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

- RL78/F23
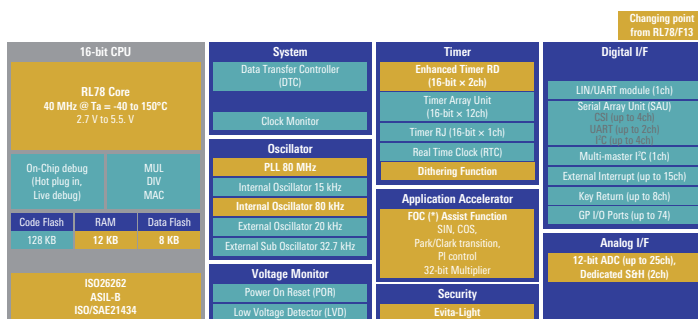
- RL78/F24
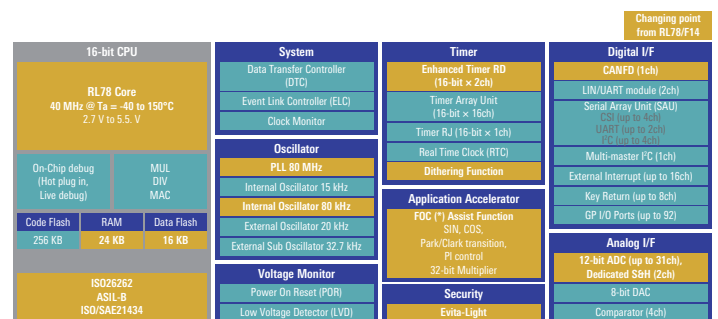
FOC: Field Oriented Control (BLDC motor vector control method). This function is included in feature AAU (Application Accelerator Unit).

RENESAS RL78/F2x

Product Lineup

■ RL78/F23

Pin Count	Memory			Operating Temperature (Ta)		
	Code Flash	Data Flash	RAM	-40 to 105°C	-40 to 125°C	-40 to 150°C
80 pins	128 KB	8 KB	12 KB	R7F123FMG3AFB	R7F123FMG4AFB	R7F123FMG5AFB
64 pins				R7F123FLG3AFB	R7F123FLG4AFB	R7F123FLG5AFB
48 pins				R7F123FGG3AFB	R7F123FGG4AFB	R7F123FGG5AFB
32 pins				R7F123FBG3ANP	R7F123FBG4ANP	R7F123FBG5ANP

■ RL78/F24

Pin Count	Memory			Operating Temperature (Ta)		
	Code Flash	Data Flash	RAM	-40 to 105°C	-40 to 125°C	-40 to 150°C
100 pins	256 KB	16 KB	24 KB	R7F124FPJ3AFB	R7F124FPJ4AFB	R7F124FPJ5AFB
80 pins				R7F124FMJ3AFB	R7F124FMJ4AFB	R7F124FMJ5AFB
64 pins				R7F124FLJ3AFB	R7F124FLJ4AFB	R7F124FLJ5AFB
48 pins				R7F124FGJ3AFB	R7F124FGJ4AFB	R7F124FGJ5AFB
32 pins				R7F124FBJ3ANP	R7F124FBJ4ANP	R7F124FBJ5ANP

Tool Support

IDE	Renesas CS+	Renesas e² studio	IAR Embedded Workbench
Compiler	Renesas CC-RL	Renesas CC-RL	IAR Compiler
Emulator	Renesas E2/E2 Lite		
Programmer	Renesas PG-FP6 Renesas Flash Programmer (Programming GUI)		
Code Generator	Renesas Smart Configurator (possible to combine CAN FD, LIN utilities)		

Board & Kit

■ RL78/F24 Target Board (CPU Board)
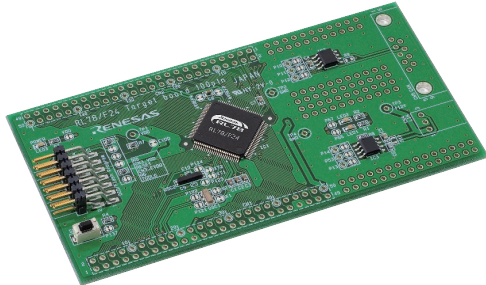
■ RL78/F24 Brushless DC Motor Control Renesas Starter Solution Kit
It provides the design information necessary for development of small motor.

BLDC RSSK Contents

Manual	- RSSK Manual
Inverter Board	- Inverter Board - Circuit Diagram - PCB layout - BOM List
BLDC Motor Control Software	Sample program & Application note - Sensorless 120-degree conducting control - Sensorless vector control (3-shunt) - Sensorless vector control (1-shunt)
Evaluation Data	- EMI/EMS Evaluation Data - Heat of parts Evaluation Data - Motor control Performance evaluation Data

Permanent Magnet Synchronous Motor
TG-55N-KA (12V, 0.51A)

MCU: RL78/F24
LDO: ISL78301
Gate Driver: ISL78434
MOSFET: NP75N04YUK

Code Generator

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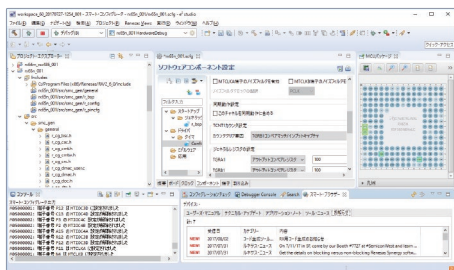

Model Based Design

■ 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.
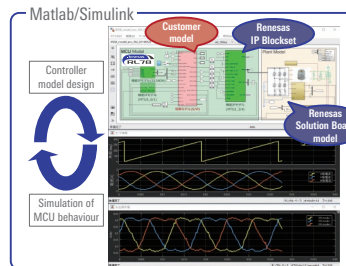
Enable to generate the code and make software implementation easier
- Enables generation of evaluation code included register operations to peripheral devices that is easy to implement.
- The man-hours for software implementation for evaluation can be significantly reduced.
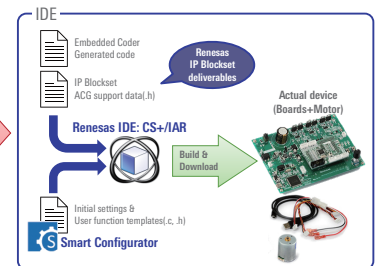
Contact information
For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/

Document No.: R01PF0222EJ0100