

RX Smart Configurator

User's Guide: IAREW

R20AN0535EJ0100 Rev.1.00 Jan 25, 2019

Introduction

This application note describes the basic usage of the RX Smart Configurator (hereafter called the Smart Configurator), and the procedure for importing its output files to IAR Embedded Workbench.

References to the Smart Configurator and Integrated Development Environment (IDE) in this application note apply to the following versions.

- RX Smart Configurator V2.0.0 or later
- IAR Embedded Workbench for RX V4.10 or later

Target device and support compiler

Refer to the following URL for the range of supported devices:

https://www.renesas.com/smart-configurator

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1. Overview

1.1 Purpose

This application note describes the basic usage of the RX Smart Configurator (hereafter called the Smart Configurator), and the procedure for importing its output files to IAR Embedded Workbench.

Refer to the User's Manual of IAR Embedded Workbench for how to use them.

1.2 Features

The Smart Configurator is a utility for combining software to meet your needs. It handles the following tow functions to support the embedding of drivers from Renesas in your systems: Generating driver code and making pin settings.



2. Installation and uninstallation

This section describes the installation and uninstallation.

2.1 Installing the Smart Configurator

Download the Smart Configurator from the URL below.

https://www.renesas.com/smart-configurator

After activating the installer, install the Smart Configurator and the plug-in by following the procedure of the installer. You will require administrator privileges to do this.

2.2 Uninstalling the Smart Configurator

If you wish to uninstall the Smart Configurator, select "Smart Configurator for RX" from [Programs and Features] in the control panel.



3. Operating the Smart Configurator

3.1 **Procedure for Operations**

Figure 3-1 Operating procedure, shows the procedure for generating a source file using Smart Configurator and loading it into IAR Embedded Workbench. For the operation of IAR Embedded Workbench, refer to relevant document of IAR.



Figure 3-1 Operating Procedure



3.2 Starting the Smart Configurator

Select [Smart Configurator for RX Vx.x.x] of [Renesas Electronics Smart Configurator] from the Windows start menu. The main window of the Smart Configurator will be starting.

Note: Please replace Vx.x.x with your version.





Figure 3-2 Starting of Smart Configurator



3.3 Create and loading a configuration file

Smart Configurator saves and refers to the configuration file (*. scfg) the configuration information of the microcontroller, build tool, peripheral function, pin function etc. used in the project.

3.3.1 Creating a New Configuration File

On the main window, click the in [New Configuration File] button to display the [New Smart Configuration File] dialog box.

- (1) In [Platform:], select the device.
- (2) In [Toolchain:], select [IAR EWRX Toolchain].
- (3) In [File name:], enter the file name.
- (4) Confirm [Location:]. If you want to change it, click [Browse] and select the save destination.
- (5) Click [Finish] to create the configuration file.

诸 New S	mart Configuration File		_		×
Smart Co	nfiguration Settings				
Selectina	tform and toolchain settings fo	or the	new configuration file		
beleet ple	atom and toolenam settings in	or the	iew conniguration nie		
Category:	RX				~
Platform	(1)		Toolchain: (2)		
	V64M - 176nin				
Ť	RSES6/MECyRG		Kenesas KAC Toolchain		
	R5E564MECxEC		IAR EWRX Toolchain		
	R5E564MEDxBG				
	R5E564MEDxEC				
	R5F564MGCxBG				
	R5F564MGCxFC				
	R5F564MGDxBG				
	R5F564MGDxFC				
	R5F564MJCxBG				
	R5F564MJCxFC				
	R5F564MJDxBG				
	R5F564MJDxFC				
	R5F564MLCxBG				
	R5F564MLCxFC	~			
ROM size	e: 4Mbytes, RAM size: 512KB, Pi	n cou	nt: 176		
File name	Smart_Configurator_Example	e			
Location:	C:\workspace			Brov	vse
			(5)		
	< Back	Ne	xt > Finish	Canc	el

Figure 3-3 Create a Configuration File

3.3.2 Opening an Existing Configuration File

On the main window, click the \square [Opening an Existing Configuration File] button to display the [Open] dialog box. Select the file and click [Open].

👩 Open				×
\leftarrow \rightarrow \checkmark \uparrow \square \rightarrow This PC	> Local Disk (C:) > smartconfigurator > workspace	ٽ ~	Search workspace	Q
Organize 🔻 New folder				• 🔟 🕐
Pictures	^ Name	Date modified	Туре	Size
Videos	Smart_Configurator_Example.scfg	10/15/2018 1:31 PM	SCFG File	1 KB
🏪 Local Disk (C:)				
💣 Network				
	¥			
File <u>n</u> ame:	Smart_Configurator_Example.scfg	~	Smart Configuration	n files 🛛 🗸
			<u>O</u> pen	Cancel

Figure 3-4 Opening an Existing Configuration File



3.4 Window

The main window is displayed when the Smart Configurator is started. The configuration of the window is shown in Figure 3-5, Main Window.

Smart_Configurator_Example.	scfg 🛛				MCU Package ⊠	pin function • Assign	ned 🔵 Default Board
This editor allows you to modi Board Allow board and device selecti Clocks Allow clock configuration Components Allow software component sel Pins Allow general pin configuration Interrupt Allow general interrupt config Current Configuration Selected components: Component	fy the settings stored in con on ection and configuration n and pin configuration for uration and interrupt config MLCxFC (ROM size: 4Mbyte	iguration file (scfg) selected software component uration for selected software component s, RAM size; 512KB, Pin count: 176) Configuration Configuration	Application under development Device RTOS - Pin	nponents		RXG4M RXG4M RSF564MLCxFC	
rerview Board Clocks Comp	onents Pins Interrupts				Legend		
Console 🛛			🔒 🚮 🐼 📑 🗉 🔻	2	S Configuration Problems		**
5000001: Pin 24 is assi 5000001: Pin 22 is assi	gned to EXTAL gned to XTAL			Î	Description		Туре



- (1) Menu bar
- (2) Main tool bar
- (3) Smart Configurator view
- (4) MCU Package view
- (5) Console view
- (6) Configuration Problems view



3.4.1 Main menu

File Window Help

Table 3-1, Main Menu Items, lists the items of the main menu.

Table 3-1 Main Menu Items

Menu		Details				
File	New	The dialog box [New Smart Configuration File], which is used to create a new configuration file, is displayed.				
	Open	The dialog box [Open], which opens an existing configuration file, is displayed.				
	Save	Saves a configuration file with the same name.				
Restart Smart Configurator is re-started.						
	Exit	Execution of the Smart Configurator is terminated.				
Window	Preference	The dialog box [Preference], which is used to specify the properties of the configuration file, is displayed.				
	Show view	The dialog box [Show view], which is used to set the view of the window, is displayed.				
Help	Help Contents	The help menu is displayed.				
	About	The version information is displayed.				

3.4.2 Toolbar



Some functions of the main menu are allocated to the buttons on the toolbar. Table 3-2, Toolbar Buttons and Related Menu Items, shows the description of those tool buttons.

Table 3-2	Toolbar	Buttons	and	Related	Menu	Items
-----------	---------	----------------	-----	---------	------	-------

Toolbar button	Related menu item
	$[File] \rightarrow [New Smart Configuration File]$
	$[File] \to [Open]$
	$[File] \to [Save]$



3.4.3 Smart Configurator view

The Smart Configurator view consists of six pages: [Overview information], [Board], [Clocks], [Components], [Pins], and [Interrupts]. Select a page by clicking on a tab; the displayed page will be changed.

Ceneral Information This editor and pin configuration and pin configuration for selected software component Interrupt Allow general interrupt configuration and interrupt configuration for selected software component Current Configuration Current Configuration Selected components Components Current Configuration Selected components Component Current Configuration Selected components Current Configuration Current Configuration Current Configuration Selected components Current Configuration Current Configuration Selected components Current Cu		1		1
this editor allows you to modify the settings stored in configuration file (scfg) Board Allow board and device selection Clocks Allow clock configuration Components Allow software component selection and configuration for selected software component Prins Allow general interrupt configuration and pin configuration for selected software component Interrupt Allow general interrupt configuration and interrupt configuration for selected software component Components Components Components Component Compone	General Information			0
Board Allow board and device selection Allow clock configuration Allow software components Allow software component selection and configuration for selected software component Mileware provide the selection and pin configuration for selected software component Allow general interrupt configuration and pin configuration for selected software component Current Configuration and pin configuration for selected software component * Pins Allow general interrupt configuration and interrupt configuration for selected software component * Current Configuration Components: * Configuration	his editor allows you to mod	ify the settings stored in co	nfiguration file (.scfg)	
Allow board and device selection Conces We clock configuration Components We software component selection and configuration for selected software component Prins We serial interrupt configuration and interrupt configuration for selected software component Current Configuration Current Configuration Current Configuration Current Configuration Current Version Configuration Configuration Current Cu	Soard			
Clocks Application under development Allow clock configuration Image: Component S Allow software component selection and configuration Image: Component S Yms Image: Component S Allow general pin configuration and pin configuration for selected software component Image: Component S Allow general interrupt configuration and interrupt configuration for selected software component Image: Component S Current Configuration Selected board/device: R7F701651 (ROM size: 4 MB, RAM size: 256 KB, Pin count: 233) Selected component: Version Component Version Configuration Image: Configuration	llow board and device select	ion		
Allow clock configuration Components We software component selection and configuration for selected software component Therrupt Allow general interrupt configuration and interrupt configuration for selected software component Current Configuration Current Configuration Current Configuration Current Version Configuration Configuration Configuration Configuration Current Current	locks			Application under
ionponents Wow software component selection and configuration or selected software component Interrupt Mow general interrupt configuration and pin configuration for selected software component Interrupt Mow general interrupt configuration and interrupt configuration for selected software component Interrupt Current Configuration Interrupt configuration and interrupt configuration for selected software component Current Configuration Interrupt configuration selected software component elected board/device: RFT01611 (ROM size: 4 MB, RAM size: 256 KB, Pin count: 233) elected components: Configuration Component Version Configuration Interrupt	llow clock configuration			Components
Wine diver Hive Hive Wine Wine - Pins Wine Generation - Pins Current Configuration and interrupt configuration for selected software component - Pins Current Configuration - Pins - Pins elected board/device: RTF701651 (ROM size: 4 MB, RAM size 256 KB, Pin count: 233) - Pins elected components: - Configuration - Pins - Pins Component Version Configuration - Pins Wine - Pins - Pins - Pins	omponents			Device
Current Configuration and pin configuration for selected software component Allow general interrupt configuration and interrupt configuration for selected software component Current Configuration Elected board/device: R7F701651 (ROM size: 4 MB, RAM size: 256 KB, Pin count: 233) elected components: Component Version Configuration	llow software component se	lection and configuration		driver RIOS
Illow general pin configuration and pin configuration for selected software component Interrupt Illow general interrupt configuration and interrupt configuration for selected software component Current Configuration elected board/device: R7F701651 (ROM size: 4 MB, RAM size: 256 KB, Pin count: 233) elected components: Component Version Configuration	ins			
Interrupt Nalow general interrupt configuration and interrupt configuration for selected software component Current Configuration Selected board/device: R7F701651 (ROM size: 4 MB, RAM size: 256 KB, Pin count: 233) Selected components: Component Version Configuration	llow general pin configuratio	on and pin configuration for	r selected software component	
Illow general interrupt configuration and interrupt configuration for selected software component Current Configuration Elected board/device R7F701651 (ROM size: 4 MB, RAM size: 256 KB, Pin count: 233) elected components: Component Version Configuration	and general phi configuratio	in and phil configuration re-	i selected software component	
Current Configuration Selected borrd/device: R7F701651 (ROM size: 4 MB, RAM size: 256 KB, Pin count: 233) Selected component: Component Version Configuration	-tt	and part consignation for	sected software component	
Current Configuration Version Component Version Configuration Configuration Configuration	nterrupt	uration and interrupt confi	suration for relected coffware component	aat
elected board/device: R7F701651 (ROM size: 4 MB, RAM size: 256 KB, Pin count: 233) elected components: Component Version Configuration	nterrupt Illow general interrupt config	uration and interrupt config	guration for selected software component	ent
Sected components: Component Version Version Configuration	nterrupt Illow general interrupt config	uration and interrupt config	guration for selected software component	ent
Component Version Configuration	nterrupt ulow general interrupt config Current Configuration elected board/device: 87570	uration and interrupt config	guration for selected software component	ent
	nterrupt Illow general interrupt config Current Configuration elected board/device: R7F70 elected components:	uration and interrupt config 1651 (ROM size: 4 MB , RAM	guration for selected software component	ent
	nterrupt Illow general interrupt config Current Configuration elected board/device: R7F70' elected oponents: Component	uration and interrupt config 1651 (ROM size: 4 MB , RAM Version	Juration for selected software component size: 256 KB, Pin count: 233)	ent
	nterrupt Illow general interrupt config Current Configuration elected board/device: R7F70 elected components: Component	uration and interrupt config 1651 (ROM size: 4 MB , RAM Version	guration for selected software component I size: 256 KB , Pin count: 233)	ent
	nterupt Wow general interupt config Current Configuration elected board/device: R7F70 elected component: Component	1651 (ROM size: 4 MB , RAM	guration for selected software component size: 256 KB , Pin count: 233) Configuration	ent
	nterupt Nilow general interrupt config Current Configuration elected board/device: R7F70 elected component: Component	1651 (ROM size: 4 MB , RAM	success seturate component guration for selected software component size: 256 KB , Pin count: 233)	ent

Figure 3-6 Smart Configurator View

3.4.4 MCU Package view

Display the MCU package. You can save rotation, enlargement, reduction, and MCU package view of the display to the image file. You can also confirmation pin assignment and change it.

Two types of package view can be switched between [Assigned] and [Default Board]. [Assigned] displays the assignment status of the pin setting, and [Default Board] displays the initial pin setting information of the board. To specify Board, set [Board] on the [Board] page.



Figure 3-7 MCU Package View



3.4.5 Console view

The console displays details of changes to the configuration made in the Smart Configurator or MCU Package view.

📮 Console 🕱	B,	R	1	Ē	*	2	• '	-	
Smart Configurator Output									
M05000001: Pin 24 is assigned to EXTAL M05000001: Pin 22 is assigned to XTAL									~
<								>	~

Figure 3-8 Console View

3.4.6 Configuration Problems view

The Configuration Problems view displays problems with peripheral functions, interrupts, and pin conflicts.

	1 1 1	\bigtriangledown	
Туре			
	Туре	Type	Type

Figure 3-9 Configuration Problems View



4. Setting of Peripheral Modules

You can select peripheral modules from the Smart Configurator view.

4.1 Board setting

On the [Board] page, you can select boards and change devices.

4.1.1 Selecting the device

Click on the [___] button to select a device.

🔅 Smart_Co	onfigurator_Example.scfg 🛛	- 8
Device s	election	5
Device se	lection	2 4
Board:	Custom User Board V	
Device:	R5F564MLCxFC	
Overview Bo	oard Clocks Components Pins Interrupts	
Device:	R5F564MLCxFC	

Figure 4-1 Selecting the Device

The following message is displayed when changing the device. For each button operation, refer to "Table 4-1, Device change confirmation operation list".

Con	firm device change	\times
?	Changing the device will refresh all configurations. Configurations that are incompatible with the new device may be removed.	
	Do you want to continue?	
	Yes No	

Figure 4-2 Confirm Device Change

Table 4-1 Device Change Confirmation Operation List

Button	Operation explanation
Yes	Change to the selected device.
No	It does not change the device.
Save and continue	After saving the current configuration contents to the configuration file, change to the
	selected device.
Continue	Changes to the selected device without saving the current configuration contents to
	the configuration file.
Cancel	It does not change the device.



4.1.2 Selecting the board

Click on the [___] button to select a device. When peripheral functions are configured by board selection, pins are automatically set according to board connection.

戀 *Smart_C	Configurator_Example.scfg 🛛	
Device s	election	🖲 🗎
Device se	election	<u>è</u> 2
Board:	Custom User Board	
Device:	RSKRX64M (1.00) RSKRX65N-2MB RSKRX65N-2MB (1.01) RSKRX65N (1.00) RSKRX66T (1.00) RSKRX66T (1.02) Custom User Board	
Overview B	oard Clocks Components Pins Interrupts	

Figure 4-3 Selecting the Board

The following items are changed according to the configuration of the selected board.

- Pin assignment
- Frequency of the main clock
- Frequency of the sub-clock
- Target device

If you change the board, the message shown in "Figure 4-2" or the following message will be displayed. For each button operation, refer to "Table 4-2, Board Change Confirmation Operation List".



Figure 4-4 Confirm Board Change

Table 4-2	Board	Change	Confirmation	Operation	List
-----------	-------	--------	--------------	-----------	------

Button	Operation explanation
Save and continue	After saving the current configuration contents to the configuration file, change to the
	selected device.
Continue	Changes to the selected device without saving the current configuration contents to
	the configuration file.
Cancel	It does not change the device.



4.1.3 Import of board configuration

The board setting is defined in bdf (Board Description File). Follow the procedure below to import board configuration.

- (1) Click on the [i (Import board setting)] button and select a desired bdf file.
- (2) The board of the imported settings is added to the board selection menu.

Smart_Configurator_Example.scfg 🛛	
Device selection	🐻 🖆
Device selection	è Z
Board: Custom User Board V	
Device: R5F564MLCxFC	
Overview Board Clocks Components Pins Interrupts	

Figure 4-5 Import of Board Configuration (bdf format)

Once a board setting file is imported, the added board is also displayed in the board selection menu of other projects for the same device group.

4.1.4 Export of board configuration

The current main clock frequency, sub clock frequency and pin assignment settings can be exported as board configuration. Follow the procedure below to export the board configuration.

- (1) Click on the [🖾 (Export board setting)] button on the [Board] tabbed page.
- (2) Select the output location and specify a name (Display Name) for the file to be exported.

💮 Smart_Co	nfigurator_Example.scfg 🛛	
Device s	election	🖲 🗎
Device se	lection	24
Board:	Custom User Board V	
Device:	R5F564MLCxFC	
Overview Bo	Dard Clocks Components Pins Interrupts	

Figure 4-6 Export of Board Configuration (bdf format)



4.2 Clock settings

On the [Clocks] page, set the clock. The [Clocks] page setting is used as the clock source for each component. Set the clock before configuring the component.

The clocks setting is performed in the following procedure.

- (1) Set the clock oscillator circuit.
- (2) Sets the clock source to be supplied to the CPU and peripheral functions.
 - (a) When you move the mouse on the screen, the clock signal is displayed in blue.
 - (b) Click on the screen to select the clock selector.



Figure 4-7 Clock Settings



4.3 Software component settings

Drivers can be combined as software components on the [Components] page. Added components are displayed in the component tree at the left of the page.

🏟 *Smart_Configurator_Example.scfg 🛛		- 8
Software component configura	tion	🖲 🗎
Components (*2 🕞 🕀 🖈	Component tree	
Overview Board Clocks Components Pins	Interrupt	

Figure 4-8 Component Page

4.3.1 Adding component

The following describes the procedure for adding a component.

(1) Click on the [^{\bigcirc} (Add component)] icon.

🏟 *Smart_Configurator_Example.scfg 🛛		- 8
Software component configur	ation	🔁 🚔
$\begin{array}{c} \text{Components} & _{\mathbb{Z}}^{a} \boxdot \textcircled{H} \xrightarrow{s} \swarrow \\ (1) & & & & \\ \end{array}$	Configure	
type filter text		
Overview Board Clocks Components Pir	s Interrupt	

Figure 4-9 Adding Components

- (2) Select a component from the list in the [Software Component Selection] page of the [New Component] dialog box (e.g. Single Scan Mode S12AD).
- (3) Click on [Next].

Software	Component Selection			-
Select cor	nponent from those availabl	e in list		#
Туре	All			
Function	All			
Filter				
Compo	^	Type	Version	
	CIE Clock Synchronous M	Code Generator	140	
# Sing	e Scan Mode S12AD	Code Generator	1.6.0	
ter Smar	t Card Interface Mode	Code Generator	1.4.0	
🖶 SPI C	lock Synchronous Mode	Code Generator	1.4.0	
<				>
Show	only latest version			
Descriptio	on			
	ware component provides si	ngle scan mode configurat	ions for 12-Bit A, ted for only onc	/D e in
This soft Convert ascendir	er which the analog inputs ar ng channel order.	bitting selected are conve		
This soft Convert ascendir Download	g channel order.	i		
This soft Convert ascendir Downloar Configure	d more software components			
This soft Convert ascendir <u>Downloar</u> <u>Configure</u>	er which the analog inputs ar ig channel order. d more software component: e general settings			
This soft Convert ascendir Downloar Configure	er winken the analog inputs an ig channel order. d more software component: e general settings	(3)		
This soft Convert ascendir Download Configure	er winch nie analog inputs ar g channel order. I more software component: e general settings	(3)		

Figure 4-10 Selection of Software Components



- (4) Specify an appropriate configuration name in the [Add new configuration for selected component] page or use the default name (e.g. Config_S12AD0).
- (5) Select a hardware resource or use the default resource (e.g. S12AD0).
- (6) Click on [Finish]. The component is added to the component tree.

	iguration for sele	ected compone	ent		
Single Scan M Configuration Resource:	ode S12AD name: (4) [Cont (5) [S12A	ig_S12AD0 D0		3	

Figure 4-11 Add New Configuration for Selected Component (e.g. S12AD0)

4.3.2 Switching between the component view and hardware view

The Smart Configurator also provides a function for adding a new component by directly clicking a node in the Components tree. To use this function, you need to switch the view of the Components tree from the component view to the hardware view.

(1) Click on the [\Rightarrow (View Menu)] icon and select [Show by Hardware View]. The Components tree will display the components in a hardware resource hierarchy.

Compone	12 0 0	*	•	Configure	
	(1)	. •	Sł	iow by Component View	
			Show by Hardware View		
type filter te	ext		-		

Figure 4-12 Switch to [Show by Hardware View]

- (2) Double-click on a hardware resource node (e.g. S12AD1 under 12-bit A/D converter) to open the [New Component] dialog box.
- (3) Select a component from the list (e.g. Single Scan Mode S12AD) in the [Software Component Selection] page.
- (4) Click the [Next].

oftware component configuration	Software Component Selection			
omponents 👌 📑 🛱	Select component from those availab	le in list	t	+
ت 😜	Type All			
type filter text				
Event link controller	Function All			
> 🧁 Multi-function timer pulse unit 3	Filter			
Port output enable 3				
> 🗁 General PWM timer	Components	Туре	Version	
> 🗁 16-bit timer pulse unit	H Continuous Scan Mode S12AD	Code Generator	1.4.0	
> 🗁 Programmable pulse generator	Group Scan Mode S12AD	Code Generator	1.4.0	
> 🗁 8-bit timer	Single Scan Mode S12AD	Code Generator	1.6.0	
> 🗁 Compare match timer				
> 🗁 Compare match timer W	(3)			
Serial communications interface	× ′			
Serial communications interface wi	Show only latest version			
Description 12C bus interface	Description			
Serial peripheral interface	This software component provides s	ingle scan mode configur	ations for 12-Bit A/D	-
Realtime clock	Converter which the analog inputs a	rbitrarily selected are conv	erted for only once in	
Watchdog timer	ascending channel order.			
Independent watchdog timer CPC astaulates				
CRC calculator	Download more software component	ts		
S12AD0	Configure general settings			
- S12AD1				
C L/ bt U/A converter				
		(4)		
Data operation circuit		(4)		

Figure 4-13 Adding CG Components form the Hardware View



- (5) Specify an appropriate configuration name in the [Add new configuration for selected component] page or use the default name (e.g. Config_S12AD1).
- (6) Select a hardware resource or use the default resource (e.g. S12AD1).
- (7) Click on [Finish]. The component is added to the component tree.

dd new conf	iguration for selected component		
Single Scan M Configuration Resource:	ode S12AD name: (4) [konfig_S12AD0 (5) S12AD0	3	

Figure 4-14 Add New Configuration for Selected Component (e.g. S12AD1)

4.3.3 Removing a component

Follow the procedure below to removing a software component.

- (1) Select a software component from the Components tree.
- (2) Click on the [(Remove component)] icon. The selected software is removed from the component tree. The selected software component will be removed from the Components tree.

$\begin{array}{c} \text{Components} & \downarrow^{a}_{\mathbb{Z}} & \boxdot & & \swarrow & \swarrow \\ & (2) & & & & & \\ & & & & & \swarrow \end{array}$
type filter text
🗸 🗁 Drivers
🗸 🗁 Timers
Config_TAUB0
(1) Config_TAUB1

Figure 4-15 Removing a Component



4.3.4 Component configuration settings

Follow the procedure below to setting the component configuration.

- (1) Click the component in the component tree. (e.g. Config_S12AD0).
- (2) Configure the driver in the [Configure] panel to the right of the Components tree. The Figure 4-16 is an example.
 - a. Select AN000.
 - b. Select [A/D conversion start trigger pin] under [Conversion start trigger setting].
 - c. Click on [Advance setting] to expand the view.
 - d. Select [Discharge] for [Charge setting].

🌼 *Smart_Configurator_Example.scfg 🛛		ting le setting AN001 AN002 AN003 AN004 AN006 AN007 er setting trigger pin ion end interrupt (S12AD) Priority Level 15 (highest) ~ ie setting AN001 AN002 AN003 AN004 AN005 AN007 AN003 AN004 AN006 AN007 AN003 AN004 AN006 AN007 Vurued Vu
Software component configur	ration	🗈 🗈
Components $\downarrow^a_Z \models \blacksquare$	the second seco	^
1 1	Basic setting	
type filter text	Analog input mode setting	
✓ ➢ Startup ✓ ➢ Generic	Double trigger mode	
e cenenc	(2) a. Analog input channel setting	
V 🗁 Drivers		
A/D Converter	AN005 AN006 AN007	
Communications	Conversion start trigger setting	
er r_ether_rx er aspi smstr rx	(2) b. Start trigger source	
	A/D conversion start trigger pin	~ _
	Interrupt setting	
	Enable AD conversion end interrupt (S12ADI) Priority Level 15 (highest)	
	(2) <u>c</u> .	
	✓ Advance setting	
	Add/Average AD value setting	
	AN000 AN001 AN002 AN003 AN004	
	AN005 AN006 AN007	
	Self diagnosis setting	
	Mode Unused V	
	Voltage used OV 🗸	
	Disconnection detection assist setting	
	Charge setting (2) d. Discharge	
	Period 2 ADCLK	
		>
Overview Board Clocks Components Pin	ns Interrupts	

Figure 4-16 Component Configuration Settings

The code generation of the component is set to enabled by default.

Right click of	n the compor	nent and click [Generate code], it changes to [Generate code] and no code is generated.
Clicking [Generate code] will change to [Generate cod	e] and generate c	ode.	



4.3.5 Component resource change

You can change the resource of the component (e.g. change from S12AD0 to S12AD1). Compatible configurations can be migrated from the current resource to the newly selected resource.

Follow the procedure below to change the resource.

- (1) Right-click on a component (e.g. Config_S12AD0).
- (2) Select [Change resource] from the context menu.



Figure 4-17 Resource Change

- (3) Select a new resource in the [Resource Selection] dialog box (e.g. S12AD1).
- (4) The [Next] button will be active; click on it.

Resource	e Selection			_		×
Resource S Select reso	election	available in the	list			
Resource: (3)	S12AD1 S12AD0 S12AD1					~
	< Back) Next >	Finish		Cancel	

Figure 4-18 Select a New Resource



RX Smart Configurator

- (5) The configuration information is displayed on the [Configuration setting selection] page of the [Select Resource] dialog.
- (6) Check the portability of the settings.
- (7) Select whether to use the listed or default settings.
- (8) Click on [Finish].

onfirm setting for resource ch	ange Use setting below Use default		
Setting (6)	Value	Portable	
Double trigger mode	Unuse	Yes	ור
AN000	Use	Yes	Ľ
AN001	Unuse	Yes	L
AN002	Unuse	Yes	Т
AN003	Unuse	Yes	L
AN004	Unuse	Yes	Т
AN005	Unuse	Yes	L
AN006	Unuse	Yes	L
AN007	Unuse	Yes	L
Start trigger source	A/D conversion start trigger	Yes	L
F	internet (C10A II	W	ļ
k line in the second se			/
AN007 Start trigger source	Unuse A/D conversion start trigger	Yes Yes	>

Figure 4-19 Confirm New Resource Settings

The resource is automatically changed (e.g. changed from S12ADI0 to S12ADI1).

oftware component configuratio	on					9월 8	
Sector Sector Sector						E	
Components 🕴 🖞 🔁 🕀 🛣 🔻	Configure						
8.5							
type filter text	Analog input	mode setting					
V 😂 Startup	Double trig	ger mode [Extend analog input	t mode			
✓ Generic ✓ r_bsp	Analog input	hannel setting					
✓ ➢ Drivers	AN100	AN101	AN102	AN103	AN104		
V 🧁 A/D Converter	AN105	AN106	AN107	AN108	AN109		
Config_S12AD0	AN110	AN111	AN112	AN113	AN114		
Communications	AN115	AN116	AN117	AN118	AN119		
r_qspi_smstr_rx	AN120	Temperatu	ire sensor output	Internal refe	rence voltage		
	Conversion start trigger setting						
	Start trigger so	urce					
	A/D conversion start trigger pin						
	Interrupt setting						
	Enable AD	conversion end inte	rrup (S12ADI1) P	riority Level 15 (h	iighest) 🗸		
	★ Advance sett	ing					
	Add/Average	AD value setting					
	AN100	AN101	AN102	AN103	AN104		
	AN105	AN106	AN107	AN108	AN109		
	AN110	AN111	AN112	AN113	AN114		
	AN115	AN116	AN117	AN118	AN119		
	AN120	Temperatu	ire sensor output	Internal refe	rence voltage		
	Self diagnosis	setting					
	Mode		Unused	~			
	1		An and a second second			>	

Figure 4-20 Resource Changed Automatically



To change the configuration name, follow the procedure below.

- (9) Right-click on the component.
- (10) Select [Rename] to rename the configuration (e.g. change Config_S12AD0 to Config_S12AD1).

Components	.¦ª _z ⊑ ⊞ 📫 ▼				
	ت ت				
type filter text					
✓	verter ig_S12AD0				
	Change resource	👩 Rename Confi	guration		×
(10)	Remove Duplicate Rename Reset to default Add Configuration >	New name:	Config_S12AD1	ОК	Cancel

Figure 4-21 Renaming the Configuration



4.4 Pin settings

The [Pins] page is used for allocating pin functions. You can switch the display by clicking on the [Pin Function] and [Pin Number] tabs. The [Pin Function] list shows the pin functions for each of the peripheral functions, and the [Pin Number] list shows all pins in order of pin number.

n configuration				You can s	ort the	e display		1
oftware Components 🗉 🖃 ↓ª₂ 🚟	Pin Functio	n		/ by click	ing th	e title.	~ 🔳 🖩	ي. ا ک ا
Type filter text	type filter	text					All	
🗸 💑 Single Scan Mode S12AD	Enabled	Function	Assignment	Pin Number	Direction	Remarks	Comments	
Config_S12AD0		ADTRG0#	P07/IBO15/ADTRG0#	/ 176	1			
		AN000	P40/IRO8/AN000	/ 173	1			
		AVCCO	/ AVCCO	/ 175	i.			
		AVSS0	/ AVSS0	/ 1	i.			
		AN001	Not assigned	Not assigned	None			
		AN002	Not assigned	Not assigned	None			
		AN003	Not assigned	Not assigned	None			
		AN004	Not assigned	Not assigned	None			
	Ē	AN005	Not assigned	Not assigned	None			
		AN006	Not assigned	Not assigned	None			
		AN007	Not assigned	Not assigned	None			
		AN108	Not assigned	Not assigned	None			
		AN109	Not assigned	Not assigned	None			
		AN110	Not assigned	Not assigned	None			
		AN111	Not assigned	Not assigned	None			
		AN112	Not assigned	Not assigned	None			
		AN113	Not assigned	Not assigned	None			
		AN114	Not assigned	Not assigned	None			
		AN115	Not assigned	Not assigned	None			
		AN116	Not assigned	Not assigned	None			
		AN117	Not assigned	Not assigned	None			
		AN118	Not assigned	Not assigned	None			
		AN119	Not assigned	Not assigned	None			
		AN120	Not assigned	Not assigned	None			
		ANEX0	Not assigned	Not assigned	None			
		ANEX1	Not assigned	Not assigned	None			
		VREFH0	Not assigned	Not assigned	None			
		VREFLO	Not assigned	Not assigned	None			
								_

Figure 4-22 [Pins] Page ([Pin Function])

in configu	ration	You can sort the	e display			Y	ou can enter		6
n Number	/	by clicking the t	itle.			СС	omments.		2
type filter text								All	
Pin Number	Pin Name		Default Function	Function	Direction	Remarks	Comments		
1	AVSS0		AVSS0	AVSS0	1		AVSS0		
2	P05/IRQ13/DA1		P05	Not assigned	None		LED1		
3	AVCC1		AVCC1	Not assigned	None		AVCC1		
4	P03/IRQ11/DA0		P03	Not assigned	None		LED0		
5	AVSS1		AVSS1	Not assigned	None		VREFL		
6	P02/TMCI1/SCK6	/IRQ10/AN120	SCK6	Not assigned	None		SCK6		
7	P01/TMCI0/RXD6	5/SMISO6/SSCL6/IRQ9/AN119	RXD6	Not assigned	None		RXD6		
8	P00/TMRI0/TXD6	SMOSI6/SSDA6/IRQ8/AN118	TXD6	Not assigned ∨	None		TXD6		
9	PF5/IRQ4		PF5	Not assigned	∧ one		SDPWREN		
10	EMLE		EMLE	P00	one		EMLE		
11	PJ5/POE8#/CTS2	#/RTS2#/SS2#	PJ5		one		XDRIVE		
12	VSS			TXD6		Read only			
13	PJ3/EDACK1/MTI	OC3C/ET0_EXOUT/CTS6#/RTS6#/CT	MTIOC3C	SMOSI6	one		MTIOC3C		
14	VCL			SSDA6		Read only			
15	VBATT			IPOR		Read only			
16	NC		NC	NOL assigned	Tone		NC		
17	PF4/TRST#		TRST#	Not assigned	None		TRST		
18	MD/FINED		MD	Not assigned	None		MD/FINED		
19	XCIN		XCIN	Not assigned	None		XCIN		
20	XCOUT		XCOUT	Not assigned	None		XCOUT		
21	RES#		RES#	Not assigned	None		RES#		
22	P37/XTAL		XTAL	XTAL	0		XTAL		
23	VSS			VSS	-	Read only			
24	P36/EXTAL		EXTAL	EXTAL	1		EXTAL		
25	VCC			VCC	-	Read only			
26	P35/UPSEL/NMI		NMI	Not assigned	None		NMI		
27	P34/MTIOC0A/T	MCI3/PO12/POE10#/SCK6/SCK0/ET0	ET0_LINKSTA	Not assigned	None		SW6		
28	P33/EDREQ1/MT	IOC0D/TIOCD0/TMRI3/PO11/POE4#	CRX0	Not assigned	None		CRX0		
29	P32/MTIOC0C/T	IOCC0/TMO3/PO10/RTCOUT/RTCIC	СТУЛ	Not assigned	None		CTX0		

Figure 4-23 [Pins] Page ([Pin Number])

When you select a board on the [Board] page, the initial pin setting information of the board is displayed in [Default Function]. In addition, the $[\mathbf{I}]$ icon displayed in the [Function] selection list indicates the initial pin function of the board.



4.4.1 Assign pins to resources

In the Pins page, assign pin to the resource used by the component. Pin assignment can be done in either [Pin Function] list or [Pin Number] list.

The procedure for pin assignment in the [Pin Function] list is described below.

- (1) Click on [44] (Show by Hardware Resource or Software Components)] to switch to the software component view.
- (2) Select the target software component (e.g. Config_S12AD1).
- (3) Click the [Enabled] header to sort by pins used.
- (4) Pin assignment is performed with the [Assignment], [Pin Number] column, or [🕐 (Next group of pins for the selected resource)] button.
 - (a) Click [Assignment] or [Pin Number] and assign a terminal from the list (e.g. change from P17 to P13).
 - (b) Click the [(Next group of pins for the selected resource)] button and change the pin assignment. Each time you click, the pin with the function switches.

(1)											_	
Software Compo 🕀 🕞 🕹	Pi	in Function	1							(4)-(b)	्रे 🖬 🖫	24
Type filter text	1	type filter t	text	(A) (a)							All	\sim
V 📩 Cingle Core Made C124D		Enabled	unction	(4)-(a)		Die Number	Direction	Demasks	Comments			
(Z) Config_SIZADU	10	\mathbf{N}	ADTRG0#	P07/IRQ15/ADTRG0#	~	/ 176	1					
	(5) 🖂 🗌	AN000	Not assigned								
		\checkmark	AVCC0	P25/CS5#/EDACK1/MTIOC4C/MTCLKB/	TIOCA4	/PO5/RXD3/SMISC	03/SSCL3/SSIDA	TA1/HSYNC/ADTRG0	#			
		\checkmark	AVSS0	P16/MTIOC3C/MTIOC3D/TIOCB1/TCLK	с/тмо2	PO14/RTCOUT/T	XD1/RXD3/SM0	OSI1/SMISO3/SSDA1/S	SSCL3/SCL2/USB0_VBU	S/USB0_VBUSEN/U	SB0_OVRCURB/IRQ	6/ADTRG0#
			AN001	P07/IRQ15/ADTRG0#								
			AN002	Anna and a second		<u>, , , , , , , , , , , , , , , , , , , </u>	11000			1		

Figure 4-24 Pin Assignments in the [Pin function] List

When the component is set, the check box in the [Enabled] column is checked. Pin assignment is possible even when the component is not set. If pin assignment is done without component being set, we will display "No component is using this pin" in the [Remarks] column.



4.4.2 Pin setting using MCU package

Follow the procedure below to assign pins in the MCU Package view.

- (1) Zoom in to the view by clicking the $[P^{(2)}(Zoom in)]$ button or scrolling the view with the mouse wheel.
- (2) Right-click on the target pin.
- (3) Select the signal to be assigned to the pin.



Figure 4-25 Assigning Pins Using the MCU Package View

(a) The color of the pins can be customized through [Preference Setting...].



4.4.3 Export pin settings

You can export pin assignment settings in XML format. Exported files can be imported into projects of the same device family. Follow the procedure below to export the pin settings.

- (1) Click on the [1] (Export board setting)] button on the [Pins] page.
- (2) In the [Export] dialog, enter the file name to export.

configuration							(1) 🖣
dware Resource 🕀 🕀 🛱	Pin Functio	n					2 🖬 🔤
/pe filter text	Type pin f	unction					
All Clock generator	Enabled	Function P00	Assignment Not assigned	Pin Number Not assigned	Direction None	Remarks	
Clock frequency accuracy measurement cir Buses		P01	Not assigned	Not assigned	None		
EXDMA controller		P02 P03	Not assigned	Not assigned	None		
Interrupt controller unit		P05	Not assigned	Not assigned	None		
A Port output enable 3		P07	Not assigned	Not assigned	None		
		P10 P11	Not assigned Not assigned	Not assigned Not assigned	None		

Figure 4-26 Export Pin Settings (XML format)

The Smart Configurator can also export the pin settings to a CSV file. Click on the [[][(Save the list to .csv file)] button on the [Pins] page.

4.4.4 Import pin settings

You can import XML format files including pin assignment settings. When you import a file, the terminal assignment is reflected. Follow the procedure below to import the pin settings.

- (1) Click on the [1] (Import board setting)] button on the [Pins] page.
- (2) In the [Import] dialog, enter the file name to import.

Image: Smart_Configurator_Example.scfg ⋈							
Pin configuration							(1) 词 🖨
Hardware Resource	Pin Functio	n					2 🖬 🖬 🗠
Type filter text	Type pin f	unction					
All Clock generator Clock frequency accuracy measurement cir Buses EXDMA controller Interrupt controller unit OM Multi-function timer pulse unit 3 O Port output enable 3	Enabled	Function P00 P01 P02 P03 P05 P07 P10 P11	Assignment Not assigned Not assigned Not assigned Not assigned Not assigned Not assigned Not assigned	Pin Number Not assigned Not assigned Not assigned Not assigned Not assigned Not assigned Not assigned	Direction None None None None None None None No	Remarks	<
Pin Function Pin Number Overview Board Clocks Components Pins Interrupts							

Figure 4-27 Import Pin Settings (XML format)



4.4.5 Pin setting using board pin configuration information

You can set the initial pin configuration of the board at once. The following describes the procedure for collective setting of pins.

- (1) Select [Default Board] in the MCU Package. (The initial pin configuration of the board can be referred.)
- (2) Open the [Pin Configuration] page and click the [H(Assign default board pins)] button.
- (3) When [Assign default board pins] dialog opens, click [Select all].
- (4) Click [OK].



Figure 4-28 Setting for Initial Pin Configuration

If you do not set pin settings all at once, specify them individually in procedure (3).

4.4.6 Pin filter feature

By specifying the filter range on the [Pin Function] tab and [Pin Number] tab on the [Pins] page, you can refer to it more easily.

Pin Function 😢								
type filt	er text						All ~	
Enabled	d Function	Assignment	Pin Number	Direction	Remarks	Comments	All Function	
	A0	Not assigned	Not assigned	None			Assignment	
	A1	Not assigned	Not assigned	None			Pin Number	
	A2	Not assigned	Not assigned	None			Direction	
	A3	Not assigned	Not assigned	None			Comments	
		# KL + 1	# KL	A.1				

Figure 4-29 Filter for [Pin Function] Tab

F	Pin Number 🔡 📓							
	type filter text							All ~
	Pin Number 1	Pin Name AVSS0	Default Function AVSS0	Function AVSS0	Direction	Remarks	Commer AVSS0	All Pin Number Pin Name
	2	P05/IRQ13/DA1	P05	Not assigned	None		LED1	Default Function
	3 4	AVCC1 P03/IRQ11/DA0	AVCC1 P03	Not assigned Not assigned	None None		AVCC1 LED0	Direction Remarks
	5	AVSS1	AVSS1	Not assigned	None		VREFL	Comments

Figure 4-30 Filter for [Pin Number] Tab



4.5 Interrupt settings

Check and set the interrupts of the peripheral modules that have been selected on the [Components] page. The interrupts are displayed for each of the vector numbers. Set the interrupt priority levels, the source of the fast interrupt, or a dynamic interrupt vector number.

🌼 *Smart_Configura	tor_Example.scfg	×					- 8
Interrupt conf	iguration						i
Interrupt vectors	used Type filter text						2
Down	Vector Number > 111 > 113 103	Interrupt GROUPBL1 GROUPAL1	Peripheral	Priority Level 15 Level 2	Status Used Used	Fast Interrupt	
	174	IIVI0122(312AUII)	316401				
Overview Board Cli	Note: The interrupt prior Please check the c pocks Components	ity settings made here may no onfiguration files of each FIT c Pint Interrupts	t be utilized in some FIT omponent for the correc	components. tt priority settings.			

Figure 4-31 [Interrupts] Page

4.5.1 Changing the interrupt priority level and fast interrupt setting

When an interrupt is used in a configuration on the [Components] page, the status of the interrupt will be changed to "Used". To display the used interrupts only, click on the [Solar (Show used interrupts)] button.

- (1) You can change the interrupt priority level on the [Interrupts] page.
- (2) To use an interrupt as a fast interrupt, tick the checkbox in the [Fast Interrupt] column. Only one interrupt can be specified as a fast interrupt among all interrupts and components used.

*Smart_Configura	tor_Example.scfg	×				- 8
Interrupt conf	iguration					t
Interrupt vectors	used					×
Up	Type filter text					
Down	Vector Number	Interrupt	Peripheral	Priority	Status Fast Interrupt	
(a)	> 113	GROUPAL1		Level 2 (1)	Used (2)	
	192	INTB192 (S12ADI1)	S12AD1	Level 15	Vused	
				Level 0 (disabled) Level 1 Level 2 Level 3 Level 4 Level 5 Level 6 Level 7 Level 8 Level 9 Level 10 Level 11 Level 12 Level 12 Level 14		
	Note:			Level 15		
	The interrupt prior	ity settings made here may not	be utilized in some FIT	components.		
	Please check the c	onfiguration files of each FIT co	omponent for the correc	t priority settings.		
Overview Board Cl	ocks Components	Pins Interrupts				

Figure 4-32 Interrupt Settings

(a) Group interrupts are collapsed in the interrupt table. Click on the [> (Open)] button to expand the view and see the interrupts in the group interrupt list.



4.5.2 Changing the interrupt priority level and fast interrupt setting

The [Interrupt configuration] page enables you to change the vector numbers of software configurable interrupts A and B.

- (1) Select a desired software configurable interrupt.
- (2) The [Up] and [Down] buttons will be enabled. Click on a button to change the vector number.

Interrupt vectors u							🐻 🖻
	ised						×
(2)	Type filter text						
Down	Vector Number > 111 > 113	Interrupt GROUPBL1 GROUPAL1	Peripheral	Priority Level 15 Level 2	Status Used Used	Fast Interrupt	
(1)	192	INTB192 (S12ADI1)	S12AD1	Level 15	Used	✓	
-							
-							
-							
1	Note:						
T P	The interrupt priori Please check the co	ty settings made here may no onfiguration files of each FIT c	t be utilized in some FIT omponent for the corre	components. ct priority settings.			

Figure 4-33 Changing the Vector Number of Software Configurable Interrupt A or B



5. Managing Conflicts

Adding components, setting pins and interrupts may cause problems related to resource mismatch. This information will be displayed in the **Configuration Problems** view. User can refer to the information displayed to fix the conflict issues.

5.1 Resource conflicts

When two software components are configured to use the same resource (e.g. S12AD1), an error mark (¹⁰) will be displayed in the [Components tree].

The [Configuration Problems view] will display messages on peripheral conflicts to inform the user in which software configurations peripheral conflicts have been detected.

Software component	configuration							۵ 💽
Components	↓ª_ 🖂 🖽 🚔 ▼ 🤇	Configure						
	5.5	▼ Basic setting						
type filter text		- Analog input n	node setting					
✓ → Startup		Double trigg	er mode	Extend analog input	t mode			
🗸 🗁 Generic								
💣 r_bsp		Analog input c	hannel setting					
V Drivers		AN100	AN101	AN102	AN103	AN104		
A/D Converter		AN105	AN106	AN107	AN108	AN109		
Config_S12AD		AN110	AN111	AN112	AN113	AN114		
Config_S12AD	D1_Dupilcatre	AN115	AN116	AN117	AN118	AN119		
r ether rx	5	AN120	Temperatur	e sensor output	Internal refe	erence voltage		
💣 r_qspi_smstr_r	_nx	Conversion do						
		Conversion sta	n ungger setting					
		Start trigger so	urce					
		A/D conversio	n start trigger pin					
		(>
	nonents Pins Interrur	ate						-
Overview Board Clocks Comr	ponents miterrup							
Overview Board Clocks Com	1							
Overview Board Clocks Comp Configuration Problems X								▽ □
Overview Board Clocks Complexity Configuration Problems State State<			^				Turpe	
Overview Board Clocks Com			^				Туре	
Overview Board Clocks Com Configuration Problems 8 B errors, 0 warnings, 0 others Description	vector used by \$12ADI	1 in Config \$12AD1 c	^	used by \$12ADI1 in (Config S12AD1 Dunli	icatre	Type	
Overview Board Clocks Com Configuration Problems State 8 errors, 0 warnings, 0 others Description Interrupt (2 items) E04010005: Interrupt (2 items) E04010005: Interrupt (2 items)	vector used by \$12ADI1	1 in Config_S12AD1 c	>	used by S12ADI1 in (Config_S12AD1_Dupli	icatre. 2ΔD1	Type Interrupt	
Overview Board Clocks Com Configuration Problems State Berrors, 0 warnings, 0 others Description State E04010005: Interrupt (2 items) E04010005: Interrupt (2 items) E04010005: Interrupt (2 items)	vector used by S12ADI1 vector used by S12ADI1	1 in Config_S12AD1 co 1 in Config_S12AD1_E	onflicts with vector	used by S12ADI1 in 0 vith vector used by S	Config_S12AD1_Dupli 12ADI1 in Config_S1	icatre. 2AD1.	Type Interrupt Interrupt	
Overview Board Clocks Com Configuration Problems State Berrors, 0 warnings, 0 others Description State E04010005: Interrupt (2 items) E04010005: Peripheral (2 items) Peripheral (2 items) E04010005:	vector used by S12ADI1 vector used by S12ADI1 sl S12AD1 used by Conf	1 in Config_S12AD1 c 1 in Config_S12AD1_D ig S12AD1 is already	onflicts with vector ouplicatre conflicts v	used by S12ADI1 in (vith vector used by S AD1 Duplicatre.	Config_S12AD1_Dupli i12ADI1 in Config_S1/	icatre. 2AD1.	Type Interrupt Interrupt Peripheral	
Overview Board Clocks Com Configuration Problems X3 8 errors, 0 warnings, 0 others Description V Interrupt (2 items) © E04010005: Interrupt V Peripheral (2 items) © E04010005: Interrupt © E04010001: Periphera @ E04010001: Periphera @ E0401001: Periphera	vector used by S12ADI1 vector used by S12ADI1 al S12AD1 used by Conf al S12AD1 used by Conf	1 in Config_S12AD1 c 1 in Config_S12AD1_C ig_S12AD1 is already ig S12AD1 bublicator	onflicts with vector Puplicatre conflicts v used by Config_S12 ± is already used by	used by S12ADI1 in (vith vector used by S AD1_Duplicatre. Config S12AD1.	Config_S12AD1_Dupli 112ADI1 in Config_S1	icatre. 2AD1.	Type Interrupt Interrupt Peripheral Peripheral	
Overview Board Clocks Com Configuration Problems State 8 errors, 0 warnings, 0 others Description State E04010005: Interrupt E04010005: Interrupt Peripheral (2 items) E04010001: Peripheral E04010001: Peripheral E04010001: Peripheral Pin (4 items)	vector used by S12ADI vector used by S12ADI al S12AD1 used by Conf al S12AD1 used by Conf	1 in Config_S12AD1 c 1 in Config_S12AD1_C iig_S12AD1 is already iig_S12AD1_Duplicatro	onflicts with vector Juplicatre conflicts v used by Config_S12 i is already used by	used by S12ADI1 in (with vector used by S AD1_Duplicatre. Config_S12AD1.	Config_S12AD1_Dupli 12ADI1 in Config_S1	icatre. 2AD1.	Type Interrupt Interrupt Peripheral Peripheral	
Overview Board Clocks Com Configuration Problems State 8 errors, 0 warnings, 0 others Description Interrupt (2 items) E04010005: Interrupt E04010005: Interrupt E04010005: Interrupt E04010001: Periphera E04010001: Periphera E04010003: Pin used I	vector used by S12ADI vector used by S12ADI al S12AD1 used by Conf al S12AD1 used by Conf by ADTRG1# in Config	1 in Config_S12AD1 c 1 in Config_S12AD1_E fig_S12AD1 is already ig_S12AD1_Duplicatro S12AD1 conflicts with	onflicts with vector Juplicatre conflicts v used by Config_S12 : is already used by n pin used by ADTR	used by S12ADI1 in (vith vector used by S AD1_Duplicatre. Config_S12AD1. S1# in Config_S12AE	Config_S12AD1_Dupli 112AD11 in Config_S1. 01_Duplicatre.	icatre. 2AD1.	Type Interrupt Interrupt Peripheral Pin	
Overview Board Clocks Com Configuration Problems S3 8 errors, 0 warnings, 0 others Description S E04010005: Interrupt E04010005: Interrupt S E04010001: Periphera S E04010003: Pin used I S E04010003: Pin used I	vector used by S12ADI vector used by S12ADI al S12AD1 used by Conf al S12AD1 used by Conf by ADTRG1# in Config_ by ADTRG1# in Config_	1 in Config_S12AD1 c 1 in Config_S12AD1_D fig_S12AD1 is already fig_S12AD1_Duplicatro _\$12AD1_Conflicts with _\$12AD1_Duplicatre c	onflicts with vector Puplicatre conflicts v used by Config_S12 e is already used by n pin used by ADTR onflicts with pin use	used by S12ADI1 in (with vector used by S AD1_Duplicatre. Config_S12AD1. G1# in Config_S12AE d by ADTRG1# in Cc	Config_S12AD1_Dupli 12ADI1 in Config_S1: 01_Duplicatre. nfig_S12AD1.	icatre. ZAD1.	Type Interrupt Interrupt Peripheral Pin Pin Pin	
Overview Board Clocks Com Configuration Problems S3 8 errors, 0 warnings, 0 others Description S E04010005: Interrupt E04010005: Interrupt S E04010005: Peripheral S E04010001: Peripheral S E04010003: Pin used I S E04010003: Pin used I S E04010003: Pin used I	vector used by S12ADI vector used by S12ADI al S12AD1 used by Conf al S12AD1 used by Conf by ADTRG1# in Config_ by ADTRG1# in Config_ by ADING in Config_	1 in Config_S12AD1 c 1 in Config_S12AD1_D fig_S12AD1 is already fig_S12AD1_Duplicatro \$12AD1 conflicts with \$12AD1_Duplicatre c 2AD1 conflicts with p	onflicts with vector Juplicatre conflicts v used by Config_S12 t is already used by t pin used by ADTR onflicts with pin use n used by AN100 ir	used by S12ADI1 in (with vector used by S AD1_Duplicatre. Config_S12AD1. G1# in Config_S12AD ed by ADTRG1# in Cct Config_S12AD1_Du	Config_S12AD1_Dupli 12ADI1 in Config_S1 12Duplicatre. onfig_S12AD1. plicatre.	icatre. 2AD1.	Type Interrupt Interrupt Peripheral Peripheral Pin Pin Pin Pin	

Figure 5-1 Resource Conflicts



5.2 Resolving pin conflicts

When multiple pin functions are assigned to the same pin, an error mark 🛞 is displayed in the tree and [Pin Function] list on the [Pins] page.

ardware Resource 🕀 🕀 🛱	Pin Functio	n				관 🛄 🕹
Type filter text	Type pin	unction				
> 🖏 8-bit timer	Enabled	Function	Assignment	Pin Number	Direction	Remarks
> 🙆 Compare match timer W		ADTRG1#	P13/WR2#/BC2#/MTIOC0	52	1	Multiple pin functions on the same pin
> 📲 Serial communications interface		AINTOO	PE2/D10/WHIOC4A/OTIO	100		
> 📲 Serial communications interface with FIFO		AN101	Not assigned	Not assigned	None	
> 📲 I2C bus interface		AN102	Not assigned	Not assigned	None	
> 🏽 🚟 Ethernet controller		AN103	Not assigned	Not assigned	None	
> 📲 USB 2.0 host/function module		AN104	Not assigned	Not assigned	None	
> 🏽 CAN module		AN105	Not assigned	Not assigned	None	
> 📲 Serial peripheral interface		AN106	Not assigned	Not assigned	None	
Quad serial peripheral interface		AN107	Not assigned	Not assigned	None	
> 40) Serial sound interface		AN108	Not assigned	Not assigned	None	
MultiMediaCard interface		AN109	Not assigned	Not assigned	None	
SD host interface		AN110	Not assigned	Not assigned	None	
Parallel data capture unit		AN111	Not assigned	Not assigned	None	
Realtime clock		AN112	Not assigned	Not assigned	None	
4 Gassian (12-bit A/D converter)		AN113	Not assigned	Not assigned	None	
C11100		AN114	Not assigned	Not assigned	None	
OF S12AD1		AN115	Not assigned	Not assigned	None	
12-bit D/A converter		AN116	Not assigned	Not assigned	None	
🚋 Digital power supply		AN117	Not assigned	Not assigned	None	
Operating mode control		AN118	Not assigned	Not assigned	None	
System control		AN119	Not assigned	Not assigned	None	
🚋 On-chip emulator		AN120	Not assigned	Not assigned	None	
Analog power supply		ANEX0	Not assigned	Not assigned	None	
💓 I/O Ports		ANEX1	Not assigned	Not assigned	None	

Figure 5-2 Pin Conflicts

The detailed information regarding conflicts is displayed in the [Configuration Problems view].

🔝 Configuration Problems 🔀		⊉ ▽ □ □			
2 errors, 2 warnings, 0 others					
Description	Туре	^			
✓ S Pin (4 items)					
Q E04010003: Pin used by ADTRG1# in Config_S12AD1 conflicts with pin used by P13 in Pin Allocator. Pin					
E05000010: Pin 52 cannot be used multiple times. Pin 52 is assigned to P13 and ADTRG1#. Pin					

Figure 5-3 Pin Conflict Message

To resolve a conflict, right-click on the node with an error mark on the tree and select [Resolve conflict].



Figure 5-4 Resolving Pin Conflicts

The pins of the selected node will be re-assigned to other pins.



6. Generating Source Code

6.1 Generating Source Code File

Output a source file for the configured details by clicking on the [Sol (Generate Code)] button in the Smart Configurator view.



Figure 6-1 Generating a Source File

The Smart Configurator generates a source file in <ConfigurationFileDir>\src\smc_gen. If your Smart Configurator has already generated a file, a backup copy of that file is also generated (refer to the section 6.6, Backing up Generated Source Code).

6.2 Configuration of Generated Files and File Names

Figure 6-2, Configuration of Generated Files and File Names, shows the folders and files output by the Smart Configurator. "ConfigName" indicates the configuration name set in the component.



Figure 6-2 Configuration of Generated Files and File Names



Table 6-1 Description of Generated File

Folder	File	Description
{ConfigName}	-	This folder is generated for the added component. API functions in this folder are named after the <i>ConfigName</i> (configuration name).
	{ConfigName}.c	This file contains functions to initialize driver (<i>R_ConfigName_Create</i>) and perform operations that are driver- specific, e.g. start (<i>R_ConfigName_Start</i>) and stop (<i>R_ConfigName_Stop</i>).
	{ConfigName}_user.c	This file contains interrupt service routines and functions for user to add code after the driver initialization (<i>R_ConfigName_Create</i>). User can add codes and functions in the dedicated user code areas.
	{ConfigName}.h	This is header file for {ConfigName}.c and {ConfigName}_user.c.
general	-	This folder is always generated. It contains header files and source files commonly used by drivers of the same peripheral function.
	r_cg_hardware_setup.c	This file is always generated. It contains $R_Systeminit$ that calls all driver initialization functions with the name $R_ConfigName_Create$. $R_Systeminit$ also calls the functions for initializing clocks other than the clock source, fast interrupt, and group interrupts.
	r_cg_macrodriver.h	This file is always generated. This header file contains common macro definitions used in drivers.
	$r_cg_xxx.h^{(Note*1)}$	These files are always generated. The files contain macro definitions for setting SFR registers.
	r_cg_userdefine.h	This file is always generated. User can add macro definitions in the dedicated user code areas.
	r_smc_cgc.c	This file is always generated. It contains the initialization of clock sources other than the clock source selected in the [Clocks] page.
	r_smc_cgc.h	This file is always generated. This header file contains macro definitions to initialize clocks other than the selected clock source.
	r_smc_cgc_user.c	This file contains functions to be added to R_CGC_Create after the CGC initialization. User can add codes and functions in the dedicated user code areas.
	r_smc_entry.h	This file is always generated. This file includes the header files of CG drivers that are added to the project. When using functions of CG drivers in source files added by user, including this file is necessary.
	r_smc_interrupt.c	This file is always generated. It contains fast interrupt and group interrupt initialization (depending on hardware specification).
	r_smc_interrupt.h	This file is always generated. It contains macro definitions for fast interrupt and group interrupt initialization. It also contains the priority level of all interrupts that are configured in the [Interrupts] tabbed page. User can use these macro definitions in application codes.
r_config	r_bsp_interrupt_config.h	This file is always generated. It contains mapping of the software configurable interrupts A and B (depending on hardware specification).
r_pincfg	Pin.c	This file is always generated. It is a reference of pin function initialization for all peripherals configured in the [Pins] tabbed page (except I/O Ports).
	Pin.h	This file is always generated. It contains the function prototypes of pin settings in <i>Pin.c</i>

Note *1: xxx is the name of a component.



6.3 Initializing Clocks

Configurations of clock source in [Clocks] page are generated in \src\smc_gen\r_config folder.



Figure 6-3 Clocks Source Configuration

Table 6-2	Clock	Source	File	Description
-----------	-------	--------	------	-------------

Folder	File	Macros/Functions	Description
general	r_cg_cgc.c	R_CGC_Create	This API function initializes clocks other than
			the selected clock source. R_Systeminit in
			<i>r_cg_hardware_setup.c</i> will call this function
			before entering <i>main()</i> function.
	r_cg_cgc.h	Macros related to clocks	These macros are for clock initialization in
			<i>R_CGC_Create</i> .
	r_cg_cgc_user.c	R_CGC_Create_UserInit	This API function is used to add code to
			<i>R_CGC_Create</i> after the CGC initialization.



6.4 Initializing Pins

Pin configuration settings are generated by the component into source files as shown in (1) and (2) below.

(1) Pins initialization for drivers with {*ConfigName*}

The pin function is initialized with $R_ConfigName_Create$ of $\sc\smc_gen\ConfigName\ConfigName\c.$

Table 6-3 File to Initialize Pins

Folder	File	Function	Description
{ConfigName}	{ConfigName}.c	R_ConfigName_Create	This API function initializes pins used by this
			<i>r_cg_hardware_setup.c</i> will call this function
			before entering <i>main()</i> function.

(2) Reference pins initialization codes

Refer to *Pin.c* in the $\src\smc_gen\r_pincfg$ folder for the initialization code of all pin functions set on the [Pins] page (except I/O ports).

Table 6-4 Reference File for Initialization of All Pins

Folder	File	Function	Description
r_pincfg	Pin.c	R_Pins_Create	This function contains the initialization codes of
			all pins function configured at [Pins] page
			except I/O ports.



6.5 Initializing Interrupts

Configurations in [Interrupt] page are generated in few source files.

Vector Number	Interrupt	Peripheral	Priority	Status	Fast Interrupt
✓ 111	GROUPBL1	(1)	Level 15	Used	
21	S12CMPI1	S12AD1		Used	(4)
> 113	GROUPAL1		Level 2	Used	(4)
(3) 192	INTB192 (S12ADI1)	s12ad1 (2)	Level 15	Used	

Figure 6-4 Interrupt Configuration

Table 6-5	Interrupt	Generation	File	Description
-----------	-----------	------------	------	-------------

No	Item	Folder	File	Description
(1)	Priority	general	r_smc_interrupt.c	This interrupt priority level setting is for group interrupts ^(Note2) . It is initialized in $R_Interrupt_Create$ of this file. $R_Systeminit$ in $r_cg_hardware_setup.c$ will call this function before entering main() function.
(2)	Priority	{ConfigName}	{ConfigName}.c	This interrupt priority level setting is for normal interrupts and software configurable interrupts A and B ^(Note2) . It is initialized in $R_ConfigName_Create$ of this file. $R_Systeminit$ in $r_cg_hardware_setup.c$ will call this function before entering main() function.
(1) (2)	Priority	general	r_smc_interrupt.h	Priority level of all interrupts configured in the [Interrupts] tabbed page is defined in this file. User can use these macro definitions in the application codes.
(3)	Vector Number	r_config	r_bsp_interrupt_config.h	Vector number of software configurable interrupts A and B $(Note2)$ in the [Interrupts] tabbed page will be mapped in this file and handled by r_bsp .
(4)	Fast Interrupt	general	r_smc_interrupt.c	Fast interrupt setting will be initialized in <i>R_Interrupt_Create</i> of this file. <i>R_Systeminit</i> in <i>r_cg_hardware_setup.c</i> will call this function before entering <i>main()</i> function.
			r_smc_interrupt.h	Priority level of all interrupts configured in the [Interrupts] tabbed page is defined in this file. User can use these macro definitions in the application codes.

Note *2: The type of interrupt depends on hardware specifications.

6.6 Backing up Generated Source Code

The smart configurator has a source code backup function.

 $<\!\!ConfigurationFileDir\!\!>\!\!trash\!<\!\!Date-and-Time\!\!>$

The Smart Configurator generates a backup folder for the previously generated source code when new code is generated by clicking on [Collection - C



7. Loading generated files in Integrated development environment

Load source code outputted by Smart Configurator on Integrated Development Environment Platform.

7.1 Loading in IAR Embedded Workbench

When IAR environment is selected for the compiler to be used, Smart Configurator also outputs the project connection file (.ipcf) together with the source file. The project connection file contains source file registration information. It is not necessary for the user to add or delete source files after configuration change in the Smart Configurator.

The usage procedure is as follows.

- (1) Select [Add Project Connection..] from the [Project] menu of IAR Embedded Workbench.
- (2) The [Add Project Connection] dialog is displayed. Select [IAR Project Connection] and click [OK].
- (3) In the [Select IAR Project Connection File] dialog box, browse to the folder where the configuration file is saved, select the project connection file (.ipcf), and click the [Open] button.
- (4) The source file output by the Smart Configurator is added to the workspace.



8. Creating User Programs

Create a user program in the IDE. This chapter describes how to add custom code to the source file generated by the SC.

8.1 Adding Custom Code in the Case of Code Generator

When [Code Generator] is selected as the component type, if files which have the same name already exist, new code will be merged only with the existing code that is between the comments below.

/* Start user code for xxxx. Do not edit comment generated here */

/* End user code. Do not edit comment generated here */

In the case of [Code Generator], three files are generated for each of the specified peripheral functions. The file names are "Config_xxx.h", "Config_xxx.c", and "Config_xxx_user.c" as the default, with "xxx" representing the name of the peripheral module. For example, "xxx" will be "CMT3" for the compare-match timer (resource CMT3). The comments to indicate where to add custom code are at the start and end of each of the three files. Comments to indicate where to add user code are also added to the interrupt function for the peripheral module corresponding to Config.xxx_user.c. The following examples are for CMT3 (Config_CMT3_user.c).

/*************************************
/*************************************
/*************************************
/*************************************
<pre>void R_Config_CMT3_Create_UserInit(void) { /* Start user code for user init. Do not edit comment generated here */ /* End user code. Do not edit comment generated here */ }</pre>



* Function Name: r_Config_CMT3_cmi3_interrupt * Description : This function is CMI3 interrupt service routine * Arguments : None * Return Value : None **#if** FAST_INTERRUPT_VECTOR == VECT_PERIB_INTB129 #pragma interrupt r_Config_CMT3_cmi3_interrupt(vect=VECT(PERIB,INTB129),fint) #else #pragma interrupt r_Config_CMT3_cmi3_interrupt(vect=VECT(PERIB,INTB129)) #endif static void r_Config_CMT3_cmi3_interrupt(void) { /* Start user code for r_Config_CMT3_cmi3_interrupt. Do not edit comment generated here */ /* End user code. Do not edit comment generated here */ } /* Start user code for adding. Do not edit comment generated here */ /* End user code. Do not edit comment generated here */



9. Generating Reports

The Smart Configurator can output the configuration information of the project to the report. Follow the procedure below to generate a report.

9.1 Report on Configuration

A report is output in response to clicking on the [a](Generate Report)] button in the Smart Configurator view.

∰ *Smart_Configurator_Example.scfg 🛛		- 8
Overview information		1
← General Information		?
This editor allows you to modify the settings stored in configuration file (.scfg)		
Board		
Allow board and device selection		
Clocks Allow clock configuration	Application under development	- Components
Components Allow software component selection and configuration	Device RTOS	🗕 Pins
Pins		
Allow general pin configuration and pin configuration for selected software component		~
Overview Board Clocks Components Pins Interrupt		

Figure 9-1 Output of a Report on the Configuration (as a Text File)

K Smart Report	×
Generate report of configurations	
Options Print all sections Print specific sections	
Board Clocks Components Pins Interrupts	
Output as PDF Output as text C:\	Browse
C	K Cancel

Figure 9-2 Dialog Box for Output of a Report



9.2 Configuration of Pin Function List and Pin Number List (in csv Format)

A list of the configuration of pin functions and pin numbers (whichever is selected at the time) is output in response to clicking on [[]] (Save the list to .csv file)] on the [Pins] page of the Smart Configurator view.

ardware 🕀 🕞 📲 🦝	Pin Functio	n		- 2 🖪 🗠 E
Type filter text	Type pin f	unction		
🗑 TMR1 🔥	Enabled	Function	Assignment	^
TMR2		CTS0#	Not assigned	
TMR3		RTS0#	Not assigned	
Compare match ti		RXD0	Not assigned	
CMTW0		SCK0	Not assigned	
CMIW1		SMIS00	Not assigned	
Serial communicat		SMOSI0	Not assigned	
SCI0		SSO#	Not assigned	
SCI1		SSCL0	Not assigned	
SCI2 V		SSDAO	Not assigned	×
< >	<			>

Figure 9-3 Output of a List of Pin Functions or Numbers (in csv Format)

9.3 Image of MCU Package (in png Format)

An image of the MCU package is output in response to clicking on the [[(Save Package View to external image file)] button of the [MCU Package] view.



Figure 9-4 Outputting a Figure of MCU Package (in png Format)



10. Help

10.1 Help

Refer to the help system for detailed information on the Smart Configurator.

💰 Smart Configurator				
File Window	Help			
📑 🗁 📑 🗄	Help Contents			
🔅 Smart_Config	About			

Figure 10-1 Help Menu

The help system can also be activated from the [Overview] page.

verview information		C
verview information		١
General Information		?
This editor allows you to modify the settings stored in configuration file (.scfg)		
Board		
Allow board and device selection		
Clocks	Application under	
Allow clock configuration	development	
-	Middleware	-Components
Components	Device	
Allow software component selection and configuration	driver	
	•	~ Pins
Pins		
Allow general pin configuration and pin configuration for selected software component		

Figure 10-2 Quick Start



11. Documents for Reference

User's Manual: Hardware

Obtain the latest version of the manual from the web site of Renesas Electronics.

Technical Update/Technical News

Obtain the latest information from the web site of Renesas Electronics.

User's Manual: Development Environment

Obtain the latest version of the manual from each company web site.



Renesas Electronics Website <u>http://www.renesas.com/</u>

Inquiries

http://www.renesas.com/contact/

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Revision History

		Descript	ion
Rev.	Date	Page	Summary
1.00	Jan 25, 2019	-	First edition issued

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.

2. Processing at power-on

The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power is supplied until the power reaches the level at which resetting is specified.

3. Input of signal during power-off state

Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.

4. Handling of unused pins

Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.

5. Clock signals

After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.

6. Voltage application waveform at input pin

Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).

7. Prohibition of access to reserved addresses

Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.

8. Differences between products

Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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(Rev.4.0-1 November 2017)



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