Nuvoton Technology Introduction

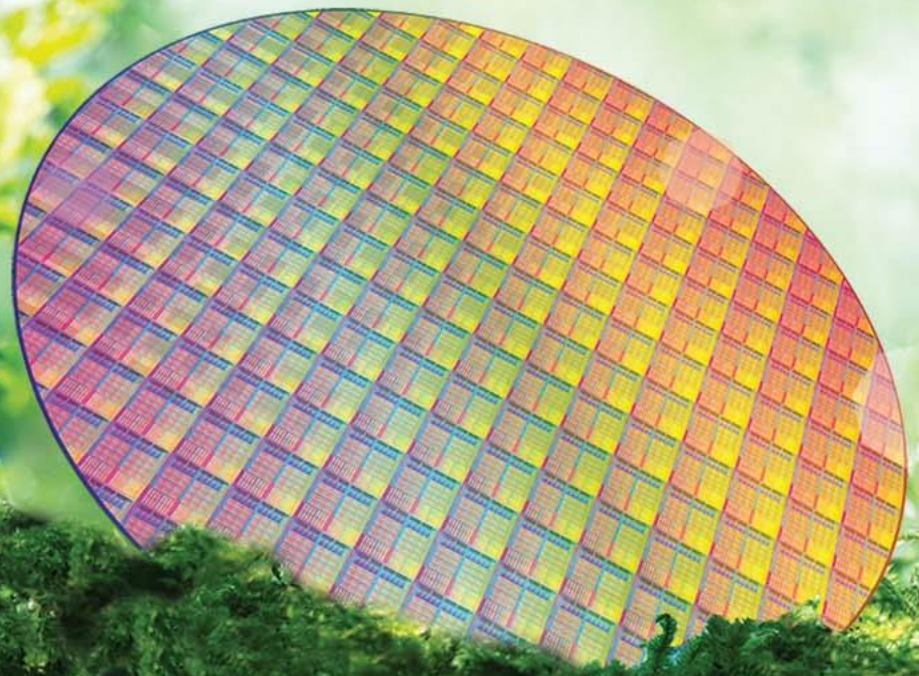
Copyright © Nuvoton Technology Corporation | Photo by Jeffery Cheng

nuvoTon
新唐科技

Vision Statement

以綠色半導體技術豐富人類生活的隱形冠軍

Be a hidden champion in providing sustainable semiconductors to enrich human life.



Nuvoton at a Glance

Number of employees	**Over 3,700 worldwide**
Capital	**NT$4,198 million**
Date of Establishment	**2008/7/1**
Date of IPO	**2010/9/27 (TSE:4919)**
Chairman	**Yuan-Mou Su**
President	**Hsin-Lung Yang**
Headquarters	**Hsinchu Science Park, Taiwan**
Main Shareholder	**Winbond holds 51.2% share**

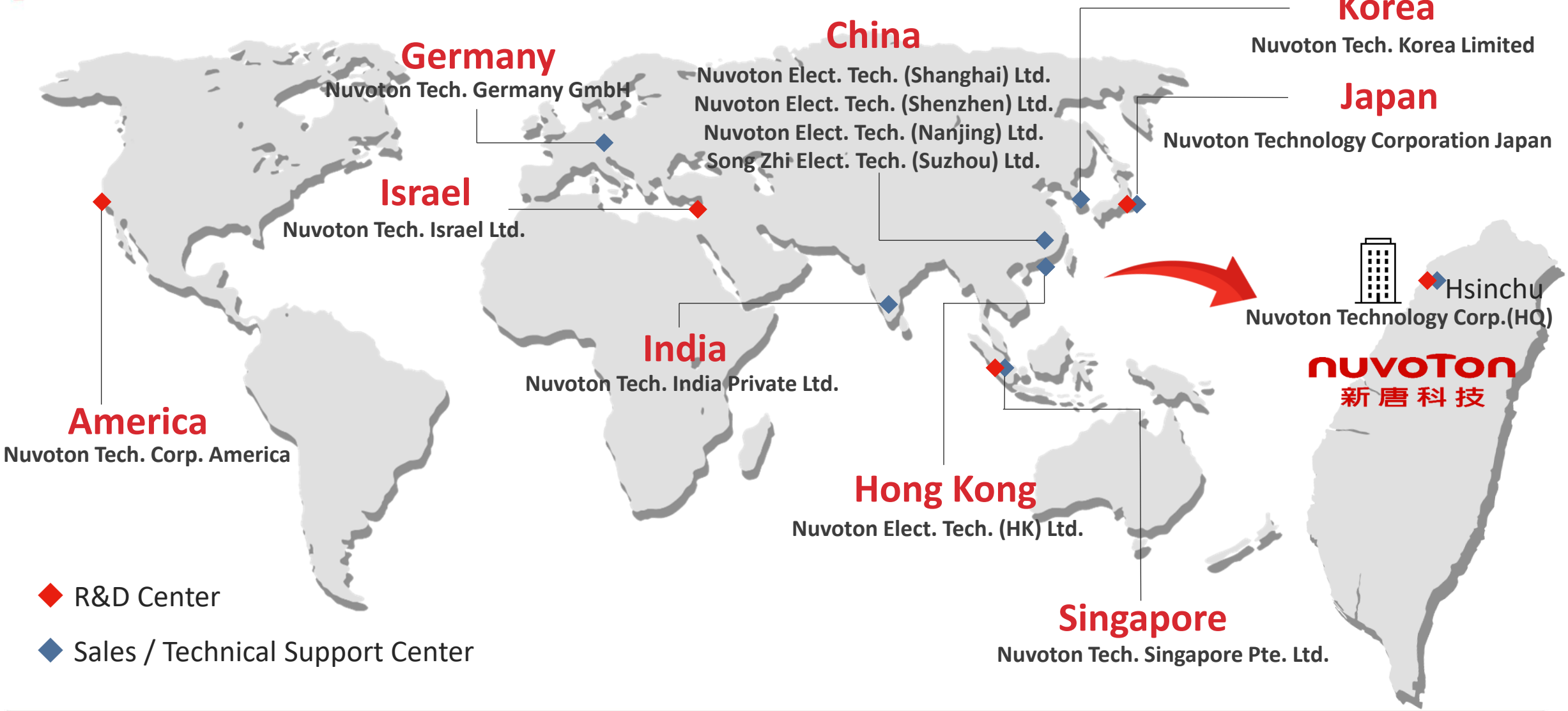
Zhubei Building*

Headquarters

*Photo by Jeffrey Cheng

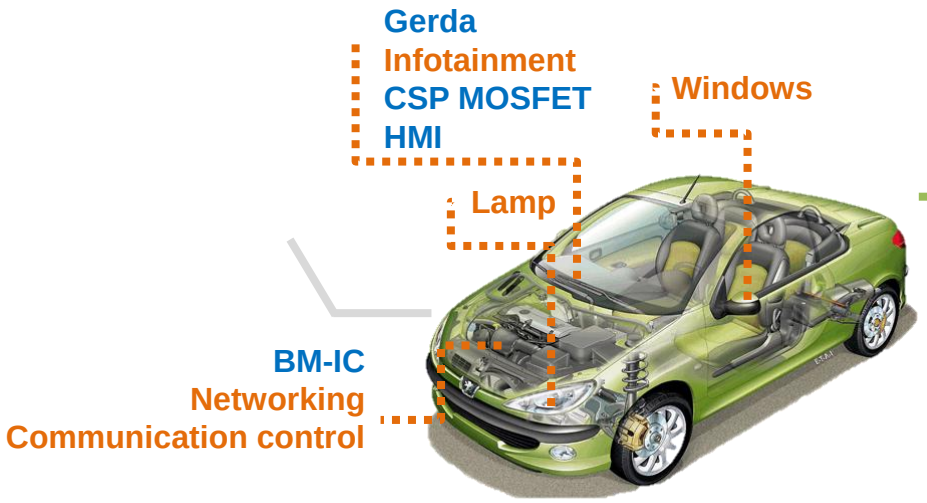
Copyright © 2022 Nuvoton Technology Corporation

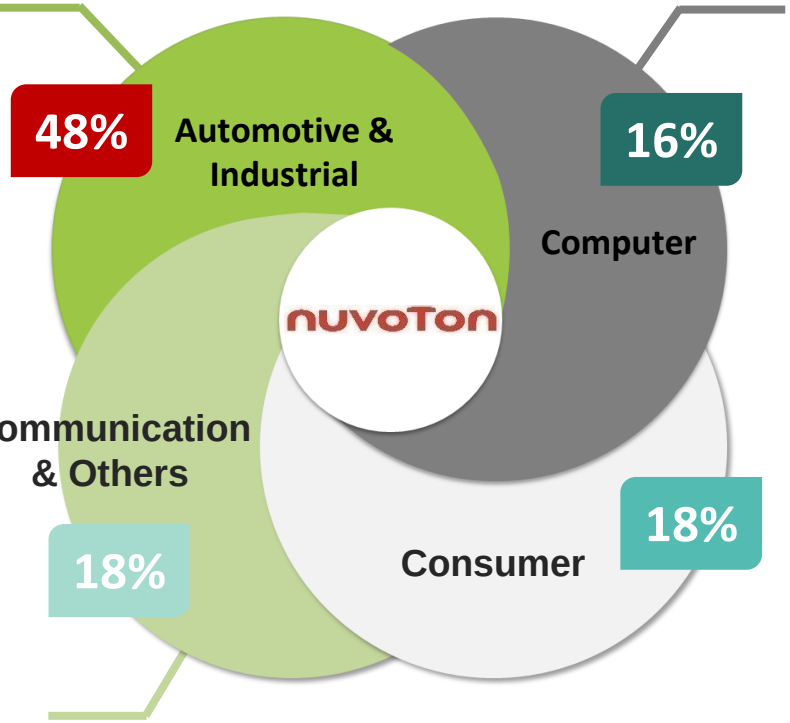
Worldwide Location

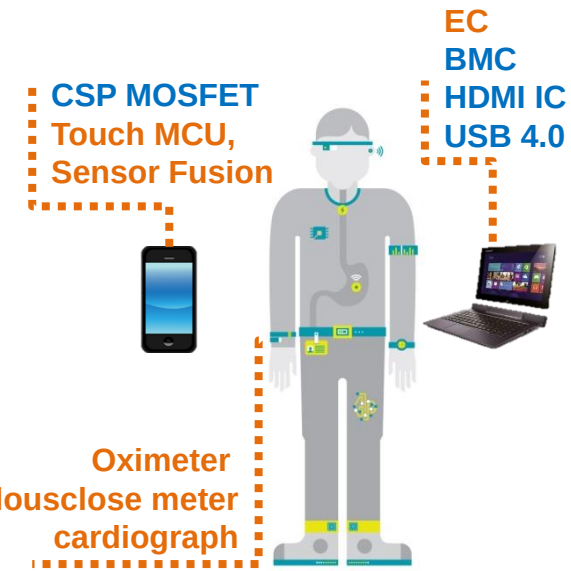


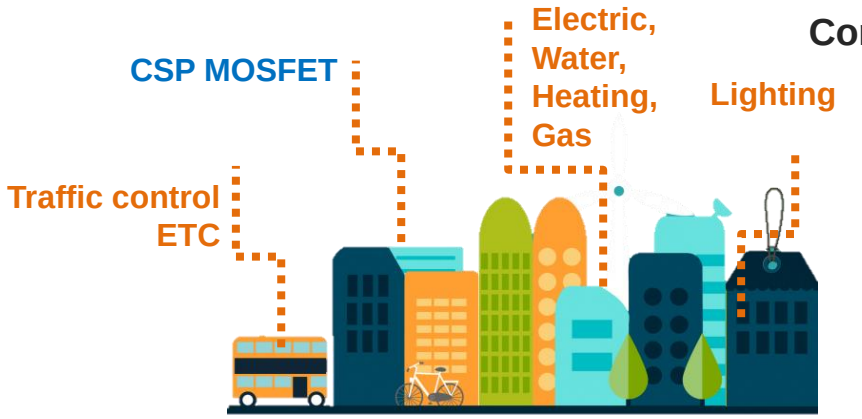
Copyright © 2022 Nuvoton Technology Corporation

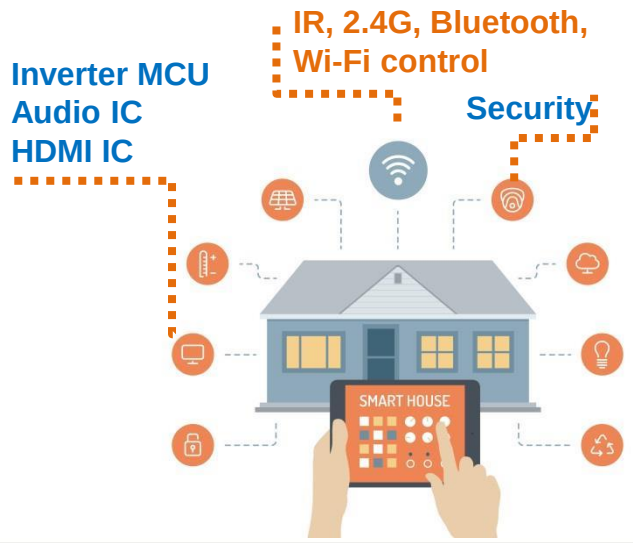
Nuvoton is Around You







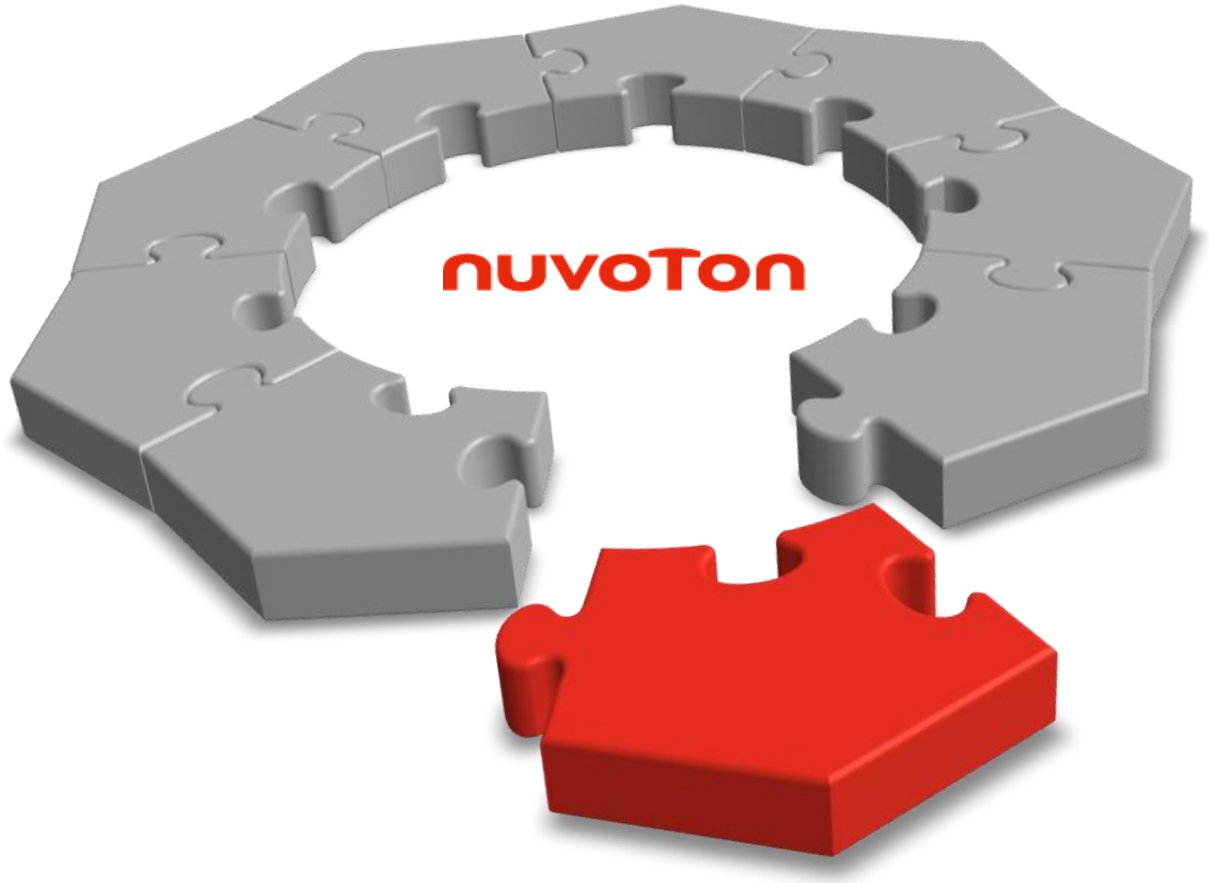




Data: 2023Q2 revenue by 4C applications

Copyright © 2022 Nuvoton Technology Corporation

Company Performance



Leading Position

Worldwide **Top 10**
Supplier of General purpose MCU

Worldwide **Top 1**
Supplier of TPM/EC for commercial PC

Worldwide **Top 1**
Supplier of MOSFET for smartphone

Copyright © 2022 Nuvoton Technology Corporation

Business Groups

Microcontroller & Audio

MCU and MPU Platform
- *NuMicro® MCU & MPU*
- *Audio Component & SoCs*

Core Technology
- *Low-power with Analog Integration*
- *Low-power Mixed Mode Design*
- *IoT Security*
- *Eco-system Platform*

Cloud Security

Computing Security
- *Secure Embedded Controller and Super I/O*
- *Trust Platform Module (TPM)*
- *Server Baseboard Management Controller (BMC)*

Core Technology
- *Security*
- *System Integration / Protection*
- *Mixed Mode ASIC*

Foundry

Foundry Service
- *30 years of operations*
- *Highly efficient fab focused on high voltage and customized power process*

Core Technology
- *BCD Process*
- *UHV Process*
- *HVIC Process*

Component

Power Component
- *CSP MOSFET*
- *RF-GaN*

Core Technology
- *Ultra Low Impedance*
- *Small Size*
- *High Efficiency*

Visual Sensing

Spatial Sensing Solution
- *Image Sensor (3D TOF)*
- *DSP (HMI Display, Audio)*

Core Technology
- *High Quality Image, Depth and Sound*
- *Enhanced Graphic Processing*
- *Software Platform*

Battery & Analog Solutions

Analog IC's for Battery / Power Application
- *Battery Monitoring IC*
- *Motor Driver IC*

Core Technology
- *Analog Design*
- *SOI (Silicon on Insulator) Process*

IoT with Security

MCU & Communication / Interface IC's
- *Motor & Power Control MCU*
- *High Speed IF*
- *NFC Tag IC*

Core Technology
- *Low Power, Security*
- *High Speed Analog*
- *System Knowledge*

Laser & GaN

Laser & GaN Component
- *High Power Laser Diode*
- *GaN Foundry*

Core Technology
- *High Power and High Reliability Laser Diode*
- *Epitaxial and full process service for GaN Power device*

Copyright © 2022 Nuvoton Technology Corporation

NuMicro® HMI Platform

NuMicro® HMI Platform

8051 | M0 | M23 | M4 | Arm9 | A35

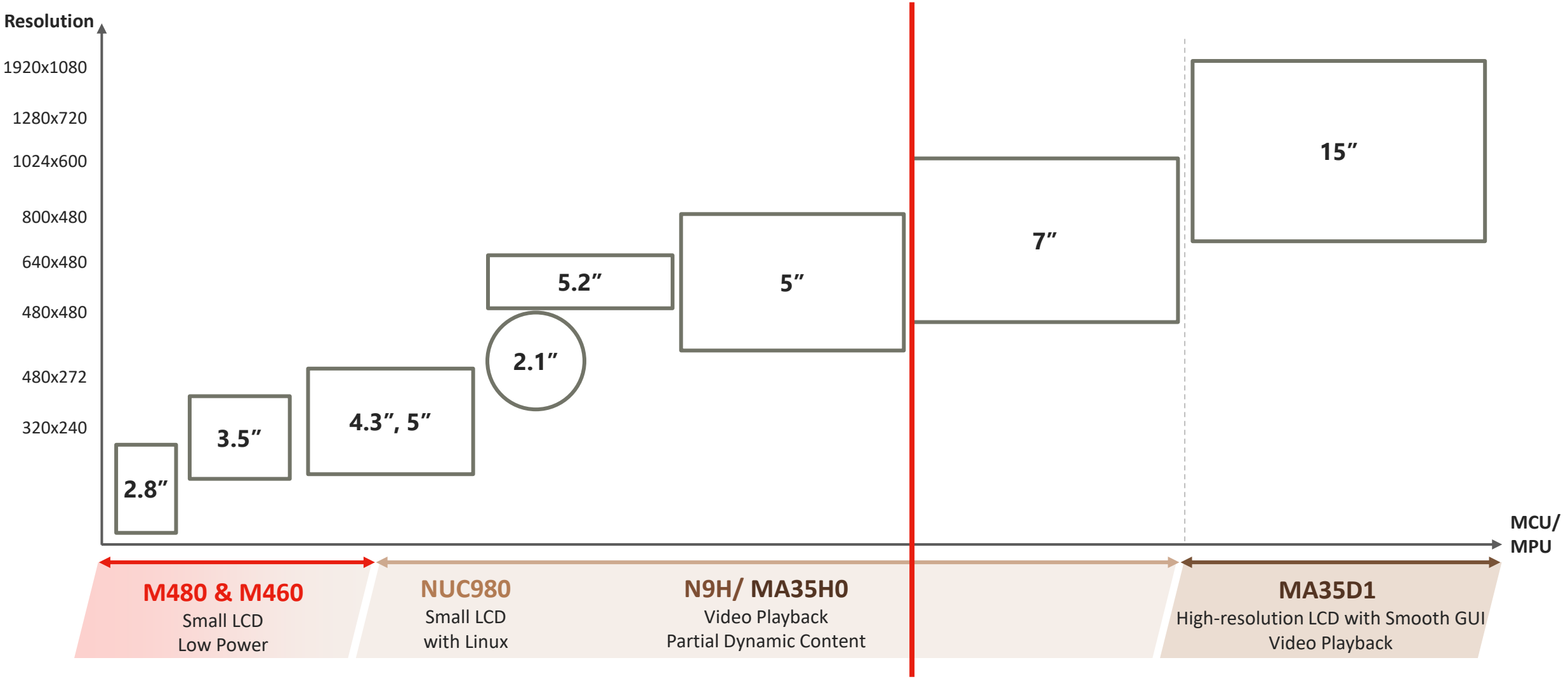
Performance

	8x44 COM-SEG LCD **M254**	8x44 COM-SEG LCD 24 Touch Key **M258**	< 4.3" (320x240) TFT-LCD Capacitive Touch **M480**	< 5" (480x272) TFT-LCD Capacitive Touch Flash 1 MB SRAM 512 KB Megabit Ethernet CAN FD **M460**	< 7" (1024x768) TFT-LCD Capacitive Touch Resistive Touch 2/ 8/ 32 MB DDR 2D Graphic Engine JPEG codec H.264 codec Audio DAC Megabit Ethernet CAN 2.0B **N9H20** **N9H26** **N9H30**	< 10" (1280x800) TFT-LCD Capacitive Touch Resistive Touch 64/ 128 MB DDR 2D Graphic Engine JPEG decoder H.264 decoder Megabit Ethernet CAN FD **MA35H0**	15" (1920x1080) TFT-LCD Capacitive Touch Resistive Touch 128/ 256/ 512 MB DDR 2D Graphic Engine JPEG codec H.264 decoder Gigabit Ethernet CAN FD **MA35D1**
	8x28 COM-SEG LCD **ML54**	8x44 COM-SEG LCD 24 Touch Key **M256**	8x40 COM-SEG LCD < 3.5" (320x240) TFT-LCD **M2354**				
7-SEG LED **MS51 Series**	6x30 COM-SEG LCD **N76E616**	8x28 COM-SEG LCD 14 Touch Key **ML56**	< 3.5" (320x240) TFT-LCD Capacitive Touch **M032**				
LED	COM-SEG LCD		COM-SEG LCD / TFT-LCD				

Display Type

Copyright © 2022 Nuvoton Technology Corporation

NuMicro® HMI Platform – TFT-LCD Resolution



Copyright © 2022 Nuvoton Technology Corporation

NuMicro® HMI Platform – MCU/MPU

NEW

		M23 Series	M480 Series	M460 Series	NUC980	N9H20 Series	N9H26 Series	N9H30 Series	MA35H0 Series	MA35D1 Series
LCD Resolution (Recommendation)		< 320 x 240	< 320 x 240	< 480 x 272	<320x240	< 800 x 480	< 800 x 480	< 1024 x 768	1280 x 800	1920 x 1080
LCD Interface		SPI	SPI / i80	SPI / i80	SPI	SPI / i80 / RGB	SPI / i80 / RGB	SPI / i80 / RGB	SPI / i80 / RGB	SPI / i80 / RGB
CPU Core		Cortex-M23	Cortex-M4	Cortex-M4	Arm9	Arm9	Arm9	Arm9	Dual Cortex-A35	Dual Cortex-A35 + M4
CPU Speed		96 MHz	192 MHz	200 MHz	300 MHz	200 MHz	240 MHz	300 MHz	650 MHz	800 MHz / 180 MHz
Flash		1024 KB	512 KB	1024 KB	External	External	External	External	External	External
RAM Size		256 KB	160 KB	512 KB	64/ 128 MB	2 / 8/ 32 MB	64 MB	64 / 128 MB	128 MB	128 / 256 / 512 MB
Video Codec		-	-	-	-	JPEG Codec	JPEG / H.264 Codec	JPEG Codec	JPEG / H.264 解码器	JPEG / H.264 Decoder
2D Graphic Engine		-	-	-	-	●	●	●	●	●
OS	RTOS	Mbed, FreeRTOS,	Mbed, FreeRTOS, RT-Thread	Mbed, FreeRTOS, RT-Thread	FreeRTOS, RT-Thread	FreeRTOS	FreeRTOS	FreeRTOS, RT-Thread	RT-Thread	RT-Thread
	Linux	-	-	-	● 5.10.y	● 2.6.35	● 2.6.35	● 3.10.y	● 5.10.y	● 5.10.y
EVB		NuMaker-HMI-M2354	NuMaker-HMI-M487	NuMaker-HMI-M467	NuMaker-IIoT-NUC980G2D	NuMaker-HMI-N9H20	NuMaker-HMI-N9H26	NuMaker-HMI-N9H30	NuMaker-HMI-MA35D1-S1	NuMaker-HMI-MA35D1-S1
Graphics Library	emWin	●	●	●	●	●	●	●	●	●
	LVGL	-	-	●	-	●	-	●	●	●
	Altia	-	-	-	●	-	-	-	-	-
	Qt	-	-	● Qt for MCU	-	● Qt for MCU	-	● Qt for MCU ● Qt Linux 4.8	● Qt Linux 5.4	● Qt Linux 5.4

Copyright © 2022 Nuvoton Technology Corporation

Get Started with NuMicro® HMI Platform

Platform Selection & Resource Download

1 NuMicro® HMI Platforms

M467

4.3” 480x272

NuMaker-HMI-M467

NUC980

3.5” 320x240

NuMaker-IIoT-NUC980G2D

N9H30

7” 800x480

NuMaker-HMI-N9H30

MA35H0

7” 1024x600

NuMaker-HMI-MA35H0-A1

MA35D1

7” 1024x600

NuMaker-HMI-MA35D1-S1

2 Third-party Graphics Libraries

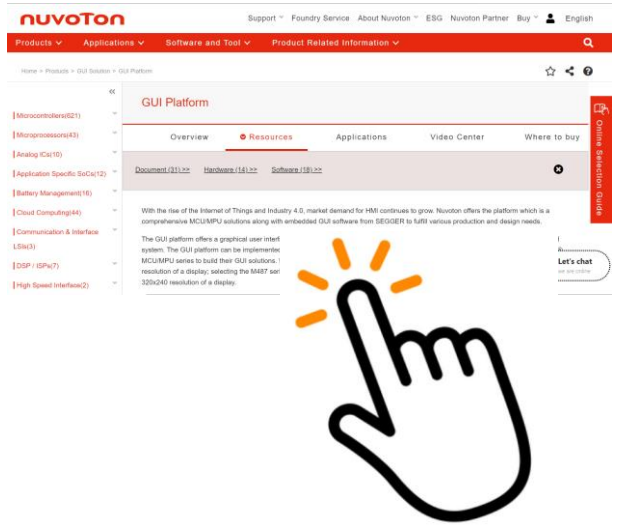
SEGGER
emWin &

LVGL

Altia

Qt Linux
Qt for MCU

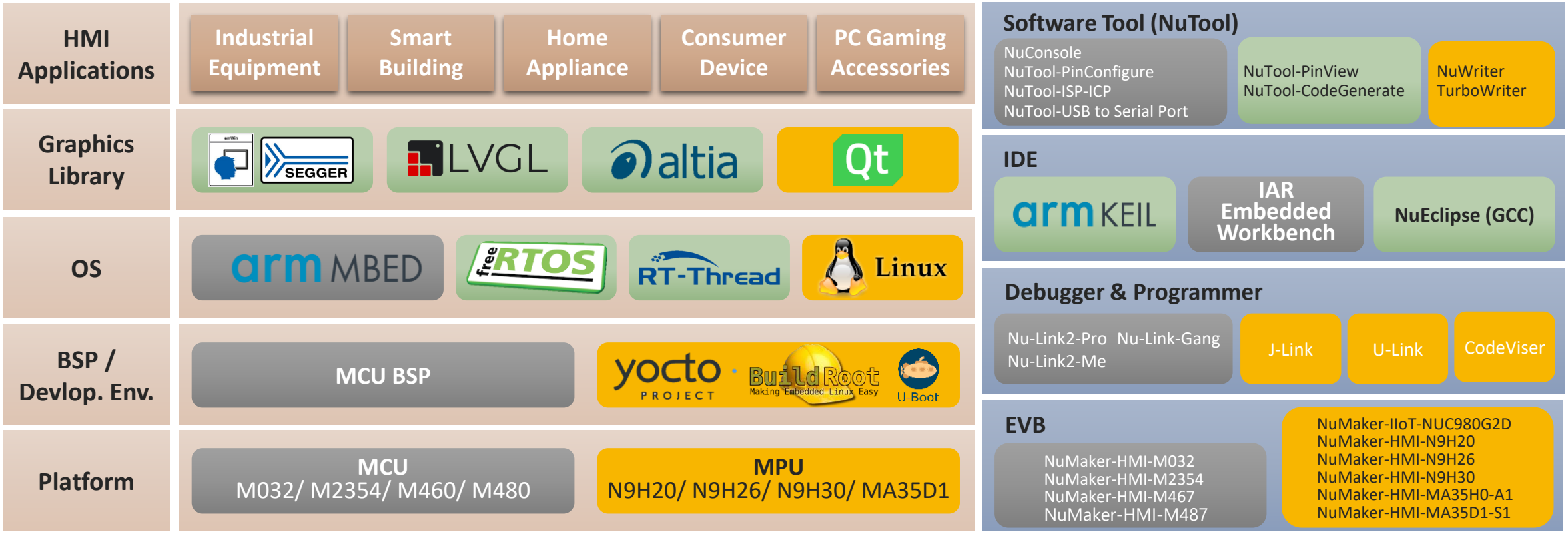
3 Download BSP & Docs



Copyright © 2022 Nuvoton Technology Corporation

NuMicro® HMI Platform – Ecosystem

Nuvoton HMI platform is a simple and easy-to-use ecosystem with complete software and hardware development tools, providing stunning and smooth GUI. The entire platform includes entry-level to high-performance and highly integrated MCU/MPU products.



Copyright © 2022 Nuvoton Technology Corporation

MCU Resource | MPU Resource | MCU/MPU Resource

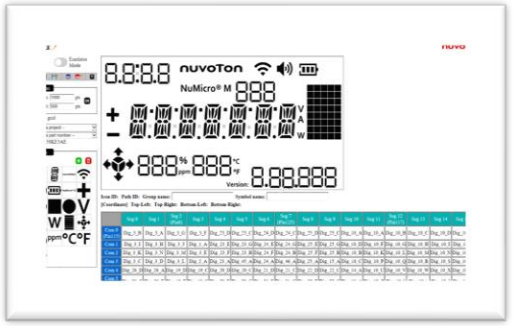
nuvoTon

NuMicro® HMI Platform – GUI Tools and Resource

- Provides **GUI tools for HMI applications**, ease your development & save your time
- Provides **diverse graphics library**, such as **emWin, LVGL, Altia & Qt for creating GUI easily**
- Nuvoton is licensed with the SEGGER emWin graphics library; users can use it for free on the HMI platforms

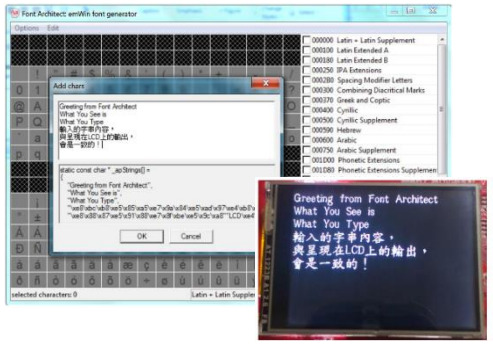
COM-SEG LCD

Nuvoton LCDView & LCD Touch Key

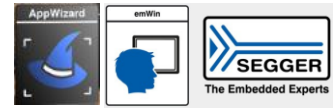


TFT-LCD

Nuvoton FontArchitect
Supports multi-language display



Graphics Libraries

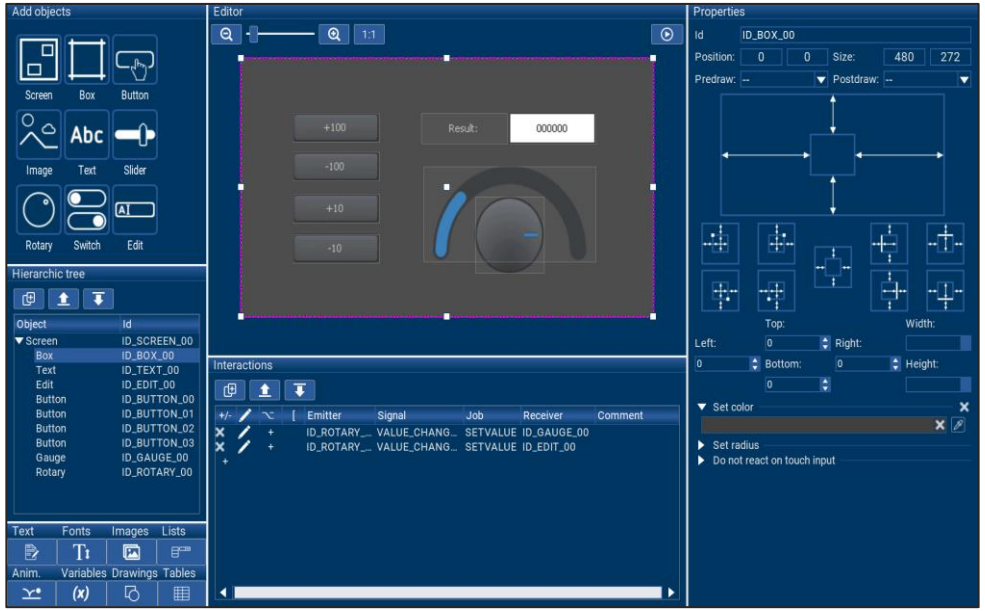


Copyright © 2022 Nuvoton Technology Corporation

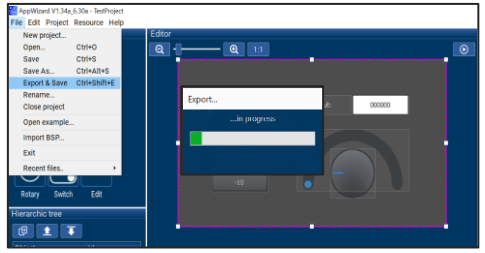
Get Started with NuMicro® HMI Platform

3 Steps to Build Up Embedded GUI by GUI Tool

Step1 Compose a UI by SEGGER AppWizard



Step2 Export & Save



Step3 Compiling and Program to target board

NuMaker-HMI EVBs

- Helps designers complete a professional interface
- Generates the corresponding C source code
- Significantly reduces development complexity and time

Copyright © 2022 Nuvoton Technology Corporation

Ready-to-Use TFT-LCD Application Templates

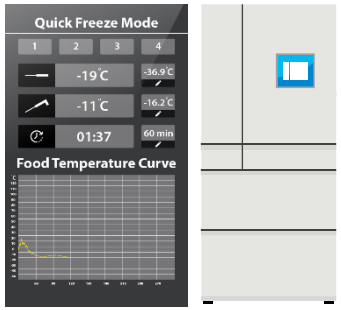
Nuvoton HMI platform is suitable for various applications and provides multiple application templates to help users shorten evaluation and product development time.

Smart Color Thermostat Template
WiFi Color Thermostat Template

Coffee Machine Template

Elevator Display Template

Home Appliance
Recipe Player Template



Refrigerator Display Template

PC Gaming Accessories Template

Motorcycle Dashboard Template

Vehicle Meter Template

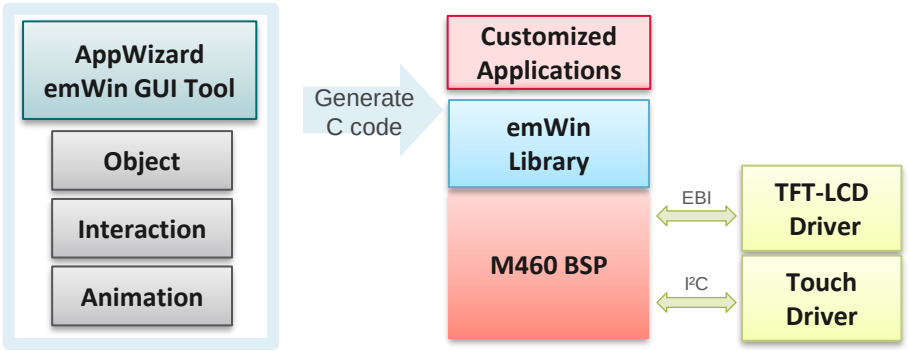
Copyright © 2022 Nuvoton Technology Corporation

E-bike Dashboard GUI designed by emWin AppWizard

NuMaker-HMI-M467 EVB

- **Develop on NuMaker-HMI-M467 EVB with high performance**
  - Operating frequency up to 200 MHz
  - Built-in 1024 KB Flash, 512 KB SRAM
  - SPIM and cache to increase external SPI Flash access performance
  - Ethernet, CAN FD, Crypto Engine, USB HS/FS, SDHC, ADC, DAC, and other rich peripherals
  - 4.3” TFT LCD Display: 480 x 272 resolution

- **Design everything using emWin Appwizard**
  - Create Objects- button, switch, rotary, progbar, text, language switch, keyboard, etc.
  - Define Interactions- connect different objects and real world
  - Design Animations- accomplish automatic animation



Copyright © 2022 Nuvoton Technology Corporation

Smart Home Thermostat GUI designed by Altia

NuMaker-IIoT-NUC980G2D

- **Develop on NuMaker-IIoT-NUC980G2D with high performance**
  - 32-bit ARM926EJ-S core, CPU speed up to 300 MHz
  - Built-in 128 MB DDR
  - Supports SPI-NOR/ NAND external flash
  - 1 set of Ethernet, 2 sets of USB HS/FS, 3 sets of UART, 4 sets of CAN
  - Arduino compatible interface
  - 2.4” (240x320) RGB LCD (SPI Interface)

- **Graphic Library – Altia Key Features**
  - Over 30 years of GUI development industry leadership
  - Prototype and deploy to any hardware target or OS
  - Reduce hardware cost by optimizing memory and performance
  - Break down collaboration barriers with model-based development process
  - Slash development time with design-to-deployment automation
  - Boost your GUI program with Altia’s expert artists, UX professionals and embedded engineer.

nuvoTon × altia

- NuMaker-IIoT-NUC980G2D - Nuvoton
- Multi-Industry GUI Demo for the Nuvoton NUC980 - Altia

Copyright © 2022 Nuvoton Technology Corporation

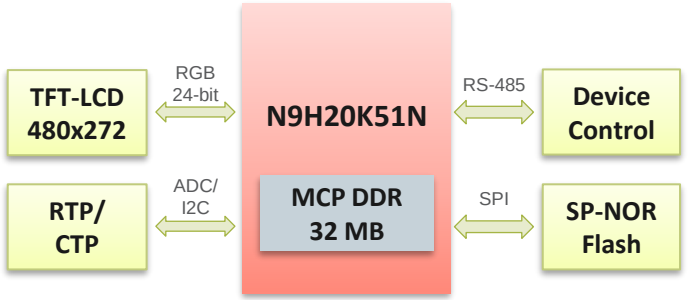
Smart Home Thermostat GUI designed by Qt for MCU

NuMaker-HMI-N9H20

- **Develop on NuMaker-HMI-N9H20 with high performance**
  - 32-bit ARM926EJ-S core, CPU speed up to 200 MHz
  - Built-in 2/ 8/ 32 MB DDR
  - Supports SPI-NOR/ NAND external flash
  - Supports Resistive Touch by internal ADC
  - Built-in Audio ADC, USB HS/FS, RTC, ADC
  - Integrated 2D Graphic Engine & JPEG codec
  - 4.3” (480x272) 24-bit RGB LCD with 4-wires Resistive Touch

Qt for MCU

- **Graphics Library - Qt for MCU Key Features**
  - A graphics engine that is optimized for low memory footprint
  - Tools to generate efficient C++ code based on the QML code and graphical resources
  - Conforms to the C++14 standard
  - Supports baremetal or MCU operating system such as FreeRTOS.
  - Ultra-light UI controls to build fluid GUIs using QML.
  - Internationalization support to enable catering to various regions.
  - Offers better developer experience with the Qt Creator IDE and Qt Design Studio.

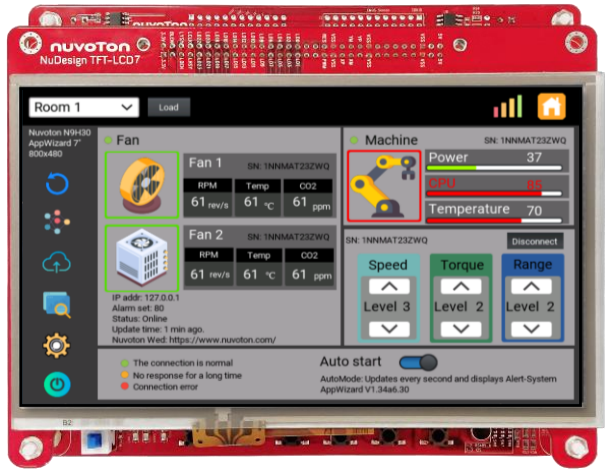


Copyright © 2022 Nuvoton Technology Corporation

Industrial Controller GUI designed by emWin AppWizard

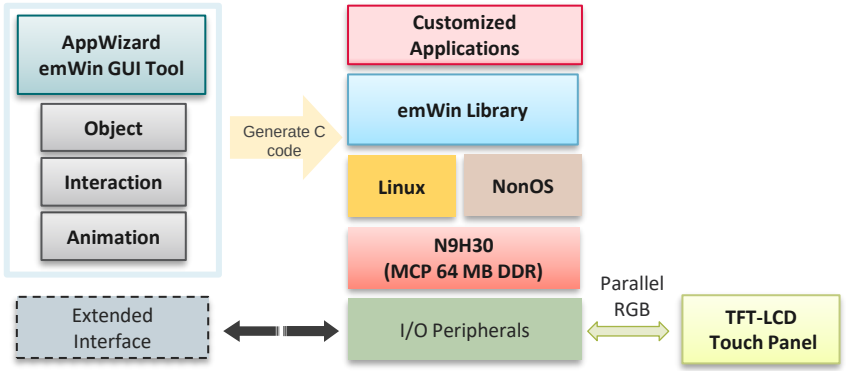
NuMaker-HMI-N9H30

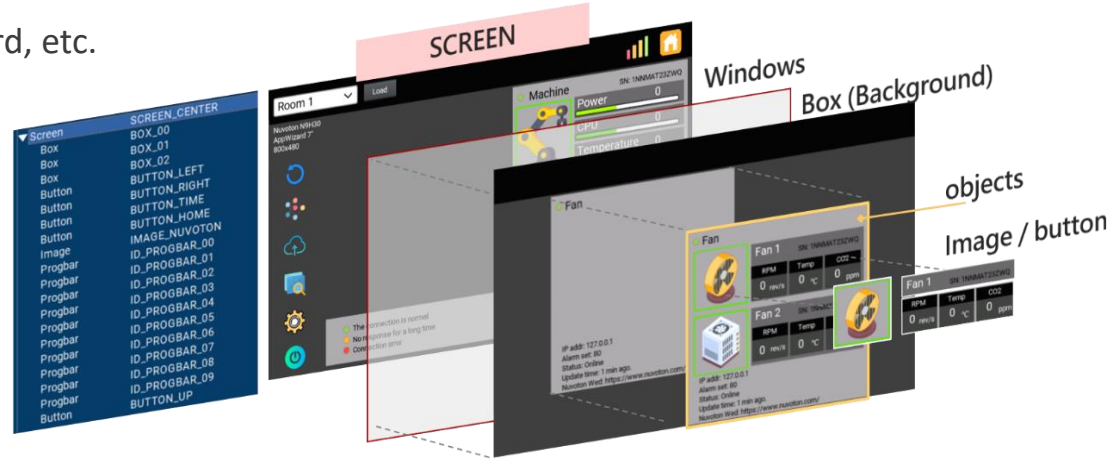
- **Develop on NuMaker-HMI-N9H30 with high performance**
  - Arm® **ARM926EJ-S** core @**300** MHz
  - **DDR (64 MB)** /SPI Flash (32 MB) /NAND Flash (128 MB)
  - 2 sets of RS-232, 7 sets of UART, RS-485, 2 sets of 10/100 Ethernet, 2 sets of USB HS, 1 set of CAN, ADC
  - 2D Graphic Engine/JPEG Codec
  - **7”** (**800x480)** 24-bit RGB LCD with 4-wires Resistive Touch
  - OS: Linux/nonOS



- **Design HMI using emWin Appwizard**

Create Objects- button, switch, rotary, progbar, text, language switch, keyboard, etc.





Copyright © 2022 Nuvoton Technology Corporation

Coffee Machine HMI by emWin

NuMaker-HMI-N9H30

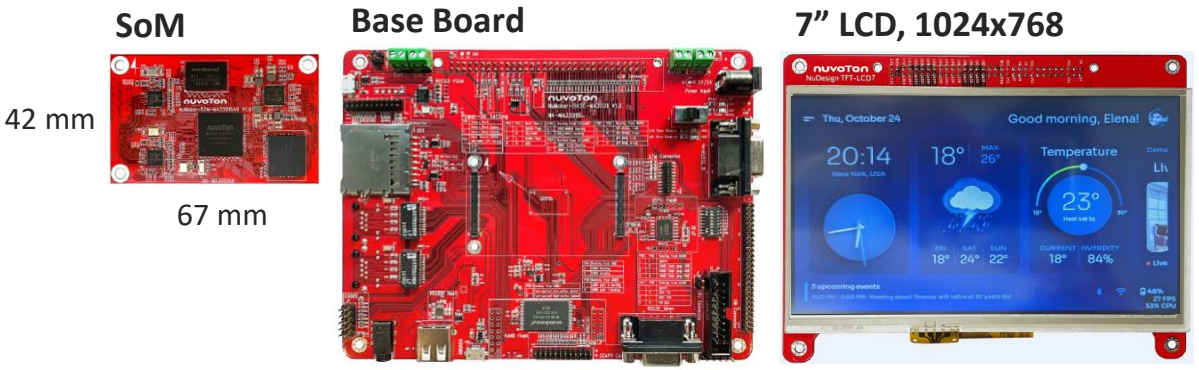
- N9H30 EVB (N9H30F63IEC@300 MHz, MCP 64 MB DDR)
- Provides application templates for easy development
  - FreeRTOS + emWin graphics library
- 7” 800x480 TFT-LCD with resistive touch
- Booting from NAND flash
- SD card be the resource storage
- Demo functions
  - Program bar widget to show up the loading status
  - Button widget to change page
  - Text widget for runtime text rendering

Copyright © 2022 Nuvoton Technology Corporation

NuMaker-HMI-MA35D1-S1 EVB

Features

- SoM
  - MA35D16A887C / BGA312 package, stacking a 256 MB DDR
  - PMIC power solution
  - eMMC Flash 16 GB
  - 2 sets of Gigabit Ethernet PHY
- Base Board
  - 2 sets of Gigabit Ethernet
  - 1 set of USB2.0 HS Host & 1 set of USB2.0 HS Host/Device
  - 2 sets of CAN FD
  - 1 set of SD2.0 (Standard SD Slot)
  - 1 set of SIM card slot
  - 2 sets of UART, 2 sets of RS485, Analog and Digital I/O
  - 2 sets of Camera Interface
  - Audio Codec with Mic, Headset Jack
- 7” TFT-LCD (1024x600) with resistive touch



Graphics Library	emWin SEGGER, LVGL, Qt
OS	Linux, RTOS
Linux Development Environment	yocto PROJECT, Buildroot, U-BOOT

Copyright © 2022 Nuvoton Technology Corporation

NuMaker-HMI-MA35H0-A1 EVB

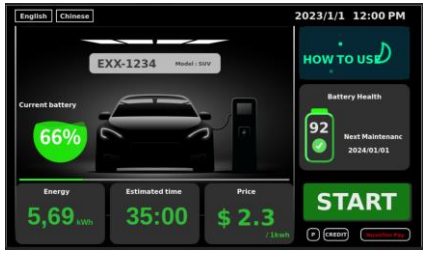
Features

- MA35H04F764C / LQFP216 package (MCP with 128MB DDR)
- Dual Cortex-A35, CPU speed up to 650MHz
- Discrete power supply
- Memory Device
  - NAND Flash 1GB
  - QSPI NAND Flash 512MB
  - SD3.0 (Standard SD slot) x1, SD2.0(Micro SD slot) x1
- High-speed Connectivity
  - Megabit Ethernet x1
  - USB2.0 HS Host x1, USB2.0 HS Host/Device x1
  - CAN FD x1
  - RS485 / RS232 x2
- Audio Codec (NAU88C22YG) with Mic &Headset Jack
- Analog and Digital I/O header
- 7” TFT-LCD(1024 x 600) with Resistive Touch

EVB Info

- EVB Web Page for Introduction
- PN: NuMaker-HMI-MA35H0-A1
- Ordering Number: NK-HMA35H0A1

EV Charging Station



Industrial Control

Coffee Machine

Speed Meter

Copyright © 2022 Nuvoton Technology Corporation

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