



**ESS Technology, Inc.**

# **ES1992 Canyon3D™2 PCI Audio Accelerator Product Brief**

## **DESCRIPTION**

The ES1992 Canyon3D™2 PCI audio accelerator combines advanced audio functionality in a highly integrated single-chip PCI solution for advanced multi-channel PC audio. With key features including hardware acceleration, 3D audio support, digital output capability, and integrated quad DAC AC'97 codec, the Canyon3D-2 will engulf the user in a 3D world of sound when used with general applications, digital music, or games.

The ES1992 combines the advantages of a high-bandwidth PCI bus interface, proven Canyon3D digital signal processing (DSP) hardware architecture, five-band speaker equalization (EQ), high-fidelity quad DAC AC'97 codec into a single-chip package with an external AC-link for additional future functionality (i.e., 6-speaker, 5.1 channel output). A Sony/Philips digital interface (S/PDIF) output provides for digital output of multichannel AC-3 content. The result is robust PC audio functionality, which features digital mixing, sample rate conversion, realtime effects processing, multistream DirectSound® hardware acceleration, and head-related transfer function (HRTF) filtering.

The 3D audio support and HRTF filtering are licensed through Sensaura™ Ltd. HRTF filtering is supported for 2, 4, and 6 speaker outputs, using MultiDrive™ technology. 3D audio is supported through DirectSound 3D, A3D 1.0, EAX 1.0, EAX 2.0, and I3DL2 advanced programming interfaces (APIs). Additional 3D audio enhancements are available through MacroFX™, EnvironmentalFX™, and ZoomFX™.

The ES1992 meets PC99/PC2001 and Microsoft WHQL specifications. Device drivers for the ES1992 are optimized for use on the Microsoft Windows® operating systems and are designed specifically to take advantage of new features available through Microsoft's DirectX® 8.

Operating at 3.3V digital and 5.0V analog, the ES1992 is compliant with the Advanced Power Management (APM) 1.2, Advanced Configuration and Power Interface (ACPI) 2.0, and PCI Power Management Interface (PPMI) 1.1 specifications.

The ES1992 Canyon3D-2 is available in an industry-standard 100-pin low-profile quad flat pack (LQFP) package.

## **FEATURES**

- High-performance single-chip PCI audio acceleration
- Four-speaker analog output
- S/PDIF digital output
- Integrated high-fidelity AC'97 codec
- High-quality sample rate conversion and digital mixing
- External AC-Link interface for 6-speaker, 5.1 channel support
- Multistream DirectSound 3D hardware acceleration
- Sensaura 3D positional audio
- Realtime effects processing
- Full-legacy DOS game support, using TDMA, PC/PCI, or DDMA hardware implementation methods
- Five-band hardware equalization

## **POWER MANAGEMENT**

- Compliance with APM 1.2, ACPI 2.0, and PPMI 1.1
- 3.3-volt digital operation with 5V-tolerant inputs
- 5.0-volt analog operation

## **COMPATIBILITY**

- Supports PC DOS games and applications for SoundBlaster™ and SoundBlaster Pro
- Supports Microsoft Windows DirectSound
- Meets PC99/PC2001 and Windows Hardware Quality Laboratory (WHQL) specifications
- Supports A3D 1.0, EAX 1.0, EAX 2.0, and I3DL2 APIs



## BLOCK DIAGRAM

Figure 1 shows the ES1992 Canyon3D-2 device block diagram.

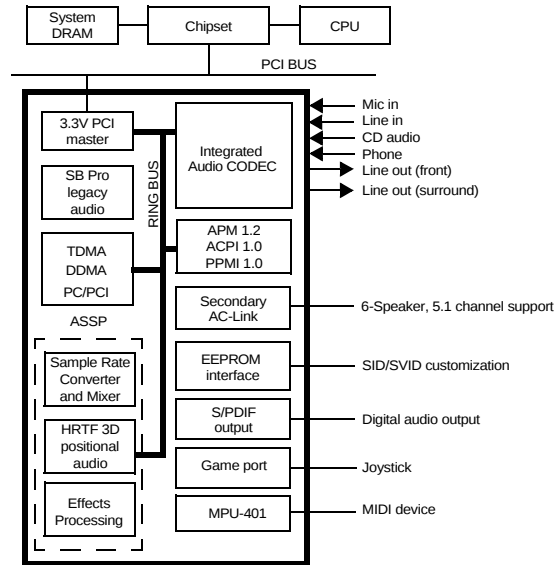


Figure 1 ES1992 Canyon3D-2 Block Diagram.

## PINOUT

Figure 2 shows the ES1992 Canyon3D-2 pinout diagram.

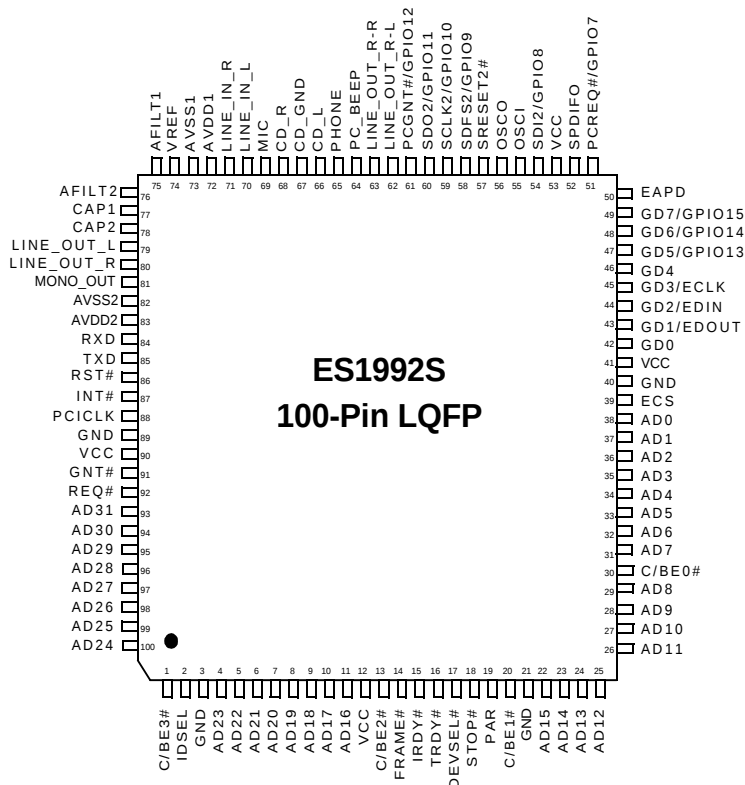


Figure 2 ES1992 Canyon3D-2 Pinout Diagram

## ES1992 PIN DESCRIPTIONS

Table 1 lists the ES1992 pin descriptions.

Table 1 ES1992 Pin Descriptions

| Names       | Pin Numbers                | I/O | Descriptions                                                                                                                                                     |
|-------------|----------------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C/BE[3:0]#  | 1, 13, 20, 30              | I/O | PCI command/byte enable. During address phase of a transaction, these pins define the bus command. During data phase, these pins define the byte enable.         |
| IDSEL       | 2                          | I   | ID Select.                                                                                                                                                       |
| GND         | 3, 21, 40, 89              | I   | Digital ground.                                                                                                                                                  |
| AD[31:0]    | 4:11, 22:29, 31:38, 93:100 | I/O | Address and data lines from the PCI bus.                                                                                                                         |
| VCC         | 12, 41, 53, 90             | I   | Digital supply voltage, 3.3V                                                                                                                                     |
| FRAME#      | 14                         | I/O | Cycle frame.                                                                                                                                                     |
| IRDY#       | 15                         | I/O | Initiator ready.                                                                                                                                                 |
| TRDY#       | 16                         | I/O | Target ready.                                                                                                                                                    |
| DEVSEL#     | 17                         | I/O | Device select.                                                                                                                                                   |
| STOP#       | 18                         | I/O | Stop transaction.                                                                                                                                                |
| PAR         | 19                         | I/O | Parity.                                                                                                                                                          |
| ECS         | 39                         | O   | EEPROM chip select. Connects to EEPROM chip select input pin. ECS is active after power-on reset and goes inactive automatically after EEPROM cycle is complete. |
| GD[0]       | 42                         | I/O | Game port data input/output.                                                                                                                                     |
| GD[1]       | 43                         | I/O | Game port data input/output.                                                                                                                                     |
| EDOUT       |                            | O   | EEPROM data output. Connects to EEPROM data input. EDOUT goes active after power-on reset and goes inactive automatically after EEPROM cycle is complete.        |
| GD[2]       | 44                         | I/O | Game port data input/output.                                                                                                                                     |
| EDIN        |                            | I   | EEPROM data input. Connects to EEPROM data output. EDIN goes active after power-on reset and goes inactive automatically after EEPROM cycle is complete.         |
| GD[3]       | 45                         | I/O | Game port data input/output.                                                                                                                                     |
| ECLK        |                            | O   | EEPROM clock. Connects to EEPROM clock input. ECLK goes active after power-on reset and goes inactive automatically after EEPROM cycle is complete.              |
| GD[4]       | 46                         | I   | Game port data input.                                                                                                                                            |
| GD[5:7]     | 47:49                      | I   | Game port data input.                                                                                                                                            |
| GPIO[15:13] |                            | I/O | General-purpose input/output.                                                                                                                                    |
| EAPD        | 50                         | I/O | External amplifier power down (active low).                                                                                                                      |
| PCREQ#      | 51                         | O   | PC/PCI request output. Enable PCREQ# by setting PCI 50h [10:8].                                                                                                  |
| GPIO7       |                            | I/O | General-purpose input/output.                                                                                                                                    |
| SPDIFO      | 52                         | O   | S/PDIF output. Enable SPDIFO by setting PCI 53h [0].                                                                                                             |
| SDI2        | 54                         | I   | External AC-link serial data input. Select external codec by enabling Canyon_Base+38h [5].                                                                       |
| GPIO8       |                            | I/O | General-purpose input/output.                                                                                                                                    |
| OSCI        | 55                         | I   | 49.152-MHz crystal input.                                                                                                                                        |
| OSCO        | 56                         | O   | 49.152-MHz crystal output.                                                                                                                                       |
| SRESET2#    | 57                         | I   | Reset output for AC-link interface. Select external codec by enabling Canyon_Base+38h [5].                                                                       |
| SDFS2       | 58                         | O   | Serial data frame sync output for AC-link interface. Select external codec by enabling Canyon_Base+38h [5].                                                      |
| GPIO9       |                            | I/O | General-purpose input/output.                                                                                                                                    |

Table 1 ES1992 Pin Descriptions (Continued)

| Names        | Pin Numbers | I/O | Descriptions                                                                                |
|--------------|-------------|-----|---------------------------------------------------------------------------------------------|
| SCLK2        | 59          | O   | Serial clock for AC-link interface. Select external codec by enabling Canyon_Base+38h [5].  |
| GPIO10       |             | I/O | General-purpose input/output.                                                               |
| SDO2         | 60          | O   | External AC-link serial data output. Select external codec by enabling Canyon_Base+38h [5]. |
| GPIO11       |             | I/O | General-purpose input/output.                                                               |
| PCGNT        | 61          | I   | PC/PCI grant input. Enable PC/PCI by setting PCI 50h [10:8].                                |
| GPIO12       |             | I/O | General-purpose input/output.                                                               |
| LINE_OUT_R-L | 62          | O   | Line output: surround, left channel.                                                        |
| LINE_OUT_R-R | 63          | O   | Line output: surround, right channel.                                                       |
| PC_BEEP      | 64          | I   | PC Speaker input.                                                                           |
| PHONE        | 65          | I   | Mono input.                                                                                 |
| CD_L         | 66          | I   | CD-audio input: left channel.                                                               |
| CD_GND       | 67          | I   | CD-audio input: ground.                                                                     |
| CD_R         | 68          | I   | CD-audio input: right channel.                                                              |
| MIC          | 69          | I   | Microphone input.                                                                           |
| LINE_IN_L    | 70          | I   | Line input: left channel.                                                                   |
| LINE_IN_R    | 71          | I   | Line input: right channel.                                                                  |
| AVDD[2:1]    | 72, 83      | I   | Analog supply voltage, 5V.                                                                  |
| AVSS[2:1]    | 73, 82      | I   | Analog ground.                                                                              |
| VREF         | 74          | O   | Reference voltage.                                                                          |
| AFILT[2:1]   | 75, 76      | O   | Anti-aliasing filter cap for the ADC channel.                                               |
| CAP[2:1]     | 77, 78      | O   | ADC and DAC reference caps.                                                                 |
| LINE_OUT_L   | 79          | O   | Line output: front, left channel.                                                           |
| LINE_OUT_R   | 80          | O   | Line output: front, right channel.                                                          |
| MONO_OUT     | 81          | O   | Mono output.                                                                                |
| RXD          | 84          | I   | MIDI receive data input. Enable MIDI I/O (MPU-401 I/O) by setting PCI 40h [3].              |
| TXD          | 85          | O   | MIDI transmit data output. Enable MIDI I/O (MPU-401 I/O) by setting PCI 40h [3].            |
| RST#         | 86          | I   | PCI reset input.                                                                            |
| INT#         | 87          | O   | Interrupt request output.                                                                   |
| PCICLK       | 88          | I   | PCI bus clock input.                                                                        |
| GNT#         | 91          | I   | Bus master grant input.                                                                     |
| REQ#         | 92          | O   | Bus master request output.                                                                  |

| Part Number | Description           | Package      |
|-------------|-----------------------|--------------|
| ES1992S     | PCI Audio Accelerator | 100-pin LQFP |



**ESS Technology, Inc.**  
**48401 Fremont Blvd.**  
**Fremont, CA 94538**  
**Tel: (510) 492-1088**  
**Fax: (510) 492-1898**



No part of this publication may be reproduced, stored in a retrieval system, transmitted, or translated in any form or by any means, electronic, mechanical, manual, optical, or otherwise, without the prior written permission of ESS Technology, Inc.

ESS Technology, Inc. makes no representations or warranties regarding the content of this document.

All specifications are subject to change without prior notice.

ESS Technology, Inc. assumes no responsibility for any errors contained herein.

U.S. patent pending.

Canyon3D is a trademark of ESS Technology, Inc.

All other trademarks are owned by their respective holders and are used for identification purposes only.