STM32H5 series

Most powerful Arm Cortex®-M33 MCU yet

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

MPU portfolio

MCU portfolio

“ **If only**
an MCU could give me more design freedom and speed up my time to market.

This is where we come in

“ **If only**
an MCU could offer certified & maintained security services.

This is where we come in

STM32H5

Makes performance & security
more accessible

Introducing the STM32H5 MCU series for high-performance designs

Most powerful Arm® Cortex®-M33 MCU

Industry-first 32-bit MCU with Arm® Cortex®-M33 core running as high as 250 MHz

Scalable security to address every need

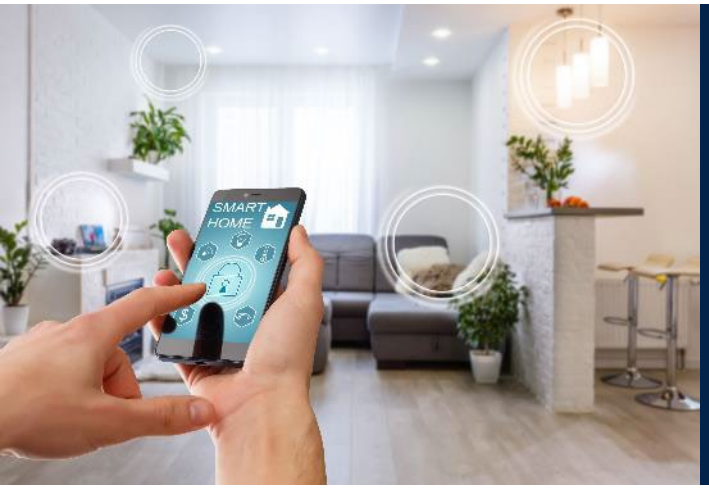
From the most essential security building blocks to fully certified services maintained by ST

Optimized cost/performance trade-off

Based on ST's optimized 40 nm process technology

Large choice of memory, peripherals, and package options

STM32H5 simplifies the design of secure industrial applications



Smart homes

Air conditioning systems
Fridges
Alarm systems

Factory automation

PLCs
Motor control
Industrial pumps

Smart cities

Communication gateways
Light control
Energy conversion

Consumer

Keyboards, tracking devices
Medical accessories

Key features for factory automation

Design freedom in harsh environments

- High performance core at 250 MHz
- Large and robust embedded memory
- Extended temperature range, up to 125°C

Ready for Industry 4.0

- PSA Certified Level 3 & SESIP3 target certifications
- SIL-ready enabled by native hardware features
- Extended connectivity (Ethernet MAC, FDCAN, MIPI-I3C, and USB)

Key features for IoT and connectivity systems

STM32H5

Performance in space-constrained devices

- High performance core at 250 MHz
- Low power dissipation
  - 61 µA/MHz at 250 MHz
  - 1.7 V power supply
- Small package sizes

Simplified connectivity solution

- Preprovisioned security keys for registration to cloud & OEM servers
- Extended connectivity (MIPI- I3C, SDMMC, USB, UCPD)

Key features for enhanced graphical user interfaces

Next-gen 2D graphics accelerator: Chrom-ART2

- The first STM32 MCU to embed the new Chrom-ART2
- Rotation: 90/180/270 degrees
- Bitmap scaling
- New color and font formats
- Automation features: command-list support and trigger generation

High-performance graphics up to 3.5-inch displays

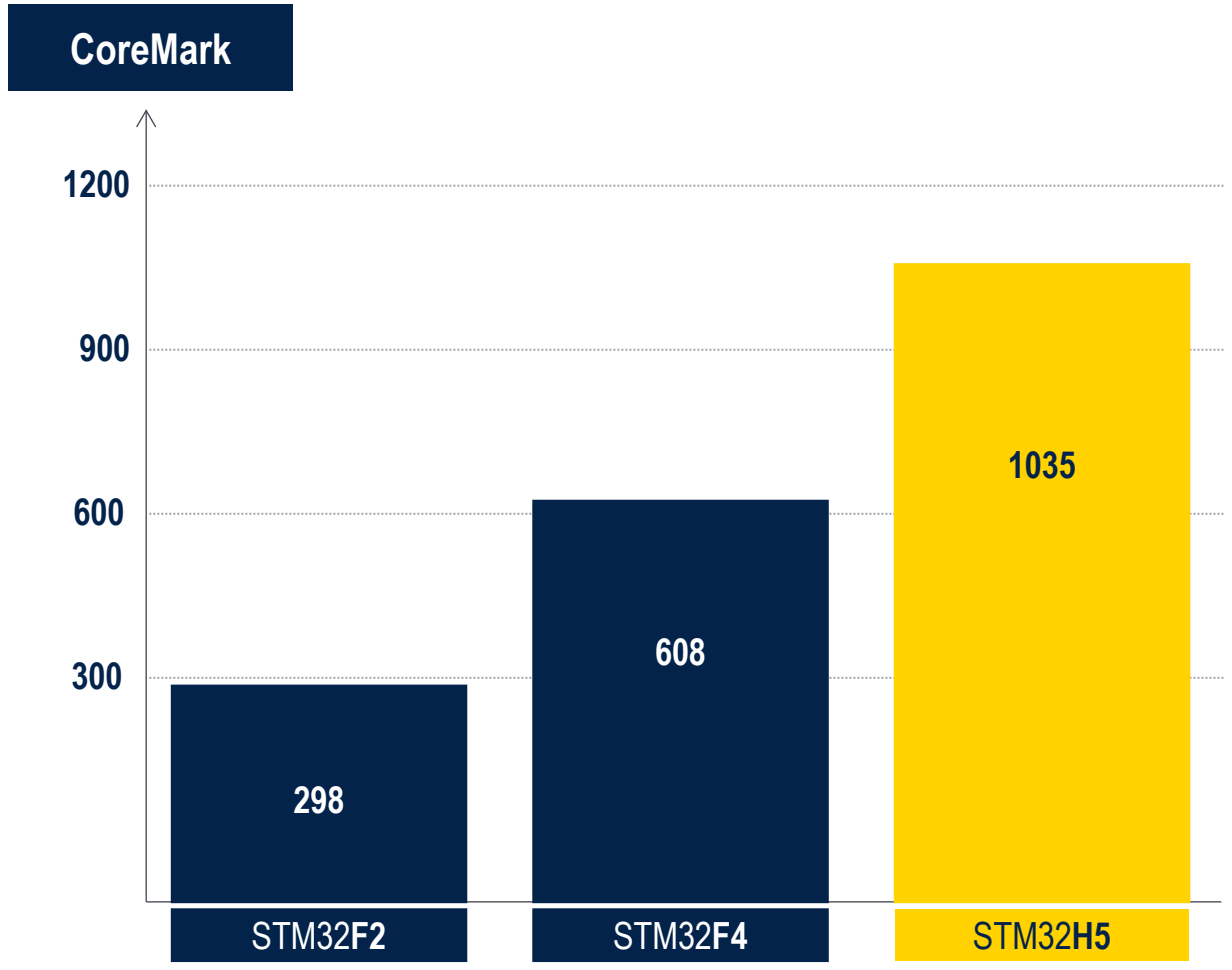
- 1.5 Mbytes of SRAM supporting up to
  - 600 x 480 in 16bpp
  - 480 x 320 in 24bpp
- 4 Mbytes of flash for code and assets
- MJPEG Codec for video acceleration

Lowering the bill of materials

Boosting application performance

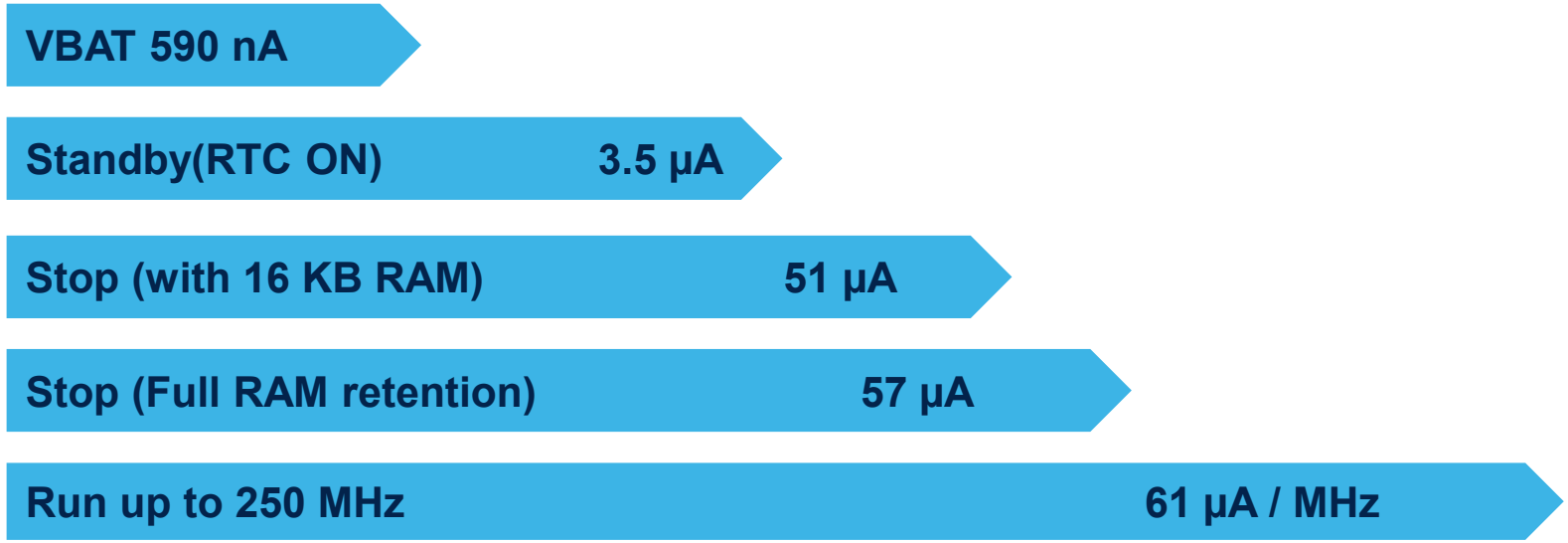
STM32**H5**

- Arm® Cortex®-M33 at **250 MHz**
  375 DMIPS & 1035 CoreMark
- **Instruction and data cache** for internal and external memory (ART Accelerator)
- Mathematics accelerators: **FMAC** and **Cordic**



Flexible power modes

Efficient power consumption with switched-mode power supply option (SMPS)

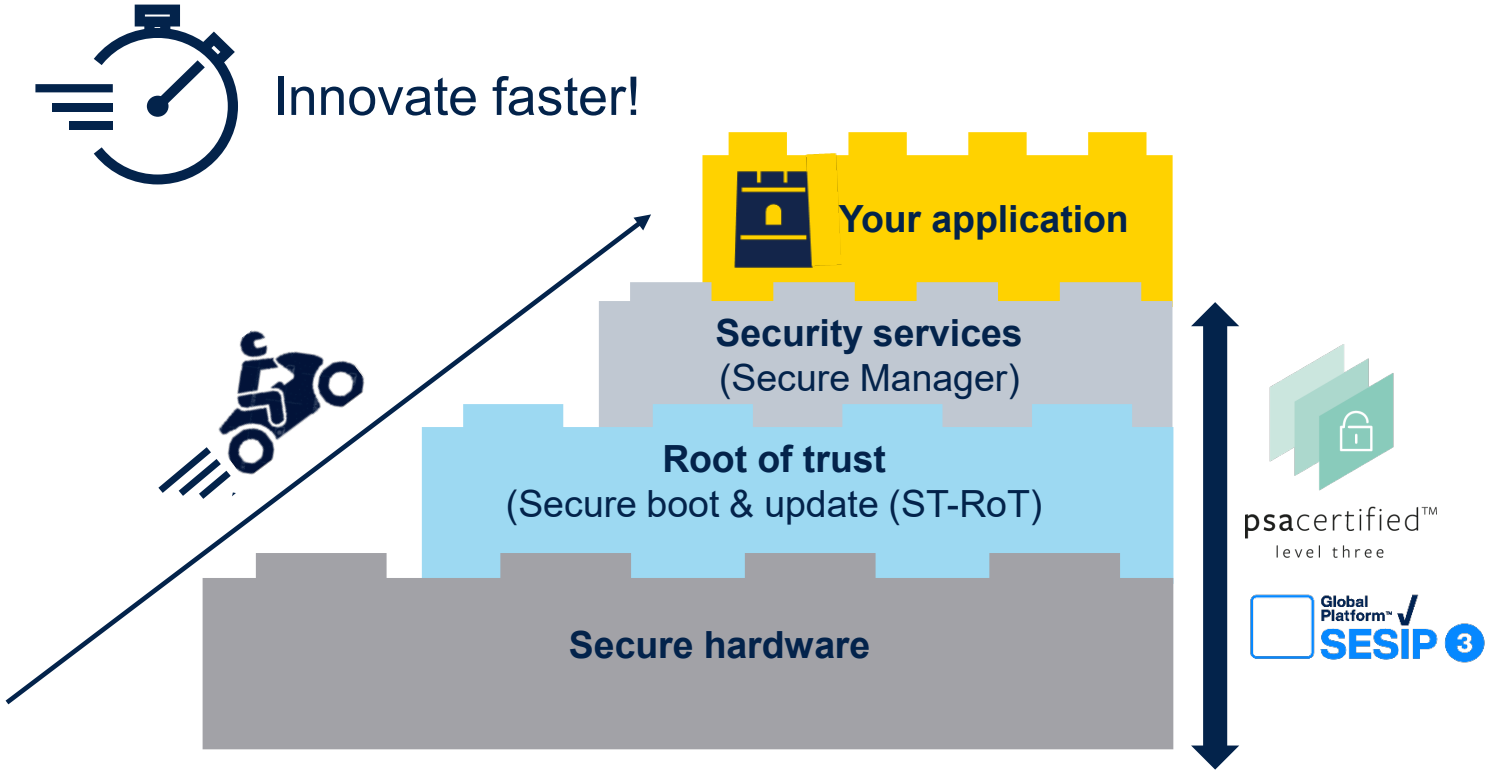


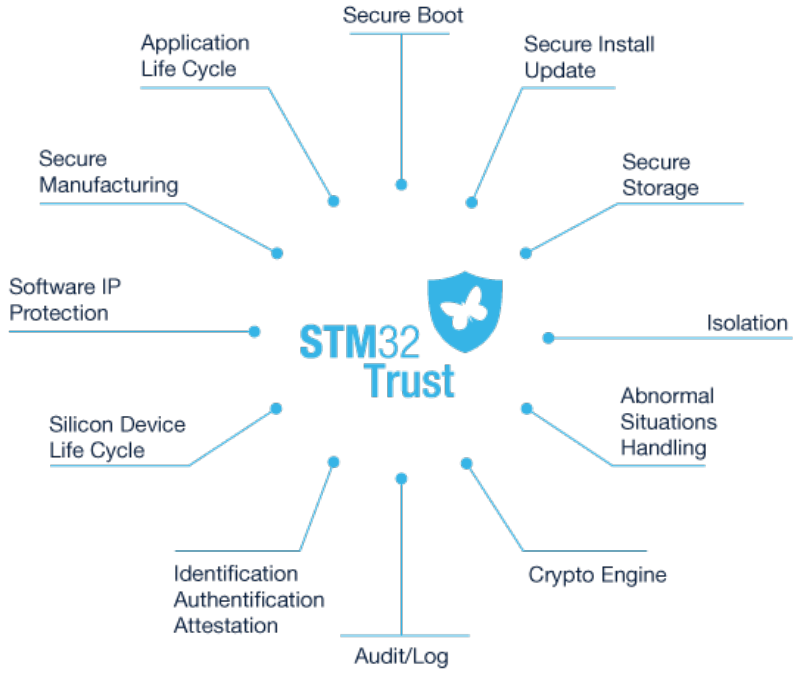
STM32H56x, Typical: 25°C, V_{DD} = 3V, SMPS mode

Security at its core

A scalable security offer to address your needs

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





The 12 STM32Trust security functions

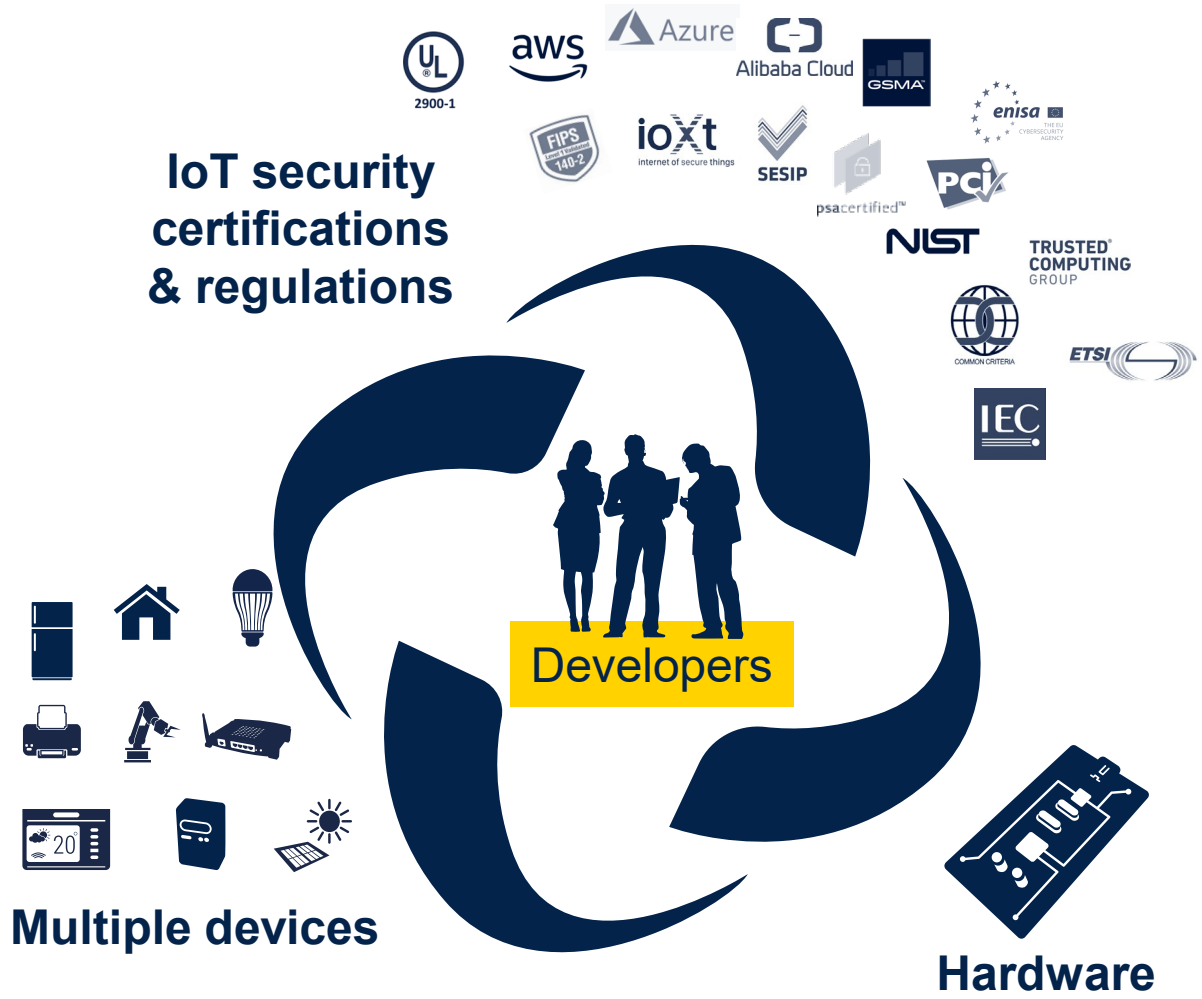
Addressing the security challenges & gaps

Security challenges for our customers

- Complex
- High cost
- Time to market

More effort to obtain

Scalability, certification, maintenance
core security hardware and services



STM32 Trust

Stronger security

Robust hardware features and turnkey SoC software implementations

Memory protections
against illegal access control

OTP, HDP, WRP, MPU
External flash decryption
OTFDec, Active Tamper
Secure debug

Cryptography
for hardware robustness

Side channel: AES, PKA
AES, PKA, SHA, TRNG, HUK,
OTFDEC, certified CryptoLib
CCB, Attestation keys

Platform authentication
during product life cycle

2 boot stages
Protection level states
Debug authentication

Code isolation
for runtime protection

7 isolation stages
Arm® TrustZone® technology
Dedicated keystores

Turnkey SoC security services

Secure Manager

Easy registration to clouds & servers

Single or multi-tenant IP protection

Pre-integrated third-party PKI life cycle

Immutable & updatable Root of Trust

State-of-the-art security assurance level

Global Platform SESIP 3

psacertified™ level three

target certifications

STM32 Trust TEE

Robust security to safeguard sensitive and mission-critical applications

More locked doors to ensure device security

Enhanced device authentication and anticloning capabilities at a reduced cost

#1

The coupling and chaining bridge (CCB) HAL

- Key hardware protection by securely wrapping provisioning keys with an encryption algorithm.
- Keeping keys hidden even from the CPU and securely stored.

#2

In-factory provisioned attestation

Assigning a unique, secure identity to each device during manufacturing.

+

Side-channel resistant hardware protection

Strong security for regulatory compliance, including the Cyber Resilience Act (CRA)

PSA Certified L3 & SESIP3 targets

STM32Trust TEE – Secure Manager

STM32 Trust TEE

Accelerate your time to market

Secure Manager

A **trusted execution environment** (TEE) integrating core security services

- **A simplified customer journey**
- **Seamless cloud/server support**
- **Supporting remote provisioning**
- **Multi-tenant IP protection**

The first MCU supplier to offer a certified and maintained TEE solution to customers

STM32 Trust TEE

The Secure Manager

Delivered as X-CUBE-SEC-M

Enhancing security while reducing costs and complexity

Multitenant IP protection

- Multiple business cases made possible
- Isolation for confidentiality at installation & runtime
- Protected development workflow

Cloud / Server

- Seamless cloud/server registration
- Pre-provisioned keys & certificates
- PSA compliant attestation

Simplified customer journey

- Turnkey TEE security solution with built-in services
- Certified secure implementation
- TrustZone® complexity abstraction
- Designed for long-term support (LTS)
- PSA-API compliant

Remote secret administration

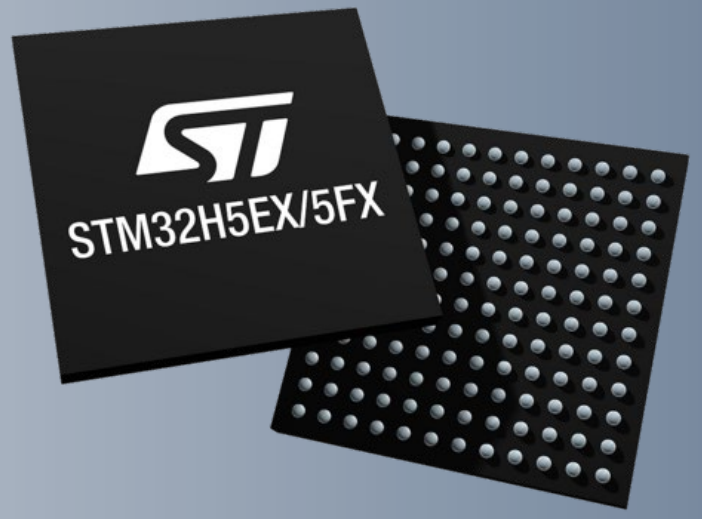
- Remote PKI lifecycle management **enabled**
- Customizable (e.g., Matter)
- Certificate installation/rotation
- Via partnership

Tailored for high-performance graphics

Boost your GUI with STM32H5Ex/Fx

NEW

STM32H5Ex/Fx lines



Next-gen 2D graphics accelerator

- The first STM32 MCU embedding the new STM32 **Chrom-ART2 graphics accelerator**

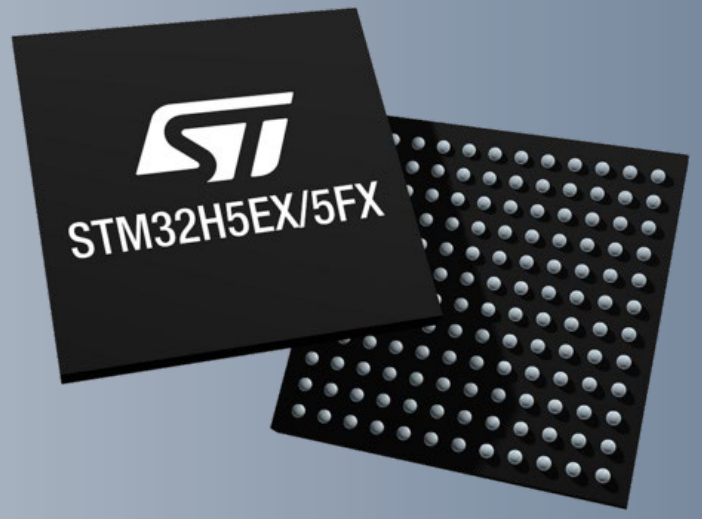
High-performance graphics up to 7"

- 1.5 Mbytes of SRAM & 4 Mbytes of flash for framebuffers, code, and assets
- MJPEG video accelerators

Lower BOM for cost-efficient HMI

- Simpler PCB and LQFP packages
- No need for external RAM and flash

New Chrom-ART2: delivering smoother GUIs



Next-gen 2D graphics accelerator

- The first STM32 MCU embedding the new **Chrom-ART2 graphics accelerator**
- Offloads the Cortex®-M33, enabling a higher frame rate and lower power

More effects for smoother, more engaging user interfaces

- Stencil buffer for advanced masking
- Rotation for dynamic layouts
- Scaling for fluid zoom and resize

More color formats / richer visuals with less memory

- Enhanced palette management and font management
- Smarter JPEG support to cut bandwidth
- New color formats to optimize framebuffer size

More automation for easier, faster GUI implementation

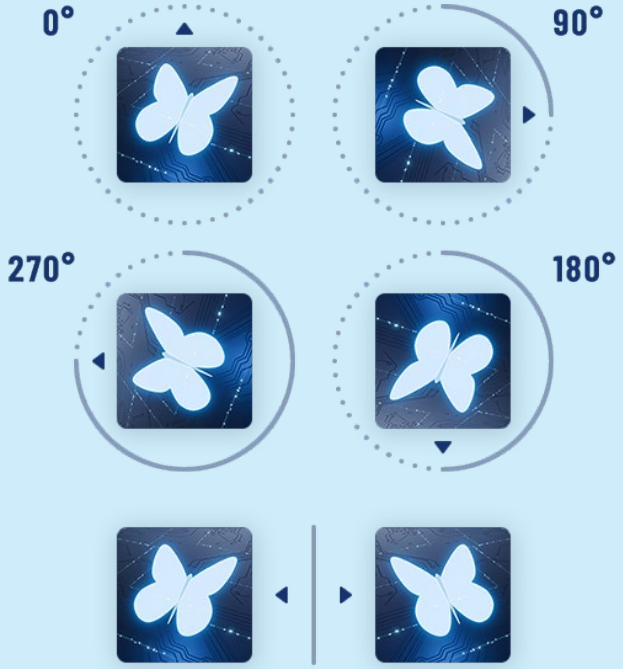
- Command list support
- Trigger generation

New Chrom-ART2 features

2D scaling 1

- 2D bitmaps scaling from largest size
- Nearest neighbor filtering

Rotation & mirroring 2

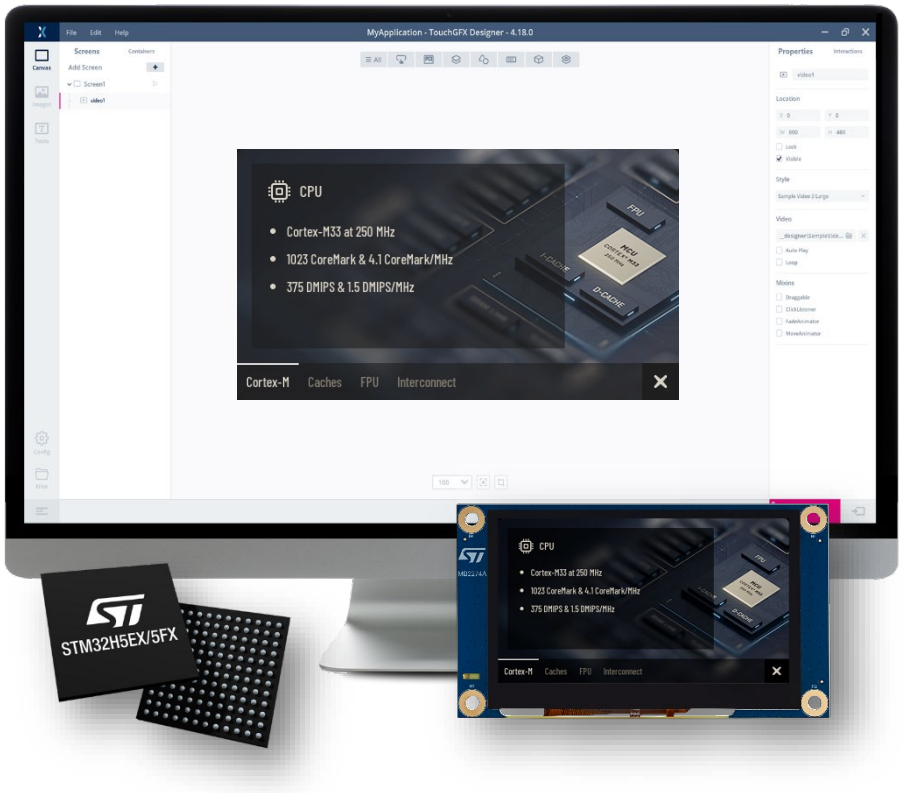


- 90° / 180° / 270° Rotation
- Image flip & mirroring

Enhanced font management 3

- New A1 & A2 mode
- Pixel precise positioning in A1, A2, A4
- Partial drawing of fonts

Develop your GUI in no time with the TouchGFX framework



Watch the video

1. Select the MCU and pick the associated developer kit

2. Download TouchGFX here

3. Find your display kit

STM32H5F5J-DK display kits is fully supported in TouchGFX:

- TBS TouchGFX Board Support (low level BSP)
- Demos in full source (App level for reference or copy)

4. Create/select a demo

5. Flash your display kit

Scalable portfolio and offer

The STM32H5 series offers a scalable portfolio

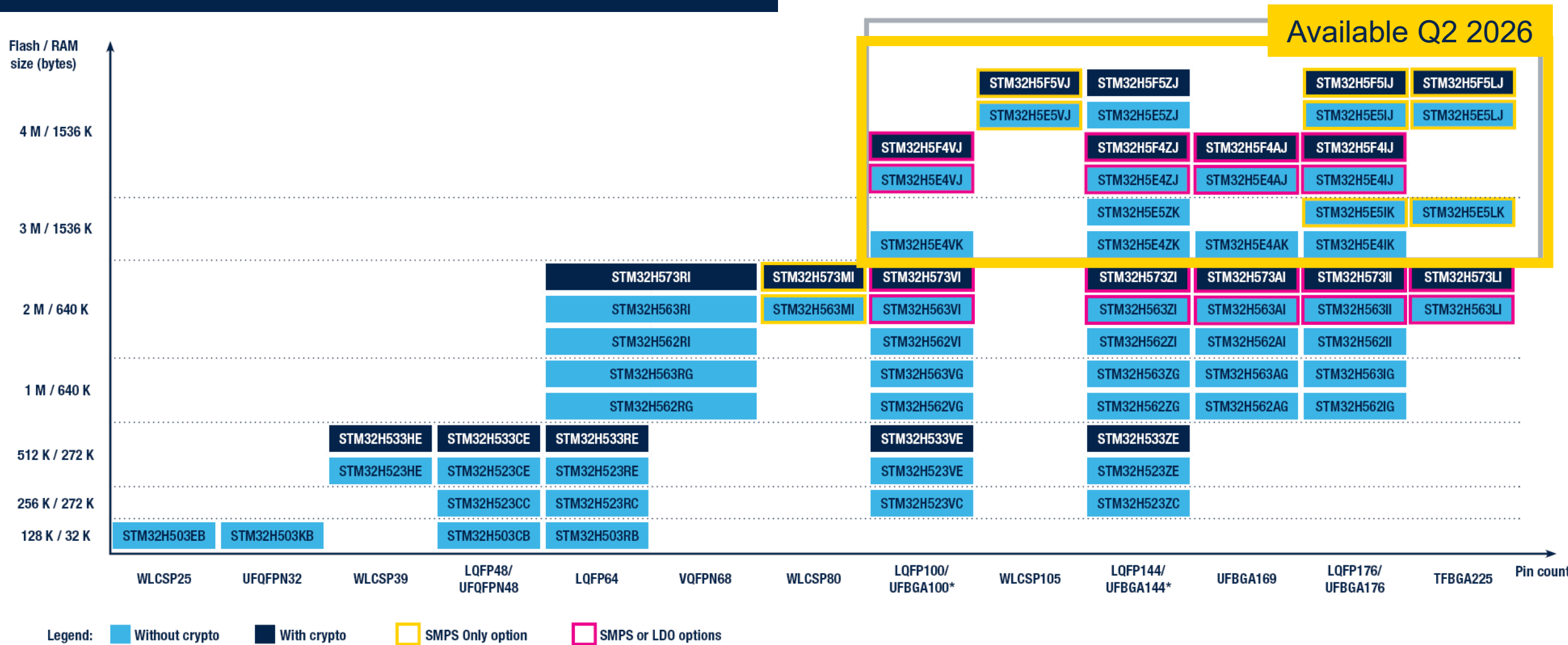
Expanding the STM32H5 series with STM32H5Ex/5Fx MCUs

	STM32H503	STM32H523	STM32H533	STM32H562	STM32H563	STM32H573	STM32H5E4	STM32H5F4	STM32H5E5	STM32H5F5
Flash size (KB)	128	256 to 512	512	1024 to 2048	1024 to 2048	2048	3072 to 4096	4096	3072 to 4096	4096
RAM size (KB)	32	272	272	640	640	640	1536	1536	1536	1536
USB	FS	FS/UCPD	FS/UCPD	FS/UCPD	FS/UCPD	FS/UCPD	FS/UCPD	FS/UCPD	**HS w/ PHY** FS/UCPD	**HS w/ PHY** FS/UCPD
12-bit ADC	1	2	2	2	2	2	3	3	3	3
Memory I/F		1x SDMMC, FMC, 1x Octo SPI	1x SDMMC, FMC, 1x Octo SPI	1x SDMMC, FMC, 1x Octo SPI	2x SDMMC, FMC, 1x Octo SPI	2x SDMMC, FMC, 1x Octo SPI	2xSDMMC FMC 2x OctoSPI	2xSDMMC FMC 2x OctoSPI	2xSDMMC FMC 2x OctoSPI	2xSDMMC FMC 2x OctoSPI
FDCAN	1	2	2	1	2	2	3	3	3	3
Ethernet					Yes	Yes	Yes	Yes	Yes	Yes
Power Supply	LDO	LDO	LDO	LDO	SMPS, LDO	SMPS, LDO	SMPS, LDO	SMPS, LDO	SMPS or LDO	SMPS or LDO
Trust Zone		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SAES, PKA, SHA-1, SHA-2, OTFDEC, HUK, ST-iRoT			Yes			Yes		Yes		Yes
SHA-3, CCB								Yes		Yes

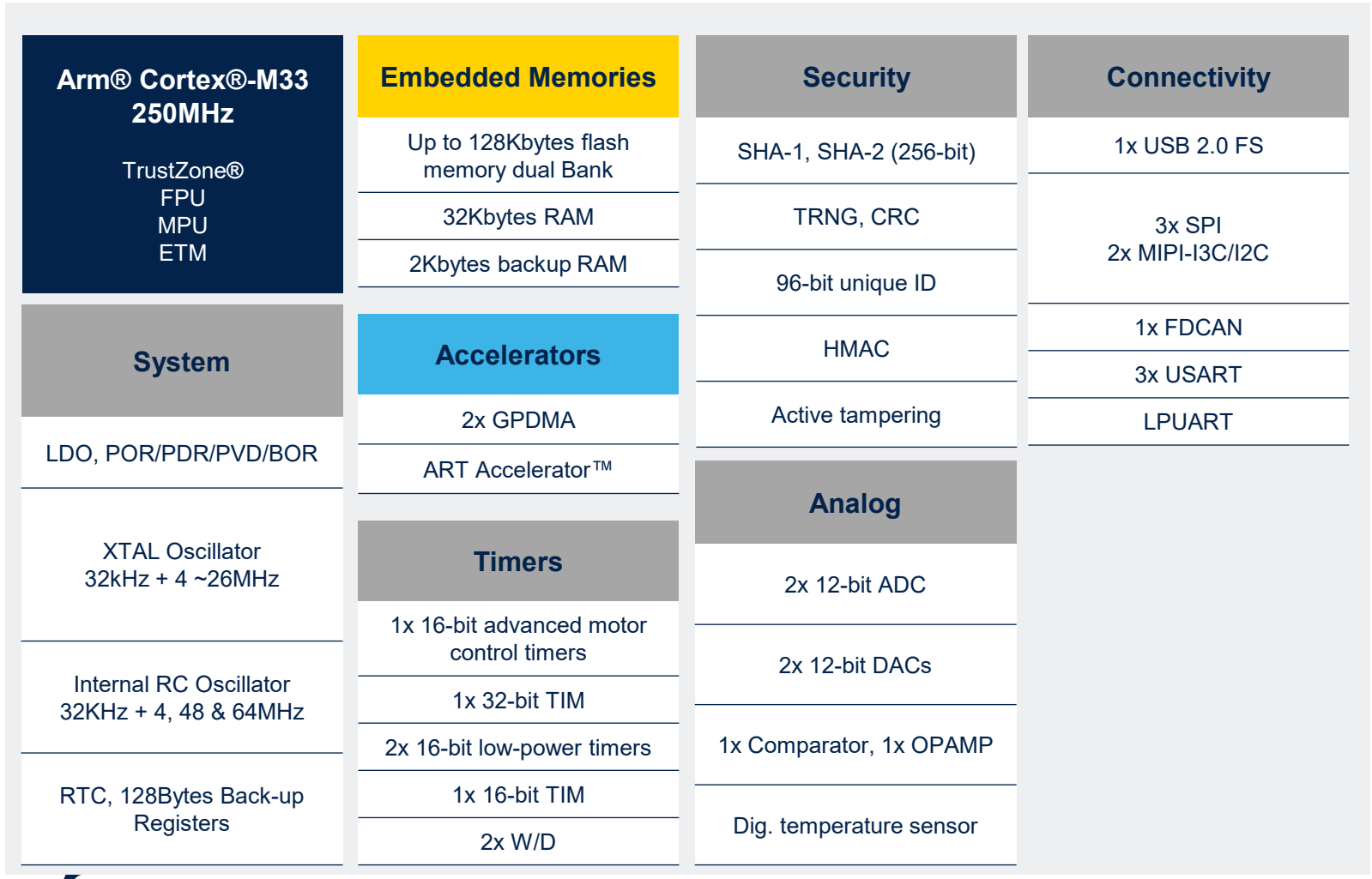
Latest release

STM32H5 portfolio

A large offer with multiple package choices



STM32H503 MCU block diagram



Embedded memory

Advanced accelerators

STM32H523/533 MCU block diagram

Arm® Cortex®-M33 250MHz

TrustZone®
FPU
MPU
ETM

Memory interfaces
FMC 8-/16-bit (SDRAM, NOR, NAND, parallel-LCD)
1x Octo-SPI w/ OTF decrypt
1x SD/SDIO/MMC

System
LDO, POR/PDR/PVD/BOR
XTAL Oscillator 32kHz + 4 ~26MHz
Internal RC Oscillator 32KHz + 4, 48 & 64MHz
RTC, 128Bytes Back-up Registers

Embedded Memories
Up to 512Kbytes flash memory dual Bank
272Kbytes RAM
2Kbytes backup RAM

Accelerators
2x GPDMA
ART Accelerator™

Timers
2x 16-bit advanced motor control timers
2x 32-bit TIM
2x 16-bit low-power timers
6x 16-bit TIM
2x W/D

Security
SHA-1, SHA-2 (512-bit)
ECDSA, TRNG, CRC
96-bit unique ID
HUK, OTFDEC, HMAC
RSA, ECC, AES, SAES
Active tampering
Secure Boot ST-iRoT
Secure manufacturing SFI

Analog
2x 12-bit ADC
2x 12-bit DACs
Dig. temperature sensor

Connectivity
1x USB 2.0 FS, UCPD
4x SPI (incl 3x I2S) 3x I²C 2x MIPI-I3C
2x FDCAN
3x UART, 3x USART
LPUART

Advanced accelerators

Embedded memory

Advanced security
on STM32H533 only

STM32H562 MCU block diagram

Arm® Cortex®-M33 250MHz

TrustZone®
FPU
MPU
ETM

Embedded Memories

- Up to 2MB flash memory dual bank data flash
- 640Kbytes RAM
- 4Kbytes backup RAM

Security

- SHA-1, SHA-2 (512-bit)
- ECDSA, TRNG, CRC
- 96-bit unique ID
- Active tampering
- Secure manufacturing SFI

Connectivity

- 1x USB 2.0 FS, UCPD
- 6x SPI (incl 3x I2S)
  2x SAI
  3x I²C
  MIPI-I3C/I2C
- HDMI-CEC
- FDCAN
- 6x UART, 6x USART
- LPUART
- DCMI/PSSI

Memory

- FMC 8-/16-bit (SDRAM, NOR, NAND, parallel-LCD)
- 1x Octo-SPI
- 1x SD/SDIO/MMC

Accelerators

- 2x GPDMA
- ART Accelerator™
- CORDIC & FMAC

System

- LDO, POR/PDR/PVD/BOR
- XTAL Oscillator
  32kHz + 4 ~26MHz
- Internal RC Oscillator
  32KHz + 4, 48 & 64MHz
- RTC, 128Bytes Back-up Registers

Timers

- 2x 16-bit advanced motor control timers
- 2x 32-bit TIM
- 6x 16-bit low-power timers
- 10x 16-bit TIM
- 2x W/D

Analog

- 2x 12-bit ADC
- 2x 12-bit DACs
- Dig. temperature sensor

Advanced accelerators

Embedded memory

STM32H563/573 MCU block diagram

Arm® Cortex®-M33 250MHz

TrustZone®
FPU
MPU
ETM

Memory

- FMC 8-/16-bit (SDRAM, NOR, NAND, parallel-LCD)
- 1x Octo-SPI
- 2x SD/SDIO/MMC

System

- LDO, SMPS, POR/PDR/PVD/BOR
- XTAL Oscillator 32kHz + 4 ~26MHz
- Internal RC Oscillator 32KHz + 4, 48 & 64MHz
- RTC, 128Bytes Back-up Registers

Embedded Memories

- Up to 2MB flash memory dual bank data flash
- 640Kbytes RAM
- 4Kbytes backup RAM

Accelerators

- 2x GPDMA
- ART Accelerator™
- CORDIC & FMAC

Timers

- 2x 16-bit advanced motor control timers
- 2x 32-bit TIM
- 6x 16-bit low-power timers
- 10x 16-bit TIM
- 2x W/D

Security

- SHA-1, SHA-2 (512-bit)
- ECDSA, TRNG, CRC
- 96-bit unique ID
- HUK, OTFDEC, HMAC
- RSA, ECC, AES, SAES
- Active tampering
- Secure Boot ST-iRoT
- Secure manufacturing SFI

Analog

- 2x 12-bit ADC
- 2x 12-bit DACs
- Dig. temperature sensor

Connectivity

- 1x USB 2.0 FS, UCPD
- 6x SPI (incl 3x I2S)
2x SAI
3x I²C
MIPI-I3C/I2C
- HDMI-CEC
- 2x FDCAN
- 6x UART, 6x USART
- LPUART
- DCMI/PSSI
- 1x Ethernet MAC 10/100 with IEEE 1588

Advanced accelerators

Large embedded memory

Advanced security on STM32H573

STM32H5E4/F4, STM32H5E5/F5 MCU block diagram

Arm® Cortex®-M33 250 MHz

TrustZone®
FPU
MPU
ETM

Memory

- FMC 8/16/-32-bit (SDRAM, NOR, NAND, parallel-LCD)
- 2x Octo-SPI + w/ OTF decrypt
- 2x SD/SDIO/MMC

System

- LDO, SMPS, POR/PDR/PVD/BOR
- XTAL Oscillator 32 kHz + 4 ~26 MHz
- Internal RC Oscillator 32 KHz + 4, 48 & 64 MHz
- RTC, 128 Bytes Back-up Registers

Embedded Memories

- Up to 4 MB flash memory dual bank data flash
- 1536 Kbytes RAM
- 4 Kbytes backup RAM

Accelerators

- Chrom-ART2
- RGB-TFT, JPEG
- 2x GPDMA
- ART Accelerator™
- CORDIC & FMAC

Timers

- 2x 16-bit advanced motor control timers
- 2x 32-bit TIM
- 6x 16-bit low-power timers
- 10x 16-bit TIM
- 2x W/D

Security

- SHA-1, -2, -3 (512-bit)
- ECDSA, TRNG, CRC
- 96-bit unique ID
- HUK, OTFDEC, HMAC
- RSA, ECC, AES, SAES
- Active tampering
- Secure Boot ST-iRoT
- Secure manufacturing SFI
- Coupling Chaining Bridge (CCB)

Analog

- 3x 12-bit ADC
- 2x 12-bit DACs
- 1xDig. temperature sensor
- 1x OPAMP, 2x COMP

Connectivity

- 1x USB 2.0 FS, UCPD
- USB HS w/ PHY
- 6x SPI (incl 3x I2S)
  2x SAI
  4x I²C
  2x I3C/I2C
- HDMI-CEC
- 3x FDCAN
- 6x UART, 6x USART
- LPUART
- DCMI/ PSSI
- MDF(6 filters), ADF
- 1x Ethernet MAC 10/100
- PLAY

USB HS with PHY on STM32H5E5/F5 only

New graphics accelerators

Extended embedded memory

Advanced security on STM32H5F5/5F4

Multiple package options

32/48/68-pin QFN
25/39/80/105-pin WLCSP

48/64/100/144/176-pin LQFP
100/144/169/176/225-pin UFBGA

7 memory size options

3 or 4 Mbytes Flash / 1504 Kbytes RAM
1 or 2 Mbytes Flash / 640 Kbytes RAM
256 or 512 Kbytes Flash / 272 Kbytes RAM
128 Kbytes Flash / 32 Kbytes RAM

Security options

With hardware crypto and ST-iRoT
Without hardware crypto and ST-iRoT

More than 70 products

STM32Cube framework

Tools and software supporting you during all your design steps

Evaluation, prototyping, and selection	Hardware and software configuration	Application development and debug	Code and hardware options programming	Runtime application monitoring
 STM32 evaluation Tools	 STM32 CubeMX	 STM32 CubeMCU Packages  STM32 CubeExpansion & Verticals and partner solutions  STM32 CubeIDE & Partner IDEs	 STM32 CubeProgrammer & Programmers from partners	 STM32 CubeMonitor

Worldwide support channels

STM32Cube framework

Helping developers release their creativity

Comprehensive offer helping you accelerate your development

Focus on quality, compatibility, and stability

Documentations, training and worldwide support channels

STM32 MCU Developer Zone
Everything for STM32 developers in one place

Applicative reference implementations

Extension libraries and AI toolkit

Hardware

Embedded SDK

Development tool kit

Development resources

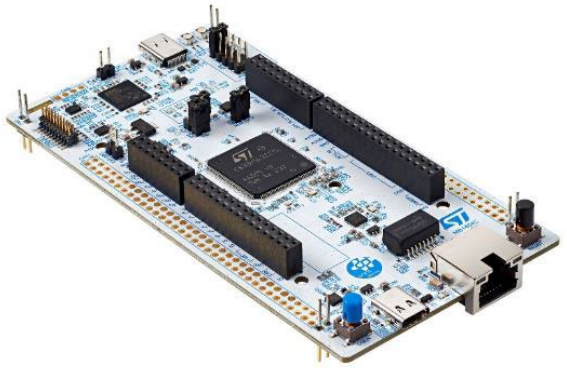
Development tools for the STM32H5 series

Jump-start your evaluation, prototype, and design

NUCLEO-H503RB
NUCLEO-H533RE

Affordable prototyping

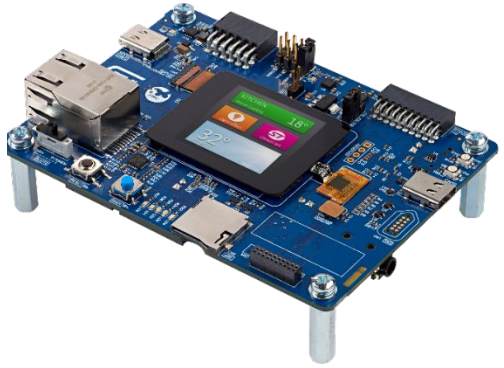
USB, Arduino uno IF, 64-pin MCU



NUCLEO-H563ZI
NUCLEO-H5E5ZJ

Affordable prototyping

USB, Ethernet, Arduino uno IF, 144-pin MCU



STM32H573I-DK

Multi-connectivity kit

USB, Ethernet, MicroSD, Display, 512-Mbit Octo-SPI flash, Audio, Multi-extension IFs, 176-pin MCU

STM32H5F5J-DK

Multi-connectivity kit

USB, Ethernet, MicroSD, Display (480x272), 512-Mbit Octo-SPI flash, Audio, Multi-extension IFs, 225-pin MCU

STM32Cube expansions cloud reference integrations

Easily connect your devices to major cloud service providers

Security

- ✓ Secure boot
- ✓ Private key and secrets storage
- ✓ Seamless registration process
- ✓ X509 certificate

Ready-to-run project

- ✓ Quick Connect script
- ✓ Project example
- ✓ Secure and non-secure projects

Connectivity

- ✓ Cellular
- ✓ Wi-Fi
- ✓ Ethernet

Cloud SDK

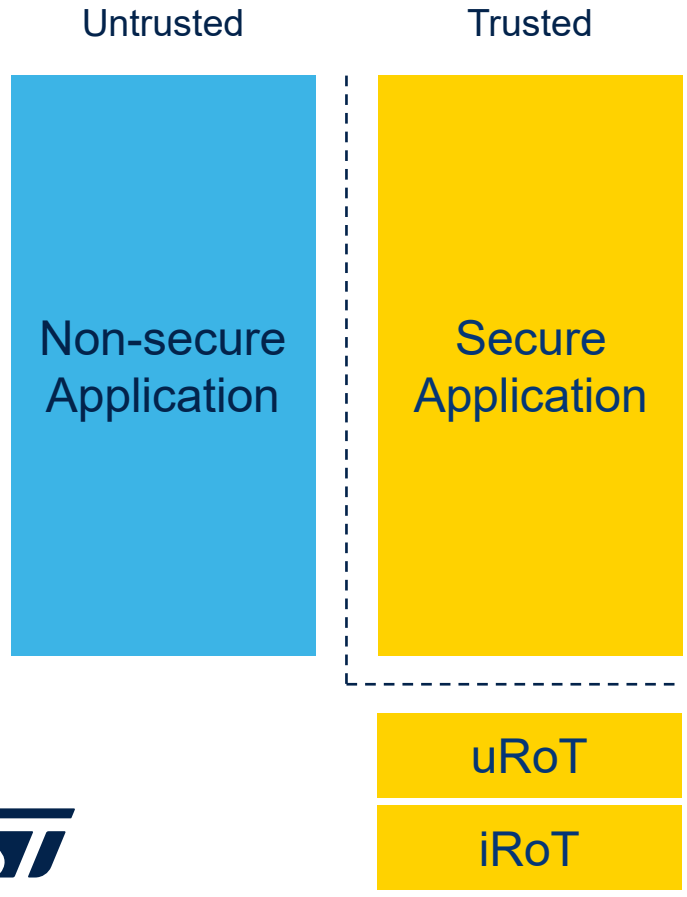
- ✓ Secure cloud connection
- ✓ MQTT-based secure communication
- ✓ Secure firmware update

STM32H5 securely connects smart things to major cloud providers.

STM32 CubeExpansion

STM32Cube boot & isolation

Reference for PSA immutable Root of Trust



STM32 CubeMX

STM32 CubeProgrammer

Security toolset

- Secure boot path configuration
- Encrypt & sign firmware
- Provision boot secrets

OEM or ST certified 2-stage Root of Trust

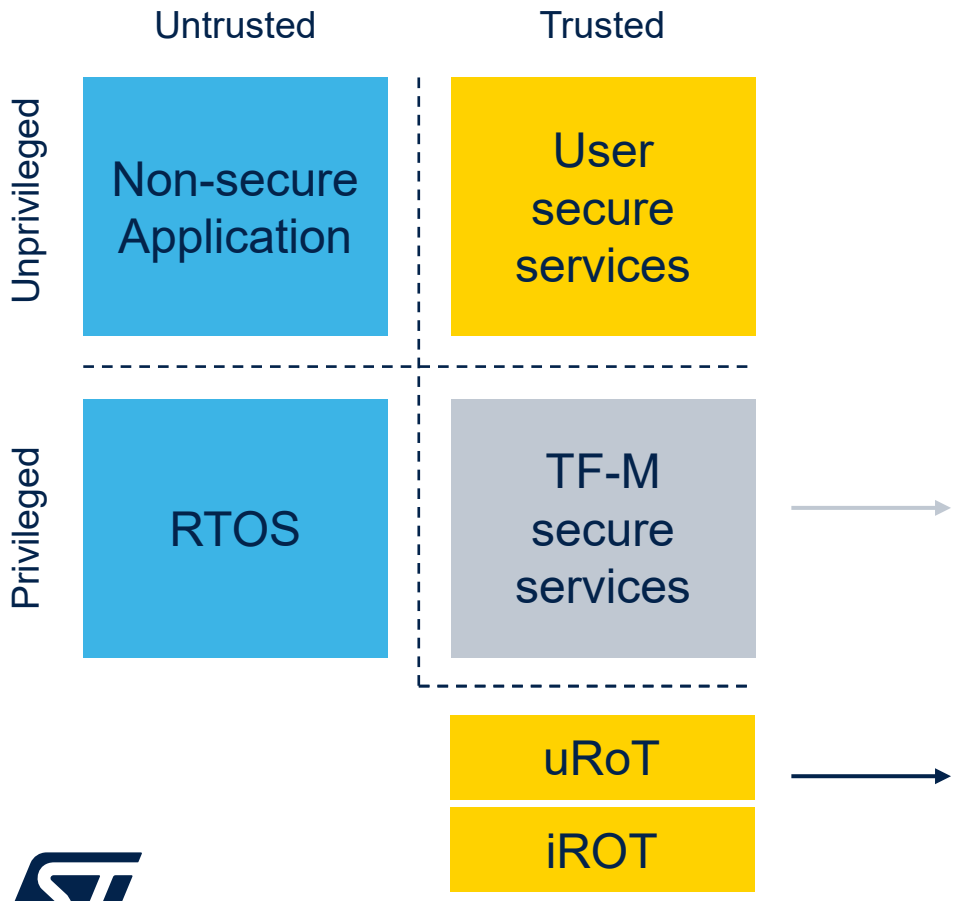
- ☑ uRoT: updatable Root of Trust
- ☑ iRoT: immutable Root of Trust

TrustedFirmware target certification

psacertified™ level three target certification

Trusted firmware TF-M

Scalable reference firmware leveraging STM32H5 security features



Open-Source TF-M secure services

- ☑ Crypto
- ☑ Secure storage
- ☑ Initial trusted storage
- ☑ Initial attestation

OEM or ST certified 2-stage Root of Trust

- ☑ uRoT: updatable Root of Trust
- ☑ iRoT: immutable Root of Trust

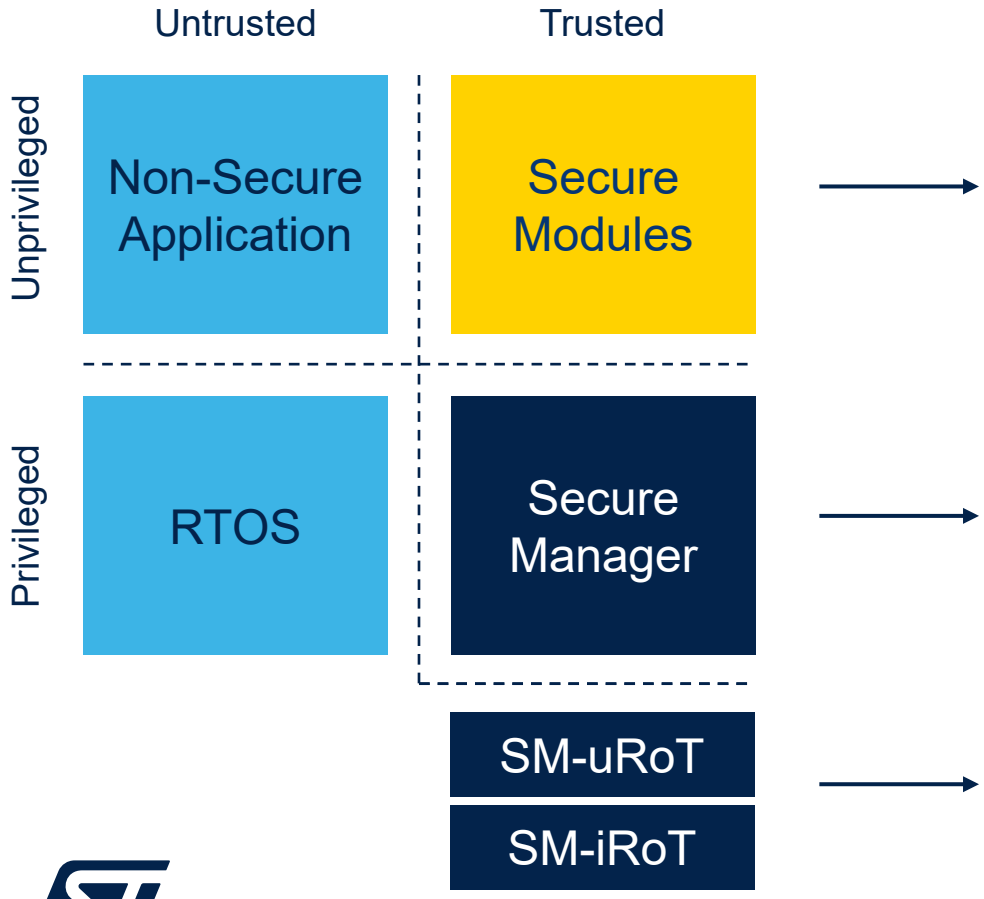
TrustedFirmware
target certification

psacertified™ level three
target certification

STM32 Trust TEE

Secure Manager

A certified set of SoC security services to reduce design effort



IP protection & Secure modules

- ☑ Trusted Apps
- ☑ Secure modules
- ☑ Software IP
- ☑ New services

ST certified PSA API secure services

- ☑ Crypto
- ☑ Provisioning
- ☑ Initial Trusted Storage
- ☑ Initial attestation

ST certified two-stage Root of Trust

- ☑ uRoT: updatable Root of Trust
- ☑ iRoT: immutable Root of Trust

TrustedFirmware
target certification

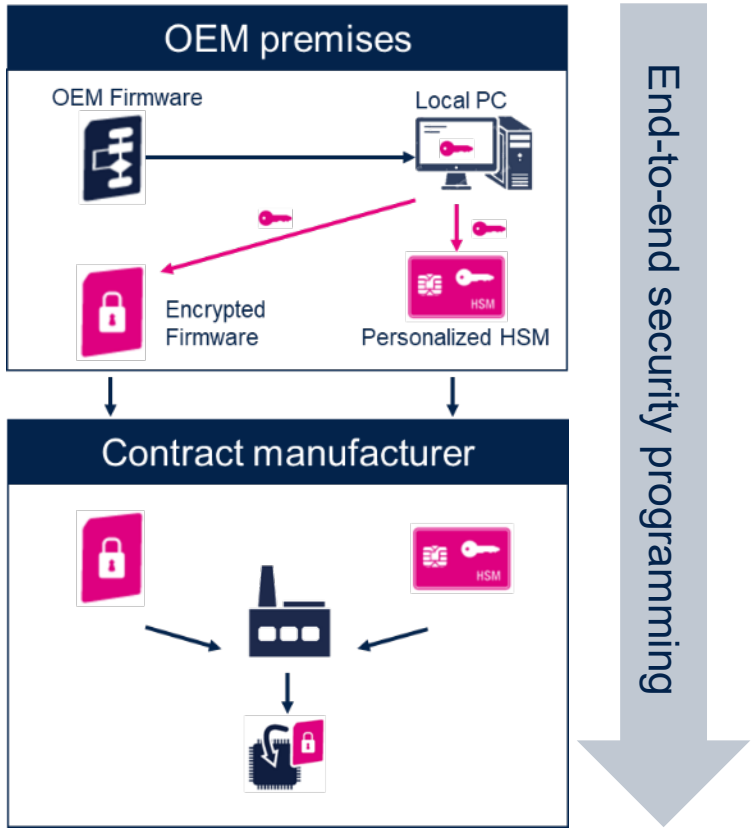
psacertified™ level three

Global Platform™ SESIP 3
target certifications

STM32 CubeProgrammer

Secure your production flow
Secure firmware Install (SFI)

Protect application firmware during the manufacturing stage



End-to-end security programming

Complete toolset to encrypt OEM binaries with the STM32 Trusted Package Creator software

Securely flash the STM32 with licenses from a STM32HSM at the programming partner location

Control the number of devices programmed with the firmware

Releasing your creativity

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community.st.com

www.st.com/stm32h5

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Our technology starts with You

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