenWrt
Wi Fi | LTE | NB-IoT | LoRa | Bluetooth

**DALI 2 Solutions**
Supports all control gear and control/ input device certified library protocol.

| | |
|---|---|
| 102 | 103 |
| 202 | 301 |
| 206 | 302 |
| 207 | 303 |
| 208 | 304 |
| 209 | |

### Reference Design Platform

| | | | |
|---|---|---|---|
| BMS | LCD Touch Key | Cold Chain | Thermostat |
| Lighting Control | HDMI2.1 | USB Type-C PD3.1 | AR & VR |

8051 / M0 / M23 / M4 / M7 / Arm9 / A35 based Microcontroller

## NuMicro® Microcontroller Platform


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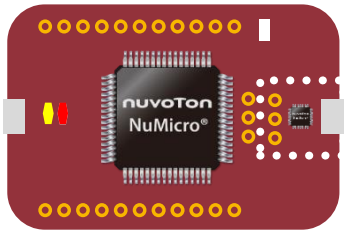
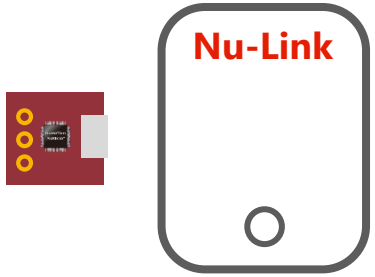
nuvoTon

# NuMicro® Development Platform



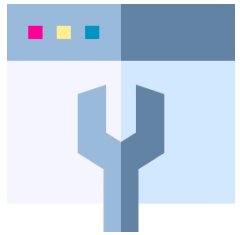

## Evaluation Board (NuMaker)

| General | Application Specific |
|---|---|
| NuMaker | DALI<br>IoT<br>HMI |



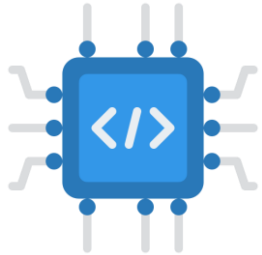

## Debugger & Programmer (Nu-Link)

| 1 to 1 Debugger & Programmer | MP Programmer |
|---|---|
| Nu-Link<br>Nu-Link-Pro<br>Nu-Link2-Pro<br>Nu-Link-Me<br>Nu-Link2-Me | Nu-Link-Gang |



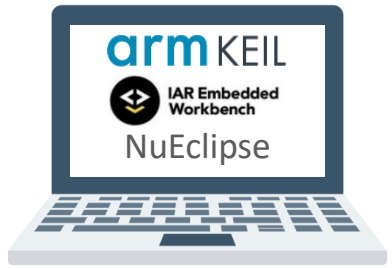
## Software Tool (NuTool)

| Programming | General | Application Specific |
|---|---|---|
| ICP<br>ISP<br>Nu-Link Command<br>NuWriter<br>NAND Writer | PinConfigure<br>PinView<br>ClockConfigure<br>CodeGenerator<br>USB to Serial Port | DALIController<br>LCDView<br>TouchView |



## Embedded Software (BSP & Example Code)

| Board Support Package (BSP) | Example Code |
|---|---|
| Peripheral<br>Drivers<br>Reference Guide<br>PDF/HTML<br>Library<br>IEC 60730/emWin<br>Operating System<br>Linux/RT-Thread<br>Security<br>TF-A/OP-TEE | Designed with NuMicro Family<br>Audio Codec<br>Lighting<br>Fan speed detect<br>SPI flash control<br>Sensor |




## IDE and Driver

| MCU | MPU |
|---|---|
| Keil MDK<br>IAR EWARM<br>NuEclipse<br>Windows or Linux | Docker<br>Yocto Project<br>Buildroot<br>OpenWRT<br>Env (RT-Thread) |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# NuMicro® Digital Platform

## Official Website

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## Online Store

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www.techdesign.com/market/nuvoton

## Forum

forum.nuvoton.com

www.nuvoton-MCU.com

bbs.21ic.com/iclist-187-1.html

## Social Media

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## Source Code Download

github.com/OpenNuvoton

gitlab.com/OpenNuvoton

gitee.com/OpenNuvoton


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Joy of innovation

NUVOTON

谢谢

謝謝

Děkuji

Bedankt

Thank you

Kiitos

Merci

Danke

Grazie

ありがとう

감사합니다

Dziękujemy

Obrigado

Спасибо

Gracias

Teşekkür ederim

Cảm ơn