

8-CHANNEL HIGH DEFINITION AUDIO CODEC
STAC9227/9228/9229/9230
Description

The STAC9227/9228/9229/9230 are a family of Theater Quality 8-channel audio CODECs that enable systems with 7.1 audio or 5.1 audio playing simultaneously with VoIP or another stereo audio stream. SigmaTel's proprietary $\Sigma\Delta$ technology provides high fidelity with an estimated DAC SNR up to 105dB. Up to four digital microphones are supported enabling high quality voice input for increased usability of voice applications.

Features

- **High performance HD Audio CODEC provides Theater Quality Audio**
- **High performance $\Sigma\Delta$ technology**
 - 105dB DAC SNR
 - 90dB ADC SNR
- **Four Stereo DACs and three stereo ADCs**
 - Supports 7.1 audio or 5.1 audio with simultaneous Real Time Communication (RTC) channel such as VoIP or separate stereo audio stream
- **24-bit resolution with up to 192 KHz sample rates**
- **Digital Microphone Interface**
 - Direct interface up to four Digital Microphones
- **Analog Stereo Microphone**
 - Microphone Boost 0, 10, 20, 30, 40dB
 - Six adjustable Vref outputs for microphone bias
- **Integrated Headphone Amps (3).**
- **S/PDIF In and Out**
- **ADAT[®] Optical "Lightpipe" Output Support**
- **Volume Up/Down Control**
- **Jack Insertion Detect and Impedance Sensing Supports Jack Retasking and Universal Jacks**



- **Digital PC BEEP to all outputs**
- **+3.3 V to +5 V analog power supply options**
- **Environmental 48-pin LQFP package option**

Software Support

- **SKPI (Kernel Processing Interface)**
 - Enables plug-ins that can operate globally on all audio streams of the system
- **12 band 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 connections made
- **Dynamics Processing SKPI plug-in**
 - Enables improved voice articulation
 - Compressor/limiter allows higher average noise level without resonances
- **Dolby PC Entertainment Experience Logo Program**
 - Dolby Master StudioTM
 - Dolby Home TheaterTM
 - Dolby Sound RoomTM
- **Dolby Technologies**
 - Dolby HeadphoneTM, Dolby Virtual SpeakerTM
 - Dolby ProLogic IITM, Dolby ProLogic IIxTM
 - Dolby Digital LiveTM
- **Intel Audio StudioTM from Sonic Focus**
- **Maxx PlayerTM from Waves**
- **Microphone Beam Forming, Acoustic Echo Cancellation, & Noise Suppression from KnowlesTM**

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1. DESCRIPTION

The STAC9227/9228/9229/9230 are high fidelity, 8-channel audio CODECs compatible with the Intel High Definition (HD) Audio Interface. The STAC9227/9228/9229/9230 CODECs provide high quality, HD Audio capability to notebook and cost sensitive desktop PC applications.

The STAC9227/9228/9229/9230 incorporate SigmaTel's proprietary technology to achieve a DAC SNR in excess of 100 dB. The higher performance and quality of SigmaTel's audio solutions brings consumer electronics level performance to the notebook, desktop and media center PC.

The STAC9227/9228/9229/9230 provide stereo 24-bit, full duplex resolution supporting sample rates up to 192 KHz by the DAC and ADC. The STAC9227/9228/9229/9230 SPDIF In/Out support sample rates of 96 KHz, 48 KHz and 44.1 KHz plus SPDIF OUT supports 88.2 KHz. Additional sample rates are supported by the driver software.

The STAC9227/9228/9229/9230 support all desired eight channel configurations, including switchable Headphone Out, and Universal Jacks™ functionality for jack detection and re-tasking. The SPDIF interface provides connectivity to Consumer Electronic equipment like Dolby Digital decoders, powered speakers, mini disk drives or to a home entertainment system. All analog I/O pairs support LINE_IN, LINE_OUT and MIC.

MIC inputs can be programmed with 0/10/20/30/40dB boost. For more advanced configurations, the STAC9227/9228/9229/9230 has up to four General Purpose I/O (GPIO) pin. The STAC9227/9228/9229/9230 also provide a single ended CD input for compatibility with DRM solutions and to support legacy OS issues.

The STAC9227/9228/9229/9230 integrate a headphone amplifier which is available on Ports A, B and D. The headphone amplifier is dedicated to these three outputs for increased flexibility, enhanced user experience, and reduced implementation costs.

The Universal Jack capabilities allow the CODECs to detect when audio devices are connected to the CODEC, and to allow the CODECs to be reconfigured to support these devices regardless of which port they are plugged into the system. SPDIF input sensing is also supported. The fully parametric SigmaTel SoftEQ can be initiated upon headphone jack insertion and removal for protection of notebook speakers. Note: The Jack Detect circuit and component selection are critical for accurate detection of audio jacks on individual ports. Please see the SigmaTel STAC927x reference design for circuit implementation details.

The STAC9227/9228/9229/9230 operate with a 3.3 V digital supply and a 3.3 V to 5 V analog supply.

The STAC9227/9228/9229/9230 are available in a 48-pin LQFP Environmental (ROHS) package.

2. CHARACTERISTICS

2.1. Audio Fidelity

| | | | |
|----------|-------|------------|--------------|
| DAC SNR: | 105dB | A-Weighted | 5.0 V +/- 5% |
| ADC SNR: | 90dB | A-Weighted | 5.0 V +/- 5% |

2.2. Electrical Specifications

2.2.1. Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the STAC9227/9228/9229/9230. 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.

| 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 | | 260 °C for 10 seconds * Soldering temperature information for all available packages begins on page 229. |

2.2.2. Recommended Operation 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 | 4.275 | 4.5 | 4.725 | V |
| | Analog - 5 V | 4.75 | 5 | 5.25 | V |
| Ambient Operating Temperature | | 0 | | +70 | °C |
| Case Temperature | T _{case} (48-LQFP) | | | +90 | °C |

ESD: The STAC9227/9228/9229/9230 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 STAC9227/9228/9229/9230 implements internal ESD protection circuitry, proper ESD precautions should be followed to avoid damaging the functionality or performance.

2.3. STAC9227/9228/9229/9230 5V, 4.5V, 4.0V, and 3.3V Analog Performance Characteristics

($T_{\text{ambient}} = 25\text{ }^{\circ}\text{C}$, $AV_{\text{dd}} = \text{Supply} \pm 5\%$, $DV_{\text{dd}} = 3.3\text{ V} \pm 5\%$, $AV_{\text{ss}} = DV_{\text{ss}} = 0\text{ V}$; 1 KHz input sine wave; Sample Frequency = 48 KHz; 0 dB = 1 VRMS, 10 K Ω /50 pF load, Testbench Characterization BW: 20 Hz – 20 KHz, 0 dB settings on all gain stages)

| Parameter | Conditions | AVdd | Min | Typ | Max | Unit |
|--|--|--------------------------------|-----|-------------------------|-----|------|
| Digital to Analog Converters | | | | | | |
| Resolution | | All | | 24 | | Bits |
| SNR - DAC to All Line-Out Ports (Note 4) | Analog Mixer Disabled, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 105 101 100 98 | | dB |
| THD+N - DAC to All Line-Out Ports (Note 3) | Analog Mixer Disabled, -3dB Signal, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 90 88 86 84 | | dB |
| SNR - DAC to All Line-Out Ports (Note 4) | Analog Mixer Enabled, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 90 88 87 85 | | dB |
| THD+N - DAC to All Line-Out Ports (Note 3) | Analog Mixer Enabled, -3dB Signal, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 80 78 77 75 | | dB |
| Dynamic Range: DAC to All Line Out Ports (Note2) | -60dB signal level | 5 V 4.5 V 4.0 V 3.3 V | - | 95 93 92 90 | - | dB |
| SNR - DAC to All Headphone Ports (Note 4) | Analog Mixer Disabled, 10 K Ω load, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 105 101 100 98 | | dB |
| THD+N - DAC to All Headphone Ports (Note 3) | Analog Mixer Disabled, -3dB Signal, 10 K Ω load, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 85 83 82 80 | | dB |
| SNR - DAC to All Headphone Ports with 2 Headphone Outputs Operating (Note 4) | Analog Mixer Disabled, 32 Ω load, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 100 98 97 95 | | dB |
| THD+N - DAC to All Headphone Ports with 2 Headphone Outputs Operating (Note 3) | Analog Mixer Disabled, -3dB Signal, 32 Ω load, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 82 80 79 77 | | dB |

| Parameter | Conditions | AVdd | Min | Typ | Max | Unit |
|---|--|--------------------------------|--------|-----------------------|--------|-------------------|
| SNR - DAC to All Headphone Ports (Note 4) | Analog Mixer Disabled, 32 Ω load, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 100 98 97 95 | | dB |
| THD+N - DAC to All Headphone Ports (Note 3) | Analog Mixer Disabled, -3dB Signal, 32 Ω load, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 85 83 82 80 | | dB |
| SNR - DAC to All Headphone Ports (Note 4) | Analog Mixer Enabled, 10 K Ω load, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 90 88 87 85 | | dB |
| THD+N - DAC to All Headphone Ports (Note 3) | Analog Mixer Enabled, -3dB Signal, 10k Ω load, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 79 77 76 74 | | dB |
| SNR - DAC to All Headphone Ports (Note 4) | Analog Mixer Enabled, 32 Ω load, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 87 85 84 82 | | dB |
| THD+N - DAC to All Headphone Ports (Note 3) | Analog Mixer Enabled, -3dB Signal, 32 Ω load, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 74 72 71 69 | | dB |
| Any Analog Input to DAC Crosstalk | 10 KHz Signal Frequency | All | - | -85 | - | dB |
| Any Analog Input to DAC Crosstalk | 1 KHz Signal Frequency | All | - | -80 | - | 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 (Note 5) | | All | 20 | - | 19,200 | Hz |
| D/A Digital Filter Transition Band | | All | 19,200 | - | 28,800 | Hz |
| D/A Digital Filter Stop Band | | All | 28,800 | - | - | Hz |
| D/A Digital Filter Stop Band Rejcn (Note 6) | | All | -100 | - | - | dB |
| D/A Out-of-Band Rejection (Note 7) | | All | -55 | - | - | dB |
| Group Delay (48 KHz sample rate) | | All | - | - | 1 | ms |
| Attenuation, Gain Step Size DIGITAL | | All | - | 0.75 | - | dB |
| Gain Drift | | All | - | 100 | - | ppm/ $^{\circ}$ C |
| DAC Offset Voltage | | All | - | 100 | 20 | mV |

| Parameter | Conditions | AVdd | Min | Typ | Max | Unit |
|--|---|--------------------------------|------------------------------|-----|--------|------------|
| Deviation from Linear Phase | | All | - | 1 | 10 | degrees |
| Analog Outputs | | | | | | |
| Full Scale All Line-Outs | DAC PCM Data | 5 V 4.5 V 4.0 V 3.3 V | 1.00 1.00 1.00 0.70 | - | - | Vrms |
| Full Scale All Line-Outs | DAC PCM Data | All | 2.83 | - | - | Vp-p |
| All Headphone Capable Outputs | 32 Ω load | All | 31 | 50 | - | mW peak |
| Analog inputs | | | | | | |
| Full Scale Input Voltage | 0dB Boost @ 4.75 V | All | 1.00 | - | - | Vrms |
| All Analog Inputs with boost | 10dB Boost | All | 0.31 | - | - | Vrms |
| All Analog Inputs with boost | 20dB Boost | All | 0.10 | - | - | Vrms |
| All Analog Inputs with boost | 30dB Boost | All | 0.03 | - | - | Vrms |
| All Analog Inputs with boost | 40dB Boost | All | 0.01 | - | - | Vrms |
| Input Impedance | | All | - | 50 | - | K Ω |
| Input Capacitance | | All | - | 15 | - | pF |
| Analog Mixer | | | | | | |
| SNR - CD to Ports A,B, & D Line-Out (Note 4) | | All | | 90 | | dB |
| THD+N - CD to Ports A,B, & D Line-Out (Note 3) | -3dB Input | All | | 70 | | dB |
| SNR - All Line-In to A,B, & D Line-Out (Note 4) | | All | | 90 | | dB |
| THD+N - All Line-In to A,B, & D Line-Out (Note 3) | -3dB Input | All | | 70 | | dB |
| SNR - Analog PC Beep to Ports A,B, & D Line-Out (Note 4) | | All | | 85 | | dB |
| THD+N - Analog PC Beep to Ports A,B, & D Line-Out (Note 3) | -3dB Input | All | | 70 | | dB |
| Analog to Digital Converter | | | | | | |
| Resolution | | All | | 24 | | Bits |
| Dynamic Range, All Analog Inputs to A/D (Note 1) | High Pass Filer Enabled, 1 Vrms Input, No boost | All | 88 | 90 | | dB |
| SNR All Analog Inputs to A/D (Note 4) | High Pass Filter enabled | All | 88 | 90 | | dB |
| THD+N All Analog Inputs to A/D (Note 3) | High Pass Filter enabled, -3dBV input Level | All | | 85 | | dB |
| Analog Frequency Response (Note 2) | | All | 10 | - | 30,000 | Hz |

| Parameter | Conditions | AVdd | Min | Typ | Max | Unit |
|---|------------------------------|------|--------|------|--------|------|
| A/D Digital Filter Pass Band (Note 5) | | All | 20 | - | 19,200 | Hz |
| A/D Digital Filter Transition Band | | All | 19,200 | - | 28,800 | Hz |
| A/D Digital Filter Stop Band | | All | 28,800 | - | - | Hz |
| A/D Digital Filter Stop Band Rejection (Note 6) | | All | -100 | - | - | dB |
| Group Delay (48 KHz sample rate) | | All | - | - | 1 | ms |
| Any Analog Input to ADC Crosstalk | 10 KHz Signal Frequency | All | - | -85 | - | dB |
| Any Analog Input to ADC Crosstalk | 1 KHz Signal Frequency | All | - | -80 | - | dB |
| Spurious Tone Rejection | | All | - | -100 | - | dB |
| Attenuation, Gain Step Size ANALOG | | All | - | 1.5 | - | dB |
| Interchannel Gain Mismatch ADC | | All | - | - | 0.5 | dB |
| Noise Floor when 40dB Mic Boost Enabled | | All | | | 0.01 | mV |
| 40dB Mic Boost Enabled SNR | 5 mV Input | All | | 60 | | dB |
| 40dB Mic Boost Enabled THD+N | 5 mV Input | All | | 55 | | dB |
| Power Supply | | | | | | |
| Power Supply Rejection Ratio | 1 KHz | All | - | -70 | - | dB |
| Power Supply Rejection Ratio | 20 KHz | All | - | -40 | - | dB |
| D0 Didd | 3.3 V | | | 75 | 90 | mA |
| D0 Aidd | 5.0 V, 4.5 V, & 4.0 V, 3.3 V | | | 85 | | mA |
| D1 Didd | 3.3 V | | | 75 | 90 | mA |
| D1 Aidd | 5.0 V, 4.5 V, & 4.0 V, 3.3 V | | | 85 | | mA |
| D2 Didd | 3.3 V | | | 23 | 30 | mA |
| D2 Aidd | 5.0 V, 4.5 V, & 4.0 V, 3.3 V | | | 58 | | mA |
| D3 Didd | 3.3 V | | | 23 | 30 | mA |
| D3 Aidd | 5.0 V, 4.5 V, & 4.0 V, 3.3 V | | | 37 | | mA |
| One Stereo ADC Didd | 3.3 V | | | 8 | 10 | mA |
| One Stereo ADC Aidd | 5.0 V, 4.5 V, & 4.0 V, 3.3 V | | | 10 | | mA |
| One Stereo DAC Didd | 3.3 V | | | 3 | 5 | mA |
| One Stereo DAC Aidd | 5.0 V, 4.5 V, & 4.0 V, 3.3 V | | | 2 | | mA |
| CD Input | | | | | | |
| CD Common Mode Rejection (CMR) | | All | 50 | 55 | | dB |
| Voltage Reference Outputs | | | | | | |

| Parameter | Conditions | AVdd | Min | Typ | Max | Unit |
|--|--|--------------------------------|-----|-------------------------|-----|------|
| VREFout (Note 8) | | All | - | 0.5 X AVdd | - | V |
| VREFILT (VAG) | | All | | 0.45 X AVdd | | V |
| Phased Locked Loop | | | | | | |
| PLL lock time | | All | | 96 | 200 | μsec |
| PLL (or Azalia Bit CLK) 24 MHz clock jitter | | All | | 150 | 500 | psec |
| Digital to Analog Converters | | | | | | |
| Resolution | | All | | 24 | | Bits |
| SNR - DAC to All Line-Out Ports (Note 4) | Analog Mixer Disabled, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 105 101 100 98 | | dB |
| THD+N - DAC to All Line-Out Ports (Note 3) | Analog Mixer Disabled, -3dB Signal, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 90 88 86 84 | | dB |
| SNR - DAC to All Line-Out Ports (Note 4) | Analog Mixer Enabled, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 90 88 87 85 | | dB |
| THD+N - DAC to All Line-Out Ports (Note 3) | Analog Mixer Enabled, -3dB Signal, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 80 78 77 75 | | dB |
| Dynamic Range: DAC to All Line Out Ports (Note2) | -60dB signal level | 5 V 4.5 V 4.0 V 3.3 V | - | 95 93 92 90 | - | dB |
| SNR - DAC to All Headphone Ports (Note 4) | Analog Mixer Disabled, 10KΩ load, PCM data | 5 V 4.5 V 4.0 V 3.3 V | | 105 101 100 98 | | dB |

- Ratio of Full Scale signal to noise output with -60dB signal, measured "A weighted" over a 20 Hz to a 20 KHz bandwidth.
- ± 3dB limits for Line Output & 0 dB gain, at -20dBV
- Amplitude of THD+N, measured with A-weighting filter, over 20 Hz to 20 KHz bandwidth.
- 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).
- Peak-to-Peak Ripple over Passband meets ± 0.25dB limits, 48 KHz Sample Frequency.
- Stop Band rejection determines filter requirements. Out-of-Band rejection determines audible noise.
- 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.
- Can be set to 0.5 or 0.8 AVdd.

3. DETAILED DESCRIPTION

3.1. Universal Jacks™

SigmaTel's Universal Jacks™ technology allows for the greatest flexibility in board design and implementation.

For the STAC9227/9228/9229/9230 family the Universal Jacks™ capabilities are as follows¹:

- Ports A, B, and D support²:
 - Headphone Out
 - Line Out
 - Line In
 - Microphone with 0/10/20/30/40 dB Microphone boost³:
- Ports C, E, F, G, H support²:
 - Line Out
 - Line In
 - Microphone with 0/10/20/30/40 dB Microphone boost³:
 - Ports G & H do not have VrefOut Support

Note¹: On the STAC9227/9228/9229/9230 family, only one function can be selected on each pin pair at a time. For example, a pin pair cannot be configured as an input and output at the same time. Configuration can be changed at any time.

Note²: Three Headphones should not be used simultaneously. Performance degradation will occur when using two Headphones simultaneously. See electrical specifications for details.

Note³: When the 40dB microphone boost feature is enabled, 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.

3.1.1. Audio Jack Presence Detect

SENSE_A pin is used to detect the presence of plugs in ports A, B, C, and D. SENSE_B pin is used to detect the presence of plugs in ports E, F, G, and H. Refer to the reference design for port detect circuitry. Select the precision of the resistors used as follows:

| AVDD Nominal Voltage (+-5%) | Resistor Tolerance Sense A (If Port D is used) | Resistor Tolerance Sense A (If Port D is not used) | Resistor Tolerance Sense B (If Port H is used) | Resistor Tolerance Sense B (If Port H is not used) |
|-----------------------------|--|--|--|--|
| 5 V | 1% | 1% | 1% | 1% |
| 4.5 V | 1% | 1% | 1% | 1% |
| 4 V | 0.50% | 1% | 0.50% | 1% |
| 3.3 V | 0.10% | 1% | 0.10% | 1% |

3.2. Impedance Sense

Impedance Sense is accomplished by on-chip circuitry that measures the impedance at the pin of the chip and compares it to internal reference impedance. Below is a table that contains the bin information and codes returned when the pin widget impedance field in the Port Pin Sense widget is read. Please note that even under the best conditions, there is no method to guarantee 100% impedance sensing due to variations in external circuitry and impedance overlap of devices that can be plugged into a jack. The impedance sense table reflects both standard Line Out and Headphone output drivers. Please reference the HD Audio Universal Jack Application Note on the SigmaTel Extranet for more information.

Table 1: Impedance Sense

| Bins | Return Hex Code | Impedance Level (Ohms) | General Device Detected |
|------|-----------------|---|------------------------------------|
| 000b | 0064h | Impedance < 300 Ω | Passive Speakers, Headset Speakers |
| 001b | 012Ch | Impedance = 300 Ω +/- 25% | Some Headset Speakers |
| 010b | 028Ah | 300 Ω > Impedance < 1275 Ω | Some Microphones |
| 011b | 03E8h | Impedance = 1275 Ω +/- 25% | Microphones |
| 100b | 07D0h | 1275 Ω > Impedance < 2000 Ω | Microphones |
| 101b | 0BB8h | Impedance = 2000 Ω +/- 25% | Amplified Speakers |
| 110b | 2710h | > 2000 Ω | Amplified Speakers, Line In |
| 111b | 2710h | > 2000 Ω | Amplified Speakers, Line In |

3.3. SPDIF Input

SPDIF IN can operate at 44.1 KHz, 48 KHz and 96 KHz, and implements internal Jack Detect.

A sophisticated digital PLL allows automatic rate detection and accurate data recovery. The ability to accept consumer SPDIF voltage levels directly eliminates the need for costly external receiver ICs. Advanced features such as record slot select and SPDIF_IN routing to the DAC allows for simultaneous record and play.

3.4. SPDIF Output

SPDIF Output can operate at 44.1 KHz, 48 KHz, 88.2 KHz, and 96 KHz, 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.

3.5. ADAT® Output

ADAT®, or “Lightpipe” is available on all versions of STAC927x family. ADAT® is a single bit stream optical digital interface for up to 8 channels of uncompressed 24-bit data. Sample rates up to 192 KHz are supported for 2 channels, up to 96 KHz for 4 channels, or up to 48 KHz for 8 channels.



3.6. Digital Microphone Support

The digital microphone interface permits connection of a digital microphone(s) to the STAC927x family via the DMIC0, DMIC1, and DMIC_CLK 3-pin interface. The DMIC0 and DMIC1 signals are inputs that carry individual channels of digital microphone data to the STAC927x family. In the event that a single microphone is used, the data is routed to both ADC channels.

The DMIC_CLK output is programmable from 1.176 MHz to 4.704 MHz in 1.176 MHz increments, and is synchronous to the 24 MHz internal clock. The default frequency is 2.352 MHz.

The STAC927x family supports the following digital microphone configurations:

Table 2. Valid Digital Microphone Configurations

| Digital Mics | Date Sample | ADC Conn. | Notes |
|--------------|--|------------|--|
| 0 | N/A | N/A | No Digital Microphones |
| 1 | Single Edge | 0, 1, or 2 | Available on either DMIC_0 or DMIC_1 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 OR Single Edge on DMIC_0 and 1 | 0, 1, or 2 | 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, 1, or 2 | Requires both 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. Two ADC units are required to support this configuration |
| 4 | Double Edge | 0, 1, or 2 | 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 3. DMIC_CLK, DMIC_0 and DMIC_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 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 |
| 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 |

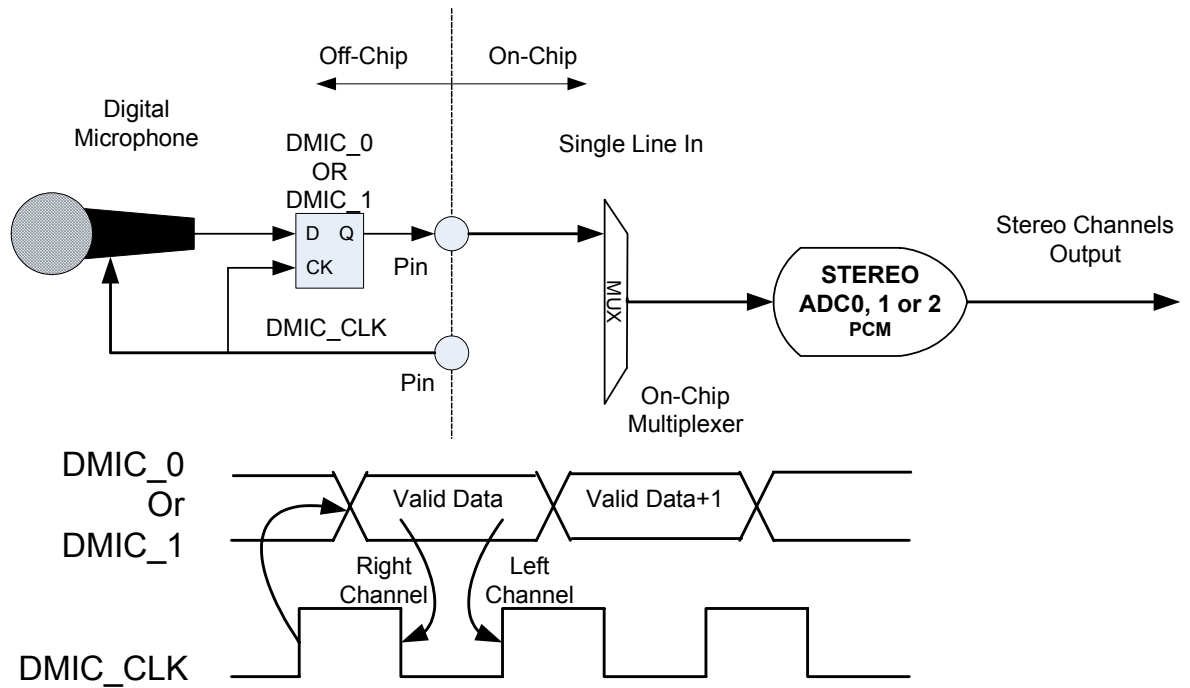


Figure 1. Single Digital Microphone (data is ported to both left and right channels)

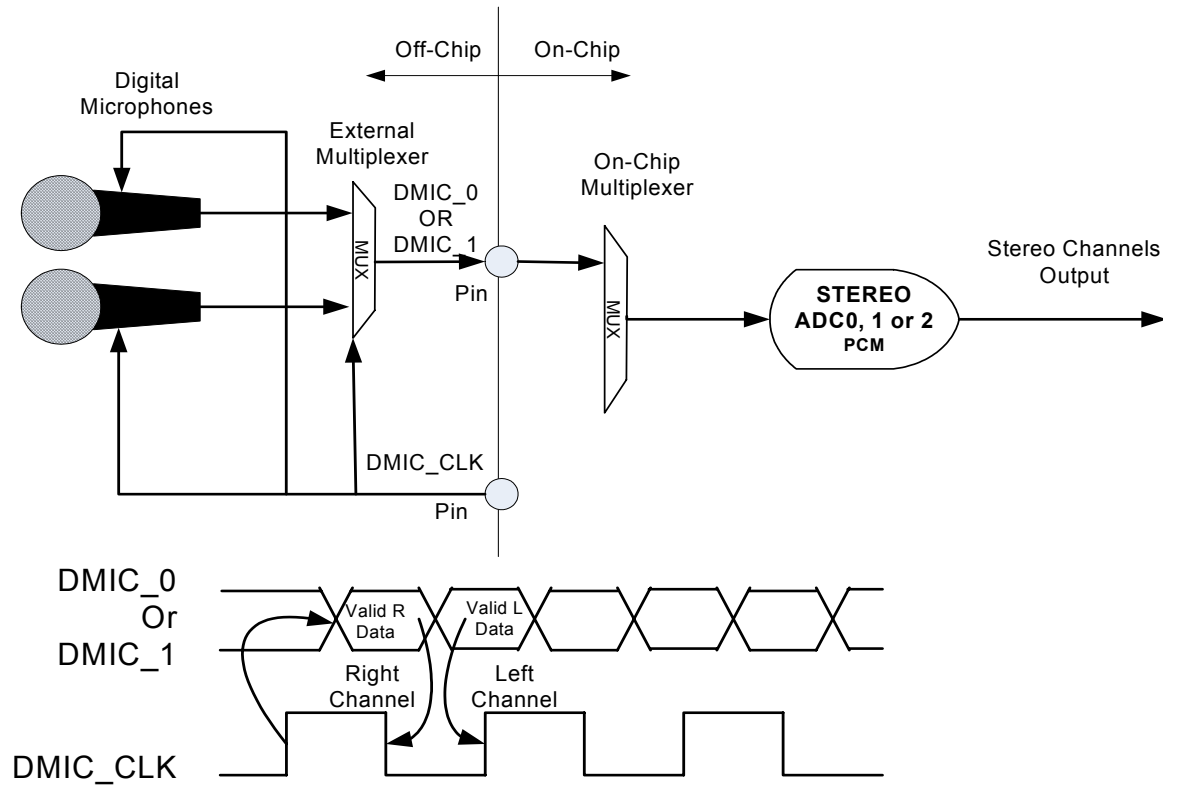


Figure 2. Stereo Digital Microphone Configuration

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

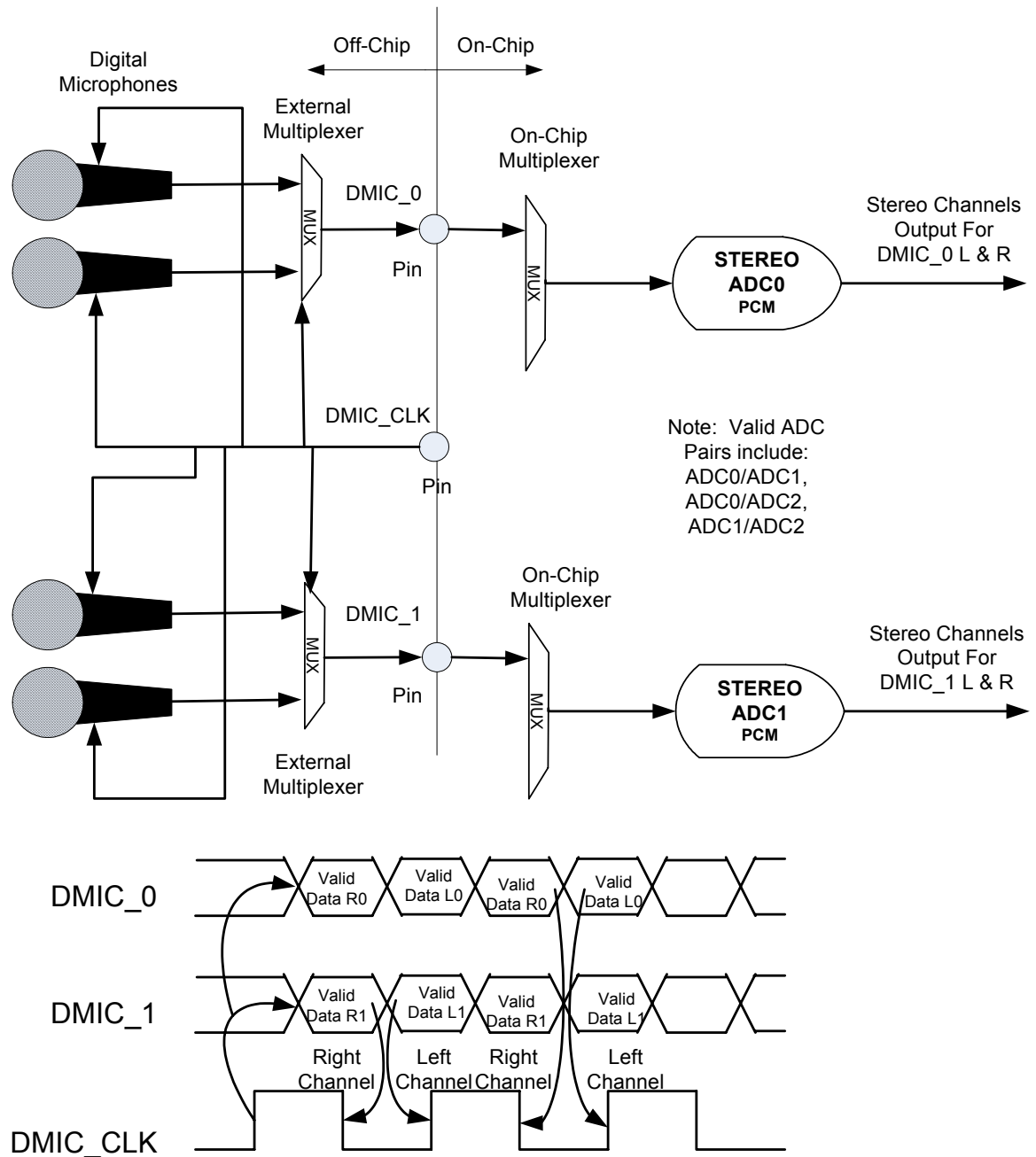


Figure 3. Quad Digital Microphone Configuration

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

3.7. Analog PC-Beep

PC-Beep is NOT supported during Link Reset.

3.8. Headphone Drivers (Restrictions)

Three Headphones should not be used simultaneously. Performance degradation will occur when using two Headphones simultaneously. See electrical specifications for details.

3.9. Device IDs

Table 4. Device IDs

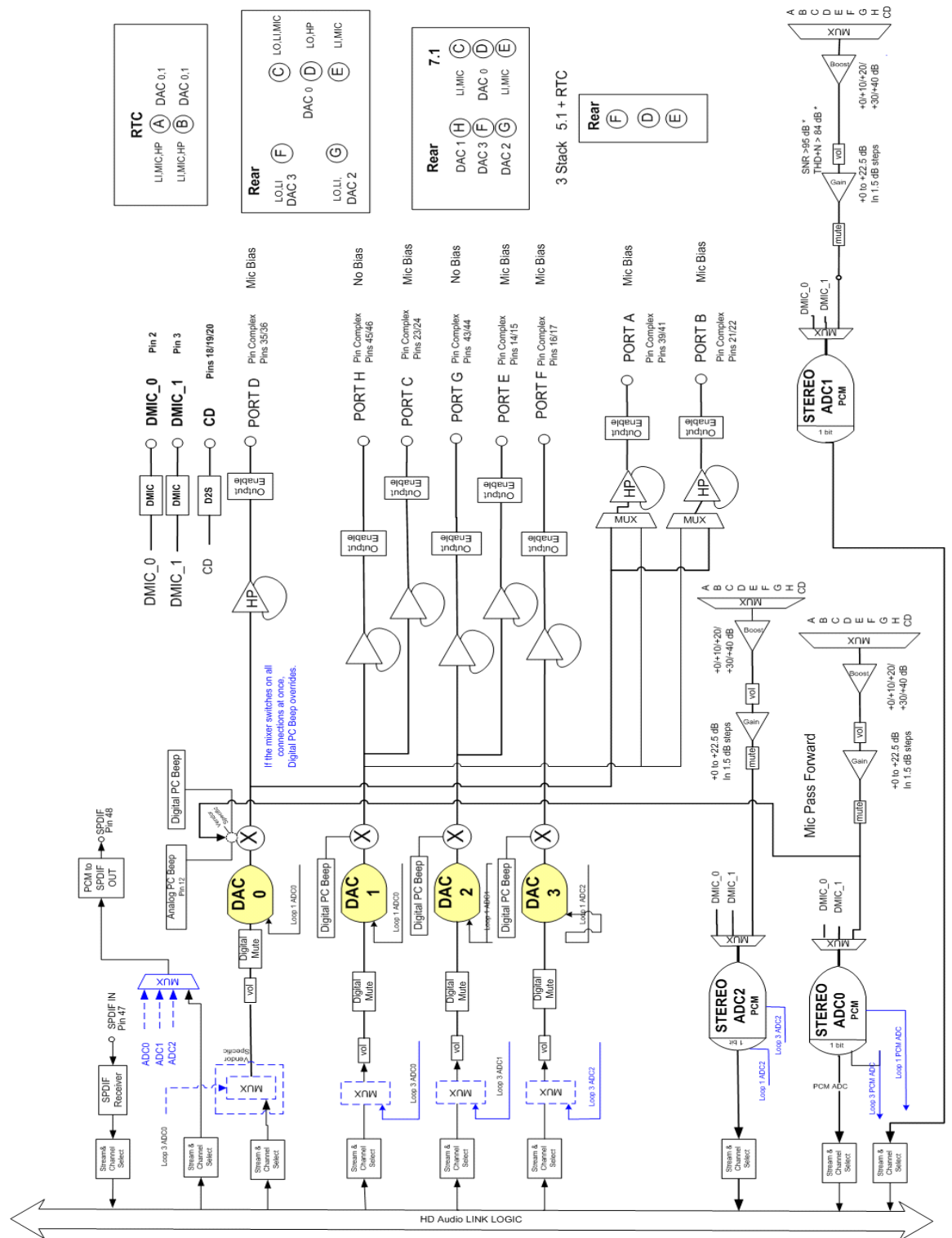
| Part Number | DAC SNR dB | VID | DID | Rev ID | Step ID | SSID* | Assm ID* | Dolby | Dig Mic | ADAT | Volume or DMIC |
|-------------|------------|-------|-------|--------|---------|---------|----------|-------|---------|------|----------------|
| STAC9230X | 105 | 8384h | 7612h | 01h | 01h | 000001h | 00h | No | Yes | Yes | Selectable |
| STAC9230D | 105 | 8384h | 7613h | 01h | 01h | 000001h | 00h | MS | Yes | Yes | Selectable |
| STAC9229X | 95 | 8384h | 7614h | 01h | 01h | 000001h | 00h | No | Yes | Yes | Selectable |
| STAC9229D | 95 | 8384h | 7615h | 01h | 01h | 000001h | 00h | HT/SR | Yes | Yes | Selectable |
| STAC9228X | 95 | 8384h | 7616h | 01h | 01h | 000001h | 00h | No | Yes | No | Selectable |
| STAC9228D | 95 | 8384h | 7617h | 01h | 01h | 000001h | 00h | HT/SR | Yes | No | Selectable |
| STAC9227X | 95 | 8384h | 7618h | 01h | 01h | 000001h | 00h | No | No | No | Selectable |
| STAC9227D | 95 | 8384h | 7619h | 01h | 01h | 000001h | 00h | HT/SR | No | No | Selectable |

Note: SVIDs, SSIDs and Assembly IDs are read/writable by BIOS. All other ID fields are read-only.

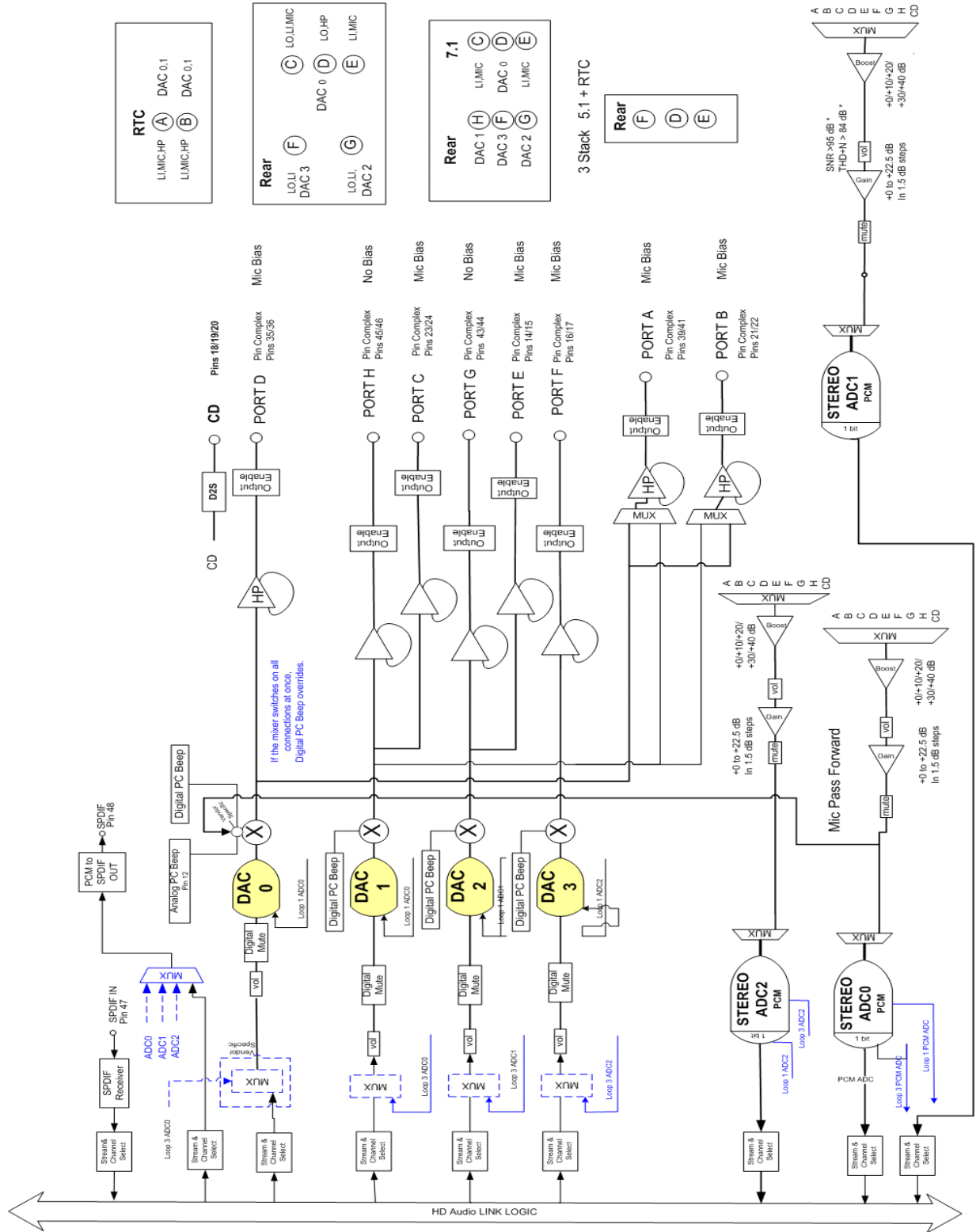
Note: MS refers to Master Studio and HT/SR refers to Home Theater/Sound Room

4. FUNCTIONAL BLOCK DIAGRAMS

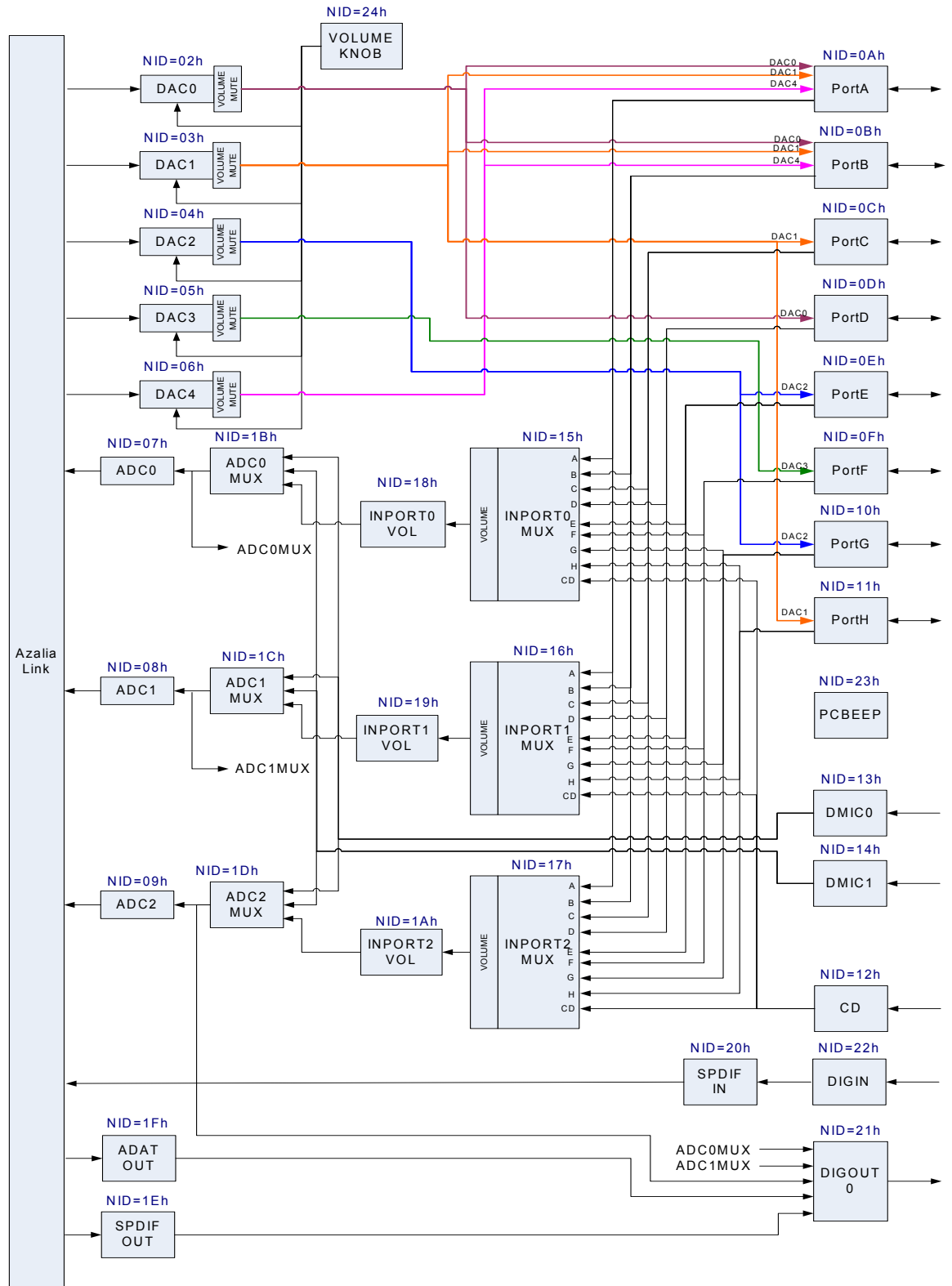
4.1. Without ADAT



4.2. Without ADAT or Digital Microphone



5. WIDGET DIAGRAM



5.1. Pin Configuration Default Register Settings

The following table shows the Pin Widget Configuration Default settings.

Table 5. Pin Configuration Default Settings

| Pin Name | Port | Location | Device | Connection | Color | Misc | Assoc. | Seq |
|-----------|-------------------------------|-------------------------------|------------------------|-----------------------------|----------------------|-----------------------------|--------|-----|
| DigInPin | Not Connected 01b | Mainboard Rear 1h | SPDIF In Ch | RCA 4h | Gray 2h | Jack Detect Override = 1 | 9h | 0h |
| DigOutPin | Connect to Jack 00b | Mainboard Rear 1h | SPDIF Out 4h | RCA 4h | Gray 2h | Jack Detect Override = 0 | 7h | 0h |
| PortAPin | Connect to Jack 00b | Mainboard Front 2h | HP Out 2h | 1/8 inch Jack 1h | Green 4h | Jack Detect Override = 0 | 2h | 0h |
| PortBPin | Connect to Jack 00b | Mainboard Front 2ht | Mic In Ah | 1/8 inch Jack 1h | Pink 9h | Jack Detect Override = 0 | 8h | 0h |
| PortCPin | Connect to Jack 00b | Mainboard Rear 1h | Line In 8h | 1/8 inch Jack 1h | Blue 3h | Jack Detect Override = 0 | 4h | Eh |
| PortDPin | Connect to Jack 00b | Mainboard Rear 1h | Line Out 0h | 1/8 inch Jack 1h | Green 4h | Jack Detect Override = 0 | 1h | 0h |
| PortEPin | Connect to Jack 00b | Mainboard Rear 1h | Mic In Ah | 1/8 inch Jack 1h | Pink 9h | Jack Detect Override = 0 | 4h | 0h |
| PortFPin | Connect to Jack 00b | Mainboard Rear 1h | Line Out 0h | 1/8 inch Jack 1h | Black 1h | Jack Detect Override = 0 | 1h | 2h |
| PortGPin | Connect to Jack 00b | Mainboard Rear 1h | Line Out 0h | 1/8 inch Jack 1h | Orange 6h | Jack Detect Override = 0 | 1h | 1h |
| PortHPin | Connect to Jack 00b | Mainboard Rear 1h | Line Out 0h | 1/8 inch Jack 1h | Gray 2h | Jack Detect Override = 0 | 1h | Fh |
| CDPin | Not Connected 01b | Internal 01000b | CD 3h | ATAPI Internal 3h | Unknown 0h | Jack Detect Override = 1 | Fh | 0h |
| DigMicPin | Not Connected 01b | Internal 01000b | Mic In Ah | Unknown 0h | Unknown 0h | Jack Detect Override = 1 | Fh | 0h |
| DigMicPin | Not Connected 01b | Internal 01000b | Mic In Ah | Unknown 0h | Unknown 0h | Jack Detect Override = 1 | Fh | 0h |

6. WIDGET INFORMATION FOR THE STAC9227/9228/9229/9230

Table 6. High Definition Audio Widget List

| ID | Widget Name | Description |
|-----|----------------------|--|
| 00h | Root | Root Node |
| 01h | Audio Function Group | Audio Function Group |
| 02h | DAC0 | Stereo Output Converter to DAC |
| 03h | DAC1 | Stereo Output Converter to DAC |
| 04h | DAC2 | Stereo Output Converter to DAC |
| 05h | DAC3 | Stereo Output Converter to DAC |
| 06h | DAC4 | Stereo Output Converter to DAC |
| 07h | ADC0 | Stereo Input Converter to ADC |
| 08h | ADC1 | Stereo Input Converter to ADC |
| 09h | ADC2 | Stereo Input Converter to ADC |
| 0Ah | Port A | Port A Pin Widget (Configurable as HP, Line In, Line Out, Mic) |
| 0Bh | Port B | Port B Pin Widget (Configurable as HP, Line In, Line Out, Mic) |
| 0Ch | Port C | Port C Pin Widget (Configurable as Line In, Line Out, Mic) |
| 0Dh | Port D | Port D Pin Widget (Configurable as HP, Line In, Line Out, Mic) |
| 0Eh | Port E | Port E Pin Widget (Configurable as Line In, Line Out, Mic) |
| 0Fh | Port F | Port F Pin Widget (Configurable as Line In, Line Out, Mic) |
| 10h | Port G | Port G Pin Widget (Configurable as Line In, Line Out, Mic) |
| 11h | Port H | Port H Pin Widget (Configurable as Line In, Line Out, Mic) |
| 12h | CD | CD Pin Widget |
| 13h | DigMic0 | Digital Microphone 0 Pin Widget |
| 14h | DigMic1 | Digital Microphone 1 Pin Widget |
| 15h | InPort0Mux | ADC0 Input Port Mux |
| 16h | InPort1Mux | ADC1 Input Port Mux |
| 17h | InPort2Mux | ADC2 Input Port Mux |
| 18h | InPort0Vol | ADC0 Input Port Volume |
| 19h | InPort1Vol | ADC1 Input Port Volume |
| 1Ah | InPort2Vol | ADC2 Input Port Volume |
| 1Bh | ADC0Mux | ADC0 Mux |
| 1Ch | ADC1Mux | ADC1 Mux |
| 1Dh | ADC2Mux | ADC2 Mux |
| 1Eh | SPDIF_OUT | Stereo Output for SPDIF_Out |
| 1Fh | ADATOut | ADAT Out |
| 20h | SPDIF_IN | Stereo Input for SPDIF_In |

Table 6. High Definition Audio Widget List

| ID | Widget Name | Description |
|-----|-------------|------------------------------|
| 21h | DigOut | Digital Output Pin |
| 22h | DigIn | Digital Microphone Input Pin |
| 23h | PCBEEP | Digital PC Beep |
| 24h | VolumeKnob | Master Volume Controls |

6.1. Root Node (NID = 0x00)

6.1.1. Root ID

Table 7. Root ID Command Verb Format

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

Table 8. Root ID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|--------|--|
| [31:16] | Vendor | R | 0x8384 | Vendor ID. |
| [15:8] | DeviceFix | R | 0x76 | Fixed portion of Device ID. |
| [7:0] | DeviceProg | R | 0x10 | Dependent of device- See device ID table in section 5.8. |

6.1.2. Root RevID

Table 9. Root RevID Command Verb Format

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

Table 10. Root RevID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:24] | Rsvd | R | 0x00 | Reserved |
| [23:20] | Major | R | 0x1 | Major rev number of compliant Azalia spec. |
| [19:16] | Minor | R | 0x0 | Minor rev number of compliant Azalia spec. |
| [15:12] | VendorFix | R | 0x0 | Fixed portion of Vendor's rev number for this device. |
| [11:8] | VendorProg | R | 0x1 | Vendor's rev number for this device. |

Table 10. Root RevID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [7:4] | SteppingFix | R | 0x0 | Fixed portion of vendor stepping number within the Vendor RevID. |
| [3:0] | SteppingProg | R | 0x1 | vendor stepping number within the Vendor RevID. |

6.1.3. Root NodeInfo

Table 11. Root NodeInfo Command Verb Format

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

Table 12. Root NodeInfo Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x00 | Reserved |
| [23:16] | StartNID | R | 0x01 | Starting node number (NID) of first function group |
| [15:8] | Rsvd1 | R | 0x00 | Reserved |
| [7:0] | TotalNodes | R | 0x01 | Total number of nodes |

6.2. AFG Node (NID = 0x01)

6.2.1. AFG Reset

Table 13. AFG Reset Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | 7FF | 00 | See bitfield table. |
| Set1 | 7FF | See bits [7:0] of bitfield table. | 0000_0000h |

Table 14. AFG Reset Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:0] | Response | R | 0x0 | Reserved. Overlaps Execute. |
| [0] | Execute | W | 0x0 | Function Reset. Function Group reset is executed when the Set verb 7FF is written with 8-bit payload of 00h. The CODEC should issue a response to acknowledge receipt of the verb, and then reset the affected Function Group and all associated widgets to their power-on reset values. Some controls such as Configuration Default controls should not be reset. Overlaps Response. |

6.2.2. AFG NodeInfo

Table 15. AFG NodeInfo Command Verb Format

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

Table 16. AFG NodeInfo Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:16] | StartNID | R | 0x2 | Starting node number for function group subordinate nodes. |
| [15:8] | Rsvd1 | R | 0x0 | Reserved |
| [7:0] | TotalNodes | R | 0x23 | Total number of nodes. |

6.2.3. AFG Type

Table 17. AFG Type Command Verb Format

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

Table 18. AFG Type Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:9] | Rsvd | R | 0x0 | Reserved |
| [8] | UnSol | R | 0x1 | This node is capable of generating an unsolicited response, and will respond to the Unsolicited Response verb (Verb ID 708h). |
| [7:0] | NodeType | R | 0x01 | Node type = Audio Function Group |

6.2.4. AFG Cap

Table 19. AFG Cap Command Verb Format

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

Table 20. AFG Cap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:17] | Rsvd3 | R | 0x0 | Reserved |
| [16] | BeepGen | R | 0x1 | Optional Beep Generator is present |
| [15:12] | Rsvd2 | R | 0x0 | Reserved |
| [11:8] | InputDelay | R | 0xD | Typical latency = 13 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 Azalia link. |
| [7:4] | Rsvd1 | R | 0x0 | Reserved |
| [3:0] | OutputDelay | R | 0xD | Typical latency = 13 frames. Number of samples between when the signal is received from the Azalia link and when it appears as an analog signal at the pin. |

6.2.5. AFG PCMCap

Table 21. AFG PCMCap Command Verb Format

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

Table 22. AFG PCMCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:21] | Rsvd2 | R | 0x0 | Reserved |
| [20] | B32 | R | 0x0 | 32 bit audio formats are NOT supported |
| [19] | B24 | R | 0x1 | 24 bit audio formats are supported |
| [18] | B20 | R | 0x1 | 20 bit audio formats are supported |
| [17] | B16 | R | 0x1 | 16 bit audio formats are supported |
| [16] | B8 | R | 0x0 | 8 bit audio formats are NOT supported |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | R12 | R | 0x0 | 384 KHz rate (8/1*48 KHz) NOT supported |
| [10] | R11 | R | 0x1 | 192.0 KHz rate (4/1*48 KHz) supported |
| [9] | R10 | R | 0x1 | 176.4 KHz rate (4/1*44.1 KHz) supported |
| [8] | R9 | R | 0x1 | 96.0 KHz rate (2/1*48 KHz) supported |
| [7] | R8 | R | 0x1 | 88.2 KHz rate (2/1*44.1 KHz) supported |
| [6] | R7 | R | 0x1 | 48.0 KHz rate supported (REQUIRED) |
| [5] | R6 | R | 0x1 | 44.1 KHz rate supported |
| [4] | R5 | R | 0x0 | 32.0 KHz rate (2/3*48 KHz) supported |
| [3] | R4 | R | 0x0 | 22.05 KHz rate (1/2*44.1 KHz) supported |
| [2] | R3 | R | 0x0 | 16.0 KHz rate (1/3*48 KHz) supported |
| [1] | R2 | R | 0x0 | 11.025 KHz rate (1/4*44.0 KHz) supported |
| [0] | R1 | R | 0x0 | 8.0 KHz rate (1/6*48 KHz) supported |

6.2.6. AFG Stream

Table 23. AFG Stream Command Verb Format

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

Table 24. AFG Stream Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-------------------------------|
| [31:3] | Rsvd | R | 0x0 | Reserved |
| [2] | NonPCM | R | 0x0 | No support for non-PCM data. |
| [1] | Float32 | R | 0x0 | No support for Float32 data. |
| [0] | PCM | R | 0x1 | PCM-formatted data supported. |

6.2.7. AFG InAmpCap

Table 25. AFG InAmpCap Command Verb Format

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

Table 26. AFG InAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31] | Mute | R | 0x0 | No mute capability |
| [30:23] | Rsvd3 | R | 0x0 | Reserved |
| [22:16] | StepSize | R | 0x5 | Size of each step in the gain range = 1.5dB |
| [15] | Rsvd2 | R | 0x0 | Reserved |
| [14:8] | NumSteps | R | 0x0E | Number of steps in the gain range = 15 (0dB to 22.5 dB) |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6:0] | Offset | R | 0x00 | 0dB-step is programmed with this offset |

6.2.8. AFG SupPwrState

Table 27. AFG SupPwrState Command Verb Format

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

Table 28. AFG SupPwrState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:4] | Rsvd | R | 0x0 | Reserved |
| [3] | D3Sup | R | 0x1 | Power State D3 is supported. Allows for lowest possible power consuming state under software control (and still properly respond to a subsequent Power State command). |
| [2] | D2Sup | R | 0x1 | Power State D2 is supported. Allows for lowest possible power consuming state from which it can return to fully on state within 10ms. |
| [1] | D1Sup | R | 0x1 | Power State D1 is supported. Allows for lowest possible power consuming state from which it can return to fully on state within 10ms, excepting analog pass-through circuits which must remain fully on. |
| [0] | D0Sup | R | 0x1 | Power State D0 is supported. Node power state is fully on. |

6.2.9. AFG GPIOCnt

Table 29. AFG GPIOCnt Command Verb Format

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

Table 30. AFG GPIOCnt Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|--------------|--|
| [31] | GPIWake | R | 0x1 | Wake capability. Assuming the Wake Enable Mask controls are enabled, GPIO's 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 | 0x1 | Unsolicited Response capability. Assuming the Unsolicited Enable Mask controls are enabled, GPIO's configured as inputs can generate an Unsolicited Response on the link when there is a change in level on the pin. |
| [29:24] | Rsvd | R | 0x0 | Reserved |
| [23:16] | NumGPIs | R | 0x00 | Number of GPI pins supported by function |
| [15:8] | NumGPOs | R | 0x00 | Number of GPO pins supported by function |
| [7:0] | NumGPIOs | R | 0x03 = 48pin | Number of GPIO pins supported by function |

6.2.10. AFG OutAmpCap

Table 31. AFG OutAmpCap Command Verb Format

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

Table 32. AFG OutAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31] | Mute | R | 0x1 | Amplifier is capable of muting |
| [30:23] | Rsvd3 | R | 0x0 | Reserved |
| [22:16] | StepSize | R | 0x02 | Size of each step in the gain range = 0.75dB |
| [15] | Rsvd2 | R | 0x0 | Reserved |
| [14:8] | NumSteps | R | 0x7F | Number of steps in the gain range = 128 (-96dB to +0dB) |

Table 32. AFG OutAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|---|
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6:0] | Offset | R | 0x7F | 0dB-step is programmed with this offset |

6.2.11. AFG PwrState

Table 33. AFG PwrState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F05 | 00 | See bitfield table. |
| Set1 | 705 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 34. AFG PwrState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7:4] | Act | R | 0x2 | PS-Act: Actual power state of referenced node. |
| [3:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | Set | RW | 0x2 | PS-Set: Current power setting of referenced node. 0: All Powered-On 1: D1 = > PR0, PR1 2: D2 = > PR0, PR1, PR2, PR6, EAPD 3: D3 = > PR6, PR5, PR3, PR2, PR1, PR0, EAPD Note: PR4 is not mapped in Azalia |

6.2.12. AFG UnsolResp

Table 35. AFG UnsolResp Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F08 | 00 | See bitfield table. |
| Set1 | 708 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 36. AFG UnsolResp Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | En | RW | 0x0 | Allow generation of Unsolicited Responses. |
| [6] | Rsvd1 | R | 0x0 | Reserved |
| [5:0] | Tag | RW | 0x0 | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

6.2.13. AFG GPIO

Table 37. AFG GPIO Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F15 | 00 | See bitfield table. |
| Set1 | 715 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 38. AFG GPIO Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:5] | Rsvd | R | 0x0 | Reserved |
| [4] | Data4 | RW | 0x0 | Data for GPIO4. If this GPIO bit is configured as Sticky (edge-sensitive) input, it can be cleared by writing zero (one) here when the corresponding Polarity Control bit is zero (one). |
| [3] | Data3 | RW | 0x0 | Data for GPIO3. If this GPIO bit is configured as Sticky (edge-sensitive) input, it can be cleared by writing zero (one) here when the corresponding Polarity Control bit is zero (one). |
| [2] | Data2 | RW | 0x0 | Data for GPIO2. If this GPIO bit is configured as Sticky (edge-sensitive) input, it can be cleared by writing zero (one) here when the corresponding Polarity Control bit is zero (one). |

Table 38. AFG GPIO Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [1] | Data1 | RW | 0x0 | Data for GPIO1. If this GPIO bit is configured as Sticky (edge-sensitive) input, it can be cleared by writing zero (one) here when the corresponding Polarity Control bit is zero (one). |
| [0] | Data0 | RW | 0x0 | Data for GPIO0. If this GPIO bit is configured as Sticky (edge-sensitive) input, it can be cleared by writing zero (one) here when the corresponding Polarity Control bit is zero (one). |

6.2.14. AFG GPIOEn

Table 39. AFG GPIOEn Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F16 | 00 | See bitfield table. |
| Set1 | 716 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 40. AFG GPIOEn Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:5] | Rsvd | R | 0x0 | Reserved |
| [4] | Mask4 | RW | 0x0 | Enable for GPIO4: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |
| [3] | Mask3 | RW | 0x0 | Enable for GPIO3: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |
| [2] | Mask2 | RW | 0x0 | Enable for GPIO2: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |

Table 40. AFG GPIOEn Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [1] | Mask1 | RW | 0x0 | Enable for GPIO1: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |
| [0] | Mask0 | RW | 0x0 | Enable for GPIO0: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |

6.2.15. AFG GPIODir

Table 41. AFG GPIODir Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F17 | 00 | See bitfield table. |
| Set1 | 717 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 42. AFG GPIODir Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:5] | Rsvd | R | 0x0 | Reserved |
| [4] | Control4 | RW | 0x0 | Direction control for GPIO4 0 = GPIO signal is configured as input 1 = GPIO signal is configured as output |
| [3] | Control3 | RW | 0x0 | Direction control for GPIO3 0 = GPIO signal is configured as input 1 = GPIO signal is configured as output |
| [2] | Control2 | RW | 0x0 | Direction control for GPIO2 0 = GPIO signal is configured as input 1 = GPIO signal is configured as output |
| [1] | Control1 | RW | 0x0 | Direction control for GPIO1 0 = GPIO signal is configured as input 1 = GPIO signal is configured as output |
| [0] | Control0 | RW | 0x0 | Direction control for GPIO0 0 = GPIO signal is configured as input 1 = GPIO signal is configured as output |

6.2.16. AFG GPIOWakeEn

Table 43. AFG GPIOWakeEn Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F18 | 00 | See bitfield table. |
| Set1 | 718 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 44. AFG GPIOWakeEn Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:5] | Rsvd | R | 0x0 | Reserved |
| [4] | W4 | RW | 0x0 | Wake enable for GPIO4: 0 = wake-up event is disabled; 1 = when Azalia link is powered down (RST# is asserted), a wake-up event will trigger a Status Change Request event on the link. |
| [3] | W3 | RW | 0x0 | Wake enable for GPIO3: 0 = wake-up event is disabled; 1 = when Azalia link is powered down (RST# is asserted), a wake-up event will trigger a Status Change Request event on the link. |
| [2] | W2 | RW | 0x0 | Wake enable for GPIO2: 0 = wake-up event is disabled; 1 = when Azalia link is powered down (RST# is asserted), a wake-up event will trigger a Status Change Request event on the link. |
| [1] | W1 | RW | 0x0 | Wake enable for GPIO1: 0 = wake-up event is disabled; 1 = when Azalia link is powered down (RST# is asserted), a wake-up event will trigger a Status Change Request event on the link. |
| [0] | W0 | RW | 0x0 | Wake enable for GPIO0: 0 = wake-up event is disabled; 1 = when Azalia link is powered down (RST# is asserted), a wake-up event will trigger a Status Change Request event on the link. |

6.2.17. AFG GPIOUnsol

Table 45. AFG GPIOUnsol Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F19 | 00 | See bitfield table. |
| Set1 | 719 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 46. AFG GPIOUnsol Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:5] | Rsvd | R | 0x0 | Reserved |
| [4] | EnMask4 | RW | 0x0 | 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 GPIO0 is configured as input and changes state. |
| [3] | EnMask3 | RW | 0x0 | 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 GPIO0 is configured as input and changes state. |
| [2] | EnMask2 | RW | 0x0 | 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 GPIO0 is configured as input and changes state. |
| [1] | EnMask1 | RW | 0x0 | 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 GPIO0 is configured as input and changes state. |
| [0] | EnMask0 | RW | 0x0 | 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. |

6.2.18. AFG GPIOSticky

Table 47. AFG GPIOSticky Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F1A | 00 | See bitfield table. |
| Set1 | 71A | See bits [7:0] of bitfield table. | 0000_0000h |

Table 48. AFG GPIOSticky Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:5] | Rsvd | R | 0x0 | Reserved |
| [4] | Mask4 | RW | 0x0 | GPIO4 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). Sticky inputs are cleared by writing zero to corresponding bit of GPIO Data register. GPIOPolarity determines rising or falling edge sensitivity. |
| [3] | Mask3 | RW | 0x0 | GPIO3 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). Sticky inputs are cleared by writing zero to corresponding bit of GPIO Data register. GPIOPolarity determines rising or falling edge sensitivity. |
| [2] | Mask2 | RW | 0x0 | GPIO2 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). Sticky inputs are cleared by writing zero to corresponding bit of GPIO Data register. GPIOPolarity determines rising or falling edge sensitivity. |

Table 48. AFG GPIOSticky Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---|
| [1] | Mask1 | RW | 0x0 | GPIO1 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). Sticky inputs are cleared by writing zero to corresponding bit of GPIO Data register. GPIOPolarity determines rising or falling edge sensitivity. |
| [0] | Mask0 | RW | 0x0 | GPIO0 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). Sticky inputs are cleared by writing zero to corresponding bit of GPIO Data register. GPIOPolarity determines rising or falling edge sensitivity. |

6.2.19. AFG SubID

Table 49. AFG SubID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F20 | 00 | See bitfield table. |
| Set1 | 720 | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 721 | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 722 | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 723 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 50. AFG SubID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Subsys3 | RW | 0x00 | Subsystem ID. (Any non-zero value) |
| [23:16] | Subsys2 | RW | 0x00 | |
| [15:8] | Subsys1 | RW | 0x01 | |
| [7:0] | Assembly | RW | 0x00 | Assembly ID. (Not applicable to CODEC vendors) |

6.2.20. AFG TCKT

Table 51. AFG TCKT Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | FE5 | 00 | See bitfield table. |
| Set1 | 7E5 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 52. AFG TCKT Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | AnaD3Enable | RW | 0x0 | D3 enable signal for analog |
| [6:0] | TCKT | RW | 0x0 | Test circuit (default reset on) TBD [6:0] |

6.2.21. AFG Sply

Table 53. AFG Sply Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | FE6 | 00 | See bitfield table. |
| Set1 | 7E6 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 54. AFG Sply Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:7] | Rsvd | R | 0x0 | Reserved |
| [6:5] | IBIAS | RW | 0x0 | 00 = Normal Current; 01 = 80% nominal Analog Current; 10 = 120%nominal Analog Current; 11 = 140% nominal Analog Current |

Table 54. AFG Sply Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [4] | PinLvl | RW | 0x1 | 0 = low-level SPDIF Input (special buffer for low level signals) 1 = standard SPDIF Input (for high level signals) |
| [3:0] | SplyOvr | RW | 0x0 | Supply Override Control. See Table below: [0] = invert ADC supply; [1] = invert DAC supply; [2] = supply value; [3] = supply override enable |

6.2.22. AFG DACMode

Table 55. AFG DACMode Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | FEB | 00 | See bitfield table. |
| Set1 | 7EB | See bits [7:0] of bitfield table. | 0000_0000h |

Table 56. AFG DACMode Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:7] | Rsvd2 | R | 0x0 | Reserved |
| [6] | ADCMixDAC | RW | 0x0 | Enable mixing of ADC with DAC signal (for karaoke) |
| [5] | FadeFast | RW | 0x0 | Gain ramps at the maximum rate |
| [4] | FadeLog | RW | 0x0 | Gain ramping is dB linear instead of voltage linear over time |
| [3:0] | Rsvd | R | 0x0 | Reserved |

6.2.23. AFG GPIOIrty

Table 57. AFG GPIOIrty Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | FEE | 00 | See bitfield table. |
| Set1 | 7EE | See bits [7:0] of bitfield table. | 0000_0000h |

Table 58. AFG GPIOIrty Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:5] | Rsvd | R | 0x0 | Reserved |
| [4] | GP4 | RW | 0x1 | GPIO4 Polarity; If configured as an output: 0 = inverting, 1 = non-inverting; If configured as a non-sticky input: 0 = inverting, 1 = non-inverting; If configured as a sticky input: 0 = falling events will be detected, 1 = rising events will be detected. |
| [3] | GP3 | RW | 0x1 | GPIO3 Polarity; If configured as an output: 0 = inverting, 1 = non-inverting; If configured as a non-sticky input: 0 = inverting, 1 = non-inverting; If configured as a sticky input: 0 = falling events will be detected, 1 = rising events will be detected. |
| [2] | GP2 | RW | 0x1 | GPIO2 Polarity; If configured as an output: 0 = inverting, 1 = non-inverting; If configured as a non-sticky input: 0 = inverting, 1 = non-inverting; If configured as a sticky input: 0 = falling events will be detected, 1 = rising events will be detected. |

Table 58. AFG GPIOIrty Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---|
| [1] | GP1 | RW | 0x1 | GPIO1 Polarity; If configured as an output: 0 = inverting, 1 = non-inverting; If configured as a non-sticky input: 0 = inverting, 1 = non-inverting; If configured as a sticky input: 0 = falling events will be detected, 1 = rising events will be detected. |
| [0] | GP0 | RW | 0x1 | GPIO0 Polarity; If configured as an output: 0 = inverting, 1 = non-inverting; If configured as a non-sticky input: 0 = inverting, 1 = non-inverting; If configured as a sticky input: 0 = falling events will be detected, 1 = rising events will be detected. |

6.2.24. AFG GPIODrive

Table 59. AFG GPIODrive Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | FEF | 00 | See bitfield table. |
| Set1 | 7EF | See bits [7:0] of bitfield table. | 0000_0000h |

Table 60. AFG GPIODrive Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:5] | Rsvd | R | 0x0 | Reserved |
| [4] | OD4 | RW | 0x0 | GPIO4 Drive Mode; 0 = push-pull (drive 0 and 1), 1 = open drain (drive 0, float for 1). |
| [3] | OD3 | RW | 0x0 | GPIO3 Drive Mode; 0 = push-pull (drive 0 and 1), 1 = open drain (drive 0, float for 1). |

Table 60. AFG GPIO Drive Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---|
| [2] | OD2 | RW | 0x0 | GPIO2 Drive Mode; 0 = push-pull (drive 0 and 1), 1 = open drain (drive 0, float for 1). |
| [1] | OD1 | RW | 0x0 | GPIO1 Drive Mode; 0 = push-pull (drive 0 and 1), 1 = open drain (drive 0, float for 1). |
| [0] | OD0 | RW | 0x0 | GPIO0 Drive Mode; 0 = push-pull (drive 0 and 1), 1 = open drain (drive 0, float for 1). |

6.2.25. AFG DMic

Table 61. AFG DMic Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | FF0 | 00 | See bitfield table. |
| Set1 | 7F0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 62. AFG DMic Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:4] | Rsvd | R | 0x0 | Reserved |
| [3:2] | PhAdj | RW | 0x0 | Selects what phase of the DigMic clock the data should be latched: 0 = rising edge 1 = center of high 2 = falling edge 3 = center of low |
| [1:0] | Rate | RW | 0x2 | Selects the DigMic rate: 0 = 4.704 MHz 1 = 3.528 MHz 2 = 2.352 MHz 3 = 1.176 MHz |

6.3. DAC0 Node (NID = 0x02)

6.3.1. DAC0 Cnvtr

Table 63. DAC0 Cnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|------------------------------------|---------------------|
| Get | A | 0000 | See bitfield table. |
| Set1 | 2 | See bits [15:0] of bitfield table. | 0000_0000h |

Table 64. DAC0 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | StrmType | R | 0x0 | Stream Type: only PCM streams are supported by this widget. |
| [14] | FrmtSmplRate | RW | 0x0 | Sample Base Rate 0 = 48 KHz 1 = 44.1 KHz |
| [13:11] | SmplRateMultp | RW | 0x0 | Sample Base Rate Multiple 000 = 48 KHz / 44.1 KHz or less 001 = x2 010 = Reserved (x3) 011 = x4 100-111 = Reserved |
| [10:8] | SmplRateDiv | RW | 0x0 | Sample Base Rate Divisor 000 = Divide by 1 001 = Divide by 2 010 = Divide by 3 011 = Divide by 4 100 = Divide by 5 101 = Divide by 6 110 = Divide by 7 111 = Divide by 8 |
| [7] | Rsvd1 | R | 0x0 | Reserved |

Table 64. DAC0 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [6:4] | BitsPerSmpl | RW | 0x3 | Bits per Sample 000 = 8 bits 001 = 16 bits 010 = 20 bits 011 = 24 bits 100-111 = Reserved |
| [3:0] | NmbrChan | RW | 0x1 | Number of Channels Number of channels in each frame of the stream. 0000 = 1 channel 0001 = 2 channels ... 1111 = 16 channels |

6.3.2. DAC0 OutAmpRight

Table 65. DAC0 OutAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B80 | 00 | See bitfield table. |
| Set1 | 390 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 66. DAC0 OutAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Gain | RW | 0x7F | Amplifier gain step number |

6.3.3. DAC0 OutAmpLeft

Table 67. DAC0 OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 68. DAC0 OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Gain | RW | 0x7F | Amplifier gain step number |

6.3.4. DAC0 WCap

Table 69. DAC0 WCap Command Verb Format

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

Table 70. DAC0 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x0 | Widget type = Audio Output |
| [19:16] | Delay | R | 0xD | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x1 | Left and right channels can be swapped |
| [10] | PwrCntrl | R | 0x1 | Power State control is supported |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x0 | No connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |

Table 70. DAC0 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.3.5. DAC0 PwrState

Table 71. DAC0 PwrState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F05 | 00 | See bitfield table. |
| Set1 | 705 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 72. DAC0 PwrState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7:4] | Act | R | 0x3 | PS-Act: Actual power state of referenced node. |
| [3:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | Set | RW | 0x3 | PS-Set: Current power setting of referenced node. 00 - Fully on. 01 - Fully on. 10 - Fully on. 11 - Powered down. |

6.3.6. *DAC0 CnvtrID*

Table 73. DAC0 CnvtrID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F06 | 00 | See bitfield table. |
| Set1 | 706 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 74. DAC0 CnvtrID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:4] | Strm | RW | 0x0 | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused. |
| [3:0] | Ch | RW | 0x0 | Integer representing lowest channel used by converter. |

6.3.7. *DAC0 LR*

Table 75. DAC0 LR Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0C | 00 | See bitfield table. |
| Set1 | 70C | See bits [7:0] of bitfield table. | 0000_0000h |

Table 76. DAC0 LR Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:3] | Rsvd2 | R | 0x0 | Reserved |
| [2] | SwapEn | RW | 0x0 | 1 = enable swapping of left and right channels. |
| [1:0] | Rsvd1 | R | 0x0 | Reserved |

6.4. DAC1 Node (NID = 0x03)

6.4.1. DAC1 Cnvtr

Table 77. DAC1 Cnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|------------------------------------|---------------------|
| Get | A | 0000 | See bitfield table. |
| Set1 | 2 | See bits [15:0] of bitfield table. | 0000_0000h |

Table 78. DAC1 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | StrmType | R | 0x0 | Stream Type: only PCM streams are supported by this widget. |
| [14] | FrmtSmplRate | RW | 0x0 | Sample Base Rate 0 = 48 KHz 1 = 44.1 KHz |
| [13:11] | SmplRateMultp | RW | 0x0 | Sample Base Rate Multiple 000 = 48 KHz / 44.1 KHz or less 001 = x2 010 = Reserved (x3) 011 = x4 100-111 = Reserved |
| [10:8] | SmplRateDiv | RW | 0x0 | Sample Base Rate Divisor 000 = Divide by 1 001 = Divide by 2 010 = Divide by 3 011 = Divide by 4 100 = Divide by 5 101 = Divide by 6 110 = Divide by 7 111 = Divide by 8 |
| [7] | Rsvd1 | R | 0x0 | Reserved |

Table 78. DAC1 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [6:4] | BitsPerSmpl | RW | 0x3 | Bits per Sample 000 = 8 bits 001 = 16 bits 010 = 20 bits 011 = 24 bits 100-111 = Reserved |
| [3:0] | NmbrChan | RW | 0x1 | Number of Channels Number of channels in each frame of the stream. 0000 = 1 channel 0001 = 2 channels ... 1111 = 16 channels |

6.4.2. DAC1 OutAmpRight

Table 79. DAC1 OutAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B80 | 00 | See bitfield table. |
| Set1 | 390 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 80. DAC1 OutAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Gain | RW | 0x7F | Amplifier gain step number |

6.4.3. DAC1 OutAmpLeft

Table 81. DAC1 OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 82. DAC1 OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Gain | RW | 0x7F | Amplifier gain step number |

6.4.4. DAC1 WCap

Table 83. DAC1 WCap Command Verb Format

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

Table 84. DAC1 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x0 | Widget type = Audio Output |
| [19:16] | Delay | R | 0xD | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x1 | Left and right channels can be swapped |
| [10] | PwrCntrl | R | 0x1 | Power State control is supported |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x0 | No connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |

Table 84. DAC1 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.4.5. DAC1 PwrState

Table 85. DAC1 PwrState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F05 | 00 | See bitfield table. |
| Set1 | 705 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 86. DAC1 PwrState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7:4] | Act | R | 0x3 | PS-Act: Actual power state of referenced node. |
| [3:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | Set | RW | 0x3 | PS-Set: Current power setting of referenced node. 00 - Fully on. 01 - Fully on. 10 - Fully on. 11 - Powered down. |

6.4.6. *DAC1 CnvtrID*

Table 87. DAC1 CnvtrID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F06 | 00 | See bitfield table. |
| Set1 | 706 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 88. DAC1 CnvtrID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:4] | Strm | RW | 0x0 | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused. |
| [3:0] | Ch | RW | 0x0 | Integer representing lowest channel used by converter. |

6.4.7. *DAC1 LR*

Table 89. DAC1 LR Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0C | 00 | See bitfield table. |
| Set1 | 70C | See bits [7:0] of bitfield table. | 0000_0000h |

Table 90. DAC1 LR Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:3] | Rsvd2 | R | 0x0 | Reserved |
| [2] | SwapEn | RW | 0x0 | 1 = enable swapping of left and right channels. |
| [1:0] | Rsvd1 | R | 0x0 | Reserved |

6.5. DAC2 Node (NID = 0x04)

6.5.1. DAC2 Cnvtr

Table 91. DAC2 Cnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|------------------------------------|---------------------|
| Get | A | 0000 | See bitfield table. |
| Set1 | 2 | See bits [15:0] of bitfield table. | 0000_0000h |

Table 92. DAC2 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | StrmType | R | 0x0 | Stream Type: only PCM streams are supported by this widget. |
| [14] | FrmtSmplRate | RW | 0x0 | Sample Base Rate 0 = 48 KHz 1 = 44.1 KHz |
| [13:11] | SmplRateMultp | RW | 0x0 | Sample Base Rate Multiple 000 = 48 KHz / 44.1 KHz or less 001 = x2 010 = Reserved (x3) 011 = x4 100-111 = Reserved |
| [10:8] | SmplRateDiv | RW | 0x0 | Sample Base Rate Divisor 000 = Divide by 1 001 = Divide by 2 010 = Divide by 3 011 = Divide by 4 100 = Divide by 5 101 = Divide by 6 110 = Divide by 7 111 = Divide by 8 |
| [7] | Rsvd1 | R | 0x0 | Reserved |

Table 92. DAC2 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [6:4] | BitsPerSmpl | RW | 0x3 | Bits per Sample 000 = 8 bits 001 = 16 bits 010 = 20 bits 011 = 24 bits 100-111 = Reserved |
| [3:0] | NmbrChan | RW | 0x1 | Number of Channels Number of channels in each frame of the stream. 0000 = 1 channel 0001 = 2 channels ... 1111 = 16 channels |

6.5.2. DAC2 OutAmpRight

Table 93. DAC2 OutAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B80 | 00 | See bitfield table. |
| Set1 | 390 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 94. DAC2 OutAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Gain | RW | 0x7F | Amplifier gain step number |

6.5.3. DAC2 OutAmpLeft

Table 95. DAC2 OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 96. DAC2 OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Gain | RW | 0x7F | Amplifier gain step number |

6.5.4. DAC2 WCap

Table 97. DAC2 WCap Command Verb Format

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

Table 98. DAC2 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x0 | Widget type = Audio Output |
| [19:16] | Delay | R | 0xD | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x1 | Left and right channels can be swapped |
| [10] | PwrCntrl | R | 0x1 | Power State control is supported |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x0 | No connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |

Table 98. DAC2 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.5.5. DAC2 PwrState

Table 99. DAC2 PwrState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F05 | 00 | See bitfield table. |
| Set1 | 705 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 100. DAC2 PwrState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7:4] | Act | R | 0x3 | PS-Act: Actual power state of referenced node. |
| [3:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | Set | RW | 0x3 | PS-Set: Current power setting of referenced node. 00 - Fully on. 01 - Fully on. 10 - Fully on. 11 - Powered down. |

6.5.6. *DAC2 CnvtrID*

Table 101. DAC2 CnvtrID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F06 | 00 | See bitfield table. |
| Set1 | 706 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 102. DAC2 CnvtrID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:4] | Strm | RW | 0x0 | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused. |
| [3:0] | Ch | RW | 0x0 | Integer representing lowest channel used by converter. |

6.5.7. *DAC2 LR*

Table 103. DAC2 LR Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0C | 00 | See bitfield table. |
| Set1 | 70C | See bits [7:0] of bitfield table. | 0000_0000h |

Table 104. DAC2 LR Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:3] | Rsvd2 | R | 0x0 | Reserved |
| [2] | SwapEn | RW | 0x0 | 1 = enable swapping of left and right channels. |
| [1:0] | Rsvd1 | R | 0x0 | Reserved |

6.6. DAC3 Node (NID = 0x05)

6.6.1. DAC3 Cnvtr

Table 105. DAC3 Cnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|------------------------------------|---------------------|
| Get | A | 0000 | See bitfield table. |
| Set1 | 2 | See bits [15:0] of bitfield table. | 0000_0000h |

Table 106. DAC3 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | StrmType | R | 0x0 | Stream Type: only PCM streams are supported by this widget. |
| [14] | FrmtSmplRate | RW | 0x0 | Sample Base Rate 0 = 48 KHz 1 = 44.1 KHz |
| [13:11] | SmplRateMultp | RW | 0x0 | Sample Base Rate Multiple 000 = 48 KHz / 44.1 KHz or less 001 = x2 010 = Reserved (x3) 011 = x4 100-111 = Reserved |
| [10:8] | SmplRateDiv | RW | 0x0 | Sample Base Rate Divisor 000 = Divide by 1 001 = Divide by 2 010 = Divide by 3 011 = Divide by 4 100 = Divide by 5 101 = Divide by 6 110 = Divide by 7 111 = Divide by 8 |
| [7] | Rsvd1 | R | 0x0 | Reserved |

Table 106. DAC3 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [6:4] | BitsPerSmpl | RW | 0x3 | Bits per Sample 000 = 8 bits 001 = 16 bits 010 = 20 bits 011 = 24 bits 100-111 = Reserved |
| [3:0] | NmbrChan | RW | 0x1 | Number of Channels Number of channels in each frame of the stream. 0000 = 1 channel 0001 = 2 channels ... 1111 = 16 channels |

6.6.2. DAC3 OutAmpRight

Table 107. DAC3 OutAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B80 | 00 | See bitfield table. |
| Set1 | 390 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 108. DAC3 OutAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Gain | RW | 0x7F | Amplifier gain step number |

6.6.3. DAC3 OutAmpLeft

Table 109. DAC3 OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 110. DAC3 OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Gain | RW | 0x7F | Amplifier gain step number |

6.6.4. DAC3 WCap

Table 111. DAC3 WCap Command Verb Format

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

Table 112. DAC3 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x0 | Widget type = Audio Output |
| [19:16] | Delay | R | 0xD | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x1 | Left and right channels can be swapped |
| [10] | PwrCntrl | R | 0x1 | Power State control is supported |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x0 | No connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |

Table 112. DAC3 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.6.5. DAC3 PwrState

Table 113. DAC3 PwrState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F05 | 00 | See bitfield table. |
| Set1 | 705 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 114. DAC3 PwrState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7:4] | Act | R | 0x3 | PS-Act: Actual power state of referenced node. |
| [3:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | Set | RW | 0x3 | PS-Set: Current power setting of referenced node. 00 - Fully on. 01 - Fully on. 10 - Fully on. 11 - Powered down. |

6.6.6. *DAC3 CnvtrID*

Table 115. DAC3 CnvtrID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F06 | 00 | See bitfield table. |
| Set1 | 706 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 116. DAC3 CnvtrID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:4] | Strm | RW | 0x0 | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused. |
| [3:0] | Ch | RW | 0x0 | Integer representing lowest channel used by converter. |

6.6.7. *DAC3 LR*

Table 117. DAC3 LR Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0C | 00 | See bitfield table. |
| Set1 | 70C | See bits [7:0] of bitfield table. | 0000_0000h |

Table 118. DAC3 LR Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:3] | Rsvd2 | R | 0x0 | Reserved |
| [2] | SwapEn | RW | 0x0 | 1 = enable swapping of left and right channels. |
| [1:0] | Rsvd1 | R | 0x0 | Reserved |

6.7. DAC4 Node (NID = 0x06)

6.7.1. DAC4 Cnvtr

Table 119. DAC4 Cnvtr Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|------------------------------------|---------------------|
| Get | A | 0000 | See bitfield table. |
| Set1 | 2 | See bits [15:0] of bitfield table. | 0000_0000h |

Table 120. DAC4 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | StrmType | R | 0x0 | Stream Type: only PCM streams are supported by this widget. |
| [14] | FrmtSmplRate | RW | 0x0 | Sample Base Rate 0 = 48 KHz 1 = 44.1 KHz |
| [13:11] | SmplRateMultp | RW | 0x0 | Sample Base Rate Multiple 000 = 48 KHz / 44.1 KHz or less 001 = x2 010 = Reserved (x3) 011 = x4 100-111 = Reserved |
| [10:8] | SmplRateDiv | RW | 0x0 | Sample Base Rate Divisor 000 = Divide by 1 001 = Divide by 2 010 = Divide by 3 011 = Divide by 4 100 = Divide by 5 101 = Divide by 6 110 = Divide by 7 111 = Divide by 8 |
| [7] | Rsvd1 | R | 0x0 | Reserved |

Table 120. DAC4 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [6:4] | BitsPerSmpl | RW | 0x3 | Bits per Sample 000 = 8 bits 001 = 16 bits 010 = 20 bits 011 = 24 bits 100-111 = Reserved |
| [3:0] | NmbrChan | RW | 0x1 | Number of Channels Number of channels in each frame of the stream. 0000 = 1 channel 0001 = 2 channels ... 1111 = 16 channels |

6.7.2. DAC4 OutAmpRight

Table 121. DAC4 OutAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B80 | 00 | See bitfield table. |
| Set1 | 390 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 122. DAC4 OutAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Gain | RW | 0x7F | Amplifier gain step number |

6.7.3. DAC4 OutAmpLeft

Table 123. DAC4 OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 124. DAC4 OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Gain | RW | 0x7F | Amplifier gain step number |

6.7.4. DAC4 WCap

Table 125. DAC4 WCap Command Verb Format

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

Table 126. DAC4 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|---|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | DAC4 Enabled = 0x0 DAC4 Disabled = 0xF | Widget type = Audio Output |
| [19:16] | Delay | R | 0xD | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x1 | Left and right channels can be swapped |
| [10] | PwrCntrl | R | 0x1 | Power State control is supported |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x0 | No connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |

Table 126. DAC4 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.7.5. DAC4 PwrState

Table 127. DAC4 PwrState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F05 | 00 | See bitfield table. |
| Set1 | 705 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 128. DAC4 PwrState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7:4] | Act | R | 0x3 | PS-Act: Actual power state of referenced node. |
| [3:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | Set | RW | 0x3 | PS-Set: Current power setting of referenced node. 00 - Fully on. 01 - Fully on. 10 - Fully on. 11 - Powered down. |

6.7.6. *DAC4 CnvtrID*

Table 129. DAC4 CnvtrID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F06 | 00 | See bitfield table. |
| Set1 | 706 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 130. DAC4 CnvtrID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:4] | Strm | RW | 0x0 | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused. |
| [3:0] | Ch | RW | 0x0 | Integer representing lowest channel used by converter. |

6.7.7. *DAC4 LR*

Table 131. DAC4 LR Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0C | 00 | See bitfield table. |
| Set1 | 70C | See bits [7:0] of bitfield table. | 0000_0000h |

Table 132. DAC4 LR Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:3] | Rsvd2 | R | 0x0 | Reserved |
| [2] | SwapEn | RW | 0x0 | 1 = enable swapping of left and right channels. |
| [1:0] | Rsvd1 | R | 0x0 | Reserved |

6.8. ADC0 Node (NID = 0x07)

6.8.1. ADC0 Cnvtr

Table 133. ADC0 Cnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|------------------------------------|---------------------|
| Get | A | 0000 | See bitfield table. |
| Set1 | 2 | See bits [15:0] of bitfield table. | 0000_0000h |

Table 134. ADC0 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | StrmType | R | 0x0 | Stream Type: only PCM streams are supported by this widget. |
| [14] | FrmtSmplRate | RW | 0x0 | Sample Base Rate 0 = 48 KHz 1 = 44.1 KHz |
| [13:11] | SmplRateMultp | RW | 0x0 | Sample Base Rate Multiple 000 = 48 KHz / 44.1 KHz or less 001 = x2 010 = Reserved (x3) 011 = x4 100-111 = Reserved |
| [10:8] | SmplRateDiv | RW | 0x0 | Sample Base Rate Divisor 000 = Divide by 1 001 = Divide by 2 010 = Divide by 3 011 = Divide by 4 100 = Divide by 5 101 = Divide by 6 110 = Divide by 7 111 = Divide by 8 |
| [7] | Rsvd1 | R | 0x0 | Reserved |

Table 134. ADC0 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [6:4] | BitsPerSmpl | RW | 0x3 | Bits per Sample 000 = 8 bits 001 = 16 bits 010 = 20 bits 011 = 24 bits 100-111 = Reserved |
| [3:0] | NmbrChan | RW | 0x1 | Number of Channels Number of channels in each frame of the stream. 0000 = 1 channel 0001 = 2 channels ... 1111 = 16 channels |

6.8.2. ADC0 WCap

Table 135. ADC0 WCap Command Verb Format

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

Table 136. ADC0 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x1 | Widget type = Audio Input |
| [19:16] | Delay | R | 0xD | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right swap capability |
| [10] | PwrCntrl | R | 0x1 | Power State control is supported |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x1 | Software should query the Processing Controls parameter for this widget. |

Table 136. ADC0 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.8.3. ADC0 ConLst

Table 137. ADC0 ConLst Command Verb Format

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

Table 138. ADC0 ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved. |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.8.4. ADC0 ConLstEntry

Table 139. ADC0 ConLstEntry Command Verb Format

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

Table 140. ADC0 ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x00 | Unused list entry. |
| [15:8] | ConL1 | R | 0x00 | Unused list entry. |
| [7:0] | ConL0 | R | 0x1B | ADC0Mux widget |

6.8.5. ADC0 ProcState

Table 141. ADC0 ProcState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F03 | 00 | See bitfield table. |
| Set1 | 703 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 142. ADC0 ProcState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | HPFOCDIS | RW | 0x0 | High Pass Filter Offset Calculation Disable 0 = Calculation enabled. 1 = Calculation disabled. |
| [6:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | ADCHPFByp | RW | 0x1 | Processing State = 00 (OFF): bypass the ADC high pass filter; Processing State = 01, 10, 11 (ON or BENIGN): ADC high pass filter is enabled. |

6.8.6. ADC0 PwrState

Table 143. ADC0 PwrState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F05 | 00 | See bitfield table. |
| Set1 | 705 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 144. ADC0 PwrState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7:4] | Act | R | 0x3 | PS-Act: Actual power state of referenced node. |
| [3:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | Set | RW | 0x3 | PS-Set: Current power setting of referenced node. 00 - Fully on. 01 - Fully on. 10 - Fully on. 11 - Powered down (default) |

6.8.7.

Table 145. ADC0 CnvtrID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F06 | 00 | See bitfield table. |
| Set1 | 706 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 146. ADC0 CnvtrID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:4] | Strm | RW | 0x0 | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused. |
| [3:0] | Ch | RW | 0x0 | Integer representing lowest channel used by converter |

6.9. ADC1 Node (NID = 0x08)

6.9.1. ADC1 Cnvtr

Table 147. ADC1 Cnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|------------------------------------|---------------------|
| Get | A | 0000 | See bitfield table. |
| Set1 | 2 | See bits [15:0] of bitfield table. | 0000_0000h |

Table 148. ADC1 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | StrmType | R | 0x0 | Stream Type: only PCM streams are supported by this widget. |
| [14] | FrmtSmplRate | RW | 0x0 | Sample Base Rate 0 = 48 KHz 1 = 44.1 KHz |
| [13:11] | SmplRateMultp | RW | 0x0 | Sample Base Rate Multiple 000 = 48 KHz / 44.1 KHz or less 001 = x2 010 = Reserved (x3) 011 = x4 100-111 = Reserved |
| [10:8] | SmplRateDiv | RW | 0x0 | Sample Base Rate Divisor 000 = Divide by 1 001 = Divide by 2 010 = Divide by 3 011 = Divide by 4 100 = Divide by 5 101 = Divide by 6 110 = Divide by 7 111 = Divide by 8 |
| [7] | Rsvd1 | R | 0x0 | Reserved |

Table 148. ADC1 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [6:4] | BitsPerSmpl | RW | 0x3 | Bits per Sample 000 = 8 bits 001 = 16 bits 010 = 20 bits 011 = 24 bits 100-111 = Reserved |
| [3:0] | NmbrChan | RW | 0x1 | Number of Channels Number of channels in each frame of the stream. 0000 = 1 channel 0001 = 2 channels ... 1111 = 16 channels |

6.9.2. ADC1 WCap

Table 149. ADC1 WCap Command Verb Format

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

Table 150. ADC1 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x1 | Widget type = Audio Input |
| [19:16] | Delay | R | 0xD | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right swap capability |
| [10] | PwrCntrl | R | 0x1 | Power State control is supported |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x1 | Software should query the Processing Controls parameter for this widget. |

Table 150. ADC1 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrđ | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParOvrđ | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.9.3. ADC1 ConLst

Table 151. ADC1 ConLst Command Verb Format

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

Table 152. ADC1 ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved. |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.9.4. ADC1 ConLstEntry

Table 153. ADC1 ConLstEntry Command Verb Format

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

Table 154. ADC1 ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x00 | Unused list entry. |
| [15:8] | ConL1 | R | 0x00 | Unused list entry. |
| [7:0] | ConL0 | R | 0x1C | ADC1Mux widget |

6.9.5. ADC1 ProcState

Table 155. ADC1 ProcState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F03 | 00 | See bitfield table. |
| Set1 | 703 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 156. ADC1 ProcState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | HPFOCDIS | RW | 0x0 | High Pass Filter Offset Calculation Disable 0 = Calculation enabled. 1 = Calculation disabled. |
| [6:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | ADCHPFByp | RW | 0x1 | Processing State = 00 (OFF): bypass the ADC high pass filter; Processing State = 01, 10, 11 (ON or BENIGN): ADC high pass filter is enabled. |

6.9.6. ADC1 PwrState

Table 157. ADC1 PwrState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F05 | 00 | See bitfield table. |
| Set1 | 705 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 158. ADC1 PwrState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7:4] | Act | R | 0x3 | PS-Act: Actual power state of referenced node. |
| [3:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | Set | RW | 0x3 | PS-Set: Current power setting of referenced node. 00 - Fully on. 01 - Fully on. 10 - Fully on. 11 - Powered down (default) |

6.9.7. ADC1 CnvtrID

Table 159. ADC1 CnvtrID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F06 | 00 | See bitfield table. |
| Set1 | 706 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 160. ADC1 CnvtrID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:4] | Strm | RW | 0x0 | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused. |
| [3:0] | Ch | RW | 0x0 | Integer representing lowest channel used by converter |

6.10. ADC2 Node (NID = 0x09)

6.10.1. ADC2 Cnvtr

Table 161. ADC2 Cnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|------------------------------------|---------------------|
| Get | A | 0000 | See bitfield table. |
| Set1 | 2 | See bits [15:0] of bitfield table. | 0000_0000h |

Table 162. ADC2 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | StrmType | R | 0x0 | Stream Type: only PCM streams are supported by this widget. |
| [14] | FrmtSmplRate | RW | 0x0 | Sample Base Rate 0 = 48 KHz 1 = 44.1 KHz |
| [13:11] | SmplRateMultp | RW | 0x0 | Sample Base Rate Multiple 000 = 48 KHz / 44.1 KHz or less 001 = x2 010 = Reserved (x3) 011 = x4 100-111 = Reserved |
| [10:8] | SmplRateDiv | RW | 0x0 | Sample Base Rate Divisor 000 = Divide by 1 001 = Divide by 2 010 = Divide by 3 011 = Divide by 4 100 = Divide by 5 101 = Divide by 6 110 = Divide by 7 111 = Divide by 8 |
| [7] | Rsvd1 | R | 0x0 | Reserved |

Table 162. ADC2 Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|---|
| [6:4] | BitsPerSmpl | RW | 0x3 | Bits per Sample 000 = 8 bits 001 = 16 bits 010 = 20 bits 011 = 24 bits 100-111 = Reserved |
| [3:0] | NmbrChan | RW | 0x1 | Number of Channels Number of channels in each frame of the stream. 0000 = 1 channel 0001 = 2 channels ... 1111 = 16 channels |

6.10.2. ADC2 WCap

Table 163. ADC2 WCap Command Verb Format

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

Table 164. ADC2 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x1 | Widget type = Audio Input |
| [19:16] | Delay | R | 0xD | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right swap capability |
| [10] | PwrCntrl | R | 0x1 | Power State control is supported |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |

Table 164. ADC2 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [6] | ProcWidget | R | 0x1 | Software should query the Processing Controls parameter for this widget. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.10.3. ADC2 ConLst

Table 165. ADC2 ConLst Command Verb Format

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

Table 166. ADC2 ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved. |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.10.4. ADC2 ConLstEntry

Table 167. ADC2 ConLstEntry Command Verb Format

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

Table 168. ADC2 ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x00 | Unused list entry. |
| [15:8] | ConL1 | R | 0x00 | Unused list entry. |
| [7:0] | ConL0 | R | 0x1D | ADC2Mux widget |

6.10.5. ADC2 ProcState

Table 169. ADC2 ProcState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F03 | 00 | See bitfield table. |
| Set1 | 703 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 170. ADC2 ProcState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | HPFOCDIS | RW | 0x0 | High Pass Filter Offset Calculation Disable 0 = Calculation enabled. 1 = Calculation disabled. |
| [6:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | ADCHPFByp | RW | 0x1 | Processing State = 00 (OFF): bypass the ADC high pass filter; Processing State = 01, 10, 11 (ON or BENIGN): ADC high pass filter is enabled. |

6.10.6. ADC2 PwrState

Table 171. ADC2 PwrState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F05 | 00 | See bitfield table. |
| Set1 | 705 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 172. ADC2 PwrState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7:4] | Act | R | 0x3 | PS-Act: Actual power state of referenced node. |
| [3:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | Set | RW | 0x3 | PS-Set: Current power setting of referenced node. 00 - Fully on. 01 - Fully on. 10 - Fully on. 11 - Powered down (default) |

6.10.7. ADC2 CnvtrID

Table 173. ADC2 CnvtrID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F06 | 00 | See bitfield table. |
| Set1 | 706 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 174. ADC2 CnvtrID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:4] | Strm | RW | 0x0 | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused. |
| [3:0] | Ch | RW | 0x0 | Integer representing lowest channel used by converter |

6.11. SPDIFOut Node (NID = 0x1E)

6.11.1. SPDIFOut Cnvtr

Table 175. SPDIFOut Cnvtr Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|------------------------------------|---------------------|
| Get | A | 0000 | See bitfield table. |
| Set1 | 2 | See bits [15:0] of bitfield table. | 0000_0000h |

Table 176. SPDIFOut Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | FrmtNonPCM | RW | 0x0 | Stream Type 0 = PCM 1 = Non-PCM (remaining bits in this verb have other meanings) |
| [14] | FrmtSmplRate | RW | 0x0 | Sample Base Rate 0 = 48 KHz 1 = 44.1 KHz |
| [13:11] | SmplRateMultp | RW | 0x0 | Sample Base Rate Multiple 000 = 48 KHz / 44.1 KHz or less 001 = x2 010 = Reserved (x3) 011 = x4 100-111 = Reserved |
| [10:8] | SmplRateDiv | RW | 0x0 | Sample Base Rate Divisor 000 = Divide by 1 001 = Divide by 2 010 = Divide by 3 011 = Divide by 4 100 = Divide by 5 101 = Divide by 6 110 = Divide by 7 111 = Divide by 8 |
| [7] | Rsvd1 | R | 0x0 | Reserved |

Table 176. SPDIFOut Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [6:4] | BitsPerSmpl | RW | 0x3 | Bits per Sample 000 = 8 bits 001 = 16 bits 010 = 20 bits 011 = 24 bits 100-111 = Reserved |
| [3:0] | NmbrChan | RW | 0x1 | Number of Channels Number of channels in each frame of the stream. 0000 = 1 channel 0001 = 2 channels ... 1111 = 16 channels |

6.11.2. SPDIFOut WCap

Table 177. SPDIFOut WCap Command Verb Format

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

Table 178. SPDIFOut WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x0 | Widget type = Audio Output |
| [19:16] | Delay | R | 0x4 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x1 | Widget supports a Digital stream |
| [8] | ConnList | R | 0x0 | No connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |

Table 178. SPDIFOut WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x1 | Widget contains format info; software should query |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.11.3. SPDIFOut PCM

Table 179. SPDIFOut PCM Command Verb Format

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

Table 180. SPDIFOut PCM Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:21] | Rsvd2 | R | 0x0 | Reserved |
| [20] | B32 | R | 0x0 | 32 bit audio formats are NOT supported |
| [19] | B24 | R | 0x1 | 24 bit audio formats are supported |
| [18] | B20 | R | 0x1 | 20 bit audio formats are supported |
| [17] | B16 | R | 0x1 | 16 bit audio formats are supported |
| [16] | B8 | R | 0x0 | 8 bit audio formats are NOT supported |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | R12 | R | 0x0 | 384 KHz rate (8/1*48 KHz) NOT supported |
| [10] | R11 | R | 0x1 | 192.0 KHz rate (4/1*48 KHz) supported |

Table 180. SPDIFOut PCM Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [9] | R10 | R | 0x1 | 176.4 KHz rate (4/1*44.1 KHz) supported |
| [8] | R9 | R | 0x1 | 96.0 KHz rate (2/1*48 KHz) supported |
| [7] | R8 | R | 0x1 | 88.2 KHz rate (2/1*44.1 KHz) supported |
| [6] | R7 | R | 0x1 | 48.0 KHz rate supported (REQUIRED) |
| [5] | R6 | R | 0x1 | 44.1 KHz rate supported |
| [4] | R5 | R | 0x0 | 32.0 KHz rate (2/3*48 KHz) NOT supported |
| [3] | R4 | R | 0x0 | 22.05 KHz rate (1/2*44.1 KHz) NOT supported |
| [2] | R3 | R | 0x0 | 16.0 KHz rate (1/3*48 KHz) NOT supported |
| [1] | R2 | R | 0x0 | 11.025 KHz rate (1/4*44.0 KHz) NOT supported |
| [0] | R1 | R | 0x0 | 8.0 KHz rate (1/6*48 KHz) NOT supported |

6.11.4. SPDIFOut Stream

Table 181. SPDIFOut Stream Command Verb Format

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

Table 182. SPDIFOut Stream Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-------------------------------|
| [31:3] | Rsvd | R | 0x0 | Reserved |
| [2] | NonPCM | R | 0x1 | Non-PCM data supported. |
| [1] | Float32 | R | 0x0 | No support for Float32 data. |
| [0] | PCM | R | 0x1 | PCM-formatted data supported. |

6.11.5. SPDIFOut CnvtrID

Table 183. SPDIFOut CnvtrID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F06 | 00 | See bitfield table. |
| Set1 | 706 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 184. SPDIFOut CnvtrID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:4] | Strm | RW | 0x0 | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused. |
| [3:0] | Ch | RW | 0x0 | Integer representing lowest channel used by converter |

6.11.6. SPDIFOut DigCnvtr

Table 185. SPDIFOut DigCnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0D | 00 | See bitfield table. |
| Set1 | 70D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 70E | See bits [7:0] of bitfield table. | 0000_0000h |

Table 186. SPDIFOut DigCnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|-------------------------|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | Rsvd1 | R | 0x0 | Reserved |
| [14:8] | CC | RW | 0x00 | CC[6:0] - Category Code |
| [7] | L | RW | 0x0 | L - Generation Level |
| [6] | PRO | RW | 0x0 | PRO - Professional |

Table 186. SPDIFOut DigCnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|------------------------|
| [5] | AUDIO | RW | 0x0 | /AUDIO - Non-Audio |
| [4] | COPY | RW | 0x0 | COPY - Copyright |
| [3] | PRE | RW | 0x0 | PRE - Preemphasis |
| [2] | VCFG | RW | 0x0 | VCFG - Validity Config |
| [1] | V | RW | 0x0 | V - Validity |
| [0] | DigEn | RW | 0x0 | DigEn - Digital Enable |

6.12. SPDIFIn Node (NID = 0x20)

6.12.1. SPDIFIn Cnvtr

Table 187. SPDIFIn Cnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|------------------------------------|---------------------|
| Get | A | 0000 | See bitfield table. |
| Set1 | 2 | See bits [15:0] of bitfield table. | 0000_0000h |

Table 188. SPDIFIn Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | FrmtNonPCM | RW | 0x0 | Stream Type 0 = PCM 1 = Non-PCM (remaining bits in this verb have other meanings) |
| [14] | FrmtSmplRate | RW | 0x0 | Sample Base Rate 0 = 48 KHz 1 = 44.1 KHz |

Table 188. SPDIFIn Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [13:11] | SmplRateMultp | RW | 0x0 | Sample Base Rate Multiple 000 = 48 KHz / 44.1 KHz or less 001 = x2 010 = Reserved (x3) 011 = x4 100-111 = Reserved |
| [10:8] | SmplRateDiv | RW | 0x0 | Sample Base Rate Divisor 000 = Divide by 1 001 = Divide by 2 010 = Divide by 3 011 = Divide by 4 100 = Divide by 5 101 = Divide by 6 110 = Divide by 7 111 = Divide by 8 |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6:4] | BitsPerSmpl | RW | 0x3 | Bits per Sample 000 = 8 bits 001 = 16 bits 010 = 20 bits 011 = 24 bits 100-111 = Reserved |
| [3:0] | NmbrChan | RW | 0x1 | Number of Channels Number of channels in each frame of the stream. 0000 = 1 channel 0001 = 2 channels ... 1111 = 16 channels |

6.12.2. SPDIFIn WCap

Table 189. SPDIFIn WCap Command Verb Format

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

Table 190. SPDIFIn WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|---------------------------------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x1 = Enabled 0xF = Disabled | Widget type = Audio Input |
| [19:16] | Delay | R | 0x4 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x1 | Widget supports a Digital stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x0 | Unsolicited Response is not supported |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x1 | Widget contains format info; software should query |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.12.3. SPDIFIn PCMCap

Table 191. SPDIFIn PCMCap Command Verb Format

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

Table 192. SPDIFIn PCMCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:21] | Rsvd2 | R | 0x0 | Reserved |
| [20] | B32 | R | 0x0 | 32 bit audio formats are NOT supported |
| [19] | B24 | R | 0x1 | 24 bit audio formats are supported |
| [18] | B20 | R | 0x1 | 20 bit audio formats are supported |
| [17] | B16 | R | 0x1 | 16 bit audio formats are supported |
| [16] | B8 | R | 0x0 | 8 bit audio formats are NOT supported |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | R12 | R | 0x0 | 384 KHz rate (8/1*48 KHz) NOT supported |
| [10] | R11 | R | 0x0 | 192.0 KHz rate (4/1*48 KHz) NOT supported |
| [9] | R10 | R | 0x0 | 176.4 KHz rate (4/1*44.1 KHz) NOT supported |
| [8] | R9 | R | 0x1 | 96.0 KHz rate (2/1*48 KHz) supported |
| [7] | R8 | R | 0x0 | 88.2 KHz rate (2/1*44.1 KHz) NOT supported |
| [6] | R7 | R | 0x1 | 48.0 KHz rate supported (REQUIRED) |
| [5] | R6 | R | 0x1 | 44.1 KHz rate supported |
| [4] | R5 | R | 0x0 | 32.0 KHz rate (2/3*48 KHz) NOT supported |
| [3] | R4 | R | 0x0 | 22.05 KHz rate (1/2*44.1 KHz) NOT supported |
| [2] | R3 | R | 0x0 | 16.0 KHz rate (1/3*48 KHz) NOT supported |
| [1] | R2 | R | 0x0 | 11.025 KHz rate (1/4*44.0 KHz) NOT supported |
| [0] | R1 | R | 0x0 | 8.0 KHz rate (1/6*48 KHz) NOT supported |

6.12.4. SPDIFIn Stream

Table 193. SPDIFIn Stream Command Verb Format

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

Table 194. SPDIFIn Stream Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-------------------------------|
| [31:3] | Rsvd | R | 0x0 | Reserved |
| [2] | NonPCM | R | 0x1 | Non-PCM data supported. |
| [1] | Float32 | R | 0x0 | No support for Float32 data. |
| [0] | PCM | R | 0x1 | PCM-formatted data supported. |

6.12.5. SPDIFIn ConLst

Table 195. SPDIFIn ConLst Command Verb Format

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

Table 196. SPDIFIn ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved. |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.12.6. SPDIFIn ConLstEntry

Table 197. SPDIFIn ConLstEntry Command Verb Format

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

Table 198. SPDIFIn ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x00 | Unused list entry. |

Table 198. SPDIFIn ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--------------------|
| [15:8] | ConL1 | R | 0x00 | Unused list entry. |
| [7:0] | ConL0 | R | 0x22 | DigIn pin widget |

6.12.7. SPDIFIn CnvtrID

Table 199. SPDIFIn CnvtrID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F06 | 00 | See bitfield table. |
| Set1 | 706 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 200. SPDIFIn CnvtrID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:4] | Strm | RW | 0x0 | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused. |
| [3:0] | Ch | RW | 0x0 | Integer representing lowest channel used by converter |

6.12.8. SPDIFIn DigCnvtr

Table 201. SPDIFIn DigCnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0D | 00 | See bitfield table. |
| Set1 | 70D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 70E | See bits [7:0] of bitfield table. | 0000_0000h |

Table 202. SPDIFIn DigCnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:15] | Rsvd2 | R | 0x0 | Reserved |
| [14:8] | CC | R | 0x00 | CC[6:0] - Category Code |
| [7] | L | R | 0x0 | L - Generation Level |
| [6] | PRO | R | 0x0 | PRO - Professional |
| [5] | AUDIO | R | 0x0 | /AUDIO - Non-Audio |
| [4] | COPY | R | 0x0 | COPY - Copyright |
| [3] | PRE | R | 0x0 | PRE - Preemphasis |
| [2] | Rsvd1 | R | 0x0 | Reserved (VCFG bit applies only to output streams) |
| [1] | V | R | 0x0 | V - Validity |
| [0] | DigEn | RW | 0x0 | DigEn - Digital Enable |

6.12.9. SPDIFIn VCSR0

Table 203. SPDIFIn VCSR0 Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | FE0 | 00 | See bitfield table. |
| Set1 | 7E0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 204. SPDIFIn VCSR0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31] | RcvSmplRate | R | 0x0 | Recovered sample rate base 0 = 48 KHz 1 = 44.1 KHz |
| [30:28] | RcvRateMult | R | 0x0 | Recovered sample rate multiplier 000 = 1X 001 = 2X, all others reserved |
| [27:26] | Rsvd | R | 0x0 | Reserved |

Table 204. SPDIFin VCSR0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [25:22] | OrigFS | R | 0x0 | Original sample rate (IEC spec). |
| [21:20] | CA | R | 0x0 | Clock accuracy 00 = Level II 01 = Level I 10 = Level III 11 = Reserved |
| [19:16] | FS | R | 0x0 | Sample Rate 0000 = 44.1 KHz 0010 = 48 KHz 0011 = 32 KHz All other combinations are reserved and shall not be used until further defined (IEC spec). |
| [15:12] | CN | R | 0x0 | Channel Number (audio channel) 0000 = do not take into account 0001 = A (left channel for stereo channel format) 0010 = B (right channel for stereo channel format) 0011 = C 1111 = O |
| [11:9] | SmplWrdL | R | 0x0 | Sample Word Length [2:0] If MaxWrdL = 1: 000 = unspecified 001 = 20 bits 010 = 22 bits 011 = reserved 100 = 23 bits 101 = 24 bits 110 = 21 bits 111 = reserved If MaxWrdL = 0: 000 = unspecified 001 = 16 bits 010 = 18 bits 011 = reserved 100 = 19 bits 101 = 20 bits 110 = 17 bits 111 = reserved |
| [8] | MaxWrdL | R | 0x0 | Max Word Length 0 = maximum audio sample word length is 20 bits 1 = maximum audio sample word length is 24 bits |
| [7] | NOBLKCH | RW | 0x0 | 0 = normal behavior 1 = disable block size checking for spdif_in. |

Table 204. SPDIFin VCSR0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|---|
| [6] | VI | RW | 0x0 | 0 = Respond to SPDIF_IN Valid tag 1 = Ignore SPDIF_IN valid tag |
| [5] | AMuteDis | RW | 0x0 | 0 = Auto mute when SPDIF stream marked non PCM 1 = Auto Mute disabled. |
| [4:3] | SPL | RW | 0x0 | SPDIF_IN Parity Limit: Loss of DPLL Lock after: 00 = 4 parity errors 01 = 3 parity errors 10 = 2 parity errors 11 = 1 parity errors NEW LOCATION -- was at Register 72h, Page 0, D13:12, moved as part of SPDIF In consolidation |
| [2] | SPRun | R | 0x0 | SPDIF IN Running 0 = no signal on pin 47 1 = signal on pin 47 NEW LOCATION -- was at Register 72h, Page 0, D2, moved as part of SPDIF In consolidation |
| [1] | SIPER | RW | 0x0 | SPDIF_IN PARITY ERROR. Set to clear. 'Overlaps SIPERSTAT'. Overlaps SIPERSTAT. |
| [0] | COPYINV | RW | 0x0 | Copyright invert bit. |

6.13. PortA Node (NID = 0x0A)

6.13.1. PortA WCap

Table 205. PortA WCap Command Verb Format

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

Table 206. PortA WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |

Table 206. PortA WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x1 | Unsolicited Response is supported |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.13.2. PortA PinCap

Table 207. PortA PinCap Command Verb Format

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

Table 208. PortA PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---------------------------------------|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |

Table 208. PortA PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [15:8] | VrefCntrl | R | 0x17 | VRef generation is supported by this pin complex, and the following voltages can be produced on the associated VRef pin: 80% Avdd; 50% Avdd; GND; Hi-Z (required since pin complex is output capable) |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x1 | Pin complex is output capable. |
| [3] | HdphDrvCap | R | 0x1 | Pin complex has headphone amplifier. |
| [2] | PresDtctCap | R | 0x1 | Pin complex can perform Presence Detect. |
| [1] | TrigRqd | R | 0x1 | Trigger is required for impedance measurement |
| [0] | ImpSenseCap | R | 0x1 | Pin complex supports impedance sense. |

6.13.3. PortA ConLst

Table 209. PortA ConLst Command Verb Format

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

Table 210. PortA ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-----------------------------------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x03 = Enabled 0x02 = Disabled | Number of NID entries in connection list. |

6.13.4. PortA ConLstEntry

Table 211. PortA ConLstEntry Command Verb Format

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

Table 212. PortA ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-----------------------------------|-----------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x06 = Enabled 0x00 = Disabled | DAC4 Converter widget |
| [15:8] | ConL1 | R | 0x03 | DAC1 Converter widget |
| [7:0] | ConL0 | R | 0x02 | DAC0 Converter widget |

6.13.5. PortA ConSelectCtrl

Table 213. PortA ConSelectCtrl Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F01 | 00 | See bitfield table. |
| Set1 | 701 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 214. PortA ConSelectCtrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------------|
| [31:2] | Rsvd | R | 0x0 | Reserved |
| [1:0] | Index | RW | 0x0 | Connection select control index. |

6.13.6. PortA PinWCntrl

Table 215. PortA PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 216. PortA PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | HPhnEn | RW | 0x0 | 1 = enable the low impedance amplifier associated with the output. |
| [6] | OutEn | RW | 0x0 | 1 = (CODEC) output path of Pin Widget is enabled |
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |
| [4:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | VRefEn | RW | 0x0 | VRefEn: Selects one of the possible states for the VRef signal associated with the Pin Widget. If the value written to this control does not correspond to a supported value defined in the VRefCntrl field of the Pin Capabilities parameter (0C), then this control will take the value of 000b (Hi-Z). |

6.13.7. PortA Unsolicited Response

Table 217. PortA Unsolicited Response Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F08 | 00 | See bitfield table. |
| Set1 | 708 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 218. PortA Unsolicited Response Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x00 | Reserved |
| [7] | En | RW | 0x0 | Allow generation of Unsolicited Responses. Unsolicited response events occur upon jack-insertion OR completion of a Jack-Sense cycle. |
| [6] | Rsvd1 | R | 0x0 | Reserved |
| [5:0] | Tag | RW | 0x00 | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

6.13.8. PortA ChSense

Table 219. PortA ChSense Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F09 | 00 | See bitfield table. |
| Set1 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 220. PortA ChSense Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------------|---|
| [31] | PresDtct | R | 0x0 | 1 = something is plugged into jack associated with Pin Complex. |
| [30:0] | Impedance | R | 0x7FFF_FFFF | Measured impedance of the widget. A value of all 1's indicates that a valid sense reading is not available, or the sense measurement is busy if it has been recently triggered. |
| [0] | RightCh | W | 0x0 | Set 1 = perform impedance sensing on right channel or ring of the connector |
| [0] | LeftCh | W | 0x0 | Set 0 = perform impedance sensing on left channel or tip of the connector |

6.13.9. PortA ConfigDefault

Table 221. PortA ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 222. PortA ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Config4 | RW | 0x02 | Port Connectivity = Jack; Location = Mainboard front. |
| [23:16] | Config3 | RW | 0x21 | Default Device = HP Out; Connection Type = 1/8 inch jack. |
| [15:8] | Config2 | RW | 0x40 | Color = Green; Misc = No jack detect override. |
| [7:0] | Config1 | RW | 0x20 | Association = 2h; Sequence = 0h. |

6.14. PortB Node (NID = 0x0B)

6.14.1. PortB WCap

Table 223. PortB WCap Command Verb Format

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

Table 224. PortB WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x1 | Unsolicited Response is supported |

Table 224. PortB WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.14.2. PortB PinCap

Table 225. PortB PinCap Command Verb Format

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

Table 226. PortB PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |
| [15:8] | VrefCntrl | R | 0x17 | VRef generation is supported by this pin complex, and the following voltages can be produced on the associated VRef pin: 80% Avdd; 50% Avdd; GND; Hi-Z (required since pin complex is output capable) |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x1 | Pin complex is output capable. |

Table 226. PortB PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---|
| [3] | HdphDrvCap | R | 0x1 | Pin has a headphone amplifier. |
| [2] | PresDtctCap | R | 0x1 | Pin complex can perform Presence Detect. |
| [1] | TrigRqd | R | 0x1 | Trigger is required for impedance measurement |
| [0] | ImpSenseCap | R | 0x1 | Pin complex supports impedance sense. |

6.14.3. PortB ConLst

Table 227. PortB ConLst Command Verb Format

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

Table 228. PortB ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|---|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x03 = Enabled DAC4 0x02 = Disabled DAC4 | Number of NID entries in connection list. |

6.14.4. PortB ConLstEntry

Table 229. PortB ConLstEntry Command Verb Format

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

Table 230. PortB ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-----------------------------------|-----------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x06 = Enabled 0x00 = Disabled | DAC4 Converter widget |
| [15:8] | ConL1 | R | 0x03 | DAC1 Converter widget |
| [7:0] | ConL0 | R | 0x02 | DAC0 Converter widget |

6.14.5. PortB ConSelectCtrl

Table 231. PortB ConSelectCtrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F01 | 00 | See bitfield table. |
| Set1 | 701 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 232. PortB ConSelectCtrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------------|
| [31:2] | Rsvd | R | 0x0 | Reserved |
| [1:0] | Index | RW | 0x0 | Connection select control index. |

6.14.6. PortB PinWCntrl

Table 233. PortB PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 234. PortB PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | HPhnEn | RW | 0x0 | 1 = enable the low impedance amplifier associated with the output. |
| [6] | OutEn | RW | 0x0 | 1 = (CODEC) output path of Pin Widget is enabled |
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |
| [4:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | VRefEn | RW | 0x0 | VRefEn: Selects one of the possible states for the VRef signal associated with the Pin Widget. If the value written to this control does not correspond to a supported value defined in the VRefCntrl field of the Pin Capabilities parameter (0C), then this control will take the value of 000b (Hi-Z). |

6.14.7. PortB Unsolicited Response

Table 235. PortB Unsolicited Response Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F08 | 00 | See bitfield table. |
| Set1 | 708 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 236. PortB Unsolicited Response Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x00 | Reserved |
| [7] | En | RW | 0x0 | Allow generation of Unsolicited Responses. Unsolicited response events occur upon jack-insertion OR completion of a Jack-Sense cycle. |
| [6] | Rsvd1 | R | 0x0 | Reserved |
| [5:0] | Tag | RW | 0x00 | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

6.14.8. PortB ChSense

Table 237. PortB ChSense Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F09 | 00 | See bitfield table. |
| Set1 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 238. PortB ChSense Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------------|---|
| [31] | PresDtct | R | 0x0 | 1 = something is plugged into jack associated with Pin Complex. |
| [30:0] | Impedance | R | 0x7FFF_FFFF | Measured impedance of the widget. A value of all 1's indicates that a valid sense reading is not available, or the sense measurement is busy if it has been recently triggered. |
| [0] | RightCh | W | 0x0 | Set 1 = perform impedance sensing on right channel or ring of the connector |
| [0] | LeftCh | W | 0x0 | Set 0 = perform impedance sensing on left channel or tip of the connector |

6.14.9. PortB ConfigDefault

Table 239. PortB ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 240. PortB ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Config4 | RW | 0x02 | Port Connectivity = Jack; Location = Mainboard front. |
| [23:16] | Config3 | RW | 0xA1 | Default Device = Mic In; Connection Type = 1/8 inch jack. |
| [15:8] | Config2 | RW | 0x90 | Color = Pink; Misc = No jack detect override. |
| [7:0] | Config1 | RW | 0x80 | Association = 8h; Sequence = 0h. |

6.15. PortC Node (NID = 0x0C)

6.15.1. PortC WCap

Table 241. PortC WCap Command Verb Format

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

Table 242. PortC WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x1 | Unsolicited Response is supported |

Table 242. PortC WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.15.2. PortC PinCap

Table 243. PortC PinCap Command Verb Format

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

Table 244. PortC PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |
| [15:8] | VrefCntrl | R | 0x17 | VRef generation is supported by this pin complex, and the following voltages can be produced on the associated VRef pin: 80% Avdd; 50% Avdd; GND; Hi-Z (required since pin complex is output capable) |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x1 | Pin complex is output capable. |

Table 244. PortC PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---|
| [3] | HdphDrvCap | R | 0x0 | Pin does not have a headphone amplifier. |
| [2] | PresDtctCap | R | 0x1 | Pin complex can perform Presence Detect. |
| [1] | TrigRqd | R | 0x1 | Trigger is required for impedance measurement |
| [0] | ImpSenseCap | R | 0x1 | Pin complex supports impedance sense. |

6.15.3. PortC ConLst

Table 245. PortC ConLst Command Verb Format

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

Table 246. PortC ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.15.4. PortC ConLstEntry

Table 247. PortC ConLstEntry Command Verb Format

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

Table 248. PortC ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x00 | Unused list entry. |

Table 248. PortC ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-----------------------|
| [15:8] | ConL1 | R | 0x00 | Unused list entry. |
| [7:0] | ConL0 | R | 0x03 | DAC1 Converter widget |

6.15.5. PortC PinWCntrl

Table 249. PortC PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 250. PortC PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:7] | Rsvd2 | R | 0x0 | Reserved |
| [6] | OutEn | RW | 0x0 | 1 = (CODEC) output path of Pin Widget is enabled |
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |
| [4:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | VRefEn | RW | 0x0 | VRefEn: Selects one of the possible states for the VRef signal associated with the Pin Widget. If the value written to this control does not correspond to a supported value defined in the VRefCntrl field of the Pin Capabilities parameter (0C), then this control will take the value of 000b (Hi-Z). |

6.15.6. PortC UnsolResp

Table 251. PortC UnsolResp Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F08 | 00 | See bitfield table. |
| Set1 | 708 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 252. PortC Unsolicited Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x00 | Reserved |
| [7] | En | RW | 0x0 | Allow generation of Unsolicited Responses. Unsolicited response events occur upon jack-insertion OR completion of a Jack-Sense cycle. |
| [6] | Rsvd1 | R | 0x0 | Reserved |
| [5:0] | Tag | RW | 0x00 | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

6.15.7. PortC ChSense

Table 253. PortC ChSense Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F09 | 00 | See bitfield table. |
| Set1 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 254. PortC ChSense Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------------|---|
| [31] | PresDtct | R | 0x0 | 1 = something is plugged into jack associated with Pin Complex. |
| [30:0] | Impedance | R | 0x7FFF_FFFF | Measured impedance of the widget. A value of all 1's indicates that a valid sense reading is not available, or the sense measurement is busy if it has been recently triggered. |
| [0] | RightCh | W | 0x0 | Set 1 = perform impedance sensing on right channel or ring of the connector |
| [0] | LeftCh | W | 0x0 | Set 0 = perform impedance sensing on left channel or tip of the connector |

6.15.8. PortC ConfigDefault

Table 255. PortC ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 256. PortC ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:24] | Config4 | RW | 0x01 | Port Connectivity = Jack; Location = Mainboard rear. |
| [23:16] | Config3 | RW | 0x81 | Default Device = Line In; Connection Type = 1/8 inch jack. |
| [15:8] | Config2 | RW | 0x30 | Color = Blue; Misc = No jack detect override. |
| [7:0] | Config1 | RW | 0x4E | Association = 4h; Sequence = Eh. |

6.16. PortD Node (NID = 0x0D)

6.16.1. PortD WCap

Table 257. PortD WCap Command Verb Format

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

Table 258. PortD WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x1 | Unsolicited Response is supported |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.16.2. PortD PinCap

Table 259. PortD PinCap Command Verb Format

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

Table 260. PortD PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |
| [15:8] | VrefCntrl | R | 0x17 | VRef generation is supported by this pin complex, and the following voltages can be produced on the associated VRef pin: 80% Avdd; 50% Avdd; GND; Hi-Z (required since pin complex is output capable) |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x1 | Pin complex is output capable. |
| [3] | HdphDrvCap | R | 0x1 | Pin complex has headphone amplifier. |
| [2] | PresDtctCap | R | 0x1 | Pin complex can perform Presence Detect. |
| [1] | TrigRqd | R | 0x1 | Trigger is required for impedance measurement |
| [0] | ImpSenseCap | R | 0x1 | Pin complex supports impedance sense. |

6.16.3. PortD ConLst

Table 261. PortD ConLst Command Verb Format

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

Table 262. PortD ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.16.4. PortD ConLstEntry

Table 263. PortD ConLstEntry Command Verb Format

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

Table 264. PortD ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|-----------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x00 | Unused list entry. |
| [15:8] | ConL1 | R | 0x00 | Unused list entry. |
| [7:0] | ConL0 | R | 0x02 | DAC0 Converter widget |

6.16.5. PortD PinWCntrl

Table 265. PortD PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 266. PortD PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | HPhnEn | RW | 0x0 | 1 = enable the low impedance amplifier associated with the output. |
| [6] | OutEn | RW | 0x0 | 1 = (CODEC) output path of Pin Widget is enabled |
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |

Table 266. PortD PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|---|
| [4:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | VRefEn | RW | 0x0 | VRefEn: Selects one of the possible states for the VRef signal associated with the Pin Widget. If the value written to this control does not correspond to a supported value defined in the VRefCntrl field of the Pin Capabilities parameter (0C), then this control will take the value of 000b (Hi-Z). |

6.16.6. PortD UnsolResp

Table 267. PortD UnsolResp Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F08 | 00 | See bitfield table. |
| Set1 | 708 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 268. PortD UnsolResp Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x00 | Reserved |
| [7] | En | RW | 0x0 | Allow generation of Unsolicited Responses. Unsolicited response events occur upon jack-insertion OR completion of a Jack-Sense cycle. |
| [6] | Rsvd1 | R | 0x0 | Reserved |
| [5:0] | Tag | RW | 0x00 | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

6.16.7. PortD ChSense

Table 269. PortD ChSense Command Verb Format

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

Table 269. PortD ChSense Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|------------|
| Set1 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 270. PortD ChSense Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------------|---|
| [31] | PresDtct | R | 0x0 | 1 = something is plugged into jack associated with Pin Complex. |
| [30:0] | Impedance | R | 0x7FFF_FFFF | Measured impedance of the widget. A value of all 1's indicates that a valid sense reading is not available, or the sense measurement is busy if it has been recently triggered. |
| [0] | RightCh | W | 0x0 | Set 1 = perform impedance sensing on right channel or ring of the connector |
| [0] | LeftCh | W | 0x0 | Set 0 = perform impedance sensing on left channel or tip of the connector |

6.16.8. PortD ConfigDefault

Table 271. PortD ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 272. PortD ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Config4 | RW | 0x01 | Port Connectivity = Jack; Location = Mainboard rear. |
| [23:16] | Config3 | RW | 0x01 | Default Device = Line Out; Connection Type = 1/8 inch jack. |
| [15:8] | Config2 | RW | 0x40 | Color = Green; Misc = No jack detect override. |
| [7:0] | Config1 | RW | 0x10 | Association = 1h; Sequence = 0h. |

6.17. PortE Node (NID = 0x0E)

6.17.1. PortE WCap

Table 273. PortE WCap Command Verb Format

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

Table 274. PortE WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x1 | Unsolicited Response is supported |

Table 274. PortE WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.17.2. PortE PinCap

Table 275. PortE PinCap Command Verb Format

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

Table 276. PortE PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |
| [15:8] | VrefCntrl | R | 0x17 | VRef generation is supported by this pin complex, and the following voltages can be produced on the associated VRef pin: 80% Avdd; 50% Avdd; GND; Hi-Z (required since pin complex is output capable) |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x1 | Pin complex is output capable. |

Table 276. PortE PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---|
| [3] | HdphDrvCap | R | 0x0 | Pin does not have a headphone amplifier. |
| [2] | PresDtctCap | R | 0x1 | Pin complex can perform Presence Detect. |
| [1] | TrigRqd | R | 0x1 | Trigger is required for impedance measurement |
| [0] | ImpSenseCap | R | 0x1 | Pin complex supports impedance sense. |

6.17.3. PortE ConLst

Table 277. PortE ConLst Command Verb Format

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

Table 278. PortE ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.17.4. PortE ConLstEntry

Table 279. PortE ConLstEntry Command Verb Format

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

Table 280. PortE ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x00 | Unused list entry. |

Table 280. PortE ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-----------------------|
| [15:8] | ConL1 | R | 0x00 | Unused list entry. |
| [7:0] | ConL0 | R | 0x04 | DAC2 Converter widget |

6.17.5. PortE PinWCntrl

Table 281. PortE PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 282. PortE PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:7] | Rsvd2 | R | 0x0 | Reserved |
| [6] | OutEn | RW | 0x0 | 1 = (CODEC) output path of Pin Widget is enabled |
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |
| [4:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | VRefEn | RW | 0x0 | VRefEn: Selects one of the possible states for the VRef signal associated with the Pin Widget. If the value written to this control does not correspond to a supported value defined in the VRefCntrl field of the Pin Capabilities parameter (0C), then this control will take the value of 000b (Hi-Z). |

6.17.6. PortE UnsolResp

Table 283. PortE UnsolResp Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F08 | 00 | See bitfield table. |
| Set1 | 708 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 284. PortE UnsolResp Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x00 | Reserved |
| [7] | En | RW | 0x0 | Allow generation of Unsolicited Responses. Unsolicited response events occur upon jack-insertion OR completion of a Jack-Sense cycle. |
| [6] | Rsvd1 | R | 0x0 | Reserved |
| [5:0] | Tag | RW | 0x00 | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

6.17.7. PortE ChSense

Table 285. PortE ChSense Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F09 | 00 | See bitfield table. |
| Set1 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 286. PortE ChSense Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------------|---|
| [31] | PresDtct | R | 0x0 | 1 = something is plugged into jack associated with Pin Complex. |
| [30:0] | Impedance | R | 0x7FFF_FFFF | Measured impedance of the widget. A value of all 1's indicates that a valid sense reading is not available, or the sense measurement is busy if it has been recently triggered. |
| [0] | RightCh | W | 0x0 | Set 1 = perform impedance sensing on right channel or ring of the connector |
| [0] | LeftCh | W | 0x0 | Set 0 = perform impedance sensing on left channel or tip of the connector |

6.17.8. PortE ConfigDefault

Table 287. PortE ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 288. PortE ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Config4 | RW | 0x01 | Port Connectivity = Jack; Location = Mainboard rear. |
| [23:16] | Config3 | RW | 0xA1 | Default Device = Mic In; Connection Type = 1/8 inch jack. |
| [15:8] | Config2 | RW | 0x90 | Color = Pink; Misc = No jack detect override. |
| [7:0] | Config1 | RW | 0x40 | Association = 4h; Sequence = 0h. |

6.18. PortF Node (NID = 0x0F)

6.18.1. PortF WCap

Table 289. PortF WCap Command Verb Format

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

Table 290. PortF WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x1 | Unsolicited Response is supported |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.18.2. PortF PinCap

Table 291. PortF PinCap Command Verb Format

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

Table 292. PortF PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |
| [15:8] | VrefCntrl | R | 0x17 | VRef generation is supported by this pin complex, and the following voltages can be produced on the associated VRef pin: 80% Avdd; 50% Avdd; GND; Hi-Z (required since pin complex is output capable) |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x1 | Pin complex is output capable. |
| [3] | HdphDrvCap | R | 0x0 | Pin does not have a headphone amplifier. |
| [2] | PresDtctCap | R | 0x1 | Pin complex can perform Presence Detect. |
| [1] | TrigRqd | R | 0x1 | Trigger is required for impedance measurement |
| [0] | ImpSenseCap | R | 0x1 | Pin complex supports impedance sense. |

6.18.3. PortF ConLst

Table 293. PortF ConLst Command Verb Format

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

Table 294. PortF ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |

Table 294. PortF ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.18.4. PortF ConLstEntry

Table 295. PortF ConLstEntry Command Verb Format

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

Table 296. PortF ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|-----------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x00 | Unused list entry. |
| [15:8] | ConL1 | R | 0x00 | Unused list entry. |
| [7:0] | ConL0 | R | 0x05 | DAC3 Converter widget |

6.18.5. PortF PinWCntrl

Table 297. PortF PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 298. PortF PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:7] | Rsvd2 | R | 0x0 | Reserved |
| [6] | OutEn | RW | 0x0 | 1 = (CODEC) output path of Pin Widget is enabled |

Table 298. PortF PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|---|
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |
| [4:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | VRefEn | RW | 0x0 | VRefEn: Selects one of the possible states for the VRef signal associated with the Pin Widget. If the value written to this control does not correspond to a supported value defined in the VRefCntrl field of the Pin Capabilities parameter (0C), then this control will take the value of 000b (Hi-Z). |

6.18.6. PortF UnsolResp

Table 299. PortF UnsolResp Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F08 | 00 | See bitfield table. |
| Set1 | 708 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 300. PortF UnsolResp Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x00 | Reserved |
| [7] | En | RW | 0x0 | Allow generation of Unsolicited Responses. Unsolicited response events occur upon jack-insertion OR completion of a Jack-Sense cycle. |
| [6] | Rsvd1 | R | 0x0 | Reserved |
| [5:0] | Tag | RW | 0x00 | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

6.18.7. PortF ChSense

Table 301. PortF ChSense Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F09 | 00 | See bitfield table. |
| Set1 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 302. PortF ChSense Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------------|---|
| [31] | PresDtct | R | 0x0 | 1 = something is plugged into jack associated with Pin Complex. |
| [30:0] | Impedance | R | 0x7FFF_FFFF | Measured impedance of the widget. A value of all 1's indicates that a valid sense reading is not available, or the sense measurement is busy if it has been recently triggered. |
| [0] | RightCh | W | 0x0 | Set 1 = perform impedance sensing on right channel or ring of the connector |
| [0] | LeftCh | W | 0x0 | Set 0 = perform impedance sensing on left channel or tip of the connector |

6.18.8. PortF ConfigDefault

Table 303. PortF ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 304. PortF ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Config4 | RW | 0x01 | Port Connectivity = Jack; Location = Mainboard rear. |
| [23:16] | Config3 | RW | 0x01 | Default Device = Line Out; Connection Type = 1/8 inch jack. |
| [15:8] | Config2 | RW | 0x10 | Color = Black; Misc = No jack detect override. |
| [7:0] | Config1 | RW | 0x12 | Association = 1h; Sequence = 2h. |

6.19. PortG Node (NID = 0x10)

6.19.1. PortG WCap

Table 305. PortG WCap Command Verb Format

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

Table 306. PortG WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x1 | Unsolicited Response is supported |

Table 306. PortG WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.19.2. PortG PinCap

Table 307. PortG PinCap Command Verb Format

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

Table 308. PortG PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |
| [15:8] | VrefCntrl | R | 0x00 | VRef generation not supported by this pin complex. |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x1 | Pin complex is output capable. |
| [3] | HdphDrvCap | R | 0x0 | Pin does not have a headphone amplifier. |

Table 308. PortG PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---|
| [2] | PresDtctCap | R | 0x1 | Pin complex can perform Presence Detect. |
| [1] | TrigRqd | R | 0x1 | Trigger is required for impedance measurement |
| [0] | ImpSenseCap | R | 0x1 | Pin complex supports impedance sense. |

6.19.3. PortG ConLst

Table 309. PortG ConLst Command Verb Format

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

Table 310. PortG ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.19.4. PortG ConLstEntry

Table 311. PortG ConLstEntry Command Verb Format

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

Table 312. PortG ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x00 | Unused list entry. |

Table 312. PortG ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-----------------------|
| [15:8] | ConL1 | R | 0x00 | Unused list entry. |
| [7:0] | ConL0 | R | 0x04 | DAC2 Converter widget |

6.19.5. PortG PinWCntrl

Table 313. PortG PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 314. PortG PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:7] | Rsvd2 | R | 0x0 | Reserved |
| [6] | OutEn | RW | 0x0 | 1 = (CODEC) output path of Pin Widget is enabled |
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |
| [4:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | VRefEn | R | 0x0 | Vref Out not supported on this Port |

6.19.6. PortG UnsolResp

Table 315. PortG UnsolResp Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F08 | 00 | See bitfield table. |
| Set1 | 708 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 316. PortG Unsolicited Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x00 | Reserved |
| [7] | En | RW | 0x0 | Allow generation of Unsolicited Responses. Unsolicited response events occur upon jack-insertion OR completion of a Jack-Sense cycle. |
| [6] | Rsvd1 | R | 0x0 | Reserved |
| [5:0] | Tag | RW | 0x00 | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

6.19.7. PortG ChSense

Table 317. PortG ChSense Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F09 | 00 | See bitfield table. |
| Set1 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 318. PortG ChSense Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------------|---|
| [31] | PresDtct | R | 0x0 | 1 = something is plugged into jack associated with Pin Complex. |
| [30:0] | Impedance | R | 0x7FFF_FFFF | Measured impedance of the widget. A value of all 1's indicates that a valid sense reading is not available, or the sense measurement is busy if it has been recently triggered. |
| [0] | RightCh | W | 0x0 | Set 1 = perform impedance sensing on right channel or ring of the connector |
| [0] | LeftCh | W | 0x0 | Set 0 = perform impedance sensing on left channel or tip of the connector |

6.19.8. PortG ConfigDefault

Table 319. PortG ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 320. PortG ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Config4 | RW | 0x01 | Port Connectivity = Jack; Location = Mainboard rear. |
| [23:16] | Config3 | RW | 0x01 | Default Device = Line Out; Connection Type = 1/8 inch jack. |
| [15:8] | Config2 | RW | 0x60 | Color = Orange; Misc = No jack detect override. |
| [7:0] | Config1 | RW | 0x11 | Association = 1h; Sequence = 1h. |

6.20. PortH Node (NID = 0x11)

6.20.1. PortH WCap

Table 321. PortH WCap Command Verb Format

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

Table 322. Porth WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x1 | Unsolicited Response is supported |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.20.2. Porth PinCap

Table 323. Porth PinCap Command Verb Format

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

Table 324. Porth PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |
| [15:8] | VrefCntrl | R | 0x00 | VRef generation not supported by this pin complex. |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x1 | Pin complex is output capable. |
| [3] | HdphDrvCap | R | 0x0 | Pin does not have a headphone amplifier. |
| [2] | PresDtctCap | R | 0x1 | Pin complex can perform Presence Detect. |
| [1] | TrigRqd | R | 0x1 | Trigger is required for impedance measurement |
| [0] | ImpSenseCap | R | 0x1 | Pin complex supports impedance sense. |

6.20.3. Porth ConLst

Table 325. Porth ConLst Command Verb Format

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

Table 326. Porth ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.20.4. Porth ConLstEntry

Table 327. Porth ConLstEntry Command Verb Format

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

Table 328. Porth ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|-----------------------|
| [31:24] | ConL3 | R | 0x00 | Unused list entry. |
| [23:16] | ConL2 | R | 0x00 | Unused list entry. |
| [15:8] | ConL1 | R | 0x00 | Unused list entry. |
| [7:0] | ConL0 | R | 0x03 | DAC1 Converter widget |

6.20.5. Porth PinWCntrl

Table 329. Porth PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 330. Porth PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:7] | Rsvd2 | R | 0x0 | Reserved |
| [6] | OutEn | RW | 0x0 | 1 = (CODEC) output path of Pin Widget is enabled |
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |
| [4:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | VRefEn | R | 0x0 | Vref Out not supported on this Port |

6.20.6. PortH UnsolicitedResp**Table 331. PortH UnsolicitedResp Command Verb Format**

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F08 | 00 | See bitfield table. |
| Set1 | 708 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 332. PortH UnsolicitedResp Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x00 | Reserved |
| [7] | En | RW | 0x0 | Allow generation of Unsolicited Responses. Unsolicited response events occur upon jack-insertion OR completion of a Jack-Sense cycle. |
| [6] | Rsvd1 | R | 0x0 | Reserved |
| [5:0] | Tag | RW | 0x00 | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

6.20.7. PortH ChSense**Table 333. PortH ChSense Command Verb Format**

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F09 | 00 | See bitfield table. |
| Set1 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 334. PortH ChSense Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------------|---|
| [31] | PresDtct | R | 0x0 | 1 = something is plugged into jack associated with Pin Complex. |
| [30:0] | Impedance | R | 0x7FFF_FFFF | Measured impedance of the widget. A value of all 1's indicates that a valid sense reading is not available, or the sense measurement is busy if it has been recently triggered. |
| [0] | RightCh | W | 0x0 | Set 1 = perform impedance sensing on right channel or ring of the connector |
| [0] | LeftCh | W | 0x0 | Set 0 = perform impedance sensing on left channel or tip of the connector |

6.20.8. PortH ConfigDefault

Table 335. PortH ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 336. PortH ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Config4 | RW | 0x01 | Port Connectivity = Jack; Location = Mainboard rear. |
| [23:16] | Config3 | RW | 0x01 | Default Device = Line Out; Connection Type = 1/8 inch jack. |
| [15:8] | Config2 | RW | 0x20 | Color = Grey; Misc = No jack detect override. |
| [7:0] | Config1 | RW | 0x14 | Association = 1h; Sequence = 4h. |

6.21. DMic0 Node (NID = 0x13)

6.21.1. DMic0 WCap

Table 337. DMic0 WCap Command Verb Format

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

Table 338. DMic0 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|---------------------------------|---|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 = Enabled 0xF = Disabled | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | DigitalStrm | R | 0x0 | Widget supports an Analog stream (since the digital microphone input is a SDM signal that needs to be processed by the digital filters, it is not a true bit for bit digital stream like I2S or SPDIF where samples are passed through unchanged) |
| [8] | ConnList | R | 0x0 | No connection list is present |
| [7] | UnsolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrđ | R | 0x0 | N/A for pin complex |
| [3] | AmpParamOvrđ | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead. |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |

Table 338. DMic0 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---------------|
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.21.2. DMic0 PinCap

Table 339. DMic0 PinCap Command Verb Format

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

Table 340. DMic0 PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |
| [15:8] | VRefCntrl | R | 0x00 | VRef generation not supported by this pin complex. |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x0 | Pin complex is not output capable. |
| [3] | HPhnDrvCap | R | 0x0 | Pin does not have a headphone amplifier. |
| [2] | PresDtctCap | R | 0x0 | Pin complex cannot perform Presence Detect. |
| [1] | TrigRqd | R | 0x0 | N/A |
| [0] | ImpSenseCap | R | 0x0 | Pin complex does not support impedance sense. |

6.21.3. DMic0 PinWCntrl

Table 341. DMic0 PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 342. DMic0 PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:6] | Rsvd2 | R | 0x0 | Reserved |
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |
| [4:0] | Rsvd1 | R | 0x0 | Reserved |

6.21.4. DMic0 ConfigDefault

Table 343. DMic0 ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 344. DMic0 ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Config4 | RW | 0x50 | Port Connectivity = No connection; Location = Internal. |
| [23:16] | Config3 | RW | 0xA0 | Default Device = Mic In; Connection Type = Unknown. |

Table 344. DMic0 ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [15:8] | Config2 | RW | 0x01 | Color = Unknown; Misc = Jack detect override. |
| [7:0] | Config1 | RW | 0xF0 | Association = Fh; Sequence = 0h. |

6.22. DMic1 Node (NID = 0x14)

6.22.1. DMic1 WCap

Table 345. DMic1 WCap Command Verb Format

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

Table 346. DMic1 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|---------------------------------|---|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 = Enabled 0xF = Disabled | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | DigitalStrm | R | 0x0 | Widget supports an Analog stream (since the digital microphone input is a SDM signal that needs to be processed by the digital filters, it is not a true bit for bit digital stream like I2S or SPDIF where samples are passed through unchanged) |
| [8] | ConnList | R | 0x0 | No connection list is present |
| [7] | UnsolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |

Table 346. DMic1 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---|
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |
| [3] | AmpParamOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead. |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.22.2. DMic1 PinCap

Table 347. DMic1 PinCap Command Verb Format

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

Table 348. DMic1 PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |
| [15:8] | VRefCntrl | R | 0x00 | VRef generation not supported by this pin complex. |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x0 | Pin complex is not output capable. |
| [3] | HPhnDrvCap | R | 0x0 | Pin does not have a headphone amplifier. |
| [2] | PresDtctCap | R | 0x0 | Pin complex cannot perform Presence Detect. |

Table 348. DMic1 PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---|
| [1] | TrigRqd | R | 0x0 | N/A |
| [0] | ImpSenseCap | R | 0x0 | Pin complex does not support impedance sense. |

6.22.3. DMic1 PinWCntrl

Table 349. DMic1 PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 350. DMic1 PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:6] | Rsvd2 | R | 0x0 | Reserved |
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |
| [4:0] | Rsvd1 | R | 0x0 | Reserved |

6.22.4. DMic1 ConfigDefault

Table 351. DMic1 ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 352. DMic1 ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Config4 | RW | 0x50 | Port Connectivity = No connection; Location = Internal. |
| [23:16] | Config3 | RW | 0xA0 | Default Device = Mic In; Connection Type = Unknown. |
| [15:8] | Config2 | RW | 0x01 | Color = Unknown; Misc = Jack detect override. |
| [7:0] | Config1 | RW | 0xF0 | Association = Fh; Sequence = 0h. |

6.23. DigOut0 Node (NID = 0x21)

6.23.1. DigOut0 WCap

Table 353. DigOut0 WCap Command Verb Format

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

Table 354. DigOut0 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No support for swapping left and right channels |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x1 | Widget supports a Digital stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |

Table 354. DigOut0 WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.23.2. DigOut0 PinCap

Table 355. DigOut0 PinCap Command Verb Format

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

Table 356. DigOut0 PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |
| [15:8] | VrefCntrl | R | 0x00 | Vref generation not supported on this pin |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x0 | Pin complex is not input capable. |
| [4] | OutCap | R | 0x1 | Pin complex is output capable. |
| [3] | HdphDrvCap | R | 0x0 | Pin does not have a headphone amplifier. |

Table 356. DigOut0 PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---|
| [2] | PresDtctCap | R | 0x0 | Pin complex cannot perform Presence Detect. |
| [1] | TrigRqd | R | 0x0 | N/A |
| [0] | ImpSenseCap | R | 0x0 | Pin complex does not support impedance sense. |

6.23.3. DigOut0 ConLst

Table 357. DigOut0 ConLst Command Verb Format

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

Table 358. DigOut0 ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved. |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x05 | Number of NID entries in connection list. |

6.23.4. DigOut0 ConLstEntry0

Table 359. DigOut0 ConLstEntry0 Command Verb Format

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

Table 360. DigOut0 ConLstEntry0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|----------------|
| [31:24] | ConL3 | R | 0x1C | ADC1Mux widget |
| [23:16] | ConL2 | R | 0x1B | ADC0Mux widget |

Table 360. DigOut0 ConLstEntry0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [15:8] | ConL1 | R | 0x1F | ADAT Out Converter widget |
| [7:0] | ConL0 | R | 0x1E | SPDIF Out Converter widget |

6.23.5. DigOut0 ConLstEntry4

Table 361. DigOut0 ConLstEntry4 Command Verb Format

| | Verb ID | Payload | Response |
|-----|---------|---------|---------------------|
| Get | F02 | 04 | See bitfield table. |

Table 362. DigOut0 ConLstEntry4 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|----------------|
| [31:24] | ConL7 | R | 0x00 | No connection |
| [23:16] | ConL6 | R | 0x00 | No connection |
| [15:8] | ConL5 | R | 0x00 | No connection |
| [7:0] | ConL4 | R | 0x1D | ADC2Mux widget |

6.23.6. DigOut0 ConSelectCtrl

Table 363. DigOut0 ConSelectCtrl Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F01 | 00 | See bitfield table. |
| Set1 | 701 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 364. DigOut0 ConSelectCtrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------------|
| [31:1] | Rsvd | R | 0x0 | Reserved |
| [2:0] | Index | RW | 0x0 | Connection select control index. |

6.23.7. DigOut0 PinWCntrl**Table 365. DigOut0 PinWCntrl Command Verb Format**

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 366. DigOut0 PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:7] | Rsvd2 | R | 0x0 | Reserved |
| [6] | OutEn | RW | 0x0 | 1 = (CODEC) output path of Pin Widget is enabled |
| [5:0] | Rsvd1 | R | 0x0 | Reserved |

6.23.8. DigOut0 ConfigDefault**Table 367. DigOut0 ConfigDefault Command Verb Format**

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 368. DigOut0 ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:24] | Config4 | RW | 0x01 | Port Connectivity = Jack; Location = Mainboard rear. |
| [23:16] | Config3 | RW | 0x44 | Default Device = SPDIF Out; Connection Type = RCA. |

Table 368. DigOut0 ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [15:8] | Config2 | RW | 0x21 | Color = Grey; Misc = Jack detect override. |
| [7:0] | Config1 | RW | 0x70 | Association = 7h; Sequence = 0h. |

6.24. DigIn Node (NID = 0x22)

6.24.1. DigIn WCap

Table 369. DigIn WCap Command Verb Format

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

Table 370. DigIn WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|---------------------------------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 = Enabled 0x8 = Disabled | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x3 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x1 | Power State control capability for support of EAPD |
| [9] | Dig | R | 0x1 | Widget supports a Digital stream |
| [8] | ConnList | R | 0x0 | No connection list is present |
| [7] | UnSolCap | R | 0x1 | Unsolicited Response is supported |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |

Table 370. DigIn WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.24.2. DigIn PinCap

Table 371. DigIn PinCap Command Verb Format

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

Table 372. DigIn PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x1 | This widget controls EAPD pin |
| [15:8] | VrefCntrl | R | 0x00 | Vref generation not supported on input pins. |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x0 | Pin complex is not output capable. (EAPD! = output stream) |
| [3] | HdphDrvCap | R | 0x0 | Pin does not have a headphone amplifier. |
| [2] | PresDtctCap | R | 0x1 | Pin complex can perform Presence Detect. |
| [1] | TrigRqd | R | 0x0 | N/A |
| [0] | ImpSenseCap | R | 0x0 | Pin complex does not support impedance sense. |

6.24.3. DigIn PwrState

Table 373. DigIn PwrState Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F05 | 00 | See bitfield table. |
| Set1 | 705 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 374. DigIn PwrState Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7:4] | Act | R | 0x3 | PS-Act: Actual power state of referenced node. |
| [3:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | Set | RW | 0x3 | PS-Set: Current power setting of referenced node. 00 - Fully on. 01 - Fully on. 10 - EAPD powered down (Hi-Z). 11 - Powered down (default) |

6.24.4. DigIn PinWCntrl

Table 375. DigIn PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 376. DigIn PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:6] | Rsvd2 | R | 0x0 | Reserved |
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |
| [4:0] | Rsvd1 | R | 0x0 | Reserved |

6.24.5. DigIn UnsolResp

Table 377. DigIn UnsolResp Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F08 | 00 | See bitfield table. |
| Set1 | 708 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 378. DigIn UnsolResp Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd2 | R | 0x00 | Reserved |
| [7] | En | RW | 0x0 | Allow generation of Unsolicited Responses. Unsolicited response events occur upon lock or loss-of-lock of SPDIF-in clock recovery circuit. |
| [6] | Rsvd1 | R | 0x0 | Reserved. |
| [5:0] | Tag | RW | 0x00 | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

6.24.6. DigIn ChSense

Table 379. DigIn ChSense Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F09 | 00 | See bitfield table. |
| Set1 | 709 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 380. DigIn ChSense Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31] | PresDtct | R | 0x0 | 1 = something is plugged into jack associated with Pin Complex. For this widget, Presence Detect indicates that the SPDIF-in clock recovery circuit has locked onto a valid SPDIF-in sampling frequency. Any change in status will generate an Unsolicited Response, if enabled with verb 708. |
| [30:0] | Rsvd | R | 0x0 | Reserved. Impedance sense not supported for this Pin Complex. |

6.24.7. DigIn EAPD

Table 381. DigIn EAPD Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0C | 00 | See bitfield table. |
| Set1 | 70C | See bits [7:0] of bitfield table. | 0000_0000h |

Table 382. DigIn EAPD Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:2] | Rsvd2 | R | 0x0 | Reserved |
| [1] | Data | RW | 0x0 | EAPD value reflected on the EAPD pin. 0 = power down external amp; 1 = power up external amp If PwrState < 0x2. If PwrState > = 0x2, Pin47 is Hi-Z. An external pull-down is required if EAPD must be low when Pin Widget is powered down. |
| [0] | Rsvd1 | R | 0x0 | Reserved |

6.24.8. DigIn ConfigDefault

Table 383. DigIn ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 384. DigIn ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:24] | Config4 | RW | 0x81 | Port Connectivity = No connect; Location = Mainboard rear. |
| [23:16] | Config3 | RW | 0xC4 | Default Device = SPDIF In; Connection Type = RCA. |
| [15:8] | Config2 | RW | 0x20 | Color = Grey; Misc = No jack detect override. |
| [7:0] | Config1 | RW | 0x90 | Association = 9h; Sequence = 0h. |

6.25. InPort0Mux Node (NID = 0x15)

6.25.1. InPort0Mux WCap

Table 385. InPort0Mux WCap Command Verb Format

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

Table 386. InPort0Mux WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x3 | Widget type = Audio Selector |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParOvrd | R | 0x1 | This widget contains its own amplifier parameters. |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp is present |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.25.2. InPort0Mux ConLst

Table 387. InPort0Mux ConLst Command Verb Format

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

Table 388. InPort0Mux ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x09 | Number of NID entries in connection list. |

6.25.3. InPort0Mux OutAmpCap

Table 389. InPort0Mux OutAmpCap Command Verb Format

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

Table 390. InPort0Mux OutAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31] | Mute | R | 0x0 | No mute capability |
| [30:23] | Rsvd3 | R | 0x0 | Reserved |
| [22:16] | StepSize | R | 0x27 | Size of each step in the gain range = 10dB |
| [15] | Rsvd2 | R | 0x0 | Reserved |
| [14:8] | NumSteps | R | 0x04 | Number of steps in the gain range = 5 (0dB to +40dB) |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6:0] | Offset | R | 0x00 | 0dB-step is programmed with this offset |

6.25.4. InPort0Mux OutAmpRight

Table 391. InPort0Mux OutAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | B80 | 00 | See bitfield table. |
| Set1 | 390 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 392. InPort0Mux OutAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | Gain | RW | 0x0 | Amplifier gain step number: 000 = 0dB; 001 = 10dB; 010 = 20dB; 011 = 30dB; 100 = 40dB |

6.25.5. InPort0Mux OutAmpLeft

Table 393. InPort0Mux OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 394. InPort0Mux OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | Gain | RW | 0x0 | Amplifier gain step number: 000 = 0dB; 001 = 10dB; 010 = 20dB; 011 = 30dB; 100 = 40dB |

6.25.6. InPort0Mux ConSelectCtrl

Table 395. InPort0Mux ConSelectCtrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F01 | 00 | See bitfield table. |
| Set1 | 701 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 396. InPort0Mux ConSelectCtrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:4] | Rsvd | R | 0x0 | Reserved |
| [3:0] | Index | RW | 0x0 | Connection select control index. (Default = Port E) |

6.25.7. InPort0Mux ConLstEntry0

Table 397. InPort0Mux ConLstEntry0 Command Verb Format

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

Table 398. InPort0Mux ConLstEntry0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|------------------|
| [31:24] | ConL3 | R | 0x0B | Port B |
| [23:16] | ConL2 | R | 0x0F | Port F |
| [15:8] | ConL1 | R | 0x12 | CD In |
| [7:0] | ConL0 | R | 0x0E | Port E (default) |

6.25.8. InPort0Mux ConLstEntry4

Table 399. InPort0Mux ConLstEntry4 Command Verb Format

| | Verb ID | Payload | Response |
|-----|---------|---------|---------------------|
| Get | F02 | 04 | See bitfield table. |

Table 400. InPort0Mux ConLstEntry4 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|-------------|
| [31:24] | ConL7 | R | 0x10 | Port G |
| [23:16] | ConL6 | R | 0x0A | Port A |

Table 400. InPort0Mux ConLstEntry4 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-------------|
| [15:8] | ConL5 | R | 0x0D | Port D |
| [7:0] | ConL4 | R | 0x0C | Port C |

6.25.9. InPort0Mux ConLstEntry8

Table 401. InPort0Mux ConLstEntry8 Command Verb Format

| | Verb ID | Payload | Response |
|-----|---------|---------|---------------------|
| Get | F02 | 08 | See bitfield table. |

Table 402. InPort0Mux ConLstEntry8 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|----------------|
| [31:24] | ConL11 | R | 0x0 | No connection. |
| [23:16] | ConL10 | R | 0x0 | No connection. |
| [15:8] | ConL9 | R | 0x0 | No connection. |
| [7:0] | ConL8 | R | 0x11 | Port H |

6.26. InPort1Mux Node (NID = 0x16)

6.26.1. InPort1Mux WCap

Table 403. InPort1Mux WCap Command Verb Format

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

Table 404. InPort1Mux WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x3 | Widget type = Audio Selector |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |

Table 404. InPort1Mux WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParOvrd | R | 0x1 | This widget contains its own amplifier parameters. |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp is present |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.26.2. InPort1Mux ConLst

Table 405. InPort1Mux ConLst Command Verb Format

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

Table 406. InPort1Mux ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |

Table 406. InPort1Mux ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x09 | Number of NID entries in connection list. |

6.26.3. InPort1Mux OutAmpCap

Table 407. InPort1Mux OutAmpCap Command Verb Format

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

Table 408. InPort1Mux OutAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31] | Mute | R | 0x0 | No mute capability |
| [30:23] | Rsvd3 | R | 0x0 | Reserved |
| [22:16] | StepSize | R | 0x27 | Size of each step in the gain range = 10dB |
| [15] | Rsvd2 | R | 0x0 | Reserved |
| [14:8] | NumSteps | R | 0x04 | Number of steps in the gain range = 5 (0dB to +40dB) |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6:0] | Offset | R | 0x00 | 0dB-step is programmed with this offset |

6.26.4. InPort1Mux OutAmpRight

Table 409. InPort1Mux OutAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | B80 | 00 | See bitfield table. |
| Set1 | 390 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 410. InPort1Mux OutAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | Gain | RW | 0x0 | Amplifier gain step number: 000 = 0dB; 001 = 10dB; 010 = 20dB; 011 = 30dB; 100 = 40dB |

6.26.5. InPort1Mux OutAmpLeft

Table 411. InPort1Mux OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 412. InPort1Mux OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | Gain | RW | 0x0 | Amplifier gain step number: 000 = 0dB; 001 = 10dB; 010 = 20dB; 011 = 30dB; 100 = 40dB |

6.26.6. InPort1Mux ConSelectCtrl

Table 413. InPort1Mux ConSelectCtrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F01 | 00 | See bitfield table. |
| Set1 | 701 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 414. InPort1Mux ConSelectCtrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:4] | Rsvd | R | 0x0 | Reserved |
| [3:0] | Index | RW | 0x0 | Connection select control index. (Default = Port E) |

6.26.7. InPort1Mux ConLstEntry0

Table 415. InPort1Mux ConLstEntry0 Command Verb Format

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

Table 416. InPort1Mux ConLstEntry0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|------------------|
| [31:24] | ConL3 | R | 0x0B | Port B |
| [23:16] | ConL2 | R | 0x0F | Port F |
| [15:8] | ConL1 | R | 0x12 | CD In |
| [7:0] | ConL0 | R | 0x0E | Port E (default) |

6.26.8. InPort1Mux ConLstEntry4

Table 417. InPort1Mux ConLstEntry4 Command Verb Format

| | Verb ID | Payload | Response |
|-----|---------|---------|---------------------|
| Get | F02 | 04 | See bitfield table. |

Table 418. InPort1Mux ConLstEntry4 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|-------------|
| [31:24] | ConL7 | R | 0x10 | Port G |
| [23:16] | ConL6 | R | 0x0A | Port A |

Table 418. InPort1Mux ConLstEntry4 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-------------|
| [15:8] | ConL5 | R | 0x0D | Port D |
| [7:0] | ConL4 | R | 0x0C | Port C |

6.26.9. InPort1Mux ConLstEntry8

Table 419. InPort1Mux ConLstEntry8 Command Verb Format

| | Verb ID | Payload | Response |
|-----|---------|---------|---------------------|
| Get | F02 | 08 | See bitfield table. |

Table 420. InPort1Mux ConLstEntry8 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|----------------|
| [31:24] | ConL11 | R | 0x0 | No connection. |
| [23:16] | ConL10 | R | 0x0 | No connection. |
| [15:8] | ConL9 | R | 0x0 | No connection. |
| [7:0] | ConL8 | R | 0x11 | Port H |

6.27. InPort2Mux Node (NID = 0x17)

6.27.1. InPort2Mux WCap

Table 421. InPort2Mux WCap Command Verb Format

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

Table 422. InPort2Mux WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x3 | Widget type = Audio Selector |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |

Table 422. InPort2Mux WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParOvrd | R | 0x1 | This widget contains its own amplifier parameters. |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp is present |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.27.2. InPort2Mux ConLst

Table 423. InPort2Mux ConLst Command Verb Format

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

Table 424. InPort2Mux ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-------------|
| [31:8] | Rsvd | R | 0x0 | Reserved |

Table 424. InPort2Mux ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x9 | Number of NID entries in connection list. |

6.27.3. InPort2Mux OutAmpCap

Table 425. InPort2Mux OutAmpCap Command Verb Format

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

Table 426. InPort2Mux OutAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31] | Mute | R | 0x0 | No mute capability |
| [30:23] | Rsvd3 | R | 0x0 | Reserved |
| [22:16] | StepSize | R | 0x27 | Size of each step in the gain range = 10dB |
| [15] | Rsvd2 | R | 0x0 | Reserved |
| [14:8] | NumSteps | R | 0x04 | Number of steps in the gain range = 5 (0dB to +40dB) |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6:0] | Offset | R | 0x00 | 0dB-step is programmed with this offset |

6.27.4. InPort2Mux OutAmpRight

Table 427. InPort2Mux OutAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | B80 | 00 | See bitfield table. |
| Set1 | 390 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 428. InPort2Mux OutAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | Gain | RW | 0x0 | Amplifier gain step number: 000 = 0dB; 001 = 10dB; 010 = 20dB; 011 = 30dB; 100 = 40dB |

6.27.5. InPort2Mux OutAmpLeft

Table 429. InPort2Mux OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 430. InPort2Mux OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:3] | Rsvd1 | R | 0x0 | Reserved |
| [2:0] | Gain | RW | 0x0 | Amplifier gain step number: 000 = 0dB; 001 = 10dB; 010 = 20dB; 011 = 30dB; 100 = 40dB |

6.27.6. InPort2Mux ConSelectCtrl

Table 431. InPort2Mux ConSelectCtrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F01 | 00 | See bitfield table. |
| Set1 | 701 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 432. InPort2Mux ConSelectCtrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:4] | Rsvd | R | 0x0 | Reserved |
| [3:0] | Index | RW | 0x0 | Connection select control index. (Default = Port E) |

6.27.7. InPort2Mux ConLstEntry0

Table 433. InPort2Mux ConLstEntry0 Command Verb Format

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

Table 434. InPort2Mux ConLstEntry0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|------------------|
| [31:24] | ConL3 | R | 0x0B | Port B |
| [23:16] | ConL2 | R | 0x0F | Port F |
| [15:8] | ConL1 | R | 0x12 | CD In |
| [7:0] | ConL0 | R | 0x0E | Port E (default) |

6.27.8. InPort2Mux ConLstEntry4

Table 435. InPort2Mux ConLstEntry4 Command Verb Format

| | Verb ID | Payload | Response |
|-----|---------|---------|---------------------|
| Get | F02 | 04 | See bitfield table. |

Table 436. InPort2Mux ConLstEntry4 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|-------------|
| [31:24] | ConL7 | R | 0x10 | Port G |
| [23:16] | ConL6 | R | 0x0A | Port A |

Table 436. InPort2Mux ConLstEntry4 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-------------|
| [15:8] | ConL5 | R | 0x0D | Port D |
| [7:0] | ConL4 | R | 0x0C | Port C |

6.27.9. InPort2Mux ConLstEntry8

Table 437. InPort2Mux ConLstEntry8 Command Verb Format

| | Verb ID | Payload | Response |
|-----|---------|---------|---------------------|
| Get | F02 | 08 | See bitfield table. |

Table 438. InPort2Mux ConLstEntry8 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|----------------|
| [31:24] | ConL11 | R | 0x0 | No connection. |
| [23:16] | ConL10 | R | 0x0 | No connection. |
| [15:8] | ConL9 | R | 0x0 | No connection. |
| [7:0] | ConL8 | R | 0x11 | Port H |

6.28. PCBEEP Node (NID = 0x23)

6.28.1. PCBEEP OutAmpLeft

Table 439. PCBEEP OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 440. PCBEEP OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-----------------------------|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x0 | 1 = disable Digital PC Beep |

Table 440. PCBEEP OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|--|
| [6:2] | Rsvd1 | R | 0x0 | Reserved |
| [1:0] | Gain | RW | 0x0 | Mono (left) amplifier gain step number |

6.28.2. PCBEEP WCap

Table 441. PCBEEP WCap Command Verb Format

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

Table 442. PCBEEP WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x7 | Widget type = Beep Generator |
| [19:4] | Rsvd1 | R | 0x0 | Reserved |
| [3] | AmpParOvrd | R | 0x1 | This widget contains its own amplifier parameters. |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp is present |
| [1] | InAmpPrsnt | R | 0x0 | N/A |
| [0] | Stereo | R | 0x0 | Mono widget |

6.28.3. PCBEEP OutAmpCap

Table 443. PCBEEP OutAmpCap Command Verb Format

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

Table 444. PCBEEP OutAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31] | Mute | R | 0x0 | Amplifier is capable of muting |
| [30:23] | Rsvd3 | R | 0x0 | Reserved |
| [22:16] | StepSize | R | 0x17 | Size of each step in the gain range = 6 dB |
| [15] | Rsvd2 | R | 0x0 | Reserved |
| [14:8] | NumSteps | R | 0x03 | Number of steps in the gain range = 4 (-18dB to 0dB) |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6:0] | Offset | R | 0x03 | 0dB-step is programmed with this offset |

6.28.4. PCBEEP Gen

Table 445. PCBEEP Gen Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0A | 00 | See bitfield table. |
| Set1 | 70A | See bits [7:0] of bitfield table. | 0000_0000h |

Table 446. PCBEEP Gen Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:0] | Divider | RW | 0x0 | <p>Enable internal PC-Beep generation.</p> <p>Divider is 00h - disables internal PC Beep generation and enables normal operation of the CODEC.</p> <p>Divider is not 00h - generates the beep tone on all Pin Complexes that are currently configured as outputs.</p> <p>The Azalia spec states that the beep tone frequency = (48 KHz Azalia SYNC rate) / (4*Divider), producing tones from 47 Hz to 12 KHz (logarithmic scale). Instead, this part generates tones with frequency = $48000 * (257 - \text{Divider}) / 1024$, yielding a linear range from 12 KHz to 93.75 Hz in steps of 46.875 Hz. If JackSenseVSR[Rate2x], then the beep tones generated have frequency = $48000 * (513 - \text{Divider}) / 1024$, yielding a range of 24 KHz to 12093.75 Hz in steps of 46.875 Hz.</p> |

6.29. CD Node (NID = 0x12)

6.29.1. CD WCap

Table 447. CD WCap Command Verb Format

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

Table 448. CD WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x4 | Widget type = Pin Complex |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |

Table 448. CD WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---------------------------------------|
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x0 | No connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | N/A for pin complex |
| [3] | AmpParOvrd | R | 0x0 | No amp |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.29.2. CD PinCap

Table 449. CD PinCap Command Verb Format

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

Table 450. CD PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:17] | Rsvd2 | R | 0x0 | Reserved |
| [16] | EapdCap | R | 0x0 | This widget does not control EAPD pin |
| [15:8] | VrefCntrl | R | 0x00 | Vref generation not supported on this pin |
| [7] | Rsvd1 | R | 0x0 | Reserved |

Table 450. CD PinCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|---|
| [6] | BalancedIO | R | 0x0 | Pin complex does not have balanced pins. |
| [5] | InCap | R | 0x1 | Pin complex is input capable. |
| [4] | OutCap | R | 0x0 | Pin complex is not output capable. |
| [3] | HdphDrvCap | R | 0x0 | Pin does not have a headphone amplifier. |
| [2] | PresDtctCap | R | 0x0 | Pin complex cannot perform Presence Detect. |
| [1] | TrigRqd | R | 0x0 | N/A |
| [0] | ImpSenseCap | R | 0x0 | Pin complex does not support impedance sense. |

6.29.3. CD PinWCntrl

Table 451. CD PinWCntrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F07 | 00 | See bitfield table. |
| Set1 | 707 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 452. CD PinWCntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:6] | Rsvd2 | R | 0x0 | Reserved |
| [5] | InEn | RW | 0x0 | 1 = (CODEC) input path of Pin Widget is enabled |
| [4:0] | Rsvd1 | R | 0x0 | Reserved |

6.29.4. CD ConfigDefault

Table 453. CD ConfigDefault Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F1C | 00 | See bitfield table. |
| Set1 | 71C | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 71D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set3 | 71E | See bits [7:0] of bitfield table. | 0000_0000h |
| Set4 | 71F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 454. CD ConfigDefault Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31:24] | Config4 | RW | 0x50 | Port Connectivity = No connect; Location = Internal. |
| [23:16] | Config3 | RW | 0x33 | Default Device = CD; Connection Type = ATAPI internal. |
| [15:8] | Config2 | RW | 0x01 | Color = Unknown; Misc = Jack detect override. |
| [7:0] | Config1 | RW | 0xF0 | Association = Fh; Sequence = 0h. |

6.30. ADATOut Node (NID = 0x1F)

6.30.1. ADATOut Cnvtr

Table 455. ADATOut Cnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|------------------------------------|---------------------|
| Get | A | 0000 | See bitfield table. |
| Set1 | 2 | See bits [15:0] of bitfield table. | 0000_0000h |

Table 456. ADATOut Cnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:16] | Rsvd2 | R | 0x0 | Reserved |
| [15] | FrmtNonPCM | RW | 0x0 | Stream Type 0 = PCM 1 = Non-PCM (remaining bits in this verb have other meanings) |
| [14] | FrmtSmplRate | RW | 0x0 | Sample Base Rate 0 = 48 KHz 1 = 44.1 KHz |
| [13:11] | SmplRateMultp | RW | 0x0 | Sample Base Rate Multiple 000 = 48 KHz / 44.1 KHz or less 001 = x2 010 = Reserved (x3) 011 = x4 100-111 = Reserved |
| [10:8] | SmplRateDiv | RW | 0x0 | Sample Base Rate Divisor 000 = Divide by 1 001 = Divide by 2 010 = Divide by 3 011 = Divide by 4 100 = Divide by 5 101 = Divide by 6 110 = Divide by 7 111 = Divide by 8 |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6:4] | BitsPerSmpl | RW | 0x3 | Bits per Sample 000 = 8 bits 001 = 16 bits 010 = 20 bits 011 = 24 bits 100-111 = Reserved |
| [3:0] | NmbrChan | RW | 0x1 | Number of Channels Number of channels in each frame of the stream. 0000 = 1 channel 0001 = 2 channels ... 1111 = 16 channels |

6.30.2. ADATOut WCap

Table 457. ADATOut WCap Command Verb Format

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

Table 458. ADATOut WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0xF | Widget type = Vendor Defined |
| [19:16] | Delay | R | 0x3 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x1 | Widget supports a Digital stream |
| [8] | ConnList | R | 0x0 | No connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.30.3. ADATOut CnvtrID

Table 459. ADATOut CnvtrID Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F06 | 00 | See bitfield table. |
| Set1 | 706 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 460. ADATOut CnvtrID Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7:4] | Strm | RW | 0x0 | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused. |
| [3:0] | Ch | R | 0x0 | N/A in ADAT mode. |

6.30.4. ADATOut DigCnvtr

Table 461. ADATOut DigCnvtr Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0D | 00 | See bitfield table. |
| Set1 | 70D | See bits [7:0] of bitfield table. | 0000_0000h |
| Set2 | 70E | See bits [7:0] of bitfield table. | 0000_0000h |

Table 462. ADATOut DigCnvtr Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|------------------------|
| [31:1] | Rsvd2 | R | 0x0 | Reserved |
| [0] | DigEn | RW | 0x0 | DigEn - Digital Enable |

6.30.5. ADATOut VCSR0

Table 463. ADATOut VCSR0 Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | FE0 | 00 | See bitfield table. |
| Set1 | 7E0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 464. ADATOut VCSR0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|-------------------|
| [31:5] | Rsvd2 | R | 0x0 | Reserved for 9778 |

Table 464. ADATOut VCSR0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [4] | ADATFRMT | RW | 0x0 | <p>ADAT Sample Split Format Select</p> <p>1: U user bits U3 and U2 in the transmitted ADAT stream are supplied by bits 3:2 of this verb (field ADAT), under software control.</p> <p>0: U user bits U3 and U2 in the transmitted ADAT stream are controlled automatically by hardware, derived according to the sample-rate of the outgoing audio stream.</p> <p>Hardware support is provided for the transfer of double- and quad-rate data streams over the 48 KHz (nominal) 8-channel ADAT interface. Two 2-channel (stereo) streams or one 4-channel audio stream at double-rate or one 2-channel stream at quad-rate will be sample-split over the appropriate ADAT channels. For each mode, the ADAT channels are listed in the order of arrival of the corresponding audio sample: ADAT_2CH_SGL C0,C1 (C2-C7 zero padded) ADAT_2CH_DBL C0,C2,C1,C3 (C4-C7 zero padded) ADAT_2CH_QUAD C0,C4,C1,C5,C2,C6,C3,C7 ADAT_4CH_SGL C0,C1,C2,C3 (C4-C7 zero padded) ADAT_4CH_DBL C0,C2,C4,C6,C1,C3,C5,C7 ADAT_8CH_SGL C0,C1,C2,C3,C4,C5,C6,C7</p> |

Table 464. ADATOut VCSR0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-------|---------------|----|-------|---|
| [3:0] | ADAT | RW | 0x0 | ADAT Lightpipe Control Used in conjunction with the ADAT Sample Rate in the stream converter to generate the 4 bit ADAT control signals. ADAT0 (U0): Time Code FLAG ADAT1 (U1): MIDI FLAG ADAT2 (U2): 0 = 44.1 / 48 KHz audio (1X operation) 1 = 88.2 / 96 KHz audio (2X operation) ADAT3 (U3): 1 = 176.4 / 192 KHz audio (4x operation). User bits U0 and U1 are always under software control. User bits U2 and U3 are also under software control if ADATFRMT is set. If ADATFRMT = 0, then bits 3:2 here are ignored and the bits transmitted as U3:U2 are controlled by hardware according to the sample-rate of the data stream. |

6.31. VolumeKnob Node (NID = 0x24)

6.31.1. VolumeKnob WCap

Table 465. VolumeKnob WCap Command Verb Format

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

Table 466. VolumeKnob WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|---------------------------------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x6 = Enabled 0xF = Disabled | Widget type = Volume Knob Widget |
| [19:0] | Rsvd1 | R | 0x0 | Reserved. Software assumes capability of unsolicited responses and a connection list for this widget type. |

6.31.2. VolumeKnob VolKnobCap**Table 467. VolumeKnob VolKnobCap Command Verb Format**

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

Table 468. VolumeKnob VolKnobCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Delta | R | 0x1 | Indicates if software can write a base volume to the Volume Control Knob. |
| [6:0] | NumSteps | R | 0x7F | Total number of steps in the range of the volume knob = 128 |

6.31.3. VolumeKnob ConLst**Table 469. VolumeKnob ConLst Command Verb Format**

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

Table 470. VolumeKnob ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|---|--|
| [31:8] | Rsvd | R | 0x0 | Reserved. |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | DAC4 enable = 0x05 DAC4 disable = 0x04 | Number of NID entries in connection list. |

6.31.4. VolumeKnob ConLstEntry0**Table 471. VolumeKnob ConLstEntry0 Command Verb Format**

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

Table 472. VolumeKnob ConLstEntry0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|-------------|
| [31:24] | ConL3 | R | 0x05 | DAC3 |
| [23:16] | ConL2 | R | 0x04 | DAC2 |
| [15:8] | ConL1 | R | 0x03 | DAC1 |
| [7:0] | ConL0 | R | 0x02 | DAC0 |

6.31.5. VolumeKnob ConLstEntry4

Table 473. VolumeKnob ConLstEntry4 Command Verb Format

| | Verb ID | Payload | Response |
|-----|---------|---------|---------------------|
| Get | F02 | 04 | See bitfield table. |

Table 474. VolumeKnob ConLstEntry4 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-----------------------------------|----------------|
| [31:24] | ConL7 | R | 0x0 | No connection. |
| [23:16] | ConL6 | R | 0x0 | No connection. |
| [15:8] | ConL5 | R | 0x0 | No connection. |
| [7:0] | ConL4 | R | 0x06 = Enabled 0x00 = Disabled | DAC4 |

6.31.6. VolumeKnob UnsolResp

Table 475. VolumeKnob UnsolResp Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F08 | 00 | See bitfield table. |
| Set1 | 708 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 476. VolumeKnob UnsolResp Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd2 | R | 0x00 | Reserved |
| [7] | En | RW | 0x0 | Allow generation of Unsolicited Responses. Unsolicited response events occur upon jack-insertion OR completion of a Jack-Sense cycle. |
| [6] | Rsvd1 | R | 0x0 | Reserved |
| [5:0] | Tag | RW | 0x00 | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |

6.31.7. VolumeKnob Cntrl

Table 477. VolumeKnob Cntrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0F | 00 | See bitfield table. |
| Set1 | 70F | See bits [7:0] of bitfield table. | 0000_0000h |

Table 478. VolumeKnob Cntrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | Direct | RW | 0x0 | 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 | 0x7F | Volume, specified in steps of amplifier gain |

6.31.8. VolumeKnob VCSR0

Table 479. VolumeKnob VCSR0 Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | FE0 | 00 | See bitfield table. |
| Set1 | 7E0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 480. VolumeKnob VCSR0 Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [31:4] | Rsvd | R | 0x0 | Reserved |
| [3] | Continuous | RW | 0x1 | Allow continuous incrementing/ decrementing of the volume knob value. |
| [2:0] | Rate | RW | 0x0 | Volume knob update rate, for continuous mode and de-bouncing (2.5 Hz to 20 Hz, in increments of 2.5 Hz) |

6.32. InPort0Vol Node (NID = 0x18)

6.32.1. InPort0Vol WCap

Table 481. InPort0Vol WCap Command Verb Format

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

Table 482. InPort0Vol WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x3 | Widget type = Audio Selector |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |

Table 482. InPort0Vol WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x1 | Input amp is present |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.32.2. InPort0Vol ConLst

Table 483. InPort0Vol ConLst Command Verb Format

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

Table 484. InPort0Vol ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.32.3. InPort0Vol InAmpRight**Table 485. InPort0Vol InAmpRight Command Verb Format**

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B00 | 00 | See bitfield table. |
| Set1 | 350 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 486. InPort0Vol InAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:4] | Rsvd1 | R | 0x0 | Reserved |
| [3:0] | Gain | RW | 0x0 | Amplifier gain step number |

6.32.4. InPort0Vol InAmpLeft**Table 487. InPort0Vol InAmpLeft Command Verb Format**

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B20 | 00 | See bitfield table. |
| Set1 | 360 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 488. InPort0Vol InAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:4] | Rsvd1 | R | 0x0 | Reserved |
| [3:0] | Gain | RW | 0x0 | Amplifier gain step number |

6.32.5. InPort0Vol ConLstEntry**Table 489. InPort0Vol ConLstEntry Command Verb Format**

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

Table 490. InPort0Vol ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--------------------|
| [31:24] | ConL3 | R | 0x00 | No Connection |
| [23:16] | ConL2 | R | 0x00 | No Connection |
| [15:8] | ConL1 | R | 0x00 | No Connection |
| [7:0] | ConL0 | R | 0x15 | InPort0 Mux widget |

6.33. InPort1Vol Node (NID = 0x19)

6.33.1. InPort1Vol WCap

Table 491. InPort1Vol WCap Command Verb Format

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

Table 492. InPort1Vol WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x3 | Widget type = Audio Selector |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |

Table 492. InPort1Vol WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [4] | FormatOvrđ | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParOvrđ | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x1 | Input amp is present |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.33.2. InPort1Vol ConLst

Table 493. InPort1Vol ConLst Command Verb Format

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

Table 494. InPort1Vol ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvđ | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.33.3. InPort1Vol InAmpRight

Table 495. InPort1Vol InAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | B00 | 00 | See bitfield table. |
| Set1 | 350 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 496. InPort1Vol InAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:4] | Rsvd1 | R | 0x0 | Reserved |
| [3:0] | Gain | RW | 0x0 | Amplifier gain step number |

6.33.4. InPort1Vol InAmpLeft

Table 497. InPort1Vol InAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B20 | 00 | See bitfield table. |
| Set1 | 360 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 498. InPort1Vol InAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:4] | Rsvd1 | R | 0x0 | Reserved |
| [3:0] | Gain | RW | 0x0 | Amplifier gain step number |

6.33.5. InPort1Vol ConLstEntry

Table 499. InPort1Vol ConLstEntry Command Verb Format

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

Table 500. InPort1Vol ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|-------------------|
| [31:24] | ConL3 | R | 0x00 | No Connection |
| [23:16] | ConL2 | R | 0x00 | No Connection |
| [15:8] | ConL1 | R | 0x00 | No Connection |
| [7:0] | ConL0 | R | 0x16 | InPort1Mux widget |

6.34. InPort2Vol Node (NID = 0x1A)

6.34.1. InPort2Vol WCap

Table 501. InPort2Vol WCap Command Verb Format

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

Table 502. InPort2Vol WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x3 | Widget type = Audio Selector |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x0 | No left/right channel swap capability |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | Dig | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnSolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParOvrd | R | 0x0 | No amplifier info; use default amplifier parameters from Audio Function node instead |
| [2] | OutAmpPrsnt | R | 0x0 | No output amp |
| [1] | InAmpPrsnt | R | 0x1 | Input amp is present |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.34.2. InPort2Vol ConLst**Table 503. InPort2Vol ConLst Command Verb Format**

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

Table 504. InPort2Vol ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x01 | Number of NID entries in connection list. |

6.34.3. InPort2Vol InAmpRight**Table 505. InPort2Vol InAmpRight Command Verb Format**

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B00 | 00 | See bitfield table. |
| Set1 | 350 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 506. InPort2Vol InAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:4] | Rsvd1 | R | 0x0 | Reserved |
| [3:0] | Gain | RW | 0x0 | Amplifier gain step number |

6.34.4. InPort2Vol InAmpLeft**Table 507. InPort2Vol InAmpLeft Command Verb Format**

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B20 | 00 | See bitfield table. |
| Set1 | 360 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 508. InPort2Vol InAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------|
| [31:4] | Rsvd1 | R | 0x0 | Reserved |
| [3:0] | Gain | RW | 0x0 | Amplifier gain step number |

6.34.5. InPort2Vol ConLstEntry

Table 509. InPort2Vol ConLstEntry Command Verb Format

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

Table 510. InPort2Vol ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|-------------------|
| [31:24] | ConL3 | R | 0x00 | No Connection |
| [23:16] | ConL2 | R | 0x00 | No Connection |
| [15:8] | ConL1 | R | 0x00 | No Connection |
| [7:0] | ConL0 | R | 0x17 | InPort2Mux widget |

6.35. ADC0Mux Node (NID = 0x1B)

6.35.1. ADC0Mux WCap

Table 511. ADC0Mux WCap Command Verb Format

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

Table 512. ADC0Mux WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|------------------------------|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x3 | Widget type = Audio Selector |

Table 512. ADC0Mux WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x1 | Left and right channels can be swapped |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | DigitalStrm | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnsolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParamOvrd | R | 0x1 | This widget contains its own amplifier parameters. |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp is present |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.35.2. ADC0Mux ConLst

Table 513. ADC0Mux ConLst Command Verb Format

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

Table 514. ADC0Mux ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-----------------------------------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x03 = Enabled 0x01 = Disabled | Number of NID entries in connection list. |

6.35.3. ADC0Mux ConSelectCtrl

Table 515. ADC0Mux ConSelectCtrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F01 | 00 | See bitfield table. |
| Set1 | 701 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 516. ADC0Mux ConSelectCtrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------------|
| [31:2] | Rsvd | R | 0x0 | Reserved |
| [1:0] | Index | RW | 0x0 | Connection select control index. |

6.35.4. ADC0Mux ConLstEntry

Table 517. ADC0Mux ConLstEntry Command Verb Format

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

Table 518. ADC0Mux ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-----------------------------------|------------------|
| [31:24] | ConL3 | R | 0x00 | No connection |
| [23:16] | ConL2 | R | 0x14 = Enabled 0x00 = Disabled | DMic1 pin widget |

Table 518. ADC0Mux ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-----------------------------------|-------------------|
| [15:8] | ConL1 | R | 0x13 = Enabled 0x00 = Disabled | DMic0 pin widget |
| [7:0] | ConL0 | R | 0x18 | InPort0Vol widget |

6.35.5. ADC0Mux LR

Table 519. ADC0Mux LR Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0C | 00 | See bitfield table. |
| Set1 | 70C | See bits [7:0] of bitfield table. | 0000_0000h |

Table 520. ADC0Mux LR Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:3] | Rsvd2 | R | 0x0 | Reserved |
| [2] | SwapEn | RW | 0x0 | 1 = swap left and right channels of this Widget. |
| [1:0] | Rsvd1 | R | 0x0 | Reserved |

6.35.6. ADC0Mux OutAmpCap

Table 521. ADC0Mux OutAmpCap Command Verb Format

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

Table 522. ADC0Mux OutAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31] | Mute | R | 0x1 | Amplifier is capable of muting |
| [30:23] | Rsvd3 | R | 0x0 | Reserved |
| [22:16] | StepSize | R | 0x00 | Size of each step in the gain range, N/A since there are no steps |

Table 522. ADC0Mux OutAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [15] | Rsvd2 | R | 0x0 | Reserved |
| [14:8] | NumSteps | R | 0x00 | No steps, gain is fixed at 0dB |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6:0] | Offset | R | 0x00 | 0dB-step is programmed with this offset |

6.35.7. ADC0Mux OutAmpRight

Table 523. ADC0Mux OutAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B80 | 00 | See bitfield table. |
| Set1 | 390 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 524. ADC0Mux OutAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--------------------|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Rsvd1 | R | 0x0 | Reserved |

6.35.8. ADC0Mux OutAmpLeft

Table 525. ADC0Mux OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 526. ADC0Mux OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--------------------|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Rsvd1 | R | 0x0 | Reserved |

6.36. ADC1Mux Node (NID = 0x1C)

6.36.1. ADC1Mux WCap

Table 527. ADC1Mux WCap Command Verb Format

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

Table 528. ADC1Mux WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x3 | Widget type = Audio Selector |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x1 | Left and right channels can be swapped |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | DigitalStrm | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnsolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |

Table 528. ADC1Mux WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|-----|---------------|----|-------|--|
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParamOvrd | R | 0x1 | This widget contains its own amplifier parameters. |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp is present |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.36.2. ADC1Mux ConLst

Table 529. ADC1Mux ConLst Command Verb Format

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

Table 530. ADC1Mux ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|----------------------------------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x03 = Enabled 0x1 = Disabled | Number of NID entries in connection list. |

6.36.3. ADC1Mux ConSelectCtrl

Table 531. ADC1Mux ConSelectCtrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F01 | 00 | See bitfield table. |
| Set1 | 701 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 532. ADC1Mux ConSelectCtrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------------|
| [31:2] | Rsvd | R | 0x0 | Reserved |
| [1:0] | Index | RW | 0x0 | Connection select control index. |

6.36.4. ADC1Mux ConLstEntry

Table 533. ADC1Mux ConLstEntry Command Verb Format

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

Table 534. ADC1Mux ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|----------------------------------|-------------------|
| [31:24] | ConL3 | R | 0x00 | No connection |
| [23:16] | ConL2 | R | 0x14 = Enabled 0x0 = Disabled | DMic1 pin widget |
| [15:8] | ConL1 | R | 0x13 = Enabled 0x0 = Disabled | DMic0 pin widget |
| [7:0] | ConL0 | R | 0x19 | InPort1Vol widget |

6.36.5. ADC1Mux LR

Table 535. ADC1Mux LR Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | F0C | 00 | See bitfield table. |
| Set1 | 70C | See bits [7:0] of bitfield table. | 0000_0000h |

Table 536. ADC1Mux LR Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:3] | Rsvd2 | R | 0x0 | Reserved |
| [2] | SwapEn | RW | 0x0 | 1 = swap left and right channels of this Widget. |
| [1:0] | Rsvd1 | R | 0x0 | Reserved |

6.36.6. ADC1Mux OutAmpCap

Table 537. ADC1Mux OutAmpCap Command Verb Format

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

Table 538. ADC1Mux OutAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31] | Mute | R | 0x1 | Amplifier is capable of muting |
| [30:23] | Rsvd3 | R | 0x0 | Reserved |
| [22:16] | StepSize | R | 0x00 | Size of each step in the gain range, N/A since there are no steps |
| [15] | Rsvd2 | R | 0x0 | Reserved |
| [14:8] | NumSteps | R | 0x00 | No steps, gain is fixed at 0dB |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6:0] | Offset | R | 0x00 | 0dB-step is programmed with this offset |

6.36.7. ADC1Mux OutAmpRight

Table 539. ADC1Mux OutAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|------|---------|-----------------------------------|---------------------|
| Get | B80 | 00 | See bitfield table. |
| Set1 | 390 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 540. ADC1Mux OutAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--------------------|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Rsvd1 | R | 0x0 | Reserved |

6.36.8. ADC1Mux OutAmpLeft

Table 541. ADC1Mux OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 542. ADC1Mux OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--------------------|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Rsvd1 | R | 0x0 | Reserved |

6.37. ADC2Mux Node (NID = 0x1D)

6.37.1. ADC2Mux WCap

Table 543. ADC2Mux WCap Command Verb Format

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

Table 544. ADC2Mux WCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|--|
| [31:24] | Rsvd2 | R | 0x0 | Reserved |
| [23:20] | Type | R | 0x3 | Widget type = Audio Selector |
| [19:16] | Delay | R | 0x0 | Number of sample delays through widget |
| [15:12] | Rsvd1 | R | 0x0 | Reserved |
| [11] | SwapCap | R | 0x1 | Left and right channels can be swapped |
| [10] | PwrCntrl | R | 0x0 | No support for Power State control |
| [9] | DigitalStrm | R | 0x0 | Widget supports an Analog stream |
| [8] | ConnList | R | 0x1 | Connection list is present |
| [7] | UnsolCap | R | 0x0 | No support for Unsolicited Response |
| [6] | ProcWidget | R | 0x0 | No Processing Controls parameter. |
| [5] | Stripe | R | 0x0 | No support for striping |
| [4] | FormatOvrd | R | 0x0 | No format info; use default format parameters from Audio Function node instead |
| [3] | AmpParamOvrd | R | 0x1 | This widget contains its own amplifier parameters. |
| [2] | OutAmpPrsnt | R | 0x1 | Output amp is present |
| [1] | InAmpPrsnt | R | 0x0 | No input amp |
| [0] | Stereo | R | 0x1 | Stereo widget |

6.37.2. ADC2Mux ConLst

Table 545. ADC2Mux ConLst Command Verb Format

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

Table 546. ADC2Mux ConLst Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|----------------------------------|--|
| [31:8] | Rsvd | R | 0x0 | Reserved |
| [7] | LForm | R | 0x0 | Connection list uses short-form (7-bit) NID entries. |
| [6:0] | ConL | R | 0x03 = Enabled 0x1 = Disabled | Number of NID entries in connection list. |

6.37.3. ADC2Mux ConSelectCtrl

Table 547. ADC2Mux ConSelectCtrl Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F01 | 00 | See bitfield table. |
| Set1 | 701 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 548. ADC2Mux ConSelectCtrl Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|----------------------------------|
| [31:2] | Rsvd | R | 0x0 | Reserved |
| [1:0] | Index | RW | 0x0 | Connection select control index. |

6.37.4. ADC2Mux ConLstEntry

Table 549. ADC2Mux ConLstEntry Command Verb Format

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

Table 550. ADC2Mux ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|----------------------------------|------------------|
| [31:24] | ConL3 | R | 0x00 | No connection |
| [23:16] | ConL2 | R | 0x14 = Enabled 0x0 = Disabled | DMic1 pin widget |

Table 550. ADC2Mux ConLstEntry Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|----------------------------------|-------------------|
| [15:8] | ConL1 | R | 0x13 = Enabled 0x0 = Disabled | DMic0 pin widget |
| [7:0] | ConL0 | R | 0x1A | InPort2Vol widget |

6.37.5. ADC2Mux LR

Table 551. ADC2Mux LR Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | F0C | 00 | See bitfield table. |
| Set1 | 70C | See bits [7:0] of bitfield table. | 0000_0000h |

Table 552. ADC2Mux LR Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--|
| [31:3] | Rsvd2 | R | 0x0 | Reserved |
| [2] | SwapEn | RW | 0x0 | 1 = swap left and right channels of this Widget. |
| [1:0] | Rsvd1 | R | 0x0 | Reserved |

6.37.6. ADC2Mux OutAmpCap

Table 553. ADC2Mux OutAmpCap Command Verb Format

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

Table 554. ADC2Mux OutAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|---------|---------------|----|-------|---|
| [31] | Mute | R | 0x1 | Amplifier is capable of muting |
| [30:23] | Rsvd3 | R | 0x0 | Reserved |
| [22:16] | StepSize | R | 0x00 | Size of each step in the gain range, N/A since there are no steps |

Table 554. ADC2Mux OutAmpCap Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|---|
| [15] | Rsvd2 | R | 0x0 | Reserved |
| [14:8] | NumSteps | R | 0x00 | No steps, gain is fixed at 0dB |
| [7] | Rsvd1 | R | 0x0 | Reserved |
| [6:0] | Offset | R | 0x00 | 0dB-step is programmed with this offset |

6.37.7. ADC2Mux OutAmpRight

Table 555. ADC2Mux OutAmpRight Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | B80 | 00 | See bitfield table. |
| Set1 | 390 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 556. ADC2Mux OutAmpRight Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--------------------|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Rsvd1 | R | 0x0 | Reserved |

6.37.8. ADC2Mux OutAmpLeft

Table 557. ADC2Mux OutAmpLeft Command Verb Format

| | Verb ID | Payload | Response |
|-------------|---------|-----------------------------------|---------------------|
| Get | BA0 | 00 | See bitfield table. |
| Set1 | 3A0 | See bits [7:0] of bitfield table. | 0000_0000h |

Table 558. ADC2Mux OutAmpLeft Command Response Format

| Bit | Bitfield Name | RW | Reset | Description |
|--------|---------------|----|-------|--------------------|
| [31:8] | Rsvd2 | R | 0x0 | Reserved |
| [7] | Mute | RW | 0x1 | 1 = mute is active |
| [6:0] | Rsvd1 | R | 0x0 | Reserved |

7. ORDERING INFORMATION

7.1. STAC9227/9228/9229/9230 Options and Part Order Numbers

| Part Order Number | Voltage | SNR | DigMic | ADAT | Dolby |
|-------------------|---------|-------|-------------|------|-------------------------|
| STAC9230X5TAEyyX | 5 | 105dB | Yes (Muxed) | Yes | No |
| STAC9230D5TAEyyX | 5 | 105dB | Yes (Muxed) | Yes | Master Studio |
| STAC9229X5TAEyyX | 5 | 95dB | Yes | Yes | No |
| STAC9229D5TAEyyX | 5 | 95dB | Yes | Yes | Home Theater/Sound Room |
| STAC9229X3TAEyyX | 3.3 | 95dB | Yes | Yes | No |
| STAC9229D3TAEyyX | 3.3 | 95dB | Yes | Yes | Home Theater/Sound Room |
| STAC9228X5TAEyyX | 5 | 95dB | Yes (Muxed) | No | No |
| STAC9228D5TAEyyX | 5 | 95dB | Yes (Muxed) | No | Home Theater/Sound Room |
| STAC9228X3TAEyyX | 3.3 | 95dB | Yes (Muxed) | No | No |
| STAC9228D3TAEyyX | 3.3 | 95dB | Yes (Muxed) | No | Home Theater/Sound Room |
| STAC9227X5TAEyyX | 5 | 95dB | No | No | No |
| STAC9227D5TAEyyX | 5 | 95dB | No | No | Home Theater/Sound Room |
| STAC9227X3TAEyyX | 3.3 | 95dB | No | No | No |
| STAC9227D3TAEyyX | 3.3 | 95dB | No | No | Home Theater/Sound Room |

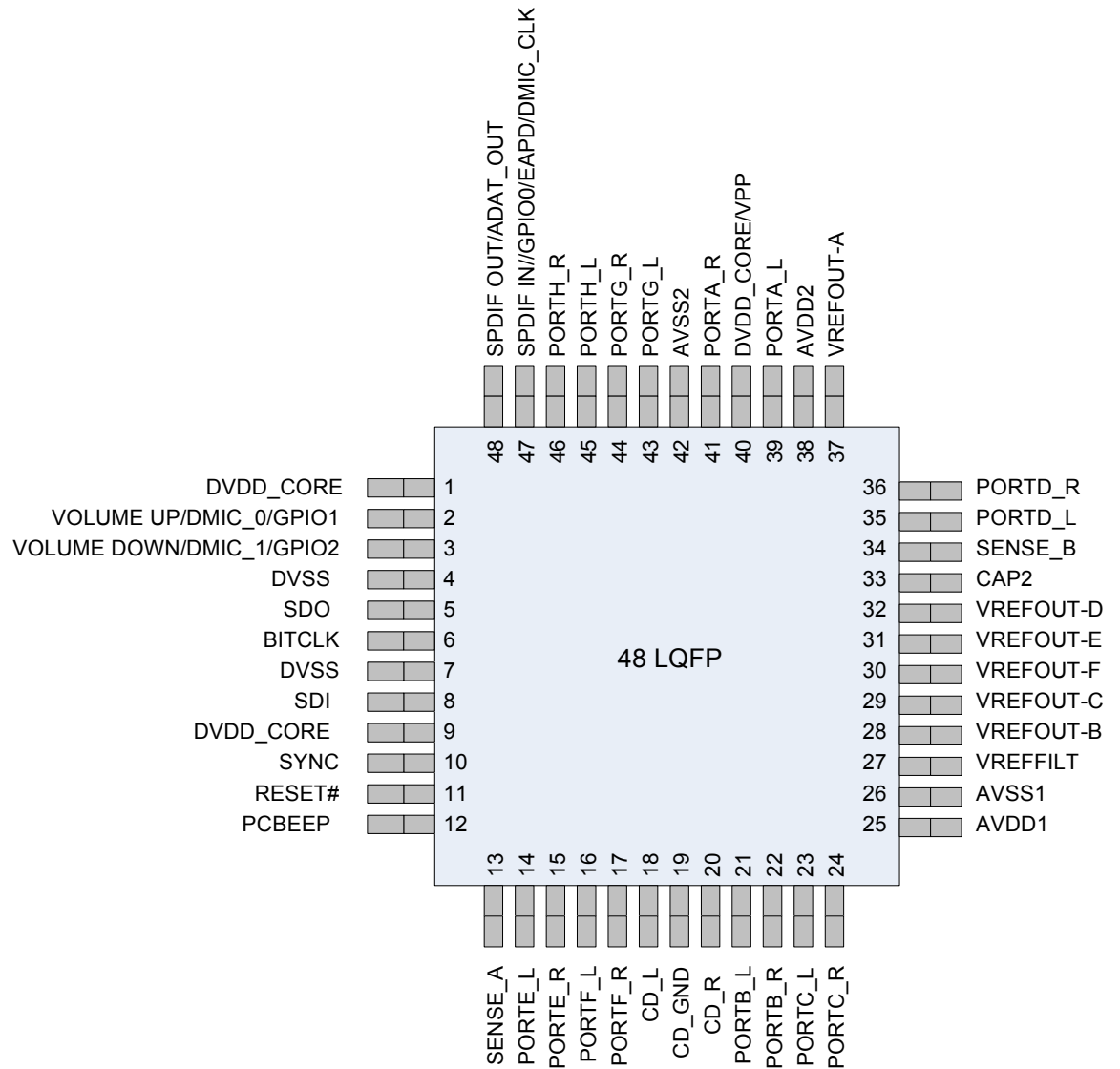
Table 559. STAC9227/9228/9229/9230 Options and Part Order Numbers

Note: When ordering these parts the “yy” will be replaced with the CODEC revision. Add an “R” to the end of any of these part numbers for delivery on Tape and Reel. The minimum order quantity for Tape and Reel is 2,000 units for 48-pin.

8. PIN INFORMATION

8.1. STAC9227/28/29/30 48-Pin LQFP Diagram

Figure 4. 48-Pin LQFP Pinout



Note: ADAT, DMIC_CLK, DMIC_0, and DMIC_1 are not available on all versions of the STAC927x family. When DMIC_CLK, DMIC_0, and DMIC_1 are unavailable, the pins are N/C

8.2. Pin Table

Table 560. Pin Table

| Pin Name | Pin Function | I/O | Internal Pull-up/ Pull-down | Pin Location |
|-------------------------|--|--------------|--|-----------------|
| DVDD_CORE | Digital Vdd = 3.3 V | I(Digital) | None | 1 |
| Volume Up/DMIC0/GPIO1 | Volume Control OR Digital Mic 0 Input/General Purpose I/O | I/O(Digital) | Pull-Up 50 K Ω with Volume, GPIO or Pull-down 50 K Ω with Digital Mic | 2 |
| Volume Down/DMIC1/GPIO2 | Volume Control OR Digital Mic 1 Input/General Purpose I/O | I/O(Digital) | Pull-Up 50 K Ω with Volume, GPIO or Pull-down 50 K Ω with Digital Mic | 3 |
| DVSS | Digital Ground | I(Digital) | None | 4 |
| SDATA_OUT | HD Audio Serial Data output (inbound stream) | I/O(Digital) | None | 5 |
| BIT_CLK | HD Audio Bit Clock | I(Digital) | None | 6 |
| DVSS3 | Digital Ground | I(Digital) | None | 7 |
| SDATA_IN | HD Audio Serial Data (outbound stream) | O(Digital) | None | 8 |
| DVDD_CORE | Digital Vdd = 3.3 V | I(Digital) | None | 9 |
| SYNC | HD Audio Frame Sync | I(Digital) | None | 10 |
| RESET# | HD Audio Reset | I(Digital) | None | 11 |
| PCBEEP | PC BEEP | I(Analog) | None | 12 |
| SENSE_A | Jack insertion detection Ports A,B,C,D | I(Analog) | None | 13 |
| PORT-E_L | Input/Output of Left DAC2 | I/O(Analog) | None | 14 |
| PORT-E_R | Input/Output of Right DAC2 | I/O(Analog) | None | 15 |
| PORT-F_L | Input/Output of Left DAC3 | I/O(Analog) | None | 16 |
| PORT-F_R | Input/Output of Right DAC3 | I/O(Analog) | None | 17 |
| CD-L | CD Audio Left Channel | I(Analog) | None | 18 |
| CD-GND | CD Audio Analog Ground | I(Analog) | None | 19 |
| CD-R | CD Audio Right Channel | I(Analog) | None | 20 |
| PORT-B_L (HP) | Input/Output of Left DAC0,3 & 4 | I/O(Analog) | None | 21 |
| PORT-B_R (HP) | Input/Output of Right DAC0, 3 & 4 | I/O(Analog) | None | 22 |
| PORT-C_L | Input/Output of Left DAC1 | I/O(Analog) | None | 23 |
| PORT-C_R | Input/Output of Right DAC1 | I/O(Analog) | None | 24 |
| AVDD1 | Analog Vdd = 3.3 V to 5 V | I(Analog) | None | 25 |
| AVSS1 | Analog Ground | I(Analog) | None | 26 |
| VREF FILT | Analog Virtual Ground | O(Analog) | None | 27 |
| VREFOUT-B | Reference Voltage out drive (intended for mic bias) for Port B | O(Analog) | None | 28 |

Table 560. Pin Table

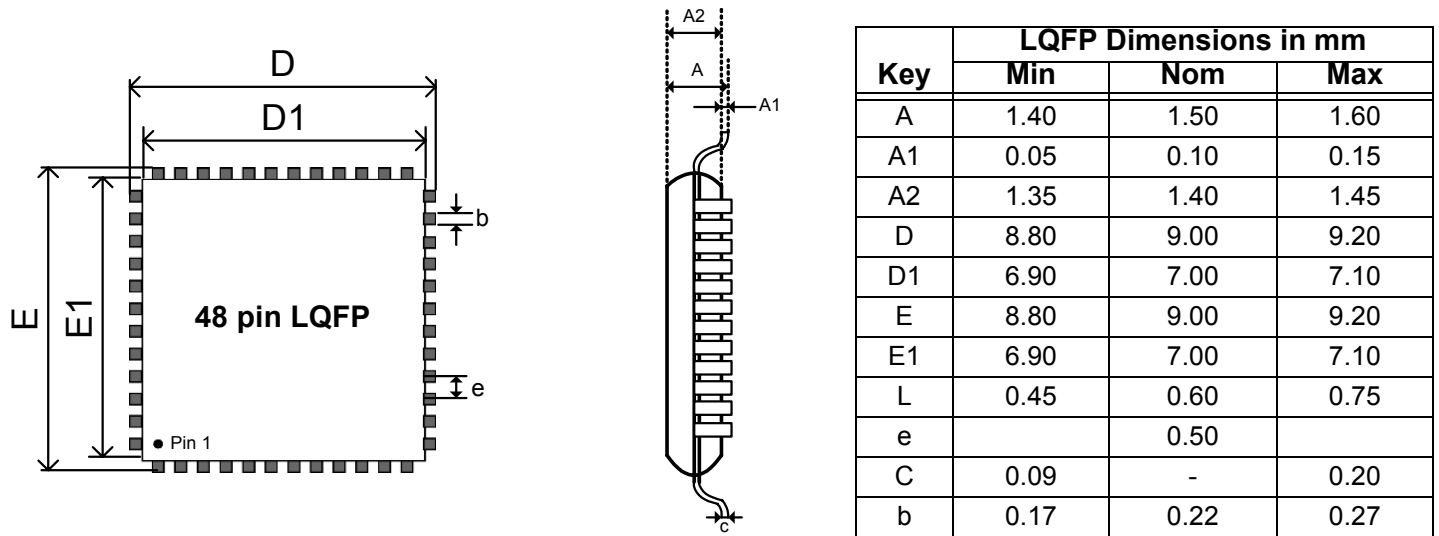
| Pin Name | Pin Function | I/O | Internal Pull-up/ Pull-down | Pin Location |
|-----------------------------|---|--------------|----------------------------------|-----------------|
| VREFOUT-C | Reference Voltage out drive (intended for mic bias) for Port C | O(Analog) | None | 29 |
| VREFOUT-F | Reference Voltage out drive (intended for mic bias) for Port F | O(Analog) | None | 30 |
| VREFOUT-E | Reference Voltage out drive (intended for mic bias) for Port E | O(Analog) | None | 31 |
| VREFOUT-D | Reference Voltage out drive (intended for mic bias) for Port D | O(Analog) | None | 32 |
| CAP2 | ADC reference Cap | O(Analog) | None | 33 |
| SENSE_B | Jack insertion detection Ports E,F,G,H | I(Analog) | None | 34 |
| PORT-D_L (HP) | Input/Output of Left DAC0 | I/O(Analog) | None | 35 |
| PORT-D_R (HP) | Input/Output of Right DAC0 | I/O(Analog) | None | 36 |
| VREFOUT-A | Reference Voltage out drive (ntended for mic bias) for Port A | O(Analog) | None | 37 |
| AVDD2 | Analog Vdd = 3.3 V to 5 V | I(Analog) | None | 38 |
| PORT-A_L (HP) | Input/Output of Left DAC0,3 & 4 | I/O(Analog) | None | 39 |
| DVDD_CORE | Digital Vdd = 3.3 V | I(Analog) | None | 40 |
| PORT-A_R (HP) | Input/Output of Right DAC0, 3 & 4 | I/O(Analog) | None | 41 |
| AVSS3 | Analog Ground | I(Analog) | None | 42 |
| PORT-G_L | Input/Output of Left DAC2 | I/O(Analog) | None | 43 |
| PORT-G_R | Input/Output of Right DAC2 | I/O(Analog) | None | 44 |
| PORT-H_L | Input/Output of Left DAC1 | I/O(Analog) | None | 45 |
| PORT-H_R | Input/Output of Right DAC1 | I/O(Analog) | None | 46 |
| SPDIFIN/GPIO0/EAPD/DMIC_CLK | SPDIF Input, General Purpose I/O, EAPD, Digital Mic Ouput Clock | I/O(Digital) | Pull-up 50 K Ω or more | 47 |
| S/PDIF-OUT/ADAT_OUT | SPDIF digital output (50 K Ω internal pull-down), ADAT Output | O(Digital) | 50 K Ω internal pull-down | 48 |

9. PACKAGE OUTLINE AND PACKAGE DIMENSIONS

Package dimensions are kept current with JEDEC Publication No. 95.

9.1. 48-Pin LQFP

Figure 5. 48-Pin LQFP Package Outline and Package Dimensions



10. SOLDER REFLOW PROFILE

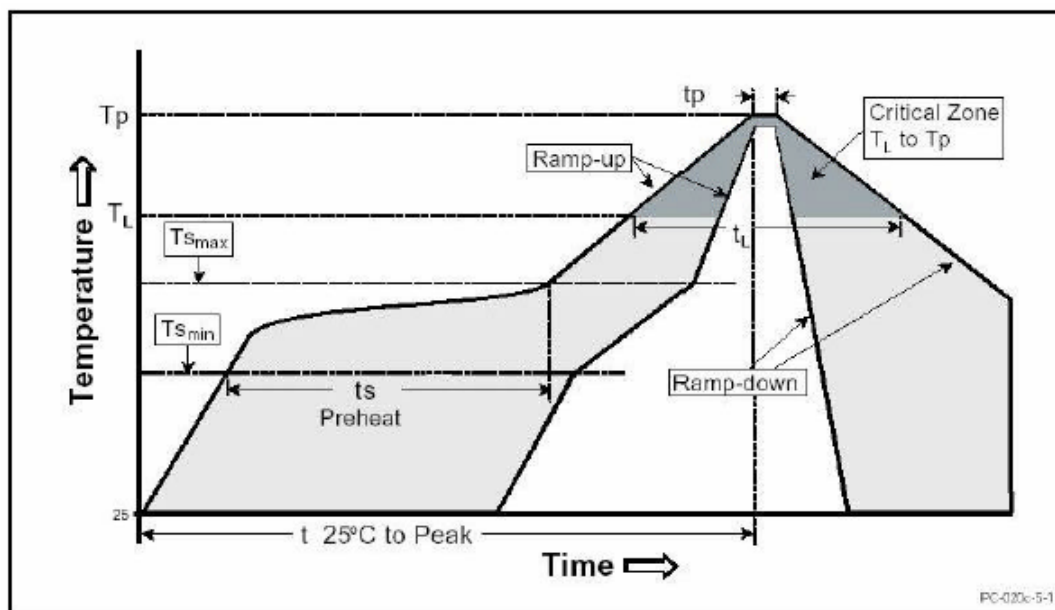
10.1. Standard Reflow Profile Data

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).

| Profile Feature | Pb Free Assembly |
|---|---|
| Average Ramp-Up Rate ($T_{s_{max}} - T_p$) | 3 °C / second max |
| Preheat Temperature Min ($T_{s_{min}}$) Temperature Max ($T_{s_{max}}$) Time ($t_{s_{min}} - t_{s_{max}}$) | 150 °C 200 °C 60 - 180 seconds |
| Time maintained above Temperature (T_L) Time (t_L) | 217 °C 60 - 150 seconds |
| Peak / Classification Temperature (T_p) | See "Package Classification Reflow Temperatures" on page 230. |
| 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 6. Solder Reflow Profile



10.2. Pb Free Process - Package Classification Reflow Temperatures

| Package Type | MSL | Reflow Temperature |
|--------------|-----|--------------------|
| LQFP 48-pin | 3 | 260 °C* |

11. REVISION HISTORY

| Revision | Date | Description of Change |
|-----------------|----------------|---|
| 0.3 | July 2005 | Initial release. |
| 0.5 | August 2005 | Updated Pin Outs and Pin Tables, Added Updated performance tables to show all voltage options, Updated Diagrams, Added Widget Diagram, Added Pin Configuration Default Register Settings Table, Added Part Numbers. Added 56-QFN Reflow Profile Information. Added Widget Information. Updated ESD Information. Added 40dB Boost Information. |
| 0.7 | May 2006 | Updated logo. Added ADAT logo. Added Audio Jack Presence Detect section. Updated Power Consumption numbers. |
| 0.82 | 8 October 2006 | Initial release in IDT format. |
| 1.0 | March 2007 | Removed 56 QFN package option for STAC9230. Corrected the missing "X" in the orderable part number. |

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