infineon

PSOC™ Control C3 Main Line Microcontrollers

The Next Generation of Industrial Microcontrollers

PSOC™ Control family of MCUs is specifically developed for motor control and power conversion applications. This family of high-performance Arm® Cortex®- M33 MCUs enables designers to innovate, solve complex design problems and get their products to market faster than ever before. Typical applications include HVAC, home appliances, robotics, telecom and server power supplies, light electric vehicle chargers, solar inverters, and industrial automation.

Real-time control

PSOC™ Control Main Line enables **real-time control** with its high-performance 12-bit, 12-MSPS SAR ADC, the built-in 16-channel sample-and-hold functions and feature-rich timer/counter/PWM (TCPWM) blocks. Designers can select products with or without the CORDIC math coprocessor depending on their requirements.

Wide bandgap ready for higher system efficiency

PSOC™ Control's **unique ADCs** allow idle sampling to boost system performance by minimizing time delay between sampling and conversion. With less than 100 picoseconds of resolution, the TCPWM provides clean signal generation and allows system in-cycle control of up to 200 kHz switching frequency. Being wide bandgap ready, PSOC™ Control enables **high system efficiency** with lower conduction and switching losses. Industrial-ready peripherals reduce the total system costs.

Advanced security and safety

PSOC™ Control is **PSA Certified™ Level 2.** With crypto accelerator, TrustZone, and secure key storage, it enables secure on-site and cloud-based designs. For critical applications, robust safety is ensured with features such as Class B/SIL 2 safety libraries.

Ease-of-use for developers

PSOC™ Control is supported by ModusToolbox™, a unified ecosystem platform with tools and software solutions. ModusToolbox™ Motor Suite, and Power Suite are available for developers of PSOC™ Control focus applications. These suites provide a seamless graphical user interface that streamlines evaluation and training, and provides real-time parameter monitoring for valuable insights into performance, efficiency, and reliability. Specialized application environments enable engineers to quickly identify issues, optimize designs, and enhance overall functionality.

Find out more about PSOC™ Control.
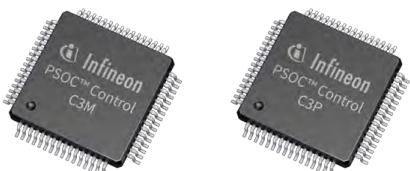
Key features

32-bit MCU subsystems
- Up to 180 MHz Arm® Cortex®-M33 with DSP and FPU
- Up to 256kB read-while-write flash with ECC
- 64kB SRAM with ECC
- 16kB I-Cache
- 6 power modes including deep sleep and hibernate

High-performance analog
- 12-bit, 12-MSPS SAR ADC
- 18 analog channels
- 5 comparators with built-in 10-bit DAC and slope generator

Real-time control peripherals
- 16 x 16-bit and 4 x 32-bit TCPWMs
- 4-channel HRPWM
- CORDIC math coprocessor

Up to PSA L2 device security
- NIST P256 and TRNG
- Cryptography
- Secure boot
- Secure firmware update
- Processing isolation

Packages
- VQFN-48, E-LQFP-48, VQFN-64, E-LQFP-64, VQFP-80

Key benefits

- Fast analog and digital peripherals **ready for wide bandgap** systems
- HW accelerators (CORDIC, DSP, FPU) for **boosted task execution**
- **Motor and Power Suite** with multi-functional GUI, dedicated tools, advanced libraries, etc.
- **Reduced power consumption** for battery operated applications

PSOC™ Control Main Line – Key applications

Smart Home and Home Appliances	Industrial Motor Control	Server and Telecom	Renewables
− Power/gardening tools − Lawn mower robots − Home robots − Residential aircon ODU − Large and medium home appliances drives	− General purpose drives − LED lighting − Servo drives − Commercial aircon	− Telecom PSUs − Server PSUs − Workstation PSUs	− PV inverters − LEV − EV charging

Orderable part numbers and kits

Feature/Package	PSOC™ Control Main Line - C3M5	PSOC™ Control Main Line - C3P5
Operating frequency	180MHz	180MHz
Flash	128kB / 256kB	128kB / 256kB
ADC	12-MSPS	12-MSPS
CORDIC accelerator	Yes	No
Hall sensor interface	Yes	No
HRPWM	Yes	Yes
QFP48 (128KB/256KB)	PSC3M5EDABQ1 / PSC3M5FDS2ABQ1	PSC3P5EDABQ1 / PSC3P5FDS2ABQ1
QFN48 (128KB/256KB)	PSC3M5EDLGQ1 / PSC3M5FDS2LGQ1	PSC3P5EDLGQ1 / PSC3P5FDS2LGQ1
QFP64 (128KB/256KB)	PSC3M5EDACQ1 / PSC3M5FDS2ACQ1	PSC3P5EDACQ1 / PSC3P5FDS2ACQ1
QFN64 (128KB/256KB)	PSC3M5EDLHQ1 / PSC3M5FDS2LHQ1	PSC3P5EDLHQ1 / PSC3P5FDS2LHQ1
QFP80 (128KB/256KB)	PSC3M5EDAFQ1 / PSC3M5FDS2AFQ1	-

Kit	Kit number with power board	Kit number without power board
General purpose evaluation kit	-	KIT_PSC3M5_EVK
Motor control kit	KIT_PSC3M5_MC1	KIT_PSC3M5_CC2
Power conversion kit	KIT_PSC3M5_DP1	KIT_PSC3M5_CC1

Block diagram
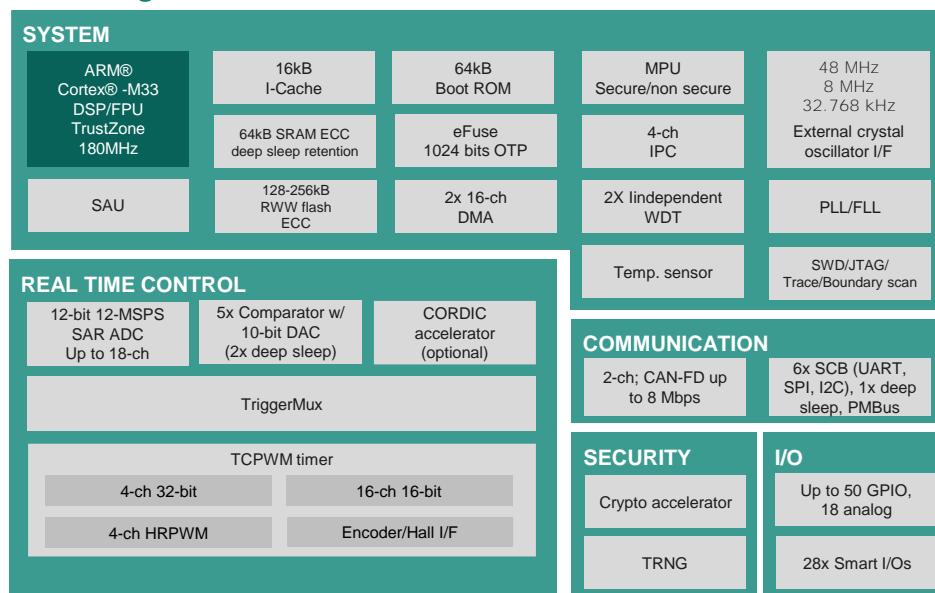
SYSTEM

ARM® Cortex® -M33 DSP/FPU TrustZone 180MHz	16kB I-Cache	64kB Boot ROM	MPU Secure/non secure	48 MHz 8 MHz 32.768 kHz
	64kB SRAM ECC deep sleep retention	eFuse 1024 bits OTP	4-ch IPC	External crystal oscillator I/F
SAU	128-256kB RWW flash ECC	2x 16-ch DMA	2X Iindependent WDT	PLL/FLL
			Temp. sensor	SWD/JTAG/ Trace/Boundary scan

REAL TIME CONTROL

12-bit 12-MSPS SAR ADC Up to 18-ch	5x Comparator w/ 10-bit DAC (2x deep sleep)	CORDIC accelerator (optional)
TriggerMux		
TCPWM timer		
4-ch 32-bit	16-ch 16-bit	
4-ch HRPWM	Encoder/Hall I/F	

COMMUNICATION

2-ch; CAN-FD up to 8 Mbps	6x SCB (UART, SPI, I2C), 1x deep sleep, PMBus

SECURITY

Crypto accelerator
TRNG

I/O

Up to 50 GPIO, 18 analog
28x Smart I/Os

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