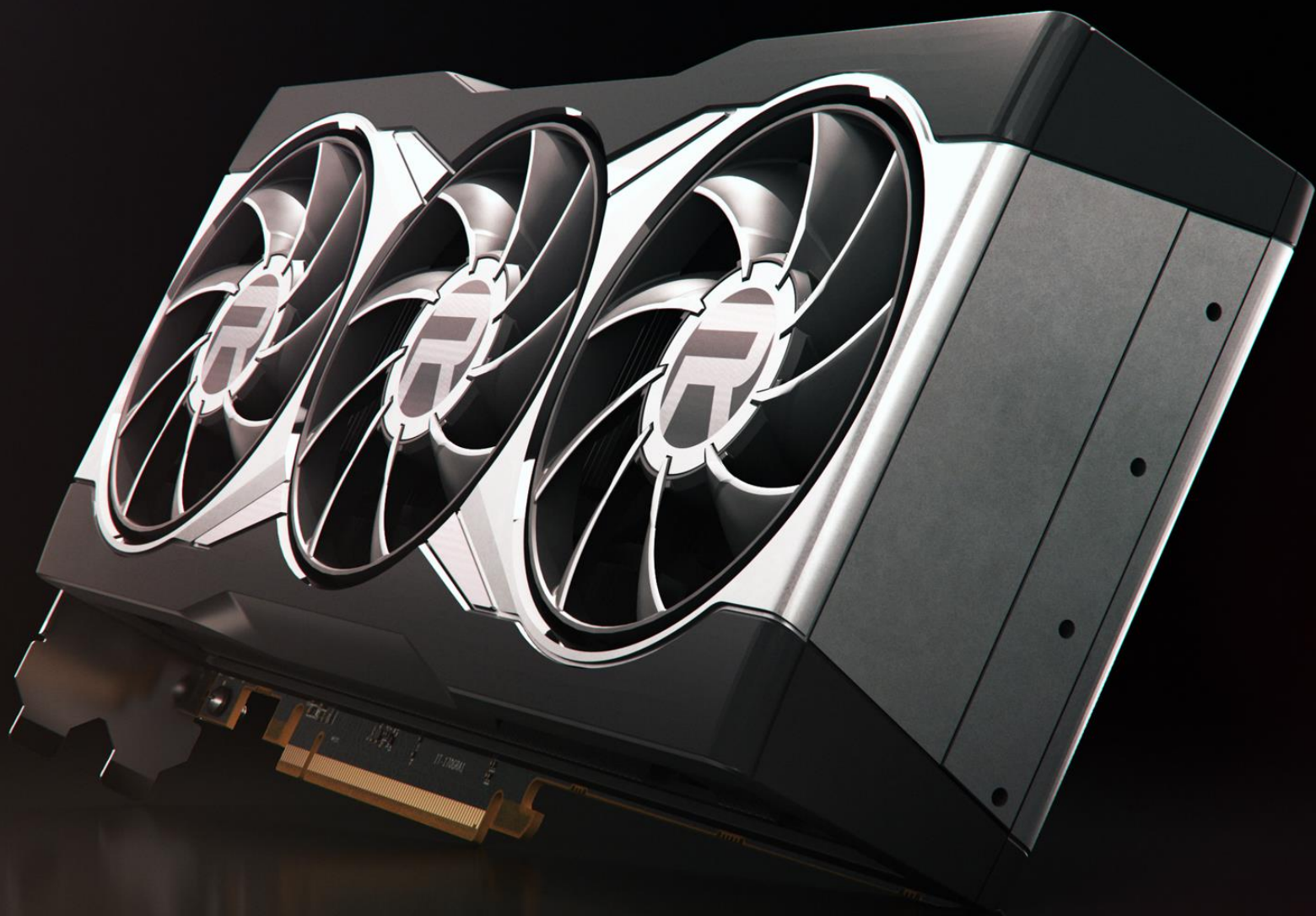# AMD Smart Access Memory Technology:

Exploring The Performance Of ASAM With Ryzen 5000 And Radeon RX 6000

HOT TECH | VISION AND ANALYSIS

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AMD Smart Access Memory Technology Explained

Due to legacy implementations, previous-generation PC platforms only allowed the host processor to access up to 256MB of GPU memory. With its latest Ryzen 5000 series desktop processors, Radeon RX 6000 series graphics cards, and 500 series motherboards, however, AMD has enabled a feature called Smart Access Memory that allows the processor to access the GPU's entire complement of memory.

AMD Smart Access Memory, or ASAM, leverages the PCI Express Resizable BAR (Base Address Register) standard, but AMD has fully qualified and validated its processors, GPUs, chipsets, firmware and driver software to use the feature to achieve increased platform performance across a variety of workloads. ASAM enables increased performance by allowing the processor to access all of the GPUs memory directly, thereby minimizing CPU overhead and transactions across the interface, and effectively improving maximum available bandwidth.

To evaluate the performance impact of AMD Smart Access Memory, we tested a pair of AMD Ryzen 5000 series processors (the Ryzen 5 5600X and Ryzen 9 5950X) along with AMD's Radeon RX 6800 and Radeon RX 6800 XT graphics cards, and measured performance across eight popular PC game titles at two different resolutions.

Our results showed an average performance improvement with ASAM enabled of over 5.4% across all games and resolutions, with some games / configurations showing much larger gains in the 12.2% - 15.7% range.
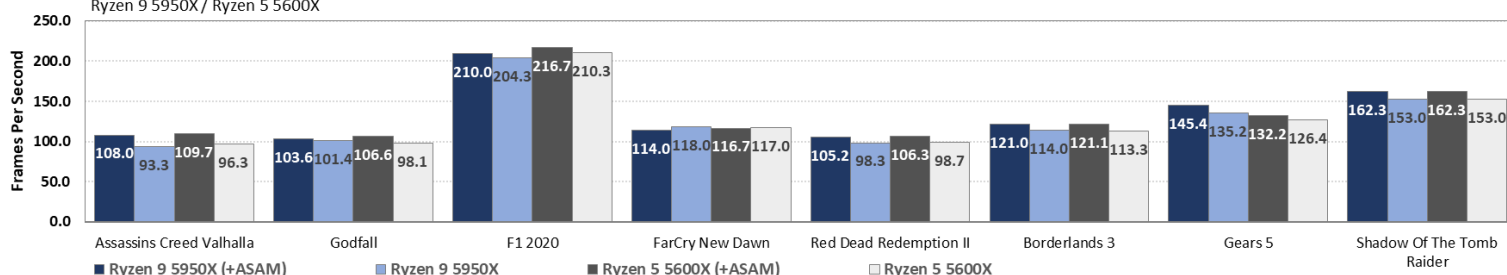

AMD Smart Access Memory Allows Ryzen 5000 Series Processor To Access All Of The Memory On Radeon RX 6000 Series Graphics Cards

Performance Impact Of AMD Smart Access Memory At 1440P Resolution

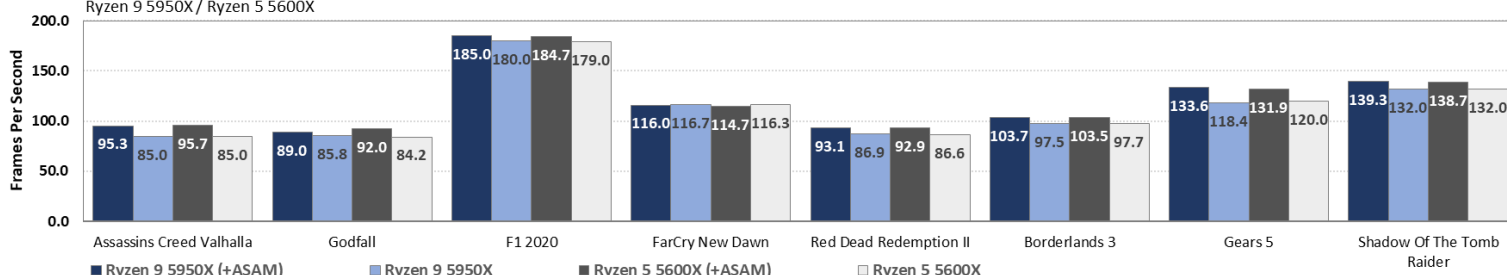

AMD Radeon RX 6800 XT With And Without ASAM - 2560x1440
Ryzen 9 5950X / Ryzen 5 5600X

Radeon RX 6800 XT						
	Ryzen 9 5950X (+ASAM)	Ryzen 9 5950X	% Improvement w/ ASAM	Ryzen 5 5600X (+ASAM)	Ryzen 5 5600X	% Improvement w/ ASAM
Assassins Creed Valhalla	108.0	93.3	15.7%	109.7	96.3	13.8%
Godfall	103.6	101.4	2.2%	106.6	98.1	8.7%
F1 2020	210.0	204.3	2.8%	216.7	210.3	3.0%
FarCry New Dawn	114.0	118.0	-3.4%	116.7	117.0	-0.3%
Red Dead Redemption II	105.2	98.3	7.0%	106.3	98.7	7.7%
Borderlands 3	121.0	114.0	6.1%	121.1	113.3	6.9%
Gears 5	145.4	135.2	7.5%	132.2	126.4	4.6%
Shadow Of The Tomb Raider	162.3	153.0	6.1%	162.3	153.0	6.1%
Radeon RX 6800 XT + Ryzen 9 5950X Avg. Improvement w/ ASAM						5.5%
Radeon RX 6800 XT + Ryzen 5 5600X Avg. Improvement w/ ASAM						6.3%

AMD Radeon RX 6800 With And Without ASAM - 2560x1440
Ryzen 9 5950X / Ryzen 5 5600X

Radeon RX 6800						
	Ryzen 9 5950X (+ASAM)	Ryzen 9 5950X	% Improvement w/ ASAM	Ryzen 5 5600X (+ASAM)	Ryzen 5 5600X	% Improvement w/ ASAM
Assassins Creed Valhalla	95.3	85.0	12.2%	95.7	85.0	12.5%
Godfall	89.0	85.8	3.8%	92.0	84.2	9.2%
F1 2020	185.0	180.0	2.8%	184.7	179.0	3.2%
FarCry New Dawn	116.0	116.7	-0.6%	114.7	116.3	-1.4%
Red Dead Redemption II	93.1	86.9	7.2%	92.9	86.6	7.4%
Borderlands 3	103.7	97.5	6.4%	103.5	97.7	6.0%
Gears 5	133.6	118.4	12.9%	131.9	120.0	9.9%
Shadow Of The Tomb Raider	139.3	132.0	5.6%	138.7	132.0	5.1%
Radeon RX 6800 + Ryzen 9 5950X Avg. Improvement w/ ASAM						6.3%
Radeon RX 6800 + Ryzen 5 5600X Avg. Improvement w/ ASAM						6.5%

With the sole exception of FarCry New Dawn, which was CPU bound at a 1440P resolution, all of the games we tested exhibited enhanced performance with ASAM enabled with both Ryzen 5000 processors and Radeon RX 6000 series graphics cards. The average performance improvement with ASAM enabled at 1440P was over 6.1%.
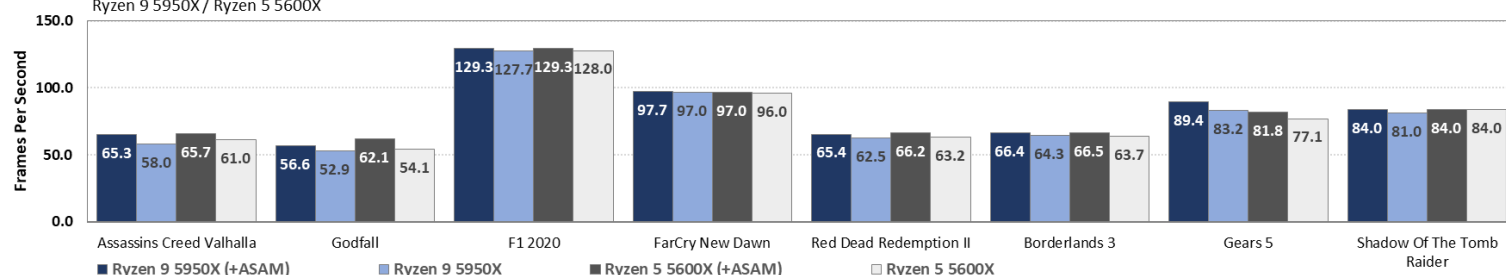
Performance Impact Of AMD Smart Access Memory At 4K Resolution

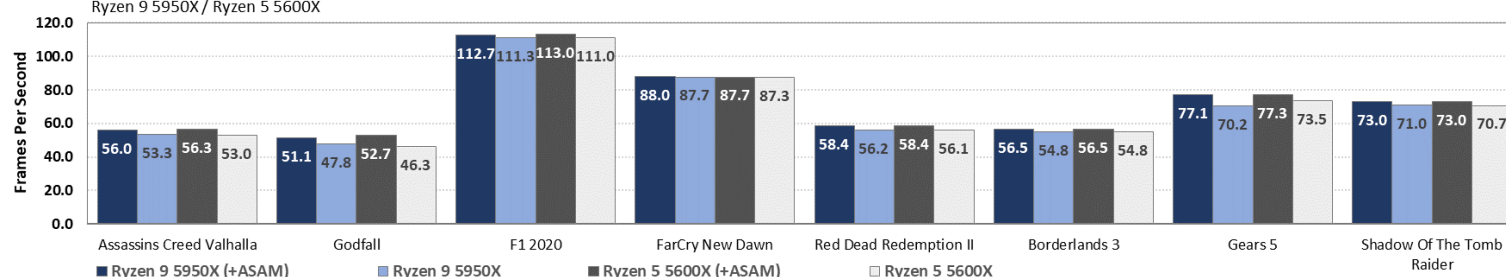### AMD Radeon RX 6800 XT With And Without ASAM - 3840x2160
Ryzen 9 5950X / Ryzen 5 5600X

Radeon RX 6800 XT						
	Ryzen 9 5950X (+ASAM)	Ryzen 9 5950X	% Improvement w/ ASAM	Ryzen 5 5600X (+ASAM)	Ryzen 5 5600X	% Improvement w/ ASAM
Assassins Creed Valhalla	65.3	58.0	12.6%	65.7	61.0	7.7%
Godfall	56.6	52.9	7.0%	62.1	54.1	14.9%
F1 2020	129.3	127.7	1.3%	129.3	128.0	1.0%
FarCry New Dawn	97.7	97.0	0.7%	97.0	96.0	1.0%
Red Dead Redemption II	65.4	62.5	4.6%	66.2	63.2	4.8%
Borderlands 3	66.4	64.3	3.3%	66.5	63.7	4.5%
Gears 5	89.4	83.2	7.5%	81.8	77.1	6.1%
Shadow Of The Tomb Raider	84.0	81.0	3.7%	84.0	84.0	0.0%
Radeon RX 6800 XT + Ryzen 9 5950X Avg. Improvement w/ ASAM						5.1%
Radeon RX 6800 XT + Ryzen 5 5600X Avg. Improvement w/ ASAM						5.0%

AMD Radeon RX 6800 With And Without ASAM - 3840x2160
Ryzen 9 5950X / Ryzen 5 5600X

Radeon RX 6800						
	Ryzen 9 5950X (+ASAM)	Ryzen 9 5950X	% Improvement w/ ASAM	Ryzen 5 5600X (+ASAM)	Ryzen 5 5600X	% Improvement w/ ASAM
Assassins Creed Valhalla	56.0	53.3	5.0%	56.3	53.0	6.3%
Godfall	51.1	47.8	6.9%	52.7	46.3	13.7%
F1 2020	112.7	111.3	1.2%	113.0	111.0	1.8%
FarCry New Dawn	88.0	87.7	0.4%	87.7	87.3	0.4%
Red Dead Redemption II	58.4	56.2	3.9%	58.4	56.1	4.0%
Borderlands 3	56.5	54.8	3.1%	56.5	54.8	3.2%
Gears 5	77.1	70.2	9.8%	77.3	73.5	5.2%
Shadow Of The Tomb Raider	73.0	71.0	2.8%	73.0	70.7	3.3%
Radeon RX 6800 + Ryzen 9 5950X Avg. Improvement w/ ASAM						4.1%
Radeon RX 6800 + Ryzen 5 5600X Avg. Improvement w/ ASAM						4.7%

Testing ASAM at a more demanding 4K resolution (3840x2160), which places a much more significant load on the GPU, revealed increased performance across every game and system configuration save for one, which remained flat. The average performance improvement with ASAM at 4K was over 4.7%.

Appendix A: Test System Specifications

We finalized the hardware and software configurations of the system represented in this paper on November 26, 2020. The system was tested with all automatic Windows, driver, and BIOS / Firmware updates installed as of the testing date. With that said, updates like these are continually released for leading-edge systems, so this particular configuration may not be representative of the latest versions released when this report is published. We concluded initial testing on December 4, 2020.

Prior to running any benchmarks the test was restarted. When Windows had fully booted, idle tasks were processed to minimize the chance of potential interference with the benchmarks by background processes. A Command Prompt with Administrator privileges was opened, and the command 'Rundll32.exe advapi32.dll,ProcessIdleTasks' was executed from the prompt. When CPU activity stopped, the system was allowed to reach an idle state before starting a benchmark.

Processor	AMD Ryzen 9 5950X	AMD Ryzen 5 5600X
Core Count (Threads)	16C (32T)	6C (12T)
Frequency (Base/Boost)	3.4GHz (4.9GHz)	3.7GHz (4.7GHz)
Memory	G.SKILL 32GB (2 x 16GB)	
Memory Frequency (Latency)	3200MHz (CL16)	
Storage	Samsung SSD 980 Pro (1TB)	
Storage Interface	NVMe, PCIe 4.0	
Network (Wired)	Killer E3000 (2.5G) / Killer E2600 (1G)	
Network (Wi-Fi)	Killer AX1650x	
Display	Acer Predator XB273K	
Display Resolution	3840x2160 (Native)	
Display Refresh Rate	120Hz (144Hz Overclocked)	
OS	Windows 10 Professional	
Build / Version	20H2 (19042.630)	
Power Plan	Balanced	
Power Mode	Best Performance	
Motherboard BIOS	v7C34v1C1	
GPU BIOS	v020.001.000.038 (6800XT) / v020.001.000.038 (6800)	
Chipset Driver	AMD Chipset Driver v2.10.13.408	
GPU Driver	AMD Adrenalin 2020 Edition v20.11.2	

Appendix B: Game Builds / Versions

All of the games we tested were download and installed from their respective game stores / launchers and used the publicly-available, retail releases, patched an updated as of the testing dates outlined in **Appendix A.** Vertical Sync (V-Sync) was disabled in all of the games during testing.

	Game Build
Godfall	v2.1.17
Assassin's Creed Valhalla	v1.04
F1 2020	v1.13
FarCry New Dawn	v1.0.5
Gears 5	v1.1.97.0
Shadow Of The Tomb Raider	v1.0 build 298.0_64
Red Dead Redemption 2	v1311.27
Borderlands 3	Patch 11/9/2020

Assassin's Creed Valhalla Performance Data

Assassin's Creed Valhalla was tested using its Ultra High graphics preset.

AMD Ryzen 9 5950X Test System:

1440P (2560x1440) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Low 1%	Avg.	Low 1%	Avg.	Low 1%	Avg.	Lowest 1%	Average FPS
Radeon RX 6800	63	85	65	85	63	85	63.67	85.00
Radeon RX 6800 (+ASAM)	68	96	71	96	68	94	69.00	95.33
Radeon RX 6800 XT	70	93	70	93	70	94	70.00	93.33
Radeon RX 6800 XT (+ASAM)	80	108	79	107	79	109	79.33	108.00
					Radeon RX 6800 ASAM (Loss / Gain)			12.16%
					Radeon RX 6800 XT ASAM (Loss / Gain)			15.71%

4K (3840x2160) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Low 1%	Avg.	Low 1%	Avg.	Low 1%	Avg.	Lowest 1%	Average FPS
Radeon RX 6800	41	53	43	53	43	54	42.33	53.33
Radeon RX 6800 (+ASAM)	44	56	44	56	44	56	44.00	56.00
Radeon RX 6800 XT	45	58	45	58	45	58	45.00	58.00
Radeon RX 6800 XT (+ASAM)	52	66	52	65	52	65	52.00	65.33
					Radeon RX 6800 ASAM (Loss / Gain)			5.00%
					Radeon RX 6800 XT ASAM (Loss / Gain)			12.64%

AMD Ryzen 5 5600X Test System:

1440P (2560x1440) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Low 1%	Avg.	Low 1%	Avg.	Low 1%	Avg.	Lowest 1%	Average FPS
Radeon RX 6800	62	85	62	85	62	85	62.00	85.00
Radeon RX 6800 (+ASAM)	71	96	69	96	70	95	70.00	95.67
Radeon RX 6800 XT	70	96	72	97	71	96	71.00	96.33
Radeon RX 6800 XT (+ASAM)	80	109	83	110	81	110	81.33	109.67
					Radeon RX 6800 ASAM (Loss / Gain)			12.55%
					Radeon RX 6800 XT ASAM (Loss / Gain)			13.84%

4K (3840x2160) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Low 1%	Avg.	Low 1%	Avg.	Low 1%	Avg.	Lowest 1%	Average FPS
Radeon RX 6800	42	53	42	53	41	53	41.67	53.00
Radeon RX 6800 (+ASAM)	44	56	44	56	44	57	44.00	56.33
Radeon RX 6800 XT	47	61	48	62	47	60	47.33	61.00
Radeon RX 6800 XT (+ASAM)	51	66	50	65	52	66	51.00	65.67
					Radeon RX 6800 ASAM (Loss / Gain)			6.29%
					Radeon RX 6800 XT ASAM (Loss / Gain)			7.65%

Godfall Performance Data

Godfall was tested using its Epic graphics preset with Ray Tracing enabled and FidelityFX LPM disabled.

AMD Ryzen 9 5950X Test System:

1440P (2560x1440) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	102	132	101	132	103	132	102.00	132.00
Radeon RX 6800 (+ASAM)	108	139	108	139	108	140	108.00	139.33
Radeon RX 6800 XT	119	153	119	153	118	153	118.67	153.00
Radeon RX 6800 XT (+ASAM)	126	162	126	163	125	162	125.67	162.33
					Radeon RX 6800 ASAM (Loss / Gain)			5.56%
					Radeon RX 6800 XT ASAM (Loss / Gain)			6.10%

4K (3840x2160) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	57	71	57	71	57	71	57.00	71.00
Radeon RX 6800 (+ASAM)	60	73	59	73	59	73	59.33	73.00
Radeon RX 6800 XT	66	81	66	81	66	81	66.00	81.00
Radeon RX 6800 XT (+ASAM)	68	84	68	84	68	84	68.00	84.00
					Radeon RX 6800 ASAM (Loss / Gain)			2.82%
					Radeon RX 6800 XT ASAM (Loss / Gain)			3.70%

AMD Ryzen 5 5600X Test System:

1440P (2560x1440) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	103	133	102	132	101	131	102.00	132.00
Radeon RX 6800 (+ASAM)	108	139	108	138	109	139	108.33	138.67
Radeon RX 6800 XT	118	153	117	153	118	153	117.67	153.00
Radeon RX 6800 XT (+ASAM)	125	162	125	163	125	162	125.00	162.33
					Radeon RX 6800 ASAM (Loss / Gain)			5.05%
					Radeon RX 6800 XT ASAM (Loss / Gain)			6.10%

4K (3840x2160) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	57	71	56	71	57	70	56.67	70.67
Radeon RX 6800 (+ASAM)	60	73	60	73	59	73	59.67	73.00
Radeon RX 6800 XT	66	81	66	81	66	81	66.00	81.00
Radeon RX 6800 XT (+ASAM)	68	84	68	84	68	84	68.00	84.00
					Radeon RX 6800 ASAM (Loss / Gain)			3.30%
					Radeon RX 6800 XT ASAM (Loss / Gain)			3.70%

F1 2020 Performance Data

F1 2020 was tested using its Ultra High graphics preset with TAA enabled.

AMD Ryzen 9 5950X Test System:

1440P (2560x1440) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	138	181	140	179	139	180	139.00	180.00
Radeon RX 6800 (+ASAM)	142	185	141	185	140	185	141.00	185.00
Radeon RX 6800 XT	160	205	161	203	160	205	160.33	204.33
Radeon RX 6800 XT (+ASAM)	168	210	163	210	165	210	165.33	210.00
						Radeon RX 6800 ASAM (Loss / Gain)		2.78%
						Radeon RX 6800 XT ASAM (Loss / Gain)		2.77%

4K (3840x2160) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	90	111	90	112	90	111	90.00	111.33
Radeon RX 6800 (+ASAM)	90	112	91	113	91	113	90.67	112.67
Radeon RX 6800 XT	106	127	106	128	106	128	106.00	127.67
Radeon RX 6800 XT (+ASAM)	106	130	103	128	107	130	105.33	129.33
						Radeon RX 6800 ASAM (Loss / Gain)		1.20%
						Radeon RX 6800 XT ASAM (Loss / Gain)		1.31%

AMD Ryzen 5 5600X Test System:

1440P (2560x1440) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	138	180	141	179	138	178	139.00	179.00
Radeon RX 6800 (+ASAM)	143	185	140	185	142	184	141.67	184.67
Radeon RX 6800 XT	165	211	163	210	167	210	165.00	210.33
Radeon RX 6800 XT (+ASAM)	165	215	172	218	171	217	169.33	216.67
						Radeon RX 6800 ASAM (Loss / Gain)		3.17%
						Radeon RX 6800 XT ASAM (Loss / Gain)		3.01%

4K (3840x2160) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	90	112	91	111	90	110	90.33	111.00
Radeon RX 6800 (+ASAM)	92	113	92	113	91	113	91.67	113.00
Radeon RX 6800 XT	106	128	105	128	105	128	105.33	128.00
Radeon RX 6800 XT (+ASAM)	107	130	106	129	106	129	106.33	129.33
						Radeon RX 6800 ASAM (Loss / Gain)		1.80%
						Radeon RX 6800 XT ASAM (Loss / Gain)		1.04%

FarCry New Dawn Performance Data

FarCry New Dawn was tested using its Ultra graphics preset.

AMD Ryzen 9 5950X Test System:

1440P (2560x1440) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	80	119	80	116	80	115	80.00	116.67
Radeon RX 6800 (+ASAM)	80	116	80	116	80	116	80.00	116.00
Radeon RX 6800 XT	81	121	81	117	79	116	80.33	118.00
Radeon RX 6800 XT (+ASAM)	79	114	79	114	79	114	79.00	114.00
					Radeon RX 6800 ASAM (Loss / Gain)			-0.57%
					Radeon RX 6800 XT ASAM (Loss / Gain)			-3.39%

4K (3840x2160) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	73	88	73	87	73	88	73.00	87.67
Radeon RX 6800 (+ASAM)	73	88	73	88	73	88	73.00	88.00
Radeon RX 6800 XT	75	98	78	97	77	96	76.67	97.00
Radeon RX 6800 XT (+ASAM)	78	99	80	97	79	97	79.00	97.67
					Radeon RX 6800 ASAM (Loss / Gain)			0.38%
					Radeon RX 6800 XT ASAM (Loss / Gain)			0.69%

AMD Ryzen 5 5600X Test System:

1440P (2560x1440) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	81	119	79	116	78	114	79.33	116.33
Radeon RX 6800 (+ASAM)	78	118	77	113	78	113	77.67	114.67
Radeon RX 6800 XT	81	119	78	115	80	117	79.67	117.00
Radeon RX 6800 XT (+ASAM)	81	119	80	115	81	116	80.67	116.67
					Radeon RX 6800 ASAM (Loss / Gain)			-1.43%
					Radeon RX 6800 XT ASAM (Loss / Gain)			-0.28%

4K (3840x2160) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	73	88	73	87	72	87	72.67	87.33
Radeon RX 6800 (+ASAM)	72	88	72	87	72	88	72.00	87.67
Radeon RX 6800 XT	78	96	75	96	75	96	76.00	96.00
Radeon RX 6800 XT (+ASAM)	77	98	76	97	77	96	76.67	97.00
					Radeon RX 6800 ASAM (Loss / Gain)			0.38%
					Radeon RX 6800 XT ASAM (Loss / Gain)			1.04%

Red Dead Redemption II Performance Data

Red Dead Redemption II was tested with its quality preset slider set to maximum quality.

AMD Ryzen 9 5950X Test System:

1440P (2560x1440) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	34.77	86.75	38.07	86.96	36.59	86.88	36.48	86.86
Radeon RX 6800 (+ASAM)	56.49	93.09	56.51	93.07	58.35	93.21	57.12	93.12
Radeon RX 6800 XT	36.12	98.46	36.5	98.21	36.34	98.31	36.32	98.33
Radeon RX 6800 XT (+ASAM)	58.17	105.01	58.13	105.34	56.92	105.27	57.74	105.21
					Radeon RX 6800 ASAM (Loss / Gain)			7.21%
					Radeon RX 6800 XT ASAM (Loss / Gain)			7.00%

4K (3840x2160) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	36.79	56.09	28.63	56.28	32.14	56.21	32.52	56.19
Radeon RX 6800 (+ASAM)	50.64	58.32	50.98	58.45	50.87	58.44	50.83	58.40
Radeon RX 6800 XT	34.28	62.56	30.71	62.56	32.55	62.5	32.51	62.54
Radeon RX 6800 XT (+ASAM)	56.73	65.55	56.52	65.38	56.59	65.41	56.61	65.45
					Radeon RX 6800 ASAM (Loss / Gain)			3.93%
					Radeon RX 6800 XT ASAM (Loss / Gain)			4.65%

AMD Ryzen 5 5600X Test System:

1440P (2560x1440) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	33.38	86.69	32.71	86.54	33.16	86.42	33.08	86.55
Radeon RX 6800 (+ASAM)	65.62	93.05	58.27	92.86	58.63	92.84	60.84	92.92
Radeon RX 6800 XT	33.45	99.08	34.76	99.92	29.63	97.09	32.61	98.70
Radeon RX 6800 XT (+ASAM)	58.32	106.44	57.46	106.22	58.84	106.29	58.21	106.32
					Radeon RX 6800 ASAM (Loss / Gain)			7.36%
					Radeon RX 6800 XT ASAM (Loss / Gain)			7.72%

4K (3840x2160) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	27.1	56.04	28.05	56.18	33.32	56.19	29.49	56.14
Radeon RX 6800 (+ASAM)	49.9	58.38	48.67	58.41	50.16	58.36	49.58	58.38
Radeon RX 6800 XT	34.9	63.11	36.8	63.39	35.28	62.97	35.66	63.16
Radeon RX 6800 XT (+ASAM)	56.96	66.2	56.79	66.18	56.91	66.24	56.89	66.21
					Radeon RX 6800 ASAM (Loss / Gain)			4.00%
					Radeon RX 6800 XT ASAM (Loss / Gain)			4.83%

Borderlands 3 Performance Data

Borderlands 3 was tested using its Badass graphics preset.

AMD Ryzen 9 5950X Test System:

1440P (2560x1440) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)
	Avg.		Avg.		Avg.		Average FPS
Radeon RX 6800	99.44		96.67		96.37		97.49
Radeon RX 6800 (+ASAM)	103.64		103.78		103.67		103.70
Radeon RX 6800 XT	113.22		115.8		113.06		114.03
Radeon RX 6800 XT (+ASAM)	120.78		120.96		121.27		121.00
					Radeon RX 6800 ASAM (Loss / Gain)		6.36%
					Radeon RX 6800 XT ASAM (Loss / Gain)		6.12%

4K (3840x2160) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)
	Avg.		Avg.		Avg.		Average FPS
Radeon RX 6800	55.16		54.65		54.49		54.77
Radeon RX 6800 (+ASAM)	56.5		56.42		56.48		56.47
Radeon RX 6800 XT	64.85		63.9		64.06		64.27
Radeon RX 6800 XT (+ASAM)	66.48		66.39		66.38		66.42
					Radeon RX 6800 ASAM (Loss / Gain)		3.10%
					Radeon RX 6800 XT ASAM (Loss / Gain)		3.34%

AMD Ryzen 5 5600X Test System:

1440P (2560x1440) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)
	Avg.		Avg.		Avg.		Average FPS
Radeon RX 6800	98.63		97.23		97.13		97.66
Radeon RX 6800 (+ASAM)	103.62		103.4		103.57		103.53
Radeon RX 6800 XT	115.2		112.37		112.4		113.32
Radeon RX 6800 XT (+ASAM)	121.15		121.1		121.04		121.10
					Radeon RX 6800 ASAM (Loss / Gain)		6.01%
					Radeon RX 6800 XT ASAM (Loss / Gain)		6.86%

4K (3840x2160) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)
	Avg.		Avg.		Avg.		Average FPS
Radeon RX 6800	55.21		54.69		54.38		54.76
Radeon RX 6800 (+ASAM)	56.47		56.56		56.51		56.51
Radeon RX 6800 XT	63.85		63.64		63.59		63.69
Radeon RX 6800 XT (+ASAM)	66.56		66.54		66.51		66.54
					Radeon RX 6800 ASAM (Loss / Gain)		3.20%
					Radeon RX 6800 XT ASAM (Loss / Gain)		4.46%

Gears 5 Performance Data

Gears 5 was tested using its Ultra graphics preset.

AMD Ryzen 9 5950X Test System:

1440P (2560x1440) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Bot. 5%	Avg.	Bot. 5%	Avg.	Bot. 5%	Avg.	...ge Min. (Bottom	Average FPS
Radeon RX 6800	96.2	118.1	95.5	119.3	96.1	117.7	95.93	118.37
Radeon RX 6800 (+ASAM)	110.9	133.7	109.5	133.33	110.3	133.9	110.23	133.64
Radeon RX 6800 XT	111.1	137.7	93.4	133.5	96.9	134.5	100.47	135.23
Radeon RX 6800 XT (+ASAM)	124.4	146.3	125.2	145.9	124.9	144.1	124.83	145.43
						Radeon RX 6800 ASAM (Loss / Gain)		12.91%
						Radeon RX 6800 XT ASAM (Loss / Gain)		7.54%

4K (3840x2160) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Bot. 5%	Avg.	Bot. 5%	Avg.	Bot. 5%	Avg.	...ge Min. (Bottom	Average FPS
Radeon RX 6800	57.3	70	57.1	70.1	57.3	70.6	57.23	70.23
Radeon RX 6800 (+ASAM)	63.4	77	63.6	77.1	63.7	77.3	63.57	77.13
Radeon RX 6800 XT	68.3	83.2	68.3	83.1	69.2	83.2	68.60	83.17
Radeon RX 6800 XT (+ASAM)	74.4	89.4	75.4	90.2	72.1	88.5	73.97	89.37
						Radeon RX 6800 ASAM (Loss / Gain)		9.82%
						Radeon RX 6800 XT ASAM (Loss / Gain)		7.45%

AMD Ryzen 5 5600X Test System:

1440P (2560x1440) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Bot. 5%	Avg.	Bot. 5%	Avg.	Bot. 5%	Avg.	...ge Min. (Bottom	Average FPS
Radeon RX 6800	97	120.8	91.6	119.9	91.2	119.2	93.27	119.97
Radeon RX 6800 (+ASAM)	109.1	131	108.1	131.4	109.2	133.3	108.80	131.90
Radeon RX 6800 XT	102	127.9	93.9	125.4	93.2	125.9	96.37	126.40
Radeon RX 6800 XT (+ASAM)	105.3	132.5	113.2	131.7	107.9	132.4	108.80	132.20
						Radeon RX 6800 ASAM (Loss / Gain)		9.95%
						Radeon RX 6800 XT ASAM (Loss / Gain)		4.59%

4K (3840x2160) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Bot. 5%	Avg.	Bot. 5%	Avg.	Bot. 5%	Avg.	...ge Min. (Bottom	Average FPS
Radeon RX 6800	60.7	73.3	60.2	73.7	60.3	73.6	60.40	73.53
Radeon RX 6800 (+ASAM)	63.1	77.1	63.5	77.5	63.3	77.4	63.30	77.33
Radeon RX 6800 XT	63.3	76.8	63.6	77.4	63	77	63.30	77.07
Radeon RX 6800 XT (+ASAM)	67.9	81.5	67.9	82.1	67.6	81.8	67.80	81.80
						Radeon RX 6800 ASAM (Loss / Gain)		5.17%
						Radeon RX 6800 XT ASAM (Loss / Gain)		6.14%

Shadow Of The Tomb Raider Performance Data

Shadow Of The Tomb Raider was tested using its Highest Quality graphics preset with FidelityFX CAS disabled.

AMD Ryzen 9 5950X Test System:

1440P (2560x1440) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	102	132	101	132	103	132	102.00	132.00
Radeon RX 6800 (+ASAM)	108	139	108	139	108	140	108.00	139.33
Radeon RX 6800 XT	119	153	119	153	118	153	118.67	153.00
Radeon RX 6800 XT (+ASAM)	126	162	126	163	125	162	125.67	162.33
							Radeon RX 6800 ASAM (Loss / Gain)	5.56%
							Radeon RX 6800 XT ASAM (Loss / Gain)	6.10%

4K (3840x2160) - 5950X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	57	71	57	71	57	71	57.00	71.00
Radeon RX 6800 (+ASAM)	60	73	59	73	59	73	59.33	73.00
Radeon RX 6800 XT	66	81	66	81	66	81	66.00	81.00
Radeon RX 6800 XT (+ASAM)	68	84	68	84	68	84	68.00	84.00
							Radeon RX 6800 ASAM (Loss / Gain)	2.82%
							Radeon RX 6800 XT ASAM (Loss / Gain)	3.70%

AMD Ryzen 5 5600X Test System:

1440P (2560x1440) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	103	133	102	132	101	131	102.00	132.00
Radeon RX 6800 (+ASAM)	108	139	108	138	109	139	108.33	138.67
Radeon RX 6800 XT	118	153	117	153	118	153	117.67	153.00
Radeon RX 6800 XT (+ASAM)	125	162	125	163	125	162	125.00	162.33
							Radeon RX 6800 ASAM (Loss / Gain)	5.05%
							Radeon RX 6800 XT ASAM (Loss / Gain)	6.10%

4K (3840x2160) - 5600X	Run 1		Run 2		Run 3		Mean (All Runs)	
	Min.	Avg.	Min.	Avg.	Min.	Avg.	Minimum FPS	Average FPS
Radeon RX 6800	57	71	56	71	57	70	56.67	70.67
Radeon RX 6800 (+ASAM)	60	73	60	73	59	73	59.67	73.00
Radeon RX 6800 XT	66	81	66	81	66	81	66.00	81.00
Radeon RX 6800 XT (+ASAM)	68	84	68	84	68	84	68.00	84.00
							Radeon RX 6800 ASAM (Loss / Gain)	3.30%
							Radeon RX 6800 XT ASAM (Loss / Gain)	3.70%

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