



## DESCRIPTION

The Maestro-2™ audio digital accelerator is a highly integrated PCI audio solution that brings advanced audio features to notebook computers. These features include a 64-voice wavetable synthesizer with Downloadable Sample (DLS) and complete DirectSound™ support. The Maestro-2 proprietary technology supports both Microsoft®'s PC97 logo requirements and DOS game compatibility.

The Maestro-2 device works with any AC'97 compliant CODEC including ESS Technology's own PT-101 AC'97-link CODEC. A secondary AC'97 CODEC interface supports an additional CODEC. Support for a Dumbar™ bridge docking solution for the secondary CODEC interface is planned for Q4 of 1997. The Maestro-2 communicates with a Dumbar bridge through a "super AC-link". This link carries both PCM audio data and data for non-CODEC related data; i.e. game port, MPU-401, GPI/O, etc.

The dual audio-engine Maestro-2 architecture consists of a 64-voice, pipelined, wavetable synthesizer and a proprietary audio signal processor. Together they can simultaneously handle multiple audio streams of different data types, high-quality MIDI synthesis, and voice compression and decompression. Each channel/stream has an independent pan, tremolo, vibrato and tone filter. The synthesizer also performs advanced audio effects such as reverb, chorus, flange, echo and 3-D spatial enhancement.

WaveCache™ technology reduces the system cost by storing data (synth samples, WAV files, algorithms) in host memory. The data is retrieved using high-performance PCI bus cycles during playback or recording.

Microsoft's DirectSound API is accelerated by digitally mixing up to 32 PCM streams of any frequency down to a single output stream of 48 kHz. This "final" buffer can then be piped to any CODEC (through the two attached AC'97 IF, 1394, USB) available to the system. This acceleration frees up the CPU to perform other tasks.

The Maestro-2 audio accelerator supports a number of different legacy audio schemes, including Distributed DMA protocol, PC/PCI DMA, Compaq® style one-signal SERIRQ#, and Transparent DMA. This ensures complete DOS game compatibility.

The Maestro-2 power management complies with both Advanced Configuration and Power Interface (ACPI) 1.0 and Advanced Power Management (APM) rev. 1.2.

The Maestro-2 audio accelerator is available in an industry-standard 100-pin Thin Quad Flat Package (TQFP).

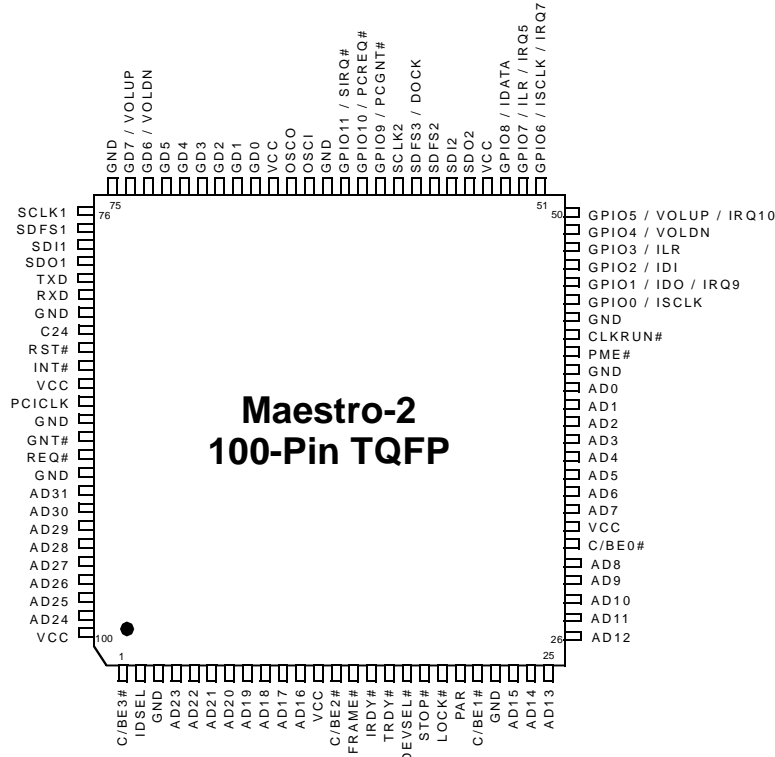
## FEATURES

- 64-voice wavetable synthesizer supporting DLS and 32 independent digital data streams
- Proprietary WaveCache™ Technology
- 3-D positional audio under DirectX™ 5.0
- Enhanced effects (reverb, chorus, echo, vibrato, etc.)
- AC-3 decode acceleration
  - External DSP for hardware AC-3 decode
  - Active Movie AC-3 filter acceleration option
- 2- or 3-button hardware master volume control
- I<sup>2</sup>S/Zoom Video support
- AC'97 CODEC interface
- Up to 20-bit ADC/DAC audio resolution
- Complies with Microsoft's ACPI rev 1.0 (D0–D3) & Advanced Power Management spec 1.2
- 3.3 V power supply, 5 V – I/O tolerant
- Supports up to 12 GPIO pins
- Secondary AC'97 CODEC interface
- PCI 2.1 bus master with scatter/gather support
- Distributed & PC/PCI DMA, Compaq/Intel serial IRQ support and Transparent DMA

## BENEFITS

- 85 dB+ high-quality audio, layout flexibility
- Uncompromising high-fidelity audio quality
- Supports OnNow, Microsoft's design initiative for power management
- Optimal power saving and simplified layout
- Flexibility for system management schemes
- Highest performance engine for DirectSound acceleration
- Uses host memory, lower system cost
- Enhanced sound images, product differentiation
- Adjusts volume independent of applications
- Zoom Video MPEG playback application
- Glueless docking interface for audio, game port, MIDI, Zoom Video
- High-speed PCI bus cycles when accessing data stored in system memory
- Ensures complete DOS game compatibility
- Small real estate for economical notebook design

PINOUT



PIN DESCRIPTION

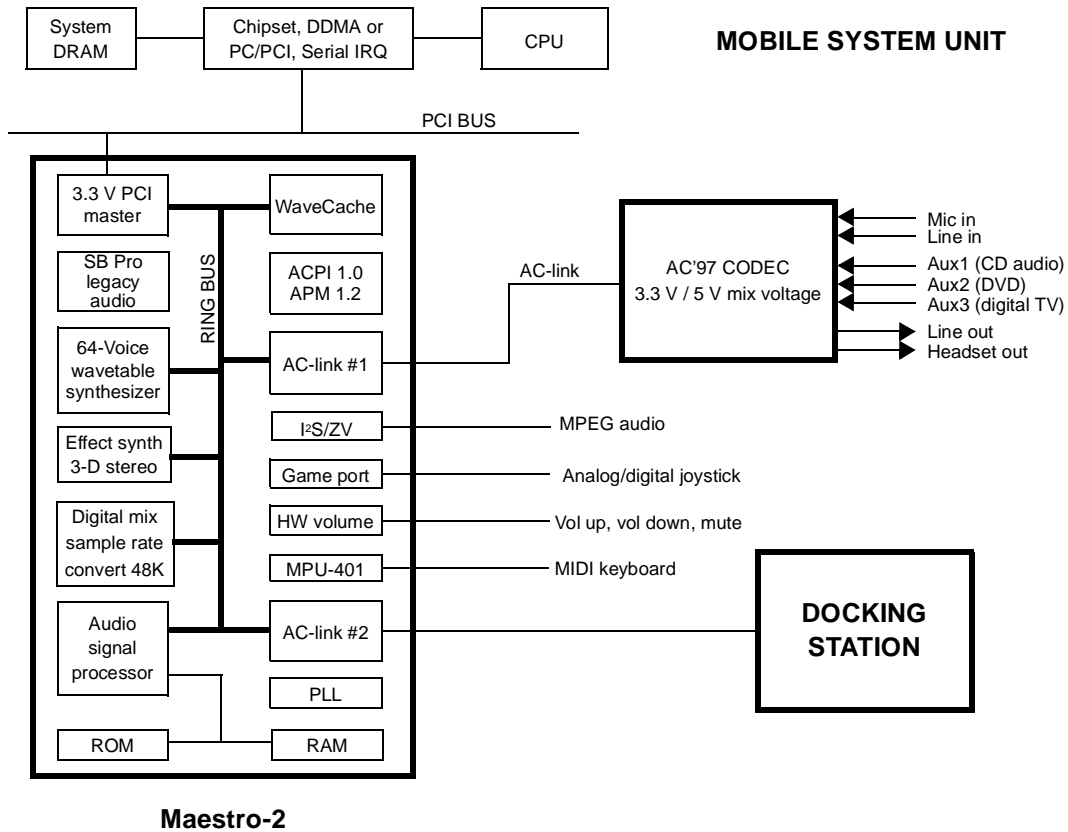
Name	Number	I/O	Definition
<b>PCI Bus Pins (50)</b>			
IDSEL	2	I	ID select.
AD[31:0]	92:99,4:11, 23:30,33:40	I/O	Address and data lines.
C/BE[3:0]#	1,13,21,31	I/O	Command/byte enable.
FRAME#	14	I/O	Cycle frame.
IRDY#	15	I/O	Initiator ready.
TRDY#	16	I/O	Target ready.
DEVSEL#	17	I/O	Device select.
STOP#	18	I/O	Stop transaction.
LOCK#	19	I/O	Lock.
PAR	20	I/O	Parity.
CLKRUN#	43	I/O	Input for clock status and output to start/speed-up clock.
RST#	84	I	Reset.
INT#	85	O	Interrupt request.
PCICLK	87	I	PCI bus clock.
GNT#	89	I	Bus master grant.
REQ#	90	O	Bus master request.
<b>ACPI Pin (1)</b>			
PME#	42	O	Power management enable interrupt output to wake up system.
<b>Legacy Audio Interface (3)</b>			
PCGNT# *	60	I	Dual-purpose pin. GPIO9 or PCGNT#. When used as PCGNT# = PC/PCI grant input.
PCREQ# *	61	O	Dual-purpose pin. GPIO10 or PCREQ#. When used as PCREQ# = PC/PCI request output.
SIRQ# *	62	I/O	Dual-purpose pin. GPIO11 or SIRQ#. When used as SIRQ# = serial interrupt request.
<b>MPU-401 Interface (2)</b>			
TXD	80	O	MIDI transmit data.
RXD	81	I	MIDI receive data.



Name	Number	I/O	Definition
<b>General-Purpose I/O Pins (12)</b>			
GPIO0 *	45	I/O	Dual-purpose pin. GPIO0 or ISCLK. When used as GPIO0 = general-purpose input/output 0.
GPIO1 *	46	I/O	Multi-purpose pin. GPIO1, IDO, or IRQ9. When used as GPIO0 = general-purpose input/output 1.
GPIO2 *	47	I/O	Dual-purpose pin. GPIO2 or IDI. When used as GPIO2 = general-purpose input/output 2.
GPIO3 *	48	I/O	Dual-purpose pin. GPIO3 or ILR. When used as GPIO3 = general-purpose input/output 3.
GPIO4 *	49	I/O	Dual-purpose pin. GPIO4 or VOLDN. When used as GPIO4 = general-purpose input/output 4.
GPIO5 *	50	I/O	Multi-purpose pin. GPIO5, VOLUP, or IRQ10. When used as GPIO5 = general-purpose input/output 5.
GPIO6 *	51	I/O	Multi-purpose pin. GPIO6, ISCLK, or IRQ7. When used as GPIO6 = general-purpose input/output 6.
GPIO7 *	52	I/O	Multi-purpose pin. GPIO7, ILR, or IRQ5. When used as GPIO7 = general-purpose input/output 7.
GPIO8 *	53	I/O	Dual-purpose pin. GPIO8 or IDATA. When used as GPIO8 = general-purpose input/output 8.
GPIO9 *	60	I/O	Dual-purpose pin. GPIO9 or PCGNT#. When used as GPIO9 = general-purpose input/output 9.
GPIO10 *	61	I/O	Dual-purpose pin. GPIO10 or PCREQ#. When used as GPIO10 = general-purpose input/output 10.
GPIO11 *	62	I/O	Dual-purpose pin. GPIO11 or SIRQ#. When used as GPIO11 = general-purpose input/output 11.
<b>CODEC #1 Interface (4)</b>			
SCLK1	76	I/O	Serial data clock. Output pin when PT-101 CODEC is used. Input pin when an AC'97 CODEC is used.
SDFS1	77	O	Serial data frame sync.
SDI1	78	I	Serial data in.
SDO1	79	O	Serial data out.
<b>CODEC #2, #3 Interface (5)</b>			
SDO2	55	O	Serial data out.
SDI2	56	I	Serial data in.
SDFS[3:2] *	58:57	O	Serial data frame sync. SFDS3 is dual-purpose; SFDS3 or DOCK. When used as SFDS3 = serial data frame sync.
SCLK2	59	I/O	Serial data clock. Output pin when multi-CODEC interface is used. Input pin when a super AC-link interface is used.
<b>Clocks (3)</b>			
OSCI	64	I	49.152 MHz crystal input.
OSCO	65	O	49.152 MHz crystal output.
C24	83	O	24.576 MHz clock output. For CODEC clock source.
<b>Game Port Interface (8)</b>			
GD[5:4]	72:71	I	Game port data.
GD[3:0]	70:67	I/O	Game port data.
GD6 *	73	I	Dual-purpose pin. GD6 or VOLDN. When used as GD6 = game port data.
GD7 *	74	I	Dual-purpose pin. GD7 or VOLUP. When used as GD7 = game port data.
<b>Hardware Volume Control Pins (2)</b>			
VOLDN *	49,73	I	Dual-purpose pin. GPIO4 or GD6, and VOLDN. When used as VOLDN = volume decrease input.
VOLUP *	50,74	I	Multi-purpose pin. GPIO5/IRQ10 or GD7, and VOLUP. When used as VOLUP = volume increase input.
<b>I<sup>2</sup>S Interface (3) and Lucent 7525 Interface (4)</b>			
ISCLK *	45,51	I	Multi-purpose pin. GPIO0 or GPIO6/IRQ7, and ISCLK. When used as ISCLK = serial shift clock for Lucent 7525 interface (pin 45) or I <sup>2</sup> S serial clock (pin 51).
IDO *	46	O	Multi-purpose pin. GPIO1/IRQ9 or IDO. When used as IDO = serial data output for Lucent 7525 interface.
IDI *	47	I	Dual-purpose pin. GPIO2 or IDI. When used as IDI = serial data input for Lucent 7525 interface.
ILR *	48,52	I	Multi-purpose pin. GPIO3 or GPIO7/IRQ5, and ILR. When used as ILR = frame sync signal for Lucent 7525 interface (pin 48) or I <sup>2</sup> S frame sync (pin 52).
IDATA *	53	O	Dual-purpose pin. GPIO8 or IDATA. When used as IDATA = I <sup>2</sup> S data input pin.
<b>ISA IRQ Interface (4)</b>			
IRQ9 *	46	O	Multi-purpose pin. GPIO1/IDO or IRQ9. When used as IRQ9 = ISA interrupt request 9.
IRQ10 *	50	O	Multi-purpose pin. GPIO5/VOLUP or IRQ10. When used as IRQ10 = ISA interrupt request 10.
IRQ7 *	51	O	Multi-purpose pin. GPIO6/ISCLK or IRQ7. When used as IRQ7 = ISA interrupt request 7.
IRQ5 *	52	O	Multi-purpose pin. GPIO7/ILR or IRQ5. When used as IRQ5 = ISA interrupt request 5.
<b>Docking Station Interface Pins (1)</b>			
DOCK *	58	I	Dual-purpose pin. DOCK or SDFS3. When used as DOCK = active-high to indicate that the unit is docked to an AC'97 CODEC with docking station support. Internal pull-down to digital ground.
<b>Power Pins (15)</b>			
VCC		Pwr	+5 volts
GND		Pwr	Ground

\* These pins share more than one function.

**BLOCK DIAGRAM**



**IMPLEMENTATION PLATFORMS**

- Desktop PCs
- Notebook PCs
- Motherboards
- Multifunction Cards

**SERVICE AND SUPPORT**

- Evaluation Kit
- Manufacturing Kit
- Reference Design

**APPLICATIONS**

- Business Audio
- Multimedia PCs
- PC Games
- Music Synthesis



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