Renesas 32-bit Zone/Domain and Vehicle Motion Microcontroller

RH850/U2B

RH850/U2B: next-generation 28nm cross-domain MCU realizes up to 6 cores x 400 MHz

The RH850/U2B MCUs is designed to address the growing need to integrate multiple applications into a single chip and realize a unified electronic control unit (ECU) for the evolving electrical-electronic (E/E) architecture. Delivering a combination of high-performance, flexibility, freedom from interference, and security, the cross-domain RH850/U2B MCUs are built for the rigorous workloads required by vehicle motion in terms of hybrid ICE and xEV traction inverter, high-end zone control, connected gateway, and domain control applications.

With this, Renesas expands its cross-domain MCU portfolio with devices that range from RH850/U2A MCUs for body and chassis control systems up to high-performance RH850/U2B MCUs. Customers can also combine these MCUs with Renesas’ R-Car S4 system-on-chip devices for automotive central gateway systems to build a scalable solution for E/E architectures.
Target applications and key features

**Target Applications**
- Zone control ECU
- Domain control ECU
- Communication gateway
- Vehicle motion applications
  - xEV, ICE, TCU

**Key Features**
- 400 MHz speed for up to 6 + 4 (LockStep) RH850 G4MH CPUs
- Top-level ratio of performance vs. power consumption
- Up to 24 MB Flash
- Up to 4 MB RAM

**RH850/U2B block diagram**

**32-bit CPU**
- Up to 6 RH850 G4MH Core + 4 Lock Step Core
  - @ 400 MHz
  - Tj = -40 ~ up to +160 °C
- Hypervisor, OsS
- MPU, FPU, FXU

**Memory**
- Up to 24 MB Code Flash
- Up to 512 KB Data Flash

**Motor Control IP**
- RDC*
- EMU3S*

**Accelerator**
- DFP (DR1000C)*

**System**
- DMA + DTS
- Clock Monitor
- Temperature Sensor
- CVM
- Error Control Module
- MBIST/LBIST
- Boundary Scan
- Power: Deep Stop
- Full OTA
- KCRC

**Generic Timers**
- GTM v4.1
- TAUD
- TAUJ*
- TAPA
- TSG3
- ENCA
- TPBA
- HRPWM
- OSTM
- ICU-MH Security
- EVITA-Full
- NEXUS, RHSIF*
- TPTM

**Generic Timers**
- ATU-VI
- LTSC

**Analog**
- SAR-ADC. T/H
- DS-ADC
- Cyclic-ADC*
- Fast Comparator
- DFE

**Interfaces**
- Up to Gbit Ethernet* (TSN/SGMII) w/Switch
- RSCAN-FD
- FlexRay
- MSPi
- RLIN3
- RHSIF
- RIIIC*
- RHSB
- RSENT
- PS15*
- PS15-S*

*dep. on the line-ups and packages

**ABBREVIATIONS:**
- ADC: Analog to Digital Converter
- ATU-VI: Advanced Timer Unit for Powertrain
- DFP: Data Flow Processor
- DFE: Digital Filter Engine
- EMU3: Enhanced Motor Control Unit 3
- FPU: Floating Point Unit
- FXU: Floating-point operation coprocessor
- GTM: Generic Timer Module
- MPU: Memory Protection Unit
- QoS: Quality of Service
- RDC: Resolver Digital Converter
- TSG3: Motor Control Timer
**Evaluation Boards**

<table>
<thead>
<tr>
<th>BOARD TYPE</th>
<th>RH850/U2Bx Series</th>
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<tbody>
<tr>
<td></td>
<td>BGA 292-pin</td>
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<tr>
<td>RH850/U2B Piggyback board</td>
<td>BGA 373-pin</td>
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<tr>
<td>with device socket</td>
<td>BGA 468-pin</td>
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<tr>
<td>(supports stand-alone operation)</td>
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<tr>
<td></td>
<td>Y-RH850-U2B-292PIN-PB-T1-V1</td>
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<td></td>
<td>Y-RH850-U2B-373PIN-PB-T1-V1</td>
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<td></td>
<td>Y-RH850-U2B-468PIN-PB-T1-V1</td>
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<tr>
<td>Main board</td>
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<tr>
<td>(adds additional functionality, e.g. physical I/F</td>
<td></td>
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<tr>
<td>for Ethernet, FlexRay, CAN and LIN)</td>
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<td>Y-RH850-X1X-MB-T1-V1</td>
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<td></td>
<td>Y-RH850-X1X-MB-T2-V1</td>
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<td>Y-RH850-X2X-MB-T1-V1</td>
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**Software development tools**

- **Compliers**
  - Green Hills Multi® C/C++ Compiler
  - IAR Embedded Workbench for RH850 (under preparation)
  - Renesas CS+ compiler

- **Emulators**
  - Renesas E2 On-Chip Debugging Emulator
  - Lauterbach TRACE32 Emulator support

- **Flash Programming Tools**
  - PG-FP6 Programmer
  - Renesas Flash Programming Software (RFP)
## Hardware Ordering Reference

<table>
<thead>
<tr>
<th>RH850/U2B Part Name</th>
<th>RH850/U2B Piggyback board</th>
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<tr>
<td>R7F7025x</td>
<td>Y-RH850-U2B-292PIN-PB-T1-V1</td>
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<td>Y-RH850-U2B-373PIN-PB-T1-V1</td>
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(part name depends on the package and configuration)

## Availability

Samples of the RH850/U2B Piggyback boards are available for selected customers now.

For more information, please contact regional sales.