
R8C/36M Group, RL78/G13, RL78/G14

Peripheral Function Comparison between R8C/36M Group and RL78/G13,
RL78/G14

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Abstract

This document describes the Peripheral Function Comparison between R8C/36M Group and RL78/G13, RL78/G14.

Products

R8C Family: R8C/36M Group

RL78 Family: RL/G13 (64-pin products), RL78/G14 (64-pin products)

For more details and electrical characteristics, refer to the hardware user's manual and technical updates.

1. Peripheral Function Comparison

Table 1.1 to Table 1.11 show the peripheral function comparison between the R8C/36M Group and RL/G13 (64-pin products), RL78/G14 (64-pin products).

In this application note, peripheral functions of the RL78/G14 and RL78/G13 are compared to the peripheral functions in the R8C/36M Group in order to show a guideline when the R8C Family is replaced with the RL78 Family. Tables comparing the peripheral functions show which peripheral functions of the RL78/G14 and RL78/G13 apply to the peripheral functions of the R8C/36M Group. A comparison of CPU cores is not included in the tables.

CPU cores and clock circuitry are different between the R8C Family and RL78 Family. Note that peripheral functions inherited from the R8C Family (timer RJ ⁽¹⁾, timer RD, timer RG, and DTC) may not be able to perform the same operations in the RL78 Family.

For more details on RL78/G14 and RL78/G13 peripheral functions, refer to the documents listed in 2. Reference Documents.

Note:

1. Timer RJ is a 16-bit version of timer RA (an 8-bit timer with an 8-bit prescaler).

Table 1.1 Peripheral Function Comparison (1)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)	
Resets	Hardware reset	External reset input via <u>RESET</u> pin		
	Power-on reset	Internal reset by comparison of supply voltage and detection voltage of power-on-reset (POR) circuit		
	Voltage monitor 0 reset	Internal reset by comparison of supply voltage of the voltage detector (LVD) and detection voltage		
	Watchdog timer reset	Internal reset by watchdog timer program loop detection		
	Software reset	—		
Voltage Detection Circuits	Voltage monitor 0 reset	• Function of voltage detector (LVD) (reset mode) • Function of voltage detector (LVD) (Interrupt and reset mode)		
	Voltage monitor 1 interrupt	Function of voltage detector (LVD) (Interrupt mode)		
	Voltage monitor 2 interrupt	Function of voltage detector (LVD) (Interrupt mode)		
Ports	Input/output control	Port mode register i (i = 0 to 7, 12 to 14)		
	Input port	Pull-up resistor option		
	Output port	Input threshold control	A TTL input buffer can be selected using the port input mode register.	
		Drive capacity control	— (High current drive ports)	
	—	—	N-ch open-drain can be selected by the port output mode registers	
Protection	Protect by protect register (protect rewriting registers associated with part of RAM, ports, interrupts, clocks, and voltage detection, etc.)	Protect by invalid memory access detection control register (protect rewriting registers associated with part of RAM, ports, interrupts, clocks, and voltage detection, etc.)		
Interrupts	Undefined instruction interrupt	Undefined instruction interrupt	Internal reset by execution of illegal instruction	
	Overflow interrupt	Overflow interrupt	—	
	BRK interrupt	BRK interrupt	Execution interrupt of BRK instruction	
	INT instruction interrupt	INT instruction interrupt	—	
	Non-maskable interrupts	Watchdog timer interrupt	Watchdog timer interrupt	Internal reset by overflow of watchdog timer
		Oscillation stop detection interrupt	Oscillation stop detection interrupt	—
		Voltage monitor 1 interrupt/comparator A1 interrupt	Voltage monitor 1 interrupt/comparator A1 interrupt	—
	Voltage monitor 2 interrupt/comparator A2 interrupt	Voltage monitor 2 interrupt/comparator A2 interrupt	—	
	Address match interrupt	Address match interrupt	—	
	Maskable interrupts	Voltage monitor 1 interrupt	Voltage monitor 1 interrupt	Function of voltage detector (LVD) (Interrupt mode)
		Voltage monitor 2 interrupt	Voltage monitor 2 interrupt	Function of voltage detector (LVD) (Interrupt mode)
	INT [−] interrupts	Peripheral function interrupts	Peripheral function interrupts	Peripheral function interrupt
		INT [−] interrupt input (INT0 to INT4) (INT [−] input filter included Both edges, rising edge, and falling edge can be selected)	INT [−] interrupt input (INT0 to INT4) (INT [−] input filter included Both edges, rising edge, and falling edge can be selected)	External interrupt input (INTP0 to INTP11) (No input filter included Both edges, rising edge, and falling edge can be selected)
Key interrupt input (K10 to K13) (falling edge or rising edge set)		Key interrupt input (K10 to K13) (falling edge or rising edge set)	Key interrupt input (KRM0 to KRM7) (Falling edge only)	

Table 1.2 Peripheral Function Comparison (2)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)
Option function select areas	<ul style="list-style-type: none"> Select watchdog timer start at reset Select count source protection mode after reset Select watchdog timer underflow period Select watchdog timer refresh acknowledgement period Select voltage detection 0 circuit start Select voltage detection 0 level Select ROM code protect function 	<ul style="list-style-type: none"> Select watchdog timer operation Select watchdog timer operation in HALT/STOP mode Select watchdog timer overflow time Set window open period of watchdog timer Select watchdog timer interval interrupt Set LVD operation mode Set LVD detection level (VLVIH) Set minimum operation voltage (VLVIL) Set frequency of the internal high-speed oscillator Set flash operation mode Handling of data of flash memory in case of failure in on-chip debug security ID authentication Select control of on-chip debug operation 	
Watchdog timers	<p>Count source protection mode can be selected</p> <ul style="list-style-type: none"> Disabled: The count source for the watchdog timer is the CPU clock Enabled: The count source for the watchdog timer is the low-speed on-chip oscillator clock for the watchdog timer <p>Watchdog timer interrupt</p> <ul style="list-style-type: none"> Underflow Writing during out of the refresh acknowledgement period for the watchdog timer 	<p>Always protect count source</p> <ul style="list-style-type: none"> The count source is the internal low-speed oscillation clock 	
	<p>Watchdog timer reset</p> <ul style="list-style-type: none"> Underflow Writing during out of the refresh acknowledgement period for the watchdog timer 	<p>Interval interrupt when 75% of the overflow time is reached</p>	
Data Transfer Functions	<p>DTC (normal mode, repeat mode, and chain transfers)</p> <p>Unit of transfers (8 bits)</p> <p>Operation cannot be performed in wait or stop mode</p> <p>Fix control data allocation</p>	<p>DTC (normal mode, repeat mode, chain transfers)</p> <p>Unit of transfers (8 bits/16 bits)</p> <p>HALT/SNOOZE: Normal operation, STOP mode: Operation stopped</p> <p>Control data allocation variable</p>	<p>DMA (single transfer)</p> <p>HALT: Normal operation, STOP and SNOOZE mode: Operation stopped</p> <p>—</p>
		<p>Internal reset by watchdog timer program loop detection</p> <ul style="list-style-type: none"> Overflow Write during a window close period Use a 1-bit manipulation instruction on the WDTE register Write data other than "ACH" to the WDTE register 	

Table 1.3 Peripheral Function Comparison (3)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)
Timers	Timer RA (timer mode)	<ul style="list-style-type: none"> • Timer RJ (timer mode) • Timer RD (timer mode) • Timer RG (timer mode) • TAU interval timer • Interval timer 	<ul style="list-style-type: none"> • TAU interval timer • Interval timer
	Timer RA (pulse output mode)	<ul style="list-style-type: none"> • Timer RJ (pulse output mode) • Timer RD (timer mode (output compare function)) • Timer RG (timer mode (output compare function)) • TAU square wave output • TAU divider function (channel 0 (unit 0 only)) 	<ul style="list-style-type: none"> • TAU square wave output • TAU divider function (channel 0 (unit 0 only))
	Timer RA (event counter mode)	<ul style="list-style-type: none"> • Timer RJ (event counter mode) • Timer RD (timer mode) • Timer RG (timer mode) • TAU external event counter 	TAU external event counter
	Timer RA (pulse width measurement mode)	<ul style="list-style-type: none"> • Timer RJ (pulse width measurement mode) • Timer RD (timer mode (input capture function)) • Timer RG (timer mode (input capture function)) • TAU measurement of high-/low-level width of input signal 	TAU measurement of high-/low-level width of input signal
	Timer RA (pulse period measurement mode)	<ul style="list-style-type: none"> • Timer RJ (pulse period measurement mode) • Timer RD (timer mode (input capture function)) • Timer RG (timer mode (input capture function)) • TAU input pulse interval measurement 	TAU input pulse interval measurement

Table 1.4 Peripheral Function Comparison (4)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)
Timers	Timer RB (timer mode)	<ul style="list-style-type: none"> • Timer RJ (timer mode) • Timer RD (timer mode) • Timer RG (timer mode) • TAU interval timer • Interval timer 	<ul style="list-style-type: none"> • TAU interval timer • Interval timer
	Timer RB (programmable waveform generation mode)	<ul style="list-style-type: none"> • Timer RJ (pulse output mode) • Timer RD (timer mode (output compare function) and PWM mode) • Timer RG (timer mode (output compare function) and PWM mode) • TAU square wave output • TAU divider function (channel 0 (unit 0 only)) • TAU PWM output (channels 0-1 to 3 and 2-3) 	<ul style="list-style-type: none"> • TAU square wave output • TAU divider function (channel 0 (unit 0 only)) • TAU PWM output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7)
	Timer RB (programmable one-shot generation mode)	<ul style="list-style-type: none"> • Timer RD (PWM mode) • TAU one-shot pulse output (channels 0-1 to 3 and 2-3) 	<ul style="list-style-type: none"> • TAU one-shot pulse output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7)
	Timer RB (programmable wait one-shot generation mode)	<ul style="list-style-type: none"> • Timer RD (PWM mode) • TAU one-shot pulse output (channels 0-1 to 3 and 2-3) 	<ul style="list-style-type: none"> • TAU one-shot pulse output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7)

Table 1.5 Peripheral Function Comparison (5)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)
Timers	Timer RC (timer mode)	<ul style="list-style-type: none"> • Timer RJ (timer mode and event counter mode) • Timer RD (timer mode) • Timer RG (timer mode) • TAU interval timer • Interval timer • TAU external event counter 	<ul style="list-style-type: none"> • TAU interval timer • Interval timer • TAU external event counter
	Timer RC (timer mode (input capture function))	<ul style="list-style-type: none"> • Timer RJ (pulse width measurement mode and pulse period measurement mode) • Timer RD (timer mode (input capture function)) • Timer RG (timer mode (input capture function)) • TAU input pulse interval measurement • TAU measurement of high-/low-level width of input signal 	<ul style="list-style-type: none"> • TAU input pulse interval measurement • TAU measurement of high-/low-level width of input signal
Timer RC (16-bit timer)	Timer RC (timer mode (output compare function))	<ul style="list-style-type: none"> • Timer RJ (pulse output mode) • Timer RD (timer mode (output compare function) and PWM mode) • Timer RG (timer mode (output compare function) and PWM mode) • TAU square wave output • TAU divider function (channel 0 (unit 0 only)) • TAU PWM output (channels 0-1 to 3 and 2-3) 	<ul style="list-style-type: none"> • TAU square wave output • TAU divider function (channel 0 (unit 0 only)) • TAU PWM output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7)
	Timer RC (PWM mode)	<ul style="list-style-type: none"> • Timer RD (PWM mode) • Timer RG (PWM mode) • TAU PWM output (channels 0-1 to 3 and 2-3) 	<ul style="list-style-type: none"> • TAU PWM output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7)
Timer RC (PWM2 mode)		<ul style="list-style-type: none"> • Timer RD (timer mode (output compare function) and PWM mode) • Timer RG (timer mode (output compare function) and PWM mode) • TAU PWM output (channels 0-1 to 3 and 2-3) • TAU one-shot pulse output (channels 0-1 to 3 and 2-3) 	<ul style="list-style-type: none"> • TAU PWM output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7) • TAU one-shot pulse output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7)

Table 1.6 Peripheral Function Comparison (6)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)
Timers	Timer RD (timer mode)	<ul style="list-style-type: none"> • Timer RJ (timer mode and event counter mode) • Timer RD (timer mode) • Timer RG (timer mode) • TAU interval timer • Interval timer • TAU external event counter 	<ul style="list-style-type: none"> • TAU interval timer • Interval timer • TAU external event counter
	Timer RD (timer mode (input capture function))	<ul style="list-style-type: none"> • Timer RJ (pulse width measurement mode and pulse period measurement mode) • Timer RD (timer mode (input capture function)) • Timer RG (timer mode (input capture function)) • TAU input pulse interval measurement • TAU measurement of high-/low-level width of input signal 	<ul style="list-style-type: none"> • TAU input pulse interval measurement • TAU measurement of high-/low-level width of input signal
	Timer RD (timer mode (output compare function))	<ul style="list-style-type: none"> • Timer RJ (pulse output mode) • Timer RD (timer mode (output compare function) and PWM mode) • Timer RG (timer mode (output compare function) and PWM mode) • TAU square wave output • TAU divider function (channel 0 (unit 0 only)) • TAU PWM output (channels 0-1 to 3 and 2-3) 	<ul style="list-style-type: none"> • TAU square wave output • TAU divider function (channel 0 (unit 0 only)) • TAU PWM output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7)
	Timer RD (PWM mode)	<ul style="list-style-type: none"> • Timer RD (PWM mode) • Timer RG (PWM mode) • TAU PWM output (channels 0-1 to 3 and 2-3) 	<ul style="list-style-type: none"> • TAU PWM output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7)
	Timer RD (reset synchronous PWM mode)	<ul style="list-style-type: none"> • Timer RD (reset synchronous PWM mode) • TAU multiple PWM output (channels 0-1-2 and 0-2-3) 	<ul style="list-style-type: none"> • TAU multiple PWM output (channels 0-1-2, 0-2-3, 0-3-4, 0-4-5, 0-5-6, 0-6-7, 2-3-4, 2-4-5, 2-5-6, 2-6-7, 4-5-6, and 4-6-7)
	Timer RD (complementary PWM mode)	<ul style="list-style-type: none"> • Timer RD (complementary PWM mode) 	—
Timer RD (PWM3 mode)	—	—	—

Table 1.7 Peripheral Function Comparison (7)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)
		Timer RE (real-time clock mode)	Real-time clock
Timers	Timer RE (4-bit counter and 8-bit counter)	Timer RE (output compare mode)	<ul style="list-style-type: none"> • TAU square wave output • TAU divider function (channel 0 (unit 0 only)) • TAU PWM output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7)
		Timer RF (input capture mode)	<ul style="list-style-type: none"> • TAU input pulse interval measurement • TAU measurement of high-/low-level width of input signal
	Timer RF (16-bit timer)	Timer RF (output compare mode)	<ul style="list-style-type: none"> • TAU square wave output • TAU divider function (channel 0 (unit 0 only)) • TAU PWM output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7) • TAU multiple PWM output (channels 0-1-2, 0-2-3, 0-3-4, 0-4-5, 0-5-6, 0-6-7, 2-3-4, 2-4-5, 2-5-6, 2-6-7, 4-5-6, and 4-6-7)

Table 1.8 Peripheral Function Comparison (8)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)
Timers	Timer RG (timer mode)	<ul style="list-style-type: none"> • Timer RJ (timer mode and event counter mode) • Timer RD (timer mode) • Timer RG (timer mode) • TAU interval timer • Interval timer • TAU external event counter 	<ul style="list-style-type: none"> • TAU interval timer • Interval timer • TAU external event counter
	Timer RG (timer mode (input capture function))	<ul style="list-style-type: none"> • Timer RJ (pulse width measurement mode and pulse period measurement mode) • Timer RD (timer mode (input capture function)) • Timer RG (timer mode (input capture function)) • TAU input pulse interval measurement • TAU measurement of high-/low-level width of input signal 	<ul style="list-style-type: none"> • TAU input pulse interval measurement • TAU measurement of high-/low-level width of input signal
	Timer RG (16-bit timer)	<ul style="list-style-type: none"> • Timer RJ (pulse output mode) • Timer RD (timer mode (output compare function) and PWM mode) • Timer RG (timer mode (output compare function) and PWM mode) • TAU square wave output • TAU divider function (channel 0 (unit 0 only)) • TAU PWM output (channels 0-1 to 3 and 2-3) 	<ul style="list-style-type: none"> • TAU square wave output • TAU divider function (channel 0 (unit 0 only)) • TAU PWM output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7)
	Timer RG (PWM mode)	<ul style="list-style-type: none"> • Timer RD (PWM mode) • Timer RG (PWM mode) • TAU PWM output (channels 0-1 to 3 and 2-3) 	TAU PWM output (channels 0-1 to 7, 2-3 to 7, 4-5 to 7, and 6-7)
	Timer RG (phase counting mode)	<ul style="list-style-type: none"> • Timer RG (phase counting mode) • TAU external event counter 	TAU external event counter
Delay counter	—	TAU delay counter	
Clock output/buzzer output	—	Clock output/buzzer output controller (PCLBUZ0 and 1)	

Table 1.9 Peripheral Function Comparison (9)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)
Serial Interface UART0	Clock Synchronous Serial I/O Mode	Serial array unit: 3-Wire Serial I/O Communication CSI00 (unit 0 channel 0) CSI01 (unit 0 channel 1) CSI10 (unit 0 channel 2) CSI11 (unit 0 channel 3) CSI20 (unit 1 channel 0) CSI21 (unit 1 channel 1)	
	Clock Asynchronous Serial I/O (UART) Mode	Serial array unit: UART UART0 [CSI00 (unit 0 channel 0) and CSI01 (unit 0 channel 1)] UART1 [CSI10 (unit 0 channel 2) and CSI11 (unit 0 channel 3)] UART2 [CSI20 (unit 1 channel 0) and CSI21 (unit 1 channel 1)]	
Serial Interface UART1	Clock Synchronous Serial I/O Mode	Serial array unit: 3-Wire Serial I/O Communication CSI00 (unit 0 channel 0) CSI01 (unit 0 channel 1) CSI10 (unit 0 channel 2) CSI11 (unit 0 channel 3) CSI20 (unit 1 channel 0) CSI21 (unit 1 channel 1)	
	Clock Asynchronous Serial I/O (UART) Mode	Serial array unit: UART UART0 [CSI00 (unit 0 channel 0) and CSI01 (unit 0 channel 1)] UART1 [CSI10 (unit 0 channel 2) and CSI11 (unit 0 channel 3)] UART2 [CSI20 (unit 1 channel 0) and CSI21 (unit 1 channel 1)]	
Communications			

Table 1.10 Peripheral Function Comparison (10)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)
Communications	Serial Interface UART2	Clock Synchronous Serial I/O Mode	Serial array unit : 3-Wire Serial I/O CSI00 (unit 0 channel 0) CSI01 (unit 0 channel 1) CSI10 (unit 0 channel 2) CSI11 (unit 0 channel 3) CSI20 (unit 1 channel 0) CSI21 (unit 1 channel 1)
	Serial Interface UART2	Clock Asynchronous Serial I/O (UART) Mode	Serial array unit UART UART0 [CSI00 (unit 0 channel 0) and CSI01 (unit 0 channel 1)] UART1 [CSI10 (unit 0 channel 2) and CSI11 (unit 0 channel 3)] UART2 [CSI20 (unit 1 channel 0) and CSI21 (unit 1 channel 1)]
		Special mode 1 (I2C mode) (Master/slave function in single master system)	Serial array unit : Simplified I2C Communication (only master function in single master system) IIC00 (unit 0 channel 0) IIC01 (unit 0 channel 1) IIC10 (unit 0 channel 2) IIC11 (unit 0 channel 3) IIC20 (unit 1 channel 0) IIC21 (unit 1 channel 1)
		Multiprocessor communication function	—
		Clock synchronous communication mode	Serial array unit : 3-wire serial I/O CSI00 (unit 0 channel 0) CSI01 (unit 0 channel 1) CSI02 (unit 0 channel 2) CSI10 (unit 1 channel 0) CSI11 (unit 1 channel 1)
	Synchronous serial communication unit (SSU) ⁽¹⁾	4-wire bus communication mode: standard mode	Serial array unit : SPI function communication CSI00 (unit 0 channel 0) (Arbitration not checked and chip select controlled by ports)
		4-wire bus communication mode: bidirectional mode	—
		I2C bus Interface mode	Serial interface IICA
	I2C bus interface ⁽¹⁾	Clock synchronous serial mode	Serial array unit 3-wire serial I/O CSI00 (unit 0 channel 0) CSI01 (unit 0 channel 1) CSI02 (unit 0 channel 2) CSI10 (unit 1 channel 0) CSI11 (unit 1 channel 1)
	Hardware LIN	LIN communication in cooperation with timer RA and UART0	Serial array unit : UART UART0 (unit 0 channels 0 and 1) supporting LIN-bus

Note:
1. Clock synchronous serial interface (SSU and I2C bus interface cannot be used at the same time for R8C.)

Table 1.11 Peripheral Function Comparison (11)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)
Flash Memories	1-wire programming	Standard serial I/O mode 3	Flash memory programming mode single-line UART
	UART programming	Standard serial I/O mode 2	Flash memory programming mode UART0
	Parallel I/F programming	Parallel I/O mode	—
	Software programming	CPU rewrite mode	Flash memory programming by self-programming
	Security function	<ul style="list-style-type: none"> ID code check function (standard serial I/O mode) ROM code protect function (parallel I/O mode) Data protect function (CPU rewrite mode) 	<ul style="list-style-type: none"> Disabling block erase Disabling write Disabling rewriting boot cluster 0 Flash shield window function (self-programming only) On-chip debug security ID
	External oscillator	XIN clock generation circuit (0 to 20 MHz)	X1 oscillator (1 to 20 MHz)
	External sub-oscillator	XCIN clock generation circuit (32.768 kHz)	XT1 oscillator (32.768 kHz)
	On-chip oscillation circuit (high speed)	High-speed on-chip oscillator (40MHz [divide-by-2 to 9 can be selected])	Internal high-speed oscillator (64 MHz, 48 MHz, 32 MHz, 24 MHz, 16 MHz, 12 MHz, 8 MHz, or 1MHz can be selected)
	On-chip oscillation circuit (low speed)	Low-speed on-chip oscillator (125 kHz)	Internal low-speed oscillator (15kHz)
	Clocks	Power control	Wait mode Stop mode —
Enable/disable peripheral clock provision		<ul style="list-style-type: none"> Timer RC Timer RD Timer RG SSU, I²C bus A/D converter 	<ul style="list-style-type: none"> Timer array unit Timer RJ Timer RD Timer RG Real-time clock Interval timer A/D converter D/A converter Comparator Serial array unit Serial interface IICA DTC
			<ul style="list-style-type: none"> Timer array unit Real-time clock Interval timer A/D converter Serial array unit Serial interface IICA

Table 1.12 Peripheral Function Comparison (12)

Item	R8C/36M Group (64-pin products)	RL78/G14 (64-pin products)	RL78/G13 (64-pin products)	
Analog Converter Functions	A/D converter	One-shot mode Repeat mode 0 Repeat mode 1 Single sweep mode Repeat sweep mode	Select mode, one-shot conversion mode Select mode, sequential conversion mode —	
	D/A converter	D/A converter	Scan mode, One-shot conversion mode Scan mode, Sequential conversion mode	
	Comparator A	D/A converter • Compare a reference input voltage and an analog input voltage. • Output compared results	D/A converter (only for products with a code flash memory size of 96 KB or more) Comparator 0, comparator 1 (only for products with a code flash memory size of 96 KB or more)	—
	Comparator B	Compare a reference input voltage and an analog input voltage.	Comparator 0, comparator 1 (only for products with a code flash memory size of 96 KB or more)	—

2. Reference Documents

R36M Group User's Manual: Hardware Rev.1.00

RL78/G13 User's Manual: Hardware Rev.0.03

RL78/G14 User's Manual: Hardware Rev.0.02

The latest version can be downloaded from the Renesas Electronics website.

Technical Update/Technical News

The latest information can be downloaded from the Renesas Electronics website.

Website and Support

Renesas Electronics website

<http://www.renesas.com>

Inquiries

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Revision History	R8C/36M Group, RL78/G13, RL78/G14 Peripheral Function Comparison between R8C/36M Group and RL78/G13, RL78/G14
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Rev.	Date	Description	
		Page	Summary
1.00	Oct. 4, 2011	—	First edition issued
1.01	Mar. 5, 2012	—	Descriptions of Table 1.3 to 1.8 adjusted
		13	Table 1.11 Item in clocks added

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General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

1. Handling of Unused Pins

Handle unused pins in accord 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 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. Unused pins should be handled as described under Handling of Unused Pins in the manual.

2. Processing at Power-on

The state of the product is undefined at the moment 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 moment 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 moment 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 moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

Access to reserved addresses is prohibited.

- The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

4. Clock Signals

After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has 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. Moreover, 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.

5. Differences between Products

Before changing from one product to another, i.e. to one with a different part number, confirm that the change will not lead to problems.

- The characteristics of MPU/MCU in the same group but having different part numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different part numbers, implement a system-evaluation test for each of the products.

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