HEALTHCARE SOLUTIONS WITH RENESAS SYNERGY™ PLATFORM

RENESAS synergy™

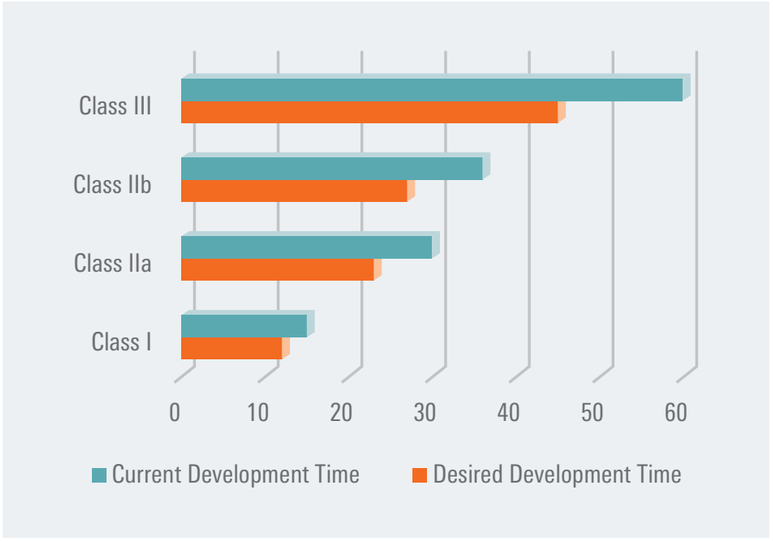
BIG IDEAS
FOR EVERY SPACE

2017.10

Speeding-up Medical Device Development

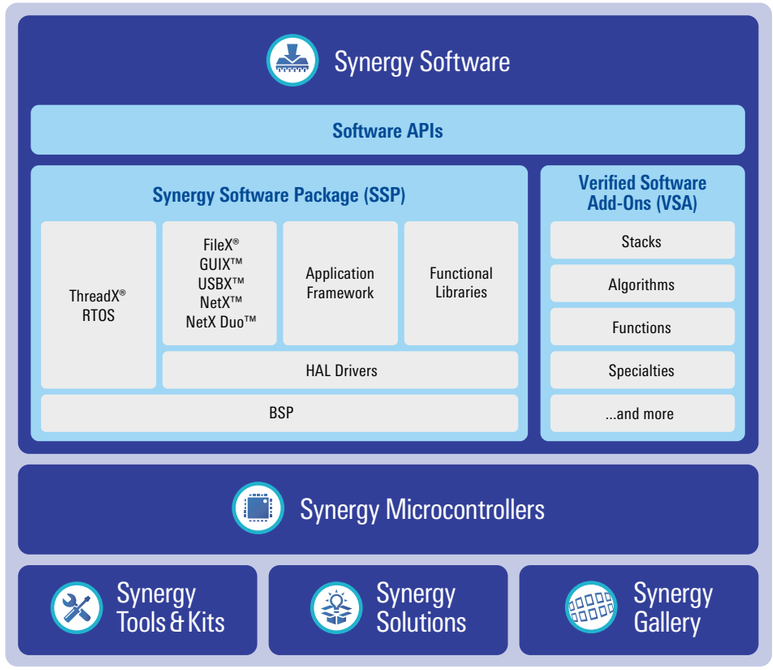
Developing medical products is a long process that not only involves all the necessary steps of modern product design in times of ever shorter product lifecycles. In addition, the need for patient / user safety is a prime concern and therefore medical devices are tightly regulated when it comes to development and putting them onto the market.

In these times, medical device manufacturers are looking for opportunities to reduce the actual development time as indicated by a recent survey by the PA Consulting Group. In light of the Medical Device Regulation that came into effect in May 2017 in Europe which puts higher requirements on device makers to achieve certification of their products, companies developing products for the medical industry might be even more occupied with work on non-differentiating aspects of their device, and expectations are that overall development times are likely even increasing.



Renesas Synergy™ Platform Benefits for Medical Devices

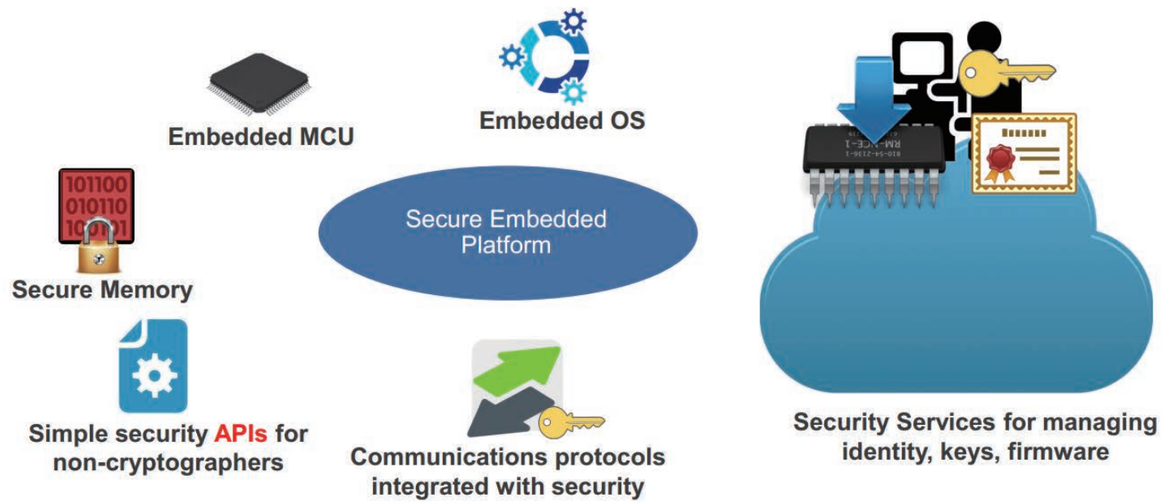
In order to address these two topics – certification and long development times – makers of medical devices can look to the Renesas Synergy Platform that provides developers with immediate access to a complete embedded platform starting with an Application Programming Interface (API) to leverage a full software framework beneath which is built around the best-in-class Express Logic X-Ware™. This software framework is the Synergy Software Package (SSP) – qualified, maintained, supported, and warranted by Renesas. The platform also integrates a wide range of scalable Arm® Cortex®-M based MCUs fully accessible through the software APIs, powerful features of the industry-leading development toolchain IAR Embedded Workbench® with intuitive configuration assistance, and hardware kits for development and solutions. Developers gain access to all these elements with simple click-through licensing on the Synergy Gallery web site. Since everything has been pre-integrated, tested, and maintained by Renesas, developers can save months of work and extensive investment, freeing them to focus developing solid, reliable, well performing medical applications.



From the certification side, the ThreadX® RTOS included in the SSP has been developed according to IEC62304 – the harmonized international standard that specifies life cycle requirements for the development of medical software and software within medical devices. This "pre-certification" will make it much easier for device manufacturers to acquire their product certification in the end. As is evident, using the Synergy Platform for your medical device development will provide you with significant advantages to compete in your market.

Addressing Security Concerns with the Synergy Platform

To address the rising level of concern regarding product security, the Synergy Platform by default includes a rich set of security functionality that addresses confidentiality, trust, non-repudiation and availability of data through mechanisms like key protection and storage, true random number generation, symmetric and asymmetric cipher algorithms, hash functions, secure boot and secure memory segments.



Synergy S1 Series MCUs for Medical Sensor Applications

32-MHz Arm® Cortex®-M0+ CPU — S1 — NVIC | SWD | MTB

Memory	Analog	Timing & Control	HMI
Code Flash (up to 256 KB)	14-Bit A/D Converter	General PWM Timer 32-Bit	Capacitive Touch Sensing Unit
Data Flash (4 KB)	12-Bit D/A Converter	General PWM Timer 16-Bit	
SRAM (up to 24 KB)	Low-Power Analog Comparator	Asynchronous General Purpose Timer	
	Temperature Sensor	WDT	

Connectivity	System & Power Management	Safety	Security & Encryption
USBFS	Data Transfer Controller	SRAM Parity Error Check	128-Bit Unique ID
CAN	Event Link Controller	Flash Area Protection	TRNG
Serial Communications Interface	Low Power Modes	ADC Diagnostics	AES (128/256)
SPI	Multiple Clocks	Clock Frequency Accuracy Measurement Circuit	
IIC	Port Function Select	CRC Calculator	
DALI Lighting Interface	RTC	Data Operation Circuit	
	SysTick	Port Output Enable for GPT	
		IWDT	

Entry-level Synergy S1 Series MCUs use a Cortex M0+ core and focus on ultra-low-power applications with active power consumption of 77µA per MHz. Typical medical use cases for S1 Series MCUs include sensor devices (e.g. respiratory sensors) or simple house-keeping functionality in a multi-chip environment like for an AED.

Synergy S3 Series MCUs for Activity Monitors and Host Applications

48-MHz Arm® Cortex®-M4 CPU — S3 — FPU | Arm MPU | NVIC | ETM | JTAG | SWD | Boundary Scan

Memory	Analog	Timing & Control	HMI
Code Flash (up to 1 MB)	14-Bit A/D Converter	General PWM Timer 32-Bit	Capacitive Touch Sensing Unit
Data Flash (up to 16 KB)	12-Bit D/A Converter	Asynchronous General Purpose Timer	Segment LCD Controller
SRAM (up to 192 KB)	Low-Power Analog Comparator	WDT	
Flash Cache	High-Speed Analog Comparator		
MPUs	OPAMP		
Memory Mirror Function	Temperature Sensor		

Connectivity	System & Power Management	Safety	Security & Encryption
USBFS	DMA Controller	ECC in SRAM	128-Bit Unique ID
CAN / SDHI/MMC	Data Transfer Controller	SRAM Parity Error Check	TRNG
Serial Communications Interface	Event Link Controller	Flash Area Protection	AES (128/256)
IrDA Interface	Low Power Modes	ADC Diagnostics	GHASH
QSPI / SPI	Multiple Clocks	Clock Frequency Accuracy Measurement Circuit	
IIC / SSI	Port Function Select	CRC Calculator	
External Memory Bus	RTC	Data Operation Circuit	
	SysTick	Port Output Enable for GPT	
	Low Voltage Detection	IWDT	

Synergy S3 Series MCUs use Cortex M4 and operate from 32 to 100MHz. For example, the S3A7 MCU Group within the S3 series contains 1MB of flash and operates at 48MHz. The primary focus of the S3 Series MCUs is on high efficiency and typical use cases are sports watches, insulin pumps and simple host applications.

Synergy S5 Series MCUs for Hospital Devices and Patient Monitors

120-MHz Arm® Cortex®-M4 CPU — S5 — FPU | Arm MPU | NVIC | ETM | JTAG | SWD | Boundary Scan

Memory	Analog	Timing & Control	HMI
Code Flash (up to 2 MB)	12-Bit A/D Converter	General PWM Timer 32-Bit Enhanced High Resolution	Capacitive Touch Sensing Unit
Data Flash (up to 64 KB)	12-Bit D/A Converter	General PWM Timer 32-Bit Enhanced	Graphics LCD Controller
SRAM (up to 640 KB)	High-Speed Analog Comparator	General PWM Timer 32-Bit	2D Drawing Engine
Flash Cache	PGA	Asynchronous General Purpose Timer	JPEG Codec
MPUs	Temperature Sensor	WDT	Parallel Data Capture Unit
Memory Mirror Function			

Connectivity	System & Power Management	Safety	Security & Encryption
Ethernet MAC Controller	DMA Controller	ECC in SRAM	128-Bit Unique ID
Ethernet DMA Controller	Data Transfer Controller	SRAM Parity Error Check	TRNG
Ethernet PTP Controller	Event Link Controller	Flash Area Protection	AES (128/192/256)
USBHS / USBFS	Low Power Modes	ADC Diagnostics	3DES/ARC4
CAN / SDHI	Multiple Clocks	Clock Frequency Accuracy Measurement Circuit	RSA/DSA
Serial Communications Interface	Port Function Select	CRC Calculator	SHA1/SHA224/SHA256
IrDA Interface	RTC	Data Operation Circuit	GHASH
QSPI / SPI	SysTick	Port Output Enable for GPT	
IIC / SSI		IWDT	
Sampling Rate Converter			
External Memory Bus			

MCU devices in the Synergy S5 Series also use Cortex M4 and operate from 100 to 200MHz. They are designed for high integration with a rich set of HMI functionality and security. Typically, you can use the S5 Series MCUs for applications like infusion pumps or other hospital equipment with a need for Ethernet connectivity.

Synergy S7 Series MCUs for High-end Patient Monitors and Gateways

240-MHz Arm® Cortex®-M4 CPU — S7 — FPU | Arm MPU | NVIC | ETM | JTAG | SWD | Boundary Scan

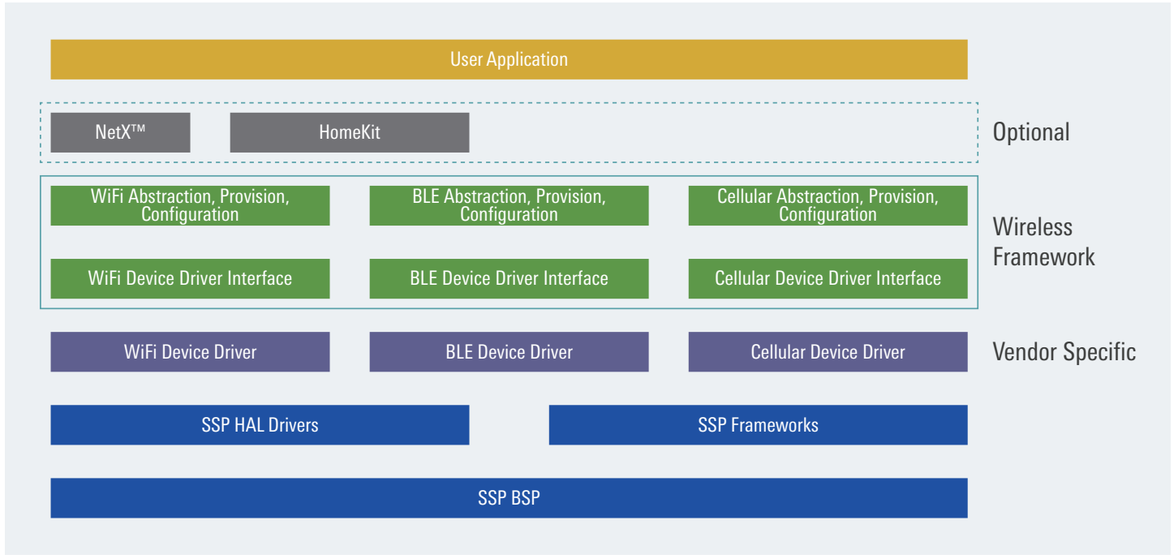
Memory	Analog	Timing & Control	HMI
Code Flash (4 MB)	12-Bit A/D Converter ×2 (25 ch.)	General PWM Timer 32-Bit Enhanced High Resolution ×4	Capacitive Touch Sensing Unit (18 ch.)
Data Flash (64 KB)	12-Bit D/A Converter ×2	General PWM Timer 32-Bit Enhanced ×4	Graphics LCD Controller
SRAM (640 KB)	High-Speed Analog Comparator ×6	General PWM Timer 32-Bit ×6	2D Drawing Engine
Flash Cache	PGA ×6	Asynchronous General Purpose Timer ×2	JPEG Codec
MPUs	Temperature Sensor	WDT	Parallel Data Capture Unit
Memory Mirror Function			

Connectivity	System & Power Management	Safety	Security & Encryption
Ethernet MAC Controller ×2	DMA Controller (8 ch.)	SRAM Parity Error Check	128-Bit Unique ID
Ethernet DMA Controller	Data Transfer Controller	Flash Area Protection	TRNG
Ethernet PTP Controller	Event Link Controller	ADC Diagnostics	AES (128/192/256)
USBHS / USBFS	Low Power Modes	Clock Frequency Accuracy Measurement Circuit	3DES/ARC4
CAN ×2 / SDHI ×2	Multiple Clocks	CRC Calculator	RSA/DSA
Serial Communications Interface ×10	Port Function Select	Data Operation Circuit	SHA1/SHA224/SHA256
IrDA Interface	RTC	Port Output Enable for GPT	GHASH
QSPI / SPI ×2	SysTick	IWDT	
IIC ×3 / SSI ×2			
Sampling Rate Converter			
External Memory Bus			

Synergy S7 Series devices represent the high end MCUs in the Synergy Platform Devices from the S7G2 MCU Group for example run a Cortex M4 at 240MHz and include 4MB of flash and 640KB of RAM. Typical medical use cases are high-end patient monitors, hospital grade blood analysis devices or gateways.

Wireless Frameworks for Enhanced Connectivity

In the time of the Internet of Things, more and more medical device are becoming connected: most of them wirelessly. To address the need for flexibility in design and choice of communication protocols, Renesas has developed a set of Wireless Frameworks for the Synergy Platform Supported wireless technologies in the Synergy ecosystem will be Wi-Fi, BLE and cellular in the first step.
One advantage of this approach is that the application is no longer tied to a particular vendor's wireless component. Also, it simplifies migration to additional vendors due to wireless product obsolescence, lack of availability, or manufacturability problems. Finally, application code can be re-used across regional requirements (e.g. allowed frequency bands), and over varying performance requirements.
The frameworks will be a part of the SSP covering an initial set of wireless module device drivers. However, it is possible – and desired – to enhance the set of supported modules in any of three ways: third party publication on the Renesas Rulz forum or the Renesas Synergy Gallery or updates of the SSP itself.



Rich Synergy Ecosystem to Make Your Life Easy

The Synergy Platform was started in 2015 and is growing now with more MCU devices and software providing you with more options to choose from to identify the ideal solution for your medical device development. All existing and future Synergy MCU devices will include SSP support and all other benefits like:

- Synergy Gallery
- IAR Embedded Workbench development environment for Synergy with no extra fee
- Development tools such as TraceX and GUIX Studio with no extra fee
- Extensive Support Model (including 24/5 chat)
- Software Ecosystem Enhancements with qualified or verified software add-ons
- Synergy Design House Network helping you in the design of your medical device

In summary, the Synergy Platform consisting of MCUs, Software, Tools, Support and Gallery will reduce your development time and investment of your resources due to its scalability, integration, qualification, and lifetime maintenance allowing you to focus on your next innovation.

RENESAS synergy™

Accelerate. Innovate. Differentiate.

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