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Vigra VME Audio

Digital Audio/Signal Processors

- Software-Selectable Sampling Rates & Encoding
- On-Board Multi-Ported RAM, Private DSP Static Memory
- Programmable Voice Signal Detection
- Real-Time Digital Mixing of Audio Stream

Vigra Digital Audio Boards serve as high-performance signal processing platforms for simulators, multi-media workstations, trainers, sonar, industrial control systems, voice synthesis and recognition, sound analysis, and communications systems of all types. The MMI-210 and -4211, with their independent high-fidelity channels, are suitable for professional audio applications.

On-board digital signal processors (DSPs) provide a variety of encoding and data compression methods ranging from 16-bit PCM to 4-bit Adaptive Differential PCM. Firmware provides a variety of easy-to-use, yet sophisticated, digital recording and playback modes.

Clear, Distinct Audio

Vigra audio boards are designed to produce the highest quality sound within the limits of the digital encoding method. Frequency response is from 20 Hz to 45.5% of the sample rate for all Vigra boards, with a dynamic range up to 96 dB. Sigma-Delta A/D conversion is employed to assure the most accurate sound reproduction - for applications using narrow telephone-line bandwidths up to full fidelity professional sound editing.

MMI-4210

- Four Channels
- Four 56001 DSPs
- Four Channel Mixing

The MMI-4210 employs modular construction allowing custom I/O designs. The installed daughter board provides four line inputs and outputs with optional balanced transformer isolation. Separate 16Kx24 data memory and program memory is provided on board for each DSP. A unique 4-channel, fully programmable matrix mixer allows any signal from any channel to be mixed with any other channel or combination of channels. Also available without the audio daughter board (DSP only) as the MMI-420.

MMI-210

- Dual Channel
- Two 56001 DSPs
- A + B Output

The MMI-210 has a separate 56001 DSP for each channel for intensive signal processing. Professional CD/DAT quality sound is achieved with 16-bit sigma- delta A/D conversion at programmable sampling rates up to 48 kHz. Both channels have 4-Watt speaker outputs, along with line-level inputs and outputs. A mixer amp provides an A + B line output.

MMI-4211

- Four Stereo Channels
- Four 56001 DSPs
- Four Channel Mixing

The MMI-4211 employs modular construction allowing custom I/O designs. The installed daughter board provides four line inputs and outputs, and four microphone inputs. Separate 16Kx24 data memory and program memory is provided on board for each DSP. A unique 4-channel, fully programmable matrix mixer allows any signal from any channel to be mixed with any other channel or combination of channels. Also available without the audio daughter board (DSP only) as the MMI-420.

Versatile DSP

Motorola 56001 DSPs control the audio encoding process as well as the recording and playback to and from a multi-ported RAM. Acting on commands from the host processor over the VMEbus, the DSP organizes buffers in the RAM to receive encoded audio input (the record process) and reads buffers in the RAM for playback through the audio outputs. The amount of RAM needed depends upon the sample rate as well as the encoding method.

RAM Storage Requirements

Recording time per 1 Megabyte of Memory (time in seconds)

Encoding Type	Sampling Rate (kHz)			
	8	16	44.1	48
Linear PCM	64	32	11.6	10.7
μ -Law, A-Law	128	64	23.2	21.3
ADPCM	256	N/A	N/A	N/A
VQ	512	N/A	N/A	N/A

Downloadable firmware provides a number of audio processing functions (see DiSPATCH). Each DSP has an on-board 24-bit-wide private static memory for data and for program instructions.

The DSP may also be used for non-audio functions, since it can be accessed directly by the VMEbus host as can the multi-ported RAM. On most models, direct DSP I/O ports are accessible to meet specific signal-processing applications.

DiSPATCH™ Firmware/Software

DiSPATCH is a powerful firmware/software package that gives the host system a high-level interface to the flow and processing of audio data. DiSPATCH frees the host processor from the demanding real-time performance requirements of audio data control and offers an extensive collection of ready-to-use features which are accessed with a unified, orthogonal interface.

Feature highlights of DiSPATCH are:

- Real-time digital mixing of up to 24 asynchronous audio streams for each DSP.
- Directly supports many audio data formats, including PCM-8, PCM-16, ADPCM, μ -Law and A-Law
- Performs real-time Vector Quantizing audio compression/decompression for very low bit-rate (16kbps) audio
- Tight buffering for low latency

- Programmable voice signal detection
- Extensive hardware diagnostics
- 144 dB (24-bit) digital dynamic range for professional recording
- High-speed interrupt-driven command interface
- RAM-to-RAM audio processing features for in-place format conversion

The DiSPATCH software development package is required with MMI-210, -4210, and -4211 VME audio signal processors. The package includes the DiSPATCH Programming Library, Device Driver, DSP Firmware and Tone Generator, plus sample applications that can be used as starting points for application development.

DiSPATCH Software Development Package

DiSPATCH DSP Firmware

The DiSPATCH firmware is compiled into the programming library, and is automatically sent to the DSP during initialization. Files containing the raw firmware binary images for use in applications that do not use the library are also included. The firmware is identical for all host platforms.

MMI-Test

This interactive program allows the user to directly access most features of DiSPATCH from script files or its command-line prompt. This direct interface to DiSPATCH allows rapid testing and prototyping.

DiSPATCH Programming Library:

This C programming library provides the interface to the DiSPATCH DSP firmware. The library simplifies many common tasks, such as initializing the DSP, playing audio from a file, and recording to a file. All DiSPATCH commands are supported by the programming library.

The library is written in standard K&R C and is compliant with ANSI standards. Complete source code is provided, allowing the programmer to study the library as an example or extract useful parts of the code for an application. Complete support packages are available for SunOS™, Solaris™, IRIX™, HP-UX™ and HP-RT™, OS/9™, and VxWorks™. For platforms that require a kernel device driver, one is provided.

DiSPATCH Tone Generator Module

This firmware module allows the DSP to serve as a powerful real-time tone synthesizer. The host has complete and immediate control over all tone parameters, even while the tone is playing.

The Tone Generator module features:

- Real-time digital mixing of up to 12 independent tones for each DSP.
- Tones can be mixed with other audio tracks.
- All tone parameters can be modified on the fly while a tone is playing.
- Programmable amplitude envelope (attack, sustain, release).
- FM and AM modulation synthesis.
- Sine, triangle, square, sawtooth waveforms built in; arbitrary waveforms can be dynamically supplied by the host.
- Supports variable-rate sweeps and two-tone sounds.
- 144 dB (24-bit) digital dynamic range.
- Interactive ToneShop development program included.

Technical Specifications

Audio

Audio Bandwidth	20Hz to 45.5% of sample rate
Programmable Output Level	0 to -72DB
Audio Data Coding	VQ, ADPCM, μ -law, A-law, linear PCM, Software selectable

Digital Signal Processor

DSP Type	Motorola DSP56001
Boot Mode	Boot from VMEbus

Memory

Audio Storage Capacity	Memory = Playback time x Sample frequency / n where;
	n = 4 for VQ
	n = 2 for ADPCM
	n = 1 for μ -law or A-law
	n = 0.5 for linear PCM

Bus Interface

VMEbus Interface	Slave, 32-16- and 8-bit Extended and standard address
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Physical Attributes

Power Consumption	Contact VisiCom for individual board power consumption rates
Operating Temperature	0° to 70° C
Storage Temperature	-20° C to +125° C
Humidity	0-95% non-condensing
Connectors:	
MM1-210	2.5mm MonoJack
MM1-4210	20 Pin IDC (AMP P/N: 87813-7)
MM1-4211	3.5mm jack

Leading-Edge Technologies

The Vigma product family offers a full line of video, graphics and audio board level solutions for multimedia applications. Vigma products utilize innovative technology designed to meet the changing needs of users and applications developers. A variety of bus form factors are supported, including SBus, VMEbus, PCI and PMC. Multimedia cards, video digitizers, LCD controllers, X- servers, and Audio/Signal processors are also available.

All VisiCom computer products are supported by an experienced staff of engineers familiar with both hardware and software development.

For More Information

For additional information on this product, or on the entire Vigra product family, contact VisiCom's Computer Products division sales department at **1-800-668-4472**. Outside of the United States, call 1-619-597-7080.



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