

DAE - 7™

Floating Point DSP modules with software frameworks for audio applications

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.

The MDS DAE-4/5/6 series includes A/D and D/A converters; in contrast the DAE-7 offers fifteen I²S ports (plus a 16th as an input if SPDIF is not used) 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.

Two DAE-7 models to choose from:

DAE-7C:

- DA710 based module for A/V receiver systems.
- Performance Audio Framework software provides complete multichannel A/V receiver system supporting standard Dolby, DTS, and optional THX processing.
- Supports new HD Dolby and DTS decode (requires separate post processing, or use MDS DAE-77 for self contained module)
- Supports Audyssey and Trinnov Room EQ applications

DAE-7A:

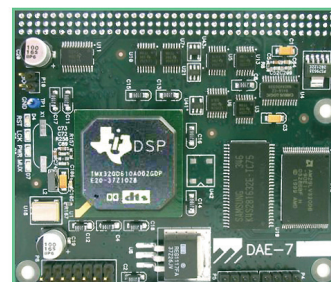
- DA610 based module for A/V receiver systems.
- Performance Audio Framework software provides complete multichannel A/V receiver system supporting standard Dolby, DTS, and optional THX processing.
- Supports Audyssey and Trinnov Room EQ applications



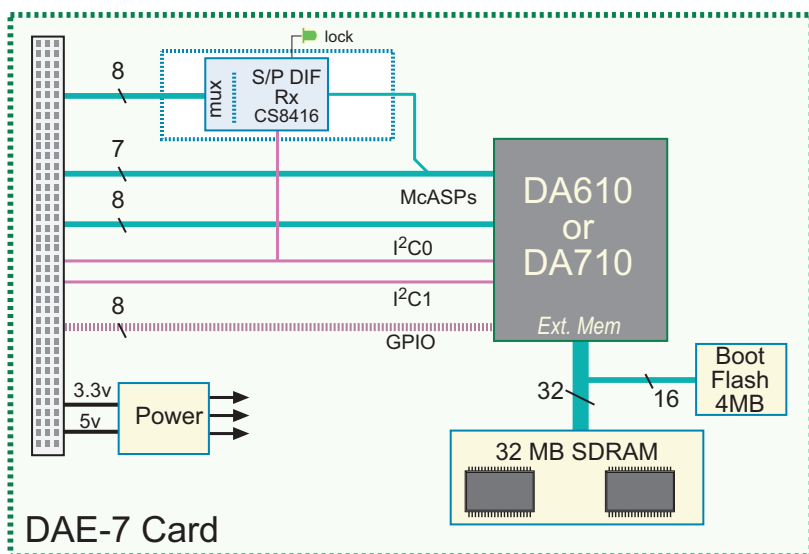
The DAE-7A can also be used for general purpose audio applications like equalization and speaker crossover. These applications run under the performance audio framework and require significant experience with that environment to develop these applications. Customers new to the Performance Audio framework should contract to MDS for application development.

Common features

- Fifteen I²S ports supporting stereo 24 bit 192 kHz codecs.
- Independent input and output clocks allows upsampling.
- S/PDIF input (or 16th I²S if not using SPDIF).
- 250MHz (DAE-7A) or 300 MHz (DAE-7C) processor with native 32 bit floating point and extended 64 bit floating point support.
- 32 MB SDRAM and 4MB boot flash for code.
- On board linear regulators to reduce EMI/RFI
- Low cost 120 pin 2mm grid connector
- Two I²C control ports, module address assignable by connector personalization pins (4 possible addresses)
- Flash (firmware) field upgrades via I²C from the host system processor



Texas Instruments DA610 and DA710 DSP based OEM Audio Modules



DAE-7 Card

DAE-7 : Digital Audio modules

The DAE-7C uses the Texas Instruments 300 MHz DA710 (part of TI's TMS320C67x+™ processor line) 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 DA710 has 4 floating point ALUs and 2 floating point multipliers, so there is no performance penalty associated with preferred floating point operations.

DAE-7A/C 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
- Post Processing
 - Comprehensive Bass Management
 - Tone Controls, 7-Channel Stereo/Mono
 - Double Bass Mode, Loudness control
 - THX Ultra 2 (optional)
 - Sound field effects (i.e., Studio, Club, Hall, Cathedral, Movie/Theater, etc., 18 total)
 - Virtualization
 - Parametric EQ
 - Multiple subwoofers
- Optional Room EQ

Unlike fixed decoder devices, the software architecture of the DAE-7 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 features and 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 uses MDS' ADP-2 platform as a development environment. This platform provides all of the functions of a typical AV Receiver; its schematics and host processor source

code are provided so that they can be copied to reduce the development effort needed to incorporate the DAE modules into your own product designs.



For a wide range of applications

The next page illustrates some applications of the module. The first figure illustrates an AV Receiver application that can be created with a stock DAE-7 module. The module can decode standard Dolby and DTS content, as well as offer post processing ranging from simple tone controls through (optional) room EQ.

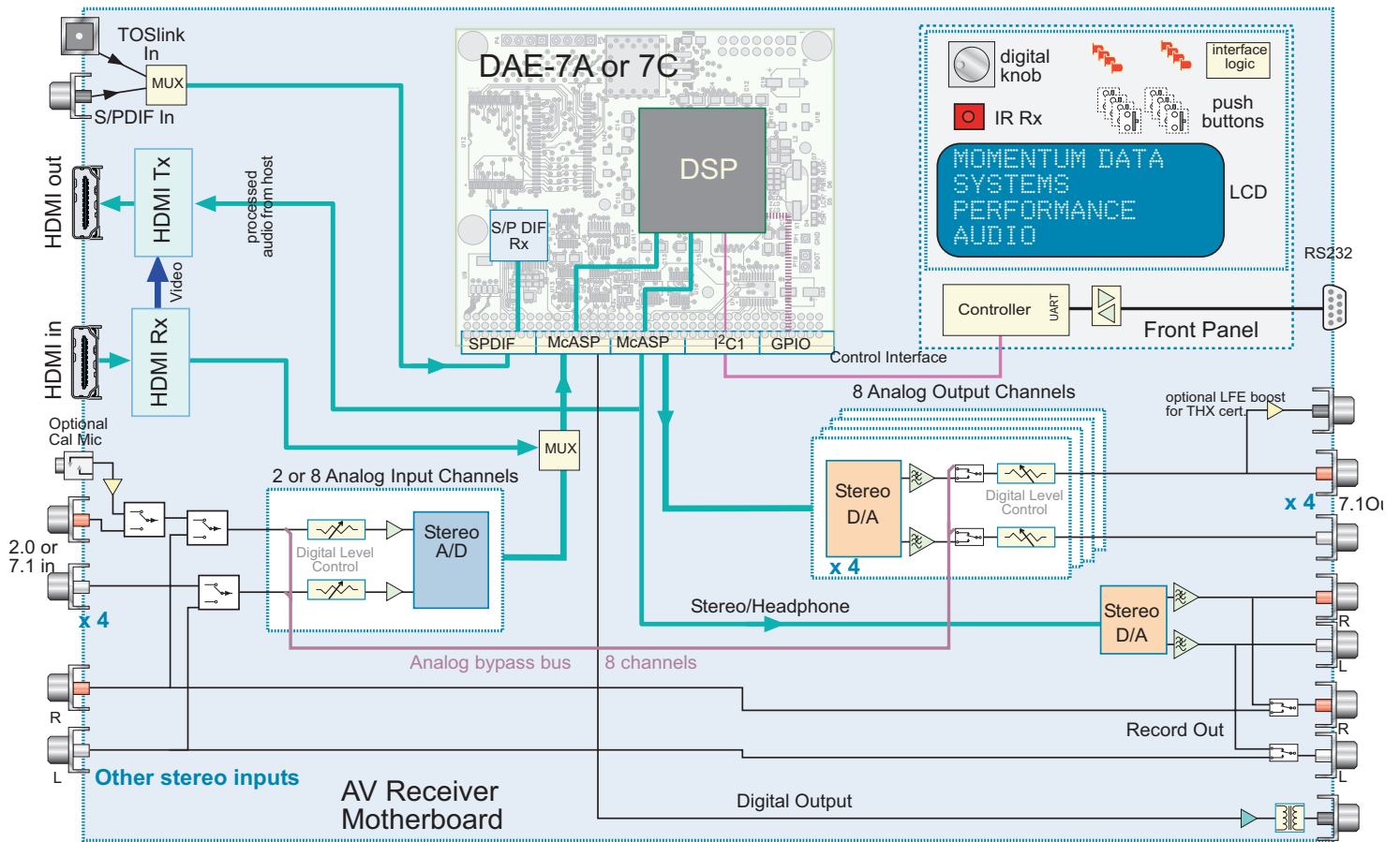
Note that while HDMI input is supported, decode of HD audio formats and post processing is not possible with the single DAE-7C module. However since the new HD Dolby and DTS formats are lossless decoders, it does not make a difference soundwise if the audio is decoded in the player or in the AVR (though not all players will decode the HD formats). For customers with market requirements for HD decode and processing in their products please see MDS' DAE-77 product information.

The second diagram illustrates the use of the module for custom speaker processing. The DSP's software flexibility allows for complex processing that simple filter designs can not achieve. In addition room equalization can be run to provide the highest quality sound.

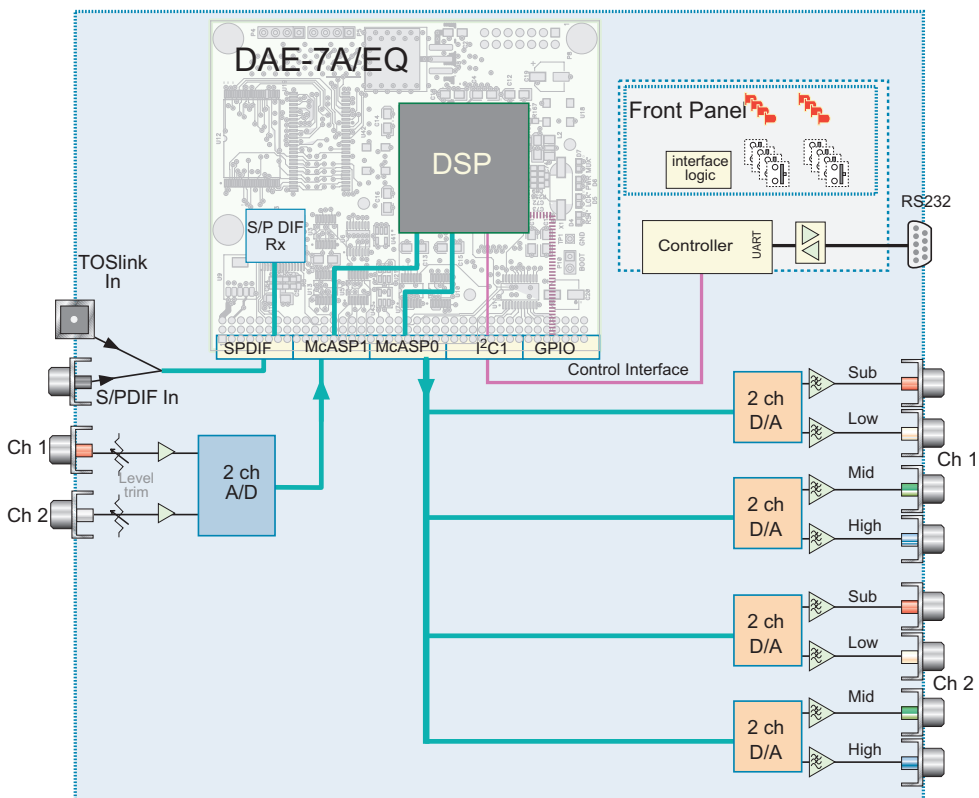
As the Performance Audio (PA) framework is the basis for all of these applications it is possible to add new functions or configure them for different processing. Particularly PA is designed for never fail 24/365 operation that consumer applications require. The flexibility of the framework and the need to ensure robustness can make it hard for inexperienced developers to create these new applications that OEMs may need. MDS staff are available for consulting to create these applications without the time and expense for customers to learn the PA environment.

DAE-7 : Digital Audio modules

Application Diagrams



AV 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 products with decoder capability 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-71xx: DAE-7A with 250 MHz DA610 processor for A/V receiver applications

DAE-72xx: DAE-7C with 300 MHz DA710 processor for speaker applications

DAE-73xx: DAE-7A/EQ with 225 MHz C6713 processor with firmware for equalizer applications

7xxx represents specific model numbers that may or may not contain optional features. Some features may incur additional charges for porting or per unit license fees.

ADP-2-DAE-7xxx: DAE development system.

- DDB-2 MotherBoard (includes stereo analog input, 7.1 analog out)
- HSR-4 HDMI repeater (if HDCP authorized)
- DAE-7xxx module
- ADC-6 module 6 channel A/D
- Design package for ADP-2: Schematics, layout, and source code to microprocessors

ADP-2 available 3Q09. Contact MDS for alternative development system options available now.

Note: For some models of DAE-7xxx TI Code Composer and compatible JTAG is required for software maintenance. Developers planning to work with the Performance Audio framework should take beginning and advanced TI DSP courses prior to starting work with DAE.

Consulting services are also available from Momentum Data Systems.

DDE-STD: 90 Day Startup Support (inc. with DESK-7xxx)

- Help with installation of hardware/software.
- Problems in installation.
- How to use/run hardware or software that comes with the system. This excludes example programs because they are provided as-is, without support.
- General questions on background information (standards, etc.)

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

Dolby is trademark of Dolby Laboratories, Inc.

DTS is a trademark of Digital Theater Systems, Inc.

THX is a trademark of THX Ltd.

Specifications

Dimensions: 3.3" x 2.8" (approx 84 mm x 71mm). Bottom to top (mother board top to top of DAE-7 connectors) height .597" (15.2 mm)

Power: +5V (used to create quiet PLL supply), + 3.3V @ 2 amps

DAE board connector: Samtec TMMH-140-01-F-T or equivalent.

Please note that the I²S signal use varies between the DAE-7A and 7C due to differences in the DA610 and DA710 devices. A total of 15 I²S lines are available, but usage may vary between specific DAE-7xxx models.

Supported ADC/DACs/Volume controls

Different parts have different control requirements. While in most cases the host processor can take responsibility, there are some direct hardware level interactions that the DAE board needs to be involved with (MUTE is the most critical).

Please contact MDS to discuss hardware choices and to determine if specific hardware might require modification to the DAE's drivers.

Related items

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



Kane Computing Ltd
7 Theatre Court, London Road,
Northwich, Cheshire, CW9 5HB, UK.
Tel: +44(0)1606 351006
Fax: +44(0)1606 351007/8
Email: sales@kanecomputing.com
Web: www.kanecomputing.co.uk



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17330 Brookhurst St., Suite 230, Fountain Valley, CA 92708
Phone: 714-378-5805 / Fax: 714-378-5985
email: sales@mds.com / web URL: <http://www.mds.com>

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