# STM32N6 SERIES

## The first high-performance STM32 MCU with AI acceleration



STM32

## Redefining the performance of microcontrollers for industrial and consumer applications

The STM32N6, powered by the Arm® Cortex® -M55 running at 800 MHz, is the first STM32 MCU that embeds the ST Neural-ART accelerator™, an in-house developed NPU engineered for power efficient edge AI applications.

An H264 hardware encoder and the NeoChrom™ Accelerator for graphics allow the STM32N6 to be deployed in demanding, feature-rich products.

A high level of security is also provided; the STM32N6 is compliant with the latest security regulation standards.

### KEY FEATURES AND BENEFITS

- Dedicated embedded Neural Processing Unit: 600 GOPS NPU, 3 TOPS/W power consumption
- Arm® Cortex®- M55 core: 1280 DMPIS/ 3360 CoreMark
- Available in 6 packages ranging from 169 to 264 pins
- Ideal for edge AI or graphics applications: 4.2 MB contiguous embedded RAM
- Extended multimedia capabilities: 2.5D graphics accelerator, H264 encoder, JPEG encoder/decoder
- Computer vision pipeline: MIPI CSI-2, camera I/F, Image signal processor
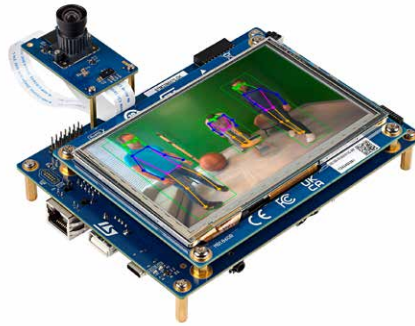- Target SESIP3 and PSA Level 3 certifications

### KEY APPLICATIONS

- Smart industry: visual anomaly detection
- Smart home: event detection
- Smart city: building automation
- Automotive: environment sensing
- Personal electronics: wearables
- Medical and healthcare: body measurements

## STM32N6 BLOCK DIAGRAM

**Embedded Memories**
- 4.2 MB Contiguous RAM
- BOOT 128 KB
- 8 KB Backup RAM
- 4 KB Debug RAM

**Arm® Cortex®-M55 800 MHz TrustZone® MVE**

**ST Neural-ART accelerator 600 Gops**

**Connectivity**
- 3x FDCAN
- 2x USB2.0 D/H HS + HS PHY
- 1x UCPD controller
- 3x I²C + 2x I3C (SDR)
- 5x UART, 5x USART
- 6x SPI (incl. 4x I2S)
- 1x ULP UART
- 1x Gbit ethernet with TSN

**External memory interfaces**
- Hexa-SPI
- Octo-SPI
- Flexible memory controller (PSRAM, SDRAM, NOR, NAND, TFT-LCD)
- 2x SD/SDIO/MMC

**System**
- 96-bit unique ID
- Watchdogs
- Cyclic redundancy Check (CRC)
- XTAL & internal osc

**Audio**
- SPDIF-RX/TX
- 2x SAI
- 1x MDF (6 filters)
- 1x ADF filter (with SAD)

**Graphics**
- Chrom-ART™ accelerator
- Chrom-GRC™
- NeoChrom GPU accelerator
- LTDC/TFT-LCD Display controller

**Security**
- Security boot
- Secure RTC
- Analog true RNG
- Crypto/Hash
- Tampering
- OTP fuses 8 KB

**Analog**
- Digital temperature sensor
- 2x 12-bit ADC 5 MSPS

**Multimedia**
- H.264 encoder
- JPEG codec

**Camera pipeline**
- MIPI CSI-2, 2 lanes Camera I/F Parallel 16-bit with PSSI
- Image signal processor

**Timers/Control**
- 2x 16-bit motor control PWM synchronized AC timers
- 12x 16-bit timers
- 5x 16-bit LP timers
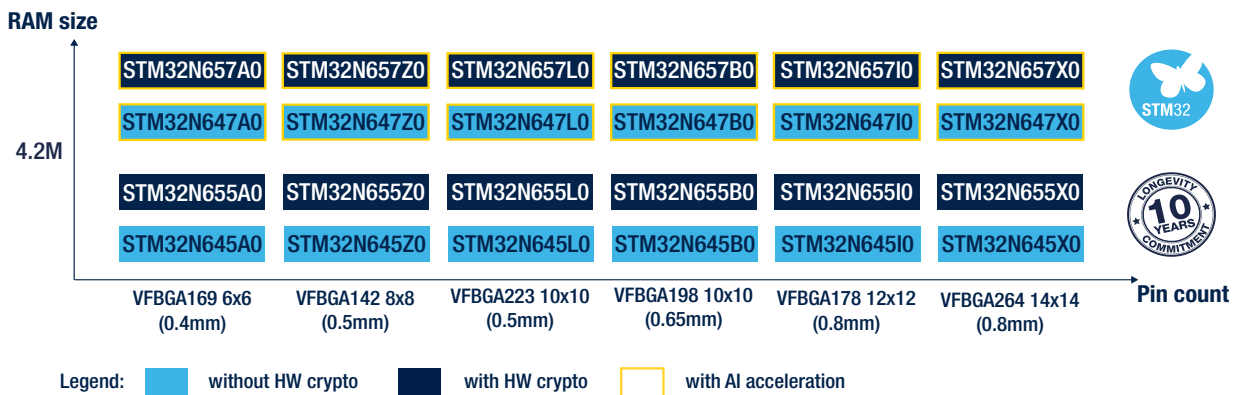- 4x 32-bit advanced timers

## HARDWARE TOOLS

**STM32N6570-DK***
Advanced prototyping including AI
STLink v3, ST morpho, Arduino, MIPI connector, USB 2.0, 1Gb Ethernet, 32 MB HexaRAM, Audio Jack, SD card.
*The board comes with B-CAMS-IMX.

**NUCLEO-N657X0-Q**
Affordable prototyping
STLINK v3, ST morpho, Arduino, MIPI CSI2 connector, USB 2.0, 1Gb Ethernet, Camera connector.

## STM32N6 PORTFOLIO

**RAM size**

| VFBGA169 6x6 (0.4mm) | VFBGA142 8x8 (0.5mm) | VFBGA223 10x10 (0.5mm) | VFBGA198 10x10 (0.65mm) | VFBGA178 12x12 (0.8mm) | VFBGA264 14x14 (0.8mm) |
|---|---|---|---|---|---|
| STM32N657A0 | STM32N657Z0 | STM32N657L0 | STM32N657B0 | STM32N657I0 | STM32N657X0 |
| STM32N647A0 | STM32N647Z0 | STM32N647L0 | STM32N647B0 | STM32N647I0 | STM32N647X0 |
| STM32N655A0 | STM32N655Z0 | STM32N655L0 | STM32N655B0 | STM32N655I0 | STM32N655X0 |
| STM32N645A0 | STM32N645Z0 | STM32N645L0 | STM32N645B0 | STM32N645I0 | STM32N645X0 |

4.2M → RAM size · Pin count

STM32 · 10 YEARS LONGEVITY COMMITMENT

**Legend:** without HW crypto — with HW crypto — with AI acceleration

## START DEVELOPING NOW!

Jumpstart your application development by leveraging our STM32Cube ecosystem and the ST Edge AI Suite, your stepping stone enabling edge AI on MCUs.

**ST Edge AI Suite**

**Order code: FL2412STM32N6**

For more information on ST products and solutions, visit www.st.com