New STM32H7A3/7B3 adding a unique balance of features to the STM32H7 series

"If only
I could create a smartphone-like Graphic UI for my embedded device with minimum cost and effort

STM32H7 - Creating a smartphone-like graphic UI for your embedded device

Graphic hardware accelerations for better effects, transitions and fluidity

Large internal SRAM (frame buffer) for integrated and cost effective single chip solution

TouchGFX free graphic tool suite for stunning HMI and simplified development

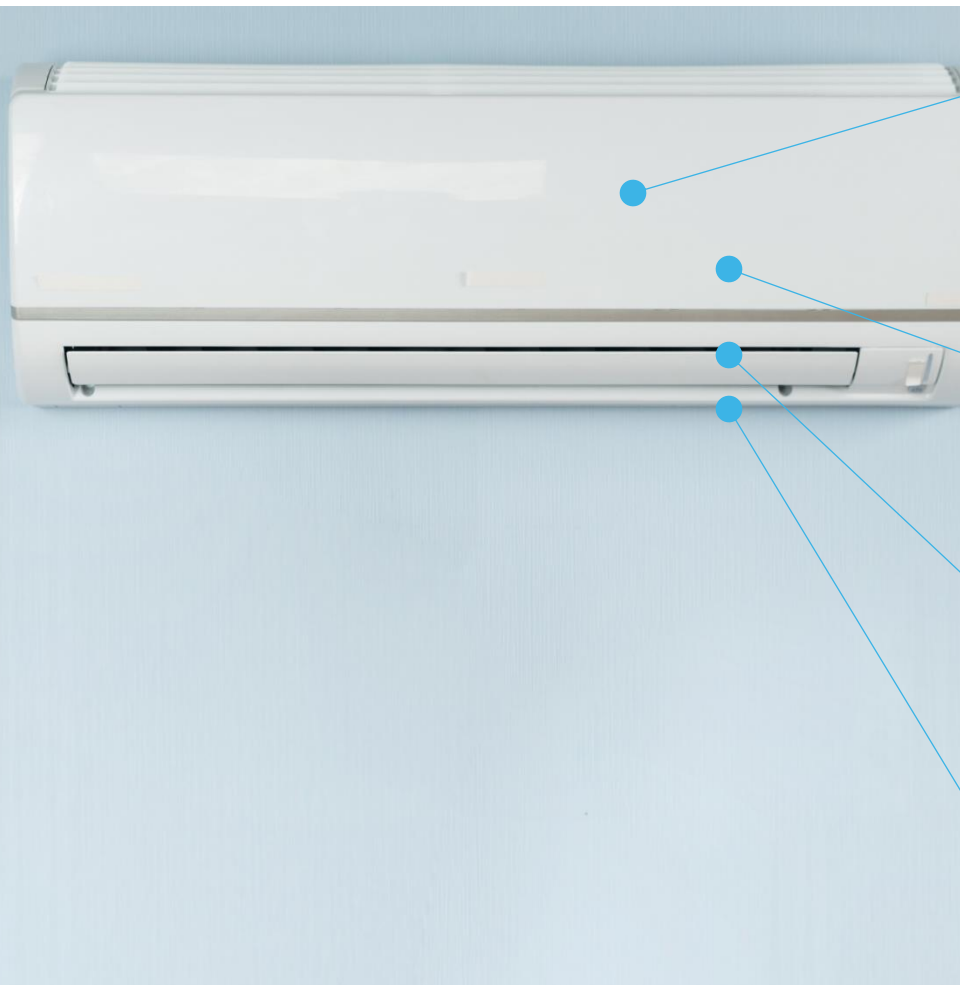Graphic support from 64-pin QFP packages (improved cost effectiveness)

STATISTICS   MCU load: 0%

100 %

50 %

0 %

36 %

65 %

54 %

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"If only I could build a wireless module solving all my challenges

Small package for better integration (as small as 4.57mm x 4.37mm)

Large embedded memory ensure firmware sustainability:
    2 MB of Flash and 1.4 MB of SRAM
    OTA ready with small 8kB flash sectors

Power efficiency for improved autonomy (down to 32 µA in STOP mode with all RAM retention)

Embedded security to protect your application and secure firmware update

"If only
I could add natural language,
cloud-based voice UI
to my product

STM32H7 - Adding natural language cloud-based voice UI to your product

All necessary memory is embedded:
  2 MB of Flash and 1.4 MB of SRAM

Arm® Cortex®-M7 core @280 MHz high performances for Audio and voice DSP

Embedded security to protect your application and secure firmware update

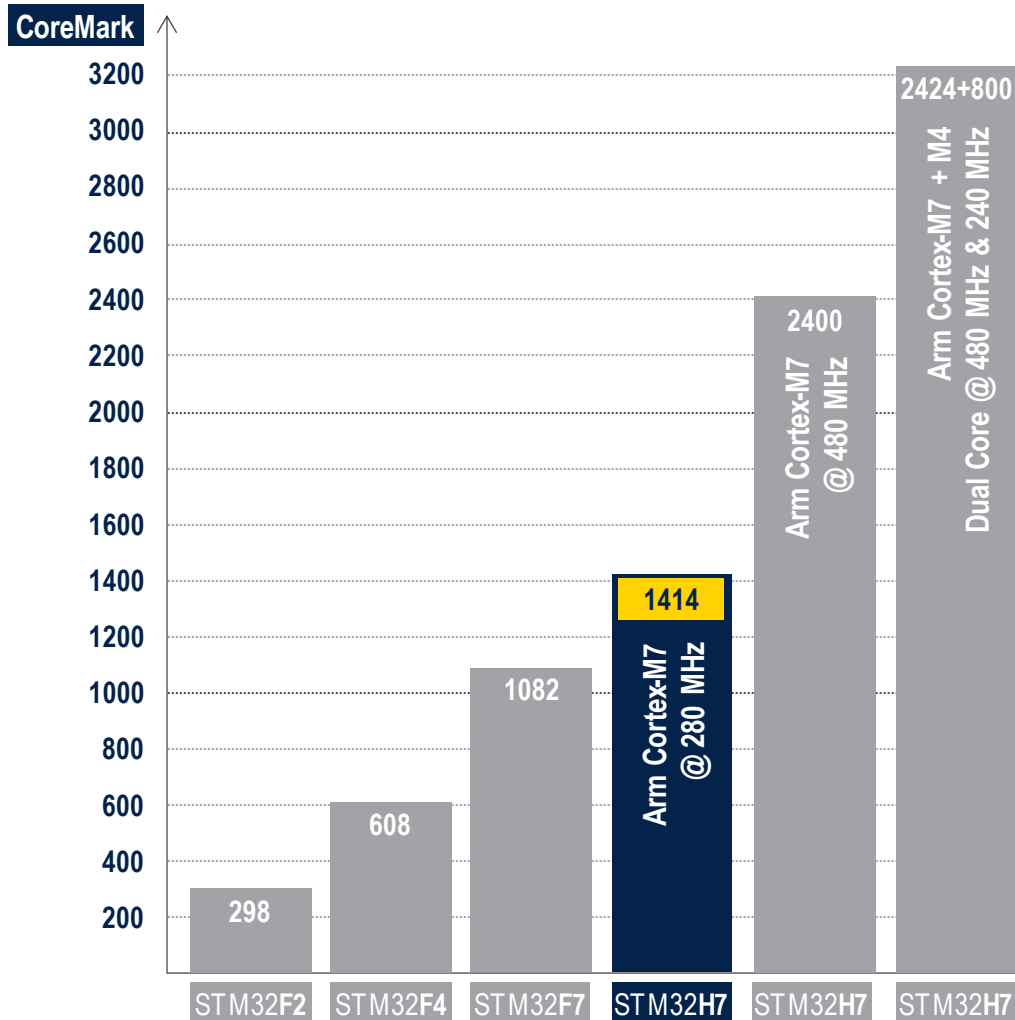One chip solution, 2 PCB-layers for cost effective applications

STM32H7A3 and **H7B3**
are adding a unique balance of features
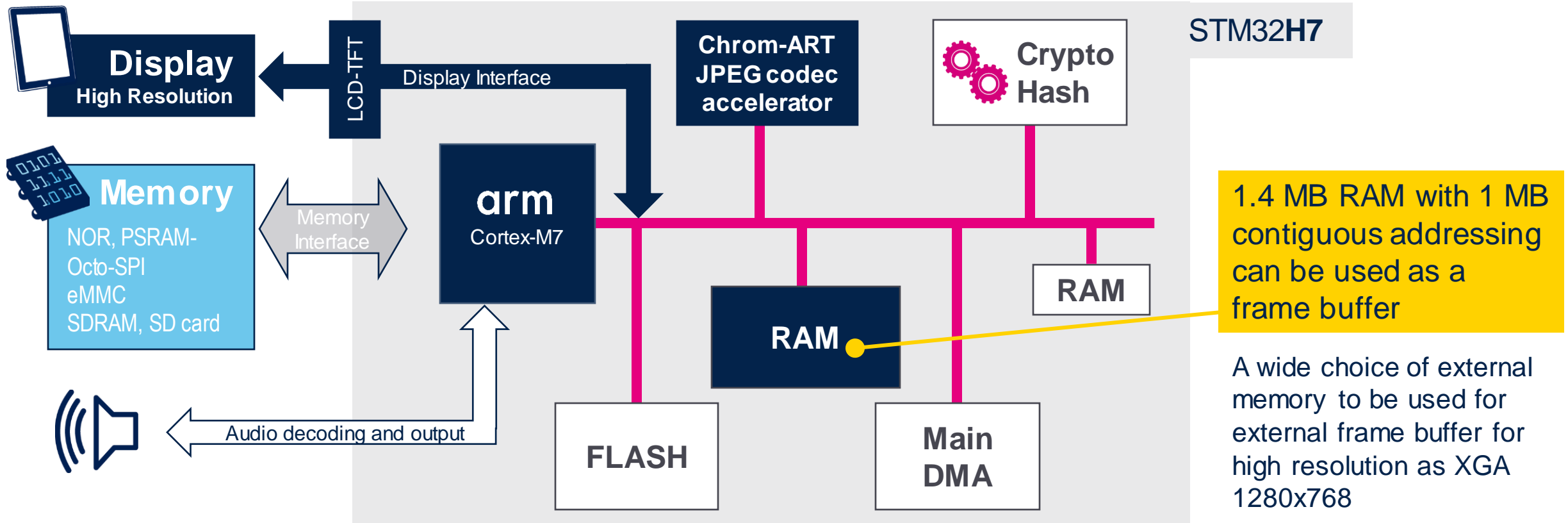to the STM32H7 Series

Architecture for performance

CoreMark chart showing:
- STM32**F2**: 298
- STM32**F4**: 608
- STM32**F7**: 1082
- STM32**H7**: 1414 (Arm Cortex-M7 @ 280 MHz)
- STM32**H7**: 2400 (Arm Cortex-M7 @ 480 MHz)
- STM32**H7**: 2424+800 (Arm Cortex-M7 + M4 Dual Core @ 480 MHz & 240 MHz)

- **Arm® Cortex®-M7 @280MHz**

- Double precision FPU, MPU, advanced DSP

- 16kB+16KB L1 I/D cache for internal and external code acceleration

- High speed Flash with 128-bit parallel bus at 70MHz
  - ➔ **320MIPS throughput without cache**

- 16kBytes Instruction TCM and 128kBytes Data TCMs for most critical code and data
  - ➔ **0-wait state guaranteed**

- Main DMA able to move over 2.2Gbytes/s of data between chip resources.

Create a rich human machine interface

Cortex-M7 - handling audio and rich HMI, Real Time control tasks

STM32**H7**

Display
High Resolution

LCD-TFT

Display Interface

Memory

NOR, PSRAM-
Octo-SPI
eMMC
SDRAM, SD card

Memory Interface

arm
Cortex-M7

**Chrom-ART
JPEG codec
accelerator**

**Crypto
Hash**

RAM

RAM

FLASH

**Main
DMA**

Audio decoding and output

1.4 MB RAM with 1 MB contiguous addressing can be used as a frame buffer

A wide choice of external memory to be used for external frame buffer for high resolution as XGA 1280x768

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Easy HMI design
TouchGFX designer

Free of charge advanced UI development suite
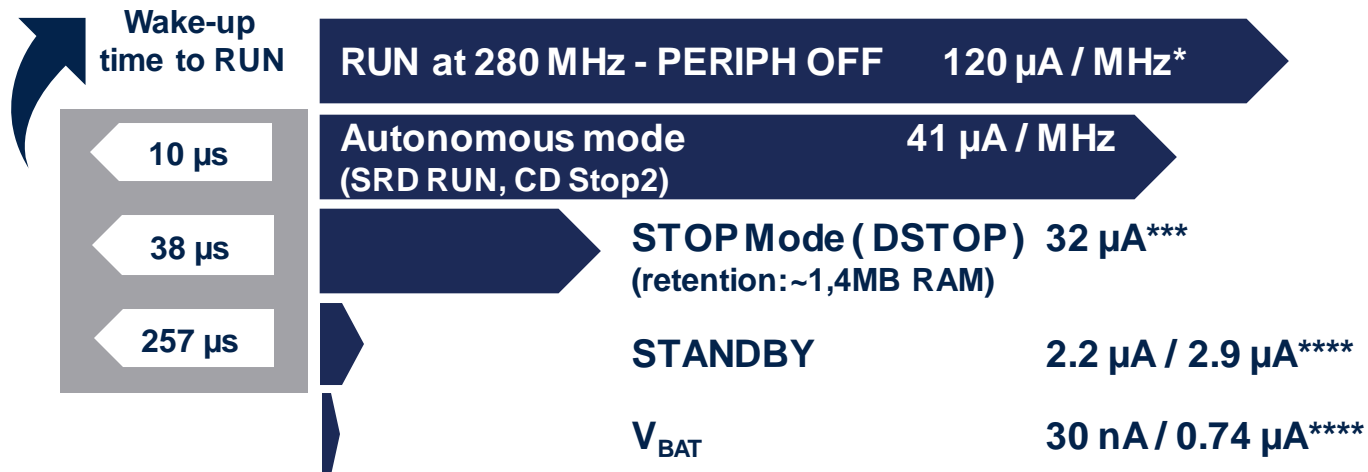
Flexible architecture for power efficiency

60% of the dynamic power thanks to the SMPS vs LDO

Typ with @ V_{DD} = 3 V @ 25 °C

Wake-up time to RUN

10 µs	
38 µs	
257 µs	

RUN at 280 MHz - PERIPH OFF   **120 µA / MHz***

Autonomous mode   **41 µA / MHz**
(SRD RUN, CD Stop2)

STOP Mode (DSTOP)   **32 µA*** **
(retention:~1,4MB RAM)

STANDBY   **2.2 µA / 2.9 µA****
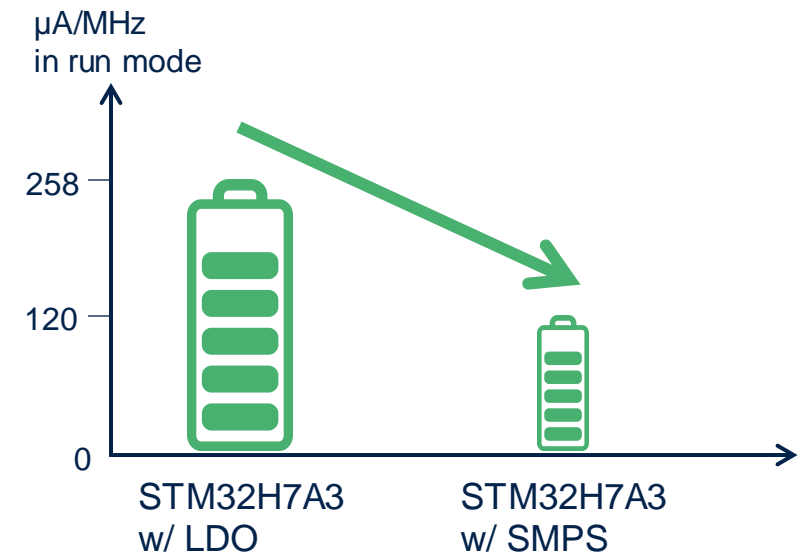
V_{BAT}   **30 nA / 0.74 µA****

* from Flash (Cache ON and Peripheral OFF), SMPS ON
** BAM run at 64MHz,SPI clock 16 MHz,
  data stored in Smart Run Domain RAM via BDMA
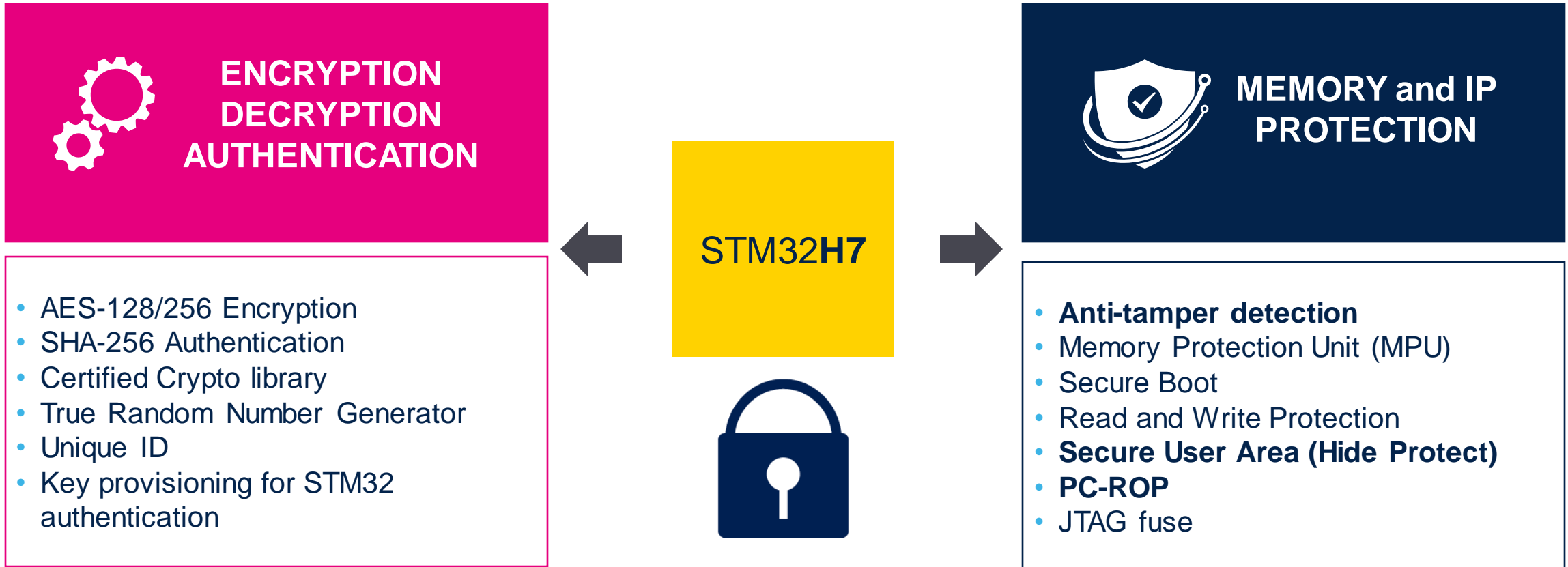*** VOS5, Flash LP mode, no IWDG ,SMPS ON
**** with RTC

µA/MHz in run mode

258

120

0

STM32H7A3 w/ LDO   STM32H7A3 w/ SMPS

A full set of security

ENCRYPTION DECRYPTION AUTHENTICATION

- AES-128/256 Encryption
- SHA-256 Authentication
- Certified Crypto library
- True Random Number Generator
- Unique ID
- Key provisioning for STM32 authentication

STM32H7

MEMORY and IP PROTECTION

- **Anti-tamper detection**
- Memory Protection Unit (MPU)
- Secure Boot
- Read and Write Protection
- **Secure User Area (Hide Protect)**
- **PC-ROP**
- JTAG fuse

Some of the above features are optional and require to procure dedicated part numbers. Please refer to product specification

STM32H7 detailed security functions

STM32Trust Security function	CM7 CM7/CM4 STM32H72x STM32H74x STM32H7Ax	CM7 Crypto CM7/CM4 Crypto STM32H75x	CM7 STM32H73x STM32H7Bx
Secure Boot Secure User Memory for SBSFU software package		●	●
Secure Install/Update By SBSFU software package		●	●
Secure Storage for Boot only		●	●
Access Debug Read Out Protection RDPL0/1/2	●	●	●
Resource Isolation Memory Protection Unit	●	●	●
Secure Execution By SBSFU software package		●	●
Crypto Engine Hardware crypto accelerator	TRNG Fips	AES / DES / SHA / TRNG Fips	AES / DES / SHA / TRNG Fips
Crypto Engine On-the-fly decryption from external memories			●
SWIP Protection/Collaborative Dev Secure Module Install (SMI)		●	●
Secure Manufacturing Secure Firmware Install (SFI)		●	●

Note: a crypto library is available on request for both crypto and non crypto parts.

STM32 MCUs and MPUs portfolio

MPU
STM32**MP1**
4158 CoreMark
Up to 800 MHz Cortex-A7
209 MHz Cortex-M4

High Perf MCUs

STM32**F2**	STM32**F4**	STM32**F7**	STM32**H7**
Up to 398 CoreMark	Up to 608 CoreMark	1082 CoreMark	Up to 3224 CoreMark
120 MHz Cortex-M3	180 MHz Cortex-M4	216 MHz Cortex-M7	Up to 550 MHz Cortex -M7
			240 MHz Cortex -M4

Mainstream MCUs

STM32**F0**	STM32**G0**	STM32**F1**
106 CoreMark	142 CoreMark	177 CoreMark
48 MHz Cortex-M0	64 MHz Cortex-M0+	72 MHz Cortex-M3

STM32**F3**	STM32**G4**
245 CoreMark	569 CoreMark
72 MHz Cortex-M4	170 MHz Cortex-M4

Mixed-signal MCUs

Ultra-low Power MCUs

STM32**L0**	STM32**L1**	STM32**L4**	STM32**L4+**	STM32**L5**	STM32**U5**
75 CoreMark	93 CoreMark	273 CoreMark	409 CoreMark	443 CoreMark	651 CoreMark
32 MHz Cortex-M0+	32 MHz Cortex-M3	80 MHz Cortex-M4	120 MHz Cortex-M4	110 MHz Cortex-M33	160 MHz Cortex-M33

Wireless MCUs

STM32**WL**	STM32**WB**
162 CoreMark	216 CoreMark
48 MHz Cortex-M4	64 MHz Cortex-M4
48 MHz Cortex-M0+	32 MHz Cortex-M0+

LONGEVITY 10 YEARS COMMITMENT

Latest product generation ● Radio co-processor only

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Expanding the STM32H7 portfolio now over 170 part numbers

Dual-core Line

STM32**H745/755**	STM32**H747/757**
480 + 240 MHz	480 + 240 MHz
1027 + 300 DMIPS	1027 + 300 DMIPS
RAM 1 MB	RAM 1 MB
Flash up to 2 MB	Flash up to 2 MB

Single-core Line

NEW

STM32**H7A3/B3**	STM32**H742**	STM32**H743/753**
280 MHz	480 MHz	480 MHz
599 DMIPS	1027 DMIPS	1027 DMIPS
RAM 1.4 MB	RAM 692 KB	RAM 1 MB
Flash up to 2 MB	Flash up to 2 MB	Flash up to 2 MB

$ Value Line

NEW

STM32**H7B0**	STM32**H750**
280 MHz	480 MHz
599 DMIPS	1027 DMIPS
RAM 1.4 MB	RAM 1 MB
Flash 128 KB	Flash 128 KB

LONGEVITY 10 YEARS COMMITMENT

Arm® Cortex® core   Cortex®-M7   Cortex®-M7 & -M4

A complete ecosystem

Supported by the STM32 ecosystem

Software

STM32 Cube

STM32 CubeMX

STM32 CubeProgrammer

Hardware

STM32 Nucleo board

Discovery kit

Evaluation board

Customer support

FAE - Worldwide Customer Support

community.st.com

MOOC

Partner Program

Neural Networks on STM32
Simple, fast, optimized

STM32
Cube.AI

Processing performance for advanced neural networks:
Cortex-M7 core running at @280MHz, achieving **1414 CoreMark** and **599 DMIPS**
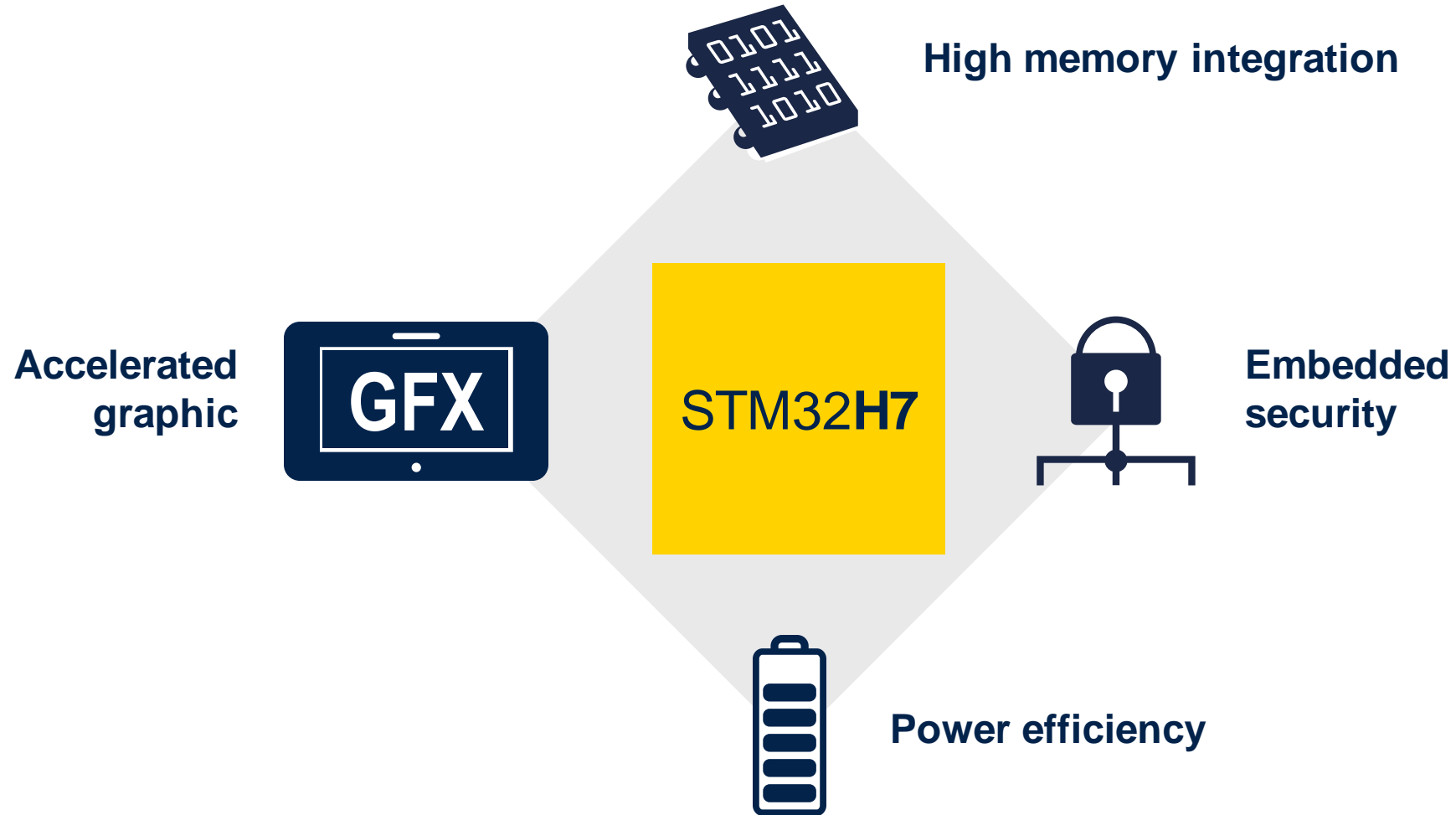
External memory interfaces for complex neural networks:
2 Octal-SPI memory interfaces with on-the-fly-decrypt (OTFDEC)

Camera and digital microphone **interfaces**

Power efficient for machine learning applications: down to 120µA/MHz in RUN mode

STM32H7A3 and H7B3 in a nutshell

High memory integration

STM32**H7**

Accelerated graphic

GFX

Embedded security

Power efficiency

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STM32H7A3/7B3 Line-up

A STM32H7 tailored for your needs

Common features

Cortex®-M7 280MHz with DP-FPU and 2x16KB Cache	Multiple 16 and 32-bit timers Incl. Low power timers
TFT-LCD controller, JPEG, Chrom-GRC and Chrom-ART Accelerator	Low-voltage 1.7 to 3.6V
External memory interfaces: (FMC, 2 x Octo SPI w/ OTFDEC and 2 x SDMMC)	2 x 16-bit ADC 4Msps
Parallel camera interface	2 x PGA and 2 x Comp.
Audio support with 2xSAI, 3xI2S, DFSDM 4filt/8ch, 2 x 12-bit DAC	Built-in 64MHz, 48MHz, 4MHz and 40KHz RC oscillators
USB OTG	HSE + LSE clocks
2 x CAN FD (incl. one with TT support)	RTC + Sub-RTC
6xSPI, 4xI²C, 5xUART+ 1xULP UART, 5xUSART	2xWD, POR/PDR, BOR/PVD, voltage scaling

+

STM32H7A3

Up to 2MB Flash	Up to 1.4 MB SRAM	DCDC + LDO

STM32H7B3 (with crypto and security services)

Up to 2MB Flash	Up to 1.4 MB SRAM	DCDC + LDO	Crypto, HASH, OTFDEC

STM32H7B0 (with crypto and security services)

128KB Flash	Up to 1.4 MB SRAM	DCDC + LDO	Crypto, HASH, OTFDEC

STM32H7A3/7B3 package lineup

Flash memory size / RAM size (bytes)

	64-pin LQFP	100-pin LQFP / TFBGA (0.8 mm pitch)	132-pin WLCSP (0.35 mm pitch)	144-pin LQFP	169-pin UFBGA (0.5 mm pitch)	176-pin LQFP / UFBGA (0.65 mm pitch)	216-pin TFBGA (0.8 mm pitch)	225-pin TFBGA (0.8 mm pitch)
2MB / 1.4M	STM32H7B3RI ◆	STM32H7B3VI	STM32H7B3QI	STM32H7B3ZI	STM32H7B3AI	STM32H7B3II	STM32H7B3NI ◆	STM32H7B3LI
	STM32H7A3RI ◆	STM32H7A3VI	STM32H7A3QI	STM32H7A3ZI	STM32H7A3AI	STM32H7A3II	STM32H7A3NI ◆	STM32H7A3LI
1MB / 1.4M	STM32H7A3RG ◆	STM32H7A3VG		STM32H7A3ZG	STM32H7A3AG	STM32H7A3IG	STM32H7A3NG ◆	STM32H7A3LG

Pin count

Legend:
- Without HW crypto/hash
- With HW crypto/hash
- ◆ LDO
- LDO + Internal SMPS only

Releasing your creativity

STM32

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