

# **AP4, Appli**cation **Leading Tool, Applilet3** Common Operations

User's Manual

Target Devices RX Family RL78 Family RZ Family

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#### Terminology

The meanings of the terms used in this manual are described in the table below.

Term	Meaning
Renesas environment	An environment in which program development is conducted by using language
	tools and an integrated development environment platform made by Renesas
	Electronics Corporation.
GNU environment	An environment in which program development is conducted using Gcc.
IAR environment	An environment in which program development is conducted by using language
	tools and an integrated development environment platform made by IAR Systems.
RL78-series AP4	AP4 for RL78-series microcontrollers
RX-series AP4	AP4 for RX-series microcontrollers
RZ-series AP4	AP4 for RZ-series mcu

#### Related Documents Ple

Please use the following documents in conjunction with this manual. The related documents listed below may include preliminary versions. However, preliminary versions are not marked as such.

#### Documents Related to Development Tools (User's Manuals)

Document Name	Document Number		
	English	Japanese	
RX Family User's Manual :Software	R01US0032J	R01US0032E	
RL78 Family User's Manual :Software	R01US0015J	R01US0015E	

Caution The related documents listed above are subject to change without notice. Be sure to use the latest version of each document for designing, etc.



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# **Chapter 1 Outline**

#### 1.1 Overview

The AP4 and Application Leading Tool(Applilet) is a software tool that automatically generates device drivers for the RL78 microcontroller and the RX microcontroller made by Renesas Electronics. The Applilet consistent with the device to be employed should be used.

Through the GUI, the Apllilet allows you to quickly initialize peripheral module registers.

This manual provides common operation specifications, such as the Applilet main window, menus, and dialog operating methods, which are not dependent on the specific device to be employed.

This manual provides explanations by using RX111 Applilet screens as examples.

## 1.2 Names and Functions of Hardware

The flowchart of developmental tasks using the Applilet is shown in the figure below.



**Remark:** e<sup>2</sup> studio: An eclipse-based integrated development environment provided by KPIT Cummins Infosystems, Inc. IAR Embedded Workbench: An integrated development environment provided by IAR Systems

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## 1.3 Functions

#### O Outputting device drivers

According to the parameters that are set through the GUI, the Applilet automatically generates, in a file, the source code that initializes peripheral functions. File names can be changed as desired.

O Providing API functions

In addition to peripheral function initialization code, the Applilet provides API functions, such as starting and stopping a peripheral function or modifying the conditions. API function names can be changed as desired.

O Selecting a build tool

The type of a build tool (compiler) can be selected from gcc and IAR.

The Applilet outputs the workspace/project file for the integrated development environment platform that matches the selected build tool.

- NEC environment: Link directive file (.dr) for the C compiler
- IAR environment: Workspace/project file for the IAR Embedded Workbench(icpf)
- GNU environment: e<sup>2</sup> studio project file
- O Merging
- Merging source codes

Programs written between the merge comments can be retained without deletion during the re-output (overwriting) of the code.

Merging workspace/project files

The Applilet stores output files as target files to be built in a workspace/project file in the integrated development environment platform. During code regeneration, the Applilet changes the storage of target build files as the number of files that are output by the Applilet increases or decreases<sup>\*</sup>. In such a case, any previously stored user files are retained without being deleted.

\* The Applilet stores files on an add-on basis, but it does not delete files that are no longer needed.

#### O Outputting report

Reports on peripheral function settings, API function names associated with the various functions, and file names can be output in a file. As the format of an output file, either HTML or CSV can be selected.



# **Chapter 2 Installation**

### 2.1 Features of Installer

The Applilet Installer has the features described below.

- O Accommodating multiple versions Multiple versions of the Applilet can be installed on a single PC.
- A common package handling both English and Japanese environments
   The Installer does not automatically distinguish languages. At the beginning of the installation process, the user should select a desired language.
   Even in Japanese-version Windows, if the Applilet is installed after selecting [English], the Installer can install the version of the Applilet that displays items in English.

**Caution:** The Applilet is used as a single application.

### 2.2 Installation Procedure

This section describes the procedure for installing the Applilet, taking the installation of [AP4 for RX111] in Windows 7 as an example. The contents of display may vary depending upon the particular operating system and software being used.

#### Cautions 1. You need to perform installation by logging in as a user with Administrator privileges.

2. For the execution of the Applilet, you need to install ".NET Framework Version 4" as well as the "Microsoft Visual C++ 2010 SP1" run-time library. If these files have not already been installed on the host machine being used, install the files by downloading them from Microsoft Corporation's website.

Whether these files have been previously installed can be checked by viewing [Add or Remove Programs] in Windows.

Figure 2-1	Add or Remove	Programs	(Verifying	.NET	Framework	Version 4.0

👸 Add or Rer	nove Programs			_ 🗆 🗡
5	Currently installed programs:	Show up <u>d</u> ates	Sort by: Name	•
Change or Remove	🚯 Microsoft .NET Framework 3.0 Service Pack 2		Size	169.00MB
Programs	😼 Microsoft .NET Framework 3.5 SP1		Size	28.14MB
- 🛃	5 Microsoft .NET Framework 4 Client Profile		Size	117.00MB
Add <u>N</u> ew	5 Microsoft .NET Framework 4 Extended		Size	38.04MB
	🚯 Microsoft Visual C++ 2008 Redistributable - x86 9.0.307	29.17	Size	9.64MB
	🚯 Microsoft Visual C++ 2008 Redistributable - x86 9.0.307	29.6161	Size	10.20MB
Add/Remove Windows	Microsoft Visual C++ 2010 x86 Redistributable - 10.0.40	)219	Size	11.14MB
Components				



(1) Using the Applilet installer, execute the [Setup.exe] file.

**Remarks** 1. The Applilet installer can be acquired from the website for Renesas Electronics. http://www.renesas.com/products/tools/coding\_tools/coding\_assistance/applilet/ (The address of the website is subject to change without notice.)

- 2. The downloaded installer may be compressed. If it is compressed, decompress it and execute the [Setup.exe] file.
- (2) The [Choose Setup Language] dialog box appears.

Select the desired language, and click the [OK] button.

Figure 2-1 [Choose Setup Language] Dialog Box

Choose S	ietup Language X
ی	Select the language for this installation from the choices below.
	English (United States)
	OK Cancel

(3) Specify installation settings according to the wizard dialog that appears.In each dialog box, clicking either the [Next] or [Yes] button brings up the next screen.

Figure 2-2 Installation Wizard Dialog Box

🔂 Application Le	eading Tool for RX1	11 ¥1.00.00 - Install9	5hield Wizard	
	wel App	lcome to the Insta plication Leading T	allShield Wizard for iool for RX111 V1.00.00	
	🙀 Application Lea	ding Tool for RX111	¥1.00.00 - InstallShield Wizard 🔀	
	License Agreem Please read the.	<b>ient</b> followina license aareem	nent carefully.	
and the second second		🖶 Application Lead	ing Tool for RX111 V1.00.00 - InstallShield Wizard	
C Mar V	USER LICENSE AG	Destination Folde	ar Il to this folder, or click Change to install to a different folder	
	IMPORTANT-READ		🙀 Application Leading Tool for RX111 ¥1.00.00 - InstallShield Wizard	×
-	This User License (either a natural p ("Renesas") for th	Install A C:\Prog	Ready to Install the Program The wizard is ready to begin installation.	2
	means the Renes computer softwar and "online" files		Click Install to begin the installation.	
	If you do not agre		It you want to review or change any of your installation settings, click Back. Clic exit the wizard.	k Cancel to
	<ul> <li>I accept the ter</li> <li>I do not accept</li> </ul>			
	InstallShield ———			
		InstallShield ———		
			Install5hield	
			< <u>B</u> ack	Cancel

Caution: In the installation destination folder name, none of these 11 characters, [( / \* : < > ? | " ¥ ; ,] can be used.

Also, a space (a single-byte blank character) cannot be used at the beginning or end of a folder name.

The installation process may fail if an illegal character is specified in the folder name.

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(4) To end the installation process, click the [Finish] button on the [Wizard Completed] screen.

Figure 2-3 [Wizard Completed] Screen

🙀 Application Leading Tool for	RX111 ¥1.00.00 - InstallShield Wizard	×
2	InstallShield Wizard Completed	1
	The InstallShield Wizard has successfully installed Application Leading Tool for RX111 V1.00.00. Click Finish to exit the wizard.	
2100		
	< Back Finish Cancel	



#### 2.3 Uninstallation Procedure

This section describes the procedure for uninstalling the Applilet, taking the uninstallation of Applilet for RX111 in Windows 7 as an example. The contents of display may vary depending upon the particular operating system and software being used.

#### Cautions 1. You need to perform uninstallation by logging in as a user with Administrator privileges.

- 2. Uninstalling the Applilet will not uninstall the ".NET Framework Version 4" and "Microsoft Visual C++ 2010 SP1" run-time library and associated files.
- (1) In [Add or Remove Programs] of Windows 7, click the [Uninstall] button for the Applilet to be uninstalled.

#### Figure 2-4 Add or Remove Programs (Uninstalling Applilet)



(2) In the wizard dialog box that appears, select [Yes].

#### Figure 2-5 Confirming Uninstallation

🐞 Add or Rer	nove Programs		
Change or	Currently installed programs	Show up <u>d</u> ates Sort	by: Name
Remove Programs	Applica Add or Remo	ve Programs	×
1	Click her To chane	e you sure you want to remove Application Leading Tool for RX111 V1.0	10.00 from your computer?
Add <u>N</u> ew	C Annillet3	<u>Yes</u> <u>N</u> o	

(3) The uninstallation process finishes.

#### Figure 2-6 Uninstall Finished

🐻 Add or Ren	nove Programs			<u>- 0 ×</u>
5	Currently installed programs:	Show up <u>d</u> ates	Sort by: Name	•
Change or	🔂 Agere Systems AC'97 Modem			
Programs	Applilet3 for RL78_G13 V1.03.01		Size	17.84MB
6	📚 ATI Control Panel		Size	10.66MB



# **Chapter 3 Operating Procedure**

## 3.1 Names of Parts

Figure 3-1 Main Window



<1> Title	: Displays the product name and the Applilet project file name.
<2> Menu	: Allows the user to select and execute a command.
<3> Main Toolbar	: Allows the user to select and execute a command by clicking a button.
<4> Module Toolb	ar : Generates code. Also, switches between peripheral functions that are displayed or set
	up on the Module Panel.
<5> Status	: Displays information on the current project.
<6> Project Tree	: Indicates the settings for a peripheral function. Also, switches between peripheral
	functions that are displayed or set up on the Module Panel.
<7> Module	: Allows the user to set up a peripheral function. The Module and Preview panels can be
	switched by pressing the tab key.
<8> Preview	: Allows the user to set the file and API function to be output when code is generated.
	The Preview and Module panels can be switched by pressing
	the tab key.
<9> Property	: Allows the user to view or make output, macro, or file settings.
<10> Output	: Displays information, including the execution status of code generation or report output,
	or the allowable range for a selected input field.



#### 3.1.1 Title Bar

The title bar displays the product name and the Applilet project file name. A project file name tagged with a "\*" indicates that the file does not contain the latest settings.

#### Figure 3-2 Title Bar

Application Leading Tool for RX111 - Sample01.cgp

#### 3.1.2 Menu Bar

The menu bar is used to select and execute a command. For the functions of the various menus, see Chapter 4 Menu Reference.

```
Figure 3-3 Menu Bar

<u>File View Peripheral Functions Options H</u>elp
```

### 3.1.3 Main Toolbar

Clicking a button on the main toolbar allows the user to execute frequently used functions. For button functions,

#### see 4.5.1 Main Toolbar.



#### 3.1.4 Module Toolbar

Code generation can be executed by clicking the [ <u>] 그 ド生成</u> [] button on the module toolbar. Also, clicking a peripheral function button switches between peripheral functions that are displayed or set up on the

Module panel. For button functions, see 4.5.2 Module Toolbar.

Figure 3-5 Module Toolbar

#### 3.1.5 Status Bar

The status bar displays device information (the product series name and device name).



Remark: <1> Device product group name, <2> Applicable device name



- 🗆 ×

## 3.1.6 Project Tree Panel

This panel shows the settings status of each peripheral function in the form of an icon. Double-clicking a peripheral function name switches between modules that are displayed or set up on the Module panel. For a description of what is displayed, see **5.1 Project Tree Panel**.

#### Figure 3-7 Project Tree Panel



Remark: If the width of the Project Tree panel is too small to display all character strings, place the mouse cursor on the character string or icon of interest. This will display all character strings for an item on the tooltip.

### 3.1.7 Module Panel

This panel is used to set up a peripheral function. For the operating procedure, see **3.6 Setting up a Peripheral Function**.

Figure 3-8 Module Panel

Code Preview	Property	x
	Property	
🐻 Generate code 🛛 🚣 📋 🚜 🖄 💥	i 💷 🛞 🥨 🧶 💭 🔜 🖉 🎜 📲 🏸 🖧	i 4 <u>1.</u> 44, 2≩
Clock setting Register write protection function setting		-
-VCC setting		
	O 2.4 (V) ≤ VCC < 2.7 (V)	○ 1.8 (V) ≤ VCC < 2.4 (V)
- Main clock oscillator setting		
Main clock oscillation source	Resonator	
Frequency	12	(MHz)
Oscillator wait time	2 cycles 0.167	(µs)
Oscillation stop detection function	Disabled	

Remark: The positions of the Module panel and Preview panel can be switched by dragging and dropping the tab.



#### 3.1.8 Preview Panel

This panel is used to set the file and the API function that are output during the code generation process. For the operating procedure, see **3.7 Checking Source Code**.

#### Figure 3-9 Preview Panel



### 3.1.9 Property Panel

This panel is used to view or make output, macro, and file settings. For a description of what is displayed, see 5-4 Property Panel.

#### Figure 3-10 Property Panel

_	<u> </u>	
	🚆 Peripheral Functions 🛛 🛃 Code Preview 🎽	Property X
•	<b>1</b> 2↓ □	
	Generate File Mode	
	API output control	Output all API functions according to the setting
	File generation control	Merge file
	Output folder	C:\Documents and Settings\toolgi\My Documents\Sar
	Report type	CSV file
	Microcontroller Information	
	Microcontroller name	R5F51115AxFM
	Nickname	RX111(128KB)
	Product Information	
	Release date	5/8/2013
	Version	V1.00.00.03
	Project Information	
	Project name	Sample01
	Project path	C:\Documents and Settings\toolgi\My Documents\Sample01\Sa
	Draiast tusa	Application

#### 3.1.10 Output Panel

This panel displays the execution status of code generation or report output, and information such as the allowable range for a selected input field. For a description of what is displayed, see **5.4 Output Panel.** 

```
Figure 3-11 Output Panel
```

Output	ф	×
M0409000;src\r_cg_userdefine.h was generated. M0409000;src\r_cg_cg_cc.c was generated. M0409000:src\r_cg_cg_cc_user.c was generated.		-
M0409000.src\r_cg_cgc.h was generated. M0409003:The operation of generating file was successful.		
•	►	



## 3.2 Operating Procedure

In the Applilet, source code is created by performing the following procedure:





## 3.3 Starting up

This section explains how to start up the Applilet.

1. In Windows, select the [Start] button -> [Program] -> [Renesas Electronics Application Leading Tool] -> [RX111] -> [Vx.xx.xx]. After these items are selected, the Applilet main window starts up.



Note: Contemporation Leading Tool		
Eile View Peripheral Function	ns <u>O</u> ptions <u>H</u> elp	
🗄 🖆 🖬 🗠   🔂 💽   🚮		
Project Tree 🛛 📮 🗙	1 Start	x
	Recent Projects	
	Name Modified Location	I
		_
	New Project Open Project	
	Output	ф ×
	•	
Ready		



## 3.4 Creating a New Project File

 On the main window, press the [New Project] button to display the [New Project] dialog box. Figure 3-14 [New Project] Dialog Box



2. Set up items and then click the [OK] button to create a new project.

#### Table 3-1 Project Creation Settings

Item	Summary		
Microcontroller	Specify a target device. Peripheral functions that can be set up vary with the		
	specified device.		
Using compiler *1	From CCRX (made by Renesas), EWRX (made by IAR), and GNURX (made b		
	KPIT), select the compiler to be used for the build process. The build tool can be		
	changed even after a project is created.		
Project name	Specify a project folder/file name. If an IAR compiler is specified as the build tool,		
	the project folder/file name is also used as a workspace/project file name.		
Place	Specify where the project is to be saved.		

\*1: The item which can be chosen changes with a micro controller.

Caution: In a folder/file name, a single-byte alphanumeric character and "\_" (underbar) can be used.

Also, a space (a single-byte blank character) cannot be used at the beginning or end of a folder/file name.

The creation process may fail if an illegal character is specified in the folder/file name.

Remark: If a project with the same name already exists in a specified location, an overwrite confirmation message appears. Clicking the [OK] button overwrites the existing project file.



## 3.5 Opening an Existing Project

If a previously created project exists, it can be opened by either specifying the file name or by selecting it from a list of recent projects.

## (1) Opening a file by selecting it

In the Main window, press the [File] button. The [Open] dialog box appears.

Figure 3-15 [Open] Dialog Box



Selecting the file and clicking the [Open] button opens the selected file.

## (2) Opening a recently used file

From the [Recent Projects] displayed in the Main window, select the file to be opened.

#### Figure 3-16 Opening a Recent Project

Eile	⊻iew	<u>P</u> eriphera	l Functions	Options	Help		
1	New		Ctrl+N			•	
2	<u>O</u> pen		Ctrl+O	🖏 Star	E		
	<u>S</u> ave		Ctrl+S				
	Save <u>A</u> s			Recent	Projects	1	1
PX	Close			Name		Modified	Location
	Generate	: Code	Ctrl+G				
	Generate	<u>R</u> eport					
	Recent P	rojects	•	1:0	C:\Documen	ts and Settings\toolgi\My	Documents\Sample01\Sample01\Sample01.cgp
3	<u>E</u> ×it						



## 3.6 Setting up a Peripheral Function

Peripheral functions to be displayed on the Module panel can be selected by one of the methods listed below. For a description of what is displayed on the Module panel, see **5.2 Module Panel**.

- From the [Peripheral Functions] menu in the Main window, select a peripheral function.
- On the Tree View panel, double-click the peripheral function name.
- Click the module toolbar button.

Remark: Even when the Module panel is not being displayed, the Module panel can be opened by selecting a peripheral function from either the [Peripheral Functions] menu or the Tree View panel.





Caution: The [Clock setting] can affect other peripheral function settings. If the [Clock setting] is modified, the settings for other peripheral functions need to be rechecked.



## 3.6.1 Input Conventions

Input of information into the Module panel is subject to the following conventions:

#### (1) Character set

Table 3-2 lists character sets that the Module panel can accept for input.

#### Table 3-2 List of Character Sets

Character set	Summary
ASCII	Single-byte alphabetic, numeric, and symbol characters
Shift-JIS	Double-byte alphabetic, numeric, symbol, hiragana, katakana, and kanji characters, and
	single-byte katakana characters
EUC-JP	Double-byte alphabetic, numeric, symbol, hiragana, katakana, and kanji characters, and
	single-byte katakana characters
UTF-8	Double-byte alphabetic, numeric, symbol, hiragana, katakana, or kanji (including Chinese)
	characters, and single-byte katakana characters

#### (2) Numeric values

Table 3-3 shows radix base numbers that the Module panel can accept for input.

#### Table 3-3 List of Radix Base Numbers

Radix number	Summary
representation	
Decimal	A number beginning with a numeral 1 to 9, followed by numerals 0 to 9, including 0.
Hexadecimal	A number beginning with 0x, followed by 0 to 9 or alphabetic characters a to f, (not case-
	sensitive).

## 3.6.2 Icon Display on Invalid Input Fields

If an illegal character string is entered or if a value is not entered in a required field, the Module panel displays a **()** icon indicating that the input data is incorrect. In addition, the Module panel represents the affected character string in red to provide a warning that input is invalid.

# Remarks 1. If an invalid input field is present, control cannot move to another peripheral function setup view.

2. If the mouse cursor is moved to the **()** icon, information on the character string to be input (a helpful hint on how to resolve the input error) is displayed as a popup.

Figure 3-18 Icon Display on Invalid Input Fields

- Main clock oscillator setting			-
Operation			
Main clock oscillation source	Resonator	<b>–</b>	
Frequency	30	(MHz) 😲	
Oscillator wait time	2 cycles 💌	0.667 Information of valid input value range: 14	<u>~20</u>
Oscillation stop detection function	Disabled	<b>_</b>	



## 3.6.3 Icon Display on Pin Contention

Manual

As peripheral functions are set on items in which pin contention can occur, the Module panel displays a 💔 icon in the affected spot to provide a warning on pin contention, indicating that a contention has occurred.

Remarks 1. The function for which a pin contention warning icon is displayed cannot be enabled. When using the affected function, the contending peripheral function should be disabled. If the mouse cursor is moved to the 👎 icon, information on pin contention (a helpful hint on how to avoid contention) appears as a popup.

## Figure 3-19 Icon Display on Pin Contention

• - P43 -	Unused	⊖ In	O Out	🗖 Pull-up	CMOS output	🗖 Output 1
• •	Unused	🔿 In 😲	🔿 Out 😲	🗖 Pull-up	CMOS output	🗖 Output 1
• - PA6	Unused	🔿 In 😲	🔿 Out 😲	🗖 Pull-up	CMOS output	🗖 Output 1
•	Unused	C In PA4	following pin co was used as TX	nflicts have been :D5.	detected. You must change the set	ing in that module before you can use it for other purpose.



#### 3.7 Checking Source Code

The Applilet generates source code (a device driver program) that matches peripheral function settings (see **3.6 Setting up a Peripheral Function)**. The source code can be checked on the Preview panel. If the Preview panel is not open, clicking the [Preview] tab switches the Module panel to the Preview Panel.

On the tree on the Preview panel, double-clicking either the source code file name or the API function name switches the display of the source code.

On the Preview panel tree, you can specify whether to turn on or off an output, rename API functions, or rename files.

Figure 3-20 Verifying Source Code



**Remarks** 1. Source code cannot be edited on the Preview panel.

2. In some API functions (such as API functions for a serial array unit), register value SFRs and other values are calculated during the code generation process before the function is finalized. For this reason, the source code displayed on the Preview panel may not agree with the source code that is actually output.



User's

### 3.7.1 Setting Output on/off

According to the peripheral function settings, the Applilet automatically enables the output of a required API function. For non-mandatory API functions, the user can enable/disable the output of the API function.

On the Preview panel tree, right-clicking the API function name brings up a context menu. By selecting [Generate Code] / [Not Generate Code], the user can specify whether to turn on or off an output of the API function.





Remark: Whether output is on or off can be checked by the type of each icon on the Preview panel.

Table 3-4 Source Code Output on/off

Icon type	Summary
fxo)	The source code for this API function will be output.
	The API function for which this icon is displayed is treated as a function
	requiring source code output (not changeable to a 💯).
fxc	The source code for this API function will be output.
éxc)	The source code for this API function will not be output.



### 3.7.2 Renaming a File

In the Applilet, the code to be output can be assigned any file name.

On the Preview panel tree, right-clicking the file name brings up the context menu. By selecting [Rename], you can edit the file name.

Figure 3-22 Renaming a File



**Remarks** 1. To reset the file name to the default file name provided by the Applilet, select [Default] from the context menu.

- 2. In file names, single-byte alphanumeric characters and [\_] (underscore) can be used.
- 3. Information on the file selected on the Preview panel is displayed in [File name] on the

Property panel. File names can also be edited in [File Information].

Figure 3-23 [File Information] Tab (Renaming a File)

🚆 Peripheral Functions* 🛛 🛃 Co	de Preview Property X				
File Information					
Default name	Yes				
File name	r_cg_cgc.c				
File used	Used				
Output folder	C:\Documents and Settings\toolgi\My Documents\Sample01\Sample01\src				
Default name					
Indicates / selects whether to use by the de	efault file name.				
If "no" is changed to "yes", the file name re	turns to the default name.				



## 3.7.3 Renaming an API Function

In the Applilet, the code to be output can be assigned any API function name.

On the Preview panel tree, right-clicking the API function name brings up the context menu. By selecting [Rename], you can edit the file name.



**Remarks** 1. The name of the *main* function cannot be changed.

- 2. In file names, single-byte alphanumeric characters and [\_] (underscore) can be used.
- 3. Whether output is on or off can be checked by the type of each icon on the Preview panel.



## 3.8 Output of Source Code

Source code (a device driver program) can be output by any of the following methods:

- From the [File] menu, select [Generate Code].
- On the toolbar, click the [ 👸 ] button.
- On the module toolbar, click the [ 6 Generate code ]button



Application Leading Tool for RX111 - Sample01.	File			
File View Peripheral Functions Options Help		2	New	Ctrl+N
🔁 🕞 🔛 🏹 🖾 🖓 🖓 🖓 🖓 🖓 🖓 GNURX for e2studio	-	2	Open	Ctrl+O
Project Tree $\Psi \times$	C Deripheral Fur	B	Save	Ctrl+S
🖃 💦 Sample01*			Save As	
Peripheral Functions			Close	
Clock Generator     Jock Generator     Jock Generator     Jock Generator	• 2.7 (V) ≤ VCC <	8	Generate Code	Ctrl+G
		0	Generate Report	
Low Power Consumption	– Main clock oscillator se			
Interrupt Controller Unit	🔽 Operation		Recent Projects	•
Buses Data Transfer Controller	Main clock oscillati	-	Exit	
Event Link Controller	Frequency			20
i i/0 Ports				
🕀 🐋 Multi-Function Timer Pulse Unit 2	Oscillator wait time			2 cy
Port Output Enable 2	Oscillation stop det	ection	function	Disa



## 3.8.1 Modifying the Output Modes

In the Applilet, you can select an output mode (overwriting, merging, or previous-file-priority) from [Generate File Mode] on the Property panel.

To change output modes, in the [File generation control] field, click the 🗾 button to select a desired mode from the list.

Figure 3-26 Changing Output Modes



An output mode can be selected from the three modes listed in Table 3-5.

#### Table 3-5 Source Code Output Mode

Output mode	Summary				
Overwrite file	If an identically named file already exists, overwrites that file.				
Merge file	If an identically named file already exists, merges that file with the current file. Only the content of a merge comment is subject to the merging action. /* Start user code. Do not edit comment generated here */ [merge section] /* End user code. Do not edit comment generated here */				
Do nothing if file exists	If an identically named file already exists, does not output the current file.				

Remarks 1. The merge comment can vary depending on where it occurs.

2. A merge comment should not be edited or moved. If it is edited or moved, the merging cannot be performed correctly.

3. The presence of any unpaired braces { } in a merge section can result in deleted source code.



## 3.8.2 Changing Output Destinations

Figure 3-27 Specifying an Output Destination

In the Applilet, where source code is to be output can be specified in [Output folder] on the Property panel.

To change destination folders, an output destination folder can be selected on the [Browse For Folder] screen, which is displayed when the 🔜 button in the destination folder field is clicked.

🗞 Application Leading Tool for RX111 - Sample01	cgp	
Eile View Peripheral Functions Options Hel	1	
👔 🖆 🔒 🖾 🧊 💁 🚮 🛛 GNURX for e2studi	•	]
Project Tree 🛛 📮 🗙	🕎 Peripheral Functions* 📑 Code Preview Property	×
🖃 🐺 Sample01*		
Peripheral Functions	Generate File Mode	
	API output control Output all API functions according to	the setting
Clock Frequency Accuracy Measurem	File generation control Merge file	dail Mu Decumental Sample(1) S
Low Power Consumption	Report type CSV file	ngrmy Documents to ampleor to m
	Misrocontrollor Information	
Г		
	Browse For Folder	<u>? ×</u>
	🞯 Desktop	
	🕀 👿 My Computer	
	E S My Network Deces	
	🗄 🛄 an_r01an0718ej0102_rl78g13_flash	
	⊞      ☐ AP4_RX111	
	🗄 🔁 CubeSuite+ E2.00.00m	
	🕀 🛅 CubeSuite+ E2.01.00a	
	Error Report Data	
		<u> </u>
	Make New Folder OK Can	cel 🛛
L		111

Remark: In the installation destination folder name, none of these 11 characters, [( / \* : <> ? | " ¥ ; ,] can be used.

Also, a space (a single-byte blank character) cannot be used at the beginning or end of a folder name.

The output changing process may fail if an illegal character is specified in the folder name.



### 3.9 Generating a Report File

A report file can be output by either of the following methods:

- From the [File] menu, select [Generate Report].
- On the toolbar, click the []] button.

```
Eile
Figure 3-28 Report Output
                                                                                                      Ctrl+N
                                                                                   New
Application Leading Tool for RX111 - Sample01.cgp
                                                                                                      Ctrl+O
                                                                                   Open
 File View
                Peripheral Functions
                                       Options
                                                  Help
                                                                                                       Ctrl+S
                                                                              무
                                                                                   Save
    📂 📙 🏹 + 🖏 💽
                            -1
                                   GNURX for e2studio
                                                                              Save As
                                                          💯 Peripheral F
                                                                                   Close
🖃 📑 Sample01
                                                   >
                                                        🕞 Generate code
                                                                              ĉ
                                                                                   Generate Code
                                                                                                      Ctrl+G
   🖻 归 Peripheral Functions
                                                         VCC setting 🚽
             🛚 Clock Generator
                                                                                   Generate <u>R</u>eport

• 2.7 (V) ≤ VC

              Voltage Detection Circuit
              Clock Frequency Accuracy Measureme
                                                                                   Recent Projects
                                                                                                                ۲

    Main clock oscillator

              Low Power Consumption
                                                                              쉐
                                                                                   <u>E</u>xit
              Interrupt Controller Unit
                                                            Operation
              Buses
                                                                                                               Res
                                                            Main clock oscillation source
              Data Transfer Controller
              Event Link Controller
                                                                                                              20
                                                            Frequency
              1/0 Ports
                                                            Oscillator wait time
                                                                                                               2 cy
              Multi-Function Timer Pulse Unit 2
              Port Output Enable 2
                                                            Oscillation stop detection function
                                                                                                               Disa
              Compare Match Time
```

**Remarks** 1. The names of report files are "macro" and "function".

macro: Peripheral function settings information

function: Source code information

- 2. The format (HTML or CSV) for the report file and its output destination can be selected on the [output] tab on the Property panel.
- **3.** If the destination folder for the report file already contains a report file, the existing file will be overwritten, irrespective of file generation mode settings.

# Figure 3-29 Example of Report File Output (a) macro.html

#### (b) function.html

Favorites	s and Settings(tool	igijHy Documents) olgijHy Documents	slSam	(**) × j≥ong 	dety + Tgols + 💽 -	Favorites 88 -	uments and Settings(toolg)(hy 20 Ct(Documents and Settings	A Cocuments	SampleOT(SampleOT(SampleOT)Function.html 🔄 🛀 🗶 🖂 Orig (Documents and Settin 🗙	🖸 🦛 • Bage • Safety • Tgols •
CU name: RX111_128KB tip name: R5F51115AxFI	(128KB) M					MCU name: R0(111_1 Chip name: R5F5111	28KB(128KB) 5AxFM			
eripheral function	Macro S	ubMacro S	etting	Status		Peripheral	File	Macro	Function	Default
Clock Generator				Used		function	100 C			
	CGC			Used		Common		-		1
		V	CC setting	2.7 (V) = VCC < 3.6 (V)			r_cg_main.c			r_cg_main.c
		C	lock source	Main clock oscillator		8 2			void main(void)	main
		M	lain clock oscillation source	Resonator	1				void R_MAIN_UserInit(void)	R_MAIN_UserInit
		M	lain clock oscillation source	100.000	1		r_cg_intprg.c			r_cg_intprg.c
		Fi	requency	12(MP12)		2 8			voidNMI_handler(void)	NMI_handler
		0	scillator wait time	2 cycles 12 (µs)					voidBRK_handler(void)	BRK_handler
		Otu	scillation stop detection inction	Disabled			r_cg_systeminit.c		unid R. Systeminit/unid)	r_cg_systeminit.c
		SI	ub-clock oscillator and RTC RTCSCLK) setting	32.768 (kHz)					intlow_level_init(void)	_low_level_init
		H	ich speed clock oscillator	Contractory of the second s			r_cg_macrodriver.h			r_cg_macrodriver.h
		()-	IOCO) setting	32 (MHz)		5 B	r_cg_userdefine.h			r_cg_userdefine.h
		S	ystem clock (ICLK)	x 1 12 (MHz)	1	Clock Generator				
		P	eripheral module clock	-1.12(000)	1	2 4	r_cg_cgc.c			r_cg_cgc.c
		(F	PCLKB)	x i iz (minz)					void R_CGC_Create(void)	R_CGC_Create
		P	eripheral module clock for DC (PCLKD)	x 1 12 (MHz)					void R_CGC_RegisterWrite_Cgc (protect_mode_t enable)	R_CGC_RegisterWrite_C
		FI	lash IF clock (FCLK)	x 1 12 (MHz)						- Long



## 3.10 Saving a Project

To save information that has been set, any of the following methods can be used:

#### (1) Save as

Select the [File] menu -> [Save As...]. Alternatively, click the [ ] button on the toolbar, The [Save As]

dialog box appears.

Figure 3-30 [Save As] Dialog Box



To save the information that has been set, specify a destination and a file name, and click the [Save] button.

### (2) Save

Select the [File] menu -> [Save]. Or on the toolbar, click the [ ] button. The file (project) being edited is saved on an overwrite basis.

#### (3) Close and save

When an attempt is made to exit from the Applilet without saving the modified settings, a save confirmation dialog box appears.

Clicking the [Yes] button saves the file (project) being edited on an overwrite basis.

Clicking the [No] button skips the save process.





Remark: The name of the file to be saved (not including the extension) is identical to the Applilet project name.



## 3.11 Closing

The Applilet can be closed by any of the following methods:

- On the Main window, select the [File] menu -> [Exit].
- On the toolbar, click the [ 🚮 ] button.
- On the Main window, click the [ 🔀 ] button.
- On the menu that appears when an icon on the title bar is clicked, select [Close].

## 3.12 Coding

After code is generated, the source code that has been output is read using the integrated development environment platform.

The program is completed by adding user source files as necessary or adding code in the merge comment in the file that is output by the Applilet.

When outputting a source code using the Applilet again after editing the source code on the integrated development environment platform, observe the following points:

- Cautions 1. If the output mode is [Overwrite file], any editing that was performed on the integrated development environment platform with respect to the Applilet output file will be disabled.
  - 2. If the output mode is [Merge file], any editing that was performed on the integrated development environment platform outside a merge comment will be disabled.
  - 3. If the output mode is [Do nothing if file exists], any changes to Applilet settings other than a new output file will be disabled.
  - 4. The Applilet does not delete files that are no longer needed due to changes in settings.



# **Chapter 4 Menu Reference**

## 4.1 [File] Menu

Figure 4-1 [File] Menu				
💊 AP4 for RX111 - AP4e2gcc_RX	(111_F	R5F51115AxFM.cgp		
File View Peripheral Function	s <u>o</u> p	itions - Help		
🍋 🐸 🗟 🐸 🕤 🚳	File	]		
Project Tree 7 ×	1	New	Ctrl+N	eview 🕋 Prope
AP4e2gcc_RX111_R5F51115AxF  Peripheral Functions	2	Open	Ctrl+O	🛚 🖧 🗱 💷 🤅
Clock Generator		Save	Ctrl+S	tion setting
		Save As		0.24
	2	Close		0 2.4
Low Power Consumption	1	Generate Code	Ctrl+G	
Buses Data Transfer Controller	0	Generate Report		Reson
Event Link Controller		Recent Projects	•	20
Multi-Function Timer Pulse     Port Output Enable 2	<b>3</b>	Exit		2 cycle Disable
🗄 🛜 Compare Match Timer				1

#### Table 4-1 [File] Menu

Item	Description
[New]	Creates a new project.
[Open]	Opens an existing project.
[Save]	Overwrites the currently open project with the current settings.
[Save As…]	Saves the current settings under a different project name.
[Close]	Closes the currently open project.
[Generate Code]	Outputs the source code.
[Generate Report]	Outputs settings information to a file.
[Recent Projects]	Displays recently opened projects. Selecting a project from a submenu loads
	the project.
[Exit]	Exits from Applilet.



## 4.2 [Peripheral Functions] Menu

Table 4.0 [Darinhard Functional Manu

The [Peripheral Functions] menu displays peripheral functions that the target device has (only those peripheral functions that are supported by Applilet). When a peripheral function is selected, the associated settings screen is displayed on the Module panel.



{ XE "メニュー:周辺機能" ¥y "メニュー:しゅうへんきのう" }

Item	Description						
Peripheral function name	Displays the associated settings screen on the Module panel.						
	The names of peripheral functions that are displayed may vary from one						
	product to another.						



## 4.3 [Options] Menu

Figure 4-3 [Options] Menu

Application Leading Tool for RX111 - Sample01.cgp							
File View Peripheral Functions	Opti	ions	Help				
: 1 🔛 🚅 🔒 🐸 1 🖏 🔜 🔤		Com	piler		۲		
Project Tree		File (	Genera	ition Control	•	unctions*  Code Previe	
🖃 📑 Sample01*	Report Type API Output Control		ort Typ	e	•	🍰 🗅 🚜 🗠 💕 🗰 🖁	
Peripheral Functions     Clock Generator			: Control	×			
Clock deneration     Cricuit     Clock Frequency Accuracy Measurement			mε		≤ V0	CC < 3.6 (V)	
Low Power Consumption     Interrupt Controller Unit     Buses     Data Transfer Controller     Event Link Controller     I/O Ports				Main clock oscillator setting			
				Main clock Frequency	. osci	llation source	

#### Table 4-3 [Options] Menu

Item	Description
Compiler	Selects the format of the output code. The compiler names that are displayed may vary from one product to another.
File Generation Control	File generation control can be selected from: overwrite file, merge files, and do nothing if a file already exists.
Report Type	Select either HTML or CSV.
API Output Control	API function output control can be selected from "output all API functions according to the setting", and "output only initialization API function." The default is "output all according to the settings". Selecting the "output only initialization API function" option skips the generation of the file R_xxx_user.c that codes interrupt handlers, in which case all interrupt handlers must be coded by the customer himself/herself.



## 4.4 [Help] Menu

Figure 4-4 [Help] Menu

AP4 for RX110 - AP4_RX110_R5F51103AxFM.cgp						
File View Peripheral F	unctions Optior	ns Help				
1 🖆 🗃 🖬 🖾 1 🖏 💁	CCRX	About AP4				
Project Tree	<del>Р X</del> 🦉 Р	eripheral Functions [ 🛃 Code Pre	view 🕋 Property			
AP4_RX110_R5F51103AxFM Pin View Device List View Device List View	Clock s	rate code   🚣 📮 🚜 🛬 🚅 etting   Block diagram	1 🏯 💷 🚳 🛄 .	87 487 18 91	123 	
Peripheral Functions	-VCC se	etting			~	
Clock Generator 📄	•	2.7 (V) ≤ VCC <b>3</b> .6 (V)	O 2.4 (V) ≤ VD	C < 2.7 (V)	0	
🗄 🐋 Voltage Detection ( 🔽	About AP4		×			
Clock Frequency A Low Power Consun	AP4 (1.0 © 2012,	)4.01.05) 2015 Renesas Electronics Corporation		1	<b>-</b> ]	
Buses	Coriala	Version			- - -	
Data Transfer Cont	BX111	V1.05.00.01 [30 Dec 2014]			(MF	
HITE Multi-Euroction Time	R×113	V1.02.00.01 [07 Jan 2015]		▼ 0.5	(μs)	
E Compare Match Tir	RX64M	V1.02.00.01 [30 Dec 2014]			-	
Realtime Clock	00740	V4.00.04.04.000 - 204.51			-	
🚽 🚽 Independent Watcl			ОК —			
🗄 🐨 Serial Communicati		•				
Serial Peripheral Interface	Sut	p-clock oscillator drive capacity	Middle drive ca	pacity	r	
CRC Calculator	Fre	quency	32.768		(kH	
🖌 🛶 A/D Converter			,			

#### Table 4-4 [Help] Menu

Item	Description
About AP4	Displays version information and other items.



#### 4.5 Toolbars

Applilet provides two toolbars: The main toolbar, which is always displayed below the Manu bar, and a module toolbar, which is displayed above the Module panel.

#### 4.5.1 Main Toolbar

The main toolbar is always displayed below the menu bar.

By clicking buttons on the main toolbar, you can execute functions such as project file operation, code generation, and report output.

Figure 4-5 Main Toolbar

🗞 Application Leading Tool for RX111 - Sample01.	cgp
Eile View Peripheral Functions Options Help	
📔 🐸 📕 🎽 👸 💁 🚮 🛛 GNURX for e2studic	•
Project Tree 🛛 📮 🗙	📲 Peripheral Functions* 🛃 Code Preview 🕋 F
E 🖪 Sample01*	🔞 Generate code 🛛 🛓 😩 🚜 🛬 🐲
Clock Generator	-VCC setting
🕀 🍯 Voltage Detection Circuit	⊙ 2.7 (V) ≤ VCC < 3.6 (V)     ○ 2
-State Clock Frequency Accuracy Measurem	
- Sow Power Consumption	- Main clock oscillator setting
Interrupt Controller Unit	Operation
Buses	Main clock oscillation source
🚽 Data Transfer Controller	
Event Link Controller	Frequency 20
· · · · · · · · · · · · · · · · · · ·	O se illeter weit time
Multi-Function Timer Pulse Unit 2	
Port Uutput Enable 2	Oscillation stop detection function Disa
Clock Generator Voltage Detection Circuit Clock Frequency Accuracy Measureme Low Power Consumption Interrupt Controller Unit Buses Data Transfer Controller Event Link Controller I/O Ports Multi-Function Timer Pulse Unit 2 Port Output Enable 2 Compare Match Timer	-VCC setting       Image: Constraint of the setting       Image: Constraint of the setting         Image: Main clock oscillator setting       Image: Constraint of the setting       Image: Constraint of the setting         Image: Main clock oscillation source       Res       Res         Image: Main clock oscillation source       Res

The main toolbar contains the following buttons:

<b>Table 4-5 Functions</b>	of	Main	Toolbar
----------------------------	----	------	---------

Button	Name	Description
	New project	Creates a new project.
	Open a project	Reads an existing project.
II S	Save a project	Overwrites the currently open project with the current settings, and saves the results.
2	Close	Closes the currently open project.
្	Generate Code	Outputs the source code.
	Generate Report	Outputs a report file.
<b>T</b>	Exit	Exits from Applilet.



### **4.5.2** Module Toolbar

The module toolbar is displayed above the Module panel.

Clicking the [ Generate code ] button causes the execution of the code generation process. By clicking peripheral function buttons, you can switch the peripheral functions to be displayed or set up on the Module panel.

Figure 4-6 Module Toolbar

🗞 Application Leading Tool for RX111 - Sample01.	:gp		
Eile <u>Vi</u> ew <u>P</u> eripheral Functions <u>O</u> ptions <u>H</u> elp			
📋 😅 🔲 🖾   🖏 💁   ᢔ   GNURX for e2studio	•		
Project Tree 🛛 📮 🗙	🚆 Peripheral Functions 📑 Code F	Preview Property	x
🖃 🌃 SampleO1 📃	🐻 Generate code 🛛 🛃 📋 🚜 ጅ 🚅	🛢 🏯 😂 🕸 🕉 💷 🖉 📲	i 🍠 123 🗛 🦊 🤩
Peripheral Functions     Clock Generator	- VCC setting		<b>_</b>
🕀 🕤 Voltage Detection Circuit		2.4 (V) ≤ VCC < 2.7 (V)	C 1.8 (V) ≤ <sup>1</sup>
Clock Frequency Accuracy Measureme	Main start, socillater setting		
Low Power Consumption			

The module toolbar contains the following buttons:

#### Table 4-6 Functions of Module Toolbar

Button	Name	Description
👸 Generate code	Generate code	Outputs source code.
	Clock Generator	On the Module panel, displays
	Voltage Detection Circuit	screens that are associated
æ	Clock Frequency Accuracy Measurement Circuit	with buttons.
277.	Low Power Consumption	
<mark>گ</mark>	Interrupt Controller	Remark: The buttons listed in the table are
	Buses	intended solely as
(第) (注目)注	Data Transfer Controller	examples. The
	Event Link Controller	actually displayed
\$0	I/O Ports	may vary from one
3	Multi-Function Timer Pulse Unit 2	product to another.
Ö.	Port Output Enable 2	
٨	Compare Match Timer	
	Realtime Clock	
æ	Independent Watchdog Timer	
₽ <mark>₩</mark>	I2C Bus Interface	
D.	Serial Communications Interface	]
<b>6</b>	12-Bit A/D Converter	]
4	D/A Converter	
123	Data Operation Circuit	



## **Chapter 5 Window Reference**

The Applilet provides different windows for different microcontroller products that it supports.

This manual describes the displays and operating procedures that are common to the microcontroller products that the Applilet supports. Product-by-product descriptions of windows are omitted.

## 5.1 Project Tree Panel

The Project Tree panel displays, in tree format, the peripheral functions (those which are supported by the Applilet) that target devices possess. By double-clicking the name of a peripheral function, you can switch between modules that are displayed or set up on the Module panel.

Figure 5-1 Display of Project Tree Panel



The shape of the icon for each peripheral function changes according to the status of the settings. Table 5-1 Project Tree Panel Icons

Icon	Summary
<i>.</i>	The corresponding peripheral function is already set.
	The corresponding peripheral function is not set/used.

Right-clicking the name of a peripheral function brings up a context menu.

Table 5-2 Project Tree Panel Context Menu

Item	Description
[Return to Reset Value]	Resets the settings for a selected peripheral function to their Applilet default.
	The range of initial settings may vary by function.



## 5.2 Module Panel

The Module panel allows you to set peripheral functions. For a description on how to operate the Module panel, see **3.6 Setting up a Peripheral Function.** 

Figure	5-2	Displa	vina of	Module	Panel
Iguie	J-Z	Displa	ying or	iniouule	i anei

Application Leading Tool for RX111 - Sample01.	cgp		
Eile View Peripheral Functions Options Help			
👔 🚔 📙 👺   📆 🚳   📲   GNURX for e2studio	•		
Project Tree P X	Reginateral Functions	Property	×
🖃 🔀 Sample01 📃	Generate code	🕶 nopole,	123 🔊 🍌 123
Peripheral Functions			44 74 74 74 74
Clock Generator	-VUC setting		
Voltage Detection Circuit		○ 2.4 (V) ≤ VCC < 2.7 (V)	O 1.8(V)∡'
Clock Frequency Accuracy Measureme	Main shade as all the setting		
Low Power Consumption	- Main clock oscillator setting		
	✓ Operation		
Data Transfer Controller	Main clock oscillation source	Resonator	1 -1
Event Link Controller	Frequency	12	- (MH <sub>2</sub> )
E i I/O Ports	riequency		((****2)
🕀 🐨 🖬 Multi-Function Timer Pulse Unit 2	Oscillator wait time	2 cycles 💽 0.167	(μs)
	Oscillation stop detection function	Disabled	ส
🗄 🕤 Compare Match Timer 🛁			-
Realtime Clock	- PLL circuit setting		
Independent Watchdog Timer	Operation		
12C Bus Interface	Frequency	× 4 🔻 48	(MHz)
Serial Peripheral Interface		, _,	
CRC Calculator	Sub-clock oscillator and RTC (RTCSCLK) setting –		
A/D Converter	I Operation		<u> </u>
D/A Converter	<b> </b> ▲		
🔄 🔄 Data Operation Circuit	Output		<b>Ф</b> ×
	M0409004:src\r_cg_userdefine.h was overwritten.		
	M0409004:src\r_cg_cgc.c was overwritten.		
For the first sector of th	MU4U9UU4:src\r_cg_cgc_user.c was overwritten.		
B MAIN Userinit	M0409003:The operation of generating file was success	sful.	
The second secon			-
MCU:RX111(128KB) Chip:R5F51115AxFM			

**Remark:** The display positions of the Module panel and Preview panels can be changed by dragging and dropping the tab.



#### **5.2.1** Example of a Module Panel for Clock Generation Circuits

The figure below shows an example of a Module panel for clock generation circuits. By changing functions to be set through the tabs, you can set an operation, by function. Executing [Return to Reset Value] from the Project Tree panel resets all tab settings to their default values.

Figure	5-3	Exam	ole c	of a	Module	Panel (	(S)	vstem)	)
	~ ~	E/(Cilli			modulo	1 41101		,,	1

1_R5F51115AxFM.cqp			-10
Zhooue Geb			
Wex for easeudio			
Coperate code	t the reperty	1 10 10 10 10 10	
Cork setton Register unte protection burging	م بر مند المربي ( من	19 10 10 10 10	
VC entron	and 1		
@ 27(M) ( VCC < 3.6(M)	C 24(M) ( VCC < 27(M)	C 1.8 (Y) ≤ VCC < 2.4 (V)	
Man shad an Wan areas			
Ran clock oscillator senang			
Main clock oscillation source	Resonator	*	
Frequency	20	[MHz]	
Ducillator wait fore	2 cocles • [ft 1	here	
Oscillation stop detection function	Disabled		
The second se	and a second sec		
Operation			
Finguency	x2 ¥ 40	(MHz)	
- Sub-clock oscillator and RTC (RTCSCLK) setting			
I Operation			
Frequency	32 768	(kHz)	
High speed clock oscillator (HOCO) setting			
C Operation	-		
Frequency	12	040423	
- Low speed clock oscillator (LOCO) setting			
C Operation	100		
Frequency	4	(MHz)	
- fwDT-dedicated low-speed clock oscillator (fwD)	LOCO) setting		
C Operation	10.50 million		
Frequency	15	0.Hz)	
- System clock setting	p		
Clock source	Main clock oscillator	<u> </u>	
System clock (ICLK)	×1 • 20	(MHz)	
Peripheral module clock (PCLKB)	×1 💌 20	(MHz)	
Peripheral module clock for ADC (PCLKD)	×1 • 20	(MHz)	
Flash IF clock (FCLK)	x1 • 20	(MHz)	
Dedicated USB clock (UCLK)	20	[M6-12]	
- CLKOUT pin setting			
C Operation	PC4	<i>y</i>	
Clock output source	Main clock, oscillator	v	
Frequency	x1	(MHz)	

#### 5.2.2 Example of a Module Panel for Ports

The figure below shows an example of a Module panel for ports. By changing ports to be set through the tabs, you can set peripheral function operations by port. Executing [Return to Reset Value] from the Project Tree panel resets all tab (port) settings to their default values.

2	Peripheral F	unctions*	🛃 Code Pre	view 🕋 Prop	erty		x
🐻 Gen	erate code	着 🗋 🚜	🔛 💕 🏢	🏭 🗱 🗊 🛞	🔍 🚳 🔜 🔗 🍠	and and a the second se	🕰 🦗 🤩
Port0	Port1 Port	t2 Port3 F	Port4 Port5	PortA PortB	PortC PortE PortH	PortJ	
-PE1 -	Unused	🔿 In 😲	🔿 Out 😗	🗖 Pull-up	CMOS output	Ŧ	🗖 Output 1
0 - PE2 -	Unused	⊖ In	Out	🗖 Pull-up	N-channel open-drain	•	🗖 Output 1
- PE3 -	Unused	⊙ In	<ul> <li>Out</li> </ul>	🗖 Pall-up	CMOS output	•	🗹 Output 1
- PE4 -	Unused	🔿 In 😲	🔿 Out 😗	🗖 Pull-up	CMOS output	Ŧ	🗖 Output 1
• - PE5 -	Unused	O In 😲	O Out 👎	🗖 Pull-up	CMOS output	Y	🗖 Output 1
- PE6 -	Unused	O In	<ul> <li>Out</li> </ul>	🗖 Pull-up	N-channel open-drain	•	🗹 Output 1
- PE7 -	Unused	⊙ In	O Out	🗖 Pull-up	CMOS output	Ŧ	🗖 Output 1
0	Unused	⊙ In	O Out	🗹 Pull-up	CMOS output	<b>v</b>	🗖 Output 1

Figure 5-4 Example of a Module Panel (Ports)



## **5.2.3** Example of a Module Panel for a Peripheral Function (1 Channel)

The figure below shows an example of a Module panel for a peripheral function with only one channel installed. The operation of the peripheral function can be set by setting the various items that are displayed on the panel. Executing [Return to Reset Value] from the Project Tree panel resets the settings to their default values.

Figure 5-5	Example	of a Modu	le Panel	(A/D Converter)
i iguic o o	Example	or a moau		

💯 Peripheral	Functions 📑 Code Pre	view 🌁 Property	x
Generate code	1 🔬 🗋 🚜 🖄 💕 🖉	i 🚠 🐹 🗊 🐵 🖏 🛄 🔏 /	ア 📲 デ 沿 🎧 🛼 🤒
General setting	Setting		
- Function setting			
-			
O Unused			<u> </u>
Analog in	put channel mode		
C Temperat	ure sensor mode		
O Internal re	eference voltage mode		
📃 Periphera	l Functions 🔣 Code Pre	eview 🎦 Property	
🐻 Generate code	। 🚣 📮 🚜 🔛 🚅	i 🖧 😂 💷 🚳 🧐 💭 🔏 .	ቻ 📲 🍠 🍪 💁 📥 🤯
General setting	Setting		
– Operation mode	settina		
• Single sca	an mode	O Group scan mode	C Continuous scan mode
Commission			
- Lonversion mode	e setting	C Hisk speed (AVCC > 2.4V	1
	1.0 V (AVUU ( 2.4V)	<ul> <li>High speed (AVCC &gt; 2.4V)</li> </ul>	J
- VHEF(+) Setting			
· AVCCO		S AVNERNU	
-VREF(-) Setting			
AVSS0		O AVREFL0	
– Double trigger m	ode setting		
<ul> <li>Disable</li> </ul>		🔿 Enable	
Analog input obar	nnal aatting		
- Analog Input cha	nnei setting		
	Convert (Group A)	Convert (Group B)	Add AD converted value
ANDOD		L_	
ANUUT			
ANUU2			-
AN003	V		
ANO04			
ANDOS			
ANU08 ANU09			
ANO10			
ANO10 ANO11			
AND12			
AN012			

## **5.2.4** Example of a Module Panel for a Peripheral Function (Multiple Channels)

The figure below shows an example of a Module panel for a peripheral function containing multiple channels. By changing channels to be set through the tabs, you can set peripheral function operations, by channel. Executing [Return to Reset Value] from the Project Tree panel resets the settings for the currently selected channel to their default values.

Figure 5-6	Example of a	Module Panel	(Compare m	natch timer)
------------	--------------	--------------	------------	--------------

💯 Peripheral Functions* 🦪 Code Preview	Property	x
🔞 Generate code 🛛 🛓 🔒 🦝 🛬 😻 🍰 😫	🕻 🗊 🛞 🖉 🛄	a 7 🖷 7 🖧 🏊 🦊 🤤
CMT0 CMT1		<b></b>
- Compare match timer operation setting		
O Unused	Used	
- Count clock setting		
PCLK/8     PCLK/32	C PCLK/128	C PCLK/512
– Interval value setting Interval value	100	μs (Actual value: 100)
- Interrupt setting		
Enable compare match interrupt (CMI1)		
Priority	Level 15 (highest)	-
		<b>•</b>

Caution: Executing the [Return to Reset Value] when a target peripheral function is not displayed on the Module panel resets the settings for the starting channel (the leftmost tab) to their default values.



#### **5.2.5** Example of a Module Panel for a Peripheral Function (1 Unit)

The figure below shows an example of a Module panel in which settings change by channel, according to a selected function. For each channel, select the function to be used, and for each selected channel, set details. Executing [Return to Reset Value] from the Project Tree panel resets all tab (channel) settings to their default values.

Elaura E Z				
FIGURE 5-7	Example of a	woone bane	a dividuite Educitior	n Timer Puis Unitzi
i iguio o i	Example of a	modulo punt		

	💯 Peripher	al Functions* 👔	🛃 Code Preview 🏾 🕋 Prope	erty					
<1>	🐻 Generate code	e [ 🚣 📮 🚜	🛬 🖬 🗿 👬 🗱 🔞	🔌 🧶 📃 🍰 🍠 :	📲 🍠 🎎 4	🗼 🦶 🤩			
	General Setting	МТОО МТОТ	<b>MTU2</b> MTU3 MTU4 MT	·U5					
	– Function setting	<3>							
<2>	МТОО	Normal mode		<b>~</b>					
	MTU1	Normal mode		-					
	MTU2	PWM mode 1		•					
	мтиз	Unused		/-4>					
	MTU4	Unused	Peripheral Function	s* 🧾 Code Preview	Property	,			
	MTUE	Unused	🐻 Generate code 🛛 🍰 📝	a 🗠 🖉 🕷 👗	🗧 💷 🔞 🤇	l 🚳 🔲 🔗 🍠 📲 .	ي 👫 🥵 🌮 🖉	23	
	MIOS	Jonused	General Setting MTU0 N	ITU1 MTU2 MTU3	мти4 мти5				
	– External clock p	oin setting	-Normal mode description -						
	П мта ки	Alpin PA4	The counter counts up in - Free-running operation: v	this mode. The following ty vhen [Disable counter clea	pes of operation ar] is selected fo	n are possible: r [Counter clear source], cou	unting continues unti	I the counter overflows and t	hen restart:
			<ul> <li>Periodic counter operation match between the value</li> </ul>	on: when a compare match es of the selected general	with a general register and of t	register [TGRx] is selected fi he counter	or [Counter clear sou	urce], the counter is cleared t	o O on a co
		s pin jr 40	- External event-count ope	eration: when an external p	in input is selec	ted for [Counter clock selec	tion], every edge of I	the input signal is counted.	
	MTCLKI	Cpin   PC4	– Synchronous mode setting						
	🗆 МТСІКІ	Dipin PC5	Include this channel in	n the synchronous operation	on				
			- Count source setting						
			Counter clock selection	PCLK	-				
			- Clock edge setting						
			<ul> <li>Rising edge</li> </ul>	C Falling edge	C Both edg	jes			
			- TCNT0 counter setting						
			Counter clear source	Disabled counter clear				<b>~</b>	
			– General register setting –						
			TGRA0	Input capture register	•	100	µs 💌	(Actual value: 100)	
			TGRBO	Input capture register	•	100	µs 💌	(Actual value: 100)	
			TGRC0	Input capture register	•	100	µs 🔻	(Actual value: 100)	
			TGRD0	Input capture register	•	100	µs 🔻	(Actual value: 100)	
			TGREO	Output compare register	-	100		(Actual value: 100)	

Remark: In the example shown in Figure 5-7, settings are specified in the following order:

- <1> Select the [general Setting] tab.
- <2> Select MTU0 function (the [MTU0] tab is enabled).
- <3> Select the [MTU0] tab.
- <4> Set details on MTU0.

#### **5.3 Preview Panel**

The Preview panel is used to the file and the API function to be output during code generation. For a description of operating procedure, see **3.7 Checking Source Code**.

Figure	5-8	Display	/ of	Preview	Panel
riguic	00	Dispia	y 01 i		i anci



#### (1) Preview Tree

Double-clicking the source file or API function name on the Preview tree changes the display of the source code display area.

On the Preview tree, the shapes of the icons change according to the status of the settings.

lcon	Summary
	Peripheral function (unused / used)
	File
fxo S	The API function to be output during code generation (required)
fx()	The API function to be output during code generation (user-specifiable)
#XC)	The API function not to be output during code generation (user-
	specifiable)

Table 5-3 Preview Tree Icons



Right-clicking the API function/file name brings up the context menu.

Item	Object of action	Description
[Generate Code]	API function 豂, 凹	Sets the API function as an object of output for code
		generation. The icon changes from 🏾 🎬 to 🙀 .
[Not Generate Code]		Excludes the API function from the object of output for code generation.
		The icon changes from 🏼 🎇 to 🖤 .
[Rename]	API function 🚱, 鑦, 竇	Renames the API function name/file name that is output
	File ( 🚺 )	during code generation. The name changes to the Edit
		mode.
[Default]		Resets to an Applilet3 initial value the API function
		name/file name that is output during code generation.

## (2) Source code display area

Verifies the source code (a device driver program). Double-clicking the source file name or the API function name on the Preview Tree switches the source code that is displayed.

The source code in this area is displayed in character colors listed in Table 5-5.

### Table 5-5 Source Code Character Colors

Color of	Summary	
display		
Green	Comment statement	
Blue	C compiler reserved word	
Red	Numeric value	
Black	Code	
Gray	File name	

#### **Remarks** 1. Source code cannot be edited in this area.

2. In some API functions (such as API functions for a serial array unit), register value SFRs and other values are calculated during the code generation process before the function is finalized. For this reason, the source code displayed in this area may not agree with the source code that is actually output.

## Figure 5-9 Example of an AP Function Display

```
void INTP_Init( void )
{
    EGP0 = INTP_EGP_RESET_VALUE;
    EGN0 = INTP_EGN_RESET_VALUE;
    EGP1 = INTP_EGP_RESET_VALUE;
    EGN1 = INTP_EGN_RESET_VALUE;
    INTP_User_Init(); 
}
```

If this API function (INTP\_Init()) is output, the function is called here. During code generation, whether this line is to be or not to be actually output depends on the settings for the API function (INTP\_User\_Init()) that is called.



## 5.4 Output Panel

The Output panel displays information such as the execution status of code generation or report output, and the allowable setting range for a selected input field.

Figure 5-10 Output Panel Display



#### Messages that are displayed on the Output panel are color-coded, depending on the type of message involved. Table 5-6 Message Character Colors

Color	Туре	Summary
Black	Normal message	Indicates information such as the execution status of code generation or report output.
Blue	Warning message	Displays a warning if the value in the input field is invalid.
Red	Error message	Indicates that the execution of processing is disabled due to a fatal error or other reasons.

#### Right-clicking the Output panel displays a context menu. Table 5-7 Output Panel Context Menu

Item	Description
Clear	Selecting [Clear] from the context menu deletes all messages that are displayed on the Output
	panel.
Сору	Dragging a message (character string) on the Output panel selects (producing an inverted
	color display) the character string.
	Selecting [Copy] from the context menu copies the selected (inverted color display) character
	string (stores it in the clipboard).
Select All	Selects (in inverted color display) all the messages (character strings) on the Output panel.



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