

Terminology

WAVEFORM CONTROL: PWM Drive and Waveform Generation	
Motor Control PWM Channel Pairs 24-bit TCC with Dead Time Insertion	In some datasheet, look for 24-bit TCC with Dead-Time Insertion (DTI) or PWM with Dead-Time Generator (also know as Dead-Band or Non-Overlapping Time). TCC (Timer/Counter for Control): Selected SAM products have TCCs for applications like Switch Mode Power Supplies (SMPS), lighting and motor control. The TCCs support up to 96 MHz and 24-bit resolution. 24-bit TTC channels with Dead Time Insertion are considered as Motor Control PWM channel.
TIMING AND MEASUREMENTS: Signal Measurement with Timing and Counter Control	
QEI: Quadrature Encoder Interface QDEC: Quadrature Decoder PDEC: Position Decoder	QEI to increment encoders for obtaining mechanical position data typical for automation or motor control applications. QDEC performs the input lines filtering, decoding of quadrature signals and connects to the timers/counters in order to read the position and speed of the motor through the user interface. The PDEC consists of a Quadrature/Hall decoder, following by a counter, with two compare channels. The counter can be split into two parts to report the angular position and the number of revolutions.
COMMUNICATIONS: General, Industrial, Lighting and Automotive	
SERCOM: Serial Communication Module	A SERCOM is a configurable peripheral that may be used to operate as I ² C, SPI or USART, giving you extended flexibility to mix serial interfaces and greater freedom in PCB layout. Each SERCOM instance can be assigned to different I/O pins through I/O multiplexing, further increasing versatility.
CMOS Camera Interface PCC: Parallel Capture Controller PIO: Parallel Input/Output	PCC: The Parallel Capture Controller can be used to interface an external system, such as a CMOS digital image sensor, ADC, or DSP, and capture its parallel data. PIO: The Parallel Input/Output Controller (PIO) manages up to 32 fully programmable input/output lines. An 8-bit Parallel Capture mode is also available which can be used to interface a CMOS digital image sensor, an ADC, a DSP synchronous port in Synchronous mode, etc.
I2S: Inter-IC Sound Controller	The Inter-IC Sound Controller provides a bidirectional, synchronous digital audio link with external audio devices.
EBI: External Bus Interface PMP: Parallel Master Port	EBI: The External Bus Interface (EBI) is designed to ensure the successful data transfer between several external devices and the embedded Memory Controller of an Arm-based device. Data transfers are performed through a 16-bit or 32-bit data bus. PMP: The PMP (mostly seen in PIC32M) is a parallel 8-bit/16-bit input/output module specifically designed to communicate with a wide variety of parallel devices, such as communications peripherals, LCDs, external memory devices and microcontrollers.
SAFETY AND MONITORING: Hardware Monitoring and Fault Detection	
Functional Safety Ready	Complete collateral ready, including FMEDA, Safety Manual, Diagnostic Software (in development) and third Party Tools.
USER INTERFACE: Capacitive Touch Sensing and LCD Control	
PTC: Peripheral Touch Controller	An embedded peripheral touch controller makes it easy to add capacitive touch buttons, sliders, wheels and proximity. By offering superb sensitivity and noise tolerance as well as self-calibration, the PTC eliminates the need for external components and minimizes CPU overhead. PTC with Driven Shield + can achieve better noise immunity and moisture tolerance.

SYSTEM FLEXIBILITY: System Peripherals and Interconnects	
CLC/CCL: Configurable Custom Logic	The CCL is a programmable logic peripheral which can be connected to the device pins, events or to other internal peripherals. This allows you to eliminate logic gates for simple glue logic function on the PCB.
Dual Panel/Bank Flash	Dual Bank Flash allows live field firmware/program update on one bank while CPU can continue executing code from another Flash bank.
EVSYS /PEVC: Event System	The Event System allows autonomous, low-latency and configurable communication between peripherals. Several peripherals can be configured to generate and/or respond to signals known as events. Communication is made without CPU intervention and without consuming system resources such as Bus or RAM bandwidth. This reduces the load on the CPU and power consumption, compared to a traditional interrupt-based system.
SECURITY: Chip-Level Security, Crypto Acceleration, Secure Key Provisioning & Storage, and Tamper Detection	
Embedded Hardware Security Module (HSM)	Secure Enclave with cryptographic hardware acceleration, True Random Number Generator, dedicated memory, dedicated processor, with factory provisioning.
TrustZone	TrustZone® for ARMv8-M provides hardware-enforced security isolation between trusted and the untrusted resources on a Cortex™-M23 based device, while maintaining the efficient exception handling.
Secure Boot	Secure Boot authenticates the Flash content at startup and ensures the desired code is executed.

Development Tools

Tools	Description
MPLAB® X Integrated Development Environment (IDE)	MPLAB X IDE is an expandable, highly configurable software program that incorporates powerful tools to help you discover, configure, develop, debug and qualify embedded designs for most of Microchip's microcontrollers and digital signal controllers. MPLAB X IDE works seamlessly with the MPLAB development ecosystem of software and tools, many of which are completely free.
MPLAB Harmony v3	MPLAB Harmony v3 is a fully integrated embedded software development framework that provides flexible and interoperable software modules to simplify the development of value-added features and reduce your product's time to market. Key benefits: <ul style="list-style-type: none"> • Core agnostic supporting both MIPS® and Arm® Cortex® core architectures • Code portability with consistent APIs that can be used across different device families • Easily configurable using MPLAB Harmony Configurator's (MHC's) Graphical User Interface (GUI) • Optimized peripheral libraries to simplify device setup and peripheral usage • Supports multiple development models with application examples and demos
MPLAB Code Configurator (MCC)	MPLAB Code Configurator (MCC) is a free graphical programming environment that generates seamless, easy-to-understand C code that can be used in your 32-bit application development, replacing the MPLAB Harmony code configurator. Key features like the content manager and project graph have now been integrated into MCC to provide a unified code configuration tool that spans all Microchip MCU platforms.
MPLAB Harmony Graphics Suite (MHGS)	MPLAB Harmony Graphics Suite (MHGS) is Microchip's industry leading embedded GUI (Graphical User Interface) development tool for 32-bit MCUs and MPUs. Available within the MPLAB Harmony embedded software development framework, this tightly integrated system of tools and software allows you to quickly and easily add GUIs, animation and imagery to a graphical display.

Note: Existing Arm® Cortex®-M based SAM products are also supported by Atmel Studio 7 IDE, Atmel START configuration tool and ASF software framework. For new projects, please start with MPLAB® X IDE and MPLAB Harmony v3.