ESS Technology, Inc.

ES56CV-PI
PCI Audio/Modem (V.90) Solution

DESCRIPTION

The ES56CV-PI chipset is a highly integrated multimedia solution which brings advanced PCI audio and modem functionality to notebook and desktop systems. The ES56CV-PI provides a complete 56k (V.90) data/fax/voice solution. It is combined with a digital audio accelerator featuring a dual-audio engine, WaveCache™ technology and acceleration of up to 64 PCM streams of any frequency down to a single output stream of 48 kHz for Microsoft DirectSound API compliance.

The ES56CV-PI chipset includes the Maestro-2EM™ digital audio accelerator, the ES2890S modem processor, the AC97-compliant ES1918 audio CODEC and either theES2816P or the ES2818 modem AFE. The heart of the ES56CV-P chipset is the Maestro-2EM™ (ES1978) digital audio accelerator. The Maestro-2EM features a hardware wavetable synthesizer with Downloadable Sample (DLS) and complete DirectSound™ acceleration. The Maestro-2EM proprietary technology supports both Microsoft®'s PC98 and PC97 logo requirements and DOS game compatibility. The Maestro-2EM audio accelerator interfaces with the ES2890S modem processor to offer users a cost-effective PCI audio/modem combination solution. The interface consists of a 24-pin IDMA parallel port and a 4-pin serial port. The parallel port is used to communicate with the ES2890S for DSP modem solutions or the DAA and AFE for HSP modem solutions. The serial port connects to the SP1 port of the ES2890S DSP modem to support speakerphone applications.

The Maestro-2EM accelerates the Microsoft DirectSound API by digitally mixing as many as 64 PCM streams of any frequency down to a single output stream of 48 kHz. This "final" buffer can then be piped to any CODEC available to the system. This acceleration frees up the CPU to perform other tasks. The Maestro-2EM audio accelerator supports a number of different legacy audio schemes, including Distributed DMA protocol, PC/PCI DMA, and Transparent DMA. The Maestro-2EM power management scheme complies with both the Advanced Configuration and Power Interface (ACPI) and PCI Power Management Interface specifications. The Maestro-2EM audio/modem accelerator is available in an industry-standard 144-pin Thin Quad Flat Package (TQFP). The ES2890S is available in a 100-pin TQFP package, while the ES2818 modem AFE is available in a 52-pin PQFP package. The ES1918 audio CODEC is available in a 48-pin TQFP package. The ES2816P is available in the 28-pin SOIC package.

AUDIO FEATURES

- Interfaces with ES56 DSP or HSP modem solutions
- Hardware wavetable and effects synthesizer
- Multi-stream Direct Sound and DSSD acceleration
- 500 MIPS equivalent processor performance to accelerate multi-stream PC audio
- 64-channel Wave Processor for direct sound and/or wavetable applications
- Distributed and PC/PCI DMA, Compaq® serial IRQ support and Transparent DMA
- DVD AC-3 speaker virtualization
- 3.3 V power supply, 5 V – input tolerant
- Multiple AC'97 CODEC interface with up to 20-bit ADC/DAC audio and signal resolution

MODEM FEATURES

- Data Mode capabilities:
  - V.90 56Kbps
  - ITU-T V.34 33,600 bps and fallbacks
- Fax Mode capabilities:
  - ITU-T V.17, V.29, V.27ter, V.21 ch2
  - Group 3 (TIA/EIA 578 Class 1 and Class 2)
- Telephony capabilities:
  - Telephone Answering Machine
  - DTMF generation and detection
  - Full Duplex Speakerphone
  - Caller ID
- TIES escape sequence
- Windows 95/Windows NT 4.0
  - UNIMODEM V
  - TAPI
- DOS box compatible
- V.80 (H.324 software stack compatible)

BENEFITS

- Complete cost-effective PCI audio/modem combo solution
- High-performance audio scalable for high-fidelity audio
- High-Speed PCI bus cycles when accessing data stored in system memory
- Adjusts volume independent of applications
- Zoomed Video MPEG audio playback application
- Small real estate for economical notebook design

ES56CV-PI: THE DSP MODEM BLOCK DIAGRAM

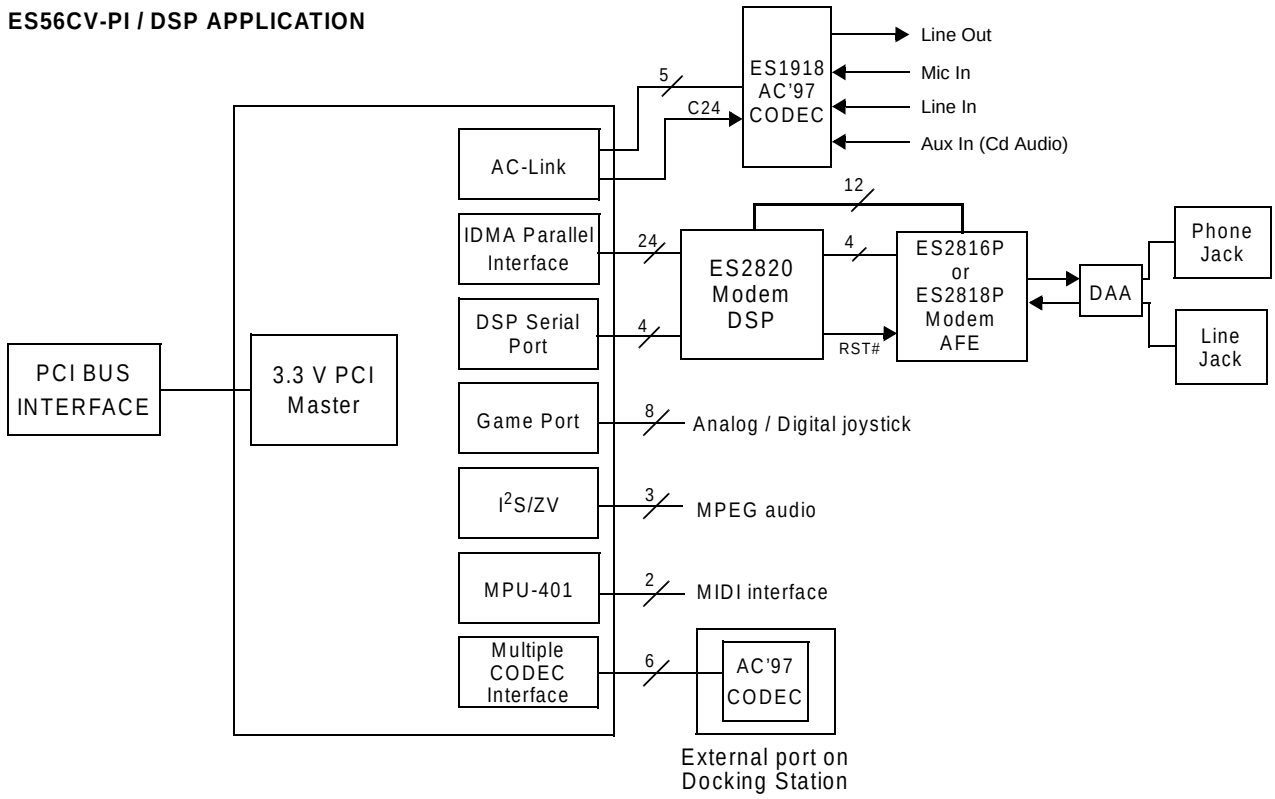

Figure 1 ES56CV-PI DSP Modem Block Diagram

ES56CV-PI: THE HSP MODEM BLOCK DIAGRAM

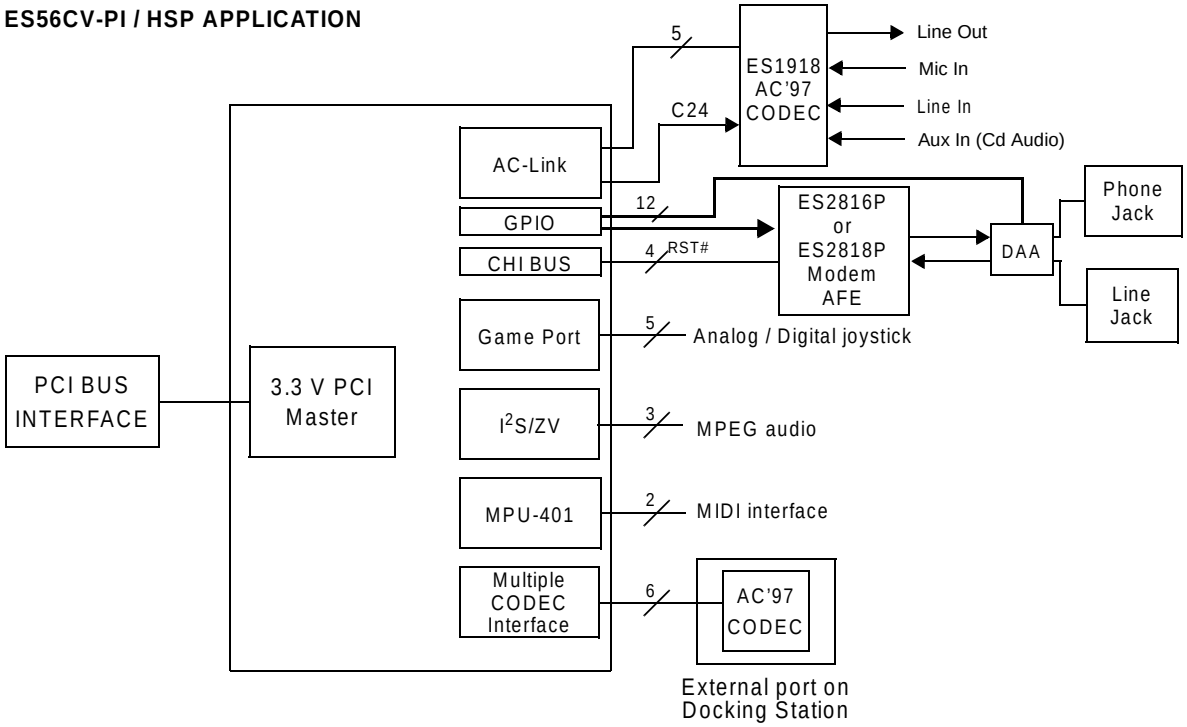

Figure 2 ES56CV-PI HSP Modem Block Diagram

ESS Technology, Inc.

ES56-PI Series
V.90 PCI Modem Solutions

DESCRIPTION

The ES56-PI chipset series is a highly integrated solution which brings advanced modem functionality to PCI-based notebook and desktop systems. The ES56-PI from ESS Technology provides an efficient 56k (V.90) data/fax solution, while the ES56T-PI adds a Telephone Answering Machine (TAM) feature and the ES56V-PI adds a full-duplex speakerphone feature.

The ES56 series data pump algorithms run on the ES2898S DSP along with the echo-cancellation required for implementing a full-duplex speakerphone feature. The host CPU is utilized to run the modem controller functions, including the standard AT command set, V.42*bis* data compression features, Classes 1 and 2 fax and ITU-T V.80 sync access to support H.324 video conferencing applications. The ES2898S DSP offers an integrated PCI bus interface. The ES56-PI and the ES56T-PI chipsets feature the ES2816P and ES2818 AFEs, while the ES56V-PI features the ES2819 AFE. All chipsets are also ACPI-compliant.

Both the ES2816P and ES2818 AFEs are single sigma-delta CODECs that provide the analog phone line interface only, while the ES2819 AFE is a dual-sigma delta CODEC that provides both the analog phone line and speakerphone interfaces. The ES2816P offers a V.90-compliant power-down feature. The ES2898S DSP is availabe in a 100-pin TQFP package, while both the ES2818 and ES2819 AFEs are available in 52-pin PQFP packages. The E2816P and ES2818 AFEs are also available in the 28-pin SOIC package.

MODEM FEATURES

- Data Mode capabilities:
  - V.90 56K bps
  - V.34 33.6 kbps and fallbacks
  - Standard AT command set
  - V.42 (LAPM) and MNP error correction
  - V.42bis/MNP 5 data compression
  - 3.3 V power supply, 5 V – input tolerant
- Fax Mode capabilities:
  - ITU-T V.17, V.21 ch2, V.27ter, V.29
  - Group 3 (TIA/EIA 578 Class 1 and Class 2)
- Telephony capabilities:
  - Telephone Answering Machine
  - Full Duplex Speakerphone
  - Caller ID
- TIES escape sequence
- Fully ACPI-compliant
- Windows 95
  - UNIMODEM V
  - TAPI
- Windows NT
- DOS box compatible
- V.80 (H.324 software stack compatible)
- Small real estate for economical notebook design

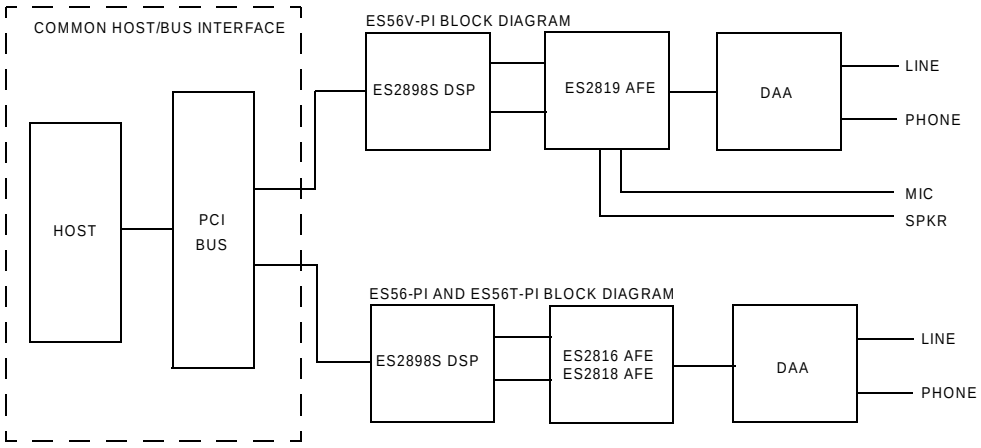

Figure 3 ES56-PI Series Block Diagrams

ESS Technology, Inc.

ES56-I Series
V.90 ISA Modem Solutions

DESCRIPTION

The ES56 chipset series is a highly integrated solution which brings advanced modem functionality to notebook and desktop systems. The ES56-I from ESS Technology provides a complete 56k (V.90) data/fax solution, while the ES56T-I adds a Telephone Answering Machine (TAM) feature and the ES56V-I adds a full-duplex speakerphone feature.

The ES56 series data pump algorithms run on the ES2890S DSP along with the echo-cancellation required for implementing a full-duplex speakerphone feature. The host CPU is utilized to run the modem controller functions, including the standard AT command set, V.42*bis* data compression features, Classes 1 and 2 fax and ITU-T V.80 sync access to support H.324 video conferencing applications. The ES2890S DSP offers an integrated ISA/ PnP bus interface. The ES56-I and the ES56T-I chipsets feature the ES2818 AFE, while the ES56V-I features the ES2819 AFE.

The ES2818 AFE is a single sigma-delta CODEC that provides the analog phone line interface only, while the ES2819 AFE is a dual-sigma delta CODEC that provides both the analog phone line and speakerphone interfaces. The ES2890S DSP is availabe in a 100-pin TQFP package, while both the ES2818 and ES2819 AFEs are available in 52-pin PQFP packages. The ES2818 AFE is also available in a 28-pin SOIC package.

MODEM FEATURES

- Data Mode capabilities
  - V.90 56K bps
  - V.34 33.6 kbps and fallbacks
  - Standard AT command set
  - V.42 (LAPM) and MNP error correction
  - V.42bis/MNP 5 data compression
  - 3.3 V power supply, 5 V – input tolerant
- Fax Mode capabilities
  - ITU-T V.17, V.21 ch2, V.27ter, V.29
  - Group 3 (TIA/EIA 578 Class 1 and Class 2)
- Telephony capabilities
  - Telephone Answering Machine
  - Full Duplex Speakerphone
  - Caller ID
- TIES escape sequence
- ISA/PnP
- Windows 95
  - UNIMODEM V
  - TAPI
- Windows NT
- DOS box compatible
- V.80 (H.324 software stack compatible)
- Small real estate for economical notebook design

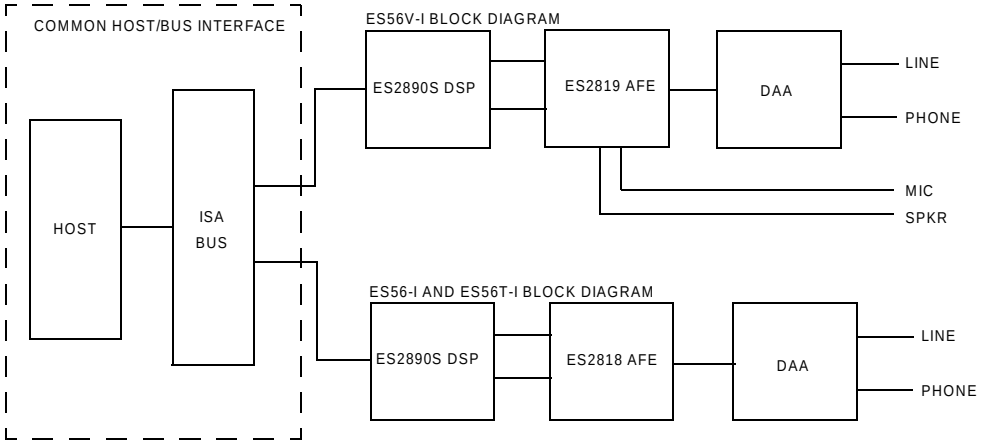

Figure 4 ES56-I Series Block Diagrams

ESS Technology, Inc.

ES56CV-P
PCI Audio/Modem (x2) Solution

DESCRIPTION

The ES56CV-P chipset is a highly integrated multimedia solution which brings advanced PCI audio and modem functionality to notebook and desktop systems. The ES56CV-P provides a complete 56k (x2) data/fax/voice solution. It is combined with a digital audio accelerator featuring a dual-audio engine, WaveCache™ technology and acceleration of up to 64 PCM streams of any frequency down to a single output stream of 48 kHz for Microsoft DirectSound API compliance.

The ES56CV-P chipset includes the Maestro-2M™ digital audio accelerator, the ES2820 modem processor, the AC97-compliant ES1918 audio CODEC and the ES2818 modem AFE. The heart of the ES56CV-P chipset is the Maestro-2M™ (ES1968MS) digital audio accelerator. The Maestro-2M features a hardware wavetable synthesizer with Downloadable Sample (DLS) and complete DirectSound™ acceleration. The Maestro-2M proprietary technology supports both Microsoft®'s PC98 and PC97 logo requirements and DOS game compatibility.

The Maestro-2M audio accelerator interfaces with the ES2820 modem processor to offer users a cost-effective PCI audio/modem combination solution. The interface consists of a 24-pin IDMA parallel port and a 4-pin serial port. The parallel port is used to communicate with the ES2820 for DSP modem solutions or the DAA and AFE for HSP modem solutions. The serial port connects to the SP1 port of the ES2820 DSP modem to support speakerphone applications.

The Maestro-2M accelerates the Microsoft DirectSound API by digitally mixing as many as 64 PCM streams of any frequency down to a single output stream of 48 kHz. This "final" buffer can then be piped to any CODEC available to the system. This acceleration frees up the CPU to perform other tasks. The Maestro-2M audio accelerator supports a number of different legacy audio schemes, including Distributed DMA protocol, PC/PCI DMA, and Transparent DMA.

The Maestro-2M power management scheme complies with both the Advanced Configuration and Power Interface (ACPI) and PCI Power Management Interface specifications. The Maestro-2M audio/modem accelerator is available in an industry-standard 144-pin Thin Quad Flat Package (TQFP). The ES2820 is available in a 100-pin TQFP package, while the ES2818 modem AFE is available in a 52-pin PQFP package and the ES1918 audio CODEC is available in a 48-pin TQFP package.

AUDIO FEATURES

- Interfaces with ES56 DSP or HSP modem solutions
- Hardware wavetable and effects synthesizer
- Multi-stream Direct Sound and DSSD acceleration
- 500 MIPS equivalent processor performance to accelerate multi-stream PC audio
- 64-channel Wave Processor for direct sound and/or wavetable applications
- Distributed and PC/PCI DMA, Compaq® serial IRQ support and Transparent DMA
- DVD AC-3 speaker virtualization
- 3.3 V power supply, 5 V – input tolerant
- Multiple AC'97 CODEC interface with up to 20-bit ADC/DAC audio and signal resolution

MODEM FEATURES

- Data Mode capabilities
  - x2 56K bps upgradeable to V.90
  - ITU-T V.34 33,600 bps and fallbacks
- Fax Mode capabilities
  - ITU-T V.17, V.29, V.27ter, V.21 ch2
  - Group 3 (TIA/EIA 578 Class 1 and Class 2)
- Telephony capabilities
  - Telephone Answering Machine
  - DTMF generation and detection
  - Full Duplex Speakerphone
  - Caller ID
- TIES escape sequence
- Windows 95/Windows NT 4.0
  - UNIMODEM V
  - TAPI
- DOS box compatible
- V.80 (H.324 software stack compatible)

BENEFITS

- Complete cost-effective PCI audio/modem combo solution
- High-performance audio scalable for high-fidelity audio
- High-Speed PCI bus cycles when accessing data stored in system memory
- Adjusts volume independent of applications
- Zoomed Video MPEG audio playback application
- Small real estate for economical notebook design

ES56CV-P: THE DSP MODEM BLOCK DIAGRAM

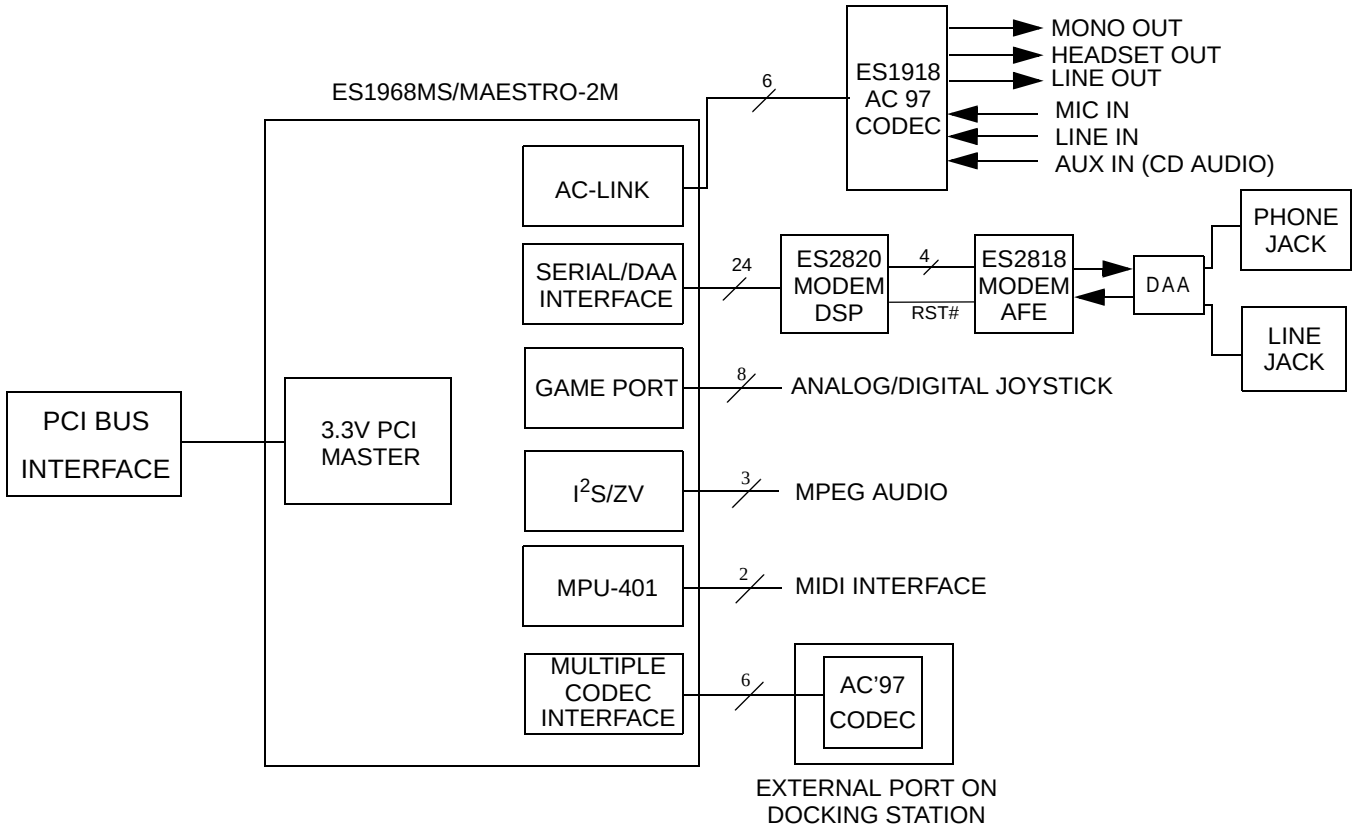

Figure 5 ES56CV-P DSP Modem Block Diagram

ES56CV-P: THE HSP MODEM BLOCK DIAGRAM

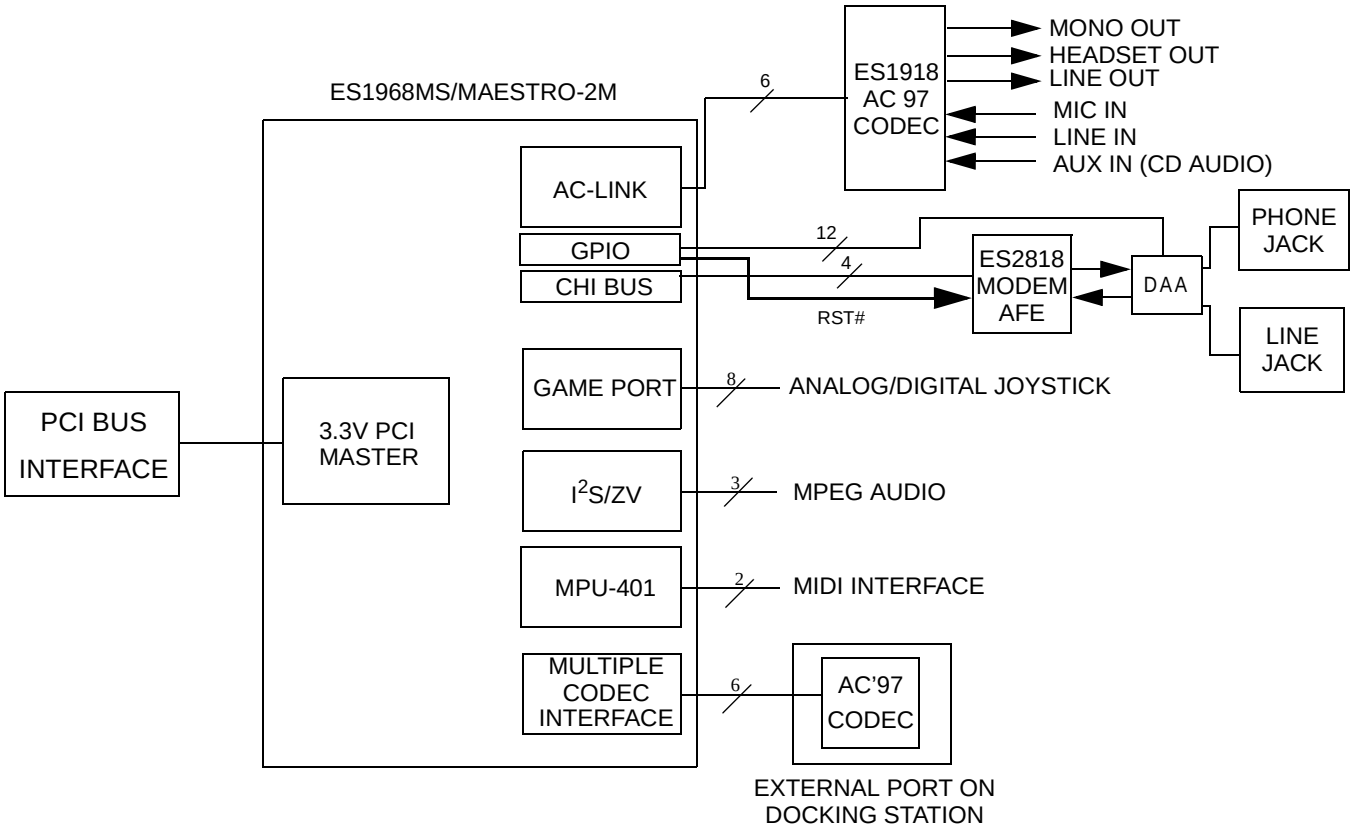

Figure 6 ES56CV-P HSP Modem Block Diagram

ESS Technology, Inc.

ES56-X/ES336 Series
x2 / V.34 Modem Solutions

DESCRIPTION

The ES56 chipset series is a highly integrated solution which brings advanced modem functionality to notebook and desktop systems. The ES56-X from ESS Technology uses the ES2820SX DSP and provides a complete 56k (x2) data/fax solution, while the ES56T-X adds a Telephone Answering Machine (TAM) feature and the ES56V-X adds a full-duplex speakerphone feature. The ES336 chipset uses the ES2820S DSP and offers the same features with a maximum connect rate of 33.6 kbps.

The ES56 series data pump algorithms run on the ES2820S/SX DSP along with the echo-cancellation required for implementing a full-duplex speakerphone. The host CPU is utilized to run the modem controller functions, including the standard AT command set, V.42*bis* data compression features, Classes 1 and 2 fax and ITU-T V.80 sync access to support H.324 video conferencing applications. The ES2820S/SX DSP offers an integrated ISA/PnP bus interface. The ES56-X/ES336 and the ES56T-X/ES336T chipsets feature the ES2818 AFE, while the ES56V-X/ES336V chipsets feature the ES2819 AFE.

The ES2818 AFE is a single sigma-delta CODEC that provides the analog phone line interface only, while the ES2819 AFE is a dual-sigma delta CODEC that provides both the analog phone line and speakerphone interfaces. The ES2820S/SX DSP is availabe in a 100-pin TQFP package, while both the ES2818 and ES2819 AFEs are available in 52-pin PQFP packages. The ES2818 AFE is also available in a 28-pin SOIC package.

MODEM FEATURES

- Data Mode capabilities
  - x2 56K bps upgradeable to V.90
  - V.34 33.6 kbps and fallbacks
  - Standard AT command set
  - V.42 (LAPM) and MNP error correction
  - V.42bis/MNP 5 data compression
  - 3.3 V power supply, 5 V – input tolerant
- Fax Mode capabilities
  - ITU-T V.17, V.21 ch2, V.27ter, V.29
  - Group 3 (TIA/EIA 578 Class 1 and Class 2)
- Telephony capabilities
  - Telephone Answering Machine
  - Full Duplex Speakerphone
  - Caller ID
- TIES escape sequence
- ISA/PnP
- Windows 95
  - UNIMODEM V
  - TAPI
- Windows NT
- DOS box compatible
- V.80 (H.324 software stack compatible)
- Small real estate for economical notebook design

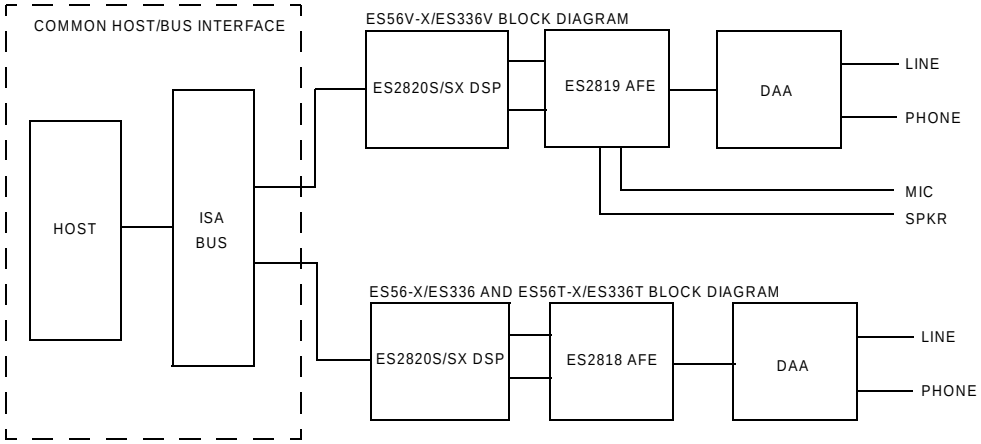

Figure 7 ES56-X/ES336 Series Block Diagrams

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