



# OS X HDMI Audio

**IORegistryExplorer Details**

**v2: 8/15/2014 - Initial Release**

**Find/Confirm: dsdt/device names/addresses** (i.e., PEG0@1, HDEF@1B)

## **Key Information**

1. Determine graphics device names and address
  - 1a. IOReg/Search display
  - 1a. Example: Discrete Graphics - PEG0@1, P0P1@1, P0P3@3, NVE3@3, etc.
  - 1a. Example: Integrated Graphics - GFX0@2

IOService :

IOService:/AppleACPIPlatformExpert/PCI0@0/AppleACPIPCI/G...r@0/AppleMCCSControlModule/AppleMCCSParameterHandler

**AppleMCCSParameterHandler** ☒ Registered Retain Count: 4  
☒ Matched Busy Count: 0  
☒ Active

Class Inheritance: AppleMCCSParameterHandler : IODisplayParameterHandler : IOService :  
 IORegistryEntry : OSObject

Bundle Identifier: com.apple.driver.AppleMCCSControl

Property	Type	Value
CFBundleIdentifier	String	com.apple.driver.AppleMCCSControl
IOClass	String	AppleMCCSParameterHandler
IOKitDebug	Number	0x0
IOMatchCategory	String	IODisplayParameter
IOProbeScore	Number	0x0
IOProviderClass	String	AppleMCCSControlFamily
IOResourceMatch	String	IOKit

▼ Root

- Macmini5,1
  - AppleACPIPlatformExpert
    - PCI0@0
      - AppleACPIPCI
        - GFX0@2
          - AppleIntelFramebuffer@0
            - AppleMCCSControlModule
              - AppleMCCSParameterHandler
            - AppleIntelFramebuffer@1
              - AppleMCCSControlModule
                - AppleMCCSParameterHandler
              - AppleIntelFramebuffer@2
                - AppleMCCSControlModule
                  - AppleMCCSParameterHandler
                - display0
                  - AppleDisplay
              - PEG0@1
                - IOPCI2PCIBridge
                  - PEGP@0
                    - ATY,Duckweed@0
                      - ATIFramebufferNI
                        - AppleMCCSControlModule
                          - AppleMCCSParameterHandler
                      - ATY,Duckweed@1
                        - ATIFramebufferNI
                          - AppleMCCSControlModule
                            - AppleMCCSParameterHandler
                        - ATY,Duckweed@2
                          - ATIFramebufferNI
                            - AppleMCCSControlModule
                              - AppleMCCSParameterHandler
                          - ATY,Duckweed@3
                            - ATIFramebufferNI
                              - AppleMCCSControlModule
                                - AppleMCCSParameterHandler
                - IOResources
                  - IODisplayWrangler

2. Determine discrete graphics device names and address

2a. IOReg/Search PEG0

2a. Example: PEG0@1

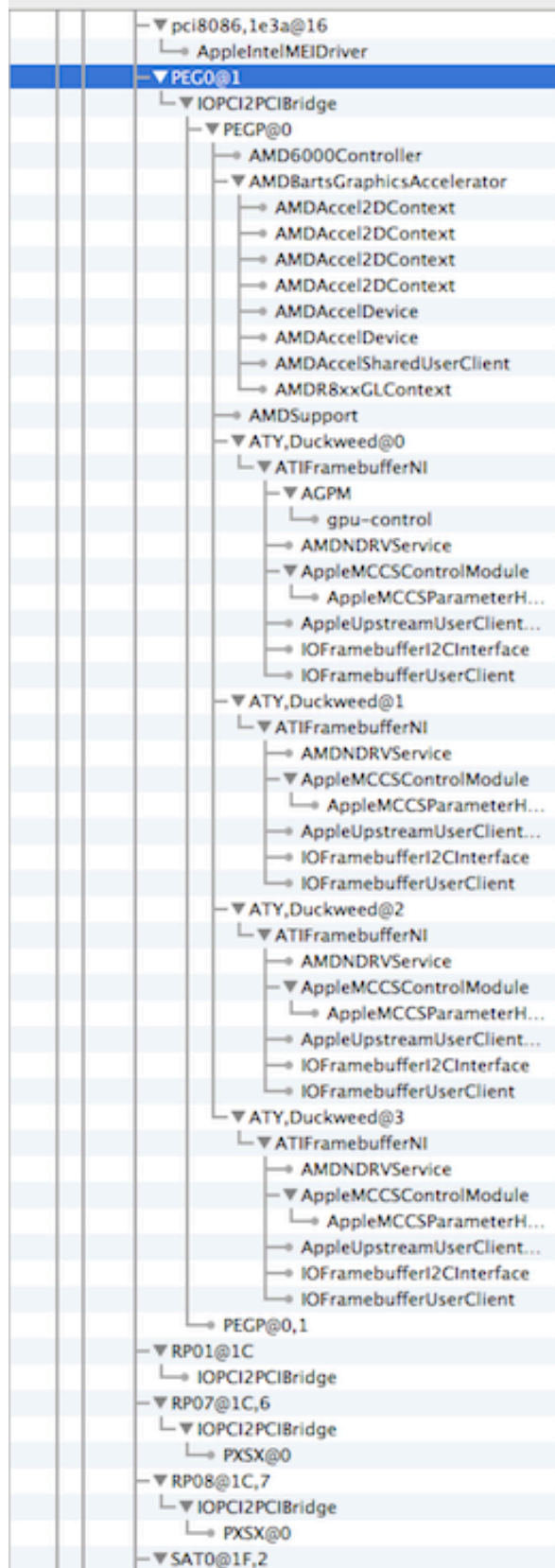
IOService :

IOService:/AppleACPIPlatformExpert/PCI0@0/AppleACPIPCI/PEG0@1

**PEG0@1** ☒ Registered Retain Count: 12  
☒ Matched Busy Count: 0  
☒ Active

Class Inheritance: IOPCIDevice : IOService : IORegistryEntry : OSObject

Bundle Identifier: com.apple.iokit.IOPCIFamily



| Property                     | Type       | Value  |
|------------------------------|------------|--|
| #address-cells               | Data       | <03 00 00 00>  |
| #size-cells                  | Data       | <02 00 00 00>  |
| acpi-device                  | String     | IOACPIPlatformDev<br>ice is not<br>serializable  |
| acpi-path                    | String     | IOACPIPlane:/_SB/<br>PCI0@0/<br>PEG0@10000   |
| acpi-pmcap-offset            | Number     | 0x80   |
| built-in                     | Data       | <00>   |
| class-code                   | Data       | <00 04 06 00>  |
| compatible                   | Data       | <"pcif,0", "pci8086<br>,151", "pciclass,06<br>0400">   |
| device-id                    | Data       | <51 01 00 00>  |
| IODTPersist                  | Data       | <>   |
| IOInterruptControllers       | Array      | 1 value  |
| IOInterruptSpecifiers        | Array      | 1 value  |
| IOName                       | String     | pci-bridge   |
| IOPCIConfigured              | Boolean    | True   |
| IOPCIExpressASPMDefault      | Number     | 0x0  |
| IOPCIExpressLinkCapabilities | Number     | 0x261ad03  |
| IOPCIExpressLinkStatus       | Number     | 0x5101   |
| IOPCIResourced               | Boolean    | True   |
| IOPowerManagement            | Dictionary | 3 values   |
| name                         | String     | pci-bridge   |
| pcidebug                     | String     | 0:1:0(1:1)   |
| ranges                       | Data       | <00 00 00 82<br>00 00 00 00<br>00 00 e0 f7<br>00 00 00 82<br>00 00 00 00<br>00 00 e0 f7<br>00 00 00 00<br>00 00 10 00<br>00 00 00 c2<br>0f 00 00 00<br>00 00 00 10<br>00 00 00 c2<br>0f 00 00 00<br>00 00 00 10<br>00 00 00 00<br>00 00 00 10<br>00 00 00 81<br>00 00 00 00<br>00 e0 00 00<br>00 00 00 81<br>00 00 00 00<br>00 e0 00 00<br>00 00 00 00<br>00 10 00 00> |
| reg                          | Data       | <00 08 00 00<br>00 00 00 00<br>00 00 00 00<br>00 00 00 00<br>00 00 00 00>  |
| revision-id                  | Data       | <09 00 00 00>  |
| subsystem-id                 | Data       | <00 00 00 00>  |
| subsystem-vendor-id          | Data       | <0f 00 00 00>  |
| vendor-id                    | Data       | <86 80 00 00>  |

3. Determine integrated graphics device names and address (N/A - HD3000 is not enabled)

3a. IOREG/Search GFX0, Select GFX0, Cancel Search (X), Scroll up

3a. Example: GFX0@2

The screenshot displays the IORegistry Explorer window. The top bar shows the selected path: `IOService:/AppleACPIPlatformExpert/PCI0@0/AppleACPIPCI/GFX0@2`. Below this, the device name **GFX0@2** is shown, along with its status (Registered, Matched, Active) and counts (Retain Count: 24, Busy Count: 0). The class inheritance path is `IOPCIDevice : IOService : IORegistryEntry : OSObject`, and the bundle identifier is `com.apple.iokit.IOPCIFamily`.

The left pane shows a hierarchical tree of the device's components. The right pane displays a table of properties for the selected device.

| Property                  | Type    | Value   |
|---------------------------|---------|---|
| AAPL,gray-page            | Data    | <01 00 00 00>   |
| AAPL,gray-value           | Data    | <c3 8c 64 00>   |
| AAPL,ig-platform-id       | Data    | <0a 00 66 01>   |
| AAPL,iokit-ndrv           | Data    | <20 bd db 80 7f ff ff ff>   |
| acpi-device               | String  | IOACPIPlatformDevice is not serializable  |
| acpi-path                 | String  | IOACPIPlane:/_SB/PCI0@0/GFX0@20000  |
| assigned-addresses        | Data    | <10 10 00 82 00 00 00 00 00 00 80 f7 00 00 00 00 00 00 40 00 18 10 00 c2 0f 00 00 00 00 00 00 20 00 00 00 00 00 10 20 10 00 81 00 00 00 00 00 f0 00 00 00 00 00 00 40 00 00 00> |
| attached-gpu-control-path | String  | IOService:/AppleACPIPlatformExpert/PCI0@0/AppleACPIPCI/GFX0@2/AppleIntelFramebuffer@0/AGPM  |
| built-in                  | Data    | <00>  |
| class-code                | Data    | <00 00 03 00>   |
| compatible                | Data    | <"pci1043,84ca", "pci8086,166", "pci-class,030000">   |
| device-id                 | Data    | <66 01 00 00>   |
| hda-gfx                   | Data    | <"onboard-1">   |
| IODeviceMemory            | Array   | 3 values  |
| IOHibernateState          | Data    | <00 00 00 00>   |
| IOInterruptControllers    | Array   | 2 values  |
| IOInterruptSpecifiers     | Array   | 2 values  |
| IOName                    | String  | display   |
| IOPCIMSIMode              | Boolean | True  |
| IOPCIResourced            | Boolean | True  |



IOService : /AppleACPIPlatformExpert/PCI0@0/AppleACPIPCI/pci8086,1e3a@16

**pci8086,1e3a@16** ☒ Registered Retain Count: 9  
☒ Matched Busy Count: 0  
☒ Active

Class Inheritance: IOPCIDevice : IOService : IORegistryEntry : OSObject

Bundle Identifier: com.apple.iokit.IOPCIFamily

| Property               | Type       | Value   |
|------------------------|------------|---|
| acpi-pmcap-offset      | Number     | 0x50  |
| assigned-addresses     | Data       | <10 b0 00 82<br>00 00 00 00<br>00 b0 f3 f7<br>00 00 00 00<br>10 00 00 00>   |
| class-code             | Data       | <00 80 07 00>   |
| compatible             | Data       | <"pci1043,84ca",<br>"pci8086,1e3a",<br>pciclass,078000">  |
| device-id              | Data       | <3a 1e 00 00>   |
| IODeviceMemory         | Array      | 1 value   |
| IOInterruptControllers | Array      | 2 values  |
| IOInterruptSpecifiers  | Array      | 2 values  |
| IOName                 | String     | pci8086,1e3a  |
| IOPCIMSIMode           | Boolean    | True  |
| IOPCIResourced         | Boolean    | True  |
| IOPowerManagement      | Dictionary | 3 values  |
| name                   | String     | pci8086,1e3a  |
| pcidebug               | String     | 0:22:0  |
| reg                    | Data       | <00 b0 00 00<br>00 00 00 00<br>00 00 00 00<br>00 00 00 00<br>10 b0 00 02<br>00 00 00 00<br>00 00 00 00<br>00 00 00 00<br>10 00 00 00> |
| revision-id            | Data       | <04 00 00 00>   |
| subsystem-id           | Data       | <ca 84 00 00>   |
| subsystem-vendor-id    | Data       | <43 10 00 00>   |
| vendor-id              | Data       | <86 80 00 00>   |

## 5. Verify HDEF

5a. IOREg/Search HDEF, Select HDEF, Cancel Search (X), Scroll up

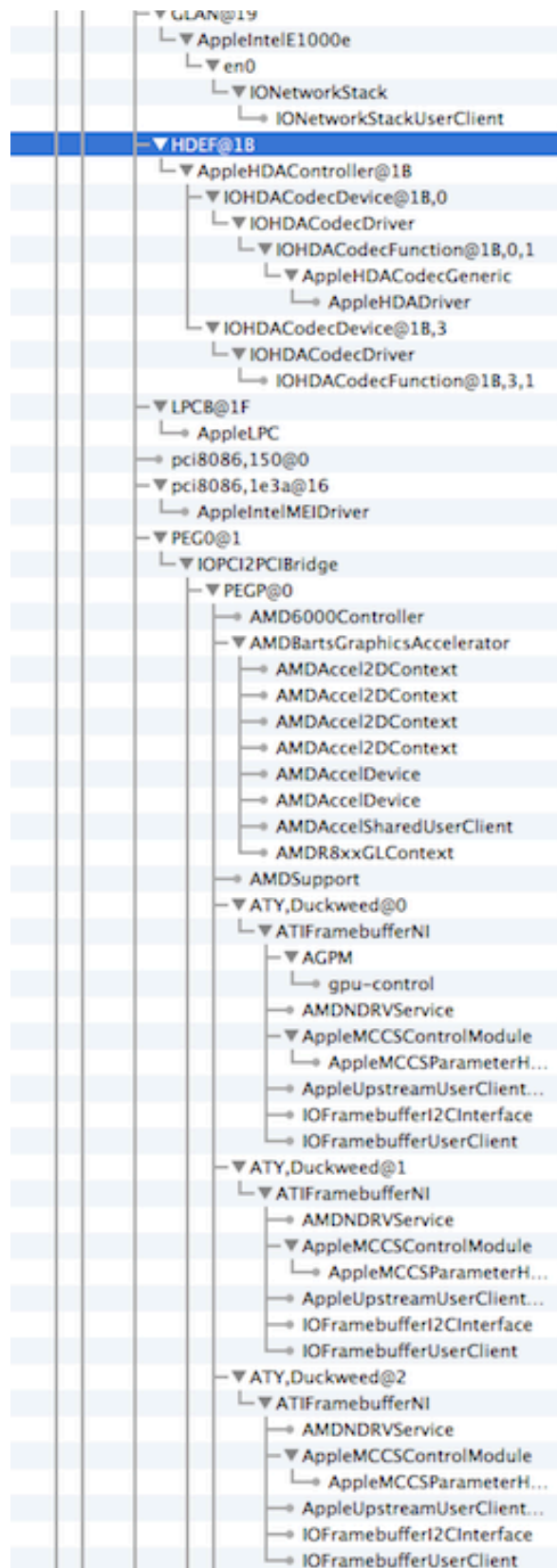
5b. Example: HDEF/layout-id 0x00 0x00 0x00 0x00 (not valid)

IOService : /AppleACPIPlatformExpert/PCI0@0/AppleACPIPCI/HDEF@18

**HDEF@18** ☒ Registered Retain Count: 10  
☒ Matched Busy Count: 0  
☒ Active

Class Inheritance: IOPCIDevice : IOService : IORegistryEntry : OSObject

Bundle Identifier: com.apple.iokit.IOPCIFamily



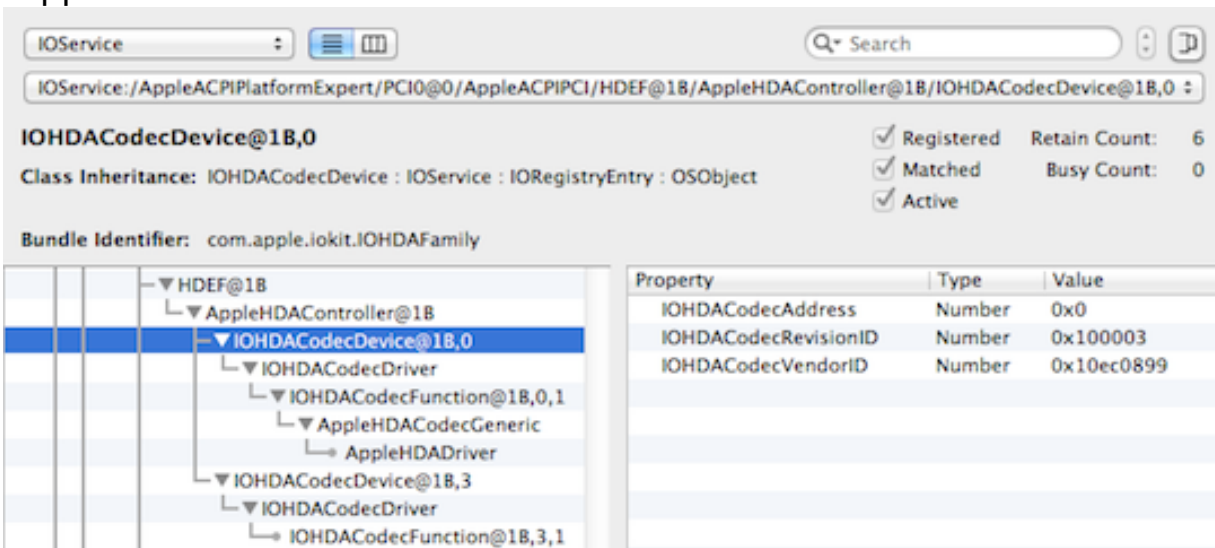
| Property                     | Type       | Value  |
|------------------------------|------------|--|
| acpi-device                  | String     | IOACPIPlatformDevice is not serializable   |
| acpi-path                    | String     | IOACPIPlane:/_SB/PCI0@0/HDEF@1b0000  |
| acpi-pmcap-offset            | Number     | 0x50   |
| assigned-addresses           | Data       | <10 d8 00 82 00 00 00 00 00 00 f3 f7 00 00 00 00 00 40 00 00>  |
| built-in                     | Data       | <00>   |
| class-code                   | Data       | <00 03 04 00>  |
| compatible                   | Data       | <"pci1043,851f", "pci8086,1e20", "pciclass,040300">  |
| device-id                    | Data       | <20 1e 00 00>  |
| IODeviceMemory               | Array      | 1 value  |
| IOInterruptControllers       | Array      | 2 values   |
| IOInterruptSpecifiers        | Array      | 2 values   |
| IOName                       | String     | pci8086,1e20   |
| IOPCIExpressASPMDefault      | Number     | 0x0  |
| IOPCIExpressLinkCapabilities | Number     | 0x0  |
| IOPCIExpressLinkStatus       | Number     | 0x0  |
| IOPCIMSIMode                 | Boolean    | True   |
| IOPCIResourced               | Boolean    | True   |
| IOPowerManagement            | Dictionary | 3 values   |
| layout-id                    | Data       | <00 00 00 00>  |
| name                         | String     | pci8086,1e20   |
| pcidebug                     | String     | 0:27:0   |
| reg                          | Data       | <00 d8 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 10 d8 00 02 00 00 00 00 00 00 00 00 00 00 00 00 40 00 00> |
| revision-id                  | Data       | <04 00 00 00>  |
| subsystem-id                 | Data       | <1f 85 00 00>  |
| subsystem-vendor-id          | Data       | <43 10 00 00>  |
| vendor-id                    | Data       | <86 80 00 00>  |

6. Determine motherboard audio codec device\_id (Select 2nd line after HDEF)

6a. IOReg/AppleHDAController/OHDACodecDevice/  
IOHDACodecVendorId

6b. Example: IOReg/10ec0899

6c. Note: if CodecVendorId is not 10ec8xx, onboard audio is not supported.



## Evaluate IOReg > HDMI Audio dsdt edit file Key Information

1. AMI EFI/6 Series/7 Series/8 Series/9 Series

| AMI EFI/6 Series    | IOReg | HDMI Audio Edit file | After HDMI Audio Edits |
|---------------------|-------|----------------------|------------------------|
| discrete graphics   | @     | PEGO@1               | PEGP@1                 |
| integrated graphics | @     | GFX0@2               | IGPU@2                 |

1a. If IOReg shows PEGO@1, no edit is required

1b. If IOReg shows ABCD@n, the edits are:

1c. Edit Name/Find: PEG0/Replace All: ABCD

1d. Edit Address/Find: 0x00010000/Replace All: 0x000n0000

1e. If IOReg shows no GFX0@2, no edit is required

1f. If IOReg shows DEFG@2, the edits are:

1g. Edit Name/Find: GFX0/Replace All: DEFG

1h. If Audio ID: 1 is correct, no edit is required

1i. For Audio ID: 3/Find: 0x01, 0x00, 0x00, 0x00/Replace All: 0x03, 0x00, 0x00, 0x00

2. AMI BIO/5 Series/6 Series

| <b>AMI BIOS/6 Series</b>   | <b>IOReg</b> | <b>HDMI Audio Edit file</b> | <b>After HDMI Audio Edits</b> |
|----------------------------|--------------|-----------------------------|-------------------------------|
| <b>discrete graphics</b>   | @            | P0P1@1                      | PEGP@1                        |
| <b>integrated graphics</b> | @            | GFX0@2                      | IGPU@2                        |

- 2a. If IOReg shows P0P1@1, no edit is required
- 2b. If IOReg shows ABCD@n, the edits are:
- 2c. Edit Name/Find: P0P1/Replace All: ABCD
- 2d. Edit Address/Find: 0x00010000/Replace All: 0x000n0000
- 2e. If IOReg shows no GFX0@2, no edit is required
- 2f. If IOReg shows DEFG@2, the edits are:
- 2g. Edit Name/Find: GFX0/Replace All: DEFG
- 2h. If Audio ID: 1 is correct, no edit is required
- 2i. For Audio ID: 3/Find: 0x01, 0x00, 0x00, 0x00/Replace: 0x03, 0x00, 0x00, 0x00

### 3. Award BIOS/5 Series/6 Series (Verify PEG0 address, 1 or 3)

| <b>Award BIOS/6 Series</b> | <b>IOReg</b> | <b>HDMI Audio Edit file</b> | <b>After HDMI Audio Edits</b> |
|----------------------------|--------------|-----------------------------|-------------------------------|
| <b>discrete graphics</b>   | PEG0@1       | PEG0@1                      | PEGP@1                        |
| <b>integrated graphics</b> | IGD0@2       | IGD0@2                      | IGPU@2                        |

- 3a. IOReg shows PEG0@1 and IGD0@2 (if present)
- 3b. If Audio ID: 1 is correct, no edit is required
- 3c. For Audio ID: 3/Find: 0x01, 0x00, 0x00, 0x00/Replace All: 0x03, 0x00, 0x00, 0x00

## Patch File Edits

- 1. If the Patch file requires edits,
  - 1a. Edit the Patch file in MaciASL Patch window or
  - 1b. Download the Patch from repo
- Select Folder/Select Patch/Raw/Copy/Save to Desktop
- edit with TextEdit and save to desktop
- MaciASL/Patch/Open/edited patch from Desktop