

Introduction to the STM32MP1 Microprocessor Series

Mike Hartmann
Product Marketing



**ST Developers
Conference**

September 12th, 2019
Santa Clara Convention Center - Mission City Ballroom
Santa Clara, CA



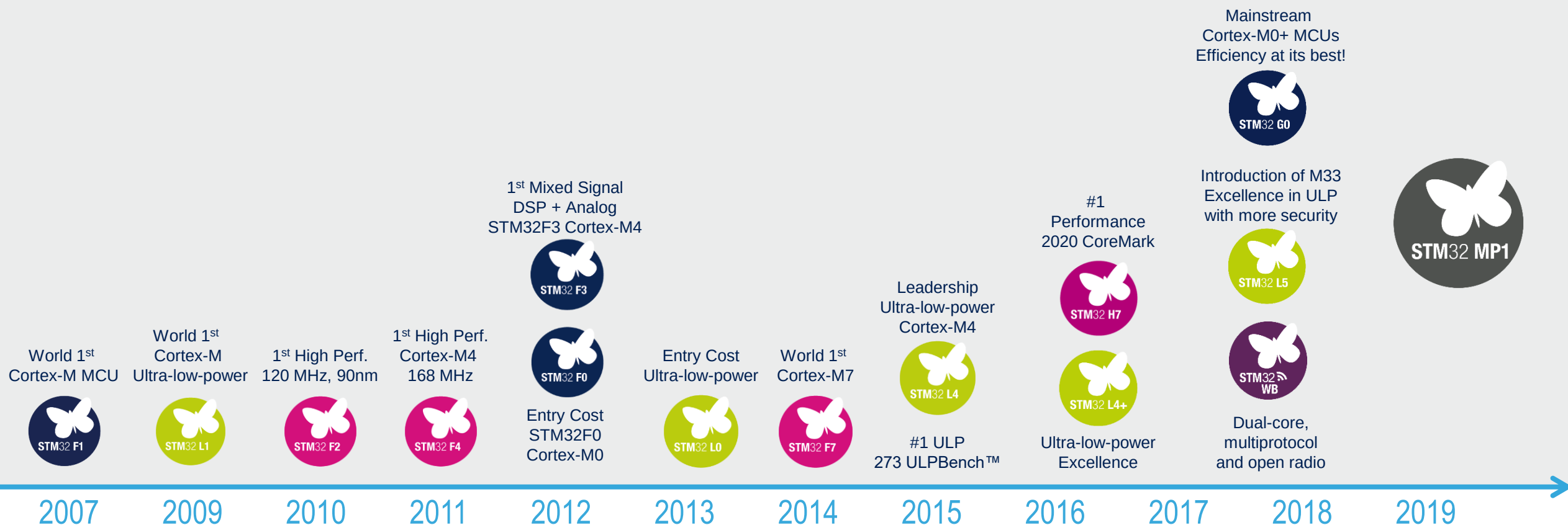
Extending STM32 Success and Commitment with Microprocessors



Continuing the STM32 Success Story

3

Leader in Arm Cortex-M 32-bit General Purpose MCU



STM32 Rolling Longevity Commitment

4

Longevity commitment is renewed every year



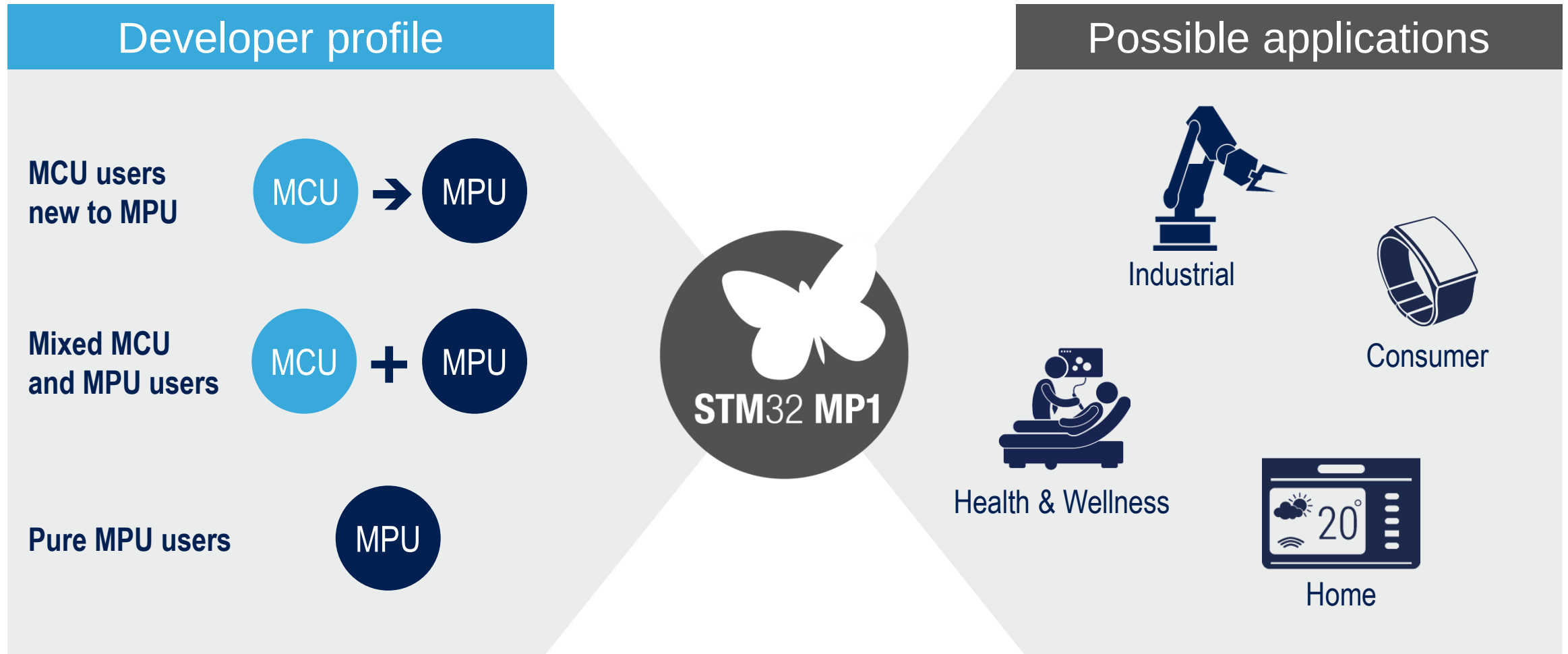
starting January
1st 2019
→ Until 2029

• STM32F1 (launched in 2007)	22 years of commitment
• STM32L1 (launched in 2009)	20 years of commitment
• STM32F2 (launched in 2010)	19 years of commitment
• STM32F4 (launched in 2011)	18 years of commitment
• STM32F0 (launched in 2012)	17 years of commitment
• STM32F3 (launched in 2012)	17 years of commitment
• STM32L0 (launched in 2013)	16 years of commitment
• STM32F7 (launched in 2014)	15 years of commitment
• STM32L4 (launched in 2015)	14 years of commitment
• STM32L4+ (launched in 2016)	13 years of commitment
• STM32H7 (launched in 2016)	13 years of commitment
• STM32WB (launched in 2018)	11 years of commitment
• STM32G0 (launched in 2018)	11 years of commitment

STM32MP1: A General Purpose MPU

Suitable for all Developer Types and Multiple Applications

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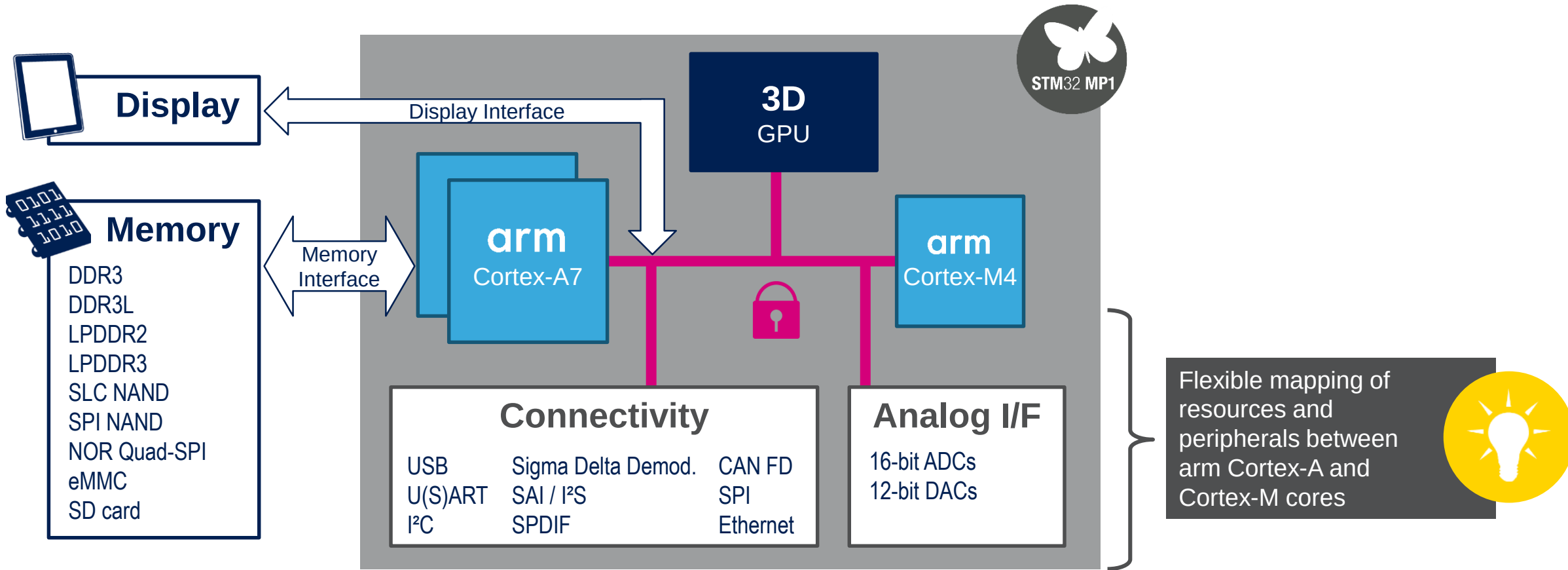


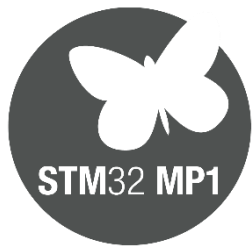
Flexible architecture
for a wide range of applications

STM32MP1 Rich Feature Set

7

Advanced & Flexible Architecture with 3D GPU





STM32MP1 Block Diagram

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STM32MP157

System

- 5x LDOs
- Crystal & Internal oscillators
- MDMA + 2x DMA
- Reset and Clock
- Watchdogs (2x I & W)
- 96-bit unique ID
- Up to 176 GPIOs

Security

- TrustZone
- DES, TDES, AES-256
- SHA-256, MD5, HMAC
- 3x Tamper Pins with 1 active
- T⁰, V and 32KHz detection
- Secure ROM and RAMs
- Secure Peripherals
- Secure RTC
- Analog true RNG

Dual Cortex-A7 @ 650MHz

Core 1 @ 650MHz
L1 32KB I / 32KB D

Core 2 @ 650MHz
L1 32KB I / 32KB D

NEON SIMD

NEON SIMD

256KB L2 cache

Cortex-M4 @ 209MHz

FPU

MPU

DDR3/DDR3L 32-bit @ 533MHz

LPDDR2/LPDDR3 32-bit @ 533MHz

System RAM 256KB

MCU System RAM 384KB

Retention RAM 64KB

Backup RAM 4KB

Boot ROM 128KB

OTP Fuse 3Kb

Control

2x 16-bit motor control PWM synchronized AC timer

10x 16-bit timer

5x 16-bit LP timer

2x 32-bit timer

3D GPU OpenGL ES2.0 @ 533MHz

26Mtri/sec, 133Mpix/sec

Connectivity

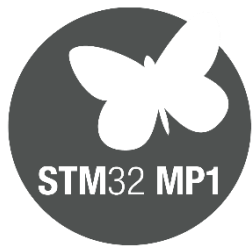
- 24-bit Parallel RGB Display
- MIPI DSI 2 lanes @ 1Gbps
- Camera Interface
- HDMI CEC
- 1Gbps Ethernet
- 2x FDCAN / TTCAN
- 2x USB2.0 Host HS
- USB2.0 OTG FS/HS
- MDIO
- DFSDM 8 channels / 6 filters
- 6x I²C
- 4x UART, 4x USART
- 6x SPI / 3x I²S
- 4x SAI
- SPDIF Tx / Rx 4 inputs
- Dual Quad SPI
- 3x SDIO3.0 / SD3 / eMMC 4.51
- 16-bit SLC NAND, 8-bit-ECC

Analog

2x 16-bit ADC 3MSPS 22 channels

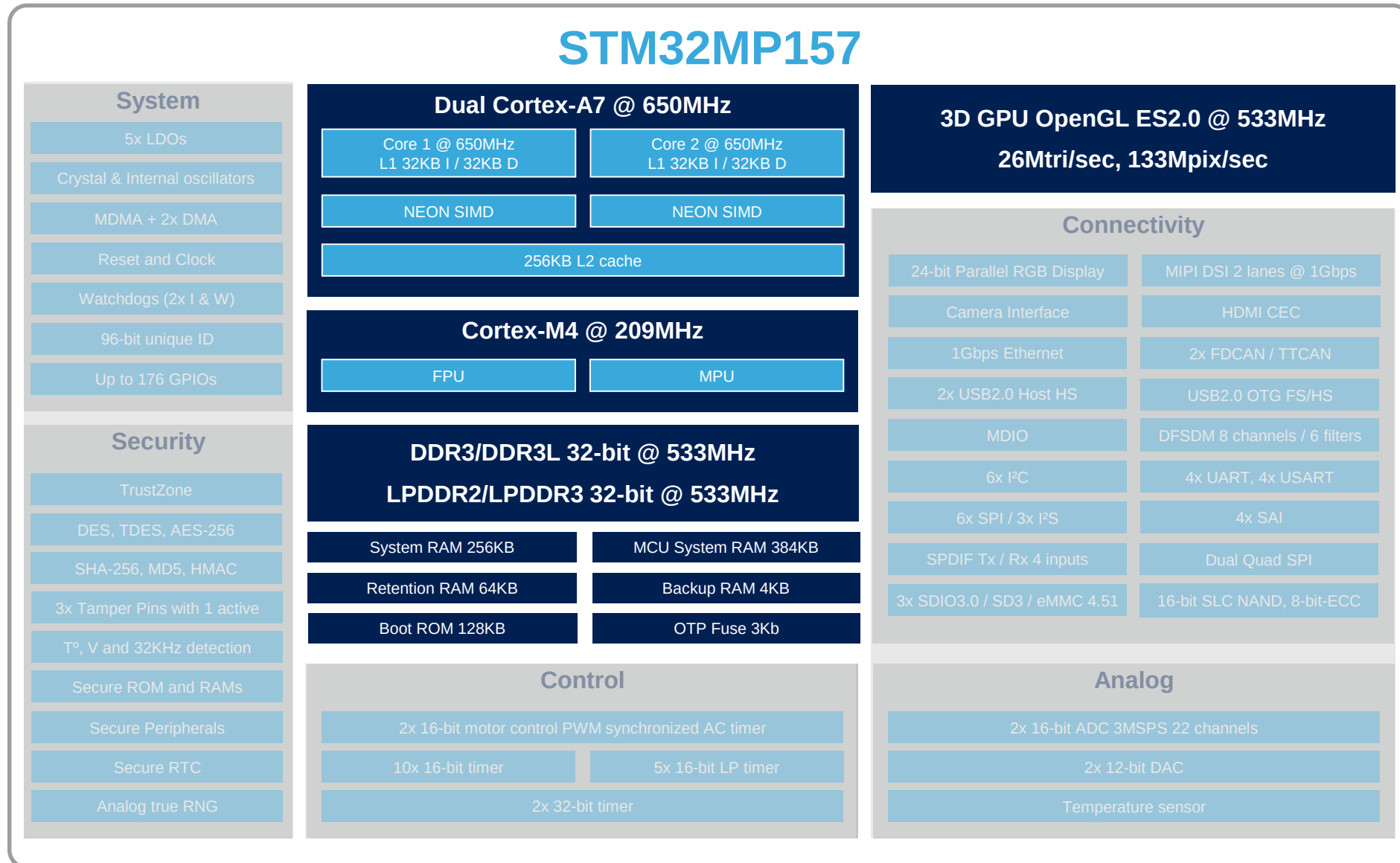
2x 12-bit DAC

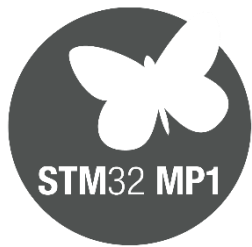
Temperature sensor



STM32MP1 Block Diagram

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STM32MP1 Block Diagram

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STM32MP157

System

5x LDOs
Crystal & Internal oscillators
MDMA + 2x DMA
Reset and Clock
Watchdogs (2x I & W)
96-bit unique ID
Up to 176 GPIOs

Security

TrustZone
DES, TDES, AES-256
SHA-256, MD5, HMAC
3x Tamper Pins with 1 active
T ⁰ , V and 32KHz detection
Secure ROM and RAMs
Secure Peripherals
Secure RTC
Analog true RNG

Dual Cortex-A7 @ 650MHz

Core 1 @ 650MHz L1 32KB I / 32KB D	Core 2 @ 650MHz L1 32KB I / 32KB D
NEON SIMD	NEON SIMD
256KB L2 cache	

Cortex-M4 @ 209MHz

FPU	MPU
-----	-----

DDR3/DDR3L 32-bit @ 533MHz

LPDDR2/LPDDR3 32-bit @ 533MHz

System RAM 256KB	MCU System RAM 384KB
Retention RAM 64KB	Backup RAM 4KB
Boot ROM 128KB	OTP Fuse 3Kb

Control

2x 16-bit motor control PWM synchronized AC timer	
10x 16-bit timer	5x 16-bit LP timer
2x 32-bit timer	

3D GPU OpenGL ES2.0 @ 533MHz

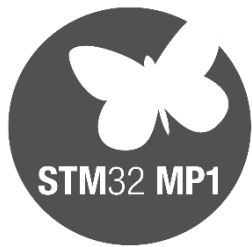
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Connectivity

24-bit Parallel RGB Display	MIPI DSI 2 lanes @ 1Gbps
Camera Interface	HDMI CEC
1Gbps Ethernet	2x FDCAN / TTCAN
2x USB2.0 Host HS	USB2.0 OTG FS/HS
MDIO	DFSDM 8 channels / 6 filters
6x I ² C	4x UART, 4x USART
6x SPI / 3x I ² S	4x SAI
SPDIF Tx / Rx 4 inputs	Dual Quad SPI
3x SDIO3.0 / SD3 / eMMC 4.51	16-bit SLC NAND, 8-bit-ECC

Analog

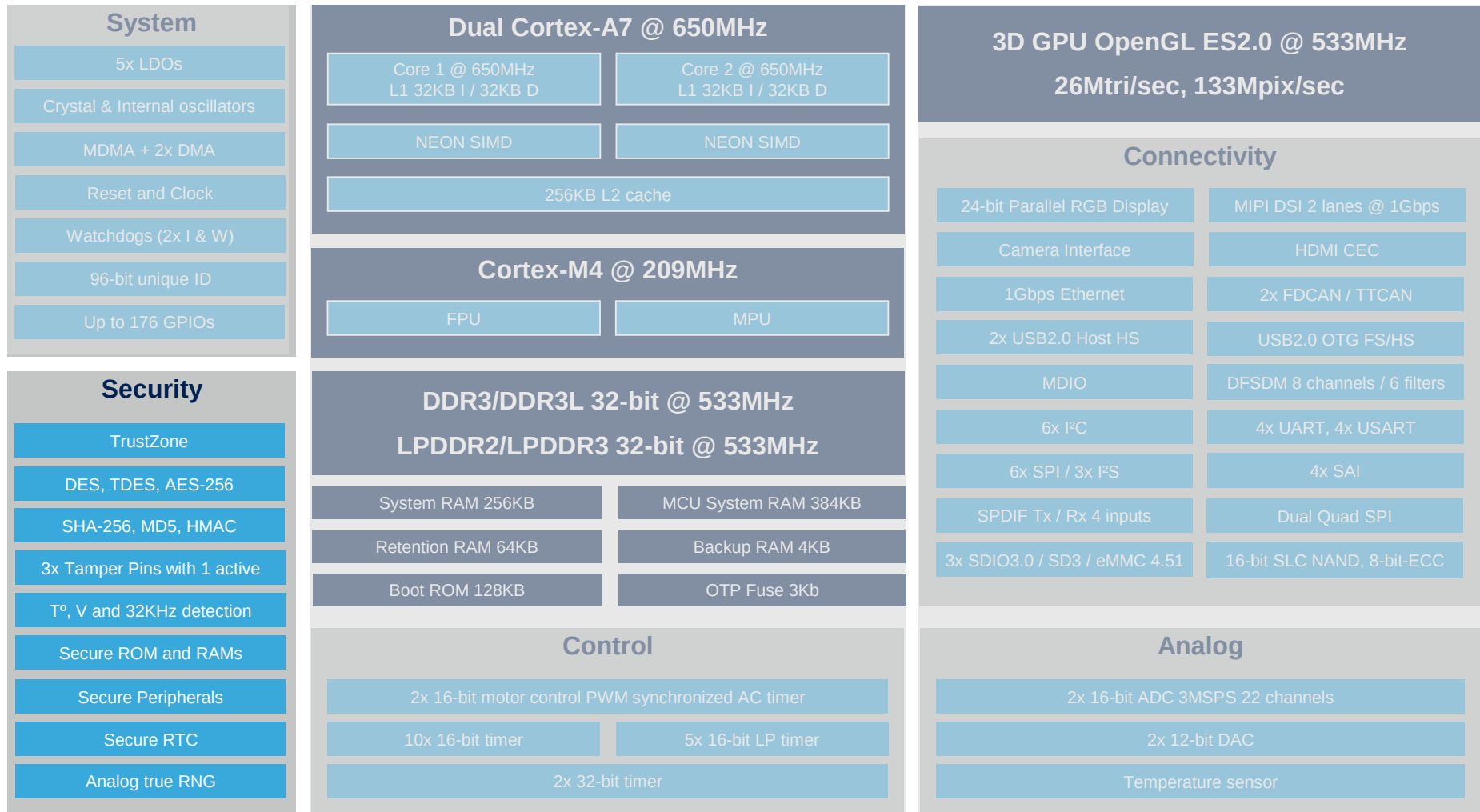
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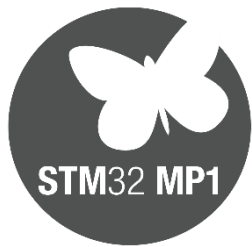


STM32MP1 Block Diagram

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STM32MP157

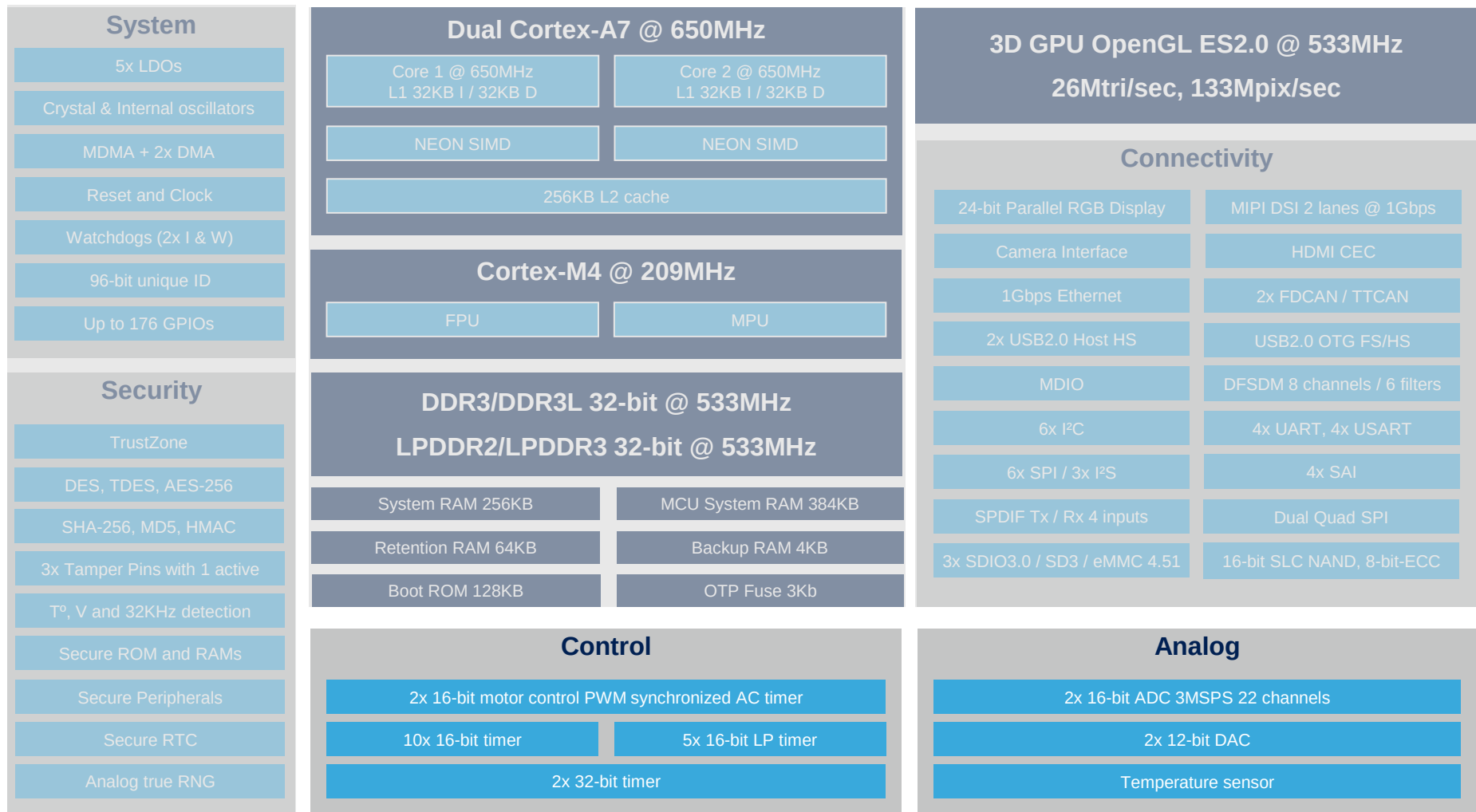


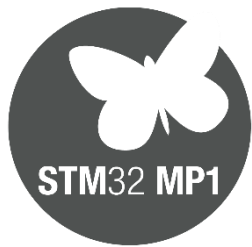


STM32MP1 Block Diagram

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STM32MP157

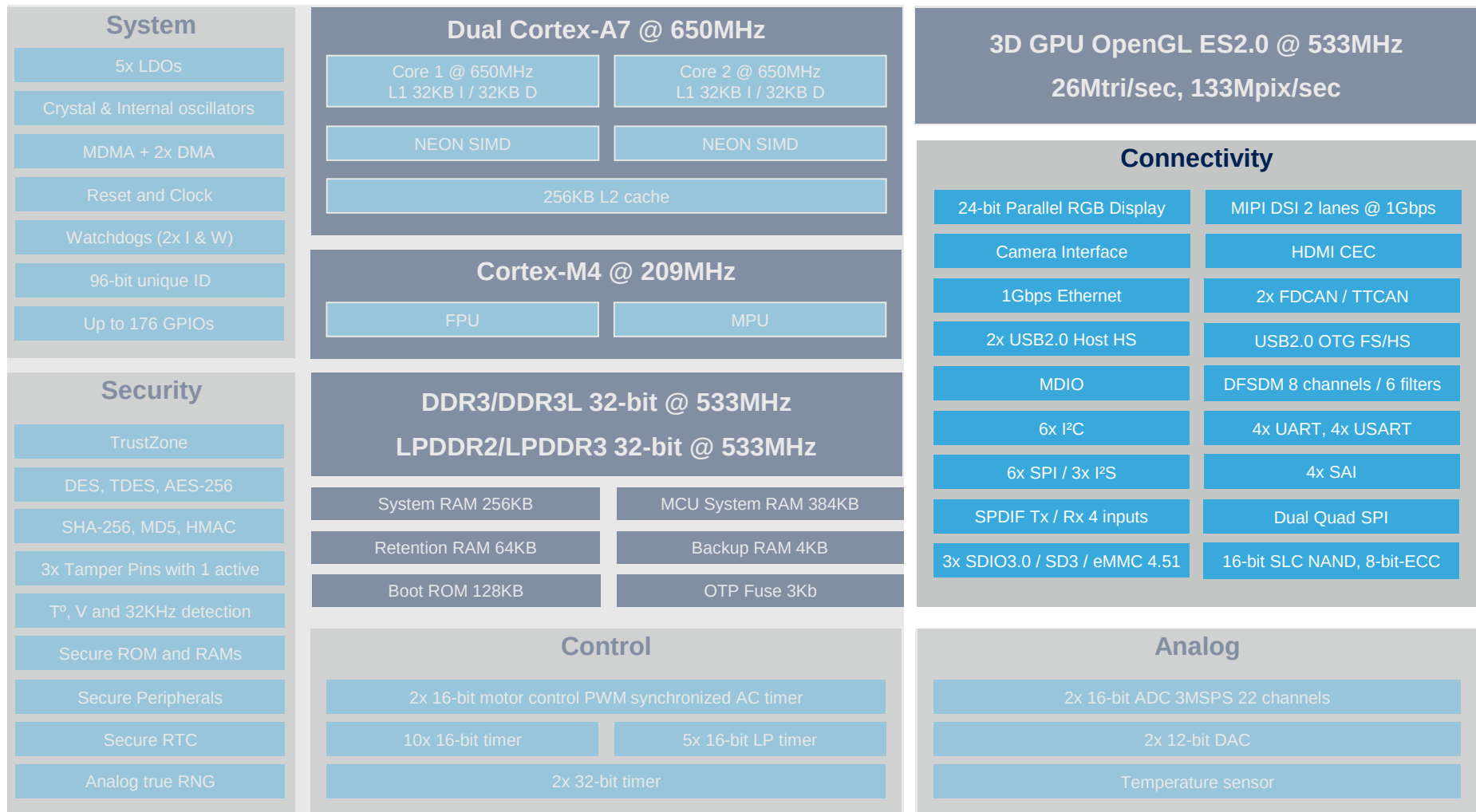




STM32MP1 Block Diagram

13

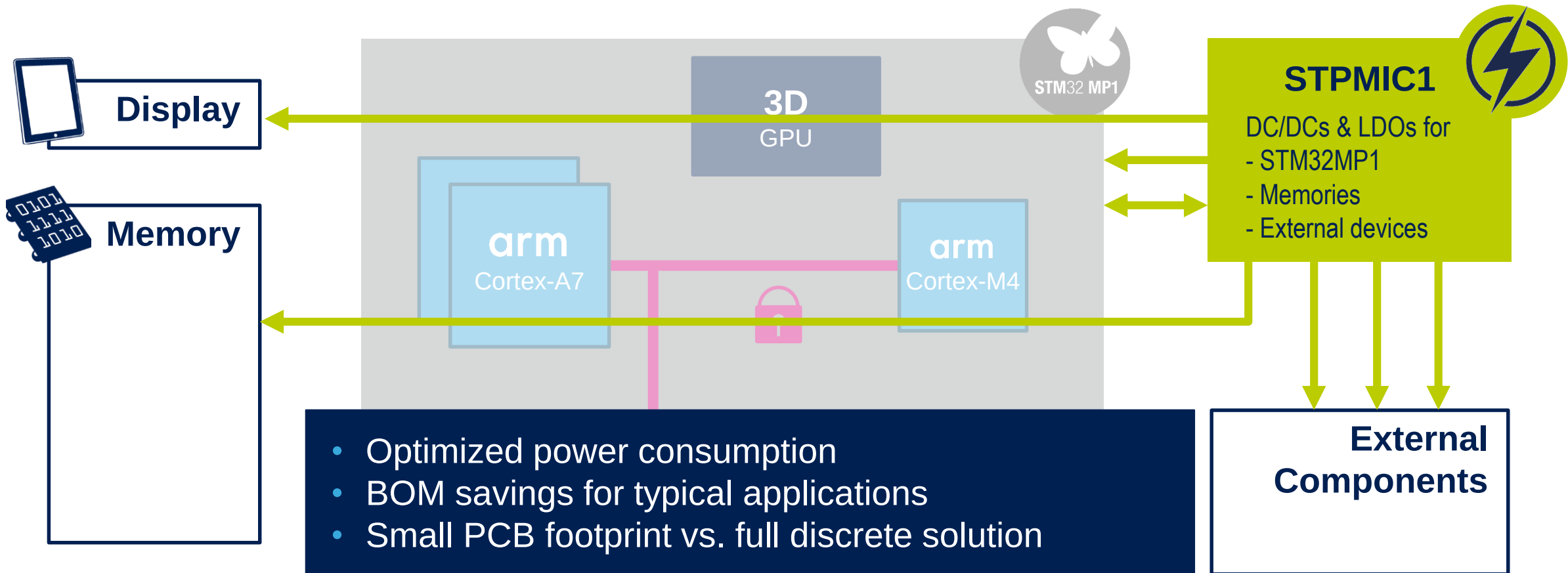
STM32MP157



STPMIC1 Power Management IC

14

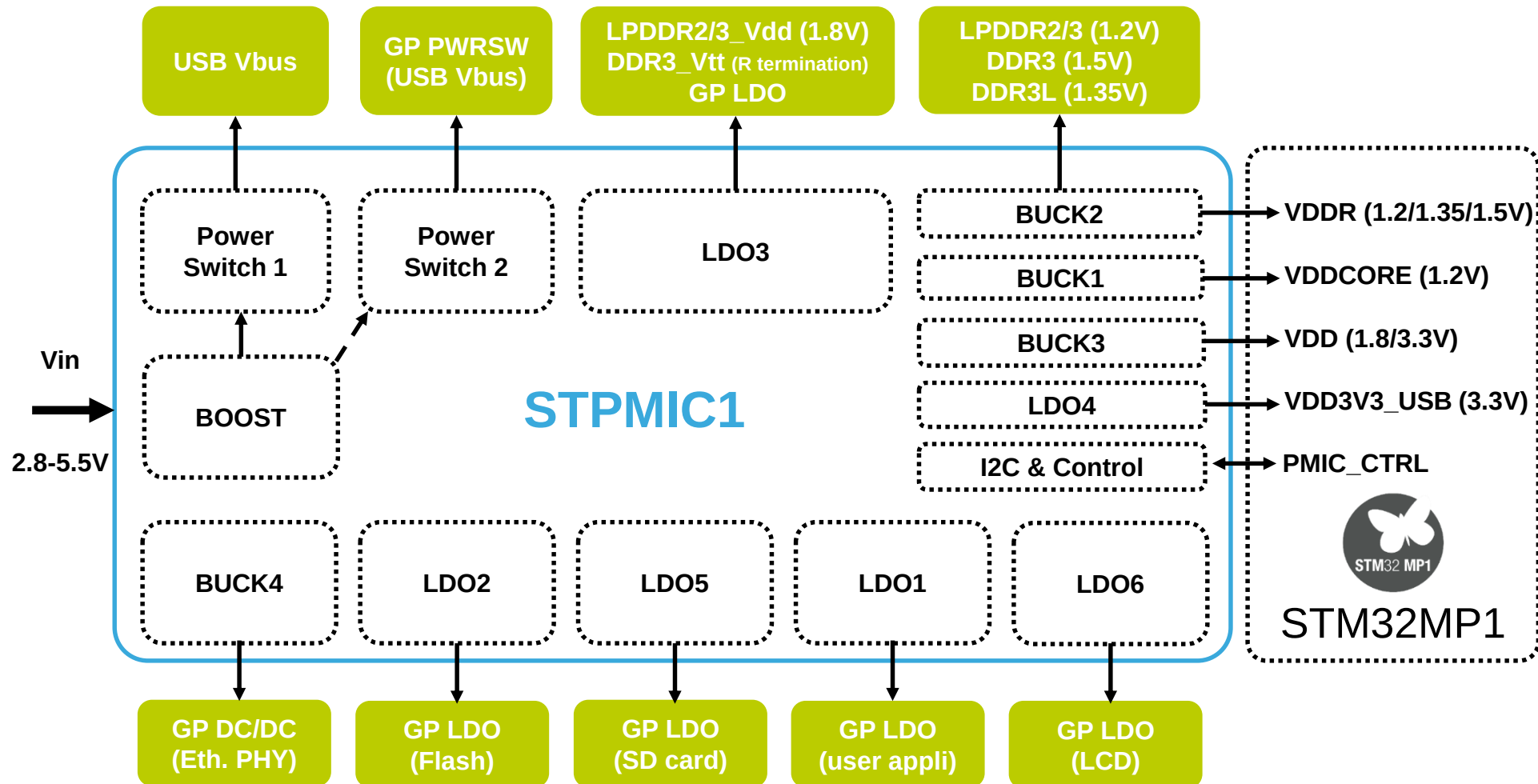
Simplify your design and optimize power consumption



STPMIC1 Power Management IC

15

Simplify your design and optimize power consumption

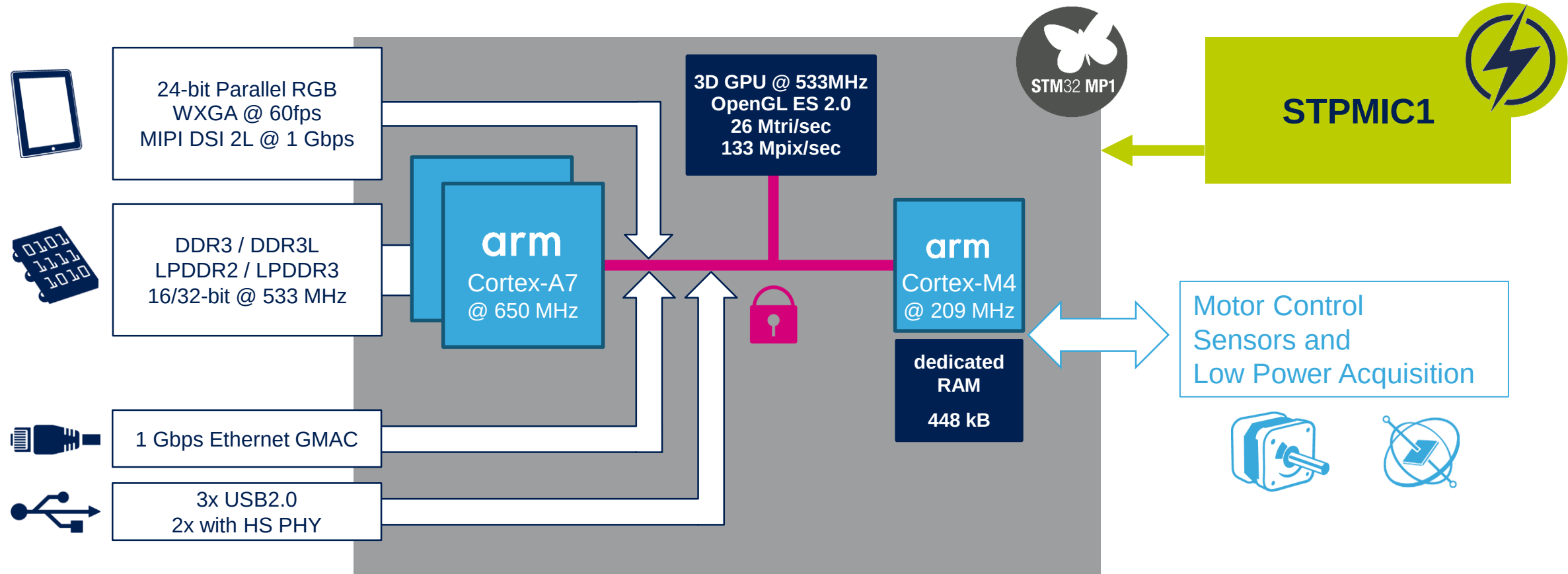


Arm Cortex-A + Cortex-M Architecture

16

High Speed I/F and Processing

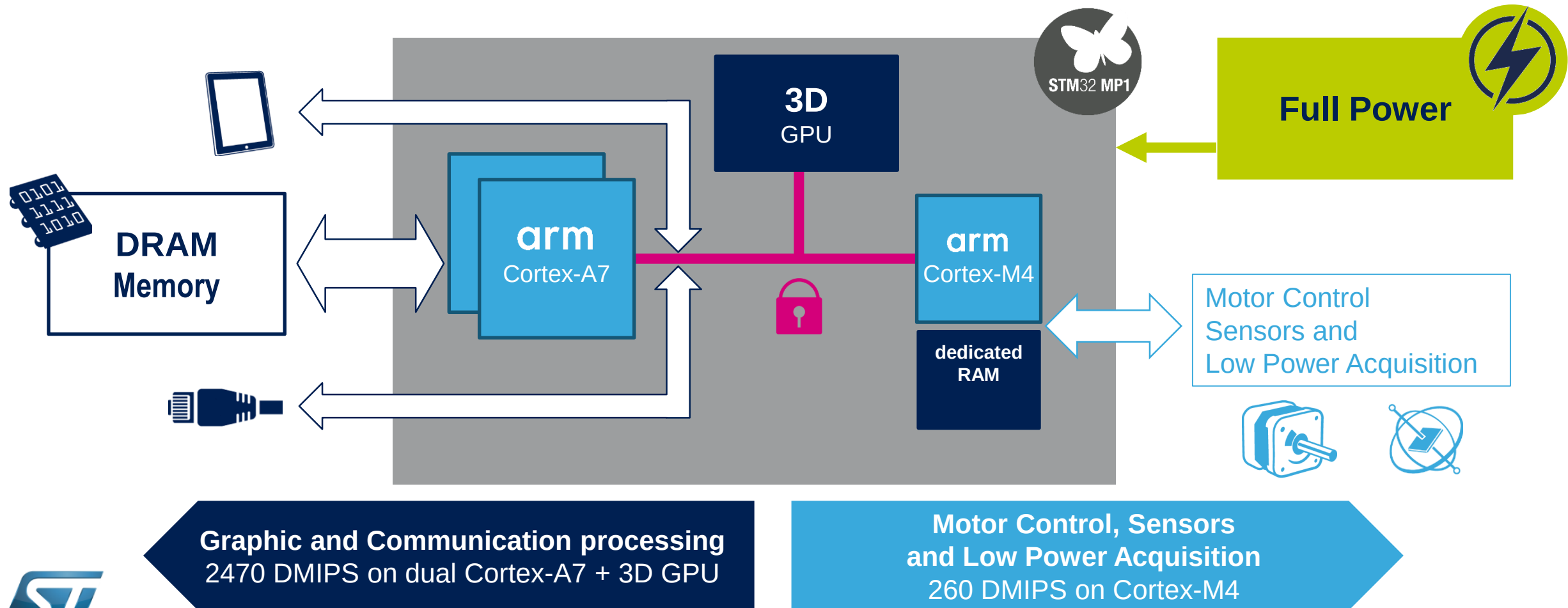
Real Time Operations



STM32MP1 Flexible Architecture

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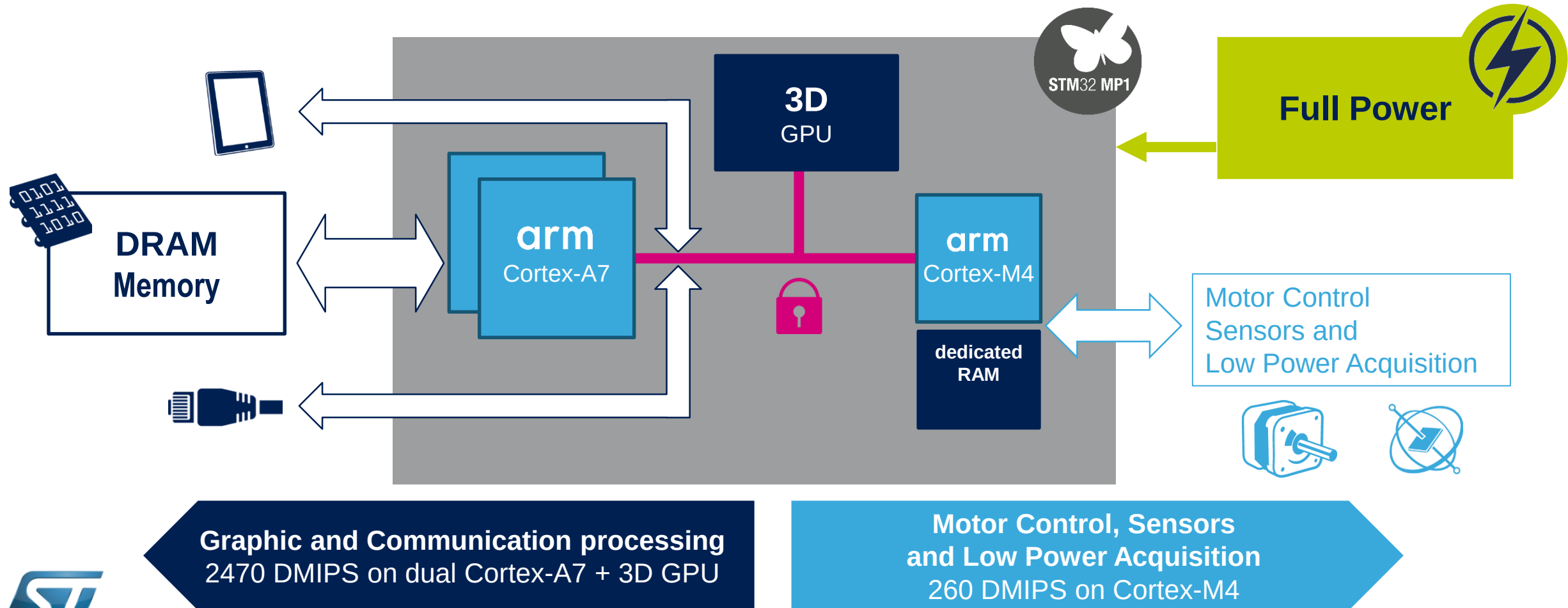
Processing for HMI and Communication + Motor Control and Sensing



Flexible Architecture for Power Efficiency

18

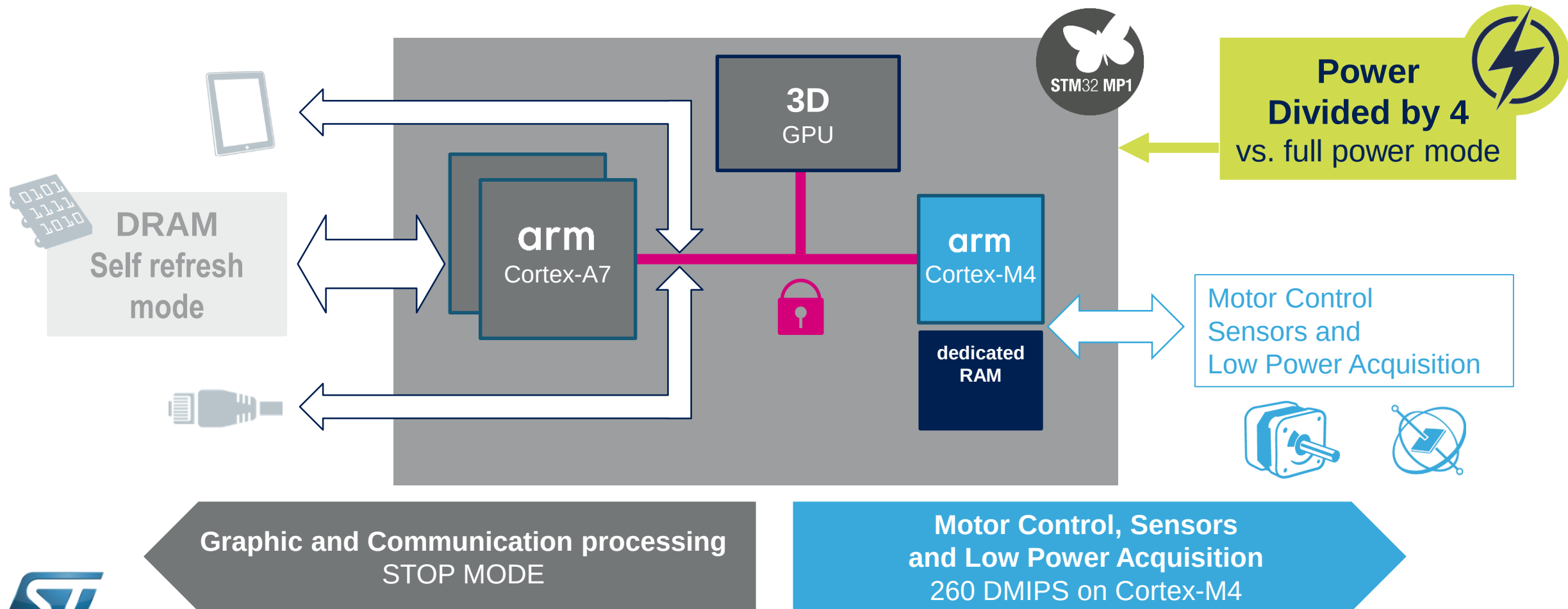
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Flexible Architecture for Power Efficiency

19

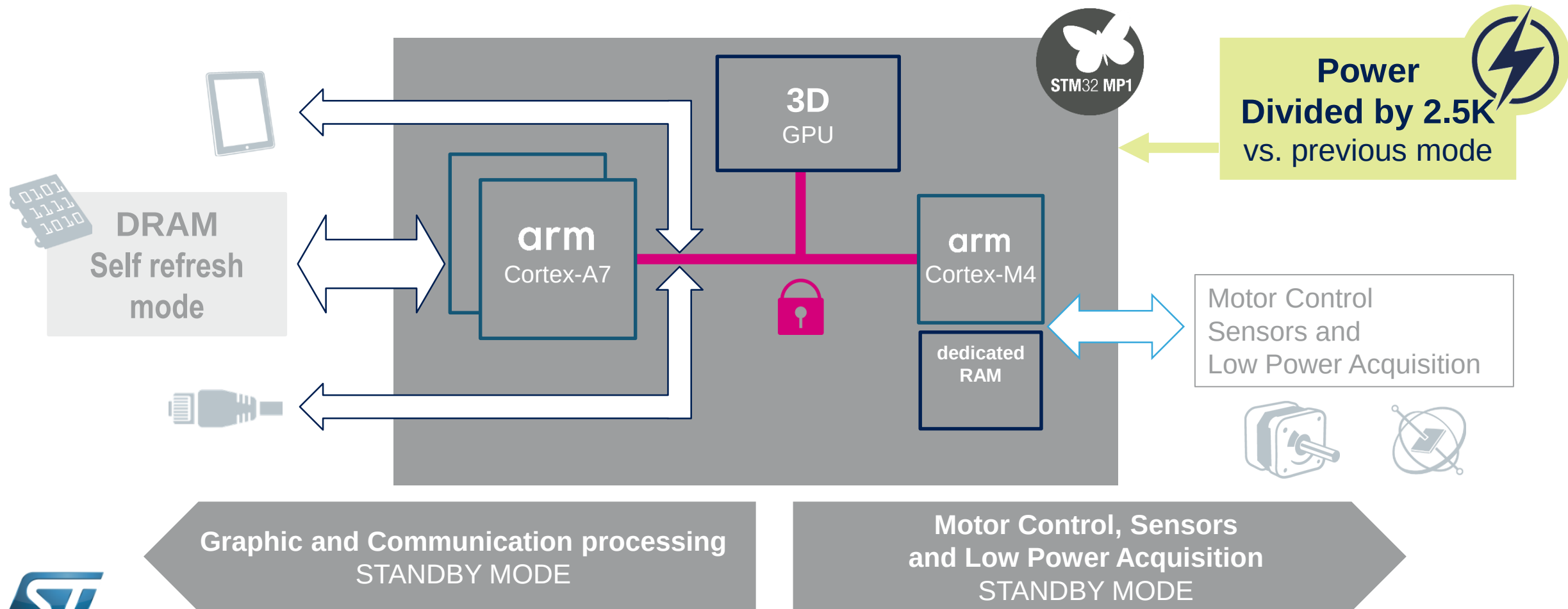
Motor Control and Sensing



Flexible Architecture for Power Efficiency

20

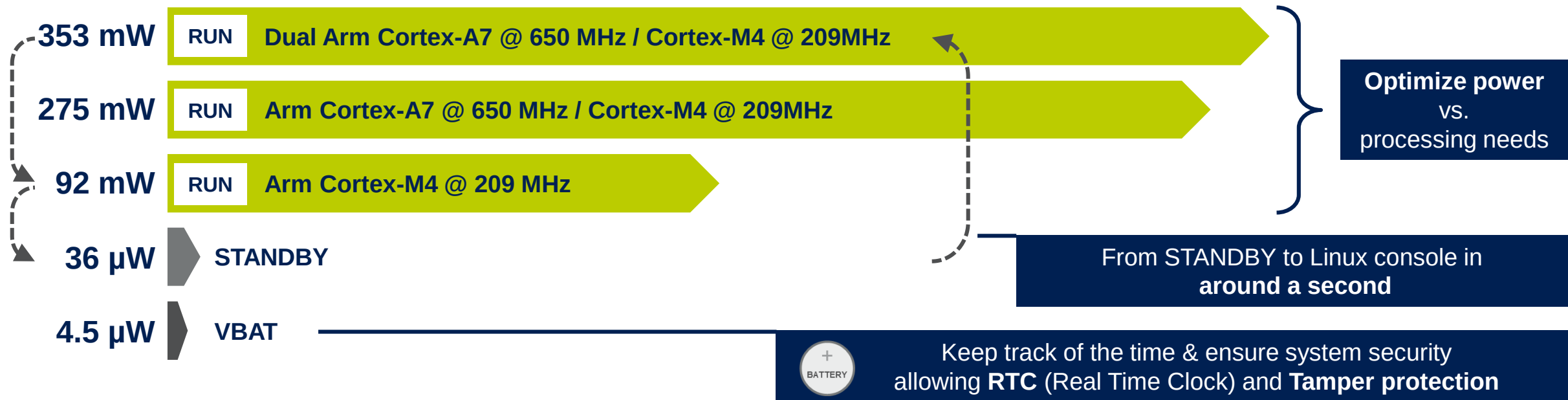
Standby Mode



Flexible Architecture for Power Efficiency

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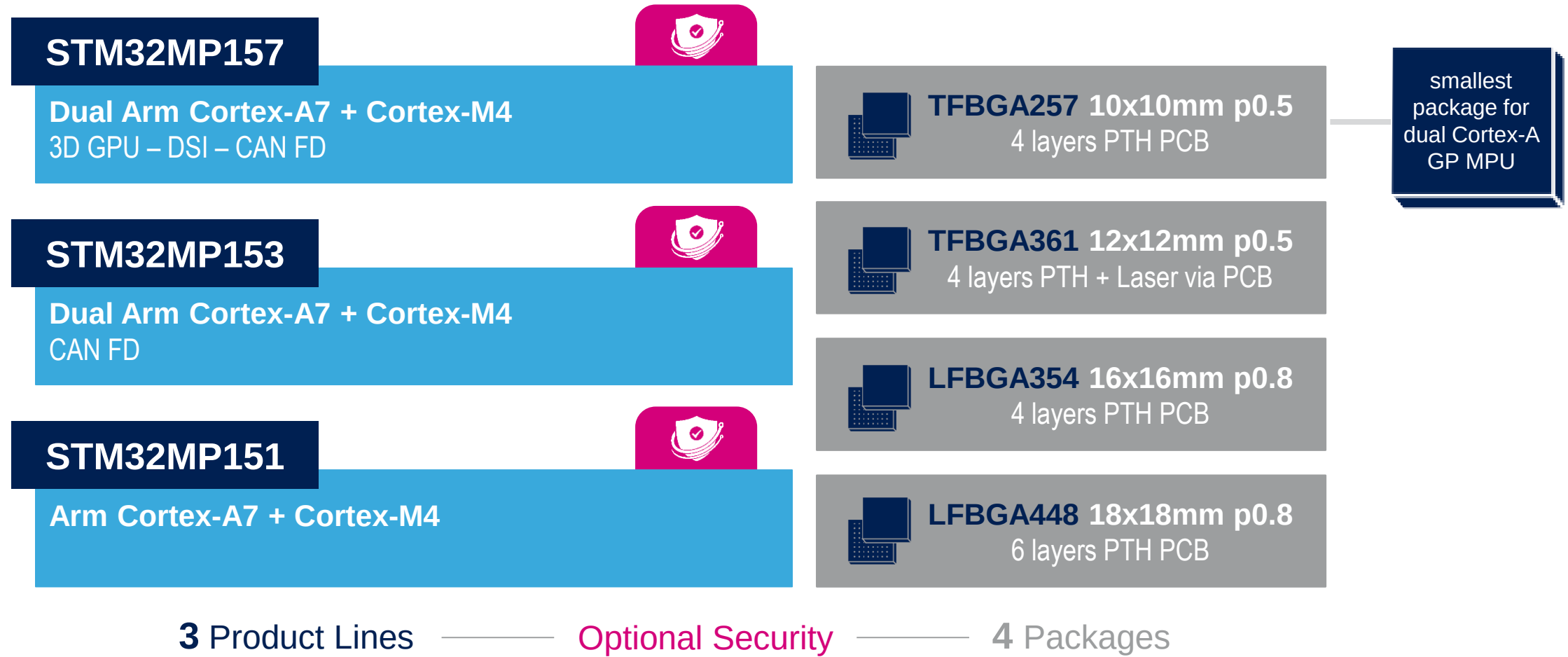
Power Figures



Typ @ VDDCORE = 1.2V, VDD = 3.3V @ 25 °C, Peripherals OFF

STM32MP1 Tailored for Multiple Applications

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Accelerated development leveraging the STM32 Ecosystem

A Fully Integrated Design Suite

Leveraging the STM32Cube Environment

24

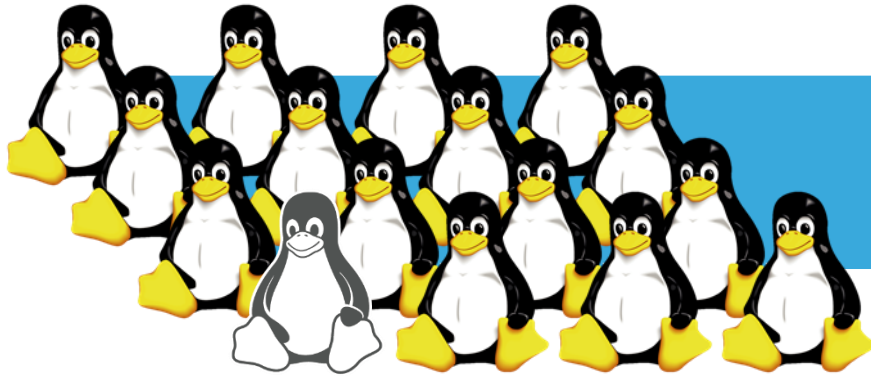


STM32MP1 Embedded Software Distribution

Simplify your Linux Development

25

Fully mainlined open source Linux distribution for Arm Cortex-A7



OpenSTLinux
Distribution

STM32MP1 SoC drivers
already adopted by the Linux community

STM32MP1 supported in Linux 4.19 LTS

Fully compliant
with
open-source
standards



yocto
PROJECT



Pre-integrated
Secure OS



OP-TEE
.org

Benefit from Field-Proven RTOS Tools

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Full re-use of STM32Cube Firmware on Arm Cortex-M



Several APIs to access peripherals



Collection of Middleware components for Cortex-M



Hundreds of Examples



Production-ready Quality



Business-friendly license terms

Supported by the STM32 Ecosystem

All the Tools for Successful MPU Development

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Software



STM32
CubeMX

STM32
CubeProgrammer



Hardware



Discovery boards



Evaluation boards

Customer support



FAE - Worldwide
Customer Support



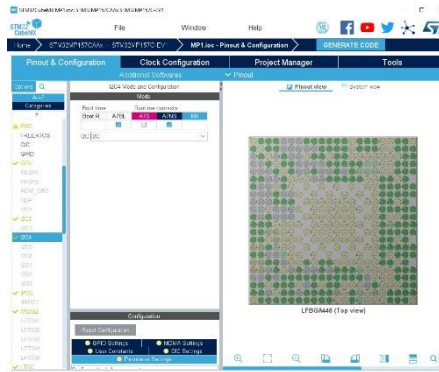
community.st.com



STM32MP1 Software Tools

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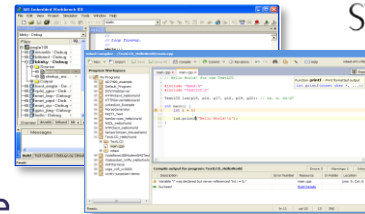
Complete support of Arm Cortex-A + Cortex-M architecture



arm KEIL

ac6

eclipse



IAR
SYSTEMS

All-in-one STM32 programming tool
Multi-mode, user-friendly



STM32CubeMX

STM32CubeMX enhanced for MPU

- Configure and generate code
- DRAM interface tuning tool
- Device Tree generation

IDEs Compile and Debug

Multi-Core Solutions

- Partners IDE
- Free IDE based on Eclipse
- Multi-core debugging

STM32 Programming Tool

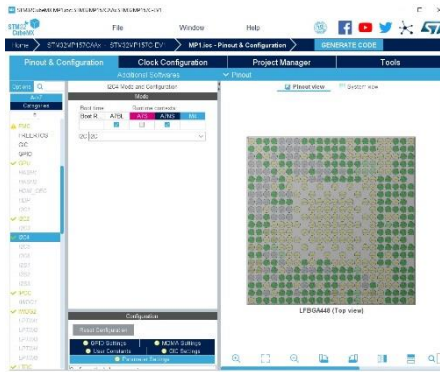
STM32CubeProgrammer

- Flash, DRAM and/or system memory
- OTP programming
- Signing tool & Keys generation

STM32MP1 Software Tools

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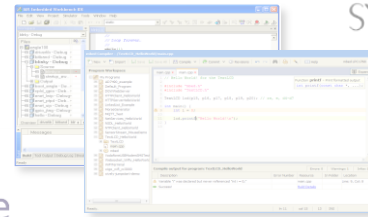
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STM32MP1 Software Tools

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Complete support of Arm Cortex-A + Cortex-M architecture



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STM32MP1 Hardware Solutions

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Speed-up evaluation, prototyping and design



Available at
\$399



Available at
\$99

Available at
\$69



Evaluation Board

Full feature STM32MP1 evaluation

- STM32MP157A-EV1
- STM32MP157C-EV1

Discovery Board

Flexible prototyping & demo

- STM32MP157A-DK1
- STM32MP157C-DK2
 - + MIPI DSI WVGA display
 - + Wi-Fi/BT combo module

Boards & SoM*s

3rd Parties Boards for prototyping and production

- Board Specification from Linaro (96boards.org)
- Commercial SoM w/ different forms

STM32MP1 Hardware Solutions

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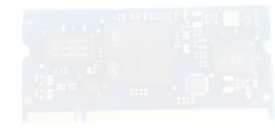
Evaluation Board

Full feature STM32MP1 evaluation

- STM32MP157A-EV1
- STM32MP157C-EV1

- STM32MP157, 18x18mm
- ST PMIC, QFN 6x5mm
- 2x DDR3L 4Gb, 533MHz
- eMMC 4GB
- SLC NAND 8Gb
- 2x Quad-SPI NOR 512Mb
- µSD card slot
- Gigabit Ethernet
- 4x USB Host HS Type-A
- 1x USB OTG HS Type-C
- 720p 5.7" DSI Display
- Audio Codec
- CMOS camera sensor
- Motor Control connector

Available at
\$69



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STM32MP1 Hardware Solutions

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Speed-up evaluation, prototyping and design

- STM32MP157, 12x12mm
- ST PMIC, QFN 6x5mm
- DDR3L 4Gb, 533MHz
- µSD card slot
- Gigabit Ethernet
- 4x USB Type-A
- USB Type-C
- WiFi 802.11b/g/n / BT 4.1
- WVGA 4" DSI display
- HDMI Transceiver
- Arduino™ Uno V3 connector
- 5V USB type-C power supply
- Audio headset jack

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Boards & SoM*s

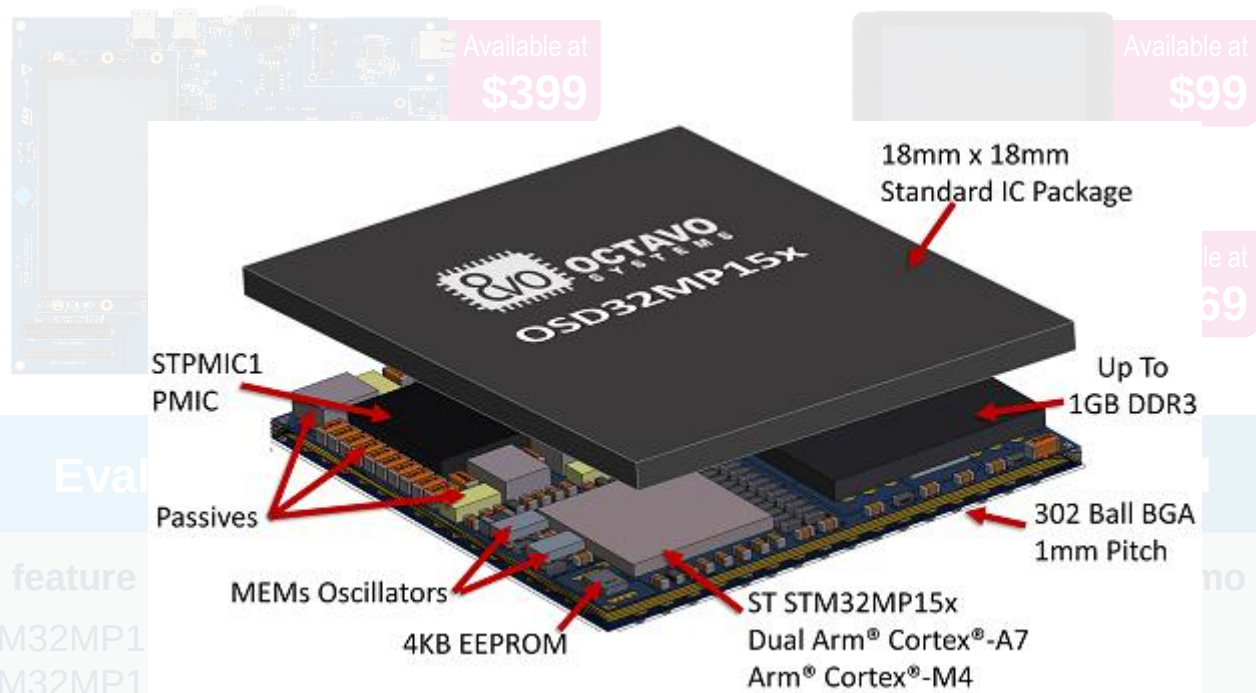
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STM32MP1 Hardware Solutions

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Software, Training and Services

a Broad Ecosystem to Support Development

36



ST's **wiki** user guide
for beginners and experts
<https://wiki.st.com/>

Large selection of partners
already engaged for:

- Graphics UI
- Security
- Training and services



STM32MP1 - Your New Companion

for Advanced Applications

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Extending STM32 success and commitment
with **Microprocessors**



Flexible architecture
for a wide range of applications



Accelerated development
leveraging the **STM32 Ecosystem**

Releasing Your Creativity

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