RL78 Development Environment Migration Guide

Migration between RL78 family
(Compiler ed; Compiler option and Assembler option)
(CA78K0R to CC-RL)

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Introduction

- This document describes how to handle the compiler options and assembler options when migrating projects created for the CA78K0R C compiler for the RL78 family of MCUs to the CC-RL C compiler for the RL78 family of MCUs.

- This document describes the CA78K0R C compiler for the RL78 family of MCUs and the CC-RL C compiler for the RL78 family of MCUs.
  The applicable versions are as follows.
  - CA78K0R V1.20 and later
  - CC-RL V1.03.00

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Agenda

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Compiler Option Specifications

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Differences in device type specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the target device.	-c	—	Use the –cpu option to specify the core type [S1/S2/S3]. Using the –dev option specifies the device file for the assembler and optimizing linkage editor.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in object module file generation specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the output of an object module file.	-o	-o	
Does not output an object module file.	-no	—	CC-RL provides no option to stop output of an object module file.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in memory allocation specification

Item	Option		Actions
	CA78K0R	CC-RL	
Performs indirect reference in 1-byte units.	-ra	—	Indirect reference cannot be done in 1-byte units.
Allocates bit fields from the MSB.	-rb	—	Bit fields are always allocated from the LSB. Reverse the order of bit field declarations.
Packs structure members.	-rc	-pack	Indirect reference cannot be done in 1-byte units.
Allocates external variables to the saddr area.	-rd	—	Use __saddr to declare the external variables that should be allocated to the saddr area.
Allocates ROM data to the far area.	-rf	-far_rom	
Allocates ROM data to the near area.	-rn	—	When allocating default ROM data to the near area, do not specify the -far_rom option.
Allocates static variables to the saddr area.	-rs	—	Use __saddr to declare the static variables that should be allocated to the saddr area.
Disables memory allocation option settings.	-nr	—	CC-RL provides no option to disable the memory allocation settings.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in optimization specification(1/2)

Item	Option		Actions
	CA78K0R	CC-RL	
Assumes char types as unsigned char.	-qu	—	Delete the -signed_char option setting.
Does not apply sign-extension to char-type operations.	-qc	—	char-type operations are always sign-extended.
Allocates register variables also to the saddr area.	-qr	—	Register variables cannot be allocated to the saddr area.
Optimizes branch instructions.	-qj	—	Specify the -optimize=branch option for the linkage editor.
Enables optimization (speed precedence, default optimization, or size precedence).	-qx[n]	-Ospeed -Odefault -Osize	
Changes the operation order.	-qw	—	Specify the –Ospeed, -Odefault, or -Osize option to enable optimization.
Allocates automatic variables to registers or the saddr area.	-qv	—	Specify the –Ospeed, -Odefault, or -Osize option to enable optimization. CC-RL provides no option to allocate register variables to the saddr area.

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Differences in optimization specification(2/2)

Item	Option		Actions
	CA78K0R	CC-RL	
Replaces standard code patterns with libraries.	-ql[n]	—	CC-RL provides no option to enable size-precedence optimization with replacing standard code patterns with libraries.
Generates relative branch tables for switch statements.	-qt	-switch =rel_table	
Executes optimization with debugging precedence.	-qg	—	Specify the –Onothing option.
Disables the optimization option settings.	-nq	-Onothing	

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in debugging information output specification

Item	Option		Actions
	CA78K0R	CC-RL	
Outputs debugging information.	-g	-g	
Does not output debugging information.	-ng	—	Delete the –g option setting.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in preprocess list file generation specification(1/2)

Item	Option		Actions
	CA78K0R	CC-RL	
Outputs a preprocess list file.	-p	-P	For the output file name, the file name specified in the –o option is used with its extension replaced with ".i".
Deletes comments when a preprocess list file is output.	-kc	—	Specify the –P option only. If the –P option and the -preprocess=comment option are used together, comments will be output to the preprocess results.
Expands #define when a preprocess list file is output.	-kd	—	#define is always expanded in the output of preprocess results.
Performs conditional compilations (such as #if) when a preprocess list file is output.	-kf	—	Conditional compilation directives such as #if are always expanded in the output of preprocess results.
Expands #include when a preprocess list file is output.	-ki	—	#include is always expanded in the output of preprocess results.
Processes #line when a preprocess list file is output.	-kl	-preprocess =line	

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Differences in preprocess list file generation specification(2/2)

Item	Option		Actions
	CA78K0R	CC-RL	
Performs the line number and paging processing when a preprocess list file is output.	-kn	—	CC-RL provides no option to output line numbers to the preprocess result file.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in preprocess specification

Item	Option		Actions
	CA78K0R	CC-RL	
Adds macro definitions.	-d	-D	
Specifies macro definitions to be canceled.	-u	-U	
Specifies the path from which include files are to be read.	-i	-I	

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in assembly-language source file generation specification

Item	Option		Actions
	CA78K0R	CC-RL	
Outputs an assembly-language source file without C source information.	-a	-S	For the output file name, the file name specified in the –o option is used with its extension replaced with ".asm".
Outputs an assembly-language source file including C source information.	-sa	-pass_source	Specify this option together with the –S option.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in error list file generation specification

Item	Option		Actions
	CA78K0R	CC-RL	
Outputs an error list file without C source information.	-e	-error_file	
Outputs an error list file including C source information.	-se	—	CC-RL provides no option to output an error list file including C source information.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in cross-reference list file specification

Item	Option		Actions
	CA78K0R	CC-RL	
Outputs a cross-reference list file.	-x	-cref	CC-RL provides no option to output a cross-reference list file. The –cref option outputs a static analysis information file.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in list format specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the number of characters per line.	-lw	—	CC-RL provides no option to specify the list format of the list file to be output.
Specifies the number of lines per page.	-ll	—	Same as above.
Specifies the tab interval.	-lt	—	Same as above.
Outputs line feed codes.	-lf	—	Same as above.
Outputs the include file contents to the assembly-language source file.	-li	—	Same as above.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in warning output specification

Item	Option		Actions
	CA78K0R	CC-RL	
Outputs warning messages.	-w	—	CC-RL provides no option to output warning messages.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in execution state display specification

Item	Option		Actions
	CA78K0R	CC-RL	
Displays the execution state.	-v	—	CC-RL provides no option to display the compilation execution state.
Disables the execution state display option settings.	-nv	—	

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in parameter file specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies a parameter file.	-f	-subcommand	

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in temporary file generation folder specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the drive and folder where a temporary file is to be generated.	-t	—	CC-RL provides no option to specify the folder where a temporary file is to be generated.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in extended function specification (1/2)

Item	Option		Actions
	CA78K0R	CC-RL	
Allows comments in the C++ format.	-zp	—	Comments in the C++ language format are always allowed.
Allows nesting of comments enclosed in "/* */".	-zc	-nest_comment	
Interprets the kanji code in comments as SJIS.	-zs	-character_set=sjis	
Interprets the kanji code in comments as EUC.	-ze	-character_set=euc_jp	
Interprets comments as not containing kanji codes.	-zn	-character_set=none	
Disables int-extension for functions.	-zb	—	CC-RL provides no option to disable int-extension for functions.
Processes codes in compliance with the ANSI standard.	-za	-ansi	
Outputs objects for flash memory.	-zf	—	CC-RL provides no option to output objects for flash memory.

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Differences in extended function specification (2/2)

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the start address of the flash area branch table.	-zt	—	CC-RL provides no option to specify the start address of the flash area branch table.
Specifies the start address of the flash area.	-zz	—	CC-RL provides no option to specify the start address of the flash area.
Outputs objects for RAM allocation.	-zx	—	Specify the –rom and –start options for the linkage editor.
Disables extended function option settings.	-nz	—	CC-RL provides no option to disable extended function settings.

Refer to the user's manual for the compiler for more information and make changes as required.

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How to allocate codes and ROM data to the RAM area

The CC-RL provides no option to allocate codes and ROM data to the RAM area.
Use the following procedure to allocate them to the RAM area.

1. Specify the far attribute for the codes to be allocated to the RAM area.
2. Modify the section names for the codes and ROM data.
3. Specify the –rom option in the optimizing linkage editor to ROMize the target sections, and specify the –start option to specify the allocation destination addresses.

For details, refer to "Executing a program in RAM" in the user's manual for the CC-RL compiler.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in device file search path specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the path to where a device file is to be searched for.	-y	—	Specify the device file name with a path in the –device option. Note that when the –dev option is specified, the specified device file is applied to the assembler and optimizing linkage editor.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in memory model specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the type of memory model.	-m	-memory_model	CC-RL does not provide the large model. To specify the far attribute for ROM data, use the -far_rom option.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in mirror area specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies a mirror area.	-mi	—	Specify the -mirror_source option for the assembler.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in common object specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the output of an object common to all devices.	-common	—	CC-RL provides no option to output an object that is used in common for all devices.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in variables/functions information file specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the variables/functions information file to be used.	-ma	—	Specify the –VFINFO option for the linkage editor, and add #include directive to the C source files to include variable/function information file.

Refer to the user's manual for the compiler for more information and make changes as required.

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How to use variable/function information file in CC-RL

Specify -VFINFO option for the linkage editor to output variable/function information file.

Add #include directive to the C source files to include it, and then compile the files.

That will reduce the size of object codes.

Specifying -preinclude option is another way to include the information file.

In this case, no modification is required for C source files.

Refer to "How to use variable/function information file" of user's manual for the compiler for more information.

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Assembler Option Specifications

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Differences in device type specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the target device.	-c	-dev	Specify the name of the target device file.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in object module file generation specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the output of an object module file.	-o	-output	
Does not output an object module file.	-no	—	CC-RL provides no option to stop output of an object module file.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in forced object module file output specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies forced output of an object module file.	-j	—	CC-RL provides no option to specify forced output of an object module file.
Does not output an object module file forcibly.	-nj	—	

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in debugging information output specification

Item	Option		Actions
	CA78K0R	CC-RL	
Outputs debugging information to object module files.	-g	-debug	
Does not output debugging information to object module files.	-ng	—	Delete the –debug option setting.
Outputs assembly-language source debugging information to object module files.	-ga	-debug	CC-RL provides no option to output assembly-language source debugging information only.
Does not output assembly-language source debugging information to object module files.	-nga	—	Delete the –debug option setting.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in include file read path specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the path from which include files are to be read.	-i	-include	

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in assemble list file output specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the output of an assemble list file.	-p	-prn_path	To output an assemble list file, specify the folder where an assemble list file is to be output .
Does not output an assemble list file.	-np	—	Delete the -prn_path option settings.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in assemble list file information specification

Item	Option		Actions
	CA78K0R	CC-RL	
Outputs an assemble list to the assemble list file.	-ka	—	CC-RL provides no option to specify the information to be output to the assemble list file.
Does not output an assemble list to the assemble list file.	-nka	—	Same as above.
Outputs a symbol list to the assemble list file.	-ks	—	Same as above.
Does not output a symbol list to the assemble list file.	-nks	—	Same as above.
Outputs a cross-reference list to the assemble list file.	-kx	—	Same as above.
Does not output a cross-reference list to the assemble list file.	-nkx	—	Same as above.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in assemble list file format specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the number of characters per line.	-lw	—	CC-RL provides no option to specify the list format for the assemble list file to be output.
Specifies the number of lines per page.	-ll	—	Same as above.
Specifies a character string to be output to the header.	-lh	—	Same as above.
Specifies the tab interval.	-lt	—	Same as above.
Outputs line feed codes.	-lf	—	Same as above.
Does not output line feed codes.	-nlf	—	Same as above.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in error list file output specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the output of an error list file.	-e	-error_file	
Does not output an error list file.	-ne	—	Delete the -error_file option settings.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in parameter file specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies a parameter file.	-f	@	

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in temporary file generation path specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the path to where a temporary file is to be generated.	-t	—	CC-RL provides no option to specify the folder where a temporary file is to be generated.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in kanji code specification

Item	Option		Actions
	CA78K0R	CC-RL	
Interprets the kanji code in comments as SJIS.	-zs	-character_set=sjis	
Interprets the kanji code in comments as EUC.	-ze	-character_set=euc_jp	
Does not interpret the kanji code in comments.	-zn	-character_set=none	

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in device file search path specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the path to where a device file is to be searched for.	-y	-dev	Specify the device file name with a path in the –device option.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in symbol definition specification

Item	Option		Item
	CA78K0R	CC-RL	
Defines symbols.	-d	-define	Defines symbols.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in common object specification

Item	Option		Actions
	CA78K0R	CC-RL	
Specifies the output of an object common to all devices.	-common	—	CC-RL provides no option to output an object that is used in common for all devices.

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in 78K0-compatible macro specification

Item	Option		Actions
	CA78K0R	CC-RL	
Assembles assembly-language source files generated by the 78K0 assembler.	-compati	—	CC-RL provides no option to assemble assembly-language source files for 78K0.
Does not assemble assembly-language source files generated by the 78K0 assembler.	-ncompati	—	

Refer to the user's manual for the compiler for more information and make changes as required.

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Differences in specification of address range check for mirror area label

Item	Option		Actions
	CA78K0R	CC-RL	
Checks the address range for a mirror area label.	-mirchk	—	CC-RL cannot check the address ranges for mirror area labels.

Refer to the user's manual for the compiler for more information and make changes as required.

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