



AVNET[®] SILICA

Sensor Node board –
ARM mbed Enabled™

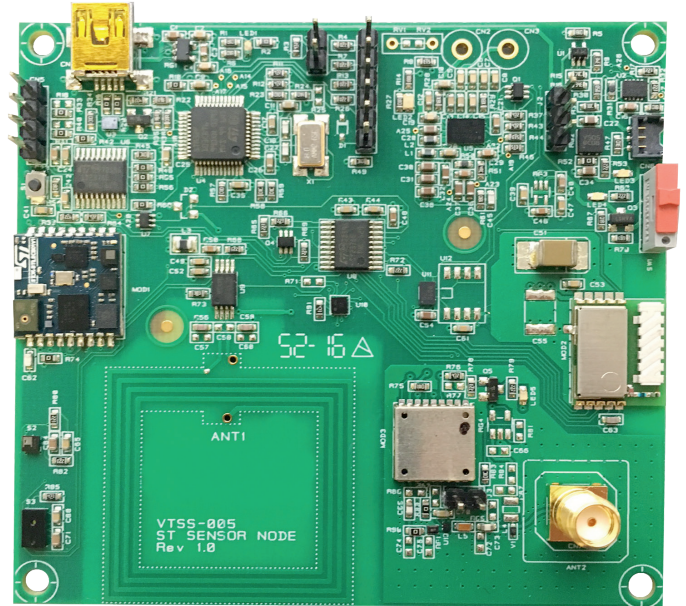
Sensor Node board

Avnet Silica, official partner of ARM Technology, developed an ARM® mbed Enabled™ Sensor Node board delivering the low power operation and secure connectivity required for Internet of Things (IoT), smart sensing and cloud applications. Avnet Silica has combined best-in-class processing, sensing, security and connectivity from STMicroelectronics with the ARM® mbed™ IoT Device Platform, which provides a complete solution including an advanced OS to run hardware, device management in the cloud and advanced security.

Powered by ST's ultra-low-power STM32L4 microcontroller, the Sensor Node board enables quick development of smart-sensor applications that can make use of several connectivity options. Choices include Bluetooth LE connectivity, which enables an easy connection with smartphones, and sub-GHz 6LoWPAN connectivity for long-range communications. Key hardware on the board includes the highly integrated ST SensorTile module, which integrates the ultra-low-power STM32L4 ARM® Cortex®-M4 microcontroller, plus ST's very-low-power BlueNRG-MS Bluetooth low energy (BLE) single-mode network processor and ST TESEO III GNSS receiver, together with a wide selection of ST's sensing devices like accelerometer, gyroscope, magnetometer, barometer and microphone plus STSAFE-A100, a highly secure solution which acts as a secure element providing authentication and data management services to the local host.

The Sensor Node board also offers some additional on-board sensors from ST that provide support for humidity, temperature, proximity and ambient light.

In addition to ARM mbed OS 5, the board also supports STM32Cube middleware and is further supported by software demos and libraries provided for both mbed OS and STM32Cube.



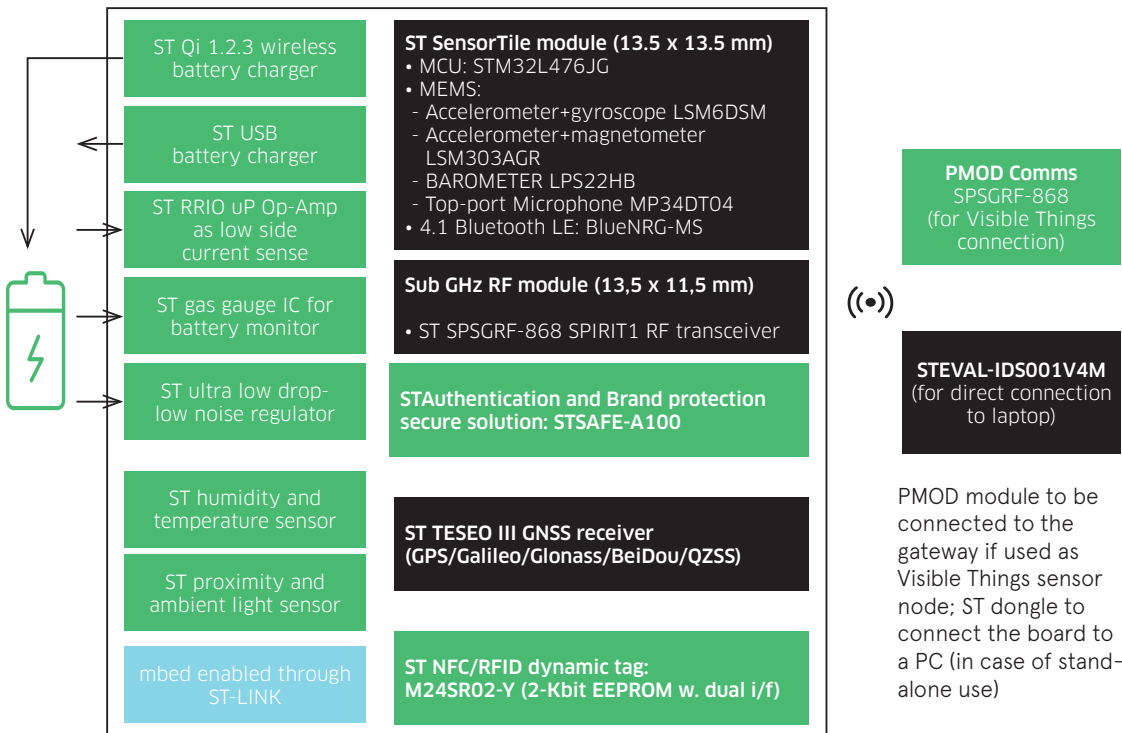
BENEFITS

- Bluetooth LE connectivity for easy connection with smartphones
- Sub GHz connectivity for long range communications
- NFC/RFID Dynamic Tag for easy pairing and configurations
- GNSS Receiver IC for location services
- STSAFE-A100 secure element ensuring integrity and confidentiality of data communications
- mbed enabled board with integrated ST-LINK for programming and debugging
- Supporting ARM mbed OS 5 and STM32Cube Ecosystems

FEATURES

- ST SensorTile module (13.5 x 13.5 mm) STEVAL-STLCS02V1 including:
 - Ultra-low-power ARM® Cortex®-M4 microcontroller - STM32L476JG
 - 3D Accelerometer and 3D Gyroscope - LSM6DSM
 - eCompass module - LSM303AGR
 - Barometer - LPS22HB
 - Digital microphone - MP34DT04
 - 4.1 Bluetooth low energy - BlueNRG-MS
 - Bluetooth Low-Energy Balun Chip - BALF-NRG-01D3
 - Low noise voltage regulator - LD39115J18R
- Additional on-board connectivity:
 - ST SPIRIT1 sub-GHz module (13.5 x 11.5 mm) - SPSGRF-868
 - ST TESEO III GNSS receiver supporting GPS/Galileo/Glonass/BeiDou/QZSS
 - ST Dynamic NFC/RFID Tag (2-Kbit EEPROM with dual interface) - M24SR02-Y
- Additional on-board sensors:
 - ST humidity and temperature sensor - HTS221
 - ST proximity and ambient light sensor - VL6180X
- Additional features:
 - STAuthentication and Brand protection secure solution - STSAFE-A100
 - mbed enabled board with embedded interface for programming and debugging (ST-LINK)
 - ST Qi 1.2.3 wireless battery charger receiver (STWL03 or STWL04)

BLOCK DIAGRAM



ARM® mbed™ The IoT Device Platform



ARM® mbed™ is the IoT Device Platform from the leading company in the connected world. Almost 16 billion ARM based chips were shipped just last year. mbed is a complete platform that includes mbed OS and advanced RTOS for Cortex-M chips, which are based on Keil RTX. The platform also provides a communication stack and advanced security.

mbed OS is supported by the major silicon vendors, making it easy to find a development board that suits customer needs. STMicroelectronics has a full-range of mbed-ready development boards. mbed is also supported by a great online community where users are freely sharing code and ideas.

mbed Cloud is ARM's solution for secure and efficient remote management of IoT devices. mbed Cloud supports firmware management and fail-safe updates across all devices in a network, including devices based on mbed OS, FreeRTOS, and Linux. The mbed Cloud solution can be used on any cloud service including Microsoft, IBM, and Amazon. It is built to scale with massive deployments of constrained IoT nodes, using unique caching mechanisms for low-energy devices. mbed Cloud reduces the time and effort required to deploy wide-spread updates, with broadcast and mesh-friendly packages.

Avnet Silica is an official ARM mbed partner, providing you skilled technical resources, easy to use Avnet development boards, and customer hands-on workshops, so you can effortlessly take your application to the cloud.

SOFTWARE PLATFORM

- **Core:** RTOS and hardware abstractions for target and toolchain portability
- **Connectivity:** Networking and communications
- **Security:** Built-in device and communications security
- **Tools:** Open build, test and workflow tools with support for 3rd party tools
- **Devices:** Remote manageability (with provisioning and firmware update)
- **Supports ARM mbed** cloud device management service out of the box



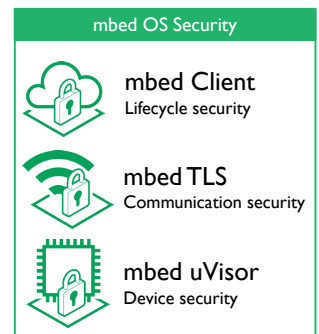
ECOSYSTEM PLATFORM

- **Open Source** collaboration with developers and partners (Apache 2, GitHub)
- **Developers.mbed.org** - Developer website for scalable community support and collaboration
 - Board and Component database, support tools, partner portal and channel to developers
- **Consistent abstraction** across disparate hardware enables contributors to leverage their work widely

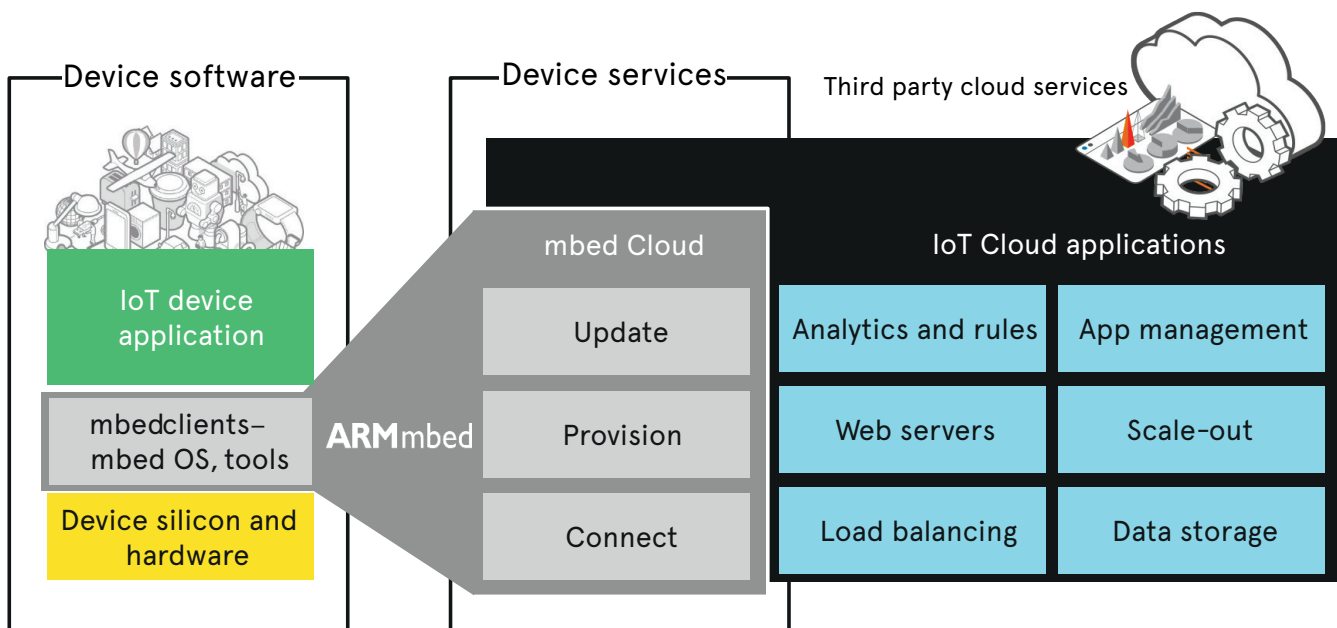
MBED OS SECURITY

Covers three main types of threats:

- Security of system, including the ability to provision, manage and update devices (e.g. security fix)
- Security of communications between device and cloud services
- Security and integrity of the device by protecting it from untrusted or malicious code



MBED PRODUCTS IN CONTEXT



ULTRA-LOW-POWER WITH HIGH PERFORMANCE

STM32™ ULTRA-LOW-POWER AT 100 DMIPS WITH DSP AND FPU

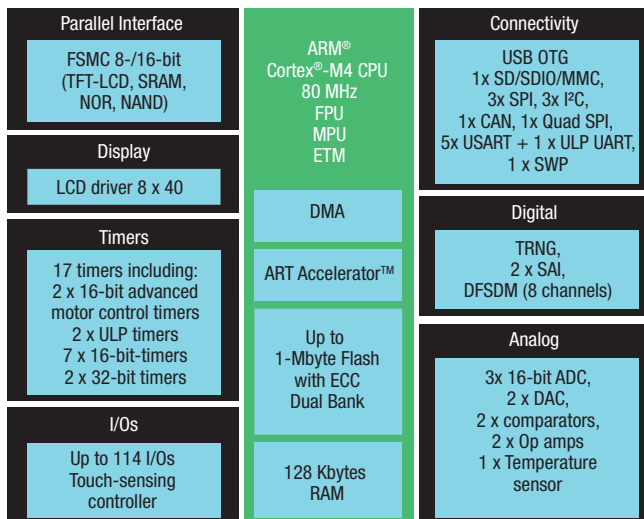
Ultra-Low-Power Excellence

The STM32L4 microcontroller is based on a new ultra-low-power platform featuring FlexPowerControl which extends flexibility to reach optimized power consumptions: With an EEMBC ULPBench score of 177 ULPBench™-CP, the STM32L4 outperforms the market in the ultra-low-power domain.

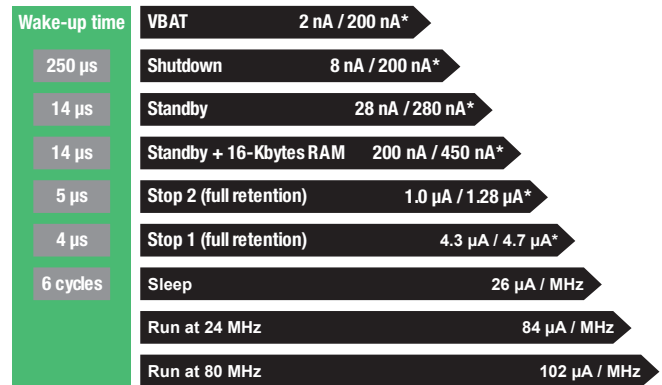
With Performance

Offering up to 1 Mbyte of Flash (dual bank) memory and 128 Kbytes of SRAM, the STM32L4 unleashes the ARM® Cortex®-M4 power efficiency with floating point unit (FPU) and DSP instructions. It delivers 100 DMIPS / 273 CoreMark thanks to the ST ART Accelerator™ at 80 MHz. The entire system performance is optimized using a multi-AHB bus matrix and DMA controllers.

STM32L476BLOCK DIAGRAM



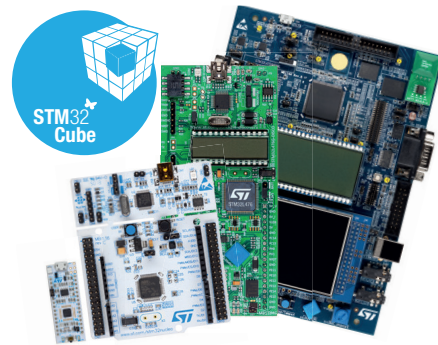
Outstanding Low-Power Modes



* without RTC / with RTC

Hardware Tools

A full set of evaluation boards enables flexible prototyping as well as full STM32L4 evaluation. Commercial part numbers: NUCLEO-L432KC (32 pins); NUCLEO-L476RG (64 pins); STM32L476G-DISCO; STM32L476G-EVAL



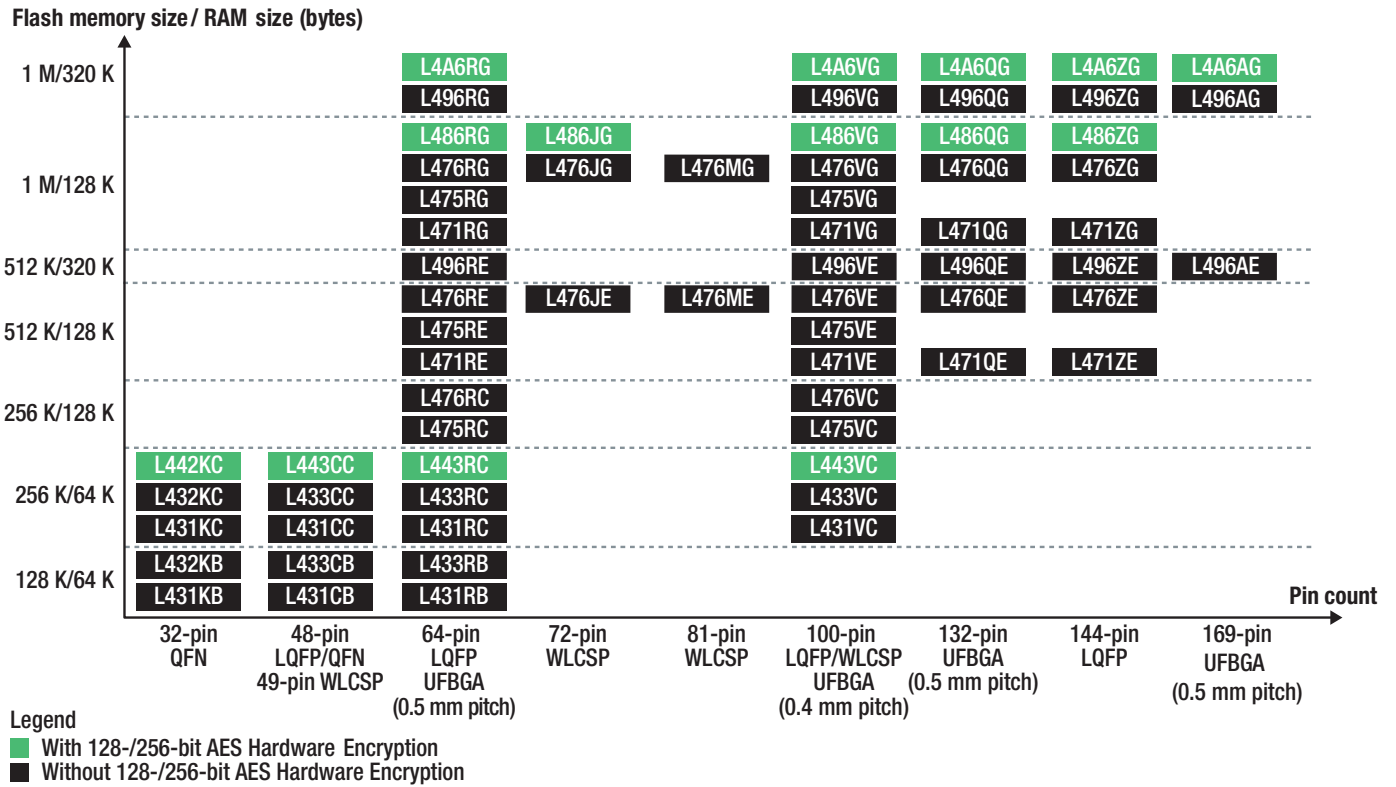
Software Tools

STM32CubeMX enables fast development thanks to its MCU clock configurator, power consumption calculator and code generation tools.

SMART PERIPHERALS

- Low-power UART and I²C communication interfaces
- Low-power time counter (16-bit low-power timers)
- Up to 7 SPIs including Quad-SPI supporting software execution
- Independent peripheral communication clock separate from main system clock
- Digital filters for sigma-delta modulators supporting digital microphone (PDM to PCM conversion w/ HW filter)

STM32L4 PORTFOLIO



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