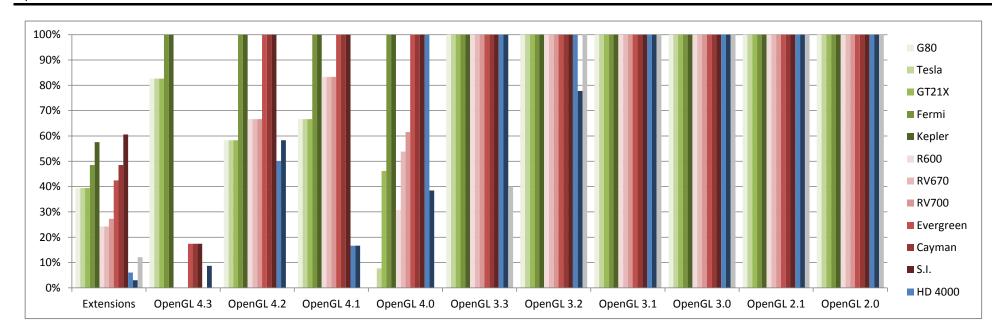
## **OpenGL hardware matrix**

Extensions exposed by OpenGL implementations

February 2013, G-Truc Creation

Vendor		NVIDIA							AMD			Intel	Intel Mesa	Apple
Drivers version			314.0	7				13	3.2 beta 6			9.18.10.2973	9.1 branch	10.8.2
Release date		18/02/2012						19	/02/2013			22/01/2013	22/01/2013	04/10/2012
Platforms	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Intel Mesa	MacOS X
Extensions	39%	39%	39%	48%	58%	24%	24%	27%	42%	48%	61%	6%	3%	12%
OpenGL 4.3	83%	83%	83%	100%	100%	0%	0%	0%	17%	17%	17%	0%	9%	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%	17%	0%
OpenGL 4.0	0%	8%	46%	100%	100%	31%	54%	62%	100%	100%	100%	100%	38%	0%
OpenGL 3.3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	40%
OpenGL 3.2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	78%	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	Intel Mesa	MacOS X
AMD vertex shader viewport index	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	V	V	٧	X	X	X
AMD vertex shader layer	Χ	X	Χ	X	Χ	Χ	Χ	Χ	V	V	V	Χ	X	X
NV vertex buffer unified memory	V	V	V	V	V	Χ	Χ	Χ	Χ	Χ	Χ	X	X	X
AMD transform feedback3 lines triangles	Χ	Χ	Χ	X	Χ	Χ	Χ	Χ	Χ	V	V	Χ	X	X
EXT texture sRGB decode	Χ	Χ	Χ	V	V	Χ	Χ	Χ	V	V	V	X	X	V
KHR texture compression astc ldr	Χ	Χ	Χ	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	X	X	X
NV texture multisample	V	V	V	V	V	Χ	Χ	Χ	Χ	Χ	Χ	X	X	X
EXT texture mirror clamp	V	V	V	V	V	V	V	V	V	V	V	X	X	V
ARB robustness	V	V	V	V	V	Χ	Χ	Χ	Χ	Χ	Χ	X	X	X
AMD stencil operation extended	Χ	Χ	Χ	X	Χ	Χ	Χ	Χ	Χ	Χ	V	X	X	X
AMD sparse texture	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	V	Χ	X	X
ARB shading language include	V	V	V	V	V	Χ	Χ	Χ	Χ	Χ	Χ	X	X	X
AMD shader trinary minmax	Χ	Χ	Χ	X	Χ	Χ	Χ	Χ	Χ	Χ	V	Χ	X	X
ARB shader stencil export	Χ	X	Χ	Χ	Χ	Χ	Χ	Χ	V	V	V	Χ	X	X
NV shader buffer store	Χ	Χ	Χ	V	V	Χ	Χ	Χ	Χ	Χ	Χ	X	X	X
NV shader buffer load	V	V	V	V	V	Χ	Χ	Χ	Χ	Χ	Χ	Χ	X	X
NV shader atomic float	Χ	Χ	Χ	V	V	Χ	Χ	Χ	Χ	Χ	Χ	X	X	X
AMD seamless cubemap per texture	Χ	Χ	Χ	X	V	Χ	Χ	V	V	V	V	Χ	X	X
AMD sample positions	Χ	Χ	Χ	X	Χ	V	V	V	V	V	V	Χ	X	X
AMD query buffer object	Χ	Χ	Χ	X	Χ	Χ	Χ	Χ	V	V	V	X	X	X
AMD pinned memory	Χ	Χ	Χ	X	Χ	V	V	V	V	V	V	X	X	X
NV multisample coverage	V	V	V	V	V	Χ	Χ	Χ	Χ	Χ	Χ	X	X	X
INTEL map texture	Χ	Χ	Χ	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	V	Χ	X
EXT framebuffer multisample blit scaled	Χ	Χ	Χ	Χ	V	Χ	Χ	Χ	Χ	Χ	Χ	X	X	V
NV explicit multisample	V	V	V	V	V	V	V	V	V	V	V	Χ	X	X
EXT direct state access	V	V	V	V	V	V	V	V	V	V	V	X	X	X
EXT depth bounds test	V	V	V	V	V	Χ	Χ	Χ	Χ	Χ	V	X	Χ	V
ARB debug output	V	V	V	V	V	V	V	V	V	V	V	X	V	X

NV copy image	V	V	V	V	٧		٧	/ \	/ V	\	1	V	X	Х	Х	
ARB compatibility	V	V	V	V	٧		٧	/ \	/ V	\	•	V	V	X	X	
ARB cl event	X	Χ	Χ	Χ	X		X X	( )	( X	×		Χ	Χ	X	X	
AMD blend minmax factor	X	Χ	Χ	Χ	Х		X X	( )	( X	V	•	V	Х	X	X	
NV bindless texture	X	Χ	Χ	Χ	V	,	X X	( )	( X	X		Χ	Χ	X	X	
Support	39%	39%	39	9%	48%	58%	24%	24%	27%	42%	48%	61%	Ó	6%	3%	12%

OpenGL 4.3	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Intel Mesa	MacOS X
GL ARB vertex attrib binding	V	٧	V	٧	V	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Х	Χ
GL ARB texture view	V	V	V	V	V	Χ	X	X	Χ	Χ	Χ	Χ	X	X
GL ARB texture storage multisample	V	V	V	V	V	Χ	Χ	X	V	V	V	Χ	X	X
GL ARB texture query levels	V	V	V	V	V	Χ	X	X	X	Χ	Χ	Χ	X	X
GL ARB texture buffer range	V	V	V	V	V	Χ	X	X	V	V	V	X	X	X
GL ARB stencil texturing	V	V	V	V	V	Χ	X	X	Χ	Χ	Χ	X	X	X
GL ARB shader storage buffer object	X	Χ	Χ	V	V	Χ	X	X	X	Χ	Χ	X	X	Χ
GL ARB shader image size	X	Χ	Χ	V	V	Χ	X	X	X	Χ	Χ	X	X	Χ
GL ARB robustness isolation	V	V	V	V	V	Χ	X	X	X	Χ	Χ	X	X	X
GL ARB robust buffer access behavior	V	V	V	V	V	Χ	X	X	X	Χ	Χ	X	X	X
GL ARB program interface query	V	V	V	V	V	Χ	X	X	X	Χ	Χ	X	X	X
GL ARB multi draw indirect	X	Χ	Χ	V	V	Χ	X	X	V	V	V	X	Х	X
GL ARB invalidate subdata	V	V	V	V	V	Χ	X	X	X	Χ	X	X	V	X
GL ARB internalformat query2	V	V	V	V	V	Χ	X	X	X	Χ	X	X	X	X
GL ARB framebuffer no attachments	V	V	V	V	V	Χ	X	X	X	Χ	Χ	X	X	X
GL ARB fragment layer viewport	V	V	V	V	V	Χ	X	X	V	V	V	X	X	X
GL ARB explicit uniform location	V	V	V	V	V	Χ	X	X	X	Χ	X	X	Х	X
GL ARB ES3 compatibility	V	V	V	V	V	Χ	X	X	X	X	X	X	V	X
GL KHR debug	V	V	V	V	V	Χ	X	X	X	Χ	X	X	X	X
GL ARB copy image	V	V	V	V	V	Χ	X	X	X	Χ	X	X	X	X
GL ARB compute shader	X	X	Χ	V	V	Χ	X	X	X	Χ	X	X	X	X
GL ARB clear buffer object	V	V	V	V	V	Χ	X	Χ	X	Χ	Χ	X	X	X
GL ARB arrays of arrays	V	V	V	V	V	X	X	X	X	X	Χ	X	X	X
Support	83%	83%	83%	100%	100%	0%	0%	0%	5 17%	17%	17%		0% 9	% 0%

OpenGL 4.2	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Intel Mesa	MacOS X
GL ARB transform feedback instanced	Χ	Χ	Χ	V	V	٧	V	V	٧	V	٧	V	V	Χ
GL ARB texture compression bptc	Χ	Χ	Χ	V	V	Χ	Χ	Χ	V	V	V	Χ	Х	X
GL ARB texture storage	V	V	V	V	V	V	V	V	V	V	V	V	V	Х
GL ARB shading language packing	V	V	V	V	V	٧	V	V	V	V	V	Χ	V	Х
GL ARB shading language 420pack	٧	V	V	V	V	٧	V	V	V	V	V	Χ	X	X
GL ARB shader image load store	Χ	Χ	Χ	V	V	Χ	Х	Х	V	V	V	Χ	X	X
GL ARB shader atomic counters	Χ	Χ	Χ	V	V	Χ	Χ	Χ	V	V	V	Χ	Χ	X
GL ARB map buffer alignment	V	V	V	V	V	V	V	V	V	V	V	V	V	Х
GL ARB internalformat query	V	V	V	V	V	٧	V	V	V	V	V	V	V	Х
GL ARB conservative depth	V	V	V	V	V	٧	V	V	V	V	٧	V	V	X
GL ARB compressed texture pixel storage	٧	V	V	V	V	٧	V	V	V	V	V	Х	Х	X
GL ARB base instance	Χ	Χ	Χ	V	V	Χ	Χ	Χ	V	V	V	V	V	X
Support	58%	58%	58%	100%	100%	67%	67%	67%	100%	100%	100%	509	% 58%	0%
OpenGL 4.1	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Intel Mesa	MacOS X
GL ARB viewport array	٧	٧	V	V	V	٧	V	V	V	V	٧	Χ	Х	Х
GL ARB vertex attrib 64bit	Χ	Χ	Χ	V	V	Χ	Х	Х	V	V	V	Χ	X	X
GL ARB shader precision	X	Χ	Χ	V	V	V	V	V	V	V	V	Χ	X	X
		· * *	, <b>,</b> ,	-		v								
GL ARB separate shader objects	V	V	V	V	V	V	V	V	V	V	V	Χ	X	Χ
GL ARB separate shader objects GL ARB get program binary	V V			V V	V V	V V	V V	V V	V V	V V	V V	X X	X X	X
	V V V	V	V	•		•	•	•	•	V V V	•	X X V	**	X X X
GL ARB get program binary	V V V	V V V	V V V	V V	V V	V V	V V	V V	V V	V V V	V	X X V	X 	X X X
GL ARB get program binary GL ARB ES2 compatibility	V V V	V V V	V V V	V V	V V	V V	V V	V V	V V	V V V	V V	X X V	X 	X X X S 0%
GL ARB get program binary GL ARB ES2 compatibility	V V V 67%	V V V	V V V	V V 100%	V V	V V 83%	V V 83%	V V 83%	V V	V V V 100%	V V 100%	X X V 179	X 	X X X S 0%
GL ARB get program binary GL ARB ES2 compatibility Support		V V V	V V V 67%	V V 100%	V V 100%	V V 83%	V V 83%	V V 83%	V V 100%		V V 100%		X V % 17%	
GL ARB get program binary GL ARB ES2 compatibility Support OpenGL 4.0		V V V 67%	V V V 67%	V V 100% Fermi	V V 100% Kepler	V V 83% R600	V V 83% RV670	V V 83% RV700	V V 100% Evergreen	Cayman	V V 100% S.I.	HD 4000	X V % 17%	
GL ARB get program binary GL ARB ES2 compatibility Support  OpenGL 4.0 GL ARB transform feedback3		V V V 5 67% Tesla	V V V 67% GT21X	V V 100% Fermi	V V 100% Kepler	V V 83% R600	V V 83% RV670 V	V V 83% RV700 V	V V 100% Evergreen	Cayman V	V V 100% S.I. V	HD 4000 V	X V % 17%	
GL ARB get program binary GL ARB ES2 compatibility Support  OpenGL 4.0 GL ARB transform feedback3 GL ARB transform feedback2		V V V 5 67% Tesla	V V V 67% GT21X	V V 100% Fermi	V V 100% Kepler V	V V 83% R600	83% RV670 V	V V 83% RV700 V	V V 100% Evergreen V	Cayman V	V V 100% S.I. V V	HD 4000 V V	X V % 17%	
GL ARB get program binary GL ARB ES2 compatibility Support  OpenGL 4.0 GL ARB transform feedback3 GL ARB transform feedback2 GL ARB texture query lod		V V V V Tesla X V	V V V 67% GT21X	V V 100% Fermi	V V 100% Kepler V V	V V 83% R600	83% RV670 V V	V V 83% RV700 V	V V 100% Evergreen V V	Cayman V	V V 100% S.I. V V	HD 4000 V V	X V % 17%	
GL ARB get program binary GL ARB ES2 compatibility Support  OpenGL 4.0 GL ARB transform feedback3 GL ARB transform feedback2 GL ARB texture query lod GL ARB texture gather		V V V Tesla X V X	V V V 67% GT21X	V V 100% Fermi	V V 100% Kepler V V V	V V 83% R600	V V 83% RV670 V V X	V V 83% RV700 V	V V 100%  Evergreen V V V V V V	Cayman V	V V V 100% S.I. V V V V V	HD 4000 V V V	X V % 17%	

GL ARB shader subroutine

											.,			
GL ARB sample shading	X	X	V	V I	V	X	V	V	V	V	V	V	X	X
GL ARB gpu shader5	X	X	X	V	V	X	X	X	V	V	V	V	X	X
GL ARB gpu shader fp64	X	X	X	V	V	X	X	X	V	V	V	V	X	X
GL ARB draw indirect	X	X	X	V	V	X	X	X	V	V	V	V	X	X
GL ARB draw buffers blend	X	X	V 1.50/	V	V	V 240/	V = 40/	V	V	V	V	V	V 222	X
Support	0%	8%	46%	100%	100%	31%	54%	62%	5 10	00% 10	0% 100%	6 1	00% 38	% 0%
OpenGL 3.3	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergree	en Cayma	n S I	HD 4000	Intel Mesa	MacOS X
GL ARB vertex type 2 10 10 10 rev	V	V	V	V	V	V	V	V	V	V	V	V	V	X
GL ARB timer query	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB texture swizzle	V	V	V	V	V	V	V	V	V	V	V	V	V	X
GL ARB texture rgb10 a2ui	V	V	V	V	V	V	V	V	V	V	V	V	V	X
GL ARB shader bit encoding	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB sampler objects	V	V	V	V	V	V	V	V	V	V	V	V	V	X
GL ARB occlusion query2	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB instanced arrays	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB explicit attrib location	V	V	V	V	V	V	V	V	V	V	V	V	V	X
GL ARB blend func extended	V	V	V	V	V	V	V	V	V	V	V	V	V	X
Support	100%	100%	100%	100%	100%	100%	100%	100%	5 10	00% 10	0% 100%	6 1	00% 100	% 40%
OpenGL 3.2	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergree	en Cayma	n S.I.	HD 4000	Intel Mesa	MacOS X
GL ARB vertex array bgra	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB texture multisample	V	V	V	V	V	V	V	V	V	V	V	V	X	V
GL ARB sync	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB seamless cube map	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB provoking vertex	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB geometry shader4	V	V	V	V	V	V	V	V	V	V	V	V	X	V
GL ARB fragment coord conventions	V	V	V	٧	V	V	V	V	V	V	V	V	V	V
GL ARB depth clamp	V	V	V	٧	V	V	V	V	V	V	V	V	V	V
GL ARB draw elements base vertex	V	V	V	٧	V	V	V	V	V	V	V	V	V	V
Support	100%	100%	100%	100%	100%	100%	100%	100%	5 10	00% 10	0% 100%	6 1	00% 78	% 100%

GL ARB uniform buffer object	V	V	V	V	٧	V	٧	V	V	V	V	V	V	V
GL EXT texture snorm	V	V	V	V	V	٧	V	V	٧	V	V	V	V	V
GL ARB texture rectangle	V	V	V	V	V	٧	V	V	٧	V	V	V	V	V
GL ARB texture buffer object	V	V	V	V	V	٧	V	V	٧	V	V	V	V	V
GL NV primitive restart	V	V	V	V	V	V	V	V	٧	V	V	V	V	V
GL ARB draw instanced	V	V	V	V	V	V	V	V	٧	V	V	V	V	V
GL ARB copy buffer	V	V	V	V	V	V	V	V	V	V	V	V	V	V
Support	100%	100%	100%	100%	100%	100%	100%	100%	100%	1009	6 100%	100%	6 100%	100%
OpenGL 3.0	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Intel Mesa	MacOS X
GL ARB vertex array object	V	V	V	V	V	٧	V	V	V	V	V	V	V	V
GL EXT transform feedback	V	V	V	V	V	V	V	V	٧	V	V	V	V	V
GL ARB texture rg	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL EXT texture shared exponent	V	V	V	V	V	V	V	V	٧	V	V	V	V	V
GL EXT texture integer	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB texture float	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB texture compression rgtc	V	V	V	V	V	٧	V	V	V	V	V	V	V	V
GL EXT texture array	V	V	V	V	V	٧	V	V	V	V	V	V	V	V
GL EXT packed float	V	V	V	V	V	٧	V	V	V	V	V	V	V	V
GL EXT packed depth stencil	V	V	V	V	V	٧	V	V	V	V	V	V	V	V
GL ARB map buffer range	V	V	V	V	V	٧	V	V	V	V	V	V	V	V
GL ARB half float vertex	V	V	V	V	V	٧	V	V	V	V	V	V	V	V
GL ARB half float pixel	V	V	V	V	V	٧	V	V	V	V	V	V	V	V
GL EXT gpu shader4	V	V	V	V	V	٧	V	V	V	V	V	V	V	V
GL ARB framebuffer sRGB	V	V	V	V	V	٧	V	V	V	V	V	V	V	V
GL ARB framebuffer object	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB depth buffer float	V	V	V	V	V	٧	V	V	V	V	V	V	V	V
GL NV conditional render	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB color buffer float	V	V	V	٧	V	V	V	V	V	V	V	V	V	V
Support	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	6 100%	100%	6 100%	100%
OpenGL 2.1	G80	Tesla	GT21X	Fermi	Kepler	R600	RV670	RV700	Evergreen	Cayman	S.I.	HD 4000	Intel Mesa	MacOS X
GL EXT texture sRGB	V	V	V	V	V	V	V	V	V	V	V	V	V	V

GL ARB pixel buffer object	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%	6 100%
OpenGL 2.0	G80	Tesla	GT21X	Fermi	Kenler	R600	RV670	RV700	Evergreen	Cavman	SI	HD 4000	Intel Mesa	MacOS X
GL ARB vertex shader	V	V	٧	٧	V	V	V	V	V	V	V	V	V	V
GL ARB texture non power of two	V	V	V	٧	V	V	V	V	٧	V	V	V	V	V
GL EXT stencil two side	V	٧	V	V	V	٧	V	V	V	V	V	V	V	V
GL ARB shading language 100	V	٧	V	V	V	٧	V	V	V	V	V	V	V	V
GL ARB shader objects	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB point sprite	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB fragment shader	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL ARB draw buffers	V	V	V	V	V	V	V	V	V	V	V	V	V	V
GL EXT blend equation separate	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%	6 100%