

C Compiler Package for RL78 Family

A new compiler for RL78 family microcontrollers that delivers substantially improved performance

This compiler package incorporates optimization technology developed by Renesas for its compilers and linkers for the RX family and RH850 family, enabling it to generate highly efficient code that extracts the full performance potential of the RL78 family.

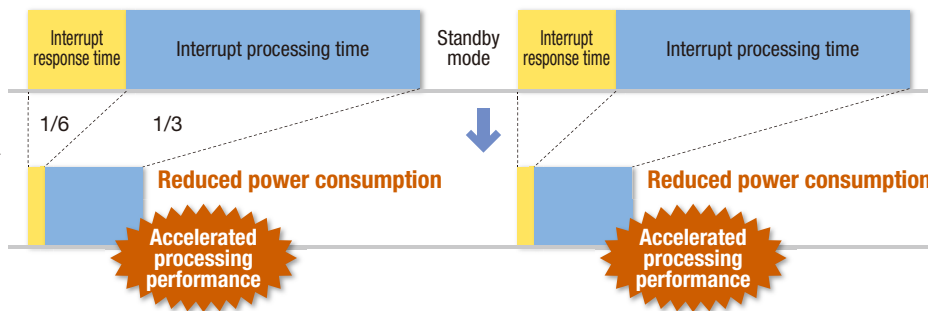
New Compiler that Boosts Performance in Systems Incorporating RL78 Microcontrollers

- **Much more powerful compiler optimization technology**
 - Output code that runs three times faster^{*1}
 - Shorter device operating duration for reduced power consumption
 - Six times better interrupt response performance^{*1}
 - 10% reduction in ROM size^{*1}
 - Ability to keep more functions in available program storage memory
 - Contributes to system added value.
 - Multitude of optimization functions that are easily accessible via the GUI
- *1. Comparison with earlier CA78K0R from Renesas. Measured using programs maintained by Renesas.

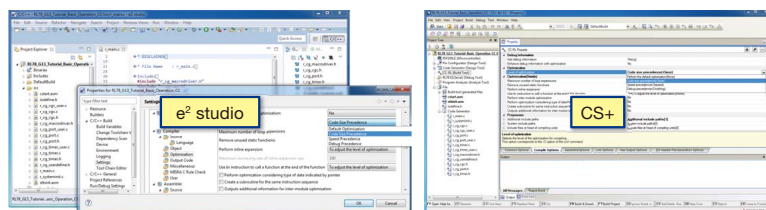
- **Support for 64-bit variables**
Eases the task of porting programs written for R8C microcontrollers.

- **Supported by e² studio**

CC-RL new C compiler from Renesas Better performance in systems incorporating RL78 microcontrollers



Easy setting of optimization functions via GUI



Comparison with earlier Renesas product

| | This Product (CC-RL) | Earlier Renesas product (CA78K0R) |
|---|---|-----------------------------------|
| Execution performance | Excellent | Fair |
| Code size | Excellent | Good |
| Build speed | Good | Excellent |
| Support for 64-bit variables ^{*1} | Excellent | Unsupported |
| Interoperation with integrated development environments | e ² studio (V4.0 and later) CS+ (V3.01 and later) | CS+ |

*1. Double (supported by RL78-S3 core only), long long

Support Functions for Migrating from Earlier Compilers

Ability to reuse previously developed software assets

- **Support for functions that assist migration from other compilers and assemblers.**
It is possible to compile or assemble code extensions of existing compilers by specifying options.^{*2}
- **Help documents provide descriptions of specific procedures and cases where changes are required.**
 - Migration from CA78K0R to CC-RL (Project Manipulation)^{*3}
 - Migration from CA78K0R to CC-RL (Coding)
 - Migration from CA78K0R to CC-RL (Compiler Options and Assembler Options)
 - Migration from CA78K0R to CC-RL (Linkage Editor Options)

*2. Refer to the user's manual for details of the supported code extensions.

*3. This document refers to the CS+ integrated development environment.

[Web http://www.renesas.com/rl78-c-documentation](http://www.renesas.com/rl78-c-documentation)



Supported Integrated Development Environments

e² studio (compiler package without integrated development environment) For RL78, RX, RH850, and RZ

This integrated development environment is suitable for developers accustomed to the Eclipse environment and to those working on collaborative development projects involving overseas partners. It is compatible with plug-ins developed for the open-source Eclipse platform as well as build and debug plug-ins that work with development tools for Renesas microcontrollers (compilers, simulators, emulators).



CS+ (compiler package with integrated development environment) For RL78, RX, RH850, V850, 78K0R, and 78K0

This product brings together in a single package all the basic software tools needed for software development, from coding through building and debugging. There is also a feature that displays information on variables, functions, etc., in an easy-to-understand format. A full selection of tutorials is available, allowing even beginners to get started using this integrated development environment right away.



Main Functions

● **ANSI compliant**

- Support for C89 and C99^{*1}
- *1. Long long data type, comments delineated by //, macros with variable arguments, etc.
- Can be combined with checker tools from third parties.

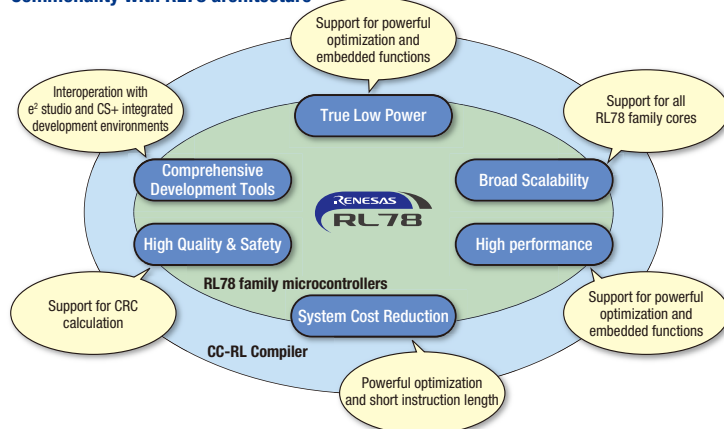
● **Commonality with the RL78 architecture allows for more efficient coding.**

- Ability to write interrupt handlers in C
- Ability to incorporate assembly language functions into the C source code
- Ability to allocate variables to the saddr area, which can be accessed by instructions with a short instruction length
- Ability to call functions with the CALLT instruction, which has a short instruction length
- Embedded CPU control functions __halt and __stop for reduced power consumption
- Embedded multiply-and-accumulate functions __macui and __macsi for improved performance
- Other embedded functions support operations that are troublesome to code independently in C.
- Support for CRC safety functionality with ability to embed CRC values in the output code

● **Professional version with support for MISRA-C rule checking**

- MISRA-C:2004 and 2012 rule checking functionality supports Functional Safety for the automotive industry.

Commonality with RL78 architecture



Other Added Functionality

● **Inline expansion of functions**

Reduces the overhead associated with function calls, and speeds up program execution.

● **Section address operators**

Allows initializing and copying of sections in the C source code.

● **Warning message output control functionality**

More efficient message checking with control based on specification of messages by number

● **Functionality for merging character string constants**

Ability to reduce the ROM size by grouping identical character string constants into a single area

● **Functionality for specifying included files using options**

Eliminates the need to specify #include declarations in multiple files.

● **Functionality for volatilizing external variables**

Package Lineup

| Product Name | License | Install Media | Components | | | | | | | | |
|---|----------|---------------|------------------------------------|------------------|-----------|--------|---------------|----------------------------|----------------------------|----------------------------|---|
| | | | Integrated Development Environment | Compiler (CC-RL) | Assembler | Linker | Utility Tools | Simulator | Emulator/Debugger | MISRA-C Rule Checking | |
| C compiler package for RL78 family, professional version (without integrated development environment) | Standard | Yes | Not included ^{*1} | ○ | ○ | ○ | ○ | Not included ^{*2} | Not included ^{*2} | Not included ^{*2} | ○ |
| | Floating | No | | | | | | | | | |
| C compiler package for RL78 family, standard version (without integrated development environment) | Standard | Yes | Not included ^{*1} | ○ | ○ | ○ | ○ | Not included ^{*2} | Not included ^{*2} | Not included ^{*2} | — |
| | Floating | No | | | | | | | | | |
| C compiler package for RL78 family, professional version (with integrated development environment) | Standard | Yes | CS+ (bundled) | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Floating | No | | | | | | | | | |
| C compiler package for RL78 family, standard version (with integrated development environment) | Standard | Yes | CS+ (bundled) | ○ | ○ | ○ | ○ | ○ | ○ | ○ | — |
| | Floating | No | | | | | | | | | |

○ : Included in product package.
^{*1}. Can be used in combination with e² studio (separate install required).
^{*2}. Included in e² studio.

Get Started Right Away!

Downloadable free version

Download the latest version of the compiler package and give it a try.

[Web](http://www.renesas.com/csp-tryitfree) <http://www.renesas.com/csp-tryitfree>

Rich Support Environment

Application notes [Web](http://www.renesas.com/rl78-appnotes) <http://www.renesas.com/rl78-appnotes>

FAQ [Web](http://www.renesas.com/rl78-c-faq) <http://www.renesas.com/rl78-c-faq>

Supported Operating Systems

Microsoft Windows® 10 (32-bit and 64-bit versions)

Windows® 8.1 (32- and 64-bit versions)

Windows® 7 (32- and 64-bit versions)

See the following webpage for information on important points and limitations regarding supported operating systems.

[Web](http://www.renesas.com/windows) <http://www.renesas.com/windows>