

www.phoronix-test-suite.com

Core i9 12900K AVX-512 Alder Lake Benchmarks

12700k comparison vs original testing by Mich L. of AVX-512 12900k performance

Automated Executive Summary

i9-12900K P-Cores + AVX-512 had the most wins, coming in first place for 75% of the tests.

Based on the geometric mean of all complete results, the fastest (i9-12900K P-Cores + AVX-512) was 1.921x the speed of the slowest (i9-12900K P-Cores). i9-12900K was 0.724x the speed of i9-12900K P-Cores + AVX-512, Intel Core i7-12700K was 0.868x the speed of i9-12900K, i9-12900K P-Cores was 0.828x the speed of Intel Core i7-12700K.

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

Cpuminer-Opt (Algorithm: Myriad-Groestl) at 2.88x
Cpuminer-Opt (Algorithm: LBC, LBRY Credits) at 2.621x
Cpuminer-Opt (Algorithm: Quad SHA-256, Pyrite) at 2.237x
Cpuminer-Opt (Algorithm: Blake-2 S) at 2.124x
Cpuminer-Opt (Algorithm: Triple SHA-256, Onecoin) at 2.061x
Cpuminer-Opt (Algorithm: Garlicoin) at 1.969x
Cpuminer-Opt (Algorithm: Skeincoin) at 1.639x
Stockfish (Total Time) at 1.526x
Stockfish (Total Time) at -1x

Stockfish (CPU Power Consumption Monitor) at -1x.

Test Systems:

i9-12900K

Processor: Intel Core i9-12900K @ 6.50GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (0702 BIOS), Chipset: Intel Device 7aa7, Memory: 64GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: Gigabyte AMD Radeon RX 6800/6800 XT / 6900 16GB (2575/1000MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 21.10, Kernel: 5.15.0-051500rc6daily20211023-generic (x86_64) 20211022, Desktop: GNOME Shell 40.5, Display Server: X Server 1.20.13 + Wayland, OpenGL: 4.6 Mesa 22.0.0-devel (git-c2d522b 2021-10-23 impish-oibaf-ppa) (LLVM 12.0.1 DRM 3.42 5.15.0-051500rc6daily20211023-generic), Vulkan: 1.2.195, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Environment Notes: CXXFLAGS="-O3 -march=native" CFLAGS="-O3 -march=native"
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-cet --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-serialization=2 --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-11-ZPT0kp/gcc-11-11.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-11-ZPT0kp/gcc-11-11.2.0/debian/tmp-gcn/usr --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: intel_pstate powersave - CPU Microcode: 0x12 - Thermald 2.4.6
Graphics Notes: BAR1 / Visible vRAM Size: 16368 MB
Python Notes: Python 3.9.7
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 Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

i9-12900K P-Cores

i9-12900K P-Cores + AVX-512

Processor: Intel Core i9-12900K @ 6.50GHz (8 Cores / 16 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (0702 BIOS), Chipset: Intel Device 7aa7, Memory: 64GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0, Graphics: Gigabyte AMD Radeon RX 6800/6800 XT / 6900 16GB (2575/1000MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 21.10, Kernel: 5.15.0-051500rc6daily20211023-generic (x86_64) 20211022, Desktop: GNOME Shell 40.5, Display Server: X Server 1.20.13 + Wayland, OpenGL: 4.6 Mesa 22.0.0-devel (git-c2d522b 2021-10-23 impish-oibaf-ppa) (LLVM 12.0.1 DRM 3.42 5.15.0-051500rc6daily20211023-generic), Vulkan: 1.2.195, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Environment Notes: CXXFLAGS="-O3 -march=native" CFLAGS="-O3 -march=native"
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-cet --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-serialization=2 --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-11-ZPT0kp/gcc-11-11.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-11-ZPT0kp/gcc-11-11.2.0/debian/tmp-gcn/usr --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: intel_pstate powersave - CPU Microcode: 0x12 - Thermald 2.4.6
Graphics Notes: BAR1 / Visible vRAM Size: 16368 MB
Python Notes: Python 3.9.7
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 Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Intel Core i7-12700K

Processor: Intel Core i7-12700K @ 5.00GHz (12 Cores / 20 Threads), Motherboard: MSI PRO Z690-A DDR4(MS-7D25) v1.0 (1.00 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 500GB Western Digital WDS500G2B0C-00PXH0 + 3 x 10001GB Seagate ST10000DM0004-1Z + 128GB HP SSD S700 Pro, Graphics: MSI AMD Radeon RX 5600 XT 6GB (1500MHz), Audio: Realtek ALC897, Monitor: LG HDR WQHD, Network: Intel Device 15f3

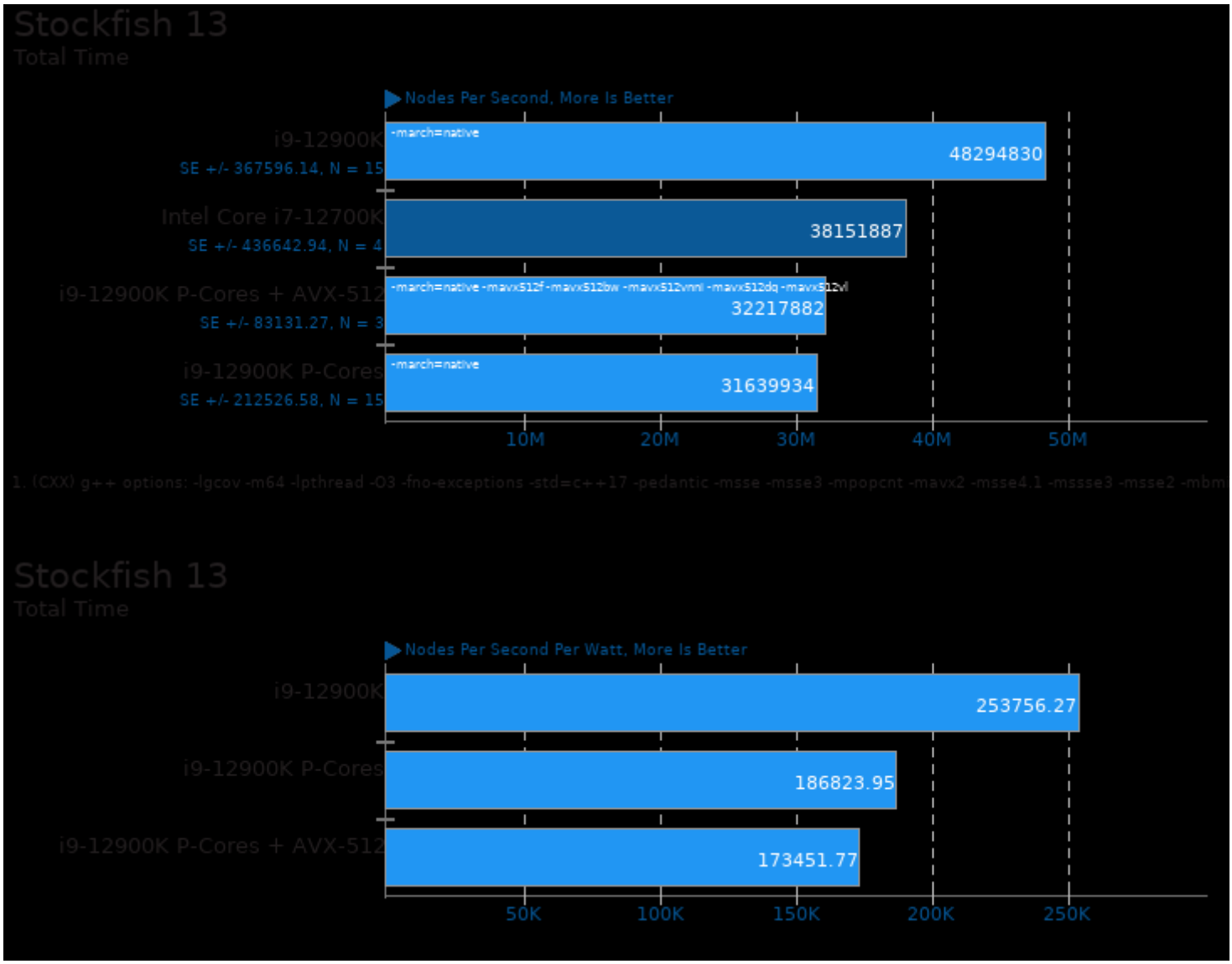
OS: Pop 20.04, Kernel: 5.14.0-1008-oem (x86_64), Desktop: GNOME Shell 3.36.7, Display Server: X Server 1.20.11, OpenGL: 4.6 Mesa 21.2.2 (LLVM 12.0.0), OpenCL: OpenCL 1.2 Intel FPGA SDK for OpenCL 20.3 + OpenCL 3.0 LINUX + OpenCL 3.0, Vulkan: 1.2.182, Compiler: GCC 9.4.0 + Intel oneAPI DPC++/C++ Compiler 2021.4.0 (2021.4.0.20210924) + ICC 2021.4.0 20210910 + CUDA 10.2, File-System: ext4, Screen Resolution: 3440x1440

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-yTrUTS/gcc-9-9.4.0/debian/tmp-nvptx/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-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: intel_pstate powersave - CPU Microcode: 0xf - Thermald 1.9.1
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 Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

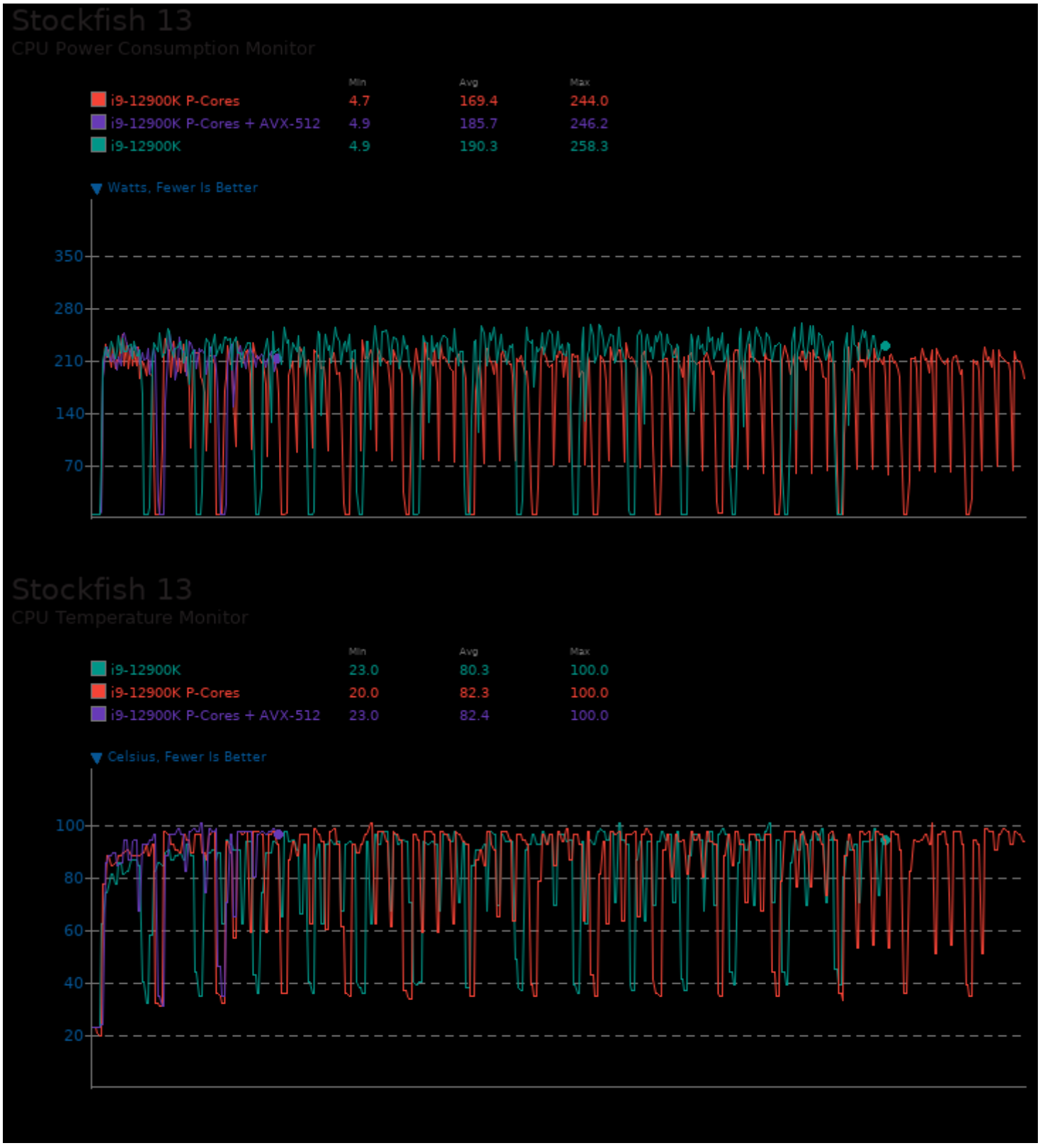
	i9-12900K	i9-12900K P-Cores	i9-12900K P-Cores + AVX-512	Intel Core i7-12700K
Stockfish - Total Time (Nodes/s)	**48294830**	**31639934**	32217882	38151887
Normalized	100%	65.51%	66.71%	79%
Standard Deviation	2.9%	2.6%	0.4%	2.3%
Stockfish - Total Time (Nodes/s/Watt)	**253756**	186824	**173452**	
Normalized	100%	73.62%	68.35%	
Cpuminer-Opt - T.S.2.O (kH/s)	**264873**	**128547**	246997	185503
Normalized	100%	48.53%	93.25%	70.03%
Standard Deviation	0.8%	0.5%	0.5%	0.2%
Cpuminer-Opt - T.S.2.O (kH/s/Watt)	**3630**	**1151**	1919	
Normalized	100%	31.71%	52.87%	
Cpuminer-Opt - Q.S.2.P (kH/s)	132160	**79207**	**177217**	95013
Normalized	74.58%	44.69%	100%	53.61%
Standard Deviation	0%	0.2%	0.9%	2.2%
Cpuminer-Opt - Q.S.2.P (kH/s/Watt)	**1632**	**613.984**	1335	
Normalized	100%	37.63%	81.82%	
Cpuminer-Opt - Myriad-Groestl (kH/s)	**13917**	17016	**40078**	20223
Normalized	34.72%	42.46%	100%	50.46%
Standard Deviation	0.3%	3.9%	5.1%	1.1%

Core i9 12900K AVX-512 Alder Lake Benchmarks

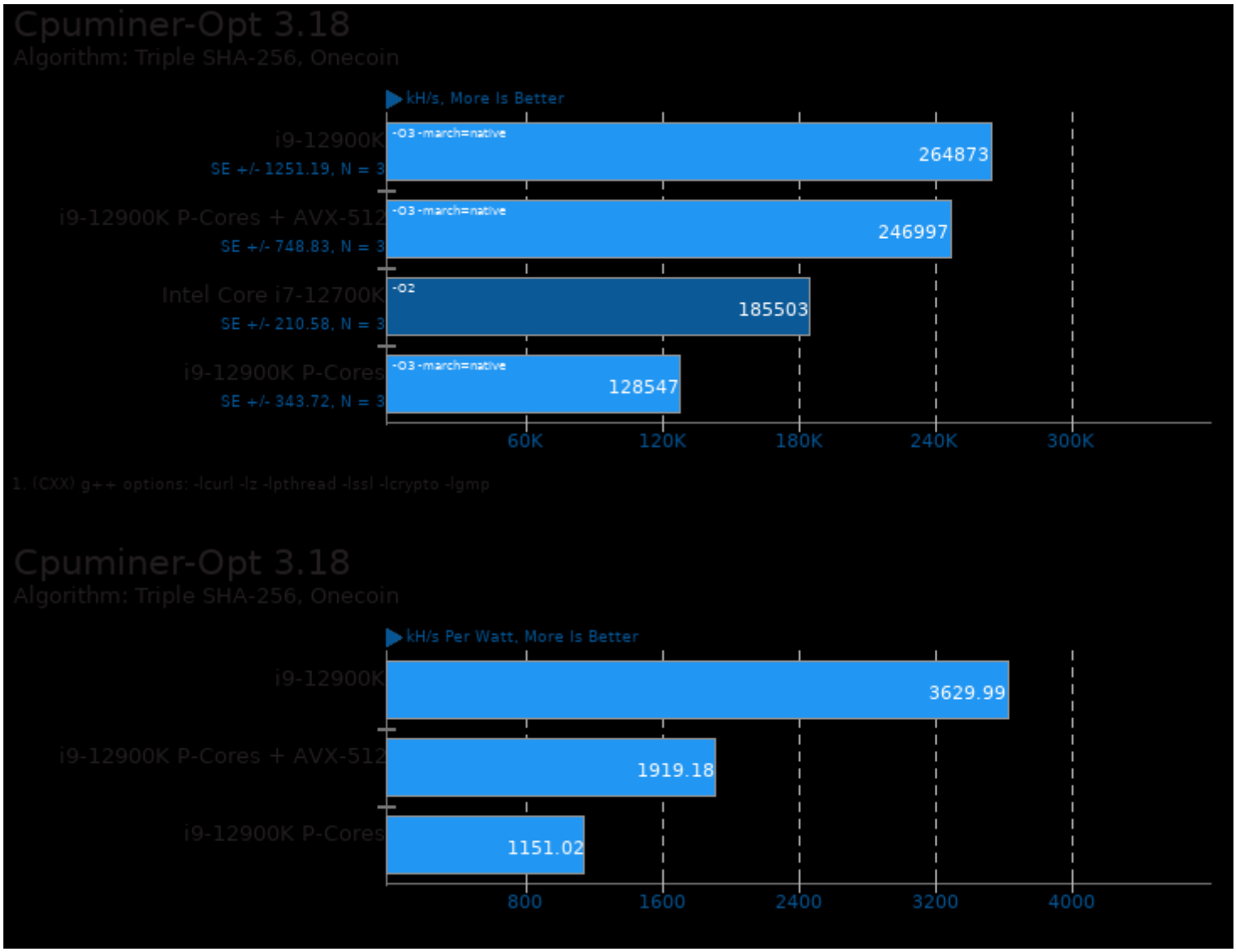
Cpuminer-Opt - Myriad-Groestl (kH/s/Watt)	114.129	108.666	242.276	
Normalized	47.11%	44.85%	100%	
Cpuminer-Opt - Blake-2 S (kH/s)	542007	419797	891470	430673
Normalized	60.8%	47.09%	100%	48.31%
Standard Deviation	0.8%	0.7%	1.1%	0.4%
Cpuminer-Opt - Blake-2 S (kH/s/Watt)	7393	3706	7454	
Normalized	99.18%	49.72%	100%	
Cpuminer-Opt - Garlicoin (kH/s)	2902	2515	4953	3103
Normalized	58.6%	50.78%	100%	62.65%
Standard Deviation	0.5%	2.6%	0.6%	1.6%
Cpuminer-Opt - Garlicoin (kH/s/Watt)	16.088	14.518	25.276	
Normalized	63.65%	57.44%	100%	
Cpuminer-Opt - Skeincoin (kH/s)	115290	75593	123903	92027
Normalized	93.05%	61.01%	100%	74.27%
Standard Deviation	1.1%	0.2%	2.2%	0.6%
Cpuminer-Opt - Skeincoin (kH/s/Watt)	1301	552.521	926.958	
Normalized	100%	42.45%	71.22%	
Cpuminer-Opt - LBC, LBRY Credits (kH/s)	43567	30274	79360	35878
Normalized	54.9%	38.15%	100%	45.21%
Standard Deviation	0.8%	3%	1.3%	2.5%
Cpuminer-Opt - LBC, LBRY Credits (kH/s/Watt)	326.666	185.471	526.214	
Normalized	62.08%	35.25%	100%	


Stockfish 13
Total Time
Nodes Per Second, More Is Better
i9-12900K
-march=native
SE +/- 367596.14, N = 15
48294830
Intel Core i7-12700K
SE +/- 436642.94, N = 4
38151887
i9-12900K P-Cores + AVX-512
-march=native -mavx512f -mavx512bw -mavx512vnni -mavx512dq -mavx512vl
SE +/- 83131.27, N = 3
32217882
i9-12900K P-Cores
-march=native
SE +/- 212526.58, N = 15
31639934
10M
20M
30M
40M
50M
1. (CXX) g++ options: -lgcov -m64 -lpthread -O3 -fno-exceptions -std=c++17 -pedantic -msse -msse3 -mpopcnt -mavx2 -msse4.1 -mssse3 -msse2 -mbmi
Stockfish 13
Total Time
Nodes Per Second Per Watt, More Is Better
i9-12900K
253756.27
i9-12900K P-Cores
186823.95
i9-12900K P-Cores + AVX-512
173451.77
50K
100K
150K
200K
250K

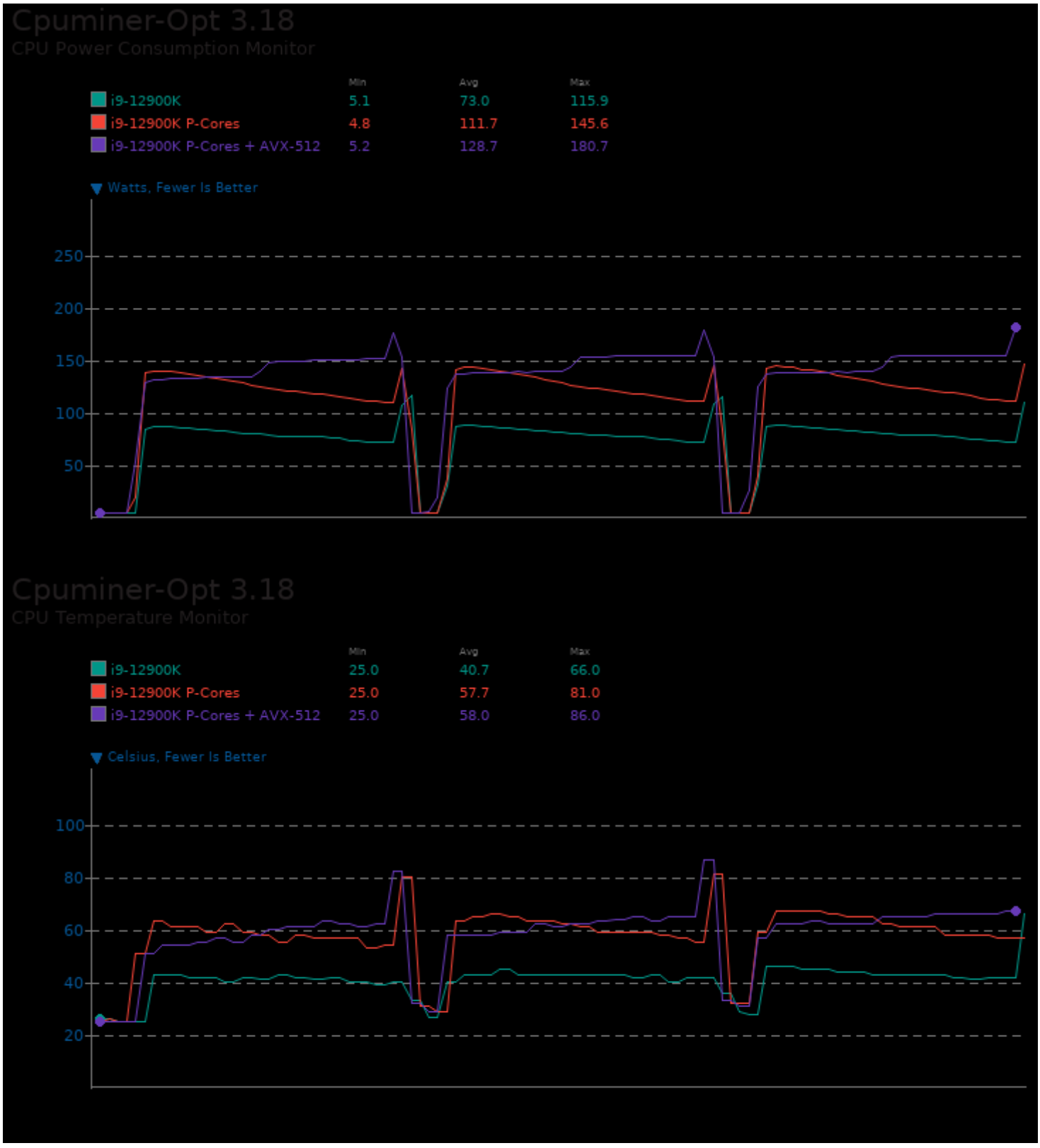
Core i9 12900K AVX-512 Alder Lake Benchmarks

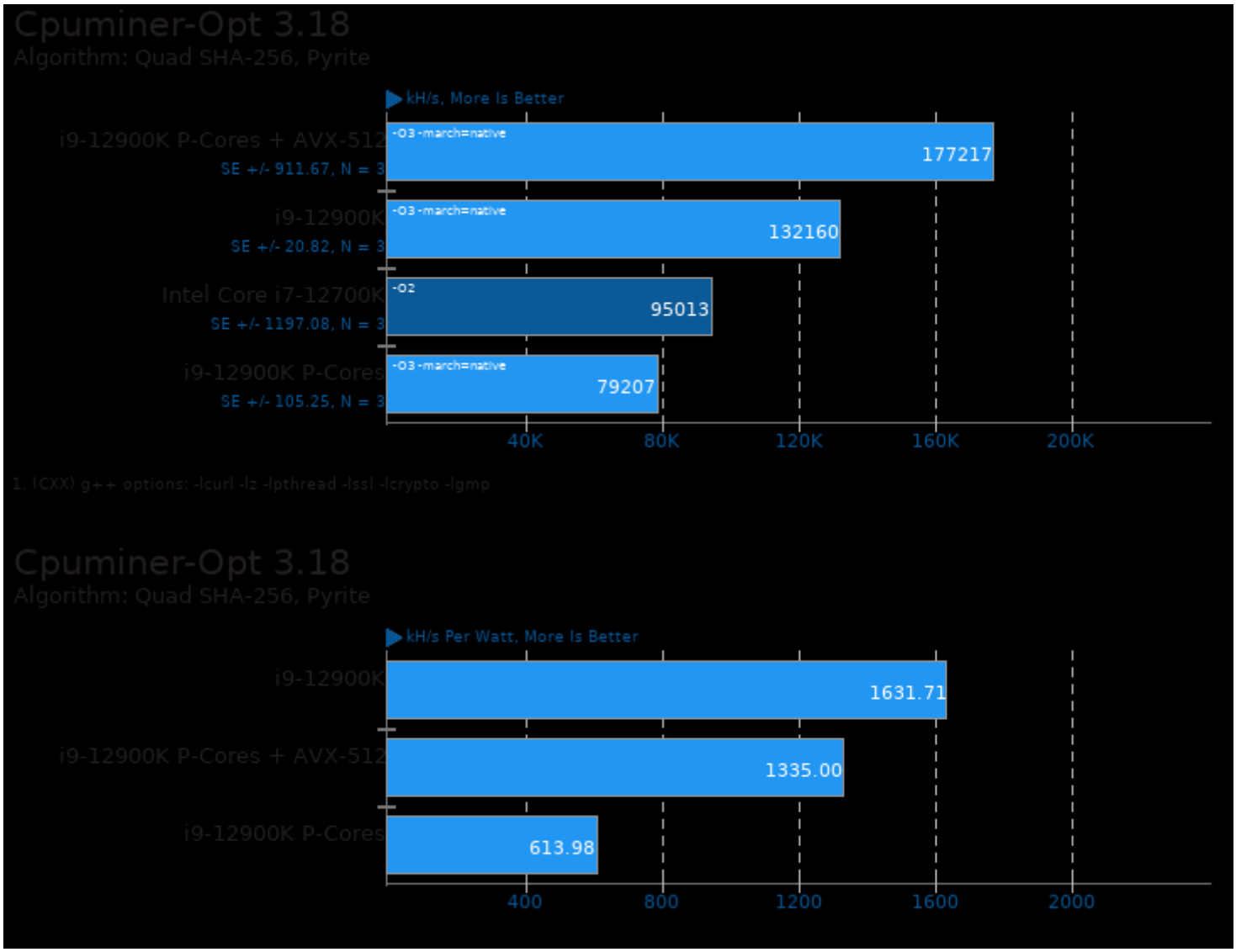


Core i9 12900K AVX-512 Alder Lake Benchmarks

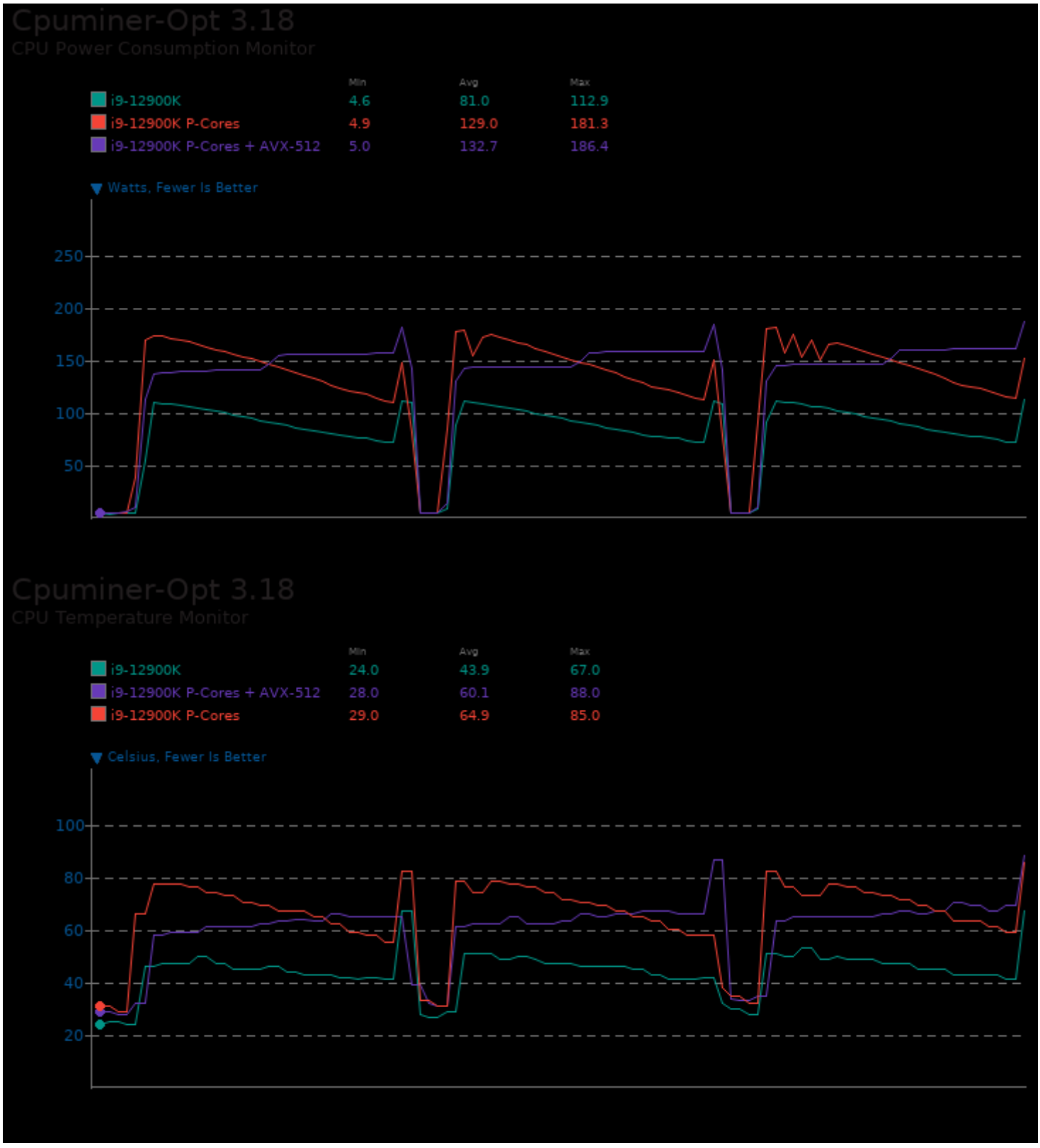


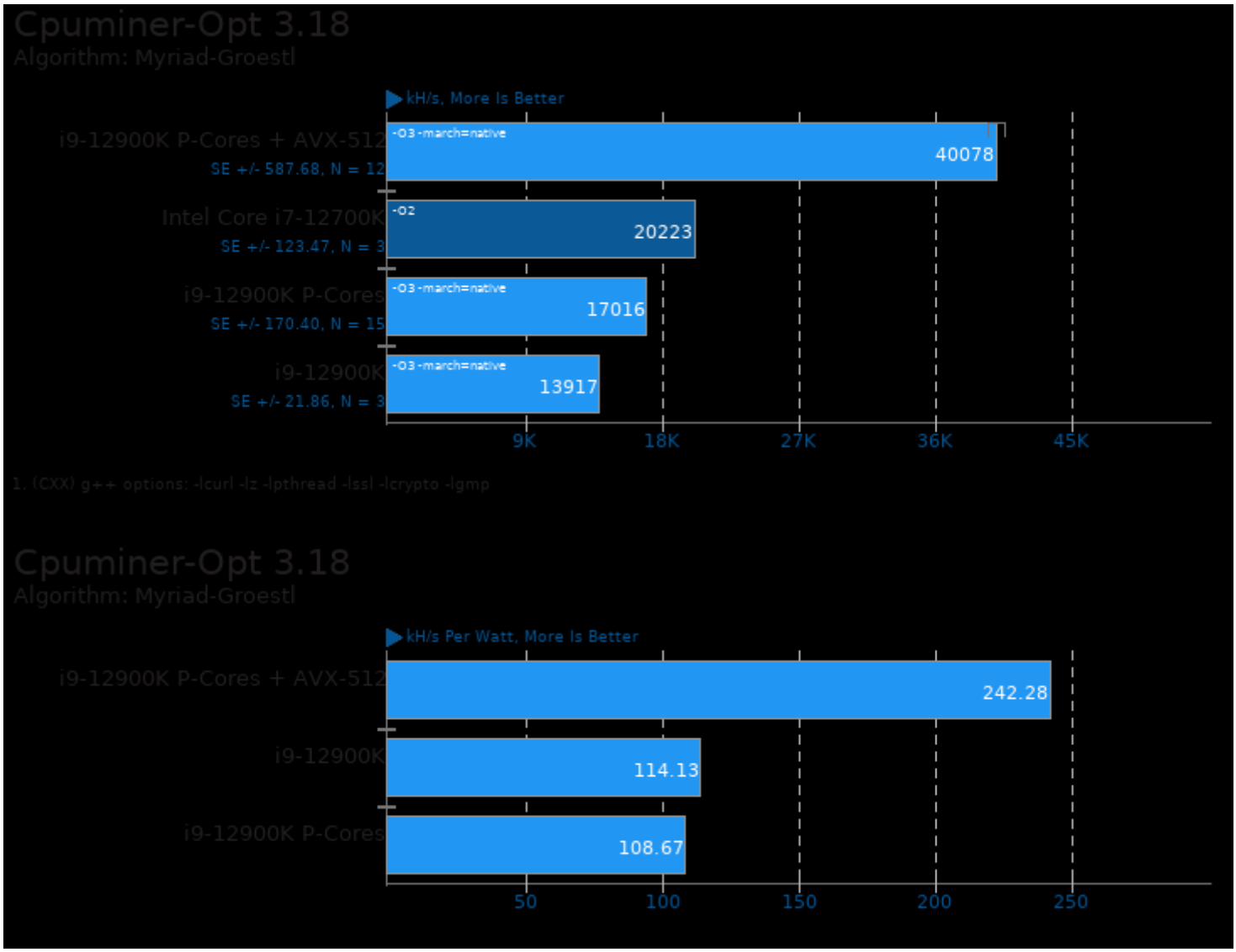
Core i9 12900K AVX-512 Alder Lake Benchmarks



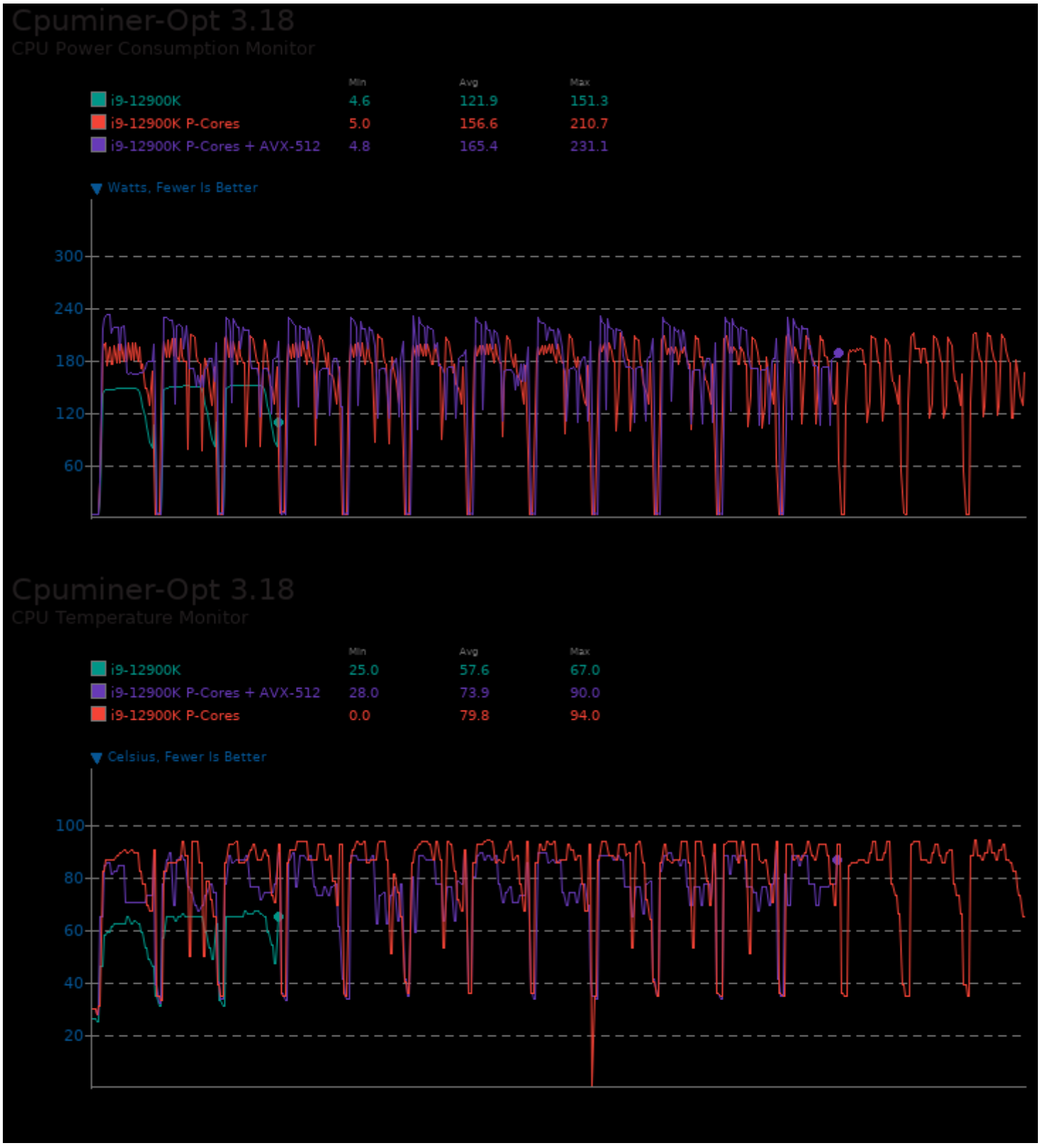

Cpuminer-Opt 3.18
Algorithm: Quad SHA-256, Pyrite
kH/s, More Is Better
i9-12900K P-Cores + AVX-512
SE +/- 911.67, N = 3
-O3 -march=native
177217
i9-12900K
SE +/- 20.82, N = 3
-O3 -march=native
132160
Intel Core i7-12700K
SE +/- 1197.08, N = 3
-O2
95013
i9-12900K P-Cores
SE +/- 105.25, N = 3
-O3 -march=native
79207
40K
80K
120K
160K
200K
1. (CXX) g++ options: -lcurl -lz -lpthread -lssl -lcrypto -lgmp
Cpuminer-Opt 3.18
Algorithm: Quad SHA-256, Pyrite
kH/s Per Watt, More Is Better
i9-12900K
1631.71
i9-12900K P-Cores + AVX-512
1335.00
i9-12900K P-Cores
613.98
400
800
1200
1600
2000

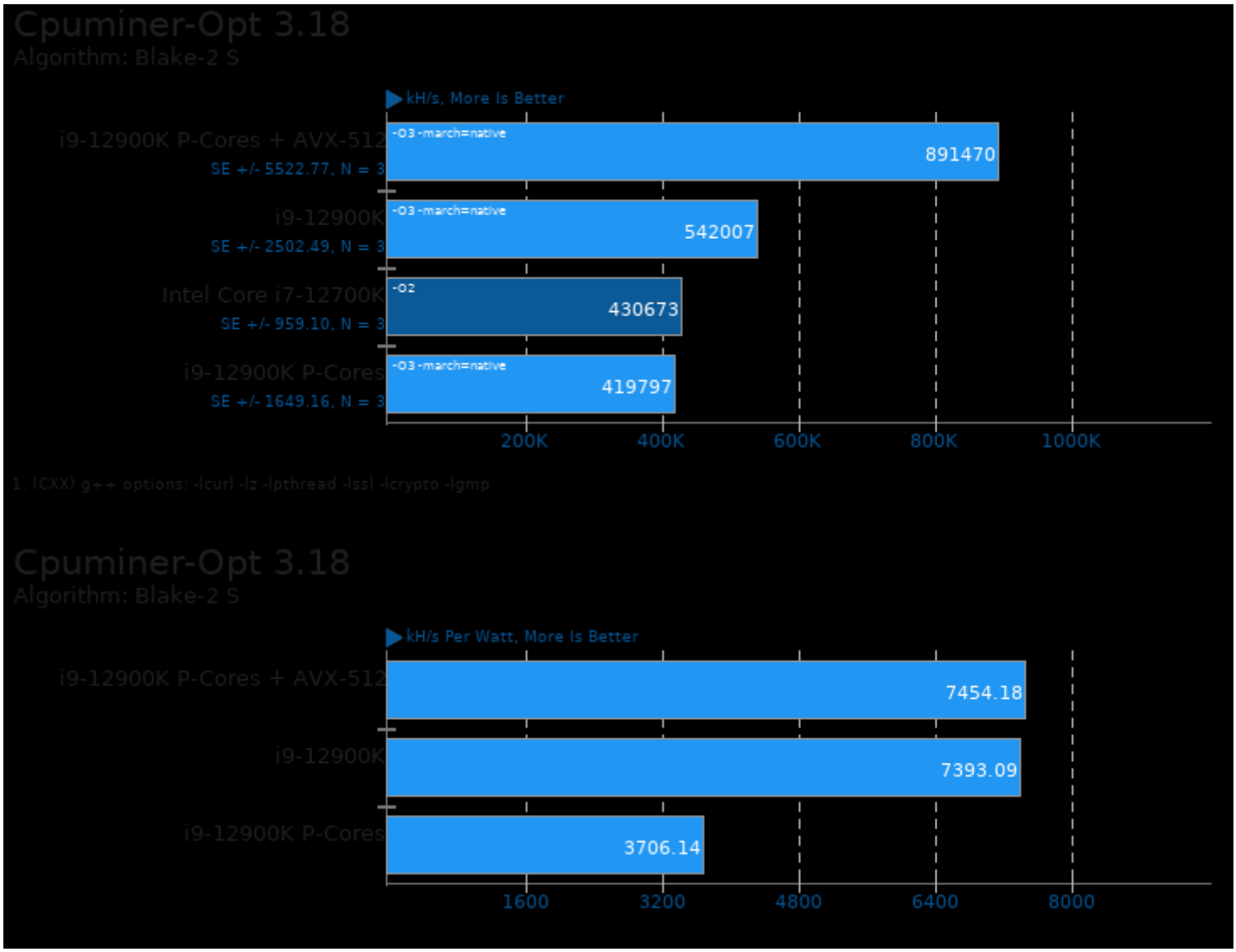
Core i9 12900K AVX-512 Alder Lake Benchmarks




Cpuminer-Opt 3.18
Algorithm: Myriad-Groestl
kH/s, More Is Better
i9-12900K P-Cores + AVX-512
SE +/- 587.68, N = 12
-O3 -march=native
40078
Intel Core i7-12700K
SE +/- 123.47, N = 3
-O2
20223
i9-12900K P-Cores
SE +/- 170.40, N = 15
-O3 -march=native
17016
i9-12900K
SE +/- 21.86, N = 3
-O3 -march=native
13917
9K
18K
27K
36K
45K
1. (CXX) g++ options: -lcurl -lz -lpthread -lssl -lcrypto -lgmp
Cpuminer-Opt 3.18
Algorithm: Myriad-Groestl
kH/s Per Watt, More Is Better
i9-12900K P-Cores + AVX-512
242.28
i9-12900K
114.13
i9-12900K P-Cores
108.67
50
100
150
200
250

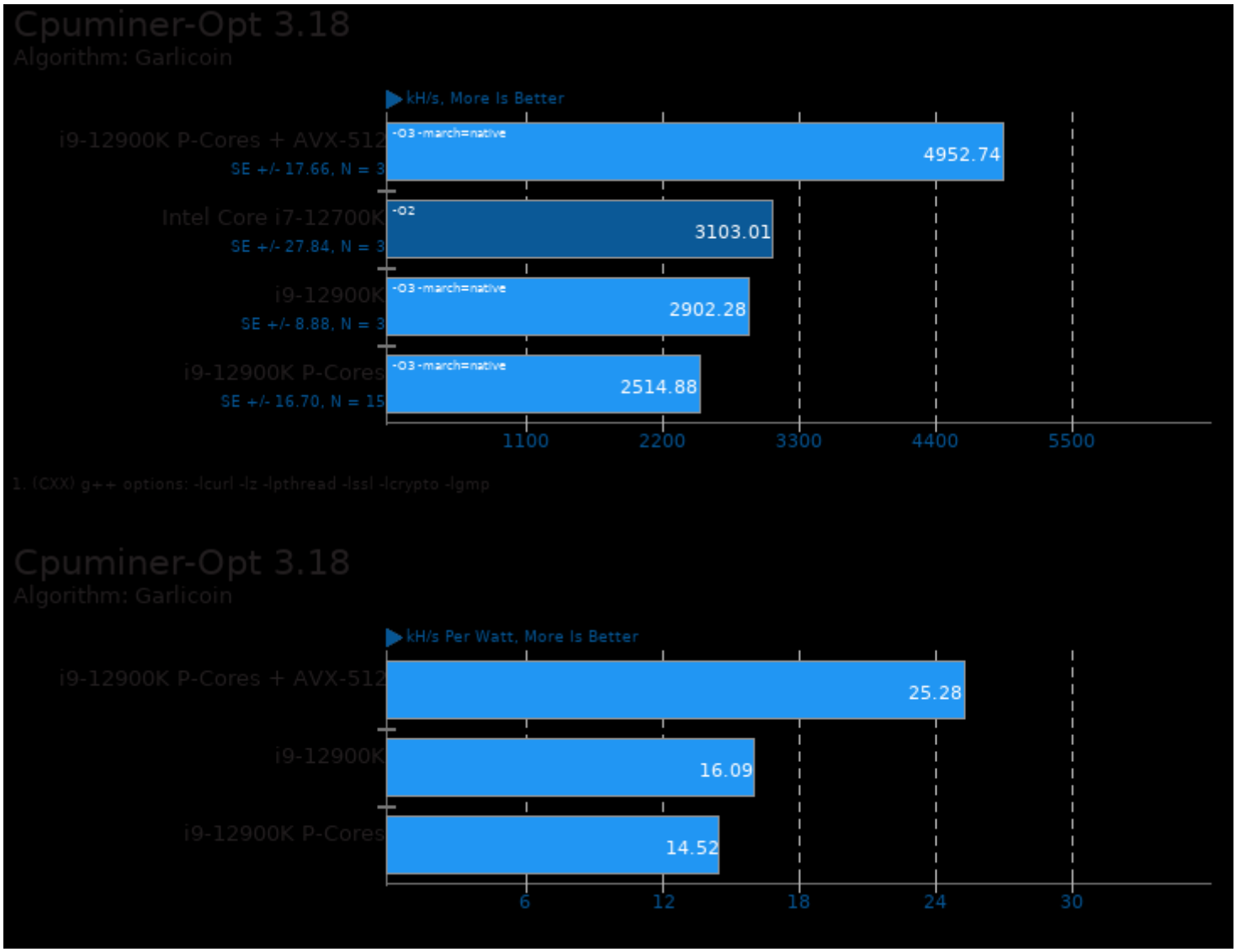
Core i9 12900K AVX-512 Alder Lake Benchmarks

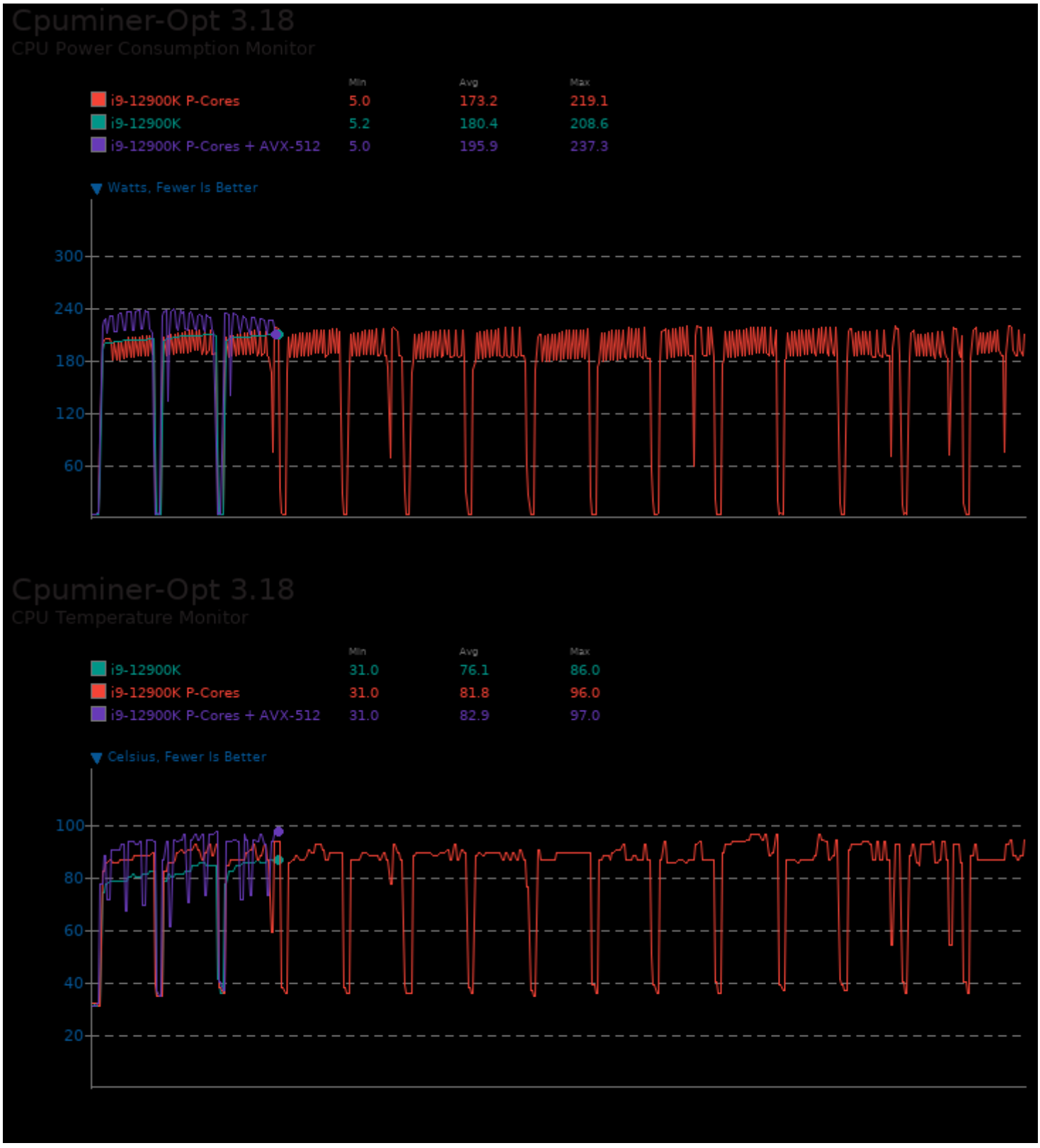



Cpuminer-Opt 3.18
Algorithm: Blake-2 S
kH/s, More Is Better
i9-12900K P-Cores + AVX-512
SE +/- 5522.77, N = 3
-O3 -march=native
891470
i9-12900K
SE +/- 2502.49, N = 3
-O3 -march=native
542007
Intel Core i7-12700K
SE +/- 959.10, N = 3
-O2
430673
i9-12900K P-Cores
SE +/- 1649.16, N = 3
-O3 -march=native
419797
200K
400K
600K
800K
1000K
1. (CXX) g++ options: -lcurl -lz -lpthread -lssl -lcrypto -lgmp
Cpuminer-Opt 3.18
Algorithm: Blake-2 S
kH/s Per Watt, More Is Better
i9-12900K P-Cores + AVX-512
7454.18
i9-12900K
7393.09
i9-12900K P-Cores
3706.14
1600
3200
4800
6400
8000

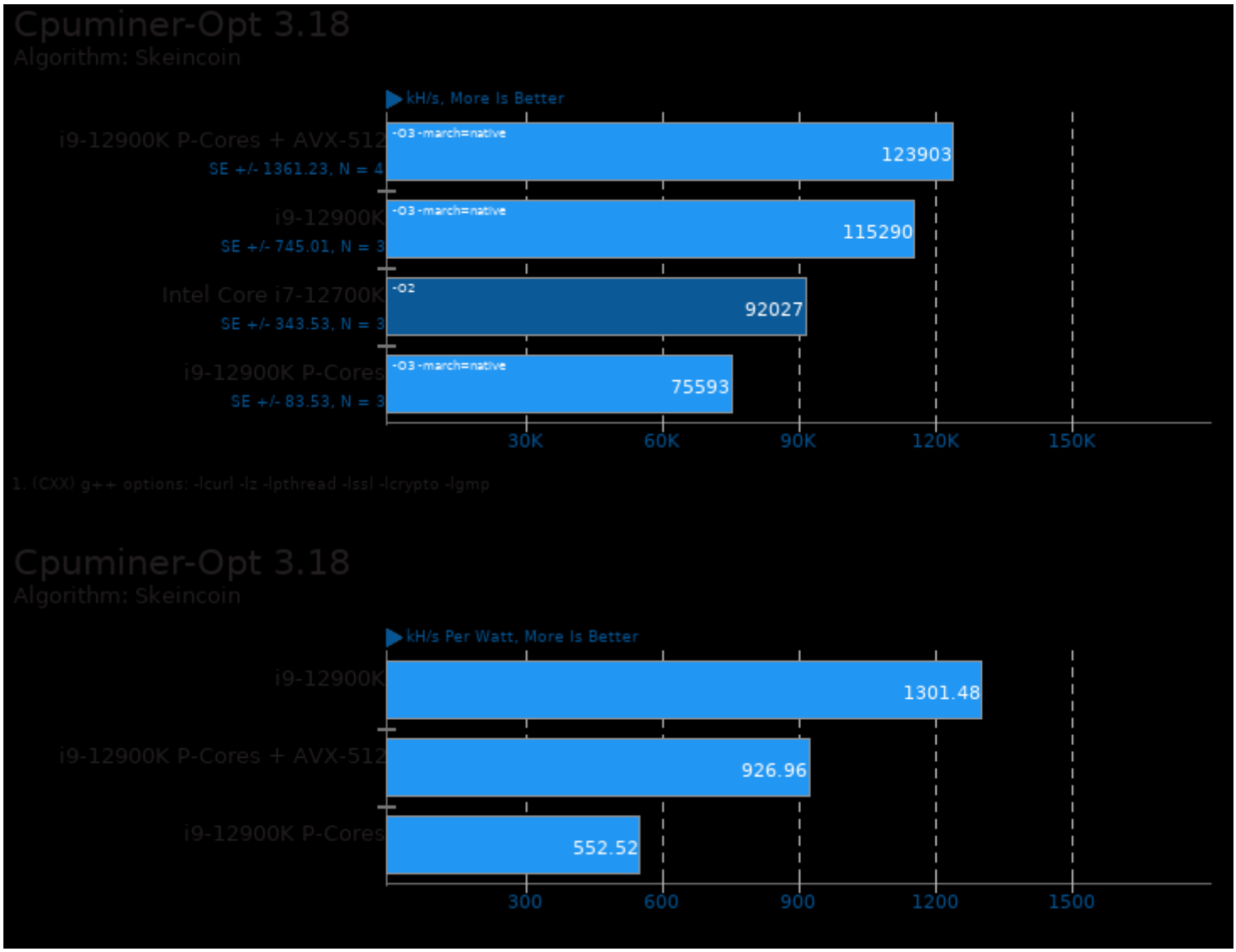
Core i9 12900K AVX-512 Alder Lake Benchmarks



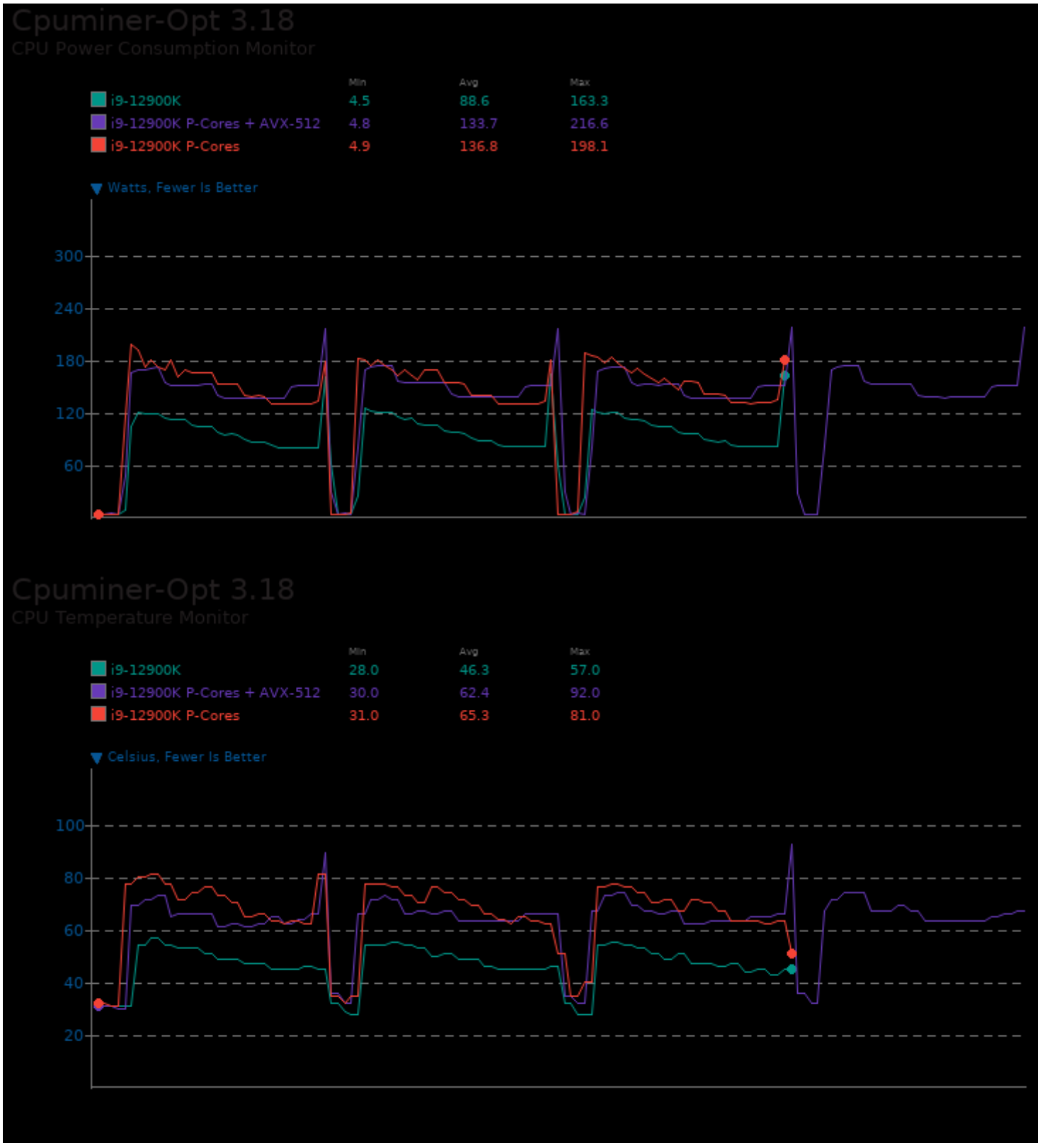

Cpuminer-Opt 3.18
Algorithm: Garlicoin
kH/s, More Is Better
i9-12900K P-Cores + AVX-512
SE +/- 17.66, N = 3
-O3 -march=native
4952.74
Intel Core i7-12700K
SE +/- 27.84, N = 3
-O2
3103.01
i9-12900K
SE +/- 8.88, N = 3
-O3 -march=native
2902.28
i9-12900K P-Cores
SE +/- 16.70, N = 15
-O3 -march=native
2514.88
1100
2200
3300
4400
5500
1. (CXX) g++ options: -lcurl -lz -lpthread -lssl -lcrypto -lgmp
Cpuminer-Opt 3.18
Algorithm: Garlicoin
kH/s Per Watt, More Is Better
i9-12900K P-Cores + AVX-512
25.28
i9-12900K
16.09
i9-12900K P-Cores
14.52
6
12
18
24
30

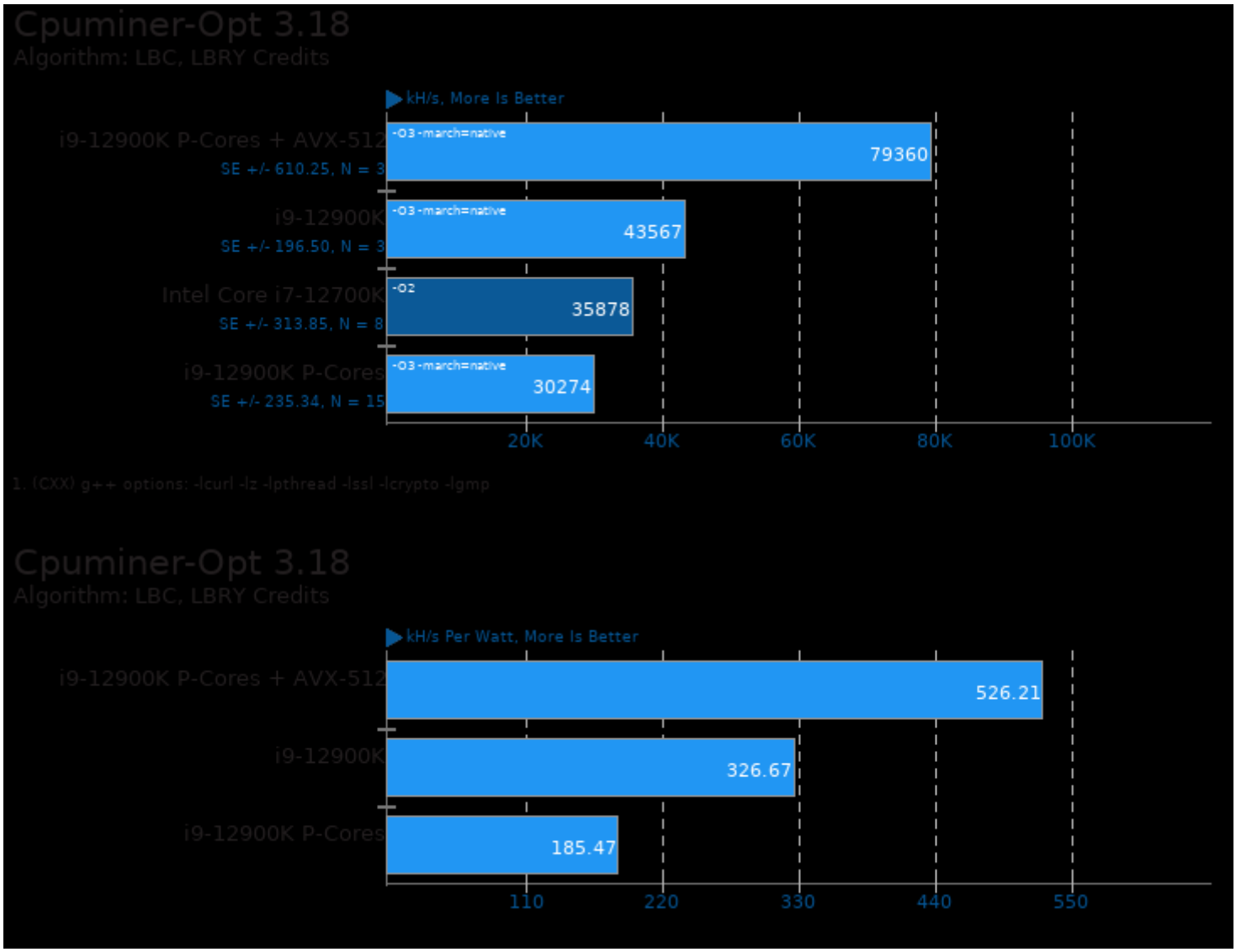

Cpuminer-Opt 3.18
CPU Power Consumption Monitor
Min
Avg
Max
i9-12900K P-Cores
5.0
173.2
219.1
i9-12900K
5.2
180.4
208.6
i9-12900K P-Cores + AVX-512
5.0
195.9
237.3
Watts, Fewer Is Better
300
240
180
120
60
Cpuminer-Opt 3.18
CPU Temperature Monitor
Min
Avg
Max
i9-12900K
31.0
76.1
86.0
i9-12900K P-Cores
31.0
81.8
96.0
i9-12900K P-Cores + AVX-512
31.0
82.9
97.0
Celsius, Fewer Is Better
100
80
60
40
20

Core i9 12900K AVX-512 Alder Lake Benchmarks



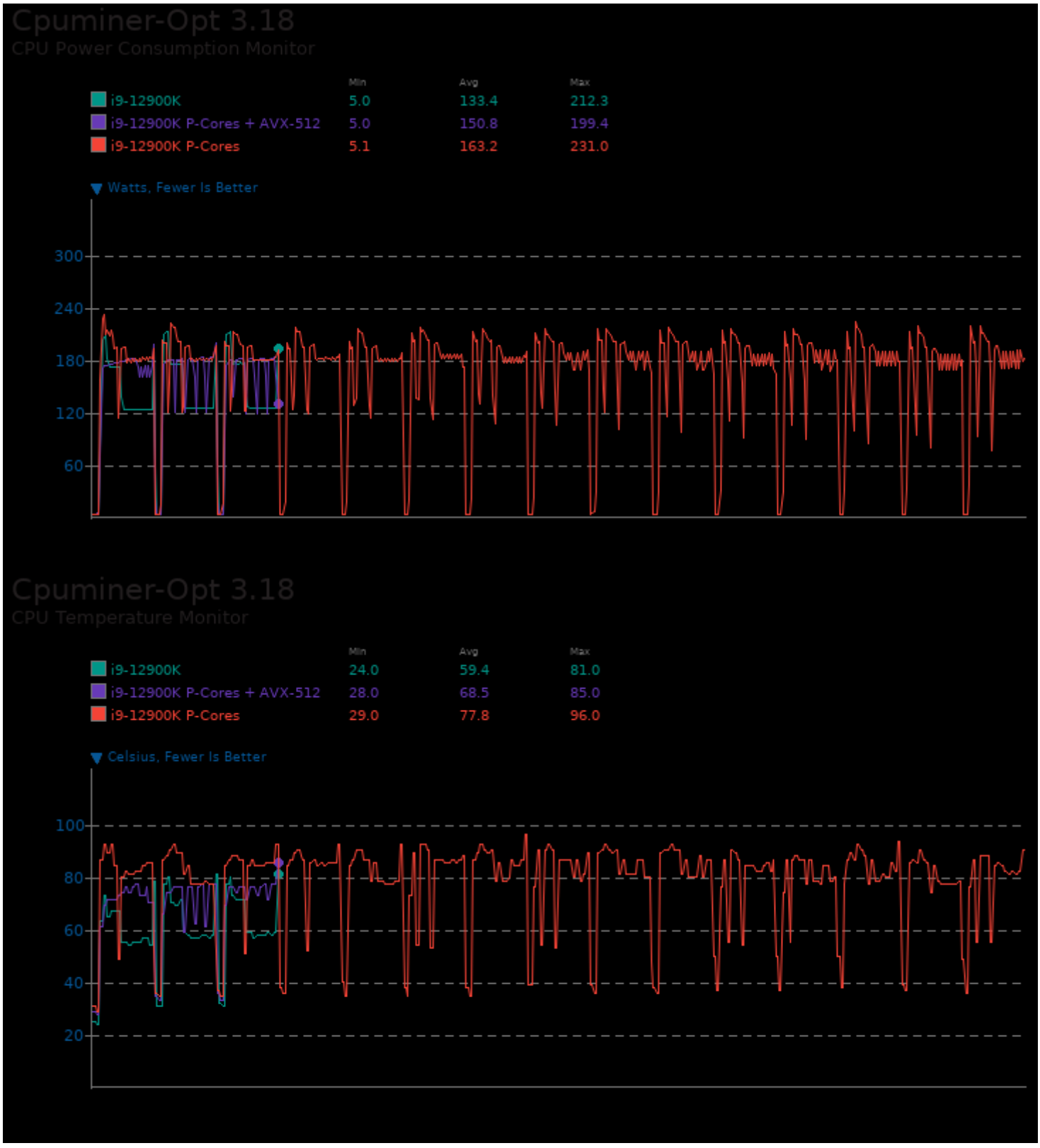
Core i9 12900K AVX-512 Alder Lake Benchmarks




Cpuminer-Opt 3.18
Algorithm: LBC, LBRY Credits
kH/s, More Is Better
i9-12900K P-Cores + AVX-512
SE +/- 610.25, N = 3
-O3 -march=native
79360
i9-12900K
SE +/- 196.50, N = 3
-O3 -march=native
43567
Intel Core i7-12700K
SE +/- 313.85, N = 8
-O2
35878
i9-12900K P-Cores
SE +/- 235.34, N = 15
-O3 -march=native
30274
20K
40K
60K
80K
100K
1. (CXX) g++ options: -lcurl -lz -lpthread -lssl -lcrypto -lgmp

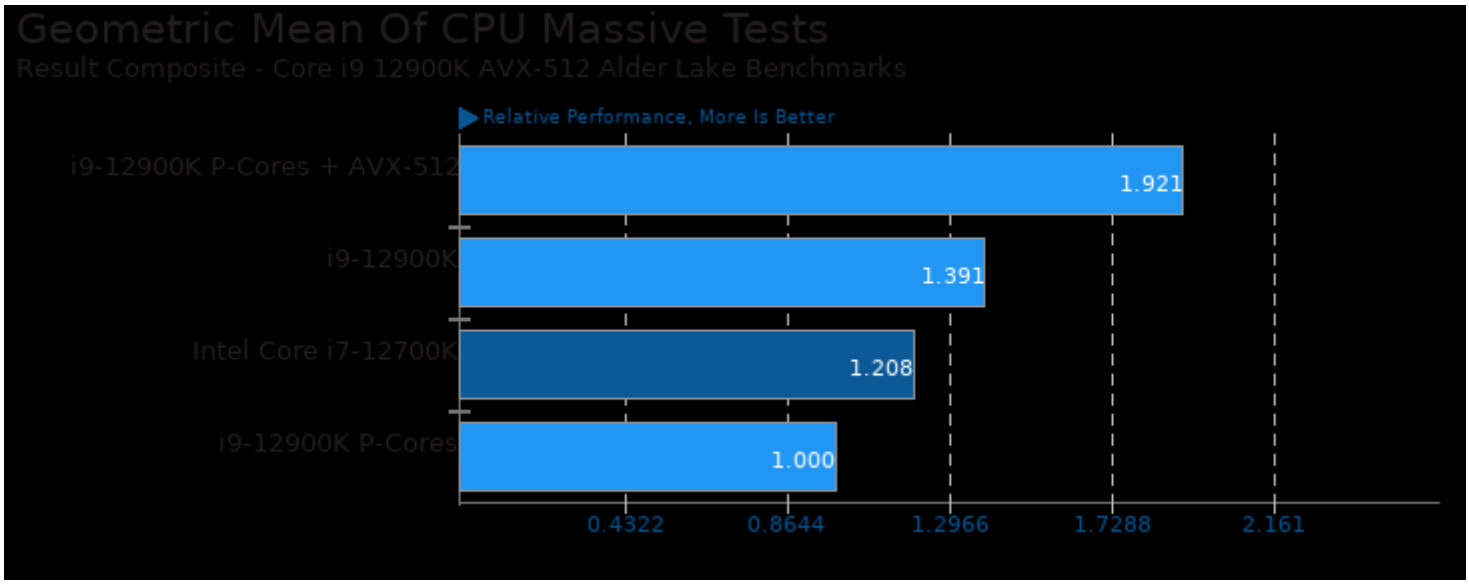
Cpuminer-Opt 3.18
Algorithm: LBC, LBRY Credits
kH/s Per Watt, More Is Better
i9-12900K P-Cores + AVX-512
526.21
i9-12900K
326.67
i9-12900K P-Cores
185.47
110
220
330
440
550

Core i9 12900K AVX-512 Alder Lake Benchmarks

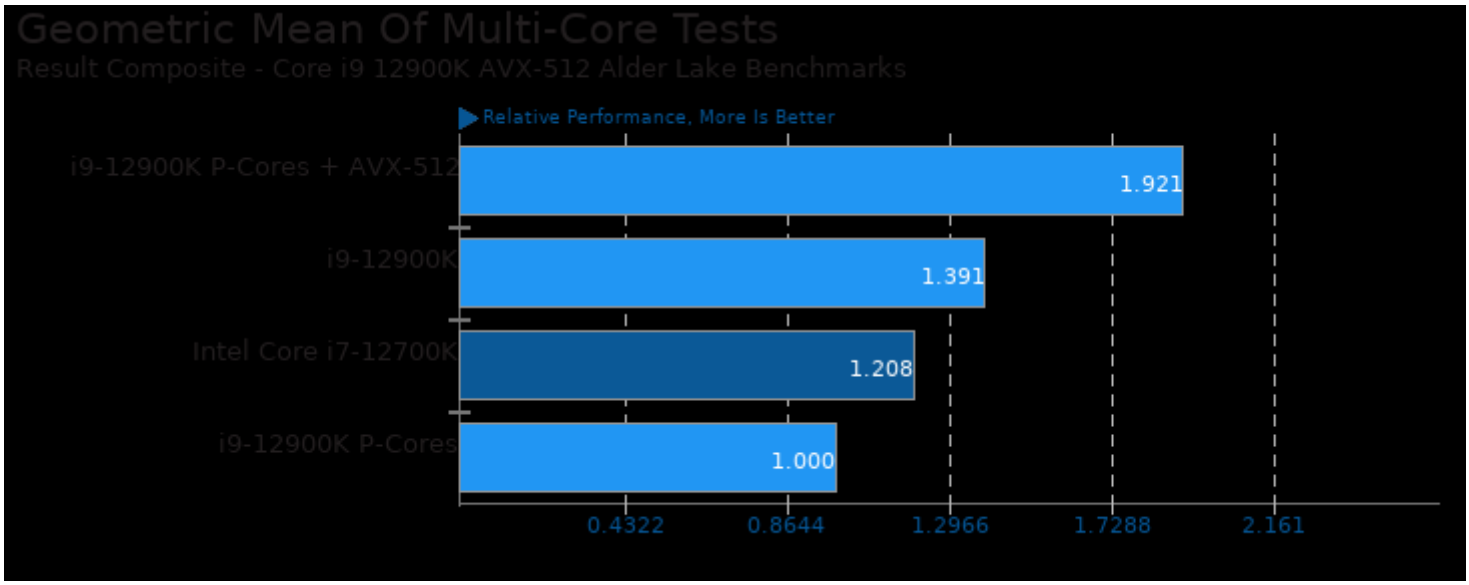


Core i9 12900K AVX-512 Alder Lake Benchmarks

These geometric means are based upon test groupings / test suites for this result file.

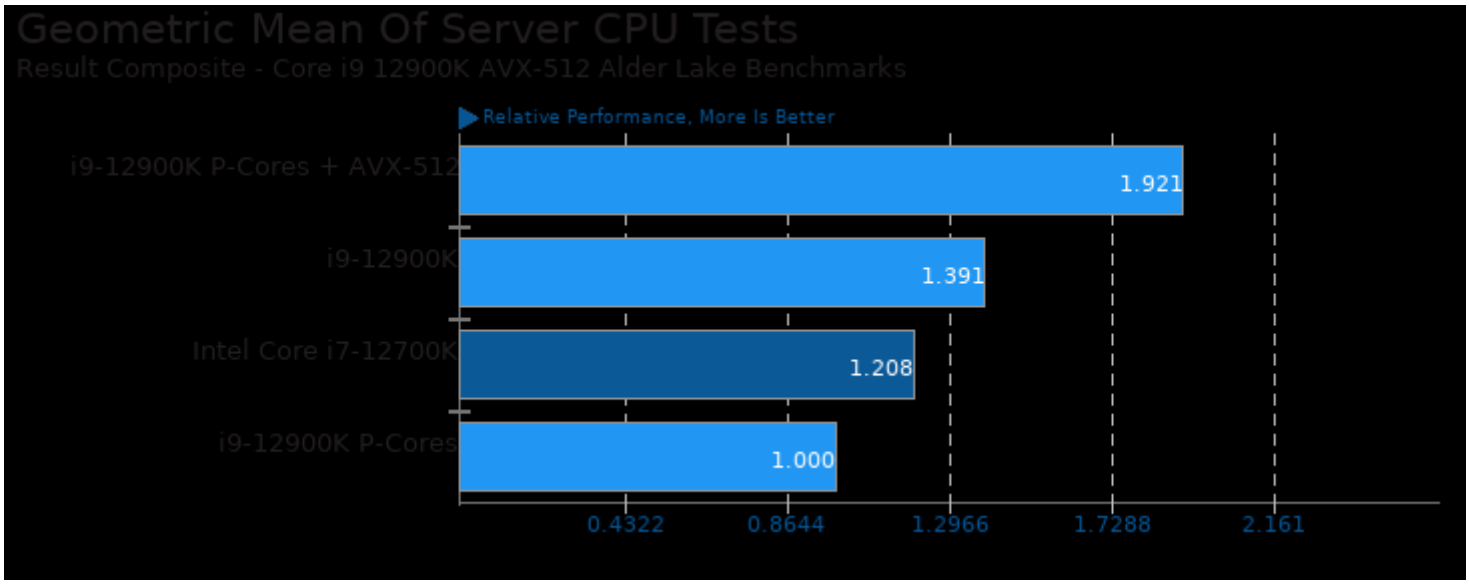


Geometric mean based upon tests: pts/stockfish and pts/cpuminer-opt



Geometric mean based upon tests: pts/cpuminer-opt and pts/stockfish

Core i9 12900K AVX-512 Alder Lake Benchmarks



Geometric mean based upon tests: pts/stockfish and pts/cpuminer-opt

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 09:40.