## **OpenGL hardware matrix**

Extensions exposed by OpenGL implementations

July 2014, G-Truc Creation

GF / Fermi: GeForce 400 series, GeForce 500 series GK / Kepler: GeForce 600 series, GeForce 700 series

GM / Maxwell: GeForce 750

EG / Evergreen: Radeon HD 5000 series, Radeon HD 6000 series

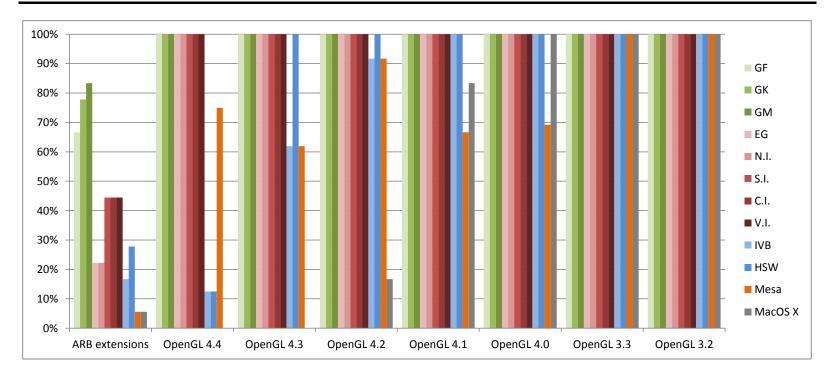
N.I. / Northern Islands: Radeon HD 6900 series

S.I. / Southern Islands: Radeon HD 7000 series, Radeon R7 250X, Radeon R7 265, Radeon R9 280 C.I. / Sea Islands: Radeon HD 7790, Radeon R7 240, Radeon R7 250, Radeon R7 260, Radeon R9 270

V.I. / Volcanic Islands: Radeon R9 290 IVB / Ivy Bridge: HD4000, HD2500

HSW / Haswell: Iris 5000 series, HD 4X00 series

Vendor		NVIDIA	1			AMD			Int	tel	Mesa	Apple
Drivers version		340.43			1	.4.7 rc2	1		3621	3652	git	10.9.4
Release date	17	/06/20	14		09	/07/20	14		24/06	/2014	25/07/2014	30/06/2014
Platforms	GF	GK	GM	EG	N.I.	S.I.	C.I.	V.I.	IVB	HSW	Mesa	MacOS X
ARB extensions	67%	78%	83%	22%	22%	44%	44%	44%	17%	28%	6%	6%
OpenGL 4.4	100%	100%	100%	100%	100%	100%	100%	100%	13%	13%	75%	0%
OpenGL 4.3	100%	100%	100%	100%	100%	100%	100%	100%	62%	100%	62%	0%
OpenGL 4.2	100%	100%	100%	100%	100%	100%	100%	100%	92%	100%	92%	17%
OpenGL 4.1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	67%	83%
OpenGL 4.0	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	69%	100%
OpenGL 3.3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
OpenGL 3.2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%



## Nomenclature:

## Supported

Not supported

Support added from previous report

OpenGL Extensions	GF	GK	GM	EG	N.I.	S.I.	C.I.	V.I.	IVB	HSW	Mesa	MacOS X
KHR blend equation advanced coherent	Χ	Χ	V	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	X
KHR blend equation advanced	V	V	V	X	Χ	Χ	Χ	Χ	Χ	V	Χ	X
KHR texture compression astc ldr	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	X	Χ
ARB robustness	V	V	V	X	Χ	Χ	Χ	Χ	V	V	X	Χ
ARB sparse texture	V	V	V	X	Χ	V	V	V	Χ	Χ	X	X
ARB shading language include	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	V
ARB shader stencil export	Χ	Χ	Χ	V	V	V	V	V	Χ	Χ	Χ	X
ARB shader group vote	V	V	V	X	Χ	V	V	V	Χ	Χ	X	Χ
ARB shader draw parameters	V	V	V	X	Χ	V	V	V	Χ	Χ	Χ	X
ARB seamless cubemap per texture	X	V	V	V	V	V	V	V	Χ	Χ	X	Χ
ARB robustness isolation	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	Χ
ARB robust buffer access behavior	V	V	V	X	X	Χ	Χ	Χ	Χ	V	X	X
ARB debug output	V	V	V	V	V	V	V	V	V	V	V	X
ARB indirect parameters	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	X
ARB compute variable group size	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	Χ
ARB compatibility	V	V	V	V	V	V	V	V	V	V	Χ	X
ARB cl event	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	X
ARB bindless texture	X	V	V	X	Χ	V	V	V	Χ	Χ	Χ	X
Support	69%	81%	81%	25%	25%	50%	50%	50%	19%	25%	6%	6%

OpenGL Extensions	GF	GK	GM	EG	N.I.	S.I.	C.I.	V.I.	IVB	HSW	Mesa	MacOS X
EXT texture compression dxt1	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	V	V
EXT texture compression s3tc	V	V	V	V	V	V	V	V	V	V	Χ	V
EXT texture sRGB decode	V	V	V	V	V	V	V	V	V	V	V	V
EXT texture mirror clamp	V	V	V	V	V	V	V	V	X	Х	Χ	V
EXT shader integer mix	V	V	V	V	V	V	V	V	V	V	V	X
EXT shader image load formatted	X	Х	V	X	Х	Х	Х	Х	Х	Х	Χ	X

EXT framebuffer multisample blit scaled	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	V	V
EXT direct state access	V	V	V	V	V	V	V	V	X	V	X	Χ
EXT depth bounds test	V	V	V	X	Χ	V	V	V	X	Χ	Х	V
EXT clip control	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	V	V	X	X
NV vertex buffer unified memory	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	X
NV texture multisample	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	X
NV texture barrier	V	V	V	V	V	V	V	V	X	Χ	X	V
NV shader thread shuffle	X	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	X
NV shader thread group	V	V	V	X	X	Χ	Χ	Χ	Χ	Χ	Χ	X
NV shader buffer store	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	X
NV shader buffer load	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	X
NV shader atomic float	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	X
NV shader atomic int64	Χ	Χ	V	X	X	Χ	Χ	Χ	Χ	Χ	Χ	X
NV multisample coverage	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	X
NV explicit multisample	V	V	V	V	V	V	V	V	X	Χ	Χ	Χ
NV depth buffer float	V	V	V	V	V	V	V	V	X	Χ	X	X
NV copy image	V	V	V	V	V	V	V	V	X	Χ	Х	X
NV bindless texture	Χ	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	X
NV bindless multi draw indirect count	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	X	X
NV bindless multi draw indirect	V	V	V	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	X
NV blend equation advanced	V	V	V	X	X	Χ	Χ	Χ	Χ	Χ	X	X
INTEL map texture	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	V	X	X
INTEL fragment shader ordering	Χ	Χ	Χ	Χ	Χ	V	V	V	V	V	X	X
INTEL conservative rasterization	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	V	X	X
ANGLE texture compression dxt5	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	V	X
ANGLE texture compression dxt3	Χ	Χ	Χ	Χ	X	Χ	Χ	Χ	Χ	Χ	V	X
AMD vertex shader viewport index	Χ	Χ	Χ	V	V	V	V	V	X	V	X	X
AMD vertex shader layer	Χ	Χ	Χ	V	V	V	V	V	X	V	V	X
AMD transform feedback4	Χ	Χ	Χ	Χ	X	V	V	V	X	Χ	Χ	X
AMD transform feedback3 lines triangles	Χ	Χ	Χ	Χ	V	V	V	V	X	Χ	X	X
AMD stencil operation extended	X	Χ	Χ	Χ	X	V	V	V	X	Χ	Χ	X
AMD sparse texture pool	Χ	Χ	Χ	Χ	Χ	Χ	V	V	X	Χ	Χ	X
AMD sparse texture	Χ	Χ	Χ	Χ	Χ	V	V	V	X	Χ	X	X

AMD shader trinary minmax	X	Χ	Χ	Χ	Χ	V	V	V	Χ	Χ	V	X	
AMD shader stencil value export	X	Χ	Χ	Χ	Χ	V	V	V	Χ	Χ	Χ	X	
AMD shader stencil export	X	Χ	Χ	V	V	V	V	V	Χ	Χ	X	X	
AMD seamless cubemap per texture	X	V	V	V	V	V	V	V	Χ	Χ	V	X	
AMD sample positions	X	Χ	Χ	V	V	V	V	V	Χ	Χ	Χ	Х	
AMD query buffer object	X	Χ	Χ	V	V	V	V	V	Χ	Χ	Χ	X	
AMD pinned memory	X	Χ	Χ	V	V	V	V	V	Χ	Χ	X	X	
AMD performance monitor	X	Χ	Χ	V	V	V	V	V	Χ	Χ	V	X	
AMD occlusion query event	X	Χ	Χ	Χ	Χ	Χ	V	V	Χ	Χ	Χ	Χ	
AMD interleaved elements	X	Χ	Χ	Χ	Χ	V	V	V	Χ	Χ	Χ	X	
AMD gpu shader int64	X	Χ	Χ	Χ	Χ	V	V	V	Χ	Χ	Χ	Х	
AMD gcn shader	X	Χ	Χ	Χ	Χ	V	V	V	Χ	Χ	Χ	Х	
AMD framebuffer sample positions	X	Χ	Χ	Χ	Χ	V	V	V	Χ	Χ	X	X	
AMD blend minmax factor	X	Χ	Χ	Χ	V	V	V	V	Χ	Χ	Χ	Х	
ATI texture mirror once	V	V	V	V	V	V	V	V	Χ	Χ	Χ	V	
	400	/ FC0/	F 00/	31%	34%	56%	59%	59%	11%	20%		16%	1 20/
Support	49%	6 56%	59%	31/0	34/0	5 30/0	33/0	33/0	11/0	20/0		10%	13%
	49%	6 56%	59%		34/0				11/0	20/0			
OpenGL 4.4	499 GF	6 56% GK	GM	EG	N.I.	S.I.	C.I.	V.I.	IVB	HSW	Mesa	MacO	
											Mesa V		
OpenGL 4.4	GF	GK	GM	EG	N.I.	S.I.	C.I.	V.I.	IVB	HSW	Mesa	MacO	
OpenGL 4.4  ARB buffer storage	GF V	GK V	GM V	EG V	N.I. V	S.I.	C.I.	V.I.	IVB V X	HSW V	Mesa V V X	MacO X	
OpenGL 4.4  ARB buffer storage  ARB clear texture	GF V	GK V V	GM V V	EG V V	N.I. V V	S.I. V V	C.I. V	V.I. V	IVB V X	HSW V X	Mesa V V	MacO X X	
OpenGL 4.4  ARB buffer storage  ARB clear texture  ARB enhanced layouts  ARB multi bind  ARB query buffer object	GF V	GK V V	GM V V	EG V V	N.I. V V	S.I. V V	C.I. V V	V.I. V V	IVB V X	HSW V X	Mesa V V X	MacO X X X	
OpenGL 4.4  ARB buffer storage  ARB clear texture  ARB enhanced layouts  ARB multi bind	GF V	GK V V V	GM V V V	EG V V V	N.I. V V V	S.I. V V V V	C.I. V V V	V.I. V V V	IVB V X X	HSW V X X	Mesa V V X	MacO X X X X	
OpenGL 4.4  ARB buffer storage  ARB clear texture  ARB enhanced layouts  ARB multi bind  ARB query buffer object	GF V	GK V V V	GM V V V V	EG V V V V	N.I. V V V V	S.I. V V V V	C.I. V V V V	V.I. V V V	IVB V X X X	HSW V X X X	Mesa V V X V	MacO X X X X	
OpenGL 4.4  ARB buffer storage  ARB clear texture  ARB enhanced layouts  ARB multi bind  ARB query buffer object  ARB texture mirror clamp to edge	GF V	GK V V V V	GM V V V V	EG V V V V	N.I. V V V V	S.I. V V V V	C.I. V V V V	V.I. V V V V	IVB V X X X X	HSW V X X X X	Mesa V V X V	MacO X X X X X	
OpenGL 4.4  ARB buffer storage  ARB clear texture  ARB enhanced layouts  ARB multi bind  ARB query buffer object  ARB texture mirror clamp to edge  ARB texture stencil8	GF V V V V V V V	GK	GM V V V V V V V V V	EG V V V V V	N.I. V V V V V V	S.I. V V V V V V V V V V V V V V V V V V	C.I.  V  V  V  V  V  V  V	V.I. V V V V V	IVB V X X X X X X	HSW V X X X X X X X	Mesa V V X V V V V V	MacO X X X X X X	
OpenGL 4.4  ARB buffer storage  ARB clear texture  ARB enhanced layouts  ARB multi bind  ARB query buffer object  ARB texture mirror clamp to edge  ARB texture stencil8  ARB vertex type 10f 11f 11f rev	GF V V V V V V V	GK	GM V V V V V V V V V	EG V V V V V V	N.I. V V V V V V	S.I. V V V V V V V V V V V V V V V V V V	C.I.  V  V  V  V  V  V  V	V.I. V V V V V	IVB V X X X X X X	HSW V X X X X X X	Mesa V V X V V V V V	MacO X X X X X X X	SX
OpenGL 4.4  ARB buffer storage  ARB clear texture  ARB enhanced layouts  ARB multi bind  ARB query buffer object  ARB texture mirror clamp to edge  ARB texture stencil8  ARB vertex type 10f 11f 11f rev	GF V V V V V V V	GK	GM V V V V V V V V V	EG V V V V V V	N.I. V V V V V V	S.I. V V V V V V V V V V V V V V V V V V	C.I.  V  V  V  V  V  V  V	V.I. V V V V V	IVB V X X X X X X	HSW V X X X X X X	Mesa V V X V V V V V	MacO X X X X X X X	S X 0%

V

V

ARB texture view

ARB texture storage multisample

ARB texture query levels

ARB texture buffer range	V	V	V	V	V	V	V	V	V	V	V	X
ARB stencil texturing	V	V	V	V	V	V	V	V	V	V	V	X
ARB shader storage buffer object	V	V	V	V	V	V	V	V	Χ	V	Χ	X
ARB shader image size	V	٧	٧	V	V	٧	٧	V	V	V	Χ	Χ
ARB program interface query	V	V	V	V	V	V	V	V	V	V	Χ	Χ
ARB multi draw indirect	V	٧	٧	V	V	٧	٧	V	V	٧	V	X
ARB invalidate subdata	V	V	V	V	V	V	V	V	Χ	V	V	X
ARB internalformat query2	V	٧	٧	V	V	٧	٧	V	V	V	Χ	X
ARB framebuffer no attachments	V	V	V	V	V	V	V	V	V	V	Χ	Χ
ARB fragment layer viewport	V	V	V	V	V	V	V	V	Χ	V	V	X
ARB explicit uniform location	V	V	V	V	V	V	V	V	Χ	V	V	X
ARB ES3 compatibility	V	V	V	V	V	V	V	V	V	V	V	Χ
KHR debug	V	V	V	V	V	V	V	V	V	V	V	X
ARB copy image	V	V	V	V	V	V	V	V	V	V	Χ	X
ARB compute shader	V	V	V	V	V	V	V	V	Χ	V	Χ	Χ
ARB clear buffer object	V	V	V	V	V	V	V	V	Χ	V	V	X
ARB arrays of arrays	V	V	V	V	V	V	V	V	V	V	Χ	Χ
Support	100%	100%	100%	100%	100%	100%	100%	100%	62%	100%	629	6 0%

OpenGL 4.2	GF	GK	GM	EG	N.I.	S.I.	C.I.	V.I.	IVB	HSW	Mesa	MacOS X
ARB transform feedback instanced	V	٧	٧	٧	٧	٧	٧	٧	٧	V	V	Х
ARB texture compression bptc	V	V	V	V	٧	V	V	V	٧	V	V	X
ARB texture storage	V	V	V	V	٧	V	V	V	V	V	V	V
ARB shading language packing	V	V	V	V	V	V	V	V	V	V	V	X
ARB shading language 420pack	V	V	V	V	V	V	V	V	V	V	V	Χ
ARB shader image load store	V	V	V	V	V	V	V	V	Χ	V	Χ	X
ARB shader atomic counters	V	V	V	V	V	V	V	V	V	V	V	Χ
ARB map buffer alignment	V	V	V	V	V	V	V	V	V	V	V	X
ARB internalformat query	V	V	V	V	V	V	V	V	V	V	V	V
ARB conservative depth	V	V	V	V	V	V	V	V	V	V	V	Χ
ARB compressed texture pixel storage	V	V	V	V	V	V	V	V	V	V	V	Χ
ARB base instance	V	V	V	V	V	V	V	V	V	V	V	X
Support	100%	6 100%	100%	100%	100%	100%	100%	100%	92%	100%	92%	17%

OpenGL 4.1	GF	GK	GM	EG	N.I.	S.I.	C.I.	V.I.	IVB	HSW	Mesa	MacOS X
ARB viewport array	V	V	٧	٧	٧	V	٧	٧	٧	٧	V	V
ARB vertex attrib 64bit	V	V	V	٧	٧	V	V	٧	٧	٧	Χ	V
ARB shader precision	V	V	V	V	V	V	V	V	V	V	Χ	V
ARB separate shader objects	V	V	V	V	V	V	V	V	V	V	V	V
ARB get program binary	V	V	V	V	V	V	V	V	V	V	V	X
ARB ES2 compatibility	V	V	V	V	V	V	V	V	V	V	V	V
Support	100%	6 100%	100%	100%	100%	100%	100%	100%	100%	100%	679	% 83%
OpenGL 4.0	GF	GK	GM	EG	N.I.	S.I.	C.I.	V.I.	IVB	HSW	Mesa	MacOS X
ARB transform feedback3	V	V	V	V	V	V	V	V	V	V	V	V
ARB transform feedback2	V	V	V	V	V	V	V	V	V	V	V	V
ARB texture query lod	V	V	V	V	V	V	V	V	V	V	V	V
ARB texture gather	V	V	V	V	V	V	V	V	V	V	V	V
ARB texture cube map array	V	V	V	V	V	V	V	V	V	V	V	V
ARB texture buffer object rgb32	V	V	V	V	V	V	V	V	V	V	V	V
ARB tessellation shader	V	V	V	V	V	V	V	V	V	V	Χ	V
ARB shader subroutine	V	V	V	V	V	V	V	V	V	V	Χ	V
ARB sample shading	V	V	V	V	V	V	V	V	V	V	V	V
ARB gpu shader5	V	V	V	V	V	V	V	V	V	V	Χ	V
ARB gpu shader fp64	V	V	V	V	V	V	V	V	V	V	Χ	V
ARB draw indirect	V	V	V	V	V	V	V	V	V	V	V	V
ARB draw buffers blend	V	V	V	V	V	V	V	V	V	V	V	V
Support	100%	6 100%	100%	100%	100%	100%	100%	100%	100%	100%	699	% 100%
OpenGL 3.3	GF	GK	GM	EG	N.I.	S.I.	C.I.	V.I.	IVB	HSW	Mesa	MacOS X
ARB vertex type 2 10 10 10 rev	V	V	V	٧	٧	٧	٧	٧	٧	٧	V	V
ARB timer query	V	V	V	V	V	V	V	٧	V	V	V	V
ARB texture swizzle	V	V	V	V	V	V	V	٧	V	V	V	V
ARB texture rgb10 a2ui	V	V	V	V	V	V	V	V	V	V	V	V
ARB shader bit encoding	V	V	V	٧	V	V	V	٧	V	V	V	V
ARB sampler objects	V	V	V	V	V	V	V	V	V	V	V	V

ARB occlusion query2	V	V	V	V	V	V	V	V	V	V	V	V	
ARB instanced arrays	V	V	V	V	V	V	V	V	V	V	V	V	
ARB explicit attrib location	V	V	V	V	V	V	V	V	V	V	V	V	
ARB blend func extended	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%
OpenGL 3.2	GF	GK	GM	EG	N.I.	S.I.	C.I.	V.I.	IVB	HSW	Mesa	Maco	OS X
ARB vertex array bgra	V	V	V	V	V	V	V	V	V	V	٧	V	
ARB texture multisample	V	V	V	V	V	V	V	V	V	V	V	V	
ARB sync	V	V	V	V	V	V	V	V	V	V	V	V	
ARB seamless cube map	V	V	V	V	V	V	V	V	V	V	V	V	
ARB provoking vertex	V	V	V	V	V	V	V	V	V	V	V	V	
ARB geometry shader4	V	V	V	V	V	V	V	V	V	V	V	V	
ARB fragment coord conventions	V	V	V	V	V	V	V	V	V	V	V	V	
ARB depth clamp	V	V	V	V	V	V	V	V	V	V	V	V	
ARB draw elements base vertex	V	V	V	V	V	V	V	V	V	V	٧	V	
Support	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%		100%	100%