



GENERAL MICRO SYSTEMS, INC.
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THUNDER S422

Rugged, Fully Sealed, Intel® Xeon® E5 CPU Server with Removable Drive(s), 40/100 Gb Ethernet, 10 Gb Ethernet Switch, and Add-in I/O

Intel® CPUs

22 cores
Xeon® E5 v4

Up to

30x 10 GbE
Packet Switch

Fat Pipes/Inter-rack

4x 40/100 GbE
Single/Multi-mode Fiber

Optional Add-in PCIe 3.0

GPGPU Co-processor
Full-size PCIe card

SYSTEM HIGHLIGHTS

- Intel® Xeon® E5 v4 CPU each with up to 22 cores (E5-2699RV4)
- Hyper-Threading on each core for total system with 44 logical cores
- Supports up to 512 GB of DDR4 memory with ECC
- Up to two fixed M.2 for OS boot or storage (Optionally used for I/O)
- Optional 30 port x 10 GbE ports configured as enterprise switch or segregated subnets
- Two removable 2.5" SATA or NVMe SSDs behind EMI/IP-rated door
- GMS FlexIO™ x16 PCIe Gen 3.0 8 Gbits/s fabric expansion architecture for inter-chassis co-processor sub-rack
- GMS SecureDNA™ security suite with Secure Erase ("zero") and Anti-Tamper
- Optional x8 PCIe add-in card slot for GPGPU, co-processor, I/O (FHFL size)
- Optional PCIe-over-cable bus extension for chassis expansion to external PCIe co-processors
- Optional MXM AMD® Radeon® GPU E8860, up to 768 GFLOPS
- Optional MXM NVIDIA® Quadro® GPU M2200M, up to 1.32 TFLOPS
- Optional MXM NVIDIA® Pascal GP104, over 8 TFLOPS
- BMC system management monitors temperatures, system status via IPMI 2.0 for out-of-band server management
- Dual 40 GbE ports directly coupled to CPU/FlexIO™ PCIe fabric for non-blocking data movement
- 100 W PoE to drive sensors and remote nodes

SYSTEM OVERVIEW

The S422-LC/SW/RT/AI is a fan-less fully rugged, low cost Intel® Xeon® E5 server family available in four variants. It is designed to provide the highest level of server-class performance possible in a fully ruggedized, conduction-cooled system, operating up to -40°C to +85°C. "Thunder" simplifies local data processing tasks that require an ultra-fast, Xeon®-class server with vast amounts of high-speed, ECC-protected RAM and storage in one ultra-rugged chassis.

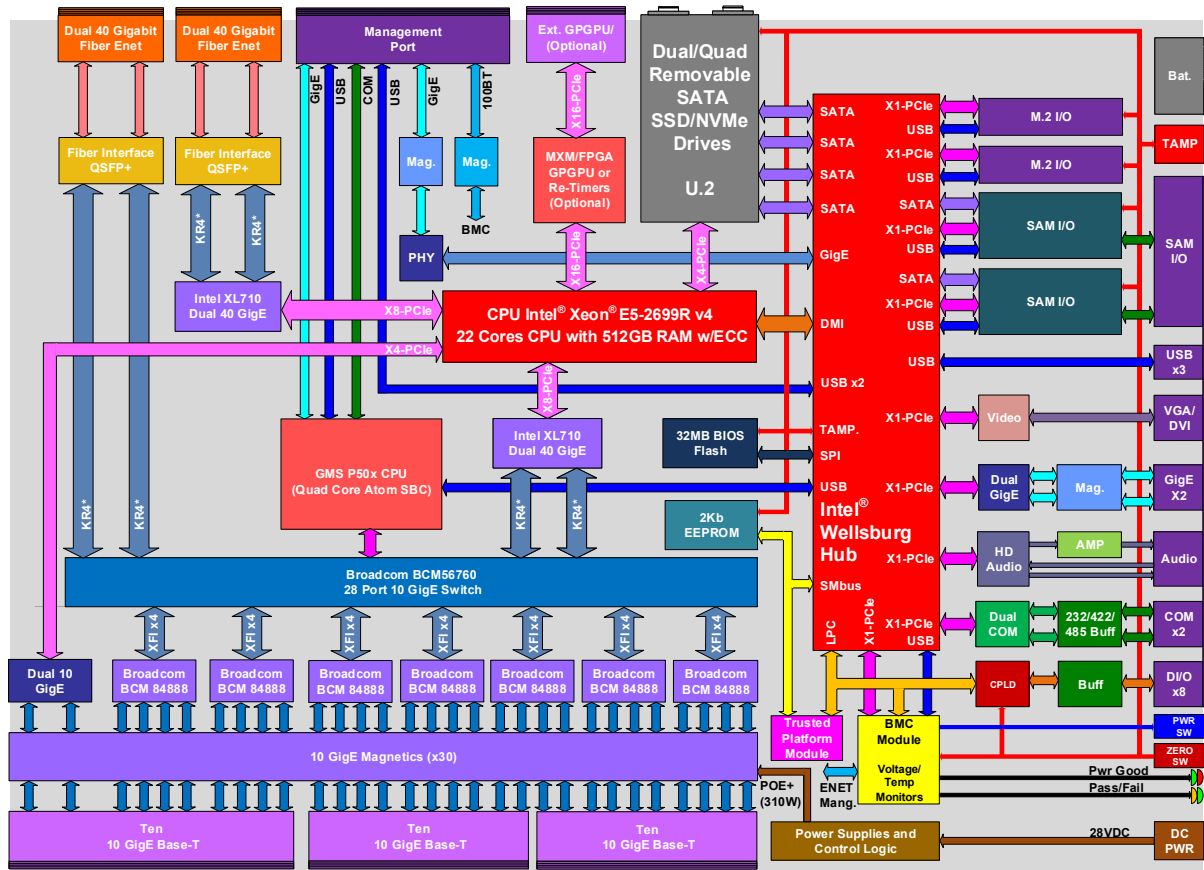
Thunder is ideal for the application that requires the horsepower of a high-performance server, enterprise-class multi-port LAN or a NAS subsystem appliance, while deployed into a rugged platform with no fans required. When equipped with the router or intelligent Layer 2/3/4 Ethernet switch, Thunder becomes a rugged compact server, with a dedicated switch or router capabilities to offer maximum network flexibility.

Networking capability starts with four 1 GbE and two 40 GbE fiber ports on the Low Cost (LC) variant and expands to an additional two 40 GbE ports and thirty 10 GbE ports (in variants SW, RT and AI). The 10 GbE ports can be configured with a Broadcom® Layer 2/3/4 enterprise class switch (SW) or as segregated and secure port connections each with their own subnet mask to avoid data crossover (RT). In the RT every Ethernet port is directly coupled to the CPU(s), an architecture that is ideal for secure communications or dedicated hypervisor/virtual environments.

Network routing technology includes software-defined networking (SDN) on various operating systems and virtual machine (VM) hypervisor environments. Each of the 10 GbE ports support power-over-Ethernet (POE+) to directly power remote nodes while simplifying wiring requirements, up to 100 W maximum total power sourced.



BLOCK DIAGRAM (SW/AI Models Shown)



ENVIRONMENTAL SPECS

SWaP-E: The industry's highest computing density in a server (cores & RAM)
 MIL-STD: MIL-STD-810G, MIL-STD-1275D, MIL-S-901D, MIL-STD-461F, DO-160D, IP67 compliant
 Temperature: Operates up to extended temp -40° C to +85° C (Optional)
 Ruggedness: Available in ruggedization levels R1-R5

S422 VARIANTS

P/N	Purpose	Max Memory	10 GbE ports	40 GbE ports	MXM Video	PCIe Add-in	XMC Add-in	Z Height (in.)
S422-LC	Low Cost	256 GB	0	2	1	0	0	2.25
S422-SW	Switch	512 GB	30	4	1	0	1	3.6
S422-RT	Router	512 GB	30	4	1	0	1	3.6
S422-AI	Artificial Intelligence	512 GB	30	4	1	1	1	4.25

MODEL BREAKDOWN

Model No.	Model	Power	Height	Length	Width	Weight
S422-LC	Low Cost	240W	2.25"	11.6"	7.75"	12 lbs
S422-SW	Switch	650W	3.6"	11.6"	7.75"	16 lbs
S422-RT	Router	650W	3.6"	11.6"	7.75"	21 lbs
S422-AI	Artificial Intel.	925W	4.25"	11.6"	7.75"	21 lbs

I/O AND EXPANSION OPTIONS

- Four 1 GbE Ethernet ports (all variants)
- Two 40/100 GbE ports directly coupled to CPU fiber (all variants)
- Optional Layer 2/3/4 Switch with thirty 10 GbE ports and two 40 GbE ports (SW variant only)
- Optional 30 segregated and secure 10 GbE ports for individual subnets (RT variant only)
- Up to two fixed mSATA SSD or SAM I/O™
- Optional XMC/FMC site or third SAM I/O™ site
- Optional MXM site for add-in GPU
- Optional PCIe module for GPGPU or other FHFL PCIe add-in card (AI variant only)
- Optional PCIe-over cable bus expansion
- Two M.2 sites optionally used for I/O
- Six USB 2.0 ports
- Dual serial ports: RS-232/422/485
- Eight TTL GPIO/DIO
- High-def 2-channel audio output with 5 W amplifier, plus mic input
- Panic support for system zeroize and Secure Erase
- Optional active cooling "radiator" assembly with smart fan control

RUGGEDIZATION LEVELS

	TEMP	SHOCK	VIBRATION	MAX IP LEVEL
RUGGED 1	0° - 55°C	20G	.0001 g²/Hz	54
RUGGED 2	-20° - 55°C	20G	.0008 g²/Hz	64
RUGGED 3	-20° - 75°C	52G	.03 g²/Hz	64
RUGGED 4	-40° - 85°C	100G	.03 g²/Hz	66
RUGGED 5	-40° - 85°C	100G	.1125 g²/Hz	67

