



# IEC61508 Certified Solutions for RA & RX Family FUNCTIONAL SAFETY SOLUTION FOR INDUSTRIAL AUTOMATION



IA Functional Safety  
Solution Info

Renesas Functional Safety solution provides core technology needed for IEC61508 SIL\* certification. The certified software kits and related reference board and documents help to construct a certified functional safety system. This solution significantly reduces the development burden on customers and contributes to the implementation of a safe working environment in factories with the ability to handle hazards even when the system functions fail.

\* SIL: Safety Integrity Level which is defined in the functional safety standard

## Target Applications

### Safety System For:

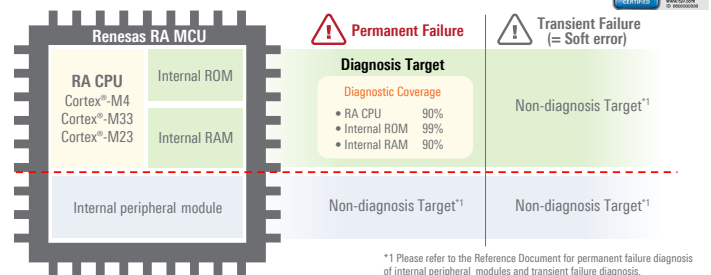
- AC Servo and Drive
- Remote IO
- Programmable Logic Controller
- Sensor and Actuator

## SIL3 Certified Self-test Software Kit for RA Family, Cortex® M23 and M33 - Now Available!

### Key Features

- Functional Safety system with MCU are required to perform self-diagnostics defined by IEC61508.
- The kit contains: diagnostic software, safety manual, user guide, and functional safety certificate.
- The certified software can be integrated into customer's system as-is; no certification process required by customer.

### Permanent Failure Diagnostic Software for CPU, ROM, and RAM



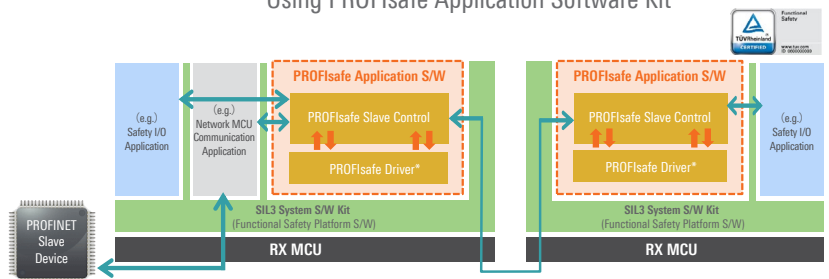
## SIL3 Certified PROFI-safe Application Software Kit\* for RX Family - New!

### Key Features

- Renesas PROFI-safe Application Software Kit is a comprehensive application software that can easily realize the PROFI-safe functionalities on the PROFINET slave devices.
- The kit contains: IEC61508-certified PROFI-safe application software, safety manual, user guide, two sample programs, and software developer's handbook.
- By using this kit, customer can easily configure safety remote I/O functionalities.

### Example:

### Safety Remote I/O System Configuration Using PROFI-safe Application Software Kit



\*Please purchase PROFI-safe driver from SIEMENS when using PROFI-safe Application Software.

# FUNCTIONAL SAFETY SOLUTION FOR INDUSTRIAL AUTOMATION

## FUNCTIONAL SAFETY SOLUTION SUPPORTING MCU


#	Product	Family	RX			RA		
		Core	RXv1	RXv2	RXv3	CM4	CM23 <b>NEW</b>	CM33 <b>NEW</b>
		Group	RX111, RX113, RX130	RX71M, RX651/N, RX64M, RX24U, RX24T, RX230/1, RX23T, RX23W, RX23E-A	RX72M, RX72N, RX72T, RX66N, RX66T	RA6M1, RA6M2, RA6M3, RA6T1, RA4M1	RA2A1, RA2L1, RA2E1	RA6M4, RA6M5, RA4M2, RA4M3
1	Self-Test Software Kit		✓	✓	✓	✓	✓	✓
2	SIL3 System Software Kit			✓	✓			
3	FSoE Application Software Kit			✓	✓			
4	PROFIsafe Application Software Kit <b>NEW</b>			✓	✓			
5	Reference Document		✓	✓	✓	✓ <sup>*1</sup>	✓ <sup>*1</sup>	✓ <sup>*1</sup>
6	Reference Hardware		✓	✓	✓			
7	IEC61508 Certification Kit for RX Compilers		✓	✓	✓	<sup>*2</sup>	<sup>*2</sup>	<sup>*2</sup>

\*1: Although the description in the document use RX MCU, it can be used to other MCUs since this is a technical document of functional safety standard which is not dedicated specific MCU Family.

\*2: IAR Systems support certified compiler for RA Family. Please contact IAR for detail.

## Software Kits and Design Tools

### Self-test Software Kit

Series		Compiler	Product Version	Content	Certificate
RX100 series <sup>*1</sup>		CC-RX compiler V2.03.00	Complimentary. Available for download via web	 <b>IEC61508 Certified Software</b> <ul style="list-style-type: none"> <li>Self-diagnostics Software Library</li> <li>Safety Manual</li> <li>User Guide</li> <li>IEC61508 Certified Document</li> </ul>	Available for download via web.
		IAR-EWRX compiler V3.10.5			
RX200 series <sup>*2</sup>		CC-RX compiler V3.01.00			
		IAR-EWRX compiler V4.14.2			
RX600 series <sup>*3</sup>		CC-RX compiler V3.01.00			
		IAR-EWRX compiler V4.14.2			
RX700 series <sup>*4</sup>		CC-RX compiler V3.01.00			
		IAR-EWRX compiler V4.14.2			
Cortex-M4	RA6 Series <sup>*5</sup>	IAR-EWARM V8.22.3			
	RA4 Series <sup>*6</sup>				
<b>NEW</b> Cortex-M33	RA6 Series <sup>*7</sup>	IAR-EWARM V8.50.10			
	RA4 Series <sup>*8</sup>				
<b>NEW</b> Cortex-M23	RA2 Series <sup>*9</sup>				

\*1: Compatible with RX111, RX113, RX130

\*2: Compatible with RX24U, RX24T, RX230/RX231, RX23T, RX23W, RX23E-A

\*3: Compatible with RX66T, RX66N, RX651/RX65N, RX64M

\*4: Compatible with RX72M, RX72T, RX72N, RX71M

\*5: Compatible with RA6M1, RA6M2, RA6M3, RA6T1


\*6: Compatible with RA4M1

\*7: Compatible with RA6M4, RA6M5

\*8: Compatible with RA4M2, RA4M3


\*9: Compatible with RA2A1, RA2L1, RA2E1

### SIL3 System Software Kit

RX group	Compiler	Commercial Version	Evaluation Version	Content	Certificate
RX72M RX72T RX72N RX71M	CC-RX compiler V3.01.00	RTK0EF0061F22002SJ	Complimentary. Available for download via web	 <b>Commercial Version</b> <ul style="list-style-type: none"> <li>IEC61508 Certified Software                             <ul style="list-style-type: none"> <li>Functional Safety Platform Software</li> <li>Safety Manual</li> <li>User Guide</li> <li>IEC61508 Certified Document</li> </ul> </li> <li>Software Development Handbook</li> <li>Configuration Tool and Manual</li> </ul>	Available for download via web.
RX66T RX66N RX651/RX65N RX64M					
RX24U RX24T RX230/RX231 RX23T RX23W RX23E-A	IAR-EWRX compiler V4.14.2	RTK0EF0062F22002SJ		<b>Evaluation Version</b> <ul style="list-style-type: none"> <li>Functional Safety Platform Software</li> <li>Safety Manual</li> <li>User Guide</li> <li>Software Developer's Handbook</li> <li>Configuration Tool and Manual</li> <li>PC Tool for Information Output Application</li> </ul>	


# FUNCTIONAL SAFETY SOLUTION FOR INDUSTRIAL AUTOMATION

## FSoE Application Software Kit

RX group	Compiler	Commercial Version	Evaluation Version	Content	Certificate
RX72M RX72T RX72N RX71M  RX66T RX66N RX651/RX65N RX64M	CC-RX compiler V3.01.00	RTK0EF0080F21001SJ	Complimentary. Available for download via web	 <b>Commercial Version</b> <ul style="list-style-type: none"> <li>• FSoE Application Software</li> <li>• Safety Manual</li> <li>• User Guide</li> <li>• IEC61508 Certified Document</li> <li>• Sample Applications<sup>*1</sup> <ul style="list-style-type: none"> <li>• Network Communication IC Interface</li> <li>• Data I/O Interface</li> </ul> </li> <li>• Software Developer's Handbook</li> </ul>	<b>Evaluation Version</b> <ul style="list-style-type: none"> <li>• FSoE Application Software</li> <li>• Safety Manual</li> <li>• User Guide</li> <li>• Sample Applications<sup>*1</sup> <ul style="list-style-type: none"> <li>• Network Communication IC Interface</li> <li>• Data I/O Interface</li> </ul> </li> <li>• Software Developer's Handbook</li> </ul>
RX24U RX24T RX230/RX231 RX23T RX23W RX23E-A	IAR-EWRX compiler V4.14.2	RTK0EF0081F21001SJ			

\*1 : Two sample applications are bundled to check the operation of the FSoE Application Software.  
 - Network Communication IC Interface: Data exchange application between Network Communication IC and RX MCU  
 - Data I/O Interface: Application for input / output of safety data  
 \* You must be the member of ETG

## PROFIsafe Application Software Kit NEW

RX group	Compiler	Commercial Version	Evaluation Version	Content	Certificate
RX72M RX72T RX72N RX71M  RX66T RX66N RX651/RX65N RX64M	CC-RX compiler V3.01.00	RTK0EF0100F21001SJ	Complimentary. Available for download via web	 <b>Commercial Version</b> <ul style="list-style-type: none"> <li>• PROFIsafe Application Software</li> <li>• Safety Manual</li> <li>• User Guide</li> <li>• IEC61508 Certified Document</li> <li>• Sample Applications<sup>*1</sup> <ul style="list-style-type: none"> <li>• Network Communication IC Interface</li> <li>• Data I/O Interface</li> </ul> </li> <li>• Software Developer's Handbook</li> <li>• Below not bundled<sup>*2</sup> PROFIsafe communication control driver V2.2.2</li> </ul>	<b>Evaluation Version</b> <ul style="list-style-type: none"> <li>• FSoE Application Software</li> <li>• Safety Manual</li> <li>• User Guide</li> <li>• Sample Applications<sup>*1</sup> <ul style="list-style-type: none"> <li>• Network Communication IC Interface</li> <li>• Data I/O Interface</li> </ul> </li> <li>• Software Developer's Handbook</li> <li>• Below not bundled<sup>*2</sup> PROFIsafe communication control driver V2.2.2</li> </ul>
RX24U RX24T RX230/RX231 RX23T RX23W RX23E-A	IAR-EWRX compiler V4.14.2	RTK0EF0101F21001SJ			

\*1 : Two sample applications are bundled to check the operation of the PROFIsafe Application Software.  
 - Network Communication IC Interface: Data exchange application between Network Communication IC and RX MCU  
 - Data I/O Interface: Application for input / output of safety data  
 \*2 : This software is included in SIEMENS PROFIsafe-Starterkit V3.5 (catalog number # 6ES7195-3BF03-0YA0). Please purchase from SIEMENS.

## Reference Documents

Category	Part Number	Content
Complete document set	RTK0EF0005Z21001ZJ	20 documents + 6 excel files

## Reference Hardware

Category	Part Number	Content
RX72N-RX72N mounted (RXv3)	RTK0EF0058D02001BJ	1. Dual MCU configuration evaluation board 2. Manual, circuit diagram, and parts list
RX71M-RX651 mounted (RXv2)	RTK0EF0058D01001BJ	
RX111-RX111 mounted (RXv1)	RTK0EF0011D01001BJ	

## Compiler and Certification Kit

C/C++ Compiler Package for RX Family	Content	
V2.03.00 (IEC61508 certified version)	Recommended for RXv1 core	
V3.01.00 (IEC61508 certified version)	Recommended for RXv2 core and RXv3 core	
Compiler Certification Kit	Part Number	Content
CC-RX compiler certification kit	RTCRX0000TC02ZNR	For CC-RX V2.03.00
	RTCRX0000TC03ZNR	For CC-RX V3.01.00

**Note:** All the above, except the reference hardware, require a license agreement beforehand.

For more information, please visit us at [www.renesas.com/industrial-functional-safety](http://www.renesas.com/industrial-functional-safety)