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PMC-AUDIO

General Purpose Audio PMC

User Manual

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PMC-AUDIO
General Purpose Audio PMC

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Product Description

PMC-Audio provides a SoundBlaster™-compatible audio module capable of interfacing to a single stereo line input, stereo auxiliary input, a microphone, and a mono input, as well as amplifier-driven stereo speaker outputs, hardware volume control, and a mono output. In addition, a TTL level PC speaker input is provided and routed through an auxiliary input.

PMC-Audio is available in two versions. The front panel version has 3.5mm jacks on the front panel for stereo speakers, one stereo line input, one stereo aux input, and a mono microphone. The rear panel version routes all I/O through the module's P4 I/O connector. Both versions include rear panel support for mono input and output, PC speaker input, and volume control.

The PMC-Audio features the ESS Solo-1™ ES1938 single-chip PCI audio controller. This device has a microcontroller, an ESFM music synthesizer, a 3D stereo effects processor, 16-bit stereo wave ADCs and DACs, a DMA controller with FIFO, and an 80 dB dynamic range. The device can record, compress, and play back music, voice, and sound with built-in mixer controls. Stereo full-duplex operation is supported. It is compliant with ACPI power management standards.

A 0.5 W peak per channel stereo audio amplifier is provided to drive speakers or headphone directly.

PMC-Audio complies with the Microsoft PC 97/PC 98 specification. Windows NT 4.0 device drivers are available. A VxWorks driver is available from 4Front Technologies.

The module is compliant with standard single-wide PMC specifications IEEE P1386.1 and PCI 2.2 specifications.

Features

- 16-bit stereo sound recording and playback
- Music synthesizer and 3D stereo effects processor
- Stereo amplifier included
- Microphone input, stereo speaker outputs, stereo aux inputs, and stereo line inputs (via front or back as ordering option)
- Hardware volume control, one mono input, one mono line level output, and one speaker input (TTL) via P4 connector
- Compatible with SoundBlaster.

Block Diagram

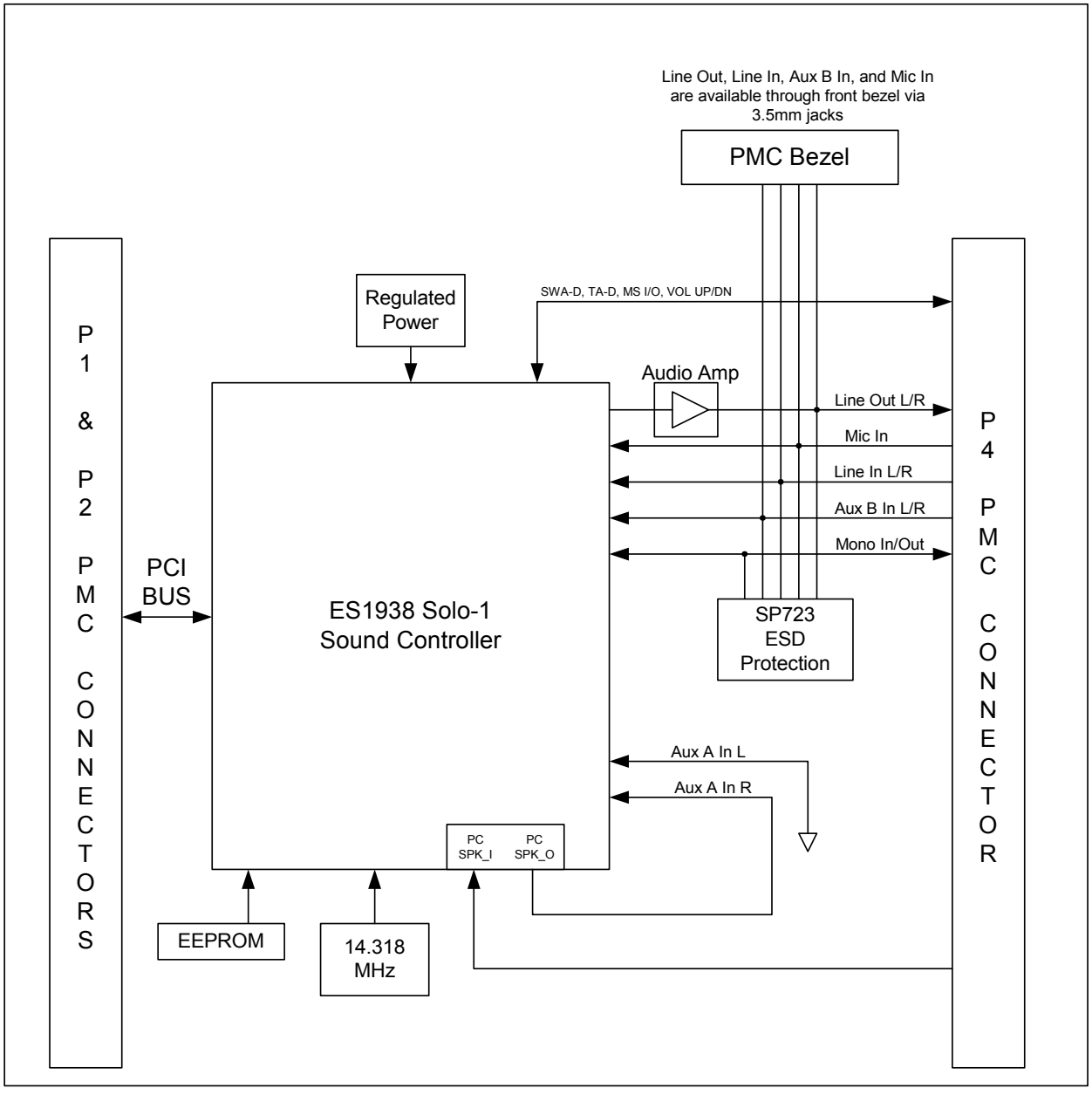


Figure 1. Block Diagram

Programming

31 16	15 0	Addr
Device ID = 0x1969	Vendor ID = 0x125D	00h
Device Status	Command	04h
Base class code = 0x04 / Sub-class code = 0x01	Programming interface / Revision ID = 0x01	08h
Reserved / Header type	Master latency timer / Reserved	0Ch
I/O space base address		10h
SB I/O space base address for native PCI audio		14h
VC I/O space base address for native PCI audio		18h
MPU-401 I/O space base address for native PCI audio		1Ch
Game port I/O space base address for native PCI audio		20h
Reserved		24h
Reserved		28h
Subsystem ID = 0x8888	Subsystem vendor ID = 0x125D	2Ch
Reserved		30h
Reserved	Capability pointer	34h
Reserved		38h
Maximum latency / Minimum grant	Interrupt pin / Interrupt line	3Ch
Reserved	Legacy audio control	40h
Reserved		44-4Ch
ES1946 configuratioon		50h
Reserved		54-5Ch
Reserved	Distributed DMA Control	60h
Power Management Capabilities	Next-Item pointer / Capability ID = 0x01	C0h
Reserved	Power-Management control/status	C4h

Figure 2. PCI Configuration Registers for ES1938

Connector Pin Assignments

P1

Connector P1 carries part of the PCI bus to the module. Connector P2 carries the remaining signals.

Pin #	Signal Name	Signal Name	Pin #
1	TCK	-12V	2
3	Ground	INTA#	4
5	INTB#	INTC#	6
7	BUSMODEl#	+5V	8
9	INTD#	PCI-RSVD	10
11	Ground	PCI-RSVD	12
13	CLK	Ground	14
15	Ground	GNT#	16
17	REQ#	+5V	18
19	V (I/O)	AD[31]	20
21	AD[28]	AD [27]	22
23	AD[25]	Ground	24
25	Ground	C/BE[3]#	26
27	AD[22]	AD[21]	28
29	AD[19]	+5V	30
31	V (I/O)	AD[17]	32
33	FRAME#	Ground	34
35	Ground	IRDY#	36
37	DEVSEL#	+5V	38
39	Ground	LOCK#	40
41	SDONE#	SBO#	42
43	PAR	Ground	44
45	V (I/O)	AD[15]	46
47	AD[12]	AD[11]	48
49	AD[09]	+5V	50
51	Ground	C/BE[O]#	52
53	AD[06]	AD[05]	54
55	AD[04]	Ground	56
57	V (I/O)	AD[03]	58
59	AD[02]	AD[01]	60
61	AD[00]	+5V	62
63	Ground	REQ64#	64

Figure 3. P1 Connector Pin Assignment

P2

Connector P2 carries part of the PCI bus to the module. Connector P1 carries the remaining signals.

Pin #	Signal Name	Signal Name	Pin #
1	+12V	TRST#	2
3	TMS	TDO	4
5	TDI	Ground	6
7	Ground	PCI-RSVD	8
9	PCI-RSVD	PCI-RSVD	10
11	BUSMODE2#	+3.3V	12
13	RST#	BUSMODE3#	14
15	3.3V	BUSMODE4#	16
17	PCI-RSVD	Ground	18
19	AD[30],	AD[29]	20
21	Ground	AD[26]	22
23	AD[24]	+3.3V	24
25	IDSEL	AD[23]	26
27	+3.3V	AD[20]	28
29	AD[18]	Ground	30
31	AD[16]	C/BE[2]#	32
33	Ground	PMC-RSVD	34
35	TRDY#	+3.3V	36
37	Ground	STOP#	38
39	PERR#	Ground	40
41	+3.3V	SERR#	42
43	C/BE[1]#	Ground	44
45	AD[14]	AD[13]	46
47	Ground	AD[10]	48
49	AD[08]	+3.3V	50
51	AD[07]	PMC-RSVD	52
53	+3.3V	PMC-RSVD	54
55	PMC-RSVD	Ground	56
57	PMC-RSVD	PMC-RSVD	58
59	Ground	PMC-RSVD	60
61	ACK64#	+3.3V	62
63	Ground	PMC-RSVD	64

Figure 4. P2 Connector Pin Assignment

P4

I/O on the PMC-AUDIO is via a flexible I/O Connector P4 as shown in the table below. Signals with an asterisk next to the name are only available with the PMC-AUDIO-BP. All other signals are available in both the front panel and rear panel versions.

Pin #	Signal Name	Pin #	Signal Name
1	NC	2	NC
3	TD	4	+5V
5	TC	6	+5V
7	TB	8	DGND
9	TA	10	MS_OUT
11	DGND	12	MS_IN
13	SWD	14	DGND
15	SWC	16	DGND
17	SWA	18	SWB
19	DGND	20	DGND
21	DGND	22	DGND
23	DGND	24	DGND
25	DGND	26	DGND
27	DGND	28	DGND
29	VOL_DN	30	DGND
31	VOL_UP	32	DGND
33	DGND	34	AGND
35	AGND	36	MONO_OUT
37	MONO_IN	38	AGND
39	AGND	40	AGND
41	AGND	42	AGND
43	AGND	44	MIC_IN*
45	AGND	46	AGND
47	AUXB_R*	48	AGND
49	AGND	50	AUX_L*
51	AGND	52	AGND
53	AGND	54	LINE_L*
55	LINE_R*	56	AGND
57	AGND	58	AGND
59	AGND	60	AOUT_L*
61	AOUT_R*	62	AGND
63	AGND	64	PCSPK_IN

Figure 5. J3 Connector Pin Assignment

Connectors and Signals

Front Panel or Rear Panel Signals

Front Panel jacks J1-J4 are only available with the PMC-AUDIO-FP. Each connector is a 3.5mm jack. J1-J3 are stereo and J4 is mono. The connectors are assigned the following signals.

Connector	Signal Name
J1	Line In
J2	AuxB In
J3	Analog Out
J4	Mic In

Figure 6. Front Panel Connectors

The diagram below indicates the layout of the signals on the front panel.

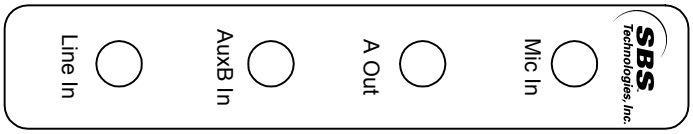


Figure 7. Front Panel Diagram

The following signals are available either through the front panel or the P4 connector, depending on the order option. Please refer to the J4 connector diagram for rear panel pin assignment information. For each of the stereo signals, the left channel is connected to the tip of the jack and the right channel is connected to the ring. The mono microphone input is connected to the tip.

Line In

Line In Left/Right is a stereo input into the playback and record mixer. Input impedance is 125 kΩ.

Aux B In

Aux B Left/Right is another input to the playback and record mixer. Input impedance is 125 kΩ.

Audio Out

Audio Out Left/Right is powered by the TEA2025D audio amplifier made by ST. The amplifier has been tuned to provide a maximum average power output of 0.5W per channel with 4Ω speakers connected in a single-ended configuration. The Audio outputs are also capable of driving 8Ω and 32Ω speakers in a single-ended configuration.

Mic In

The mono microphone input is an input to the playback and record mixer. Input impedance is 125 kΩ.

Rear Panel Only Signals

The signals below are available only through the rear panel connector. These signals are present for both the PMC-Audio-FP and PMC-Audio-BP.

Mono In/ Mono Out

Mono input mixer is a line level analog input to the playback and record. Input impedance is 125 kΩ.

Mono output includes source select and volume control, including mute. This output signal can drive an external 5kΩ load. It is not powered by an on-board amplifier.

PC Speaker Input

A TTL level PC Speaker input is provided at pin 64. It is supported with a 1-bit DAC with volume control internal to the ES1938. The analog output is then routed into the Aux A input of the ES1938. When programming the mixer, the Aux A input may also be referred to as the CD input by some drivers.

Hardware Volume Control

Vol_Up and Vol_Down are provided to allow hardware master volume control. Each signal is active low and must be held low for at least 40 milliseconds for it to be recognized as a valid pulse. A single valid low pulse corresponds to a single step change in volume. If the signals are held low, the volume controls enter fast scrolling mode. Mute is emulated when Vol_Up and Vol_Down are held low simultaneously.

+5VDC

Pins 4 and 6 provide +5VDC from the chassis power supply that may be used to power external devices. 200Ω series resistors are used to limit the amount of current that can pass through these pins.

Specifications

Form Factor	Single PMC
PCI Interface	33 MHz, 32-bit, slave and master, 5V signaling only
PMC Conformance	PCI Protocol and Electrical Rev 2.2
PCI Interface/Audio Controller	ESS Technology Solo-1 ES1938
Stereo Audio Inputs	Two pair
Mono Line Level Inputs	One
TTL Level Inputs	One (for PC speaker input)
Mono Microphone Level Input	One
Input Impedance (all analog inputs)	125 kOhm
Mono Line Outputs	One, 5 kOhm impedance
Stereo Amplified Outputs	Each 0.5 W peak into 4 Ohms
Mixer	Stereo, seven channel
Software Volume Control	6-bit logarithmic
Hardware Volume Control	Two wire
Record/Playback Sample Rates	Programmable 4 kHZ to 48 kHz
On-Board Crystal	14.31818 MHz
Front Panel I/O (-FP version only)	Stereo speaker outputs (3.5mm jack) Stereo line input (3.5mm jack) Stereo aux input (3.5mm jack) Mono microphone input (3.5 mm jack) *Front panel inputs are grounded when not in use*
Rear Panel I/O (-BP version only)	Stereo speaker outputs Stereo line input Stereo aux input Mono microphone input
Common Rear Panel I/O (both versions)	Mono line input and output PC speaker input (TTL) Volume up/down +5V via protection resistor
Dimensions	75.0 mm x 150.0 mm
Weight	0.082 kg (0.181 lb.)
Power Requirements	+3.3 VDC, 20 mA typ +5 VDC, 20 mA typ +12 VDC, 150 mA typ -12 VDC, 20 mA typ
Environmental	Operating temperature: 0 to 70°C Humidity: 5 to 95% non-condensing Storage: -40 to +85°C

Repair

Service Policy

Before returning a product for repair, verify as soon as possible that the suspected unit is at fault; then call the Customer Service Department for a RETURN MATERIAL AUTHORIZATION (RMA) number. Carefully package the unit, in the original shipping carton if it is available, and ship prepaid and insured with the RMA number clearly written on the outside of the package. Include the return address and telephone number of a technical contact. For out-of-warranty repairs, a purchase order for repair charges must accompany the return. SBS Technologies will not be responsible for damages due to improper packaging of returned items. For service of SBS Technologies products not purchased directly from SBS Technologies, contact your reseller. Products returned to SBS Technologies for repair by other than the original customer will be treated as out-of-warranty.

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