



# RENESAS VEHICLE COMPUTER GENERATION 4

AVAILABLE  
Q2/2022

The four megatrends of autonomous driving, connected cars, electric vehicles and shared mobility have significant impact to the E/E architecture which moves from domain based into a zonal architecture. This new zonal architecture addresses the increasing complexity and the computation demand of the next generation vehicles. Renesas has developed a comprehensive Communication Gateway ECU (Vehicle Computer) offering the newest automotive network technologies like a TSN Ethernet Switch, 10BASE-T1S, 1000BASE-RH (optical fiber) and 2.5GBASE-T1 plus legacy networks like CAN, LIN, FlexRay and SENT as well as sufficient computing power to host the ever-increasing amount of user applications.

## Universal development platform

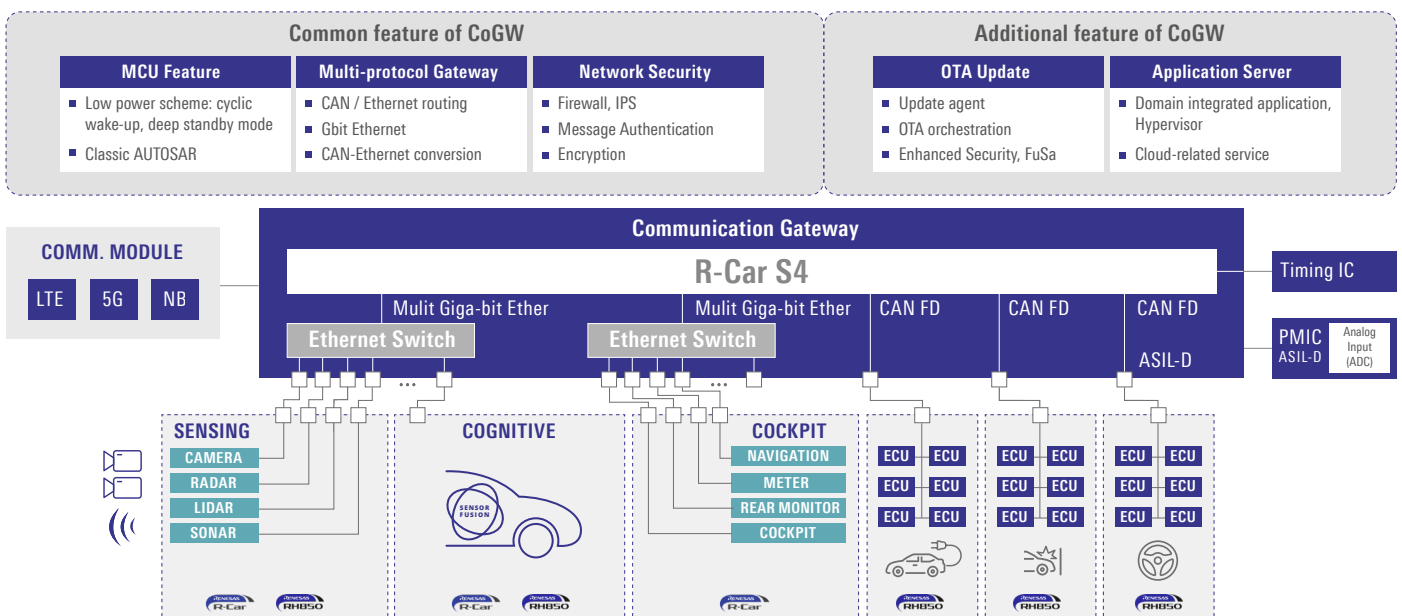
This Communication Gateway ECU is considered as universal development platform for automotive customers. This type of platform typically requires Application performance which is provided by a cluster of several Arm® CPU's.

Beside that also real-time performance is needed that traditionally is provided by a micro controller that carries the typical automotive communication interfaces as well. In the past this required a mix of several chips on one PCB. Now with the new R-Car S4 everything is provided by a single device, this allows a drastic BOM cost reduction.

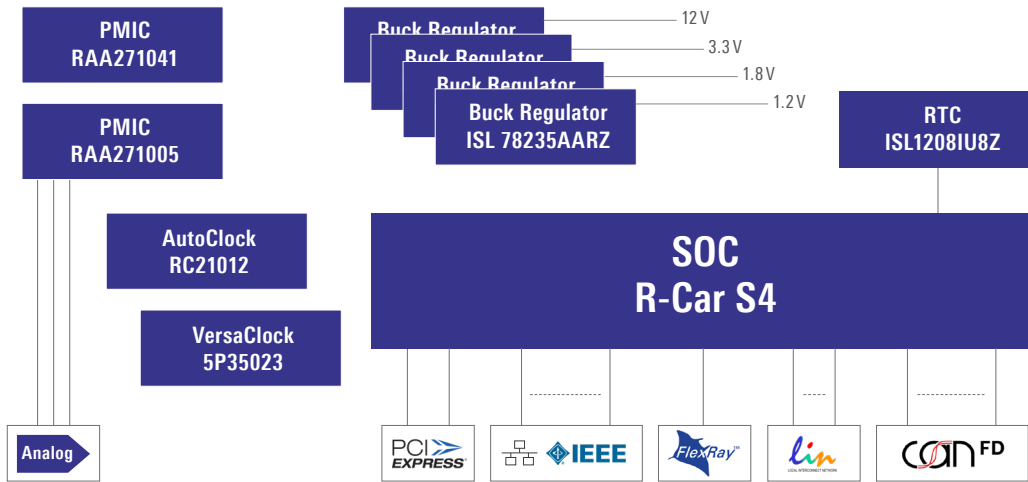
## High level of software compatibility

The Renesas R-Car S4 SoC is the first product in Renesas' 4th-generation R-Car Family. It includes multiple Arm® Cortex® A55, Cortex® R52 and an integrated high performance G4MH CPU core for control domain management. R-Car S4 SoCs offers a huge number of automotive interfaces such as 16x CAN FD, 16x LIN, 8x SENT, 1x FlexRay, 2x PCIe V4.0 and also a high-bandwidth 3 x 2.5Gbit Ethernet Switch to enable rich communication and connectivity options both inside and outside of the vehicle. The R-Car S4 solution allows designers to re-use up to 80 percent of software code developed for three generations of R-Car SoCs and RH850 MCU applications. The software package supports the real-time cores with various drivers and basic software such as Linux BSP and hypervisors.

## Block Diagram



Vehicle Computer VC4 Block diagram



The VC4 is based on a complete Renesas chipset. The centerpiece is the R-Car S4 with 8x Cortex®A55 cores, 1x Cortex® R52 core 2x RH850 G4MH delivering up to 27K DMIPS application performance plus >5.3K DMIPS lock step real-time performance. It incorporates an 8MB SRAM to execute code on the RH850 G4MH cores with low latency. A rich selection of automotive interfaces including a 3-port Ethernet Switch, 16x CAN FD, 8x LIN, 4x SENT, 1x FlexRay, 2x PCIe V4.0 allow a wide range of connectivity inside the vehicle.

Together with the powerful Renesas PMIC components RAA271041 and RAA271005 which provide advanced power control to support extremely low power operation for always-on, cyclic-run, and suspend-to-RAM modes. The RAA271041 device’s supports the buck stage when the battery voltage drops during cranking transients as low as 2.5V. The RAA271005 has an integrated 12-bit SAR ADC monitors external signals. Finally, high precision timing devices RC21012 and 5P35023 will provide perfect clocking to all devices.

It is the ideal platform to evaluate new E/E Architectures using the R-Car S4 in Gateway, Car Server or Zone Control applications.

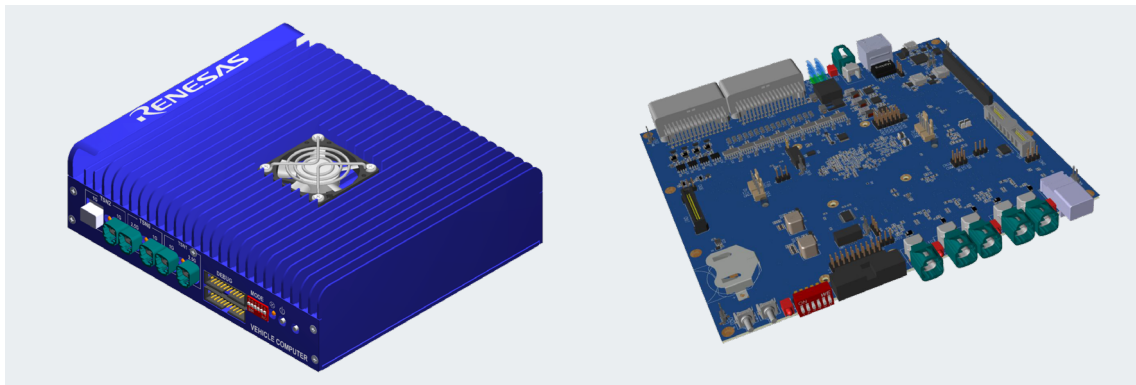
Characteristics

KEY FEATURES

- Gateway solution based on R-Car S4 SoCs
- Automotive qualified components (timing IC and PMIC)
- Robust Metal housing
- Wide temperature range 40°C to 85°C
- Input voltage range 2.5V to 40V
- Wake-up support
- Real Time clock on board

INTERFACES

- 10BASE-T1S
- 100BASE-T1
- 1000BASE-T1
- 1000BASE-RH
- 2.5GBASE-T1
- CAN/CAN FD
- FlexRay
- LIN
- SENT
- PCIe
- Analog Input



For more details, please visit: <https://www.renesas.com/r-car-s4>