Low Power 16-bit MCUs for Automotive, Enhanced Security, Connectivity and Functional Safety Capabilities

RENESAS RL78/F2x

Actuator and Sensor Control RL78 MCUs for Edge Applications in Next-Gen. E/E Architecture

Renesas’ next-generation RL78/F24 and RL78/F23 MCUs address changing technology demands for actuator and sensor control with enhanced security, rich connectivity, and functional safety capabilities. The new devices support the CAN FD high-speed communication protocol (RL78/F24) and EVITA-Light security. They are also optimized for systems targeting ASIL-B level under the ISO 26262 functional safety standard.

Features
- 40 MHz operating frequency
- Supports various connectivity interfaces, including CAN FD (RL78/F24), LIN, SPI, and I²C
- EVITA-Light security functionality (support AES-128/192/256 encryption algorithms, etc.)
- Pin compatible with the RL78/F14 and RL78/F13 MCUs
- Same power efficiency as current generation RL78/F1x MCUs
- On-chip flash memory capacity of 128 KB or 256 KB
- Package lineup ranging from compact 5mm × 5mm 32-pin QFN to 14mm × 14mm 100-pin QFP
- Support for high temperatures up to 150°C

Applications
- Smart actuators
- Sensors ECUs
- Low-end body

Benefits
- About 70 percent maximum operating frequency increase from current generation RL78/F1x. More than double the performance for brushless motor control (BLDC) applications.
- Add a new hardware accelerator and enhance the timer functions for motor control.
- Improve A/D converter from 10-bit to 12-bit.
- CAN FD for high-speed communication.
- Up to ASIL-B level FuSa support base on ISO26262 standard.

Block Diagram

[Diagram of RL78/F23 and RL78/F24 MCUs]

FDC: Field Oriented Control (BLDC motor vector control method). This function is included in feature AAU (Application Accelerator Unit).

renesas.com
### Product Lineup

**RL78/F23**

<table>
<thead>
<tr>
<th>Pin Count</th>
<th>Code Flash</th>
<th>Data Flash</th>
<th>RAM</th>
<th>Operating Temperature (Ta)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 pins</td>
<td>128 KB</td>
<td>8 KB</td>
<td>12 KB</td>
<td>R7F123FG5A/AFB R7F123FMG4AFB R7F123FMG5A/AFB</td>
</tr>
<tr>
<td>64 pins</td>
<td>128 KB</td>
<td>8 KB</td>
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</tr>
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<tr>
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<td>128 KB</td>
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<td>R7F123FG5A/AFB R7F123FMG4AFB R7F123FMG5A/AFB</td>
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**RL78/F24**

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<th>Operating Temperature (Ta)</th>
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<td>100 pins</td>
<td>256 KB</td>
<td>16 KB</td>
<td>24 KB</td>
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<td>80 pins</td>
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</table>

### Tool Support

<table>
<thead>
<tr>
<th>IDE</th>
<th>Renesas CS+</th>
<th>Renesas e2 studio</th>
<th>IAR Embedded Workbench</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler</td>
<td>Renesas CC-RL</td>
<td>Renesas CC-RL</td>
<td>IAR Compiler</td>
</tr>
<tr>
<td>Emulator</td>
<td></td>
<td>Renesas E2/E2 Lite</td>
<td></td>
</tr>
<tr>
<td>Programmer</td>
<td></td>
<td>Renesas PG-FPB</td>
<td>Renesas Flash Programmer (Programming GUI)</td>
</tr>
<tr>
<td>Code Generator</td>
<td></td>
<td>Renesas Smart Configurator (possible to combine CAN FD, LIN utilities)</td>
<td></td>
</tr>
</tbody>
</table>

### Board & Kit

**RL78/F24 Target Board (CPU Board)**

- Rapid peripheral initialization including CAN FD and LIN by Renesas Smart Configurator utility.

**RL78/F24 Brushless DC Motor Control Renesas Starter Solution Kit**

It provides the design information necessary for development of small motor.

### Code Generator

**Model Based Design**

- **RL78/F2x provides support options for Model Based Design**
  - Enable to handle design iteration in model world with applicable MCU behavior
    - Build a virtual system quickly by connecting with the user model.
    - Be able to check the detailed control timing and function combination of the MCU peripherals on the model.
    - Evaluate the operation assuming an actual MCU behavior on the model.

- **Enable to generate the code and make software implementation easier**
  - Enables generation of evaluation code included register operations to peripheral devices that is easy to implement.
  - The man-hours for software implementation for evaluation can be significantly reduced.

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**Contact information**

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit: www.renesas.com/contact/

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