Metal Feature Set Tables

Developer

Feature Availability

This table lists the availability of major Metal features.

OS	iOS 8	iOS 8	iOS 9	iOS 9	iOS 9	iOS 10	iOS 10	iOS 10	iOS 11	iOS 11	iOS 11	iOS 11	tvOS 9	tvOS 10	tvOS 11	tvOS 11	macOS 10.11	macOS 10.12	macOS 10.13
GPU Family	1	2	1	2	3	1	2	3	1	2	3	4	1	1	1	2	1	1	1
Version	1	1	2	2	1	3	3	2	4	4	3	1	1	2	3	1	1	2	3
Feature Set	iOS_GPUFamily1_v1	iOS_GPUFamily2_v1	iOS_GPUFamily1_v2	iOS_GPUFamily2_v2	iOS_GPUFamily3_v1	iOS_GPUFamily1_v3	iOS_GPUFamily2_v3	iOS_GPUFamily3_v2	iOS_GPUFamily1_v4	iOS_GPUFamily2_v4	iOS_GPUFamily3_v3	iOS_GPUFamily4_v1	tvOS_GPUFamily1_v1	tvOS_GPUFamily1_v2	tvOS_GPUFamily1_v3	tvOS_GPUFamily2_v1	macOS_GPUFamily1_v1	macOS_GPUFamily1_v2	macOS_GPUFamily1_v3
Features																			
MetalKit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Metal Performance Shaders		✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓			✓
Programmable blending	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
PVRTC pixel formats	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
EAC/ETC pixel formats	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
ASTC pixel formats		✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓			
Linear textures	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
BC pixel formats																	✓	✓	✓
MSAA depth resolve					✓			✓			✓	✓				✓			
Counting occlusion query					✓			✓			✓	✓				✓	✓	✓	✓
Base vertex/instance drawing					✓			✓			✓	✓				✓	✓	✓	✓
Indirect buffers					✓			✓			✓	✓				✓	✓	✓	✓
Cube map texture arrays												✓					✓	✓	✓
Texture barriers																	✓	✓	✓
Layered rendering																	✓	✓	✓
Tessellation								✓			✓	✓				✓		✓	✓
Resource heaps						✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			✓
Memoryless render targets						✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			
Function specialization						✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
Function buffer read-writes								✓			✓	✓				✓		✓	✓
Function texture read-writes												✓						✓	✓
Array of textures								✓			✓	✓				✓			✓
Array of samplers											✓	✓				✓			✓
Stencil texture views						✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
Depth-16 pixel format																		✓	✓
Extended range pixel formats								✓			✓	✓				✓			
Wide color pixel format									✓	✓	✓	✓			✓	✓			✓
Combined MSAA store and resolve action								✓			✓	✓				✓		✓	✓
Deferred store action						✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
MSAA blits						✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
sRGB writes					✓		✓	✓		✓	✓	✓		✓	✓	✓			
16-bit unsigned integer coordinates						✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
Extract, insert, and reverse bits						✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
SIMD barrier						✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			
Sampler max anisotropy						✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			
Sampler LOD clamp						✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			
Border color																		✓	✓
Dual-source blending									✓	✓	✓	✓			✓	✓		✓	✓
Argument buffers									✓	✓	✓	✓			✓	✓			✓
Programmable sample positions									✓	✓	✓	✓			✓	✓			✓
Uniform type									✓	✓	✓	✓			✓	✓			✓
Imageblocks												✓							
Tile shaders												✓							
Imageblock sample coverage control												✓							
Threadgroup sharing												✓							
Post-depth coverage												✓							
Quad-scoped permute operations												✓							
Raster order groups												✓							✓
Non-uniform threadgroup size												✓							✓
Multiple viewports																			✓
Device notifications																			✓

Implementation Limits

This table lists the implementation limits in Metal.

OS	**iOS 8**	**iOS 8**	**iOS 9**	**iOS 9**	**iOS 9**	**iOS 10**	**iOS 10**	**iOS 10**	**iOS 11**	**iOS 11**	**iOS 11**	**iOS 11**	**tvOS 9**	**tvOS 10**	**tvOS 11**	**tvOS 11**	**macOS 10.11**	**macOS 10.12**	**macOS 10.13**
GPU Family	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**4**	**1**	**1**	**1**	**2**	**1**	**1**	**1**
Version	**1**	**1**	**2**	**2**	**1**	**3**	**3**	**2**	**4**	**4**	**3**	**1**	**1**	**2**	**3**	**1**	**1**	**2**	**3**
Feature Set	**iOS_ GPUFamily1_ v1**	**iOS_ GPUFamily2_ v1**	**iOS_ GPUFamily1_ v2**	**iOS_ GPUFamily2_ v2**	**iOS_ GPUFamily3_ v1**	**iOS_ GPUFamily1_ v3**	**iOS_ GPUFamily2_ v3**	**iOS_ GPUFamily3_ v2**	**iOS_ GPUFamily1_ v4**	**iOS_ GPUFamily2_ v4**	**iOS_ GPUFamily3_ v3**	**iOS_ GPUFamily4_ v1**	**tvOS_ GPUFamily1_ v1**	**tvOS_ GPUFamily1_ v2**	**tvOS_ GPUFamily1_ v3**	**tvOS_ GPUFamily2_ v1**	**macOS_ GPUFamily1_ v1**	**macOS_ GPUFamily1_ v2**	**macOS_ GPUFamily1_ v3**
Function arguments																			
Maximum number of vertex attributes, per vertex descriptor	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Maximum number of entries in the buffer argument table, per graphics or compute function	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Maximum number of entries in the texture argument table, per graphics or compute function	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	128	128	128
Maximum number of entries in the sampler state argument table, per graphics or compute function[1]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Maximum number of entries in the threadgroup memory argument table, per compute function	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Maximum number of inlined constant data buffers, per graphics or compute function	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	14	14	14
Maximum length of an inlined constant data buffer, per graphics or compute function	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB
Maximum threads per threadgroup	512	512	512	512	512	512	512	512	512	512	512	1024	512	512	512	512	1024	1024	1024
Maximum total threadgroup memory allocation[2]	16352 B	16352 B	16352 B	16352 B	16 KB	16352 B	16352 B	16 KB	16352 B	16352 B	16 KB	32 KB	16352 B	16352 B	16352 B	16 KB	32 KB	32 KB	32 KB
Maximum total tile memory allocation[3]	Not accessible	Not accessible	Not accessible	Not accessible	Not accessible	Not accessible	Not accessible	Not accessible	Not accessible	Not accessible	Not accessible	32 KB	Not accessible	Not accessible	Not accessible	Not accessible	Not accessible	Not accessible	Not accessible
Threadgroup memory length alignment	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B
Maximum function memory allocation for a buffer in the constant address space	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	64 KB	64 KB	64 KB
Maximum number of inputs (scalars or vectors) to a fragment function, declared with the stage_in qualifier[4]	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	32	32	32
Maximum number of input components to a fragment function, declared with the stage_in qualifier[4]	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	128	128	128
Maximum number of function constants	Not available	Not available	Not available	Not available	Not available	65536	65536	65536	65536	65536	65536	65536	Not available	65536	65536	65536	Not available	65536	65536
Maximum tessellation factor	Not available	Not available	Not available	Not available	Not available	Not available	Not available	16	Not available	Not available	16	16	Not available	Not available	Not available	16	Not available	64	64
Maximum number of viewports and scissor rectangles, per vertex function	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
Maximum number of raster order groups, per fragment function	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	8	Not available	Not available	Not available	Not available	Not available	Not available	8
Resources																			
Maximum buffer length	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	1 GB	1 GB
Minimum buffer offset alignment	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	256 B	256 B	256 B
Maximum 1D texture width	4096 px	4096 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	16384 px	8192 px	8192 px	8192 px	16384 px	16384 px	16384 px	16384 px
Maximum 2D texture width and height	4096 px	4096 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	16384 px	8192 px	8192 px	8192 px	16384 px	16384 px	16384 px	16384 px
Maximum cube map texture width and height	4096 px	4096 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	16384 px	8192 px	8192 px	8192 px	16384 px	16384 px	16384 px	16384 px
Maximum 3D texture width, height, and depth	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px
Maximum number of layers per 1D texture array, 2D texture array, or 3D texture	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
Buffer alignment for copying an existing texture to a buffer	64 B	64 B	64 B	64 B	16 B	64 B	64 B	16 B	64 B	64 B	16 B	16 B	64 B	64 B	64 B	16 B	256 B	256 B	256 B
Buffer alignment for creating a new texture from a buffer (i.e. linear texture)[5]	64 B	64 B	64 B	64 B	16 B	64 B	64 B	16 B	By API query	By API query	By API query	By API query	64 B	64 B	By API query	By API query	Not available	Not available	By API query
Render Targets																			
Maximum number of color render targets per render pass descriptor	4	8	4	8	8	4	8	8	4	8	8	8	8	8	8	8	8	8	8
Maximum size of a point primitive	511	511	511	511	511	511	511	511	511	511	511	511	511	511	511	511	511	511	511
Maximum total render target size, per pixel, when using multiple color render targets	128 bits	256 bits	128 bits	256 bits	256 bits	128 bits	256 bits	256 bits	128 bits	256 bits	256 bits	512 bits	256 bits	256 bits	256 bits	256 bits	No limit	No limit	No limit
Maximum visibility query offset	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B

[1] Inline constant samplers, declared in Metal shading language code, also count against this limit. For example, if the feature set limit is 16, you can have 12 API samplers and 4 language samplers (16 total) but you cannot have 12 API samplers and 6 language samplers (18 total).

[2] In some iOS and tvOS feature sets, the driver may consume up to 32 B of a device's total threadgroup memory. Therefore, the maximum limit is actually 16 KB minus 32 B, which equals 16352 B.

[3] Tile memory can be allocated between imageblocks and threadgroup memory, but the sum of these allocations cannot exceed the maximum total tile memory limit. Some feature sets cannot access tile memory directly, but they can access threadgroup memory.

[4] A vector counts as n scalars, where n is the number of components in the vector. In iOS and tvOS feature sets, you can only reach the maximum number of inputs if you do not exceed the maximum number of input components. For example, you can have 60 float inputs (60 input components) but you cannot have 60 float4 inputs (240 input components).

[5] In some feature sets, this value is determined by API query. Use the minimumLinearTextureAlignment(for:) method to determine the minimum alignment required for creating a linear texture with a given pixel format.

Pixel Format Capabilities

This table lists the capabilities of all Metal pixel formats. These capabilities determine the operations that can be performed on a texture that uses a given pixel format. All graphics and compute functions can read or sample from any texture, regardless of its pixel format. Additional capabilities are defined as follows:

- Filter—the texture can be filtered during sampling.
- Write—the texture can be written to by a function.[6]
- Color—the texture can be used as a color render target.
- Blend—the texture can be blended.
- MSAA—the texture can be used as the destination for multisample antialias (MSAA) data.
- Resolve—the texture can be used as the destination for resolved MSAA data.
- All—the texture has all the previously-listed capabilities.

OS	iOS 8	iOS 8	iOS 9	iOS 9	iOS 9	iOS 10	iOS 10	iOS 10	iOS 11	iOS 11	iOS 11	iOS 11	tvOS 9	tvOS 10	tvOS 11	tvOS 11	macOS 10.11	macOS 10.12	macOS 10.13
GPU Family	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**4**	**1**	**1**	**1**	**2**	**1**	**1**	**1**
Version	**1**	**1**	**2**	**2**	**1**	**3**	**3**	**2**	**4**	**4**	**3**	**1**	**1**	**2**	**3**	**1**	**1**	**2**	**3**
Feature Set	**iOS_ GPUFamily1_ v1**	**iOS_ GPUFamily2_ v1**	**iOS_ GPUFamily1_ v2**	**iOS_ GPUFamily2_ v2**	**iOS_ GPUFamily3_ v1**	**iOS_ GPUFamily1_ v3**	**iOS_ GPUFamily2_ v3**	**iOS_ GPUFamily3_ v2**	**iOS_ GPUFamily1_ v4**	**iOS_ GPUFamily2_ v4**	**iOS_ GPUFamily3_ v3**	**iOS_ GPUFamily4_ v1**	**tvOS_ GPUFamily1_ v1**	**tvOS_ GPUFamily1_ v2**	**tvOS_ GPUFamily1_ v3**	**tvOS_ GPUFamily2_ v1**	**macOS_ GPUFamily1_ v1**	**macOS_ GPUFamily1_ v2**	**macOS_ GPUFamily1_ v3**
Ordinary 8-bit pixel formats																			
A8Unorm	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
R8Unorm	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All
R8Unorm_sRGB	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	All	All	Filter Color MSAA Resolve Blend	All	All	All	Filter Color MSAA Resolve Blend	All	All	All	Not available	Not available	Not available
R8Snorm	Filter Write Color MSAA Blend	All	Filter Write Color MSAA Blend	All	All	Filter Write Color MSAA Blend	All	All	Filter Write Color MSAA Blend	All	All	All	All	All	All	All	All	All	All
R8Uint R8Sint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA
Ordinary 16-bit pixel formats																			
R16Unorm R16Snorm	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	All	All	All
R16Uint R16Sint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA
R16Float	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All
RG8Unorm	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All
RG8Unorm_sRGB	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	All	All	Filter Color MSAA Resolve Blend	All	All	All	Filter Color MSAA Resolve Blend	All	All	All	Not available	Not available	Not available
RG8Snorm	Filter Write Color MSAA Blend	All	Filter Write Color MSAA Blend	All	All	Filter Write Color MSAA Blend	All	All	Filter Write Color MSAA Blend	All	All	All	All	All	All	All	All	All	All
RG8Uint RG8Sint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA
Packed 16-bit pixel formats																			
B5G6R5Unorm A1BGR5Unorm ABGR4Unorm BGR5A1Unorm	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Not available	Not available	Not available
Ordinary 32-bit pixel formats																			
R32Uint R32Sint	Color	Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color MSAA	Write Color MSAA	Write Color MSAA
R32Float	Color MSAA Blend	Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	All	All	All
RG16Unorm RG16Snorm	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	All	All	All
RG16Uint RG16Sint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA
RG16Float	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All
RGBA8Unorm	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All
RGBA8Unorm_sRGB	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	All	All	Filter Color MSAA Resolve Blend	All	All	All	Filter Color MSAA Resolve Blend	All	All	All	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend

RGBA8Snorm	Filter Write Color MSAA Blend	All	Filter Write Color MSAA Blend	All	All	Filter Write Color MSAA Blend	All	All	Filter Write Color MSAA Blend	All	All	All	All	All	All	All	All	All	All
RGBA8Uint RGBA8Sint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA
BGRA8Unorm	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All
BGRA8Unorm_sRGB	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	All	All	Filter Color MSAA Resolve Blend	All	All	All	Filter Color MSAA Resolve Blend	All	All	All	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend
Packed 32-bit pixel formats																			
RGB10A2Unorm	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	All	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	All	All	All
RGB10A2Uint	Color MSAA	Color MSAA	Color MSAA	Color MSAA	Write Color MSAA	Color MSAA	Color MSAA	Write Color MSAA	Color MSAA	Color MSAA	Write Color MSAA	Write Color MSAA	Color MSAA	Color MSAA	Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA
RG11B10Float	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	All	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	All	All	All
RGB9E5Float	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	All	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter	Filter	Filter
Ordinary 64-bit pixel formats																			
RG32Uint RG32Sint	Color	Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color MSAA	Write Color MSAA	Write Color MSAA
RG32Float	Color Blend	Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	Write Color Blend	All	All	All
RGBA16Unorm RGBA16Snorm	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	All	All	All
RGBA16Uint RGBA16Sint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA
RGBA16Float	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All
Ordinary 128-bit pixel formats																			
RGBA32Uint RGBA32Sint	Color	Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color MSAA	Write Color MSAA	Write Color MSAA
RGBA32Float	Color	Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	All	All	All
Compressed pixel formats																			
PVRTC pixel formats[7]	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Not available	Not available	Not available
EAC/ETC pixel formats	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Not available	Not available	Not available
ASTC pixel formats	Not available	Filter	Not available	Filter	Filter	Not available	Filter	Filter	Not available	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Not available	Not available	Not available
BC pixel formats	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Filter	Filter	Filter
YUV pixel formats																			
GBGR422 BGRG422	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
Depth and stencil pixel formats																			
Depth16Unorm	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Filter MSAA Resolve	Filter MSAA Resolve
Depth32Float	MSAA	MSAA	MSAA	MSAA	MSAA Resolve	MSAA	MSAA	MSAA Resolve	MSAA	MSAA	MSAA Resolve	MSAA Resolve	MSAA	MSAA	MSAA	MSAA Resolve	Filter MSAA Resolve	Filter MSAA Resolve	Filter MSAA Resolve
Stencil8	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA
Depth24Unorm_Stencil8	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Filter MSAA Resolve	Filter MSAA Resolve	Filter MSAA Resolve
Depth32Float_Stencil8	MSAA	MSAA	MSAA	MSAA	MSAA Resolve	MSAA	MSAA	MSAA Resolve	MSAA	MSAA	MSAA Resolve	MSAA Resolve	MSAA	MSAA	MSAA	MSAA Resolve	Filter MSAA Resolve	Filter MSAA Resolve	Filter MSAA Resolve
X24_Stencil8	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	MSAA	MSAA	MSAA
X32_Stencil8	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA
Extended range and wide color pixel formats																			
BGRA10_XR BGRA10_XR_sRGB BGR10_XR BGR10_XR_sRGB	Not available	Not available	Not available	Not available	Not available	Not available	Not available	All	Not available	Not available	All	All	Not available	Not available	Not available	All	Not available	Not available	Not available

BGR10A2Unorm	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	All	All	All	All	Not available	Not available	All	All	Not available	Not available	Filter Color MSAA Resolve Blend

[6] Read-write textures are available in some feature sets, where the texture can be both read from and written to by the same function.
[7] For PVRTC pixel formats, the clamp_to_zero sampler state is supported only in the iOS GPU Family 3 and 4 feature sets.

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