Code Generator for RL78

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Rev.1.07
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CS+ Code Generator for RL78 (CS+ for CC/CA,CX) V2.22.00,
e² studio Code Generator Plug-in V2.19.0,
AP4 for RL78 V1.21.00, Applilet3 for RL78 V1.21.00
Release Note

Introduction

Thank you for using the Code Generator for RL78. This document describes the restrictions and points for caution. Read this document before using the product.

Contents

1. Introduction

The Code Generator for RL78 is a software tool to generate control programs (device driver programs) for peripheral modules (timers, UART, A/D, etc.). It generates device driver codes using user settings through GUI. Initialize code and API (Application Programming Interface) functions are provided. The following products are provided as code generator for RL78.

- Code Generator Plug-in for RL78 (IDE CS+ for CC, CS+ for CA,CX, e^2 studio)
- AP4 for RL78
- Applilet3 for RL78

1.1 Product version

- CS+ Code Generator for RL78 (CS+ for CC) 2.22.00
- CS+ Code Generator for RL78 (CS+ for CA,CX) 2.22.00
- e^2 studio Code Generator Plug-in 2.19.00
- Applilet3 for RL78 1.21.00 (4.08.05.01)

Group	Version	Group	Version
RL78/D1A	V2.04.05.02	RL78/G13, G13A	V2.05.06.02
RL78/F12	V2.04.06.02	RL78/G14	V2.05.06.02
RL78/F13	V2.03.07.02	RL78/G1A	V2.04.04.02
RL78/F14	V2.03.07.02	RL78/I1A	V2.04.05.02
RL78/F15	V1.01.08.02	RL78/L12	V2.04.05.02
RL78/G12	V2.04.06.02		

- AP4 for RL78 1.21.00 (2.10.07.02)

Group	Version	Group	Version
RL78/F1E	V1.01.07.02	RL78/H1D	V1.00.03.02
RL78/G10	V1.05.05.02	RL78/I1B	V1.03.04.02
RL78/G11	V1.02.06.02	RI78/I1C	V1.01.07.02
RL78/G1C	V1.03.04.02	RL78/I1D	V1.01.05.02
RL78/G1D	V1.01.04.02	RL78/I1E	V1.03.05.02
RL78/G1E	V1.04.04.02	RL78/L13	V1.04.05.02
RL78/G1F	V1.01.06.02	RL78/L1A	V1.01.05.02
RL78/G1G	V1.01.03.02	RL78/L1C	V1.03.03.02
RL78/G1H	V1.01.05.02		

1.2 Operating environments

1.2.1 PC

- IBM PC/AT compatible (Windows® 10, Windows® 8.1)
- Processor: At least 1 GHz (the product supports hyper-threading and multi-core CPUs)
- Memory capacity: 2 GB or more is recommended. At least 1 GB (or 2 GB for 64-bit versions of Windows®) is required.
- Hard disk capacity: At least 200 MB available
- Display resolution: 1024x768 or higher; at least 65536 colors
- Required elements of the software environment other than the Windows OS: .NET Framework 4.5 plus a language pack

1.2.2 Development tools

1.2.2.1 CS+

- Integrated development environment CS+ from Renesas, V8.07.00 or later
- Renesas electronics Compiler for RL78 [CC-RL] V1.11 or later
- Renesas electronics Compiler for 78K0R [CA78K0R] V1.72 or later

1.2.2.2 e² studio, AP4 for RL78 and Applilet3 for RL78

- Integrated development environment e² studio (64-bit) from Renesas, 2022-01 or later
- Renesas electronics Compiler for RL78 [CC-RL] V1.10 or later
- Renesas GCC for RL78 V4.9 or later
- IAR Embedded Workbench for Renesas RL78 V4.20 or later

2. Supported devices

The devices supported by the Code Generator for RL78 are listed below.

Table 2-1. Supported devices

✓: Support -: Not support

Group (HW Manual number)	PIN	Device name	CS+	e² studio	AP4	Applilet3
RL78/F12 Group (R01UH0231EJ0111)	20pin	R5F1096E, R5F1096D, R5F1096C, R5F1096B, R5F1096A, R5F10968	✓	✓	-	✓
	30pin	R5F109AE, R5F109AD, R5F109AC, R5F109AB, R5F109AA	✓	✓	-	✓
	32pin	R5F109BE, R5F109BD, R5F109BC, R5F109BB, R5F109BA	✓	✓	-	✓
	48pin	R5F109GE, R5F109GD, R5F109GC, R5F109GB, R5F109GA	✓	✓	-	✓
	64pin	R5F109LE, R5F109LD, R5F109LC, R5F109LB, R5F109LA	✓	✓	-	✓
RL78/F13 Group (R01UH0368EJ0210)	20pin	R5F10A6A, R5F10A6C, R5F10A6D, R5F10A6E	✓	✓	-	✓
	30pin	R5F10AAA, R5F10AAC, R5F10AAD, R5F10AAE, R5F10BAC, R5F10BAD, R5F10BAE, R5F10BAF, R5F10BAG	✓	✓	-	✓
	32pin	R5F10ABA, R5F10ABC, R5F10ABD, R5F10ABE, R5F10BBC, R5F10BBD, R5F10BBE, R5F10BBF, R5F10BBG	✓	✓	-	✓
	48pin	R5F10AGA, R5F10AGC, R5F10AGD, R5F10AGE, R5F10AGF, R5F10AGG, R5F10BGC, R5F10BGD, R5F10BGE, R5F10BGF, R5F10BGG	✓	✓	-	✓
	64pin	R5F10BLC, R5F10ALD, R5F10ALE, R5F10ALF, R5F10ALG, R5F10BLC, R5F10BLD, R5F10BLE, R5F10BLF, R5F10BLG	✓	✓	-	✓
	80pin	R5F10AME, R5F10AMF, R5F10AMG, R5F10BME, R5F10BMF, R5F10BMG	✓	✓	-	✓
RL78/F14 Group (R01UH0368EJ0210)	30pin	R5F10PAD, R5F10PAE	✓	✓	-	✓
	32pin	R5F10PBD, R5F10PBE	✓	✓	-	✓
	48pin	R5F10PGD, R5F10PGE, R5F10PGF, R5F10PGG, R5F10PGH, R5F10PGJ	✓	✓	-	✓
	64pin	R5F10PLE, R5F10PLF, R5F10PLG, R5F10PLH, R5F10PLJ	✓	✓	-	✓
	80pin	R5F10PME, R5F10PMF, R5F10PMG, R5F10PMH, R5F10PMJ	✓	✓	-	✓
	100pin	R5F10PPE, R5F10PPF, R5F10PPG, R5F10PPH, R5F10PPJ	✓	✓	-	✓
RL78/F15 Group (R01UH0559EJ0100)	48pin	R5F113GL, R5F113GK	✓	✓	-	✓
	64pin	R5F113LL, R5F113LK	✓	✓	-	✓
	80pin	R5F113ML, R5F113MK	✓	✓	-	✓
	100pin	R5F113PL, R5F113PK, R5F113PJ, R5F113PH, R5F113PG	✓	✓	-	✓
	144pin	R5F113TL, R5F113TK, R5F113TJ, R5F113TH, R5F113TG	✓	✓	-	✓
RL78/F1E Group (R01UH0611EJ0052)	64pin	R5F11KLE, R5F11LLE, R5F11KLF, R5F11LLF, R5F11KLG, R5F11LLG	✓	✓	✓	-

Table 2-2. Supported devices

✓: Support -: Not support

Group (HW Manual number)	PIN	Device name	CS+	e² studio	AP4	Applilet3
RL78/G10 Group (R01UH0384EJ0311)	10pin	R5F10Y14, R5F10Y16, R5F10Y17	✓	✓	✓	-
	16pin	R5F10Y44, R5F10Y46, R5F10Y47	✓	✓	✓	-
RL78/G11 Group (R01UH0637EJ0110)	10pin	R5F1051A	✓	✓	✓	-
	16pin	R5F1054A	✓	✓	✓	-
	20pin	R5F1056A	✓	✓	✓	-
	24pin	R5F1057A	✓	✓	✓	-
	25pin	R5F1058A	✓	✓	✓	-
RL78/G12 Group (R01UH0200EJ0210)	20pin	R5F10266, R5F10267, R5F10268, R5F10269, R5F1026A, R5F10366, R5F10367, R5F10368, R5F10369, R5F1036A	✓	✓	-	✓
	24pin	R5F10277, R5F10278, R5F10279, R5F1027A, R5F10377, R5F10378, R5F10379, R5F1037A	✓	✓	-	✓
	30pin	R5F102A7, R5F102A8, R5F102A9, R5F102AA, R5F103A7, R5F103A8, R5F103A9, R5F103AA	✓	✓	-	✓
RL78/G13 Group (R01UH0146EJ0330)	20pin	R5F1006A, R5F1006C, R5F1006D, R5F1006E, R5F1016A, R5F1016C, R5F1016D, R5F1016E	✓	✓	-	✓
	24pin	R5F1007A, R5F1007C, R5F1007D, R5F1007E, R5F1017A, R5F1017C, R5F1017D, R5F1017E	✓	✓	-	✓
	25pin	R5F1008A, R5F1008C, R5F1008D, R5F1008E, R5F1018A, R5F1018C, R5F1018D, R5F1018E	✓	✓	-	✓
	30pin	R5F100AA, R5F100AC, R5F100AD, R5F100AE, R5F100AF, R5F100AG, R5F101AA, R5F101AC, R5F101AD, R5F101AE, R5F101AF, R5F101AG	✓	✓	-	✓
	32pin	R5F100BA, R5F100BC, R5F100BD, R5F100BE, R5F100BF, R5F100BG, R5F101BA, R5F101BC, R5F101BD, R5F101BE, R5F101BF, R5F101BG	✓	✓	-	✓
	36pin	R5F100CA, R5F100CC, R5F100CD, R5F100CE, R5F100CF, R5F100CG, R5F101CA, R5F101CC, R5F101CD, R5F101CE, R5F101CF, R5F101CG	✓	✓	-	✓
	40pin	R5F100EA, R5F100EC, R5F100ED, R5F100EE, R5F100EF, R5F100EG, R5F100EH, R5F101EA, R5F101EC, R5F101ED, R5F101EE, R5F101EF, R5F101EG, R5F101EH	✓	✓	-	✓
	44pin	R5F100FA, R5F100FC, R5F100FD, R5F100FE, R5F100FF, R5F100FG, R5F100FH, R5F100FJ, R5F100FK, R5F100FL, R5F101FA, R5F101FC, R5F101FD, R5F101FE, R5F101FF, R5F101FG, R5F101FH, R5F101FJ, R5F101FK, R5F101FL	✓	✓	-	✓
	48pin	R5F100GA, R5F100GC, R5F100GD, R5F100GE, R5F100GF, R5F100GG, R5F100GH, R5F100GJ, R5F100GK, R5F100GL, R5F101GA, R5F101GC, R5F101GD, R5F101GE, R5F101GF, R5F101GG, R5F101GH, R5F101GJ, R5F101GK, R5F101GL	✓	✓	-	✓
	52pin	R5F100JC, R5F100JD, R5F100JE, R5F100JF, R5F100JG, R5F100JH, R5F100JJ, R5F100JK, R5F100JL, R5F101JC, R5F101JD, R5F101JE, R5F101JF, R5F101JG, R5F101JH, R5F101JJ, R5F101JK, R5F101JL	✓	✓	-	✓

Table 2-3. Supported devices

✓: Support -: Not support

Group (HW Manual number)	PIN	Device name	CS+	e² studio	AP4	Applilet3
RL78/G13 Group (R01UH0146EJ0330)	64pin	R5F100LC, R5F100LD, R5F100LE, R5F100LF, R5F100LG, R5F100LH, R5F100LJ, R5F100LK, R5F100LL, R5F101LC, R5F101LD, R5F101LE, R5F101LF, R5F101LG, R5F101LH, R5F101LJ, R5F101LK, R5F101LL	✓	✓	-	✓
	80pin	R5F100MF, R5F100MG, R5F100MH, R5F100MJ, R5F100MK, R5F100ML, R5F101MF, R5F101MG, R5F101MH, R5F101MJ, R5F101MK, R5F101ML	✓	✓	-	✓
	100pin	R5F100PF, R5F100PG, R5F100PH, R5F100PJ, R5F100PK, R5F100PL, R5F101PF, R5F101PG, R5F101PH, R5F101PJ, R5F101PK, R5F101PL	✓	✓	-	✓
	128pin	R5F100SH, R5F100SJ, R5F100SK, R5F100SL, R5F101SH, R5F101SJ, R5F101SK, R5F101SL	✓	✓	-	✓
RL78/G13A Group (R01UH0856EJ0050)	44pin	R5F140FK, R5F140FL	✓	✓	-	✓
	48pin	R5F140GK, R5F140GL	✓	✓	-	✓
	64pin	R5F140LK, R5F140LL	✓	✓	-	✓
	100pin	R5F140PK, R5F140PL	✓	✓	-	✓
RL78/G14 Group (R01UH0186EJ0330)	30pin	R5F104AA, R5F104AC, R5F104AD, R5F104AE, R5F104AF, R5F104AG	✓	✓	-	✓
	32pin	R5F104BA, R5F104BC, R5F104BD, R5F104BE, R5F104BF, R5F104BG	✓	✓	-	✓
	36pin	R5F104CA, R5F104CC, R5F104CD, R5F104CE, R5F104CF, R5F104CG	✓	✓	-	✓
	40pin	R5F104EA, R5F104EC, R5F104ED, R5F104EE, R5F104EF, R5F104EG, R5F104EH	✓	✓	-	✓
	44pin	R5F104FA, R5F104FC, R5F104FD, R5F104FE, R5F104FF, R5F104FG, R5F104FH, R5F104FJ	✓	✓	-	✓
	48pin	R5F104GA, R5F104GC, R5F104GD, R5F104GE, R5F104GF, R5F104GG, R5F104GH, R5F104GJ, R5F104GK, R5F104GL	✓	✓	-	✓
	52pin	R5F104JC, R5F104JD, R5F104JE, R5F104JF, R5F104JG, R5F104JH, R5F104JJ	✓	✓	-	✓
	64pin	R5F104LC, R5F104LD, R5F104LE, R5F104LF, R5F104LG, R5F104LH, R5F104LJ, R5F104LK, R5F104LL	✓	✓	-	✓
	80pin	R5F104MF, R5F104MG, R5F104MH, R5F104MJ, R5F104MK, R5F104ML	✓	✓	-	✓
	100pin	R5F104PF, R5F104PG, R5F104PH, R5F104PJ, R5F104PK, R5F104PL	✓	✓	-	✓
RL78/G1A Group (R01UH0305EJ0200)	20pin	R5F10E8A, R5F10E8C, R5F10E8D, R5F10E8E	✓	✓	-	✓
	24pin	R5F10EBA, R5F10EBC, R5F10EBD, R5F10EBE	✓	✓	-	✓
	30pin	R5F10EGA, R5F10EGC, R5F10EGD, R5F10EGE	✓	✓	-	✓
	64pin	R5F10ELC, R5F10ELD, R5F10ELE	✓	✓	-	✓
RL78/G1C Group (R01UH0348EJ0100)	32pin	R5F10JBC, R5F10KBC	✓	✓	✓	-
	48pin	R5F10JGC, R5F10KGC	✓	✓	✓	-

Table 2-4. Supported devices

✓: Support -: Not support

Group (HW Manual number)	PIN	Device name	CS+	e² studio	AP4	Applilet3
RL78/G1D Group (R01UH0515EJ0100)	48pin	R5F11AGG, R5F11AGH, R5F11AGJ	✓	✓	✓	-
RL78/G1E Group (R01UH0353EJ0101)	64pin	R5F10FLC, R5F10FLD, R5F10FLE	✓	✓	✓	-
	80pin	R5F10FMC, R5F10FMD, R5F10FME	✓	✓	✓	-
RL78/G1F Group (R01UH0516EJ0100)	24pin	R5F11B7C, R5F11B7E	✓	✓	✓	-
	32pin	R5F11BBC, R5F11BBE	✓	✓	✓	-
	36pin	R5F11BCC, R5F11BCE	✓	✓	✓	-
	48pin	R5F11BGC, R5F11BGE	✓	✓	✓	-
	64pin	R5F11BLC, R5F11BLE	✓	✓	✓	-
RL78/G1G Group (R01UH0499EJ0100)	30pin	R5F11EA8, R5F11EAA	✓	✓	✓	-
	32pin	R5F11EB8, R5F11EBA	✓	✓	✓	-
	44pin	R5F11EF8, R5F11EFA	✓	✓	✓	-
RL78/G1H Group (R01UH0575EJ0100)	64pin	R5F11FLJ, R5F11FLK, R5F11FLL	✓	✓	✓	-
RL78/H1D Group (R01UH0756EJ0080)	48pin	R5F11NGG, R5F11NGF	✓	✓	✓	-
	64pin	R5F11NLG, R5F11PLG, R5F11NLF, R5F11PLF	✓	✓	✓	-
	80pin	R5F11RMG, R5F11NMG, R5F11NMF, R5F11NME	✓	✓	✓	-
RL78/I1A Group (R01UH0169EJ0210)	20pin	R5F1076C	✓	✓	-	✓
	30pin	R5F107AC, R5F107AE	✓	✓	-	✓
	38pin	R5F107DE	✓	✓	-	✓
RL78/I1B Group (R01UH0407EJ0100)	80pin	R5F10MME, R5F10MMG	✓	✓	✓	-
	100pin	R5F10MPE, R5F10MPG	✓	✓	✓	-
RL78/I1C Group (R01UH0587EJ0210)	64pin	R5F10NLE, R5F10NLG, R5F11TLE, R5F11TLG	✓	✓	✓	-
	80pin	R5F10NME, R5F10NMG, R5F10NMJ,	✓	✓	✓	-
	100pin	R5F10NPJ, R5F10NPG	✓	✓	✓	-
RL78/I1C (512KB) Group (R01UH0889EJ0100)	80pin	R5F10NML, R5F10NML(DUAL)	✓	✓	✓	-
	100pin	R5F10NPL, R5F10NPL(DUAL)	✓	✓	✓	-

Note: RL78/I1C (512KB) User's Manual Hardware version is V1.0 Dec 2020.

Table 2-5. Supported devices

✓: Support -: Not support

Group (HW Manual number)	PIN	Device name	CS+	e² studio	AP4	Applilet3
RL78/I1D Group (R01UH0474EJ0100)	20pin	R5F11768, R5F1176A	✓	✓	✓	-
	24pin	R5F11778, R5F1177A	✓	✓	✓	-
	30pin	R5F117A8, R5F117AA, R5F117AC	✓	✓	✓	-
	32pin	R5F117BA, R5F117BC	✓	✓	✓	-
	48pin	R5F117GA, R5F117GC	✓	✓	✓	-
RL78/I1E Group (R01UH0524EJ0100)	32pin	R5F11CBC	✓	✓	✓	-
	36pin	R5F11CCC	✓	✓	✓	-
RL78/L12 Group (R01UH0330EJ0200)	32pin	R5F10RBC, R5F10RBA, R5F10RB8	✓	✓	-	✓
	44pin	R5F10RFC, R5F10RFA, R5F10RF8	✓	✓	-	✓
	48pin	R5F10RGC, R5F10RGA, R5F10RG8	✓	✓	-	✓
	52pin	R5F10RJC, R5F10RJA, R5F10RJ8	✓	✓	-	✓
	64pin	R5F10RLC, R5F10RLA	✓	✓	-	✓
RL78/L13 Group (R01UH0382EJ0100)	64pin	R5F10WLA, R5F10WLC, R5F10WLD, R5F10WLE, R5F10WLF, R5F10WLG	✓	✓	✓	-
	80pin	R5F10WMA, R5F10WMC, R5F10WMD, R5F10WME, R5F10WMF, R5F10WMG	✓	✓	✓	-
RL78/L1A Group (R01UH0636EJ0100)	80pin	R5F11MMD, R5F11MME, R5F11MMF	✓	✓	✓	-
	100pin	R5F11MPE, R5F11MPF, R5F11MPG	✓	✓	✓	-
RL78/L1C Group (R01UH0409EJ0100)	80pin	R5F110MJ, R5F110MH, R5F110MG, R5F110MF, R5F110ME, R5F111MJ, R5F111MH, R5F111MG, R5F111MF, R5F111ME	✓	✓	✓	-
	100pin	R5F110PJ, R5F110PH, R5F110PG, R5F110PF, R5F110PE, R5F111PJ, R5F111PH, R5F111PG, R5F111PF, R5F111PE	✓	✓	✓	-
RL78/D1A Group (R01UH0317EJ0003)	48pin	R5F10CGB, R5F10CGC, R5F10CGD, R5F10DGC, R5F10DGD, R5F10DGE	-	✓	-	✓
	64pin	R5F10CLD, R5F10DLD, R5F10DLE	-	✓	-	✓
	80pin	R5F10CMD, R5F10CME, R5F10DMD, R5F10DME, R5F10DMF, R5F10DMG, R5F10DMJ	-	✓	-	✓
	100pin	R5F10DPE, R5F10DPF, R5F10DPG, R5F10DPJ, R5F10TPJ	-	✓	-	✓

3. Changes

Describes the changes in this release of the Code Generator for RL78.

3.1 Correction of issues/limitations

Table 3-1. List of Correction of issues/limitations

✓: Applicable, -: Not applicable

No	Description	Group													
		RL78/D1A	RL78/G10	RL78/G11	RL78/G12	RL78/G13, G13A	RL78/G14	RL78/G1A	RL78/G1C	RL78/G1D	RL78/G1E	RL78/G1F	RL78/G1G	RL78/G1H	RL78/H1D
1	Removal of restrictions on using device change function in CS+ and e^2 studio	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Removal of restriction that Code Generator isn't refreshed immediately after device change in e^2 studio	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Removal of restrictions about CSI11 displays wrong GUI and locks wrong callback function when changing from receive function to transmit function (r20ts0545)	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3-2. List of Correction of issues/limitations

✓: Applicable, -: Not applicable

No	Description	Group													
		RL78/F12	RL78/F13	RL78/F14	RL78/F15	RL78/F1E	RL78/I1A	RL78/I1B	RL78/I1C	RL78/I1D	RL78/I1E	RL78/L12	RL78/L13	RL78/L1A	RL78/L1C
1	Removal of restrictions on using device change function in CS+ and e^2 studio	-	-	-	-	-	-	-	✓	-	-	-	-	-	-
2	Removal of restriction that Code Generator isn't refreshed immediately after device change in e^2 studio	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Removal of restrictions about CSI11 displays wrong GUI and locks wrong callback function when changing from receive function to transmit function (r20ts0545)	-	-	-	-	-	-	-	-	-	✓	-	-	-	-

3.1.1 Removal of restrictions on using device change function in CS+ and e^2 studio

When using device change function, the following devices have some known issue, so that if these devices are selected, it can cause abnormal phenomenon in CS+ and e^2 studio:

- Using [Change Microcontroller…] function in CS+, device change is failed and CS+ crash error can be seen.
- Using [Change device] function in e^2 studio, after change, the [Code Generator] node disappears from project tree.

This restriction is removed in this release.

Table 3-3. Change between following devices have some known issue

Before change	After change
R5F10NME(80pin)	R5F10NML(80pin), R5F10NML(Dual) (80pin)
R5F10NMG(80pin)	R5F10NML(80pin) , R5F10NML(Dual) (80pin)
R5F10NMJ(80pin)	R5F10NML(80pin) , R5F10NML(Dual) (80pin)
R5F10NML(80pin)	R5F10NME(80pin), R5F10NMG(80pin), R5F10NMJ(80pin)
R5F10NML(Dual) (80pin)	R5F10NME(80pin), R5F10NMG(80pin), R5F10NMJ(80pin)
R5F10NPG(100pin)	R5F10NPL(100pin), R5F10NPL(Dual) (100pin)
R5F10NPJ(100pin)	R5F10NPL(100pin), R5F10NPL(Dual) (100pin)
R5F10NPL(100pin)	R5F10NPG(100pin), R5F10NPJ(100pin)
R5F10NPL(Dual) (100pin)	R5F10NPG(100pin), R5F10NPJ(100pin)

3.1.2 Removal of restriction that Code Generator isn't refreshed immediately after device change in e² studio

Code Generator isn't refreshed immediately after device change in e² studio.

For example: Change device from RL78/F15 to RL78/G13. After change, the project tree and the panel contents don't be refreshed to RL78/G13 immediately.

This restriction is removed from this release.

[Before]

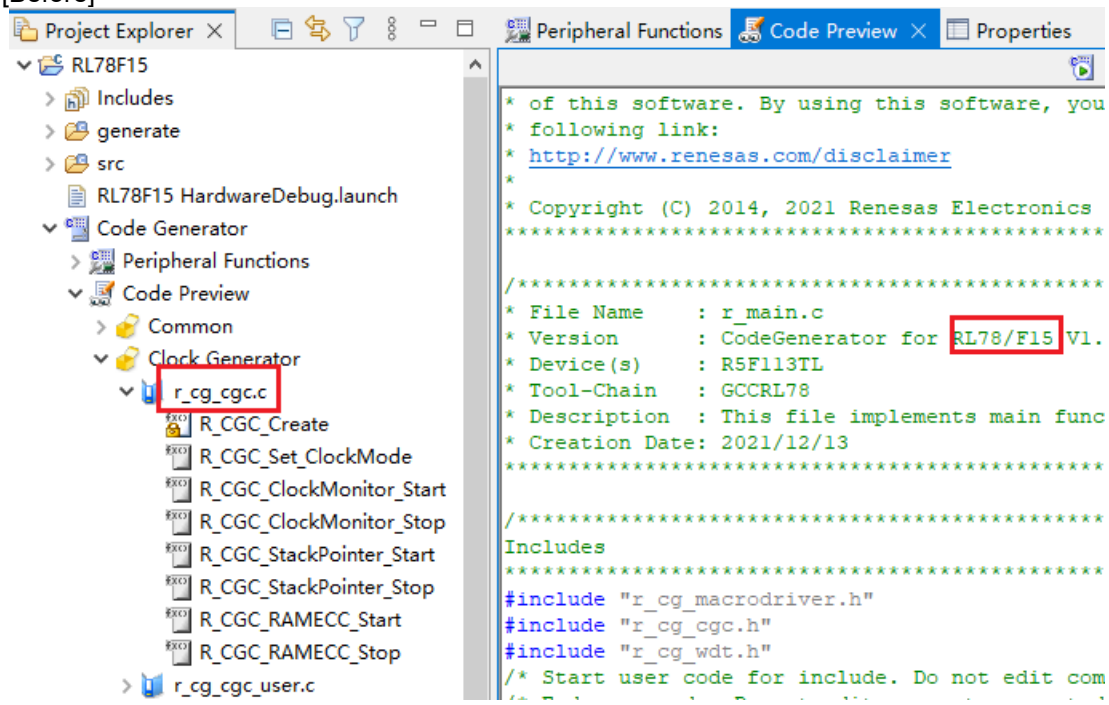


Figure 3-1 [Code Preview] node is still RL78/F15

[After]

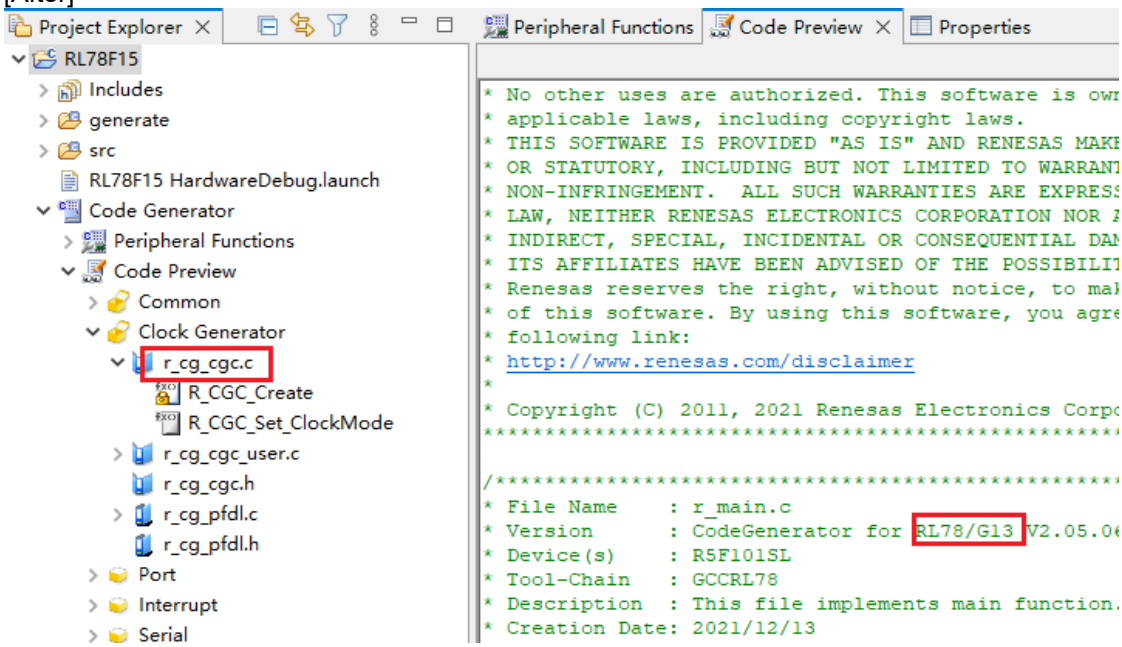


Figure 3-2 [Code Preview] node changes to RL78/G13

3.1.3 Removal of restrictions about CSI01 displays wrong GUI and locks wrong callback function when changing from receive function to transmit function

CSI11 displays wrong GUI and locks wrong callback function when changing from receive function to transmit function.

Please refer to the document number R20TS0545 of RENESAS TOOL NEWS.

This restriction is removed from this release.

3.2 Specification changes

Table 3-4. List of Specification changes

✓: Applicable, -: Not applicable

No	Description	Group													
		RL78/D1A	RL78/G10	RL78/G11	RL78/G12	RL78/G13, G13A	RL78/G14	RL78/G1A	RL78/G1C	RL78/G1D	RL78/G1E	RL78/G1F	RL78/G1G	RL78/G1H	RL78/H1D
1	Support for RL78/I1C (512KB) User's Manual Hardware V1.00 (Dec 2020)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Improvement for the specification of RTC with independent power supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Improvement for the readability of generated comments for IIC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Improvement for error handling of simple IIC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
5	Improvement for showing message when “Device Top View” and “Device List View” aren’t supported in e^2 studio	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 3-5. List of Specification changes

✓: Applicable, -: Not applicable

No	Description	Group													
		RL78/F12	RL78/F13	RL78/F14	RL78/F15	RL78/F1E	RL78/I1A	RL78/I1B	RL78/I1C	RL78/I1D	RL78/I1E	RL78/L12	RL78/L13	RL78/L1A	RL78/L1C
1	Support for RL78/I1C (512KB) User's Manual Hardware V1.00 (Dec 2020)	-	-	-	-	-	-	-	✓	-	-	-	-	-	-
2	Improvement for the specification of RTC with independent power supply	-	-	-	-	-	-	-	✓	-	-	-	-	-	-
3	Improvement for the readability of generated comments for IIC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Improvement for error handling of simple IIC	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	✓	✓
5	Improvement for showing message when “Device Top View” and “Device List View” aren’t supported in e^2 studio	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

3.2.1 Support for RL78/I1C (512KB) User's Manual Hardware V1.00 (Dec 2020)

Improved the specification to support for RL78/I1C (512KB) User's Manual Hardware V1.00 (Dec 2020). The detailed information is as following:

1. Removal of GUI interrupt conflict control between INTRTCIC0 and INTP12.
2. Removal of GUI interrupt conflict control between INTRTCIC2 and INTP14.
3. Improvement for the code when selecting INTRTCIC0 and INTRTCIC2 in interrupt module.
4. Improvement for DTC GUI and code when selecting RTCIC0 and RTCIC2.

3.2.2 Improvement for the specification of RTC with independent power supply

Apply 2 improvements for RTC specification:

1. GUI displays message to guide the customer to connect VRTC pin and enable VRTC pin voltage detection function.
   1) [Clock setting] page displays a note message.

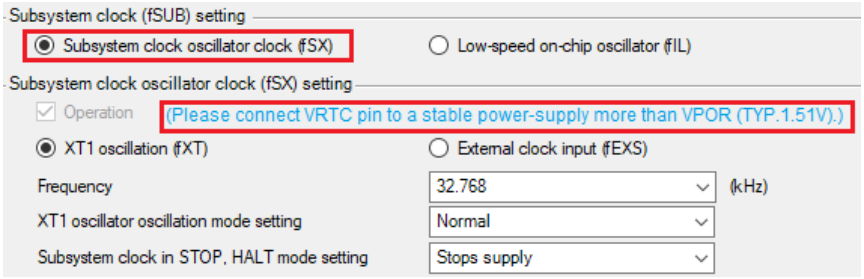


Figure 3-3 Note message in [Clock setting] page

   2) [RTC] module displays a note message.

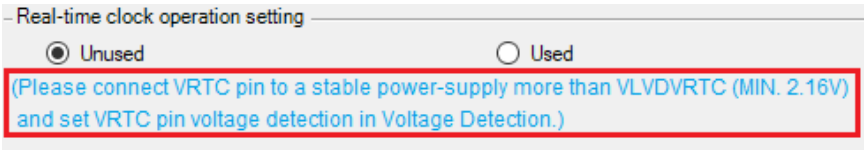


Figure 3-4 Note message in [RTC] module

2. Improved the code so that RTC doesn't initialize when VRTC is still above operating voltage while VDD is low and enter power-on-reset.
   1) VRTC pin voltage detection code is generated in R_LVD_Create() when VRTC pin voltage detection is selected in Voltage Detection module.

```
void R_LVD_Create(void)
{
    (Omitted)
    /* Set INTLVDVRTC low priority */
    LVDVRPR1 = 1U;
    LVDVRPR0 = 1U;
    /* Start VRTC pin voltage detection */
    LVDVRIF = 0U;   /* clear INTLVDVRTC interrupt flag */
    LVDVRMK = 0U;   /* enable INTLVDVRTC interrupt */
    LVDVRTC = _80_LVD_VRTC_DELECT_ENABLE | _00_LVD_VRTC_VOLTAGE_216;

    R_LVD_Create_UserInit();
}
```

Figure 3-5 VRTC pin voltage detection code in R_LVD_Create()

   2) In r_cg_lvd_user.c file, a global variable will be set to 1 to indicate VRTC pin voltage is higher than detection voltage.

```
volatile uint8_t g_lvd_vrtc_ready_flag;    /* VRTC pin voltage ready flag */
/* Start user code for global. Do not edit comment generated here */
/* End user code. Do not edit comment generated here */
__interrupt static void r_lvd_vrtcinterrupt(void)
{
    if (0U == LVDVRTCF)
    {
        g_lvd_vrtc_ready_flag = 1U;
    }
    /* Start user code. Do not edit comment generated here */
    /* End user code. Do not edit comment generated here */
}
```

Figure 3-6 The global variable in R_LVD_Create()

3) Initialize RTC in R_RTC_Create() only when RTC power-on-reset signal generates and VRTC pin voltage is higher than detection voltage.

```
extern volatile uint8_t g_lvd_vrtc_ready_flag;    /* VRTC pin voltage ready flag */
/* Start user code for global. Do not edit comment generated here */
/* End user code. Do not edit comment generated here */
void R_RTC_Create(void)
{
    volatile uint8_t tmp;
    volatile uint16_t w_count;

    VRTCEN = 1U;    /* enables input clock supply */

    /* Change the waiting time according to the system */
    for (w_count = 0U; w_count <= RTC_STARTWAITTIME; w_count++)
    {
        NOP();
    }

    if ((_00_RTC_POWERON_RESET_OCCUR == RTCPORSR) && (1U == g_lvd_vrtc_ready_flag))
    {
        RTCPORSR = _01_RTC_POWERON_RESET_CHECK;
        g_lvd_vrtc_ready_flag = 0U;
        tmp = RCR2;
        tmp &= (uint8_t)~_01_RTC_COUNTER_NORMAL;
        RCR2 = tmp;
        ……
        RTCCR0 = _80_RTC_RTCICN0_ENABLE | _00_RTC_EVENT0_NOTDETECTED | _02_RTC_CAPTURE0_FALLING;
        RTCCR1 = _00_RTC_RTCICN1_DISABLE | _00_RTC_EVENT1_NOTDETECTED;
        RTCCR2 = _00_RTC_RTCICN2_DISABLE | _00_RTC_EVENT2_NOTDETECTED;
    }

    /* Set RTCIC0 pin */
    PM15 |= 0x01U;

    R_RTC_Create_UserInit();
}
```

Figure 3-7 RTC code in R_RTC_Create()

Note: For using IAR Embedded Workbench, “volatile” is unnecessary.

4) R_LVD_Create() runs before R_RTC_Create() in R_Systeminit().

```
void R_Systeminit(void)
{
    PIOR0 = 0x10U;
    R_CGC_Get_ResetSource();
    R_CGC_Create();
    R_WDT_Create();
    R_LVD_Create();
    R_RTC_Create();
    IAWCTL = 0x00U;
}
```

Figure 3-8 The code sequence in R_Systeminit()

3.2.3 Improvement for the readability of generated comments for IIC

Improved the generated comments in Simple IIC and IICA so that the customer can understand it easily.

Add comments in red rectangle.

```
void R_IIC00_StartCondition(void)
{
    volatile uint8_t w_count;

    SO0 &= (uint16_t)~(_0001_SAUm_CH0_DATA_OUTPUT_1);

    /* Set delay to secure a hold time after SDA output low. The delay time depend on slave device.
       Here set 5us as default base on current clock */
    for (w_count = 0U; w_count <= IIC00_WAITTIME; w_count++)
    {
        NOP();
    }

    SO0 &= (uint16_t)~(_0100_SAUm_CH0_CLOCK_OUTPUT_1);
    SOE0 |= _0001_SAUm_CH0_OUTPUT_ENABLE;
    SS0 |= _0001_SAUm_CH0_START_TRG_ON;

    /* Set delay to secure a hold time after SCL output low. The delay time depend on slave device.
       Here set 5us as default base on current clock */
    for (w_count = 0U; w_count <= IIC00_WAITTIME; w_count++)
    {
        NOP();
    }
}
```

Figure 3-9 R_IIC00_StartCondition() function: For IIC00

```
void R_IIC00_StopCondition(void)
{
    volatile uint8_t w_count;

    ST0 |= _0001_SAUm_CH0_STOP_TRG_ON;
    SOE0 &= (uint16_t)~_0001_SAUm_CH0_OUTPUT_ENABLE;
    SO0 &= (uint16_t)~(_0001_SAUm_CH0_DATA_OUTPUT_1);

    /* Set delay to secure a hold time after SDA output low. The delay time depend on slave device.
       Here set 5us as default base on current clock */
    for (w_count = 0U; w_count <= IIC00_WAITTIME; w_count++)
    {
        NOP();
    }

    SO0 |= _0100_SAUm_CH0_CLOCK_OUTPUT_1;

    /* Set delay to secure a hold time after SCL output high. The delay time depend on slave device.
       Here set 5us as default base on current clock */
    for (w_count = 0U; w_count <= IIC00_WAITTIME; w_count++)
    {
        NOP();
    }

    SO0 |= _0001_SAUm_CH0_DATA_OUTPUT_1;

    /* Set delay to secure a hold time after SDA output high. The delay time depend on slave device.
       Here set 5us as default base on current clock */
    for (w_count = 0U; w_count <= IIC00_WAITTIME; w_count++)
    {
        NOP();
    }
}
```

Figure 3-10 R_IIC00_StopCondition() function: For IIC00

```
__interrupt static void r_iic00_interrupt(void)
{
    volatile uint16_t w_count;

    /* Set delay to start next transmission. The delay time depend on slave device.
       Here set 20us as default base on current clock */
    for (w_count = 0U; w_count <= IIC00_WAITTIME_2; w_count++)
    {
        NOP();
    }

    if (((SSR00 & _0002_SAU_PARITY_ERROR) == 0x0002U) && (g_iic00_tx_count != 0U))
    {
```

Figure 3-11 r_iic00_interrupt() function: For IIC00

```
static void iica0_masterhandler(void)
{
    /* Detection of stop condition handling */
    if ((0U == IICBSY0) && (g_iica0_tx_cnt != 0U))
    {
        r_iica0_callback_master_error(MD_SPT);
    }
    else
    {
        /* Control for sended address */
        if ((g_iica0_master_status_flag & _80_IICA_ADDRESS_COMPLETE) == 0U)
        {
```

Figure 3-12 iica0_masterhandler() function: For IICA0

3.2.4 Improvement for error handling of simple IIC

Add the code to clear error detection flag so that the next send-receive operation can work correctly. Add new code in red rectangle.

```
__interrupt static void r_iic00_interrupt(void)
{
    volatile uint16_t w_count;

    /* Set delay to start next transmission. The delay time depend on slave device.
       Here set 20us as default base on current clock */
    for (w_count = 0U; w_count <= IIC00_WAITTIME_2; w_count++)
    {
        NOP();
    }

    if (((SSR00 & _0002_SAU_PARITY_ERROR) == 0x0002U) && (g_iic00_tx_count != 0U))
    {
        SIR00 |= _0002_SAU_SIRMN_PECTMN; //clear ACK error detection flag
        R_IIC00_StopCondition();
        r_iic00_callback_master_error(MD_NACK);
    }
    else if(((SSR00 & _0001_SAU_OVERRUN_ERROR) == 0x0001U) && (g_iic00_tx_count != 0U))
    {
        SIR00 |= _0001_SAU_SIRMN_OVCTMN; //clear overrun error detection flag
        R_IIC00_StopCondition();
        r_iic00_callback_master_error(MD_OVERRUN);
    }
    else
    {
```

Figure 3-13 r_iic00_interrupt() function: For IIC00

3.2.5 Improvement for showing message when “Device Top View” and “Device List View” aren’t supported in e^2 studio

Improved the specification so that “Device Top View” and “Device List View” show message for unsupported device. When switching to a project which doesn’t support “Device Top View” and “Device List View”, after double click [Code Generator] nodes, “Device Top View” and “Device List View” will be cleared and show message.

Figure 3-14 Message on “Device Top View”

Figure 3-15 Message on “Device List View”

4. History of Corrections Announced in Renesas Tool New

This section is a summary of corrections announced in Renesas Tool News.

Issue Date	Document No.	Description	Device Concerned	Fixed version
May 21, 2012	120521/tn2	With generating codes for the R5F1007x and R5F1017x MCUs, RL78/G13 group	RL78/G13	CS+ V1.00.06
Aug. 01, 2012	120801/tn3	Problems arising in Applilet3 for RL78/G13 and Applilet3 for RL78/G14	RL78/G13, RL78/G14	CS+ V1.00.06
Sep. 01, 2012	120901/tn1	With using the code generator for the RL78/G12 group	RL78/G12	CS+ V1.00.06
Feb. 01, 2013	130201/tn1	With using the code generator for the RL78/G14 group of MCUs	RL78/G14	CS+ V2.00.00
Jul. 01, 2013	130701/tn1	When edited source codes disappear	RL78/F12, RL78/F13, RL78/F14, RL78/F15, RL78/G10, RL78/G12, RL78/G13, RL78/G14, RL78/G1A, RL78/G1C, RL78/G1D, RL78/G1E, RL78/G1F, RL78/G1G, RL78/G1H, RL78/I1A, RL78/I1D, RL78/I1E, RL78/L12, RL78/L13, RL78/L1C	CS+ V2.11.00
		When the port cannot be set properly	RL78/G1A	CS+ V2.00.01
Aug. 01, 2013	130801/tn1	With using the code generator for the RL78/G12 group of MCUs	RL78/G12	CS+ V2.00.01
Oct. 16, 2013	131016/tn1	2. When a RL78/G13 product in a 100-pin package is selected	RL78/G13	CS+ V2.03.00
		3. With the key input interrupt setting	RL78/L12	CS+ V2.03.00
		4. With A/D converter operation setting	RL78/G1A	CS+ V2.03.00
		5. When the timer KB20 is in use	RL78/L13	CS+ V2.03.00
Apr. 16, 2014	140416/tn5	With selecting the 20-pin, 30-pin, or 32-pin package for the RL78/F13 or RL78/F14 group	RL78/F13, RL78/F14	CS+ V2.04.00
		With using the remote control carrier wave mask signal in the RL78/L12 or RL78/L13 group	RL78/L12, RL78/L13	CS+ V2.04.00
		With processing to reflect the pin configurator when the A/D converter is set in the RL78/G12 group	RL78/G12	CS+ V2.04.00
		With the case when ports that are not available in the MCU are displayed in the RL78/G14 group	RL78/G14	CS+ V2.04.00

Issue Date	Document No.	Description	Device Concerned	Fixed version
Jul. 01, 2014	140701/tn1	With setting port 2	RL78/L13	CS+ V2.07.00
		With setting an interval timer	RL78/G10, RL78/G12, RL78/G13, RL78/G14, RL78/G1A, RL78/G1C, RL78/L12, RL78/L13, RL78/L1C, RL78/I1A	CS+ V2.07.00
Aug. 16, 2014	140816/tn1	With setting of P20 and P21 of port2	RL78/L1C	CS+ V2.05.00
		With setting of port1	RL78/G14	CS+ V2.05.00
Nov, 1, 2014	141101/tn2	1. Point for Caution on Settings for CPU Stack Pointer Monitoring	RL78/F13	CS+ V2.07.00
		2. Point for Caution on Writing to the Serial Flag Clear Trigger Register (SIR) When Using 3-wire Serial (CSI) Transfer	RL78/F14	CS+ V2.07.00
Dec. 16, 2014	141216/tn3	1. Code Generated for Comparator Settings	RL78/I1A	CS+ V2.07.00
		2. DTC Settings	RL78/F13, RL78/F14	CS+ V2.07.00
		3. Setting the Voltage Detection Circuit to "Interrupt Mode"	RL78/L12, RL78/I1A, RL78/G1A, RL78/F13, RL78/F14	CS+ V2.07.00
		4. Saving Projects with Settings for the A/D Convertor	RL78/L1C	CS+ V2.07.00
		5. Reflection of Pin Configurations in Generated Code	RL78/G12, RL78/ G13, RL78/G14	CS+ V2.07.00
Jul. 16, 2015	150716/tn2	1. Clock Generation Circuit (PLL Circuit Operation)	RL78/F13, RL78/F14, RL78/G1C, RL78/L1C	CS+ V2.11.00 AP4 V1.10.00 Applilet3 V1.10.00
		2. Setting P40 of Port 4	RL78/F12, RL78/F13, RL78/F14, RL78/G10, RL78/G12, RL78/G13, RL78/G14, RL78/G1A, RL78/G1C, RL78/G1E, RL78/G1F, RL78/G1G, RL78/I1A, RL78/I1D, RL78/L1C, RL78/L12, RL78/L13	CS+ V2.11.00 AP4 V1.10.00 Applilet3 V1.10.00
		3. Code Generated for UART0 and UARTF	RL78/F12	CS+ V2.11.00 Applilet3 V1.10.00

Issue Date	Document No.	Description	Device Concerned	Fixed version
Nov. 16, 2015	151116/tn2	1. Indication of Channels of Serial Interface IICA	RL78/G14	CS+ V2.11.00 Applilet3 V1.10.00
		2. Procedure for Setting the PLL Clock	RL78/F13, RL78/F14, RL78/F15	CS+ V2.11.00 Applilet3 V1.10.00
Jan. 16, 2016	160116/tn5	Transfer of data with a length of 10 or more bits through an element of a serial array unit configured as a CSI or data with a length of 16 bits through an element configured as a UART	RL78/F12, RL78/F13, RL78/F14, RL78/F15, RL78/D1A	CS+ V2.11.00 Applilet3 V1.10.00
Feb. 16, 2016	160216/tn5	1. Using the error interrupt of serial array unit 4 as UART4 or DALI4	RL78/I1A	CS+ V2.11.00 Applilet3 V1.10.00
		2. Using serial array unit 4 as DALI4	RL78/I1A	CS+ V2.11.00 Applilet3 V1.10.00
Mar. 16, 2016	160316/tn1	Pin settings for the IICA serial interface when setting the PIOR to change the assignment of pin functions	RL78/G12	CS+ V2.11.00 Applilet3 V1.10.00
Jun. 16, 2016	R20TS0038EJ0100	Scan Mode of A/D Converter	RL78/F12, RL78/F13, RL78/F14, RL78/F15, RL78/G1A	CS+ V2.12.00 Applilet3 V1.11.00
Aug. 01, 2016	R20TS0045EJ0100	Peripheral I/O redirection register 0 (PIOR0)	RL78/G1F	CS+ V2.12.00 AP4 V1.11.00
Mar. 1, 2017	R20TS0139EJ0100	1. Input of Ports P10 and P11	RL78/G13 (20/24/25pin product)	CS+ V2.14.00 Applilet3 V1.13.00
		2. Port Settings Related to Reset Processing	RL78/F12 (20pin product)	CS+ V2.14.00 Applilet3 V1.13.00

Issue Date	Document No.	Description	Device Concerned	Fixed version
Dec. 16, 2017	R20TS0244EJ0100	When Continuous Transfer Mode is Selected in the CSI Configuration	RL78/D1A, RL78/F12, RL78/F13, RL78/F14, RL78/F15	CS+ V2.16.00 Applilet3 V1.15.00
			RL78/H1D, RL78/I1C, RL78/L12, RL/78L13	CS+ V2.21.00, AP4 V1.20.00 Applilet3 V1.20.00
Mar. 16, 2018	R20TS0290EJ0100	When Opening a Project for RL78/G11 Created by a Previous Version of Code Generator	RL78/G11 (20-pin R5F1056A)	CS+ V2.16.00 AP4 V1.15.00
May. 16, 2018	R20TS0313EJ0100	Writing to Port-Related Registers for Unused Pins	RL78/I1D	CS+ V2.16.00 AP4 V1.15.00
Nov. 16, 2018	R20TS0370EJ0100	When setting the Serial UART4	RL78/I1A	CS+ V2.17.00 Applilet3 V1.16.00
Jun. 1, 2019	R20TS0432EJ0100	1. PLL clock setting of clock generator	RL78/F13, RL78/F14, RL78/F15	CS+ V2.18.00 Applilet3 V1.17.00
		2. RTC operation clock setting of clock generator	RL78/F13, RL78/F14, RL78/F15	CS+ V2.18.00 Applilet3 V1.17.00
			RL78/D1A	CS+ V2.19.00 Applilet3 V1.18.00

Issue Date	Document No.	Description	Device Concerned	Fixed version
2019/08/01	R20TS0459EJ0100	1. When using IICA0 or IICA1 as a Single Master System	RL78/G10, RL78/G11, RL78/G12, RL78/G13, RL78/G14, RL78/F12, RL78/F13, RL78/F14, RL78/F15	CS+ V2.19.00 AP4 V1.18.00 Applilet3 V1.18.00
			RL78/H1D, RL78/I1C, RL78/L12, RL78/L13	CS+ V2.21.00, AP4 V1.20.00 Applilet3 V1.20.00
			RL78/G1A, RL78/G1C, RL78/G1D, RL78/G1F, RL78/G1H, RL78/I1A, RL78/I1B, RL78/L1A, RL78/L1C	Not supported
		2. When using the R_ADC_Set_ADChannel() function in the A/D converter	RL78/D1A, RL78/G1A, RL78/G1F, RL78/I1D	CS+ V2.19.00 AP4 V1.18.00 Applilet3 V1.18.00
2019/09/16	R20TS0472EJ0100	1. When using the data flash library	RL78/D1A, RL78/G11, RL78/G12, RL78/G13, RL78/G14, RL78/F12, RL78/F13, RL78/F14, RL78/F15	CS+ V2.19.00 AP4 V1.18.00 Applilet3 V1.18.00
2020/02/01	R20TS0545EJ0100	1. Callback function setting of CSI and UART 2. Operation that cancels pin function assignment of CSI and UART	RL78/G11	CS+ V2.21.00, AP4 V1.20.00
			RL78/I1E	CS+ V2.22.00, AP4 V1.21.00
2020/02/01	R20TS0544EJ0100	1. When using the trace function of the on-chip debug setting	RL78/F15	CS+ V2.21.00, Applilet3 V1.20.00
2020/05/16	R20TS0571EJ0100	1. User option byte (000C1H/010C1H) LVD off setting values	RL78/G13A	CS+ V2.21.00 Applilet3 V1.20.00

5. Restrictions

This section describes the restriction regarding the Code Generator for RL78.

5.1 List of Restrictions

Table 5-1. List of Points of Restriction

✓: Applicable, -: Not applicable

No	Description	Group													
		RL78/D1A	RL78/G10	RL78/G11	RL78/G12	RL78/G13, G13A	RL78/G14	RL78/G1A	RL78/G1C	RL78/G1D	RL78/G1E	RL78/G1F	RL78/G1G	RL78/G1H	RL78/H1D
1	Timer array unit input clock sauce	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	24-pin device TAU0 channel 1 setting restriction	-	-	-	-	-	-	-	-	-	-	✓	-	-	-
3	Real-time clock API function	-	-	-	-	-	-	-	-	-	-	✓	-	✓	-
4	Unit for 'Gain setting' of ΔΣ A/D CONVERTER	-	-	-	-	-	-	-	-	-	-	-	-	-	✓
5	Restrictions on CSI continuous transfer mode	✓	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	-
6	Incorrect function description in data lash library	-	-	✓	✓	✓	✓	-	-	-	-	-	-	-	-
7	Operation clock when fSUB and fIL are selected in TAU input pulse interval measurement	-	-	-	-	✓	✓	-	-	-	-	-	-	-	-
8	64-bit environment restrictions	✓	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Incorrect content of R_ELC_Stop() function	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	-
10	The trace address is incorrect	-	-	-	-	-	-	-	-	-	-	✓	-	-	-
11	R_ELC_Stop() function build error in IAR Embedded Workbench	-	-	-	-	-	✓	-	-	-	-	-	-	-	-
12	Generate multiple [Code Generator] categories	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 5-2. List of Points of Restriction

✓: Applicable, -: Not applicable

No	Description	Group													
		RL78/F12	RL78/F13	RL78/F14	RL78/F15	RL78/F1E	RL78/I1A	RL78/I1B	RL78/I1C	RL78/I1D	RL78/I1E	RL78/L12	RL78/L13	RL78/L1A	RL78/L1C
1	Timer array unit input clock sauce	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-
2	24-pin device TAU0 channel 1 setting restriction	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Real-time clock API function	-	-	-	-	-	-	-	-	-	✓	-	-	-	-
4	Unit for 'Gain setting' of ΔΣ A/D CONVERTER	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Restrictions on CSI continuous transfer mode	-	-	-	-	-	✓	✓	-	✓	✓	-	-	✓	✓
6	Incorrect function description in data lash library	✓	✓	✓	✓	-	-	-	-	-	✓	-	-	-	-
7	Operation clock when fSUB and fIL are selected in TAU input pulse interval measurement	✓	-	-	-	-	-	-	-	-	-	-	-	-	-
8	64-bit environment restrictions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Incorrect content of R_ELC_Stop() function	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	-
10	The trace address is incorrect	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	R_ELC_Stop() function build error in IAR Embedded Workbench	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Generate multiple [Code Generator] categories	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

5.2 Details for Restriction

5.2.1 Timer array unit input clock sauce

When the clock sauce of a timer input is set as a RTC1HZ output by setup of a timer array unit, a setup about the output of the RTC1HZ terminal of a real-time clock becomes invalid. The code which outputs RTC1HZ then is not generated.

[Workaround] When you set to a RTC1HZ signal by setup of a timer array unit, please choose a setup which uses a real-time clock and add the code which outputs RTC1HZ.

5.2.2 24-pin device TAU0 channel 1 setting restriction

In the 24-pin device, interval timer is only selectable for the TAU0 channel 1 setting.

[Workaround] There is no workaround.
In the 32-pin device, other timer functions besides “Interval timer” are selectable for the TAU0 channel 1 setting. Refer to the setting to make a correction.

5.2.3 Real-time clock API function

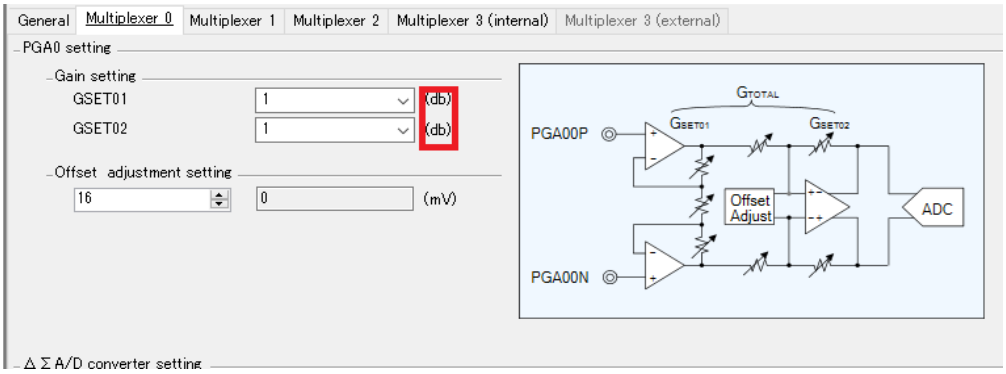
An unnecessary wait time code is output in the R_RTC_Set_AlarmOn().

```
/* Change the waiting time according to the system */
for (w_count = 0U; w_count < RTC_WAITTIME_2FRTC; w_count++)
{
   NOP();
}
```

[Workaround] There is no workaround.
I Delete the wait time code in the R_RTC_Set_AlarmOn () function after generating the code.

5.2.4 Unit for 'Gain setting' of ΔΣ A/D CONVERTER

The unit of Multiplexer 0/1/2/3(Internal)/3(external) are 'db' but it should be 'Gain'.



[Workaround] Please interpret ‘db’ as ‘Gain’ when use GSET01 and-or GSET02.

5.2.5 Restrictions on CSI continuous transfer mode

When CSI is used in continuous transfer mode, 2 bytes are received even if 1 is specified in the function argument.

[Workaround] Change the code in the red frame below. If code generation is executed again after changing the code, the code will be overwritten and deleted, so be caution.

[R_CSIn_Receive() function] case with CSI00

[Before]

```
MD_STATUS R_CSI00_Receive(uint8_t * const rx_buf, uint16_t rx_num)
{
    MD_STATUS status = MD_OK;

    if (rx_num < 1U)
    {
        status = MD_ARGERROR;
    }
    else
    {
        SMR00 |= _0001_SAU_BUFFER_EMPTY;
        g_csi00_rx_length = rx_num;    /* receive data length */
        g_csi00_rx_count = 0U;         /* receive data count */
        gp_csi00_rx_address = rx_buf;  /* receive buffer pointer */
        SIO00 = 0xFFU;    /* start receive by dummy write */
    }

    return (status);
}
```

[After]

```
MD_STATUS R_CSI00_Receive(uint8_t * const rx_buf, uint16_t rx_num)
{
    MD_STATUS status = MD_OK;

    if (rx_num < 1U)
    {
        status = MD_ARGERROR;
    }
    else
    {
        if ( 1U == rx_num )
        {
            SMR00 &= ~_0001_SAU_BUFFER_EMPTY;
        }
        else
        {
            SMR00 |= _0001_SAU_BUFFER_EMPTY;
        }
        g_csi00_rx_length = rx_num;    /* receive data length */
        g_csi00_rx_count = 0U;         /* receive data count */
        gp_csi00_rx_address = rx_buf;  /* receive buffer pointer */
        SIO00 = 0xFFU;    /* start receive by dummy write */
    }

    return (status);
}
```

[R_CSIn_Send_Receive() function] case with CSI00

[Before]

```
MD_STATUS R_CSI00_Send_Receive(uint8_t * const tx_buf, uint16_t tx_num, uint8_t * const rx_buf)
{
    MD_STATUS status = MD_OK;

    if (tx_num < 1U)
    {
        status = MD_ARGERROR;
    }
    else
    {
        g_csi00_send_length = tx_num;     /* send data length */
        g_csi00_tx_count = tx_num;        /* send data count */
        gp_csi00_tx_address = tx_buf;     /* send buffer pointer */
        gp_csi00_rx_address = rx_buf;     /* receive buffer pointer */
        SMR00 |= _0001_SAU_BUFFER_EMPTY;
        CSIMK00 = 1U;                     /* disable INTCSI00 interrupt */

        if (0U != gp_csi00_tx_address)
        {
            SIO00 = *gp_csi00_tx_address;    /* started by writing data to SDR[7:0] */
            gp_csi00_tx_address++;
        }
        else
        {
            SIO00 = 0xFFU;
        }

        g_csi00_tx_count--;
        CSIMK00 = 0U;                     /* enable INTCSI00 interrupt */
    }

    return (status);
}
```

[After]

```
MD_STATUS R_CSI00_Send_Receive(uint8_t * const tx_buf, uint16_t tx_num, uint8_t * const rx_buf)
{
    MD_STATUS status = MD_OK;

    if (tx_num < 1U)
    {
        status = MD_ARGERROR;
    }
    else
    {
        g_csi00_send_length = tx_num;     /* send data length */
        g_csi00_tx_count = tx_num;        /* send data count */
        gp_csi00_tx_address = tx_buf;     /* send buffer pointer */
        gp_csi00_rx_address = rx_buf;     /* receive buffer pointer */
        if ( 1U == tx_num )
        {
            SMR00 &= ~_0001_SAU_BUFFER_EMPTY;
        }
        else
        {
            SMR00 |= _0001_SAU_BUFFER_EMPTY;
        }
        CSIMK00 = 1U;                     /* disable INTCSI00 interrupt */

        if (0U != gp_csi00_tx_address)
        {
            SIO00 = *gp_csi00_tx_address;    /* started by writing data to SDR[7:0] */
            gp_csi00_tx_address++;
        }
        else
        {
            SIO00 = 0xFFU;
        }

        g_csi00_tx_count--;
        CSIMK00 = 0U;                     /* enable INTCSI00 interrupt */
    }

    return (status);
}
```

5.2.6 Incorrect function description in data lash library

There is an erroneous in the description of the R_FDL_BlankCheck () function and the R_FDL_Iverify () function. The description in Code Generator RL78 API Reference (P736) is the correct explanation. Please refer to it.

[Workaround] The code is not affected.

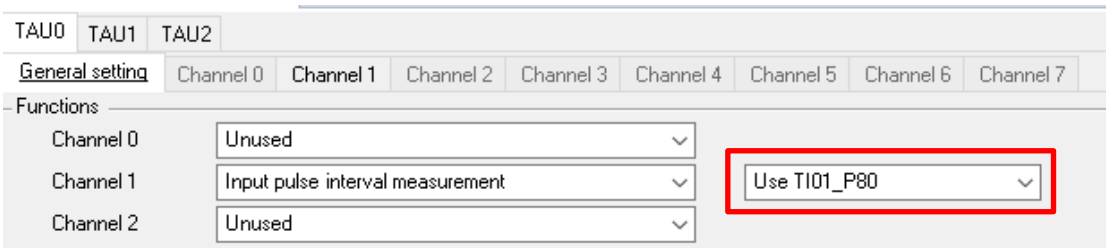
5.2.7 Operation clock when fSUB and fIL are selected in TAU input pulse interval measurement

When input pulse interval measurement is specified with TAU and fSUB and fIL are selected, the division ratio is fixed to fclk/2^8. Due to the fixed operation clock, the intended detection accuracy may not be achieved in the safety function frequency detection.

[Workaround] After code generation, change the operating clock (f_{MCK}) of the timer mode register from CK00 to CK01. If code generation is executed again after changing the code, the code will be overwritten and deleted, so be caution.

5.2.8 64-bit environment restrictions

After loading project (e^2 studio project or AP3 project) which is saved on 32-bit environment in 64-bit environment, TAU0 channel1 input selection (refer to the red box in the figure below) can't be kept.



[Workaround] Custom should confirm this GUI setting after loading project in such a case.

5.2.9 Incorrect code in R_ELC_Stop() function

The content of API R_ELC_Stop() should be fixed as "*sfr_addr = _00_ELC_EVENT_LINK_OFF;", but it generates other code sometimes.

[Workaround] Change the code in the red frame below. If code generation is executed again after changing the code, the code will be overwritten and deleted, so be caution.

[Before]

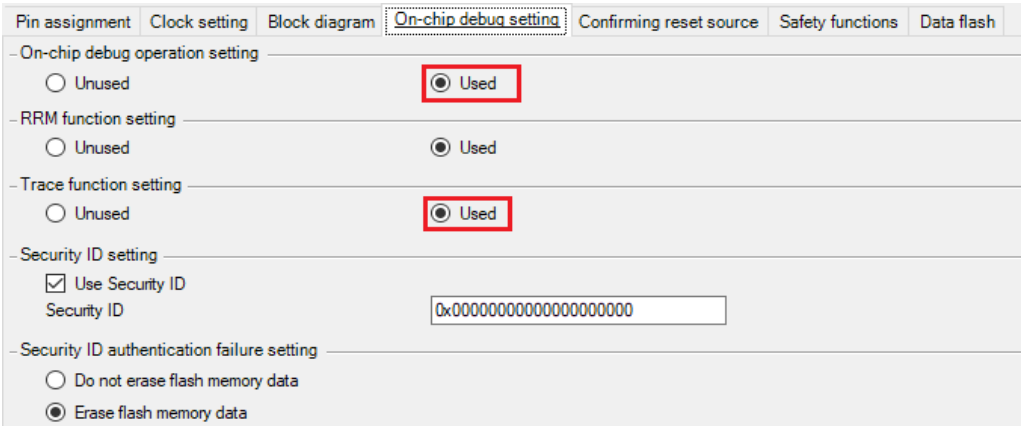
```
void R_ELC_Stop(uint32_t event)
{
    volatile uint32_t                  w_count;
    volatile uint8_t __no_bit_access * sfr_addr;

    sfr_addr = &ELSELR00;

    for (w_count = 0U; w_count < ELC_DESTINATION_COUNT; w_count++)
    {
        if (0x1U == ((event >> w_count) & 0x1U))
        {
            *sfr_addr = _04_ELC_EVENT_LINK_TAU05;
        }

        sfr_addr++;
    }
}
```

[After]

```
void R_ELC_Stop(uint32_t event)
{
    volatile uint32_t                  w_count;
    volatile uint8_t __no_bit_access * sfr_addr;

    sfr_addr = &ELSELR00;

    for (w_count = 0U; w_count < ELC_DESTINATION_COUNT; w_count++)
    {
        if (0x1U == ((event >> w_count) & 0x1U))
        {
            *sfr_addr = _00_ELC_EVENT_LINK_OFF;
        }

        sfr_addr++;
    }
}
```

5.2.10 The trace address is incorrect

When OCD and trace is used (as following picture) and IAR compiler is selected, the trace address should be 0xFED00 in r_cg_main.c.



[Workaround] Change the code in the red frame below. If code generation is executed again after changing the code, the code will be overwritten and deleted, so be caution.

Before:

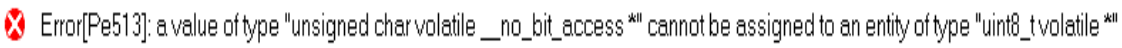
```
/* Secure trace RAM area */
__no_init __root unsigned char ocdtraceram[1024] @ 0xFE300;
```

After:

```
/* Secure trace RAM area */
__no_init __root unsigned char ocdtraceram[1024] @ 0xFED00;
```

5.2.11 R_ELC_Stop() function build error in IAR Embedded Workbench

When creating IAR project of RL78/G14 and using ELC function, it has build error as following picture:

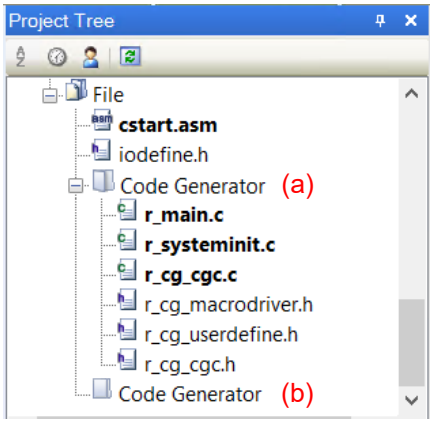


[Workaround] Add the code in the red frame below. If code generation is executed again after changing the code, the code will be overwritten and deleted, so be caution.

```
void R_ELC_Stop(uint32_t event)
{
    volatile uint32_t   w_count;
    volatile uint8_t __no_bit_access * sfr_addr;

    sfr_addr = &ELSELR00;

    for (w_count = 0U; w_count < ELC_DESTINATION_COUNT; w_count++)
    {
        if (((event >> w_count) & 0x1U) == 0x1U)
        {
            *sfr_addr = _00_ELC_EVENT_LINK_OFF;
        }

        sfr_addr++;
    }
}
```

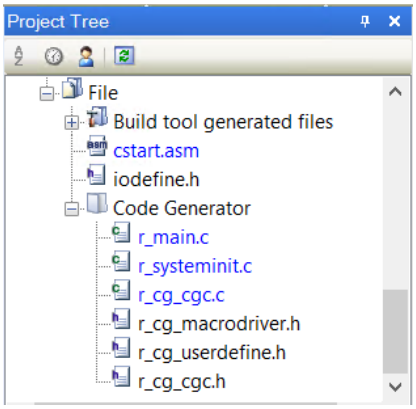
5.2.12 Generate multiple [Code Generator] categories

There are cases where multiple [Code Generator] categories are generated, as shown below.



[Workaround] You can remove unwanted [Code Generator] categories by following the steps below.

1. Select the [Code Generator] category in (a) and remove it from the project.
2. Make sure it has been removed from your project and run generate code.



6. Points for Caution

This section describes points for caution regarding the Code Generator for RL78.

6.1 List for Cautions

Table 6-1. List of Points for Caution

✓: Applicable, -: Not applicable

No	Description	Group													
		RL78/D1A	RL78/G10	RL78/G11	RL78/G12	RL78/G13, G13A	RL78/G14	RL78/G1A	RL78/G1C	RL78/G1D	RL78/G1E	RL78/G1F	RL78/G1G	RL78/G1H	RL78/H1D
1	Online Help (Applilet3, AP4)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Coding rule of MISRA-C.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	High-speed on-chip oscillator frequency select register	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Internal low-speed or internal high-speed oscillator trimming	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Serial array unit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Flash memory CRC operation function (high-speed CRC)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	Port mode select register (PMS)	✓	✓	-	-	✓	-	✓	✓	✓	✓	✓	✓	✓	✓
8	LIN-bus function of UART	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	Extension code, multi-master and wakeup function of serial interface IICA and multi-master function of simple IIC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10	CAN controllers	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Safety Functions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12	USB	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	RI78V4 project	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	DTC function (CS+ for CA,CX)	✓	-	-	-	✓	-	-	-	-	-	-	-	-	-
15	High Speed DTC chain transfer	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Fast Mode Plus setting in IICA slave	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
17	high-speed on-chip oscillator (CS+ for CA,CX)	-	-	✓	✓	✓	✓	-	-	-	-	-	-	-	-
18	Pin Configurator (CS+ for CA,CX)	-	-	✓	✓	✓	✓	-	-	-	-	-	-	-	-
19	Version notation of RL78/G13A generation file.	-	-	-	-	✓	-	-	-	-	-	-	-	-	-
20	Simple IIC stop condition generation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
21	Device change function	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	Code Generator doesn't support C++ project	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	Panel display of code generator node when using multiple projects in e^2 studio	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 6-2. List of Points for Caution

✓: Applicable, -: Not applicable

No	Description	Group													
		RL78/F12	RL78/F13	RL78/F14	RL78/F15	RL78/F1E	RL78/I1A	RL78/I1B	RL78/I1C	RL78/I1D	RL78/I1E	RL78/L12	RL78/L13	RL78/L1A	RL78/L1C
1	Online Help (Applilet3, AP4)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Coding rule of MISRA-C.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	High-speed on-chip oscillator frequency select register	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓
4	Internal low-speed or internal high-speed oscillator trimming	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Serial array unit	-	-	-	-	-	✓	-	-	-	-	-	-	-	-
6	Flash memory CRC operation function (high-speed CRC)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	Port mode select register (PMS)	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓
8	LIN-bus function of UART	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	Extension code, multi-master and wakeup function of serial interface IICA and multi-master function of simple IIC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10	CAN controllers	-	✓	✓	✓	✓	-	-	-	-	-	-	-	-	-
11	Safety Functions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12	USB	-	-	-	-	-	-	-	-	-	-	-	-	-	✓
13	RI78V4 project	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	DTC function (CS+ for CA,CX)	-	✓	✓	✓	✓	-	-	-	-	-	-	-	✓	-
15	High Speed DTC chain transfer	-	✓	✓	✓	-	-	-	-	-	-	-	-	-	-
16	Fast Mode Plus setting in IICA slave	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
17	high-speed on-chip oscillator (CS+ for CA,CX)	✓	✓	✓	-	-	✓	-	-	-	-	✓	-	-	-
18	Pin Configurator (CS+ for CA,CX)	✓	✓	✓	✓	-	✓	-	-	-	-	✓	-	-	-
19	Version notation of RL78/G13A generation file.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Simple IIC stop condition generation	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	-	✓	✓	✓
21	Device change function	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	Code Generator doesn't support C++ project	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	Panel display of code generator node when using multiple projects in e^2 studio	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

6.2 Details for Caution

6.2.1 Online Help (Applilet3, AP4)

Applilet3 and AP4 do not support online help.

6.2.2 Coding rule of MISRA-C

Compliance with the MISRA-C (Guidelines for the Use of the C Language in Vehicle Based Software) coding convention is not supported for source code output by the code generator.

6.2.3 High-speed on-chip oscillator frequency select register

The code generator is not equivalent to a setup of high-speed on-chip oscillator frequency select register.

6.2.4 Internal low-speed or internal high-speed oscillator trimming

The code generator is not equivalent to a setup of internal low-speed or internal high-speed oscillator trimming register.

6.2.5 Serial array unit

The code generator is not equivalent to a setup of single-wire UART mode and DMX512 communication.

6.2.6 Flash memory CRC operation function (high-speed CRC)

The code generator does not correspond to a flash memory CRC operation function (high-speed CRC). Please refer to application note r01an0736.
https://www.renesas.com/document/apn/rl78g13-safety-function-flash-memory-crc-operation-function

6.2.7 Port mode select register (PMS)

The code generator does not correspond to a port mode select register (PMS).

6.2.8 LIN-bus function of UART

The code generator is not supporting the LIN-bus functions of serial interface UART0, UART2, UART3, UART6 or UARTF.

6.2.9 Extension code, multi-master and wakeup function of serial interface IICA and multi-master function of simple IIC

The code generator is not supporting the extension code, multi-master and wakeup function of serial interface IICA. It isn't supporting the multi-master function of simple IIC also.

6.2.10 CAN controllers

The code generator is not supporting the CAN Controllers.

6.2.11 Safety Functions

The code generator is not supporting the USB host, USB function.

6.2.12 USB

The code generator is not supporting the USB host, USB function.

6.2.13 RI78V4 project

The Code generator can't be used in a project of RI78V4. But code generator is shown to a project of RI78V4.
Even if a code is generated, RI78V4 will be an unsupported purpose build error.

6.2.14 DTC function (CS+ for CA,CX)

When DTC is used, the following warning message is displayed and an object file is not generated.
CC78K0R warning W0837: Output assembler source file , not object file.
[Workaround]
Set up the following individual option of building.

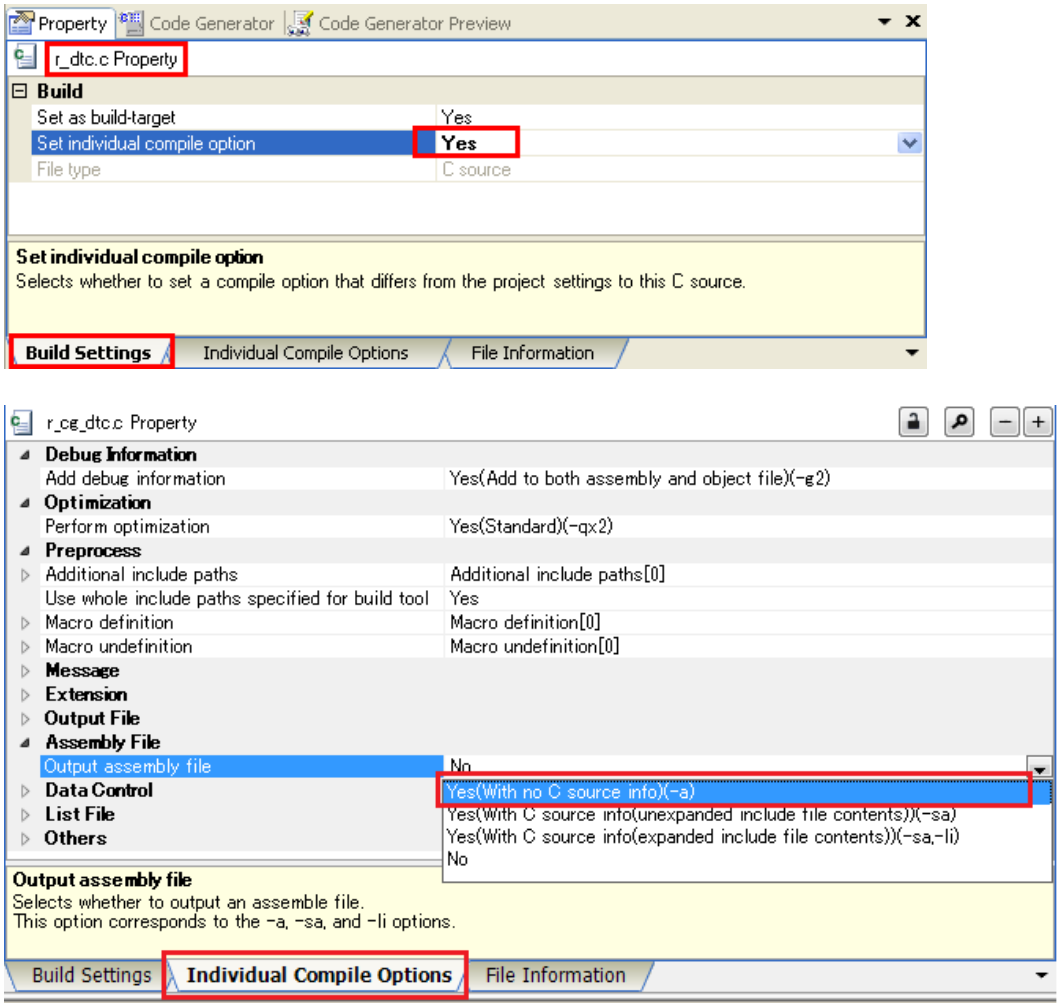


Figure 6-1 CS+ individual option of building

6.2.15 High Speed DTC chain transfer

Although there are chain transfer setting items of High Speed DTC, code corresponding to chain transfer is not supported.

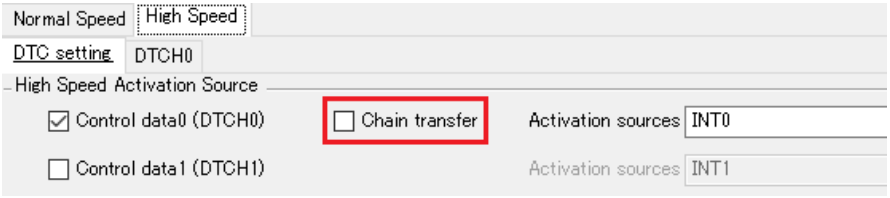


Figure 6-2 High Speed DTC

[Workaround] It cannot be used for chain transfer.

6.2.16 Fast Mode Plus setting in IICA slave

If the Fast Mode Plus is set when using the IICA slave, IICA Low level range setting register (IICWLn, n= channel number), and IICA High level range setting register (IICWHLn) are not set correctly.

[Workaround] There is no workaround.
After doing code generator, please rewrite the numerical value of the register setting of IICWLn, IICWHn in the R_IICAn_Create function. I depend on a system for the numerical value. Please change device UM to reference.

6.2.17 High-speed on-chip oscillator (CS+ for CA,CX)

When a high-speed on-chip oscillator clock is set up by CubeSuite+ RL78, 78K0R, and 78K0 code generator V2.01.00 or earlier, If it is read by CubeSuite+V2.03.00, a clock frequency setup of a high-speed on-chip oscillator may not be right.

[Workaround] Re-set up the frequency right in that case.

6.2.18 Pin Configurator (CS+ for CA,CX)

There is a pin which is not reflected even if it performs reflection to pin configurator from code generator.
Even if it sets up using a code generator PIOR function, it is not reflected to pin configurator.

[Workaround] Edit terminal information with pin configurator.

6.2.19 Version notation of RL78/G13A generation file.

The device name output in the version of the file generated by RL78/G13A is output as “RL78/G13” instead of “RL78/G13A”.

```
/***********************************************************************
* File Name    : r_main.c
* Version      : CodeGenerator for RL78/G13 V2.05.04.02 [20 Nov 2019]
* Device(s)    : R5F140PL
* Tool-Chain   : CCRL
* Description  : This file implements main function.
* Creation Date: 2019/11/27
***********************************************************************/
```

Figure 6-3 RL78/G13A version file

6.2.20 Simple IIC stop condition generation

Using simple IIC (master) to transmit data, after all data are transmitted to the slave, a stop condition should be generated, and the bus is released. Otherwise, subsequent data transmission can't start correctly. However, there is no generation of stop condition in code generator generated code because the code generator can't know when slave process completes.

[Workaround] User should manually check slave process completion and set stop condition in main() function.

For example:

```
void main(void)
{
    ....
    R_IICA0_Slave_Receive(IICA_rx_buff,5U);
    R_IIC00_Master_Send(16U, IIC0_tx_buff, 5U);
    while(IICA_Receive_flag != 1U);//After IICA0 receive all data, IICA_Receive_flag will become 1.
    R_IIC00_StopCondition();//Trigger stop condition signal.
    ....
}
```

Figure 6-4 The code in main()

6.2.21 Device change function

The Code Generator can only support device change function within same group and same pin-count devices. If the devices selected before and after change are in the same group and the number of pins is the same, the Code Generator can be changed with current setting successfully.
Otherwise, after change, Code Generator setting is restored to the initial state.

6.2.22 Code Generator doesn't support C++ project

The Code Generator doesn't support C++ project. So, please avoid using Code Generator in C++ project. Otherwise, maybe you can see a build error when C++ project build.

6.2.23 Panel display of code generator node when using multiple projects in e^2 studio

For the case there are multiple projects in e^2 studio project tree, after reopening one of "Peripheral Functions", "Code Preview", "Device Top View" and "Device List View" panels, the contents on the panel are uncertain.

[Workaround]
Double click any node under [Code Generator], then all these panels content will be refreshed to match the selected project.

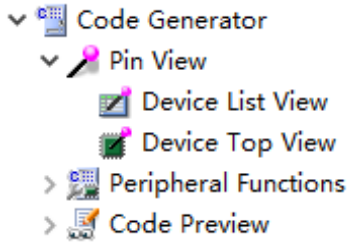


Figure 6-5 [Code Generator] node

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Oct 8, 2019	-	First edition issued
1.01	Jan 20, 2020	6	Updated “2. Supported devices” for Jan 20, 2020 release
		9	Updated “3. Changes” for Jan 20, 2020 release
		23	Update “4. History of Corrections Announced in Renesas Tool New” for Jan 20, 2020 release
		25	Update “5. Restrictions” for Jan 20, 2020 release
		31	Update “6. Cautions” for Jan 20, 2020 release
1.02	Apr 20.2020	3	Updated “1.1 Product version” for Apr.20. 2020 release
		4	Added e² studio 64-bit environment to "1.2.2 Development Tools"
		10	Updated “3. Changes” for Apr.20. 2020 release
		16	Updated “5. Restrictions” for Apr.20. 2020 release
1.03	Oct 6.2020	4	Updated “1.1 Product version”
		6	Updated “2. Supported devices”
		11	Updated “3. Changes”
		19	Updated “4. History of Corrections Announced in Renesas Tool New”
		24	Updated “5. Restrictions”
		34	Added ‘restart’ in “6.2.9”
		5	Updated “1.2.2 Development Tools"
		9	Updated “2. Supported devices”
		11	Updated “3. Changes”
		23	Updated “4. History of Corrections Announced in Renesas Tool New”
		28	Updated “5. Restrictions”
		36	Updated “6. Cautions”
1.04	Jan.20.2021	4	Updated “1.1 Product version”
		5	Updated “1.2.2 Development Tools"
		9	Updated “2. Supported devices”
		11	Updated “3. Changes”
		23	Updated “4. History of Corrections Announced in Renesas Tool New”
		28	Updated “5. Restrictions”
		36	Updated “6. Cautions”
1.05	Oct.15.2021	28, 36	Updated “5. Restrictions”
		37, 43	Updated “6. Cautions”
1.06	Jan.20.2022	10	Updated “3. Changes”
		19	Updated “4. History of Corrections Announced in Renesas Tool New”
		24	Updated “5. Restrictions”
		32	Updated “6. Points of Caution”
1.07	Jul.20.2022	24	Updated “5. Restrictions”

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

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

1. Precaution against Electrostatic Discharge (ESD)
   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on
   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state
   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins
   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals
   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin
   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses
   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products
   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
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