RL78

The True Low Power Microcontroller Platform

Renesas Electronics
www.renesas.eu

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RL78 The True Low Power Microcontroller Platform

RL78 from Renesas Electronics is an advanced family of general purpose and application specific microcontrollers (MCU's) combining true low power and high performance operation.

RL78's innovative Snooze mode allows serial communication and ADC operation in standby, which makes it best in class for battery powered designs.

Why RL78?

- World's best in class performance for an equivalent MCU family
- Scalability of physical size including smart pin layout
- System cost saving features
- Wide voltage operation
- Wide temperature operation
- On board security features

An extensive ecosystem and more details of RL78 can be found at **www.Renesas.eu/RL78**

Extensive Ecosystem

> Advanced development tools
> 3rd party support
> Online training: renesas interactive

True Low Power

> From 46µA/MHz operation
> 0.57 µA (RTC + LVD)
> Snooze mode

Broad Scalability

> 10 to 128 pins, 1 KB to 512 KB Flash
> Extensive product lineup to meet a broad range of requirements
> Pin compatibility
> Ability to reassign peripheral function pins

High Quality & Safety

> Flash memory with ECC
> Safety support includes iec 60730
> Wide operating temperature (-20° to 105°)
> Abnormal operation detection/avoidance function

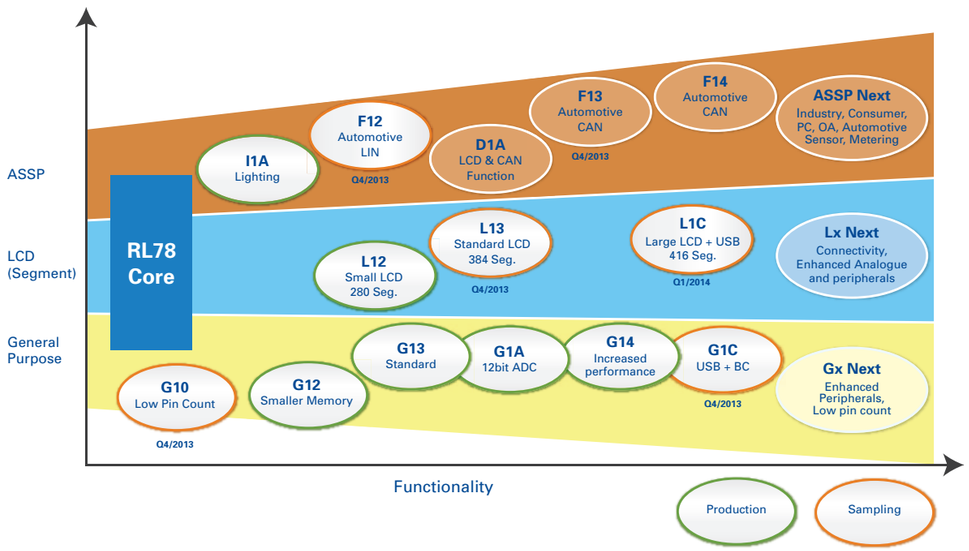
High Efficiency

> 1.39 DMIPS/MHz high-speed operation
> 1.6 V to 5.5 V operation
> Up to 32 MHz operation

System Cost Reduction

> 32/64 MHz +/- 1% OCO
> On-chip temperature sensor
> On-chip low-voltage detection circuit

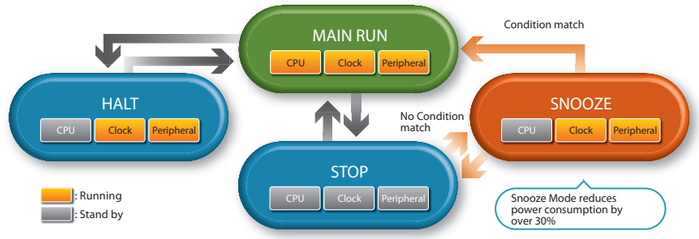
RL78 Roadmap



RL78 Low Power Modes

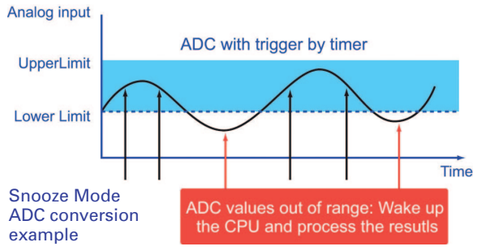
RL78 offers multiple power saving modes

- RL78's three low power modes maximise battery life, by offering flexible low power states to minimise CPU run time



Snooze Mode

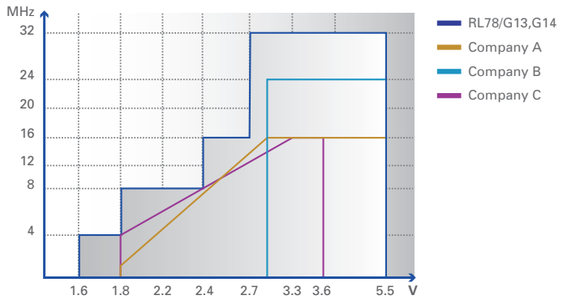
- No need to wake up CPU for receiving data
- The unique Snooze Mode allows some peripherals ie. ADC and UART operation whilst in standby modes
- Achieve 1/10th of the power consumption; Snooze mode uses 0.5mA vs. 5mA in Run mode (ADC)



Standby Modes

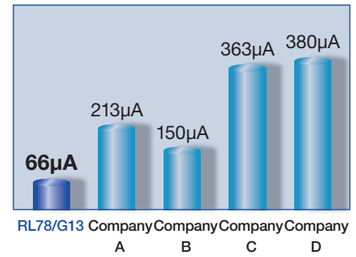
- Halt mode disables CPU operation saving as much as 80% of total MCU current, whilst allowing fast CPU enable time
- STOP mode achieves lowest power consumption by disabling more CPU functions

RL78 Wide Operating Voltage

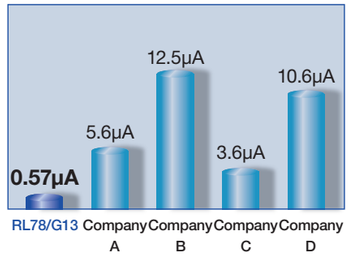


Power Consumption Values

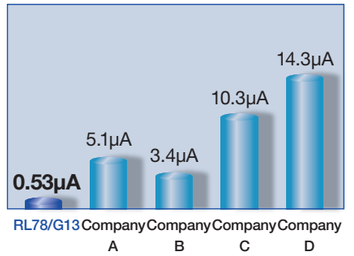
Current consumed in Main Run mode (µA/MHz)



Current consumed in Halt mode (32.768 kHz, RTC + LVD)



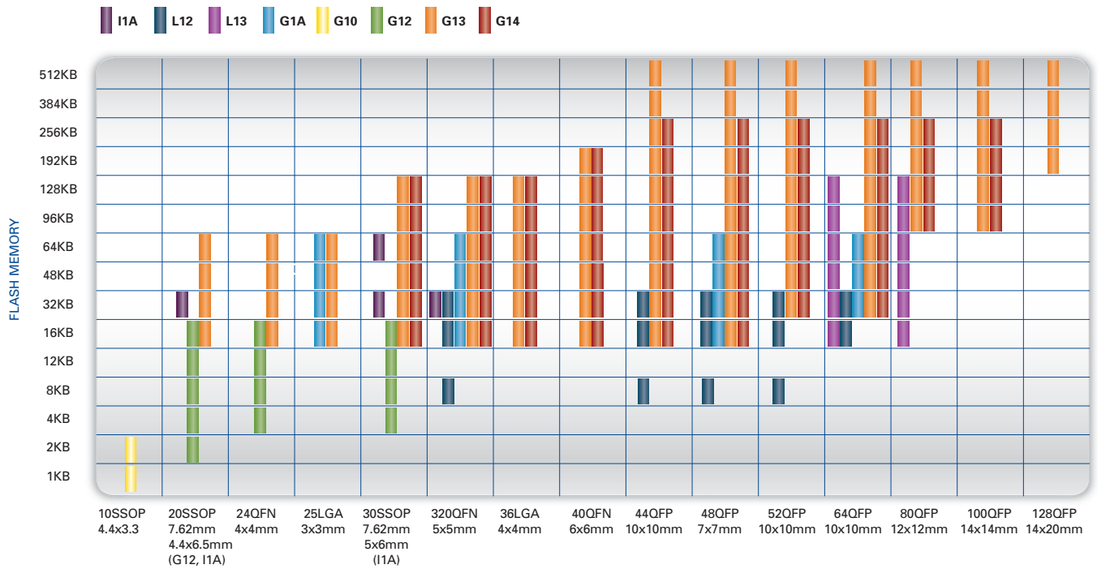
Current consumed in Stop mode (WDT + LVD)



Source: data sheets and actual measuren

RL78 General Purpose (G Series) Lineup

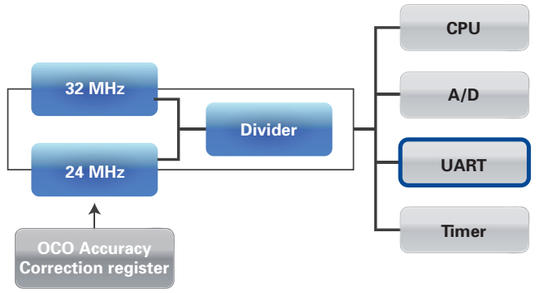
Packages available down to 3x3mm

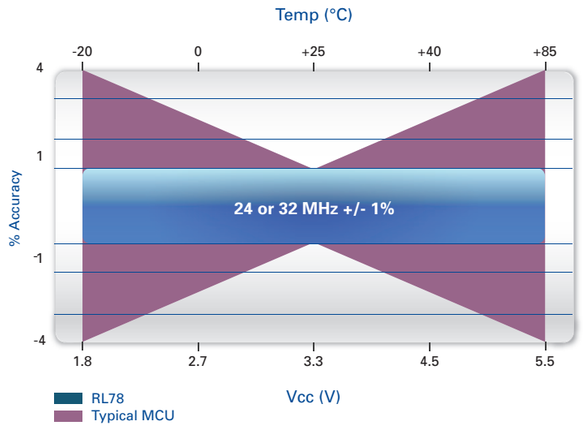


RL78 Reducing System Cost

High Accuracy On Chip Oscillator

- **+/-1% accuracy over temperature and voltage (-20 to 85 °C)**
- Two pre-set frequencies:
  24 MHz and 32MHz
  16MHz, 12MHz, 8MHz, 4MHz, 3MHz, 2MHz, 1MHz using divider
- Improved accuracy with correction register





RL78 Applications

RL78 offers System Designers key advantages for next generation designs, reducing system power, enhancing integration and providing a cost effective platform approach.

Industrial Automation

- RL78 offers and extensive range of small packages
- RL78 has standard and extended temperature range devices from -40 to +105^{0}C
- Renesas has a proven track record in IA with complimentary ASIC and ASSP solutions

Consumer

- RL78 MCU's offer a full calendar function
- RL78 has an integrated temperature sensor

White Goods

- RL78 offers integrated safety compliance for white goods (IEC 60730)
- RL78 offers high temperature support
- RL78's integrated peripherals make it the ideal choice for cost sensitive white goods

Lighting

- RL78/I1A offers dedicated DALI and Power Factor control
- RL78's free windows based Applilet software make it easy for designers to turn around a lighting design with little design experience
- RL78/IA integrates high resolution PWM timers

Home Automation

- For long battery life, RL78 offers class leading low power including the unique Snooze mode
- Battery operation down to 1.6V

Power Tools

- Renesas is renowned for high quality long life MCU's
- RL78 is available in multiple packages and scalable for the platform design approach

Medical

- When a small package MCU with long product life is required, RL78 is your first choice
- Renesas have provided solutions for Tier one Medical manufacturers and are part of the Continua alliance

Metering

- RL78's low power modes make the MCU ideal to meet industry power consumption requirements
- RL78 is analog rich, ideal for smart metering applications
- Renesas has three decades experience of providing high quality and long product life MCU's within metering

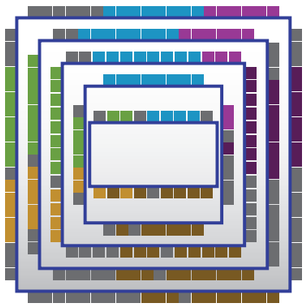
Motor Control

- RL78/G14 family is ideal for motor control applications with integrated MC timers
- RL78's on chip oscillators with 1% accuracy provide an integrated low cost solution for timing critical applications

Compatibility

RL78 MCU's offer full pin compatibility

- I/O and peripheral pins scale up
- Easily add additional I/O and functionality by migrating to a larger pin count
- Keep peripheral pin PCB layout in the same order/position as pin count is increased
- Software code can be reused across the full RL78 family from 20 pins to 128 pins

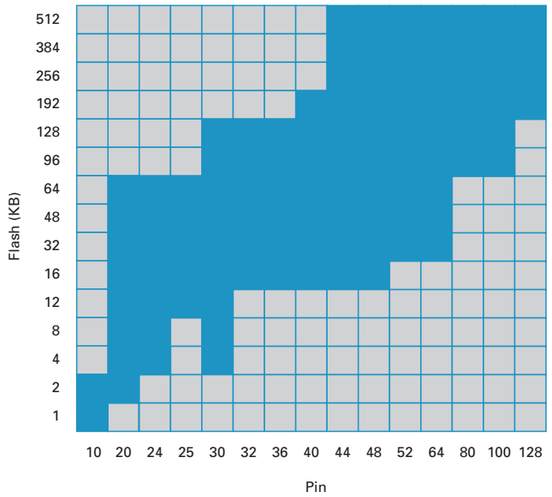


The colour coded pins of RL78/Gxx series opposite is an example of actual I/O port commonality from a 20pin SSOP up through 80pin QFP package version

Scalability

RL78 offers an unprecedented line up

- Over 300 devices
- Available in 10 to 128 pin packages & 1KB to 512KB Flash

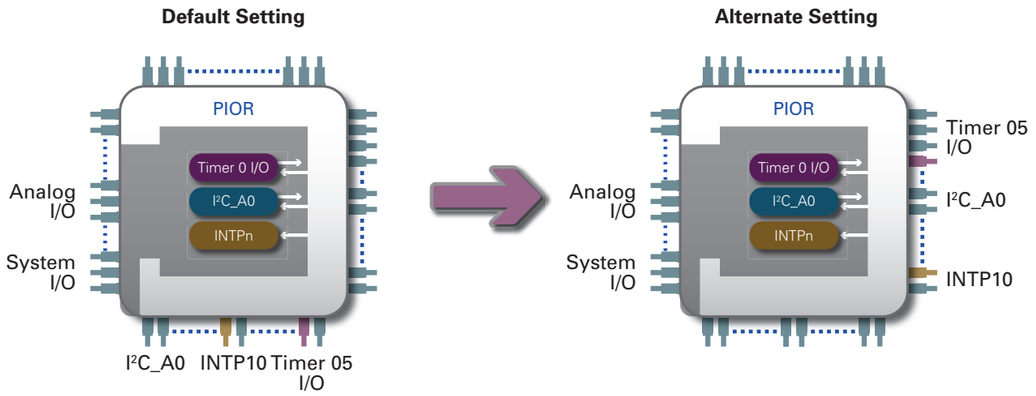


Flexibility

Peripheral I/O Re-direction (PIOR) capability remaps functions to alternate ports

- Due to layout or peripheral pin sharing constraint, there may be conflicts for existing peripheral I/O pin assignments
- Optimise peripheral pin functionality by easing function bottlenecks on a pin

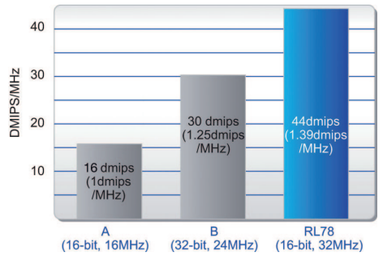
PIOR capability can help ease a bottleneck, as shown in this example by remapping to alternate pins



High Efficiency

RL78/G14 offers up to 44 DMIPS performance at 32MHz

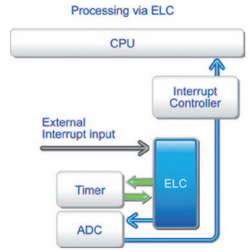
- Unrivalled power consumption/performance ratio (1/3 that of competitors)
- Higher DMIPS rating and lower power consumption than a popular 32 bit competitor technology
- RL78 offers widest operating voltage in its class from1.6V to 5.5V
- 85% instructions executed in one clock cycle



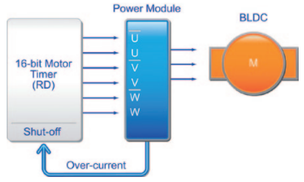
Advanced Features

Event Link Controller (ELC)

- ELC reduces interrupt processing
- ELC improves real time function & reduces program size by using less interrupts



Improved overall performance as ELC independently controls the operation reducing CPU overhead



- Integrated Motor Control timer functions
- Timer RD supports 5 modes of operation; Timer Mode, PWM Mode, Reset Synchronous PWM Mode, Complementary PWM Mode
- Security shut off function for over current or high impedance detection

Safety Features

Hardware for IEC/UL 60730 compliance

CRC

Two types of CRC hardware

- High-speed CRC (on flash memory)
- CRC peripheral (for application usage)

RAM

Parity / Write Protection

- Parity: Internal reset when parity error generated on Read or Write
- Write Protection: Select from: ~128B/~256B/~512B

SFR

Write Protection

- Write protection for: Port setting, interrupt setting, clock setting, LVI setting
- RAM Parity setting

CPU

Illegal memory access detection

- Illegal memory access: generates "internal reset"
- Trap instruction "FF" instruction generates "internal reset"

Clock

Stop Detection / Frequency check

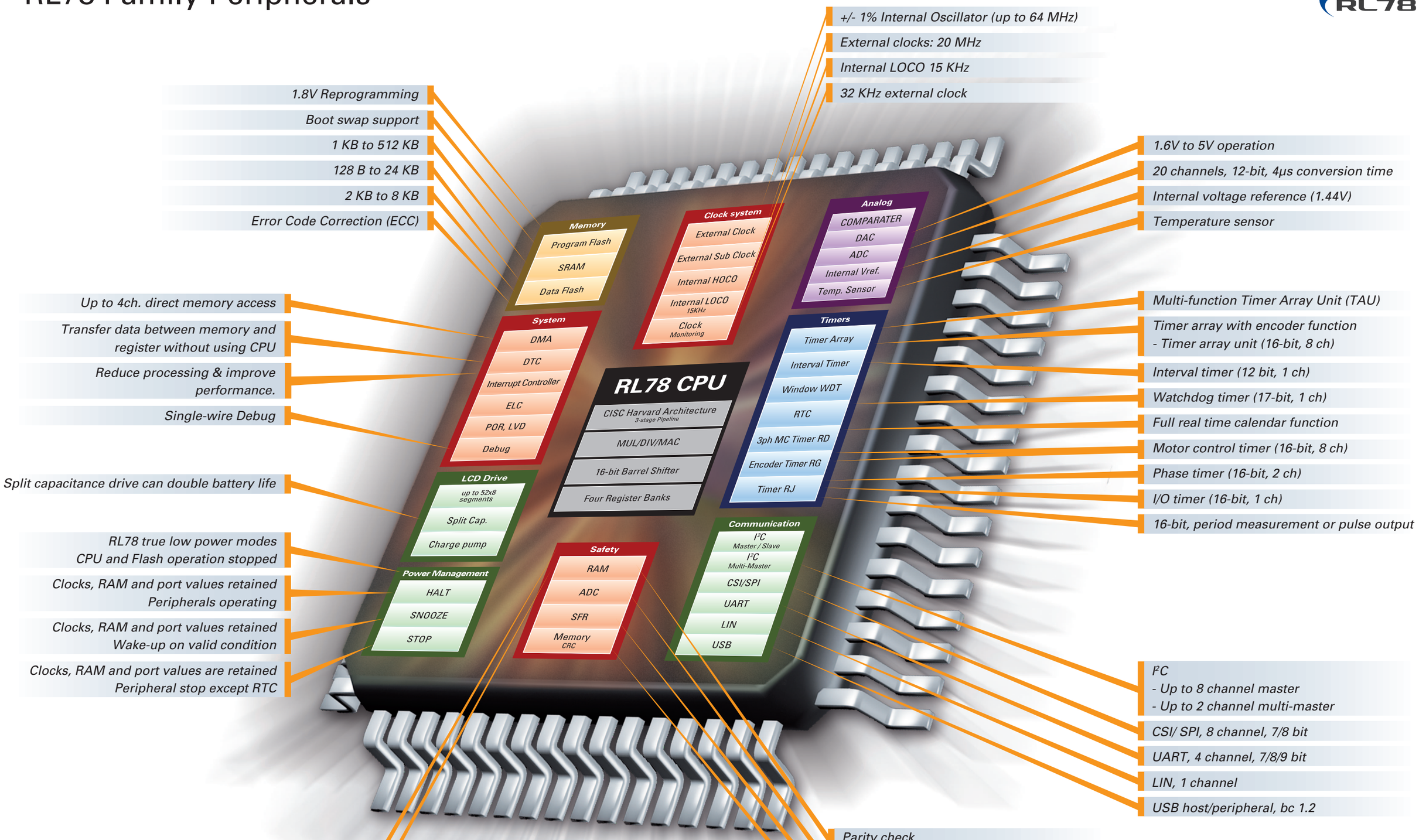
- Stop detection: possible to detect by WWDT
- Frequency check: possible to check by timer function

ADC

Multiple input signal selectable

- ADC measurement sources:
  - External ADC input pins
  - External / Internal AVref sources
  - Internal Vref (1.4 V typ)
  - Temperature sensor

RL78 Family Peripherals



Please refer to RL78 series datasheet for device functionality

RL78 Development Tools

Extensive Renesas Development Ecosystem

Renesas Electronics and selected partners offer a comprehensive suite of hardware and software tools for the rapid evaluation and development of embedded systems built with RL78.

Explore ⟶ Evaluate ⟶ Develop ⟶ Manufacture

Renesas
Promotion Board

Renesas
Starter Kit

Emulator E1
(OCD), IECUBE
(Full ICE)

Programmer PG-FP5,
Renesas Factory

Compiler
IAR Embedded Workbench (EWRL78)
Full C and C++ support, MISRA C compliance checker

Renesas e² studio
IAR & GNU build phase plug-in support, E1/ECUBE debug phase plug-in support

Code Generator
"Applilet" Royalty-free Windows based code generator

RTOS
Micrium µC/OS-II and µC/OS-III
CMX SYSTEMS RTX
freeRTOS
SEGGER embOS

Development Tools And Kits

Part Number	Title	Description
YRPBRL78G13	RL78/G13 Renesas Promotion Board (RPB)	USB evaluation board for RL78/G13
YR0K50100LS000BE	RL78/G13 Renesas Starter Kit (RSK)	Starter kit and E1 debugger for RL78/G13
YRPBRL78G14	RL78/G14 Renesas Promotion Board (RPB)	USB evaluation board for RL78/G14
YR0K50104LS000BE	RL78/G14 Renesas Starter Kit (RSK)	Starter kit and E1 debugger for RL78/G14
YRMCKITRL78G14	RL78/G14 Motor Control Kit	Sinusoidal commutation with Field Oriented Control (FOC)
YR0K5010JGS000BE	RL78/G1C Renesas Starter Kit (RSK)	Starter kit and E1 debugger for RL78/G1C
YRPBRL78L12	RL78/L12 Renesas Promotion Board (RPB)	USB evaluation board for RL78/L12
YR0K5010RLS000BE	RL78/L12 Renesas Starter Kit (RSK)	Starter kit and E1 debugger for RL78/L12
QB-RL78G13-ZZZ-EE	IECUBE (Full in circuit emulator)	Full in circuit emulator
PG-FP5-EE	Flash Programmer	Full Flash programmer
YR0E000010KCE00-EE	E1 Debugger	Low cost On-chip debugging emulator

RL78 Development Tools

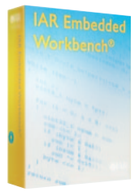
Software Development Tools

e² Studio

- Based on the popular Eclipse open source environment
- Complete IDE based on GNU or IAR compilers
- Powerful project management
- Download free at: www. Renesas.com/E2Studio

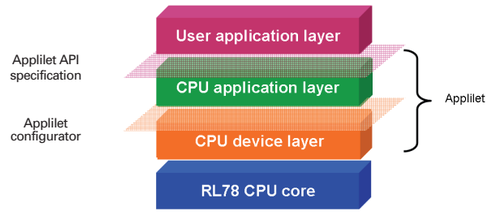
IAR Embedded Workbench

- Integrated development environment and optimised C++ compiler for RL78
- Project management tools and editor
- Configuration files for all RL78 devices
- Emulator Debugger Support
- Run-time libraries



Applilet

- Renesas software tool generates device driver code to initialize and use on-chip peripherals
- Full code generation for IAR EWRL78
- Integrated project wizard guides user to create a new project
- **Download free at: www.renesas.com/applilet**



Third Party RTOS Support

freeRTOS — Free of charge RTOS for download to deploy RL78 designs
Commercial versions available as OpenRTOS

CMX SYSTEMS — Fast context switching time
Nested Interrupts

Micrium — µC OSII & µC OSIII RTOS
Highly efficient and ideal for safety-critical designs

SEGGER www.segger.com — Priority controlled RTOS based on zero interrupt latency
Optimised for minimum memory consumption in both RAM and ROM

RL78 Low pin count

RL78/G10 series

RL78 family expands its lineup to offer a highly-integrated small, low-pin count 10 and 16-pin SSOP packaged MCUs, optimized for space-constrained, low-cost applications in consumer, industrial, and medical markets. Development is quick and easy due to cost-effective, professional development tools and **on-chip debugging** capabilities.

- **Low-Pin Count in small, cost saving packages**
  - 10pin 4.4x3.6mm SSOP, 16pin 4.4x5.0mm SSOP
- **8, 14 I/Os are available (10pin, 16pin)**
  - All the pins other than VDD/VSS pin can be used for I/Os
- **Small Flash memory size**
  - 1-4KB Flash memory
- **Serial communications**
  - I²C, CSI/SPI, UART
- **Timer Functions**
  - Multi-function Timer Array Unit (TAU), 1 PWM output
  - Clock output/ buzzer output
  - Watchdog
- **System Cost reduction with integrated features**
  - 20MHz On-Chip Oscillator +/- 2%
  - 15kHz Low speed On-Chip Oscillator
  - SPOR for Low Voltage Reset
- **Power Management**
  - Run: as low as 46uA/MHz
  - Stop: 0.56uA (RAM retained) w/ SPOR

Note: Basic power consumption (NOP operation)

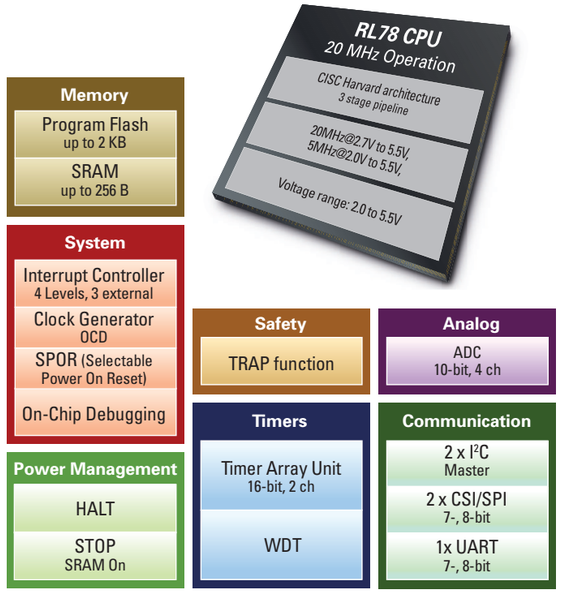
Flash Memory (KB)	RL78/G10	
	10-pins SSOP	16-pins SSOP
4		512 *
2	256	256 *
1	128	128 *
	SSOP 4.4 x 3.6	SSOP 4.4 x 5.0

RAM size (Byte)
* Under Planning

RL78/G10 Applications

Consumer:

- Small appliances, Healthcare applications, System management: RL78/G10 offers all the basic features with 8/14 I/O capabilities
- Charger, Discrete replacement: RL78/G10 offers ADC and Timers.



RL78 with advanced peripherals

RL78/G13 series

For applications that require increased performance the best-selling RL78/G13, G1A (12 bit ADC) and G14 series offer the same uncompromised low power RL78 solution but are also peripheral rich.
The series offer 16K to 512K of on-board Flash, have variants with high precision 12bit ADC, multiple smart timers and integrated safety functions.

- **Flash Memory**
  - 1.8V Reprogramming, Boot swap support
  - 16K - 512KB
  - Data: up to 8KB (option)
  - Error Code Correction (ECC)
- **System**
  - +/- 1% Internal Oscillator (32MHz, 24MHz)
  - 16x16 Multiplier, 32/32 Divider, Multiply-Accumulate
- **Power Management**
  - Operating: as low as 66uA/MHz
  - Halt: 0.57mA (RTC + LVD)
  - Stop: 220nA (RAM retained)
  - Snooze: 580uA (UART), 780uA (ADC)
- **Safety**
  - IEC/UL 60730 Support
  - Others: Illegal memory access, guard
- **Timers**
  - Multi-function Timer Array Unit (TAU)
  - Watchdog (window function)
- **Analog**
  - 1.6V (Vcc) operation
  - 26 channels, 10-bit, 2.1ms conversion time
  - Internal Voltage Reference (1.44V)
- **Communication**
  - SPI, UART, I²C, LIN
- **Packages**
  - 20-128 pins

RL78/G13 Applications

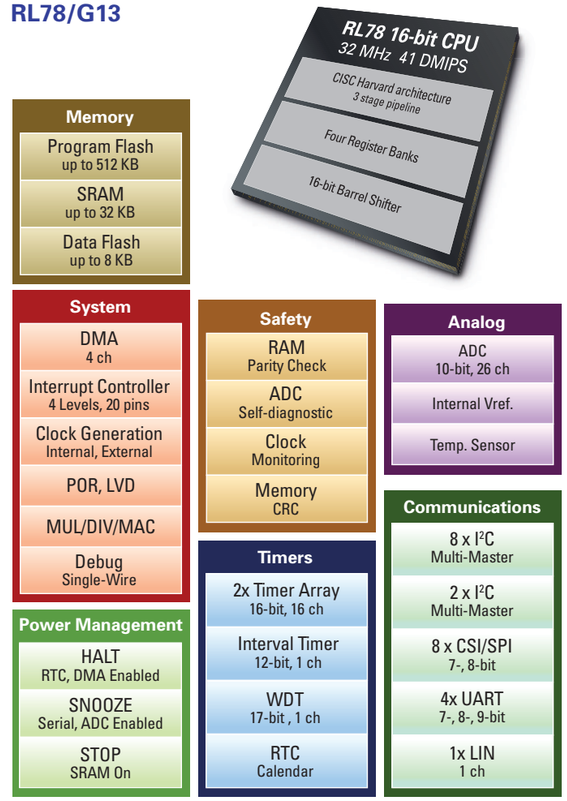
Industrial:

- Sensors
- Vending machines
- Meters
- Thermostats
- Detectors
- HMI

Consumer:

- Household appliances
- Power tools
- Camera's
- Electronic gaming

RL78/G13



RL78 With LCD Drive

RL78/L12 & RL78/L13 Series

The latest devices from the RL78 platform offer integrated LCD drive. The first member in the family with integrated LCD drive to be released is the RL78/L12.

- More segment drive for a smaller package: RL78/L12 can drive 35segment x 8 or 39 segment x 4. RL78/L13 can drive 47segment x 8com or 48seg x 4com
- **Low power LCD drive, only 0.6 uA @ 3 V with capacitor split method**
- Flexible control method: Split capacitors, capacitive charge pump or external split resistor
- Selectable functions (Seg or I/O) for every segment pin
- Drive for both A waveform glass and B waveform panel

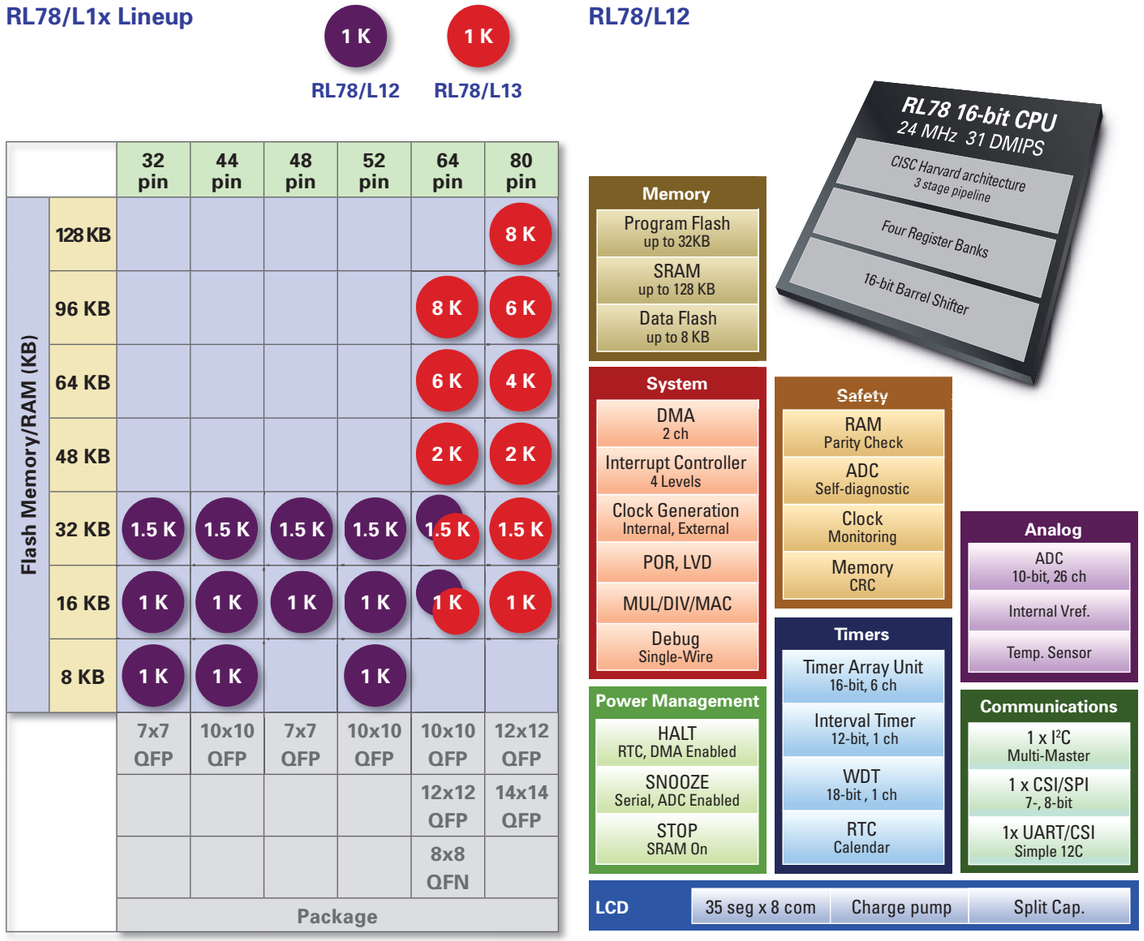
RL78/L1x Applications

- Home Automation: For long battery life and operation down to 1.6 V RL78 is the first choice

- Metering: RL78 is analogue rich, ideal for smart metering applications. Renesas has three decades of metering experience

- Medical: RL78 offers true low power consumption and rich features, ideal for portable healthcare devices and Renesas Electronics is an active member of Continua alliance.

RL78/L1x Lineup



RL78/L12

RL78 With USB

RL78/G1C series

As the RL78 family expands another new series of devices, the RL78/G1C adds USB connectivity. Renesas is one of the pioneers of USB bringing the first USB2.0 and USB3.0 ASSP's to market. RL78/G1C family integrates USB2.0 host and peripheral full speed functionality.

- **USB BC1.2 Compliance**
  RL78/G1C allows currents up to 1.5 A to be used during charging
- **USB Compatibility**
  - Support USB standard class driver (Host/Peripheral)
  - Support class: CDC/HID/MSC/PHD/etc.
- **Compact & small**
  - Cover Low Pin Count (LPC) area: 32pin to 48pin
  - Cover Small package: Body size (Min.5x5 mm), Thinness (Min.0.75 mm)
- **Wide Line-up**
  - Host/Peripheral, Peripheral, Host x 2ch
  - PKG variation: LQFP/QFN

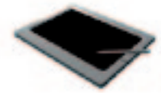
RL78/G1C Applications

Industrial:

Vending, printers and industrial meters. RL78/G1C offers USB2.0 host/peripheral LS/HS and offers 1% accuracy OCO.

Consumer:

DVD player, scanners and portable devices. RL78/G1C offers high speed battery charging (BC1.2 compliance).

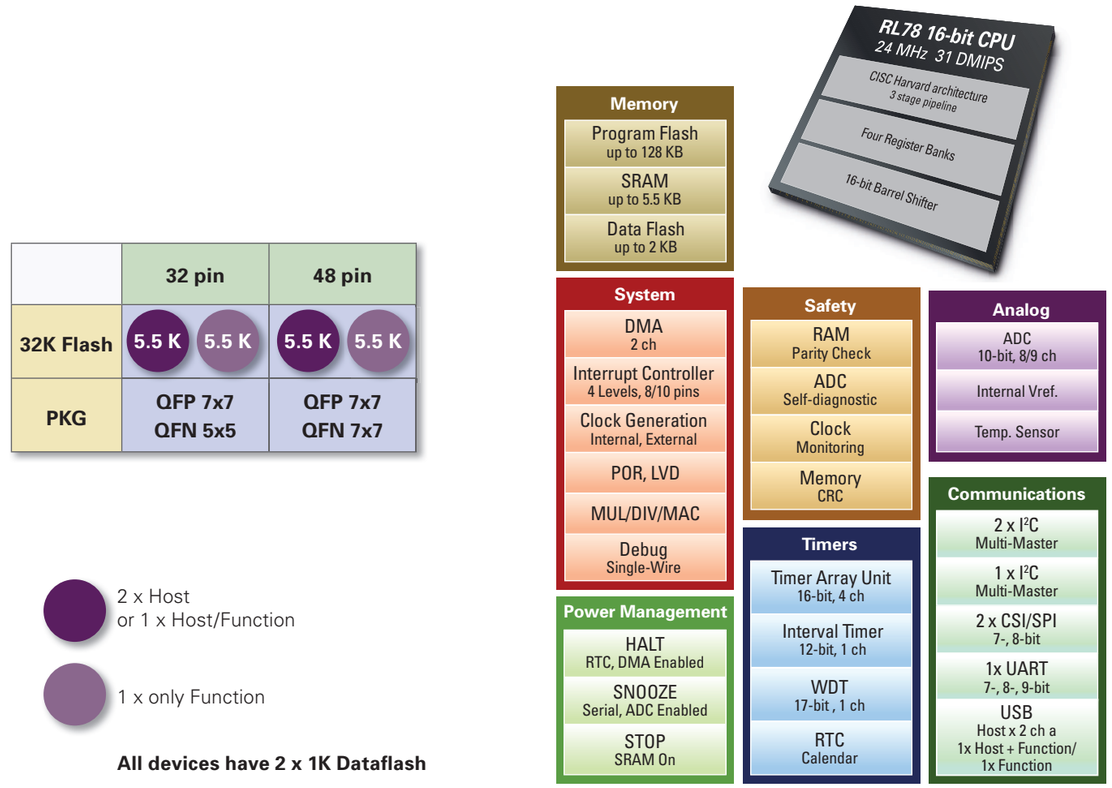


	32 pin	48 pin
32K Flash	5.5 K 5.5 K	5.5 K 5.5 K
PKG	QFP 7x7 QFN 5x5	QFP 7x7 QFN 7x7

2 x Host or 1 x Host/Function

1 x only Function

All devices have 2 x 1K Dataflash



Package lineup

10-SSOP (4.4 x 3.6)

Pin count	20-pin
Type	SSOP
Size	4.4 x 3.6
Pitch	0.65 mm
Thickness*	1.40 mm
Used by	RL78/G10

20-SSOP (7.62 mm)

Pin count	20-pin
Type	SSOP
Size	7.62 mm
Pitch	0.65 mm
Thickness*	1.40 mm
Used by	RL78/G13, F12

20-LSSOP (4.4 × 6.5 mm)

Pin count	20-pin
Type	LSSOP
Size	4.4 × 6.5 mm
Pitch	0.65 mm
Thickness*	1.45 mm
Used by	RL78/G12, I1A

24-WQFN (4 × 4 mm)

Pin count	24-pin
Type	WQFN
Size	4 × 4 mm
Pitch	0.50 mm
Thickness*	0.80 mm
Used by	RL78/G12, G13

25-FLGA (3 × 3 mm)

Pin count	25-pin
Type	FLGA
Size	3 × 3 mm
Pitch	0.50 mm
Thickness*	0.76 mm
Used by	RL78/G13, G1A

30-SSOP (7.62 mm)

Pin count	30-pin
Type	SSOP
Size	7.62 mm
Pitch	0.65 mm
Thickness*	1.40 mm
Used by	RL78/G12, G13, G14, I1A

32-LQFP (7 × 7 mm)

Pin count	32-pin
Type	LQFP
Size	7 × 7 mm
Pitch	0.80 mm
Thickness*	1.70 mm
Used by	RL78/G14

32-VQFN (5 × 6 mm)

Pin count	32-pin
Type	VQFN
Size	5 × 6 mm
Pitch	0.5 mm
Thickness*	0.95 mm
Used by	RL78/I1A

32-WQFN (5 × 5 mm)

Pin count	32-pin
Type	WQFN
Size	5 × 5 mm
Pitch	0.50 mm
Thickness*	0.80 mm
Used by	RL78/G13, G14, G1A, F12

36-FPLGA (4 × 4 mm)

Pin count	36-pin
Type	FPLGA
Size	4 × 4 mm
Pitch	0.50 mm
Thickness*	0.76 mm
Used by	RL78/G13, G14

38-SSOP (7.62 mm)

Pin count	38-pin
Type	SSOP
Size	7.62 mm
Pitch	0.65 mm
Thickness*	2.00 mm
Used by	RL78/I1A

40-WQFN (6 × 6 mm)

Pin count	40-pin
Type	WQFN
Size	6 × 6 mm
Pitch	0.50 mm
Thickness*	0.80 mm
Used by	RL78/G13, G14

44-LQFP (10 × 10 mm)

Pin count	44-pin
Type	LQFP
Size	10 × 10 mm
Pitch	0.80 mm
Thickness*	1.60 mm
Used by	RL78/G13, G14, L12

48-LQFP (7 × 7 mm)

Pin count	48-pin
Type	LQFP
Size	7 × 7 mm
Pitch	0.50 mm
Thickness*	1.60 mm
Used by	RL78/G13, G14, G1A, F12, L12

48-WQFN (7 × 7 mm)

Pin count	48-pin
Type	WQFN
Size	7 × 7 mm
Pitch	0.50 mm
Thickness*	0.80 mm
Used by	RL78/G13, G14, G1A, F12

52-LQFP (10 × 10 mm)

Pin count	52-pin
Type	LQFP
Size	10 × 10 mm
Pitch	0.65 mm
Thickness*	1.70 mm
Used by	RL78/G13, G14, L12

64-LQFP (14 × 14 mm)

Pin count	64-pin
Type	LQFP
Size	14 × 14 mm
Pitch	0.80 mm
Thickness*	1.70 mm
Used by	RL78/G14

64-LQFP (12 × 12 mm)

Pin count	64-pin
Type	LQFP
Size	12 × 12 mm
Pitch	0.65 mm
Thickness*	1.60 mm
Used by	RL78/G13, G14, L12

64-LQFP (10 × 10 mm)

Pin count	64-pin
Type	LQFP
Size	10 × 10 mm
Pitch	0.50 mm
Thickness*	1.60 mm
Used by	RL78/G13, G14, G1A, F12, L12

64-FPBGA (4 × 4 mm)

Pin count	64-pin
Type	FPBGA
Size	4 × 4 mm
Pitch	0.40 mm
Thickness*	0.99 mm
Used by	RL78/G13, G1A

64-FLGA (5 × 5 mm)

Pin count	64-pin
Type	FLGA
Size	5 × 5 mm
Pitch	0.50 mm
Thickness*	0.76 mm
Used by	RL78/G14

64-WQFN (8 × 8mm)

Pin count	64-pin
Type	WQFN
Size	8 × 8 mm
Pitch	0.40 mm
Thickness*	0.80 mm
Used by	RL78/L12

80-LQFP (14 × 14 mm)

Pin count	80-pin
Type	LQFP
Size	14 × 14 mm
Pitch	0.65 mm
Thickness*	1.70 mm
Used by	RL78/G13, G14

80-LQFP (12 × 12 mm)

Pin count	80-pin
Type	LQFP
Size	12 × 12 mm
Pitch	0.50 mm
Thickness*	1.60 mm
Used by	RL78/G13, G14

100-LQFP (14 × 20 mm)

Pin count	100-pin
Type	LQFP
Size	14 × 20 mm
Pitch	0.65 mm
Thickness*	1.60 mm
Used by	RL78/G13, G14

100-LQFP (14 × 14 mm)

Pin count	100-pin
Type	LQFP
Size	14 × 14 mm
Pitch	0.50 mm
Thickness*	1.60 mm
Used by	RL78/G13, G14

128-LQFP (14 × 20 mm)

Pin count	128-pin
Type	LQFP
Size	14 × 20 mm
Pitch	0.50 mm
Thickness*	1.60 mm
Used by	RL78/G13

* Indicates maximum thickness.

RL78 Part Number Guide

R5 | F | 10 | 0 | 6 | E | A | SP | #V0

- Renesas MCU
- ROM Type F: Flash
- RL78 Series
- Product Group

Family	Partname starts with	Comment
RL78/G10	R5F10Y	Low pin count, without Dataflash
RL78/G12	R5F102	with Dataflash
RL78/G12	R5F103	without Dataflash
RL78/G13	R5F100	with Dataflash
RL78/G13	R5F101	without Dataflash
RL78/G14	R5F104	without Dataflash, Motor Control timer, DTC, ELC
RL78/G1A	R5F10E	with 12bit ADC
RL78/L12	R5F10R	small LCD
RL78/L13	R5F10W	standard LCD
RL78/I1A	R5F107	for LED Lighting
RL78/G1C	R5F10J	USB: Host / Peripheral
RL78/G1C	R5F10K	USB: - / Peripheral

- Pin Count

6	20
7	24
8	25
A	30
B	32
C	36
D	38
E	40
F	44
G	48
J	52
L	64
M	80
P	100
S	128

- ROM Size (KB)

6	2
7	4
8	8
9	12
A	16
C	32
D	48
E	64
F	96
G	128
H	192
J	256
K	384
L	512

- Temperature and quality grade

A	-40°C to 85°C	Consumer
D	-40°C to 85°C	Industrial
G	-40°C to 105°C	Industrial
J	-40°C to 85°C	Automotive
K	-40°C to 125°C	Automotive

- Package and pin width

SP	SSOP	FP	QFP
NA	QFN	FB	QFP 0.5 mm
LA	LGA	FA	QFP 0.65 mm

- Packaging type

#V0, #30	Tray/Tube	Sn (Tin) only
#U0	Tray	SnCu & others
#X0, #50	T&R	SN (Tin) Only
#V0	T&R	SnCu & others

RL78 specifications RL78/G10 (10 pins)

Series		RL78/G10	
Pin count		10-pin	
Product name		R5F10Y14ASP	R5F10Y16ASP
CPU		RL78 CPU core	
Memory size	Flash memory (bytes)	1 K	2 K
	Data flash (bytes)	—	
	RAM (bytes)	128	256
Operating clocks	Maximum operating frequency (Hz): On-chip oscillator clock	20 M	
	Maximum operating frequency (Hz): External resonator clock	20 M	
Oscillators	Crystal/ceramic oscillator (Hz)	1 M to 20 M	
	On-chip high-speed oscillator (Hz)	20, 10, 2.5, 1.25 MHz	
	On-chip low-speed oscillator (Hz)	15 k	
	Subclock (32.768 kHz)	—	
I/O	I/O ports	6	
Timers	16-bit timer	2	
	Real-time counter	—	
	Watchdog timer	Without window function	
	Interval timer	—	
	PWM output	Up to 2	
Serial interfaces	CSI, UART	—	
	CSI: 2ch UART:1 ch, simplified I²C: 2ch	—	
	CSI, UART, simplifed I²C	1	
	I²C	—	
External interrupt sources		6	
OCD	On-chip debugging	Yes	
Peripherals	10-bit A/D converter	10-bit	
	8-bit D/A converter	—	
	Multiplier/divider	—	
	Comparator	—	
	Other features	—	
Safety features		WDT, TRAP instruction	
Other	Power supply voltage (V)	2.0 to 5.5	
	Operating ambient temperature (°C)	−40 to +85	
	Package size (mm)	SSOP (4.4x3.6)	SSOP (4.4x3.6)

RL78 specifications
RL78/G12 (20 to 30 pins)

Series			RL78/G12																								
Pin count			20-pin										24-pin								30-pin							
Product name			R5F10266ASP	R5F10267ASP	R5F10268ASP	R5F10269ASP	R5F1026AASP	R5F10366ASP	R5F10367ASP	R5F10368ASP	R5F10369ASP	R5F1036AASP	R5F10277ANA	R5F10278ANA	R5F10279ANA	R5F1027AANA	R5F10377ANA	R5F10378ANA	R5F10379ANA	R5F1037AANA	R5F102A7ASP	R5F102A8ASP	R5F102A9ASP	R5F102AAASP	R5F103A7ASP	R5F103A8ASP	R5F103A9ASP	R5F103AAASP
CPU			RL78 CPU core																								
Memory size	Flash memory (bytes)		2 K	4 K	8 K	12 K	16 K	2 K	4 K	8 K	12 K	16 K	4 K	8 K	12 K	16 K	4 K	8 K	12 K	16 K	4 K	8 K	12 K	16 K	4 K	8 K	12 K	16 K
	Data flash (bytes)		2 K					—					2 K				—				2 K				—			
	RAM (bytes)		256	512	768	1K	1.5 K	256	512	768	1K	1.5 K	512	768	1K	1.5 K	512	768	1K	1.5 K	512	768	1K	2 K	512	768	1K	2 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	24 M																								
		External resonator clock	20 M																								
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M																								
	On-chip high-speed oscillator (Hz)		24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M																								
	On-chip low-speed oscillator (Hz)		15 k																								
	Subclock (32.768 kHz)		—																								
I/O	I/O ports		18										22								26							
Timers	16-bit timer		4																		8							
	Real-time counter		—																								
	Watchdog timer		1																								
	Interval timer		1																								
	PWM output		PWM: 16 bits × 2, Multiplexed PWM: 16 bits × 3																								
Serial interfaces	CSI, UART		—		1			—		1			—		1												
	CSI: 2 ch, UART: 1 ch, simplified I²C: 2 ch		1		—			1		—			—		—												
	CSI, UART, simplified I²C		—																		3				—			
	I²C		1																								
External interrupt sources			5																		6							
OCD	On-chip debugging		Yes																								
Peripherals	8/10-bit A/D converter		8																		11							
	Multiplier/divider/multiply-accumulator		16 × 16 32 ÷ 32 16 × 16 + 32																								
	DMA		●		—			●		—			●		—						●				—			
	Other features		POR (power-on-reset circuit), LVD (voltage detector)																								
Safety features	WDT, TRAP instruction, RAM parity error detection, frequency detection, A/D converter testing, invalid memory access detection		●																								
	Flash memory CRC operations, RAM guarding, SFR guarding		●		—			●		—			●		—						●				—			
Other	Power supply voltage (V)		1.8 to 5.5																								
	Operating ambient temperature (°C)		–40 to +85																								
	Package size (mm)		20-LSSOP (4.4 × 6.5)										24-WQFN (4 × 4)								30-SSOP (7.62)							

RL78 specifications
RL78/I1A (20 to 38 pins)

Series			RL78/I1A					
Pin count			20-pin	30-pin		32-pin	38-pin	
Product name			(1)R5F1076CGSP (2)R5F1076CMSP★★	(1)R5F107ACGSP (2)R5F107ACMSP★★	(1)R5F107AEGSP (2)R5F107AEMSP★★	(1)R5F107BCGNA★★ (2)R5F107BCMNA★★	(1)R5F107DEGSP (2)R5F107DEMSP★★	
CPU			RL78 CPU core					
Memory size	Flash memory (bytes)		32 K		64 K	32 K	64 K	
	Data flash (bytes)		4 K					
	RAM (bytes)		2 K		4 K	2 K	4 K	
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M					
		External resonator clock	20 M					
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M					
	On-chip high-speed oscillator (Hz)		32 M, 24 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M					
	On-chip low-speed oscillator (Hz)		15 k					
	Subclock (32.768 kHz)		—				Yes	
I/O	I/O ports		16	26		28	34	
Timers	16-bit timer		8					
	Real-time counter		1 Note					
	Watchdog timer		1					
	Interval timer		1					
	Lighting/power supply control timer		4	6				
	PWM dimmer timer		1					
	PWM output		PWM: 16 bits × 6, Multiplexed PWM: 16 bits × 7	PWM: 16 bits × 10, Multiplexed PWM: 16 bits × 13		PWM: 16 bits × 12, Multiplexed PWM: 16 bits × 15	PWM: 16 bits × 13, Multiplexed PWM: 16 bits × 15	
Serial interfaces	UART		—	1		—	1	
	CSI/UART (LIN bus, DMX512 support)		—				1	
	UART (LIN bus, DMX512 support)		1	1			1	
	UART (DALI communication support)		1					
	I²C		1					
External interrupt sources			7	10			11	
OCD	On-chip debugging		Yes					
Peripherals	8/10-bit A/D converter		6	11		9	11	
	Multiplier/divider/multiply-accumulator		16 × 16 32 ÷ 32 16 × 16 + 32					
	Other features		POR (power-on-reset circuit), LVD (voltage detector), comparator, programmable gain amplifier					
Safety features			WDT, TRAP instruction, flash memory CRC operations, RAM parity error detection, invalid memory access detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing					
Other	Power supply voltage (V)		2.7 to 5.5					
	Operating ambient temperature (°C)		(1) –40 to +105 (2) –40 to +125					
	Package size (mm)		20-LSSOP (4.4 × 6.5)	30-SSOP (7.62)		32-VQFN (5 × 6)	38-SSOP (7.62)	

A dedicated library (approx. 8.1 KB) is required to use the data flash.

Note: The 20-pin to 32-pin product versions have no subsystem clock, so only the fixed-period interrupt function employing the low-speed on-chip oscillator clock (15 kHz) can be used.

★★ Under development

RL78 specifications
RL78/G13 (20 to 128 pins)

Series			RL78/G13																																														
Pin count			20-pin								24-pin								25-pin								30-pin												32-pin											
Product name			R5F1006AASP	R5F1006CASP	R5F1006DASP	R5F1006EASP	R5F1016AASP	R5F1016CASP	R5F1016DASP	R5F1016EASP	R5F1007AANA	R5F1007CANA	R5F1007DANA	R5F1007EANA	R5F1017AANA	R5F1017CANA	R5F1017DANA	R5F1017EANA	R5F1008AALA	R5F1008CALA	R5F1008DALA	R5F1008EALA	R5F1018AALA	R5F1018CALA	R5F1018DALA	R5F1018EALA	R5F100AAASP	R5F100ACASP	R5F100ADASP	R5F100AEASP	R5F100AFASP	R5F100AGASP	R5F101AAASP	R5F101ACASP	R5F101ADASP	R5F101AEASP	R5F101AFASP	R5F101AGASP	R5F100BAANA	R5F100BCANA	R5F100BDANA	R5F100BEANA	R5F100BFANA	R5F100BGANA	R5F101BAANA	R5F101BCANA	R5F101BDANA	R5F101BEANA	R5F101BFANA	R5F101BGANA
CPU			RL78 CPU core																																														
Memory size	Flash memory (bytes)		16 K	32 K	48 K	64 K	16 K	32 K	48 K	64 K	16 K	32 K	48 K	64 K	16 K	32 K	48 K	64 K	16 K	32 K	48 K	64 K	16 K	32 K	48 K	64 K	16 K	32 K	48 K	64 K	96 K	128 K	16 K	32 K	48 K	64 K	96 K	128 K	16 K	32 K	48 K	64 K	96 K	128 K	16 K	32 K	48 K	64 K	96 K	128 K
	Data flash (bytes)		4 K				—				4 K				—				4 K				—				4 K				8 K		—						4 K				8 K		—					
	RAM (bytes)		2 K	2 K	3 K	4 K	2 K	2 K	3 K	4 K	2 K	2 K	3 K	4 K	2 K	2 K	3 K	4 K	2 K	2 K	3 K	4 K	2 K	2 K	3 K	4 K	2 K	2 K	3 K	4 K	8 K	12 K	2 K	2 K	3 K	4 K	8 K	12 K	2 K	2 K	3 K	4 K	8 K	12 K	2 K	2 K	3 K	4 K	8 K	12 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M																																														
		External resonator clock	20 M																																														
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M																																														
	On-chip high-speed oscillator (Hz)		32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M																																														
	On-chip low-speed oscillator (Hz)		15 k																																														
	Subclock (32.768 kHz)		—																																														
I/O	I/O ports		16								20								21								26												28											
Timers	16-bit timer		8																																														
	Real-time counter		1 Note																																														
	Watchdog timer		1																																														
	Interval timer		1																																														
	PWM output		PWM: 16 bits × 1, Multiplexed PWM: 16 bits × 2								PWM: 16 bits × 2, Multiplexed PWM: 16 bits × 3																																							
Serial interfaces	CSI, UART, simplified I²C		2																																														
	CSI: 2 ch, UART: 1 ch, simplified I²C: 2 ch		—																																														
	CSI, LIN bus-supporting UART, simplified I²C		—																								1																							
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I²C: 2 ch		—																																														
	I²C		—								1																																							
External interrupt sources			3								5																6																							
OCD	On-chip debugging		Yes																																														
Peripherals	8/10-bit A/D converter		6																								8																							
	Multiplier/divider/ multiply-accumulator		16 × 16 32 ÷ 32 16 × 16 + 32																																														
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DMA																																														
Safety features			WDT, TRAP instruction, flash memory CRC operations, RAM parity error detection, invalid memory access detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing																																														
Other	Power supply voltage (V)		1.6 to 5.5																																														
	Operating ambient temperature (°C)		-40 to 85, -40 to 105																																														
	Package size (mm)		20-SSOP (7.62)								24-WQFN (4 × 4)								25-FLGA (3 × 3)								30-SSOP (7.62)												32-WQFN (5 × 5)											

RL78 specifications

RL78/G13 (20 to 128 pins)

Series			RL78/G13											
Pin count			36-pin											
Product name			R5F100CAALA	R5F100CCALA	R5F100CDALA	R5F100CEALA	R5F100CFALA	R5F100CGALA	R5F101CAALA	R5F101CCALA	R5F101CDALA	R5F101CEALA	R5F101CFALA	R5F101CGALA
CPU			RL78 CPU core											
Memory size	Flash memory (bytes)		16 K	32 K	48 K	64 K	96 K	128 K	16 K	32 K	48 K	64 K	96 K	128 K
	Data flash (bytes)		4 K				8 K		—					
	RAM (bytes)		2 K	2 K	3 K	4 K	8 K	12 K	2 K	2 K	3 K	4 K	8 K	12 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M											
		External resonator clock	20 M											
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M											
	On-chip high-speed oscillator (Hz)		32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M											
	On-chip low-speed oscillator (Hz)		15 k											
	Subclock (32.768 kHz)		—											
I/O	I/O ports		32											
Timers	16-bit timer		8											
	Real-time counter		1[Note]											
	Watchdog timer		1											
	Interval timer		1											
	PWM output		PWM: 16 bits × 2, Multiplexed PWM: 16 bits × 3											
Serial interfaces	CSI, UART, simplified I²C		2											
	CSI: 2 ch, UART: 1 ch, simplified I²C: 2 ch		—											
	CSI, LIN bus-supporting UART, simplified I²C		1											
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I²C: 2 ch		—											
	I²C		1											
External interrupt sources			6											
OCD	On-chip debugging		Yes											
Peripherals	8/10-bit A/D converter		8											
	Multiplier/divider/multiply-accumulator		16 × 16 32 ÷ 32 16 × 16 + 32											
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DMA											
Safety features			WDT, TRAP instruction, flash memory CRC operations, RAM parity error detection, invalid memory access detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing											
Other	Power supply voltage (V)		1.6 to 5.5											
	Operating ambient temperature (°C)		-40 to 85, -40 to 105											
	Package size (mm)		36-FPLGA (4 × 4)											

Series			RL78/G13													
Pin count			40-pin													
Product name			R5F100EAANA	R5F100ECANA	R5F100EDANA	R5F100EEANA	R5F100EFANA	R5F100EGANA	R5F100EHANA	R5F101EAANA	R5F101ECANA	R5F101EDANA	R5F101EEANA	R5F101EFANA	R5F101EGANA	R5F101EHANA
CPU			RL78 CPU core													
Memory size	Flash memory (bytes)		16 K	32 K	48 K	64 K	96 K	128 K	192 K	16 K	32 K	48 K	64 K	96 K	128 K	192 K
	Data flash (bytes)		4 K				8 K			—						
	RAM (bytes)		2 K	2 K	3 K	4 K	8 K	12 K	16 K	2 K	2 K	3 K	4 K	8 K	12 K	16 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M													
		External resonator clock	20 M													
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M, 32.768 k													
	On-chip high-speed oscillator (Hz)		32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M													
	On-chip low-speed oscillator (Hz)		15 k													
	Subclock (32.768 kHz)		Yes													
I/O	I/O ports		36													
Timers	16-bit timer		8													
	Real-time counter		1[Note]													
	Watchdog timer		1													
	Interval timer		1													
	PWM output		PWM: 16 bits × 2, Multiplexed PWM: 16 bits × 3													
Serial interfaces	CSI, UART, simplified I²C		1													
	CSI: 2 ch, UART: 1 ch, simplified I²C: 2 ch		1													
	CSI, LIN bus-supporting UART, simplified I²C		1													
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I²C: 2 ch		—													
	I²C		1													
External interrupt sources			7													
OCD	On-chip debugging		Yes													
Peripherals	8/10-bit A/D converter		9													
	Multiplier/divider/multiply-accumulator		16 × 16 32 ÷ 32 16 × 16 + 32													
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DMA													
Safety features			WDT, TRAP instruction, flash memory CRC operations, RAM parity error detection, invalid memory access detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing													
Other	Power supply voltage (V)		1.6 to 5.5													
	Operating ambient temperature (°C)		-40 to 85, -40 to 105													
	Package size (mm)		40-WQFN (6 × 6)													

Series			RL78/G13																			
Pin count			44-pin																			
Product name			R5F100FAAFP	R5F100FCAFP	R5F100FDAFP	R5F100FEAFP	R5F100FFAFP	R5F100FGAFP	R5F100FHAFP	R5F100FJAFP	R5F100FKAFP	R5F100FLAFP	R5F101FAAFP	R5F101FCAFP	R5F101FDAFP	R5F101FEAFP	R5F101FFAFP	R5F101FGAFP	R5F101FHAFP	R5F101FJAFP	R5F101FKAFP	R5F101FLAFP
CPU			RL78 CPU core																			
Memory size	Flash memory (bytes)		16 K	32 K	48 K	64 K	96 K	128 K	192 K	256 K	384 K	512 K	16 K	32 K	48 K	64 K	96 K	128 K	192 K	256 K	384 K	512 K
	Data flash (bytes)		4 K				8 K						—									
	RAM (bytes)		2 K	2 K	3 K	4 K	8 K	12 K	16 K	20 K	24 K	32 K	2 K	2 K	3 K	4 K	8 K	12 K	16 K	20 K	24 K	32 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M																			
		External resonator clock	20 M																			
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M, 32.768 k																			
	On-chip high-speed oscillator (Hz)		32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M																			
	On-chip low-speed oscillator (Hz)		15 k																			
	Subclock (32.768 kHz)		Yes																			
I/O	I/O ports		40																			
Timers	16-bit timer		8																			
	Real-time counter		1[Note]																			
	Watchdog timer		1																			
	Interval timer		1																			
	PWM output		PWM: 16 bits × 3, Multiplexed PWM: 16 bits × 4																			
Serial interfaces	CSI, UART, simplified I²C		1																			
	CSI: 2 ch, UART: 1 ch, simplified I²C: 2 ch		1																			
	CSI, LIN bus-supporting UART, simplified I²C		1																			
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I²C: 2 ch		—																			
	I²C		1																			
External interrupt sources			7																			
OCD	On-chip debugging		Yes																			
Peripherals	8/10-bit A/D converter		10																			
	Multiplier/divider/multiply-accumulator		16 × 16 32 ÷ 32 16 × 16 + 32																			
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DMA																			
Safety features			WDT, TRAP instruction, flash memory CRC operations, RAM parity error detection, invalid memory access detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing																			
Other	Power supply voltage (V)		1.6 to 5.5																			
	Operating ambient temperature (°C)		-40 to 85, -40 to 105																			
	Package size (mm)		44-LQFP (10 × 10)																			

RL78 specifications
RL78/G13 (20 to 128 pins)

Series			RL78/G13																																					
Pin count			48-pin																				52-pin																	
Product name			(1)R5F100GAAFB (2)R5F100GAANA	(1)R5F100GCAFB (2)R5F100GCANA	(1)R5F100GDAFB (2)R5F100GDANA	(1)R5F100GEAFB (2)R5F100GEANA	(1)R5F100GFAFB (2)R5F100GFANA	(1)R5F100GGAFB (2)R5F100GGANA	(1)R5F100GHAFB (2)R5F100GHANA	(1)R5F100GJAFB (2)R5F100GJANA	(1)R5F100GKAFB (2)R5F100GKANA	(1)R5F100GLAFB (2)R5F100GLANA	(1)R5F101GAAFB (2)R5F101GAANA	(1)R5F101GCAFB (2)R5F101GCANA	(1)R5F101GDAFB (2)R5F101GDANA	(1)R5F101GEAFB (2)R5F101GEANA	(1)R5F101GFAFB (2)R5F101GFANA	(1)R5F101GGAFB (2)R5F101GGANA	(1)R5F101GHAFB (2)R5F101GHANA	(1)R5F101GJAFB (2)R5F101GJANA	(1)R5F101GKAFB (2)R5F101GKANA	(1)R5F101GLAFB (2)R5F101GLANA	R5F100JCAFA	R5F100JDAFA	R5F100JEAFA	R5F100JFAFA	R5F100JGAFA	R5F100JHAFA	R5F100JJAFA	R5F100JKAFA	R5F100JLAFA	R5F101JCAFA	R5F101JDAFA	R5F101JEAFA	R5F101JFAFA	R5F101JGAFA	R5F101JHAFA	R5F101JJAFA	R5F101JKAFA	R5F101JLAFA
CPU			RL78 CPU core																																					
Memory size	Flash memory (bytes)		16 K	32 K	48 K	64 K	96 K	128 K	192 K	256 K	384 K	512 K	16 K	32 K	48 K	64 K	96 K	128 K	192 K	256 K	384 K	512 K	32 K	48 K	64 K	96 K	128 K	192 K	256 K	384 K	512 K	32 K	48 K	64 K	96 K	128 K	192 K	256 K	384 K	512 K
	Data flash (bytes)		4 K				8 K						—										4 K			8 K						—								
	RAM (bytes)		2 K	2 K	3 K	4 K	8 K	12 K	16 K	20 K	24 K	32 K	2 K	2 K	3 K	4 K	8 K	12 K	16 K	20 K	24 K	32 K	2 K	3 K	4 K	8 K	12 K	16 K	20 K	24 K	32 K	2 K	3 K	4 K	8 K	12 K	16 K	20 K	24 K	32 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M																																					
		External resonator clock	20 M																																					
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M, 32.768 k																																					
	On-chip high-speed oscillator (Hz)		32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M																																					
	On-chip low-speed oscillator (Hz)		15 k																																					
	Subclock (32.768 kHz)		Yes																																					
I/O	I/O ports		44																				48																	
Timers	16-bit timer		8																																					
	Real-time counter		1																																					
	Watchdog timer		1																																					
	Interval timer		1																																					
	PWM output		PWM: 16 bits × 3, Multiplexed PWM: 16 bits × 4																																					
Serial interfaces	CSI, UART, simplified I^2C		1																																					
	CSI: 2 ch, UART: 1 ch, simplified I^2C: 2 ch		1																																					
	CSI, LIN bus-supporting UART, simplified I^2C		—																																					
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I^2C: 2 ch		1																																					
	I^2C		1																																					
External interrupt sources			10																				12																	
OCD	On-chip debugging		Yes																																					
Peripherals	8/10-bit A/D converter		10																				12																	
	Multiplier/divider/ multiply-accumulator		16 × 16 32 ÷ 32 16 × 16 + 32																																					
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DMA																																					
Safety features			WDT, TRAP instruction, flash memory CRC operations, RAM parity error detection, invalid memory access detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing																																					
Other	Power supply voltage (V)		1.6 to 5.5																																					
	Operating ambient temperature (°C)		-40 to 85, -40 to 105																																					
	Package size (mm)		(1) 48-LQFP (7 × 7) (2) 48-WQFN (7 × 7)																				52-LQFP (10 × 10)																	

RL78 specifications
RL78/G13 (20 to 128 pins)

Series			RL78/G13																
Pin count			64-pin																
Product name			(1)R5F100LCAFA (2)R5F100LCAFB (3)R5F100LCABG	(1)R5F100LDAFA (2)R5F100LDAFB (3)R5F100LDABG	(1)R5F100LEAFA (2)R5F100LEAFB (3)R5F100LEABG	(1)R5F100LFAFA (2)R5F100LFAFB (3)R5F100LFABG	(1)R5F100LGAFA (2)R5F100LGAFB (3)R5F100LGABG	(1)R5F100LHAFA (2)R5F100LHAFB (3)R5F100LHABG	(1)R5F100LJAFA (2)R5F100LJAFB (3)R5F100LJABG	(1)R5F100LKAFA (2)R5F100LKAFB	(1)R5F100LLAFA (2)R5F100LLAFB	(1)R5F101LCAFA (2)R5F101LCAFB (3)R5F101LCABG	(1)R5F101LDAFA (2)R5F101LDAFB (3)R5F101LDABG	(1)R5F101LEAFA (2)R5F101LEAFB (3)R5F101LEABG	(1)R5F101LFAFA (2)R5F101LFAFB (3)R5F101LFABG	(1)R5F101LGAFA (2)R5F101LGAFB (3)R5F101LGABG	(1)R5F101LHAFA (2)R5F101LHAFB (3)R5F101LHABG	(1)R5F101LJAFA (2)R5F101LJAFB (3)R5F101LJABG	(1)R5F101LKAFA (2)R5F101LKAFB	(1)R5F101LLAFA (2)R5F100LLAFB
CPU			RL78 CPU core																
Memory size	Flash memory (bytes)		32 K	48 K	64 K	96 K	128 K	192 K	256 K	384 K	512 K	32 K	48 K	64 K	96 K	128 K	192 K	256 K	384 K	512 K
	Data flash (bytes)		4 K			8 K						—								
	RAM (bytes)		2 K	3 K	4 K	8 K	12 K	16 K	20 K	24 K	32 K	2 K	3 K	4 K	8 K	12 K	16 K	20 K	24 K	32 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M																
		External resonator clock	20 M																
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M, 32.768 k																
	On-chip high-speed oscillator (Hz)		32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M																
	On-chip low-speed oscillator (Hz)		15 k																
	Subclock (32.768 kHz)		Yes																
I/O	I/O ports		58																
Timers	16-bit timer		8																
	Real-time counter		1																
	Watchdog timer		1																
	Interval timer		1																
	PWM output		PWM: 16 bits × 4, Multiplexed PWM: 16 bits × 7																
Serial interfaces	CSI, UART, simplified I²C		—																
	CSI: 2 ch, UART: 1 ch, simplified I²C: 2 ch		2																
	CSI, LIN bus-supporting UART, simplified I²C		—																
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I²C: 2 ch		1																
	I²C		1																
External interrupt sources			13																
OCD	On-chip debugging		Yes																
Peripherals	8/10-bit A/D converter		12																
	Multiplier/divider/ multiply-accumulator		16 × 16 32 ÷ 32 16 × 16 + 32																
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DMA																
Safety features			WDT, TRAP instruction, flash memory CRC operations, RAM parity error detection, invalid memory access detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing																
Other	Power supply voltage (V)		1.6 to 5.5																
	Operating ambient temperature (°C)		-40 to 85, -40 to 105																
	Package size (mm)		(1) 64-LQFP (12 × 12)					(2) 64-LQFP (10 × 10)				(3) 64-FPBGA (4 × 4)							

RL78 specifications
RL78/G13 (20 to 128 pins)

Series			RL78/G13																													
Pin count			80-pin												100-pin												128-pin							
Product name			(1)R5F100MFAFB (2)R5F100MFAFA	(1)R5F100MGAFB (2)R5F100MGAFA	(1)R5F100MHAFB (2)R5F100MHAFA	(1)R5F100MJAFB (2)R5F100MJAFA	(1)R5F100MKAFB (2)R5F100MKAFA	(1)R5F100MLAFB (2)R5F100MLAFA	(1)R5F101MFAFB (2)R5F101MFAFA	(1)R5F101MGAFB (2)R5F101MGAFA	(1)R5F101MHAFB (2)R5F101MHAFA	(1)R5F101MJAFB (2)R5F101MJAFA	(1)R5F101MKAFB (2)R5F101MKAFA	(1)R5F101MLAFB (2)R5F101MLAFA	(1)R5F100PFAFB (2)R5F100PFAFA	(1)R5F100PGAFB (2)R5F100PGAFA	(1)R5F100PHAFB (2)R5F100PHAFA	(1)R5F100PJAFB (2)R5F100PJAFA	(1)R5F100PKAFB (2)R5F100PKAFA	(1)R5F100PLAFB (2)R5F100PLAFA	(1)R5F101PFAFB (2)R5F101PFAFA	(1)R5F101PGAFB (2)R5F101PGAFA	(1)R5F101PHAFB (2)R5F101PHAFA	(1)R5F101PJAFB (2)R5F101PJAFA	(1)R5F101PKAFB (2)R5F101PKAFA	(1)R5F101PLAFB (2)R5F101PLAFA	R5F100SHAFB	R5F100SJAFB	R5F100SKAFB	R5F100SLAFB	R5F101SHAFB	R5F101SJAFB	R5F101SKAFB	R5F101SLAFB
CPU			RL78 CPU core																													
Memory size	Flash memory (bytes)		96 K	128 K	192 K	256 K	384 K	512 K	96 K	128 K	192 K	256 K	384 K	512 K	96 K	128 K	192 K	256 K	384 K	512 K	96 K	128 K	192 K	256 K	384 K	512 K	192 K	256 K	384 K	512 K	192 K	256 K	384 K	512 K
	Data flash (bytes)		8 K						—						8 K						—						8 K				—			
	RAM (bytes)		8 K	12 K	16 K	20 K	24 K	32 K	8 K	12 K	16 K	20 K	24 K	32 K	8 K	12 K	16 K	20 K	24 K	32 K	8 K	12 K	16 K	20 K	24 K	32 K	16 K	20 K	24 K	32 K	16 K	20 K	24 K	32 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M																													
		External resonator clock	20 M																													
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M, 32.768 k																													
	On-chip high-speed oscillator (Hz)		32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M																													
	On-chip low-speed oscillator (Hz)		15 k																													
	Subclock (32.768 kHz)		Yes																													
I/O	I/O ports		74												92												120							
Timers	16-bit timer		12																								16							
	Real-time counter		1																													
	Watchdog timer		1																													
	Interval timer		1																													
	PWM output		PWM: 16 bits × 6, Multiplexed PWM: 16 bits × 10																								PWM: 16 bits × 8, Multiplexed PWM: 16 bits × 14							
Serial interfaces	CSI, UART, simplified I²C		—																													
	CSI: 2 ch, UART: 1 ch, simplified I²C: 2 ch		3																													
	CSI, LIN bus-supporting UART, simplified I²C		—																													
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I²C: 2 ch		1																													
	I²C		2																													
External interrupt sources			13																													
OCD	On-chip debugging		Yes																													
Peripherals	8/10-bit A/D converter		17												20												26							
	Multiplier/divider/ multiply-accumulator		16 × 16 32 ÷ 32 16 × 16 + 32																													
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DMA																													
Safety features			WDT, TRAP instruction, flash memory CRC operations, RAM parity error detection, invalid memory access detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing																													
Other	Power supply voltage (V)		1.6 to 5.5																													
	Operating ambient temperature (°C)		-40 to 85, -40 to 105																													
	Package size (mm)		(1) 80-LQFP (12 × 12) (2) 80-LQFP (14 × 14)												(1) 100-LQFP (14 × 14) (2) 100-LQFP (14 × 20)												128-LQFP (14 × 20)							

RL78 specifications
RL78/G1A (25 to 64 pins)

Series			RL78/G1A														
Pin count			25-pin				32-pin				48-pin				64-pin		
Product name			R5F10E8AALA**	R5F10E8CALA**	R5F10E8DALA**	R5F10E8EALA**	R5F10EBAANA**	R5F10EBCANA**	R5F10EBDANA**	R5F10EBEANA**	(1)R5F10EGAAFB** (2)R5F10EGAANA**	(1)R5F10EGCAFB** (2)R5F10EGCANA**	(1)R5F10EGDAFB** (2)R5F10EGDANA**	(1)R5F10EGEAFB** (2)R5F10EGEANA**	(1)R5F10ELCAFB** (2)R5F10ELCABG**	(1)R5F10ELDAFB** (2)R5F10ELDABG**	(1)R5F10ELEAFB** (2)R5F10ELEABG**
CPU			RL78 CPU core														
Memory size	Flash memory (bytes)		16 K	32 K	48 K	64 K	16 K	32 K	48 K	64 K	16 K	32 K	48 K	64 K	32 K	48 K	64 K
	Data flash (bytes)		4 K														
	RAM (bytes)		2 K		3 K	4 K	2 K		3 K	4 K	2 K		3 K	4 K	2 K	3 K	4 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M														
		External resonator clock	20 M														
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M														
	On-chip high-speed oscillator (Hz)		32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M														
	On-chip low-speed oscillator (Hz)		15 k														
	Subclock (32.768 kHz)		—								Yes						
I/O	I/O ports		19				26				42				56		
Timers	16-bit timer		8														
	Real-time counter		1 Note														
	Watchdog timer		1														
	Interval timer		1														
	PWM output		PWM: 16 bits × 1								PWM: 16 bits × 3, Multiplexed PWM: 16 bits × 3				PWM: 16 bits × 4, Multiplexed PWM: 16 bits × 6		
Serial interfaces	CSI, UART, simplified I²C		2								1				—		
	CSI: 2 ch, UART: 1 ch, simplified I²C: 2 ch		—								1				2		
	CSI, LIN bus-supporting UART, simplified I²C		—				1				—						
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I²C: 2 ch		—								1						
	I²C		1														
External interrupt sources			6								10				13		
OCD	On-chip debugging		Yes														
Peripherals	12-bit A/D converter		13				18				24				28		
	Multiplier/divider		16 × 16 32 ÷ 32 16 × 16 + 32														
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DMA														
Safety features			RAM parity error detection,								WDT, TRAP instruction, flash memory CRC operations, invalid memory access detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing						
Other	Power supply voltage (V)		1.6 to 3.6														
	Operating ambient temperature (°C)		−40 to +85														
	Package size (mm)		25-FLGA (3 × 3)				32-WQFN (5 × 5)				(1) 48-LQFP (7 × 7) (2) 48-WQFN (7 × 7)				(1) 64-LQFP (10 × 10) (2) 64-FPBGA (4 × 4)		

RL78 specifications (1/2)
RL78/G14 (30 to 48 pins)

Series			RL78/G14											
Pin count			30-pin						32-pin					
Product name			R5F104AAASP	R5F104ACASP	R5F104ADASP	R5F104AEASP	R5F104AFASP	R5F104AGASP	(1)R5F104BAANA (2)R5F104BAAFP	(1)R5F104BCANA (2)R5F104BCAFP	(1)R5F104BDANA (2)R5F104BDAFP	(1)R5F104BEANA (2)R5F104BEAFP	(1)R5F104BFANA (2)R5F104BFAFP	(1)R5F104BGANA (2)R5F104BGAFP
CPU			RL78 CPU core											
Memory size	Flash memory (bytes)		16 K	32 K	48 K	64 K	96 K	128 K	16 K	32 K	48 K	64 K	96 K	128 K
	Data flash (bytes)		4 K				8 K		4 K				8 K	
	RAM (bytes)		2.5 K	4 K	5.5 K		12 K	16 K	2.5 K	4 K	5.5 K		12 K	16 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M											
		External resonator clock	20 M											
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M											
	On-chip high-speed oscillator (Hz)		64 M, 48 M, 32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M											
	On-chip low-speed oscillator (Hz)		15 k											
	Subclock (32.768 kHz)		—											
I/O	I/O ports		26						28					
Timers	16-bit timer		8											
	Real-time counter		1 Note											
	Watchdog timer		1											
	Interval timer		1											
	PWM output		PWM: 16 bits × 8, Multiplexed PWM: 16 bits × 10											
Serial interfaces	CSI, UART, simplified I^{2}C		2											
	CSI: 2 ch, UART: 1 ch, simplified I^{2}C: 2 ch		—											
	CSI, LIN bus-supporting UART, simplified I^{2}C		1											
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I^{2}C: 2 ch		—											
	I^{2}C		1											
External interrupt sources			7											
OCD	On-chip debugging		Yes											
Peripherals	10-bit A/D converter		8											
	8-bit D/A converter		—				1		—				2	
	Multiplier/divider/multiply-accumulator		16 × 16 16 ÷ 16, 32 ÷ 32 16 × 16 + 32											
	Comparator		—				2		—				2	
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DTC, ELC											
Safety features			WDT, TRAP instruction, invalid memory access detection, frequency detection, flash memory CRC operations, RAM parity error detection, RAM guarding, SFR guarding, A/D converter testing, I/O port output signal level detection function											
Other	Power supply voltage (V)		1.6 to 5.5											
	Operating ambient temperature (°C)		-40 to 85, -40 to 105											
	Package size (mm)		30-SSOP (7.62)						(1) 32-WQFN (5 × 5) (2) 32-LQFP (7 × 7)					

Series			RL78/G14												
Pin count			36-pin						40-pin						
Product name			R5F104CAALA	R5F104CCALA	R5F104CDALA	R5F104CEALA	R5F104CFALA	R5F104CGALA	R5F104EAANA	R5F104ECANA	R5F104EDANA	R5F104EEANA	R5F104EFANA	R5F104EGANA	R5F104EHANA
CPU			RL78 CPU core												
Memory size	Flash memory (bytes)		16 K	32 K	48 K	64 K	96 K	128 K	16 K	32 K	48 K	64 K	96 K	128 K	192 K
	Data flash (bytes)		4 K				8 K		4 K				8 K		
	RAM (bytes)		2.5 K	4 K	5.5 K		12 K	16 K	2.5 K	4 K	5.5 K		12 K	16 K	20 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M												
		External resonator clock	20 M												
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M						1 M to 20 M, 32.768 k						
	On-chip high-speed oscillator (Hz)		64 M, 48 M, 32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M												
	On-chip low-speed oscillator (Hz)		15 k												
	Subclock (32.768 kHz)		—						Yes						
I/O	I/O ports		32						36						
Timers	16-bit timer		8												
	Real-time counter		1 Note												
	Watchdog timer		1												
	Interval timer		1												
	PWM output		PWM: 16 bits × 8, Multiplexed PWM: 16 bits × 10												
Serial interfaces	CSI, UART, simplified I^{2}C		2												
	CSI: 2 ch, UART: 1 ch, simplified I^{2}C: 2 ch		—												
	CSI, LIN bus-supporting UART, simplified I^{2}C		—												
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I^{2}C: 2 ch		1												
	I^{2}C		1												
External interrupt sources			7												
OCD	On-chip debugging		Yes												
Peripherals	10-bit A/D converter		8												
	8-bit D/A converter		—				2		—				2		
	Multiplier/divider/multiply-accumulator		16 × 16 16 ÷ 16, 32 ÷ 32 16 × 16 + 32												
	Comparator		—				2		—				2		
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DTC, ELC												
Safety features			WDT, TRAP instruction, invalid memory access detection, frequency detection, flash memory CRC operations, RAM parity error detection, RAM guarding, SFR guarding, A/D converter testing, I/O port output signal level detection function												
Other	Power supply voltage (V)		1.6 to 5.5												
	Operating ambient temperature (°C)		-40 to 85, -40 to 105												
	Package size (mm)		36-FPLGA (4 × 4)						40-WQFN (6 × 6)						

Series			RL78/G14															
Pin count			44-pin								48-pin							
Product name			R5F104FAAFP	R5F104FCAFP	R5F104FDAFP	R5F104FEAFP	R5F104FFAFP	R5F104FGAFP	R5F104FHAFP	R5F104FJAFP	(1)R5F104GAAFB (2)R5F104GAANA	(1)R5F104GCAFB (2)R5F104GCANA	(1)R5F104GDAFB (2)R5F104GDANA	(1)R5F104GEAFB (2)R5F104GEANA	(1)R5F104GFAFB (2)R5F104GFANA	(1)R5F104GGAFB (2)R5F104GGANA	(1)R5F104GHAFB (2)R5F104GHANA	(1)R5F104GJAFB (2)R5F104GJANA
CPU			RL78 CPU core															
Memory size	Flash memory (bytes)		16 K	32 K	48 K	64 K	96 K	128 K	192 K	256 K	16 K	32 K	48 K	64 K	96 K	128 K	192 K	256 K
	Data flash (bytes)		4 K				8 K				4 K				8 K			
	RAM (bytes)		2.5 K	4 K	5.5 K		12 K	16 K	20 K	24 K	2.5 K	4 K	5.5 K		12 K	16 K	20 K	24 K
Operating clocks	Maximum operating frequency (Hz)	On-chip oscillator clock	32 M															
		External resonator clock	20 M															
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M, 32.768 k															
	On-chip high-speed oscillator (Hz)		64 M, 48 M, 32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M															
	On-chip low-speed oscillator (Hz)		15 k															
	Subclock (32.768 kHz)		Yes															
I/O	I/O ports		40								44							
Timers	16-bit timer		8															
	Real-time counter		1 Note															
	Watchdog timer		1															
	Interval timer		1															
	PWM output		PWM: 16 bits × 8, Multiplexed PWM: 16 bits × 10															
Serial interfaces	CSI, UART, simplified I^{2}C		2								1							
	CSI: 2 ch, UART: 1 ch, simplified I^{2}C: 2 ch		—								1							
	CSI, LIN bus-supporting UART, simplified I^{2}C		—															
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I^{2}C: 2 ch		1															
	I^{2}C		1															
External interrupt sources			7								10							
OCD	On-chip debugging		Yes															
Peripherals	10-bit A/D converter		8															
	8-bit D/A converter		—				2				—				2			
	Multiplier/divider/multiply-accumulator		16 × 16 16 ÷ 16, 32 ÷ 32 16 × 16 + 32															
	Comparator		—				2				—				2			
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DTC, ELC															
Safety features			WDT, TRAP instruction, invalid memory access detection, frequency detection, flash memory CRC operations, RAM parity error detection, RAM guarding, SFR guarding, A/D converter testing, I/O port output signal level detection function															
Other	Power supply voltage (V)		1.6 to 5.5															
	Operating ambient temperature (°C)		-40 to 85, -40 to 105															
	Package size (mm)		44-LQFP (10 × 10)								(1) 48-LQFP (7 × 7) (2) 48-WQFN (7 × 7)							

RL78 specifications (2/2)
RL78/G14 (52 to 100 pins)

Series		RL78/G14																					
Pin count		52-pin							64-pin							80-pin				100-pin			
Product name		R5F104JCAFA	R5F104JDAFA	R5F104JEAFA	R5F104JFAFA	R5F104JGAFA	R5F104JHAFA	R5F104JJAFA	(1)R5F104LCAFB (2)R5F104LCAFA (3)R5F104LCAFP (4)R5F104LCALA	(1)R5F104LDAFB (2)R5F104LDAFA (3)R5F104LDAFP (4)R5F104LDALA	(1)R5F104LEAFB (2)R5F104LEAFA (3)R5F104LEAFP (4)R5F104LEALA	(1)R5F104LFAFB (2)R5F104LFAFA (3)R5F104LFAFP (4)R5F104LFALA	(1)R5F104LGAFB (2)R5F104LGAFA (3)R5F104LGAFP (4)R5F104LGALA	(1)R5F104LHAFB (2)R5F104LHAFA (3)R5F104LHAFP (4)R5F104LHALA	(1)R5F104LJAFB (2)R5F104LJAFA (3)R5F104LJAFP (4)R5F104LJALA	(1)R5F104MFAFB (2)R5F104MFAFA	(1)R5F104MGAFB (2)R5F104MGAFA	(1)R5F104MHAFB (2)R5F104MHAFA	(1)R5F104MJAFB (2)R5F104MJAFA	(1)R5F104PFAFB (2)R5F104PFAFA	(1)R5F104PGAFB (2)R5F104PGAFA	(1)R5F104PHAFB (2)R5F104PHAFA	(1)R5F104PJAFB (2)R5F104PJAFA
CPU		RL78 CPU core																					
Memory size	Flash memory (bytes)	32 K	48 K	64 K	96 K	128 K	192 K	256 K	32 K	48 K	64 K	96 K	128 K	192 K	256 K	96 K	128 K	192 K	256 K	96 K	128 K	192 K	256 K
	Data flash (bytes)	4 K			8 K				4 K			8 K											
	RAM (bytes)	4 K	5.5 K		12 K	16 K	20 K	24 K	4 K	5.5 K		12 K	16 K	20 K	24 K	12 K	16 K	20 K	24 K	12 K	16 K	20 K	24 K
Operating clocks	Maximum operating frequency (Hz): On-chip oscillator clock	32 M																					
	Maximum operating frequency (Hz): External resonator clock	20 M																					
Oscillators	Crystal/ceramic oscillator (Hz)	1 M to 20 M, 32.768 k																					
	On-chip high-speed oscillator (Hz)	64 M, 48 M, 32 M, 24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M																					
	On-chip low-speed oscillator (Hz)	15 k																					
	Subclock (32.768 kHz)	Yes																					
I/O	I/O ports	48							58							74				92			
Timers	16-bit timer	8														12							
	Real-time counter	1																					
	Watchdog timer	1																					
	Interval timer	1																					
	PWM output	PWM: 16 bits × 8, Multiplexed PWM: 16 bits × 10														PWM: 16 bits × 10, Multiplexed PWM: 16 bits × 13							
Serial interfaces	CSI, UART, simplified I²C	1							—														
	CSI: 2 ch, UART: 1 ch, simplified I²C: 2 ch	1							2							3							
	CSI, LIN bus-supporting UART, simplified I²C	—																					
	CSI: 2 ch, LIN bus-supporting UART: 1 ch, simplified I²C: 2 ch	1																					
	I²C	1														2							
External interrupt sources		12							13														
OCD	On-chip debugging	Yes																					
Peripherals	10-bit A/D converter	12														17				20			
	8-bit D/A converter	—			2				—			2											
	Multiplier/divider/multiply-accumulator	16 × 16 16 ÷ 16, 32 ÷ 32 16 × 16 + 32																					
	Comparator	—			2				—			2											
	Other features	POR (power-on-reset circuit), LVD (voltage detector), DTC, ELC																					
Safety features		WDT, TRAP instruction, flash memory CRC operations, RAM parity error detection, invalid memory access detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing, I/O port output signal level detection function																					
Other	Power supply voltage (V)	1.6 to 5.5																					
	Operating ambient temperature (°C)	-40 to 85, -40 to 105																					
	Package size (mm)	52-LQFP (10 × 10)							(1) 64-LQFP (10 × 10) (2) 64-LQFP (12 × 12) (3) 64-LQFP (14 × 14) (4) 64-FLGA (5 × 5)							(1) 80-LQFP (12 × 12) (2) 80-LQFP (14 × 14)				(1) 100-LQFP (14 × 14) (2) 100-LQFP (14 × 20)			

RL78 specifications
RL78/L12 (32 to 64 pins)

Series			RL78/L12																
Pin count			32-pin			44-pin			48-pin			52-pin			64-pin				
Product name			R5F10RB8AFP**	R5F10RBAAFP**	R5F10RBCAFP**	R5F10RF8AFP**	R5F10RFAAFP**	R5F10RFCAFP**	R5F10RG8AFB**	R5F10RGAAFB**	R5F10RGCAFB**	R5F10RJ8AFA**	R5F10RJAAFA**	R5F10RJCAFA**	(1)R5F10RLAAFB**	(2)R5F10RLAAFA**	(3)R5F10RLAANB**	(1)R5F10RLCAFB**	(2)R5F10RLCAFA**	(3)R5F10RLCANB**
CPU			RL78 CPU core																
Memory size	Flash memory (bytes)		8 K	16 K	32 K	8 K	16 K	32 K	8 K	16 K	32 K	8 K	16 K	32 K	16 K			32 K	
	Data flash (bytes)		2K																
	RAM (bytes)		1 K	1 K	1.5 K	1 K	1 K	1.5 K	1 K	1 K	1.5 K	1 K	1 K	1.5 K	1 K			1.5 K	
Operating clocks	Maximum operating freguency (Hz)	On-chip oscillator clock	24 M																
		External resonator clock	20 M																
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M																
	On-chip high-speed oscillator (Hz)		24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M																
	On-chip low-speed oscillator (Hz)		15 k																
	Subclock (32.768 kHz)		—			Yes													
I/O	I/O ports		20			29			33			37			47				
Timers	16-bit timer		8			8 (1 channel for remote control output function)													
	Real-time counter		1 Note																
	Watchdog timer		1																
	Interval timer		1																
	PWM output		PWM: 16 bits × 2 Multiplexed PWM: 16 bits × 3			PWM: 16 bits × 3 Multiplexed PWM: 16 bits × 4			PWM: 16 bits × 3 Multiplexed PWM: 16 bits × 5			PWM: 16 bits × 4 Multiplexed PWM: 16 bits × 7							
Serial interfaces	CSI, UART		—																
	CSI: 2 ch, UART: 1 ch		—																
	CSI, LIN bus-supporting UART		—																
	CSI: 2 ch, LIN bus-supporting UART		1																
	I²C		1																
External interrupt sources			4			6			7			9							
OCD	On-chip debugging		Yes																
LCD controller/driver			Switchable among internal voltage boost, capacitor split, and external resistance division																
	Segment signal output		13			22 (18)*2			26 (22)*2			30 (26)*2			39 (35)*2				
	Common signal output		4			4 (8)*2			4 (8)*2			4 (8)*2			4 (8)*2				
Peripherals	8/10-bit A/D converter		4			7			9			10							
	Multiplier/divider		16 × 1 6 32 ÷ 32 16 × 16 + 32																
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DMA, Buzzer output																
Safety features			WDT, invalid memory access TRAP instruction, flash memory CRC operations, RAM parity error detection, detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing																
Other	Power supply voltage (V)		1.6 to 5.5																
	Operating ambient temperature (°C)		-40 to 85, -40 to 105																
	Package size (mm)		32-LQFP (7 × 7)			44-LQFP (10 × 10)			48-LQFP (7 × 7)			52-LQFP (10 × 10)			(1) 64-LQFP (10 × 10) (2) 64-LQFP (12 × 12) (3) 64-WQFN (8 × 8)			(1) 64-LQFP (10 × 10) (2) 64-LQFP (12 × 12) (3) 64-WQFN (8 × 8)	

RL78 specifications
RL78/L13 (46 to 80 pins)

Series			RL78/L13																					
Pin count			64-pin											80-pin										
Product name			R5F10WLAAFB	R5F10WLAAFB	R5F10WLDAFB	R5F10WLEAFB	R5F10WLFAFB	R5F10WLGAFB	R5F10WLAAFA	R5F10WLCAFA	R5F10WLDAFA	R5F10WLEAFA	R5F10WLFAFA	R5F10WLGAFA	R5F10WMAAFB	R5F10WMCAFB	R5F10WMDAFB	R5F10WMEAFB	R5F10WMFAFB	R5F10WMGAFB	R5F10WMAAFA	R5F10WMCAFA	R5F10WMDAFA	R5F10WMEAFA	R5F10WMFAFA	R5F10WMGAFA
CPU			RL78																					
Memory size	Flash memory (bytes)		16 K	32 K	48 K	64 K	96 K	128 K	16 K	32 K	48 K	64 K	96 K	128 K	16 K	32 K	48 K	64 K	96 K	128 K	16 K	32 K	48 K	64 K	96 K	128 K
	Data flash (bytes)		2 K																					
	RAM (bytes)		1 K	1.5 K	2 K	4 K	6 K	8 K	1 K	1.5 K	2 K	4 K	6 K	8 K	1 K	1.5 K	2 K	4 K	6 K	8 K	1 K	1.5 K	2 K	4 K	6 K	8 K
Operating clocks	Maximum operating freguency (Hz)	On-chip oscillator clock	24 M																					
		External resonator clock	20 M																					
Oscillators	Crystal/ceramic oscillator (Hz)		1 M to 20 M																					
	On-chip high-speed oscillator (Hz)		24 M, 16 M, 12 M, 8 M, 6 M, 4 M, 3 M, 2 M, 1 M																					
	On-chip low-speed oscillator (Hz)		15 k																					
	Subclock (32.768 kHz)		Yes																					
I/O	I/O ports		49												65									
Timers	16-bit timer		8																					
	Real-time counter		1																					
	Watchdog timer		1																					
	Interval timer		1																					
	PWM output		PWM: 16 bits × 4 Multiplexed PWM: 16 bits × 7																					
Serial interfaces	CSI, UART		2																					
	CSI: 2ch UART:4 ch, LIN, simplified I²C: 2ch		1																					
	CSI, UART, simplifed I²C		1																					
	LIN-UART		1																					
External interrupt sources			11																					
OCD	On-chip debugging		Yes																					
Peripherals	10-bit A/D converter		9												12									
	Multiplier/divider/ multiply-accumulator		16 × 16, 32 ÷ 32, 16 × 16 + 32																					
	Comparator		2																					
	Other features		POR (power-on-reset circuit), LVD (voltage detector), DMA, Buzzer output																					
Safety features			WDT, TRAP instruction, flash memory CRC operations, RAM parity error detection, invalid memory access detection, frequency detection, RAM guarding, SFR guarding, A/D converter testing																					
Other	Power supply voltage (V)		(1) 48-LQFP (7 × 7) (2) 48-WQFN (7 × 7)64-LQFP (10 × 10)																					
	Operating ambient temperature (°C)		-40 to +85 -40 to 105																					
	Package size (mm)		LQFP (10x10)						LQFP (12x12)						LQFP (12x12)						LQFP (14x14)`			

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