RL78/I1B

The Single-phase Electricity Meter Microcontroller

Renesas Electronics' RL78/I1B microcontroller family delivers a genuine single-chip solution for electricity measurements in applications such as single or multi-load energy monitoring. The software defined metrology architecture offers a highly flexible methodology that can be adapted to many varied industrial and consumer applications both within and outside of the traditional 50/60Hz power measurement arena, whilst high accuracy and a wide range of peripherals, including segment LCD direct drive and flexible serial communications, make the RL78/I1B family an ideal fit for any non-billing single-phase application. The RL78/I1B is supported by a complete suite of tools including software, debugger, and an energy monitor evaluation platform that allows performance tests to be conducted.

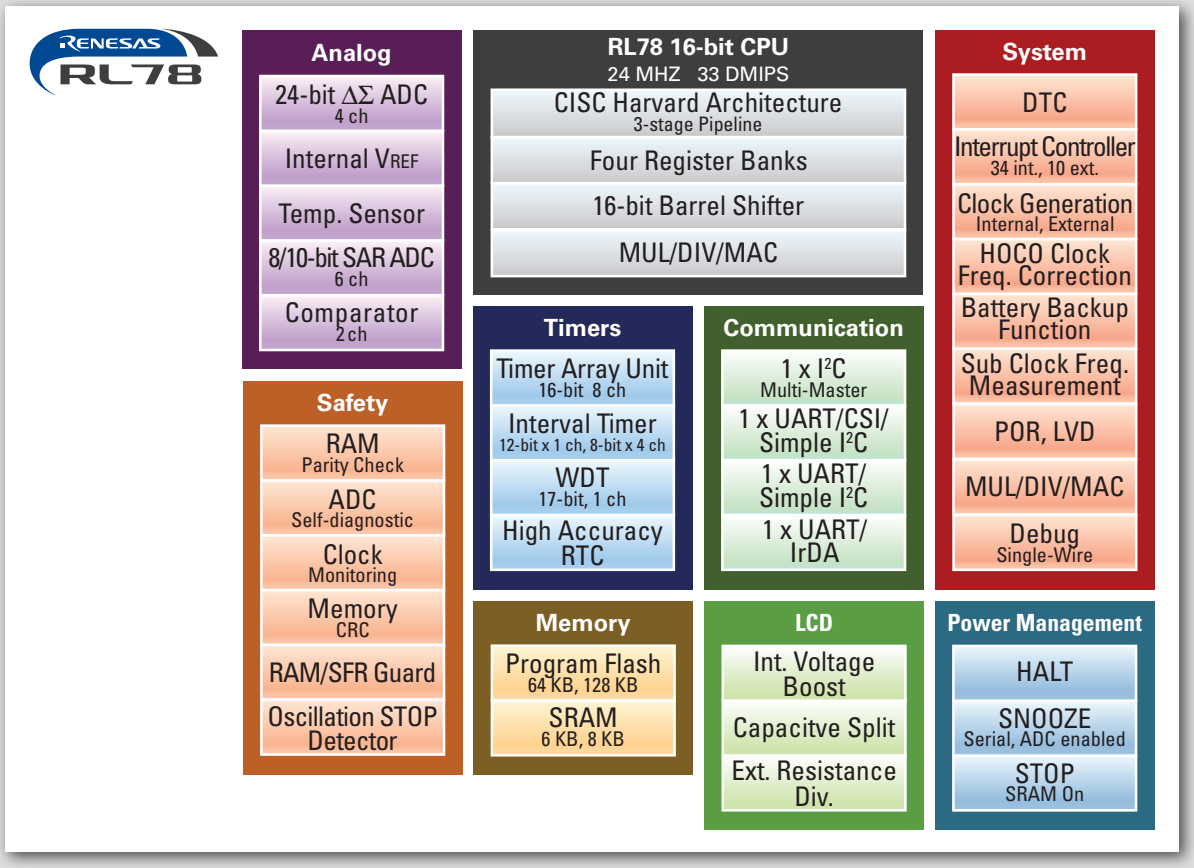
Applications

- Non-billing electricity meters (sub-metering)
- Industrial metering
- Appliance monitoring
- Single-phase home energy monitors
- Multi-outlet power distribution unit monitors
- UPS/generator power output monitoring

Key Benefits

- Full single-chip solution including direct segment LCD drive
- Up to four independent 24-bit ΔΣADC channels, each with its own PGA
- Full energy monitor reference design provided
  - » Windows™ GUI connects to reference design
  - » Accuracy to EN50470 class B (1%). Reference design rated to 16 A
  - » Tested metrology software provided in source code

RL78/I1B Block Diagram



RL78/I1B – The Single-phase Electricity Meter Microcontroller

Key Features

Ultra low power 16-bit RL78 CPU core

- 24 MHz operating frequency
- High Accuracy +/-1% High-Speed On-chip oscillator with clock frequency correction function

Memory Line-up

- 64 Kbytes and 128 Kbytes Flash
- 6 K bytes and 8 Kbytes SRAM

Low-power design and architecture

- 1.9 to 5.5 V operation
- 70 µA/MHz operation current.
- 0.7 µA (RTC + LVD) standby current.
- Standby function: HALT, STOP, SNOOZE mode

Optimized System & Peripherals

- System
  - » Power On Reset (POR), Low Voltage Detection (LVD)
  - » Battery backup function
  - » Debug function
  - » Data Transfer Controller (DTC)
  - » Clock output/buzzer output controller
- Real-time clock
  - » 1 channel with high accuracy 1 Hz output function
- General Purpose Timers
  - » 8 channel 16-bit timer TAU, 1 channel 12-bit interval timer, 4 channels 8-bit interval timer, 1 channel oscillation stop detection circuit
- Watchdog Timer
  - » 1 channel, operable with the dedicated low-speed on-chip oscillator
- Communications
  - » 1 channel CSI/UART (LIN-bus supported)/simplified I^2C, 1 channel UART/simplified I^2C, 1 channel UART/IrDA
- Analog functions
  - » 2.4 to 5.5 V operation
  - » Up to four independent 24-bit ΔΣADC channels, each with its own PGA
  - » Up to 80dB SINAD
  - » Voltage reference with typ. 30 ppm/°C temp coefficient
  - » Up to 6 channels 10-bit ADC
  - » On-chip comparator
- LCD Controller
  - » Segment output 34 (30) or 42 (38)
  - » Common signal output 4 (8)

Operating temperature range

- -40°C to +85°C

Package line-up

- 80-pin and 100-pin

Ordering Information

Pin Count	Flash ROM	RAM	Package	Part Number
100-pin	128 K	8 K	100-pin plastic LQFP (14 × 14 mm, 0.5 mm pitch)	R5F10MPGDFB
80-pin	128 K	8 K	80-pin plastic LQFP (12 × 12 mm, 0.5 mm pitch)	R5F10MMGDFB
100-pin	64 K	6 K	100-pin plastic LQFP (14 × 14 mm, 0.5 mm pitch)	R5F10MPEDFB
80-pin	64 K	6 K	80-pin plastic LQFP (12 × 12 mm, 0.5 mm pitch)	R5F10MMEDFB

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