

AMD Instinct MI210 Accelerator

Product Guide

The ThinkSystem AMD Instinct MI210 Accelerator is a compute workhorse optimized for accelerating single precision and double-precision HPC-class system. The accelerator can also be deployed for training large scale machine intelligence workloads.

The accelerator's powerful compute engine, new matrix math FP64 cores and advanced memory architecture, combined with AMD's ROCm open software platform and ecosystem, provides a powerful, flexible heterogeneous compute solution that is designed to help datacenter designers meet the challenges of a new era of compute.



Figure 1. AMD Instinct MI210 PCIe Gen4 Passive Accelerator

Did you know?

The ThinkSystem SR670 V2 supports 8x MI210 Accelerator and these GPUs can be connected together using 2x Infinity Fabric Link Bridge Cards, connecting two sets of four GPUs together. Each accelerator has three Infinity Fabric links with 300 GB/s of Peer-to-Peer (P2P) bandwidth performance. The AMD Infinity Architecture enables platform designs with direct-connect GPU hives with high-speed P2P connectivity and delivers up to 1.2 TB/s of total theoretical GPU bandwidth.

Part number information

The following table shows the part numbers for the MI210 Accelerator.

Table 1. Ordering information

Part number	Feature code	Description
4X67A81102	BP04	ThinkSystem AMD Instinct MI210 PCIe Gen4 Passive Accelerator
4X67A82325	BRMD	ThinkSystem AMD Instinct MI210 4x Infinity Fabric Link Bridge Card

The PCIe option part number includes the following:

- One MI210 Accelerator with full-height (3U) adapter bracket attached
- Documentation

Each Infinity Fabric Link Bridge Card connects four MI210 Accelerators.

Features

The AMD Instinct MI210 accelerator offers the following features:

- Exascale-Class Technologies for the Data Center

The AMD Instinct MI210 accelerator extends AMD industry performance leadership in accelerated compute for double precision (FP64) on PCIe form factors for mainstream HPC and AI workloads in the data center. Built on AMD Exascale-class technologies with the 2nd Gen AMD CDNA architecture, the MI210 enables scientists and researchers to tackle our most pressing challenges from climate change to vaccine research. MI210 accelerators, combined with the AMD ROCm 5 software ecosystem, allow innovators to tap the power of HPC and AI data center PCIe GPUs to accelerate their time to science and discovery.

- Purpose-built Accelerators for HPC & AI Workloads

Powered by the 2nd Gen AMD CDNA architecture, AMD Instinct MI210 accelerator delivers HPC performance leadership in FP64 for a broad set of HPC & AI applications. The MI210 accelerator is built to accelerate deep learning training, providing an expanded range of mixed-precision capabilities based on the AMD Matrix Core Technology, and delivers an outstanding 181 teraflops peak theoretical FP16 and BF16 performance to bring users a powerful platform to fuel the convergence of HPC and AI.

- Innovations Delivering Performance Leadership

AMD innovations in architecture, packaging and integration are pushing the boundaries of computing by unifying the most important processors in the data center, the CPU, and the GPU accelerator. With our innovative double-precision Matrix Core capabilities along with the 3rd Gen AMD Infinity Architecture, AMD is delivering performance, efficiency and overall system throughput for HPC and AI using AMD EPYC CPUs and AMD Instinct MI210 accelerators.

- Ecosystem without Borders

AMD ROCm is an open software platform allowing researchers to tap the power of AMD Instinct accelerators to drive scientific discoveries. The ROCm platform is built on the foundation of open portability, supporting environments across multiple accelerator vendors and architectures. With ROCm 5, AMD extends its platform powering top HPC and AI applications with AMD Instinct MI200 series accelerators, increasing accessibility of ROCm for developers and delivering outstanding performance across key workloads.

- 2nd Generation AMD CDNA Architecture

The AMD Instinct MI210 accelerator brings commercial HPC & AI customers the compute engine selected for the first U.S. Exascale supercomputer. Powered by the 2nd Gen AMD CDNA architecture, the MI210 accelerator delivers outstanding performance for HPC and AI. The MI210 PCIe GPU delivers superior double and single precision performance for HPC workloads with up to 22.6 TFLOPS peak FP64|FP32 performance, enabling scientists and researchers around the globe to process HPC parallel codes more efficiently across several industries.

AMD's Matrix Core technology delivers a broad range of mixed precision operations bringing you the ability to work with large models and enhance memory-bound operation performance for whatever combination of AI and machine learning workloads you need to deploy. The MI210 offers optimized BF16, INT4, INT8, FP16, FP32, and FP32 Matrix capabilities bringing you supercharged compute performance to meet all your AI system requirements. The AMD Instinct MI210 accelerator handles large data efficiently for training and delivers 181 teraflops of peak FP16 and bfloat16 floating-point performance for deep learning training.

- AMD Infinity Fabric Link Technology

AMD Instinct MI210 GPUs provide advanced I/O capabilities in standard off-the-shelf servers with our AMD Infinity Fabric technology and PCIe Gen4 support. The MI210 GPU delivers 64 GB/s CPU to GPU bandwidth without the need for PCIe switches, and up to 300 GB/s of Peer-to-Peer (P2P) bandwidth performance through three Infinity Fabric links. The AMD Infinity Architecture enables platform designs with dual and quad, direct-connect, GPU hives with high-speed P2P connectivity and delivers up to 1.2 TB/s of total theoretical GPU bandwidth within a server design. Infinity Fabric helps unlock the promise of accelerated computing, enabling a quick and simple onramp for CPU codes to accelerated platforms.

- Ultra-Fast HBM2e Memory

AMD Instinct MI210 accelerators provide up to 64GB High-bandwidth HBM2e memory with ECC support at a clock rate of 1.6 GHz. and deliver an ultra-high 1.6 TB/s of memory bandwidth to help support your largest data sets and eliminate bottlenecks moving data in and out of memory. Combine this performance with the MI210's advanced Infinity Fabric I/O capabilities and you can push workloads closer to their full potential.

Technical specifications

The following table lists the MI210 Accelerator specifications.

Table 2. Technical specifications

Feature	Specification
Compute units	104
Stream Processors:	6,656
GPU Memory:	64GB HBM2e
ECC	Yes
Memory Bandwidth:	1.6 TB/s
Peak FP64 Vector	23 TFLOPS
Peak FP32 Vector	23 TFLOPS
Peak FP64 Matrix	45 TFLOPS
Peak FP32 Matrix	45 TFLOPS
Peak FP16	181 TFLOPS
Peak BF16	181 TFLOPS
Bus Interface:	PCIe Gen 4 x16
AMD Infinity Fabric Link support:	4 GPU (4-GPU link support by using part number 4X67A82325)
Board Form Factor:	Full-Height, Full-Length, Dual-Slot
Thermal Solution:	Passively Cooled
Standard Max Power:	300W TDP
OS Support:	Linux 64-bit
ROCm Software Platform:	ROCm 5.0
Programing Environment:	OpenMP, OpenCL, ISO C++ (via HIP conversion tool), CUDA (via HIP conversion tool)

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 3. Server support (Part 1 of 4)

Part Number	Description	AMD V3				2S Intel V3		4S 8S Intel V3		Multi Node		GPU Rich		1S V3								
		SR635 V3 (7D9H / 7D9G)	SR655 V3 (7D9F / 7D9E)	SR645 V3 (7D9D / 7D9C)	SR665 V3 (7D9B / 7D9A)	ST650 V3 (7D7B / 7D7A)	SR630 V3 (7D72 / 7D73)	SR650 V3 (7D75 / 7D76)	SR850 V3 (7D97 / 7D96)	SR860 V3 (7D94 / 7D93)	SR950 V3 (7DC5 / 7DC4)	SD535 V3 (7DD8 / 7DD1)	SD530 V3 (7DDA / 7DD3)	SD550 V3 (7DD9 / 7DD2)	SR670 V2 (7Z22 / 7Z23)	SR675 V3 (7D9Q / 7D9R)	SR680a V3 (7DHE)	SR685a V3 (7DHC)	ST50 V3 (7DF4 / 7DF3)	ST250 V3 (7DCF / 7DCE)	SR250 V3 (7DCM / 7DCL)	
4X67A81102	ThinkSystem AMD Instinct MI210 PCIe Gen4 Passive Accelerator	N	3	N	3	N	N	3	2	4	N	N	N	N	8	8	N	N	N	N	N	N
4X67A82325	ThinkSystem AMD Instinct MI210 4x Infinity Fabric Link Bridge Card	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N

Table 4. Server support (Part 2 of 4)

Part Number	Description	Edge						Super Computing				1S Intel V2		2S Intel V2		
		SE350 (7Z46 / 7D1X)	SE350 V2 (7DA9)	SE360 V2 (7DAM)	SE450 (7D8T)	SE455 V3 (7DBY)	SD665 V3 (7D9P)	SD665-N V3 (7DAZ)	SD650 V3 (7D7M)	SD650-I V3 (7D7L)	SD650-N V3 (7D7N)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)
4X67A81102	ThinkSystem AMD Instinct MI210 PCIe Gen4 Passive Accelerator	N	N	N	N	N	N	N	N	N	N	N	N	N	N	3
4X67A82325	ThinkSystem AMD Instinct MI210 4x Infinity Fabric Link Bridge Card	N	N	N	N	N	N	N	N	N	N	N	N	N	N	

Table 5. Server support (Part 3 of 4)

Part Number	Description	AMD V1					Dense V2				4S V2	8S	4S V1		1S Intel V1						
		SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR655 Client OS		SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)	SD630 V2 (7D1K)	SD650 V2 (7D1M)	SD650-N V2 (7D1N)	SN550 V2 (7Z69)	SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SR950 (7X11 / 7X12)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y52 / 7Y51)
4X67A81102	ThinkSystem AMD Instinct MI210 PCIe Gen4 Passive Accelerator	N	2 ¹	N	N	3 ¹	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4X67A82325	ThinkSystem AMD Instinct MI210 4x Infinity Fabric Link Bridge Card	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

1. Supported only with EPYC 7003 "Milan" processors. Not supported with EPYC 7002 "Rome" processors

Table 6. Server support (Part 4 of 4)

Part Number	Description	2S Intel V1								Dense V1			
		ST550 (7X09 / 7X10)	SR530 (7X07 / 7X08)	SR550 (7X03 / 7X04)	SR570 (7Y02 / 7Y03)	SR590 (7X98 / 7X99)	SR630 (7X01 / 7X02)	SR650 (7X05 / 7X06)	SR670 (7Y36 / 7Y37)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
4X67A81102	ThinkSystem AMD Instinct MI210 PCIe Gen4 Passive Accelerator	N	N	N	N	N	N	N	N	N	N	N	N
4X67A82325	ThinkSystem AMD Instinct MI210 4x Infinity Fabric Link Bridge Card	N	N	N	N	N	N	N	N	N	N	N	N

Operating system support

The following table lists the supported operating systems:

Tip: These tables are automatically generated based on data from [Lenovo ServerProven](#).

Table 7. Operating system support for ThinkSystem AMD Instinct MI210 PCIe Gen4 Passive Accelerator, 4X67A81102

Operating systems	SR650 V3 (4th Gen Xeon)	SR655 V3	SR665 V3	SR675 V3	SR850 V3	SR860 V3	SR650 V2	SR670 V2	SR655	SR665
Red Hat Enterprise Linux 7.9	N	N	N	N	N	N	Y	Y	N	N
Red Hat Enterprise Linux 8.3	N	N	N	N	N	N	Y	N	N	N
Red Hat Enterprise Linux 8.4	N	N	N	N	N	N	Y	Y	Y ¹	Y ¹
Red Hat Enterprise Linux 8.5	N	N	N	N	N	N	Y	Y	Y ¹	Y ¹
Red Hat Enterprise Linux 8.6	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹
Red Hat Enterprise Linux 9.0	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹
SUSE Linux Enterprise Server 15 SP3	N	N	N	N	N	N	Y	Y	Y ¹	Y ¹
SUSE Linux Enterprise Server 15 SP4	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹
Ubuntu 18.04.5 LTS	N	N	N	N	N	N	Y	Y	N	N
Ubuntu 20.04 LTS	N	N	N	N	N	N	Y	N	N	N
Ubuntu 20.04.5 LTS	N	Y	Y	Y	Y	Y	N	N	N	N
Ubuntu 22.04 LTS	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹

¹ HW is not supported with EPYC 7002 processors.

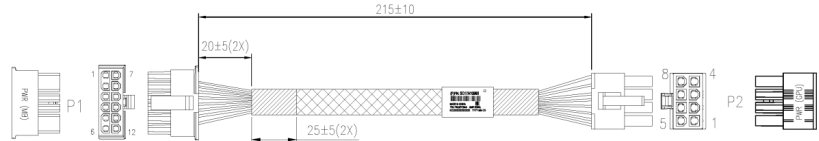
Auxiliary power cables

The MI210 Accelerator option part number does not ship with auxiliary power cables.

Table 8. Auxiliary power cables for MI210 (click images to show larger versions)

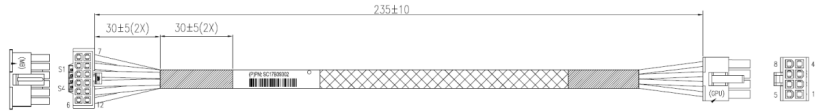
Auxiliary power cables supplied with the SR655	
<p>350mm 8pin (2x4) cable Server support: SR655 (Riser 1 or Riser 2) Option: 4X97A59853, ThinkSystem SR655 GPU Cable Kit Feature: B5T5 SBB: SBB7A14640 Base: SC17A50848 FRU: 02JK011</p>	
<p>250mm 8pin (2x4) cable Server support: SR655 (Riser 3) Option: 4X97A59853, ThinkSystem SR655 GPU Cable Kit Feature: B5TS SBB: SBB7A10974 Base: SC17A50844 FRU: 02JK010</p>	
Auxiliary power cables needed with the SR650 V3, SR655 V3, SR665 V3, SR650 V2, SR665	
<p>360mm 8pin (2x4) cable Option*:</p> <ul style="list-style-type: none"> SR665: 4M17A80478 / 4M17A11759, ThinkSystem SR665 GPU Thermal Option Kit v2 SR650 V2: 4H47A38666 / 4H47A80491, ThinkSystem SR650 V2 GPU Full Length Thermal Option Kit v2 SR650 V3: 4X67A82883, ThinkSystem SR650 V3 GPU Full Length Thermal Option Kit SR655 V3: 4X67A86438, ThinkSystem SR655 V3 GPU Enablement Kit SR665 V3: 4X67A85856, ThinkSystem SR665 V3 GPU Full Length Thermal Option Kit <p>Feature: BAD8 SBB: SBB7A49792 or SBB7A21691 Base: SC17A95312 or SC17A59596 FRU: 03HA297 or 02YE420</p> <p>* The option part numbers are for thermal kits and include other components needed to install the GPU. See the server product guide for details.</p>	
Auxiliary power cable needed with the SR670 V2	

215mm 8pin (2x4) cable
Option: 4X97A69627, ThinkSystem
 SR670 V2 GPU Option Power Cable
Feature: BFNL
SBB: SBB7A40281
Base: SC17A10990
FRU: 02YE945



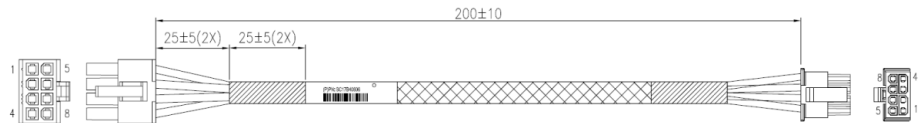
Auxiliary power cable needed with the SR675 V3

235mm 8pin (2x4) cable
Option: 4X97A84509, ThinkSystem
 SR675 V3 GPU Power Cable Kit
Feature: BRGU
SBB: SBB7A65297
Base: SC17B39302
FRU: 03LE555



Auxiliary power cable needed with the SR850 V3 or SR860 V3

200mm 8pin (2x4) cable
Option: 4X97A88017,
 ThinkSystem SR850
 V3/SR860 V3
 A100/A6000/MI210 GPU
 Power Cable Option Kit
Feature: BTPB
SBB: SBB7A72760
Base: SC17B40606
FRU: 03LF917



Regulatory approvals

The MI210 Accelerator has the following regulatory approvals:

- Electromagnetic Compliance
 - Australia and New Zealand: CISPR 32: 2015 +COR1: 2016, Class A
 - Canada ICES-003, Issue 7, Class A
 - European Countries: EN 55032: 2015 + A11: 2020 Class B, EN 55024: 2010, EN 55035: 2017
 - Japan VCCI-CISPR32:2016, VCCI 32-1: 2016 Class A
 - Korea KN32, Class A, KN35, RRA Public Notification 2019-32
 - Taiwan CNS 13438: 2016, C6357, Class A
 - USA FCC 47 CFR Part 15, Subpart B, Class A
- Product Safety Compliance
 - UL 62368-1, 2nd Edition, 2014-12
 - CSA-C22.2 No. 62368-1, 2nd Edition, 2014-12
 - EN 62368-1, 2nd Edition, 2014 + A1: 2017
 - IEC 62368-1, 2nd Edition, 2014
 - RoHS Compliance: EU RoHS Directive (EU) 2015/863 Amendment to EU RoHS 2 (Directive 2011/65/EU)
 - REACH Compliance
 - Halogen Free: IEC 61249-2-21:2003 standard

Operating environment

The MI210 Accelerator has the following operating characteristics:

- Ambient temperature
 - Operational: 5°C to 45°C
 - Storage: -40°C to 70°C
- Relative humidity:
 - Operational: 8-90%
 - Storage: 0-95%

Warranty

One year limited warranty. When installed in a Lenovo server, the MI210 Accelerator assumes the server's base warranty and any warranty upgrades.

Related publications

For more information, refer to these documents:

- ThinkSystem and ThinkAgile GPU Summary:
<https://lenovopress.lenovo.com/lp0768-thinksystem-thinkagile-gpu-summary>
- ServerProven compatibility:
<https://serverproven.lenovo.com/>
- AMD MI210 product page:
<https://www.amd.com/en/products/server-accelerators/amd-instinct-mi210>

Related product families

Product families related to this document are the following:

- [GPU adapters](#)

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