

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It was then superseded by the new gate (#2678) providing improvements to the gfx_private interface and agpgart driver, as well as containing userland libraries used by graphics, like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.x.org/wiki/Events/XDC2015/Program/#Fishel_status_drm_i915_solaris
- https://en.wikipedia.org/wiki/Direct_Rendering_Manager
- <http://dri.freedesktop.org/wiki/>
- 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://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

| 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 | | | |
| | | | Bearlake | 0x2982 | G35G | | |
| | | | | Broadwater | 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 | | | | |
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|--------|----------------|-------------------------|------------------|------------------|---|--|--|
| | 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

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|--------|---------------------|--|--|
| 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 | | |

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|-----------------|--------------------------------------|-------------------------|-------------|------------------|--------------------------------------|--|
| | | | 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 NOT 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 | | |

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|------------------|---------------------------|------------------|------------------------|---------|----------|--|--|
| | | 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 | | | | |

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|--|-------------|-------------|--------|--------|-----|--|--|
| | | | 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 X10SLH-F motherboard) |
| Custom Test System | Intel Iris Pro Graphics 580 | Working, Tested at 1920x1080. (Intel Core i7-6785R , 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 @ 5600FPS , 2D (UXA)/3D Visual Effects works - Xserver 1.14.7, 1366x768 resolution |
| Thinkpad T430 | Intel HD Graphics 4000 | OI-Hipster MATE 2017.05, glxgears @ 4927FPS , 2D (UXA)/3D Visual Effects works - Xserver 1.18.4, 1366x768 resolution |
| Thinkpad T430 | Intel HD Graphics 4000 | OI-Hipster MATE 2017.10, glxgears @ 5073FPS , 2D (UXA)/3D Visual Effects works - Xserver 1.19.5, 1366x768 resolution |

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| 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 glitch with intel driver (workaround), 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
```