STM32V8 series

New generation of high-performance MCUs for demanding industrial applications.

New milestone in the high-performance MCU roadmap

STM32**V8**

World-first MCUs built on 18 nm process technology
delivering next-level performance

The STM32 portfolio

Five product categories

Wireless MCU

Short- and long-range connectivity

Ultra-low-power MCU

Mainstream MCU

High-performance MCU

32-bit general-purpose microcontrollers: from 75 to 5,072 CoreMark score

Embedded MPU

32- and 64-bit microprocessors





Enabling edge AI solutions

Scalable security

STM32 portfolio

MPU

- STM32**MP1**: 1 GHz Cortex®-A7, 209 MHz Cortex®-M4
- STM32**MP2**: Dual 1.5 GHz Cortex®-A35, 400 MHz Cortex®-M33

High-performance MCUs

- STM32**F7**: 1,082 CoreMark, 216 MHz Cortex®-M7
- STM32**N6**: 3,360 CoreMark, 800 MHz Cortex® -M55, Neural processing unit
- STM32**V8**: Up to 5,072 CoreMark, 800 MHz Cortex®-M85
- STM32**F2**: 398 CoreMark, 120 MHz Cortex®-M3
- STM32**F4**: 608 CoreMark, 180 MHz Cortex®-M4
- STM32**H5**: 1,023 CoreMark, 250 MHz Cortex®-M33
- STM32**H7**: 3,347 CoreMark, Up to 600 MHz Cortex® -M7, 240 MHz Cortex® -M4

Mainstream MCUs

- STM32**F3**: 245 CoreMark, 72 MHz Cortex®-M4
- STM32**G4**: 569 CoreMark, 170 MHz Cortex®-M4
- Mixed-signal MCUs
- STM32**C0**: 114 CoreMark, 48 MHz Cortex® M0+
- STM32**F0**: 106 CoreMark, 48 MHz Cortex®-M0
- STM32**G0**: 142 CoreMark, 64 MHz Cortex®-M0+
- STM32**F1**: 177 CoreMark, 72 MHz Cortex®-M3

Ultra-low-power MCUs

- STM32**L0**: 75 CoreMark, 32 MHz Cortex®-M0+
- STM32**U0**: 140 CoreMark, 56 MHz Cortex®-M0+
- STM32**L4**: 273 CoreMark, 80 MHz Cortex®-M4
- STM32**U3**: 393 CoreMark, 96 MHz Cortex®-M33
- STM32**L4+**: 409 CoreMark, 120 MHz Cortex®-M4
- STM32**L5**: 443 CoreMark, 110 MHz Cortex®-M33
- STM32**U5**: 651 CoreMark, 160 MHz Cortex®-M33

Wireless MCUs

- STM32**WL**: 162 CoreMark, 48 MHz Cortex®-M4, 48 MHz Cortex®-M0+
- STM32**WB0**: 156 CoreMark, 64 MHz Cortex®-M0+
- STM32**WB**: 216 CoreMark, 64 MHz Cortex®-M4, 32 MHz Cortex®-M0+
- STM32**WBA**: 407 CoreMark, 100 MHz Cortex®-M33

Latest product generation · Radio coprocessor only · New series or lines introduced in 2025 · Preannouncement

STM32V8: a new DNA for high-performance MCUs

FD-SOI and phase-change memory technology on 18 nm node

- High integration on single die
- High density: larger program embedded NVM
- Excellent power efficiency
- Strong robustness in harsh environments

+

Cutting-edge architecture & advanced features

- Powerful Arm Cortex®-M85 core
- Scalar & vectorial performance with Helium
- Rich features & memory integration
- Strong security for regulatory compliance
  - PSA Certified L3 & SESIP3 targets

Arm Cortex®-M85

significant performance increase in scalar, DSP, and ML compared with Arm Cortex®-M7

800 MHz frequency
thanks to 18 nm technology node

4 Mbytes of embedded NVM

140°C junction temperature

What this means for your applications

Factory automation & robotics

Energy management systems

Smart cities & buildings

Digital signal processing & analysis

Power conversion

Motor control

Secure IoT connectivity

Healthcare & biosensing

Audio applications

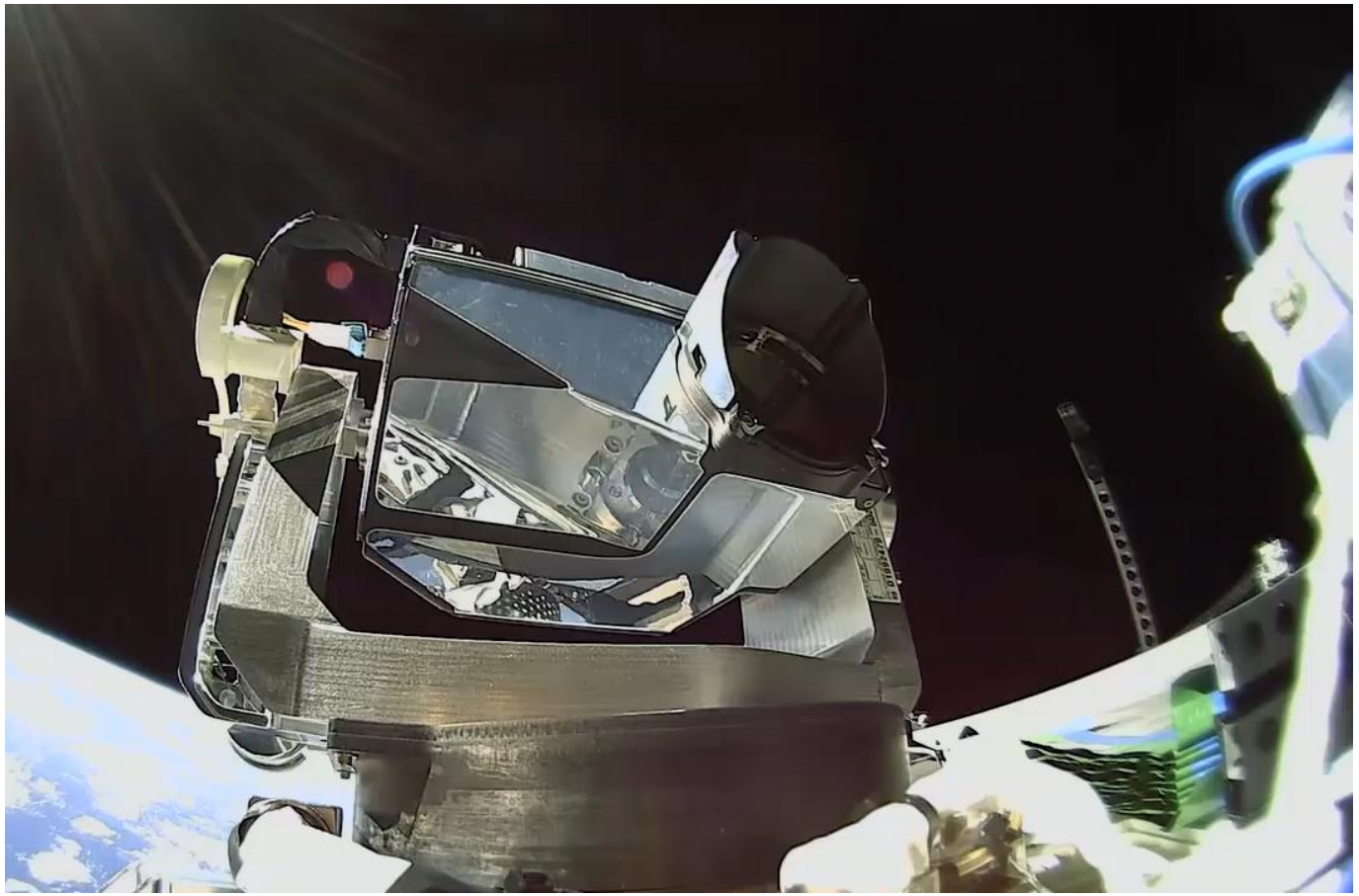
Transportation (ebikes)

Aerospace

Aerospace application: STM32V8 in SpaceX mini-laser

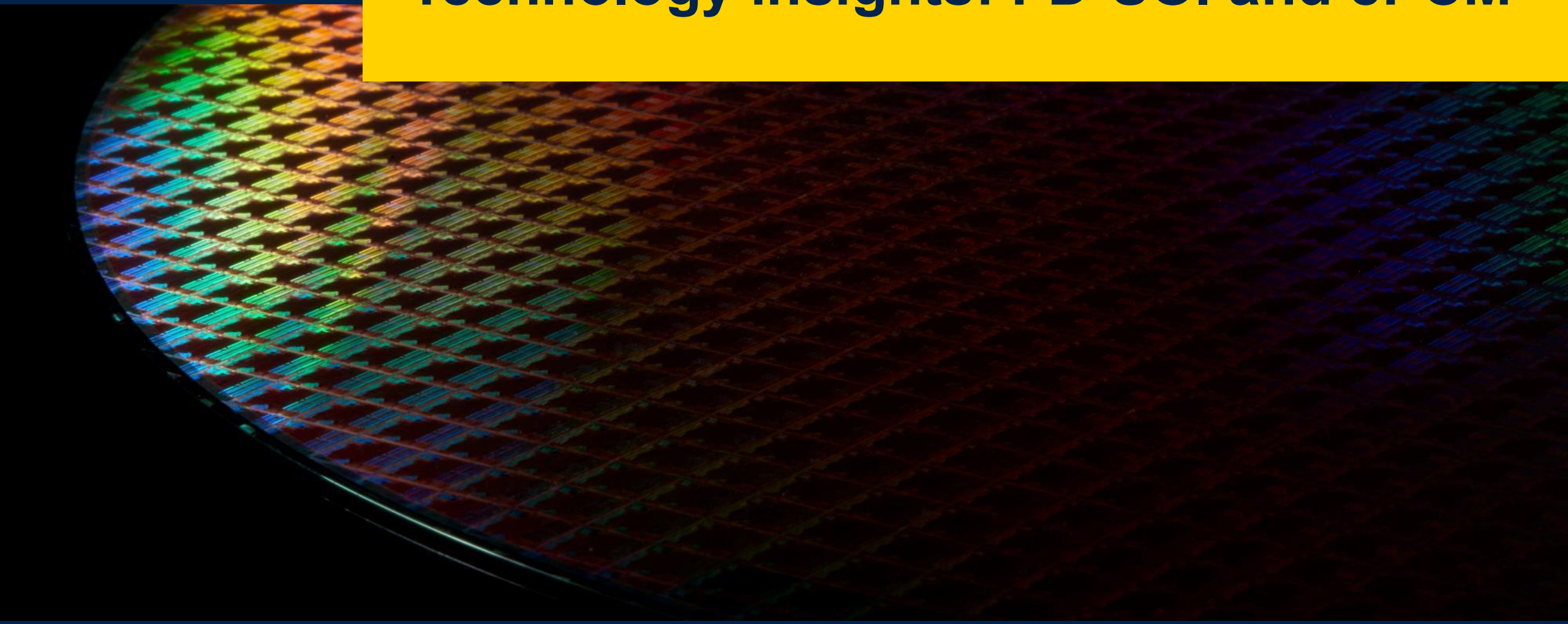
“The STM32V8’s high computing performance and integration of large embedded memory and digital features were critical in meeting our demanding real-time processing requirements, while providing a higher level of reliability and robustness to low Earth orbit environment, thanks to the 18nm FD-SOI technology.”

Michael Nicolls, Vice President, Starlink Engineering at SpaceX



High-speed connectivity system in Starlink satellite network

Technology insights: FD-SOI and ePCM



The main benefits in the context of STM32V8

Competitive advantages

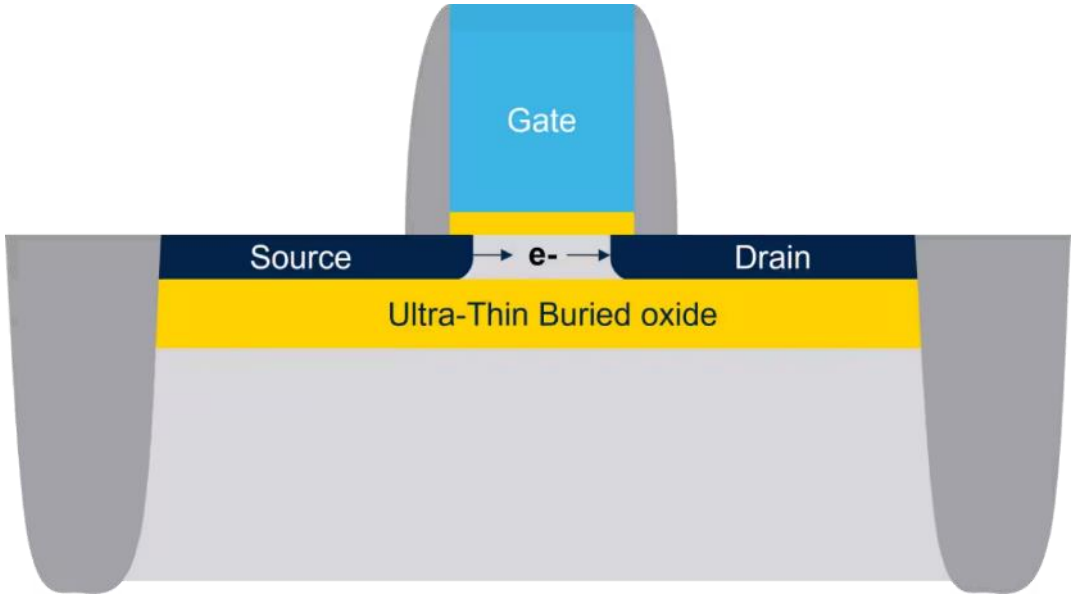
- Outstanding **energy efficiency** through FD-SOI body biasing capability, enabling overdrive mode that boosts core frequency
- **Robust** embedded nonvolatile memory (eNVM) qualified in automotive
- Unrivaled **immunity against radiation**, essential for harsh environments
- **Cost efficiency**
  - Highest digital & SRAM density of any planar technology
  - Smallest eNVM cell on the market (half the size vs 22 nm)
  - Lower structural cost than FinFET solutions

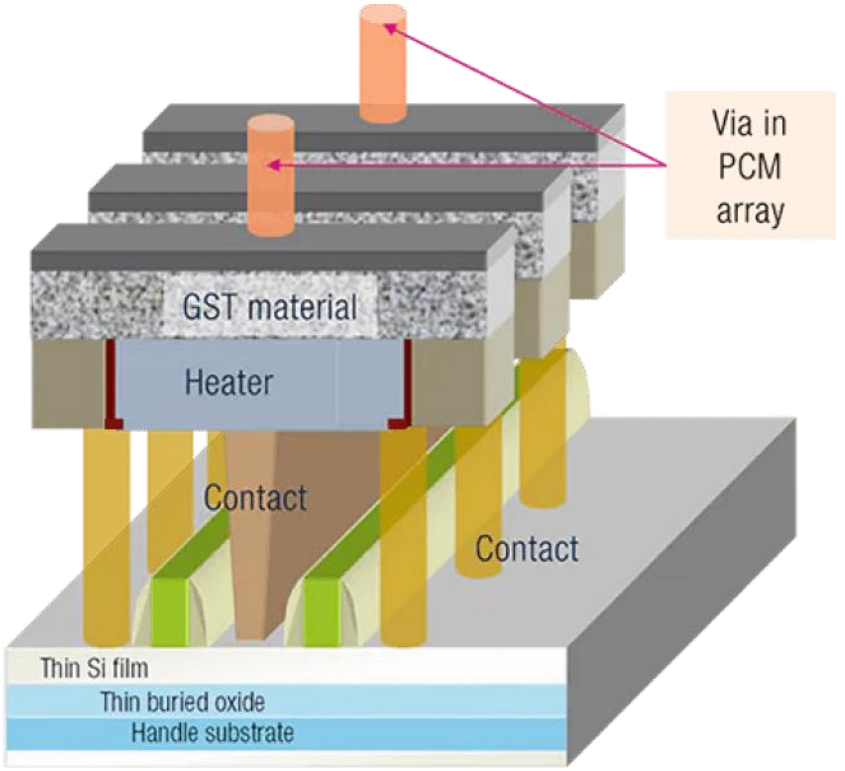
Resilient supply chain

Dual source with Samsung Foundry, Korea and ST Crolles, France

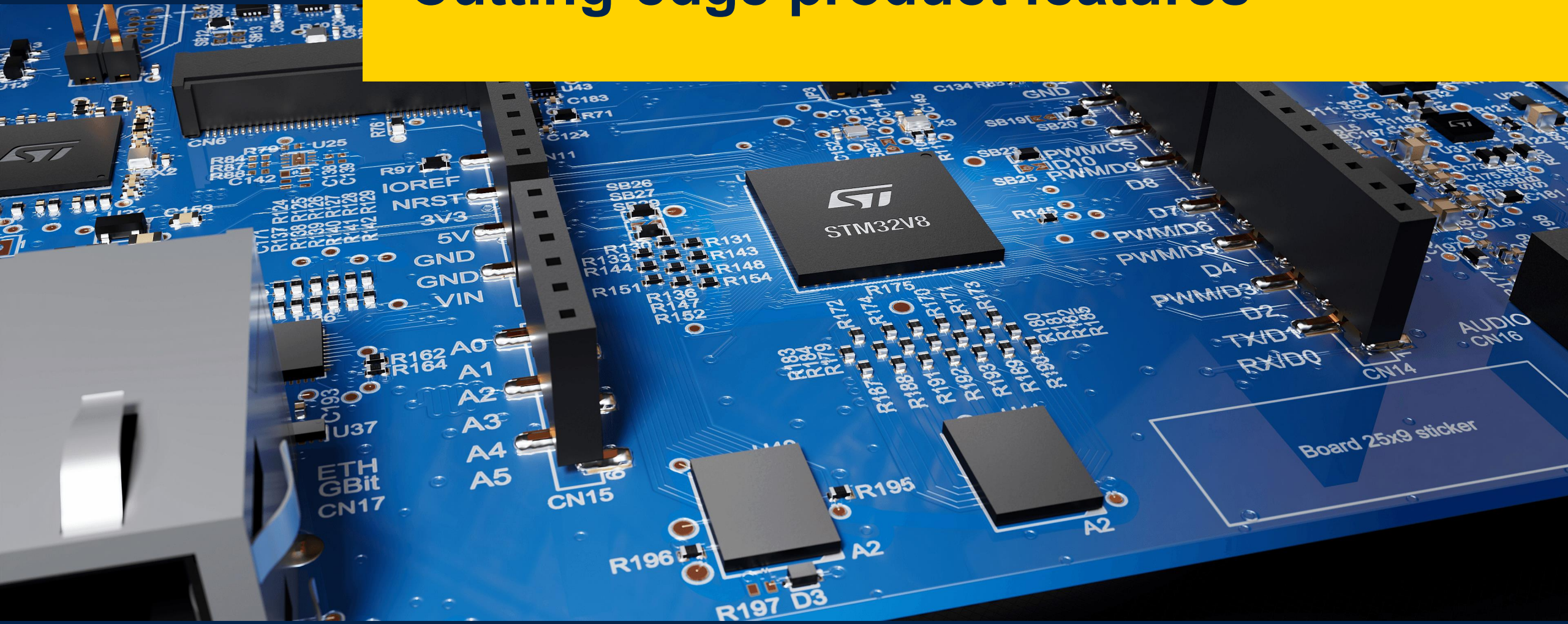
18 nm FD-SOI phase change memory (PCM) Technology breakthrough for MCUs

Fully depleted silicon on insulator (FD-SOI) + **Embedded phase change memory (ePCM)**

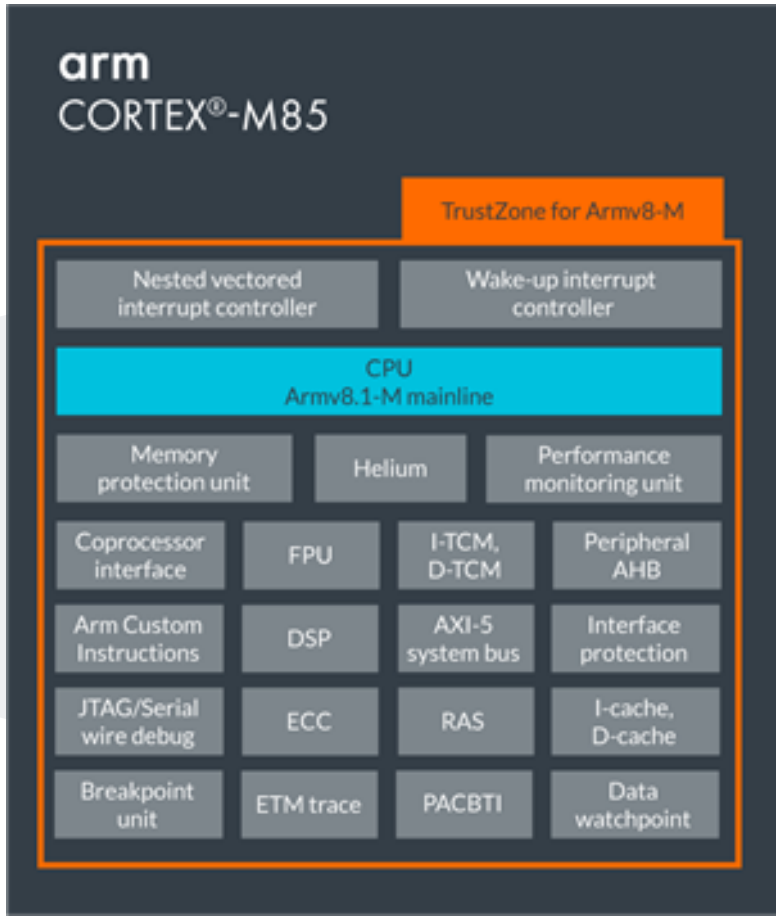




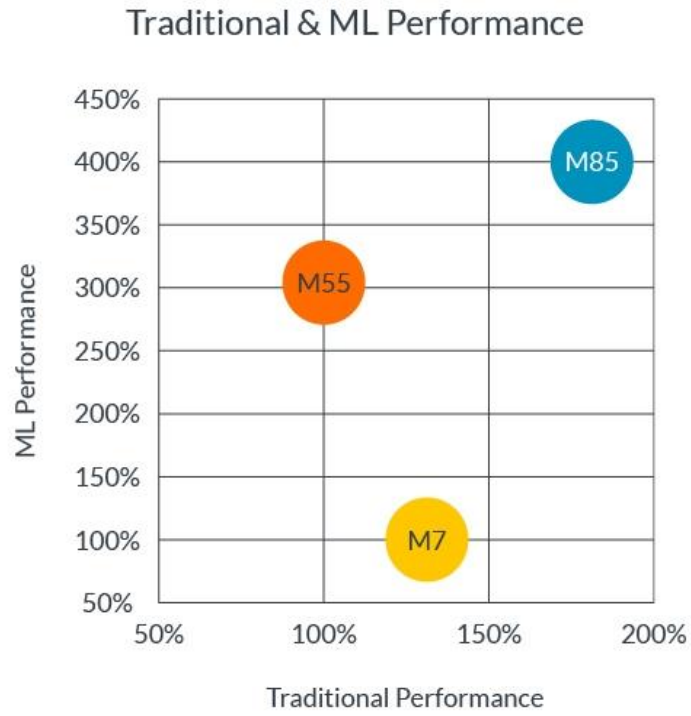
Cutting-edge product features



Arm Cortex®-M85: a cutting-edge MCU core

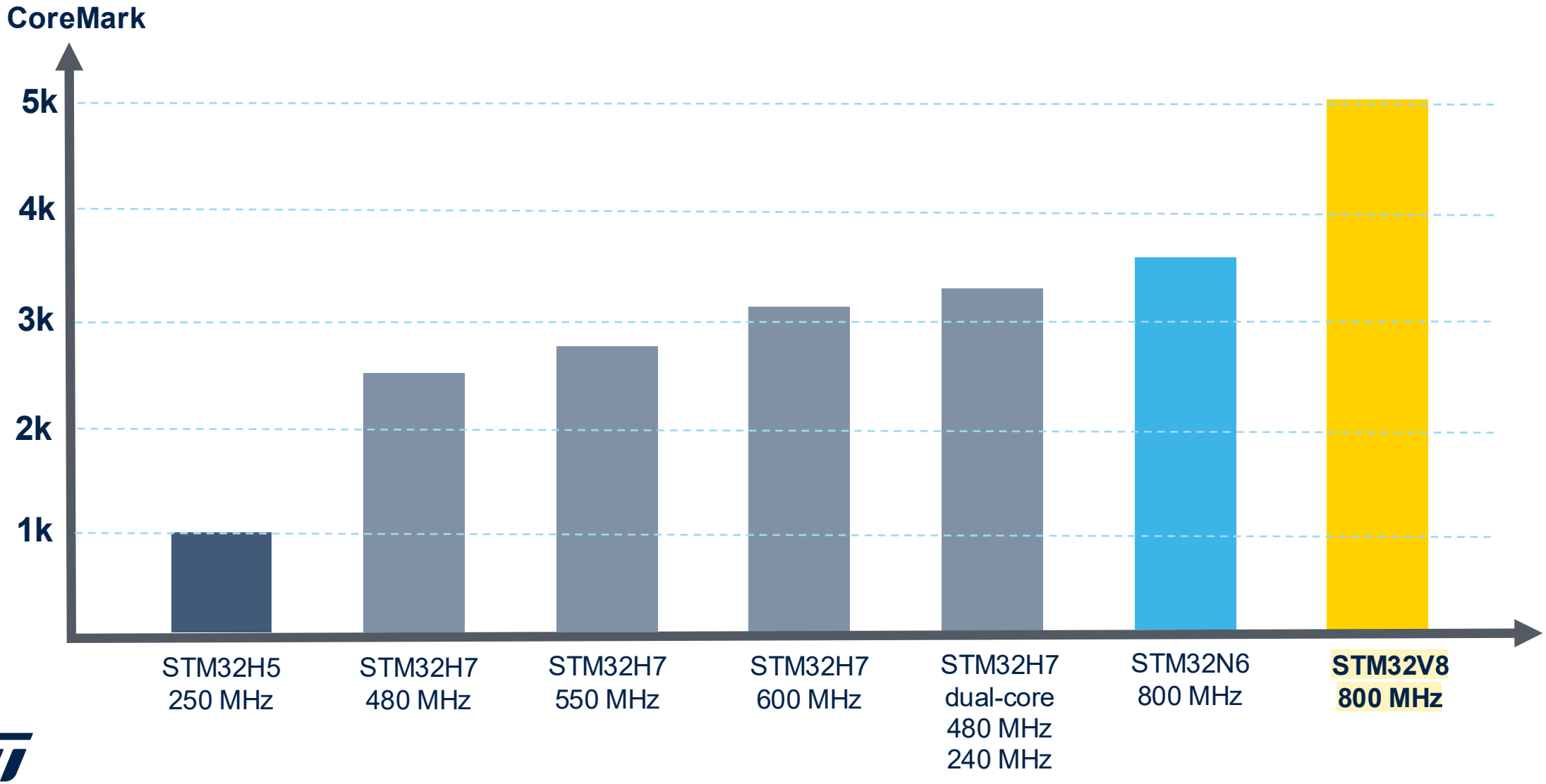


Up to 400% performance boost in DSP and ML workloads versus Cortex®-M7 core



Source: Arm

Scalar performance increase



Edge AI demo: 6x more ML performance versus previous product generation

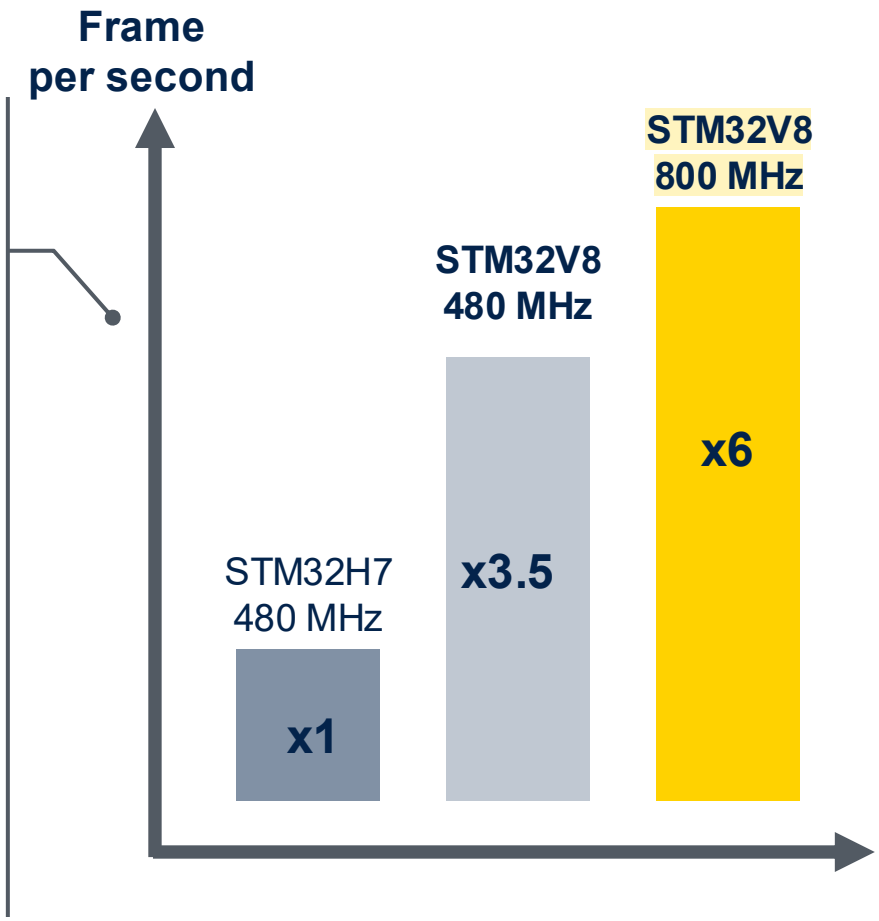
Set up

STM32Cube.AI

- YoloLC Model conversion
- Memory optimization
- Code optimization

STM32V8 discovery kit

- Cortex®-M85 up to 800 MHz
- Helium/MVE-enabled
- Model weights in eNVM
- Model buffering in SRAM



Block diagram

STM32V863/873

Arm Cortex®-M85 800 MHz DP-FPU, MPU, ETM TrustZone®, MVE 2x 32 KB – CACHE (I/D)	Embedded memories	Connectivity	Timers/Control
	Up to 4 MB embedded NVM 2x Banks 2 MB w./ ECC	1x Gbit Ethernet with TSN	3x motor control timers
	1.5 MB SYST.RAM w/ECC (partial)	3x FD-CAN	HR timer, 10x 16-bit timers
	2x 128 KB Data NVM	1x USB HS + 1x USB FS w/PHYs	5x 16-bit LP timers
	192 KB 0-WS TCM Up to 512 KB TCM w./ ECC	1x UCPD controller	4x 32-bit GP timers
	256 KB SYST NVM	3x I²C + 2x I3C	2x watchdog timers, gtx timer
	8 KB Backup RAM	5x UART, 5x USART, 1x LPUART	FMAC + cordic
		6x SPI (incl. 4x I2S)	
		HDMI-CEC	

System	External memory interfaces	Graphics	Security
GPDMA/HPDMA	hexa-SPI w/MCE	TFT LCD controller	Unique immutable ID
DEBUG	octo-SPI w/MCE	Chrom-GRC	Secure storage (HUK)
GPIO	2x SD/SDIO/MMC	Chrom-ART Accelerator	Secure boot/Upgrade (STiRoT)
SMPS, LDO (for RAM)	Fast FMC w/MCE (SDRAM, NDR, NAND)	JPEG hardware accelerator	Secure debug
RTC, backup, Reg			Crypto SAES/AES

Analog	Audio	Camera	
Digital temperature sensor	2x SAI, 4x I2S (SPI), SPDIFRX	16-bit parallel camera I/F	OTF XSPI Enc./ Dec
3x 12-bit ADC, 1x 12-bit DAC	1x MDF (6 filters) + ADF		Tampering services

STM32V8 brings both scalar and vector performance improvements that enable cutting-edge digital signal processing and machine learning, alongside graphics capabilities and next-level security.

Run efficient GUIs with high FPS & low CPU load

STM32 graphics IP

Chrom-ART

- Efficient 2D copy
- Alpha blending
  - For transparency effects
  - Anti-aliased bitmap fonts
- Color format conversion

JPEG codec

- JPEG compression & decompression
- Full & easy management of JPEG headers

LTDC/Display controller

Efficient & automatic display updates

Text scrolling

Full screen transitions

Fast 2D bitmap copy

MJPEG videos

Advanced graphics with STM32V8

Up to **600 x 480p** in **internal SRAM**

2x 16 bpp framebuffers: 1.2 Mbytes

STM32V8

RGB interface TFT-LCD display controller

Chrome-ART JPEG codec

1.5 MB RAM

FB 1

FB 2

4 MB eNVM

Assets

octo-SPI

hexadeca-SPI

External memory (optional)

NOR Flash

Hyper & PSRAM

Up to **1280 x 800p** with **external RAM**

2x 16 bpp framebuffers: 4.1 Mbytes

Supported by ST edge AI ecosystem leveraging Cortex®-M85 MVE accelerator

Applications

Applicative examples
(function packs)

Processing libraries

Frameworks

NANOEDGE AI STUDIO

scikit learn

TensorFlow Lite

Keras

ONNX

MATLAB

PyTorch

STM32 Cube.AI

Model conversion

NPU Graph optimizer

Memory optimization

Code optimization

ST Edge AI Developer Cloud

STM32 Cube

Coming soon

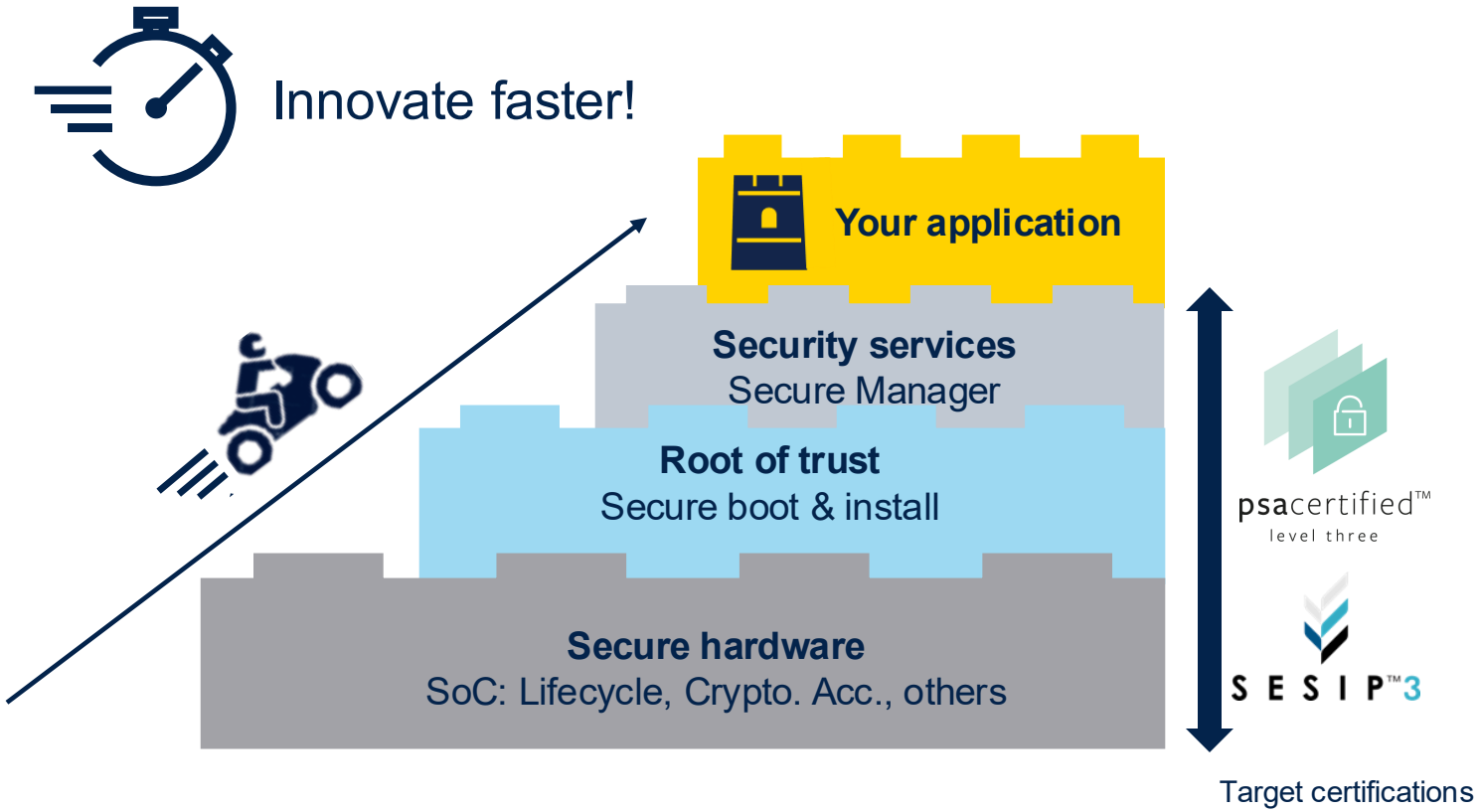
STM32V8-DK

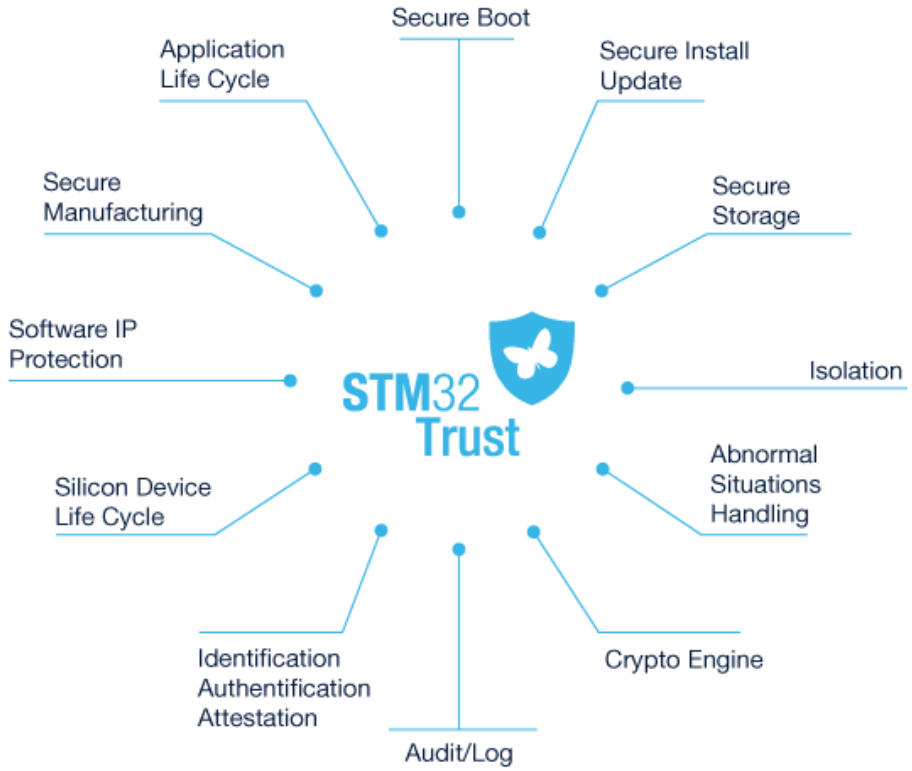
Coming soon

Nucleo-V8

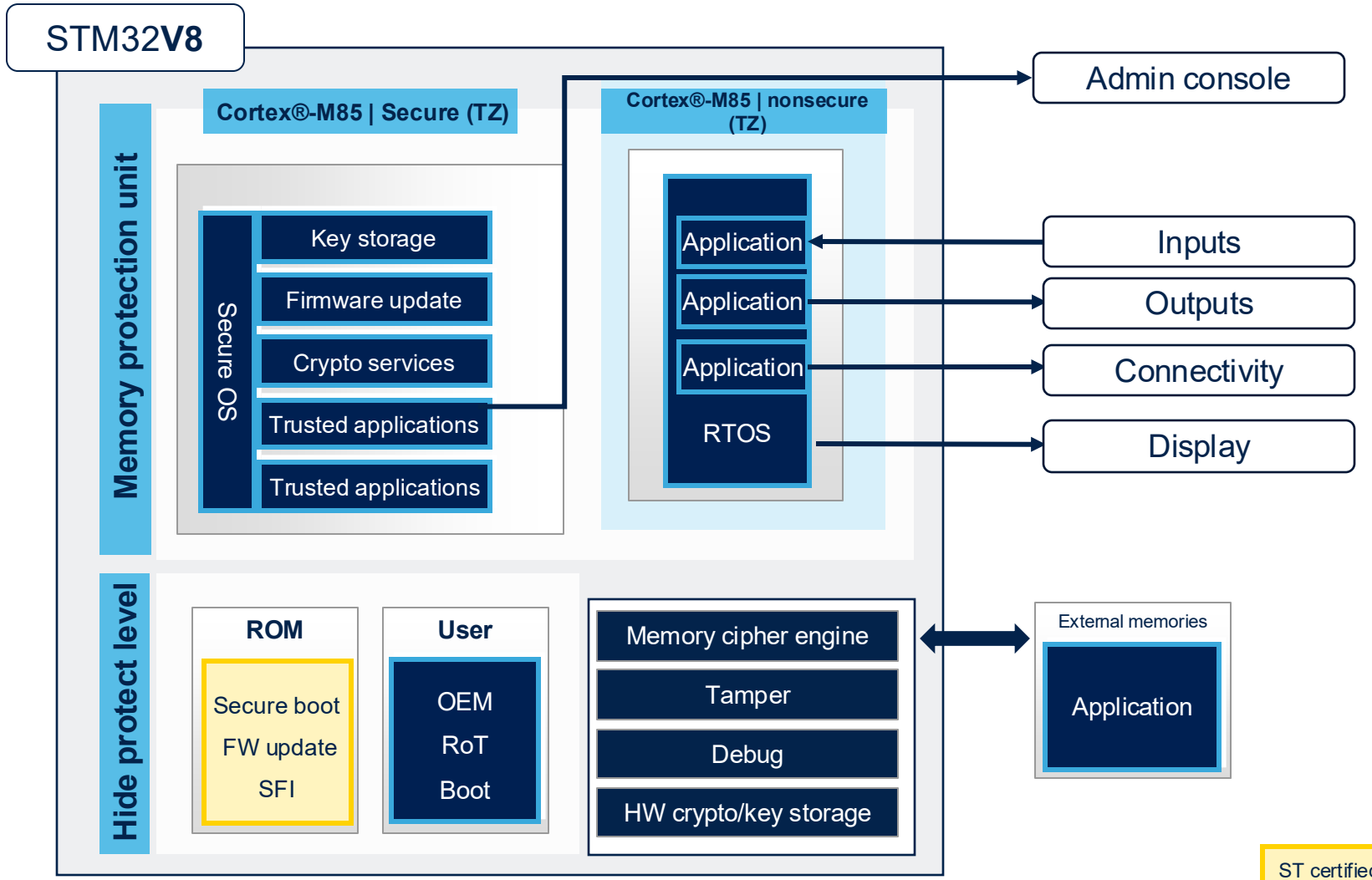
A scalable security offering

Choose your preferred security track, from secure hardware to the entire STM32Trust function coverage





Strong security for regulatory compliance



A robust security design for handling large data throughput

psacertified™ level three

SESIP™3

Target certifications

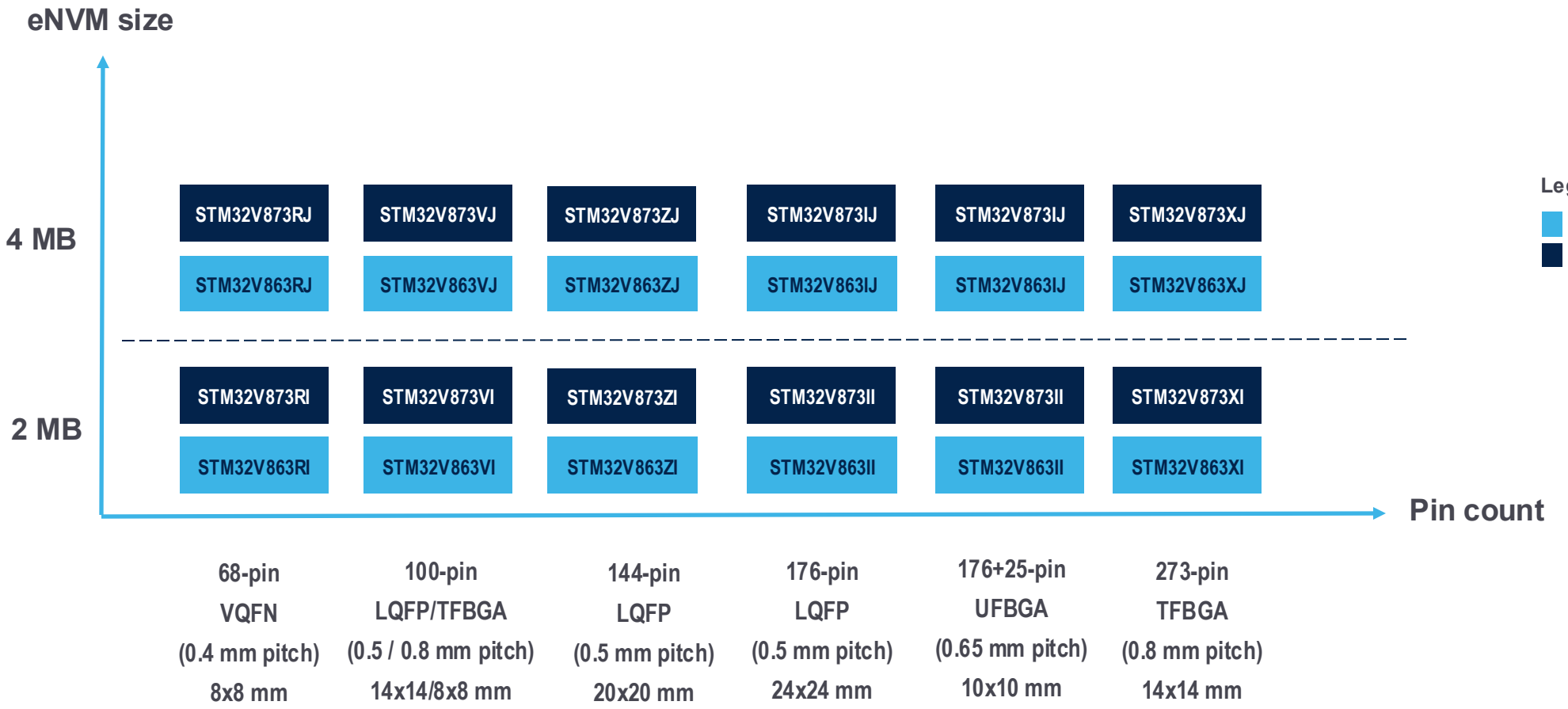
ST certified code

Customer

STM32V8 features
Overview compared with STM32N6 and STM32H7

	Computer vision edge AI	Industrial	
	High-performance MCU with NPU	High-performance MCUs	
	STM32**N6**	STM32**H7**	STM32**V8**
Computing performance	3,360 CoreMark Cortex®-M55 up to 800 MHz	Up to 3,347 CoreMark Cortex®-M7 up to 600 MHz Cortex® -M4 at 240 MHz	Up to 5,072 CoreMark Cortex®-M85 up to 800 MHz
Memory	External flash memory / 4.2 Mbytes RAM hexa-SPI, octo-SPI, FMC	Up to 2 Mbytes eNVM Up to 1.4 Mbytes RAM hexa-SPI, octo-SPI, FMC	Up to 4 Mbytes eNVM Up to 1.5 Mbytes RAM hexa-SPI, octo-SPI, FMC
Graphics	2.5D GPU – NeoChrom, Chrom-ART	2.5D GPU – NeoChrom, Chrom-ART	Chrom-ART
Edge AI	Neural-ART Accelerator (600 GOPS)	Software acceleration only	Software acceleration only leveraging Helium/MVE
Image processing	MIPI CSI-2 interface & ISP H.264 encoder	16-bit parallel camera I/F	16-bit parallel camera I/F
Security	Target SESIP3 & PSA L3 certifications	Up to target SESIP3 & PSA L3 certifications	Target SESIP3 & PSA L3 certifications
Robustness (Tj)	Up to 125°C	Up to 140°C	Up to 140°C PCM memory radiation immunity

Package line-up



Note: no pin-to-pin compatibility between STM32H7x and the STM32V8 series

Our technology starts with You

Find out more in the tech dive