life.augmented

STM32L series
Ultra-low-power
32-bit MCUs
Releasing your creativity

Contents

STM32 and ultra-low-power

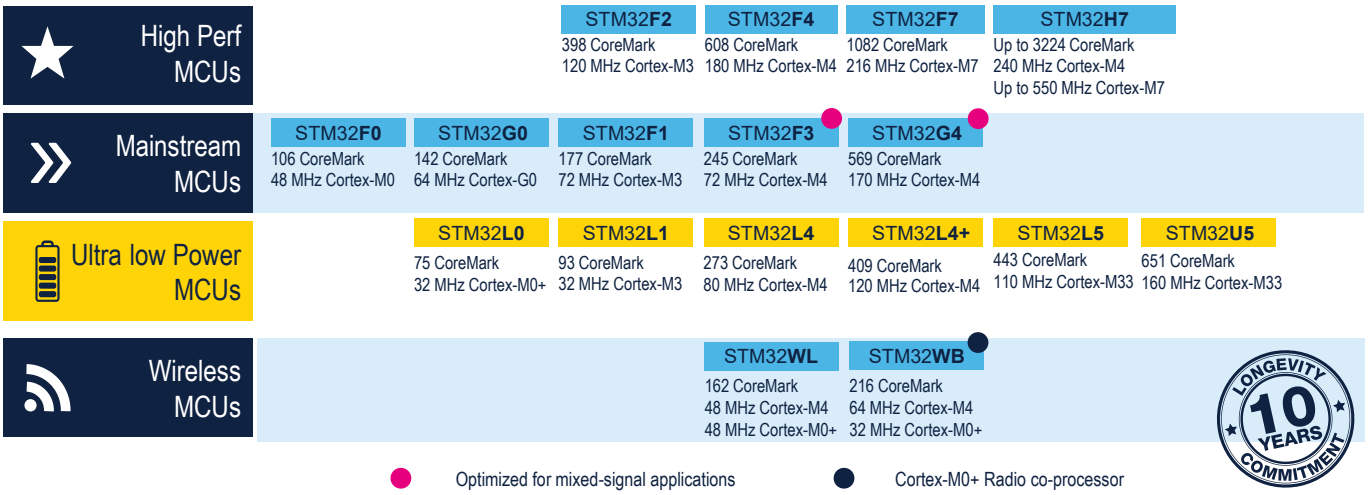
By choosing an STM32 microcontroller for your embedded application, you gain from our market-leading expertise in MCU architecture, technology, multi-source manufacturing and long-term supply.

17 PRODUCT SERIES – MORE THAN 70 PRODUCT LINES

The STM32 family of 32-bit microcontrollers based on the Arm® Cortex®-M processor is designed to offer new degrees of freedom to MCU users. It offers products combining very high performance, real-time capabilities, digital signal processing, low-power / low-voltage operation, and connectivity, while maintaining full integration and ease of development.

The unparalleled range of STM32 microcontrollers, based on an industry-standard core, comes with a vast choice of tools and software to support project development, making this family of products ideal for both small projects and end-to-end platforms.

STM32 MCUS - 32-BIT ARM® CORTEX®-M



ST MCU Finder

Free mobile and desktop application to find the right STM32 MCU

www.st.com/stmcufinder

ST Community

Ask, learn, share, discuss, become famous and engage with the community of STM32 enthusiasts on:

community.st.com

STM32 MCU wiki by

wiki.st.com/stm32mcu

STM32 ULP series

From cost smart up to advanced performance, there is an STM32Lx series to match all your memory, analog or peripheral needs.

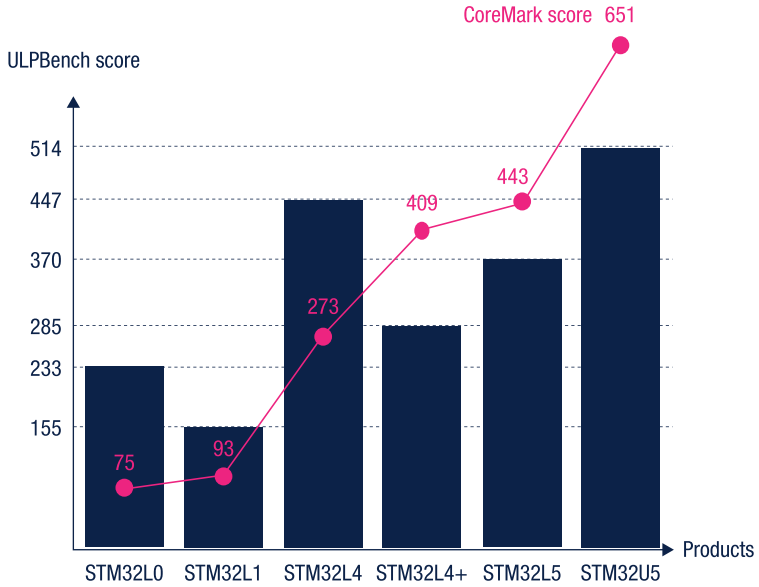
STM32L: ULTRA-LOW-POWER 32-BIT MCU SERIES

ST's ultra-low-power MCU platform is based on a proprietary ultra-low-leakage technology and optimized design.
STM32 ultra-low-power microcontrollers offer designers of energy-efficient embedded systems and applications a balance between performance, power, security and cost effectiveness. The portfolio includes the STM8L (8-bit proprietary core), the STM32L4 (Arm® Cortex®-M4), the STM32L0 (Arm® Cortex®-M0+) and the STM32L1 (Arm® Cortex®-M3). The STM32L5 MCU (Arm® Cortex®-M33) with its enhanced security features is the latest addition to this rich portfolio.
Achieving the industry's lowest current variation (25 to 125 °C), STM8L/STM32L/STM32U solutions guarantee outstanding low-current consumption at high temperatures.

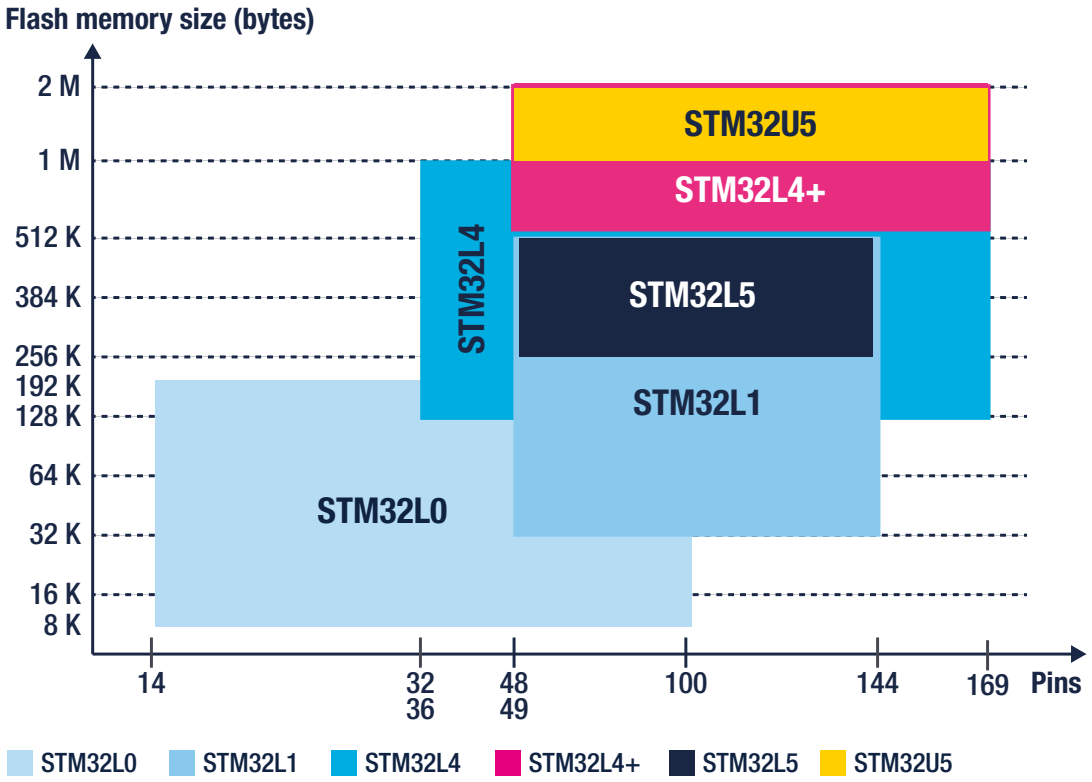
- The new STM32U5 series combines the latest and most efficient Arm Cortex-M33 core with an innovative 40 nm platform that reduces energy consumption to the bone, while increasing performance. The series also adds the state-of-the-art features which are required in today's applications, including advanced cyber security with hardware-based protection, and graphics accelerators for rich graphical user interfaces.
- The STM32L5 series enhanced security features leverage Arm® Cortex®-M33 and its TrustZone® for Armv8-M. Thanks to this new core and a new ST ART Accelerator™ (also supporting external memory), the STM32L5 reaches an 443 CoreMark.
- The STM32L4 series offers the excellence of ST's ultra-low power platform with an additional performance dimension by providing 100 DMIPS with DSP instructions and Floating-Point Unit (FPU), more memory (up to 1 Mbyte of Flash memory) and innovative features.
- The STM32L4+ series extends STM32L4 technology by offering higher performance (120 MHz/409 CoreMark executing from internal Flash memory), larger embedded memories (up to 2 Mbytes of Flash memory and 640 Kbytes of SRAM), and rendering advanced graphics without compromising ultra-low-power consumption.
- The STM32L0 series offers a genuine energy-saving solution for entry-level applications. Available in tiny packages down to 14 pins and with a wide range of Flash memory densities from 8 to 192 Kbytes, the STM32L0 features ultra-low power consumption in a competitive portfolio.

6 PRODUCT SERIES - 18 PRODUCT LINES

STM32U5	• 32-bit Arm® Cortex®-M33 + FPU at 160 MHz • From 1 to 2 Mbytes of Flash memory • Lowest power mode + RAM + RTC: 0.35 µA
STM32L5	• 32-bit Arm® Cortex®-M33 + FPU at 110 MHz • From 256 to 512 Kbytes of Flash memory • Lowest power mode + RAM + RTC: 0.35 µA
STM32L4+	• 32-bit Arm® Cortex®-M4 + FPU at 120 MHz • From 512 Kbytes up to 2 Mbytes of Flash memory • Lowest power mode + RAM + RTC: 0.39 µA
STM32L4	• 32-bit Arm® Cortex®-M4 + FPU at 80 MHz • From 64 Kbytes to 1 Mbyte of Flash memory • Lowest power mode + RAM + RTC: 0.34 µA
STM32L1	• 32-bit Arm® Cortex®-M3 at 32 MHz • From 32 to 512 Kbytes of Flash memory • Lowest power mode + RAM + RTC: 1.2 µA
STM32L0	• 32-bit Arm® Cortex®-M0+ at 32 MHz • From 8 to 192 Kbytes of Flash memory • Lowest power mode + RAM + RTC: 0.67 µA



MORE MEMORY, PERFORMANCE, PERIPHERALS AND PACKAGE



WLCSP

WLCSP25 (~2x2 mm)
WLCSP36 (~2x3 mm)
WLCSP49 (~3x3 mm)
WLCSP63 (~3x4 mm)
WLCSP64 (~4x5 mm)
WLCSP72 (~3x4 mm)
WLCSP81 (~3x4 mm)
WLCSP90 (~4x4 mm)
WLCSP100 (~4x4 mm)
WLCSP104 (~4x5 mm)
WLCSP144 (~5x5 mm)

QFN

UFQFN20 (3x3 mm)
UFQFN28 (4x4 mm)
UFQFN32 (5x5 mm)
UFQFN48 (7x7 mm)

BGA

UFBGA64 (5x5 mm)
UFBGA100 (7x7 mm)
UFBGA132 (7x7 mm)
UFBGA144 (10x10mm)
UFBGA169 (7x7 mm)

TSSOP

TSSOP14 (4.4x4.1 mm)
TSSOP20 (4.4x6.6 mm)

LQFP

LQFP32 (7x7 mm)
LQFP48 (7X7 mm)
LQFP64 (10X10 mm)
LQFP100 (14X14 mm)
LQFP144 (20x20 mm)

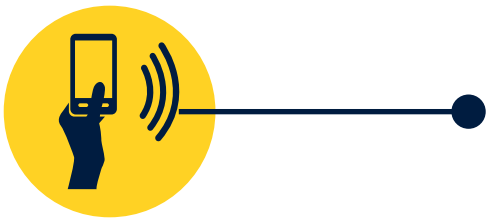
STM32 ULP MCUs ARE THE ANSWER, WHATEVER THE APPLICATION

Power tools

- -40 to +125 °C temperature range
- 1.65 to 3.6 V power supply range
- RTC with anti-tamper at 0.95 ppm
- Safety with ECC on Flash and SRAM, CRC
- Independent dual-bank Flash memory and EEPROM (RWW)
- Internal RC ± 1% accuracy over temperature and VDD
- Wide package offer from 14 to 169 pins
- Full Arm® Cortex®-M0+/M3/M4/M33 range offer

- Down to 450 nA mode with RTC, 16 Kbytes of SRAM
- LPBAM (Low Power Background Autonomous Mode), an innovative autonomous power mode
- LP-UART, Pulse counter, 16-bit LP-Timer
- 3.5 µs wakeup with 16 wakeup lines
- Dual-bank Flash memory (up to 2 Mbytes) for firmware upgrade
- Up to 16 Kbytes of true EEPROM for data login
- Built-in comparator and Op Amp with PGA
- TrustZone®, PCROP, ECC, CRC, JTAG fuse for security purposes
- Full Arm® Cortex®-M0+/M3/M4/M33 range offer

Gas/water meters



Sensor hub
Mobile phone/gaming

- 1.4 µA Stop mode with 128 Kbytes of RAM+RTC
- 4 µs wakeup time for fast system response
- USB 2.0 OTG for fast application processors
- Up to 786 Kbytes of SRAM
- Down to 1.65 V full speed
- I²C FM+, Fast SPI, Fast ADC for sensor acquisition
- Arm® Cortex®-M33 with FPU 240 DMIPS with ART Accelerator™

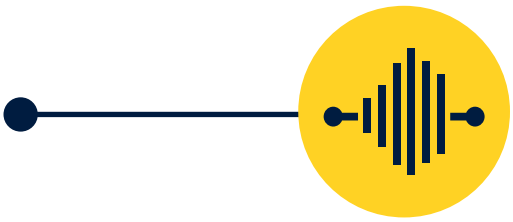
- Dynamics Efficiency 19 µA/MHz
- FSMC or Quad/Octo SPI for external memories
- LCD (4x52 or 8x48) for Display control
- TRNG and 256-bit AES for Security
- Digital filter for Sigma-Delta modulators or MDF
- VBAT with RTC for Battery backup domain

Electricity smart meters

Fitness/healthcare

- 8 nA Shutdown mode to extend battery life
- Up to 2-Mbyte Flash memory to support advanced algorithms
- Dynamic Efficiency 19 µA/MHz
- I²C FM+ for sensors and HS communication
- 12-/16-bit ADC analog sensing and monitoring
- FS USB host for data transfer + device charging
- Full Arm® Cortex®-M0+/M3/M4/M33 range offer
- Up to 786 or ADF Kbytes of SRAM
- Graphic accelerator: Chrom-ART Accelerator™ and memory optimization Chrom-GRC™ round display
- MIPI-DSI, LCD-TFT and parallel interface for advanced graphics

- 28 nA Standby mode to extend battery life
- 4 to 14 µs wakeup time for a better user experience
- Digital filter for Sigma Delta for MEMS microphone
- 12-bit ADC at 200 µA / MSPS
- SAI / I2S for audio peripheral connections
- Arm® Cortex®-M33 up to 160 MHz with 240 DMIPS
- Quad or Octo-SPI Memory interface for data or execution in place



Audio and
voice recognition

STM32L0 series

A tiny consumption budget for a wide application range

STM32L0 MCU Series - 32-bit Arm® Cortex®-M0+

- Ultra low leakage process
- Dynamic voltage scaling
- 14 to 100-pin
- 5 clock sources
- Advanced RTC w/ calibration
- 12-bit ADC 1.14 Msps
- Multiple USART, SPI, I²C
- Multiple 16-bit timers
- LP UART1
- LP Timers1
- 2 watchdogs
- Reset circuitry POR/PDR
- Brown-out Reset
- DMA
- AES-128

Product line	Flash (KB)	RAM (KB)	EE - PROM (Bytes)	Power supply	PVD [2]	TEMP sensor	2x ULP COMP	2x 12-bit DAC	Touch sense	TRNG	USB 2.0 FS Crys - tal-less	Segment LCD Driver
STM32L0x0 Value line	Up to 128	Up to 20	Up to 512	Down to 1.8V								
STM32L0x1 Access	Up to 192	Up to 20	Up to 6K	Down to 1.65V	•	•	•					
STM32L0x2 USB	Up to 192	Up to 20	Up to 6K	Down to 1.65V	•	•	•	•	•	•	•	
STM32L0x3 USB & LCD	Up to 192	Up to 20	Up to 6K	Down to 1.65V	•	•	•	•	•	•	•	Up to 4x52 or 8x48

Note 1: Low-power peripherals available in ultra-low-power modes
Note 2: PVD = Programmable voltage detector

STM32L0 ULTRA-LOW-POWER

- 33 DMIPS
- Dynamic run mode down to 49 µA/MHz (with external DC/DC) and 76 µA/MHz (with LDO)
- Stop mode with RAM + LTC (low-power time clock): 420 nA

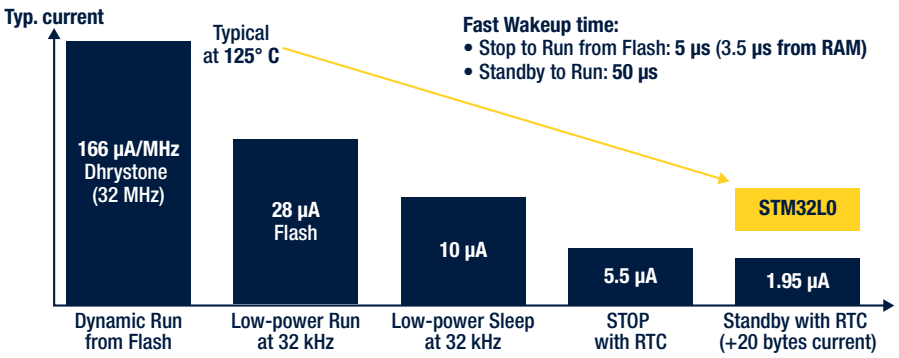
ULPMark™ An EEMBC Benchmark

ULPMark-CP™ 244

ULPMark-PP™ 95

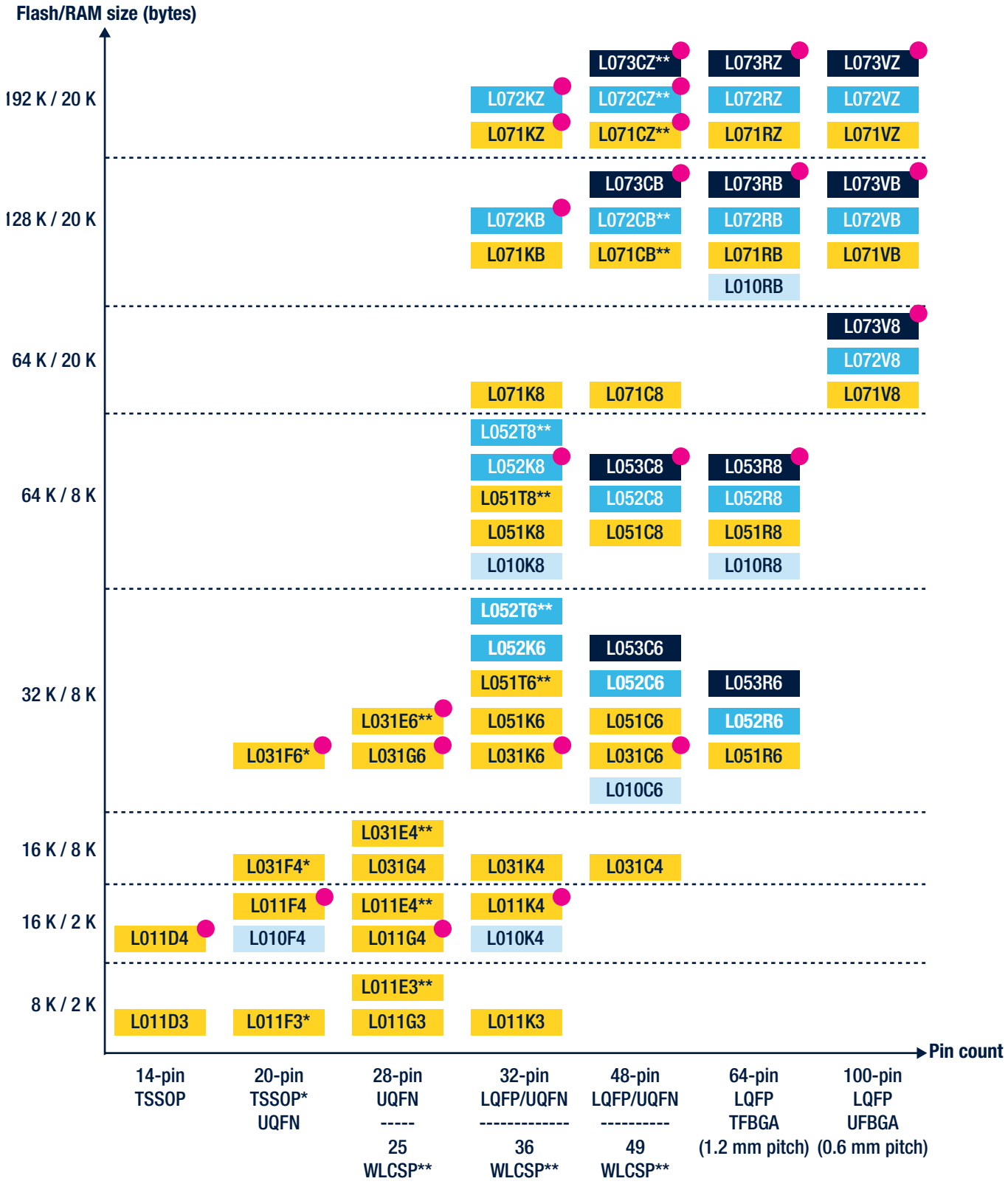
CORE MARK® An EEMBC Benchmark

75



www.st.com/stm32l0

A WIDE PORTFOLIO IN FULL PRODUCTION



Legend

- STM32L0x0: Value line
- STM32L0x1: Access line
- STM32L0x2: USB 2.0 FS + Advanced analog and peripherals
- STM32L0x3: STM32L0x2 + LCD
- 128-bit AES hardware encryption

STM32L1 series

The legacy STM32 Ultra low power family

A MARKET-PROVEN SOLUTION

STM32L1 MCU Series - 32-bit Arm® Cortex®-M3

- Reset POR/PDR
- 2x watchdogs
- Hardware CRC
- Internal RC
- Crystal oscillators
- PLL
- RTC calendar
- 16- and 32-bit timers
- 1x12-bit ADC
- Temperature sensor
- Multiple-channel DMA
- Single-wire debug
- Unique ID
- USB 2.0 (with internal 48 MHz PLL)

Product line	Flash (Kbytes)	RAM	EE PROM (Kbytes)	Memory I/F	Op-Amp	Comp.	Temp. Sensor	Capacitive Touch	Segment LCD Driver	AES 128-bit
STM32L100 Value line	32 to 256	4 to 16	2						Up to 8 x 28	
STM32L151 STM32L152	32 to 512	16 to 80	4 to 16	SDIO FSMC	•	•	•	•	Up to 8 x 40	
STM32L162	256 to 512	32 to 80	8 to 16	SDIO FSMC	•	•	•	•	Up to 8 x 28	•

STM32L1 ULTRA-LOW-POWER

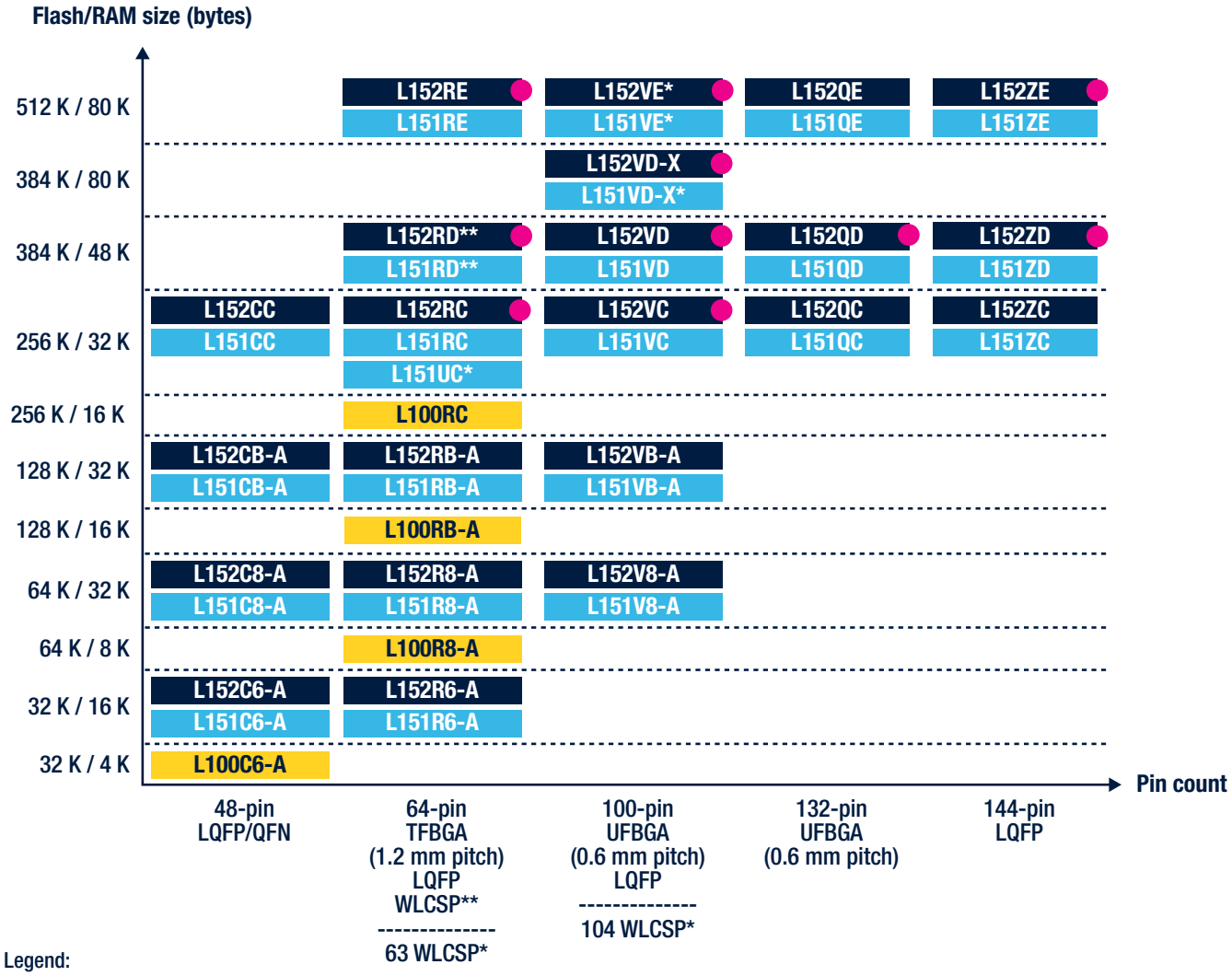
- Arm® Cortex®-M3+ at 32 MHz, 33 DMIPS
- Dynamic run mode: down to 177 µA/MHz
- Stop with Full RAM retention 435 nA (1.3 µA with RTC)
- Standby mode + RTC: 900 nA with backup registers
- Standby mode: 280 nA with backup registers
- Dual-bank Flash memory and True embedded EEPROM
- Operates at up to 105 °C

ULPMark™ An EEMBC Benchmark — ULPMark-CP™ 155

COREMARK® An EEMBC Benchmark — 92.4

www.st.com/stm32l1

A WIDE, FULLY-DEPLOYED PORTFOLIO



Legend:

- STM32L100: Value line
- STM32L151: USB 2.0 FS + Advanced analog and peripherals
- STM32L152: STM32L151 + LCD
- STM32L162: STM32L152 + 128-bit AES

STM32L4 series

STM32™ ultra-low-power at 100 DMIPS with DSP and FPU

SUCCESSFULLY MEET ALL CHALLENGES

STM32L4 MCU Series - 32-bit Arm® Cortex®-M4 (DSP + FPU) - 80 MHz

- ART Accelerator™
- USART, SPI, I²C
- Quad-SPI
- 16- and 32-bit timers
- SAI + audio PLL
- SWP
- 2x CAN
- 2x 12-bit DACs
- Temperature sensor
- Low voltage 1.71 to 3.6 V
- VBAT mode
- Unique ID
- Capacitive touch sensing
- AES-128/256* and SHA-256**

Product line	Flash (KB)	RAM (KB)	Memo - ry I/F FSMC	Op-Amp	CAN	Sigma Delta Interface	12-bit ADC 5 Msps 16-bit HW oversampling	DAC	SAI	USB2.0 OTG	USB Device	Segment LCD driver	Chrom-ART Accelerator™
STM32L4x6 - USB OTG + Segment LCD Lines													
STM32L496**	512 to 1024	320	•	2	2	8x ch	3	2	2	•		Up to 8x40	•
STM32L476*	256 to 1024	128	•	2	1	8x ch	3	2	2	•		Up to 8x40	
STM32L4x5 - USB OTG lines													
STM32L475	256 to 1024	128	•	2	1	8x ch	3	2	2	•			
STM32L4x3 - USB Device + Segment LCD lines													
STM32L433*	128 to 256	64		1	1		1	2	1		•	Up to 8x40	
STM32L4x2 - USB Device lines													
STM32L452*	256 to 512	160		1	1	4x ch	1	1	1		•		
STM32L432*	128 to 256	64		1	1		1	2	1		•		
STM32L412*	64 to 128	40		1			2				•		
STM32L4x1 - Access lines													
STM32L471	512 to 1024	128	•	2	1	8x ch	3	2	2				
STM32L451	256 to 512	160		1	1	4x ch	1	1	1				
STM32L431	128 to 256	64		1	1		1	2	1				

Note: * HW crypto/hash functions are available on STM32L486, STM32L443, STM32L462, STM32L442 and STM32L422 - ** on STM32L4A6

STM32L4 ULTRA-LOW-POWER

- Up to 80 MHz/ 100 DMIPS with Chrom-ART Accelerator™
- Dynamic run mode at 28 µA/MHz
- Down to 450 nA with 32 kHz RTC + 16 Kbytes of RAM + I/Os
- Down to 200 nA with 32 kHz RTC or 8 nA without RTC
- Operates at up to 125 °C

ULPMark™ An EEMBC Benchmark

ULPMark-CP™ 447

COREMARK® An EEMBC Benchmark

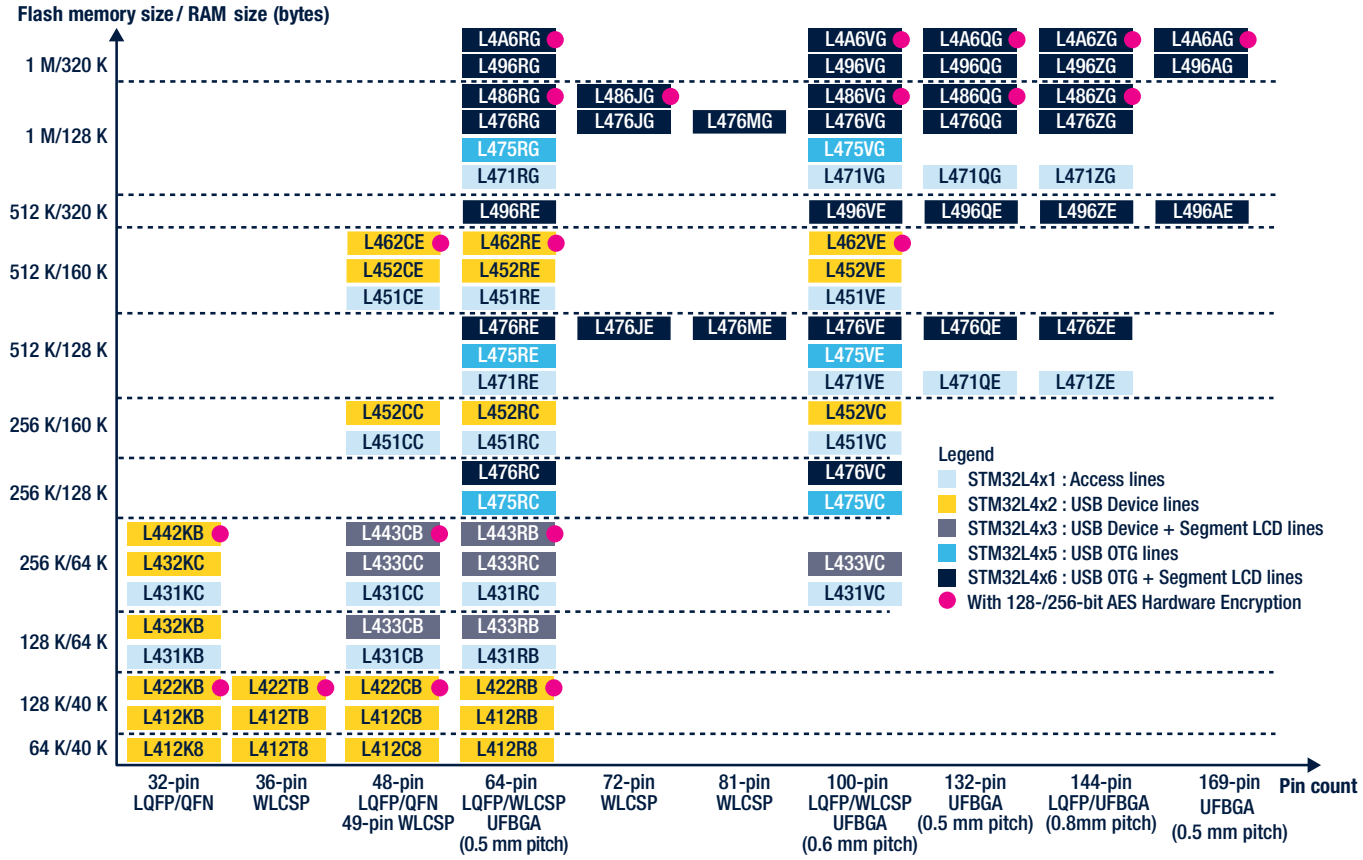
ULPMark-PP™ 167

273

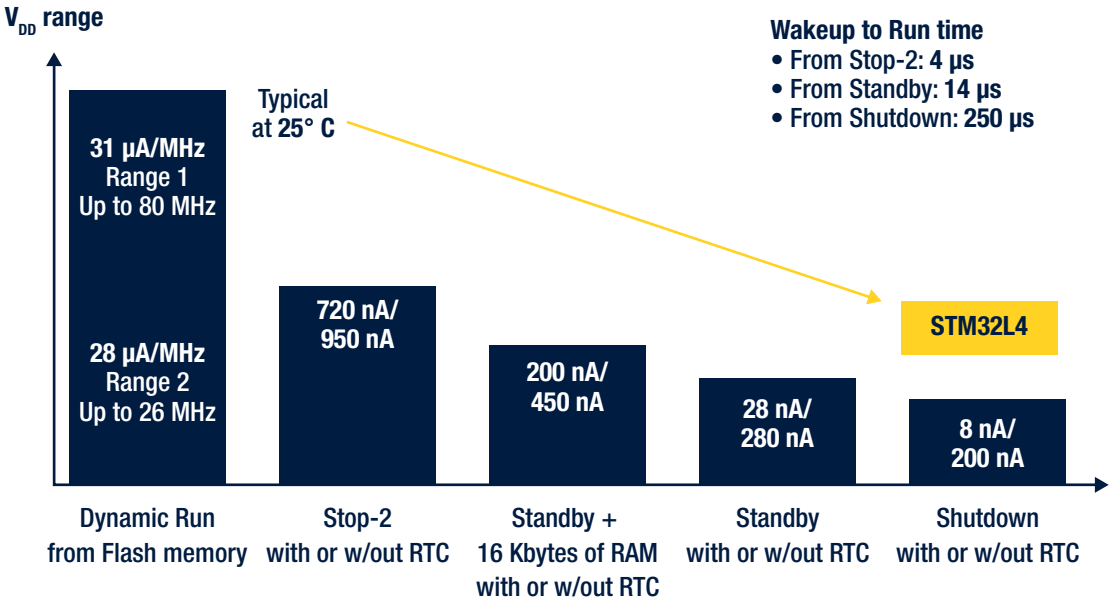
STM32L4 Online training

www.st.com/stm32l4-online-training

A WIDE PORTFOLIO IN FULL PRODUCTION



STM32L4 DEVICES OFFER THE LOWEST POWER CONSUMPTION VALUES ON THE MARKET (25 °C)



STM32L4+ series

Longer battery life and superior user experience

LONGER BATTERY LIFE AND SUPERIOR USER EXPERIENCE

STM32L4+ MCU Series - 32-bit Arm® Cortex®-M4 (DSP + FPU) - 120 MHz

- USART, SPI, I2C
- 2x Quad-SPI
- 16- and 32-bit timers
- SAI + audio PLL
- CAN
- Camera IF
- ART Accelerator™
- Chrom-ART Accelerator™
- 2x 12-bit DACs
- Temperature sensor
- Low voltage 1.71 to 3.6V
- VBAT mode
- Unique ID
- Capacitive touch-sensing

STM32L4+ Product line	Flash (KB)	RAM (KB)	Memory I/F	Op-Amp	Comp.	Sigma Delta Interface	12-bit ADC 5 Msps 16-bit HW oversampling	USB2.0 OTG	TFT Display Interface	*Chrom-GRC™	MIPI-DSI	AES 128-/256-bit
STM32L4P5/Q5												
STM32L4P5 USB OTG	512 to 1024	320	SDIO FSMC	2	2	4 ch	2	•				
STM32L4Q5 USB OTG & AES	1024	320	SDIO FSMC	2	2	4 ch	2	•				•
STM32L4R5/S5												
STM32L4R5 USB OTG	1024 to 2048	640	SDIO FSMC	2	2	8x ch	1	•				
STM32L4S5 USB OTG & AES	2048	640	SDIO FSMC	2	2	8x ch	1	•				•
STM32L4R7/S7												
STM32L4R7 USB OTG & TFT Interface	1024 to 2048	640	SDIO FSMC	2	2	8x ch	1	•	•	•		
STM32L4S7 USB OTG & TFT Interface & AES	2048	640	SDIO FSMC	2	2	8x ch	1	•	•	•		•
STM32L4R9/S9												
STM32L4R9 USB OTG & MIPI-DSI	1024 to 2048	640	SDIO FSMC	2	2	8x ch	1	•	•	•	•	
STM32L4S9 USB OTG & MIPI-DSI & AES	1024 to 2048	640	SDIO FSMC	2	2	8x ch	1	•	•	•	•	•

STM32L4+ ULTRA-LOW-POWER

- 233 ULPMark-CP score
- Chrom-GRC™ round display memory optimizer
- 20 nA in shutdown mode
- 2.5 µA in stop mode with full SRAM and peripheral states retention and with 4 µs wakeup time
- Down to 41 µA/MHz in active mode
- Superior graphic effects and fluid user interfaces thanks to ST's Chrom-ART Accelerator™
- Zero wait state execusion from internal Flash memory thanks to ST's ART-Accelerator™

ULPMark™ An EEMBC Benchmark — ULPMark-CP™ 285

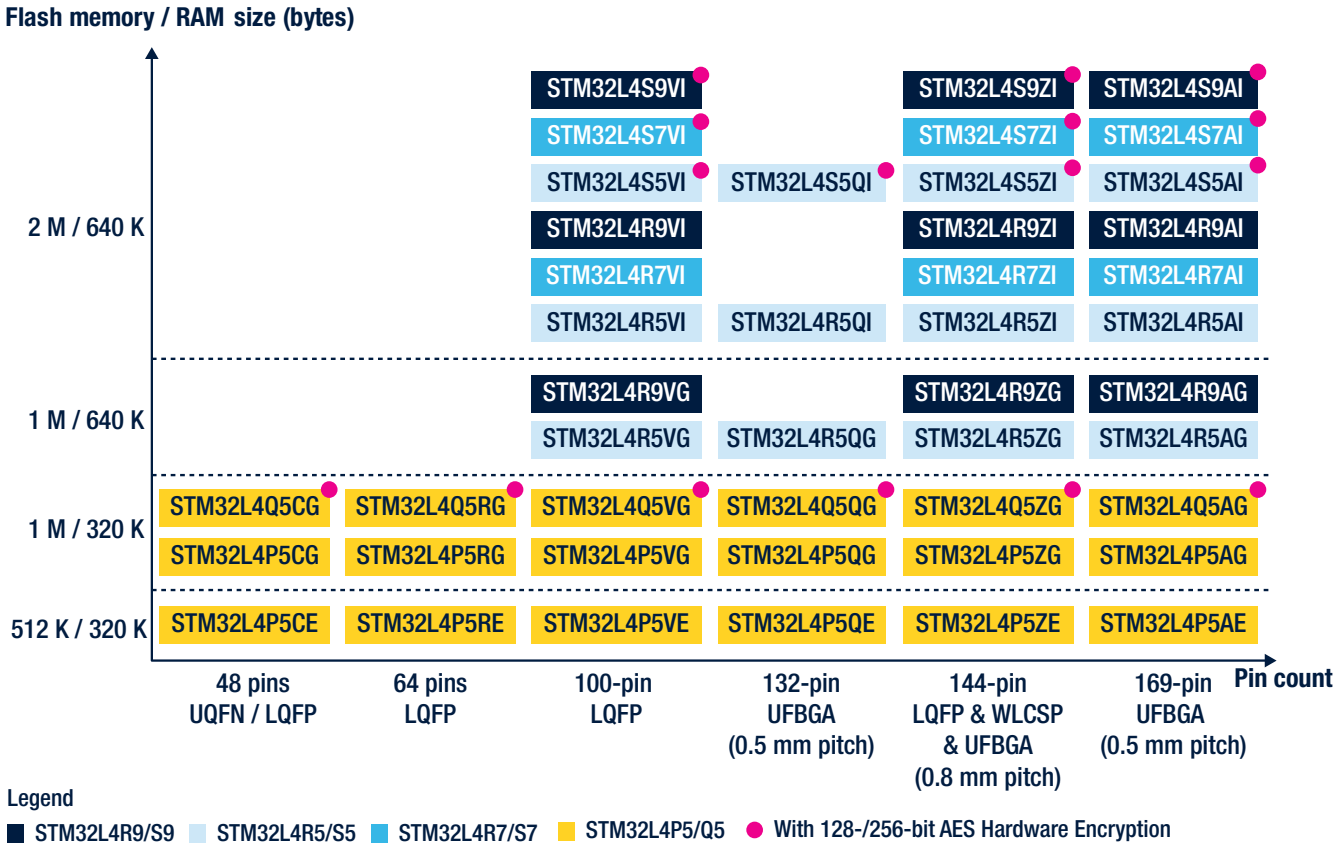
COREMARK® An EEMBC Benchmark — ULPMark-PP™ 60 409

STM32L4+ Online training

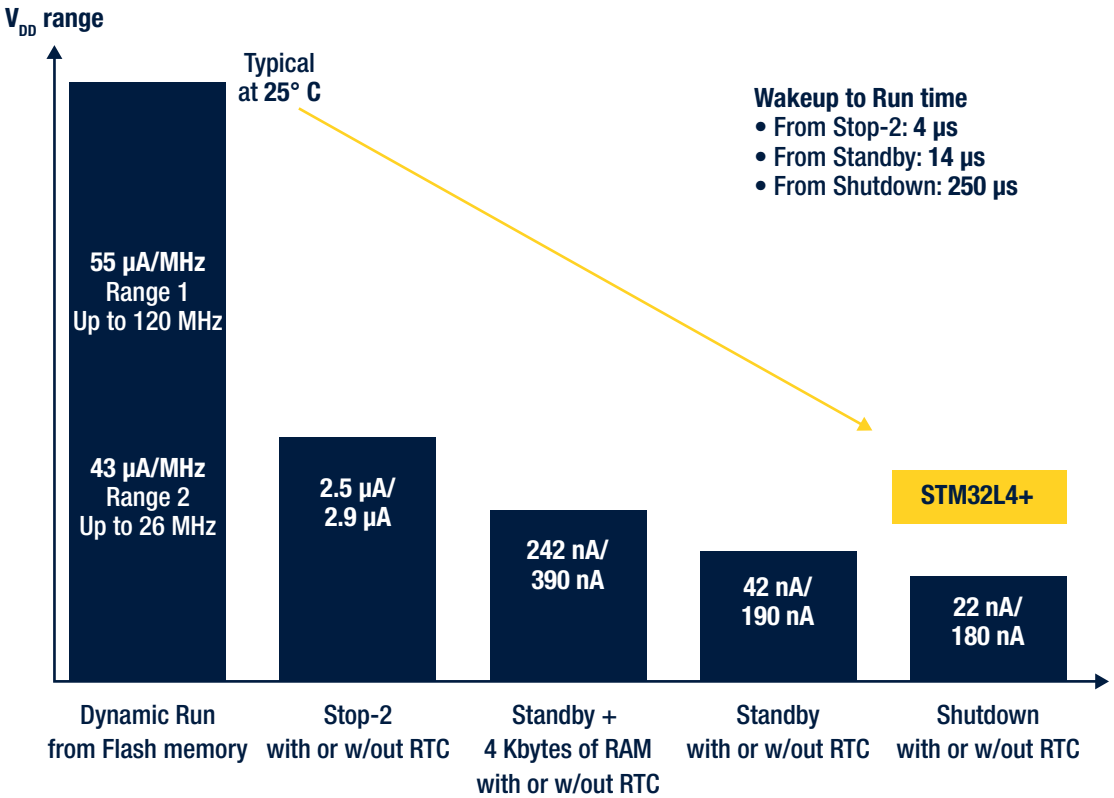
www.st.com/stm32l4plus-online-training

www.st.com/stm32l4-plus

A BRAND NEW PORTFOLIO IN FULL PRODUCTION



STM32L4+ DEVICES POWER CONSUMPTION



STM32L5 series

Excellence in ultra-low power with more security

EXCELLENCE IN ULTRA-LOW-POWER WITH MORE SECURITY

STM32L5 MCU Series - 32-bit Arm® Cortex®-M33 (TrustZone®+ DSP + FPU) - 110 MHz

• ART Accelerator™ • USART, SPI, I²C • Octo-SPI • 16 and 32-bit timers • SAI + audio PLL • SHA, TRNG • 2x 12-bit DAC • Temperature sensor • Low voltage 1.71V to 3.6V • Vbat Mode • Unique ID • Capacitive Touch sensing	Product line	FLASH (KB)	RAM (KB)	Memory I/F	2 x Op-Amp	2 x Comp	4ch / 2x Sigma Delta Interface	12- bit ADC 5 Msps 16 bit HW oversam - pling	USB2.0 Device XTAL-less USB Type-C and Power Delivery	CAN-FD	AES, PKA, OTFDEC 128/256-bit
	STM32L552 USB Device & CAN-FD	512 to 256	256	SDIO FSMC Octo SPI	•	•	•	2	•	•	
	STM32L562 USB Device & CAN-FD & AES	512	256	SDIO FSMC Octo SPI	•	•	•	2	•	•	•

STM32L5 ULTRA-LOW-POWER

- New Arm Cortex-M33 at 110 MHz performance: +20% versus Cortex-M4
- New ST ART Accelerator: working both on internal and external Flash (8 Kbytes of instruction cache)
- Embedded SMPS step down converter (optional)
- Flexible hardware and software secure isolations with TrustZone®
- 17 nA in shutdown mode
- 3 µA in stop mode with full SRAM and peripheral states retention and with 5 µs wake-up time
- Down to 62 µA/MHz in active mode
- 165 DMIPS

ULPMark™ An EEMBC Benchmark

ULPMark-CP™ 370

ULPMark-PP™ 54

CORE MARK® An EEMBC Benchmark

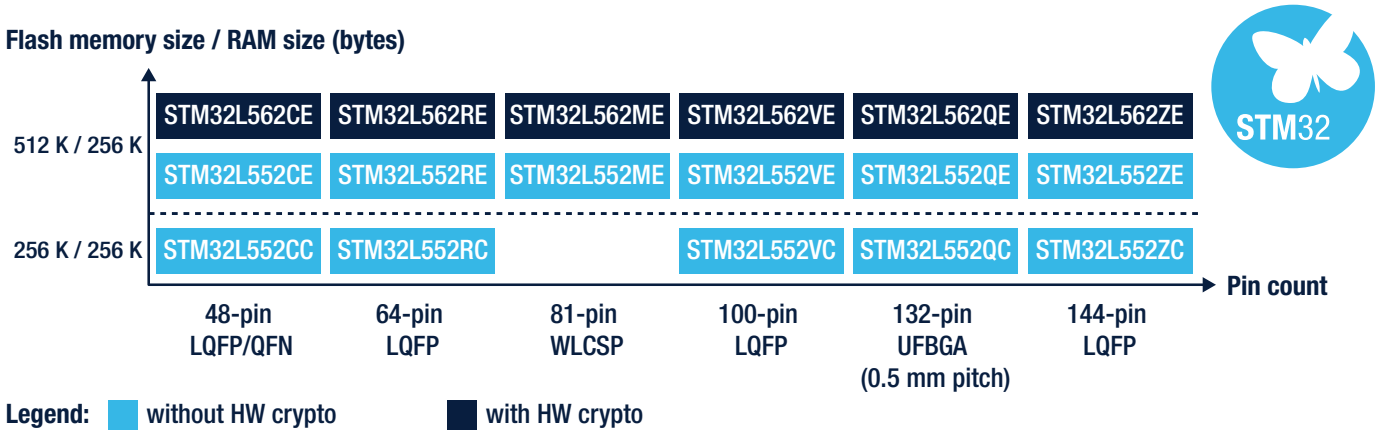
443

STM32L5 Online training

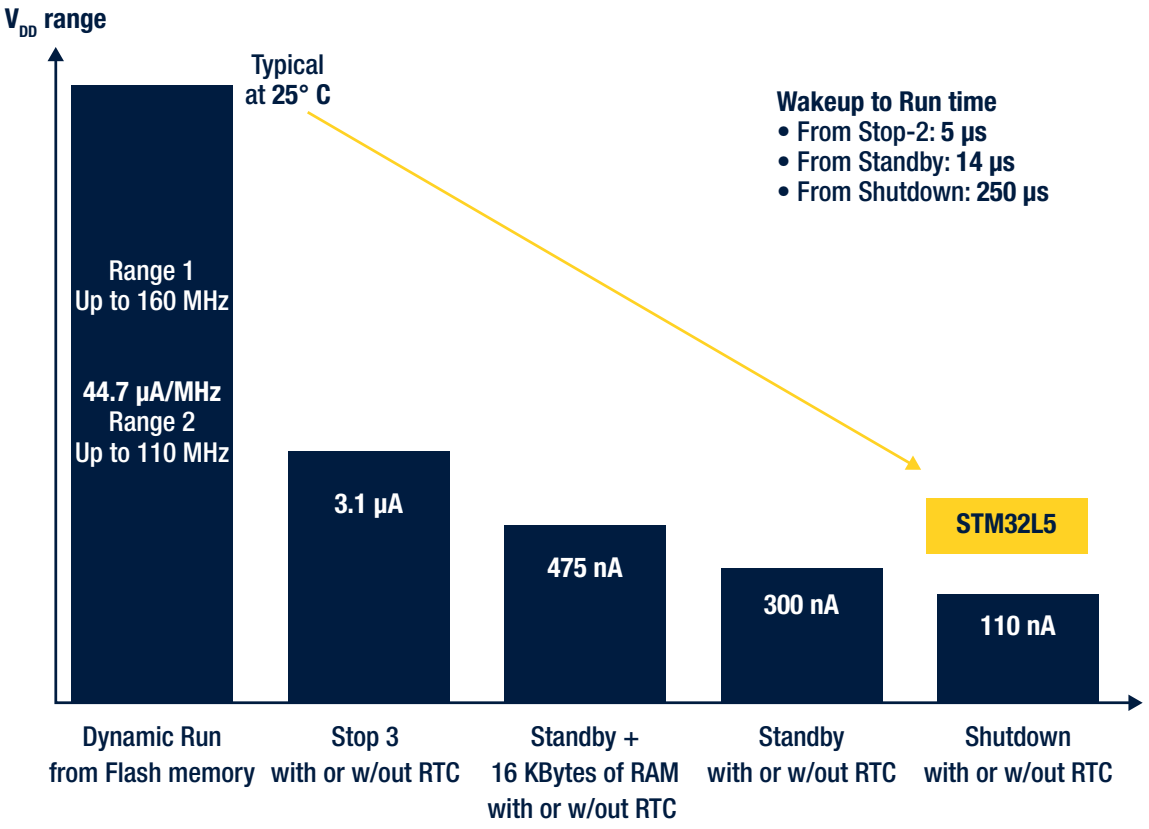
www.st.com/stm32l5-online-training

www.st.com/stm32l5

STM32L5 PORTFOLIO



STM32L5 DEVICES' POWER CONSUMPTION



STM32U5 series

The flagship of ultra-low power MCUs with advanced performance and security

EXCELLENCE IN ULTRA-LOW-POWER WITH MORE SECURITY

STM32U5 MCU Series - 32-bit Arm® Cortex®-M33 (TrustZone®+ DSP + FPU) - 160 MHz

• ART Accelerator™ • USART, SPI, I²C • 16 and 32-bit timers • SAI + audio PLL • LPDMA • SHA, TRNG • Chrom-ART Accelerator™ • Camera Interface • 2x 12-bit DAC • Temperature sensor • Low voltage 1.71V to 3.6V • V_{bat} Mode • Unique ID • Capacitive Touch sensing	Product line	FLASH (KB)	RAM (KB)	Memory I/F	2 x Op-Amp	2 x Comp	8ch / 4x MDF/ ADF	1 x 14-bit 1 x 12-bit ADC	USB-C FS Dual Role	CAN-FD	AES 128/ 256-bit	PKA	OTFDEC On the Fly Decryption
	STM32U575	2048 to 1024	786	SDIO FSMC 2x Octo SPI	•	•	•	•	•	•			
	STM32U585	2048	786	SDIO FSMC 2x Octo SPI	•	•	•	•	•	•	•	•	•

STM32U5 ULTRA-LOW-POWER

- Arm Cortex-M33 running at 160 MHz
- New ST ART Accelerator: working both on internal and external Flash (8 Kbytes of instruction cache)
- Embedded SMPS step down converter (optional)
- Flexible hardware and software secure isolations with TrustZone®
- PSA Certified level 3 and SESIP (Security Evaluation Standard for IoT Platforms) level 3 certified
- 160 nA in shutdown mode
- Down to 19 µA/MHz in active mode
- 240 DMIPS

ULPMark™ An EEMBC Benchmark

ULPMark-CP™ 553

ULPMark-PP™ 149

CORE MARK® An EEMBC Benchmark

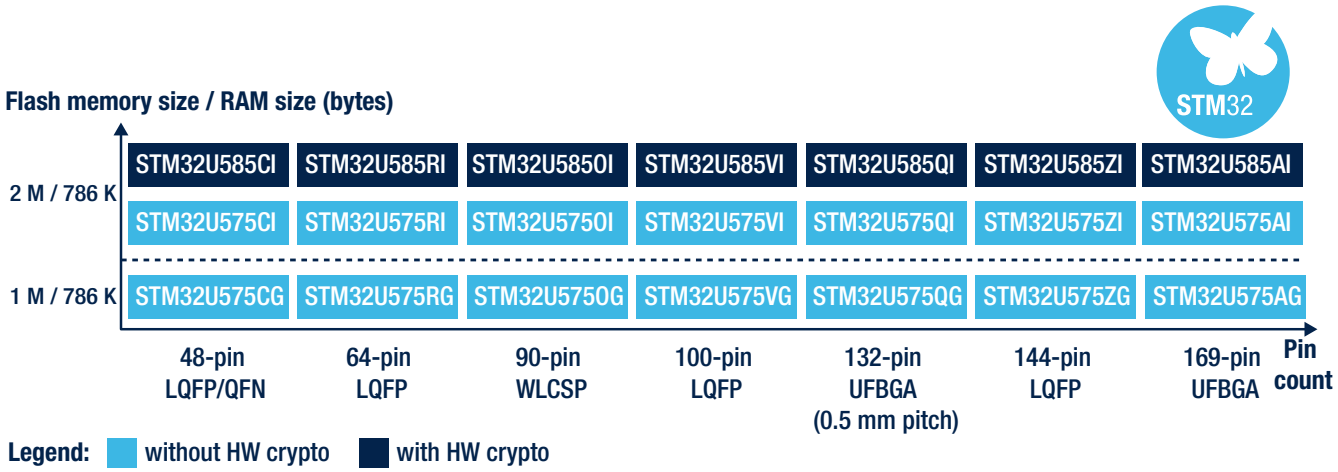
651

STM32U5 Online training

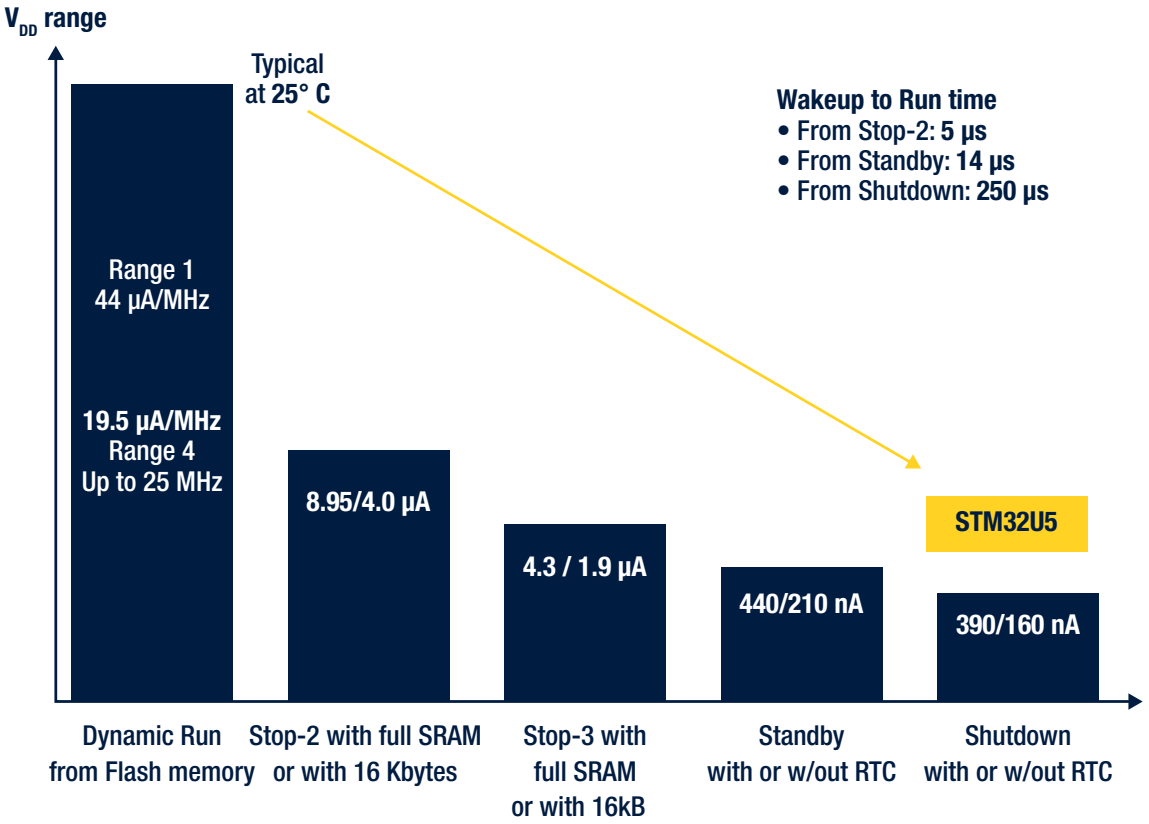
www.st.com/stm32u5-online-training

www.st.com/stm32u5

STM32U5 PORTFOLIO



STM32U5 DEVICES' POWER CONSUMPTION



STM32 ecosystem

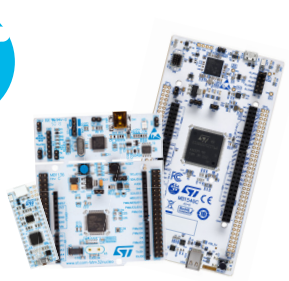
STM32 HARDWARE TOOLS

www.st.com/stm32hardwaretools

Various types of development boards enable you to get started with STM32 products

- STM32 Nucleo boards provide an affordable and flexible way for anyone to try out new ideas and build prototypes with a wide choice of specialized expansion boards.
- The Discovery kits enable users to seamlessly explore key low-power features of STM32 ultra-low-power products, while the evaluation boards let you evaluate all MCU functions and peripherals.
- All these development boards include an integrated debugger/programmer as well as a comprehensive software library with examples that help developers take advantage of STM32 capabilities.

STM32 Nucleo boards

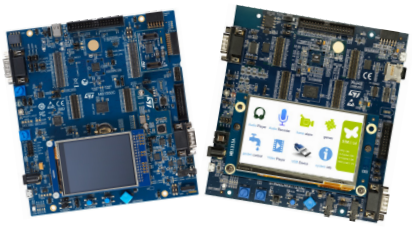


Flexible prototyping

Discovery kits

Creative demos

Evaluation boards



Full-feature evaluation

STM32 DISCOVERY KIT IOT NODE

The Discovery kits for IoT node allows users to develop power-efficient systems with direct connection to cloud servers.

This Discovery kit enables a wide diversity of applications by exploiting low-power communication (BLE, SubGHz, NFC) and WiFi, together with a complete collection of motion, gesture and environmental sensors.

The X-CUBE-CLD-GEN software package provides all the components needed to prototype end-to-end IoT solutions, including pre-integrated full application examples.

B-L475E-IOT01A

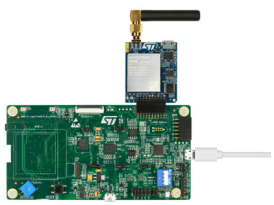
B-U585I-IOT02A

STM32 CELLULAR-TO-CLOUD DISCOVERY PACK

The P-L496G-CELL02 pack combines an STM32L496 Discovery board and a STMod+ Cellular add-on board, based on Quectel's BG96 modem for LTE Cat M1/NB1 + 2G networks.

Software includes an embedded JavaScript engine running on STM32 for live coding, and an X-CUBE-CLD-GEN STM32Cube expansion package.

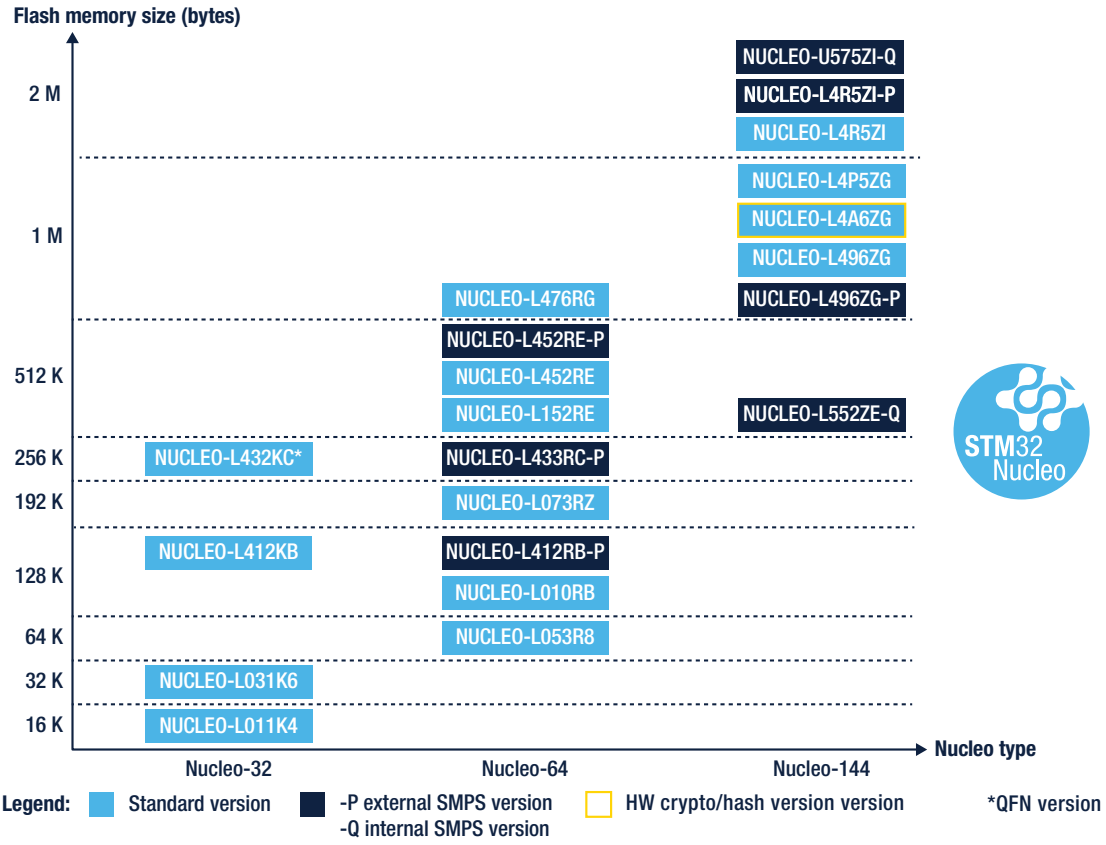
This Cellular-to-Cloud Discovery Pack also includes an ST eSIM with a complimentary trial plan from a telecom partner, while various partner Cloud services can be evaluated by mass-market developers.



P-L496G-CELL02

STM32 NUCLEO

- Open platform with one MCU and integrated debugger/programmer
- Wide choice of connectors for unlimited extension capabilities :
  - Arduino Uno Rev3 connectors on Nucleo-64 and Nucleo-144, Arduino Nano on Nucleo-32
  - ST Zio connectors to access a wider range of peripherals on Nucleo-144
  - ST Morpho connectors for direct access to all MCU I/Os on Nucleo-64 and Nucleo-144
- Support for multiple IDEs and Arm® mbed™ online tools



STM32L WIRELESS CONNECTIVITY SOLUTIONS: LoRaWAN™

www.st.com/stm32-lrwan

As a strong player on LPWAN, ST offers up to 3 affordable and easy-touse sets of hardware tools dedicated to the evaluation and development of LoRa® solutions which combined with the LoRaWAN software expansion package for STM32Cube (I-CUBELRWAN) is the quickest way to build a LoRaWAN end-node device. Check out the STM32 LoRa® Discovery kit (B-L072Z-LRWAN1), the STM32 expansion board (I-NUCLEO-LRWAN1) and the STM32 Nucleo packs (P-NUCLEO-LRWAN2/3).

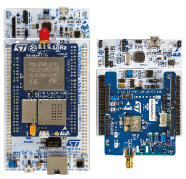
STM32 Nucleo expansion boards

www.st.com/x-nucleo

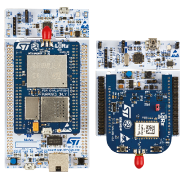
STM32 Nucleo development boards can easily be expanded through a variety of addon boards. These expansion boards open the door to any type of application leveraging the appropriate mix of performance/peripherals/power within the comprehensive STM32 family.

Each expansion board integrates the necessary components to implement specialized features of a chosen application, and comes with complementary STM32 software modules.

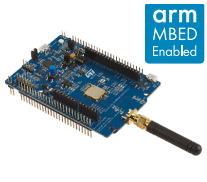
STM32 Nucleo expansion boards from ST and third parties



STM32 NUCLEO PACK:
END-NODE + GATEWAY
P/N: P-NUCLEO-LRWAN2
EU/US/APAC (868/915/923 MHZ)
(ST and USI®)



STM32 NUCLEO PACK:
END-NODE + GATEWAY
P/N: P-NUCLEO-LRWAN3
CN (433/470 MHZ)
(ST and RisingHF®)



DISCOVERY KIT
P/N: B-L072Z-LRWAN1
(ST and Murata®)

EXPANSION BOARD
P/N: I-NUCLEO-LRWAN1
(ST and USI®)

STM32 SOFTWARE DEVELOPMENT TOOLS

www.st.com/stm32softwaretools

STM32CubeMX

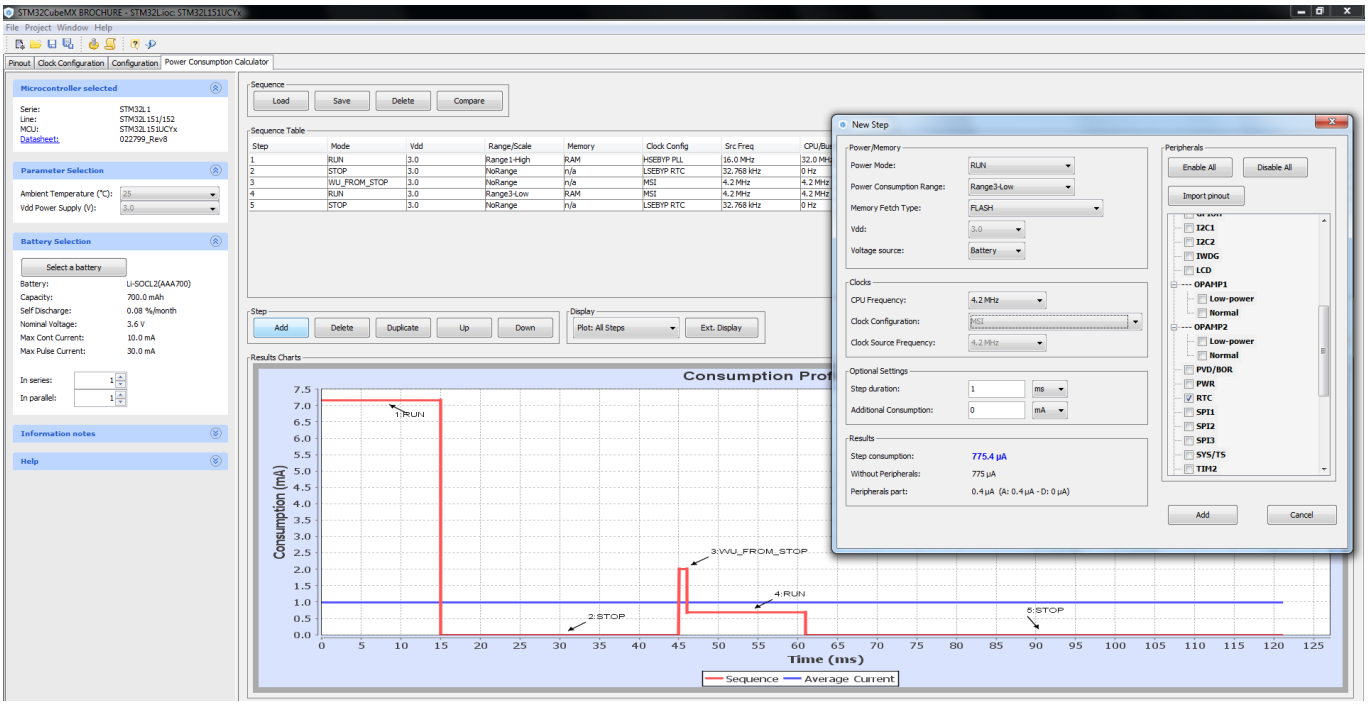
IDEs

STM32CubeProgrammer
STM32CubeMonitor

Configure and generate code | Compile and debug | Monitor & program

Specific focus on STM32L series

Build your own chip configuration, select the battery type or configure your own, define a sequence of steps representing your application, and use the STM32CubeMX Power Consumption Calculator wizard to determine power consumption and battery life results.

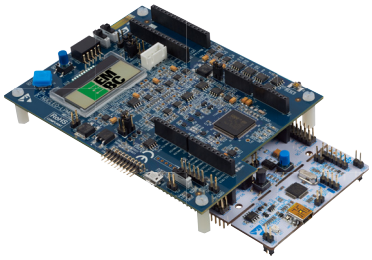


STM32 Power Shield: EEMBC-approved power-monitoring technology for energy-critical embedded development

To check the power consumption of embedded designs accurately, the STM32 Power shield (X-NUCLEO-LPM01A) provides developers an affordable tool with an ideal measurement range for ultra-low-power devices, such as IoT endpoints. This STM32 tool features voltage supply to the target down to 1.8V, measures dynamic current from 100nA to 50mA, and directly computes EEMBC ULPMark scores.

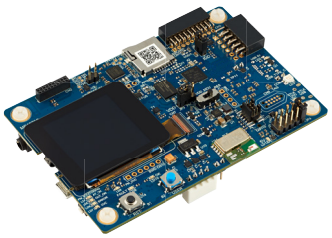
The STM32L562-DK discovery kit embeds an Energy Meter to monitor dynamic currents from 300nA to 150mA. Together with the STM32CubeMonitor-Power graphical application (STM32CubeMonPwr), users will be able to visualize the data captured to make better-informed decisions.

STM32 Power shield



X-NUCLEO-LPM01A

STM32 Discovery kit



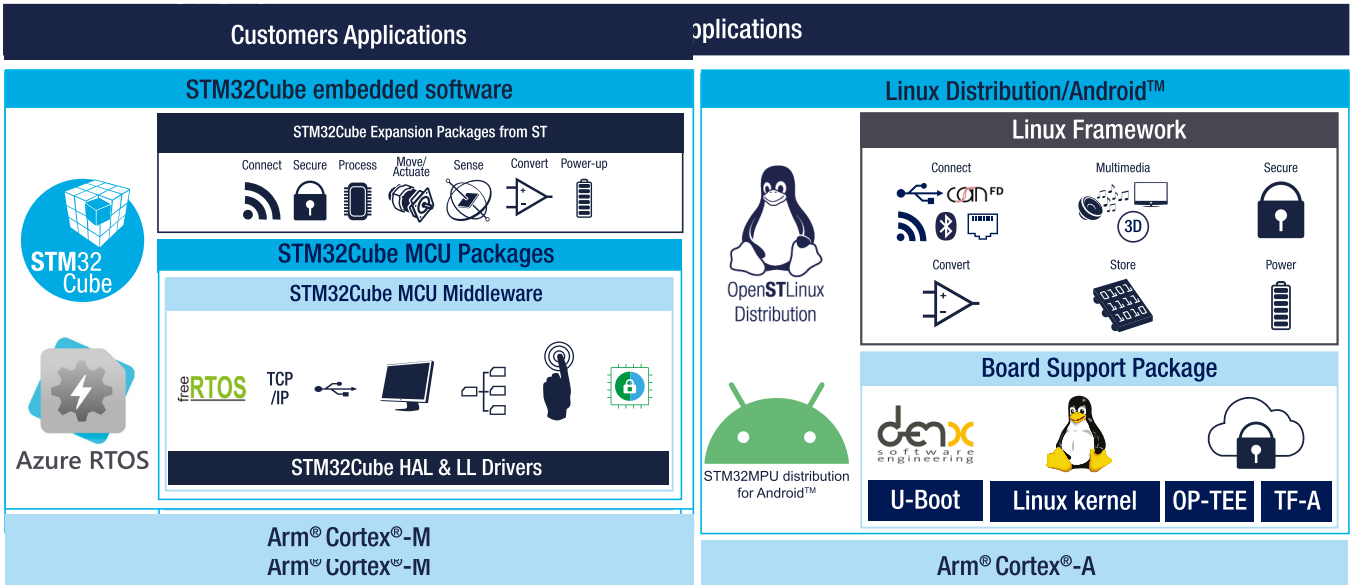
STM32L562E-DK

STM32 CubeMonitor

STM32CubeMonPwr

STM32 EMBEDDED SOFTWARE

www.st.com/stm32embeddedsoftware



www.st.com/stm32embeddedsoftware

Specific offers for STM32L series

Product	Availability					
	STM32L0	STM32L1	STM32L4	STM32L4+	STM32L5	STM32U5
STM32Snippets	•					
Standard Peripheral Library		•				
STM32Cube HAL	•	•	•	•	•	•
STM32Cube LL	•	•	•	•	•	•

User recommendations

STM32Cube HAL is the best answer when a high level of portability is required. STM32Cube LL APIs allow user control down to the register level, thus minimizing software overhead and allowing power consumption optimization. Both are available on all STM32L devices (part numbers: STM32CubeL0, STM32CubeL1, STM32CubeL4, STM32CubeL5, STM32CubeU5).

STM32L1 users:

- Standard Peripheral Library ensures a good portability level between all STM32L1 devices (part number: STSW-STM32077). STM32Cube is still highly recommended for new designs.

STM32L0 users:

- For STM32L0 users, STM32Snippets allow to control the hardware with minimal software overhead therefore optimizing power consumption (part number: STM32SnippetsL0). STM32Cube is still highly recommended for new designs.

CERTIFICATIONS

ST is fully committed at certifying its solutions by independent recognized authority.

Available now

CERTIFICATIONS			EVALUATIONS
ARM PSA • **Level 1** STM32L4 STM32L5 • **Level 2** STM32L5 (TFM) • **API Compliant** STM32L5 (TFM)	**COMMON CRITERIA** • **CC EAL5+** STSAFE-A110 STSAFE-TPM	**SESIP** • **Level 1** STM32L4 (SBSFU) • **Level 3** STM32L4 (SBSFU)	**PCI** • **Point of Sale application** STM32L4

STM32 Trust

Based on PSA and SESIP certifications, STM32Trust helps designers meet the requirements of their pre-defined security assurance levels

www.st.com/stm32trust

life.augmented

MIX
Paper from responsible sources
FSC® C003379
www.fsc.org

Order code: BR2207STM32ULP

For more information on ST products and solutions, visit www.st.com

life.augmented