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newram_profile2_07042021

Ampere ARMv8 Neoverse-N1 testing with a FOXCONN Mt. Collins (0ACOC016 SCP: 1.08.20210825 BIOS) and ASPEED on Ubuntu 20.04 via the Phoronix Test Suite.

Automated Executive Summary

HW20220118A had the most wins, coming in first place for 22% of the tests.

The results with the greatest spread from best to worst included:

Stream (Type: Scale) at 7.419x
Stream (Type: Triad) at 6.495x
Stream (Type: Add) at 6.43x
Stream (Type: Copy) at 4.804x
Tinymembench (Standard Memset) at 4.215x
CacheBench (Read Cache) at 3.843x
CacheBench (Write Cache) at 2.357x
MBW (Test: Memory Copy - Array Size: 1024 MiB) at 2.031x
RAMspeed SMP (Type: Scale - Benchmark: Floating Point) at 1.983x
t-test1 (Threads: 2) at 1.9x.

Test Systems:

AMD Ryzen 5 2600 Six-Core

Processor: AMD Ryzen 5 2600 Six-Core @ 3.40GHz (6 Cores / 12 Threads), Motherboard: MSI B450-A PRO MAX (MS-7B86) v4.0 (M.B0 BIOS), Chipset: AMD 17h, Memory: 16GB, Disk: 1000GB Western Digital WDS100T2B0C-00PXH0, Graphics: eVGA NVIDIA NVA0 896MB, Audio: Realtek ALC892, Monitor: HP VH240a, Network: Realtek RTL8111/8168/8411 + Qualcomm Atheros AR93xx

OS: Ubuntu 21.04, Kernel: 5.11.0-22-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server + Wayland, Display Driver: nouveau, OpenGL: 3.3 Mesa 21.0.1, Vulkan: 1.0.2, Compiler: GCC 10.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-gcn/usr, hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq schedutil (Boost: Enabled) - CPU Microcode: 0x800820d
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: disabled RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Ampere Altra 80 cores 3,0 GHz

Processor: ARMv8 Neoverse-N1 @ 3.00GHz (80 Cores), Motherboard: GIGABYTE MP32-AR0-00 v01000100 (F09 BIOS), Chipset: Ampere Computing LLC Altra PCI Root Complex A, Memory: 126GB, Disk: 2 x Samsung SSD 980 PRO 500GB, Graphics: ASPEED, Monitor: HL229DPB, Network: 2 x Intel I350

OS: Ubuntu 21.04, Kernel: 5.11.0-22-generic (aarch64), Vulkan: 1.0.2, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --disable-libsanitizer --enable-__cxa_atexit --enable-gold --enable-languages=c,c++,fortran,objc --enable-lto --enable-shared --enable-threads=posix --host=aarch64-ampere-linux-gnu --target=aarch64-ampere-linux-gnu --with-abi=lp64 --with-build-sysroot=/home/jenkins/workspace/armv8/ampere-9.3.0/build/ampere-9.3.0-20200410/nativetools//opt/ampere-aarch64/ampere-9.3.0-20200410/aarch64-ampere-linux-gnu/sysroot --with-cpu=neoverse-n1 --with-gmp=/home/jenkins/workspace/armv8/ampere-9.3.0/build/ampere-9.3.0-20200410/obj/gmp-aarch64-install --with-host-libstdcxx='-static-libgcc --with-mpc=/home/jenkins/workspace/armv8/ampere-9.3.0/build/ampere-9.3.0-20200410/obj/mpc-aarch64-install --with-mpfr=/home/jenkins/workspace/armv8/ampere-9.3.0/build/ampere-9.3.0-20200410/obj/mpfr-aarch64-install --with-multilib-list=lp64 -Wl,-Bstatic,-lstdc++,-Bdynamic -lm'
Processor Notes: Scaling Governor: cppc_cpufreq performance (Boost: Enabled)
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + srbds: Not affected + tsx_async_abort: Not affected

standard

Processor: ARMv8 Neoverse-N1 @ 3.00GHz (80 Cores), Motherboard: GIGABYTE MP32-AR0-00 v01000100 (F09 BIOS), Chipset: Ampere Computing LLC Altra PCI Root Complex A, Memory: 126GB, Disk: 2 x Samsung SSD 980 PRO 500GB, Graphics: ASPEED, Monitor: HL229DPB, Network: 2 x Intel I350

OS: Ubuntu 21.04, Kernel: 5.11.0-22-generic (aarch64), Vulkan: 1.0.2, Compiler: GCC 10.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu

--with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-target-system-zlib=auto -v
Processor Notes: Scaling Governor: cppc_cpufreq performance (Boost: Enabled)
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + srbds: Not affected + tsx_async_abort: Not affected

HWRUN20210713A

Processor: ARMv8 Neoverse-N1 @ 3.00GHz (80 Cores), Motherboard: GIGABYTE MP32-AR0-00 v01000100 (F13 SCP: 1.4.20210223 BIOS), Chipset: Ampere Computing LLC Device e100, Memory: 8 x 16384 MB DDR4-3200MT/s Samsung M393A2K43DB3-CWE, Disk: 2 x Samsung SSD 980 PRO 500GB, Graphics: ASPEED, Monitor: HL229DPB, Network: 2 x Intel I350

OS: Ubuntu 20.04, Kernel: 5.4.0-77-generic (aarch64), Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-target-system-zlib=auto -v
Processor Notes: Scaling Governor: cppc_cpufreq ondemand
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + srbds: Not affected + tsx_async_abort: Not affected

HW20220118A

Processor: Ampere ARMv8 Neoverse-N1 @ 3.00GHz (160 Cores), Motherboard: FOXCONN Mt. Collins (0ACOC016 SCP: 1.08.20210825 BIOS), Chipset: Ampere Computing LLC Device e100, Memory: 16 x 16384 MB DDR4-3200MT/s Samsung M393A2K40DB3-CWE, Disk: 60GB Expansion, Graphics: ASPEED, Monitor: PHL 223V5, Network: 2 x Intel I350

OS: Ubuntu 20.04, Kernel: 5.4.0-94-generic (aarch64), Desktop: Xfce, Display Server: X Server 1.20.13, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-target-system-zlib=auto -v
Processor Notes: Scaling Governor: cppc_cpufreq ondemand
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + srbds: Not affected + tsx_async_abort: Not affected

Mt. Collins

16 x 16384 MB DDR4-3200MT

Processor: Ampere ARMv8 Neoverse-N1 @ 3.00GHz (160 Cores), Motherboard: FOXCONN Mt. Collins (0ACOC016 SCP: 1.08.20210825 BIOS), Chipset: Ampere Computing LLC Device e100, Memory: 16 x 16384 MB DDR4-3200MT/s Samsung M393A2K40DB3-CWE, Disk: 60GB Expansion, Graphics: ASPEED, Monitor: PHL 223V5, Network: 2 x Intel I350

OS: Ubuntu 20.04, Kernel: 5.4.0-94-generic (aarch64), Desktop: Xfce, Display Server: X Server 1.20.13, Compiler: GCC 10.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu

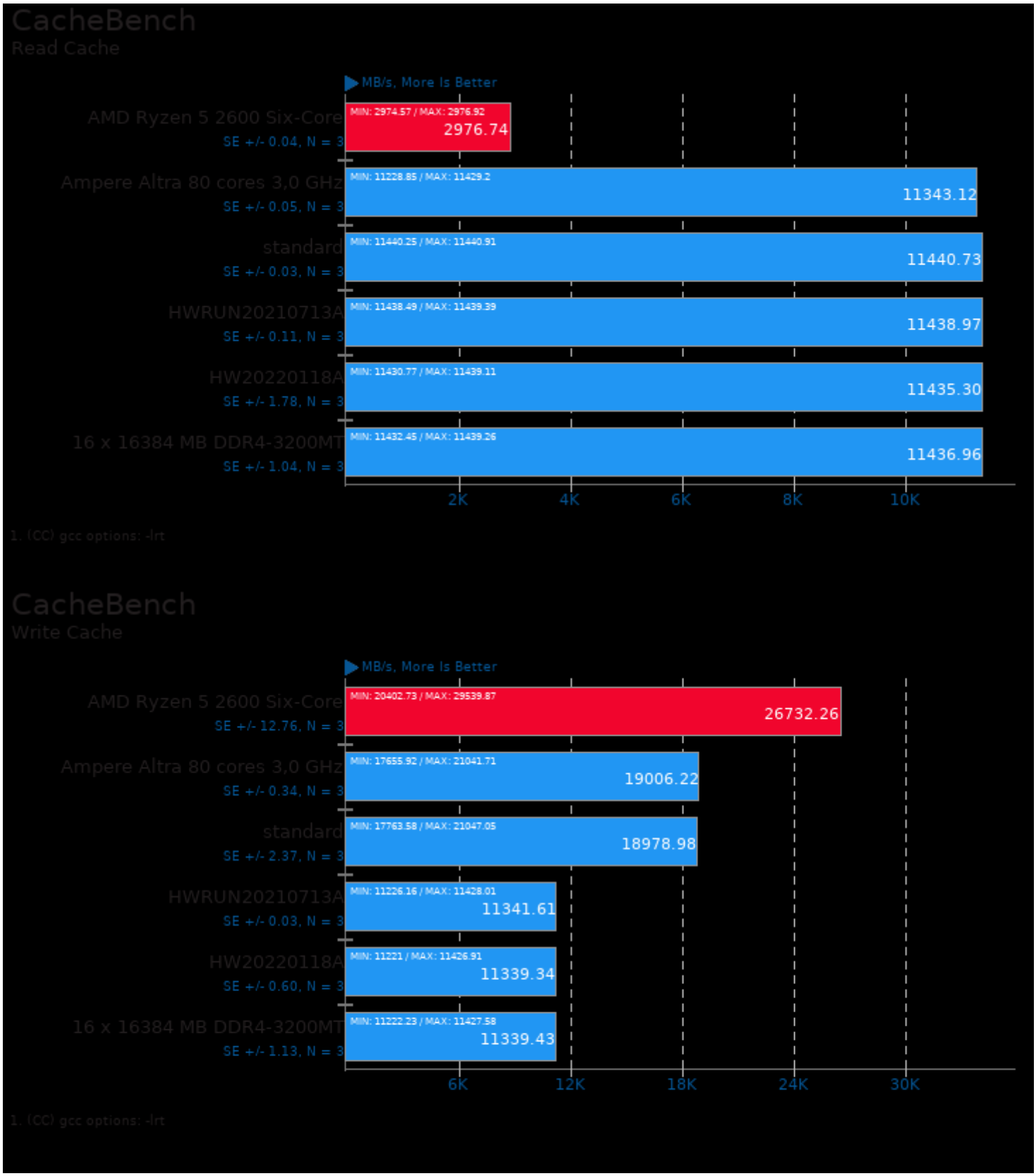
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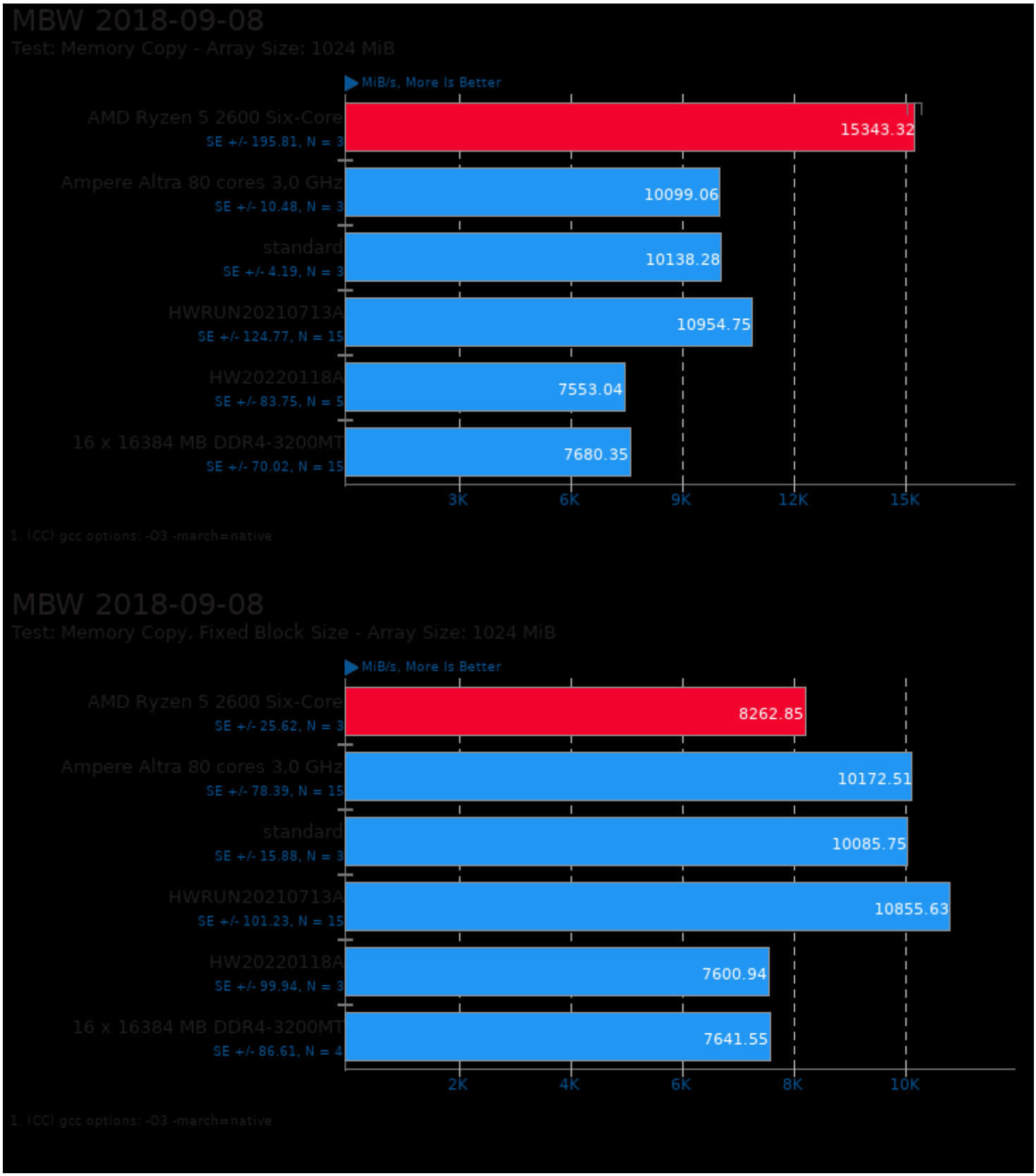
--with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-target-system-zlib=auto -v
Processor Notes: Scaling Governor: cppc_cpufreq performance
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + srbds: Not affected + tsx_async_abort: Not affected

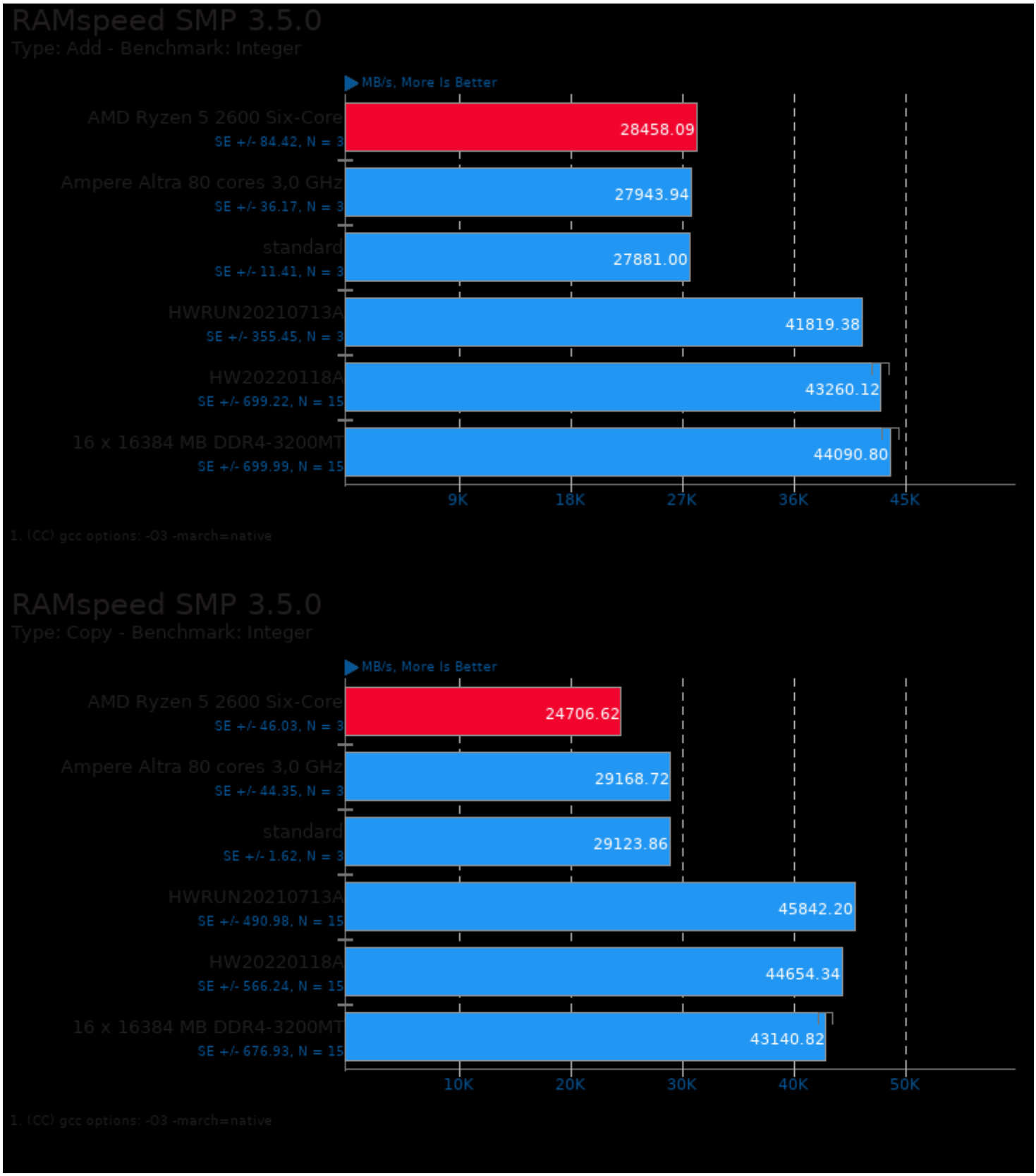
	AMD Ryzen 5 2600 Six-Core	Ampere Altra 80 cores 3,0 GHz	standard	HWRUN20210713A	HW20220118A	Mt. Collins	16 x 16384 MB DDR4-3200 MT
CacheBench - Read Cache (MB/s)	2977	11343	11441	11439	11435		11437
Normalized	26.02%	99.15%	100%	99.98%	99.95%		99.97%
Standard Deviation	0%	0%	0%	0%	0%		0%
CacheBench - Write Cache (MB/s)	26732	19006	18979	11342	11339		11339
Normalized	100%	71.1%	71%	42.43%	42.42%		42.42%
Standard Deviation	0.1%	0%	0%	0%	0%		0%
MBW - Memory Copy - 1024 MiB (MiB/s)	15343	10099	10138	10955	7553		7680
Normalized	100%	65.82%	66.08%	71.4%	49.23%		50.06%
Standard Deviation	2.2%	0.2%	0.1%	4.4%	2.5%		3.5%
MBW - M.C.F.B.S - 1024 MiB (MiB/s)	8263	10173	10086	10856	7601		7642
Normalized	76.12%	93.71%	92.91%	100%	70.02%		70.39%
Standard Deviation	0.5%	3%	0.3%	3.6%	2.3%		2.3%
RAMspeed SMP - Add - Integer (MB/s)	28458	27944	27881	41819	43260		44091
Normalized	64.54%	63.38%	63.24%	94.85%	98.12%		100%
Standard Deviation	0.5%	0.2%	0.1%	1.5%	6.3%		6.1%
RAMspeed SMP - Copy - Integer (MB/s)	24707	29169	29124	45842	44654		43141
Normalized	53.89%	63.63%	63.53%	100%	97.41%		94.11%
Standard Deviation	0.3%	0.3%	0%	4.1%	4.9%		6.1%
RAMspeed SMP - Scale - Integer (MB/s)	22629	27147	27113	30574	31586		30895
Normalized	71.64%	85.95%	85.84%	96.8%	100%		97.81%
Standard Deviation	0.9%	0.1%	0.2%	2.5%	1.1%		4.5%
RAMspeed SMP - Triad - Integer (MB/s)	22751	25520	24446	37077	37011		39630
Normalized	57.41%	64.39%	61.69%	93.56%	93.39%		100%
Standard Deviation	2.4%	13.1%	9.1%	7.9%	8.4%		11.3%
RAMspeed SMP - Average - Integer (MB/s)	24322	27095	28008	39176	40312		38810
Normalized	60.33%	67.21%	69.48%	97.18%	100%		96.27%
Standard Deviation	1.2%	0.9%	8.3%	3.3%	5.9%		6.5%
RAMspeed SMP - Add - Floating Point (MB/s)	28396	28198	28220	43212	46143		42253
Normalized	61.54%	61.11%	61.16%	93.65%	100%		91.57%
Standard Deviation	0.2%	0.6%	0.3%	3.7%	5.7%		5.8%

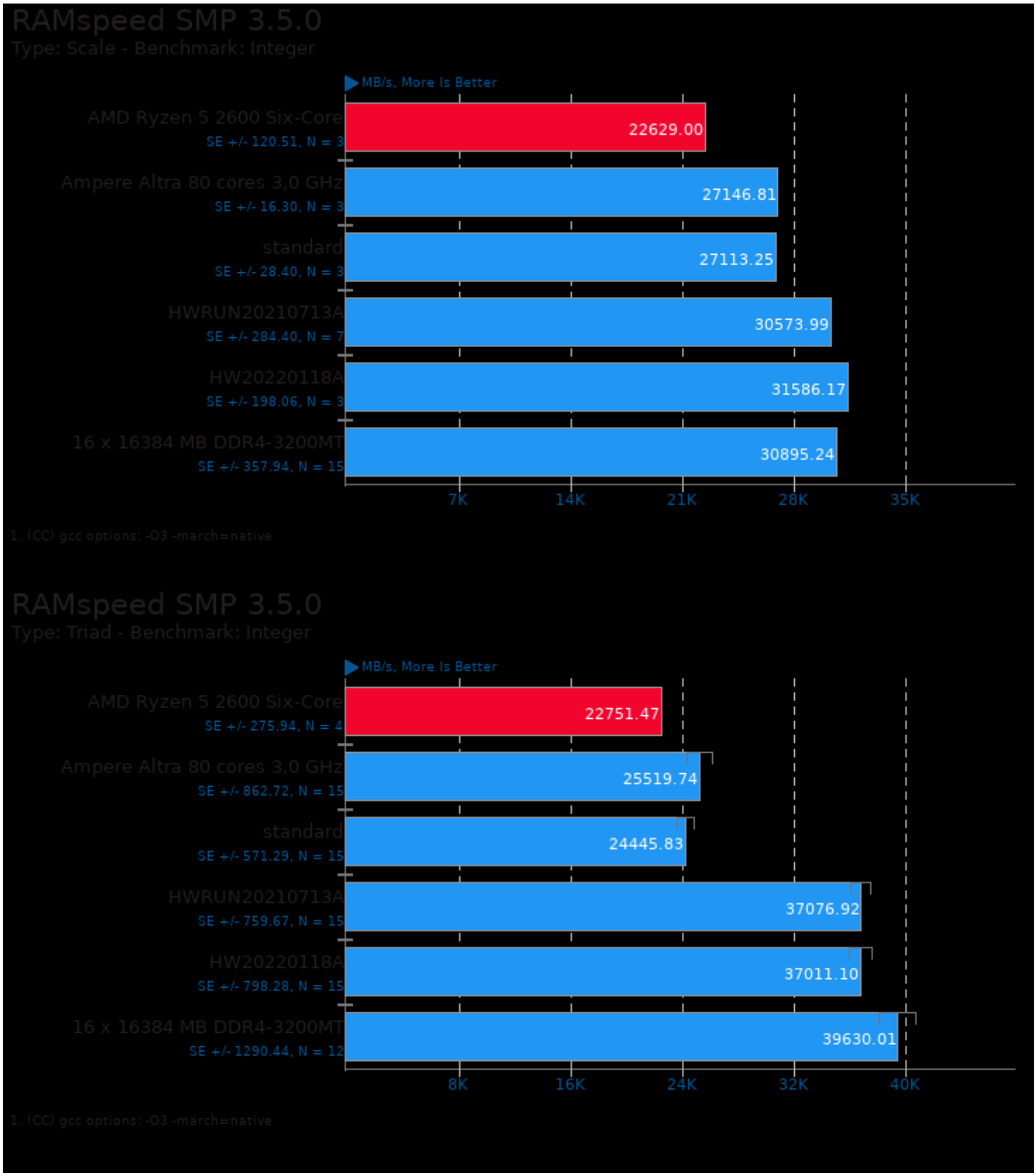
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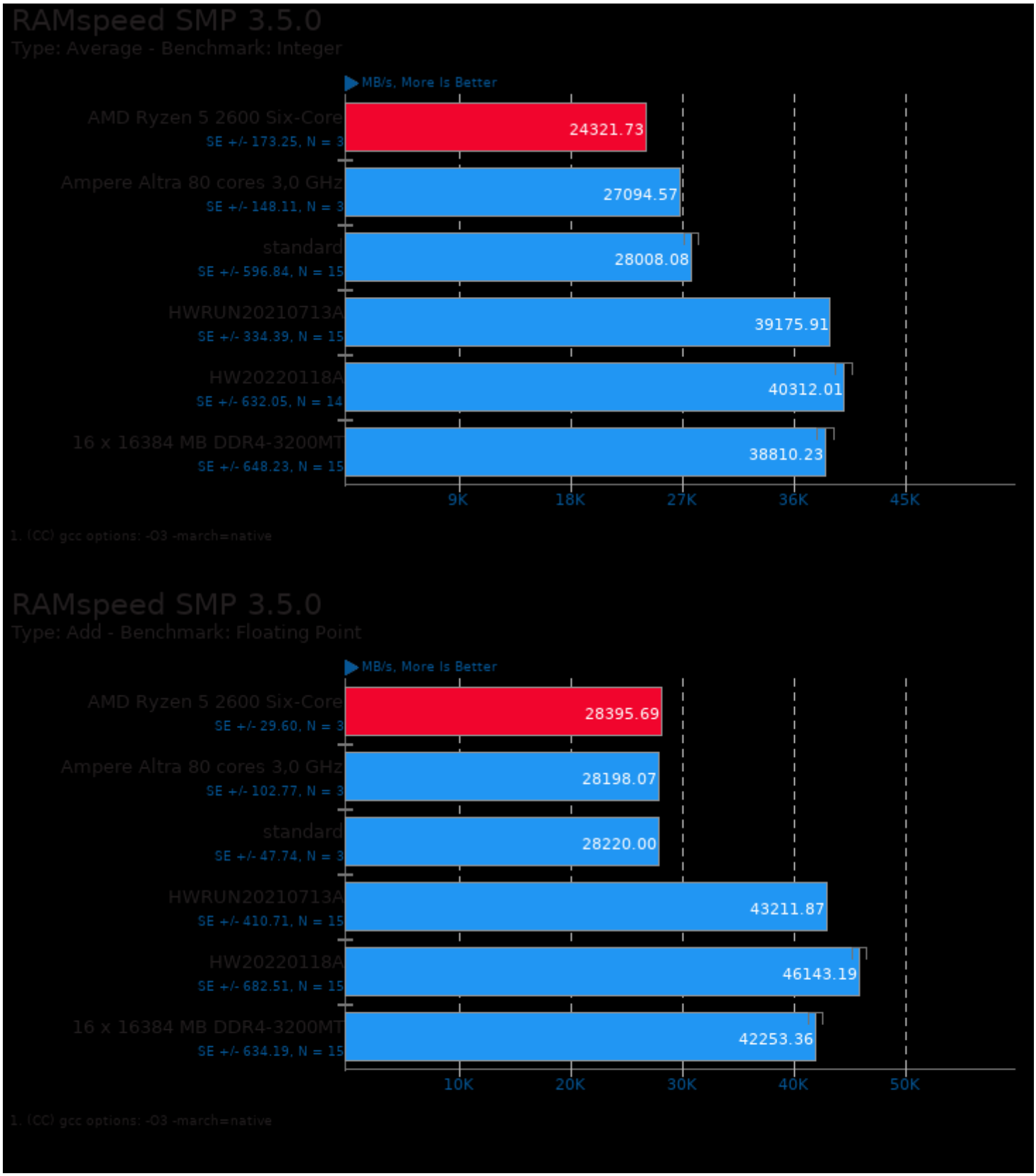
RAMspeed SMP - Copy - Floating Point (MB/s)	**24450**	29325	29080	45148	44533	**45296**
Normalized	53.98%	64.74%	64.2%	99.67%	98.32%	100%
Standard Deviation	0.3%	0.9%	0.1%	6.1%	5.1%	7.9%
RAMspeed SMP - Scale - Floating Point (MB/s)	**23089**	29063	28925	**45791**	44763	43008
Normalized	50.42%	63.47%	63.17%	100%	97.76%	93.92%
Standard Deviation	0.7%	0.1%	0.4%	7.2%	1.4%	8.4%
RAMspeed SMP - Triad - Floating Point (MB/s)	**27516**	**18914**	19249	25263	26488	25103
Normalized	100%	68.74%	69.95%	91.81%	96.26%	91.23%
Standard Deviation	0.4%	0.5%	0.2%	0.8%	2.3%	4.4%
RAMspeed SMP - Average - Floating Point (MB/s)	**25875**	26490	26413	39002	**41357**	40631
Normalized	62.56%	64.05%	63.87%	94.31%	100%	98.25%
Standard Deviation	0.2%	0.1%	1.2%	1%	3.9%	0.8%
Stream - Copy (MB/s)	**34859**	164746	166057	159505	161563	**167474**
Normalized	20.81%	98.37%	99.15%	95.24%	96.47%	100%
Standard Deviation	0.2%	1.5%	1.8%	0.2%	12%	13.5%
Stream - Scale (MB/s)	**22231**	160246	**164939**	160231	151255	151260
Normalized	13.48%	97.16%	100%	97.15%	91.7%	91.71%
Standard Deviation	0.1%	2.5%	1.3%	0.2%	14.4%	6.1%
Stream - Triad (MB/s)	**25761**	165040	**167307**	158611	149572	146715
Normalized	15.4%	98.65%	100%	94.8%	89.4%	87.69%
Standard Deviation	0.3%	1.3%	1.9%	0.2%	13.4%	5.4%
Stream - Add (MB/s)	**25746**	163078	**165543**	157578	150872	149074
Normalized	15.55%	98.51%	100%	95.19%	91.14%	90.05%
Standard Deviation	0.1%	1.7%	1.4%	0.1%	10.6%	9.7%
t-test1 - 1 (sec)	**41.681**	**22.380**	22.489	27.065	24.630	26.554
Normalized	53.69%	100%	99.52%	82.69%	90.86%	84.28%
Standard Deviation	8.8%	0.2%	0.1%	0.4%	0.4%	3.3%
t-test1 - 2 (sec)	**14.787**	**7.782**	7.807	9.469	9.088	8.873
Normalized	52.63%	100%	99.68%	82.18%	85.63%	87.7%
Standard Deviation	11.3%	0.2%	0.1%	0.1%	0.2%	1.1%
Tinymembench - Standard Memcpy (MB/s)	**15856**	11319	**11120**	11448	11237	11501
Normalized	100%	71.38%	70.13%	72.2%	70.87%	72.54%
Standard Deviation	2.5%	1.9%	0.6%	0.6%	5.5%	7.3%
Tinymembench - Standard Memset (MB/s)	**11317**	39172	34526	47696	**47698**	47601
Normalized	23.73%	82.12%	72.38%	99.99%	100%	99.8%
Standard Deviation	0.4%	2.7%	0.5%	0%	0.4%	0%

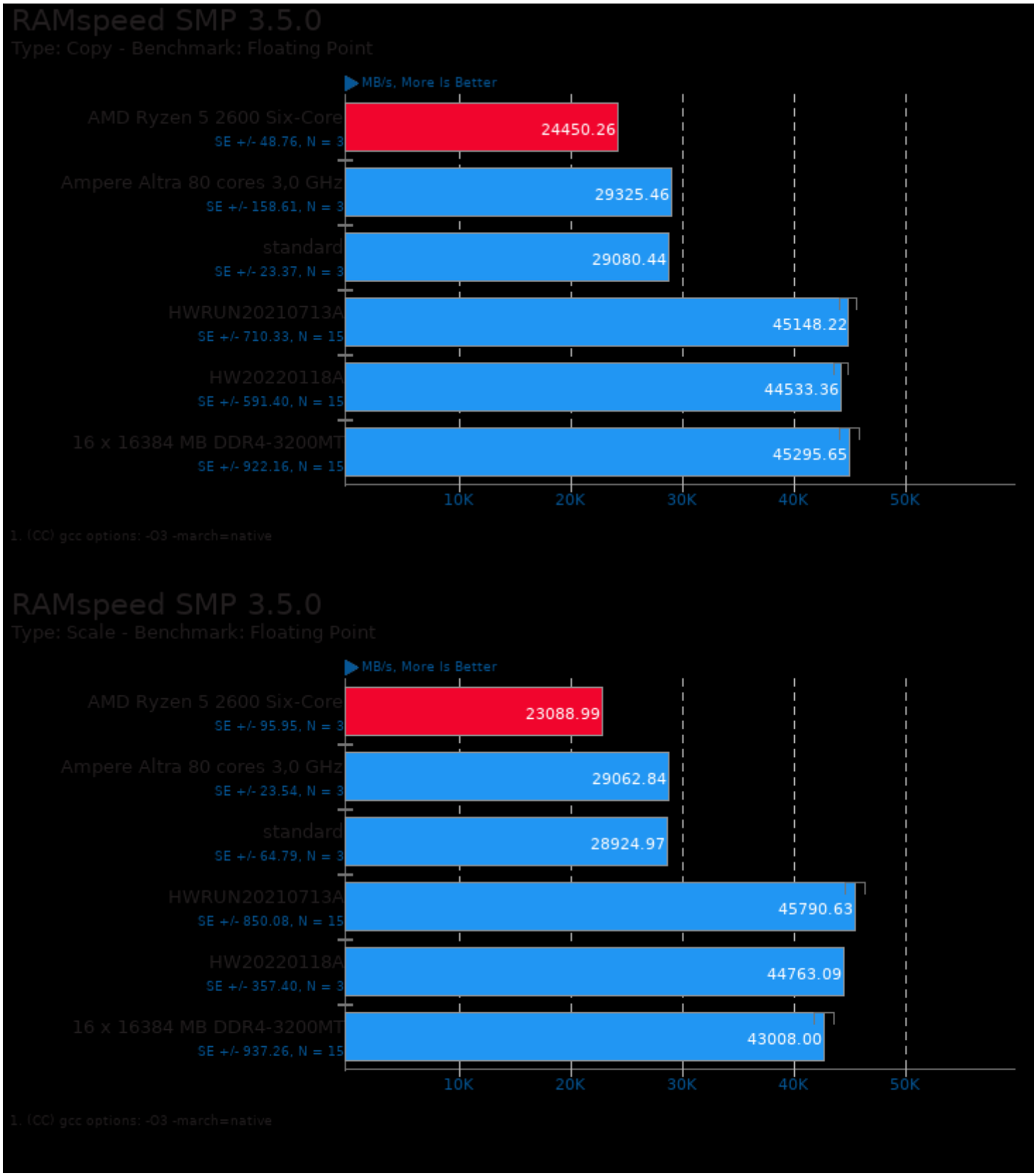

CacheBench
Read Cache
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 0.04, N = 3
MIN: 2974.57 / MAX: 2976.92
2976.74
Ampere Altra 80 cores 3,0 GHz
SE +/- 0.05, N = 3
MIN: 11228.85 / MAX: 11429.2
11343.12
standard
SE +/- 0.03, N = 3
MIN: 11440.25 / MAX: 11440.91
11440.73
HWRUN20210713A
SE +/- 0.11, N = 3
MIN: 11438.49 / MAX: 11439.39
11438.97
HW20220118A
SE +/- 1.78, N = 3
MIN: 11430.77 / MAX: 11439.11
11435.30
16 x 16384 MB DDR4-3200MT
SE +/- 1.04, N = 3
MIN: 11432.45 / MAX: 11439.26
11436.96
2K
4K
6K
8K
10K
1. (CC) gcc options: -lrt
CacheBench
Write Cache
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 12.76, N = 3
MIN: 20402.73 / MAX: 29539.87
26732.26
Ampere Altra 80 cores 3,0 GHz
SE +/- 0.34, N = 3
MIN: 17655.92 / MAX: 21041.71
19006.22
standard
SE +/- 2.37, N = 3
MIN: 17763.58 / MAX: 21047.05
18978.98
HWRUN20210713A
SE +/- 0.03, N = 3
MIN: 11226.16 / MAX: 11428.01
11341.61
HW20220118A
SE +/- 0.60, N = 3
MIN: 11221 / MAX: 11426.91
11339.34
16 x 16384 MB DDR4-3200MT
SE +/- 1.13, N = 3
MIN: 11222.23 / MAX: 11427.58
11339.43
6K
12K
18K
24K
30K
1. (CC) gcc options: -lrt

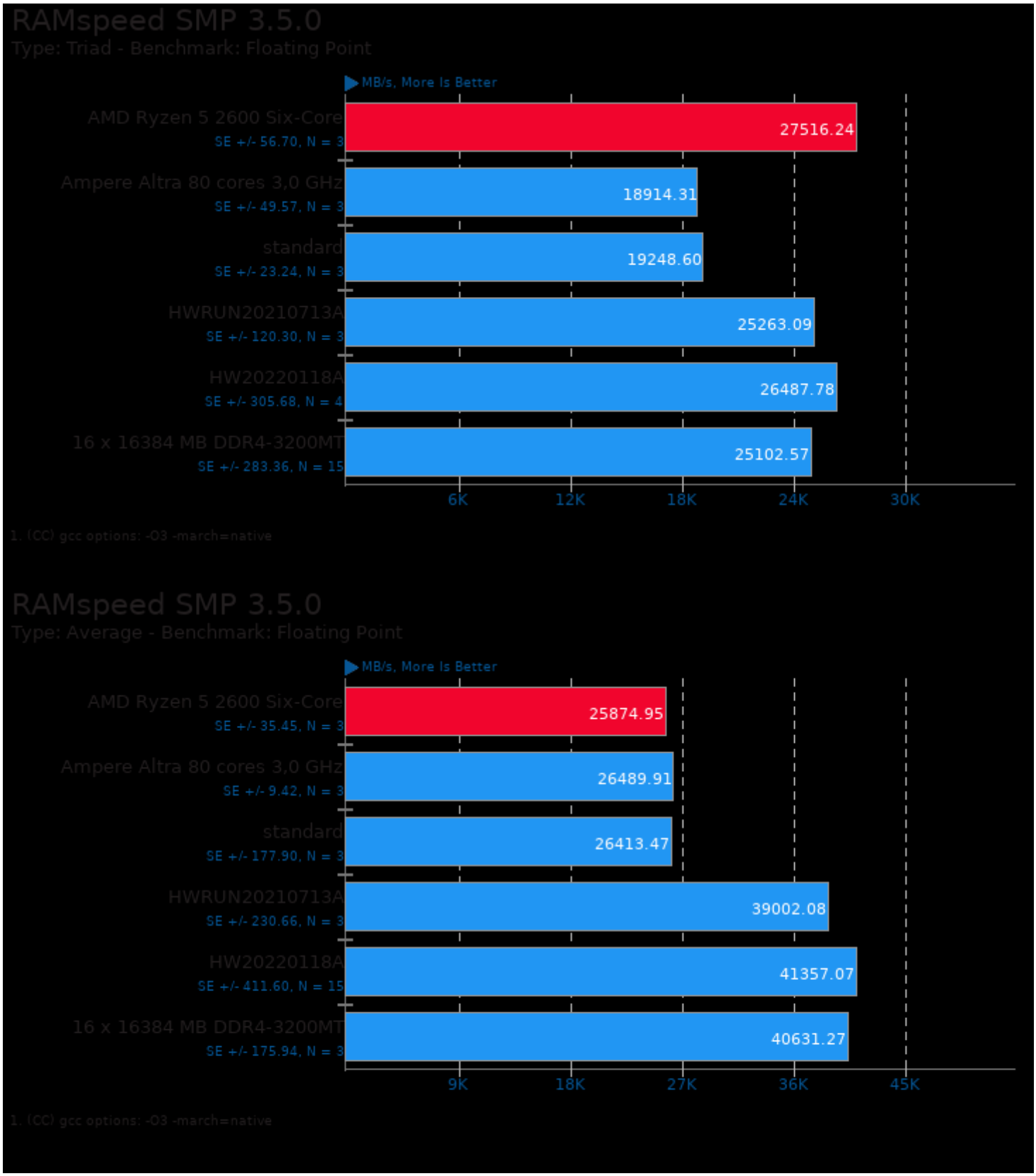

MBW 2018-09-08
Test: Memory Copy - Array Size: 1024 MiB
MiB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 195.81, N = 3
15343.32
Ampere Altra 80 cores 3,0 GHz
SE +/- 10.48, N = 3
10099.06
standard
SE +/- 4.19, N = 3
10138.28
HWRUN20210713A
SE +/- 124.77, N = 15
10954.75
HW20220118A
SE +/- 83.75, N = 5
7553.04
16 x 16384 MB DDR4-3200MT
SE +/- 70.02, N = 15
7680.35
3K
6K
9K
12K
15K
1. (CC) gcc options: -O3 -march=native
MBW 2018-09-08
Test: Memory Copy, Fixed Block Size - Array Size: 1024 MiB
MiB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 25.62, N = 3
8262.85
Ampere Altra 80 cores 3,0 GHz
SE +/- 78.39, N = 15
10172.51
standard
SE +/- 15.88, N = 3
10085.75
HWRUN20210713A
SE +/- 101.23, N = 15
10855.63
HW20220118A
SE +/- 99.94, N = 3
7600.94
16 x 16384 MB DDR4-3200MT
SE +/- 86.61, N = 4
7641.55
2K
4K
6K
8K
10K
1. (CC) gcc options: -O3 -march=native

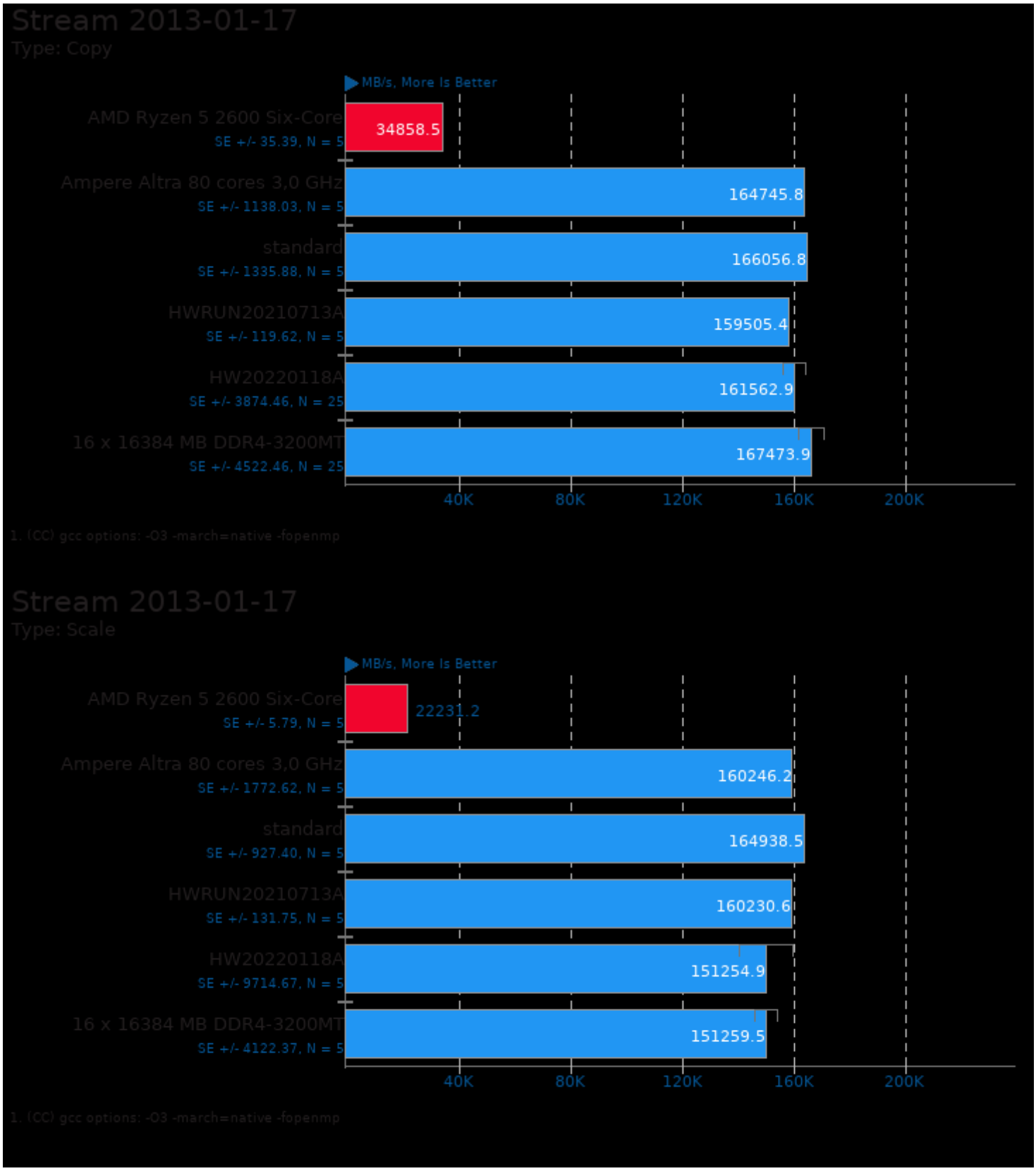

RAMspeed SMP 3.5.0
Type: Add - Benchmark: Integer
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 84.42, N = 3
28458.09
Ampere Altra 80 cores 3,0 GHz
SE +/- 36.17, N = 3
27943.94
standard
SE +/- 11.41, N = 3
27881.00
HWRUN20210713A
SE +/- 355.45, N = 3
41819.38
HW20220118A
SE +/- 699.22, N = 15
43260.12
16 x 16384 MB DDR4-3200MT
SE +/- 699.99, N = 15
44090.80
9K
18K
27K
36K
45K
1. (CC) gcc options: -O3 -march=native
RAMspeed SMP 3.5.0
Type: Copy - Benchmark: Integer
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 46.03, N = 3
24706.62
Ampere Altra 80 cores 3,0 GHz
SE +/- 44.35, N = 3
29168.72
standard
SE +/- 1.62, N = 3
29123.86
HWRUN20210713A
SE +/- 490.98, N = 15
45842.20
HW20220118A
SE +/- 566.24, N = 15
44654.34
16 x 16384 MB DDR4-3200MT
SE +/- 676.93, N = 15
43140.82
10K
20K
30K
40K
50K
1. (CC) gcc options: -O3 -march=native

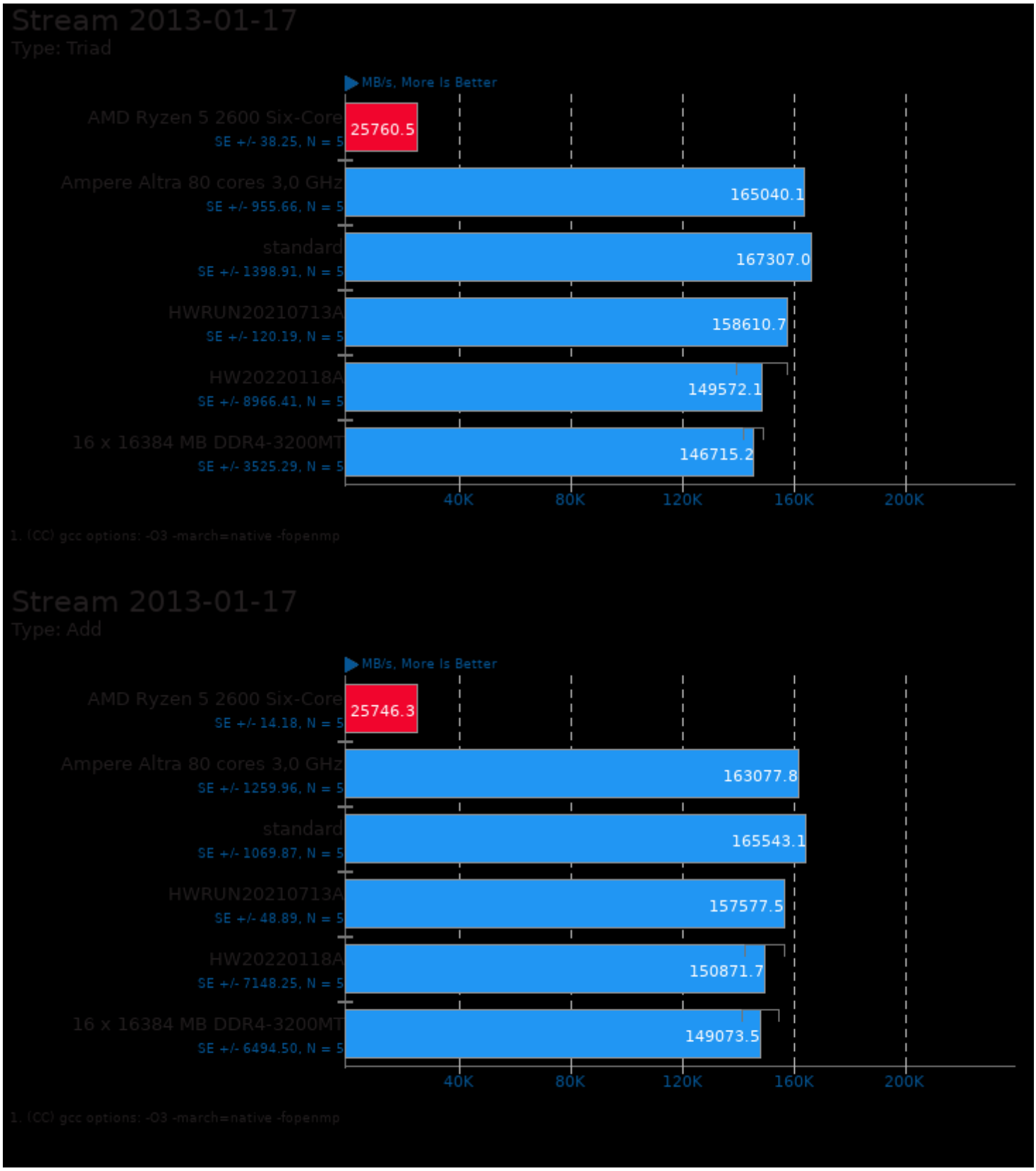

RAMspeed SMP 3.5.0
Type: Scale - Benchmark: Integer
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 120.51, N = 3
22629.00
Ampere Altra 80 cores 3,0 GHz
SE +/- 16.30, N = 3
27146.81
standard
SE +/- 28.40, N = 3
27113.25
HWRUN20210713A
SE +/- 284.40, N = 7
30573.99
HW20220118A
SE +/- 198.06, N = 3
31586.17
16 x 16384 MB DDR4-3200MT
SE +/- 357.94, N = 15
30895.24
7K
14K
21K
28K
35K
1. (CC) gcc options: -O3 -march=native
RAMspeed SMP 3.5.0
Type: Triad - Benchmark: Integer
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 275.94, N = 4
22751.47
Ampere Altra 80 cores 3,0 GHz
SE +/- 862.72, N = 15
25519.74
standard
SE +/- 571.29, N = 15
24445.83
HWRUN20210713A
SE +/- 759.67, N = 15
37076.92
HW20220118A
SE +/- 798.28, N = 15
37011.10
16 x 16384 MB DDR4-3200MT
SE +/- 1290.44, N = 12
39630.01
8K
16K
24K
32K
40K
1. (CC) gcc options: -O3 -march=native

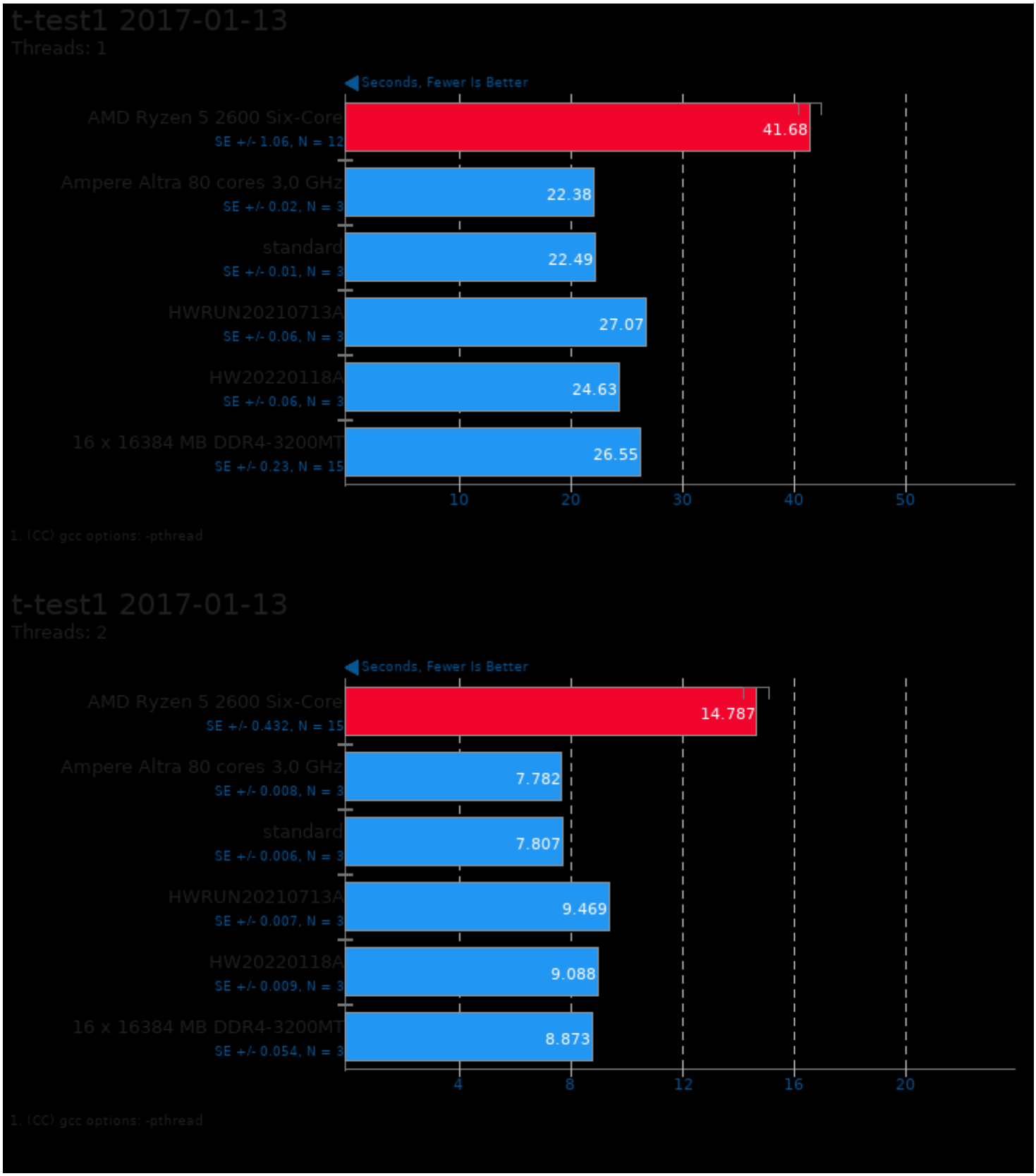

RAMspeed SMP 3.5.0
Type: Average - Benchmark: Integer
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 173.25, N = 3
24321.73
Ampere Altra 80 cores 3,0 GHz
SE +/- 148.11, N = 3
27094.57
standard
SE +/- 596.84, N = 15
28008.08
HWRUN20210713A
SE +/- 334.39, N = 15
39175.91
HW20220118A
SE +/- 632.05, N = 14
40312.01
16 x 16384 MB DDR4-3200MT
SE +/- 648.23, N = 15
38810.23
9K
18K
27K
36K
45K
1. (CC) gcc options: -O3 -march=native
RAMspeed SMP 3.5.0
Type: Add - Benchmark: Floating Point
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 29.60, N = 3
28395.69
Ampere Altra 80 cores 3,0 GHz
SE +/- 102.77, N = 3
28198.07
standard
SE +/- 47.74, N = 3
28220.00
HWRUN20210713A
SE +/- 410.71, N = 15
43211.87
HW20220118A
SE +/- 682.51, N = 15
46143.19
16 x 16384 MB DDR4-3200MT
SE +/- 634.19, N = 15
42253.36
10K
20K
30K
40K
50K
1. (CC) gcc options: -O3 -march=native

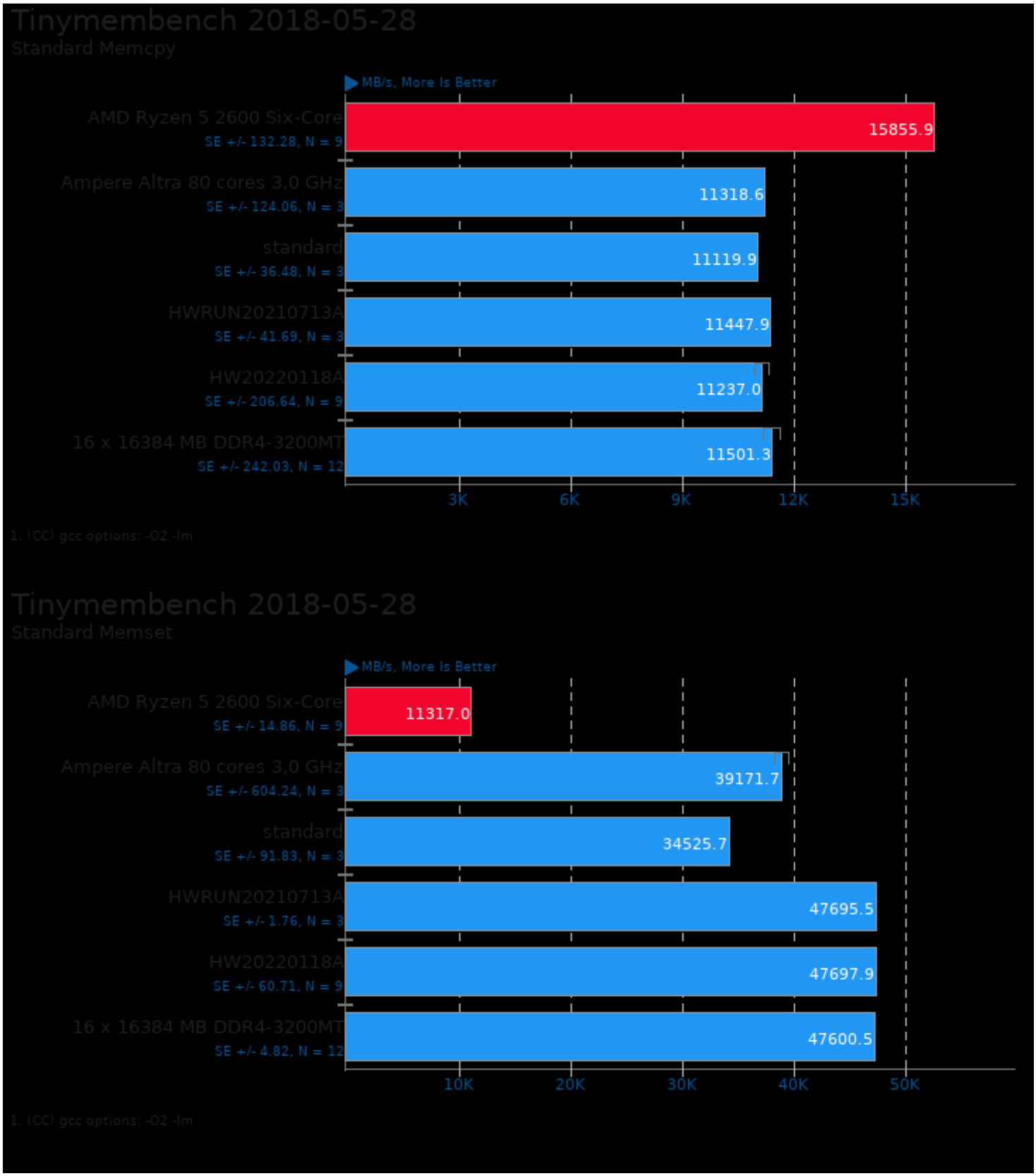

RAMspeed SMP 3.5.0
Type: Copy - Benchmark: Floating Point
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 48.76, N = 3
24450.26
Ampere Altra 80 cores 3,0 GHz
SE +/- 158.61, N = 3
29325.46
standard
SE +/- 23.37, N = 3
29080.44
HWRUN20210713A
SE +/- 710.33, N = 15
45148.22
HW20220118A
SE +/- 591.40, N = 15
44533.36
16 x 16384 MB DDR4-3200MT
SE +/- 922.16, N = 15
45295.65
10K
20K
30K
40K
50K
1. (CC) gcc options: -O3 -march=native
RAMspeed SMP 3.5.0
Type: Scale - Benchmark: Floating Point
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 95.95, N = 3
23088.99
Ampere Altra 80 cores 3,0 GHz
SE +/- 23.54, N = 3
29062.84
standard
SE +/- 64.79, N = 3
28924.97
HWRUN20210713A
SE +/- 850.08, N = 15
45790.63
HW20220118A
SE +/- 357.40, N = 3
44763.09
16 x 16384 MB DDR4-3200MT
SE +/- 937.26, N = 15
43008.00
10K
20K
30K
40K
50K
1. (CC) gcc options: -O3 -march=native


RAMspeed SMP 3.5.0
Type: Triad - Benchmark: Floating Point
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 56.70, N = 3
27516.24
Ampere Altra 80 cores 3,0 GHz
SE +/- 49.57, N = 3
18914.31
standard
SE +/- 23.24, N = 3
19248.60
HWRUN20210713A
SE +/- 120.30, N = 3
25263.09
HW20220118A
SE +/- 305.68, N = 4
26487.78
16 x 16384 MB DDR4-3200MT
SE +/- 283.36, N = 15
25102.57
6K
12K
18K
24K
30K
1. (CC) gcc options: -O3 -march=native
RAMspeed SMP 3.5.0
Type: Average - Benchmark: Floating Point
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 35.45, N = 3
25874.95
Ampere Altra 80 cores 3,0 GHz
SE +/- 9.42, N = 3
26489.91
standard
SE +/- 177.90, N = 3
26413.47
HWRUN20210713A
SE +/- 230.66, N = 3
39002.08
HW20220118A
SE +/- 411.60, N = 15
41357.07
16 x 16384 MB DDR4-3200MT
SE +/- 175.94, N = 3
40631.27
9K
18K
27K
36K
45K
1. (CC) gcc options: -O3 -march=native


Stream 2013-01-17
Type: Copy
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 35.39, N = 5
34858.5
Ampere Altra 80 cores 3,0 GHz
SE +/- 1138.03, N = 5
164745.8
standard
SE +/- 1335.88, N = 5
166056.8
HWRUN20210713A
SE +/- 119.62, N = 5
159505.4
HW20220118A
SE +/- 3874.46, N = 25
161562.9
16 x 16384 MB DDR4-3200MT
SE +/- 4522.46, N = 25
167473.9
40K
80K
120K
160K
200K
1. (CC) gcc options: -O3 -march=native -fopenmp
Stream 2013-01-17
Type: Scale
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 5.79, N = 5
22231.2
Ampere Altra 80 cores 3,0 GHz
SE +/- 1772.62, N = 5
160246.2
standard
SE +/- 927.40, N = 5
164938.5
HWRUN20210713A
SE +/- 131.75, N = 5
160230.6
HW20220118A
SE +/- 9714.67, N = 5
151254.9
16 x 16384 MB DDR4-3200MT
SE +/- 4122.37, N = 5
151259.5
40K
80K
120K
160K
200K
1. (CC) gcc options: -O3 -march=native -fopenmp


Stream 2013-01-17
Type: Triad
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 38.25, N = 5
25760.5
Ampere Altra 80 cores 3,0 GHz
SE +/- 955.66, N = 5
165040.1
standard
SE +/- 1398.91, N = 5
167307.0
HWRUN20210713A
SE +/- 120.19, N = 5
158610.7
HW20220118A
SE +/- 8966.41, N = 5
149572.1
16 x 16384 MB DDR4-3200MT
SE +/- 3525.29, N = 5
146715.2
40K
80K
120K
160K
200K
1. (CC) gcc options: -O3 -march=native -fopenmp
Stream 2013-01-17
Type: Add
MB/s, More Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 14.18, N = 5
25746.3
Ampere Altra 80 cores 3,0 GHz
SE +/- 1259.96, N = 5
163077.8
standard
SE +/- 1069.87, N = 5
165543.1
HWRUN20210713A
SE +/- 48.89, N = 5
157577.5
HW20220118A
SE +/- 7148.25, N = 5
150871.7
16 x 16384 MB DDR4-3200MT
SE +/- 6494.50, N = 5
149073.5
40K
80K
120K
160K
200K
1. (CC) gcc options: -O3 -march=native -fopenmp


t-test1 2017-01-13
Threads: 1
Seconds, Fewer Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 1.06, N = 12
41.68
Ampere Altra 80 cores 3,0 GHz
SE +/- 0.02, N = 3
22.38
standard
SE +/- 0.01, N = 3
22.49
HWRUN20210713A
SE +/- 0.06, N = 3
27.07
HW20220118A
SE +/- 0.06, N = 3
24.63
16 x 16384 MB DDR4-3200MT
SE +/- 0.23, N = 15
26.55
10
20
30
40
50
1. (CC) gcc options: -pthread
t-test1 2017-01-13
Threads: 2
Seconds, Fewer Is Better
AMD Ryzen 5 2600 Six-Core
SE +/- 0.432, N = 15
14.787
Ampere Altra 80 cores 3,0 GHz
SE +/- 0.008, N = 3
7.782
standard
SE +/- 0.006, N = 3
7.807
HWRUN20210713A
SE +/- 0.007, N = 3
9.469
HW20220118A
SE +/- 0.009, N = 3
9.088
16 x 16384 MB DDR4-3200MT
SE +/- 0.054, N = 3
8.873
4
8
12
16
20
1. (CC) gcc options: -pthread



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