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NVIDIA R515 Benchmarks

Benchmarks by Michael Larabel for a future article with R515 beta using open and proprietary kernel module options. Plus latest R510 release for additional reference.

Automated Executive Summary

NVIDIA 510.68.02 had the most wins, coming in first place for 90% of the tests.

Based on the geometric mean of all complete results, the fastest (NVIDIA 510.68.02) was 1.057x the speed of the slowest (NVIDIA Open 515.43.04). NVIDIA 515.43.04 was 0.977x the speed of NVIDIA 510.68.02 and NVIDIA Open 515.43.04 was 0.968x the speed of NVIDIA 515.43.04.

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

Tesseract (Resolution: 3840 x 2160) at 1.302x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: Low - Denoiser: Off - Ray Tracing API: VK_NV_ray_tracing) at 1.147x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_NV_ray_tracing) at 1.117x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_NV_ray_tracing) at 1.095x
Xonotic (Resolution: 3840 x 2160 - Effects Quality: Ultimate) at 1.091x

Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: Low - Denoiser: On - Ray Tracing API: VK_NV_ray_tracing) at 1.091x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: Low - Denoiser: On - Ray Tracing API: VK_KHR_ray_query) at 1.087x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query) at 1.085x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: Low - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline) at 1.077x
Unigine Superposition (Resolution: 1920 x 1080 - Mode: Fullscreen - Quality: High - Renderer: OpenGL) at 1.074x.

Test Systems:

NVIDIA 510.68.02

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce RTX 3090 24GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.15.0-27-generic (x86_64), Desktop: GNOME Shell 42.0, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 510.68.02, OpenGL: 4.6.0, Vulkan: 1.2.204, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 32768 MiB - vBIOS Version: 94.02.27.00.02
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

NVIDIA 515.43.04

NVIDIA Open 515.43.04

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce RTX 3090 24GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

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NVIDIA R515 Benchmarks

	NVIDIA 510.68.02	NVIDIA 515.43.04	NVIDIA Open 515.43.04
DiRT Rally 2.0 - 2560 x 1080 - Ultra (FPS)	**217.573186**	**218.309743**	218.204493
Normalized	99.66%	100%	99.95%
Standard Deviation	0.7%	0.3%	0%
DiRT Rally 2.0 - 3840 x 1600 - Ultra (FPS)	**143.713572**	**145.299672**	144.128683
Normalized	98.91%	100%	99.19%
Standard Deviation	0.2%	0.2%	0.4%
F1 2021 - 1920 x 1080 - Ultra High (FPS)	**218**	**214**	**214**
Normalized	100%	98.17%	98.17%
Standard Deviation	0.8%	0.8%	0.3%
F1 2021 - 3840 x 2160 - Ultra High (FPS)	**109**	**107**	**107**
Normalized	100%	98.17%	98.17%
Standard Deviation	0%	0.5%	0%
GeeXLab Vulkan Ray-Tracing Demo - 1920 x 1080 (FPS)	**107.8**	106.5	**100.8**
Normalized	100%	98.79%	93.51%
Standard Deviation	1.1%	1%	0.2%
GeeXLab Vulkan Ray-Tracing Demo - 3840 x 2160 (FPS)	**29.5**	29.3	**28.2**
Normalized	100%	99.32%	95.59%
Standard Deviation	0.2%	0.2%	0.2%
HITMAN 3 - 1920 x 1080 - Ultra (FPS)	**258.40**	254.83	**253.60**
Normalized	100%	98.62%	98.14%
Standard Deviation	0.1%	0.1%	0.3%
HITMAN 3 - 3840 x 2160 - Ultra (FPS)	**114.80**	114.03	**113.40**
Normalized	100%	99.33%	98.78%
Standard Deviation	0%	0.1%	0.3%
Quake II RTX - 1920 x 1080 - Low - On - VK_KHR_ray_query (FPS)	**184.887721**	173.113642	**170.084070**
Normalized	100%	93.63%	91.99%
Standard Deviation	3.5%	1.2%	3.3%
Quake II RTX - 3840 x 2160 - Low - On - VK_KHR_ray_query (FPS)	**58.343231**	58.183397	**57.152644**
Normalized	100%	99.73%	97.96%
Standard Deviation	0.2%	0.9%	0.3%
Quake II RTX - 1920 x 1080 - High - On - VK_KHR_ray_query (FPS)	**157.331975**	154.104740	**147.247660**
Normalized	100%	97.95%	93.59%
Standard Deviation	2%	2.4%	0.4%
Quake II RTX - 1920 x 1080 - Low - Off - VK_KHR_ray_query (FPS)	**248.439210**	241.780706	**232.184820**
Normalized	100%	97.32%	93.46%
Standard Deviation	4.2%	1.8%	1.4%
Quake II RTX - 1920 x 1080 - Low - On - VK_NV_ray_tracing (FPS)	**182.982147**	182.157339	**167.769689**
Normalized	100%	99.55%	91.69%
Standard Deviation	2%	2.8%	1.9%
Quake II RTX - 3840 x 2160 - High - On - VK_KHR_ray_query (FPS)	**49.244552**	48.191134	**48.017914**
Normalized	100%	97.86%	97.51%
Standard Deviation	0.3%	0.6%	0.3%

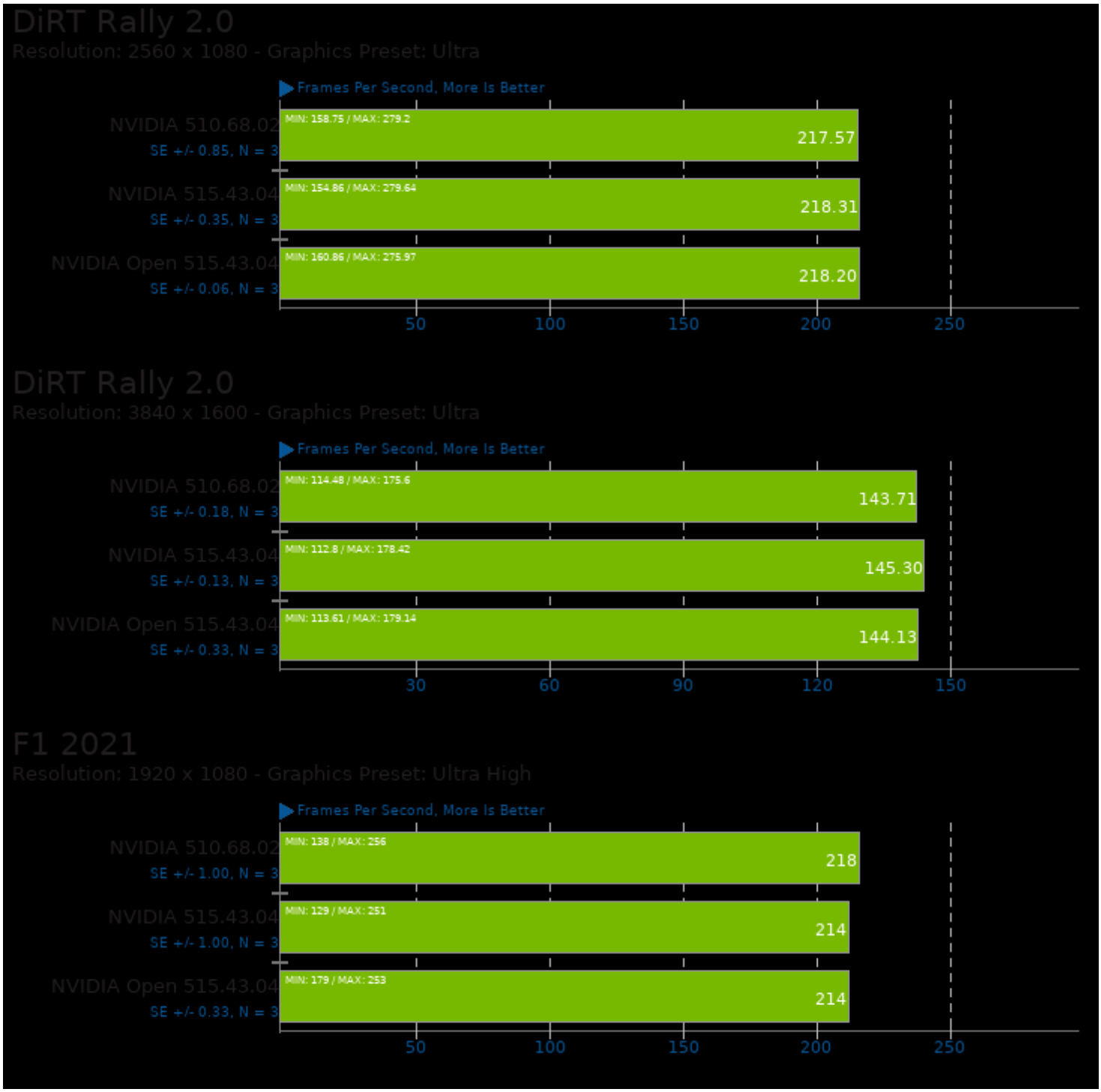
NVIDIA R515 Benchmarks

Quake II RTX - 3840 x 2160 - Low - Off - VK_KHR_ray_query (FPS)	**93.377329**	90.714634	**89.179779**
Normalized	100%	97.15%	95.5%
Standard Deviation	1.6%	2.1%	0.4%
Quake II RTX - 3840 x 2160 - Low - On - VK_NV_ray_tracing (FPS)	**58.666346**	58.082503	**57.393118**
Normalized	100%	99%	97.83%
Standard Deviation	0.6%	0.4%	1.3%
Quake II RTX - 1920 x 1080 - High - Off - VK_KHR_ray_query (FPS)	**203.032322**	196.356901	**187.175141**
Normalized	100%	96.71%	92.19%
Standard Deviation	2.5%	2.5%	1.5%
Quake II RTX - 1920 x 1080 - High - On - VK_NV_ray_tracing (FPS)	**162.392075**	153.420621	**148.354205**
Normalized	100%	94.48%	91.36%
Standard Deviation	2%	2.3%	2.2%
Quake II RTX - 1920 x 1080 - Low - Off - VK_NV_ray_tracing (FPS)	**246.417329**	240.249050	**214.925334**
Normalized	100%	97.5%	87.22%
Standard Deviation	3.8%	4.5%	0.7%
Quake II RTX - 3840 x 2160 - High - Off - VK_KHR_ray_query (FPS)	**71.422424**	**69.606214**	69.826121
Normalized	100%	97.46%	97.76%
Standard Deviation	0.6%	0.3%	1%
Quake II RTX - 3840 x 2160 - High - On - VK_NV_ray_tracing (FPS)	**49.255258**	48.241636	**47.873739**
Normalized	100%	97.94%	97.2%
Standard Deviation	0.8%	0.1%	0.4%
Quake II RTX - 3840 x 2160 - Low - Off - VK_NV_ray_tracing (FPS)	**92.448026**	91.154910	**88.338409**
Normalized	100%	98.6%	95.55%
Standard Deviation	0.7%	1.5%	0.2%
Quake II RTX - 1920 x 1080 - High - Off - VK_NV_ray_tracing (FPS)	**206.696675**	200.239214	**184.966548**
Normalized	100%	96.88%	89.49%
Standard Deviation	3.6%	2.4%	1%
Quake II RTX - 3840 x 2160 - High - Off - VK_NV_ray_tracing (FPS)	71.127912	**71.129659**	**69.405607**
Normalized	100%	100%	97.58%
Standard Deviation	1.1%	1.4%	0.9%
Quake II RTX - 1920 x 1080 - Low - On - VK_KHR_ray_tracing_pipeline (FPS)	**142.586528**	136.435908	**133.595116**
Normalized	100%	95.69%	93.69%
Standard Deviation	1.8%	1.2%	2.6%
Quake II RTX - 3840 x 2160 - Low - On - VK_KHR_ray_tracing_pipeline (FPS)	**44.176431**	42.423082	**42.222468**
Normalized	100%	96.03%	95.58%
Standard Deviation	0.2%	0.6%	0.1%
Quake II RTX - 1920 x 1080 - High - On - VK_KHR_ray_tracing_pipeline (FPS)	**117.046562**	113.042330	**110.694837**
Normalized	100%	96.58%	94.57%
Standard Deviation	1.3%	0.2%	0.9%

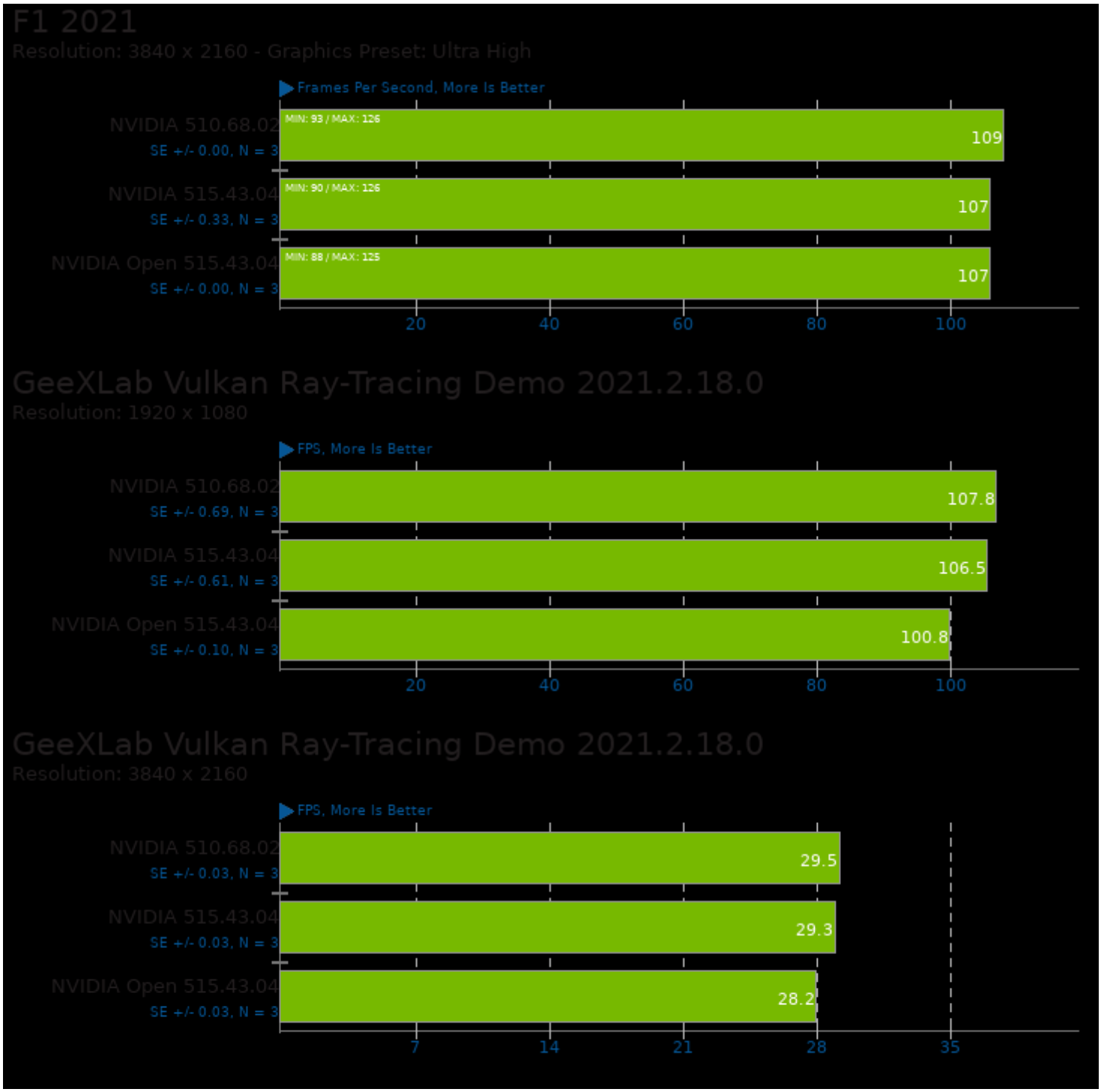
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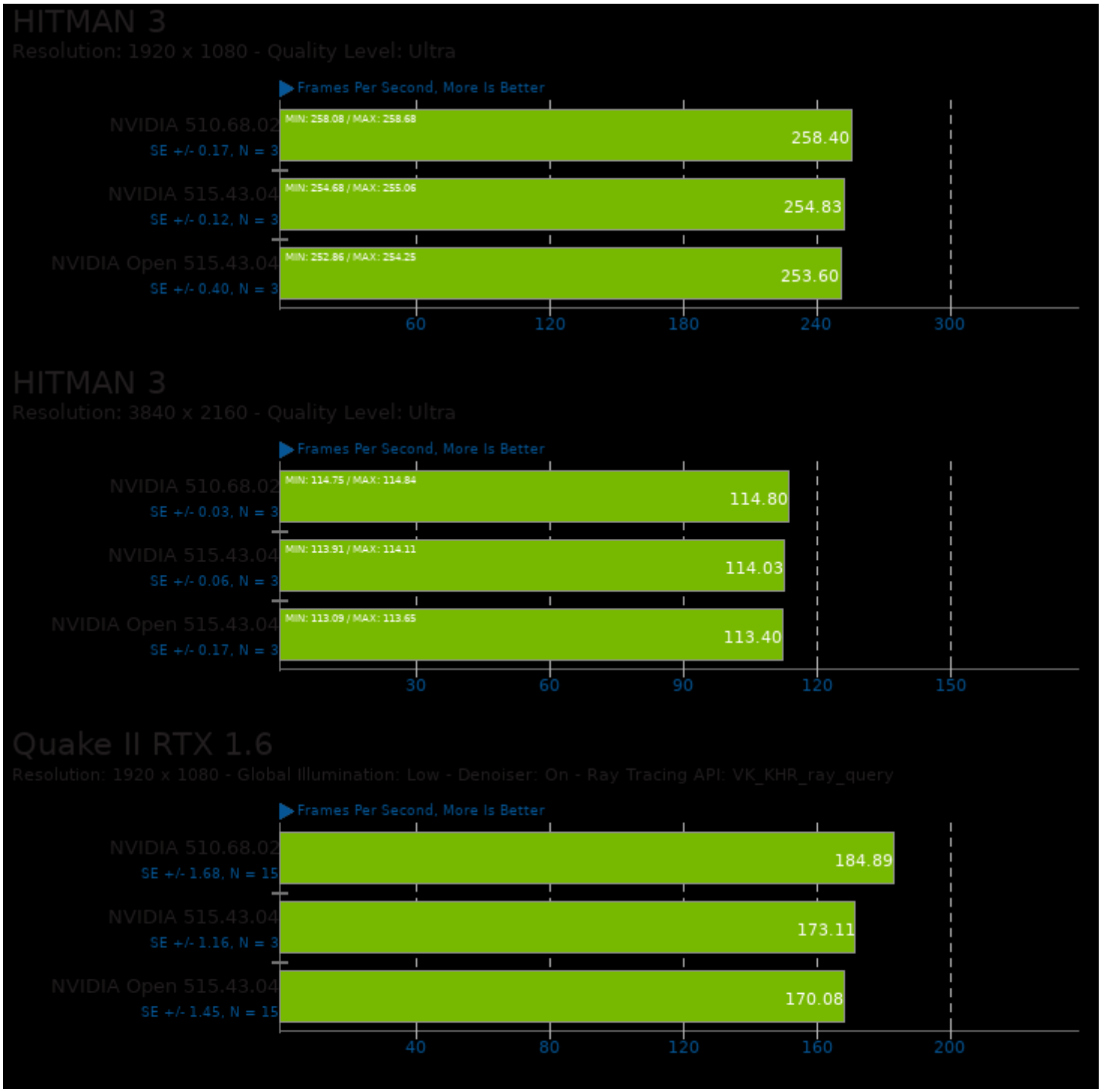
Quake II RTX - 1920 x 1080 - Low - Off - VK_KHR_ray_tracing_pipeline (FPS)	**180.376038**	171.504094	**167.421300**
Normalized	100%	95.08%	92.82%
Standard Deviation	0.6%	2.4%	2.4%
Quake II RTX - 3840 x 2160 - High - On - VK_KHR_ray_tracing_pipeline (FPS)	**34.706570**	33.743451	**33.632508**
Normalized	100%	97.22%	96.91%
Standard Deviation	0.1%	0.2%	0.2%
Quake II RTX - 3840 x 2160 - Low - Off - VK_KHR_ray_tracing_pipeline (FPS)	**60.504577**	59.000794	**57.334962**
Normalized	100%	97.51%	94.76%
Standard Deviation	0.2%	0.6%	0.5%
Quake II RTX - 1920 x 1080 - High - Off - VK_KHR_ray_tracing_pipeline (FPS)	**147.988937**	145.659505	**142.074974**
Normalized	100%	98.43%	96%
Standard Deviation	0.8%	1%	2.3%
Quake II RTX - 3840 x 2160 - High - Off - VK_KHR_ray_tracing_pipeline (FPS)	**46.767627**	46.521565	**45.899086**
Normalized	100%	99.47%	98.14%
Standard Deviation	0.7%	0.9%	0.4%
Strange Brigade - 1920 x 1080 - Ultra (FPS)	**227.7**	**224.8**	**224.8**
Normalized	100%	98.73%	98.73%
Standard Deviation	1.5%	1.8%	1.8%
Strange Brigade - 3840 x 2160 - Ultra (FPS)	**203.6**	198.9	**198.6**
Normalized	100%	97.69%	97.54%
Standard Deviation	0.4%	0.4%	0.3%
Tesseract - 3840 x 2160 (FPS)	654.0414	**656.8587**	**504.5641**
Normalized	99.57%	100%	76.81%
Standard Deviation	3.9%	1.9%	0.8%
Total War: Three Kingdoms - 1920 x 1080 - Ultra - Battle Benchmark (FPS)	**164.1**	161.8	**159.5**
Normalized	100%	98.6%	97.2%
Standard Deviation	7%	7%	7.7%
Total War: Three Kingdoms - 3840 x 2160 - Ultra - Battle Benchmark (FPS)	**58.5**	58.0	**57.9**
Normalized	100%	99.15%	98.97%
Standard Deviation	0.3%	1.2%	1.4%
Unigine Superposition - 1920 x 1080 - Fullscreen - High - OpenGL (FPS)	**176.7**	172.1	**164.5**
Normalized	100%	97.4%	93.1%
Standard Deviation	0.1%	4.1%	0%
Unigine Superposition - 1920 x 1080 - Fullscreen - Ultra - OpenGL (FPS)	**83.9**	82.7	**80.3**
Normalized	100%	98.57%	95.71%
Standard Deviation	0.2%	0.1%	0.1%
X-Plane - 1920 x 1080 - Very High - Vulkan (FPS)	**117.24**	102.83	**94.19**
Normalized	100%	87.71%	80.34%
Standard Deviation	2.4%	19.2%	24.1%
Xonotic - 3840 x 2160 - Ultimate (FPS)	**393.1503774**	386.4645542	**360.3719763**
Normalized	100%	98.3%	91.66%
Standard Deviation	0.4%	0.2%	0.2%

NVIDIA R515 Benchmarks

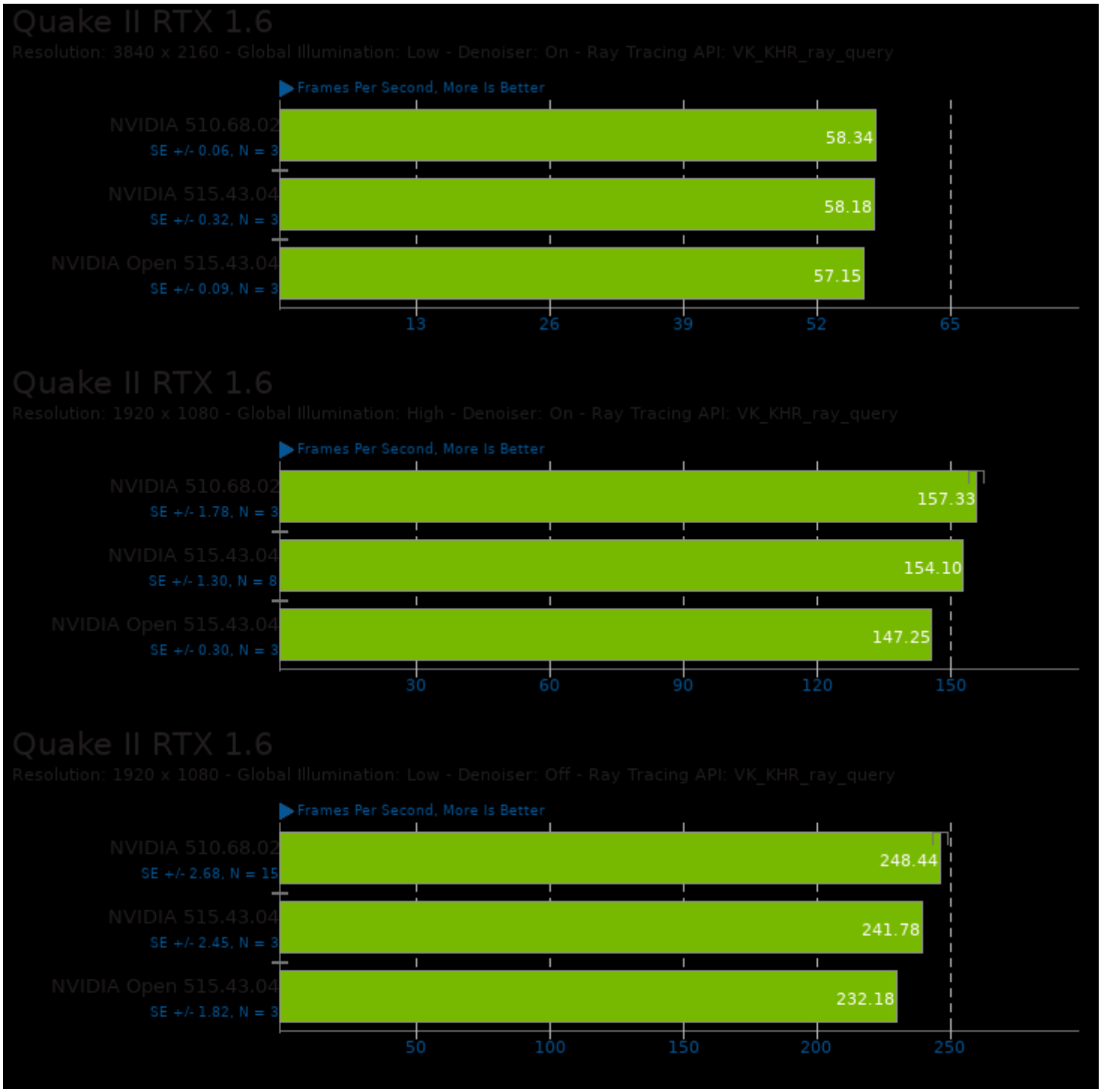


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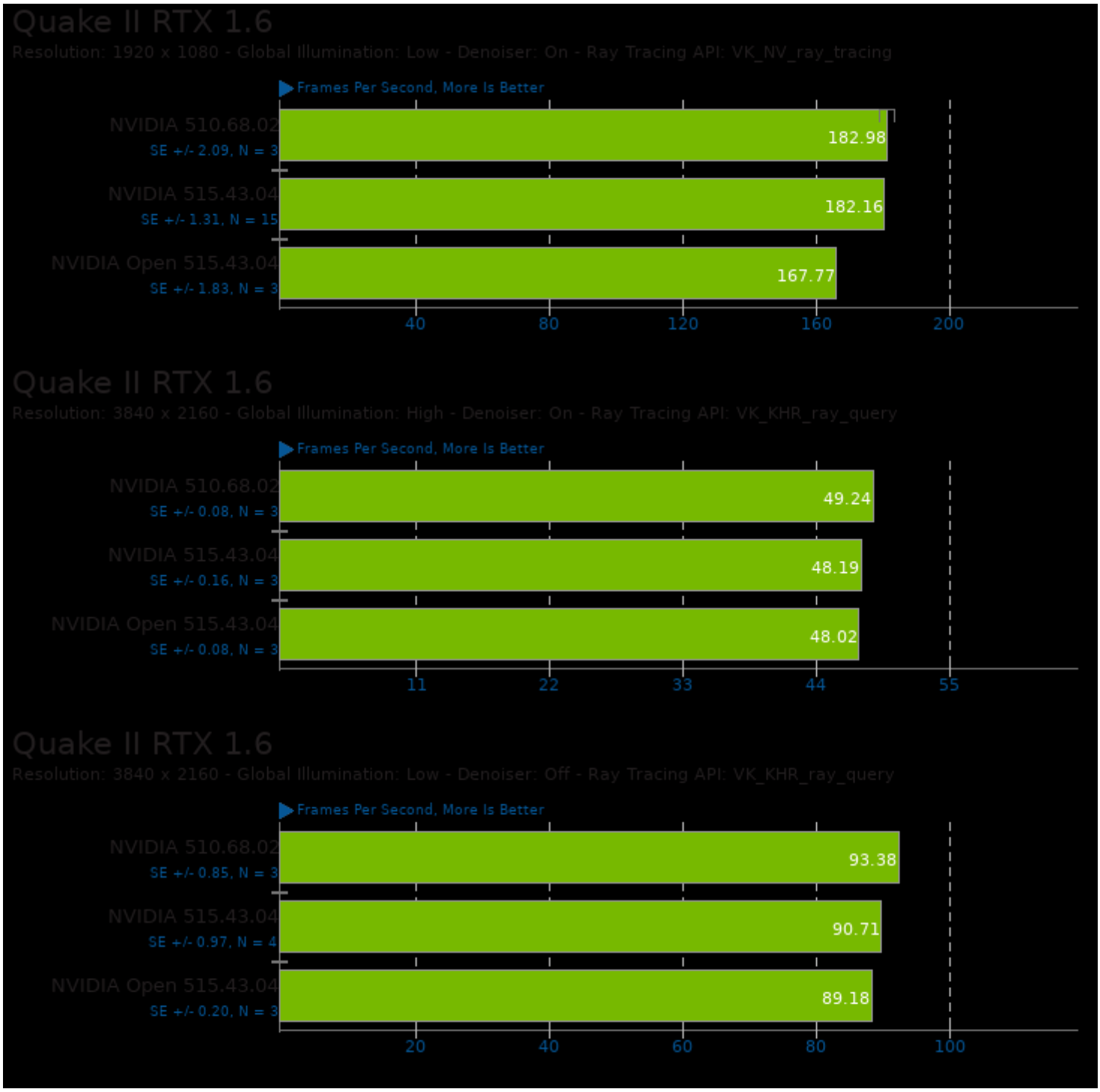



HITMAN 3
Resolution: 1920 x 1080 - Quality Level: Ultra
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 0.17, N = 3
MIN: 258.08 / MAX: 258.68
258.40
NVIDIA 515.43.04
SE +/- 0.12, N = 3
MIN: 254.68 / MAX: 255.06
254.83
NVIDIA Open 515.43.04
SE +/- 0.40, N = 3
MIN: 252.86 / MAX: 254.25
253.60
60
120
180
240
300
HITMAN 3
Resolution: 3840 x 2160 - Quality Level: Ultra
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 0.03, N = 3
MIN: 114.75 / MAX: 114.84
114.80
NVIDIA 515.43.04
SE +/- 0.06, N = 3
MIN: 113.91 / MAX: 114.11
114.03
NVIDIA Open 515.43.04
SE +/- 0.17, N = 3
MIN: 113.09 / MAX: 113.65
113.40
30
60
90
120
150
Quake II RTX 1.6
Resolution: 1920 x 1080 - Global Illumination: Low - Denoiser: On - Ray Tracing API: VK_KHR_ray_query
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 1.68, N = 15
184.89
NVIDIA 515.43.04
SE +/- 1.16, N = 3
173.11
NVIDIA Open 515.43.04
SE +/- 1.45, N = 15
170.08
40
80
120
160
200

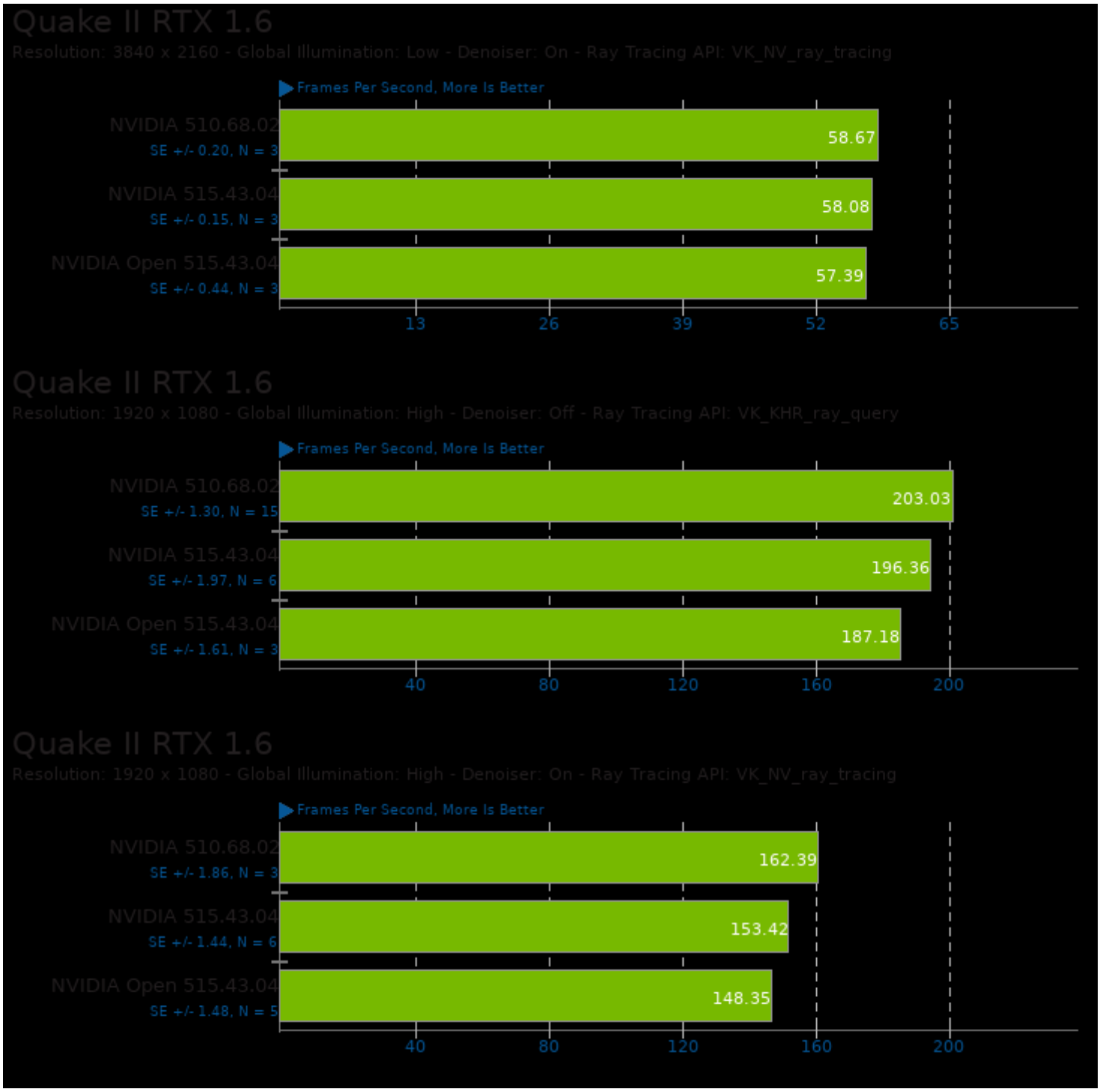
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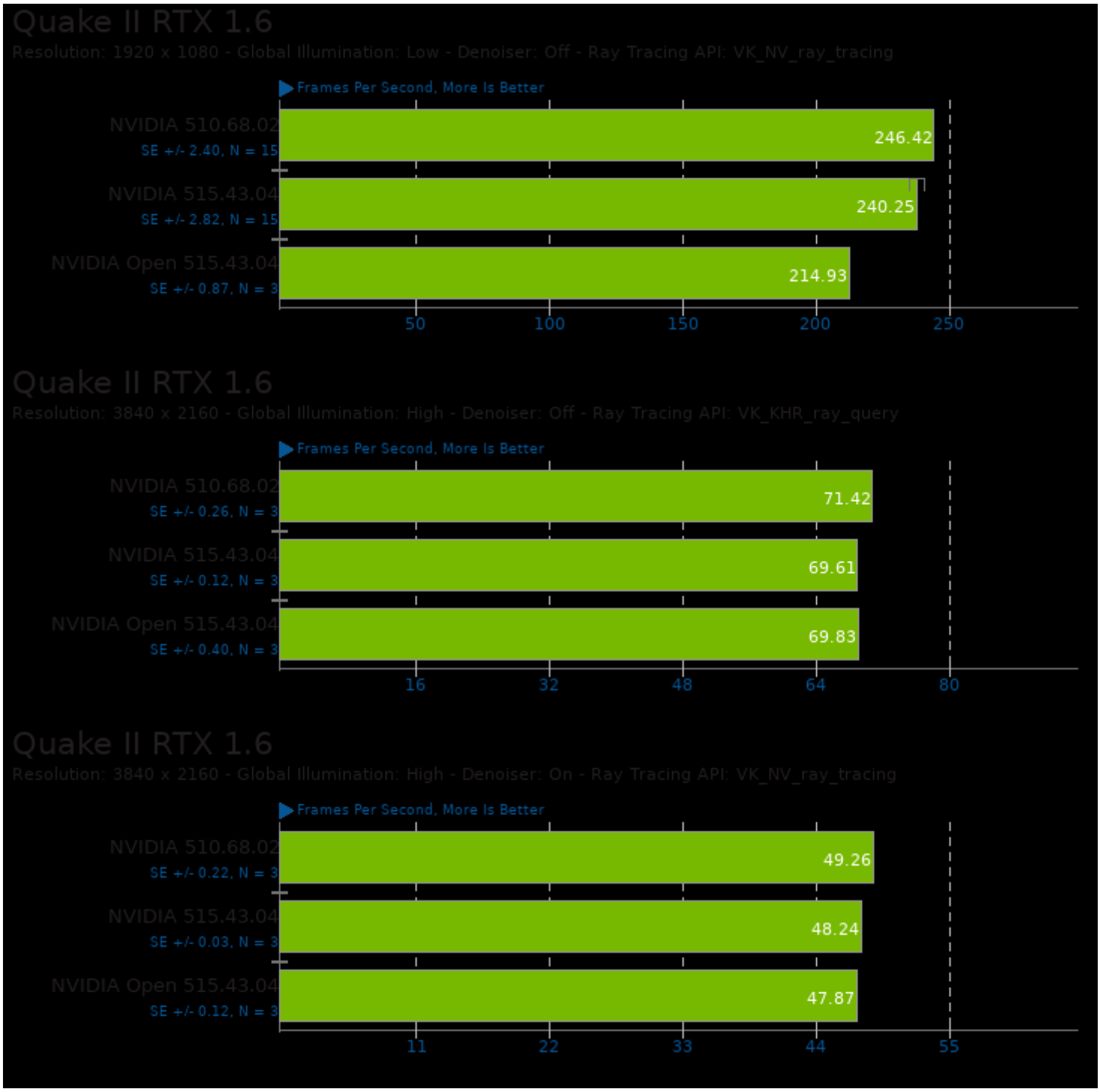
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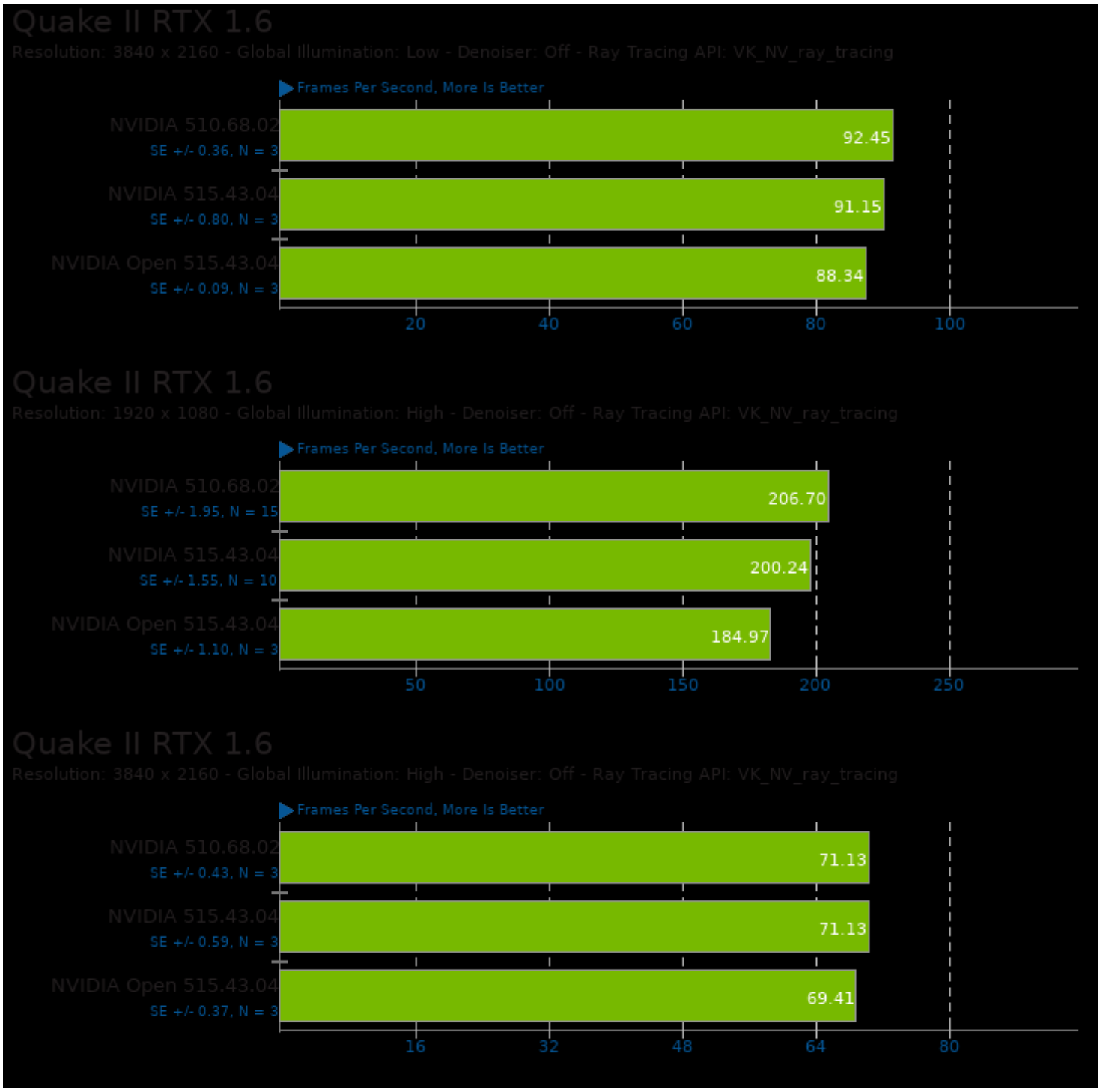
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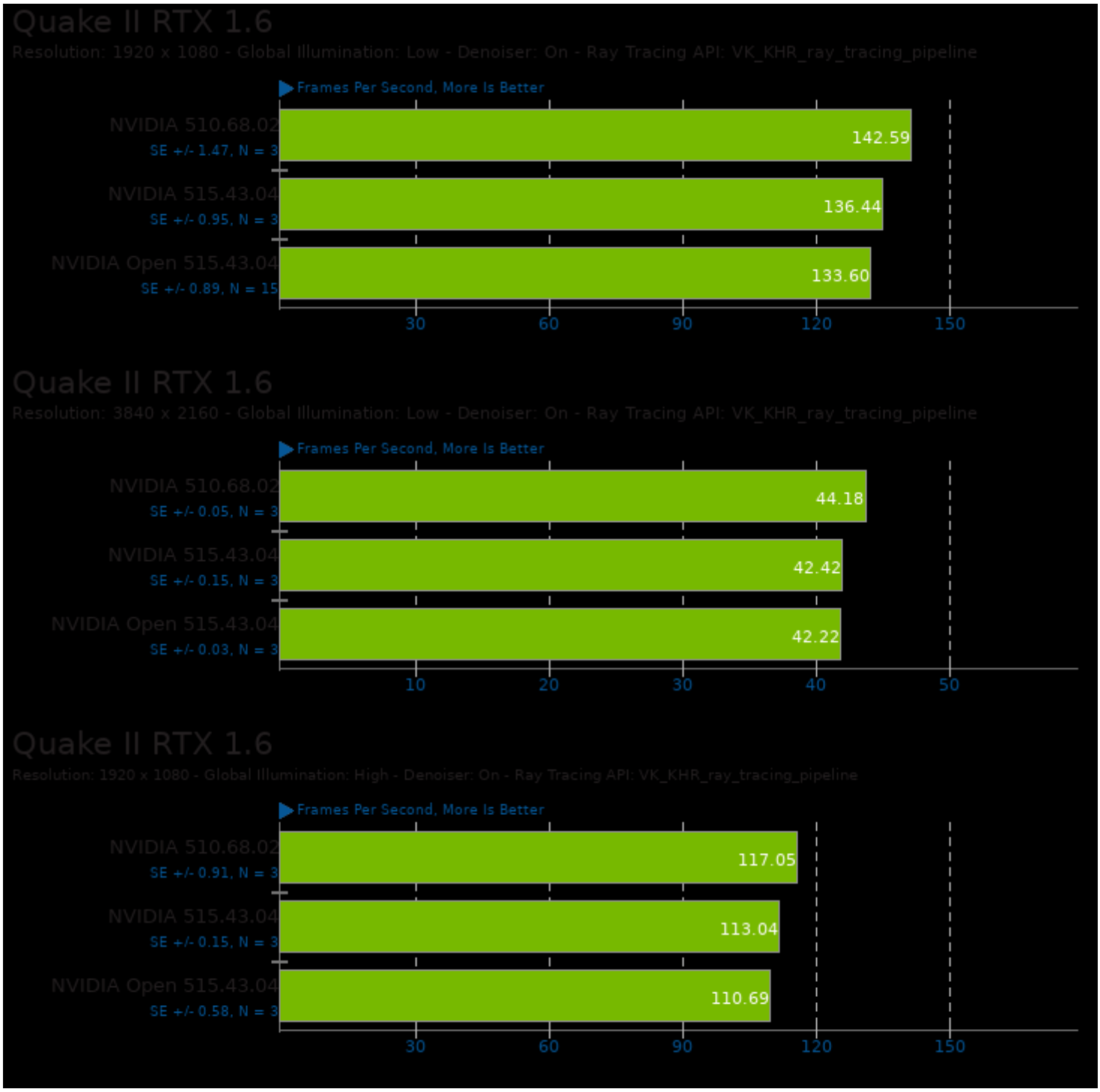


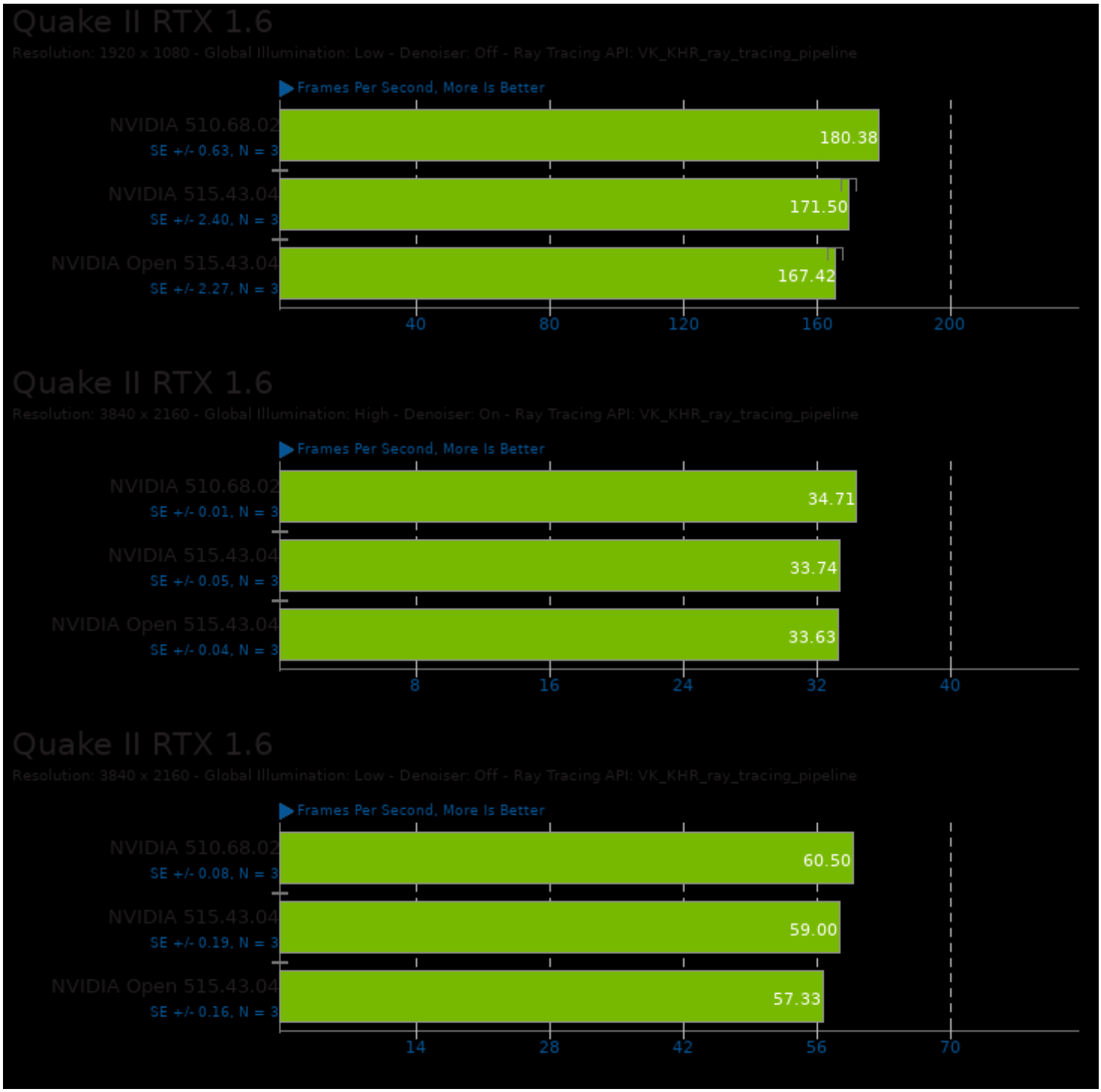
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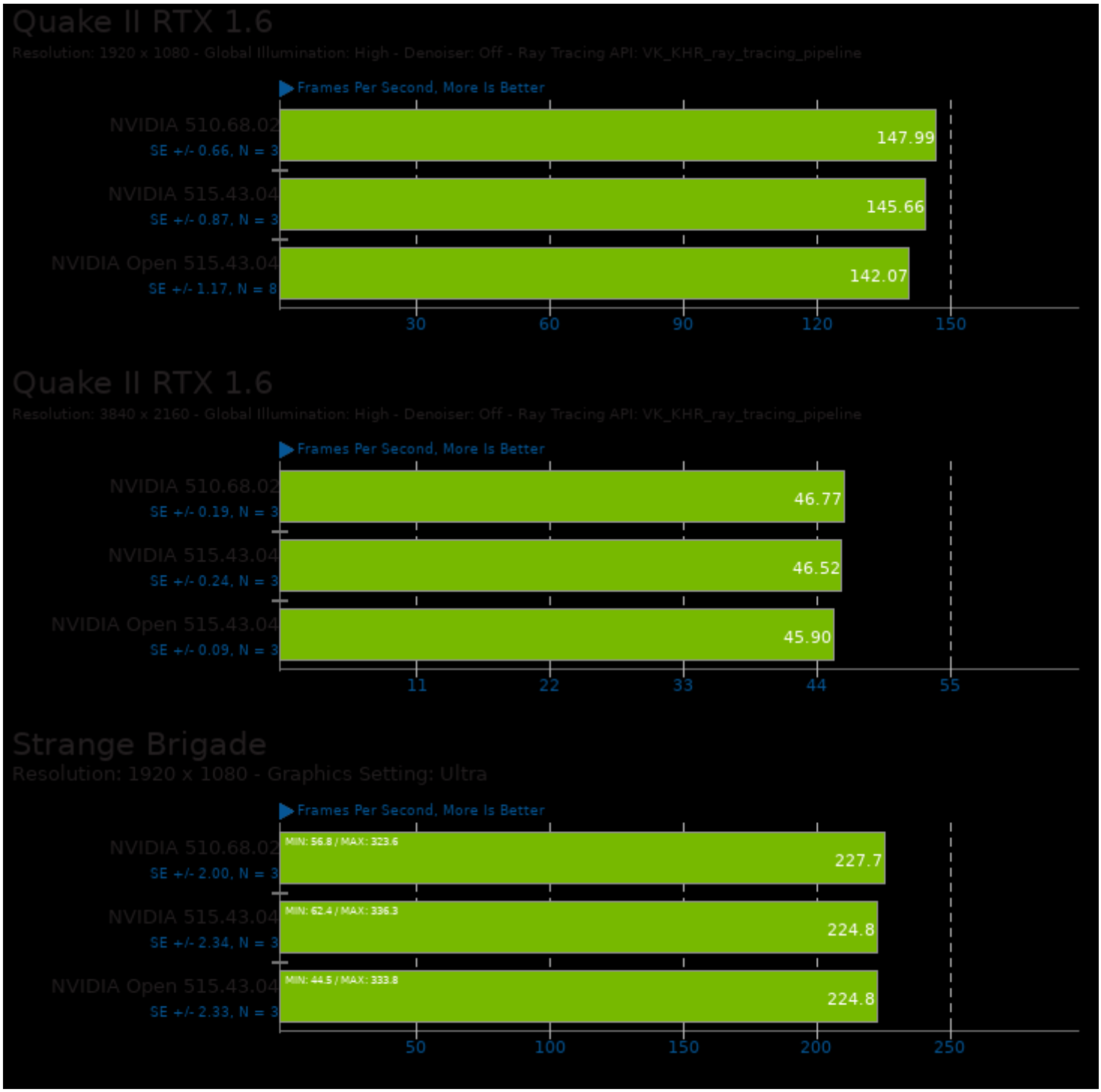
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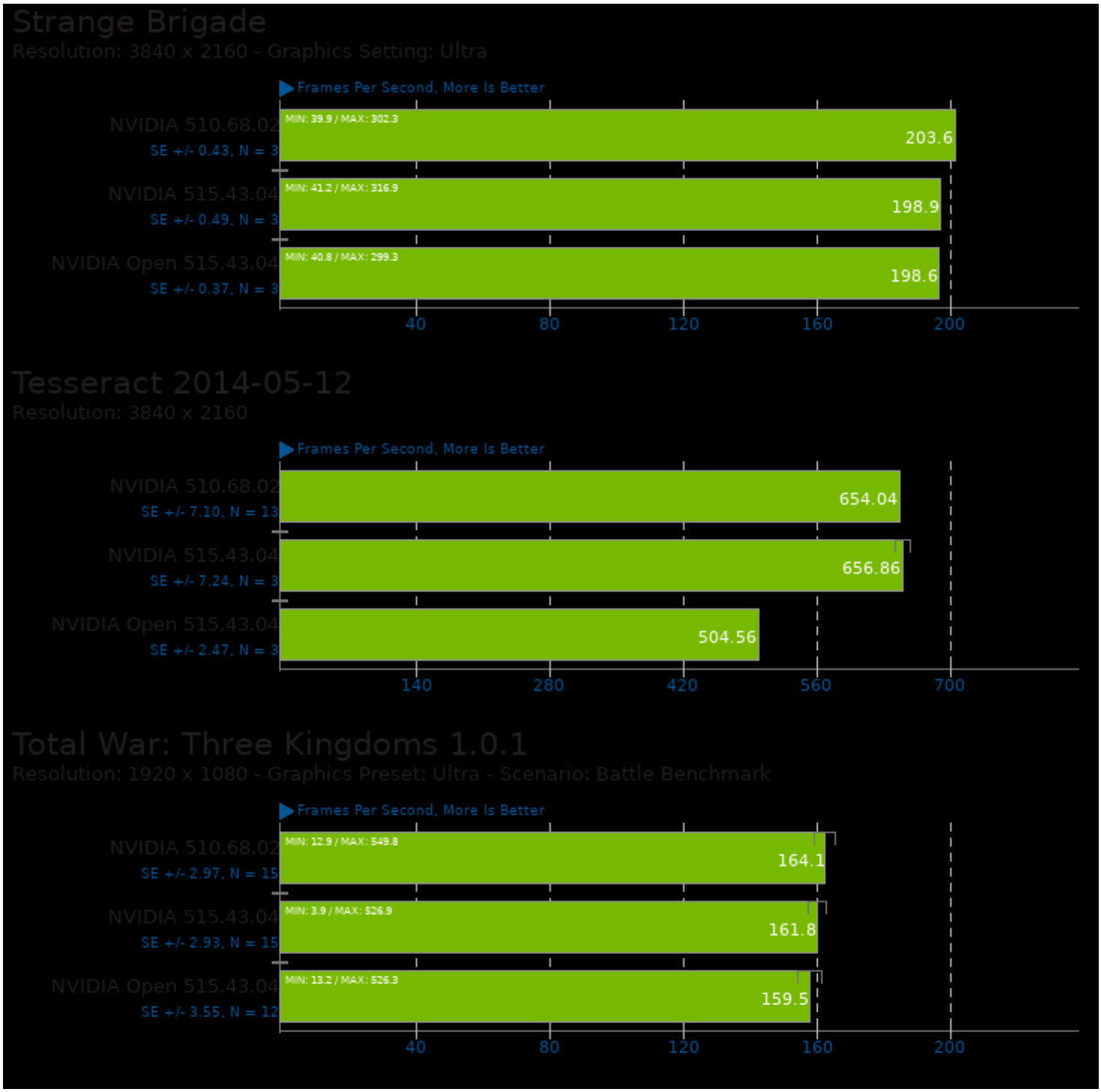

Quake II RTX 1.6
Resolution: 1920 x 1080 - Global Illumination: Low - Denoiser: On - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 1.47, N = 3
142.59
NVIDIA 515.43.04
SE +/- 0.95, N = 3
136.44
NVIDIA Open 515.43.04
SE +/- 0.89, N = 15
133.60
30
60
90
120
150
Quake II RTX 1.6
Resolution: 3840 x 2160 - Global Illumination: Low - Denoiser: On - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 0.05, N = 3
44.18
NVIDIA 515.43.04
SE +/- 0.15, N = 3
42.42
NVIDIA Open 515.43.04
SE +/- 0.03, N = 3
42.22
10
20
30
40
50
Quake II RTX 1.6
Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 0.91, N = 3
117.05
NVIDIA 515.43.04
SE +/- 0.15, N = 3
113.04
NVIDIA Open 515.43.04
SE +/- 0.58, N = 3
110.69
30
60
90
120
150

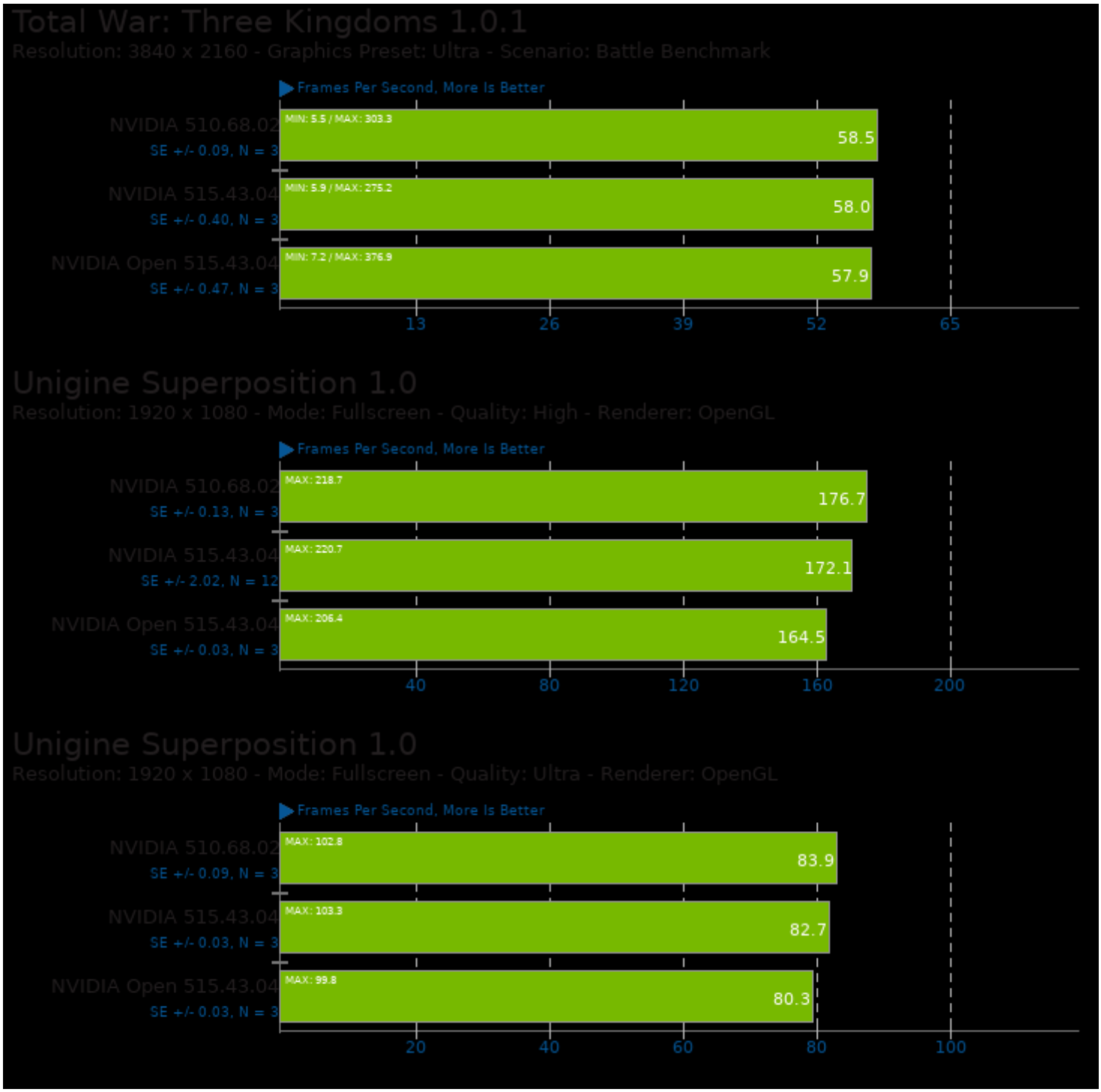

Quake II RTX 1.6
Resolution: 1920 x 1080 - Global Illumination: Low - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 0.63, N = 3
180.38
NVIDIA 515.43.04
SE +/- 2.40, N = 3
171.50
NVIDIA Open 515.43.04
SE +/- 2.27, N = 3
167.42
40
80
120
160
200
Quake II RTX 1.6
Resolution: 3840 x 2160 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 0.01, N = 3
34.71
NVIDIA 515.43.04
SE +/- 0.05, N = 3
33.74
NVIDIA Open 515.43.04
SE +/- 0.04, N = 3
33.63
8
16
24
32
40
Quake II RTX 1.6
Resolution: 3840 x 2160 - Global Illumination: Low - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 0.08, N = 3
60.50
NVIDIA 515.43.04
SE +/- 0.19, N = 3
59.00
NVIDIA Open 515.43.04
SE +/- 0.16, N = 3
57.33
14
28
42
56
70

NVIDIA R515 Benchmarks

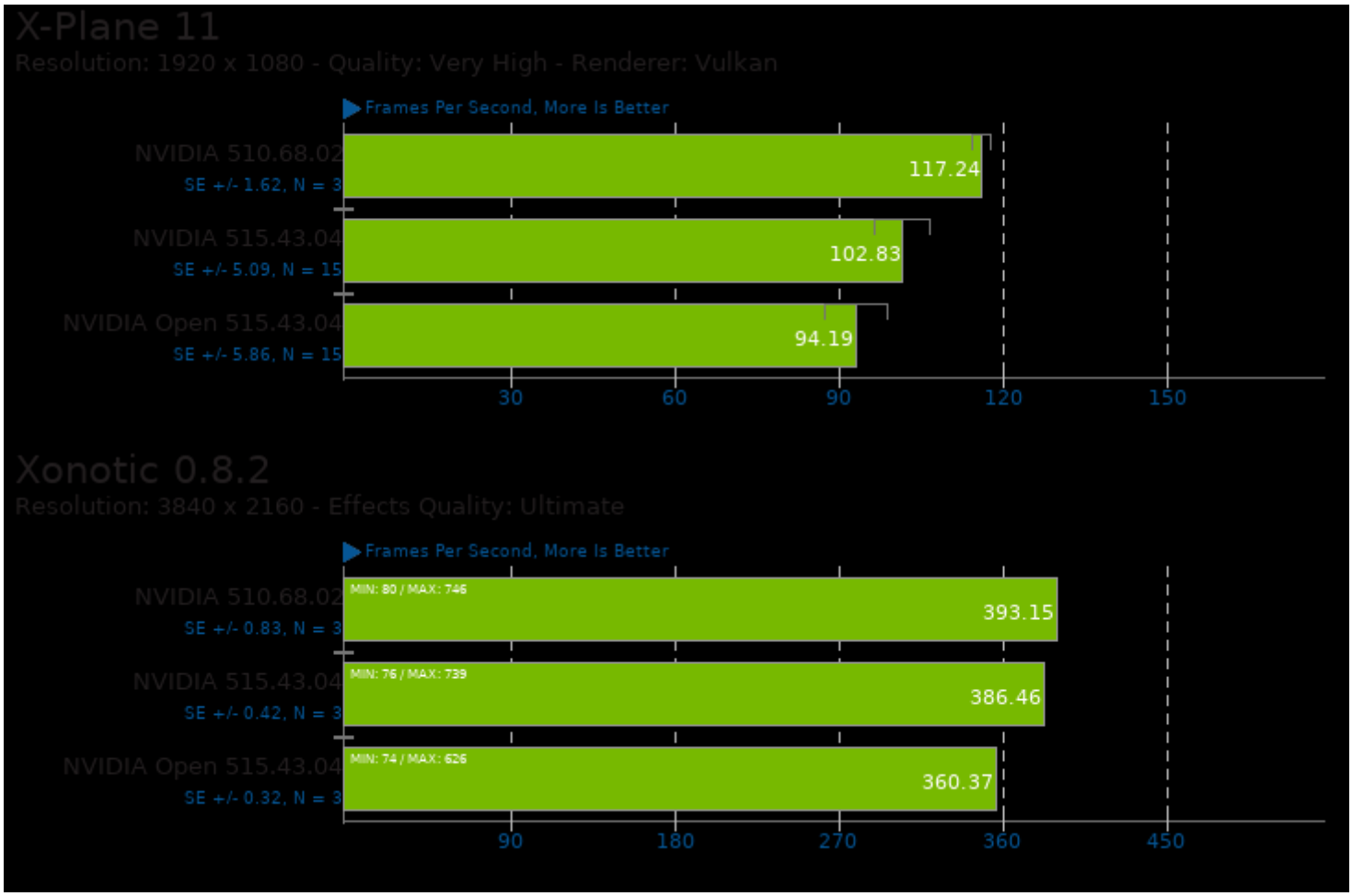


NVIDIA R515 Benchmarks

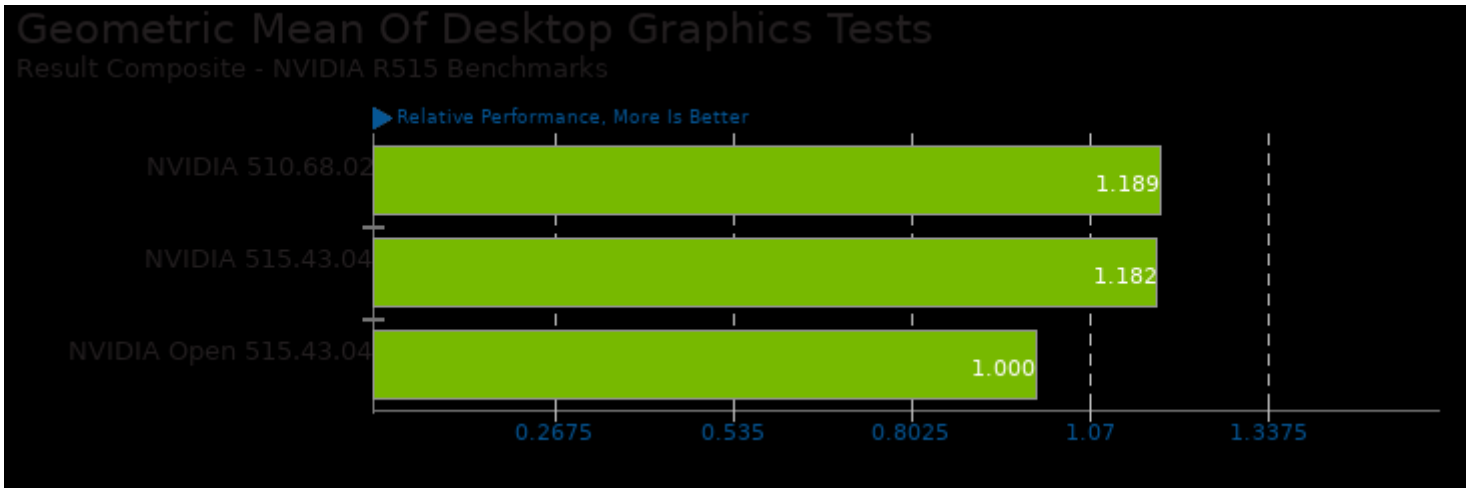



Total War: Three Kingdoms 1.0.1
Resolution: 3840 x 2160 - Graphics Preset: Ultra - Scenario: Battle Benchmark
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 0.09, N = 3
MIN: 5.5 / MAX: 303.3
58.5
NVIDIA 515.43.04
SE +/- 0.40, N = 3
MIN: 5.9 / MAX: 275.2
58.0
NVIDIA Open 515.43.04
SE +/- 0.47, N = 3
MIN: 7.2 / MAX: 376.9
57.9
13
26
39
52
65
Unigine Superposition 1.0
Resolution: 1920 x 1080 - Mode: Fullscreen - Quality: High - Renderer: OpenGL
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 0.13, N = 3
MAX: 218.7
176.7
NVIDIA 515.43.04
SE +/- 2.02, N = 12
MAX: 220.7
172.1
NVIDIA Open 515.43.04
SE +/- 0.03, N = 3
MAX: 206.4
164.5
40
80
120
160
200
Unigine Superposition 1.0
Resolution: 1920 x 1080 - Mode: Fullscreen - Quality: Ultra - Renderer: OpenGL
Frames Per Second, More Is Better
NVIDIA 510.68.02
SE +/- 0.09, N = 3
MAX: 102.8
83.9
NVIDIA 515.43.04
SE +/- 0.03, N = 3
MAX: 103.3
82.7
NVIDIA Open 515.43.04
SE +/- 0.03, N = 3
MAX: 99.8
80.3
20
40
60
80
100

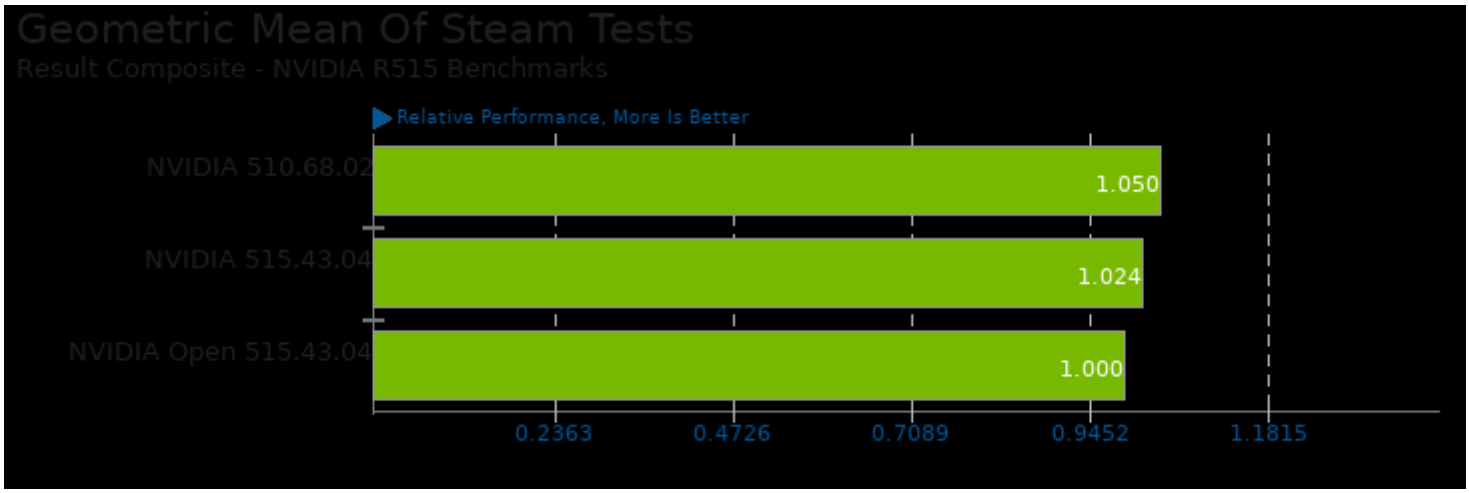
NVIDIA R515 Benchmarks



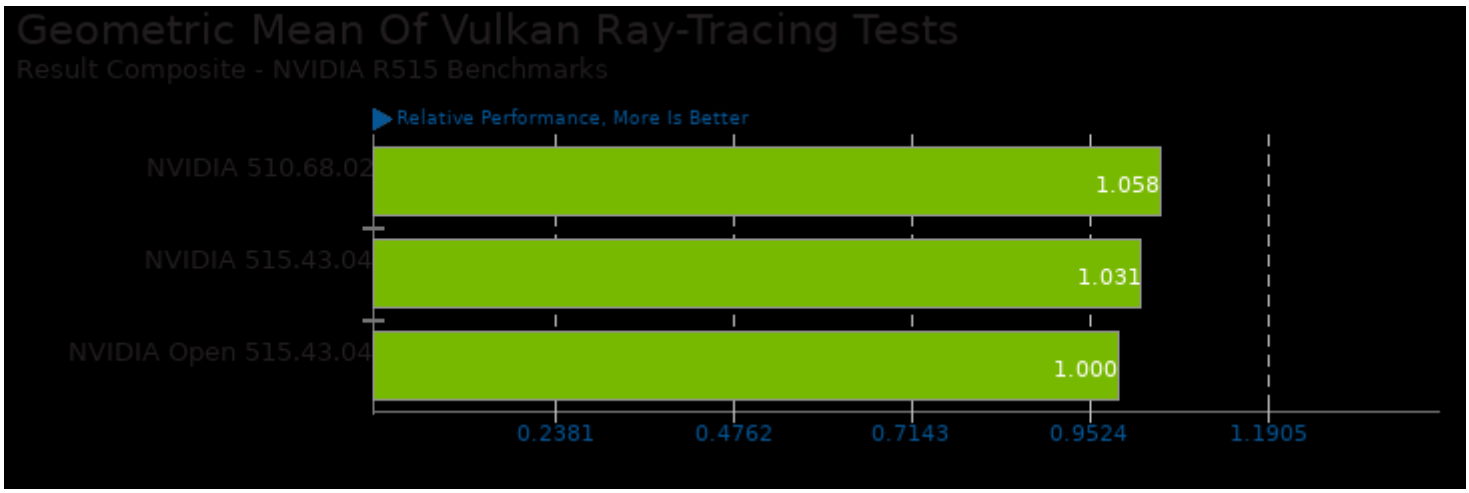
These geometric means are based upon test groupings / test suites for this result file.



Geometric mean based upon tests: pts/xonotic and pts/tesseract



Geometric mean based upon tests: pts/dirt-rally2, pts/f12021, pts/hitman3, pts/strange-brigade, pts/twtk, pts/xplane11 and pts/quake2rtx



Geometric mean based upon tests: pts/geexlab-rt and pts/quake2rtx

This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024

10:00.