MOMENTUM DATA SYSTEMS

http://www.mds.com

DAE - 7™

Floating Point DSP modules with software frameworks for audio applications

Preliminary

Texas Instruments DA610 or TMS320C6713 DSP based OEM Audio

Momentum Data Systems DAE-7 series modules provide a high performance off-the-shelf audio processing solution for OEMs and system integrators needing a low cost, quick time to market solution.

Based on the Audio Frameworks, all DAE-7s can be customized with application specific modules. Software modules are developed using Texas Instruments standard Code Composer Studio development environment.

The MDS DAE-5 series includes PGAs, A/D and D/A converters; in contrast the DAE-7 offers fifteen I^2S ports allowing the mixed signal portions to be selected to meet the exact system requirements.
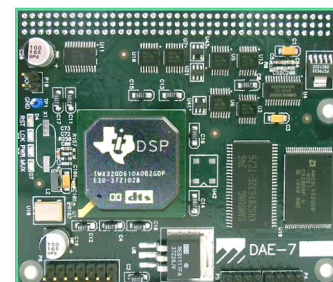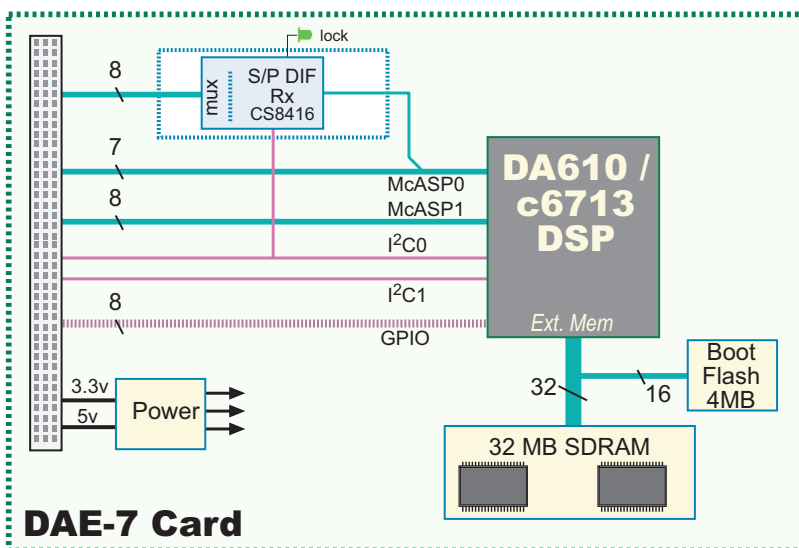
For OEMs and integrators needing assistance with analog, system, or software design, MDS' Audio Services Group can provide design services ranging from consulting through complete product design.

Complete details of the Performance Audio Framework and the Basic Audio Framework can be found on the Audio Framework datasheet.

Three DAE-7 models to choose from:

DAE-7/AV:

- DA610 based module for A/V receiver systems.
- Performance Audio Framework software provides complete multichannel A/V receiver system supporting Dolby, DTS, and optional THX processing.
- Optional processing modules for customization.
- Easy code migration from MDS Mozart II development platform.

DAE-7/EQ:

- C6713 based module for general EQ applications.
- Basic Audio Framework software.
- Independent Parametric EQ for each audio channel.
- Number of bands per channel is dependent upon the number of channels and sample rates.
- System Setup: White / Pink noise and Bass noise.

DAE-7/SP:

- C6713 based module for speaker applications.
- Basic Audio Framework software.
- 2-, 3-, or 4-way crossover support with adjustable crossover frequency and slope.
- Independent Parametric EQ for each audio channel.
- Delay for each output.
- Output limiter and compressor.
- Phase Reverse.
- System Setup: White / Pink noise and Bass noise.

Common features

- Fifteen I^2S ports supporting stereo 24 bit 192 kHz codecs.
- Independent input and output clocks allows upsampling.
- Two clocking zones for input and output (see text for differences between DA610 and C6713).
- S/PDIF input with 8 channel mux.
- Serial output can support direct biphase encoding for S/PDIF output (see text for restrictions).
- 225 MHz processor with native 32 bit floating point processing and extended 64 bit floating point support.
  - 32 MB SDRAM and 4MB boot flash for code.
  - Uses 5V and 3.3V supplies.
  - On board linear regulators to reduce EMI/RFI
  - Low cost 120 pin .1" grid connector
  - Two I^2C control ports, module address assignable by connector personalization pins (4 possible addresses)
  - Firmware upgrades via I^2C or S/PDIF port

Special reduced cost EQ/SP version

For applications needing less functionality, a special order version is available that removes the following:

- no S/PDIF input
- no external SDRAM
- 5V supply not needed (i.e., 3.3V only)

DAE-7 Card

The DAE-7 uses the Texas Instruments 225 MHz DA610 or TMS320C6713 VLIW processor. Executing multiple instructions per clock cycle, these parts provide the computational power (1800 MIPS) to perform all I/O and decoder operations with enough CPU bandwidth left over for sophisticated sound field processing.

The use of floating point arithmetic throughout overcomes the inherent dynamic range limitations of fixed point (integer) processors. The DA610 has 4 floating point ALUs and 2 floating point multipliers, so there is no performance penalty associated with preferred floating point operations.

DAE-7/AV Performance Audio Framework Software Features

- Decoders
  - DTS-96/24, DTS-ES Discrete
  - Dolby Digital
  - PCM-96/24
  - AAC (optional)
- Matrix Processing
  - Pro Logic IIx, Dolby Digital EX
  - DTS-ES Matrix, DTS Neo:6 2-channel
- Standard Post Processing
  - Comprehensive Bass Management
  - Tone Controls, 7-Channel Stereo/Mono
  - Double Bass Mode, Loudness control (avail 2Q04)
  - THX Ultra 2 (optional)
  - Soundfield effects
- Premium Post Processing
  - Virtualization, Dolby Headphone
  - Parametric EQ, Graphic EQ
  - Multiple subwoofers
- Auto Calibration of levels and delays (future upgrade)
- Custom code can be written in C and integrated into the Performance Audio Framework
- Supported via Texas Instruments' Code Composer Studio IDE

Momentum Data Systems newest Digital Audio Engine builds on the sonic excellence and versatile decoder capability of the DAE™ product series. The DAE-7/AV™ offers support for all of the latest decoders and sound field processing algorithms from Dolby™, DTS™, and THX™.

Unlike fixed decoder devices, the software architecture of the DAE-7/AV is based on the Performance Audio Framework. This open and extensible framework allows for software customization (e.g. to add specific audio processing), as well as in-the-field software upgrades to support new decoder standards.

The system's device drivers automatically recognize the type of source encoding and automatically switch operation to the correct decoder with no artifacts in the output audio stream. The stream manager architecture simplifies development of post processing/effects such as room equalization, dynamic range compression, and surround modes.

DAE-7 development platform

The DAE-7 is available with the DAE Development Environment Model 7 (DDE-7). This board provides access to
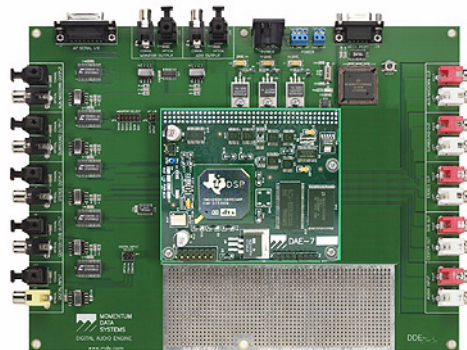
DAE-7 signals for testing and offers A/D and D/A for evaluation prior to integration into a system.

Access to the DAE-7 control port allows interfacing with a PC or an emulator board running MDS DAE system software.

For Pro or Consumer applications

For simplicities sake this document refers to digital audio connections only as S/PDIF, but in reality this could be S/P DIF, optical, or AES/EBU.

Likewise, only unbalanced RCA jacks are shown for analog interconnect, but XLR connectors and balanced receivers and drivers (or high quality audio transformers, if called for by the application) can just as easily be used.

S/PDIF vs. AES/EBU for digital audio

For typical consumer applications, the coax style S/PDIF, or its optical equivalent of TOSlink, is a very practical and cost-effective way to send digital audio between devices located relatively close to each other.

For professional applications over long distances the balanced AES/EBU specified connection is the preferred signaling/connector scheme. The professional version also specifies slightly different as well as additional uses for non-data bits in each word.

Generally, these extra bits are not used by the Audio Framework and thus you are free to process and/or generate them as needed in your application code.
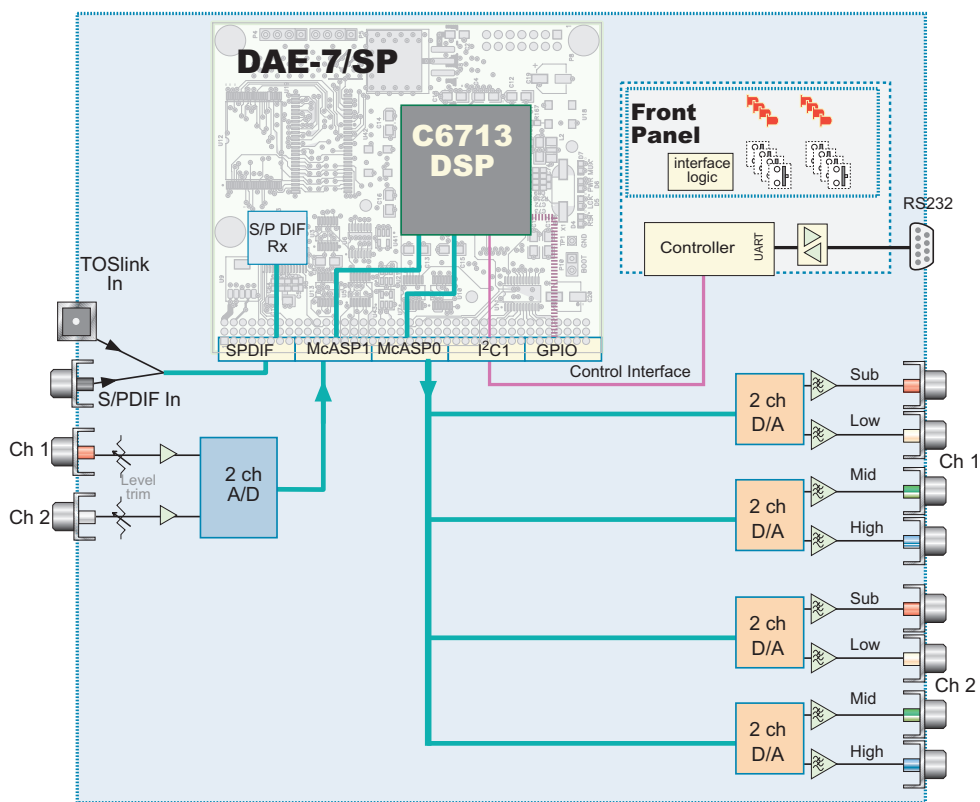
Preliminary

DAE-7 : Digital Audio modules

Application Diagrams
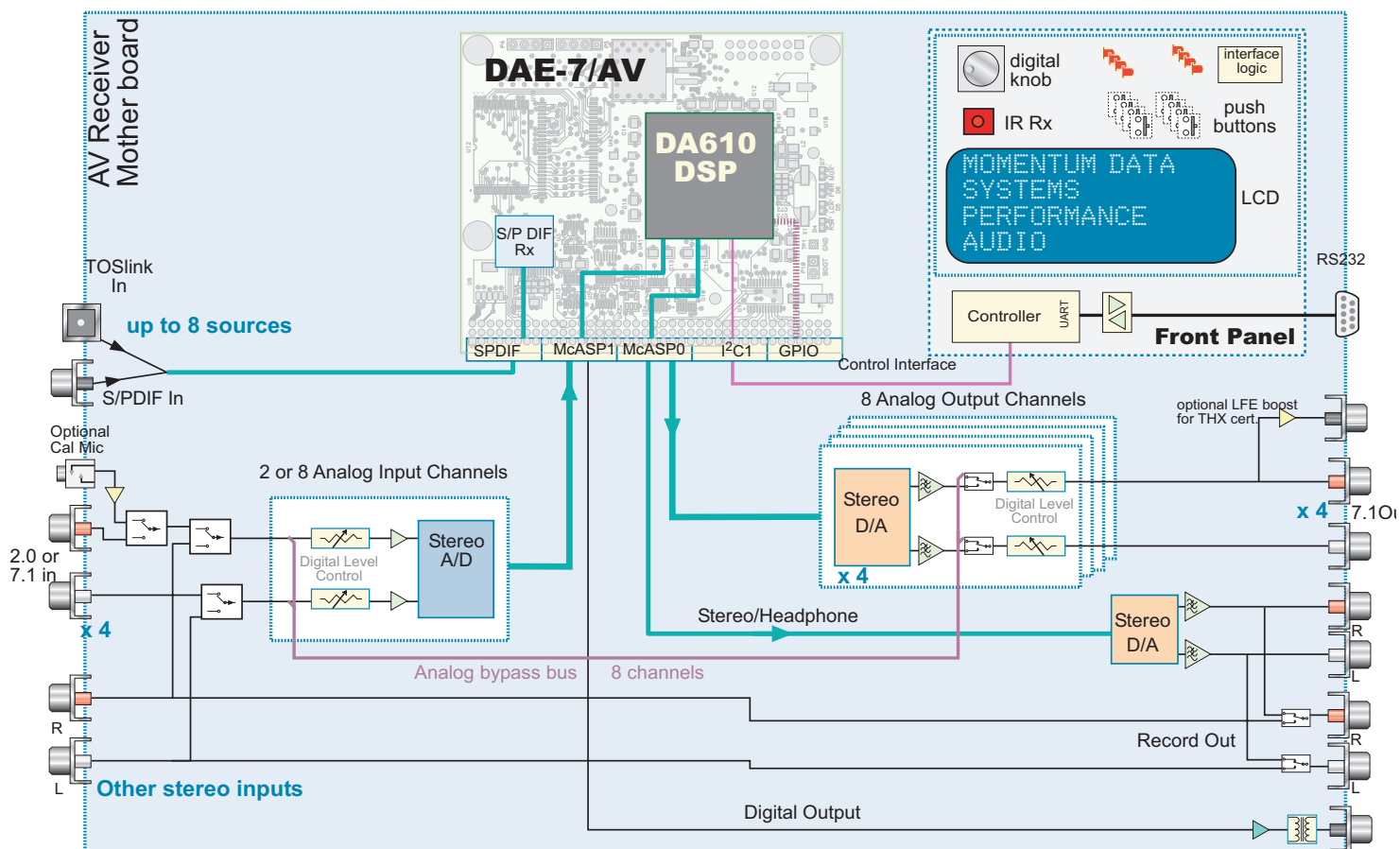
A/V Receiver with processing of analog stereo inputs

2 channel 4-way speaker crossover application

DAE-7 : Digital Audio modules

Ordering information (order code is in *Italics*)

Shipment of DAE-7/AV product requires appropriate license information from Dolby Labs, Digital Theater Systems, or THX, as needed.

Modules orders are subject to minimum quantities, please contact MDS sales department for a quotation

DAE-7100: DAE-7/AV unit with 225 MHz DA610 processor for A/V receiver applications

DAE-7200: DAE-7/SP unit with 225 MHz C6713 processor for speaker applications

DAE-7300: DAE-7/EQ unit with 225 MHz C6713 processor for equalizer applications

DAE-ASP-#: DAE-7 premium post processing item

- Premium post-processing items can be added to the DAE-7 on an individual basis for additional cost.

DDE-DK-EVAL: DAE with eval board

- DDE-7 MotherBoard
- DAE-7100, -7200, or DAE-7300 module
- PC based control software for DDE
- 90 Day DDE Getting Started support

DDE-DK-FULL: DAE Development Environment

- DDE-7 MotherBoard
- DAE-7100, -7200, or DAE-7300 module
- Open Audio System Tool Kit for Performance Audio Framework (DAE-7100) or Basic Audio Framework (DAE-7200, DAE-7300)
- Source code to example applications and device drivers used by the DSP
- PC based control software for DDE-7
- 90 Day DDE Getting Started support
  Please check with MDS for the currently available software options prior to ordering.

DAE-TRAIN-1: 2 Day DAE integration course

- One on one training to learn how to integrate DAE
- Covers both software and hardware
- Cost of course credited towards first production DAE-7 order
- 180 days of extended support

DAE-TRAIN-2: 3 Day DAE training course: Custom software

- Prerequisite: Texas Instruments TMS320C6000/CCS course
- Covers writing and integrating the following:
  - Interface control/mode setups
  - Hardware interfacing
  - post decode sound field processing selection
  - custom post decode processing
- 270 days of extended support

Consulting services are also available from Momentum Data Systems.

DDE-STD 90: Day Startup Support (inc. with DDE-DK)
- Help with installation of hardware/software.
- Problems in installation.
- How to use/run hardware or software that comes with the DVE. This excludes example programs because they are provided as-is, without support.
- General questions on background information (standards, etc.)

DDE-EXT_# DAE Extended Support
- (TBD/In development).

Please see the MDS website for a copy of the DAE Support data sheet, which has full details.

Related items

Please visit `http://www.mds.com` for more information on these and other products to speed your design to market.

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