



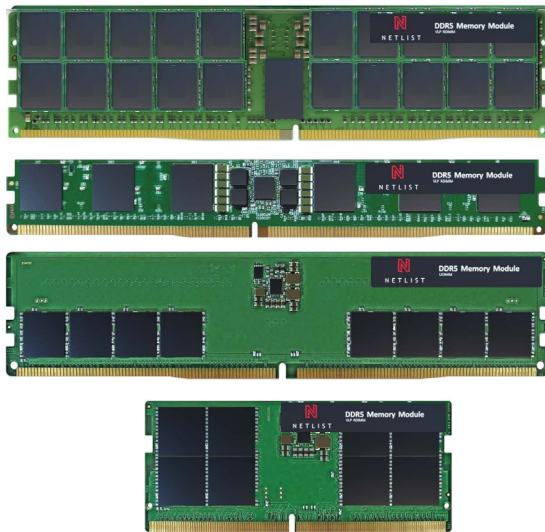
NETLIST

Netlist DDR5 Memory Module

Emerging Workloads Driving New Memory

Requirements

DIMM Capacities 8GB to 128GB



Netlist's DDR5 DIMM products are designed to address a broad range of applications including Enterprise and Cloud

DDR5 DIMM is a new architecture family with several different form factors to support the needs of the latest processors and emerging applications.

Core counts of new processors continue to accelerate year over year. DDR5 feature and performance capability allow CPU cores to scale due to an increase of 2X bandwidth on a DDR5 DIMM. DDR5 memory bandwidth and capacity will scale and be cost-effective with reliability to meet the ever-growing demands of future applications. Diversification of memory solutions and technology is needed to improve and support this scale-out effect. Enterprise, Cloud Hosting, Edge, Telco, HPC, AI/ML, and Data Centers are just a few examples. Netlist DDR5 family provides a long-term DIMM roadmap on Registered DIMM, Unbuffered DIMM ECC and non ECC, and SODIMM form factor to support these multiple applications.

HIGHLIGHTS



PERFORMANCE

Overall, a significant increase in performance up to 5600 Mbps due to a 2X increase in the number of banks (32), Burst length (BL16), and Bank Groups (8) compared to DDR4.



AVAILABILITY

Whether looking for high capacity (up to 128GB) or low capacity (8GB) RDIMM, short lead times, differentiating features, unparalleled technical or logistical support, Netlist delivers.

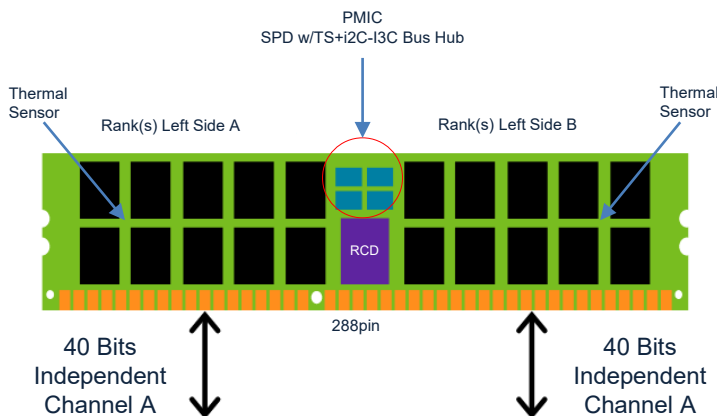


PRODUCT HIGHLIGHTS

- Multiple capacities: 8,16,32,64,128GB
- DDR5 performance up to 5600 Mbps
- SK Hynix DDR5 DIMM Product Family available
- Non-ECC and ECC Unbuffered DIMM and SODIMM

DIMM Changes from DDR4 to DDR5

Feature	DDR4	DDR5
Frequency (GT/s)	1.6~3.2	4.8~5.6
Voltage (V)	1.2	1.1
Power Supply	PMIC on MB	PMIC on DIMM
Temp sensor device	1 per DIMM	2 or 3 per DIMM
Side bus protocol	I2C bus	Legacy SMBus, I2C, I3C
Sideband bus access	Direct Access	1xC Hub in SPD
Channel Architecture	72-bit data channel 64 data + 8 ECC 1 channel per DIMM	40-bit data channel 32 data+ 8 ECC 2 channel per DIMM
DFE Support	DB Only	RCD, DB, and DRAM





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FEATURES

- Data rates up to 5600 Mbps
- Burst Length (BL16)
- On-Die Error Correction Coding (ECC)
- Post-Package Repair
- Refresh Management
- CRC (write & read)
- Decision Feedback Equalization (DFE)
- Temperature Sensor-ICs on DIMM
- Enhanced Training Modes
- Up to 128GB RDIMM capacity
- Reduced I/O voltage (1.1V)
- Multiple DIMM Form Factors: RDIMM, UDIMM, SODIMM, VLP

BENEFITS

- Locked BOM Support
- JEDEC Compliant
- 100% System level testing
- Technical support
- Customization

NETLIST DDR5 RDIMM Ordering Information

DIMM Type	Form Factor	Height	Density	Config	Number of DRAM	Speed (MT/s)	Hynix PN	Netlist PN	Description	
Server RDIMM	LP	31.25	16GB	1Rx8	10	4800	HMCG78AEBRA	NLR4G0054G0748200HA	16GB 1Rx8 DDR5-4800-40-39-39 RDIMM SK Hynix A-Die SDP	
						5600	HMCG78AGBRA	NLR4G0054G0756200HA	16GB 1Rx8 DDR5-5600-46-45-45 RDIMM SK Hynix A-Die SDP	
			32GB	1Rx4	20	4800	HMCG84AEBRA	NLR5G0054G0348200HA	32GB 1Rx4 DDR5-4800-40-39-39 RDIMM SK Hynix A-Die SDP	
						5600	HMCG84AGBRA	NLR5G0054G0356200HA	32GB 1Rx4 DDR5-5600-46-45-45 RDIMM SK Hynix A-Die SDP	
			32GB	2Rx8	20	4800	HMCG88AEBRA	NLR5G0054G0748200HA	32GB 2Rx8 DDR5-4800-40-39-39 RDIMM SK Hynix A-Die SDP	
						5600	HMCG88AGBRA	NLR5G0054G0756200HA	32GB 2Rx8 DDR5-5600-46-45-45 RDIMM SK Hynix A-Die SDP	
			48GB	1Rx4	20	4800	HMCGY4MEBRB	NLRF0054G0348200HA	48GB 1Rx4 DDR5-4800-40-39-39 RDIMM SK Hynix M-Die SDP	
						5600	HMCGY4MGBRB	NLRF0054G0356200HA	48GB 1Rx4 DDR5-5600-46-45-45 RDIMM SK Hynix M-Die SDP	
			48GB	2Rx8	20	4800	HMCGY8MEBRB	NLRF0054G0748200HA	48GB 2Rx8 DDR5-4800-40-39-39 RDIMM SK Hynix M-Die SDP	
						5600	HMCGY8MGBRB	NLRF0054G0756200HA	48GB 2Rx8 DDR5-5600-46-45-45 RDIMM SK Hynix M-Die SDP	
			64GB	2Rx4	20	4800	HMCG94AEBRA	NLR6G0054G0348200HA	64GB 2Rx4 DDR5-4800-40-39-39 RDIMM SK Hynix A-Die SDP	
						5600	HMCG94AGBRA	NLR6G0054G0356200HA	64GB 2Rx4 DDR5-5600-46-45-45 RDIMM SK Hynix A-Die SDP	
	96GB	2Rx4	20	4800	HMCGM4MEBRB	NLR6G0054G0356200HA	96GB 2Rx4 DDR5-4800-40-39-39 RDIMM SK Hynix M-Die SDP			
				5600	HMCGM4MGBRB	NLR6G0054G0356200HA	96GB 2Rx4 DDR5-5600-46-45-45 RDIMM SK Hynix M-Die SDP			
	128GB	4Rx4	40	4800	HMCT04MEBRA129N	NLR7G0054G3B48209HM	128GB 4Rx4 DDR5-4800-46-39-39 RDIMM SK Hynix M-Die 3DS-2H			
				5600	HMCT04AGBRA129N**	NLR7G0054G3B48209HA	128GB 4Rx4 DDR5-5600-52-45-45 RDIMM SK Hynix A-Die 3DS-2H			
	VLP	LP	18.75	16GB	1Rx8	10	4800	N*/A	NVR4G0054G0748201HA	16GB 1Rx8 DDR5-4800-40-39-39 RDIMM SK Hynix A-Die SDP
							5600	N*/A	NVR4G0054G0756202HA	16GB 1Rx8 DDR5-5600-46-45-45 RDIMM SK Hynix A-Die SDP
				32GB	2Rx8	20	4800	N*/A	NVR5G0054G0748201HA	32GB 2Rx8 DDR5-4800-40-39-39 RDIMM SK Hynix A-Die SDP
							5600	N*/A	NVR5G0054G0756202HA	32GB 2Rx8 DDR5-5600-46-45-45 RDIMM SK Hynix A-Die SDP
48GB		2Rx8	20	4800	N*/A	NVRF0054G0748201HA	48GB 2Rx8 DDR5-5600-46-45-45 RDIMM SK Hynix M-Die SDP			
				5600	N*/A	NVRF0054G0756202HA	48GB 2Rx8 DDR5-5600-46-45-45 RDIMM SK Hynix M-Die SDP			

NETLIST DDR5 UDIMM and SODIMM Ordering Information

** Available in Q3'23

DIMM Type	Form Factor	Height	Density	Config	Number of DRAM	Speed (MT/s)	Hynix PN	Netlist PN	W	
Client Unbuffered DIMM nECC	LP	31.25	8GB	1Rx16	4	4800	HMCG66AEBUA	NLU3G0054G1548200HA	8GB 1Rx8 DDR5-4800-40-39-39 UDIMM nECC SK Hynix A-Die SDP	
							HMCG78AEBUA	NLU4G0054G0748200HA	16GB 1Rx8 DDR5-4800-40-39-39 UDIMM nECC SK Hynix A-Die SDP	
			32GB	2Rx8	16		HMCG88AEBUA	NLU5G0054G0748200HA	32GB 2Rx8 DDR5-4800-40-39-39 UDIMM nECC SK Hynix A-Die SDP	
							HMCGY8MEBUB	NLUF0054G0748200HA	48GB 2Rx8 DDR5-4800-40-39-39 UDIMM nECC SK Hynix M-Die SDP	
			8GB	1Rx16	4		HMCG66AGBUA	NLU3G0054G1556200HA	8GB 1Rx8 DDR5-5600-46-45-45 UDIMM nECC SK Hynix A-Die SDP	
							HMCG78AGBUA	NLU4G0054G0756200HA	16GB 1Rx8 DDR5-5600-46-45-45 UDIMM nECC SK Hynix A-Die SDP	
	32GB	2Rx8	16	HMCG88AGBUA	NLU5G0054G0756200HA	32GB 2Rx8 DDR5-5600-46-45-45 UDIMM nECC SK Hynix A-Die SDP				
				HMCGY8MGBUB	NLUF0054G0756200HA	48GB 2Rx8 DDR5-5600-46-45-45 UDIMM nECC SK Hynix M-Die SDP				
	Client Unbuffered DIMM ECC	LP	31.25	16GB	1Rx8	9	4800	HMCG78AEBEA	NLE4G0054G0748200HA	16GB 1Rx8 DDR5-4800-40-39-39 UDIMM ECC SK Hynix A-Die SDP
								HMCG88AEBEA	NLE5G0054G0748200HA	32GB 2Rx8 DDR5-4800-40-39-39 UDIMM ECC SK Hynix A-Die SDP
				32GB	2Rx8	18		HMCGY8MEBEB	NLEFG0054G0748200HA	48GB 2Rx8 DDR5-4800-40-39-39 UDIMM ECC SK Hynix M-Die SDP
								HMCG78AGBEA	NLE4G0054G0756200HA	16GB 1Rx8 DDR5-5600-46-45-45 UDIMM ECC SK Hynix A-Die SDP
32GB				2Rx8	18	HMCG88AGBEA		NLE5G0054G0756200HA	32GB 2Rx8 DDR5-5600-46-45-45 UDIMM ECC SK Hynix A-Die SDP	
						HMCGY8MGBEB		NLEFG0054G0756200HA	48GB 2Rx8 DDR5-5600-46-45-45 UDIMM ECC SK Hynix M-Die SDP	
Client Unbuffered SODIMM DIMM nECC	LP	31.25	8GB	1Rx16	4	4800	HMCG66AEBSA	NLS3G0054G1548200HA	8GB 1Rx8 DDR5-4800-40-39-39 SODIMM nECC SK Hynix A-Die SDP	
							HMCG78AEBSA	NLS4G0054G0748200HA	16GB 1Rx8 DDR5-4800-40-39-39 SODIMM nECC SK Hynix A-Die SDP	
			32GB	2Rx8	16		HMCG88AEBSA	NLS5G0054G0748200HA	32GB 2Rx8 DDR5-4800-40-39-39 SODIMM nECC SK Hynix A-Die SDP	
							HMCGY8MEBSB	NLSFG0054G0748200HA	48GB 2Rx8 DDR5-4800-40-39-39 SODIMM nECC SK Hynix M-Die SDP	
			8GB	1Rx16	4		HMCG66AGBSA	NLS3G0054G1556200HA	8GB 1Rx8 DDR5-5600-46-45-45 SODIMM nECC SK Hynix A-Die SDP	
							HMCG78AGBSA	NLS4G0054G0756200HA	16GB 1Rx8 DDR5-5600-46-45-45 SODIMM nECC SK Hynix A-Die SDP	
	32GB	2Rx8	16	HMCG88AGBSA	NLS5G0054G0756200HA	32GB 2Rx8 DDR5-5600-46-45-45 SODIMM nECC SK Hynix A-Die SDP				
				HMCGY8MGBSB	NLSFG0054G0756200HA	48GB 2Rx8 DDR5-5600-46-45-45 SODIMM nECC SK Hynix M-Die SDP				
	Client Unbuffered SODIMM DIMM ECC	LP	31.25	16GB	1Rx8	9	4800	HMCG78AEBAA	NLT4G0054G0748200HA	16GB 1Rx8 DDR5-4800-40-39-39 SODIMM ECC SK Hynix A-Die SDP
								HMCG88AEBAA	NLT5G0054G0748200HA	32GB 2Rx8 DDR5-4800-40-39-39 SODIMM ECC SK Hynix A-Die SDP
				32GB	2Rx8	18		HMCGY8MEBAB	NLTF0054G0748200HA	48GB 2Rx8 DDR5-4800-40-39-39 SODIMM ECC SK Hynix M-Die SDP
								HMCG78AGBAA	NLT4G0054G0756200HA	16GB 1Rx8 DDR5-5600-46-45-45 SODIMM ECC SK Hynix A-Die SDP
32GB				2Rx8	18	HMCG88AGBAA		NLT5G0054G0756200HA	32GB 2Rx8 DDR5-5600-46-45-45 SODIMM ECC SK Hynix A-Die SDP	
						HMCGY8MGBAB		NLTF0054G0756200HA	48GB 2Rx8 DDR5-5600-46-45-45 SODIMM ECC SK Hynix M-Die SDP	

LEARN MORE: EMAIL US AT Sales@NETLIST.COM OR VISIT NETLIST.COM/PRODUCTS

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