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# Raspberry Pi Model 4 Benchmarks

ARMv7 rev 3 testing with a BCM2835 Raspberry Pi 4 Model B Rev 1.1 and V3D 4.2 2GB by Michael Larabel.

**Automated Executive Summary**

*tm8372tg had the most wins, coming in first place for 85% of the tests.*

*Based on the geometric mean of all complete results, the fastest (tm8372tg) was 8.93x the speed of the slowest (RPi Model 3 B+). RPi Model 4 B 2GB was 0.482x the speed of tm8372tg, RPi Model 4 B 4GB was 0.94x the speed of RPi Model 4 B 2GB, ASUS Tinker Board was 0.84x the speed of RPi Model 4 B 4GB, Firefly ROC-RK3328-CC was 0.727x the speed of ASUS Tinker Board, Libre Board ALL-H3-CC H5 was 0.525x the speed of Firefly ROC-RK3328-CC, RPi Model 3 B+ was 0.772x the speed of Libre Board ALL-H3-CC H5.*

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

*x264 (H.264 Video Encoding) at 35.071x*
*FLAC Audio Encoding (WAV To FLAC) at 34.118x*
*Rust Prime Benchmark (Prime Number Test To 200,000,000) at 22.155x*
*Rust Prime Benchmark (Performance / Cost - Prime Number Test To 200,000,000) at 22.155x*
*PyBench (Total For Average Test Times) at 17.491x*
*PHPBench (PHP Benchmark Suite) at 15.471x*
*Perl Benchmarks (Test: Interpreter) at 10.422x*

*LAME MP3 Encoding (WAV To MP3) at 9.801x*
*SciMark (Computational Test: Composite) at 8.953x*
*Perl Benchmarks (Test: Pod2html) at 7.889x.*

# 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

## tm8372tg

Processor: Intel Core i5 450M @ 2.40GHz (2 Cores / 4 Threads), Motherboard: Acer TravelMate 8372 (V1.10 BIOS), Chipset: Intel Core DRAM, Memory: 8GB, Disk: 250GB Western Digital WD2500BEVS-1, Graphics: Intel HD ILK 2GB, Audio: Conexant CX20585, Network: Broadcom NetXtreme BCM57760 PCIe + Broadcom BCM43225 802.11b/g/n

OS: Debian 11, Kernel: 6.0.0-4mx-amd64 (x86_64), Desktop: Xfce 4.18, Display Server: X Server 1.20.14, OpenGL: 2.1 Mesa 22.0.5, Compiler: GCC 10.2.1 20210110, File-System: ext4, Screen Resolution: 1366x768

Kernel Notes: Transparent Huge Pages: always
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie

# Raspberry Pi Model 4 Benchmarks

--enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-Km9U7s/gcc-10-10.2.1/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-Km9U7s/gcc-10-10.2.1/debian/tmp-gcn/usr, hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq ondemand (Boost: Enabled) - CPU Microcode: 0x7
Python Notes: Python 3.9.2
Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Vulnerable: Clear buffers attempted no microcode; SMT vulnerable + meltdown: Mitigation of PTI + mmio_stale_data: Unknown: No mitigations + retbleed: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Retpolines IBPB: conditional IBRS_FW STIBP: conditional RSB filling PBRSB-eIBRS: Not affected + srbds: Not affected + tsx_async_abort: Not affected

| | 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 | tm8372tg |
|---|---|---|---|---|---|---|---|
| **x264 - H.2.V.E (FPS)** | **0.14** | 3.32 | | 2.31 | 3.10 | **4.91** | |
| **Normalized** | 2.85% | 67.62% | | 47.05% | 63.14% | 100% | |
| **Standard Deviation** | 0% | 6.3% | | 0.2% | 8.5% | 2.1% | |
| **x264 - Performance / Cost - H.2.V.E (FPS/Dollar)** | | **0.05** | | 0.07 | 0.06 | **0.11** | |
| **Normalized** | | 45.45% | | 63.64% | 54.55% | 100% | |
| **GraphicsMagick - Performance / Cost - Rotate** | **0.46** | 0.93 | 0.69 | 1.26 | 1.15 | **1.42** | |
| **Normalized** | 32.39% | 65.49% | 48.59% | 88.73% | 80.99% | 100% | |
| **GraphicsMagick - Performance / Cost - Resizing (Iterations/min/Dollar)** | **0.43** | 0.75 | 0.63 | 1.03 | 0.82 | **1.18** | |
| **Normalized** | 36.44% | 63.56% | 53.39% | 87.29% | 69.49% | 100% | |
| **GraphicsMagick - Rotate (Iterations/min)** | **16** | 66 | 24 | 44 | 63 | 64 | **125** |
| **Normalized** | 12.8% | 52.8% | 19.2% | 35.2% | 50.4% | 51.2% | 100% |
| **Standard Deviation** | | 3.4% | | | 1.8% | | 0.8% |
| **GraphicsMagick - Resizing (Iterations/min)** | **15** | 53 | 22 | 36 | 45 | 53 | **87** |
| **Normalized** | 17.24% | 60.92% | 25.29% | 41.38% | 51.72% | 60.92% | 100% |
| **Standard Deviation** | | 3.4% | | | 2.9% | | |
| **SciMark - Performance / Cost - Composite (Mflops/Dollar)** | 1.39 | 2.00 | **0.82** | 1.46 | 2.58 | **3.18** | |
| **Normalized** | 43.71% | 62.89% | 25.79% | 45.91% | 81.13% | 100% | |
| **SciMark - Composite (Mflops)** | 48.80 | 141.72 | **28.76** | 51.13 | 142.17 | 143.02 | **257.49** |
| **Normalized** | 18.95% | 55.04% | 11.17% | 19.86% | 55.21% | 55.54% | 100% |
| **Standard Deviation** | 0.4% | 0.1% | 0.1% | 0% | 1.6% | 1.1% | 2.4% |
| **NGINX Benchmark - S.W.P.S (Reqs/sec)** | **2012** | 3880 | | | 4746 | 5105 | **8216** |
| **Normalized** | 24.49% | 47.23% | | | 57.76% | 62.13% | 100% |
| **Standard Deviation** | 0.7% | 1.6% | | | 3.1% | 0.1% | 0.4% |

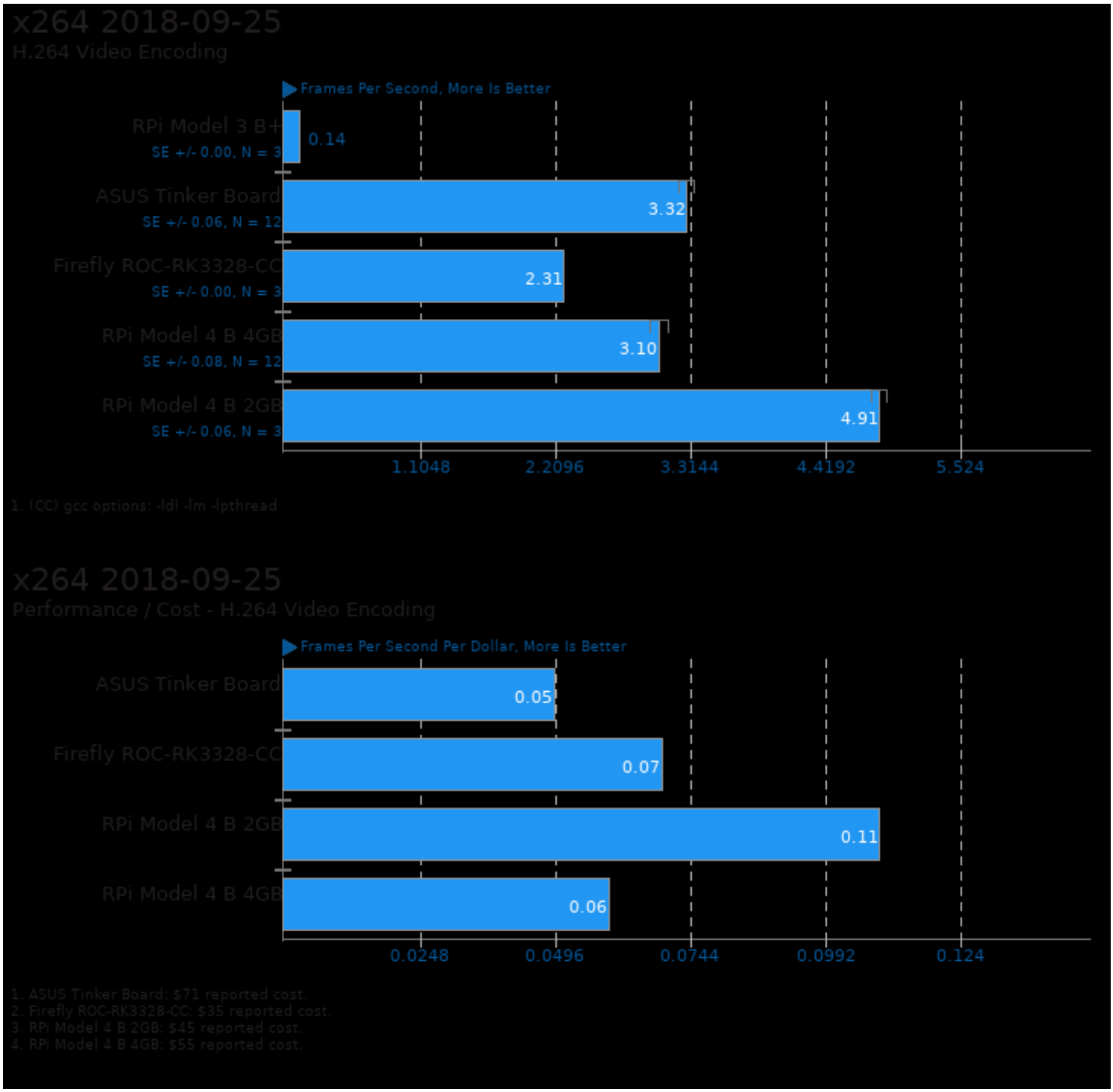
# Raspberry Pi Model 4 Benchmarks

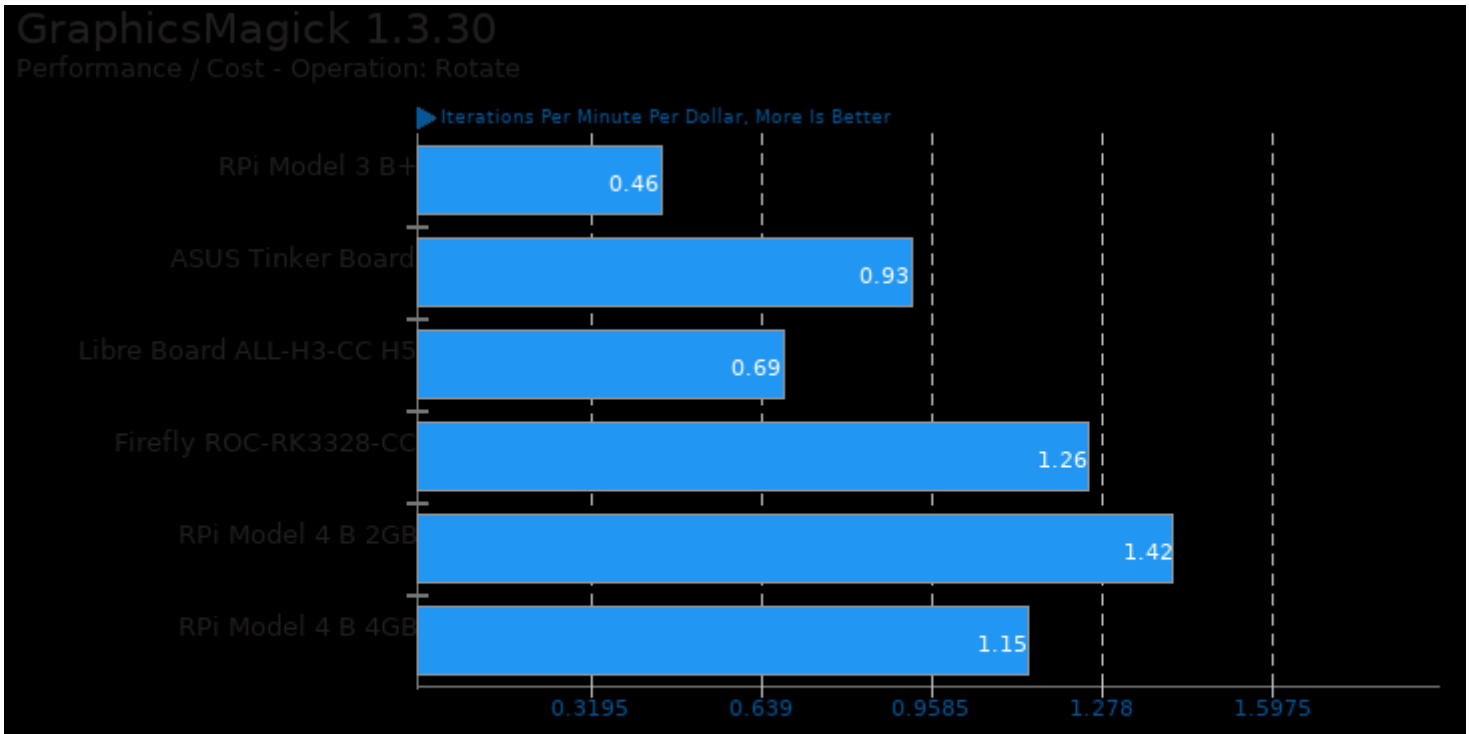
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|---|---|---|---|---|---|---|---|
| **NGINX Benchmark - Performance / Cost - S.W.P.S (Reqs/sec/Dollar)** | 57.49 | **54.65** | | | 86.29 | **113.44** | |
| **Normalized** | 50.68% | 48.18% | | | 76.07% | 100% | |
| **PHPBench - P.B.S (Score)** | **20275** | 59450 | 21345 | 54131 | 101564 | 100678 | **313675** |
| **Normalized** | 6.46% | 18.95% | 6.8% | 17.26% | 32.38% | 32.1% | 100% |
| **Standard Deviation** | 0.5% | 3.3% | 0.1% | 0.2% | 0.4% | 0.9% | 0.8% |
| **PHPBench - Performance / Cost - P.B.S** | **579.29** | 837.32 | 609.86 | 1547 | 1847 | **2237** | |
| **Normalized** | 25.89% | 37.43% | 27.26% | 69.13% | 82.54% | 100% | |
| **PyBench - T.F.A.T.T (Milliseconds)** | 29609 | 9312 | **40683** | 13542 | 5249 | 5233 | **2326** |
| **Normalized** | 7.86% | 24.98% | 5.72% | 17.18% | 44.31% | 44.45% | 100% |
| **Standard Deviation** | 0.5% | 0.5% | 0.8% | 0.2% | 0.2% | 0.3% | 0.2% |
| **PyBench - Performance / Cost - T.F.A.T.T (Milliseconds x Dollar)** | 1036315 | 661152 | **1423905** | 473970 | 288695 | **235485** | |
| **Normalized** | 22.72% | 35.62% | 16.54% | 49.68% | 81.57% | 100% | |
| **Rust Prime Benchmark - P.N.T.T.2.0.0 (sec)** | **3106** | 1052 | | **140.20** | 1104 | 657.76 | |
| **Normalized** | 4.51% | 13.32% | | 100% | 12.7% | 21.31% | |
| **Standard Deviation** | 1.1% | 1% | | 0.3% | 0.6% | 0% | |
| **Smallpt - G.I.R.1.S (sec)** | **744.55** | 273.30 | 424.02 | 251.36 | 260.72 | 145.50 | **119.625** |
| **Normalized** | 16.07% | 43.77% | 28.21% | 47.59% | 45.88% | 82.22% | 100% |
| **Standard Deviation** | 0.1% | 0.9% | 0.3% | 1.1% | 2.3% | 2.9% | 0.3% |
| **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 | **219.426** |
| **Normalized** | 27.88% | 91.44% | 54.57% | 63.91% | 75.28% | 75.26% | 100% |
| **Standard Deviation** | 0.4% | 0.3% | 3.4% | 0.1% | 1.5% | 1% | 0.5% |
| **FLAC Audio Encoding - WAV To FLAC (sec)** | **777.65** | 135.25 | 566.40 | 288.92 | 111.09 | 111.48 | **22.793** |
| **Normalized** | 2.93% | 16.85% | 4.02% | 7.89% | 20.52% | 20.45% | 100% |
| **Standard Deviation** | 0.9% | 3.4% | 0.3% | 0.7% | 3.1% | 0.7% | 0.8% |
| **LAME MP3 Encoding - WAV To MP3 (sec)** | **658.82** | 162.41 | 518.49 | 295.44 | 125.34 | 125.22 | **67.222** |
| **Normalized** | 10.2% | 41.39% | 12.96% | 22.75% | 53.63% | 53.68% | 100% |
| **Standard Deviation** | 2.4% | 0.6% | 0% | 0.2% | 0.1% | 0.1% | 0.1% |
| **Perl Benchmarks - Pod2html (sec)** | 2.56511278 | 0.78254268 | **2.57273250** | 1.31659761 | 0.61207402 | 0.62136299 | **0.32613134** |
| **Normalized** | 12.71% | 41.68% | 12.68% | 24.77% | 53.28% | 52.49% | 100% |
| **Standard Deviation** | 5.2% | 2% | 0.6% | 2% | 0.8% | 1.3% | 0.8% |
| **Perl Benchmarks - Interpreter (sec)** | **0.03173653** | 0.01229804 | 0.01091688 | 0.00491447 | 0.00778405 | 0.00826085 | **0.00304529** |
| **Normalized** | 9.6% | 24.76% | 27.9% | 61.97% | 39.12% | 36.86% | 100% |
| **Standard Deviation** | 3.5% | 0.4% | 0.3% | 0.5% | 5.6% | 6.9% | 1% |
| **Rust Prime Benchmark - Performance / Cost - P.N.T.T.2.0.0 (sec x Dollar)** | **108715** | 74726 | | **4907** | 60738 | 29599 | |
| **Normalized** | 4.51% | 6.57% | | 100% | 8.08% | 16.58% | |

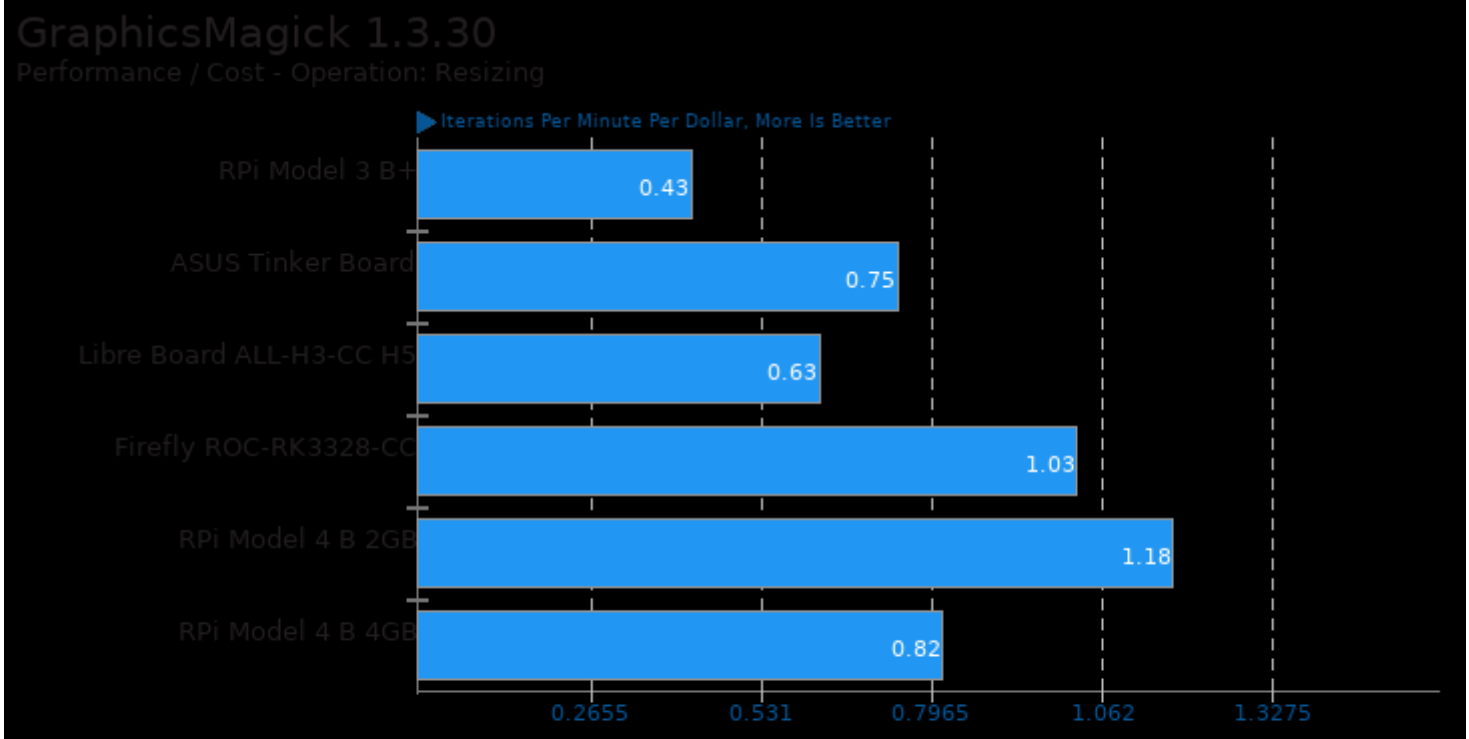
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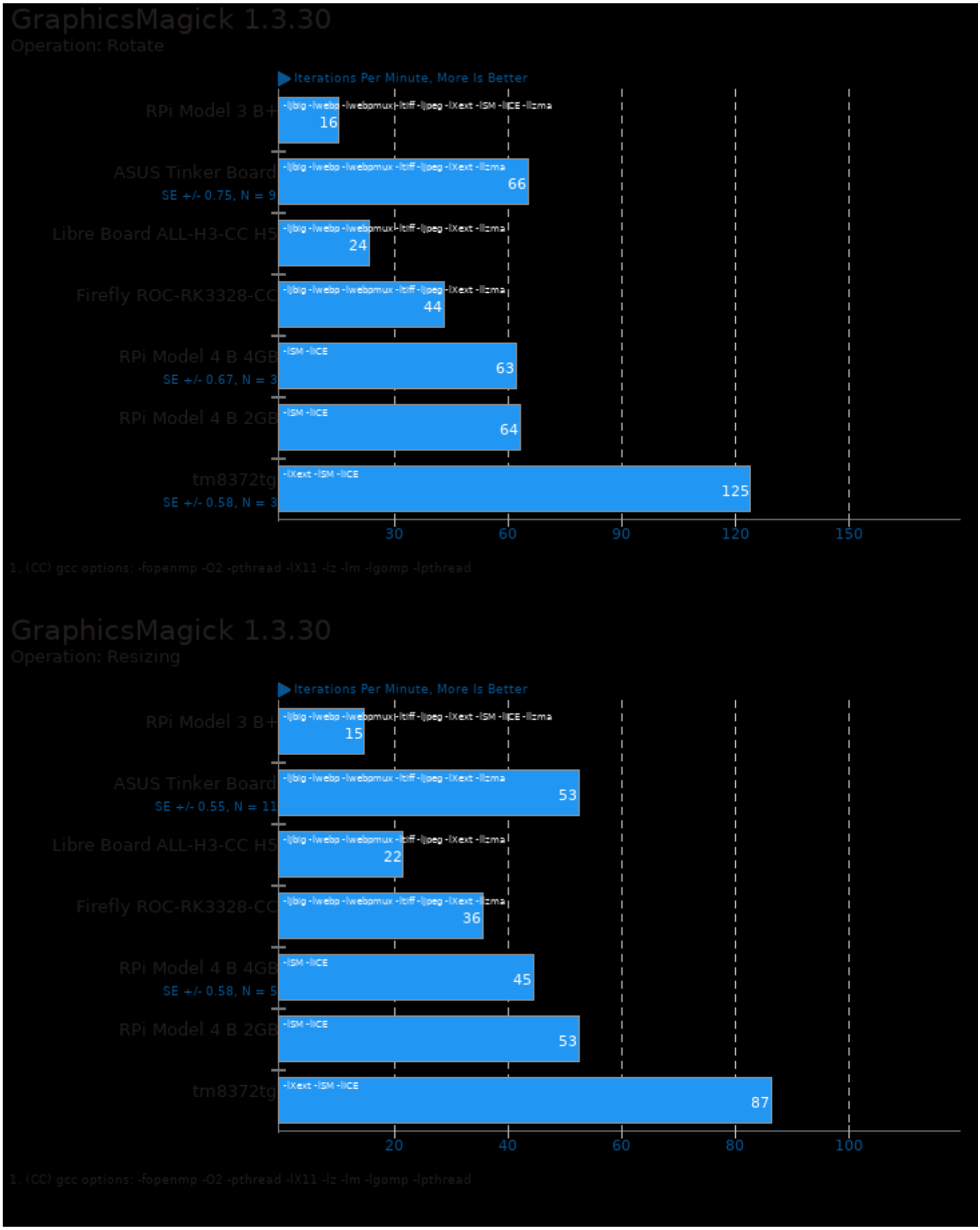
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|---|---|---|---|---|---|---|
| **Smallpt - Performance / Cost - G.I.R.1.S (sec x Dollar)** | **26059** | 19404 | 14841 | 8798 | 14340 | **6548** |
| **Normalized** | 25.13% | 33.74% | 44.12% | 74.42% | 45.66% | 100% |
| **Zstd Compression - Performance / Cost - C.u.1.0.3.s.i.i.C.L.1 (sec x Dollar)** | **27545** | 17039 | 14075 | **12016** | 16031 | 13120 |
| **Normalized** | 43.62% | 70.52% | 85.37% | 100% | 74.95% | 91.59% |
| **FLAC Audio Encoding - Performance / Cost - WAV To FLAC (sec x Dollar)** | **27218** | 9603 | 19824 | 10112 | 6110 | **5017** |
| **Normalized** | 18.43% | 52.24% | 25.31% | 49.61% | 82.11% | 100% |
| **LAME MP3 Encoding - Performance / Cost - WAV To MP3 (sec x Dollar)** | **23059** | 11531 | 18147 | 10340 | 6894 | **5635** |
| **Normalized** | 24.44% | 48.87% | 31.05% | 54.49% | 81.74% | 100% |
| **Perl Benchmarks - Performance / Cost - Pod2html (sec x Dollar)** | 89.78 | 55.56 | **90.05** | 46.08 | 33.66 | **27.96** |
| **Normalized** | 31.14% | 50.32% | 31.05% | 60.68% | 83.07% | 100% |
| **Perl Benchmarks - Performance / Cost - Interpreter (sec x Dollar)** | **1.11** | 0.87 | 0.38 | **0.17** | 0.43 | 0.37 |
| **Normalized** | 15.32% | 19.54% | 44.74% | 100% | 39.53% | 45.95% |

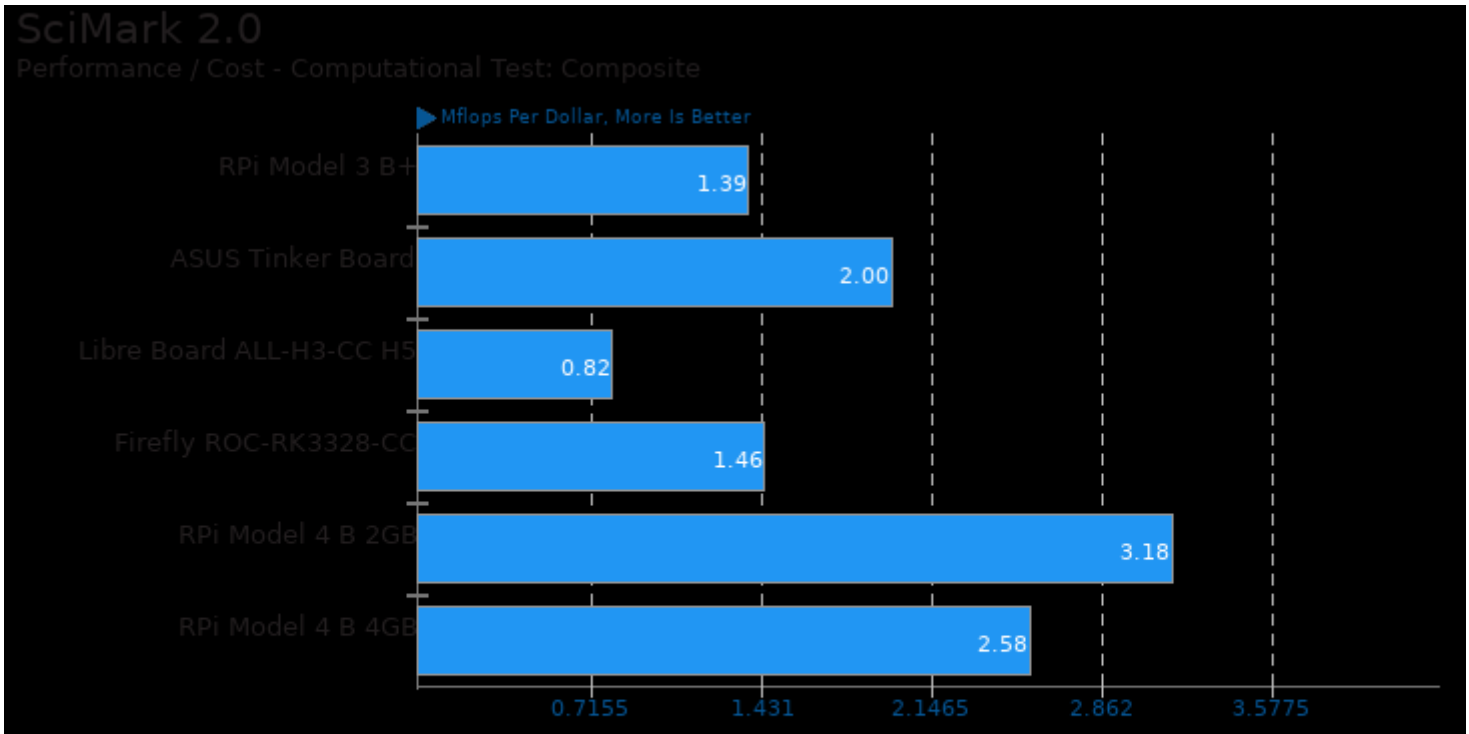
# Raspberry Pi Model 4 Benchmarks



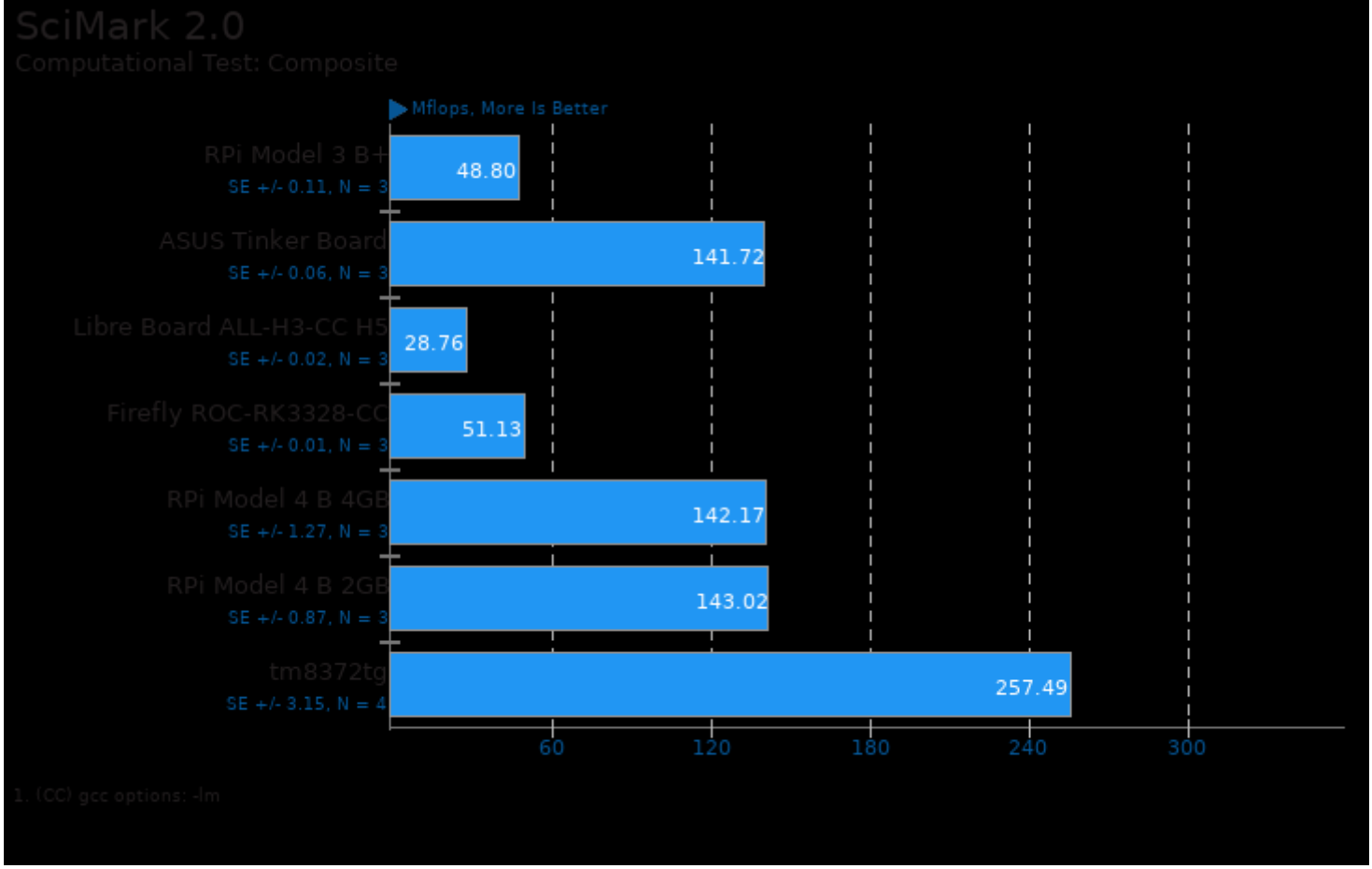

GraphicsMagick 1.3.30
Performance / Cost - Operation: Rotate
Iterations Per Minute Per Dollar, More Is Better
RPi Model 3 B+
0.46
ASUS Tinker Board
0.93
Libre Board ALL-H3-CC H5
0.69
Firefly ROC-RK3328-CC
1.26
RPi Model 4 B 2GB
1.42
RPi Model 4 B 4GB
1.15
0.3195
0.639
0.9585
1.278
1.5975
1. RPi Model 3 B+: $35 reported cost.
2. ASUS Tinker Board: $71 reported cost.
3. Libre Board ALL-H3-CC H5: $35 reported cost.
4. Firefly ROC-RK3328-CC: $35 reported cost.
5. RPi Model 4 B 2GB: $45 reported cost.
6. RPi Model 4 B 4GB: $55 reported cost.


GraphicsMagick 1.3.30
Performance / Cost - Operation: Resizing
Iterations Per Minute Per Dollar, More Is Better
RPi Model 3 B+
0.43
ASUS Tinker Board
0.75
Libre Board ALL-H3-CC H5
0.63
Firefly ROC-RK3328-CC
1.03
RPi Model 4 B 2GB
1.18
RPi Model 4 B 4GB
0.82
0.2655
0.531
0.7965
1.062
1.3275
1. RPi Model 3 B+: $35 reported cost.
2. ASUS Tinker Board: $71 reported cost.
3. Libre Board ALL-H3-CC H5: $35 reported cost.
4. Firefly ROC-RK3328-CC: $35 reported cost.
5. RPi Model 4 B 2GB: $45 reported cost.
6. RPi Model 4 B 4GB: $55 reported cost.

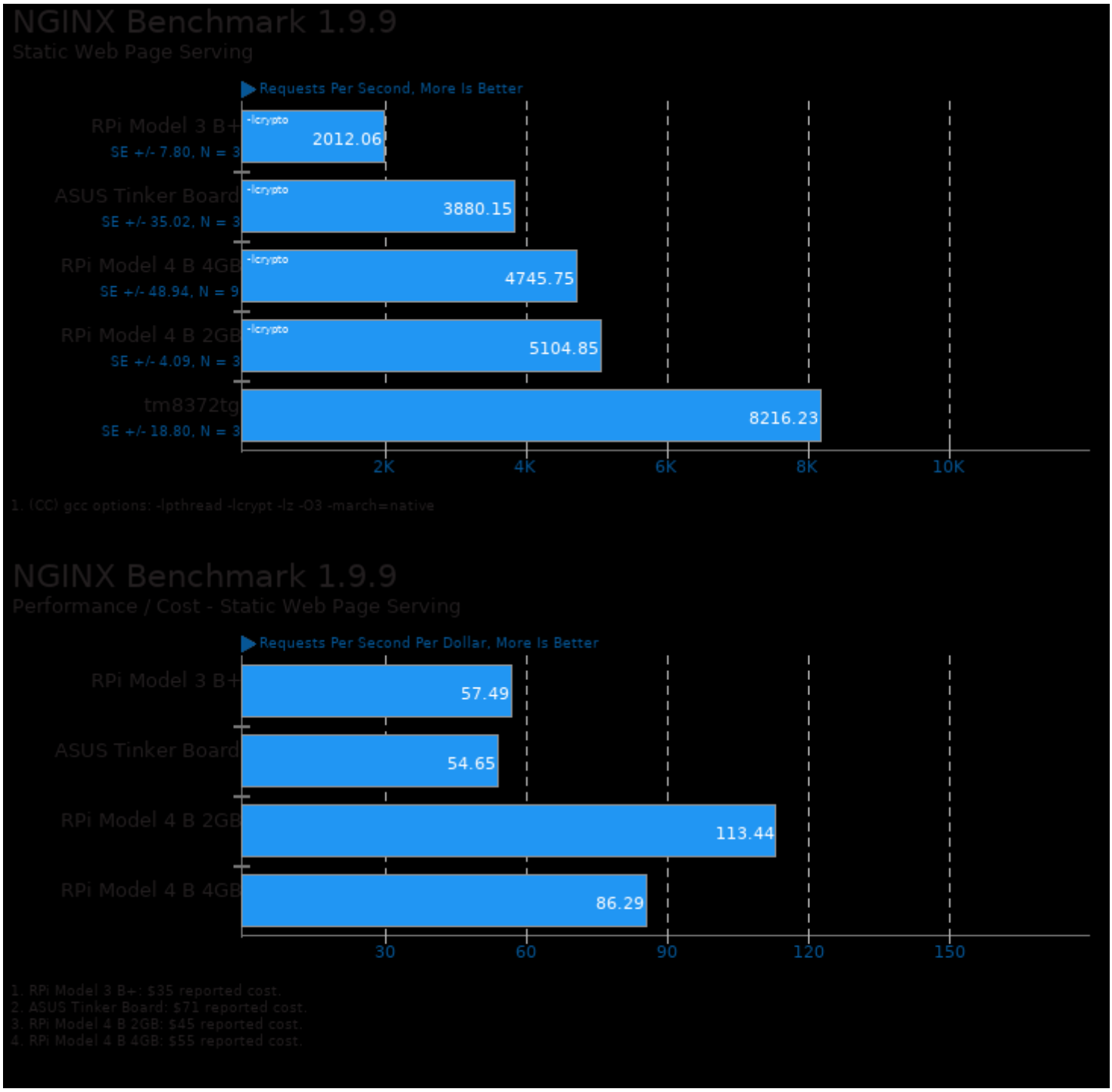

GraphicsMagick 1.3.30
Operation: Rotate
Iterations Per Minute, More Is Better
RPi Model 3 B+
-ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -llzma
16
ASUS Tinker Board
SE +/- 0.75, N = 9
-ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -llzma
66
Libre Board ALL-H3-CC H5
-ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -llzma
24
Firefly ROC-RK3328-CC
-ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -llzma
44
RPi Model 4 B 4GB
SE +/- 0.67, N = 3
-lSM -lICE
63
RPi Model 4 B 2GB
-lSM -lICE
64
tm8372tg
SE +/- 0.58, N = 3
-lXext -lSM -lICE
125
30
60
90
120
150
1. (CC) gcc options: -fopenmp -O2 -pthread -lX11 -lz -lm -lgomp -lpthread
GraphicsMagick 1.3.30
Operation: Resizing
Iterations Per Minute, More Is Better
RPi Model 3 B+
-ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lSM -lICE -llzma
15
ASUS Tinker Board
SE +/- 0.55, N = 11
-ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -llzma
53
Libre Board ALL-H3-CC H5
-ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -llzma
22
Firefly ROC-RK3328-CC
-ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -llzma
36
RPi Model 4 B 4GB
SE +/- 0.58, N = 5
-lSM -lICE
45
RPi Model 4 B 2GB
-lSM -lICE
53
tm8372tg
-lXext -lSM -lICE
87
20
40
60
80
100
1. (CC) gcc options: -fopenmp -O2 -pthread -lX11 -lz -lm -lgomp -lpthread



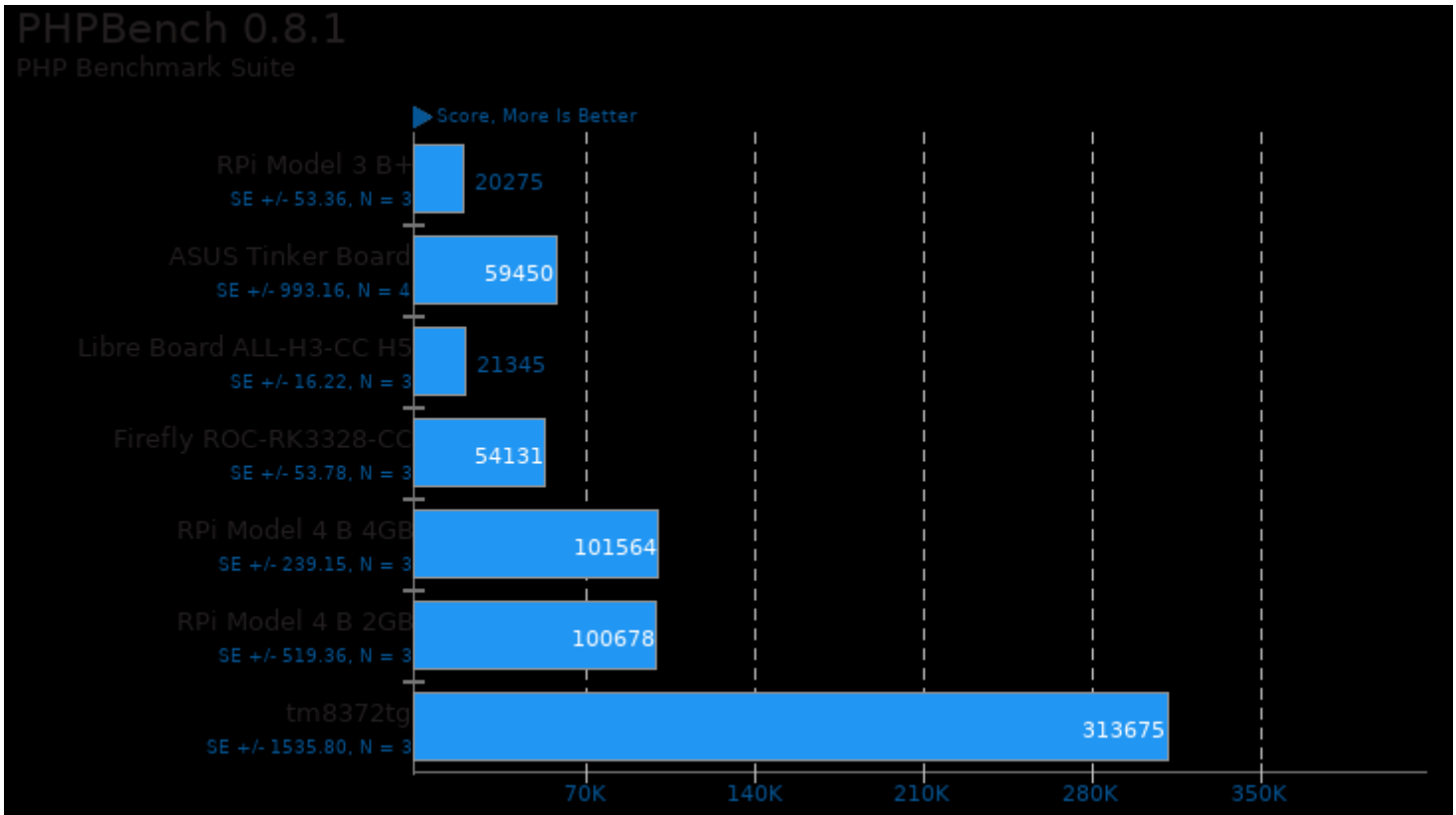

1. RPi Model 3 B+: $35 reported cost.
2. ASUS Tinker Board: $71 reported cost.
3. Libre Board ALL-H3-CC H5: $35 reported cost.
4. Firefly ROC-RK3328-CC: $35 reported cost.
5. RPi Model 4 B 2GB: $45 reported cost.
6. RPi Model 4 B 4GB: $55 reported cost.

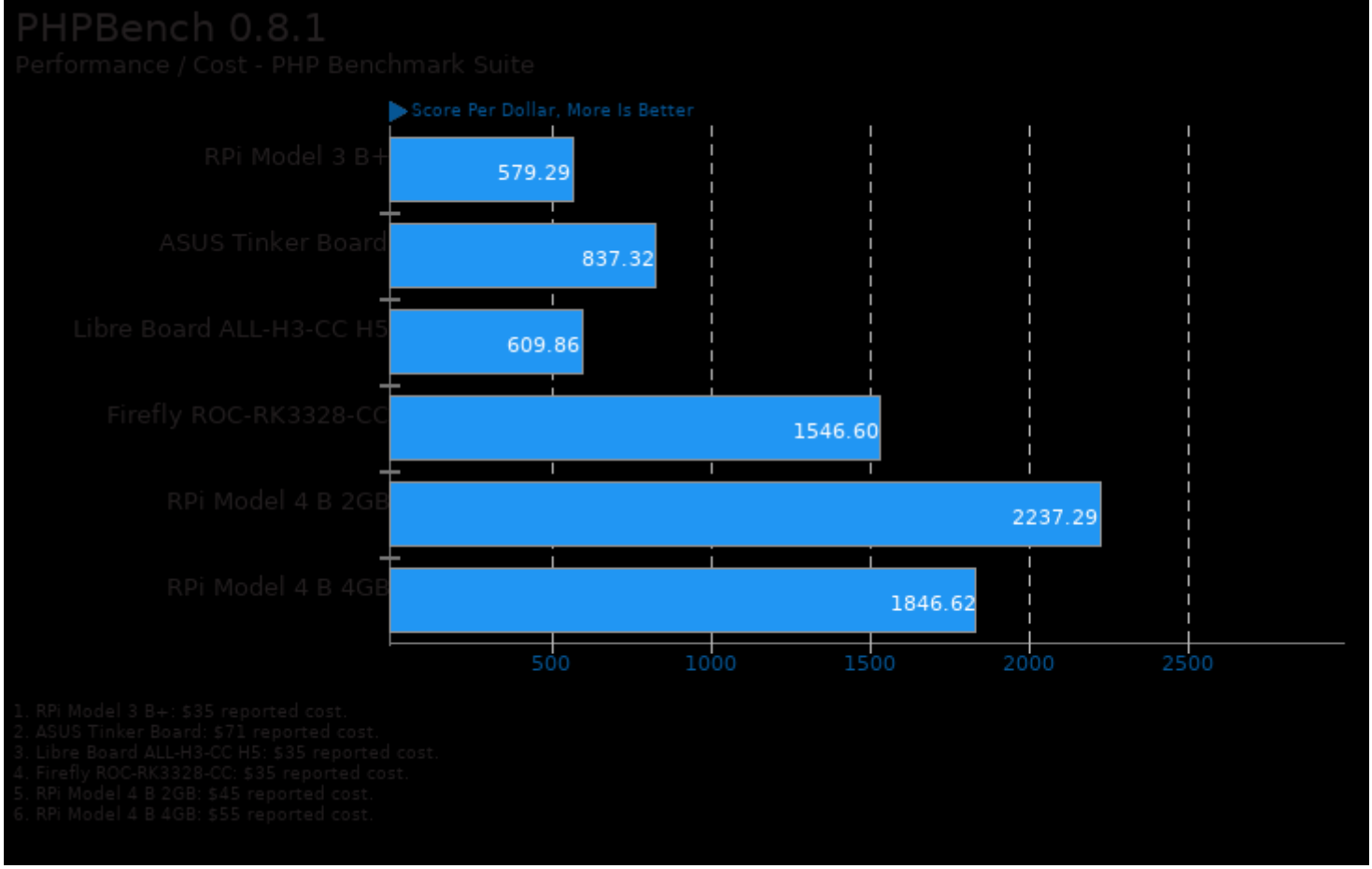



1. (CC) gcc options: -lm

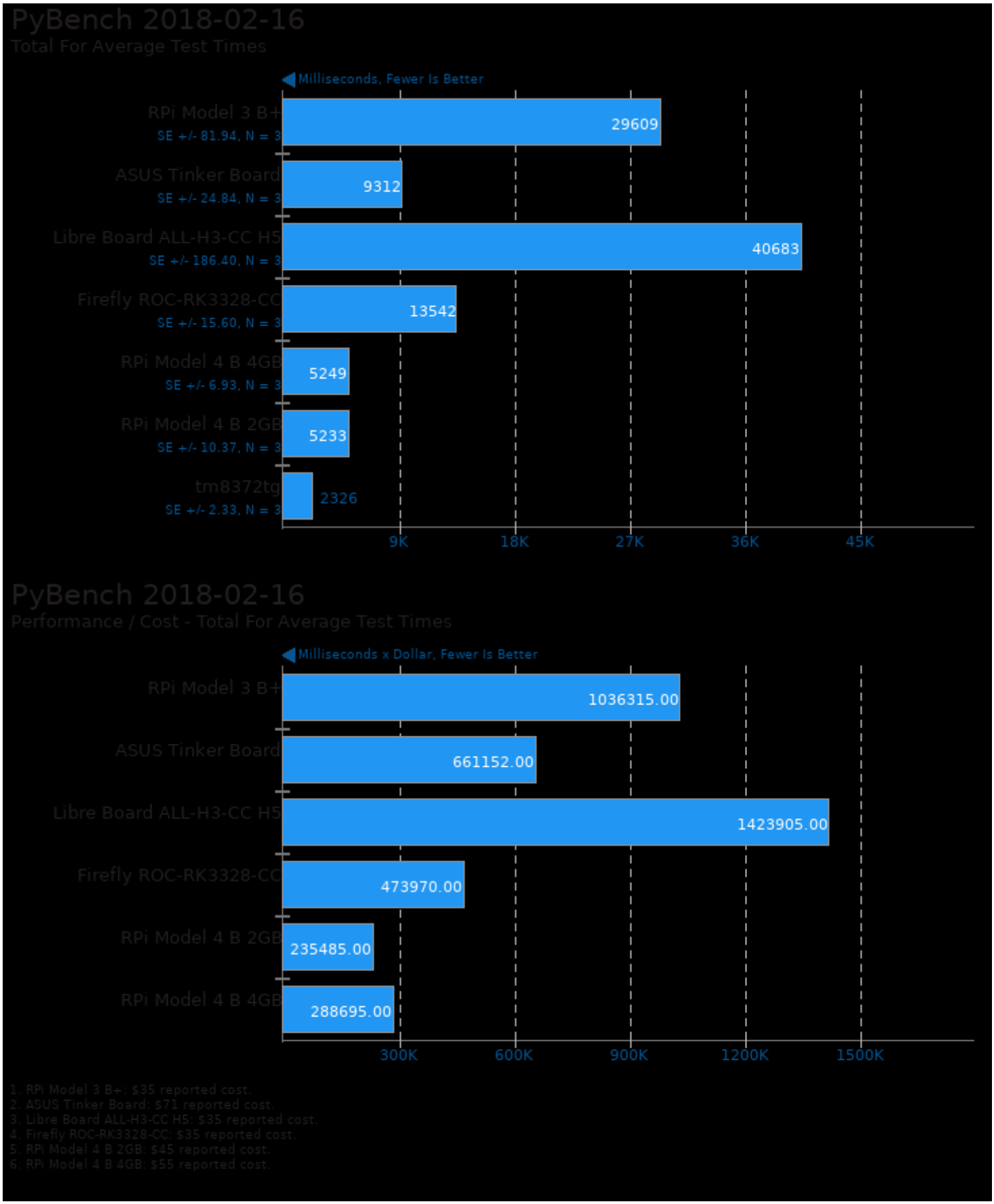

NGINX Benchmark 1.9.9
Static Web Page Serving
Requests Per Second, More Is Better
RPi Model 3 B+
SE +/- 7.80, N = 3
-lcrypto
2012.06
ASUS Tinker Board
SE +/- 35.02, N = 3
-lcrypto
3880.15
RPi Model 4 B 4GB
SE +/- 48.94, N = 9
-lcrypto
4745.75
RPi Model 4 B 2GB
SE +/- 4.09, N = 3
-lcrypto
5104.85
tm8372tg
SE +/- 18.80, N = 3
8216.23
2K
4K
6K
8K
10K
1. (CC) gcc options: -lpthread -lcrypt -lz -O3 -march=native
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
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.

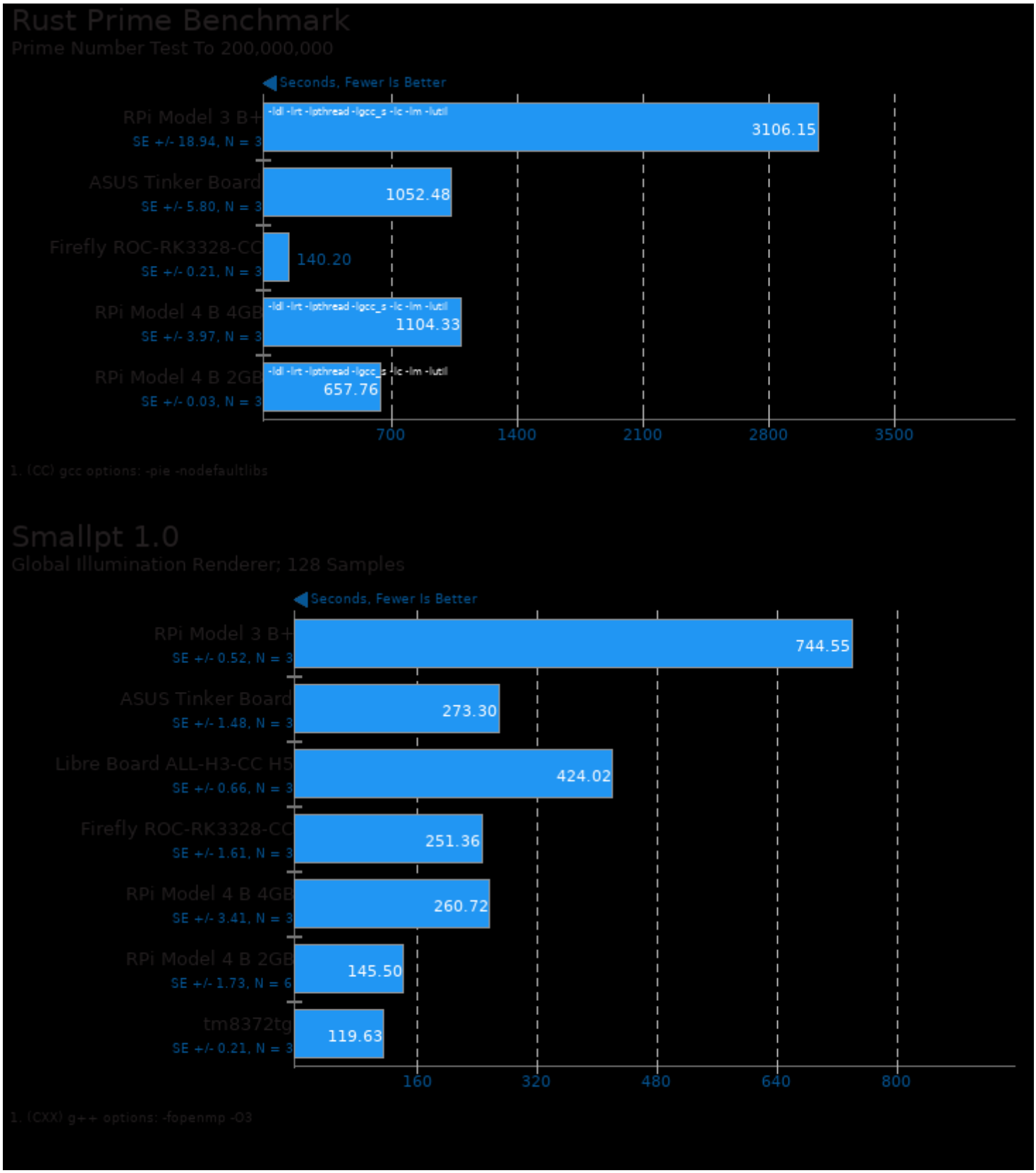
# Raspberry Pi Model 4 Benchmarks



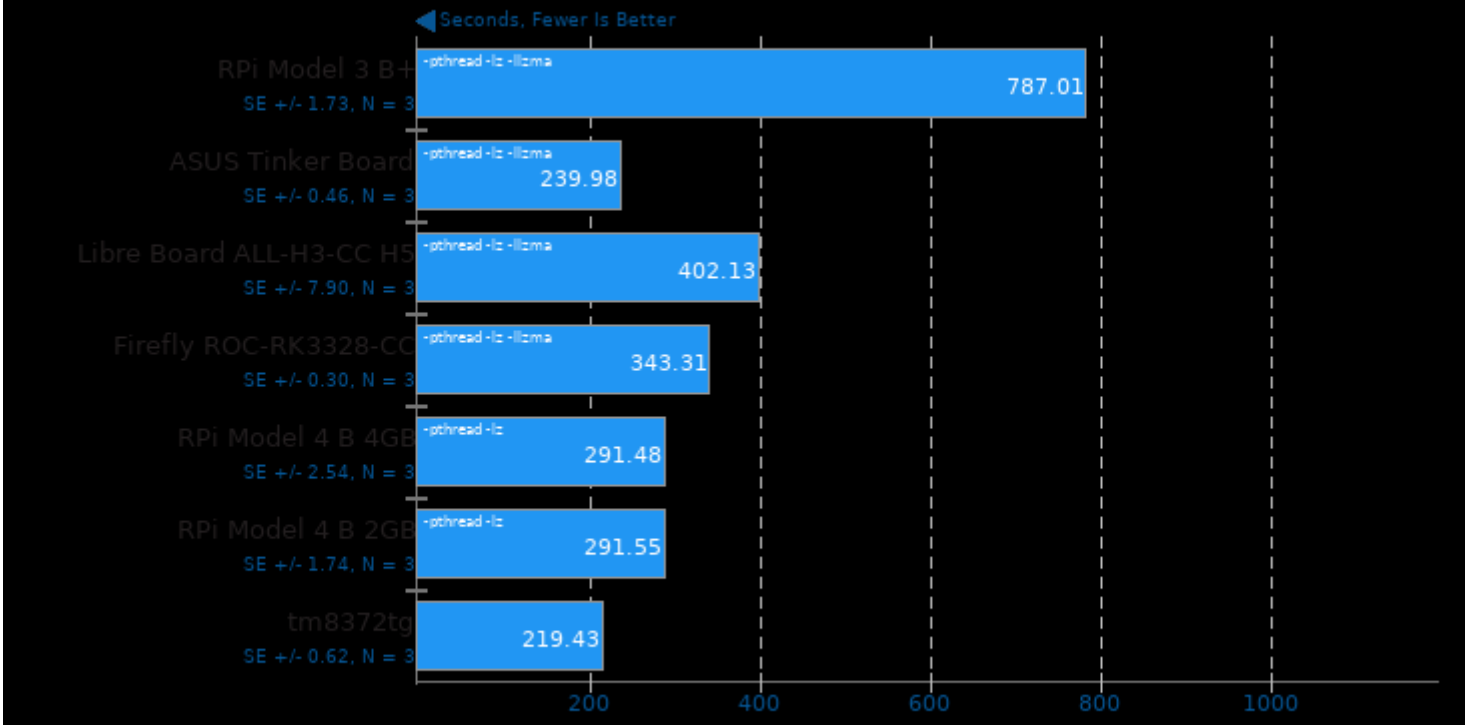
# Raspberry Pi Model 4 Benchmarks




Rust Prime Benchmark
Prime Number Test To 200,000,000
Seconds, Fewer Is Better
RPi Model 3 B+
SE +/- 18.94, N = 3
-ldl -lrt -lpthread -lgcc_s -lc -lm -lutil
3106.15
ASUS Tinker Board
SE +/- 5.80, N = 3
1052.48
Firefly ROC-RK3328-CC
SE +/- 0.21, N = 3
140.20
RPi Model 4 B 4GB
SE +/- 3.97, N = 3
-ldl -lrt -lpthread -lgcc_s -lc -lm -lutil
1104.33
RPi Model 4 B 2GB
SE +/- 0.03, N = 3
-ldl -lrt -lpthread -lgcc_s -lc -lm -lutil
657.76
700
1400
2100
2800
3500
1. (CC) gcc options: -pie -nodefaultlibs
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
tm8372tg
SE +/- 0.21, N = 3
119.63
160
320
480
640
800
1. (CXX) g++ options: -fopenmp -O3

## Zstd Compression 1.3.4

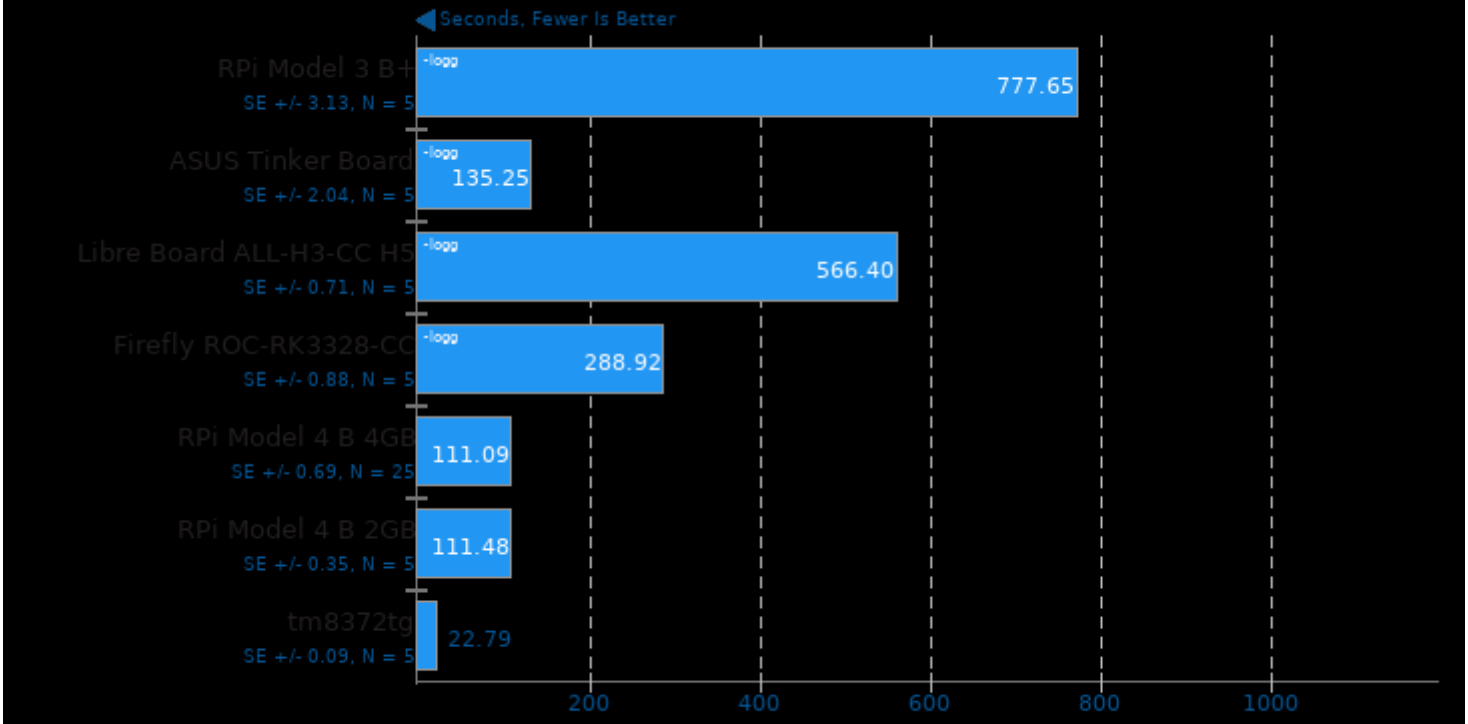
Compressing ubuntu-16.04.3-server-i386.img, Compression Level 19



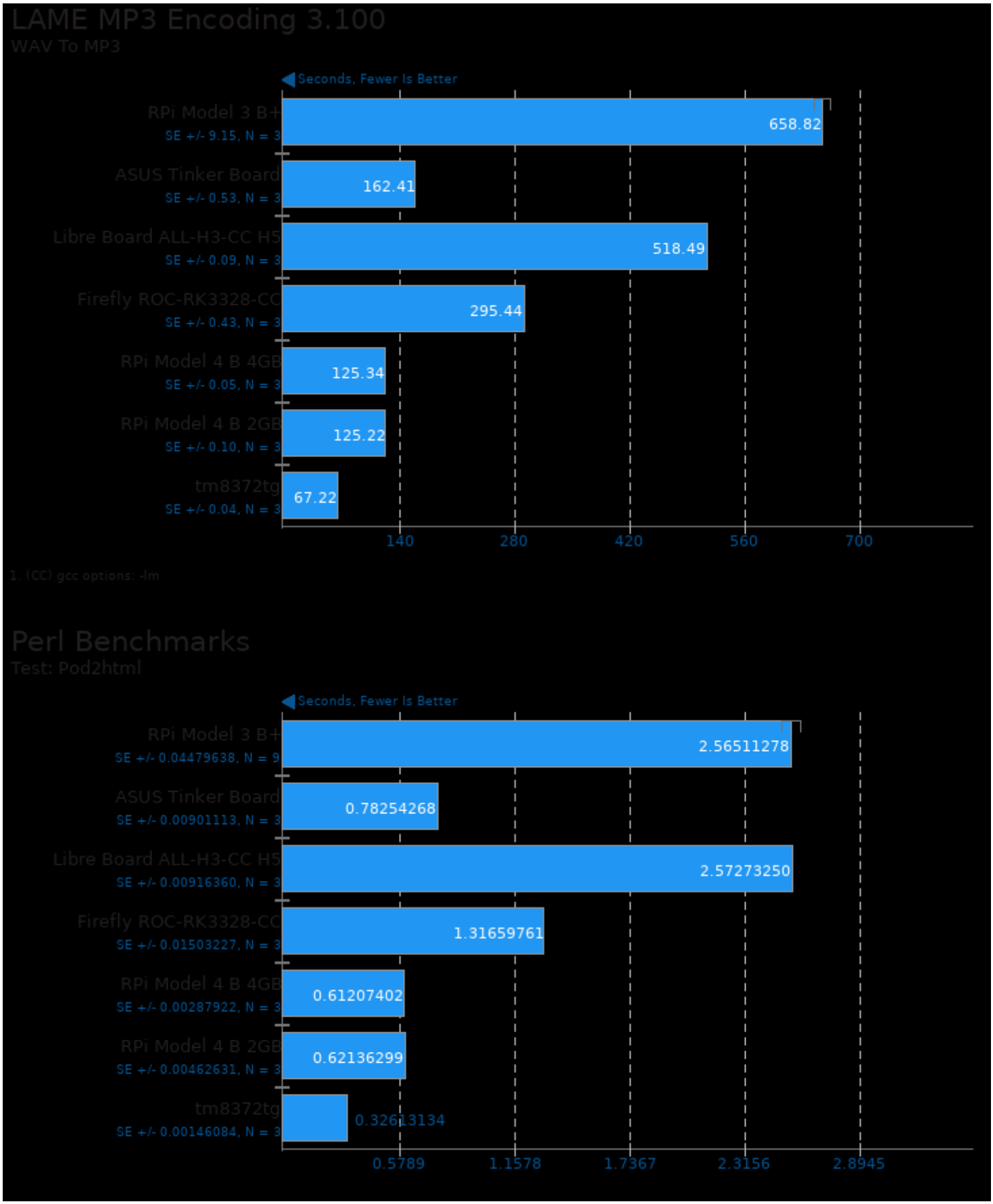

1. (CC) gcc options: -O3

## FLAC Audio Encoding 1.3.2

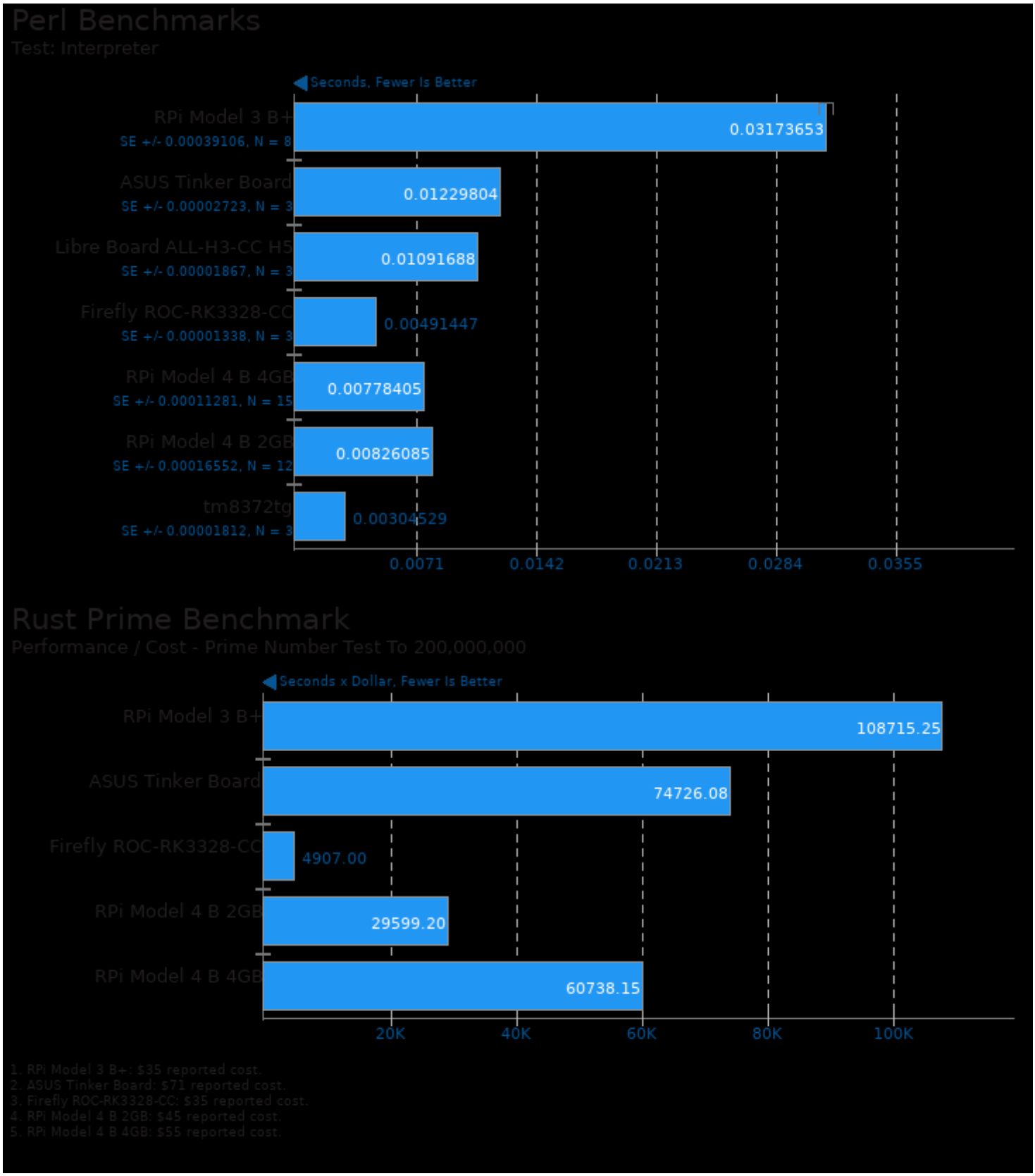
WAV To FLAC




1. (CXX) g++ options: -O2 -fvisibility=hidden -lm

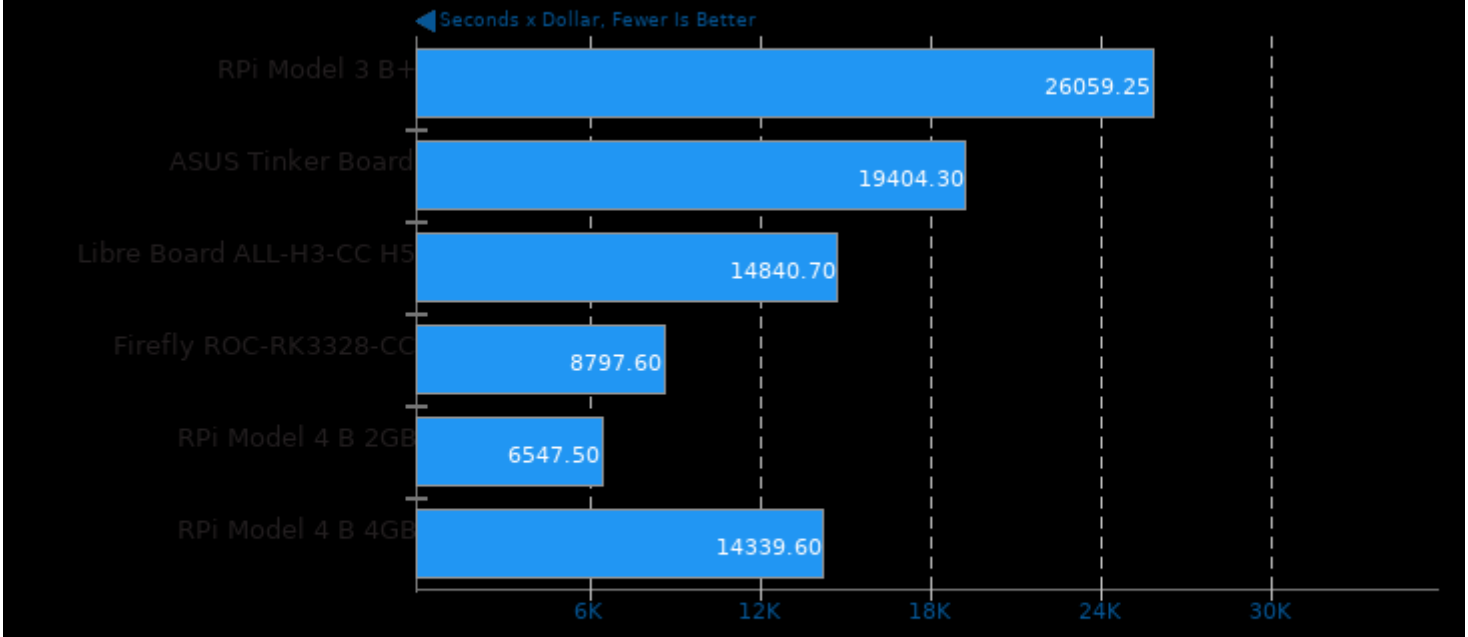

LAME MP3 Encoding 3.100
WAV To MP3
Seconds, Fewer Is Better
RPi Model 3 B+
SE +/- 9.15, N = 3
658.82
ASUS Tinker Board
SE +/- 0.53, N = 3
162.41
Libre Board ALL-H3-CC H5
SE +/- 0.09, N = 3
518.49
Firefly ROC-RK3328-CC
SE +/- 0.43, N = 3
295.44
RPi Model 4 B 4GB
SE +/- 0.05, N = 3
125.34
RPi Model 4 B 2GB
SE +/- 0.10, N = 3
125.22
tm8372tg
SE +/- 0.04, N = 3
67.22
140
280
420
560
700
1. (CC) gcc options: -lm
Perl Benchmarks
Test: Pod2html
Seconds, Fewer Is Better
RPi Model 3 B+
SE +/- 0.04479638, N = 9
2.56511278
ASUS Tinker Board
SE +/- 0.00901113, N = 3
0.78254268
Libre Board ALL-H3-CC H5
SE +/- 0.00916360, N = 3
2.57273250
Firefly ROC-RK3328-CC
SE +/- 0.01503227, N = 3
1.31659761
RPi Model 4 B 4GB
SE +/- 0.00287922, N = 3
0.61207402
RPi Model 4 B 2GB
SE +/- 0.00462631, N = 3
0.62136299
tm8372tg
SE +/- 0.00146084, N = 3
0.32613134
0.5789
1.1578
1.7367
2.3156
2.8945

# Raspberry Pi Model 4 Benchmarks



## Smallpt 1.0

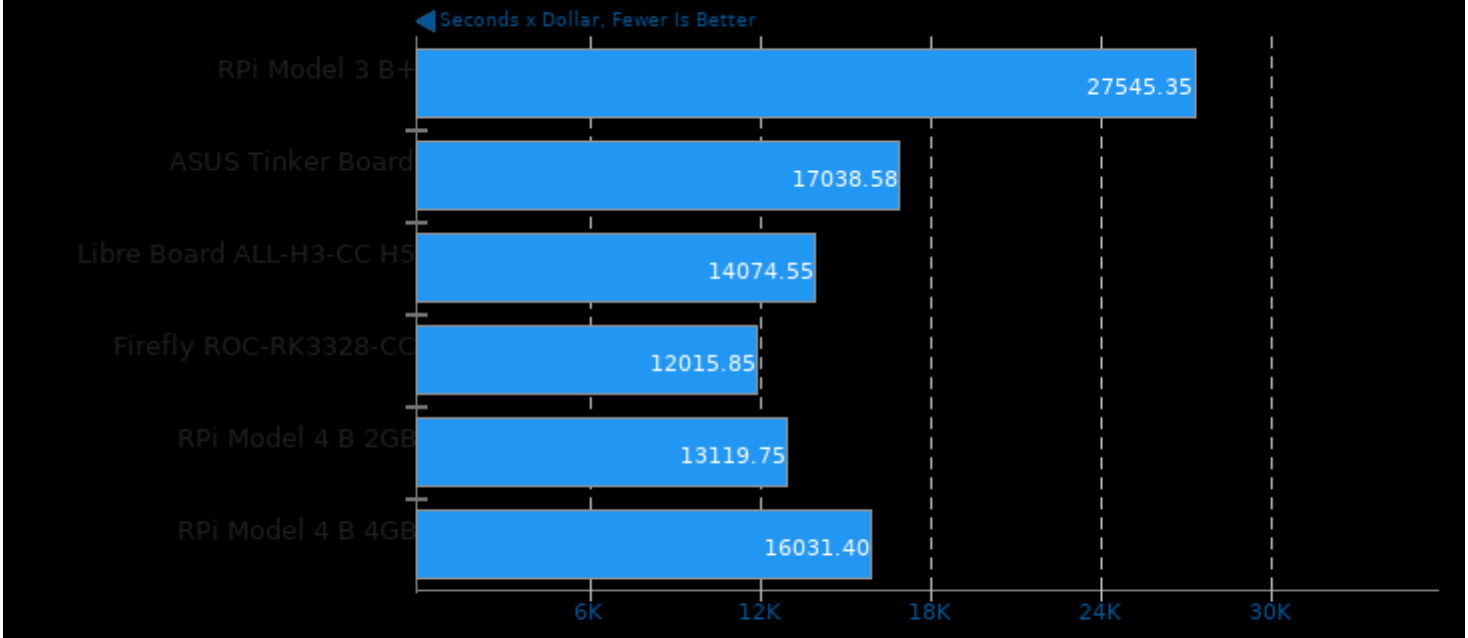
Performance / Cost - Global Illumination Renderer; 128 Samples




1. RPi Model 3 B+: $35 reported cost.
2. ASUS Tinker Board: $71 reported cost.
3. Libre Board ALL-H3-CC H5: $35 reported cost.
4. Firefly ROC-RK3328-CC: $35 reported cost.
5. RPi Model 4 B 2GB: $45 reported cost.
6. RPi Model 4 B 4GB: $55 reported cost.

## Zstd Compression 1.3.4

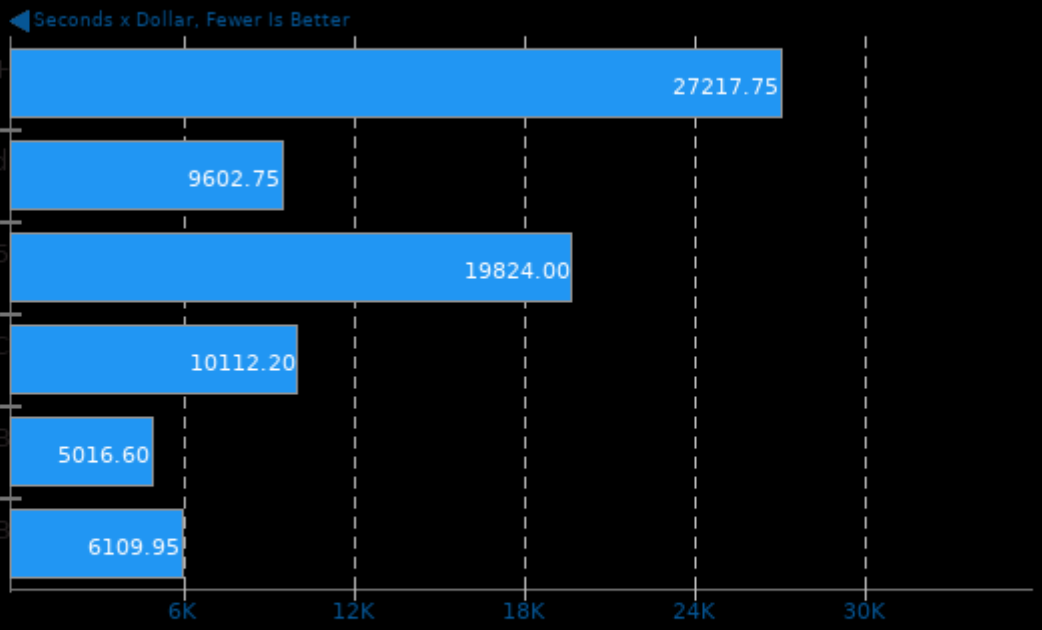
Performance / Cost - Compressing ubuntu-16.04.3-server-i386.img, Compression Level 19




1. RPi Model 3 B+: $35 reported cost.
2. ASUS Tinker Board: $71 reported cost.
3. Libre Board ALL-H3-CC H5: $35 reported cost.
4. Firefly ROC-RK3328-CC: $35 reported cost.
5. RPi Model 4 B 2GB: $45 reported cost.
6. RPi Model 4 B 4GB: $55 reported cost.

## FLAC Audio Encoding 1.3.2

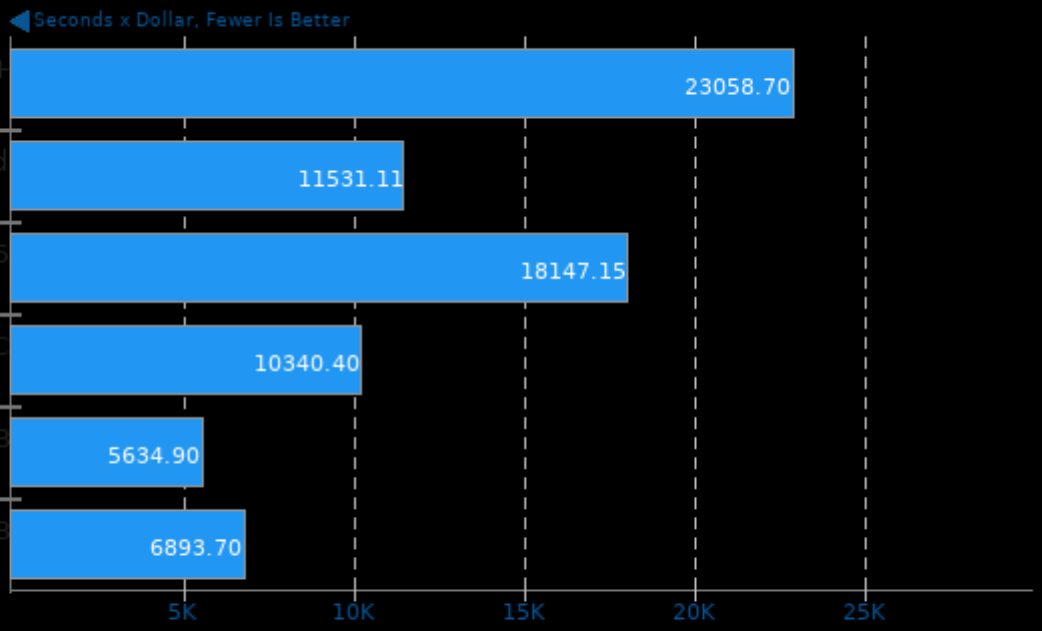
Performance / Cost - WAV To FLAC




1. RPi Model 3 B+: $35 reported cost.
2. ASUS Tinker Board: $71 reported cost.
3. Libre Board ALL-H3-CC H5: $35 reported cost.
4. Firefly ROC-RK3328-CC: $35 reported cost.
5. RPi Model 4 B 2GB: $45 reported cost.
6. RPi Model 4 B 4GB: $55 reported cost.

## LAME MP3 Encoding 3.100

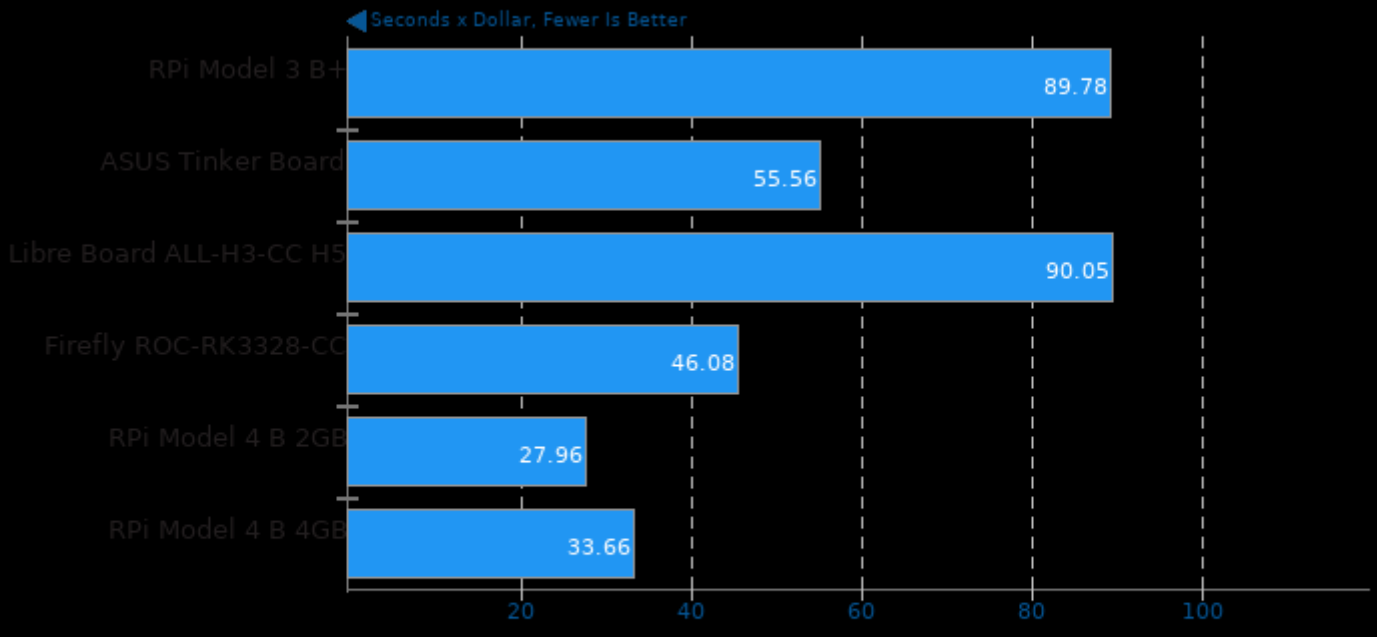
Performance / Cost - WAV To MP3




1. RPi Model 3 B+: $35 reported cost.
2. ASUS Tinker Board: $71 reported cost.
3. Libre Board ALL-H3-CC H5: $35 reported cost.
4. Firefly ROC-RK3328-CC: $35 reported cost.
5. RPi Model 4 B 2GB: $45 reported cost.
6. RPi Model 4 B 4GB: $55 reported cost.

## Perl Benchmarks

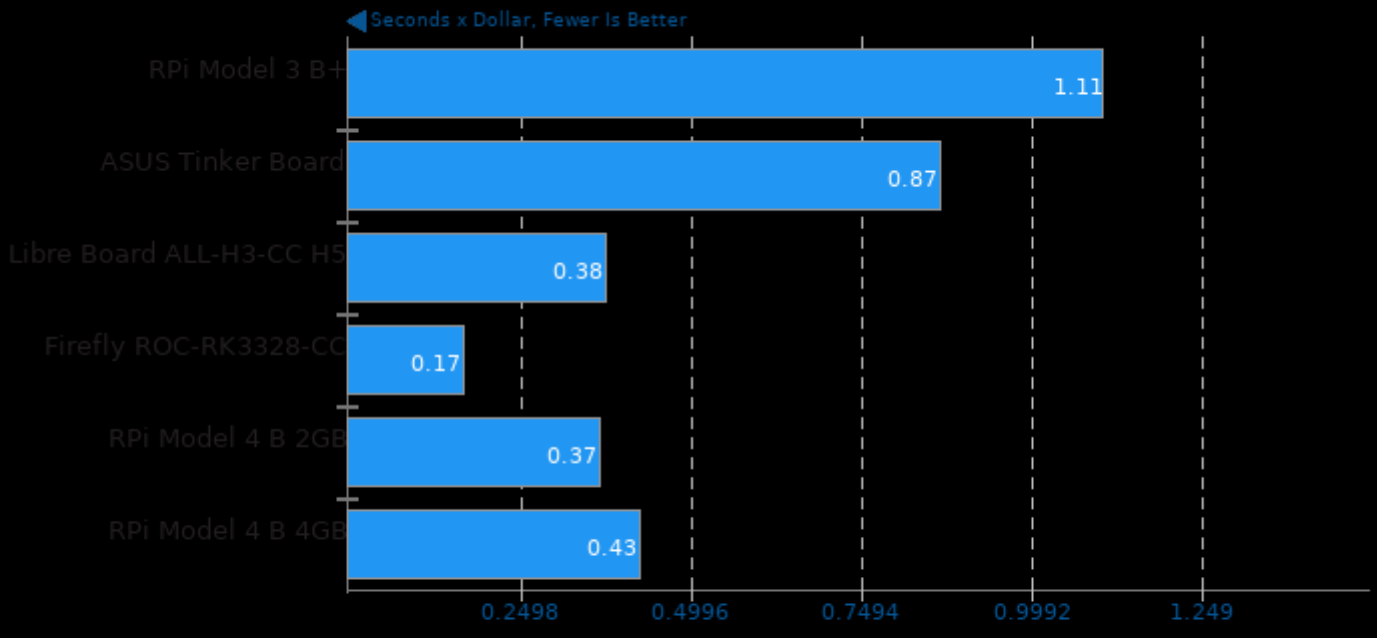
Performance / Cost - Test: Pod2html




1. RPi Model 3 B+: $35 reported cost.
2. ASUS Tinker Board: $71 reported cost.
3. Libre Board ALL-H3-CC H5: $35 reported cost.
4. Firefly ROC-RK3328-CC: $35 reported cost.
5. RPi Model 4 B 2GB: $45 reported cost.
6. RPi Model 4 B 4GB: $55 reported cost.

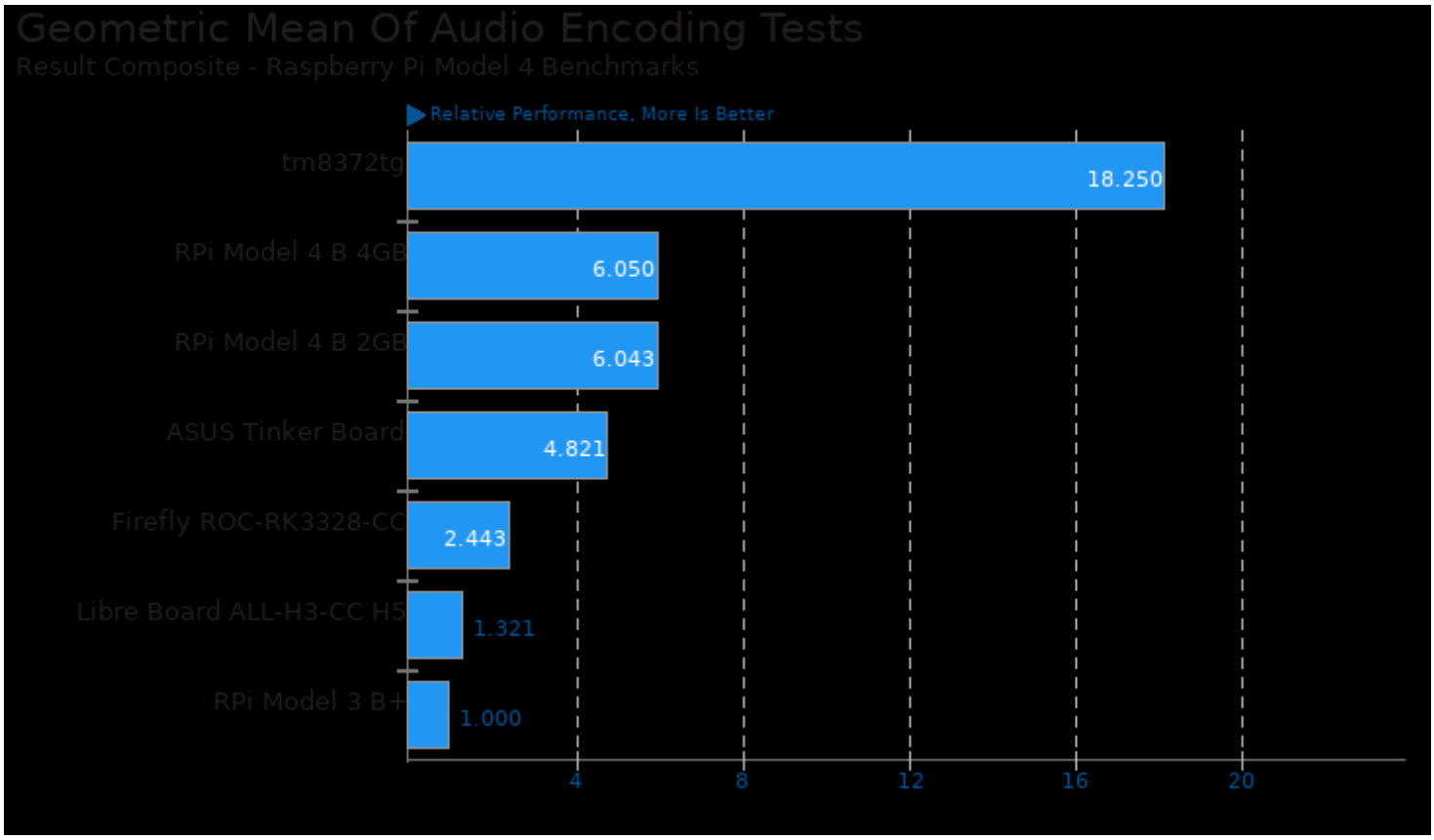
## Perl Benchmarks

Performance / Cost - Test: Interpreter

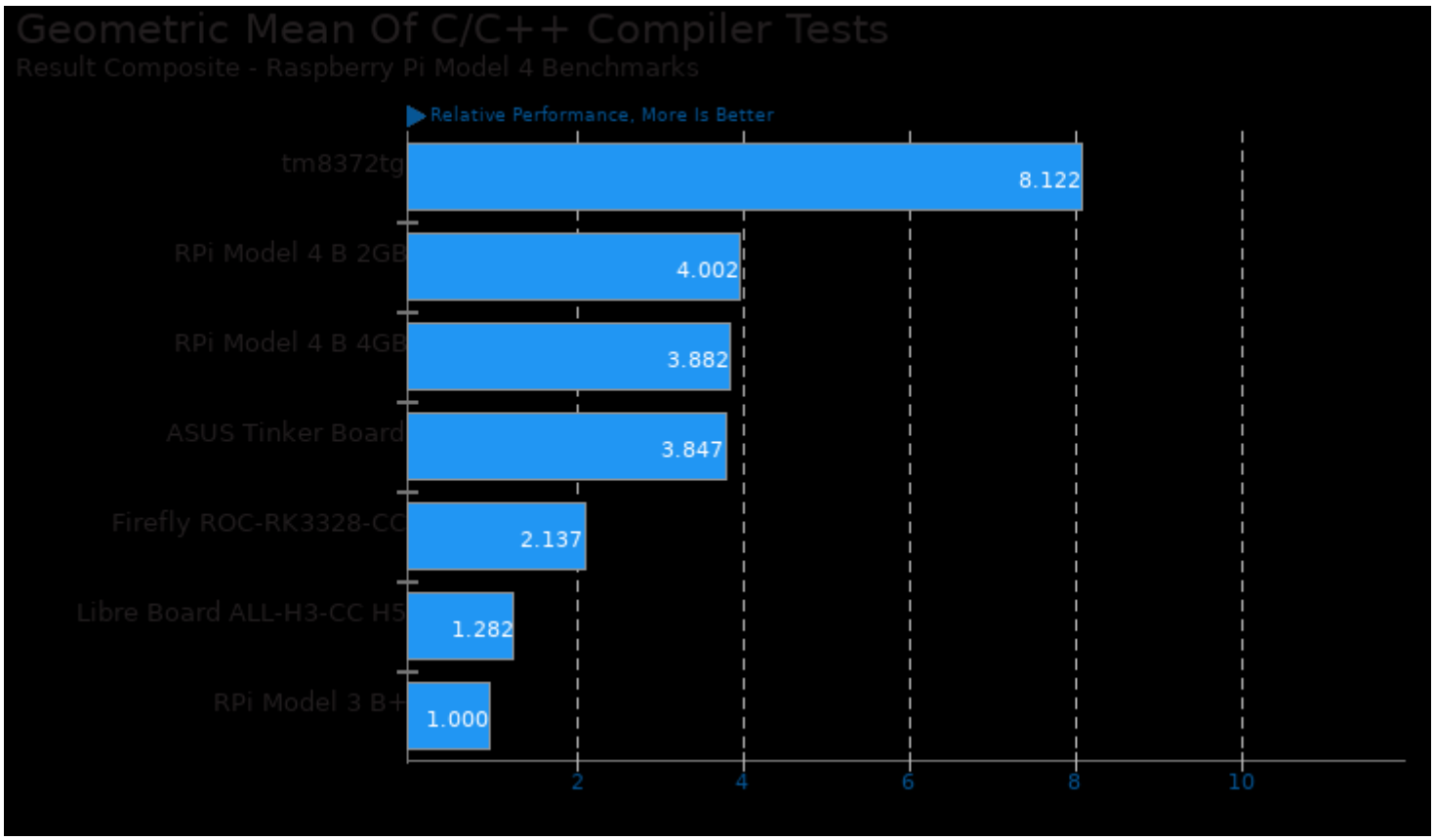



1. RPi Model 3 B+: $35 reported cost.
2. ASUS Tinker Board: $71 reported cost.
3. Libre Board ALL-H3-CC H5: $35 reported cost.
4. Firefly ROC-RK3328-CC: $35 reported cost.
5. RPi Model 4 B 2GB: $45 reported cost.
6. RPi Model 4 B 4GB: $55 reported cost.

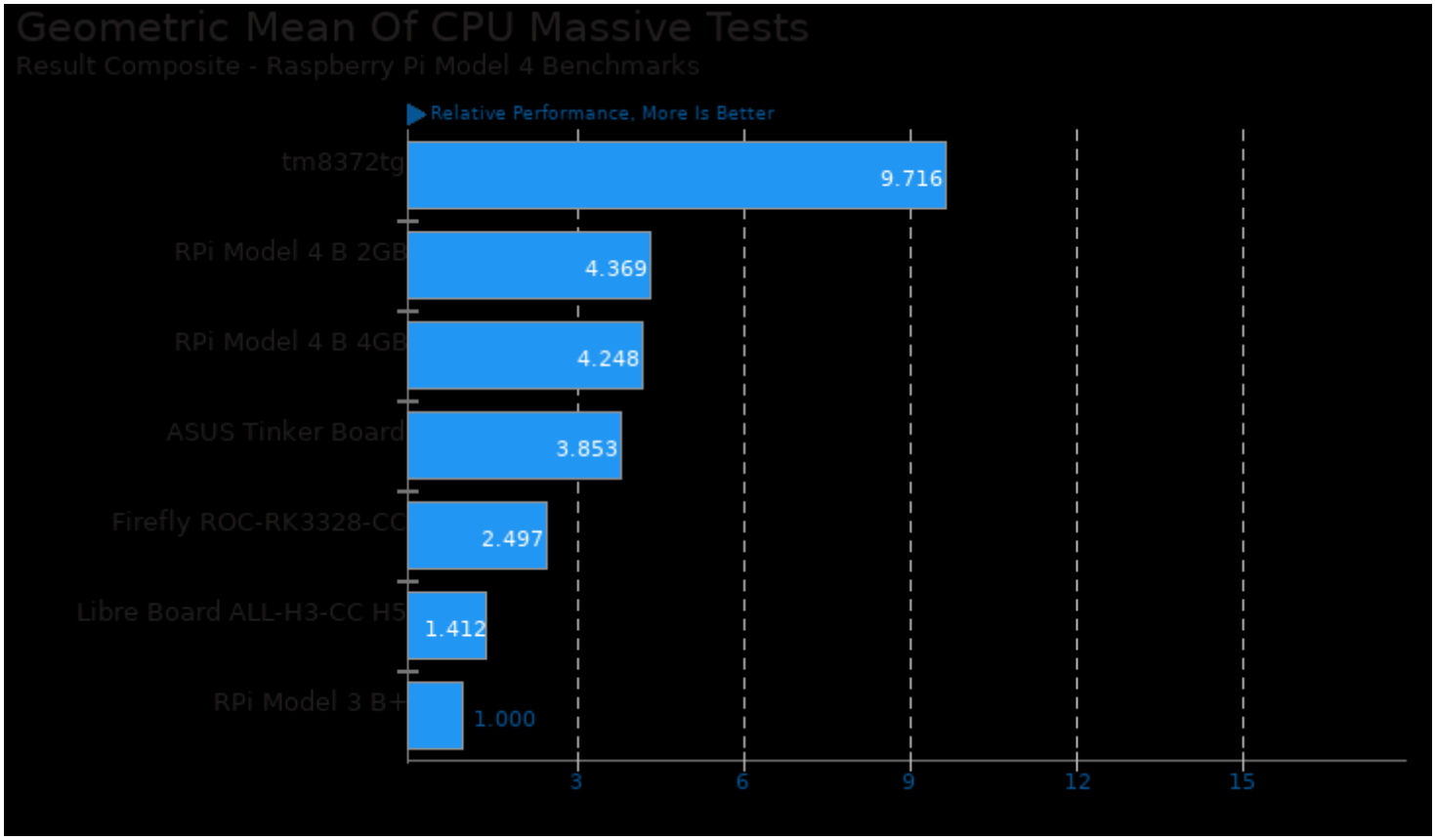
These geometric means are based upon test groupings / test suites for this result file.



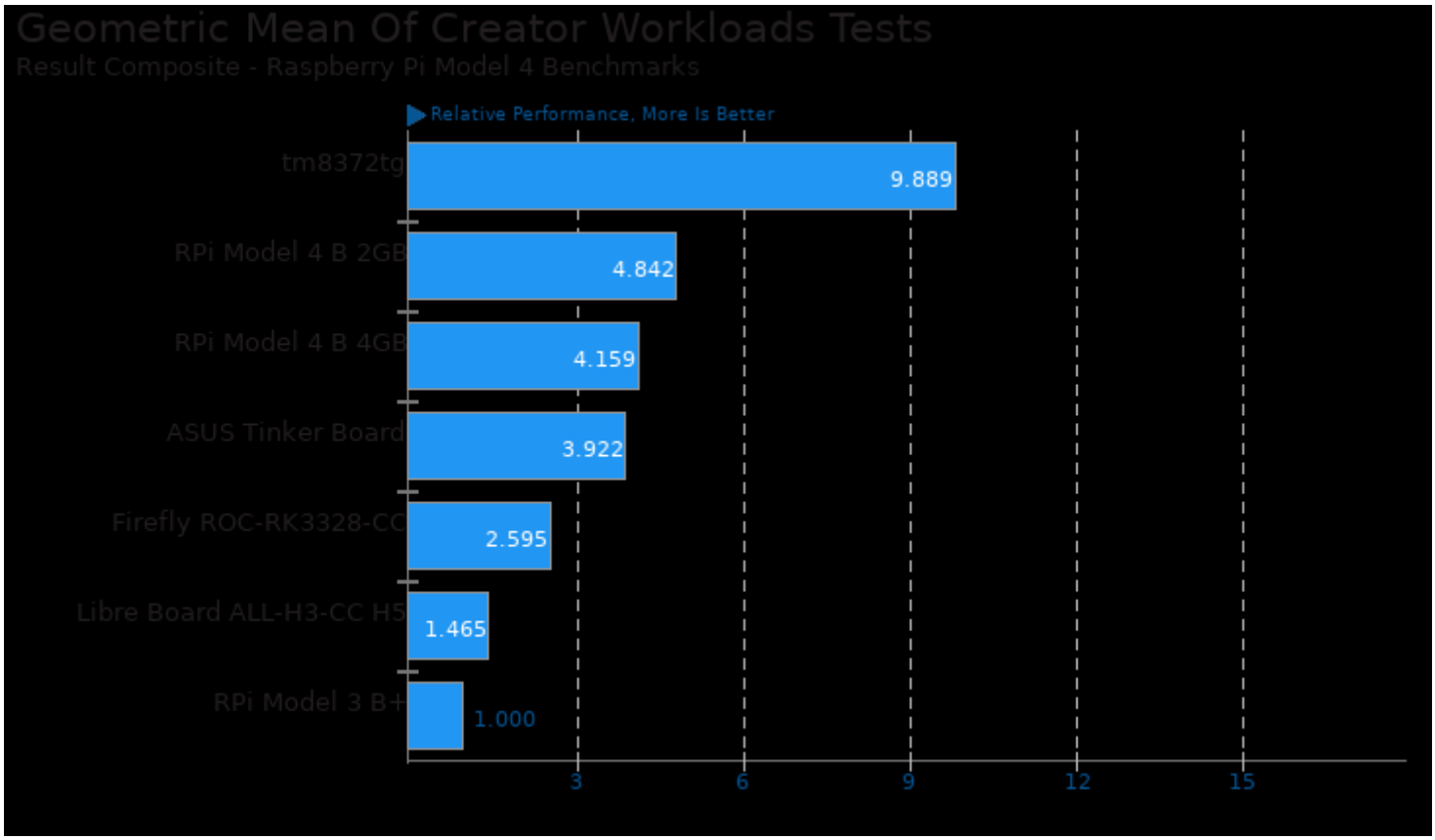

Geometric mean based upon tests: pts/encode-mp3 and pts/encode-flac



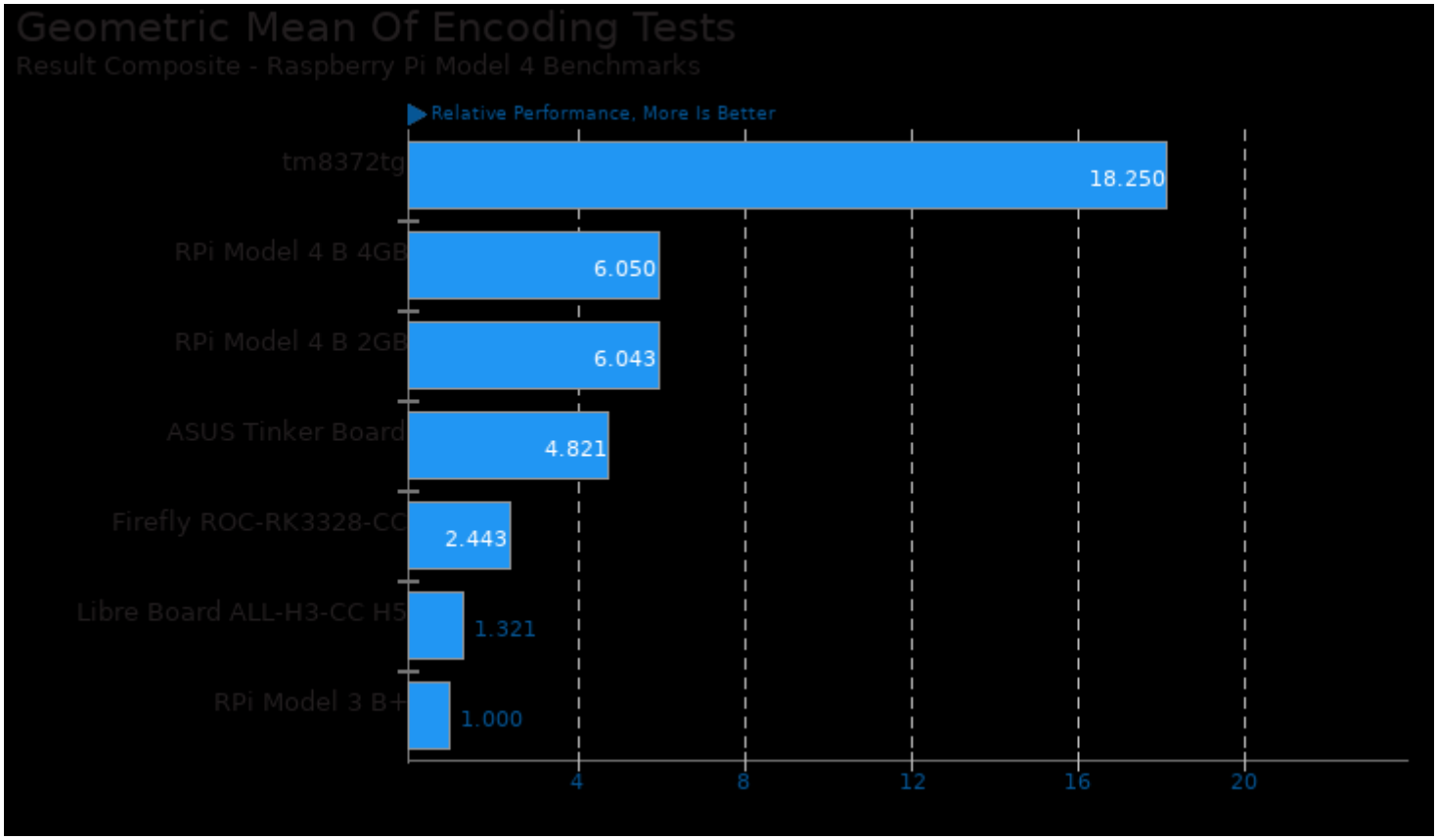
Geometric mean based upon tests: pts/scimark2, pts/graphics-magick, pts/encode-mp3, pts/encode-flac, pts/x264, pts/compress-zstd and pts/nginx



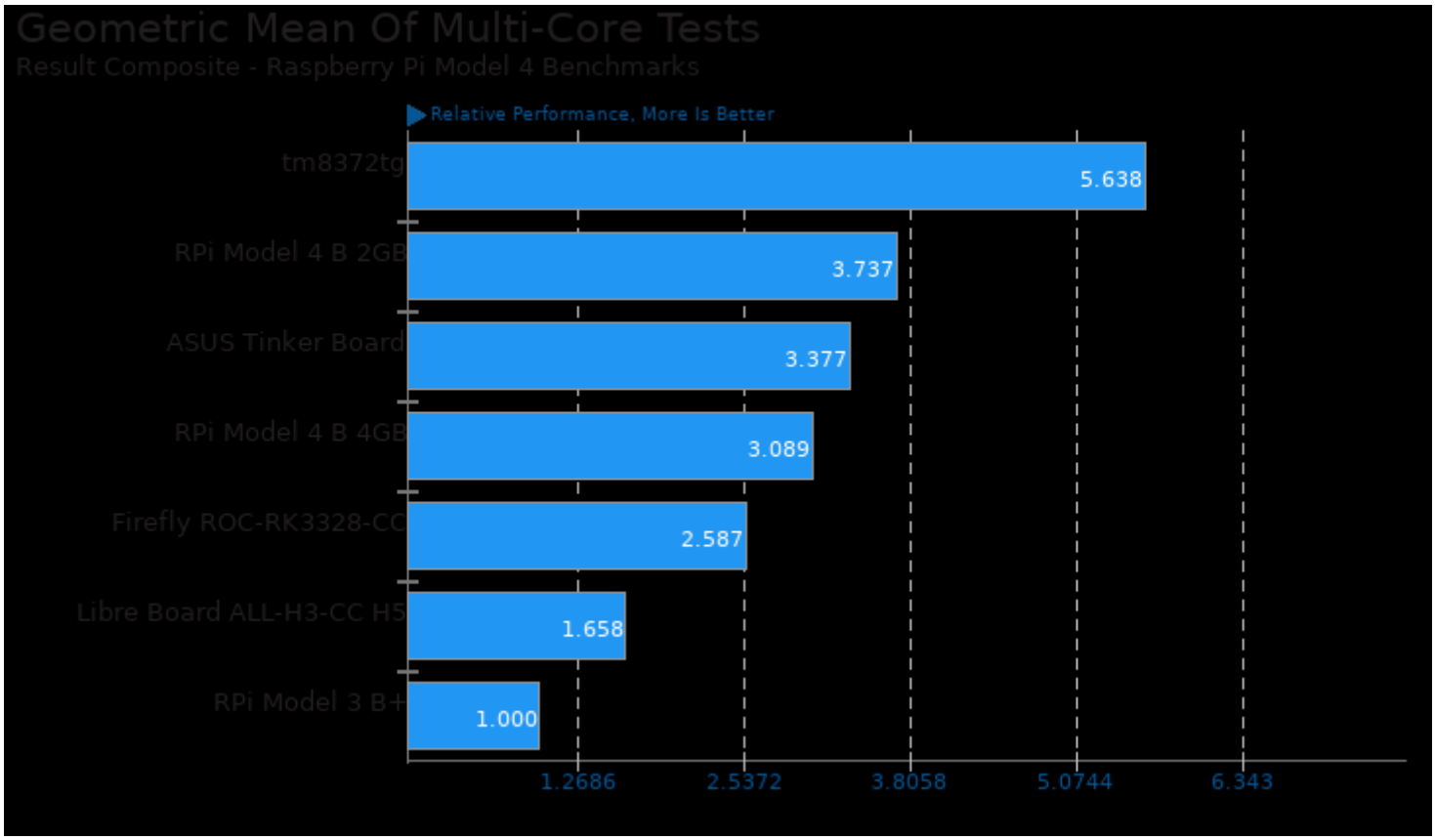

Geometric mean based upon tests: pts/compress-zstd, pts/x264, pts/encode-flac, pts/encode-mp3, pts/graphics-magick, pts/nginx, pts/phpbench and pts/rust-prime



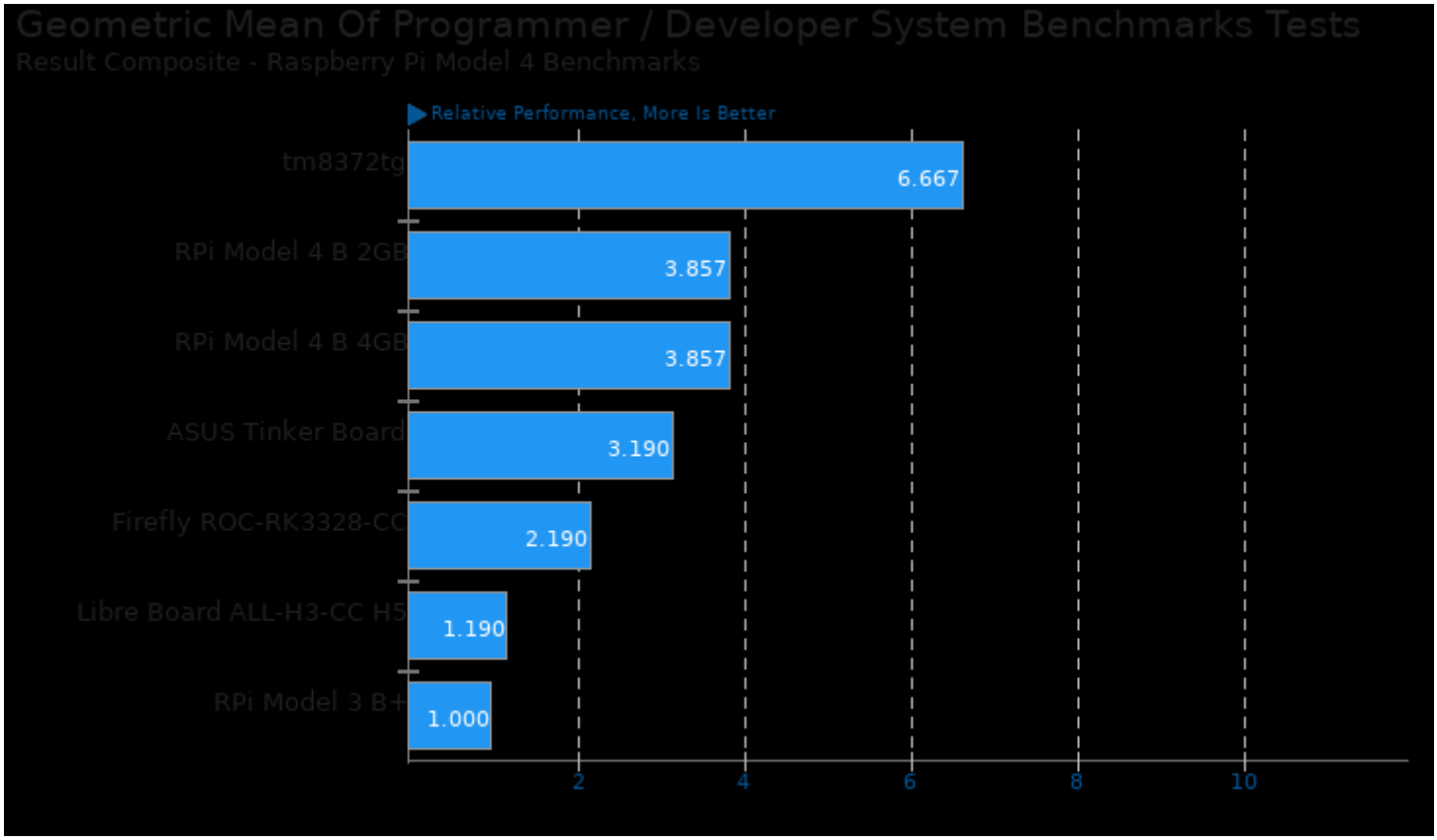

Geometric mean based upon tests: pts/smallpt, pts/x264, pts/encode-mp3, pts/encode-flac and pts/graphics-magick



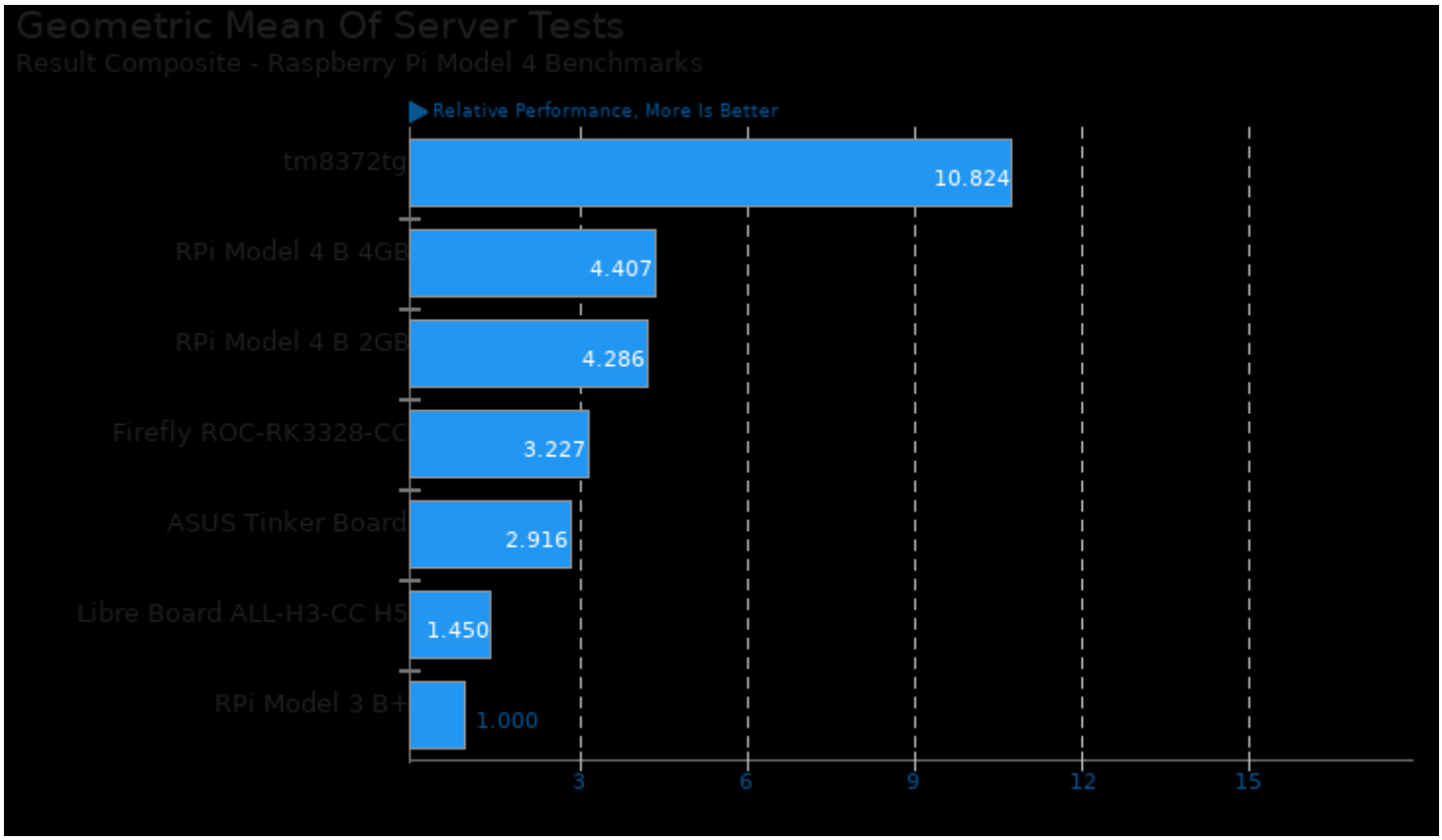

Geometric mean based upon tests: pts/encode-mp3, pts/encode-flac and pts/x264



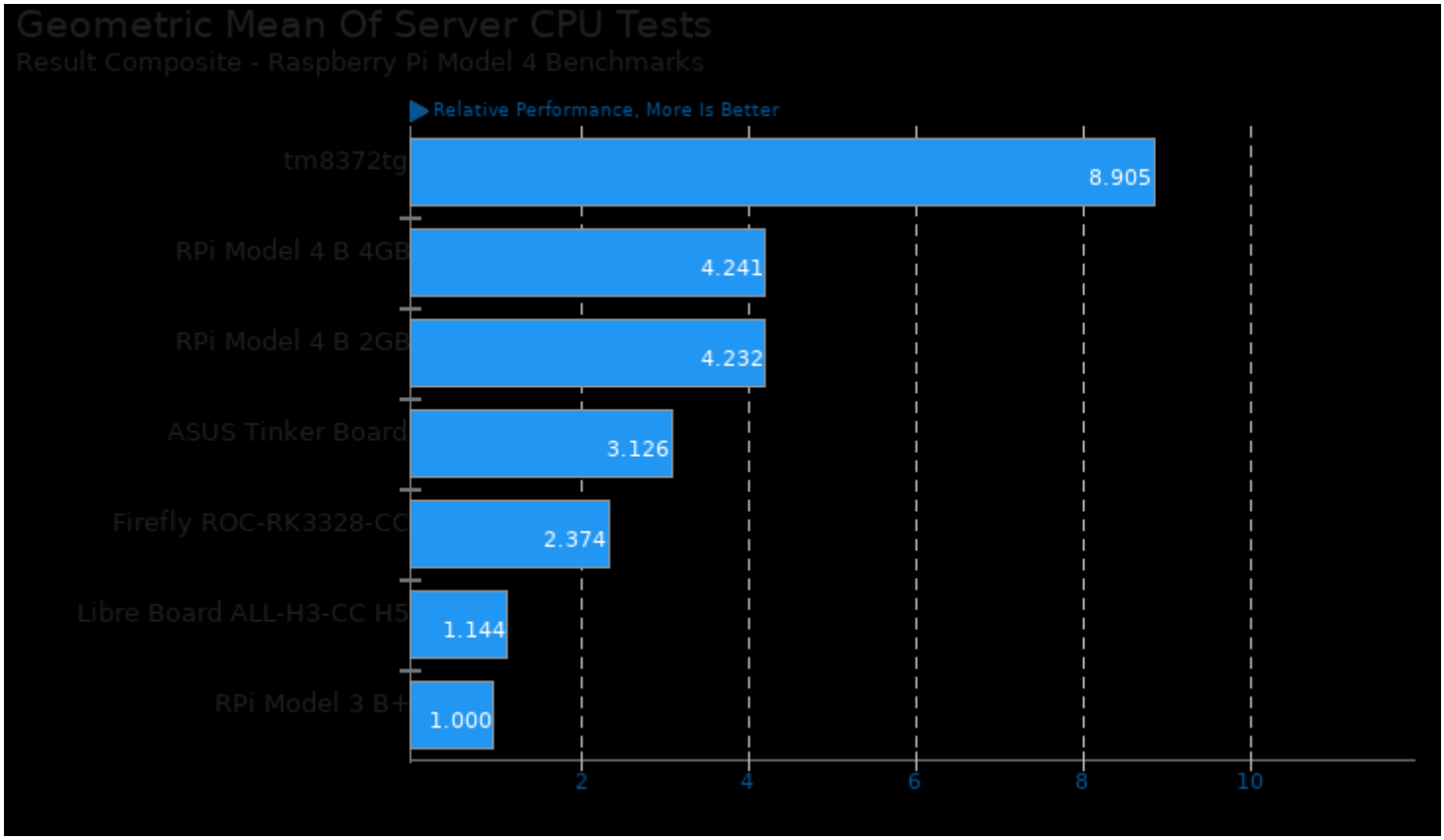

Geometric mean based upon tests: pts/x264, pts/smallpt, pts/graphics-magick, pts/compress-zstd and pts/rust-prime




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

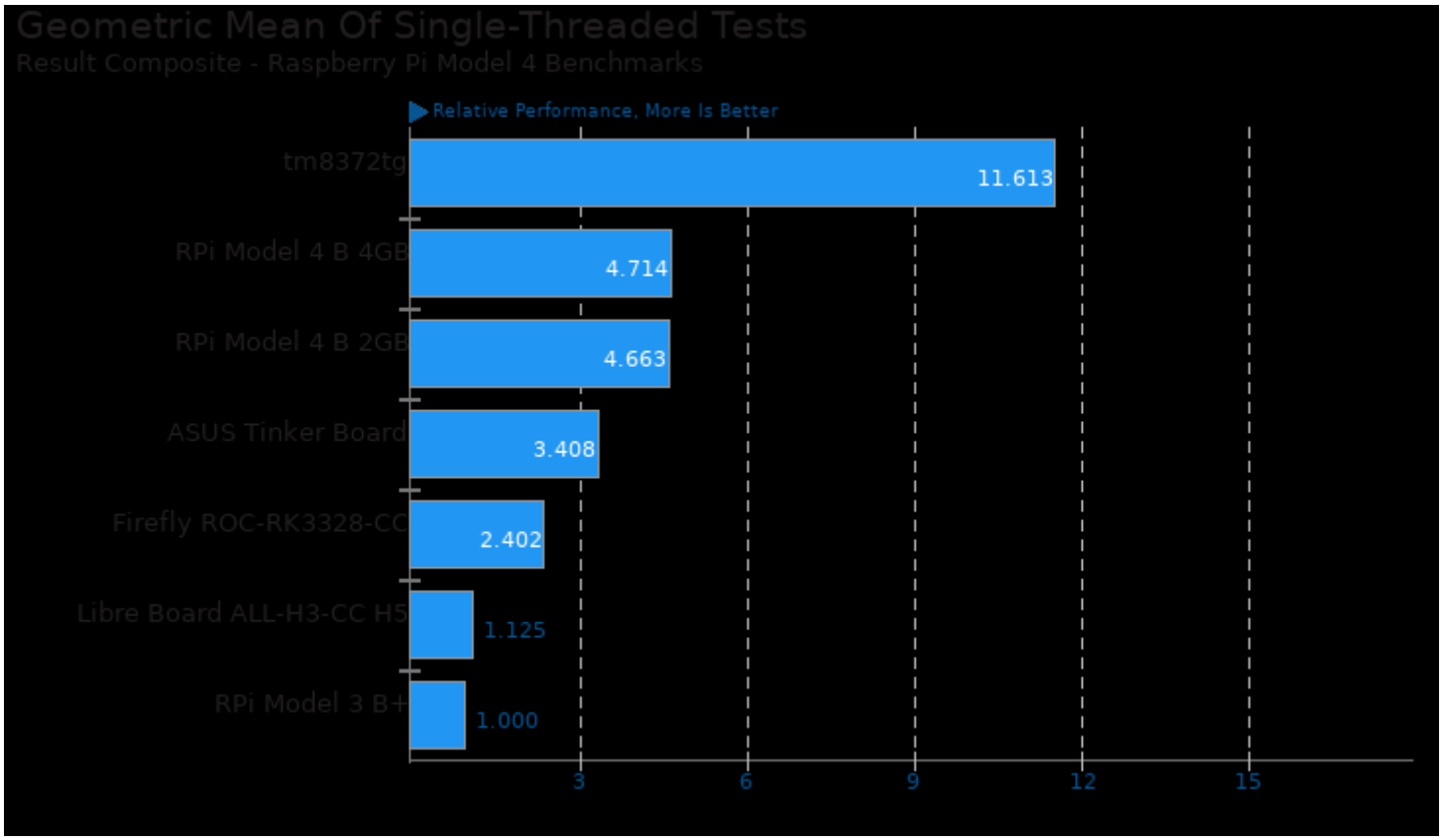



Geometric mean based upon tests: pts/nginx, pts/phpbench and pts/perl-benchmark




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 11:05.*