



Page EEPROM

**Pushing back the limits
of Serial EEPROM**



EEPROM

“ If only

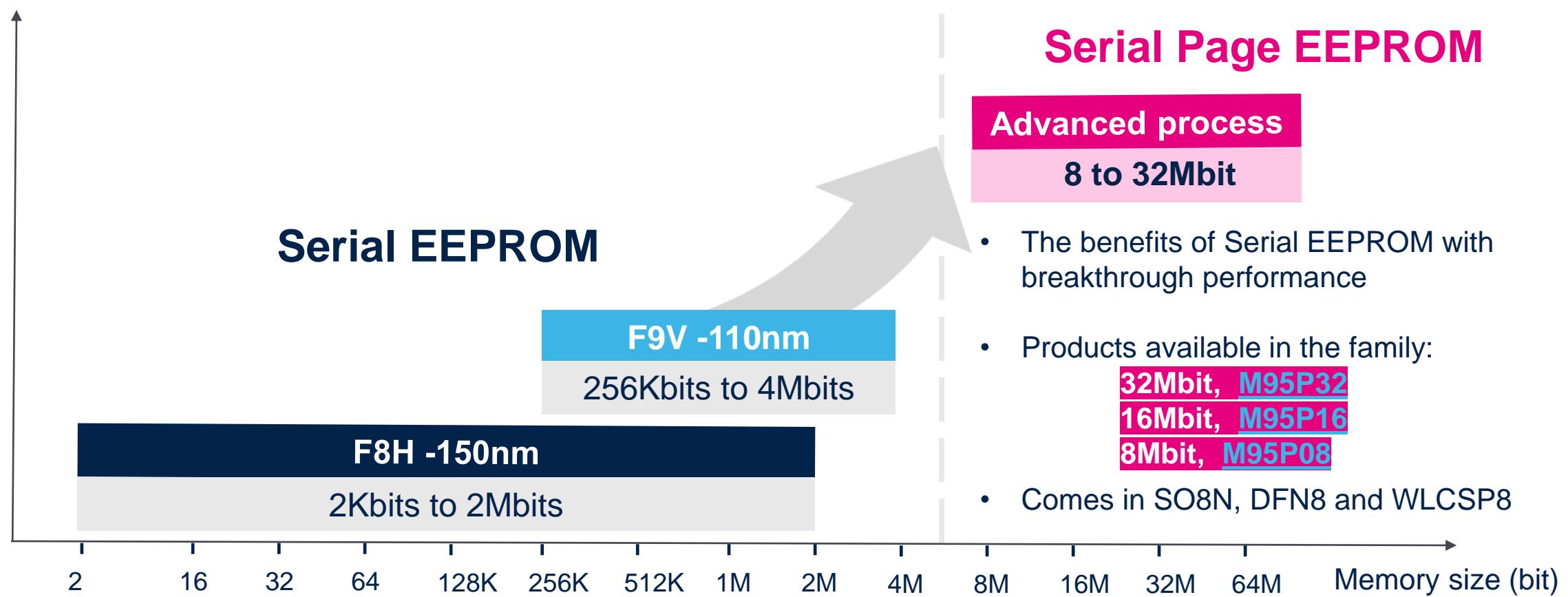
**My smart device had more storage
capacity and could last longer**

This is where we come in

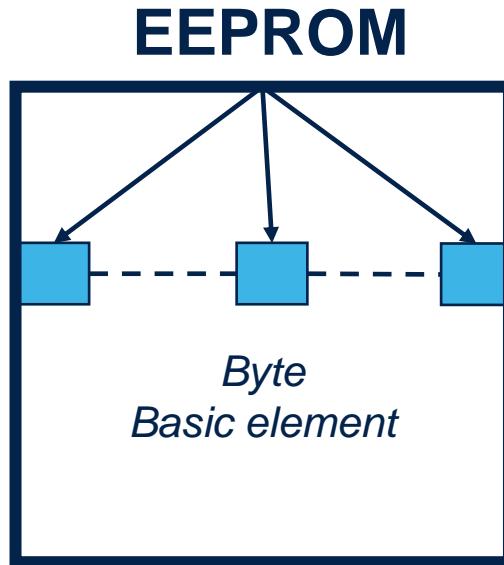


Going beyond today's market-standard 4Mbit EEPROMs

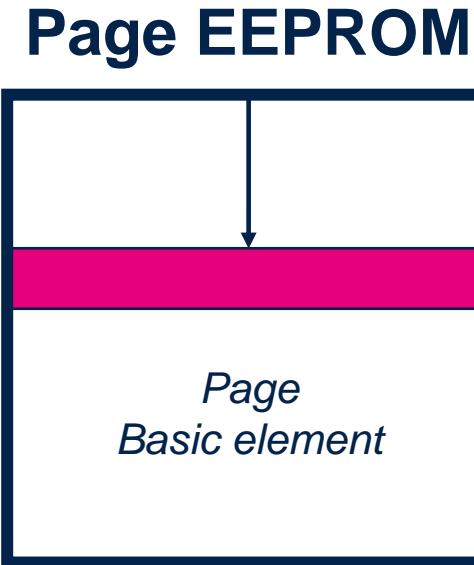
Technology



Introducing the Page EEPROM family



- Byte architecture
- Each byte is independent
- True Byte granularity (except ECCx4)

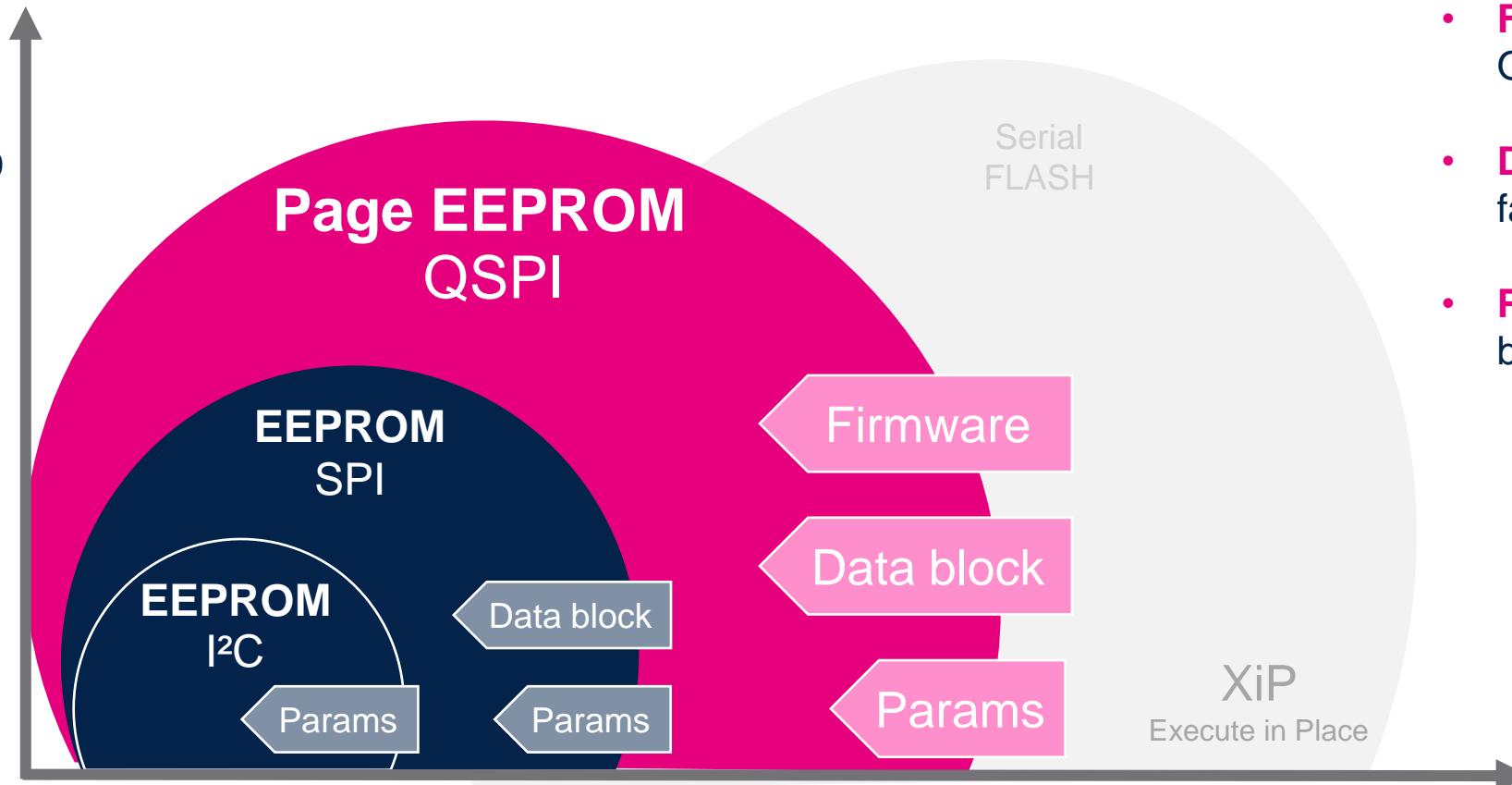


- **Page architecture for competitive die size on high densities**
- Byte on same page are tied together
- Page granularity & seamless **Byte granularity** thanks to smart page internal management

Page EEPROM – Functional perimeter

High density & performances for efficient management of mixed high data quantity

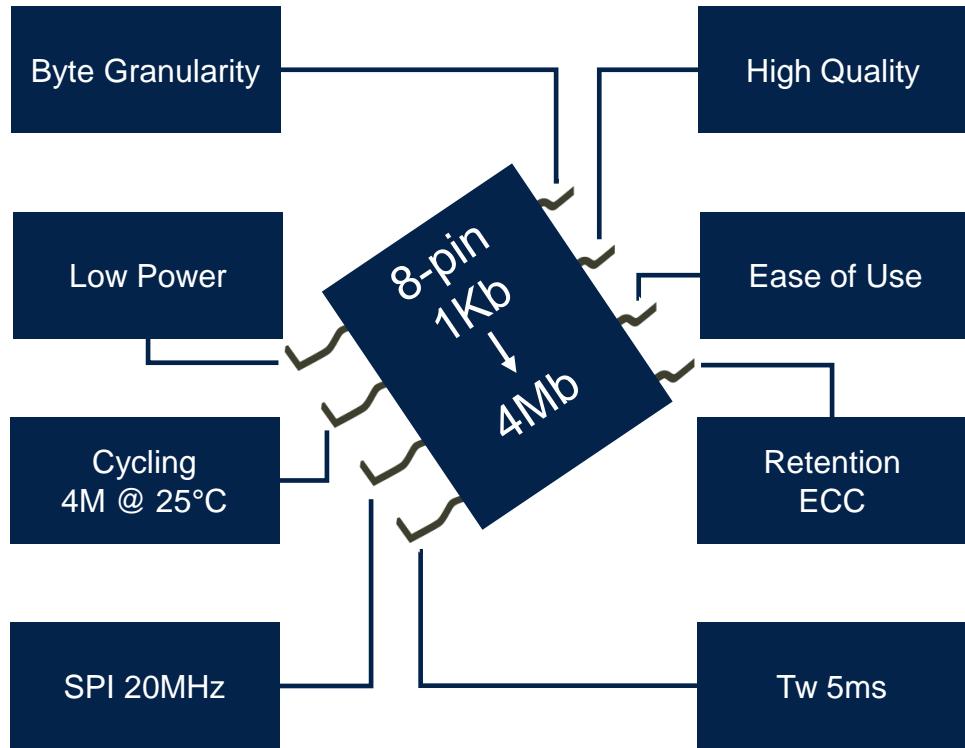
Communication speed



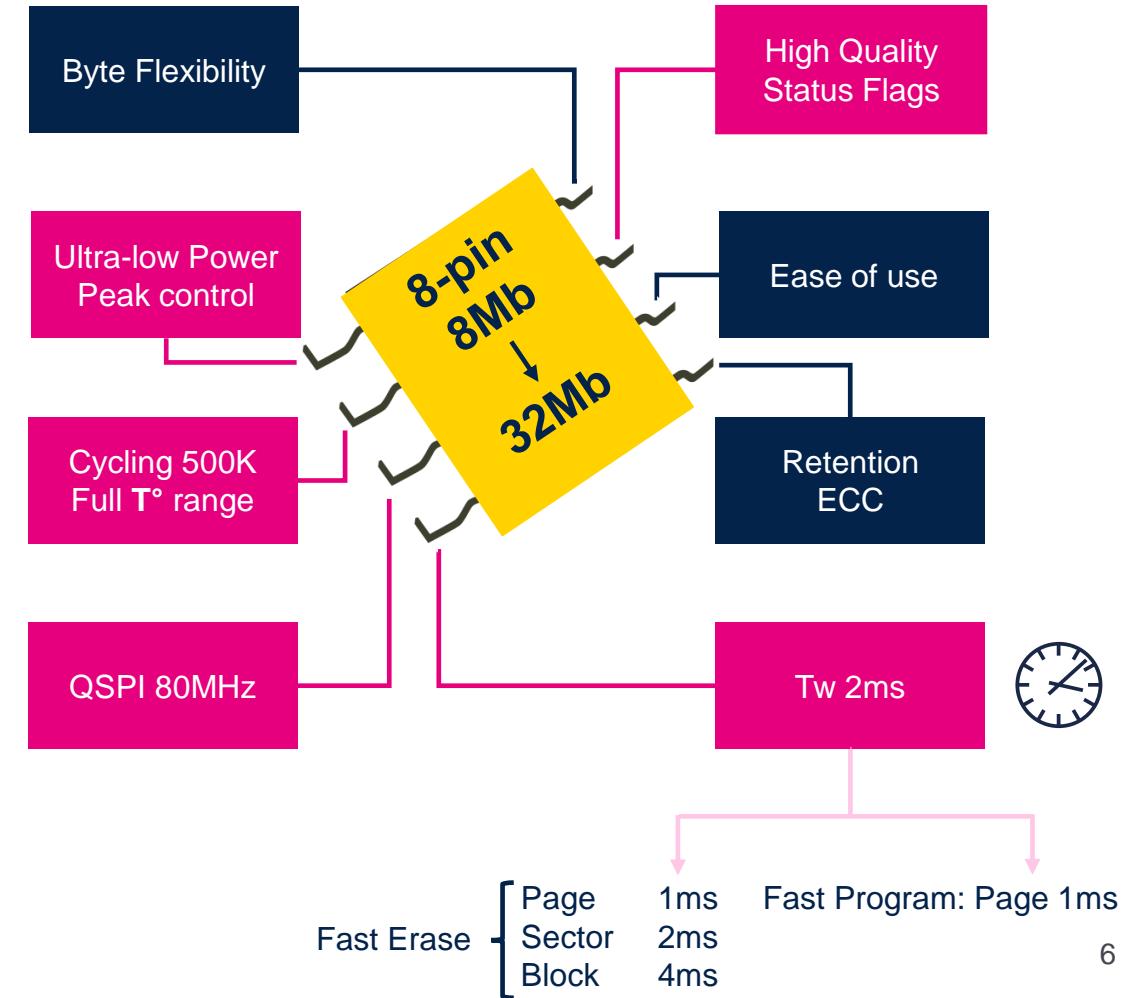
- **Firmware** upload/download for OTA and application start-up
- **Data blocks** and calibration tables fast access with Quad read
- **Parameters** easy to manage with byte flexibility

Page EEPROM extended features

EEPROM

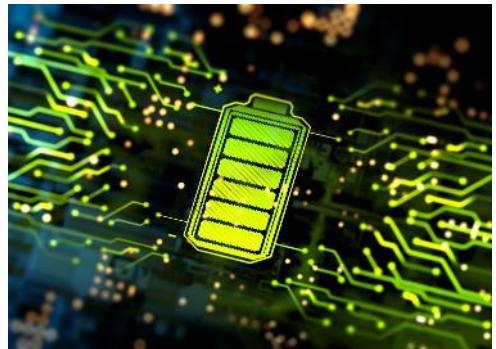


Page EEPROM



Page EEPROM – Application benefits

Ultra-low power



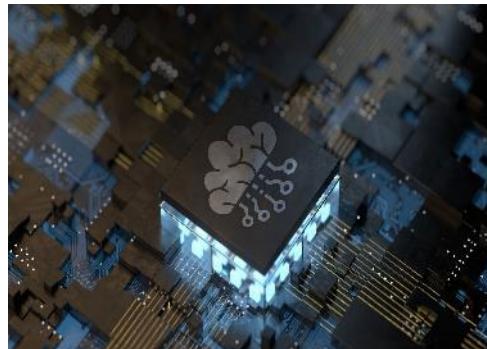
- Very low operating consumption
- Current Peak Control

Manufacturing



- Program with buffer load
- Quad SPI 80Mhz Read

FOTA*



- Ultra Fast Erase Time
- Fast Program 512 bytes

Data logging & event recording



- High cycling endurance
- Fast Byte write granularity

Robustness

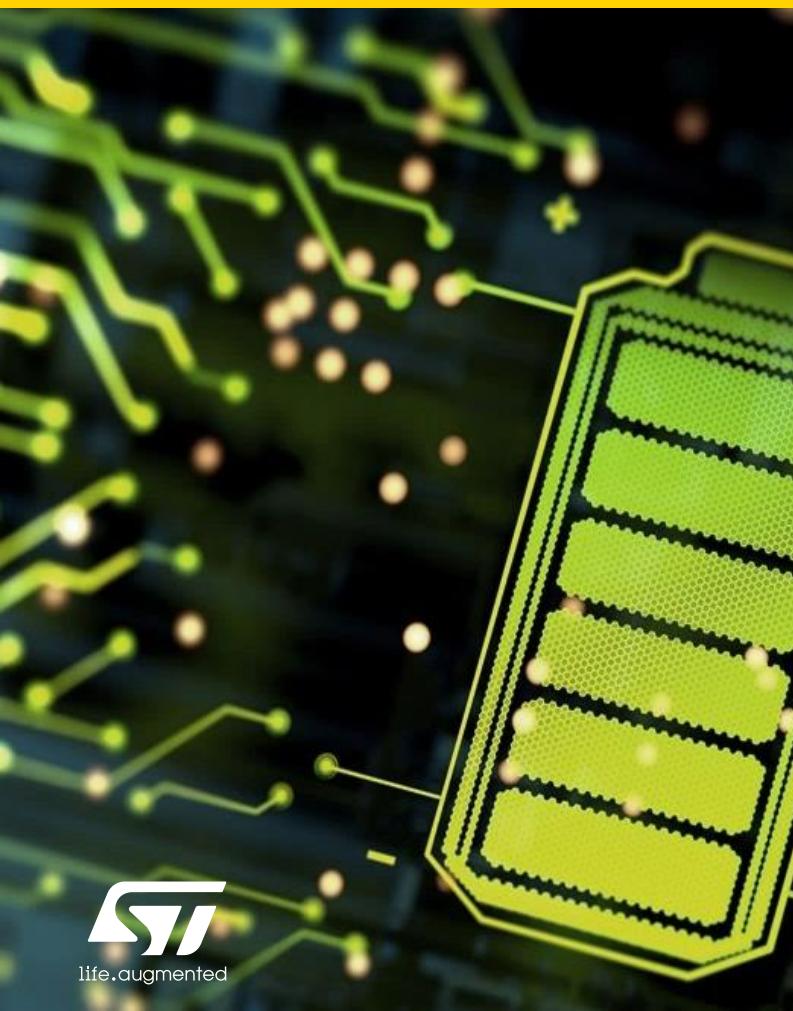


- Prog/Erase status flag
- Read ECC flag

Page EEPROM

Ultra-low power consumption

A power-saving design for intensive use, ideal for tiny IoT modules



The enabling features

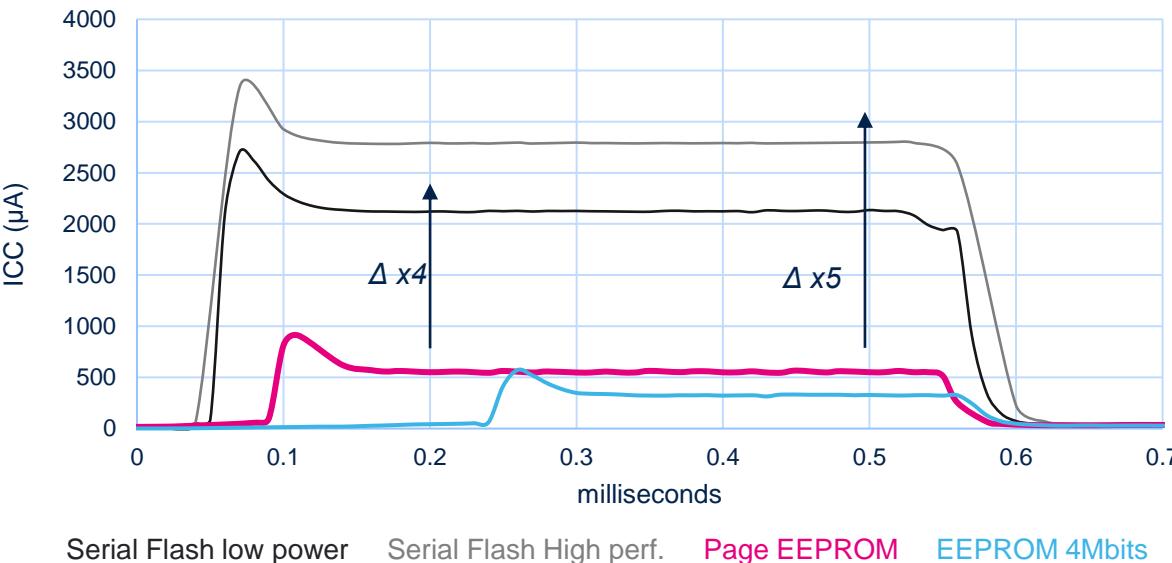
- Wide power supply range
- Current Peak Control & output buffer strength trimming
- Very low operating consumption
- Deep Power Down mode

What this means for designers

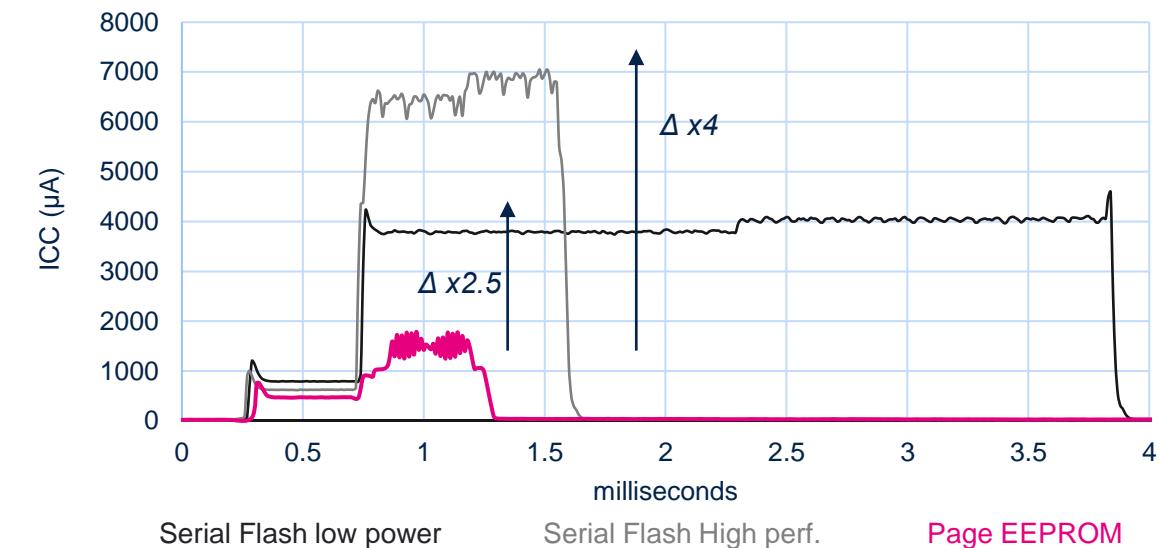
- ➔ Direct battery plug-in
- ➔ Fits application powered by small battery
- ➔ Gain in read & write energy dissipation even for intensive use
- ➔ Optimize idle mode consumption

Ultra-low power consumption

READ 256 bytes 1.8v at 4MHz



PROGRAM 256 bytes 1.8v at 4MHz



- Page EEPROM Read **current = 500 μ A** (1.8V 4Mhz)
 - Consumption **divided by 5** vs Serial FLASH
- Current peak < 1mA

Consumption close to EEPROM 4Mbits

- Page Program consumption and peak < 2mA
- Page Program instruction **faster than Serial Flash**

High energy* reduction (x6 to x12)

Page EEPROM - Manufacturing

Page EEPROM helps save time & costs in the manufacturing process



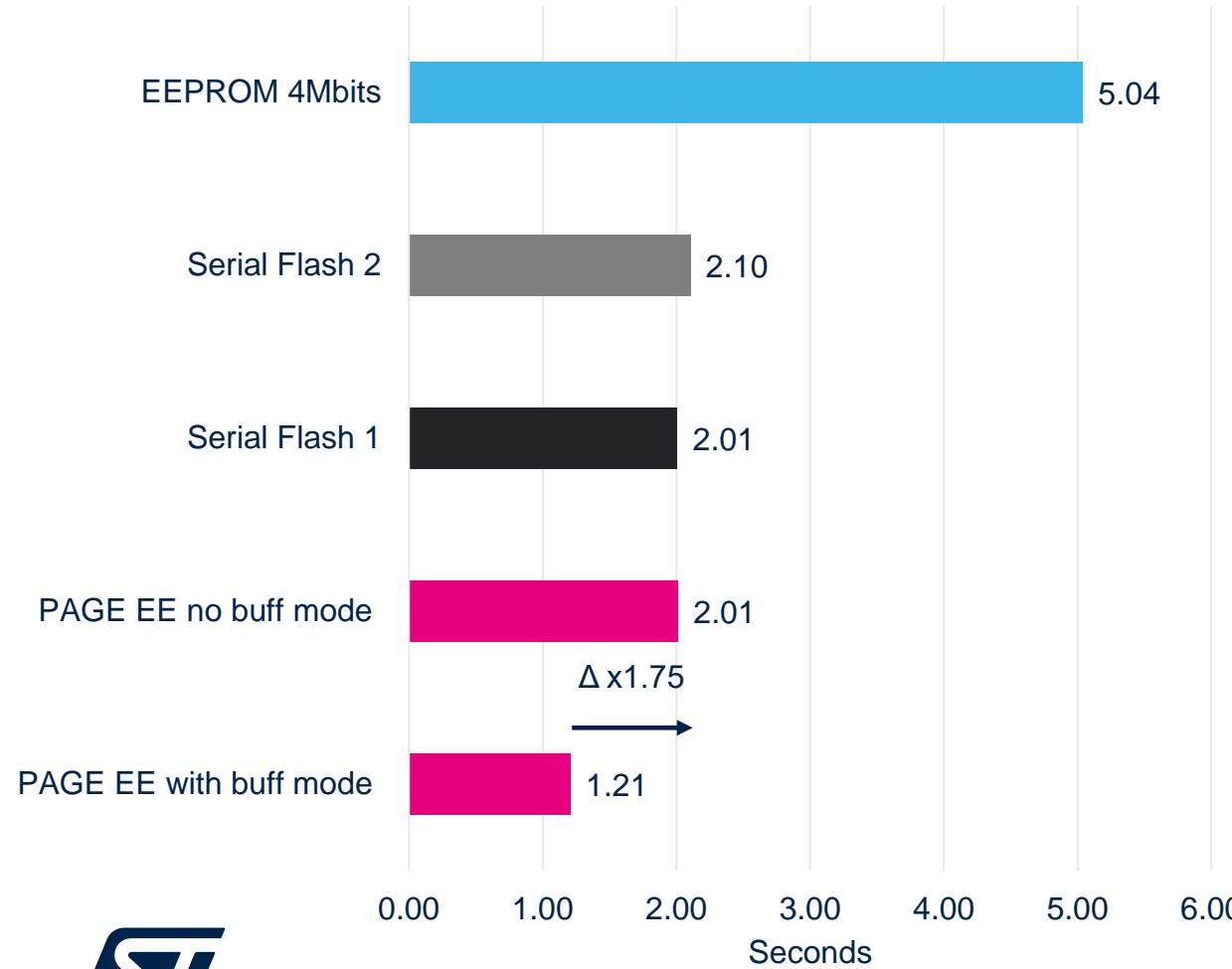
The enabling features

- Initial state erased (FF)
- Program with buffer load
- Fast Erase chip, block, sector
- Write byte granularity
- Quad SPI 80Mhz Read

What this means for manufacturers

- ➔ Ready to upload new data
- ➔ Faster initial data upload
- ➔ Faster rework
- ➔ Easy update of traceability
- ➔ Content verification

Programming: 4Mbits of data at 5MHz



- **Fast Page Program: 512 bytes in 1.2ms**
- Buffer mode is **x1.75 faster** than Serial flash
 - Buffer mode hides SPI communication
 - Very efficient between 4MHz to 40Mhz
- To program 100k parts it takes:
 - ~ 33h with Page EEPROM
 - ~ 55h with serial Flash

One production day less

Reduced downtime, fast device availability

The enabling features

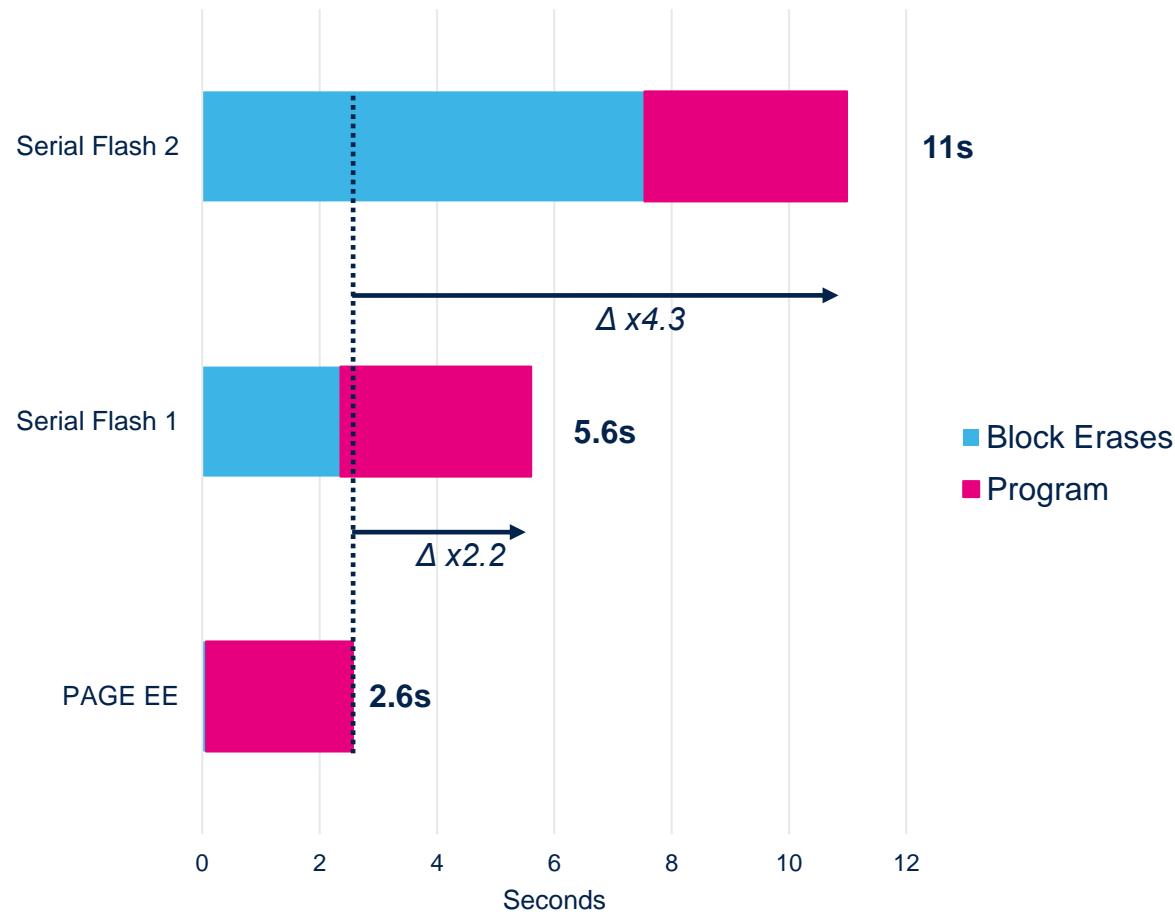
- Fast Wake up 30µs
- QSPI 80Mhz Read
- Erase Chip, Block, Sector
- Ultra Fast Erase Time
- Fast Program 512 bytes
- ECC

What this means for end users

- ➔ Fast application setup
- ➔ Fast download for Firmware
- ➔ Flexible code erase for FOTA
- ➔ Shorter downtime during FOTA
- ➔ Fast code upload for FOTA
- ➔ Code integrity & high reliability

Firmware Over The Air

FOTA scenario: 8Mbits uploaded at 80MHz



- **Ultra fast erase:**

- Page erase in 1.1ms
- Sector erase in 1.3 ms
- Block erase in 4 ms
- Chip erase in 15 ms

- **Program and Erases are both faster** than Serial Flash

Application downtime highly reduced with Page EEPROM

Page EEPROM

Robust data logging & event recording

Smarter, more accurate end applications



The enabling features

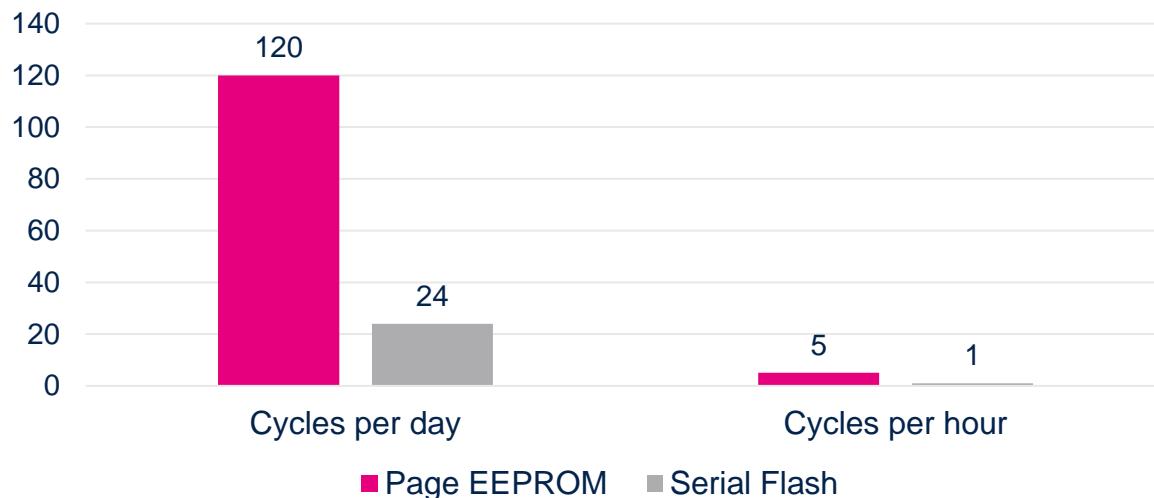
- High cycling endurance
- High retention after cycling + Error Correction Code
- Fast Byte write granularity
- Fast Programming 512bytes

What this means for designers

- ➔ High monitoring rate
- ➔ Data integrity for intensive use
- ➔ Easy datalogging without software emulation
- ➔ Efficient event recording

Data logging & event recording

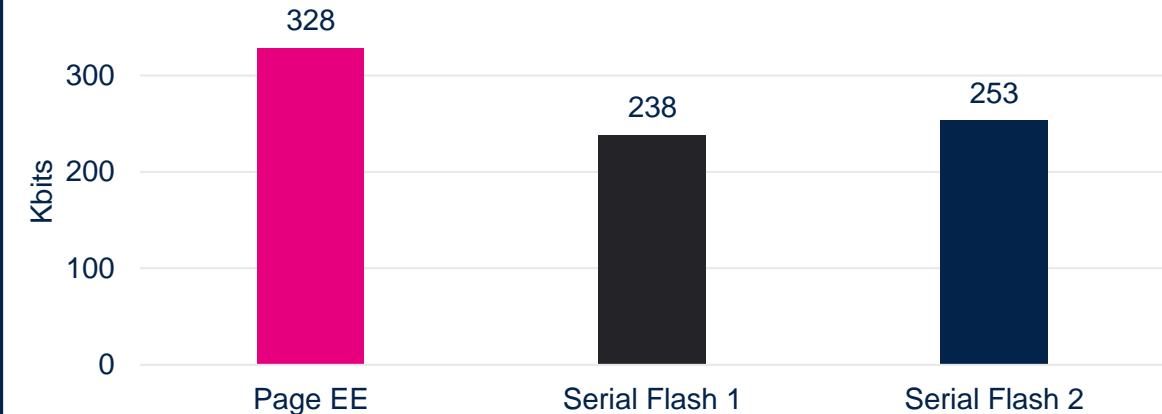
Datalogging frequency over a page for 10 years



- Page EEPROM **high endurance** :
 - 500k cycles per page (full T°)
 - x5 more cycling than Serial Flash

Easy update with page write instruction

Event Recording : 100 ms of programming at 80MHz



- Fast program **512 bytes in 1.2ms**

+25% data stored VS Serial Flash

Page EEPROM - Robustness

Product monitoring & data protection



Operation status

- Prog/Erase status flag
- Power up flag



Data integrity

- Read ECC flag



Anti-corruption

- Protected area flag



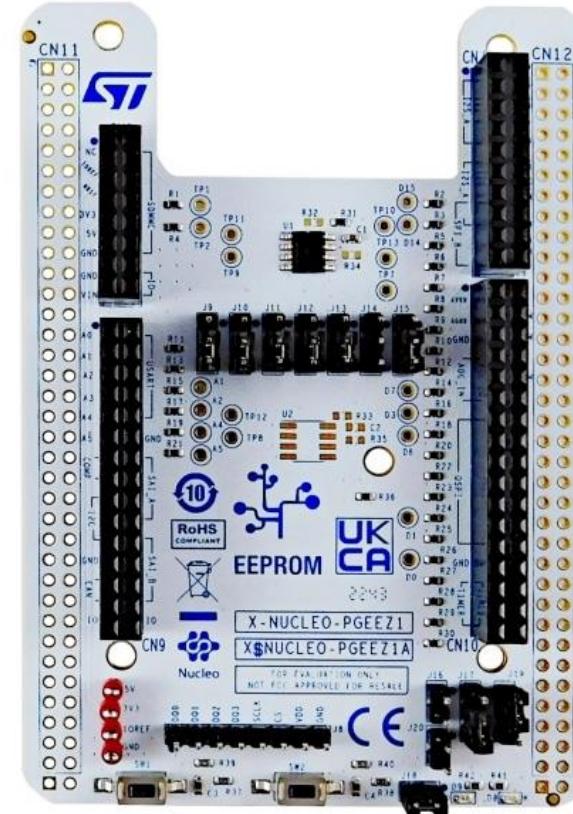
Page EEPROM development tool

STM32 Nucleo expansion board

X-NUCLEO-PGEEZ1

- Based on M95P32-I in SO8 package
- Compatible with 64-or 144-pin Nucleo board
- Possibility to add a second memory
- Documentation & Drivers available

[Read more](#)



Our technology starts with You



Find out more at www.st.com/page-eeprom

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