RH850 Development Environment Migration Guide

Migration from SuperH Family Compiler to RH850 Family Compiler (Building Guide)

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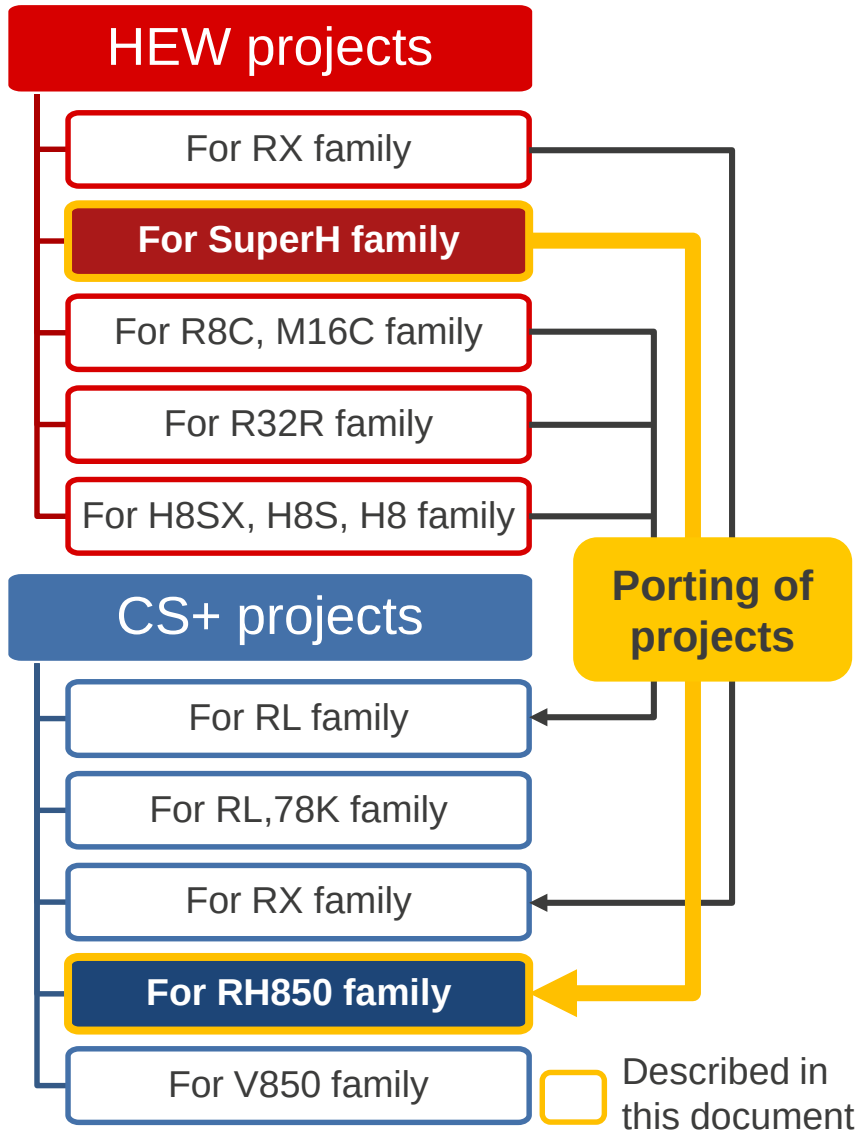
Preface

- This document describes the procedure for processing of CS+ projects and method of building in CS+ when porting a project from a SuperH family C/C++ compiler (hereinafter SHC) to an RH850 family compiler (hereinafter CC-RH).

- The contents of this document apply to the CS+ and High-performance Embedded Workshop (hereinafter HEW) IDEs, CC-RH, and SHC. The applicable versions are as follows.
  - CS+ for CC V4.00.00
  - CC-RH V1.03.00
  - HEW V.4.09.01.007
  - SHC V.9.04 Release 03



Contents

Porting a Project

Procedures for Porting a Project

There are two ways to port an existing HEW project for SHC to the CS+ environment for CC-RH. Of the two procedures below, this document mainly describes **procedure 1**.

1. **Diversion of an existing project**

   Creating a new CS+ project for CC-RH by diverting the HEW project for SHC.

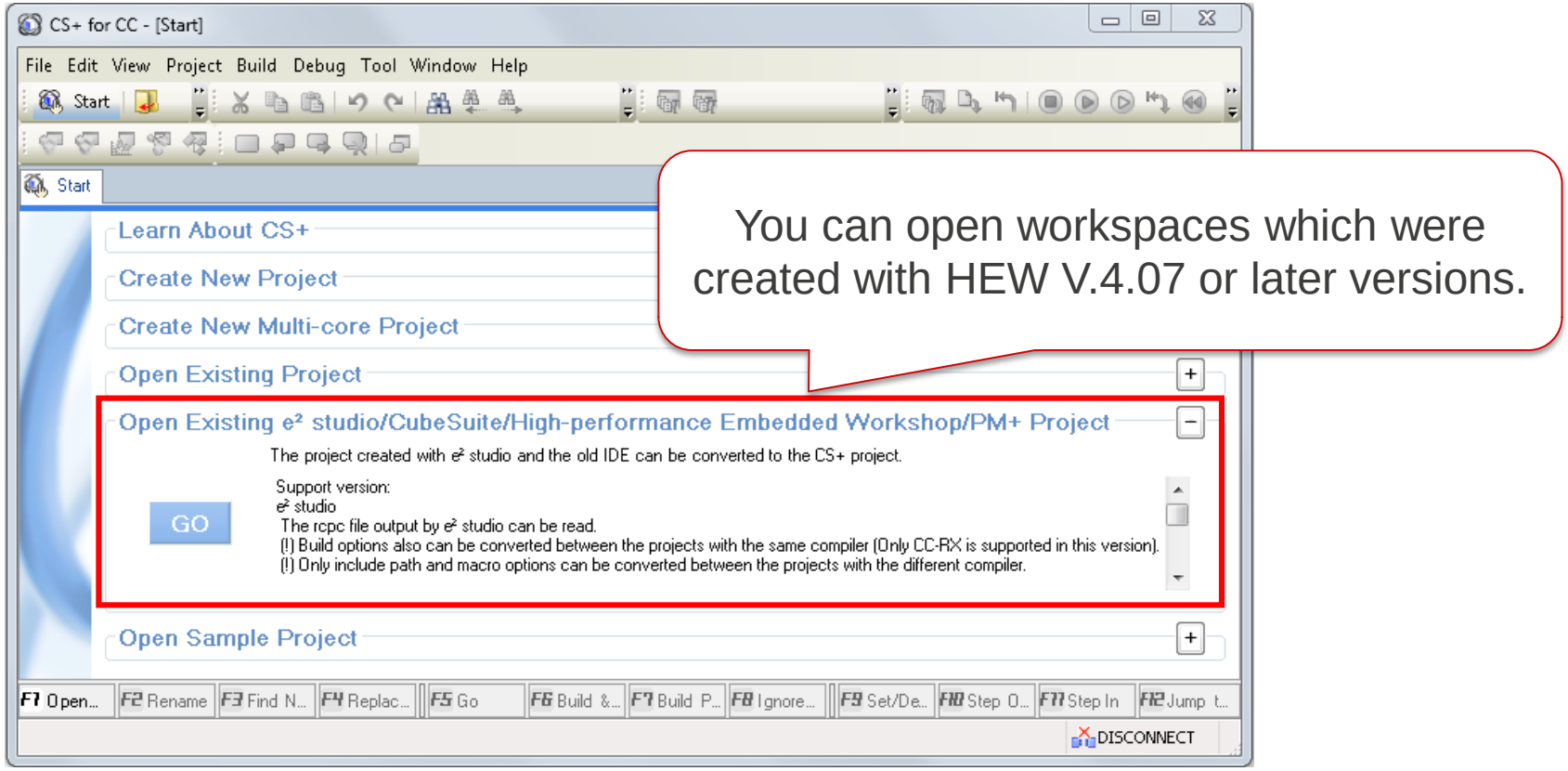
2. Newly creating a project in CS+

   Using the source files which you have already created in creating and registering a project in CS+ for CC-RH.

Contents	Procedure 1	Procedure 2
Registering source files	**Automatic**	Manual
Option settings	**Automatic (only partly)**	Manual
Contention between the names of original source files and automatically generated files	Names need to be modified after the project is generated	Manual (consider this at the time of registration)

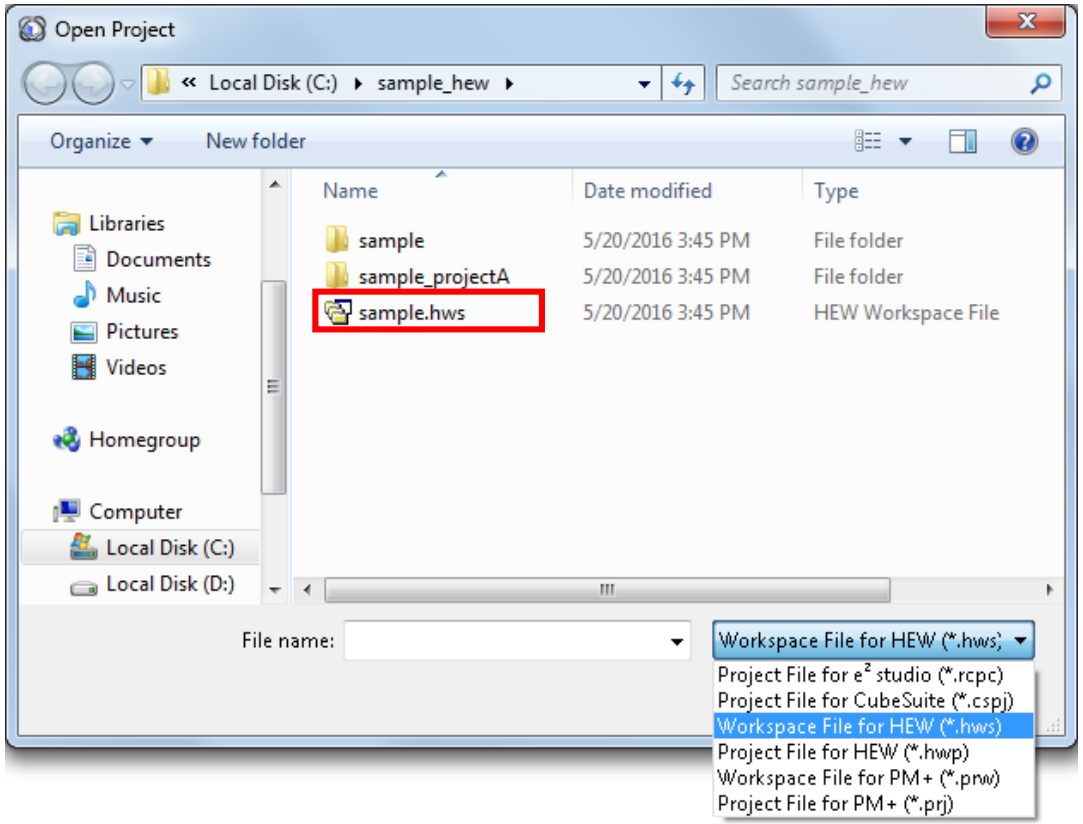
Opening a HEW Project in CS+ (1)

Select [Open Existing e² studio/CubeSuite/High-performance Embedded Workshop/PM+ Project].



Opening a HEW Project in CS+ (2)

Select “Workspace File for HEW(*.hws)” or “Project File for HEW(*.hwp)”.

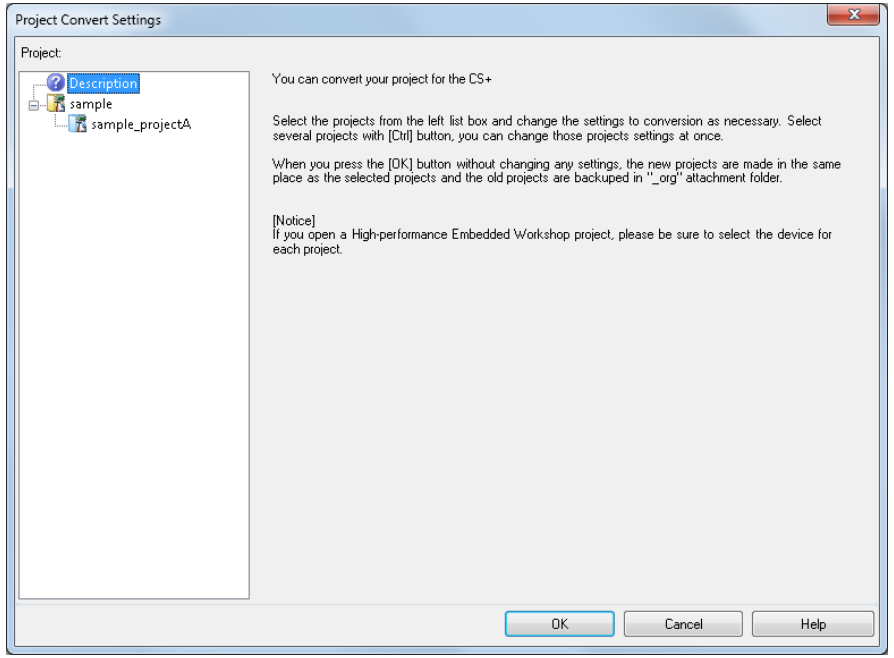


Opening a HEW Project in CS+ (3)

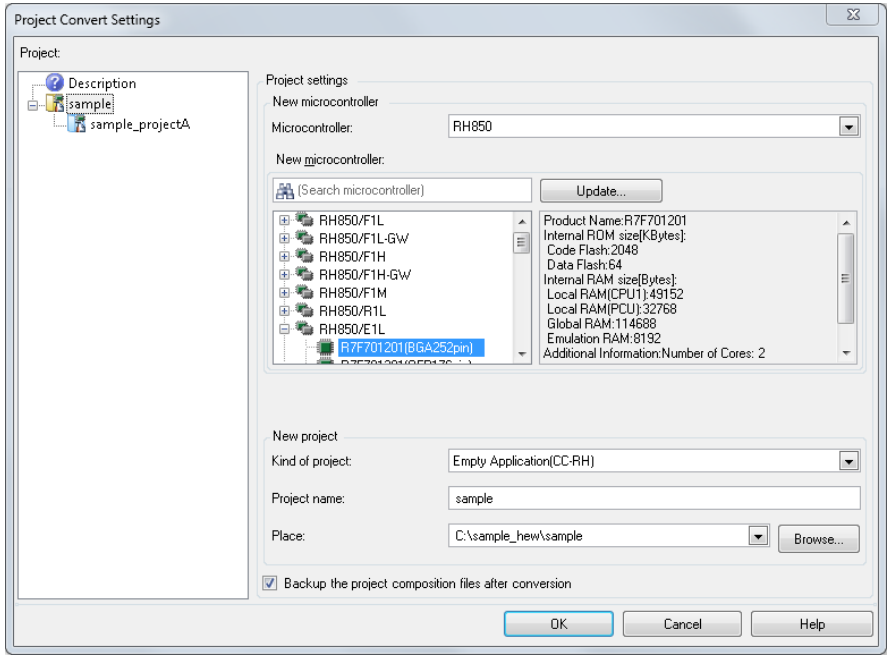
1. Select the project to be set for conversion from the [Project Convert Setting] dialog box.

2. Make the settings for the microcontroller, session, kind of project, project name, and place of storage which are to be used with the ported project.

1.

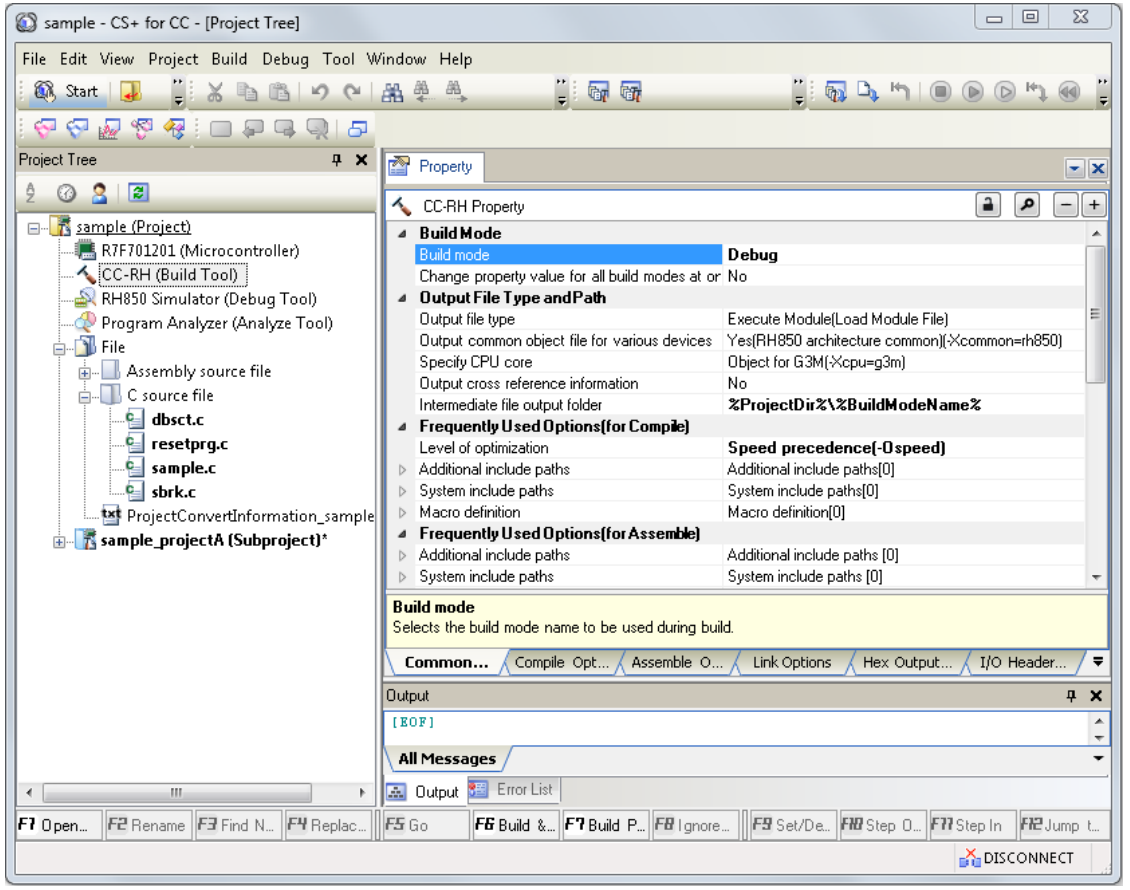


2.



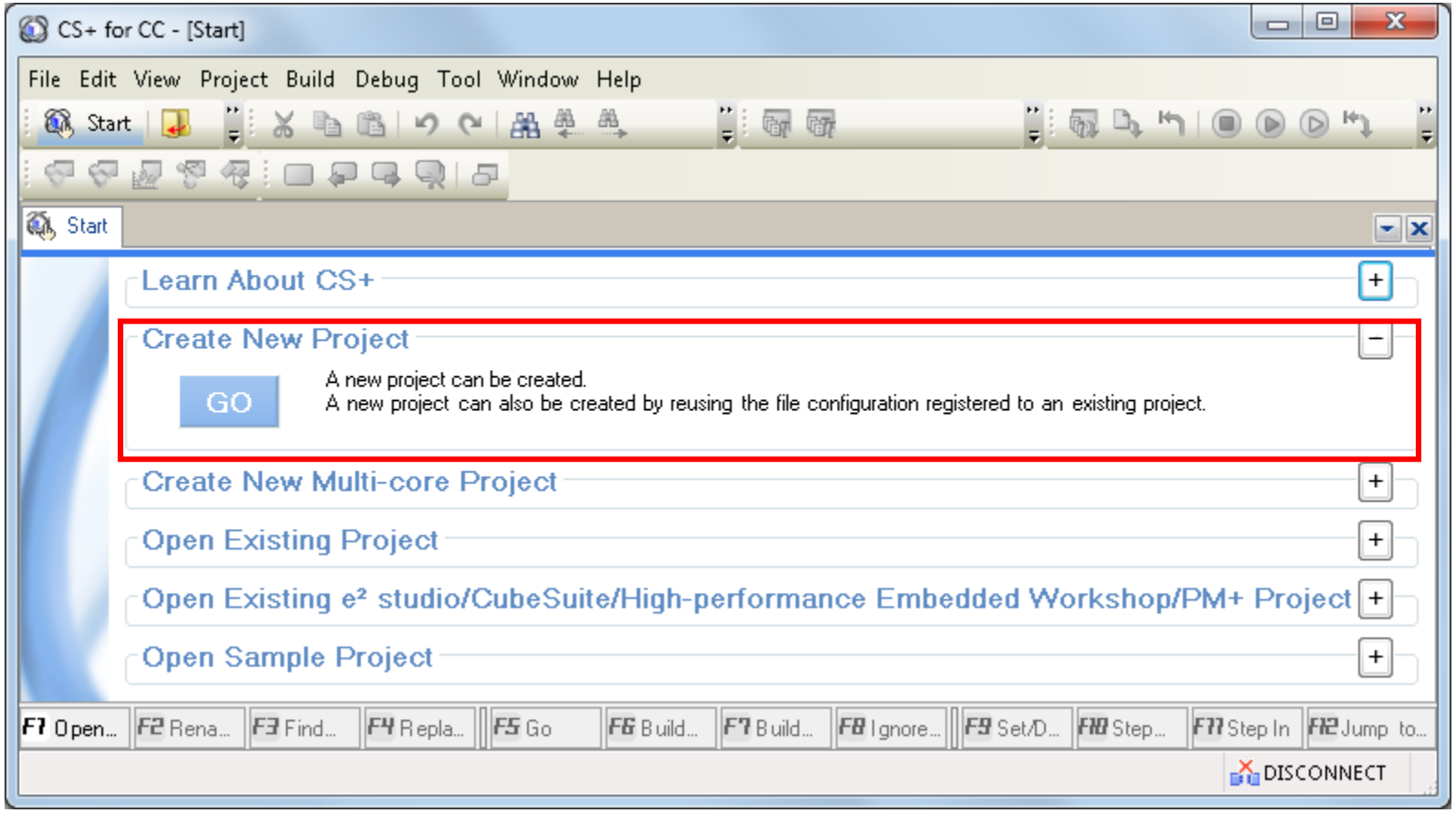
Opening a HEW Project in CS+ (4)

A screenshot of the CS+ window right after a HEW project has been read.



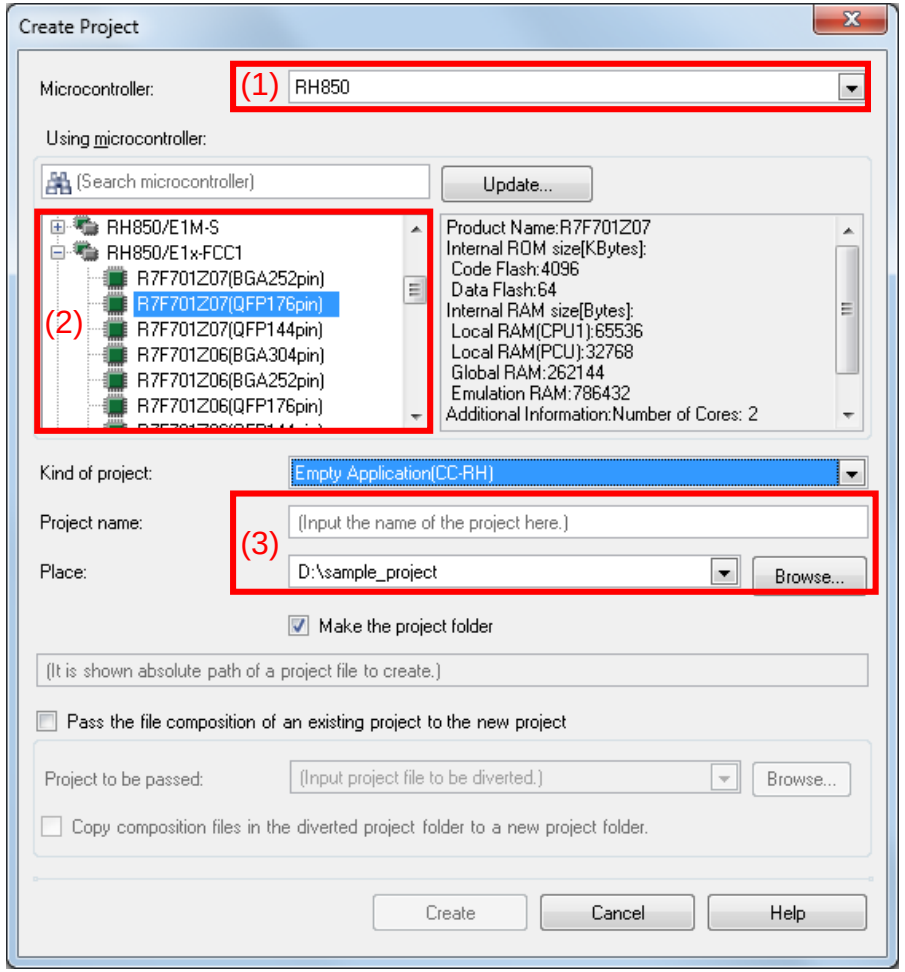
For Reference: Creating a New CS+ Project (1)

Select [Create New Project].



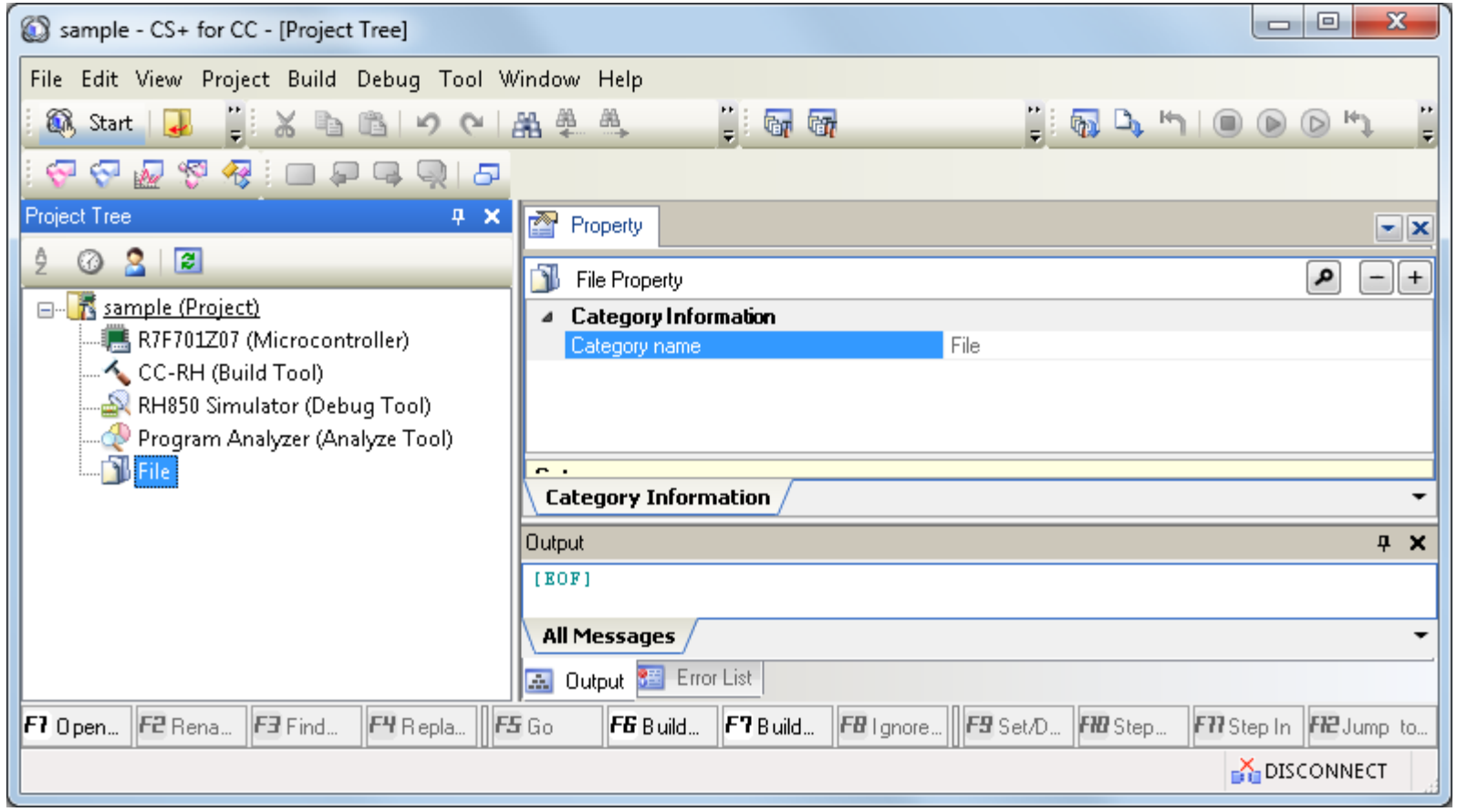
For Reference: Creating a New CS+ Project (2)

Select the type of microcontroller in [Microcontroller] and the particular device in [Using microcontroller], labelled (1) and (2) at right, set a name for the project in [Project name] and the place where it is to be stored in [Place], both labelled (3), and then click on the [Create] button.



For Reference: Creating a New CS+ Project (3)

A screenshot of the CS+ window right after creating a new project.

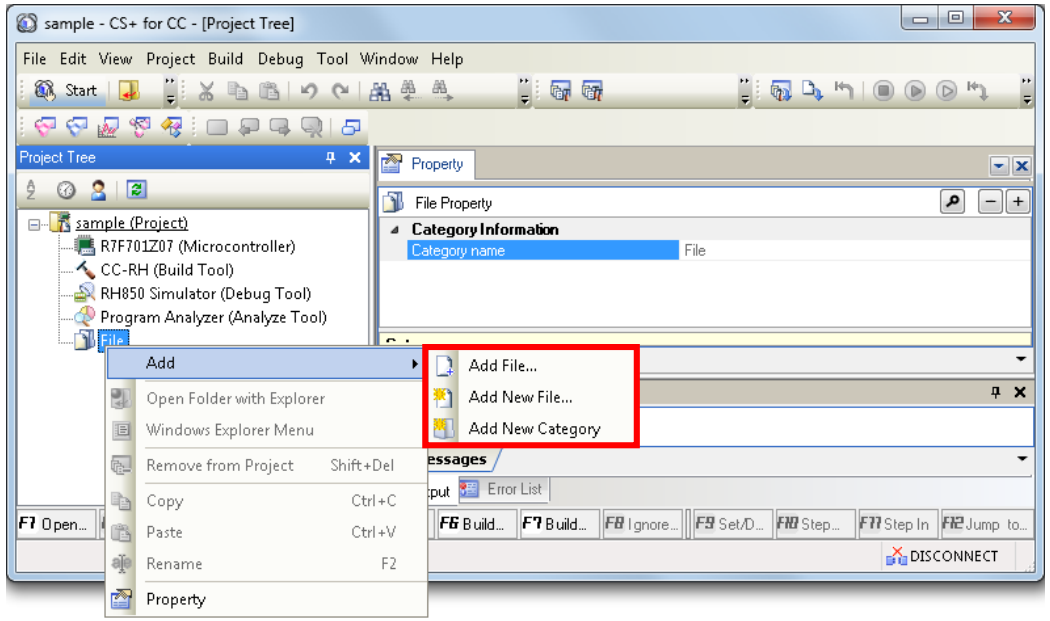


For Reference: Creating a New CS+ Project (4)

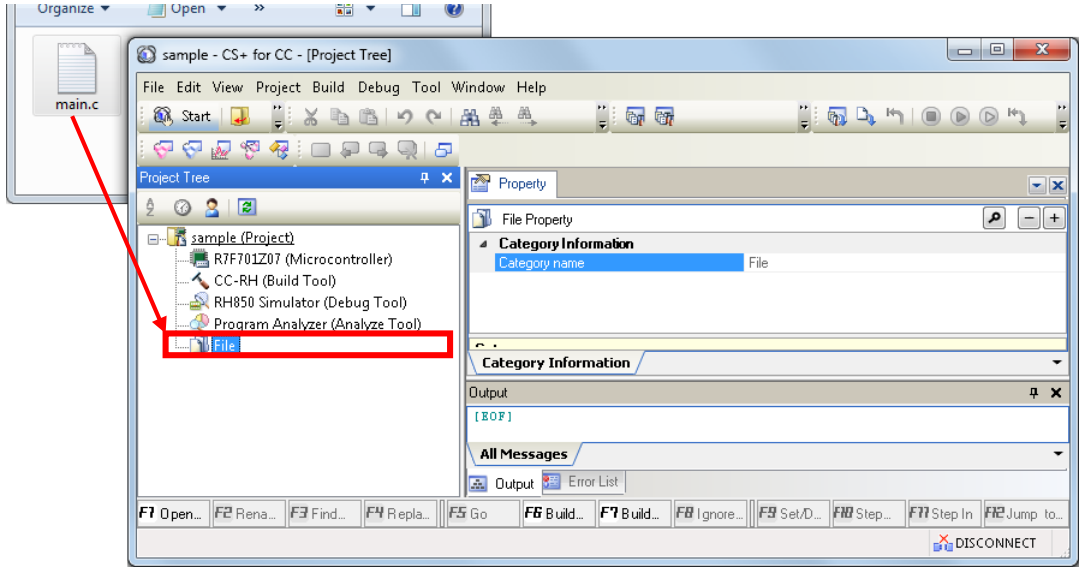
Add the existing source files to the file branch of the [Project Tree].

New files can also be added.

(1) Add File or Add New File...



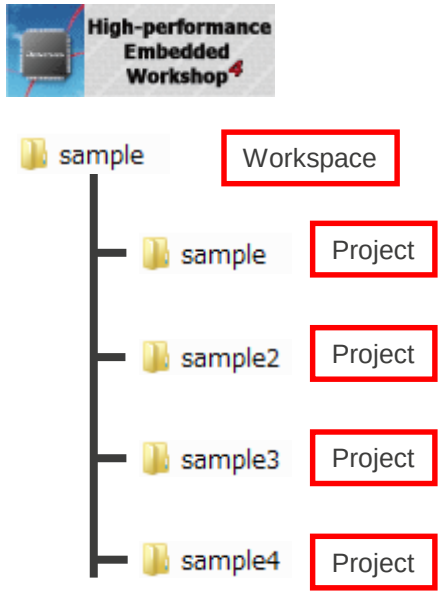
(2) You can also add files by dragging and dropping on the file category in the project tree.



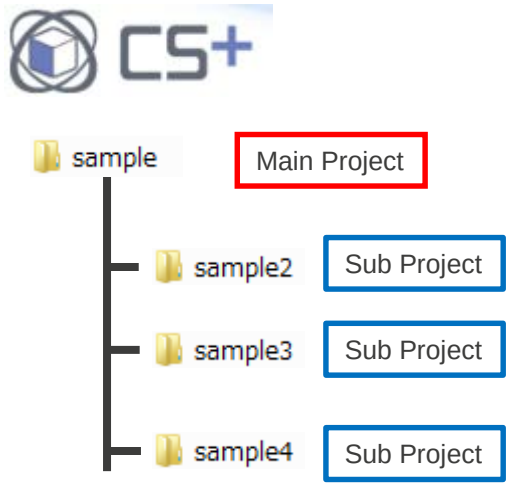
Project Configurations

The HEW environment and CS+ environment have different project configurations.

CS+ holds multiple sub-projects in one project.



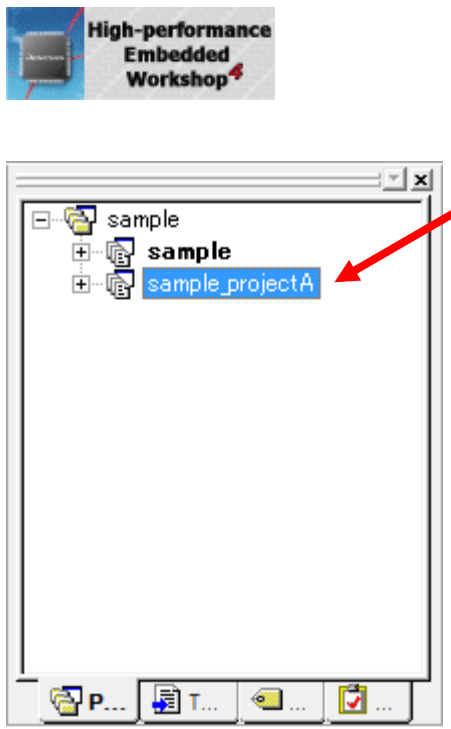
You can freely create projects in HEW.
For example, *.abs and *.lib files can be generated for each project and parent and child relationships between projects can be set up.



You cannot create more than one project.
Projects other than this main project should be created as sub-projects which depend on the main project.

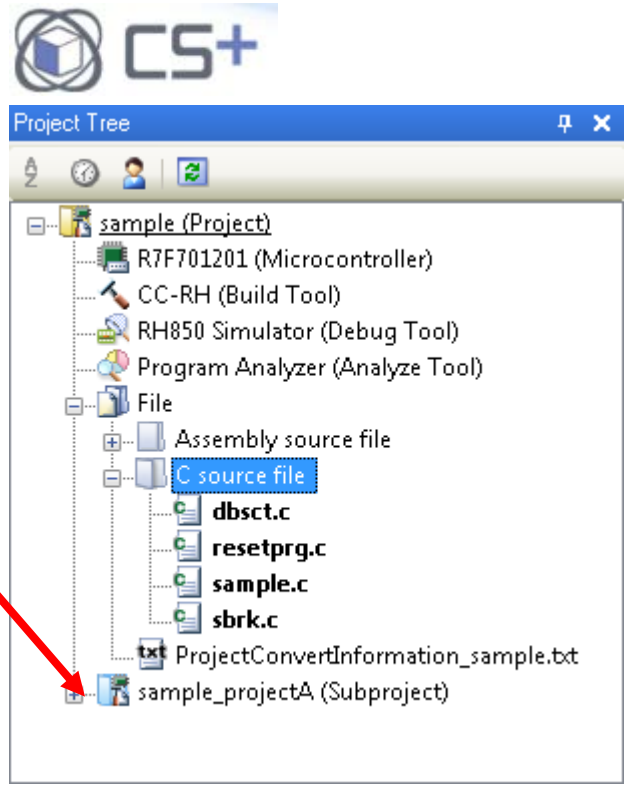
Example of Project Configurations

If a HEW workspace is opened with CS+, the project configuration is altered as follows.



Example: HEW
Projects **sample** and **sample_projectA** are both in the workspace **sample**.

Example: CS+
A sub-project **sample_projectA** is in the project **sample**.



Automatic Conversion of Options (Compiler: 1)

SHC options which are specified in HEW will be converted automatically in cases where CC-RH supports corresponding options.

Functions	HEW (SHC)				CS+ (CC-RH)			
	Place to be set			Name of option	Place to be set			Name of option
	Tab	Category	Property		Tab	Category	Property	
Paths to additional included file directories	C/C++	Source	[Show entries for : Include file directories]	-include	Compile Options	Preprocess	[Additional include paths]	-I
Files to be included at the top of each compilation unit			[Show entries for : Preinclude files]	-preinclude			[Include files at head of compiling units]	-Xpreinclude
Definition of macros			[Show entries for : Defines]	-define			[Macro definition]	-D
Expansion by the preprocessor		Object	[Output file type : Preprocessed source file (*.p/*.pp)]	-preprocessor		Output File	[Output preprocessed source file : Yes]	-P -Xpreprocess=line
						Preprocess	[Output line number information to preprocessed file : Yes]	
			[Output file type : Suppress #line in preprocessed source file]	-preprocessor -noline		Output File	[Output preprocessed source file : Yes]	-P
						Preprocess	[Output line number information to preprocessed file : No]	

Automatic Conversion of Options (Compiler: 2)

Functions	HEW (SHC)				CS+ (CC-RH)			
	Place to be set			Name of option	Place to be set			Name of option
	Tab	Category	Property		Tab	Category	Property	
Specifying a directory for the output of object files	C/C++	Object	[Output directory]	-objectfile	Common Options	Output File Type and Path	[Intermediate file output folder]	-Xobj_path
Form of object code			[Output file type : Assembly source code(*.src)]	-code= asmcode	Compile Options	Output File	[Output assembly source file : Yes]	-Xasm_option= -Xprn_path
Output of debugging information			[Generate debug informations]	-debug		Debug Information	[Add debug information : Yes]	-g
				-nodebug			[Add debug information : No]	Not explicitly specified
Output of listing files		List	[Generate list file]	-listfile	Assemble Options	Assemble List	[Output assemble list file ; Yes]	Xasm_option= -Xprn_path
				-NOListfile			[Output assemble list file ; No]	Not explicitly specified

Automatic Conversion of Options (Compiler: 3)

Functions	HEW (SHC)					CS+ (CC-RH)			
	Place to be set				Name of option	Place to be set			Name of option
	Tab	Category	Property			Tab	Category	Property	
Optimization	C/C++	Optimize	[Optimize : for debug only]		-optimize= debug_only	Compile Options	Optimization	[Level of optimizations : Debug precedence]	-Onothing
			Speed or size :	[Optimize for speed] [Optimize for size] [Optimize for both speed and size]	-speed -size -nospeed				
			[Optimize : off]		-optimize=0			[Level of optimizations : Preform the default optimization]	-Odefault
			Speed or size :	[Optimize for speed] [Optimize for size] [Optimize for both speed and size]	-speed -size -nospeed				
			[Optimize : on] Speed or size :	[Optimize for speed]	-optimize=1 -speed			[Level of optimizations : Speed precedence]	-Ospeed
				[Optimize for size]	-optimize=1 -size			[Level of optimizations : Code size precedence]	-Osize
				[Optimize for both speed and size]	-optimize=1 -nospeed			[Level of optimizations : Preform the default optimization]	-Ospeed
							Optimization (Details)	[Maximum number of loop expansions : 1] [Perform inline expansion : Yes(Only specified functions)]	-Ounroll=1 -Oinline=1

Automatic Conversion of Options (Compiler: 4)

Functions	HEW (SHC)					CS+ (CC-RH)			
	Place to be set				Name of option	Place to be set			Name of option
	Tab	Category	Property			Tab	Category	Property	
Optimization for access to external variables (inter-module)	C/C++	Optimize	[Optimization for access to external variables : Inter-module]		-map	Compile Options	Optimization (Details)	[Optimize accesses to external variables : Yes(Optimizes the inter-module)]	-Omap
Optimization for access to external variables (intra-module)			[[Optimization for access to external variables : Inner-module]		-smap			[Optimize accesses to external variables : Yes(Optimizes the inner-module)]	-Osmap
System for unrolling switch statements			[Switch statement : If then]		-case=Ifthen		Output Code	[Output code of switch statement : if-else]	-Xswitch=ifelse
			[Switch statement : Table]		-case=Table			[Output code of switch statement : Table jump]	-Xswitch=table
Controlling automatic inline expansion			<Details...> Tab : [Inline]	[Automatic inline expansion : Default]	-inline		Optimization (Details)	[Preform inline expansion : Yes(Auto-detect)] [Maximum increasing rate of inline expansion size : 100]	-Oinline=2 -Oinline_size=100
				[Automatic inline expansion : Custom] [Maximum : number]	-inline=<number>			[Preform inline expansion : Yes(Auto-detect)] [Maximum increasing rate of inline expansion size : number]	-Oinline=2 -Oinline_size= <number>

Automatic Conversion of Options (Compiler: 5)

Functions	HEW (SHC)					CS+ (CC-RH)			
	Place to be set				Name of option	Place to be set			Name of option
	Tab	Category	Property			Tab	Category	Property	
Treating external variables as volatile	C/C++	Optimize	<Details...> Tab : [Global variables]	[Treat global variables as volatile qualified]	-GLOBAL_Volatile=0 -GLOBAL_Volatile=1	Compile Options	C Language	[Handle external variables as if they are volatile qualified : No] [Handle external variables as if they are volatile qualified : Yes]	Not explicitly specified -Xvolatile
Sorting instructions				[Schedule instructions : Disable]	-SChedule=0		Optimization (Details)	[Preform pipeline expansion : No]	-Opipeline=off
				[Schedule instructions : Enable]	-SChedule=1			[Preform pipeline expansion : Yes]	-Opipeline
Unrolling loops			<Details...> Tab : [Miscellaneous]	[Loop unrolling : Enable]	-loop			[Maximum number of loop expansions : 4]	-Ounroll=4
				[Loop unrolling : Disable]	-noloop			[Maximum number of loop expansions : 0]	-Ounroll=0
Specifying a maximum unrolling factor for unrolling loops				[Specify maximum unroll factor : Custom <number>]	-max_unroll=number			[Maximum number of loop expansions: number]	-Ounroll=number
Optimization considering the types of items indicated by pointers				[Optimization considering type of object indicated by pointer]	-ALIAS=ANSI		C Language	[Compile strictly according to ANSI standards : Yes]	-Xalias=ansi
Auto-selection of enum size		Other		Miscellaneous options : [enum size id made the smallest]	-auto_enum			[Enumeration type]	-Xenum_type=auto

Automatic Conversion of Options (Compiler: 6, CPU)

Functions	HEW (SHC)				CS+ (CC-RH)			
	Place to be set			Name of option	Place to be set			Name of option
	Tab	Category	Property		Tab	Category	Property	
Character coding for character strings	C/C++	Other	User defined options : -euc -sjis	-euc -sjis	Compile Options	Character Encoding	[Character Encoding : EUC] [Character Encoding : SJIS]	-Xcharacter_set=euc_jp -Xcharacter_set=sjis
Specifying the order of bit fields	CPU	[Bit field's members are allocated from the lower bit]		-BIt_order=Left -BIt_order=Right		Output Code	[Order of bit-field members : Allocates from left] [Order of bit-field members : Allocates from right]	-Xbit_order=left -Xbit_order=right
Alignment number for members of structures, unions, and class instances		[Pack struct, union and class]		-PACK=1 -PACK=4			[Structure packing : 1 byte] [Structure packing : 4 byte]	-Xpack=1 -Xpack=4

Automatic Conversion of Options (Assembler)

Functions	HEW (SHC)				CS+ (CC-RH)			
	Place to be set			Name of option	Place to be set			Name of option
	Tab	Category	Property		Tab	Category	Property	
Specifying include file path names	Assembly	Source	Show entries for : [Include file directories]	-include	Assemble Options	Preprocess	Additional include paths	-I
Defining symbol replacement			Show entries for : [Defines]	-define			Macro definition	-D
Debugging information		Object	Debug information : [With debug information] Debug information : [Without debug information]	-debug -nodebug		Debug Information	[Add debug information : Yes] [Add debug information : No]	-g Not explicitly specified
Output of listing files		List	[Generate list file]	-list -nolist		Assemble List	[Output assemble list file ; Yes] [Output assemble list file ; No]	-Xprn_path Not explicitly specified
Character coding in source files		Other	User defined options : -euc -sjis	-euc -sjis		Character Encoding	[Character Encoding : EUC] [Character Encoding : SJIS]	-Xcharacter_set=euc_jp -Xcharacter_set=sjis

Automatic Conversion of Options (Linker: 1)

Functions	HEW (SHC)					CS+ (CC-RH)			
	Place to be set				Name of option	Place to be set			Name of option
	Tab	Category	Property			Tab	Category	Property	
Specifying input files	Link/Library	Input	Show entries for :	Library files	-LIBrary	Link Options	Library	System libraries	-LIBrary
				Relocatable files and object files	-Input		Input File	Object file	-Input
				Binary files	-Binary			Binary file	-Binary
Defining undefined symbols				Defines	-DEFine			Symbol definition	-DEFine
Specifying the address where execution starts			[Use entry point]		-ENTry		Output Code	[Specify execution start address : Yes]	-ENTry

Automatic Conversion of Options (Linker: 2)

Functions	HEW (SHC)					CS+ (CC-RH)			
	Place to be set				Name of option	Place to be set			Name of option
	Tab	Category	Property			Tab	Category	Property	
Specifying forms of output	Link/Library	Output	Type of output file :	Absolute(ELF/DWARF)	-Form=Absolute	No place to support (default)			-Form=Absolute
				Relocatable	-Form=Relocate	Create Library Options	Output File	[Output file format : Relocatable file]	-Form=Relocate
				System library	-Form=Library=S			[Output file format : System libraries]	-Form=Library=S
				User library	-Form=Library=U			[Output file format : User libraries]	-Form=Library=U
				HEX via absolute	-Form=Hexadecimal	Hex Output Options	Hex Format	[Hex file format : Intel HEX file]	-Form=Hexadecimal
				Stype via absolute	-Form=Stype			[Hex file format : Motorola S-record file]	-Form=Stype
				Binary via absolute	-Form=Binary			[Hex file format : Binary file]	-Form=Binary

Automatic Conversion of Options (Linker: 3)

Functions	HEW (SHC)					CS+ (CC-RH)			
	Place to be set				Name of option	Place to be set			Name of option
	Tab	Category	Property			Tab	Category	Property	
Debugging information	Link/Library	Output	[Debug information : In separate debug file (*.dbg)] [Debug information : None]		-DEBug -NODEBug	Link Options	Debug Information	[Output debug information : Yes(Output to the output file)] [Output debug information : No]	-DEBug -NODEBug
Unifying record size			[Date record header]		-Record	Hex Output Options	Hex Format	[Unify record size]	-RECord
Specifying the number of bytes in data records			[Length of data record]		-BYte_count			[Specify byte count for data record: Yes]	-BYte_count
Specifying a value for output to empty areas			Show entries for :	Specify value filled in unused area	-Space			[Fill unused areas in the output ranges with the value : Yes]	-SPace
Specifying output files				Output file path	-Output	Link Options	Output File	[Output folder] [Output file name]	-Output
Information file on allocation of external symbols				Output file path [Generate external symbol-allocation information file]	-Map		Optimization (Details)	[Output external symbol allocation information file]	-MAp

Automatic Conversion of Options (Linker: 4)

Functions	HEW (SHC)					CS+ (CC-RH)			
	Place to be set				Name of option	Place to be set			Name of option
	Tab	Category	Property			Tab	Category	Property	
Informational messages	Link/Library	Output	Show entries for :	Output message [Repressed information level messages]	-Message -NOMessage	Link Options	Message	[Enable information message output : Yes] [Enable information message output : No]	-Message -NOMessage
Notification of defined symbols with no reference				Output message [Notify unused symbol]	-MSg_unused			[Notify unused symbol : Yes]	-MSg_unused
Padding at the ends of sections				Padding	-PADDING		Output Code	[Fill with padding data at the end of a section : Yes]	-PADDING
Specifying the output of listing files		List	Generate list file		-LISt		List	[Output link map file : Yes]	-LISt
Specifying the information to be output to listing files			[Output method : All] [Output method : Custom] [Show symbol] [Show reference] [Show section] [Show cross reference] [Show total section size]		-Show=ALL -Show=Symbol -Show=Reference -Show=Section -Show=Xreference -Show=Total_size			[Output link map file : Yes(List contents=ALL)] [Output link map file : Yes(List contents=specify)] [Output symbol information : Yes] [Output number of symbol reference : Yes] [Output section information : Yes] [Output cross reference information : Yes] [output total sizes of sections : Yes]	-Show=ALL -Show=Symbol -Show=Reference -Show=Section -Show=Xreference -Show=Total_size

Automatic Conversion of Options (Linker: 5)

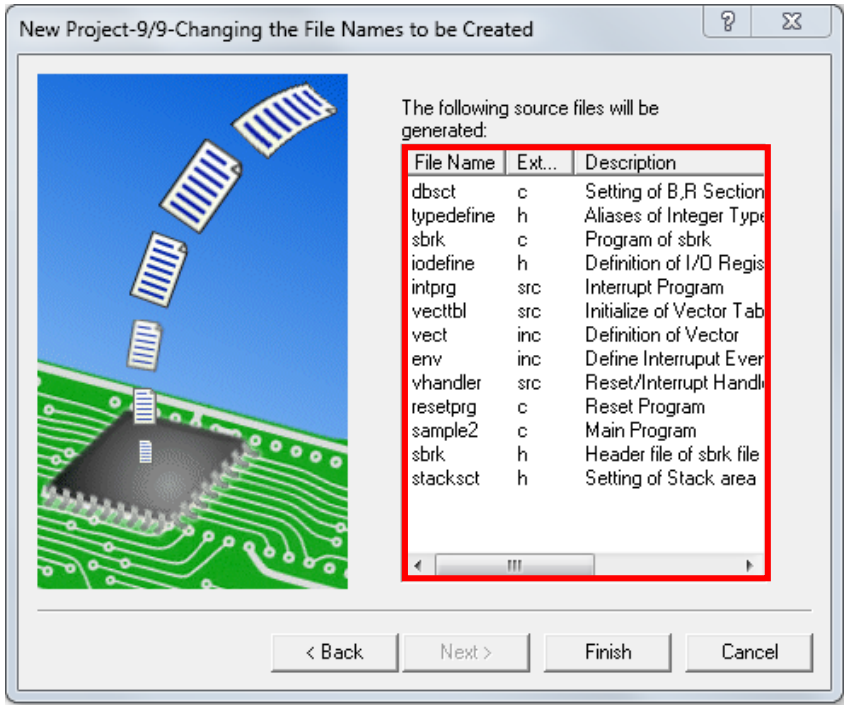
Functions	HEW (SHC)					CS+ (CC-RH)			
	Place to be set				Name of option	Place to be set			Name of option
	Tab	Category	Property			Tab	Category	Property	
Checking the consistency of addresses	Link/Library	Verify	CPU information check		-Cpu	Link Options	Verify	[Check section larger than specified range of address : Yes]	-Cpu
Stack information file		Other	Miscellaneous options	Stack information output	-STACk		Others	[Output stack information file : Yes]	-STACk
Specifying reduction of memory usage				Low memory use during linkage	-MEMory			[Reduce memory occupancy]	-MEMory
Compression of debugging information				Compress debug information	-Compress -NOCOmpress		Debug Information	[Output debug information : Yes(Output to the output file)] [Output debug information : No]	-Compress -NOCOmpress
S9 records always to be output				Always output S9 record at the end	-S9	Hex Output Options	Hex Format	[Output S9 record at the end : Yes]	-S9

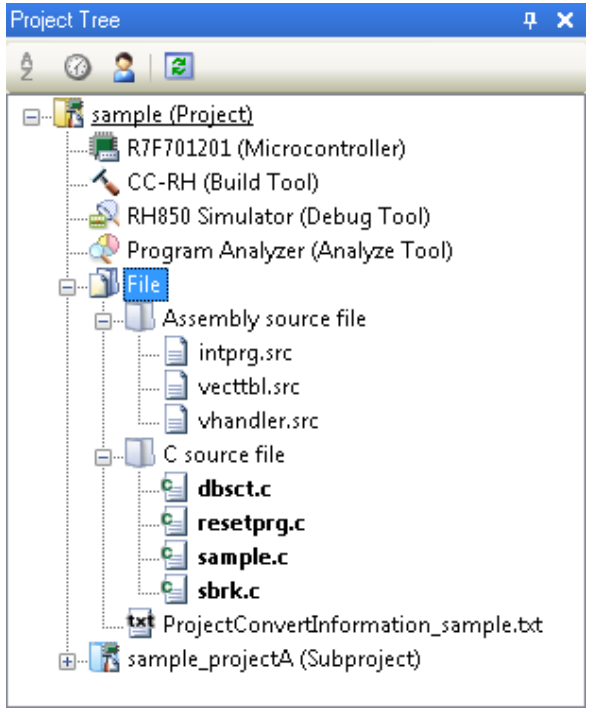
Automatic Conversion of Options (Linker: 6)

Functions	HEW (SHC)					CS+ (CC-RH)			
	Place to be set				Name of option	Place to be set			Name of option
	Tab	Category	Property			Tab	Category	Property	
Changing the level of messages	Link/Library	Other	User defined options	-CHange_message	-CHange_message	Link Options	Message	[Change warning message to information message : Yes]	-CHange_message
Specifying concealment of local symbol names				-Hide	-Hide		Debug Information	[Delete local symbol name information : Yes]	-Hide
Displaying total size of sections				-Total_size	-Total_size		Others	[Display total size of sections : Yes]	-Total_size

Caution

Delete startup files which are automatically generated by HEW, since they are unusable.





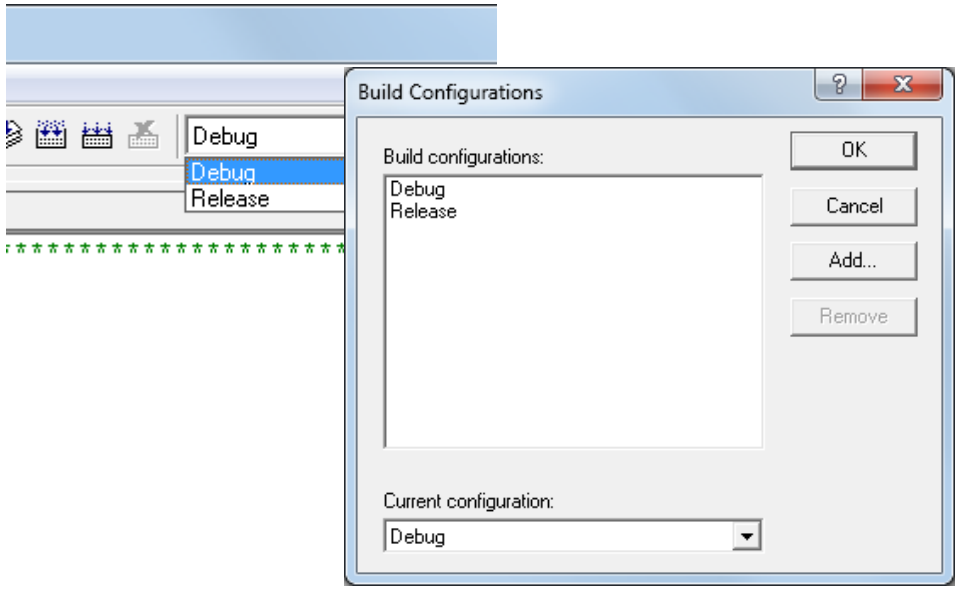
Building

Managing the Build Environment

The setting of options is managed differently in the HEW and CS+ environments.

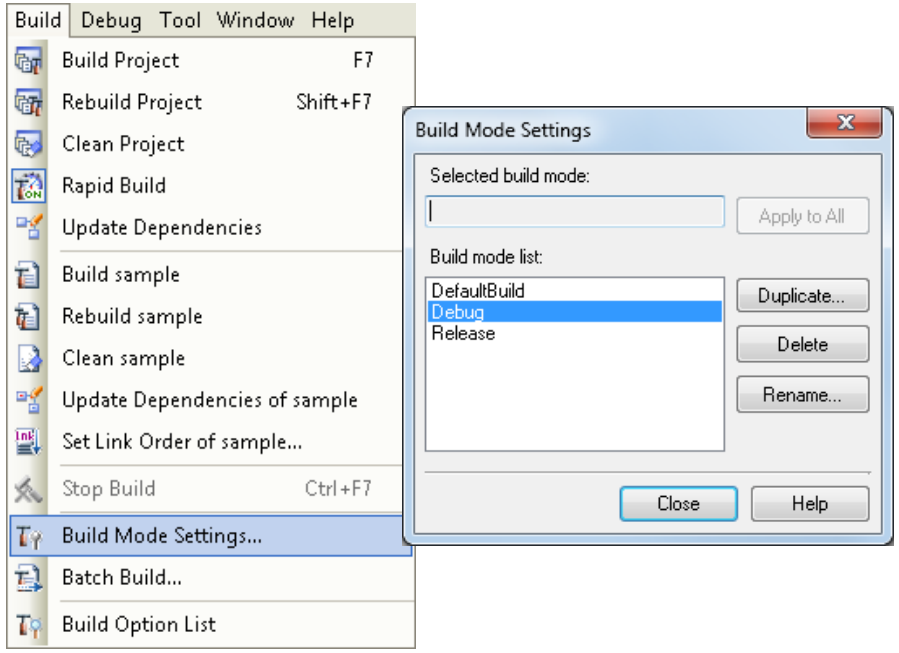
High-performance Embedded Workshop 4

The build options are saved in units called configurations. They can be added as desired.



CS+

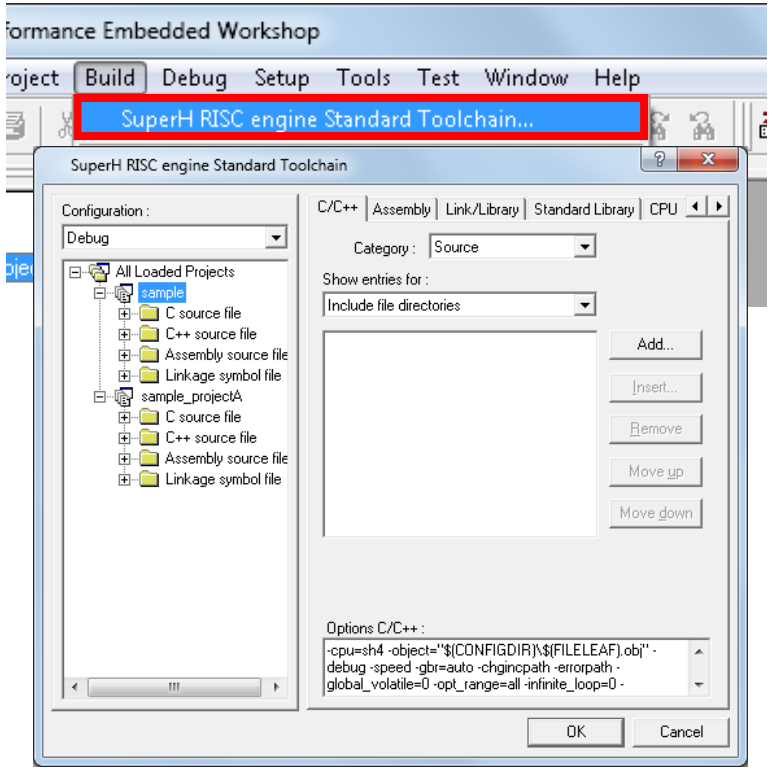
The options are saved in units called build modes.



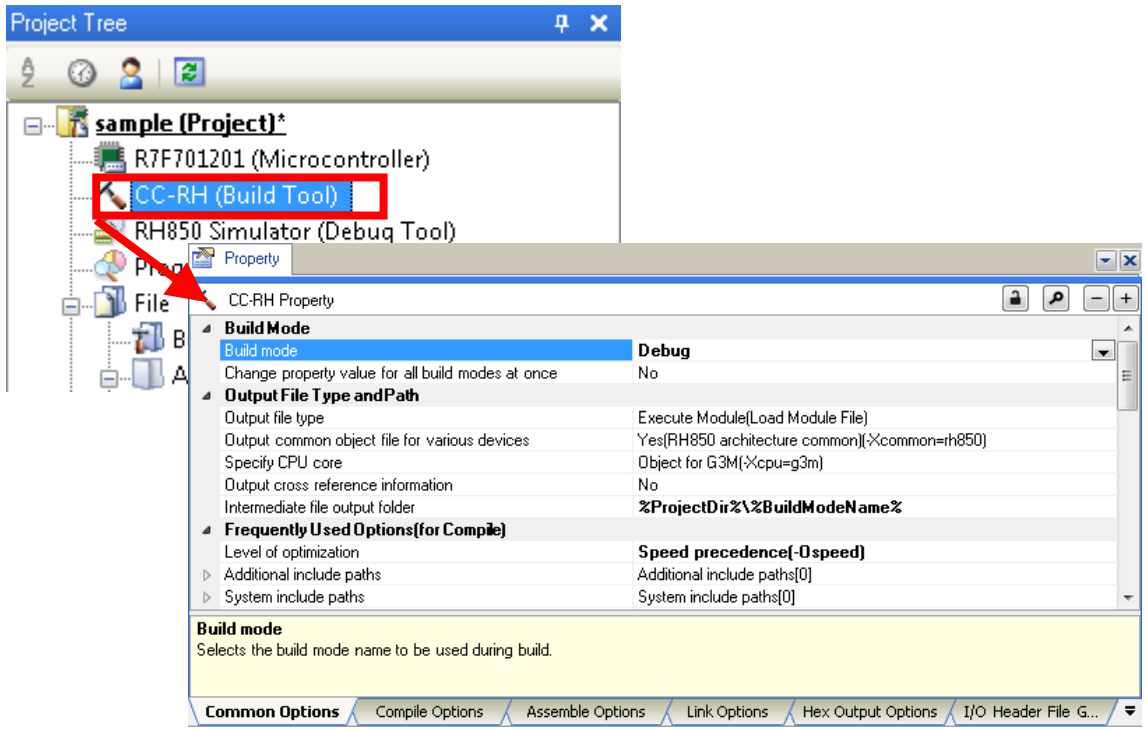
Setting Build Options

For CS+, the build options can be specified by property settings.

The build options are specified in order of [Tab]->[Category]->etc…, and the place they are to be set is then displayed.



All settings are displayed by specifying a tab.

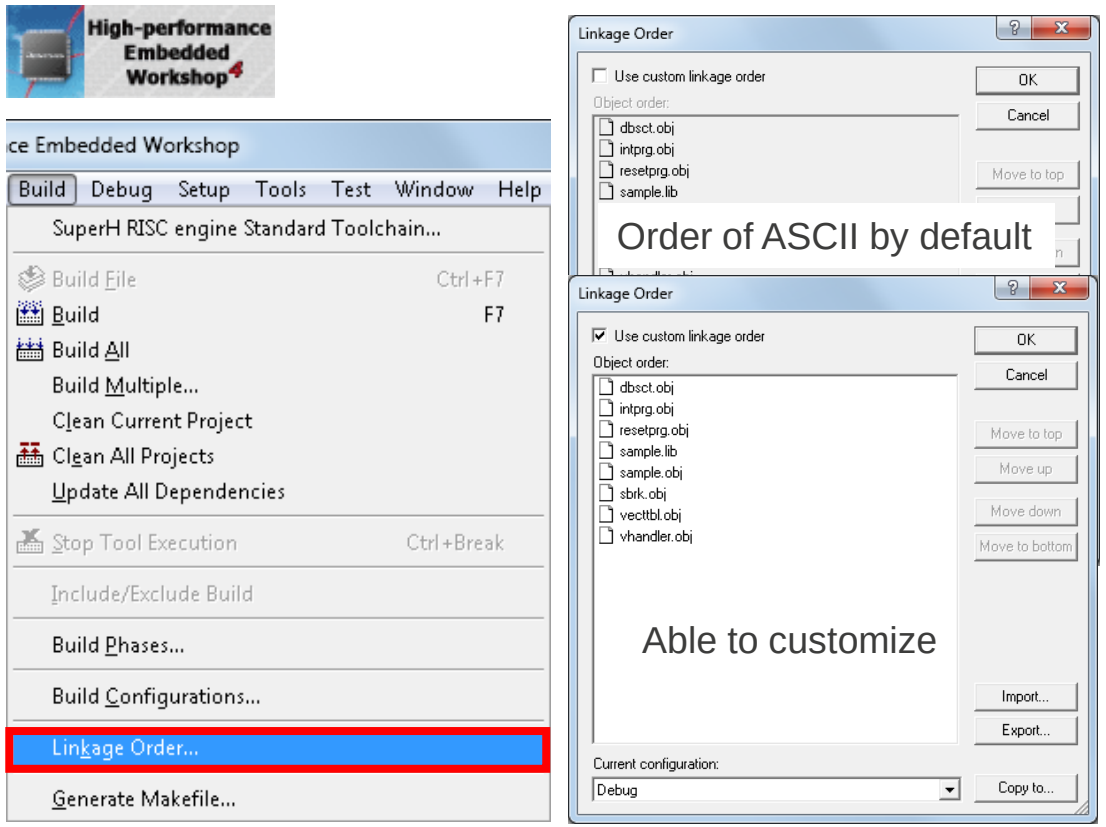


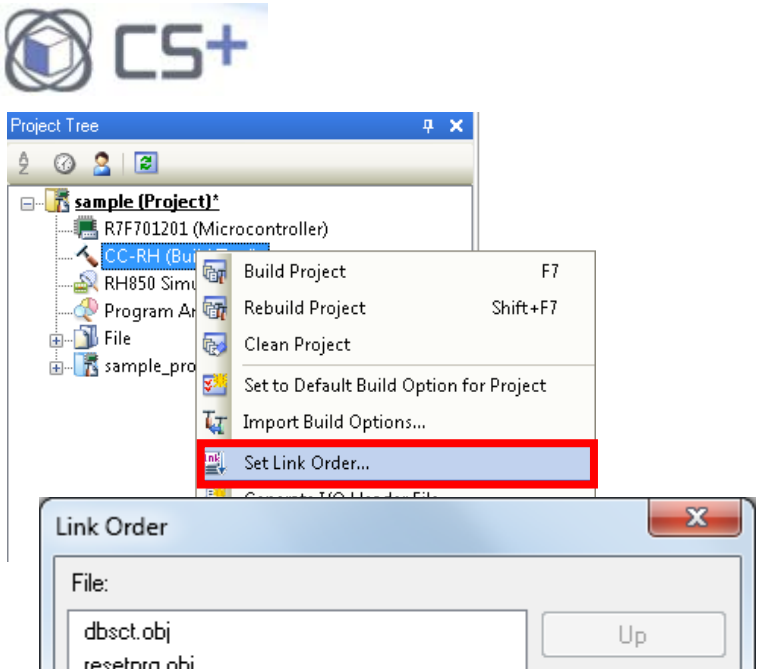
Descriptions of options are also shown.

Setting the Order of Linkage

Note: This setting influences the result of building.

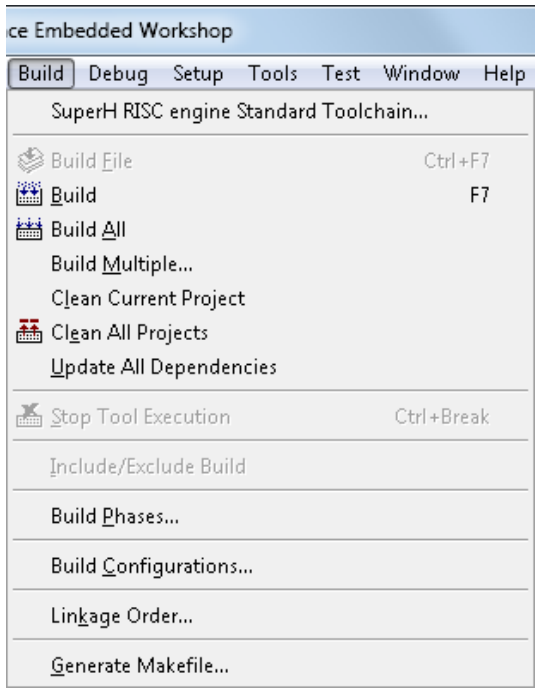
The HEW and CS+ environments have different orders of linkage. By default, the HEW environment handles the files in ASCII order of their names, while CS+ has an internal order of management.





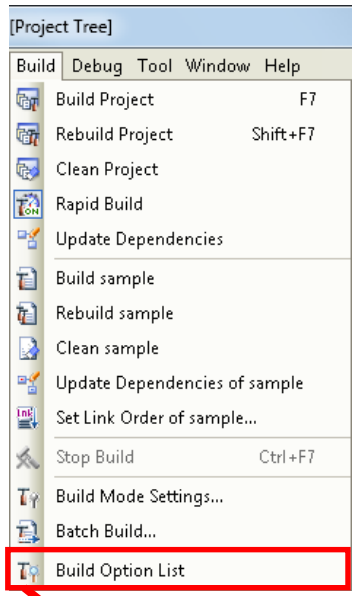
Since CS+ has an internal order of management by default, the order will require rearrangement to have the order in CS+ conform to that in the HEW environment.

Build Menu

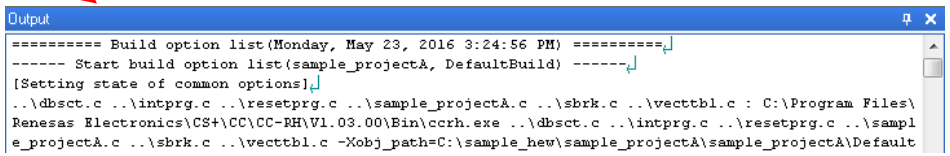


Comparison of build functions

- Build	- Build Project
- Build All	- Rebuild Project
- Build Multiple...	- Batch Build...
- Clean Current Project	- Clean Project
- Clean All Project	
- Update All Dependencies	- Update Dependencies
- Build Configurations...	- Build Mode Settings ...

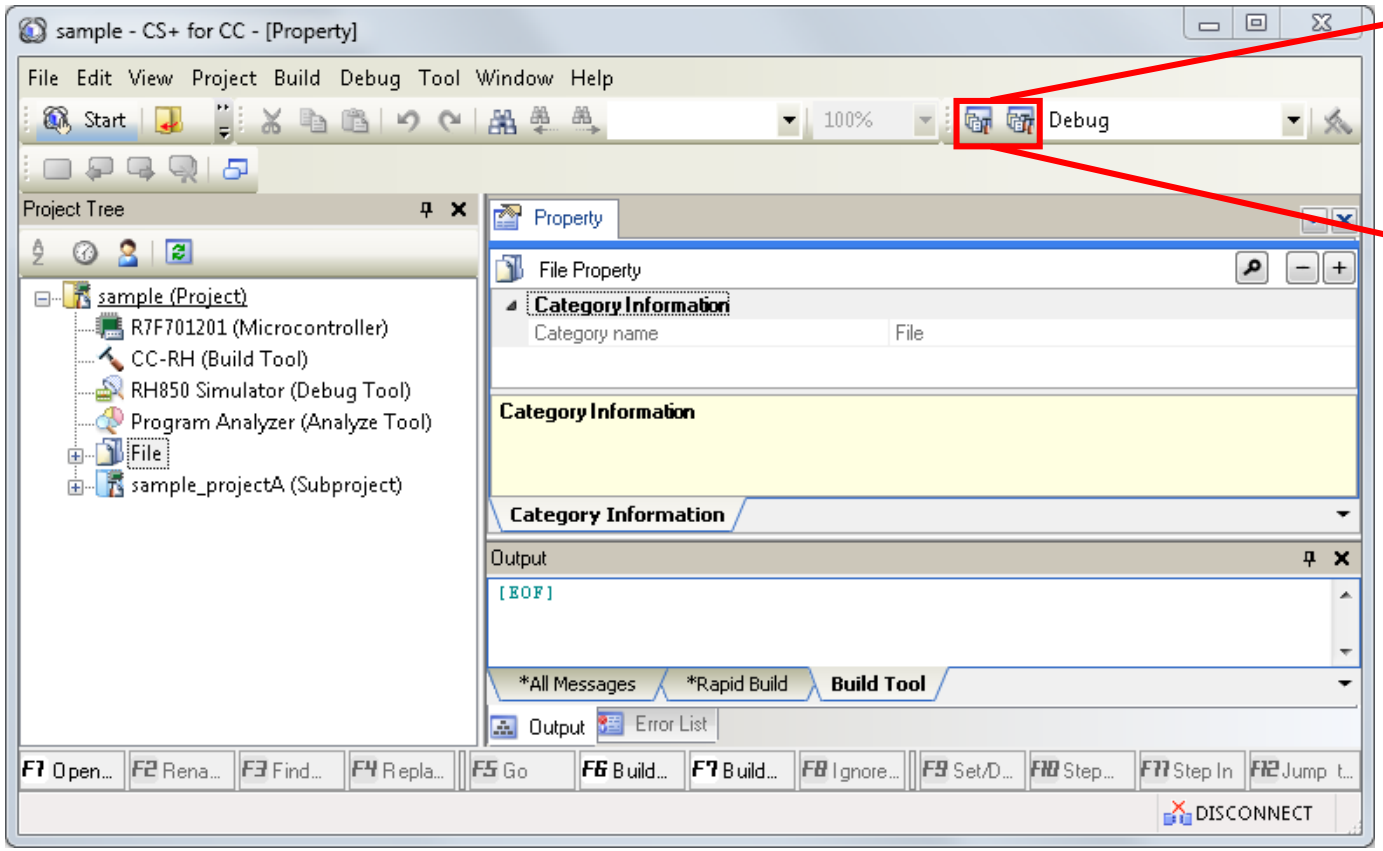


A list of option settings can be displayed.



Building and Rebuilding

Building and rebuilding can be executed from the [Build] menu, or by clicking on the buttons shown below.



Builds the project. Rebuilds the project.

Renesas System Design Co., Ltd.