

BIÊN SOẠN VÀ PHÁT HÀNH



CÔNG TY TNHH GIẢI PHÁP TULA

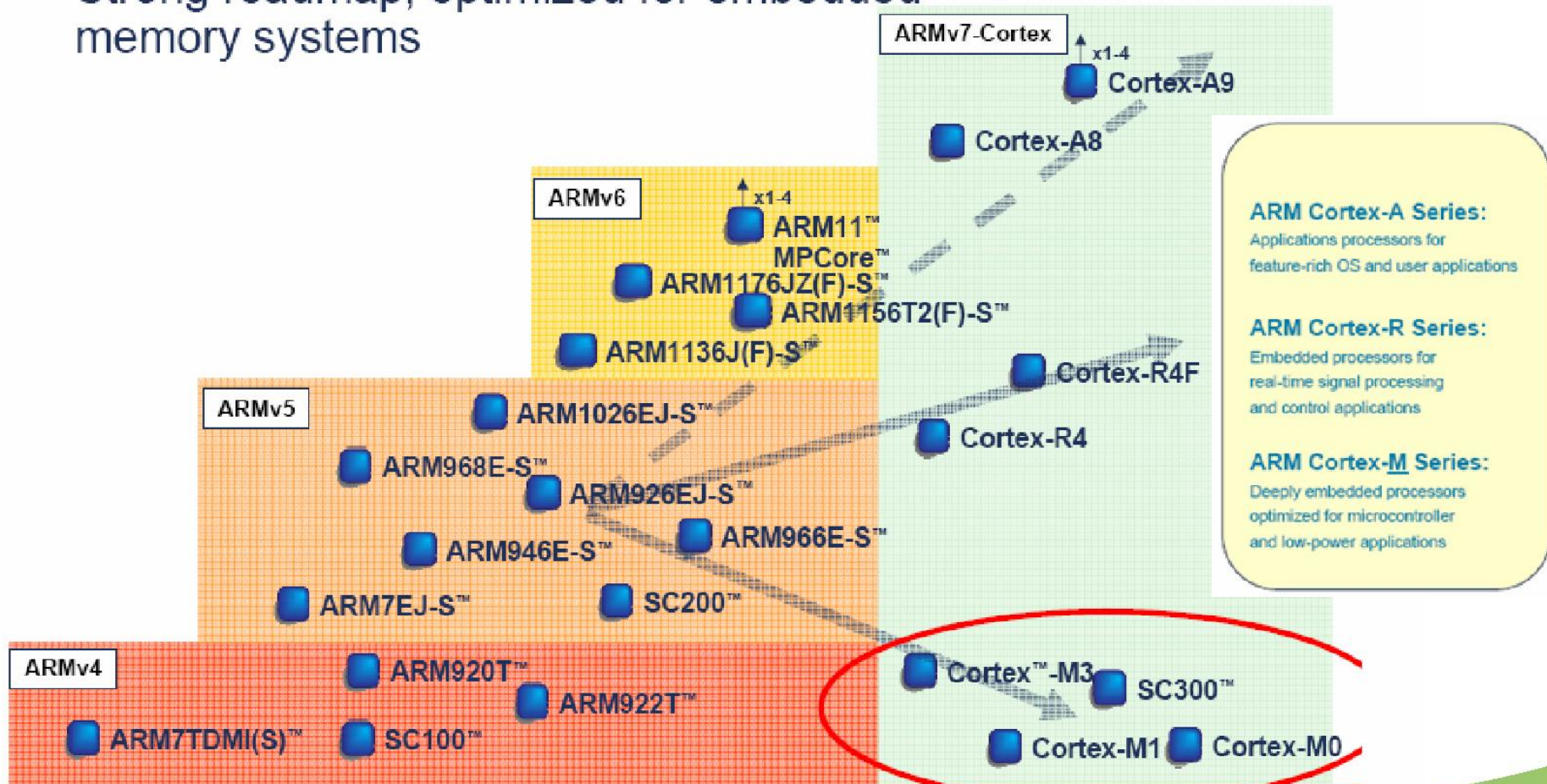
Địa chỉ: Số 6 Ngõ 23 Đình Thôn (Phạm Hùng), Mỹ Đình, Nam Từ Liêm, Hà Nội

Website: www.tula.vn ----- E-mail: info@tula.vn ----- Tel./Fax: 04.39655633

Tổng quan về bộ xử lý ARM Cortex-M0

ARM Processors roadmap (Lộ trình phát triển bộ xử lý ARM)

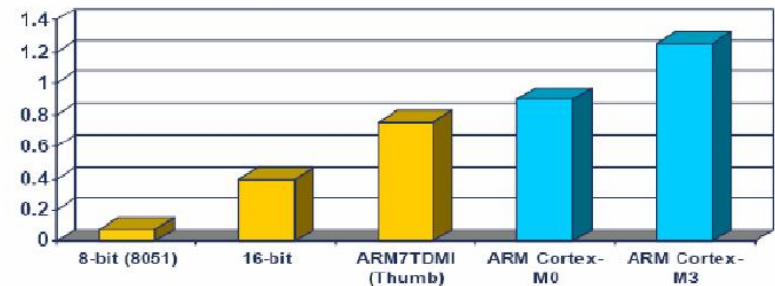
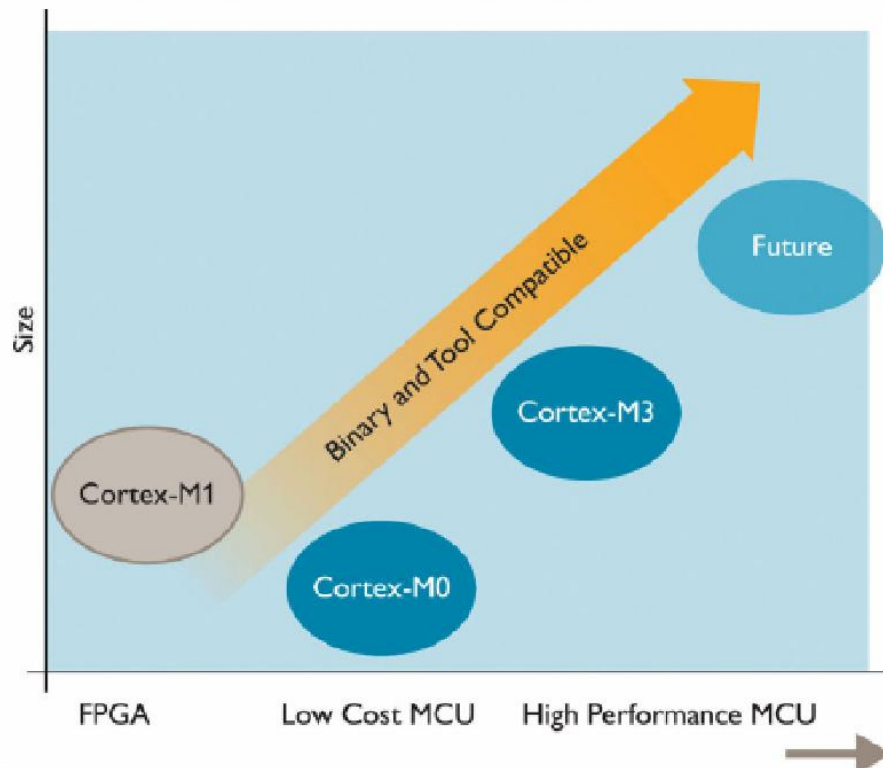
- Strong roadmap, optimized for embedded memory systems



Tổng quan về bộ xử lý ARM Cortex-M0

ARM Cortex-M Series roadmap

- Designed for microcontroller applications
 - Broad software development tools and RTOS support



| | ARM7TDMI | Cortex-M0 | Cortex-M3 |
|------------------------------|----------------------------|------------|-------------|
| DMIPS/MHz | 0.75 (Thumb) 0.95 (ARM) | 0.90 | 1.25 |
| Gate count | 45k | 12k | 43k |
| Number interrupts | 2 | 1-32 + NMI | 1-240 + NMI |
| Interrupt priorities | None | 4 | 8-256 |
| Breakpoints, Watchpoints | 2/0 | 4/2, 2/1 | 8/4, 2/1 |
| MPU, integrated trace option | No | No | Yes |
| Hardware Divide | No | No | Yes |

Lộ trình phát triển dòng ARM Cortex-M

Hiệu năng của ARM Cortex-M0

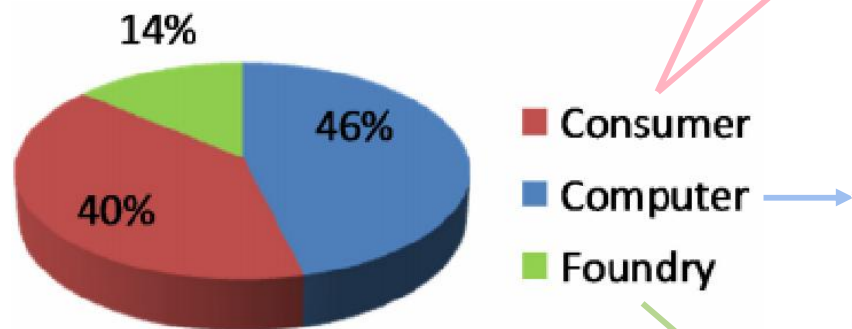
Giới thiệu về Nuvoton & Công ty TULA

nuvoton

新唐科技

founded by winbond

Established on July 1st, 2008,
a spin-off of Winbond Logic
business in Taiwan.



| Categories | Products |
|---|--|
| Microcontroller Application IC Vi mạch ứng dụng Vi điều khiển | <ul style="list-style-type: none">◆ Industrial 8-bit MCU◆ Industrial ARM 32-bit MCU◆ ARM Video SoC |
| Audio Application IC Vi mạch ứng dụng nhạc, audio | <ul style="list-style-type: none">◆ ISD ChipCorder®◆ emPower Audio™◆ ARM Audio Soc◆ MaxxAudio Sound Enhancement IC |
| Cloud & Computing IC Vi mạch điện toán đám mây (giao tiếp ngoại vi Computer) | <ul style="list-style-type: none">◆ Super I/O (SIO)◆ Embedded Controller (EC)◆ Power IC◆ Voltage Level Shift IC◆ Hardware Monitor IC◆ Trusted Platform Module (TPM)◆ Bus Interface Bridge IC |
| Foundry Service Dịch vụ sản xuất chip bán dẫn | <ul style="list-style-type: none">◆ High-Voltage Power IC Process◆ Flat Cell Process◆ Embedded Memory, Mixed signal Process◆ General Logic Process |

Giới thiệu về Nuvoton & Công ty TULA



CÔNG CỤ VÀ THIẾT BỊ ĐIỆN TỬ CHUYÊN DỤNG
Field Electronics Instruments and Accessories

LINH KIỆN ĐIỆN TỬ VÀ DỊCH VỤ PHỤ TRỢ
Electronics Components and Technical Services

% Thị phần tiêu thụ
& Our Turnover



Established on Sep. 3rd, 2009, found by Mr. Le Anh TU as CTO of HANEL Corporation in Hanoi.

| | | | | |
|---|--|---|--|---|
| <p>Emulator/ Debugger (Mô phỏng / gỡ lỗi)</p> | <p>Electronics Load (Tải điện tử DC)</p> | <p>Spectrum / Logic Analyzer (Máy phân tích phổ / Phân tích logic)</p> | <p>Digital Multimeter (Đồng hồ vạn năng)</p> | <p>Oscilloscope (Máy hiển sóng)</p> |
| <p>Training Board (Bo mạch đào tạo)</p> | <p>DC Power Supply (Nguồn điện DC)</p> | <p>Lead cut & Forming (Máy cắt chân linh kiện)</p> | <p>UI, LCR Tester (Máy đo RLC, U, I)</p> | <p>Waveform Generator (Máy phát xung)</p> |
| <p>Dry Cabinet (Tủ sấy IC, PCB)</p> | <p>Chip Counter (Máy đếm chip)</p> | <p>SMT Line System (Printer - Moulder - Reflow Oven) (Dây chuyền công nghệ sản xuất SMT: in - cảm - hàn)</p> | <p>PCB Separator (Máy cắt tách PCB)</p> | |
| <p>Solder Paste Mixer (Máy trộn kem hàn)</p> | <p>Electronics Parts (Linh kiện điện tử)</p> | <p>BGA Rework System + Solder Tools + Wave Soldering Pot (Máy hàn chip BGA + Máy hàn/ khò thiếc + Máy hàn sóng)</p> | <p>Technical Service (Dịch vụ kỹ thuật)</p> | |

DEVICE PROGRAMMER

DIGITAL MULTIMETER

LOGIC ANALYZER

OSCILLOSCOPE

DATA LOGGER

SOLDER TOOLS

ELECTRONIC LOAD

DC POWER SUPPLY

SPECTRUM ANALYZER

FUNCTION GENERATOR

COMPONENT/ LCR METER

SMT & PCBA EQUIPMENT

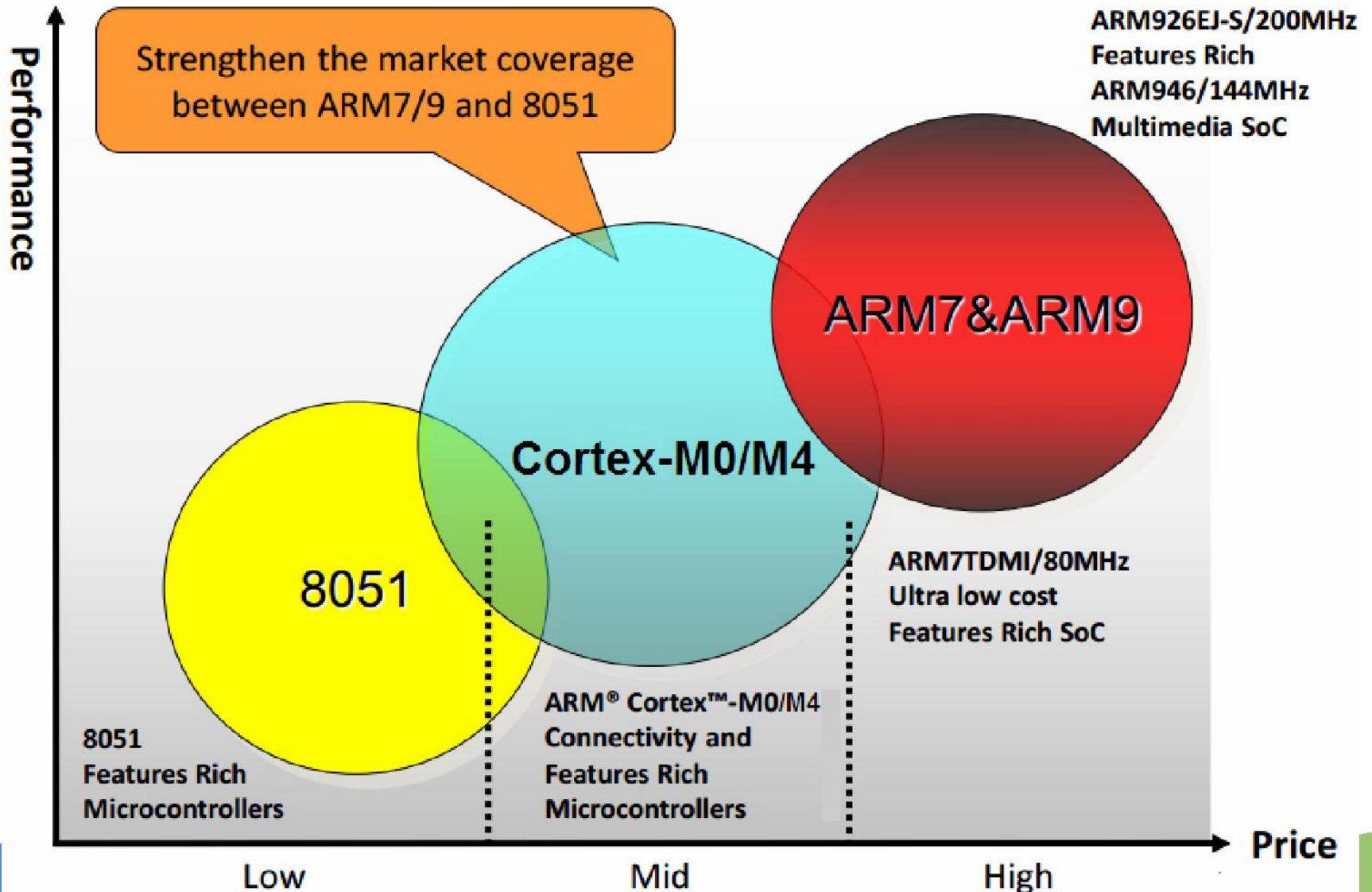
ELECTRONICS COMPONENT

EMBEDDED ELECTRONIC TOOL

ELECTRONICS TECHNICAL SERVICE
(Embedded Electronics & Factory Automation)

MCU 32-bit ARM Cortex-M0 của Nuvoton

Vi mạch ứng dụng vi điều khiển



MCU 32-bit ARM Cortex-M0 của Nuvoton

Lộ trình phát triển dòng MCU/MPU

Over 20 Years MCU/MPU Development

8051
8-bit MCU

- World's 1st eFlash base
- Has shipped over 450 Millions chips
- Flexible package 16 ~ 100 pins
- Up to 40 MHz

1992

ARM7/9
32-bit MPU

- MPU – NUC700/900
 - Up to 300 MHz
 - Ethernet, USB 2.0 Host/Device, LCD display
 - uClinux/ Linux, WinCE
- Video MPU – N329
 - SDR/DDR embedded
 - CMOS/MJPEG/H.264
- SPIE Flash MCU – NUC500
 - Low cost/High performance ARM7
 - Data intensive applications

2002

Cortex-M0
NuMicro™ MCU

- Has shipped 60MU. #1 WW
- 190 P/Ns -> 250 in '14
- Price starting from 29 cents, offering 32 bit performance at 8/16 bit price
- Stand-by power as low as 0.65uA

2009

Cortex-M4
NuMicro™ MCU

- Ethernet, crypto
- USB OTG, USB HS
- ASSP optimized for Audio, IMC, Computing. **DSP lib**

2012



MCU 32-bit ARM Cortex-M0 của Nuvoton

Danh mục sản phẩm NuMicro và công năng

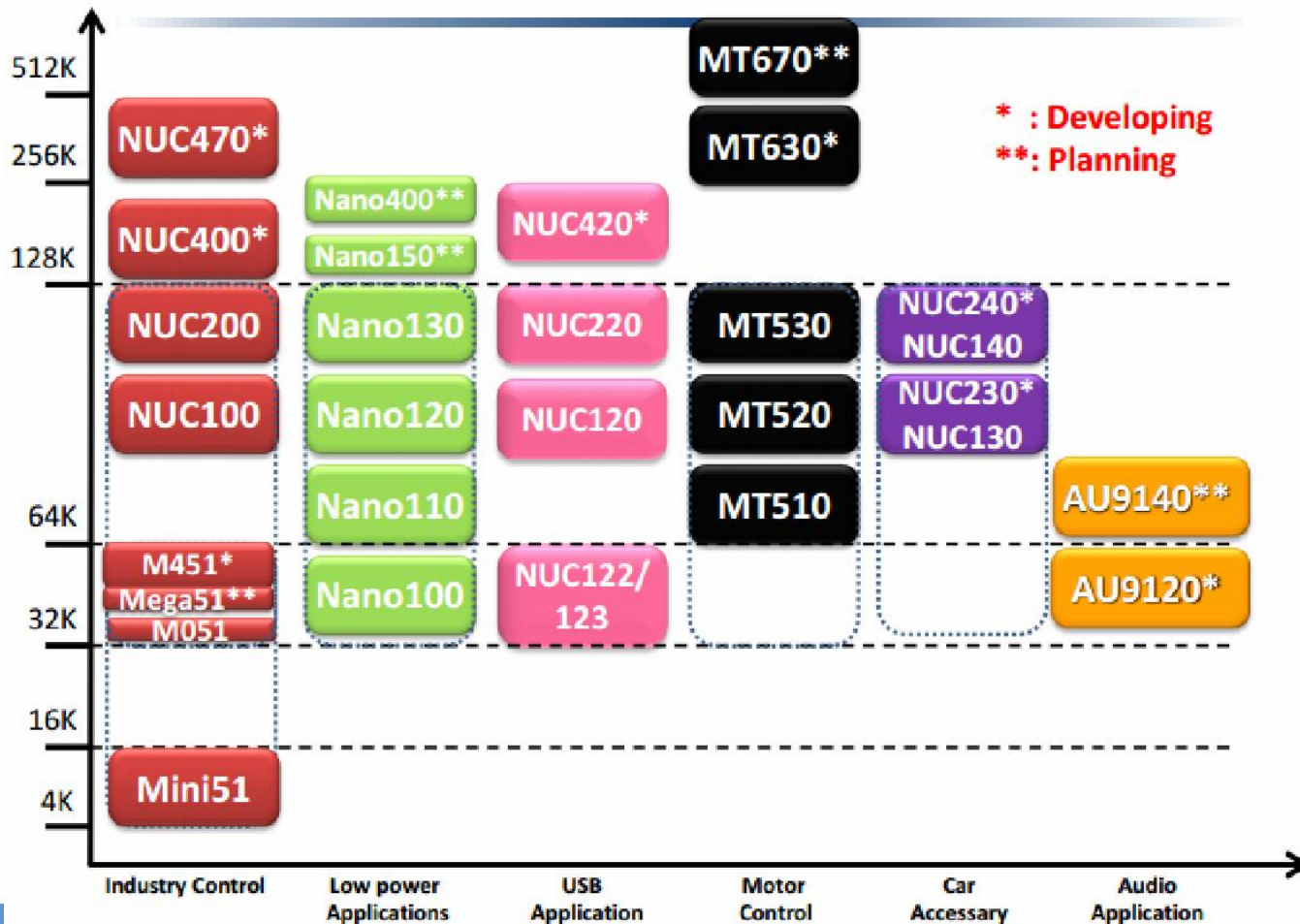
(Flash)



MCU 32-bit ARM Cortex-M0 của Nuvoton

Danh mục sản phẩm NuMicro và ứng dụng

Products Portfolio and Applications

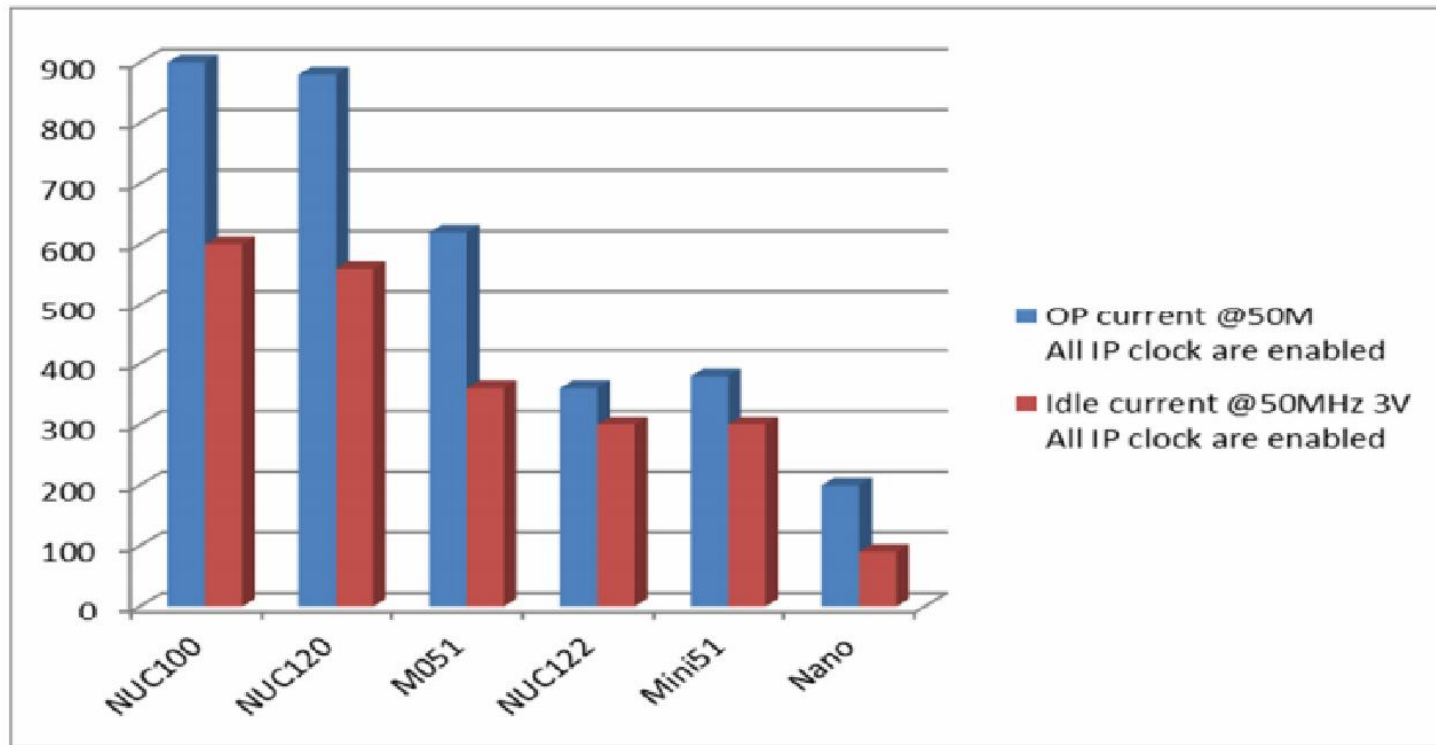




MCU 32-bit ARM Cortex-M0 của Nuvoton

Tiêu thụ điện năng của họ NuMicro

Power Consumption



| NUC100 | NUC120 | M051 | NUC122 | Mini51 | Nano | |
|--------|--------|------|--------|--------|------|--------|
| 900 | 880 | 620 | 360 | 380 | 200 | uA/MHz |
| 600 | 560 | 360 | 300 | 300 | 90 | uA/MHz |



MCU 32-bit ARM Cortex-M0 của Nuvoton

Nuvoton M0 Family Strength – Điểm mạnh của dòng M0

Wide Operation Voltage
2.5 ~ 5.5 V / 1.8 ~ 3.8V

Rich Peripheral
USB2.0: NUC220/122/123
CAN/LIN: NUC230/240

Program Protection
128-bit UCID
96-bit UID

**Nuvoton
ARM-Cortex
M0 Family
Mini51
M051
NUC**

Competitive Price
32-bit performance as
8-bit price

Real Time Clock
NUC200/220/230/240
Capacitor I/O / Voice core

ISO-7816-3
(Smart Card Interface)
NUC200/220/230/240

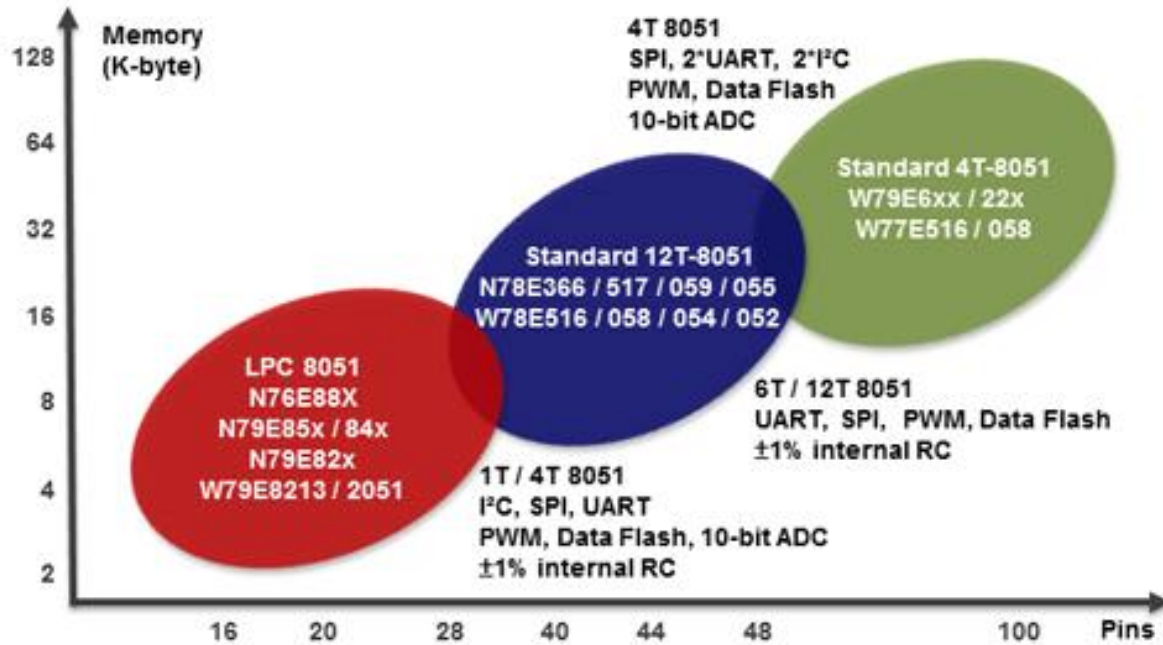


MCU 32-bit ARM Cortex-M0 của Nuvoton

Compare with competitors – So sánh với hãng khác

| Application | Product Number | Feature | Competitor | How to act |
|---------------------|------------------|--|-------------------------------|---|
| Industrial Control | M051 | Wide Oper. Voltage :2.4 – 5.5V High Reliability ESD >6KV, 4KV EFT 8ch 12-bit ADC @1Msps Embedded HW Divider | STM32F050/051 TI MSP430 | <p>Competitors Weakness Don't support 5V, need extra LDO Poor ESD reliability (STM) Higher Price Long Delivery Time</p> <p>NuMicro ARM Cortex-M0 Wide Oper. Voltage 2.5 – 5.5V Short Delivery Time Competitive Price High Reliability ESD/EFT</p> |
| BLDC | Mini51 | Wide Oper. Voltage :2.4 – 5.5V Small Size Package QFN 33(4x4) Full PWM Function to drive Motor | STM32F030 Microchip PIC16F | |
| Security System | NUC200 | ARM-M0 Core72MHz, UART x 6 Anti-copied, 128-bit UCID RTC High speed ADC 800kSPS | STM32F100/101 | |
| IPhone Docking | NUC122 NUC123 | ARM-M0 Core72MHz, 68K Flash/20K RAM for Computing USB2.0 FS, 8 end-points | STM32F103 | |
| Elevator Automotive | NUC230 NUC240 | Bosch CAN Bus x 2 , LIN Bus x 3 Wide Oper. Voltage :2.4 – 5.5V High Reliability ESD >6KV, 4KV EFT | STM32F103 | |

MCU 8-bit 8051 và Audio IC của Nuvoton



| | | | | | | | |
|---|---|--|---|---|--|--|---|
| <p>Mono Class AB</p> <p>ISD8104</p> <p>2W Mono Class AB</p> <p>ISD8102</p> <p>2W Mono Class AB Headphone Sense</p> <p>ISD8101</p> <p>1.5W Mono Class AB</p> | <p>Mono Class-D</p> <p>NAU82039</p> <p>3W Mono Class AB Fixed Gain</p> <p>NAU82011</p> <p>3W Mono Class-D Variable Gain</p> <p>NAU8214</p> <p>2.9W Mono Class-D With Speaker Protection</p> | <p>Stereo Class-D</p> <p>NAU8224</p> <p>3W Stereo Class-D 2-wire Interface Variable Gain</p> <p>NAU8223</p> <p>3W Stereo Class-D 5 Gain Steps</p> | <p>2 Vrms Line Driver</p> <p>NAU8220</p> <p>Stereo 2 Vrms Line Driver</p> | <p>Playback Only</p> <p>ISD2130 ISD2115A</p> <ul style="list-style-type: none"> • 2.7 - 3.6V • 32/15 seconds • Playback-only • Embedded flash memory • Class-D <p>ISD3800 / ISD15D00 *</p> <ul style="list-style-type: none"> • 2.7 to 5.5V • Playback-only • 1W Class-AB/Class-D • External SPI flash memory for audio storage <p>ISD2360</p> <ul style="list-style-type: none"> • 2.4 - 5.5V • 64 seconds • Playback-only • Flash • Class-D (~1W) • 3-channel mixer | <p>Record & Playback</p> <p>ISD15102 ISD15104 ISD15108 ISD15116</p> <ul style="list-style-type: none"> • 2.7 - 3.6V • 2 - 16 min • Rec/Playback • Multi-message • Integrated flash memory • Class-AB/Class-D <p>ISD3900 / ISD15C00 *</p> <ul style="list-style-type: none"> • 2.7 - 3.6V • Rec/Playback • Class-AB/Class-D • External SPI flash memory for audio storage | <p>Multiple Message Analog Record Playback</p> <p>ISD4000</p> <ul style="list-style-type: none"> • 2.7 - 3.6V • 2 - 16 Min • Record/Playback • Multi-message • SPI • AUX <p>ISD5100</p> <ul style="list-style-type: none"> • 2.7 - 3.6V • 2 - 16 Min • Record/Playback • Multi-message • I²C • Class-AB, AUX, ANA <p>ISD1900</p> <ul style="list-style-type: none"> • 2.4 - 5.5V • 16 - 64 sec • Record/Playback • Multi-message • Trigger/Address input • Class-D <p>ISD1700</p> <ul style="list-style-type: none"> • 2.4 - 5.5V • 20-480 sec • Record/Playback • Multi-message • SPI/Trigger input • Class-D | <p>Single Message Analog Record Playback</p> <p>ISD1600B</p> <ul style="list-style-type: none"> • 2.4 - 5.5V • 7-40 sec • Record/Playback • Single-message • Trigger input • Class-D <p>ISD18B24 ISD18B12 ISD18A04</p> <ul style="list-style-type: none"> • 2.4 - 5.5V • 4/12/24 sec • Record/Playback • Single-message • Trigger input • Class-AB <p>ISD1810 ISD18C10 ISD1806</p> <ul style="list-style-type: none"> • 2.7 - 4.5V • 8/10 sec • Record/Playback • Single-message • Trigger input • Class-AB |
|---|---|--|---|---|--|--|---|

* Automotive AEC-Q100 Qual

Giải pháp và Ứng dụng thành công

Mảng ứng dụng dòng NuMicro

Track Record of NuMicro Series

kindle fire

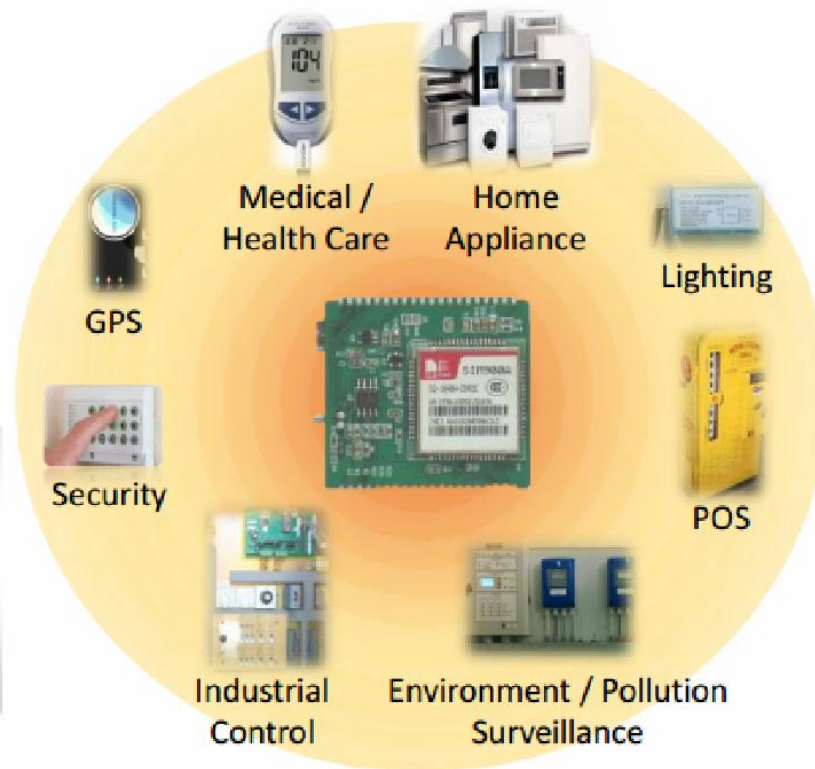
Web, movies, apps,
games, reading
and more, with
built-in Wi-Fi



Quick Tour



Padfone™



Tài nguyên phát triển (hardware/software)

Công cụ phát triển của hãng (Development tools)

■ NuMicro-SDK

■ NuTiny-SDK

■ Nu-Link-Pro

■ NuGang



Nu-LB-NUC140



Nu-LB-Nano100



Nu-LB-Mini51

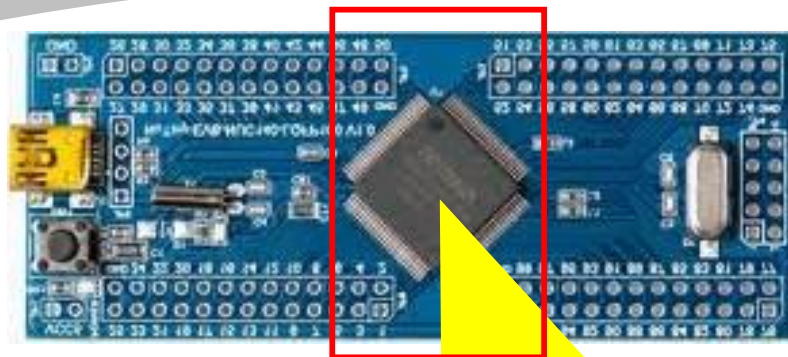
Tài nguyên phát triển (hardware/software)

Công cụ phát triển phần mềm

Third party Tools

| Provider | Website | |
|---|--|---|
|  | www.keil.com |  |
|  | www.iar.com |  |
|  | www.coocox.org/Nuvoton.htm |  |
|  | www.rowley.co.uk |  |

Hướng dẫn Thực hành với Kit của Nuvoton



Development board
(MCU NUC140VE3CN)

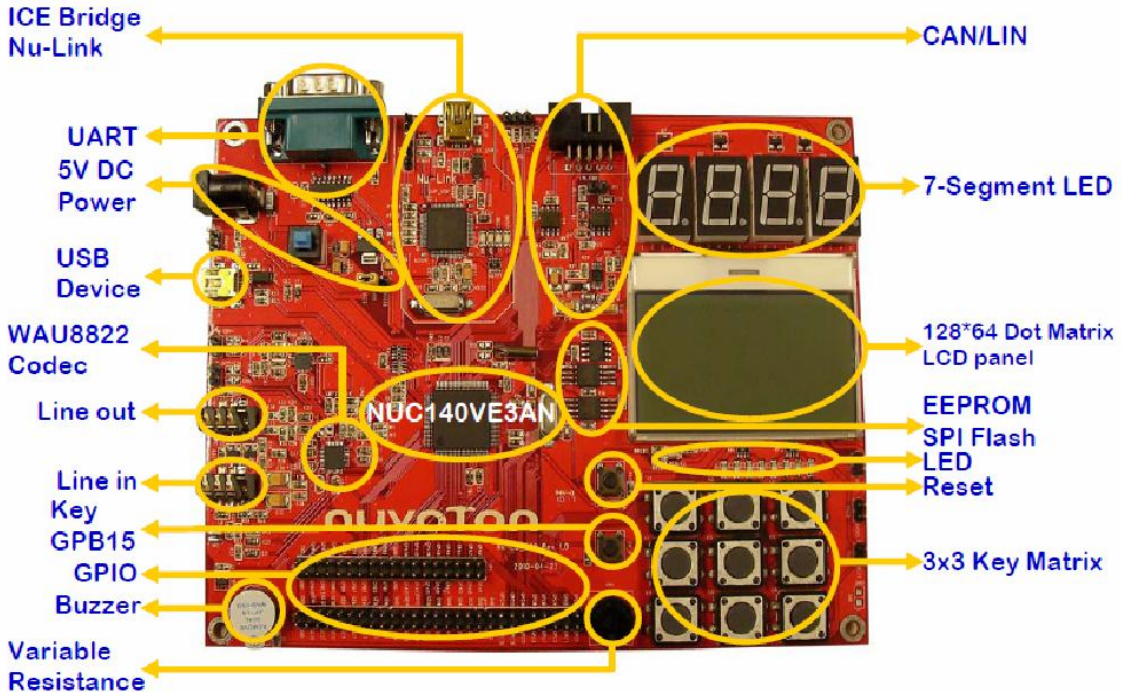


ICE (Nu-Link)



PC IDE

USB



Tài liệu tham khảo

- ❖ www.tula.vn
- ❖ www.nuvoton.com
- ❖ www.nuvoton-m0.com
- ❖ <http://sourceforge.net/projects/numicronulbnuc1/files/?source=directory>



We bring 32-bit Performance at 8-bit Prices!

A promotional banner for the NuMicro Family. It features a teal background with a circuit board pattern. On the left is a Nuvoton NUC100LE3AN microcontroller chip. On the right is a hand holding a Nuvoton M052ZAN microcontroller chip. The text "NuMicro™ Family" is prominently displayed in the center, with "32-bit ARM® Cortex™-M0 Microcontroller" below it. A pink link text ">> Click here for more information" is positioned below the main text.

nuvoton
NUC100LE3AN

NuMicro™ Family

32-bit ARM® Cortex™-M0 Microcontroller

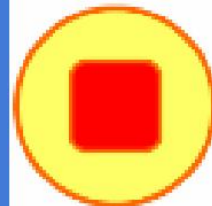
>> Click here for more information

nuvoton
M052ZAN

The Distributor of Quality

Thank You !

Chúc các bạn thành công!



TULA Solution

The Distributor of Quality