# RENESAS SYNERGY<sup>TM</sup> PLATFORM FOR IOT OVERVIEW PRESENTATION

IOT PLATFORM BUSINESS DIVISION 20 FEBRUARY 2019

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Click icons to jump to: Home Hardware MCU Kits Software Tools SSP Add-Ons Solutions Support Gallery

# AGENDA









#### Introduction

- ✓ Renesas & Product Portfolio
- ✓ IoT Challenges
- ✓ Synergy Platform for IoT

#### Synergy Hardware

- ✓ Microcontrollers
- ✓ Kits
- ✓ Ordering & Resources

#### Synergy Software

- Synergy Software Package
- ✓ Software Add-ons
- ✓ Development Tools

#### **Synergy Solutions Gallery**

- ✓ Download Center
- ✓ Technical Support
- ✓ Getting Started in 3 Easy Steps



### **RENESAS ELECTRONICS CORPORATION** INTRODUCTION



Among leading Japanese semiconductor companies Global operations in 14 countries ~20,000 staff Established in 2002. Formed by several iconic M&As Digital, analog & mixedsignal products for automotive, industrial & broad-based applications

**BIG IDEAS FOR EVERY SPA** 

MCU

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FY2016 ~US\$6.8B sales

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Tools

Software

Kits

#### Renesas creates leading semiconductor solutions that spark innovation for a connected world.

### RENESAS ELECTRONICS CORPORATION PRODUCT PORTFOLIO

RENESAS Solution	ns Products	Platforms	Design & Support	About	Search	۹
Microcontrollers & Microprocessors RL78 MCUs RX MCUs RH850 MCUs RH850 MCUs RZ MPUs Renesas Synergy™ MCUs Other MCUs / MPUs Other MCUs / MPUs Automotive MCUs and Processors Systems-on-Chip (SOC) Power Management Battery Management Video & Display	Embedded System Platfor Renesas Autonomy™ Platfor Automotive R-IN Platform for Industrial RZ/G Platform for HMI Renesas Synergy™ Platform for Others Analog Interface Memory Optoelectronics Power Management Sensors Space & Harsh Environment	m for E	Software & Tools Boards & Kits Software & Drivers Tools & Downloads Gadget Renesas Reference Packaging Overview ROM Ordering Part Number Decoder	Find Pro Parametri Cross Refe PowerCon	c Search erence	

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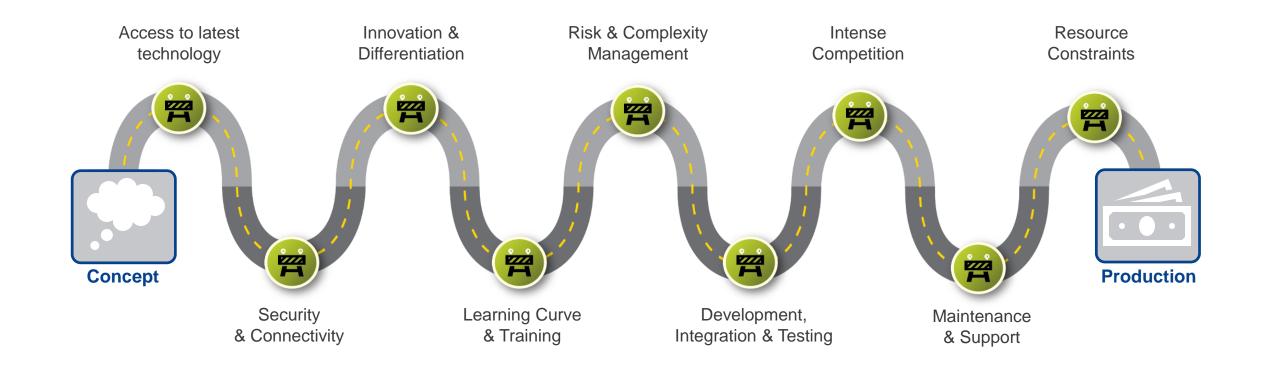
Kits Software

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**INTERNET OF THINGS** CHALLENGES & PAIN POINTS



Each step in the long journey from concept to production adds to time to market & costs

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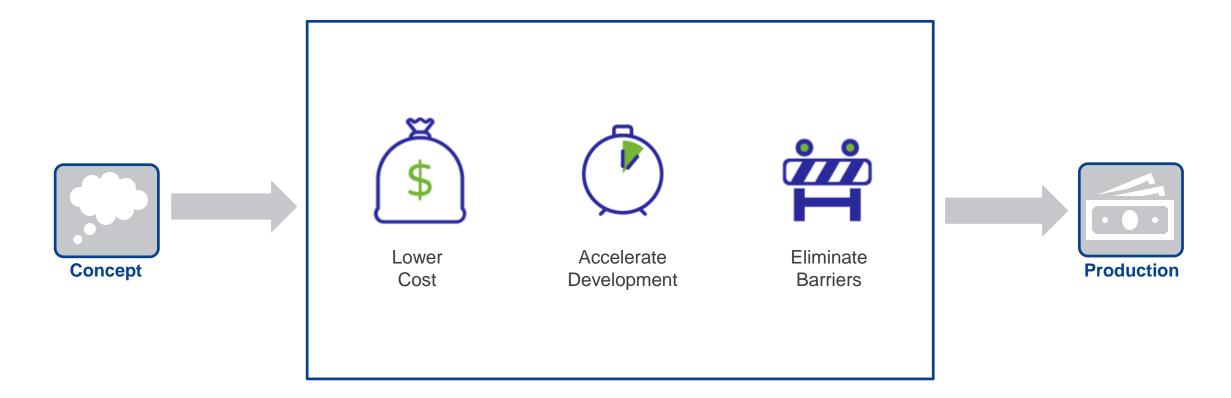
Software

Kits



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### INTERNET OF THINGS PLATFORM APPROACH



Platform approach provides a faster path from concept to production

### SYNERGY PLATFORM FOR IOT PROVIDES A FASTER PATH TO PRODUCTION

	SYNERGY	PLATFORM	
Concept	Solutions   Software   Normalized   Development Tools   Synergy Software Package   Software Add-Ons	Gallery   Hardware   Kits   Microcontrollers	Production
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Hardware MCU

Kits Software



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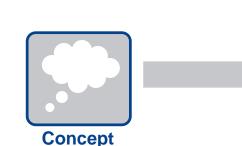
Tools

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### SYNERGY PLATFORM FOR IOT PROVIDES A FASTER PATH TO PRODUCTION



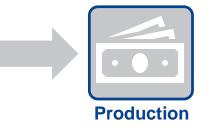
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#### SYNERGY PLATFORM

#### **Key Features**

- Complete & qualified platform for IoT
- Best in class MCUs, software & tools
- Integrated & tested
- More functionality available using software add-ons
- Support & maintenance provided by Renesas
- Production licenses for software and tools included for no charge



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### **APPLICATION EXAMPLES** SYNERGY PLATFORM ENABLES SMART CONNECTED PRODUCTS

#### **Consumer Appliances**

- Entertainment
- Kitchen appliances
- Heating & cooling
- Personal devices
- Computing accessories

- **Health Care & Wearables**
- Fitness & health tracking
- Clinical instrumentation
- Portable medical
  - devices

# Smart Factories & Industrial Automation

- PLC
- Process control
- Sensors & actuators
- Motion & position control

# Smart Buildings & Automation

- Security

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- Fire & safety
- HVAC
- Lighting
- Energy management

# Smart Cities & Infrastructure

- Advanced metering

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Tools

- Utility infrastructure
- Waste management
- Communication



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## SYNERGY HARDWARE MICROCONTROLLERS & KITS



الله SYNERGY HARDWARE					
Synergy Microcontrollers	Synergy Kits				
S1 S3 S5 S7	Starter Kits Target Board Kits Development Kits				
	Development Kits Application & Product Example Kits				



Visit & learn more at: Renesas.com/synergy/hardware



SYNERGY MICROCONTROLLERS THE FOUNDATION OF SYNERGY PLATFORM FOR IOT



**Ultra-Low Power Series** Arm<sup>®</sup> Cortex<sup>®</sup>-M0+ 32 MHz 64 KB – 256 KB Flash 16 KB - 24 KB SRAM

Starting at \$1.54@10K pcs





**High Efficiency Series** Arm<sup>®</sup> Cortex<sup>®</sup>- M4 48 MHz 256 KB - 1 MB Flash 32 KB - 192 KB SRAM

Starting at \$2.73@10K pcs





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**High Integration Series** Arm<sup>®</sup> Cortex<sup>®</sup>- M4 120 MHz 512 KB - 2 MB Flash 256 KB - 640 KB SRAM

Starting at \$5.10@10K pcs







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**High Performance Series** Arm<sup>®</sup> Cortex<sup>®</sup>- M4 240 MHz 3 MB - 4 MB Flash 640 KB SRAM

Starting at \$10.36@10K pcs





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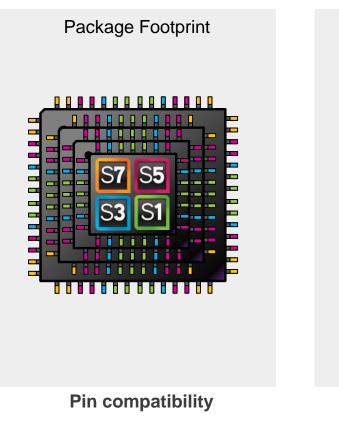


Visit & learn more at: Renesas.com/svnergv/mcus

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SYNERGY MICROCONTROLLERS SCALABLE & COMPATIBLE MCU SERIES



Register Set and Features

Rn	31	30	 	2	1	0
	31	30	 	2	1	0
	31	30	 	2	1	0
	31	30	 	2	1	0
	31	30	 	2	1	0
	31	30	 	2	1	0
R3	31	30	 	2	1	0
R2	31	30	 	2	1	0
R1	31	30	 	2	1	0
R0	31	30	 	2	1	0

Feature compatibility

APIs and Functionality

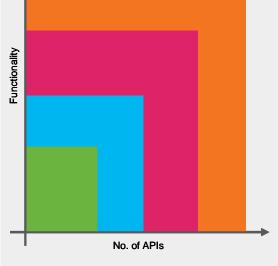
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# S1 SERIES ULTRA-LOW POWER SERIES

- 130-nm process
- Operating temperature range: -40°C to 105°C
- MCU Groups: S1JA S128 S124
- GPIO pins: Up to 51
- Packages options for S1 series products
  - QFN: 32, 40, 48, 64
  - LQFP: 32, 48, 64
  - LGA: 36
- Typical current consumption of S1 series products
  - 113 µA/MHz (Normal Mode)
  - 47 µA/MHz (Sleep Mode)
  - 440 nA (Software Standby Mode)

Memory	<b>≁</b> ≁ Analog	Timing & Control	🖑 нмі
Code Flash (up to 256 KB)	14-Bit A/D Converter	General PWM Timer 32-Bit	Capacitive Touch Sensing Ur
Data Flash (4 KB)	8-Bit D/A Converter	Genral PWM Timer 16-Bit	(28 ch.)
SRAM (up to 24 KB)	Low-Power Analog Comparator x2	High Resolution x3	
Memory Protection Unit	High-Speed Analog Comparator x3	Asynchronous General Purpose Timer	
	Temperature Sensor	WDT	
	OPAMP x4		
	System & Power Management	Safety	Security & Encryption
USBFS	Data Transfer Controller	ECC in SRAM	128-Bit Unique ID
CAN	Event Link Controller	SRAM Parity Error Check	TRNG
Serial Communications		Flash Area Protection	AES (128/256)
Interface	Low Power Modes	ADC Diagnostics	
SPI x2	Multiple Clocks	Clock Frequency Accuracy	
	Port Function Select	Measurement Circuit	
12C x2			
I2C x2 DALI Lighting Interface	RTC	CRC Calculator	
	RTC	Data Operation Circuit	
		Data Operation Circuit	

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S128 MCU Group Block Diagram



Visit & learn more at: <u>Renesas.com/synergy/s1</u> | <u>Renesas.com/synergy/mcuglossary</u> | <u>Renesas.com/synergy/s128</u>

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# **S3 SERIES** HIGH EFFICIENCY SERIES

- 130-nm process
- Operating temperature range: -40°C to 105°C
- MCU Groups: S3A7 S3A6 S3A3 S3A1
- GPIO pins: Up to 124
- Packages options for S3 series products
  - QFN: 40, 48, 64
  - LQFP: 48, 64, 100, 144
  - BGA: 121
  - LGA: 100, 145
- Typical current consumption of S3 series products
  - 173 µA/MHz (Normal Mode)
  - 69 µA/MHz (Sleep Mode)
  - 800 nA (Software Standby Mode)



Visit & learn more at:

<u>Renesas.com/synergy/s3 | Renesas.com/synergy/mcuglossary | Renesas.com/synergy/s3a1</u>

Memory	Analog	O Timing & Control	ны		
Code Flash (1 MB)	14-Bit A/D Converter (28 ch.)	General PWM Timer 32-Bit x4	Capacitive Touch Sensin Unit (27 ch.)		
Data Flash (8 KB)	12-Bit D/A Converter x1	General PWM Timer 16-Bit			
SRAM (192 KB)	8-Bit D/A Converter x2	x6	Segment LCD Controlle		
Flash Cache	Low-Power Analog	Asynchronous General Purpose Timer x2			
Memory Protection Unit	Comparator x2				
Memory Mirror Function	OPAMP x4 Temperature Sensor	WDT			
<u>^</u>		<u>^</u>	•		
Connectivity	System & Power Management	Safety	Security & Encrypti		
Connectivity USBFS	DMA Controller (4 ch.)	ECC in SRAM	Security & Encrypti 128-Bit Unique ID		
	wanagement	$\sim$			
USBFS	DMA Controller (4 ch.)	ECC in SRAM	128-Bit Unique ID		
USBFS CAN SDHI/MMC Serial Communications	DMA Controller (4 ch.) Data Transfer Controller	ECC in SRAM SRAM Parity Error Check	128-Bit Unique ID TRNG		
USBFS CAN SDHI/MMC Serial Communications Interface x6	DMA Controller (4 ch.) Data Transfer Controller Event Link Controller	ECC in SRAM SRAM Parity Error Check Flash Area Protection	128-Bit Unique ID TRNG AES (128/256)		
USBFS CAN SDHI/MMC Serial Communications Interface x6 QSPI SPI x2	DMA Controller (4 ch.) Data Transfer Controller Event Link Controller Low Power Modes	ECC in SRAM SRAM Parity Error Check Flash Area Protection ADC Diagnostics Clock Frequency Accuracy	128-Bit Unique ID TRNG AES (128/256)		
USBFS CAN SDHI/MMC Serial Communications Interface x6 QSPI SPI x2 I2C x3 SSI x1	DMA Controller (4 ch.)         Data Transfer Controller         Event Link Controller         Low Power Modes         Multiple Clocks	ECC in SRAM SRAM Parity Error Check Flash Area Protection ADC Diagnostics Clock Frequency Accuracy Measurement Circuit	128-Bit Unique ID TRNG AES (128/256)		
USBFS CAN SDHI/MMC Serial Communications Interface x6 QSPI SPI x2 I2C x3 SSI x1	DMA Controller (4 ch.)         Data Transfer Controller         Event Link Controller         Low Power Modes         Multiple Clocks         Port Function Select	ECC in SRAM SRAM Parity Error Check Flash Area Protection ADC Diagnostics Clock Frequency Accuracy Measurement Circuit CRC Calculator	128-Bit Unique ID TRNG AES (128/256)		

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S3A1 MCU Group Block Diagram



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# **S5 SERIES** HIGH INTEGRATION SERIES

- 40-nm high-performance process
- Operating temperature range: -40°C to 105°C
- MCU Groups: S5D9 S5D5 S5D3
- GPIO pins: Up to 133
- Packages options for S5 series products
  - LQFP: 64, 100, 144, 176
  - BGA: 176
  - LGA: 145
  - QFN: 64
- Typical current consumption of S5 series products
  - 100 µA/MHz (Normal Mode)
  - 1.3 µA (Software Standby Mode)
  - 900 nA (V\_{BATT} for RTC)



Visit & learn more at: <u>Renesas.com/synergy/s5 | Renesas.com/synergy/mcuglossary | Renesas.com/synergy/s5d9</u>

Memory	Analog	Timing & Control	ны	
Code Flash (Up to 2 MB)	12-Bit A/D Converter x2 (24 ch.)	General PWM Timer 32-Bit Enhanced High Resolution x4	Capacitive Touch Sensing Unit (18 ch.)	
Data Flash (64 KB)	12-Bit D/A Converter x2	General PWM Timer 32-Bit Enhanced x4	Graphics LCD Controller	
SRAM (640 KB)	HIgh Speed Analog Comparator x6	General PWM Timer 32-Bit	2D Drawing Engine	
Memory Protection Unit	PGA x6	x6 Asynchronous General	JPEG Codec	
Memory Mirror Function	Temperature Sensor	Purpose Timer x2 WDT	Parallel Data Capture U	
	System & Power Management	Safety	Security & Encryptic	
Ethernet MAC Controller	DMA Controller (8 ch.)	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 x2 SDHI x2	Multiple Clocks	Clock Frequency Accuracy Measurement Circuit	ECC/RSA/DSA	
Serial Communications Interface x10	Port Function Select	CRC Calculator	SHA1/SHA224/SHA256	
	RTC	Data Operation Circuit	GHASH	
IrDA Interface	NIO NIO	Data Operation Oneut		
I2C x3 SSI x2	SysTick	Port Output Enable for GPT		

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S5D9 MCU Group Block Diagram



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# **S7 SERIES** HIGH PERFORMANCE SERIES

- 40-nm high-performance process
- Operating temperature range: -40°C to 105°C
- MCU Groups: S7G2
- GPIO pins: Up to 172
- Packages options for S7 series products
  - LQFP: 100, 144, 176
  - BGA: 176, 224
  - LGA: 145
- Typical current consumption of S7 series products
  - 133 µA/MHz (Normal Mode)
  - 2.4 µA (Software Standby Mode)
  - 900 nA (V\_{BATT} for RTC)

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Memory	Analog	U Timing & Control		
Code Flash (4 MB)	12-Bit A/D Converter x2 (25 ch.)	General PWM Timer 32-Bit Enhanced High Resolution x4	Capacitive Touch Sensing Unit (18 ch.)	
Data Flash (64 KB)	12-Bit D/A Converter x2	General PWM Timer 32-Bit Enhanced x4	Graphics LCD Controlle	
Flash Cache	High Speed Analog Comparator x6	General PWM Timer 32-Bit x6	2D Drawing Engine	
MPUs	PGA x6	Asynchronous General	JPEG Codec	
Memory Mirror Function	Temperature Sensor	WDT	Parallel Data Capture Un	
Connectivity Ethernet MAC Controller x2	System & Power Management	SRAM Parity Error Check	Security & Encrypti	
	DMA Controller (8 ch.)		,	
Ethernet DMA Controller	DMA Controller (8 ch.)	Flash Area Protection	TRNG	
	Data Transfer Controller	Flash Area Protection ADC Diagnostics	· · · · · · · · · · · · · · · · · · ·	
Ethernet DMA Controller			TRNG	
Ethernet DMA Controller Ethernet PTP Controller	Data Transfer Controller Event Link Controller	ADC Diagnostics Clock Frequency Accuracy	TRNG AES (128/192/256)	
Ethernet DMA Controller Ethernet PTP Controller USBHS USBFS	Data Transfer Controller Event Link Controller Low Power Modes	ADC Diagnostics Clock Frequency Accuracy Measurement Circuit	TRNG AES (128/192/256) 3DES/ARC4	
Ethernet DMA Controller         Ethernet PTP Controller         USBHS       USBFS         CAN x2       SDHI x2         Serial Communications	Data Transfer Controller Event Link Controller Low Power Modes Multiple Clocks	ADC Diagnostics Clock Frequency Accuracy Measurement Circuit CRC Calculator	TRNG AES (128/192/256) 3DES/ARC4 ECC/RSA/DSA	
Ethernet DMA Controller         Ethernet PTP Controller         USBHS       USBFS         CAN x2       SDHI x2         Serial Communications Interface x10	Data Transfer Controller Event Link Controller Low Power Modes Multiple Clocks Port Function Select	ADC Diagnostics Clock Frequency Accuracy Measurement Circuit CRC Calculator Data Operation Circuit	TRNG AES (128/192/256) 3DES/ARC4 ECC/RSA/DSA SHA1/SHA224/SHA256	

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S7G2 MCU Group Block Diagram

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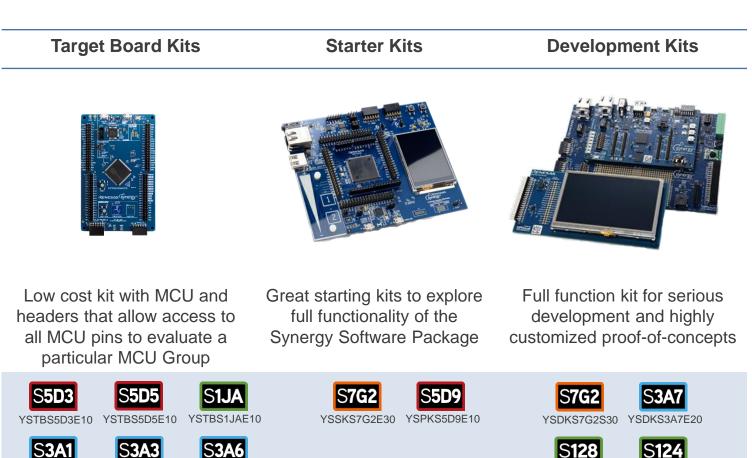
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# **PRODUCT KITS** EXPLORE & EVALUTE ANY SYNERGY MCU PRODUCT GROUP

- ~35 Application projects
  - Application note
  - Source code & project
- Key Features
  - On-board debugging interface
  - Access to most pins
  - Wired/wireless connectivity
  - Expandable ecosystem connectors
  - Complete engineering collateral user manuals, schematics, BOM, layout, gerbers, etc.



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## **SOLUTION KITS EXPLORE TECHNOLOGY & APPLICATIONS**

- ~15 Application projects
  - Application note
  - Source code & project

#### Key Features

- Highly optimized for specific endapplication or technology
- Solid engineering reference
- Complete engineering collateral user manuals, schematics, BOM, layout, gerbers, etc.

**Application Example Kits** 



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application solution utilizing Synergy Hardware & Software elements



Showcases a core technology or end-

Reference design of end-product to help create similar solutions & products

> S7G2 YSPEHMI1S20WS2 Human Machine Interface

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S5D9 YSAECLOUD2 Cloud

Connectivity



YSAECAP1S11 **Capacitive Touch** 

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### **LEARN MORE & ORDER ONLINE** SYNERGY HARDWARE

#### Find the right MCU & Kit

- MCUs (User Manual, Datasheets)
  - MCU Series
    - Renesas.com/synergy/s1
    - Renesas.com/synergy/s3
    - Renesas.com/synergy/s5
    - Renesas.com/synergy/s7
- Kits (User Manual, Schematics, Design Files, etc.)
  - Kit Renesas.com/synergy/sk-s7g2 (\*ex.)

#### **Order MCU & Kits globally from Leading Distributors**

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- **Europe** Arrow, Avnet, Rutronik, Glyn, Anglia, RS Components (UK), Renesas Shop
- Japan Marutsu, Chip One Stop, RS Components
- South East Asia & Oceania Dragon, Future, Braemac, Arrow, Rabyte, SM Electronics



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- Visit & learn more at: Renesas.com/svnergv/hardware
- S5D9 MCU Group Renesas.com/synergy/s5d9
  - Target Board for S5D5 Renesas.com/synergy/tb-s5d5
  - Development Kit for S128 Renesas.com/synergy/dk-s128
  - Application Example for HMI Renesas.com/synergy/pe-hmi1



# **SYNERGY SOFTWARE**

	Synergy Software						
	🔀 Development Tools						
IAI	R Embedde	ed Workbench® fo	or Renesas Syner	Development Tools			
	न्ह Syn	ergy Softwar	e Package (S	Herified Software Add-ons (VSA)			
		Softwa	re APIs		Software APIs		
					Stacks		
	RTOS	Application Framework	Middleware	Functional Libraries	Algorithms		
Г	(103				Functions		
			HAL Drivers		Specialties		
		Board Supp	ort Package		and more		



Renesas.com/synergy/software

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## SYNERGY SOFTWARE PACKAGE KEY COMPONENTS

#### Key features

- Uses Express Logic's ThreadX<sup>®</sup> and X-Ware<sup>®</sup>
- Commercial software worth over \$100K
- Unlimited production licenses at no additional cost
- Fully tested, maintained and supported by Renesas

ThreadX <sup>®</sup> RTOS	Applic Frame						Functional Libraries				
Fully Preemptive Scheduler	Audio	Wi-Fi	Г	FileX™		USBX™	GUIX™	Ι	NetX <sup>™</sup> and N	letX Duo™	Encryption and Hashing Library
	Console	BLE	E/	AT 12/16/32		Host Classes Storage, CDC,	Run Time Library		FTP	SNTP	AES, RSA, ECC, SHA1/256, ARC4,
Inter-process and Inter-thread		Cellular	١.,	Formats		HID, Hub)	Image Processing		TFTP	NAT	3TDES, MD5, TRNG
Communication	JPEG	(NB-IOT, CAT1/3/M1)		DSC, SDHC,		Host Stack	Widget Library		Telnet	ТСР	CMSIS DSP Library
Memory	Touch Panel	ADC	eN	MMC Support	н	ost Controller	Event Processing		PPP	IPv4/v6	Coftwara Cafaty
Management		Thread		multaneous		evice Classes	Canvas Processing		SMTP	UDP	Software Safety Library
	Capacitive Touch	Monitor	M	Media Support		(Storage, CDC, HID, UVC)	Rotation, Scaling		POP3	ICMP	Signature Generatio and Verification
Interrupt Management	Cryptographic	Power Profile		ault tolerant, ournal-Based		Device Stack	Blend, Anti-alias		TLS	MQTT	
managament		External	-		D	evice Controller	SDSC, SDHC,		DNS	ARP	Wrapped Key Generation
Execution Profiling	X-Ware Interface	Interrupt		evelX Flash /ear Leveling	lsochronous Transfer		eMMC Support		DHCP	RARP	Key Installation
Literation Proming		Mass Storage (SDMMC, USB,				Transfer			HTTP/1.1		Public Key Encryptio
Picokemel™	UART	QSPI, RAM)			L			Л	HTTPS	BSD Socket Library	Private Key Decryptio
Architecture				Hard	wa	ire Abstractio	n Layer (HAL)	Dr	rivers		
Event-Chaining™ Technology	UART	SF	1	ADC 12/14/1	16	Code Flash	Data Flash		QSPI	SDHI	CRC
	USBHS	12	-	Sigma Delta A	DC	CAN	GPIO		RTC	JPEG Codec	PDC
Preemption- Threshold™ Scheduling	USBFS	SS	I	DAC 8		Timer	Watchdog Timer	DN	/A Controller	AGT 16-BitTime	er GPT 32-BitTime
Schedding	Ethernet MA Controller			DAC 12		Independent Watchdog Tmr	2D Drawing Engine	L	ow Voltage Detection	Low Power Modes	Segment LCD Controller
	Clock Managemer	Functi nt Safe		Data Tranfe Controller		Capacitive Touch Sensing Unit	Event Link Controller	Int	errupt Control Unit	Security and Encryption	Graphics LCD Controller
	Analog Comparator	OPA	MP	_							

#### Synergy Software Package (SSP)

Kits

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# SYNERGY SOFTWARE PACKAGE QUALITY ASSURANCE

Quality testing performed by a dedicated quality team		
<ul> <li>10K+ testcases used to verify 80+ SSP modules</li> </ul>	s Manual	Renesas Synergy™ Platform Software Quality Summary for SSP v1.5.0 Rev.100 Cot 3, 2018 Introduction
<ul> <li>60K+ lines of executable test code</li> </ul>		This document presents a summary of the realist collected by the Software/Quality Assumace (SQA) test bits performed during final qualification of version 1.60 of the Renses 3 strenges". Software Values (SSF). The SQA process keels documented in the Synerge" Software Quality Handbook available on <u>EDECOMPTING</u> . Contents 1. Scope2
<ul> <li>Run on 25 MCU hardware systems across 4 MCU series</li> </ul>	Synergy Software Quality	Scope 2     How to Read the Synergy Software Quality Summary Report
Built with 2 compliers – GCC & IAR	Handbook	2.2.1         Coverage Indux         2           2.2.2         Coverage Indux         2           2.2.3         Complexity Index         3           2.2.4         Coding Standard Index         3           2.2.5         Verification Index         3           2.2.6         Verification Index         3
<ul> <li>Tested for backward compatibility</li> </ul>	Renesas Synergy™ Platform Synergy Software Software Quality Assurance	2.3 Software Unit Tests.     3     2.4 Verification Index Score     3     3. Additional Information.     3     4. Synergy Software Quality Summary for SSP version 1.5.0.     4
5 Key quality metrices for SSP		5. Quality Summary Notes
1. Meet coding standards		Revision History9
2. Maintain low complexity		
3. Traceability to requirements	All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by Reneasa Electronics Corp. without notose. Please review the latest information published by Reneasa Electronics Corp. through various means, including the Reneasa Electronics Corp. website (http://www.reneasa.com).	
4. Clean builds	Renesas Electronics Rev.1.17 Mar 2017	R11AN0336EU0100 Rev.1.00 Page 1 of9 Oct 3, 2018 Revessor
5. Full test coverage	Software Quality Handbook	Software Quality Summary
Visit & learn more at: Renesas.com/synergy/ssp	Click here to Download	Click here to Download

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# SOFTWARE ADD-ONS ADDITIONAL SOFTWARE WHICH CAN BE USED WITH THE SSP

#### Extend functionality of the platform using libraries, drivers, stacks, etc. to enable a wide range of specialized functions

- Verified & Supplemental Add-ons
  - 3<sup>rd</sup> Party software compatible with SSP tested by Renesas
  - Evaluation version provided at no cost. Commercial version sold & supported by 3<sup>rd</sup> parties.
- Partner Projects
  - 3<sup>rd</sup> Party software, compatible with SSP tested by 3<sup>rd</sup> party
  - Drivers, trace tools, demos, connectivity stacks, etc.
  - Supported by 3<sup>rd</sup> parties
- Application Projects & Module Guides
  - Reference code and example code with application notes for different SSP modules
  - Synergy Kits comes with application projects and module quides



Software

MCU

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Visit & learn more at:

Renesas.com/synergy/addons | Renesas.com/synergy/partnerprojects | Renesas.com/synergy/applicationprojects

Sampling of libraries, drivers, stacks, etc.



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# **DEVELOPMENT TOOLS** INTEGRATED DEVELOPMENT ENVIRONMENTS (IDE)

# Professional embedded software development & debugging tools at no additional cost!

- No license and maintenance fee
- No limitation on code size or number of users
- Segger J-Link® debugger integration
- Graphic configurators
  - Pin, clock, interrupts, SSP module configurations
  - Auto code generation



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Tools

e<sup>2</sup> studio

Workbench

IAR Embedded

for Renesas Synergy<sup>™</sup>

Tool Chain	Compilers supported at no charge	Products supported	Utilities supported
e <sup>2</sup> studio (eclipse-based)	GNU & IAR	Synergy MCUs & other Renesas MCUs	Trace X & Synergy Standalone Configurator (included)
IAR Embedded Workbench for Renesas Synergy	IAR	Synergy MCUs	Synergy Standalone Configurator (add-on)



Visit & learn more at: Renesas.com/synergy/tools IAR Embedded Workbench for Renesas Synergy<sup>™</sup>



AR

## **DEVELOPMENT UTILITIES** EMBEDDED & SYSTEM APPLICATIONS

#### Advanced utilities at no additional cost!

- GUIX Studio<sup>™</sup>
  - PC-based drag-and-drop WYSIWYG design tool for embedded graphical user interfaces, Automatically generates C code compatible with GUIX<sup>™</sup> run-time library
- TraceX<sup>®</sup>
  - PC-based graphical event analysis tool for ThreadX performance monitoring
- Capacitive Touch Workbench
  - Tuning tool for capacitive touch applications
- IAR C-RUN<sup>®</sup> & S-STAT<sup>®</sup>
  - Static and run-time analysis



Kits

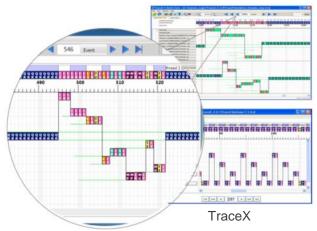
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#### **Download Synergy Software & Documentation**

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  - Renesas.com/synergy/addons
- Getting Started Collateral
  - Application Projects -Renesas.com/synergy/applicationprojects
  - Partner Projects <u>Renesas.com/synergy/partnerprojects</u>

#### **Download Synergy Development & Debugging Tools/Utilities**

- Tools
  - IDE e<sup>2</sup> studio <u>Renesas.com/synergy/e2studio</u>
  - IDE IAR EWB for Synergy <u>Renesas.com/synergy/ewsynergy</u>

Software

- Standalone configurator <u>Renesas.com/synergy/ssc</u>
- Drivers & Utilities
  - J-Link Drivers Renesas.com/synergy/jlink
  - TraceX Renesas.com/synergy/tracex

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  - Software
  - Software Tools
  - Partner Projects
  - Application Projects
  - Kits & Hardware Components
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							Tools and partner development tools enable efficient configuration, coding, debugging, analysis, and tation of Synergy Software projects.						
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**Knowledgebase** – explore a collection of easily searchable how-to articles and FAQs Renesas.com/synergy/knowledgebase



**Forum** – interact with a community of developers to find and share solutions Renesas.com/synergy/forum



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**Videos** – watch tutorials on official Synergy Platform YouTube channel <u>Renesas.com/synergy/videos</u>

#### Personalized resources



**Chat** - Instantly chat around the clock with a Synergy Platform expert <u>Renesas.com/synergy/support</u>



### **START NOW** BEGIN DEVELOPING IN JUST THREE EASY STEPS



#### 1. Get a kit Order a Synergy kit featuring the Synergy MCU of your choice



#### 2. Download

Download & install embedded software and development tools







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#### 3. Develop

Begin developing using one of the existing applications projects or partner projects







