ASF: Release ASF-3.12

The Atmel® Software Framework (ASF, www.atmel.com/asf) is a compilation of embedded software for Atmel flash MCUs: megaAVR®, AVR XMEGA®, AVR UC3 and SAM devices. It has been designed to help develop and glue together the different components of a software design. It can easily integrate into an operating system (OS) or run as a stand-alone product.

The ASF is included in Atmel Studio® 6 (www.atmel.com/atmelstudio). A separate package is available for megaAVR, AVR XMEGA, AVR UC3 and SAM users for IAR™, Atmel AVR Studio 4 and AVR32 Studio on www.atmel.com/asf. Atmel Studio users do not need this package as the ASF is integrated in Atmel Studio.

This document describes the supported devices, supported tools, and changes since last ASF release (enhancements, bugs fixes and known issues).
Installation Instructions

Device Support

This release supports the following devices:

- AVR UC3
  - AVR UC3 A0/A1 (revision H and later)
  - AVR UC3 A3/A4 (revision E and later)
  - AVR UC3 A3xS/A4xS (revision E and later)
  - AVR UC3 B (revision F and later)
  - AVR UC3 C (revision D and later)
  - AVR UC3 D
  - AVR UC3 L
- AVR XMEGA
  - AVR XMEGA A1
  - AVR XMEGA A1U
  - AVR XMEGA A3
  - AVR XMEGA A3B
  - AVR XMEGA A3U
  - AVR XMEGA A3BU
  - AVR XMEGA A4U
  - AVR XMEGA A4
  - AVR XMEGA B
  - AVR XMEGA C
  - AVR XMEGA D3
  - AVR XMEGA D4
  - AVR XMEGA E
- megaAVR
  - ATmega1284P
  - ATmega2560
  - ATmega48/88/168/328
  - ATmega16/32
  - ATmega169/329
  - ATmega64/128
  - ATmega324/644/1284
  - ATmegaxRF
- SAM
  - SAM3N
  - SAM3S
  - SAM3U
  - SAM3X
  - SAM4E
  - SAM4L
  - SAM4L8
  - SAM4S
  - SAM D20
  - SAM4N
  - SAM4C
Supported Tools

• Atmel Studio 6.1SP1 using GCC compiler - Visit www.atmel.com/atmelstudio -:
  - Atmel ARM GNU Toolchain - 4.7.3.1029
  - Atmel AVR (32 bit) GNU Toolchain - 3.4.2.1002
  - Atmel AVR (8 bit) GNU Toolchain - 3.4.2.1002
• Atmel AVR32 Studio version 2.6
• Atmel AVR Studio 4.18 SP3
• IAR EWAVR32 version 3.30
• IAR EWAVR version 6.12
• IAR EWARM version 6.50
• WinAVR version 20100110

Note:

• Atmel Studio 6.0 version is not supported since ASF3.6 extension.
• IAR EWAVR32 requires updated header files for the UC3 A3 and UC3 A3xS, UC3C C revision C, UC3 L series (unzip the avr32/utils/header_files/avr32-headers.zip under /Embedded Workbench x.x/avr32/inc/). WinAVR requires updated header files (refer toxmega/utils/header_files/readme.txt).
• SAM4L support for IAR requires the add-on installer EWARM_6.40_SAM4L_addon_vx.x.zip from www.atmel.com/tools/SAM4L-EK.aspx
• SAM4E support for IAR requires the add-on installer EWARM_6.40_SAM4E_addon_vx.x.zip http://cmsg1prd.atmel.com/images/Atmel-42145-AT03088-Getting-Started-with-SAM4E-ewarm-add-on_%20v0.1.1_Application-Note.zip
• XMEGA E support for Atmel Studio 6 requires the Atmel Studio 6 Part Pack for ATxmega32E5 installed and an updated AVR GCC toolchain (3.4.0.84 or higher). Visit www.atmel.com/atmelstudio.
• SAM4N support for IAR requires the add-on installer IAR-EWARM-SAM4N-ADDON-V1.0.zip http://cmsg1prd.atmel.com/images/Atmel-42169-AT03758-Getting-Started-with-SAM4N_Application-Note.zip
• SAM4C support for IAR requires the add-on installer EWARM_SAM4C_addon_v0.6.zip
• SAM4C support for Atmel Studio requires the part pack to support the devices.

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Documentation

• ASF on-line documentation: http://asf.atmel.com/.
• Atmel Studio 6 installer (includes ASF): www.atmel.com/atmelstudio
• Atmel Gallery: http://gallery.atmel.com/

Community Information

These forums can be used to have an open discussion about usage, development, bugs, fixes, improvements, etc.

• ASF forum on AT91® (SAM users) at http://www.at91.com.
New and Noteworthy

**Release ASF3.12 (Oct 2013)**

- SAM4C: added support for new device series and SAM4C Evaluation kit; added drivers support for aes, adc, chipid, smc, etc, gpr, icm, matrix, pdc, pio, pmc, pwm, rrtc, rtc, rtc, slcdc, spi, supc, tc, trng, twi, uart, usart, wdt; added services support for clock, iport, serial, sleep manager, serial, flash, eeprom, at30ts75 and c42364a slcdc; added third party support for CMSIS, freertos and fatfs, added applications support for getting-started and low-power.
- SAM4S: added support for SAM4S4 and SAM4S2.
- SAM D20: maintenance and improvements to API.

**Previous release ASF3.11 (July 2013)**

- SAM4N new device and SAM4N Xplained pro kit support in ASF.
- Performance Analyzer supports the kits supported in Wireless Library 1.0 Release.
- SAM4L: Add USB device PHDC example, add TWIM PDC transfer example.

**Previous release ASF3.10 (July 2013)**

- SAM4L8 new device and SAM4L/SAM4L8 Xplained pro kit support in ASF, with all existing drivers, services, third parties from SAM4L4.
- Feature Enhancement in Performance Analyzer v2.1 firmware to support Wireless Composer-2.0
- SAM D20: maintenance and improvements to API

**Previous release ASF3.9 (June 2013)**

- Added SAM D20 Drivers (AC, ADC, BOD, DAC, Events, External Interrupts, NVM, PAC, PORT, RTC, SERCOM USART/SPI/I2C, TC and WDT).
- Added SAM D20 Services (GFX mono, Delay, Dataflash, FreeRTOS)
- Added SAM D20 applications (DAC sound player, SPI/I2C bootloader, Led toggle and OSC8 calibration, FreeRTOS demo)

**Previous release ASF3.8 (April 2013)**

- mega128RFA1 new drivers: MAC symbol counter and TWI.
- SAM4E: USB stack, lwIP demo, new drivers (AFE, DAC, MATRIX, ACC, CHIPID, USART, PIO, AFEC), QTouch library, low power and getting started demo, FreeRTOS demo.

**Previous release ASF3.7 (Feb 2013)**

- SAM4L new drivers: AESA, IISC, ACIFC, PEVC, USB device composite, USB host, picoUART, ABDACB, FREOM, ADCIFE, Gloc, FatFS.
- SAM4E new drivers: FPU, SPI, DMA, USB HID, TC, AT25 flash, WDT, EBI SMC, RTT, CAN, RTC, GPBR, SUPC, PDC, USART, GMAC, PWM.
- megaRF, megaRF2 new drivers: USART, STDIO, clock, interrupt, TWI
- XMEGA E new drivers: XCL, EDMA, QDEC. New ADC demo for XMEGA-E5 Xplained board
- SAM4S and SAM4L Xplained Pro demo: low power and sleep modes
- Added supports Performance analyzer application for Xplained Pro Boards compatible with Wireless Analyzer in Atmel Studio. Supports MAC demo applications for Beacon, No Beacon and No Beacon Sleep Application. Supports RF4CE demo applications for Button controller, Single button controller and Terminal target.
Platforms supported are: Atmega256RFR2 Xplained Pro, ZigBit ATmegaRFR2, ZigBit ATRF233 XMEGA, ZigBit ATRF212B XMEGA, USB stick with ZigBit ATRF233 XMEGA, USB stick with ZigBit ATRF212B XMEGA, SAM4L Xplained Pro with ZigBit ATmegaRFR2, SAM4L Xplained Pro with ZigBit ATRF233 XMEGA, SAM4L Xplained Pro with ZigBit ATRF212B XMEGA, XMEGA-A3BU Xplained, RZ600

Previous release ASF3.6 (Internal, Jan 2013)

• Added SAM4E support: WDT, TC, EEFC, PMC, clock, ioport, CMSIS, stdio, PIO, Flash, interrupt
• Added XMEGA C3 Xplained demos: LED, switches, QTouch, OLED, USB, SD card
• Added megaRF drivers: interrupt, adc
• Added SAM4L drivers: GPIO for event and interrupt, Watchdog, USB Host HID class, HMATRIX, CRCCU, CMSIS DSPlib examples, FreeRTOS demo, Getting Started, IISC, improved TWIM with sleep manager support.
• Added SAM4S-EK2 demo (same as SAM4S-EK)
• Added examples for XMEGA-E5 Xplained board: XCL, USART
• USB Device PHDC class is now compliant with the USB command verified tool 2.0 v1.4.9.2.

Previous release ASF3.5 (Nov 2012)

• Added XMEGA E (STK600) support, added new XCL driver demo
• Added XMEGA-C3 Xplained board support
• Added SAM4SD32 and SAM4S-EK2 support
• SD stack for SAM, UC3, XMEGA ready, with SPI and MMC interface. With file system example.
• SAM4L: added AST, EIC, USB device HID, BPM, PDCA, TC, DACC, Flashcaldw, LCDCA, C42364
• Updated CMSIS for SAM from v2.1 to 3.0
• FatFs is now available in Atmel Studio ASF wizard
• Added USB Host vendor class
• megaRF: added GPIO and clock driver
• Added new FreeRTOS specific driver for USART, SPI and TWI for SAM4S
New features added

- **Issue #ASFP-3047**: SAM4L-Adding PicoCache cases to the flashcalw unit tests.
  Adding PicoCache cases to the flashcalw unit tests
  File modified:
  `sam/drivers/flashcalw/unit_tests/unit_tests.c`

- **Issue #ASFP-3055**: SAM4L-Enhanced PicoCache example to demonstrate low frequency behavior.
  Add PicoCache working behavior with the system clock running at 12MHz.
  Files modified:
  `sam/drivers/flashcalw/flash_example3/flashcalw_example3.c`
  `sam/drivers/flashcalw/flash_example3/sam4lc4c_sam4l_ek/conf_board.h`
  `sam/drivers/flashcalw/flash_example3/sam4lc4c_sam4l_ek/conf_clock.h`

- **Issue #ASFP-3358**: SAM4C - Add SAM4C and SAM4C-EK support in ASF.
  Add SAM4C devices and SAM4C-EK support in ASF:
  - Support devices: SAM4C16C and SAM4C8C
  - Drivers: AES, ADC, CHIPID, SMC, EFC, GPBR, ICM, MATRIX, PDC, PIO, PMC, PWM, RSTC, RTC, RTT, SLCDC, SPI, SUPC, TC, TRNG, TWI, UART, USART, WDT
  - Services: clock, delay, ioprt, serial, sleepmgr, spi, storage/ctrl_access, twi, flash_efc, smart_card
  - Components: serial_flash, eeprom, at30ts75, c42364a(slcdc)
  - Third party: CMSIS, freertos, fats
  - Applications: Getting-started, sam_low_power

- **Issue #ASFP-3849**: The NAND Flash library need to be improved to avoid FatFS example project fails in some conditions.
  Files modified:
  `common/components/memory/nand_flash/nand_flash_ebi/example1/sam3s4c_sam3s_ek/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example1/sam3sd8c_sam3s_ek2/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example1/sam3u4e_sam3u_ek/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example1/sam3x8h_sam3x_ek/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example1/sam4e16e_sam4e_ek/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example1/sam4s16c_sam4s_ek/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example1/sam4sd32c_sam4s_ek2/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example2/sam3s4c_sam3s_ek/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example2/sam3sd8c_sam3s_ek2/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example2/sam3u4e_sam3u_ek/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example2/sam3x8h_sam3x_ek/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example2/sam4e16e_sam4e_ek/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example2/sam4s16c_sam4s_ek/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/example2/sam4sd32c_sam4s_ek2/conf_nf.h`
  `common/components/memory/nand_flash/nand_flash_ebi/ftl_lib/gcc/lib_nand_flash_cortexm3.a`
  `common/components/memory/nand_flash/nand_flash_ebi/ftl_lib/gcc/lib_nand_flash_cortexm4.a`
  `common/components/memory/nand_flash/nand_flash_ebi/ftl_lib/iar/lib_nand_flash_cortexm3.a`
  `common/components/memory/nand_flash/nand_flash_ebi/ftl_lib/iar/lib_nand_flash_cortexm4.a`
  `common/components/memory/nand_flash/nand_flash_ebi/ftl_lib/nand_flash_mem.c`
  `common/components/memory/nand_flash/nand_flash_ebi/ftl_lib/nand_flash_translation.h`
Issue #ASFP-3909: SERCOM SPI pad mux documentation is difficult to understand. Update SERCOM SPI pad documentation.
File changed:
sam0/drivers/sercom/spi/spi.h

Issue #ASFP-3988: SAMD20: Support new DFLL register layout on revD.
SAM D20: The clock driver will support clock setup for both SAM D20 before revD, revD (including any later revision) runtime.
Files changed:
sam0/drivers/system/clock\clock.h
sam0/drivers/system/clock\clock.c
• **Issue #ASFP-4006**: Need NOT_FOUND status code in status_codes.h.
  SAM D20: Added STATUS_ERR_NOT_FOUND status code
  File changed:
  sam0/utils/status_codes.h

• **Issue #ASFP-4022**: SERCOM SPI and USART init pad configuration code can be shortened.
  Simplified the internal driver initialization code for the SERCOM SPI and USART drivers to reduce the compiled code size.
  Files Changed:
  sam0/drivers/sercom/spi/spi.c
  sam0/drivers/sercom/usart/usart.c

• **Issue #ASFP-4068**: Update SAM D20 header files to include PTC module.
  SAM D20: Header files updated to latest version

Notable bugs fixed

• **Issue #ASFP-3682**: SAM4S and SAM4E sleep management is bad in SAM_PM_SMODE_WAIT mode.
  Optimize sleep management for WAIT mode of SAM.
  Files modified:
  common/services/sleepmgr/sam/sleepmgr.h
  sam/drivers/pmc/pmc.c
  sam/drivers/pmc/sleep.c
  sam/drivers/pmc/sleep.h
  sam/drivers/udp/udp_device.c
  sam/drivers/udphs/udphs_device.c
  sam/drivers/uotghs/uotghs_device.c
  sam/drivers/uotghs/uotghs_host.c

• **Issue #ASFP-3763**: Issue on the SAM4E Ethernet driver.
  Update FCS configuration of GMAC driver from GMAC_NCFGR_IRXFCS to GMAC_NCFGR_RFCS.
  Modified file:
  sam/drivers/gmac/gmac.c

• **Issue #ASFP-3853**: CANIFFC Register Access macros not usable.
  Fixed incorrect definitions of the macros "CANIF_get_error_mode", "CANIF_get_tec" and "CANIF_get_rec" in the UC3 CANIF driver.
  Files changed:
  avr32/drivers/canif/canif.h

• **Issue #ASFP-3874**: SAM4L - The wait state setting is wrong in the flashcalw driver.
  File modified:
  sam/drivers/flashcalw/flashcalw.c

• **Issue #ASFP-3887**: System Clock Driver quick start crashes device when run.
  The System Clock quick start (sam0/drivers/system/clock/quick_start_clock) contains invalid code, which will lock up the device when run.
  Files changed:
  sam0/drivers/system/clock/clock.h
• **Issue #ASFP-3896**: Update SAM D20 NVM driver to support picachu bit fields.
  SAM D20: Added support for setting NVM Cache configuration parameters.
  Files changed:
  ```
  sam0/drivers/nvm/nvm.c
  sam0/drivers/nvm/nvm.h
  ```

• **Issue #ASFP-3924**: Broken documentation links.
  Fixed missing online documentation links.
  Files changed:
  ```
  mega/drivers/macsc/macsc_megarf.h
  sam/components/cmos_image_sensor/ov7740/ov7740_table_registers.c
  sam/drivers/aesa/aesa.h
  ```

• **Issue #ASFP-3929**: multiple definition of EFC in flash service.
  Files Modified:
  ```
  sam\services\flash_efc\flash_efc.c
  ```

• **Issue #ASFP-3937**: SAM4S/E - erase operation is required before write operation.
  File modified:
  ```
  sam/service/flash_efc_flash_program_example/flash_program_example.c
  ```

• **Issue #ASFP-3938**: SAM - The lock error is not detected in flash program example.
  Files modified:
  ```
  sam/services/flash_efc/unit_tests/unit_test.c
  sam/drivers/efc/efc.c
  ```

• **Issue #ASFP-3942**: `uart_read_wait()` is incorrect when the driver is in callback mode.
  Corrected `uart_read_wait()` for SAM D20 devices when the SERCOM USART driver is used in
  callback mode. Previously, invalid data would be returned if no character was received.
  Files changed:
  ```
  sam0/drivers/sercom/usart/usart.c
  ```

• **Issue #ASFP-3946**: SAM3X-EK: lwIP Example does work when ping transfer size is strictly higher than 1024
  bytes.
  Update the quick start guide of GMAC driver. Explained the Ethernet configurations and the special
  case of large ping echo test.
  Modified files:
  ```
  sam\drivers\gmac\gmac.h
  sam\drivers\emac\emac.h
  ```

• **Issue #ASFP-3947**: SAMD20 ASF i2c master driver, missing variable initialization in the module struct.
  SAM D20: Fixed bug where the driver failed because of uninitialized variables.
  File changed:
  ```
  sam0/drivers/sercom/i2c/i2c_master.c
  ```

• **Issue #ASFP-3978**: Default stack size should be changed for SAM D20.
SAM D20: Linker scripts updated to latest revision.

- **Issue #ASFP-3991**: SAMD20 system_flash_set_waitstates() fails assert for odd number of wait states.
  Fixed Assert() sanity check in the system_flash_set_waitstates() function for the SAM D20 devices failing for an odd number of wait states:
  Files changed:
  sam0/drivers/system/clock/clock.h

- **Issue #ASFP-3992**: SAM D20: TC driver, tc_set_compare_value in 32bit mode uses the COUNT16.CC register.
  SAM D20: Updated tc_set_compare_value function to use correct register in 32-bit mode
  File changed:
  sam0/drivers/tc/tc.c

- **Issue #ASFP-3993**: Unit tests for SAMD20 X.Pro are missing project type, have unconventional directory name.
  Fix the output directory and type of unit test projects for SAMD20 to conform with unit test server standard.

- **Issue #ASFP-3996**: SAM D20: Remove always_inline from ioport service as this generate unnecessary warnings.
  SAM D20: Removed always_inline from ioport service to remove gcc compiler warnings
  File changed:
  common/services/ioport/sam0/ioport.h

- **Issue #ASFP-3997**: Inconsistent line ending in RTT example.
  Fix mixed line ending in RTT example.
  Modified file:
  sam0/drivers/rtt/example/rtt_example.c

- **Issue #ASFP-4003**: SAM4S-Xplained - Board designators mismatch.
  Fix the silkscreen update for SAM4S-Xplained RevB.
  Modified file:
  sam0/boards/sam4s_xplained/sam4s_xplained.h

- **Issue #ASFP-4018**: SERCOM I2C master callback quickstart has error in callback function.
  Fixed incorrect call to i2c_master_read_packet_job() in the SAM D20 SERCOM I2C Master Mode Callback quick start example.
  Files changed:
  sam0/drivers/sercom/i2c/quick_start_master_callback/qs_i2c_master_callback.c

- **Issue #ASFP-4020**: Error in SAM D20 pinmux driver.
  SAM D20: Updated portmux driver to correctly follow current hardware spec.
  Files changed:
  sam0/drivers/system/pinmux/pinmux.c
  sam0/drivers/system/pinmux/pinmux.h

- **Issue #ASFP-4021**: spi_transceive_wait() should not be static inline.
Removed static inline qualifier from spi_transceive_wait() for SAM D20 devices, and moved the implementation into the C file to reduce compiled binary size.

Files changed:
- sam0/drivers/sercom/spi/spi.c
- sam0/drivers/sercom/spi/spi.h

- **Issue #ASFP-4027**: SAM4S4 - Add SAM4S4 and SAM4S2 to ASF.

Files modified:
- common/utils/parts.h
- sam/boards/sam4s_ek/sam4s_ek.h
- sam/boards/sam4s_xplained/sam4s_xplained.h
- sam/drivers/adc/adc.c
- sam/drivers/pio/pio_handler.c
- sam/drivers/ssc/ssc.c

Folder modified:
- sam\utils\linker_scripts\sam4s\include\*

Folders added:
- sam\utils\linker_scripts\sam4s\sam4s2\*
- sam\utils\linker_scripts\sam4s\sam4s4\*

**Known issues**

- **Issue #ASFP-184**: AT42QT1060 driver - use of EIC hardcoded for EVK1105 only.
  AT42QT1060 component is not supported by the AT32UC3A0 and AT32UC3A1 device family.

- **Issue #ASFP-198**: PolarSSL needs to be updated to version 1.0.0 to solve build error.
  Header file "openssl.h" from polarssl version 0.14.0 has some wrong function definition that creates build error. Update to version 0.99 will solve the issue

- **Issue #ASFP-674**: common/components/memory/data_flash/at45dbx is not listed for any devices in AVR Studio 5 ASF menu.
  Some AT45DBX definitions are missing in board definition causing module errors when using it in AVR Studio 5 with those boards. Modified file : avr32/boards/uc3_a3_xplained/uc3_a3_xplained.h ,xmega/bxboards/xmega_a1_xplained/xmega_a1_xplained.h

- **Issue #ASFP-881**: XMEGA NVM driver does not support XMEGA A3 rev B errata.
  XMEGA NVM driver does not support XMEGA A3 rev B errata.

- **Issue #ASFP-882**: Sensor library fails compilation if not using a board in the "Xplained" series of boards.
  Sensor library fails compilation if not using an board in the "Xplained" series of boards.

- **Issue #ASFP-3595**: ASF includes its own SAM header files set which is not synchronized with the latest header files from Atmel Studio 6.1 toolchain.
  The Atmel Studio 6.1beta header files set for SAM devices is not backward compatible with the Atmel Studio 6.0 header files set.
  ASF SAM drivers are using their own set of header files (from sam/utils/cmsis/sam*\include) and are not compatible with the Atmel Studio 6.1beta header files.
SAM drivers will be ported to the new Atmel Studio 6.1beta header files set in a later ASF release.
Contact Information

For more info about Atmel MCU visit http://www.atmel.com/products/microcontrollers/default.aspx, download application notes from the Application Notes page or contact support through the http://support.atmel.no/ site. The support site also have a Frequently Asked Questions.

ASF bug or enhancement requests can be reported in the ASF Bug Tracker at http://asf.atmel.com/bugzilla/.

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