



## DESCRIPTION

The ES1990 Canyon3D™2LE PCI audio accelerator combines advanced audio functionality in a highly integrated, single-chip, PCI solution for advanced multichannel PC audio. With key features, including hardware acceleration, 3D audio support, and integrated quad DAC AC'97 codec, the Canyon3D-2LE will engulf the user in a 3D world of sound when used with general applications, digital music, or games.

The ES1990 combines the advantages of a high-bandwidth PCI bus interface, proven Canyon3D digital signal processing (DSP) hardware architecture, high-fidelity quad DAC AC'97 codec into a single-chip package with external AC-link for additional future functionality. 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. The HRTF filtering is supported for 2- and 4-speaker outputs, using MultiDrive™ technology. The 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 ES1990 meets PC99/PC2001 and Microsoft WHQL specifications. Device drivers for the ES1990 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 ES1990 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 ES1990 Canyon3D-2LE 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
- Integrated high-fidelity quad AC'97 codec
- High-quality sample rate conversion and digital mixing
- External AC-Link interface
- 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

## Power Management

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



## BLOCK DIAGRAMS

Figure 1 shows the ES1990 Canyon3D-2LE device block diagram.

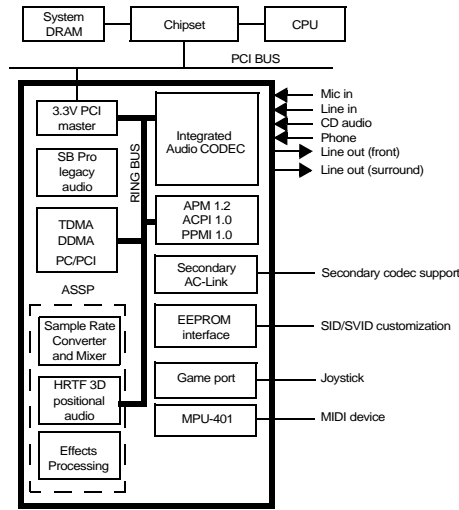


Figure 1 ES1990 Canyon3D-2LE Device Block Diagram

## PINOUT

Figure 2 shows the ES1990 Canyon3D-2LE pinout diagram.

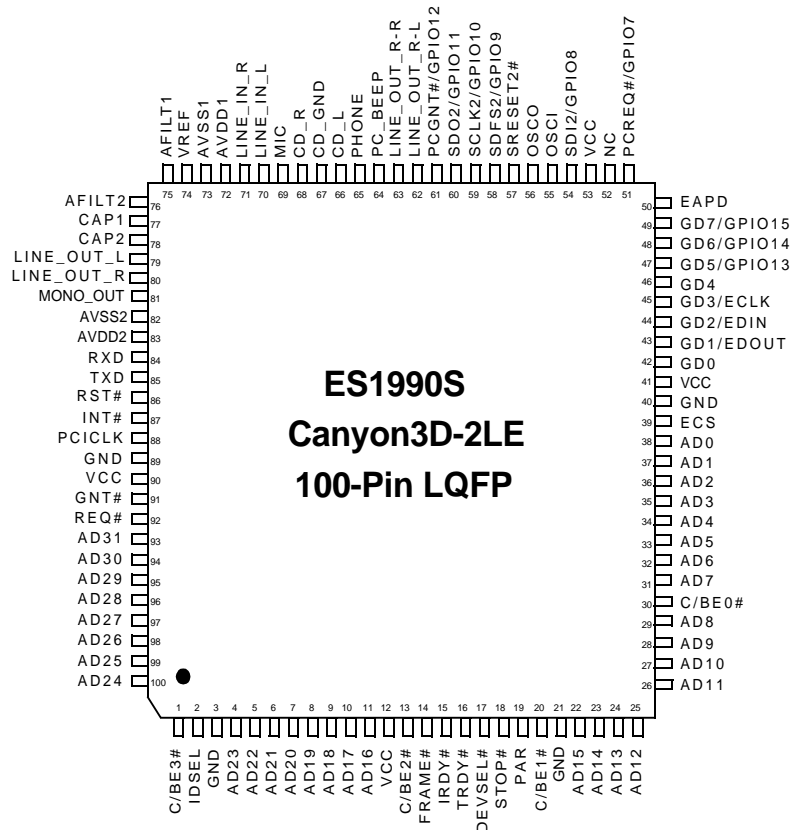


Figure 2 ES1990 Canyon3D-2LE Device Pinout

## PIN DESCRIPTION

The ES1990 Canyon3D-2LE pinouts are listed and described in Table 1.

Table 1 ES1990 Canyon3D-2LE 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	O	External amplifier power down (active high).
PCREQ#	51	O	PC/PCI request output. Enable PCREQ# by setting PCI 50h [10:8].
GPIO7		I/O	General-purpose input/output.
NC	52	—	No connect.
SDI2	54	I	External AC-link serial data input. Select external codec by enabling Canyon3D_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	Resets output for AC-link interface. Select external codec by enabling Canyon3D_Base+38h [5].
SDFS2	58	O	Serial data frame sync output for AC-link interface. Select external codec by enabling Canyon3D_Base+38h [5].
GPIO9		I/O	General-purpose input/output.
SCLK2	59	O	Serial clock for AC-link interface. Select external codec by enabling Canyon3D_Base+38h [5].
GPIO10		I/O	General-purpose input/output.

Table 1 ES1990 Canyon3D-2LE Pin Descriptions (Continued)

Names	Pin Numbers	I/O	Descriptions
SDO2	60	O	External AC-link serial data output. Select external codec by enabling Canyon3D_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	Antialiasing 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.

## ORDERING INFORMATION

Part Number	Description	Package
ES1990S	PCI Audio Accelerator	100-pin LQFP



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