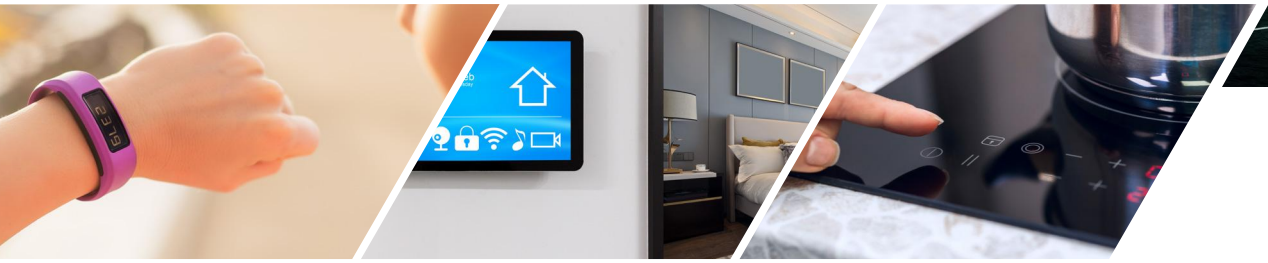
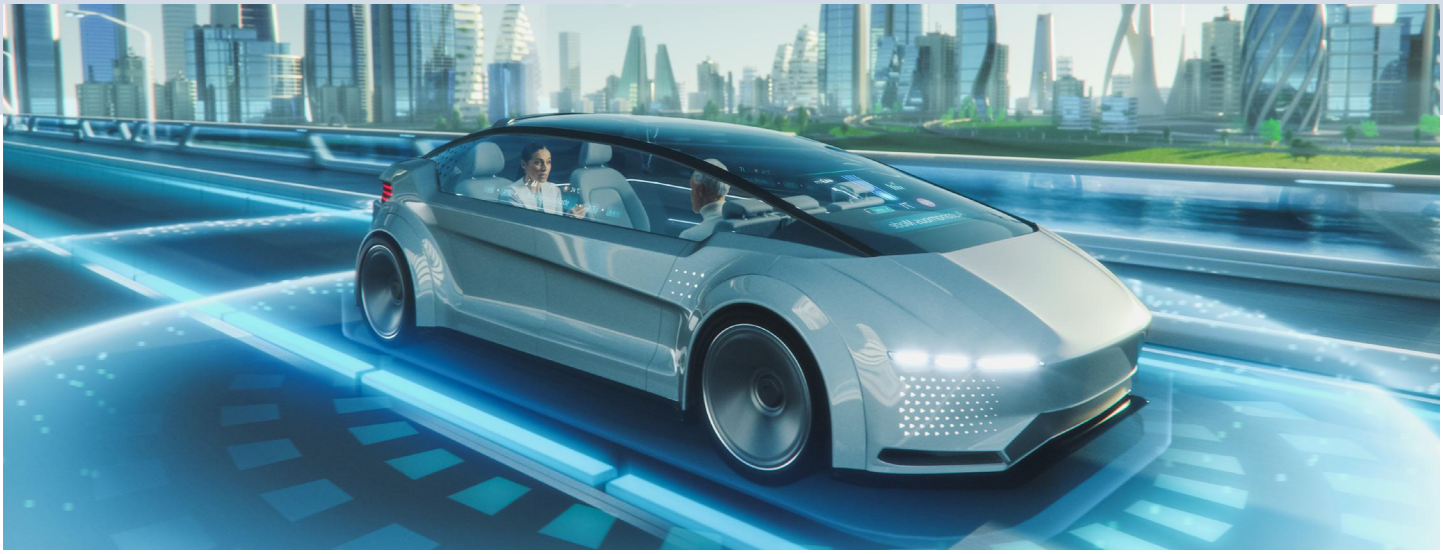
World-Class 32-bit Microcontrollers

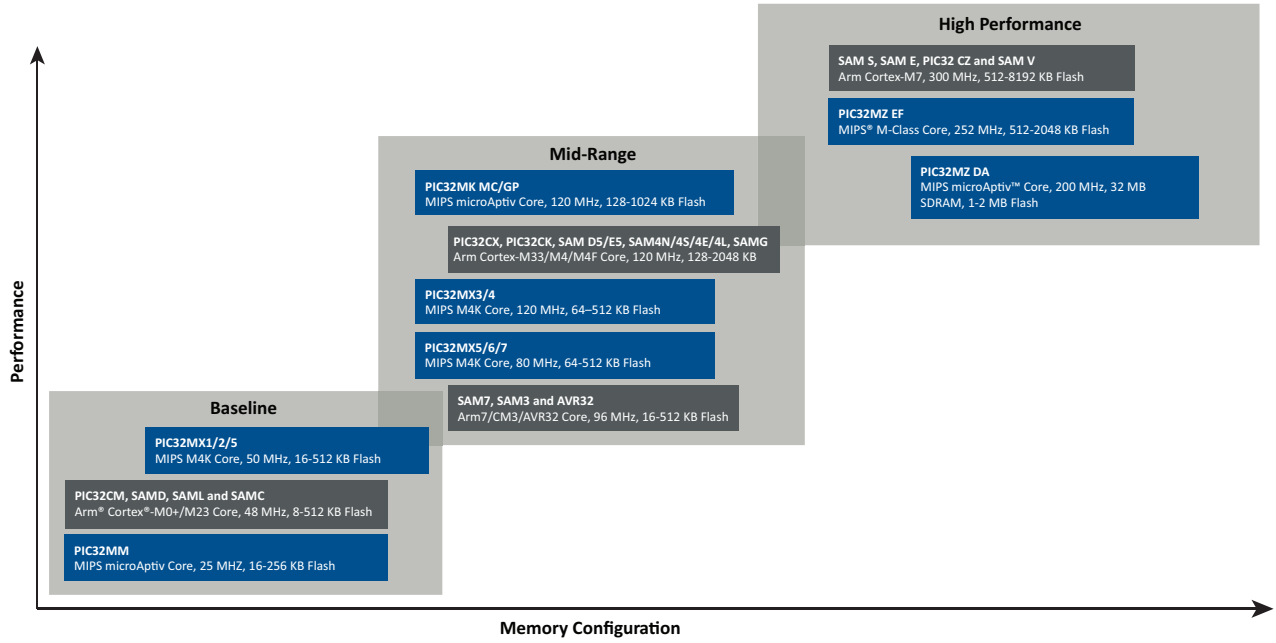
Broad Portfolio With Smart Peripheral Mix and Multiple Performance Options





Building on our heritage of world-leading 8-bit and 16-bit microcontrollers (MCUs), devices in our 32-bit MCU portfolio provide ultra-low power consumption, high performance and functional capabilities to meet the requirements of a vast array of embedded designs. They are excellent choices for secure Internet of Things (IoT), 5G, data center, sustainability, E-Mobility and Advanced Driver Assistance Systems (ADAS) applications.

Accelerate your development with our comprehensive and easy-to-use ecosystem of hardware and software tools which include the MPLAB® X Integrated Development Environment (IDE) and MPLAB Harmony embedded software development framework.



Most Comprehensive 32-bit MCU Solutions for a Wide Range of Applications

Device Family	Digital Audio/ Bluetooth®	Graphics/ Segmented Display	Connectivity	Functoinal Safety	Touch	IoT Nodes/ Gateways	Wearables/ Sensor Hubs	Appliances	Industrial Automation	Automotive	Motor Control	Metering	Connected Lighting
PIC32CM			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAM D			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
SAM L		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
SAM C			✓	✓	✓			✓	✓	✓	✓	✓	
PIC32CX			✓	✓	✓	✓	✓	✓	✓	✓	✓		
SAM D5/E5			✓		✓	✓	✓	✓	✓	✓	✓		
SAM 4S			✓			✓	✓		✓			✓	
SAM 4L		✓	✓		✓	✓	✓	✓				✓	
SAM 4N			✓						✓			✓	
SAM 4E			✓			✓			✓			✓	
SAM G			✓			✓	✓		✓				
SAM S70/E70			✓			✓			✓		✓		
SAM V7x			✓						✓	✓	✓		
PIC32MM			✓			✓	✓	✓	✓		✓		
PIC32MX1/2/5	✓	✓	✓	✓		✓	✓	✓	✓	✓			
PIC32MX3/4	✓	✓	✓	✓				✓	✓	✓			
PIC32MX5/6/7		✓	✓	✓		✓		✓	✓	✓			✓
PIC32MK	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	
PIC32MZEF	✓	✓	✓	✓		✓		✓	✓	✓		✓	✓
PIC32CZ CA	✓		✓	✓	✓	✓		✓	✓	✓		✓	
PIC32CK SG	✓		✓	✓	✓	✓	✓			✓	✓		
PIC32MZDA	✓	✓	✓	✓				✓		✓			

Features and Solutions

- Ultra-low power of < 25 µA/MHz in active mode and 100 nA in sleep mode
- High performance of up to 600 DMIPS with double-precision hardware floating point and up to 8 MB dual-panel Flash and 1 MB of SRAM
- Enhanced Peripheral Touch Controller (PTC), a dedicated hardware peripheral with parallel acquisition and superior water tolerance and noise immunity that enables the creation of robust capacitive touch solutions
- Functional safety portfolio supporting IEC 60730 (Class B), IEC 61508 (SIL) and ISO 26262 (ASIL) safety standards
- Error Correction Code (ECC) support with fault injection for Flash, data Flash and SRAM
- Memory Built-In Self-Test (MBIST) testing of SRAM
- Chip-level security and Arm® TrustZone® technology
- System-in-Package (SiP) options with secure elements
- SleepWalking allows peripherals to perform a desired task while the Central Processing Unit (CPU) is asleep
- Event system enables inter-peripheral communication and efficiently offloads the CPU
- 2D Graphics Processing Unit (GPU) and three-layer graphics controller with up to 24-bit color
- picoPower® and eXtreme Low Power (XLP) technologies
- Low-Cost Controllerless Graphics (LCCG) solutions
- Integrated Advanced Encryption Standard (AES) and Public Key Cryptography Controller (PUKCC)
- Security: Secure Boot, Public Key and Private Key Cryptographic Acceleration, Secure Key Storage, and embedded Hardware Security Module (HSM)
- Motor control Pulse-Width Modulation (PWM) and motor encoder interface
- Dual-panel Flash options for live updates
- High-performance Analog-to-Digital Converter (ADC) with up to 25.45 Msps in 12-bit mode or 33.79 Msps in 8-bit mode

Baseline MCUs: PIC32CM, SAM D, SAM L and SAM C Series

Key Features:

- Arm Cortex®-M0+ or M23 core
- Enhanced security
  - Arm TrustZone technology
  - TRNG, AES, SHA and CRC
  - User tamper detection
  - Secure boot option
- Event system
- Sleepwalking peripherals
- SERCOM
- 10-bit/12-bit DAC
- Enhanced PTC
- Analog comparator
- Supports crystal-less USB operation
- CCL
- Nested vector interrupt
- I^2S, ISO 7816, CAN FD USB
- WDT, POR, BOR, RTC, PAC and CFD
- AEC-Q100 Automotive qualified
- 5V operation
- Functional safety support

Feature	PIC32CM LX	PIC32CM JH	PIC32CM MC	SAM D	SAM L	SAM C20/21
Frequency	48 MHz	48 MHz	48 MHz	48 MHz	48/32 MHz	48 MHz
Flash Memory	256–512 KB Flash	128–512 KB Flash with ECC	64–128 KB Flash	8–256 KB Flash	16–256 KB Flash	32–256 KB Flash
SRAM	32–64 KB SRAM	16–64 KB SRAM with ECC	8–16 KB SRAM	2–32 KB SRAM	4–32 KB SRAM	4–32 KB SRAM
Pin Count	48, 64, 100 pins	32, 48, 64, 100 pins	32, 48 pins	14, 20, 24, 32, 48, 64 pins	24, 32, 48, 64, 100 pins	32, 48, 64, 100 pins
System Flexibility	16-channel DMA, CCL, intelligent low-power peripheral event system	12-channel DMA, CCL, intelligent low- power peripheral event system, 5V operation	Up to 12-channel DMA, CCL, intelligent low-power peripheral event system, 5V operation	Up to 12-channel DMA intelligent low-power peripheral event system	Up to 16-channel DMA, CCL, intelligent low-power peripheral event system	Up to 12 channel DMA, CCL, intelligent low-power peripheral event system, 5V operation
Timing and Measurements	3 × TC for control	3 × TC for control, PDEC, DIVAS	5 × TC for control, PDEC	4 × TC for control	3 × TC for control	3 × TC for control, DIVAS
Integrated Analog	12-bit ADC, 1 Msps, 3 × op amps	12-bit ADC, 1 Msps DIVAS	16-bit SDADC and two 12-bit ADCs, 1 Msps	12-bit ADC, 350 ksps	12-bit ADC, 1 Msps 3 × op amps	16-bit SDADC and two 12-bit ADCs, 1 Msps DIVAS
Communication	Full-Speed USB host and device, UART, I2C, SPI, I²S™	CAN FD, UART, I²C, SPI	UART, I²C, SPI	Full-Speed USB host and device, UART, I2C, SPI, I²C	Full-Speed USB host and device, UART, I²C, SPI	CAN FD, UART, I²C, SPI
User Interface	PTC	PTC with Driven Shield		PTC	PTC, SLCD controller	PTC
Security and Automotive	Joint Interpretation Library (JIL) high-rated Trust Platform ATECC608 secure element with Arm® TrustZone® technology, AES, SHA, TRNG, secure boot, tamper detection	Automotive qualified, secure boot	Automotive qualified	Automotive qualified	Chip-level security, Arm TrustZone technology, securely pre-provisioned, Kinibi-M™ support	

- **PIC32CM Lx:** This family of MCUs provides robust security, ultra-low power consumption, enhanced touch and smart analog. These easy-to-use MCUs run at 48 MHz and are available with large memory options and peripherals that include an enhanced PTC, Full Speed (FS) USB, op amps, one ADC and two DACs.
- **PIC32CM JH:** These 5V MCUs are excellent options for appliance, ASIL-B and industrial applications. This family features 12-bit ADCs, hardware DIVAS, a PTC with Driven Shield and high-end timers/counters.
- **PIC32CM MC:** These devices combine the performance and energy efficiency of an Arm Cortex-M0+ based MCU with an optimized architecture and powerful peripherals. They are an excellent choice for motor control, home appliance, industrial control and other 5V applications.
- **SAM D:** This series of flexible and easy-to-use MCUs offers large memory options, low power consumption and peripherals that include a PTC. They also include Full-Speed USB, DMA and a timer/counter for control.
- **SAM L:** This ultra-low-power MCU family includes an enhanced PTC, SLCD controller, 12-bit ADC, 12-bit DAC, op amps, Full-Speed USB and security features. These MCUs run at up to 48 MHz and come in 24-, 32-, 48-, 64- and 100-pin packages.
- **SAM C20/21:** This family of 5V MCUs targets appliance and industrial applications. They feature 12-bit ADCs, hardware DIVAS, a PTC and high-end timers/counters. The SAM C21 also includes a 16-bit Delta-Sigma ADC, CAN FD and CAN 2.0A/B.

Mid-Range MCUs: PIC32CX, PIC32CK, SAM D5/E5, SAM 4, SAM G and SAM3 Series

Key Features:

- Arm Cortex®-M4/M4F and M33 core
- Arm Cortex-M3 SAM3 core
- Enhanced security
  - Arm TrustZone technology
  - TRNG, PUKCC, ICM (SHA,) AES and ECC
  - User tamper detection
  - Secure boot option
  - Hardware Security Module (HSM)
- DSP instructions and Floating Point Unit (FPU)
- Event system
- SleepWalking peripherals
- High I/O pin count
- 10-/12-bit DACs
- Analog comparators
- Communication (USB, CAN, Ethernet)
- EBI with memory controller
- Automotive qualified

Feature	PIC32CX	PIC32CK	SAM D5/E5	SAM 4S/4N/4E	SAM 4L	SAM G	SAM 3
Frequency	120 MHz CM4F	120 MHz CM33	120 MHz CM4F	100-120 MHz CM4	48 MHz CM4	48–120 MHz CM4F	48–96 MHz CM3
Flash Memory	1 MB Flash with ECC	512 KB–2 MB Flash with ECC	256 KB–1 MB Flash	128 KB–2 MB Flash	128–512 KB Flash	256-512 KB Flash	16 KB–512 KB Flash
SRAM	128 KB–256 KB SRAM with ECC	128 KB–512 KB SRAM	128 KB–256 KB SRAM	64–160 KB SRAM	32–64 KB SRAM	64–176 KB SRAM	4–96 KB SRAM
Pin Count	100, 128 pins	64, 100, 144 pins	48, 64, 100, 120, 128 pins	48, 64, 100 pins	48, 64, 100 pins	49, 64, 100 pins	48, 64, 100, 144 pins
System Flexibility	DMA, CCL, intelligent low-power peripheral event system	DMA, CCL, intelligent low-power peripheral event system	DMA, CCL, intelligent low-power peripheral event system	DMA, intelligent low-power peripheral event system	DMA, intelligent low-power peripheral event system	DMA, intelligent low-power peripheral event system	DMA
Communication	Full-Speed USB host and device, 2 × CAN FD, 1 × Ethernet, 1 × QSPI, SDHC	2 × SDHC, 1 × Ethernet, Full-Speed USB host and device, 2 × CAN FD	Full-Speed USB host and device, 2 × CAN FD, 1 × Ethernet, 1 × QSPI, SDHC	Full-Speed USB device 2 × CAN, 1 × Ethernet	Full-Speed USB host and device	Full-Speed USB host and device, I²S™	USB 2.0 device 5 × UARTs, 4 × SPI, 2 × I2C and I²S, 1 × Ethernet, 2 × CAN
User Interface	PTC, PCC	PCC, PTC	PCC	SLCD controller			
Integrated Analog	2 × 16-bit ADCs, 2 × 12-bit DACs	2 × 12-bit ADCs, temperature sensor	2 × 12-bit ADCs, 2 × 12-bit DACs	2 × 16-bit ADCs, 2 × 10–12-bit DACs	12-bit 300 ksps ADC, 12-bit DAC	12-bit 500 ksps ADC, 12-bit DAC	12- bit 1 Msps ADC, 12-bit 1 Msps DAC
Security	PUKCC, ICM, AES, ECC TRNG, GCM	HSM, AES, HASH, ECC TRNG, GCM, Secure Boot	PUKCC, ICM, AES	CRC, AES	AES, TRNG	Tamper detection	

- **PIC32CX:** This family of MCUs combines connectivity, performance and industry-leading integrated security options to power industrial, IoT, automotive and other applications. It features a JIL High-certified Hardware Security Module (HSM), secure boot, secure debug and code protection from chip erase.
- **PIC32CK:** These MCUs combine connectivity, performance and industry-leading integrated security options to power industrial, IoT, automotive and other applications. They include an HSM, Arm TrustZone technology and integrated security features.
- **SAM D5/E5:** Targeting connectivity and security applications, these MCUs run at 120 MHz and consume under 65 µA/MHz in active mode. They feature a PTC, PCC for image sensing, PUKCC and ICM based on SHAs.
- **SAM 4S:** This family of MCUs features a multi-layer bus matrix, multi-channel DMA and distributed memory to support high-data-rate communication.
- **SAM 4N:** These MCUs have features for use in a variety of industrial automation, consumer, appliance and energy metering applications. The SAM 4N is pin compatible with the SAM 3S, SAM 3N and SAM 7S families of MCUs.
- **SAM 4E:** This family offers a rich set of connectivity peripherals including 10/100 Mbps Ethernet MAC supporting IEEE® 1588, dual CAN 2.0B and single-precision FPU.
- **SAM 4L:** These MCUs are excellent options for power-sensitive designs. They feature power consumption as low as 90 µA/MHz in active mode and sleep modes with full RAM retention down to 1.5 µA and a fast wake-up time of 1.5 µs.
- **SAM G:** Optimized for ultra-low power and high performance, these small-form-factor MCUs are bundled with a FPU, DMA and good SRAM-to-Flash ratio in a very tiny 2.8 × 2.8 mm WLCSP.
- **SAM 3N:** This family of MCUs, which is available in 48-, 64- and 100-pin options, offers up to 64 KB Flash, 8 KB SRAM, 48 MHz performance, touch support, USART, SPI, I²C, 10-bit ADC and 10-bit DAC.
- **SAM 3S:** These MCUs, which are available in 48-, 64- and 100-pin options, offer up to 512 KB dual-bank Flash, 64 KB SRAM, 64 MHz performance, SDIO/SD/MMC interface, touch support, I2S, SPI, I²C, UARTs, 12-bit ADC and 12-bit DAC.
- **SAM 3U:** This family of devices comes in 100- and 144-pin options and offers up to 256 KB dual-bank Flash, 48 KB SRAM, 96 MHz performance, static memory controller, SDIO/SD/MMC interface, touch, HS USB, SPI, I²C, I2S, UARTs and 10-/12-bit ADCs.
- **SAM 3X/A:** These devices, which are available in 100- and 144-pin options, offer up to 512 KB dual-bank Flash with safety and security features, 96 KB SRAM, 84 MHz performance, NAND Flash controller, touch, dual CAN, Ethernet MAC, HS USB, SDIO/SD/MMC interface, SPI, I²C, I2S, UARTs, 12-bit ADC and 12-bit DAC.

High-Performance MCUs: PIC32CZ and SAM S70/E70/V7x Series

Key Features:

- High performance
  - Arm Cortex-M7 core: 300 MHz, 1500 CoreMarks®
  - Single- and double-precision hardware FPU
  - 16 KB of I-Cache and 16 KB of D-Cache with ECC
  - Execution in place from on-chip Flash NVM connected to QSPI and EBI
  - Multi-port SRAM minimizes latency
  - User-configurable SRAM and TCM size
- Advanced Analog Front End (AFE)
  - Dual sample and hold, 12-bit ADC and 16-bit hardware averaging
  - Differential input, programmable gain
  - Automatic gain and offset error correction
  - DMA support, hardware and software trigger
- Hi-Speed USB host/device with integrated PHY
- Embedded Hardware Security Module (HSM)
- Memory integrity check monitor
- CMOS camera interface
- Ethernet and dual CAN on SAM E70 and SAM V71
- Sleepwalking on UART and I²C
- Event system
- Temperature options
  - −40°C to +105°C
  - AEC-Q100, −40°C to +105°C (Grade 2)

Feature	PIC32CZ	SAM S70	SAM E70	SAM V70	SAM V71
Frequency	300 MHz				
Flash	2 MB, 4 MB, 8 MB Flash with ECC	512 KB, 1 MB, 2 MB Flash with ECC	512 KB, 1 MB, 2 MB Flash with ECC	512 KB, 1 MB Flash with ECC	512 KB, 1 MB, 2 MB Flash with ECC
SRAM	512 KB, 1 MB SRAM with ECC	256 KB, 384 KB	256 KB, 384 KB	256 KB, 384 KB	256 KB, 384 KB
Backup SRAM	1 KB				
External Bus Interface	16-bit (SDRAM, SRAM)				
Ethernet IEEE® 1588 (MAC)	10/100/1000 Mbps	–	10/100 Mbps	–	10/100 Mbps
CAN FD	6	–	2		
MediaLB® Bus	Yes	–	Yes		
Hi-Speed USB	2	1			
Automotive Qualified	Yes	–	Yes		
Camera Interface	1				
QSPI	-	1			
HSMCI/SDIO/ eMMC	10 TCC, 2 × SD	1 × HS			
USART or SPI/ UART	10 USART	5/3			
SPI/I²C/SSC (I²S™/ TDM)	1/2	2/3/1			
12-bit ADC	36-channel, 4 Msps	2 × 12-channel, 2 Msps			
12-bit DAC		2-channel, 2 Msps			
Timers/PWM	10/10	12/8			
Security	HSM	TRNG, AES 256, SHA 1/256 Crypto Acceleration			
Pin Count	100–208	64–144			
Package	TQFP, TFBGA	QFN, QFP, BGA			

Baseline MCUs: PIC32MX1/2/5 and PIC32MM Series

Key Features:

- MIPS® core
- UART
- SPI
- I²C
- PPS
- 32-bit CRC
- RTCC
- WDT, BOR, POR
- Timer/compare/capture
- eXtreme Low Power (XLP) technology
- Functional safety

Feature	PIC32MX1	PIC32MX2	PIC32MX5	PIC32MM
Frequency	40, 50, 72 MHz			25 MHz
Flash	16–512 KB Flash		64–512 KB Flash	16–256 KB Flash
SRAM	4–64 KB SRAM		8–64 KB SRAM	4–32 KB SRAM
Pin Count	28, 36, 44, 64, 100 pins		64, 100 pins	20, 28, 36, 40, 48, 64 pins
Communication	Full-Speed USB and OTG, PMP, SPI, UART	Full-Speed USB and OTG, PMP, SPI, UART	Full-Speed USB and OTG, PMP, SPI, UART, CAN	Full-Speed USB host, device and OTG
Intelligent Analog	10-bit 1 Msps ADCs, analog comparators	10-bit 1 Msps ADCs, analog comparators	10-bit 1 Msps ADCs, analog comparators	12-bit 300 ksps ADCs, analog comparators

- **PIC32MX1:** This family of MCUs is optimized for cost and performance with additional features such as DMA and PMP and more serial interfaces, comparators and ADC channels than the PIC32MM family. It is a good choice for general-purpose embedded control and graphics applications. Select variants feature XLP options.
- **PIC32MX2:** This family of MCUs is an upgrade to the PIC32MX1 family and includes Full-Speed USB. It targets cost-sensitive digital audio, graphics and USB applications. Select variants feature XLP options.
- **PIC32MX5:** This family of MCUs extends the capabilities of the PIC32MX2 family with the addition of CAN 2.0B. It is a good choice for industrial, digital audio, graphics, USB and CAN applications.
- **PIC32MM:** The PIC32MM family is the lowest-power and smallest member of the PIC32 family, offering sleep modes down to 500 nA and packages as small as 4 × 4 mm. These features make this family suitable for low-power and space-constrained applications.

Mid-Range MCUs: PIC32MK, PIC32MX3/4 and PIC32MX5/6/7 Series

Key Features:

- MIPS core
- UART
- SPI
- I²C
- PPS
- 32-bit CRC
- RTCC
- WDT, BOR, POR
- Timer/compare/capture
- ECC
- Functional safety support

Feature	PIC32MK	PIC32MX3	PIC32MX4	PIC32MX5	PIC32MX6	PIC32MX7
Frequency	120 MHz	Up to 120 MHz		80 MHz		
Flash	256–1024 KB dual bank	64–512 KB Flash				
SRAM	64–256 KB RAM	16–128 KB SRAM				
Pin Count	48, 64, 100 pins	64, 100, 124 pins		64, 100, 121, 124 pins		
	2 × Full-Speed USB device, host and OTG, 4 × CAN 2.0B and CAN FD	Full-Speed USB device, host and OTG, I²S™		Full-Speed USB device, host, OTG, CAN 2.0B, 10/100 Ethernet MAC		
Timing and Measurements System Flexibility	MC, PWM and QEI					
	DMA and PMP	DMA and PMP				
Intelligent Analog	25.45 Msps 12-bit mode or 33.79 Msps 8-bit mode, op amp, 12-bit CDAC and analog compare	10-bit 1 Msps ADC, analog comparators				

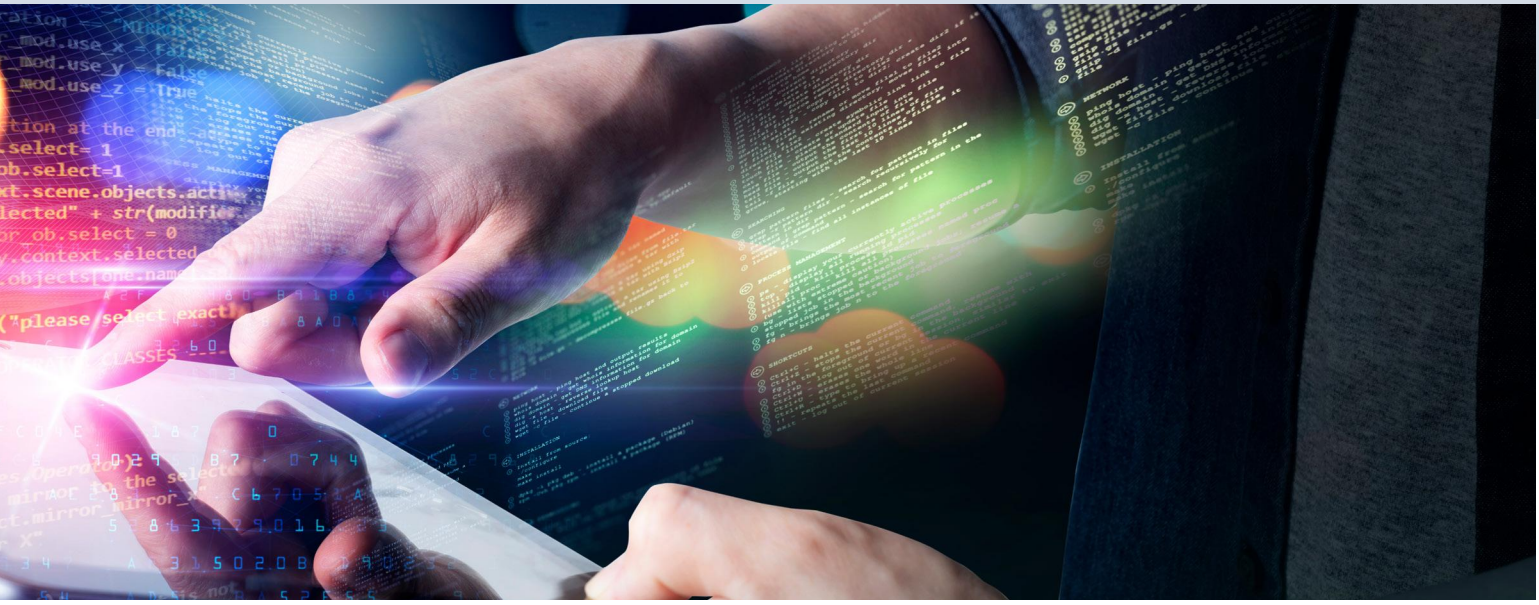
- **PIC32MX3:** These general-purpose MCUs offer up to 120 MHz performance for complex embedded applications that require larger code and data size.
- **PIC32MX4:** This family expands the capabilities of the PIC32MX3 family to include Full-Speed USB and targets USB, Bluetooth®, high-end digital audio and graphics applications.
- **PIC32MX5:** Offering large RAM, Full-Speed USB and CAN 2.0B, this mid-range MCU family with embedded connectivity is a good choice for industrial, automotive cabin and infotainment, USB and graphics applications.
- **PIC32MX6:** These MCUs feature large RAM and embedded connectivity options that include Full-Speed USB and a 10/100 Ethernet MAC. They are excellent options for IoT, gateways, industrial, USB and graphics applications.
- **PIC32MX7:** As an upgrade to the PIC32MX5 and PIC32MX6 families, this family offers a rich set of connectivity peripherals including dual CAN 2.0B, Full-Speed USB and a 10/100 Ethernet MAC for designing a broad range of embedded connectivity applications.
- **PIC32MK:** This motor control and general-purpose family of MCUs offers up to 1 MB dual-panel Flash with live update as well as a motor control PWM, QEI, four CAN modules and advanced analog. It also features a high-performance ADC supporting up to 25.45 Msps in 12-bit mode or 33.79 Msps in 8-bit mode.

High Performance MCUs: PIC32MZ Series

Key Features:

- High Performance
  - MIPS M-Class core: 252 MHz, 415 DMIPS
  - MIPS microAptiv™ core: 200 MHz, 330 DMIPS
  - Seven-stage FPU for 32-bit and 64-bit floating-point math
  - microMIPS mode for up to 35% smaller code size
  - 32 KB I-cache, 32 KB D-cache
  - DSP-enhanced core
  - High-performance graphics
  - Three-layer graphics controller with up to 24-bit color support
  - High-performance 2D GPU
  - Advanced analog
  - 12-bit ADC, 18 Msps, 6 sample and hold, 48 channels
  - Six digital comparators and filters
  - Sleep and idle mode operation
  - Two analog comparators with 32 programmable voltage references
  - Temperature sensor with ±2°C accuracy
- Dual-panel Flash for live updates
- Memory management unit for optimum embedded OS execution
- Hi-Speed USB device/host/OTG with PHY
- 10/100 Ethernet MAC with MII and RMII interfaces
- Dual CAN 2.0B with DeviceNet addressing support
- SPI/I2S for audio
- Crypto engine with TRNG
- Peripheral Pin Select (PPS) for function remapping
- Temperature options
- −40°C to +85°C
- −40°C to +105°C
  - −40°C to +125°C (AEC-Q100 Grade 1)

Feature	PIC32MZ EF	PIC32MZ DA
Speed	252 MHz	200 MHz
FPU	Yes	–
2D GPU	–	Yes
Three-Layer Graphics Controller	–	Yes
DDR2 SDRAM	–	32 MB
Flash	512 KB, 1 MB, 2 MB	1, 2 MB
SRAM	128, 256, 512 KB	256, 640 KB
Boot Flash	160 KB	
DMA	26 channels	
Ethernet	10/100 Ethernet MAC	
USB	Hi-Speed device, host and OTG	
CAN	Dual CAN 2.0B	
ADC	12-bit, 18 Msps, 48 channels	12-bit, 18 Msps, 45 channels
Analog Compare	Two ACs with 32 programmable voltage references	
TRNG	Yes	
Crypto Engine Acceleration	AES 256, DES/TDES, SHA1/256, MD-5, AES-GCM	
Timers/Compare/Capture	9/9/9	
AEC-Q100	Grade 1	Grade 2
RTCC	Yes	
PMP	Yes	
SQI	Yes	
SD/SDIO/eMMC Bus Interface	–	Yes
DDR2 SDRAM Interface	–	Yes
EBI	Yes	
SPI/I²S™	6	
I²C	5	
UART	6	
Pin Count	64, 100, 124, 144	169, 176, 288
Packages	QFN, TQFP, VTLA, LQFP, TFBGA	LFBGA, LQFP



AVR32 and RISC MCUs

UC3L

Offers up to 256 KB Flash, 16 KB SRAM, 50 MHz performance and is available in 48- and 64-pin options with picoPower® peripherals, CAT module, Full-Speed USB and FlashVault code protection

UC3C

Offers up to 512 KB Flash, 68 KB SRAM, 66 MHz performance and is available in 64-, 100- and 144-pin options with automotive qualification, FPU, Ethernet, USB, dual CAN, dual LIN and FlashVault code protection

UC3D

Offers up to 128 KB Flash, 16 KB SRAM, 48 MHz performance and is available in 48- and 64-pin options with hardware QTouch® technology, Full-Speed USB and CAT module

UC3A3/A4

Offers up to 256 KB Flash, 128 KB SRAM, 84 MHz performance and is available in 100- and 144-pin options with Hi-Speed USB, NAND Flash and SDRAM interface, SD/SDIO, AES and crypto module

UC3A0/A1

Offers up to 512 KB Flash, 64 KB SRAM, 66 MHz performance and is available in 100- and 144-pin options with Ethernet MAC, USB and SDRAM interfaces

UC3B

Offers up to 512 KB Flash, 96 KB SRAM, 60 MHz performance and is available in 48- and 64-pin options with USB and I²S

SAM 7 Series

SAM 7S

Offers up to 512 KB of dual-bank Flash, 64 KB SRAM, 55 MHz performance and available in 48- and 64-pin options with Full-Speed USB, SPI, USART, I²C and 10-bit ADC

SAM 7SE

Offers up to 512 KB of dual-bank Flash and 32 KB SRAM, 55 MHz performance and available in 128- and 144-pin options with EBI (supports static memory, NAND, CompactFlash® and SDRAM), Full-Speed USB, USART, SPI, I²C and 10-bit ADC

SAM 7X

Offers up to 512 KB dual-bank Flash, 128 KB SRAM, 55 MHz performance and available in 100-pin options with Full-Speed USB, Ethernet MAC, CAN 2.0A and 2.0B, USART, SPI, I²C and 10-bit ADC

SAM 7XC

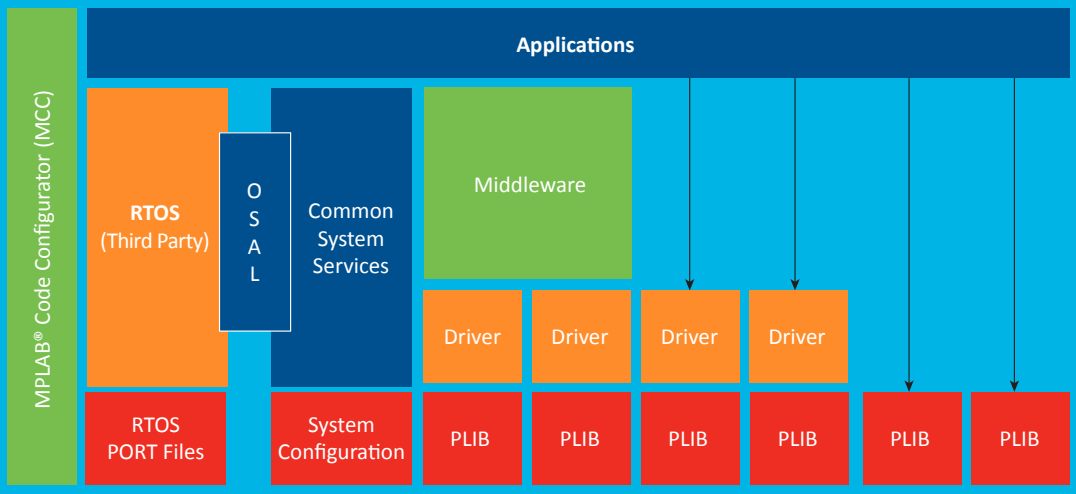
Offers up to 512 KB dual-bank Flash, 128 KB SRAM, 55 MHz performance and is available in a 100-pin option with two crypto blocks, Full-Speed USB, Ethernet MAC, CAN 2.0A and 2.0B, USARTs, SPI, I²C and 10-bit ADC

MPLAB Harmony v3 Embedded Software Development Framework

The MPLAB Harmony Software Framework is a unified and powerful content development and delivery environment that includes optimized peripheral libraries, simplified drivers and modular software downloads. It works with MPLAB X Integrated Development Environment (IDE) to enhance your application development experience.

MPLAB Harmony provides flexible choices that span different architectures, performance levels and applications. It enables you to develop robust, interoperable, Real-Time Operating System (RTOS)-friendly applications and offers quick and extensive support for third-party software integration. Use it with MPLAB Code Configurator (MCC), our free graphical programming environment, to generate seamless, easy-to-understand C code that can be used in your application development. MCC includes a modular download manager and can be used to select and configure all MPLAB Harmony middleware, system services and peripherals.

MPLAB Harmony Block Diagram



Key Benefits

- Core-agnostic implementation that supports MIPS and Arm Cortex core architectures
- 1000+ demo/application examples
- A variety of reference applications/examples
- Easily configurable using MCC's Graphical User Interface (GUI)
- Layered and self-contained framework includes:
  - Peripheral libraries: hardware abstraction layer
  - Drivers and services
  - Reusable middleware
  - Supports 32-bit PIC® (MIPS-based) and SAM (Arm Cortex-based) MCU and MPU device families
  - Fully integrated with third-party solutions

MPLAB Harmony Resources

MPLAB Harmony Middleware Repositories

Audio Library: This repository contains a variety of audio drivers, encoders, decoders and firmware projects. Each example application project describes its hardware setup, block diagram, requirements, hardware compatibility and operation.

Bluetooth Library: This repository contains the MPLAB Harmony v3 Bluetooth Package. It supports a fast-to-market Bluetooth development environment for 32-bit SAM and PIC MCUs.

Cryptography Library: The cryptography library includes functions to perform encryption, decryption, hashing, authentication and compression within an embedded application. It also comes with Random Number Generation (RNG) functions.

Graphics Library: The graphics repository contains the files for MPLAB Harmony Graphics Suite quick-start applications, drivers, tools, libraries and templates.

Wireless Wi-Fi® Library: This repository contains Wi-Fi solutions that will enable you to incorporate connectivity quickly into your designs. We also offer wireless ICs, modules, software and development kits that make connecting effortless for your customers.

Motor Control Library: This module contains motor control demonstrations implemented on 32-bit microcontrollers.

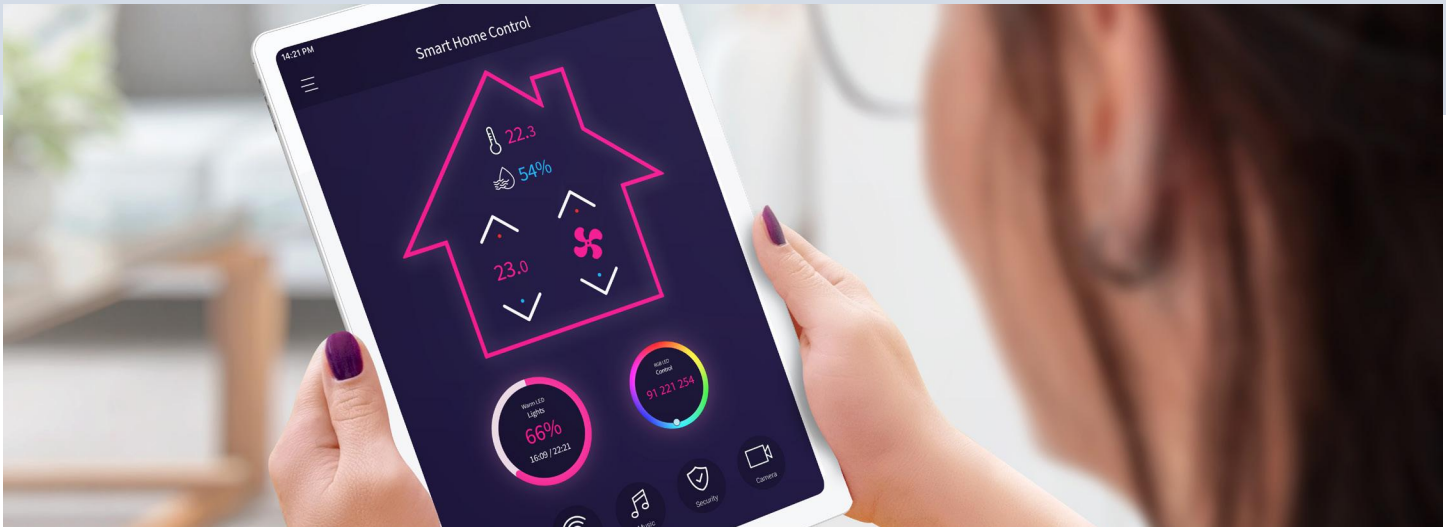
Touch Library: Use this software library for developing touch applications on 32-bit microcontrollers with a Peripheral Touch Controller. The library supports both self-capacitance and mutual-capacitance acquisition methods.

Networking (TCP/IP) Library: This repository provides a fast-to-market TCP/IP stack for 32-bit PIC and SAM microcontrollers. It contains multiple applications that demonstrate communication over TCP/IP using well-known protocols such as TCP, UDP, HTTP and SMTP.

USB Library: The USB module provides USB controller drivers for 32-bit PIC and SAM devices, as well as host and device middleware with support for common device classes.

Device Setup Repositories

Core	The core module components provide the simple-to-use abstractions of 32-bit SAM and PIC device peripherals and shared resources on which the MPLAB Harmony middleware is based, including drivers, services and the Operating System Abstraction Layer (OSAL).
Chip Support Package (CSP)	The CSP module contains independent, low-level Peripheral Libraries (PLIBs) that are simple functions to initialize and control peripherals and basic device features on which MPLAB Harmony drivers and services are based. The CSP supports initialization of 32-bit devices and development of simple applications that directly control peripheral hardware with minimal external dependencies.
Board Support Package (BSP)	The BSP module provides initial configuration settings for PIC and SAM Xplained development boards.
MPLAB® Code Configurator (MCC)	This GUI-based configuration utility accelerates the development of embedded applications using 32-bit SAM and PIC devices.
Bootloader	The bootloader module components provide a framework to develop bootloaders for microcontrollers. The Bootloader Library can be used to upgrade firmware on a target device without requiring an external programmer or debugger.



Functional Safety

Our 32-bit MCUs offer a wide range of functional safety support focused on the following standards:

- ISO 26262 for automotive applications
- ISO 61508 for industrial applications
- IEC 60730 for household appliance applications

We offer a complete set of functional safety collateral for each standard as well as third-party certifications.

32-bit MCU Functional Safety Portfolio	Description	CPU Frequency (MHz)	AEC-Q100	ISO 26262 Automotive Safety	IEC 60730 (Class B)	IEC 61508 (SIL 2/3)
SAM DA1	Arm® Cortex®-M0+ core, 16–64 KB Flash	48	✓	✓	-	-
SAM D21	Arm Cortex-M0+ core, 16–256 KB Flash	48	✓	✓	✓	✓[1]
SAM D20	Arm Cortex-M0+ core, 16–256 KB Flash	48	✓	-	✓	-
SAM C20/C21	Arm Cortex-M0+ core, 32–256 KB Flash, 5V	48	✓	✓	✓	✓[1]
SAM C20N/C21N	Arm Cortex-M0+ core, 32–256 KB Flash, 5V	48	✓	✓	-	✓[1]
PIC32CM MC	Arm Cortex-M0+ core, 64–128 KB Flash, 5V	48	✓	✓	✓	✓[1]
SAM L21	Arm Cortex-M0+ core, 32–256 KB Flash	48	-	-	-	✓[1]
PIC32CM JH	Arm Cortex-M0+ core, 256–512 KB Flash	48	✓	✓	✓	✓[2]
SAM D51/E5x	Arm Cortex-M4F core, 512–1024 KB Flash	120	✓	✓	✓	✓[2]
PIC32CX SG	Arm Cortex-M4F core, 512–1024 KB Flash	120	✓	✓	✓	✓[2]
PIC32CK SG	Arm Cortex-M33 core, 512–2048 KB Flash	120	✓	✓	-	✓[2]
PIC32MK MC/GP	MIPS32® microAptiv™ core, 512–2048 KB Flash	120	✓	✓	-	✓[2]
SAM S70/E70	Arm Cortex-M7 core, 512–2048 KB Flash	300	-	-	✓	✓[2]
SAM V70/V71	Arm Cortex-M7 core, 512–2048 KB Flash	300	✓	✓	-	-
PIC32CZ CA	Arm Cortex-M7 core, 2048–8192 KB Flash	300	✓	✓	-	✓[2]

IEC 61508 Industrial Safety Notes:

1. Third-party SIL 2/3 STL developed by embeX
2. Microchip-developed SIL 2 STL

Please contact your local Microchip sales office for the current safety and security schedules for our 32-bit MCUs.

Available Now

In Development

Planned

Developing With SAM, PIC32C, and AVR32 Microcontrollers

Development Platforms

Xplained Platforms

Our Xplained prototyping and evaluation platform speeds up the development of projects using our Arm Cortex-based SAM, PIC32C, and AVR32 MCUs. These low-cost, easy-to-use evaluation kits are excellent for demonstrating the features and capabilities of your selected device and can be customized with a wide range of extension boards. We also offer a variety of example projects and code drivers to simplify your development. We offer the following families of Xplained boards:

- **Xplained:** This platform supports fast prototyping and evaluation for designs using AVR32 and SAM MCUs.
- **Xplained Pro:** This professional platform features auto-identification, an on-board debugger and standardized extension connectors.
- **Xplained Mini:** This ultra-low-cost platform is excellent for evaluating low-pin-count parts. It features auto-identification, an on-board debugger and access to all device pins.
- **Xplained Ultra:** This evaluation platform for high-end MCUs provides access to high-speed data and external memory interfaces, CCL, intelligent low-power peripheral event system.

Xplained Platform

Product Family	Board	Part Number
SAM E	SAM E70 Xplained	ATSAME70-XPLD

Xplained Pro Platform

Product Family	Board	Part Number
SAM C	SAM C21 Xplained Pro	ATSAMC21-XPRO
	SAM C21N Xplained Pro	ATSAMC21N-XPRO
SAM D	SAM DA1 Xplained Pro	ATSAMDA1-XPRO
	SAM D11 Xplained Pro	ATSAMD11-XPRO
	SAM D20 Xplained Pro	ATSAMD20-XPRO
	SAM HA1G16A Xplained Pro	ATSAMHA1G16A-XPRO
	SAM D21 Xplained Pro	ATSAMD21-XPRO
SAM L	SAM L10 Xplained Pro	DM320204
	SAM L11 Xplained Pro	DM320205
	SAM L21 Xplained Pro	ATSAML21-XPRO-B
	SAM L22 Xplained Pro	ATSAML22-XPRO-B
SAM G	SAM G55 Xplained Pro	ATSAMG55-XPRO
SAM 4	SAM 4E Xplained Pro	ATSAM4E-XPRO
	SAM 4L8 Xplained Pro	ATSAM4L8-XPRO
	SAM 4N Xplained Pro	ATSAM4N-XPRO
	SAM 4S Xplained Pro	ATSAM4S-XPRO
	SAM 4S Xplained Pro Starter Kit	ATSAM4S-XSTK
SAM D5/E5	SAM E54 Xplained Pro	ATSAME54-XPRO

Xplained Mini Platform

Product Family	Board	Part Number
SAM D	SAM D10 Xplained Mini	ATSAMD10-XMINI

Xplained Ultra Platform

Product Family	Board	Part Number
SAM V	SAM V71 Xplained Ultra	ATSAMV71-XULT
SAM E	SAM E70 Xplained Ultra	DM320113

Legacy Xplained Platform

Product Family	Board	Part Number
AVR32	UC3-A3 Xplained	AT32UC3A3-XPLD
	UC3-L0 Xplained	AT32UC3L0-XPLD

Curiosity Platform

Our Curiosity platform is a fully integrated development solution that is targeted at first-time users, makers and anyone seeking a feature-rich rapid prototyping board.

Curiosity Platform

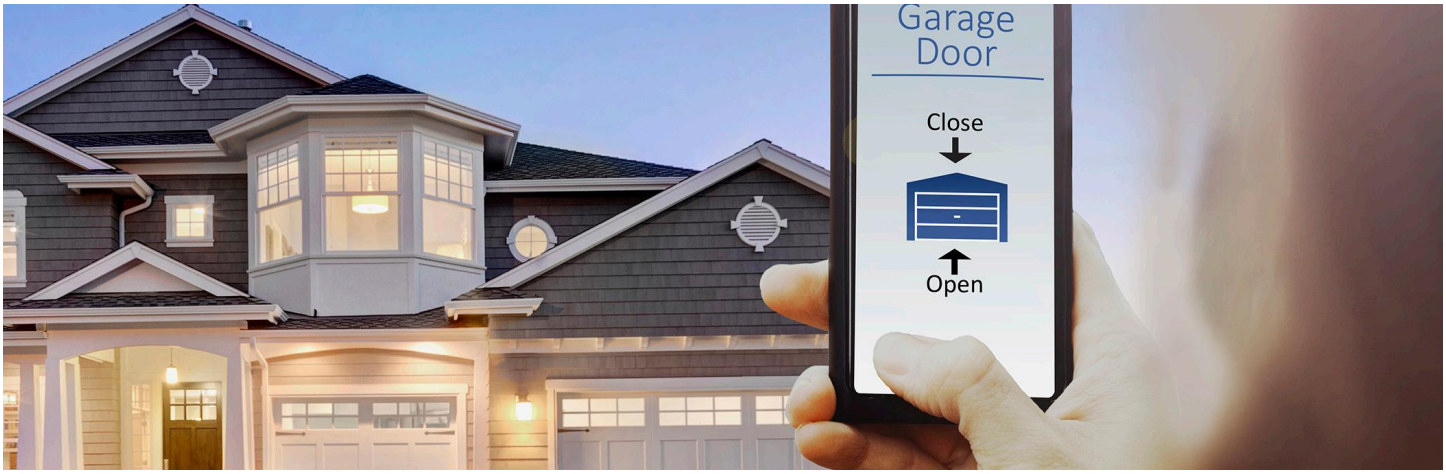
Product Family	Board	Part Number
SAM G	SAM G55 Audio Curiosity Board	EV78Y10A
SAM D	SAM D21 Curiosity Nano Evaluation Kit	DM320119
SAM D5/E5	SAM E54 Curiosity Ultra Development Board	DM320210
	SAM E51 Curiosity Nano Evaluation Kit	EV76S68A
PIC32CM	PIC32CM MC00 Curiosity Pro Evaluation Kit	EV15N46A
	PIC32CM MC Curiosity Nano Evaluation Kit	EV10N93A
	PIC32CM LE00 Curiosity Pro Evaluation Kit	EV80P12A
	PIC32CM LS00 Curiosity Pro Evaluation Kit	EV12U44A
	PIC32CM LS60 Curiosity Pro Evaluation Kit	EV76R77A
	PIC32CM JH01 Curiosity Pro Evaluation Kit	EV81X90A
PIC32CX	PIC32CX SG61 Curiosity Ultra Evaluation Board	EV09H35A
	PIC32CX SG41 Curiosity Ultra Evaluation Board	EV06X38A

IoT Cloud Platform

This plug-and-play platform for designing secure, cloud-connected systems features a SAM D21 MCU.

IoT Cloud Platform

Product Family	Board	Part Number
SAM D	SAM D21 IoT WG Development Board	EV75S95A



Extension Boards

Application	Extension Board	Part Number
Connectivity	WINC1500 Xplained Pro (Wi-Fi®)	ATWINC1500-XPRO
	WINC3400 Xplained Pro	ATWINC3400-XPRO
	WBZ451 Curiosity Development Board	EV96B94A
	Ethernet1 Xplained Pro	ATETHERNET1-XPRO
	PIC32 WFI32E Curiosity Board	EV12F11A
	WFI32-IoT Development Board	EV36W50A
	ATWILC1000-SD Evaluation Kit	ATWILC1000-SD
Touch and Graphics	QT1 Xplained Pro	ATQT1-XPRO
	QT2 Xplained Pro	ATQT2-XPRO
	QT3 Xplained Pro	ATQT3-XPRO
	QT4 Xplained Pro	ATQT4-XPRO
	QT6 Xplained Pro	ATQT6-XPRO
	QT7 Xplained Pro	ATQT7-XPRO
	T10 Xplained Pro Extension Kit	AC47H23A
	Curiosity Nano Touch Adapter	AC80T88A
	SAM E5x Graphics and Touch Curiosity Development Board	EV14C17A
	SLCD1 Xplained Pro	ATSLCD1-XPRO
	QT8 Xplained Pro Extension Kit	AC164161
	PIC32CM LE00 ULP Touch	EV55S83A
General Purpose	OLED1 Xplained Pro	ATOLED1-XPRO
	Curiosity Nano Base for Click boards™	AC164162
	PROTO1 Xplained Pro	ATPROTO1-XPRO
	I/O1 Xplained Pro	ATIO1-XPRO
	BNO055 Xplained Pro	ATBNO055-XPRO
Security	CryptoAuth Xplained Pro Version B	ATCRYPTOAUTH-XPRO-B
	CryptoAuth Trust Platform Development Kit	DM320118
	SAM D21 ML Evaluation Kit with TDK InvenSense 6-Axis MEMS	EV18H79A
	SAM D21 ML Evaluation Kit with BOSCH IMU	EV45Y33A
	TA100 14-pin SOIC CryptoAutomotive™ Security IC Socket Board	AC164166
	TA100 8-pin SOIC CryptoAutomotive Security IC Socket Board	AC164167

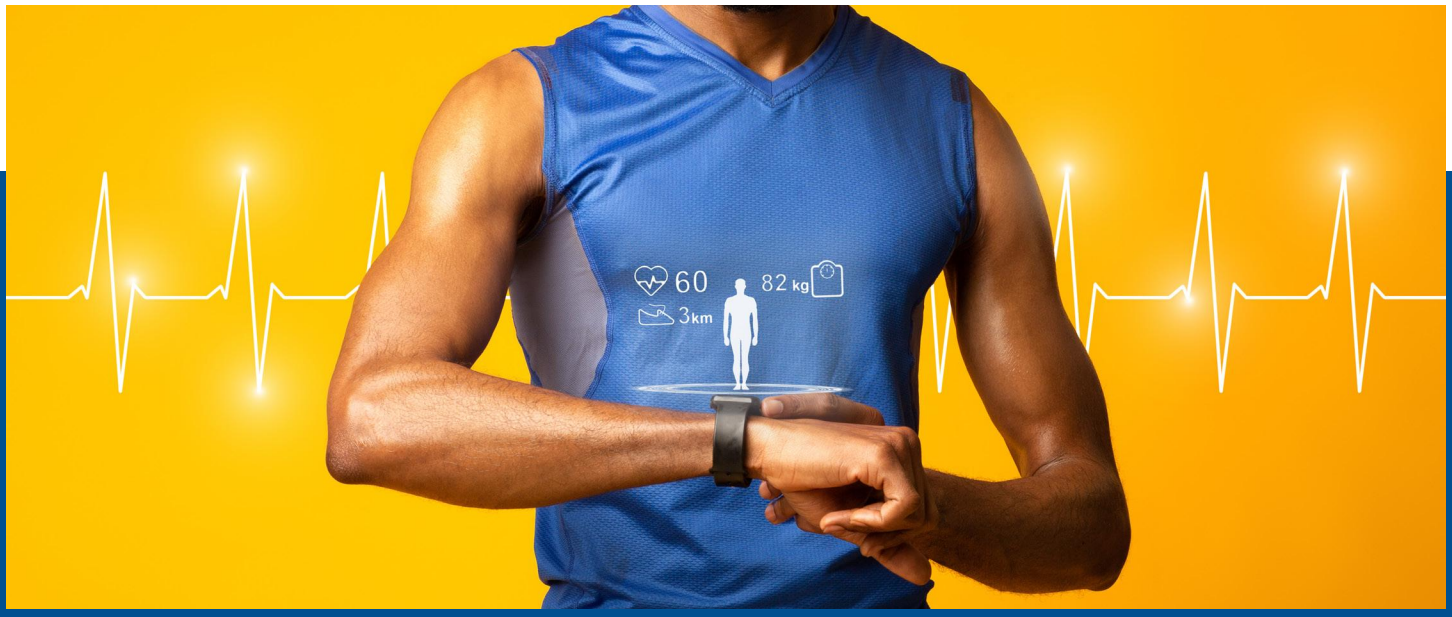
Motor Control Plug-in Modules (PIMs)

Product Family	PIM	Part Number
SAM E70	ATSAME70 Motor Control Plug-In Module*	MA320203
SAM C21	ATSAMC21 Motor Control Plug-In Module*	MA320206
SAM E54	ATSAME54 Motor Control Plug-In Module*	MA320207
PIC32CM	PIC32CM MC00 Motor Control Plug-In Module	EV94F66A
PIC32MK	PIC32MK MCA Motor Control Plug-In Module	EV74U93A

*Works with MCHV-2 (DM330023-2) and MCLV-2 (DM330021-2) Motor Control Development Boards

Programming and Debugging Tools

Programmer/Debugger	Part Number
MPLAB® Snap In-Circuit Debugger	PG164100
MPLAB PICkit™ 5 In-Circuit Debugger	PG164150

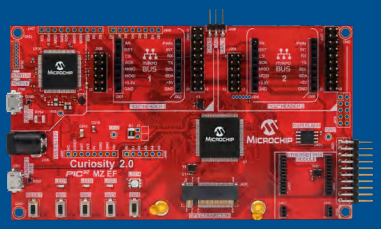


Developing With PIC32M Microcontrollers

32-bit Starter Kits and Curiosity Development Kits

Getting started with one of our 32-bit PIC32M MCUs is easy with one of our fully integrated starter kits or Curiosity boards. We also include application demos, software libraries and Board Support Packages (BSP) for faster development.

Featured Product: Curiosity PIC32MZ EF 2.0 Development Board (DM320209)



The Curiosity PIC32 MZ EF 2.0 Development Board is a fully integrated 32-bit development platform featuring the high-performance PIC32MZ EF series of MCUs. This development board comes with an integrated programmer and debugger and is available with a variety of expansion options, including a mikroBUS™ socket. It is a excellent option for developing Ethernet, Wi-Fi, IoT, audio, graphics and general-purpose embedded control applications.

Starter Kits and Curiosity Boards

Product Family	Starter Kits and Curiosity Boards	Part Number
PIC32MK	PIC32MK MCA Curiosity Pro	EV15D86A
	PIC32MK MCJ Curiosity Pro Development Board	DT100133
	PIC32MK MCM Curiosity Pro Development Board	EV31E34A
PIC32MM	PIC32MM USB Curiosity Development Board	DM320107
	PIC32MM Curiosity Development Board	DM320101
PIC32MX1/2/5	PIC32MX1/2/5 Starter Kit	DM320100
	Microstick II	DM330013-2
	PIC32MX274 XLP Starter Kit	DM320105
PIC32MX3/4	Curiosity PIC32MX Development Board	DM320103
	PIC32 USB Starter Kit III	DM320003-3
	PIC32 Starter Kit	DM320001
PIC32MX5/6/7	PIC32 Ethernet Starter Kit II	DM320004-2
PIC32MZ	Curiosity 2.0 PIC32MZ Development Board	DM320209
	PIC32MZ with FPU Embedded Connectivity Starter Kit	DM320007
	PIC32MZ with FPU Embedded Connectivity Starter Kit with Crypto Engine	DM320007-C
	PIC32MZ Embedded Graphics with External DRAM (DA) Starter Kit	DM320008
	PIC32MZ Embedded Graphics with External DRAM (DA) Starter Kit (Crypto)	DM320008-C
	PIC32MZ DA Curiosity Development Kit	EV87D54A

Plug-In Module (PIM) Platforms

Development Boards

Board	Part Number
Motor Control MCHV-3 Development Board	DM330023-3
Explorer 16/32 Development Board	DM240001-2
Motor Control MCHV-2 Development Board	DM330023-2
Motor Control MCLV-2 Development Board	DM330021-2

PIMs

Product Family	PIM	Part Number
PIC32MK	PIC32MK1024 Motor Control Plug-In Module*	MA320024
	PIC32MK MCM Motor Control Plug-In Module*	MA320211
PIC32MM	PIC32MM0064GPL036 Plug-In Module	MA320020
	PIC32MM0256GPM064 Plug-In Module	MA320023
PIC32MX1/2/5	PIC32MX250F128D Plug-In Module	MA320011
	PIC32MX270F256D Plug-In Module	MA320014
	PIC32MX570F512L Plug-In Module	MA320015
	PIC32 XLP Plug-In Module	MA320021
PIC32MX3/4	PIC32MX360F512L Plug-In Module	MA320001
	PIC32MX460F512L Plug-In Module	MA320002
	PIC32MX450/470 Plug-In Module	MA320002-2
PIC32MX5/6/7	PIC32MX795F512L Plug-In Module	MA320003
PIC32MZ	PIC32MZ with FPU Plug-In Module	MA320019

*Works with MCHV-2 (DM330023-2), MCLV-2 (DM330021-2) and MCHV-3 (DM330023-3) Motor Control Development Boards

PICtail™ Plus Daughter Boards

Application	Board	Part Number
CAN	CAN/LIN PICtail Plus Daughter Card	AC164130-2
USB	USB PICtail Plus Daughter Card	AC164131
Ethernet	Ethernet PICtail Plus Daughter Card	AC164123
	Fast 100 Mbps Ethernet PICtail Plus Daughter Card	AC164132
Wi-Fi®	MRF24WN0MA Module	AC164153
	MRF24WG0MA Module	AC164149
	WINC1500 Module	AC164156

*Note: Starter Kits require I/O Expansion Board (DM320002) to connect PICtail Plus daughter cards.

Expansion Boards and Development Kits

Board	Part Number
I/O Expansion Board	DM320002
High-Performance 4.3" WQVGA Display Module with maXTouch® Technology	AC320005-4
High-Performance WVGA LCD Display Module with maXTouch Technology	AC320005-5
KSZ8863 Ethernet PHY Daughter Board	AC320004-7
565 LCD Adapter Graphics Card	AC320212
SSD1963 LCD Controller Graphics Card	AC320214
maXTouch® Curiosity Pro Board	AC320007
24-bit Pass-Through Graphics Card	AC320213

Emulators and Debuggers

Emulator/Debugger	Part Number
MPLAB® PICkit™ 5 In-Circuit Debugger	PG164150
MPLAB ICD 5 In-Circuit Debugger	DV164055
MPLAB Snap In-Circuit Debugger	PG164100

Reference Designs and Solutions Pages

To accelerate your prototyping and development, we provide an array of online reference designs and solutions that highlight a selection of our products and technologies. These designs range from implementing the basic functional elements of an application up to creating an entire subsystem. Each of these proven hardware and software solutions includes an evaluation kit, firmware source code, hardware design files and user guides.

Reference Design	MCU Family	Featured Microchip Products
IoT Smart Asset Monitor	PIC32CM MC00	ATECC608B ATWINC1510
IoT Smart Appliance Control	PIC32CM MC00 SAM C21 SAM E51	EMC2301 BM70 MIC33050 MCP73871
SD Card USB Data Logger	SAM D21 SAM L21	AT30TSE758A
Thermal Camera Heat Map	PIC32MZ EF SAM E70	LAN8740A ATWINC1510
Bluetooth® Low Energy-Based Weather Station	M D21 SAM L21	MCP73830 BM70/71
Location-Tagged SOS, Asset or Vehicle Tracking	SAM D21	AT27C4096
Motion Surveillance	SAM E70 SAM E54	LAN8740A ATWINC1510 AC243008
Audio Player/Recorder	PIC32C	MCP4725
SD Card/USB Audio Player	PIC32C	ATMXT144UD-A
Snake Game with Graphics	PIC32MZ EF	MCP3204 SSD1963
USB Mass Storage Device for Multiple Drives	PIC32MX	
Vending Machine	SAM E54	MIC2184 KSZ8091 SST2xVF
Wi-Fi® Remote Control for Lighting or Appliances	PIC32MZ EF	HV96001 WINC3400

Visit the Reference Designs area on our website to explore more solutions.

Package Options

Package	Size (mm)	Pin Count
QFN	4 × 4	24
	5 × 5	32
	5 × 5	40
	6 × 6	28
	6 × 6	36
	6 × 6	48
	7 × 7	48
	8 × 8	44
	9 × 9	64
UFBGA	5 × 5	64
	6 × 6	100
	6 × 6	144
VFGBA	7 × 7	100
WLCSP	1.9 × 2.4	20
	2.2 × 2.2	27
	2.8 × 2.6	35
	2.7 × 2.7	45
	2.79 × 2.79	32
	2.84 × 2.84	49
	3.2 × 3.4	56
	5.2 × 5.3	64
Thin WLCSP	4.4 × 4.7	64

	Package Size (mm)	Pin Count
TFBGA	7 × 7	100
	7 × 7	144
	10 × 10	121
LFBGA	11 × 11	144
	15 × 15	208
	15 × 15	288
VFGBA	7 × 7	32
	7 × 7	48
	10 × 10	44
	10 × 10	64
	12 × 12	100
	14 × 14	100
	14 × 14	128
	16 × 16	144
LQFP	20 × 20	176
	20 × 20	144
SOIC	3.9 × 8.7	14
	7.5 × 12.8	20
	7.5 × 17.9	28
SSOP	5.3 × 10.2	28
	5.3 × 8.2	24
SPDIP	7.3 × 34.7	28

Terminology

AC	Analog Comparator
ADC	Analog-to-Digital Converter
AES	Advanced Encryption Standard
AFE	Analog Front End
BOR	Brown-out Reset
CAT	Capacitive Touch
CCL	Configurable Custom Logic
CDAC	Control Digital-to-Analog Converter
CFD	Clock Failure Detection
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
DAC	Digital-to-Analog Converter
DES	Data Encryption Standard
DIVAS	Division and Square Root Accelerator
DMA	Direct Memory Access
DSP	Digital Signal Processing
EBI	External Bus Interface
ECC	Error Correction Code
eMMC	Embedded MultiMediaCard
FPU	Floating Point Unit
GCM	Galois/Counter Mode
GPU	Graphics Processing Unit
HSM	Hardware Security Module
HSMCI	High-Speed MultiMediaCard Interface
ICM	Integrity Check Monitor
LCCG	Low-Cost Controllerless Graphics
MAC	Media Access Controller
MBIST	Memory Built-in Self-Test
NVM	Nonvolatile Memory
QEI	Quadrature Encoder Interface
PAC	Peripheral Access Controller
PDEC	Positional Decoder
PMP	Parallel Master Port
POR	Power-on Reset
PPS	Peripheral Pin Select
PTC	Peripheral Touch Controller
PUKCC	Public Key Cryptography Controller
PWM	Pulse-Width Modulation
QSPI	Quad Serial Peripheral Interface
RAM	Random Access Memory
RTC	Real-Time Clock
RTCC	Real-Time Clock/Calendar
SD	Secure Digital
SDADC	Sigma-Delta Analog-to-Digital Converter
SDIO	Secure Digital Input/Output
SERCOM	Serial Communication
SHA	Secure Hash Algorithm
SDHC	Secure Digital Host Controller
SLCD	Segment LCD
SiP	System in Package
TC	Timer/Counter
TCM	Tightly Coupled Memory
TDES	Triple Data Encryption Standard
TRNG	True Random Number Generator
WDT	Watchdog Timer
XLP	eXtreme Low Power

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