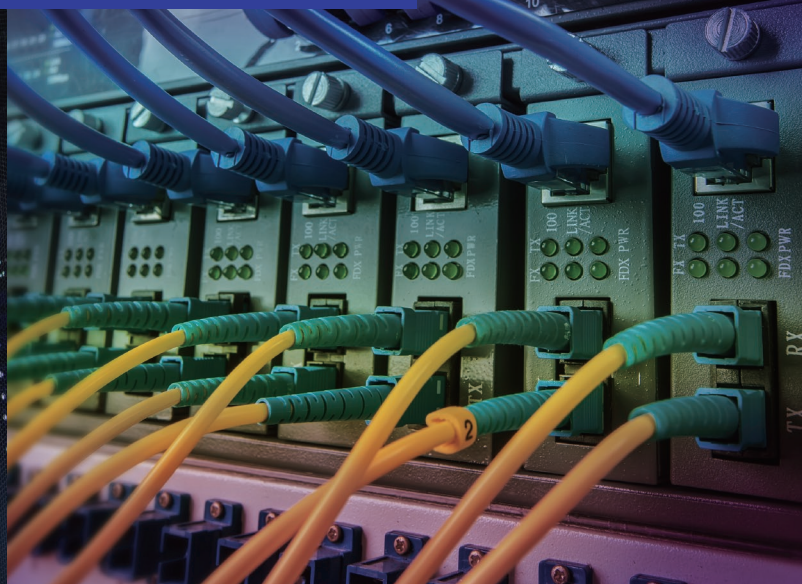


MEMORY INTERFACE PRODUCTS

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



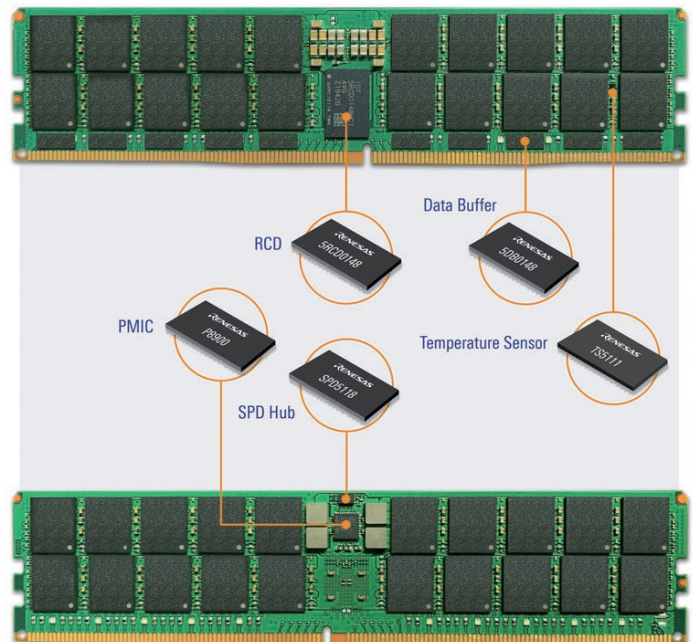
MEMORY INTERFACE PRODUCTS

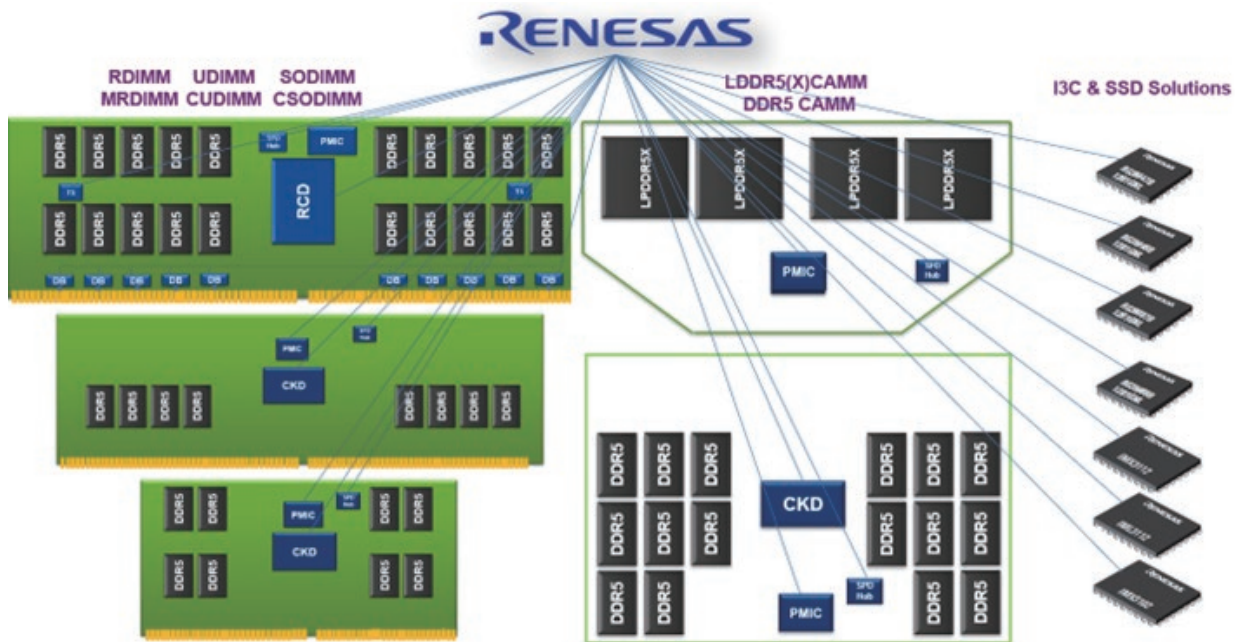
THE ONLY COMPLETE PROVIDER OF
ALL MEMORY INTERFACE PRODUCTS FOR
DDR5 SERVERS AND CLIENT DIMMS



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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, CAMP, LPCAMP, 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.

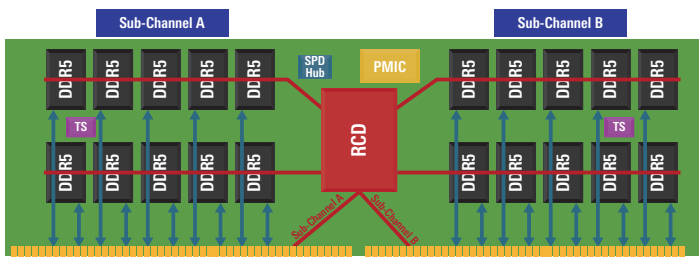
I3C Intelligent Switches and Expanders

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

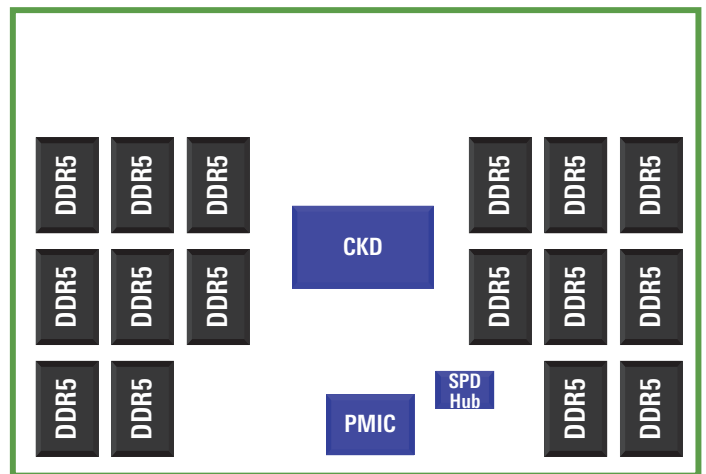
DDR5 Solutions



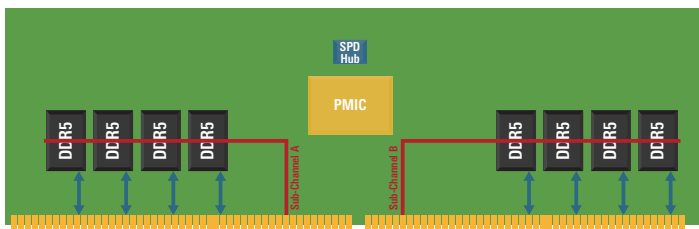
DDR5 Server DIMM



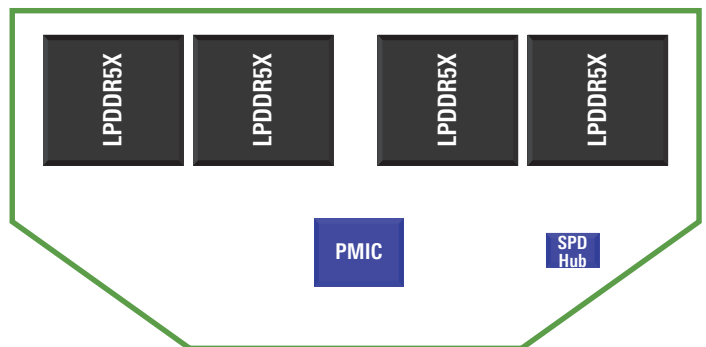
DDR5 CAMM



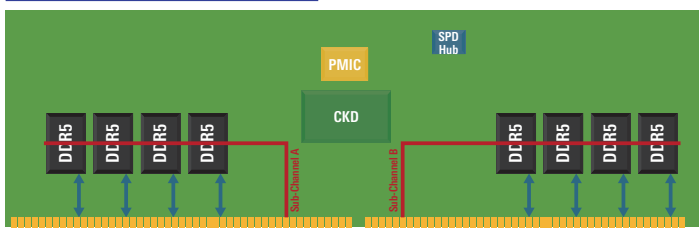
Client DIMM



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.

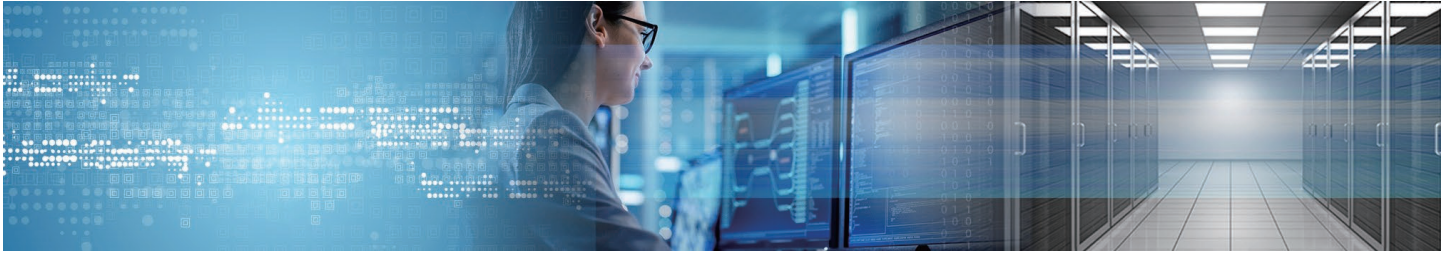
With a deep history of delivering industry-leading memory interface chipsets for all DDR generations, Renesas' devices will provide reliable performance to meet the most demanding enterprise and data center applications.

DDR5 Solutions

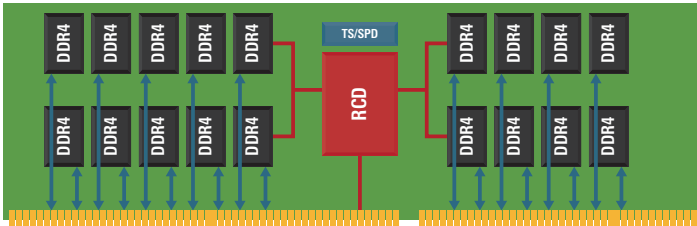
Product Lineup

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 LPCAMM	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 1600MT/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

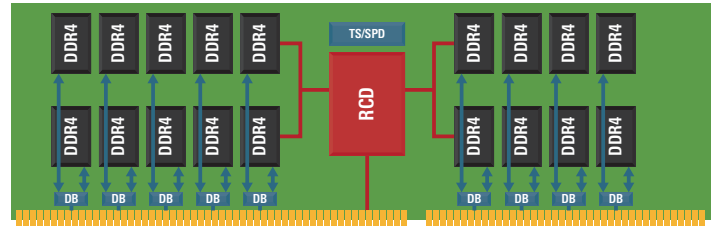
DDR4 Solutions



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

Renesas Electronics Corporation TOYOSU FORESIA, 3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan

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