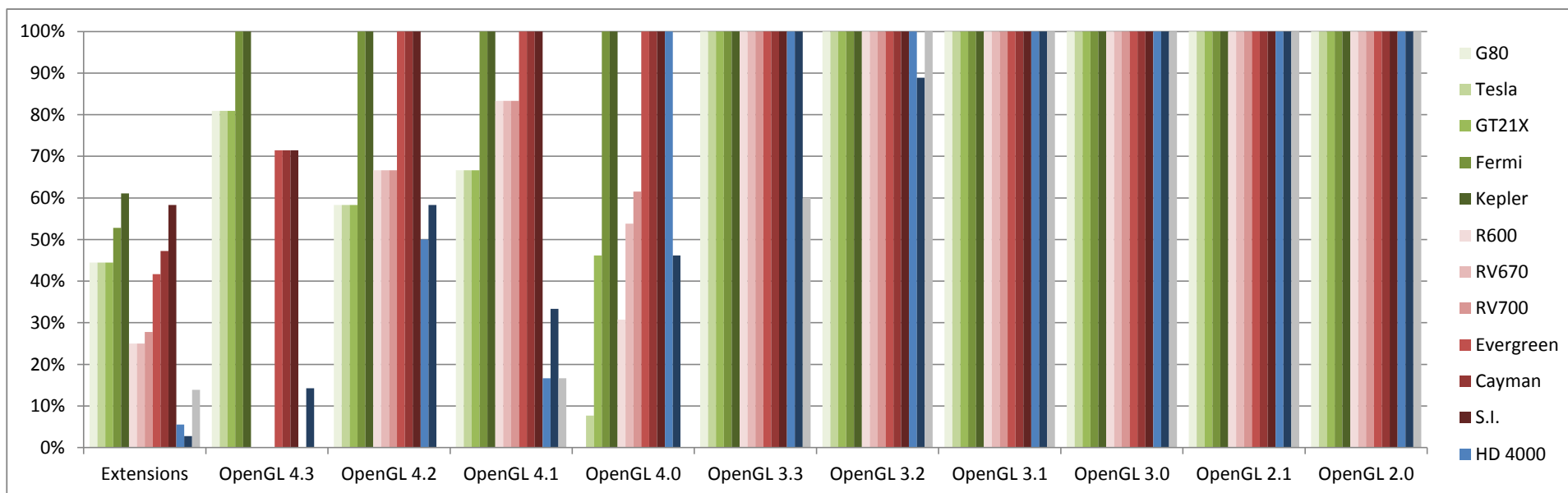


# OpenGL hardware matrix

Extensions exposed by OpenGL implementations

Avril 2013, G-Truc Creation

Vendor	NVIDIA						AMD					Intel	Mesa	Apple
Drivers version	320.00 beta						13.4					9.18.10.3006	git-9.2	10.8.3
Release date	23/04/2013						24/04/2013					23/02/2013	30/03/2013	14/03/2013
Platforms	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Mesa	MacOS X
Extensions	44%	44%	44%	53%	61%	25%	25%	28%	42%	47%	58%	6%	3%	14%
OpenGL 4.3	81%	81%	81%	100%	100%	0%	0%	0%	71%	71%	71%	0%	14%	0%
OpenGL 4.2	58%	58%	58%	100%	100%	67%	67%	67%	100%	100%	100%	50%	58%	0%
OpenGL 4.1	67%	67%	67%	100%	100%	83%	83%	83%	100%	100%	100%	17%	33%	17%
OpenGL 4.0	0%	8%	46%	100%	100%	31%	54%	62%	100%	100%	100%	100%	46%	0%
OpenGL 3.3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	60%
OpenGL 3.2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	89%	100%
OpenGL 3.1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
OpenGL 3.0	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
OpenGL 2.1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
OpenGL 2.0	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%



Nomenclature:

Supported
Not supported

OpenGL Extensions	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Mesa	MacOS X
<u>AMD vertex shader viewport index</u>	X	X	X	X	X	X	X	X	V	V	V	X	X	X
<u>AMD vertex shader layer</u>	X	X	X	X	X	X	X	X	V	V	V	X	X	X
<u>NV vertex buffer unified memory</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>AMD transform feedback3 lines triangles</u>	X	X	X	X	X	X	X	X	X	V	V	X	X	X
<u>EXT texture sRGB decode</u>	X	X	X	V	V	X	X	X	V	V	V	X	X	V
<u>KHR texture compression astc ldr</u>	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<u>NV texture multisample</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>EXT texture mirror clamp</u>	V	V	V	V	V	V	V	V	V	V	V	X	X	V
<u>ARB robustness</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>AMD stencil operation extended</u>	X	X	X	X	X	X	X	X	X	X	V	X	X	X
<u>AMD sparse texture</u>	X	X	X	X	X	X	X	X	X	X	V	X	X	X
<u>ARB shading language include</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>AMD shader trinary minmax</u>	X	X	X	X	X	X	X	X	X	X	V	X	X	X
<u>ARB shader stencil export</u>	X	X	X	X	X	X	X	X	V	V	V	X	X	X
<u>ARB robustness isolation</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>ARB robust buffer access behavior</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>NV shader buffer store</u>	X	X	X	V	V	X	X	X	X	X	X	X	X	X
<u>NV shader buffer load</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>NV shader atomic float</u>	X	X	X	V	V	X	X	X	X	X	X	X	X	X
<u>AMD seamless cubemap per texture</u>	X	X	X	X	V	X	X	V	V	V	V	X	X	X
<u>AMD sample positions</u>	X	X	X	X	X	V	V	V	V	V	V	X	X	X
<u>AMD query buffer object</u>	X	X	X	X	X	X	X	X	V	V	V	X	X	X
<u>AMD pinned memory</u>	X	X	X	X	X	V	V	V	V	V	V	X	X	X
<u>NV multisample coverage</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>ATI texture mirror once</u>	V	V	V	V	V	V	V	V	V	V	V	X	X	V
<u>INTEL map texture</u>	X	X	X	X	X	X	X	X	X	X	X	V	X	X
<u>EXT framebuffer multisample blit scaled</u>	X	X	X	X	V	X	X	X	X	X	X	X	X	V
<u>NV explicit multisample</u>	V	V	V	V	V	V	V	V	V	V	V	X	X	X

<u>EXT direct state access</u>	V	V	V	V	V	V	V	V	V	V	V	X	X	X
<u>EXT depth bounds test</u>	V	V	V	V	V	X	X	X	X	X	V	X	X	V
<u>ARB debug output</u>	V	V	V	V	V	V	V	V	V	V	V	X	V	X
<u>NV copy image</u>	V	V	V	V	V	V	V	V	V	V	V	X	X	X
<u>ARB compatibility</u>	V	V	V	V	V	V	V	V	V	V	V	V	X	X
<u>ARB cl event</u>	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<u>AMD blend minmax factor</u>	X	X	X	X	X	X	X	X	X	V	V	X	X	X
<u>NV bindless texture</u>	X	X	X	X	V	X	X	X	X	X	X	X	X	X
Support	44%	44%	44%	53%	61%	25%	25%	28%	42%	47%	58%	6%	3%	14%

OpenGL 4.3	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Mesa	MacOS X
<u>GL ARB vertex attrib binding</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>GL ARB texture view</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>GL ARB texture storage multisample</u>	V	V	V	V	V	X	X	X	V	V	V	X	X	X
<u>GL ARB texture query levels</u>	V	V	V	V	V	X	X	X	V	V	V	X	X	X
<u>GL ARB texture buffer range</u>	V	V	V	V	V	X	X	X	V	V	V	X	V	X
<u>GL ARB stencil texturing</u>	V	V	V	V	V	X	X	X	V	V	V	X	X	X
<u>GL ARB shader storage buffer object</u>	X	X	X	V	V	X	X	X	V	V	V	X	X	X
<u>GL ARB shader image size</u>	X	X	X	V	V	X	X	X	V	V	V	X	X	X
<u>GL ARB program interface query</u>	V	V	V	V	V	X	X	X	V	V	V	X	X	X
<u>GL ARB multi draw indirect</u>	X	X	X	V	V	X	X	X	V	V	V	X	X	X
<u>GL ARB invalidate subdata</u>	V	V	V	V	V	X	X	X	V	V	V	X	V	X
<u>GL ARB internalformat query2</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>GL ARB framebuffer no attachments</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>GL ARB fragment layer viewport</u>	V	V	V	V	V	X	X	X	V	V	V	X	X	X
<u>GL ARB explicit uniform location</u>	V	V	V	V	V	X	X	X	V	V	V	X	X	X
<u>GL ARB ES3 compatibility</u>	V	V	V	V	V	X	X	X	V	V	V	X	V	X
<u>GL_KHR_debug</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>GL ARB copy image</u>	V	V	V	V	V	X	X	X	X	X	X	X	X	X
<u>GL ARB compute shader</u>	X	X	X	V	V	X	X	X	V	V	V	X	X	X
<u>GL ARB clear buffer object</u>	V	V	V	V	V	X	X	X	V	V	V	X	X	X
<u>GL ARB arrays of arrays</u>	V	V	V	V	V	X	X	X	V	V	V	X	X	X
Support	81%	81%	81%	100%	100%	0%	0%	0%	71%	71%	71%	0%	14%	0%

OpenGL 4.2	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Mesa	MacOS X
<u>GL_ARB_transform_feedback_instanced</u>	X	X	X	V	V	V	V	V	V	V	V	V	V	X
<u>GL_ARB_texture_compression_bptc</u>	X	X	X	V	V	X	X	X	V	V	V	X	X	X
<u>GL_ARB_texture_storage</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	X
<u>GL_ARB_shading_language_packing</u>	V	V	V	V	V	V	V	V	V	V	V	X	V	X
<u>GL_ARB_shading_language_420pack</u>	V	V	V	V	V	V	V	V	V	V	V	X	X	X
<u>GL_ARB_shader_image_load_store</u>	X	X	X	V	V	X	X	X	V	V	V	X	X	X
<u>GL_ARB_shader_atomic_counters</u>	X	X	X	V	V	X	X	X	V	V	V	X	X	X
<u>GL_ARB_map_buffer_alignment</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	X
<u>GL_ARB_internalformat_query</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	X
<u>GL_ARB_conservative_depth</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	X
<u>GL_ARB_compressed_texture_pixel_storage</u>	V	V	V	V	V	V	V	V	V	V	V	X	X	X
<u>GL_ARB_base_instance</u>	X	X	X	V	V	X	X	X	V	V	V	V	V	X
Support	58%	58%	58%	100%	100%	67%	67%	67%	100%	100%	100%	50%	58%	0%

OpenGL 4.1	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Mesa	MacOS X
<u>GL_ARB_viewport_array</u>	V	V	V	V	V	V	V	V	V	V	V	X	X	X
<u>GL_ARB_vertex_attrib_64bit</u>	X	X	X	V	V	X	X	X	V	V	V	X	X	X
<u>GL_ARB_shader_precision</u>	X	X	X	V	V	V	V	V	V	V	V	X	X	X
<u>GL_ARB_separate_shader_objects</u>	V	V	V	V	V	V	V	V	V	V	V	X	X	V
<u>GL_ARB_get_program_binary</u>	V	V	V	V	V	V	V	V	V	V	V	X	V	X
<u>GL_ARB_ES2_compatibility</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	X
Support	67%	67%	67%	100%	100%	83%	83%	83%	100%	100%	100%	17%	33%	17%

OpenGL 4.0	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Mesa	MacOS X
<u>GL_ARB_transform_feedback3</u>	X	X	X	V	V	V	V	V	V	V	V	V	V	X
<u>GL_ARB_transform_feedback2</u>	X	V	V	V	V	V	V	V	V	V	V	V	V	X
<u>GL_ARB_texture_query_lod</u>	X	X	V	V	V	X	X	V	V	V	V	V	V	X
<u>GL_ARB_texture_gather</u>	X	X	V	V	V	X	V	V	V	V	V	V	X	X
<u>GL_ARB_texture_cube_map_array</u>	X	X	V	V	V	X	V	V	V	V	V	V	V	X
<u>GL_ARB_texture_buffer_object_rgb32</u>	X	X	X	V	V	V	V	V	V	V	V	V	V	X
<u>GL_ARB_tessellation_shader</u>	X	X	X	V	V	X	X	X	V	V	V	V	X	X

<u>GL_ARB_shader_subroutine</u>	X	X	X	V	V	X	X	X	V	V	V	V	X	X
<u>GL_ARB_sample_shading</u>	X	X	V	V	V	X	V	V	V	V	V	V	X	X
<u>GL_ARB_gpu_shader5</u>	X	X	X	V	V	X	X	X	V	V	V	V	X	X
<u>GL_ARB_gpu_shader_fp64</u>	X	X	X	V	V	X	X	X	V	V	V	V	X	X
<u>GL_ARB_draw_indirect</u>	X	X	X	V	V	X	X	X	V	V	V	V	X	X
<u>GL_ARB_draw_buffers_blend</u>	X	X	V	V	V	V	V	V	V	V	V	V	V	X
Support	0%	8%	46%	100%	100%	31%	54%	62%	100%	100%	100%	100%	46%	0%

OpenGL 3.3	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Mesa	MacOS X
<u>GL_ARB_vertex_type_2_10_10_10_rev</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	X
<u>GL_ARB_timer_query</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_texture_swizzle</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_texture_rgb10_a2ui</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	X
<u>GL_ARB_shader_bit_encoding</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_sampler_objects</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	X
<u>GL_ARB_occlusion_query2</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_instanced_arrays</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_explicit_attrib_location</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_blend_func_extended</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	X
Support	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	60%

OpenGL 3.2	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Mesa	MacOS X
<u>GL_ARB_vertex_array_bgra</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_texture_multisample</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_sync</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_seamless_cube_map</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_provoking_vertex</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_geometry_shader4</u>	V	V	V	V	V	V	V	V	V	V	V	V	X	V
<u>GL_ARB_fragment_coord_conventions</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_depth_clamp</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL_ARB_draw_elements_base_vertex</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Support	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	89%	100%

OpenGL 3.1	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Mesa	MacOS X
<u>GL ARB uniform buffer object</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL EXT texture snorm</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB texture rectangle</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB texture buffer object</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL NV primitive restart</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB draw instanced</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB copy buffer</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Support	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

OpenGL 3.0	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Mesa	MacOS X
<u>GL ARB vertex array object</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL EXT transform feedback</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB texture rg</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL EXT texture shared exponent</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL EXT texture integer</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB texture float</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB texture compression rgtc</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL EXT texture array</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL EXT packed float</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL EXT packed depth stencil</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB map buffer range</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB half float vertex</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB half float pixel</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL EXT gpu shader4</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB framebuffer sRGB</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB framebuffer object</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB depth buffer float</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL NV conditional render</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
<u>GL ARB color buffer float</u>	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Support	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

OpenGL 2.1	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Mesa	MacOS X
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