

MEMORY INTERFACE PRODUCTS

The only complete provider of all memory interface products for DDR5 servers and client DIMMs



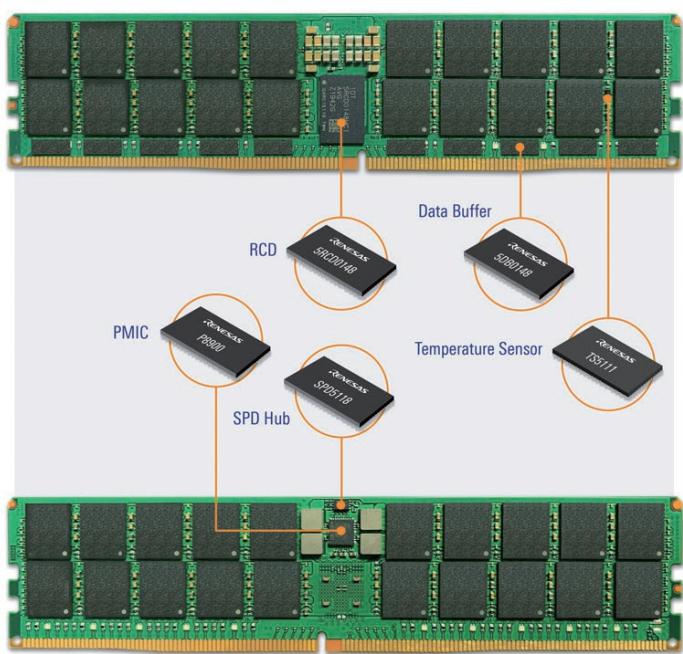
MEMORY INTERFACE PRODUCTS

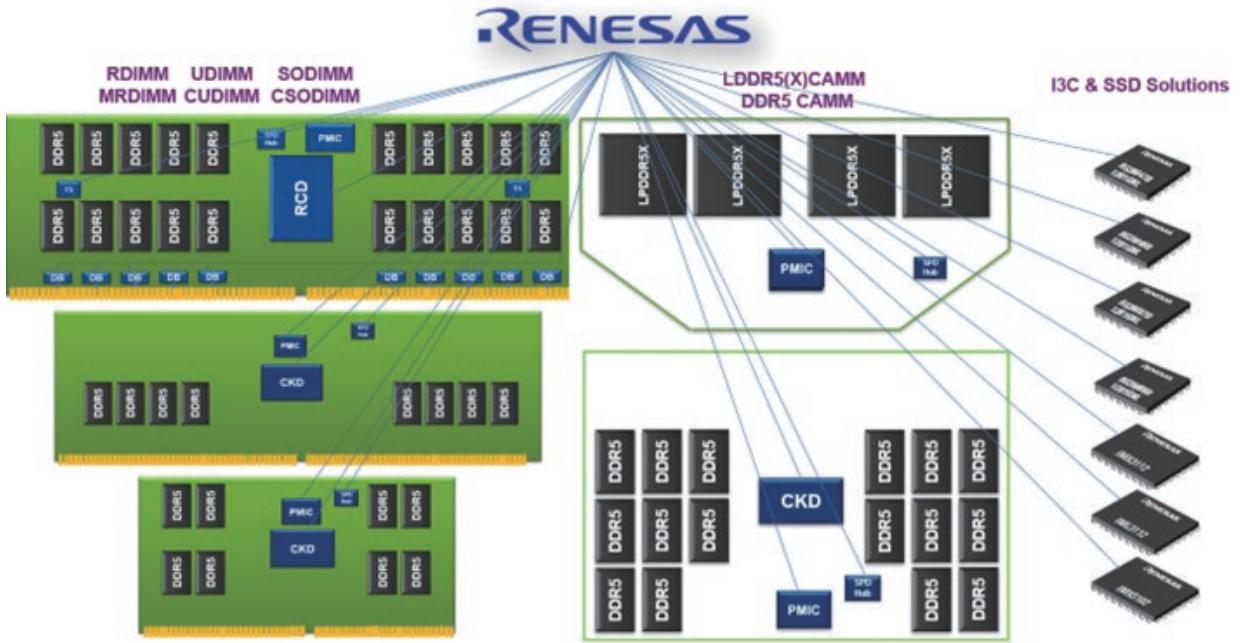
THE ONLY COMPLETE PROVIDER OF
ALL MEMORY INTERFACE PRODUCTS FOR
DDR5 SERVERS AND CLIENT DIMMS



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Memory Interface Products

As the industry leader for over 20 years and the only full system solution supplier of memory interface products for DDR5 modules, Renesas offers a wide array of JEDEC-compliant registered clock drivers (RCD), client clock driver (CKD), data buffers (DB), power management ICs (PMIC), temperature sensors, and SPD hubs to meet the tight timing budget requirement of dual in-line memory modules (DIMM).

With a focus on low power, high performance and thorough validation through each new generation of memory technology, Renesas has established its position as the unquestioned market leader in memory interface solutions.

DDR5 Solutions

For DDR5 RDIMM, MRDIMM, UDIMM, SODIMM, CUDIMM, CSODIMM, CAMM, LPCAMM, and memory down applications.

DDR4 Solutions

For DDR4 RDIMM, UDIMM, SODIMM, and memory down applications.

DDR3 Solutions

For DDR3 RDIMM, ECC UDIMM, and memory down applications.

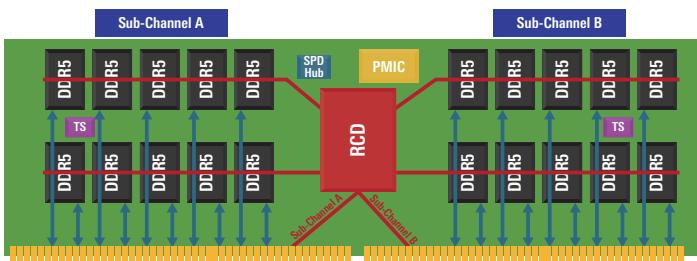
I3C Intelligent Switches and Expanders

For memory and control plane expanders to improve signal integrity and performance on server motherboards.

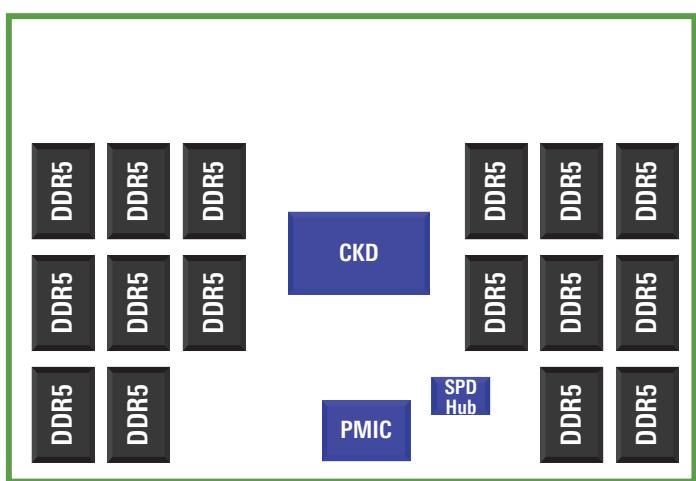
DDR5 Solutions



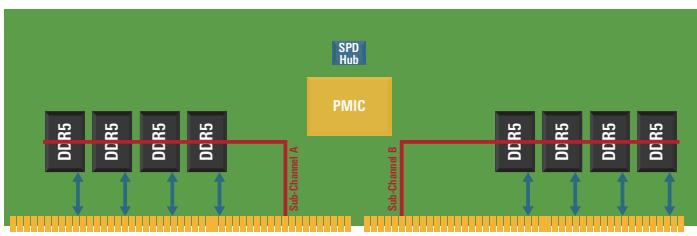
DDR5 Server DIMM



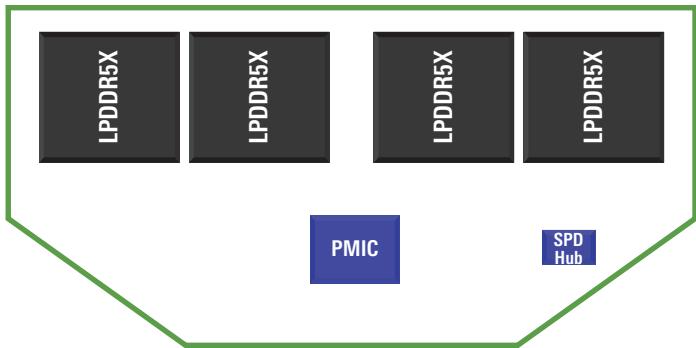
DDR5 CAMM



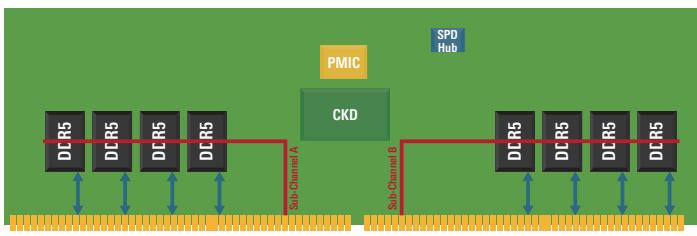
Client DIMM



LPCAMM



Client DIMM with CKD



DDR5 memory is projected to double the bandwidth of DDR4, and as with previous generations of DDR memory, Renesas' devices are leading the market in performance and reliability. Renesas has a complete family of ICs to develop high-performance DDR5 RDIMM, MRDIMM, UDIMM, SODIMM, CUDIMM, CSODIMM, CAMM, LPCAMM, gaming DIMM, and memory interface products for server and client memory down applications. Renesas' portfolio includes power management ICs (PMICs), SPD hubs, registered clock drivers, temperature sensors, data buffers, I3C Intelligence Switches, and I3C re-driver and expander products. Renesas' family of DDR5 and I3C expander ICs enables the next generation of server and client DIMM as well as server and client motherboard solutions to efficiently scale to greater performance, density, and reliability while reducing overall system power.

Renesas also offers an industrial temp DDR5 RCD that supports temperatures as low as -40°C and as high as 105°C for DDR5 industrial temperature dual inline memory modules (DIMMs) and memory-down applications.

With a deep history of delivering industry-leading memory interface chipsets for all DDR generations, Renesas' devices will provide reliable performance to meet the most demanding enterprise and data center applications.

DDR5 Solutions

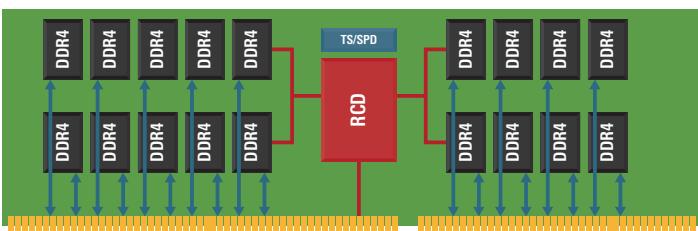
Product Lineup

| Part No. | Product Title | Function | Input Voltage Range (V) |
|----------|--|--------------------------------|-------------------------|
| P8900 | PMIC for DDR5 RDIMM | DDR5 Server PMIC | 12, 3.3 |
| P8910 | PMIC for DDR5 RDIMM | DDR5 Server PMIC | 12, 3.3 |
| RRG5321 | JEDEC P5020 compliant PMIC for RDIMM and MRDIMM | DDR5 Gen 1 MRDIMM PMIC | 12, 3.3 |
| RRG5322 | JEDEC P5030 compliant PMIC for RDIMM and MRDIMM | DDR5 Gen 2 MRDIMM PMIC | 15, 3.6 |
| P8911 | PMIC for DDR5 UDIMM and SODIMM | DDR5 Client PMIC | 5 |
| RRG5332 | JEDEC P5120 compliant PMIC for UDIMM and SODIMM | DDR5 Gen 2 Client PMIC | 5 |
| RRG5341 | JEDEC P5200 compliant PMIC for LPCCAMM | DDR5 LLPMIC | 5 |
| RG5C172 | DDR5 Gen 1 Client Clock Driver for UDIMM, SODIMMs, Over Clocking DIMMs and Memory Down. Address up to 7200MT/s | DDR5 Gen 1 Client Clock Driver | 1.07 – 1.17 |
| RRG52021 | DDR5 Gen 2 Client Clock Driver for UDIMM, SODIMMs, Over Clocking DIMMs and Memory Down. Address up to 8800MT/s | DDR5 Gen 2 Client Clock Driver | 1.1 |
| RG5D188 | Gen 1 MDB for DDR5 MRDIMM. Address up to 8800MT/s | DDR5 Gen 1 MDB | 1.07 – 1.17 |
| RRG51021 | Gen 2 MDB for DDR5 MRDIMM. Address up to 12800MT/s | DDR5 Gen 2 MDB | 1.07 – 1.17 |
| RRG51031 | Gen 3 MDB for DDR5 MRDIMM. Address up to 16000MT/s | DDR5 Gen 3 MDB | 1.07 – 1.17 |
| RG5R188 | Gen 1 MRCD for DDR5 MRDIMM. Address up to 8800MT/s | DDR5 Gen 1 MRCD | 1.1 |
| RRG50121 | Gen 2 MRCD for DDR5 MRDIMM. Address up to 12800MT/s | DDR5 Gen 2 MRCD | 1.1 |
| RRG50131 | Gen 3 MRCD for DDR5 MRDIMM. Address up to 16000MT/s | DDR5 Gen 3 MRCD | 1.1 |
| 5RCD0148 | DDR5 Register Command Address up to 4800MT/s | DDR5 Gen 1 Server RCD | 1.04 – 1.16 |
| RG5R256 | DDR5 Register Command Address up to 5600MT/s | DDR5 Gen 2 Server RCD | 1.06 – 1.16 |
| RG5R364 | DDR5 Register Command Address up to 6400MT/s | DDR5 Gen 3 Server RCD | 1.06 – 1.16 |
| RRG50041 | DDR5 Register Command Address up to 7200MT/s | DDR5 Gen 4 Server RCD | 1.1 |
| RRG50051 | DDR5 Register Command Address up to 8800MT/s | DDR5 Gen 5 Server RCD | 1.1 |
| RRG50061 | DDR5 Register Command Address up to 9600MT/s | DDR5 Gen 6 Server RCD | 1.1 |

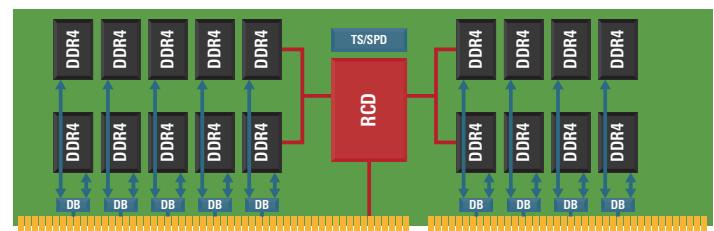
DDR4 Solutions



DDR4 RDIMM



DDR4 LRDIMM



Renesas' DDR4 registered clock driver, data buffer and temp sensor make up the industry's first complete chipset for DDR4 registered dual inline memory modules (RDIMMs) and load reduced dual inline memory modules (LRDIMMs). With DDR4 data rates climbing to 3.2Gb/s and higher, the clear advantages afforded by RDIMM and LRDIMM as a speed-scalable memory technology are expected to drive adoption across a broad array of memory-intensive computing and storage applications.

Renesas also offers an industrial temp DDR4 RCD that supports temperatures as low as -40 °C and as high as 105 °C for existing DDR4 applications.

Through flexible I/O control, timing and voltage calibration, and control register programmability, the Renesas DDR4 registered clock drivers and data buffers enable faster data rates at higher densities on all JEDEC® defined DDR4 LRDIMM and RDIMM topologies. DIMM topology configuration and DRAM information are stored in Renesas' temperature sensor EEPROM.

With a deep knowledge of memory interface chipsets based on successful chipset introductions for all DDR generations, Renesas' devices will provide reliable performance for your application.

Product Lineup

| Part No. | Product Title | Function | Input Voltage Range (V) |
|------------|--|-------------------------|-------------------------|
| 4DB0232KD | Data Buffer for DDR4 Memory Modules | DDR4 Data Buffer | 1.2, 1.14 – 1.26 |
| 4RCD0124K | DDR4 Register Command Address up to 2400MT/s | DDR4 Gen 1 Server RCD | 1.2 |
| 4RCD0229K | DDR4 Register Command Address up to 2667MT/s | DDR4 Gen 2 Server RCD | 1.2 |
| 4RCD0232K | DDR4 Register Command Address up to 3200MT/s | DDR4 Gen 2.5 Server RCD | 1.2 |
| TSE2004GB2 | DDR4 Temp Sensor with SPD | DDR4 Temp Sensor | 2.2 – 3.6 |

DDR3 Solutions



DDR3 memory offers significant advantages in power, bandwidth, capacity, and reliability versus previous generations of memory technology. Renesas offers both Register/PLL and temperature sensor products for the DDR3 memory module market. Fully compliant with all JEDEC specifications, the Renesas DDR3 Register/PLL is an essential building block for advanced memory subsystems in applications such as servers, workstations and communications equipment. DDR3 RDIMMs and ECC UDIMMs all require the use of a temperature sensor with an integrated SPD. Renesas offers digital temperature sensors with accuracy up to $\pm 0.5^{\circ}\text{C}$ typical, that is designed for memory modules demanding the highest level of temperature readout.

Product Lineup

| Part No. | Product Title | Function | Input Voltage Range (V) |
|--------------|-------------------------------|---------------|-------------------------|
| SSTE32882KB1 | LOW POWER DDR3 Register + PLL | DDR3 Register | 1.25, 1.35, 1.5 |

I3C Intelligent Switches and Expanders



Renesas has a family of control plane (I3C) switches and expanders to significantly improve signal integrity and performance in a wide variety of applications, including CPU/BMC/DIMM management for servers and data centers.

Renesas control plane (I3C) switches and expanders enable intelligent management of CPU, BMC, DIMM, and other peripherals with significant performance and power benefits over other serial communication interfaces with easy-to-use bidirectional signaling capabilities in a small footprint.

Product Lineup

| Part No. | Product Title | Function | Supply Voltage (V) | Temp. Range | Package Type | Lead Count |
|-----------|---|---------------------------------------|--------------------|-------------|--------------|------------|
| RG3M27B12 | 2:2 Hub, Downstream Ports default disabled | I3C 2:2 Intelligence Switch | 3.3 | -40 to 85°C | FCQFN | 18 |
| RG3M28B12 | 2:2 Hub, Downstream Ports default enabled | I3C 2:2 Intelligence Switch | 3.3 | -40 to 85°C | FCQFN | 18 |
| RG3M29B12 | 2:2 Hub, Downstream Ports default disabled and VIO LDOs Enabled | I3C 2:2 Intelligence Switch | 3.3 | -40 to 85°C | FCQFN | 18 |
| RG3M47B12 | 2:4 Hub, Downstream Ports default disabled | I3C 2:4 Intelligence Switch | 3.3 | -40 to 85°C | VFQFPN | 28 |
| RG3M48B12 | 2:4 Hub, Downstream Ports default enabled | I3C 2:4 Intelligence Switch | 3.3 | -40 to 85°C | VFQFPN | 28 |
| RG3M49B12 | 2:4 Hub, Downstream Ports default disabled and VIO LDOs Enabled | I3C 2:4 Intelligence Switch | 3.3 | -40 to 85°C | VFQFPN | 28 |
| RG3M87B12 | 2:8 Hub, Downstream Ports default disabled | I3C 2:8 Intelligence Switch | 3.3 | -40 to 85°C | VFQFPN | 28 |
| RG3M88B12 | 2:8 Hub, Downstream Ports default enabled | I3C 2:8 Intelligence Switch | 3.3 | -40 to 85°C | VFQFPN | 28 |
| RG3M89B12 | 2:8 Hub, Downstream Ports default disabled and VIO LDOs Enabled | I3C 2:8 Intelligence Switch | 3.3 | -40 to 85°C | VFQFPN | 28 |
| IMX3112 | I3C 1:2 Bus Expander | I3C 1:2 Bus Expander | 1.8 | 0 to 125°C | DFN | 8 |
| IMX3102 | I3C 2:1 Bus Re-driver | I3C 2:1 Bus Re-driver | 1.8 | -40 to 85°C | DFN | 8 |
| IML3112 | I3C 1:2 Bus Expander with Level Shift | I3C 1:2 Bus Expander with Level Shift | 1.8 | 0 to 125°C | DFN | 8 |

MEMO

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(Rev.5.0-1 2020.10)

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