

Atmel Unleashes Highest-Performing ARM Cortex-M7-based MCUs with Superior Memory Architecture and Connectivity for Automotive, IoT and Industrial Markets

On January 6th Atmel will announce the world’s highest-performing ARM[®] Cortex[®]-M-based microcontroller (MCU) with a 1500 CoreMark score. The new family of Atmel[®] | SMART[™] ARM Cortex-M7-based MCUs is composed of four series: the SAM S70 general purpose, SAM E70 connectivity and SAM V70 and V71 automotive series.

Key Benefits

- Extends Atmel | SMART MCU portfolio with the industry’s highest performing ARM Cortex-M-based MCUs (1500 CoreMark score)
- Offers superior connectivity options and unique memory architecture optimized for real-time deterministic code execution and low latency peripheral data access.
- Delivers industry’s first auto-qualified ARM Cortex-M7-based MCU with Ethernet AVB and media LB peripheral combination with DSP capabilities of the core for Automotive Connectivity and Audio applications

SAM S70 and E70 Devices

Flash	SRAM				
2048	384	SAMV71J21	SAMV71N21	SAMV71Q21	
		SAME70J21	SAME70N21	SAME70Q21	
		SAMS70J21	SAMS70N21	SAMS70Q21	
1024	384	SAMV71J20	SAMV71N20	SAMV71Q20	
		SAMV70J20	SAMV70N20	SAMV70Q20	
		SAME70J20	SAME70N20	SAME70Q20	
		SAMS70J20	SAMS70N20	SAMS70Q20	
512	256	SAMV71J19	SAMV71N19	SAMV71Q19	
		SAMV70J19	SAMV70N19	SAMV70Q19	
		SAME70J19	SAME70N19	SAME70Q19	
		SAMS70J19	SAMS70N19	SAMS70Q19	
		64	100	144	Pin count
				x	EBI
			x	x	SD/MMC
		FS	HS	HS	USB

SAM E70 series features Dual CAN-FD and Ethernet MAC - IEEE1588

SAM V70 and SAM V71 will be automotive qualified grade 2 (-40C / 105C)

SAM V71 series features Ethernet Audio Video Bridging (AVB) MAC

Atmel Software and Ecosystem

The new Atmel | SMART ARM Cortex-M7-based MCUs are supported by the following development tools:

- IAR EWARM
- ARM MDK
- Atmel Studio
- GNU tools for ARM embedded processors

Several market-leading RTOS solutions are being ported to the SAM S70 and E70 series

- ARM, RTX
- Segger, embOS
- Express Logic, Thread-X
- FreeRTOS
- NuttX

The Atmel Software Package for the SAM S70 and E70 series includes a complete set of peripheral driver examples, facilitates board bring up and testing for the hardware designer, complements the datasheet for the software programmer to optimize software for the target device and facilitates software porting from previous MCUs.

Source code for the software package is available under Atmel SAM Software Package license, which offers source code reuse for commercial purposes without any publication obligation.

The Software Package includes a set of open source middleware that can be easily ported on an RTOS or bare metal software platform

- High Speed USB device
 - o Class drivers: Audio, CDC, HID, mass storage, PHDC
 - o Support for composite devices
- High Speed USB mini host stack
 - o Class drivers: CDC, HID, mass storage
- Ethernet
 - o lwip - Lightweight TCP/IP stack
 - o uIP – Micro IP TC/IP stack
- Storage (file system)
 - o fatfs – FAT file system (NAND Flash, SD card, eMMC card, on-chip Flash)

- JPEG encoder & decoder

AUTOSAR 4.0 (MCALs, OSEK and Communication stacks) is being ported to the SAM V70 and V71 automotive series.

A complete Automotive Ethernet Audio Video Bridging (AVB) stack is being ported to the SAM V71 series.

An ATSAMV71-XULT full-featured Xplained Ultra board covers all four series of Atmel | SMART ARM Cortex-M7-based MCUs

Target Applications

Broadening the Atmel | SMART ARM Cortex-M-based MCU portfolio, the new SAM E70 and the SAM S70 series devices are ideal for connectivity and general-purpose industrial, consumer and IoT applications, while the auto-grade SAM V70 and SAM V71 devices are ideal for in-vehicle infotainment connectivity, audio amplifiers, telematics and head control units companion device.

Competition

ST Microelectronics, Freescale and Cypress/Spansion have announced licensing of the ARM Cortex-M7 processor. Only ST Microelectronics has announced early customer sampling and disclosed product details.

	SAM S70 and E70 series 65nm	STM32F7xx series 90nm
Flash	512KB-1MB-2MB	512KB-1MB
SRAM total	384KB	336KB
Cache	2x16KB with ECC	2x4KB no ECC
TCM	256KB/configurable	80KB / Fixed
Backup SRAM	1KB	4KB
Ext. Bus	16b SDRAM	32b SDRAM
Frequency	300MHz	200MHz
Package option	64-100-144 QFN-QFP-BGA	100-144-176 -208-216 QFP-BGA-WLCSP
Ethernet	10/100 with IEEE1588	10/100

USB	1x HS OTG w/ Phy	1x HS OTG w/o Phy 1 x FS OTG w/ Phy
Camera int.	Yes	Yes
Crypto/Secure	AES-256, TRNG, SHA	AES-256, TDES, HASH (MD5, SHA), HMAC, TRNG
TFT + Graphics	No	Yes
SPI/QSPI	Up to 5/1	Up to 6/1
CAN	2x FD	2x 2.0
USART/UART	3/5	4/4
ADC	2x12b 2Msps / 24ch	3x12b 2.4Msps / 24ch
DAC	2ch	2ch
I2C	3	4
SD/SDIO	1	1
I2S	1	3
Timers 16-b	20	13

At this point, the ST Cortex-M7 device is not intended to be brought to automotive.

Availability of Product, HW Tools and Documentation

General sampling

Sampling of the 2MByte Flash versions of the SAM E70 and S70 series is planned to start end of February using engineering samples under a CPN with postfix "ES2". The 512kB and 1MB Flash versions will sample in May when the product is released to production.

Production shipments will start in May 2015.

CPN	Description
SAME70Q21A-CN-ES2	CM7, 2048kB Flash, 384kB SRAM, BGA144, ES2
SAME70Q21A-AN-ES2	CM7, 2048kB Flash, 384kB SRAM, LQFP144, ES2
SAME70N21A-CN-ES2	CM7, 2048kB Flash, 384kB SRAM, BGA100, ES2
SAME70N21A-AN-ES2	CM7, 2048kB Flash, 384kB SRAM, LQFP100, ES2
SAME70J21A-AN-ES2	CM7, 2048kB Flash, 384kB SRAM, LQFP64, ES2
SAMS70Q21A-CN-ES2	CM7, 2048kB Flash, 384kB SRAM, BGA144, ES2

SAMS70Q21A-AN-ES2	CM7, 2048kB Flash, 384kB SRAM, LQFP144, ES2
SAMS70N21A-CN-ES2	CM7, 2048kB Flash, 384kB SRAM, BGA100, ES2
SAMS70N21A-AN-ES2	CM7, 2048kB Flash, 384kB SRAM, LQFP100, ES2
SAMS70J21A-AN-ES2	CM7, 2048kB Flash, 384kB SRAM, LQFP64, ES2
SAMS70N21A-CFN-ES2	CM7,2048kB Flash,384kB SRAM,VFBGA100,ES2

Sampling of 2MByte Flash versions of the SAM V71 series is planned to start end of February using engineering samples under a CPN with postfix "ES2". The 512kB and 1MB Flash version will sample in October 2015 along with SAM V70 series when the product is released to production with PPAP. Production shipments will start in October 2015.

CPN	Description
SAMV71Q21A-CB-ES2	Auto grade CM7, 2048kB Flash, 384kB SRAM, Ethernet AVB, BGA144, ES2
SAMV71Q21A-AB-ES2	Auto-grade CM7, 2048kB Flash, 384kB SRAM, Ethernet AVB, LQFP144, ES2
SAMV71N21A-CB-ES2	Auto-grade CM7, 2048kB Flash, 384kB SRAM, Ethernet AVB, BGA100, ES2
SAMV71N21A-AB-ES2	Auto-grade CM7, 2048kB Flash, 384kB SRAM, Ethernet AVB, LQFP100, ES2
SAMV71J21A-AB-ES2	Auto-grade CM7, 2048kB Flash, 384kB SRAM, Ethernet AVB, LQFP64, ES2
SAMV70N20A-CB-ES2	Auto-grade CM7, 2014kB Flash, 384kB SRAM, BGA100, ES2

The ATSAMV71-XULT XPlained Ultra evaluation kit is available for selected customers approved by marketing until market introduction end of February at the same time as general sampling