Samsung launches a series of new memory standards: 'Shinebolt' HBM3E 9.8Gbps, GDDR7 32Gbps, LPDDR5x CAMM2 7.5Gbps

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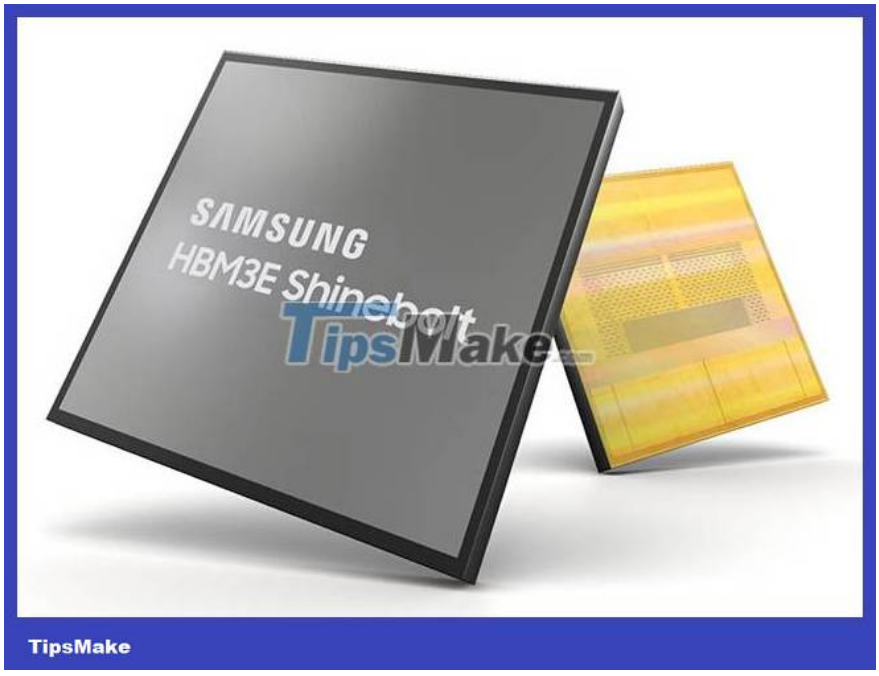
Samsung has officially introduced the highly anticipated next generation memory technologies, including HBM3E, GDDR7, LPDDR5x CAMM2, etc. within the framework of the company's annual Memory Tech Day 2023 event. Among them, the HBM3E memory line codenamed "Shine Bolt" and GDDR7 technology for data center, game and AI applications requiring high performance can be considered the two most prominent highlights of the program. presented this year.

Samsung HBM3E "Shinebolt" for data center and AI

Building on its expertise in commercializing the industry's first HBM2 and opening up the HBM market for high-performance computing (HPC) in 2016, Samsung has officially announced the next generation HBM3E DRAM called Shinebolt . The new memory family is expected to provide optimal support for AI applications, improve total cost of ownership (TCO), and accelerate AI model training and inference in the center data.



Samsung's HBM3E memory is said to boast an impressive speed of 9.8 gigabits per second (Gbps) per pin, meaning it can achieve peak transfer speeds in excess of 1.2 terabytes per second (TBps). To enable higher layer stacking and improved thermal properties, Samsung has optimized its non-conductive film (NCF) technology to eliminate gaps between chip layers and maximize thermal conductivity levels. Samsung's HBM3 8H and 12H products are currently in mass production, while prototypes are being shipped to partners worldwide.

Compare HBM memory specifications:

DRAM	HBM1	HBM2	HBM2E	HBM3	HBM3 GEN2	HBMNEXT (HBM4)
I/O (Bus Interface)	1024	1024	1024	1024	1024-2048	1024-2048
Prefetch (I/O)	2	2	2	2	2	2
Maximum Bandwidth	128 GB/s	256 GB/s	460.8 GB/s	819.2 GB/s	1.2 TB/s	1.5 - 2.0 TB/s
DRAM ICs Per Stack	4	8	8	12	8-12	8-12
Maximum Capacity	4 GB	8 GB	16 GB	24 GB	24 - 36 GB	36-64 GB
tRC	48ns	45ns	45ns	TBA	TBA	TBA
tCCD	2ns (=1tCK)	2ns (=1tCK)	2ns (=1tCK)	TBA	TBA	TBA
VPP	External VPP	External VPP	External VPP	External VPP	External VPP	TBA
VDD	1.2V	1.2V	1.2V	TBA	TBA	TBA
Command Input	Dual Command	Dual Command	Dual Command	Dual Command	Dual Command	Dual Command

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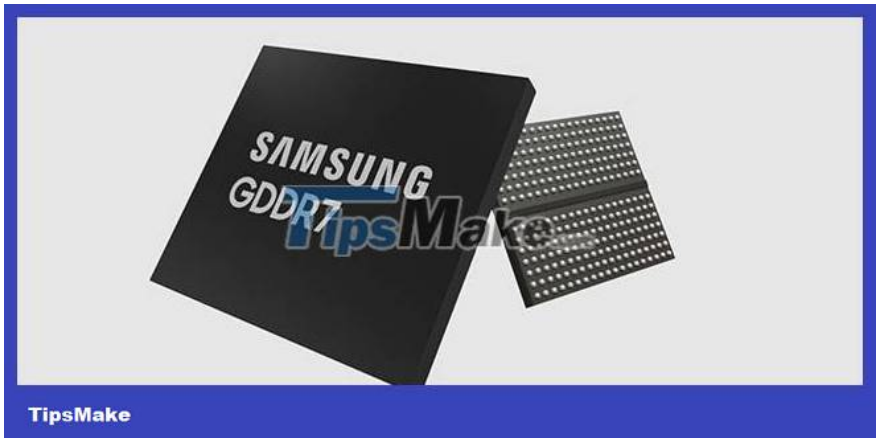
Samsung GDDR7 - DRAM32 Gbps & 32Gb new generation gaming graphics card

Other products highlighted at the event include ultra-high-capacity 32Gb DDR5 DRAM, the industry's first 32Gbps GDDR7, and petabyte-scale PBSSD, which significantly enhances storage capabilities for server applications.



According to Samsung, GDDR7 memory will increase performance by 40% and improve energy efficiency by 20% compared to today's fastest 24 Gbps GDDR6 DRAM. Its first commercial GDDR7 products will deliver transfer speeds of up to 32 Gbps, representing a 33% improvement over GDDR6 memory, while bandwidth of up to 1.5TB/s will be achievable on the 384-bit bus interface solution.

Here is the bandwidth that a 32Gbps pin rate will provide on different bus configurations:

1. 512-bit - 2048GB/s (2.0 TB/s)
2. 384-bit - 1536GB/s (1.5 TB/s)
3. 320-bit - 1280GB/s (1.3 TB/s)
4. 256-bit - 1024GB/s (1.0 TB/s)
5. 192-bit - 768GB/s
6. 128-bit - 512GB/s

Additionally, Samsung GDDR7 DRAM is said to include technology specifically optimized for high-speed workloads, and will also have a low operating voltage option designed for power-hungry applications. low volume like on a laptop. For heatsinks, the new memory standard will use a high thermal conductivity epoxy molding compound (EMC) that reduces thermal resistance by up to 70%. In August, it was reported that Samsung was sending its GDDR7 DRAM prototypes to NVIDIA to evaluate integration on its upcoming line of gaming graphics cards.

GRAPHICS MEMORY	GDDR5X	GDDR6	GDDR6X	GDDR7
Workload	Gaming	Gaming / AI	Gaming / AI	Gaming / AI
Platform (Example)	GeForce GTX 1080 Ti	GeForce RTX 2080 Ti	GeForce RTX 4090	GeForce RTX 5090?
Number of Placements	12	12	12	12?
Gb/s/pin	11.4	14-16	19-24	32-36
GB/s/placement	45	56-64	76-96	128-144
GB/s/system	547	672-768	912-1152	1536-1728
Configuration (Example)	384 IO (12pcs x 32 IO package)	384 IO (12pcs x 32 IO package)	384 IO (12pcs x 32 IO package)	384 IO (12pcs x 32 IO package)?
Frame Buffer of Typical System	12GB	12GB	24 GB	24 GB?
Average Device Power (pJ/bit)	8.0	7.5	7.25	TBD
Typical IO Channel	PCB (P2P SM)	PCB (P2P SM)	PCB (P2P SM)	PCB (P2P SM)

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Samsung LPDDR5x for next generation CAMM2 module

To handle data-intensive tasks, today's AI technologies are moving towards a hybrid model that distributes and allocates workloads between cloud and edge devices. Accordingly, Samsung has introduced a series of memory solutions that support high performance, high capacity, low power consumption and compact form factor on the edge device side.

GRAPHICS CARD NAME	MEMORY TECHNOLOGY	MEMORY SPEED	MEMORY BUS	MEMORY BANDWIDTH	RELEASE
AMD Radeon R9 Fury X	HBM1	1.0 Gbps	4096-bit	512 GB/s	2015
NVIDIA GTX 1080	GDDR5X	10.0 Gbps	256-bit	320 GB/s	2016
NVIDIA Tesla P100	HBM2	1.4 Gbps	4096-bit	720 GB/s	2016
NVIDIA Titan Xp	GDDR5X	11.4 Gbps	384-bit	547 GB/s	2017
AMD RX Vega 64	HBM2	1.9 Gbps	2048-bit	483 GB/s	2017
NVIDIA Titan V	HBM2	1.7 Gbps	3072-bit	652 GB/s	2017
NVIDIA Tesla V100	HBM2	1.7 Gbps	4096-bit	901 GB/s	2017
NVIDIA RTX 2080 Ti	GDDR6	14.0 Gbps	384-bit	672 GB/s	2018
AMD Instinct MI100	HBM2	2.4 Gbps	4096-bit	1229 GB/s	2020
NVIDIA A100 80 GB	HBM2e	3.2 Gbps	5120-bit	2039 GB/s	2020
NVIDIA RTX 3090	GDDR6X	19.5 Gbps	384-bit	936.2 GB/s	2020
AMD Instinct MI200	HBM2e	3.2 Gbps	8192-bit	3200 GB/s	2021
NVIDIA RTX 3090 Ti	GDDR6X	21.0 Gbps	384-bit	1008 GB/s	2022

In addition to the industry's first 7.5Gbps LPDDR5X CAMM2, which is expected to be a real game-changer in the next-generation PC and laptop DRAM market, Samsung also introduced the 9.6Gbps LPDDR5X DRAM, which is LLW DRAM model specialized for AI. Along with that is the new generation Universal Flash Storage (UFS) and high-capacity Quad-Level Cell (QLC) BM9C1 SSD for PCs.