Cypress PSoC® 6 Microcontrollers

Purpose-Built for the Internet of Things

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INCREASING DEMANDS FOR THE INTERNET OF THINGS

The IoT is exploding, with more that 30 billion devices projected to be in service by 2020. At the heart of every IoT device lies a mixed-signal embedded system that is taking on an increased amount of data processing, fueled by cloud connectivity. Devices such as door locks, factory machinery, and wearables are becoming smart — sensing, connecting, learning and responding — to make life easier. With connectivity, security becomes critical to protect users from malicious activity. These next-generation IoT devices require increased processing and security without incurring power and cost penalties.

Increased Data Processing

Today's IoT devices are collecting and processing more data than ever. Even wearable devices can contain more than a dozen sensors, including biometric, environmental, and motion sensors. Sensor data is collected and processed in real-time requiring a processor capable of sensor aggregation.

Flexible Connectivity

IoT devices connect to the cloud via various wired and wireless protocols including USB, Bluetooth Low Energy (BLE), Wi-Fi, and cellular broadband. Having the flexibility to connect via different connectivity options is essential.

Security

Security and privacy are significant IoT concerns. Users must be confident that their personal data is always protected while their IoT devices are connected to the Internet. Similarly, IoT developers must be able to ensure the authenticity of their products to eliminate counterfeits and enable secure, over-the-air updates.

Extended Battery Life

From wearables to remote sensors, more and more IoT devices are running on batteries. Extending the time between battery charges is a key requirement for battery-powered IoT devices.

INTRODUCING PSoC® 6 MICROCONTROLLERS

Purpose-Built for the Internet of Things

Cypress' new PSoC 6 MCU architecture is purpose-built for the IoT, filling the gap between expensive, power-hungry applications processors and low-performance MCUs. The ultra-low power PSoC 6 MCU architecture offers the processing performance needed by IoT devices. Security is built-in, enabling a single-chip solution. PSoC 6 enables engineers to uniquely create innovative, next-generation IoT devices leveraging the unique PSoC fabric with its easy-to-use, software-defined peripherals.

**Expensive,
High-Power Consumption**

Application Processors

IoT
**Long Battery Life
More Data Processing
Security**

**Limited
Processing Capacity**

Microcontrollers

LOWEST POWER

IoT devices are often portable, making battery life a critical factor. The PSoC 6 MCU architecture is built on a cutting-edge, ultra-low-power, 40-nm process technology with a dual Arm® Cortex®-M core architecture. Active power consumption is as low as 22-µA/MHz for the M4 core, and 15-µA/MHz for the M0+ core. PSoC 6 delivers extended battery life without sacrificing performance.

MOST FLEXIBILITY

The rapid growth of the IoT is sparking a need for innovation in IoT products. The PSoC 6 MCU architecture's best-in-class flexibility enables the addition of new features, and addresses the need for unique IoT products with multiple connectivity options, such as USB and BLE. PSoC 6 also offers software-defined peripherals to create custom analog and digital circuits, and the industry's best capacitive-sensing solution, CapSense®. In addition, a flexible dual-core architecture is used to optimize for system power consumption and performance. The possibilities are endless.

BUILT-IN SECURITY

With a growing number of devices connecting to the IoT, security must be established between hardware, cloud applications, and servers, and finally users and services. The PSoC 6 MCU architecture supports multiple, simultaneous secure environments without the need for external memories or secure elements, and offers scalable secure memory for multiple, independent user-defined security policies, preventing your IoT device from becoming a security liability. PSoC 6 provides you with a new standard for IoT security.

UNMATCHED SOLUTIONS FOR THE INTERNET OF THINGS

Embedded in Tomorrow

Cypress' IoT leadership is built on world-class wireless technology, and a broad portfolio of MCUs, memories, analog ICs, and USB controllers. Our solutions are helping transform traditional markets like industrial, home appliances, medical, and consumer, producing next-generation smart devices and connected / autonomous vehicle applications. From the entrepreneur building a revolutionary new product in a garage to the Fortune 500 engineering team tasked with making the impossible happen now, Cypress is today's technology partner for tomorrow's innovations.
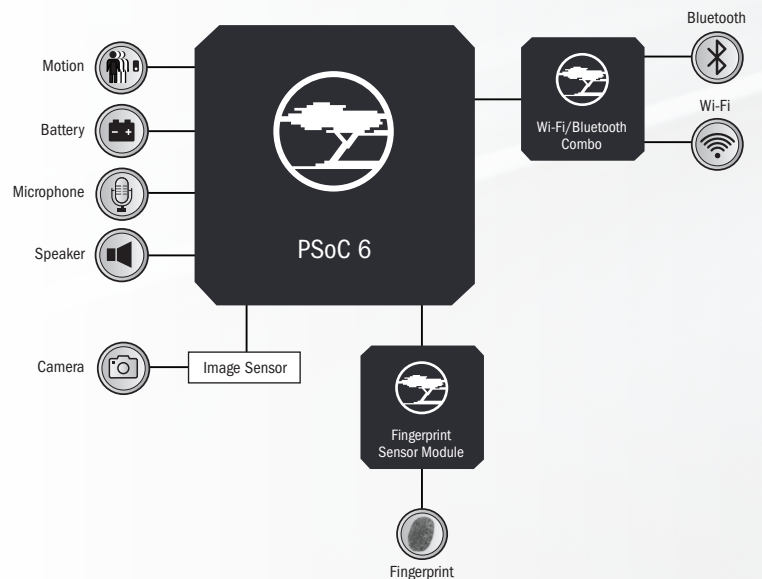
WEARABLE EXAMPLE

Modern wearables incorporate a growing number of functions and capabilities while maximizing battery life. Functions such as sleek user interfaces with sliders and proximity sensors, voice command support, seamless BLE connectivity, display driving, and process-intensive sensor aggregation can all be achieved in a single PSoC 6 MCU without sacrificing battery life.
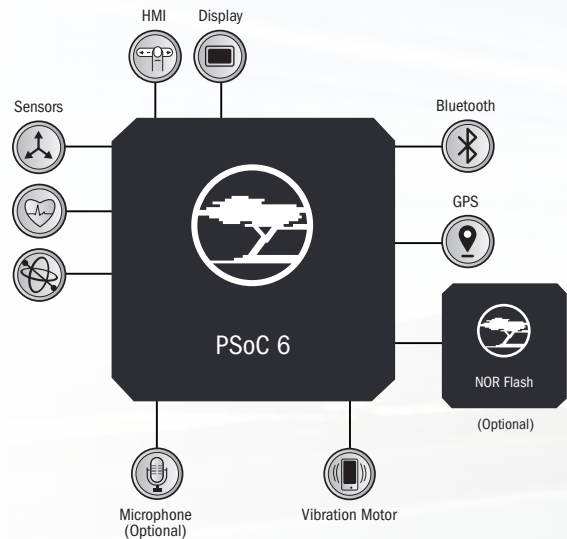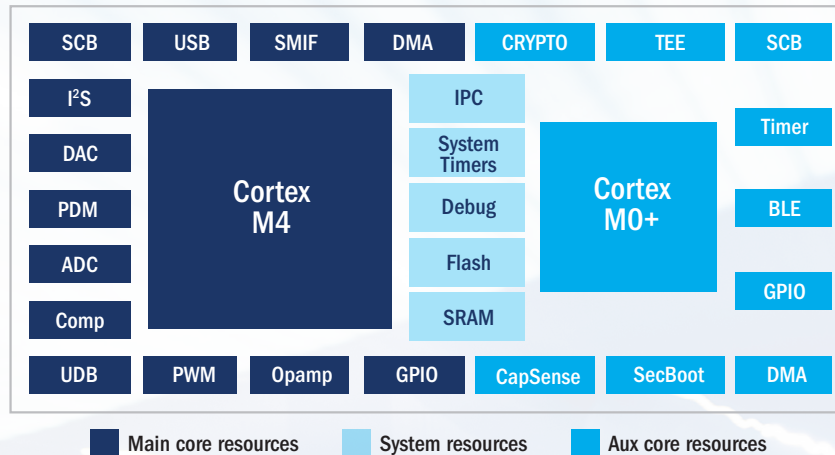
VIDEO DOORBELL EXAMPLE

For a smart home application like a video doorbell, PSoC 6, with its dual Cortex-M4 and Cortex-M0+ cores, can transmit real-time video as well as incorporate proximity detection, capture and play audio, and interface to a Cypress fingerprint sensor module or Cypress WICED Wi-Fi chipset. The PSoC 6 MCU's ultra-low-power profile enables smart applications to run off batteries.

PSoC 6 MICROCONTROLLER FEATURES

PSoC 6 DUAL-CORE MCU ARCHITECTURE

Legend:
- Main core resources
- System resources
- Aux core resources

Blocks shown: SCB, USB, SMIF, DMA, CRYPTO, TEE, SCB, I²S, DAC, PDM, ADC, Comp, Cortex M4, IPC, System Timers, Debug, Flash, SRAM, Cortex M0+, Timer, BLE, GPIO, UDB, PWM, Opamp, GPIO, CapSense, SecBoot, DMA

KEY FEATURES

32-BIT DUAL-CORE CPU SUBSYSTEM

PSoC 6 was built with two cores: a 150-MHz Arm Cortex-M4 core to handle data processing and a 100-MHz Arm Cortex-M0+ core to manage peripherals functions. Interprocessor communication is supported in hardware along with access to shared memory from both cores.

LOW POWER

PSoC 6 was designed for ultra-low power consumption. Starting with the dual-core architecture, the Cortex-M4 core can be put to sleep to conserve power, while monitoring functions can be managed by the Cortex-M0+ core. Dynamic voltage and frequency scaling can be controlled by the user to optimize power for different operating environments. With multiple sleep and hibernate modes, users can fine-tune their power profiles.

BUILT-IN SECURITY

PSoC 6 is designed to provide a hardware-based root of trust for secure applications. A hardware-based root of trust provides extra protection against unauthorized access to keys. In addition, hardware accelerated cryptography and true random-number generation are provided, which are needed for secure boot, authentication, secure over-the-air updates and other functions.

CAPSENSE

PSoC 6 leverages Cypress' industry-leading CapSense solution for capacitive sensing with state-of-the-art noise immunity and water rejection used for applications including touch buttons and sliders, proximity detection and liquid-level sensing.

CONNECTIVITY

PSoC 6 supports multiple wired and wireless connectivity options including Bluetooth Low Energy, Wi-Fi, and USB.
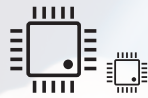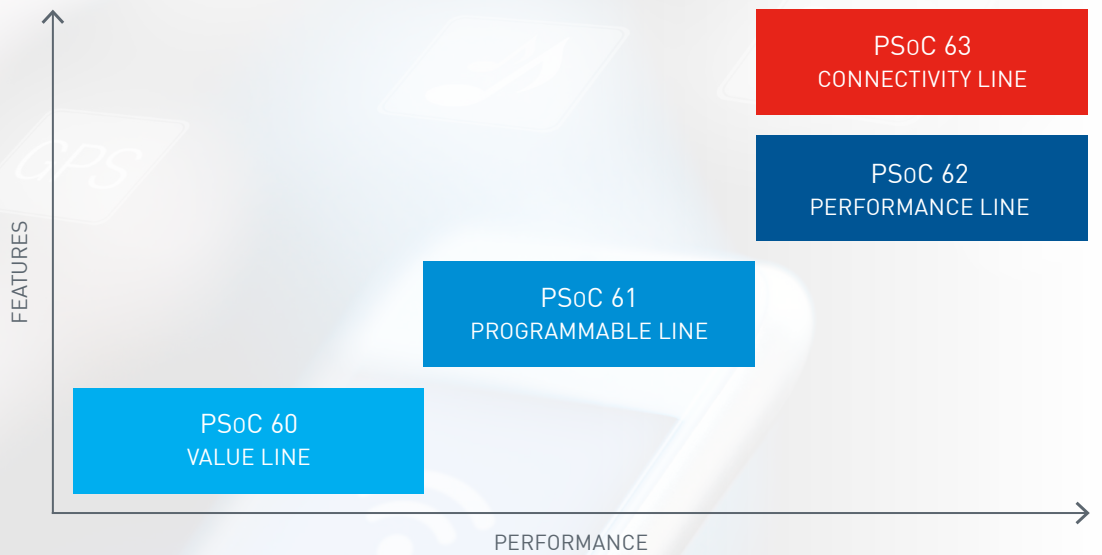
SOFTWARE-DEFINED PERIPHERALS

Cypress' software-defined peripherals can be configured using pre-built library functions or customized using the programmable architecture inside of PSoC 6 devices:

Programmable analog blocks are composed of an assortment of opamps, comparators, ADCs, and DACs, enabling complex analog signal flows.

Programmable digital blocks are composed of Universal Digital Blocks (UDBs), Serial Communication Blocks (SCBs), and Timer / Counter / Pulse Width Modulators (TCPWMs). These blocks can be configured to set-up custom digital interfaces, state machines, and custom logic functions.

PSₒC 6 PORTFOLIO

With multiple lines in the PSoC 6 portfolio, you can choose the right device for your specific application needs.
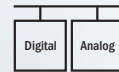

FEATURES ↑

PSₒC 63
CONNECTIVITY LINE

PSₒC 62
PERFORMANCE LINE

PSₒC 61
PROGRAMMABLE LINE

PSₒC 60
VALUE LINE

PERFORMANCE →

	Core	On-Chip Memory	CapSense	Software-Defined Peripherals	Security	Connectivity
PSₒC 63 CONNECTIVITY LINE	150-MHz Cortex-M4 100-MHz Cortex-M0+	Up to 4096KB Flash, 2048KB SRAM	Advanced CapSense for proximity detection and gesture control	Digital Blocks Analog Blocks	Crypto Accelerators Full Trusted Execution Environment	USB BLE Wi-Fi*

GENERAL PURPOSE MCUS

	Core	On-Chip Memory	CapSense	Software-Defined Peripherals	Security	Connectivity
PSₒC 62 PERFORMANCE LINE	150-MHz Cortex-M4 100-MHz Cortex-M0+	Up to 4096KB Flash, 2048KB SRAM	Advanced CapSense for proximity detection and gesture control	Digital Blocks Analog Blocks	Crypto Accelerators Full Trusted Execution Environment	USB
PSₒC 61 PROGRAMMABLE LINE	150-MHz Cortex-M4	Up to 1024KB Flash, 288KB SRAM	Advanced CapSense for proximity detection and gesture control	Digital Blocks Analog Blocks	Crypto Accelerators	USB
PSₒC 60 VALUE LINE	50-MHz Cortex-M4	Up to 512KB Flash, 128KB SRAM	Basic CapSense for button replacement			

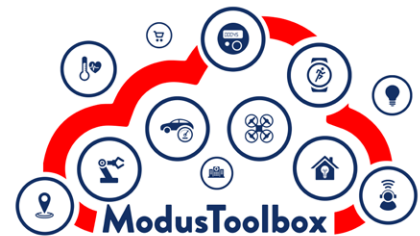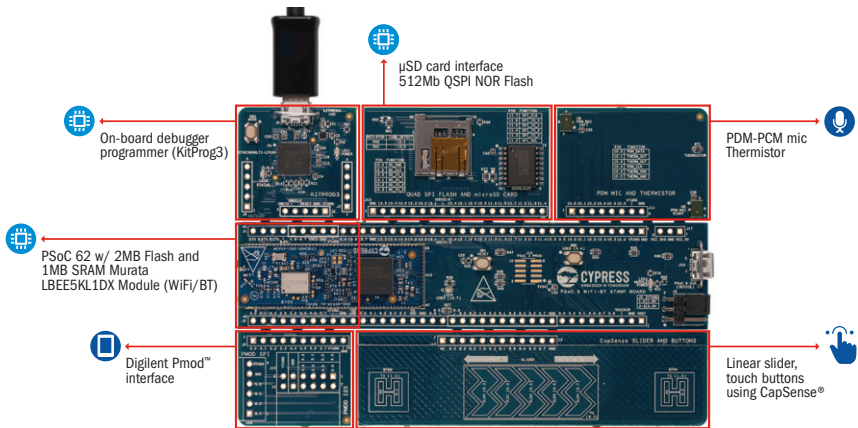* With external Cypress WiCED Wi-Fi solution.

ACCELERATE YOUR NEXT IoT DESIGN CYCLE
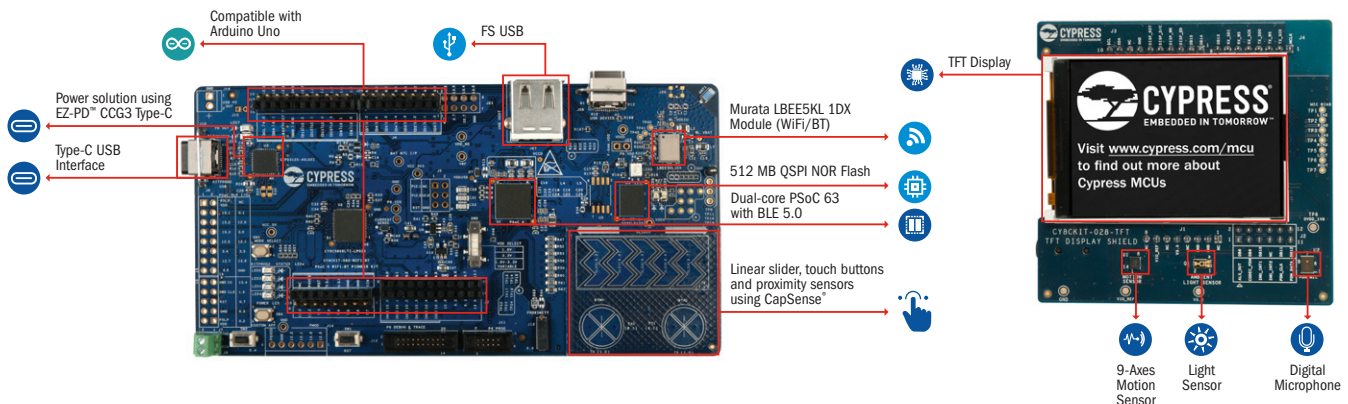
ModusToolbox™

ModusToolbox simplifies development for IoT designers. It delivers easy-to-use tools and a familiar microcontroller (MCU) integrated development environment (IDE) in Windows®, macOS®, and Linux. It provides a sophisticated environment for system setup, WICED wireless connectivity libraries, power analysis, application-specific configurators for Bluetooth® Low Energy (BLE), CapSense, as well as other peripherals. In addition, code examples, documentation, technical support and community forums are available to help your IoT development process along.

- **WICED SDK with PSoC 6 Support:** PSoC 6 MCUs and WICED wireless connectivity libraries, APIs, and drivers have been combined into a single SDK to simplify and accelerate IoT designs
- **Middleware Libraries:** Drivers, middleware and code examples in the WICED SDK with PSoC 6 support all have a Makefile build out of the box enabling easy migration into other build tools and build automation, such as Arm DS5, iAR, VSCode, and Xcode
- **Code examples:** includes examples for drivers, stacks and middleware, plus sample applications to get started easily

- **Trusted 3rd party SW add-ons**:
    - **RTOS Support**: Pre-integrated, licensed, 3rd-party support for Real Time Operating Systems include FreeRTOS, AliOS Things, MBed, and Thread X
    - **Cloud Support**: Support for cloud services such as Amazon AWS, AliOS Things, and arm Pelion
    - **Board support packages**: 3rd party boards are pre-configured for you and include peripheral and driver support to quickly develop an IoT design
- **Graphical configurator**: GUI-based configuration tools for PSoC MCU and WICED wireless peripherals, such as Smart I/O, CapSense and WiFi/BT, to quickly configure peripherals for an IoT design

PSoC 6 WI-FI BT PROTOTYPING KIT (CY8CPROTO-062-4343W)

On-board debugger programmer (KitProg3)

PSoC 62 w/ 2MB Flash and 1MB SRAM Murata LBEE5KL1DX Module (WiFi/BT)

Digilent Pmod™ interface

µSD card interface
512Mb QSPI NOR Flash

PDM-PCM mic
Thermistor

Linear slider, touch buttons using CapSense®

PSoC 6 WIFI-BT PIONEER KIT (CY8CKIT-062-WIFI-BT)

Compatible with Arduino Uno

Power solution using EZ-PD™ CCG3 Type-C

Type-C USB Interface

FS USB

Murata LBEE5KL 1DX Module (WiFi/BT)

512 MB QSPI NOR Flash

Dual-core PSoC 63 with BLE 5.0

Linear slider, touch buttons and proximity sensors using CapSense®

TFT Display

9-Axes Motion Sensor

Light Sensor

Digital Microphone
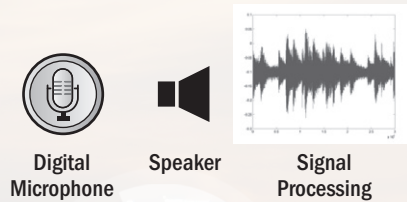
SOLVE YOUR IoT PROBLEM HERE

What's your next game-changing application?

Graphic Display

Incorporate a slick graphics display to your next
IoT application with the use of the Universal
Digital Blocks (programmable logic).

Audio Processing

Digital Microphone   **Speaker**   **Signal Processing**

Add an audio subsystem with an I^2S interface and
two Pulse Density Modulation (PDM) channels.

Sensor Fusion

Analog Sensors

Digital Sensors

Interface to analog sensors with the programmable
analog block functions of PSoC 6, which includes
op-amps, comparators, and a 12-bit SAR ADC.
Digital sensors can easily be connected via the
Serial Communication Blocks (SCBs).

PSoC 63 Connectivity Line

MCU Subsystem

arm
Cortex-M4
with SP FPU
150-MHz

I-Cache 8KB

arm
Cortex-M0+
100-MHz

I-Cache 8KB

SRAM
Up to 2MB

Flash: Up to 4MB

CRYPTO

DMA X2

eFUSE

RTC

Advanced Microcontroller Bus Architecture (AMBA-AHB) and IPC

Analog Blocks

Opamp x2	CMP x2
12-bit DAC	12-bit SAR ADC
CapSense	

Digital Blocks

UDB x12	TCPWM x32

Communication Interfaces

SCB x8	I²S PDM-PCM
Deep Sleep SCB	SMIF (Quad-SPI)

Bluetooth Smart Connectivity

BLE 5.0 Link Layer

2.4-GHz RF Transceiver

I/O Subsystem

Programmable Interconnect and Routing

GPIO x6
GPIO x6
GPIO x6
GPIO x6
GPIO x6
GPIO x6
GPIO x6
GPIO x6
GPIO x6
GPIO x8
GPIO x8
GPIO x8

Human Machine Interface

Sliders   Buttons   Proximity   Vibration Motor   Multiple LEDs

Replace traditional buttons with touch, add touch sliders, or add proximity detection with Cypress' CapSense technology. Use the TCPWM to drive motors, actuators or LEDs.

Interface Bridging and Port Expansion

Full-speed USB Host or Device

UART   I²C BUS   CS   SPI   SCK   MOSI   MISO

Serial Interfaces

Serial Communication Blocks (SCBs) can be configured to support serial interfaces such as UART, I²C and SPI. USB 2.0 host and device support is available with PSoC 6.

Wireless Connectivity

Bluetooth   Wi-Fi

Add Bluetooth Low Energy connectivity with built-in BLE radio and sub-system. Add Wi-Fi or Bluetooth with Cypress' WICED portfolio.

PSoC®

LOWEST POWER, MOST FLEXIBILITY, BUILT-IN SECURITY.

BE A GAME-CHANGER.
GET STARTED TODAY.

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