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Raspberry Pi Model 4 Benchmarks

Rock5B Testing thermal solutions & perf vs. N2 & Pi4B

Automated Executive Summary

Rock 5B v1.42 NB + Heatsink + Noctua NF-A4x10@5v had the most wins, coming in first place for 71% of the tests.

Based on the geometric mean of all complete results, the fastest (Rock 5B v1.42 NB + Heatsink + Noctua NF-A4x10@5v) was 8.51x the speed of the slowest (RPi Model 3 B+).

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

x264 (H.264 Video Encoding) at 142.857x
Rust Prime Benchmark (Prime Number Test To 200,000,000) at 68.729x
PyBench (Total For Average Test Times) at 23.024x
Rust Prime Benchmark (Performance / Cost - Prime Number Test To 200,000,000) at 22.155x
FLAC Audio Encoding (WAV To FLAC) at 21.162x
Smallpt (Global Illumination Renderer; 128 Samples) at 20.882x
Perl Benchmarks (Test: Pod2html) at 13.339x
LAME MP3 Encoding (WAV To MP3) at 12.828x
SciMark (Computational Test: Composite) at 11.394x
GraphicsMagick (Operation: Resizing) at 10.933x.

Test Systems:

RPi Model 3 B+

Processor: ARMv7 rev 4 @ 1.40GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 3 Model B Plus Rev 1.3, Memory: 926MB, Disk: 32GB GB2MW, Graphics: BCM2708

OS: Raspbian 10, Kernel: 4.19.42-v7+ (armv7l), Display Server: X Server 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 656x416

Compiler Notes: --build=arm-linux-gnueabihf --disable-libitm --disable-libquadmath --disable-libquadmath-support --disable-sjlj-exceptions --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch=armv6 --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfp --with-gcc-major-version-only --with-target-system-zlib -v
Processor Notes: Scaling Governor: BCM2835 Freq ondemand
Python Notes: Python 2.7.16 + Python 3.7.3

ASUS Tinker Board

Processor: ARMv7 rev 1 @ 1.80GHz (4 Cores), Motherboard: Rockchip (Device Tree), Memory: 2048MB, Disk: 32GB GB1QT

OS: Debian 9.0, Kernel: 4.4.16-00006-g4431f98-dirty (armv7l), Desktop: LXDE, Display Server: X Server 1.18.4, Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv7-a --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfpv3-d16 --with-mode=thumb --with-target-system-zlib -v
Processor Notes: Scaling Governor: cpufreq-dt interactive
Python Notes: Python 2.7.13 + Python 3.5.3

Libre Board ALL-H3-CC H5

Processor: ARMv8 Cortex-A53 (4 Cores), Motherboard: Libre Board ALL-H3-CC H5, Memory: 2048MB, Disk: 32GB GB1QT

OS: Raspbian 9.6, Kernel: 4.18.0-rc3-gfc36def997cf-dirty (aarch64), Display Server: X Server 1.19.2, Compiler: GCC 6.3.0 20170516, File-System: ext4

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv6 --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfp --with-target-system-zlib -v
Python Notes: Python 2.7.13 + Python 3.5.3

Firefly ROC-RK3328-CC

Processor: Rockchip ARMv8 Cortex-A53 @ 1.39GHz (4 Cores), Motherboard: Firefly ROC-RK3328-CC, Memory: 2048MB, Disk: 32GB GB1QT

OS: Ubuntu 18.04, Kernel: 4.4.114 (aarch64), Display Server: X Server 1.18.4, Compiler: GCC 7.4.0, File-System: ext4, Screen Resolution: 1024x768

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++ --enable-libstdcxx-debug

--enable-libstdcxx-time=yes --enable-multiarch --enable-nls --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 -v
Processor Notes: Scaling Governor: cpufreq-dt performance
Python Notes: Python 2.7.15rc1 + Python 3.6.7

RPi Model 4 B 4GB

Processor: ARMv7 rev 3 @ 1.50GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 4 Model B Rev 1.1, Memory: 4096MB, Disk: 16GB SC16G, Graphics: V3D 4.2 4GB, Monitor: DELL P2415Q

OS: Raspbian 10, Kernel: 4.19.50-v7l+ (armv7l), Desktop: LXDE 0.10.0, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 2.1 Mesa 19.1.0-devel, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=arm-linux-gnueabihf --disable-libitm --disable-libquadmath --disable-libquadmath-support --disable-sjlj-exceptions --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch=armv6 --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfp --with-gcc-major-version-only --with-target-system-zlib -v
Processor Notes: Scaling Governor: BCM2835 Freq ondemand
Python Notes: Python 2.7.16 + Python 3.7.3

RPi Model 4 B 2GB

Processor: ARMv7 rev 3 @ 1.50GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 4 Model B Rev 1.1, Memory: 2048MB, Disk: 16GB SC16G, Graphics: V3D 4.2 2GB, Monitor: DELL P2415Q

OS: Raspbian 10, Kernel: 4.19.50-v7l+ (armv7l), Desktop: LXDE 0.10.0, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 2.1 Mesa 19.1.0-devel, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=arm-linux-gnueabihf --disable-libitm --disable-libquadmath --disable-libquadmath-support --disable-sjlj-exceptions --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch=armv6 --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfp --with-gcc-major-version-only --with-target-system-zlib -v
Processor Notes: Scaling Governor: BCM2835 Freq ondemand
Python Notes: Python 2.7.16 + Python 3.7.3

RPi 4B 4GB No Heatsink

RPi 4B Rev 1.2 4GB XL Heatsink

RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v

RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v

Processor: ARMv7 Cortex-A72 @ 1.50GHz (4 Cores), Motherboard: BCM2711 Raspberry Pi 4 Model B Rev 1.2, Memory: 3584MB, Disk: 31GB Y032V, Graphics: V3D 4.2 3GB

OS: Raspbian 10, Kernel: 5.4.51-v7l+ (armv7l), Desktop: LXDE 0.10.0, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 2.1 Mesa 19.3.2, Compiler: GCC 8.3.0 + Clang 7.0.1-8+rpi3, File-System: ext4, Screen Resolution: 848x480

Kernel Notes: snd_bcm2835.enable_compat_alsa=0 snd_bcm2835.enable_hdmi=1 snd_bcm2835.enable_headphones=1
Environment Notes: COST_PERF_PER_DOLLAR=73
Compiler Notes: --build=arm-linux-gnueabihf --disable-libitm --disable-libquadmath --disable-libquadmath-support --disable-sjlj-exceptions --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix

--host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch=armv6 --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfp --with-gcc-major-version-only --with-target-system-zlib -v
Processor Notes: Scaling Governor: cpufreq-dt ondemand
Python Notes: Python 2.7.16 + Python 3.7.3

Odroid N2 4GB Stock Heatsink

Processor: ARMv8 Cortex-A73 @ 1.90GHz (6 Cores), Motherboard: Hardkernel ODROID-N2, Memory: 4096MB, Disk: 16GB AJTD4R + 8GB SA08G, Graphics: mesondrmfb, Monitor: G246HL

OS: Ubuntu 20.04, Kernel: 5.7.0-odroid-arm64 (aarch64), Desktop: GNOME Shell 3.36.3, Display Server: X Server 1.20.8 + Wayland, Display Driver: modesetting 1.20.8, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Environment Notes: COST_PERF_PER_DOLLAR=124
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-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: cpufreq-dt ondemand
Python Notes: Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Vulnerable + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Vulnerable + srbds: Not affected + tsx_async_abort: Not affected

Rock 5B v1.42 NB + Heatsink + Noctua NF-A4x10@5v

Processor: Rockchip ARMv8 Cortex-A76 @ 1.80GHz (6 Cores / 8 Threads), Motherboard: Radxa ROCK 5B, Memory: 8GB, Disk: 31GB BJTD4R, Graphics: llvmpipe, Monitor: S243HL, Network: Realtek RTL8125 2.5GbE

OS: Debian 11, Kernel: 5.10.110-36-rockchip-gba392dc725fa (aarch64), Desktop: Xfce 4.16, Display Server: X Server 1.20.11, OpenGL: 4.5 Mesa 20.3.5 (LLVM 11.0.1 128 bits), Compiler: GCC 10.2.1 20210110, File-System: ext4, Screen Resolution: 1920x1080

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: cpufreq-dt performance
Python Notes: Python 2.7.18 + Python 3.9.2
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: Vulnerable: Unprivileged eBPF enabled + srbds: Not affected + tsx_async_abort: Not affected

Raspberry Pi Model 4 Benchmarks

	RPi Model 3 B+	ASUS Tinker Board	Libre Board ALL-H3 -CC H5	Firefly ROC-RK3328-CC	RPi Model 4 B 4GB	RPi Model 4 B 2GB	RPi 4B 4GB No Heatsink	RPi 4B Rev 1.2 4GB XL Heatsink	RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x 25-5V-PWM@3.3v	RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x 25-5V-PWM@5v	Odroid N2 4GB Stock Heatsink	Rock 5B v1.42 NB + Heatsink + Noctua NF-A4x 10@5v
SciMark - Composite (Mflops)	48.80	141.72	28.76	51.13	142.17	143.02	142.62	142.54	143.01	142.74	168.37	327.69
Normalized	14.89%	43.25%	8.78%	15.6%	43.39%	43.64%	43.52%	43.5%	43.64%	43.56%	51.38%	100%
Standard Deviation	0.4%	0.1%	0.1%	0%	1.6%	1.1%	1%	0.8%	0.1%	0.8%	0.1%	1.7%
x264 - H.2.V.E (FPS)	0.14	3.32		2.31	3.10	4.91	4.30	4.96	5.09	5.11	9.92	20.00
Normalized	0.7%	16.6%		11.55%	15.5%	24.55%	21.5%	24.8%	25.45%	25.55%	49.6%	100%
Standard Deviation	0%	6.3%		0.2%	8.5%	2.1%	5.4%	4.1%	3%	2.9%	0.2%	0.5%
GraphicsMagick - Rotate (Iterations/min)	16	66	24	44	63	64	64	64	63	64	96	171
Normalized	9.36%	38.6%	14.04%	25.73%	36.84%	37.43%	37.43%	37.43%	36.84%	37.43%	56.14%	100%
Standard Deviation		3.4%			1.8%					0.9%		
GraphicsMagick - Resizing (Iterations/min)	15	53	22	36	45	53	54	52	52	52	80	164
Normalized	9.15%	32.32%	13.41%	21.95%	27.44%	32.32%	32.93%	31.71%	31.71%	31.71%	48.78%	100%
Standard Deviation		3.4%			2.9%							0.4%
Rust Prime Benchmark - P.N.T.T.2.0.0 (sec)	3106	1052		140.20	1104	657.76	774.771	674.699	663.582	659.501	77.212	45.194
Normalized	1.45%	4.29%		32.24%	4.09%	6.87%	5.83%	6.7%	6.81%	6.85%	58.53%	100%
Standard Deviation	1.1%	1%		0.3%	0.6%	0%	1.8%	1.4%	0.1%	0.1%	0%	2%
Smallpt - G.I.R.1.S (sec)	744.55	273.30	424.02	251.36	260.72	145.50	178.919	153.972	129.872	130.803	88.420	35.655
Normalized	4.79%	13.05%	8.41%	14.18%	13.68%	24.51%	19.93%	23.16%	27.45%	27.26%	40.32%	100%
Standard Deviation	0.1%	0.9%	0.3%	1.1%	2.3%	2.9%	2.3%	2.9%	0.1%	1.7%	0.1%	0%
Zstd Compression - C.u.1.0.3.s.i.i.C.L.1 (sec)	787.01	239.98	402.13	343.31	291.48	291.55	279.522	276.601	285.254	284.324	164.565	445.577
Normalized	20.91%	68.57%	40.92%	47.93%	56.46%	56.44%	58.87%	59.5%	57.69%	57.88%	100%	36.93%
Standard Deviation	0.4%	0.3%	3.4%	0.1%	1.5%	1%	0.6%	0.6%	1%	2%	1.4%	0.3%
FLAC Audio Encoding - WAV To FLAC (sec)	777.65	135.25	566.40	288.92	111.09	111.48	103.846	104.717	104.299	103.551	88.672	36.748
Normalized	4.73%	27.17%	6.49%	12.72%	33.08%	32.96%	35.39%	35.09%	35.23%	35.49%	41.44%	100%
Standard Deviation	0.9%	3.4%	0.3%	0.7%	3.1%	0.7%	1.2%	0.5%	0.8%	0.5%	1.2%	0.6%

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LAME MP3 Encoding - WAV To MP3 (sec)	658.82	162.41	518.49	295.44	125.34	125.22	125.570	125.625	125.580	125.487	118.146	51.356
Normalized	7.8%	31.62%	9.9%	17.38%	40.97%	41.01%	40.9%	40.88%	40.9%	40.93%	43.47%	100%
Standard Deviation	2.4%	0.6%	0%	0.2%	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%	0%	0.2%
Perl Benchmarks - Pod2html (sec)	2.56511278	0.78254268	2.57273250	1.31659761	0.61207402	0.62136299	0.63956570	0.64987035	0.64384120	0.64817096	0.49963810	0.19287588
Normalized	7.52%	24.65%	7.5%	14.65%	31.51%	31.04%	30.16%	29.68%	29.96%	29.76%	38.6%	100%
Standard Deviation	5.2%	2%	0.6%	2%	0.8%	1.3%	0.5%	0.8%	1.4%	0.9%	0.4%	0.3%
Perl Benchmarks - Interpreter	0.03173653	0.01229804	0.01091688	0.00491447	0.00778405	0.00826085	0.00823096	0.00804936	0.00739185	0.00781140	0.00972674	0.02580090
Normalized	15.49%	39.96%	45.02%	100%	63.14%	59.49%	59.71%	61.05%	66.48%	62.91%	50.53%	19.05%
Standard Deviation	3.5%	0.4%	0.3%	0.5%	5.6%	6.9%	2.9%	12.1%	2.7%	13.1%	0.7%	0.3%
PyBench - T.F.A.T.T (Milliseconds)	29609	9312	40683	13542	5249	5233	5220	5222	5209	5193	4346	1767
Normalized	5.97%	18.98%	4.34%	13.05%	33.66%	33.77%	33.85%	33.84%	33.92%	34.03%	40.66%	100%
Standard Deviation	0.5%	0.5%	0.8%	0.2%	0.2%	0.3%	0.1%	0.3%	0.2%	0.5%	0.3%	0.4%
NGINX Benchmark - S.W.P.S (Reqs/sec)	2012	3880			4746	5105	4291	4298	4287	4291		
Normalized	39.41%	76.01%			92.97%	100%	84.07%	84.19%	83.99%	84.06%		
Standard Deviation	0.7%	1.6%			3.1%	0.1%	0.1%	0%	0.4%	0.1%		
PHPBench - P.B.S (Score)	20275	59450	21345	54131	101564	100678	102276	102686	102391	103001	168295	159817
Normalized	12.05%	35.32%	12.68%	32.16%	60.35%	59.82%	60.77%	61.02%	60.84%	61.2%	100%	94.96%
Standard Deviation	0.5%	3.3%	0.1%	0.2%	0.4%	0.9%	0.4%	0.2%	0.5%	0.4%	0.5%	1.1%
SciMark - Performance / Cost - Composite	1.39	2.00	0.82	1.46	2.58	3.18	2.593	2.46	1.96	1.96	1.36	
Normalized	43.71%	62.89%	25.79%	45.91%	81.13%	100%	81.54%	77.36%	61.64%	61.64%	42.77%	
GraphicsMagick - Performance / Cost - Rotate (Iterations/min/Dollar)	0.46	0.93	0.69	1.26	1.15	1.42	1.164	1.10	0.86	0.88	0.77	
Normalized	32.39%	65.49%	48.59%	88.73%	80.99%	100%	81.97%	77.46%	60.56%	61.97%	54.23%	
GraphicsMagick - Performance / Cost - Resizing (Iterations/min/Dollar)	0.43	0.75	0.63	1.03	0.82	1.18	0.982	0.90	0.71	0.71	0.65	
Normalized	36.44%	63.56%	53.39%	87.29%	69.49%	100%	83.22%	76.27%	60.17%	60.17%	55.08%	

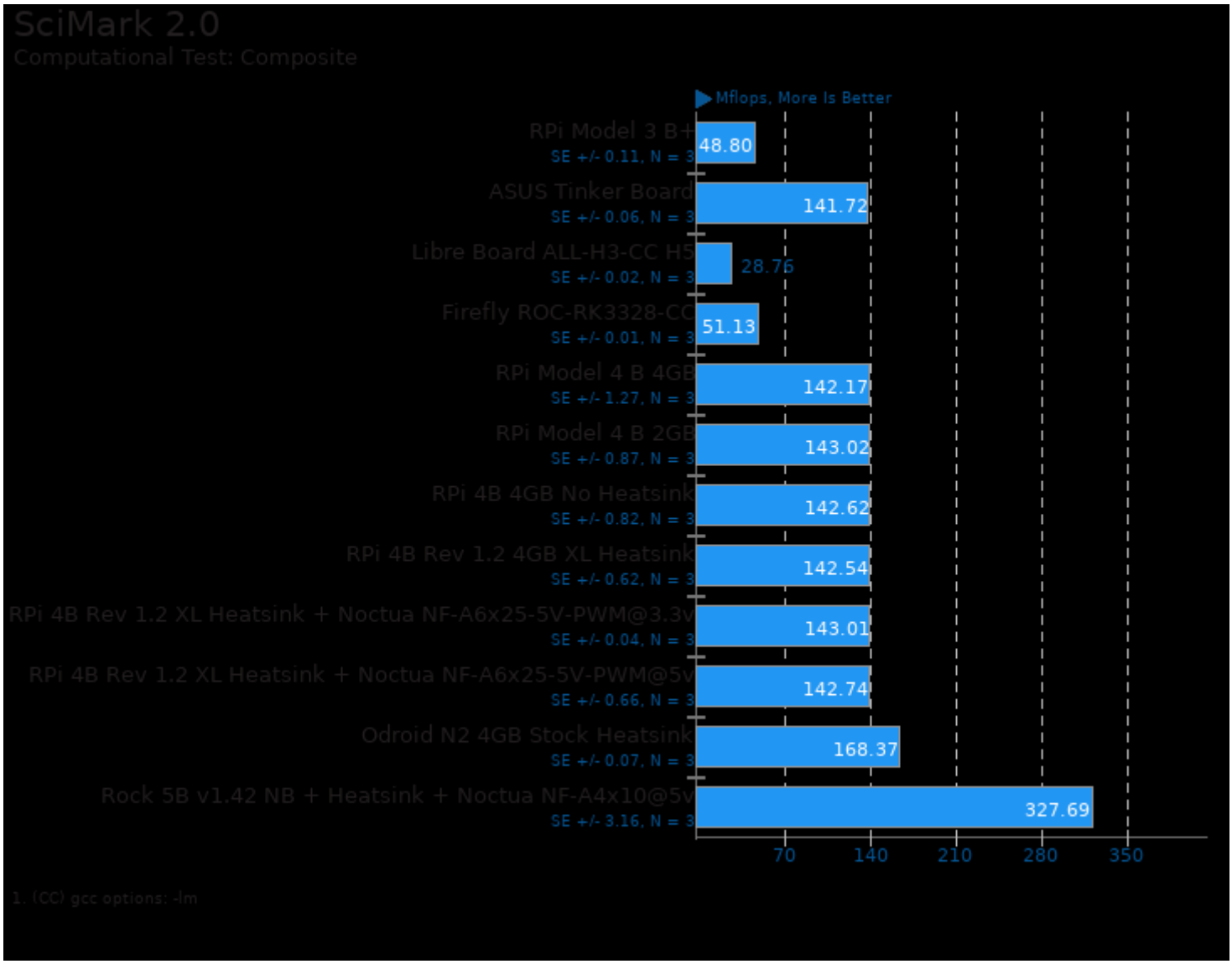
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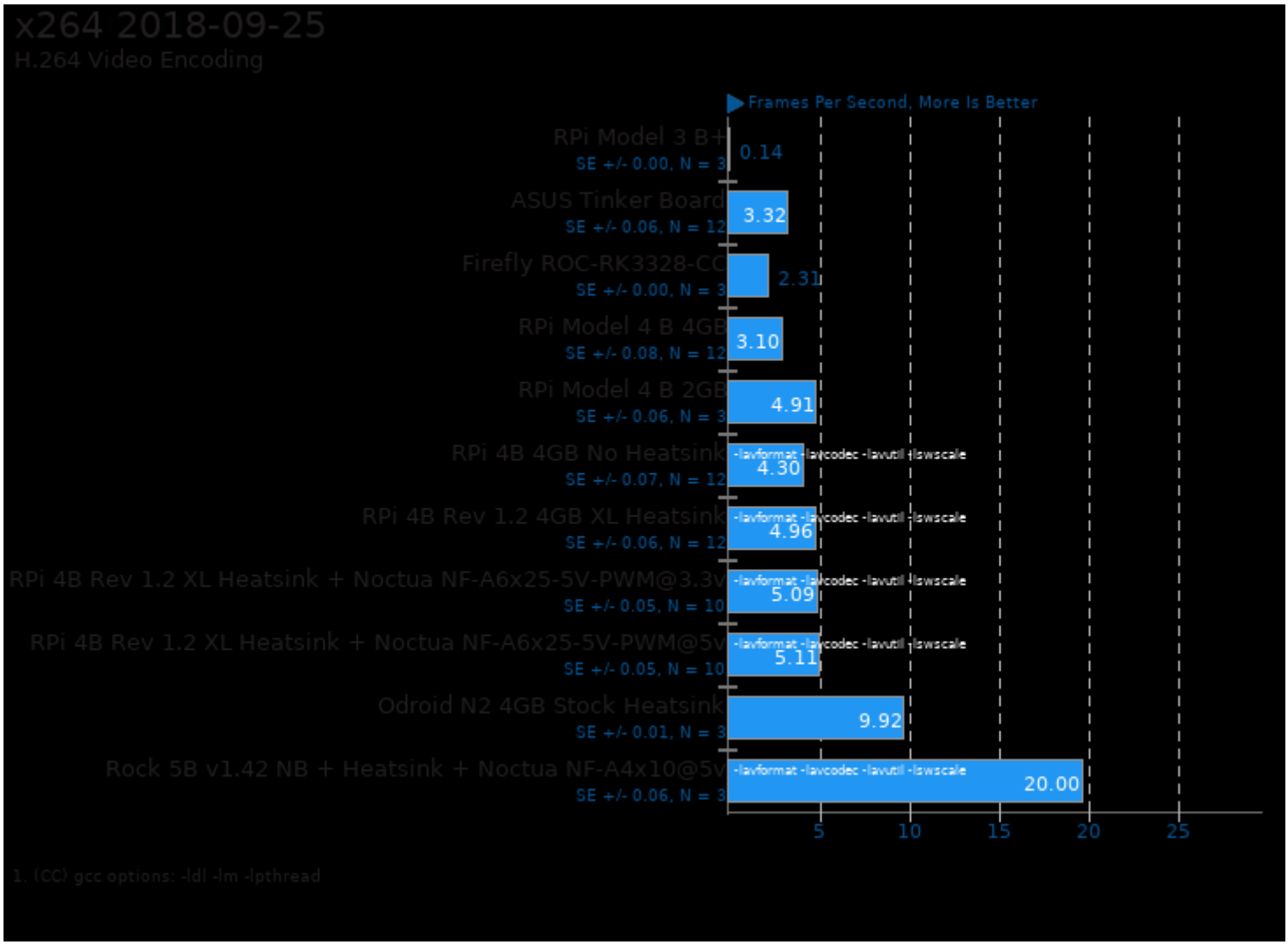
Rust Prime Benchmark - Performance / Cost - P.N.T.T.2.0.0 (sec x Dollar)	**108715**	74726		**4907**	60738	29599	42612	39133	48441	48144	9574
Normalized	4.51%	6.57%		100%	8.08%	16.58%	11.52%	12.54%	10.13%	10.19%	51.25%
Smallpt - Performance / Cost - G.I.R.1.S (sec x Dollar)	**26059**	19404	14841	8798	14340	**6548**	9841	8930	9481	9549	10964
Normalized	25.13%	33.74%	44.12%	74.42%	45.66%	100%	66.54%	73.32%	69.06%	68.57%	59.72%
Zstd Compression - Performance / Cost - C.u.1.0.3.s.i.i.C.L	**27545**	17039	14075	**12016**	16031	13120	15374	16043	20824	20756	20406
Normalized	43.62%	70.52%	85.37%	100%	74.95%	91.59%	78.16%	74.9%	57.7%	57.89%	58.88%
FLAC Audio Encoding - Performance / Cost - WAV To FLAC (sec x Dollar)	**27218**	9603	19824	10112	6110	**5017**	5712	6074	7614	7559	10995
Normalized	18.43%	52.24%	25.31%	49.61%	82.11%	100%	87.83%	82.6%	65.89%	66.36%	45.62%
LAME MP3 Encoding - Performance / Cost - WAV To MP3 (sec x Dollar)	**23059**	11531	18147	10340	6894	**5635**	6906	7286	9167	9161	14650
Normalized	24.44%	48.87%	31.05%	54.49%	81.74%	100%	81.59%	77.34%	61.47%	61.51%	38.46%
Perl Benchmarks - Performance / Cost - Pod2html (sec x Dollar)	89.78	55.56	**90.05**	46.08	33.66	**27.96**	35.176	37.69	47.00	47.32	61.96
Normalized	31.14%	50.32%	31.05%	60.68%	83.07%	100%	79.49%	74.18%	59.49%	59.09%	45.13%
Perl Benchmarks - Performance / Cost - Interpreter (sec x Dollar)	1.11	0.87	0.38	**0.17**	0.43	0.37	0.453	0.47	0.54	0.57	**1.21**
Normalized	15.32%	19.54%	44.74%	100%	39.53%	45.95%	37.53%	36.17%	31.48%	29.82%	14.05%

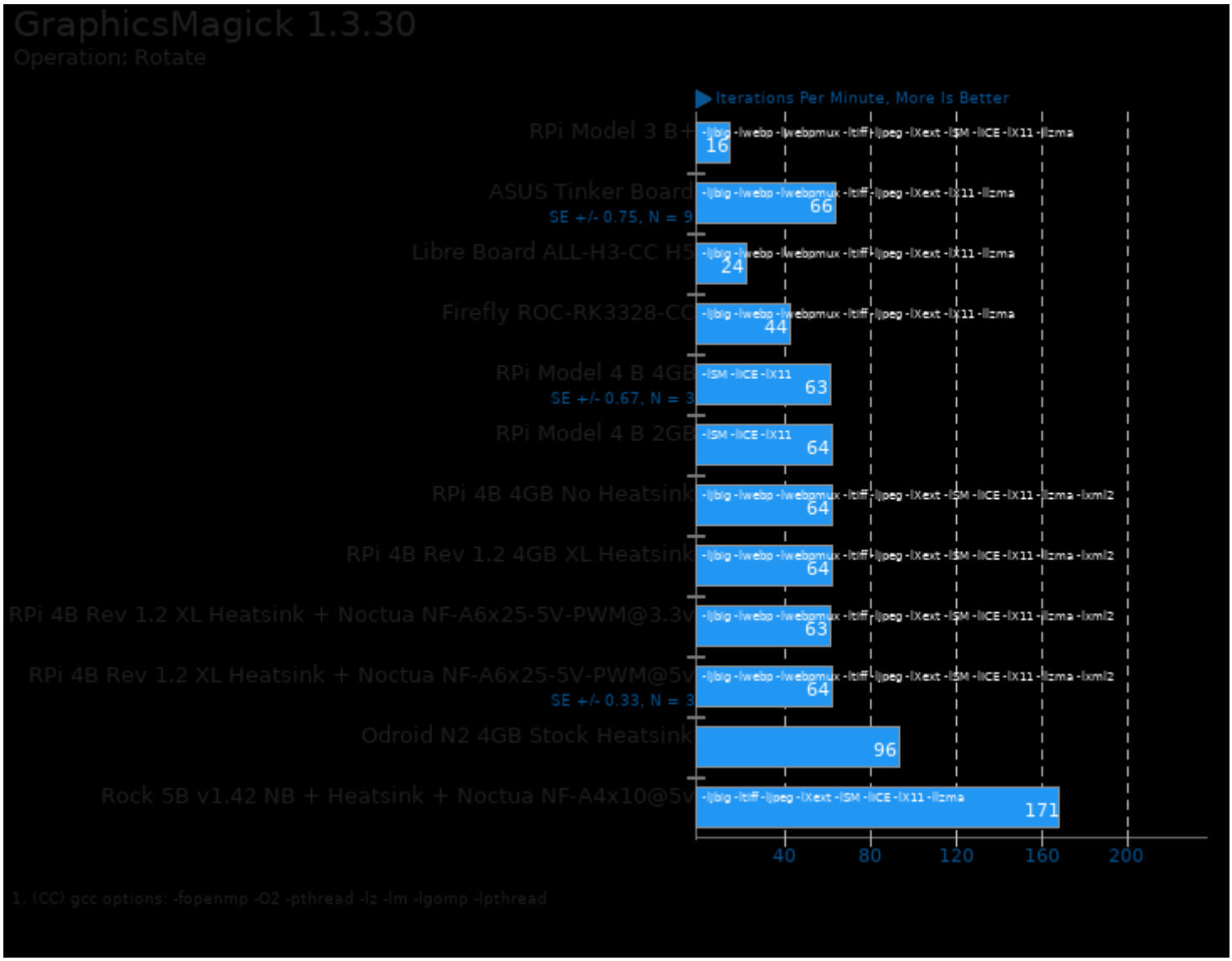
Raspberry Pi Model 4 Benchmarks

PyBench - Performance / Cost - T.F.A.T.T (Milliseconds x Dollar)	1036315	661152	**1423905**	473970	288695	**235485**	287100	302876	380257	379089	538904
Normalized	22.72%	35.62%	16.54%	49.68%	81.57%	100%	82.02%	77.75%	61.93%	62.12%	43.7%
NGINX Benchmark - Performance / Cost - S.W.P.S (Reqs/sec/Dollar)	57.49	**54.65**			86.29	**113.44**	78.027	74.10	58.73	58.78	
Normalized	50.68%	48.18%			76.07%	100%	68.78%	65.32%	51.77%	51.82%	
PHPBench - Performance / Cost - P.B.S (Score/Dollar)	**579.29**	837.32	609.86	1547	1847	**2237**	1860	1770	1403	1411	1357
Normalized	25.89%	37.43%	27.26%	69.13%	82.54%	100%	83.12%	79.13%	62.69%	63.07%	60.66%
x264 - Performance / Cost - H.2.V.E (FPS/Dollar)		**0.05**		0.07	0.06	**0.11**	0.078	0.09	0.07	0.07	0.08
Normalized		45.45%		63.64%	54.55%	100%	70.91%	81.82%	63.64%	63.64%	72.73%
Meta Performance Per Dollar - P.P.D (Performance/Dollar)								**140.15**	111.02	111.60	**107.65**
Normalized								100%	79.22%	79.63%	76.81%

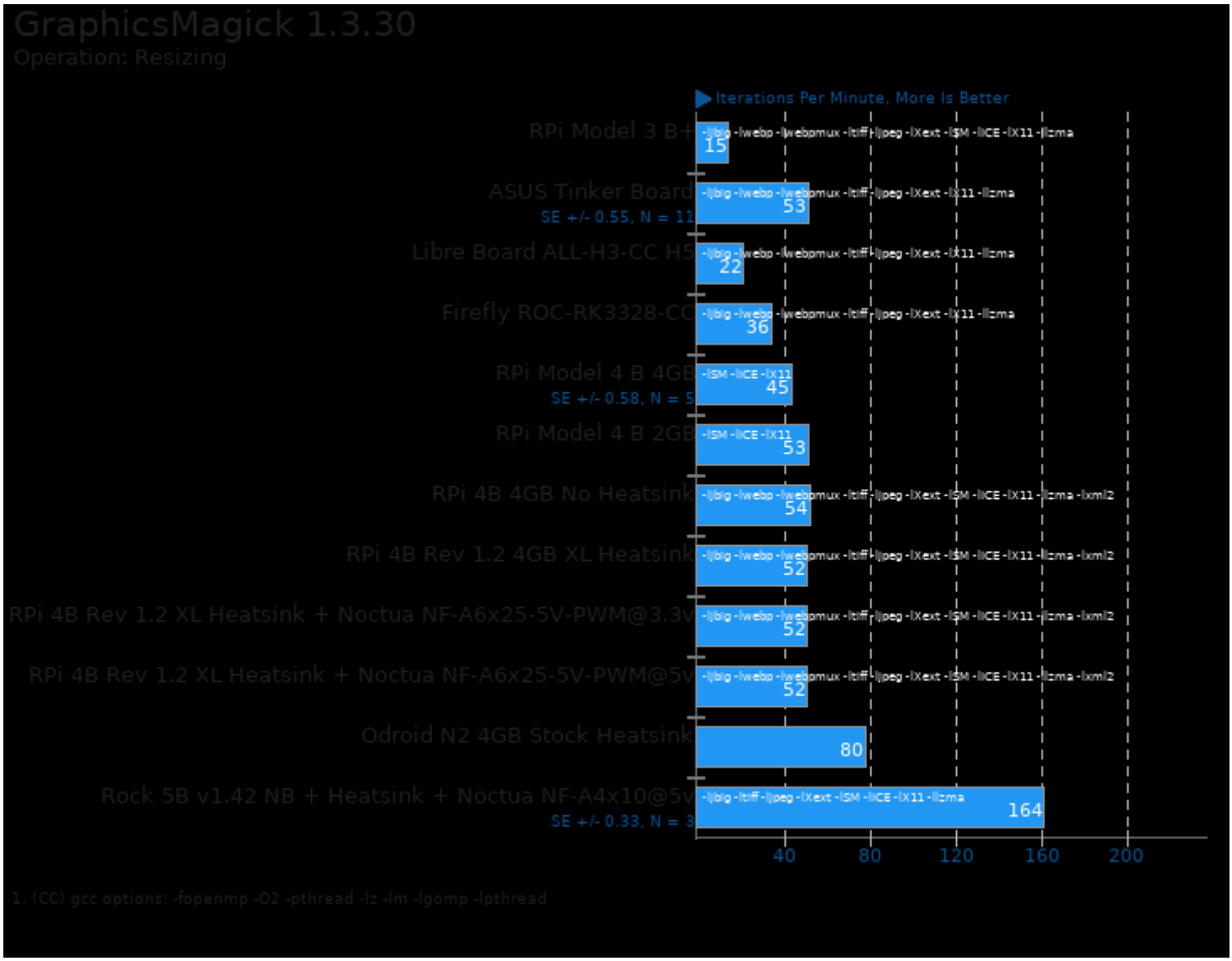
Raspberry Pi Model 4 Benchmarks



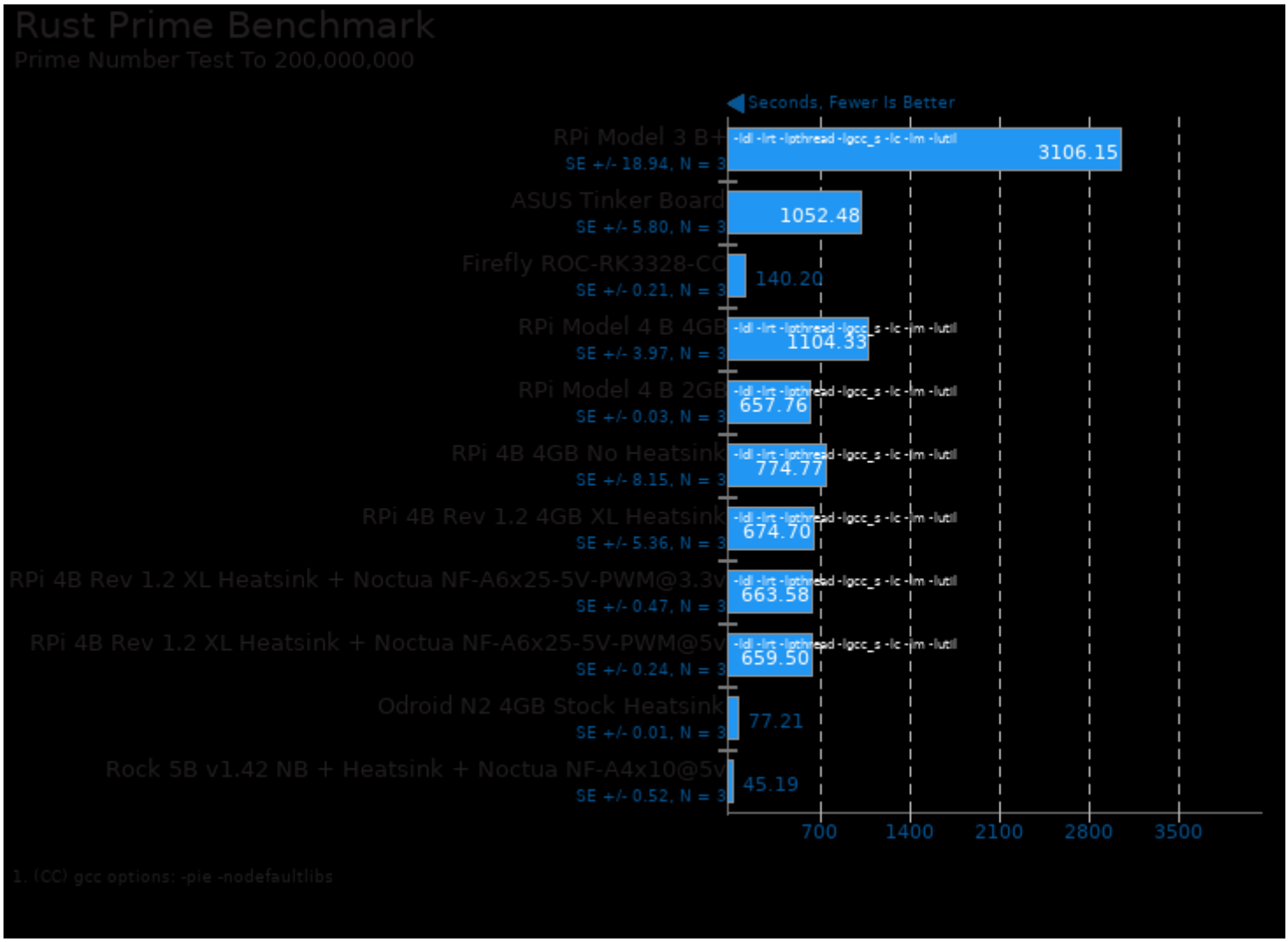

x264 2018-09-25
H.264 Video Encoding
Frames Per Second, More Is Better
RPi Model 3 B+
SE +/- 0.00, N = 3
0.14
ASUS Tinker Board
SE +/- 0.06, N = 12
3.32
Firefly ROC-RK3328-CC
SE +/- 0.00, N = 3
2.31
RPi Model 4 B 4GB
SE +/- 0.08, N = 12
3.10
RPi Model 4 B 2GB
SE +/- 0.06, N = 3
4.91
RPi 4B 4GB No Heatsink
SE +/- 0.07, N = 12
-lavformat -lavcodec -lavutil -lswscale
4.30
RPi 4B Rev 1.2 4GB XL Heatsink
SE +/- 0.06, N = 12
-lavformat -lavcodec -lavutil -lswscale
4.96
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
SE +/- 0.05, N = 10
-lavformat -lavcodec -lavutil -lswscale
5.09
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
SE +/- 0.05, N = 10
-lavformat -lavcodec -lavutil -lswscale
5.11
Odroid N2 4GB Stock Heatsink
SE +/- 0.01, N = 3
9.92
Rock 5B v1.42 NB + Heatsink + Noctua NF-A4x10@5v
SE +/- 0.06, N = 3
-lavformat -lavcodec -lavutil -lswscale
20.00
5
10
15
20
25
1. (CC) gcc options: -ldl -lm -lpthread

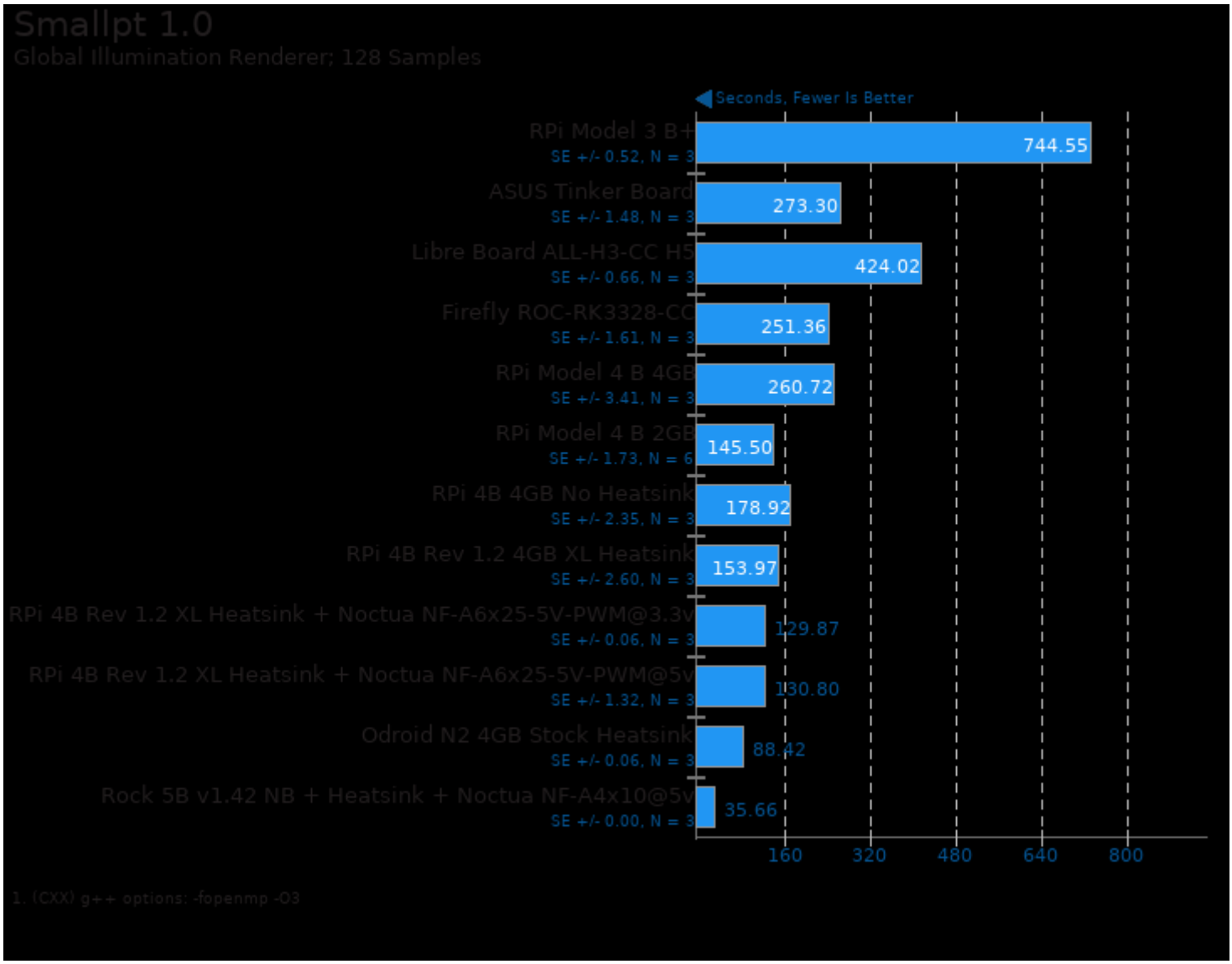

GraphicsMagick 1.3.30
Operation: Rotate
Iterations Per Minute, More Is Better
RPi Model 3 B+
16
ASUS Tinker Board
66
SE +/- 0.75, N = 9
Libre Board ALL-H3-CC H5
24
Firefly ROC-RK3328-CC
44
RPi Model 4 B 4GB
63
SE +/- 0.67, N = 3
RPi Model 4 B 2GB
64
RPi 4B 4GB No Heatsink
64
RPi 4B Rev 1.2 4GB XL Heatsink
64
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3V
63
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5V
64
SE +/- 0.33, N = 3
Odroid N2 4GB Stock Heatsink
96
Rock 5B v1.42 NB + Heatsink + Noctua NF-A4x10@5V
171
40
80
120
160
200
1. (CC) gcc options: -fopenmp -O2 -pthread -lz -lm -lgomp -lpthread

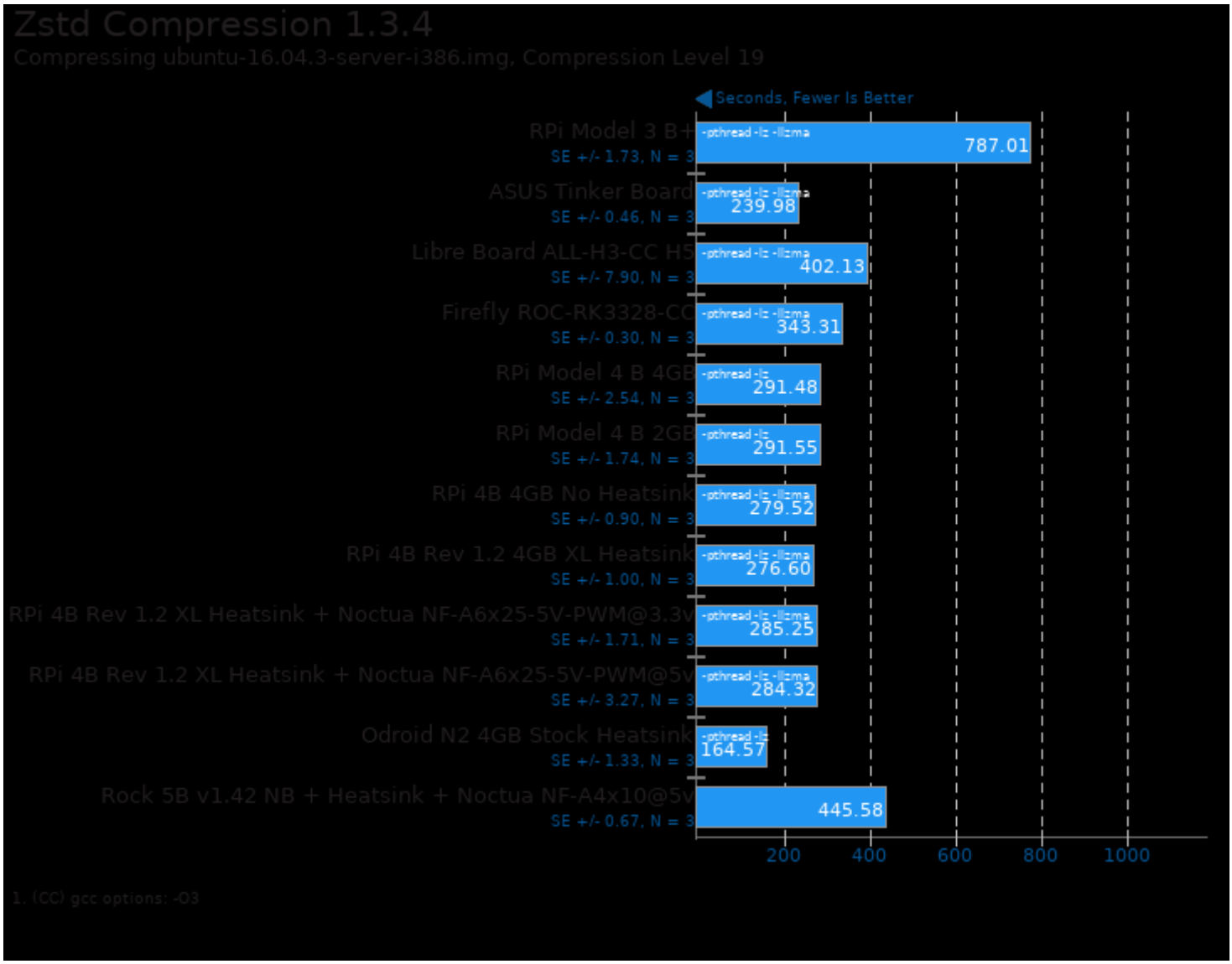
Raspberry Pi Model 4 Benchmarks

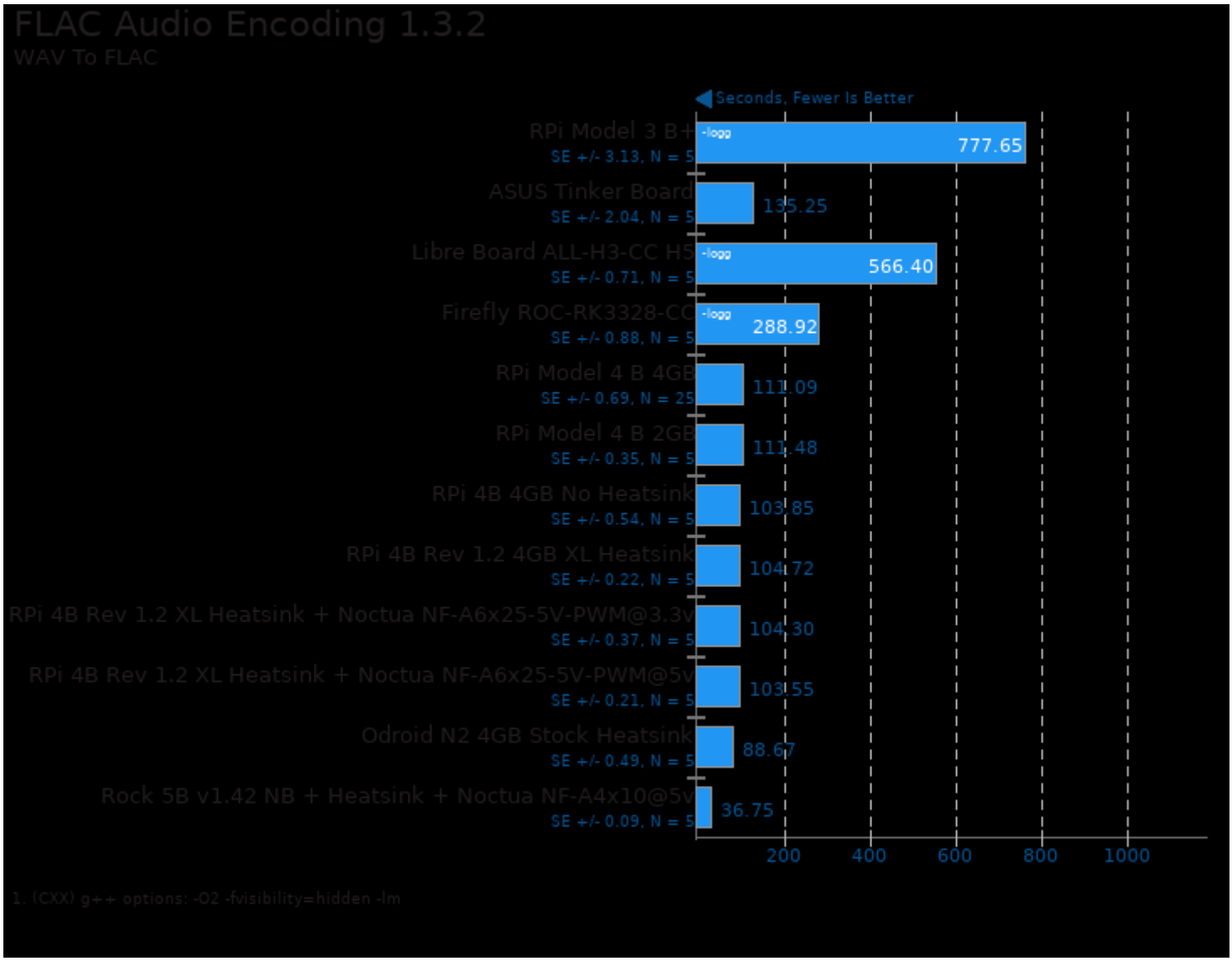


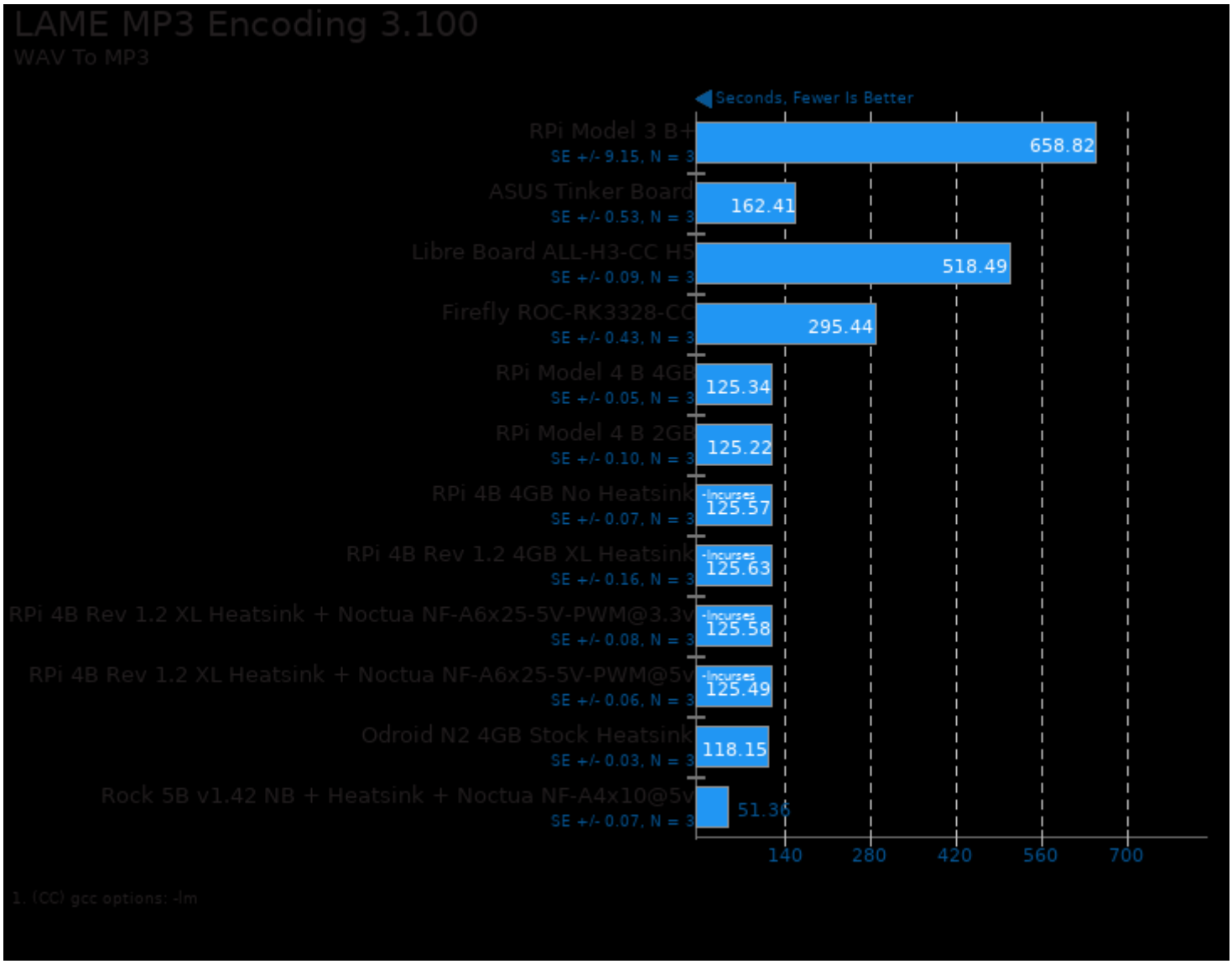
Raspberry Pi Model 4 Benchmarks



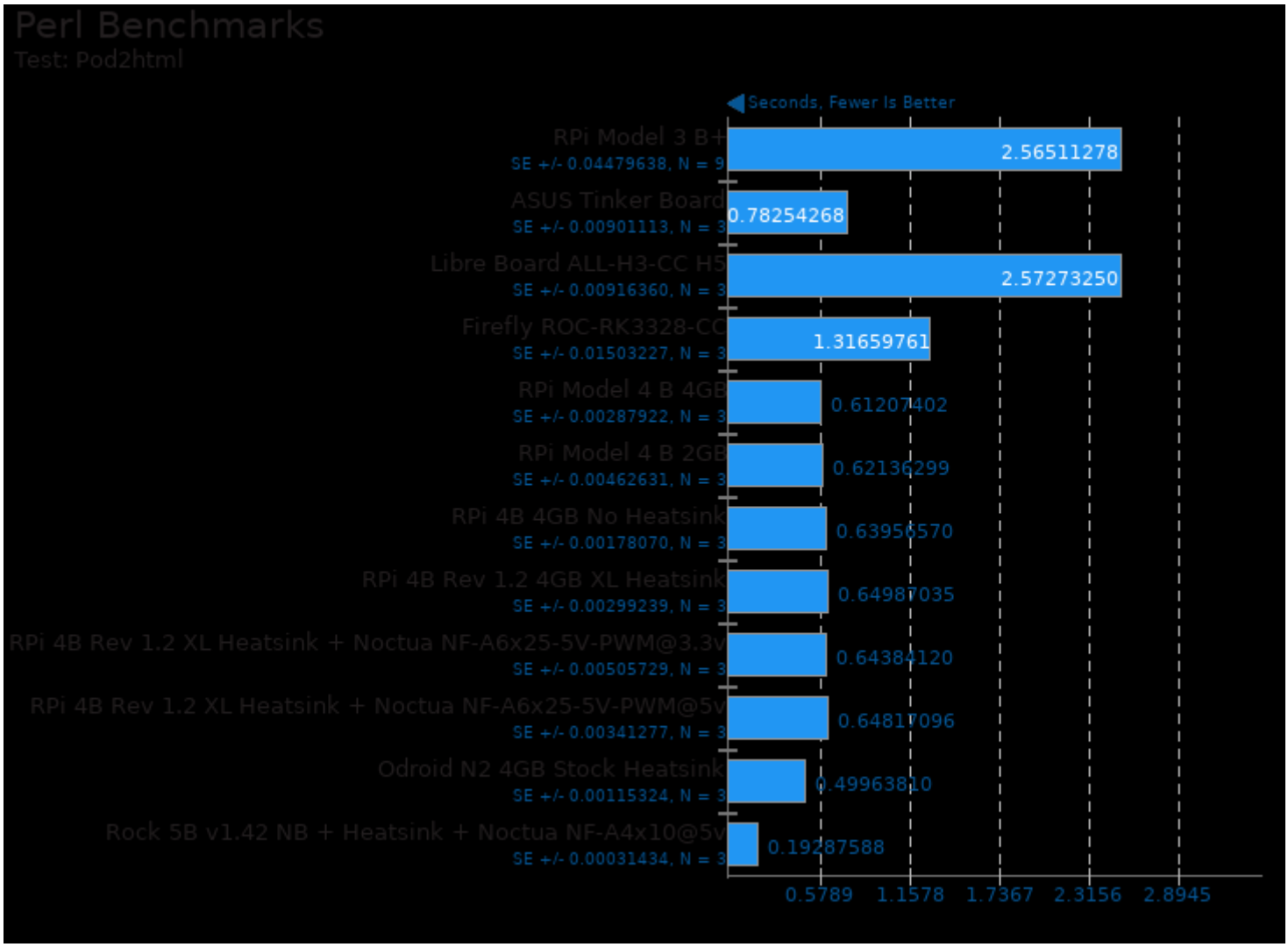

Smallpt 1.0
Global Illumination Renderer; 128 Samples
Seconds, Fewer Is Better
RPi Model 3 B+
SE +/- 0.52, N = 3
744.55
ASUS Tinker Board
SE +/- 1.48, N = 3
273.30
Libre Board ALL-H3-CC H5
SE +/- 0.66, N = 3
424.02
Firefly ROC-RK3328-CC
SE +/- 1.61, N = 3
251.36
RPi Model 4 B 4GB
SE +/- 3.41, N = 3
260.72
RPi Model 4 B 2GB
SE +/- 1.73, N = 6
145.50
RPi 4B 4GB No Heatsink
SE +/- 2.35, N = 3
178.92
RPi 4B Rev 1.2 4GB XL Heatsink
SE +/- 2.60, N = 3
153.97
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
SE +/- 0.06, N = 3
129.87
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
SE +/- 1.32, N = 3
130.80
Odroid N2 4GB Stock Heatsink
SE +/- 0.06, N = 3
88.42
Rock 5B v1.42 NB + Heatsink + Noctua NF-A4x10@5v
SE +/- 0.00, N = 3
35.66
160
320
480
640
800
1. (CXX) g++ options: -fopenmp -O3


Zstd Compression 1.3.4
Compressing ubuntu-16.04.3-server-i386.img, Compression Level 19
Seconds, Fewer Is Better
RPi Model 3 B+
SE +/- 1.73, N = 3
787.01
ASUS Tinker Board
SE +/- 0.46, N = 3
239.98
Libre Board ALL-H3-CC H5
SE +/- 7.90, N = 3
402.13
Firefly ROC-RK3328-CC
SE +/- 0.30, N = 3
343.31
RPi Model 4 B 4GB
SE +/- 2.54, N = 3
291.48
RPi Model 4 B 2GB
SE +/- 1.74, N = 3
291.55
RPi 4B 4GB No Heatsink
SE +/- 0.90, N = 3
279.52
RPi 4B Rev 1.2 4GB XL Heatsink
SE +/- 1.00, N = 3
276.60
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
SE +/- 1.71, N = 3
285.25
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
SE +/- 3.27, N = 3
284.32
Odroid N2 4GB Stock Heatsink
SE +/- 1.33, N = 3
164.57
Rock 5B v1.42 NB + Heatsink + Noctua NF-A4x10@5v
SE +/- 0.67, N = 3
445.58
200
400
600
800
1000
1. (CC) gcc options: -O3

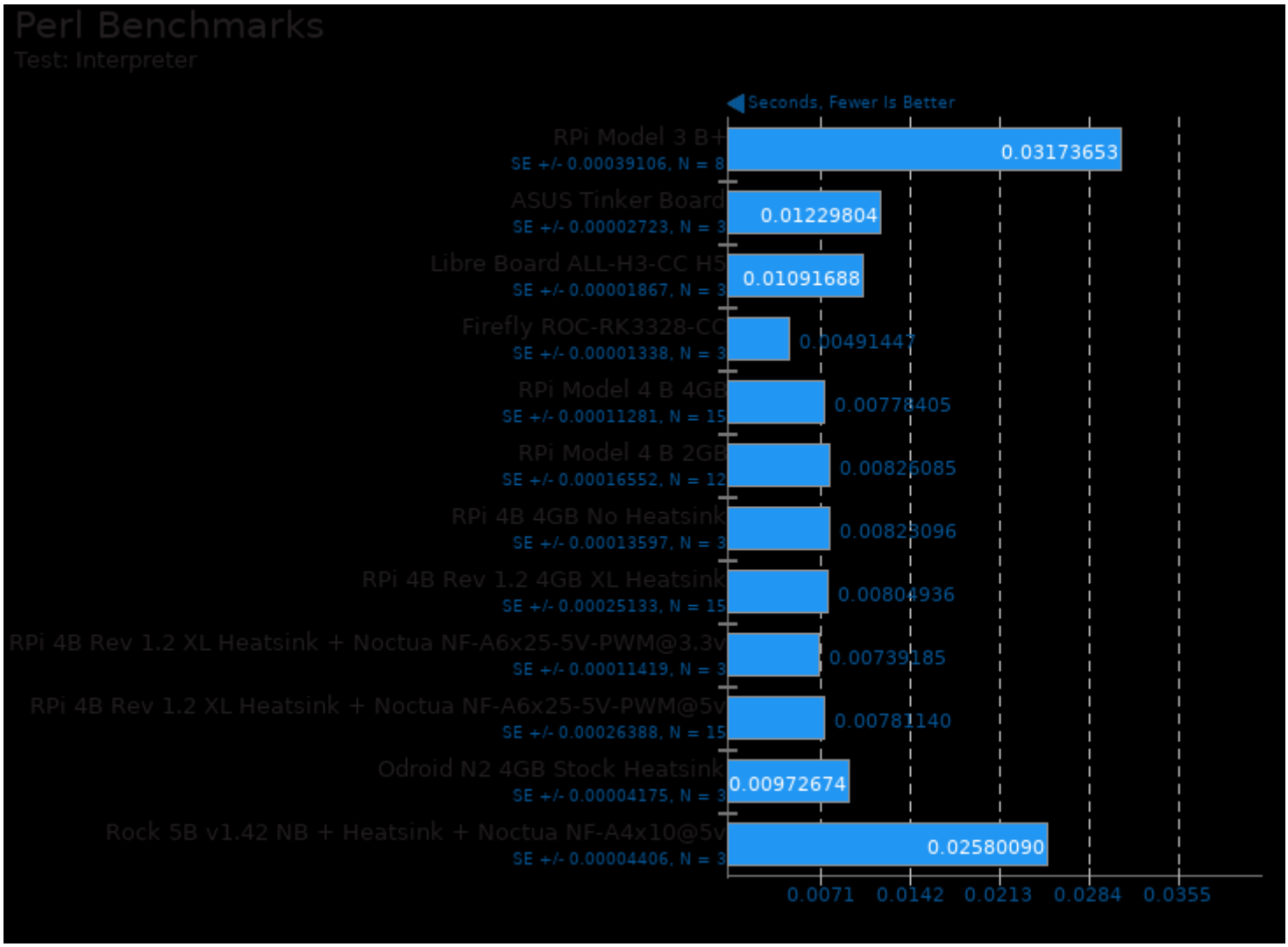

FLAC Audio Encoding 1.3.2
WAV To FLAC
Seconds, Fewer Is Better
RPi Model 3 B+
SE +/- 3.13, N = 5
-logg
777.65
ASUS Tinker Board
SE +/- 2.04, N = 5
135.25
Libre Board ALL-H3-CC H5
SE +/- 0.71, N = 5
-logg
566.40
Firefly ROC-RK3328-CC
SE +/- 0.88, N = 5
-logg
288.92
RPi Model 4 B 4GB
SE +/- 0.69, N = 25
111.09
RPi Model 4 B 2GB
SE +/- 0.35, N = 5
111.48
RPi 4B 4GB No Heatsink
SE +/- 0.54, N = 5
103.85
RPi 4B Rev 1.2 4GB XL Heatsink
SE +/- 0.22, N = 5
104.72
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
SE +/- 0.37, N = 5
104.30
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
SE +/- 0.21, N = 5
103.55
Odroid N2 4GB Stock Heatsink
SE +/- 0.49, N = 5
88.67
Rock 5B v1.42 NB + Heatsink + Noctua NF-A4x10@5v
SE +/- 0.09, N = 5
36.75
200
400
600
800
1000
1. (CXX) g++ options: -O2 -fvisibility=hidden -lm


LAME MP3 Encoding 3.100
WAV To MP3
Seconds, Fewer Is Better
RPi Model 3 B+
SE +/- 9.15, N = 3
658.82
ASUS Tinker Board
SE +/- 0.53, N = 3
162.41
Libre Board ALL-H3-CC H5
SE +/- 0.09, N = 3
518.49
Firefly ROC-RK3328-CC
SE +/- 0.43, N = 3
295.44
RPi Model 4 B 4GB
SE +/- 0.05, N = 3
125.34
RPi Model 4 B 2GB
SE +/- 0.10, N = 3
125.22
RPi 4B 4GB No Heatsink
SE +/- 0.07, N = 3
-lncurses
125.57
RPi 4B Rev 1.2 4GB XL Heatsink
SE +/- 0.16, N = 3
-lncurses
125.63
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
SE +/- 0.08, N = 3
-lncurses
125.58
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
SE +/- 0.06, N = 3
-lncurses
125.49
Odroid N2 4GB Stock Heatsink
SE +/- 0.03, N = 3
118.15
Rock 5B v1.42 NB + Heatsink + Noctua NF-A4x10@5v
SE +/- 0.07, N = 3
51.36
140
280
420
560
700
1. (CC) gcc options: -lm

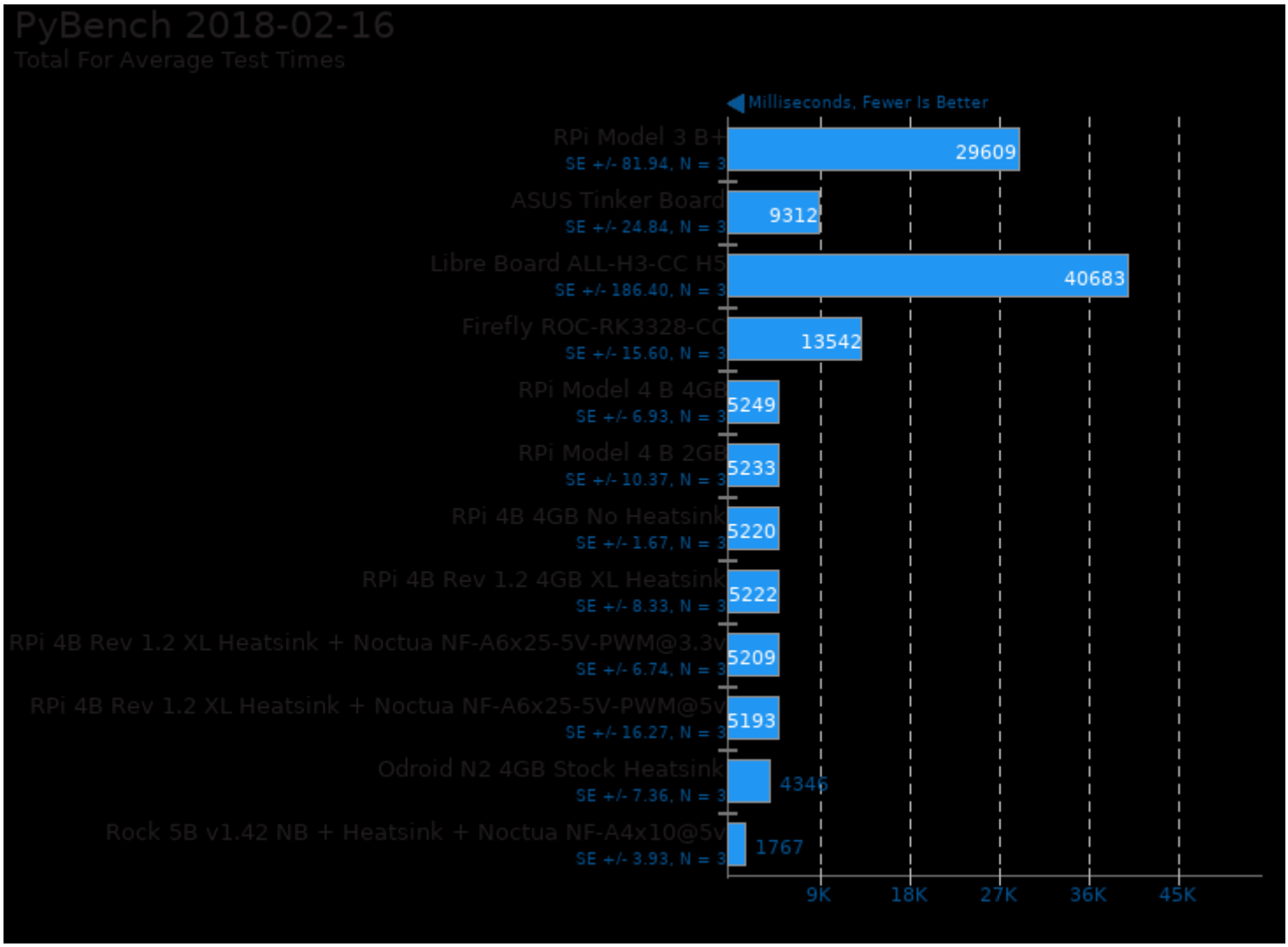
Raspberry Pi Model 4 Benchmarks



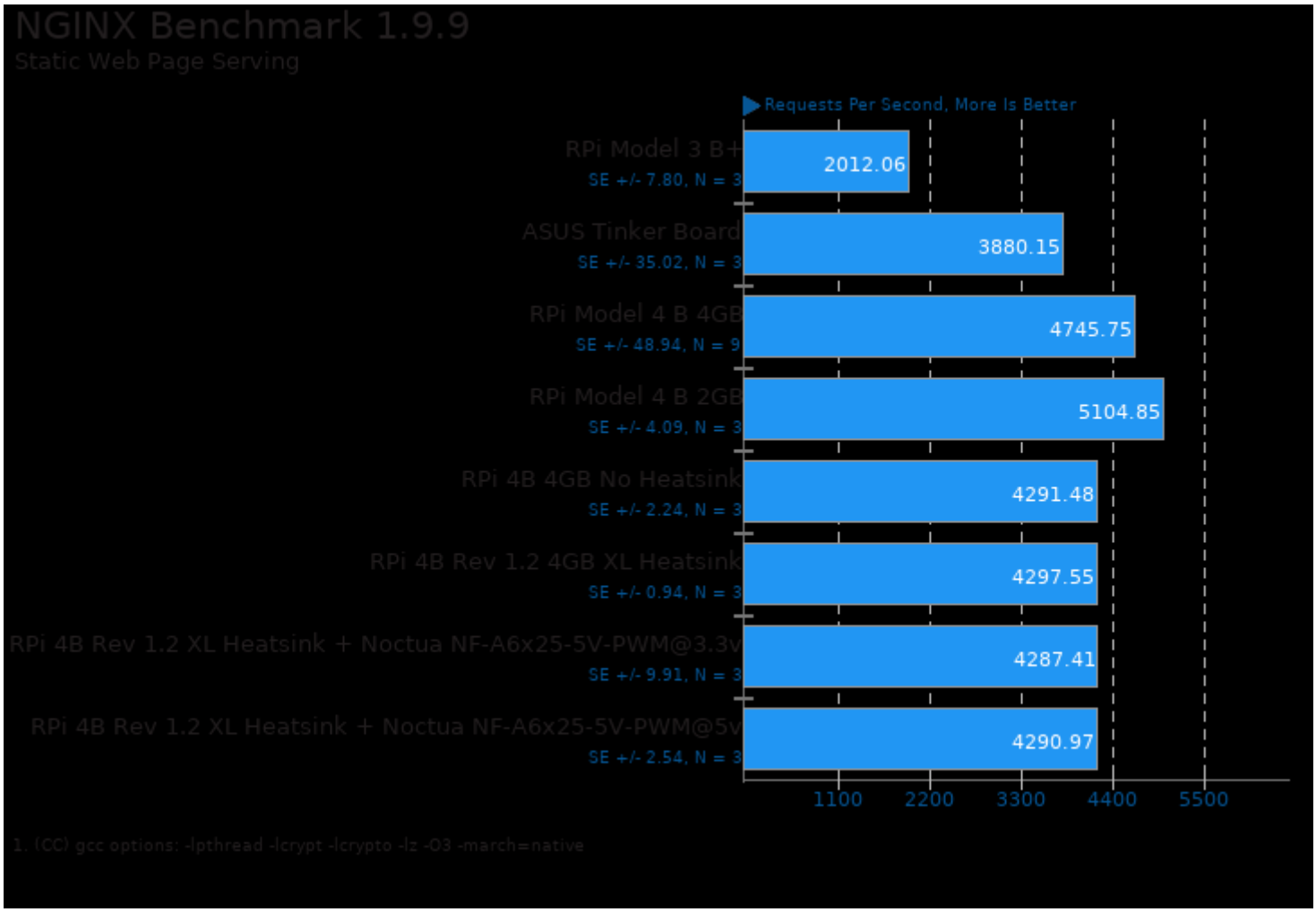
Raspberry Pi Model 4 Benchmarks



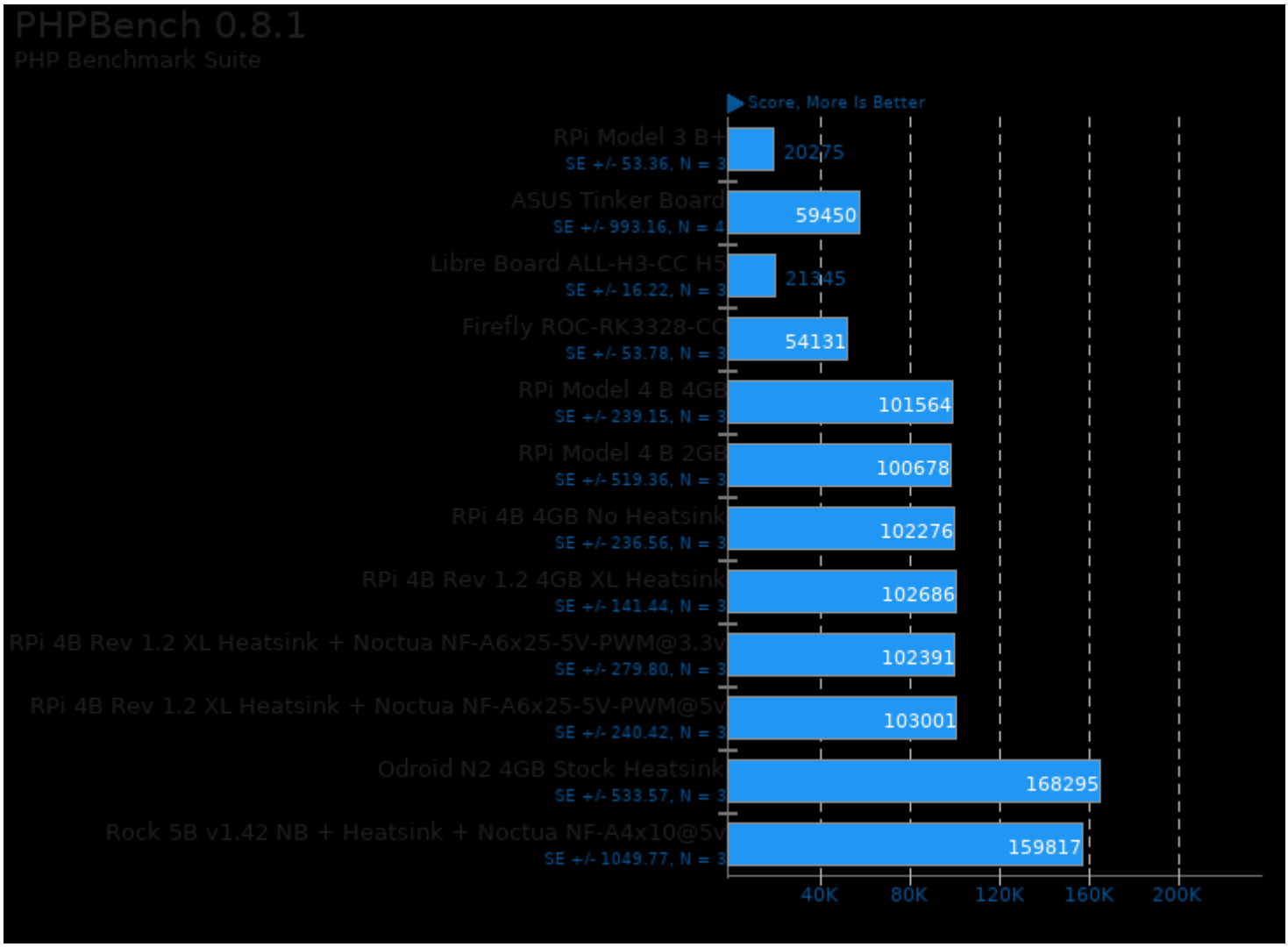
Raspberry Pi Model 4 Benchmarks



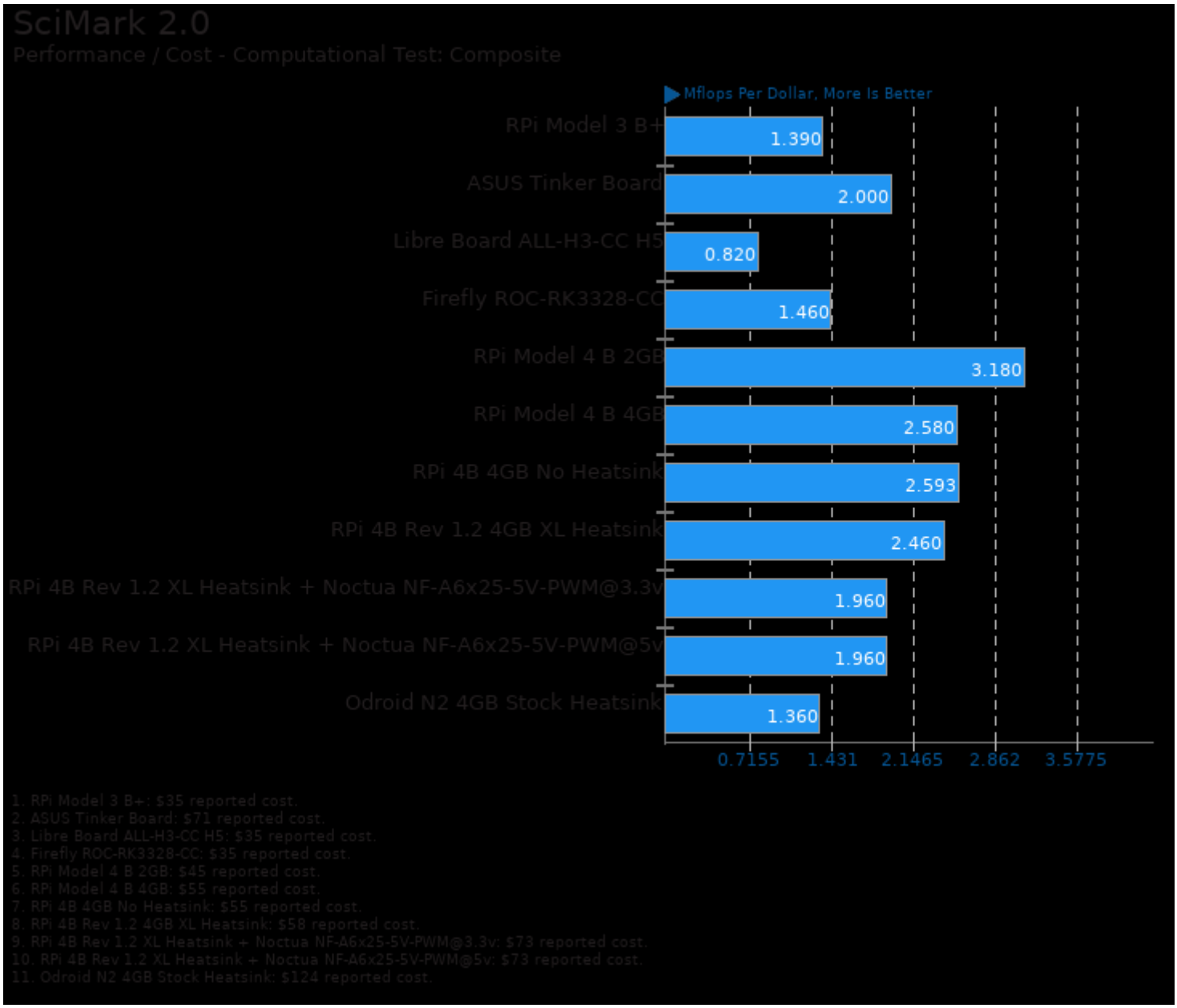
Raspberry Pi Model 4 Benchmarks



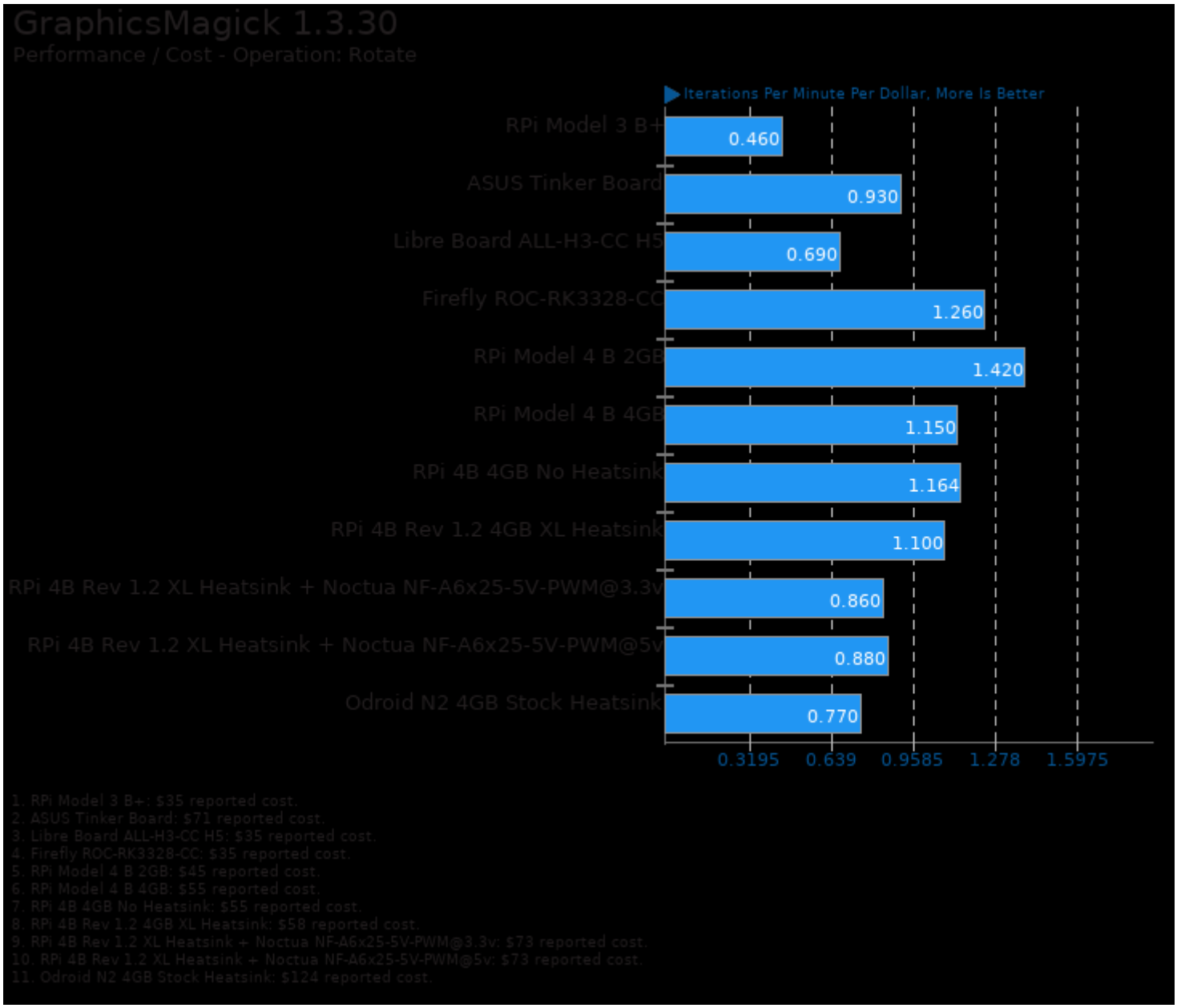
Raspberry Pi Model 4 Benchmarks



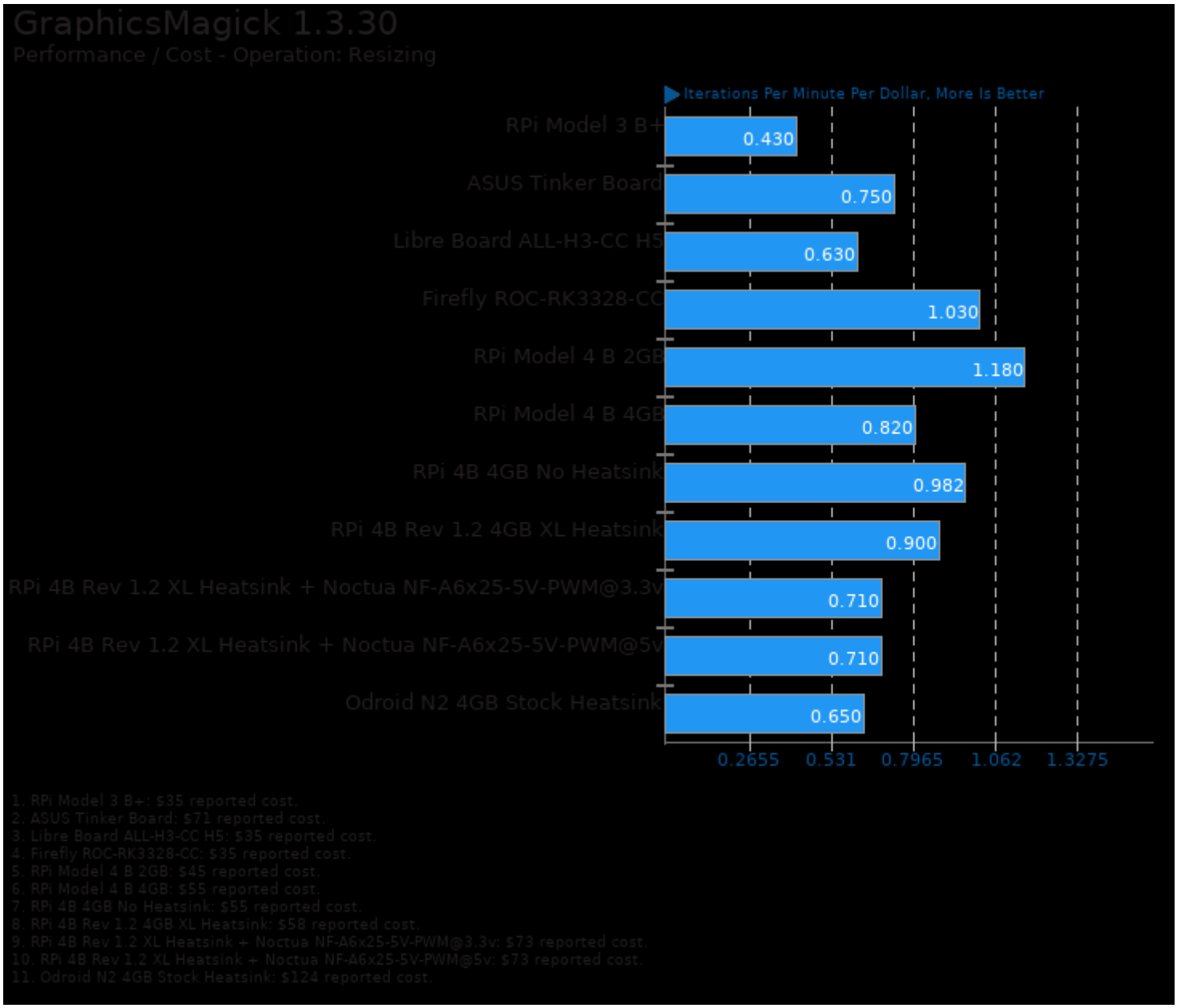
Raspberry Pi Model 4 Benchmarks

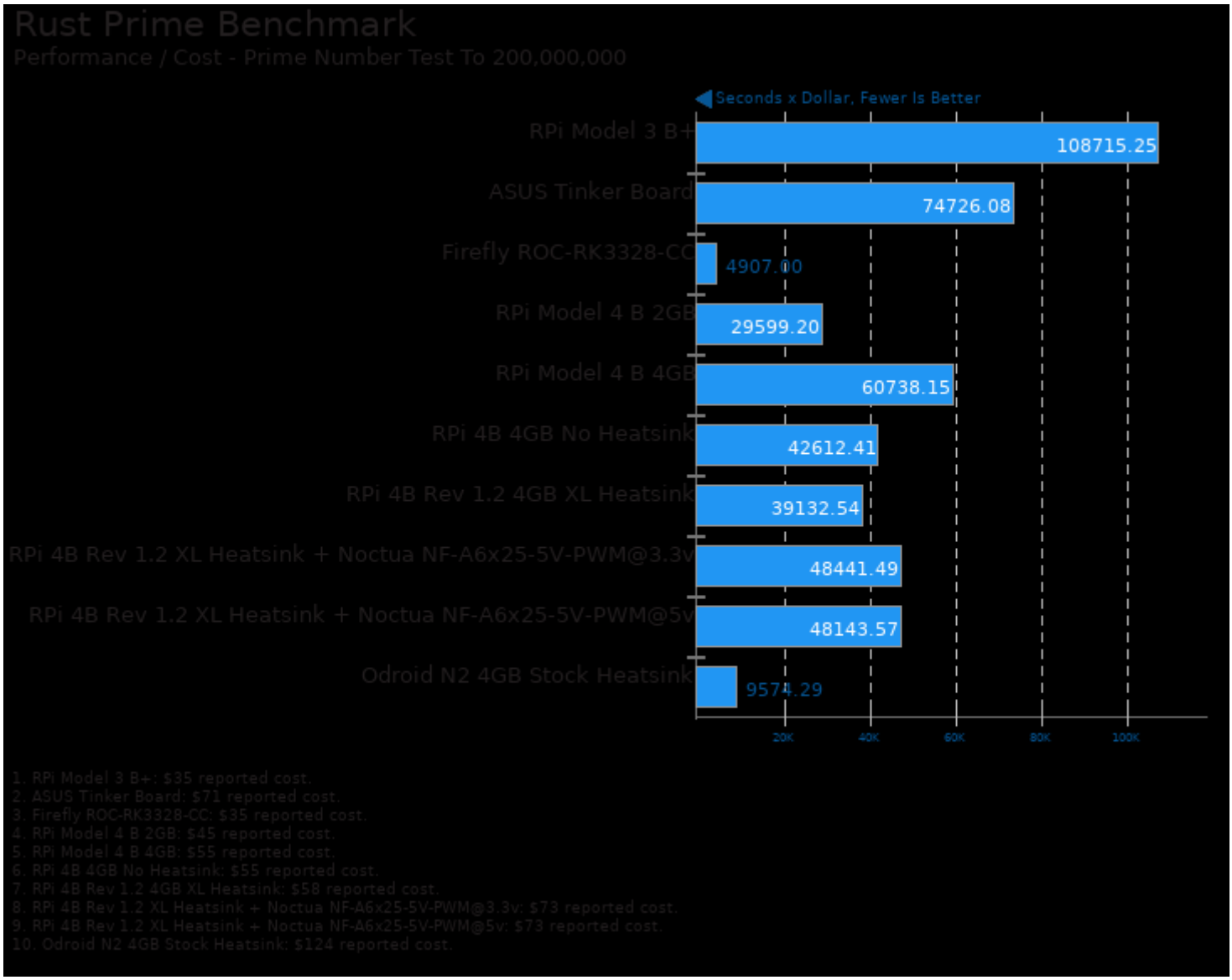


Raspberry Pi Model 4 Benchmarks

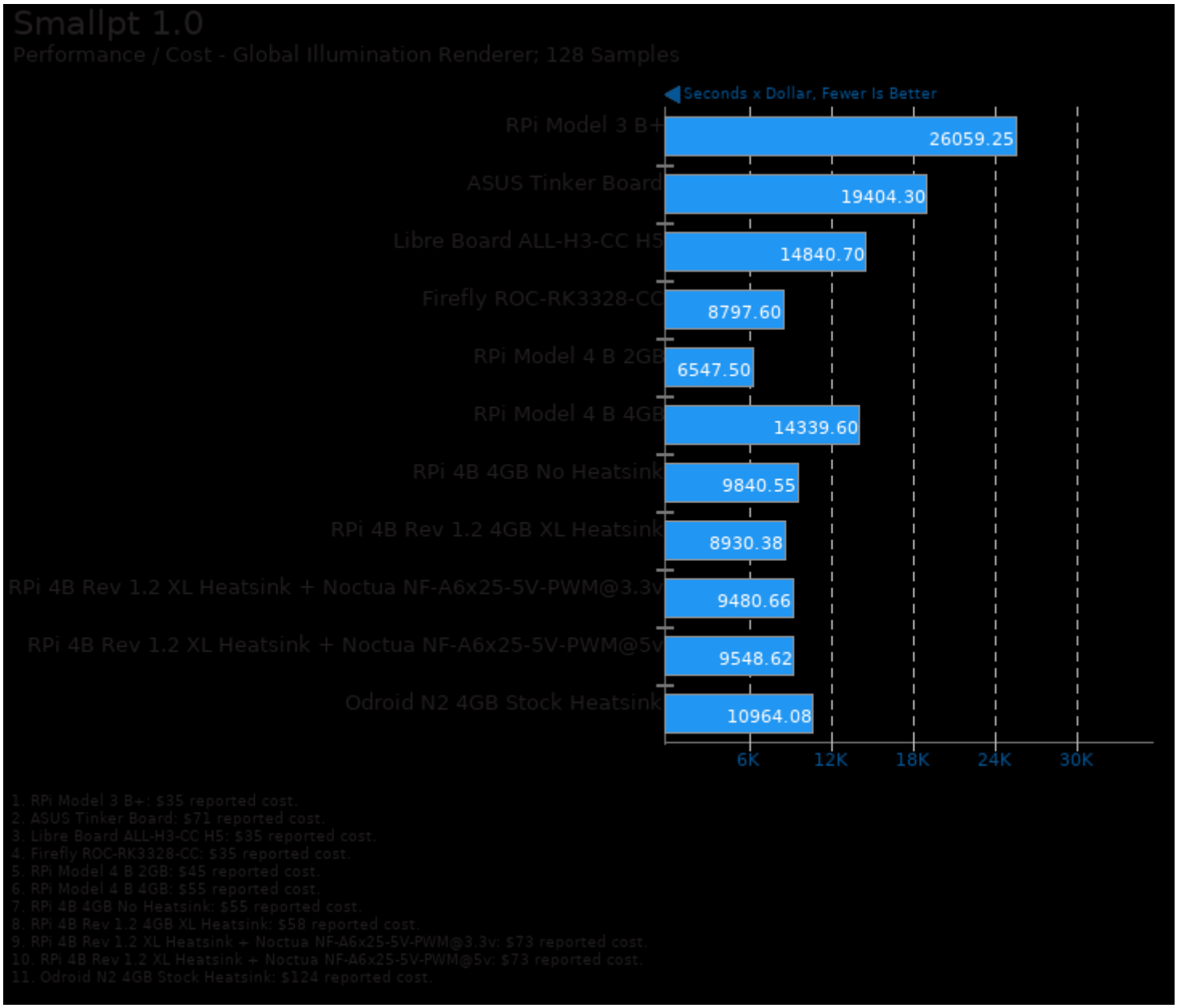


Raspberry Pi Model 4 Benchmarks

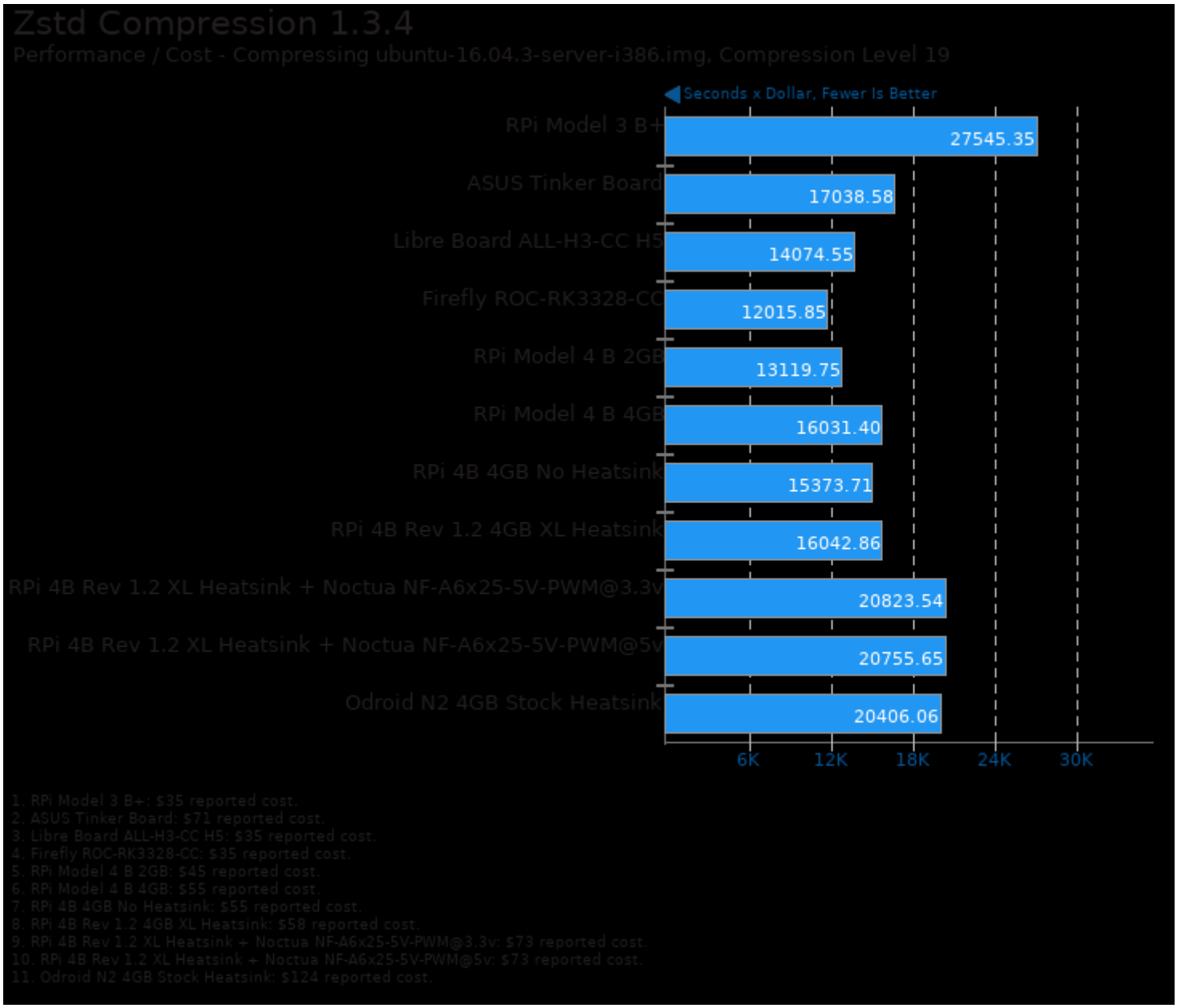



Rust Prime Benchmark
Performance / Cost - Prime Number Test To 200,000,000
Seconds x Dollar, Fewer Is Better
RPi Model 3 B+
108715.25
ASUS Tinker Board
74726.08
Firefly ROC-RK3328-CC
4907.00
RPi Model 4 B 2GB
29599.20
RPi Model 4 B 4GB
60738.15
RPi 4B 4GB No Heatsink
42612.41
RPi 4B Rev 1.2 4GB XL Heatsink
39132.54
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
48441.49
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
48143.57
Odroid N2 4GB Stock Heatsink
9574.29
20K
40K
60K
80K
100K
1. RPi Model 3 B+: $35 reported cost.
2. ASUS Tinker Board: $71 reported cost.
3. Firefly ROC-RK3328-CC: $35 reported cost.
4. RPi Model 4 B 2GB: $45 reported cost.
5. RPi Model 4 B 4GB: $55 reported cost.
6. RPi 4B 4GB No Heatsink: $55 reported cost.
7. RPi 4B Rev 1.2 4GB XL Heatsink: $58 reported cost.
8. RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v: $73 reported cost.
9. RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v: $73 reported cost.
10. Odroid N2 4GB Stock Heatsink: $124 reported cost.

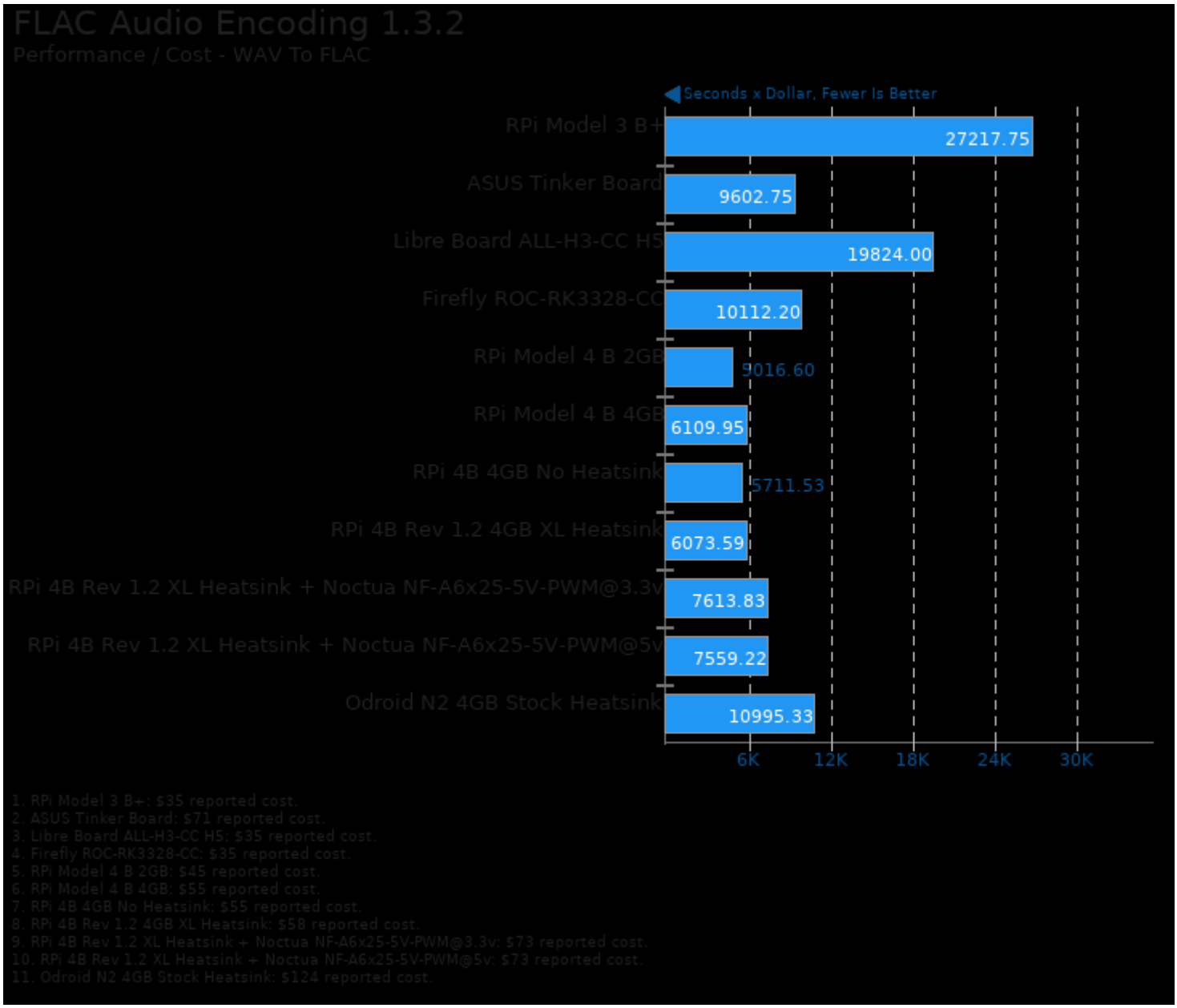
Raspberry Pi Model 4 Benchmarks



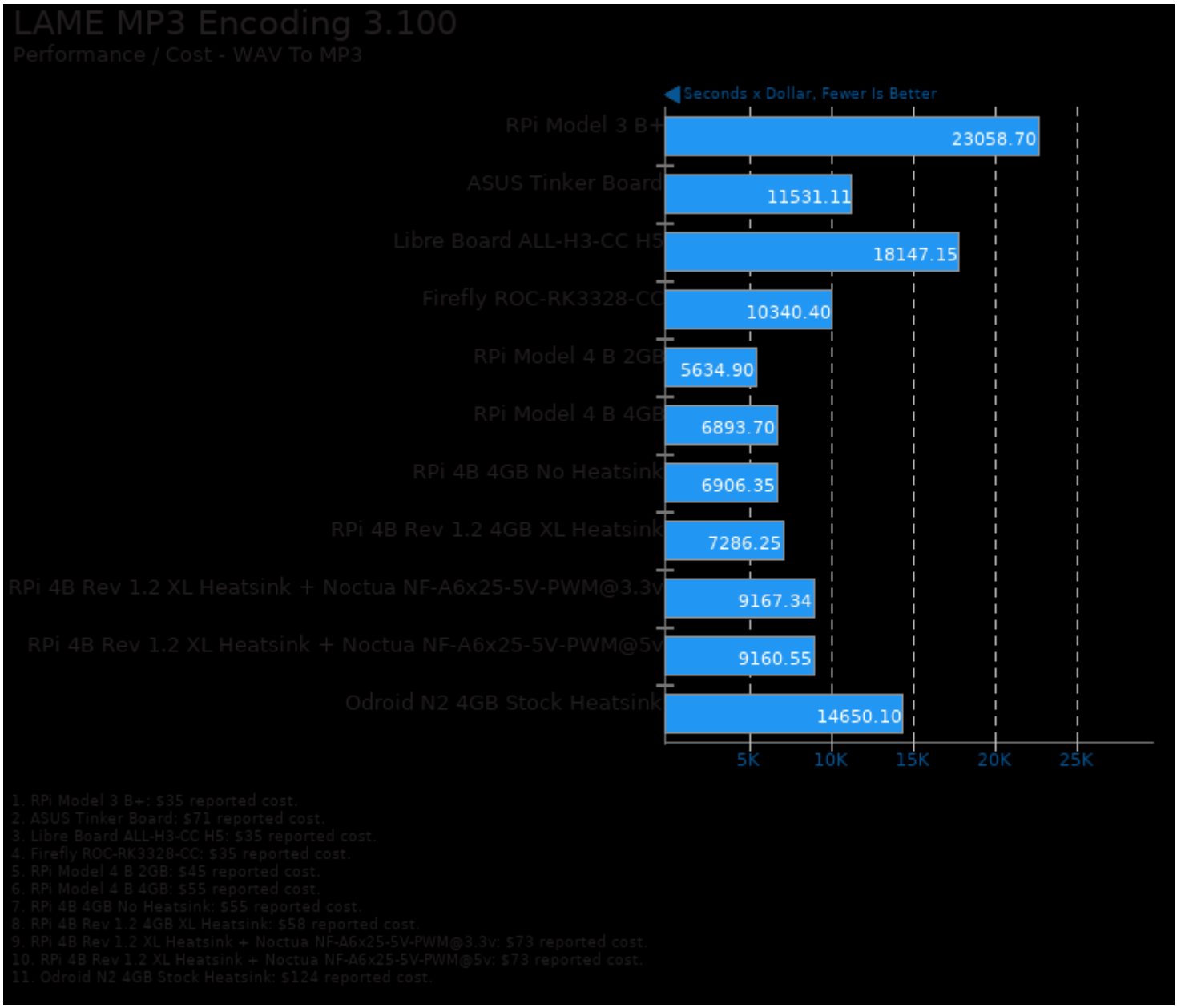
Raspberry Pi Model 4 Benchmarks



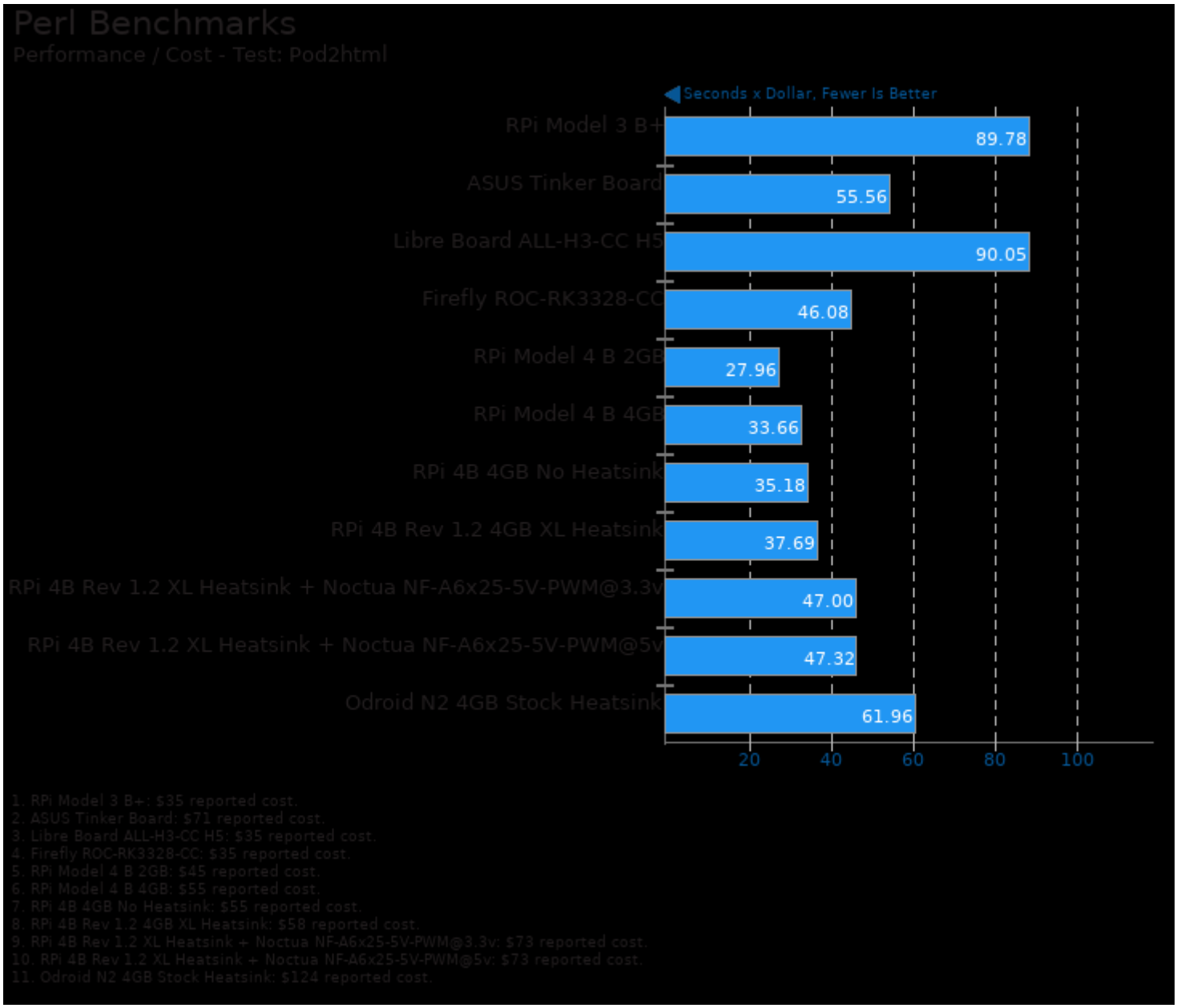
Raspberry Pi Model 4 Benchmarks



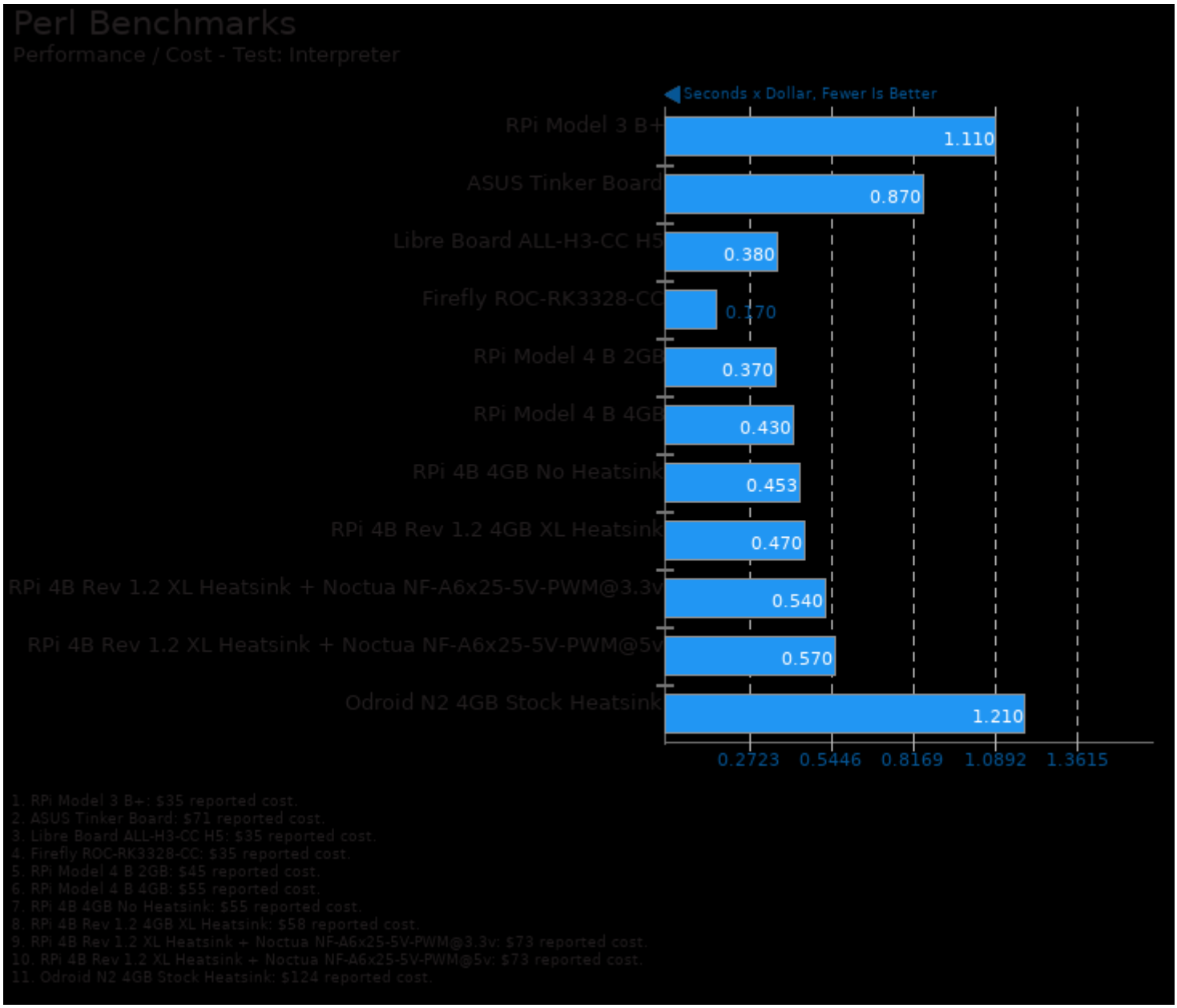
Raspberry Pi Model 4 Benchmarks



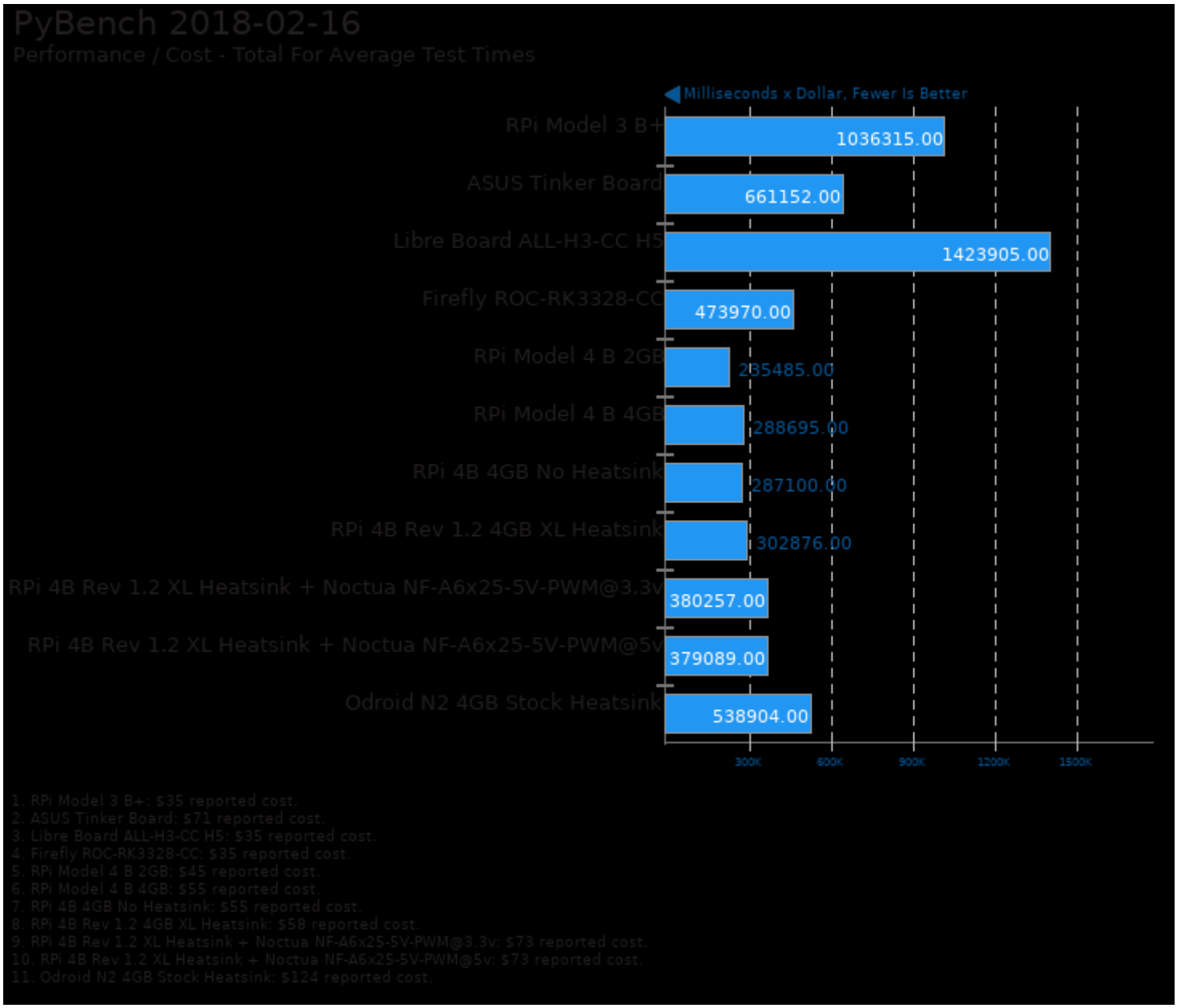
Raspberry Pi Model 4 Benchmarks

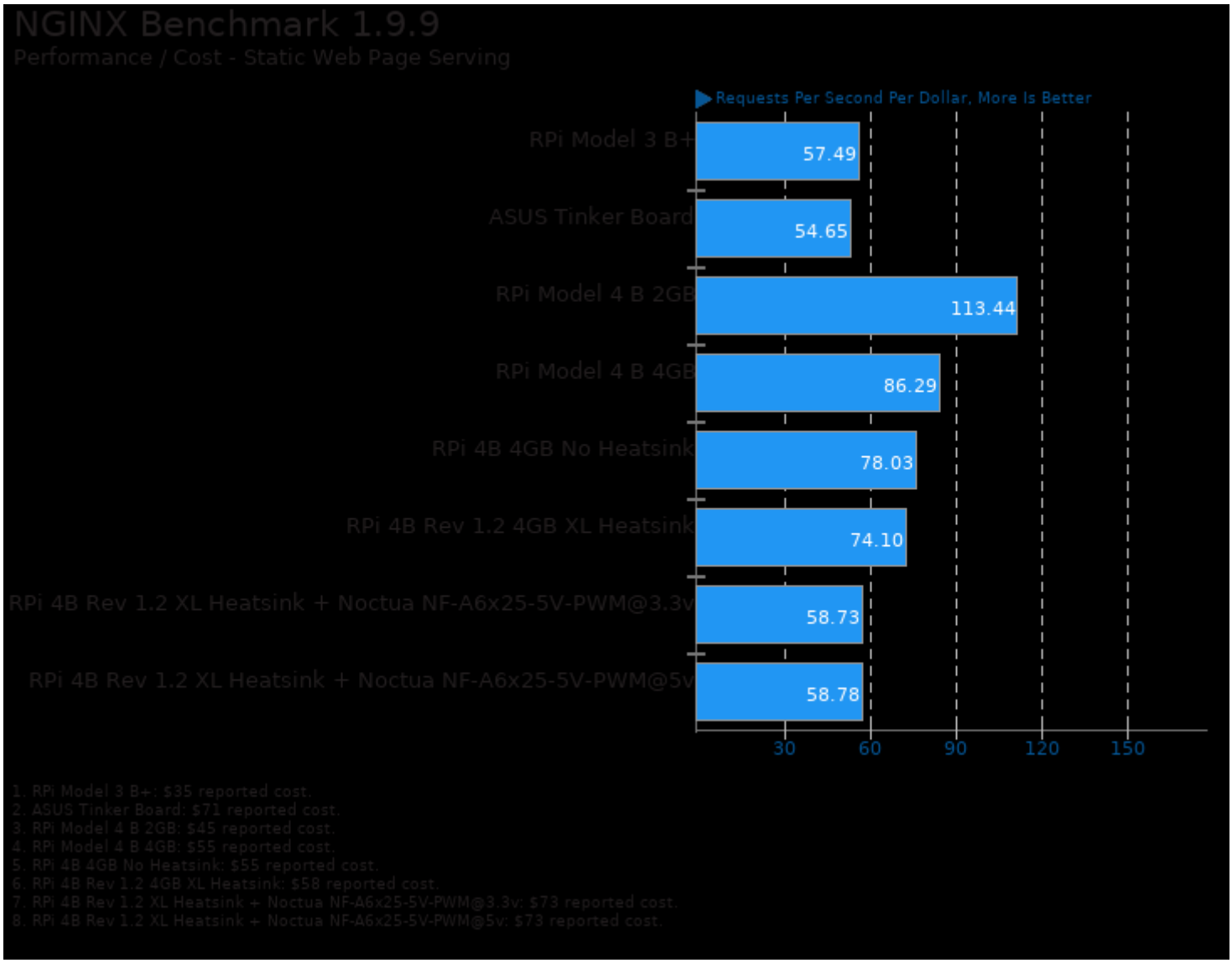


Raspberry Pi Model 4 Benchmarks

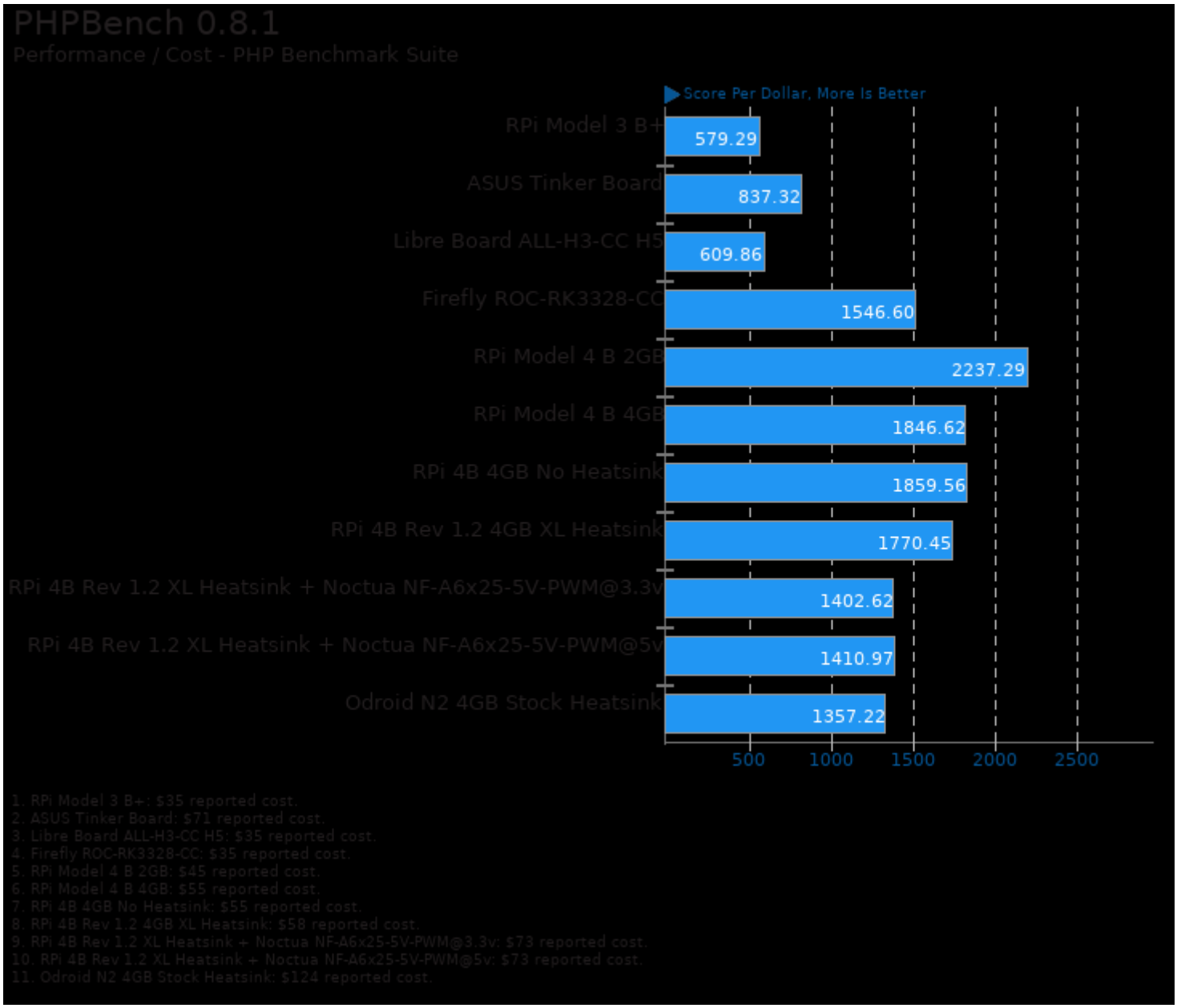


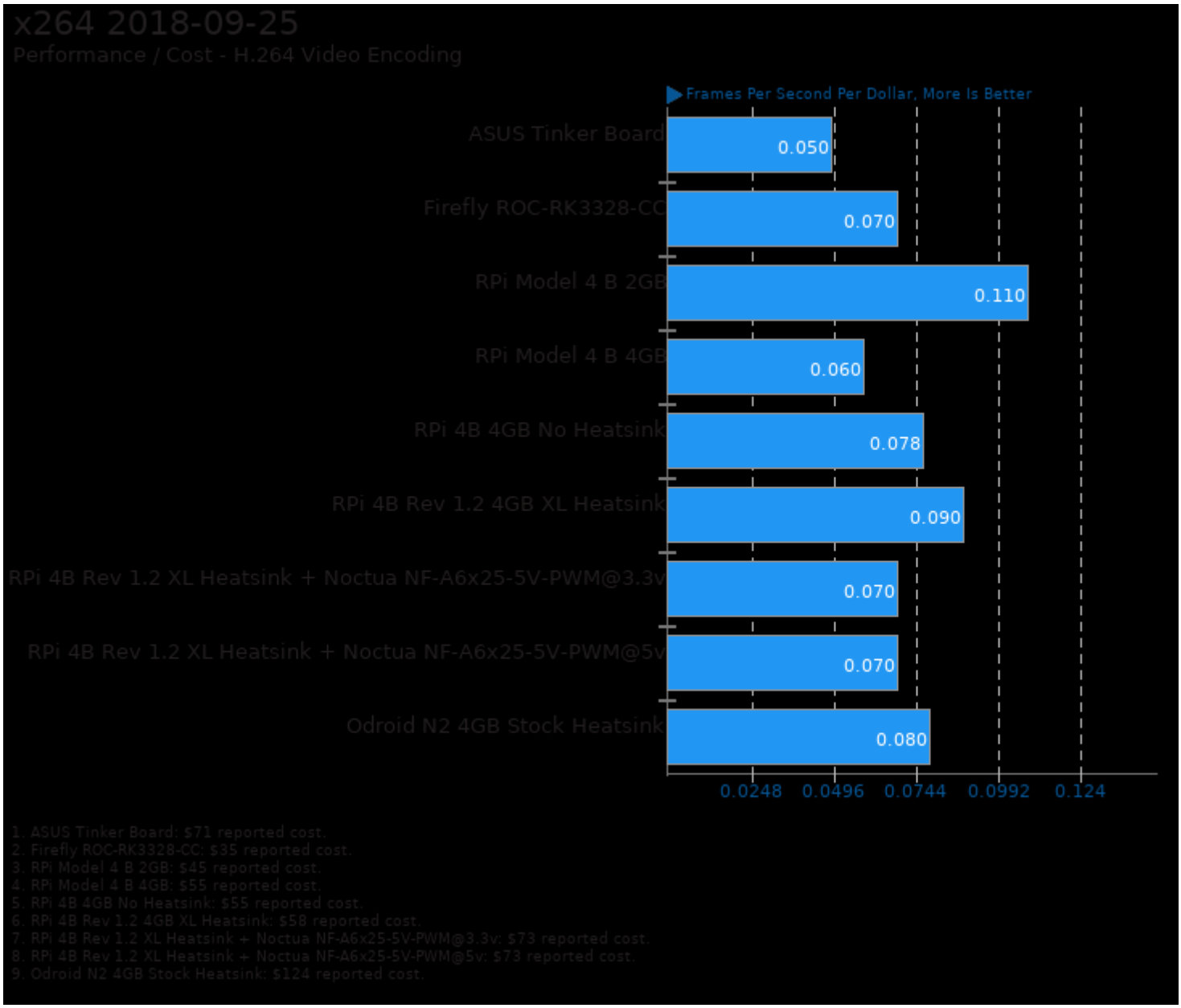
Raspberry Pi Model 4 Benchmarks



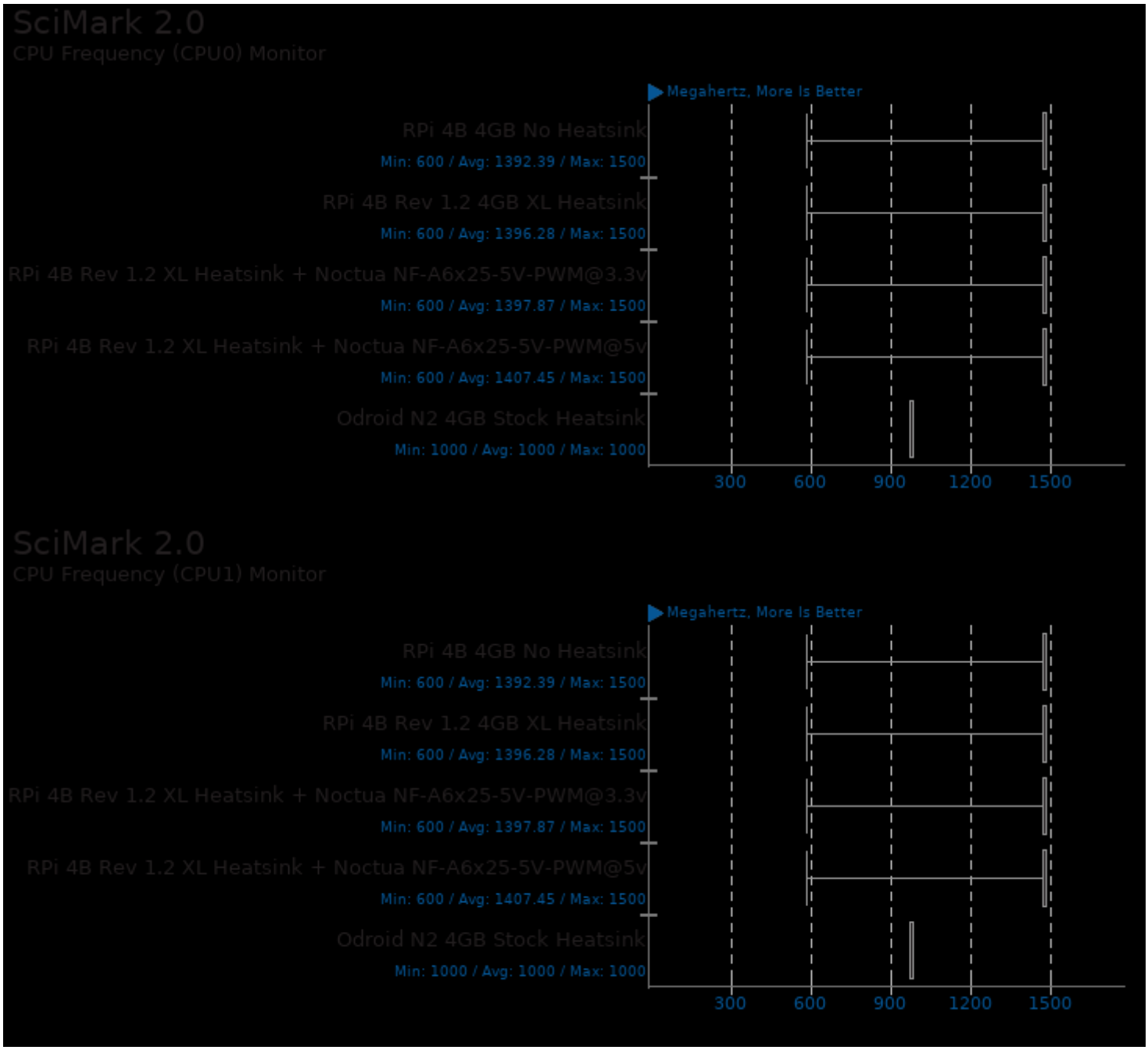

NGINX Benchmark 1.9.9
Performance / Cost - Static Web Page Serving
Requests Per Second Per Dollar, More Is Better
RPi Model 3 B+
57.49
ASUS Tinker Board
54.65
RPi Model 4 B 2GB
113.44
RPi Model 4 B 4GB
86.29
RPi 4B 4GB No Heatsink
78.03
RPi 4B Rev 1.2 4GB XL Heatsink
74.10
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
58.73
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
58.78
30
60
90
120
150
1. RPi Model 3 B+: $35 reported cost.
2. ASUS Tinker Board: $71 reported cost.
3. RPi Model 4 B 2GB: $45 reported cost.
4. RPi Model 4 B 4GB: $55 reported cost.
5. RPi 4B 4GB No Heatsink: $55 reported cost.
6. RPi 4B Rev 1.2 4GB XL Heatsink: $58 reported cost.
7. RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v: $73 reported cost.
8. RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v: $73 reported cost.

Raspberry Pi Model 4 Benchmarks

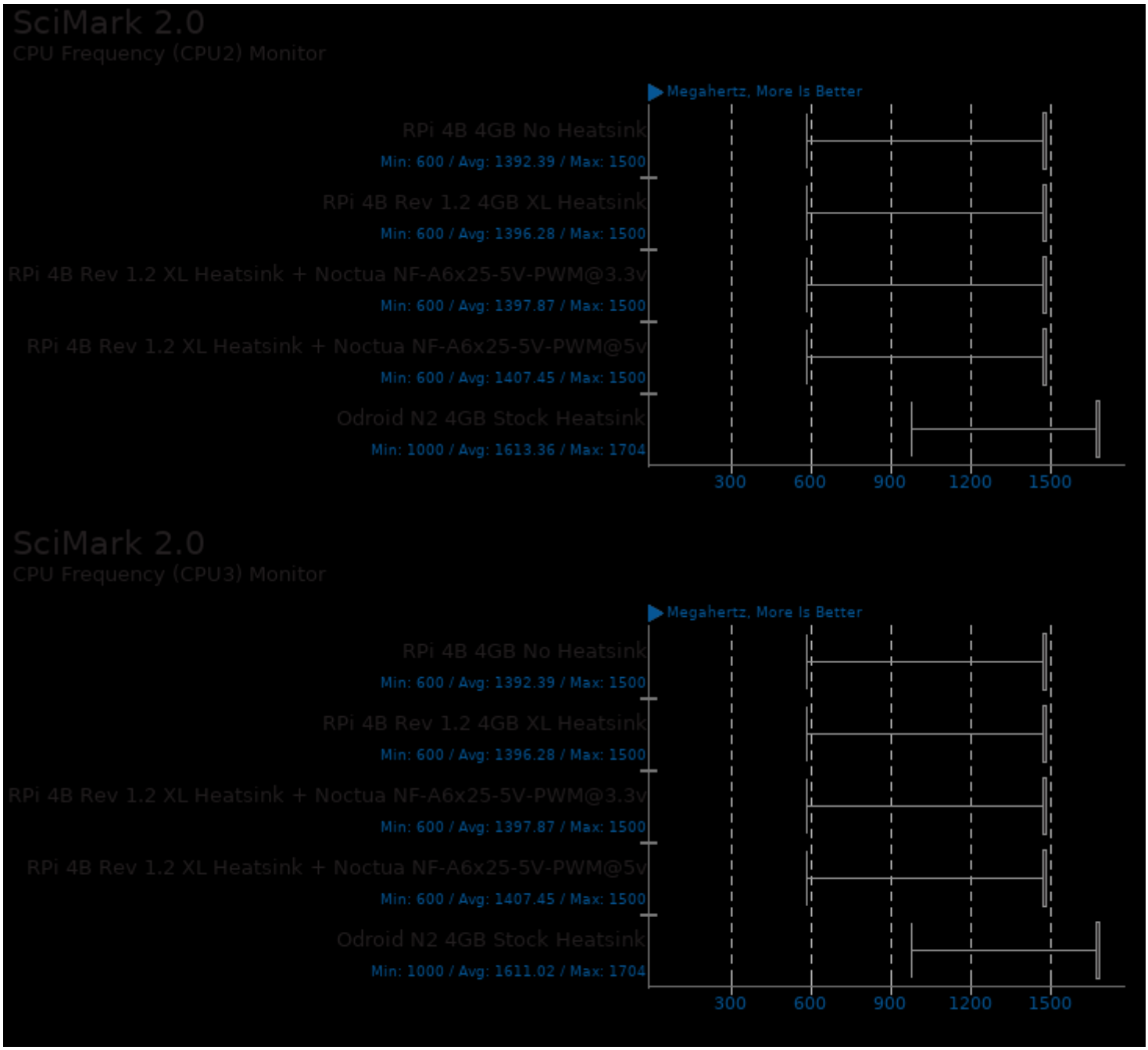



x264 2018-09-25
Performance / Cost - H.264 Video Encoding
Frames Per Second Per Dollar, More Is Better
ASUS Tinker Board
0.050
Firefly ROC-RK3328-CC
0.070
RPi Model 4 B 2GB
0.110
RPi Model 4 B 4GB
0.060
RPi 4B 4GB No Heatsink
0.078
RPi 4B Rev 1.2 4GB XL Heatsink
0.090
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
0.070
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
0.070
Odroid N2 4GB Stock Heatsink
0.080
0.0248
0.0496
0.0744
0.0992
0.124
1. ASUS Tinker Board: $71 reported cost.
2. Firefly ROC-RK3328-CC: $35 reported cost.
3. RPi Model 4 B 2GB: $45 reported cost.
4. RPi Model 4 B 4GB: $55 reported cost.
5. RPi 4B 4GB No Heatsink: $55 reported cost.
6. RPi 4B Rev 1.2 4GB XL Heatsink: $58 reported cost.
7. RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v: $73 reported cost.
8. RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v: $73 reported cost.
9. Odroid N2 4GB Stock Heatsink: $124 reported cost.

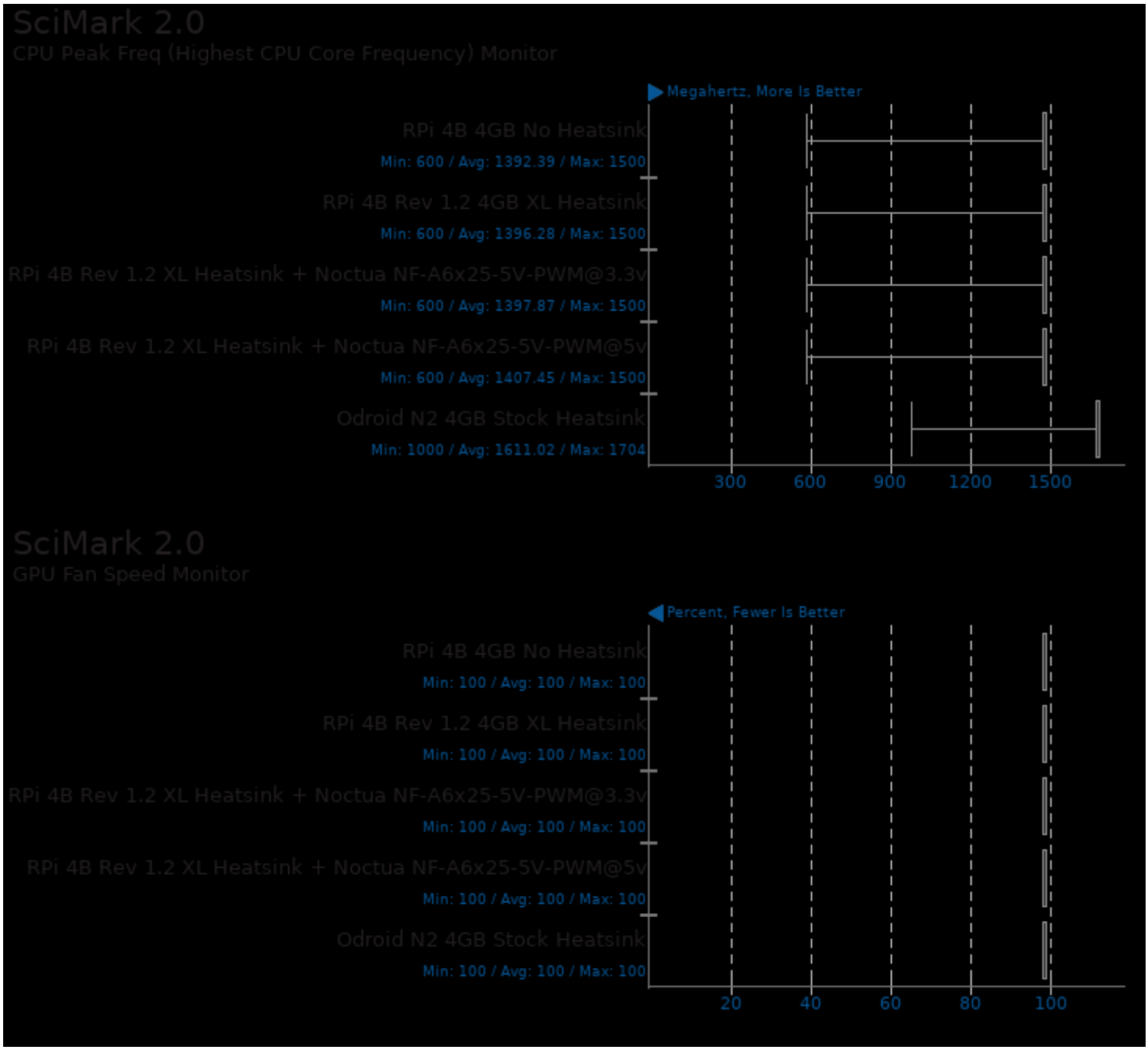
Raspberry Pi Model 4 Benchmarks



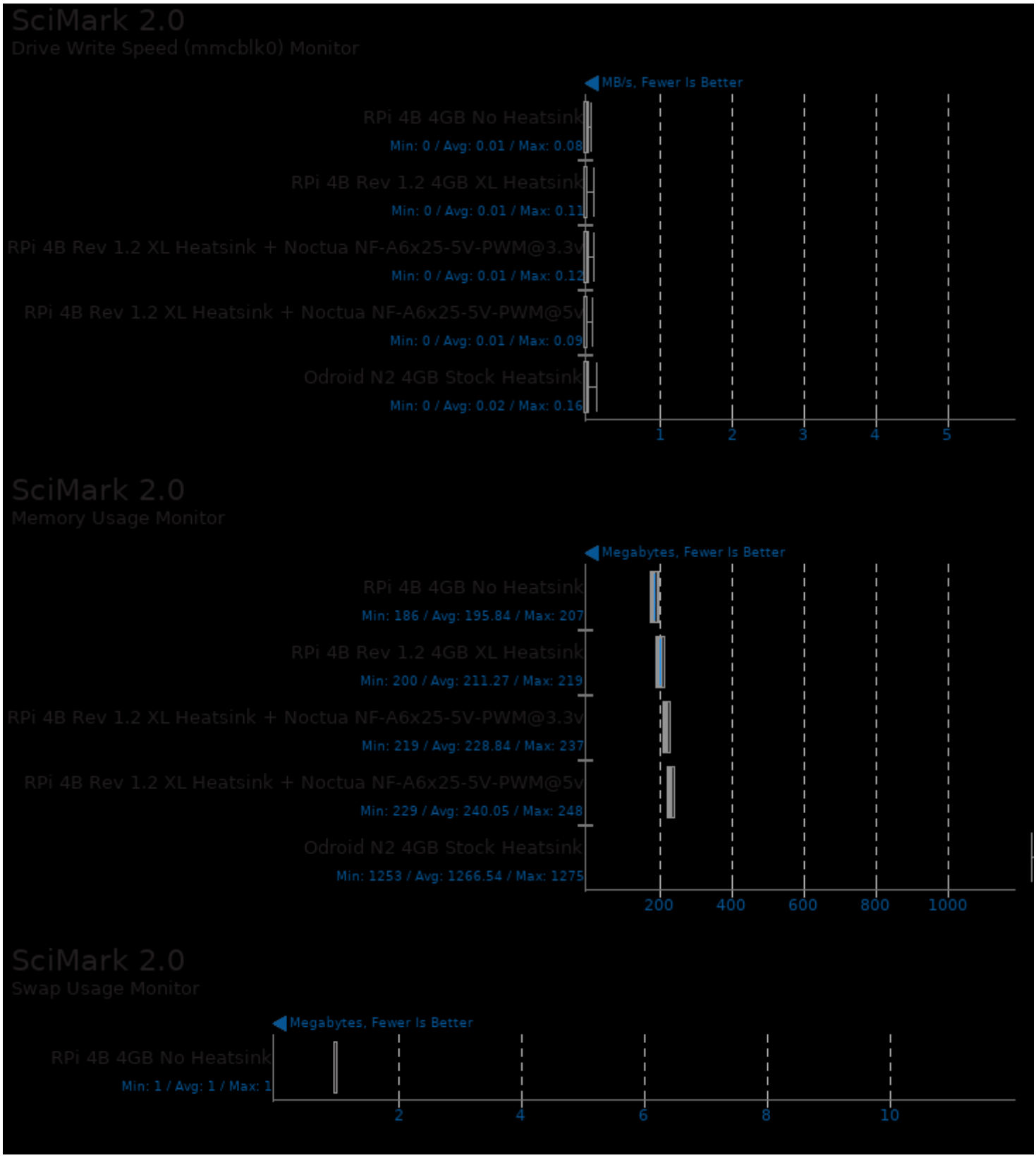
Raspberry Pi Model 4 Benchmarks



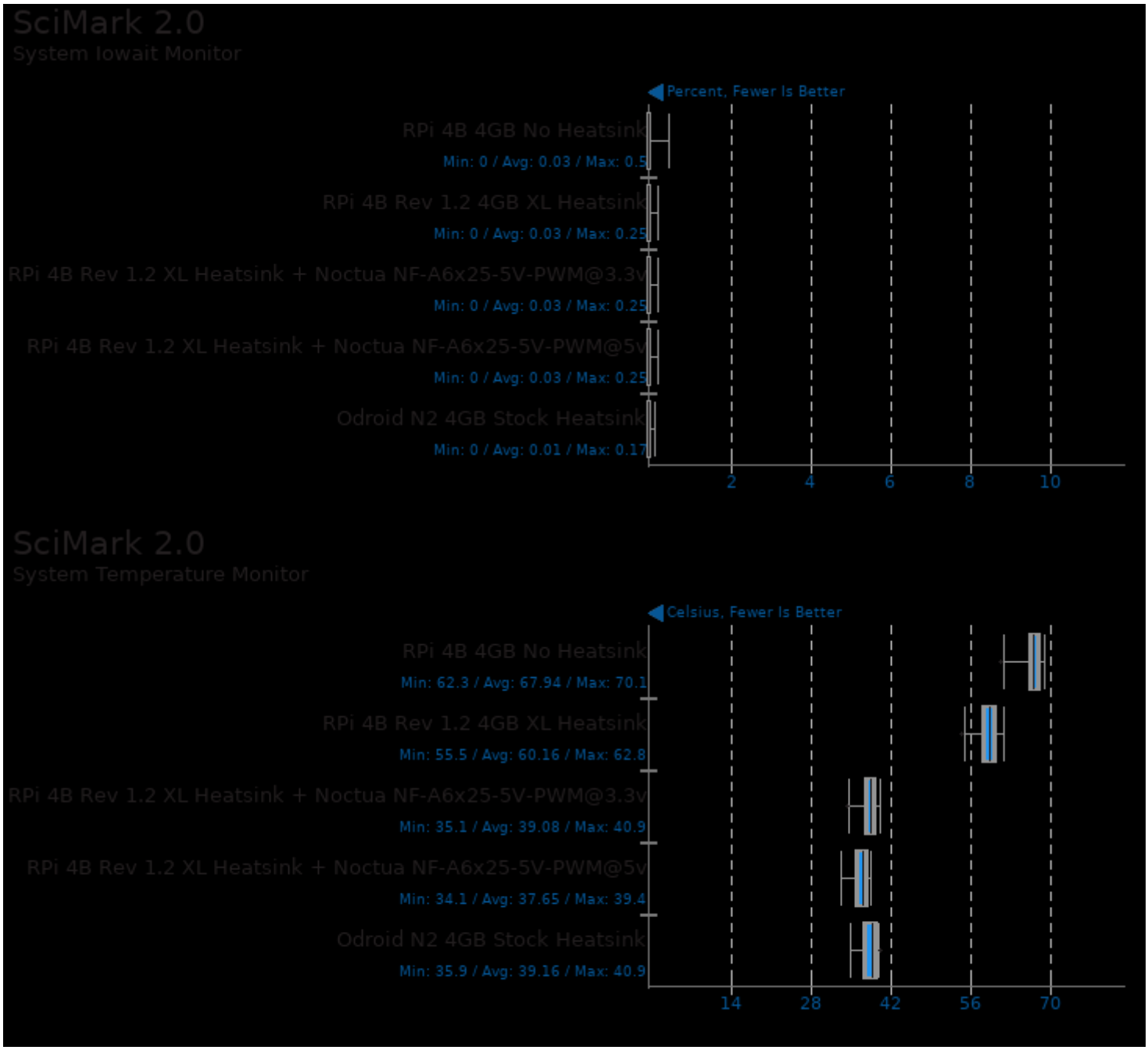
Raspberry Pi Model 4 Benchmarks

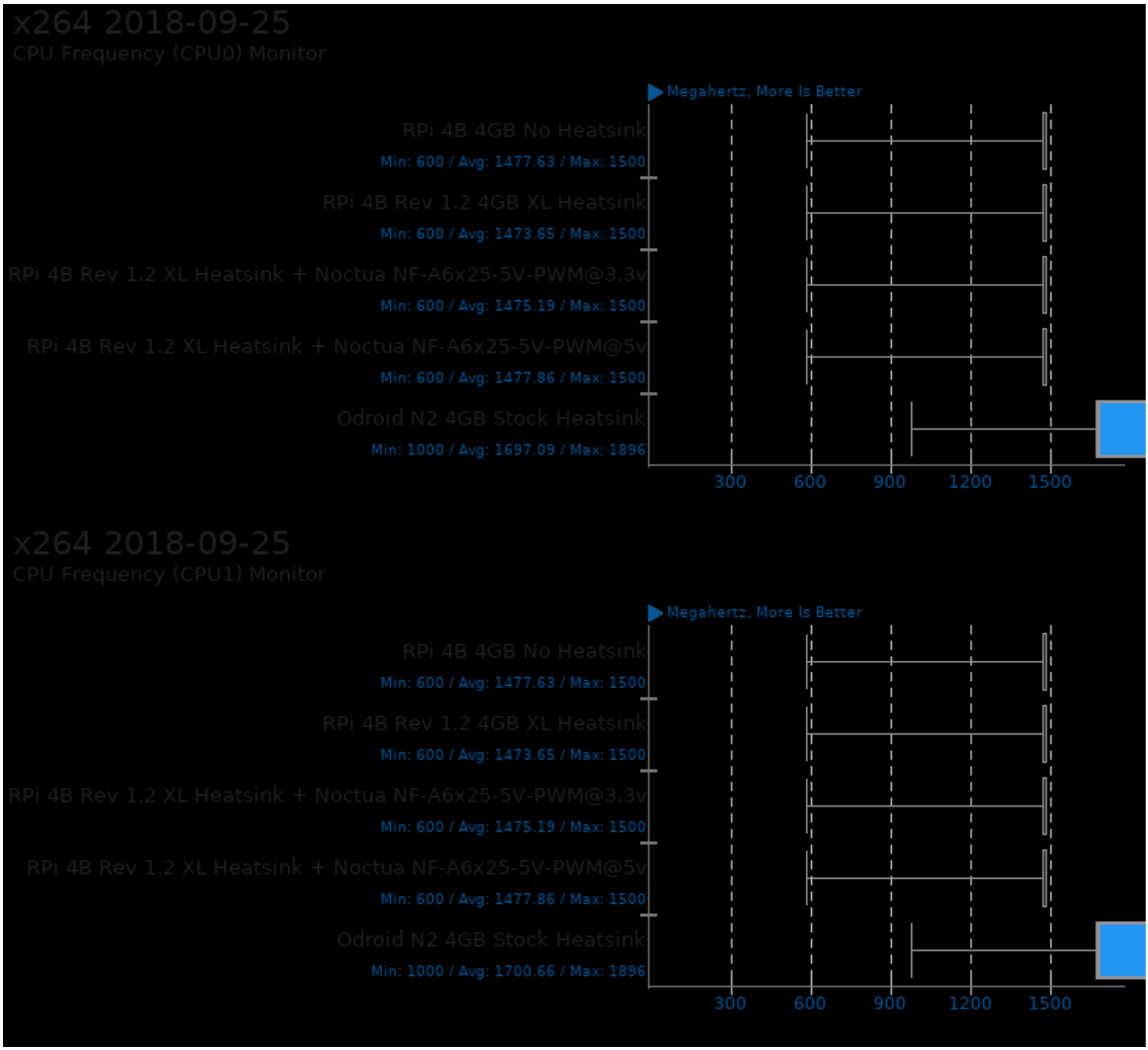


Raspberry Pi Model 4 Benchmarks

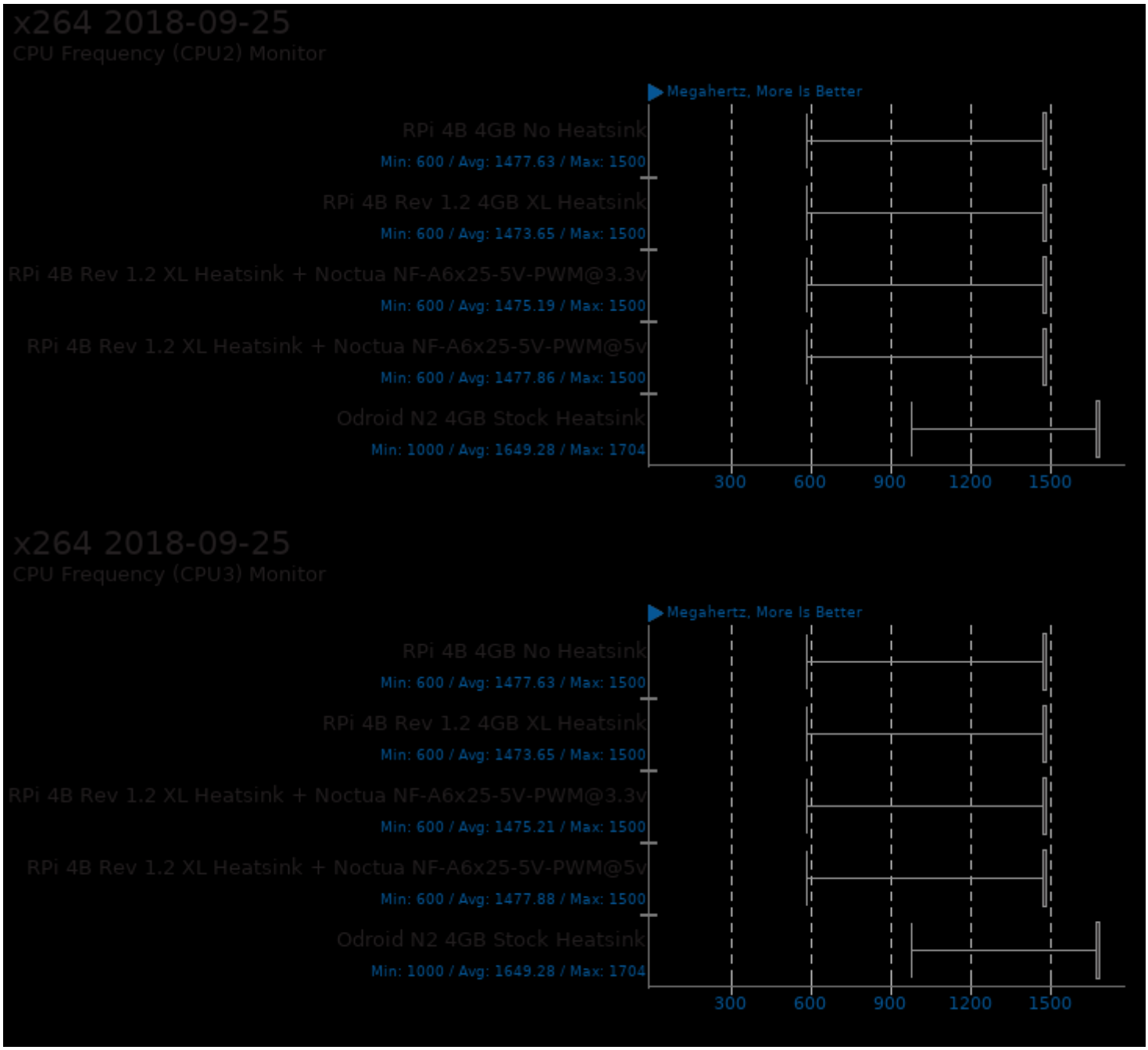


Raspberry Pi Model 4 Benchmarks

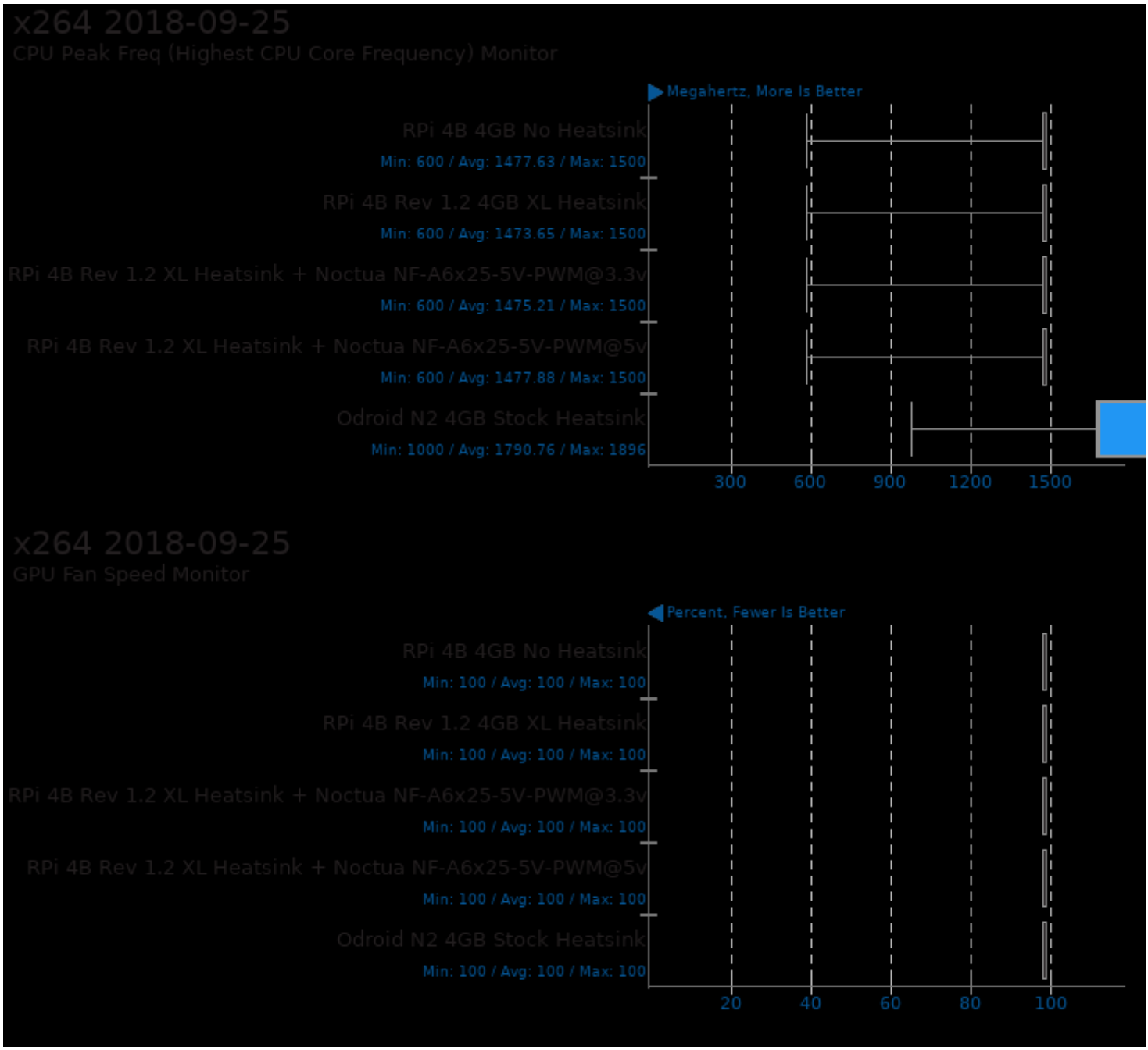


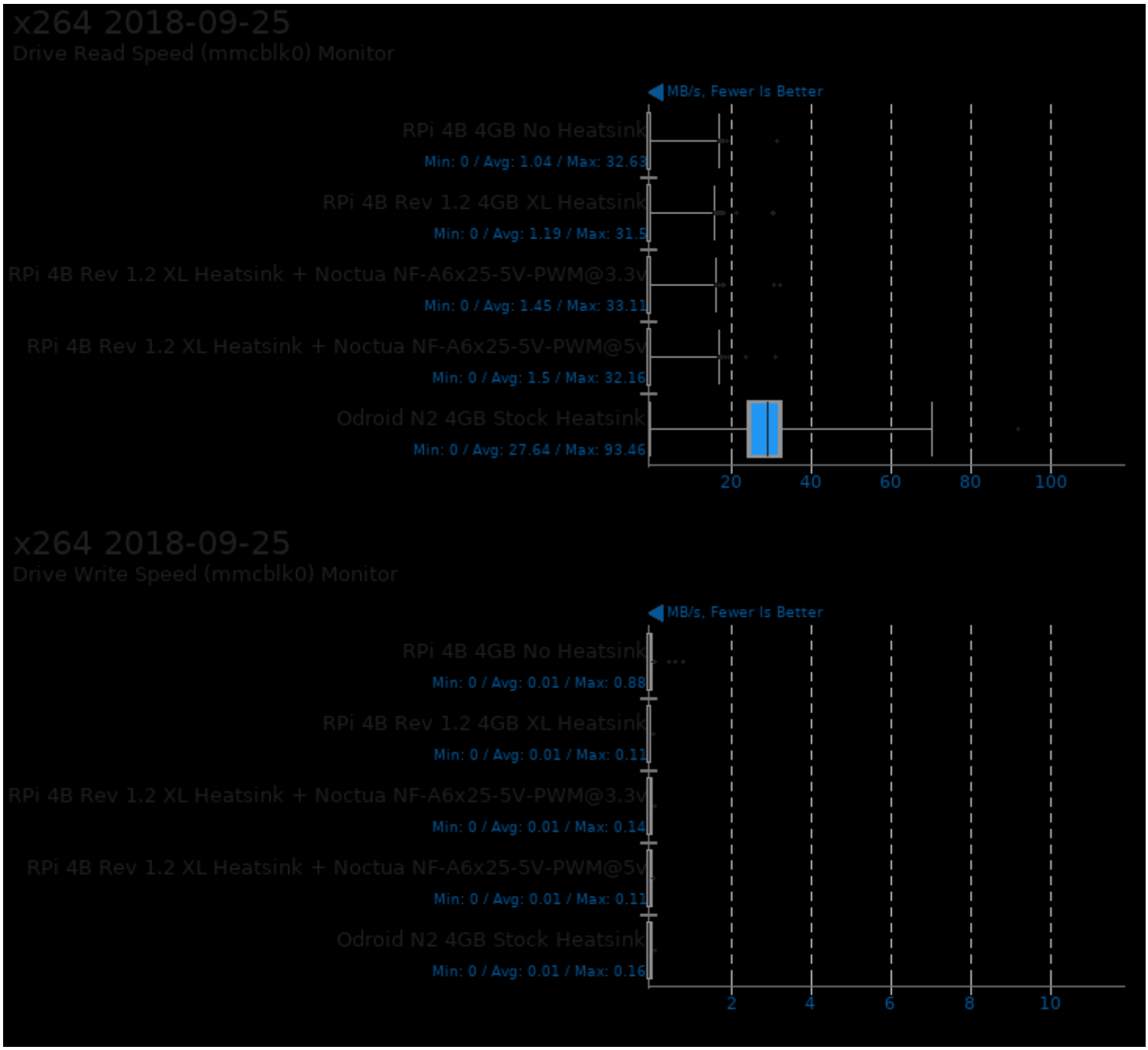

x264 2018-09-25
CPU Frequency (CPU0) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1477.63 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1473.65 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1475.19 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1477.86 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1697.09 / Max: 1896
300
600
900
1200
1500

x264 2018-09-25
CPU Frequency (CPU1) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1477.63 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1473.65 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1475.19 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1477.86 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1700.66 / Max: 1896
300
600
900
1200
1500

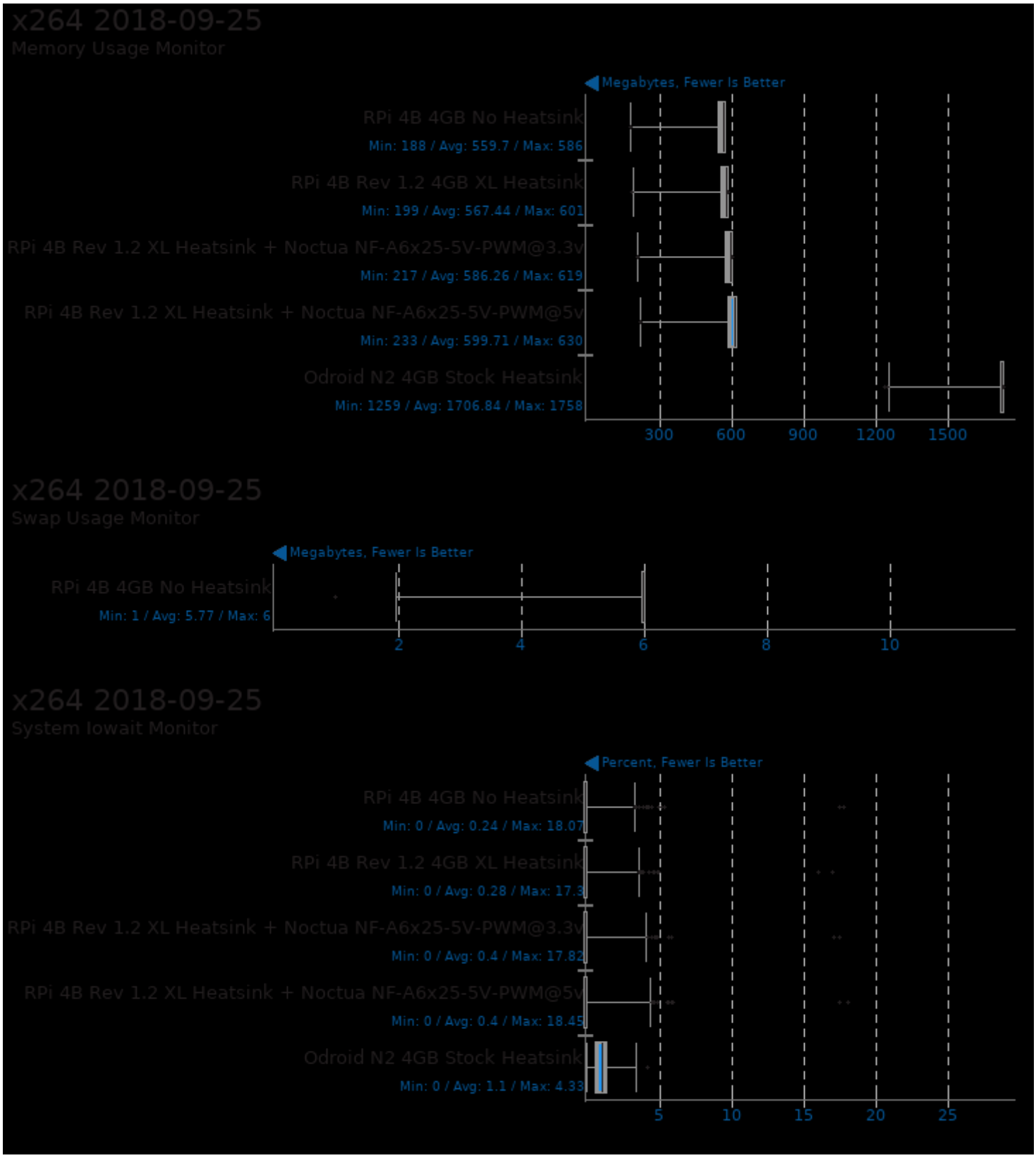

x264 2018-09-25
CPU Frequency (CPU2) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1477.63 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1473.65 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1475.19 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1477.86 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1649.28 / Max: 1704
300
600
900
1200
1500
x264 2018-09-25
CPU Frequency (CPU3) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1477.63 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1473.65 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1475.21 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1477.88 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1649.28 / Max: 1704
300
600
900
1200
1500

Raspberry Pi Model 4 Benchmarks

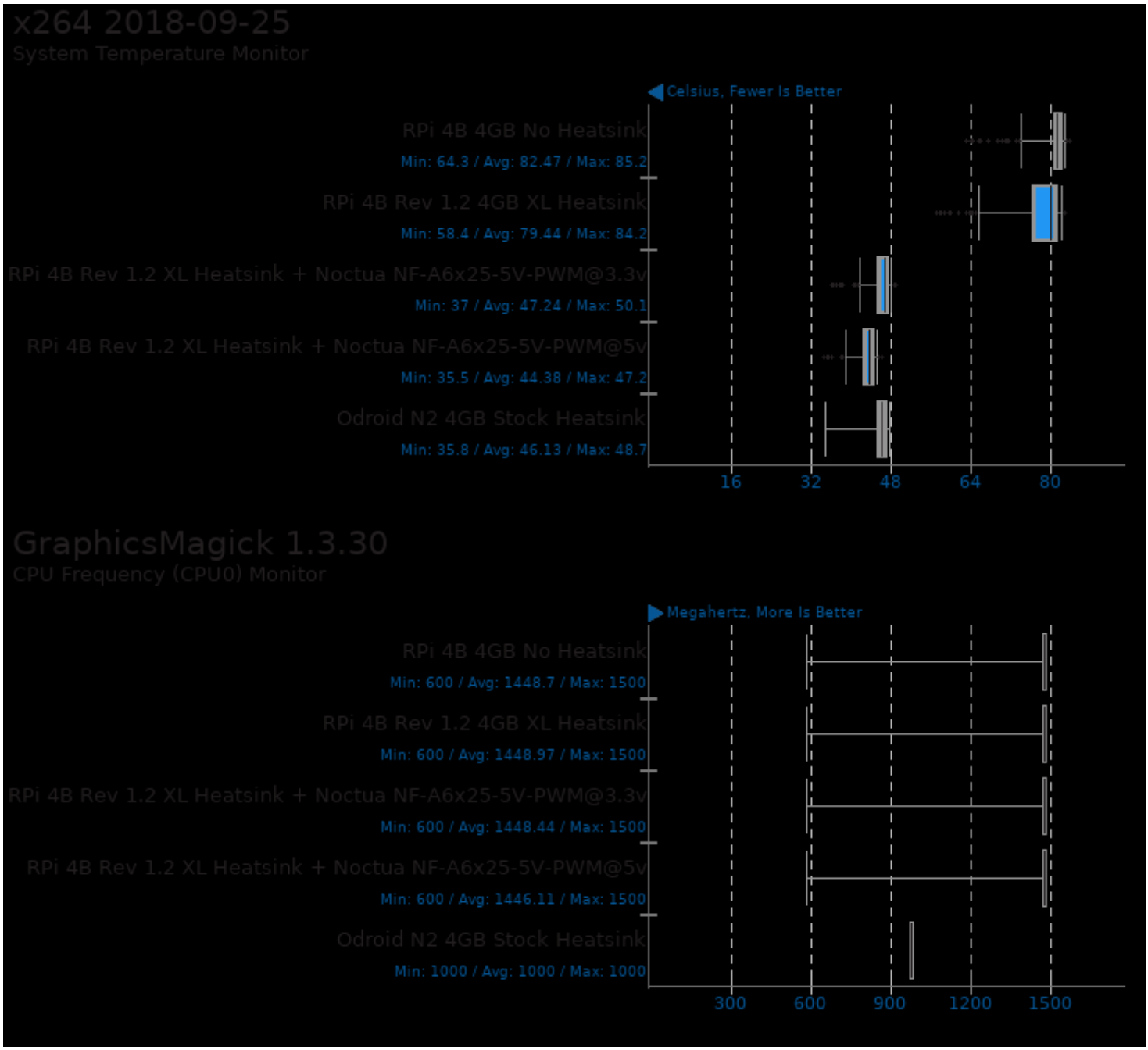


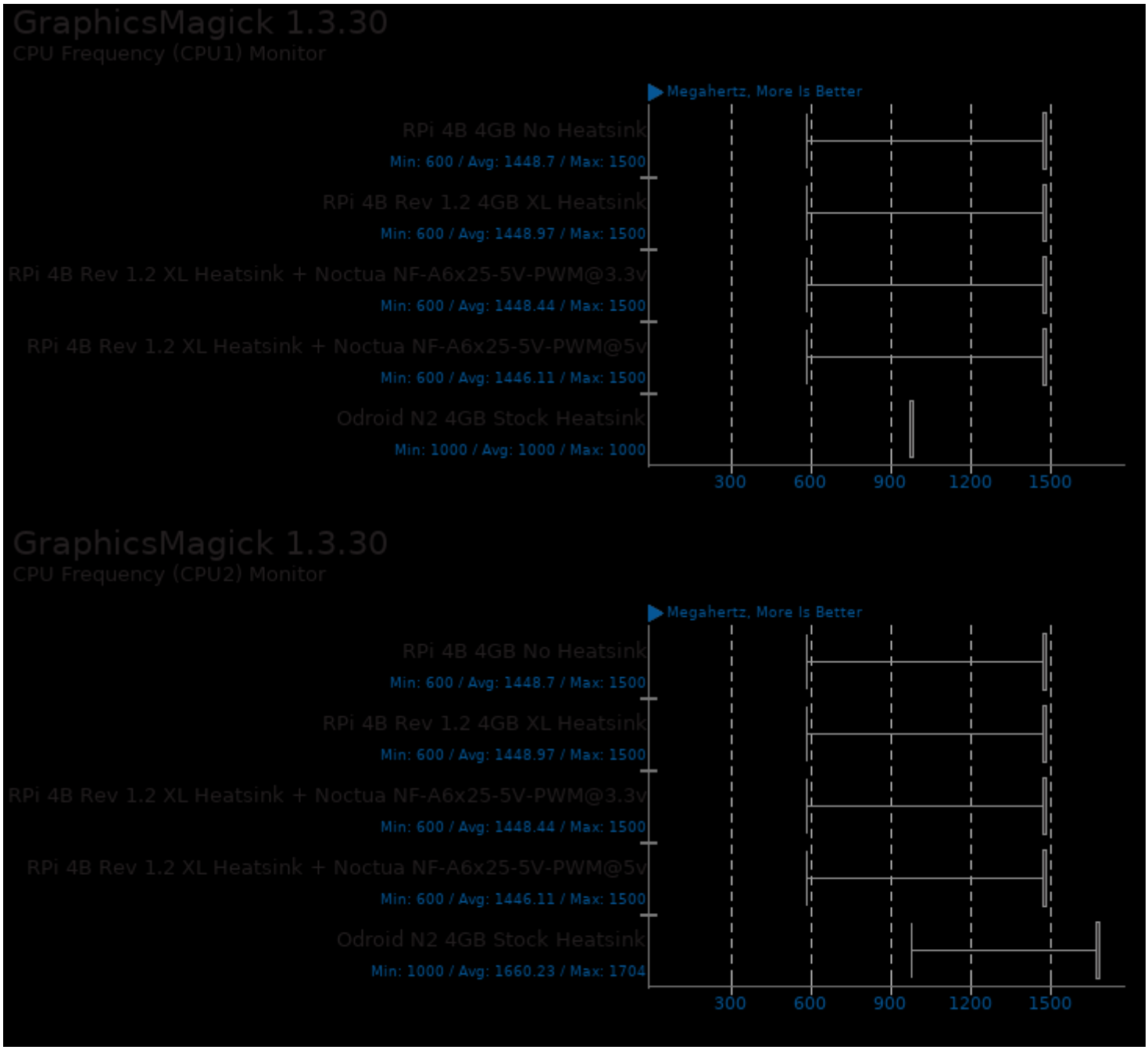

x264 2018-09-25
Drive Read Speed (mmcblk0) Monitor
MB/s, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 1.04 / Max: 32.63
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 1.19 / Max: 31.5
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 1.45 / Max: 33.11
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 1.5 / Max: 32.16
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 27.64 / Max: 93.46
20
40
60
80
100
x264 2018-09-25
Drive Write Speed (mmcblk0) Monitor
MB/s, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.01 / Max: 0.88
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.01 / Max: 0.11
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.01 / Max: 0.14
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0.01 / Max: 0.11
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 0.01 / Max: 0.16
2
4
6
8
10

Raspberry Pi Model 4 Benchmarks

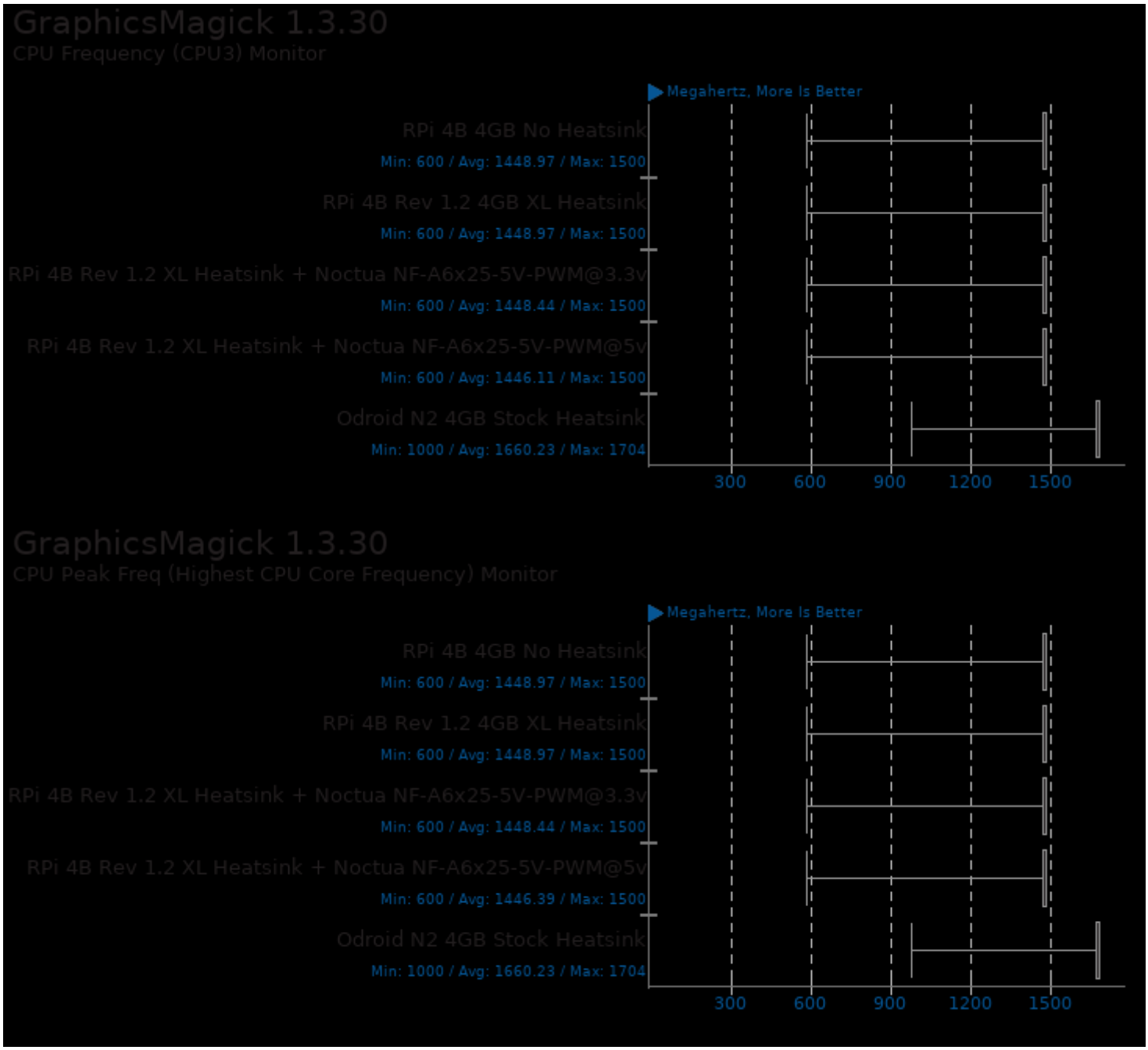


Raspberry Pi Model 4 Benchmarks



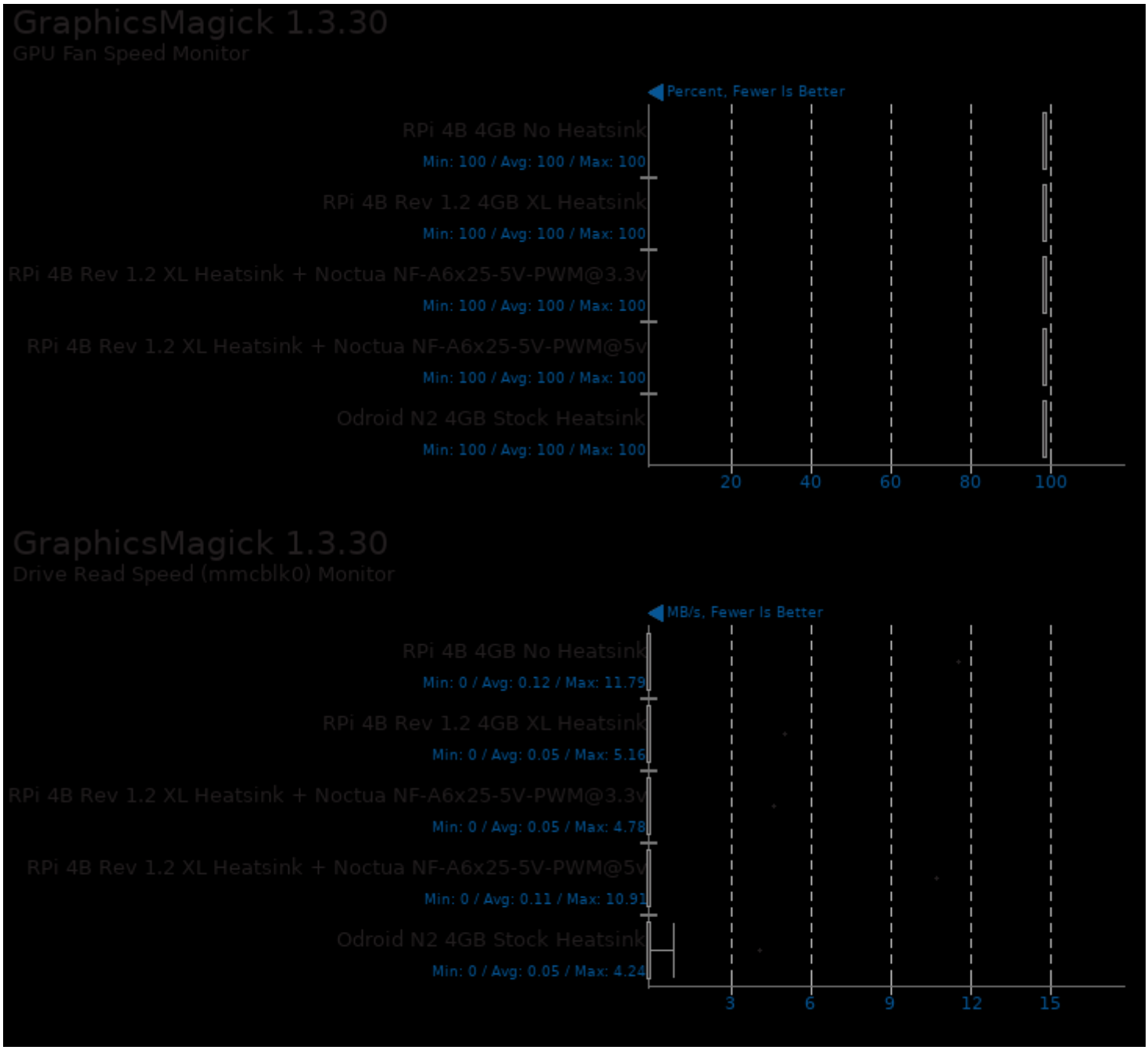

GraphicsMagick 1.3.30
CPU Frequency (CPU1) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1448.7 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1448.97 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1448.44 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1446.11 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1000 / Max: 1000
300
600
900
1200
1500

GraphicsMagick 1.3.30
CPU Frequency (CPU2) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1448.7 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1448.97 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1448.44 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1446.11 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1660.23 / Max: 1704
300
600
900
1200
1500

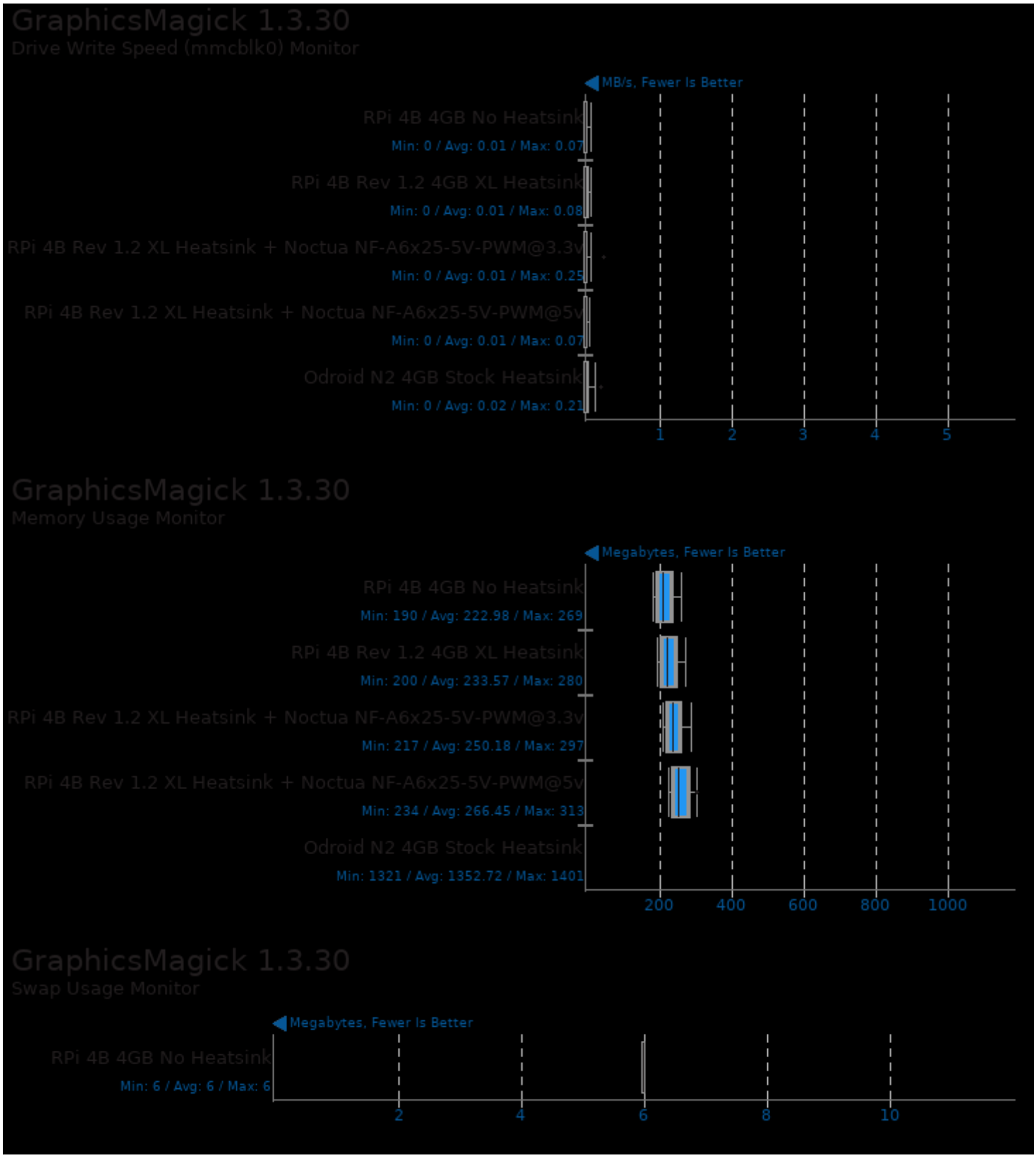

GraphicsMagick 1.3.30
CPU Frequency (CPU3) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1448.97 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1448.97 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1448.44 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1446.11 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1660.23 / Max: 1704
300
600
900
1200
1500

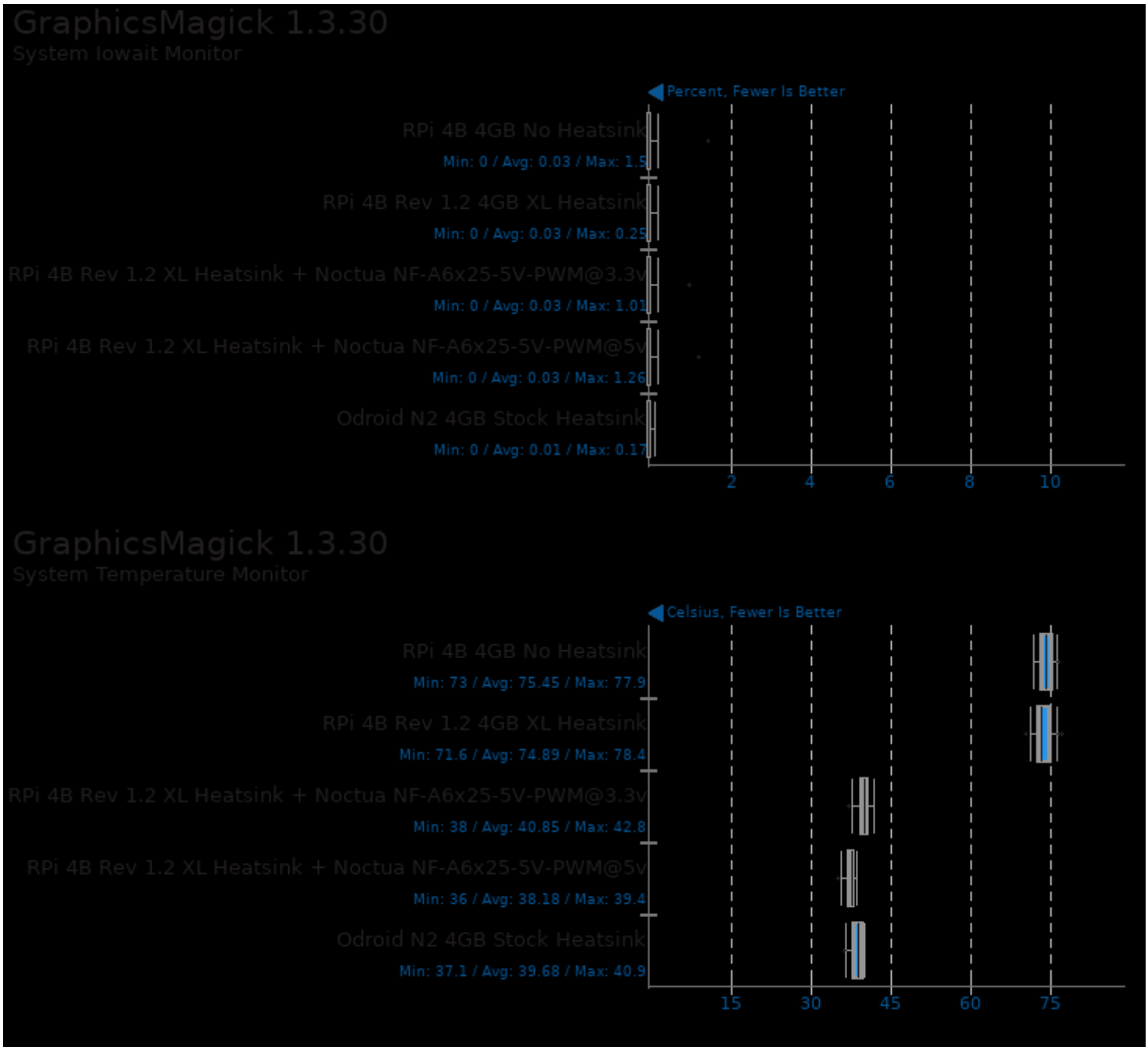
GraphicsMagick 1.3.30
CPU Peak Freq (Highest CPU Core Frequency) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1448.97 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1448.97 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1448.44 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1446.39 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1660.23 / Max: 1704
300
600
900
1200
1500

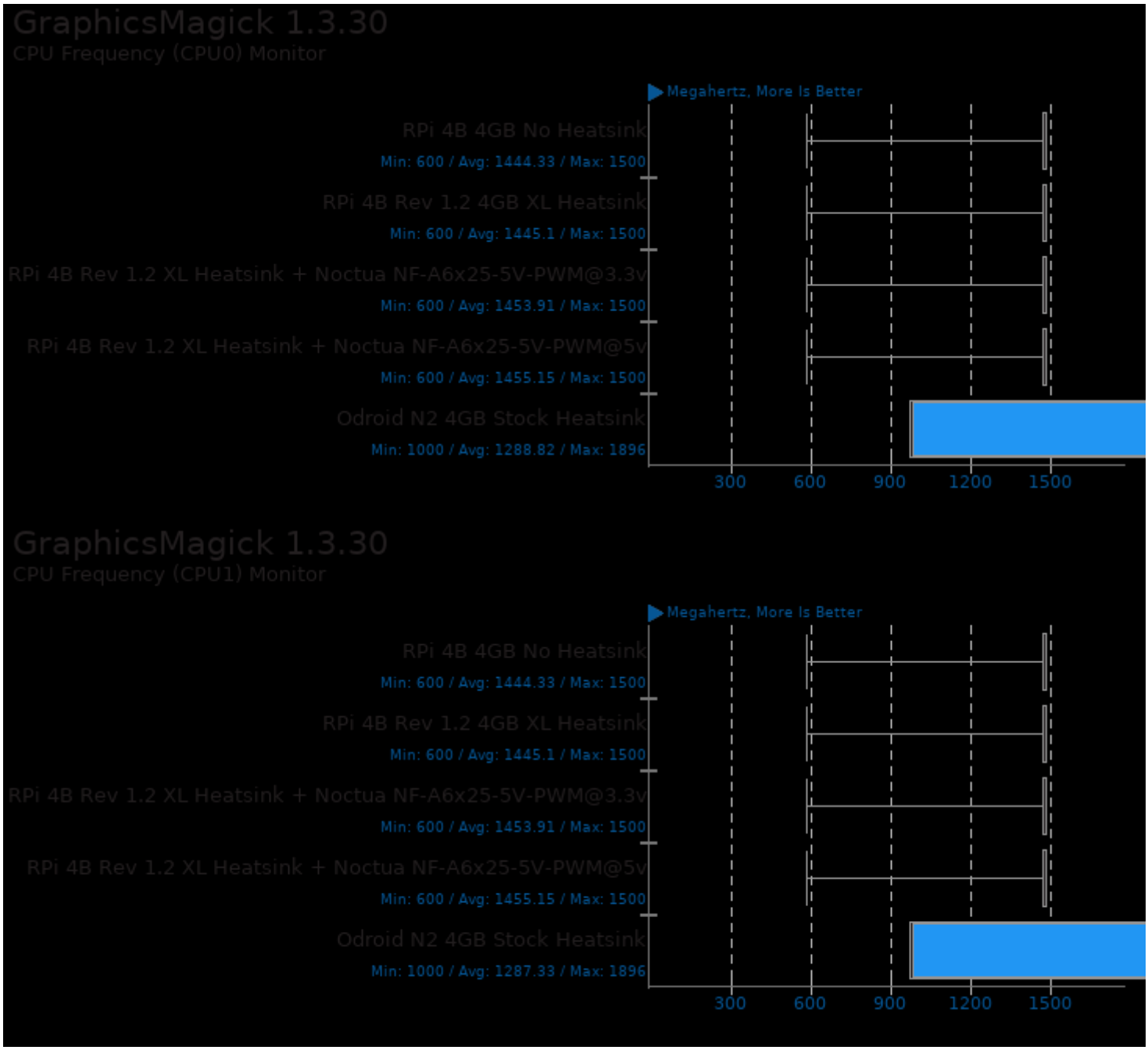
Raspberry Pi Model 4 Benchmarks

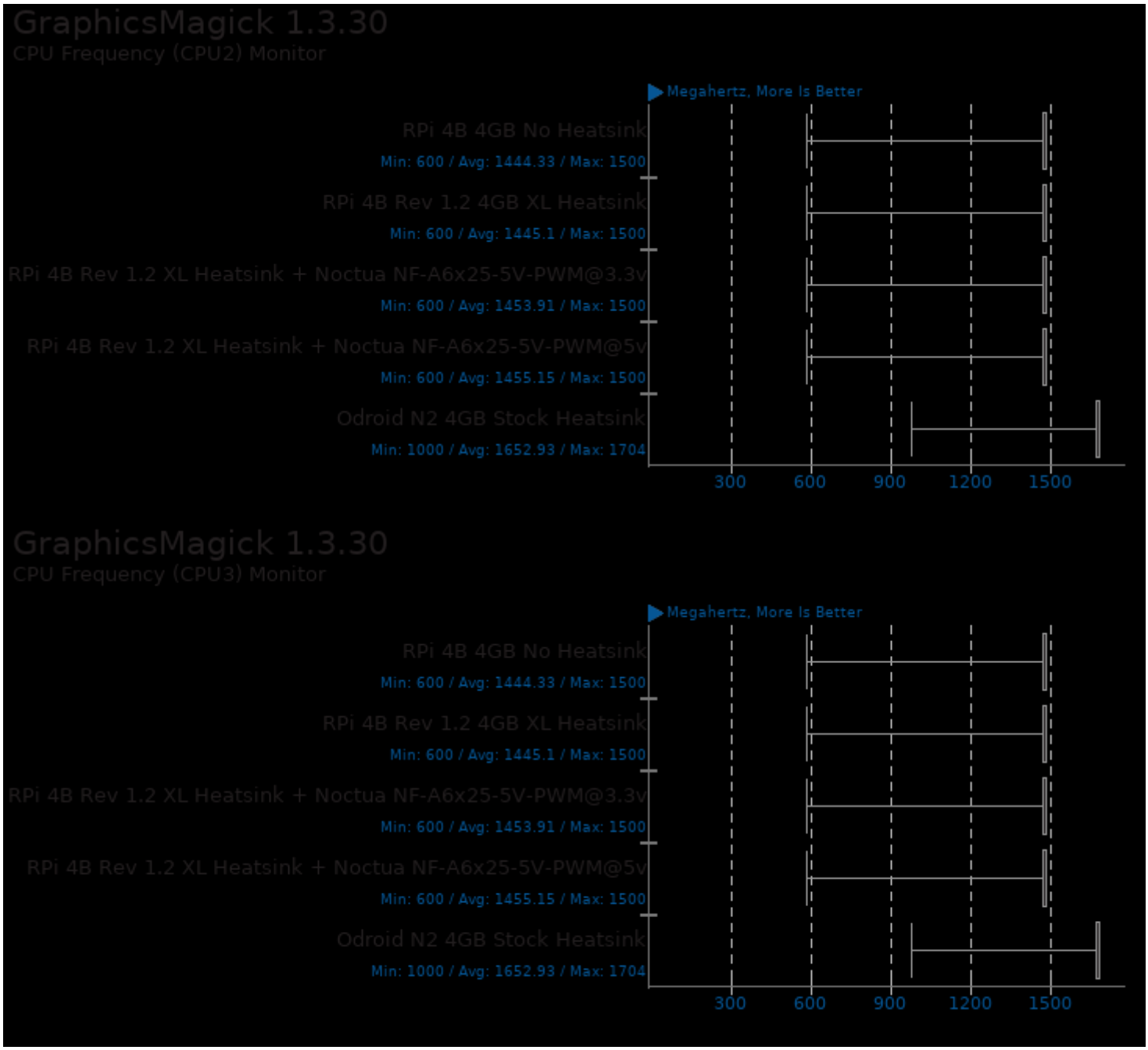


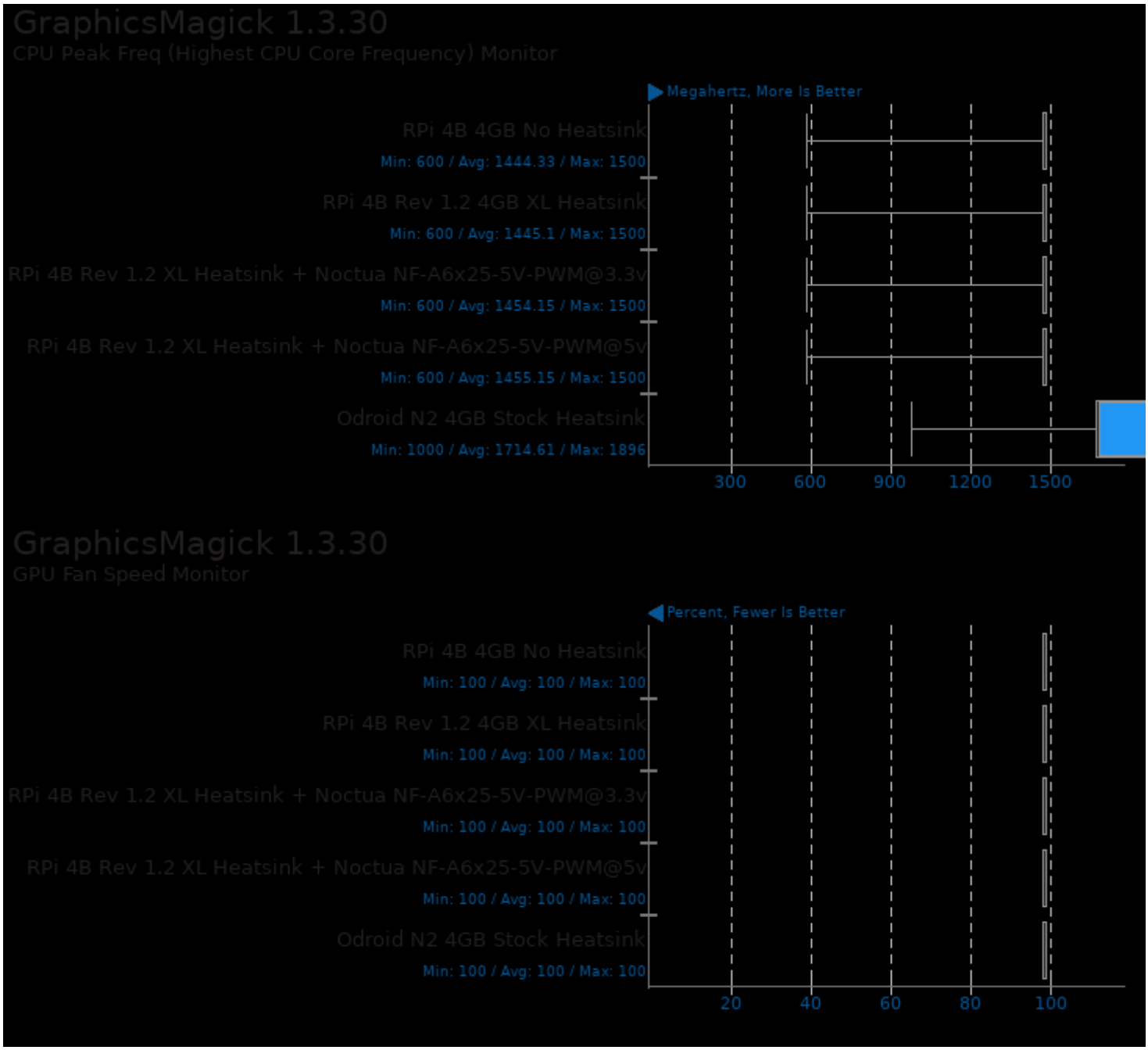
Raspberry Pi Model 4 Benchmarks

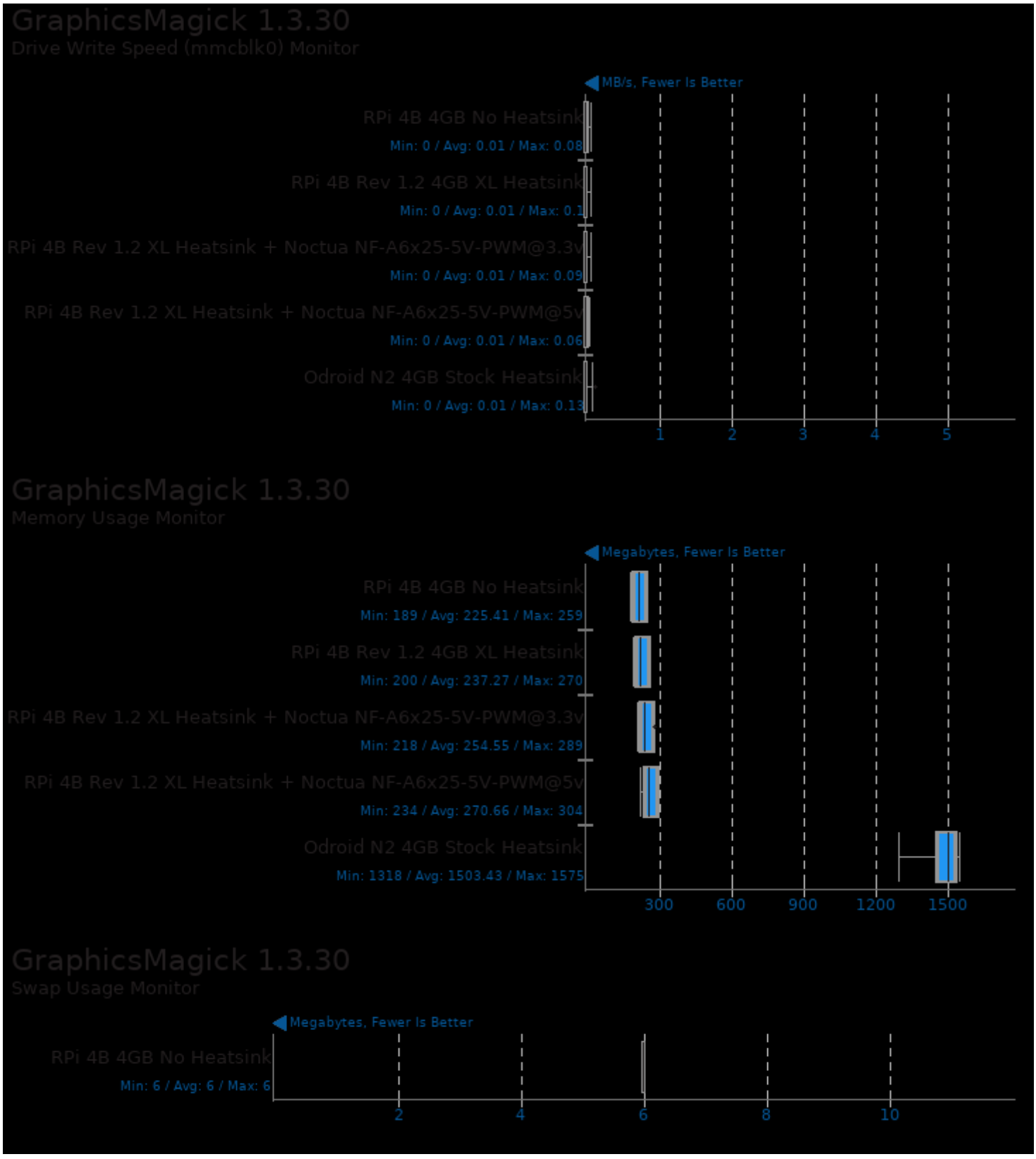


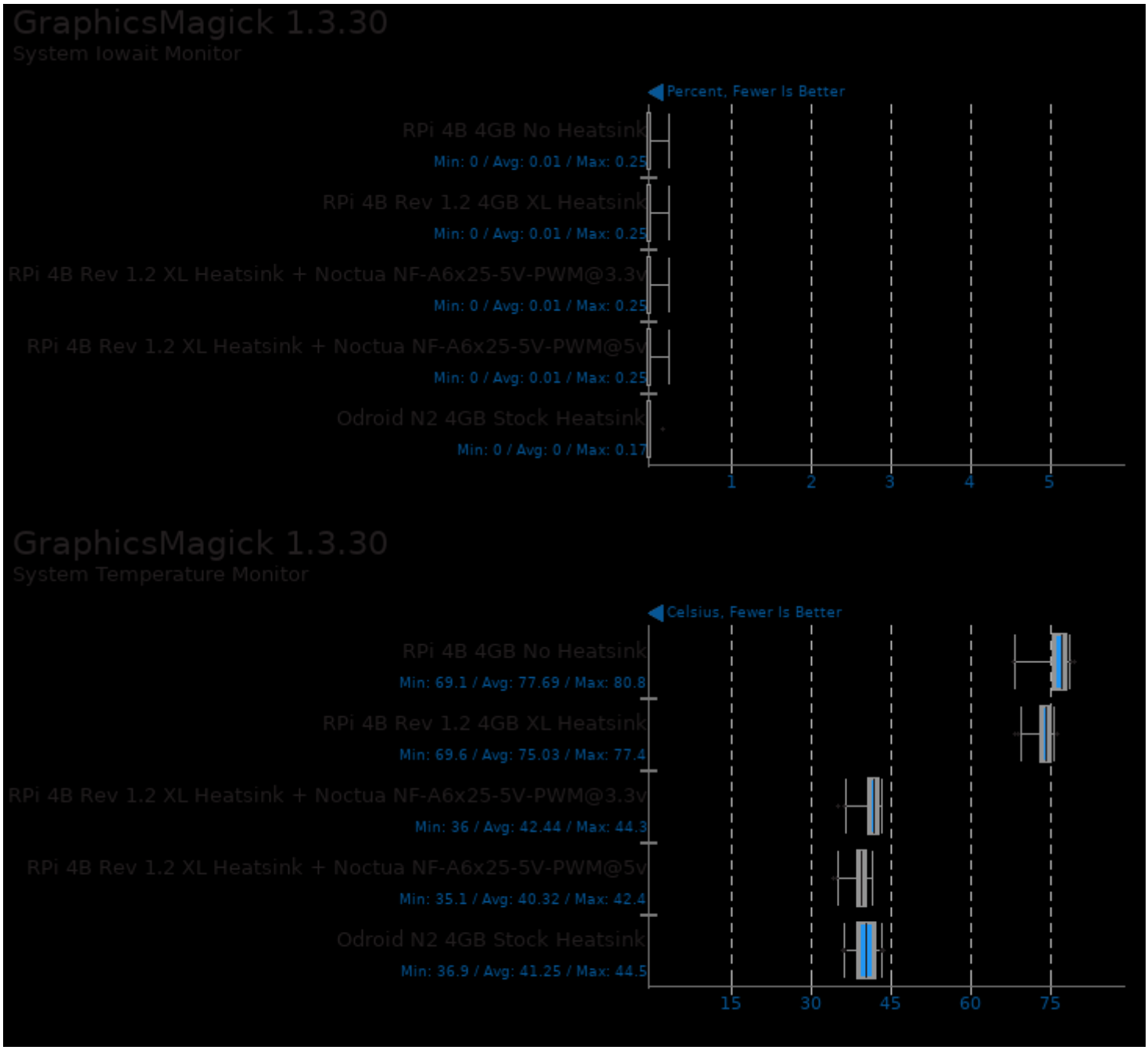

GraphicsMagick 1.3.30
System Iowait Monitor
Percent, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.03 / Max: 1.5
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.03 / Max: 0.25
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.03 / Max: 1.01
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0.03 / Max: 1.26
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 0.01 / Max: 0.17
2
4
6
8
10
GraphicsMagick 1.3.30
System Temperature Monitor
Celsius, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 73 / Avg: 75.45 / Max: 77.9
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 71.6 / Avg: 74.89 / Max: 78.4
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 38 / Avg: 40.85 / Max: 42.8
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 36 / Avg: 38.18 / Max: 39.4
Odroid N2 4GB Stock Heatsink
Min: 37.1 / Avg: 39.68 / Max: 40.9
15
30
45
60
75


GraphicsMagick 1.3.30
CPU Frequency (CPU0) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1444.33 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1445.1 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1453.91 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1455.15 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1288.82 / Max: 1896
300
600
900
1200
1500
GraphicsMagick 1.3.30
CPU Frequency (CPU1) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1444.33 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1445.1 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1453.91 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1455.15 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1287.33 / Max: 1896
300
600
900
1200
1500

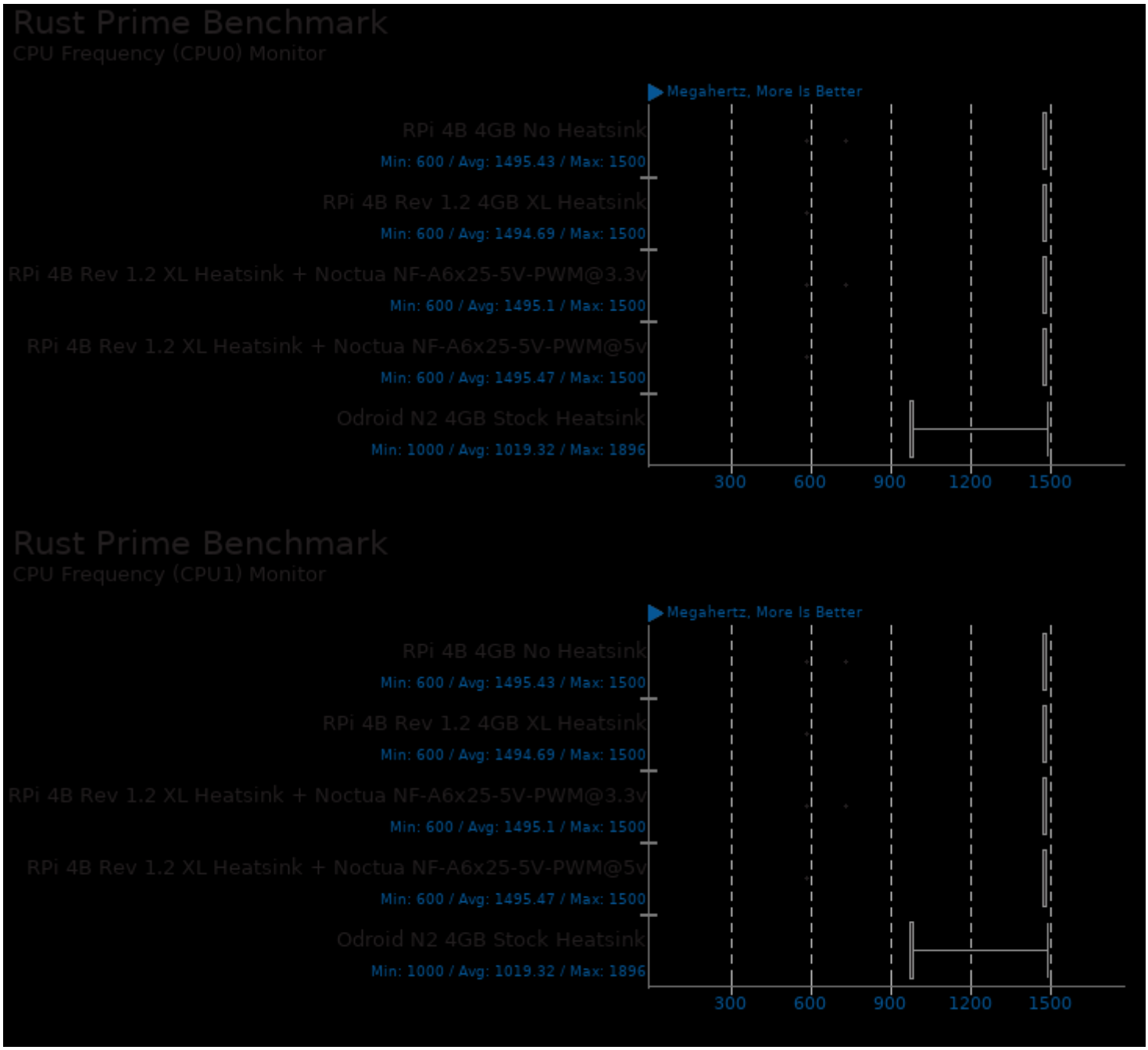

GraphicsMagick 1.3.30
CPU Frequency (CPU2) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1444.33 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1445.1 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1453.91 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1455.15 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1652.93 / Max: 1704
300
600
900
1200
1500
GraphicsMagick 1.3.30
CPU Frequency (CPU3) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1444.33 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1445.1 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1453.91 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1455.15 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1652.93 / Max: 1704
300
600
900
1200
1500


GraphicsMagick 1.3.30
CPU Peak Freq (Highest CPU Core Frequency) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1444.33 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1445.1 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1454.15 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1455.15 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1714.61 / Max: 1896
300
600
900
1200
1500
GraphicsMagick 1.3.30
GPU Fan Speed Monitor
Percent, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 100 / Avg: 100 / Max: 100
Odroid N2 4GB Stock Heatsink
Min: 100 / Avg: 100 / Max: 100
20
40
60
80
100

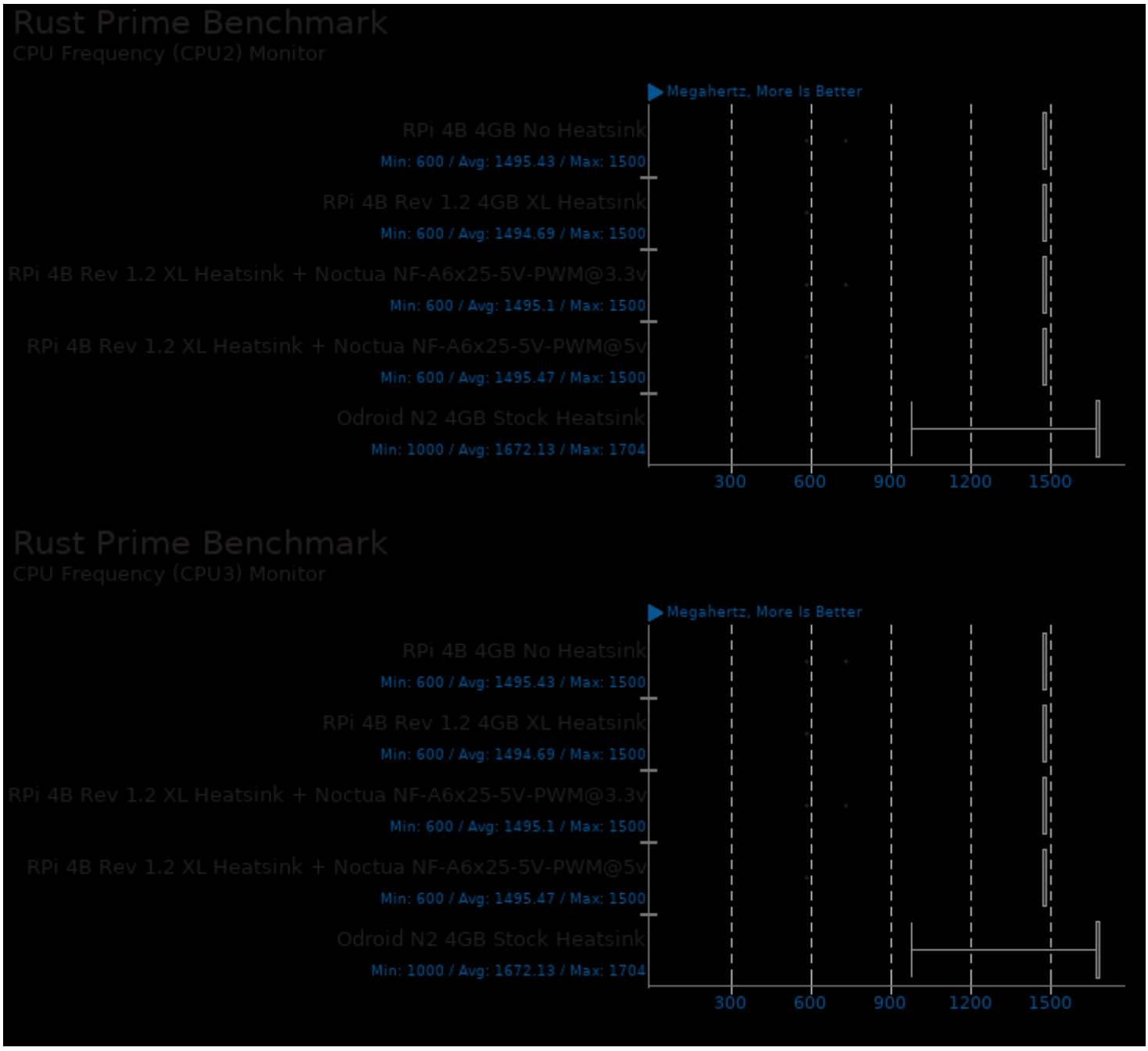

GraphicsMagick 1.3.30
Drive Write Speed (mmcblk0) Monitor
MB/s, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.01 / Max: 0.08
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.01 / Max: 0.1
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.01 / Max: 0.09
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0.01 / Max: 0.06
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 0.01 / Max: 0.13
1
2
3
4
5
GraphicsMagick 1.3.30
Memory Usage Monitor
Megabytes, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 189 / Avg: 225.41 / Max: 259
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 200 / Avg: 237.27 / Max: 270
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 218 / Avg: 254.55 / Max: 289
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 234 / Avg: 270.66 / Max: 304
Odroid N2 4GB Stock Heatsink
Min: 1318 / Avg: 1503.43 / Max: 1575
300
600
900
1200
1500
GraphicsMagick 1.3.30
Swap Usage Monitor
Megabytes, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 6 / Avg: 6 / Max: 6
2
4
6
8
10


GraphicsMagick 1.3.30
System Iowait Monitor
Percent, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.01 / Max: 0.25
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.01 / Max: 0.25
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.01 / Max: 0.25
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0.01 / Max: 0.25
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 0 / Max: 0.17
1
2
3
4
5
GraphicsMagick 1.3.30
System Temperature Monitor
Celsius, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 69.1 / Avg: 77.69 / Max: 80.8
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 69.6 / Avg: 75.03 / Max: 77.4
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 36 / Avg: 42.44 / Max: 44.3
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 35.1 / Avg: 40.32 / Max: 42.4
Odroid N2 4GB Stock Heatsink
Min: 36.9 / Avg: 41.25 / Max: 44.5
15
30
45
60
75

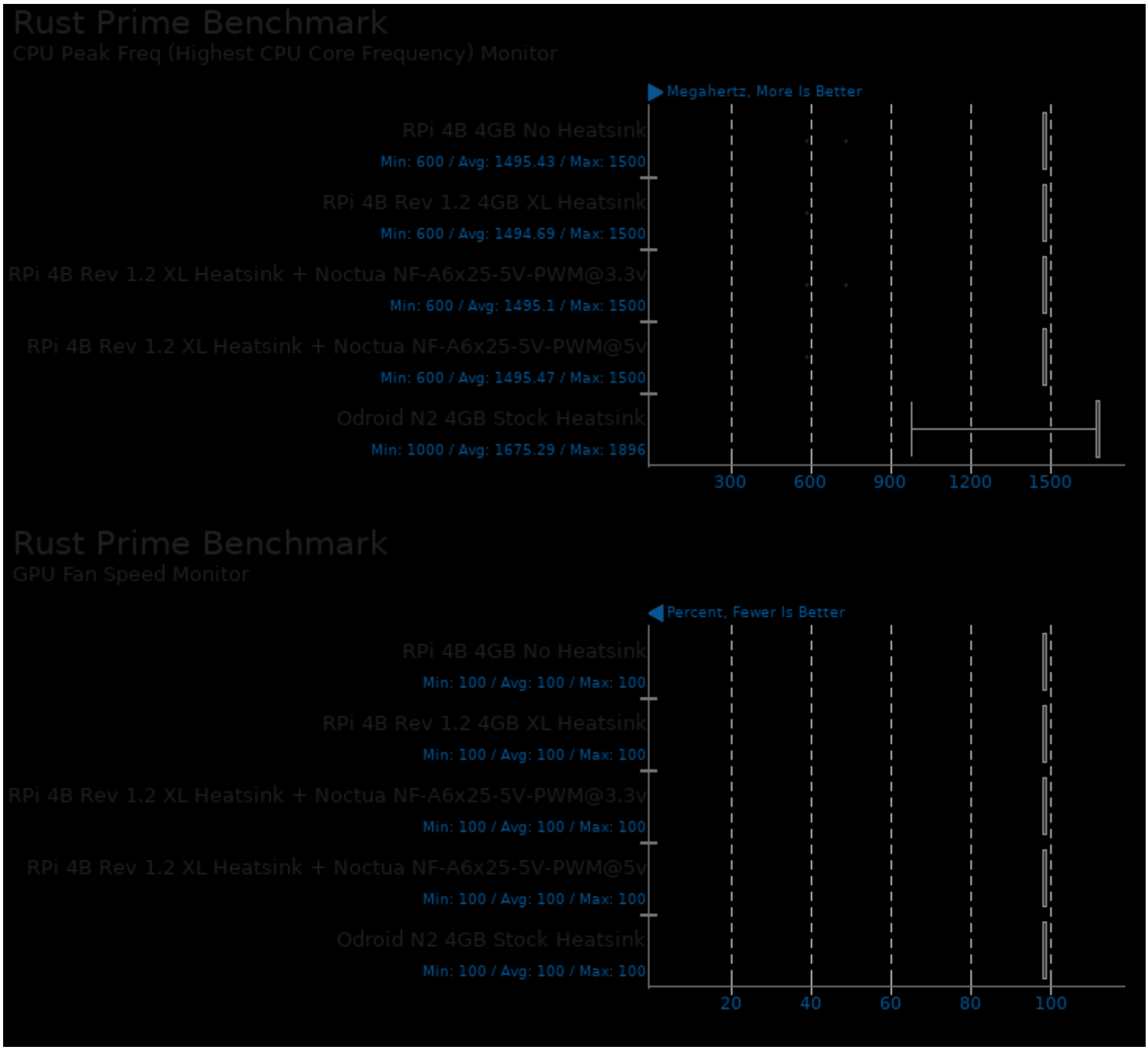
Raspberry Pi Model 4 Benchmarks

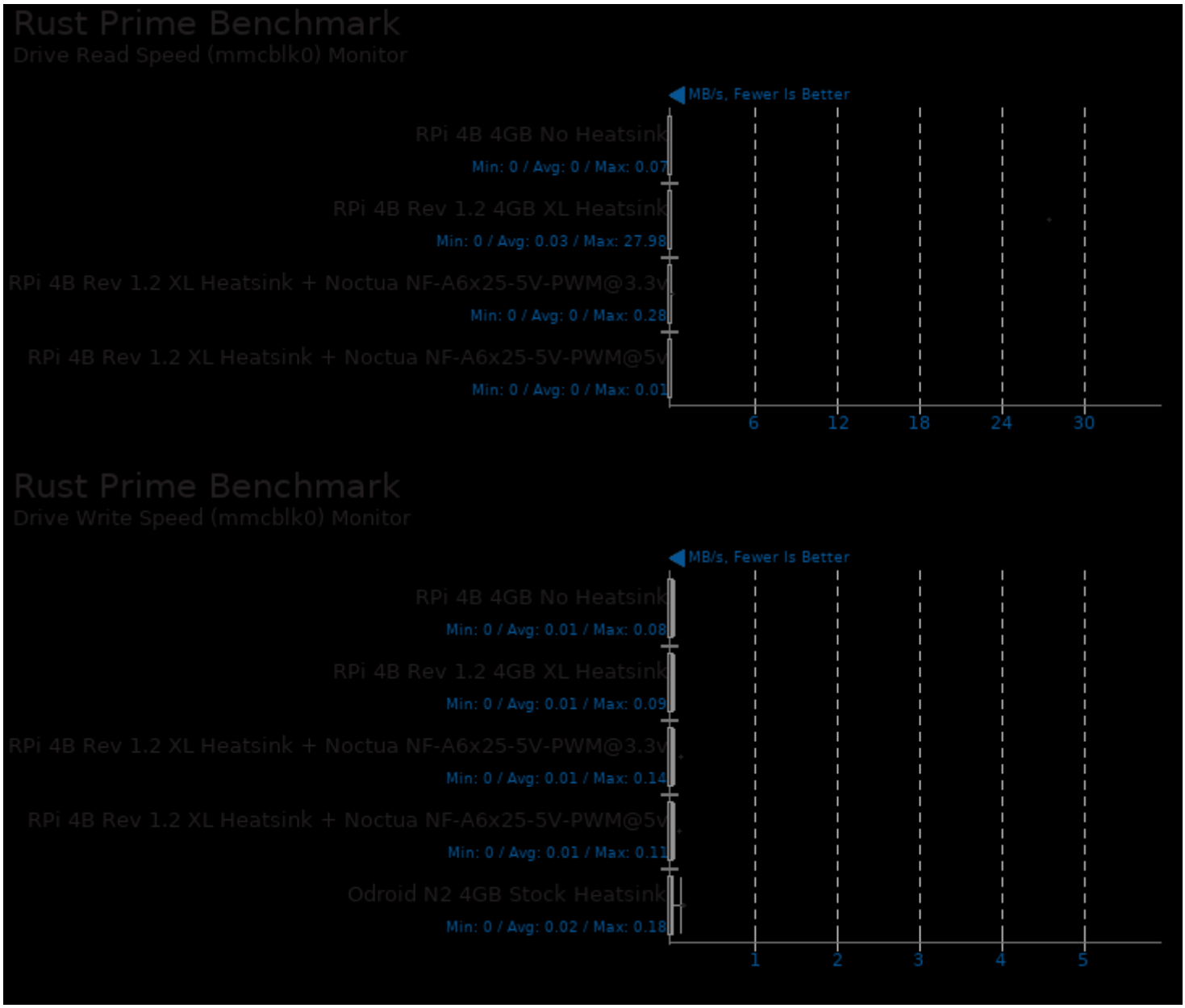


Raspberry Pi Model 4 Benchmarks

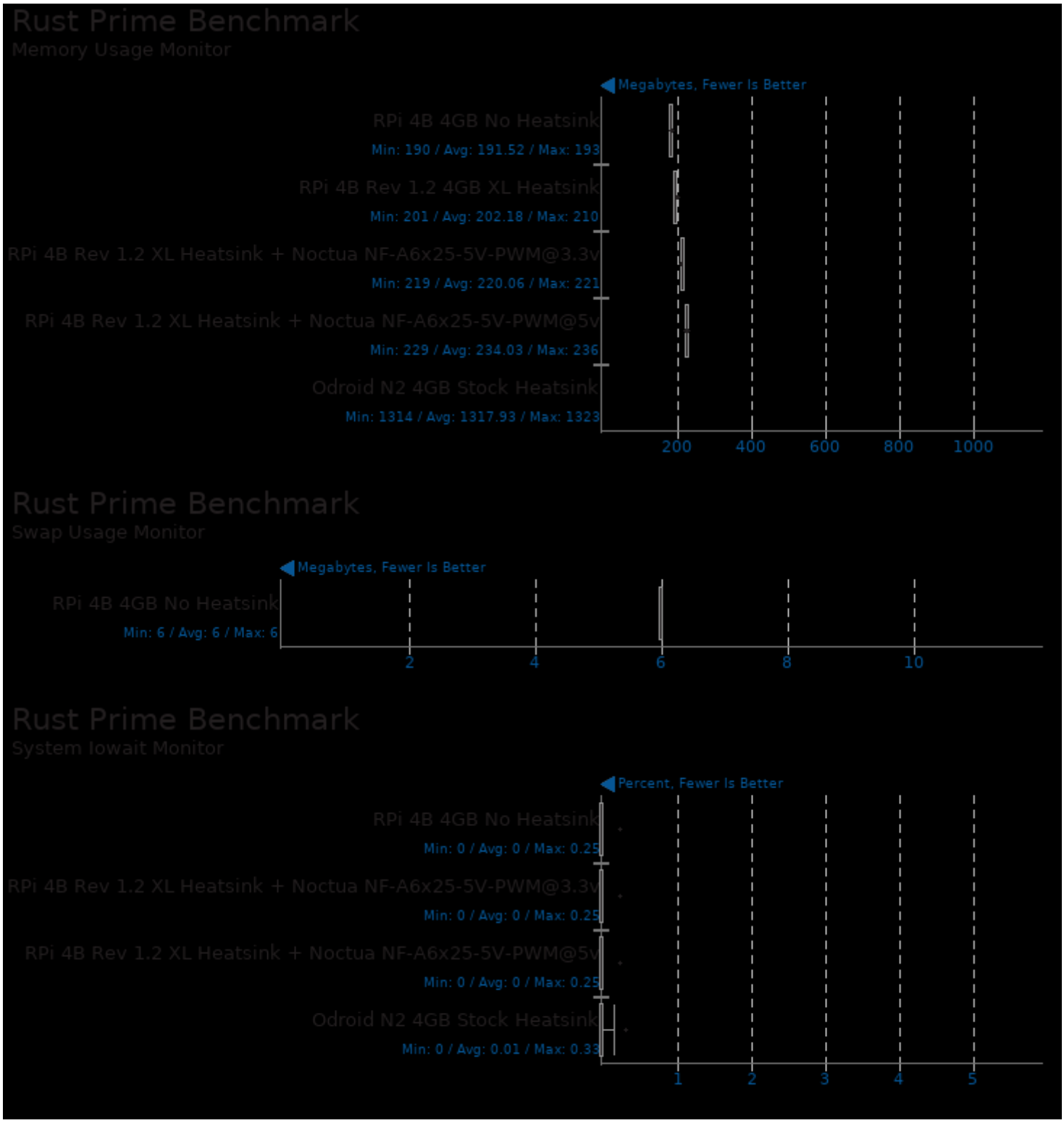


Raspberry Pi Model 4 Benchmarks

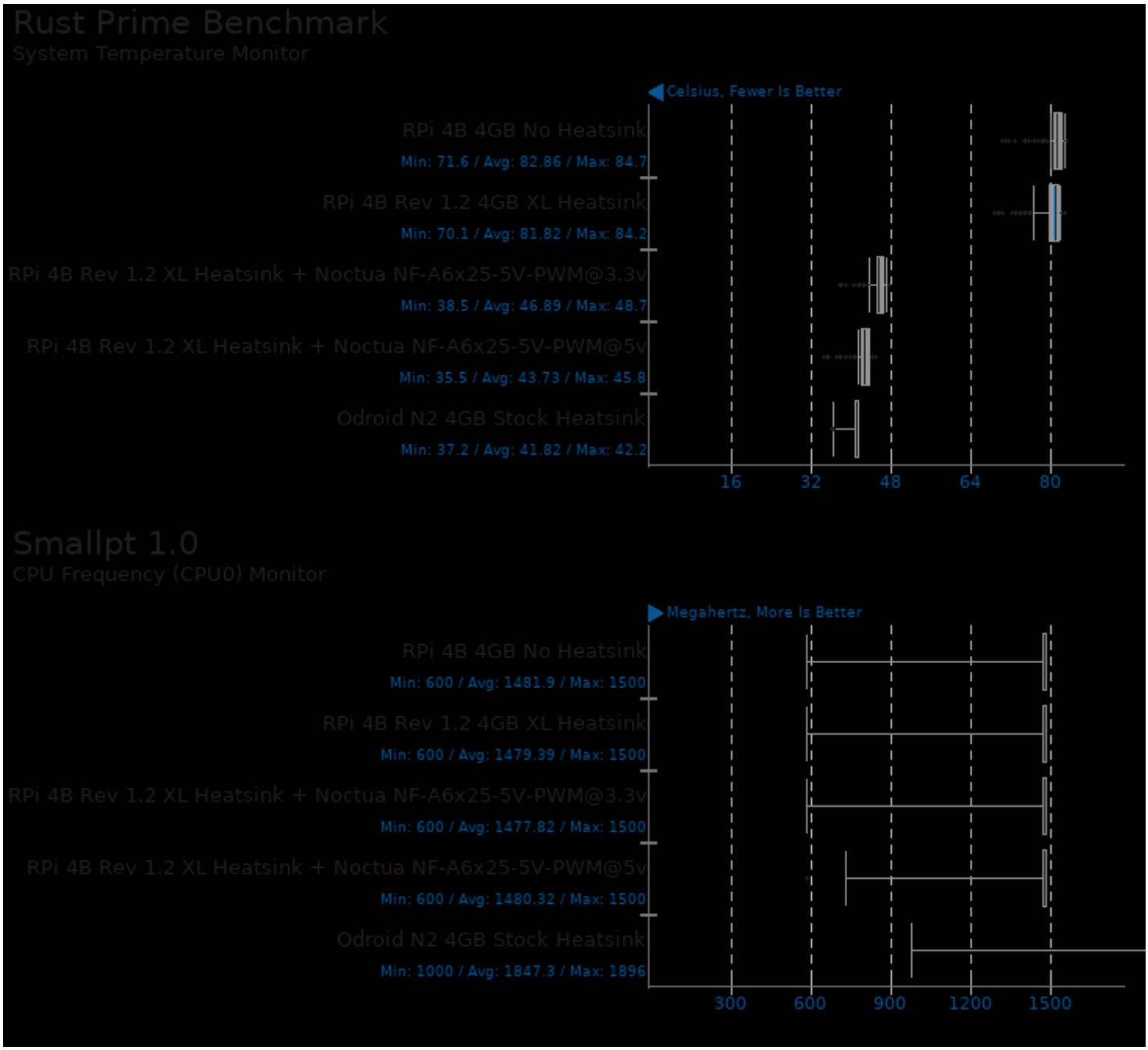



Rust Prime Benchmark
Drive Read Speed (mmcblk0) Monitor
MB/s, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0 / Max: 0.07
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.03 / Max: 27.98
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0 / Max: 0.28
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0 / Max: 0.01
6
12
18
24
30
Rust Prime Benchmark
Drive Write Speed (mmcblk0) Monitor
MB/s, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.01 / Max: 0.08
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.01 / Max: 0.09
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.01 / Max: 0.14
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0.01 / Max: 0.11
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 0.02 / Max: 0.18
1
2
3
4
5

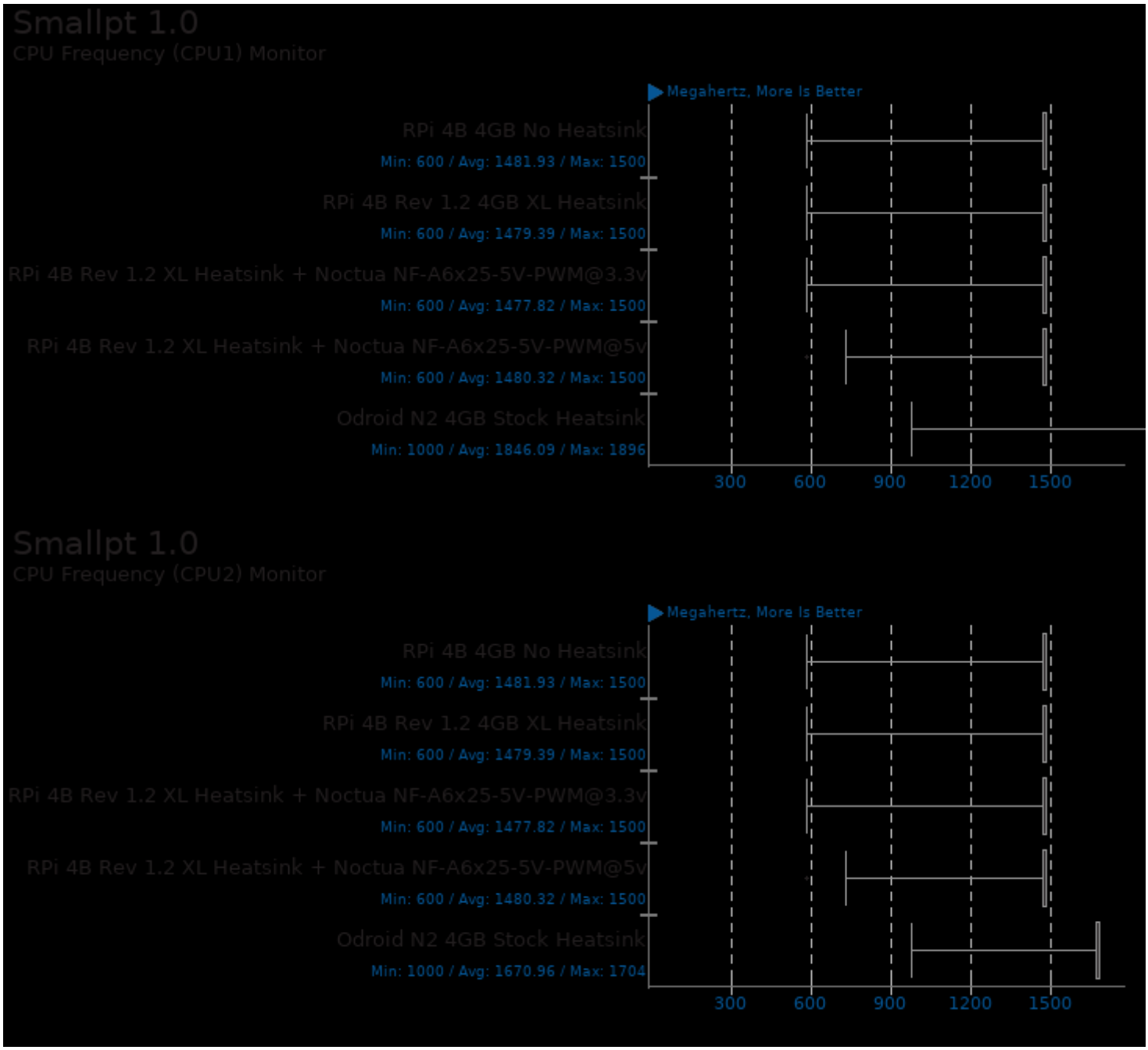
Raspberry Pi Model 4 Benchmarks



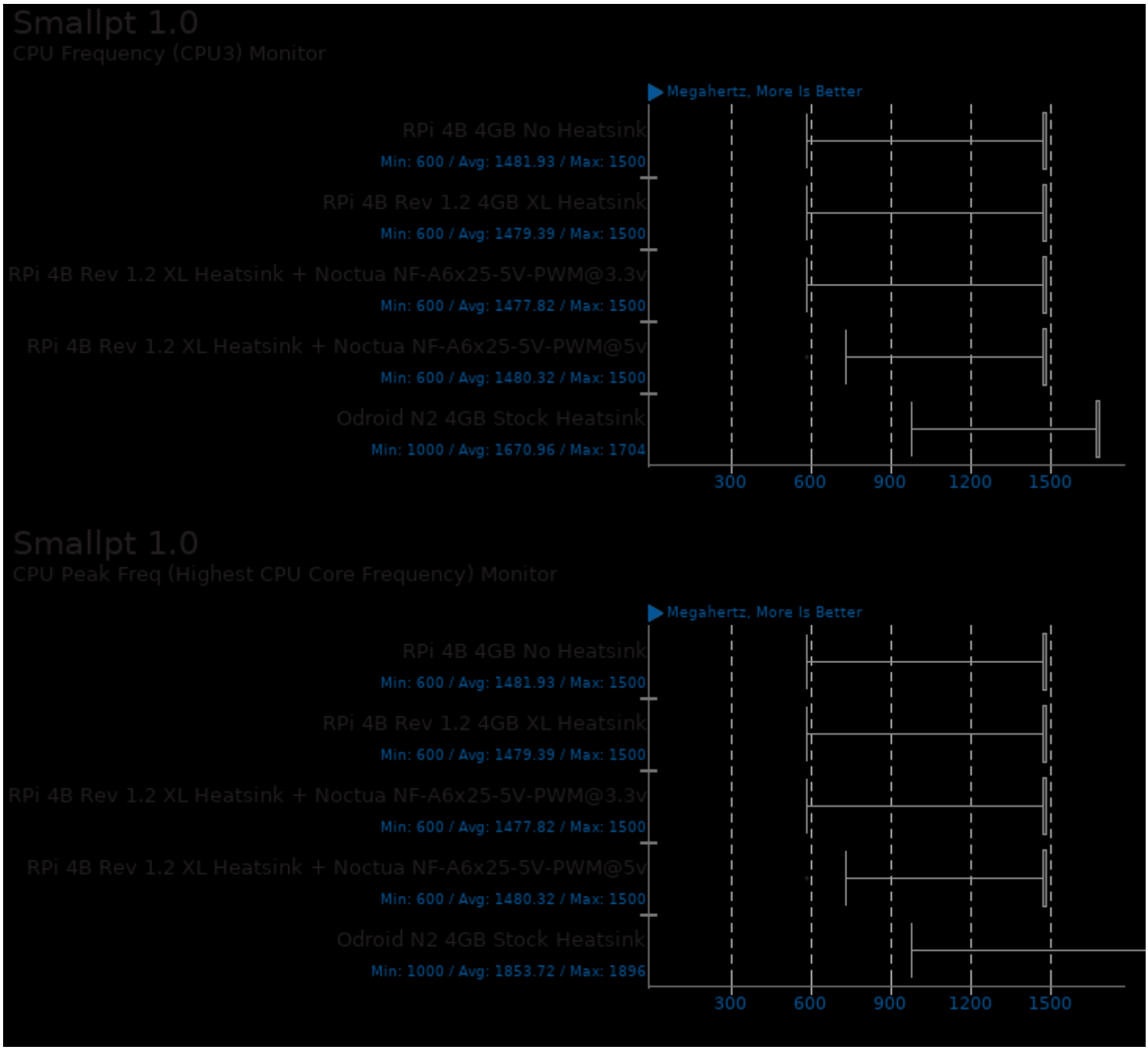
Raspberry Pi Model 4 Benchmarks



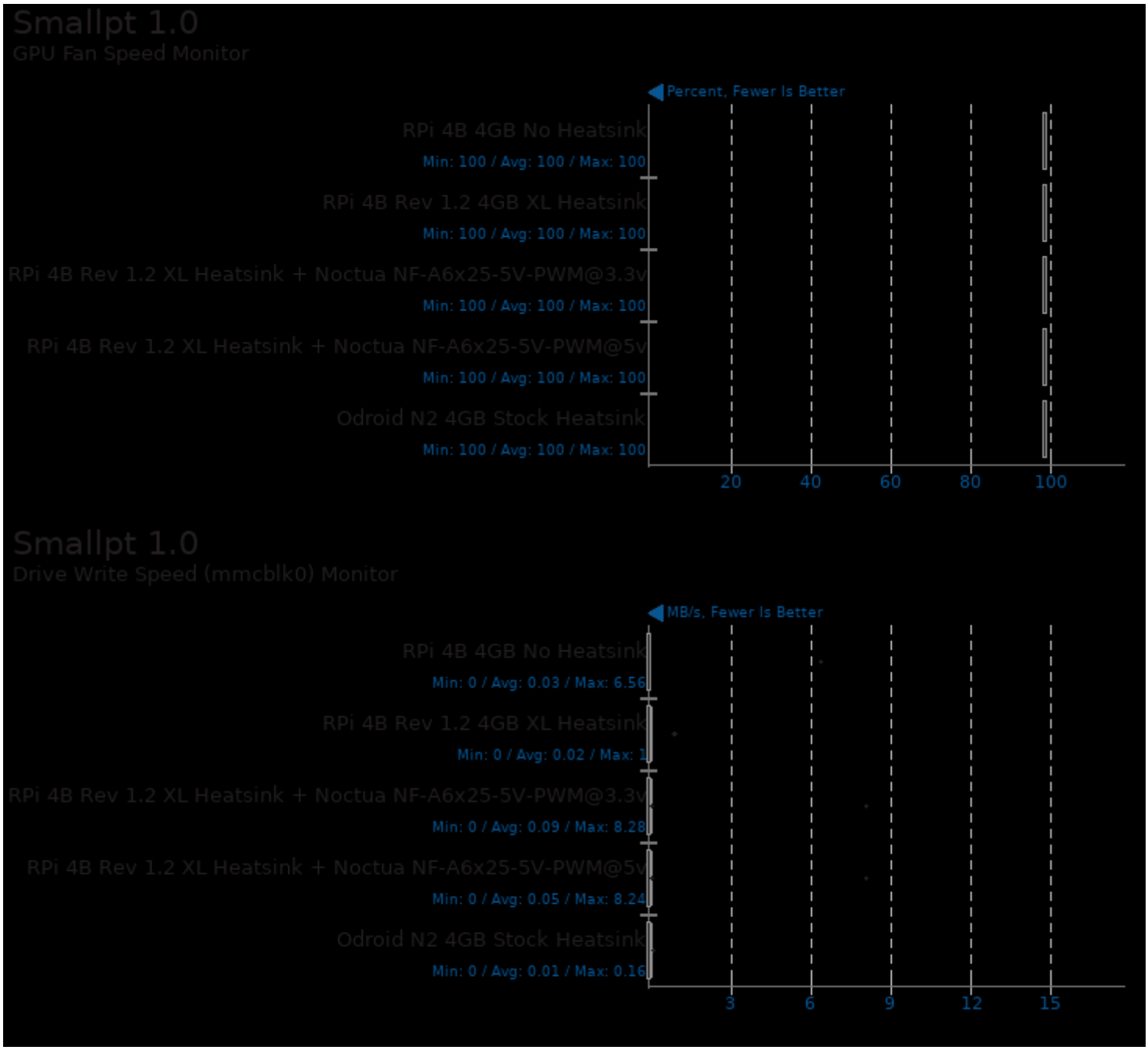
Raspberry Pi Model 4 Benchmarks



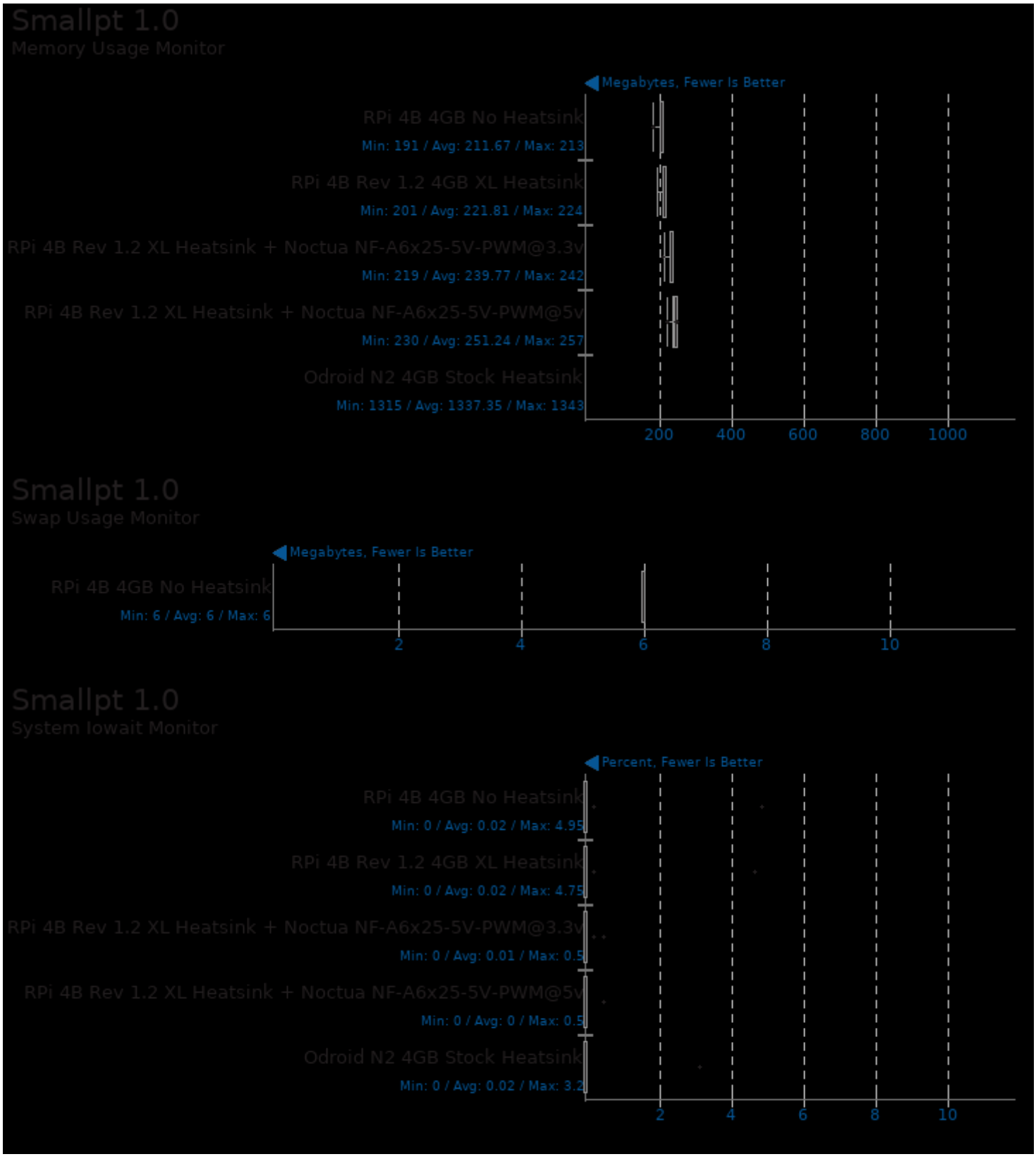
Raspberry Pi Model 4 Benchmarks



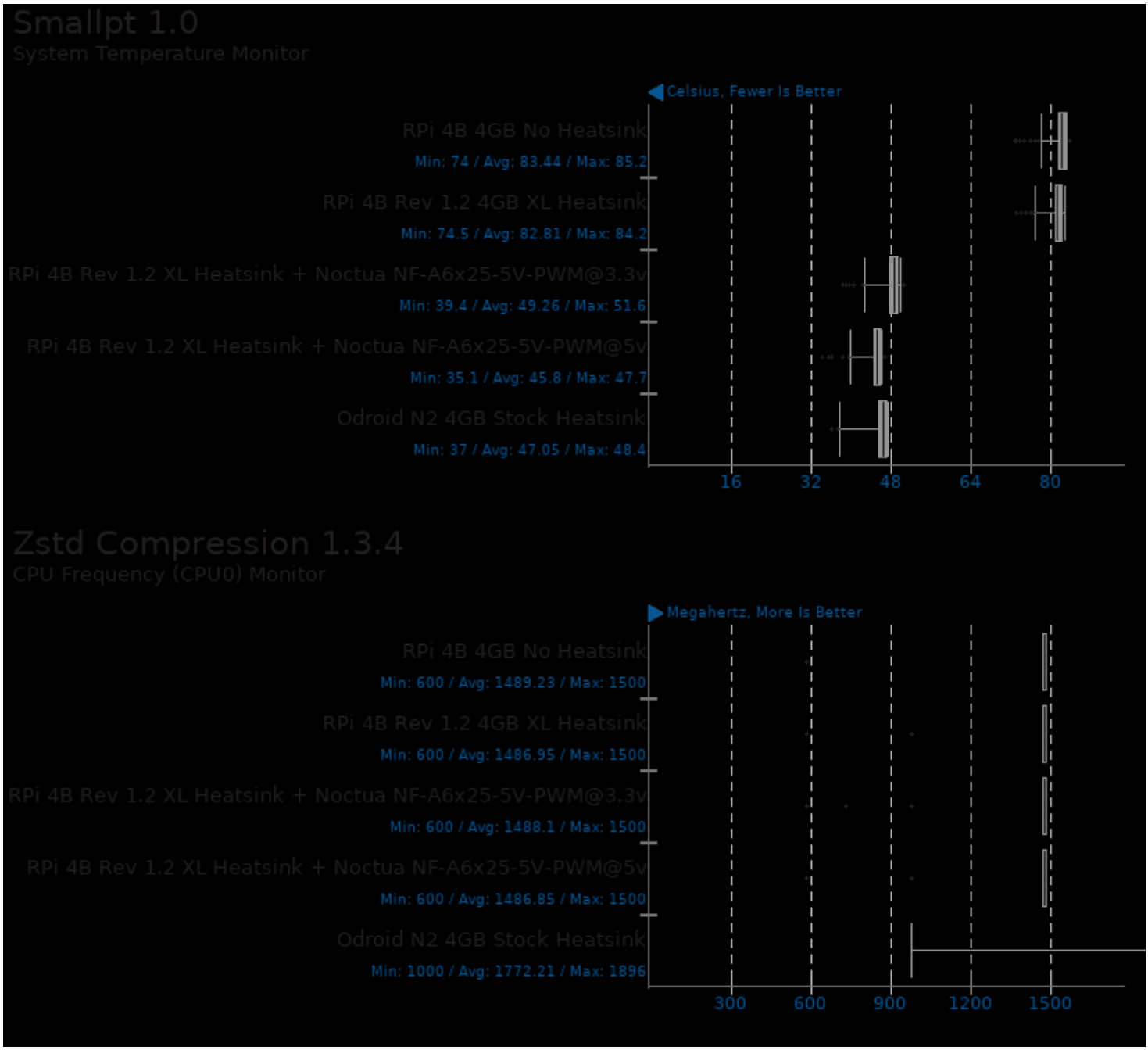
Raspberry Pi Model 4 Benchmarks

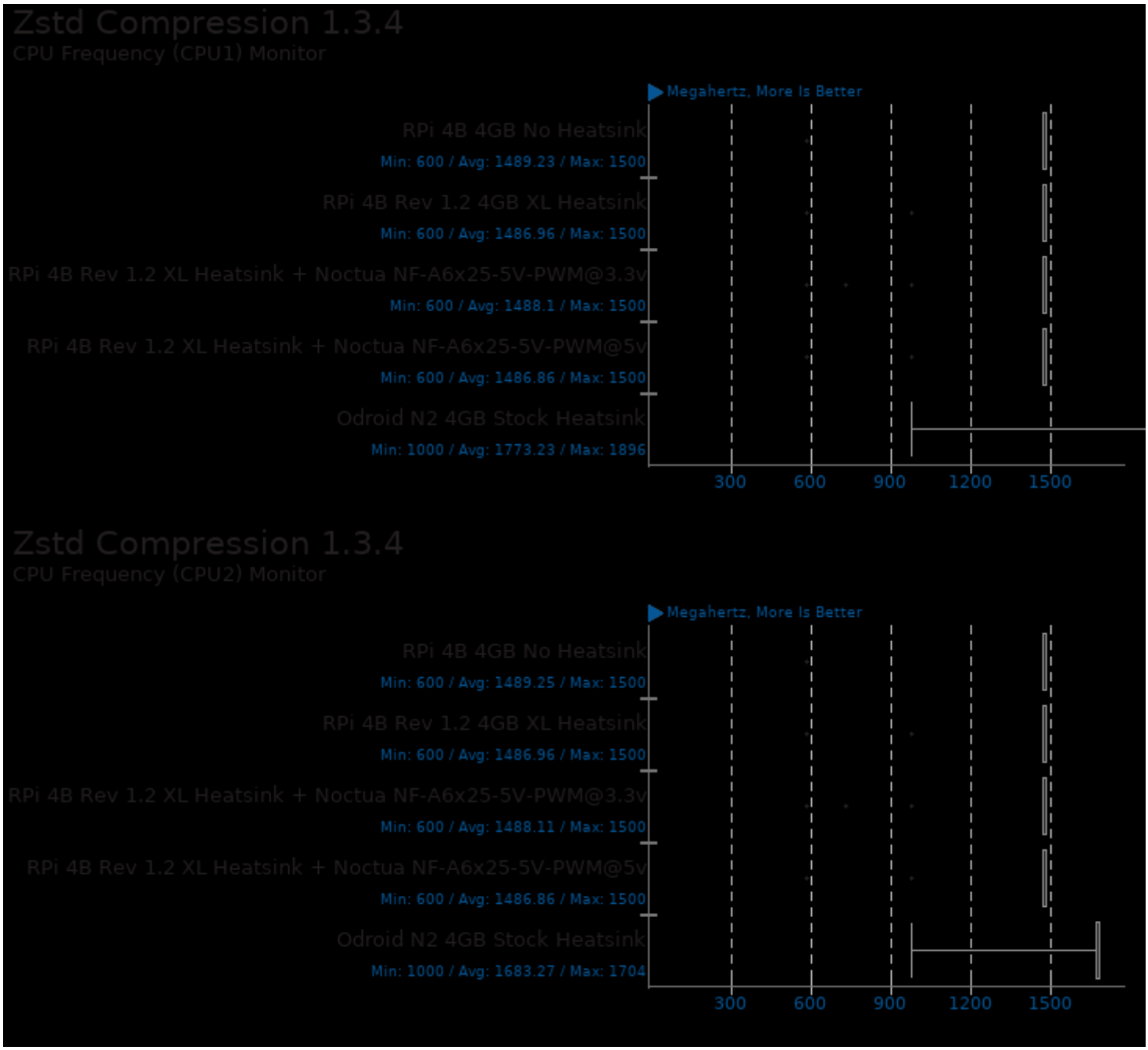


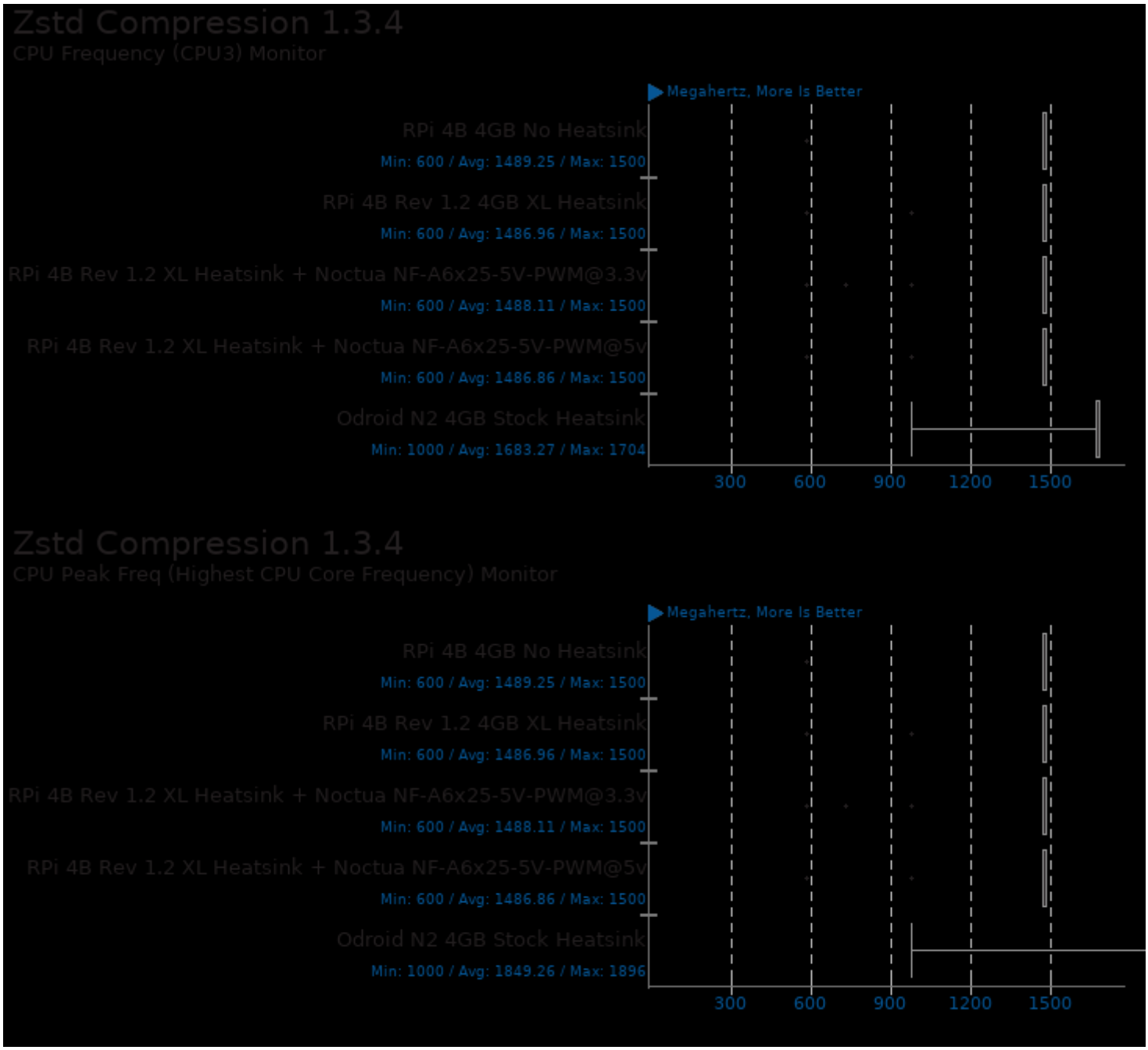
Raspberry Pi Model 4 Benchmarks



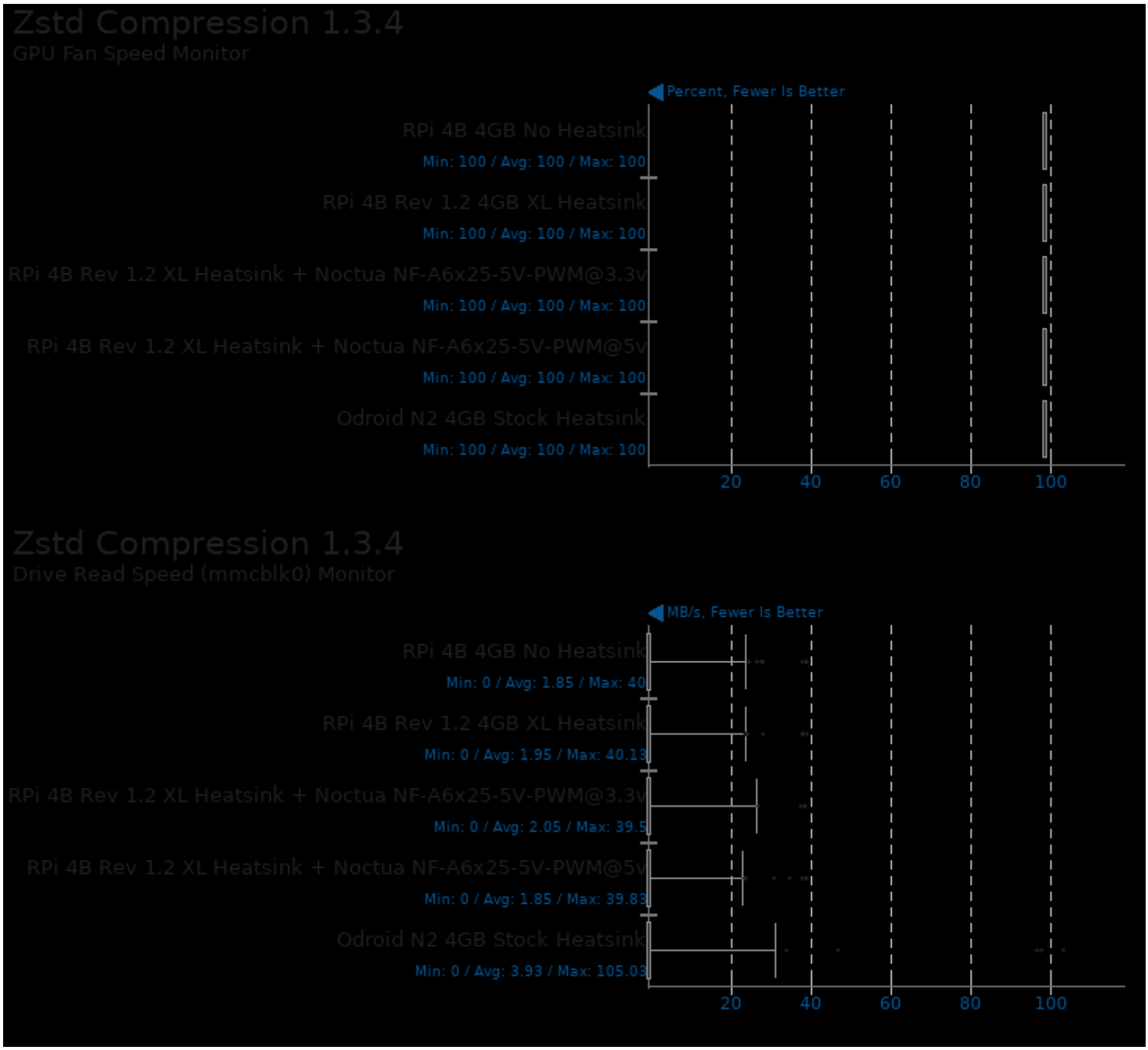
Raspberry Pi Model 4 Benchmarks

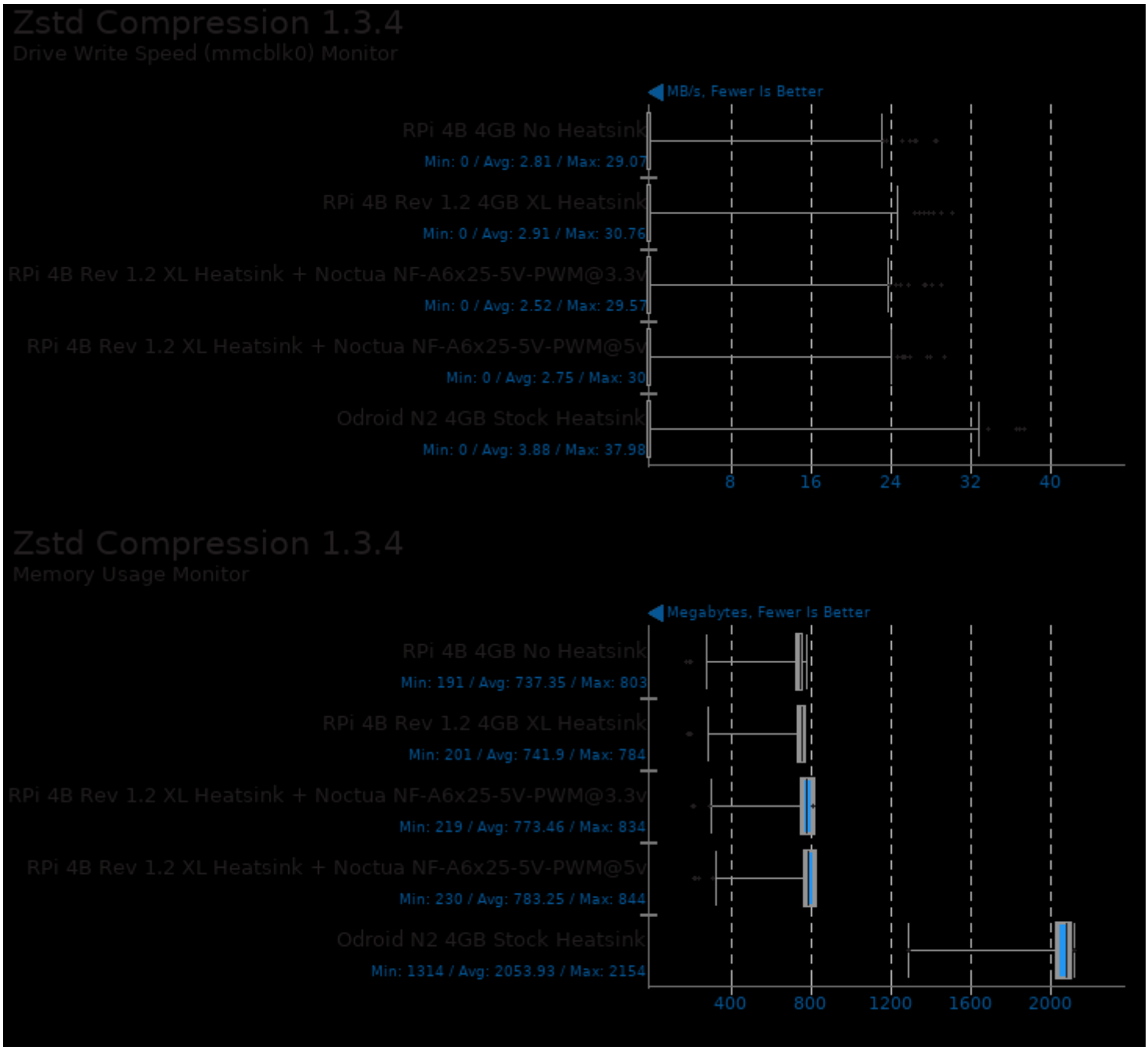


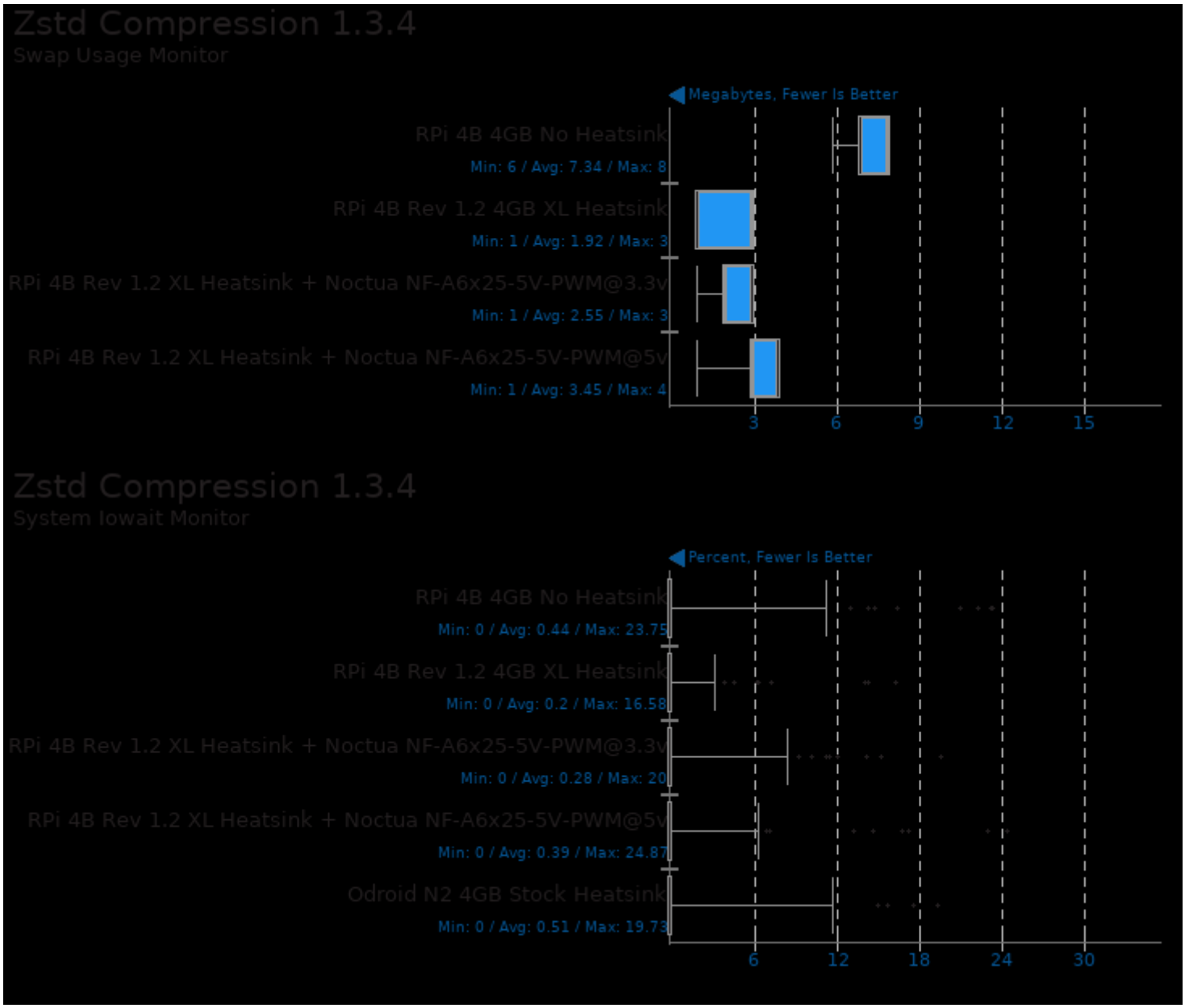

Zstd Compression 1.3.4
CPU Frequency (CPU1) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1489.23 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1486.96 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1488.1 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1486.86 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1773.23 / Max: 1896
300
600
900
1200
1500
Zstd Compression 1.3.4
CPU Frequency (CPU2) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1489.25 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1486.96 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1488.11 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1486.86 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1683.27 / Max: 1704
300
600
900
1200
1500

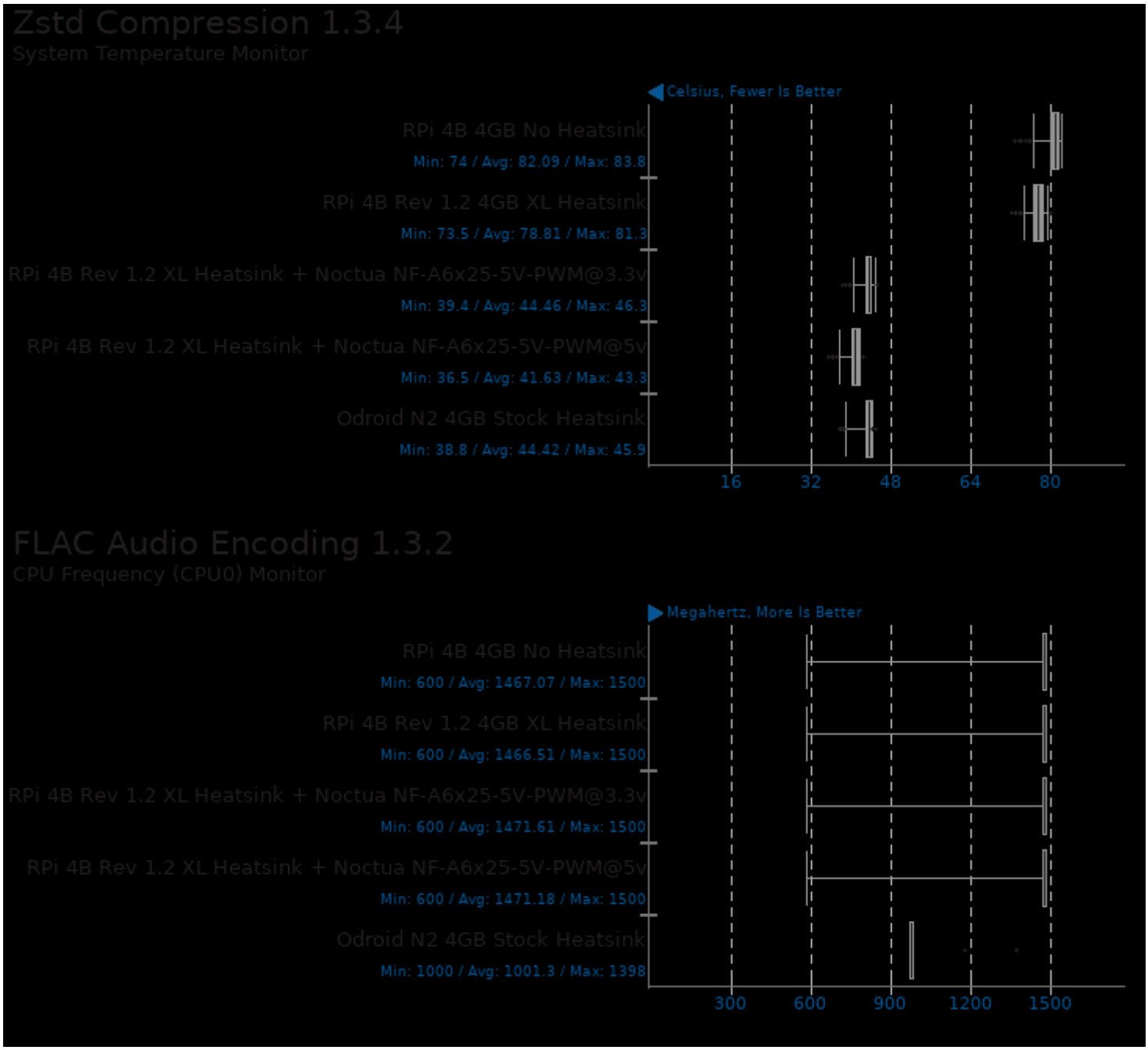

Zstd Compression 1.3.4
CPU Frequency (CPU3) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1489.25 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1486.96 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1488.11 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1486.86 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1683.27 / Max: 1704
300
600
900
1200
1500
Zstd Compression 1.3.4
CPU Peak Freq (Highest CPU Core Frequency) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1489.25 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1486.96 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1488.11 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1486.86 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1849.26 / Max: 1896
300
600
900
1200
1500

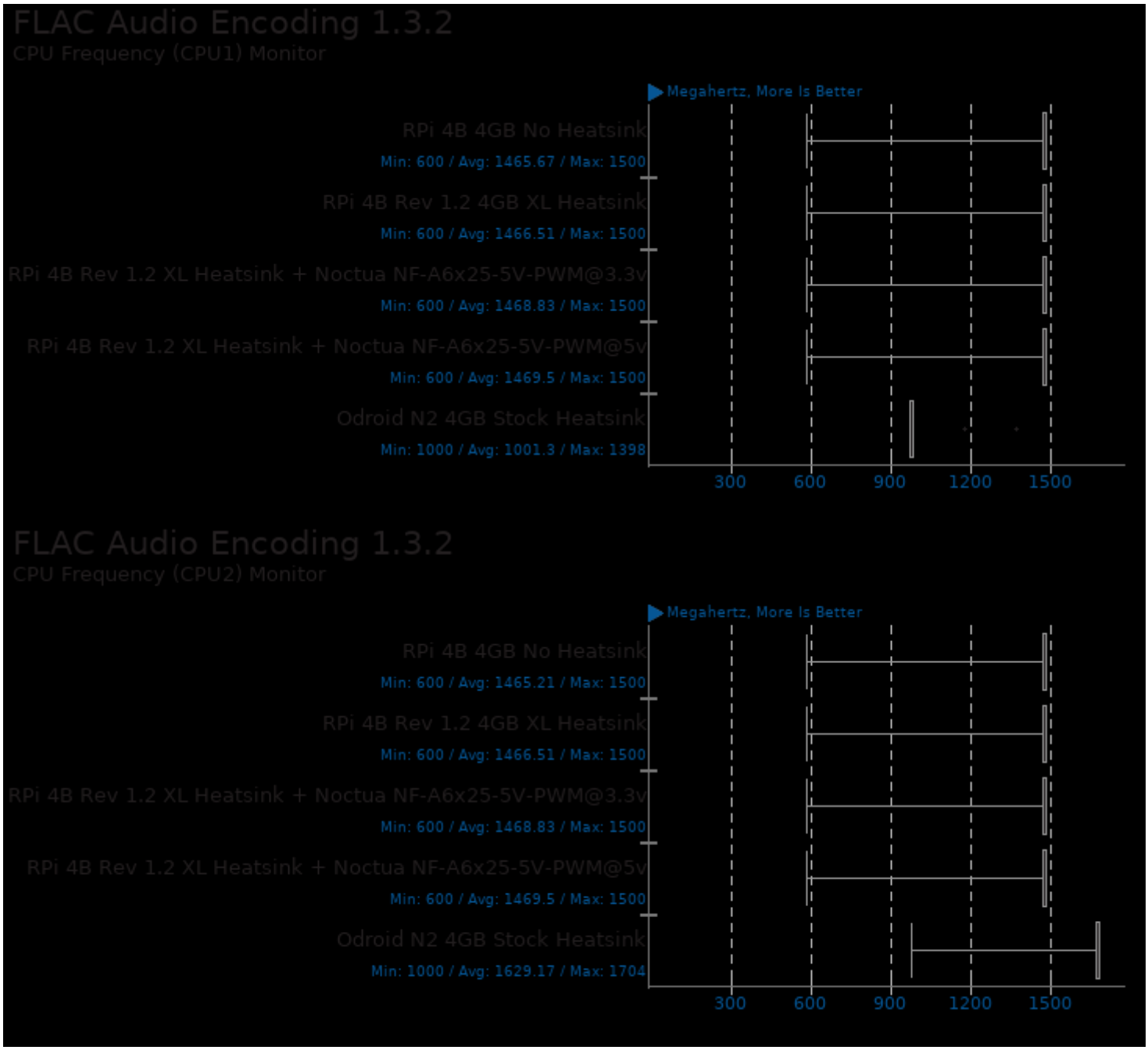
Raspberry Pi Model 4 Benchmarks

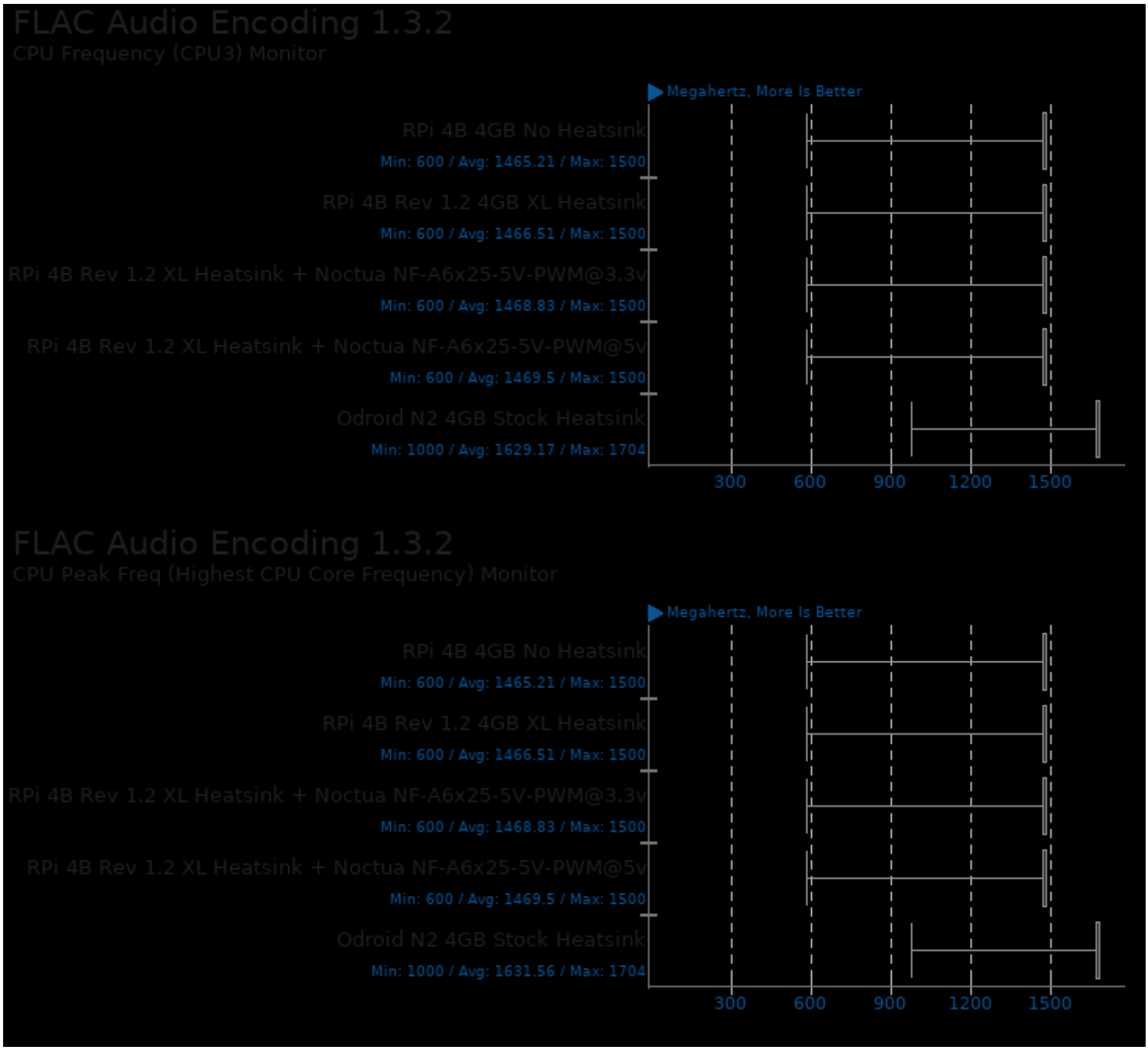


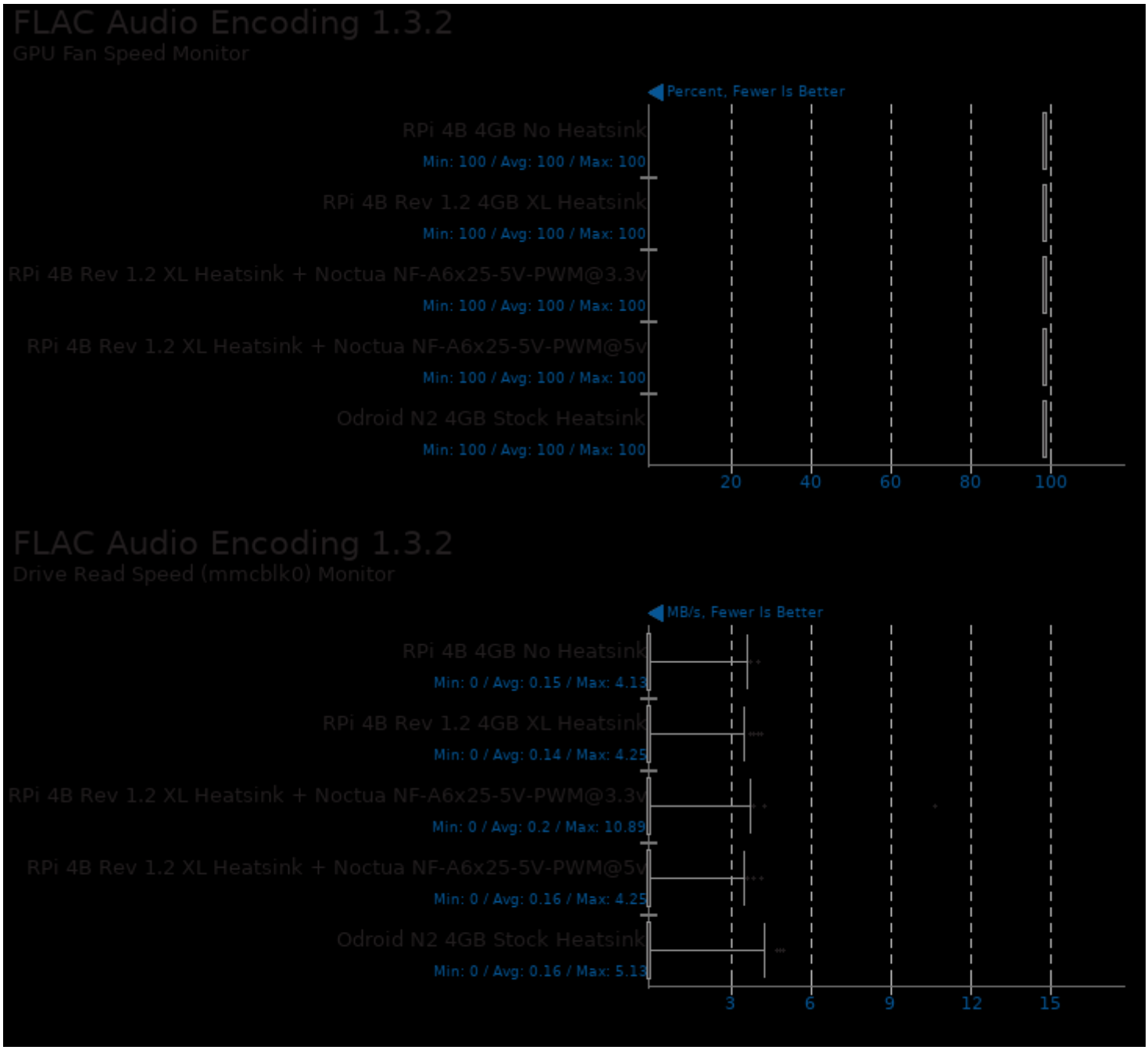

Zstd Compression 1.3.4
Drive Write Speed (mmcblk0) Monitor
MB/s, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 2.81 / Max: 29.07
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 2.91 / Max: 30.76
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 2.52 / Max: 29.57
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 2.75 / Max: 30
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 3.88 / Max: 37.98
8
16
24
32
40
Zstd Compression 1.3.4
Memory Usage Monitor
Megabytes, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 191 / Avg: 737.35 / Max: 803
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 201 / Avg: 741.9 / Max: 784
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 219 / Avg: 773.46 / Max: 834
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 230 / Avg: 783.25 / Max: 844
Odroid N2 4GB Stock Heatsink
Min: 1314 / Avg: 2053.93 / Max: 2154
400
800
1200
1600
2000

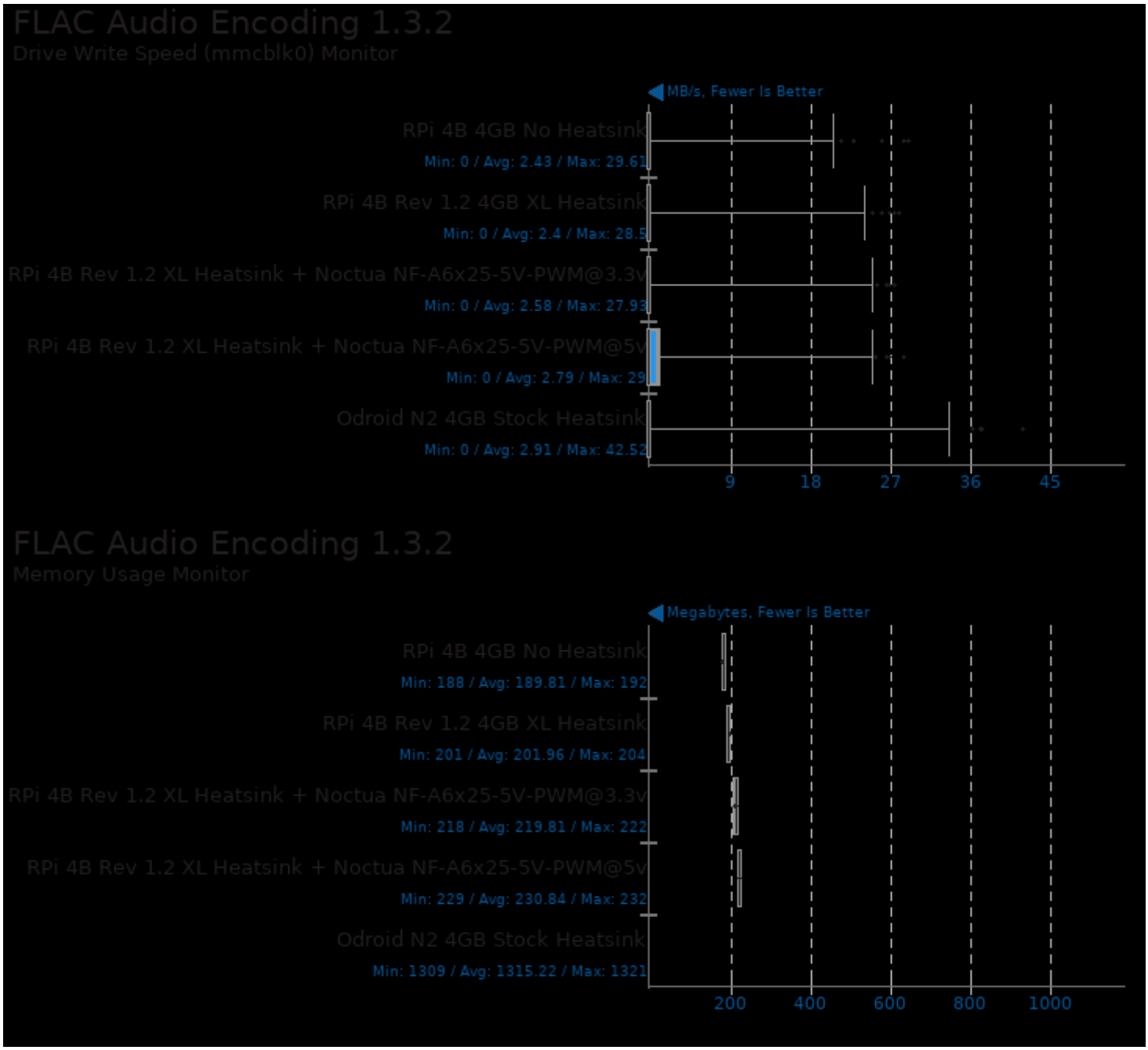

Zstd Compression 1.3.4
Swap Usage Monitor
Megabytes, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 6 / Avg: 7.34 / Max: 8
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 1 / Avg: 1.92 / Max: 3
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 1 / Avg: 2.55 / Max: 3
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 1 / Avg: 3.45 / Max: 4
3
6
9
12
15
Zstd Compression 1.3.4
System Iowait Monitor
Percent, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.44 / Max: 23.75
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.2 / Max: 16.58
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.28 / Max: 20
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0.39 / Max: 24.87
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 0.51 / Max: 19.73
6
12
18
24
30

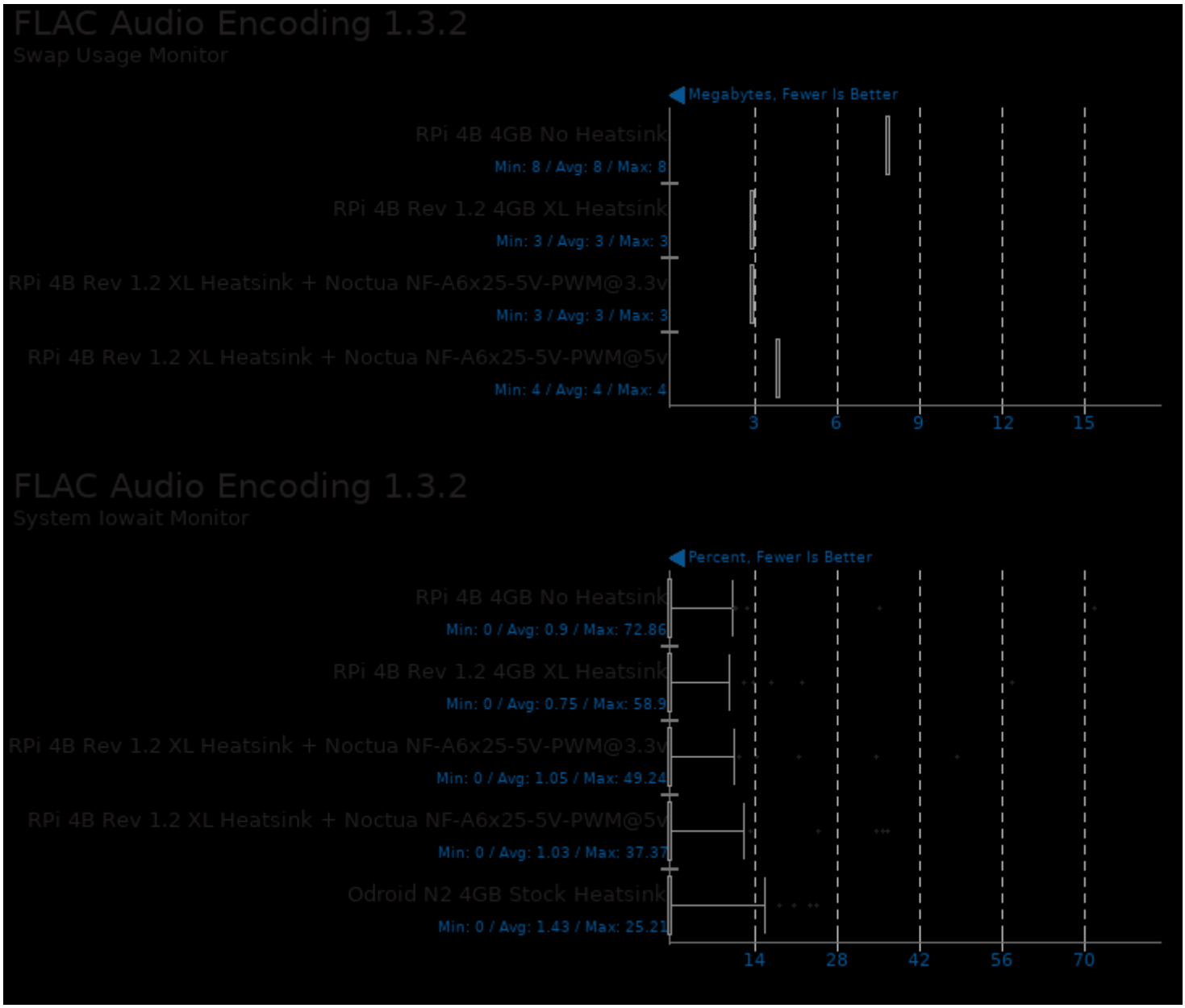

Zstd Compression 1.3.4
System Temperature Monitor
Celsius, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 74 / Avg: 82.09 / Max: 83.8
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 73.5 / Avg: 78.81 / Max: 81.3
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 39.4 / Avg: 44.46 / Max: 46.3
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 36.5 / Avg: 41.63 / Max: 43.3
Odroid N2 4GB Stock Heatsink
Min: 38.8 / Avg: 44.42 / Max: 45.9
16
32
48
64
80
FLAC Audio Encoding 1.3.2
CPU Frequency (CPU0) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1467.07 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1466.51 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1471.61 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1471.18 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1001.3 / Max: 1398
300
600
900
1200
1500


FLAC Audio Encoding 1.3.2
CPU Frequency (CPU1) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1465.67 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1466.51 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1468.83 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1469.5 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1001.3 / Max: 1398
300
600
900
1200
1500
FLAC Audio Encoding 1.3.2
CPU Frequency (CPU2) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1465.21 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1466.51 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1468.83 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1469.5 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1629.17 / Max: 1704
300
600
900
1200
1500

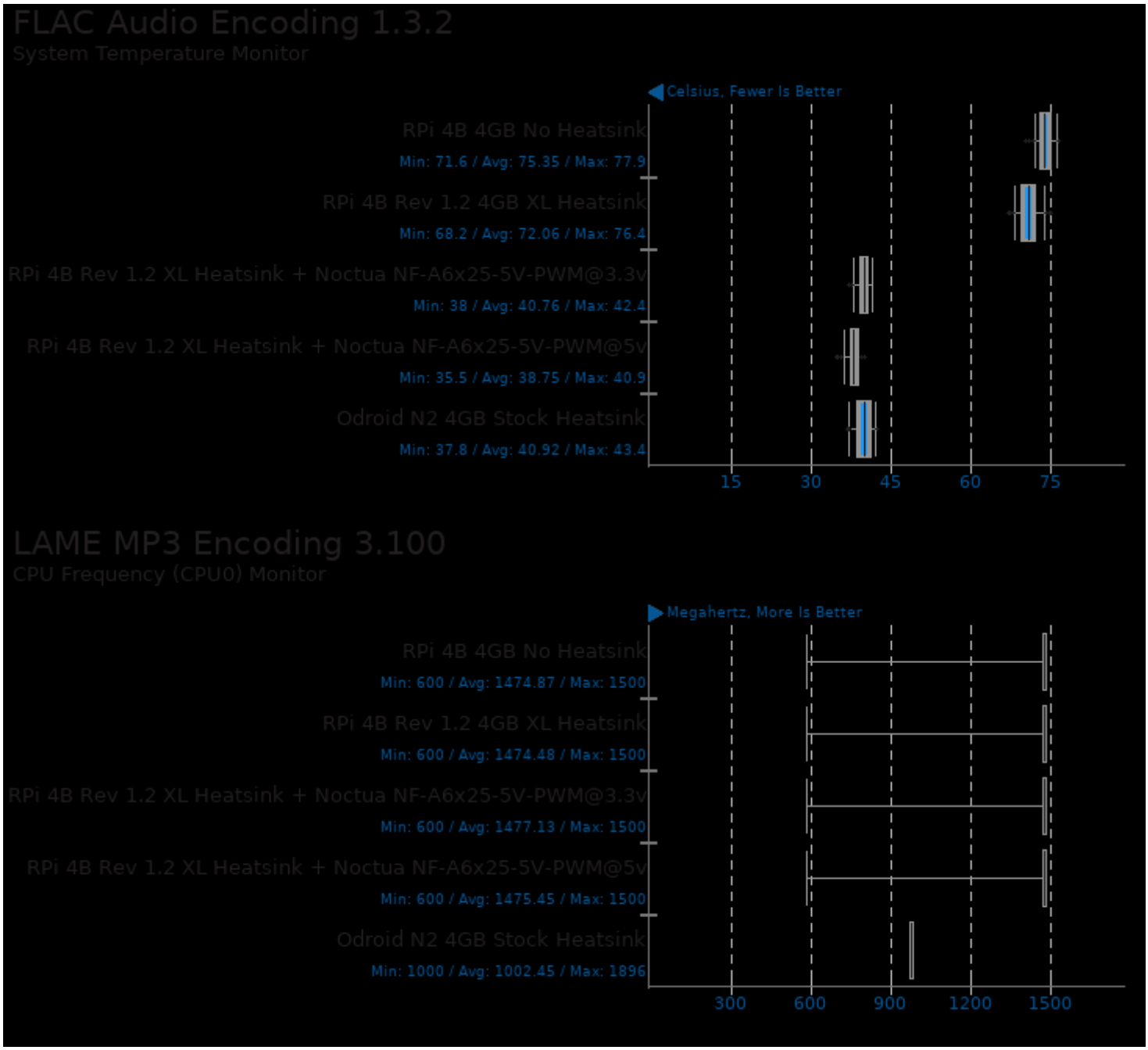

FLAC Audio Encoding 1.3.2
CPU Frequency (CPU3) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1465.21 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1466.51 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1468.83 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1469.5 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1629.17 / Max: 1704
300
600
900
1200
1500
FLAC Audio Encoding 1.3.2
CPU Peak Freq (Highest CPU Core Frequency) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1465.21 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1466.51 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1468.83 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1469.5 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1631.56 / Max: 1704
300
600
900
1200
1500

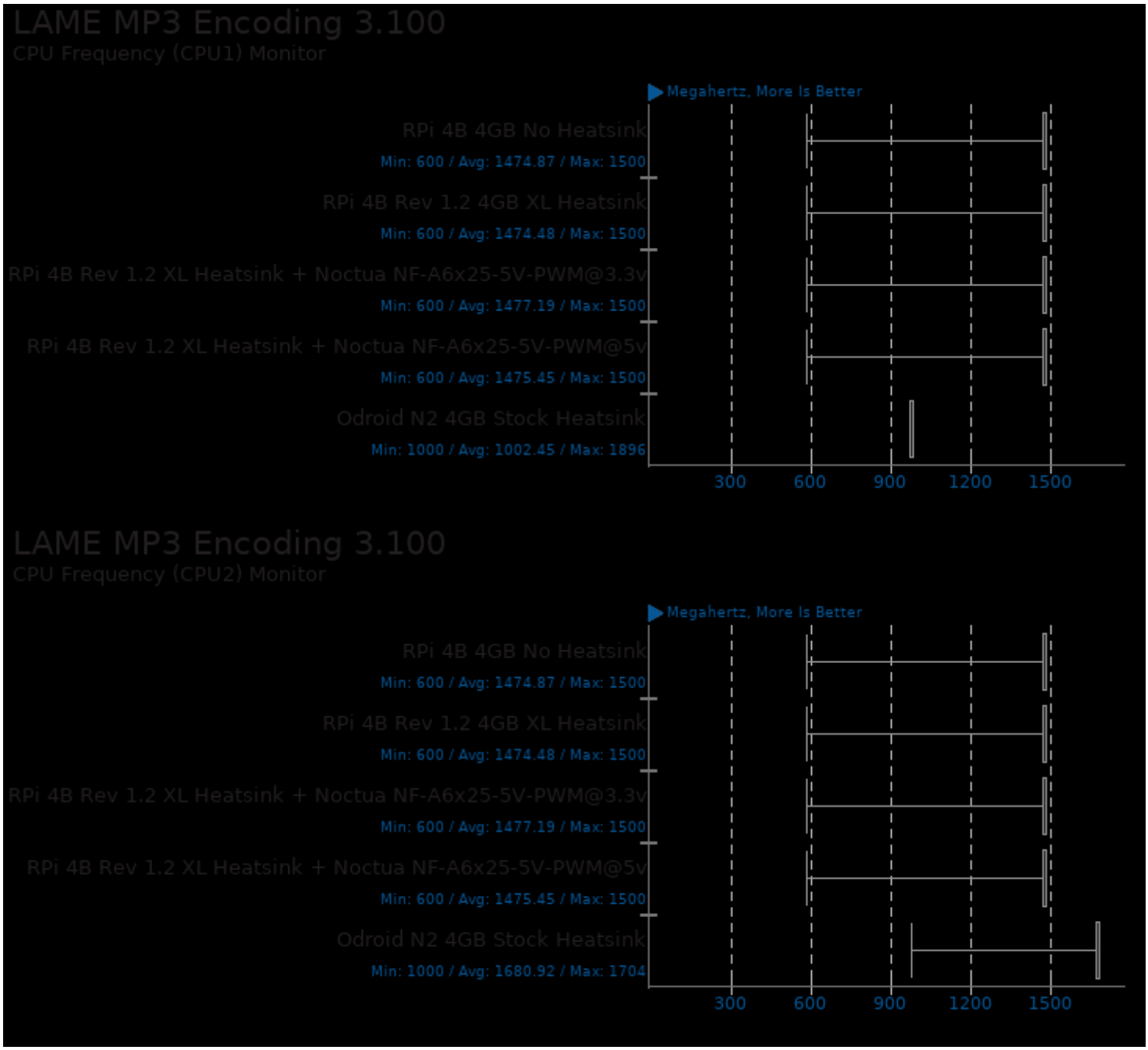

FLAC Audio Encoding 1.3.2
GPU Fan Speed Monitor
Percent, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 100 / Avg: 100 / Max: 100
Odroid N2 4GB Stock Heatsink
Min: 100 / Avg: 100 / Max: 100
20
40
60
80
100
FLAC Audio Encoding 1.3.2
Drive Read Speed (mmcblk0) Monitor
MB/s, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.15 / Max: 4.13
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.14 / Max: 4.25
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.2 / Max: 10.89
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0.16 / Max: 4.25
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 0.16 / Max: 5.13
3
6
9
12
15

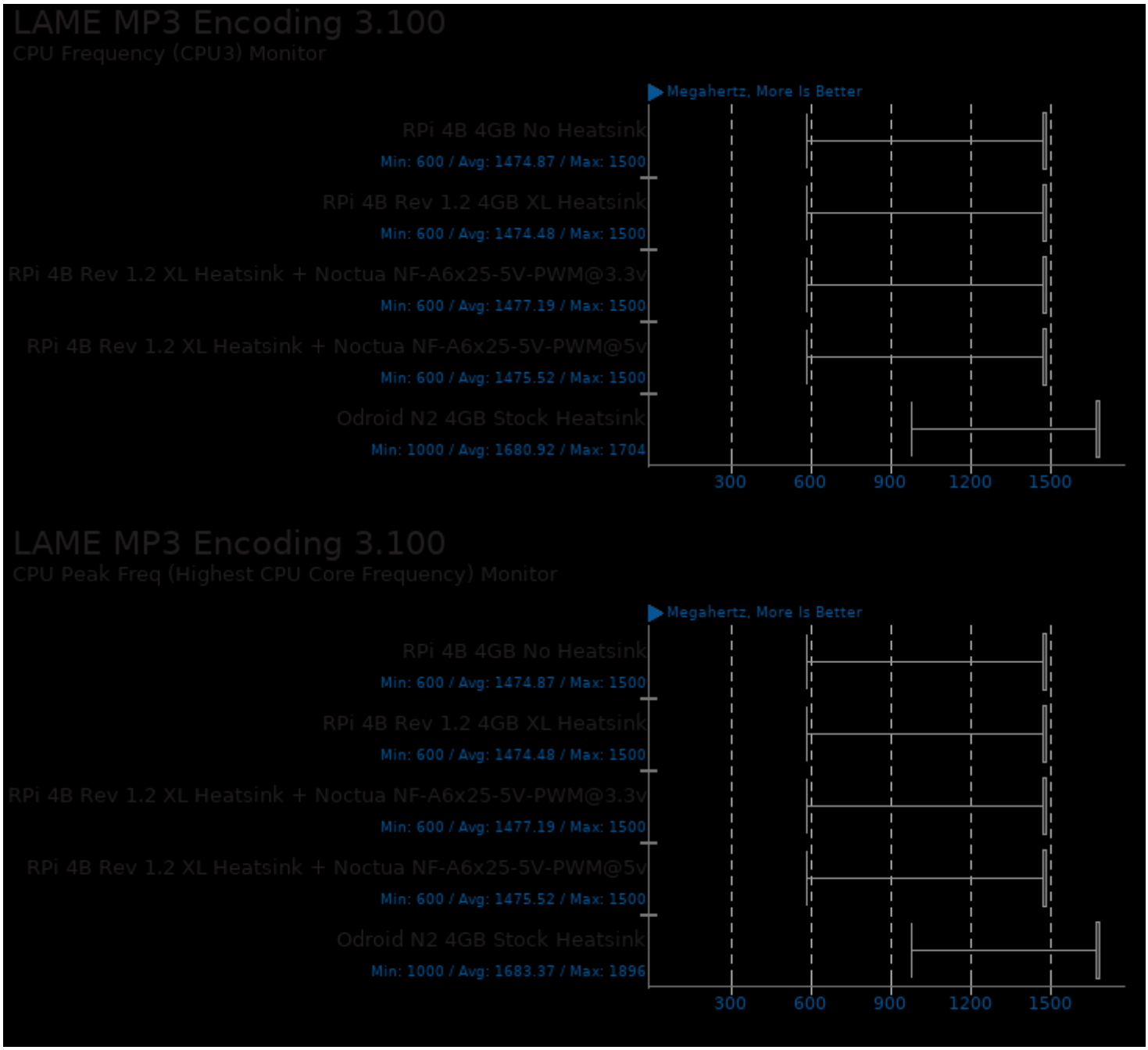

FLAC Audio Encoding 1.3.2
Drive Write Speed (mmcblk0) Monitor
MB/s, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 2.43 / Max: 29.61
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 2.4 / Max: 28.5
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 2.58 / Max: 27.93
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 2.79 / Max: 29
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 2.91 / Max: 42.52
9
18
27
36
45
FLAC Audio Encoding 1.3.2
Memory Usage Monitor
Megabytes, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 188 / Avg: 189.81 / Max: 192
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 201 / Avg: 201.96 / Max: 204
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 218 / Avg: 219.81 / Max: 222
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 229 / Avg: 230.84 / Max: 232
Odroid N2 4GB Stock Heatsink
Min: 1309 / Avg: 1315.22 / Max: 1321
200
400
600
800
1000

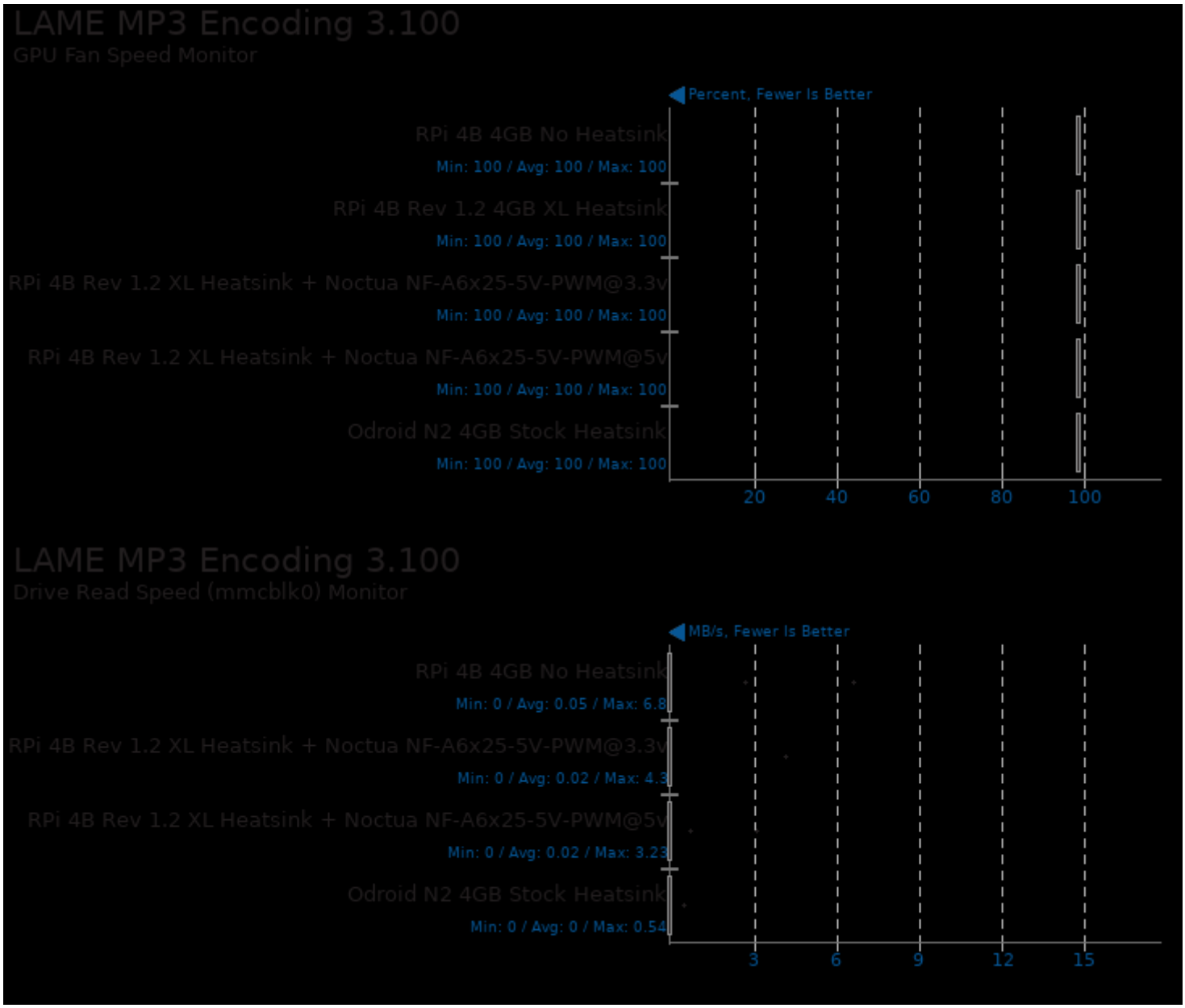

FLAC Audio Encoding 1.3.2
Swap Usage Monitor
Megabytes, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 8 / Avg: 8 / Max: 8
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 3 / Avg: 3 / Max: 3
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 3 / Avg: 3 / Max: 3
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 4 / Avg: 4 / Max: 4
3
6
9
12
15
FLAC Audio Encoding 1.3.2
System Iowait Monitor
Percent, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.9 / Max: 72.86
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.75 / Max: 58.9
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 1.05 / Max: 49.24
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 1.03 / Max: 37.37
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 1.43 / Max: 25.21
14
28
42
56
70

Raspberry Pi Model 4 Benchmarks

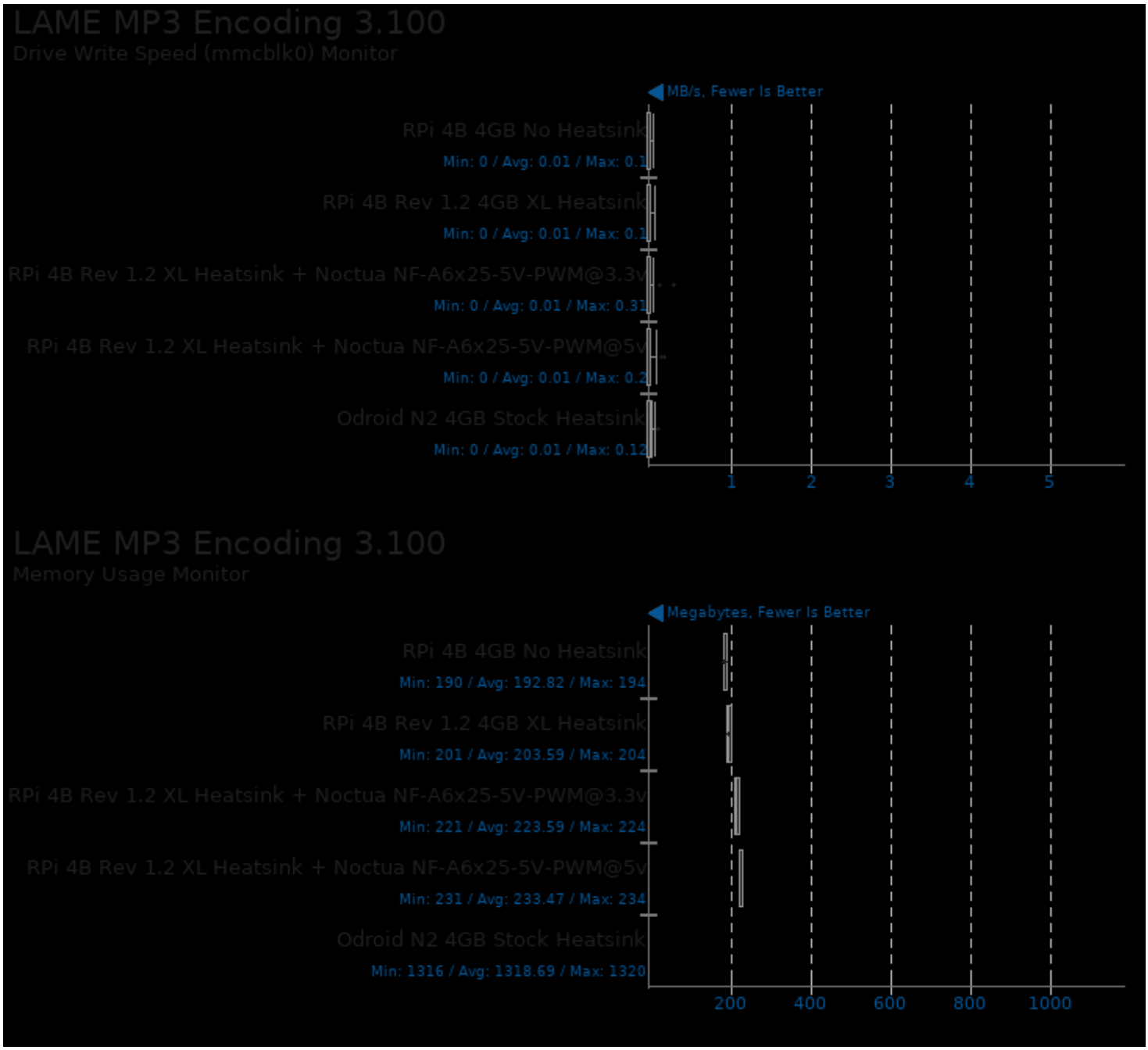


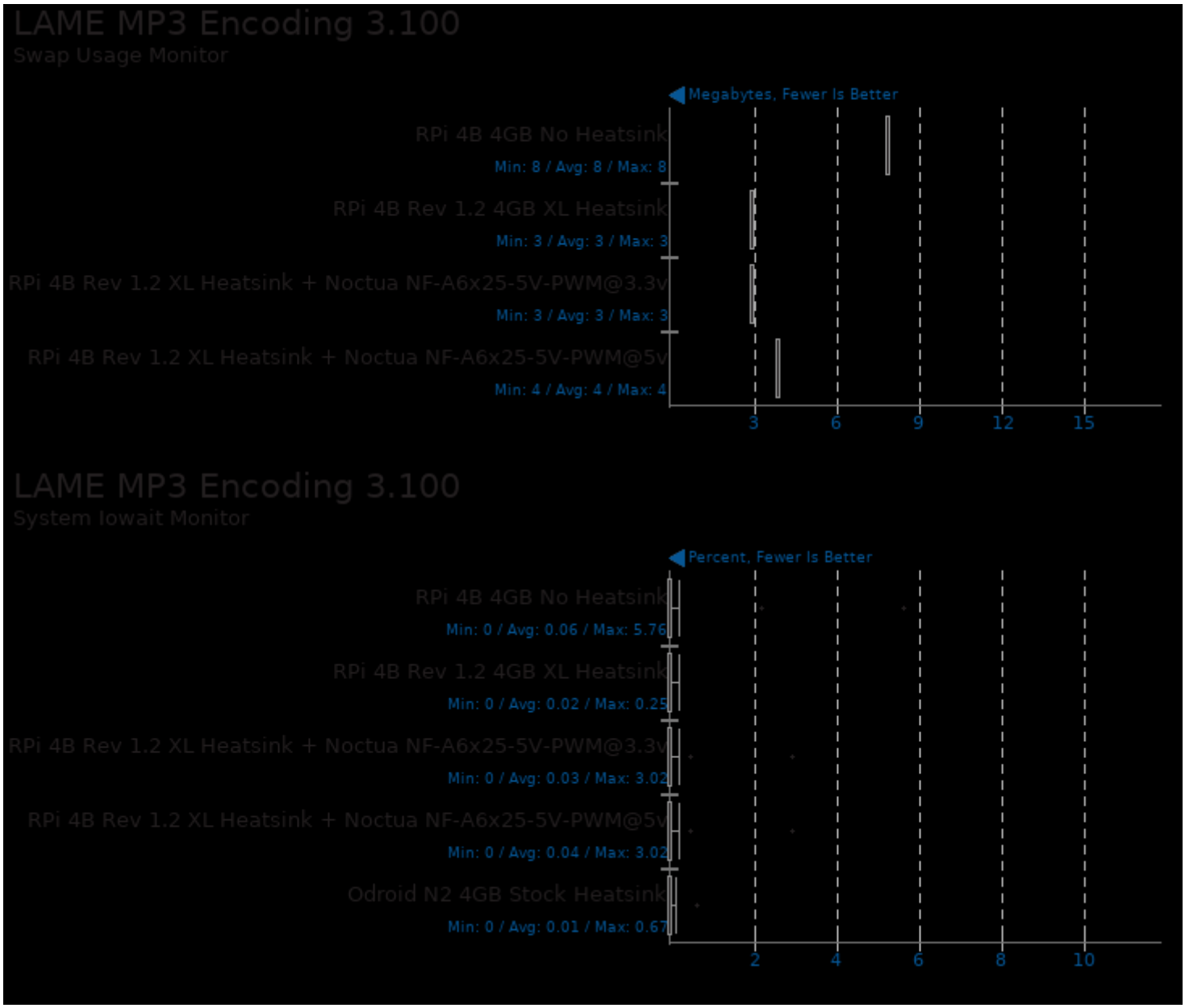

LAME MP3 Encoding 3.100
CPU Frequency (CPU1) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1474.87 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1474.48 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1477.19 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1475.45 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1002.45 / Max: 1896
300
600
900
1200
1500
LAME MP3 Encoding 3.100
CPU Frequency (CPU2) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1474.87 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1474.48 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1477.19 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1475.45 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1680.92 / Max: 1704
300
600
900
1200
1500


LAME MP3 Encoding 3.100
CPU Frequency (CPU3) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1474.87 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1474.48 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1477.19 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1475.52 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1680.92 / Max: 1704
300
600
900
1200
1500
LAME MP3 Encoding 3.100
CPU Peak Freq (Highest CPU Core Frequency) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1474.87 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1474.48 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1477.19 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1475.52 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1683.37 / Max: 1896
300
600
900
1200
1500

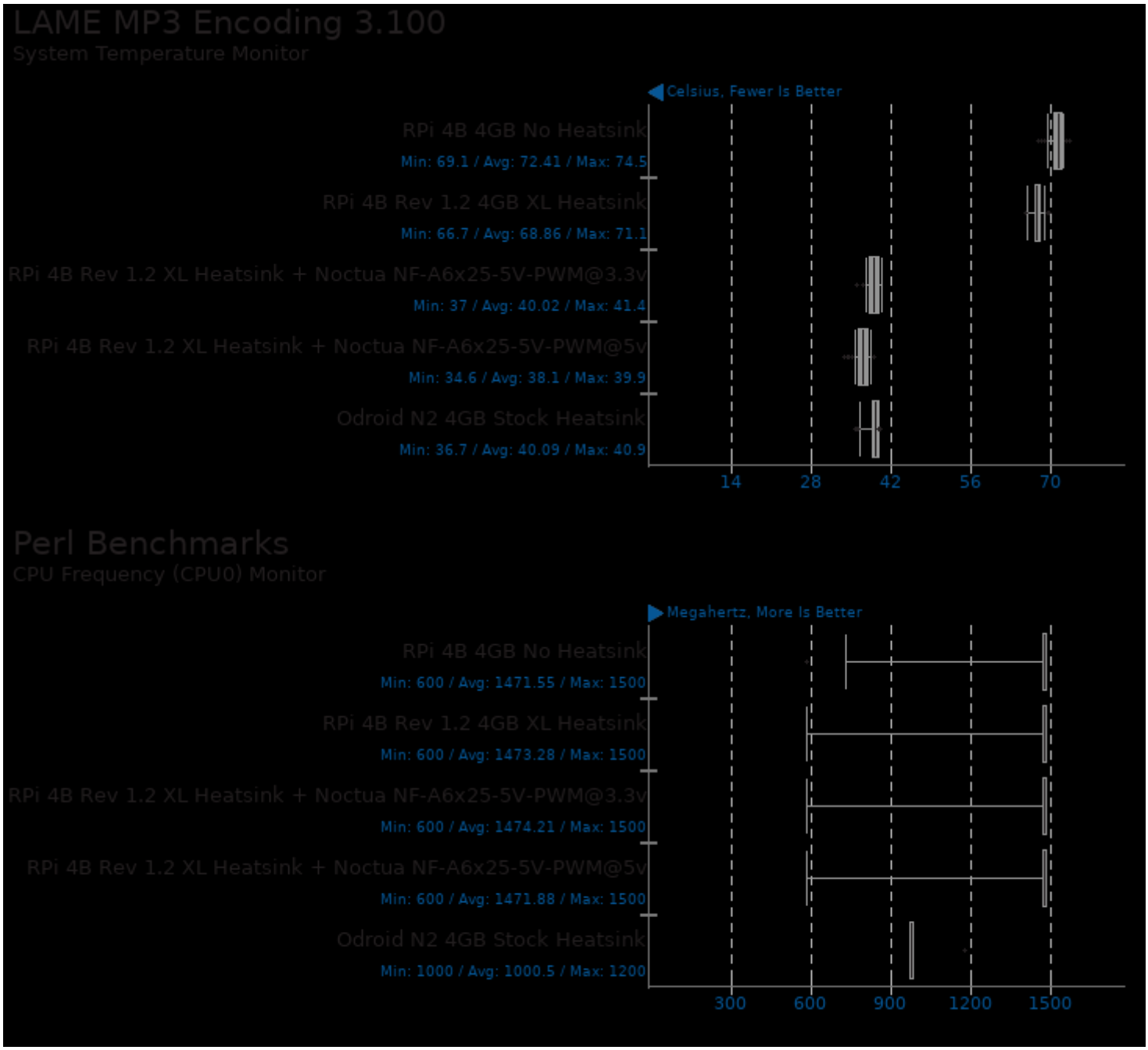

LAME MP3 Encoding 3.100
GPU Fan Speed Monitor
Percent, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 100 / Avg: 100 / Max: 100
Odroid N2 4GB Stock Heatsink
Min: 100 / Avg: 100 / Max: 100
20
40
60
80
100
LAME MP3 Encoding 3.100
Drive Read Speed (mmcblk0) Monitor
MB/s, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.05 / Max: 6.8
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.02 / Max: 4.3
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0.02 / Max: 3.23
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 0 / Max: 0.54
3
6
9
12
15

Raspberry Pi Model 4 Benchmarks

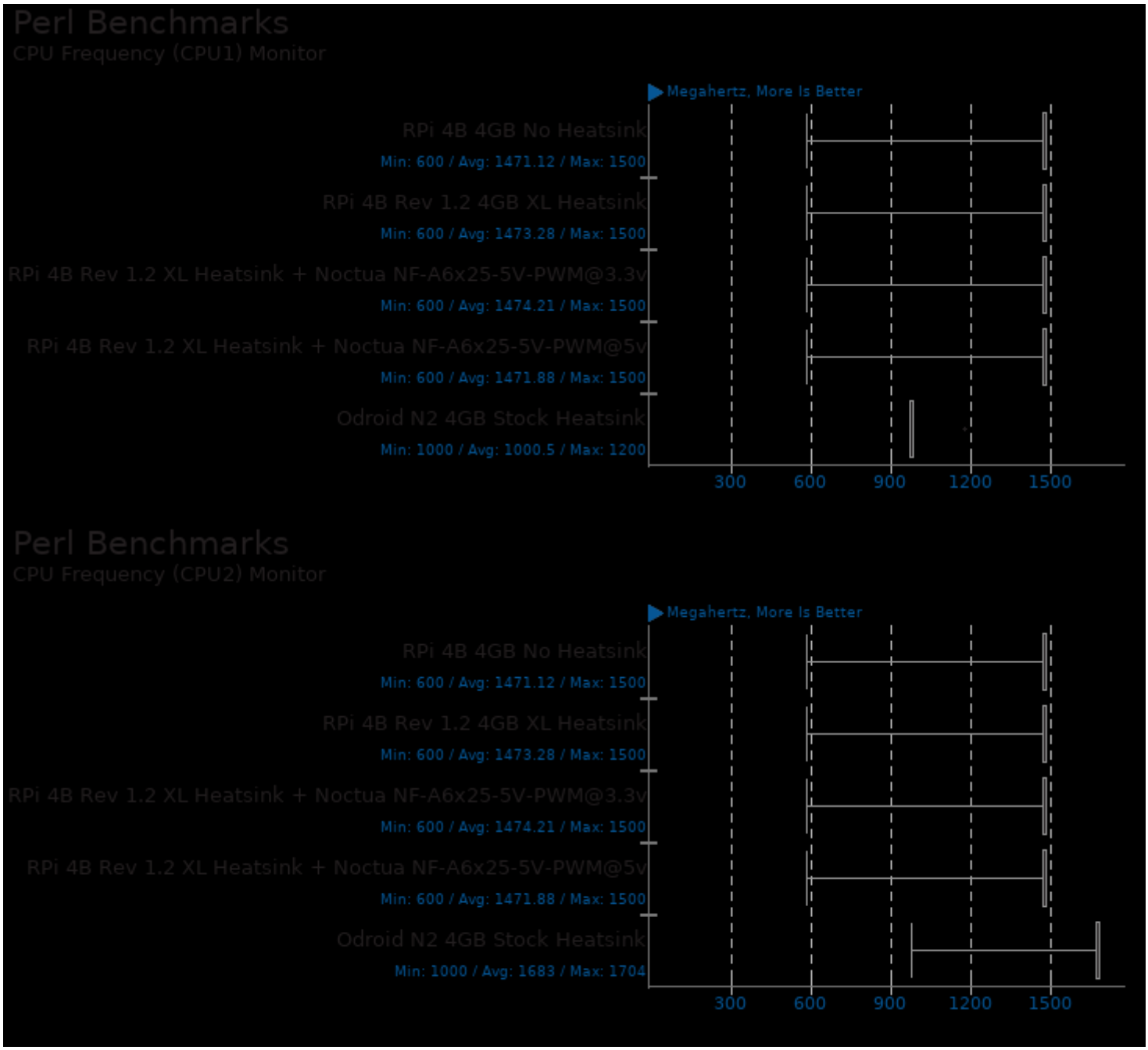



LAME MP3 Encoding 3.100
Swap Usage Monitor
Megabytes, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 8 / Avg: 8 / Max: 8
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 3 / Avg: 3 / Max: 3
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 3 / Avg: 3 / Max: 3
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 4 / Avg: 4 / Max: 4
3
6
9
12
15
LAME MP3 Encoding 3.100
System Iowait Monitor
Percent, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.06 / Max: 5.76
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.02 / Max: 0.25
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.03 / Max: 3.02
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0.04 / Max: 3.02
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 0.01 / Max: 0.67
2
4
6
8
10

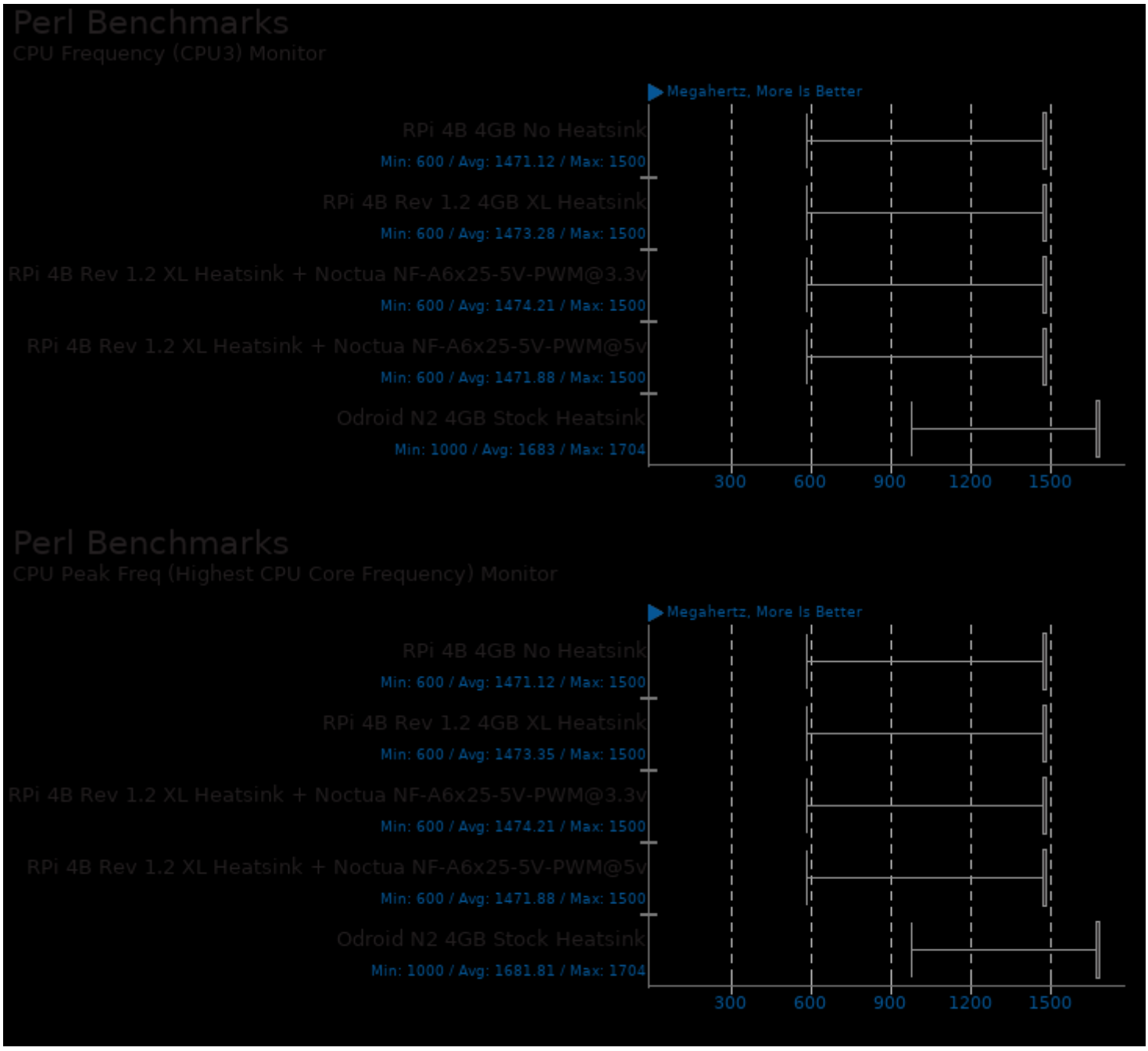
Raspberry Pi Model 4 Benchmarks

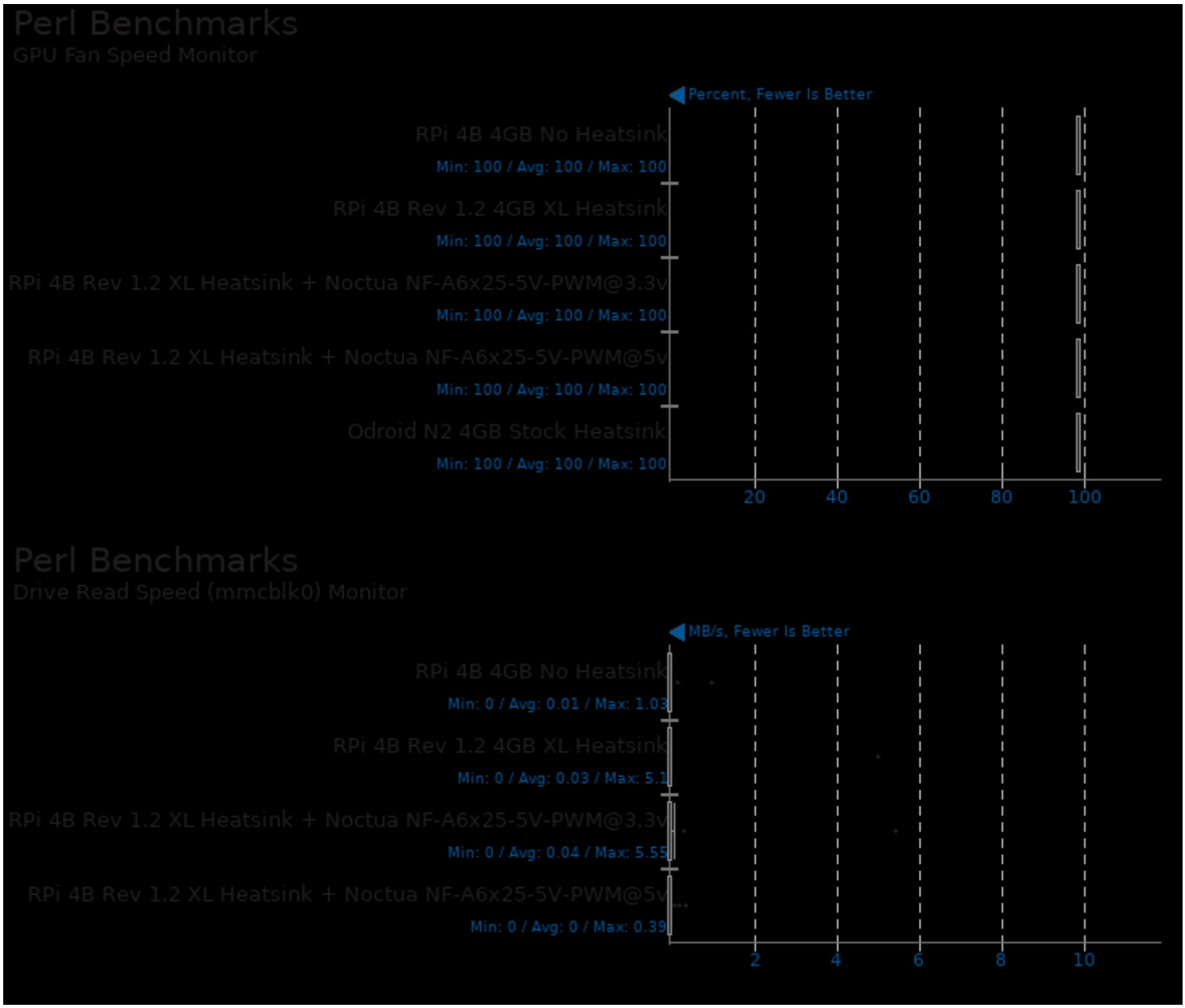


Raspberry Pi Model 4 Benchmarks

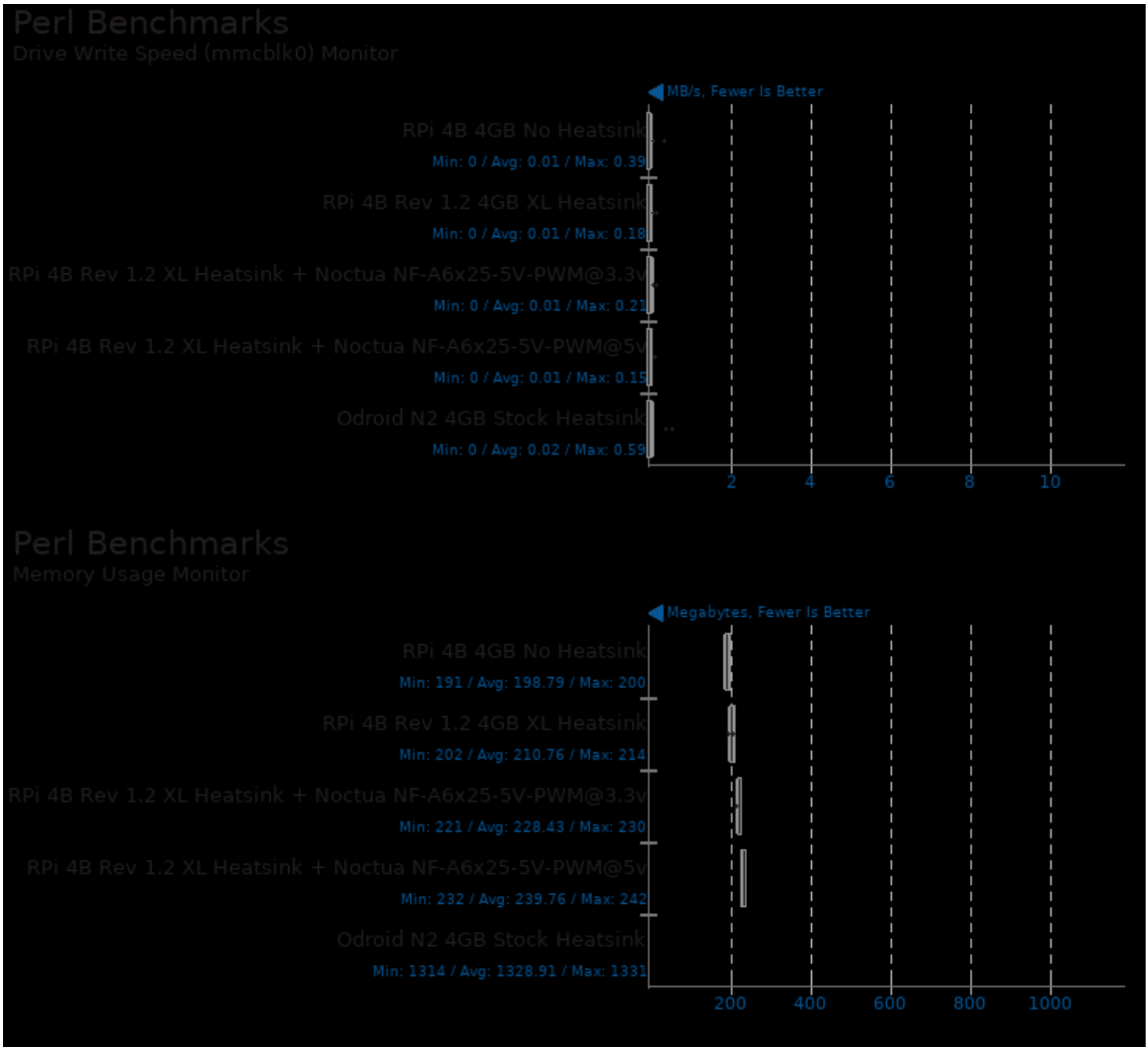


Raspberry Pi Model 4 Benchmarks

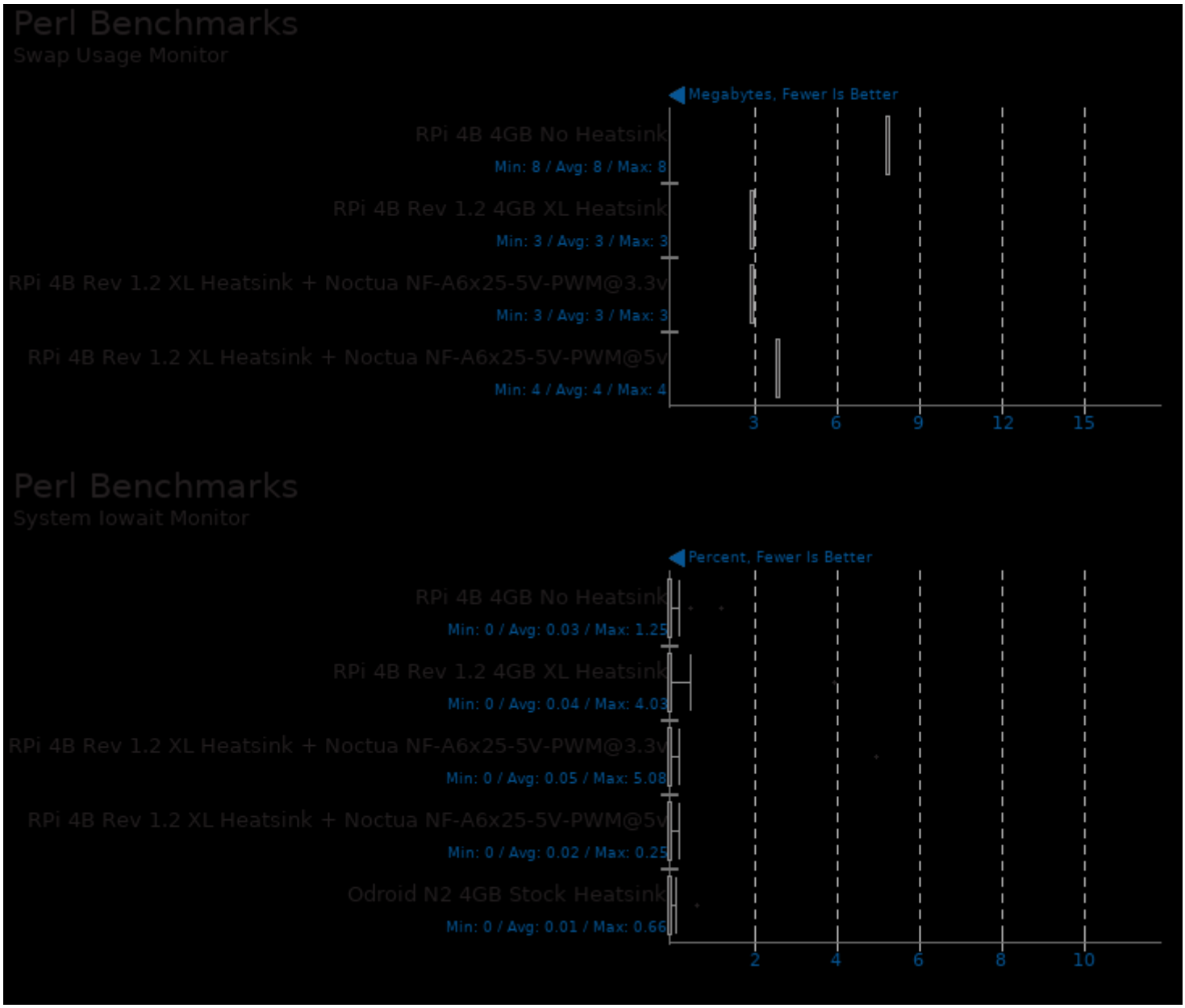



Perl Benchmarks
GPU Fan Speed Monitor
Percent, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 100 / Avg: 100 / Max: 100
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 100 / Avg: 100 / Max: 100
Odroid N2 4GB Stock Heatsink
Min: 100 / Avg: 100 / Max: 100
20
40
60
80
100
Perl Benchmarks
Drive Read Speed (mmcblk0) Monitor
MB/s, Fewer Is Better
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.01 / Max: 1.03
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.03 / Max: 5.1
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.04 / Max: 5.55
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0 / Max: 0.39
2
4
6
8
10

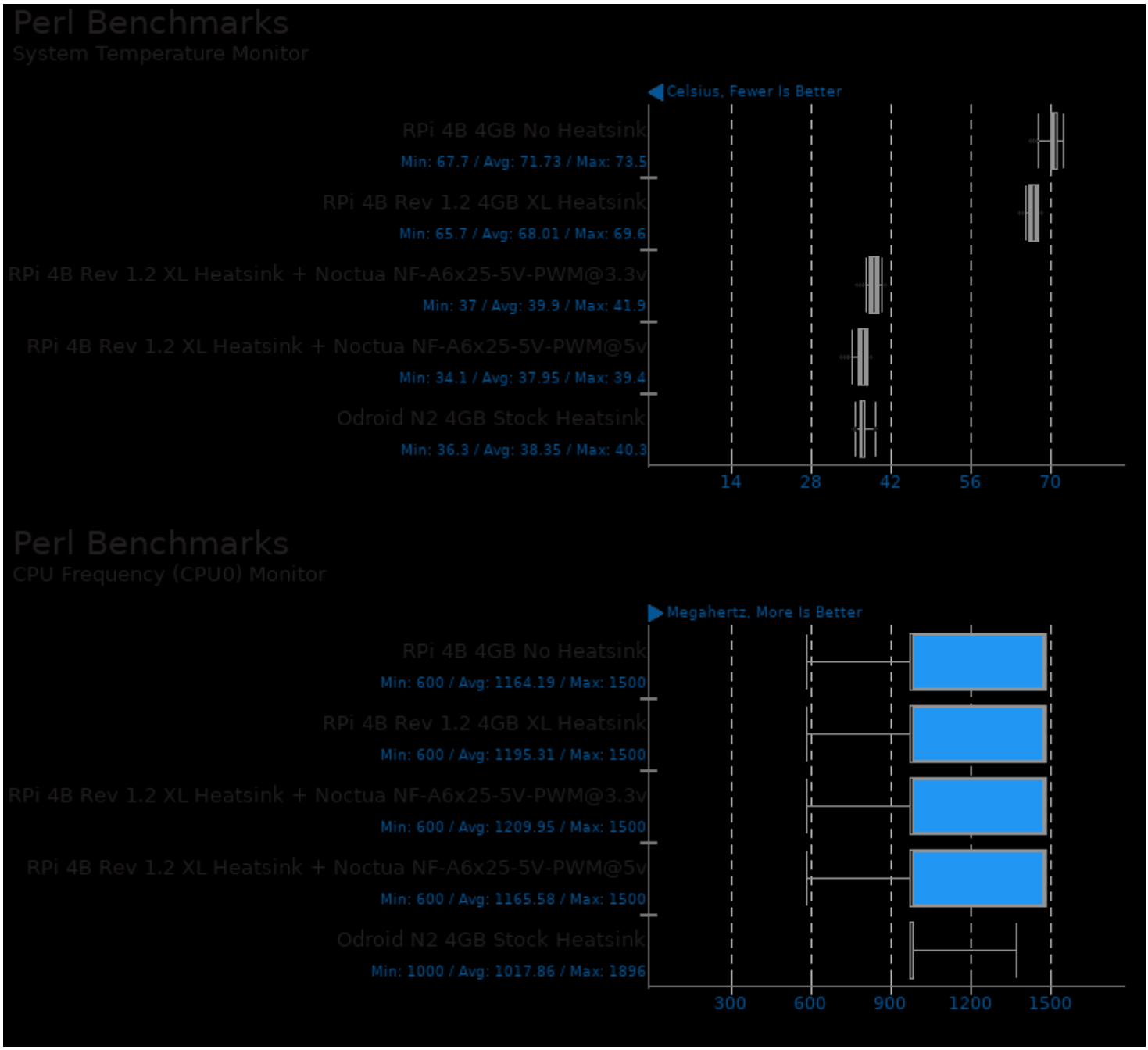
Raspberry Pi Model 4 Benchmarks

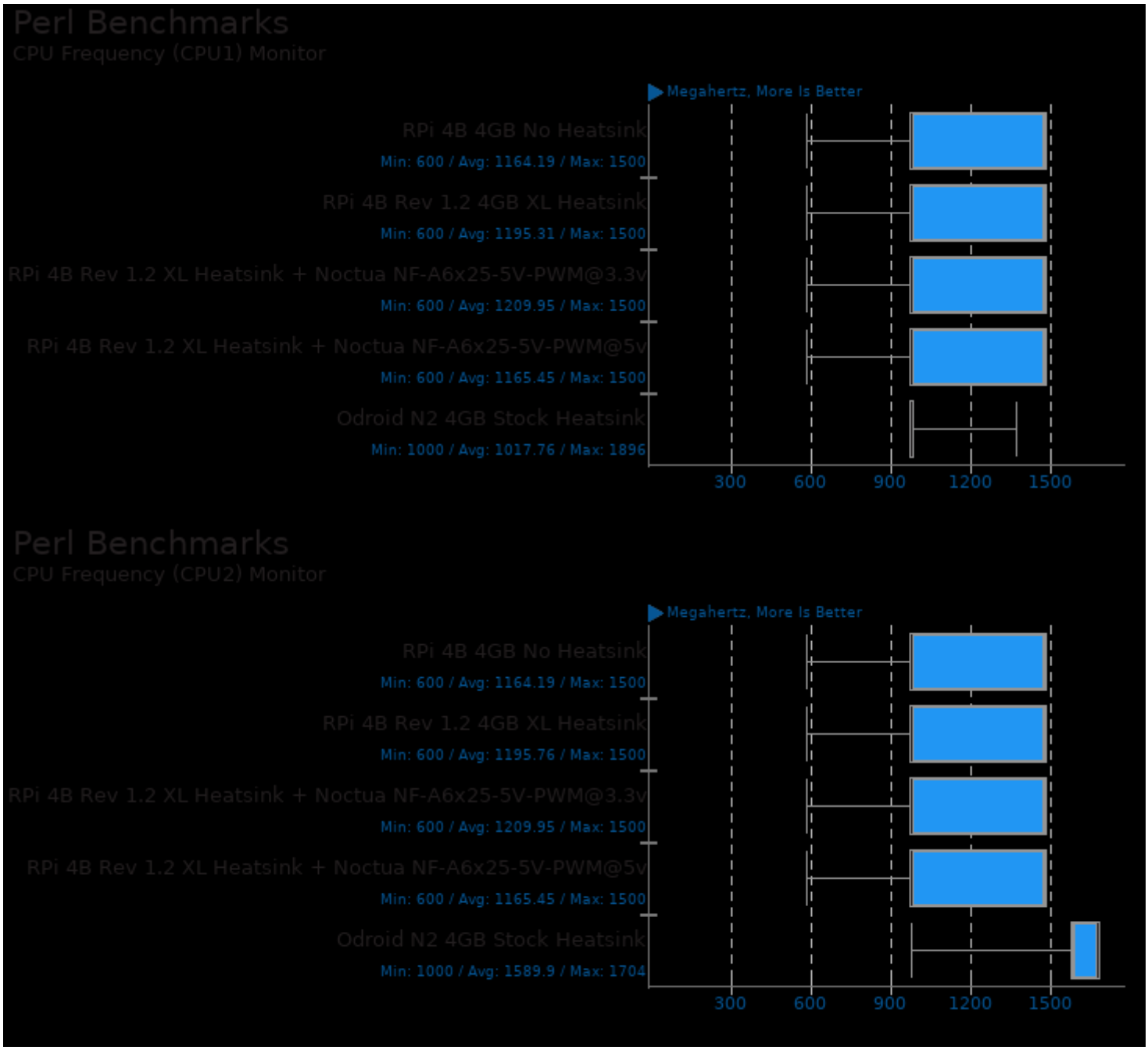


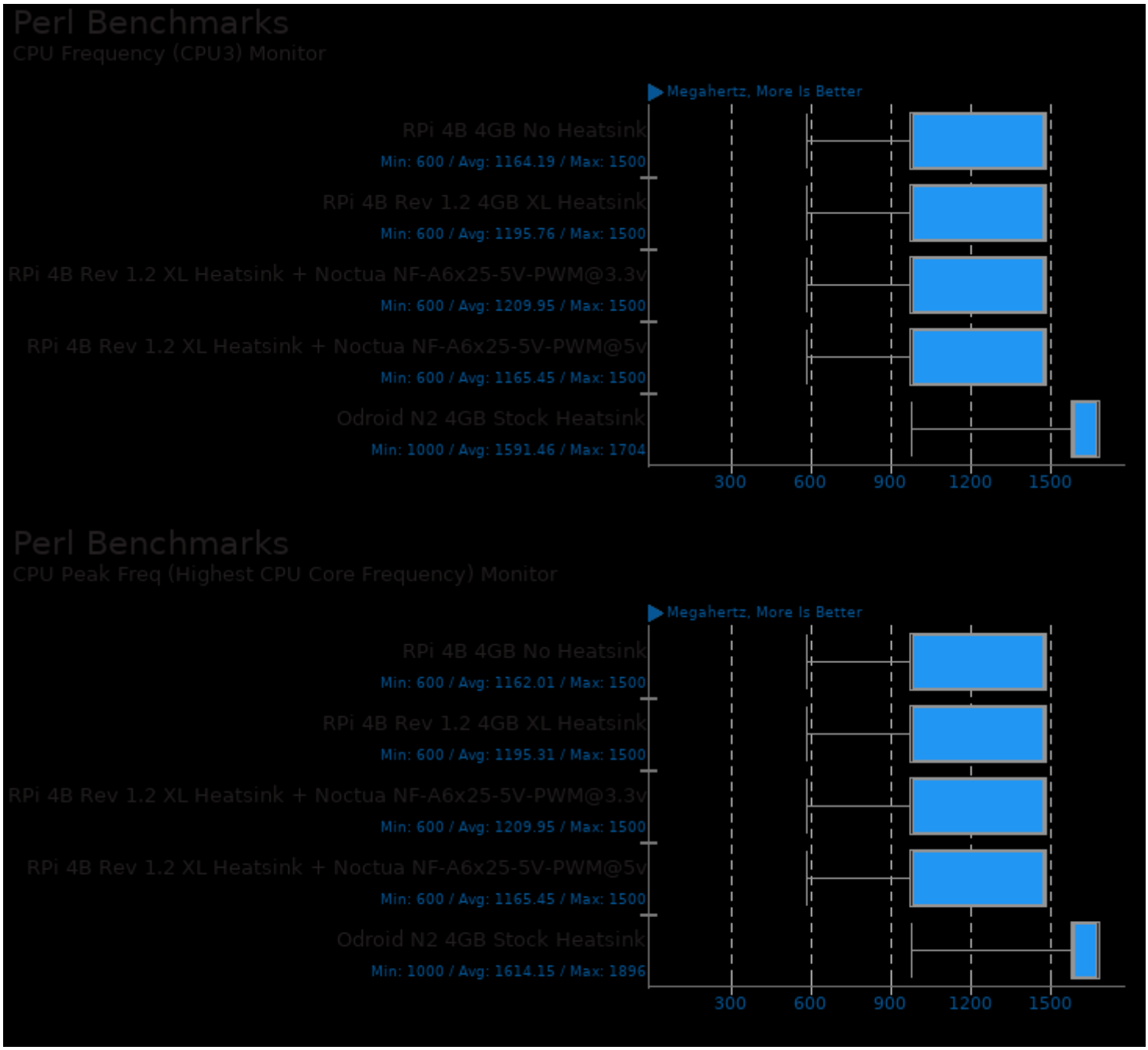
Raspberry Pi Model 4 Benchmarks



Raspberry Pi Model 4 Benchmarks

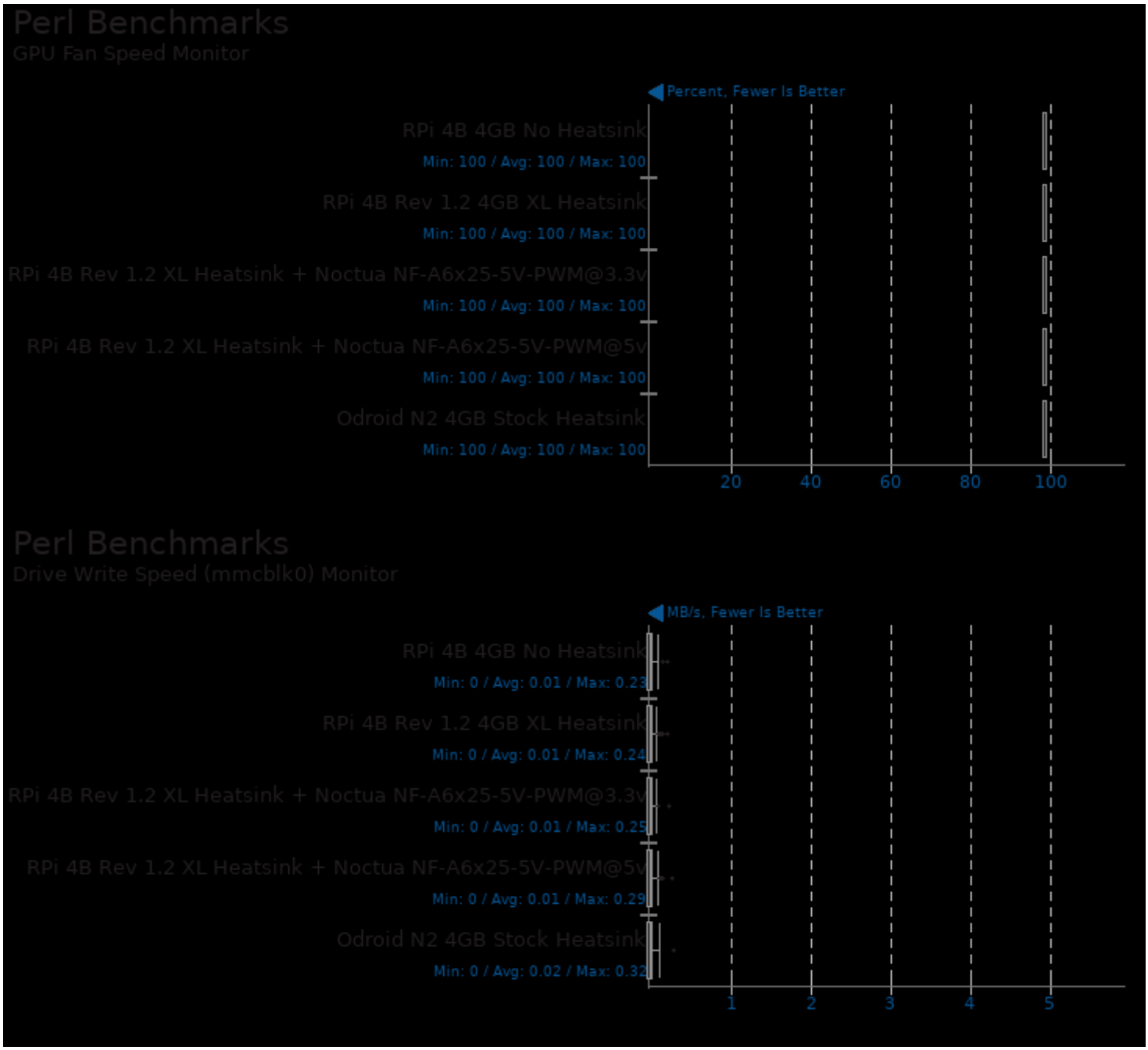



Perl Benchmarks
CPU Frequency (CPU1) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1164.19 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1195.31 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1209.95 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1165.45 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1017.76 / Max: 1896
300
600
900
1200
1500
Perl Benchmarks
CPU Frequency (CPU2) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1164.19 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1195.76 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1209.95 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1165.45 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1589.9 / Max: 1704
300
600
900
1200
1500

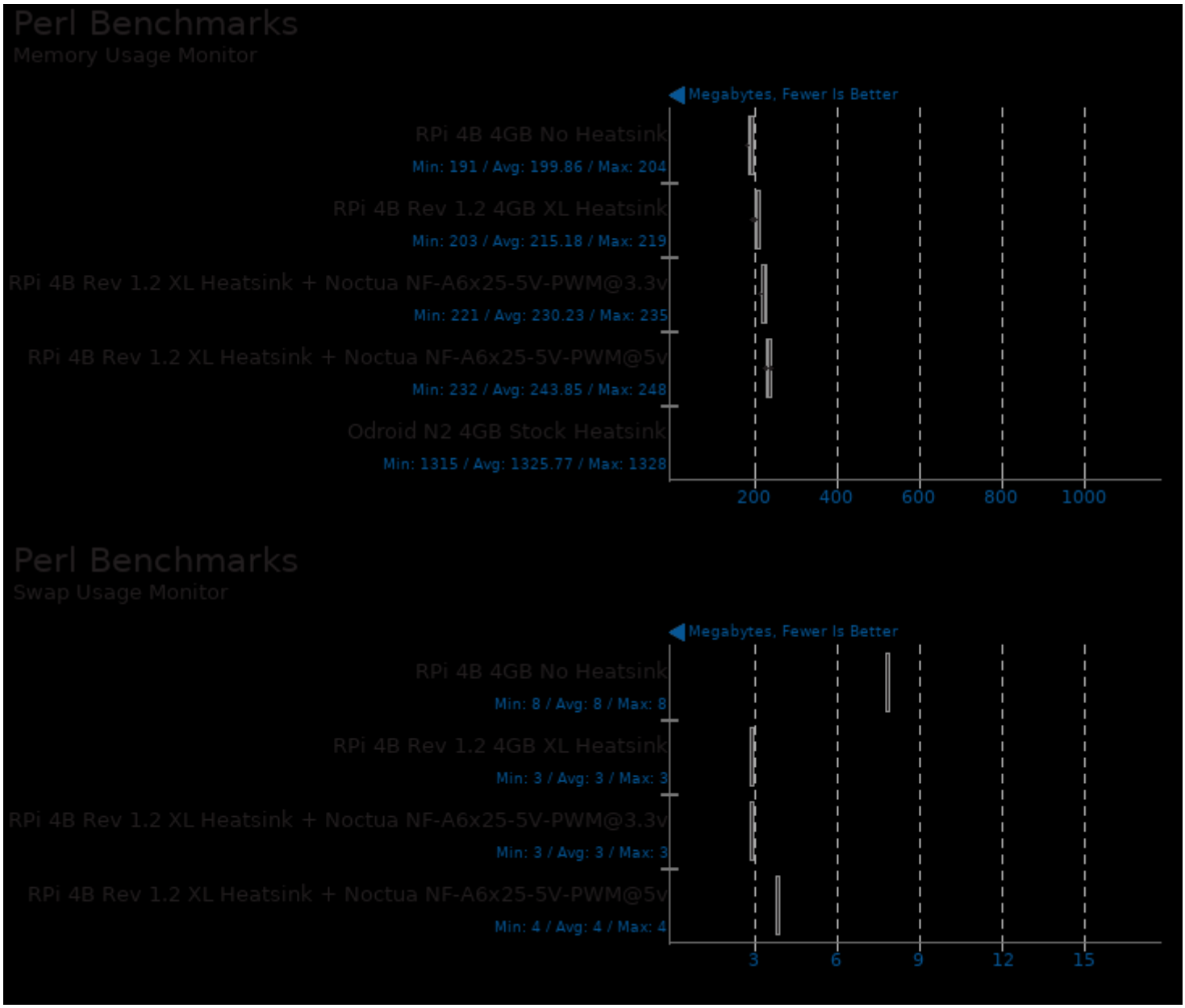

Perl Benchmarks
CPU Frequency (CPU3) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1164.19 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1195.76 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1209.95 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1165.45 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1591.46 / Max: 1704
300
600
900
1200
1500

Perl Benchmarks
CPU Peak Freq (Highest CPU Core Frequency) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1162.01 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1195.31 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1209.95 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1165.45 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1614.15 / Max: 1896
300
600
900
1200
1500

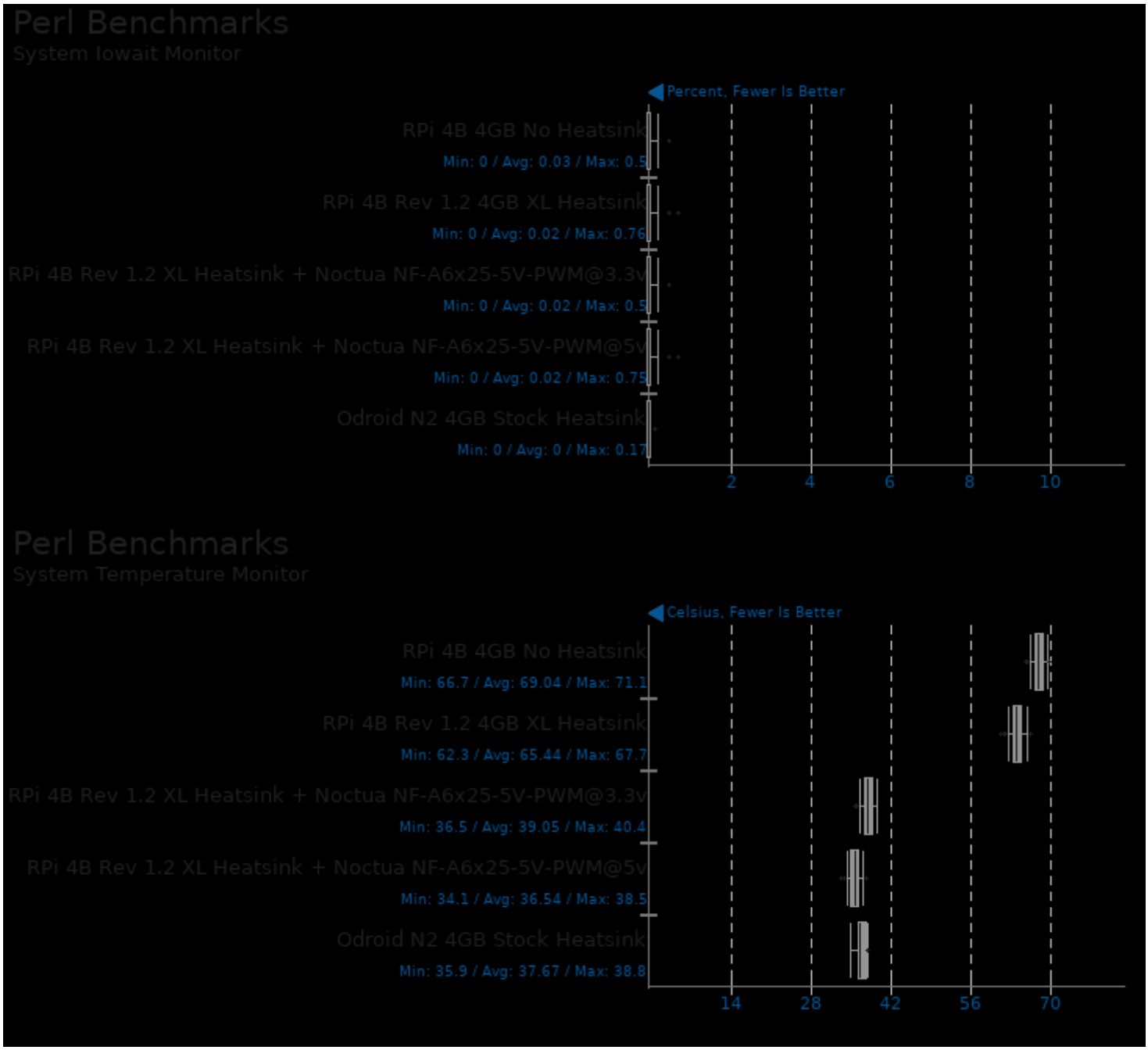
Raspberry Pi Model 4 Benchmarks



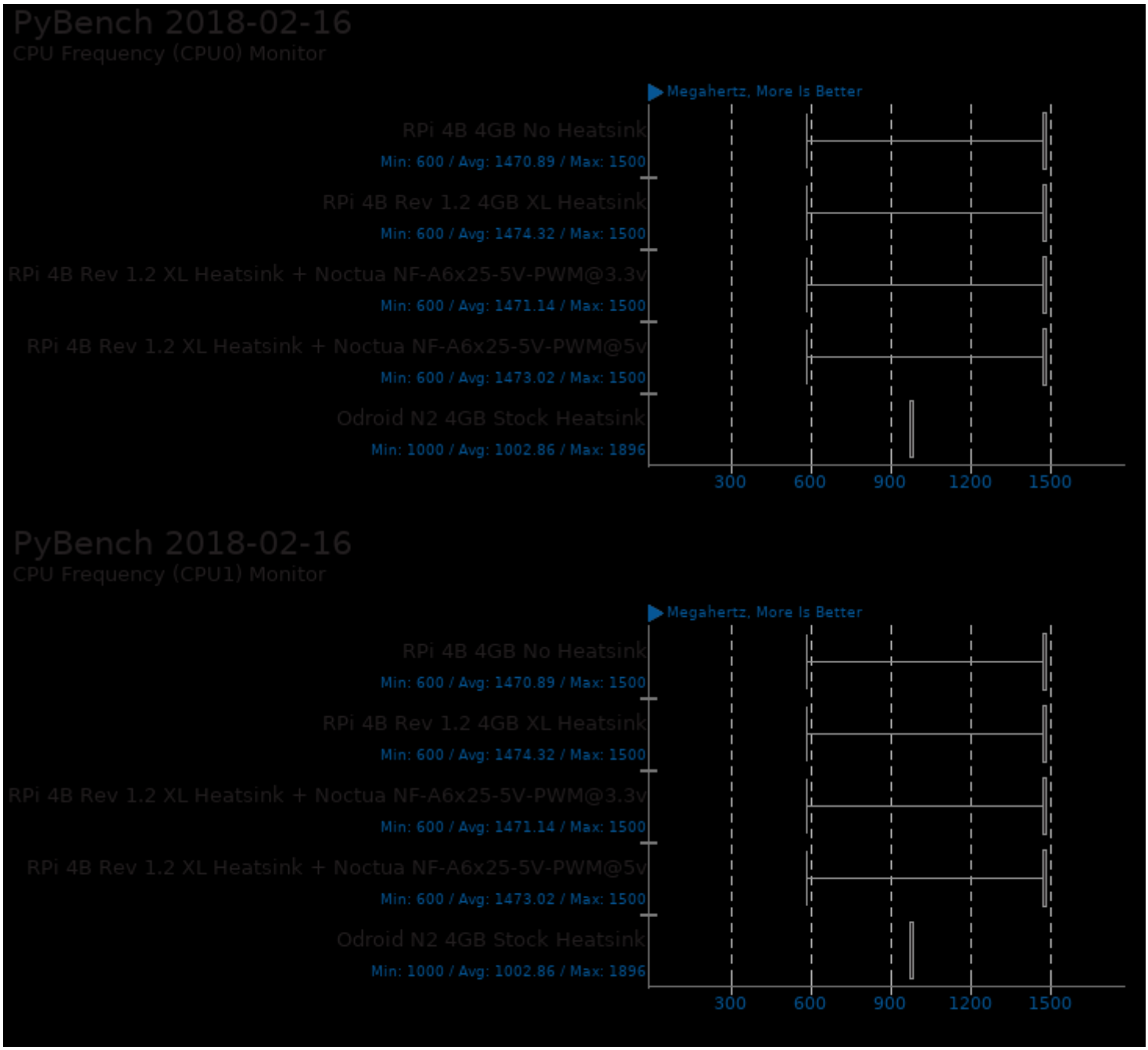
Raspberry Pi Model 4 Benchmarks



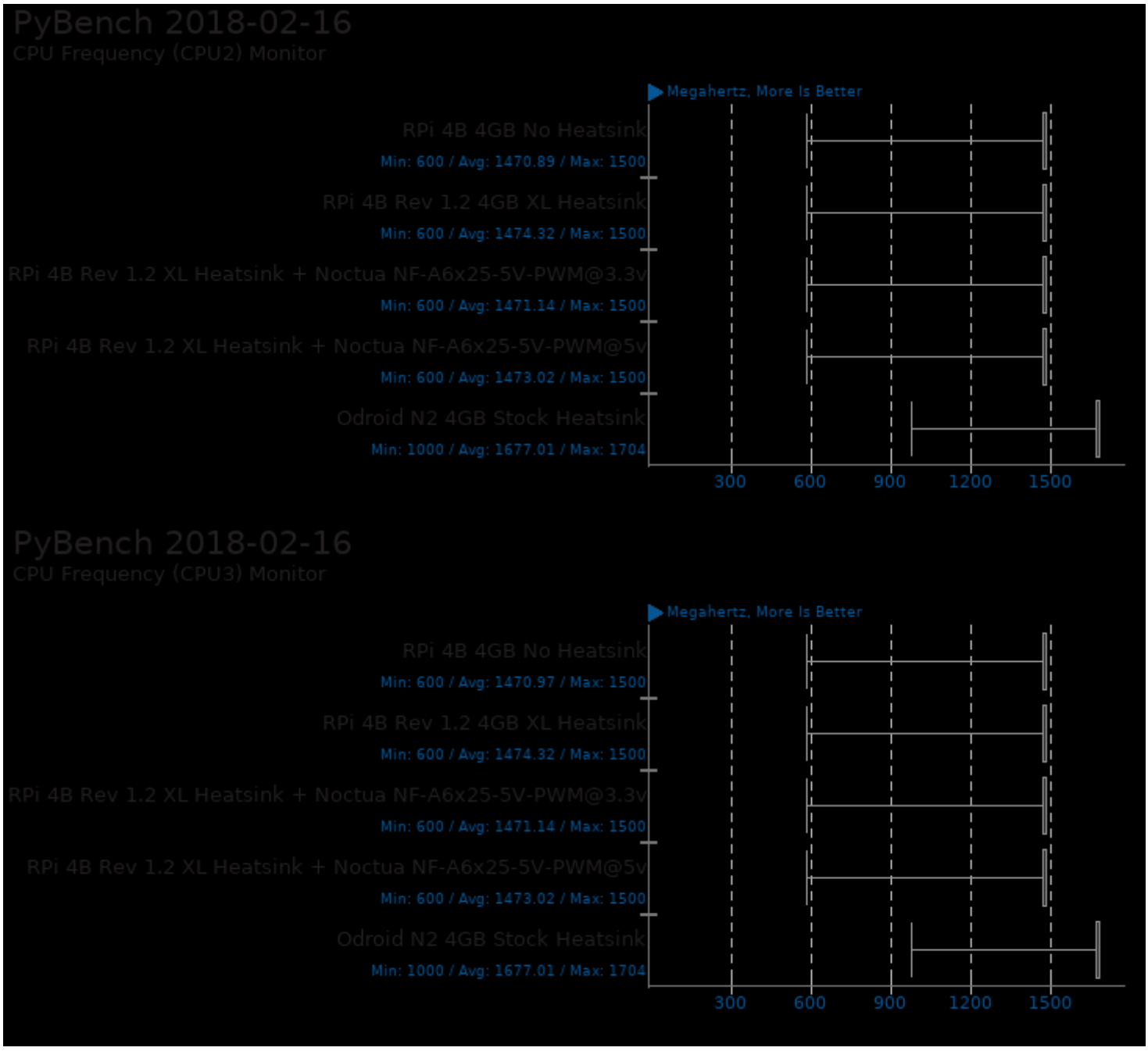
Raspberry Pi Model 4 Benchmarks



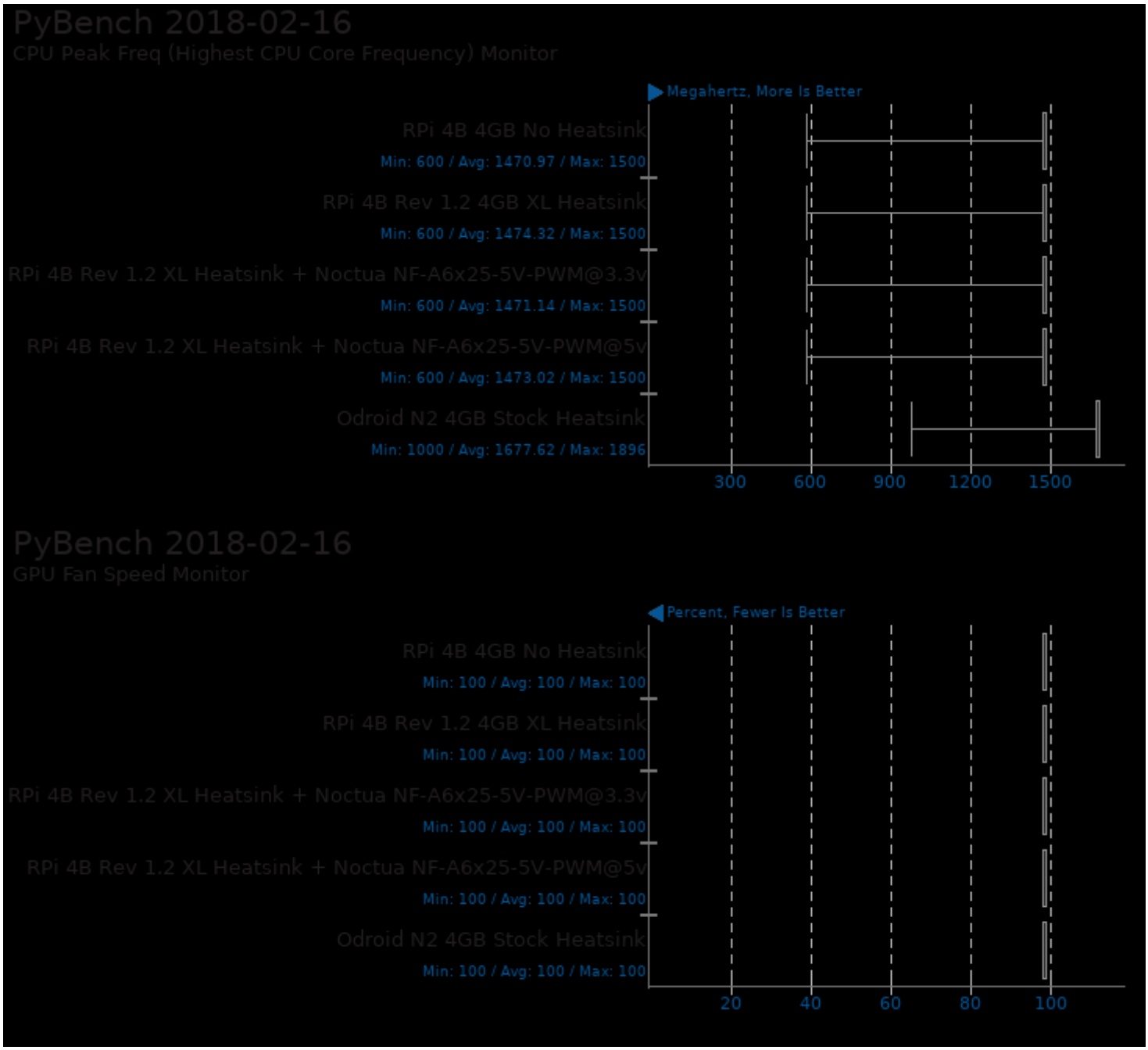
Raspberry Pi Model 4 Benchmarks



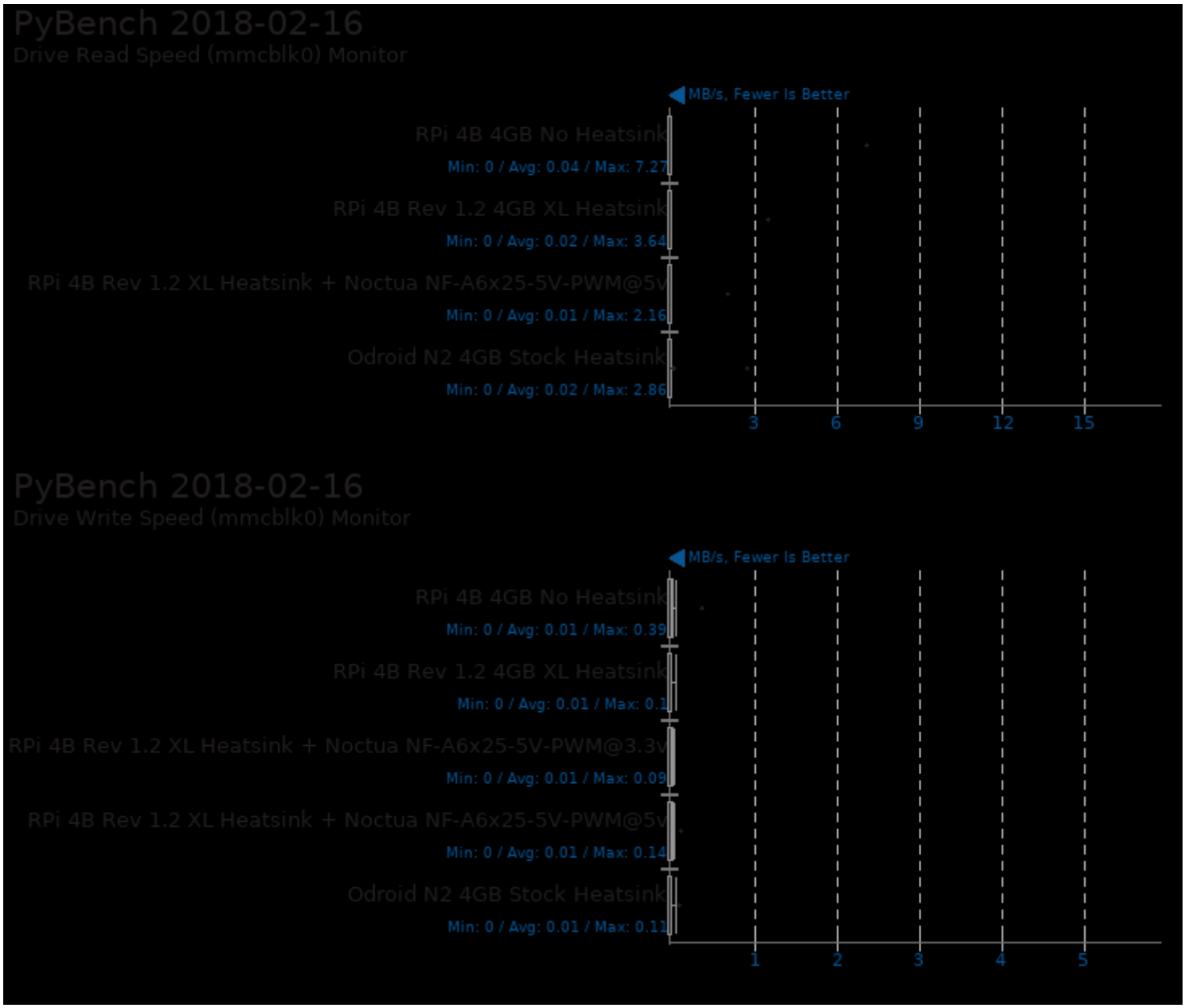
Raspberry Pi Model 4 Benchmarks



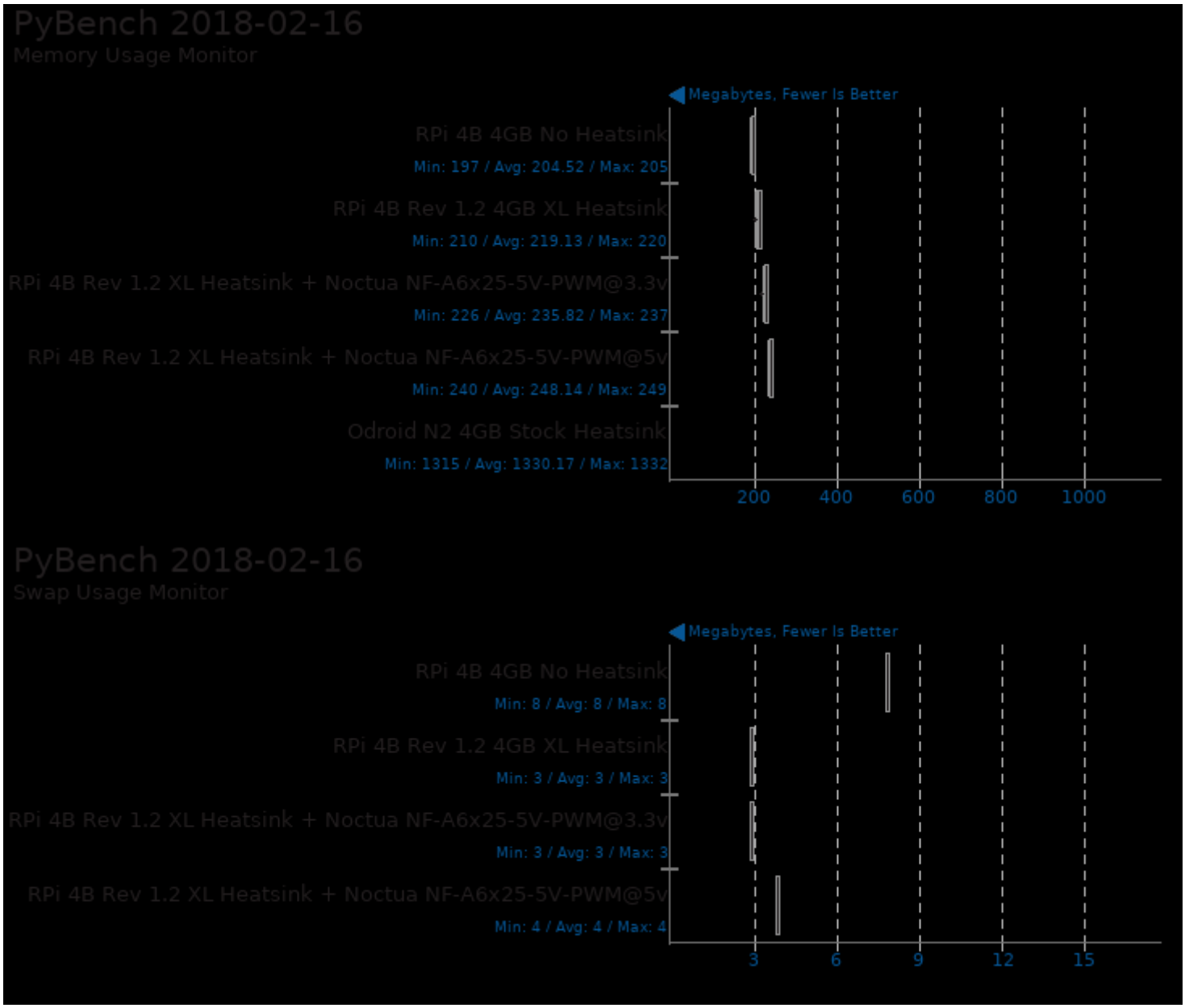
Raspberry Pi Model 4 Benchmarks



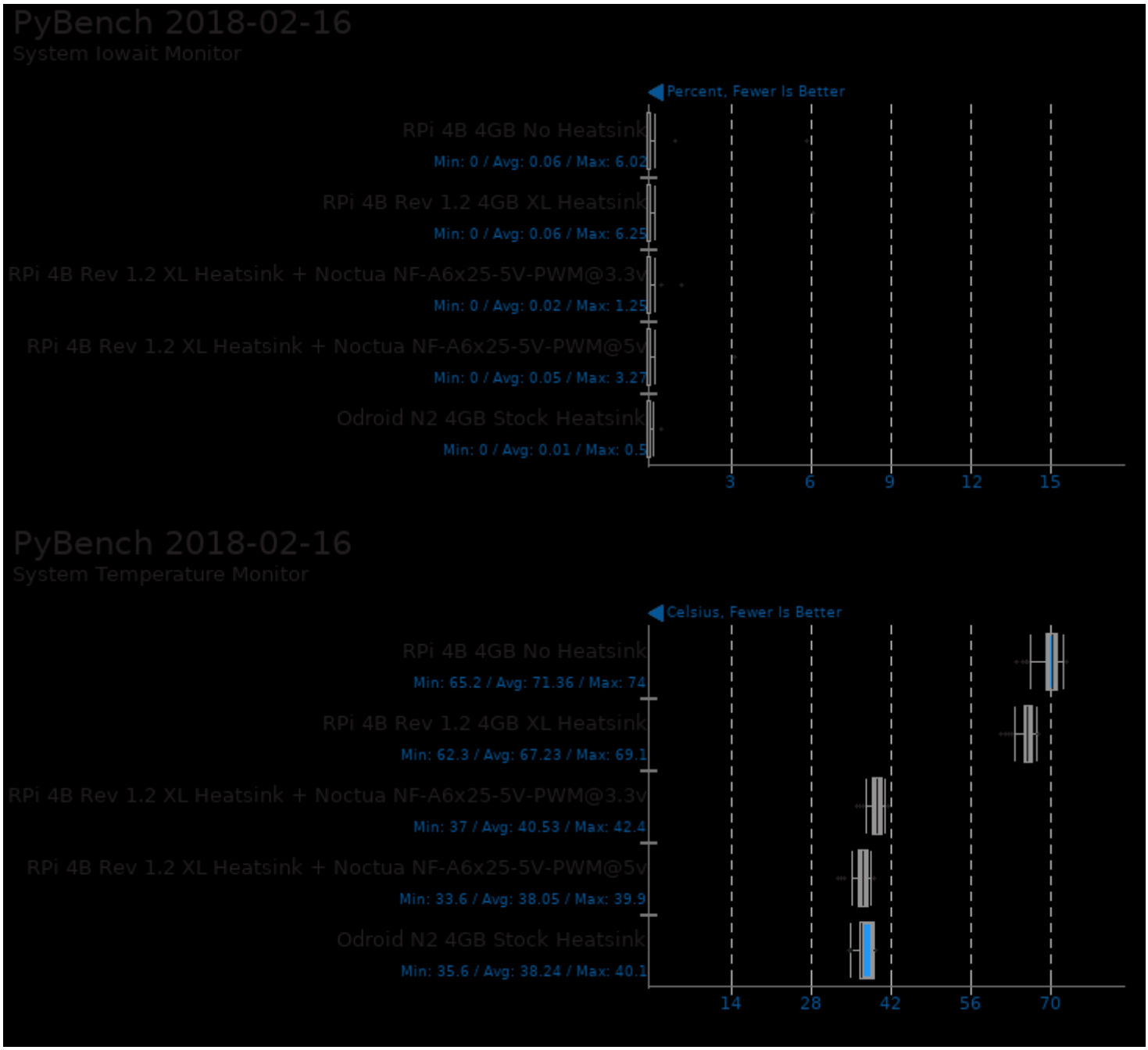
Raspberry Pi Model 4 Benchmarks

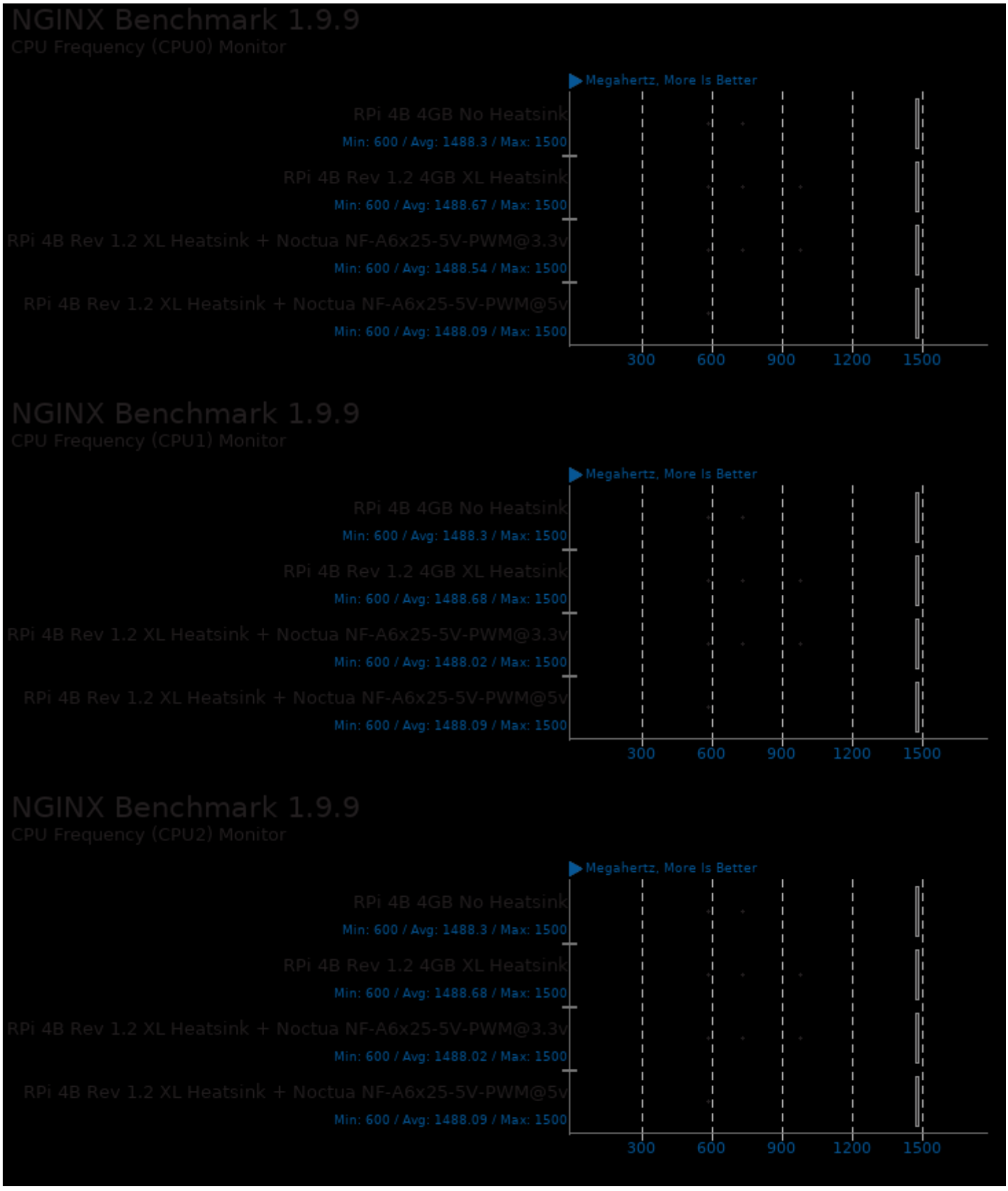


Raspberry Pi Model 4 Benchmarks

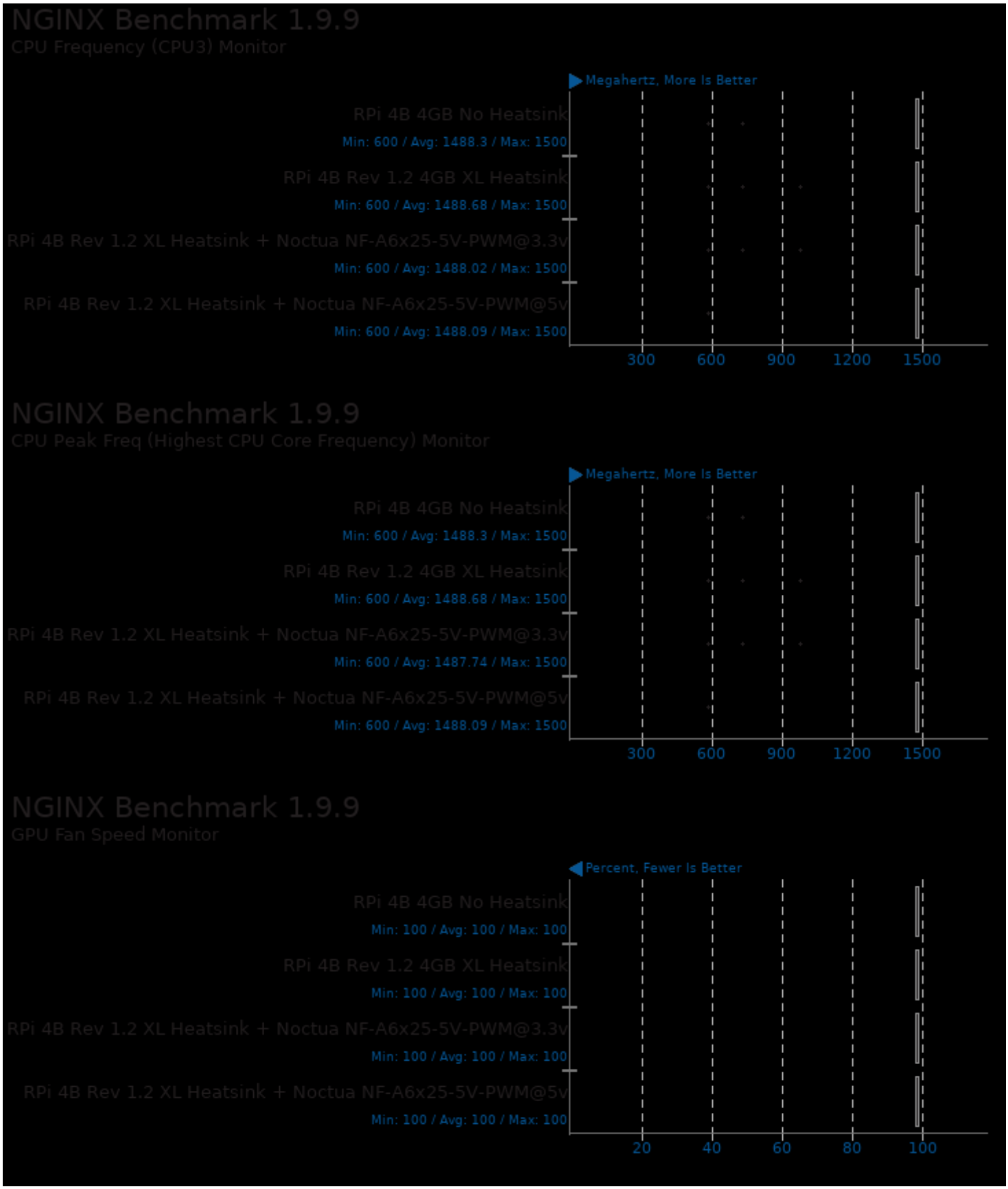


Raspberry Pi Model 4 Benchmarks

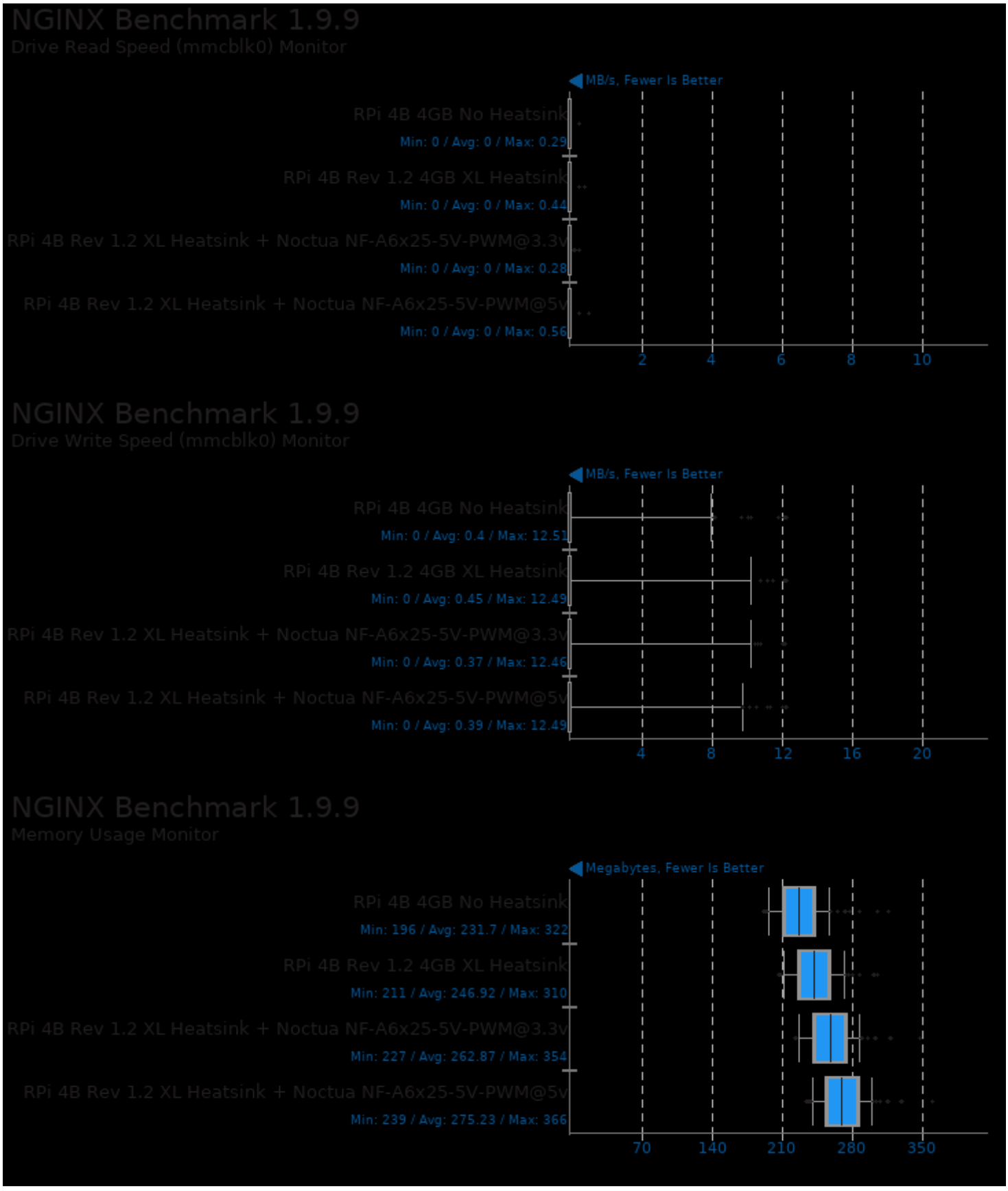



NGINX Benchmark 1.9.9
CPU Frequency (CPU0) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1488.3 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1488.67 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1488.54 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1488.09 / Max: 1500
300
600
900
1200
1500
NGINX Benchmark 1.9.9
CPU Frequency (CPU1) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1488.3 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1488.68 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1488.02 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1488.09 / Max: 1500
300
600
900
1200
1500
NGINX Benchmark 1.9.9
CPU Frequency (CPU2) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1488.3 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1488.68 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1488.02 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1488.09 / Max: 1500
300
600
900
1200
1500

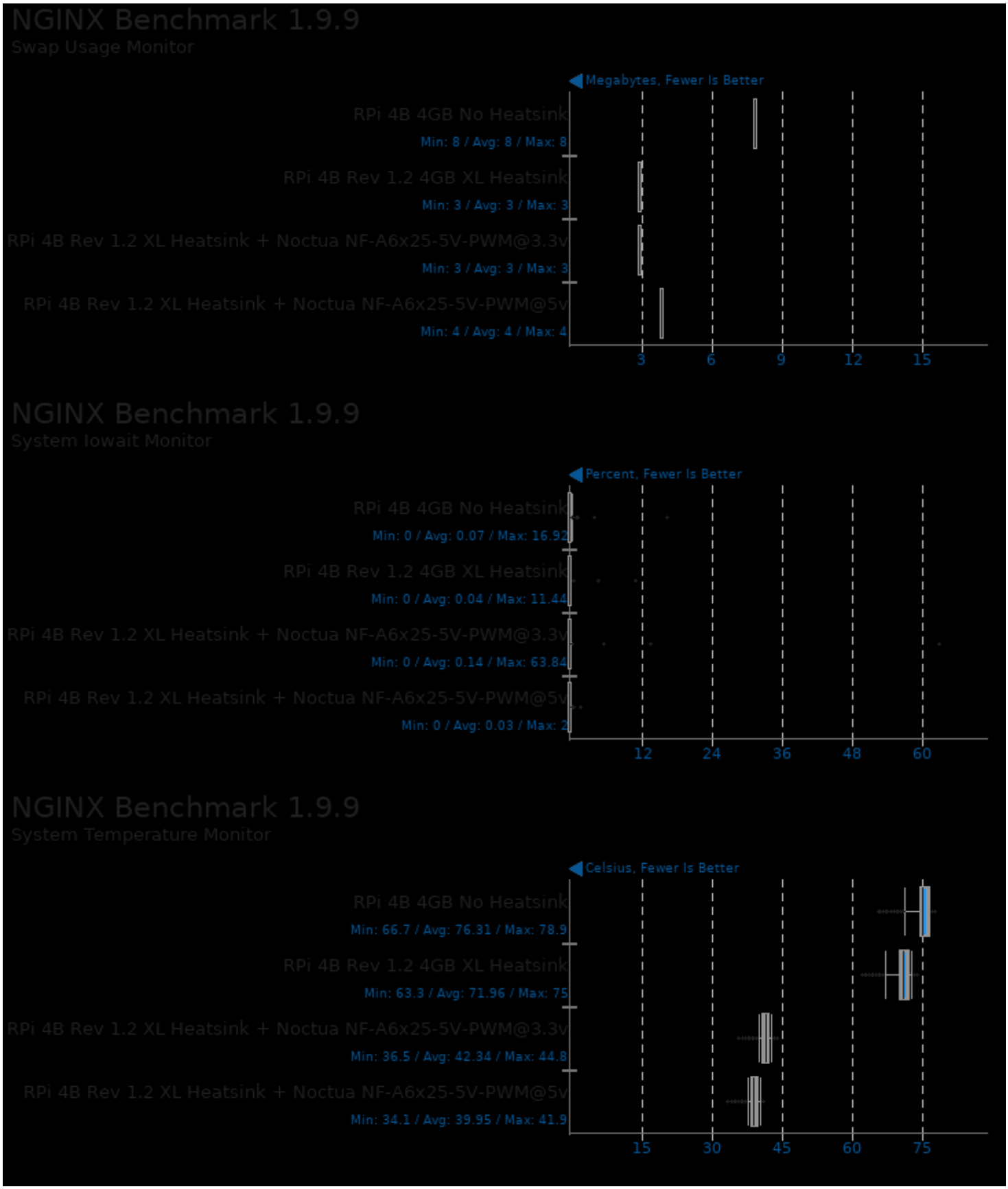
Raspberry Pi Model 4 Benchmarks

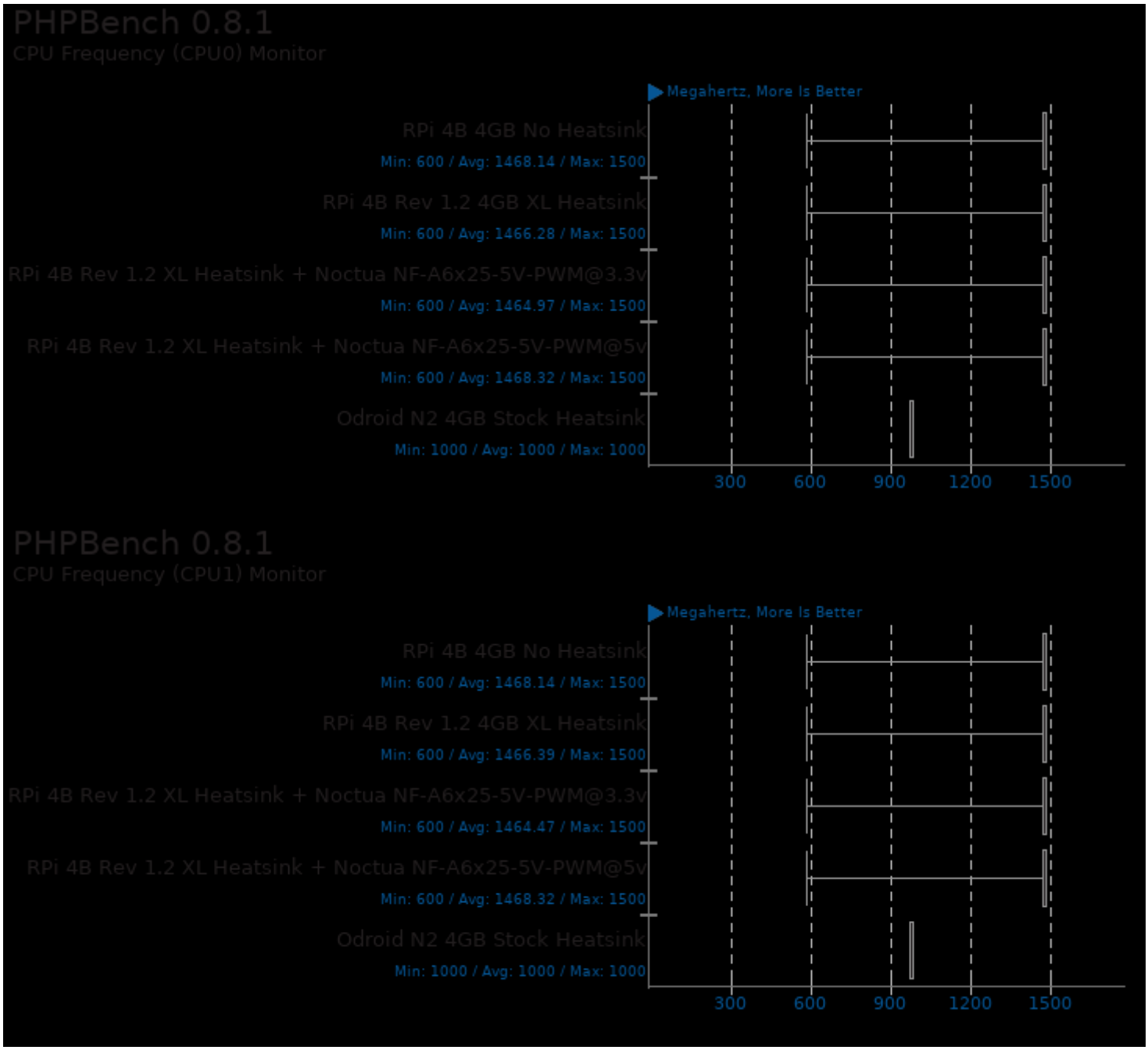


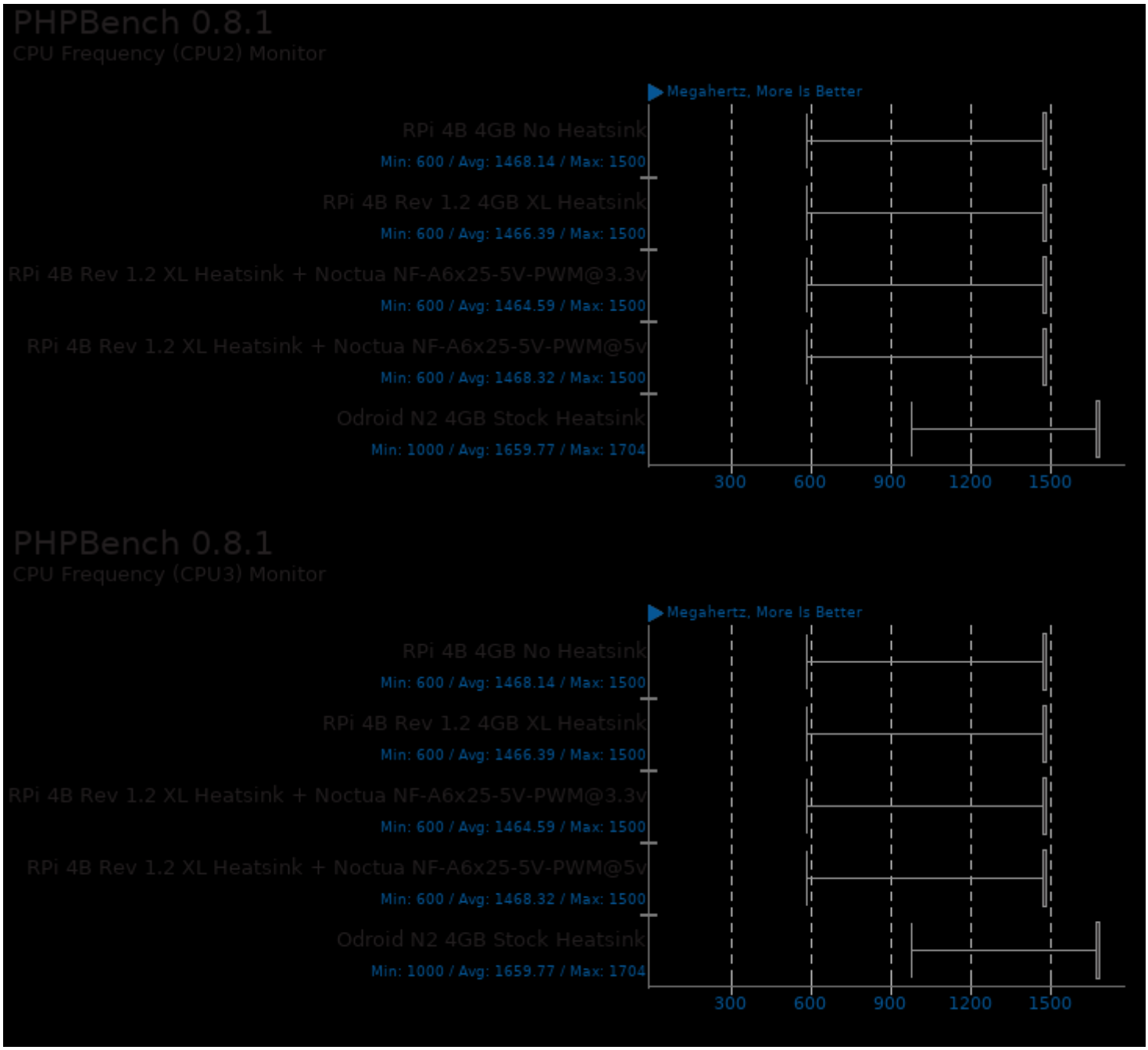
Raspberry Pi Model 4 Benchmarks



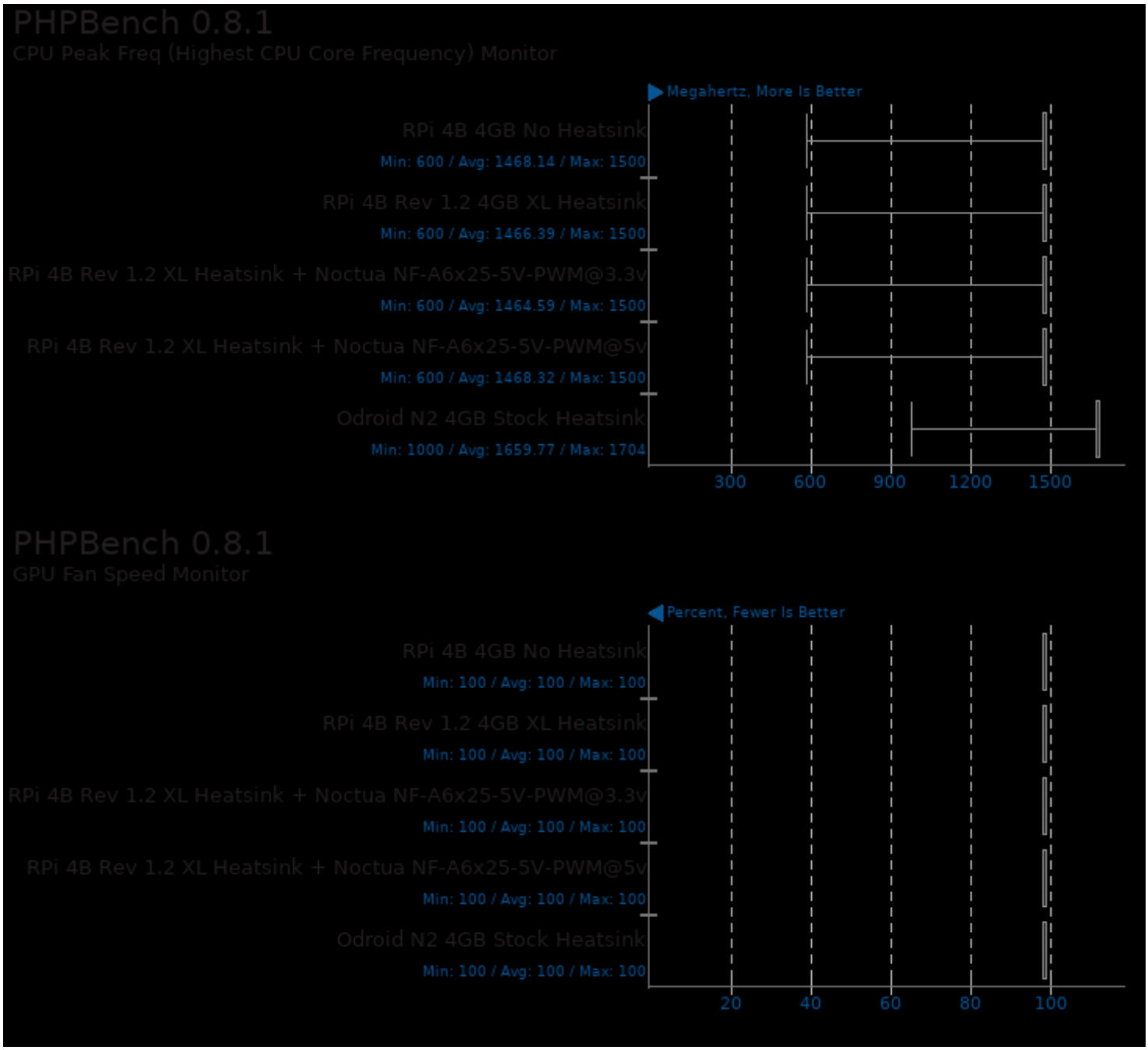
Raspberry Pi Model 4 Benchmarks



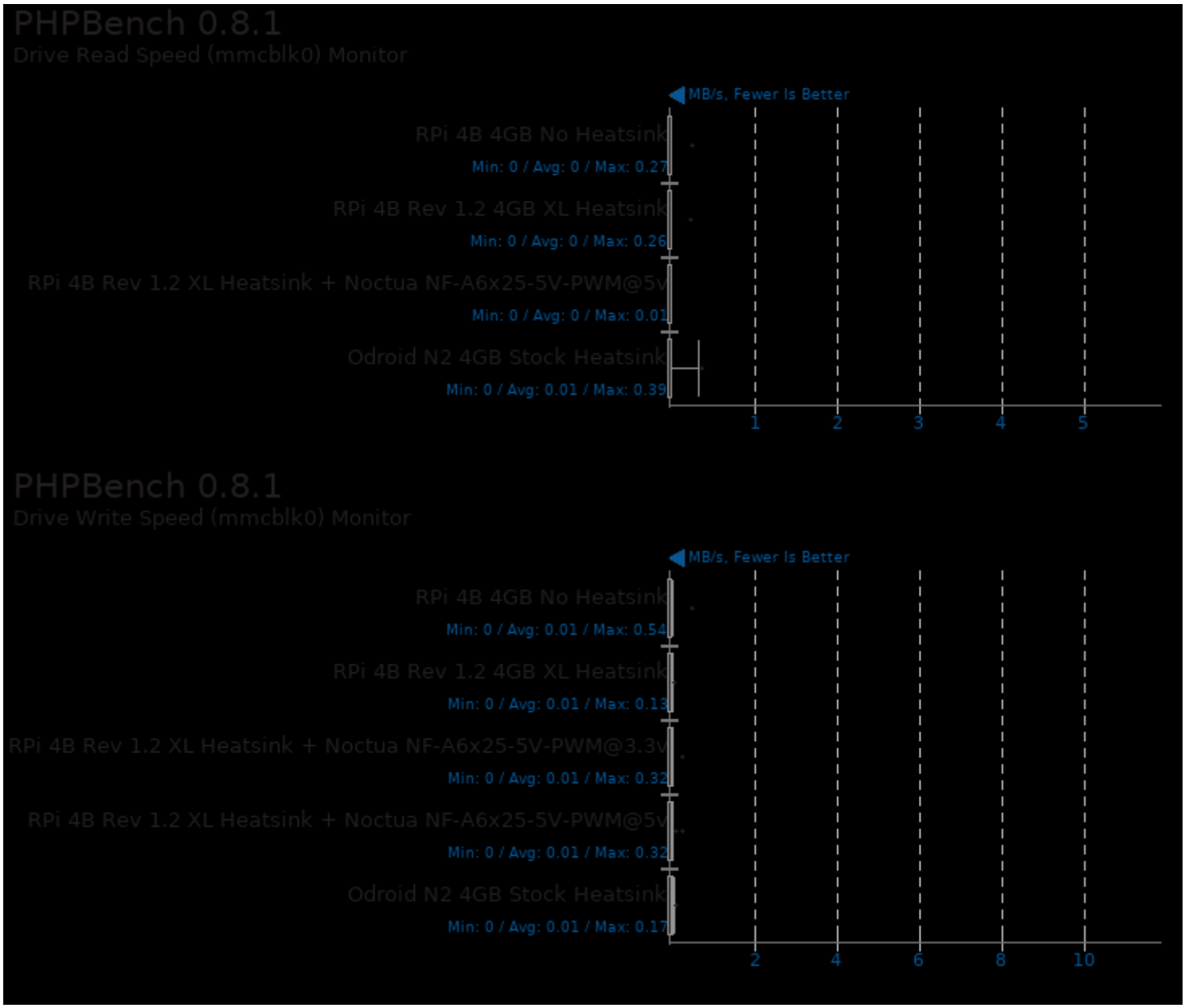

PHPBench 0.8.1
CPU Frequency (CPU0) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1468.14 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1466.28 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1464.97 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1468.32 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1000 / Max: 1000
300
600
900
1200
1500
PHPBench 0.8.1
CPU Frequency (CPU1) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1468.14 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1466.39 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1464.47 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1468.32 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1000 / Max: 1000
300
600
900
1200
1500


PHPBench 0.8.1
CPU Frequency (CPU2) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1468.14 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1466.39 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1464.59 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1468.32 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1659.77 / Max: 1704
300
600
900
1200
1500
PHPBench 0.8.1
CPU Frequency (CPU3) Monitor
Megahertz, More Is Better
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1468.14 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1466.39 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1464.59 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1468.32 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1659.77 / Max: 1704
300
600
900
1200
1500

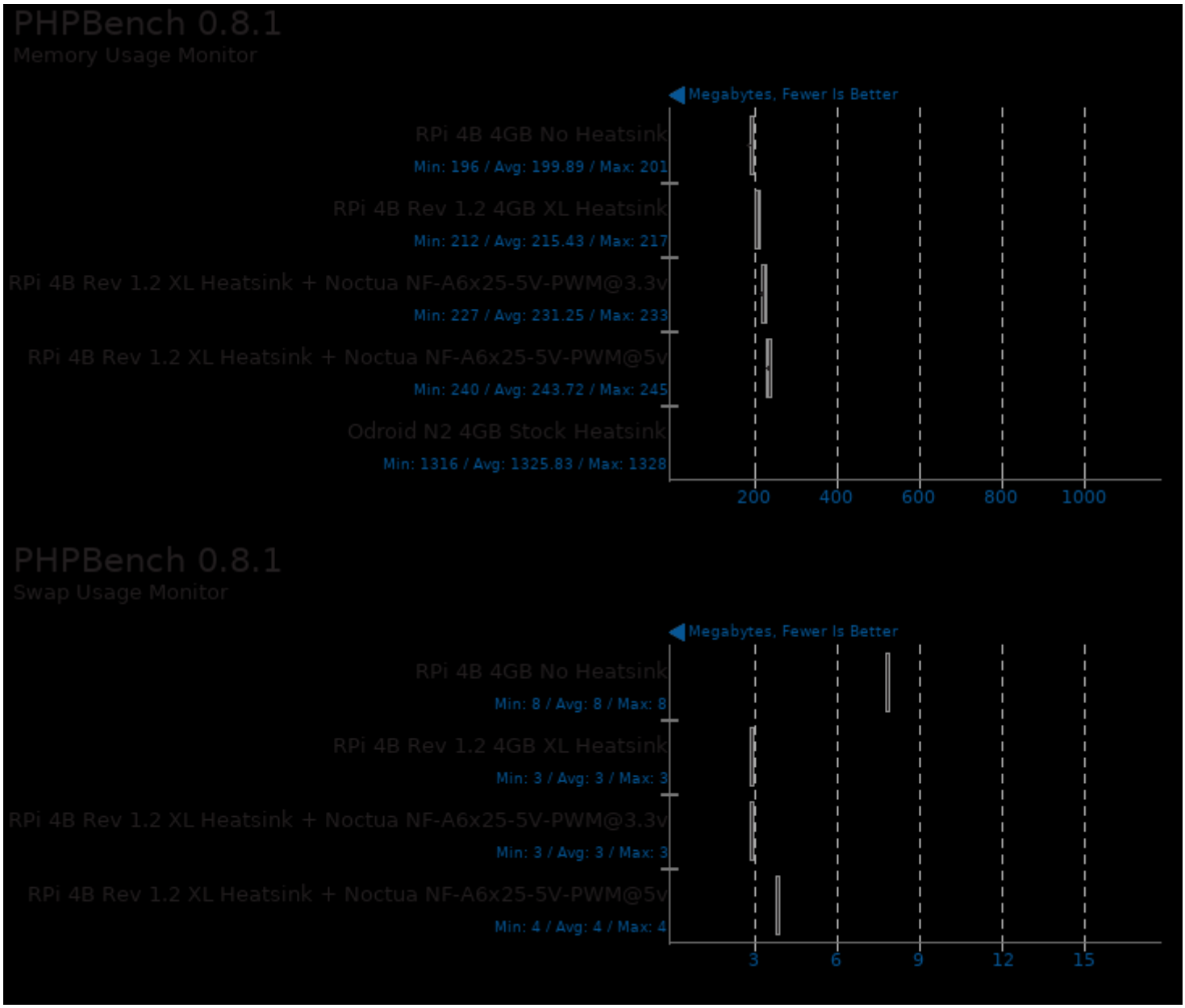
Raspberry Pi Model 4 Benchmarks



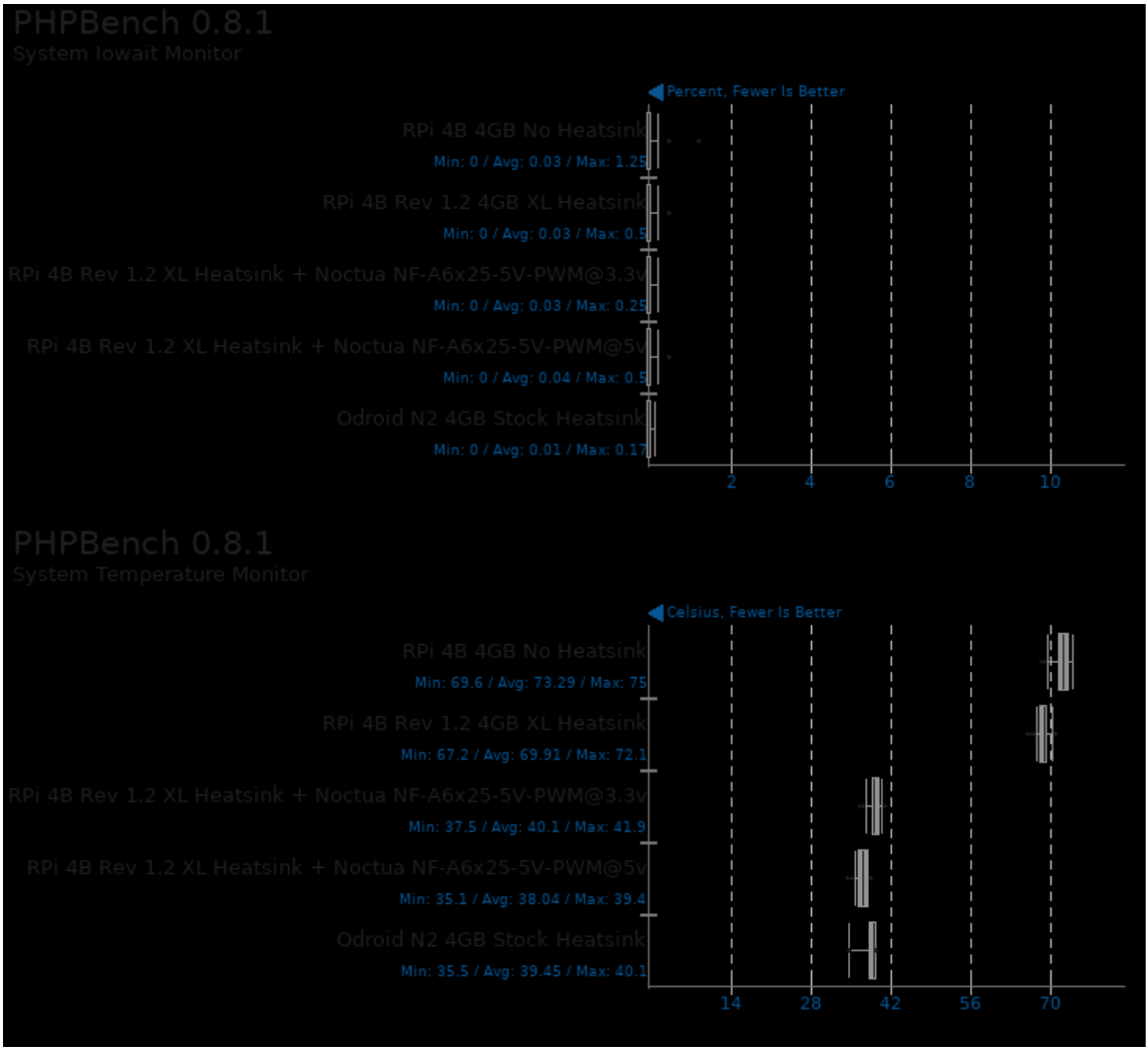
Raspberry Pi Model 4 Benchmarks



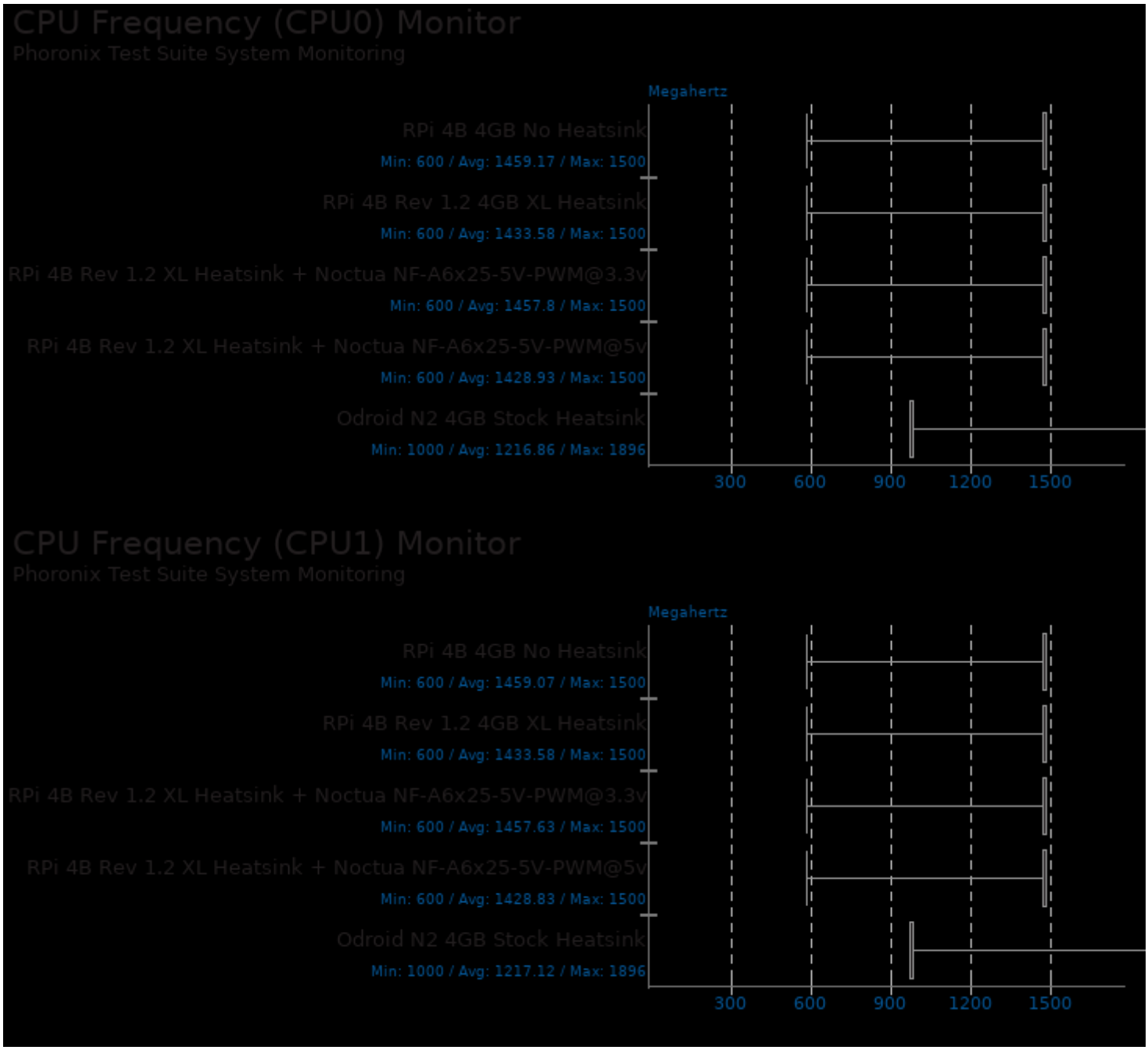
Raspberry Pi Model 4 Benchmarks

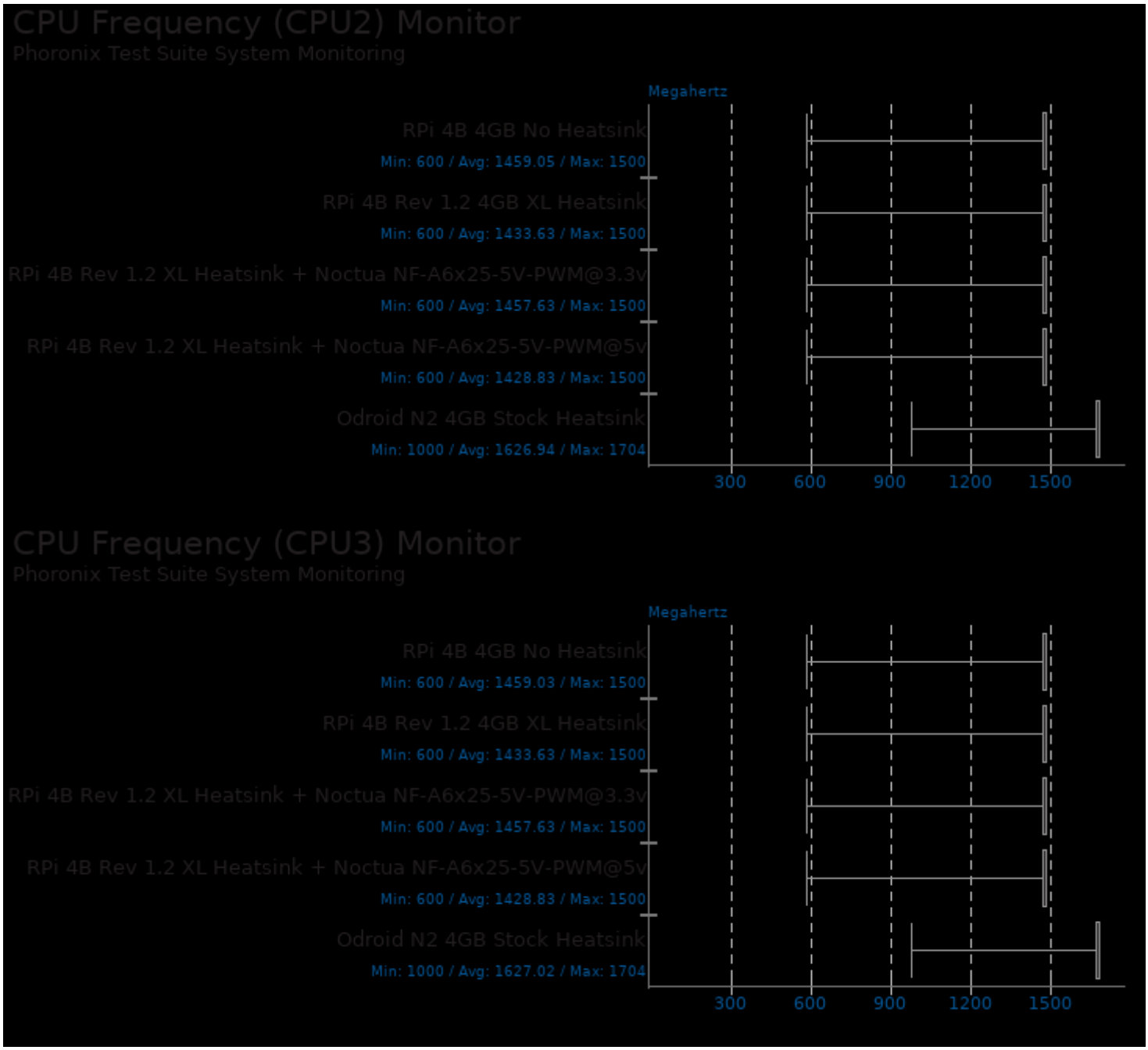


Raspberry Pi Model 4 Benchmarks

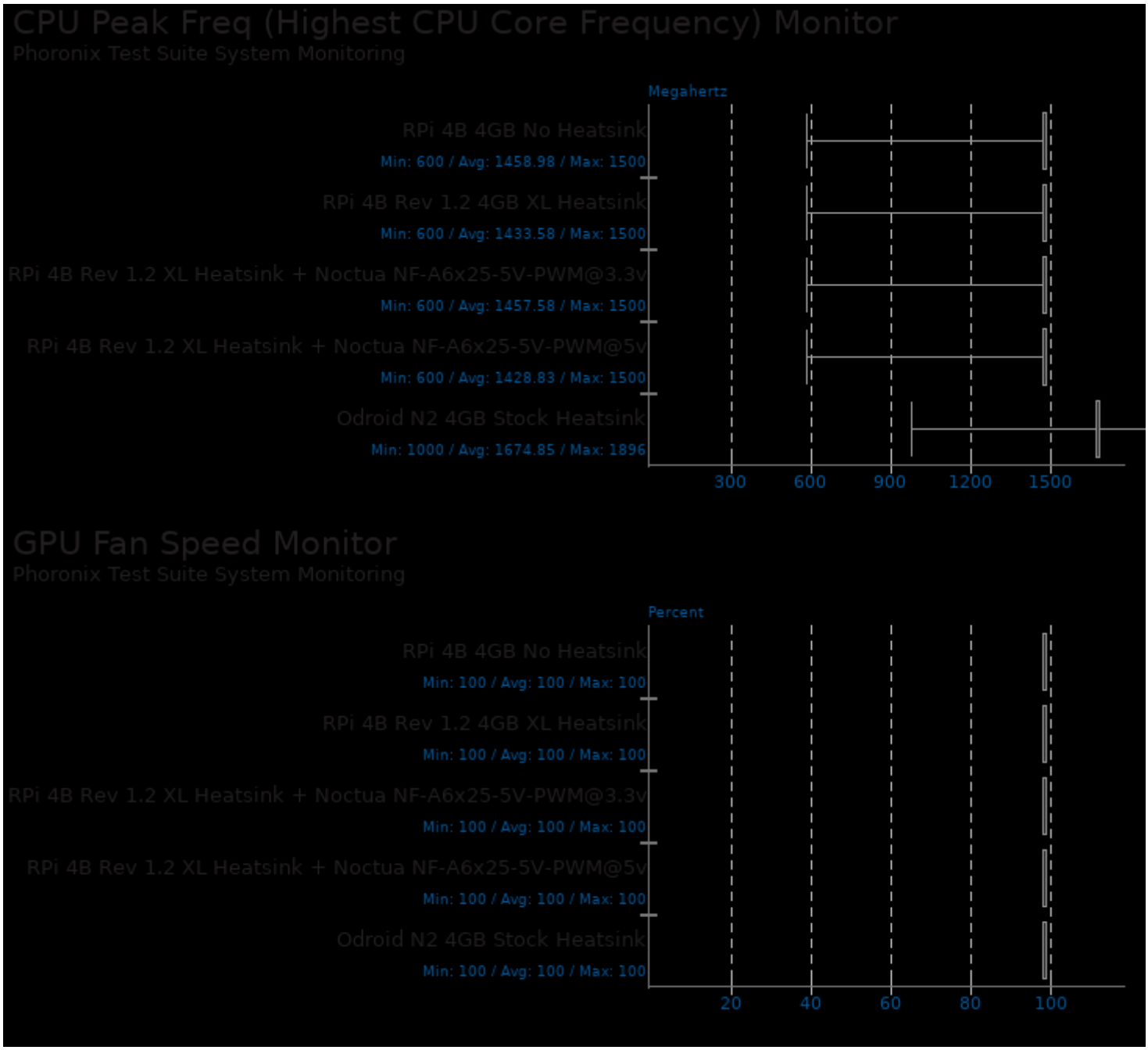


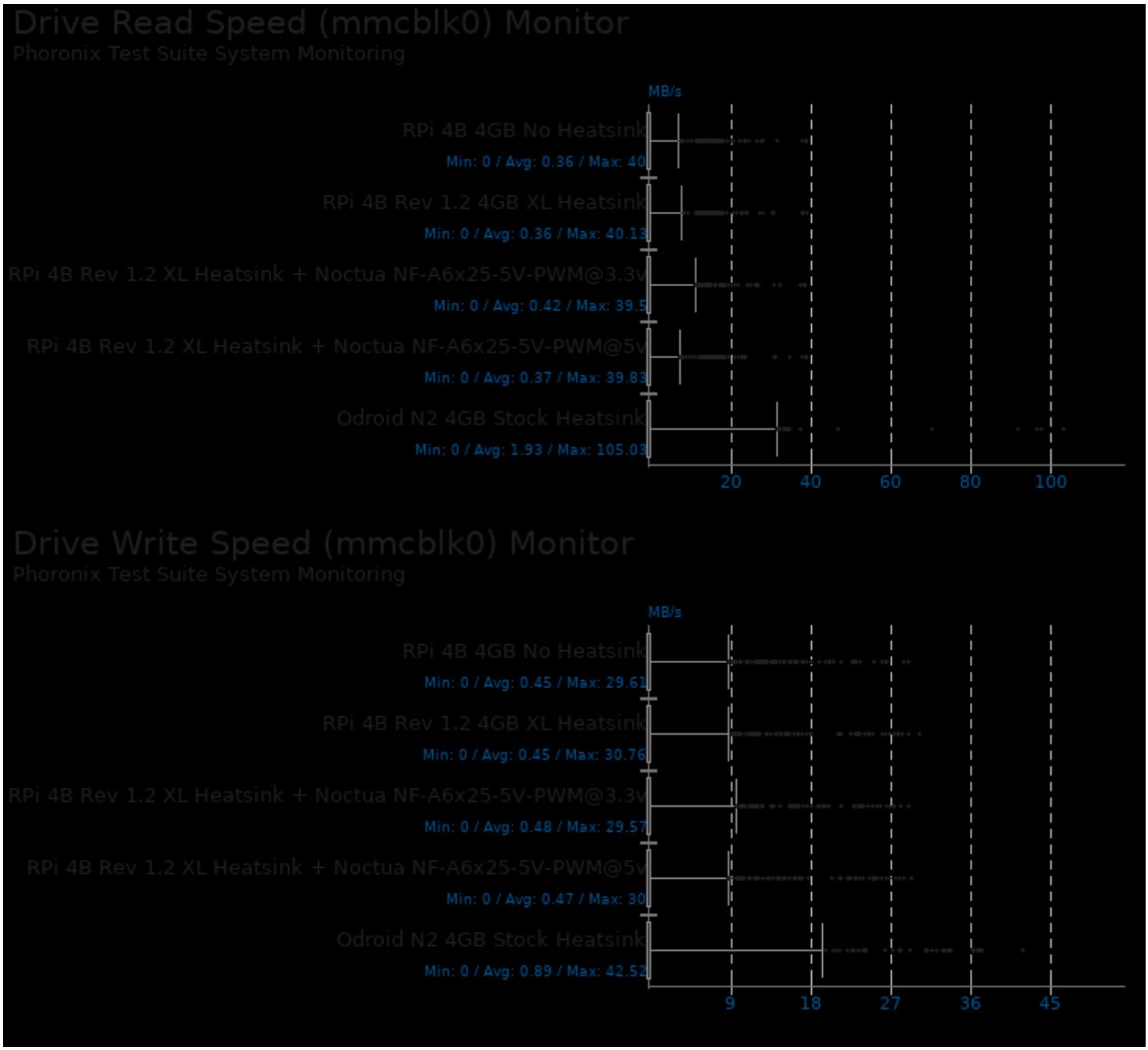
Raspberry Pi Model 4 Benchmarks



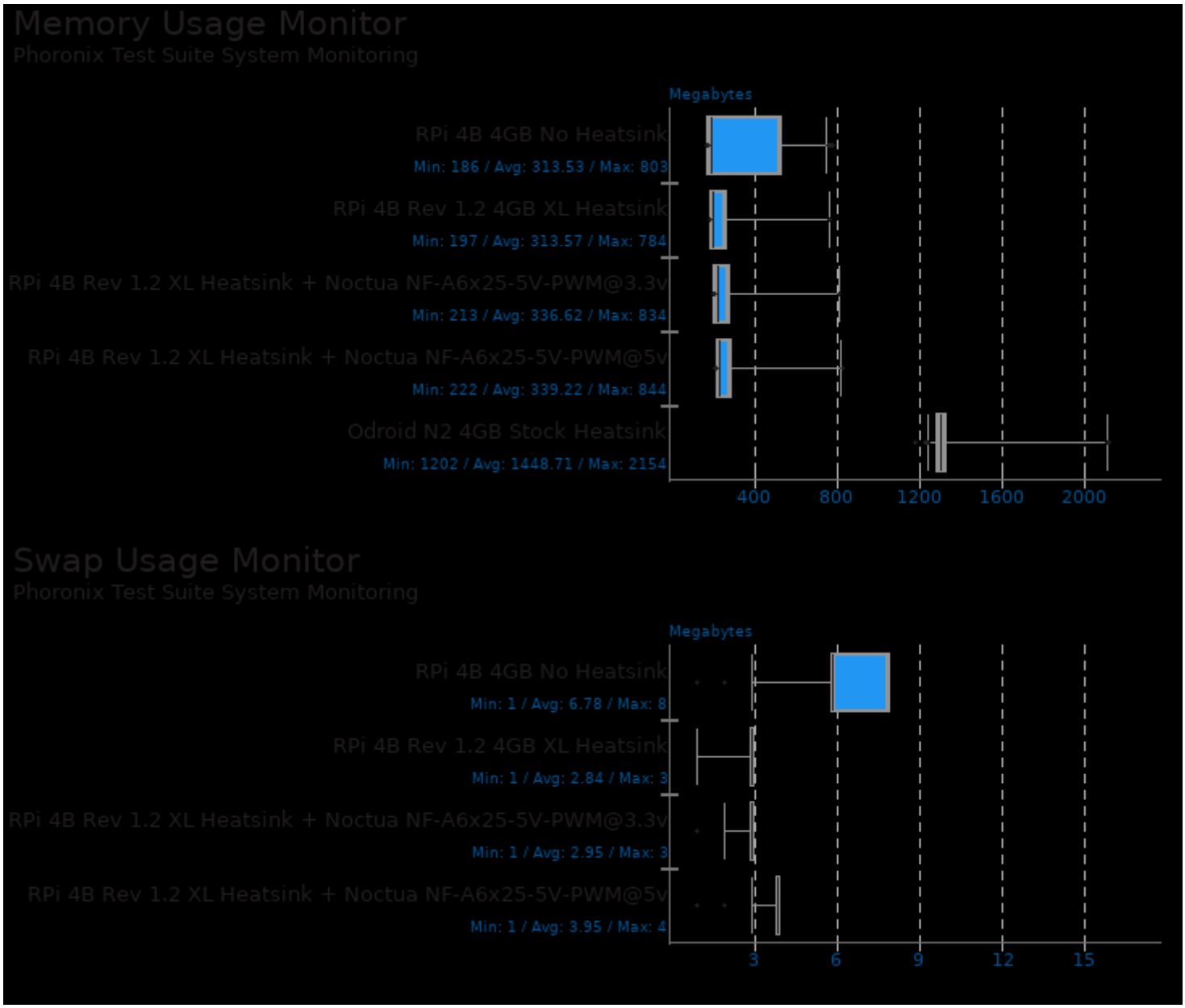

CPU Frequency (CPU2) Monitor
Phoronix Test Suite System Monitoring
Megahertz
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1459.05 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1433.63 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1457.63 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1428.83 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1626.94 / Max: 1704
300
600
900
1200
1500
CPU Frequency (CPU3) Monitor
Phoronix Test Suite System Monitoring
Megahertz
RPi 4B 4GB No Heatsink
Min: 600 / Avg: 1459.03 / Max: 1500
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 600 / Avg: 1433.63 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 600 / Avg: 1457.63 / Max: 1500
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 600 / Avg: 1428.83 / Max: 1500
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1627.02 / Max: 1704
300
600
900
1200
1500

Raspberry Pi Model 4 Benchmarks



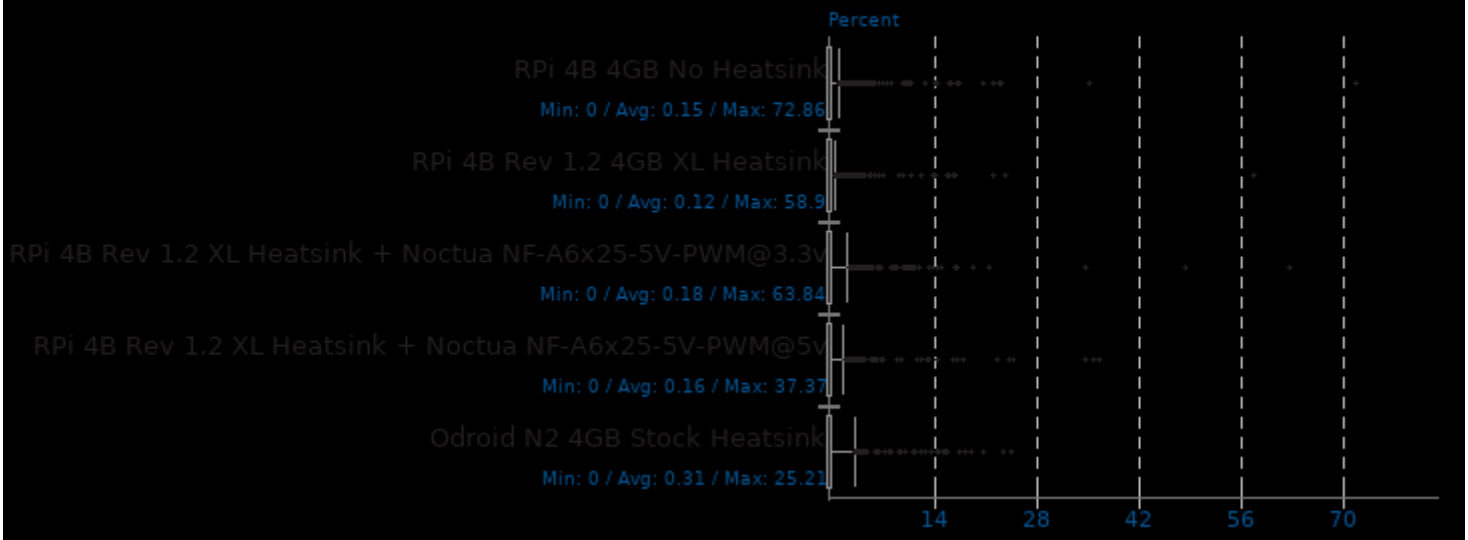

Drive Read Speed (mmcblk0) Monitor
Phoronix Test Suite System Monitoring
MB/s
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.36 / Max: 40
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.36 / Max: 40.13
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.42 / Max: 39.5
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0.37 / Max: 39.83
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 1.93 / Max: 105.03
20
40
60
80
100
Drive Write Speed (mmcblk0) Monitor
Phoronix Test Suite System Monitoring
MB/s
RPi 4B 4GB No Heatsink
Min: 0 / Avg: 0.45 / Max: 29.61
RPi 4B Rev 1.2 4GB XL Heatsink
Min: 0 / Avg: 0.45 / Max: 30.76
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v
Min: 0 / Avg: 0.48 / Max: 29.57
RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v
Min: 0 / Avg: 0.47 / Max: 30
Odroid N2 4GB Stock Heatsink
Min: 0 / Avg: 0.89 / Max: 42.52
9
18
27
36
45

Raspberry Pi Model 4 Benchmarks



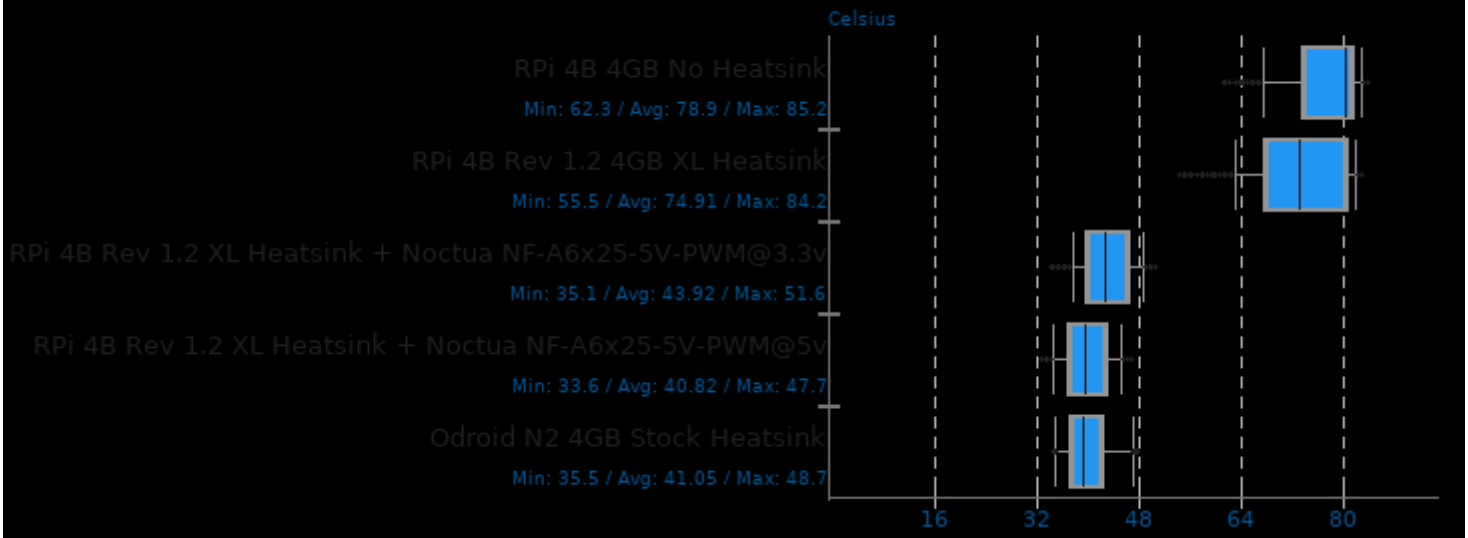
System Iowait Monitor

Phoronix Test Suite System Monitoring



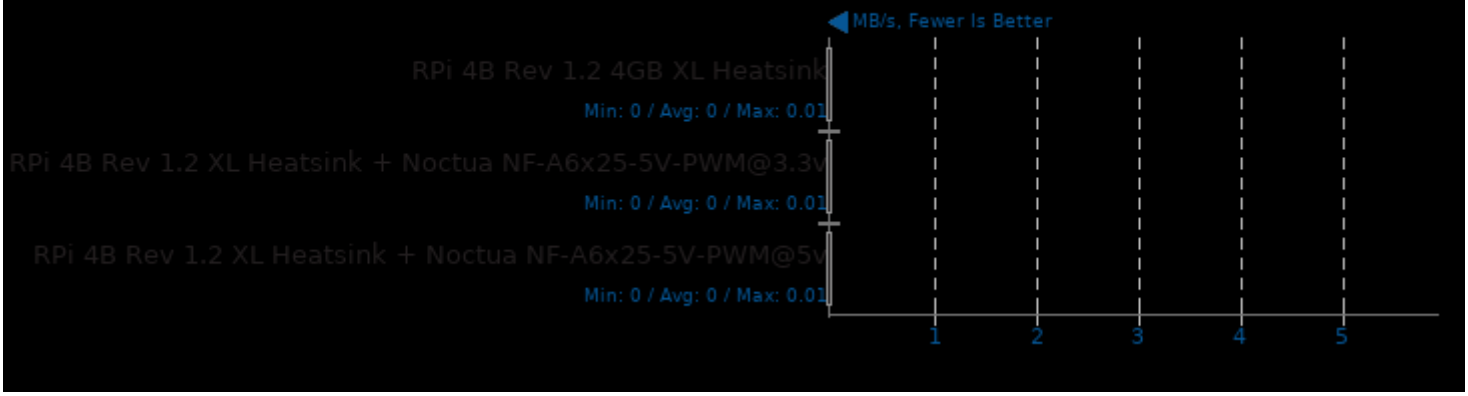
System Temperature Monitor

Phoronix Test Suite System Monitoring



GraphicsMagick 1.3.30

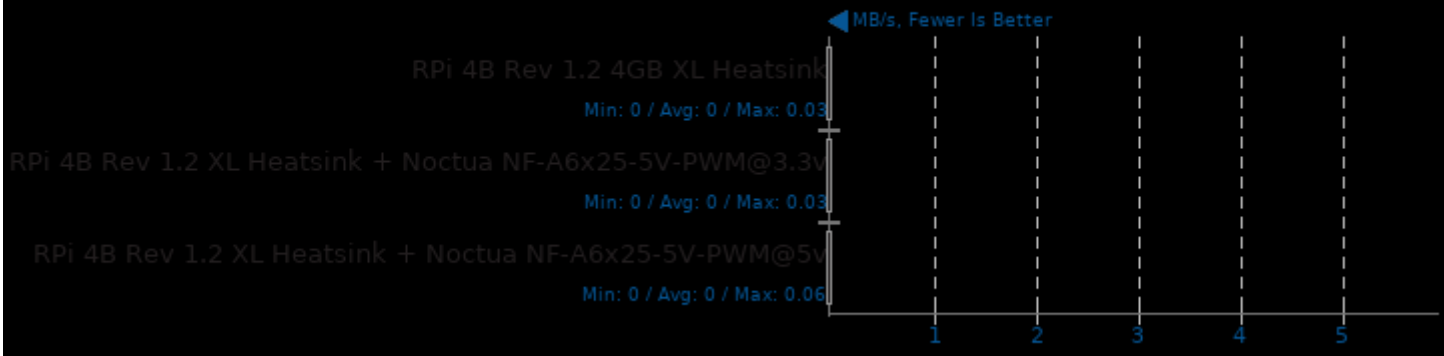
Drive Read Speed (mmcblk0) Monitor



Raspberry Pi Model 4 Benchmarks

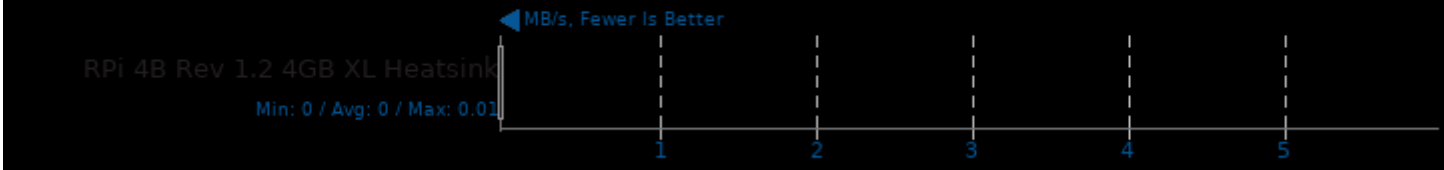
Smallpt 1.0

Drive Read Speed (mmcblk0) Monitor



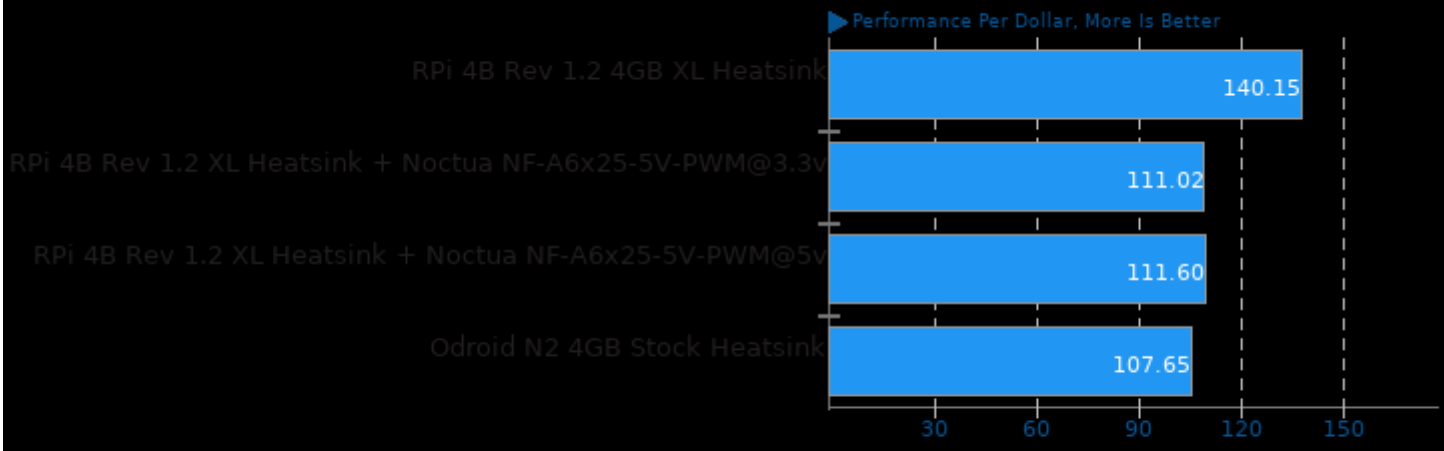
Perl Benchmarks

Drive Read Speed (mmcblk0) Monitor



Meta Performance Per Dollar

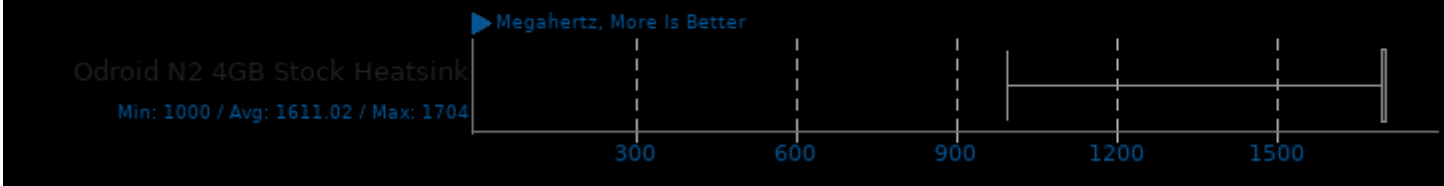
Performance Per Dollar



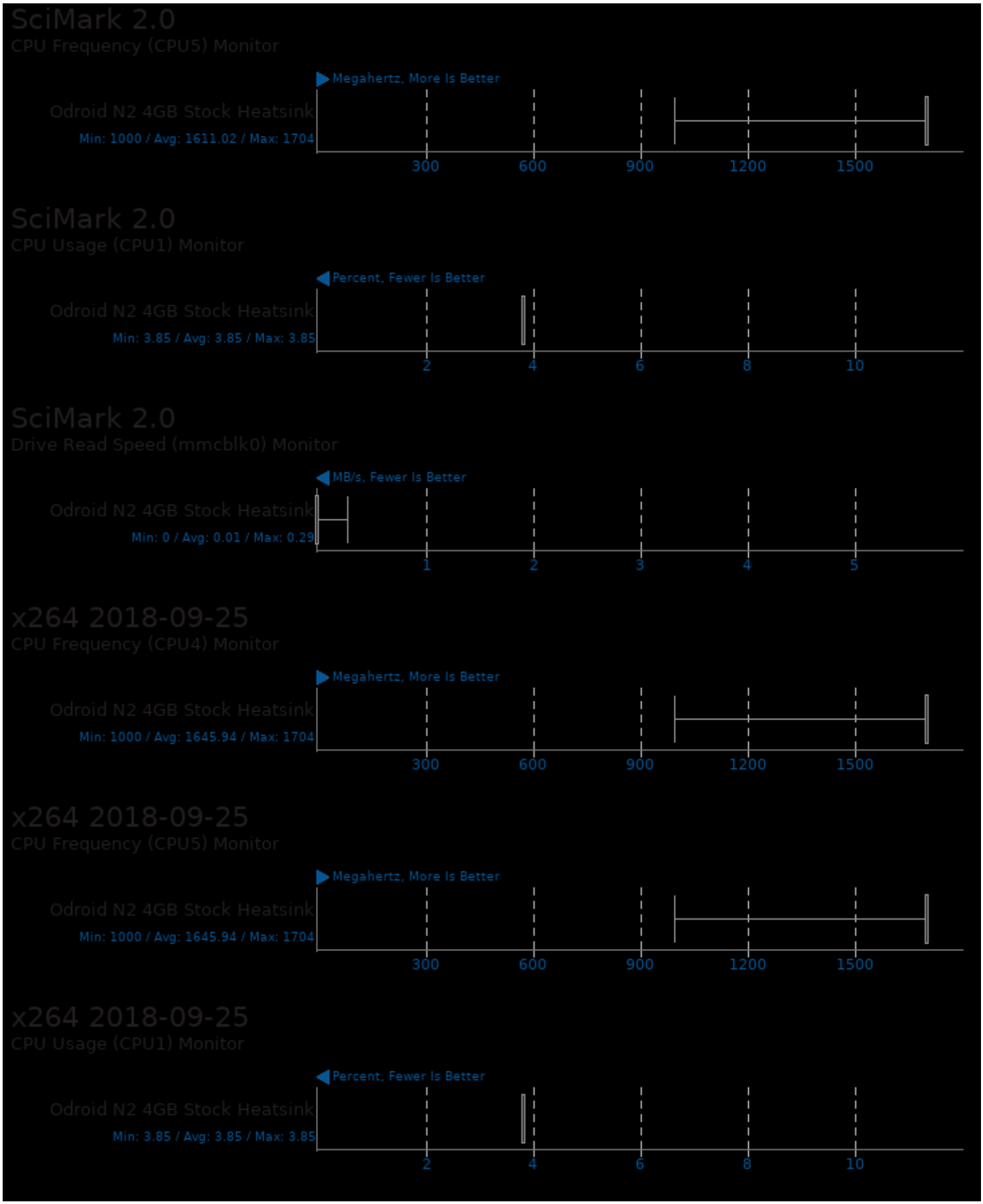
1. RPi 4B Rev 1.2 4GB XL Heatsink: $58 reported value. Average value: 8128.95.
2. RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@3.3v: $73 reported value. Average value: 8104.27.
3. RPi 4B Rev 1.2 XL Heatsink + Noctua NF-A6x25-5V-PWM@5v: $73 reported value. Average value: 8146.65.
4. Odroid N2 4GB Stock Heatsink: $124 reported value. Average value: 13348.68.

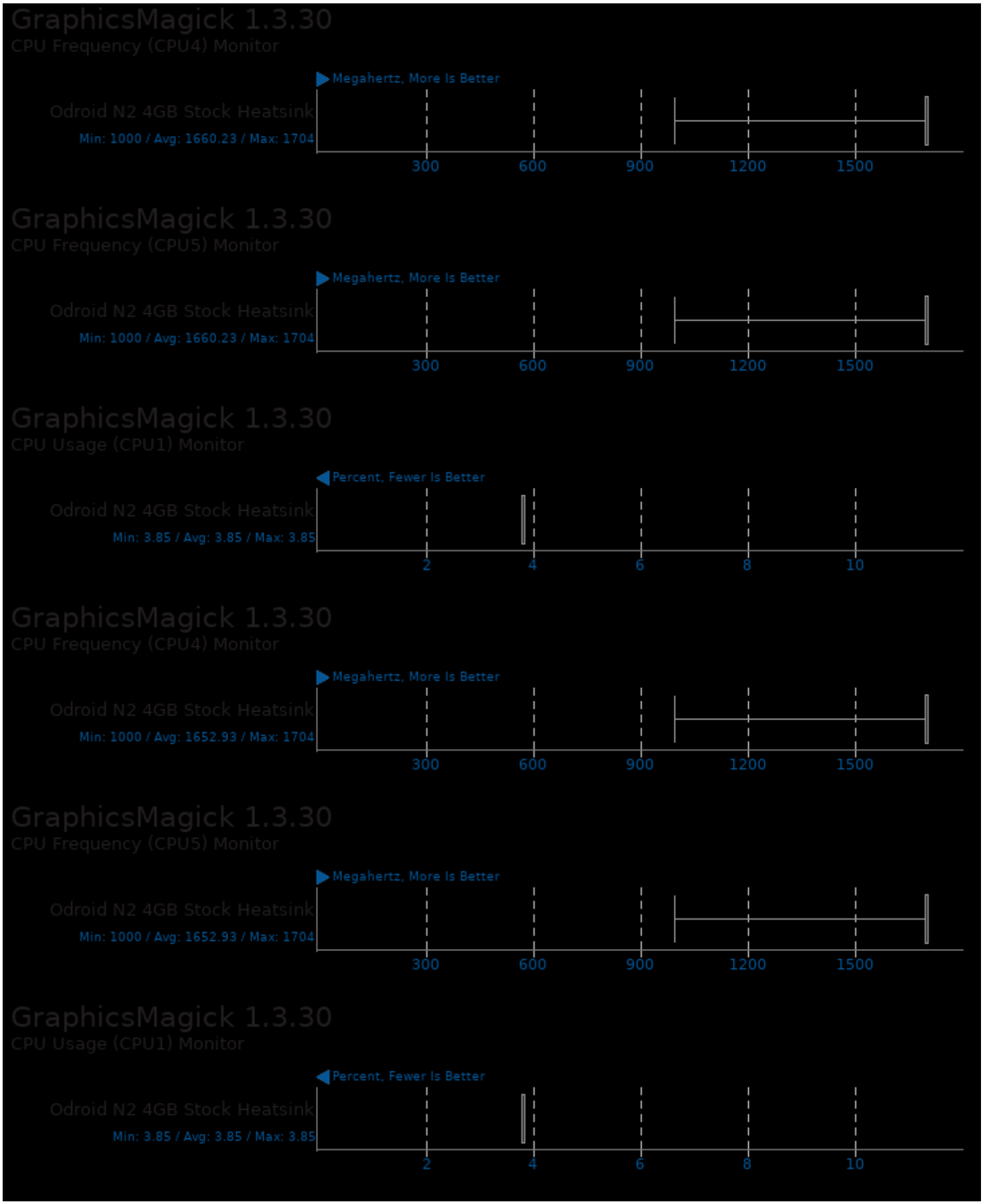
SciMark 2.0

CPU Frequency (CPU4) Monitor

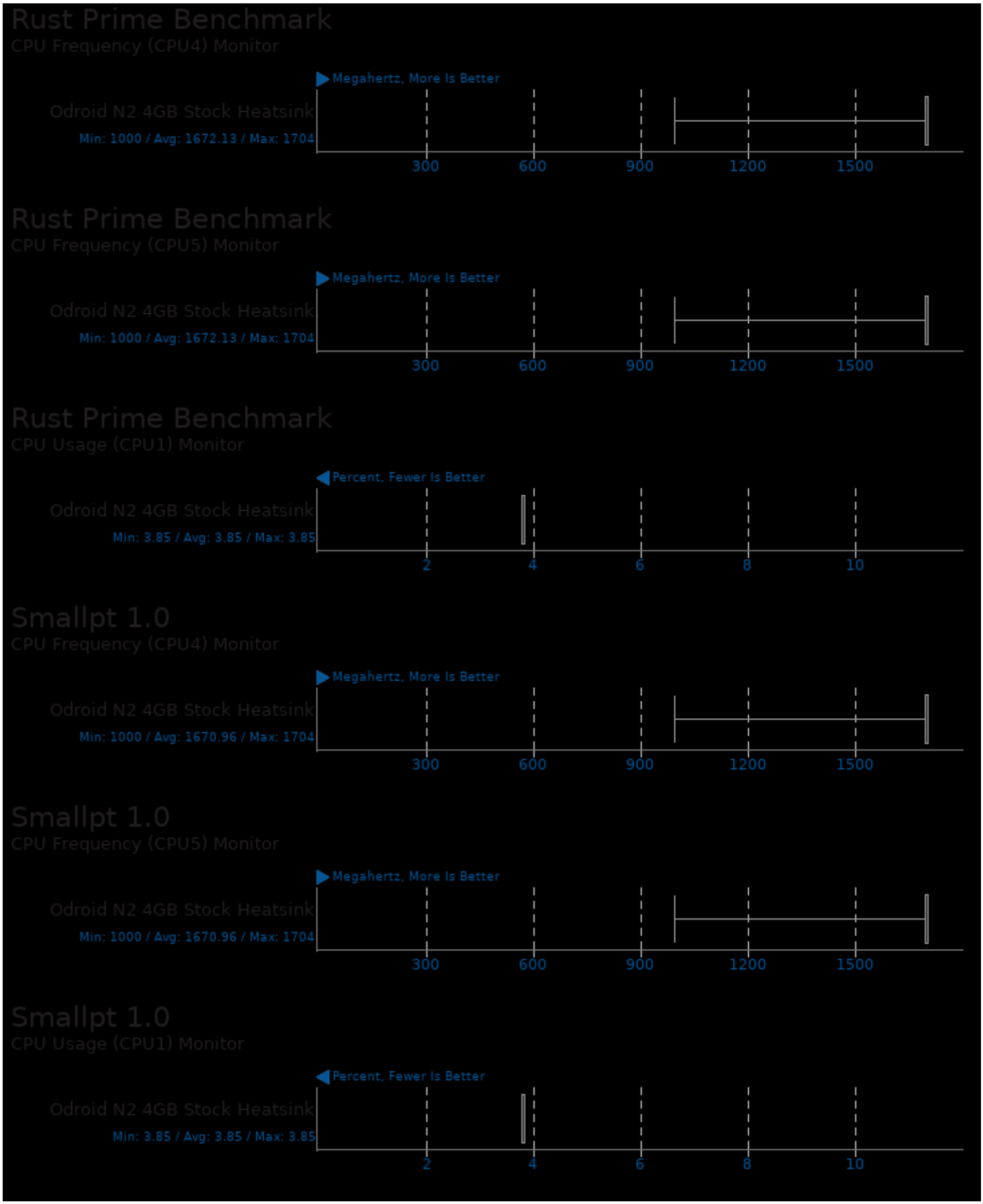


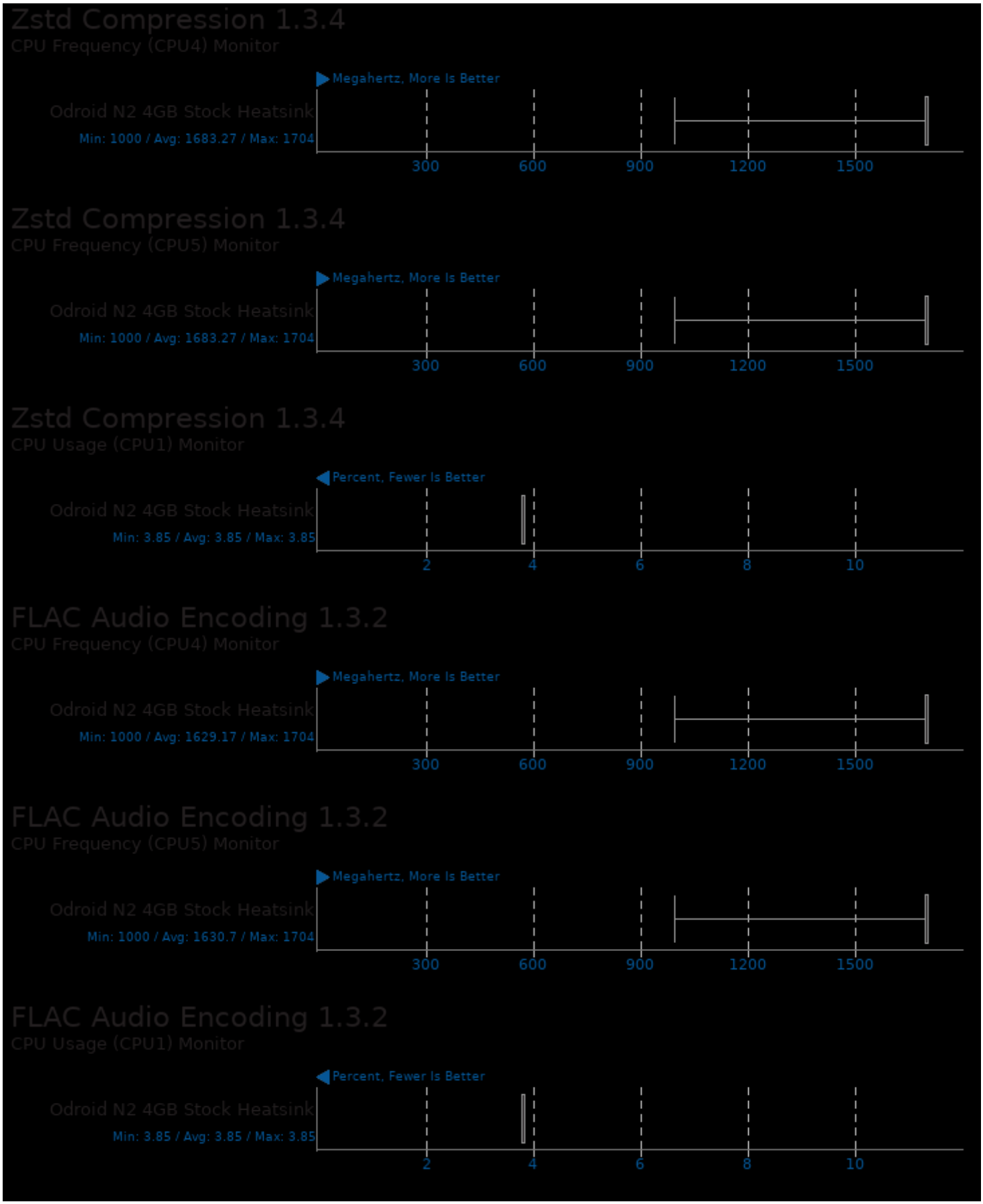
Raspberry Pi Model 4 Benchmarks




GraphicsMagick 1.3.30
CPU Frequency (CPU4) Monitor
Megahertz, More Is Better
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1660.23 / Max: 1704
300
600
900
1200
1500
GraphicsMagick 1.3.30
CPU Frequency (CPU5) Monitor
Megahertz, More Is Better
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1660.23 / Max: 1704
300
600
900
1200
1500
GraphicsMagick 1.3.30
CPU Usage (CPU1) Monitor
Percent, Fewer Is Better
Odroid N2 4GB Stock Heatsink
Min: 3.85 / Avg: 3.85 / Max: 3.85
2
4
6
8
10
GraphicsMagick 1.3.30
CPU Frequency (CPU4) Monitor
Megahertz, More Is Better
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1652.93 / Max: 1704
300
600
900
1200
1500
GraphicsMagick 1.3.30
CPU Frequency (CPU5) Monitor
Megahertz, More Is Better
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1652.93 / Max: 1704
300
600
900
1200
1500
GraphicsMagick 1.3.30
CPU Usage (CPU1) Monitor
Percent, Fewer Is Better
Odroid N2 4GB Stock Heatsink
Min: 3.85 / Avg: 3.85 / Max: 3.85
2
4
6
8
10

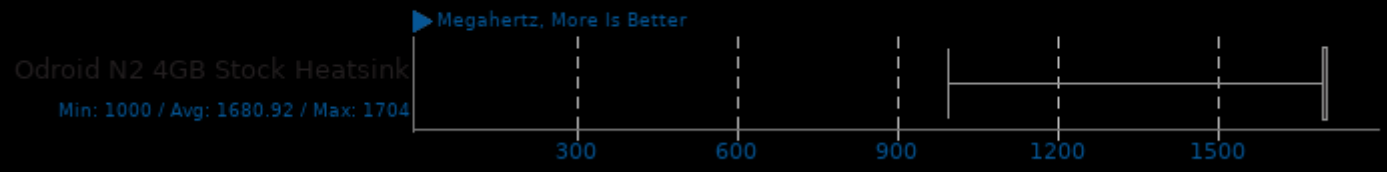
Raspberry Pi Model 4 Benchmarks



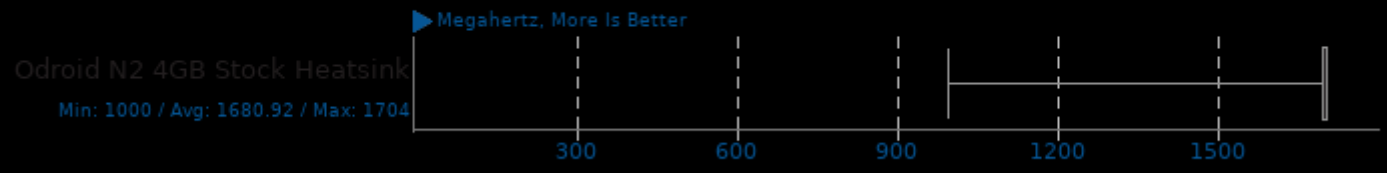

Zstd Compression 1.3.4
CPU Frequency (CPU4) Monitor
Megahertz, More Is Better
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1683.27 / Max: 1704
300
600
900
1200
1500
Zstd Compression 1.3.4
CPU Frequency (CPU5) Monitor
Megahertz, More Is Better
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1683.27 / Max: 1704
300
600
900
1200
1500
Zstd Compression 1.3.4
CPU Usage (CPU1) Monitor
Percent, Fewer Is Better
Odroid N2 4GB Stock Heatsink
Min: 3.85 / Avg: 3.85 / Max: 3.85
2
4
6
8
10
FLAC Audio Encoding 1.3.2
CPU Frequency (CPU4) Monitor
Megahertz, More Is Better
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1629.17 / Max: 1704
300
600
900
1200
1500
FLAC Audio Encoding 1.3.2
CPU Frequency (CPU5) Monitor
Megahertz, More Is Better
Odroid N2 4GB Stock Heatsink
Min: 1000 / Avg: 1630.7 / Max: 1704
300
600
900
1200
1500
FLAC Audio Encoding 1.3.2
CPU Usage (CPU1) Monitor
Percent, Fewer Is Better
Odroid N2 4GB Stock Heatsink
Min: 3.85 / Avg: 3.85 / Max: 3.85
2
4
6
8
10

Raspberry Pi Model 4 Benchmarks

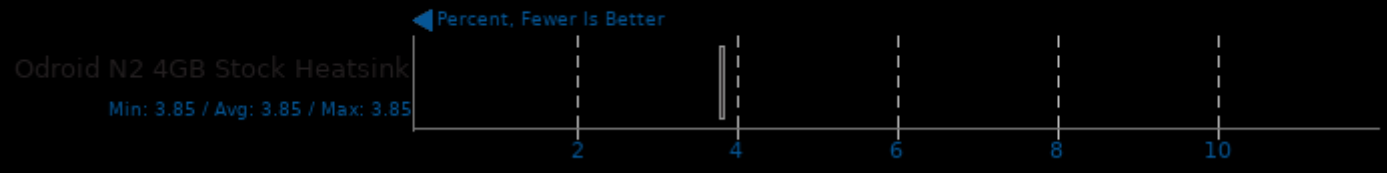
LAME MP3 Encoding 3.100
CPU Frequency (CPU4) Monitor



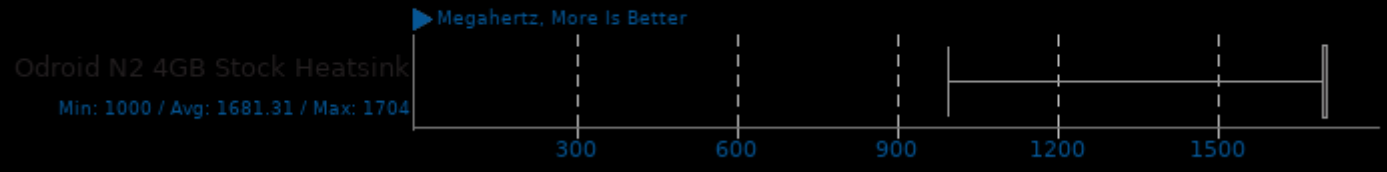
LAME MP3 Encoding 3.100
CPU Frequency (CPU5) Monitor



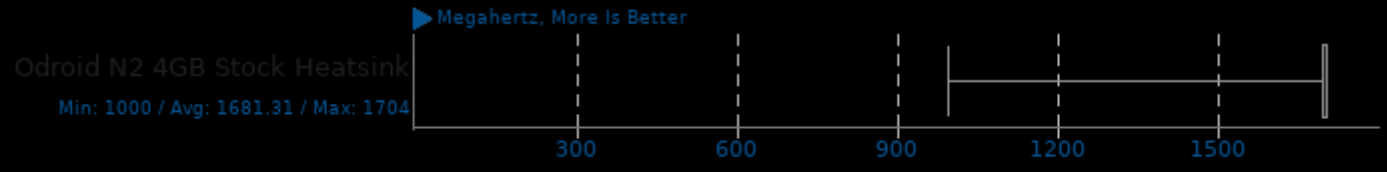
LAME MP3 Encoding 3.100
CPU Usage (CPU1) Monitor



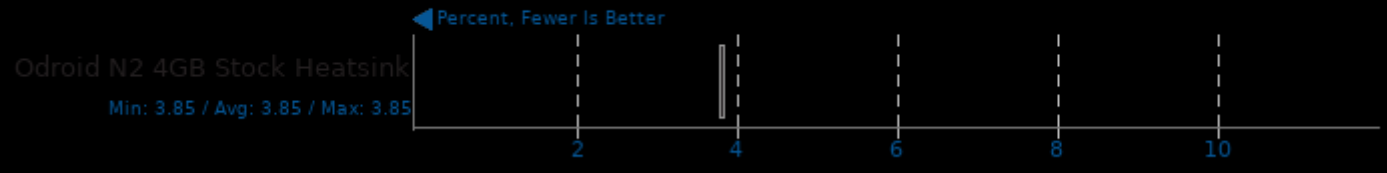
Perl Benchmarks
CPU Frequency (CPU4) Monitor



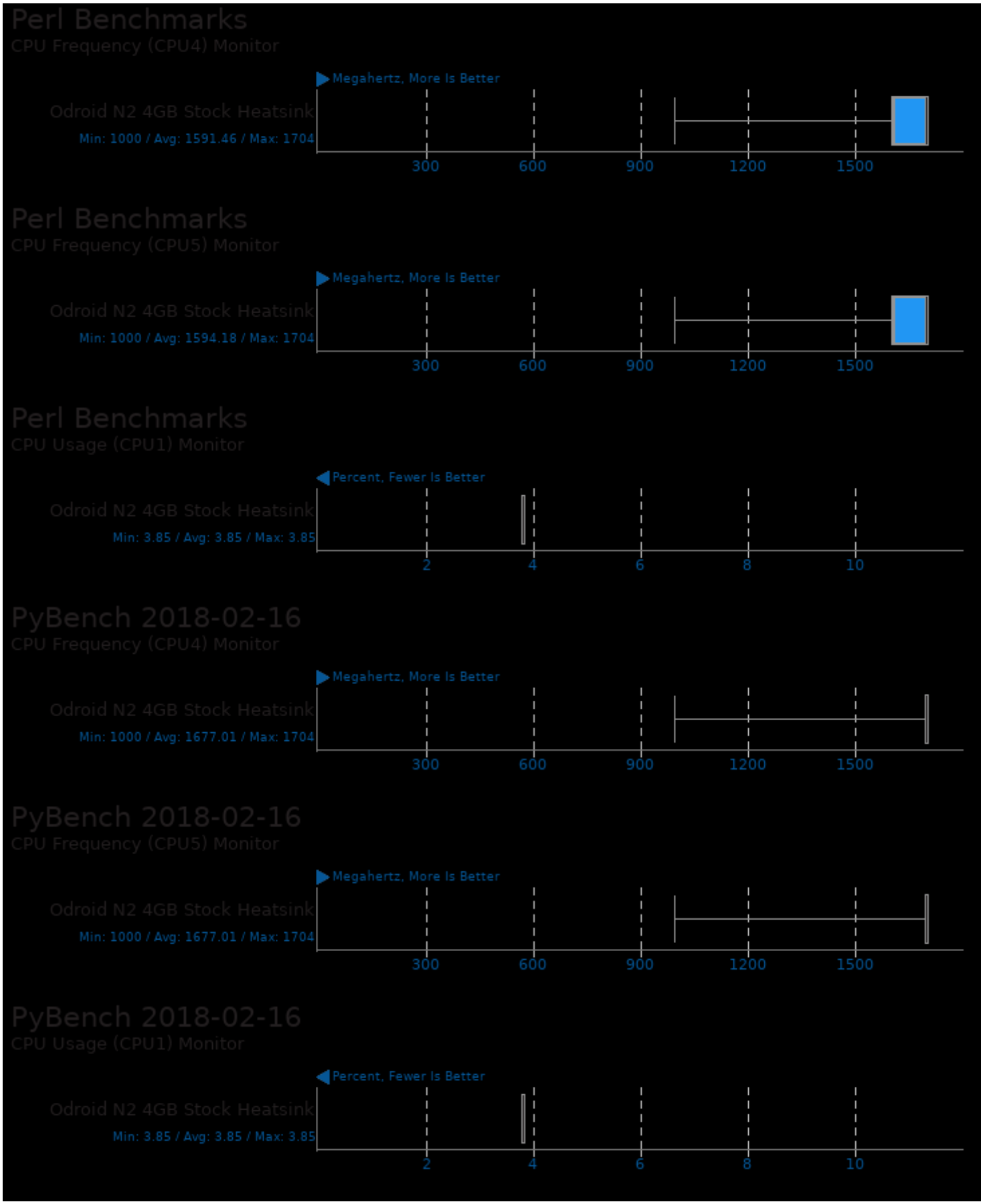
Perl Benchmarks
CPU Frequency (CPU5) Monitor



Perl Benchmarks
CPU Usage (CPU1) Monitor

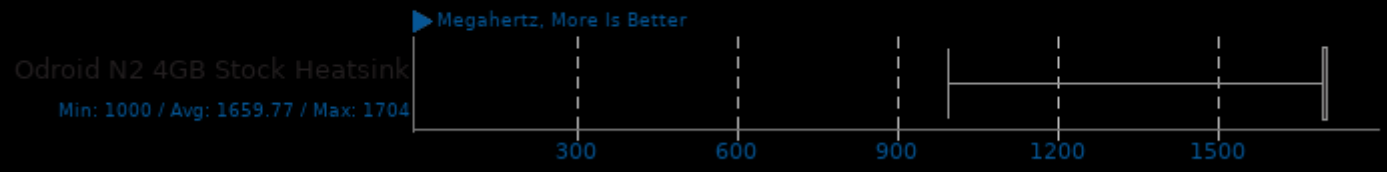


Raspberry Pi Model 4 Benchmarks

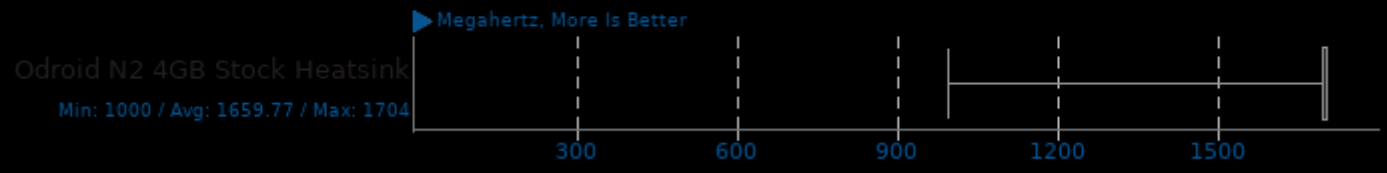


Raspberry Pi Model 4 Benchmarks

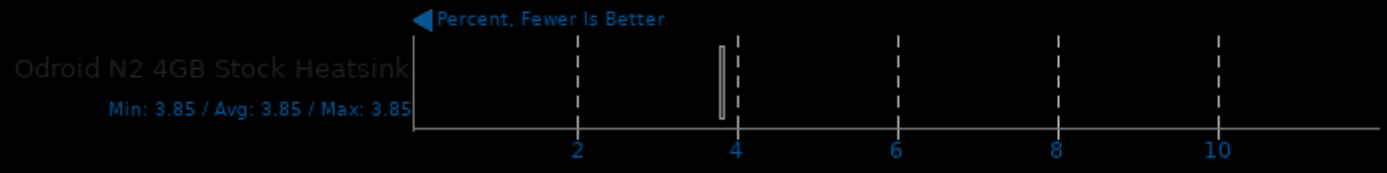
PHPBench 0.8.1
CPU Frequency (CPU4) Monitor



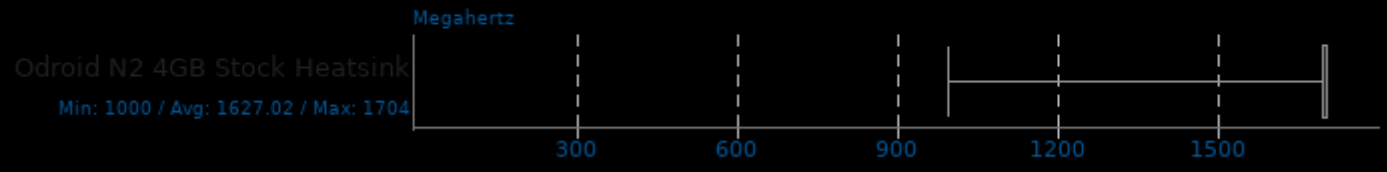
PHPBench 0.8.1
CPU Frequency (CPU5) Monitor



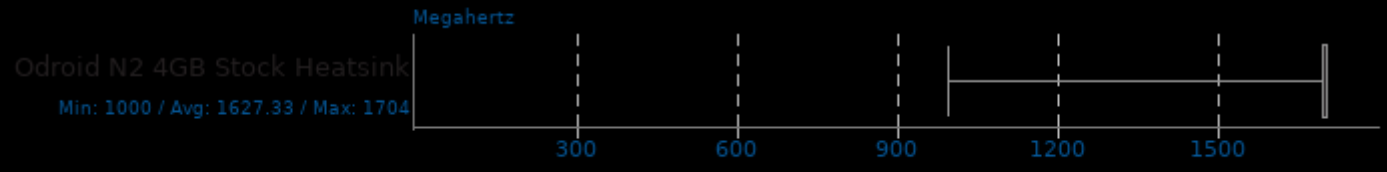
PHPBench 0.8.1
CPU Usage (CPU1) Monitor



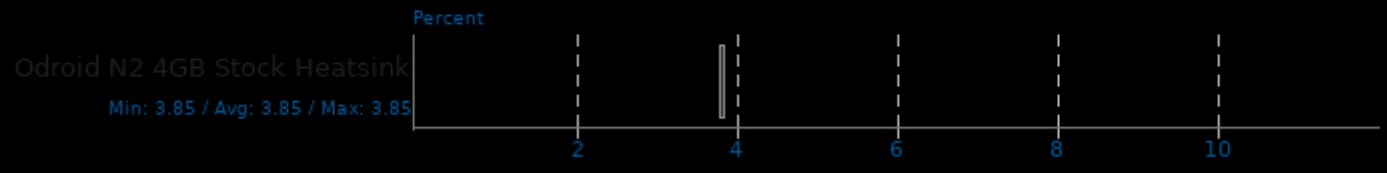
CPU Frequency (CPU4) Monitor
Phoronix Test Suite System Monitoring



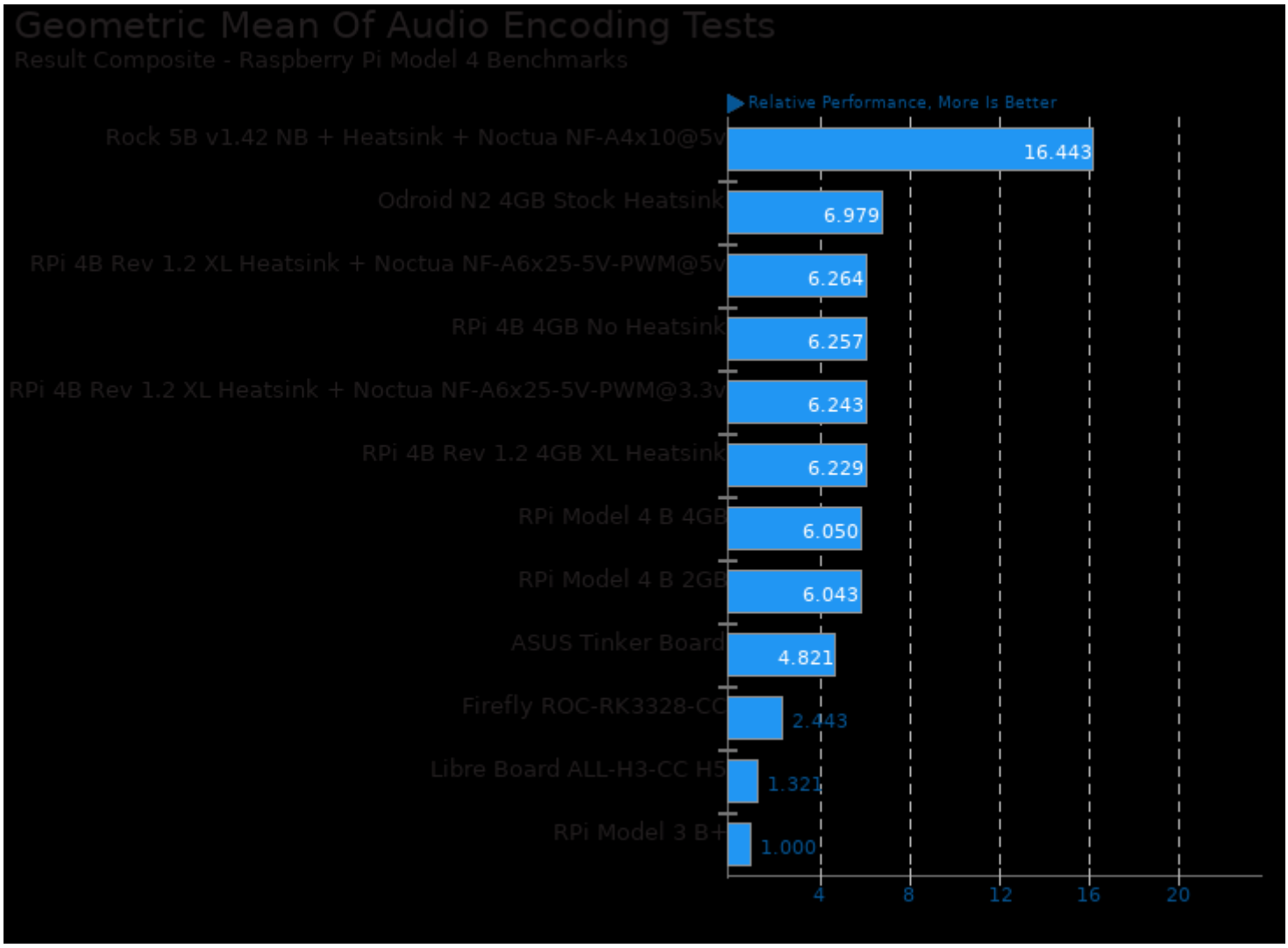
CPU Frequency (CPU5) Monitor
Phoronix Test Suite System Monitoring



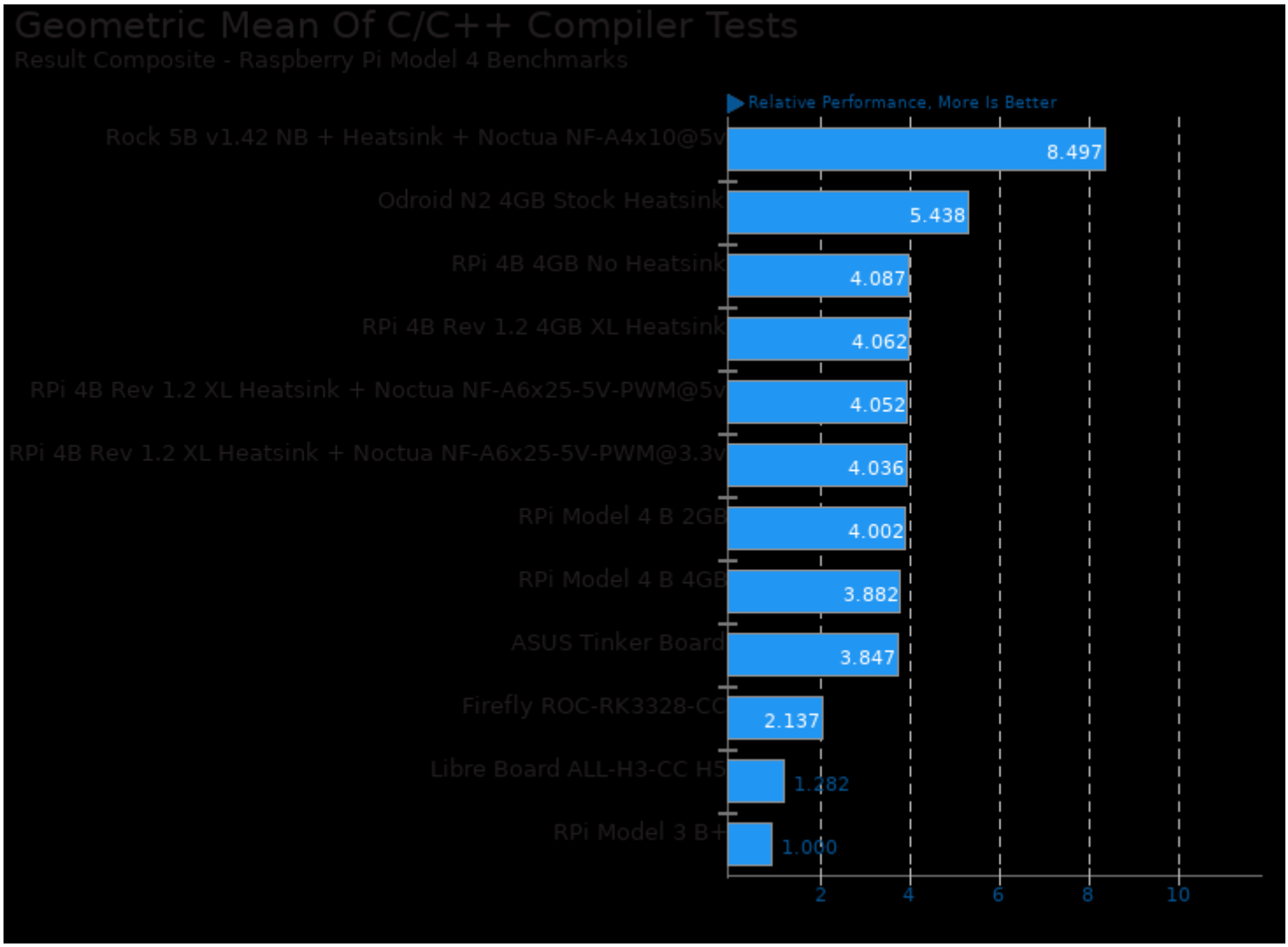
CPU Usage (CPU1) Monitor
Phoronix Test Suite System Monitoring



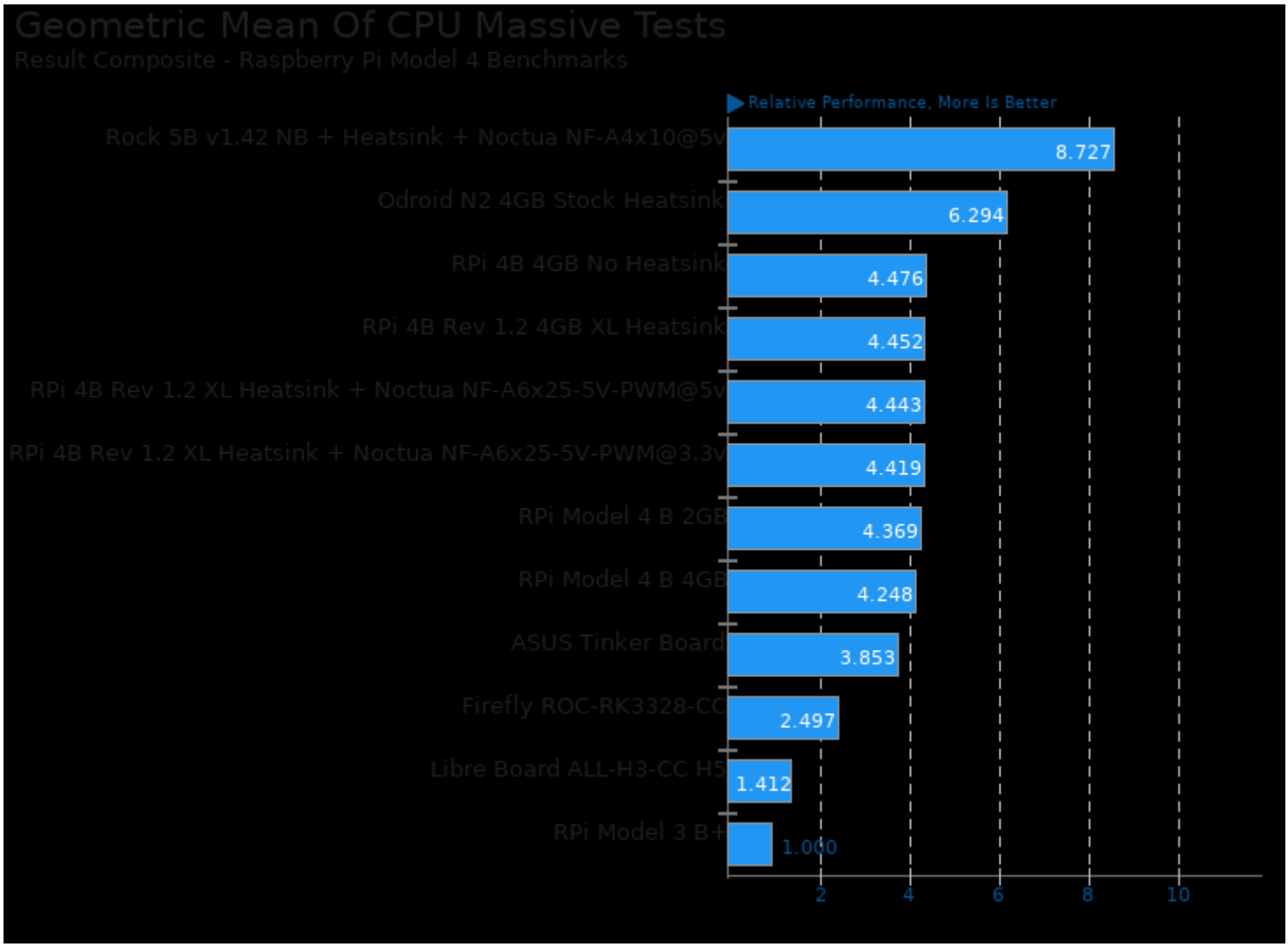
These geometric means are based upon test groupings / test suites for this result file.



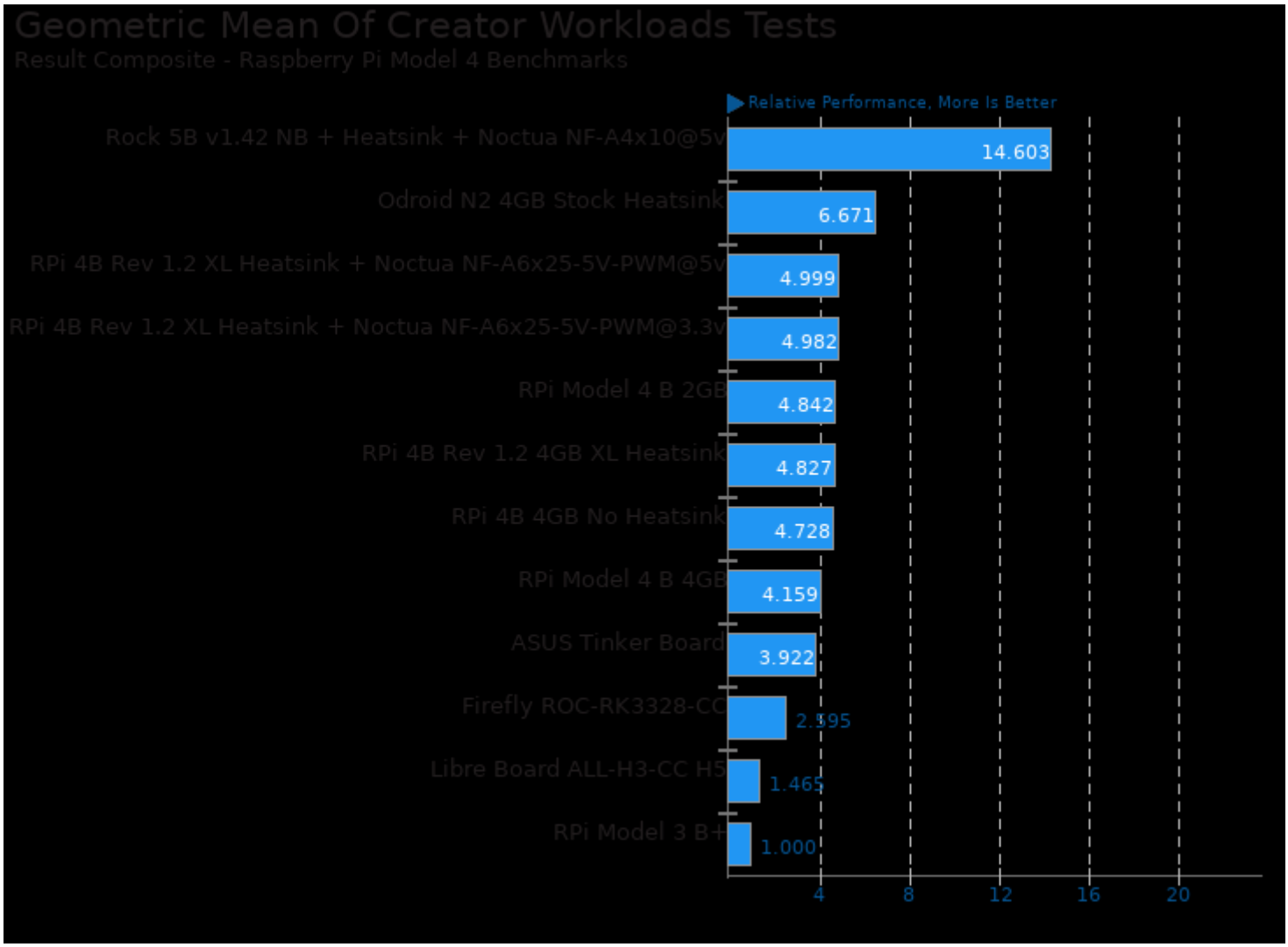
Geometric mean based upon tests: pts/encode-mp3 and pts/encode-flac



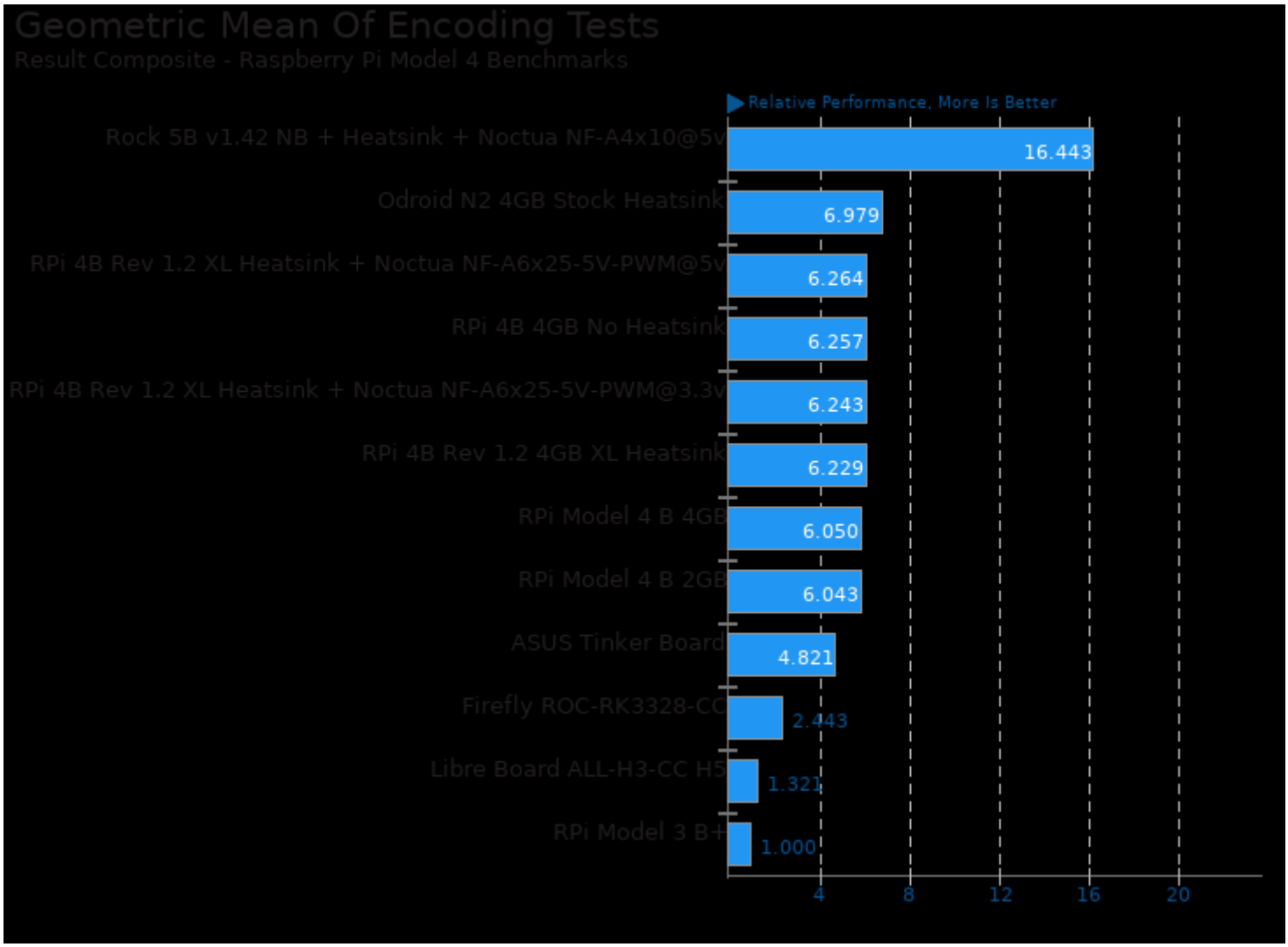
Geometric mean based upon tests: pts/scimark2, pts/graphics-magick, pts/encode-mp3, pts/encode-flac, pts/x264, pts/compress-zstd and pts/nginx



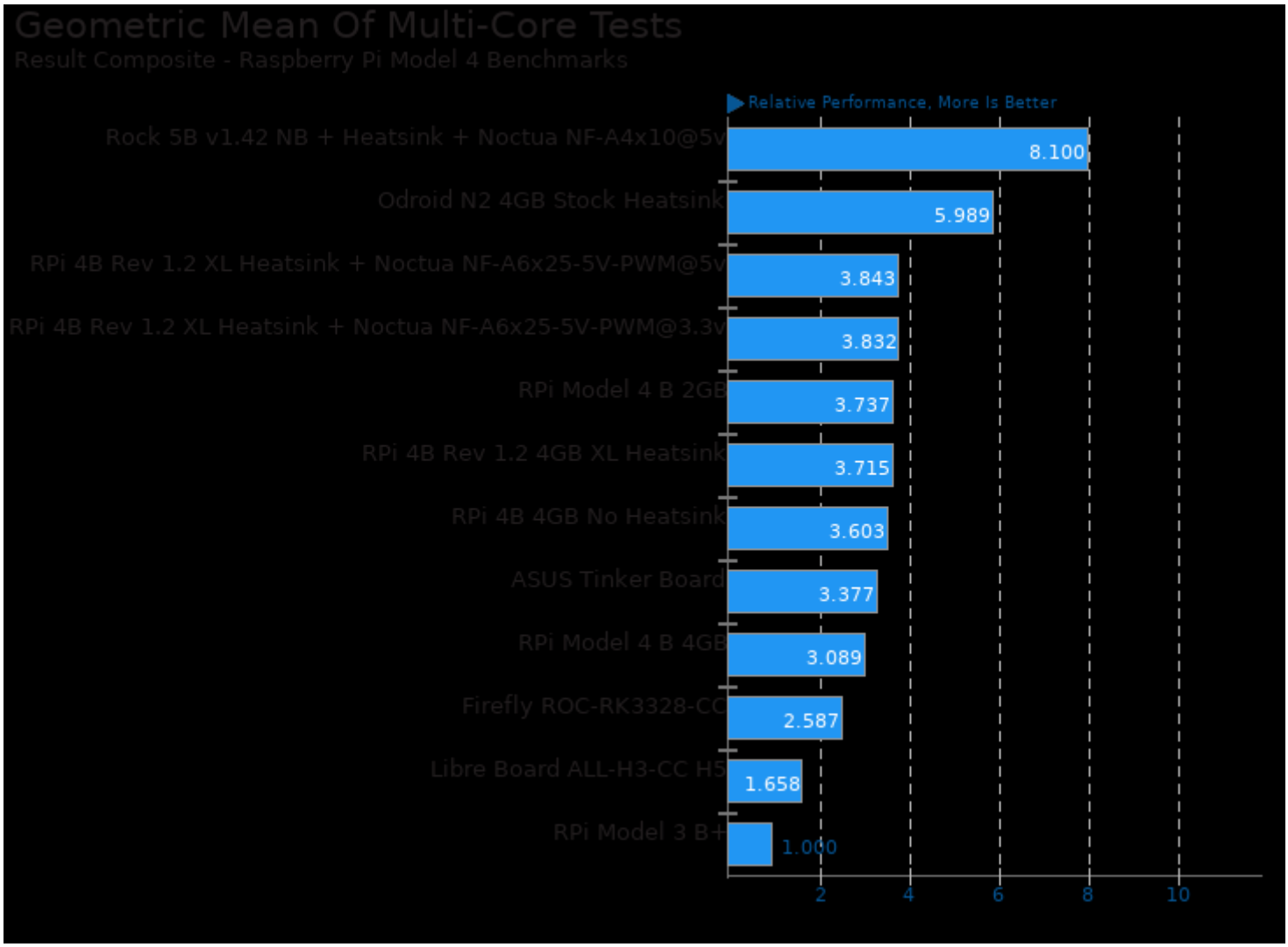
Geometric mean based upon tests: pts/compress-zstd, pts/x264, pts/encode-flac, pts/encode-mp3, pts/graphics-magick, pts/nginx, pts/phpbench and pts/rust-prime



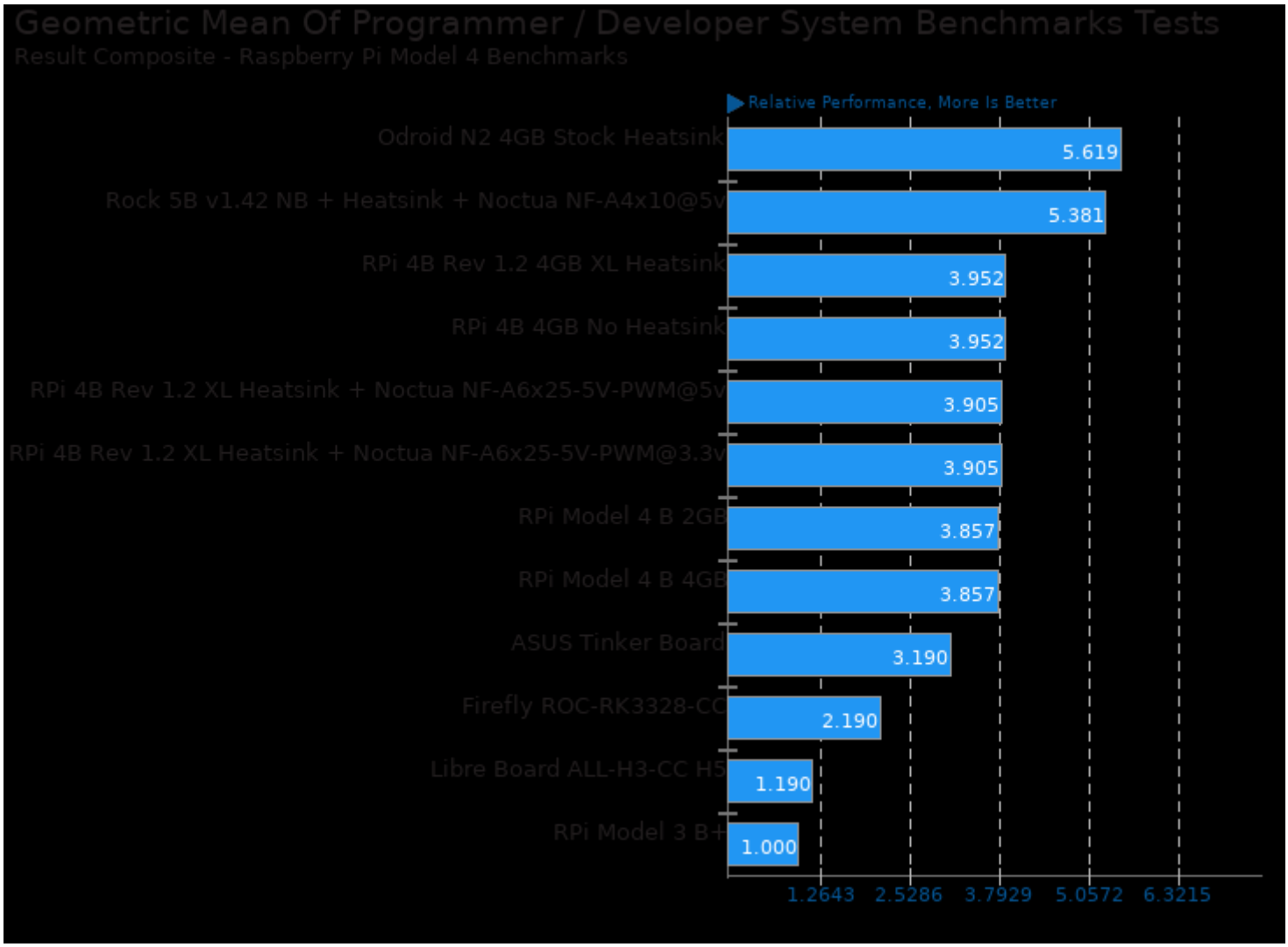
Geometric mean based upon tests: pts/smallpt, pts/x264, pts/encode-mp3, pts/encode-flac and pts/graphics-magick



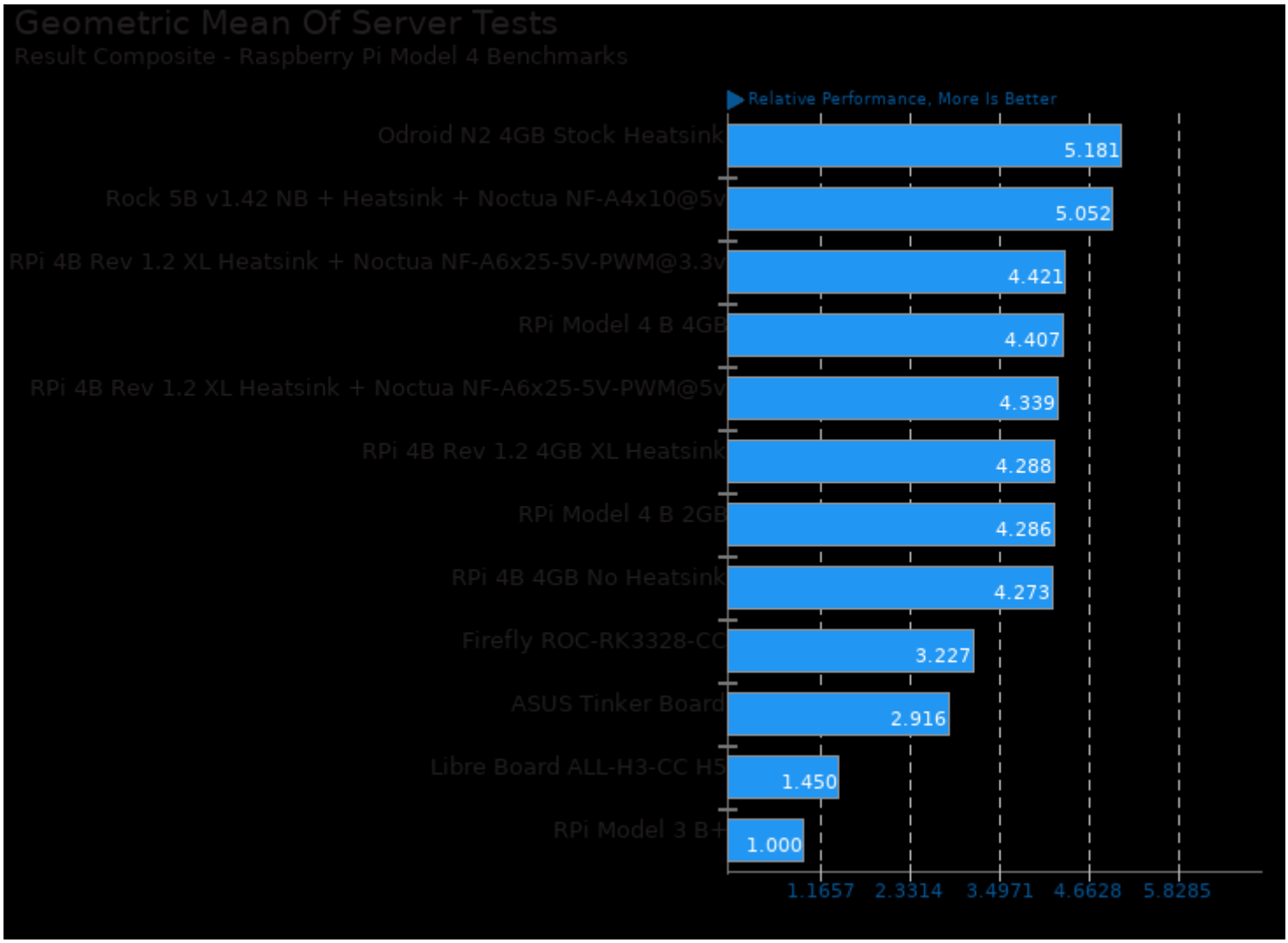
Geometric mean based upon tests: pts/encode-mp3, pts/encode-flac and pts/x264



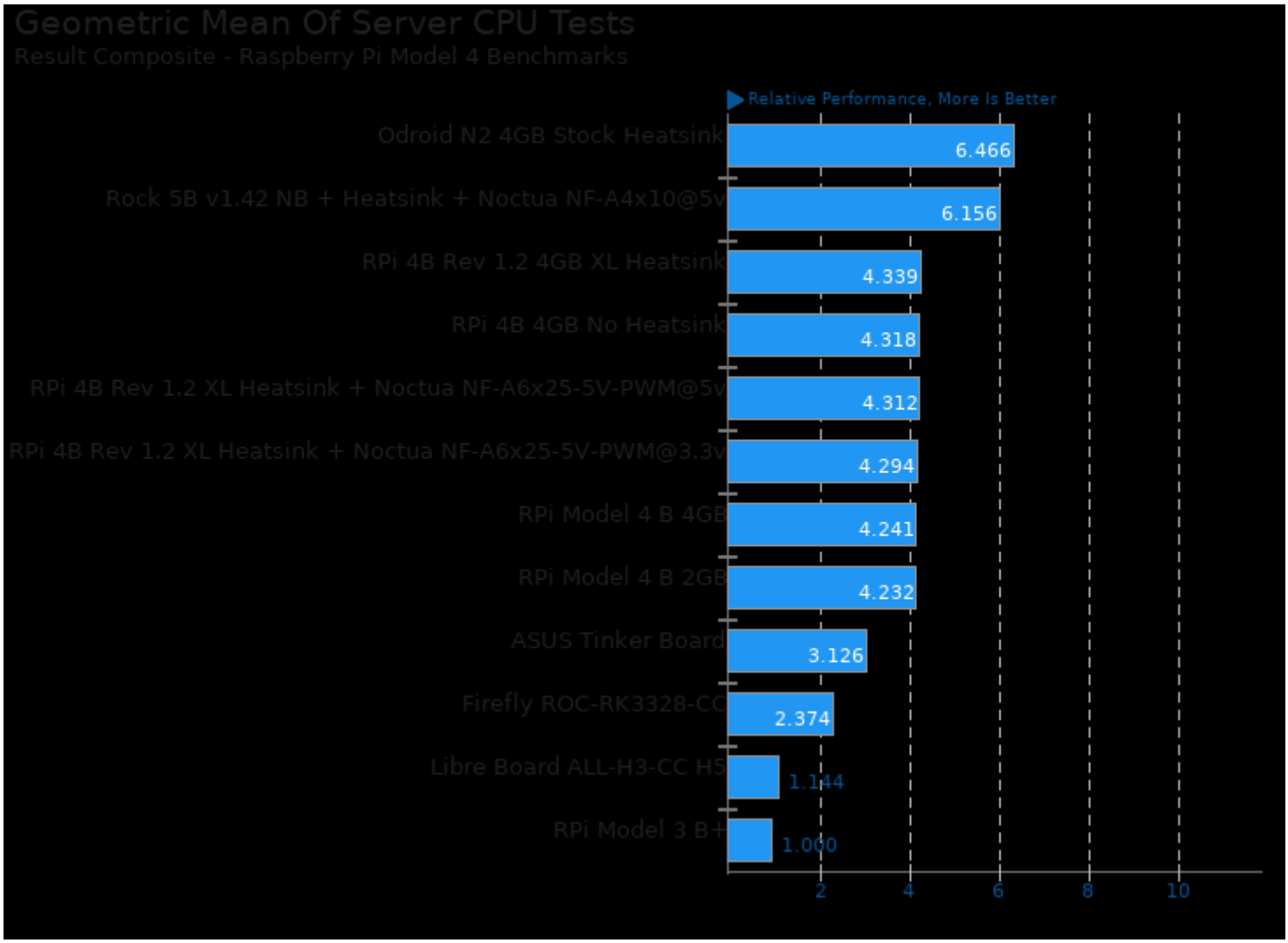
Geometric mean based upon tests: pts/x264, pts/smallpt, pts/graphics-magick, pts/compress-zstd and pts/rust-prime



Geometric mean based upon tests: pts/compress-zstd and pts/pybench

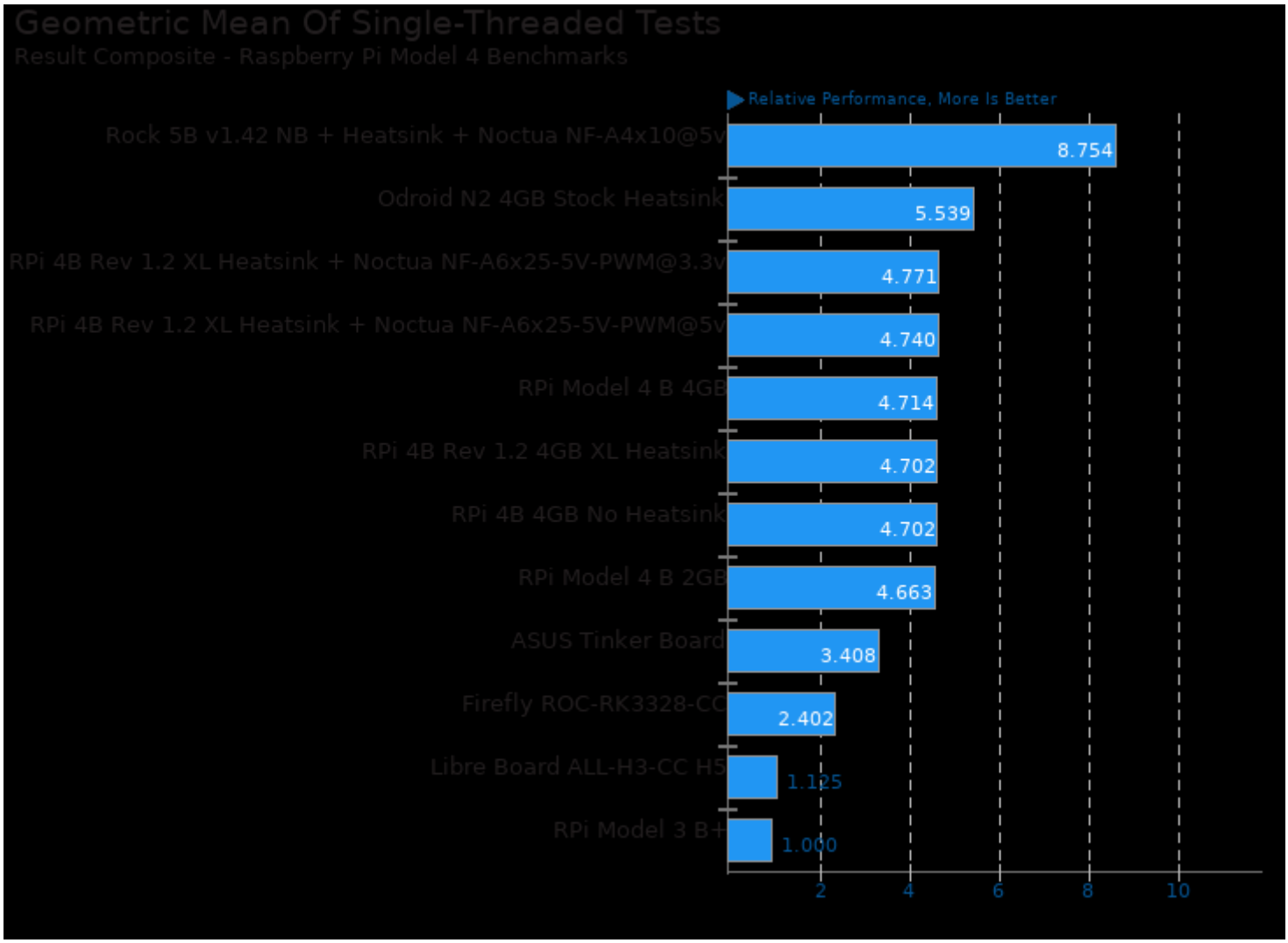


Geometric mean based upon tests: pts/nginx, pts/phpbench and pts/perl-benchmark



Geometric mean based upon tests: pts/x264, pts/compress-zstd, pts/pybench and pts/phpbench

Raspberry Pi Model 4 Benchmarks



Geometric mean based upon tests: pts/scimark2, pts/encode-flac, pts/encode-mp3, pts/perl-benchmark, pts/pybench, pts/phpbench and pts/nginx

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 09:12.