

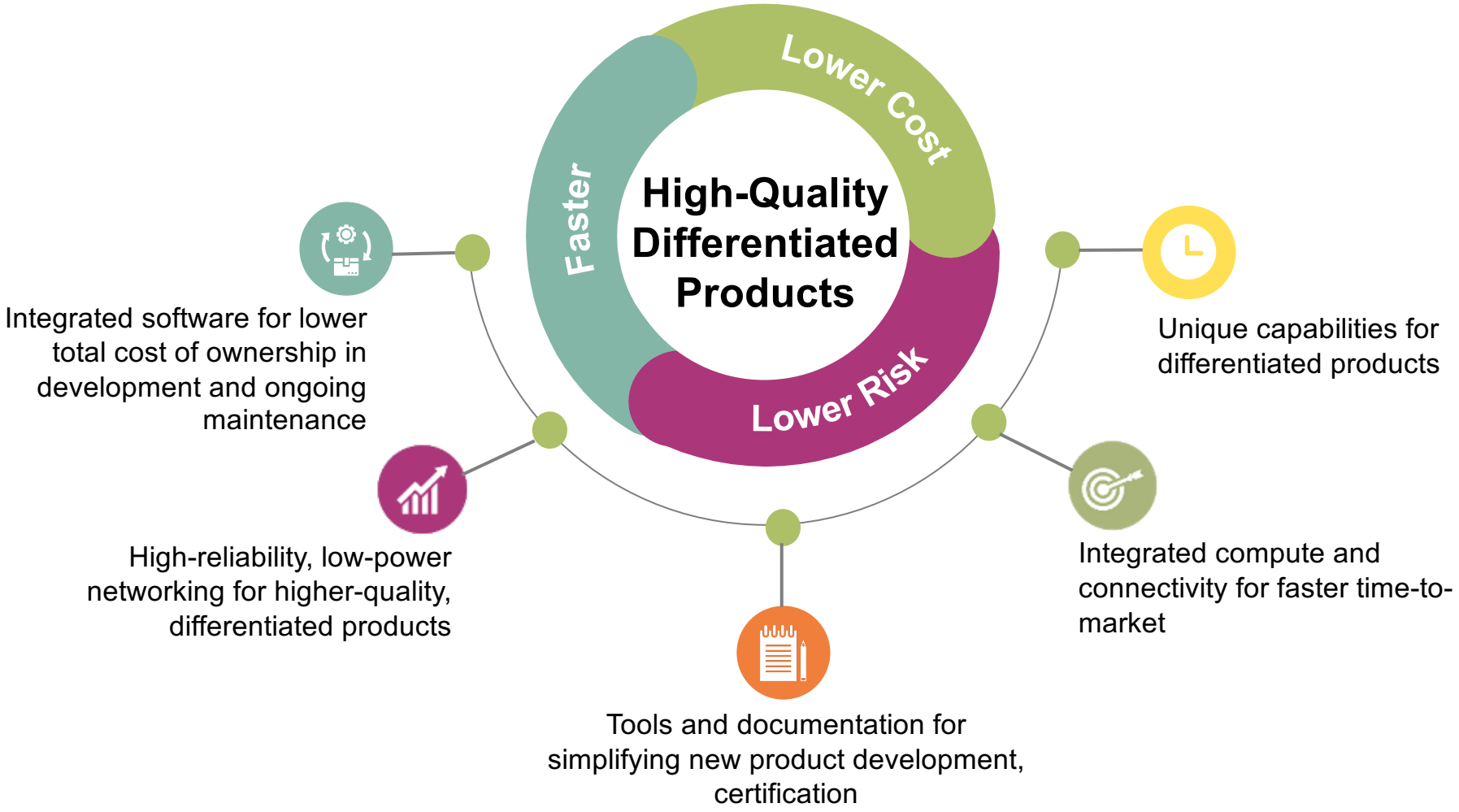
20 Years PSoC™

PSoC™ 4100S Max: Higher performance and lower power for HMI applications

Jim Davis
Senior Product Marketing Director
MCU Products

Infineon

Infineon MCUs: Enabling more developers to get products to market…



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Infineon MCUs: portfolio & roadmap



Automotive



Industrial



Consumer

8-bit	32-bit Arm® Cortex®-M0/M0+	32-bit Arm® Cortex®-M3	32-bit Arm® Cortex®-M4	32-bit Arm® Cortex®-M7	32-bit TriCore™
Auto PSoC™ 1	Embedded Power ICs Auto PSoC™ 4			Traveo II XMC7000™	Aurix TC3X Aurix TC2X
	XMC1000™ FM0+™	FM3+™	XMC4000™ FM4+™		
PSoC™ 3 PSoC™ 1	PSoC™ 4	PSoC™ 5	PSoC™ 6		

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Infineon MCUs: product portfolio

8-Bit	32-Bit Arm® Cortex®-M0/M0+	32-Bit Arm® Cortex®-M3	32-Bit Arm® Cortex®-M4 / Arm® Cortex®-M0+	32-bit Arm® Cortex®-Mx (next generation)

IoT / Consumer

PSoC™ 6 MCUs for the broad-base of IoT and Consumer applications, bringing best-in class low-power, connectivity, and security
PSoC™ 4 delivers unique software-defined peripherals and industry-leading capacitive-sensing designs



PSoC™ 3
8051 CPU
67 MHz, 64 KB Flash
Up to 19 PAB, 30 PDB, 72 I/Os

PSoC™ 1
M8C CPU
24-MHz, 32 KB Flash
16 PAB, 16 PDB, 64 I/Os

8FX
8-bit RISC MCU
16-MHz, 32–50 KB Flash

PSoC™ 4
Cortex® -M0/M0+
48-MHz, 384 KB Flash
Up to 13 PAB, 20 PDB, 98 I/Os

FM0+ MCUs
Cortex®-M0+
40 MHz, 512 KB Flash, 102 I/Os

XMC1000™ MCUs
Cortex®-M0
32-48-MHz, 200 KB Flash, 55 I/Os

PSoC™ 5LP
Cortex® -M3
80 MHz, 256 KB Flash
20 PAB, 30 PDB, 72 I/Os

FM3 MCUs
Cortex® -M3
144 MHz, 1.5 MB Flash, 154 I/Os

PSoC™ 6
150 MHz Cortex® -M4/100 MHz M0+
2 MB Flash
7 PAB, 56 PDB, 104 I/Os

FM4 MCUs
Cortex® -M4
200 MHz, 2 MB Flash, 190 I/Os

XMC 4000™ MCUs
Cortex®-M4
80-144 MHz, 2 MB Flash, 119 I/Os
Industrial Comms, Ta 125C

Industrial

XMC™ is a family of high-performance Arm® Cortex® -M-based
MCUs for industrial applications, with industrial control peripherals and extended temp range
FM is a portfolio of high-performance Arm® Cortex ®-M-based MCUs for industrial and consumer applications



Next Generation MCU
Multi-core Cortex®-Mx
ML-Ready, HMI Rich

XMC 7000™
350 MHz Multi-core Cortex®-M7
Industrial Quality, 8 MB Flash

Other

Specialized and Legacy

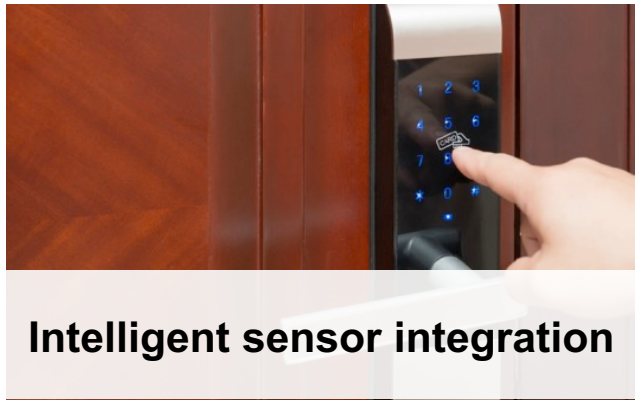


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PSoC™ 4: Problem solver-on-chip

Sense anything

Programmable analog and digital blocks in PSoC™ 4 enable you to customize your analog-front-end, apply simple glue logic and easily integrate intelligent analog sensors into an application.



Intelligent sensor integration

Easy to-use HMI

PSoC™ 4 simplifies complex HMI interfaces such as capacitive and inductive sensing enabling sleek, robust, and easy to-use interfaces.



Capacitive and inductive sensing

Connected

Bluetooth Low Energy (BLE) integrated into some PSoC™ 4 devices simplifies RF design. Additional wired interfaces such as USB and CAN are also available.

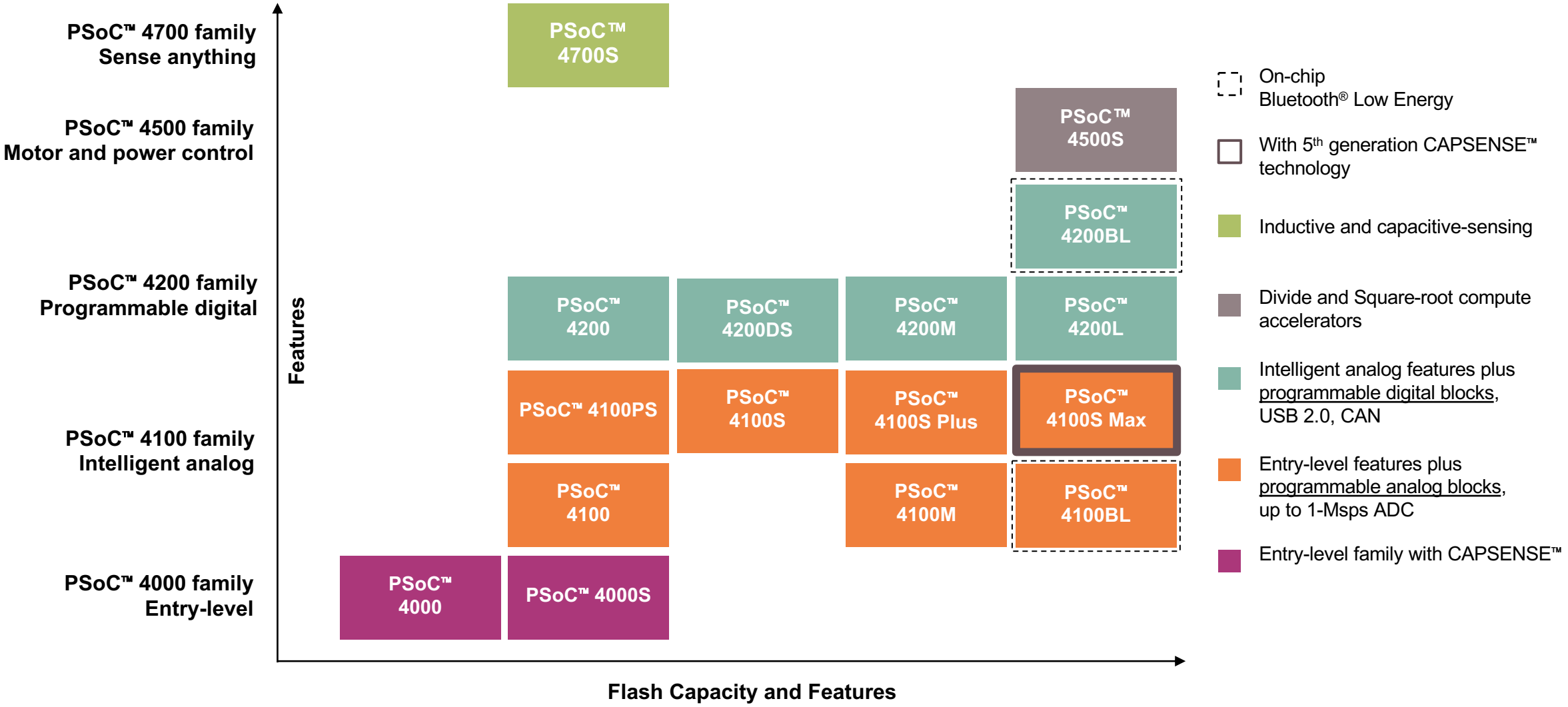


Wired and wireless connectivity

Endless possibilities and applications

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PSoC™ 4 portfolio



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PSoC™ 4100S Max new features and key benefits

Key features	Key benefits	Value
Maximum Memory and I/O Integration – Up-to 384 KB Flash & 32 KB SRAM Up-to 84 pins of analog and digital capabilities	› Low power compute & integration, optimized right from the hardware level. › Differentiated Touch HMI features in MCU. › Integrate differentiated analog capabilities to support resistive and current sensing. › Highspeed communications from Fast I2C or CAN-FD. › Dedicated cryptography block for fast cryptographic functions. › Easy to use software for prototyping and productizing end applications.	Reduced system costs with feature integration in single host MCU
Dual 5th Gen CAPSENSE™ Blocks – Support multiple data collection methods from touch to resistive or current sensors		Improve end product user experience with robust touch based user interfaces, and intelligent analog sensing
New variety of on-chip peripherals – CAN-FD, TX I2S, Fast I2C, Segment LCD, TCPWM x8, SCB x5		Flexible options for both Consumer and Industrial IoT applications
Enhanced Cryptography – Dedicated HW security block to support AES, SHA, TRNG, PRNG & CRC functions		Long range wired communication protocols for physically large systems
Modern, Flexible ModusToolbox™ software for developing embedded applications, ready to use code examples, development kits		Futureproof product upgrades for higher feature options

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PSoC™ 4100S Max

Applications

Main control and user interface for home appliance, consumer, and industrial applications

Features

32-bit MCU Subsystem

› 48-MHz Arm® Cortex®-M0+ CPU with a DMA controller
› 384 KB flash and 32 KB SRAM
› External MHz oscillator (ECO) with PLL and 32-kHz watch crystal oscillator (WCO)
› CRYPTO block include AES, TRNG, PRNG, CRC and SHA

Programmable Analog Blocks

› One 12-bit, 1-Msps SAR ADC
› Two opamps configurable as programmable gain amplifiers (PGAs), comparators (CMPs), etc.
› Two low-power comparators
› Two MSC (Multi-Sense Convertor) blocks with next-generation CAPSENSE™ technology

Programmable Digital Blocks

› Eight 16-bit timer/counter/pulse-width modulator (TCPWM) blocks
› Five serial communication blocks (SCBs) that are configurable as I²C, SPI, or UART
› Segment LCD
› TX I2S Mater channels

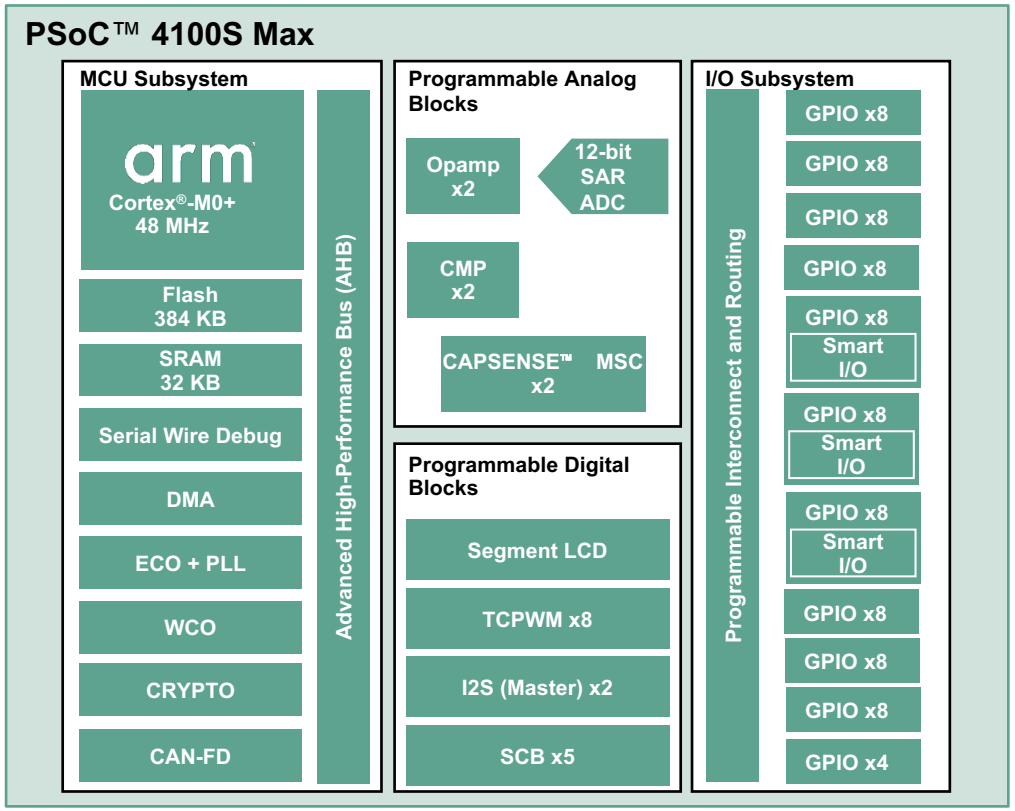
One CAN-FD (Controller Area Network with Flexible Data-rate) Controller

Packages

› 48-TQFP, 64-TQFP and 100-TQFP

I/O Subsystem

› Up to 84 GPIOs, including 24 Smart I/Os[1]



Software Enablement

ModusToolbox™ Exclusively supported in ModusToolbox™

Availability

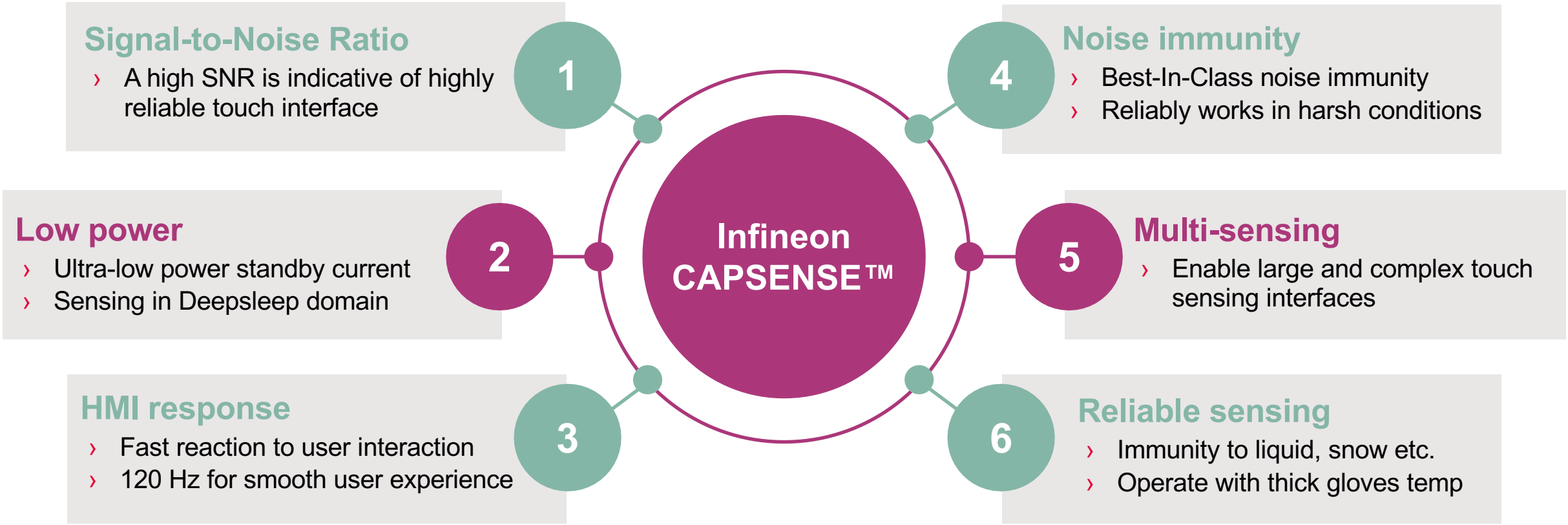
Sampling: Now **Production**: Now

[1] Embedded programmable digital logic in the I/O subsystem

Purple indicates new to the PSoC™ 4 portfolio.

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The Infineon Solution:
5th Gen CAPSENSE™ touch-sensing technology



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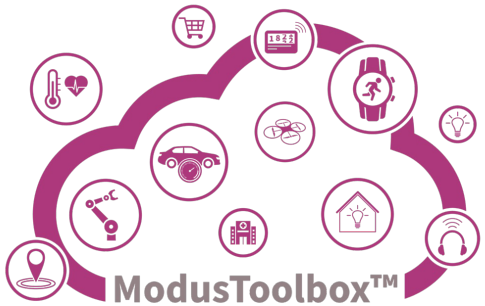
5th Gen CAPSENSE™

Key features	Key benefits	Condition
Improved SNR – Up to 48:1 SNR vs 6.1:1 on current fourth generation CAPSENSE™ technology	› Better sensitivity in a noisy environment. › Wider parasitic capacitance allows for greater flexibility in PCB routing. › Allows for smaller sensors, longer traces, and different PCB material. › Support tougher HMI solutions for industrial environments. › Improved touch response faster than most displays for a smooth experience. › Free up the CPU to perform faster control loops or other peripheral operations.	VDD = 5 V No FW filter Cp = 33 pF Cr = 0.1 pF
Wider Parasitic Capacitance Range – 2 pF – 200 pF		10 mm CSD button Acrylic Overlay Cp = 33 pF Cr = 0.1 pF
Support Thicker Overlays – Up from 5 mm to 18 mm thick overlays		7x5 CSX touch 3 mm Acrylic Overlay SNR = 10:1 Finger Size = 8 mm
Faster Refresh Rates – From 22 Hz to 242 Hz		10x8 CSX touch Scan Clock = 1 MHz No of sub-conversions = 70 Refresh rate = 100 Hz
Reduced CPU Utilization – From 40% utilization to 7%		

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World-class whole product solution for fast time-to-market

CAPSENSE™ Software (Touch Firmware & Tools)



- A comprehensive State of the art **Touch firmware library** for reliable touch interface design
- Why re-invent? **Decades of learning** & optimization: Noise immunity, Low power, SmartSense™ Auto-Tuning
- Simple **graphical user interface** for easy customization, real-time performance analysis, tuning and debugging

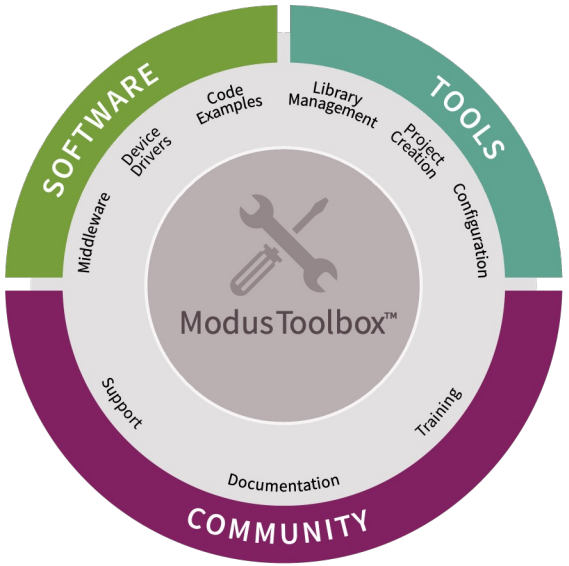
Support



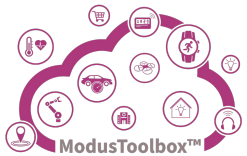
- A **complete and comprehensive** Technical documentation, Code examples, Webinar, Dev Kits etc.
- Invested in **R&D** and world-wide sales / field **support teams** and Ecosystem partners
- Infineon Developer Community for design and product support
- Customer Design Service, Sensor Design support

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ModusToolbox™ software



- ModusToolbox™ software is a modern, extensible development environment supporting a wide range of Infineon microcontroller devices.
- Provided as collection of development tools, libraries, and embedded runtime assets architected to provide a flexible and comprehensive development experience.



Development Tools

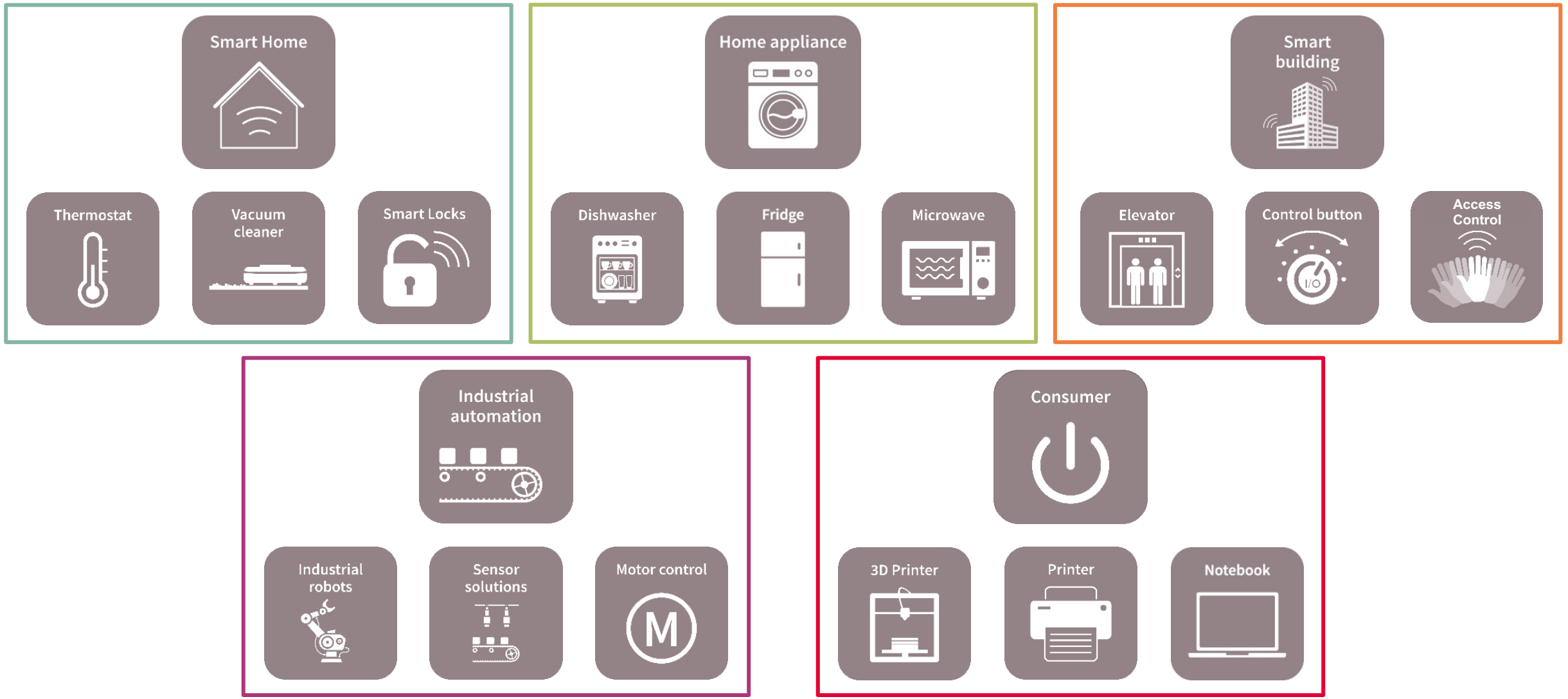
The ModusToolbox™ tools package includes desktop programs that enable the creation of new embedded applications, managing software components, configuring device peripherals and middleware, and embedded development tools for compiling, programming, and debugging.

Runtime Software

The ModusToolbox™ software includes an extensive collection of GitHub-hosted repositories comprised of code examples, board support packages, middleware, and application support.

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PSoC™ 4100S Max: Target applications



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Part of your life. Part of tomorrow.