

# Intel KMS driver



**Welcome to Intel DRM/KMS Extreme Graphics!**

The xorg-video-intel package is the open-source 2D graphics driver for the X Window System as implemented by X.org. It supports a variety of Intel graphics chipsets including:

- i810/i810e/i810-dc100,i815,
- i830M,845G,852GM,855GM,865G,
- 915G/GM,945G/GM/GME,946GZ
- G/GM/GME/Q965,
- G/Q33,G/Q35,G41,G/Q43,G/GM/Q45
- PineView-M (Atom N400 series)
- PineView-D (Atom D400/D500 series)
- Intel(R) HD Graphics,
- Intel(R) Iris(TM) Graphics,
- Intel(R) Iris(TM) Pro Graphics.

**NOTE:** Latest Intel video drivers are attached to this page.

Support for Intel DRM modules: <https://www.illumos.org/projects/gfx-drm>

Open source kernel driver(s) by Oracle:

- <https://github.com/oracle/solaris-xorg/tree/master/open-src/kernel>

Relevant kernel code is located in drm and i915 subfolders.

illumos port of Oracle code is available here:

<https://github.com/illumos/gfx-drm>

Martin Bochnig, creator of OpenSXCE, initially backported the S12 driver to illumos, available in oi-userland until December 20. 2016.

It was then superseded by the new gate (#2678) providing improvements to the gfx\_private interface and agpgart driver, as well as containing userland libraries used by graphics, like libdrm.

## References

Alan Coopersmith pointed to the following documents regarding DRI/KMS:

- [http://www.phoronix.com/scan.php?page=news\\_item&px=Solaris-DRM-KMS-2015](http://www.phoronix.com/scan.php?page=news_item&px=Solaris-DRM-KMS-2015)
- [http://www.x.org/wiki/Events/XDC2015/Program/#Fishel\\_status\\_drm\\_i915\\_solaris](http://www.x.org/wiki/Events/XDC2015/Program/#Fishel_status_drm_i915_solaris)
- [https://en.wikipedia.org/wiki/Direct\\_Rendering\\_Manager](https://en.wikipedia.org/wiki/Direct_Rendering_Manager)
- <http://dri.freedesktop.org/wiki/>
- [https://wiki.archlinux.org/index.php/kernel\\_mode\\_setting](https://wiki.archlinux.org/index.php/kernel_mode_setting)
- <http://lanyrd.com/topics/x-window-system>

Additionally, information about driver development:

- <https://01.org/linuxgraphics>
- <http://dri.freedesktop.org/docs/drm/>
- <http://blog.ffwll.ch/2013/01/i915gem-crashcourse-overview.html>
- blog posts from the i915 Linux maintainer <http://blog.ffwll.ch/>

## Known Issues

### SNA

May causes segmentation fault if enabled. If so, just disable SNA and you can copy attached [20-intel-uxa.conf](#) to `/etc/X11/xorg.conf.d/`.

For now, UXA mode is set by default.

### Sandy Bridge GT1

A hardware bug requires implementing a workaround in the Intel ringbuffer implementation, occasional 1-2 second hangs may occur.

## Gen >= 8

Generation 8 specifics in Intel ringbuffer implementation are not committed yet.

## Hardware Matrix

Reference:

- [https://cgit.freedesktop.org/xorg/driver/xf86-video-intel/tree/src/i915\\_pciids.h](https://cgit.freedesktop.org/xorg/driver/xf86-video-intel/tree/src/i915_pciids.h)
- [https://en.wikipedia.org/wiki/List\\_of\\_Intel\\_graphics\\_processing\\_units](https://en.wikipedia.org/wiki/List_of_Intel_graphics_processing_units)
- [http://src.illumos.org/source/xref/gfx-drm/usr/src/uts/intel/io/i915/i915\\_drv.c#294](http://src.illumos.org/source/xref/gfx-drm/usr/src/uts/intel/io/i915/i915_drv.c#294)

Generation	Family	Codename	PCI id	Model	i915 support	xf86-video-intel support
2nd	I830	Almador	0x3577	I830M, I830MG		
	I845G	Brookdale	0x2562	I845G, I845GL, I845GV		
	I85X	Montara	0x3582	I855GM		
			0x358e			
I865G	Springdale	0x2572	I865G			
3rd	I915G	Grantsdale	0x2582	I915G		
			0x258a	E7221G		
	I915GM	Alviso	0x2592	I915GM		
	I945G	Lakeport	0x2772	I945G		
	I945GM	Calistoga	0x27a2	I945GM		
			0x27ae	I945GME		
	G33	Bearlake	0x29b2	Q35G		
			0x29c2	G33G		
			0x29d2	Q33G		
PINEVIEW	Pineview	0xa001				
		0xa011				
4th	I965G	Lakeport	0x2972	I946GZ		
			0x2982	G35G		
			0x2992	I965Q		
				0x29a2	I965G	
	I965GM	Crestline	0x2a02	I965GM		
			0x2a12	I965GME		
	GM45	Cantiga	0x2a42	GM45G		
	G45	Eaglelake	0x2e02	IGDEG		
			0x2e12	Q45G		
			0x2e22	G45G		
			0x2e32	G41G		
			0x2e42	B43G		
			0x2e92	B43G.1		
5th	IRONLAKE D	Ironlake (Clarkdale)	0x0042			

	IRONLAKE M	Ironlake (Arrandale)	0x0046		Gen 5 and earlier don't work until after (#2678) is fixed. (black screen before that)		
6th	SANDY BRIDGE D	Sandy Bridge	0x0102				
			0x0112				
			0x0122				
			0x010A				
	SANDY BRIDGE M		0x0106		HW bug causes GPU hangs. Work-around in place, but one may see brief render delays.		
			0x0116				
0x0126							
7th	IVY BRIDGE M	Ivy Bridge	0x0156	GT1 mobile			
	IVY BRIDGE D		0x0166	GT2 mobile			
			0x0152	GT1 desktop			
			0x0162	GT2 desktop			
			0x015a	GT1 server			
			0x016a	GT2 server			
	IVY BRIDGE Q	QUANTA_VGA_DEVICE					
	HASWELL D	Haswell	0x0402	GT1 desktop			
			0x0412	GT2 desktop			
			0x0422	GT3 desktop			
			0x040a	GT1 server			
			0x041a	GT2 server			
			0x042a	GT3 server			
			0x040B	GT1 reserved			
			0x041B	GT2 reserved			
			0x042B	GT3 reserved			
			0x040E	GT1 reserved			
			0x041E	GT2 reserved			
			0x042E	GT3 reserved			
			0x0C02	SDV GT1 desktop			
			0x0C12	SDV GT2 desktop			
			0x0C22	SDV GT3 desktop			
			0x0C0A	SDV GT1 server			
			0x0C1A	SDV GT2 server			
			0x0C2A	SDV GT3 server			
			0x0C0B	SDV GT1 reserved			
			0x0C1B	SDV GT2 reserved			
	0x0C2B	SDV GT3 reserved					
0x0C0E	SDV GT1 reserved						
0x0C1E	SDV GT2 reserved						
0x0C2E	SDV GT3 reserved						

HASWELL M

0x0A02	ULT GT1 desktop		
0x0A12	ULT GT2 desktop		
0x0A22	ULT GT3 desktop		
0x0A0A	ULT GT1 server		
0x0A1A	ULT GT2 server		
0x0A2A	ULT GT3 server		
0x0A0B	ULT GT1 reserved		
0x0A1B	ULT GT2 reserved		
0x0A2B	ULT GT3 reserved		
0x0D02	CRW GT1 desktop		
0x0D12	CRW GT2 desktop		
0x0D22	CRW GT3 desktop		
0x0D0A	CRW GT1 server		
0x0D1A	CRW GT2 server		
0x0D2A	CRW GT3 server		
0x0D0B	CRW GT1 reserved		
0x0D1B	CRW GT2 reserved		
0x0D2B	CRW GT3 reserved		
0x0D0E	CRW GT1 reserved		
0x0D1E	CRW GT2 reserved		
0x0D2E	CRW GT3 reserved		
0x0406	GT1 mobile		
0x0416	GT2 mobile		
0x0426	GT2 mobile		
0x0C06	SDV GT1 mobile		
0x0C16	SDV GT2 mobile		
0x0C26	SDV GT3 mobile		
0x0A06	ULT GT1 mobile		
0x0A16	ULT GT2 mobile		
0x0A26	ULT GT3 mobile		
0x0A0E	ULX GT1 mobile		

			0x0A1E	ULX GT2 mobile		
			0x0A2E	ULT GT3 reserved		
			0x0D06	CRW GT1 mobile		
			0x0D16	CRW GT2 mobile		
			0x0D26	CRW GT3 mobile		
	VALLEY VIEW M	Valley View (Bay Trail)	0x0f30			
			0x0f31			
			0x0f32			
			0x0f33			
			0x0157			
	VALLEY VIEW D		0x0155			
8th	BROADWELL GT12M	Broadwell	0x1602	GT1 ULT	Gen >=8 <b>NOT</b> supported at all.	
			0x1606	GT1 ULT		
			0x160B	GT1 Iris		
			0x160E	GT1 ULX		
			0x1612	GT2 Halo		
			0x1616	GT2 ULT		
			0x161B	GT2 ULT		
			0x161E	GT2 ULX		
	BROADWELL GT12D		0x160A	GT1 Server		
			0x160D	GT1 Workstation		
			0x161A	GT2 Server		
			0x161D	GT2 Workstation		
	BROADWELL GT3M		0x1622	GT3 ULT		
			0x1626	GT3 ULT		
			0x162B	GT3 Iris		
			0x162E	GT3 ULX		
	BROADWELL GT3D		0x162A	GT3 Server		
			0x162D	GT3 Workstation		
	BROADWELL RSVDM		0x1632	ULT		
			0x1636	ULT		
		0x163B	Iris			
		0x163E	ULX			
BROADWELL RSVDD		0x163A	Server			
		0x163D	Workstation			
CHERRY VIEW	Cherry View (Braswell, Cherry Trail)	0x22b0				
		0x22b1				
		0x22b2				
		0x22b3				
9th	SKYLAKE GT1	Skylake	0x1906	ULT GT1		
			0x190E	ULX GT1		
			0x1902	DT GT1		

		0x190B	Halo GT1			
		0x190A	SRV GT1			
SKYLAKE GT2		0x1916	ULT GT2			
		0x1921	ULT GT2F			
		0x191E	ULX GT2			
		0x1912	DT GT2			
		0x191B	Halo GT2			
		0x191A	SRV GT2			
		0x191D	WKS GT2			
	SKYLAKE GT3		0x1923	ULT GT3		
			0x1926	ULT GT3		
		0x1927	ULT GT3			
		0x192B	Halo GT3			
		0x192A	SRV GT3			
SKYLAKE GT4		0x1932	DT GT4			
		0x193B	Halo GT4			
		0x193D	WKS GT4			
		0x193A	SRV GT4			
BROXTON	Goldmont (Apollo Lake)	0x0A84				
		0x1A84				
		0x1A85				
		0x5A84	APL HD Graphics 505			
		0x5A85	APL HD Graphics 500			
KABY LAKE GT1	Kaby Lake	0x5913	ULT GT1.5			
		0x5915	ULX GT1.5			
		0x5917	DT GT1.5			
		0x5906	ULT GT1			
		0x590E	ULX GT1			
		0x5902	DT GT1			
		0x5908	Halo GT1			
		0x590B	Halo GT1			
		0x590A	SRV GT1			
		KABY LAKE GT2		0x5916	ULT GT2	
	0x5921		ULT GT2F			
	0x591E		ULX GT2			
	0x5912		DT GT2			
	0x591B		Halo GT2			
	0x591A		SRV GT2			
	0x591D		WKS GT2			
KABY LAKE GT3			0x5923	ULT GT3		
		0x5926	ULT GT3			
		0x5927	ULT GT3			
KABY LAKE GT4		0x593B	Halo GT4			
COFFEE LAKE	Coffee Lake	0x3E90	GT1			
		0x3E91	DT GT2			

			0x3E92	DT GT2			
			0x3E93	GT1			
			0x3E94	GT2			
			0x3E95	GT3			
			0x3E96	GT2			
			0x3E9B	GT2			
			0x3EA6	GT3			
			0x3EA7	GT3			
			0x3EA8	GT3			
	CANNON LAKE	Cannon Lake	0x5A52	GT2			
				0x5A5A	GT2		
				0x5A42	GT2		
				0x5A4A	GT2		
				0x5A51	GT2		
				0x5A59	GT2		
				0x5A41	GT2		
				0x5A49	GT2		
				0x5A71	GT2		
					0x5A79	GT2	

## Testing

System	Chipset	Status
Custom Test System	Intel Iris Pro Graphics P6300	Working, Tested at 1920x1080 (Intel Xeon E3-1285V4 w/Supermicro <a href="#">X10SLH-F</a> motherboard)
Custom Test System	Intel Iris Pro Graphics 580	Working, Tested at 1920x1080. ( <a href="#">Intel Core i7-6785R</a> , BGA1364 socket)
Dell Latitude D620	Intel 945GM Graphics	Tested at 1280x800 resolution (crashes, seems problematic in NVIDIA Optimus configurations)
Dell Optiplex 9010	Intel HD Graphics 4000	OI Hipster MATE 2018.04, external monitor via DisplayPort works at 1920x1080
Dell Precision M2800	Intel HD Graphics 4600	Working, Tested at 1920x1080.
HP 15t Laptop	Intel HD Graphics 520	Working, Tested at 1920x1080. (Part#: V1Z72AV_1)
HP ZBook Studio G3	Intel HD Graphics 530	crashes, system has both discrete graphics and Intel graphics
ThinkCentre M91p	Intel HD Graphics 2000	Working, tested from 1024x768 to 1920x1080, GPU hangs and wrong screen adjustment.
Thinkpad T430	Intel HD Graphics 4000	OI-Hipster MATE 2016.08, glxgears @ <b>5600FPS</b> , 2D (UXA)/3D Visual Effects works - Xserver 1.14.7, 1366x768 resolution
Thinkpad T430	Intel HD Graphics 4000	OI-Hipster MATE 2017.05, glxgears @ <b>4927FPS</b> , 2D (UXA)/3D Visual Effects works - Xserver 1.18.4, 1366x768 resolution
Thinkpad T430	Intel HD Graphics 4000	OI-Hipster MATE 2017.10, glxgears @ <b>5073FPS</b> , 2D (UXA)/3D Visual Effects works - Xserver 1.19.5, 1366x768 resolution

Thinkpad X1 Carbon	Intel HD Graphics 520	OI-Hipster MATE 2016.10, 2D (UXA)/3D Visual Effects works - Xserver 1.18.4, 1920x1080 resolution
ThinkPad X220	Intel HD Graphics 3000	OI Hipster MATE 2018.04, embedded panel has a <a href="#">glitch</a> with intel driver ( <a href="#">workaround</a> ), vesa is fine but has non-native resolution, external display via Display Port and VGA D-Sub works fine.
ThinkPad X230	Intel HD Graphics 4000	Test working with some panels, 1366x768 but others cause issues.
Thinkpad T580	Intel UHD Graphics 620	OI-Hipster MATE 2017.10, 2D (UXA)/3D Visual Effects works - Xserver 1.19.5, 3840x2160 resolution

## How to checkout Linux drm code only

```
mkdir linux-drm
cd linux-drm/
git init
git remote add origin https://github.com/freedesktop/drm-intel.git
git config core.sparsecheckout true
echo "drivers/gpu/drm/*" >> .git/info/sparse-checkout
echo "include/drm/*" >> .git/info/sparse-checkout
git pull --depth=1 origin drm-intel-fixes
```