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ODROID-H2 Intel Ubuntu Linux Benchmarks

Automated Executive Summary

ASUS U36JC v1.0 had the most wins, coming in first place for 58% of the tests.

Based on the geometric mean of all complete results, the fastest (ASUS U36JC v1.0) was 8.256x the speed of the slowest (Raspberry Pi 2 Model B). ODROID-H2 was 0.938x the speed of ASUS U36JC v1.0, Odroid-XU4 + Cloudshell 2 was 0.478x the speed of ODROID-H2, AMD Turion II Neo N40L was 0.975x the speed of Odroid-XU4 + Cloudshell 2, ASUS Tinker Board was 0.836x the speed of AMD Turion II Neo N40L, ODROID-C2 was 0.797x the speed of ASUS Tinker Board, Firefly ROC-RK3328-CC was 0.809x the speed of ODROID-C2, Raspberry Pi 3 Model B+ was 0.939x the speed of Firefly ROC-RK3328-CC, Raspberry Pi 3 Model A+ was 0.98x the speed of Raspberry Pi 3 Model B+, Raspberry Pi 3 Model B was 0.924x the speed of Raspberry Pi 3 Model A+, Raspberry Pi 2 Model B was 0.605x the speed of Raspberry Pi 3 Model B.

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

PyBench (Total For Average Test Times) at 17.328x
PHPBench (PHP Benchmark Suite) at 15.035x
x264 (H.264 Video Encoding) at 10.646x
C-Ray (Total Time - 4K, 16 Rays Per Pixel) at 9.612x

AOBench (Size: 2048 x 2048 - Total Time) at 9.458x
Perl Benchmarks (Test: Pod2html) at 8.926x
LAME MP3 Encoding (WAV To MP3) at 8.519x
TTSIOD 3D Renderer (Phong Rendering With Soft-Shadow Mapping) at 6.927x
Tinymembench (Standard Memset) at 6.389x
7-Zip Compression (Compress Speed Test) at 6.202x.

Test Systems:

Raspberry Pi 2 Model B

Processor: ARMv7 rev 5 @ 0.90GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 2 Model B Rev 1.1, Memory: 927MB, Disk: 32GB GB2MW, Graphics: BCM2708

OS: Raspbian 9.6, Kernel: 4.14.79-v7+ (armv7l), Desktop: LXDE, Display Server: X Server 1.19.2, Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 656x416

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
Processor Notes: Scaling Governor: BCM2835 Freq ondemand
Python Notes: Python 2.7.13 + Python 3.5.3

Raspberry Pi 3 Model B

Processor: ARMv7 rev 4 @ 1.20GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 3 Model B Rev 1.2, Memory: 927MB, Disk: 32GB GB1QT, Graphics: BCM2708

OS: Raspbian 9.6, Kernel: 4.14.79-v7+ (armv7l), Desktop: LXDE, Display Server: X Server 1.19.2, Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 656x416

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
Processor Notes: Scaling Governor: BCM2835 Freq ondemand
Python Notes: Python 2.7.13 + Python 3.5.3

Raspberry Pi 3 Model B+

Processor: ARMv7 rev 4 @ 1.40GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 3 Model B Plus Rev 1.3, Memory: 927MB, Disk: 32GB GB2MW, Graphics: BCM2708

OS: Raspbian 9.6, Kernel: 4.14.79-v7+ (armv7l), Desktop: LXDE, Display Server: X Server 1.19.2, Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 1824x984

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
Processor Notes: Scaling Governor: BCM2835 Freq ondemand
Python Notes: Python 2.7.13 + Python 3.5.3

Raspberry Pi 3 Model A+

Processor: ARMv7 rev 4 @ 1.40GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 3 Model A Plus Rev 1.0, Memory: 431MB, Disk: 32GB SC32G, Graphics: BCM2708

OS: Raspbian 9.6, Kernel: 4.14.79-v7+ (armv7l), Desktop: LXDE, Display Server: X Server 1.19.2, Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 1824x984

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
Processor Notes: Scaling Governor: BCM2835 Freq ondemand
Python Notes: Python 2.7.13 + Python 3.5.3

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

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 7.3.0, 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-as=/usr/bin/aarch64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/aarch64-linux-gnu-ld -v
Processor Notes: Scaling Governor: cpufreq-dt performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5

ODROID-C2

Processor: Amlogic ARMv8 Cortex-A53 @ 1.54GHz (4 Cores), Motherboard: ODROID-C2, Memory: 2048MB, Disk: 32GB GB1QT, Graphics: OSD

OS: Ubuntu 18.04, Kernel: 3.16.57-20 (aarch64), Display Server: X Server 1.19.6, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 1920x1080

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-as=/usr/bin/aarch64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/aarch64-linux-gnu-ld -v
Processor Notes: Scaling Governor: meson_cpufreq performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5

ODROID-H2

Processor: Intel Celeron J4105 @ 2.50GHz (4 Cores), Motherboard: HARDKERNEL ODROID-H2 v1.0 (5.13 BIOS), Chipset: Intel Device 31f0, Memory: 32768MB, Disk: 500GB Western Digital WDS500G2X0C-00L350, Graphics: inteldrmfb (750MHz), Audio: Realtek ALC662 rev1, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 18.10, Kernel: 4.15.0-38-generic (x86_64), Display Server: X Server, Compiler: GCC 8.2.0, File-System: overlayfs, Screen Resolution: 1920x1080, System Layer: docker

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave
Python Notes: Python 2.7.15+ + Python 3.6.7
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp

Odroid-XU4 + Cloudshell 2

Processor: ARMv7 rev 3 @ 1.50GHz (8 Cores), Motherboard: ODROID-XU4 Hardkernel Odroid XU4, Memory: 2048MB, Disk: 2 x 4001GB 004-2CV104 + 31GB BJNB4R, Graphics: fb_ili9340

OS: Debian 9.6, Kernel: 4.14.69-odroidxu4 (armv7l), Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 320x240

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 ondemand
Python Notes: Python 2.7.13 + Python 3.5.3

ASUS U36JC v1.0

Processor: Intel Core i5 480M @ 2.67GHz (2 Cores / 4 Threads), Motherboard: ASUS U36JC v1.0 (U36JC.206 BIOS), Chipset: Intel Core DRAM, Memory: 4096MB, Disk: 128GB M4-CT128M4SSD2, Graphics: ASUS NVIDIA GeForce 310M 1GB (606/667MHz), Audio: Realtek ALC269VB, Network: Realtek RTL8111/8168/8411 + Qualcomm Atheros AR9285 Wireless

OS: Ubuntu 18.04, Kernel: 4.15.0-39-generic (x86_64), Desktop: GNOME Shell 3.28.3, Display Server: X Server 1.19.6, Display Driver: NVIDIA 340.107, OpenGL: 3.3.0, Compiler: GCC 7.3.0, File-System: ext4 (ecryptfs), Screen Resolution: 1366x768

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq ondemand
Python Notes: Python 2.7.15rc1 + Python 3.6.7
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp + PTE Inversion; VMX: conditional cache flushes SMT vulnerable

ODROID-H2 Intel Ubuntu Linux Benchmarks

AMD Turion II Neo N40L

Processor: AMD Turion II Neo N40L @ 1.50GHz (2 Cores), Motherboard: HP ProLiant MicroServer (O41 BIOS), Chipset: AMD RS880, Memory: 2048MB, Disk: 250GB VB0250EAVER + 3 x 2000GB Seagate ST2000DL004 HD20, Graphics: AMD Mobility Radeon HD 4225/4250 128MB (500/400MHz), Network: Broadcom Limited NetXtreme BCM5723 Gigabit PCIe

OS: Debian 9.6, Kernel: 4.9.0-8-amd64 (x86_64), Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: acpi-cpufreq conservative
Python Notes: Python 2.7.13 + Python 3.5.3
Security Notes: __user pointer sanitization + Full AMD retpoline

	Raspberry Pi 2 Model B	Raspberry Pi 3 Model B	Raspberry Pi 3 Model B+	Raspberry Pi 3 Model A+	ASUS Tinker Board	Firefly ROC-RK3328-CC	ODROID-C2	ODROID-H2	Odroid-XU4 + Cloudshell 2	ASUS U36JC v1.0	AMD Turion II Neo N40L
7-Zip Compression -	1168	1858	1803	1993	2946	1536	2165	7244		6248	2504
Normalized	16.12%	25.65%	24.89%	27.51%	40.67%	21.2%	29.89%	100%		86.25%	34.57%
Standard Deviation	0.4%	0.3%	3%	0.7%	4%	0.5%	0.4%	0.9%		2.5%	2.7%
7-Zip Compression - Performance / Cost - C.S.T			51.51	79.72	45.32	43.89	36.08	65.26			
Normalized			64.61%	100%	56.85%	55.06%	45.26%	81.86%			
AOBench - 2048 x 2048 - Total Time (sec)	668	334	298	286	214	298	262	88.80	150.53	70.63	217.38
Normalized	10.57%	21.15%	23.7%	24.7%	33%	23.7%	26.96%	79.54%	46.92%	100%	32.49%
Standard Deviation	0.4%	0.1%	4.7%	0.4%	3.4%	0.4%	0.9%	0.5%	0.9%	0.1%	0.3%
AOBench - Performance / Cost - 2048 x 2048 - Total Time (sec x Dollar)			10430	7150	13910	10430	15720	9857			
Normalized			68.55%	100%	51.4%	68.55%	45.48%	72.54%			
C-Ray - Total Time - 4.1.R.P.P (sec)	4364	2317	2111	2068	1579	2604	1559	454	816	822	1584
Normalized	10.4%	19.59%	21.51%	21.95%	28.75%	17.43%	29.12%	100%	55.64%	55.23%	28.66%
Standard Deviation	1.6%	0.9%	0.2%	0.4%	0.3%	0.8%	1.9%	0%	8.6%	2.6%	0.2%

ODROID-H2 Intel Ubuntu Linux Benchmarks

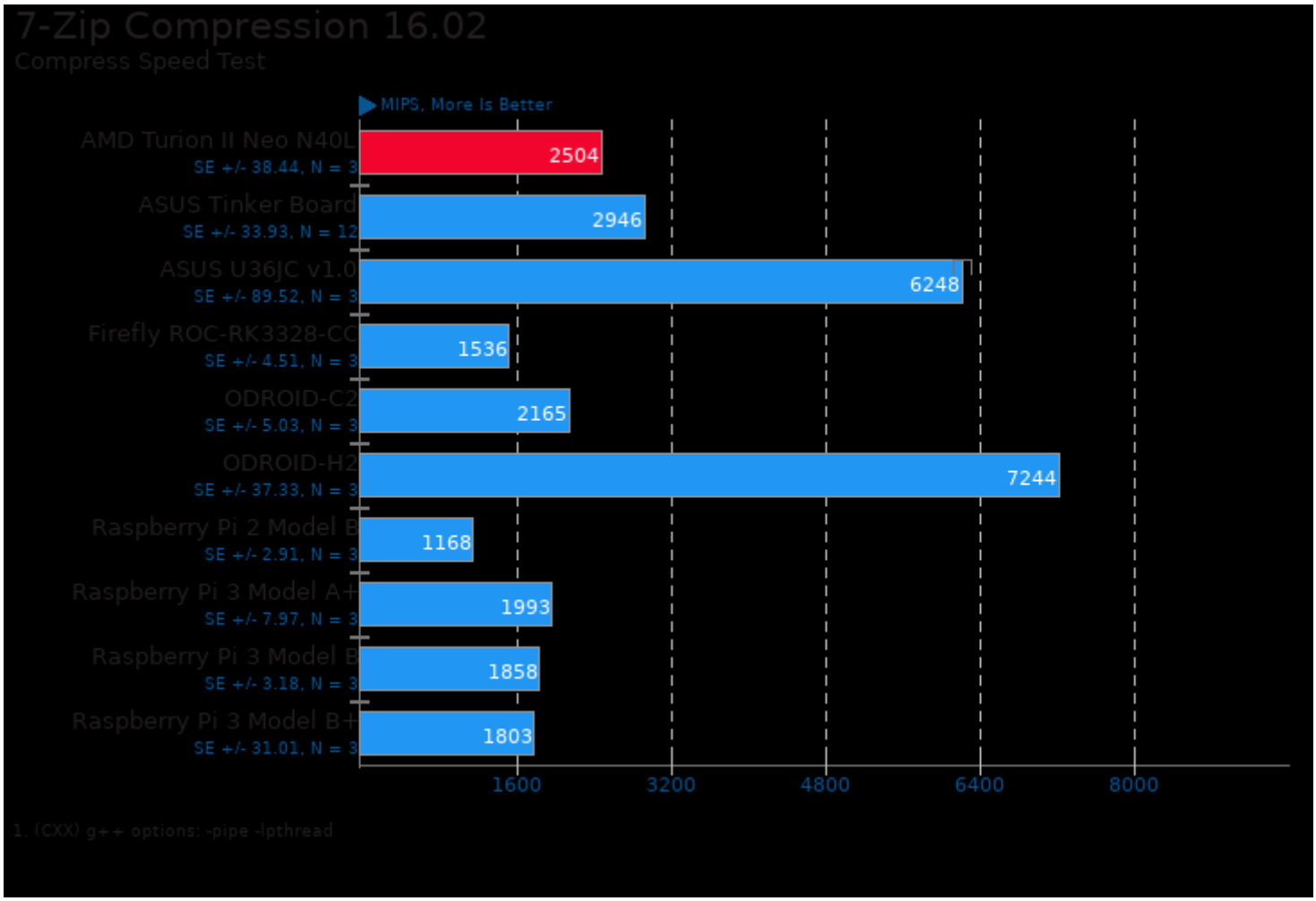
C-Ray - Performance / Cost - Total Time - 4.1.R.P.P (sec x Dollar)			73885	51700	**102635**	91140	93540	**50436**			
Normalized			68.26%	97.56%	49.14%	55.34%	53.92%	100%			
Git - T.T.C.C.G.C (sec)	**96.99**	59.52	49.17	58.67	25.72	41.47	42.08	12.99	26.98	**11.87**	26.53
Normalized	12.24%	19.94%	24.14%	20.23%	46.15%	28.62%	28.21%	91.38%	44%	100%	44.74%
Standard Deviation	5.5%	10.2%	10.4%	1.7%	3.5%	2.5%	13.9%	2%	6.9%	4.1%	16.2%
Git - Performance / Cost - T.T.C.C.G.C (sec x			1721	1467	1672	1451	**2525**	**1442**			
Normalized			83.78%	98.31%	86.25%	99.34%	57.11%	100%			
LAME MP3 Encoding - WAV To MP3 (sec)	**515**	352	302	304	158	315	265	73.22	122.87	**60.45**	145.08
Normalized	11.74%	17.17%	20.02%	19.88%	38.26%	19.19%	22.81%	82.56%	49.2%	100%	41.67%
Standard Deviation	0.3%	0.2%	0.3%	0.6%	0.6%	0.2%	0.1%	0%	0.2%	0.7%	0.4%
LAME MP3 Encoding - Performance / Cost - WAV To MP3 (sec x Dollar)			10570	**7600**	10270	11025	**15900**	8127			
Normalized			71.9%	100%	74%	68.93%	47.8%	93.51%			
Perl Benchmarks - Pod2html (sec)	**2.39198**	1.29932	1.21061	1.15952	0.74372	1.70325	1.08893	0.32890	0.65061	**0.26799**	0.52462
	371	392	075	401	882	877	965	668	412	**331**	974
Normalized	11.2%	20.63%	22.14%	23.11%	36.03%	15.73%	24.61%	81.48%	41.19%	100%	51.08%
Standard Deviation	1.9%	1.7%	0.8%	0.1%	1.1%	2.3%	4.7%	0.1%	3.9%	0.9%	0.9%
Perl Benchmarks - Interpreter (sec)	**0.01409**	0.00843	0.00807	0.00971	0.00427	0.00598	0.00548	0.00333	0.00590	**0.00210**	0.00467
	889	041	974	687	466	828	034	289	166	**400**	685
Normalized	14.92%	24.96%	26.04%	21.65%	49.22%	35.14%	38.39%	63.13%	35.65%	100%	44.99%
Standard Deviation	5.7%	3.3%	7%	14.5%	7.2%	0.2%	0.9%	0.6%	0.7%	1.7%	7.3%
Perl Benchmarks - Performance / Cost - Pod2html (sec x Dollar)			42.37	**28.99**	48.34	59.61	**65.34**	36.51			
Normalized			68.42%	100%	59.97%	48.63%	44.37%	79.4%			
Perl Benchmarks - Performance / Cost - Interpreter (sec x Dollar)			0.28	0.24	0.28	**0.21**	0.33	**0.37**			
Normalized			75%	87.5%	75%	100%	63.64%	56.76%			
PHPBench - P.B.S (Score)	**20920**	34426	38087	40338	61415	52852	59664	257186	82714	**314540**	116077
Normalized	6.65%	10.94%	12.11%	12.82%	19.53%	16.8%	18.97%	81.77%	26.3%	100%	36.9%
Standard Deviation	0.5%	0.2%	0.7%	0.2%	0.7%	0.5%	0.2%	0.1%	0.8%	0.2%	0.2%

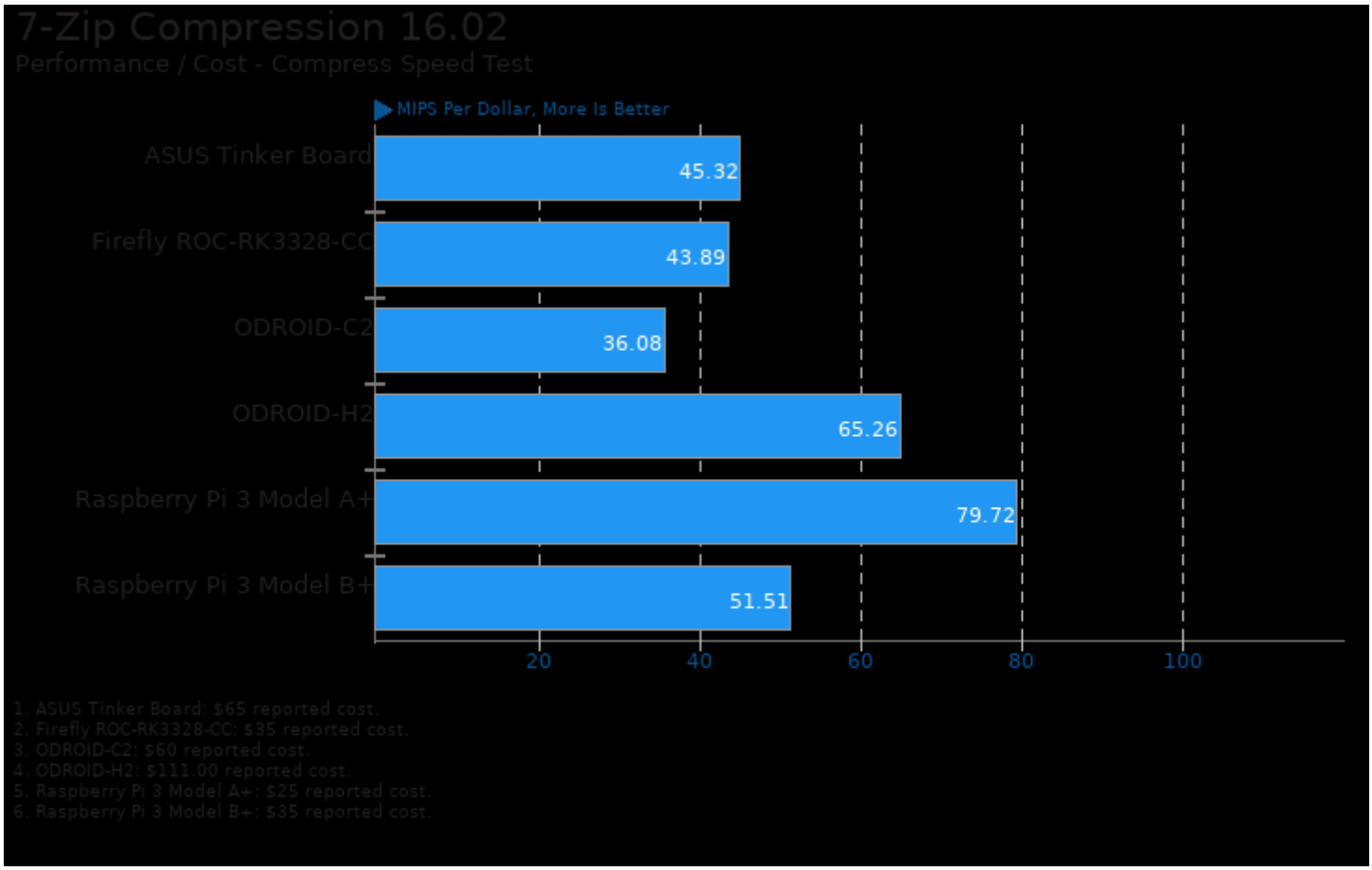
ODROID-H2 Intel Ubuntu Linux Benchmarks

PHPBench - Performance / Cost - P.B.S (Score/Dollar)			1088	1614	**944.85**	1510	994.40	**2317**			
Normalized			46.97%	69.64%	40.78%	65.17%	42.92%	100%			
PyBench - T.F.A.T.T (Milliseconds)	**38087**	24328	21206	20874	9318	14242	12619	3031	8277	**2198**	6679
Normalized	5.77%	9.03%	10.36%	10.53%	23.59%	15.43%	17.42%	72.52%	26.56%	100%	32.91%
Standard Deviation	0.4%	0.4%	0.4%	0.2%	0.8%	0.4%	0.1%	0.1%		0.5%	0.2%
PyBench - Performance / Cost - T.F.A.T.T (Milliseconds x Dollar)			742210	521850	605670	498470	**757140**	**336441**			
Normalized			45.33%	64.47%	55.55%	67.49%	44.44%	100%			
Tinymembench - Standard Memcpy (MB/s)	**1000**	1302	1285	1300	1532	1240	1718	**5577**	2294	3273	2174
Normalized	17.93%	23.35%	23.04%	23.31%	27.47%	22.23%	30.81%	100%	41.13%	58.69%	38.98%
Standard Deviation	2.5%	0.3%	1.2%	1.3%	0.3%	3.4%	0.4%	0.3%	3.4%	0.3%	0.2%
Tinymembench - Standard Memset (MB/s)	**1188**	1773	1826	1833	4199	5628	3737	**7590**	4843	3488	2201
Normalized	15.65%	23.36%	24.06%	24.15%	55.32%	74.15%	49.24%	100%	63.81%	45.96%	29%
Standard Deviation	0.5%	1.6%	2.4%	3.4%	0%	5.3%	0.1%	0.1%	0.2%	0.1%	1.9%
Tinymembench - Performance / Cost - Standard Memcpy			36.71	**52.00**	**23.57**	35.43	28.63				
Normalized			70.6%	100%	45.33%	68.13%	55.06%				
Tinymembench - Performance / Cost - Standard Memset								68.38			
TTSIOD 3D Renderer - P.R.W.S.S.M (FPS)	**11.20**	15.99	16.51	17.25	22.38		22.51	**77.58**	51.18	55.56	18.79
Normalized	14.44%	20.61%	21.28%	22.24%	28.85%		29.02%	100%	65.97%	71.62%	24.22%
Standard Deviation	0.4%	3.3%	0.3%	1.6%	2.6%		2.2%	0.3%	1.7%	2.5%	0.9%
TTSIOD 3D Renderer - Performance / Cost - P.R.W.S.S.M			0.47	0.69	**0.34**		0.38	**0.70**			
Normalized			67.14%	98.57%	48.57%		54.29%	100%			
x264 - H.2.V.E (FPS)	**1.13**	2.03	2.08		3.36	1.65	2.88	**12.03**	5.22	8.16	3.63
Normalized	9.39%	16.87%	17.29%		27.93%	13.72%	23.94%	100%	43.39%	67.83%	30.17%
Standard Deviation	0.5%	0%	0.6%		0.5%	0.6%	0.2%	0.3%	3.3%	0.2%	0.3%

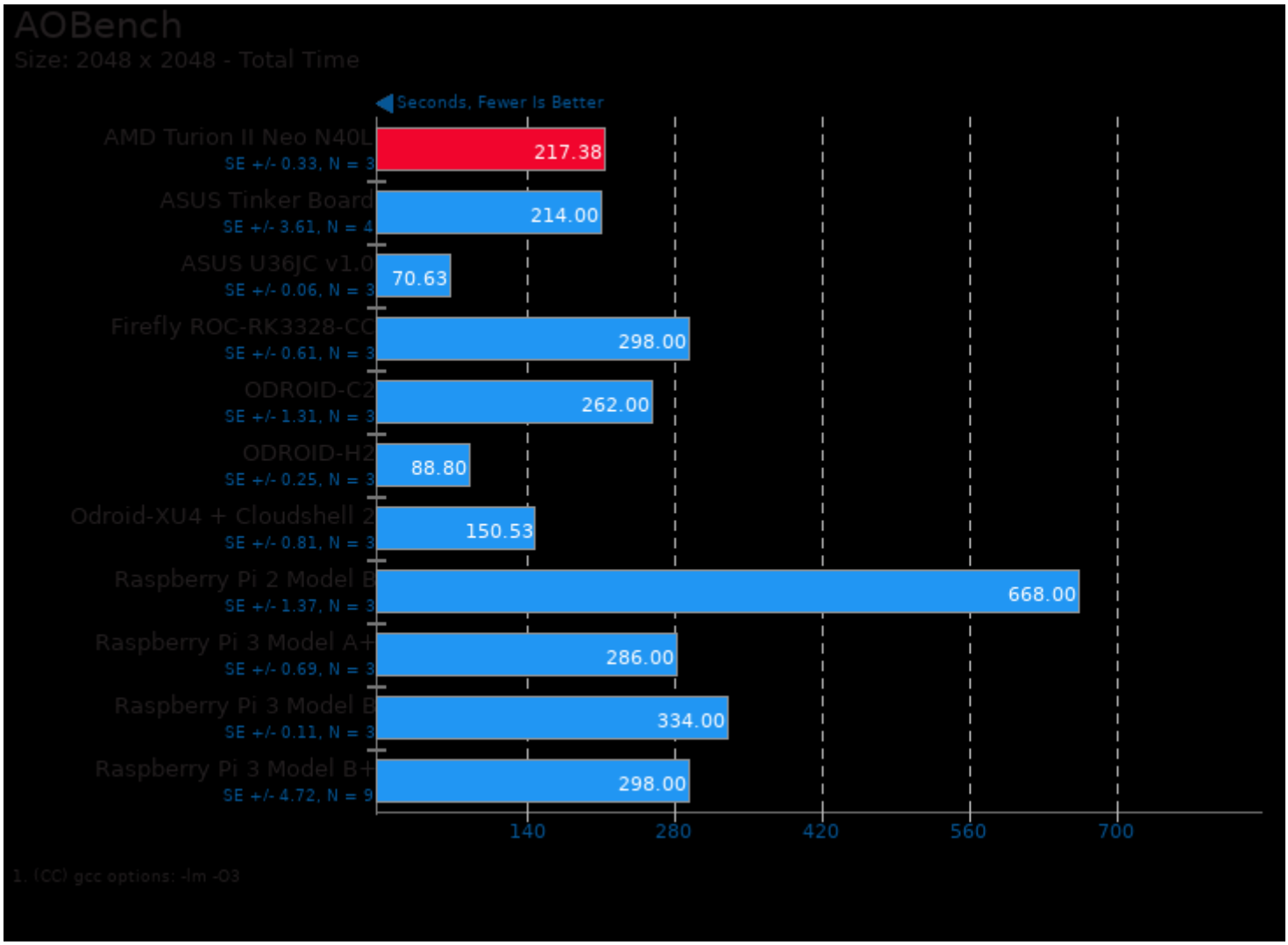
x264 - Performance / Cost - H.2.V.E	0.06	**0.05**	**0.05**	**0.05**	**0.11**
Normalized	54.55%	45.45%	45.45%	45.45%	100%

ODROID-H2 Intel Ubuntu Linux Benchmarks

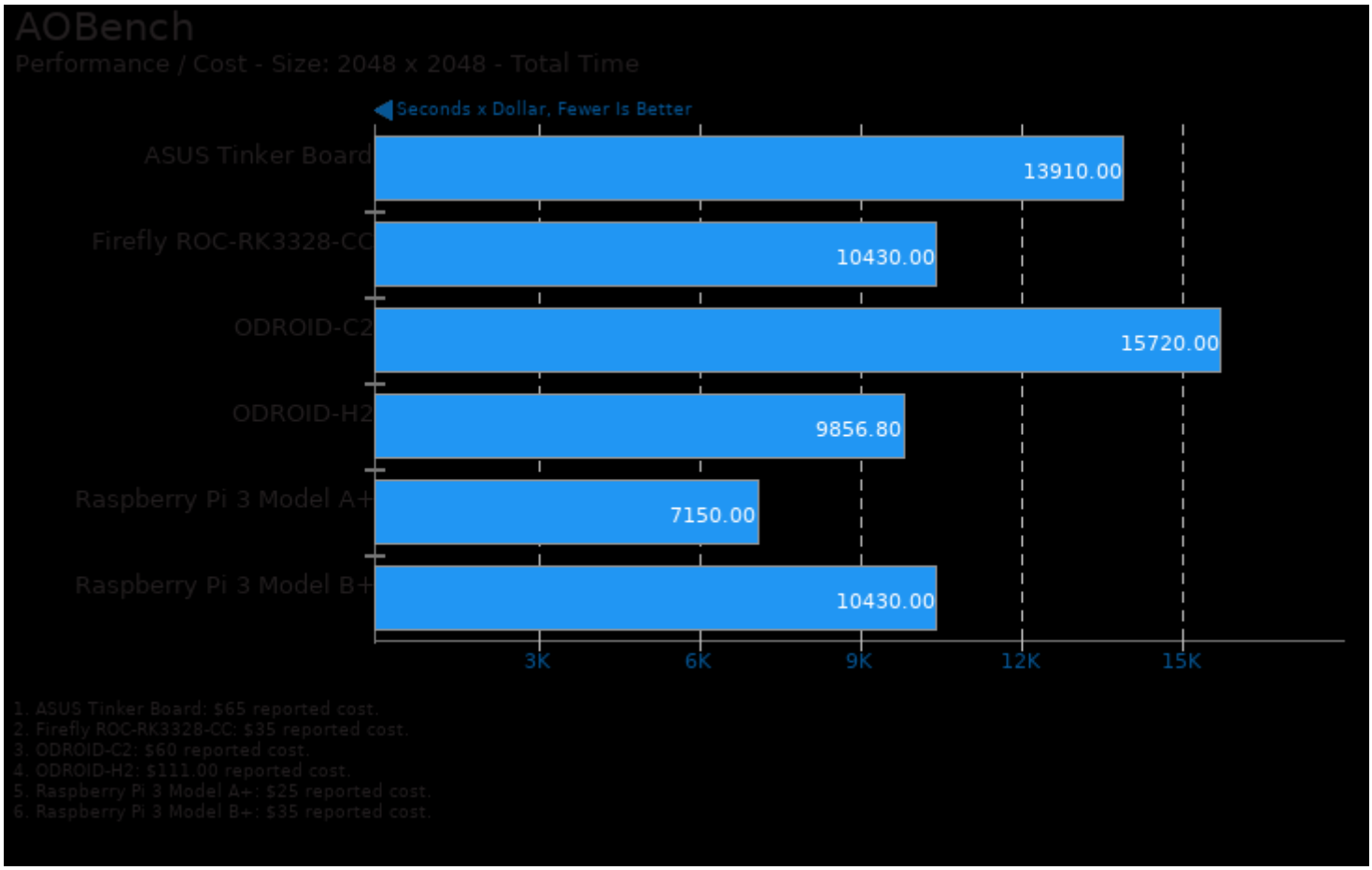


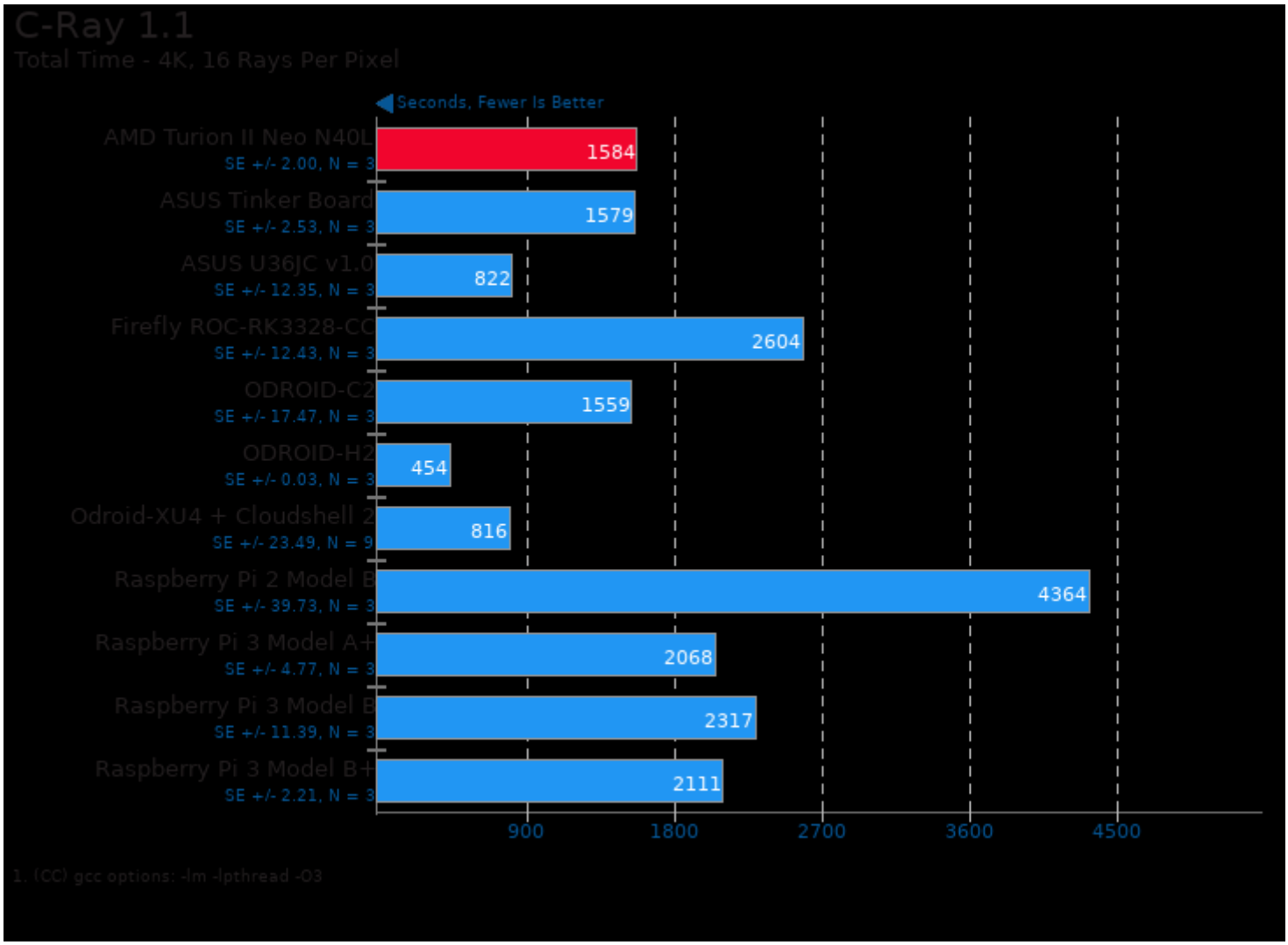

7-Zip Compression 16.02
Performance / Cost - Compress Speed Test
MIPS Per Dollar, More Is Better
ASUS Tinker Board
45.32
Firefly ROC-RK3328-CC
43.89
ODROID-C2
36.08
ODROID-H2
65.26
Raspberry Pi 3 Model A+
79.72
Raspberry Pi 3 Model B+
51.51
20
40
60
80
100
1. ASUS Tinker Board: $65 reported cost.
2. Firefly ROC-RK3328-CC: $35 reported cost.
3. ODROID-C2: $60 reported cost.
4. ODROID-H2: $111.00 reported cost.
5. Raspberry Pi 3 Model A+: $25 reported cost.
6. Raspberry Pi 3 Model B+: $35 reported cost.

ODROID-H2 Intel Ubuntu Linux Benchmarks

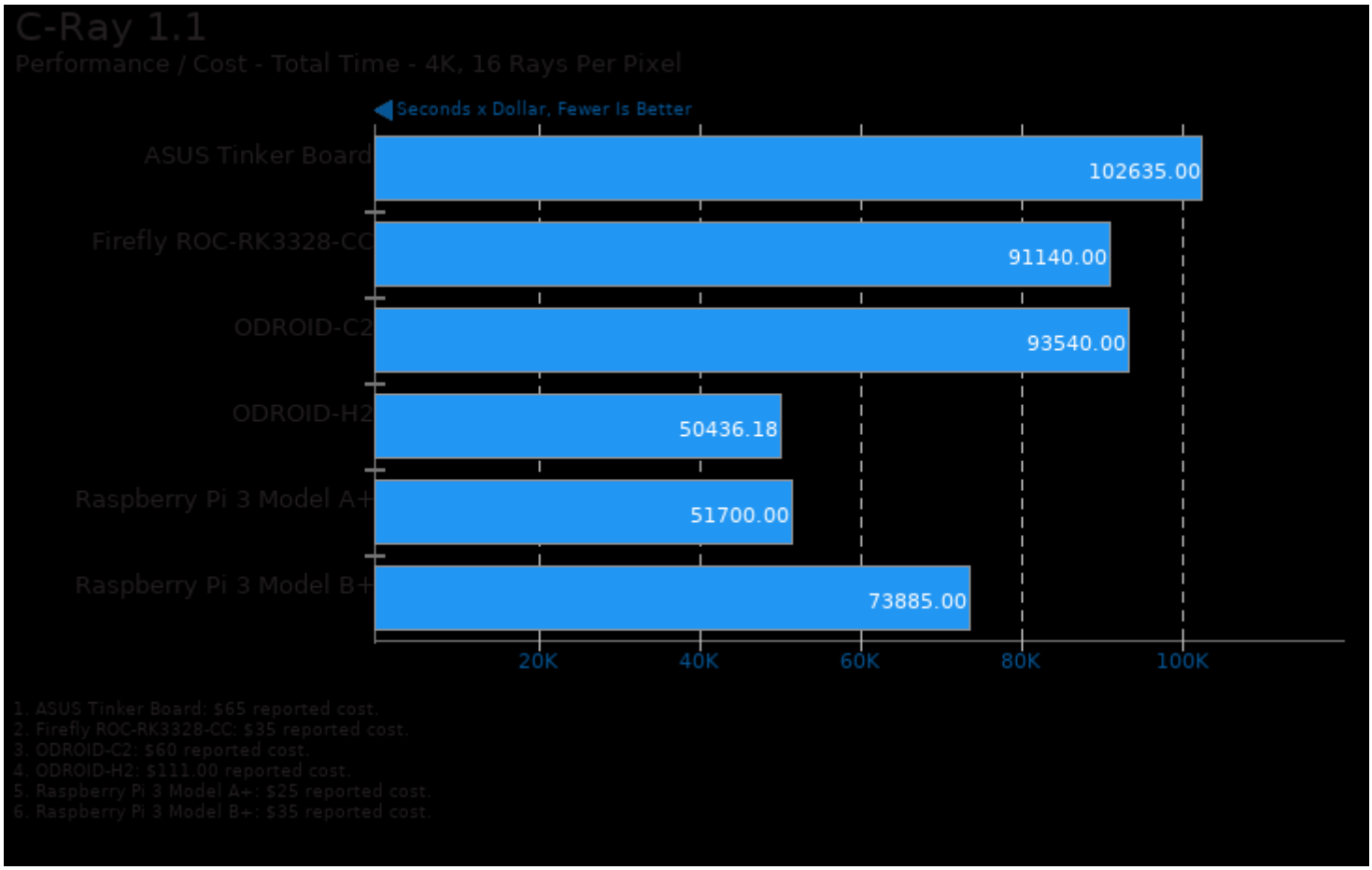


ODROID-H2 Intel Ubuntu Linux Benchmarks

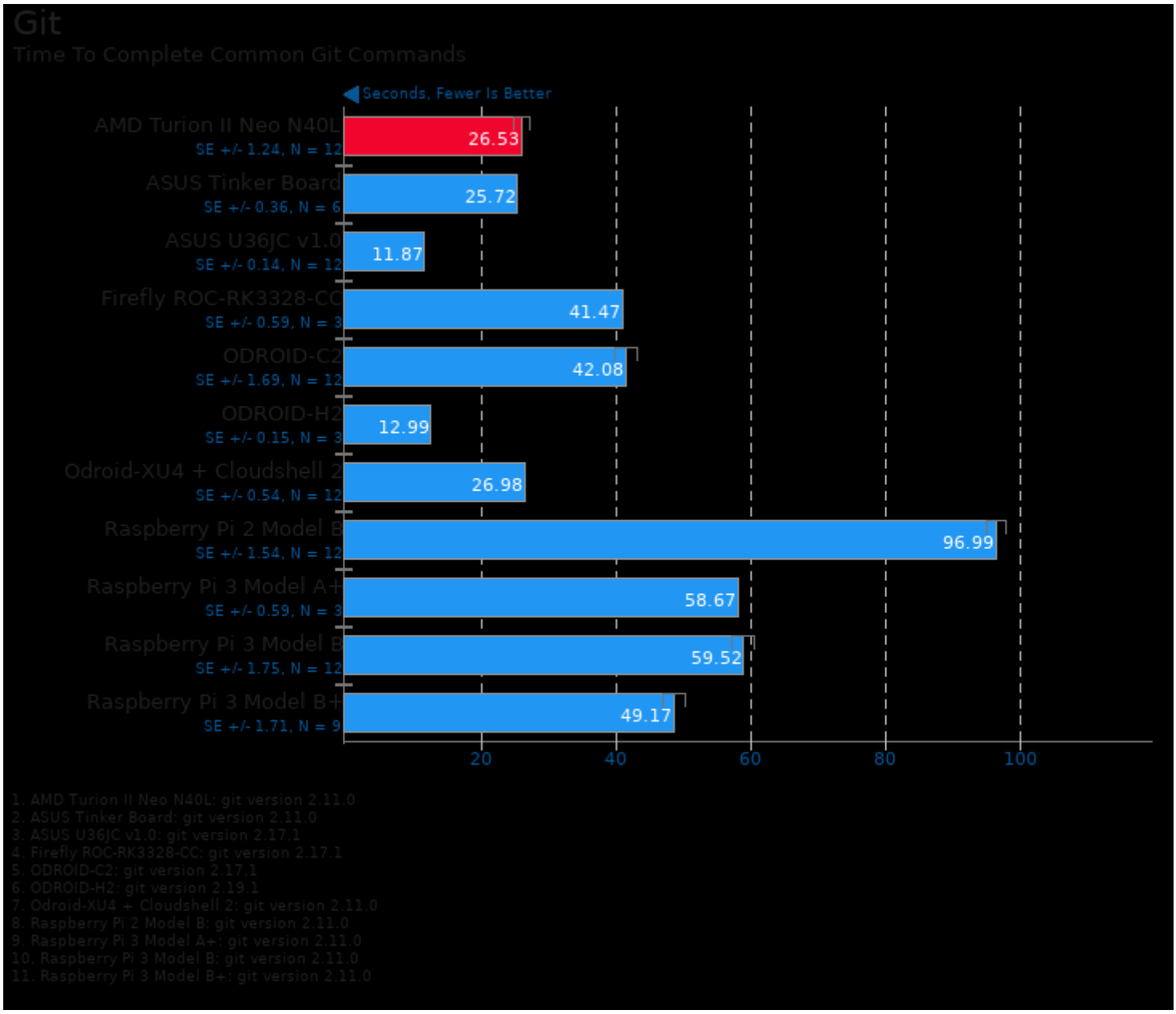



C-Ray 1.1
Total Time - 4K, 16 Rays Per Pixel
Seconds, Fewer Is Better
AMD Turion II Neo N40L
SE +/- 2.00, N = 3
1584
ASUS Tinker Board
SE +/- 2.53, N = 3
1579
ASUS U36JC v1.0
SE +/- 12.35, N = 3
822
Firefly ROC-RK3328-CC
SE +/- 12.43, N = 3
2604
ODROID-C2
SE +/- 17.47, N = 3
1559
ODROID-H2
SE +/- 0.03, N = 3
454
Odroid-XU4 + Cloudshell 2
SE +/- 23.49, N = 9
816
Raspberry Pi 2 Model B
SE +/- 39.73, N = 3
4364
Raspberry Pi 3 Model A+
SE +/- 4.77, N = 3
2068
Raspberry Pi 3 Model B
SE +/- 11.39, N = 3
2317
Raspberry Pi 3 Model B+
SE +/- 2.21, N = 3
2111
900
1800
2700
3600
4500
1. (CC) gcc options: -lm -lpthread -O3

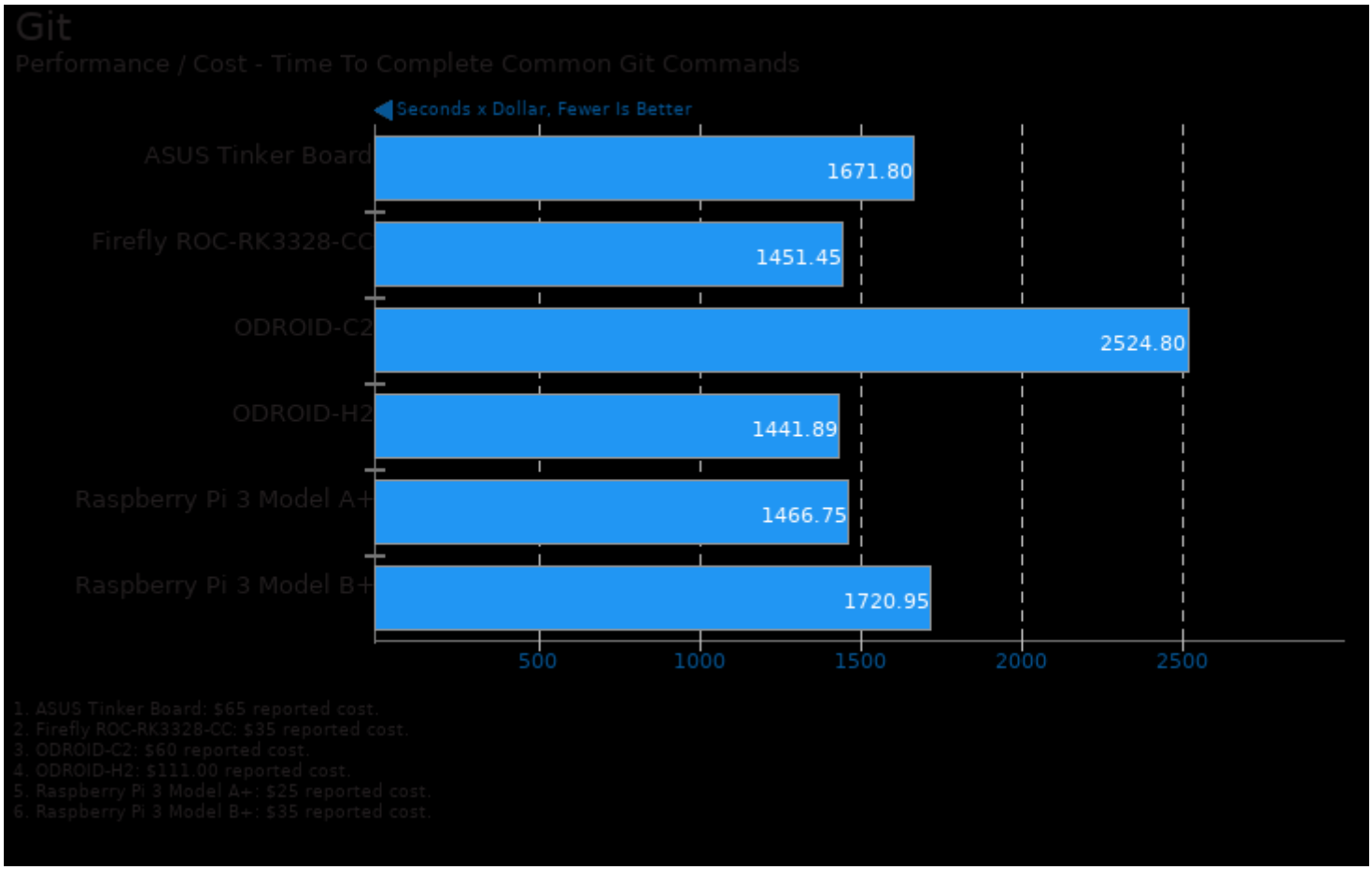
ODROID-H2 Intel Ubuntu Linux Benchmarks



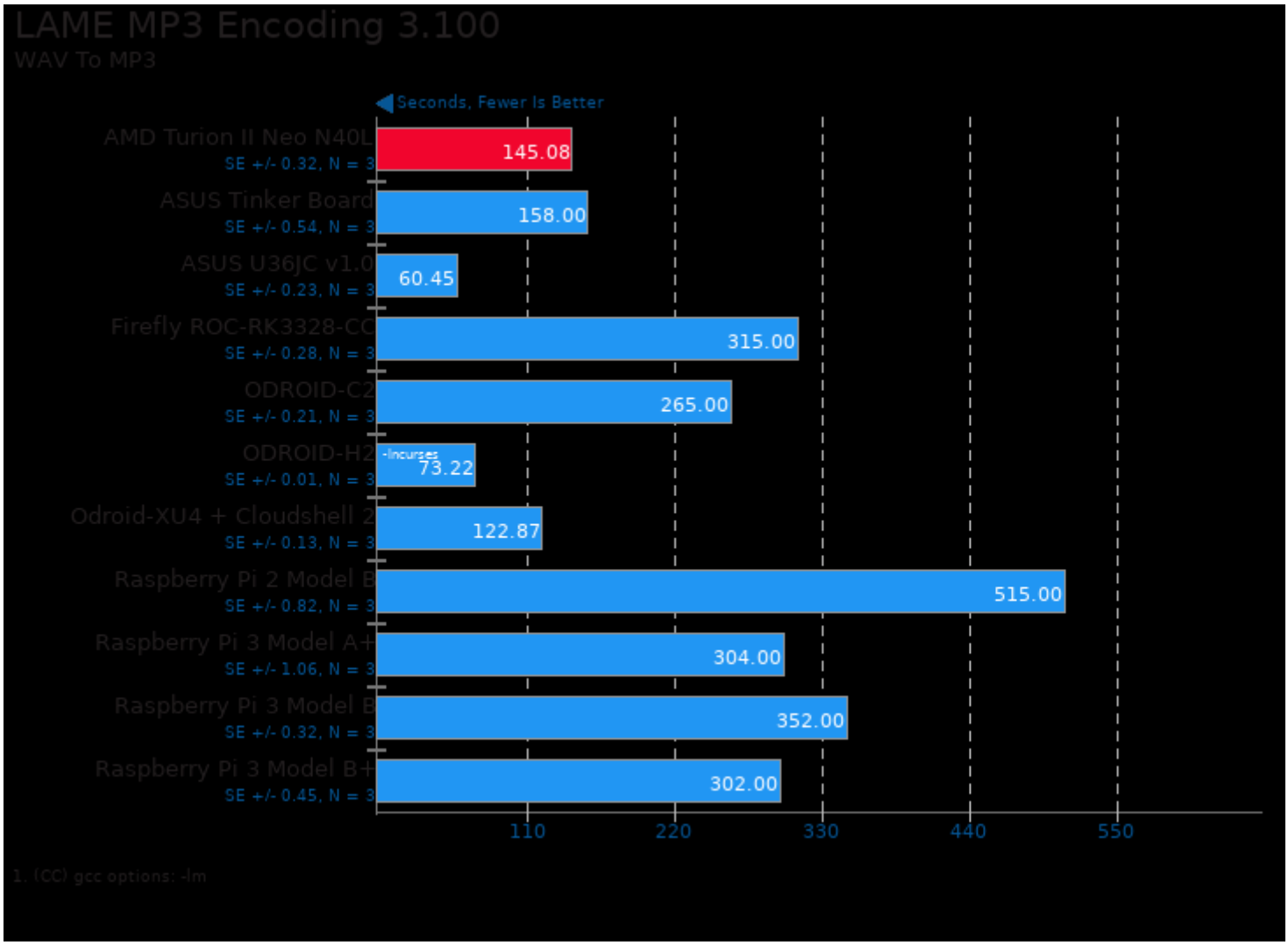
ODROID-H2 Intel Ubuntu Linux Benchmarks



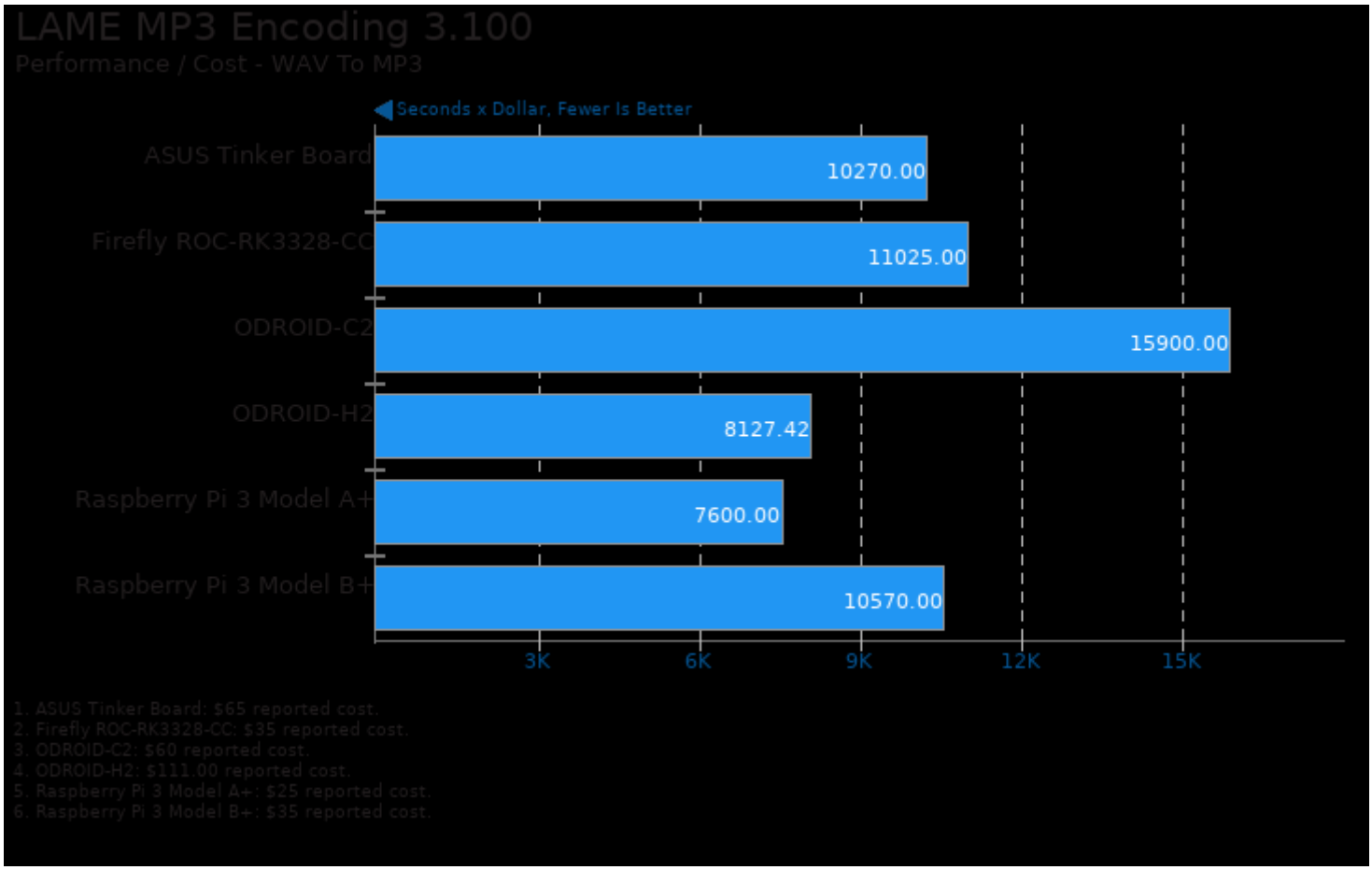
ODROID-H2 Intel Ubuntu Linux Benchmarks



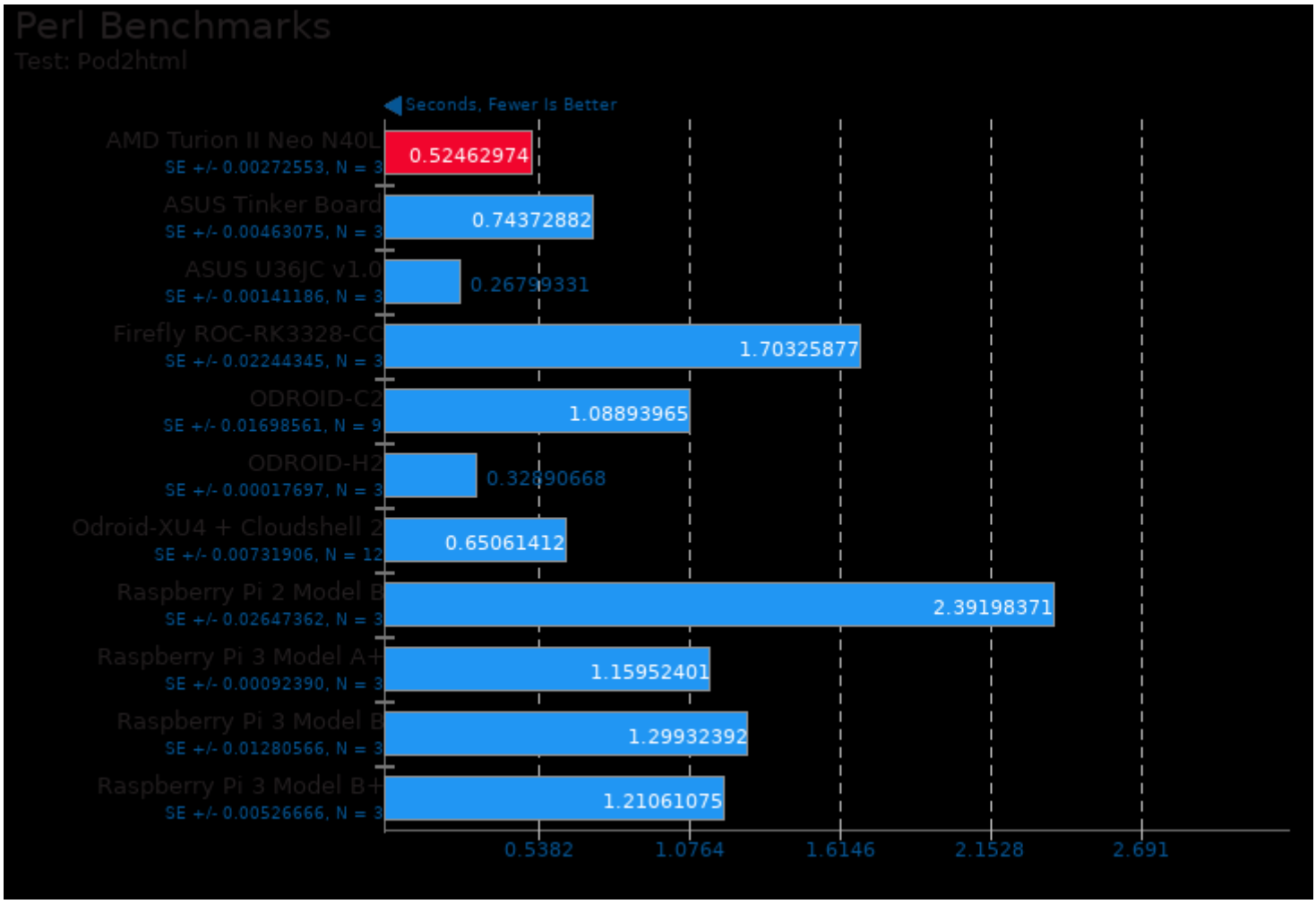
ODROID-H2 Intel Ubuntu Linux Benchmarks



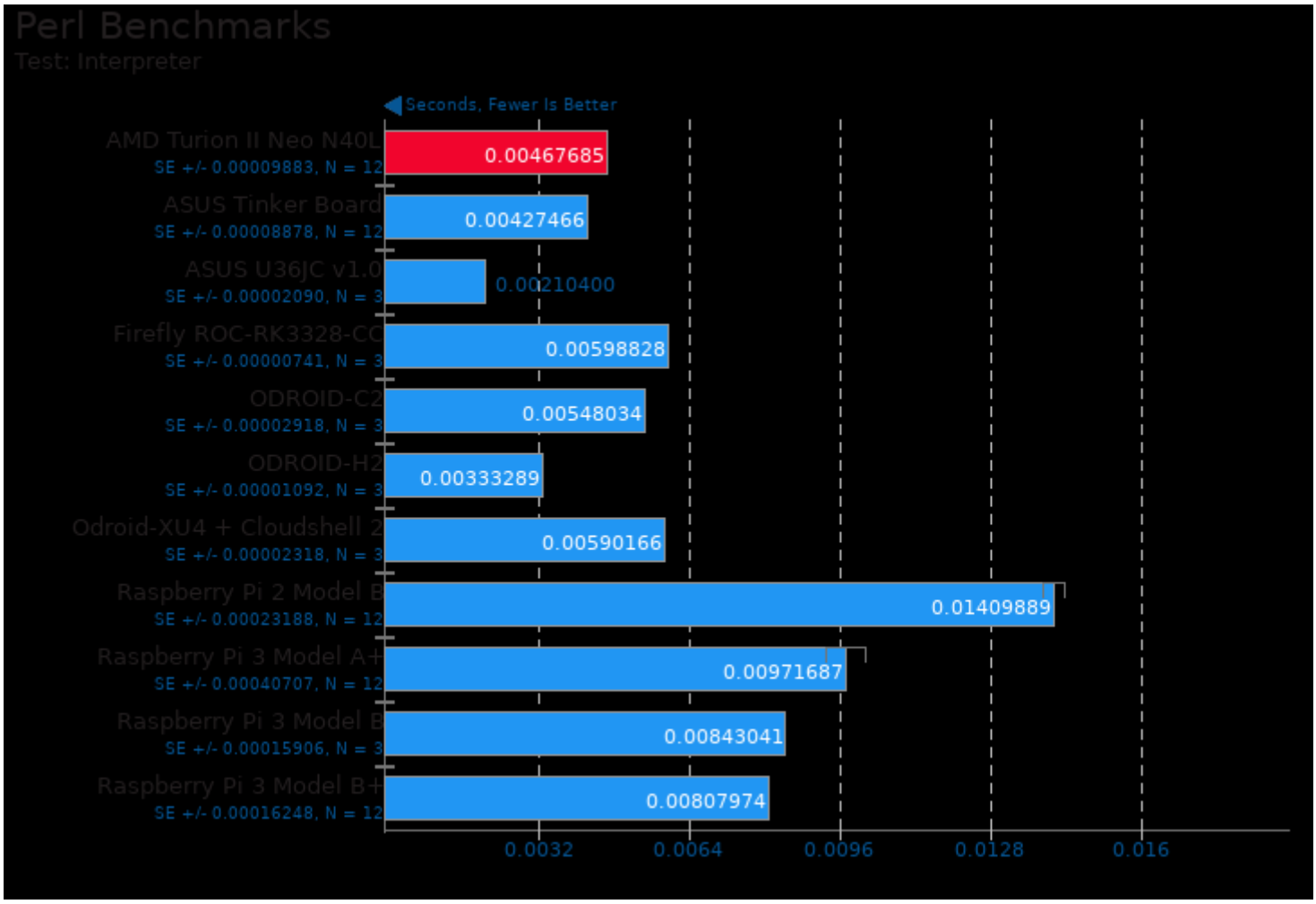
ODROID-H2 Intel Ubuntu Linux Benchmarks

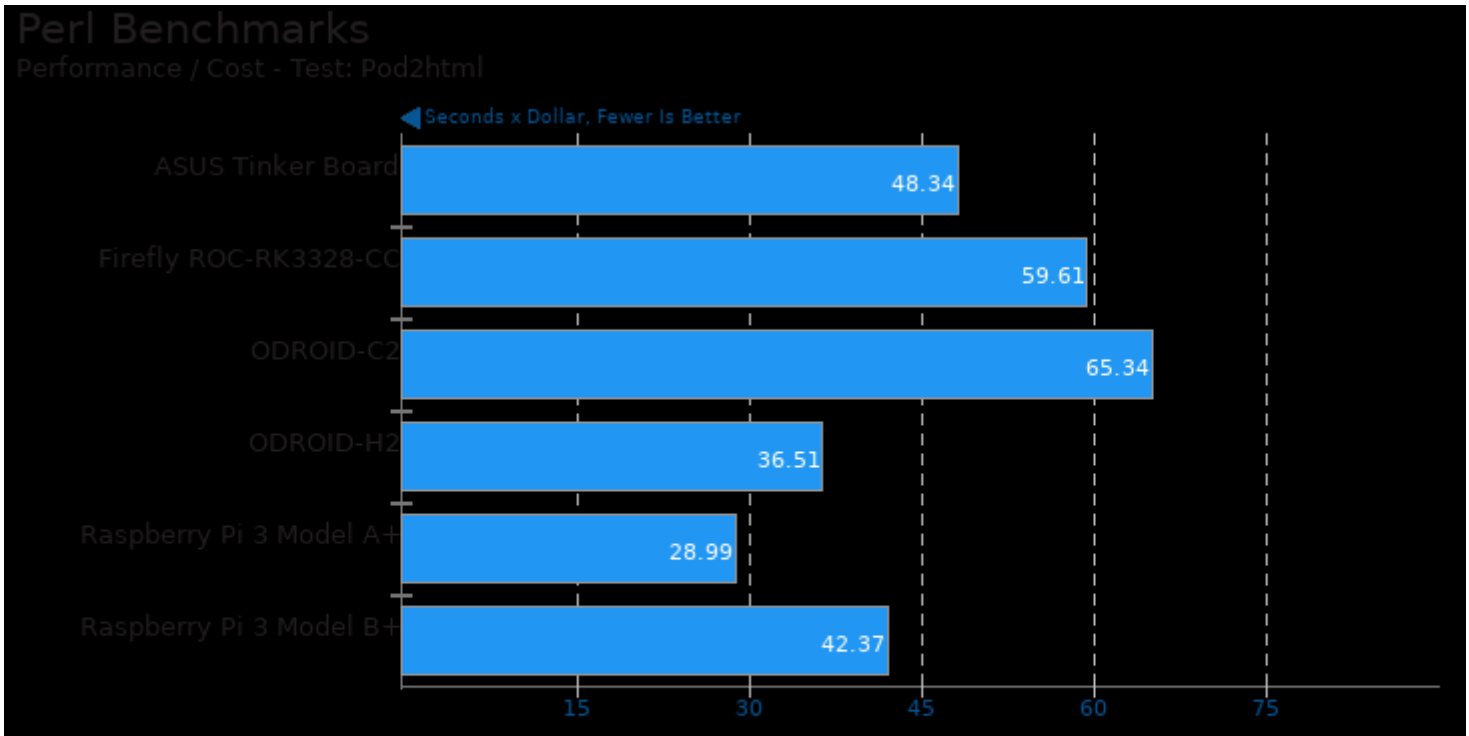


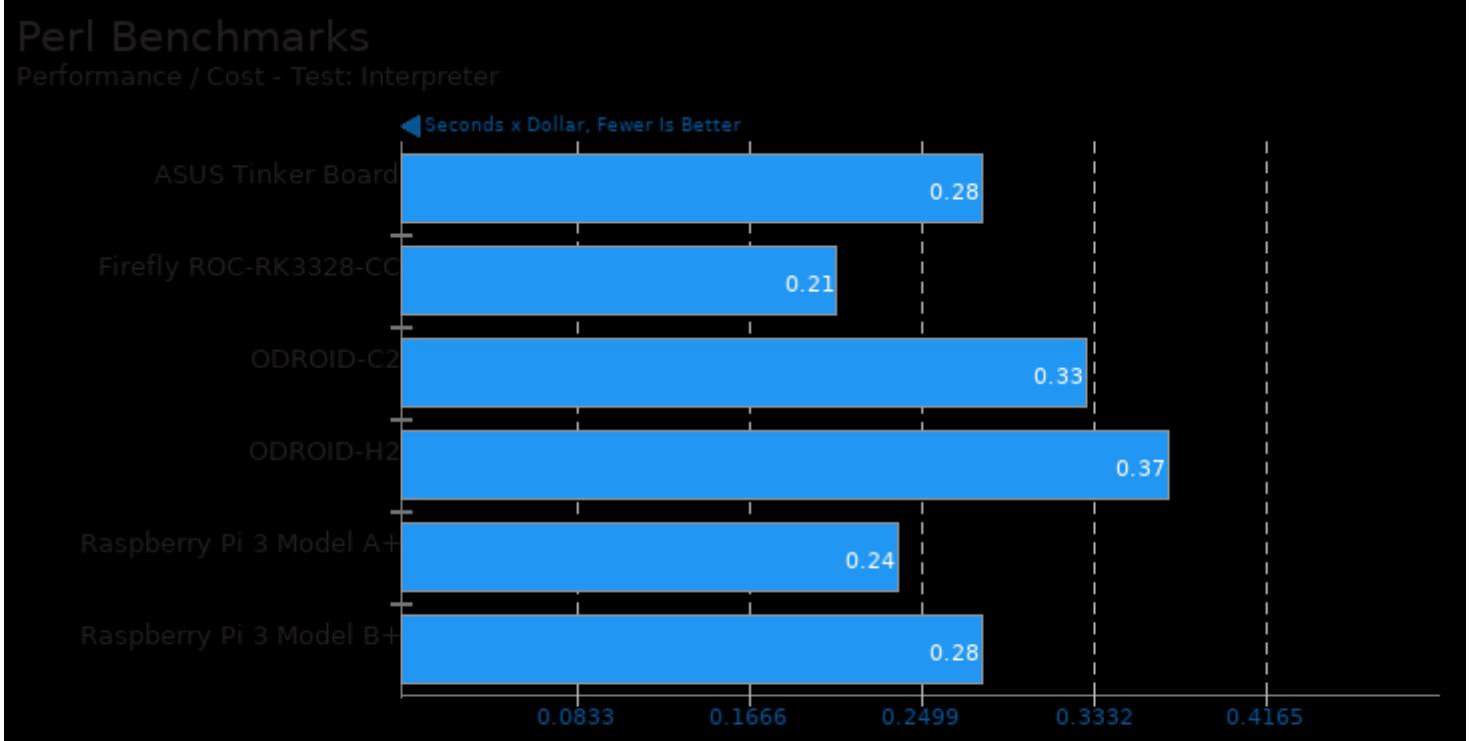
ODROID-H2 Intel Ubuntu Linux Benchmarks



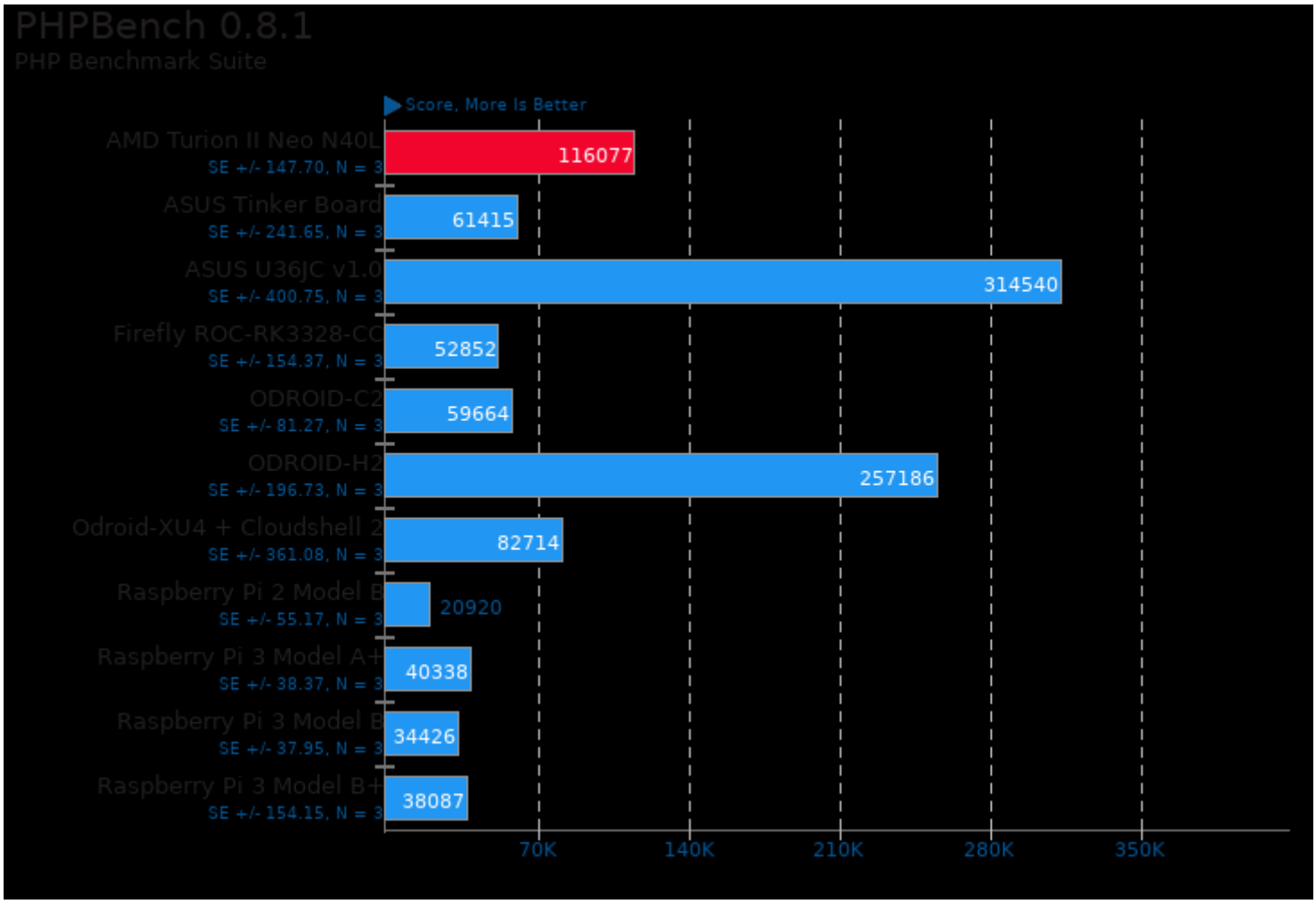
ODROID-H2 Intel Ubuntu Linux Benchmarks



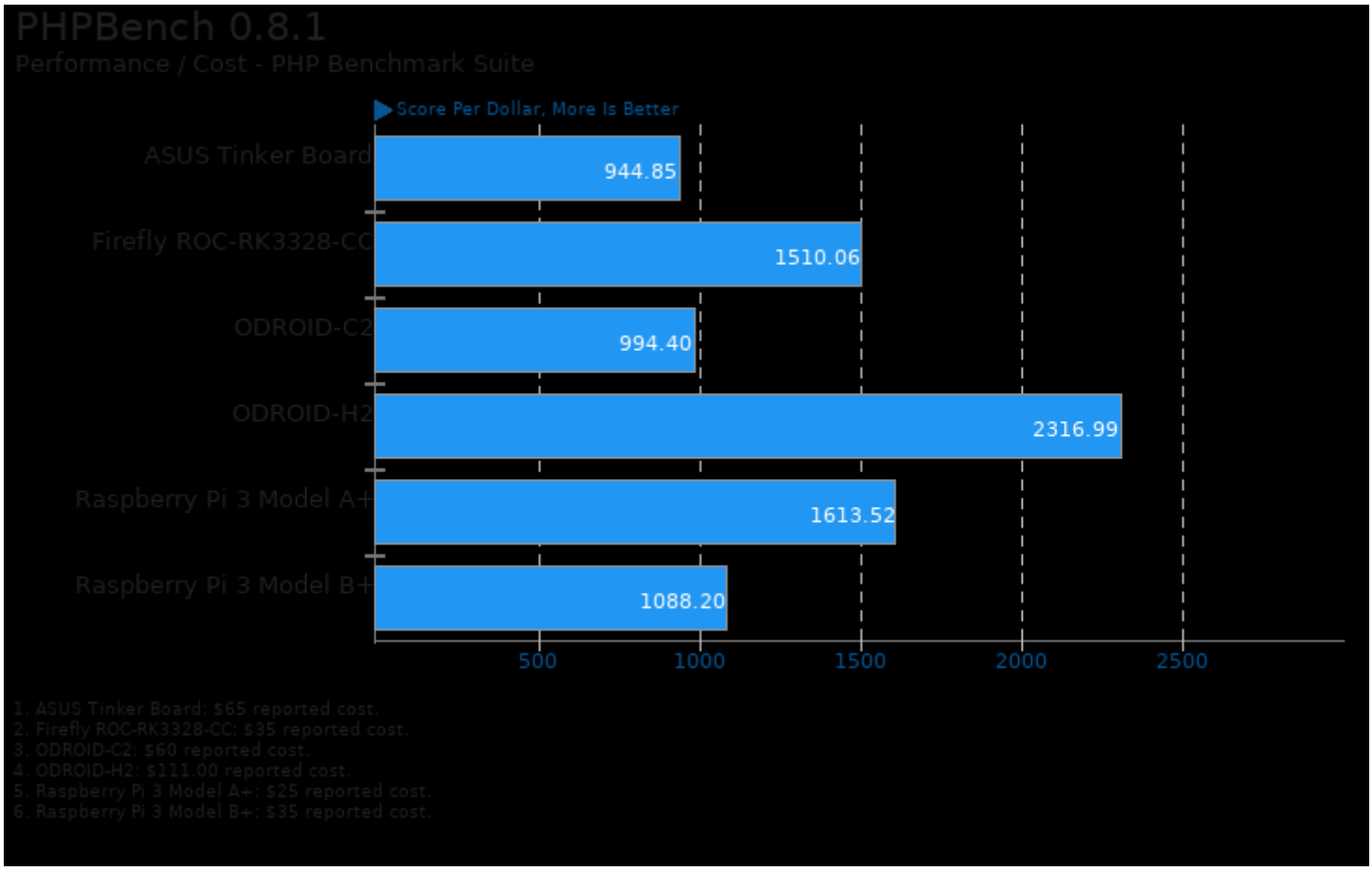

Perl Benchmarks
Performance / Cost - Test: Pod2html
Seconds x Dollar, Fewer Is Better
ASUS Tinker Board
48.34
Firefly ROC-RK3328-CC
59.61
ODROID-C2
65.34
ODROID-H2
36.51
Raspberry Pi 3 Model A+
28.99
Raspberry Pi 3 Model B+
42.37
15
30
45
60
75
1. ASUS Tinker Board: $65 reported cost.
2. Firefly ROC-RK3328-CC: $35 reported cost.
3. ODROID-C2: $60 reported cost.
4. ODROID-H2: $111.00 reported cost.
5. Raspberry Pi 3 Model A+: $25 reported cost.
6. Raspberry Pi 3 Model B+: $35 reported cost.


Perl Benchmarks
Performance / Cost - Test: Interpreter
Seconds x Dollar, Fewer Is Better
ASUS Tinker Board
0.28
Firefly ROC-RK3328-CC
0.21
ODROID-C2
0.33
ODROID-H2
0.37
Raspberry Pi 3 Model A+
0.24
Raspberry Pi 3 Model B+
0.28
0.0833
0.1666
0.2499
0.3332
0.4165
1. ASUS Tinker Board: $65 reported cost.
2. Firefly ROC-RK3328-CC: $35 reported cost.
3. ODROID-C2: $60 reported cost.
4. ODROID-H2: $111.00 reported cost.
5. Raspberry Pi 3 Model A+: $25 reported cost.
6. Raspberry Pi 3 Model B+: $35 reported cost.

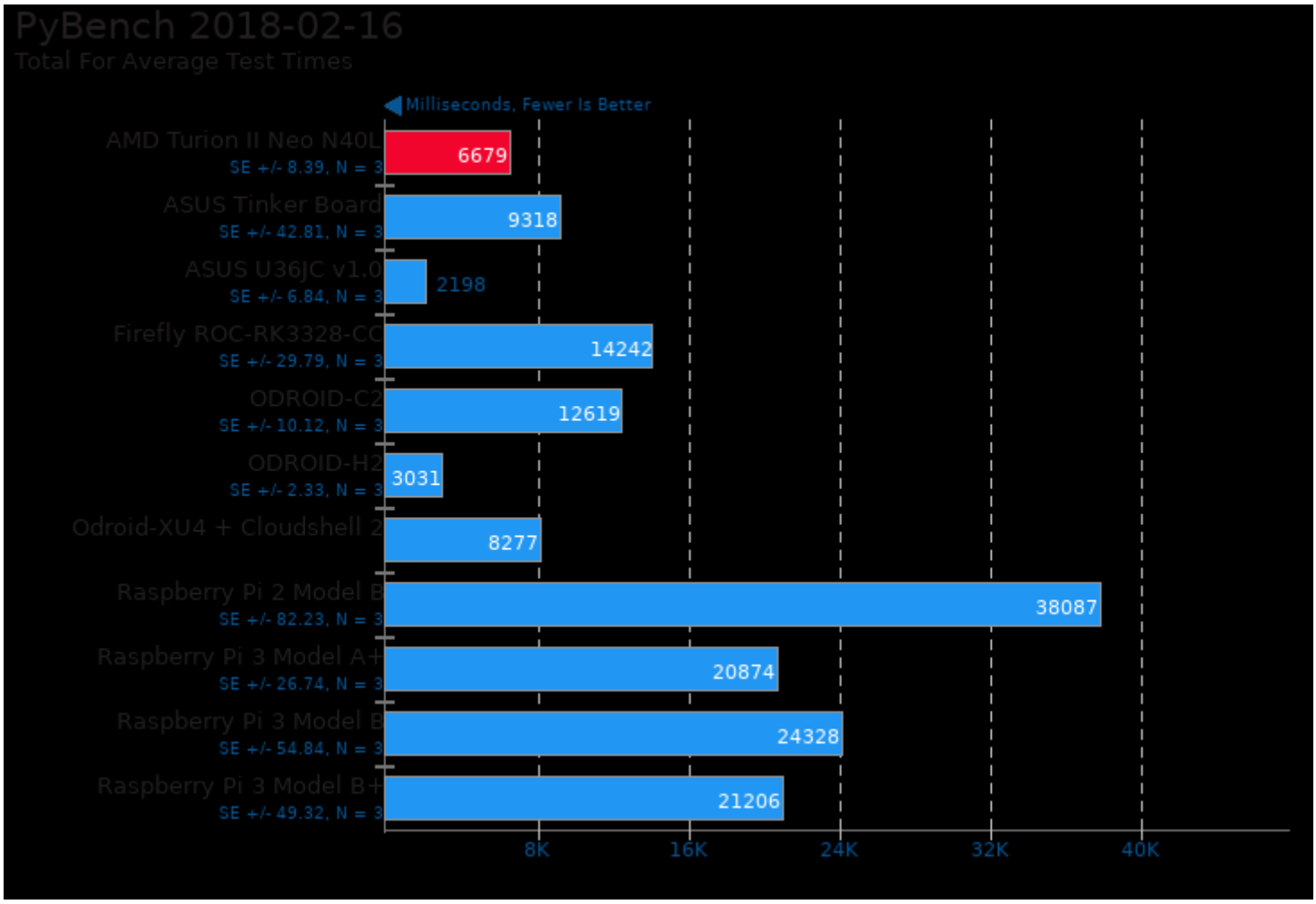
ODROID-H2 Intel Ubuntu Linux Benchmarks



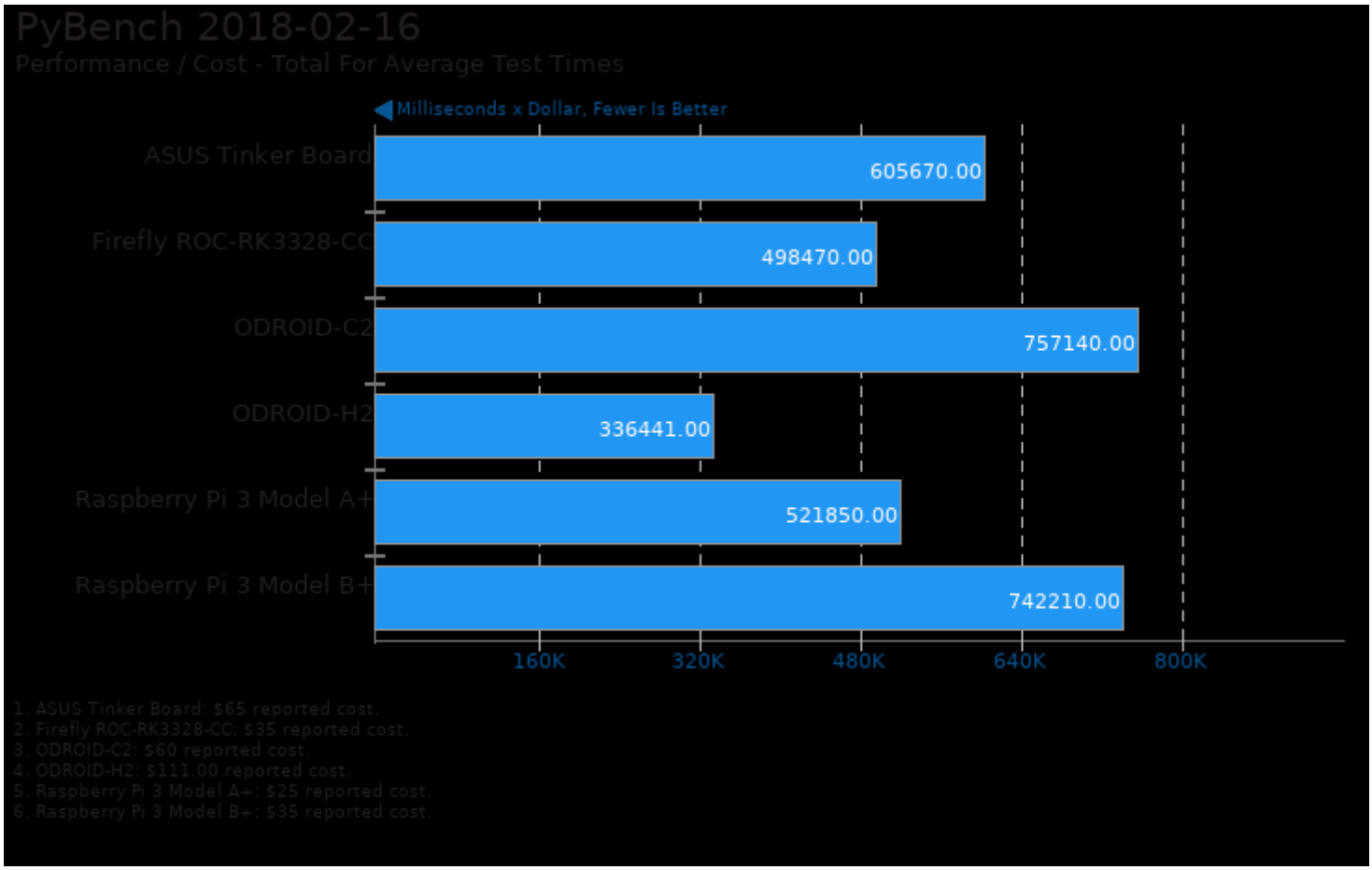
ODROID-H2 Intel Ubuntu Linux Benchmarks



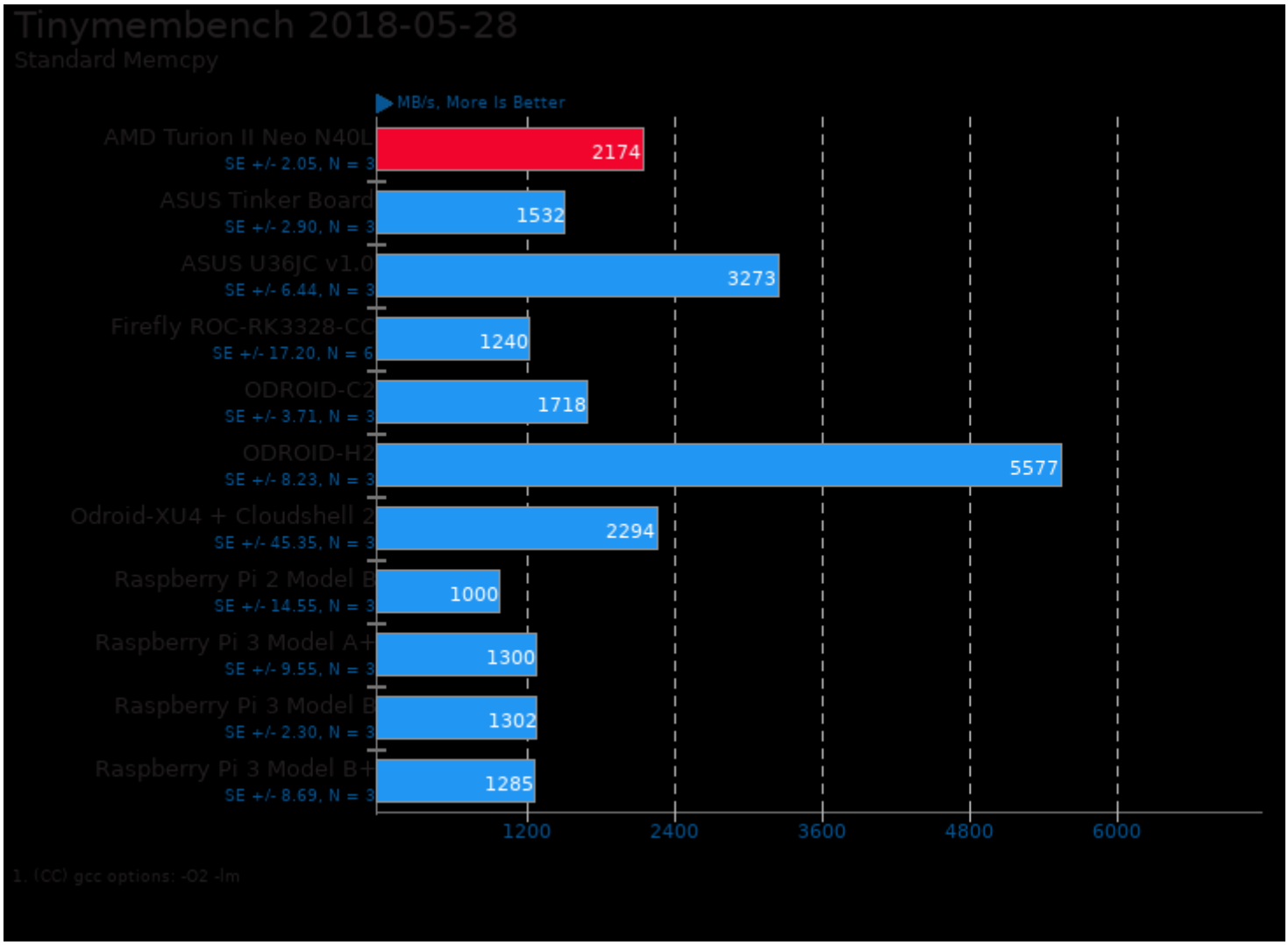
ODROID-H2 Intel Ubuntu Linux Benchmarks



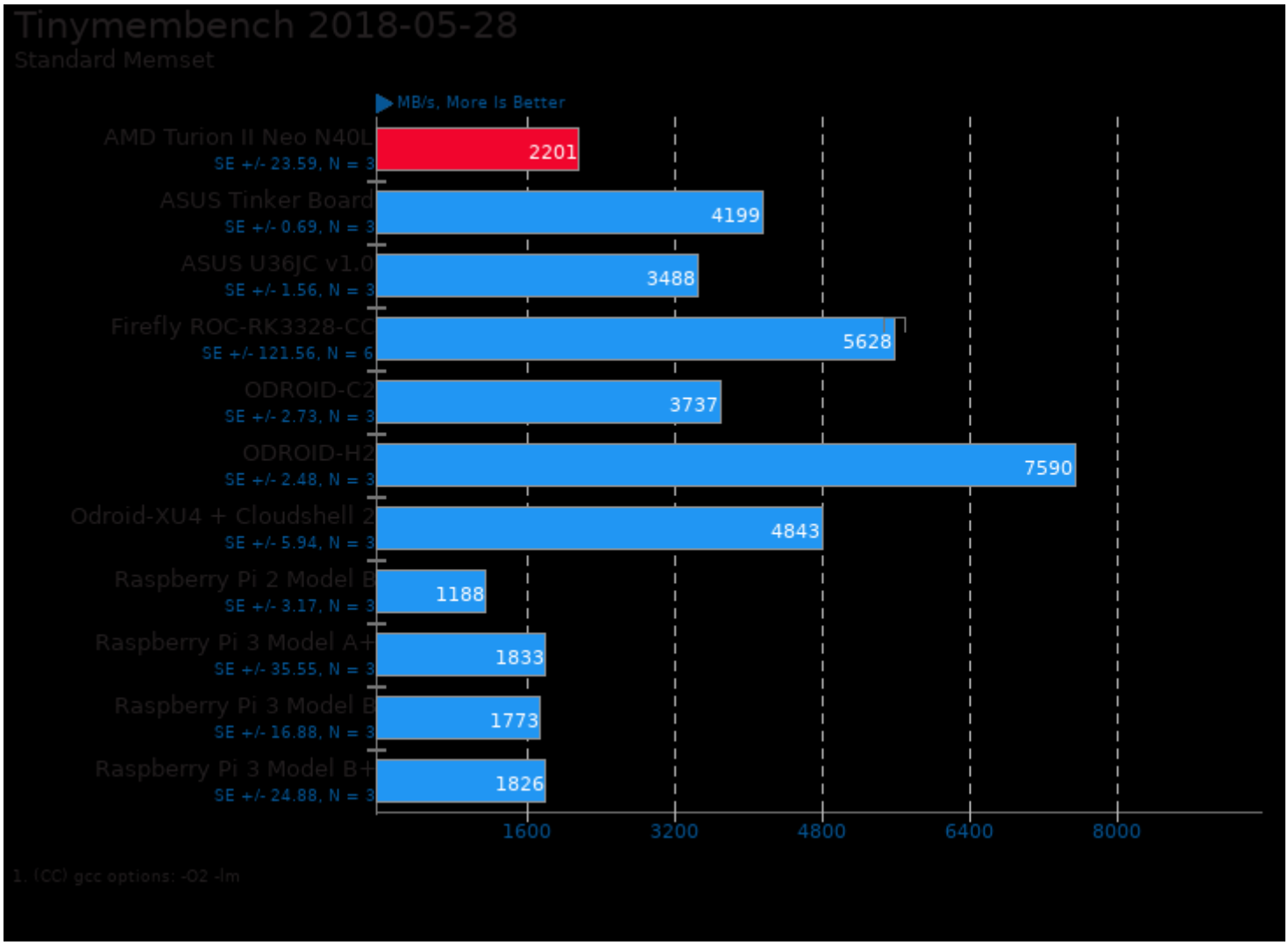
ODROID-H2 Intel Ubuntu Linux Benchmarks

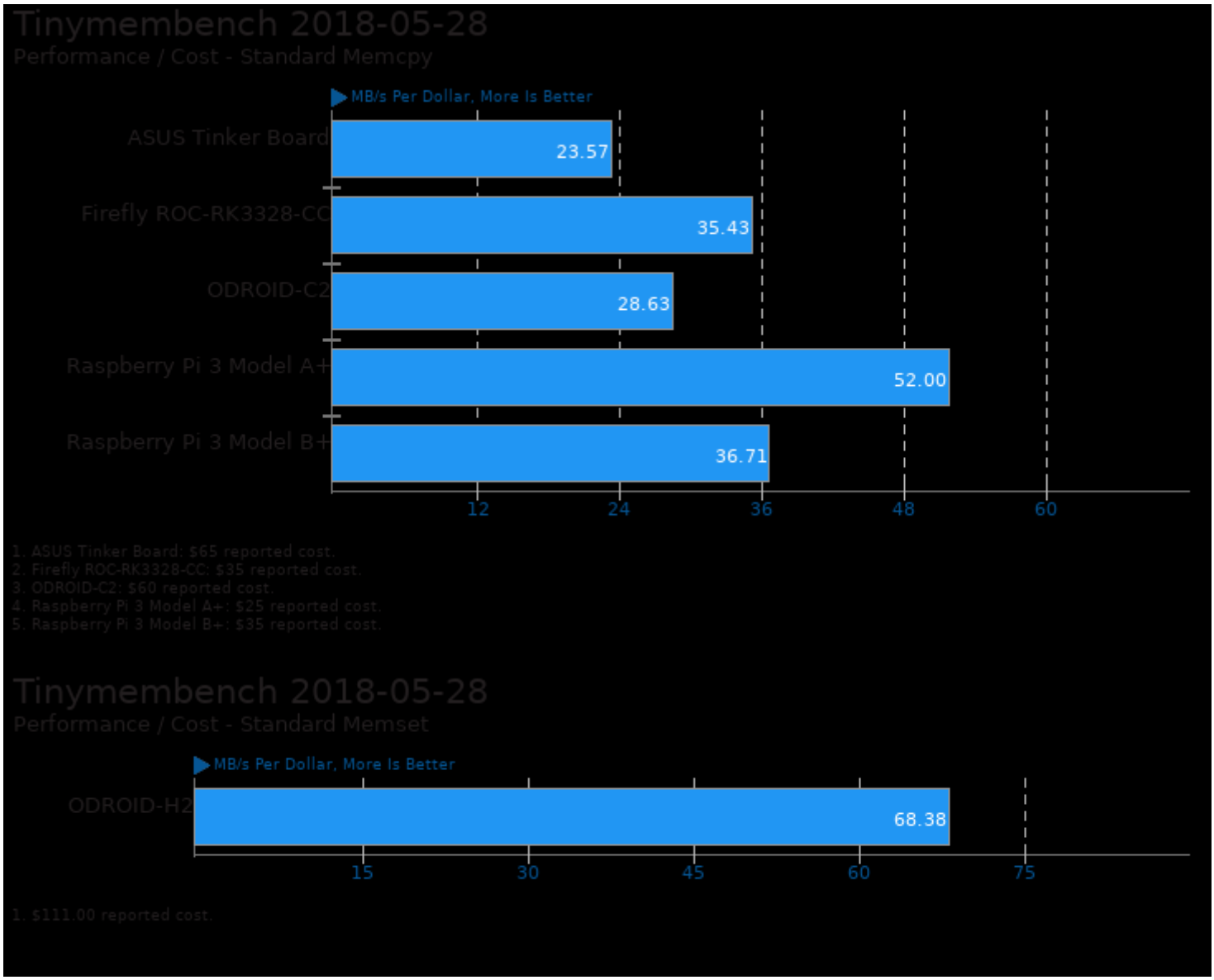


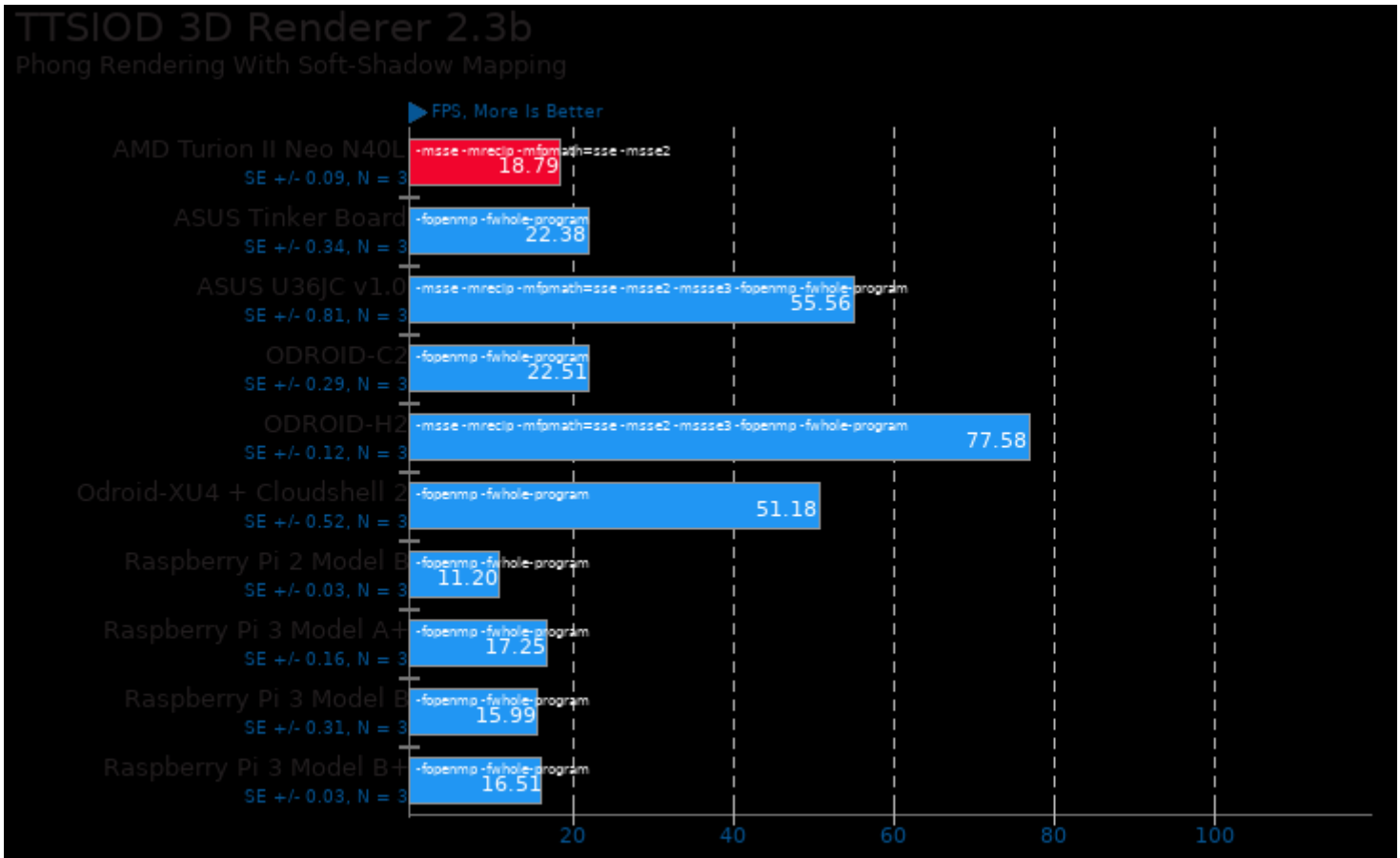
ODROID-H2 Intel Ubuntu Linux Benchmarks

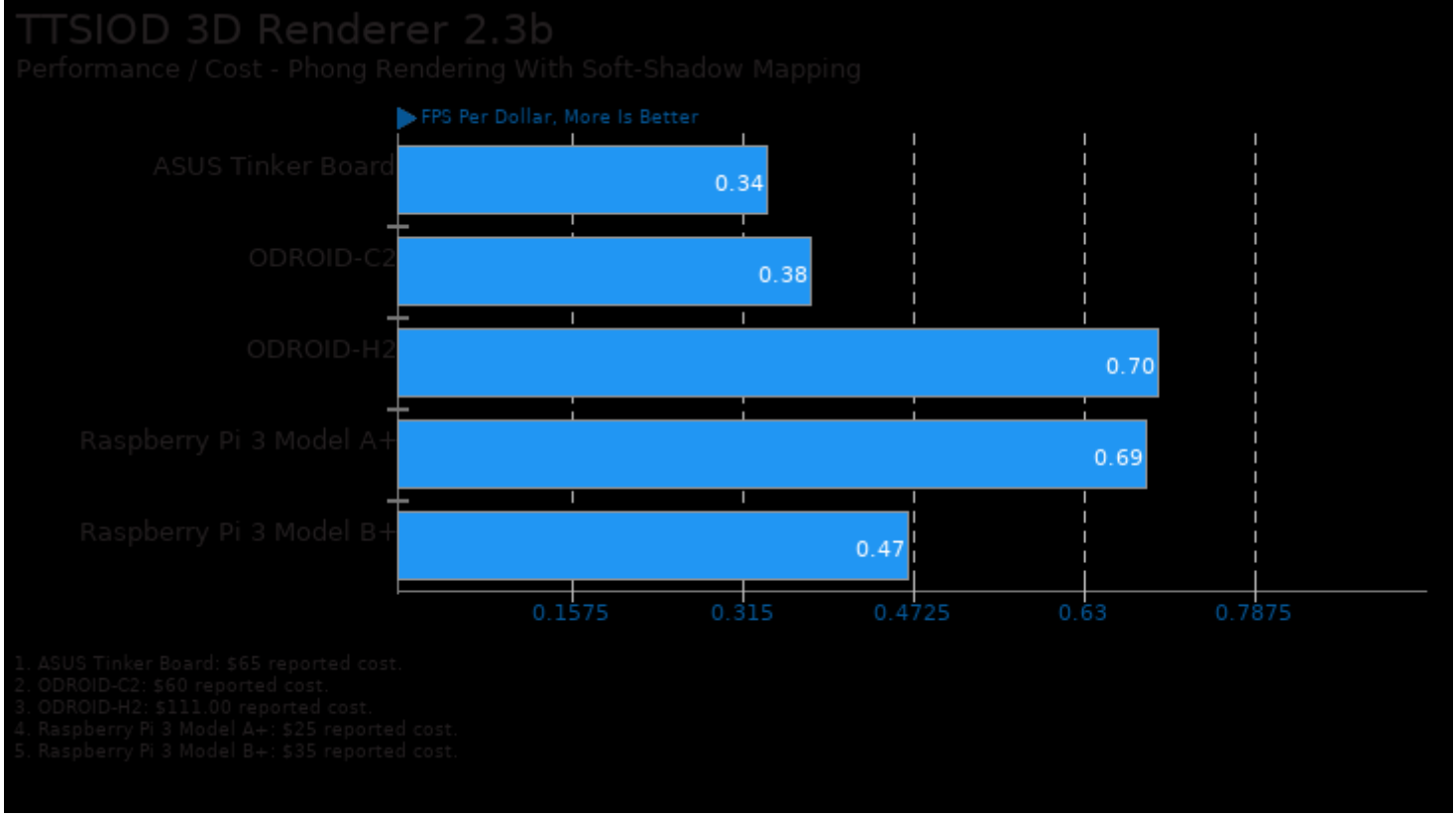


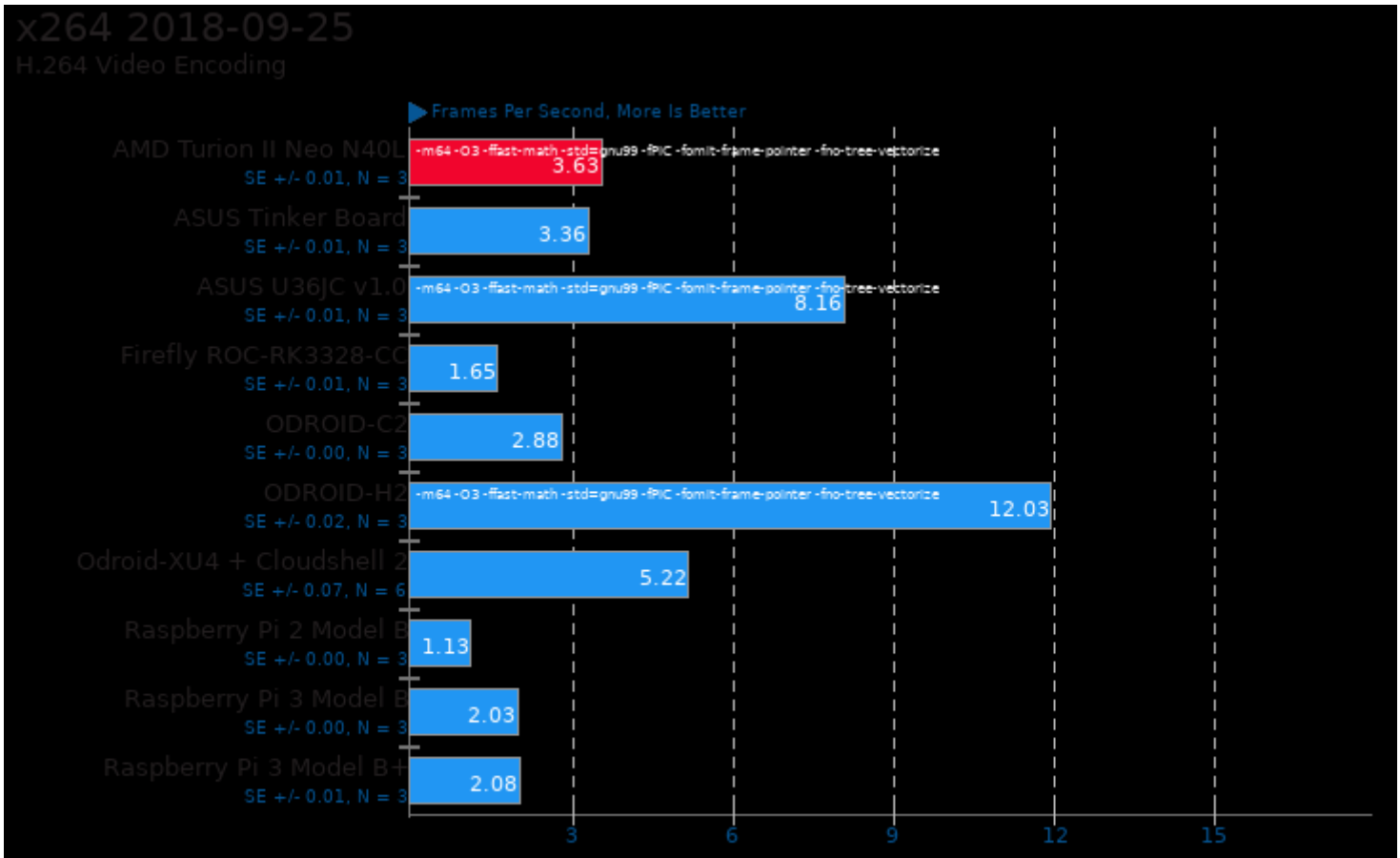
ODROID-H2 Intel Ubuntu Linux Benchmarks



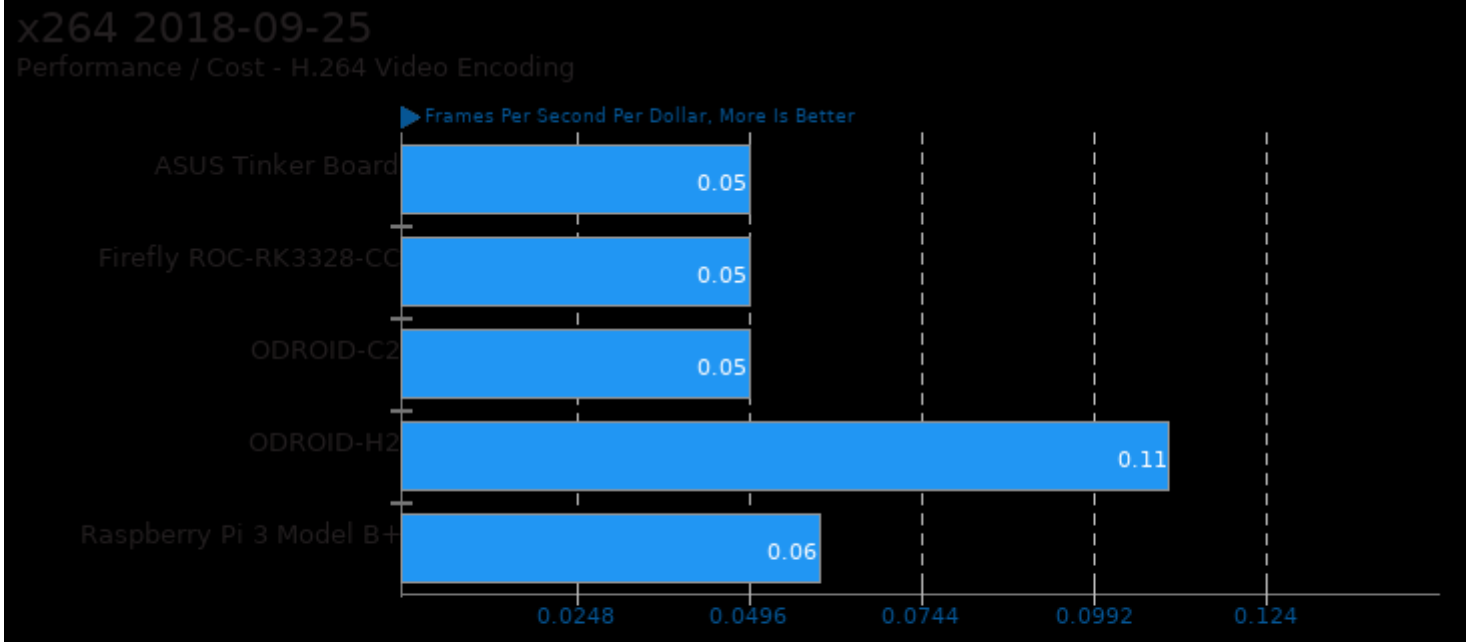

Tinymembench 2018-05-28
Performance / Cost - Standard Memcpy
MB/s Per Dollar, More Is Better
ASUS Tinker Board
23.57
Firefly ROC-RK3328-CC
35.43
ODROID-C2
28.63
Raspberry Pi 3 Model A+
52.00
Raspberry Pi 3 Model B+
36.71
12
24
36
48
60
1. ASUS Tinker Board: $65 reported cost.
2. Firefly ROC-RK3328-CC: $35 reported cost.
3. ODROID-C2: $60 reported cost.
4. Raspberry Pi 3 Model A+: $25 reported cost.
5. Raspberry Pi 3 Model B+: $35 reported cost.
Tinymembench 2018-05-28
Performance / Cost - Standard Memset
MB/s Per Dollar, More Is Better
ODROID-H2
68.38
15
30
45
60
75
1. $111.00 reported cost.


TTSIOD 3D Renderer 2.3b
Phong Rendering With Soft-Shadow Mapping
FPS, More Is Better
AMD Turion II Neo N40L
SE +/- 0.09, N = 3
-msse -mrecip -mfpmath=sse -msse2
18.79
ASUS Tinker Board
SE +/- 0.34, N = 3
-fopenmp -fwhole-program
22.38
ASUS U36JC v1.0
SE +/- 0.81, N = 3
-msse -mrecip -mfpmath=sse -msse2 -mssse3 -fopenmp -fwhole-program
55.56
ODROID-C2
SE +/- 0.29, N = 3
-fopenmp -fwhole-program
22.51
ODROID-H2
SE +/- 0.12, N = 3
-msse -mrecip -mfpmath=sse -msse2 -mssse3 -fopenmp -fwhole-program
77.58
Odroid-XU4 + Cloudshell 2
SE +/- 0.52, N = 3
-fopenmp -fwhole-program
51.18
Raspberry Pi 2 Model B
SE +/- 0.03, N = 3
-fopenmp -fwhole-program
11.20
Raspberry Pi 3 Model A+
SE +/- 0.16, N = 3
-fopenmp -fwhole-program
17.25
Raspberry Pi 3 Model B
SE +/- 0.31, N = 3
-fopenmp -fwhole-program
15.99
Raspberry Pi 3 Model B+
SE +/- 0.03, N = 3
-fopenmp -fwhole-program
16.51
20
40
60
80
100
1. (CXX) g++ options: -O3 -fomit-frame-pointer -ffast-math -mtune=native -flto -lSDL -lstdc++


TTSIOD 3D Renderer 2.3b
Performance / Cost - Phong Rendering With Soft-Shadow Mapping
FPS Per Dollar, More Is Better
ASUS Tinker Board
0.34
ODROID-C2
0.38
ODROID-H2
0.70
Raspberry Pi 3 Model A+
0.69
Raspberry Pi 3 Model B+
0.47
0.1575
0.315
0.4725
0.63
0.7875
1. ASUS Tinker Board: $65 reported cost.
2. ODROID-C2: $60 reported cost.
3. ODROID-H2: $111.00 reported cost.
4. Raspberry Pi 3 Model A+: $25 reported cost.
5. Raspberry Pi 3 Model B+: $35 reported cost.

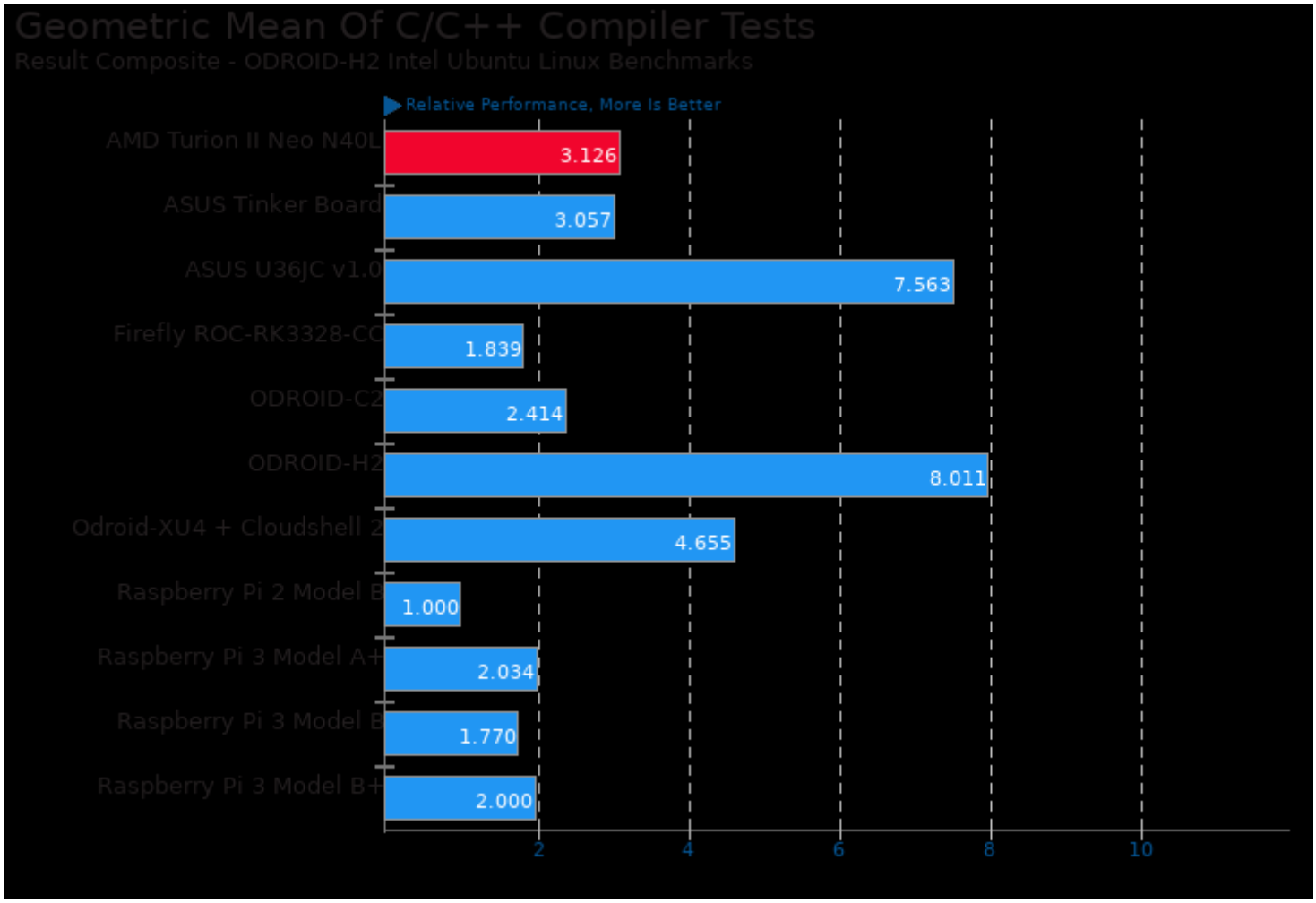


1. (CC) gcc options: -ldl -lm -lpthread

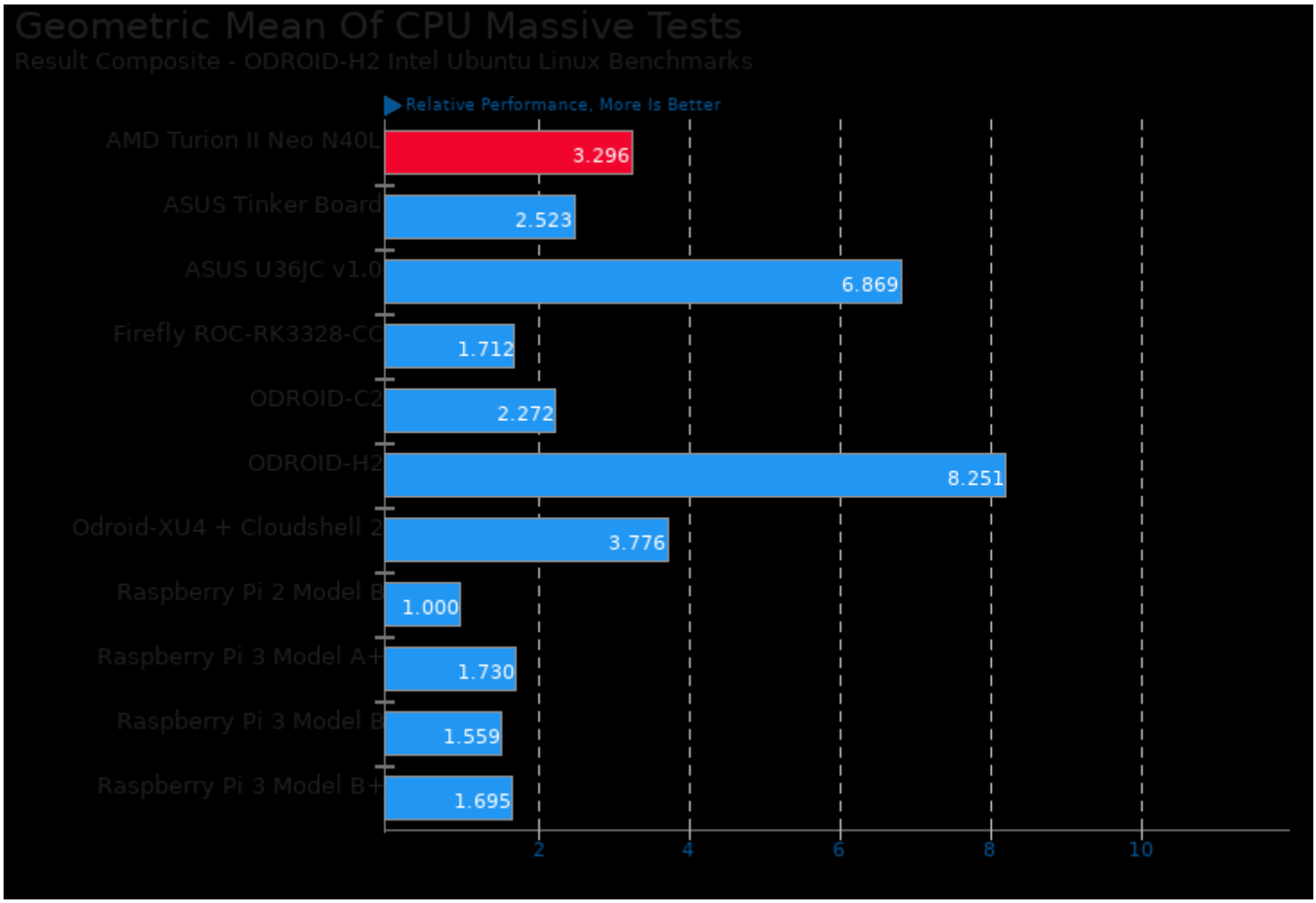


1. ASUS Tinker Board: $65 reported cost.
2. Firefly ROC-RK3328-CC: $35 reported cost.
3. ODROID-C2: $60 reported cost.
4. ODROID-H2: $111.00 reported cost.
5. Raspberry Pi 3 Model B+: $35 reported cost.

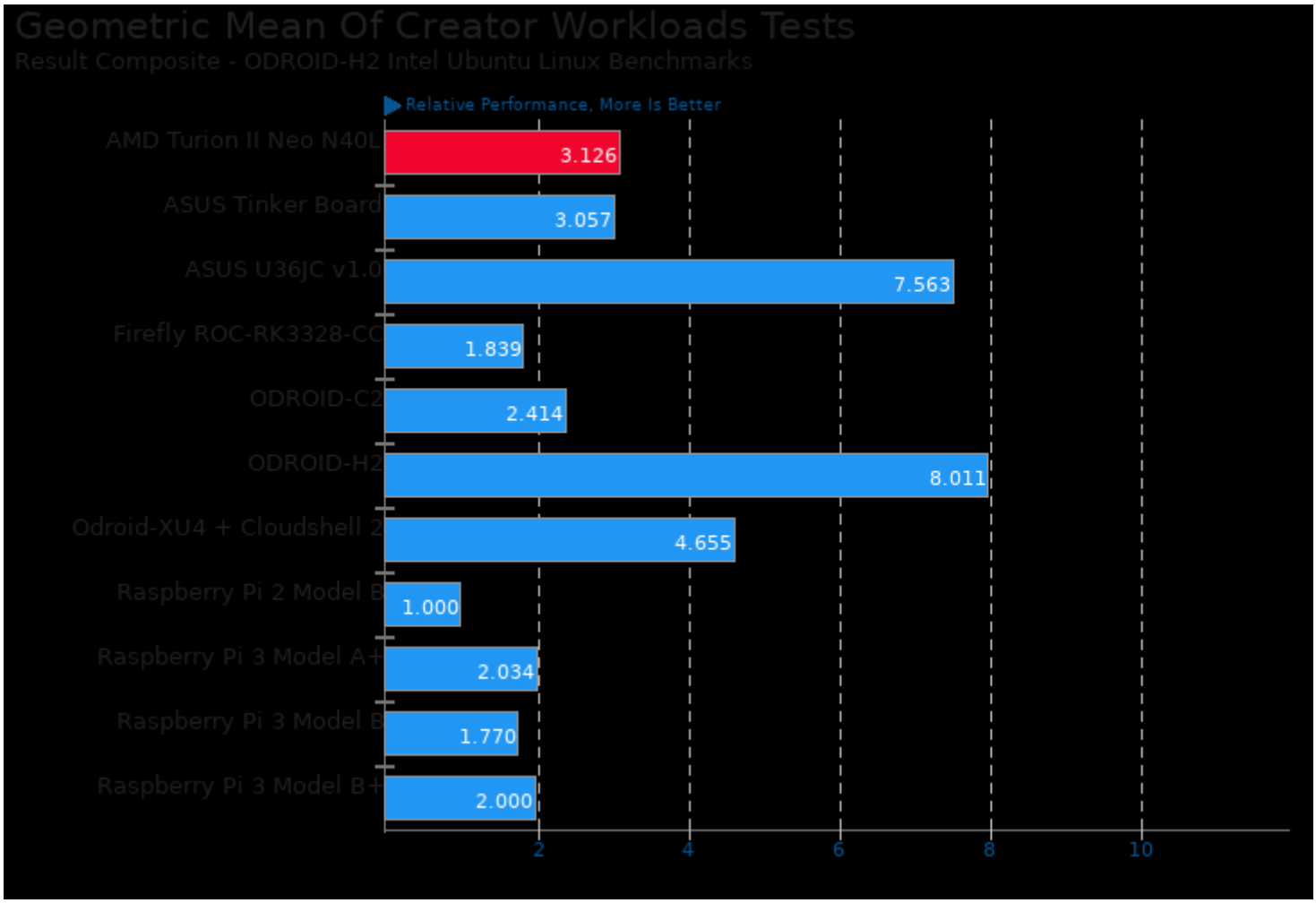
These geometric means are based upon test groupings / test suites for this result file.



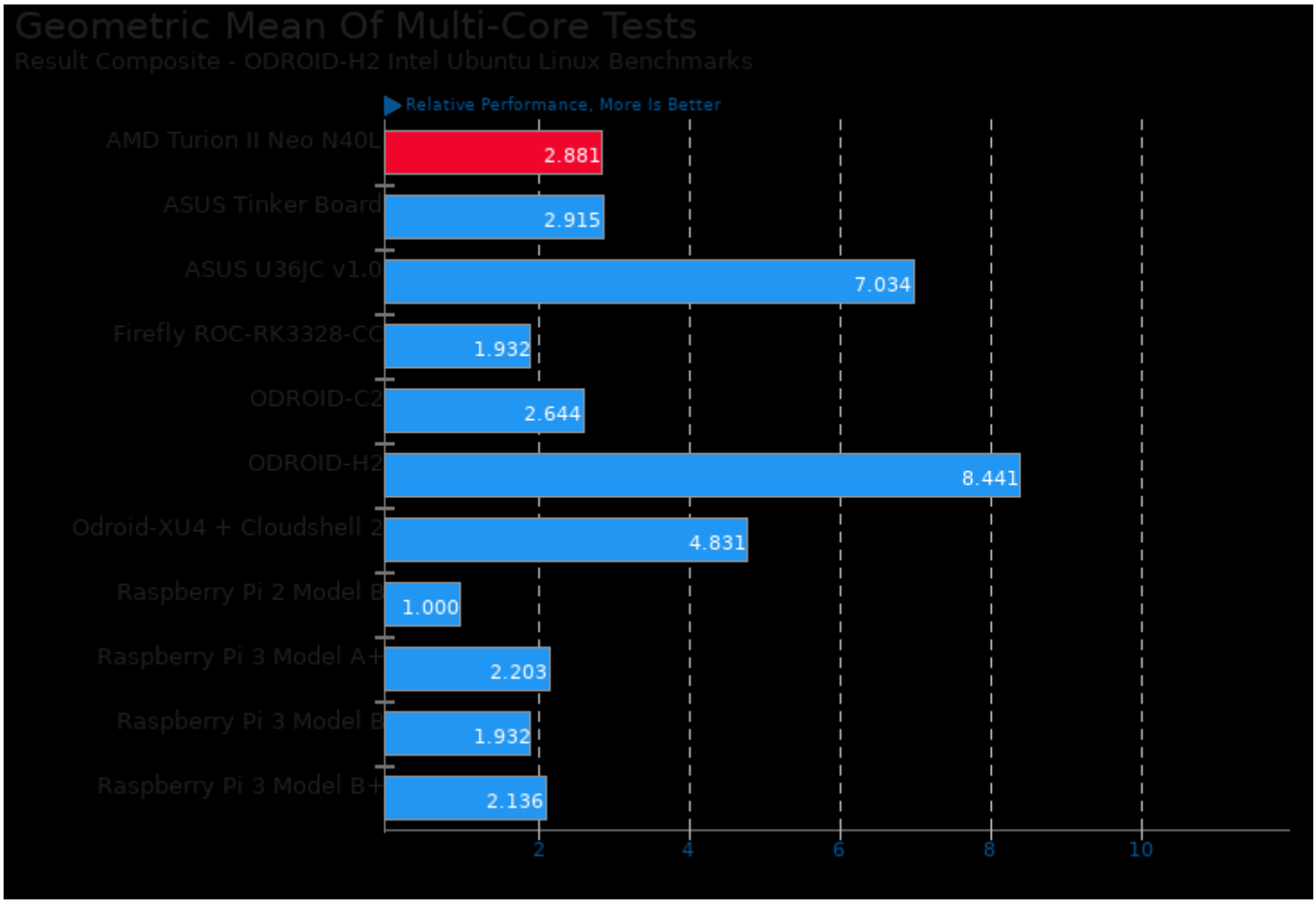
Geometric mean based upon tests: pts/aobench, pts/c-ray, pts/compress-7zip, pts/encode-mp3 and pts/x264



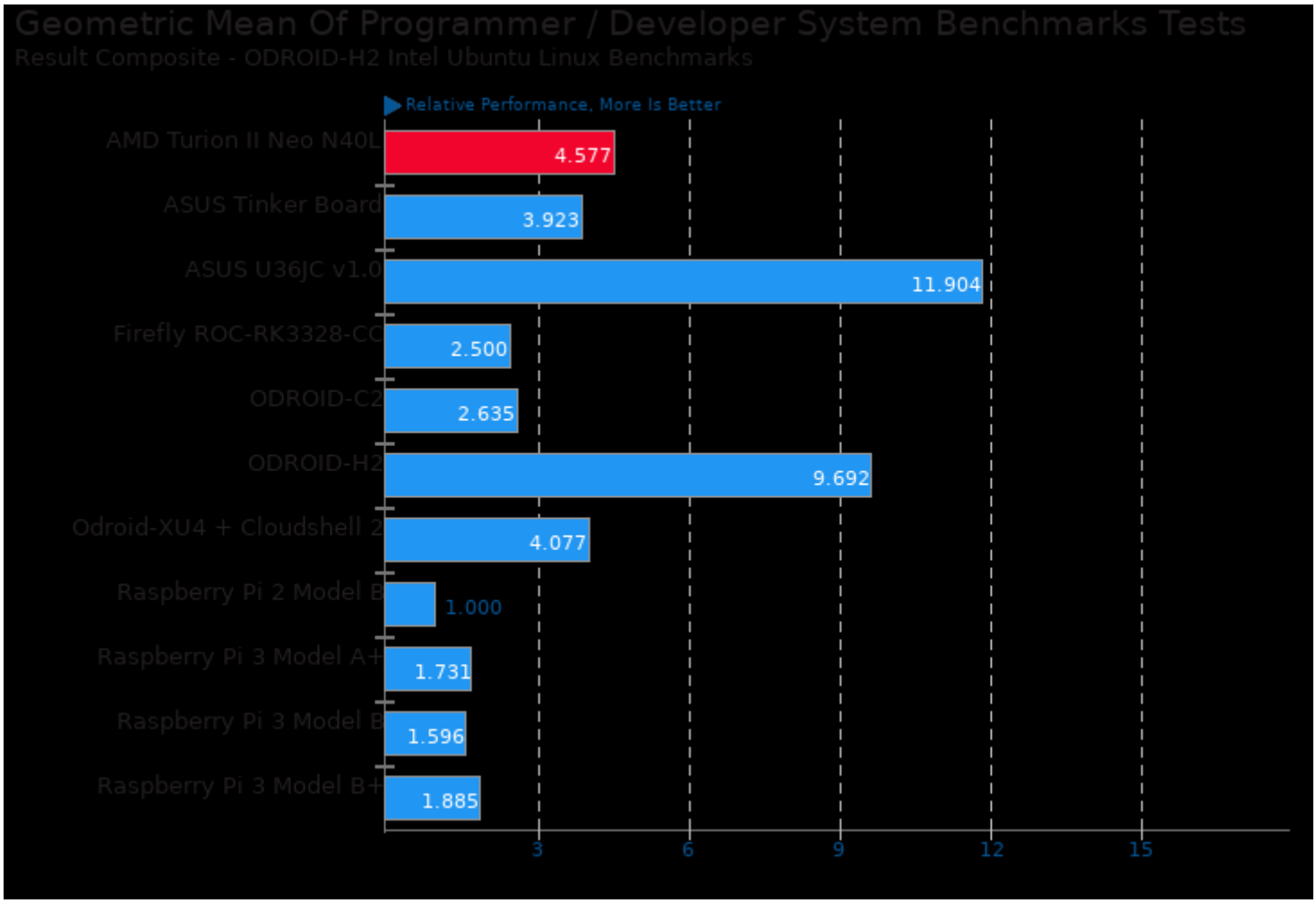
Geometric mean based upon tests: pts/c-ray, pts/compress-7zip, pts/x264, pts/encode-mp3, pts/phpbench, pts/tinymembench and pts/ttsiod-renderer



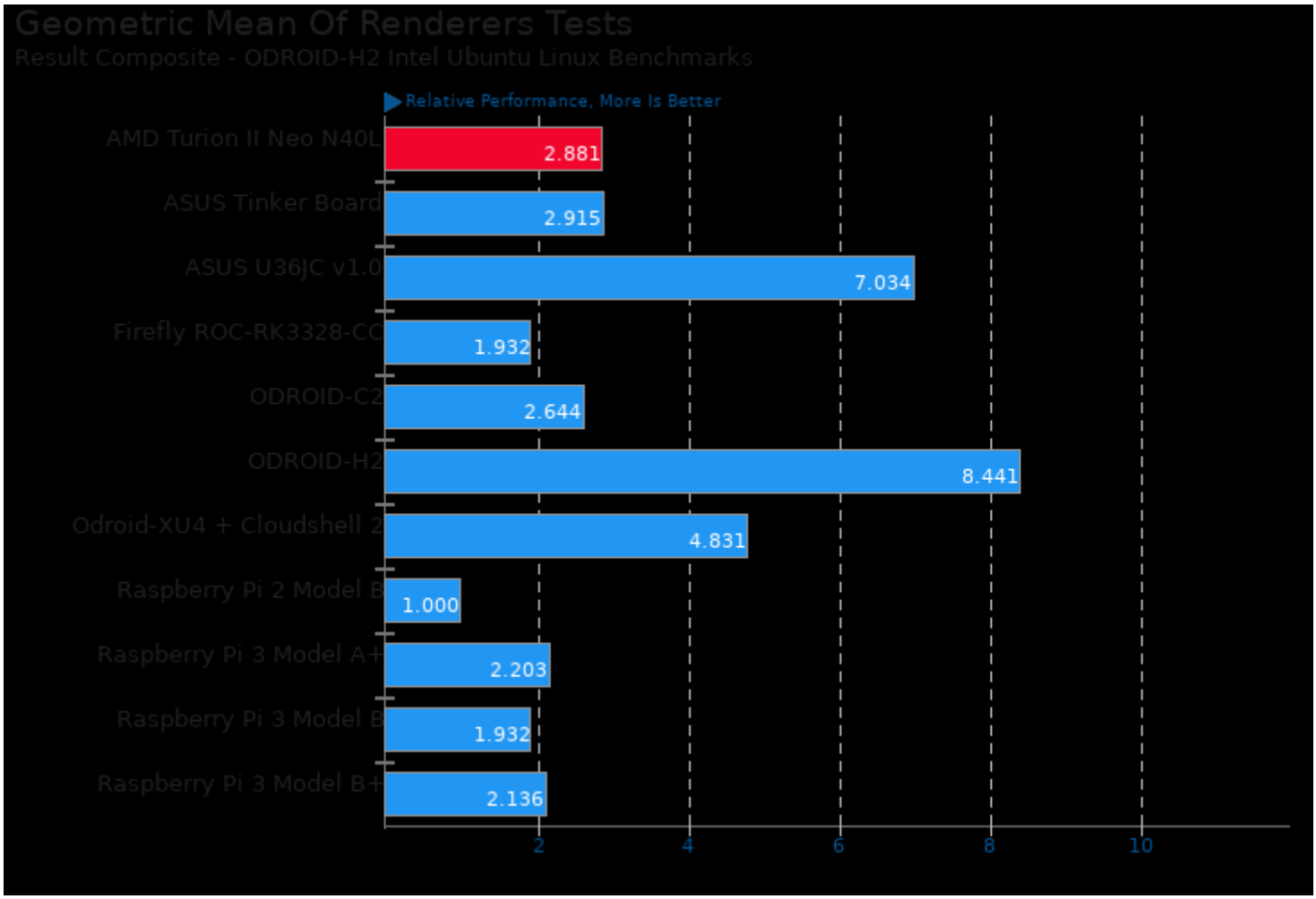
Geometric mean based upon tests: pts/c-ray, pts/aobench, pts/ttsiod-renderer, pts/x264 and pts/encode-mp3



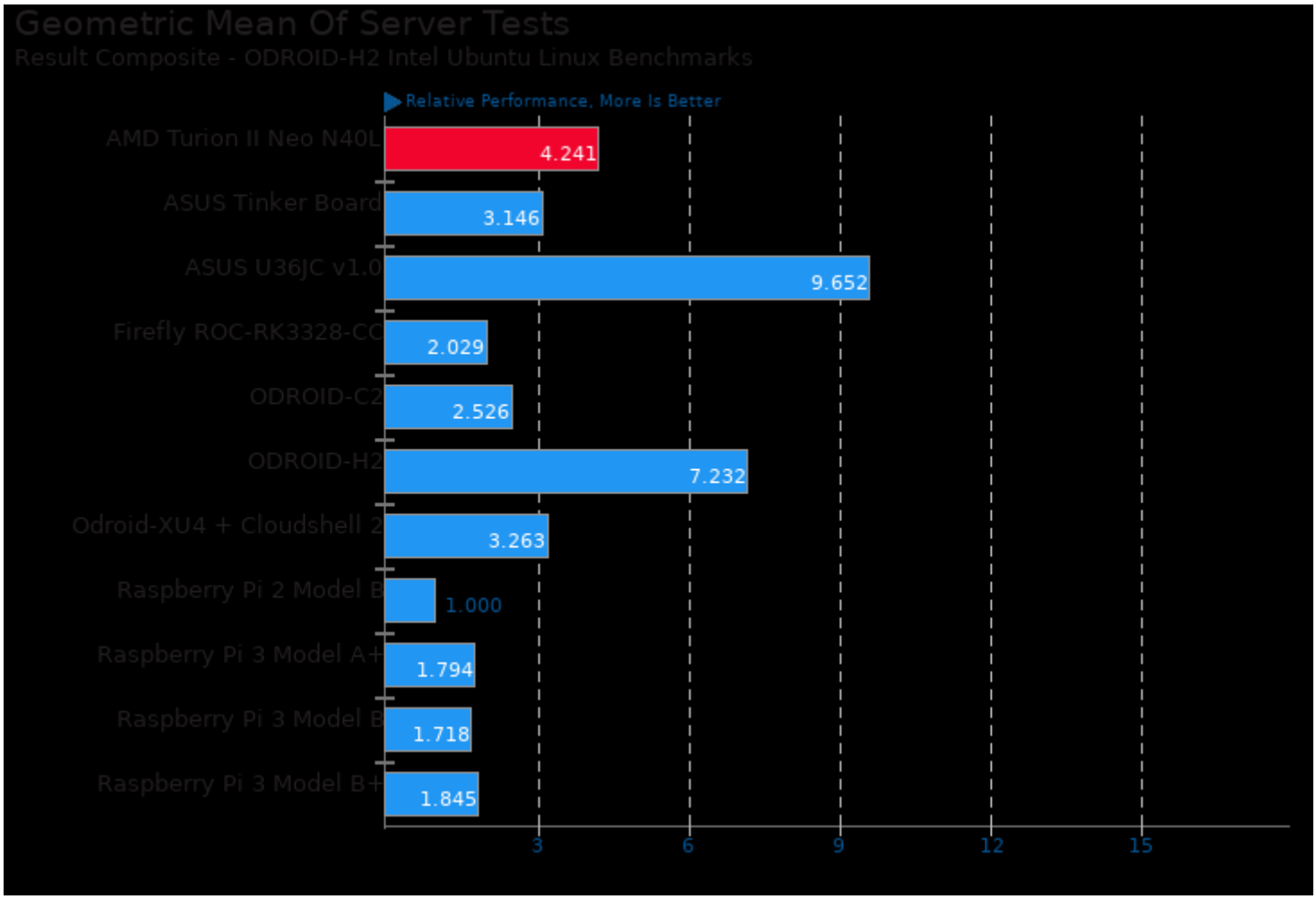
Geometric mean based upon tests: pts/c-ray, pts/x264, pts/compress-7zip, pts/aobench and pts/ttsiod-renderer



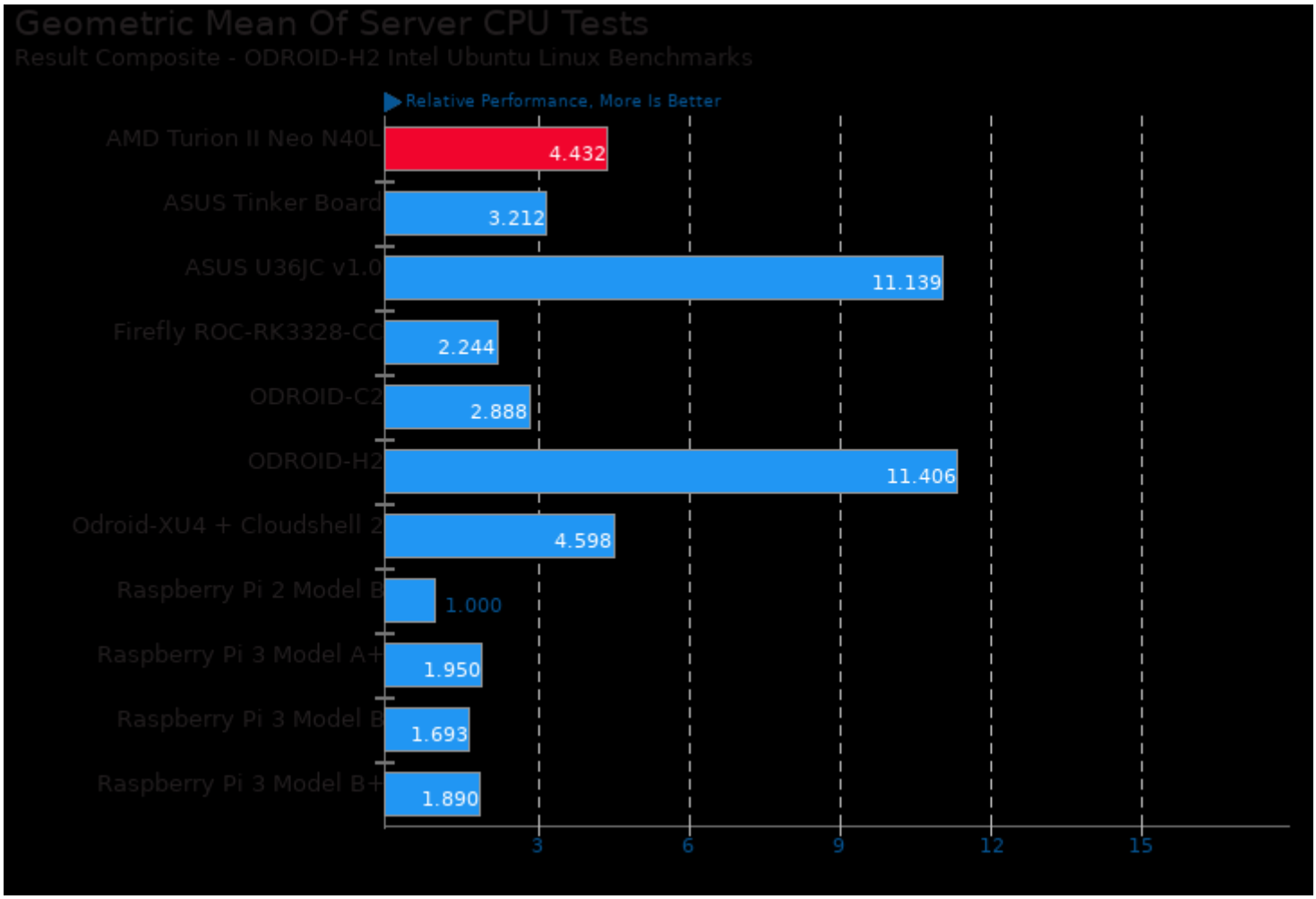
Geometric mean based upon tests: pts/git and pts/pybench



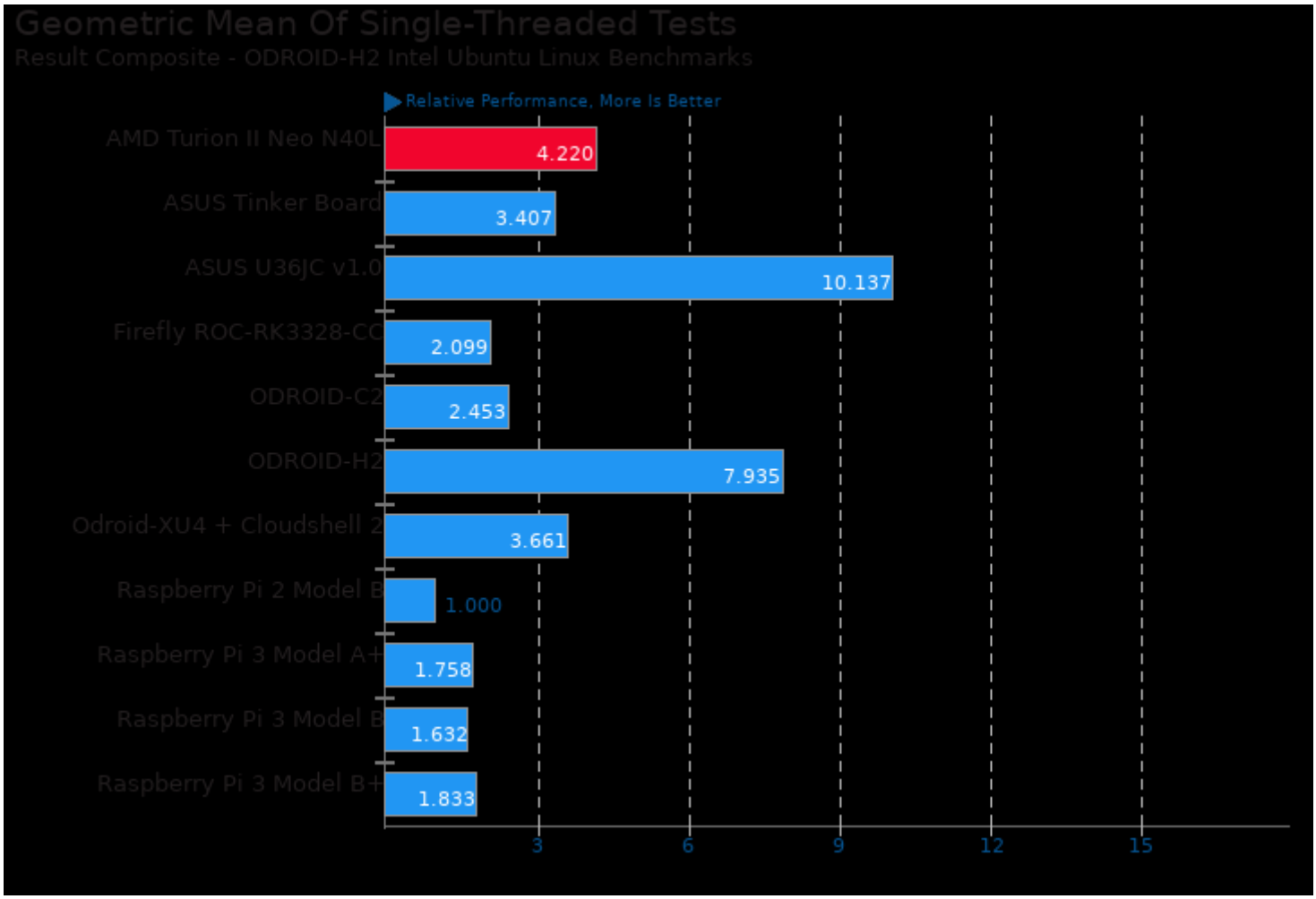
Geometric mean based upon tests: pts/c-ray, pts/aobench and pts/ttsiod-renderer



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



Geometric mean based upon tests: pts/x264, pts/compress-7zip, pts/c-ray, pts/pybench and pts/phpbench



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

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