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# STM32L0 series

# Ultra-low-power MCUs for entry-level applications


“**If only**
My metering system could monitor my energy consumption in an accurate and reliable way over an extended time period.”

## This is where we come in

Reliable and energy-efficient, discover the STM32L0 MCU.

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# 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 3,224 CoreMark score

- **Embedded MPU** — 32- and 64-bit microprocessors





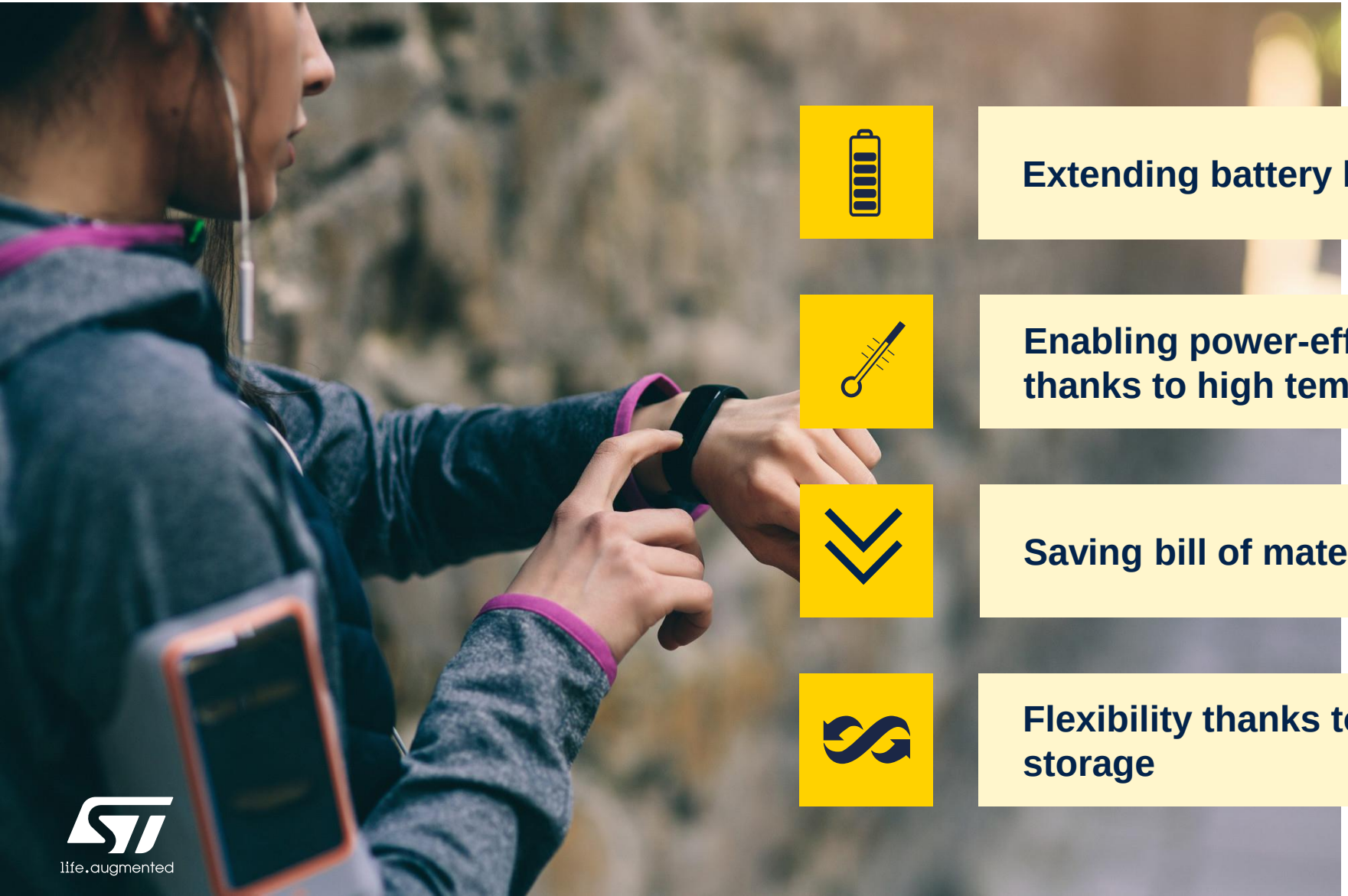
**Enabling edge AI solutions**

**Scalable security**

MPU portfolio

MCU portfolio

# STM32L0 reduces power consumption in entry-level IoT devices



- **Extending battery lifetime**
- **Enabling power-efficient and robust designs thanks to high temperature stability**
- **Saving bill of material costs**
- **Flexibility thanks to innovative memory storage**

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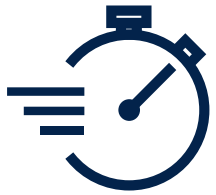
# Ultra-low-power modes

## Highly efficient power consumption for an entry-level product

ULPBENCH™ An EEMBC Benchmark **244**

**Typical current at 25°C**

| | | |
|---|---|---|
| **Standby** | **230 nA** | |
| **Stop** | **340 nA** | (RAM retention) |
| **Stop** | **670 nA** | (RAM + RTC) |
| **LP sleep** | **2.5 µA** | @32KHz |
| **Sleep** | **25 µA/Mhz** | |
| **Run** | **76 µA/MHz[1]** | From flash - full speed 4 MHz |
| **Run** | **115 µA/MHz[2]** | From flash - full speed 32 MHz |



**Fast wake-up**
3.5 µs from stop

**RTC** 200 nA with calendar and alarms

Notes: Down to 49 µA/MHz with external DC/DC at 3,3 V
Down to 74 µA/MHz with external DC/DC at 3,3 V

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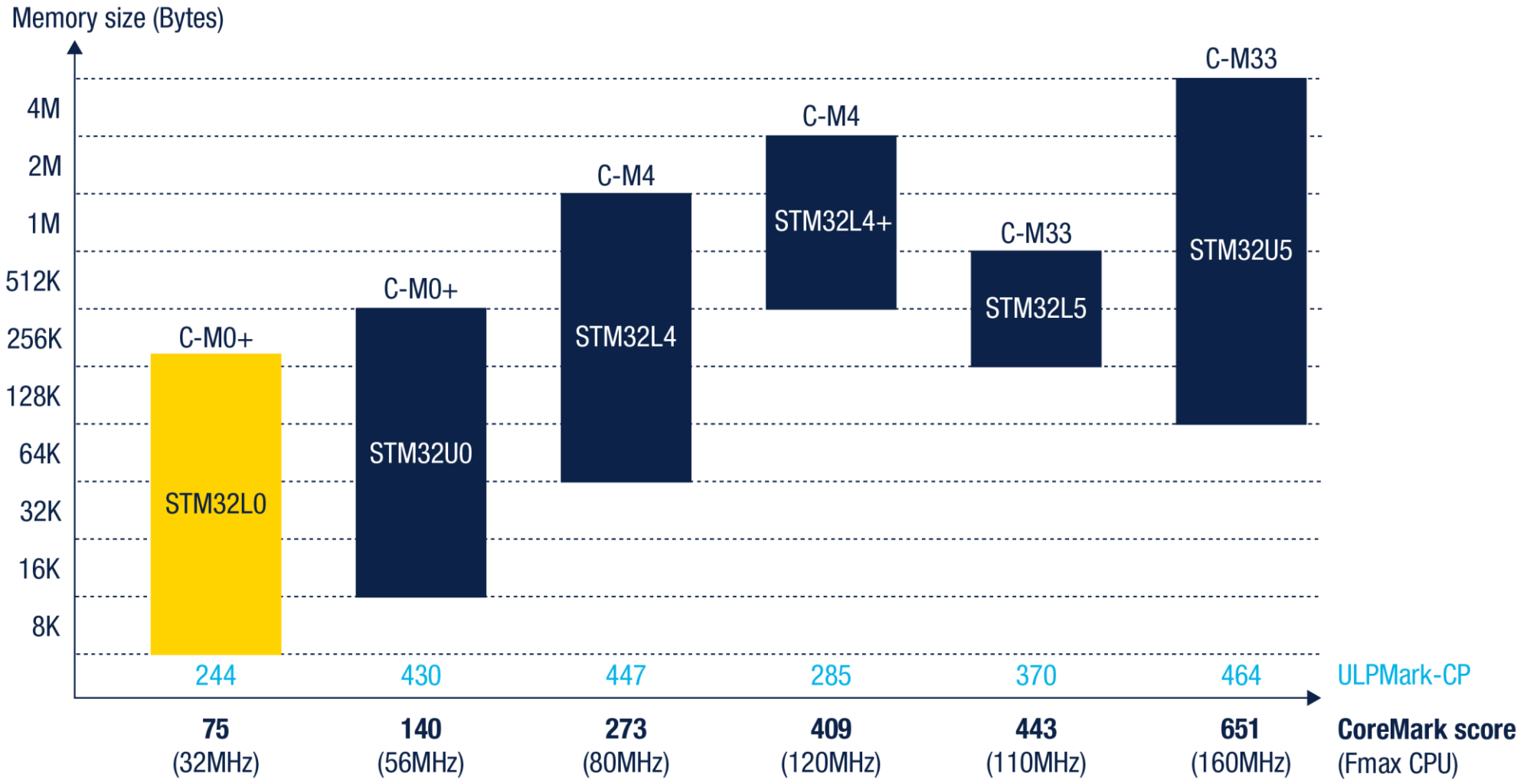
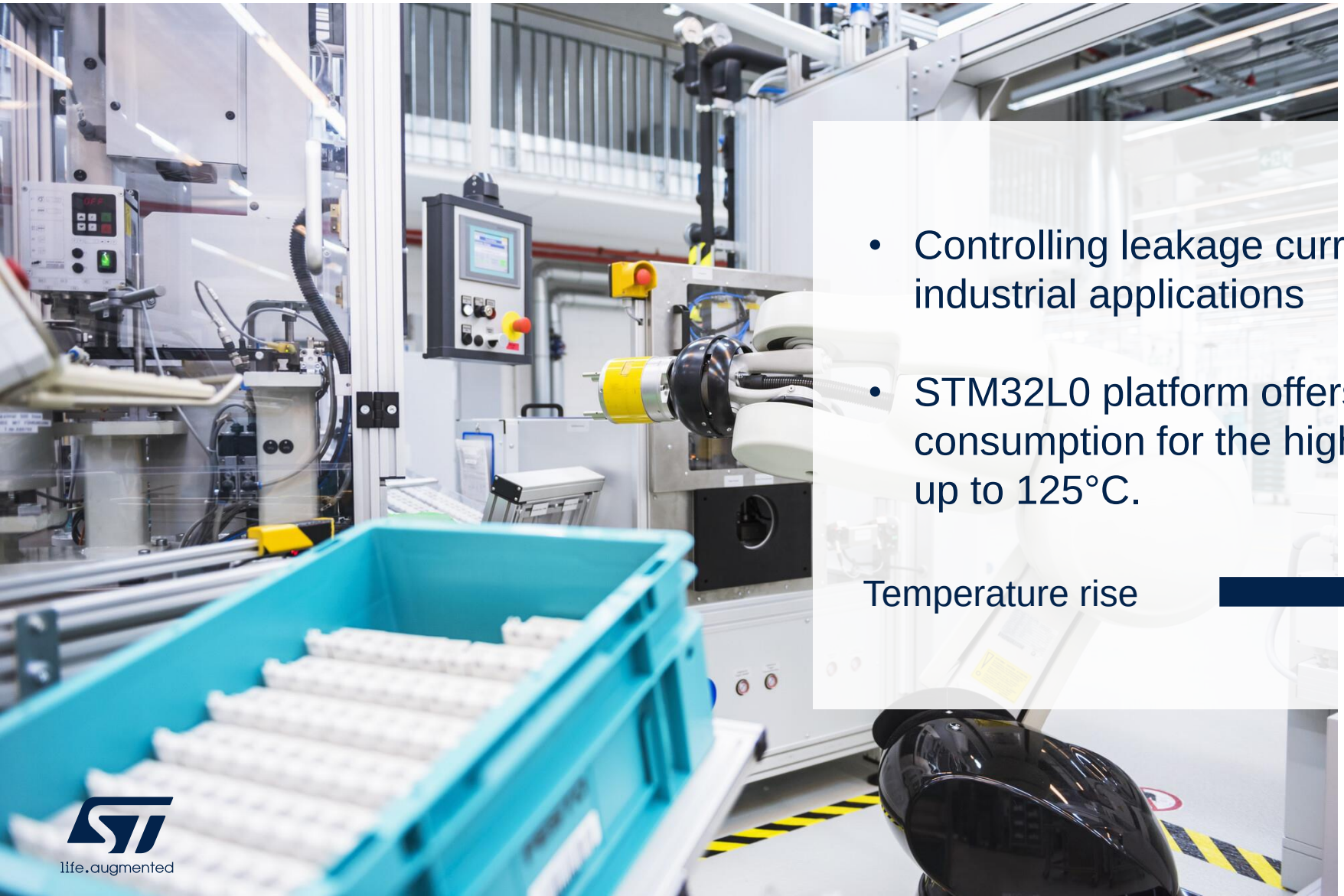
# STM32L0 ultra-low-power benchmark



# STM32L0 operating range leader at 125°c



- Controlling leakage current is essential in industrial applications
- STM32L0 platform offers the lowest power consumption for the highest temperature range, up to 125°C.

Temperature rise → Stable power consumption

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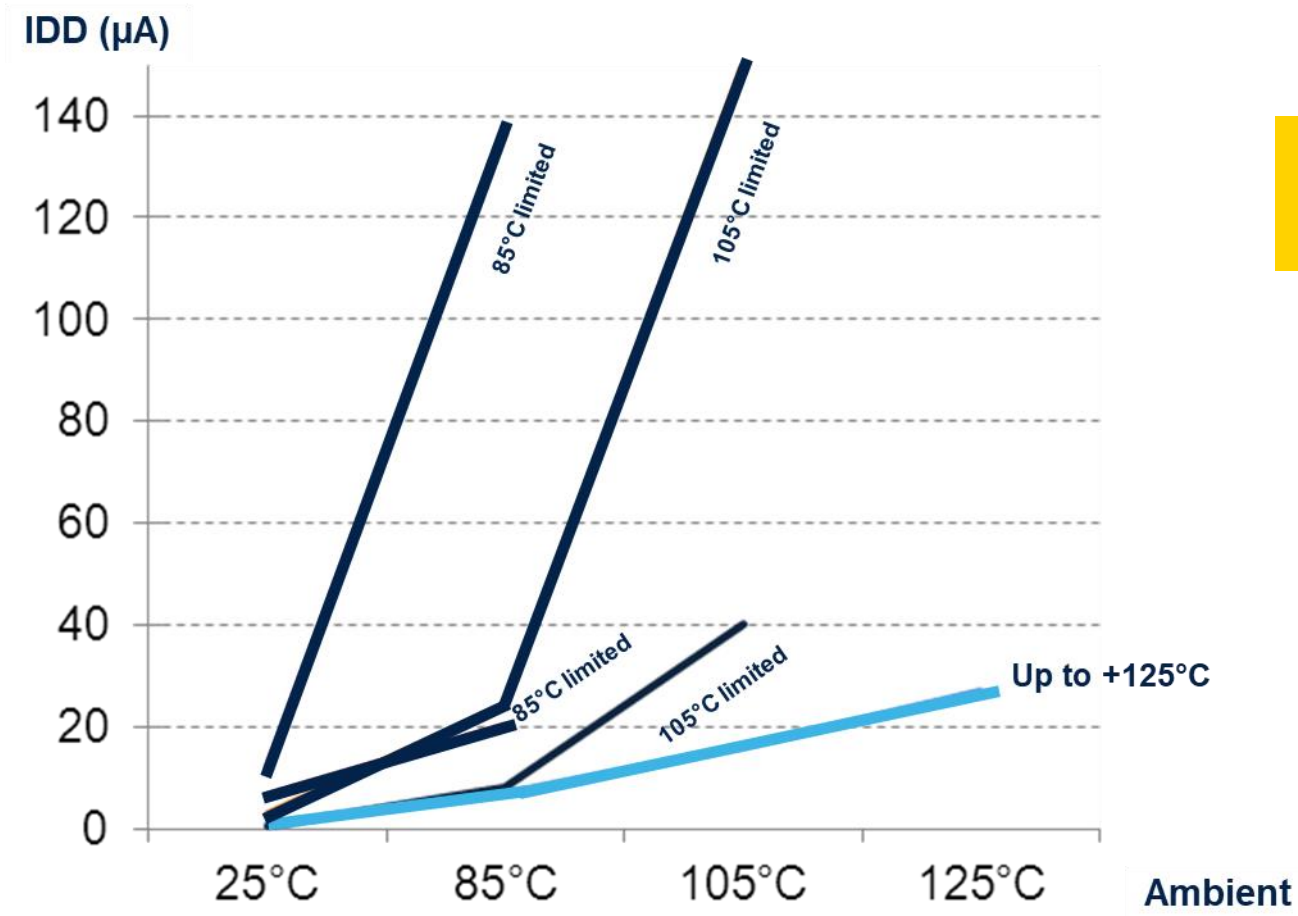
# STM32L0 operating range leader at 125°c




Note: Value based on lowest power mode with full RAM retention at VDD 3.0V.
All datasheets give same value for -40°C/+25°C temperature range.

Maximum current value at lowest power mode VS temperature capability

STM32L0 MCU

Competition

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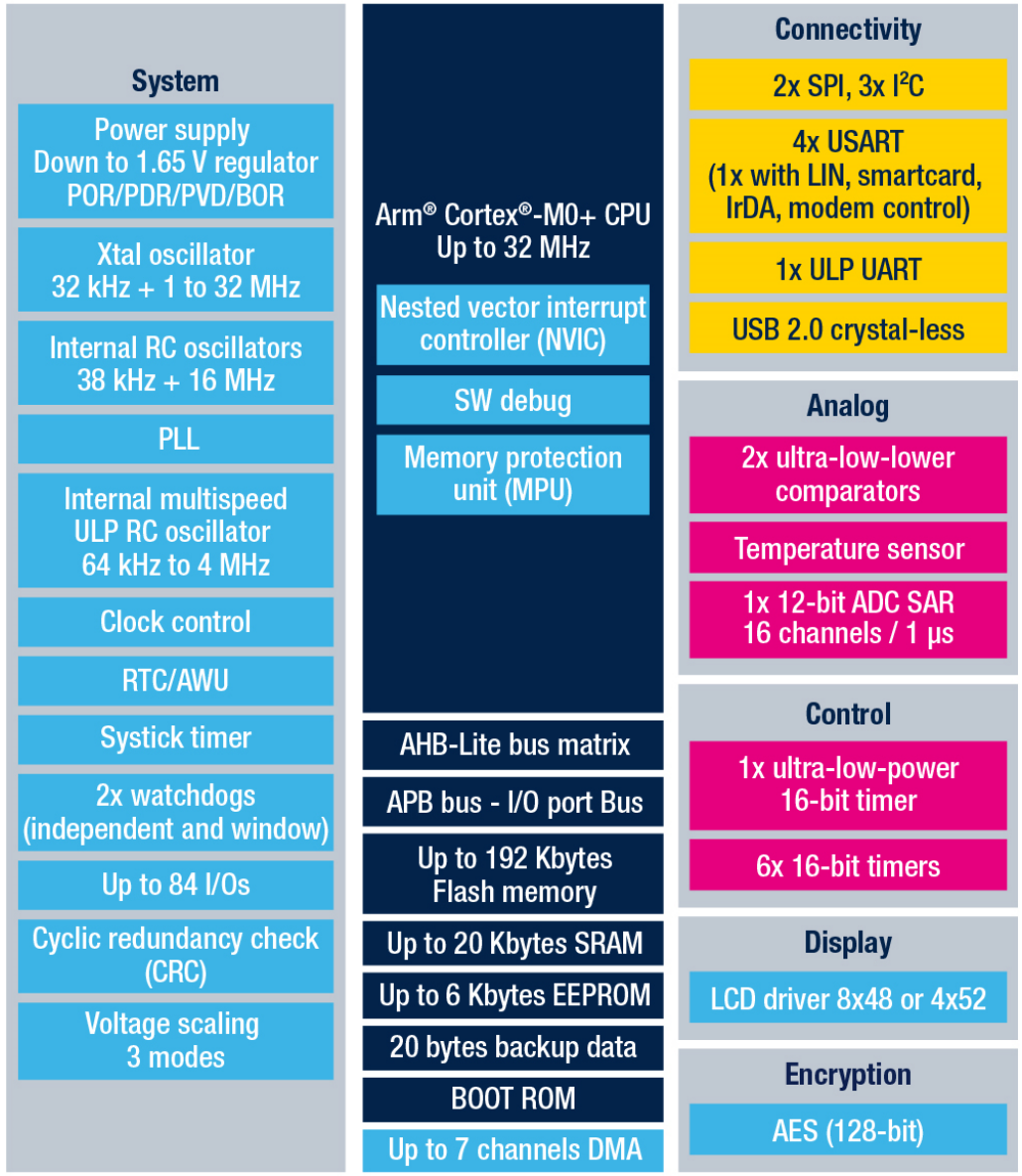
# STM32L0 save bill of material cost




**Connectivity**

**Analog and Control**

# Moving to the analog world in a fast & efficient way

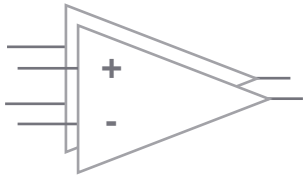
## ADC


### High resolution capable
Up to **16-bit** hardware oversampling

### Ultra low power
**41 µA** at 10KSPS
Down to **1,65 V**

**Up to 1MSPS**

## Comparators




### 2 built-in comparators
**Rail-to-rail** capable

### Selectable inputs
**Internal 1.2V** reference, or external
**DAC ouptut**

**Down to 160 nA**

## DAC


### 2 channel DAC
Integrated buffer

### Waveform generator
Triangle waveform
Noise wave

**Up to 1MSPS**

# Saving battery lifetime

**STM32L0 saves battery lifetime thanks to low-power duty cycles**

## Low-power timer

- PWM generator
- Event schedule with
- Minimum power consumption

## Real-time clock

**Real Time Clock**
Calendar
Alarm

**Wakeup capability**
Calendar
Alarm

## Timers

**General-purpose timers**
PWM generator
Event schedule with
Minimum power consumption

# Connectivity interfaces lower the need for external components

## I2C

### Advanced mode
Fast mode+ ready
Multimaster capability

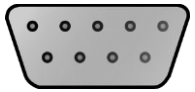
### Robust
Analog and digital noise filters

### Easy to use
Analog and digital noise filters
Wakeup from stop on address match

**Up to 1Mbit/s**

## All-in-one USART

### 8 modes
IrDA, SmartCard, LIN,
Single-wire, MODBUS
Asynchronous Multi-processor,



### Flexible interface
Swappable Tx/Rx pin
Programmable frame and data order
Wakeup from stop

**Up to 16Mbit/s**

## LCD driver

### Up to 384 segments
8 x 48
or 4 x 52

### High contrast
Internal **STEP-UP** voltage or External

### Low power
Low power waveform
Independent voltage source

**Up to 100Hz frame**

# Fast, reliable connectivity

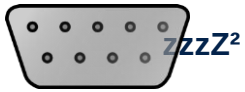
## Fast & reliable SPI / I2S

**Data integrity**
Hardware CRC calculation

**Digital Audio Interface**
I2S Up to 192kHZ 32bits

**Up to 16Mbit/s**

## Low-power UART




Asynchronous communication with low power consumption

**Down to stop mode**

## USB 2.0 FS

**Smart charging**
Battery Charging Detection
Link Power Management

**Cost-effective solution**
External 48MHz crystal not needed
- synchronized signals from the host USB
Oscillator with clock recovery system

**Up to 12Mbit/s**

# Flexible memory use

**STM32L0 features an EEPROM and flash memory providing more flexibility.**

## Up to 6 Kbytes of EEPROM

- Byte-level write and erase capabilities
- Faster write and erase times at byte-level

**Robust**
Up to 100K cycles (-40 to 105°C)

For applications where data updates are not frequent, such as storing configuration settings and calibration data.

## Up to 192 Kbytes of flash memory

- store large data
- writings by block

**Dual bank**
Read while write capability

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# STM32L0 portfolio

- 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 UART[1]
- LP Timers[1]
- 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

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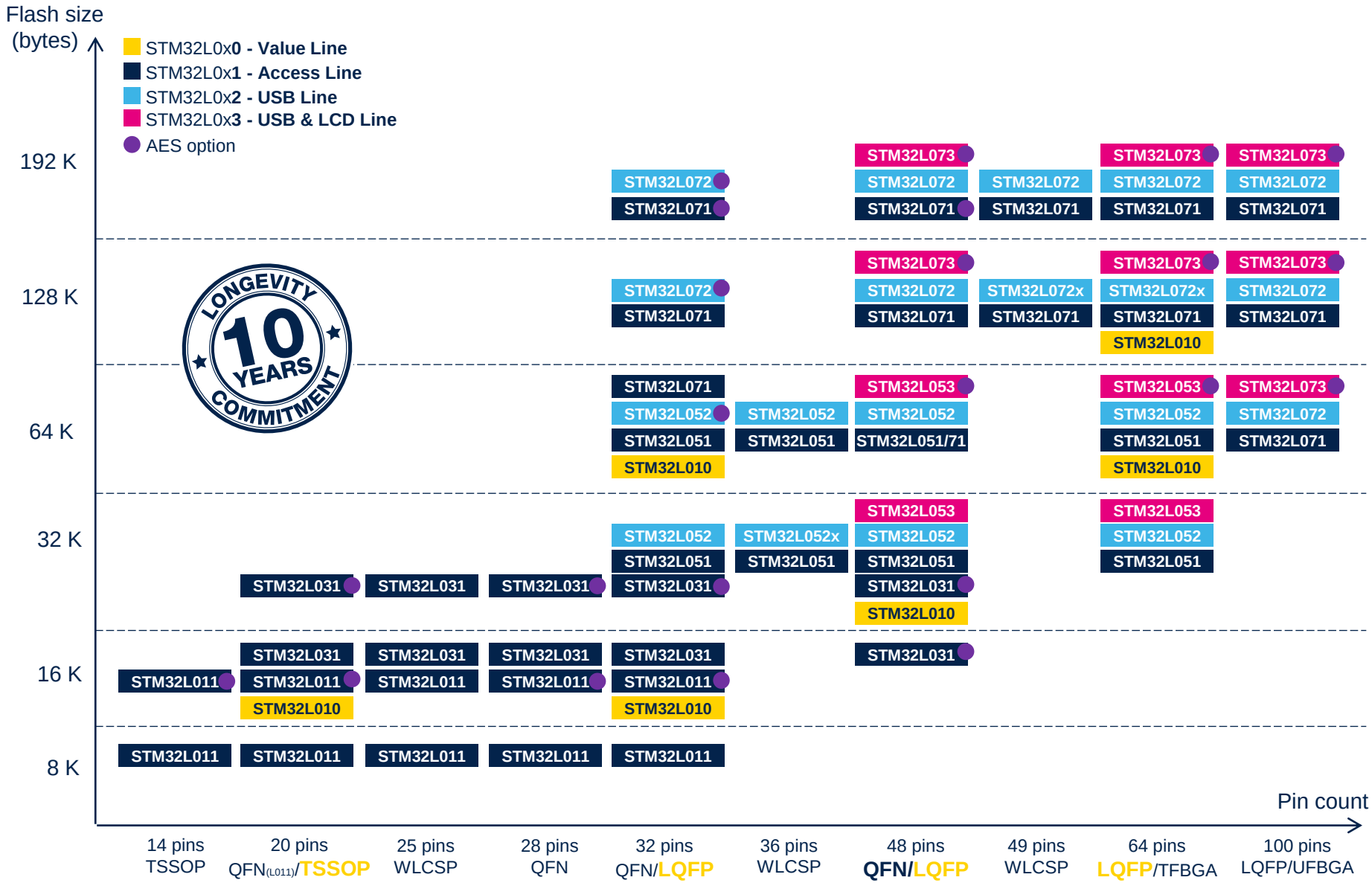
# STM32L0 portfolio



# STM32L0 hardware solutions

64-pin

32-pin(A)

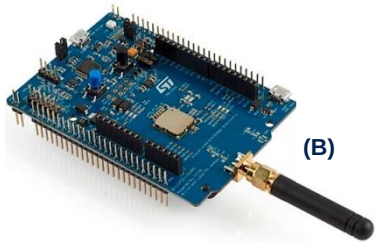
*** $13.9**

*** $10.7**

## STM32 Nucleo

**Flexible prototyping**

- NUCLEO-L010RB
- NUCLEO-L053R8
- NUCLEO-L073RZ
- NUCLEO-L011K4(A)
- NUCLEO-L031K6(A)



(B)

*** $24.8**

*** $45.5**

## Discovery kits

**Key feature prototyping**

- STM32L0538-DISCO
- B-L072Z-LRWAN1(B)

*** $220.5**

## Evaluation boards

**Full feature STM32L0 evaluation**

- STM32L073Z-EVAL

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**Recommended Resale Price (RRP)*

# Releasing your creativity

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github.com/stm32-hotspot

http://www.st.com/mcu-developer-zone

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# Our technology starts with You

Find out more at http://www.st.com/STM32L0



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