

# 4-CHANNEL HD AUDIO CODECS OPTIMIZED FOR LOW POWER

**92HD71B5**

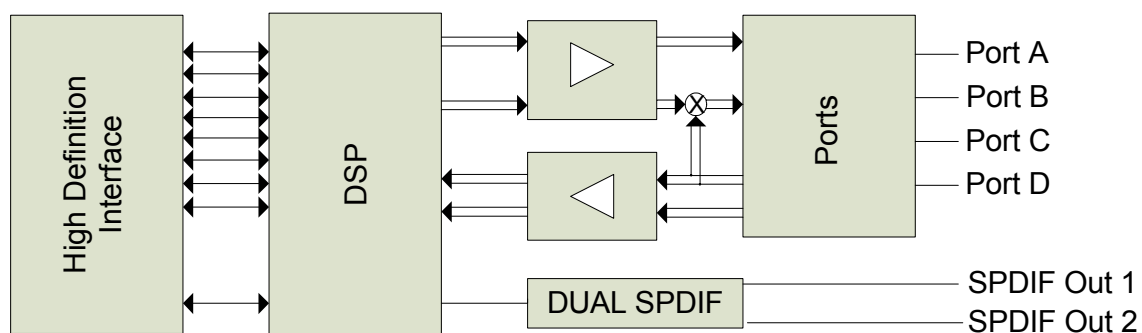
## Description

The 92HD71B5 codec is a low power optimized, high fidelity, 4-channel audio codec compatible with Intel's High Definition (HD) Audio Interface. The 92HD71B5 codec provides stereo 24-bit resolution with sample rates up to 192kHz. Dual SPDIF provides connectivity to consumer electronic equipment that is WLP compliant. The 92HD71B5 provides high quality, HD Audio capability to notebook and business desktop PC applications.

## Features

- **4 Channels (2 stereo DACs and 2 stereo ADCs) with 24-bit resolution**
  - Supports full-duplex stereo audio and simultaneous VoIP
  - Provides a mono output for laptop sub-woofer
- **Microsoft WLP 3/4 premium logo compliant, as defined in WLP 3.09**
- **Optimized and flexible power management with pop/click mitigation**
- **2 independent S/PDIF Output converters for WLP compliant HDMI/SPDIF support.**
- **Support for 1.5V and 3.3V HDA signaling with runtime selection**
- **Digital microphone input (mono, stereo, or quad array)**
- **2 Adjustable VREF Out pins for microphone bias**
- **4 analog ports**
- **Supports to 2 stereo microphone inputs**
- **Two-pin volume up/down control**
- **Digital PC Beep to all outputs**
- **Integrated headphone amp**
- **Jack insertion detection**
- **Sample rates up to 192kHz**
- **+3.3 V, +4 V, +4.75 V and +5 V analog power supply options**
- **48-pin QFP and 48-pad QFN RoHS packages**

## Block Diagram



## Software Support

- Intuitive graphical user interface that allows configurability and preference settings
- SKPI (Kernel Processing Interface)
  - Enables plug-ins that can operate globally on all audio streams of the system
- 12 band fully parametric equalizer (SKPI plug-in)
  - Constant, system-level effects tuned to optimize a particular platform can be combined with user-mode “presets” tailored for specific acoustical environments and applications
  - System-level effects automatically disabled when external audio connections made
- Dynamics Processing (SKPI plug-in)
  - Enables improved voice articulation
  - Compressor/limiter allows higher average noise level without resonances
- IDT Vista APO wrapper
  - Enables multiple APOs to be used with the IDT Driver
- Microphone Beam Forming, Acoustic Echo Cancellation, and Noise Suppression
- Dynamic Stream Switching
  - Improved multi-streaming user experience with less support calls
- Dolby PC Entertainment Experience Logo Program
  - Dolby Home Theater™ (HT)
  - Dolby Sound Room™ (SR)
- Dolby Technologies
  - Dolby Headphone™, Dolby Virtual Speaker™
  - Dolby ProLogic II™, Dolby ProLogic IIx™
  - Dolby Digital Live™ (DDL)
- Maxx Player™ from Waves
- WOW™ and Tru Surround™ from SRS

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## 1. DESCRIPTION

### 1.1. Overview

The 92HD71B is a family of high fidelity, 4-channel audio codecs compatible with the Intel High Definition (HD) Audio Interface. The 92HD71B codecs provide high quality, HD Audio capability to notebook and cost sensitive desktop PC applications.

92HD71B variants:

| <i>PartNumber</i> | <i>DAC<br/>SNR</i> | <i>#<br/>of<br/>Ports</i> | <i>Digital<br/>Mixer</i> | <i>Hi-Perf.<br/>Analog<br/>Mixer</i> |
|-------------------|--------------------|---------------------------|--------------------------|--------------------------------------|
| 92HD71B8          | 103                | 6                         | Yes                      | Yes                                  |
| 92HD71B7          | 95                 | 6                         | Yes                      | Yes                                  |
| 92HD71B5          | 95                 | 4                         | Yes                      | No                                   |

The higher performance and quality of IDT's audio solutions brings consumer electronics level performance to notebook and desktop PCs. 92HD71B5 is designed to meet or exceed premium logo requirements for Microsoft's Windows Logo Program (WLP) 3.09 and revision 4 as indicated in WLP 3.09.

The 92HD71B5 provides stereo 24-bit, full duplex resolution supporting sample rates up to 192kHz by the DAC and ADC. The 92HD71B5 SPDIF outputs support sample rates of 192kHz, 96kHz, 88.2kHz, 48kHz, and 44.1kHz. Additional sample rates are supported by the driver software.

The 92HD71B5 supports a wide range of mobile and desktop 4 channel configurations. The 2 independent SPDIF output interfaces provide connectivity to Consumer Electronic equipment like Dolby Digital decoders, powered speakers, mini disk drives or to a home entertainment system. Simultaneous WLP compliant HDMI and SPDIF output is possible. All analog input pairs support LINE\_IN and MIC.

MIC inputs can be programmed with 0/10/20/30dB boost. (40dB boost is available using the IDT driver.) For more advanced configurations, the 92HD71B5 has up to 8 General Purpose I/O (GPIO).

The port presence detect capabilities allow the codecs to detect when audio devices are connected to the codec. The fully parametric IDT SoftEQ can be initiated or disabled upon headphone jack removal and insertion for protection of notebook speakers.

The 92HD71B5 operates with a 3.3V digital supply and either 3.3V, 4V, 4.75V or 5V analog supply. It can also work with 1.5V and 3.3V HDA signaling; the correct signalling level is selected dynamically based on the power supply voltage on the DVDD-IO pin.

Available in a 48-pin QFP or QFN Environmental (ROHS) packages.

## 1.2. Orderable Part numbers

|                   |                          |
|-------------------|--------------------------|
| 92HD71B5X5PRGXyyX | 4port, 95dB, 5V, 48QFP   |
| 92HD71B5X5NLGXyyX | 4port, 95dB, 5V, 48QFN   |
| 92HD71B5X3PRGXyyX | 4port, 95dB, 3.3V, 48QFP |
| 92HD71B5X3NLGXyyX | 4port, 95dB, 3.3V, 48QFN |

yy = silicon stepping/revision, contact sales for current data.

Add an "8" to the end for tape and reel delivery. Min/Mult order quantity 2ku.

## 1.3. Block Diagram

Figure 1. 92HD71B5 Block Diagram

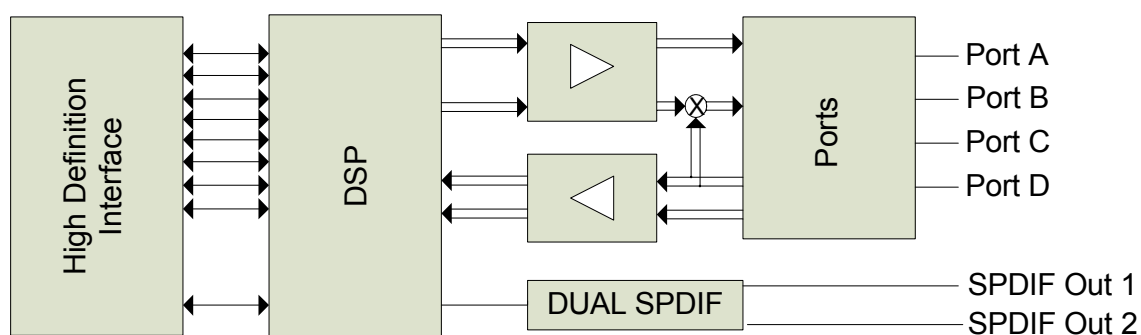
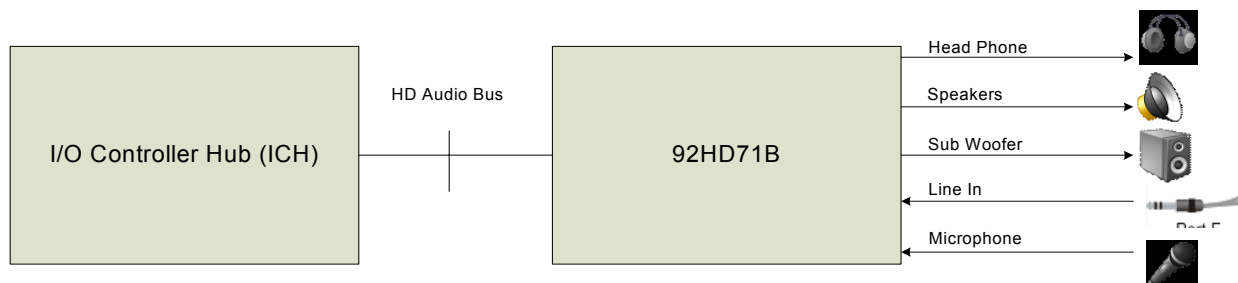


Figure 2. System Diagram



## 1.4. Detailed Description

### 1.4.1. Low-voltage High Definition Audio Link Signaling

The 92HD71B5 is compatible with either 1.5 V or 3.3 V High Definition Audio Link signaling; the voltage selection is performed dynamically based on the input voltage of DVDD\_IO. Note that DVDD\_IO is not a logic configuration pin but provides the digital power supply to be used for the High Definition Audio Link signals.

When in 1.5 V mode, the 92HD71B5 can correctly decode BITCLK, SYNC, RESET# and SDO because they operate at 1.5 V. Additionally, it will drive SDI\_CODEC at 1.5 V. None of the GPIOs are affected, as they always function at their nominal voltage (DVDD or AVDD).

### 1.4.2. Port Functionality

Single function (Input only / output only) ports allow for the highest possible performance.

- Port A supports
  - Headphone Out
  - Line Out
- Port D supports
  - Line Out
- Ports B and C support
  - Line In
  - Mic with 0/10/20/30/40 dB Mic boost<sup>4</sup>
- Mono Output cannot be reconfigured

*Note<sup>4</sup>: 40dB boost requires using the IDT driver. When the 40dB mic boost feature is enabled, additional gain increases greater than 6dB may result in significant audio quality degradation of the microphone audio input. In particular, when the 40dB MIC boost is active, the SNR, THD+N and DC offset will significantly degrade regardless of the input signal level.*

### 1.4.3. Port Characteristics

Ports are designed to be dedicated inputs or outputs only. Universal (Bi-directional) jacks are not supported. Port A is designed to drive a set of 32 ohm (nominal) headphones or a 10K (nominal) load with on board shunt resistance as low as 20K ohms (typical - used to maintain coupling CAP bias.) Line Level outputs are intended to drive an external 10K speaker load (nominal) and an on board shunt resistor of 20-47K (nominal). However, applications may support load impedances of 5K ohms and above. Input ports are 47K impedance (nominal) at the pin.

DAC full scale outputs and intended full scale input levels are 1V rms. Line output ports and Head-on output ports on the 92HD71B5 may be configured for +3dBV full scale output levels by using a vendor specific verb.

Output ports are always on to prevent pops/clicks associated with charging and discharging output coupling capacitors. This maintains proper bias on output coupling caps even in D3 as long as AVDD is available. Unused ports should be left unconnected. When updating existing designs to use 92HD71B5, ensure that there are no conflicts between the output ports on 92HD71B5 and existing circuitry.

Table 1. Analog Output Port Behavior

| AFG Power State | Output Enable | Mute | Port Behavior                                                                                                                                              |
|-----------------|---------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| D0-D2           | 1             | 0    | Active - audio enabled                                                                                                                                     |
|                 | 1             | 1    | Active - audio mute. Port drives silence                                                                                                                   |
|                 | 0             | -    | Inactive - port is powered on (low output impedance) but drives silence only.                                                                              |
| D3              | -             | -    | Inactive (lower power) - Port keeps output coupling caps charged and has low output impedance (not necessarily the same as in D0) but consumes less power. |

#### 1.4.4. Jack Detect

Plugs inserted to a jack on Ports A, B, C, & D are detected using SENSE\_A. The following table summarizes the proper resistor tolerances for different analog supply voltages.

Table 2. Jack Detect

| AVdd Nominal Voltage (+/- 5%) | Resistor Tolerance Pull-Up | Resistor Tolerance SENSE_A (If port D is used) | Resistor Tolerance SENSE_A (If port D is not used) |
|-------------------------------|----------------------------|------------------------------------------------|----------------------------------------------------|
| 5V                            | 1%                         | 1%                                             | 1%                                                 |
| 4.75V                         | 1%                         | 1%                                             | 1%                                                 |
| 4V                            | 0.50%                      | 0.50%                                          | 1%                                                 |
| 3.3V                          | 0.10%                      | 0.10%                                          | 1%                                                 |

See reference design for more information on Jack Detect implementation.

#### 1.4.5. SPDIF Output

All SPDIF Outputs can operate at 44.1kHz, 48kHz, 88.2kHz, 96kHz and 192kHz as defined in the Intel High Definition Audio Specification with resolutions up to 24 bits. This insures compatibility with all consumer audio gear and allows for convenient integration into home theater systems and media center PCs.

A second independent SPDIF Output is provided as an option for WLP compliant HDMI and SPDIF outputs. Its function is identical to the primary SPDIF output.

Table 3. SPDIF OUT 0 (Pin 48) Behavior

| AFG Power State | RESET#             | Output Enable | Converter Dig Enable | Stream ID | Pin Behavior                                                                                                                           |
|-----------------|--------------------|---------------|----------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------|
| D0-D3           | Asserted (Low)     | -             | -                    | -         | Hi-Z (internal pull-down enabled) immediately after power on, otherwise the previous state is retained until the rising edge of RESET# |
|                 | De-Asserted (High) | Disabled      | -                    | -         | Hi-Z (internal pull-down enabled)                                                                                                      |
|                 | De-Asserted (High) | Enabled       | Disabled             | -         | Active - Pin drives 0 (internal pull-down enabled)                                                                                     |
|                 | De-Asserted (High) | Enabled       | Enabled              | 0         | Active - Pin drives SPDIF-format, but data is zeroes (internal pull-down enabled)                                                      |
|                 | De-Asserted (High) | Enabled       | Enabled              | 1-15      | Active - Pin drives SPDIFOut0 data (internal pull-down enabled)                                                                        |

Table 4. SPDIF OUT 1 (Pin 45) Behavior

| AFG Power State | RESET#             | GPIO7 Enable | Output Enable | Converter Dig Enable | Stream ID | Pin Behavior                                                                                                                           |
|-----------------|--------------------|--------------|---------------|----------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------|
| D0-D3           | Asserted (Low)     | -            | -             | -                    | -         | Hi-Z (internal pull-down enabled) immediately after power on, otherwise the previous state is retained until the rising edge of RESET# |
|                 | De-Asserted (High) | Enabled      | -             | -                    | -         | Active - Pin reflects GPIO7 configuration (internal pull-up enabled)                                                                   |
|                 | De-Asserted (High) | Disabled     | Disabled      | -                    | -         | Hi-Z (internal pull-down enabled)                                                                                                      |
|                 | De-Asserted (High) | Disabled     | Enabled       | Disabled             | -         | Active - Pin drives 0 (internal pull-down enabled)                                                                                     |
|                 | De-Asserted (High) | Disabled     | Enabled       | Enabled              | 0         | Active - Pin drives SPDIF-format, but data is zeroes (internal pull-down enabled)                                                      |
|                 | De-Asserted (High) | Disabled     | Enabled       | Enabled              | 1-15      | Active - Pin drives SPDIFOut1 data (internal pull-down enabled)                                                                        |

#### 1.4.6. Mono Output

The MONO Output is connected to pin 32 and has an independent mute (see the Widget listing for details). The MONO Output derives its input from the output of the summing node after the mono mux. The following sources are available for the mono pin:

DAC0 Output: When enabled (by using port connection list), both DAC0 Outputs are summed together.

DAC1 Output: When enabled (by using port connection list), both DAC1 Outputs are summed together.

Input Mixer: When enabled (by using mono mix connection list and DAC mixer), both mixer outputs are summed together.

The stereo inputs are scaled by -6dB and then summed to provide an output that is the average of the two inputs. The full scale output at mono out is designed to be about 0dBV. It is not possible to adjust to a +3dBV output level.

#### 1.4.7. Input Multiplexers

92HD71B5 implements 2 port input multiplexers. These multiplexers incorporate the microphone boost function (0, 10dB, 20dB, 30dB, and 40dB gain) as an output amp and allow a preselection of one of three possible inputs:

Port B

Port C

NOTE: Changing the Input multiplexer setting will affect the ADC.

#### 1.4.8. ADC Multiplexers

92HD71B5 implements 2 ADC input multiplexers. These multiplexers incorporate the ADC record gain function (0 to +22.5dB gain in 1.5dB steps) as an output amp and allow a preselection of one of four possible inputs:

- DMIC 0
- DMIC1
- InPortMux (ADC0 selects inport0\_mux / ADC1 selects inport1\_mux)

#### 1.4.9. Power Management

The following table describes what functionality is active in each power state

The D3-default state is available for HD Audio compliance. The programmable values, exposed via vendor-specific settings, are under the IDT Device Driver control for further power reduction.

The default power state for the Audio Function Group after reset is D3-default..

Table 5. Power Management

| D0 | D1  | D2 <sup>1</sup> | D3                     | vendor specific | Function           |
|----|-----|-----------------|------------------------|-----------------|--------------------|
| On | Off | Off             | Off                    | -               | DAC                |
| On | Off | Off             | Off                    | -               | D2S                |
| On | Off | Off             | Off                    | -               | ADC                |
| On | Off | Off             | Off                    | -               | ADC Volume Control |
| On | Off | Off             | Off                    | -               | Ref ADC            |
| On | Off | Off             | Off                    | -               | Analog Clocks      |
| On | On  | Off             | Off                    | -               | VrefOut Pins       |
| On | On  | Off             | Off                    | -               | Input Boost        |
| On | On  | On              | Low Drive <sup>2</sup> | Programmable    | Lo Amp             |
| On | On  | On              | Low Drive <sup>2</sup> | Programmable    | HP Amps            |
| On | On  | On              | Low Drive <sup>3</sup> | Programmable    | VAG amp            |

Table 5. Power Management

| D0 | D1 | D2 <sup>1</sup> | D3              | vendor specific           | Function                 |
|----|----|-----------------|-----------------|---------------------------|--------------------------|
| On | On | On              | On <sup>4</sup> | Programmable              | Port Sense               |
| On | On | On              | On              | Programmable <sup>5</sup> | Reference Bias generator |
| On | On | On              | On              | Programmable <sup>5</sup> | Reference Bandgap core   |
| On | On | On              | On <sup>6</sup> | -                         | AZ-Link                  |

1.No DAC or ADC streams are active. Analog mixing and loop thru are supported.

2.VAG is kept active when ports are disabled or in D2/D3. Ports A, D, F and mono may be powered down using vendor specific verbs.

3.VAG is always ramped up and down gradually, except in the case of a sudden power removal. VAG is active in D2/D3 but in a low power state.

4. BITCLK must be active and both AVDD and DVDD must be available for Port Sense to operate.

5.Vendor specific bit for Ref Top controls VAG generator, Bandgap Reference, and Reference bias generator. Place part into D3 and power down all ports (using vendor specific verbs) before powering down Ref Top.

6.Obviously not active if BITCLK is not running (Controller in D3).

#### 1.4.10. Multi-channel capture

The capability to assign multiple “ADC Converters” to the same stream is supported to meet the microphone array requirements of Vista and future operating systems. Single converter streams are still supported and is done by assigning unique non zero Stream IDs to each converter. All capture devices (ADCs 0 and 1) must be used to create a multi-channel input stream. There are no restrictions regarding digital microphones.

The ADC Converters can be associated with a single stream as long the sample rate and the bits per sample are the same. The assignment of converter to channel is done using the “CnvtrID” widget and is restricted to even values. The ADC converters will always put out a stereo sample and therefore require 2 channels per converter.

The stream will not be generated unless all entries for the targeted converters are set identically, and the total number of assigned converter channels matches the value in the NmbrChan field. These are listed the “Multi-Converter Stream Critical Entries.” table.

An example of a 4 Channel Stream with ADC0 supplying channels 0&1 and ADC1 supplying channels 2 & 3 is shown below. A 4 Channel stream can be created by assigning the same non-zero stream id “Strm= N” to both ADC0 and ADC1. The sample rates must be set the same and the number of channels must be set to 4 channels “NmbrChan = 0011”.

Table 6: Example channel mapping

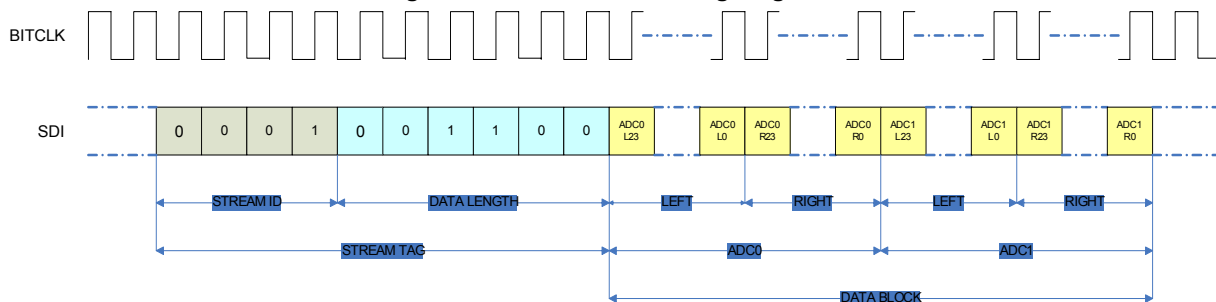
|              |              |        |
|--------------|--------------|--------|
| ADC1 CnvtrID | (NID = 0x08) |        |
|              | [3:0]        | Ch = 2 |
| ADC0 CnvtrID | (NID = 0x07) |        |
|              | [3:0]        | Ch=0   |

Figure 3. Multi-channel capture

|                                                      |           |             |                   |                    |                   |                    |          |
|------------------------------------------------------|-----------|-------------|-------------------|--------------------|-------------------|--------------------|----------|
| ADC0.CnvrtID.Channel = 0<br>ADC1.CnvrtID.Channel = 2 | Stream ID | Data Length | ADC0 Left Channel | ADC0 Right Channel | ADC1 Left Channel | ADC1 Right Channel | Null PAD |
| ADC0.CnvrtID.Channel = 2<br>ADC1.CnvrtID.Channel = 0 | Stream ID | Data Length | ADC1 Left Channel | ADC1 Right Channel | ADC0 Left Channel | ADC0 Right Channel | Null PAD |

The following figure describes the bus waveform for a 24-bit, 48KHz capture stream with ID set to 1.

Figure 4. Multi-channel timing diagram



#### 1.4.11. EAPD

The EAPD pin (pin 47) also supports SPDIF and GPIO functions. The pin defaults to EAPD after power on reset and will remain in EAPD mode until either GPIO is enabled for pin 47 or the port I/O is enabled to support SPDIF. The EAPD value is reflected on the EAPD pin; a 1 causes the external amplifier to power up, and a 0 causes it to power down. When the EAPD value = 1, the EAPD pin must be placed in a state appropriate to the current power state of the associated Pin Widget even though the EAPD value may remain 1. The default state of this pin is 0 (driving low) and a Pull-down prevents the line from floating high when the part is in reset.

Table 7. EAPD Behavior

| AFG Power State | RESET#             | GPIO Enable | Output Enable | EAPD Power State | Pin Behavior                                                                                                                           |
|-----------------|--------------------|-------------|---------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| D0-D3           | Asserted (Low)     | -           | -             | -                | Hi-Z (internal pull-down enabled) immediately after power on, otherwise the previous state is retained until the rising edge of RESET# |
|                 | De-Asserted (High) | Enabled     | -             | -                | Active - Pin reflects GPIO0 configuration (internal pull-up enabled)                                                                   |
|                 | De-Asserted (High) | Disabled    | Enabled       | -                | Active - Pin Drives SPDIFOut0/1 output (internal pull-down enabled)                                                                    |
|                 | De-Asserted (High) | Disabled    | Disabled      | D2-D3            | Hi-Z (internal pull-down enabled)                                                                                                      |
|                 | De-Asserted (High) | Disabled    | Disabled      | D0-D1            | Active - Pin drives the value of the EAPD bit (internal pull-down enabled)                                                             |

### 1.4.12. Digital Microphone Support

The digital microphone interface permits connection of a digital microphone(s) to the CODEC via the DMIC0, DMIC1, and DMIC\_CLK 3-pin interface. The DMIC0 and DMIC1 signals are inputs that carry individual channels of digital Mic data to the ADC. In the event that a single microphone is used, the data is ported to both ADC channels.

The DMIC\_CLK output is controllable from 4.704Mhz, 3.528Mhz, 2.352Mhz, 1.176Mhz and is synchronous to the 24Mhz internal clock. The default frequency is 2.352Mhz.

92HD71B5 supports the following digital microphone configurations:

**Table 8. Valid Digital Mic Configurations**

| Digital Mics | Data Sample                                                            | ADC Conn. | Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0            | N/A                                                                    | N/A       | No Digital Microphones                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 1            | Single Edge                                                            | 0, or 1   | Available on either DMIC_0 or DMIC_1<br>Both ADC Channels produce data, may be in phase or out by 1/2 DMIC_CLK period depending upon external configuration and timing                                                                                                                                                                                                                                                                                                                       |
| 2            | Double Edge on either DMIC_0 or 1<br>OR<br>Single Edge on DMIC_0 and 1 | 0, or 1   | Available on either DMIC_0 or DMIC_1, External logic required to support sampling on a single Digital Mic pin channel on rising edge and second Digital Mic right channel on falling edge of DMIC_CLK for those digital microphones that don't support alternative clock edge capability. If both DMIC_0 and DMIC_1 are used to support 2 digital microphones, 2 separate ADC units will be used, however, this configuration is not recommended since it consumes two stereo ADC resources. |
| 3            | Double Edge on one DMIC pin and Single Edge on the second DMIC pin.    | 0, or 1   | Requires both DMIC_0 AND DMIC_1, External logic required to support sampling on a single Digital Mic pin channel on rising edge and second Digital Mic right channel on falling edge of DMIC_CLK for those digital microphones that don't support alternative clock edge capability. Two ADC units are required to support this configuration                                                                                                                                                |
| 4            | Double Edge                                                            | 0, or 1   | Connected to DMIC_0 and DMIC_1, External logic required to support sampling on a single Digital Mic pin channel on rising edge and second Digital Mic right channel on falling edge of DMIC_CLK for those digital microphones that don't support alternative clock edge capability. Two ADC units are required to support this configuration                                                                                                                                                 |

**Table 9. DMIC\_CLK and DMIC\_0,1 Operation During Power States**

| Power State | DMIC Widget Enabled? | DMIC_CLK Output | DMIC_0,1       | Notes                                                                                                                |
|-------------|----------------------|-----------------|----------------|----------------------------------------------------------------------------------------------------------------------|
| D0          | Yes                  | Clock Capable   | Input Capable  | DMIC_CLK Output is Enabled when either DMIC_0 or DMIC_1 Input Widget is Enabled. Otherwise, the DMIC_CLK remains Low |
| D1          | Yes                  | Clock Disabled  | Input Disabled | DMIC_CLK Output is Enabled when either DMIC_0 or DMIC_1 Input Widget is Enabled. Otherwise, the DMIC_CLK remains Low |
| D2          | Yes                  | Clock Disabled  | Input Disabled | DMIC_CLK Remains Low                                                                                                 |
| D3          | Yes                  | Clock Disabled  | Input Disabled | DMIC_CLK Remains Low                                                                                                 |
| D0-D3       | No                   | Clock Disabled  | Input Disabled | DMIC_CLK is HIGH-Z with Weak Pull-down                                                                               |

Figure 5. Single Digital Microphone (data is ported to both left and right channels)

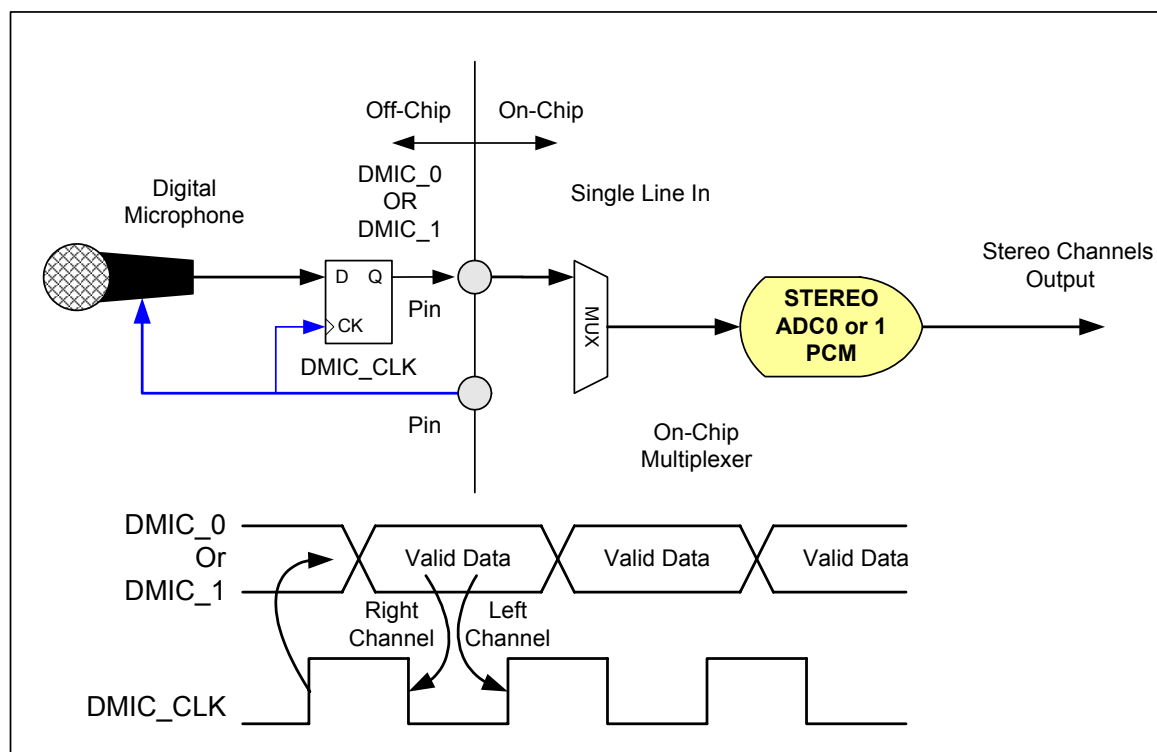
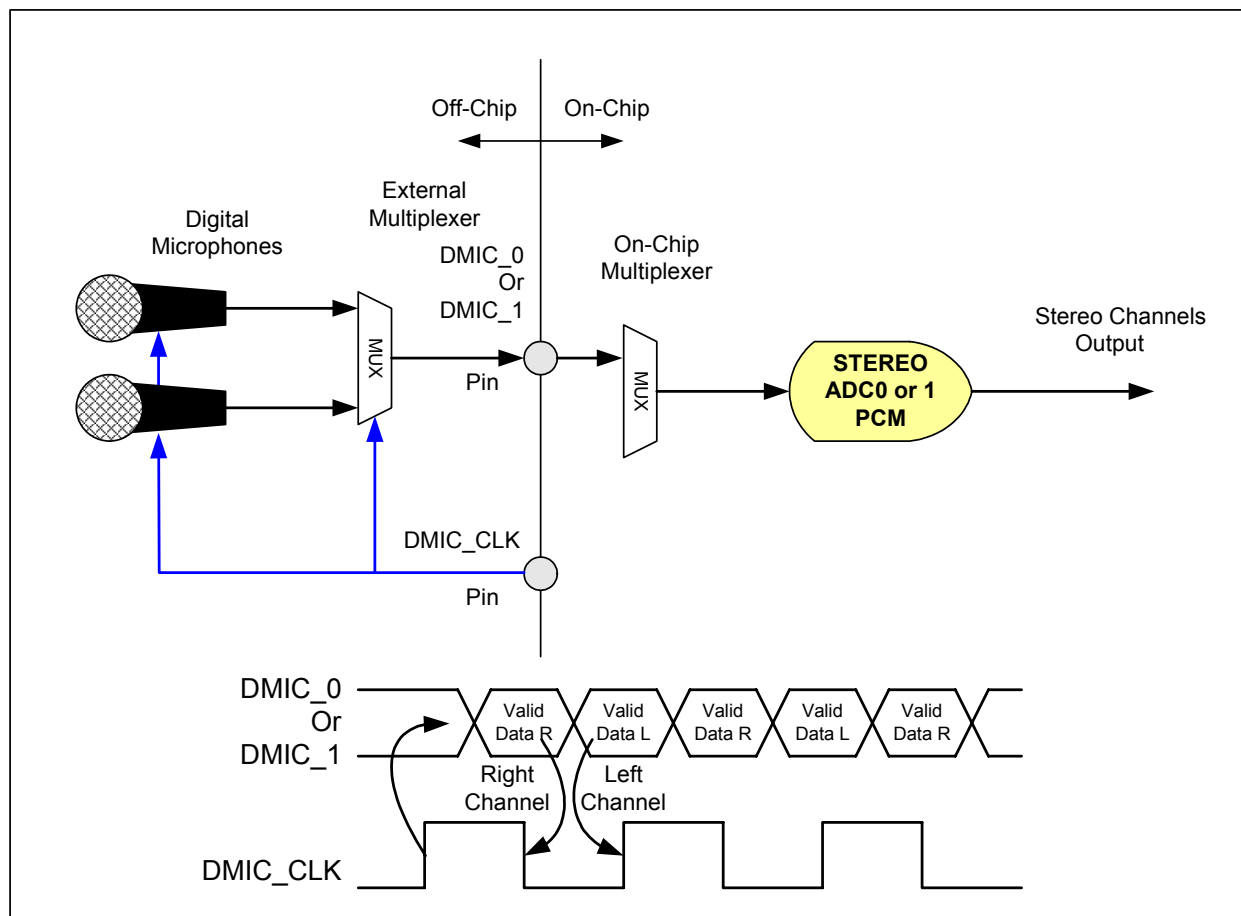
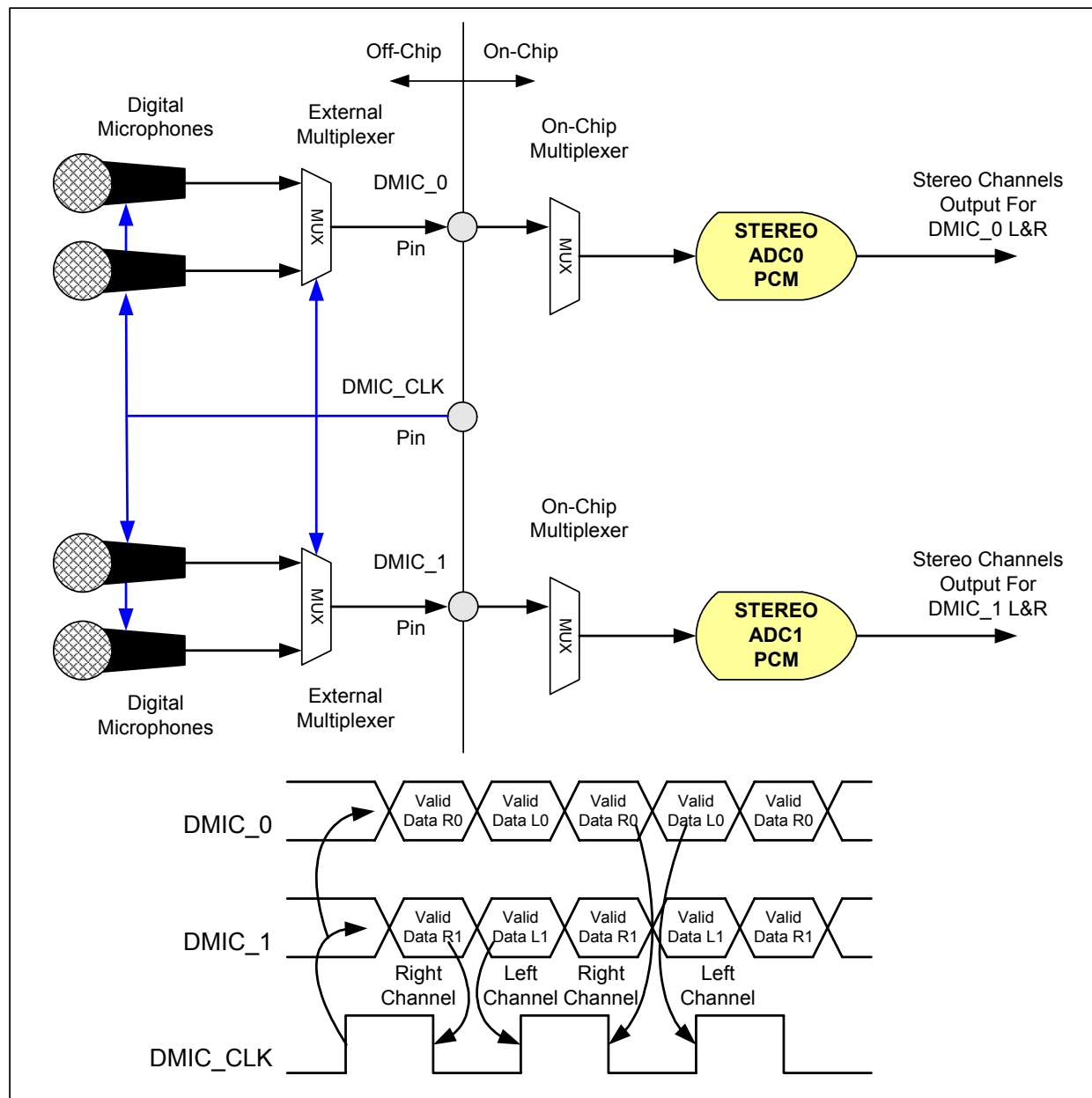


Figure 6. Stereo Digital Microphone Configuration



Note: Some Digital Microphone Implementations support data on either edge, therefore, the external mux may not be required.

Figure 7. Quad Digital Microphone Configuration



Note: Some Digital Microphone Implementations support data on either edge, therefore, the external mux may not be required.

### 1.4.13. Analog PC-Beep

92HD71B5 does not support automatic routing of the PC\_Beep pin to all outputs when the link is in reset. Analog PC\_BEEP is supported using a vendor specific verb.

### 1.4.14. Headphone Drivers

This product implements a +3dBV output option on headphone capable ports. (HP output and line output levels are defined as 1Vrms with an option to enable +3dBV FSOV using a vendor specific verb.)

### 1.4.15. GPIO

#### 1.4.15.1. GPIO Pin mapping and shared functions.

Table 10. GPIO Pin mapping and shared functions

| GPIO # | Pin | Supply | SPDIF In | SPDIF Out | GPI/O | GPI | GPO | VrefOut | ADAT | DMIC | VOL | Pull Up           | Pull Down         |
|--------|-----|--------|----------|-----------|-------|-----|-----|---------|------|------|-----|-------------------|-------------------|
| 1      | 2   | DVDD   |          |           | YES   |     |     |         |      | YES  | YES | 50K (GPIO/VOL)    | 50K (DMIC)        |
| 2      | 4   | DVDD   |          |           | YES   |     |     |         |      | YES  | YES | 50K (GPIO/VOL)    | 50K (DMIC)        |
| 3      | 30  | AVDD   |          |           | YES   |     |     |         |      |      |     | 50K <sup>1</sup>  |                   |
| 4      | 31  | AVDD   |          |           | YES   |     |     | YES     |      |      |     |                   |                   |
| 5      | 43  | DVDD   |          |           | YES   |     |     |         |      |      |     | 50K<superscript>1 |                   |
| 6      | 44  | DVDD   |          |           | YES   |     |     |         |      |      |     | 50K<superscript>1 |                   |
| 7      | 45  | DVDD   |          | YES       | YES   |     |     |         |      |      |     | 50K (GPIO)        | 50K1 (SPDIF)      |
| 0      | 47  | DVDD   |          | YES       | YES   |     |     |         |      |      |     | 50K (GPIO)        | 50K1 (SPDIF/EAPD) |

1.Default condition.

#### 1.4.15.2. Volume/Digital Microphone/GPIO Selection

To determine which function is actually enabled on pins2 and 4, the order of precedence is followed:

- 1) If the GPIOs are enabled, they override both Volume Control and Digital Mics
- 2) If the GPIOs are not enabled through the AFG, then at reset, the Volume control is enabled with the weak pull-up.
- 3) If BIOS or other software application enables either Digital Microphones inputs through the Configuration Default Register, the Volume is disconnected and the pull-ups are disconnected with the weak pull-downs enabled.

#### 1.4.15.3. VRefOut/GPIO Selection

Two functions are available on pin 31. To determine which function is actually enabled, the order of precedence is followed:

- 1) If the GPIO4 function is enabled, it overrides VRefOut-E
- 2) If the GPIO4 function is not enabled through the AFG, then, at reset the VrefOut-E is enabled.
- 3) If using pin 31 as GPIO, make sure to incorporate a 10K ohm external pull-up to AVDD to prevent the pin from floating in GPI mode and to allow proper operation in open-drain GPO mode.

### 1.4.16. External Volume Control

92HD71B5 incorporates a 2-pin volume control interface. Volume up, down, and mute functions are easily implemented using 2 push-button switches. The CODEC provides internal pull-up resistors simplifying external CODEC circuitry. Also, repeat and direct modes of operation add flexibility to the interface. The typical usage model is for front panel master volume buttons on an entertainment PC, or case mounted hardware volume control for mobile platforms.

#### 1.4.16.1. Theory of Operation

The codec monitors the volume up/down inputs for a change of state from high to low, and waits for the inputs to settle. If the inputs have not settled by the end of the de-bounce period, then the value at the end of the period is used. A 0 (low voltage) on the Down pin will decrement the volume register, while a 0 on the Up pin will increment the volume register. If both inputs are 0 at the same time, then the volume register will be set to its lowest value (mute). Pressing Up, Down, or both buttons at the same time when the volume control interface is in mute mode, will cause the part to un-mute.

The de-bounce / repeat rate is selectable from 2.5Hz to 20Hz in 2.5Hz increments using the Volume Knob VCSR0 verb (FE0) Rate bits (bits 2:0). This value is used for both de-bounce and repeat rates. The de-bounce period is the time that the CODEC waits for the inputs to settle, and the repeat rate is the rate at which the CODEC will increment/decrement the volume if a volume button is pushed and held. When a falling edge is detected on either one of the volume control pins, the codec will wait for (1/Rate) seconds for the input to settle. If the Continuous bit is set in the Volume Knob VCSR0 verb (bit 3), then the codec will wait for the de-bounce period to expire then repeatedly increment or decrement the volume register at the rate specified in the Rate bits until the button is released.

#### 1.4.16.2. Modes of Operation

- DIRECT MODE
  - In Direct mode, the Volume Knob widget directly controls the volume of all of the DACs in the part. The volume in the Volume Knob widget acts as the master volume and limits the maximum volume for each of the DAC amplifiers. The amp gain for each of the DACs can also be adjusted using the DAC amplifiers. However, the actual gain for an individual DAC will be the sum of the Volume Knob volume and the DAC amplifier volume. For example, if the DAC amplifier gain is set to 0x7F (0dB) and the Volume Knob volume is set to 0x3F (-48dB) the resulting gain would be -48dB. If the combination of gains is less than -95.25dB (the equivalent to a value of 0x0 for the DAC or Volume Knob volume settings) then the

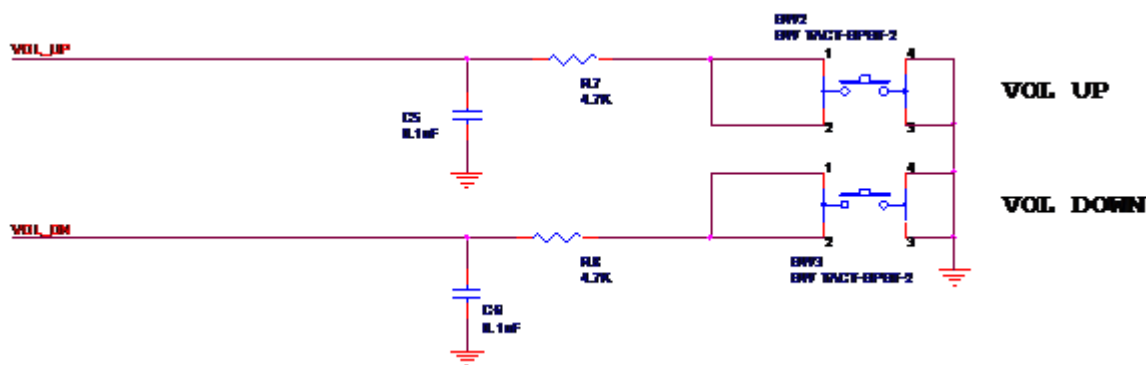
actual gain will be -95.25dB. For example, if the Volume Knob is set to 0x3F (-48dB) and the DAC amplifier volume is set to 0x1F (-72dB) then the DAC volume will be set to -95.25dB.

- Direct mode is enabled by setting bit 7 in the Volume Knob Cntrl verb (F0F). The volume is reflected in the Volume Knob Cntrl bits 6:0 and the step size is 0.75dB. In direct mode, software can read or write the volume in the Volume Knob widget.
- **INDIRECT MODE**
  - In indirect mode, the Volume Knob widget does not directly control the DAC amplifier gains. An event on the volume Up/Down pins will increment/decrement the value in the Volume Knob Cntrl verb (F0F) volume bits (bits 6:0) just as in Direct mode. However, instead of adjusting the DAC amplifier gain, an unsolicited response is generated (if enabled) and the control software must read the volume in the Volume Knob widget and take appropriate action. Indirect mode is particularly useful when it is undesirable to control all of the DAC amplifier volumes at the same time, or when implementing ADC volume control.
  - In indirect mode, there are only 128 volume levels in the Volume Knob Cntrl volume bits, the value will not go beyond the lower and upper limits (0x0 or 0x7F), and an unsolicited response will not be generated if an input event tries to go beyond these limits. Therefore, it is the responsibility of the controlling software to monitor the volume in the Volume Knob Widget and take appropriate action.
  - Indirect mode is enabled by clearing bit 7 in the Volume Knob Cntrl verb (F0F). The volume is reflected in the Volume Knob Cntrl bits 6:0 and the step size is 0.75dB. In direct mode, software can read or write the volume in the Volume Knob widget.

#### 1.4.16.3. Hardware Implementation

The Volume Knob interface is comprised of two input pins, CODEC pins 2 and 4. Both pins have internal pull-up resistors, so only two push button switches are required for most implementations. Typically, a series resistor and shunt capacitor are used to help reduce noise and prevent damage from ESD and other potential faults. An example circuit is shown below.

Figure 8. Volume Knob



## 2. CHARACTERISTICS

### 2.1. Electrical Specifications

#### 2.1.1. Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the 92HD71B5. These ratings, which are standard values for IDT commercially rated parts, are stress ratings only. Functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods can affect product reliability. Electrical parameters are guaranteed only over the recommended operating temperature range.

**Table 11. Electrical Specification: Maximum Ratings**

| Item                                  | Pin  | Maximum Rating                                                                                |
|---------------------------------------|------|-----------------------------------------------------------------------------------------------|
| Analog maximum supply voltage         | AVdd | 6 Volts                                                                                       |
| Digital maximum supply voltage        | DVdd | 5.5 Volts                                                                                     |
| VREFOUT output current                |      | 5 mA                                                                                          |
| Voltage on any pin relative to ground |      | Vss - 0.3 V to Vdd + 0.3 V                                                                    |
| Operating temperature                 |      | 0 °C to +70 °C                                                                                |
| Storage temperature                   |      | -55 °C to +125 °C                                                                             |
| Soldering temperature                 |      | Soldering temperature information for all available in the package section of this datasheet. |

#### 2.1.2. Recommended Operating Conditions

**Table 12. Recommended Operating Conditions**

| Parameter                                                           |                             | Min.  | Typ. | Max.  | Units |
|---------------------------------------------------------------------|-----------------------------|-------|------|-------|-------|
| Power Supply Voltage                                                | Digital - 3.3 V             | 3.135 | 3.3  | 3.465 | V     |
|                                                                     | Analog - 3.3 V              | 3.135 | 3.3  | 3.465 | V     |
| (Note: With Supply Override Enable Bit set to force 5 V operation.) | Analog - 4 V                | 3.8   | 4    | 4.2   | V     |
|                                                                     | Analog - 4.5 V              | 4.51  | 4.75 | 4.99  | V     |
|                                                                     | Analog - 5 V                | 4.75  | 5    | 5.25  | V     |
| Ambient Operating Temperature                                       |                             | 0     |      | +70   | °C    |
| Case Temperature                                                    | T <sub>case</sub> (48-LQFP) |       |      | +90   | °C    |
|                                                                     | T <sub>case</sub> (48-QFN)  |       |      | +95   | °C    |

**ESD:** The 92HD71B5 is an ESD (electrostatic discharge) sensitive device. The human body and test equipment can accumulate and discharge electrostatic charges up to 4000 Volts without detection. Even though the 92HD71B5 implements internal ESD protection circuitry, proper ESD precautions should be followed to avoid damaging the functionality or performance.

## 2.2. 92HD71B5 5V, 4.75V, and 3.3V Analog Performance Characteristics

(Tambient = 25 °C, AVdd = Supply ± 5%, DVdd = 3.3V ± 5%, AVss=DVss=0V; 20Hz to 20KHz swept sinusoidal input; Sample Frequency = 48 kHz; 0 dB = 1 VRMS, 10KΩ//50pF load, Testbench Characterization BW: 20 Hz – 20 kHz, 0 dB settings on all gain stages)

**Table 13. 92HD71B5 5V, 4.75V, and 3.3V Analog Performance Characteristics**

| Parameter                                              | Conditions                                                 | AVdd                | Min            | Typ            | Max | Unit |
|--------------------------------------------------------|------------------------------------------------------------|---------------------|----------------|----------------|-----|------|
| <b>Digital to Analog Converters</b>                    |                                                            |                     |                |                |     |      |
| Resolution                                             |                                                            | All                 |                | 24             |     | Bits |
| Dynamic Range <sup>1</sup> : PCM to All Analog Outputs | -60dB FS signal level                                      | 5V<br>4.75V<br>3.3V | 90<br>90<br>85 | 95<br>95<br>90 | -   | dB   |
| SNR <sup>2</sup> - DAC to All Line-Out Ports           | Analog Mixer Disabled, PCM data                            | 5V<br>4.75V<br>3.3V | 90<br>90<br>85 | 95<br>95<br>90 |     | dB   |
| THD+N <sup>3</sup> - DAC to All Line-Out Ports         | Analog Mixer Disabled, -1dB FS Signal, PCM data            | 5V<br>4.75V<br>3.3V | 80<br>80<br>80 | 83<br>82<br>84 |     | dBr  |
| THD+N <sup>3</sup> - DAC to All Line-Out Ports         | Analog Mixer Disabled, -3dB FS Signal, PCM data            | 5V<br>4.75V<br>3.3V | 80<br>80<br>80 | 83<br>82<br>84 |     | dBr  |
| SNR <sup>2</sup> - DAC to All Headphone Ports          | Analog Mixer Disabled, 10KΩ load, PCM data                 | 5V<br>4.75V<br>3.3V | 80<br>80<br>80 | 83<br>83<br>83 |     | dB   |
| THD+N <sup>3</sup> - DAC to All Headphone Ports        | Analog Mixer Disabled, -1dB FS Signal, 10KΩ load, PCM data | 5V<br>4.75V<br>3.3V | 80<br>80<br>80 | 83<br>82<br>84 |     | dBr  |
| THD+N <sup>3</sup> - DAC to All Headphone Ports        | Analog Mixer Disabled, -3dB FS Signal, 10KΩ load, PCM data | 5V<br>4.75V<br>3.3V | 80<br>80<br>80 | 83<br>82<br>84 |     | dBr  |
| SNR <sup>2</sup> - DAC to All Headphone Ports          | Analog Mixer Disabled, 32Ω load, PCM data                  | 5V<br>4.75V<br>3.3V | 90<br>90<br>85 | 95<br>95<br>90 |     | dB   |
| THD+N <sup>3</sup> - DAC to All Headphone Ports        | Analog Mixer Disabled, -1dB FS Signal, 32Ω load, PCM data  | 5V<br>4.75V<br>3.3V | 70<br>68<br>68 | 78<br>76<br>73 |     | dBr  |

Table 13. 92HD71B7 5V, 4.75V, and 3.3V Analog Performance Characteristics

| Parameter                                           | Conditions                                                     | AVdd                | Min                   | Typ                   | Max    | Unit         |
|-----------------------------------------------------|----------------------------------------------------------------|---------------------|-----------------------|-----------------------|--------|--------------|
| THD+N <sup>3</sup> - DAC to All Headphone Ports     | Analog Mixer Disabled, -3dB FS Signal, 32Ω load, PCM data      | 5V<br>4.75V<br>3.3V | 70<br>68<br>68        | 78<br>76<br>73        |        | dBr          |
| Any Analog Input (ADC) to DAC Crosstalk             | 10KHz Signal Frequency<br>VREF_OUT=80%, BOOST=0dB, 10k load    | All                 | -                     | -100                  | -      | dB           |
| Any Analog Input (ADC) to DAC Crosstalk             | 1KHz Signal Frequency<br>VREF_OUT=80%, BOOST=0dB, 10k load     | All                 | -                     | -100                  | -      | dB           |
| DAC L/R crosstalk                                   | DAC to LO or HP 20-15KHz into 10KΩ load                        | All                 | 65                    | 75                    |        | dB           |
| DAC L/R crosstalk                                   | DAC to HP 20-15KHz into 32Ω load                               | All                 | 65                    | 70                    |        | dB           |
| Gain Error                                          | Analog Mixer Disabled                                          | All                 |                       |                       | 0.5    | dB           |
| Interchannel Gain Mismatch                          | Analog Mixer Disabled                                          | All                 |                       |                       | 0.5    | dB           |
| D/A Digital Filter Pass Band <sup>4</sup>           |                                                                | All                 | 20                    | -                     | 21,000 | Hz           |
| D/A Digital Filter Transition Band                  |                                                                | All                 | 21,000                | -                     | 31,000 | Hz           |
| D/A Digital Filter Stop Band                        |                                                                | All                 | 31,000                | -                     | -      | Hz           |
| D/A Digital Filter Stop Band Rejection <sup>5</sup> |                                                                | All                 | -100                  | -                     | -      | dB           |
| D/A Out-of-Band Rejection <sup>6</sup>              |                                                                | All                 | -55                   | -                     | -      | dB           |
| Group Delay (48KHz sample rate)                     |                                                                | All                 | -                     | -                     | 1      | ms           |
| Attenuation, Gain Step Size DIGITAL                 |                                                                | All                 | -                     | 0.75                  | -      | dB           |
| DAC Offset Voltage                                  |                                                                | All                 | -                     | 10                    | 20     | mV           |
| Deviation from Linear Phase                         |                                                                | All                 | -                     | 10                    | 1      | deg.         |
| <b>Analog Outputs</b>                               |                                                                |                     |                       |                       |        |              |
| Full Scale All Line-Outs + HP                       | DAC PCM Data                                                   | 5V<br>4.75V<br>3.3V | 1.00<br>1.00<br>0.707 | 1.07<br>1.07<br>0.758 | -      | Vrms         |
| Full Scale All Line-Outs + HP                       | DAC PCM Data                                                   | 5V<br>4.75V<br>3.3V | 2.83<br>2.83<br>2.00  | 3.03<br>3.03<br>2.14  | -      | Vp-p         |
| All Headphone Capable Outputs                       | 32Ω load                                                       | 5V<br>4.75V<br>3.3V | 40<br>40<br>31        | 60<br>60<br>42        | -      | mW<br>(peak) |
| Amplifier output impedance                          | Line Outputs<br>Headphone Outputs                              | All                 |                       | 150<br>0.1            |        | Ohms         |
| <b>Analog inputs</b>                                |                                                                |                     |                       |                       |        |              |
| Full Scale Input Voltage                            | 0dB Boost @4.75V<br>(input voltage required for 0dB FS output) | 5V<br>4.75V<br>3.3V | 1.00<br>1.00<br>0.707 | 1.03                  | -      | Vrms         |

Table 13. 92HD71B7 5V, 4.75V, and 3.3V Analog Performance Characteristics

| Parameter                                            | Conditions                                                        | AVdd                | Min            | Typ            | Max | Unit              |
|------------------------------------------------------|-------------------------------------------------------------------|---------------------|----------------|----------------|-----|-------------------|
| All Analog Inputs with boost                         | 10dB Boost                                                        | 5V<br>4.75V<br>3.3V | 0.31           | -              | -   | Vrms              |
| All Analog Inputs with boost                         | 20dB Boost                                                        | 5V<br>4.75V<br>3.3V | 0.10           | -              | -   | Vrms              |
| All Analog Inputs with boost                         | 30dB Boost                                                        | 5V<br>4.75V<br>3.3V | 0.03           | -              | -   | Vrms              |
| All Analog Inputs with boost                         | 40dB Boost                                                        | 5V<br>4.75V<br>3.3V | 0.01           | -              | -   | Vrms              |
| Input Impedance                                      |                                                                   | All                 | -              | 50             | -   | K $\Omega$        |
| Input Capacitance                                    |                                                                   | All                 | -              | 15             | -   | pF                |
| <b>Analog Mixer</b>                                  |                                                                   |                     |                |                |     |                   |
| SNR <sup>2</sup> - All Line-In to A D & F Line-Outs  |                                                                   | 5V<br>4.75V<br>3.3V | 84             | 90             |     | dB                |
| THD+N <sup>3</sup> - All Line-In to A D & F Line-Out | 0dBFS Input                                                       | 5V<br>4.75V<br>3.3V | 65             | 77             |     | dBr               |
| SNR <sup>2</sup> - DAC to All Line-Out Ports         | Analog Mixer Enabled, PCM data                                    | 5V<br>4.75V<br>3.3V | 88<br>86<br>83 | 90<br>88<br>85 |     | dB                |
| THD+N <sup>3</sup> - DAC to All Line-Out Ports       | Analog Mixer Enabled, -1dB FS Signal, PCM data                    | 5V<br>4.75V<br>3.3V | 74<br>72<br>70 | 79<br>78<br>75 |     | dBr               |
| SNR <sup>2</sup> - DAC to All Headphone Ports        | Analog Mixer Enabled, 10K $\Omega$ load, PCM data                 | 5V<br>4.75V<br>3.3V | 88<br>86<br>83 | 90<br>88<br>85 |     | dB                |
| THD+N <sup>3</sup> - DAC to All Headphone Ports      | Analog Mixer Enabled, -1dB FS Signal, 10K $\Omega$ load, PCM data | 5V<br>4.75V<br>3.3V | 76<br>74<br>71 | 79<br>77<br>74 |     | dBr               |
| SNR <sup>2</sup> - DAC to All Headphone Ports        | Analog Mixer Enabled, 32 $\Omega$ load, PCM data                  | 5V<br>4.75V<br>3.3V | 86<br>84<br>81 | 89<br>87<br>84 |     | dB                |
| THD+N <sup>3</sup> - DAC to All Headphone Ports      | Analog Mixer Enabled, -1dB FS Signal, 32 $\Omega$ load, PCM data  | 5V<br>4.75V<br>3.3V | 64<br>62<br>59 | 72<br>70<br>67 |     | dBr               |
| Attenuation, Gain Step Size ANALOG                   |                                                                   | All                 | -              | 1.5            | -   | dB                |
| Gain Drift <sup>7</sup>                              |                                                                   | All                 | -              | 100            | -   | ppm/ $^{\circ}$ C |
| <b>Analog to Digital Converter</b>                   |                                                                   |                     |                |                |     |                   |
| Resolution                                           |                                                                   | All                 |                | 24             |     | Bits              |

Table 13. 92HD71B7 5V, 4.75V, and 3.3V Analog Performance Characteristics

| Parameter                                             | Conditions                                                          | AVdd                | Min            | Typ            | Max    | Unit   |
|-------------------------------------------------------|---------------------------------------------------------------------|---------------------|----------------|----------------|--------|--------|
| Dynamic Range <sup>1</sup> , All Analog Inputs to A/D | High Pass Filter Enabled, -60dB FS, No boost                        | 5V<br>4.75V<br>3.3V | 86<br>86<br>80 | 88<br>88<br>85 |        | dB     |
| SNR <sup>2</sup> - All Analog Inputs to A/D           | High Pass Filter enabled                                            | 5V<br>4.75V<br>3.3V | 86<br>86<br>80 | 88<br>88<br>85 |        | dB     |
| THD+N All Analog Inputs to A/D                        | High Pass Filter enabled, -1dB FS signal level                      | 5V<br>4.75V<br>3.3V | 78<br>75<br>65 | 82<br>79<br>71 |        | dBr    |
| THD+N All Analog Inputs to A/D                        | High Pass Filter enabled, -3dB FS signal level                      | 5V<br>4.75V<br>3.3V | 78<br>78<br>65 | 83<br>83<br>73 |        | dBr    |
| Analog Frequency Response <sup>8</sup>                |                                                                     | All                 | 10             | -              | 30,000 | Hz     |
| A/D Digital Filter Pass Band <sup>4</sup>             |                                                                     | All                 | 20             | -              | 21,000 | Hz     |
| A/D Digital Filter Transition Band                    |                                                                     | All                 | 21,000         | -              | 31,000 | Hz     |
| A/D Digital Filter Stop Band                          |                                                                     | All                 | 31,000         | -              | -      | Hz     |
| A/D Digital Filter Stop Band Rejection <sup>5</sup>   |                                                                     | All                 | -100           | -90            | -      | dB     |
| Group Delay                                           | 48 KHz sample rate                                                  | All                 | -              | -              | 1      | ms     |
| Any unselected analog Input to ADC Crosstalk          | 10KHz Signal Frequency<br>VREF_OUT=80%, BOOST=0dB                   | All                 | -65            | -80            | -      | dB     |
| Any unselected analog Input to ADC Crosstalk          | 1KHz Signal Frequency<br>VREF_OUT=80%, BOOST=0dB                    | All                 | -65            | -85            | -      | dB     |
| ADC L/R crosstalk                                     | Any selected input to ADC 20-15Khz                                  | All                 | -65            | -73            |        | dB     |
| DAC to ADC crosstalk                                  | Any DAC output to ADC 20-15Khz<br>VREF_OUT=80%, BOOST=0dB, 32Ω load | All                 | -65            | -78            |        | dB     |
| Spurious Tone Rejection <sup>9</sup>                  |                                                                     | All                 | -              | -100           | -      | dB     |
| Attenuation, Gain Step Size (analog)                  |                                                                     | All                 | -              | 1.5            | -      | dB     |
| Gain Drift                                            |                                                                     | All                 | -              | 100            | -      | ppm/°C |
| Interchannel Gain Mismatch ADC                        |                                                                     | All                 | -              | -              | 0.5    | dB     |
| 40dB Mic Boost Enabled SNR                            | 5mV Input                                                           | All                 |                | 60             |        | dB     |
| 40dB Mic Boost Enabled THD+N                          | 5mV Input                                                           | All                 |                | 55             |        | dB     |
| <b>Power Supply<sup>10</sup></b>                      |                                                                     |                     |                |                |        |        |
| Power Supply Rejection Ratio                          | 10kHz                                                               | All                 | -              | -60            | -      | dB     |
| Power Supply Rejection Ratio                          | 1kHz                                                                | All                 | -              | -70            | -      | dB     |
| D0 Didd (Stereo Stream)                               | 3.3V                                                                |                     | -              | 43             | -      | mA     |
| D0 Aidd (Stereo Stream)                               | 5.0V, 4.75V, & 3.3V                                                 |                     | -              | 31             | -      | mA     |

Table 13. 92HD71B7 5V, 4.75V, and 3.3V Analog Performance Characteristics

| Parameter                                  | Conditions                       | AVdd | Min | Typ            | Max | Unit |
|--------------------------------------------|----------------------------------|------|-----|----------------|-----|------|
| D0 Didd<br>(All converters/ports enabled)  | 3.3V                             |      | -   | 39             | -   | mA   |
| D0 Aidd<br>(All converters/ports enabled)  | 5.0V, 4.75V, & 3.3V              |      | -   | 53             | -   | mA   |
| D1 Didd                                    | 3.3V                             |      | -   | 13             | -   | mA   |
| D1 Aidd                                    | 5.0V, 4.75V, & 3.3V              |      | -   | 25             | -   | mA   |
| D2 Didd                                    | 3.3V                             |      | -   | 13             | -   | mA   |
| D2 Aidd                                    | 5.0V, 4.75V, & 3.3V              |      | -   | 18             | -   | mA   |
| D3 Didd                                    | 3.3V                             |      | -   | 10             | -   | mA   |
| D3 Aidd                                    | 5.0V, 4.75V, & 3.3V              |      | -   | 8              | -   | mA   |
| <b>Voltage Reference Outputs</b>           |                                  |      |     |                |     |      |
| VREFOut <sup>11</sup>                      |                                  | All  | -   | 0.5 X<br>AVdd  | -   | V    |
| VREFILT (VAG)                              |                                  | All  |     | 0.45 X<br>AVdd |     | V    |
| <b>Phased Locked Loop</b>                  |                                  |      |     |                |     |      |
| PLL lock time                              |                                  | All  |     | 96             | 200 | usec |
| PLL (or Azalia Bit CLK) 24MHz clock jitter |                                  | All  |     | 150            | 500 | psec |
| <b>ESD / Latchup</b>                       |                                  |      |     |                |     |      |
| Latch-up                                   | As described in JESD78A Class II | All  |     | 70             |     | degC |
| ESD - Human Body Model                     | As described in JESD22-A114-B    | All  | 2K  | 3K             |     | V    |
| Charged Device Model                       | As described in JESD22-C101      | All  | 500 | 1K             |     | V    |

1. Dynamic Range is the ratio of the full scale signal to the noise output with a -60dBFS signal as defined in AES17 as SNR in the presence of signal and outlined in AES6id, measured "A weighted" over 20 Hz to 20 kHz bandwidth.

2. Ratio of Full Scale signal to idle channel noise output is measured "A weighted" over a 20 Hz to a 20 kHz bandwidth. (AES17-1991 Idle Channel Noise or EIAJ CP-307 Signal-to-noise Ratio).

3. THD+N ratio as defined in AES17 and outlined in AES6id, non-weighted, over 20 Hz to 20 kHz bandwidth. Results at the jack are dependent on external components and will likely be 1 - 2dB worse.

4. Peak-to-Peak Ripple over Passband meets  $\pm 0.125$ dB limits, 48 kHz or 44.1 kHz Sample Frequency. 1dB limit.

5. Stop Band rejection determines filter requirements. Out-of-Band rejection determines audible noise.

6. The integrated Out-of-Band noise generated by the DAC process, during normal PCM audio playback, over a bandwidth 28.8 to 100 kHz, with respect to a 1 Vrms DAC output.

7. Gain drift is the change in analog volume control gain for each step across the supported 0 °C TO 70 °C temperature range referenced to the 25 °C gain value and specified in ppm per °C

8.  $\pm 1$ dB limits for Line Output & 0 dB gain, at -20dBV

9. Spurious tone rejection is tested with ADC dither enabled and compared to ADC performance without dither.

10. Does not include 32 $\Omega$  load headphone power.

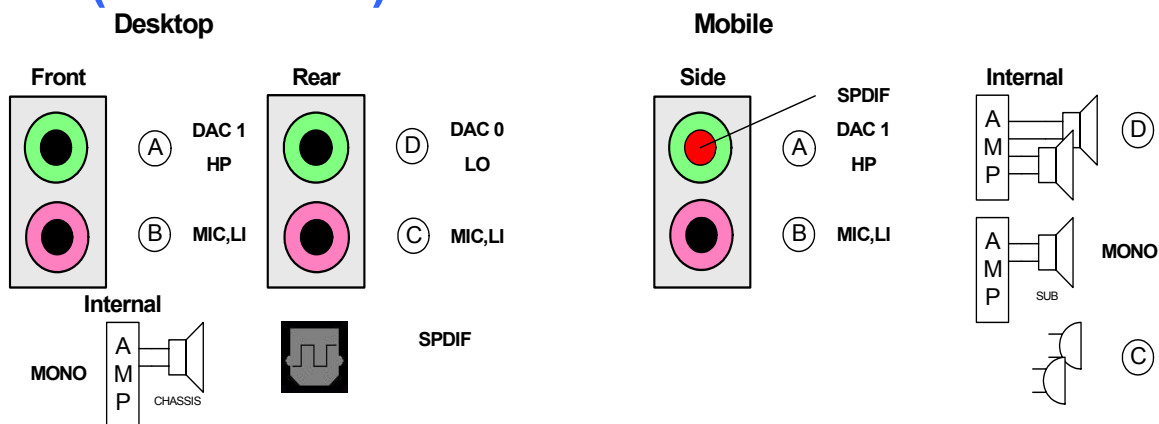
11. Can be set to 0.5 or 0.8 AVdd.

### 3. PORT CONFIGURATIONS

Figure 9. Port Configurations

## 92HD71B5

## 4-port (2 out / 2 in)



## 4. FUNCTIONAL BLOCK DIAGRAM

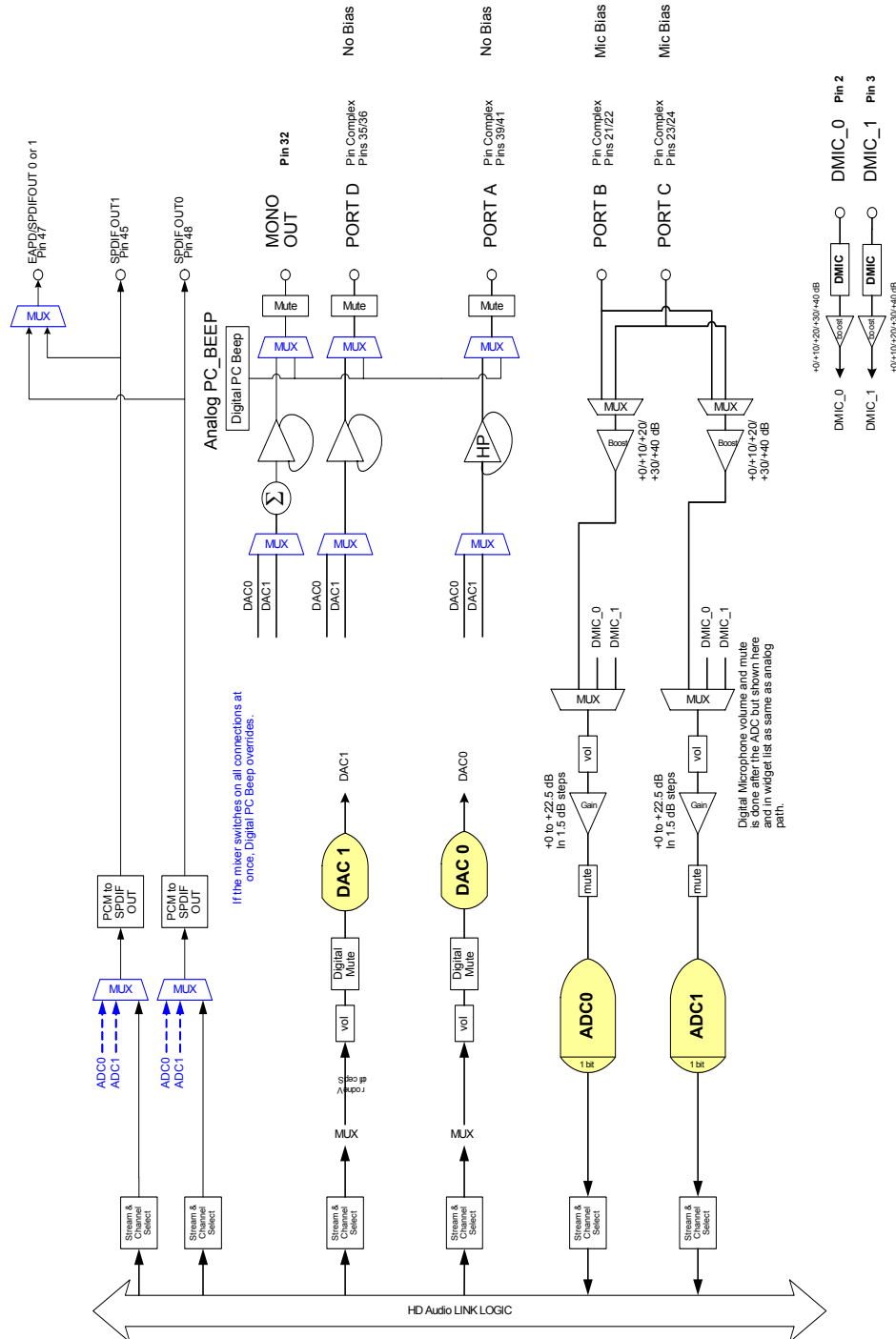


Figure 10. 92HD71B5 Functional Block Diagram

## 5. WIDGET INFORMATION AND SUPPORTED COMMAND VERBS

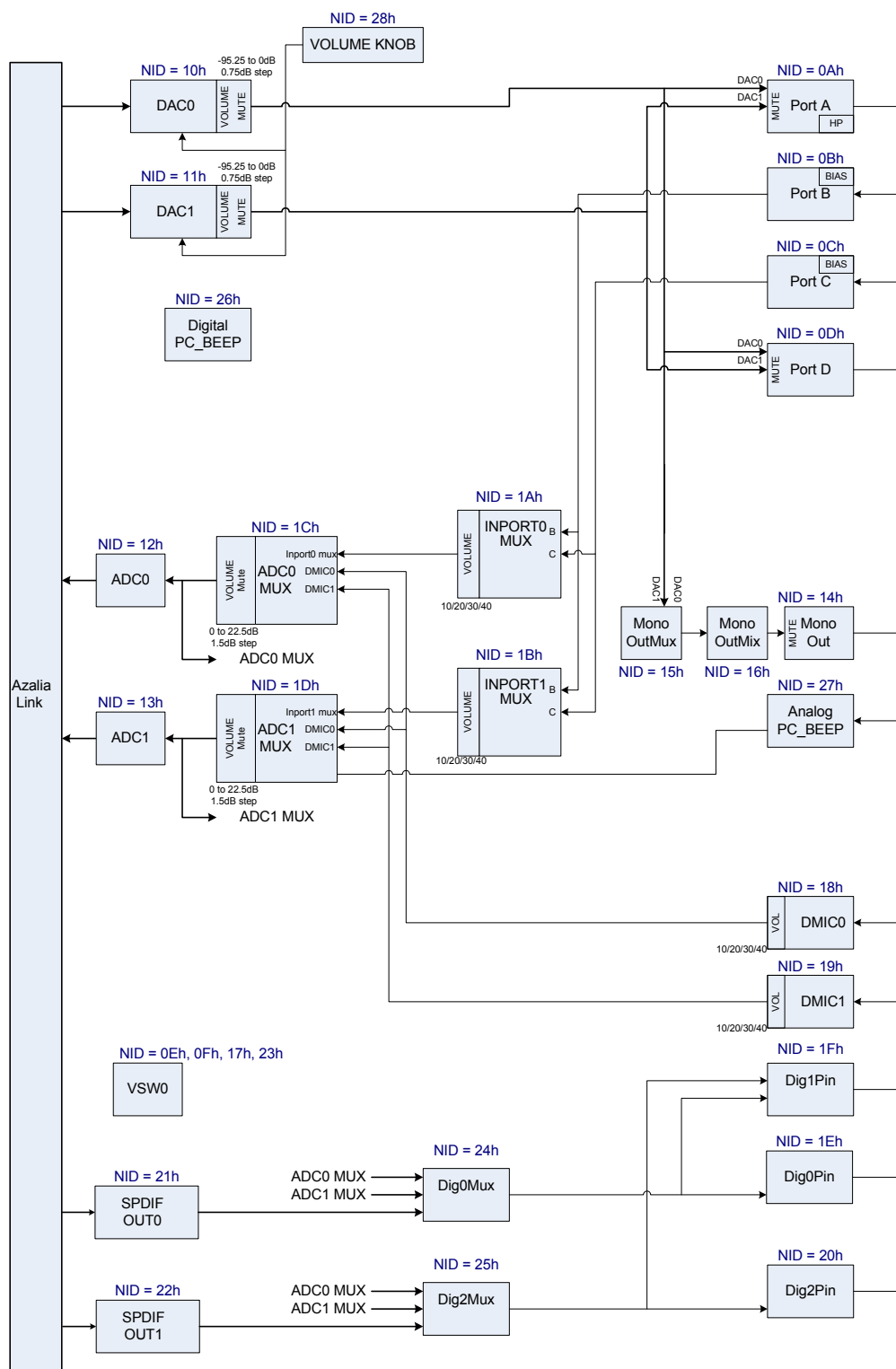


Figure 11. 92HD71B5 Widget Diagram

## 5.1. Widget List 92HD71B5

Table 14. High Definition Audio Widget

| ID  | Widget Name     | Description                                      |
|-----|-----------------|--------------------------------------------------|
| 00h | Root            | Root Node                                        |
| 01h | AFG             | Audio Function Group                             |
| 0Ah | Port A          | Port A Pin Widget (Configurable as HP, Line Out) |
| 0Bh | Port B          | Port B Pin Widget (Configurable as Line In, Mic) |
| 0Ch | Port C          | Port C Pin Widget (Configurable as Line In, Mic) |
| 0Dh | Port D          | Port D Pin Widget (Configurable as Line Out)     |
| 0Eh | Vendor Reserved | Vendor Reserved                                  |
| 0Fh | Vendor Reserved | Vendor Reserved                                  |
| 10h | DAC0            | Stereo Output Converter to DAC                   |
| 11h | DAC1            | Stereo Output Converter to DAC                   |
| 12h | ADC0            | Stereo Input Converter to ADC                    |
| 13h | ADC1            | Stereo Input Converter to ADC                    |
| 14h | Port MonoOut    | Port MonoOut Pin Widget (output only)            |
| 15h | MonoOutMux      | Mono output source selector                      |
| 16h | MonoOutMix      | Port MonoOut Mixer                               |
| 17h | Vendor Reserved | Vendor Reserved                                  |
| 18h | DigMic0         | Digital Microphone 0 Pin Widget                  |
| 19h | DigMic1         | Digital Microphone 1 Pin Widget                  |
| 1Ah | InPort0Mux      | Input port pre-select for ADC0                   |
| 1Bh | InPort1Mux      | input port pre-select for ADC1                   |
| 1Ch | ADC0Mux         | ADC0 Mux with volume and mute                    |
| 1Dh | ADC1Mux         | ADC1 Mux with volume and mute                    |
| 1Eh | Dig0Pin         | Digital Output Pin (pin48)                       |
| 1Fh | Dig1Pin         | EAPD and tertiary Digital Output Pin (pin 47)    |
| 20h | Dig2Pin         | Secondary Digital Output Pin (Pin 45)            |
| 21h | SPDIFOut0       | Stereo Output for SPDIF_Out                      |
| 22h | SPDIFOut1       | Second Stereo Output for SPDIF_Out               |
| 23h | Vendor Reserved | Vendor Reserved                                  |
| 24h | Dig0Mux         | Digital Output mux for Dig0Pin                   |
| 25h | Dig2Mux         | Digital Output Mux for Dig2Pin                   |
| 26h | PCBeep          | Digital PC Beep                                  |
| 27h | AnalogBeep      | Analog PC Beep Input Pin                         |
| 28h | ExtVolume       | External Volume Control                          |

## 6. PIN CONFIGURATION DEFAULT REGISTER SETTINGS

The configuration default registers are 32-bit registers required for each pin widget. These registers are normally used by the CODEC driver to determine the configuration of jacks and devices attached to the CODEC. When the CODEC is powered on, these registers are loaded with the default values provided by IDT for typical system usage, and are loaded in a way that is compatible with the Microsoft Universal Audio Architecture (UAA) driver. The values can be overridden by IDT customers according to their system configuration. Table 15 shows the Pin Widget Configuration Default settings.

**Table 15. Pin Configuration Default Settings**

| Pin Name           | Port                | Location               | Device               | Connection       | Color      | Misc                   | Assoc. | Seq |
|--------------------|---------------------|------------------------|----------------------|------------------|------------|------------------------|--------|-----|
| PortAPin           | Connect to Jack 00b | Mainboard Front 2h     | HP Out 2h            | 1/8 inch Jack 1h | Green 4h   | Jack Detect Override=0 | 3h     | 0h  |
| PortBPin           | Connect to Jack 00b | Mainboard Front 2h     | Mic In Ah            | 1/8 inch Jack 1h | Pink 9h    | Jack Detect Override=0 | 4h     | 0h  |
| PortCPin           | Connect to Jack 00b | Mainboard Rear 1h      | Mic In Ah            | 1/8 inch Jack 1h | Pink 9h    | Jack Detect Override=0 | 2h     | 0h  |
| PortDPin           | Connect to Jack 00b | Mainboard Rear 1h      | Line Out 0h          | 1/8 inch Jack 1h | Green 4h   | Jack Detect Override=0 | 1h     | 0h  |
| MonoOutPin         | Not Connected 01b   | NA 000000b             | Other Fh             | Unknown 0h       | Unknown 0h | Jack Detect Override=0 | Fh     | 0h  |
| DigOutPin0         | Connect to Jack 00b | Mainboard Rear 000001b | SPDIF Out 4h         | optical 5h       | Gray 2h    | Jack Detect Override=0 | 5h     | 0h  |
| DigOutPin1         | Connect to Jack 10b | Internal 011000b       | Digital Other Out 5h | Other Digital 6h | Unknown 0h | Jack Detect Override=0 | 6h     | 0h  |
| DigOutPin2         | Not Connected 01b   | NA 000000b             | Other Fh             | Unknown 0h       | Unknown 0h | Jack Detect Override=0 | Fh     | 0h  |
| DigMic0Pin         | Not Connected 01b   | NA 000000b             | Other Fh             | Unknown 0h       | Unknown 0h | Jack Detect Override=0 | Fh     | 0h  |
| DigMic1Pin         | Not Connected 01b   | NA 000000b             | Other Fh             | Unknown 0h       | Unknown 0h | Jack Detect Override=0 | Fh     | 0h  |
| Analog PC_BEEP Pin | Not Connected 01b   | NA 000000b             | Other Fh             | Unknown 0h       | Unknown 0h | Jack Detect Override=0 | Fh     | 0h  |

## 7. WIDGET INFORMATION

**Table 16. Command Format for Verb with 4-bit Identifier**

| Bits [39:32] | Bits [31:28]  | BITS [27:20] | BITS[19:16]     | BITS [15:0]           |
|--------------|---------------|--------------|-----------------|-----------------------|
| Reserved     | CODEC Address | NID          | Verb ID (4-bit) | Payload Data (16-bit) |

**Table 17. Command Format for Verb with 12-bit Identifier**

| Bits [39:32] | Bits [31:28]  | BITS [27:20] | BITS[19:8]       | BITS [7:0]           |
|--------------|---------------|--------------|------------------|----------------------|
| Reserved     | CODEC Address | NID          | Verb ID (12-bit) | Payload Data (8-bit) |

There are two types of responses: Solicited and Unsolicited. Solicited responses are provided as a direct response to an issued command and will be provided in the frame immediately following the command. Unsolicited responses are provided by the CODEC independent of any command. Unsolicited responses are the result of CODEC events such as a jack insertion detection. The formats for Solicited Responses and Unsolicited Responses are shown in Tables 18 and 19 respectively. The “Tag” field in bits [31:28] of the Unsolicited Response identify the event.

**Table 18. Solicited Response Format**

| Bit [35]          | Bit [34]  | BITS [33:32] | BITS[31:0] |
|-------------------|-----------|--------------|------------|
| Valid (Valid = 1) | UnSol = 0 | Reserved     | Response   |

**Table 19. Unsolicited Response Format**

| Bit [35]          | Bit [34]  | BITS [33:32] | BITS[31:28] | BITS [27:0] |
|-------------------|-----------|--------------|-------------|-------------|
| Valid (Valid = 1) | UnSol = 1 | Reserved     | Tag         | Response    |

## 8. SUPPORTED VERBS AND COMMANDS

### 8.1. Root Node (NID = 00)

)

#### 8.1.1. Root VendorID

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 00      | See bitfield table. |

##### 8.1.1.1. Root VendorID

| Bit      | Bitfield Name | RW | Reset | Description        |
|----------|---------------|----|-------|--------------------|
| [31.:16] | Vendor        | R  | 111D  | Vendor ID.         |
| [15.:8]  | DeviceFix     | R  | 76    | Device ID = 76B6h. |
| [7.:0]   | DeviceProg    | R  | 40    | Device ID = 76B6h. |

#### 8.1.2. Root RevID

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 02      | See bitfield table. |

##### 8.1.2.1. Root RevID

| Bit      | Bitfield Name | RW | Reset | Description                            |
|----------|---------------|----|-------|----------------------------------------|
| [31.:24] | Rsvd          | R  | 00    | Reserved.                              |
| [23.:20] | Major         | R  | 1     | Compliant HDAudio spec major revision. |
| [19.:16] | Minor         | R  | 0     | Compliant HDAudio spec minor revision  |
| [15.:12] | RevisionFix   | R  | 0     | Vendors rev number for this device.    |
| [11.:8]  | RevisionProg  | R  | 1     | Vendors rev number for this device.    |
| [7.:4]   | SteppingFix   | R  | 0     | Vendor RevID.                          |
| [3.:0]   | SteppingProg  | R  | 1     | Vendor RevID.                          |

8.1.2.2. *Root NodeInfo*

| Bit      | Bitfield Name | RW | Reset | Description                                        |
|----------|---------------|----|-------|----------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                          |
| [23.:16] | StartNID      | R  | 01    | Starting node number (NID) of first function group |
| [15.:8]  | Rsvd1         | R  | 00    | Reserved.                                          |
| [7.:0]   | TotalNodes    | R  | 01    | Total number of nodes                              |

## 8.2. AFG Node (NID = 01)

)

8.2.1. *AFG Reset*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get |         |         | See bitfield table. |

8.2.1.1. *AFG Reset*

| Bit     | Bitfield Name | RW | Reset  | Description     |
|---------|---------------|----|--------|-----------------|
| [31.:8] | Rsvd1         | R  | 000000 | Reserved.       |
| [7.:0]  | Execute       | W  | 00     | Function Reset. |

8.2.2. *AFG NodeInfo*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 04      | See bitfield table. |

8.2.2.1. *AFG NodeInfo*

| Bit      | Bitfield Name | RW | Reset | Description                                                |
|----------|---------------|----|-------|------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                  |
| [23.:16] | StartNID      | R  | 0A    | Starting node number for function group subordinate nodes. |

**8.2.2.1. AFG NodeInfo**

| Bit     | Bitfield Name | RW | Reset | Description            |
|---------|---------------|----|-------|------------------------|
| [15..8] | Rsvd1         | R  | 00    | Reserved.              |
| [7..0]  | TotalNodes    | R  | 1F    | Total number of nodes. |

**8.2.3. AFG FGType**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 05      | See bitfield table. |

**8.2.3.1. AFG FGType**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                                                                                   |
|---------|---------------|----|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..9] | Rsvd          | R  | 000000 | Reserved.                                                                                                                                                                     |
| [8]     | UnSol         | R  | 1      | Unsolicited response supported: 1 = yes<br>0 = no.                                                                                                                            |
| [7..0]  | NodeType      | R  | 1      | Function group type: 00h = Reserved;<br>01h = Audio Function Group; 02h = Vendor Defined Modem Function Group;<br>03h-7Fh = Reserved; 80h-FFh = Vendor Defined Function Group |

**8.2.4. AFG AFGCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 08      | See bitfield table. |

**8.2.4.1. AFG AFGCap**

| Bit      | Bitfield Name | RW | Reset | Description                             |
|----------|---------------|----|-------|-----------------------------------------|
| [31..17] | Rsvd3         | R  | 00    | Reserved.                               |
| [16]     | BeepGen       | R  | 1     | Beep generator present: 1 = yes 0 = no. |
| [15..12] | Rsvd2         | R  | 0     | Reserved.                               |

## 8.2.4.1. AFG AFGCap

| Bit     | Bitfield Name | RW | Reset | Description                                                                                                                                                                              |
|---------|---------------|----|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [11..8] | InputDelay    | R  | D     | Typical latency in frames. Number of samples between when the sample is received as an analog signal at the pin and when the digital representation is transmitted on the HD Audio link. |
| [7..4]  | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                |
| [3..0]  | OutputDelay   | R  | D     | Typical latency in frames. Number of samples between when the signal is received from the HD Audio link and when it appears as an analog signal at the pin.                              |

## 8.2.5. AFG PCMCap

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0A      | See bitfield table. |

## 8.2.5.1. AFG PCMCap

| Bit      | Bitfield Name | RW | Reset | Description                                  |
|----------|---------------|----|-------|----------------------------------------------|
| [31..21] | Rsvd2         | R  | 000   | Reserved.                                    |
| [20]     | B32           | R  | 0     | 32 bit audio format support: 1 = yes 0 = no. |
| [19]     | B24           | R  | 1     | 24 bit audio format support: 1 = yes 0 = no. |
| [18]     | B20           | R  | 1     | 20 bit audio format support: 1 = yes 0 = no. |
| [17]     | B16           | R  | 1     | 16 bit audio format support: 1 = yes 0 = no. |
| [16]     | B8            | R  | 0     | 8 bit audio format support: 1 = yes 0 = no.  |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                    |
| [11]     | R12           | R  | 0     | 384kHz rate support: 1 = yes 0 = no.         |

8.2.5.1. *AFG PCMCap*

| Bit  | Bitfield Name | RW | Reset | Description                             |
|------|---------------|----|-------|-----------------------------------------|
| [10] | R11           | R  | 1     | 192kHz rate support: 1 = yes 0 = no.    |
| [9]  | R10           | R  | 1     | 176.4kHz rate support: 1 = yes 0 = no.  |
| [8]  | R9            | R  | 1     | 96kHz rate support: 1 = yes 0 = no.     |
| [7]  | R8            | R  | 1     | 88.2kHz rate support: 1 = yes 0 = no.   |
| [6]  | R7            | R  | 1     | 48kHz rate support: 1 = yes 0 = no.     |
| [5]  | R6            | R  | 1     | 44.1kHz rate support: 1 = yes 0 = no.   |
| [4]  | R5            | R  | 0     | 32kHz rate support: 1 = yes 0 = no.     |
| [3]  | R4            | R  | 0     | 22.05kHz rate support: 1 = yes 0 = no.  |
| [2]  | R3            | R  | 0     | 16kHz rate support: 1 = yes 0 = no.     |
| [1]  | R2            | R  | 0     | 11.025kHz rate support: 1 = yes 0 = no. |
| [0]  | R1            | R  | 0     | 8kHz rate support: 1 = yes 0 = no.      |

8.2.6. *AFG StreamCap*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0B      | See bitfield table. |

8.2.6.1. *AFG StreamCap*

| Bit     | Bitfield Name | RW | Reset    | Description                                     |
|---------|---------------|----|----------|-------------------------------------------------|
| [31..3] | Rsvd          | R  | 00000000 | Reserved.                                       |
| [2]     | AC3           | R  | 0        | AC-3 formatted data support: 1 = yes 0 = no.    |
| [1]     | Float32       | R  | 0        | Float32 formatted data support: 1 = yes 0 = no. |
| [0]     | PCM           | R  | 1        | PCM-formatted data support: 1 = yes 0 = no.     |

**8.2.7. AFG InAmpCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0D      | See bitfield table. |

**8.2.7.1. AFG InAmpCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                   |
|----------|---------------|----|-------|-------------------------------------------------------------------------------|
| [31]     | Mute          | R  | 1     | Mute support: 1 = yes 0 = no.                                                 |
| [30.:23] | Rsvd3         | R  | 00    | Reserved.                                                                     |
| [22.:16] | StepSize      | R  | 00    | Size of each step in the gain range: 0 to 127 = .25dB to 32dB in .25dB steps. |
| [15]     | Rsvd2         | R  | 0     | Reserved.                                                                     |
| [14.:8]  | NumSteps      | R  | 00    | Number of gains steps (number of possible settings - 1).                      |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                     |
| [6.:0]   | Offset        | R  | 00    | Indicates which step is 0dB                                                   |

**8.2.8. AFG PwrStateCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0F      | See bitfield table. |

**8.2.8.1. AFG PwrStateCap**

| Bit     | Bitfield Name | RW | Reset   | Description                             |
|---------|---------------|----|---------|-----------------------------------------|
| [31.:4] | Rsvd          | R  | 0000000 | Reserved.                               |
| [3]     | D3Sup         | R  | 1       | D3 power state support: 1 = yes 0 = no. |
| [2]     | D2Sup         | R  | 1       | D2 power state support: 1 = yes 0 = no. |
| [1]     | D1Sup         | R  | 1       | D1 power state support: 1 = yes 0 = no. |
| [0]     | D0Sup         | R  | 1       | D0 power state support: 1 = yes 0 = no. |

**8.2.9. AFG GPIOCnt**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 11      | See bitfield table. |

**8.2.9.1. AFG GPIOCnt**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                              |
|----------|---------------|----|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31]     | GPIWake       | R  | 1     | Wake capability. Assuming the Wake Enable Mask controls are enabled GPIOs configured as inputs can cause a wake (generate a Status Change event on the link) when there is a change in level on the pin. |
| [30]     | GPIUnsol      | R  | 1     | GPIO unsolicited response support: 1 = yes 0 = no.                                                                                                                                                       |
| [29.:24] | Rsvd          | R  | 00    | Reserved.                                                                                                                                                                                                |
| [23.:16] | NumGPIs       | R  | 00    | Number of GPI pins supported by function group.                                                                                                                                                          |
| [15.:8]  | NumGPOs       | R  | 00    | Number of GPO pins supported by function group.                                                                                                                                                          |
| [7.:0]   | NumGPIOs      | R  | 08    | Number of GPIO pins supported by function group.                                                                                                                                                         |

**8.2.10. AFG OutAmpCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 12      | See bitfield table. |

**8.2.10.1. AFG OutAmpCap**

| Bit      | Bitfield Name | RW | Reset | Description                   |
|----------|---------------|----|-------|-------------------------------|
| [31]     | Mute          | R  | 1     | Mute support: 1 = yes 0 = no. |
| [30.:23] | Rsvd3         | R  | 00    | Reserved.                     |

**8.2.10.1. AFG OutAmpCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                   |
|----------|---------------|----|-------|-------------------------------------------------------------------------------|
| [22..16] | StepSize      | R  | 02    | Size of each step in the gain range: 0 to 127 = .25dB to 32dB in .25dB steps. |
| [15]     | Rsvd2         | R  | 0     | Reserved.                                                                     |
| [14..8]  | NumSteps      | R  | 7F    | Number of gains steps (number of possible settings - 1).                      |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                     |
| [6..0]   | Offset        | R  | 7F    | Indicates which step is 0dB                                                   |

**8.2.11. AFG PwrState**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F05     | 00      | See bitfield table. |

**8.2.11.1. AFG PwrState**

| Bit     | Bitfield Name | RW | Reset   | Description                                  |
|---------|---------------|----|---------|----------------------------------------------|
| [31..6] | Rsvd2         | R  | 0000000 | Reserved.                                    |
| [5..4]  | Act           | R  | 3       | Actual power state of this widget.           |
| [3..2]  | Rsvd1         | R  | 0       | Reserved.                                    |
| [1..0]  | Set           | RW | 3       | Current power state setting for this widget. |

**8.2.12. AFG UnsolResp**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F08     | 00      | See bitfield table. |

## 8.2.12.1. AFG UnsolResp

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                        |
|---------|---------------|----|--------|--------------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                                                                                                          |
| [7]     | En            | RW | 0      | Unsolicited response enable: 1 = enabled 0 = disabled.                                                             |
| [6]     | Rsvd1         | R  | 0      | Reserved.                                                                                                          |
| [5..0]  | Tag           | RW | 00     | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

## 8.2.13. AFG GPIO

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F15     | 00      | See bitfield table. |

## 8.2.13.1. AFG GPIO

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                                                                                               |
|---------|---------------|----|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                                                                                                                 |
| [7]     | Data7         | RW | 0      | Data for GPIO7. If this GPIO bit is configured as Sticky (edge-sensitive) input it can be cleared by writing "0". For details of read back value refer to HD Audio spec. section 7.3.3.22 |
| [6]     | Data6         | RW | 0      | Data for GPIO6. If this GPIO bit is configured as Sticky (edge-sensitive) input it can be cleared by writing "0". For details of read back value refer to HD Audio spec. section 7.3.3.22 |
| [5]     | Data5         | RW | 0      | Data for GPIO5. If this GPIO bit is configured as Sticky (edge-sensitive) input it can be cleared by writing "0". For details of read back value refer to HD Audio spec. section 7.3.3.22 |

**8.2.13.1. AFG GPIO**

| Bit | Bitfield Name | RW | Reset | Description                                                                                                                                                                               |
|-----|---------------|----|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [4] | Data4         | RW | 0     | Data for GPIO4. If this GPIO bit is configured as Sticky (edge-sensitive) input it can be cleared by writing "0". For details of read back value refer to HD Audio spec. section 7.3.3.22 |
| [3] | Data3         | RW | 0     | Data for GPIO3. If this GPIO bit is configured as Sticky (edge-sensitive) input it can be cleared by writing "0". For details of read back value refer to HD Audio spec. section 7.3.3.22 |
| [2] | Data2         | RW | 0     | Data for GPIO2. If this GPIO bit is configured as Sticky (edge-sensitive) input it can be cleared by writing "0". For details of read back value refer to HD Audio spec. section 7.3.3.22 |
| [1] | Data1         | RW | 0     | Data for GPIO1. If this GPIO bit is configured as Sticky (edge-sensitive) input it can be cleared by writing "0". For details of read back value refer to HD Audio spec. section 7.3.3.22 |
| [0] | Data0         | RW | 0     | Data for GPIO0. If this GPIO bit is configured as Sticky (edge-sensitive) input it can be cleared by writing "0". For details of read back value refer to HD Audio spec. section 7.3.3.22 |

**8.2.14. AFG GPIOEn**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F16     | 00      | See bitfield table. |

**8.2.14.1. AFG GPIOEn**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                           |
|---------|---------------|----|--------|-----------------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                                             |
| [7]     | Mask7         | RW | 0      | Enable for GPIO7: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |
| [6]     | Mask6         | RW | 0      | Enable for GPIO6: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |
| [5]     | Mask5         | RW | 0      | Enable for GPIO5: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |
| [4]     | Mask4         | RW | 0      | Enable for GPIO4: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |
| [3]     | Mask3         | RW | 0      | Enable for GPIO3: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |
| [2]     | Mask2         | RW | 0      | Enable for GPIO2: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |
| [1]     | Mask1         | RW | 0      | Enable for GPIO1: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |
| [0]     | Mask0         | RW | 0      | Enable for GPIO0: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |

**8.2.15. AFG GPIODir**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F17     | 00      | See bitfield table. |

**8.2.15.1. AFG GPIODir**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | Control7      | RW | 0      | Direction control for GPIO7: 0 = GPIO is configured as input; 1 = GPIO is configured as output |
| [6]     | Control6      | RW | 0      | Direction control for GPIO6: 0 = GPIO is configured as input; 1 = GPIO is configured as output |
| [5]     | Control5      | RW | 0      | Direction control for GPIO5: 0 = GPIO is configured as input; 1 = GPIO is configured as output |
| [4]     | Control4      | RW | 0      | Direction control for GPIO4: 0 = GPIO is configured as input; 1 = GPIO is configured as output |
| [3]     | Control3      | RW | 0      | Direction control for GPIO3: 0 = GPIO is configured as input; 1 = GPIO is configured as output |
| [2]     | Control2      | RW | 0      | Direction control for GPIO2: 0 = GPIO is configured as input; 1 = GPIO is configured as output |
| [1]     | Control1      | RW | 0      | Direction control for GPIO1: 0 = GPIO is configured as input; 1 = GPIO is configured as output |
| [0]     | Control0      | RW | 0      | Direction control for GPIO0: 0 = GPIO is configured as input; 1 = GPIO is configured as output |

**8.2.16. AFG GPIOWakeEn**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F18     | 00      | See bitfield table. |

## 8.2.16.1. AFG GPIOWakeEn

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                                                                                             |
|---------|---------------|----|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                                                                                                               |
| [7]     | W7            | RW | 0      | Wake enable for GPIO7: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted) a wake-up event will trigger a Status Change Request event on the link. |
| [6]     | W6            | RW | 0      | Wake enable for GPIO6: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted) a wake-up event will trigger a Status Change Request event on the link. |
| [5]     | W5            | RW | 0      | Wake enable for GPIO5: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted) a wake-up event will trigger a Status Change Request event on the link. |
| [4]     | W4            | RW | 0      | Wake enable for GPIO4: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted) a wake-up event will trigger a Status Change Request event on the link. |
| [3]     | W3            | RW | 0      | Wake enable for GPIO3: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted) a wake-up event will trigger a Status Change Request event on the link. |
| [2]     | W2            | RW | 0      | Wake enable for GPIO2: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted) a wake-up event will trigger a Status Change Request event on the link. |

## 8.2.16.1. AFG GPIOWakeEn

| Bit | Bitfield Name | RW | Reset | Description                                                                                                                                                                             |
|-----|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [1] | W1            | RW | 0     | Wake enable for GPIO1: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted) a wake-up event will trigger a Status Change Request event on the link. |
| [0] | W0            | RW | 0     | Wake enable for GPIO0: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted) a wake-up event will trigger a Status Change Request event on the link. |

## 8.2.17. AFG GPIOUnsol

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F19     | 00      | See bitfield table. |

## 8.2.17.1. AFG GPIOUnsol

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                                                                                                               |
|---------|---------------|----|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                                                                                                                                 |
| [7]     | EnMask7       | RW | 0      | Unsolicited enable mask for GPIO7. If set and the Unsolicited Response control for this widget has been enabled an unsolicited response will be sent when GPIO2 is configured as input and changes state. |
| [6]     | EnMask6       | RW | 0      | Unsolicited enable mask for GPIO6. If set and the Unsolicited Response control for this widget has been enabled an unsolicited response will be sent when GPIO2 is configured as input and changes state. |

## 8.2.17.1. AFG GPIOUnsol

| Bit | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|-----|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [5] | EnMask5       | RW | 0     | Unsolicited enable mask for GPIO5. If set and the Unsolicited Response control for this widget has been enabled an unsolicited response will be sent when GPIO2 is configured as input and changes state. |
| [4] | EnMask4       | RW | 0     | Unsolicited enable mask for GPIO4. If set and the Unsolicited Response control for this widget has been enabled an unsolicited response will be sent when GPIO2 is configured as input and changes state. |
| [3] | EnMask3       | RW | 0     | Unsolicited enable mask for GPIO3. If set and the Unsolicited Response control for this widget has been enabled an unsolicited response will be sent when GPIO2 is configured as input and changes state. |
| [2] | EnMask2       | RW | 0     | Unsolicited enable mask for GPIO2. If set and the Unsolicited Response control for this widget has been enabled an unsolicited response will be sent when GPIO2 is configured as input and changes state. |
| [1] | EnMask1       | RW | 0     | Unsolicited enable mask for GPIO1. If set and the Unsolicited Response control for this widget has been enabled an unsolicited response will be sent when GPIO1 is configured as input and changes state. |
| [0] | EnMask0       | RW | 0     | Unsolicited enable mask for GPIO0. If set and the Unsolicited Response control for this widget has been enabled an unsolicited response will be sent when GPIO0 is configured as input and changes state. |

**8.2.18. AFG GPIOSticky**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1A     | 00      | See bitfield table. |

**8.2.18.1. AFG GPIOSticky**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                 |
|---------|---------------|----|--------|-------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                                   |
| [7]     | Mask7         | RW | 0      | GPIO7 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |
| [6]     | Mask6         | RW | 0      | GPIO6 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |
| [5]     | Mask5         | RW | 0      | GPIO5 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |
| [4]     | Mask4         | RW | 0      | GPIO4 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |
| [3]     | Mask3         | RW | 0      | GPIO3 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |
| [2]     | Mask2         | RW | 0      | GPIO2 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |
| [1]     | Mask1         | RW | 0      | GPIO1 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |
| [0]     | Mask0         | RW | 0      | GPIO0 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |

**8.2.19. AFG SubID**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F20     | 00      | See bitfield table. |

**8.2.19.1. AFG SubID**

| Bit      | Bitfield Name | RW | Reset | Description                                    |
|----------|---------------|----|-------|------------------------------------------------|
| [31..24] | Subsys3       | RW | 00    | Subsystem ID (byte 3)                          |
| [23..16] | Subsys2       | RW | 00    | Subsystem ID (byte 2)                          |
| [15..8]  | Subsys1       | RW | 01    | Subsystem ID (byte 1)                          |
| [7..0]   | Assembly      | RW | 00    | Assembly ID (Not applicable to codec vendors). |

**8.2.20. AFG GPIOIrty**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F70     | 00      | See bitfield table. |

**8.2.20.1. AFG GPIOIrty**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                                                                                                         |
|---------|---------------|----|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                                                                                                                           |
| [7]     | GP7           | RW | 1      | GPIO7 Polarity: If configured as output or non-sticky input: 0 = inverting; 1 = non-inverting. If configured as sticky input: 0 = falling edges will be detected; 1 = rising edges will be detected |
| [6]     | GP6           | RW | 1      | GPIO6 Polarity: If configured as output or non-sticky input: 0 = inverting; 1 = non-inverting. If configured as sticky input: 0 = falling edges will be detected; 1 = rising edges will be detected |

## 8.2.20.1. AFG GPIOIrty

| Bit | Bitfield Name | RW | Reset | Description                                                                                                                                                                                         |
|-----|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [5] | GP5           | RW | 1     | GPIO5 Polarity: If configured as output or non-sticky input: 0 = inverting; 1 = non-inverting. If configured as sticky input: 0 = falling edges will be detected; 1 = rising edges will be detected |
| [4] | GP4           | RW | 1     | GPIO4 Polarity: If configured as output or non-sticky input: 0 = inverting; 1 = non-inverting. If configured as sticky input: 0 = falling edges will be detected; 1 = rising edges will be detected |
| [3] | GP3           | RW | 1     | GPIO3 Polarity: If configured as output or non-sticky input: 0 = inverting; 1 = non-inverting. If configured as sticky input: 0 = falling edges will be detected; 1 = rising edges will be detected |
| [2] | GP2           | RW | 1     | GPIO2 Polarity: If configured as output or non-sticky input: 0 = inverting; 1 = non-inverting. If configured as sticky input: 0 = falling edges will be detected; 1 = rising edges will be detected |
| [1] | GP1           | RW | 1     | GPIO1 Polarity: If configured as output or non-sticky input: 0 = inverting; 1 = non-inverting. If configured as sticky input: 0 = falling edges will be detected; 1 = rising edges will be detected |
| [0] | GP0           | RW | 1     | GPIO0 Polarity: If configured as output or non-sticky input: 0 = inverting; 1 = non-inverting. If configured as sticky input: 0 = falling edges will be detected; 1 = rising edges will be detected |

## 8.2.21. AFG GPIODrive

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F71     | 00      | See bitfield table. |

## 8.2.21.1. AFG GPIODrive

| Bit     | Bitfield Name | RW | Reset  | Description                                                                            |
|---------|---------------|----|--------|----------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                              |
| [7]     | OD7           | RW | 0      | GPIO7 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open drain (drive 0 float for 1). |
| [6]     | OD6           | RW | 0      | GPIO6 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open drain (drive 0 float for 1). |
| [5]     | OD5           | RW | 0      | GPIO5 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open drain (drive 0 float for 1). |
| [4]     | OD4           | RW | 0      | GPIO4 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open drain (drive 0 float for 1). |
| [3]     | OD3           | RW | 0      | GPIO3 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open drain (drive 0 float for 1). |
| [2]     | OD2           | RW | 0      | GPIO2 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open drain (drive 0 float for 1). |
| [1]     | OD1           | RW | 0      | GPIO1 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open drain (drive 0 float for 1). |
| [0]     | OD0           | RW | 0      | GPIO0 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open-drain (drive 0 float for 1). |

## 8.2.22. AFG DMic

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F78     | 00      | See bitfield table. |

## 8.2.22.1. AFG DMic

| Bit     | Bitfield Name | RW | Reset   | Description                                                                                                                                                                                                                                                                             |
|---------|---------------|----|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..4] | Rsvd          | R  | 0000000 | Reserved.                                                                                                                                                                                                                                                                               |
| [3..2]  | PhAdj         | RW | 0       | Selects what phase of the DMic clock the data should be latched: 0h = left data rising edge/right data falling edge; 1h = left data center of high/right data center of low; 2h = left data falling edge/right data rising edge; 3h = left data center of low/right data center of high |
| [1..0]  | Rate          | RW | 2       | Selects the DMic clock rate: 0h = 4.704MHz; 1h = 3.528MHz; 2h = 2.352MHz; 3h = 1.176MHz.                                                                                                                                                                                                |

## 8.2.23. AFG Misc. (B3 revision and beyond only)

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F7F     | 00      | See bitfield table. |

## 8.2.23.1. AFG Misc. (B3 revision and beyond only)

| Bit      | Bitfield Name | RW | Reset   | Description                                                                                                               |
|----------|---------------|----|---------|---------------------------------------------------------------------------------------------------------------------------|
| [31..11] | Rsvd2         | R  | 0000000 | Reserved.                                                                                                                 |
| [10]     | DMic1Mono     | RW | 0       | Enable Mono Mode for DMIC1<br>0=disable, 1=enable mono mode<br><i>B3 revision and beyond only</i>                         |
| [9]      | DMic0Mono     | RW | 0       | Enable Mono Mode for DMIC0<br>0=disable, 1=enable mono mode<br><i>B3 revision and beyond only</i>                         |
| [8]      | DMicSelect    | RW | 0       | Digital Mic Select<br>0=DMic uses external pins<br>1=Volume knob uses external pins<br><i>B3 revision and beyond only</i> |
| [7..0]   | Rsvd1         | R  | 0000000 | Reserved.                                                                                                                 |

### 8.3. Port A Node (NID = 0A)

#### 8.3.1. PortA WCap

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

##### 8.3.1.1. PortA WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23.:20] | Type          | R  | 4     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnSolCap      | R  | 1     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |

**8.3.1.1. PortA WCap**

| Bit | Bitfield Name | RW | Reset | Description                                               |
|-----|---------------|----|-------|-----------------------------------------------------------|
| [1] | InAmpPrsnt    | R  | 1     | Input amp present: 1 = yes 0 = no.                        |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono). |

**8.3.2. PortA PinCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0C      | See bitfield table. |

**8.3.2.1. PortA PinCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..17] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [16]     | EapdCap       | R  | 0     | EAPD support: 1 = yes 0 = no.                                                                                                                                                                                                                                      |
| [15..8]  | VrefCntrl     | R  | 00    | Vref support: bit 7 = Reserved; bit 6 = Reserved; bit 5 = 100% support (1 = yes 0 = no); bit 4 = 80% support (1 = yes 0 = no); bit 3 = Reserved; bit 2 = GND support (1 = yes 0 = no); bit 1 = 50% support (1 = yes 0 = no); bit 0 = Hi-Z support (1 = yes 0 = no) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6]      | BalancedIO    | R  | 0     | Balanced I/O support: 1 = yes 0 = no.                                                                                                                                                                                                                              |
| [5]      | InCap         | R  | 0     | Input support: 1 = yes 0 = no.                                                                                                                                                                                                                                     |
| [4]      | OutCap        | R  | 1     | Output support: 1 = yes 0 = no.                                                                                                                                                                                                                                    |
| [3]      | HdphDrvCap    | R  | 1     | Headphone amp present: 1 = yes 0 = no.                                                                                                                                                                                                                             |
| [2]      | PresDtctCap   | R  | 1     | Presence detection support: 1 = yes 0 = no.                                                                                                                                                                                                                        |

**8.3.2.1. PortA PinCap**

| Bit | Bitfield Name | RW | Reset | Description                                           |
|-----|---------------|----|-------|-------------------------------------------------------|
| [1] | TrigRqd       | R  | 0     | Trigger required for impedance sense: 1 = yes 0 = no. |
| [0] | ImpSenseCap   | R  | 0     | Impedance sense support: 1 = yes 0 = no.              |

**8.3.3. PortA ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.3.3.1. PortA ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries 0 = short-form (7-bit) NID entries. |
| [6..0]  | ConL          | R  | 03     | Number of NID entries in connection list.                                                      |

**8.3.4. PortA ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.3.4.1. PortA ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description                      |
|----------|---------------|----|-------|----------------------------------|
| [31.:24] | ConL3         | R  | 00    | Unused list entry.               |
| [23.:16] | ConL2         | R  | 17    | InputMixer Summing widget (0x17) |
| [15.:8]  | ConL1         | R  | 11    | DAC1 Converter widget (0x11)     |
| [7.:0]   | ConL0         | R  | 10    | DAC0 Converter widget (0x10)     |

**8.3.5. PortA ConSelectCtrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F01     | 00      | See bitfield table. |

**8.3.5.1. PortA ConSelectCtrl**

| Bit     | Bitfield Name | RW | Reset    | Description                      |
|---------|---------------|----|----------|----------------------------------|
| [31.:2] | Rsvd          | R  | 00000000 | Reserved.                        |
| [1.:0]  | Index         | RW | 0        | Connection select control index. |

**8.3.6. PortA PinWCntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F07     | 00      | See bitfield table. |

**8.3.6.1. PortA PinWCntrl**

| Bit     | Bitfield Name | RW | Reset  | Description                                     |
|---------|---------------|----|--------|-------------------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                                       |
| [7]     | HPhnEn        | RW | 0      | Headphone amp enable: 1 = enabled 0 = disabled. |
| [6]     | OutEn         | RW | 0      | Output enable: 1 = enabled 0 = disabled.        |
| [5..0]  | Rsvd1         | R  | 0      | Reserved.                                       |

**8.3.7. PortA UnsolicitedResp**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F08     | 00      | See bitfield table. |

**8.3.7.1. PortA UnsolicitedResp**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                        |
|---------|---------------|----|--------|--------------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                                                                                                          |
| [7]     | En            | RW | 0      | Unsolicited response enable: 1 = enabled 0 = disabled.                                                             |
| [6]     | Rsvd1         | R  | 0      | Reserved.                                                                                                          |
| [5..0]  | Tag           | RW | 00     | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

**8.3.8. PortA ChSense**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F09     | 00      | See bitfield table. |

**8.3.8.1. PortA ChSense**

| Bit     | Bitfield Name | RW | Reset | Description                                                                     |
|---------|---------------|----|-------|---------------------------------------------------------------------------------|
| [31]    | PresDtct      | R  | 0     | Presence detection indicator: 1 = presence detected; 0 = presence not detected. |
| [30.:0] | Rsvd          | R  | 0     | Reserved.                                                                       |

**8.3.9. PortA InAmpLeft**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B20     | 00      | See bitfield table. |

**8.3.9.1. PortA InAmpLeft**

| Bit     | Bitfield Name | RW | Reset  | Description                        |
|---------|---------------|----|--------|------------------------------------|
| [31.:8] | Rsvd2         | R  | 000000 | Reserved.                          |
| [7]     | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted. |
| [6.:0]  | Rsvd1         | R  | 00     | Reserved.                          |

**8.3.10. PortA InAmpRight**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B00     | 00      | See bitfield table. |

**8.3.10.1. PortA InAmpRight**

| Bit     | Bitfield Name | RW | Reset  | Description                        |
|---------|---------------|----|--------|------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                          |
| [7]     | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted. |
| [6..0]  | Rsvd1         | R  | 00     | Reserved.                          |

**8.3.11. PortA ConfigDefault**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1C     | 00      | See bitfield table. |

**8.3.11.1. PortA ConfigDefault**

| Bit      | Bitfield Name    | RW | Reset | Description                                                                                                                                                                                                                                                                         |
|----------|------------------|----|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..30] | PortConnectivity | RW | 0     | Port connectivity: 0h = Port complex is connected to a jack; 1h = No physical connection for port; 2h = Fixed function device is attached; 3h = Both jack and internal device attached (info in all other fields refers to integrated device any presence detection refers to jack) |
| [29..24] | Location         | RW | 02    | Location. Bits [5..4]: 0h = External on primary chassis; 1h = Internal; 2h = Separate chassis; 3h = Other. Bits [3..0]: 0h = N/A; 1h = Rear; 2h = Front; 3h = Left; 4h = Right; 5h = Top; 6h = Bottom; 7h-9h = Special; Ah-Fh = Reserved                                            |
| [23..20] | Device           | RW | 2     | Default device: 0h = Line out; 1h = Speaker; 2h = HP out; 3h = CD; 4h = SPDIF Out; 5h = Digital other out; 6h = Modem line side; 7h = Modem handset side; 8h = Line in; 9h = Aux; Ah = Mic in; Bh = Telephony; Ch = SPDIF In; Dh = Digital other in; Eh = Reserved; Fh = Other      |

8.3.11.1. *PortA ConfigDefault*

| Bit      | Bitfield Name   | RW | Reset | Description                                                                                                                                                                                                                                                                                |
|----------|-----------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [19..16] | Connection Type | RW | 1     | Connection type: 0h = Unknown; 1h = 1/8" stereo/mono; 2h = 1/4" stereo/mono; 3h = ATAPI internal; 4h = RCA; 5h = Optical; 6h = Other digital; 7h = Other analog; 8h = Multichannel analog (DIN); 9h = XLR/Professional; Ah = RJ-11 (modem); Bh = Combination; Ch-Eh = Reserved; Fh = Other |
| [15..12] | Color           | RW | 4     | Color: 0h = Unknown; 1h = Black; 2h = Grey; 3h = Blue; 4h = Green; 5h = Red; 6h = Orange; 7h = Yellow; 8h = Purple; 9h = Pink; Ah-Dh = Reserved; Eh = White; Fh = Other                                                                                                                    |
| [11..8]  | Misc            | RW | 0     | Miscellaneous: Bits [3..1] = Reserved; Bit 0 = Jack detect override                                                                                                                                                                                                                        |
| [7..4]   | Association     | RW | 3     | Default association.                                                                                                                                                                                                                                                                       |
| [3..0]   | Sequence        | RW | 0     | Sequence.                                                                                                                                                                                                                                                                                  |

8.4. **PortB Node (NID = 0B)**8.4.1. *PortB WCap*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

8.4.1.1. *PortB WCap*

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 4     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |

**8.4.1.1. PortB WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                   |
|----------|---------------|----|-------|---------------------------------------------------------------|
| [19..16] | Delay         | R  | 0     | Number of sample delays through widget.                       |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                                     |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                      |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                          |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital)<br>0 = no (analog). |
| [8]      | ConnList      | R  | 0     | Connection list present: 1 = yes 0 = no.                      |
| [7]      | UnSolCap      | R  | 1     | Unsolicited response support: 1 = yes 0 = no.                 |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                     |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                             |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                       |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes<br>no.               |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                           |
| [1]      | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                            |
| [0]      | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono).     |

**8.4.2. PortB PinCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0C      | See bitfield table. |

**8.4.2.1. PortB PinCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:17] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [16]     | EapdCap       | R  | 0     | EAPD support: 1 = yes 0 = no.                                                                                                                                                                                                                                      |
| [15.:8]  | VrefCntrl     | R  | 17    | Vref support: bit 7 = Reserved; bit 6 = Reserved; bit 5 = 100% support (1 = yes 0 = no); bit 4 = 80% support (1 = yes 0 = no); bit 3 = Reserved; bit 2 = GND support (1 = yes 0 = no); bit 1 = 50% support (1 = yes 0 = no); bit 0 = Hi-Z support (1 = yes 0 = no) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6]      | BalancedIO    | R  | 0     | Balanced I/O support: 1 = yes 0 = no.                                                                                                                                                                                                                              |
| [5]      | InCap         | R  | 1     | Input support: 1 = yes 0 = no.                                                                                                                                                                                                                                     |
| [4]      | OutCap        | R  | 0     | Output support: 1 = yes 0 = no.                                                                                                                                                                                                                                    |
| [3]      | HdphDrvCap    | R  | 0     | Headphone amp present: 1 = yes 0 = no.                                                                                                                                                                                                                             |
| [2]      | PresDtctCap   | R  | 1     | Presence detection support: 1 = yes 0 = no.                                                                                                                                                                                                                        |
| [1]      | TrigRqd       | R  | 0     | Trigger required for impedance sense: 1 = yes 0 = no.                                                                                                                                                                                                              |
| [0]      | ImpSenseCap   | R  | 0     | Impedance sense support: 1 = yes 0 = no.                                                                                                                                                                                                                           |

**8.4.3. PortB PinWCntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F07     | 00      | See bitfield table. |

**8.4.3.1. PortB PinWCntrl**

| Bit     | Bitfield Name | RW | Reset   | Description                                                                                                                                                                                |
|---------|---------------|----|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..6] | Rsvd2         | R  | 0000000 | Reserved.                                                                                                                                                                                  |
| [5]     | InEn          | RW | 0       | Input enable: 1 = enabled 0 = disabled.                                                                                                                                                    |
| [4..3]  | Rsvd1         | R  | 0       | Reserved.                                                                                                                                                                                  |
| [2..0]  | VRefEn        | RW | 0       | Vref selection (See VrefCntrl field of PinCap parameter for supported selections): 000b= HI-Z; 001b= 50%; 010b= GND; 011b= Reserved; 100b= 80%; 101b= 100%; 110b= Reserved; 111b= Reserved |

**8.4.4. PortB UnsolicitedResp**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F08     | 00      | See bitfield table. |

**8.4.4.1. PortB UnsolicitedResp**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                        |
|---------|---------------|----|--------|--------------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                                                                                                          |
| [7]     | En            | RW | 0      | Unsolicited response enable: 1 = enabled 0 = disabled.                                                             |
| [6]     | Rsvd1         | R  | 0      | Reserved.                                                                                                          |
| [5..0]  | Tag           | RW | 00     | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

**8.4.5. PortB ChSense**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F09     | 00      | See bitfield table. |

**8.4.5.1. PortB ChSense**

| Bit     | Bitfield Name | RW | Reset | Description                                                                     |
|---------|---------------|----|-------|---------------------------------------------------------------------------------|
| [31]    | PresDtct      | R  | 0     | Presence detection indicator: 1 = presence detected; 0 = presence not detected. |
| [30..0] | Rsvd          | R  | 0     | Reserved.                                                                       |

**8.4.6. PortB ConfigDefault**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1C     | 00      | See bitfield table. |

**8.4.6.1. PortB ConfigDefault**

| Bit      | Bitfield Name    | RW | Reset | Description                                                                                                                                                                                                                                                                         |
|----------|------------------|----|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..30] | PortConnectivity | RW | 0     | Port connectivity: 0h = Port complex is connected to a jack; 1h = No physical connection for port; 2h = Fixed function device is attached; 3h = Both jack and internal device attached (info in all other fields refers to integrated device any presence detection refers to jack) |
| [29..24] | Location         | RW | 02    | Location. Bits [5..4]: 0h = External on primary chassis; 1h = Internal; 2h = Separate chassis; 3h = Other. Bits [3..0]: 0h = N/A; 1h = Rear; 2h = Front; 3h = Left; 4h = Right; 5h = Top; 6h = Bottom; 7h-9h = Special; Ah-Fh = Reserved                                            |

8.4.6.1. *PortB ConfigDefault*

| Bit      | Bitfield Name  | RW | Reset | Description                                                                                                                                                                                                                                                                                |
|----------|----------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [23.:20] | Device         | RW | A     | Default device: 0h = Line out; 1h = Speaker; 2h = HP out; 3h = CD; 4h = SPDIF Out; 5h = Digital other out; 6h = Modem line side; 7h = Modem handset side; 8h = Line in; 9h = Aux; Ah = Mic in; Bh = Telephony; Ch = SPDIF In; Dh = Digital other in; Eh = Reserved; Fh = Other             |
| [19.:16] | ConnectionType | RW | 1     | Connection type: 0h = Unknown; 1h = 1/8" stereo/mono; 2h = 1/4" stereo/mono; 3h = ATAPI internal; 4h = RCA; 5h = Optical; 6h = Other digital; 7h = Other analog; 8h = Multichannel analog (DIN); 9h = XLR/Professional; Ah = RJ-11 (modem); Bh = Combination; Ch-Eh = Reserved; Fh = Other |
| [15.:12] | Color          | RW | 9     | Color: 0h = Unknown; 1h = Black; 2h = Grey; 3h = Blue; 4h = Green; 5h = Red; 6h = Orange; 7h = Yellow; 8h = Purple; 9h = Pink; Ah-Dh = Reserved; Eh = White; Fh = Other                                                                                                                    |
| [11.:8]  | Misc           | RW | 0     | Miscellaneous: Bits [3..1] = Reserved; Bit 0 = Jack detect override                                                                                                                                                                                                                        |
| [7.:4]   | Association    | RW | 4     | Default association.                                                                                                                                                                                                                                                                       |
| [3.:0]   | Sequence       | RW | 0     | Sequence.                                                                                                                                                                                                                                                                                  |

## 8.5. Port C Node (NID = 0C)

8.5.1. *PortC WCap*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

## 8.5.1.1. PortC WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23.:20] | Type          | R  | 4     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 0     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnSolCap      | R  | 1     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |
| [1]      | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                                                                                                                                                                        |
| [0]      | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo) 0 = no (mono).                                                                                                                                                    |

**8.5.2. PortC PinCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0C      | See bitfield table. |

**8.5.2.1. PortC PinCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..17] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [16]     | EapdCap       | R  | 0     | EAPD support: 1 = yes 0 = no.                                                                                                                                                                                                                                      |
| [15..8]  | VrefCntrl     | R  | 17    | Vref support: bit 7 = Reserved; bit 6 = Reserved; bit 5 = 100% support (1 = yes 0 = no); bit 4 = 80% support (1 = yes 0 = no); bit 3 = Reserved; bit 2 = GND support (1 = yes 0 = no); bit 1 = 50% support (1 = yes 0 = no); bit 0 = Hi-Z support (1 = yes 0 = no) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6]      | BalancedIO    | R  | 0     | Balanced I/O support: 1 = yes 0 = no.                                                                                                                                                                                                                              |
| [5]      | InCap         | R  | 1     | Input support: 1 = yes 0 = no.                                                                                                                                                                                                                                     |
| [4]      | OutCap        | R  | 0     | Output support: 1 = yes 0 = no.                                                                                                                                                                                                                                    |
| [3]      | HdphDrvCap    | R  | 0     | Headphone amp present: 1 = yes 0 = no.                                                                                                                                                                                                                             |
| [2]      | PresDtctCap   | R  | 1     | Presence detection support: 1 = yes 0 = no.                                                                                                                                                                                                                        |
| [1]      | TrigRqd       | R  | 0     | Trigger required for impedance sense: 1 = yes 0 = no.                                                                                                                                                                                                              |
| [0]      | ImpSenseCap   | R  | 0     | Impedance sense support: 1 = yes 0 = no.                                                                                                                                                                                                                           |

**8.5.3. PortC PinWCntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F07     | 00      | See bitfield table. |

**8.5.3.1. PortC PinWCntrl**

| Bit     | Bitfield Name | RW | Reset   | Description                                                                                                                                                                                |
|---------|---------------|----|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..6] | Rsvd2         | R  | 0000000 | Reserved.                                                                                                                                                                                  |
| [5]     | InEn          | RW | 0       | Input enable: 1 = enabled 0 = disabled.                                                                                                                                                    |
| [4..3]  | Rsvd1         | R  | 0       | Reserved.                                                                                                                                                                                  |
| [2..0]  | VRefEn        | RW | 0       | Vref selection (See VrefCntrl field of PinCap parameter for supported selections): 000b= HI-Z; 001b= 50%; 010b= GND; 011b= Reserved; 100b= 80%; 101b= 100%; 110b= Reserved; 111b= Reserved |

**8.5.4. PortC UnsolicitedResp**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F08     | 00      | See bitfield table. |

**8.5.4.1. PortC UnsolicitedResp**

| Bit     | Bitfield Name | RW | Reset   | Description                                            |
|---------|---------------|----|---------|--------------------------------------------------------|
| [31..8] | Rsvd2         | R  | 0000000 | Reserved.                                              |
| [7]     | En            | RW | 0       | Unsolicited response enable: 1 = enabled 0 = disabled. |

**8.5.4.1. PortC UnsolicitedResp**

| Bit    | Bitfield Name | RW | Reset | Description                                                                                                        |
|--------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------|
| [6]    | Rsvd1         | R  | 0     | Reserved.                                                                                                          |
| [5.:0] | Tag           | RW | 00    | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

**8.5.5. PortC ChSense**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F09     | 00      | See bitfield table. |

**8.5.5.1. PortC ChSense**

| Bit     | Bitfield Name | RW | Reset | Description                                                                     |
|---------|---------------|----|-------|---------------------------------------------------------------------------------|
| [31]    | PresDtct      | R  | 0     | Presence detection indicator: 1 = presence detected; 0 = presence not detected. |
| [30.:0] | Rsvd          | R  | 0     | Reserved.                                                                       |

**8.5.6. PortC ConfigDefault**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1C     | 00      | See bitfield table. |

## 8.5.6.1. PortC ConfigDefault

| Bit      | Bitfield Name    | RW | Reset | Description                                                                                                                                                                                                                                                                                |
|----------|------------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..30] | PortConnectivity | RW | 0     | Port connectivity: 0h = Port complex is connected to a jack; 1h = No physical connection for port; 2h = Fixed function device is attached; 3h = Both jack and internal device attached (info in all other fields refers to integrated device any presence detection refers to jack)        |
| [29..24] | Location         | RW | 1     | Location. Bits [5..4]: 0h = External on primary chassis; 1h = Internal; 2h = Separate chassis; 3h = Other. Bits [3..0]: 0h = N/A; 1h = Rear; 2h = Front; 3h = Left; 4h = Right; 5h = Top; 6h = Bottom; 7h-9h = Special; Ah-Fh = Reserved                                                   |
| [23..20] | Device           | RW | A     | Default device: 0h = Line out; 1h = Speaker; 2h = HP out; 3h = CD; 4h = SPDIF Out; 5h = Digital other out; 6h = Modem line side; 7h = Modem handset side; 8h = Line in; 9h = Aux; Ah = Mic in; Bh = Telephony; Ch = SPDIF In; Dh = Digital other in; Eh = Reserved; Fh = Other             |
| [19..16] | ConnectionType   | RW | 1     | Connection type: 0h = Unknown; 1h = 1/8" stereo/mono; 2h = 1/4" stereo/mono; 3h = ATAPI internal; 4h = RCA; 5h = Optical; 6h = Other digital; 7h = Other analog; 8h = Multichannel analog (DIN); 9h = XLR/Professional; Ah = RJ-11 (modem); Bh = Combination; Ch-Eh = Reserved; Fh = Other |
| [15..12] | Color            | RW | 9     | Color: 0h = Unknown; 1h = Black; 2h = Grey; 3h = Blue; 4h = Green; 5h = Red; 6h = Orange; 7h = Yellow; 8h = Purple; 9h = Pink; Ah-Dh = Reserved; Eh = White; Fh = Other                                                                                                                    |
| [11..8]  | Misc             | RW | 0     | Miscellaneous: Bits [3..1] = Reserved; Bit 0 = Jack detect override                                                                                                                                                                                                                        |
| [7..4]   | Association      | RW | 2     | Default association.                                                                                                                                                                                                                                                                       |
| [3..0]   | Sequence         | RW | 0     | Sequence.                                                                                                                                                                                                                                                                                  |

## 8.6. Port D Node (NID = 0D)

### 8.6.1. PortD WCap

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

#### 8.6.1.1. PortD WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 4     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19..16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnSolCap      | R  | 1     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |

**8.6.1.1. PortD WCap**

| Bit | Bitfield Name | RW | Reset | Description                                               |
|-----|---------------|----|-------|-----------------------------------------------------------|
| [1] | InAmpPrsnt    | R  | 1     | Input amp present: 1 = yes 0 = no.                        |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono). |

**8.6.2. PortD PinCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0C      | See bitfield table. |

**8.6.2.1. PortD PinCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..17] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [16]     | EapdCap       | R  | 0     | EAPD support: 1 = yes 0 = no.                                                                                                                                                                                                                                      |
| [15..8]  | VrefCntrl     | R  | 00    | Vref support: bit 7 = Reserved; bit 6 = Reserved; bit 5 = 100% support (1 = yes 0 = no); bit 4 = 80% support (1 = yes 0 = no); bit 3 = Reserved; bit 2 = GND support (1 = yes 0 = no); bit 1 = 50% support (1 = yes 0 = no); bit 0 = Hi-Z support (1 = yes 0 = no) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6]      | BalancedIO    | R  | 0     | Balanced I/O support: 1 = yes 0 = no.                                                                                                                                                                                                                              |
| [5]      | InCap         | R  | 0     | Input support: 1 = yes 0 = no.                                                                                                                                                                                                                                     |
| [4]      | OutCap        | R  | 1     | Output support: 1 = yes 0 = no.                                                                                                                                                                                                                                    |
| [3]      | HdphDrvCap    | R  | 0     | Headphone amp present: 1 = yes 0 = no.                                                                                                                                                                                                                             |
| [2]      | PresDtctCap   | R  | 1     | Presence detection support: 1 = yes 0 = no.                                                                                                                                                                                                                        |

**8.6.2.1. PortD PinCap**

| Bit | Bitfield Name | RW | Reset | Description                                           |
|-----|---------------|----|-------|-------------------------------------------------------|
| [1] | TrigRqd       | R  | 0     | Trigger required for impedance sense: 1 = yes 0 = no. |
| [0] | ImpSenseCap   | R  | 0     | Impedance sense support: 1 = yes 0 = no.              |

**8.6.3. PortD ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.6.3.1. PortD ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries 0 = short-form (7-bit) NID entries. |
| [6..0]  | ConL          | R  | 03     | Number of NID entries in connection list.                                                      |

**8.6.4. PortD ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.6.4.1. PortD ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description                      |
|----------|---------------|----|-------|----------------------------------|
| [31.:24] | ConL3         | R  | 00    | Unused list entry.               |
| [23.:16] | ConL2         | R  | 17    | InputMixer Summing widget (0x17) |
| [15.:8]  | ConL1         | R  | 11    | DAC1 Converter widget (0x11)     |
| [7.:0]   | ConL0         | R  | 10    | DAC0 Converter widget (0x10)     |

**8.6.5. PortD ConSelectCtrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F01     | 00      | See bitfield table. |

**8.6.5.1. PortD ConSelectCtrl**

| Bit     | Bitfield Name | RW | Reset    | Description                      |
|---------|---------------|----|----------|----------------------------------|
| [31.:2] | Rsvd          | R  | 00000000 | Reserved.                        |
| [1.:0]  | Index         | RW | 0        | Connection select control index. |

**8.6.6. PortD PinWCntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F07     | 00      | See bitfield table. |

**8.6.6.1. PortD PinWCntrl**

| Bit     | Bitfield Name | RW | Reset  | Description                              |
|---------|---------------|----|--------|------------------------------------------|
| [31..7] | Rsvd2         | R  | 000000 | Reserved.                                |
| [6]     | OutEn         | RW | 0      | Output enable: 1 = enabled 0 = disabled. |
| [5..0]  | Rsvd1         | R  | 0      | Reserved.                                |

**8.6.7. PortD UnsolicitedResp**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F08     | 00      | See bitfield table. |

**8.6.7.1. PortD UnsolicitedResp**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                        |
|---------|---------------|----|--------|--------------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                                                                                                          |
| [7]     | En            | RW | 0      | Unsolicited response enable: 1 = enabled 0 = disabled.                                                             |
| [6]     | Rsvd1         | R  | 0      | Reserved.                                                                                                          |
| [5..0]  | Tag           | RW | 00     | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

**8.6.8. PortD ChSense**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F09     | 00      | See bitfield table. |

**8.6.8.1. PortD ChSense**

| Bit      | Bitfield Name | RW | Reset | Description                                                                     |
|----------|---------------|----|-------|---------------------------------------------------------------------------------|
| [31]     | PresDtct      | R  | 0     | Presence detection indicator: 1 = presence detected; 0 = presence not detected. |
| [30..:0] | Rsvd          | R  | 0     | Reserved.                                                                       |

**8.6.9. PortD InAmpLeft**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B20     | 00      | See bitfield table. |

**8.6.9.1. PortD InAmpLeft**

| Bit      | Bitfield Name | RW | Reset  | Description                        |
|----------|---------------|----|--------|------------------------------------|
| [31..:8] | Rsvd2         | R  | 000000 | Reserved.                          |
| [7]      | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted. |
| [6..:0]  | Rsvd1         | R  | 00     | Reserved.                          |

**8.6.10. PortD InAmpRight**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B00     | 00      | See bitfield table. |

**8.6.10.1. PortD InAmpRight**

| Bit     | Bitfield Name | RW | Reset  | Description                        |
|---------|---------------|----|--------|------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                          |
| [7]     | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted. |
| [6..0]  | Rsvd1         | R  | 00     | Reserved.                          |

**8.6.11. PortD ConfigDefault**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1C     | 00      | See bitfield table. |

**8.6.11.1. PortD ConfigDefault**

| Bit      | Bitfield Name    | RW | Reset | Description                                                                                                                                                                                                                                                                         |
|----------|------------------|----|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..30] | PortConnectivity | RW | 0     | Port connectivity: 0h = Port complex is connected to a jack; 1h = No physical connection for port; 2h = Fixed function device is attached; 3h = Both jack and internal device attached (info in all other fields refers to integrated device any presence detection refers to jack) |
| [29..24] | Location         | RW | 1     | Location. Bits [5..4]: 0h = External on primary chassis; 1h = Internal; 2h = Separate chassis; 3h = Other. Bits [3..0]: 0h = N/A; 1h = Rear; 2h = Front; 3h = Left; 4h = Right; 5h = Top; 6h = Bottom; 7h-9h = Special; Ah-Fh = Reserved                                            |
| [23..20] | Device           | RW | 0     | Default device: 0h = Line out; 1h = Speaker; 2h = HP out; 3h = CD; 4h = SPDIF Out; 5h = Digital other out; 6h = Modem line side; 7h = Modem handset side; 8h = Line in; 9h = Aux; Ah = Mic in; Bh = Telephony; Ch = SPDIF In; Dh = Digital other in; Eh = Reserved; Fh = Other      |

8.6.11.1. *PortD ConfigDefault*

| Bit      | Bitfield Name  | RW | Reset | Description                                                                                                                                                                                                                                                                                |
|----------|----------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [19..16] | ConnectionType | RW | 1     | Connection type: 0h = Unknown; 1h = 1/8" stereo/mono; 2h = 1/4" stereo/mono; 3h = ATAPI internal; 4h = RCA; 5h = Optical; 6h = Other digital; 7h = Other analog; 8h = Multichannel analog (DIN); 9h = XLR/Professional; Ah = RJ-11 (modem); Bh = Combination; Ch-Eh = Reserved; Fh = Other |
| [15..12] | Color          | RW | 4     | Color: 0h = Unknown; 1h = Black; 2h = Grey; 3h = Blue; 4h = Green; 5h = Red; 6h = Orange; 7h = Yellow; 8h = Purple; 9h = Pink; Ah-Dh = Reserved; Eh = White; Fh = Other                                                                                                                    |
| [11..8]  | Misc           | RW | 0     | Miscellaneous: Bits [3..1] = Reserved; Bit 0 = Jack detect override                                                                                                                                                                                                                        |
| [7..4]   | Association    | RW | 1     | Default association.                                                                                                                                                                                                                                                                       |
| [3..0]   | Sequence       | RW | 0     | Sequence.                                                                                                                                                                                                                                                                                  |

## 8.7. DAC0 Node (NID = 10)

8.7.1. *DAC0 WCap*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

8.7.1.1. *DAC0 WCap*

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 0     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |

**8.7.1.1. DAC0 WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                   |
|----------|---------------|----|-------|---------------------------------------------------------------|
| [19..16] | Delay         | R  | D     | Number of sample delays through widget.                       |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                                     |
| [11]     | SwapCap       | R  | 1     | Left/right swap support: 1 = yes 0 = no.                      |
| [10]     | PwrCntrl      | R  | 1     | Power state support: 1 = yes 0 = no.                          |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital)<br>0 = no (analog). |
| [8]      | ConnList      | R  | 0     | Connection list present: 1 = yes 0 = no.                      |
| [7]      | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                 |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                     |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                             |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                       |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes<br>no.               |
| [2]      | OutAmpPrsnt   | R  | 1     | Output amp present: 1 = yes 0 = no.                           |
| [1]      | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                            |
| [0]      | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono).     |

**8.7.2. DAC0 Cnvtr**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | A       | 0000    | See bitfield table. |

**8.7.2.1. DAC0 Cnvtr**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..16] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [15]     | StrmType      | R  | 0     | Stream type: 1 = Non-PCM 0 = PCM.                                                                                                                                                                                                                                  |
| [14]     | FrmtSmplRate  | RW | 0     | Sample base rate: 1 = 44.1kHz 0 = 48kHz.                                                                                                                                                                                                                           |
| [13..11] | SmplRateMultp | RW | 0     | Sample base rate multiple: 000b= x1 (48kHz/44.1kHz or less); 001b= x2 (96kHz/88.2kHz/32kHz); 010b= x3 (144kHz); 011b= x4 (192kHz/176.4kHz); 100b-111b Reserved                                                                                                     |
| [10..8]  | SmplRateDiv   | RW | 0     | Sample base rate divider: 000b= Divide by 1 (48kHz/44.1kHz); 001b= Divide by 2 (24kHz/20.05kHz); 010b= Divide by 3 (16kHz/32kHz); 011b= Divide by 4 (11.025kHz); 100b= Divide by 5 (9.6kHz); 101b= Divide by 6 (8kHz); 110b= Divide by 7; 111b= Divide by 8 (6kHz) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6..4]   | BitsPerSmpl   | RW | 3     | Bits per sample: 000b= 8 bits; 001b= 16 bits; 010b= 20 bits; 011b= 24 bits; 100b= 32 bits; 101b-111b= Reserved                                                                                                                                                     |
| [3..0]   | NmbrChan      | RW | 1     | Total number of channels in the stream assigned to this converter: 0000b-1111b= 1-16 channels.                                                                                                                                                                     |

**8.7.3. DAC0 OutAmpLeft**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | BA0     | 00      | See bitfield table. |

**8.7.3.1. DAC0 OutAmpLeft**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                |
|---------|---------------|----|--------|----------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                  |
| [7]     | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted.                                         |
| [6..0]  | Gain          | RW | 7F     | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

**8.7.4. DAC0 OutAmpRight**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B80     | 00      | See bitfield table. |

**8.7.4.1. DAC0 OutAmpRight**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                |
|---------|---------------|----|--------|----------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                  |
| [7]     | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted.                                         |
| [6..0]  | Gain          | RW | 7F     | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

**8.7.5. DAC0 PwrState**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F05     | 00      | See bitfield table. |

**8.7.5.1. DAC0 PwrState**

| Bit     | Bitfield Name | RW | Reset   | Description                                  |
|---------|---------------|----|---------|----------------------------------------------|
| [31..6] | Rsvd2         | R  | 0000000 | Reserved.                                    |
| [5..4]  | Act           | R  | 3       | Actual power state of this widget.           |
| [3..2]  | Rsvd1         | R  | 0       | Reserved.                                    |
| [1..0]  | Set           | RW | 3       | Current power state setting for this widget. |

**8.7.6. DAC0 CnvtrID**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F06     | 00      | See bitfield table. |

**8.7.6.1. DAC0 CnvtrID**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                     |
|---------|---------------|----|--------|---------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                       |
| [7..4]  | Strm          | RW | 0      | Stream ID: 0h = Converter "off" 1h-Fh = valid IDs.                              |
| [3..0]  | Ch            | RW | 0      | Channel assignment ("Ch" and "Ch+1" assigned as a pair for a stereo converter). |

**8.7.7. DAC0 LR**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F0C     | 00      | See bitfield table. |

8.7.7.1. *DAC0 LR*

| Bit     | Bitfield Name | RW | Reset    | Description                                              |
|---------|---------------|----|----------|----------------------------------------------------------|
| [31..3] | Rsvd2         | R  | 00000000 | Reserved.                                                |
| [2]     | SwapEn        | RW | 0        | Swap enable: 1 = L/R swap enabled 0 = L/R swap disabled. |
| [1..0]  | Rsvd1         | R  | 0        | Reserved.                                                |

8.8. **DAC1 Node (NID = 11)**8.8.1. *DAC1 WCap*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

8.8.1.1. *DAC1 WCap*

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 0     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19..16] | Delay         | R  | D     | Number of sample delays through widget.                                                                                                                                                                   |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 1     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 1     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |

8.8.1.1. *DAC1 WCap*

| Bit | Bitfield Name | RW | Reset | Description                                            |
|-----|---------------|----|-------|--------------------------------------------------------|
| [8] | ConnList      | R  | 0     | Connection list present: 1 = yes 0 = no.               |
| [7] | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.          |
| [6] | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.              |
| [5] | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                      |
| [4] | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                |
| [3] | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.           |
| [2] | OutAmpPrsnt   | R  | 1     | Output amp present: 1 = yes 0 = no.                    |
| [1] | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                     |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo) 0 = no (mono). |

8.8.2. *DAC1 Cnvtr*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | A       | 0000    | See bitfield table. |

8.8.2.1. *DAC1 Cnvtr*

| Bit      | Bitfield Name | RW | Reset | Description                              |
|----------|---------------|----|-------|------------------------------------------|
| [31..16] | Rsvd2         | R  | 0000  | Reserved.                                |
| [15]     | StrmType      | R  | 0     | Stream type: 1 = Non-PCM 0 = PCM.        |
| [14]     | FrmtSmplRate  | RW | 0     | Sample base rate: 1 = 44.1kHz 0 = 48kHz. |

8.8.2.1. *DAC1 Cnvtr*

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [13.:11] | SmplRateMultp | RW | 0     | Sample base rate multiple: 000b= x1 (48kHz/44.1kHz or less); 001b= x2 (96kHz/88.2kHz/32kHz); 010b= x3 (144kHz); 011b= x4 (192kHz/176.4kHz); 100b-111b Reserved                                                                                                     |
| [10.:8]  | SmplRateDiv   | RW | 0     | Sample base rate divider: 000b= Divide by 1 (48kHz/44.1kHz); 001b= Divide by 2 (24kHz/20.05kHz); 010b= Divide by 3 (16kHz/32kHz); 011b= Divide by 4 (11.025kHz); 100b= Divide by 5 (9.6kHz); 101b= Divide by 6 (8kHz); 110b= Divide by 7; 111b= Divide by 8 (6kHz) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6.:4]   | BitsPerSmpl   | RW | 3     | Bits per sample: 000b= 8 bits; 001b= 16 bits; 010b= 20 bits; 011b= 24 bits; 100b= 32 bits; 101b-111b= Reserved                                                                                                                                                     |
| [3.:0]   | NmbrChan      | RW | 1     | Total number of channels in the stream assigned to this converter: 0000b-1111b= 1-16 channels.                                                                                                                                                                     |

8.8.3. *DAC1 OutAmpLeft*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | BA0     | 00      | See bitfield table. |

8.8.3.1. *DAC1 OutAmpLeft*

| Bit     | Bitfield Name | RW | Reset  | Description |
|---------|---------------|----|--------|-------------|
| [31.:8] | Rsvd          | R  | 000000 | Reserved.   |

**8.8.3.1. DAC1 OutAmpLeft**

| Bit    | Bitfield Name | RW | Reset | Description                                                                |
|--------|---------------|----|-------|----------------------------------------------------------------------------|
| [7]    | Mute          | RW | 1     | Amp mute: 1 = muted 0 = not muted.                                         |
| [6.:0] | Gain          | RW | 7F    | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

**8.8.4. DAC1 OutAmpRight**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B80     | 00      | See bitfield table. |

**8.8.4.1. DAC1 OutAmpRight**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                |
|---------|---------------|----|--------|----------------------------------------------------------------------------|
| [31.:8] | Rsvd          | R  | 000000 | Reserved.                                                                  |
| [7]     | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted.                                         |
| [6.:0]  | Gain          | RW | 7F     | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

**8.8.5. DAC1 PwrState**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F05     | 00      | See bitfield table. |

**8.8.5.1. DAC1 PwrState**

| Bit     | Bitfield Name | RW | Reset   | Description                                  |
|---------|---------------|----|---------|----------------------------------------------|
| [31..6] | Rsvd2         | R  | 0000000 | Reserved.                                    |
| [5..4]  | Act           | R  | 3       | Actual power state of this widget.           |
| [3..2]  | Rsvd1         | R  | 0       | Reserved.                                    |
| [1..0]  | Set           | RW | 3       | Current power state setting for this widget. |

**8.8.6. DAC1 CnvtrID**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F06     | 00      | See bitfield table. |

**8.8.6.1. DAC1 CnvtrID**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                     |
|---------|---------------|----|--------|---------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                       |
| [7..4]  | Strm          | RW | 0      | Stream ID: 0h = Converter "off" 1h-Fh = valid IDs.                              |
| [3..0]  | Ch            | RW | 0      | Channel assignment ("Ch" and "Ch+1" assigned as a pair for a stereo converter). |

**8.8.7. DAC1 LR**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F0C     | 00      | See bitfield table. |

**8.8.7.1. DAC1 LR**

| Bit     | Bitfield Name | RW | Reset    | Description                                              |
|---------|---------------|----|----------|----------------------------------------------------------|
| [31..3] | Rsvd2         | R  | 00000000 | Reserved.                                                |
| [2]     | SwapEn        | RW | 0        | Swap enable: 1 = L/R swap enabled 0 = L/R swap disabled. |
| [1..0]  | Rsvd1         | R  | 0        | Reserved.                                                |

**8.9. ADC0 Node (NID = 12)****8.9.1. ADC0 WCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

**8.9.1.1. ADC0 WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 1     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19..16] | Delay         | R  | D     | Number of sample delays through widget.                                                                                                                                                                   |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 1     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |

8.9.1.1. *ADC0 WCap*

| Bit | Bitfield Name | RW | Reset | Description                                            |
|-----|---------------|----|-------|--------------------------------------------------------|
| [8] | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.               |
| [7] | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.          |
| [6] | ProcWidget    | R  | 1     | Processing state support: 1 = yes 0 = no.              |
| [5] | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                      |
| [4] | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                |
| [3] | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.           |
| [2] | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                    |
| [1] | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                     |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo) 0 = no (mono). |

8.9.2. *ADC0 ConLst*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

8.9.2.1. *ADC0 ConLst*

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries 0 = short-form (7-bit) NID entries. |
| [6..0]  | ConL          | R  | 01     | Number of NID entries in connection list.                                                      |

**8.9.3. ADC0 ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.9.3.1. ADC0 ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description                    |
|----------|---------------|----|-------|--------------------------------|
| [31..24] | ConL3         | R  | 00    | Unused list entry.             |
| [23..16] | ConL2         | R  | 00    | Unused list entry.             |
| [15..8]  | ConL1         | R  | 00    | Unused list entry.             |
| [7..0]   | ConL0         | R  | 1C    | ADC0Mux Selector widget (0x1C) |

**8.9.4. ADC0 Cnvtr**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | A       | 0000    | See bitfield table. |

**8.9.4.1. ADC0 Cnvtr**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                    |
|----------|---------------|----|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..16] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                      |
| [15]     | StrmType      | R  | 0     | Stream type: 1 = Non-PCM 0 = PCM.                                                                                                                              |
| [14]     | FrmtSmplRate  | RW | 0     | Sample base rate: 1 = 44.1kHz 0 = 48kHz.                                                                                                                       |
| [13..11] | SmplRateMultp | RW | 0     | Sample base rate multiple: 000b= x1 (48kHz/44.1kHz or less); 001b= x2 (96kHz/88.2kHz/32kHz); 010b= x3 (144kHz); 011b= x4 (192kHz/176.4kHz); 100b-111b Reserved |

8.9.4.1. *ADC0 Cnvtr*

| Bit     | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|---------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [10.:8] | SmplRateDiv   | RW | 0     | Sample base rate divider: 000b= Divide by 1 (48kHz/44.1kHz); 001b= Divide by 2 (24kHz/20.05kHz); 010b= Divide by 3 (16kHz/32kHz); 011b= Divide by 4 (11.025kHz); 100b= Divide by 5 (9.6kHz); 101b= Divide by 6 (8kHz); 110b= Divide by 7; 111b= Divide by 8 (6kHz) |
| [7]     | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6.:4]  | BitsPerSmpl   | RW | 3     | Bits per sample: 000b= 8 bits; 001b= 16 bits; 010b= 20 bits; 011b= 24 bits; 100b= 32 bits; 101b-111b= Reserved                                                                                                                                                     |
| [3.:0]  | NmbrChan      | RW | 1     | Total number of channels in the stream assigned to this converter: 0000b-1111b= 1-16 channels.                                                                                                                                                                     |

8.9.5. *ADC0 ProcState*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F03     | 00      | See bitfield table. |

8.9.5.1. *ADC0 ProcState*

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                       |
|---------|---------------|----|--------|---------------------------------------------------------------------------------------------------|
| [31.:8] | Rsvd2         | R  | 000000 | Reserved.                                                                                         |
| [7]     | HPFOCDIS      | RW | 0      | HPF offset calculation disable. 1 = calculation disabled; 0 = calculation enabled.                |
| [6.:2]  | Rsvd1         | R  | 00     | Reserved.                                                                                         |
| [1.:0]  | ADCHPFByp     | RW | 1      | Processing State: 00b= bypass the ADC HPF ("off") 01b-11b= ADC HPF is enabled ("on" or "benign"). |

**8.9.6. ADC0 PwrState**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F05     | 00      | See bitfield table. |

**8.9.6.1. ADC0 PwrState**

| Bit     | Bitfield Name | RW | Reset   | Description                                  |
|---------|---------------|----|---------|----------------------------------------------|
| [31..6] | Rsvd2         | R  | 0000000 | Reserved.                                    |
| [5..4]  | Act           | R  | 3       | Actual power state of this widget.           |
| [3..2]  | Rsvd1         | R  | 0       | Reserved.                                    |
| [1..0]  | Set           | RW | 3       | Current power state setting for this widget. |

**8.9.7. ADC0 CnvtrID**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F06     | 00      | See bitfield table. |

**8.9.7.1. ADC0 CnvtrID**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                     |
|---------|---------------|----|--------|---------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                       |
| [7..4]  | Strm          | RW | 0      | Stream ID: 0h = Converter "off" 1h-Fh = valid IDs.                              |
| [3..0]  | Ch            | RW | 0      | Channel assignment ("Ch" and "Ch+1" assigned as a pair for a stereo converter). |

## 8.10. ADC1 Node (NID = 13)

### 8.10.1. ADC1 WCap

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

#### 8.10.1.1. ADC1 WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23.:20] | Type          | R  | 1     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:16] | Delay         | R  | D     | Number of sample delays through widget.                                                                                                                                                                   |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 1     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 1     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |

**8.10.1.1. ADC1 WCap**

| Bit | Bitfield Name | RW | Reset | Description                                               |
|-----|---------------|----|-------|-----------------------------------------------------------|
| [1] | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                        |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono). |

**8.10.2. ADC1 ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.10.2.1. ADC1 ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                          |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                            |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form<br>(15-bit) NID entries 0 = short-form<br>(7-bit) NID entries. |
| [6..0]  | ConL          | R  | 01     | Number of NID entries in connection list.                                                            |

**8.10.3. ADC1 ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.10.3.1. ADC1 ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description        |
|----------|---------------|----|-------|--------------------|
| [31..24] | ConL3         | R  | 00    | Unused list entry. |
| [23..16] | ConL2         | R  | 00    | Unused list entry. |

8.10.3.1. *ADC1 ConLstEntry0*

| Bit     | Bitfield Name | RW | Reset | Description           |
|---------|---------------|----|-------|-----------------------|
| [15..8] | ConL1         | R  | 00    | Unused list entry.    |
| [7..0]  | ConL0         | R  | 1D    | ADC1Mux widget (0x1D) |

8.10.4. *ADC1 Cnvtr*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | A       | 0000    | See bitfield table. |

8.10.4.1. *ADC1 Cnvtr*

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..16] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [15]     | StrmType      | R  | 0     | Stream type: 1 = Non-PCM 0 = PCM.                                                                                                                                                                                                                                  |
| [14]     | FrmtSmplRate  | RW | 0     | Sample base rate: 1 = 44.1kHz 0 = 48kHz.                                                                                                                                                                                                                           |
| [13..11] | SmplRateMultp | RW | 0     | Sample base rate multiple: 000b= x1 (48kHz/44.1kHz or less); 001b= x2 (96kHz/88.2kHz/32kHz); 010b= x3 (144kHz); 011b= x4 (192kHz/176.4kHz); 100b-111b Reserved                                                                                                     |
| [10..8]  | SmplRateDiv   | RW | 0     | Sample base rate divider: 000b= Divide by 1 (48kHz/44.1kHz); 001b= Divide by 2 (24kHz/20.05kHz); 010b= Divide by 3 (16kHz/32kHz); 011b= Divide by 4 (11.025kHz); 100b= Divide by 5 (9.6kHz); 101b= Divide by 6 (8kHz); 110b= Divide by 7; 111b= Divide by 8 (6kHz) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |

**8.10.4.1. ADC1 Cnvtr**

| Bit    | Bitfield Name | RW | Reset | Description                                                                                                    |
|--------|---------------|----|-------|----------------------------------------------------------------------------------------------------------------|
| [6.:4] | BitsPerSmpl   | RW | 3     | Bits per sample: 000b= 8 bits; 001b= 16 bits; 010b= 20 bits; 011b= 24 bits; 100b= 32 bits; 101b-111b= Reserved |
| [3.:0] | NmbrChan      | RW | 1     | Total number of channels in the stream assigned to this converter: 0000b-1111b= 1-16 channels.                 |

**8.10.5. ADC1 ProcState**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F03     | 00      | See bitfield table. |

**8.10.5.1. ADC1 ProcState**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                       |
|---------|---------------|----|--------|---------------------------------------------------------------------------------------------------|
| [31.:8] | Rsvd2         | R  | 000000 | Reserved.                                                                                         |
| [7]     | HPFOCDIS      | RW | 0      | HPF offset calculation disable. 1 = calculation disabled; 0 = calculation enabled.                |
| [6.:2]  | Rsvd1         | R  | 00     | Reserved.                                                                                         |
| [1.:0]  | ADCHPFByp     | RW | 1      | Processing State: 00b= bypass the ADC HPF ("off") 01b-11b= ADC HPF is enabled ("on" or "benign"). |

**8.10.6. ADC1 PwrState**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F05     | 00      | See bitfield table. |

**8.10.6.1. ADC1 PwrState**

| Bit     | Bitfield Name | RW | Reset   | Description                                  |
|---------|---------------|----|---------|----------------------------------------------|
| [31..6] | Rsvd2         | R  | 0000000 | Reserved.                                    |
| [5..4]  | Act           | R  | 3       | Actual power state of this widget.           |
| [3..2]  | Rsvd1         | R  | 0       | Reserved.                                    |
| [1..0]  | Set           | RW | 3       | Current power state setting for this widget. |

**8.10.7. ADC1 CnvtrID**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F06     | 00      | See bitfield table. |

**8.10.7.1. ADC1 CnvtrID**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                     |
|---------|---------------|----|--------|---------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                       |
| [7..4]  | Strm          | RW | 0      | Stream ID: 0h = Converter "off" 1h-Fh = valid IDs.                              |
| [3..0]  | Ch            | RW | 0      | Channel assignment ("Ch" and "Ch+1" assigned as a pair for a stereo converter). |

**8.11. MonoOut Node (NID = 14)****8.11.1. MonoOut WCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

## 8.11.1.1. MonoOut WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23.:20] | Type          | R  | 4     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |
| [1]      | InAmpPrsnt    | R  | 1     | Input amp present: 1 = yes 0 = no.                                                                                                                                                                        |
| [0]      | Stereo        | R  | 0     | Stereo stream support: 1 = yes (stereo) 0 = no (mono).                                                                                                                                                    |

**8.11.2. MonoOut PinCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0C      | See bitfield table. |

**8.11.2.1. MonoOut PinCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..17] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [16]     | EapdCap       | R  | 0     | EAPD support: 1 = yes 0 = no.                                                                                                                                                                                                                                      |
| [15..8]  | VrefCntrl     | R  | 00    | Vref support: bit 7 = Reserved; bit 6 = Reserved; bit 5 = 100% support (1 = yes 0 = no); bit 4 = 80% support (1 = yes 0 = no); bit 3 = Reserved; bit 2 = GND support (1 = yes 0 = no); bit 1 = 50% support (1 = yes 0 = no); bit 0 = Hi-Z support (1 = yes 0 = no) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6]      | BalancedIO    | R  | 0     | Balanced I/O support: 1 = yes 0 = no.                                                                                                                                                                                                                              |
| [5]      | InCap         | R  | 0     | Input support: 1 = yes 0 = no.                                                                                                                                                                                                                                     |
| [4]      | OutCap        | R  | 1     | Output support: 1 = yes 0 = no.                                                                                                                                                                                                                                    |
| [3]      | HdphDrvCap    | R  | 0     | Headphone amp present: 1 = yes 0 = no.                                                                                                                                                                                                                             |
| [2]      | PresDtctCap   | R  | 0     | Presence detection support: 1 = yes 0 = no.                                                                                                                                                                                                                        |
| [1]      | TrigRqd       | R  | 0     | Trigger required for impedance sense: 1 = yes 0 = no.                                                                                                                                                                                                              |
| [0]      | ImpSenseCap   | R  | 0     | Impedance sense support: 1 = yes 0 = no.                                                                                                                                                                                                                           |

**8.11.3. MonoOut ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.11.3.1. MonoOut ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries 0 = short-form (7-bit) NID entries. |
| [6..0]  | ConL          | R  | 01     | Number of NID entries in connection list.                                                      |

**8.11.4. MonoOut ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.11.4.1. MonoOut ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description              |
|----------|---------------|----|-------|--------------------------|
| [31..24] | ConL3         | R  | 00    | Unused list entry.       |
| [23..16] | ConL2         | R  | 00    | Unused list entry.       |
| [15..8]  | ConL1         | R  | 00    | Unused list entry.       |
| [7..0]   | ConL0         | R  | 16    | MonoMixer Summing widget |

**8.11.5. MonoOut PinWCntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F07     | 00      | See bitfield table. |

**8.11.5.1. MonoOut PinWCntrl**

| Bit     | Bitfield Name | RW | Reset  | Description                              |
|---------|---------------|----|--------|------------------------------------------|
| [31.:7] | Rsvd2         | R  | 000000 | Reserved.                                |
| [6]     | OutEn         | RW | 0      | Output enable: 1 = enabled 0 = disabled. |
| [5.:0]  | Rsvd1         | R  | 0      | Reserved.                                |

**8.11.6. MonoOut InAmpLeft**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B00     | 00      | See bitfield table. |

**8.11.6.1. MonoOut InAmpLeft**

| Bit     | Bitfield Name | RW | Reset  | Description                        |
|---------|---------------|----|--------|------------------------------------|
| [31.:8] | Rsvd2         | R  | 000000 | Reserved.                          |
| [7]     | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted. |
| [6.:0]  | Rsvd1         | R  | 00     | Reserved.                          |

**8.11.7. MonoOut ConfigDefault**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1C     | 00      | See bitfield table. |

## 8.11.7.1. MonoOut ConfigDefault

| Bit      | Bitfield Name    | RW | Reset | Description                                                                                                                                                                                                                                                                                |
|----------|------------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:30] | PortConnectivity | RW | 1     | Port connectivity: 0h = Port complex is connected to a jack; 1h = No physical connection for port; 2h = Fixed function device is attached; 3h = Both jack and internal device attached (info in all other fields refers to integrated device any presence detection refers to jack)        |
| [29.:24] | Location         | RW | 00    | Location. Bits [5..4]: 0h = External on primary chassis; 1h = Internal; 2h = Separate chassis; 3h = Other. Bits [3..0]: 0h = N/A; 1h = Rear; 2h = Front; 3h = Left; 4h = Right; 5h = Top; 6h = Bottom; 7h-9h = Special; Ah-Fh = Reserved                                                   |
| [23.:20] | Device           | RW | F     | Default device: 0h = Line out; 1h = Speaker; 2h = HP out; 3h = CD; 4h = SPDIF Out; 5h = Digital other out; 6h = Modem line side; 7h = Modem handset side; 8h = Line in; 9h = Aux; Ah = Mic in; Bh = Telephony; Ch = SPDIF In; Dh = Digital other in; Eh = Reserved; Fh = Other             |
| [19.:16] | ConnectionType   | RW | 0     | Connection type: 0h = Unknown; 1h = 1/8" stereo/mono; 2h = 1/4" stereo/mono; 3h = ATAPI internal; 4h = RCA; 5h = Optical; 6h = Other digital; 7h = Other analog; 8h = Multichannel analog (DIN); 9h = XLR/Professional; Ah = RJ-11 (modem); Bh = Combination; Ch-Eh = Reserved; Fh = Other |
| [15.:12] | Color            | RW | 0     | Color: 0h = Unknown; 1h = Black; 2h = Grey; 3h = Blue; 4h = Green; 5h = Red; 6h = Orange; 7h = Yellow; 8h = Purple; 9h = Pink; Ah-Dh = Reserved; Eh = White; Fh = Other                                                                                                                    |
| [11.:8]  | Misc             | RW | 0     | Miscellaneous: Bits [3..1] = Reserved; Bit 0 = Jack detect override                                                                                                                                                                                                                        |
| [7.:4]   | Association      | RW | F     | Default association.                                                                                                                                                                                                                                                                       |
| [3.:0]   | Sequence         | RW | 0     | Sequence.                                                                                                                                                                                                                                                                                  |

## 8.12. MonoMux Node (NID = 15)

### 8.12.1. MonoMux WCap

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

#### 8.12.1.1. MonoMux WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 3     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19..16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |

**8.12.1.1. MonoMux WCap**

| Bit | Bitfield Name | RW | Reset | Description                                               |
|-----|---------------|----|-------|-----------------------------------------------------------|
| [1] | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                        |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono). |

**8.12.2. MonoMux ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.12.2.1. MonoMux ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                          |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                            |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form<br>(15-bit) NID entries 0 = short-form<br>(7-bit) NID entries. |
| [6..0]  | ConL          | R  | 03     | Number of NID entries in connection list.                                                            |

**8.12.3. MonoMux ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.12.3.1. MonoMux ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description               |
|----------|---------------|----|-------|---------------------------|
| [31..24] | ConL3         | R  | 00    | Unused list entry.        |
| [23..16] | ConL2         | R  | 17    | Input Mixer widget (0x17) |

**8.12.3.1. MonoMux ConLstEntry0**

| Bit     | Bitfield Name | RW | Reset | Description                  |
|---------|---------------|----|-------|------------------------------|
| [15.:8] | ConL1         | R  | 11    | DAC1 Converter widget (0x11) |
| [7.:0]  | ConL0         | R  | 10    | DAC0 Converter widget (0x10) |

**8.12.4. MonoMux ConSelectCtrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F01     | 00      | See bitfield table. |

**8.12.4.1. MonoMux ConSelectCtrl**

| Bit     | Bitfield Name | RW | Reset   | Description                      |
|---------|---------------|----|---------|----------------------------------|
| [31.:2] | Rsvd          | R  | 0000000 | Reserved.                        |
| [1.:0]  | Index         | RW | 0       | Connection select control index. |

**8.13. MonoMixer Node (NID = 16)****8.13.1. MonoMixer WCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

## 8.13.1.1. MonoMixer WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23.:20] | Type          | R  | 2     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |
| [1]      | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                                                                                                                                                                        |
| [0]      | Stereo        | R  | 0     | Stereo stream support: 1 = yes (stereo) 0 = no (mono).                                                                                                                                                    |

**8.13.2. MonoMixer ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.13.2.1. MonoMixer ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31.:8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries 0 = short-form (7-bit) NID entries. |
| [6.:0]  | ConL          | R  | 01     | Number of NID entries in connection list.                                                      |

**8.13.3. MonoMixer ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.13.3.1. MonoMixer ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description                    |
|----------|---------------|----|-------|--------------------------------|
| [31.:24] | ConL3         | R  | 00    | Unused list entry.             |
| [23.:16] | ConL2         | R  | 00    | Unused list entry.             |
| [15.:8]  | ConL1         | R  | 00    | Unused list entry.             |
| [7.:0]   | ConL0         | R  | 15    | MonoMux Selector widget (0x15) |

## 8.14. DMic0 Node (NID = 18)

### 8.14.1. DMic0 WCap

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

#### 8.14.1.1. DMic0 WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23.:20] | Type          | R  | 4     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | DigitalStrm   | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 0     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnsolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 1     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 1     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |

**8.14.1.1. DMic0 WCap**

| Bit | Bitfield Name | RW | Reset | Description                                               |
|-----|---------------|----|-------|-----------------------------------------------------------|
| [1] | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                        |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono). |

**8.14.2. DMic0 PinCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0C      | See bitfield table. |

**8.14.2.1. DMic0 PinCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..17] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [16]     | EapdCap       | R  | 0     | EAPD support: 1 = yes 0 = no.                                                                                                                                                                                                                                      |
| [15..8]  | VRefCntrl     | R  | 00    | Vref support: bit 7 = Reserved; bit 6 = Reserved; bit 5 = 100% support (1 = yes 0 = no); bit 4 = 80% support (1 = yes 0 = no); bit 3 = Reserved; bit 2 = GND support (1 = yes 0 = no); bit 1 = 50% support (1 = yes 0 = no); bit 0 = Hi-Z support (1 = yes 0 = no) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6]      | BalancedIO    | R  | 0     | Balanced I/O support: 1 = yes 0 = no.                                                                                                                                                                                                                              |
| [5]      | InCap         | R  | 1     | Input support: 1 = yes 0 = no.                                                                                                                                                                                                                                     |
| [4]      | OutCap        | R  | 0     | Output support: 1 = yes 0 = no.                                                                                                                                                                                                                                    |
| [3]      | HPhnDrvCap    | R  | 0     | Headphone amp present: 1 = yes 0 = no.                                                                                                                                                                                                                             |
| [2]      | PresDtctCap   | R  | 0     | Presence detection support: 1 = yes 0 = no.                                                                                                                                                                                                                        |

**8.14.2.1. DMic0 PinCap**

| Bit | Bitfield Name | RW | Reset | Description                                           |
|-----|---------------|----|-------|-------------------------------------------------------|
| [1] | TrigRqd       | R  | 0     | Trigger required for impedance sense: 1 = yes 0 = no. |
| [0] | ImpSenseCap   | R  | 0     | Impedance sense support: 1 = yes 0 = no.              |

**8.14.3. DMic0 PinWCntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F07     | 00      | See bitfield table. |

**8.14.3.1. DMic0 PinWCntrl**

| Bit     | Bitfield Name | RW | Reset   | Description                             |
|---------|---------------|----|---------|-----------------------------------------|
| [31..6] | Rsvd2         | R  | 0000000 | Reserved.                               |
| [5]     | InEn          | RW | 0       | Input enable: 1 = enabled 0 = disabled. |
| [4..0]  | Rsvd1         | R  | 00      | Reserved.                               |

**8.14.4. DMic0 OutAmpCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 12      | See bitfield table. |

**8.14.4.1. DMic0 OutAmpCap**

| Bit      | Bitfield Name | RW | Reset | Description                   |
|----------|---------------|----|-------|-------------------------------|
| [31]     | Mute          | R  | 0     | Mute support: 1 = yes 0 = no. |
| [30..23] | Rsvd3         | R  | 00    | Reserved.                     |

**8.14.4.1. DMic0 OutAmpCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                   |
|----------|---------------|----|-------|-------------------------------------------------------------------------------|
| [22..16] | StepSize      | R  | 27    | Size of each step in the gain range: 0 to 127 = .25dB to 32dB in .25dB steps. |
| [15]     | Rsvd2         | R  | 0     | Reserved.                                                                     |
| [14..8]  | NumSteps      | R  | 03    | Number of gains steps (number of possible settings - 1).                      |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                     |
| [6..0]   | Offset        | R  | 00    | Indicates which step is 0dB                                                   |

**8.14.5. DMic0 OutAmpLeft**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | BA0     | 00      | See bitfield table. |

**8.14.5.1. DMic0 OutAmpLeft**

| Bit     | Bitfield Name | RW | Reset    | Description                                                               |
|---------|---------------|----|----------|---------------------------------------------------------------------------|
| [31..3] | Rsvd1         | R  | 00000000 | Reserved.                                                                 |
| [2..0]  | Gain          | RW | 0        | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |

**8.14.6. DMic0 OutAmpRight**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B80     | 00      | See bitfield table. |

**8.14.6.1. DMic0 OutAmpRight**

| Bit     | Bitfield Name | RW | Reset    | Description                                                                |
|---------|---------------|----|----------|----------------------------------------------------------------------------|
| [31..3] | Rsvd1         | R  | 00000000 | Reserved.                                                                  |
| [2..0]  | Gain          | RW | 0        | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

**8.14.7. DMic0 ConfigDefault**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1C     | 00      | See bitfield table. |

**8.14.7.1. DMic0 ConfigDefault**

| Bit      | Bitfield Name    | RW | Reset | Description                                                                                                                                                                                                                                                                         |
|----------|------------------|----|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..30] | PortConnectivity | RW | 1     | Port connectivity: 0h = Port complex is connected to a jack; 1h = No physical connection for port; 2h = Fixed function device is attached; 3h = Both jack and internal device attached (info in all other fields refers to integrated device any presence detection refers to jack) |
| [29..24] | Location         | RW | 00    | Location. Bits [5..4]: 0h = External on primary chassis; 1h = Internal; 2h = Separate chassis; 3h = Other. Bits [3..0]: 0h = N/A; 1h = Rear; 2h = Front; 3h = Left; 4h = Right; 5h = Top; 6h = Bottom; 7h-9h = Special; Ah-Fh = Reserved                                            |
| [23..20] | Device           | RW | F     | Default device: 0h = Line out; 1h = Speaker; 2h = HP out; 3h = CD; 4h = SPDIF Out; 5h = Digital other out; 6h = Modem line side; 7h = Modem handset side; 8h = Line in; 9h = Aux; Ah = Mic in; Bh = Telephony; Ch = SPDIF In; Dh = Digital other in; Eh = Reserved; Fh = Other      |

8.14.7.1. *DMic0 ConfigDefault*

| Bit      | Bitfield Name  | RW | Reset | Description                                                                                                                                                                                                                                                                                |
|----------|----------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [19..16] | ConnectionType | RW | 0     | Connection type: 0h = Unknown; 1h = 1/8" stereo/mono; 2h = 1/4" stereo/mono; 3h = ATAPI internal; 4h = RCA; 5h = Optical; 6h = Other digital; 7h = Other analog; 8h = Multichannel analog (DIN); 9h = XLR/Professional; Ah = RJ-11 (modem); Bh = Combination; Ch-Eh = Reserved; Fh = Other |
| [15..12] | Color          | RW | 0     | Color: 0h = Unknown; 1h = Black; 2h = Grey; 3h = Blue; 4h = Green; 5h = Red; 6h = Orange; 7h = Yellow; 8h = Purple; 9h = Pink; Ah-Dh = Reserved; Eh = White; Fh = Other                                                                                                                    |
| [11..8]  | Misc           | RW | 0     | Miscellaneous: Bits [3..1] = Reserved; Bit 0 = Jack detect override                                                                                                                                                                                                                        |
| [7..4]   | Association    | RW | F     | Default association.                                                                                                                                                                                                                                                                       |
| [3..0]   | Sequence       | RW | 0     | Sequence.                                                                                                                                                                                                                                                                                  |

8.15. **DMic1 Node (NID = 19)**8.15.1. *DMic1 WCap*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

8.15.1.1. *DMic1 WCap*

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 4     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |

**8.15.1.1. DMic1 WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                   |
|----------|---------------|----|-------|---------------------------------------------------------------|
| [19..16] | Delay         | R  | 0     | Number of sample delays through widget.                       |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                                     |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                      |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                          |
| [9]      | DigitalStrm   | R  | 0     | Digital stream support: 1 = yes (digital)<br>0 = no (analog). |
| [8]      | ConnList      | R  | 0     | Connection list present: 1 = yes 0 = no.                      |
| [7]      | UnsolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                 |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                     |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                             |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                       |
| [3]      | AmpParOvrd    | R  | 1     | Amplifier capabilities override: 1 = yes<br>no.               |
| [2]      | OutAmpPrsnt   | R  | 1     | Output amp present: 1 = yes 0 = no.                           |
| [1]      | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                            |
| [0]      | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono).     |

**8.15.2. DMic1 PinCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0C      | See bitfield table. |

**8.15.2.1. DMic1 PinCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:17] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [16]     | EapdCap       | R  | 0     | EAPD support: 1 = yes 0 = no.                                                                                                                                                                                                                                      |
| [15.:8]  | VRefCntrl     | R  | 00    | Vref support: bit 7 = Reserved; bit 6 = Reserved; bit 5 = 100% support (1 = yes 0 = no); bit 4 = 80% support (1 = yes 0 = no); bit 3 = Reserved; bit 2 = GND support (1 = yes 0 = no); bit 1 = 50% support (1 = yes 0 = no); bit 0 = Hi-Z support (1 = yes 0 = no) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6]      | BalancedIO    | R  | 0     | Balanced I/O support: 1 = yes 0 = no.                                                                                                                                                                                                                              |
| [5]      | InCap         | R  | 1     | Input support: 1 = yes 0 = no.                                                                                                                                                                                                                                     |
| [4]      | OutCap        | R  | 0     | Output support: 1 = yes 0 = no.                                                                                                                                                                                                                                    |
| [3]      | HPhnDrvCap    | R  | 0     | Headphone amp present: 1 = yes 0 = no.                                                                                                                                                                                                                             |
| [2]      | PresDtctCap   | R  | 0     | Presence detection support: 1 = yes 0 = no.                                                                                                                                                                                                                        |
| [1]      | TrigRqd       | R  | 0     | Trigger required for impedance sense: 1 = yes 0 = no.                                                                                                                                                                                                              |
| [0]      | ImpSenseCap   | R  | 0     | Impedance sense support: 1 = yes 0 = no.                                                                                                                                                                                                                           |

**8.15.3. DMic1 PinWCntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F07     | 00      | See bitfield table. |

**8.15.3.1. DMic1 PinWCntrl**

| Bit     | Bitfield Name | RW | Reset   | Description                             |
|---------|---------------|----|---------|-----------------------------------------|
| [31..6] | Rsvd2         | R  | 0000000 | Reserved.                               |
| [5]     | InEn          | RW | 0       | Input enable: 1 = enabled 0 = disabled. |
| [4..0]  | Rsvd1         | R  | 00      | Reserved.                               |

**8.15.4. DMic1 OutAmpCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 12      | See bitfield table. |

**8.15.4.1. DMic1 OutAmpCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                   |
|----------|---------------|----|-------|-------------------------------------------------------------------------------|
| [31]     | Mute          | R  | 0     | Mute support: 1 = yes 0 = no.                                                 |
| [30..23] | Rsvd3         | R  | 00    | Reserved.                                                                     |
| [22..16] | StepSize      | R  | 27    | Size of each step in the gain range: 0 to 127 = .25dB to 32dB in .25dB steps. |
| [15]     | Rsvd2         | R  | 0     | Reserved.                                                                     |
| [14..8]  | NumSteps      | R  | 03    | Number of gains steps (number of possible settings - 1).                      |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                     |
| [6..0]   | Offset        | R  | 00    | Indicates which step is 0dB                                                   |

**8.15.5. DMic1 OutAmpLeft**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | BA0     | 00      | See bitfield table. |

**8.15.5.1. DMic1 OutAmpLeft**

| Bit     | Bitfield Name | RW | Reset    | Description                                                                |
|---------|---------------|----|----------|----------------------------------------------------------------------------|
| [31..3] | Rsvd1         | R  | 00000000 | Reserved.                                                                  |
| [2..0]  | Gain          | RW | 0        | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

**8.15.6. DMic1 OutAmpRight**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B80     | 00      | See bitfield table. |

**8.15.6.1. DMic1 OutAmpRight**

| Bit     | Bitfield Name | RW | Reset    | Description                                                                |
|---------|---------------|----|----------|----------------------------------------------------------------------------|
| [31..3] | Rsvd1         | R  | 00000000 | Reserved.                                                                  |
| [2..0]  | Gain          | RW | 0        | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

**8.15.7. DMic1 ConfigDefault**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1C     | 00      | See bitfield table. |

8.15.7.1. *DMic1 ConfigDefault*

| Bit      | Bitfield Name    | RW | Reset | Description                                                                                                                                                                                                                                                                                |
|----------|------------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..30] | PortConnectivity | RW | 1     | Port connectivity: 0h = Port complex is connected to a jack; 1h = No physical connection for port; 2h = Fixed function device is attached; 3h = Both jack and internal device attached (info in all other fields refers to integrated device any presence detection refers to jack)        |
| [29..24] | Location         | RW | 00    | Location. Bits [5..4]: 0h = External on primary chassis; 1h = Internal; 2h = Separate chassis; 3h = Other. Bits [3..0]: 0h = N/A; 1h = Rear; 2h = Front; 3h = Left; 4h = Right; 5h = Top; 6h = Bottom; 7h-9h = Special; Ah-Fh = Reserved                                                   |
| [23..20] | Device           | RW | F     | Default device: 0h = Line out; 1h = Speaker; 2h = HP out; 3h = CD; 4h = SPDIF Out; 5h = Digital other out; 6h = Modem line side; 7h = Modem handset side; 8h = Line in; 9h = Aux; Ah = Mic in; Bh = Telephony; Ch = SPDIF In; Dh = Digital other in; Eh = Reserved; Fh = Other             |
| [19..16] | ConnectionType   | RW | 0     | Connection type: 0h = Unknown; 1h = 1/8" stereo/mono; 2h = 1/4" stereo/mono; 3h = ATAPI internal; 4h = RCA; 5h = Optical; 6h = Other digital; 7h = Other analog; 8h = Multichannel analog (DIN); 9h = XLR/Professional; Ah = RJ-11 (modem); Bh = Combination; Ch-Eh = Reserved; Fh = Other |
| [15..12] | Color            | RW | 0     | Color: 0h = Unknown; 1h = Black; 2h = Grey; 3h = Blue; 4h = Green; 5h = Red; 6h = Orange; 7h = Yellow; 8h = Purple; 9h = Pink; Ah-Dh = Reserved; Eh = White; Fh = Other                                                                                                                    |
| [11..8]  | Misc             | RW | 0     | Miscellaneous: Bits [3..1] = Reserved; Bit 0 = Jack detect override                                                                                                                                                                                                                        |
| [7..4]   | Association      | RW | F     | Default association.                                                                                                                                                                                                                                                                       |
| [3..0]   | Sequence         | RW | 0     | Sequence.                                                                                                                                                                                                                                                                                  |

## 8.16. InPort0Mux Node (NID = 1A)

### 8.16.1. InPort0Mux WCap

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

#### 8.16.1.1. InPort0Mux WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23.:20] | Type          | R  | 3     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 1     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 1     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |

**8.16.1.1. InPort0Mux WCap**

| Bit | Bitfield Name | RW | Reset | Description                                               |
|-----|---------------|----|-------|-----------------------------------------------------------|
| [1] | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                        |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono). |

**8.16.2. InPort0Mux ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.16.2.1. InPort0Mux ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                          |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                            |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form<br>(15-bit) NID entries 0 = short-form<br>(7-bit) NID entries. |
| [6..0]  | ConL          | R  | 03     | Number of NID entries in connection list.                                                            |

**8.16.3. InPort0Mux ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.16.3.1. InPort0Mux ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description        |
|----------|---------------|----|-------|--------------------|
| [31..24] | ConL3         | R  | 00    | Unused list entry. |
| [23..16] | ConL2         | R  | 0E    | Reserved           |

**8.16.3.1. InPort0Mux ConLstEntry0**

| Bit     | Bitfield Name | RW | Reset | Description              |
|---------|---------------|----|-------|--------------------------|
| [15..8] | ConL1         | R  | 0C    | Port C Pin widget (0x0C) |
| [7..0]  | ConL0         | R  | 0B    | Port B Pin widget (0x0B) |

**8.16.4. InPort0Mux ConSelectCtrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F01     | 00      | See bitfield table. |

**8.16.4.1. InPort0Mux ConSelectCtrl**

| Bit     | Bitfield Name | RW | Reset    | Description                      |
|---------|---------------|----|----------|----------------------------------|
| [31..2] | Rsvd          | R  | 00000000 | Reserved.                        |
| [1..0]  | Index         | RW | 0        | Connection select control index. |

**8.16.5. InPort0Mux OutAmpCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 12      | See bitfield table. |

**8.16.5.1. InPort0Mux OutAmpCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                   |
|----------|---------------|----|-------|-------------------------------------------------------------------------------|
| [31]     | Mute          | R  | 0     | Mute support: 1 = yes 0 = no.                                                 |
| [30..23] | Rsvd3         | R  | 00    | Reserved.                                                                     |
| [22..16] | StepSize      | R  | 27    | Size of each step in the gain range: 0 to 127 = .25dB to 32dB in .25dB steps. |
| [15]     | Rsvd2         | R  | 0     | Reserved.                                                                     |

**8.16.5.1. InPort0Mux OutAmpCap**

| Bit     | Bitfield Name | RW | Reset | Description                                              |
|---------|---------------|----|-------|----------------------------------------------------------|
| [14.:8] | NumSteps      | R  | 03    | Number of gains steps (number of possible settings - 1). |
| [7]     | Rsvd1         | R  | 0     | Reserved.                                                |
| [6.:0]  | Offset        | R  | 00    | Indicates which step is 0dB                              |

**8.16.6. InPort0Mux OutAmpLeft**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | BA0     | 00      | See bitfield table. |

**8.16.6.1. InPort0Mux OutAmpLeft**

| Bit     | Bitfield Name | RW | Reset    | Description                                                               |
|---------|---------------|----|----------|---------------------------------------------------------------------------|
| [31.:3] | Rsvd1         | R  | 00000000 | Reserved.                                                                 |
| [2.:0]  | Gain          | RW | 0        | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |

**8.16.7. InPort0Mux OutAmpRight**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B80     | 00      | See bitfield table. |

**8.16.7.1. InPort0Mux OutAmpRight**

| Bit     | Bitfield Name | RW | Reset    | Description                                                                |
|---------|---------------|----|----------|----------------------------------------------------------------------------|
| [31..3] | Rsvd1         | R  | 00000000 | Reserved.                                                                  |
| [2..0]  | Gain          | RW | 0        | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

**8.17. InPort1Mux Node (NID = 1B)****8.17.1. InPort1Mux WCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

**8.17.1.1. InPort1Mux WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 3     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19..16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |

**8.17.1.1. InPort1Mux WCap**

| Bit | Bitfield Name | RW | Reset | Description                                            |
|-----|---------------|----|-------|--------------------------------------------------------|
| [7] | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.          |
| [6] | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.              |
| [5] | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                      |
| [4] | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                |
| [3] | AmpParOvrd    | R  | 1     | Amplifier capabilities override: 1 = yes no.           |
| [2] | OutAmpPrsnt   | R  | 1     | Output amp present: 1 = yes 0 = no.                    |
| [1] | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                     |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo) 0 = no (mono). |

**8.17.2. InPort1Mux ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.17.2.1. InPort1Mux ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries 0 = short-form (7-bit) NID entries. |
| [6..0]  | ConL          | R  | 03     | Number of NID entries in connection list.                                                      |

**8.17.3. InPort1Mux ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.17.3.1. InPort1Mux ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description              |
|----------|---------------|----|-------|--------------------------|
| [31.:24] | ConL3         | R  | 00    | Unused list entry.       |
| [23.:16] | ConL2         | R  | 0E    | Reserved                 |
| [15.:8]  | ConL1         | R  | 0C    | Port C Pin widget (0x0C) |
| [7.:0]   | ConL0         | R  | 0B    | Port B Pin widget (0x0B) |

**8.17.4. InPort1Mux ConSelectCtrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F01     | 00      | See bitfield table. |

**8.17.4.1. InPort1Mux ConSelectCtrl**

| Bit     | Bitfield Name | RW | Reset    | Description                      |
|---------|---------------|----|----------|----------------------------------|
| [31.:2] | Rsvd          | R  | 00000000 | Reserved.                        |
| [1.:0]  | Index         | RW | 0        | Connection select control index. |

**8.17.5. InPort1Mux OutAmpCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 12      | See bitfield table. |

**8.17.5.1. InPort1Mux OutAmpCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                   |
|----------|---------------|----|-------|-------------------------------------------------------------------------------|
| [31]     | Mute          | R  | 0     | Mute support: 1 = yes 0 = no.                                                 |
| [30..23] | Rsvd3         | R  | 00    | Reserved.                                                                     |
| [22..16] | StepSize      | R  | 27    | Size of each step in the gain range: 0 to 127 = .25dB to 32dB in .25dB steps. |
| [15]     | Rsvd2         | R  | 0     | Reserved.                                                                     |
| [14..8]  | NumSteps      | R  | 03    | Number of gains steps (number of possible settings - 1).                      |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                     |
| [6..0]   | Offset        | R  | 00    | Indicates which step is 0dB                                                   |

**8.17.6. InPort1Mux OutAmpLeft**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | BA0     | 00      | See bitfield table. |

**8.17.6.1. InPort1Mux OutAmpLeft**

| Bit     | Bitfield Name | RW | Reset    | Description                                                               |
|---------|---------------|----|----------|---------------------------------------------------------------------------|
| [31..3] | Rsvd1         | R  | 00000000 | Reserved.                                                                 |
| [2..0]  | Gain          | RW | 0        | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |

**8.17.7. InPort1Mux OutAmpRight**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B80     | 00      | See bitfield table. |

**8.17.7.1. InPort1Mux OutAmpRight**

| Bit     | Bitfield Name | RW | Reset    | Description                                                                |
|---------|---------------|----|----------|----------------------------------------------------------------------------|
| [31..3] | Rsvd1         | R  | 00000000 | Reserved.                                                                  |
| [2..0]  | Gain          | RW | 0        | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

**8.18. ADC0Mux Node (NID = 1C)****8.18.1. ADC0Mux WCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

**8.18.1.1. ADC0Mux WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 3     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19..16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |

**8.18.1.1. ADC0Mux WCap**

| Bit  | Bitfield Name | RW | Reset | Description                                                   |
|------|---------------|----|-------|---------------------------------------------------------------|
| [11] | SwapCap       | R  | 1     | Left/right swap support: 1 = yes 0 = no.                      |
| [10] | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                          |
| [9]  | DigitalStrm   | R  | 0     | Digital stream support: 1 = yes (digital)<br>0 = no (analog). |
| [8]  | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                      |
| [7]  | UnsolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                 |
| [6]  | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                     |
| [5]  | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                             |
| [4]  | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                       |
| [3]  | AmpParamOvrd  | R  | 1     | Amplifier capabilities override: 1 = yes<br>no.               |
| [2]  | OutAmpPrsnt   | R  | 1     | Output amp present: 1 = yes 0 = no.                           |
| [1]  | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                            |
| [0]  | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono).     |

**8.18.2. ADC0Mux ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.18.2.1. ADC0Mux ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries 0 = short-form (7-bit) NID entries. |
| [6..0]  | ConL          | R  | 04     | Number of NID entries in connection list.                                                      |

**8.18.3. ADC0Mux ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.18.3.1. ADC0Mux ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description                       |
|----------|---------------|----|-------|-----------------------------------|
| [31..24] | ConL3         | R  | 19    | DMic1 Pin widget (0x19)           |
| [23..16] | ConL2         | R  | 18    | DMic0 Pin widget (0x18)           |
| [15..8]  | ConL1         | R  | 17    | InputMixer Summing widget (0x17)  |
| [7..0]   | ConL0         | R  | 1A    | InPort0Mux Selector widget (0x1A) |

**8.18.4. ADC0Mux ConSelectCtrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F01     | 00      | See bitfield table. |

**8.18.4.1. ADC0Mux ConSelectCtrl**

| Bit     | Bitfield Name | RW | Reset    | Description                      |
|---------|---------------|----|----------|----------------------------------|
| [31..2] | Rsvd          | R  | 00000000 | Reserved.                        |
| [1..0]  | Index         | RW | 0        | Connection select control index. |

**8.18.5. ADC0Mux LR**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F0C     | 00      | See bitfield table. |

**8.18.5.1. ADC0Mux LR**

| Bit     | Bitfield Name | RW | Reset    | Description                                              |
|---------|---------------|----|----------|----------------------------------------------------------|
| [31..3] | Rsvd2         | R  | 00000000 | Reserved.                                                |
| [2]     | SwapEn        | RW | 0        | Swap enable: 1 = L/R swap enabled 0 = L/R swap disabled. |
| [1..0]  | Rsvd1         | R  | 0        | Reserved.                                                |

**8.18.6. ADC0Mux OutAmpCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 12      | See bitfield table. |

**8.18.6.1. ADC0Mux OutAmpCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                   |
|----------|---------------|----|-------|-------------------------------------------------------------------------------|
| [31]     | Mute          | R  | 1     | Mute support: 1 = yes 0 = no.                                                 |
| [30..23] | Rsvd3         | R  | 00    | Reserved.                                                                     |
| [22..16] | StepSize      | R  | 05    | Size of each step in the gain range: 0 to 127 = .25dB to 32dB in .25dB steps. |
| [15]     | Rsvd2         | R  | 0     | Reserved.                                                                     |
| [14..8]  | NumSteps      | R  | 0F    | Number of gains steps (number of possible settings - 1).                      |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                     |
| [6..0]   | Offset        | R  | 00    | Indicates which step is 0dB                                                   |

**8.18.7. ADC0Mux OutAmpLeft**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | BA0     | 00      | See bitfield table. |

**8.18.7.1. ADC0Mux OutAmpLeft**

| Bit     | Bitfield Name | RW | Reset  | Description                                                               |
|---------|---------------|----|--------|---------------------------------------------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                                                                 |
| [7]     | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted.                                        |
| [6..4]  | Rsvd1         | R  | 0      | Reserved.                                                                 |
| [3..0]  | Gain          | RW | 0      | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |

**8.18.8. ADC0Mux OutAmpRight**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B80     | 00      | See bitfield table. |

**8.18.8.1. ADC0Mux OutAmpRight**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                |
|---------|---------------|----|--------|----------------------------------------------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                                                                  |
| [7]     | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted.                                         |
| [6..4]  | Rsvd1         | R  | 0      | Reserved.                                                                  |
| [3..0]  | Gain          | RW | 0      | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

**8.19. ADC1Mux Node (NID = 1D)****8.19.1. ADC1Mux WCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

**8.19.1.1. ADC1Mux WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 3     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |

**8.19.1.1. ADC1Mux WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                   |
|----------|---------------|----|-------|---------------------------------------------------------------|
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                       |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                     |
| [11]     | SwapCap       | R  | 1     | Left/right swap support: 1 = yes 0 = no.                      |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                          |
| [9]      | DigitalStrm   | R  | 0     | Digital stream support: 1 = yes (digital)<br>0 = no (analog). |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                      |
| [7]      | UnsolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                 |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                     |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                             |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                       |
| [3]      | AmpParamOvrd  | R  | 1     | Amplifier capabilities override: 1 = yes<br>no.               |
| [2]      | OutAmpPrsnt   | R  | 1     | Output amp present: 1 = yes 0 = no.                           |
| [1]      | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                            |
| [0]      | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono).     |

**8.19.2. ADC1Mux ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.19.2.1. ADC1Mux ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries 0 = short-form (7-bit) NID entries. |
| [6..0]  | ConL          | R  | 04     | Number of NID entries in connection list.                                                      |

**8.19.3. ADC1Mux ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.19.3.1. ADC1Mux ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description                       |
|----------|---------------|----|-------|-----------------------------------|
| [31..24] | ConL3         | R  | 19    | DMic1 Pin widget (0x19)           |
| [23..16] | ConL2         | R  | 18    | DMic0 Pin widget (0x18)           |
| [15..8]  | ConL1         | R  | 17    | InputMixer Summing widget (0x17)  |
| [7..0]   | ConL0         | R  | 1B    | InPort1Mux Selector widget (0x1B) |

**8.19.4. ADC1Mux ConSelectCtrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F01     | 00      | See bitfield table. |

**8.19.4.1. ADC1Mux ConSelectCtrl**

| Bit     | Bitfield Name | RW | Reset    | Description                      |
|---------|---------------|----|----------|----------------------------------|
| [31..2] | Rsvd          | R  | 00000000 | Reserved.                        |
| [1..0]  | Index         | RW | 0        | Connection select control index. |

**8.19.5. ADC1Mux LR**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F0C     | 00      | See bitfield table. |

**8.19.5.1. ADC1Mux LR**

| Bit     | Bitfield Name | RW | Reset    | Description                                              |
|---------|---------------|----|----------|----------------------------------------------------------|
| [31..3] | Rsvd2         | R  | 00000000 | Reserved.                                                |
| [2]     | SwapEn        | RW | 0        | Swap enable: 1 = L/R swap enabled 0 = L/R swap disabled. |
| [1..0]  | Rsvd1         | R  | 0        | Reserved.                                                |

**8.19.6. ADC1Mux OutAmpCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 12      | See bitfield table. |

**8.19.6.1. ADC1Mux OutAmpCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                   |
|----------|---------------|----|-------|-------------------------------------------------------------------------------|
| [31]     | Mute          | R  | 1     | Mute support: 1 = yes 0 = no.                                                 |
| [30..23] | Rsvd3         | R  | 00    | Reserved.                                                                     |
| [22..16] | StepSize      | R  | 05    | Size of each step in the gain range: 0 to 127 = .25dB to 32dB in .25dB steps. |
| [15]     | Rsvd2         | R  | 0     | Reserved.                                                                     |
| [14..8]  | NumSteps      | R  | 0F    | Number of gains steps (number of possible settings - 1).                      |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                     |
| [6..0]   | Offset        | R  | 00    | Indicates which step is 0dB                                                   |

**8.19.7. ADC1Mux OutAmpLeft**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | BA0     | 00      | See bitfield table. |

**8.19.7.1. ADC1Mux OutAmpLeft**

| Bit     | Bitfield Name | RW | Reset  | Description                                                               |
|---------|---------------|----|--------|---------------------------------------------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                                                                 |
| [7]     | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted.                                        |
| [6..4]  | Rsvd1         | R  | 0      | Reserved.                                                                 |
| [3..0]  | Gain          | RW | 0      | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |

**8.19.8. ADC1Mux OutAmpRight**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | B80     | 00      | See bitfield table. |

**8.19.8.1. ADC1Mux OutAmpRight**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                |
|---------|---------------|----|--------|----------------------------------------------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                                                                  |
| [7]     | Mute          | RW | 1      | Amp mute: 1 = muted 0 = not muted.                                         |
| [6..4]  | Rsvd1         | R  | 0      | Reserved.                                                                  |
| [3..0]  | Gain          | RW | 0      | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

**8.20. Dig0Pin Node (NID = 1E)****8.20.1. Dig0Pin WCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

**8.20.1.1. Dig0Pin WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 4     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |

**8.20.1.1. Dig0Pin WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                   |
|----------|---------------|----|-------|---------------------------------------------------------------|
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                       |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                     |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                      |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                          |
| [9]      | Dig           | R  | 1     | Digital stream support: 1 = yes (digital)<br>0 = no (analog). |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                      |
| [7]      | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                 |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                     |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                             |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                       |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes<br>no.               |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                           |
| [1]      | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                            |
| [0]      | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono).     |

**8.20.2. Dig0Pin PinCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0C      | See bitfield table. |

**8.20.2.1. Dig0Pin PinCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..17] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [16]     | EapdCap       | R  | 0     | EAPD support: 1 = yes 0 = no.                                                                                                                                                                                                                                      |
| [15..8]  | VrefCntrl     | R  | 00    | Vref support: bit 7 = Reserved; bit 6 = Reserved; bit 5 = 100% support (1 = yes 0 = no); bit 4 = 80% support (1 = yes 0 = no); bit 3 = Reserved; bit 2 = GND support (1 = yes 0 = no); bit 1 = 50% support (1 = yes 0 = no); bit 0 = Hi-Z support (1 = yes 0 = no) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6]      | BalancedIO    | R  | 0     | Balanced I/O support: 1 = yes 0 = no.                                                                                                                                                                                                                              |
| [5]      | InCap         | R  | 0     | Input support: 1 = yes 0 = no.                                                                                                                                                                                                                                     |
| [4]      | OutCap        | R  | 1     | Output support: 1 = yes 0 = no.                                                                                                                                                                                                                                    |
| [3]      | HdphDrvCap    | R  | 0     | Headphone amp present: 1 = yes 0 = no.                                                                                                                                                                                                                             |
| [2]      | PresDtctCap   | R  | 0     | Presence detection support: 1 = yes 0 = no.                                                                                                                                                                                                                        |
| [1]      | TrigRqd       | R  | 0     | Trigger required for impedance sense: 1 = yes 0 = no.                                                                                                                                                                                                              |
| [0]      | ImpSenseCap   | R  | 0     | Impedance sense support: 1 = yes 0 = no.                                                                                                                                                                                                                           |

**8.20.3. Dig0Pin ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.20.3.1. Dig0Pin ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries 0 = short-form (7-bit) NID entries. |
| [6..0]  | ConL          | R  | 01     | Number of NID entries in connection list.                                                      |

**8.20.4. Dig0Pin ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.20.4.1. Dig0Pin ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description                    |
|----------|---------------|----|-------|--------------------------------|
| [31..24] | ConL3         | R  | 00    | Unused list entry.             |
| [23..16] | ConL2         | R  | 00    | Unused list entry.             |
| [15..8]  | ConL1         | R  | 00    | Unused list entry.             |
| [7..0]   | ConL0         | R  | 24    | Dig0Mux Selector widget (0x24) |

**8.20.5. Dig0Pin PinWCntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F07     | 00      | See bitfield table. |

**8.20.5.1. Dig0Pin PinWCntrl**

| Bit     | Bitfield Name | RW | Reset   | Description                              |
|---------|---------------|----|---------|------------------------------------------|
| [31..7] | Rsvd2         | R  | 0000000 | Reserved.                                |
| [6]     | OutEn         | RW | 0       | Output enable: 1 = enabled 0 = disabled. |
| [5..0]  | Rsvd1         | R  | 00      | Reserved.                                |

**8.20.6. Dig0Pin ConfigDefault**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1C     | 00      | See bitfield table. |

**8.20.6.1. Dig0Pin ConfigDefault**

| Bit      | Bitfield Name    | RW | Reset | Description                                                                                                                                                                                                                                                                         |
|----------|------------------|----|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..30] | PortConnectivity | RW | 0     | Port connectivity: 0h = Port complex is connected to a jack; 1h = No physical connection for port; 2h = Fixed function device is attached; 3h = Both jack and internal device attached (info in all other fields refers to integrated device any presence detection refers to jack) |
| [29..24] | Location         | RW | 1     | Location. Bits [5..4]: 0h = External on primary chassis; 1h = Internal; 2h = Separate chassis; 3h = Other. Bits [3..0]: 0h = N/A; 1h = Rear; 2h = Front; 3h = Left; 4h = Right; 5h = Top; 6h = Bottom; 7h-9h = Special; Ah-Fh = Reserved                                            |

8.20.6.1. *Dig0Pin ConfigDefault*

| Bit      | Bitfield Name  | RW | Reset | Description                                                                                                                                                                                                                                                                                |
|----------|----------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [23.:20] | Device         | RW | 4     | Default device: 0h = Line out; 1h = Speaker; 2h = HP out; 3h = CD; 4h = SPDIF Out; 5h = Digital other out; 6h = Modem line side; 7h = Modem handset side; 8h = Line in; 9h = Aux; Ah = Mic in; Bh = Telephony; Ch = SPDIF In; Dh = Digital other in; Eh = Reserved; Fh = Other             |
| [19.:16] | ConnectionType | RW | 5     | Connection type: 0h = Unknown; 1h = 1/8" stereo/mono; 2h = 1/4" stereo/mono; 3h = ATAPI internal; 4h = RCA; 5h = Optical; 6h = Other digital; 7h = Other analog; 8h = Multichannel analog (DIN); 9h = XLR/Professional; Ah = RJ-11 (modem); Bh = Combination; Ch-Eh = Reserved; Fh = Other |
| [15.:12] | Color          | RW | 2     | Color: 0h = Unknown; 1h = Black; 2h = Grey; 3h = Blue; 4h = Green; 5h = Red; 6h = Orange; 7h = Yellow; 8h = Purple; 9h = Pink; Ah-Dh = Reserved; Eh = White; Fh = Other                                                                                                                    |
| [11.:8]  | Misc           | RW | 0     | Miscellaneous: Bits [3..1] = Reserved; Bit 0 = Jack detect override                                                                                                                                                                                                                        |
| [7.:4]   | Association    | RW | 5     | Default association.                                                                                                                                                                                                                                                                       |
| [3.:0]   | Sequence       | RW | 0     | Sequence.                                                                                                                                                                                                                                                                                  |

## 8.21. Dig1Pin Node (NID = 1F)

8.21.1. *Dig1Pin WCap*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

8.21.1.1. *Dig1Pin WCap*

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23.:20] | Type          | R  | 4     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 1     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 1     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |
| [1]      | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                                                                                                                                                                        |
| [0]      | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo) 0 = no (mono).                                                                                                                                                    |

**8.21.2. Dig1Pin PinCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0C      | See bitfield table. |

**8.21.2.1. Dig1Pin PinCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:17] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [16]     | EapdCap       | R  | 1     | EAPD support: 1 = yes 0 = no.                                                                                                                                                                                                                                      |
| [15.:8]  | VrefCntrl     | R  | 00    | Vref support: bit 7 = Reserved; bit 6 = Reserved; bit 5 = 100% support (1 = yes 0 = no); bit 4 = 80% support (1 = yes 0 = no); bit 3 = Reserved; bit 2 = GND support (1 = yes 0 = no); bit 1 = 50% support (1 = yes 0 = no); bit 0 = Hi-Z support (1 = yes 0 = no) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6]      | BalancedIO    | R  | 0     | Balanced I/O support: 1 = yes 0 = no.                                                                                                                                                                                                                              |
| [5]      | InCap         | R  | 0     | Input support: 1 = yes 0 = no.                                                                                                                                                                                                                                     |
| [4]      | OutCap        | R  | 1     | Output support: 1 = yes 0 = no.                                                                                                                                                                                                                                    |
| [3]      | HdphDrvCap    | R  | 0     | Headphone amp present: 1 = yes 0 = no.                                                                                                                                                                                                                             |
| [2]      | PresDtctCap   | R  | 0     | Presence detection support: 1 = yes 0 = no.                                                                                                                                                                                                                        |
| [1]      | TrigRqd       | R  | 0     | Trigger required for impedance sense: 1 = yes 0 = no.                                                                                                                                                                                                              |
| [0]      | ImpSenseCap   | R  | 0     | Impedance sense support: 1 = yes 0 = no.                                                                                                                                                                                                                           |

**8.21.3. Dig1Pin ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.21.3.1. Dig1Pin ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31.:8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries 0 = short-form (7-bit) NID entries. |
| [6.:0]  | ConL          | R  | 02     | Number of NID entries in connection list.                                                      |

**8.21.4. Dig1Pin ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.21.4.1. Dig1Pin ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description                    |
|----------|---------------|----|-------|--------------------------------|
| [31.:24] | ConL3         | R  | 00    | Unused list entry.             |
| [23.:16] | ConL2         | R  | 00    | Unused list entry.             |
| [15.:8]  | ConL1         | R  | 25    | Dig2Mux Selector widget (0x25) |
| [7.:0]   | ConL0         | R  | 24    | Dig0Mux Selector widget (0x24) |

**8.21.5. Dig1Pin ConSelectCtrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F01     | 00      | See bitfield table. |

**8.21.5.1. Dig1Pin ConSelectCtrl**

| Bit     | Bitfield Name | RW | Reset    | Description                      |
|---------|---------------|----|----------|----------------------------------|
| [31.:1] | Rsvd          | R  | 00000000 | Reserved.                        |
| [0]     | Index         | RW | 0        | Connection select control index. |

**8.21.6. Dig1Pin PinWCntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F07     | 00      | See bitfield table. |

**8.21.6.1. Dig1Pin PinWCntrl**

| Bit     | Bitfield Name | RW | Reset    | Description                              |
|---------|---------------|----|----------|------------------------------------------|
| [31.:7] | Rsvd2         | R  | 00000000 | Reserved.                                |
| [6]     | OutEn         | RW | 0        | Output enable: 1 = enabled 0 = disabled. |
| [5.:0]  | Rsvd1         | R  | 00       | Reserved.                                |

**8.21.7. Dig1Pin PwrState**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F05     | 00      | See bitfield table. |

**8.21.7.1. Dig1Pin PwrState**

| Bit     | Bitfield Name | RW | Reset    | Description                                                                                                                                                  |
|---------|---------------|----|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..6] | Rsvd2         | R  | 00000000 | Reserved.                                                                                                                                                    |
| [5..4]  | Act           | R  | 3        | Actual power state of this widget.                                                                                                                           |
| [3..2]  | Rsvd1         | R  | 0        | Reserved.                                                                                                                                                    |
| [1..0]  | Set           | RW | 3        | Current power state setting for this widget used for EAPD control in this case: 0h-1h = Pin drives the value of the EAPD control bit; 2h-3h = Pin tri-stated |

**8.21.8. Dig1Pin EAPD**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F0C     | 00      | See bitfield table. |

**8.21.8.1. Dig1Pin EAPD**

| Bit     | Bitfield Name | RW | Reset    | Description                                                                                              |
|---------|---------------|----|----------|----------------------------------------------------------------------------------------------------------|
| [31..2] | Rsvd2         | R  | 00000000 | Reserved.                                                                                                |
| [1]     | Control       | RW | 0        | EAPD value reflected on the EAPD pin: 0 = Power down external amplifier; 1 = Power up external amplifier |
| [0]     | Rsvd1         | R  | 0        | Reserved.                                                                                                |

**8.21.9. Dig1Pin ConfigDefault**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1C     | 00      | See bitfield table. |

8.21.9.1. *Dig1Pin ConfigDefault*

| Bit      | Bitfield Name    | RW | Reset | Description                                                                                                                                                                                                                                                                                |
|----------|------------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:30] | PortConnectivity | RW | 2     | Port connectivity: 0h = Port complex is connected to a jack; 1h = No physical connection for port; 2h = Fixed function device is attached; 3h = Both jack and internal device attached (info in all other fields refers to integrated device any presence detection refers to jack)        |
| [29.:24] | Location         | RW | 18    | Location. Bits [5..4]: 0h = External on primary chassis; 1h = Internal; 2h = Separate chassis; 3h = Other. Bits [3..0]: 0h = N/A; 1h = Rear; 2h = Front; 3h = Left; 4h = Right; 5h = Top; 6h = Bottom; 7h-9h = Special; Ah-Fh = Reserved                                                   |
| [23.:20] | Device           | RW | 5     | Default device: 0h = Line out; 1h = Speaker; 2h = HP out; 3h = CD; 4h = SPDIF Out; 5h = Digital other out; 6h = Modem line side; 7h = Modem handset side; 8h = Line in; 9h = Aux; Ah = Mic in; Bh = Telephony; Ch = SPDIF In; Dh = Digital other in; Eh = Reserved; Fh = Other             |
| [19.:16] | ConnectionType   | RW | 6     | Connection type: 0h = Unknown; 1h = 1/8" stereo/mono; 2h = 1/4" stereo/mono; 3h = ATAPI internal; 4h = RCA; 5h = Optical; 6h = Other digital; 7h = Other analog; 8h = Multichannel analog (DIN); 9h = XLR/Professional; Ah = RJ-11 (modem); Bh = Combination; Ch-Eh = Reserved; Fh = Other |
| [15.:12] | Color            | RW | 0     | Color: 0h = Unknown; 1h = Black; 2h = Grey; 3h = Blue; 4h = Green; 5h = Red; 6h = Orange; 7h = Yellow; 8h = Purple; 9h = Pink; Ah-Dh = Reserved; Eh = White; Fh = Other                                                                                                                    |
| [11.:8]  | Misc             | RW | 0     | Miscellaneous: Bits [3..1] = Reserved; Bit 0 = Jack detect override                                                                                                                                                                                                                        |
| [7.:4]   | Association      | RW | 6     | Default association.                                                                                                                                                                                                                                                                       |
| [3.:0]   | Sequence         | RW | 0     | Sequence.                                                                                                                                                                                                                                                                                  |

## 8.22. Dig2Pin Node (NID = 20)

### 8.22.1. Dig2Pin WCap

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

#### 8.22.1.1. Dig2Pin WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23.:20] | Type          | R  | 4     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 1     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |

**8.22.1.1. Dig2Pin WCap**

| Bit | Bitfield Name | RW | Reset | Description                                               |
|-----|---------------|----|-------|-----------------------------------------------------------|
| [1] | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                        |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono). |

**8.22.2. Dig2Pin PinCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0C      | See bitfield table. |

**8.22.2.1. Dig2Pin PinCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..17] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [16]     | EapdCap       | R  | 0     | EAPD support: 1 = yes 0 = no.                                                                                                                                                                                                                                      |
| [15..8]  | VrefCntrl     | R  | 00    | Vref support: bit 7 = Reserved; bit 6 = Reserved; bit 5 = 100% support (1 = yes 0 = no); bit 4 = 80% support (1 = yes 0 = no); bit 3 = Reserved; bit 2 = GND support (1 = yes 0 = no); bit 1 = 50% support (1 = yes 0 = no); bit 0 = Hi-Z support (1 = yes 0 = no) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6]      | BalancedIO    | R  | 0     | Balanced I/O support: 1 = yes 0 = no.                                                                                                                                                                                                                              |
| [5]      | InCap         | R  | 0     | Input support: 1 = yes 0 = no.                                                                                                                                                                                                                                     |
| [4]      | OutCap        | R  | 1     | Output support: 1 = yes 0 = no.                                                                                                                                                                                                                                    |
| [3]      | HdphDrvCap    | R  | 0     | Headphone amp present: 1 = yes 0 = no.                                                                                                                                                                                                                             |
| [2]      | PresDtctCap   | R  | 0     | Presence detection support: 1 = yes 0 = no.                                                                                                                                                                                                                        |

**8.22.2.1. Dig2Pin PinCap**

| Bit | Bitfield Name | RW | Reset | Description                                           |
|-----|---------------|----|-------|-------------------------------------------------------|
| [1] | TrigRqd       | R  | 0     | Trigger required for impedance sense: 1 = yes 0 = no. |
| [0] | ImpSenseCap   | R  | 0     | Impedance sense support: 1 = yes 0 = no.              |

**8.22.3. Dig2Pin ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.22.3.1. Dig2Pin ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                    |
|---------|---------------|----|--------|------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                      |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries 0 = short-form (7-bit) NID entries. |
| [6..0]  | ConL          | R  | 01     | Number of NID entries in connection list.                                                      |

**8.22.4. Dig2Pin ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.22.4.1. Dig2Pin ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description                    |
|----------|---------------|----|-------|--------------------------------|
| [31.:24] | ConL3         | R  | 00    | Unused list entry.             |
| [23.:16] | ConL2         | R  | 00    | Unused list entry.             |
| [15.:8]  | ConL1         | R  | 00    | Unused list entry.             |
| [7.:0]   | ConL0         | R  | 25    | Dig2Mux Selector widget (0x25) |

**8.22.5. Dig2Pin PinWCntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F07     | 00      | See bitfield table. |

**8.22.5.1. Dig2Pin PinWCntrl**

| Bit     | Bitfield Name | RW | Reset   | Description                              |
|---------|---------------|----|---------|------------------------------------------|
| [31.:7] | Rsvd2         | R  | 0000000 | Reserved.                                |
| [6]     | OutEn         | RW | 0       | Output enable: 1 = enabled 0 = disabled. |
| [5.:0]  | Rsvd1         | R  | 00      | Reserved.                                |

**8.22.6. Dig2Pin ConfigDefault**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1C     | 00      | See bitfield table. |

## 8.22.6.1. Dig2Pin ConfigDefault

| Bit      | Bitfield Name    | RW | Reset | Description                                                                                                                                                                                                                                                                                |
|----------|------------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:30] | PortConnectivity | RW | 1     | Port connectivity: 0h = Port complex is connected to a jack; 1h = No physical connection for port; 2h = Fixed function device is attached; 3h = Both jack and internal device attached (info in all other fields refers to integrated device any presence detection refers to jack)        |
| [29.:24] | Location         | RW | 00    | Location. Bits [5..4]: 0h = External on primary chassis; 1h = Internal; 2h = Separate chassis; 3h = Other. Bits [3..0]: 0h = N/A; 1h = Rear; 2h = Front; 3h = Left; 4h = Right; 5h = Top; 6h = Bottom; 7h-9h = Special; Ah-Fh = Reserved                                                   |
| [23.:20] | Device           | RW | F     | Default device: 0h = Line out; 1h = Speaker; 2h = HP out; 3h = CD; 4h = SPDIF Out; 5h = Digital other out; 6h = Modem line side; 7h = Modem handset side; 8h = Line in; 9h = Aux; Ah = Mic in; Bh = Telephony; Ch = SPDIF In; Dh = Digital other in; Eh = Reserved; Fh = Other             |
| [19.:16] | ConnectionType   | RW | 0     | Connection type: 0h = Unknown; 1h = 1/8" stereo/mono; 2h = 1/4" stereo/mono; 3h = ATAPI internal; 4h = RCA; 5h = Optical; 6h = Other digital; 7h = Other analog; 8h = Multichannel analog (DIN); 9h = XLR/Professional; Ah = RJ-11 (modem); Bh = Combination; Ch-Eh = Reserved; Fh = Other |
| [15.:12] | Color            | RW | 0     | Color: 0h = Unknown; 1h = Black; 2h = Grey; 3h = Blue; 4h = Green; 5h = Red; 6h = Orange; 7h = Yellow; 8h = Purple; 9h = Pink; Ah-Dh = Reserved; Eh = White; Fh = Other                                                                                                                    |
| [11.:8]  | Misc             | RW | 0     | Miscellaneous: Bits [3..1] = Reserved; Bit 0 = Jack detect override                                                                                                                                                                                                                        |
| [7.:4]   | Association      | RW | F     | Default association.                                                                                                                                                                                                                                                                       |
| [3.:0]   | Sequence         | RW | 0     | Sequence.                                                                                                                                                                                                                                                                                  |

## 8.23. SPDIFOut0 Node (NID = 21)

### 8.23.1. SPDIFOut0 WCap

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

#### 8.23.1.1. SPDIFOut0 WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23.:20] | Type          | R  | 0     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:16] | Delay         | R  | 4     | Number of sample delays through widget.                                                                                                                                                                   |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes 0 = no.                                                                                                                                                                  |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes 0 = no.                                                                                                                                                                      |
| [9]      | Dig           | R  | 1     | Digital stream support: 1 = yes (digital) 0 = no (analog).                                                                                                                                                |
| [8]      | ConnList      | R  | 0     | Connection list present: 1 = yes 0 = no.                                                                                                                                                                  |
| [7]      | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes 0 = no.                                                                                                                                                             |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes 0 = no.                                                                                                                                                                 |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes 0 = no.                                                                                                                                                                         |
| [4]      | FormatOvrd    | R  | 1     | Stream format override: 1 = yes 0 = no.                                                                                                                                                                   |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes no.                                                                                                                                                              |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes 0 = no.                                                                                                                                                                       |

**8.23.1.1. SPDIFOut0 WCap**

| Bit | Bitfield Name | RW | Reset | Description                                               |
|-----|---------------|----|-------|-----------------------------------------------------------|
| [1] | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes 0 = no.                        |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo)<br>0 = no (mono). |

**8.23.2. SPDIFOut0 PCMCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0A      | See bitfield table. |

**8.23.2.1. SPDIFOut0 PCMCap**

| Bit      | Bitfield Name | RW | Reset | Description                                   |
|----------|---------------|----|-------|-----------------------------------------------|
| [31.:21] | Rsvd2         | R  | 000   | Reserved.                                     |
| [20]     | B32           | R  | 0     | 32 bit audio format support: 1 = yes, 0 = no. |
| [19]     | B24           | R  | 1     | 24 bit audio format support: 1 = yes, 0 = no. |
| [18]     | B20           | R  | 1     | 20 bit audio format support: 1 = yes, 0 = no. |
| [17]     | B16           | R  | 1     | 16 bit audio format support: 1 = yes, 0 = no. |
| [16]     | B8            | R  | 0     | 8 bit audio format support: 1 = yes, 0 = no.  |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                     |
| [11]     | R12           | R  | 0     | 384kHz rate support: 1 = yes, 0 = no.         |
| [10]     | R11           | R  | 1     | 192kHz rate support: 1 = yes, 0 = no.         |
| [9]      | R10           | R  | 1     | 176.4kHz rate support: 1 = yes, 0 = no.       |
| [8]      | R9            | R  | 1     | 96kHz rate support: 1 = yes, 0 = no.          |
| [7]      | R8            | R  | 1     | 88.2kHz rate support: 1 = yes, 0 = no.        |

**8.23.2.1. SPDIFOut0 PCMCap**

| Bit | Bitfield Name | RW | Reset | Description                              |
|-----|---------------|----|-------|------------------------------------------|
| [6] | R7            | R  | 1     | 48kHz rate support: 1 = yes, 0 = no.     |
| [5] | R6            | R  | 1     | 44.1kHz rate support: 1 = yes, 0 = no.   |
| [4] | R5            | R  | 0     | 32kHz rate support: 1 = yes, 0 = no.     |
| [3] | R4            | R  | 0     | 22.05kHz rate support: 1 = yes, 0 = no.  |
| [2] | R3            | R  | 0     | 16kHz rate support: 1 = yes, 0 = no.     |
| [1] | R2            | R  | 0     | 11.025kHz rate support: 1 = yes, 0 = no. |
| [0] | R1            | R  | 0     | 8kHz rate support: 1 = yes, 0 = no.      |

**8.23.3. SPDIFOut0 StreamCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0B      | See bitfield table. |

**8.23.3.1. SPDIFOut0 StreamCap**

| Bit     | Bitfield Name | RW | Reset    | Description                                      |
|---------|---------------|----|----------|--------------------------------------------------|
| [31..3] | Rsvd          | R  | 00000000 | Reserved.                                        |
| [2]     | AC3           | R  | 1        | AC-3 formatted data support: 1 = yes, 0 = no.    |
| [1]     | Float32       | R  | 0        | Float32 formatted data support: 1 = yes, 0 = no. |
| [0]     | PCM           | R  | 1        | PCM-formatted data support: 1 = yes, 0 = no.     |

**8.23.4. SPDIFOut0 Cnvtr**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | A       | 0000    | See bitfield table. |

**8.23.4.1. SPDIFOut0 Cnvtr**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:16] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [15]     | FrmtNonPCM    | RW | 0     | Stream type: 1 = Non-PCM, 0 = PCM.                                                                                                                                                                                                                                 |
| [14]     | FrmtSmplRate  | RW | 0     | Sample base rate: 1 = 44.1kHz, 0 = 48kHz.                                                                                                                                                                                                                          |
| [13.:11] | SmplRateMultp | RW | 0     | Sample base rate multiple: 000b= x1 (48kHz/44.1kHz or less); 001b= x2 (96kHz/88.2kHz/32kHz); 010b= x3 (144kHz); 011b= x4 (192kHz/176.4kHz); 100b-111b Reserved                                                                                                     |
| [10.:8]  | SmplRateDiv   | RW | 0     | Sample base rate divider: 000b= Divide by 1 (48kHz/44.1kHz); 001b= Divide by 2 (24kHz/20.05kHz); 010b= Divide by 3 (16kHz/32kHz); 011b= Divide by 4 (11.025kHz); 100b= Divide by 5 (9.6kHz); 101b= Divide by 6 (8kHz); 110b= Divide by 7; 111b= Divide by 8 (6kHz) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |
| [6.:4]   | BitsPerSmpl   | RW | 3     | Bits per sample: 000b= 8 bits; 001b= 16 bits; 010b= 20 bits; 011b= 24 bits; 100b= 32 bits; 101b-111b= Reserved                                                                                                                                                     |
| [3.:0]   | NmbrChan      | RW | 1     | Total number of channels in the stream assigned to this converter: 0000b-1111b= 1-16 channels.                                                                                                                                                                     |

**8.23.5. SPDIFOut0 CnvtrID**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F06     | 00      | See bitfield table. |

**8.23.5.1. SPDIFOut0 CnvtrID**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                      |
|---------|---------------|----|--------|----------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                        |
| [7..4]  | Strm          | RW | 0      | Stream ID: 0h = Converter "off", 1h-Fh = valid IDs.                              |
| [3..0]  | Ch            | RW | 0      | Channel assignment ("Ch" and "Ch+1" assigned as a pair, for a stereo converter). |

**8.23.6. SPDIFOut0 DigCnvtr**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F0D     | 00      | See bitfield table. |

**8.23.6.1. SPDIFOut0 DigCnvtr**

| Bit      | Bitfield Name | RW | Reset | Description          |
|----------|---------------|----|-------|----------------------|
| [31..16] | Rsvd2         | R  | 0000  | Reserved.            |
| [15]     | Rsvd1         | R  | 0     | Reserved.            |
| [14..8]  | CC            | RW | 00    | CC: Category Code.   |
| [7]      | L             | RW | 0     | L: Generation Level. |
| [6]      | PRO           | RW | 0     | PRO: Professional.   |
| [5]      | AUDIO         | RW | 0     | /AUDIO: Non-Audio.   |
| [4]      | COPY          | RW | 0     | COPY: Copyright.     |

## 8.23.6.1. SPDIFOut0 DigCnvtr

| Bit | Bitfield Name | RW | Reset | Description                                                   |
|-----|---------------|----|-------|---------------------------------------------------------------|
| [3] | PRE           | RW | 0     | PRE: Preemphasis.                                             |
| [2] | VCFG          | RW | 0     | VCFG: Validity Config.                                        |
| [1] | V             | RW | 0     | V: Validity.                                                  |
| [0] | DigEn         | RW | 0     | Digital enable: 1 = converter enabled, 0 = converter disable. |

## 8.24. SPDIFOut1 Node (NID = 22)

## 8.24.1. SPDIFOut1 WCap

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

## 8.24.1.1. SPDIFOut1 WCap

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 0     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19..16] | Delay         | R  | 4     | Number of sample delays through widget.                                                                                                                                                                   |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes, 0 = no.                                                                                                                                                                 |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes, 0 = no.                                                                                                                                                                     |
| [9]      | Dig           | R  | 1     | Digital stream support: 1 = yes (digital), 0 = no (analog).                                                                                                                                               |
| [8]      | ConnList      | R  | 0     | Connection list present: 1 = yes, 0 = no.                                                                                                                                                                 |

**8.24.1.1. SPDIFOut1 WCap**

| Bit | Bitfield Name | RW | Reset | Description                                             |
|-----|---------------|----|-------|---------------------------------------------------------|
| [7] | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes, 0 = no.          |
| [6] | ProcWidget    | R  | 0     | Processing state support: 1 = yes, 0 = no.              |
| [5] | Stripe        | R  | 0     | Striping support: 1 = yes, 0 = no.                      |
| [4] | FormatOvrd    | R  | 1     | Stream format override: 1 = yes, 0 = no.                |
| [3] | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes, no.           |
| [2] | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes, 0 = no.                    |
| [1] | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes, 0 = no.                     |
| [0] | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |

**8.24.2. SPDIFOut1 PCMCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0A      | See bitfield table. |

**8.24.2.1. SPDIFOut1 PCMCap**

| Bit      | Bitfield Name | RW | Reset | Description                                   |
|----------|---------------|----|-------|-----------------------------------------------|
| [31..21] | Rsvd2         | R  | 000   | Reserved.                                     |
| [20]     | B32           | R  | 0     | 32 bit audio format support: 1 = yes, 0 = no. |
| [19]     | B24           | R  | 1     | 24 bit audio format support: 1 = yes, 0 = no. |
| [18]     | B20           | R  | 1     | 20 bit audio format support: 1 = yes, 0 = no. |
| [17]     | B16           | R  | 1     | 16 bit audio format support: 1 = yes, 0 = no. |

**8.24.2.1. SPDIFOut1 PCMCap**

| Bit      | Bitfield Name | RW | Reset | Description                                  |
|----------|---------------|----|-------|----------------------------------------------|
| [16]     | B8            | R  | 0     | 8 bit audio format support: 1 = yes, 0 = no. |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                    |
| [11]     | R12           | R  | 0     | 384kHz rate support: 1 = yes, 0 = no.        |
| [10]     | R11           | R  | 1     | 192kHz rate support: 1 = yes, 0 = no.        |
| [9]      | R10           | R  | 1     | 176.4kHz rate support: 1 = yes, 0 = no.      |
| [8]      | R9            | R  | 1     | 96kHz rate support: 1 = yes, 0 = no.         |
| [7]      | R8            | R  | 1     | 88.2kHz rate support: 1 = yes, 0 = no.       |
| [6]      | R7            | R  | 1     | 48kHz rate support: 1 = yes, 0 = no.         |
| [5]      | R6            | R  | 1     | 44.1kHz rate support: 1 = yes, 0 = no.       |
| [4]      | R5            | R  | 0     | 32kHz rate support: 1 = yes, 0 = no.         |
| [3]      | R4            | R  | 0     | 22.05kHz rate support: 1 = yes, 0 = no.      |
| [2]      | R3            | R  | 0     | 16kHz rate support: 1 = yes, 0 = no.         |
| [1]      | R2            | R  | 0     | 11.025kHz rate support: 1 = yes, 0 = no.     |
| [0]      | R1            | R  | 0     | 8kHz rate support: 1 = yes, 0 = no.          |

**8.24.3. SPDIFOut1 StreamCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0B      | See bitfield table. |

**8.24.3.1. SPDIFOut1 StreamCap**

| Bit     | Bitfield Name | RW | Reset    | Description                                   |
|---------|---------------|----|----------|-----------------------------------------------|
| [31..3] | Rsvd          | R  | 00000000 | Reserved.                                     |
| [2]     | AC3           | R  | 1        | AC-3 formatted data support: 1 = yes, 0 = no. |

## 8.24.3.1. SPDIFOut1 StreamCap

| Bit | Bitfield Name | RW | Reset | Description                                      |
|-----|---------------|----|-------|--------------------------------------------------|
| [1] | Float32       | R  | 0     | Float32 formatted data support: 1 = yes, 0 = no. |
| [0] | PCM           | R  | 1     | PCM-formatted data support: 1 = yes, 0 = no.     |

## 8.24.4. SPDIFOut1 Cnvtr

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | A       | 0000    | See bitfield table. |

## 8.24.4.1. SPDIFOut1 Cnvtr

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                        |
|----------|---------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:16] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                          |
| [15]     | FrmtNonPCM    | RW | 0     | Stream type: 1 = Non-PCM, 0 = PCM.                                                                                                                                                                                                                                 |
| [14]     | FrmtSmplRate  | RW | 0     | Sample base rate: 1 = 44.1kHz, 0 = 48kHz.                                                                                                                                                                                                                          |
| [13.:11] | SmplRateMultp | RW | 0     | Sample base rate multiple: 000b= x1 (48kHz/44.1kHz or less); 001b= x2 (96kHz/88.2kHz/32kHz); 010b= x3 (144kHz); 011b= x4 (192kHz/176.4kHz); 100b-111b Reserved                                                                                                     |
| [10.:8]  | SmplRateDiv   | RW | 0     | Sample base rate divider: 000b= Divide by 1 (48kHz/44.1kHz); 001b= Divide by 2 (24kHz/20.05kHz); 010b= Divide by 3 (16kHz/32kHz); 011b= Divide by 4 (11.025kHz); 100b= Divide by 5 (9.6kHz); 101b= Divide by 6 (8kHz); 110b= Divide by 7; 111b= Divide by 8 (6kHz) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                          |

**8.24.4.1. SPDIFOut1 Cnvtr**

| Bit    | Bitfield Name | RW | Reset | Description                                                                                                    |
|--------|---------------|----|-------|----------------------------------------------------------------------------------------------------------------|
| [6.:4] | BitsPerSmpl   | RW | 3     | Bits per sample: 000b= 8 bits; 001b= 16 bits; 010b= 20 bits; 011b= 24 bits; 100b= 32 bits; 101b-111b= Reserved |
| [3.:0] | NmbrChan      | RW | 1     | Total number of channels in the stream assigned to this converter: 0000b-1111b= 1-16 channels.                 |

**8.24.5. SPDIFOut1 CnvtrID**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F06     | 00      | See bitfield table. |

**8.24.5.1. SPDIFOut1 CnvtrID**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                      |
|---------|---------------|----|--------|----------------------------------------------------------------------------------|
| [31.:8] | Rsvd          | R  | 000000 | Reserved.                                                                        |
| [7.:4]  | Strm          | RW | 0      | Stream ID: 0h = Converter "off", 1h-Fh = valid IDs.                              |
| [3.:0]  | Ch            | RW | 0      | Channel assignment ("Ch" and "Ch+1" assigned as a pair, for a stereo converter). |

**8.24.6. SPDIFOut1 DigCnvtr**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F0D     | 00      | See bitfield table. |

## 8.24.6.1. SPDIFOut1 DigCnvtr

| Bit      | Bitfield Name | RW | Reset | Description                                                   |
|----------|---------------|----|-------|---------------------------------------------------------------|
| [31..16] | Rsvd2         | R  | 0000  | Reserved.                                                     |
| [15]     | Rsvd1         | R  | 0     | Reserved.                                                     |
| [14..8]  | CC            | RW | 00    | CC: Category Code.                                            |
| [7]      | L             | RW | 0     | L: Generation Level.                                          |
| [6]      | PRO           | RW | 0     | PRO: Professional.                                            |
| [5]      | AUDIO         | RW | 0     | /AUDIO: Non-Audio.                                            |
| [4]      | COPY          | RW | 0     | COPY: Copyright.                                              |
| [3]      | PRE           | RW | 0     | PRE: Preemphasis.                                             |
| [2]      | VCFG          | RW | 0     | VCFG: Validity Config.                                        |
| [1]      | V             | RW | 0     | V: Validity.                                                  |
| [0]      | DigEn         | RW | 0     | Digital enable: 1 = converter enabled, 0 = converter disable. |

## 8.25. Dig0Mux Node (NID = 24)

## 8.25.1. Dig0Mux WCap

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

8.25.1.1. *DigOMux WCap*

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23.:20] | Type          | R  | 3     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes, 0 = no.                                                                                                                                                                 |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes, 0 = no.                                                                                                                                                                     |
| [9]      | DigitalStrm   | R  | 0     | Digital stream support: 1 = yes (digital), 0 = no (analog).                                                                                                                                               |
| [8]      | ConnList      | R  | 1     | Connection list present: 1 = yes, 0 = no.                                                                                                                                                                 |
| [7]      | UnsolCap      | R  | 0     | Unsolicited response support: 1 = yes, 0 = no.                                                                                                                                                            |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes, 0 = no.                                                                                                                                                                |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes, 0 = no.                                                                                                                                                                        |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes, 0 = no.                                                                                                                                                                  |
| [3]      | AmpParamOvrd  | R  | 0     | Amplifier capabilities override: 1 = yes, no.                                                                                                                                                             |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes, 0 = no.                                                                                                                                                                      |
| [1]      | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes, 0 = no.                                                                                                                                                                       |
| [0]      | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo), 0 = no (mono).                                                                                                                                                   |

**8.25.2. Dig0Mux ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.25.2.1. Dig0Mux ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                     |
|---------|---------------|----|--------|-------------------------------------------------------------------------------------------------|
| [31.:8] | Rsvd          | R  | 000000 | Reserved.                                                                                       |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |
| [6.:0]  | ConL          | R  | 03     | Number of NID entries in connection list.                                                       |

**8.25.3. Dig0Mux ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.25.3.1. Dig0Mux ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description                       |
|----------|---------------|----|-------|-----------------------------------|
| [31.:24] | ConL3         | R  | 00    | Unused list entry.                |
| [23.:16] | ConL2         | R  | 1D    | ADC1Mux Selector widget (0x1D)    |
| [15.:8]  | ConL1         | R  | 1C    | ADC0Mux Selector widget (0x1C)    |
| [7.:0]   | ConL0         | R  | 21    | SPDIFOut0 Converter widget (0x21) |

**8.25.4. Dig0Mux ConSelectCtrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F01     | 00      | See bitfield table. |

**8.25.4.1. Dig0Mux ConSelectCtrl**

| Bit     | Bitfield Name | RW | Reset    | Description                      |
|---------|---------------|----|----------|----------------------------------|
| [31..2] | Rsvd          | R  | 00000000 | Reserved.                        |
| [1..0]  | Index         | RW | 0        | Connection select control index. |

**8.26. Dig2Mux Node (NID = 25)****8.26.1. Dig2Mux WCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

**8.26.1.1. Dig2Mux WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 3     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19..16] | Delay         | R  | 0     | Number of sample delays through widget.                                                                                                                                                                   |
| [15..12] | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes, 0 = no.                                                                                                                                                                 |

8.26.1.1. *Dig2Mux WCap*

| Bit  | Bitfield Name | RW | Reset | Description                                                 |
|------|---------------|----|-------|-------------------------------------------------------------|
| [10] | PwrCntrl      | R  | 0     | Power state support: 1 = yes, 0 = no.                       |
| [9]  | DigitalStrm   | R  | 0     | Digital stream support: 1 = yes (digital), 0 = no (analog). |
| [8]  | ConnList      | R  | 1     | Connection list present: 1 = yes, 0 = no.                   |
| [7]  | UnsolCap      | R  | 0     | Unsolicited response support: 1 = yes, 0 = no.              |
| [6]  | ProcWidget    | R  | 0     | Processing state support: 1 = yes, 0 = no.                  |
| [5]  | Stripe        | R  | 0     | Striping support: 1 = yes, 0 = no.                          |
| [4]  | FormatOvrd    | R  | 0     | Stream format override: 1 = yes, 0 = no.                    |
| [3]  | AmpParamOvrd  | R  | 0     | Amplifier capabilities override: 1 = yes, no.               |
| [2]  | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes, 0 = no.                        |
| [1]  | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes, 0 = no.                         |
| [0]  | Stereo        | R  | 1     | Stereo stream support: 1 = yes (stereo), 0 = no (mono).     |

8.26.2. *Dig2Mux ConLst*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

8.26.2.1. *Dig2Mux ConLst*

| Bit     | Bitfield Name | RW | Reset  | Description |
|---------|---------------|----|--------|-------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.   |

8.26.2.1. *Dig2Mux ConLst*

| Bit    | Bitfield Name | RW | Reset | Description                                                                                     |
|--------|---------------|----|-------|-------------------------------------------------------------------------------------------------|
| [7]    | LForm         | R  | 0     | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |
| [6..0] | ConL          | R  | 03    | Number of NID entries in connection list.                                                       |

8.26.3. *Dig2Mux ConLstEntry0*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

8.26.3.1. *Dig2Mux ConLstEntry0*

| Bit      | Bitfield Name | RW | Reset | Description                       |
|----------|---------------|----|-------|-----------------------------------|
| [31..24] | ConL3         | R  | 00    | Unused list entry.                |
| [23..16] | ConL2         | R  | 1D    | ADC1Mux Selector widget (0x1D)    |
| [15..8]  | ConL1         | R  | 1C    | ADC0Mux Selector widget (0x1C)    |
| [7..0]   | ConL0         | R  | 22    | SPDIFOut1 Converter widget (0x22) |

8.26.4. *Dig2Mux ConSelectCtrl*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F01     | 00      | See bitfield table. |

8.26.4.1. *Dig2Mux ConSelectCtrl*

| Bit     | Bitfield Name | RW | Reset    | Description                      |
|---------|---------------|----|----------|----------------------------------|
| [31..2] | Rsvd          | R  | 00000000 | Reserved.                        |
| [1..0]  | Index         | RW | 0        | Connection select control index. |

## 8.27. DigBeep Node (NID = 26)

8.27.1. *DigBeep WCap*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

8.27.1.1. *DigBeep WCap*

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd3         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 7     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19..4]  | Rsvd2         | R  | 0     | Reserved.                                                                                                                                                                                                 |
| [3]      | AmpParOvrd    | R  | 1     | Amplifier capabilities override: 1 = yes, no.                                                                                                                                                             |
| [2]      | OutAmpPrsnt   | R  | 1     | Output amp present: 1 = yes, 0 = no.                                                                                                                                                                      |
| [1..0]   | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |

**8.27.2. DigBeep OutAmpCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 12      | See bitfield table. |

**8.27.2.1. DigBeep OutAmpCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                    |
|----------|---------------|----|-------|--------------------------------------------------------------------------------|
| [31]     | Mute          | R  | 1     | Mute support: 1 = yes, 0 = no.                                                 |
| [30.:23] | Rsvd3         | R  | 00    | Reserved.                                                                      |
| [22.:16] | StepSize      | R  | 17    | Size of each step in the gain range: 0 to 127 = .25dB to 32dB, in .25dB steps. |
| [15]     | Rsvd2         | R  | 0     | Reserved.                                                                      |
| [14.:8]  | NumSteps      | R  | 03    | Number of gains steps (number of possible settings - 1).                       |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                      |
| [6.:0]   | Offset        | R  | 03    | Indicates which step is 0dB                                                    |

**8.27.3. DigBeep OutAmpLeft**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | BA0     | 00      | See bitfield table. |

**8.27.3.1. DigBeep OutAmpLeft**

| Bit     | Bitfield Name | RW | Reset  | Description                         |
|---------|---------------|----|--------|-------------------------------------|
| [31.:8] | Rsvd2         | R  | 000000 | Reserved.                           |
| [7]     | Mute          | RW | 0      | Amp mute: 1 = muted, 0 = not muted. |

8.27.3.1. *DigBeep OutAmpLeft*

| Bit    | Bitfield Name | RW | Reset | Description                                                                |
|--------|---------------|----|-------|----------------------------------------------------------------------------|
| [6.:2] | Rsvd1         | R  | 00    | Reserved.                                                                  |
| [1.:0] | Gain          | RW | 0     | Amp gain step number (see OutAmp-Cap parameter pertaining to this widget). |

8.27.4. *DigBeep Gen*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F0A     | 00      | See bitfield table. |

8.27.4.1. *DigBeep Gen*

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------|---------------|----|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:8] | Rsvd          | R  | 000000 | Reserved.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| [7.:0]  | Divider       | RW | 00     | Enable internal PC-Beep generation. Divider == 00h disables internal PC Beep generation and enables normal operation of the codec. Divider != 00h generates the beep tone on all Pin Complexes that are currently configured as outputs. The HD Audio spec states that the beep tone frequency = (48kHz HD Audio SYNC rate) / (4*Divider), producing tones from 47 Hz to 12 kHz (logarithmic scale). This part can selectively generate tones with frequency = 48KHz * (257 - Divider) / 1024, yielding a linear range from 12kHz to 93.75Hz in steps of 46.875Hz. If the FreqShift bit is set, then the beep tones generated have frequency = 48KHz * (513 - Divider) / 1024, yielding a range of 24kHz to 12093.75Hz in steps of 46.875Hz. |

**8.27.5. DigBeep Mode**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | FE0     | 00      | See bitfield table. |

**8.27.5.1. DigBeep Mode**

| Bit     | Bitfield Name | RW | Reset    | Description                                                                                       |
|---------|---------------|----|----------|---------------------------------------------------------------------------------------------------|
| [31..2] | Rsvd1         | R  | 00000000 | Reserved.                                                                                         |
| [1]     | FreqShift     | RW | 0        | Digital PCBeep frequency range shift (for linear mode only): 0 = 47Hz-12kHz, 1 = 12.047kHz-24kHz. |
| [0]     | LinearSel     | RW | 0        | Linear PCBeep frequency select. 0 = HD Audio Rev.1.0 frequencies ; 1 = linear frequencies         |

**8.28. AnaBeep Node (NID = 27)****8.28.1. AnaBeep WCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

**8.28.1.1. AnaBeep WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.                                                                                                                                                                                                 |
| [23..20] | Type          | R  | 4     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |

**8.28.1.1. AnaBeep WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                 |
|----------|---------------|----|-------|-------------------------------------------------------------|
| [19.:16] | Delay         | R  | 0     | Number of sample delays through widget.                     |
| [15.:12] | Rsvd1         | R  | 0     | Reserved.                                                   |
| [11]     | SwapCap       | R  | 0     | Left/right swap support: 1 = yes, 0 = no.                   |
| [10]     | PwrCntrl      | R  | 0     | Power state support: 1 = yes, 0 = no.                       |
| [9]      | Dig           | R  | 0     | Digital stream support: 1 = yes (digital), 0 = no (analog). |
| [8]      | ConnList      | R  | 0     | Connection list present: 1 = yes, 0 = no.                   |
| [7]      | UnSolCap      | R  | 0     | Unsolicited response support: 1 = yes, 0 = no.              |
| [6]      | ProcWidget    | R  | 0     | Processing state support: 1 = yes, 0 = no.                  |
| [5]      | Stripe        | R  | 0     | Striping support: 1 = yes, 0 = no.                          |
| [4]      | FormatOvrd    | R  | 0     | Stream format override: 1 = yes, 0 = no.                    |
| [3]      | AmpParOvrd    | R  | 0     | Amplifier capabilities override: 1 = yes, no.               |
| [2]      | OutAmpPrsnt   | R  | 0     | Output amp present: 1 = yes, 0 = no.                        |
| [1]      | InAmpPrsnt    | R  | 0     | Input amp present: 1 = yes, 0 = no.                         |
| [0]      | Stereo        | R  | 0     | Stereo stream support: 1 = yes (stereo), 0 = no (mono).     |

**8.28.2. AnaBeep PinCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0C      | See bitfield table. |

**8.28.2.1. AnaBeep PinCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                                                                                             |
|----------|---------------|----|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31.:17] | Rsvd2         | R  | 0000  | Reserved.                                                                                                                                                                                                                                                               |
| [16]     | EapdCap       | R  | 0     | EAPD support: 1 = yes, 0 = no.                                                                                                                                                                                                                                          |
| [15.:8]  | VrefCntrl     | R  | 00    | Vref support: bit 7 = Reserved; bit 6 = Reserved; bit 5 = 100% support (1 = yes, 0 = no); bit 4 = 80% support (1 = yes, 0 = no); bit 3 = Reserved; bit 2 = GND support (1 = yes, 0 = no); bit 1 = 50% support (1 = yes, 0 = no); bit 0 = Hi-Z support (1 = yes, 0 = no) |
| [7]      | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                                                                               |
| [6]      | BalancedIO    | R  | 0     | Balanced I/O support: 1 = yes, 0 = no.                                                                                                                                                                                                                                  |
| [5]      | InCap         | R  | 1     | Input support: 1 = yes, 0 = no.                                                                                                                                                                                                                                         |
| [4]      | OutCap        | R  | 0     | Output support: 1 = yes, 0 = no.                                                                                                                                                                                                                                        |
| [3]      | HdphDrvCap    | R  | 0     | Headphone amp present: 1 = yes, 0 = no.                                                                                                                                                                                                                                 |
| [2]      | PresDtctCap   | R  | 0     | Presence detection support: 1 = yes, 0 = no.                                                                                                                                                                                                                            |
| [1]      | TrigRqd       | R  | 0     | Trigger required for impedance sense: 1 = yes, 0 = no.                                                                                                                                                                                                                  |
| [0]      | ImpSenseCap   | R  | 0     | Impedance sense support: 1 = yes, 0 = no.                                                                                                                                                                                                                               |

**8.28.3. AnaBeep PinWCntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F07     | 00      | See bitfield table. |

**8.28.3.1. AnaBeep PinWCntrl**

| Bit     | Bitfield Name | RW | Reset   | Description                              |
|---------|---------------|----|---------|------------------------------------------|
| [31..6] | Rsvd2         | R  | 0000000 | Reserved.                                |
| [5]     | InEn          | RW | 0       | Input enable: 1 = enabled, 0 = disabled. |
| [4..0]  | Rsvd1         | R  | 0       | Reserved.                                |

**8.28.4. AnaBeep ConfigDefault**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F1C     | 00      | See bitfield table. |

**8.28.4.1. AnaBeep ConfigDefault**

| Bit      | Bitfield Name    | RW | Reset | Description                                                                                                                                                                                                                                                                          |
|----------|------------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..30] | PortConnectivity | RW | 1     | Port connectivity: 0h = Port complex is connected to a jack; 1h = No physical connection for port; 2h = Fixed function device is attached; 3h = Both jack and internal device attached (info in all other fields refers to integrated device, any presence detection refers to jack) |
| [29..24] | Location         | RW | 00    | Location. Bits [5..4]: 0h = External on primary chassis; 1h = Internal; 2h = Separate chassis; 3h = Other. Bits [3..0]: 0h = N/A; 1h = Rear; 2h = Front; 3h = Left; 4h = Right; 5h = Top; 6h = Bottom; 7h-9h = Special; Ah-Fh = Reserved                                             |
| [23..20] | Device           | RW | F     | Default device: 0h = Line out; 1h = Speaker; 2h = HP out; 3h = CD; 4h = SPDIF Out; 5h = Digital other out; 6h = Modem line side; 7h = Modem handset side; 8h = Line in; 9h = Aux; Ah = Mic in; Bh = Telephony; Ch = SPDIF In; Dh = Digital other in; Eh = Reserved; Fh = Other       |

8.28.4.1. *AnaBeep ConfigDefault*

| Bit      | Bitfield Name  | RW | Reset | Description                                                                                                                                                                                                                                                                                |
|----------|----------------|----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [19..16] | ConnectionType | RW | 0     | Connection type: 0h = Unknown; 1h = 1/8" stereo/mono; 2h = 1/4" stereo/mono; 3h = ATAPI internal; 4h = RCA; 5h = Optical; 6h = Other digital; 7h = Other analog; 8h = Multichannel analog (DIN); 9h = XLR/Professional; Ah = RJ-11 (modem); Bh = Combination; Ch-Eh = Reserved; Fh = Other |
| [15..12] | Color          | RW | 0     | Color: 0h = Unknown; 1h = Black; 2h = Grey; 3h = Blue; 4h = Green; 5h = Red; 6h = Orange; 7h = Yellow; 8h = Purple; 9h = Pink; Ah-Dh = Reserved; Eh = White; Fh = Other                                                                                                                    |
| [11..8]  | Misc           | RW | 0     | Miscellaneous: Bits [3..1] = Reserved; Bit 0 = Jack detect override                                                                                                                                                                                                                        |
| [7..4]   | Association    | RW | F     | Default association.                                                                                                                                                                                                                                                                       |
| [3..0]   | Sequence       | RW | 0     | Sequence.                                                                                                                                                                                                                                                                                  |

## 8.29. VolumeKnob Node (NID = 28)

8.29.1. *VolumeKnob WCap*

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 09      | See bitfield table. |

8.29.1.1. *VolumeKnob WCap*

| Bit      | Bitfield Name | RW | Reset | Description |
|----------|---------------|----|-------|-------------|
| [31..24] | Rsvd2         | R  | 00    | Reserved.   |

**8.29.1.1. VolumeKnob WCap**

| Bit      | Bitfield Name | RW | Reset | Description                                                                                                                                                                                               |
|----------|---------------|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [23.:20] | Type          | R  | 6     | Widget type: 0h = Out Converter; 1h = In Converter; 2h = Summing (Mixer); 3h = Selector (Mux); 4h = Pin Complex; 5h = Power; 6h = Volume Knob; 7h = Beep Generator; 8h-Eh = Reserved; Fh = Vendor Defined |
| [19.:0]  | Rsvd1         | R  | 0     | Reserved.                                                                                                                                                                                                 |

**8.29.2. VolumeKnob VolKnobCap**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 13      | See bitfield table. |

**8.29.2.1. VolumeKnob VolKnobCap**

| Bit     | Bitfield Name | RW | Reset  | Description                                                               |
|---------|---------------|----|--------|---------------------------------------------------------------------------|
| [31.:8] | Rsvd          | R  | 000000 | Reserved.                                                                 |
| [7]     | Delta         | R  | 1      | Indicates if software can write a base volume to the Volume Control Knob. |
| [6.:0]  | NumSteps      | R  | 7F     | Number of gains steps (number of possible settings - 1).                  |

**8.29.3. VolumeKnob ConLst**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F00     | 0E      | See bitfield table. |

**8.29.3.1. VolumeKnob ConLst**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                     |
|---------|---------------|----|--------|-------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                       |
| [7]     | LForm         | R  | 0      | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |
| [6..0]  | ConL          | R  | 02     | Number of NID entries in connection list.                                                       |

**8.29.4. VolumeKnob ConLstEntry0**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F02     | 00      | See bitfield table. |

**8.29.4.1. VolumeKnob ConLstEntry0**

| Bit      | Bitfield Name | RW | Reset | Description                  |
|----------|---------------|----|-------|------------------------------|
| [31..24] | ConL3         | R  | 00    | Unused list entry.           |
| [23..16] | ConL2         | R  | 00    | Unused list entry.           |
| [15..8]  | ConL1         | R  | 11    | DAC1 Converter widget (0x11) |
| [7..0]   | ConL0         | R  | 10    | DAC0 Converter widget (0x10) |

**8.29.5. VolumeKnob UnsolResp**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F08     | 00      | See bitfield table. |

**8.29.5.1. VolumeKnob UnsolResp**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                        |
|---------|---------------|----|--------|--------------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd2         | R  | 000000 | Reserved.                                                                                                          |
| [7]     | En            | RW | 0      | Unsolicited response enable: 1 = enabled, 0 = disabled.                                                            |
| [6]     | Rsvd1         | R  | 0      | Reserved.                                                                                                          |
| [5..0]  | Tag           | RW | 00     | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

**8.29.6. VolumeKnob Cntrl**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | F0F     | 00      | See bitfield table. |

**8.29.6.1. VolumeKnob Cntrl**

| Bit     | Bitfield Name | RW | Reset  | Description                                                                                                                                              |
|---------|---------------|----|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| [31..8] | Rsvd          | R  | 000000 | Reserved.                                                                                                                                                |
| [7]     | Direct        | RW | 0      | Direct = 1 causes the volume control to directly control the hardware volume of the slave amps. Direct = 0 causes unsolicited responses to be generated. |
| [6..0]  | Volume        | RW | 7F     | Volume, specified in steps of amplifier gain                                                                                                             |

**8.29.7. VolumeKnob Update**

|     | Verb ID | Payload | Response            |
|-----|---------|---------|---------------------|
| Get | FE0     | 00      | See bitfield table. |

8.29.7.1. *VolumeKnob Update*

| Bit     | Bitfield Name | RW | Reset   | Description                                                                                             |
|---------|---------------|----|---------|---------------------------------------------------------------------------------------------------------|
| [31..4] | Rsvd          | R  | 0000000 | Reserved.                                                                                               |
| [3]     | Continuous    | RW | 1       | Allow continuous incrementing/decrementing of the volume knob value.                                    |
| [2..0]  | Rate          | RW | 0       | Volume knob update rate, for continuous mode and de-bouncing (0..7 = 2.5..20Hz, in increments of 2.5Hz) |

## 9. DISCLAIMER

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## 10. PINOUTS

### 10.1. Pin Assignment

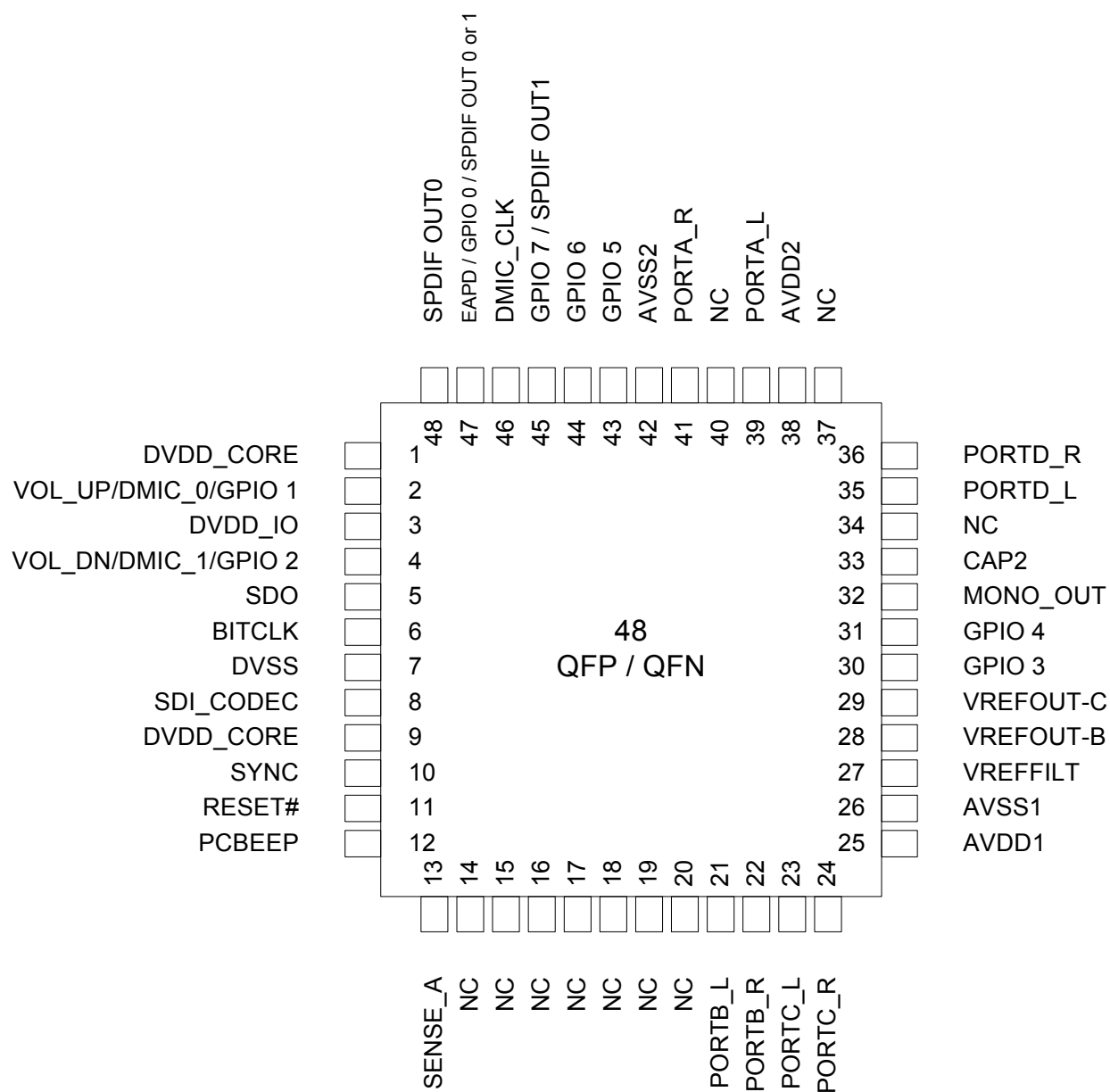


Figure 12. Pin Assignment

## 10.2. Pin Descriptions

Table 20. Pin Description

| Pin No. | Pin Name                       | Pin Type     | Internal Pull-up/<br>Pull-down                                                                     | Pin Description                                                           |
|---------|--------------------------------|--------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 1       | DVDD_CORE                      | I(Digital)   | None                                                                                               | Digital Vdd = 3.3 V                                                       |
| 2       | Volume Up /<br>DMIC0 / GPIO1   | I/O(Digital) | 50 K $\Omega$ pull-up<br>with Volume or GPIO<br>50 K $\Omega$ pull-down<br>with Digital Microphone | Volume Control or<br>Digital Microphone 0 Input or<br>General Purpose I/O |
| 3       | DVDD_IO                        | I(Digital)   | None                                                                                               | Reference Voltage (1.5 V or 3.3 V)                                        |
| 4       | Volume Down /<br>DMIC1 / GPIO2 | I/O(Digital) | 50 K $\Omega$ pull-up<br>with Volume or GPIO<br>50 K $\Omega$ pull-down<br>with Digital Microphone | Volume Control or<br>Digital Microphone 1 Input or<br>General Purpose I/O |
| 5       | SDO                            | I/O(Digital) | None                                                                                               | HD Audio Serial Data output (inbound stream)                              |
| 6       | BITCLK                         | I(Digital)   | None                                                                                               | HD Audio Bit Clock                                                        |
| 7       | DVSS                           | I(Digital)   | None                                                                                               | Digital Ground                                                            |
| 8       | SDI_CODEC                      | O(Digital)   | None                                                                                               | HD Audio Serial Data (outbound stream), audio module                      |
| 9       | DVDD_CORE                      | I(Digital)   | None                                                                                               | Digital Vdd = 3.3 V                                                       |
| 10      | SYNC                           | I(Digital)   | None                                                                                               | HD Audio Frame Sync                                                       |
| 11      | RESET#                         | I(Digital)   | None                                                                                               | HD Audio Reset                                                            |
| 12      | PCBEEP                         | I(Analog)    | None                                                                                               | PC Beep                                                                   |
| 13      | SENSE_A                        | I(Analog)    | None                                                                                               | Jack insertion detection Ports A, B, C, D                                 |
| 14      | NC                             | -            | None                                                                                               | No Connect                                                                |
| 15      | NC                             | -            | None                                                                                               | No Connect                                                                |
| 16      | NC                             | -            | None                                                                                               | No Connect                                                                |
| 17      | NC                             | -            | None                                                                                               | No Connect                                                                |
| 18      | NC                             | -            | None                                                                                               | No Connect                                                                |
| 19      | NC                             | -            | None                                                                                               | No Connect                                                                |
| 20      | NC                             | -            | None                                                                                               | No Connect                                                                |
| 21      | PORTB_L                        | I(Analog)    | None                                                                                               | Port B Input Left                                                         |
| 22      | PORTB_R                        | I(Analog)    | None                                                                                               | Port B Input Right                                                        |
| 23      | PORTC_L                        | I(Analog)    | None                                                                                               | Port C Input Left                                                         |
| 24      | PORTC_R                        | I(Analog)    | None                                                                                               | Port C Input Right                                                        |

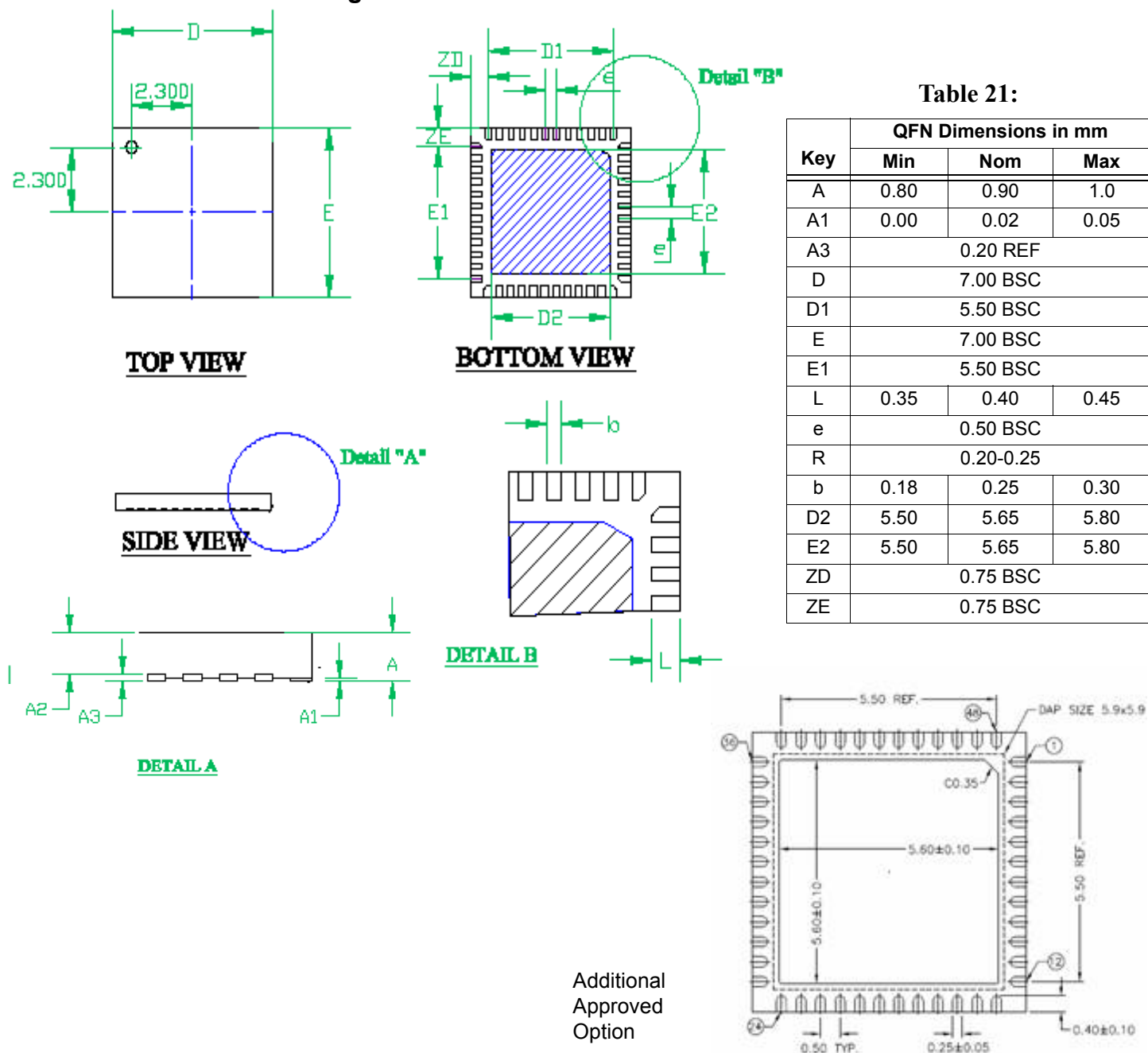
Table 20. Pin Description

| Pin No. | Pin Name                     | Pin Type      | Internal Pull-up/<br>Pull-down | Pin Description                                                       |
|---------|------------------------------|---------------|--------------------------------|-----------------------------------------------------------------------|
| 25      | AVDD1                        | I(Analog)     | None                           | Analog Vdd = 5.0 V or 3.3 V                                           |
| 26      | AVSS1                        | I(Analog)     | None                           | Analog Ground                                                         |
| 27      | VREFFILT                     | O(Analog)     | None                           | Analog Virtual Ground                                                 |
| 28      | VREFOUT-B                    | O(Analog)     | None                           | Reference Voltage out drive (intended for microphone bias) for Port B |
| 29      | VREFOUT-C                    | O(Analog)     | None                           | Reference Voltage out drive (intended for microphone bias) for Port C |
| 30      | GPIO3                        | I/O(Analog)   | None                           | General Purpose I/O                                                   |
| 31      | VREFOUT-E /<br>GPIO4         | I/O(Analog)   | None                           | Analog GPIO4                                                          |
| 32      | MONO_OUT                     | O(Analog)     | None                           | Mono output of DAC0                                                   |
| 33      | CAP2                         | O(Analog)     | None                           | ADC reference Capacitor                                               |
| 34      | NC                           | -             | None                           | No Connect                                                            |
| 35      | PORT-D_L                     | O(Analog)     | None                           | Port D Output Left                                                    |
| 36      | PORT-D_R                     | O(Analog)     | None                           | Port D Output Right                                                   |
| 37      | NC                           | -             | None                           | No Connect                                                            |
| 38      | AVDD2                        | I(Analog)     | None                           | Analog Vdd = 5.0 V or 3.3 V                                           |
| 39      | PORTA_L (HP)                 | O(Analog)     | None                           | Port A Output Left                                                    |
| 40      | NC                           | -             | None                           | No Connect                                                            |
| 41      | PORTA_R (HP)                 | O(Analog)     | None                           | Port A Output Right                                                   |
| 42      | AVSS2                        | I(Analog)     | None                           | Analog Ground                                                         |
| 43      | GPIO5                        | I/O (Digital) | 50 K $\Omega$ pull-up          | General Purpose I/O                                                   |
| 44      | GPIO6                        | I/O (Digital) | 50 K $\Omega$ pull-up          | General Purpose I/O                                                   |
| 45      | GPIO7 /<br>SPDIFOUT1         | I/O (Digital) | 50 K $\Omega$ pull-down        | General Purpose I/O or Second SPDIF output                            |
| 46      | DMIC_CLK                     | O(Digital)    | 50 K $\Omega$ pull-down        | Digital Microphone Output Clock                                       |
| 47      | GPIO0/EAPD/<br>SPDIF-OUT0or1 | I/O(Digital)  | 50 K $\Omega$ pull-up          | General Purpose I/O, EAPD, SPDIF Out                                  |
| 48      | SPDIF-OUT0                   | O(Digital)    | 50 K $\Omega$ pull-down        | SPDIF digital output                                                  |

## 11. PACKAGE OUTLINE AND PACKAGE DIMENSIONS

Package dimensions are kept current with JEDEC Publication No. 95

### 11.1. 48-Pad QFN Package



**Figure 13. 48-pad QFN Package Drawing**

11.2. 48-Pin QFP Package

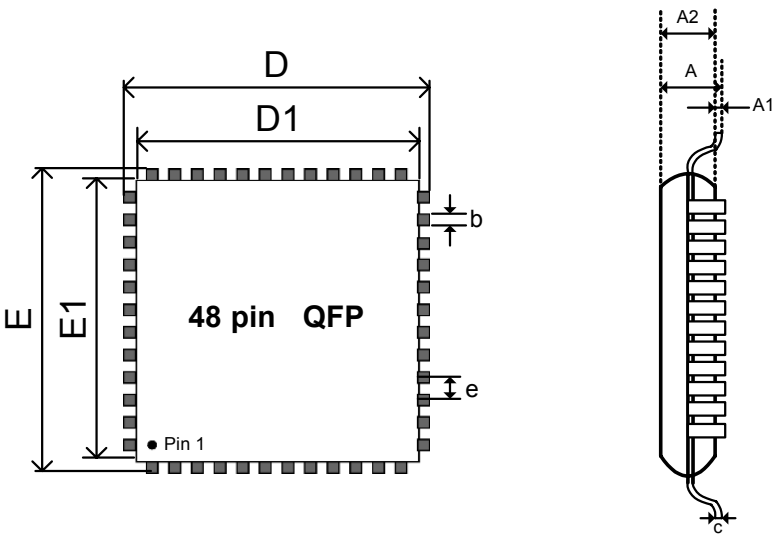


Figure 14. 48-pin QFP Package Drawing

Table 22:

| Key | QFP Dimensions in mm |      |  |
|-----|----------------------|------|--|
|     | Min                  | Nom  |  |
| A   | 1.40                 | 1.50 |  |
| A1  | 0.05                 | 0.10 |  |
| A2  | 1.35                 | 1.40 |  |
| D   | 8.80                 | 9.00 |  |
| D1  | 6.90                 | 7.00 |  |
| E   | 8.80                 | 9.00 |  |
| E1  | 6.90                 | 7.00 |  |
| L   | 0.45                 | 0.60 |  |
| e   |                      | 0.50 |  |
| c   | 0.09                 | -    |  |
| b   | 0.17                 | 0.22 |  |

## 12. SOLDER REFLOW PROFILE

### 12.1. Standard Reflow Profile Data

Note: These devices can be hand soldered at 360 °C for 3 to 5 seconds.

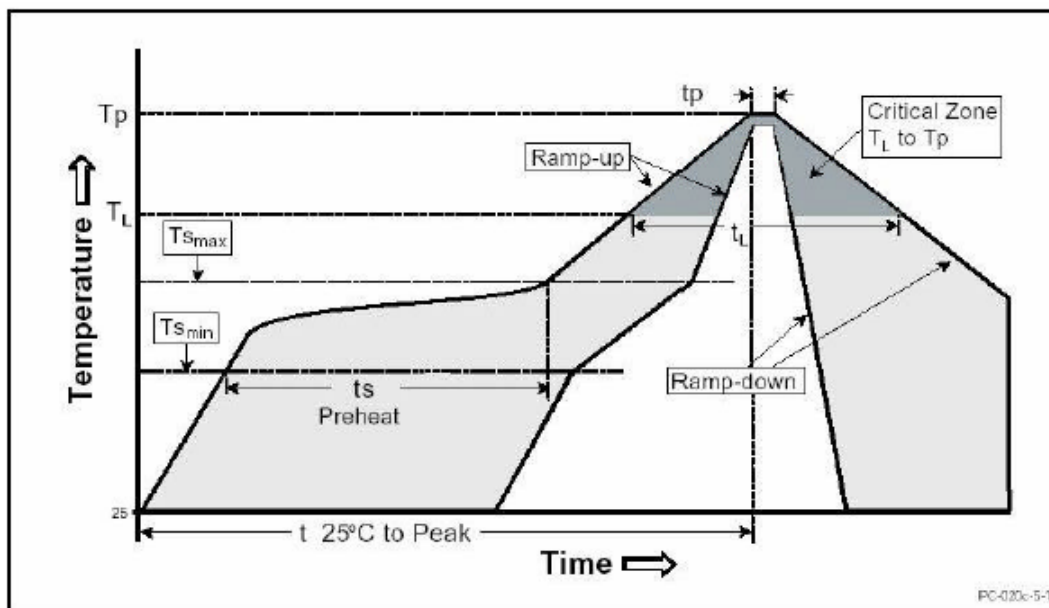
**FROM:** IPC / JEDEC J-STD-020C "Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices" ([www.jedec.org/download](http://www.jedec.org/download)).

**Table 23. Standard Reflow Profile**

| Profile Feature                                                                                                         | Pb Free Assembly                                   |
|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Average Ramp-Up Rate ( $T_{s_{max}} - T_p$ )                                                                            | 3 °C / second max                                  |
| Preheat: Temperature Min ( $T_{s_{min}}$ )<br>Temperature Max ( $T_{s_{max}}$ )<br>Time ( $t_{s_{min}} - t_{s_{max}}$ ) | 150 °C<br>200 °C<br>60 - 180 seconds               |
| Time maintained above: Temperature ( $T_L$ )<br>Time ( $t_L$ )                                                          | 217 °C<br>60 - 150 seconds                         |
| Peak / Classification Temperature ( $T_p$ )                                                                             | See "Package Classification Reflow Temperatures" . |
| Time within 5 °C of actual Peak Temperature ( $t_p$ )                                                                   | 20 - 40 seconds                                    |
| Ramp-Down rate                                                                                                          | 6 °C / second max                                  |
| Time 25 °C to Peak Temperature                                                                                          | 8 minutes max                                      |

Note: All temperatures refer to topside of the package, measured on the package body surface.

**Figure 15. Solder Reflow Profile**



## 12.2. Pb Free Process - Package Classification Reflow Temperatures

Table 24. Pb-Free Process Reflow

| Package Type | MSL | Reflow Temperature |
|--------------|-----|--------------------|
| QFP 48-pin   | 3   | 260 °C             |
| QFN 48-pad   | 3   | 260 °C             |

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### 13. REVISION HISTORY

| Revision | Date             | Description of Change                                                                                                                                                                          |
|----------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.8      | Aug 17, 2007     | initial release                                                                                                                                                                                |
| 0.91     | Sept 26, 2007    | added widget information, added feature bullet for GUI, listed B6 in family options table, corrected number of adjustable vref from 3 to 2, corrected number of stereo microphones from 3 to 2 |
| 0.92     | Nov 14, 2007     | Added AFG Misc widget, B3 silicon revision adds this functionality                                                                                                                             |
| 1.0      | January 23, 2008 | Removed Preliminary and confidential, corrected all THD number unit to dBr. Performance numbers updated based on characterization. Latchup/ESD specifications clarified/updated.               |