

Graphics stack

Contents

| | | |
|----------|---|----------|
| 1 | Xorg | 2 |
| 2 | Mesa | 2 |
| 3 | Fonts | 2 |
| 4 | Nvidia | 3 |
| 5 | gfx-drm | 4 |
| 5.1 | Intel KMS driver | 4 |
| 5.1.1 | References | 5 |
| 5.1.2 | Known Issues | 5 |
| 5.1.3 | Sandy Bridge GT1 | 5 |
| 5.1.4 | Gen >= 8 | 5 |
| 5.2 | Hardware Matrix | 5 |
| 5.3 | How to checkout Linux drm code only | 15 |

Like most UNIX/Linux operating systems, OpenIndiana's GUI environment is based on the X Window System bundled with libraries and applications developed by the freedesktop.org community.

Therefore the Graphic Stack is comprised of: * the opensource X11 display server Xorg, client libraries and utilities developed by the [X.org Project](https://www.x.org), * an OpenGL implementation in the form of the opensource [Mesa](https://mesa.sourceforge.io/) library, * and illumos kernel drivers for different graphics adapters provided by the [gfx-drm](https://dri.freedesktop.org/docs/gfx-drm/) gate, * together with the [libdrm](https://dri.freedesktop.org/docs/libdrm/) implementing communication between kernel drivers and user-space components through the Direct Rendering Infrastructure (DRI) protocol.

All these components can be installed using the unified build system [oi-userland](https://openIndiana.org/oi-userland/) or simply installed from the package repositories.

Notes concerning different components are provided:

| Component | Scope |
|-------------------------|--|
| Xorg | Building the Xorg display server, protocol headers, client libraries and applications. |
| Mesa | Building the Mesa library and testing OpenGL capabilities. |
| Fonts | Packaging new fonts for OpenIndiana. |
| Nvidia | Installation of Nvidia's proprietary graphics driver for Solaris. |
| gfx-drm | Building the illumos KMS drivers and libdrm from the gfx-drm gate. |

1 Xorg

All the Xorg components are build in oi-userland and located in the x11 directory:

<https://github.com/OpenIndiana/oi-userland/tree/oi/hipster/components/x11>

A bogus component is provided to rebuild the X11 gate: <https://github.com/OpenIndiana/oi-userland/tree/oi/hipster/components/x11/x11-gate>

The upstream Solaris code is located at:

<https://github.com/oracle/solaris-userland/tree/master/components/x11>

2 Mesa

To build Mesa use the [x11/mesa](#) component.

3 Fonts

Font components in oi-userland are located in the [components/fonts](#) directory.

4 Nvidia

Nvidia provides Solaris x86-64/x86 packages of their proprietary driver for different families of graphic adapters.

The Nvidia driver shipped with OpenIndiana is built using `openindiana/nvidia-XXX` e.g. `openindiana/nvidia-470` component.

The list of currently supported and legacy drivers is updated on the [Unix Drivers](#) page.

| Series | Label | Models | Notes |
|--------|----------------------------|---|---|
| 430.xx | Current long lived branch | Quadro RTX 4000-8000, Quadro, Quadro Blade, Quadro NVS, NVS | |
| 415.xx | Current short lived branch | Quadro RTX 4000-6000, Quadro, Quadro Blade, Quadro NVS, NVS | |
| 396.xx | Legacy GPU | GeForce 400 to Geforce GTX 10 | Driver 396.24 |
| 340.xx | Legacy GPU | GeForce 8 to GeForce 700 series | Driver 340.106 ; Delivers libvdpau as part of the package. |
| 304.xx | Legacy GPU | GeForce 6 to GeForce 600 series | Driver 304.137 |

The drivers series 340.xx, 390.xx, and 490.xx are currently part of oi-userland, others may be installed manually following Nvidia's instructions.

The 390.xx drivers are current default.

Note on switching driver versions

```
# beadm create nvidia-460
# beadm mount nvidia-460 /tmp/nvidia-460
# pkg -R /tmp/nvidia-460 uninstall xorg-video nvidia nvidia-390
# pkg -R /tmp/nvidia-460 install nvidia-460
# beadm activate nvidia-460
# init 6
```

Note on manual driver installations:

```
# beadm create oi-nvidia
# beadm mount oi-nvidia /mnt
# pkg -R /mnt uninstall x11/server/xorg/driver/xorg-video driver/graphics/nvidia
# /bin/sh NVIDIA-Solaris-x86-390.48.run --extract-only
# cd NVIDIA-Solaris-x86-390.48
# pkgadd -R /mnt -d . NVDAgraphics NVDAgraphicsr
# bootadm update-archive -R /mnt
# beadm unmount -f oi-nvidia
# beadm activate oi-nvidia
# init 6
```

5 gfx-drm

The gfx-drm gate consists of different kernel components for support of various graphic adapters in the illumos and the Direct Rendering Infrastructure (DRI) library, libdrm.

| Component | Description |
|------------|--|
| libdrm | The library enables communication between kernel components and user-space libraries through the DRI protocol. |
| agpart | Kernel driver for the Graphics Address Remapping Table (GART) / Graphics Translation Table (GTT) support. |
| header-drm | System headers for DRM/KMS kernel drivers and user-space libraries. |
| i915 | Intel KMS driver for Intel Graphics Media Accelerator (GMA) and Intel HD Graphics adapters. |

5.1 Intel KMS driver

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.

Open source kernel driver(s) by Oracle:

<https://github.com/oracle/solaris-userland/tree/master/components/x11/kernel/sun-src>

The relevant kernel code is located in drm and i915 subfolders.

An 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 providing improvements to the gfx_private interface and agpgart driver, as well as containing userland libraries used by graphics, like libdrm.

5.1.1 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
- <https://web.archive.org/web/20170711030533/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/>

5.1.2 Known Issues

5.1.2.1 SNA SNA may cause segmentation faults if enabled. If so, just disable SNA and you can copy the attached 20-intel-uxa.conf to /etc/X11/xorg.conf.d/.

For now UXA mode is set by default.

5.1.3 Sandy Bridge GT1

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

5.1.4 Gen >= 8

Generation 8 (and later) devices are not supported at all. They require Intel ringbuffer support, which is not implemented.

5.2 Hardware Matrix

Reference:

- https://github.com/torvalds/linux/blob/master/include/drm/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 | | |
| 2nd | I845G | Brookdale | 0x2562 | I845G, I845GL, I845GV | | |

| Generation | Family | Codename | PCI id | Model | i915 support | xf86-video-intel support |
|------------|--------------|--------------|--------|--------|--------------|--------------------------|
| 2nd | I85X | Montara | 0x3582 | 855GM | | |
| 2nd | I85X | Montara | 0x358d | 855GM | | |
| 2nd | I865G | Springdale | 0x2572 | 865G | | |
| 3rd | I915G | Grantsdale | 0x2582 | 915G | | |
| 3rd | I915G | Grantsdale | 0x258d | E7221G | | |
| 3rd | I915GM | Alviso | 0x2592 | 915GM | | |
| 3rd | I945G | Lakeport | 0x2772 | 945G | | |
| 3rd | I945GM | Calistoga | 0x27a2 | 945GM | | |
| 3rd | I945GM | Calistoga | 0x27ad | 945GME | | |
| 3rd | G33 | Bearlake | 0x29b2 | Q35G | | |
| 3rd | G33 | Bearlake | 0x29c2 | G33G | | |
| 3rd | G33 | Bearlake | 0x29d2 | Q33G | | |
| 3rd | PINEVIEW | Pineview | 0xa001 | | | |
| 3rd | PINEVIEW | Pineview | 0xa011 | | | |
| 4th | I965G | Lakeport | 0x2972 | 946GZ | | |
| 4th | I965G | Bearlake | 0x2982 | G35G | | |
| 4th | I965G | Broadwater | 0x2992 | 965Q | | |
| 4th | I965G | Broadwater | 0x29a2 | 965G | | |
| 4th | I965GM | Crestline | 0x2a02 | 965GM | | |
| 4th | I965GM | Crestline | 0x2a12 | 965GME | | |
| 4th | GM45 | Cantiga | 0x2a42 | GM45G | | |
| 4th | G45 | Eaglelake | 0x2e02 | GDEG | | |
| 4th | G45 | Eaglelake | 0x2e12 | Q45G | | |
| 4th | G45 | Eaglelake | 0x2e22 | G45G | | |
| 4th | G45 | Eaglelake | 0x2e32 | G41G | | |
| 4th | G45 | Eaglelake | 0x2e42 | B43G | | |
| 4th | G45 | Eaglelake | 0x2e92 | B43G.1 | | |
| 5th | IRONLAKE | Ironlake | 0x0042 | | | |
| | D | (Clarkdale) | | | | |
| 5th | IRONLAKE | Ironlake | 0x0046 | | | |
| | M | (Arrandale) | | | | |
| 6th | SANDY BRIDGE | Sandy Bridge | 0x0102 | | | |
| | D | | | | | |
| 6th | SANDY BRIDGE | Sandy Bridge | 0x0112 | | | |
| | D | | | | | |
| 6th | SANDY BRIDGE | Sandy Bridge | 0x0122 | | | |
| | D | | | | | |
| 6th | SANDY BRIDGE | Sandy Bridge | 0x010A | | | |
| | D | | | | | |

| Generation | Family | Codename | PCI id | Model | i915 support | xf86-video-intel support |
|------------|----------------|--------------|--------|-------------|---|--------------------------|
| 6th | SANDY BRIDGE M | Sandy Bridge | 0x0106 | | HW bug causes GPU hangs. Work-around in place, but one may see brief render delays. | |
| 6th | SANDY BRIDGE M | Sandy Bridge | 0x0116 | | HW bug causes GPU hangs. Work-around in place, but one may see brief render delays. | |
| 6th | SANDY BRIDGE M | Sandy Bridge | 0x0126 | | HW bug causes GPU hangs. Work-around in place, but one may see brief render delays. | |
| 7th | IVY BRIDGE M | Ivy Bridge | 0x0156 | GT1 mobile | | |
| 7th | IVY BRIDGE M | Ivy Bridge | 0x0166 | GT2 mobile | | |
| 7th | IVY BRIDGE D | Ivy Bridge | 0x0152 | GT1 desktop | | |

| Generation | Family | Codename | PCI id | Model | i915 support | xf86-video-intel support |
|------------|--------------|------------|--------|------------------|--------------|--------------------------|
| 7th | IVY BRIDGE D | Ivy Bridge | 0x0162 | GT2 desktop | | |
| 7th | IVY BRIDGE D | Ivy Bridge | 0x015a | GT1 server | | |
| 7th | IVY BRIDGE D | Ivy Bridge | 0x016a | GT2 server | | |
| 7th | HASWELL D | Haswell | 0x0402 | GT1 desktop | | |
| 7th | HASWELL D | Haswell | 0x0412 | GT2 desktop | | |
| 7th | HASWELL D | Haswell | 0x0422 | GT3 desktop | | |
| 7th | HASWELL D | Haswell | 0x040a | GT1 server | | |
| 7th | HASWELL D | Haswell | 0x041a | GT2 server | | |
| 7th | HASWELL D | Haswell | 0x042a | GT3 server | | |
| 7th | HASWELL D | Haswell | 0x040b | GT1 reserved | | |
| 7th | HASWELL D | Haswell | 0x041b | GT2 reserved | | |
| 7th | HASWELL D | Haswell | 0x042b | GT3 reserved | | |
| 7th | HASWELL D | Haswell | 0x040c | GT1 reserved | | |
| 7th | HASWELL D | Haswell | 0x041c | GT2 reserved | | |
| 7th | HASWELL D | Haswell | 0x042c | GT3 reserved | | |
| 7th | HASWELL D | Haswell | 0x0C02 | SDV GT1 desktop | | |
| 7th | HASWELL D | Haswell | 0x0C12 | SDV GT2 desktop | | |
| 7th | HASWELL D | Haswell | 0x0C22 | SDV GT3 desktop | | |
| 7th | HASWELL D | Haswell | 0x0C0a | SDV GT1 server | | |
| 7th | HASWELL D | Haswell | 0x0C1a | SDV GT2 server | | |
| 7th | HASWELL D | Haswell | 0x0C2a | SDV GT3 server | | |
| 7th | HASWELL D | Haswell | 0x0C0b | SDV GT1 reserved | | |

| Generation | Family | Codename | PCI id | Model | i915 support | xf86-video-intel support |
|------------|-----------|----------|--------|------------------|--------------|--------------------------|
| 7th | HASWELL D | Haswell | 0x0C15 | SDV GT2 reserved | | |
| 7th | HASWELL D | Haswell | 0x0C25 | SDV GT3 reserved | | |
| 7th | HASWELL D | Haswell | 0x0C05 | SDV GT1 reserved | | |
| 7th | HASWELL D | Haswell | 0x0C15 | SDV GT2 reserved | | |
| 7th | HASWELL D | Haswell | 0x0C25 | SDV GT3 reserved | | |
| 7th | HASWELL D | Haswell | 0x0A02 | ULT GT1 desktop | | |
| 7th | HASWELL D | Haswell | 0x0A12 | ULT GT2 desktop | | |
| 7th | HASWELL D | Haswell | 0x0A22 | ULT GT3 desktop | | |
| 7th | HASWELL D | Haswell | 0x0A0A | ULT GT1 server | | |
| 7th | HASWELL D | Haswell | 0x0A1A | ULT GT2 server | | |
| 7th | HASWELL D | Haswell | 0x0A2A | ULT GT3 server | | |
| 7th | HASWELL D | Haswell | 0x0A0B | ULT GT1 reserved | | |
| 7th | HASWELL D | Haswell | 0x0A1B | ULT GT2 reserved | | |
| 7th | HASWELL D | Haswell | 0x0A2B | ULT GT3 reserved | | |
| 7th | HASWELL D | Haswell | 0x0D02 | CRW GT1 desktop | | |
| 7th | HASWELL D | Haswell | 0x0D12 | CRW GT2 desktop | | |
| 7th | HASWELL D | Haswell | 0x0D22 | CRW GT3 desktop | | |
| 7th | HASWELL D | Haswell | 0x0D0A | CRW GT1 server | | |
| 7th | HASWELL D | Haswell | 0x0D1A | CRW GT2 server | | |
| 7th | HASWELL D | Haswell | 0x0D2A | CRW GT3 server | | |
| 7th | HASWELL D | Haswell | 0x0D0B | CRW GT1 reserved | | |
| 7th | HASWELL D | Haswell | 0x0D1B | CRW GT2 reserved | | |
| 7th | HASWELL D | Haswell | 0x0D2B | CRW GT3 reserved | | |

| Generation | Family | Codename | PCI id | Model | i915 support | xf86-video-intel support |
|------------|---------------|-------------------------|--------|-------------------|--------------|--------------------------|
| 7th | HASWELL D | Haswell | 0x0D00 | CRW GT1 reserved | | |
| 7th | HASWELL D | Haswell | 0x0D10 | CRW GT2 reserved | | |
| 7th | HASWELL D | Haswell | 0x0D20 | CRW GT3 reserved | | |
| 7th | HASWELL M | Haswell | 0x0400 | GT1 mobile | | |
| 7th | HASWELL M | Haswell | 0x0410 | GT2 mobile | | |
| 7th | HASWELL M | Haswell | 0x0420 | GT2 mobile | | |
| 7th | HASWELL M | Haswell | 0x0C00 | SDV GT1 mobile | | |
| 7th | HASWELL M | Haswell | 0x0C10 | SDV GT2 mobile | | |
| 7th | HASWELL M | Haswell | 0x0C20 | SDV GT3 mobile | | |
| 7th | HASWELL M | Haswell | 0x0A00 | ULT GT1 mobile | | |
| 7th | HASWELL M | Haswell | 0x0A10 | ULT GT2 mobile | | |
| 7th | HASWELL M | Haswell | 0x0A20 | ULT GT3 mobile | | |
| 7th | HASWELL M | Haswell | 0x0A00 | EULX GT1 mobile | | |
| 7th | HASWELL M | Haswell | 0x0A10 | EULX GT2 mobile | | |
| 7th | HASWELL M | Haswell | 0x0A20 | EULX GT3 reserved | | |
| 7th | HASWELL M | Haswell | 0x0D00 | CRW GT1 mobile | | |
| 7th | HASWELL M | Haswell | 0x0D10 | CRW GT2 mobile | | |
| 7th | HASWELL M | Haswell | 0x0D20 | CRW GT3 mobile | | |
| 7th | VALLEY VIEW M | Valley View (Bay Trail) | 0x0f30 | | | |
| 7th | VALLEY VIEW M | Valley View (Bay Trail) | 0x0f31 | | | |
| 7th | VALLEY VIEW M | Valley View (Bay Trail) | 0x0f32 | | | |
| 7th | VALLEY VIEW M | Valley View (Bay Trail) | 0x0f33 | | | |
| 7th | VALLEY VIEW M | Valley View (Bay Trail) | 0x0157 | | | |

| Generation | Family | Codename | PCI id | Model | i915 support | xf86-video-intel support |
|------------|------------------|-------------------------|--------|-----------------|---|--------------------------|
| 7th | VALLEY VIEW D | Valley View (Bay Trail) | 0x0155 | | | |
| 8th | BROADWELL GT12M | Broadwell | 0x1602 | GT1 ULT | Gen >=8 NOT sup- ported at all. | |
| 8th | BROADWELL GT12M | Broadwell | 0x1606 | GT1 ULT | | |
| 8th | BROADWELL GT12M | Broadwell | 0x160B | GT1 Iris | | |
| 8th | BROADWELL GT12M | Broadwell | 0x160E | GT1 ULX | | |
| 8th | BROADWELL GT12M | Broadwell | 0x1612 | GT2 Halo | | |
| 8th | BROADWELL GT12M | Broadwell | 0x1616 | GT2 ULT | | |
| 8th | BROADWELL GT12M | Broadwell | 0x161B | GT2 ULT | | |
| 8th | BROADWELL GT12M | Broadwell | 0x161E | GT2 ULX | | |
| 8th | BROADWELL GT12D | Broadwell | 0x160A | GT1 Server | | |
| 8th | BROADWELL GT12D | Broadwell | 0x160D | GT1 Workstation | | |
| 8th | BROADWELL GT12D | Broadwell | 0x161A | GT2 Server | | |
| 8th | BROADWELL GT12D | Broadwell | 0x161D | GT2 Workstation | | |
| 8th | BROADWELL GT3M | Broadwell | 0x1622 | GT3 ULT | | |
| 8th | BROADWELL GT3M | Broadwell | 0x1626 | GT3 ULT | | |
| 8th | BROADWELL GT3M | Broadwell | 0x162B | GT3 Iris | | |
| 8th | BROADWELL GT3M | Broadwell | 0x162E | GT3 ULX | | |
| 8th | BROADWELL GT3D | Broadwell | 0x162A | GT3 Server | | |
| 8th | BROADWELL GT3D | Broadwell | 0x162D | GT3 Workstation | | |
| 8th | BROADWELL RSVD M | Broadwell | 0x1632 | ULT | | |
| 8th | BROADWELL RSVD M | Broadwell | 0x1636 | ULT | | |

| Generation | Family | Codename | PCI id | Model | i915 support | xf86-video-intel support |
|------------|-------------|--------------------------------------|--------|--------------|--------------|--------------------------|
| 8th | BROADWELL | Broadwell | 0x163b | Bris | | |
| 8th | BROADWELL | Broadwell | 0x163b | EULX | | |
| 8th | BROADWELL | Broadwell | 0x163b | AServer | | |
| 8th | BROADWELL | Broadwell | 0x163b | DWorkstation | | |
| 8th | CHERRY VIEW | Cherry View (Braswell, Cherry Trail) | 0x22b0 | | | |
| 8th | CHERRY VIEW | Cherry View (Braswell, Cherry Trail) | 0x22b1 | | | |
| 8th | CHERRY VIEW | Cherry View (Braswell, Cherry Trail) | 0x22b2 | | | |
| 8th | CHERRY VIEW | Cherry View (Braswell, Cherry Trail) | 0x22b3 | | | |
| 9th | SKYLAKE GT1 | Skylake | 0x1906 | ULT GT1 | | |
| 9th | SKYLAKE GT1 | Skylake | 0x1906 | EULX GT1 | | |
| 9th | SKYLAKE GT1 | Skylake | 0x1906 | DT GT1 | | |
| 9th | SKYLAKE GT1 | Skylake | 0x1906 | BHalo GT1 | | |
| 9th | SKYLAKE GT1 | Skylake | 0x1906 | ASRV GT1 | | |
| 9th | SKYLAKE GT2 | Skylake | 0x1916 | ULT GT2 | | |
| 9th | SKYLAKE GT2 | Skylake | 0x1921 | ULT GT2F | | |
| 9th | SKYLAKE GT2 | Skylake | 0x1916 | EULX GT2 | | |
| 9th | SKYLAKE GT2 | Skylake | 0x1916 | DT GT2 | | |
| 9th | SKYLAKE GT2 | Skylake | 0x1916 | BHalo GT2 | | |
| 9th | SKYLAKE GT2 | Skylake | 0x1916 | ASRV GT2 | | |
| 9th | SKYLAKE GT2 | Skylake | 0x191d | DWKS GT2 | | |
| 9th | SKYLAKE GT3 | Skylake | 0x1923 | ULT GT3 | | |

| Generation | Family | Codename | PCI id | Model | i915 support | xf86-video-intel support |
|------------|---------------------|---------------------------|--------|------------------------|--------------|--------------------------|
| 9th | SKYLAKE | Skylake | 0x1926 | ULT GT3 | | |
| 9th | SKYLAKE | Skylake | 0x1927 | ULT GT3 | | |
| 9th | SKYLAKE | Skylake | 0x192B | Halo GT3 | | |
| 9th | SKYLAKE | Skylake | 0x192A | SRV GT3 | | |
| 9th | SKYLAKE | Skylake | 0x1932 | DT GT4 | | |
| 9th | SKYLAKE | Skylake | 0x193B | Halo GT4 | | |
| 9th | SKYLAKE | Skylake | 0x193D | DWKS GT4 | | |
| 9th | SKYLAKE | Skylake | 0x193A | SRV GT4 | | |
| 9th | BROXTON | Goldmont (Apollo Lake) | 0x0A84 | | | |
| 9th | BROXTON | Goldmont (Apollo Lake) | 0x1A84 | | | |
| 9th | BROXTON | Goldmont (Apollo Lake) | 0x1A85 | | | |
| 9th | BROXTON | Goldmont (Apollo Lake) | 0x5A84 | APL HD Graphics 505 | | |
| 9th | BROXTON | Goldmont (Apollo Lake) | 0x5A85 | APL HD Graphics 500 | | |
| 9th | KABY LAKE GT1 | Kaby Lake | 0x5913 | ULT GT1.5 | | |
| 9th | KABY LAKE GT1 | Kaby Lake | 0x5915 | ULX GT1.5 | | |
| 9th | KABY LAKE GT1 | Kaby Lake | 0x5917 | DT GT1.5 | | |
| 9th | KABY LAKE GT1 | Kaby Lake | 0x5906 | ULT GT1 | | |
| 9th | KABY LAKE GT1 | Kaby Lake | 0x590E | ULX GT1 | | |
| 9th | KABY LAKE GT1 | Kaby Lake | 0x5902 | DT GT1 | | |
| 9th | KABY LAKE GT1 | Kaby Lake | 0x5908 | Halo GT1 | | |

| Generation | Family | Codename | PCI id | Model | i915 support | xf86-video-intel support |
|------------|---------------|-------------|--------|----------|--------------|--------------------------|
| 9th | KABY LAKE GT1 | Kaby Lake | 0x590B | Halo GT1 | | |
| 9th | KABY LAKE GT1 | Kaby Lake | 0x590A | SRV GT1 | | |
| 9th | KABY LAKE GT2 | Kaby Lake | 0x5916 | ULT GT2 | | |
| 9th | KABY LAKE GT2 | Kaby Lake | 0x5921 | ULT GT2F | | |
| 9th | KABY LAKE GT2 | Kaby Lake | 0x591E | EULX GT2 | | |
| 9th | KABY LAKE GT2 | Kaby Lake | 0x5912 | DT GT2 | | |
| 9th | KABY LAKE GT2 | Kaby Lake | 0x591B | Halo GT2 | | |
| 9th | KABY LAKE GT2 | Kaby Lake | 0x591A | SRV GT2 | | |
| 9th | KABY LAKE GT2 | Kaby Lake | 0x591D | WKS GT2 | | |
| 9th | KABY LAKE GT3 | Kaby Lake | 0x5923 | ULT GT3 | | |
| 9th | KABY LAKE GT3 | Kaby Lake | 0x5926 | ULT GT3 | | |
| 9th | KABY LAKE GT3 | Kaby Lake | 0x5927 | ULT GT3 | | |
| 9th | KABY LAKE GT4 | Kaby Lake | 0x593B | Halo GT4 | | |
| 9th | COFFEE LAKE | Coffee Lake | 0x3E9C | GT1 | | |
| 9th | COFFEE LAKE | Coffee Lake | 0x3E9D | DT GT2 | | |
| 9th | COFFEE LAKE | Coffee Lake | 0x3E9E | DT GT2 | | |
| 9th | COFFEE LAKE | Coffee Lake | 0x3E93 | GT1 | | |

| Generation | Family | Codename | PCI id | Model | i915 support | xf86-video-intel support |
|------------|-------------|-------------|--------|-------|--------------|--------------------------|
| 9th | COFFEE LAKE | Coffee Lake | 0x3E94 | GT2 | | |
| 9th | COFFEE LAKE | Coffee Lake | 0x3E95 | GT3 | | |
| 9th | COFFEE LAKE | Coffee Lake | 0x3E96 | GT2 | | |
| 9th | COFFEE LAKE | Coffee Lake | 0x3E9B | GT2 | | |
| 9th | COFFEE LAKE | Coffee Lake | 0x3EA6 | GT3 | | |
| 9th | COFFEE LAKE | Coffee Lake | 0x3EA7 | GT3 | | |
| 9th | COFFEE LAKE | Coffee Lake | 0x3EA8 | GT3 | | |
| 9th | CANNON LAKE | Cannon Lake | 0x5A52 | GT2 | | |
| 9th | CANNON LAKE | Cannon Lake | 0x5A5A | GT2 | | |
| 9th | CANNON LAKE | Cannon Lake | 0x5A42 | GT2 | | |
| 9th | CANNON LAKE | Cannon Lake | 0x5A4A | GT2 | | |
| 9th | CANNON LAKE | Cannon Lake | 0x5A51 | GT2 | | |
| 9th | CANNON LAKE | Cannon Lake | 0x5A59 | GT2 | | |
| 9th | CANNON LAKE | Cannon Lake | 0x5A41 | GT2 | | |
| 9th | CANNON LAKE | Cannon Lake | 0x5A49 | GT2 | | |
| 9th | CANNON LAKE | Cannon Lake | 0x5A71 | GT2 | | |
| 9th | CANNON LAKE | Cannon Lake | 0x5A79 | GT2 | | |

5.3 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
```